SERVICE MANUAL

COMPACT TRACTOR

YT235

en Original instructions

YANMAR

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1. SAFETY PRECAUTIONS

1. Safety Alert Symbol

The safety alert symbol appears with most safety statements. The safety alert symbol means attention, become alert, the operator's safety is involved! Please read and strictly observe the message that follows the safety alert symbol.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, *will* result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, *could* result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a situation which can cause damage to the tractor, personal property and/or the environment or cause the equipment to operate improperly.

IMPORTANT: Means that implement or property damage could occur if instructions are ignored.

NOTE: Provides useful information.

WARNING: READ AND FOLLOW ALL INSTRUCTIONS IN THE *OPERATOR'S MANUAL* BEFORE ATTEMPTING TO OPERATE THE TRACTOR. FAILURE TO COMPLY WITH THE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

WARNING: The engine exhaust, some of its constituents and certain tractor components contain or emit chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

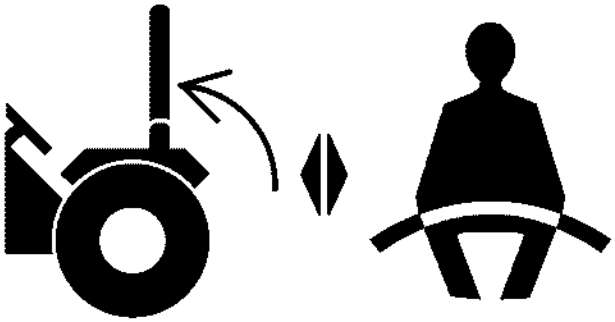
DANGER: The tractor is built to be operated according to the rules for safe operation in the *Operator's Manual*. As with any type of power equipment, carelessness or error on the part of the operator can result in serious injury. To help prevent accidents, read and take the following precautions before operating the tractor. Failure to observe the following safety instructions could result in serious injury or death.

1

2. Precautions Before Operating The Tractor

1. Understand the performance and limitations of the tractor. Carefully study the *Operator's Manual* and learn the instructions in the *Operator's Manual* before operating or servicing the tractor. Keep the *Operator's Manual* in an easily accessible place.
   Do not operate the tractor with the mounted or trailed machinery or trailer unless all instructions in the Operator's Manual have been followed.

2. Strictly follow the statements given in the DANGER, WARNING and CAUTION safety decals attached to the tractor.
3. Do not operate the tractor with the Roll-Over Protective Structure (ROPS) in the folded "down" position.
   Keep the seatbelt fastened while operating the tractor with the CAB or Roll-Over Protective Structure (ROPS) in the unfolded "up" position. The preceding practice will reduce the possibility of injury or death in the event of roll over accident.
   If the Roll-Over Protective Structure (ROPS) or CAB has been removed for any reason, ensure to install all the associated parts before operating the tractor.
   Do not alter the Roll-Over Protective Structure (ROPS) or CAB. The altered Roll-Over Protective Structure (ROPS) or CAB may fail to provide the designed protection.
   Replace the damaged Roll-Over Protective Structure (ROPS) or CAB immediately. Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.
   The foldable Roll-Over Protective Structure (ROPS) may be temporarily folded down when absolutely necessary for areas with height limitations. Remember that when the Roll-Over Protective Structure (ROPS) is in the "down" position, the Roll-Over Protective Structure (ROPS) does not provide operator protection and the seatbelt should not be worn.
   For operator safety, always keep the Roll-Over Protective Structure (ROPS) in the unfolded "up" position and locked securely.
   NEVER alter or repair the Roll-Over Protective Structure (ROPS) or CAB. Welding, bending, drilling, grinding, or cutting may weaken the Roll-Over Protective Structure (ROPS) or CAB. Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.
4. Always fasten the seatbelt while operating the tractor with CAB or the Roll-Over Protective Structure (ROPS) in the unfolded "up" position. Check the seatbelt for any damage. Replace the damaged seatbelt immediately. Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance. Do not use the seatbelt if the Roll-Over Protective Structure (ROPS) is in the folded "down" position.



5. Check overhead clearance carefully before driving under power lines, wires, bridges or low hanging tree branches, before entering or leaving buildings, or in any other situation where the operator and/or Roll-Over Protective Structure (ROPS) or CAB may be struck, which could result in serious injury.
6. Make sure that the usual operator and any other person who will operate the tractor studies the *Operator's Manual* before operation. Know the controls and how to stop the tractor quickly.
7. Make sure that any person or obstacle is not under or around the tractor before and during operation. Make sure to maintain sufficient overhead clearance above the tractor.
8. Do not operate the tractor and/or implement installed on the tractor while under the influence of alcohol, drugs, medicine or controlled substance/s or when not fit to operate the tractor.

9. During operation and when performing service work:
   - Wear close-fitting clothing.
   - Do not wear loose-fitting clothes, jewelry, baggy or torn clothing.
   - When any of the preceding items is caught by a moving part of the tractor, an accident can happen.
   - Do not wear cut-off pants or shorts which do not provide protection against flying debris.
   - Do not under any circumstances operate the tractor with bare feet.
   - Do not wear sandals or sneakers.
   - Wear additional protection including non-slip safety boots or shoes, protective goggles and gloves, etc., as appropriate or required by applicable local laws and regulations.
   - Wear ear protection in a noisy environment to prevent hearing damage and to reduce operator fatigue.
10. **NEVER** allow passenger/s on any portion of the tractor.
11. Always remain seated in the operator seat while operating the tractor.
12. Make sure that the brakes and other mechanical components are properly adjusted and do not have excessive wear.
    - Immediately replace all excessively worn out or damaged components.
    - At regular intervals, check that all nuts, bolts and screws are properly tightened.
13. Always keep the tractor clean. Dust, grease or grass clippings accumulated on the tractor can lead to fire accidents or personal injury.

14. Use the handholds and running board step when getting on and off the tractor to help prevent accidental falls. Keep the running board step clear of mud and debris.
15. Only use the implements that satisfy the requirements in the *Operator's Manual* or are approved by your Yanmar tractor dealer..
16. When using front, mid- or rear mounted implements, install an appropriate weight/s to the front or rear of the tractor to prevent upsetting the tractor. When using the mid-implement, the operator may use front and rear weights. If the operator choose to use the loader, mount an implement or weight to the 3-point hitch in order to stabilize the tractor. Observe the instructions about safety in the *Operator's Manual* for the implement to be used.
17. Remember that a narrower tire tread width can lead to greater possibility of upsetting the balance of the tractor. To positively stabilize the tractor, select a maximum possible tire tread width appropriate for the intended application. Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.
18. Do not under any circumstances modify the tractor. Modification can deteriorate the performance and/or safety of the tractor, possibly leading to personal injury or property damage.
19. Do not attempt to adjust the low or high idle speed limit screw. Adjusting the low or high idle speed limit screw may impair the safety and performance of the tractor and shorten the life of the tractor.
20. Be careful to the doors, steps and handles when entering the cabin.
21. Do not operate the tractor during thunderstorms. Lightning strikes can cause severe injury or even death.
    Be extremely careful when operating the tractor in close vicinity of suspended power lines. Always be sure that the tractor will not touch the power lines. It can cause severe injury or even death.
22. Do not work with ROPS type when there is a possibility of objects falling from above.

3. Safe Practices for Operating the Tractor

1. Start the Tractor

1. Remain seated in the operator seat when starting the engine or actuating the levers or controls. Do not start the engine or operate controls while standing beside the tractor.
2. Before starting the engine, ensure that all the levers are in the N (neutral) position, the parking brake is engaged securely, and Power Take Off (PTO) switch is in the OFF position.
3. Always keep the seatbelt fastened around the operator's waist within CAB or whenever the Roll-Over Protective Structure (ROPS) is in the unfolded "up" position and locked securely.
4. If the tractor is started where there is a height limitation, immediately return the Roll-Over Protective Structure (ROPS) to the unfolded "up" position and locked securely and fasten the seatbelt.
5. Start the engine of the tractor only by using the starter key switch. Avoid starting the engine by short circuiting across the starter solenoid terminals with a jumper wire, or by bypassing the safety start switch. This defeats the safety interlock circuit and the tractor may begin to move and/or the Power Take Off (PTO) shafts may begin to rotate, possibly leading to personal injury or property damage.
6. Avoid running or idling the engine in a confined area that is poorly ventilated or not ventilated at all. The engine emits carbon monoxide gas that is colorless, odorless and can cause death.

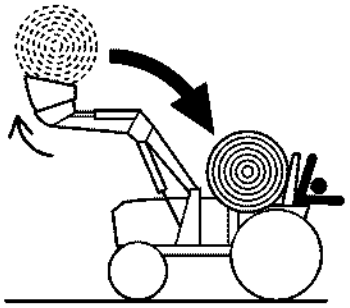
7. Before operation, check that all the safety features are functioning correctly. Never tamper with safety devices. Check the proper operation regularly. Contact YOUR LOCAL YANMAR TRACTOR DEALER for safety devices malfunction.
8. Avoid accidental contact with control pedals while the engine is running, as this can cause unexpected movement of the tractor.
9. Always attend to the running tractor.

2. Work with the Tractor

1. Tow an implement only with the drawbar. Avoid hitching via the axle housing. The tractor can upset its balance, leading to serious injury or death. Make sure the drawbar pin is locked in place.
2. Any towed implement or attachment should not exceed the towing capacity of the tractor as laid out in the specifications. If a braking is fitted to the implement or the attachment, the braking system should be operational from the tractor.
3. Make sure that all the covers and guards are in position. Replace any missing or damaged covers immediately.
4. Before turning or during traveling on a rough terrain, or before stopping, decrease the tractor speed in order to prevent upsetting.
5. Use extra caution during operating over rough ground, when crossing ditches or operating on slopes and when turning corners.
6. Avoid turning with the differential lock engaged. Attempting to turn the tractor while the differential lock is engaged can lead to a roll over.
7. Stay clear of ditches, potholes, embankments or ponds. The incident of upsetting the tractor can occur more on soft or wet ground. Before entering an area covered with tall grass, inspect the area to detect any obstacles.
8. The operator should always pay attention for blind corners, trees and other object that can obstruct the operator's vision. The operator should always remain alert when approaching the row of trees or any obstacle.
9. When two or more people are working in one area, always keep in good communication between each other.
10. Do not under any circumstances get on or off the moving tractor.
11. When driving at night, ensure that all necessary lights are illuminated.
12. When driving, do not shift the range gear. Always shift the range gear when the tractor is completely stopped.

13. Avoiding the falling objects.
    Be careful when handling large or heavy objects, as there is a danger of the tractor rolling over, or of the object falling off the loader boom onto the operator.
    - Never lift a large object with an attachment that may allow the object to roll back onto the operator.
    - Do not carry large objects that can fall out of loader bucket into operator's station.
    - Do not carry transport or move round or square bales with the bucket attachment.
    - Never lift loader higher than necessary to clear ground.
    - Move slowly and carefully. Avoid rough terrain.

    Front loader attachment points are provided. Never mount loader that is not approved for the YANMAR tractor.
    Consult your local YANMAR tractor dealer.



3. Stop the Tractor

The procedures of stopping the tractor are as follows:

1. Reduce the engine speed.
2. Release the forward and reverse drive pedal completely.
3. Depress the brake pedals to stop the tractor.

4. Considerations for Safety of a Child

Tragic accidents can occur if the operator is not alert to the presence of a child. A child is often attracted to the tractor. A child does not understand the dangers. Never assume a child will remain where the operator last saw the child.

1. Keep a child out of the operating area and under the watchful care of an adult other than the operator.
2. Be alert if a child enters the work area, stop the tractor immediately.
3. **NEVER** allow a child to ride on the tractor. The child can fall off and be seriously injured or interfere with safe tractor operation.
4. **NEVER** allow a child under 16 years old to operate the tractor. A child, 16 years old and under should only operate the tractor under close parental supervision and proper instruction.
5. Be extremely careful when backing the tractor. Before and during backing, look back and downward. A child may be in the path.
6. Use extra care when approaching blind corners, shrubs, trees or other objects that may obscure the operator's vision of a child or other hazard.
7. **NEVER** allow a child to play on the tractor or implement.
8. Keep a child away from hot or running engine. The child may suffer burns.

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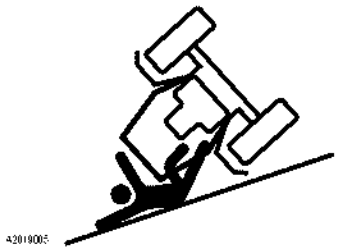
4. Operate the Tractor on Slopes

On a slope, the tractor is less stable and more prone to tip over, possibly leading to serious injury or death. Remain very cautious while the tractor is on any slope.



DO:

- Operate up and down slopes, not across.
- Remove obstacles such as rocks, limbs, etc.
- Watch for potholes, ruts or bumps. Uneven terrain can overturn the tractor. Tall grass can hide such obstacles.
- Place the tractor in low range and engage the 4-wheel drive when climbing or descending slopes. Always keep the tractor in gear when going down slopes to take advantage of engine braking action.
- Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction. Rapid engagement or braking can cause the front of the tractor to lift and rapidly tip over backwards which can cause serious injury.
- Avoid starting or stopping on a slope. If tires lose traction, push down Power Take Off (PTO) switch to OFF position and proceed slowly straight down the slope.
- To avoid upset, move backward up a steep slope. If backing on the slope is difficult, do not attempt to continue. Avoid an extremely steep slope.
- When moving forward to get out from a ditch, deep mud or when traveling on a steep slope, the risk of the tractor upsetting backward is high. Always move backward to get out from these situations. In the 4-wheel drive mode, special caution is needed to avoid false confidence in the tractor's ability to climb slopes.
- To improve stability on a slope, select the widest possible tire tread width. Observe the instructions for appropriate weighting.

DO NOT:

- Keep away from drop-offs, ditches or embankments during mowing. The mower could suddenly turn over if a wheel goes over the edge of a cliff, ditch or if an edge caves in.

⚠ WARNING

- **Before approaching a slope, select an appropriate speed setting. Make sure to run the tractor at a lower speed on slopes. Never attempt to shift gears on a slope. The tractor can suddenly go downhill out of control. Avoid increasing and decreasing the tractor speed rapidly.**
- **Do not move the range shift lever in the N (neutral) position when on a slope.**
- **When climbing or descending a slope, do not shift the range shift lever. Shifting the range shift lever into the N (neutral) position can result in loss of control of the tractor.**
- **Starting the tractor with the front end uphill can cause the front wheels to jump off the ground and this situation poses an extreme danger. To avoid this problem, run the engine at a lower speed, and gently start the tractor.**
- **Avoid parking the tractor on a slope. If parking on a slope is unavoidable, chock all the tires safely and securely and engage the parking brake securely.**

5. Travel on a Road

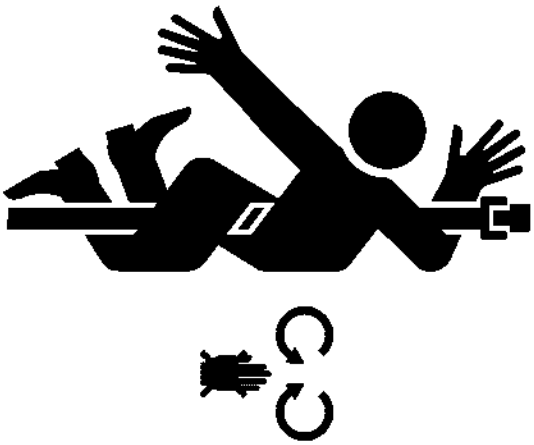
1. Disengagement of the 4-wheel drive is recommended.
2. Remember that the braking characteristics differ between the 2-wheel drive and 4-wheel drive modes. Be aware of the current drive mode and use carefully.
3. Before turning, always slow down the tractor. High speed turn may cause the tractor to tip over.
4. When traveling on a road, use the hazard lights and turn signal lights as required by the currently effective local laws or regulations.
5. Strictly observe all the currently effective local traffic and safety laws and regulations.
6. Turn ON the headlights as required by the currently effective local laws or regulations.
7. Always travel at a speed that allows the operator to maintain control of the tractor.
8. **NEVER** engage the differential lock while traveling on a road. It may cause the operator to lose control of the tractor.
9. While traveling on a road, do not turn the steering wheel suddenly. Such an action can lead to loss in the stability of the tractor and can cause an extremely dangerous situation.
10. While on a road, do not attempt to operate an implement. During transportation, place the 3-point hitch control lever in the raised position and lock the 3-point hitch control lever with the position stop knob. Do not fully close the hydraulic flow control/stop knob to hold an implement in the raised position while the tractor is traveling with the implements.
    The preceding action can cause damage to the hydraulic lift circuit.
11. The tractor should be checked by an authorised person to ensure that the tractor has the correct equipment that meet local regulations for the tractor to be used on public roads.
12. Use safety lights and devices at night because slow moving tractors on public road are hard to see.

6. Safe Practices for Parking the Tractor

1. Before leaving the tractor, ensure that the tractor is completely stopped.
2. Push down Power Take Off (PTO) switch to OFF position, **ALWAYS** lower all implements and attachments to the ground, move all the levers to N (neutral) position, engage the parking brake securely, and remove the key.
3. Avoid parking the tractor on a slope. Rather, park on solid and level ground whenever possible. If parking on a slope is unavoidable, park the tractor across the slope and lower the implement to the ground and chock all the tires safely and securely.

7. Operate the Power Take Off (PTO)

1. Before connecting/disconnecting, adjusting, cleaning or servicing Power Take Off (PTO) driven implement, ensure that the engine is not running and that all the moving components are not moving.
2. Make sure that Power Take Off (PTO) shaft cap is always in place. Replace Power Take Off (PTO) shaft cap only when the shaft is not moving.



3. Before installing or operating the Power Take Off (PTO) driven implement, carefully study the *Operator's Manual* of the implement and the safety decals on the implement.
4. When installing stationary Power Take Off (PTO) driven implements, ensure to engage the parking brake securely, chock all the tires safely and securely. Avoid approaching or accessing any rotating component.
5. Make sure to remove the drawbar before using the Power Take Off (PTO).

8. Use the 3-Point Hitch

1. Use the 3-point hitch only in conjunction with the implement that is specifically designed for use with the 3-point hitch.
2. Before using the 3-point hitch mounted implement, the appropriate weight may need to be installed on the front of the tractor.
3. While on a road, do not attempt to operate an implement. During transportation, place the 3-point hitch control lever in the raised position and lock the 3-point hitch control lever with the position stop knob.
   Do not fully close the hydraulic flow control/stop knob to hold an implement in the raised position while the tractor is traveling with the implement. The preceding action can cause damage to the hydraulic lift circuit.

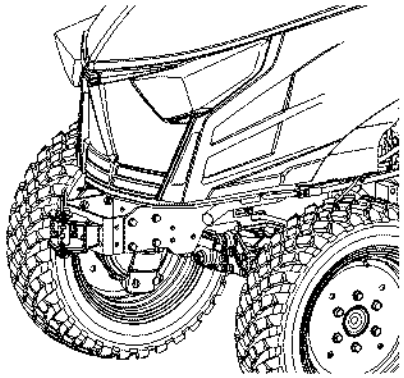
9. Roll-Over Protective Structure (ROPS) and CAB Precautions

The tractor is equipped with a Roll-Over Protective Structure (ROPS) or CAB which must be maintained in a fully functional condition. Check overhead clearance carefully before driving under power lines, wires, bridges or low hanging branches, before entering or leaving buildings, or in any other situation where the operator and/or Roll-Over Protective Structure (ROPS) or CAB can be struck, which can result in serious injury.

1. Always keep the Roll-Over Protective Structure (ROPS) or CAB on its original condition.
2. Replace the Roll-Over Protective Structure (ROPS) or CAB whenever the Roll-Over Protective Structure (ROPS) or CAB has been damaged. Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.
3. Never attach ropes, chains or cables to the Roll-Over Protective Structure (ROPS) or CAB for pulling purposes.
4. Although the Roll-Over Protective Structure (ROPS) or CAB provides the operator protection in accordance with the regulations and relevant standards at the time of manufacture, **ALWAYS** take the necessary precautions.
5. protection possible, always take necessary precautions.

10. Use the Front Hitch

Be sure to use the front hitch of the tractor for towing tractor. And only for towing the tractor!



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11. Safe Practices for Servicing the Tractor

Before starting any service work, park the tractor on solid and level ground, engage the parking brake securely, lower the implement to the ground, move all the levers to N (neutral) position, push down Power Take Off (PTO) switch to OFF position, shut off the engine and remove the key.

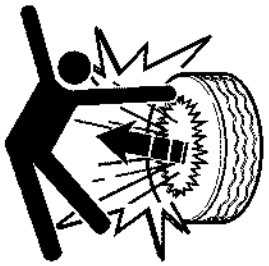
1. Always keep a first aid kit and a fire extinguisher readily available.
2. Before accessing the engine, muffler, radiator and radiator cap or other possibly hot components, wait until the tractor has fully cooled down.
3. Keep the tractor and the attachments free of grass, leaves or other debris build-up.

4. Use extreme care in handling diesel fuels. Diesel fuels are extremely flammable and the vapors are explosive. Use only a container approved by the local effective law.
5. Close fuel shut-off valve before servicing the fuel system.
6. Make sure to shut off the engine before refueling. After refueling, replace fuel filler cap securely and wipe off any spilled diesel fuel before starting the engine as the diesel fuel may cause a fire or explosion.
7. Do not smoke while refueling. Keep any spark or open flame away from the fuel tank.
8. Never refuel the tractor indoors because diesel fuel vapors will accumulate in the area.
9. Never store the fuel container or tractor indoor where there is an open flame or spark, such as a gas water heater, space heater or furnace.
10. Do not smoke while working around the battery. Keep any sparks or open flame away from the battery. The battery emits hydrogen and oxygen gasses, in particular during recharging and can pose a hazard of explosion.

11. Prior to "jump starting" a tractor that has fully depleted battery.
12. Add coolant or water to the reserve tank, not to the radiator.

13. Before working on or around electrical components, disconnect the negative (–) battery terminal first.
14. To prevent a spark occurring from short circuit, disconnect the negative (–) battery terminal first and reconnect last.

15. The operator must not mount a tire onto a rim. Only qualified person must mount tire onto a rim.
16. Always keep the tires at the correct tire air pressure level. Avoid exceeding the recommended tire air pressure specified in the *Operator's Manual*.



17. Wheel bolts must be tightened to specified torque using the proper procedure anytime it is loosened.
18. Keep the tractor securely supported while changing the wheels or adjusting the tire tread width. Make sure to tighten the wheel bolts to the specified tightening torque.
19. Avoid working under any hydraulically supported devices. Such devices can leak, suddenly settle down, or be accidentally lowered. If working beneath the tractor or an implement is unavoidable, ensure to use a stand or lift apparatus with the capacity of more than 2.7 metric tons (3 tons).
20. High pressure hydraulic fluid when released can penetrate human skin, possibly leading to serious personal injury. Before disconnecting any hydraulic line, fully release the internal pressure. Before exerting a pressure to the hydraulic system, ensure that all connections are tight and all the lines, pipes and hoses are free from fractures/fissures or any other damage.
21. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
22. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

23. Check brake operation frequently. Adjust and service as required.
24. Keep all bolts and nuts tightened, make sure the tractor and the attachment is in safe working condition.
25. Avoid changing the engine governor settings or overspeed the engine. Excessive engine speeds are dangerous.
26. Observe proper waste disposal laws and regulations. Prior to disposal, determine the proper method to dispose of waste from your local Environmental Protection Agency. Recycling centers are established to properly dispose of materials in an environmentally safe fashion.
27. Use container approved by the effective law when draining fluids. Avoid using food or beverage containers that can mislead someone into drinking from food or beverage containers. Properly dispose of the containers immediately following the draining of fluids.
28. Observe your local Environmental Protection Agency regulations when disposing of oil, fuel, coolant, brake fluids, filters, batteries, tires and other harmful waste.
29. Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.
30. Yanmar does not recommend the use of a pressure washer or garden hose to clean the tractor. Electrical components, spindles, pulleys, bearings or the engine can be damaged. The use of water will result in shortened life and reduce serviceability.

WARNING: THE OWNER/OPERATOR RESPONSIBILITY: Restrict the use of the tractor to persons who read, understand and follow the warnings and instructions in the *Operator's Manual* and on the tractor.

12. Replace the Rubber Product/s, such as Hydraulic House, Fuel Hoses, Power Steering House, Radiator Hoses and Air Intake House for Every 2Years

The rubber product/s has/have a deteriorative character and will deteriorate overtime. The deteriorated rubber product/s may cause defects and damages such as fluid leakage, loss control of the tractor during operation, fire, burn injury.

13. Avoid contact with Agricultural Chemicals

This enclosed CAB does not protect against inhaling vapor, aerosol or dust. If pesticide use instructions require respiratory protection, wear an appropriate respirator inside the CAB.
Before leaving the CAB, wear personal protective equipment as required by the pesticide use instructions.
When re-entering the CAB, remove protective equipment and store either outside the CAB in a closed box or some other type of sealable container or inside the CAB in a pesticide resistant container, such as a plastic bag.
Clean your shoes or boots to remove soil or other contaminated particles prior to entering the CAB.
These instructions do not replace or supersede instructions and safety methods advised by the pesticide manufacturer.
Please strictly follow the pesticide manufacturer's instructions on chemical use and safety.

14. Understand the Tractor Safety Decals

■ Safety Alert Symbol

The tractor safety decals illustrated in this section are provided in critical areas on the tractor so that people including the operator can remain always aware of potential hazards.
The tractor safety decals contain the words DANGER, WARNING and CAUTION together with the safety alert symbol. DANGER and WARNING stand for the most serious hazards.
The *Operator's Manual* also contains special safety messages that explain potential hazards about which the operator must remain cautious. The messages are presented together with the word CAUTION and the safety alert symbol.

■ Care of DANGER, WARNING and CAUTION Decals

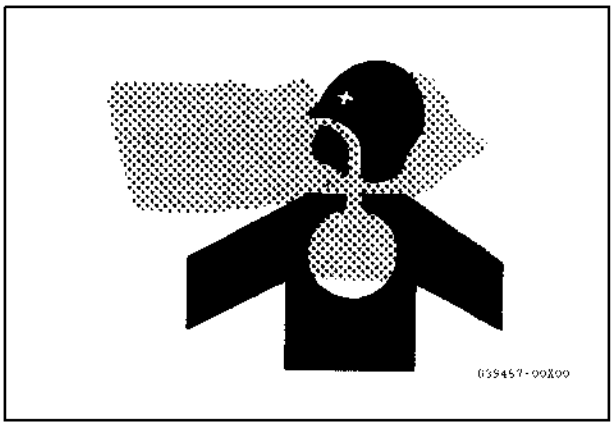
1. Always keep all the DANGER, WARNING and CAUTION decals clean and clearly legible.
2. Clean the DANGER, WARNING and CAUTION decals with soap and water, wipe dry with clean soft cloth.
3. Replace damaged or missing DANGER, WARNING and CAUTION decals with new decals available from YOUR LOCAL YANMAR TRACTOR DEALER.
4. If a component having a DANGER, WARNING and CAUTION decals is replaced with a new decal, ensure that the new decal is on the same location as of the old component.
5. Affix a new DANGER, WARNING and CAUTION decals flat on a clean and dry surface, squeezing out trapped air.

1

15. Handle agricultural chemicals safely

■ Handle agricultural chemicals safely

Chemicals used in agricultural applications such as fungicides, herbicides, insecticides, pesticides, rodenticides, and fertilizers can be harmful to your health or the environment if not used carefully. Always follow all label directions for effective, safe, and legal use of agricultural chemicals.



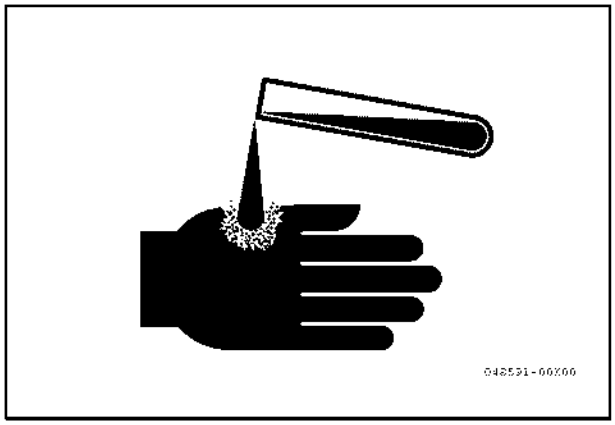
■ Reduce risk of exposure and injury

- Wear appropriate personal protective equipment as recommended by the chemical manufacturer. In the absence of manufacturer's instructions, follow these general guidelines:
  - Chemicals labeled "**Danger**": Most toxic. Generally require use of goggles, respirator, gloves, and skin protection.
  - Chemicals labeled "**Warning**": Less toxic. Generally require use of goggles, gloves, and skin protections.
  - Chemicals labeled "**Caution**": Least toxic. Generally require use of gloves and skin protection.
- Avoid inhaling vapor, aerosol or dust.
- Always have soap, water, and towel available when working with chemicals. If chemical contacts skin, hands, or face, wash immediately with soap and water. If chemical gets into eyes, flush immediately with water.
- Wash hands and face after using chemicals and before eating, drinking, smoking, or urination.
- Do not smoke or eat while applying chemicals.
- After handling chemicals, always bathe or shower and change clothes. Wash clothing before wearing again.
- Seek medical attention immediately if illness occurs during or shortly after use of chemicals.
- Keep chemicals in original containers. Do not transfer chemicals to unmarked containers or to containers used for food or drink.
- Store chemicals in a secure, locked area away from human or livestock food. Keep children away.
- Always dispose of containers properly Triple rinse empty containers and puncture or crush containers and dispose of properly.
- Dispose of filter with hazardous pesticide according to published regulations or directives.

- For the training and education of an agricultural chemical, refer to the instruction manual for that agricultural chemicals.

■ Avoid Contact with Agricultural Chemicals

This enclosed cab does not protect against inhaling vapor, aerosol or dust.
The tractor shall not be used under conditions requiring protection against hazardous substances.



- When operating in an environment where pesticides are present, wear a long-sleeved shirt, long-legged pants, shoes, and socks.
- If pesticide use instructions require respiratory protection, wear an appropriate respirator inside the cab.
- Wear personal protective equipment as required by the pesticide use instructions when must be cleaned, enclosed cab:
  - into a treated area
  - to work with contaminated application equipment such as nozzles which must be cleaned, changed or redirected
  - to become involved with mixing and loading activities
- Before re-entering the cab, remove protective equipment and store either outside the cab in a closed box or some other type of sealable container or inside the cab in a pesticide resistant container, such as a plastic bag.
- Clean your shoes or boots to remove soil or other contaminated particles prior to entering the cab.

■ Clean vehicle of hazardous pesticides

During application of hazardous pesticides, pesticide residue can build up on the inside or outside of the vehicle. Clean vehicle according to use instructions of hazardous pesticides.

When exposed to hazardous pesticides, clean exterior and interior of vehicle daily to keep free of the accumulation of visible dirt and contamination.

- Sweep or vacuum the floor of cab.
- Clean headliners and inside cowlings of cab.
- Wash entire exterior of vehicle.
- Dispose of any wash water with hazardous concentrations of active or non- active ingredients according to published regulations or directives.

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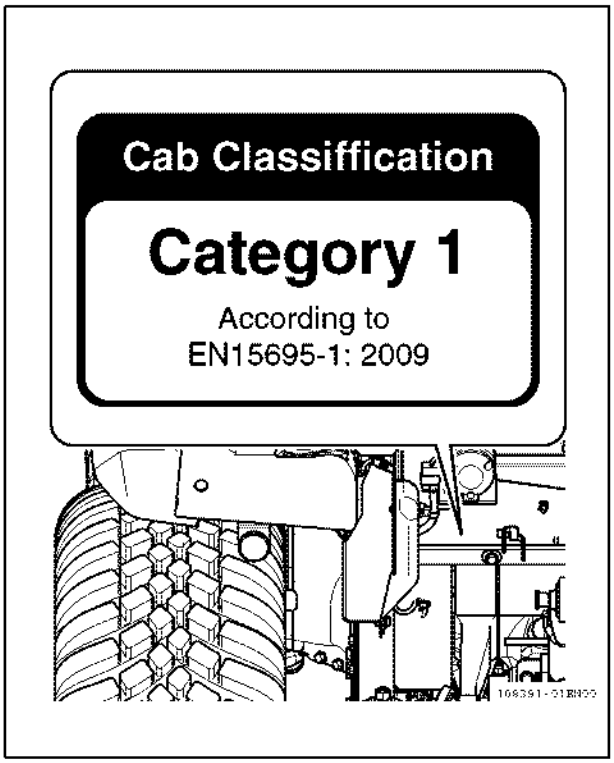
16. Cab classification according to EN15695-1

■ Handle agricultural chemicals safely

Cab classification according to EN 15695-1 provides information on the effective of protection against harmful substances offered by the cab.
Categories 1 to 4 are used for classification and specified on a label inside the cab.
Replace label if missing or damaged. See your YANMAR dealer.

Category 1- The cab does not offer any protection against substances which are harmful to health.
Category 2- The cab offers protection against solid airborne particles such as dust, but not against aerosols and vapors.
Category3- The cab offers protection against dust and aerosols (liquid airborne substances such as spray), but not against vapors.
Category4- The cab offers protection against dust, aerosols and vapors.



Before working in an environment containing hazardous substances, i.e. when using pesticides, check whether the cab offers sufficient protection. Refer to the product data sheets of the spraying liquid manufacturer specifying the category required for the cab.

An example of the hazards and precautions identified by a tractor manufacturer is given in the list below:

- Study the tractor and implements
- Protect operator safely
- Before operating
- Start the engine safely
- Operate the tractor safely
- Avoid tipping over
- Stay clear of the PTO
- Travelling
- Transportation
- Towing
- Tow tractor
- Park the tractor safely
- Maintenance and service
- Storage
- Handle agricultural chemicals safely

⚠ CAUTION

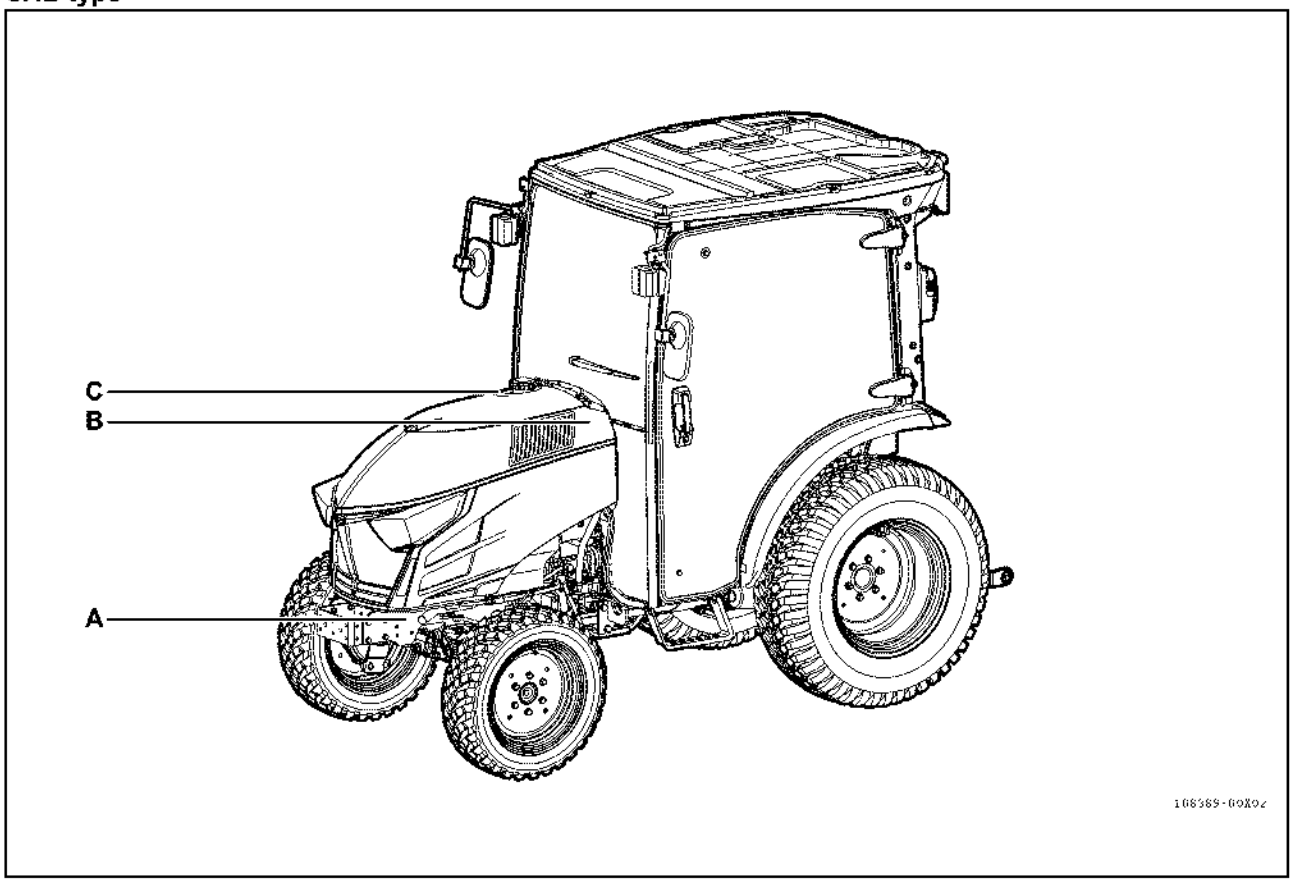
Refer to product data sheets and product identification of the crop protection chemicals. These contain important information on how to avoid hazards.

The following requirements must be met to offer best protection:

1. All seals (on door, windows and roof) in good condition
2. Doors, windows and roof closed
3. Grommets for cables in the cab sealed properly
4. Fan ON
5. Cab air filters in good condition

These examples are not intended to be exhaustive lists, but only as indications of the type of information that may be included.

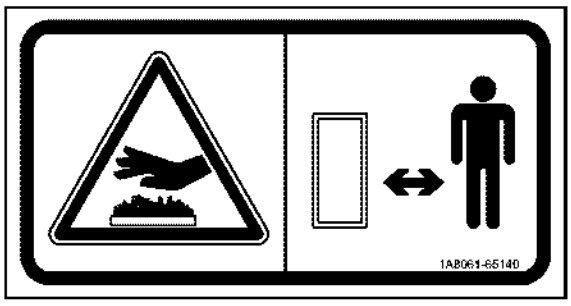
CAB type



(A) 1A8061-65140

⚠ CAUTION

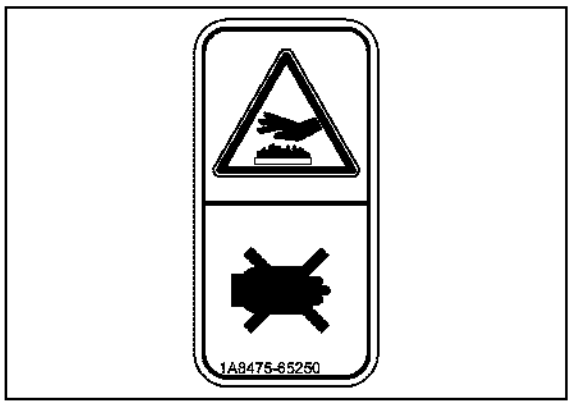
Stay clear of hot surface.
Do not touch hot surface like exhaust muffler, etc.



(B) 1A8475-65250

⚠ CAUTION

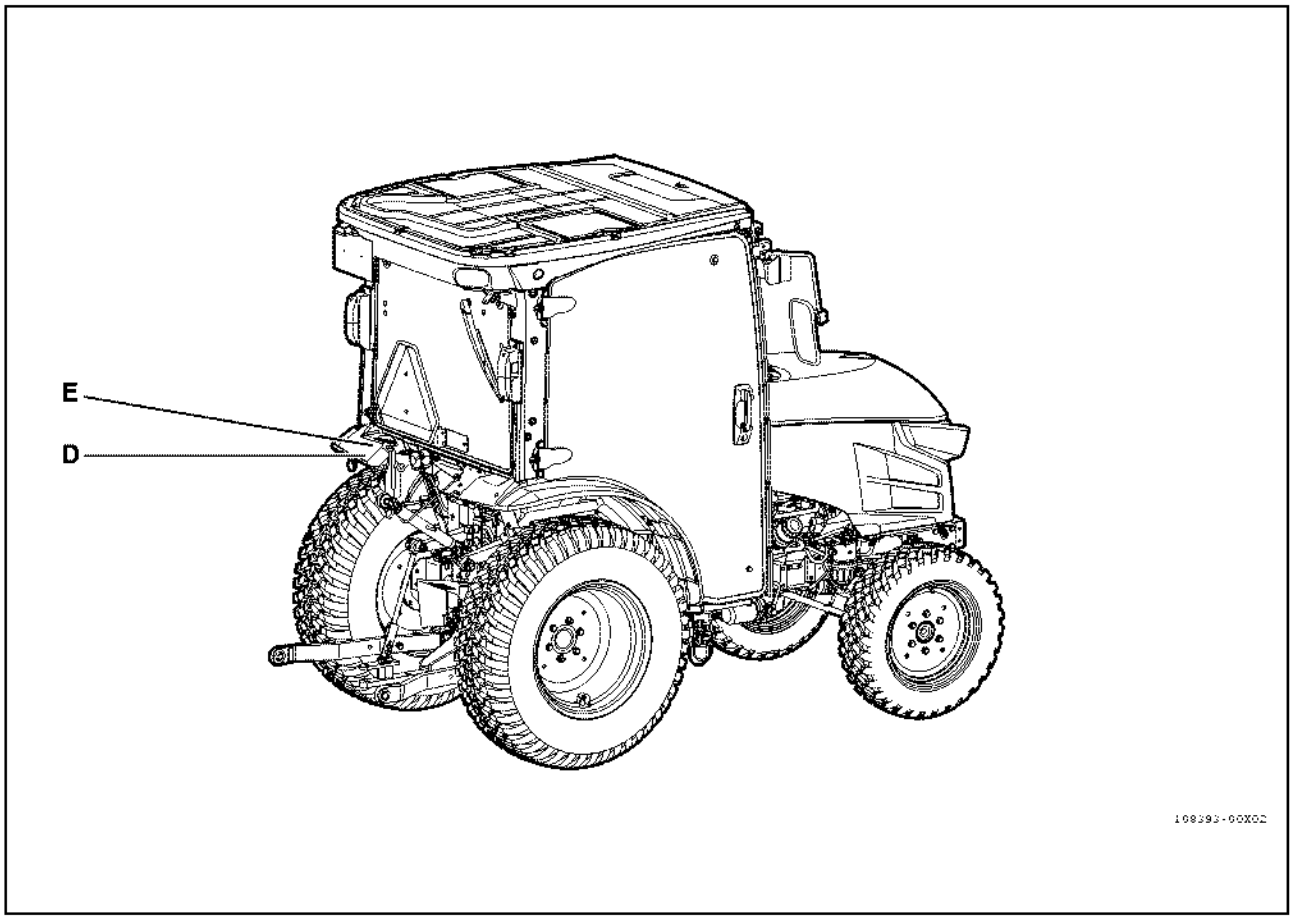
Stay clear of hot surface.
Do not touch hot surface like exhaust muffler, etc.



(C) 1A8330-65930

⚠ WARNING

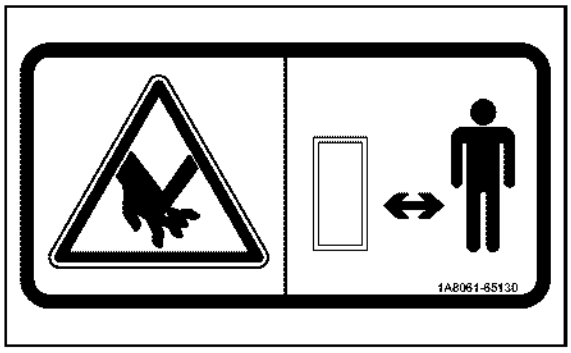
1. Use extreme care in handling diesel fuels. Diesel fuels are extremely flammable and the vapors are explosive. Use only a container approved by the local effective law.
2. Make sure to shut off the engine before refueling. After refueling, replace fuel filler cap securely and wipe off any spilled diesel fuel before starting the engine as the diesel fuel may cause a fire or explosion.
3. Do not smoke while refueling. Keep any spark or open flame away from the fuel tank.
4. Never refuel the tractor indoors because diesel fuel vapors will accumulate in the area.
5. Never store the fuel container or tractor indoor where there is an open flame or spark, such as a gas water heater, space heater or furnace.



(D) 1A8061-65130

⚠ WARNING

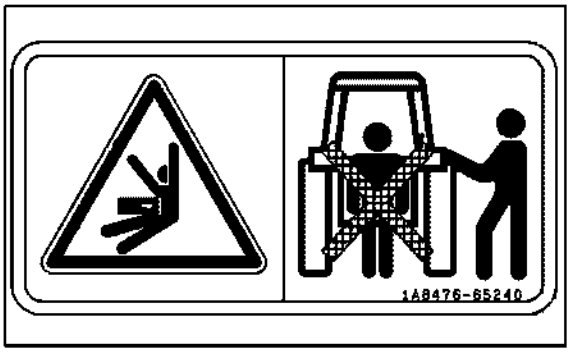
Stay clear of moving parts area as long as tractor engine is running with PTO connected.

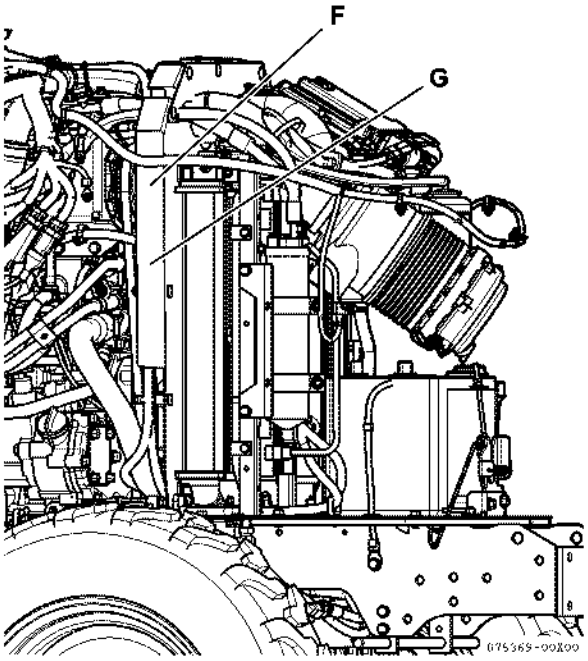


(E) 1A8476-65240

⚠ WARNING

Stay clear of the back of the tractor.



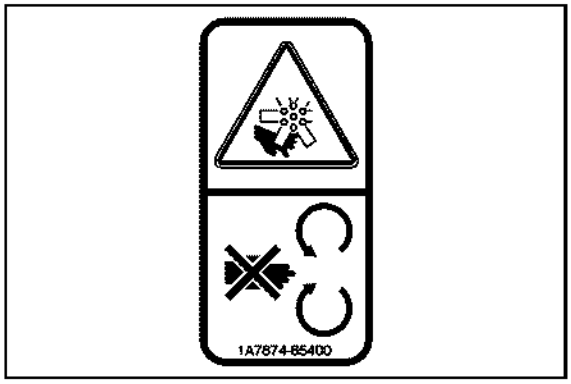


*The hood is open.
Same labels are attached on the other side.

(F) 1A7874-65400

⚠ WARNING

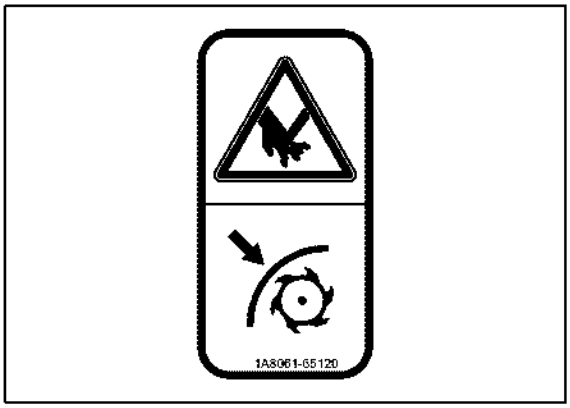
STAY CLEAR OF ENGINE FAN AND FAN BELT

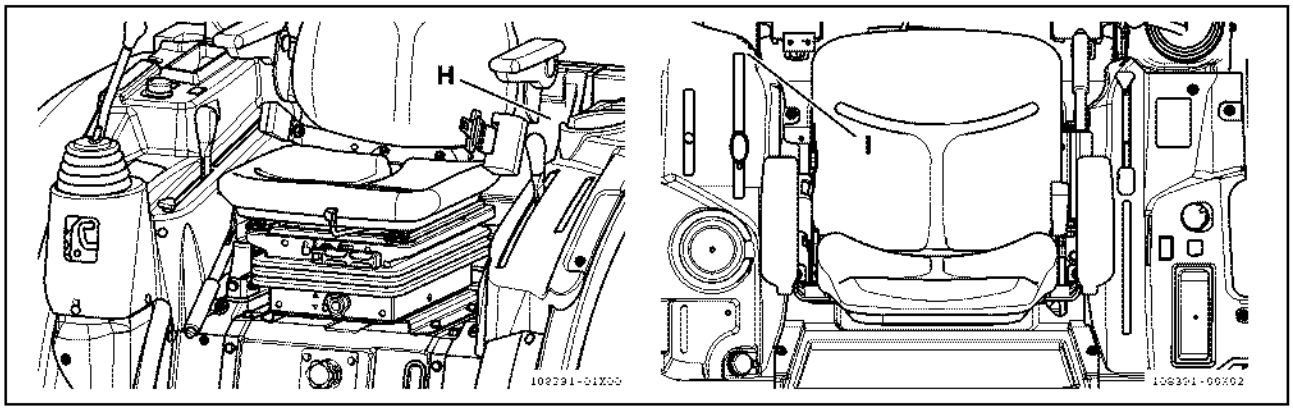


(G) 1A8061-65120

⚠ CAUTION

Fingers or hand entanglement rotating parts. Put safety shield in place while engine is running or machine is moving.





(H) 198280-65950 (CAB only)

(I) 1A8061-65100

⚠ WARNING

Always fasten seatbelt while operating the tractor.

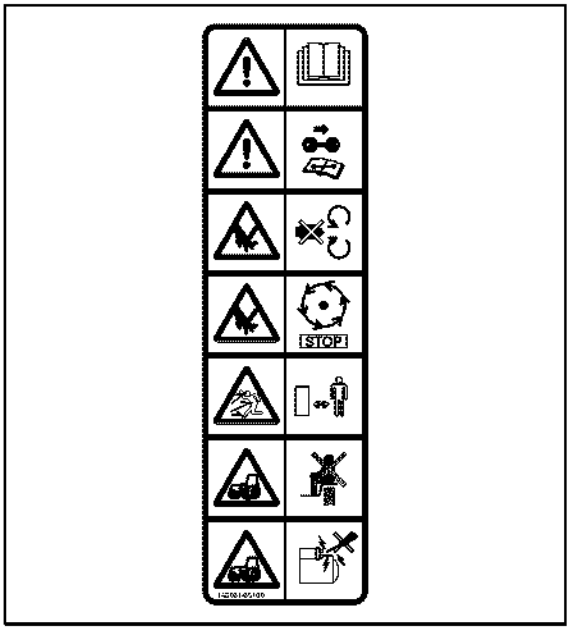
⚠ WARNING

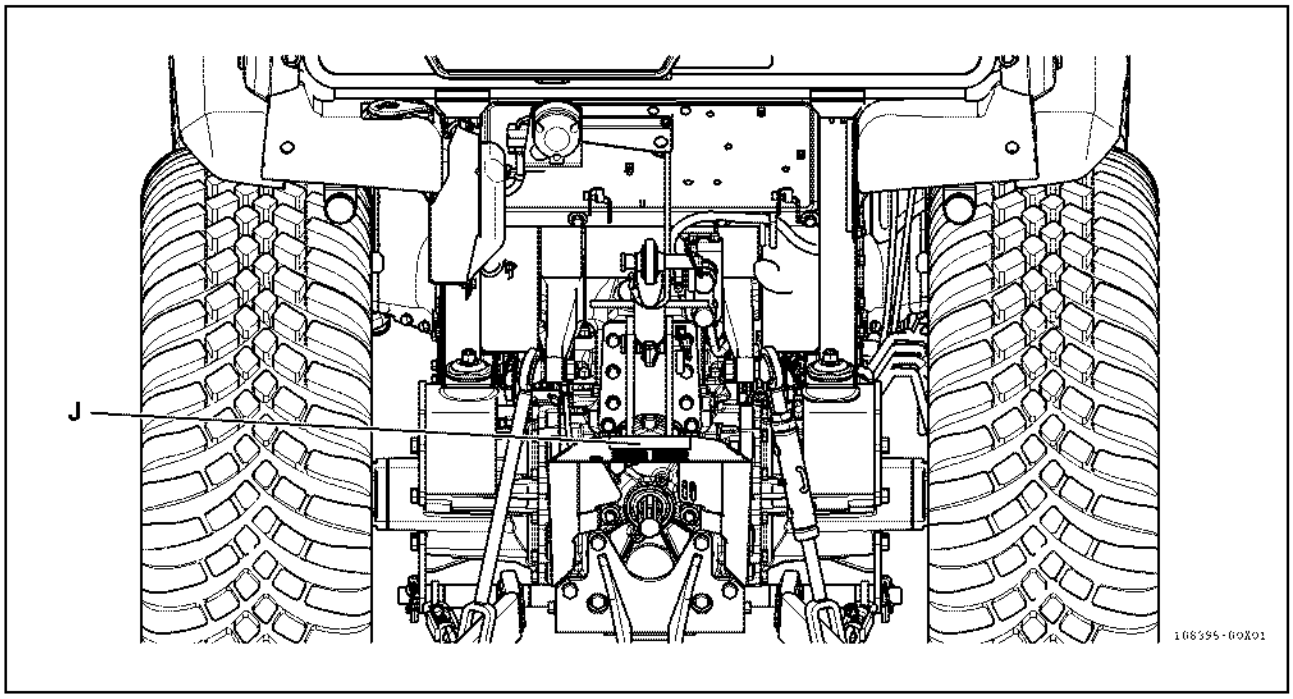
- Read and understand Operator's Manual carefully.
- Stop the engine and remove key before servicing.
- Avoid entanglement. Always keep hands away from rotating parts.
- Stop the rotating parts before servicing. Do not put fingers or hands close to rotating parts.
- Keep a safe distance from the machine.
- Never allow passenger/s on any portion of the tractor.

⚠ DANGER

TO AVOID INJURY OR DEATH:

- Do not start engine by shorting across starter terminals or bypassing safety start switch.
- Start engine only from seat with transmission and PTO OFF.

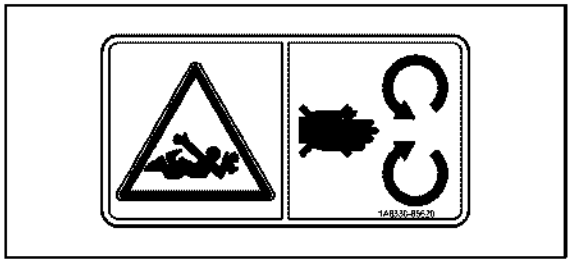




(J) 1A8330-65620

⚠ WARNING

AVOID INJURY FROM PTO
- **Keep all shields in place.**
- **Keep hands, feet and clothing away.**
- **Operate only with 540 min^{-1}.**



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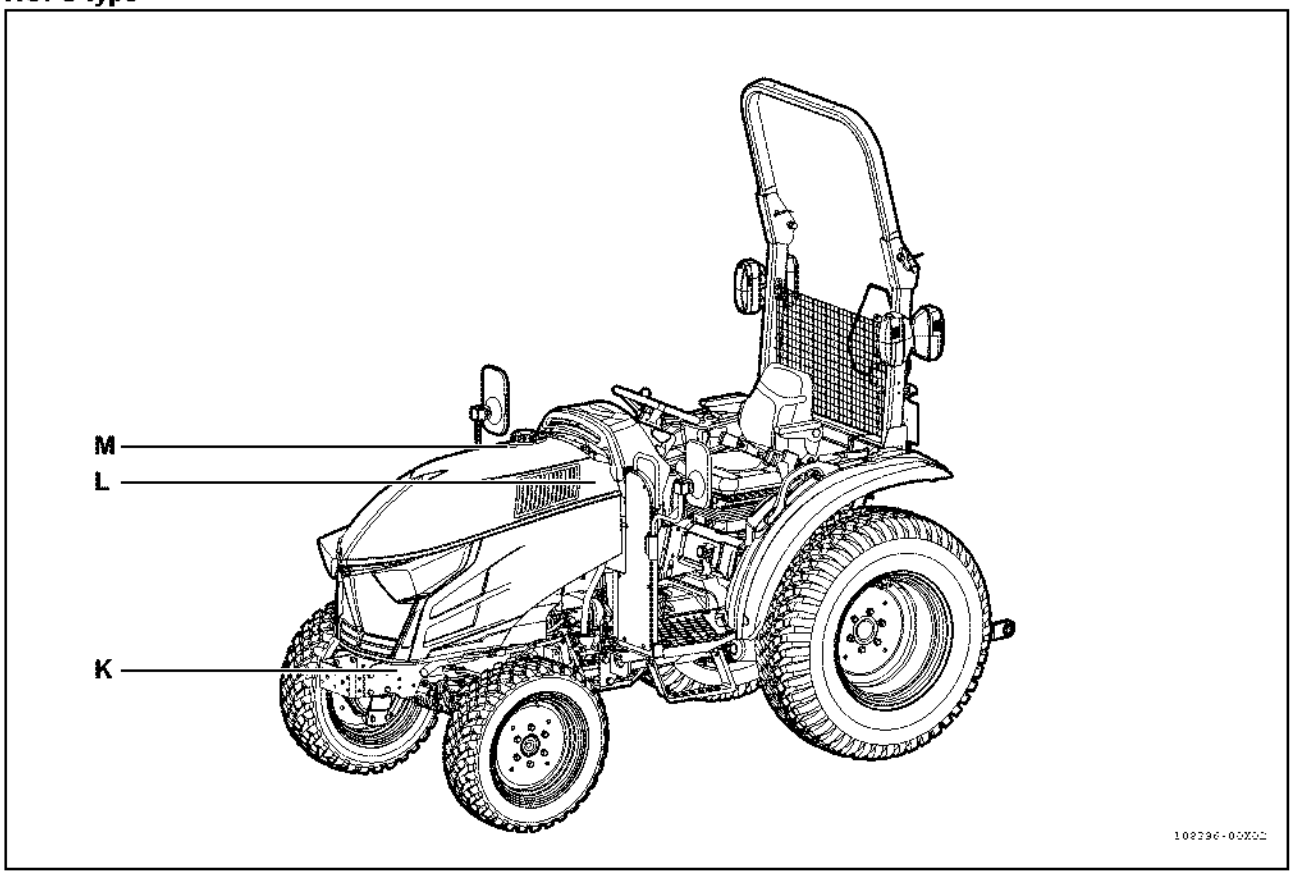
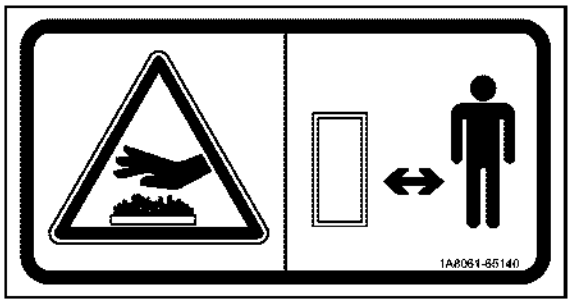
ROPS type



(K) 1A8061-65140

⚠ CAUTION

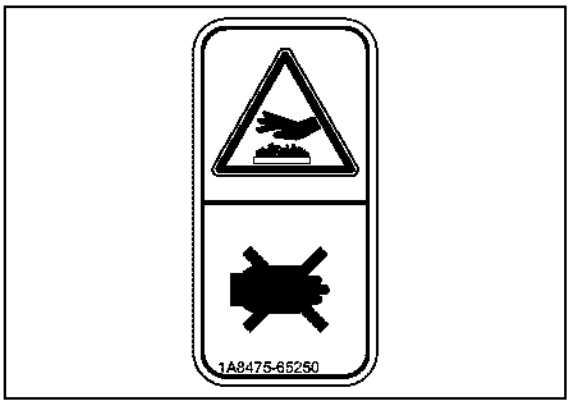
Stay clear of hot surface.
Do not touch hot surface like exhaust muffler, etc.



(L) 1A8475-65250

⚠ CAUTION

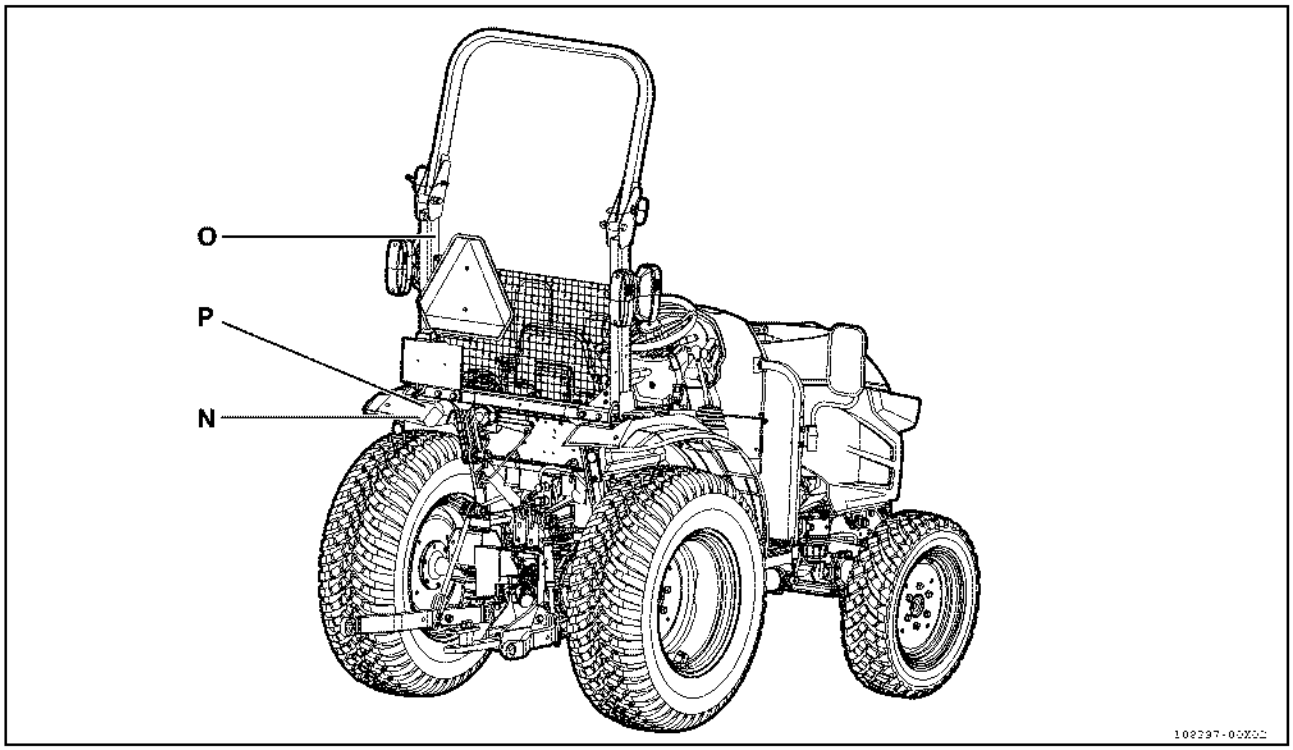
Stay clear of hot surface.
Do not touch hot surface like exhaust muffler, etc.



(M) 1A8330-65930

⚠ WARNING

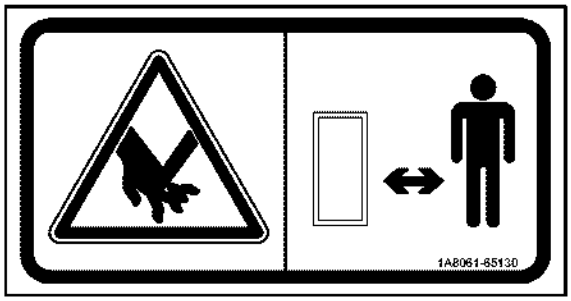
1. Use extreme care in handling diesel fuels. Diesel fuels are extremely flammable and the vapors are explosive. Use only a container approved by the local effective law.
2. Make sure to shut off the engine before refueling. After refueling, replace fuel filler cap securely and wipe off any spilled diesel fuel before starting the engine as the diesel fuel may cause a fire or explosion.
3. Do not smoke while refueling. Keep any spark or open flame away from the fuel tank.
4. Never refuel the tractor indoors because diesel fuel vapors will accumulate in the area.
5. Never store the fuel container or tractor indoor where there is an open flame or spark, such as a gas water heater, space heater or furnace.



(N) 1A8061-65130

⚠ WARNING

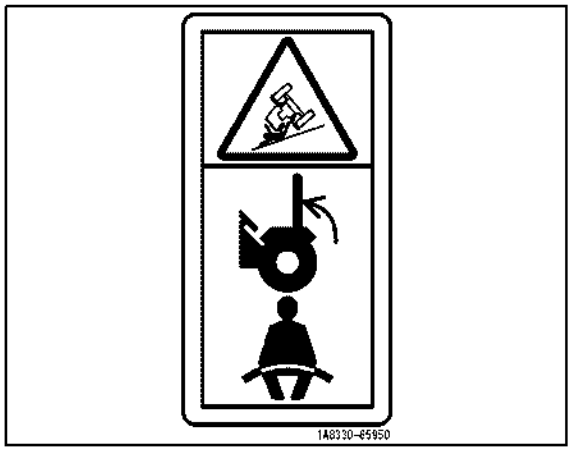
Stay clear of moving parts area as long as tractor engine is running with PTO connected.



(O) 1A8330-65950 (ROPS only)

⚠ WARNING

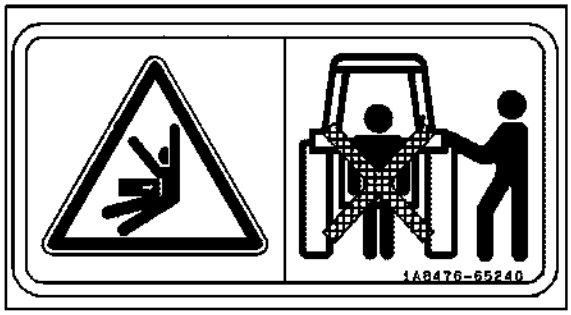
- This structure's protective capability may be impaired by structural damage, overturn, or alteration. If any of these conditions occur, this structure must be replaced.
- Keep the retractable seatbelt fastened while operating the tractor with the Roll-Over Protective Structure (ROPS) in the unfolded "up" position.
  - the preceding practice reduces the possibility of injury or death in the event of a roll over accident
- Always lock ROPS in upright position unless it must be folded down to allow operation underneath trees and bushes.

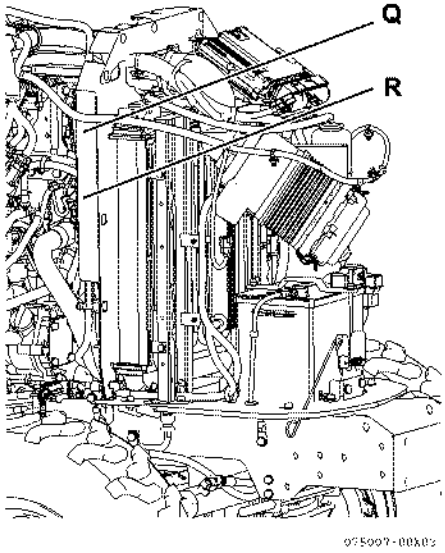


(P) 1A8476-65240

⚠ WARNING

Stay clear of the back of the tractor.



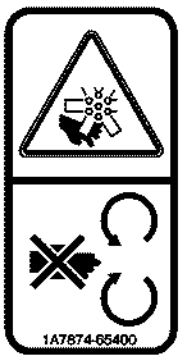


*The hood is open.
Same labels are attached on the other side.

(Q) 1A7874-65400

⚠ WARNING

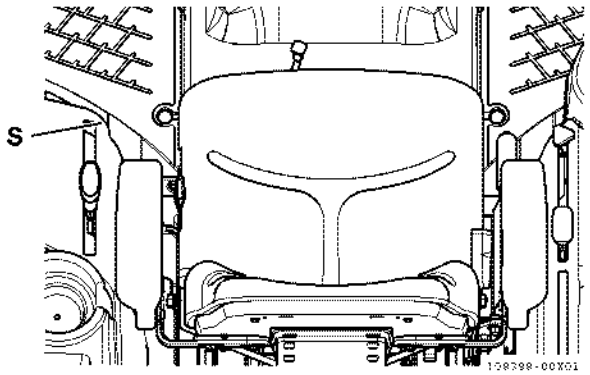
STAY CLEAR OF ENGINE FAN AND FAN BELT



(R) 1A8061-65120

⚠ CAUTION

Fingers or hand entanglement rotating parts. Put safety shield in place while engine is running or machine is moving.



(S) 1A8061-65100

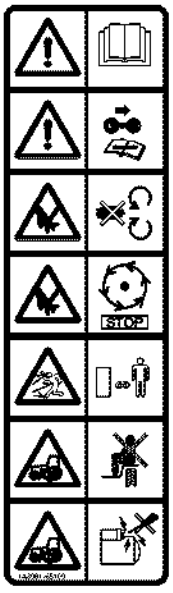
⚠ WARNING

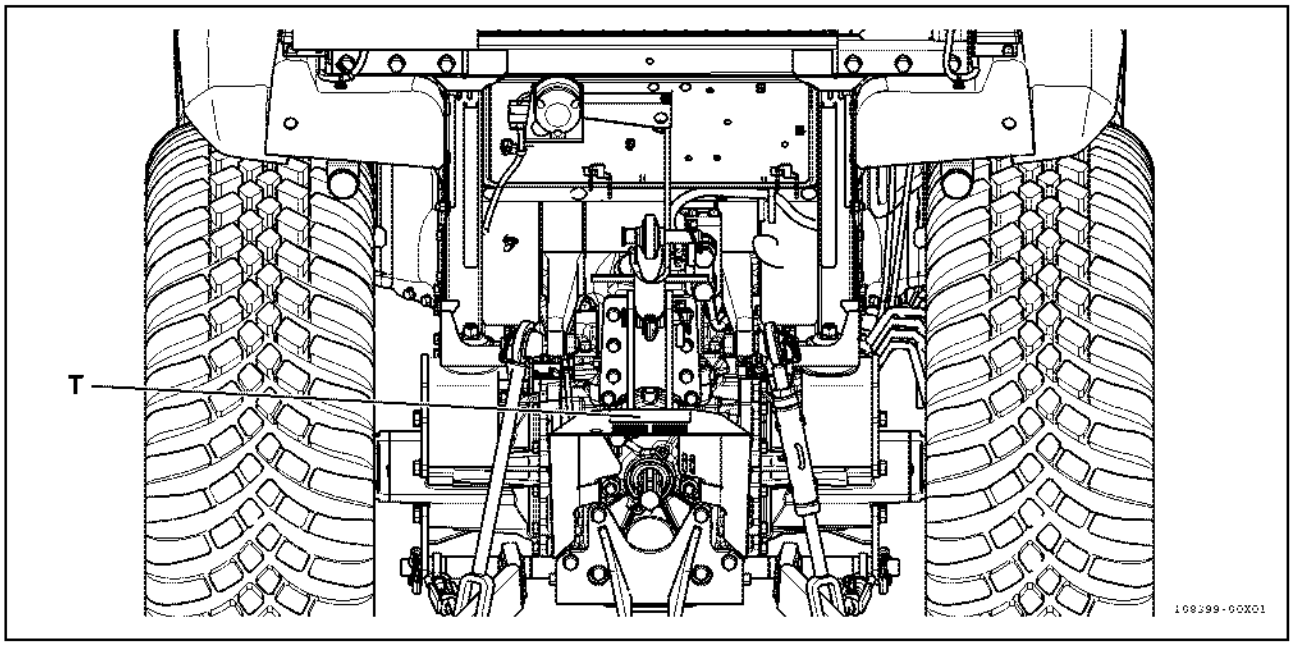
- Read and understand Operator's Manual carefully.
- Stop the engine and remove key before servicing.
- Avoid entanglement. Always keep hands away from rotating parts.
- Stop the rotating parts before servicing. Do not put fingers or hands close to rotating parts.
- Keep a safe distance from the machine.
- Never allow passenger/s on any portion of the tractor.

⚠ DANGER

TO AVOID INJURY OR DEATH:

- Do not start engine by shorting across starter terminals or bypassing safety start switch.
- Start engine only from seat with transmission and PTO OFF.



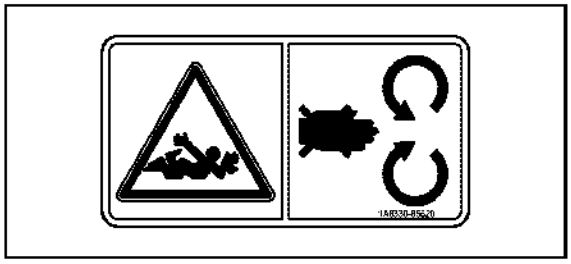


(T) 1A8330-65620

⚠ WARNING

AVOID INJURY FROM PTO

- **Keep all shields in place.**
- **Keep hands, feet and clothing away.**
- **Operate only with 540 min^{-1}.**



Your Yanmar tractor dealer is committed to provide reliable and quality services to the tractor. Through the preceding services, the full performance potential of the tractor can be realized.

After carefully studying the contents of the *Operator's Manual*, the tractor owner/operator can perform certain regular maintenance work.

- Exercise caution so as not to injure the operator and other persons.
- Do not attempt to do work that is beyond the owner/ operator capability and knowledge.

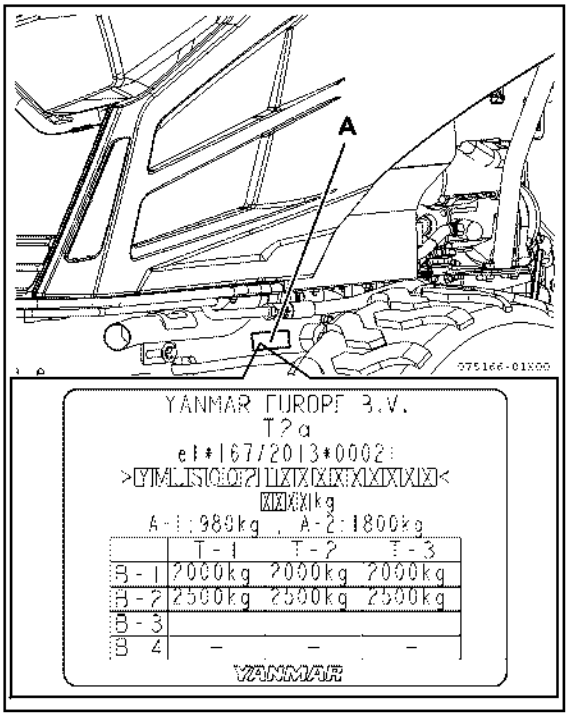
When in doubt, always consult YOUR LOCAL YANMAR TRACTOR DEALER.

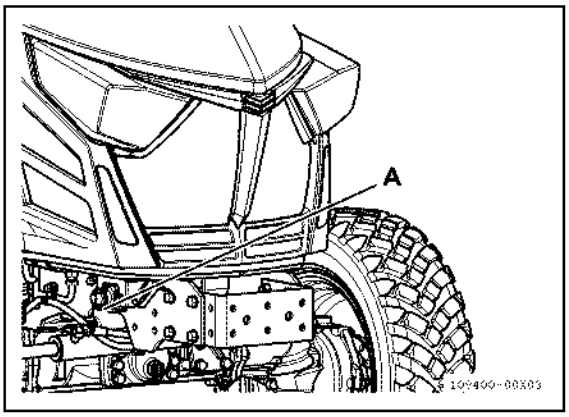
For information about servicing, contact YOUR LOCAL YANMAR TRACTOR DEALER.

For new parts and components and major service work, contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

When ordering a part or component, always provide the serial numbers of the following to YOUR LOCAL YANMAR TRACTOR DEALER:

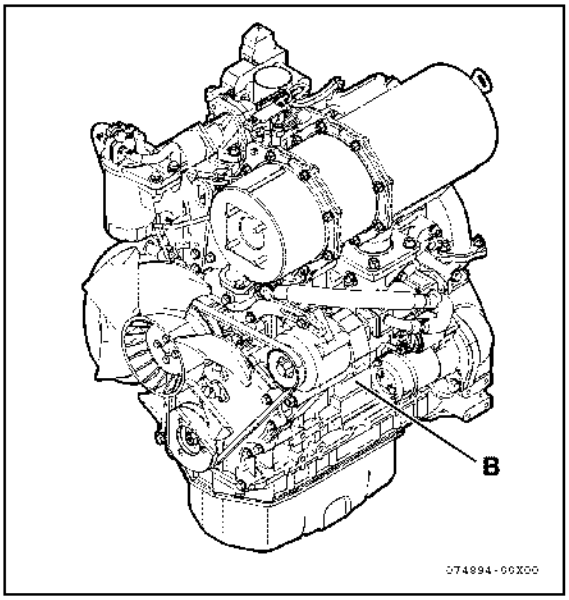
- Tractor
- Engine
- Roll-Over Protective Structure (ROPS)
- CAB





(A) Tractor identification plate with tractor serial number (Tractor serial number is also engraved at the right side of the tractor)

(B) Engine serial number



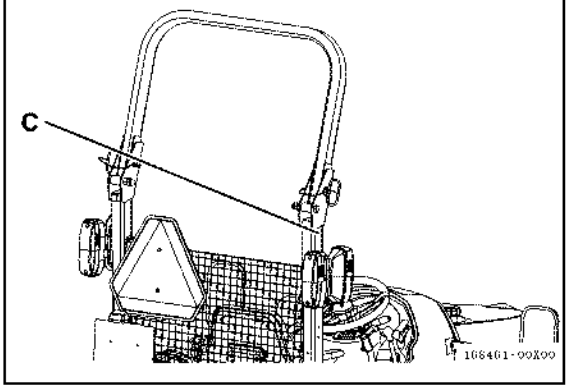
After accepting delivery of the tractor, immediately find the serial numbers and enter the numbers into the following table.

- The information in the table must come in handy, if for some reason, the serial numbers on the tractor are covered, erased or become illegible.

	Type/Model	Serial No.
Tractor		
Engine		
Roll-Over Protective Structure (ROPS)		
CAB		
Date of Purchase		
Name of Dealer		

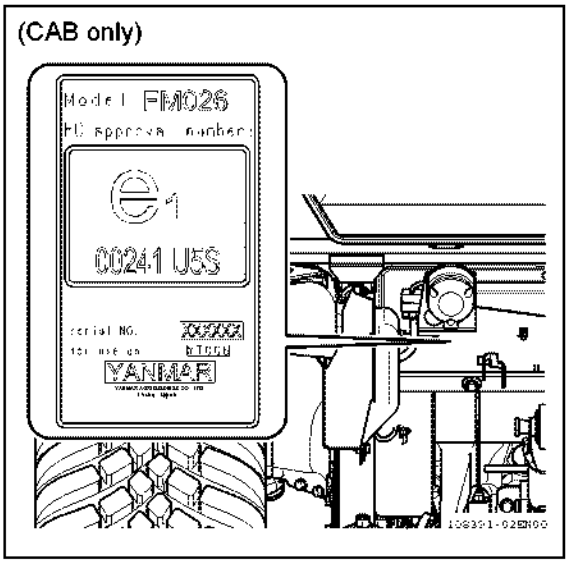
(C) Roll-Over Protective Structure (ROPS) serial number (ROPS only)

(ROPS only)



(D) CAB serial number (CAB only)

(CAB only)



17. Maintenance Check List

No	Topic		Time	Service Intervals																After purchase	
						Hours															
				Daily	If Necessary	50	100	150	200	250	300	350	400	450	500	550	600	800	1000	1 year	2 years
1	Engine Oil Level	Check	Daily	✔																	
2	Transmission Hydraulic Oil Level	Check	Daily	✔																	
3	Tire Air Pressure	Check	Daily	✔																	
4	Grille	Check	Daily	✔																	
5	Fuel Tank	Check	Daily	✔																	
		Refill																			
6	Rubber Dust Unloading Valve	Clean	Daily	✔																	
7	Radiator Hose and Clamp	Check	Daily	✔																	
		Replace	Every 2 years																		✔
8	Radiator Cooling Screen	Clean	Daily	✔																	
9	Oil Cooler Screen	Clean	Daily	✔																	
10	Safety Systems	Check	Daily	✔																	
11	Radiator Cooling Fins	Clean	Daily	✔																	
12	Cooling System	Check	Daily	✔																	
		Flush	Every 2 years or after 1000hr																✔		✔
13	Coolant	Change	Every 2 years or after 1000hr																✔		✔
14	Fuel Line	Check	Daily	✔																	
		Replace	Every 2 years																		✔
15	Power Steering Line (Rubber hose)	Check	Daily	✔																	
		Replace	Every 2 years or if necessary		✔																✔
16	Retractable seatbelt	Check	Daily	✔																	
		Replace	If necessary		✔																
17	Roll-Over Protective Structure (ROPS)	Check	Daily	✔																	
		Replace	If necessary		✔																
18	Headlights, Hazard Lights, and all other lights (lights and/or bulbs).	Check	Daily	✔																	
		Replace	If necessary		✔																
19	Fan and Alternator Belt	Inspect	Daily	✔																	
		Adjust	Every 50hr or if necessary		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Replace	First 50hr, then if necessary		✔	✔															
20	Air Cleaner Element	Clean	Every 100hr or if necessary		✔		✔		✔		✔		✔		✔		✔	✔	✔		
		Replace	Every 300hr or if necessary								✔						✔				
21	Fuses	Check	Daily	✔																	
		Replace	If necessary		✔																
22	Battery Condition	Check	Daily	✔																	
23	Battery	Replace	If necessary		✔																✔
24	Fuel Filter	Replace	Every 200hr or if necessary						✔				✔				✔	✔	✔		

No	Topic		Time	Service Intervals																After purchase	
						Hours															
				Daily	If Necessary	50	100	150	200	250	300	350	400	450	500	550	600	800	1000	1 year	2 years
25	Fuel/Water Separator	Drain	Every 50hr or if necessary		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Clean	Every 100hr or if necessary		✔		✔		✔		✔		✔		✔		✔	✔	✔		
		Replace	Every 100hr or if necessary		✔		✔		✔		✔		✔		✔		✔	✔	✔		
26	Wheel Bolt Tightening Torque	Check	Daily	✔																	
27	Engine Oil	Change	200hr and every 200hr after						✔				✔				✔	✔	✔		
28	Engine Oil Filter	Replace	200hr and every 200hr after						✔				✔				✔	✔	✔		
29	Transmission Hydraulic Oil	Change	50/600hr and every 600hr after			✔											✔				
30	Hydraulic cooler system																				
31	Hydraulic Filters	Replace	50/300hr and every 300hr after			✔					✔						✔				
32	Line Filter	Replace	50/300hr and every 300hr after			✔					✔						✔				
33	Hydraulic hose	Replace	Every 2 years																		✔
34	Grease fittings	-	Every 50hr after			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
35	Toe-in	Inspect/ Adjust	50/200hr and every 200hr after			✔			✔				✔				✔	✔	✔		
36	Front Axle Pivot	Check	Every 50hr			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
	Air Intake Hoses and Clamps	Check	50/200hr and every 200hr after			✔			✔				✔				✔	✔	✔		
37		Replace	Every 2 years or if necessary																		✔
38	Front Axle Gear Oil	Check	Every 50hr			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		
		Change	First 50hr and every 300hr after			✔					✔						✔				
39	Brake	Adjust	Every 500hr												✔				✔		
		Replace	If necessary		✔							✔									
40	Engine Valve Clearance	Adjust	Every 1000hr																✔		
41	Fuel Injection Pump	Check	Every 1000hr																✔		
42	Fuel Injection Nozzle	Check	Every 1000hr																✔		
43	Thermostat	Replace	Every 2 years or 2000hr after																		✔

For assistance in periodic maintenance procedures, contact YOUR LOCAL YANMAR TRACTOR DEALER.

NOTE

- Check the wheel bolt tightening torque after one hour of break-in.

CAB type

Periodic inspection list (CAB type)

Inspection/adjustment parts	Normal inspection	Category	Hour meter display time												
			50 hours	100 hours	150 hours	200 hours	250 hours	300 hours	350 hours	400 hours	450 hours	500 hours	550 hours	600 hours	
Cleaning and replacing the internal air inlet filter *1		Replace												✔	Every 600 hours
		Clean				✔				✔				✔	Every 200 hours
Cleaning and replacing the external air introduction filter *2		Replace						✔						✔	Every 300 hours
		Clean		✔		✔		✔		✔		✔		✔	Every 100 hours
Liquid in the washer liquid tank	Amount														
Condenser screen	Clean														
Condenser *3	Clean			✔		✔		✔		✔		✔		✔	Every 100 hours
Warm water piping		Replace	Every year												
Compressor drive belt	Adequate tension Strength	Adjustment	✔		✔		✔		✔		✔		✔		Every 100 hours

*1, *2 Please replace the internal air inlet filter and the external air introduction filter every 2 years no matter the actual usage time.
*3 When working in a dusty place, carry on every 50 hours.

18. Lubricants

No.	Locations	Capacities	Lubricants	
1	Fuel	Approximately 28 L	No.2-D diesel fuel No.1-D diesel fuel if temperature is below -10°C	
2	Coolant*	CAB: Approximately 5.0 L ROPS: Approximately 4.5 L	High Quality Permanent Type Antifreeze (Ethylene Glycol with corrosion and rust inhibitor chemicals) Coolant Mixture Ratio Distilled Water 50%: Antifreeze 50%	
3	Engine crankcase (with filter)	Approximately 4.3 L	API Service Classifications CJ-4 or higher SAE 10W-30	
4	Transmission hydraulic oil	Approximately 31 L	Hydraulic/Transmission Fluid (TF 500)	
5	Front axle case	Approximately 5.5 L	SAE 80W-90 gear oil	
6	Greasing	No. of Greasing points	Lubricants	Type of grease
	Front axle pivot	2	Until grease overflows	General all purpose grease NLGI grade No.2
	Tie rod end	2		
	Lift link	1		

(Specifications and design are subject to change without prior notice for improvement.)

***NOTE**

- Immediately after purchasing the tractor:
  - adjust the coolant mixture ratio of the coolant and water to suite the local climate
  - the preceding practice assists in making the tractor function efficiently
- The coolant can remain unchanged for a period of 2 years:
  - if during the period the tractor is operated for less than 1200 hours
  - if the tractor is operated for more than 1200 hours during the period, the coolant has to be replaced during flushing of the system
- After pouring the coolant, run the engine for a short period to mix the two fluids thoroughly.

19. Replacement Parts

Part Numbers

Item	Part Number
Engine Oil Filter	129150-35153
Transmission Hydraulic Oil Filter	198119-48310
Line filter	1A7180-48191
Outer Filter	1A8240-05110
Inner Filter	1A8240-05120
Fuel Filter Element	129A23-55800
Water Separator Element	129A00-55730
Alternator Belt	25152-004100
1 Amp Fuse	1A8426-52800
10 Amp Fuse	198535-52120
15 Amp Fuse	198535-52130
20 Amp Fuse	198535-52140
50 Amp Slow Blow Fuse	1E8720-83120
80 Amp Fuse	198153-51700
Battery	1A8160-51500
Headlights Bulb	1A8070-53140
Turn Signal/Hazard Lights Bulb (Front) CAB	1A7100-53220
Turn Signal/Hazard Lights Bulb (Front) ROPS	1A8060-53410
Turn Signal/Hazard Lights Bulb (Rear)	1E9170-81270
Tail Lights Bulb (Rear)/Brake lamp (Rear)	1A7400-53530
Compressor Belt	25132-005600
Gas damper	1A8470-61360
Front position lamp (CAB)	1A7100-53230
Front position lamp (ROPS)	1A8060-53400

20. Battery

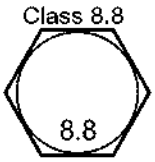
⚠ WARNING

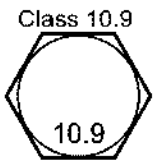
- **The battery posts, terminals and associated accessories contain lead and lead compounds that are known to the State of California to cause cancer and reproductive harm.**
- **After handling the battery, wash the hands thoroughly.**

1

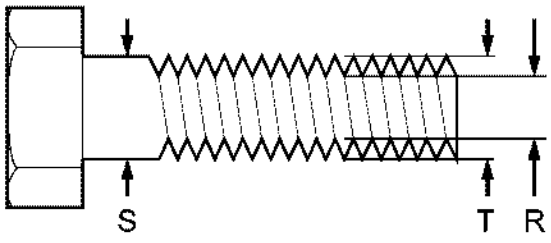
21. Fasteners Identification

- **Metric Bolts and Nuts**
  - the class number of the metric bolts are raised or depressed on the head of the bolt.
  - the following marks is carried on metric bolts:
    - Class 4.8 is marked with "4.8"
    - Class 8.8 is marked with "8.8"
    - Class 10.9 is marked with "10.9"

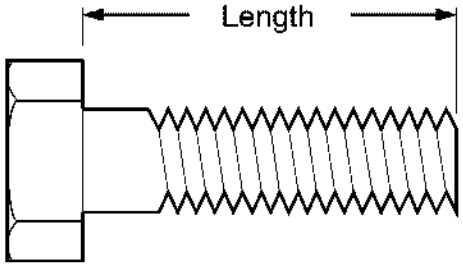




  - the class number of metric nuts may carry dashes radiating from the perimeter of the nut and may have a raised or depressed insignia of the manufacturer
    - Class 5 is marked with two dashes opposite to each other
    - Class 10 is marked with two dashes adjacent to each other
    - Class 12 is marked with adjacent pair of dashes
  - there are several part on the bolt to measure the diameter:
    - Thread Diameter (T). Also called major diameter.
    - Shank Diameter (S).
    - Root Diameter (R). Also called minor diameter.



  - the length of the bolt can be measured.



Metric Bolt Torque Table

Nominal Size and Thread Pitch	Bolt Torque Specifications											
	Dry		Lubed		Dry		Lubed		Dry		Lubed	
	Ft-lb.	N-m	Ft-lb.	N-m	Ft-lb.	N-m	Ft-lb.	N-m	Ft-lb.	N-m	Ft-lb.	N-m
M5 x 0.80	4.5	6.1	3.4	4.6	6.5	8.8	4.9	6.7	7.6	10.3	5.7	7.7
M6 x 1.00	7.7	10.4	5.8	7.8	11.1	15	8.3	11.2	13	17.6	9.7	13.1
M7 x 1.00	13	17.6	9.7	13.1	18.5	25.1	13.9	18.9	21.7	29.4	16.2	22
M8 x 1.25	18.7	25.4	14.1	19.1	27.7	37.6	20.1	27.3	31.42	42.6	23.7	32.1
M10 x 1.50	36.9	50	28	38	53.1	72	39.8	54	62	84	47.2	64
M12 x 1.75	64.9	88	48.7	66	93	126	69.3	94	107.7	146	81.1	110
M14 x 2.00	104	141	78.2	106	148.2	201	110.6	150	173.3	235	129.8	176
M16 x 2.00	160.8	218	121	164	230.1	312	172	233	269.2	365	202.1	274
M18 x 2.50	222	301	166.7	226	317.9	431	238.2	323	371.7	504	278.8	378
M20 x 2.50	314.2	426	235.3	319	449.2	609	337.1	457	525.1	712	393.9	534
M22 x 2.50	427.8	580	320.8	435	612.9	831	460.2	624	716.2	971	536.9	728
M24 x 3.00	542.8	736	407.1	552	775.9	1052	581.9	789	907.9	1231	680.8	923
M27 x 3.00	795.8	1079	596.7	809	1138.8	1544	854.1	1158	1331.3	1805	997.9	1353
M30 x 3.50	1079.1	1463	809.1	1097	1543	2092	1158	1570	1804.1	2446	1352.7	1834
M33 x 3.50	1467.7	1990	1101.2	1493	2101.3	2849	1576.2	2137	2454.6	3328	1841.7	2497
M36 x 4.00	1886	2557	1414.6	1918	2689.7	3659	2023.9	2744	3153.8	4276	2366.1	3208

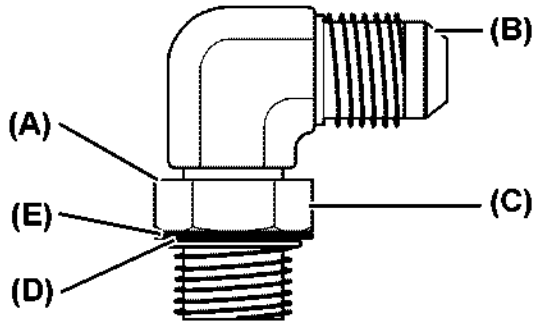
- Lubed means cleaned dry bolts lubricated with standard medium viscosity machine oil.
- Lubricate all contact areas of the bolts and washers.
- Lubricating the bolts is the recommended method.

1

22. Hydraulic Fittings

⚠ WARNING

- **Hydraulic fluid when under pressure can cause serious damage and personal injury.**
  - always completely release the internal hydraulic pressure before disconnecting a hydraulic line
  - always ensure that all hydraulic lines, pipes and hoses are free from wear and/or damage
  - always ensure that all connections are securely tightened
- **Inspect all the hydraulic lines for leaks, wear and/or damage.**
- **Replace hydraulic lines that is leaking, worn out and/or damaged.**
- **Replace O-ring/s that is dirty, worn out and/or damaged.**
- **Apply petroleum jelly to the new O-ring before installation.**
- **Adjust angle fittings to the required angle position**
  - loosen the jam nut using a wrench
  - hold the angle fitting with another wrench
  - rotate the angle fitting to the required angle position
  - tighten the jam nut to the torque value on table 3



A - Jam nut

B - Flare

C - Straight threads

D - O-ring

E - Washer

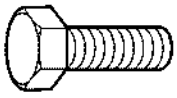
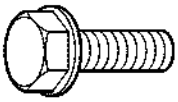
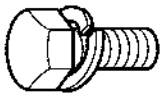
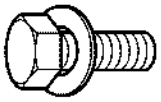
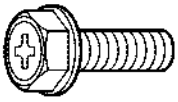
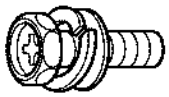
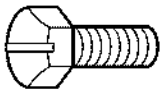
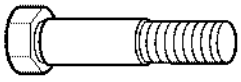
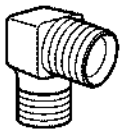
- Tighten the fittings to the torque value on table 3.

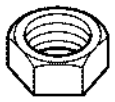
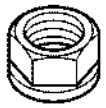
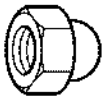
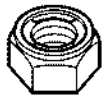
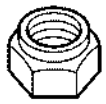
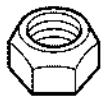
Thread Size and Pitch	Torque[a]		Numbers of Flats[b]
	N-m	Ft-lb.	
3/8"-24	8	6	2
7-16"-20	12	9	2
1/2"-20	16	12	2
9/16"-18	24	18	2
3/4"-16	46	34	2
7/8"-14	62	46	1-1/2
1-1/16"-12	1025	75	1
1-3/16"-12	122	90	1
1-5/16"-12	142	105	3/4
1-5/8"-12	190	140	3/4
1-7/8"-12	217	160	1/2

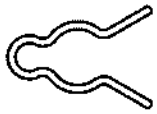
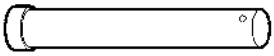
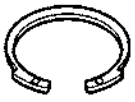
a: The torque tolerance is +15% to -20%

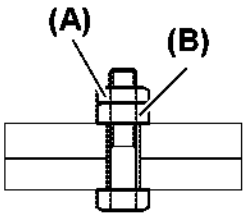
b: To be used if a torque wrench cannot be used. After tightening the angle fitting by hand, mark the nut or boss. Tighten the jam nut or angle fitting the number of flats indicated in table 3.

23. Hardware Description Table

	Shape	Description
Bolt		Hex head bolt
		Hex flange bolt
		Hex head bolt w/ lock washer
		Hex head bolt w/ flat washer
		Phillips hex head flange bolt
		Bolt w/ captive washers
		Slotted hex head bolt
		Socket head cap screw
		Wing bolt
		Shoulder bolt
		Elbow

	Shape	Description
Nut		Double-beveled nut
		Single-beveled nut
		Flange nut
		Washer faced nut
		Wing nut
		Acorn nut
		Castle nut
		Nylon lock nut
		Prevailing torque nut
		Lock nut
Washer		Flat washer
		Lock washer
		Wave lock washer

	Shape	Description
Pin		Cotter pin
		Dowel pin
		Hairpin clip
		Locking hairpin clip
		Retainer type snap
		Clevis pin
		Roll pin
		Double roll pin
Ring		Internal snap ring
		External snap ring
		E-ring
		Tapered internal snap ring
		Tapered external snap ring

	Shape	Description
Other		Turnbuckle
		Turnbuckle
		A - Jam nut B - Nut

2. SPECIFICATIONS

1. Specifications Table

Model				YT235 (CAB)
Power Take Off (PTO) Power: Estimated Average			kW	20.1
Engine	Maker			YANMAR
	Model			3TNV88C
	Type			3 Cycle Inline, Water-Cooled Diesel
	Aspiration			Without Turbo Charged
	Number of Cylinders			3
	Bore and Stroke		mm	88 x 90
	Total Displacement		L	1.642
	Gross Power: EPA Regulation		kW	25.5
	Net Power		kW	-
	Rated Revolution		min^{-1}	2800
	Maximum Torque		N•m	107.4
	Battery			540 CCA
	Fuel			Diesel Fuel: Ultra Low Sulfur
Capacities	Fuel Tank		L	28
	Engine Oil		L	4.3
	Coolant		L	5.0
	Transmission Oil		L	31
	Front-axle Oil		L	5.5
Dimensions	Overall Length (with 3-Point Hitch)		mm	3063
	Overall Width (with R4 Tires)		mm	1482
	Overall Height (with CAB, R4 Tires)		mm	2113
	Overall Height (with R4 Tires) (Top of Steering Wheel)		mm	1488
	Wheel Base		mm	1650
	Min. Ground Clearance (with R4 Tires)		mm	289
	Tread (with R4 Tires)	Front	mm	1075
		Rear	mm	1093
Weight (with CAB and R4 Tires)			kg	1320

Traveling System	Tire	Ag (R1)	Front	6-14
			Rear	9.5-22
		Turf (R3)	Front	24 x 8.50-12
			Rear	315/80D-16
		Industrial (R4)	Front	25 x 8.50-14
			Rear	15 x 19.5
	Clutch			-
	Steering			Hydrostatic Power
	Transmission			HST
	Brake			Wet Disc
	Minimum Turning Radius		m	2.8
Hydraulic Unit	Hydraulic Control System			Position Control, Open Center
	Pump Capacity (main)		L/min	26.8
	Pump Capacity (steering)		L/min	15.5
	3-Point Hitch			Category 1
	Max. Lift Force	Lift Point	kg	1300
		24 in. Behind Lift Point	kg	1000
	System Pressure		MPa	16.7
Power Take Off (PTO)	Type			Independent
	Rear	Shaft size		35 mm OD, 6 Splines.
		Speed/Engine	min^{-1}	587/2800
				540/2576

All data are subject to change without notice.

Model				YT235 (ROPS)
Power Take Off (PTO) Power: Estimated Average			kW	20.9
Engine	Maker			YANMAR
	Model			3TNV88C
	Type			3 Cycle Inline, Water-Cooled Diesel
	Aspiration			Without Turbo Charged
	Number of Cylinders			3
	Bore and Stroke		mm	88 x 90
	Total Displacement		L	1.642
	Gross Power: EPA Regulation		kW	25.5
	Net Power		kW	-
	Rated Revolution		min^{-1}	2800
	Maximum Torque		N•m	107.4
	Battery			540 CCA
	Fuel			Diesel Fuel: Ultra Low Sulfur
Capacities	Fuel Tank		L	28
	Engine Oil		L	4.3
	Coolant		L	4.5
	Transmission Oil		L	31
	Front-axle Oil		L	5.5
Dimensions	Overall Length (with 3-Point Hitch)		mm	3063
	Overall Width (with R4 Tires)		mm	1482
	Overall Height (with ROPS, R4 Tires)		mm	2520
	Overall Height (with R4 Tires) (Top of Steering Wheel)		mm	1488
	Wheel Base		mm	1650
	Min. Ground Clearance (with R4 Tires)		mm	289
	Tread	Front	mm	1075
		Rear	mm	1093
Weight (with Roll-Over Protective Structure (ROPS) and R4 Tires)			kg	1160

Traveling System	Tire	Ag (R1)	Front	6-14
			Rear	9.5-22
		Turf (R3)	Front	24 x 8.50-12
			Rear	315/80D-16
		Industrial (R4)	Front	25 x 8.50-14
			Rear	15 x 19.5
	Clutch			-
	Steering			Hydrostatic Power
	Transmission			HST
	Brake			Wet Disc
	Minimum Turning Radius		m	2.8
Hydraulic Unit	Hydraulic Control System			Position Control, Open Center
	Pump Capacity (main)		L/min	26.5
	Pump Capacity (steering)		L/min	15.3
	3-Point Hitch			Category 1
	Max. Lift Force	Lift Point	kg	1300
		24 in. Behind Lift Point	kg	1000
	System Pressure		MPa	16.7
Power Take Off (PTO)	Type			Independent
	Rear	Shaft size		35 mm OD, 6 Splines.
		Speed/Engine	min^{-1}	587/2800
				540/2690

All data are subject to change without notice.

Model				YT235		
Noise	COMMISSION DELEGATED REGULATION (EU) No 1322/2014 Annex XIII	Noise at the operator's ear	ROPS	85 dB(A)		
			CAB Closed cabin	82 dB(A)		
			CAB Opened cabin	83 dB(A)		
Vibration	COMMISSION DELEGATED REGULATION (EU) No 1322/2014 Annex XIV	Vibration acceleration (aws)		Cobo M200 Mech suspension	Grammer MSG83 Mech suspension	Grammer MSG93 Air suspension
		Light driver (59kg)		1.22 m/s^2	1.13 m/s^2	1.21 m/s^2
		Heavy driver (98kg)		1.06 m/s^2	1.00 m/s^2	1.05 m/s^2

2. Traveling Speeds (Reference)

(At rated engine Revolutions Per Minute (min^{-1}))

	Range shift lever	Approximately rated speed		
		R1	R3	R4
		km/h		
Forward	1	0 to 7.4	0 to 6.7	0 to 7.3
	2	0 to 11.0	0 to 10.0	0 to 10.8
	3	0 to 29.2	0 to 26.4	0 to 28.7
Reverse	1	0 to 5.2	0 to 4.7	0 to 5.1
	2	0 to 7.7	0 to 7.0	0 to 7.6
	3	0 to 20.4	0 to 18.5	0 to 20.1

3. PERIODIC SERVICE

⚠ WARNING

Explosion Hazard

- **Never smoke around the battery.**
- **Never smoke during refueling.**
- **Keep sparks and open flames away from the battery and the fuel tank.**
- **The battery emits hydrogen and oxygen during recharging and can pose a serious hazard.**

- **Never work under any hydraulically supported devices which can settle down, suddenly leak or be accidentally lowered.**
- **Always support the tractor securely with rugged jack stands or other suitable lifting device with the capacity of more than 2.7 metric tons (3 tons).**
- **Always allow the tractor to fully cool down before accessing the:**
  - **engine, muffler, radiator, and hot components**

- **Always park the tractor on a solid and level ground.**
- **Engage the parking brake securely.**
- **Push down Power Take Off (PTO) switch to OFF position.**
- **Lower all the implement to the ground.**
- **Move the range shift lever to N (neutral) position.**
- **Shut off the engine.**
- **Remove the key from the starter key switch before starting any maintenance work.**
- **Chock all the tires safely and securely.**

Service the Tractor

IMPORTANT

- Service and maintain the tractor more frequently if the tractor is used in severe conditions.
- Engine components and parts can get dirty or deteriorate on the following condition:
  - the tractor is operated in extreme heat
  - dusty locations
  - severe operating conditions
- The engine oil deteriorates earlier than expected on the following conditions:
  - the tractor is constantly operated at slow or low engine speeds
  - the tractor is used frequently for short durations
  - for details, see "1. Maintenance Check List" on page 1-33

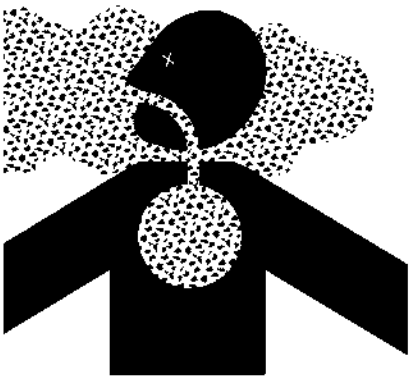
Warranty and Repair of the Engine

NOTE

- The maintenance, inspection, repair and replacement services on the engine emission control devices and systems:
  - can be performed at the owner's expense by any qualified off road engine repair shop or mechanic
  - warranty repairs must be executed by an authorized Yanmar tractor dealer

⚠ WARNING

NEVER inhale the engine exhaust gas



- **Read the DANGER, WARNING and CAUTION statements on the safety alert decals on the tractor.**
- **Before starting the engine:**
  - **remain seated on the operator seat**
  - **move the range shift lever to the N (neutral) position**
  - **push down Power Take Off (PTO) switch to OFF position**
  - **never attempt to start the engine while the operator is still on the ground**
- **Engine exhaust gas contains carbon monoxide.**
  - **if inhaled, the engine exhaust gas can cause severe poisoning or even death**
- **Always perform the safety checks in a well ventilated area.**
- **When working in an enclosed area, always expel the engine exhaust gas to an outdoor area.**
  - **connect one end of an extension pipe to the engine exhaust pipe**
  - **set the other end outside of the work area**
- **Allow fresh outside air to flow into an enclosed work area to remove the engine exhaust gas from the area.**

1. Open/Close the Hood

⚠ WARNING

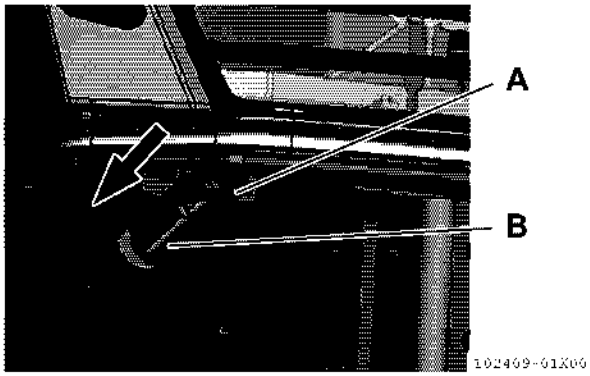
Avoid injury!

- **Avoid opening the hood while the engine is running.**
- **Avoid touching any hot components, e.g., the muffler and the exhaust pipe.**

■ Open the Hood

1. Park the tractor safely and securely.
2. Use the hood opening tool (accessory), and pull the hood releasing hook.
3. Lifting up the hood using both of your hands will automatically lift the hood up with gas damper.

* Immediately replace with new gas damper if holding force is decreased.
Code No. 1A8470-61360



(A) Hood opening tool
(B) Hood releasing hook

■ Close the Hood

1. Pull the rope hanging from the inside of the hood to close the hood.
2. Push the front upper face of the hood with both your hands until there is a clicking sound.
3. After closing the hood, lift the hood up to make sure the hood is securely locked.

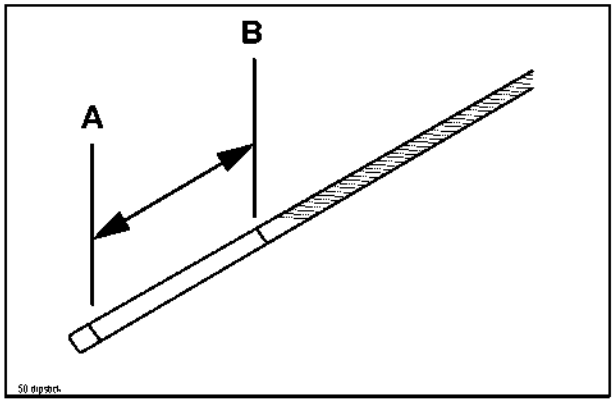
⚠ CAUTION

- **When closing the hood, avoid getting finger/s trapped in the hood or hood support.**

2. Daily Checks

■ Check the Engine Oil Level

IMPORTANT
- Always check the engine oil level daily.
  - insufficient or no engine oil can cause serious engine problems
- Always check the engine oil level before commencing operations.
- Always check the engine oil level only while the engine is cold and not running.
- Always maintain the engine oil level between the lower and the upper mark.



(A) Lower mark
(B) Upper mark

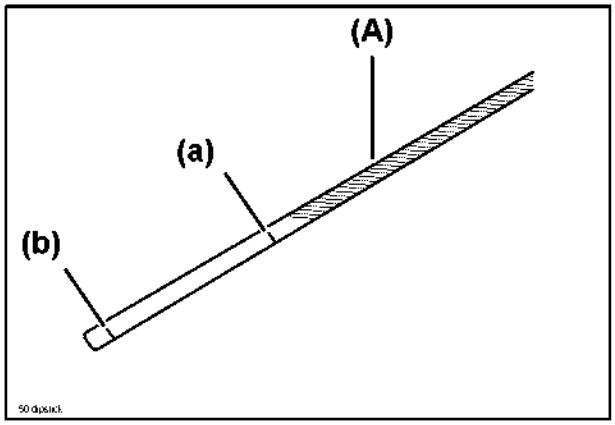
IMPORTANT
- Before adding the engine oil, always:
  - shut off the engine
  - allow the engine to cool down for several minutes

NOTE
- If the engine is used for more than 4 hours in a day:
  - check the engine oil level twice a day
- Make sure that the engine is cold before checking the engine oil level.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.
5. Raise the hood.

NOTE
- During the checking of the engine oil level:
  - dirt and dust can enter the engine
- Clean the area around the dipstick before removing the dipstick.

6. Remove the dipstick.
7. Clean the dipstick with a clean rag.
8. Insert the dipstick completely.
9. Remove the dipstick again.
10. Read the engine oil level on the dipstick.
11. The engine oil level must be between the upper and lower marks on the dipstick.



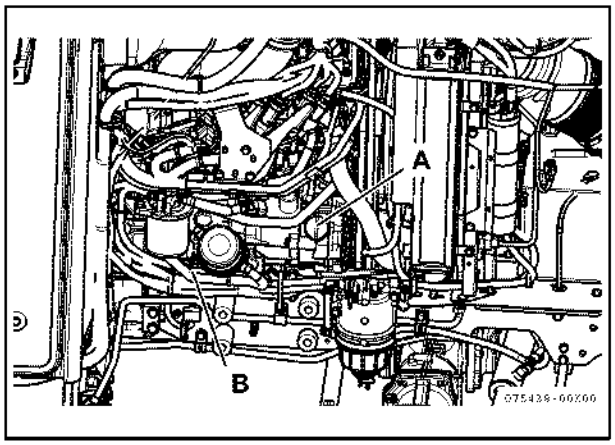
(A) Dipstick
(a) Upper mark
(b) Lower mark

NOTE
If the engine oil level is low:
- Remove the engine oil filler cap.
- Add the specified engine oil until the engine oil level is in the operating range on the dipstick.

NOTICE
- Avoid overfilling the engine with engine oil.

12.If the engine oil exceeds the upper mark level on the dipstick:
- Drain the engine oil to a proper level.

13.Insert the dipstick to check the engine oil level.
14.Lower the hood.



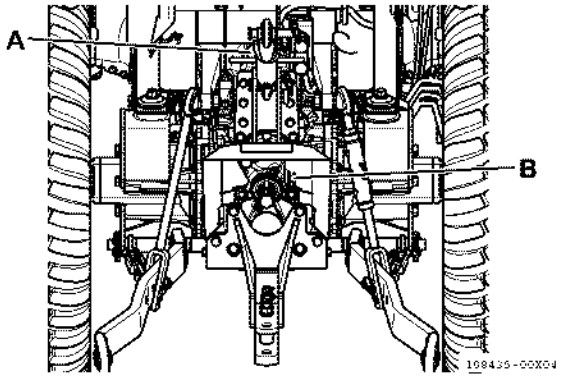
(A) Engine oil filler cap
(B) Dipstick

NOTE
Remove the engine side cover (right) if you need to add the engine oil.

■ Inspect the Transmission Hydraulic Oil Level

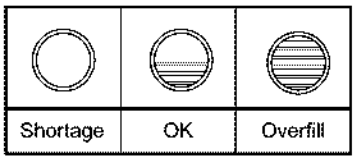
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.

IMPORTANT
- Before removing transmission hydraulic oil filler cap and dipstick, carefully clean the area around the transmission hydraulic oil filler cap and dipstick.
- The preceding action prevents dirt and other contaminants from entering the transmission.
- Avoid overfilling the transmission with transmission hydraulic oil.



(A) Transmission hydraulic oil filler cap
(B) Transmission oil gauge window

5. Look through the window next to the PTO shaft to check the oil surface.
6. If there is not enough oil in the engine, add more (but within the visible area of the window) via the oil filler port.



■ Check the Tire Air Pressure

⚠ WARNING

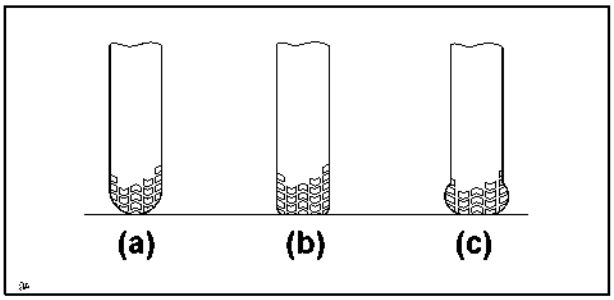
Avoid injury!
Improperly maintained tires and rim parts can cause explosive separation of the wheels.

- **Mounting and dismounting of the tires into the rim must be performed by an authorized person using proper equipment.**
- **Avoid inflating the tires above the recommended tire air pressure.**
- **Avoid standing in front of or over a tire assembly during inflation.**
- **Always use a clip-on chuck and extension hose long enough for the tire to be inflated from a safe distance.**
- **Avoid attempting to weld or apply heat into a rim and tire assembly.**
  - **welding can structurally weaken or deform the rim**
  - **heat can cause an increase in tire air pressure and result in an explosion**

IMPORTANT

- When checking tire air pressure of liquid filled tires:
  - rotate the tire placing the valve stem on top position
  - the preceding practice prevents the liquid from escaping through the valve stem
- To prevent tire damage:
  - always inflate the tires to less than the maximum tire air pressure shown on the tire sidewall

1. Inspect the tires for fissures or any other damages.
2. Use a tire gauge to check the tire air pressure.
3. Adjust the tires to the standard tire air pressure as per the illustration below.



(a) Too high
(b) Standard
(c) Too low

The table below shows the maximum allowed tire air pressure.

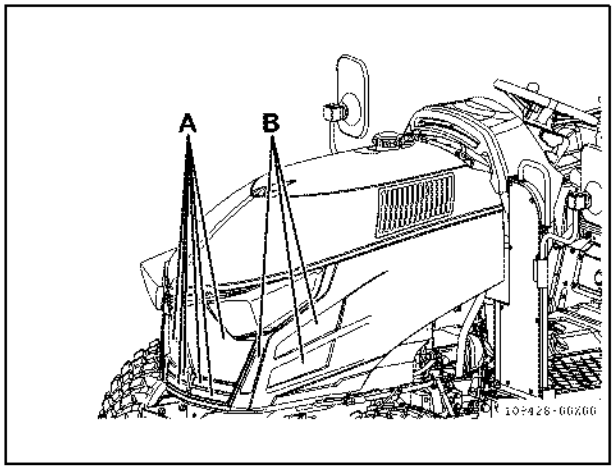
Maximum Tire Air Pressure

Tire Size		Tire Air Pressure MPa
Front	R1: 6-14	0.24
	R3: 24 x 8.50-12	0.25
	R4: 25 x 8.50-14	0.34
Rear	R1: 9.5-22	0.22
	R3: 315/80D-16	0.25
	R4: 15 x 19.5	0.21

■ Clean the Front Grille and Side Screens

IMPORTANT: Avoid damage!
- To prevent the engine from overheating.
- To ensure adequate air inflow.

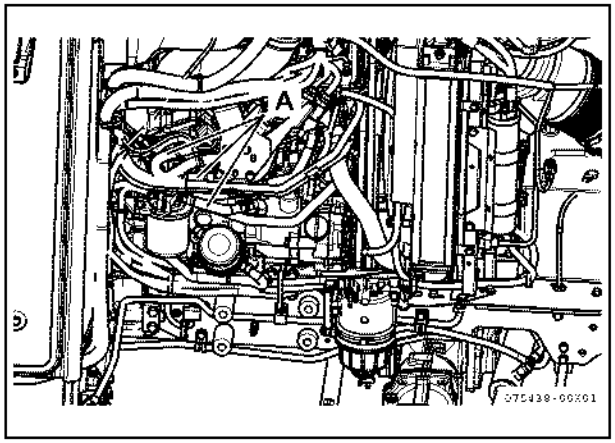
1. Check the front grille and the side screens for dirt, grass clippings and debris.
2. Clean the front grille and side screens with a brush or cloth.



(A) Front grille
(B) Side screens

■ Check the Fuel Line

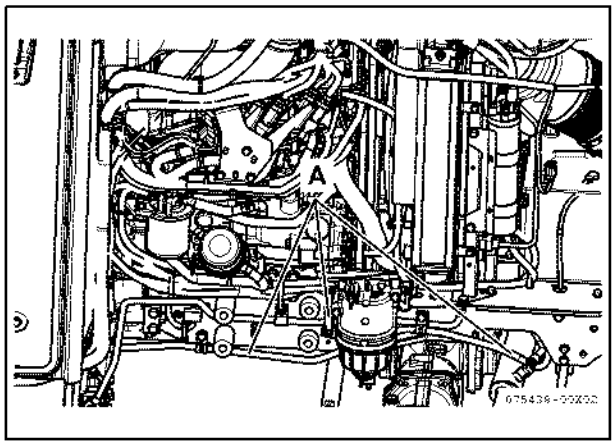
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.
5. Raise the hood.
6. Check the fuel rubber hoses for any leaks or damages.



(A) Fuel rubber hoses

■ Check the Power Steering Line

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.
5. Check at the lower part and underneath the tractor.
6. Check the power steering hose for leaks and damages.



(A) Power steering hose

■ Check the Retractable Seatbelt

1. Before operating the tractor:
   - Always ensure that all the retractable seatbelt mounting hardwares are in good working condition.
2. Replace any damaged hardware.

■ Check the Roll-Over Protective Structure (ROPS type)

1. Before operating the tractor:
   - Always ensure that the Roll-Over Protective Structure (ROPS) mounting hardwares are in correct working condition.
2. If any damage hardware is detected:
   - Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

■ Check the Headlights, Hazard Lights, etc.

1. Inspect the lights for blown bulb/s and damage lens/es.
2. Replace blown bulb/s and/or damage lens/es.

■ Check and Refill the Fuel Tank

⚠ Warning

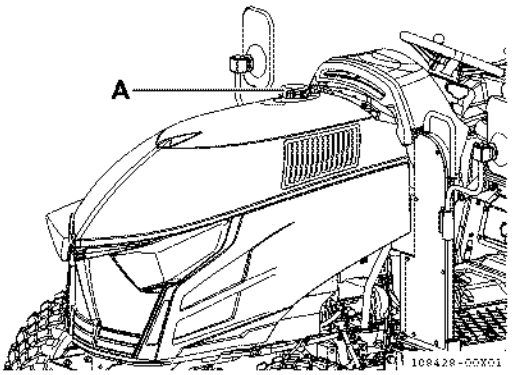
Avoid injury!
Remember that the fuel vapor is explosive and flammable:
- **Shut off the engine before refilling the fuel tank.**
- **Never smoke while handling fuel.**
- **Keep the fuel away from an open flame or sparks.**
- **Refuel on outdoors or in a well ventilated area.**
- **Immediately wipe away any spilled fuel.**
- **To prevent static electric discharge:**
  - **use a clean and approved non-metal fuel container**
  - **use a clean and approved plastic funnel that has no metallic screen mesh or filter**

IMPORTANT
- Dirt and water in the fuel can damage the engine.
- Remove dirt and debris from the fuel tank opening.
- Use a clean, fresh, and no additive fuel.
- At the end of each day's operation:
  - fill the fuel tank to prevent condensation from occurring in the fuel tank
  - the preceding procedure prevents freezing of the fuel during cold weather
- To fill the fuel tank or container:
  - use a non-metallic funnel that has a plastic mesh strainer
- The fuel tank is vented through the fuel filler cap.
- Replace the fuel filler cap with an approved vented cap as needed.
- Add a fuel conditioner when:
  - storing diesel fuel for a long period of time
  - there is a slow turnover of fuel

1. Park the tractor safely and securely.
2. Turn the starter key switch to ON position.
   - By observing the fuel gauge on the instrument panel.
   - If the reading on the fuel gauge is 1/4 or less.
3. Turn the starter key switch to the OFF position.
4. Allow the engine to cool down for several minutes.
5. Remove the fuel filler cap.
6. Fill the fuel tank with fresh fuel.

IMPORTANT
- Never overfill the fuel tank.

7. Install the fuel filler cap.

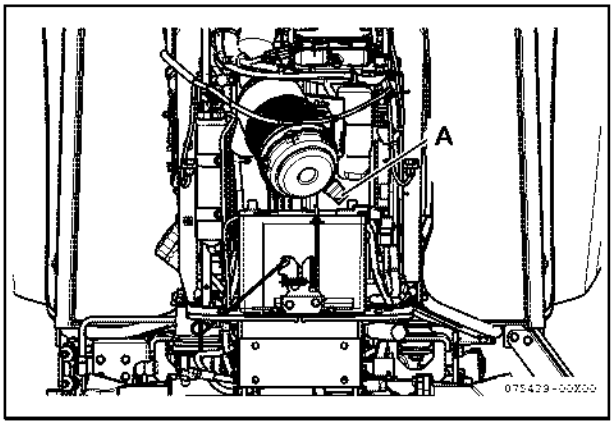


(A) Fuel filler cap

■ Check and Clean the Rubber Dust Unloading Valve

IMPORTANT: Avoid damage!
Always operate the engine with:
- The air filter element installed.
- The rubber dust unloading valve installed.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood to access the rubber dust unloading valve.
5. Clean the dust unloading valve by squeezing the valve. Replace the valve as necessary.



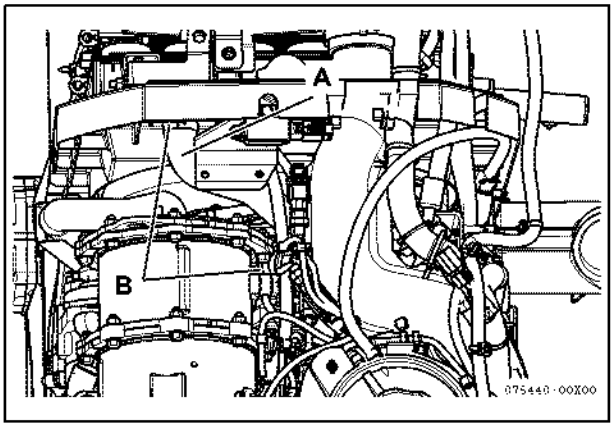
(A) Rubber dust unloading valve

■ Clean the Radiator Hoses and Clamps

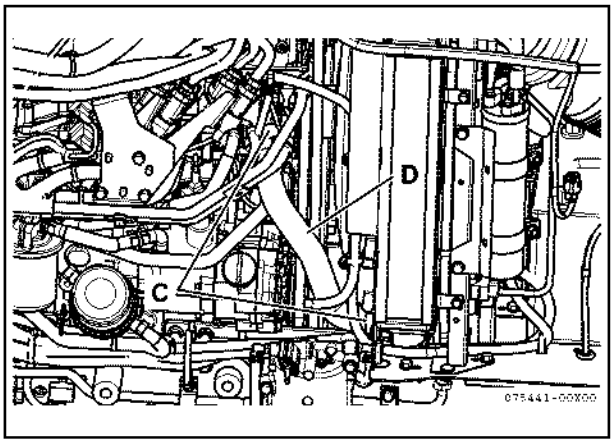
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.

NOTE
- Visually check the hoses for cracks and wear.
- Squeeze the hoses to check for evidences of deterioration.
- The hoses must not be too hard, brittle, too soft or swollen.
- Replace the damaged hose/s.

5. Check the upper and the lower radiator hoses for any damages and cracks.
6. Replace any damaged hoses.
7. Check the hose clamps for looseness.
8. Replace as necessary.
9. Lower the hood.



(A) Upper radiator hose
(B) Hose clamps



(C) Hose clamps
(D) Lower radiator hose

■ Clean the Radiator Cooling Screen

⚠ WARNING

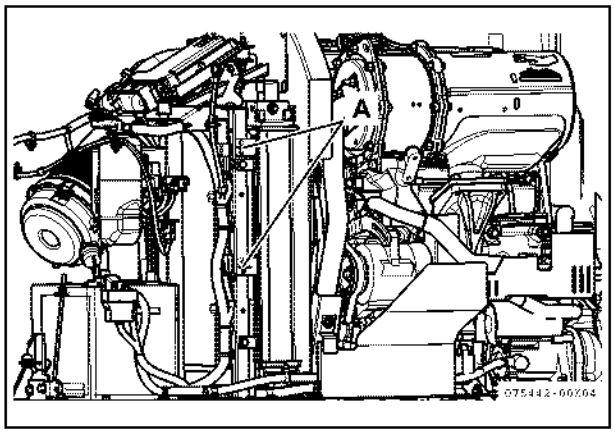
Compressed air can explosively spray debris and dirt over a wide area:

- **Make sure there are no bystander/s near the tractor.**
- **While using compressed air for cleaning, always wear protective goggles.**
- **Reduce compressed air pressure to 210 kPa.**

IMPORTANT

- Keep the cooling screen clean:
  - make sure adequate air inflow is present
  - prevent the engine from overheating

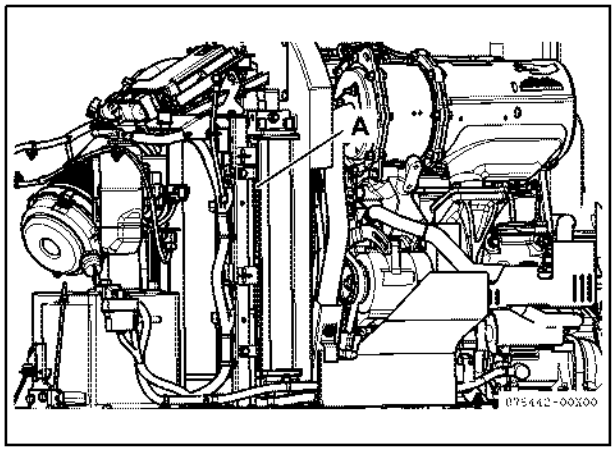
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Set the cam-lock of the upper/lower side screen at the stand position and turn it to the left.



(A) Cam-lock

6. Slide both screens and remove.

7. Remove straw and dust attached from the screen.



(A) Radiator cooling screen
(2 screens: Upper and lower)

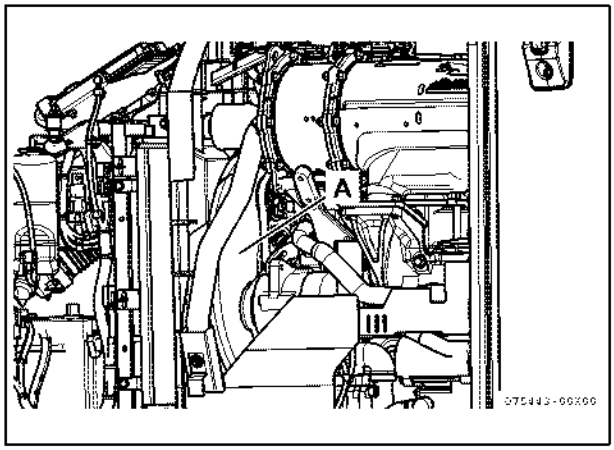
■ Clean Radiator Cooling Fins, Cooling Screen and Oil Cooler Screen

⚠ WARNING

Avoid injury!
Compressed air can explosively spray debris and dirt over a wide area:
- **Make sure there are no bystander/s near the tractor.**
- **While using compressed air for cleaning, always wear protective goggles.**
- **Reduce compressed air pressure to 210 kPa.**

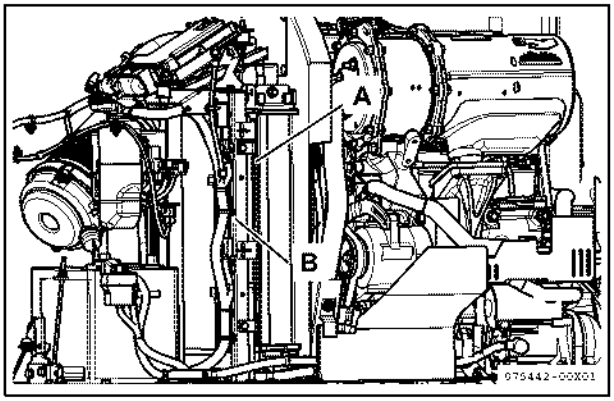
IMPORTANT: Avoid damage!
- To prevent overheating:
  - keep the radiator cooling fins clean
- When cleaning the radiator cooling fins:
  - avoid using pressure washers, which can damage the radiator cooling fins
- Prevent the cooling fins from bending:
  - avoid spraying compressed air directly into the radiator cooling fins

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Clean the radiator cooling fins from all dirt and debris:
   - Use low pressure, compressed air.
   - During the preceding procedure, maintain maximum distance to the engine.



(A) Radiator cooling fins

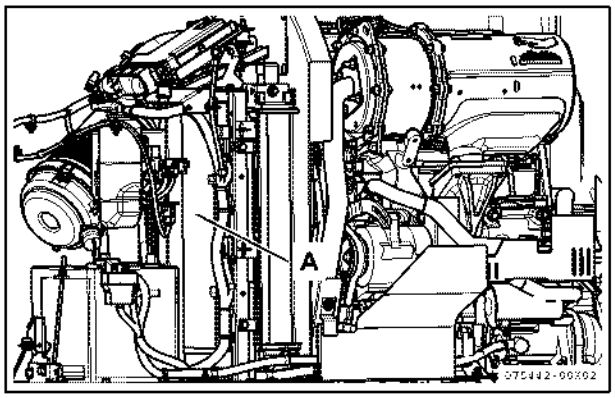
6. Raise and remove the radiator cooling screen.
7. Clean the radiator cooling screen with compressed air, brush or cloth.
8. Install the radiator cooling screen.
9. Remove the oil cooler screen from the front frame.
10. Clean the oil cooler screen with compressed air, brush or cloth.
11. Install the oil cooler screen.
12. Lower the hood.



(A) Radiator cooling screen
(2 screens: Upper and lower)
(B) Oil cooler screen

■ Clean Condenser Screen (CAB only)

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Remove the radiator condenser screen.
6. Clean the condenser screen with compressed air, brush or cloth.
7. Install the condenser screen.
8. Lower the hood.

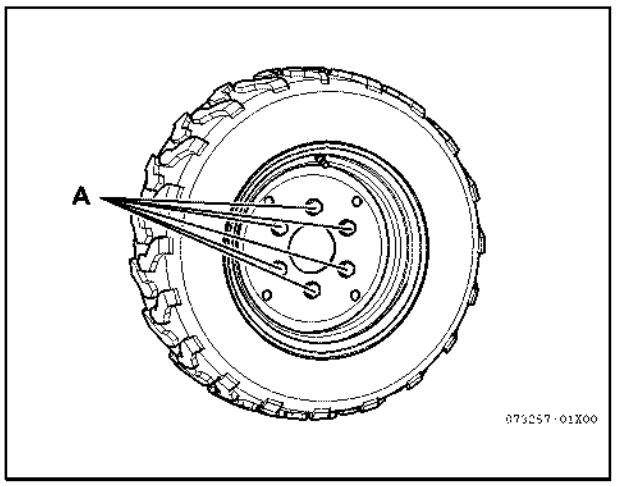


(A) Condenser screen

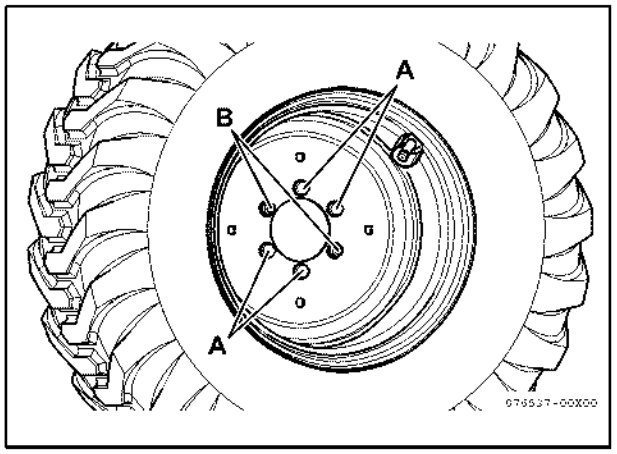
■ Check the Wheel Bolt Tightening Torque

Service Intervals

- Regular intervals: Before daily operation.
- After adjusting the wheel tread width and after replacing the tires:
  - after 1 hour of operation
  - every 4 hours after, until appropriate tightening torque values are reached and maintained



(A) Front wheel bolts

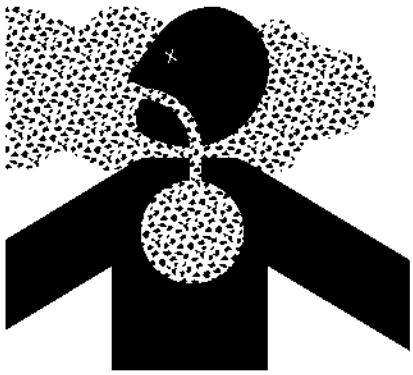


(A) Rear wheel bolts
(B) Rear wheel nuts

■ Inspection Procedure for the Safety System

⚠ WARNING

NEVER inhale the engine exhaust gas



- **Read the DANGER, WARNING AND CAUTION statements on the safety alert decals on the tractor.**
- **Before starting the engine:**
  - **remain seated on the operator seat**
  - **release the forward and reverse drive pedal completely**
  - **push down Power Take Off (PTO) switch to OFF position**
  - **never attempt to start the engine while the operator is still on the ground**
- **Engine exhaust gas contains carbon monoxide.**
  - **if inhaled, the engine exhaust gas can cause severe poisoning or even death**
- **Always perform the safety checks in a well ventilated area.**
- **When working in an enclosed area, always expel the engine exhaust gas to an outdoor area.**
  - **connect one end of an extension pipe to the engine exhaust pipe**
  - **set the other end outside of the work area**
- **Allow fresh outside air to flow into an enclosed work area to remove the engine exhaust gas from the area.**

Before operating the tractor, ALWAYS:
- Get familiarized with the operation of the tractor.
- Perform the safety checks on the tractor's safety interlock system.

If a problem is detected on the safety interlock system:
- Do not attempt to operate the tractor.
- Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

1. Power Take Off (PTO) switch

1. Sit on the operator seat.
2. Engage the parking brake securely.
3. Release the forward and reverse drive pedal completely.
4. Pull up Power Take Off (PTO) switch to ON position.
5. Turn the starter key switch to START position.

NOTE
- The engine must not crank when Power Take Off (PTO) switch is in ON position.

6. Confirm that the starter motor does not operate.
7. Push down Power Take Off (PTO) to OFF position.
8. Activate the starter motor to start the engine.

NOTE
- The engine starting combination as shown on the chart below.

SWITCH / ENGINE	SEAT - ON	RANGE SHIFT LEVER - N	PTO - OFF	PARKING - ON
START 1	○	○	○	
START 2		○	○	○

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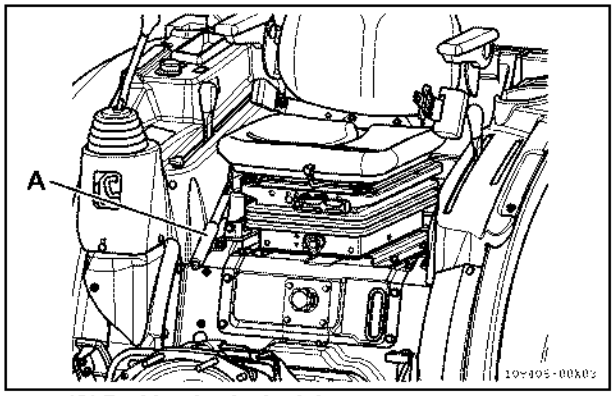
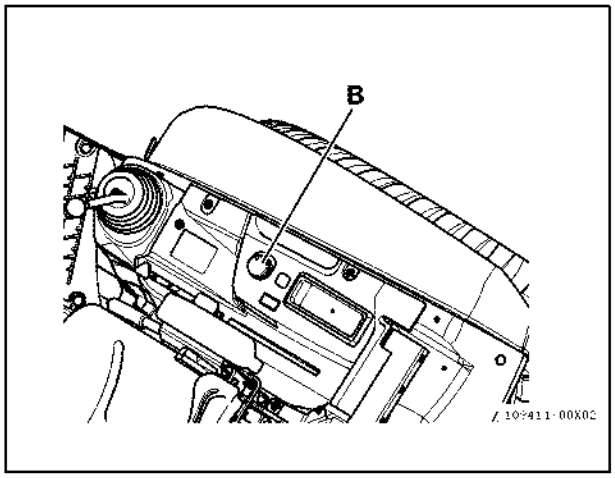
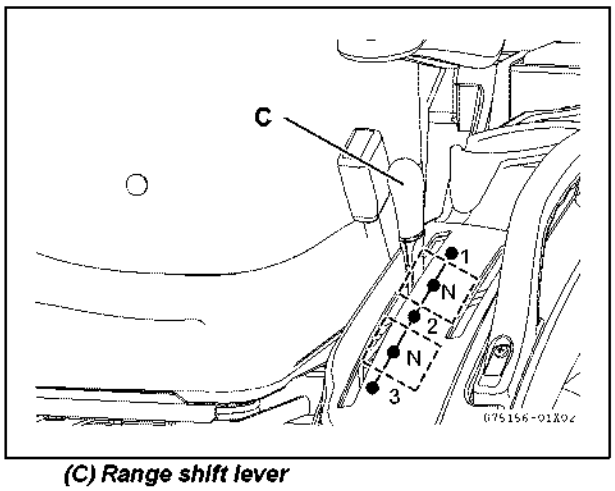
- After starting the engine, if SEAT or PARKING isn't ON, the engine stops.
- For example, if the operator gets off the machine without applying the parking brake, the engine stops.



(A) Parking brake lock lever



(B) Power Take Off (PTO) switch



(C) Range shift lever

2. Seat Switch

1. Sit on the operator seat.
2. Engage the parking brake securely.
3. Push down Power Take Off (PTO) switch to OFF position.
4. Move the range shift lever to N (neutral) position.
5. Turn the starter key switch to START position.
6. Slightly rise up from the operator seat to remove weight from the operator seat.

IMPORTANT

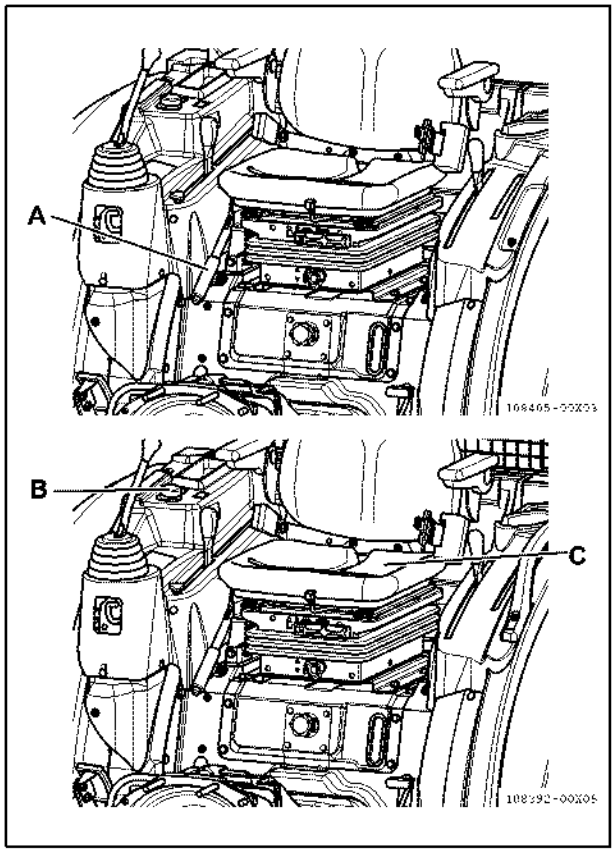
- Do not dismount from the tractor.

7. Make sure that the engine is not shut down.

NOTE

- The engine must stop when the operator is not sitting on the operator seat.

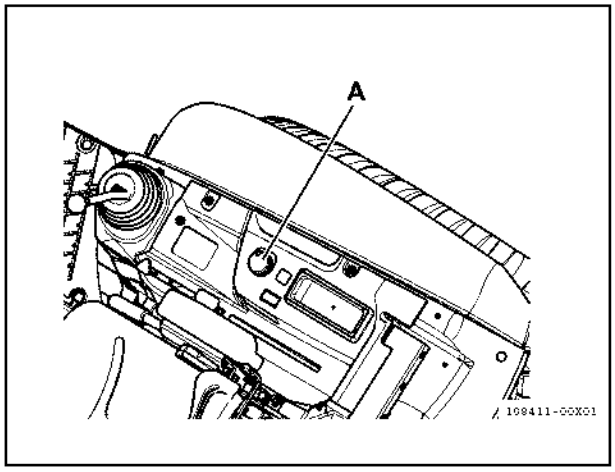
8. Turn the starter key switch to OFF position.



(A) Parking brake lock lever
(B) Power Take Off (PTO) switch
(C) Operator seat

3. Range shift lever switch

1. Sit on the operator seat.
2. Engage the parking brake securely.
3. Move the range shift lever to N (neutral) position.
4. Push down Power Take Off (PTO) switch to OFF position.
5. Turn the starter key switch to START position to run the engine.
6. Pull up the Power Take Off (PTO) switch to ON position.
7. Disengage the parking brake.
8. Depress the reverse drive pedal.
9. Make sure that the Power Take Off (PTO) is not running.



(A) Power Take Off (PTO) switch

4. Power Take Off (PTO) Interface

IMPORTANT

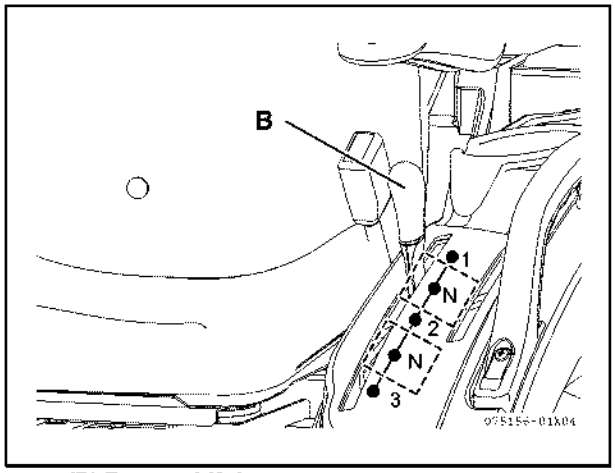
- Power Take Off (PTO) is provided with a mechanism that automatically stops the engine for safety. Make sure the operation is normal with the following steps.

1. Sit on the operator seat.
2. Engage the parking brake securely.
3. Push down Power Take Off (PTO) switch to OFF position.
4. Move the range shift lever to N (neutral) position.
5. 3-point hitch control lever is in lowest position.
6. Turn the starter key switch to START position.
7. Pull up Power Take Off (PTO) switch to ON position.
8. Slightly rise up from the operator seat to remove weight from the operator seat.

IMPORTANT

- Do not dismount from the tractor.

9. Make sure that the engine stops.
10. Also when you go through procedures 1 to 7, make sure that the engine stops by leaving the seat when the parking brake is OFF, PTO switch is ON, or the range shift lever is in "N (Neutral)".



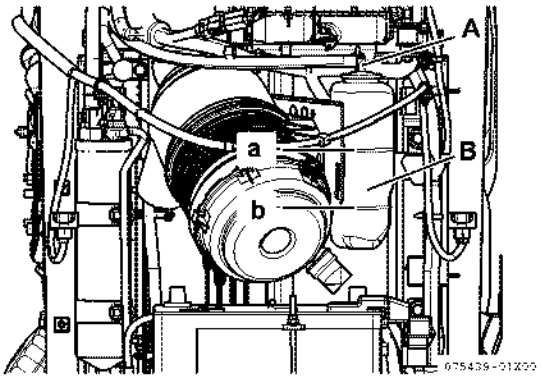
(B) Range shift lever

■ Check the Cooling System

⚠ Warning

Avoid injury!

- **Always allow the radiator to cool down:**
  - **the radiator is hot and can cause burns**
  - **the build up pressure in the cooling system can cause the coolant to spray out explosively during removal of the radiator cap**
- **Always shut off the engine.**
- **Allow the engine to cool down.**
- **Remove the radiator cap only when:**
  - **the radiator and the engine are sufficiently cooled down that can be touched with bare hands**
- **When removing the radiator cap, always:**
  - **loosen the radiator cap to the first stop**
    - **the preceding action releases excessive pressure on the radiator**
  - **fully remove the radiator cap once the pressure has been released completely**
- **Add coolant or water to reserve tank, not to the radiator.**



(A) Reserve tank cap
(B) Reserve tank
(a) FULL line
(b) LOW line

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Check the coolant level of the reserve tank:
   - If the engine is warm, the coolant level must be between the full line and the low line.
   - If the engine is cold, the coolant level must be at the low line on the reserve tank.
6. When necessary, remove the reserve tank cap and add coolant.
7. Add a pre-diluted coolant with an antifreeze water ratio that suits the local climate.
   - For details contact YOUR LOCAL YANMAR TRACTOR DEALER.
   - Use High Quality Permanent Type Antifreeze (Ethylene Glycol with corrosion and rust inhibitor chemicals).
8. Install the reserve tank cap.
9. Lower the hood.
10. Confirm that the hood latch locked securely.

■ Inspection and cleaning procedure for condenser and condenser screen (CAB type)

⚠ WARNING

- **Always stop the engine while inspecting and cleaning. Failure to observe this precaution may result in entanglement in moving parts and related injuries.**

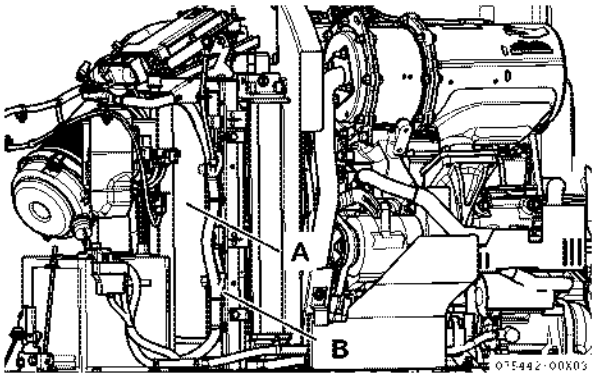
Inspection timing

Inspection of the condenser screen	Normal inspection (Cleaning)
Inspection of the condenser	Every 100 hours (At dusty places: 50 hours)

If mud, dust, or grass is attached to the condenser, the air conditioning function will not be sufficient. Inspect and clean with the following procedure.

Inspecting and cleaning procedure

1. Open the hood. (Refer to Page 3-2)
2. Make sure that no mud, dust, or grass is attached to the condenser screen. If so, use a soft brush and water to remove them.
3. When contaminants are attached to the fin of the condenser (Further inside the condenser screen), rinse it with water, or blow it off with compressed air.



(A) Condenser screen
(B) Fin of the condenser

IMPORTANT

- When cleaning the condenser with compressed air, make sure you do not crush the fin. (If possible, carefully bend the fin to original shape.) If the fin is crushed, the cooling function will degrade.

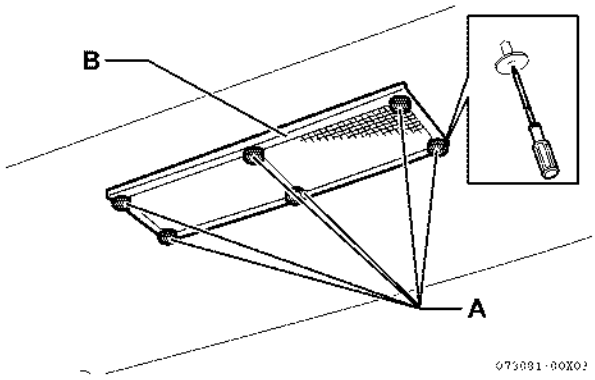
■ Cleaning and replacing the internal air inlet filter (CAB type)

Cleaning and replacement period

Cleaning	Every 200 hours
Replace	Every 600 hours

Cleaning procedure

1. Push the push rivets and remove the panel.



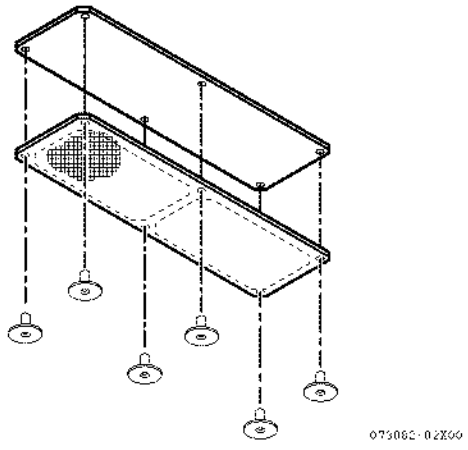
(A) Push rivets
(B) Panel

2. Soak it in lukewarm water with neutral detergent, wash by moving it in every direction. Rinse it thoroughly, and dry it naturally.

IMPORTANT

- Do not use organic solvent (gasoline, trichloroethylene, thinner, etc.) as detergent.

3. If the stain is excessive, replace with a new filter.
4. Put the filter back in the initial position.



Product name, code No.

Name	Code No.
Air conditioner internal air filter	1A8111-88680

■ Cleaning and replacing the external air introduction filter (CAB type)

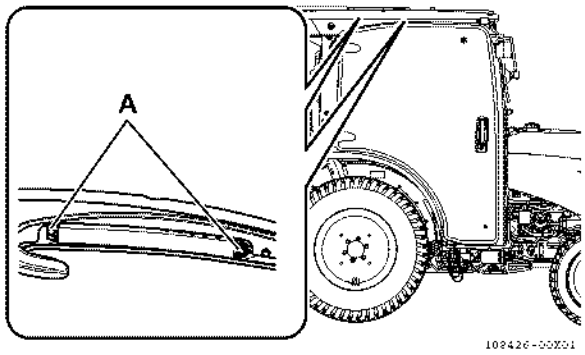
Cleaning and replacing the external air introduction filter <CAB type>
Cleaning and replacement period

Cleaning	Every 100 hours
Replace	Every 300 hours

If the external air introduction filter is stained and clogged, the blow-out amount of the external introduction air will reduce.

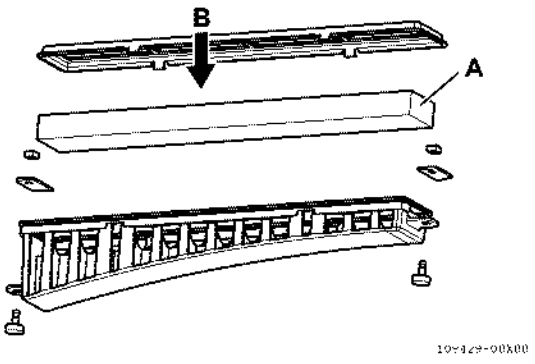
Cleaning procedure

1. The filter can be removed by removing 2 bolts.



(A) Bolts

2. Blow compressed air to the filter part and remove the stain.



(A) Filter
(B) Compressed air

3. If the stain is excessive, replace with a new filter.
*If mud is on the panel, rinse the panel with water, dry it, and then attach.

IMPORTANT
- Do not rinse the filter with water.
- When removing stain on the filter part using compressed air, blow air from the direction indicated by the arrow mark (opposite direction toward the air flow) in the drawing.

Product name, code No.

Name	Code No.
Air conditioner external air filter	1A8420-87990

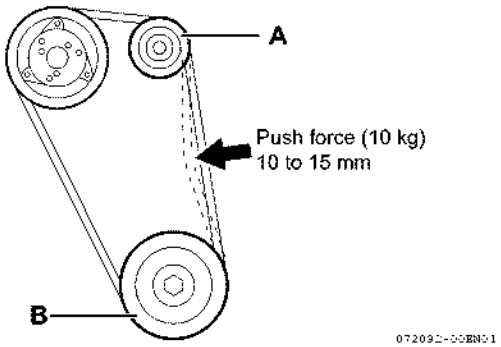
■ Inspecting and adjusting the compressor drive belt (CAB type)

Inspection timing

Inspection	1st time: 50hrs
	2nd time on: every 100hrs

Inspection procedure

1. Open the hood. (Refer to Page 3-2)
2. Push the middle part between the idler pulley and crank pulley with a finger (10 kg force), and check that the belt deflection is within 10 to 15 mm.
If the belt deflection amount is not adequate, adjust the belt tension.



(A) Idler pulley
(B) Crank pulley

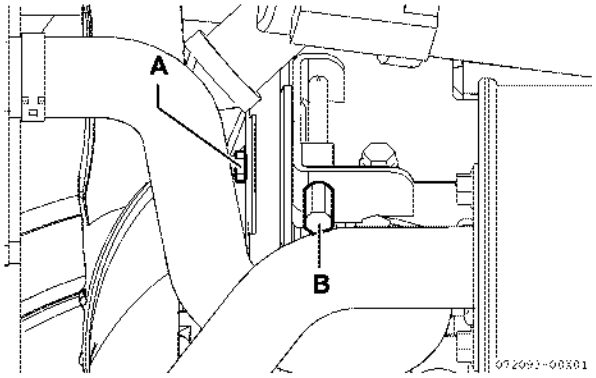
3. Check for belt wear. If the belt is broken, contact your dealer to replace it with a new compressor drive belt.
4. Close the hood.

Product name, code No.

Name	Code No.
V-belt (low edge A56	25132-005600

How to adjust the belt

1. Loosen the M10 nut (14 mm) in the middle of the idler pulley.
2. Screw the adjustment M8 bolt (12 mm) to adjust the belt tension. By rotating clockwise, the belt stretches, and by rotating anti-clockwise, the belt loosens.



(A) M10 nut (14 mm)
(B) M8 bolt (12 mm)

3. Tighten the nut (M10) in the middle of the idler pulley.

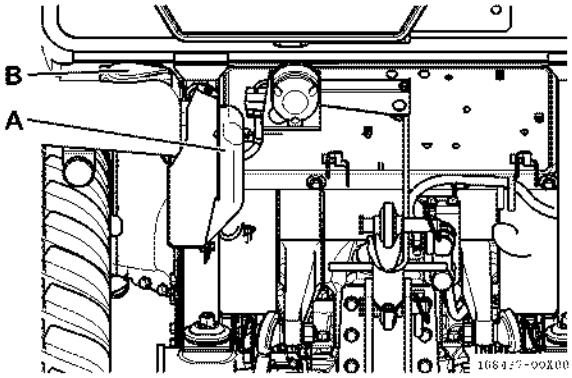
■ Inspecting and refilling the washer tank (CAB type)

Inspection timing

Inspection	Normal inspection

The washer tank is attached to the rear of the fender (right side). If the washer liquid is low and it does not spurt fully, remove the filler port and refill the washer liquid. The capacity of the tank is 2.0 L. Although the ratio of water and washer liquid is 1:1, the mixing rate differs depending on the external temperature. Please follow the instruction manual for the washer liquid.

<CAB rear part>



(A) Washer tank
(B) Filler port

■ Regenerating the exhaust filter

⚠ DANGER

- **Please be very careful when regenerating, especially not to let children and elderly approach. Do not leave the tractor. Failure to observe this precaution may result in fire and fatal accidents.**

⚠ WARNING

- **While regenerating or right after regeneration, the temperatures around the exhaust filter and exhaust gas rises. Never touch or approach toward it, and always keep the surroundings clean so that there is nothing burnable nearby. Also, do not cover it with a sheet cover right after the regeneration. If you cover it with a sheet cover in an over-heated state, the cover may start to burn and can cause fire accident.**
- **Do not start the regeneration in an enclosed area, such as a warehouse or garage. Pick a well-ventilated location outside when regenerating. Poisoning as a result of exhaust fumes may occur, leading to injury accidents.**

IMPORTANT

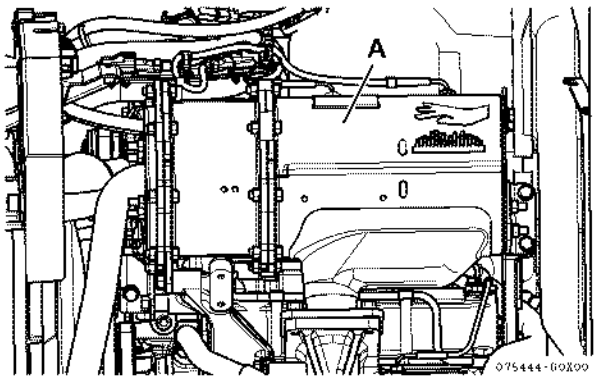
- Always use the specified engine oil. If you use oil that is besides the specified oil, the exhaust filter may clog and cause malfunction.

NOTE

- Exhaust gas that occur during regeneration smells unusual, but it is not malfunction.
- While the exhaust filter regeneration, there may be noise occurring due to activation of intake throttle, but it is not malfunction.
- While regeneration, the engine noise may change, or white smoke may occur, but it is not malfunction.
- PM is easily accumulated while idling.
- Do not do unnecessary idling (low speed).

Exhaust filter

The exhaust filter is a filter device that is installed between the engine and the exhaust gas port, and by collecting the PM (particulate matter such as soot), it prevents them to be released into open air. By burning out the PM accumulated in the exhaust filter, the exhaust filter function can be regenerated.



(A) Exhaust filter

NOTE

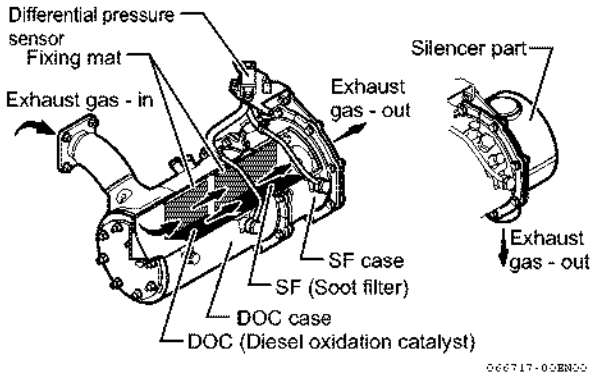
- If you leave the accumulated PM, it will start clogging and degrade the engine quality. Therefore, the exhaust temperature must be raised periodically to burn out the PM. This is called regenerating the exhaust filter.

Exhaust filter maintenance

⚠ WARNING

- **The ash contains harmful ingredients to human body in the remaining of unburnt engine oil additives. Therefore you must request the dealer for maintenance.**

The exhaust filter accumulates, other than PM (particulate matter such as soot), ashes of metal component contained in the lubricating oil additives. Because those ashes cannot be completely burnt inside the exhaust filter, maintenance is needed.



Part name	Maintenance period	Replace-ment period
SF (Soot filter)	Every 6000 hours	9000 hours
DOC (Diesel oxidation catalyst)	Not needed	9000 hours

IMPORTANT

- Low-sulfur diesel must be used for fuel.
- Use API service categories CJ-4 diesel engine oil for the engine which exhaust filter is mounted on.
- The maintenance and replacement periods are based on when the Yanmar's specified fuel and engine oil are used. If you use other than those designated items, it can cause failure.
- The exhaust filter needs periodical maintenance. If you do not run maintenance for the accumulated ashes, it can cause degrading of engine output and increasing fuel consumption.

Regeneration mode for exhaust filter

The exhaust filter regeneration includes 5 patterns of regeneration modes according to the PM accumulation amount and operating time. Out of the 5, automatic regeneration and assist regeneration are carried on automatically, but reset regeneration, parking regeneration, and recovery regeneration are to be carried on manually. When the exhaust filter regeneration request display is shown, always carry on the regeneration manually.

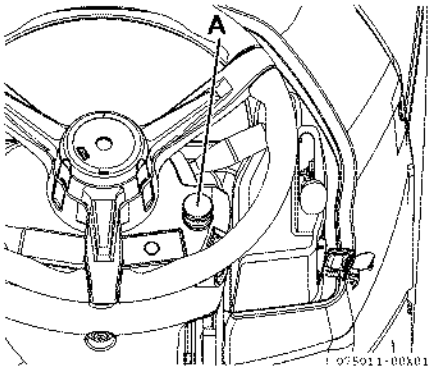
IMPORTANT

- If you leave it without regeneration, the exhaust filter will clog and cause degradation in engine function and fuel consumption. Further, if you keep operating for a certain amount of time without manual regeneration, you may need to repair the filter.

NOTE

- Operation must be stopped during parking regeneration and recovery regeneration. The operation procedure will be shown in the meter panel. Follow the instructions and operate each lever. For details, refer to the next page on.

When you manually start regeneration, press the exhaust filter regeneration switch located under the steering wheel for more than 3 seconds.



(A) Regeneration switch

PM accumulation level	Regeneration mode	Description	Intake amount control	Fuel control	Monitor display	Lamp switch	Notification buzzer	Operable	Note	
0	Self-regeneration	Do not use self-renewal regeneration assisting device. Automatic regeneration (Normal operation)	×	×	-	-	-	✔		
1	Assist regeneration	Automatic regeneration using regeneration assisting device.	✔	✔	-	-	-	✔		
2	Reset regeneration (page 3-22)	A regeneration adopting the assist regeneration with post injection. This will show within 50 hours after the initial hour meter, or every 100 hours thereafter, or otherwise when the PM accumulating amount reaches the reset regeneration level.	✔	✔		ON	✔ OFF during regenera-tion	✔	Approximately 30 minutes	Usually operable to this state
3	Parking regeneration (page 3-23)	Regeneration that adopts reset regeneration with high-idling.	✔	✔		ON	✔ OFF during regenera-tion	×	Approximately 30 minutes	
4	Recovery regeneration	Regeneration carried on with service tools when parking regeneration fails.	✔	✔		ON	-	×	Forced regeneration by SA-D*	

* Contact YOUR LOCAL YANMAR TRACTOR DEALER.

Exhaust filter regeneration notifying function

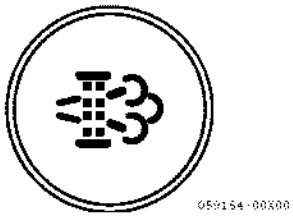
Exhaust filter regeneration switch (Notification lamp)	Buzzer	Status
Blinking	ON	Waiting for exhaust filter regeneration
ON	Stop	Regenerating exhaust filter (Approx. 30 min.)
OFF	Stop	Exhaust filter regeneration ended

IMPORTANT

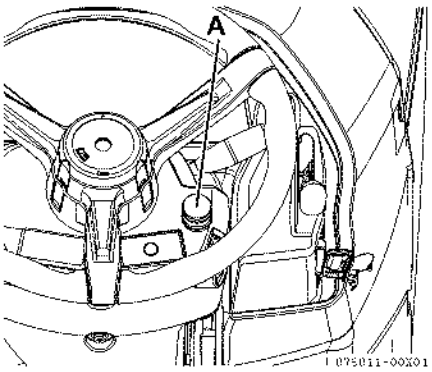
- When the recovery regeneration lamp is on, request your dealer for repairing.

Reset regeneration

1. The notification lamp of the exhaust filter regeneration switch blinks, and the buzzer goes off at once in 2 seconds.



2. Stop the operation.
3. Press the "Exhaust filter regeneration switch" for 3 seconds or longer.



(A) Regeneration switch

4. The buzzer stops, the regeneration starts, and the notification lamp on the switch turns on. The lamp goes off when it is finished.
   *Tractor can keep being operated.

IMPORTANT

- The reset regeneration must be done during operation.
  If it is not done during operation, the regeneration condition will not meet and the regeneration request lamp will stay on, and the regeneration may not end.
  If the reset regeneration does not end, please contact your purchased dealer.

NOTE

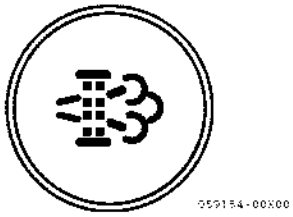
- In reset regeneration, the regeneration will not start at the following conditions. Warm up first when cold and increase engine load. The regeneration will start automatically start when conditions meet.
  - When engine coolant temperature is low
  - When exhaust filter temperature is low
- Regeneration will end in about 30 minutes, but the time until the end of regeneration is different depending on the external temperature. Check the remaining fuel quantity beforehand, and start the regeneration.
- If possible, continue regeneration until the end without stopping. If you need to stop the regeneration, turn the key switch to OFF position. If you stop the engine without completing the regeneration, please restart as soon as possible because the exhaust filter regeneration request warning will show the next time you start the engine.
- At reset regeneration, the condition may not meet when it is stopped at idling.
  Please try to run engine at rated speed during operation or traveling. (Even during stopping, by increasing the engine speed to rated speed, it will become easier to regenerate.)

Parking regeneration

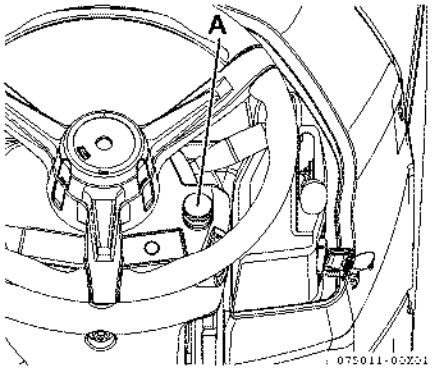
⚠ WARNING

- **If you keep the engine running while ignoring the exhaust filter regeneration (parking regeneration) request, because the PM will excessively accumulate, there may be cases where PM abnormally burn and break the exhaust filter, cause fire, and lead to injury accidents.**

1. The notification lamp of the exhaust filter regeneration switch blinks, and the buzzer goes off at once every second.



2. Park the tractor in a safe place, turn the PTO drive switch to "OFF", shift the range shift lever to "N (neutral)", apply the parking brake and set engine to idle (low speed).
3. Press the "Exhaust filter regeneration switch" for 3 seconds or longer.



(A) Regeneration switch

4. The buzzer stops, the regeneration starts, and the notification lamp on the switch turns on.
5. The lamp goes off when it is finished.

NOTE

- The engine will speed up automatically while regeneration.
- Regeneration will stop when the next operation is performed.
  - · When the accelerator lever is on "🐇" rotation side.
  - · When the PTO switch in ON position.
  - · When the range shift lever is in a position other than "N (neutral)".
  - · When the parking brake lock lever is released.

NOTE

- Regeneration will end in about 30 minutes, but the time until the end of the regeneration is different depending on the external temperature. Check the remaining fuel quantity beforehand, and start the regeneration.
- If possible, continue regeneration until the end without stopping. If you need to stop the regeneration, turn the key switch to OFF position. If you stop the engine without completing the regeneration, please restart as soon as possible because the exhaust filter regeneration request indication will show the next time you start the engine.
- While regeneration, the engine noise may change, or white smoke may occur, but it is not malfunction.
- Exhaust gas that occur during regeneration smells unusual, but it is not malfunction.
- While exhaust filter regeneration, there may be noise occurring due to activation of intake throttle, but it is not malfunction.

3. Check and Replace as Necessary

■ Inspect the Alternator/Fan Belt

- Perform a visual inspection on the alternator/fan belt.
- Check for loose alternator/fan belt tension or damaged alternator/fan belt.

For more information on maintenance work on the alternator/fan belt, for detail, see "Service the Alternator/Fan Belt" on page 3-27.

■ Check and Replace the Battery

■ Check the Fuses

■ Check the Light Bulbs

■ Check and Drain the Fuel/Water Separator

For details, see "Check the Fuel/Water Separator" on page 3-29.

4. First 50 Hours

■ Change the Transmission Hydraulic Oil

For maintenance work, see "Change the Transmission Hydraulic Oil, Transmission Hydraulic Oil Filter and Line Filter" on page 3-36.

■ Replace the Transmission Hydraulic Oil Filters

For maintenance work, see "Change the Transmission Hydraulic Oil, Transmission Hydraulic Oil Filter and Line Filter" on page 3-36.

■ Check the Alternator/Fan Belt

For maintenance work, for details, see "Service the Alternator/Fan Belt" on page 3-27.

(CAB type only)

■ Inspecting the compressor drive belt

For maintenance work, for details, see "Inspecting and adjusting the compressor drive belt (CAB type)" on page 3-17.

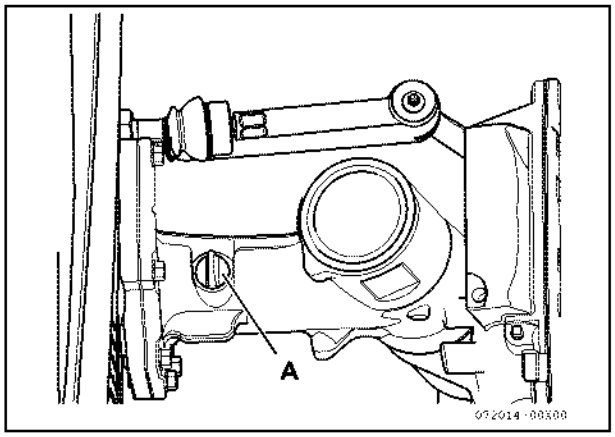
5. Every 50 Hours

■ Check the Front Axle Oil Level

IMPORTANT
- Before checking the front axle gear oil level, allow the front axle gear oil to settle for 1 hour until the current front axle gear oil level can be accurately read on the dipstick.
  Recheck the front axle gear oil level after operating the tractor for several hours.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Make the front axle gear oil settle for at least 1 hour.

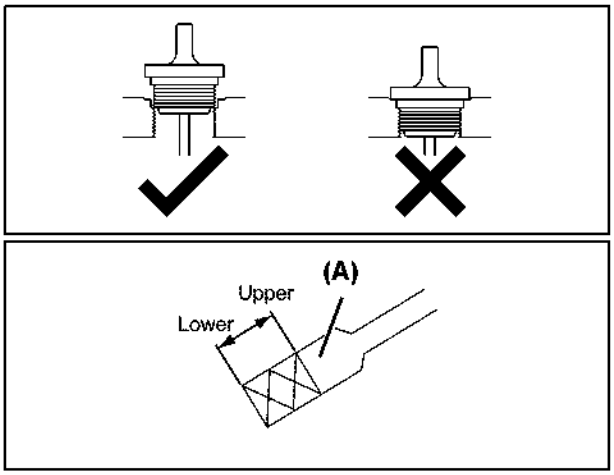
IMPORTANT
- Clean the area around the oil cap/dipstick before removing the oil cap/dipstick.



(A) Oil cap

6. Loosen and remove the dipstick located on the right side of the front axle.
7. Use a clean rag to wipe the front axle gear oil from the dipstick.
8. Insert the dipstick into the hole without tightening.
9. Remove the dipstick again.
10. Check the front axle gear oil level on the dipstick.
11. The front axle gear oil level must be between the upper and lower marks on the dipstick.

IMPORTANT
- When the front axle gear oil level is low:
  - add SAE 80W-90 gear oil through the fill opening until the front axle gear oil level is appropriate



(A) Dipstick

12. Install and tighten the dipstick.
13. Operate the tractor for several hours.
14. Check the front axle gear oil level again.

■ Grease Fittings

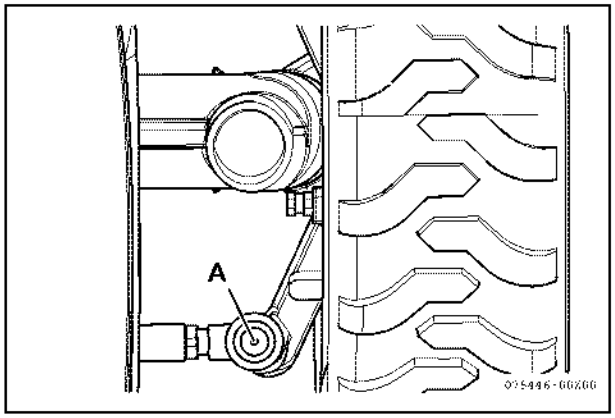
IMPORTANT
- Use the recommended greases by Yanmar.
  - the preceding procedure prevents premature wear or failure of the parts and components
- The recommended greases by Yanmar perform efficiently in an average ambient temperature range from -29 to +135 °C.
- When intending to operate the tractor outside the preceding temperature range:
  - contact YOUR LOCAL YANMAR TRACTOR DEALER for the applicable special purpose greases

(General all purpose grease NLGI grade No. 2)

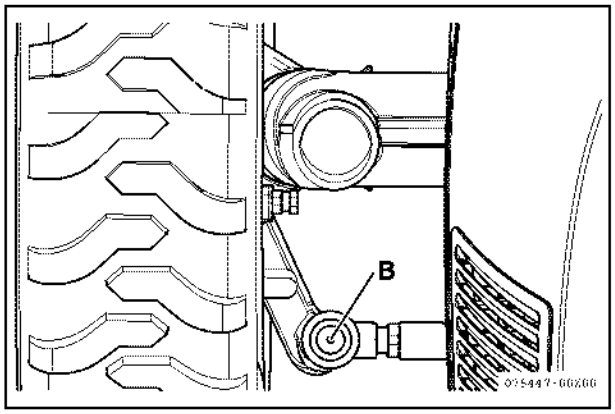
1. Lubricate the Grease Fittings on the Tie Rod

Extremely Wet or Muddy Conditions
Lubricate the grease fittings once every 10 operating hours or once a day.

All Other Conditions
Lubricate the grease fittings once every 50 operating hours.



(A) Right tie rod end (grease fitting)

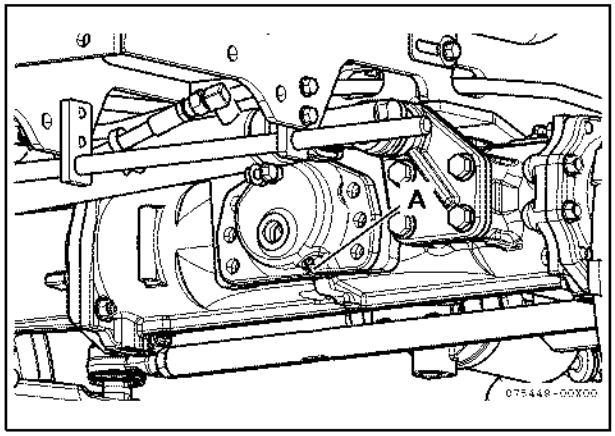


(B) Left tie rod end (grease fitting)

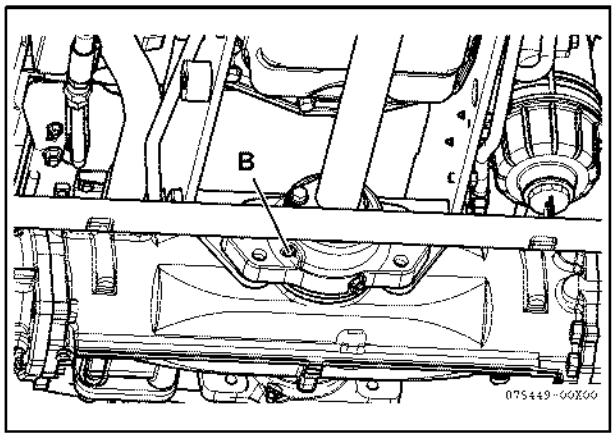
2. Check and Lubricate the Front Axle Pivot

Extremely Wet or Muddy Conditions
Lubricate the grease fittings once every 10 operating hours or once a day.

All Other Conditions
Lubricate the grease fittings once every 50 operating hours.



(A) Front axle pivot pin grease fitting (front)



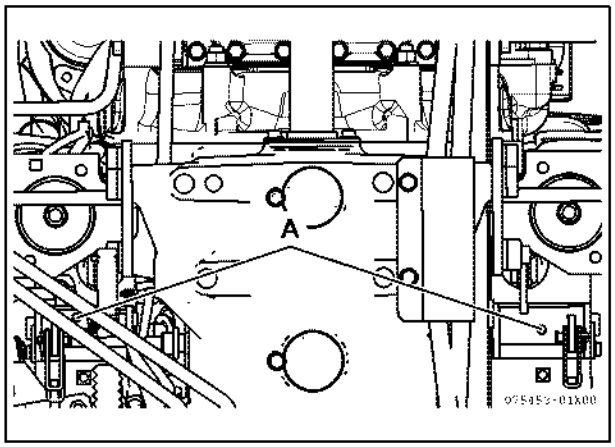
(B) Front axle pivot pin grease fitting (rear)

NOTE
- The grease fitting of the front axle pivot pin is located below the front platform on the tractor.

3. Lubricate the Brake Pedal Shaft

Lubricate the grease fittings once every 50 operating hours.

1. Remove the cover near the foot space of the operator's seat, and work from above.

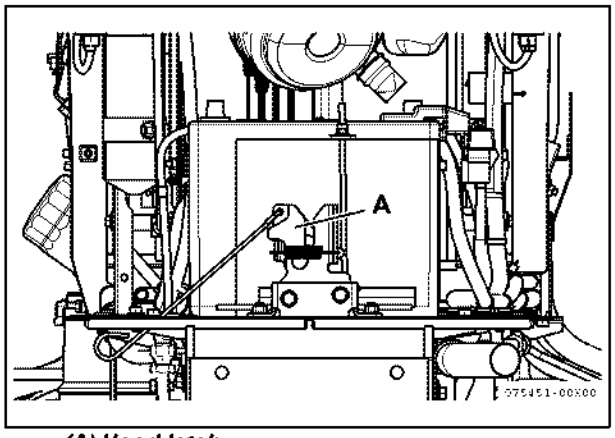


(A) Brake Pedal Shaft pin grease fitting

*Bottom of the tractor.

4. Lubricate the Hood Latch

Lubricate the hood latch with SUPER LUBE ® lubricants once every 50 operating hours. SUPER LUBE ® is a registered trademark of Synco Chemical Corp ®.



(A) Hood latch

■ Service the Alternator/Fan Belt

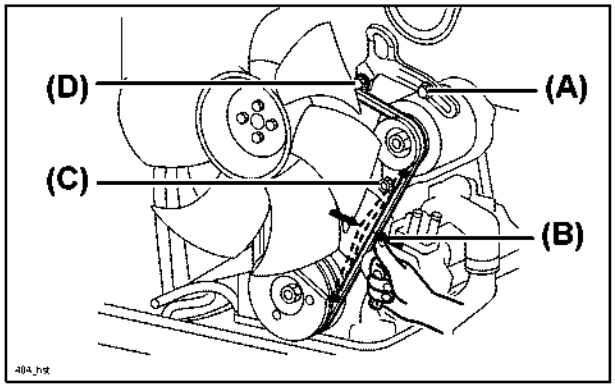
⚠ Warning

Avoid injury!

- **Fingers or loose clothing can get entangled with rotating parts.**
- **Before performing maintenance, shut off the engine.**
- **Allow all the moving parts to completely stop.**

1. Check the Alternator/Fan Belt Tension

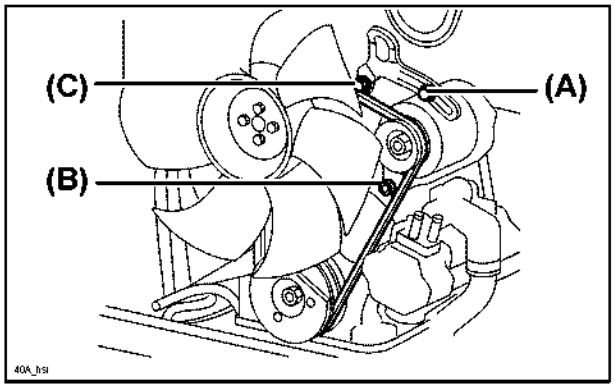
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.
5. Raise the hood.
6. Using the thumb, gently apply pressure to the midpoint of the alternator/fan belt between the pulleys.
7. Check that the alternator/fan belt deflects inward by approximately 10 to 15 mm.
8. If the deflection is not as specified, adjust the tension of the alternator/fan belt.



(A) Adjusting bolt
(B) 10 to 15 mm
(C) Mounting bolt
(D) Fixing bolt

2. Adjust the Alternator/Fan Belt Tension

1. Loosen the adjusting bolt.
2. Loosen the mounting bolt.
3. Loosen the fixing bolt.



(A) Adjusting bolt
(B) Mounting bolt
(C) Fixing bolt

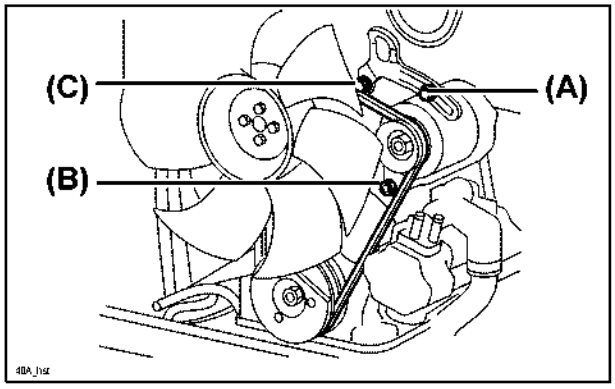
4. Exert an outward pressure on the alternator housing to attain the correct tension.
5. Tighten the adjusting bolt, and the mounting bolt, in that order.
6. Check the alternator belt tension.
7. Tighten the fixing bolt.
8. Lower the hood.
9. Confirm that the hood latch locked securely.

3. Replace the Alternator/Fan Belt

NOTE

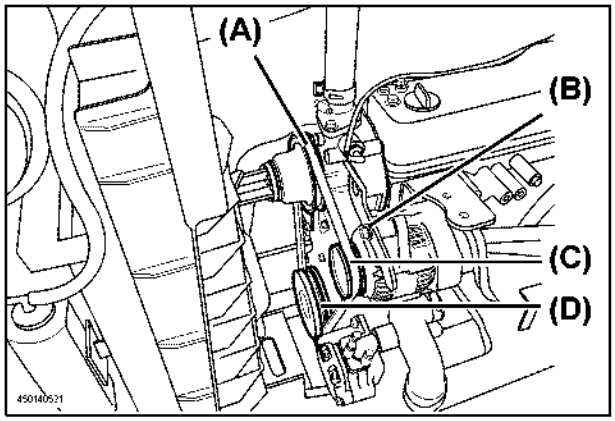
- Replace an excessively worn out, damaged or elongated alternator/fan belt with a new alternator/fan belt.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Chock all the tires safely and securely.
4. Allow the engine to cool down for several minutes.
5. Raise the hood.
6. Loosen the adjusting bolt.
7. Loosen the mounting bolt.
8. Loosen the fixing bolt.



(A) Adjusting bolt
(B) Mounting bolt
(C) Fixing bolt

9. Apply an inward pressure to the alternator housing.
10. Remove the alternator/fan belt from the alternator sheave, fan sheave and crankshaft sheave.
11. Route the defective alternator/fan belt over the fan and remove the alternator/fan belt.
12. Install a new alternator/fan belt over the fan and onto the sheaves.
13. Exert an outward pressure to the alternator housing to attain the correct tension.
14. Tighten the adjusting bolt and the mounting bolt, in that order.
15. Check the alternator belt tension.
16. Tighten fixing bolt.
17. Lower the hood.
18. Confirm that the hood latch locked securely.



(A) Fan sheave
(B) Adjusting bolt
(C) Alternator sheave
(D) Crankshaft sheave

■ Check the Fuel/Water Separator

(Drain the Fuel/Water Separator)

⚠ WARNING

Avoid injury!
Remember that diesel fuel vapor is explosive and flammable:

- **Never smoke while handling diesel fuel.**
- **Keep the diesel fuel away from open flame or sparks.**
- **Before performing maintenance, shut off the engine and allow the engine to cool down.**
- **Work in a well ventilated area.**
- **Immediately wipe away any spilled diesel fuel.**

NOTE

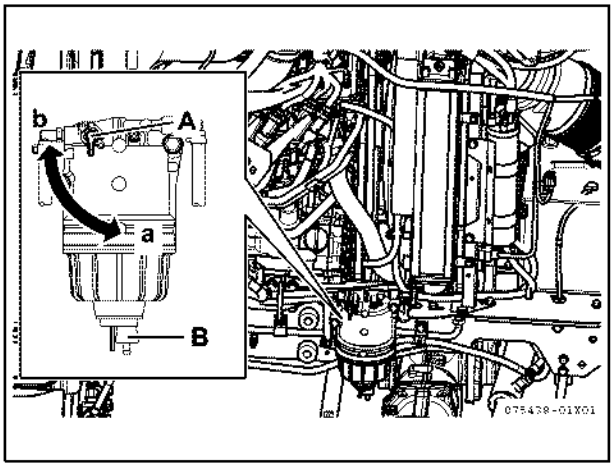
- Change the fuel filter if the fuel in the tank runs out while the engine is running.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Turn the fuel shut-off valve to the OFF (closed) position.
5. Turn the drain cock at the bottom of the fuel/water separator to drain away the water condensation.
6. Close the drain cock.
7. Turn the fuel shut-off valve to the ON (open) position.

NOTE

- The fuel system is self bleeding.

8. Turn the starter key switch to START position. Allow any trapped air to be bled from the fuel system. If necessary, contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.



(A) Fuel shut-off valve
(B) Drain cock
(a) ON (open) position
(b) OFF (closed) position

■ Check the Battery Condition

■ Inspect the Battery

1. Measure the voltage on the battery across the positive (+) and negative (–) posts while the engine is shut off.
2. If the reading is 11 V or lower, replace the battery with a new one.

IMPORTANT

- When replacing the battery, be sure to use the battery of the model specified.

6. Every 100 Hours

■ Service the Air Cleaner Element

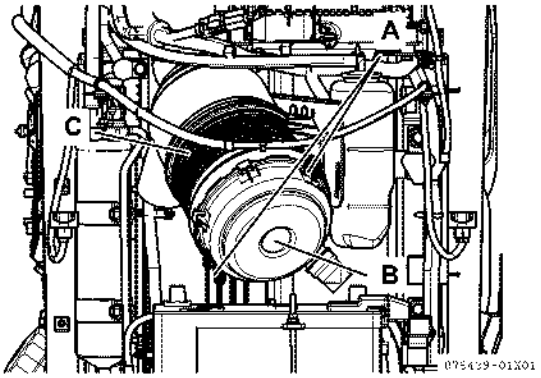
Avoid injury!
- **Touching hot surfaces can burn skin.**
- **If the engine has been running for some time, the engine components are hot including all internal fluids.**
- **Before performing maintenance or working near the engine and engine parts:**
  - **allow the engine to cool down**
  - **always wear protective goggles and protective clothing**

IMPORTANT

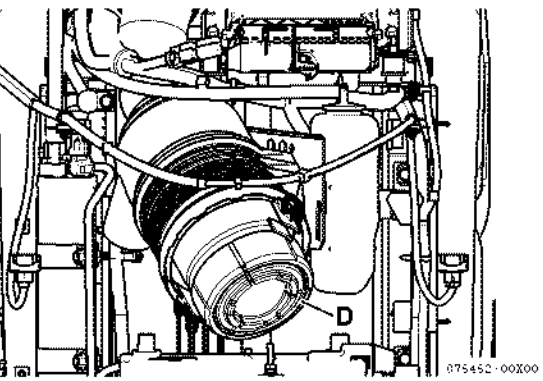
A damaged air cleaner element can fail to prevent dirt, dust and other contaminants from entering the engine.
- Never wash filter.
- Never attempt to clean filter by tapping the filter against another object.
- Never use a compressed air to clean the inner filter.
- Always replace a contaminated, damaged and cracked seal filter.

1. Service the Outer Filter

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Release the three latch hooks.
   - The latch hooks secures the air cleaner canister cover to the air cleaner canister.
6. Unhook the latch hooks from the air cleaner canister.
7. Remove the air cleaner canister cover.



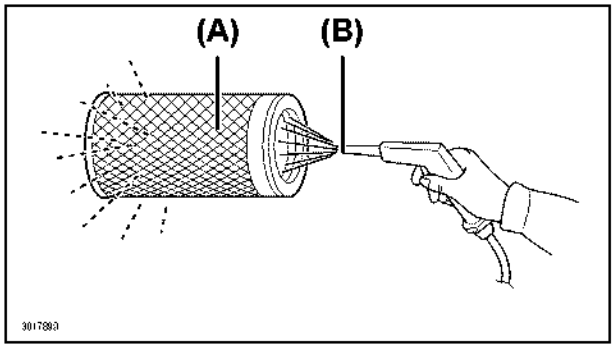
(A) Latch hook
(B) Air cleaner canister cover
(C) Air cleaner canister



(D) Outer filter

8. Remove the outer filter.
9. Clean the outer filter using the procedure below.
   - When dust is found on the element:
     - apply compressed air from inside the element to blow away the dust
     - keep the compressed air pressure below 205 kPa
   - If carbon or oil deposits are found on the outer filter:
     - immerse the outer filter in detergent for 15 minutes
     - wash the outer filter several times in water
     - rinse in clean water and allow to dry
     - once the outer filter is fully dry, inspect the interior using a light to check for any damage

NOTE
- Replace the outer filter at least once a year.



(A) Outer filter
(B) Compressed air

10. Install the outer filter.
11. Replace the old outer filter with a new outer filter, as necessary.
12. Install the air cleaner canister cover.
13. Make sure the rubber dust unloading valve points downward.
14. Align the arrow on the air cleaner canister cover with the arrow shown on the air cleaner canister cover.
15. Hook the three latch hooks onto the air cleaner canister.
16. Push the top of the latch hooks inward toward the air cleaner canister cover:
    - To lock the latch hooks.
    - To secure the air cleaner canister cover.

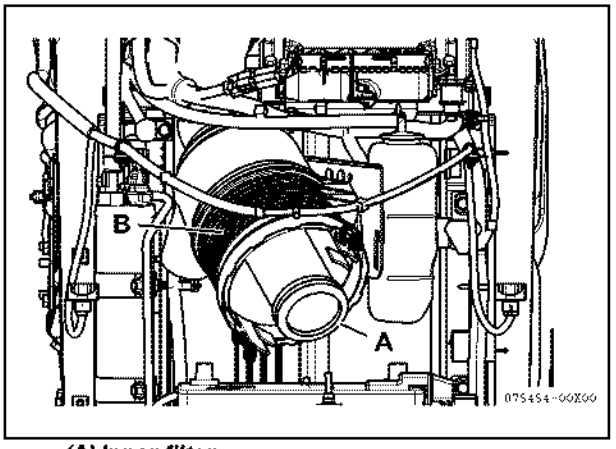
NOTE
- Replace the outer filter at least once a year.
- Do not forget to align the arrow.

2. Service the Inner Filter

1. Remove the air cleaner canister cover.
2. Remove the outer filter.
3. Remove the inner filter.
4. Clean the inside of the air cleaner canister.
5. Install a new inner filter as necessary.

IMPORTANT
- Do not use the old inner filter.

6. Install the outer filter.
7. Install the air cleaner canister cover.
8. Lower the hood.



(A) Inner filter
(B) Air cleaner canister

NOTE
- Replace the inner filter at least once a year.

IMPORTANT
- The main purpose of the inner filter is to:
  - protect the engine against dust when a fouled up outer filter is removed
- Do not remove the inner filter during maintenance work on the outer filter.

■ Clean the Fuel/Water Separator

⚠ WARNING

Avoid injury!
Remember that diesel fuel vapor is explosive and flammable:
- **Never smoke while handling diesel fuel.**
- **Keep the diesel fuel away from open flame or sparks.**
- **Before performing maintenance, shut off the engine and allow the engine to cool down.**
- **Work in a well ventilated area.**
- **Immediately wipe away any spilled diesel fuel.**

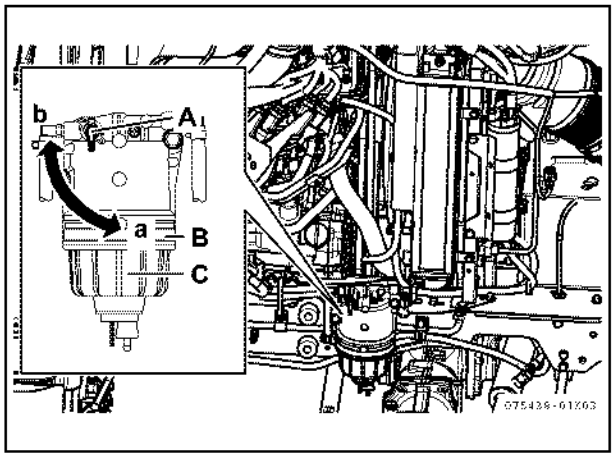
NOTE
- Change the fuel filter if the fuel in the tank runs out while the engine is running.

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.

4. Turn the fuel shut-off valve to the OFF (closed) position.
5. Place a drain pan underneath the fuel/water separator to catch any spilled fuel.
   Dispose of the waste fuel properly following effective local law.
6. Turn the locking collar counterclockwise to unlock the sediment bowl.
7. Pull down the sediment bowl to remove from separator body.
8. Remove the filter from the separator body.
   Dispose of the fuel filter properly following effective local law.
9. Clean the sediment bowl.
10. Install the new fuel filter into the separator body.
11. Install the sediment bowl and turn the locking collar clockwise to secure the bowl.
12. Open the fuel shut-off valve to the ON (open) position.

NOTE
- The fuel system is self bleeding.

13. Turn the starter key switch to START position.
14. Allow any trapped air to bleed from the fuel system.

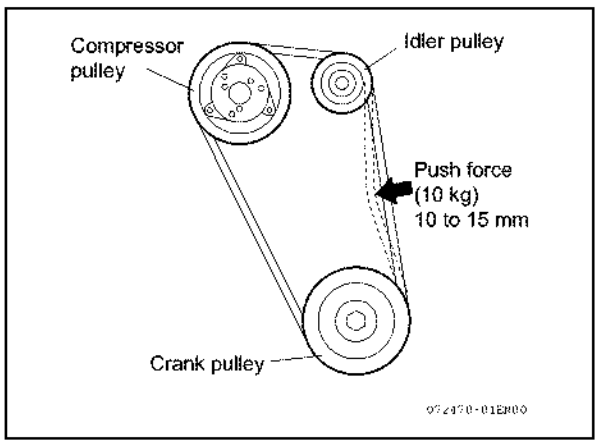


(A) Fuel shut-off valve
(B) Locking collar
(C) Sediment bowl
(a) OFF (closed) position
(b) ON (open) position

■ Inspecting and adjusting the compressor drive belt [CAB type]

<Inspection procedure>

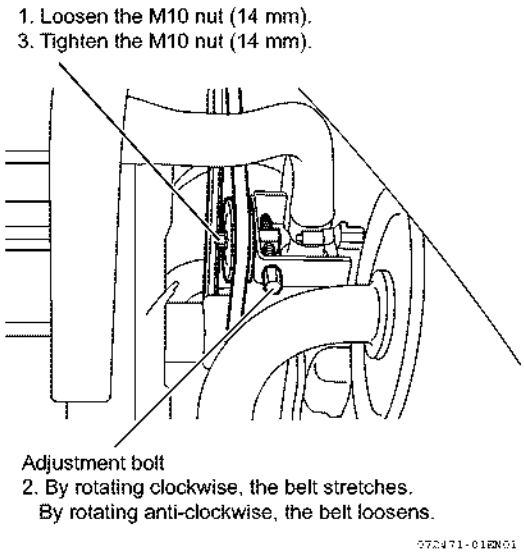
1. Open the hood. (Refer to Page 3-2)



2. Push the middle part between the idler pulley and crank pulley with a finger (10 kg force), and check that the belt deflection is within 10 to 15 mm.
   If the belt deflection amount is not adequate, adjust the belt tension.
3. Check for belt damage.
   If the belt is damaged, contact your dealer to replace it with a new compressor drive belt.
4. Close the hood.

How to adjust the belt

1. Loosen the M10 nut (14 mm) in the middle of the idler pulley.
2. Screw the adjustment M18 bolt (12 mm) to adjust the belt tension. By rotating clockwise, the belt stretches, and by rotating anti-clockwise, the belt loosens.
3. Tighten the M10 nut (14 mm) in the middle of the idler pulley.



Name	Size	Code No.
Compressor drive belt	**A56**	**25132-005600**

7. Every 200 Hours

■ Engine Oil

Use engine oil with a viscosity that is appropriate for use within the air temperature range:

- Wherein the tractor is scheduled to operate until the next engine oil change.

Engine Crankcase

Capacity	Lubricant
Approximately 4.3 L	API Service Classifications CJ-4 or higher SAE 10W-30

■ Change the Engine Oil and Engine Oil Filter

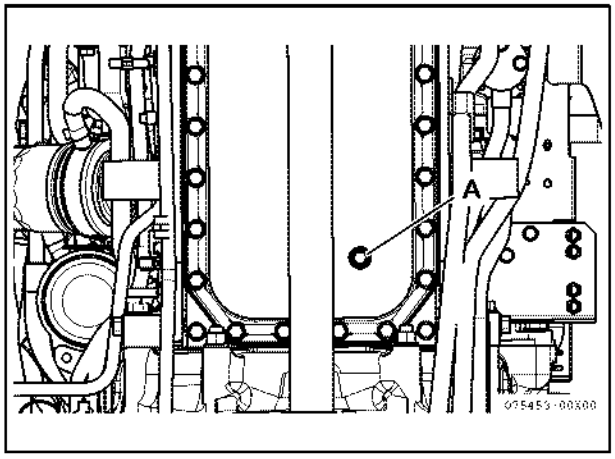
IMPORTANT

Change the engine oil more frequently if the tractor is used in extremely demanding conditions such as the following:

- Extremely dusty conditions.
- Frequent slow speed operation.
- Frequent short trips.

1. Run the engine to warm up the engine oil.
2. Park the tractor safely and securely.
3. Shut off the engine.
4. Allow the engine to cool down for several minutes.
5. Raise the hood.
6. Remove the engine side cover (right).

7. Place an oil pan underneath the engine oil drain plug.



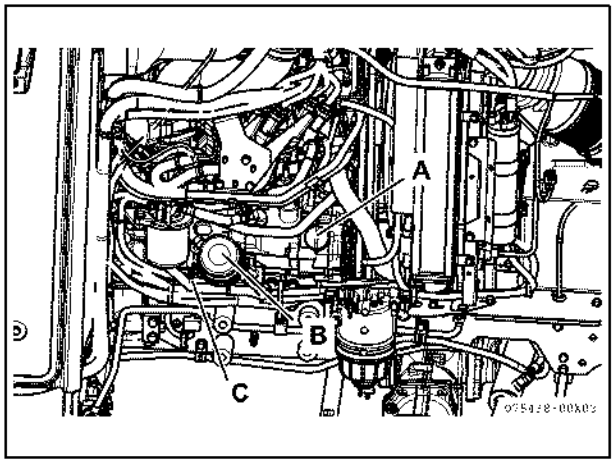
(A) Engine oil drain plug

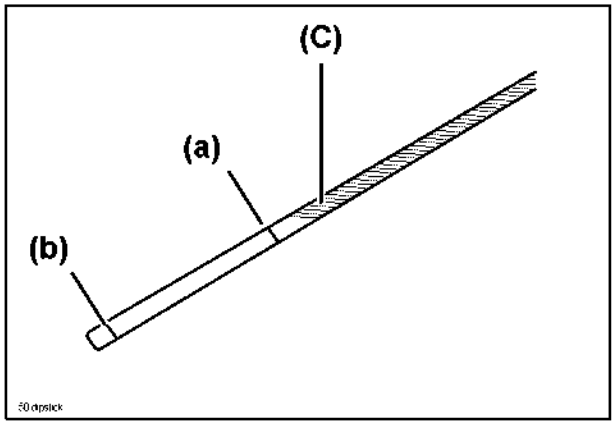
⚠ CAUTION

While draining oil that is still hot:

- **Stay clear of the hot oil and other engine parts in order to avoid getting burned.**

8. Remove the engine oil drain plug by turning counterclockwise.
9. Allow the engine oil to drain completely from the engine.
10. Wipe away the dirt and dust surrounding the engine oil filter.





(A) Engine oil filler cap
(B) Engine oil filter
(C) Dipstick
(a) Upper mark
(b) Lower mark

NOTE

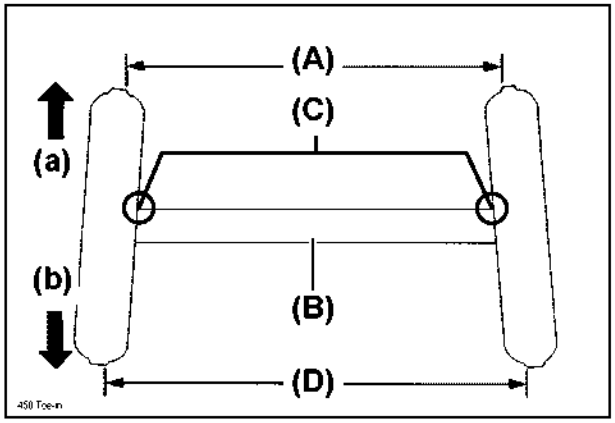
- Carefully clean the area around the dipstick before removing the dipstick.

11. Remove the engine oil filter by turning counterclockwise.
12. Clean the area around engine oil filter mounting base.
13. Apply a small amount of clean engine oil into the gasket of the new engine oil filter.
14. Install the new engine oil filter by turning clockwise:
    - Until the gasket is seated against the engine oil filter base.
    - Turn the engine oil filter an additional half turn.
15. Install the engine oil drain plug.
    Avoid over tightening.
16. Remove the engine oil filler cap.
17. Pour an approximately 4.3 L of engine oil.
18. Install the engine oil filler cap.
19. Start and run the engine at idle to check for any leaks.
20. Shut off the engine.
    Repair any leaks before operating the tractor.
21. The engine oil level must be between the upper and lower marks on the dipstick.
    Add engine oil as necessary.
22. Lower the hood.

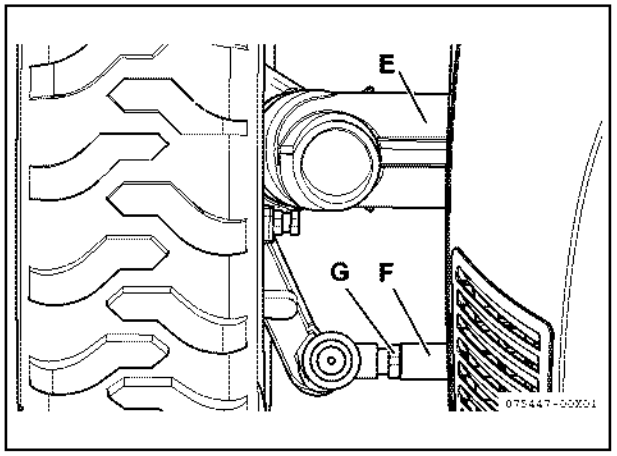
■ Inspect and Adjust the Toe-in

NOTE
- Poorly adjusted toe-in can cause difficulty in steering action or abnormal sway of the steering wheel.

1. Mark the center line of the front end of the two front tires.
2. Mark the center line of the rear end of the two front tires.
3. Measure the distance between the marks at the rear end of the tire as D.
4. Measure the distance between the marks at the front end of the tire as A.
5. Get the difference of the distance measurements: D minus A.
   - The difference of the distance measurements must be limited to 4 to 8 mm.
6. If the difference of the distance measurement is not within the limits.
   - Loosen the lock nut of the left and right tie-rods.
   - Adjust the length of the threaded portion of the left and right tie rods.
   - Do the preceding procedures 3, 4 and 5.
7. If the difference of the distance measurement is within the limits.
   - Hold the tie rod and tighten the lock nut.



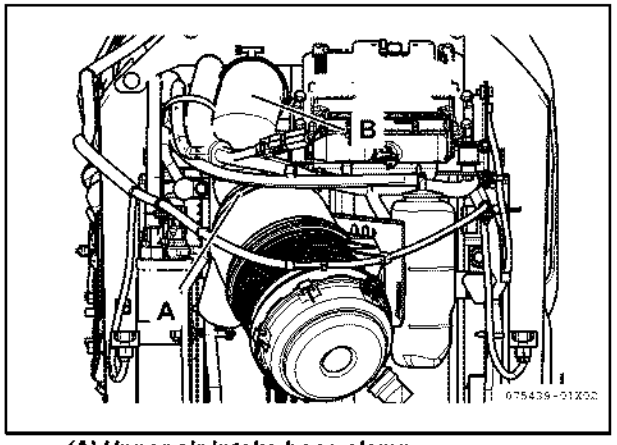
(A) Front tire (front end)
(B) Front axle
(C) Tie rod
(D) Front tire (rear end)
(a) Front
(b) Rear



(E) Front axle
(F) Tie rod
(G) Lock nut

■ Check the Air Intake Hoses and Clamps

1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.
5. Check for loose clamps.
   As necessary, tighten the upper air intake hose clamp and the lower air intake hose clamp.
6. Lower the hood.



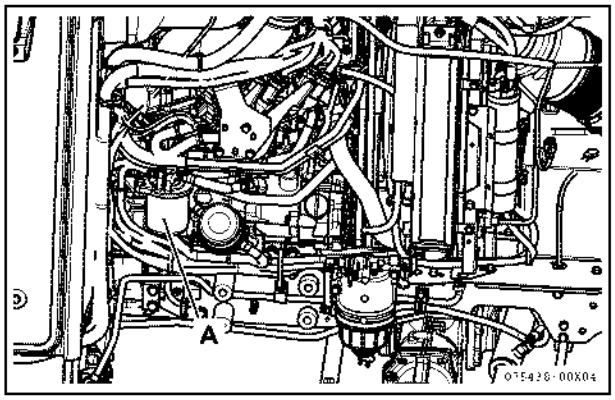
(A) Upper air intake hose clamp
(B) Air intake hose

■ Replace the Fuel Filter

⚠ WARNING

Avoid injury!
Remember that diesel fuel vapor is explosive and flammable:
- **Never smoke while handling diesel fuel.**
- **Keep the diesel fuel away from open flame or sparks.**
- **Before performing maintenance, shut off the engine and allow the engine to cool down.**
- **Work in a well ventilated area.**
  - **immediately wipe away any spilled diesel fuel**

NOTE
When replacing the fuel filter:
- Turn the fuel shut-off valve to OFF (closed) position to prevent the fuel from draining.
- Place an oil pan underneath the fuel filter.
- Clean the area around fuel filter base.
- Remove the fuel filter by turning counterclockwise using filter wrench.
- Apply a small amount of diesel fuel into the gasket of the new fuel filter.
- Install the new fuel filter by turning clockwise and hand tighten until the gasket is seated against the fuel filter base.
- Turn the fuel filter an additional of approximately 1/2 turn.
- Turn the fuel shut-off valve to ON (open) position.
- Turn the starter key switch to ON position.
- Wait at least 5 seconds to fill up the fuel filter.
- Start the engine.



(A) Fuel filter

NOTE
When replacing the fuel filter:
- Turn the fuel shut-off valve to OFF (closed) position.

8. Every 500 Hours

■ Adjust the Brake

Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

9. Every 600 Hours

■ Transmission Hydraulic Oil

IMPORTANT
- Always use a Hydraulic/Transmission Fluid for the transmission hydraulic oil.

Transmission

Capacity	Lubricant
Approximately 31 L	Hydraulic/Transmission Fluid (TF500)

■ Change the Transmission Hydraulic Oil, Transmission Hydraulic Oil Filter and Line Filter

⚠ WARNING

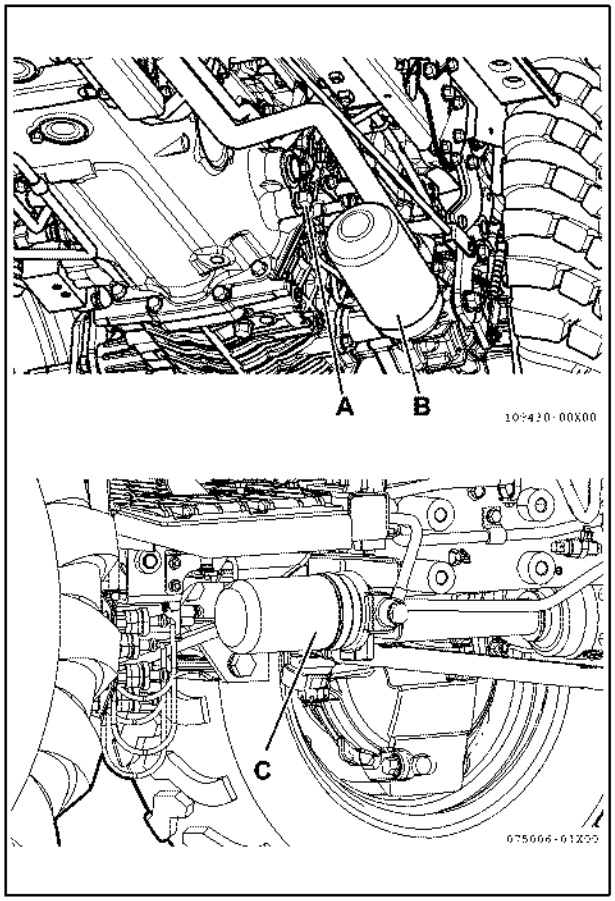
- **Touching any hot surfaces can burn the skin.**
- **If the engine has been running for some time, the engine components, including all internal fluids are hot:**
  - **always allow the engine to cool down before performing maintenance or working near the engine and engine parts**

IMPORTANT
- More frequent maintenance can be required under severe or abnormal conditions.
- Always keep the transmission hydraulic oil filler cap in place.
- Remove the transmission hydraulic oil filler cap only as necessary:
  - the preceding practice prevents the transmission hydraulic oil from becoming contaminated
  - a contaminated transmission hydraulic oil can cause damage to or failure of the transmission
- Avoid operating the tractor immediately after the transmission hydraulic oil is changed.
- After the transmission hydraulic oil is changed, run the engine at medium speed for a few minutes, to prevent damage to the transmission.

1. Park the tractor safely and securely.
2. Run the engine to warm up the transmission hydraulic oil.
3. Shut off the engine.
4. Allow the engine to cool down for several minutes.

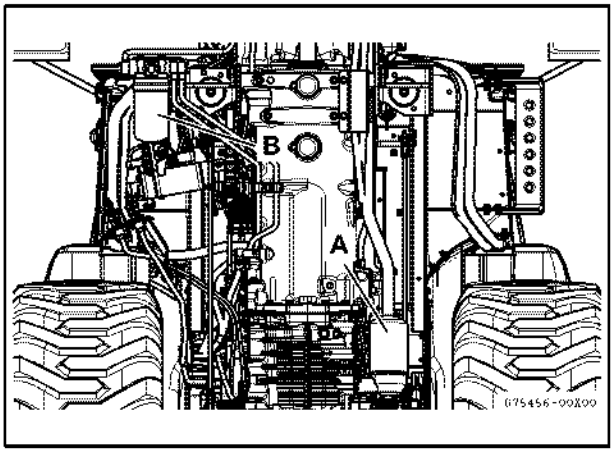
IMPORTANT
- Take the preceding information into consideration while draining the transmission hydraulic oil.

5. Place an oil pan underneath the transmission drain plug and rear axle drain plugs. Remove the drain plugs and allow the transmission hydraulic oil to drain completely.
6. Install all the drain plugs.
   Tighten accordingly.



(A) Drain plug (transmission)
(B) Transmission hydraulic oil filter
(C) Line filter

7. Place an oil pan underneath the transmission hydraulic oil filter on the left side of the transmission and line filter.
8. Remove the transmission hydraulic oil filter and line filter by turning counterclockwise using a filter wrench.
9. Apply a small amount of clean transmission hydraulic oil into the gasket of the new transmission hydraulic oil filter and line filter.
10. Fill the transmission hydraulic oil filter and line filter with the designated type of transmission hydraulic oil to about 1/3 to 1/2 full.
11. Install the new transmission hydraulic oil filter and line filter by turning clockwise.
    - Continue turning until the gasket is seated against the transmission hydraulic oil filter and line filter base.
    - Turn the transmission hydraulic oil filter and line filter an additional of approximately 1/2 turn.

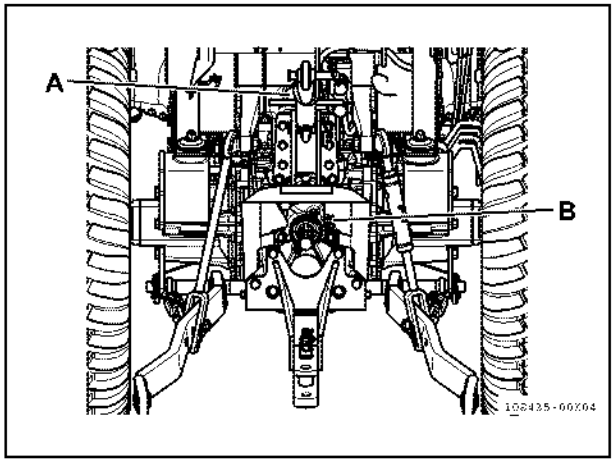


(A) Transmission hydraulic oil filter
(B) Line filter

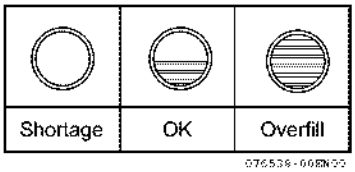
IMPORTANT
To prevent dirt and other contaminants from entering the transmission:
- Carefully clean the area around the transmission hydraulic oil filler cap prior to removal.
- Avoid overfilling the transmission.
- Oil expands during operation and can overflow.

12. Remove the transmission hydraulic oil filler cap.
13. Add approximately 31 L of transmission hydraulic oil through the transmission hydraulic oil filler opening.

14.Install the transmission hydraulic oil filler cap.
- Start the engine.
- Check for leaks around the transmission hydraulic oil filter base and the drain plugs.
- Using the dipstick, check the transmission hydraulic oil level is in the correct operating range. Add transmission hydraulic oil as necessary.



(A) Transmission hydraulic oil filler cap
(B) Oil observing window



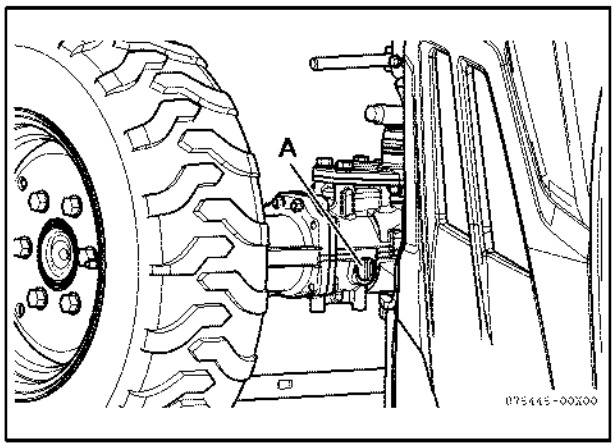
■ Change the Front Axle Gear Oil

IMPORTANT
- Always use SAE 80W-90 gear oil for the front axle.

Front Axle Gear Oil

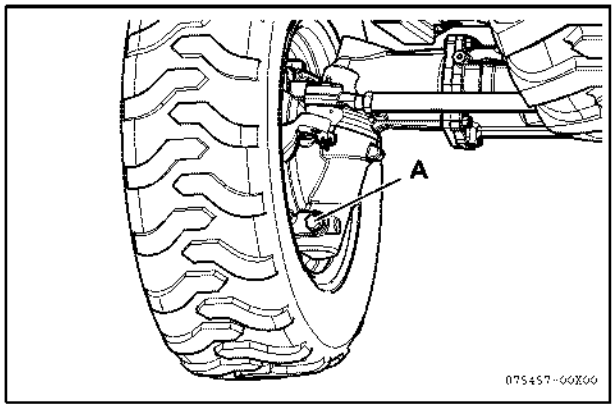
Capacity	Lubricant
Approximately 5.5 L	SAE 80W-90 gear oil

1. Drive the tractor to warm up the front axle gear oil.
2. Park the tractor safely and securely.
3. Shut off the engine.
4. Allow the engine to cool down for several minutes.
5. Remove the dipstick located on the right side of the front axle.



(A) Dipstick

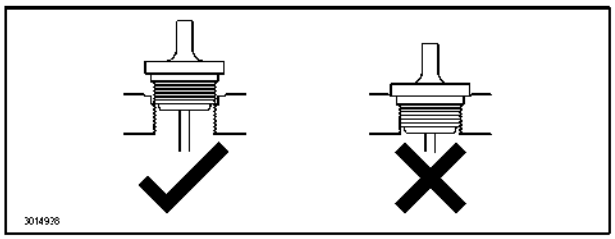
6. Place an oil pan underneath the drain plugs on both sides of front axle.
   - Remove the drain plugs.
   - Allow the front axle gear oil to drain completely.



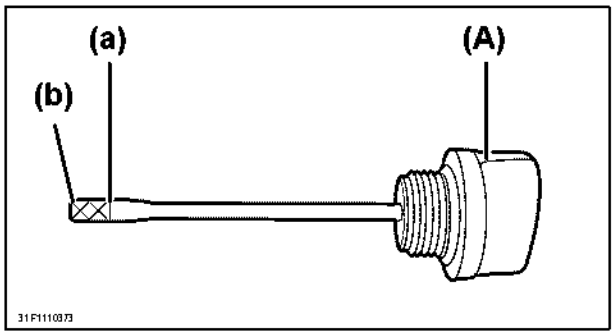
(A) Front axle oil drain plug
(Also on the right side)

7. Once the front axle gear oil is completely drained:
   - Install and tighten all the drain plugs.
8. Pour approximately 5.5 L of Gear Lubricate through the fill hole.
9. Insert the dipstick to the fill hole.
10. Make the front axle gear oil settle for at least 1 hour.
11. Remove the dipstick from the fill hole.
12. Use a clean rag to wipe the front axle gear oil from the dipstick.

13.Insert the dipstick into the fill hole without tightening.



14.Remove the dipstick again.
15.Check the front axle gear oil level on the dipstick.
16.The front axle gear oil level must be between the upper and lower marks on the dipstick.
Add front axle gear oil as necessary.



(A) Dipstick
(a) Upper mark
(b) Lower mark

17.Install and tighten the dipstick.
18.Operate the tractor for several hours.
19.Check the front axle gear oil level again.

IMPORTANT

Before checking the front axle gear oil level:

- Allow the front axle gear oil to settle for 1 hour.
- The preceding action allows accurate reading of the current front axle gear oil level on the dipstick.
- Recheck the front axle gear oil level after operating the tractor for several hours.

10. Every 1000 Hours

■ Service the Cooling System

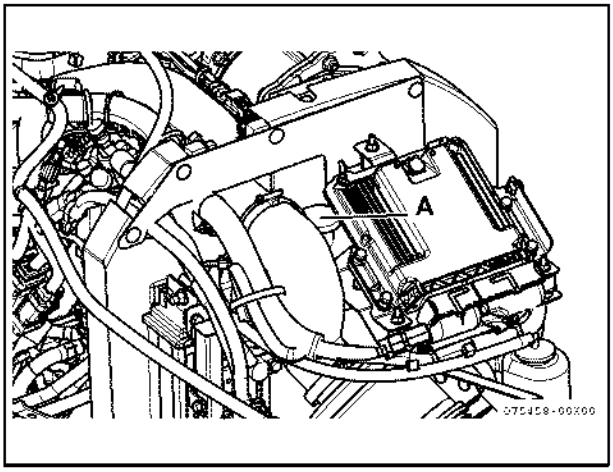
Avoid injury!

- **Always allow the radiator to cool down:**
  - **the radiator is hot and can cause burns**
  - **the build up pressure in the cooling system can cause the coolant to spray out explosively during removal of the radiator cap**
- **Always shut off the engine.**
- **Allow the engine to cool down.**
- **Remove the radiator cap only when:**
  - **the radiator and the engine are sufficiently cooled down that can be touched with bare hands**
- **When removing the radiator cap, always:**
  - **loosen the radiator cap to the first stop**
    - **the preceding action releases excessive pressure on the radiator**
  - **fully remove the radiator cap once the pressure has been released completely**
- **Add coolant or water to reserve tank, not to the radiator.**

1. Drain the Cooling System

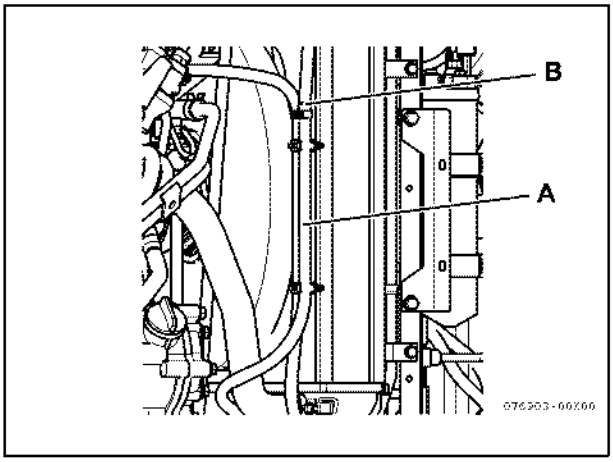
1. Park the tractor safely and securely.
2. Shut off the engine.
3. Allow the engine to cool down for several minutes.
4. Raise the hood.

5. Remove the radiator cap to speed up the draining of the coolant.
   - Loosen the radiator cap to the first stop.
     - the preceding action releases excessive pressure on the radiator
   - Fully remove the radiator cap once the pressure has been released completely.



(A) Radiator cap

6. Place a drain pan underneath the radiator rubber cap.
7. Take out the drain hose, and remove the clevis pin to drain water.
8. After draining the water, set the clevis pin and the drain hose to the original positions.



(A) Drain hose
(B) Clevis pin

2. Flush the Cooling System

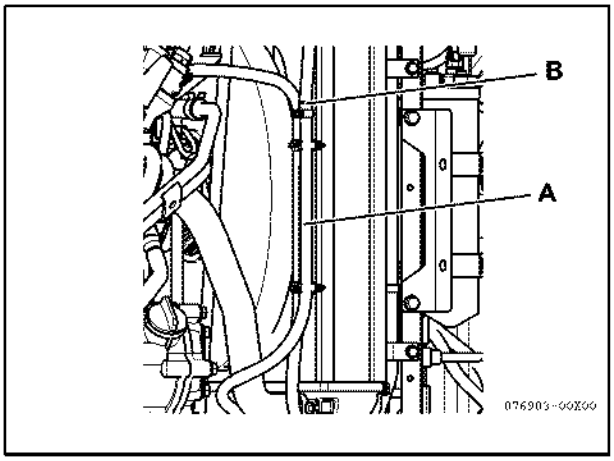
1. Fill the cooling system with water and common flushing/cooling liquid.
   - Follow the manufacturer's instructions.
2. Install and tighten the radiator cap.
3. Start and run the engine until the operating temperature is reached.

⚠ WARNING

Avoid injury!

- **Touching hot surfaces can burn skin.**
- **If the engine has been running for some time, the engine components are hot including all internal fluids.**
- **Before performing maintenance or working near the engine and engine parts:**
  - **allow the engine to cool down**
  - **always wear protective goggles and protective clothing**

4. Shut off the engine.
5. Take out the drain hose, and remove the clevis pin to drain water.
6. After draining the water, set the clevis pin and the drain hose to the original positions.



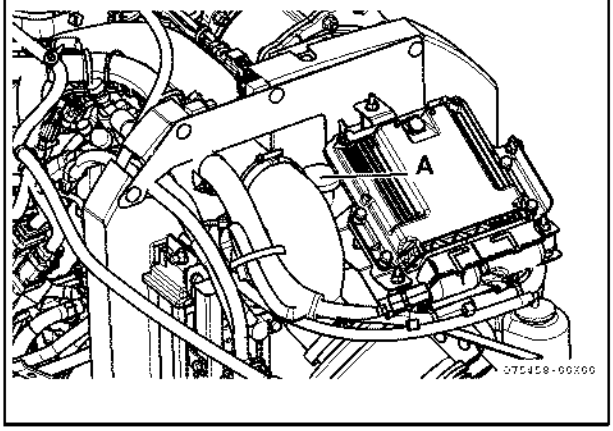
(A) Drain hose
(B) Clevis pin

3. Fill the Cooling System

IMPORTANT
- Use correct coolant mixture to prevent damage to the cooling system.
- Avoid operating the engine with plain water in the cooling system.
- Always use a pre-diluted coolant, with an antifreeze water mixture ratio that suits the local climate.
- Allow the engine to cool down first before pouring the coolant.

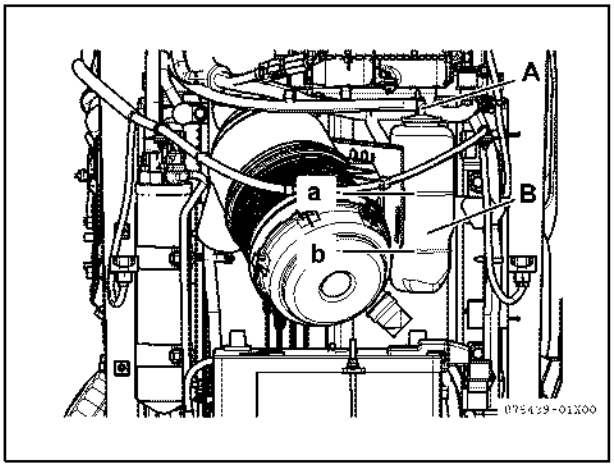
NOTE
When adding coolant to the cooling system:
- Use of High Quality Permanent Type Antifreeze (Ethylene Glycol with corrosion and rust inhibitor chemicals) is recommended.
- For the correct mixture ratio, read the manufacturer's direction on the coolant container.

1. Allow the radiator to cool down.
2. Fill the cooling system with approximately 5.0 L of coolant.
3. Install and tighten the radiator cap.



(A) Radiator cap

4. Start and run the engine until the operating temperature is reached.
5. Shut off the engine.
6. Check the reserve tank coolant level.
7. Add coolant as necessary.
8. Lower the hood.



(A) Reserve tank cap
(B) Reserve tank
(a) FULL line
(b) LOW line

■ Recommended Engine Coolant

The Following Coolant is Recommended
- High Quality Permanent Type Antifreeze (Ethylene Glycol with corrosion and rust inhibitor chemicals).
- Before using the coolant:
  - read and understand the instructions and data on the coolant's container
  - make sure that the coolant is suitable for the engine
- Immediately after purchasing the tractor:
  - make sure that the blend ratio of the coolant is in accordance with the climate of the work area
  - the preceding practice contributes to make the entire tractor system function normally
- Replace the coolant in the following cases:
  - after 1000 hours of operation or 2 years whichever comes first
  - the cooling system is flushed

Follow the instructions on the antifreeze container or contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.
- Avoid exceeding the maximum dilution ratio for the coolant.
- Exceeding the preceding ratio can jeopardize the effectiveness of the coolant.

■ Adjust the Tension of the Throttle Control Lever

Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

■ Adjust the Engine Valve Clearance

Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

■ Check the Fuel Injection Nozzle

Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

■ Check the Fuel Injection Pump

Contact YOUR LOCAL YANMAR TRACTOR DEALER for technical assistance.

11. Every 2 Years or 2000 Hours

■ Replace the Thermostat

Contact YOUR LOCAL YANMAR TRACTOR DEALER.

12. General Maintenance

⚠ Warning

Avoid injury!

- **The rubber product/s has/have a deteriorative character. The deteriorated rubber product/s may cause defects and damages such as fluid leakage, loss control of the tractor during operation, fire, burn injury.**

NOTE

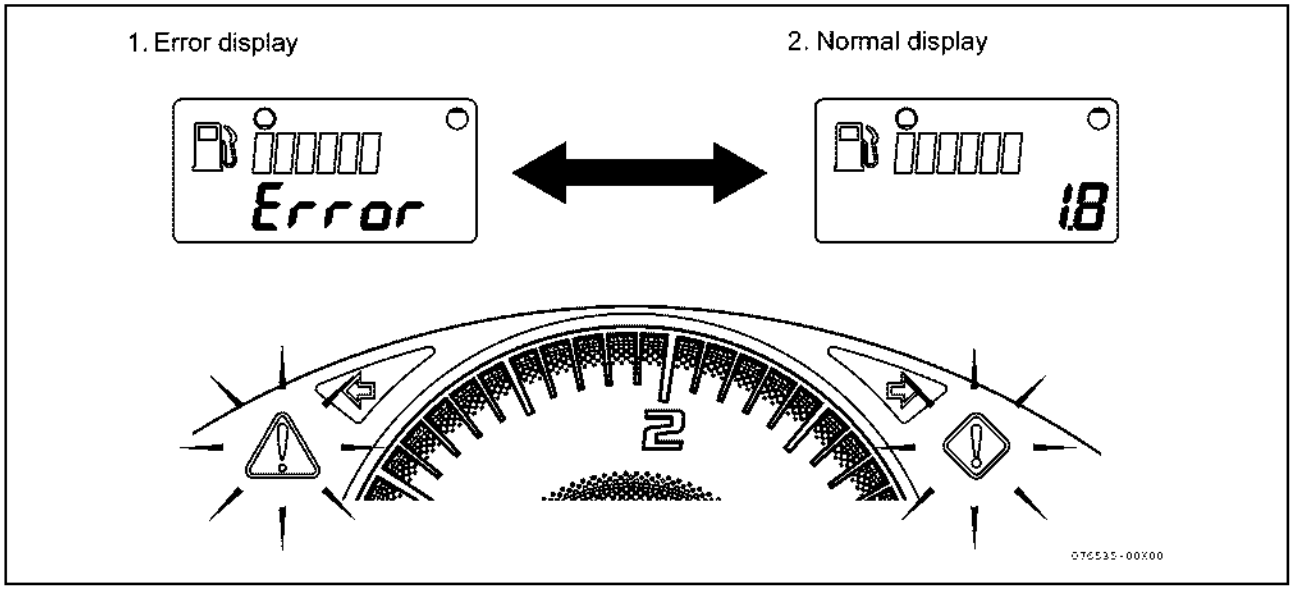
- Replace the air cleaner element at least once a year.
- Replace the coolant once every 2 years or 1000 hours.
- Replace the radiator hoses at least once every 2 years.
- Replace the fuel hoses at least once every 2 years.
- Replace the air intake hose at least once every 2 years.
- Replace the power steering hoses at least once every 2 years.

13. Error Code

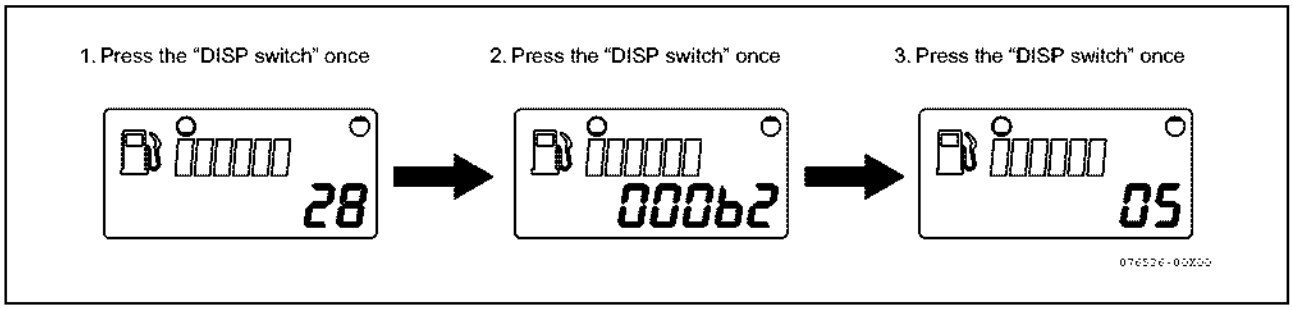
⚠ Warning

If the tractor is running poorly, stop the engine, set the parking brake, and then examine it for any problems.
Failure to do so may result in: entanglement in moving parts and related injuries. If it does not get better after the treatment, contact your purchased dealer.

1. When an error occurs, the LCD indicates "Error" (Alternately switches with the normal display). Either of the panel icons will also blink.



2. Press the "DISP switch" three times. The error code will be displayed by being divided into three parts. For example: 28 00062.05



■ Error Code (Engine)

Error Code	Detail	Treatment
00 7F8A0.02	Crank Signal Error	Can still operate, But engine output will be restricted.
00 7F8A0.05	No Crank Signal	Can still operate, But engine output will be restricted.
00 7F8A1.02	Cam Signal Error	Can still operate, But engine performance may degrade.
00 7F8A1.05	No Cam Signal	Can still operate, But engine performance may degrade.
00 7F8A1.07	Angle Offset Error	Can still operate, But engine performance may degrade.
00 7FBF1.05	No Crank/Cam Speed Sensor Signal	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 0005B.03	Accelerator Sensor1 (High Voltage)	Engine will operate in the same speed.
00 0005B.04	Accelerator Sensor1 (Low Voltage)	Engine will operate in the same speed.
00 00033.03	Intake Throttle Opening Sensor (High Voltage)	Can still operate, But engine output will be restricted. Exhaust filter regeneration stops.
00 00033.04	Intake Throttle Opening Sensor (Low Voltage)	Can still operate, But engine output will be restricted. Exhaust filter regeneration stops.
00 00066.03	EGR Low Pressure Side Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00066.04	EGR Low Pressure Side Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00066.13	EGR Low Pressure Side Sensor (Memory Error)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 004B9.03	EGR High Pressure Side Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted.

00 004B9.04	EGR High Pressure Side Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted.
00 004B9.13	EGR High Pressure Side Sensor (Memory Error)	Can still operate, But high idle speed will be restricted. Engine output will be restricted.
00 0006E.03	Cooling Water Temperature Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted.
00 0006E.04	Cooling Water Temperature Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted.
00 000AC.03	Fresh Air Temperature Sensor (High Voltage)	Can still operate, But engine performance may degrade.
00 000AC.04	Fresh Air Temperature Sensor (Low Voltage)	Can still operate, But engine performance may degrade.
00 0009D.03	Rail Pressure Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 0009D.04	Rail Pressure Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CB3.03	Exhaust Filter Differential Pressure Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CB3.04	Exhaust Filter Differential Pressure Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CB3.13	Exhaust Filter Differential Pressure Sensor (Memory Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00E19.03	Exhaust Filter High Pressure Side Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00E19.04	Exhaust Filter High Pressure Side Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CAA.03	Exhaust Filter Intake Port Temperature Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CAA.04	Exhaust Filter Intake Port Temperature Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.

00 00CB2.03	Exhaust Filter Midway Temperature Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00CB2.04	Exhaust Filter Midway Temperature Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 0006C.03	Atmospheric Pressure Sensor (High Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 0006C.04	Atmospheric Pressure Sensor (Low Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 0006C.10	Atmospheric Pressure Sensor Property Error	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 0019C.03	EGR Gas Temperature Sensor (High Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 0019C.04	EGR Gas Temperature Sensor (Low Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 00069.03	Intake Manifold Temperature Sensor (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00069.04	Intake Manifold Temperature Sensor (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 000AD.03	Exhaust Manifold Temperature Sensor (High Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 000AD.04	Exhaust Manifold Temperature Sensor (Low Voltage)	Can still operate, But engine output will be restricted, And engine performance may degrade.
00 005CD.07	Main Relay Contact Point Adherence	Can still operate, But engine performance may degrade.
00 005CD.02	Main Relay Early Stage Opening	Can still operate, But engine performance may degrade.
00 7F803.05	Start Supporting Relay Disconnection	Can still operate, But engine performance may degrade.
00 7F803.05	Start Supporting Relay Disconnection/VB Short	Can still operate, But engine performance may degrade.
00 7F803.06	Start Supporting Relay GND Short	Can still operate, But engine performance may degrade.

00 0028B.05	Injector Disconnection (Injector Peculiar Part)	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028B.06	Injector Coil Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028B.03	Injector Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028D.05	Injector Disconnection (Injector Peculiar Part)	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028D.06	Injector Coil Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028D.03	Injector Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028E.05	Injector Disconnection (Injector Peculiar Part)	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028E.06	Injector Coil Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028E.03	Injector Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028C.05	Injector Disconnection (Injector Peculiar Part)	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028C.06	Injector Coil Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 0028C.03	Injector Short	Can still operate, But engine output will be restricted. * Part of failure may differ according to engine model.
00 010A1.12	Injector Driving IC Error	Can still operate, But engine output will be restricted.
00 00AED.06	Injector Driving Circuit (Bank1) Short	Can still operate, But engine output will be restricted.

00 00AED.05	Injector Driving Circuit (Bank1) Disconnection	Can still operate, But engine output will be restricted.
00 00AED.03	Injector Driving Circuit (Bank1) +B Short	Can still operate, But engine output will be restricted.
00 00AEE.06	Injector Driving Circuit (Bank2) Short	Can still operate, But engine output will be restricted.
00 00AEE.05	Injector Driving Circuit (Bank3) Disconnection	Can still operate, But engine output will be restricted.
00 00AEE.03	Injector Driving Circuit (Bank3) +B Short	Can still operate, But engine output will be restricted.
00 7FAF4.04	Injector Driving Circuit Low Charge Error	Can still operate, But engine output will be restricted.
00 7FAF5.03	Injector Driving Circuit Over Charge Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7F94B.03	SCV (MPROP) L Side VB Short	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7F94B.06	SCV (MPROP) L Side GND Short	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00279.03	SCV (MPROP) VB Short	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops. * Part of failure may differ according to engine model.
00 00279.06	SCV (MPROP) GND Short	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops. * Part of failure may differ according to engine model.
00 00279.05	SCV (MPROP) Disconnection	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7F94C.11	SCV (MPROP) Pump Overload Error	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7F94C.06	SCV (MPROP) Over Current Error	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.

00 00279.07	SCV (MPROP) Driving Circuit Error (SCV Adherence)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00543.00	High Pressure Pump Protection Fail	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 00543.15	High Pressure Pump Replacement Fail	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FA33.13	High Pressure Pump Memory Uncompleted Alert	Can still operate, But engine performance may degrade.
00 0009D.00	Actual Rail Over Pressure Error	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 0009D.18	Rail Pressure Deflection Error of When Actual Rail Pressure is Excessively Small	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 0009D.15	Rail Pressure Deflection Error of When Actual Rail Pressure is Excessively Large	Can still operate, But engine performance may degrade.
00 0009D.16	PLV Open	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FCE1.00	PLV (Not Activating)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCCD.00	PLV (Valve Opening Number Exceeded)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FCCE.00	PLV (Valve Opening Time Exceeded)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FCE3.00	Rail Pressure Control (Fuel Temperature is High When PLV is Open)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FCCC.09	PLV (Malfunction)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCC4.07	Rail Pressure Control (Pump and Fuel Temperature Sensor Error at Rail Pressure Sensor Error)	Engine stops. Notify the dealer, And go through checkup & maintenance.

00 000BE.00	Over speed	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCC6.13	First Cylinder Injector (Correction value Error)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCC7.13	Second Cylinder Injector (Correction value Error)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCC8.13	Third Cylinder Injector (Correction value Error)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCC9.13	Fourth Cylinder Injector (Correction value Error)	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FBD5.12	QR Data Not Written	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FBD5.13	QA Data Error	Can still operate, But engine output will be restricted.
00 7FAF3.12	QA Data Correction Input Error	Can still operate, But engine output will be restricted.
00 00B86.05	Intake Throttle Driving Circuit Disconnection	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 00B86.06	Intake Throttle Driving Circuit Overload	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 00B86.03	Intake Throttle Driving Circuit Short	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops. * Part of failure may differ according to engine model.
00 00B87.03	VB Power Short of Intake Throttle Driving Circuit Output2	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 00B86.04	GND Short of Intake Throttle Driving Circuit Output1	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 00B87.04	GND Short of Intake Throttle Driving Circuit Output2	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 7F964.09	Receiving Timeout of TSC1 (SA1)	Can still operate, But engine performance may degrade.
00 7F965.09	Receiving Timeout of TSC1 (SA2)	Can still operate, But engine performance may degrade.

00 7F967.09	Receiving Timeout of Y_ECR1	Can still operate, But engine performance may degrade.
00 7F968.09	Receiving Timeout of Y_EC	Can still operate, But engine performance may degrade.
00 7F969.09	Receiving Timeout of Y_RSS	Can still operate, But engine performance may degrade.
00 7F97B.09	Receiving Timeout of Y_Exhaust Filter IF	Can still operate, But engine performance may degrade.
00 7F971.09	Receiving Timeout of Y_ETCP1	Can still operate, But engine performance may degrade.
00 7F97A.09	Receiving Timeout of EBC1	Can still operate, But engine performance may degrade.
00 7F972.09	Receiving Timeout of CAN1 (For EGR)	Can still operate, But engine output will be restricted.
00 7F9EA.12	Immobilizer Error (CAN Error)	Engine will not start. Notify the dealer, And go through checkup & maintenance.
00 004B2.02	Immobilizer Error (System)	Engine will not start. Notify the dealer, And go through checkup & maintenance.
00 00AE7.12	EGR Disconnection Between Motor Coils	Can still operate, But engine output will be restricted.
00 7F953.12	EGR Short Between Motor Coils	Can still operate, But engine output will be restricted.
00 7F954.12	EGR Position Sensor Error	Can still operate, But engine output will be restricted.
00 00AE7.07	EGR Feedback Error	Can still operate, But engine output will be restricted.
00 7F955.07	EGR Valve Opening Adhering Error	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 7F956.07	EGR Initializing Error	Can still operate, But high idle speed will be restricted. Exhaust filter regeneration stops.
00 00AE7.09	EGR ECM Data Error	Can still operate, But engine output will be restricted.

00 7F979.12	EGR Target Value Out of Range	Can still operate, But engine output will be restricted.
00 00AE7.00	EGR Over Voltage Error	Can still operate, But engine output will be restricted.
00 00AE7.01	EGR Low Voltage Error	Can still operate, But engine output will be restricted.
00 7F957.01	EGR High Temperature Thermistor Error	Can still operate, But engine output will be restricted.
00 7F958.01	EGR Low Temperature Thermistor Error	Can still operate, But engine output will be restricted.
00 7F9FA.12	Exhaust Throttle Voltage Error	Can still operate, But engine performance may degrade.
00 7F9FB.12	Exhaust Throttle Motor Error	Can still operate, But engine performance may degrade.
00 7F9FC.12	Exhaust Throttle Sensor Error	Can still operate, But engine performance may degrade.
00 7F9FD.12	Exhaust Throttle MPU Error	Can still operate, But engine performance may degrade.
00 7F9FE.12	Exhaust Throttle PCB Error	Can still operate, But engine performance may degrade.
00 7F9FF.19	Exhaust Throttle CAN Error	Can still operate, But engine performance may degrade.
00 7F973.09	CAN1 (For Exhaust Throttle) : Receiving Timeout	Can still operate, But engine performance may degrade.
00 00276.12	EEPROM Memory Delete Error	Can still operate, But engine output will be restricted.
00 7F950.12	EEPROM Memory Read Out Error	Can still operate, But engine output will be restricted.
00 7F952.12	EEPROM Memory Writing Error	Can still operate, But engine output will be restricted.
00 00276.02	EEPROM Error	Can still operate, But engine output will be restricted.

00 7F959.12	CY146 SPI Communication Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7F95C.12	Supply1 Over Voltage Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7F95D.12	Supply1 Excessively Small Voltage Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7F95E.12	Sensor Supply Voltage Error1	Can still operate, But engine performance may degrade.
00 7F95F.12	Sensor Supply Voltage Error2	Can still operate, But engine performance may degrade.
00 7F960.12	Sensor Supply Voltage Error3	Can still operate, But engine performance may degrade.
00 7F9F8.04	Actuator Driving Circuit1 GND Short	Can still operate, But engine performance may degrade.
00 7FAF2.04	Actuator Driving Circuit2 GND Short	Can still operate, But engine performance may degrade.
00 7FCCF.06	Actuator Driving Circuit3 GND Short	Can still operate, But engine performance may degrade.
00 7FCD1.12	AD Converter Error1	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD2.12	AD Converter Error2	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD3.12	External Monitoring ECU and CPU Error1	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD4.12	External Monitoring ECU and CPU Error2	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD5.12	ROM Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD6.12	Shutoff Bus Error1	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD7.12	Shutoff Bus Error2	Engine stops. Notify the dealer, And go through checkup & maintenance.

00 7FCD8.12	Shutoff Bus Error3	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCD9.12	Shutoff Bus Error4	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDA.12	Shutoff Bus Error5	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDB.12	Shutoff Bus Error6	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDC.12	Shutoff Bus Error7	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDD.12	Shutoff Bus Error8	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDE.12	Shutoff Bus Error9	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCDF.12	Shutoff Bus Error10	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FCE0.00	Engine Speed Check Error	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 7FB42.01	Sensor 5V Circuit1 Error (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FB42.00	Sensor 5V Circuit1 Error (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FB43.01	Sensor 5V Circuit2 Error (Low Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FB43.00	Sensor 5V Circuit2 Error (High Voltage)	Can still operate, But high idle speed will be restricted. Engine output will be restricted. Exhaust filter regeneration stops.
00 7FAF1.12	CPU Monitoring IC Error	Can still operate, But engine output will be restricted.
00 7FAF2.12	CPU Error	Can still operate, But engine output will be restricted.
00 7FAF6.12	Flash ROM Error	Engine stops. Notify the dealer, And go through checkup & maintenance.

00 000A7.05	Charge Switch Disconnection	Can still operate, But engine performance may degrade.
00 000A7.01	Charge Alert	Can still operate, But engine performance may degrade.
00 00064.04	Hydraulic Pressure Switch Disconnection	Can still operate, But engine performance may degrade.
00 00CB2.01	Exhaust Filter Midway Temperature Sensor (Low Temperature)	Can still operate, But engine output will be restricted. Exhaust filter regeneration stops.
00 7F94D.00	Too Much Sediment (C)	Can still operate, But engine performance may degrade.
00 7F94E.00	Too Much Sediment (P)	Can still operate, But engine performance may degrade.
00 7F951.11	Regeneration Malfunction (Stationary Regeneration Incomplete)	Can still operate, But engine performance may degrade.
00 7F94F.07	Regeneration Malfunction (Stationary Regeneration Failed)	Can still operate, But engine performance may degrade.
00 00E88.16	Ash Cleaning Request1	Can still operate, But engine output will be restricted.
00 00E88.00	Ash Cleaning Request2	Can still operate, But engine output will be restricted.
00 00E87.16	Stationary Regeneration Stand-By	Can still operate, But engine output will be restricted.
00 00E87.09	Recovery Regeneration Failed	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 00E87.07	Recovery Regeneration Prohibited	Engine stops. Notify the dealer, And go through checkup & maintenance.
00 00CAA.00	Exhaust Filter Intake Port Temperature Sensor (Abnormal Temperature Rise)	Can still operate, But engine performance may degrade.
00 00CB3.00	Exhaust Filter Differential Pressure Sensor (Differential Pressure Abnormal Temperature Rise)	Can still operate, But engine output will be restricted. Exhaust filter regeneration stops.

00 00CB2.00	Midway Temperature Sensor Abnormal Temperature Rise (Post Injection Malfunction)	Can still operate, But engine output will be restricted. Exhaust filter regeneration stops.
00 00E87.00	Backup Mode	Can still operate, But engine output will be restricted.

■ Error Code (Others)

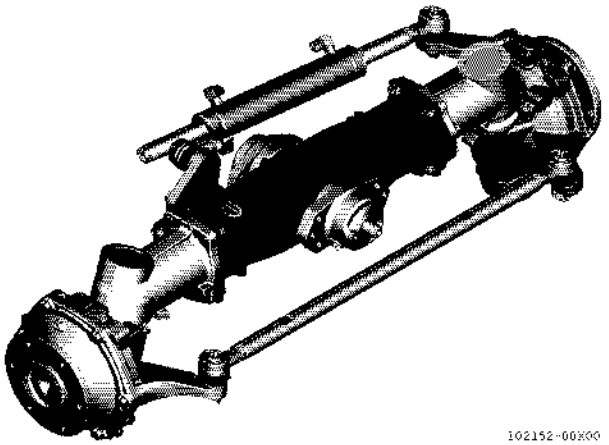
Error Code	Detail	Treatment
28 00062.05	Resistance value of fuel sensor is 123Ω or higher. Sensor failure.	Check sensor failure. Check sensor installation.
28 00068.12	EEPROM failure inside meter panel.	Replace meter panel.
28 00067.12	Memory inside the controller is broken.	Replace meter panel.
28 00067.02	Memory inside the controller is broken.	Rewrite software.
28 00082.09	Meter panel cannot confirm completion of CAN data transmission. CAN communication disconnection or short, Other controller failure.	Check meter panel connection. Check CAN communication. Replace other controller.
28 00083.09	CAN communication is not operating correctly. CAN communication wire short, Other controller failure, Other controller installation mistake.	Check connection of CAN communication wire. Check other controller. Installation replace other controller.
28 00099.09	Cannot receive CAN data from engine controller. Fusing, Disconnection short, engine controller failure.	Check fuse. Check wiring. Check connection of engine controller.
28 0006B.02	Switch input stays on. The switch is fixed to on.	Check wiring. Replace switch.

14. Front Axle Disassembly and Reassembly

1. Front Axle Disassembly

1. Park the tractor safely and securely.
2. Turn OFF the engine.
   - Engage the parking brake.
   - Place chocks on each driving direction of both front and rear wheels.

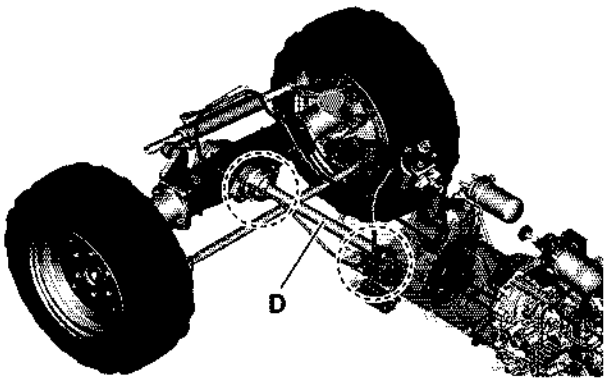
NOTE
- Make sure that the parking brake is securely engaged.
- Make sure to lower any implements to the ground.

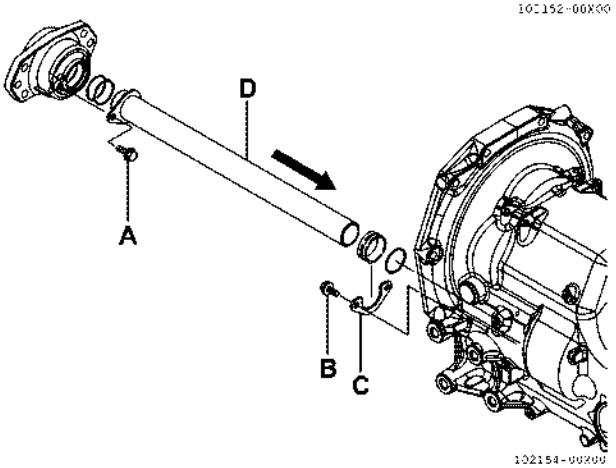


3. Remove the front wheel drive shaft.
   (1) Remove the front bolts (A), rear bolts (B), and hanger (C) from the shaft cover-(D).

   (A) M8 x 16 bolts (x1)
   (B) M8 x 16 bolts (x2)
   (C) Hanger (x1)
   (D) Shaft cover

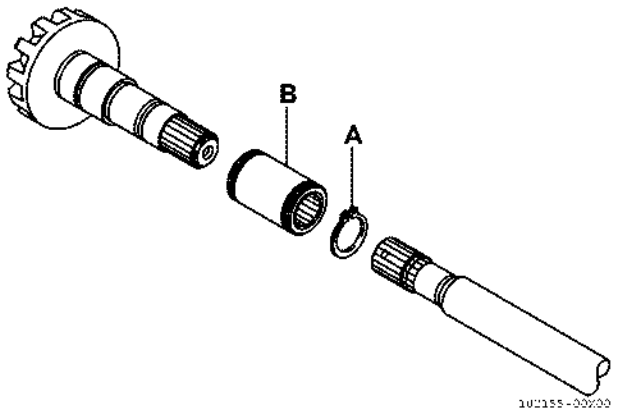
   (2) Slide the shaft cover (D) to the back.





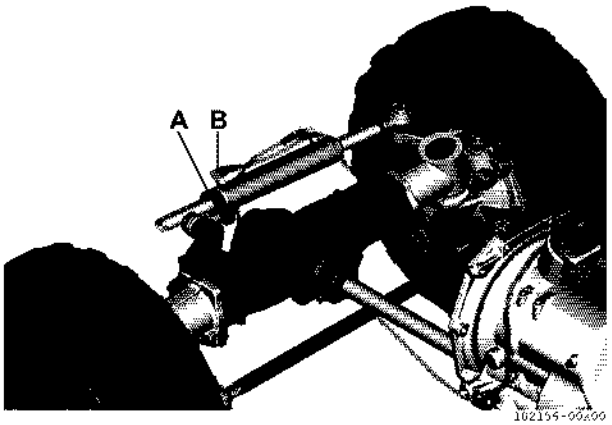
(3) Slide the snap ring (A) on the front axle to the back.
(4) Slide the spline collar (B) to the back.

(A) Snap ring
(B) Spline collar



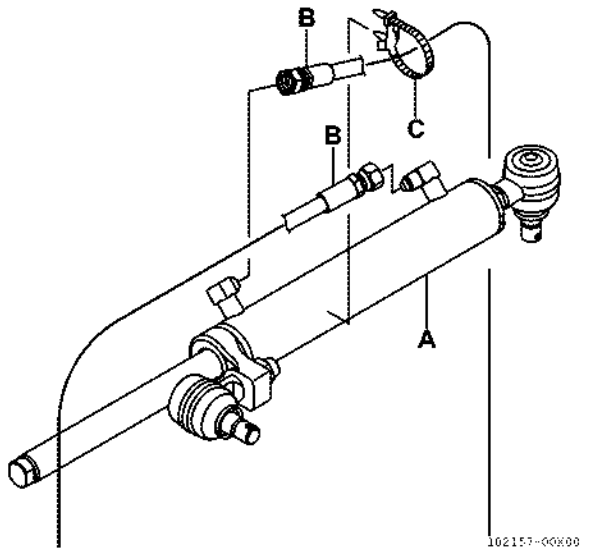
4. .Remove the left and right power steering hoses on the cylinder.
(1) Remove the left and right power steering hoses (B) (x2) from the power steering cylinder (A).

(A) Power steering cylinder
(B) Power steering hoses (x2)



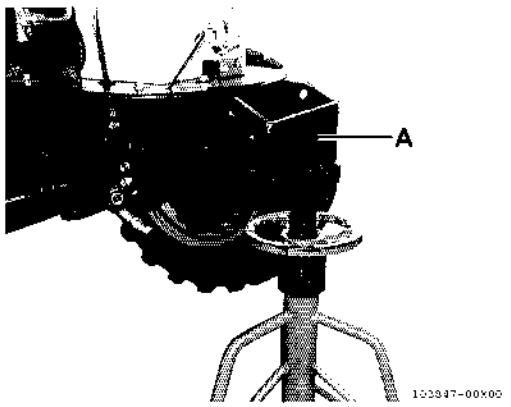
(2) Remove the power steering hoses (B) from the power steering cylinder clamp (C).

(B) Power steering hose
(C) Clamp



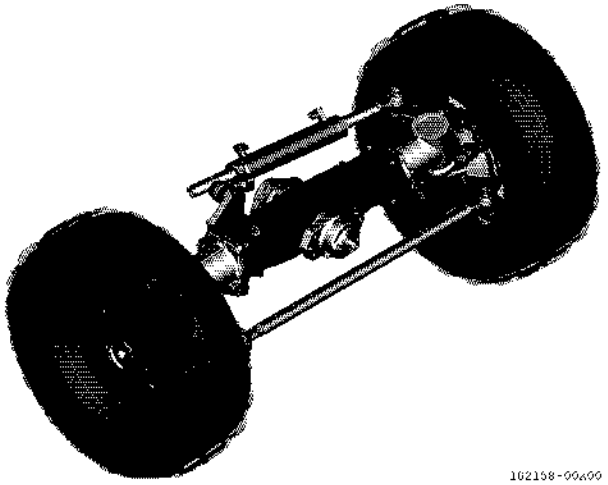
5. Remove the front tire.
   (1) Jack up the bumper (A).

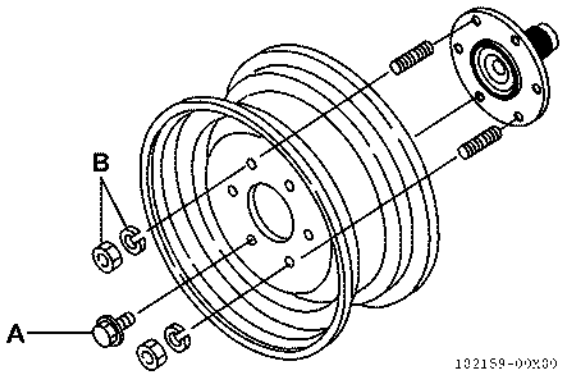
(A) Bumper



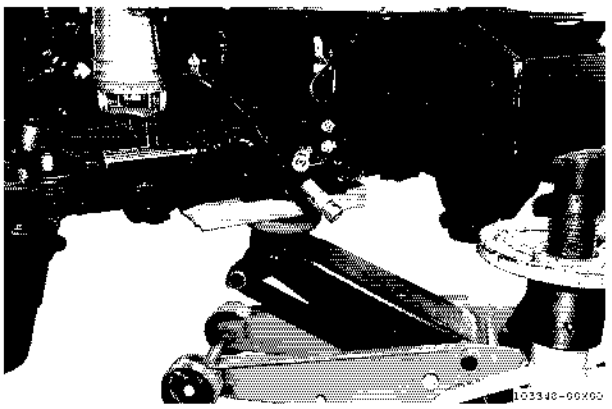
(2) Remove the bolts (A) and nuts (B), and remove the front tire.

(A) M14 bolt
Left: x4, Right: x4
(B) M8 nut + washer lock 14
Left: x2, Right: x2



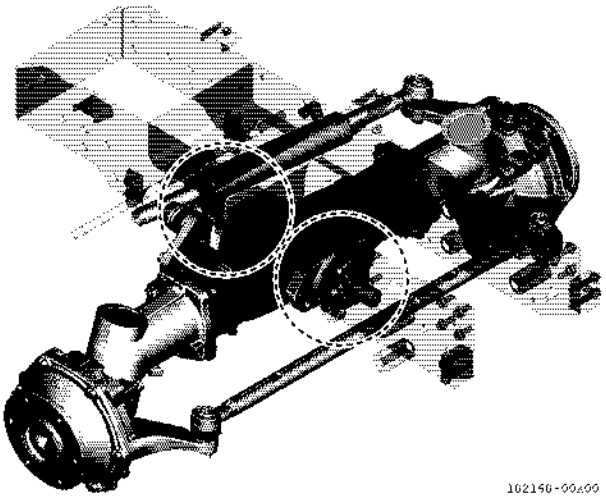


6. Remove the front axle assembly.
   (1) Place the jack in the center of the front axle for support.

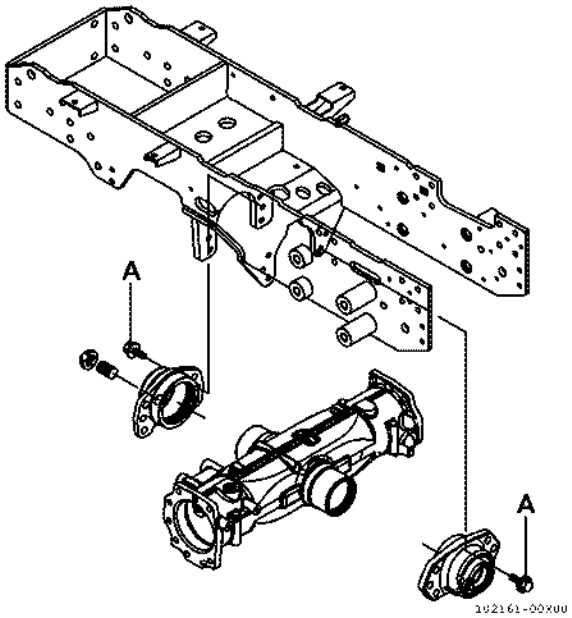


(2) Remove the mounting bolts from the front and back of the front axle support.

(A) M12 x 12 bolts
Front: x6, Back: x6



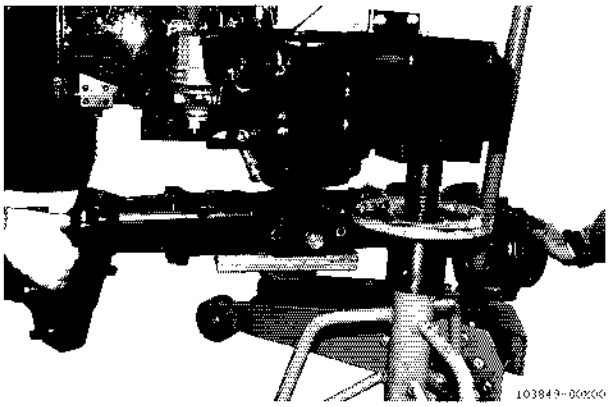
102160-00X00



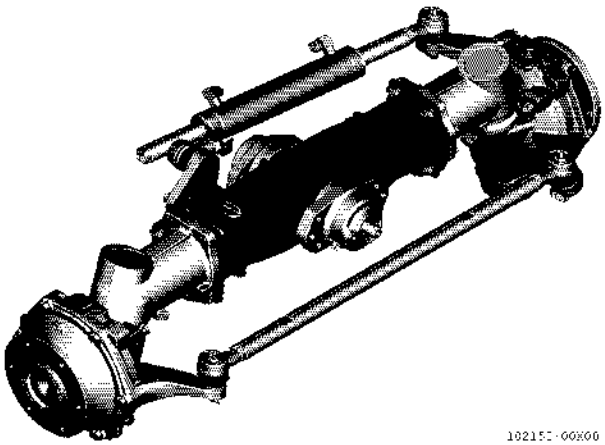
102161-00X00

(3) Lower the jack slowly, and lower and pull out the front axle assembly.

NOTE
- Make sure this task is implemented by 2 or more people.



103849-00X00



102151-00X00

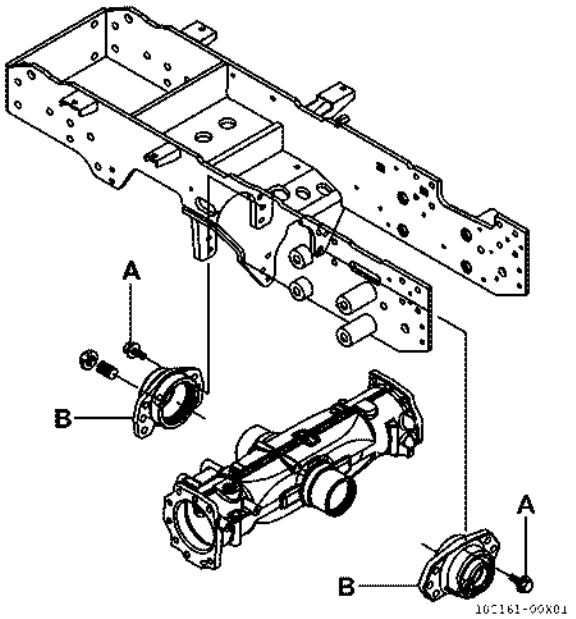
2. Front Axle Assembly

1. Mount the front axle.

(A) M12 x 12 bolts
Front: x6, Back: x6

Tightening torque: 78 to 98N· m

(B) Front axle support



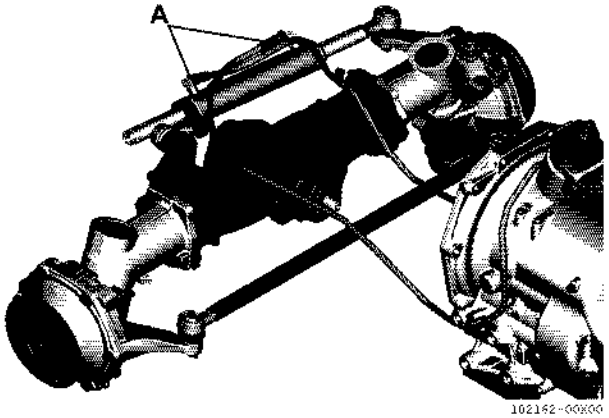
NOTE
- When mounting the front axle support (B), coat the bolts (A) with LOCTITE: ThreeBond 1324 Red.

2. Mount the power steering hoses (A).

Tightening torque: 22.6 to 27.5N· m

(A) Power steering hoses

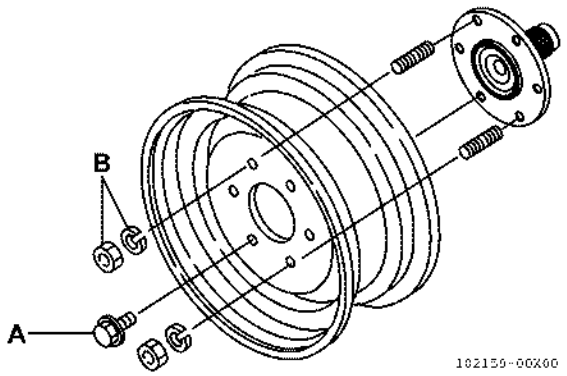
NOTE
- Thread the hoses through the clamps.



3. Mount both forward wheels.

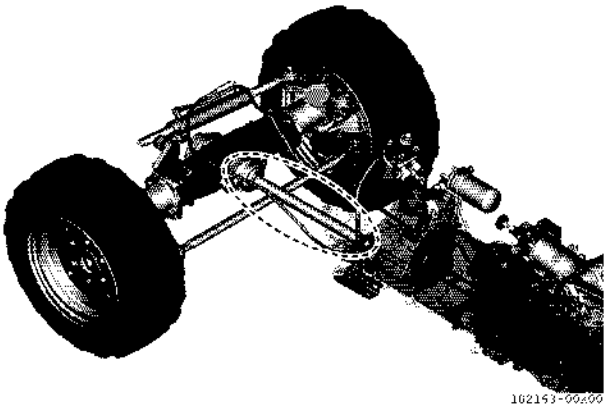
(A) M14 bolt
Left: x4, Right: x4
(B) M14 nut + washer lock 14
Left: x2, Right: x2

Tightening torque: 176.4 to 196.0 N•m bolt and nut



NOTE
- Coat the nuts with LOCTITE: TB1324 or equivalent product.

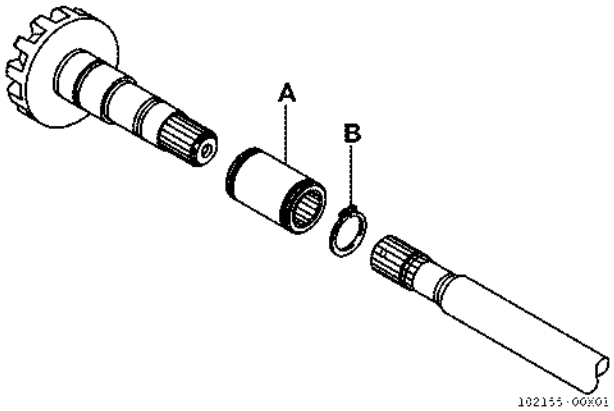
4. Mount the front wheel drive shaft cover.



(1) Slide the front axle spline collar (A) to the front and secure.

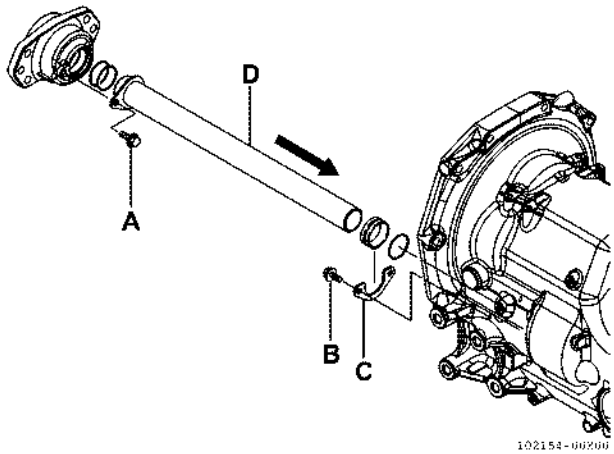
NOTE
- Coat the spline collar (A) with lithium-based grease.

(2) Slide the snap ring (B) to the front.



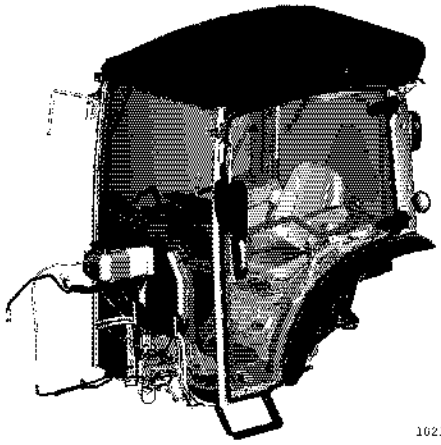
(3) Slide the shaft cover (D) to the front.
(4) Mount the front bolts (A), rear bolts (B), and hanger (C) to the front of the shaft cover.

(A) M8 x 16 bolt (x1)
(B) M8 x 16 bolts (x2)
(C) Hanger (x1)
(D) Shaft cover



15. Cabin

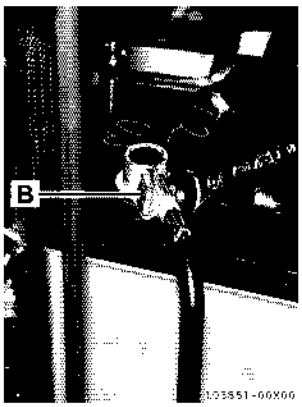
1. Cabin Separation

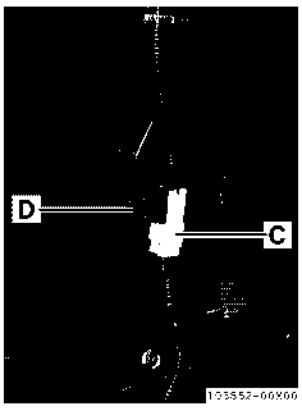


1. Pull the hood release lever (A) to open the hood.

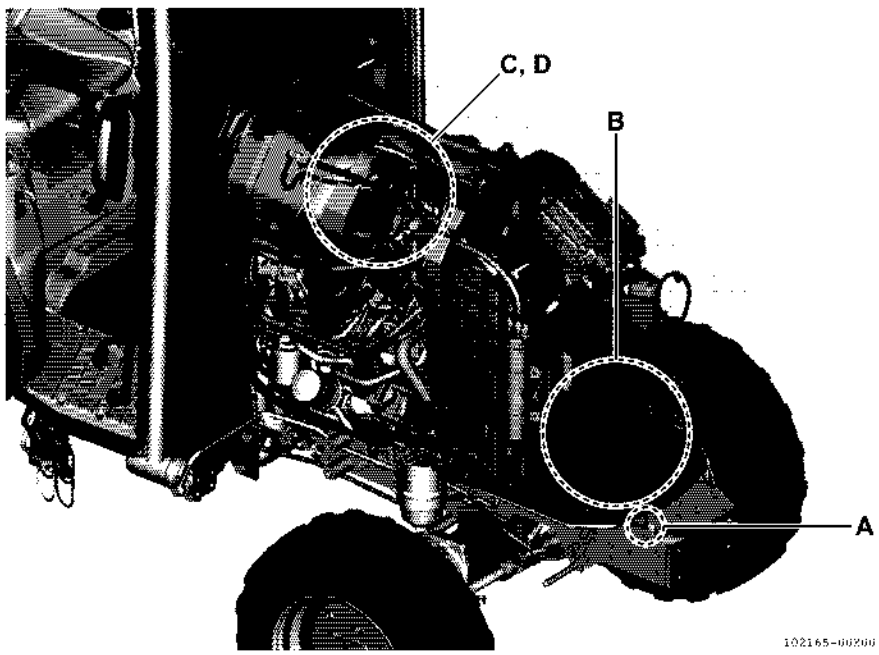
2. Remove the battery.
   (1) Loosen the M6 nuts, and remove the negative cable (B).

3. Remove the hood.
   (1) Remove the white coupler (C) connected to the headlight. At this time, also align and remove the clamp (D).

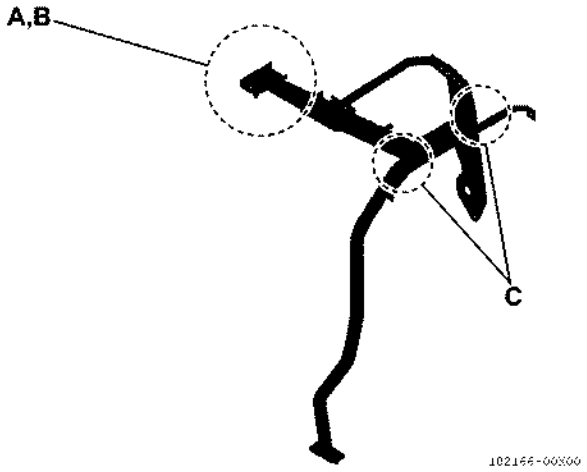




(A) Hood release lever
(B) Negative cable
(C) Coupler
(D) Clamp



(2) Remove snap pin 10 (A), and remove pin 10 x 35 (B).

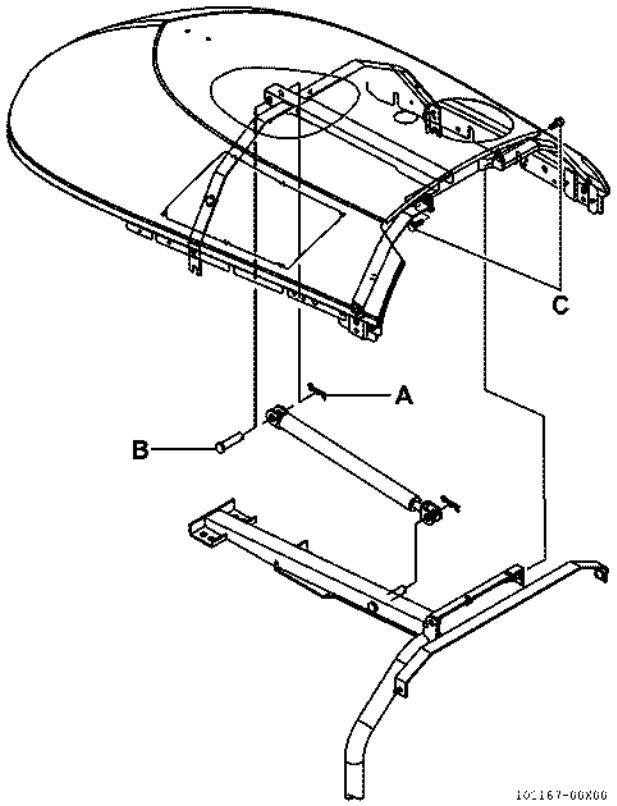


NOTE
- Lifting the hood makes removing snap pin 10 (A) easy.

(3) Remove the stepped bolts (C) from the rotation strut.

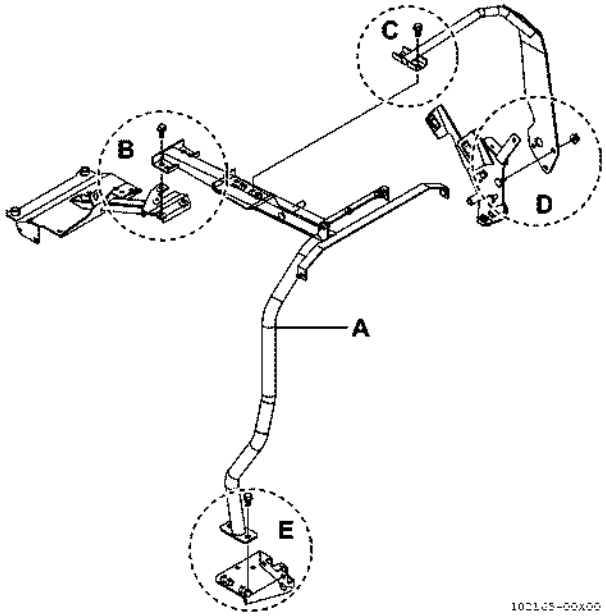
(4) 2 people must support and remove the hood.

(A) Snap pin 10
(B) Pin 10 x 35
(C) Bolt stepped M8 (x2)



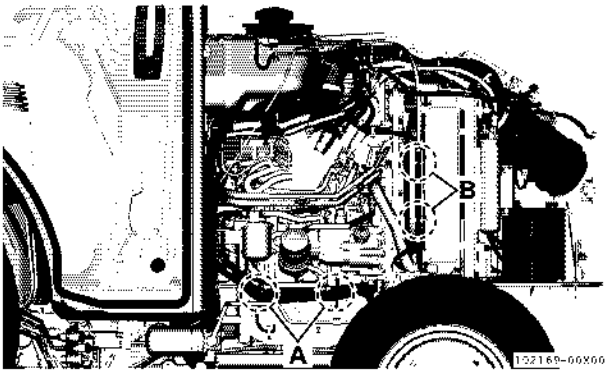
4. Remove the engine rear frame (A).
   (1) Remove the bolts and nuts.

   (A) Engine rear frame
   (B) M8 x 16 bolts (x2)
   (C) M8 x 16 bolts (x2)
   (D) M8 nuts (x3)
   (E) M8 x 16 bolts (x2)



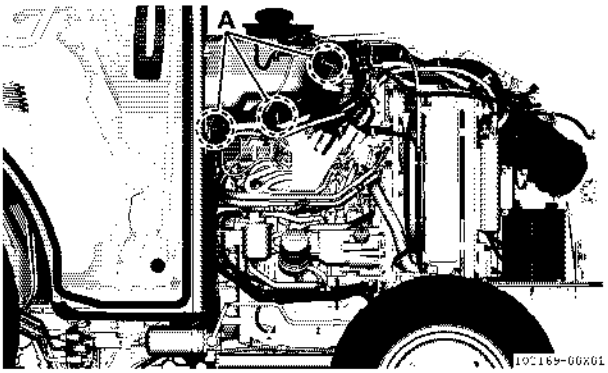
5. Slightly raise the fuel tank.
   (1) Remove all the fuel from inside the fuel tank.
   (2) Loosen the bands (A) on the hose connected from the fuel tank to the water separator. (x2)
   (3) Loosen the bands (B) on the overflow hose at the fuel inlet. (x2)

   (A) Bands (x2)
   (B) Bands (x2)



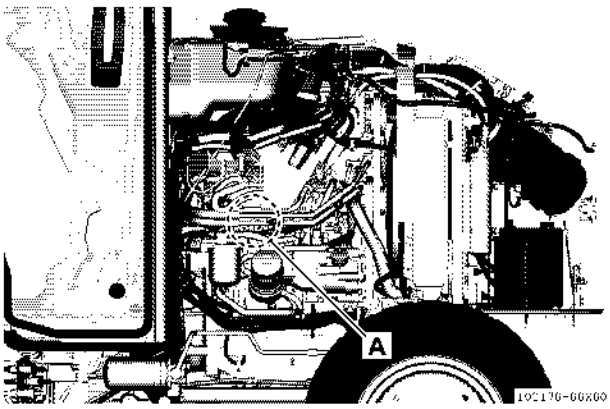
6. Loosen the AC hose bands.
   (1) Loosen the AC hose bands. (x3)

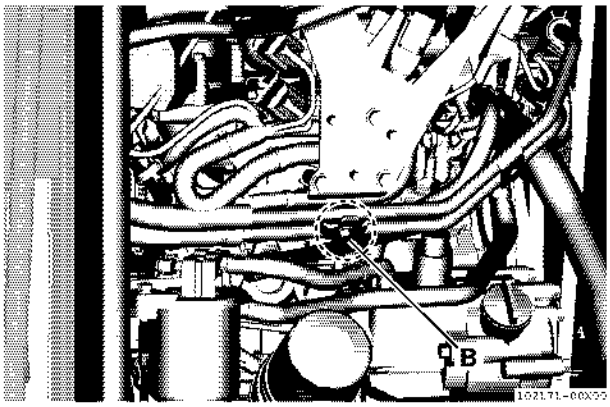
   (A) Bands (x3)



(2) Loosen the heater hose clamp (A).

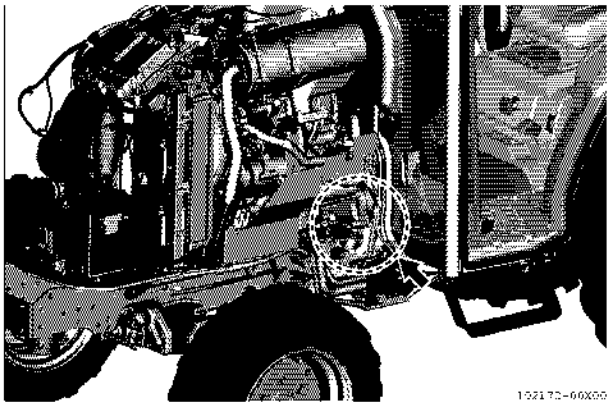
(A) Clamp
(B) M8 x 30 bolt (x1)

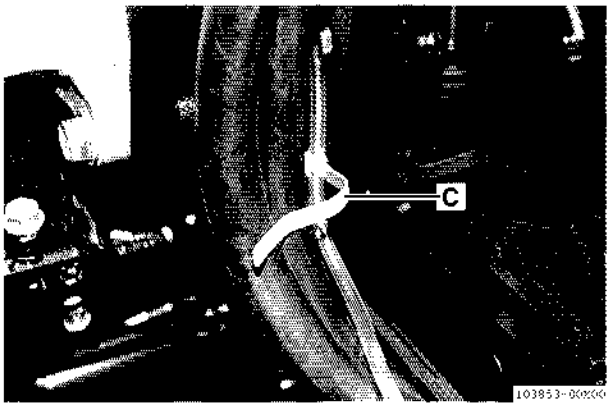




(3) Loosen the heater hose clamp (C) (x1) on the left of the cabin, and pull the hose out to the right of the engine as far as possible to slacken the hose.

(C) Clamp



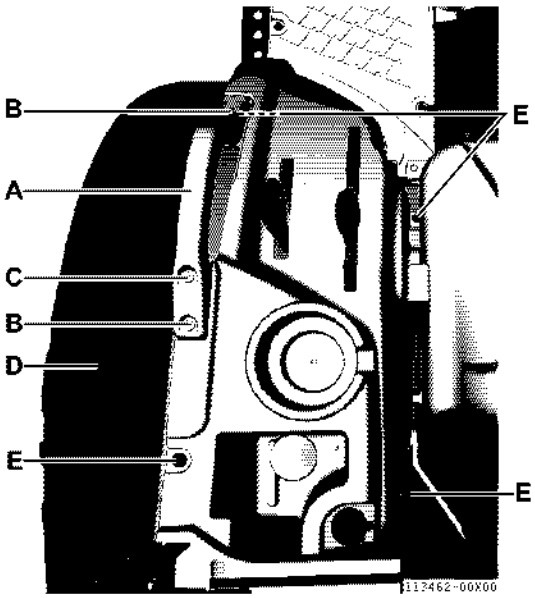


7. Remove the assist grip (A) and lever guide L (D) from the left of the driver's seat.
   (1) Remove the assist grip (A).

   (A) Assist grip
   (B) M6 x 25 bolts (x2)
   (C) M6 x 50 bolt (x1)

   (2) Remove the lever guide L(D) fasteners.

   (D) Lever guide L
   (E) M6 x 20 bolts (x4)

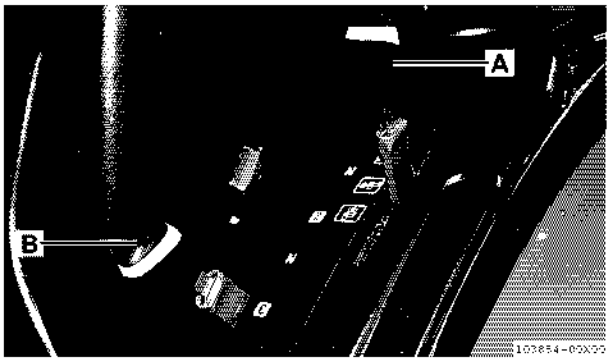


   (3) Pull OUT the PTO shift lever (A) grip (yellow).

   (A) PTO shift lever

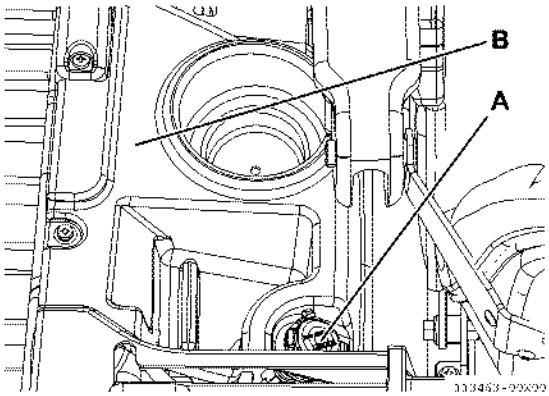
   (4) Pull OUT the range shift lever (B) grip (orange).

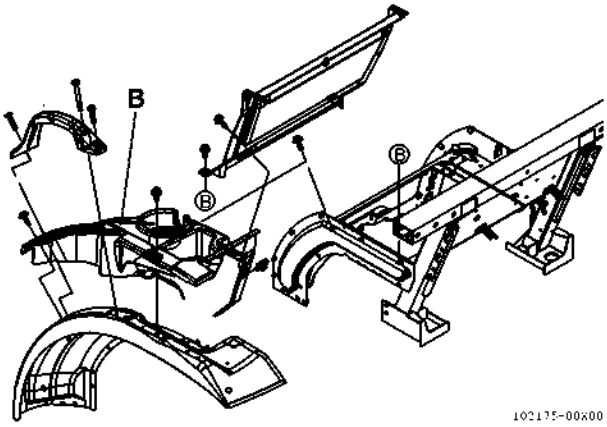
   (B) Range shift lever



   (5) Remove the external power supply removal coupler (A) (x1), and remove lever guide L (B).

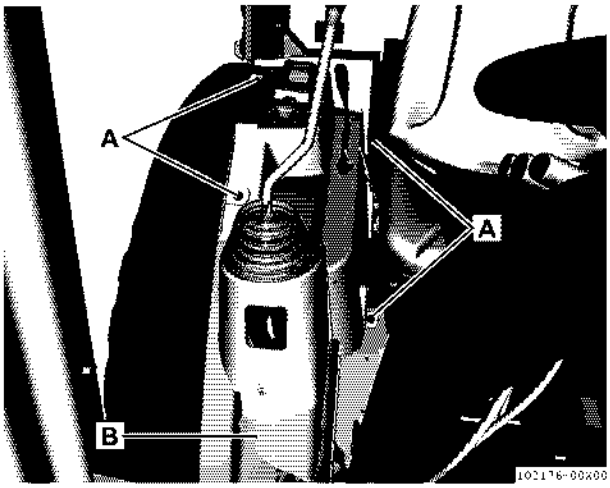
   (A) External power supply removal coupler (x1)
   (B) Lever guide L





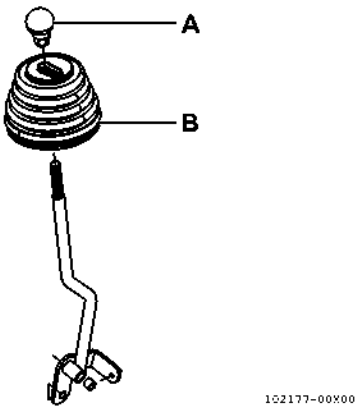
(6) Remove the lever guide fasteners on the right of the driver's seat.

(A) M6 x 20 bolts (x5)
(B) Rivet, push (x1)



(7) Extract the loader lever knob (A), and remove the boot (B).

(A) Knob
(B) Boot

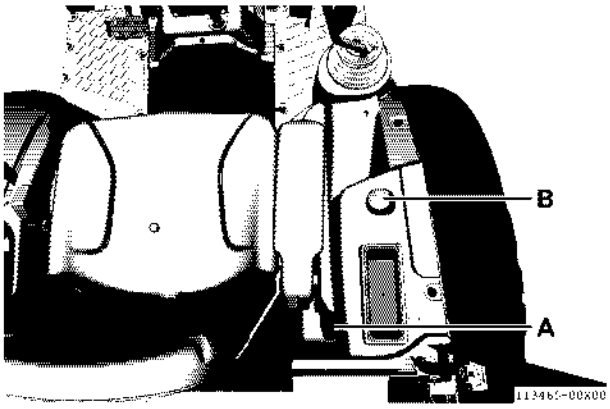


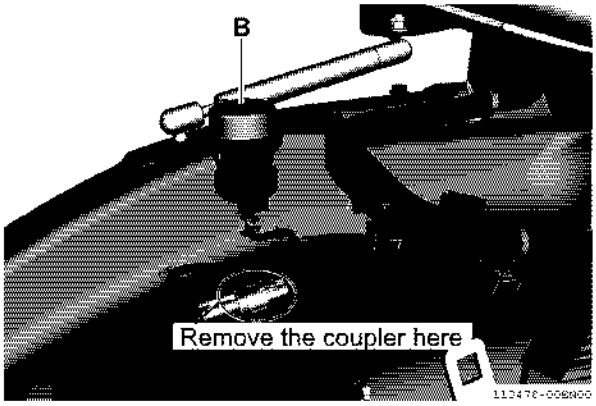
(8) Remove the position lever knob (A).

(A) Knob

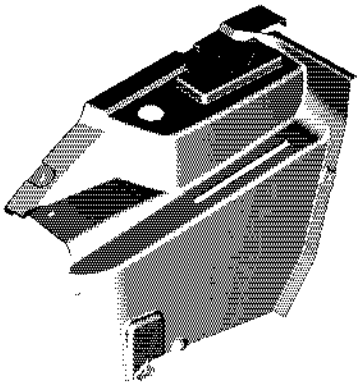
(9) Remove the PTO switch (B) coupler.

(B) PTO switch





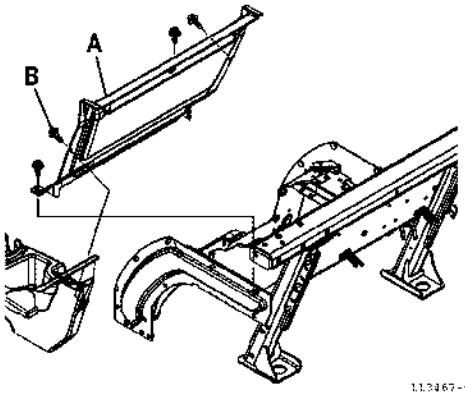
(10)Remove the right lever guide assembly.



113466-00X00

8. Remove the driver's seat rear cover.

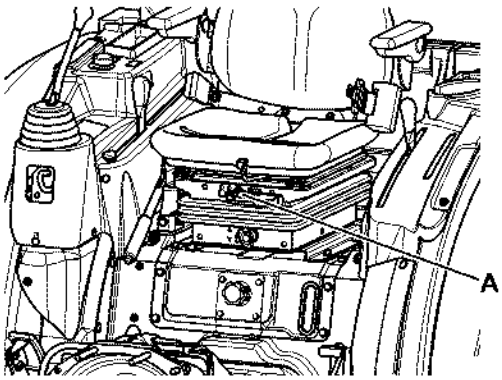
(A) Driver's seat rear cover
(B) M6 x 20 bolt (x4)

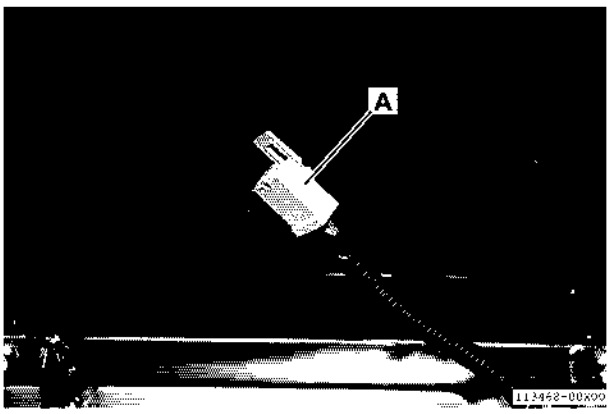


113467-00X00

9. Remove the seat.
   Remove the seat switch coupler (A).

(A) Coupler

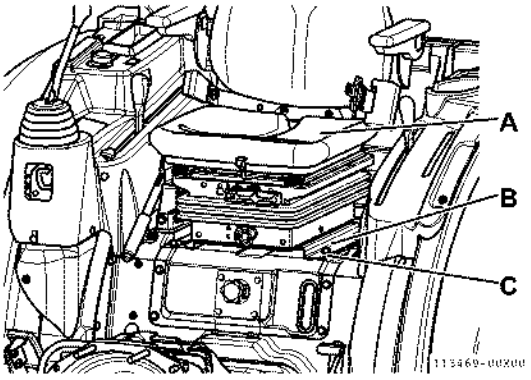




113468-00X00

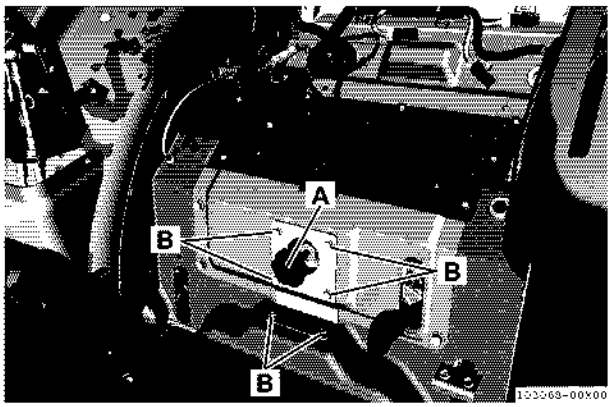
(1) Remove the seat using the tool box (A) under the seat and the assembly.

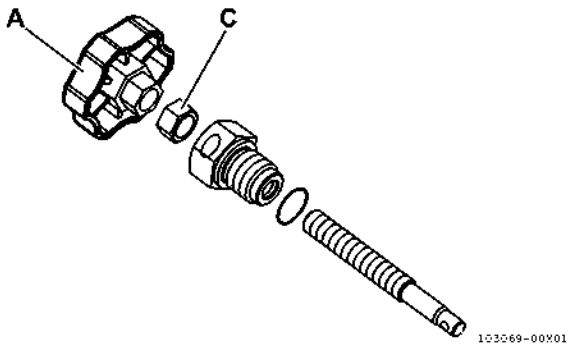
(A) seat
(B) seat mount plate
(C) M8 x 16 plated bolt (x4)



10.Remove the stop valve knob (A) and cover.

(A) Stop valve knob
(B) M6 x 12 plated bolts (x4)
(C) M6 Nuts (x2)
(D) M10 Nut (x1)



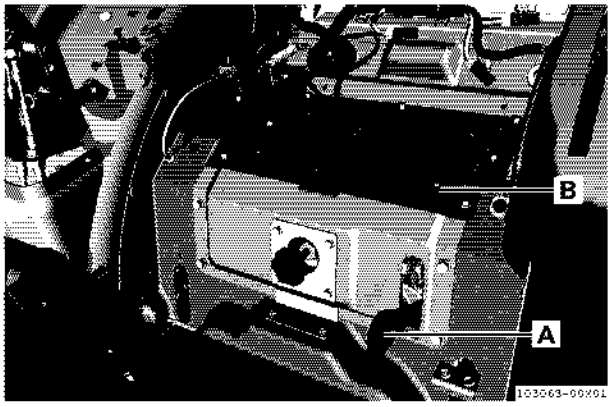


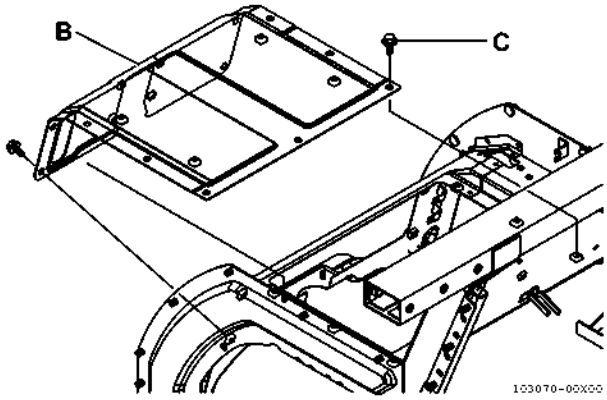
11.Remove the 2WD/4WD switching lever knob (orange) (A).

(A) 4WD lever knob

12.Remove the lower seat cover (B).

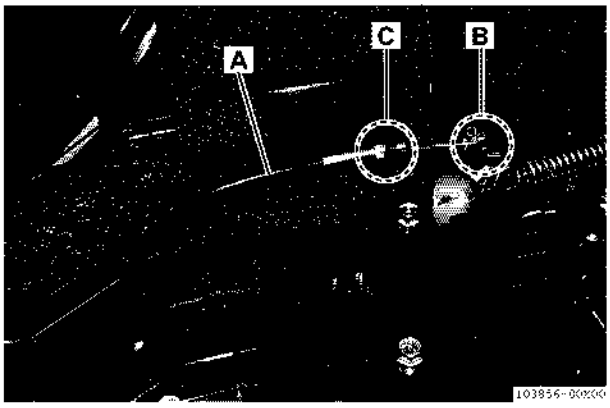
(B) Lower seat cover
(C) M8 x 16 plated bolts (x11)





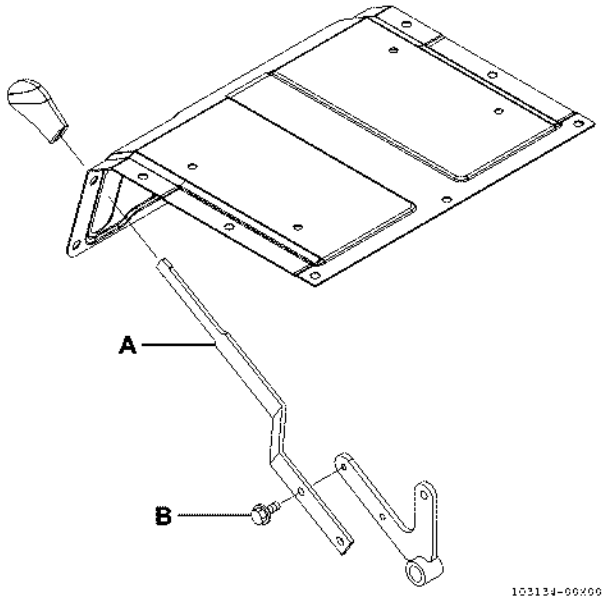
13.Remove the operation wire (A) on the position control lever, and pull OUT of the cabin.

(A) Operation wire
(B) Snap 6 pin (x1)
(C) M6 nuts (x2)



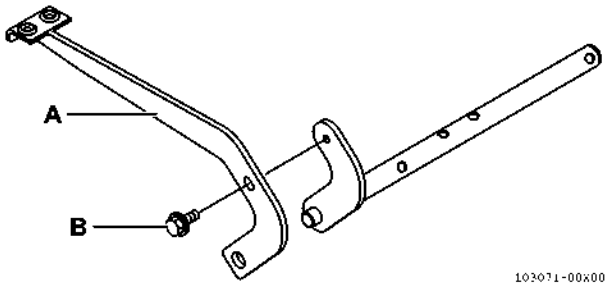
14.Remove the 4WD lever (A).

(A) 4WD lever
(B) M8 x 12 plated bolt (x1)



15.Remove the differential lock pedal (A).

(A) Differential lock pedal
(B) M8 x 16 plated bolt (x1)

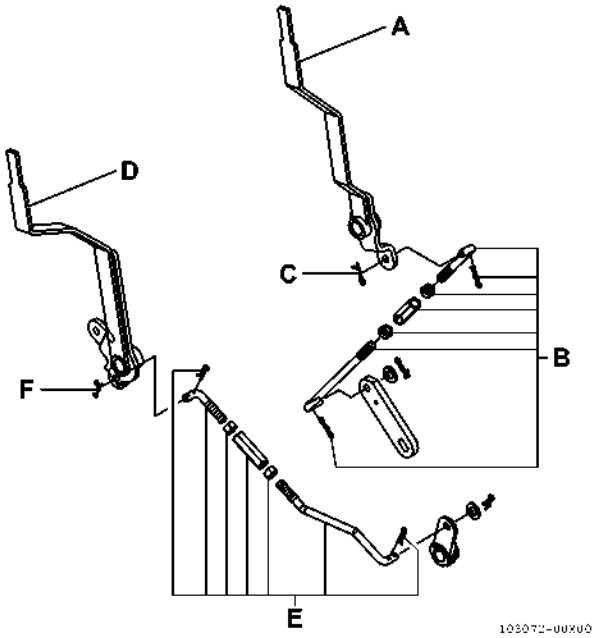


16.Separate the range shift lever (A) and the shift rod (B).

(A) Range shift lever
(B) Shift rod
(C) Snap 8 pin (x1)

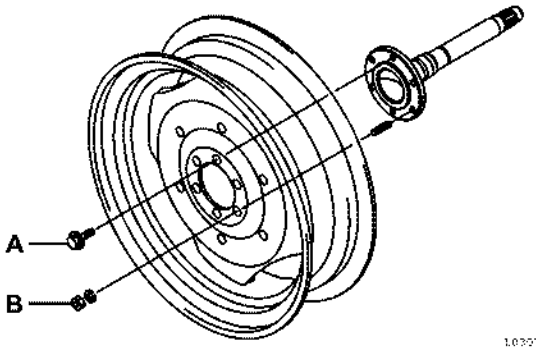
17.Separate the PTO shift lever (D) and the PTO rod (E).

(D) PTO shift lever
(E) PTO rod
(F) Snap 8 pin (x1)



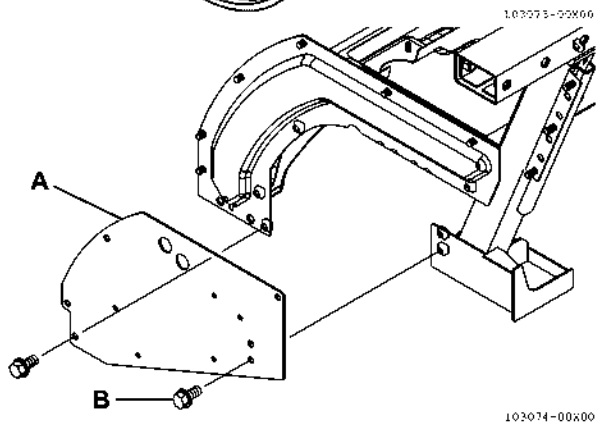
18.Remove the right-rear tire.

(A) M14 x 24 bolts (x4)
(B) M14 nuts and washers (x2)



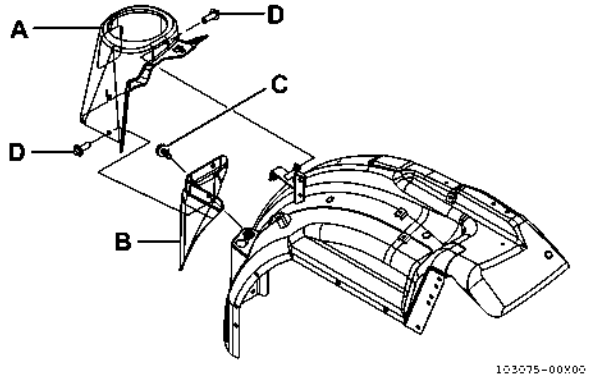
19.Remove the right fender lower cover.

(A) Fender lower cover
(B) M8 x 16 bolts (x6)



20.Remove the loader lever lower covers (A and B).

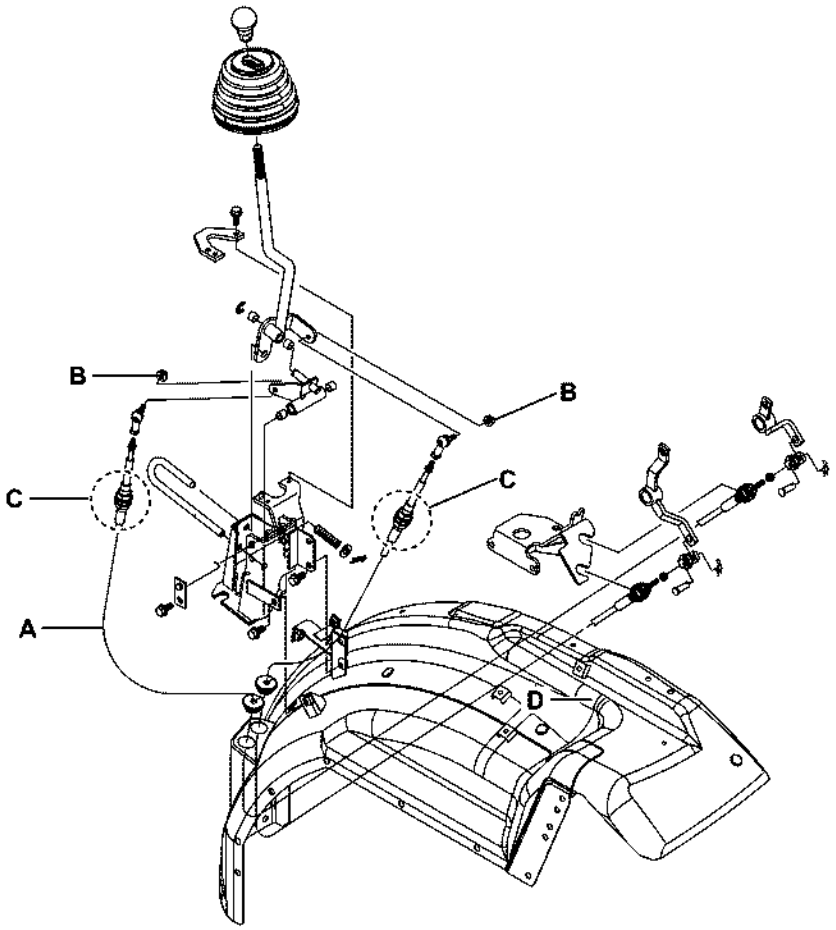
(A) Loader lever top cover
(B) Loader lever lower cover
(C) M6 x 20 bolt (x1)
(D) Push rivet (x2)



21.Remove the loader lever operation wires (A).

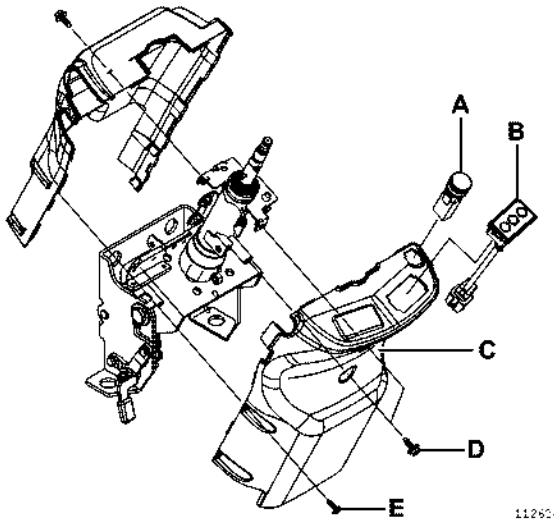
(A) Operation wires x2
(B) M6 nuts (x2)
(C) Nuts M12 (x2)

IMPORTANT
- The two operation wires are marked to prevent confusion during assembly.



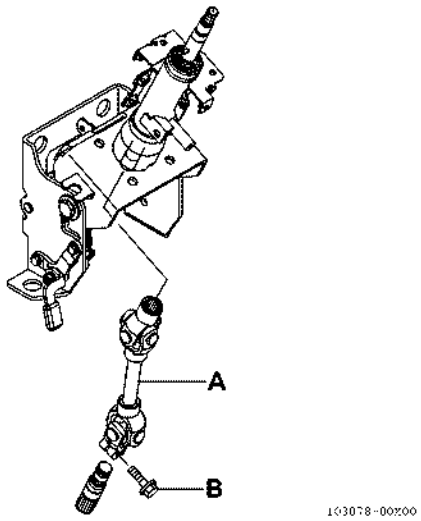
22.Remove the DPF regeneration switch coupler (A) and the traveling switch coupler (B), and then remove the column cover (C).

(A) DPF regeneration switch coupler
(B) Traveling switch coupler
(C) Column cover
(D) M6 x 20 bolts (x2)
(E) M5 x 16 tapping screws (x4)



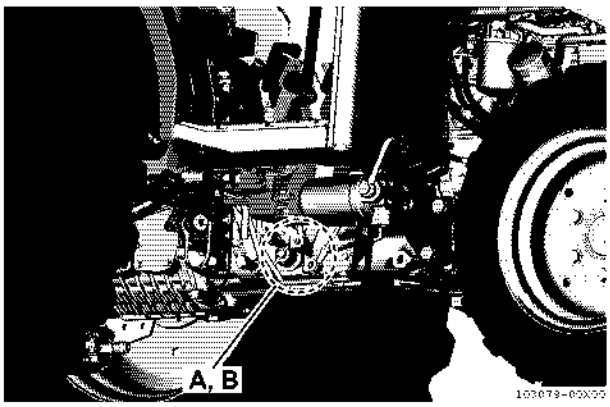
23.Remove the steering shaft (A).

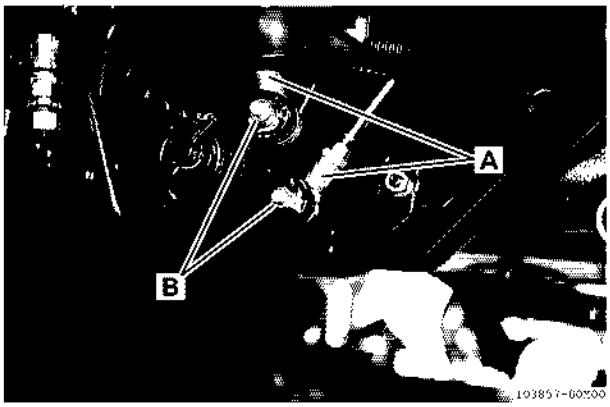
(A) Steering shaft
(B) M8 x 30 plated bolt (x1)



24.Remove the pedal links (front and rear) (A).

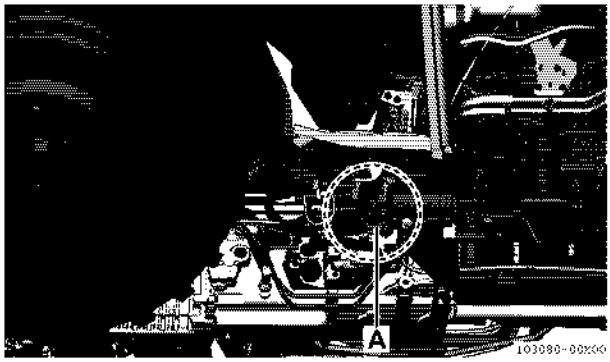
(A) Pedal links (front and rear)
(B) M8 nuts (x2)

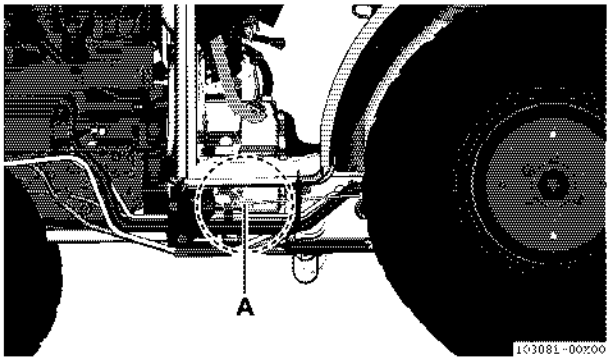


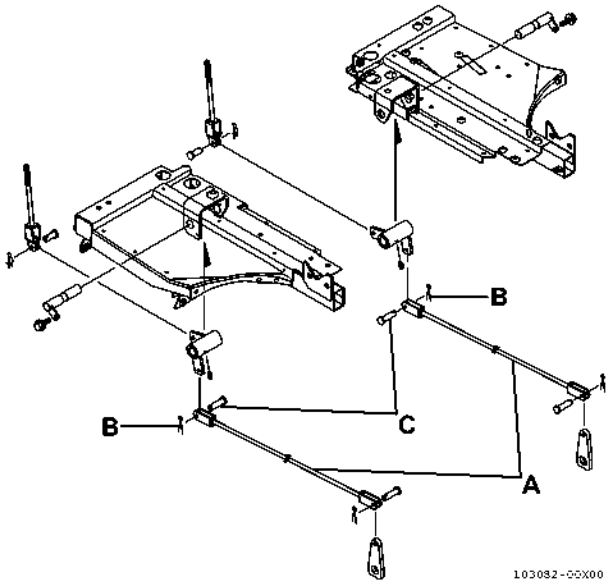


25.Remove the left and right brake rods (A).

(A) Brake rods (left and right)
(B) Cotter 2.5 x 30 pins (x2)
(C) 8 x 24 pins (x2)



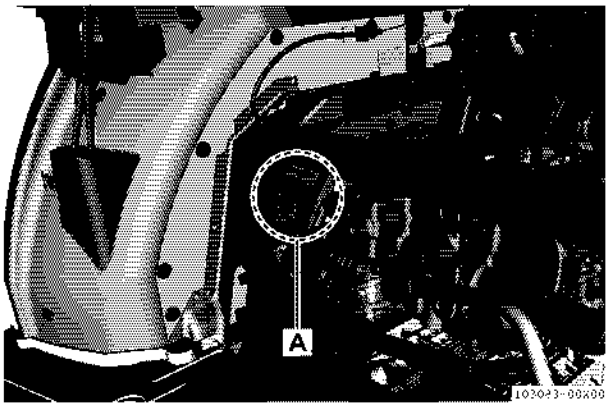


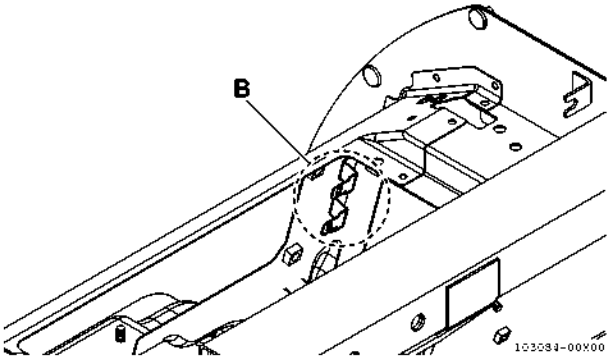


26. Separate the transmission harness and floor harness.
    First, remove the coupler (A) from the cabin floor coupler stay (B), and then separate the coupler.

    (A) Coupler
    (B) Coupler stay

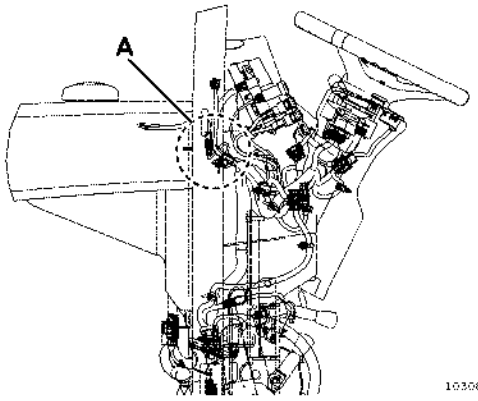
NOTE
- When separating the harness, insert a flat screwdriver into the coupler and press in the coupler hook to remove.

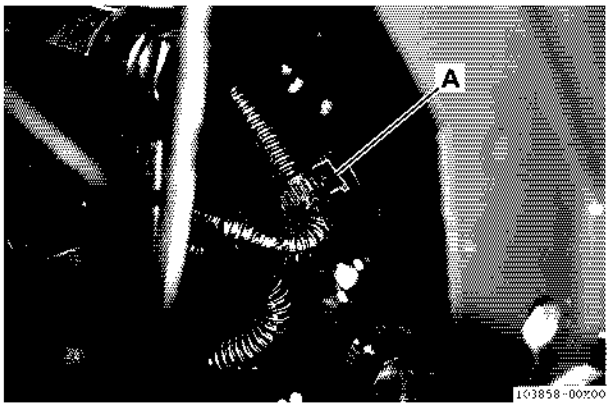




27.Remove the clamp (A) from the floor harness engine frame.

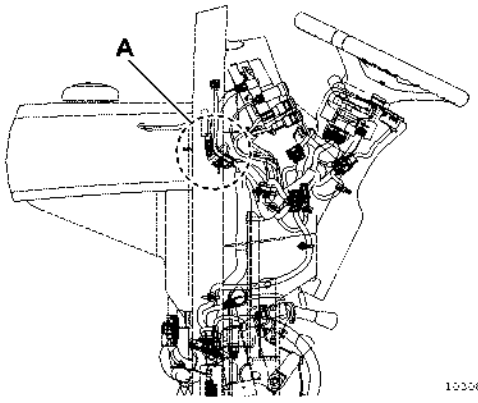
(A) Clamp

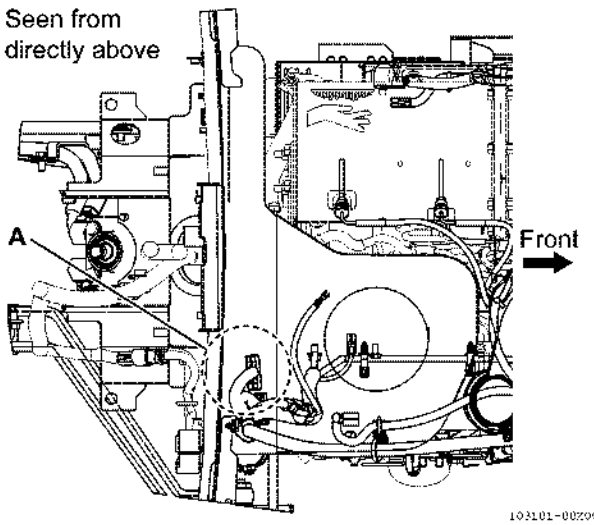




28.Remove the connection coupler (A) for the engine harness and floor harness.

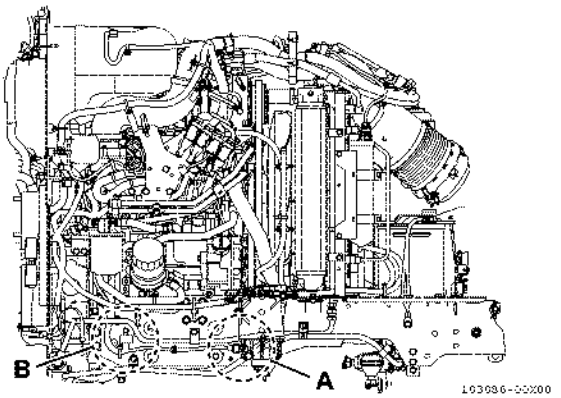
(A) Connection coupler



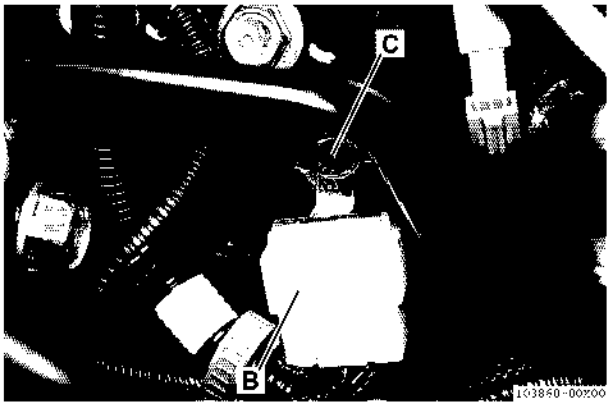


29.Remove the floor harness ground (B) and the water separator coupler (A) from the left of the engine frame.

(A) Water separator coupler
(B) Floor harness ground
(C) M6 nut (x1)

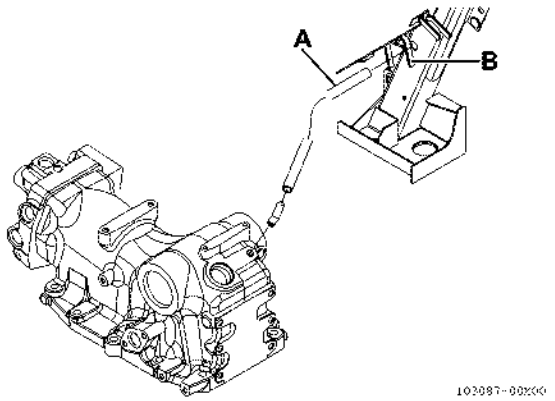


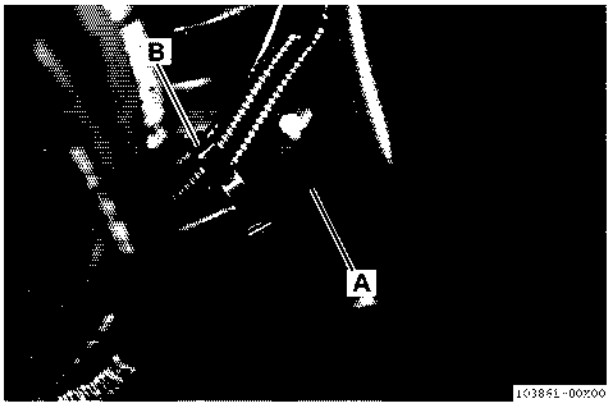
30.Remove the floor harness securing bands (x2), and pull OUT towards the cabin (UP).



31.Remove the breather hose clamp (B), and remove the transmission breather hose (A) from the frame at the back of the cabin.

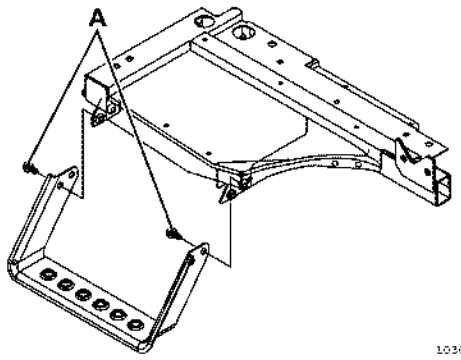
(A) Breather hose
(B) Clamp





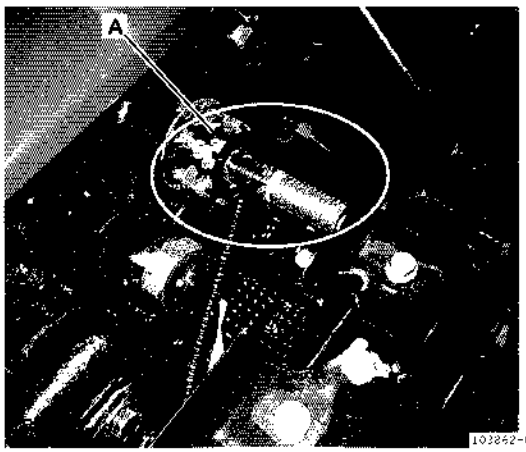
32.Remove the step.

(A) M8 x 16 bolts (x2)



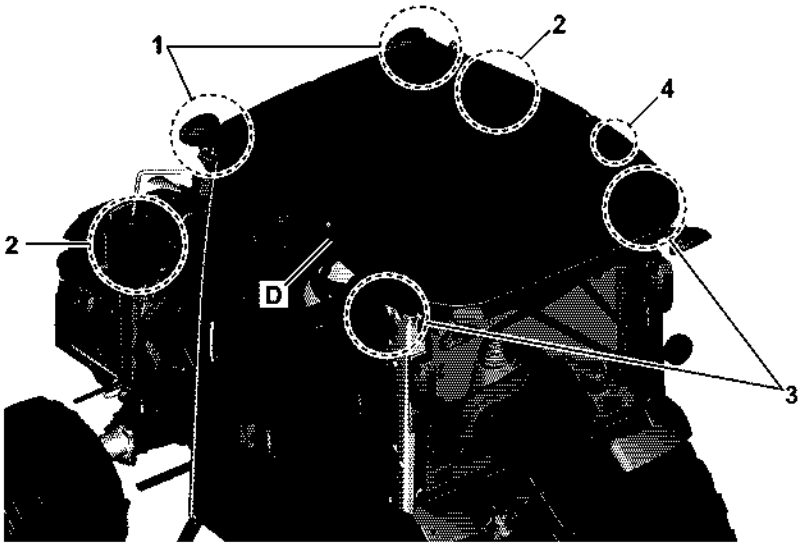
33.Remove the hydraulic slow return valve assembly.

NOTE
- As it catches on the cabin floor, loosen A to remove.



34.Mount the hanger to the cabin.
Remove the following parts beforehand.

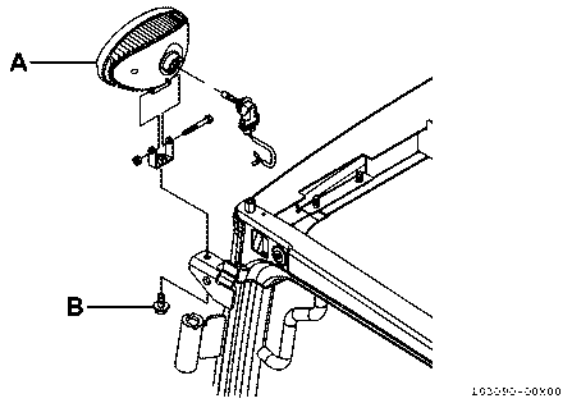
(1) Work lamps (x2)
(2) Mirrors (x2)
(3) Bore screws (x2)
(4) Roof cover



(1) Remove the front work lamps (x2) (A).

NOTE
- Remove beforehand to prevent damage.

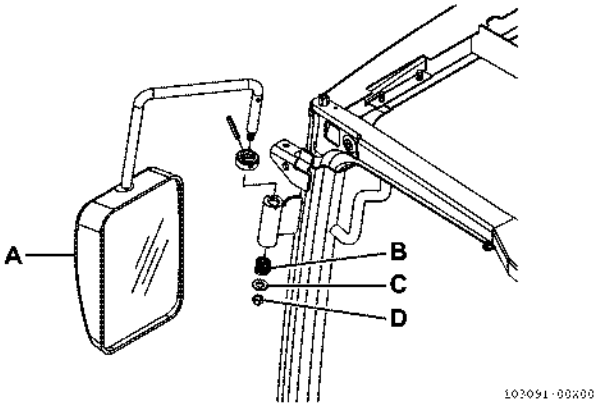
(A) Front work lamps (x2)
(B) M8 x 16 bolts (x2)



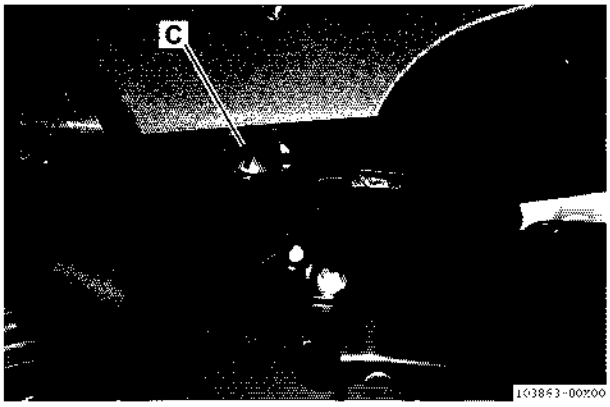
(2) Remove the front mirrors (A).

NOTE
- Remove beforehand to prevent damage.

(A) Mirrors right and left (x1 each)
(B) Spring friction right and left (x1 each)
(C) Washers 12 right and left (x1 each)
(D) Nuts, M10 right and left (x1 each)



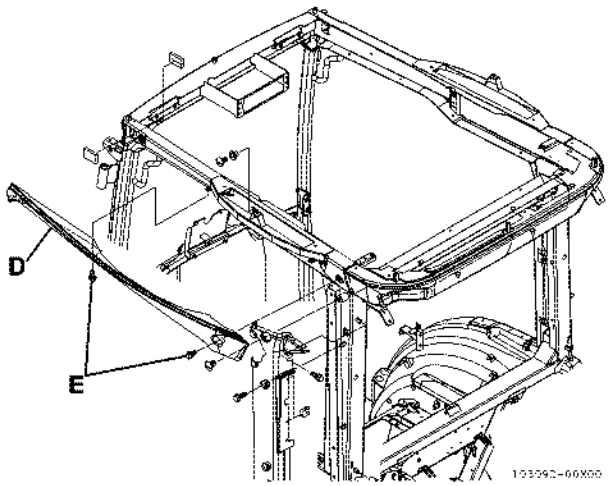
(3) Remove the rear bore screws (C) (x2).



(4) Remove the roof covers (D) (left and right).

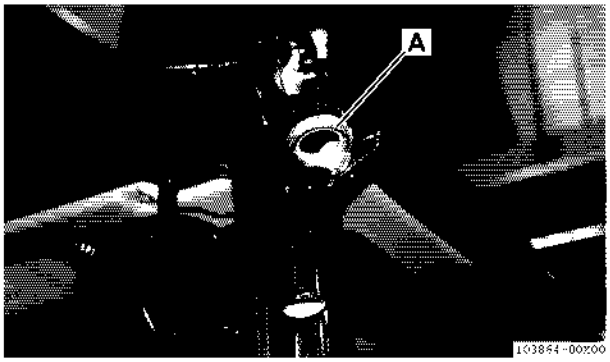
NOTE
- Remove beforehand to prevent damage.

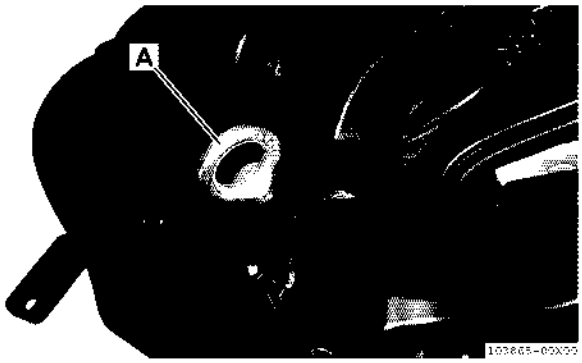
(D) Roof covers right and left (x1 each)
(E) M8 x 16 bolts (x6)



(5) Mount the hangers (A) to the front and back of the cabin.

(A) Hangers (M12 eye bolts) (x4)

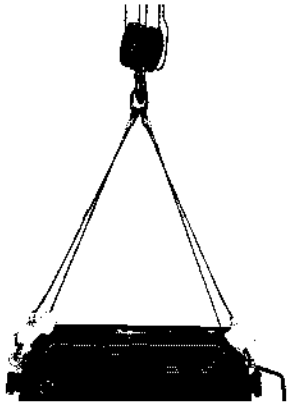




35.Hang the cabin.

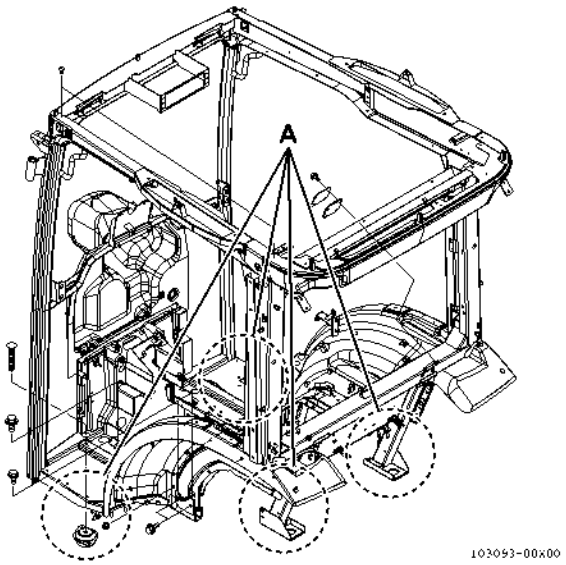
(1) Mount the wires to the hangers (x4: front, back, left, and right).

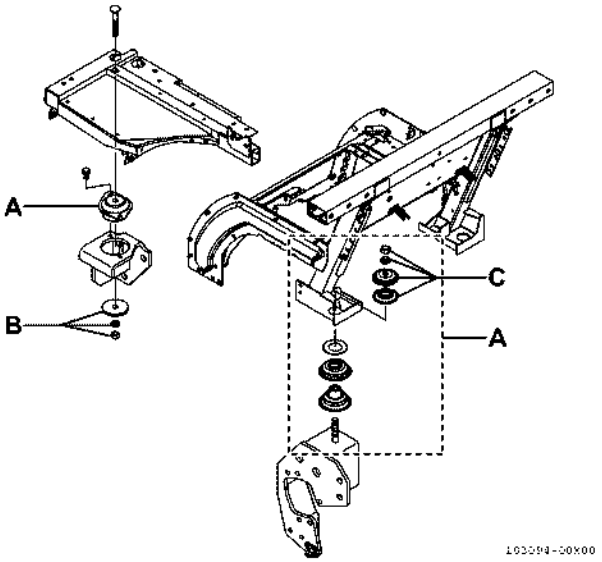
(2) Mount the hangers.



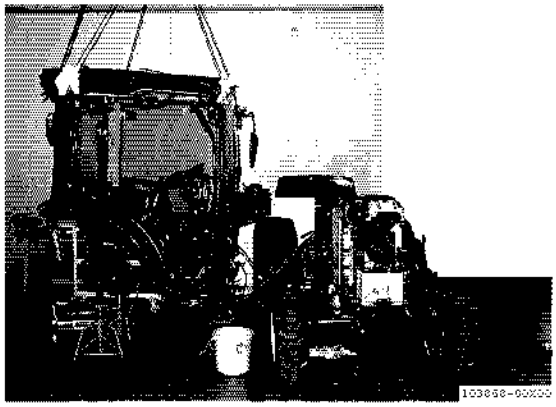
36.Remove the floor mount (A) nuts (x4: front, back, left, and right).

(A) Floor mount
(B) M12 nut, spring washer 12, stopper
(C) M14 nut, spring washer 14, stopper U, mount upper





37.Hang the cabin.
38.Rotate the cabin 90o to place it on its side.



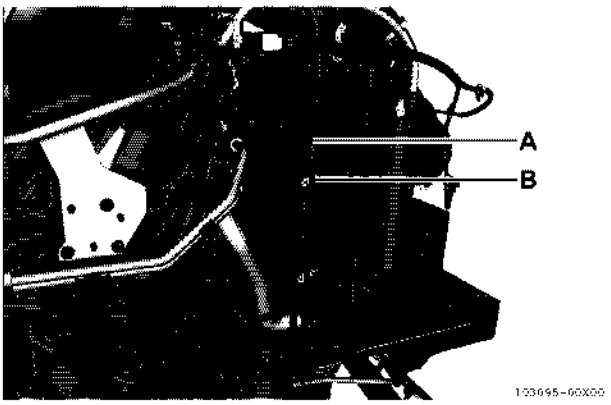
IMPORTANT
- Pay close attention to safety when hanging the cabin.
- Make sure that 2 or more people implement the task, and check that no parts have been removed and forgotten or that parts are snagging while lifting slowly.

NOTE
- When disassembling the transmission subsequently, if the cabin is in the way, remove the heater hose to enable the cabin to be moved slightly sideways. However, make sure to work within range of the cooler hose.

2. Removing the heater hose

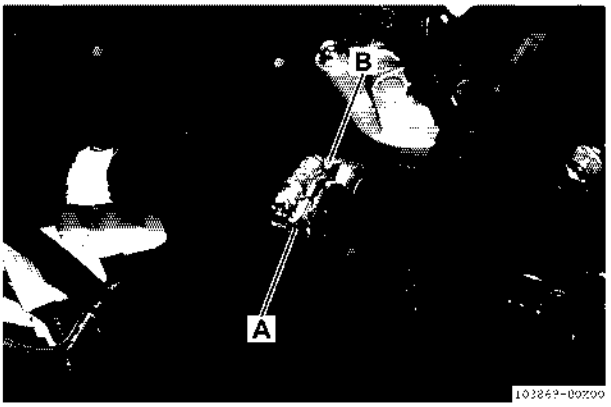
1. Vent the engine coolant.
   (1) Place a drain pan underneath the radiator rubber cap.
   (2) Take out the drain hose (A), and remove the clevis pin (B) to drain water.
   (3) After draining the water, set the clevis pin (B) and the drain hose (A) to the original positions.

   (A) Drain hose
   (B) Clevis pin

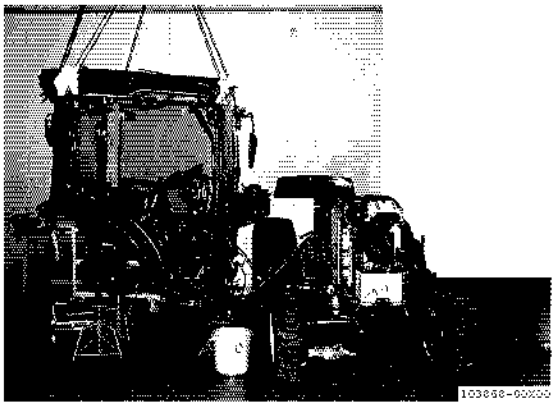


2. Remove the heater hose. (x2)

   (A) Clamp 22
   (B) Clip



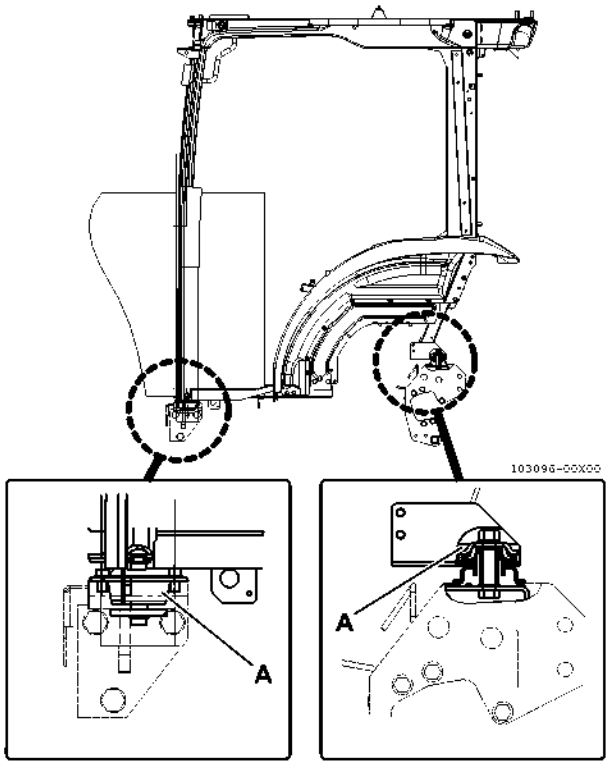
NOTE
- When removing the heater hose, place the cabin close to the device beforehand.



3. Cabin Assembly

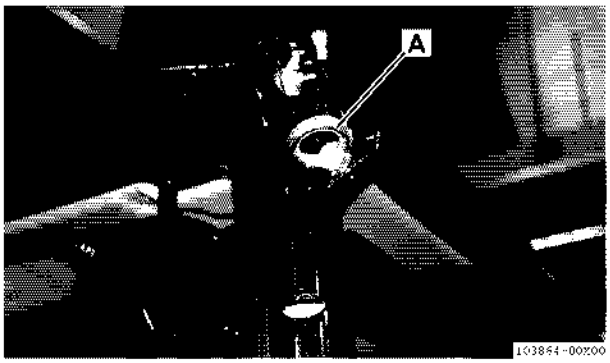
1. Set the anti-vibration rubber (A) for the cabin mount.

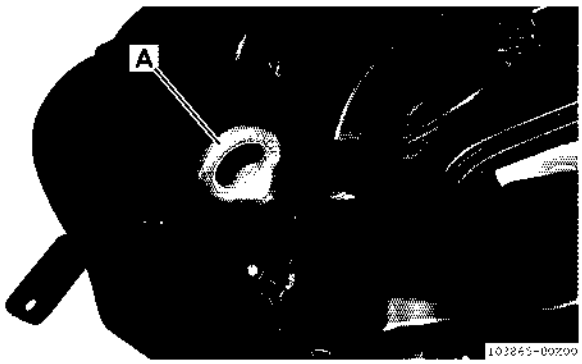
   (A) Anti-vibration rubber



2. Set the cabin hangers (eye bolts) (A) x4.

   (A) Hangers (M12 eye bolts) (x4)





3. Hang the cabin, and mount to the cabin mount.

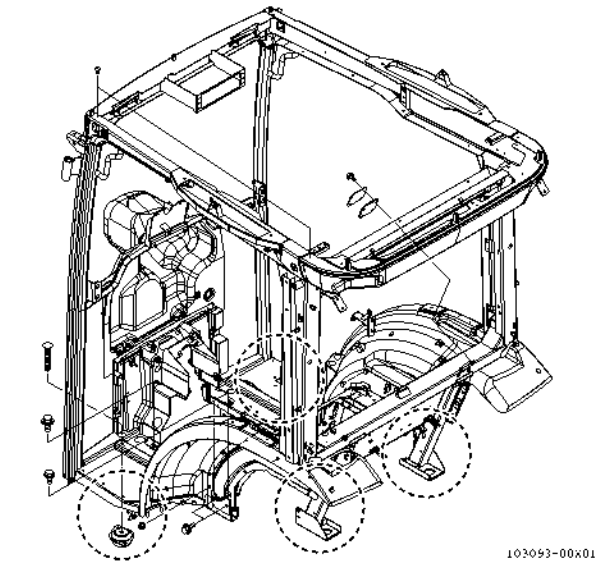
IMPORTANT

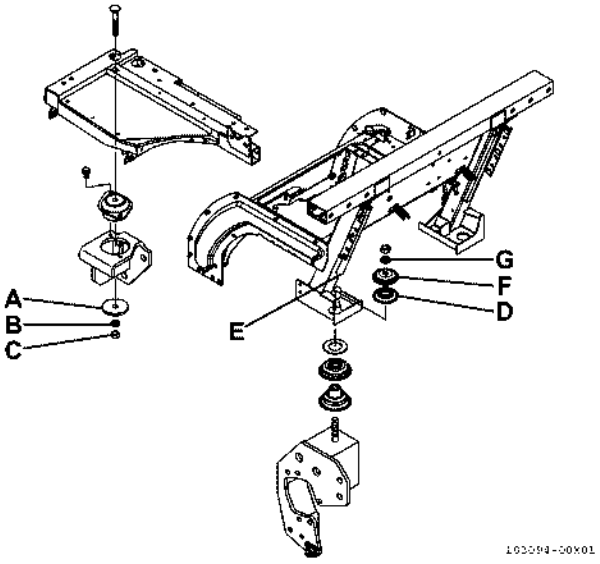
- Make sure this task is implemented by 2 or more people while paying attention to lever interference and deformation.

4. Mount the floor mount (A) nuts (x4: front, back, left, and right).

- Front
  - ***(A) Stopper (x2)***
  - ***(B) Washer, spring 12 (x2)***
  - ***(C) M12 nuts (x2)***

- Rear
  - ***(D) Mount, upper (x2)***
  - ***(E) Stopper, U (x2)***
  - ***(F) Washer, spring 14 (x2)***
  - ***(G) M12 nuts (x2)***



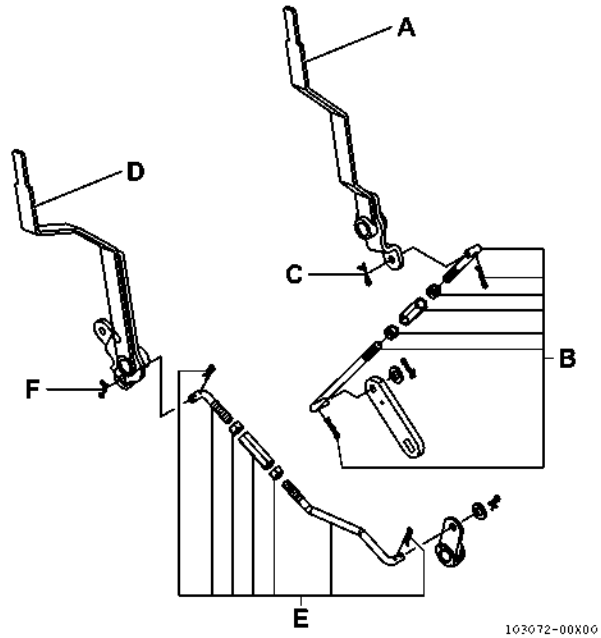


5. Assemble the lever links and wires.
   Left:
   (1) Connect the range shift lever links.

   (A) Range shift lever
   (B) Shift rod
   (C) Snap 8 pin (x1)

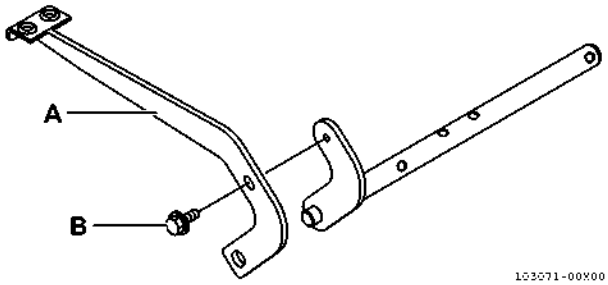
   (2) Connect the PTO shift lever links.

   (D) PTO shift lever
   (E) PTO rod
   (F) Snap 8 pin x1



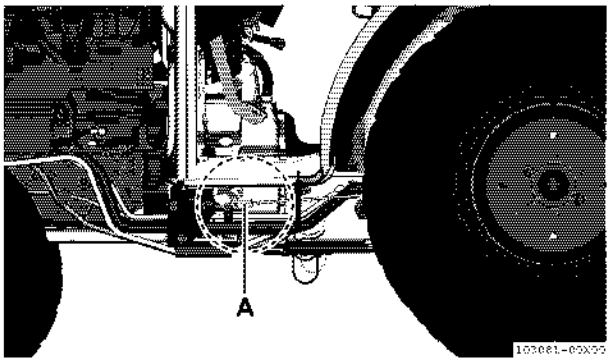
(3) Mount the differential lock pedal (A).

(A) Differential lock pedal
(B) M8 x 16 plated bolt (x1)

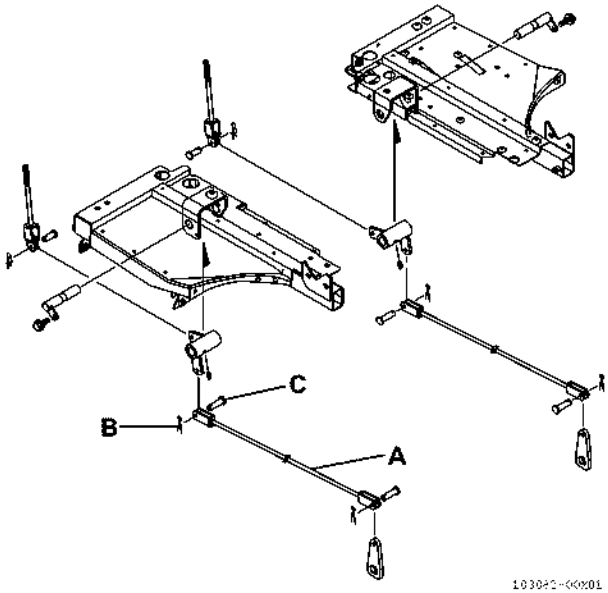


(4) Connect the left brake rod (A).

(A) Left brake rod
(B) Cotter pin (Replace with new product)
(C) Flat head pin



IMPORTANT
- After assembling the cabin, adjust the brake pedal play.

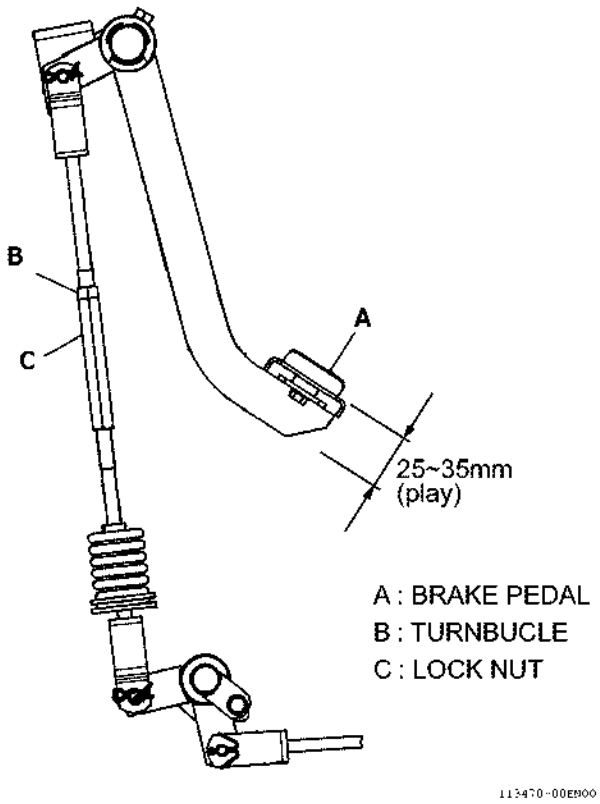


(5) Brake pedal Adjustment Procedure

⚠ WARNING

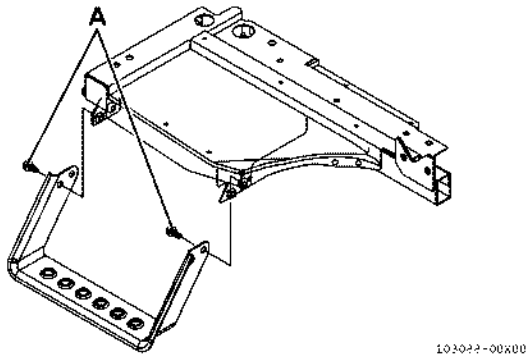
- **Adjust brake pedal free travels evenly to prevent tractor from swerving to one side when coupled pedals are depressed.**

1) Press the brake to check required play 25 - 35mm.
2) Measure brake pedal (A) free travel at top of brake pedal stroke before engaging the brakes.
3) If free travel is more than 35mm, loosen the brake link lock nut (B) and adjust the turnbuckle (C: left and right) to obtain 25mm free travel.
4) Tighten the lock nuts securely.
   Tightening torque: 25 to 32 N·m



(6) Mount the auxiliary step.

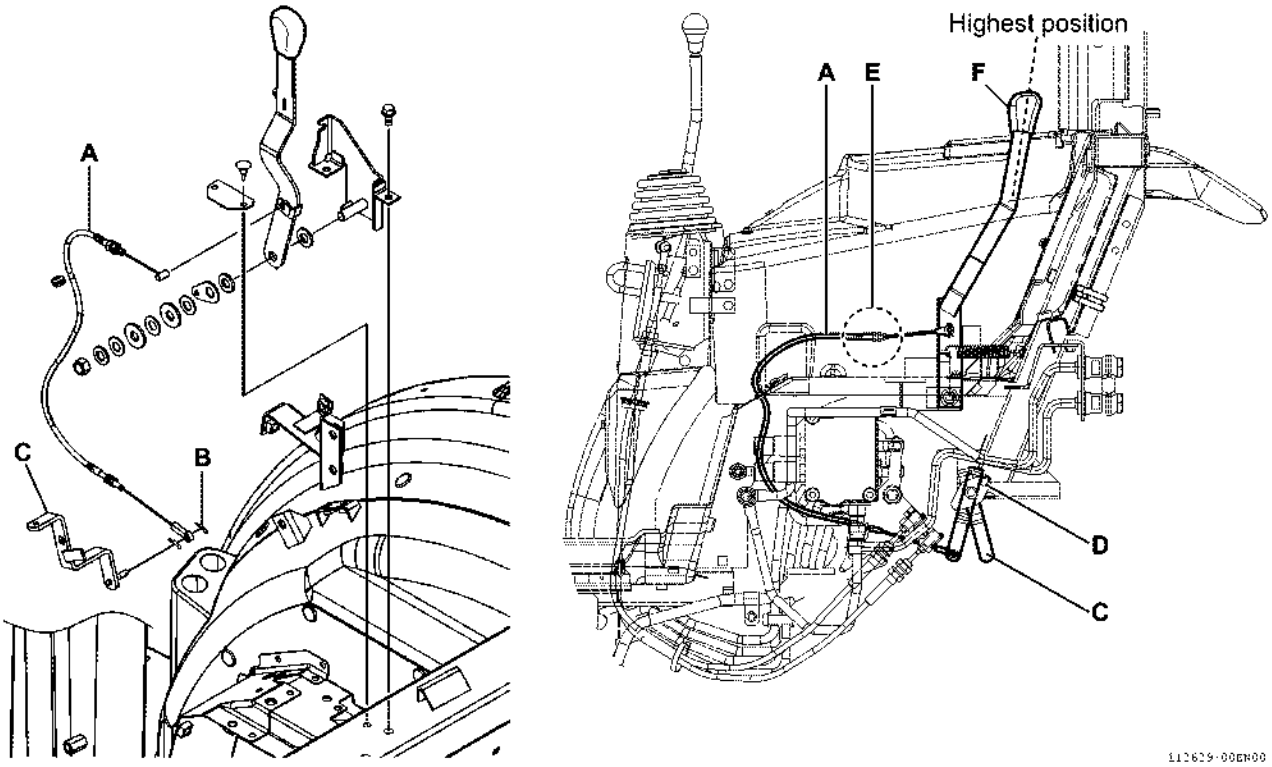
(A) M8 x 16 bolts (x2)



6. Mounting the parts on the right
   (1) Mount the wire (A) for the position control lever (E).

(A) Position control lever wire
(B) Stopper snap pin (x1)
(C) Lever arm
(D) Stopper
(E) Position control lever

IMPORTANT
- After assembling the cabin, adjust the position control lever wire (A).



Position Lever Adjustment Procedure

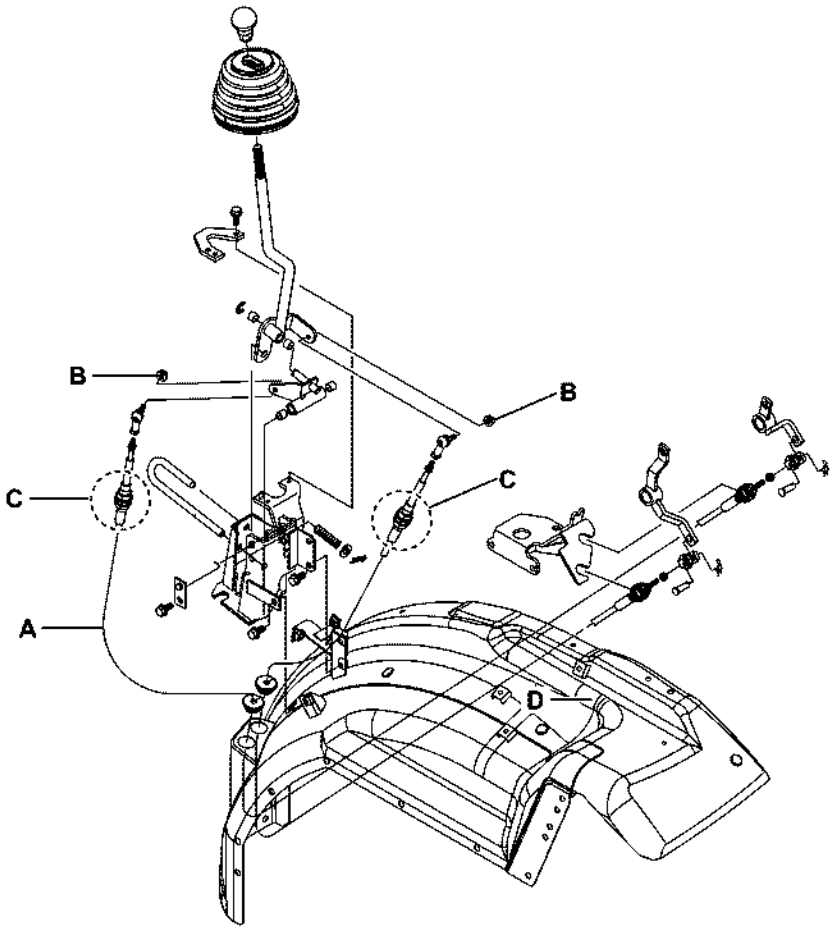
1) Secure he lever wire nut (E) like part H.
2) Mount the position control wire (A) to the lift lever arm (C).
3) Raise the position control lever (F) to its highest position.
4) Connect the lever arm to the stopper (D).
5) Secure the hydraulic lift wire nut while maintaining the status described above.

IMPORTANT
- Make sure there is no gap between the lever arm (C) and the stopper (D).

(2) Mount the loader lever operation wires (A).

(A) Operation wires x2
(B) M6 nuts (x2)
(C) Nuts M12 (x2)

IMPORTANT
- Be careful to thread the wires (x2) correctly.
- After assembling the cabin, adjust the loader valve wires.



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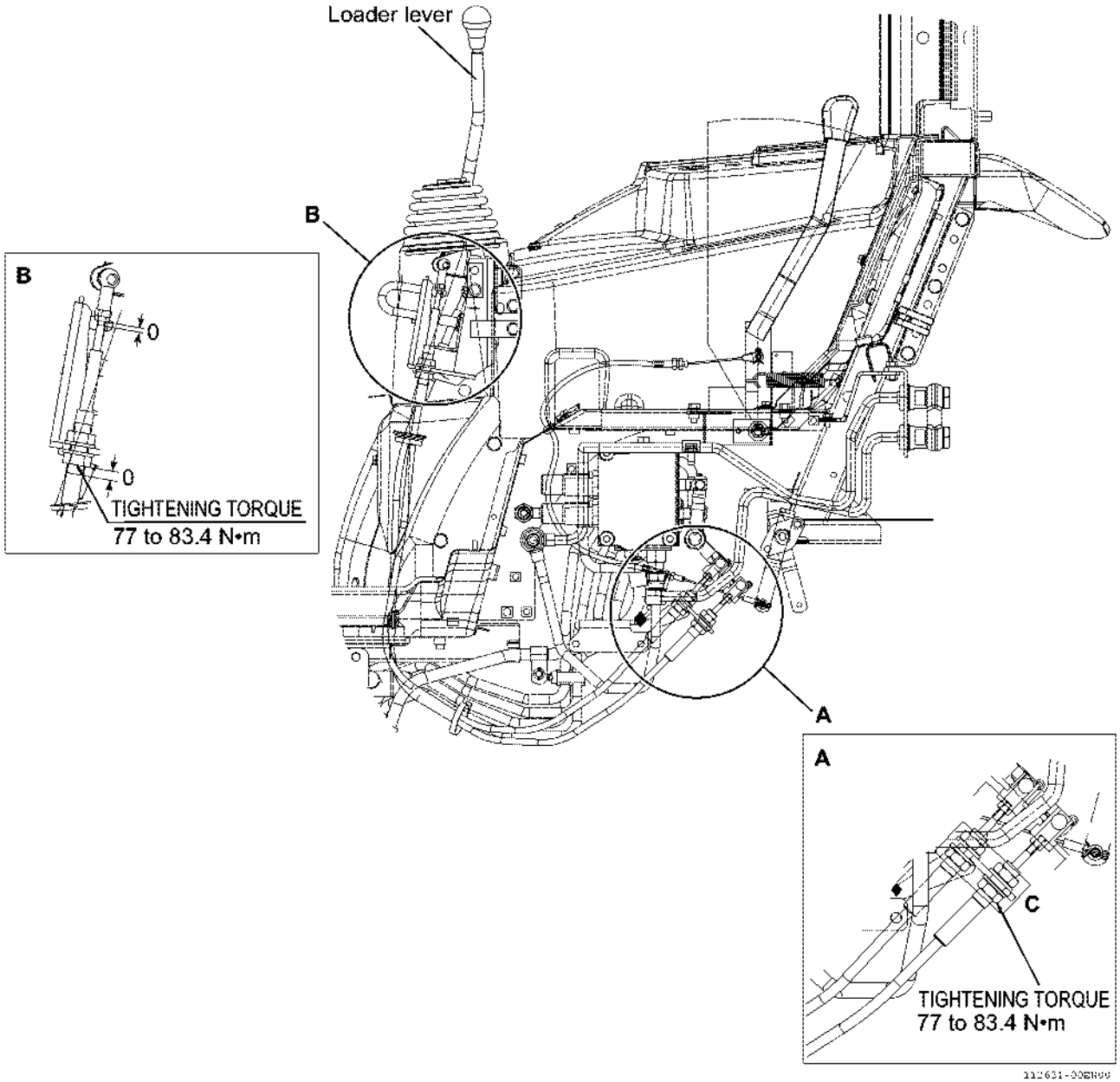
(3) Adustment of Loader lever

1.Wire shall be adjusted to the dimentsions of figure E when the loader lever is set to the locked position.

2.Loader lever is adjustted by F part to be able to lock loader lever when nutral position.

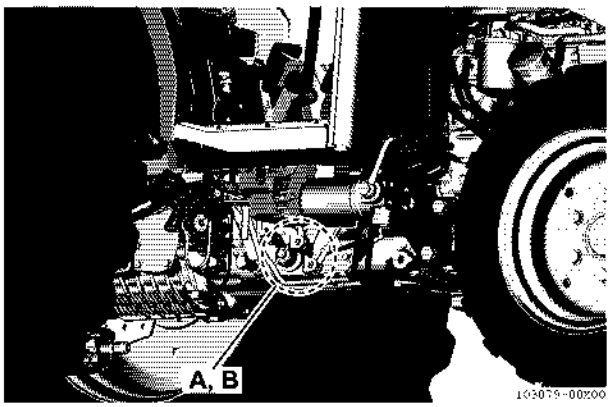


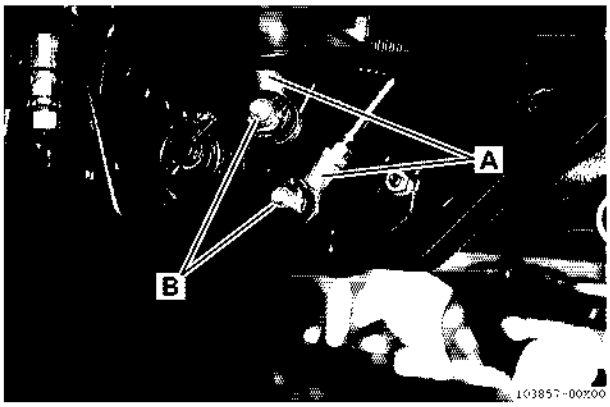
(4) Mount the forwards and backwards travel pedal rods.

(A) Pedal links (front and rear)
(B) M8 nuts (x2)

*After assembling the cabin, adjust the forwards and backwards travel pedals.

Excerpt from assembly diagram Z1-A8405-2980



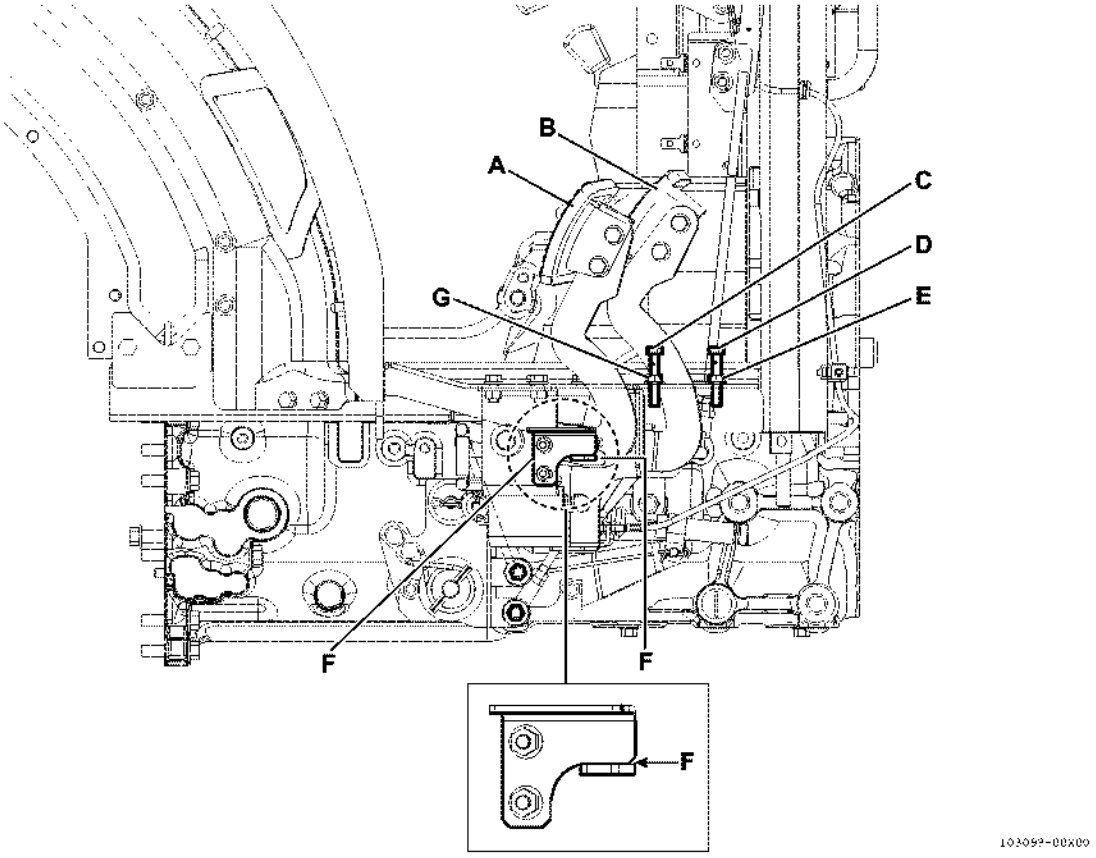


HST Pedal Stopper Adjustment Procedure

Left side: Move the HST pedal (B) to the T/M stopper (D), and use a 1/4 rotation to loosen the condition whereby the bolt head of D and the pedal are in contact, and lock using the nut (E).

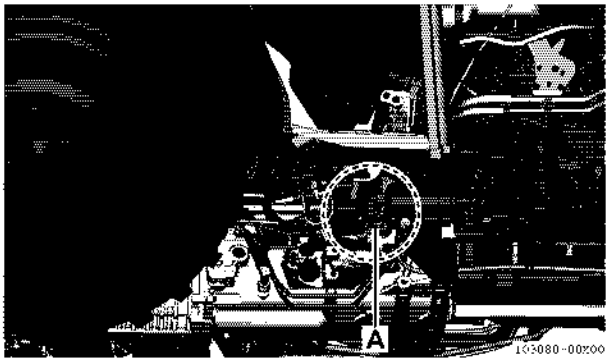
Right side: Adjust the height of the bolt C head to 31.51mm, and lock using the nut (G).

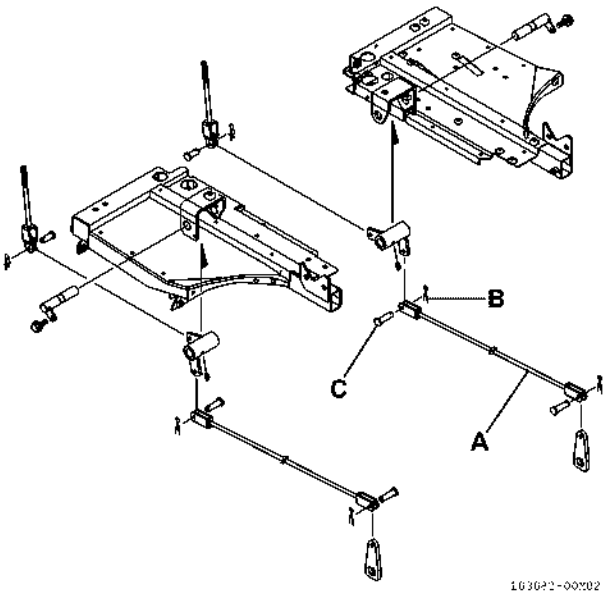
After assembling and adjusting the HST pedal unit, mount part H so that the gap with F is 0.



(5) Connect the right brake rod (A).

(A) Right brake rod
(B) Cotter pin (x1) (Replace with new product)
(C) Flat head pin (x1)

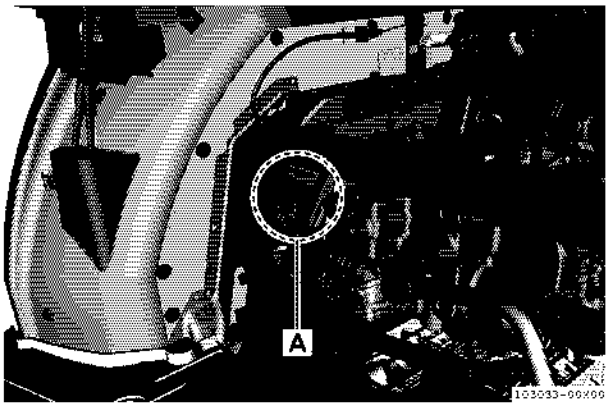




IMPORTANT
- After assembling the cabin, adjust the brake pedal play.

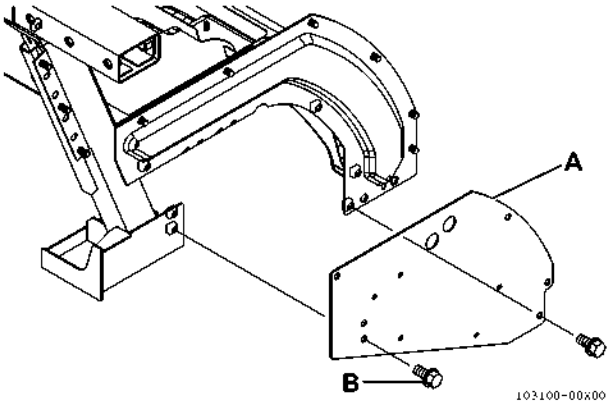
(6) Connect the harness coupler (A) for the transmission and cabin.

(A) Harness coupler



(7) Mount the right fender lower cover (A).

(A) Fender lower cover
(B) M8 x 16 bolts (x6)

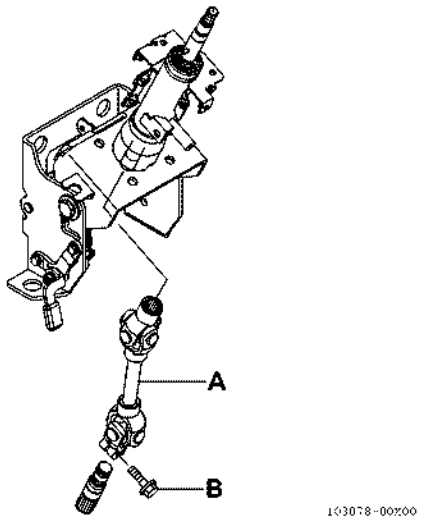


IMPORTANT
- Do not forget to mount the buzzer coupler.

7. Mount the steering shaft (A).

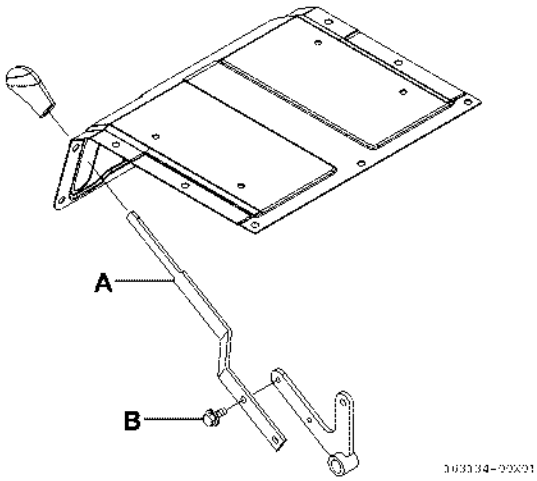
IMPORTANT
- Coat the spline with grease.
- Coat the M8 bolts with LOCTITE TB1401 or equivalent product.

(A) Steering shaft
(B) M8 x 30 plated bolt (x1)



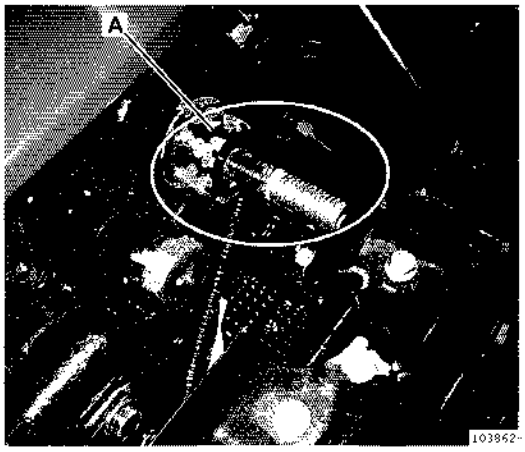
8. Mount the 4WD lever (A).

(A) 4WD lever
(B) M8 x 12 plated bolt (x1)



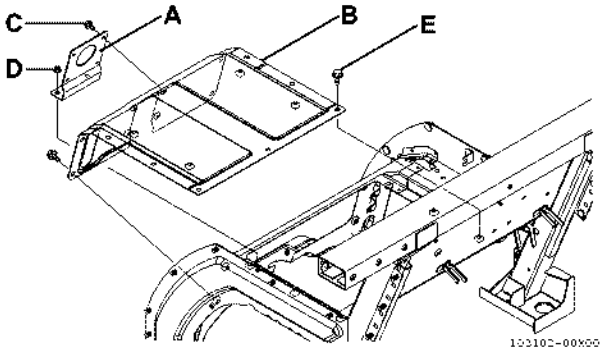
9. Mount the fittings inside the cabin.
   (1) Mount the stop valve assembly (A).

(A) Hydraulic slow return valve assembly



(2) Mount the cover seat B cover (A) and the seat cover (B).

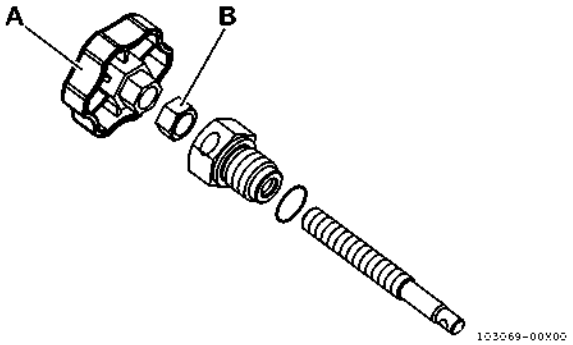
(A) Cover seat B cover
(B) Seat cover
(C) M8 x 16 plated bolt (x1)
(D) M6 nuts (x2)
(E) M6 x 12 plated bolts (x4)

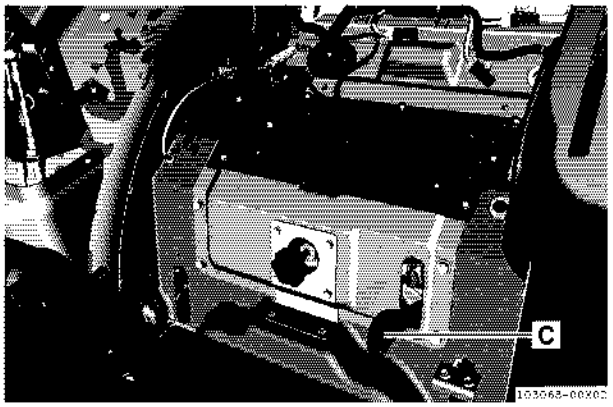


(3) Mount the hydraulic slow return valve knob (A) and the 4WD lever knob (C).

NOTE
- The 4WD lever knob is orange.

(A) Stop valve knob
(B) M10 nut x1
(C) 4WD lever knob



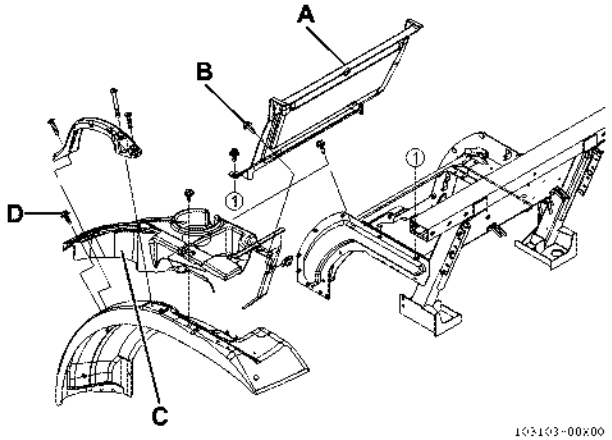


(4) Temporarily mount the driver's seat rear cover (A).

(A) Driver's seat rear cover
(B) M6 x 20 bolts (x2)

(5) Connect the external power supply discharge coupler, and mount the lever guide (C) to the left of the driver's seat.

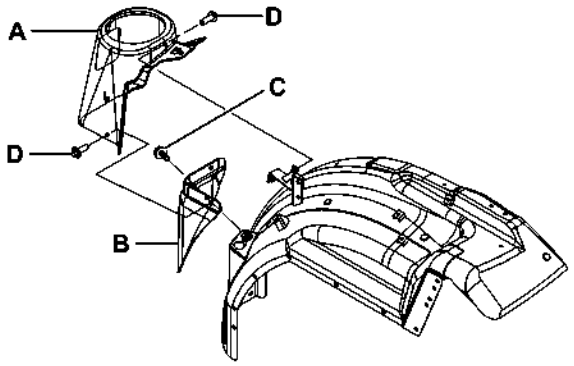
(C) Lever guide
(D) M6 x 20 bolts (x4)



(6) Mount the range shift lever knob (orange) and the PTO shift lever knob (yellow).

(7) Mount the loader lever covers (A and B).

(A) Loader lever cover A
(B) Loader lever cover B
(C) M6 x 20 bolt (x1)
(D) Push rivets (x2)



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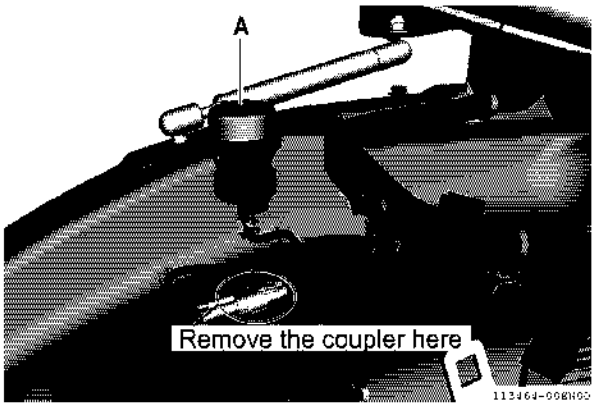
(8) Mount the PTO switch (A) and mount the right lever guide.

(A) PTO switch



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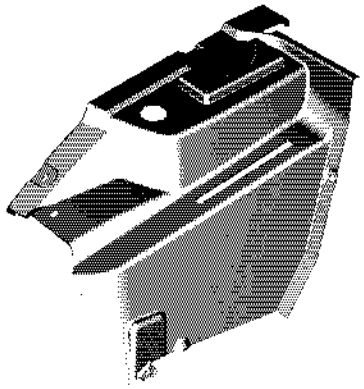
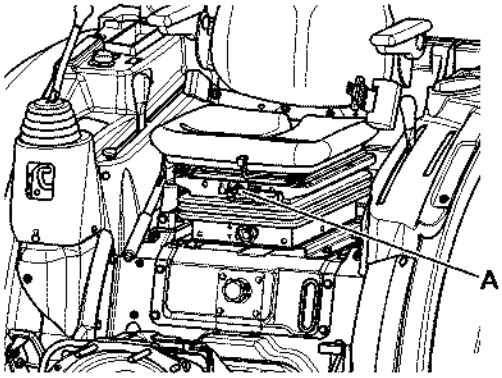
(B) Right lever guide
M6 x 20 bolt (x5)

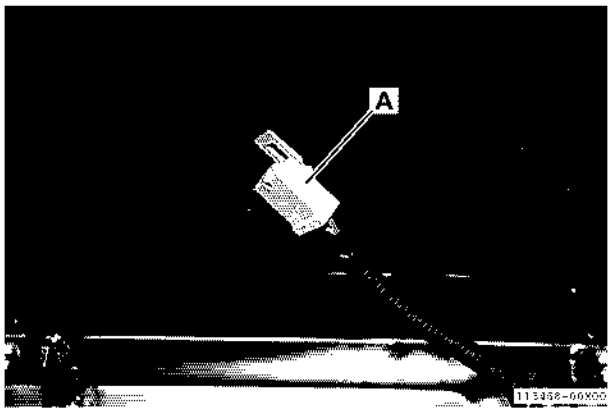


112466-00X00

(9) Mount the seat.
M8 x 16 plated bolts (x4)
(10)Connect the seat switch coupler, and secure the bands.

(A) Seat switch coupler



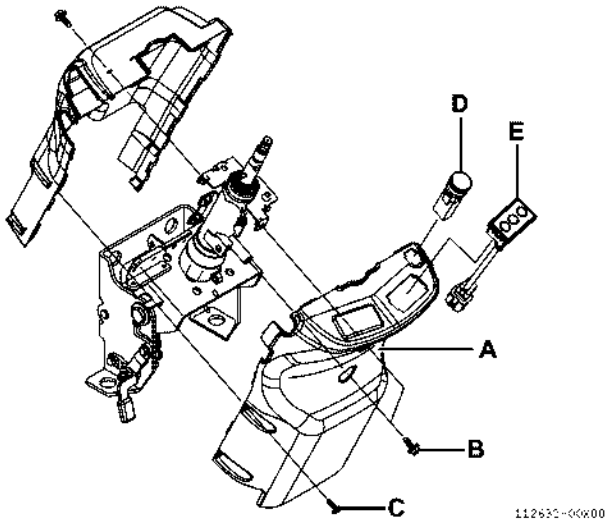


(11)Mount the column cover (A).

(A) Column cover
(B) M6 x 20 bolts (x2)
(C) Tapping M5 x 16 screws (x4)

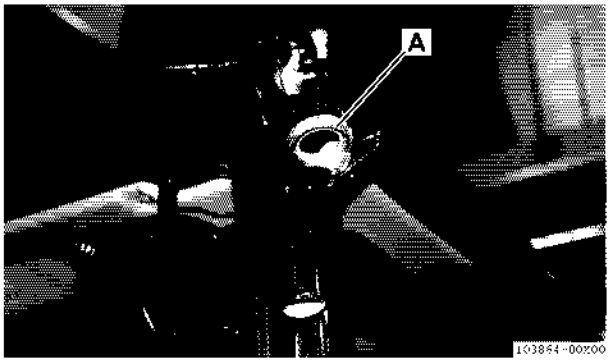
(12)Connect the DPF regeneration switch (D) and traveling switch (E) couplers.

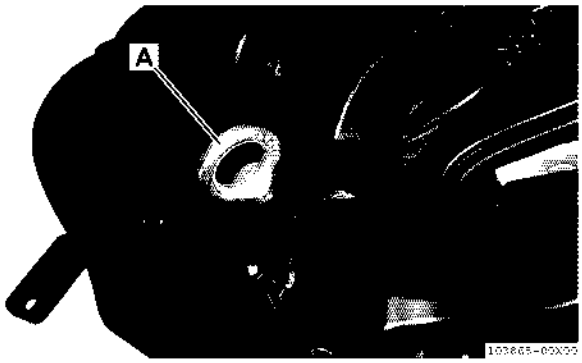
(D) DPF regeneration switch coupler
(E) Traveling switch coupler



(13)Remove the cabin hangers.
Front and back x4

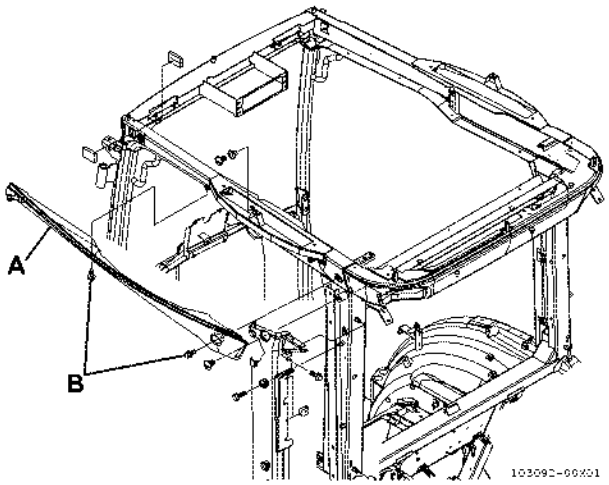
(A) Hangers (M12 eye bolts) (x4)





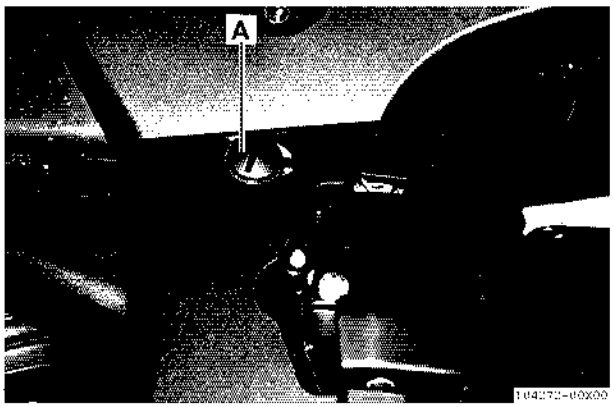
10. Mount the left and right roof covers (A).

(A) Roof covers right and left x1 each
(B) M8 x 16 bolts right and left x3 each



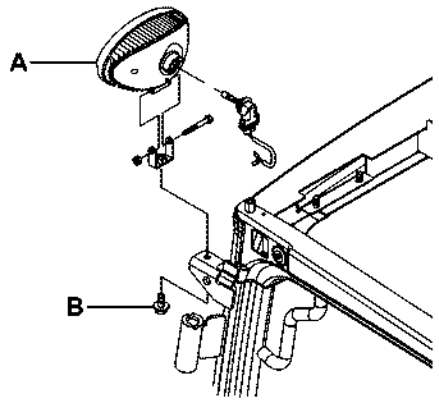
(1) Mount the bolt caps (A) to the screws holes for the cabin hangers.

(A) Bolt cap left and right x1 each



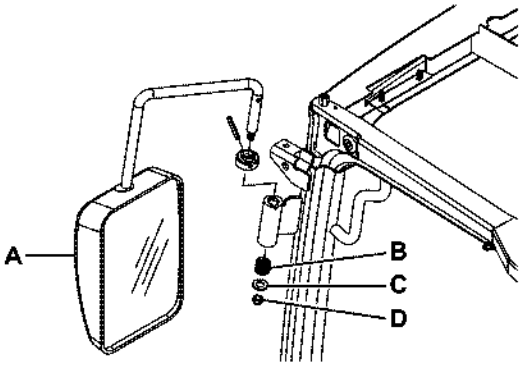
(2) Mount the cabin work lights.

(A) Work lights left and right x1 each
(B) M8 x 16 bolts right and left x1 each



(3) Mount the mirrors.

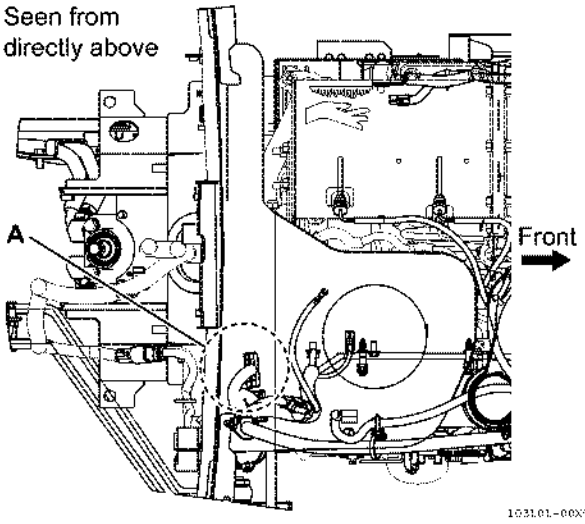
(A) Mirrors right and left x1 each
(B) Spring friction right and left x1 each
(C) Washers 12 right and left x1 each
(D) Nuts, M10 right and left x1 each



11.Assemble the engine rotation.

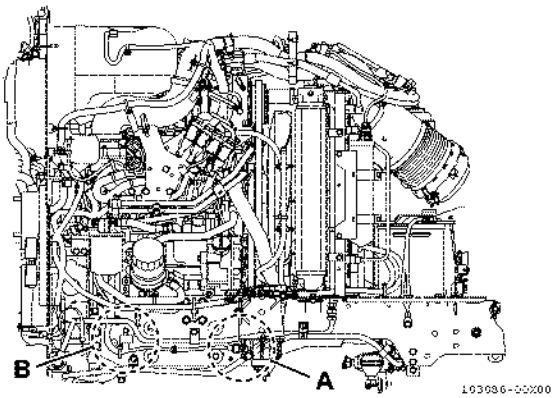
(1) Connect the couplers (A) for the floor harness and engine harness (x2).

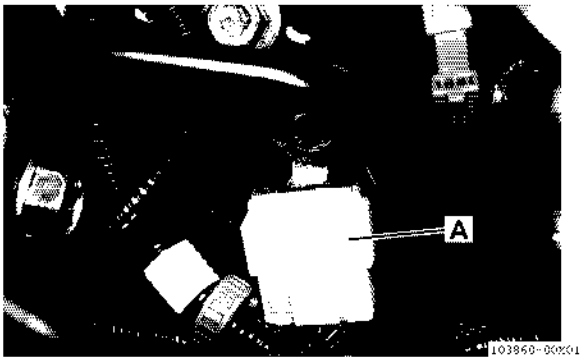
(A) Connection coupler



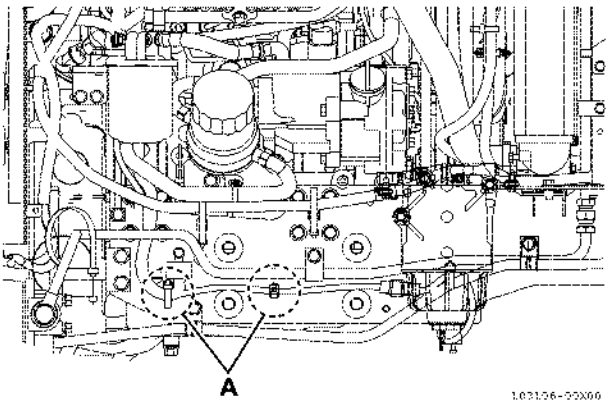
(2) Mount the ground terminal (A) to the front axle bracket, and connect the water separator coupler (B).

(A) Ground terminal
(B) Water separator coupler



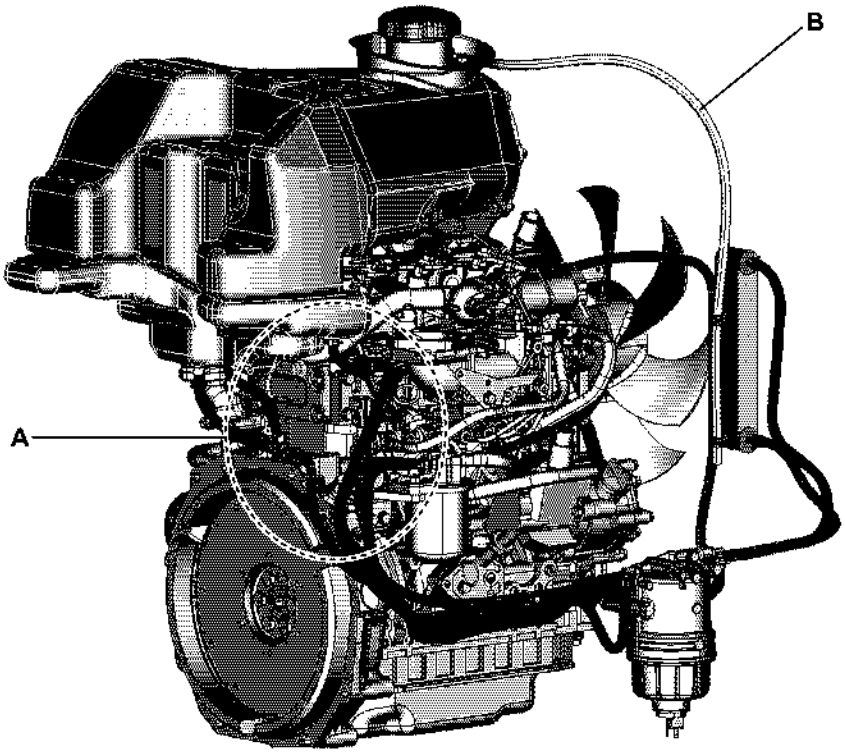


(3) Clamp (A) the harness as it was before.



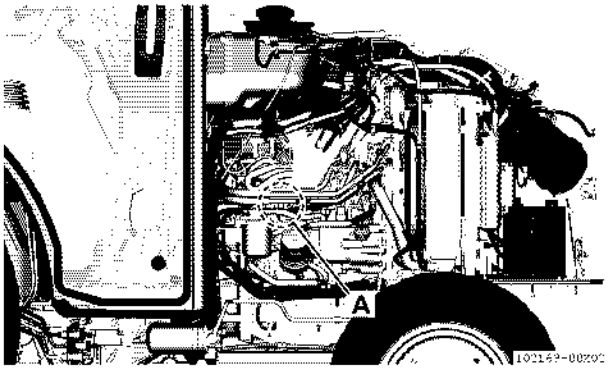
Mount the fuel hose (A) that connects the fuel tank and the water separator, and align the fuel inlet overflow hose (B), and clamp as it was before.(A) Fuel hose

(B) Overflow hose



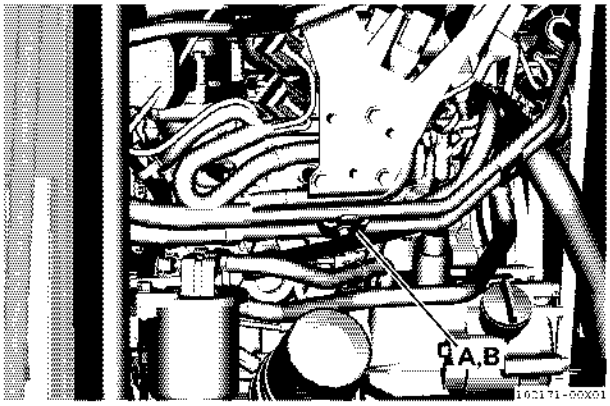
(4) If the heater hoses have been removed, remount two AC heater hoses (A).

(A) Heater hose



(5) Clamp the AC hose as it was before.

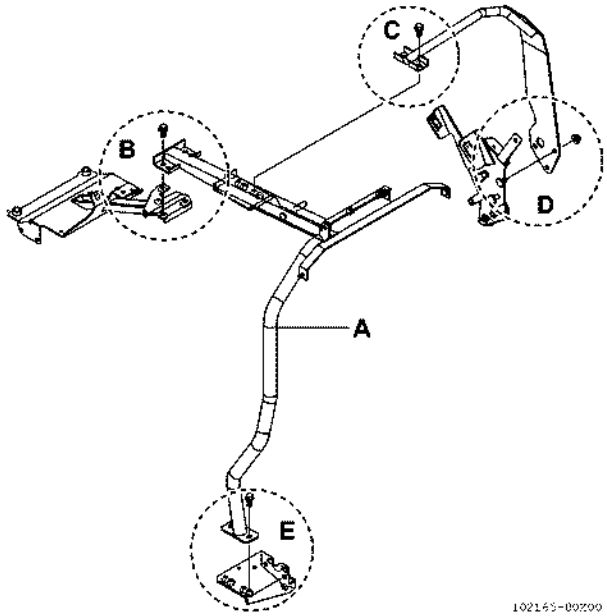
(B) Clamp (A) Clamp
(C) M8 x 30 bolts (x1)



12.Mount the hood.
(1) Mount the engine rear frame (A).

(A) Engine rear frame
(B) M8 x 16 bolts (x2)
(C) M8 x 16 bolts (x2)
(D) M8 nuts (x3)
(E) M8 x 16 bolts (x2)

IMPORTANT
- The mounting hole positions differ between the ROPS and CAB specifications.

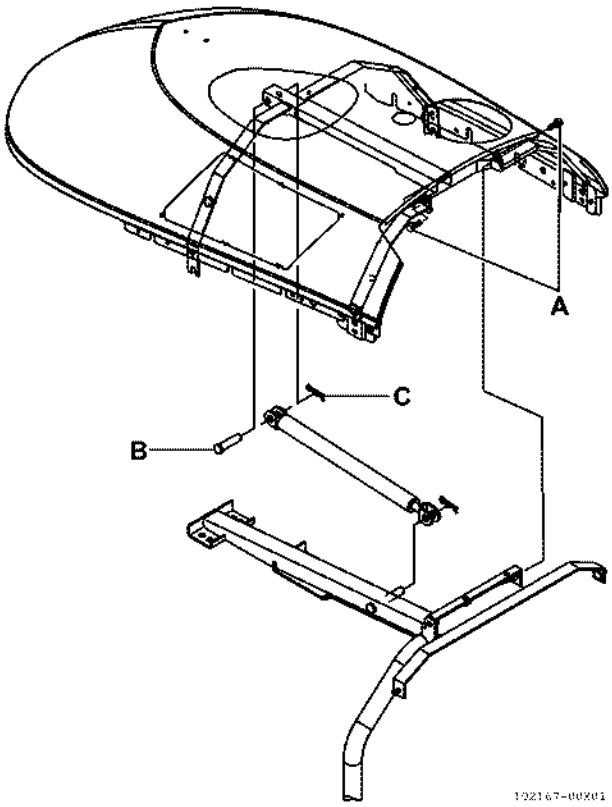


(2) Mount the hood.

(A) Stepped M8 bolts (x2)

(3) Mount the gas dampers.

(B) Pin 10 x 35 (x1)
(C) Snap pin 10 (x1)

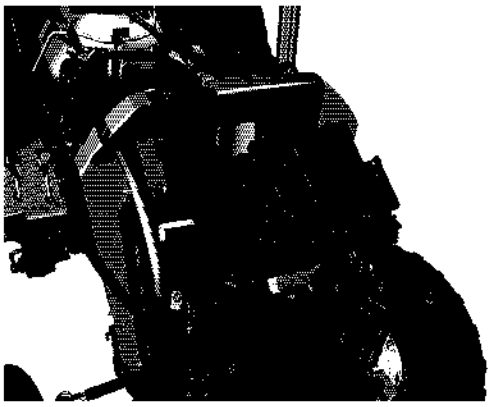


(4) Connect the headlight coupler, and clamp the harness.

13.If the heater hoses have been removed and the coolant vented, replenish the engine coolant.

NOTE

- If the heater hoses have been removed and the coolant vented, set the AC control panel in the cabin on the heater, and operate the engine for approx. 10 minutes until the heater operates. Doing so will cause the hot water (coolant) in the heater hose to flow into the cabin, reducing the coolant in the radiator. At this time, replenish the coolant once again.



14.Refuel the fuel tank.

15.Connect the battery terminals, and check that the engine starts normally and that all parts are operating normally.

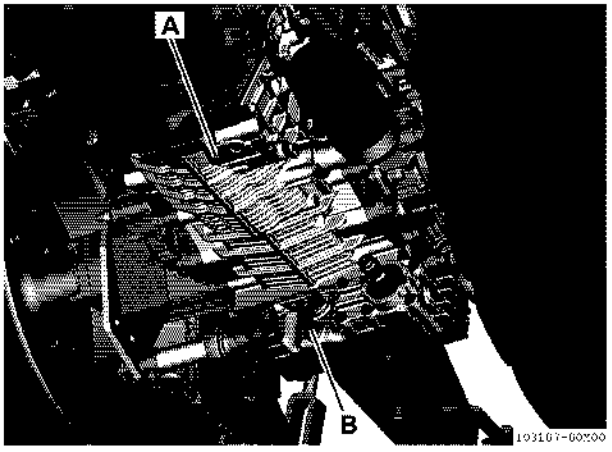
16. Separating the Clutch Housing

1. Preparation for Separation

Separate the cabin or floor before separating the clutch housing.

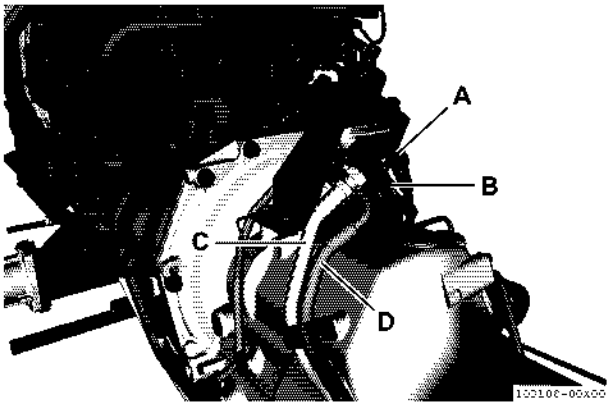
1. Remove the transmission drain plug (A) and mid-PTO output case drain plug (B), and vent the transmission oil.

   (A) Transmission drain plug
   (B) Mid-PTO output case drain plug



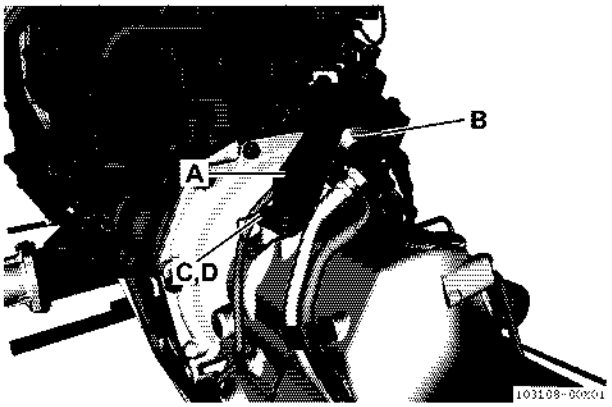
2. Remove the power steering pipes (x4).

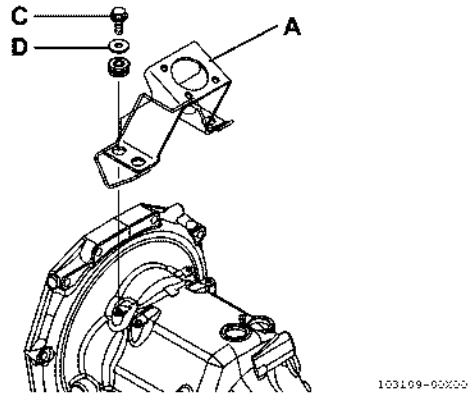
   (A) PST valve-left PST cylinder (L port)
   (B) PST valve-right PST cylinder (R port)
   (C) PST valve-left oil cooler (T port)
   (D) PST valve-hydraulic pump (P port)



3. Use the assembly to remove the PST VA. bracket assembly (A) and PST valve (B).

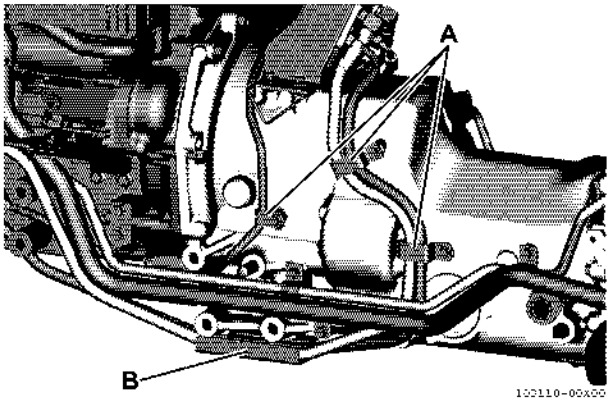
   (A) PST VA. bracket assembly
   (B) PST valve
   (C) M8 x 25 plated bolts (x4)
   (D) 8 washers (x4)



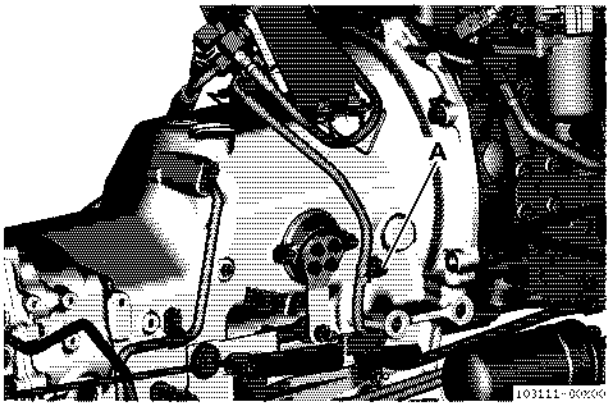


4. Remove the hose clamps (A) and hose brackets (B).

Device left side (x3)
(A) Hose clamp (x3)
M8 x 16 plated bolts (x3)
(B) Hose bracket (x1)
M8 x 16 plated bolts (x2)

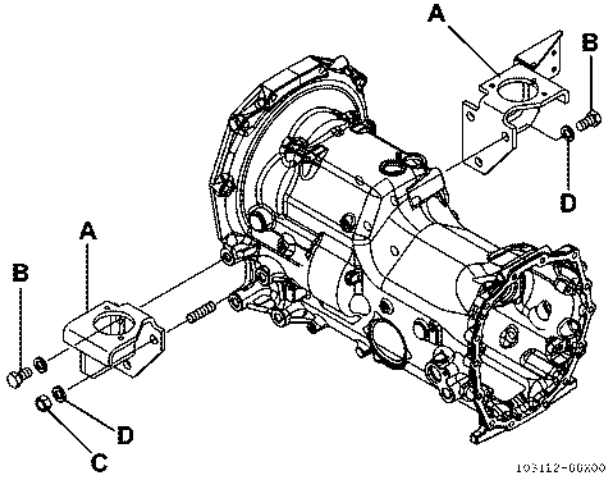


Right side (x1)
(C) Hose clamp (x3)
M8 x 16 plated bolt (x1)

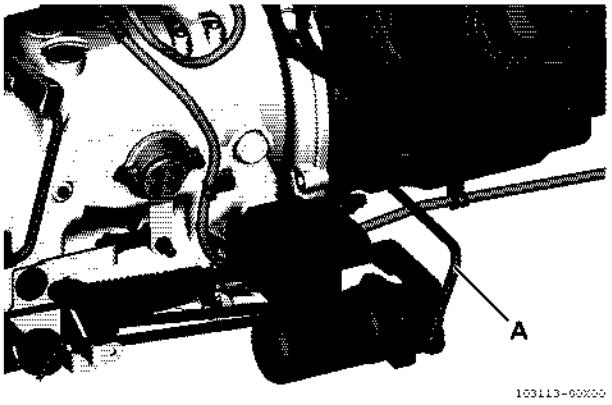


5. Remove the floor mount (A) on the left of the clutch housing assembly.

(A) Floor mount
(B) M16 x 30 plated bolts (x2)
(C) M16 nut (x1)
(D) Spring 16 washers (x3)



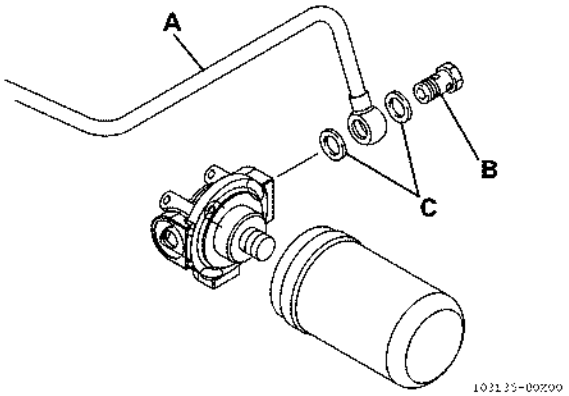
6. Remove the pipe (A) connected to the oil cooler on the line filter side.



103113-00X00

NOTE
- During assembly, make sure to replace the copper packing (C) with a new part.

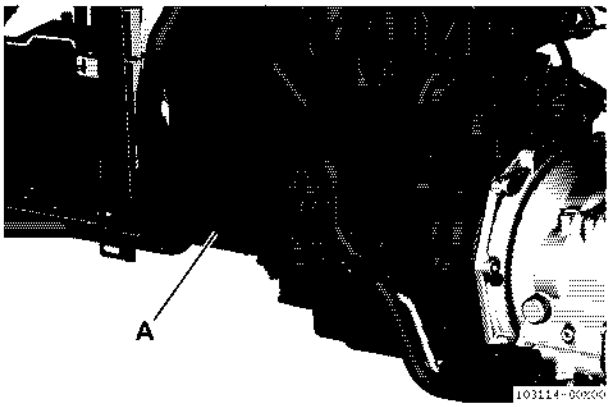
(A) Pipe
(B) Joint (PF3/8)
(C) Gasket U17



103125-00X00

7. Remove the cover plate assembly (A) on the left of the engine.

(A) Cover plate assembly
- ***M6 nuts (x2)***
- ***6 washer (x1)***
- ***M6 x 16 plated bolt (x1)***



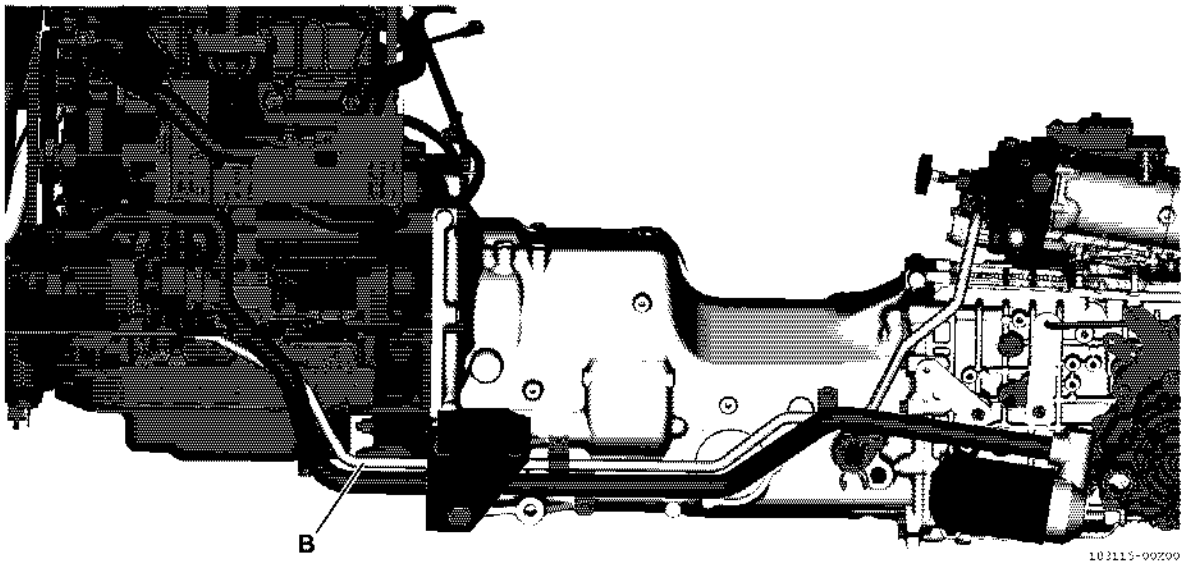
103114-00X00

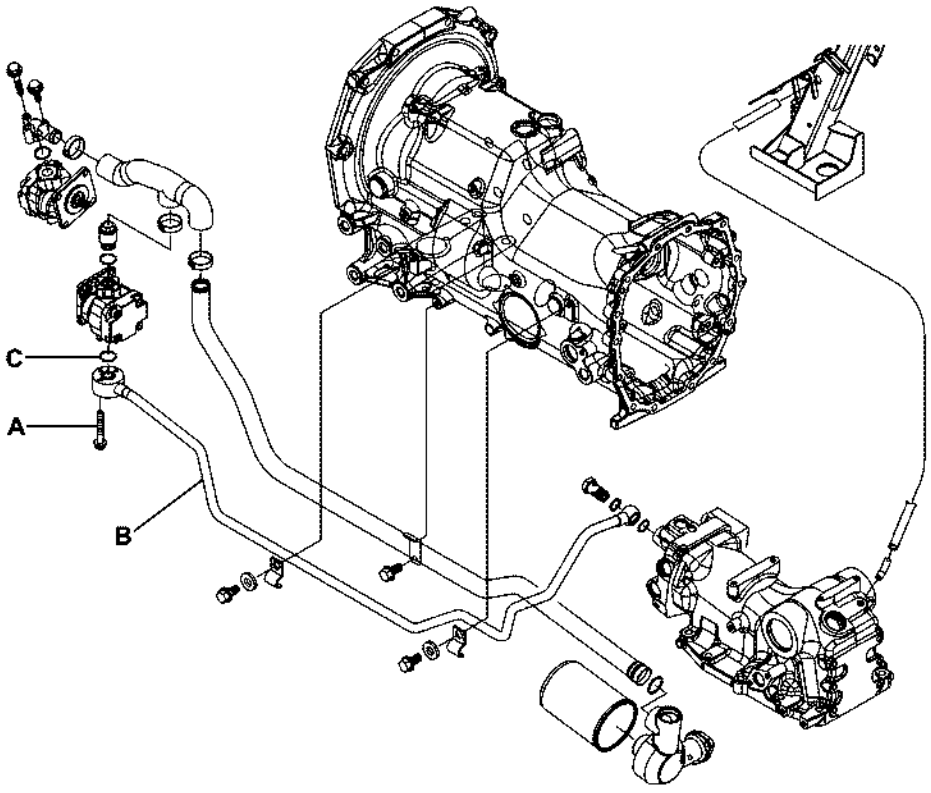
8. Remove the bolts (A) for the high-pressure pipe pump.

(A) M6 x 40 plated bolts (x3)

IMPORTANT
- Be careful not to drop the O-ring (1AP20.0) (C).

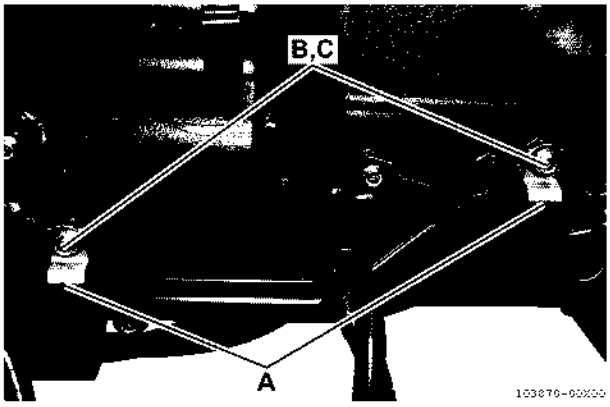
(B) Pump pipe assembly
(C) O-Ring (1AP20.0)





9. Remove the high-pressure pipe clamps (x2).

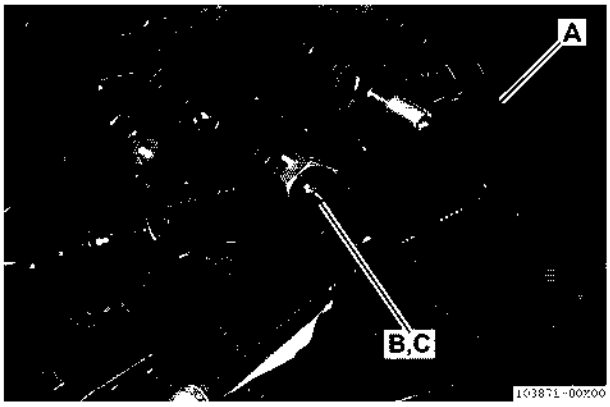
(A) Clamps
(B) M8 x 16 plated bolts (x2)
(C) 8 washer (x2)



10. Remove the high-pressure pipe (A) on the hydraulic head.

(A) High-pressure pipe
(B) Joint bolt assembly (x1)
(C) 18 x 1.0 gaskets (x2)

NOTE
- During assembly, make sure to replace the copper packing with a new part.

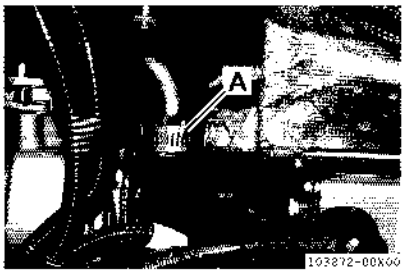


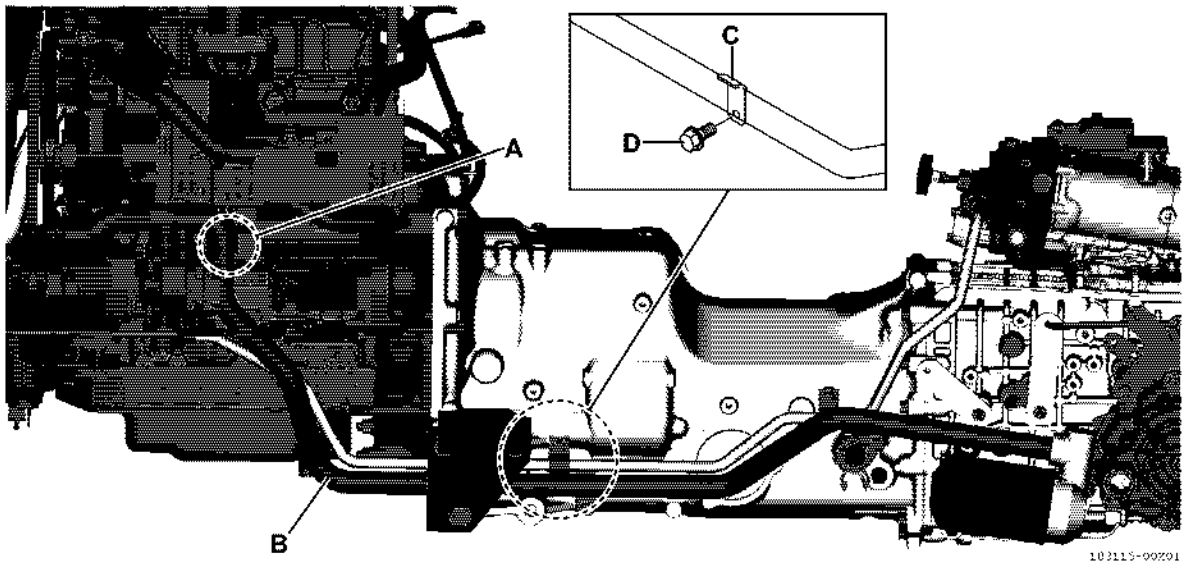
11. Loosen the hose clips (A) on the hydraulic pump low-pressure pipe, and remove the low-pressure pipe (B).

(A) Hose clip 31
(B) Low-pressure pipe

12. Remove the low-pressure pipe clamps (A).

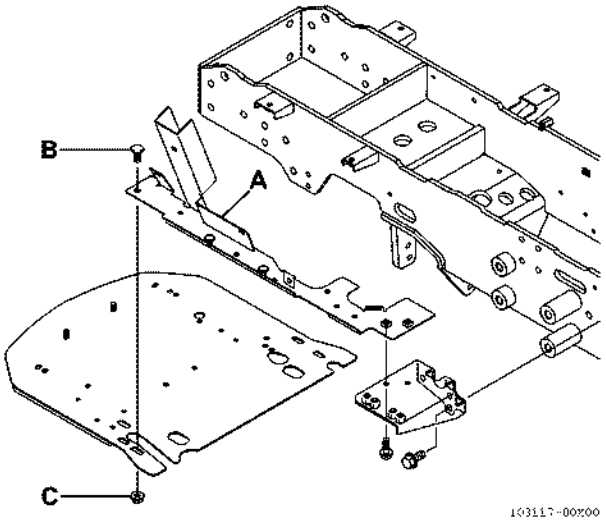
(C) Clamps
(D) M8 x 16 plated bolt (x1)





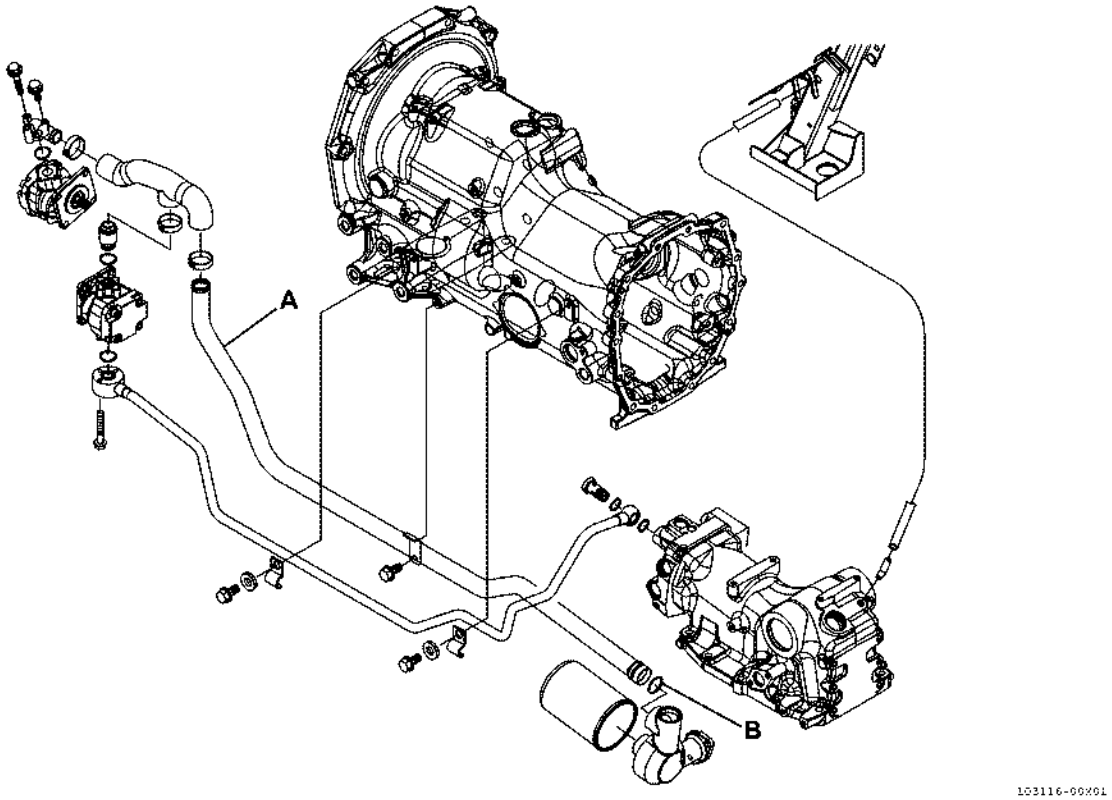
13.Remove the current plate assembly (A) under the hydraulic pump.

(A) Current plate assembly
(B) M6 x 16 plated bolts (x3)
(C) M6 nut (x1)



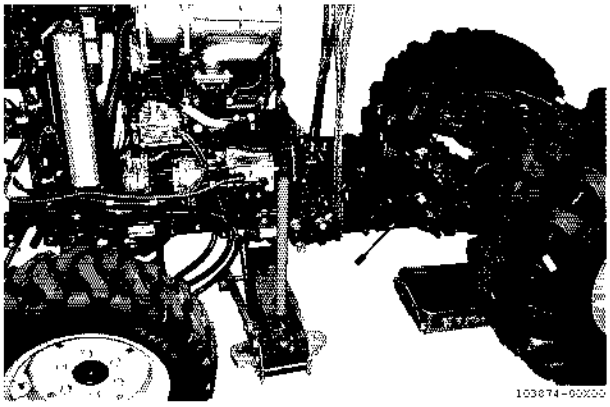
14.Remove the low-pressure pipe (A).

NOTE
- Be careful not to drop the filter O-ring (1AP26.0) (B).



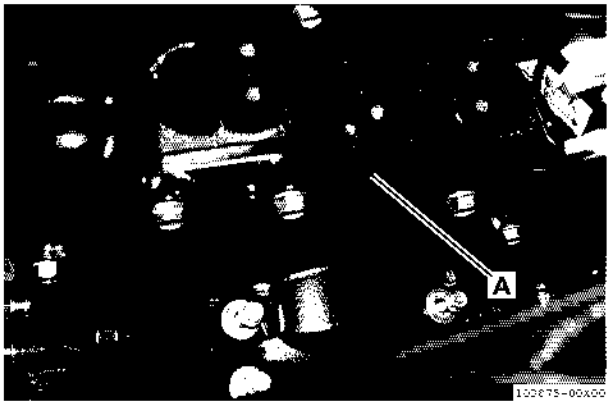
15.Slide the snap ring on the front axle to the back.
Remove the front propeller shaft.

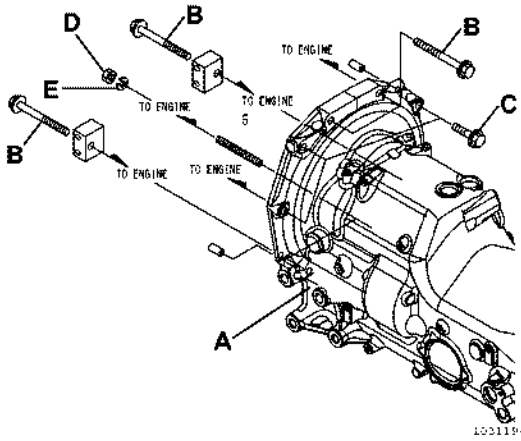
16.Jack UP the transmission and engine (or suspend from a crane).

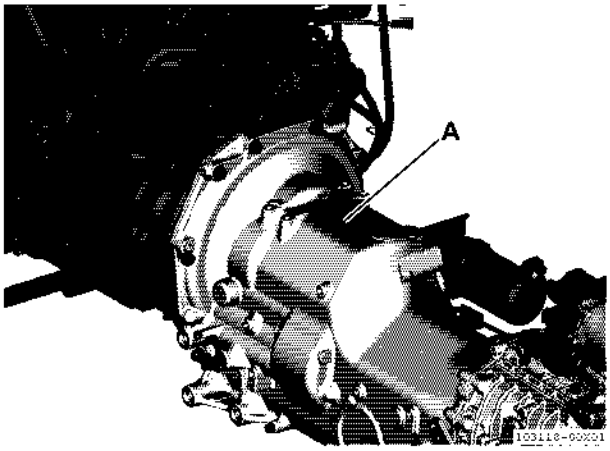


17.Remove the tightening bolts for the clutch housing (A).

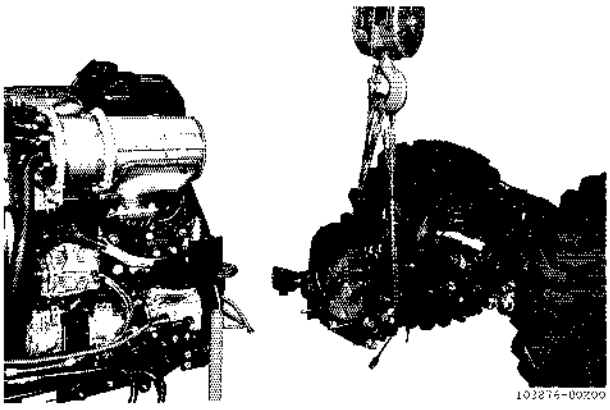
(A) Clutch housing
(B) 12 x 120 bolts (x4)
(C) M12 x 50 plated bolts (x3)
(D) M12 nuts (x2)
(E) Spring 12 washers (x2)







18.Separate the clutch housing.

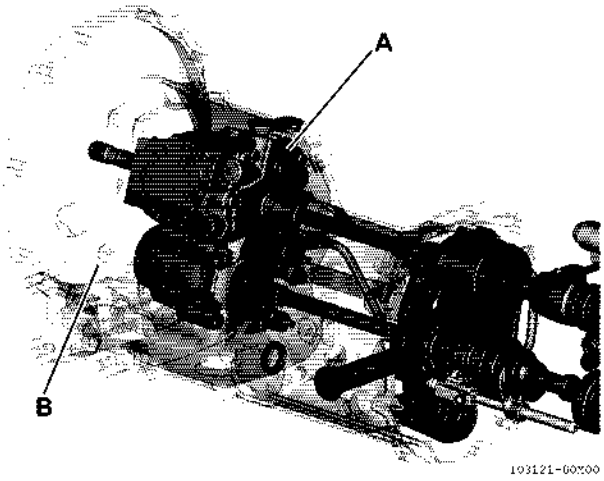


17. Separating and Mounting the HST Assembly

1. Preparation for Separation

First, separate the clutch housing case from the engine.
(See page 3-103.)

(A) HST assembly
(B) Clutch housing case

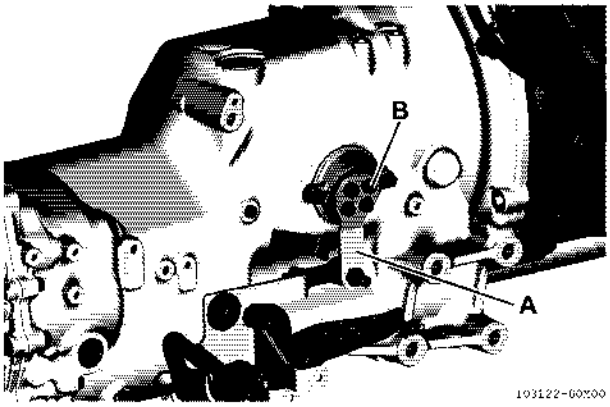


103121-00X00

2. Separating the HST Assembly

1. Remove the HST trunnion arm (A).

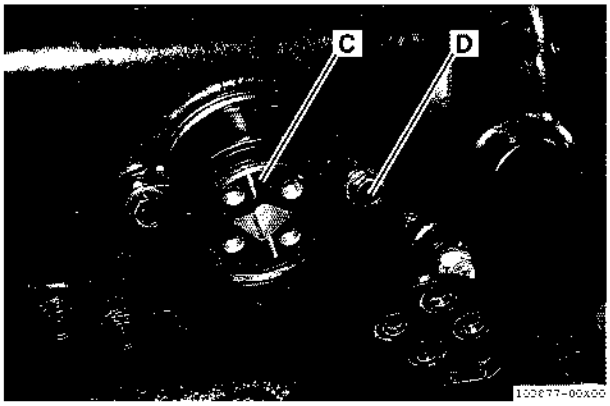
(A) HST trunnion arm
(B) M8 x 16 plated bolts (x4)



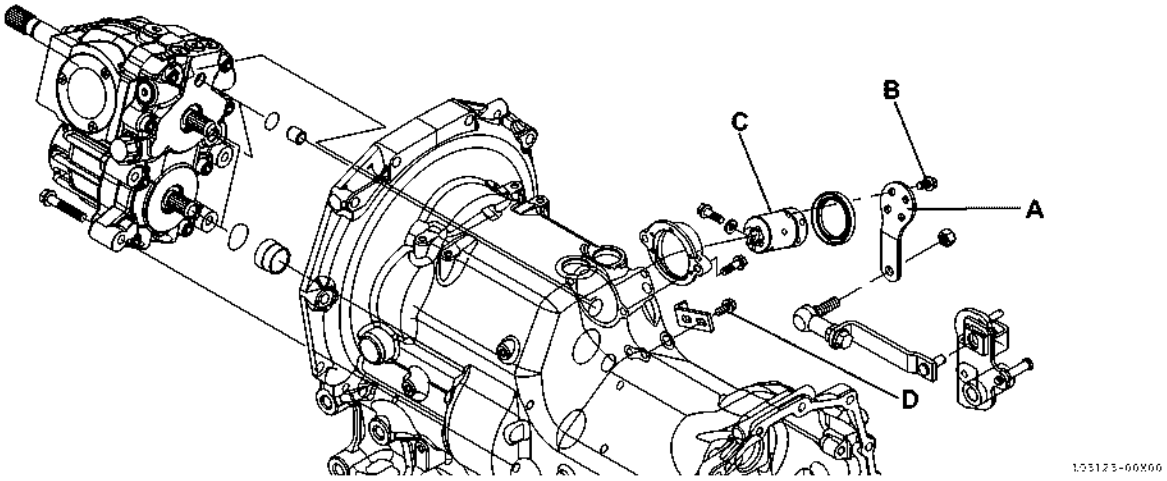
103122-00X00

2. Remove the seal case (C).

(C) Seal case
(D) M8 x 25 plated bolts (x2)

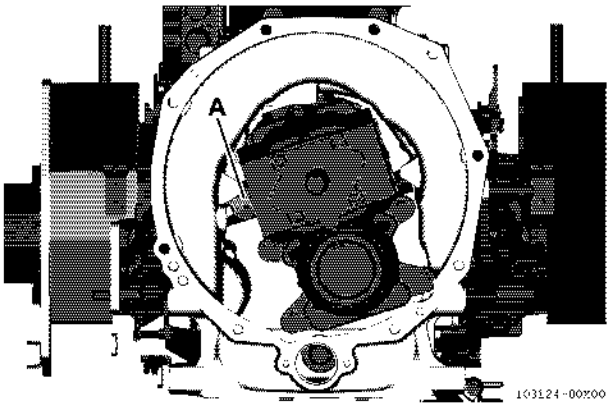


103677-00X00



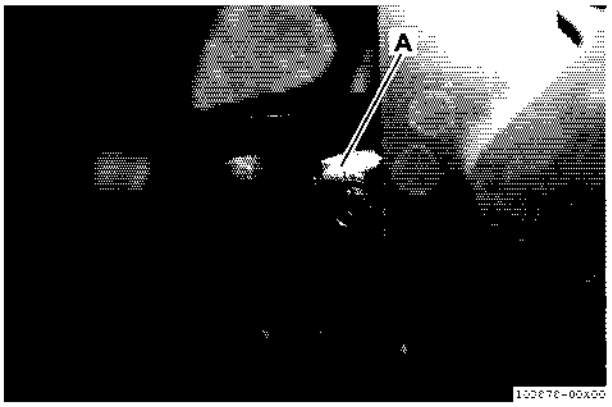
3. Remove the HST trunnion boss (A) hexagonal screws.

(A) HST trunnion boss



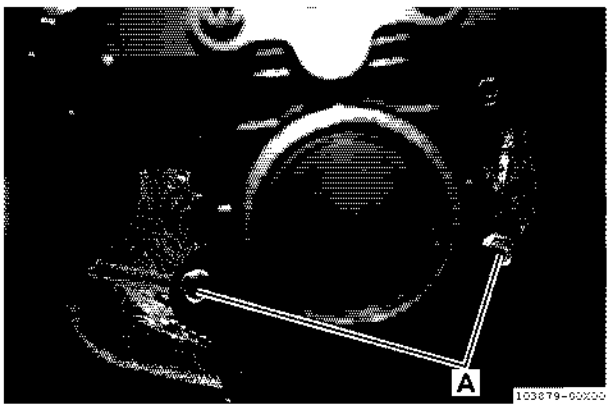
IMPORTANT

- Note the tightening torque in the assembly diagram.
  Tightening torque: 26 ±3 N· m



4. Remove the HST tightening bolts.

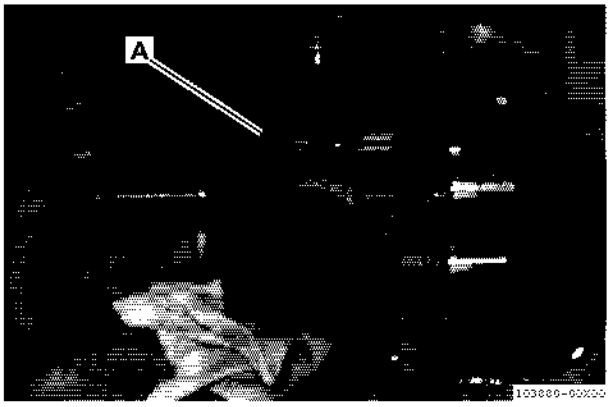
(A) M10 x 55 plated bolts (x4)



5. Remove the HST assembly (A).

NOTE
- Be careful not to lose the O-ring and collar.

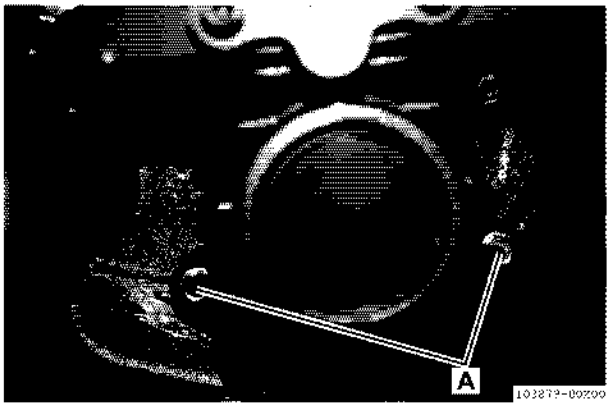
(A) HST assembly



3. Mounting the HST Assembly

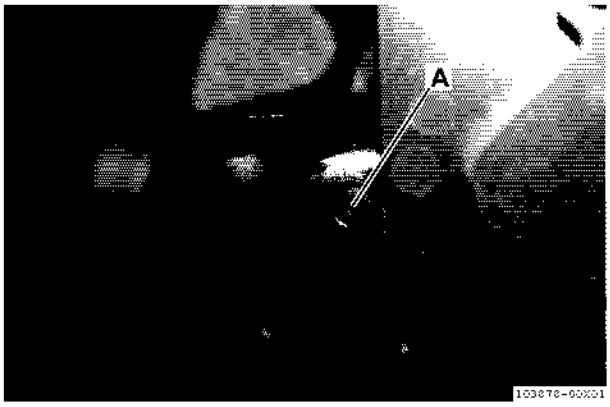
1. Mount the HST tightening bolts.

(A) M10 x 55 plated bolts (x4)



2. Mount the HST trunnion boss hexagonal screw (A).
   Tightening torque: 26 ±3 N· m

(A) Hexagonal screw (x1)

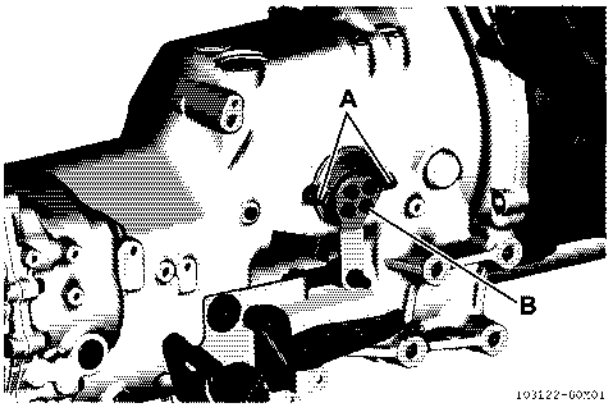


3. Mount the seal case.

(A) M8 x 25 plated bolts (x2)

4. Mount the HST trunnion arm.

(B) M8 x 16 plated bolts (x4)



18. Separating the Clutch Housing from the Transmission Case

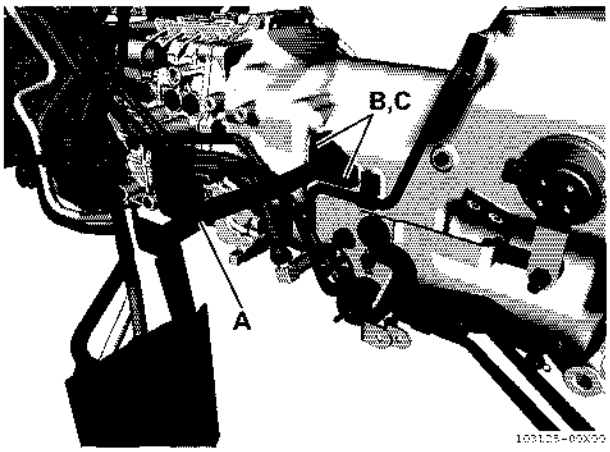
1. Preparation for Separation

Before starting work, separate the engine and the clutch housing.

2. Separating the Clutch Housing from the Transmission Case

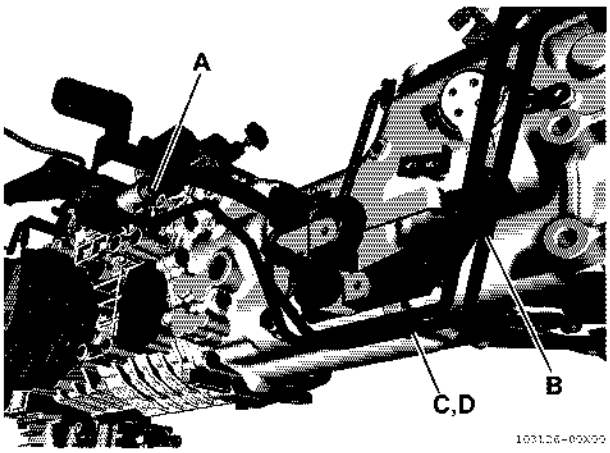
1. Remove the SCV stay assembly (A).

   (A) SCV stay assembly
   (B) M10 x 20 plated bolts (x2)
   (C) M8 x 16 plated bolts (x2)



2. Remove the hydraulic hose (B) connected to the PTO valve (A) from the line filter, and also remove the clamps (C) along the hose.

   (A) PTO valve
   (B) Hydraulic hose
   (C) Clamp
   (D) M8 x 16 plated bolt (x1)
   (E) Filter
   (F) Bolt assembly pipe joint (PTO valve)
   (G) Plus Rot (line filter)

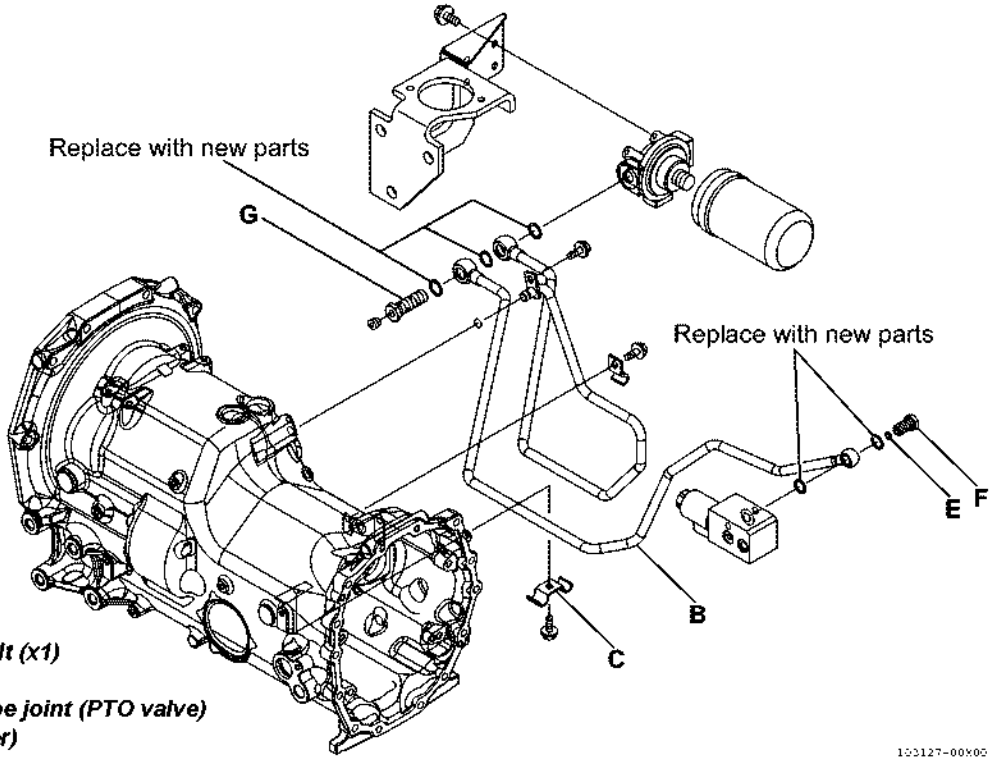


IMPORTANT

- Make sure to replace the copper packing with a new part.

NOTE

- Be careful not to lose the filter (E) among the joint bolts on the PTO valve.

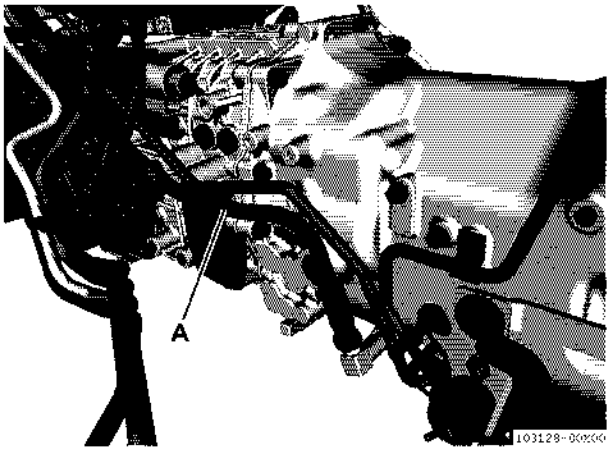


(B) Hydraulic hose
(C) Clamp
(D) M8 x 16 plated bolt (x1)
(E) Filter
(F) Bolt assembly pipe joint (PTO valve)
(G) Plus Rot (line filter)

103127-00X00

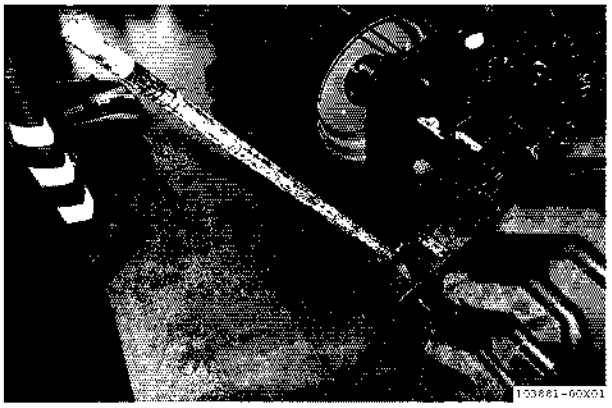
3. Remove the return hose (A) connected to the clutch housing from the loader valve assembly.

(A) Hose



103128-00X00

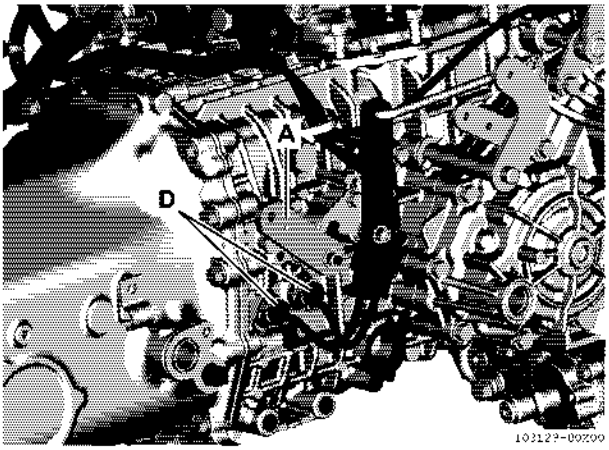
4. Use a jack to support the transmission case.



103881-00X01

5. Remove the keep plate (B) on the shift range arm (A), and pull out the shift range arm.
6. Remove the range shift lever neutral switches (D) (x2).

(A) Shift range arm
(B) Keep plate
(C) M8 x 16 plated bolt (x1)
(D) Range shift lever unilateral switches (x2)



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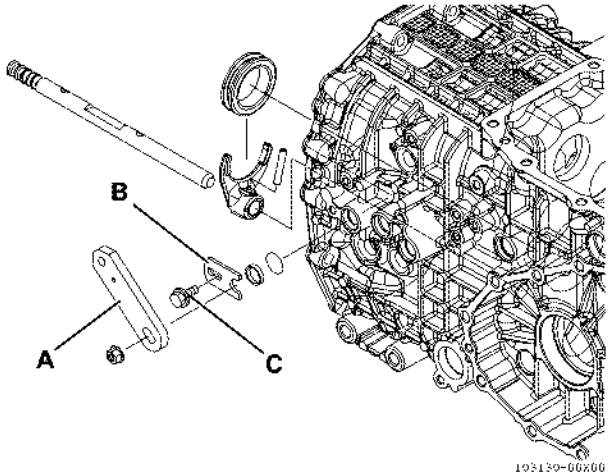
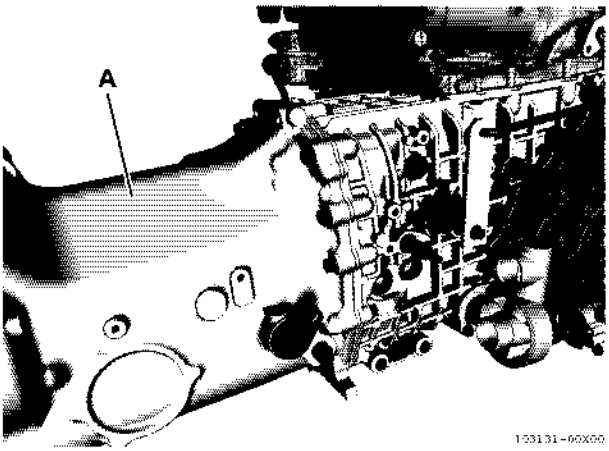


103130-00X00

7. Remove the mounting bolts for the clutch housing case (A).

(A) Clutch housing case
(B) M10 x 40 plated bolts (x11)
(C) M10 x 50 plated bolts (x2)
(D) M10 x 95 plated bolt (x1)



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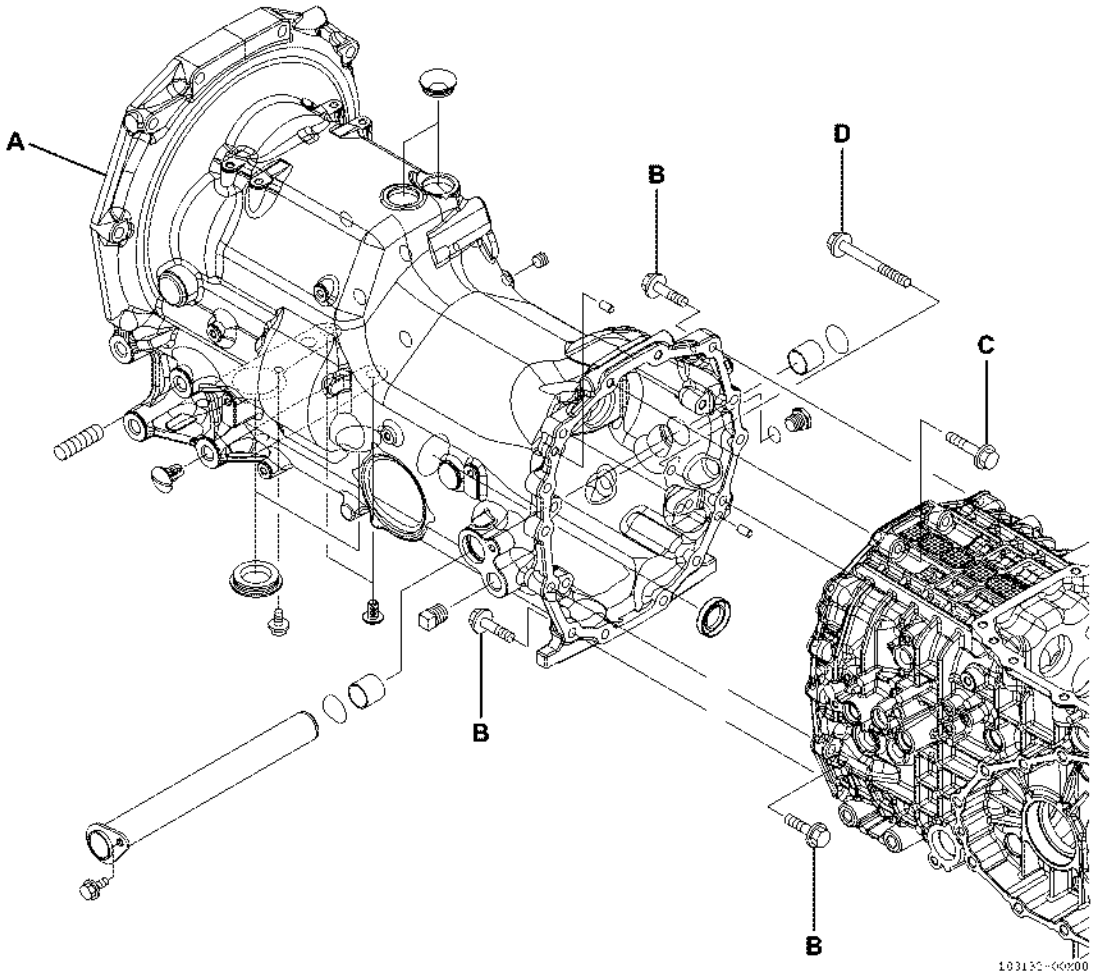
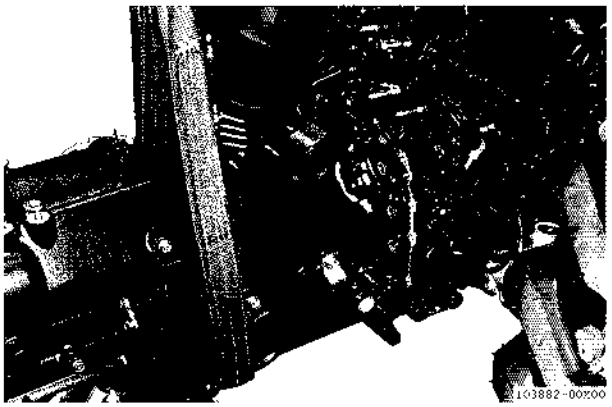
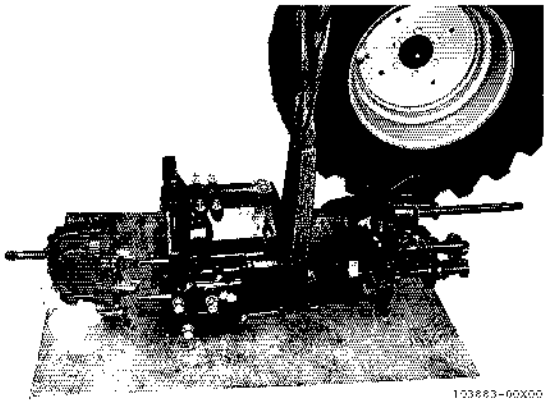


8. Suspend the housing case, and separate from the device.

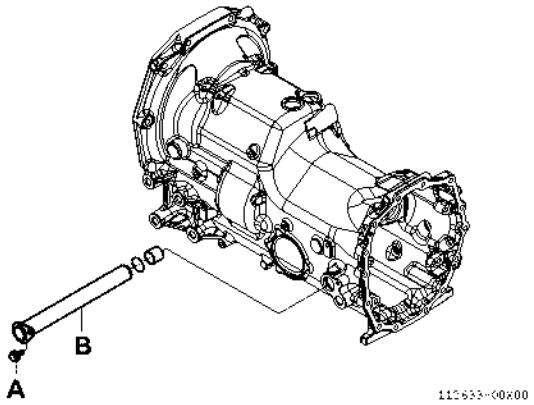




19. Separating the Center Plate

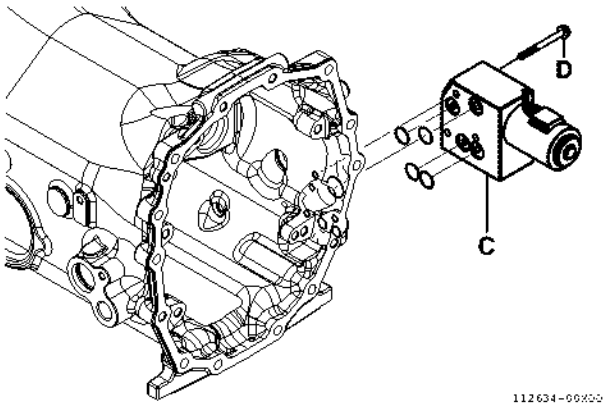
1. Remove the bolt and the M8 X 16 plated (B).
2. Remove the pipe assy and the mower link (A).

(A) PIPE ASSY, MOWER LINK
(B) BOLT, M8 X 16 PLATED



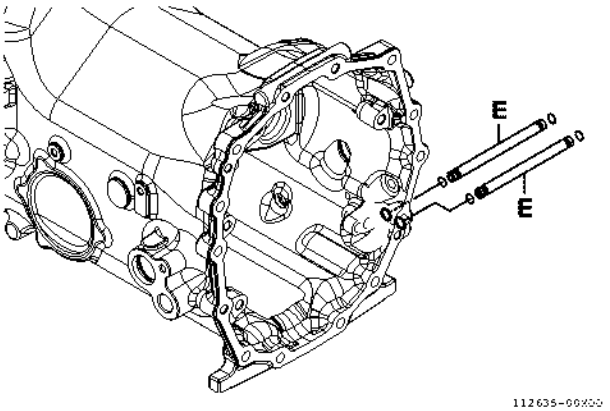
3. Remove the bolt and the M6 X 60 plated (D).
4. Remove the valve assy and the 4WD (C).

(C) VALVE ASSY, 4WD
(D) BOLT, M6 X 60 PLATED (x3)



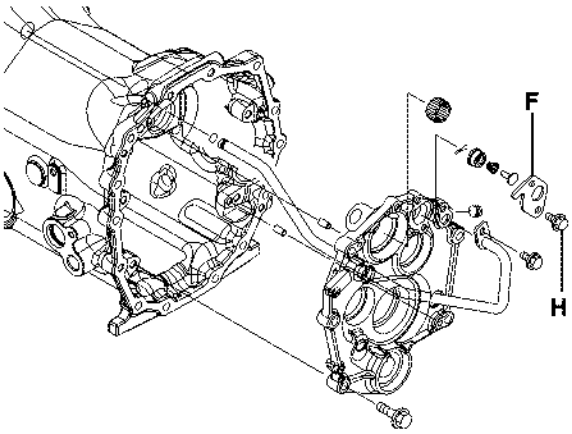
5. Remove the pipe and the FWD (E).

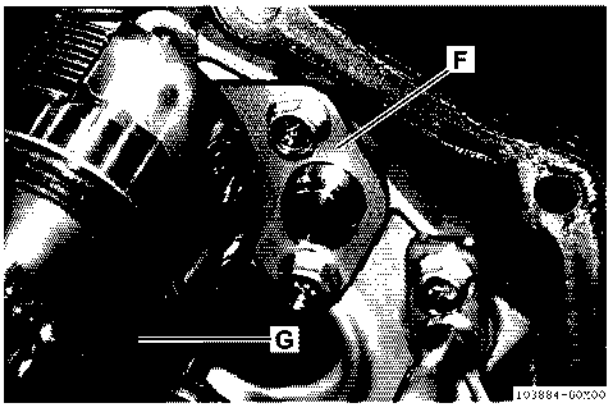
(E) PIPE, FWD (x2)



6. Remove the retainer plate (F) and the PTO clutch (G).

(A) PIPE ASSY,MOWER LINK
(B) BOLT, M8X 16 PLATED
(C) VALVE ASSY, 4WD
(D) BOLT, M6X 60 PLATED (x3)
(E) PIPE, FWD (x2)
(F) Retainer plate
(G) PTO clutch
(H) M8 x 16 plated bolts (x2)

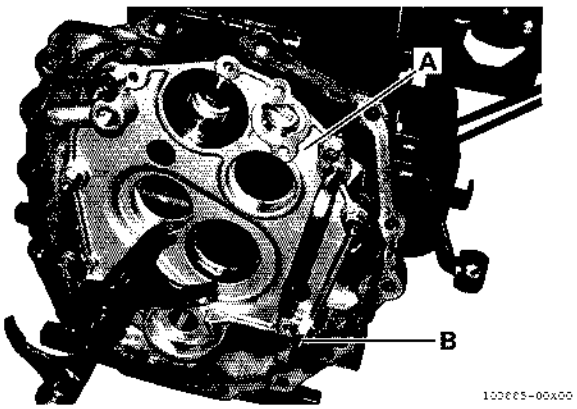




7. Remove the other 3 shafts.
Counter shaft
Reduction shaft
Front drive shaft
3 shafts described above

8. Remove the bearing retainer (A).

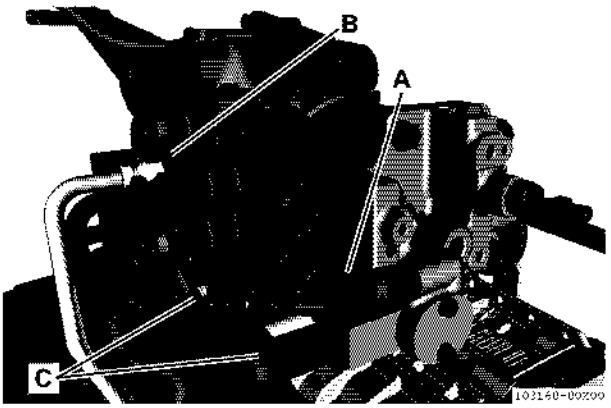
(A) Bearing retainer
(B) M10 x 35 plated bolts (x5)



20. Separating the Hydraulic Lift Assembly

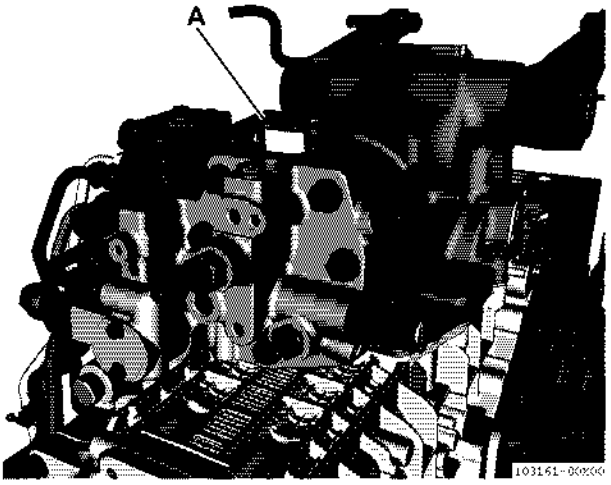
1. Remove the loader valve.
   (1) Remove the hydraulic pipes (C) (x2) between the hydraulic lift (A) and loader valve (B).

NOTE
- Make sure to replace the copper packing with a new part during assembly.

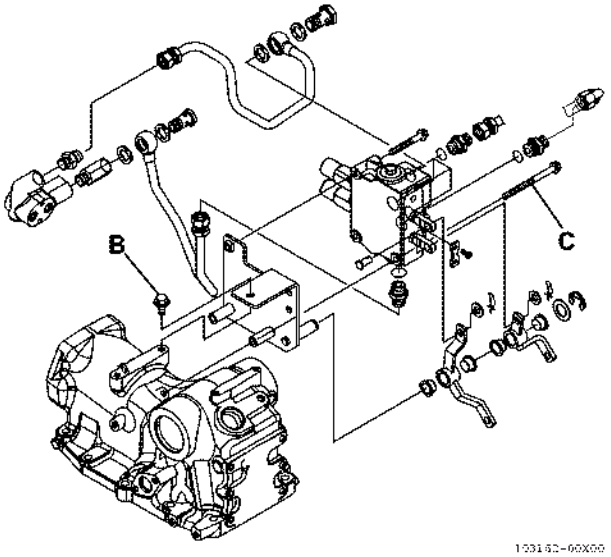


(A) Hydraulic lift
(B) Loader valve
(C) Hydraulic pipes (x2)

(1) Remove the loader valve mounting bolts, and remove along with the brackets (A) from the hydraulic lift.

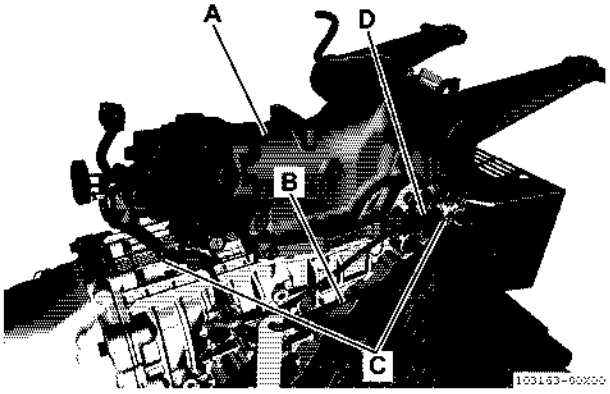


(A) Bracket
(B) M8 x 16 plated bolt (x1)
(C) M8 x 100 plated bolts (x2)

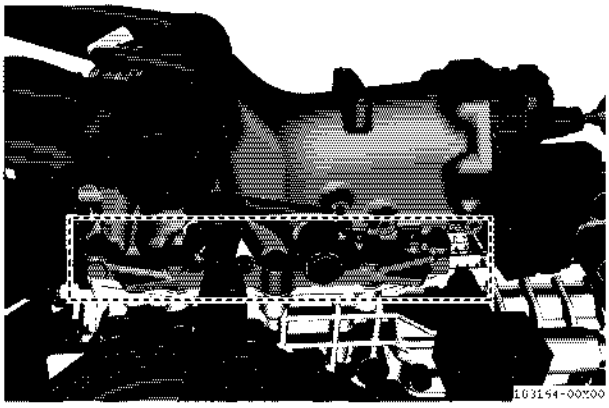


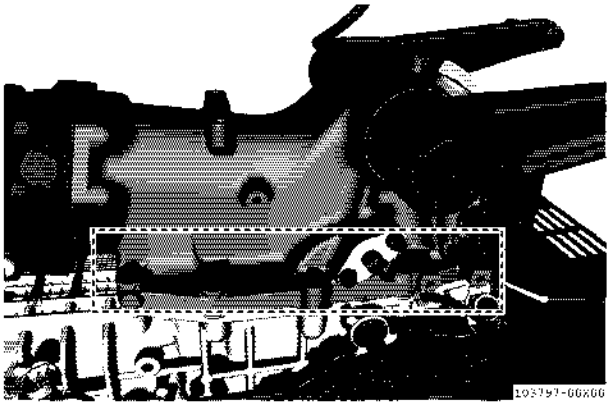
2. Remove the hydraulic lift case (A).
   (1) Remove the harness (B) and clamps (C) (x2).
   (2) Remove the PTO switch (D) coupler, and remove the harness from the hydraulic lift case.

(A) Hydraulic lift case
(B) Harness
(C) Clamp
(D) PTO switch



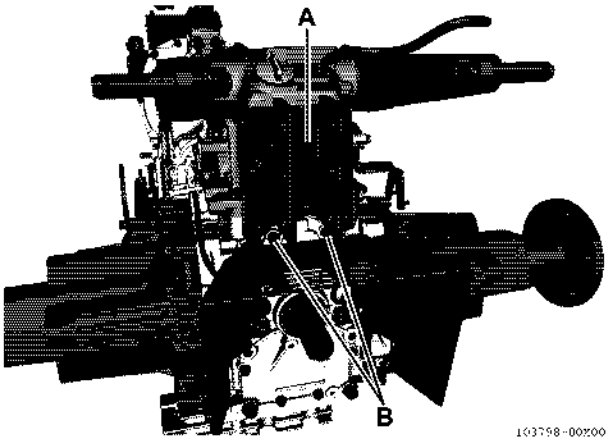
   (3) Remove the lift case mounting bolts.
   M10 x 40 plated bolts (x10)





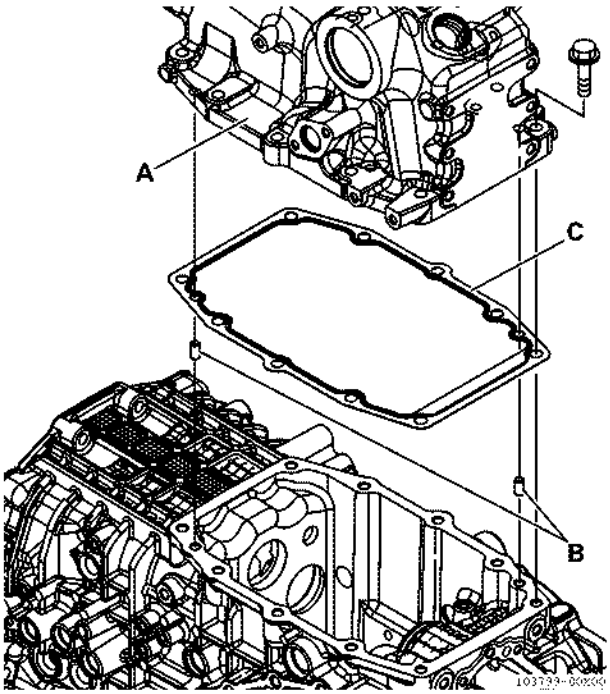
   (4) Remove the two bolts at the bottom of the top link hinge (A).

(A) Top link hinge
(B) M10 x 25 plated bolts (x2)



(5) Remove the lift case (A).

NOTE
- During assembly, make sure to replace the packing.
- Be careful not to lose the parallel M8 x 14 pins (B).

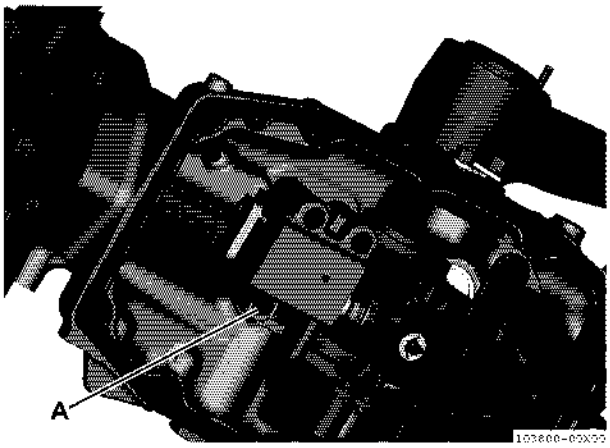


(A) Lift case
(B) Parallel M8 x 14 pins (x2)
(C) Gasket, cylinder case
1A8310-42180

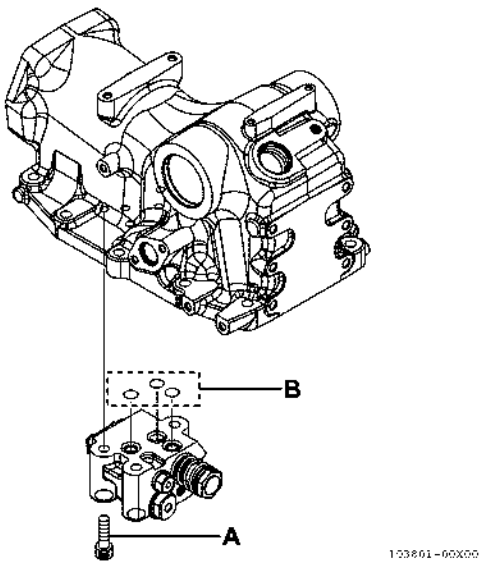
■ Removing the Control Valve

1. Remove the hexagonal bolts with holes (x3).

NOTE
- Be careful not to lose the O-rings (B) (x3).



(A) M8 x 25 bolts (x3)
(B) O-rings (x3)

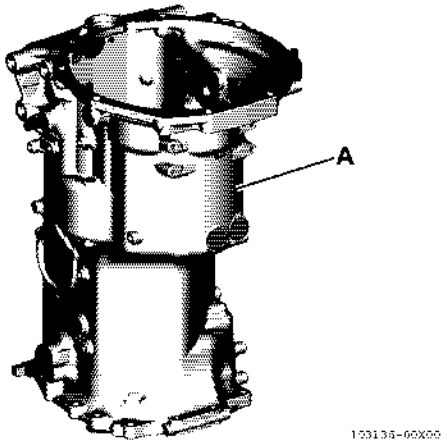


21. Mounting the Clutch Housing Case to the Transmission Case

1. Mount the HST assembly to the clutch housing case (A).
   (1) Stand the housing case (A) vertically.

NOTE
- Standing the housing case vertically makes mounting the HST easy.

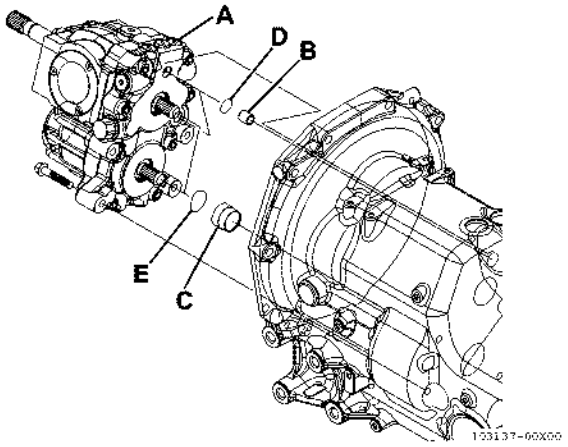
(A) Housing case

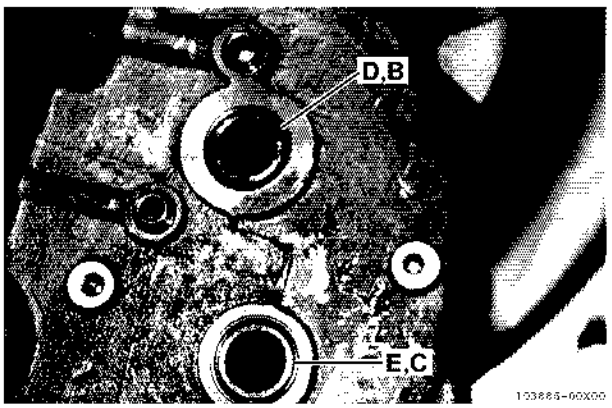


(2) Mount the collars (B) and (C) to the HST (A).

IMPORTANT
- During assembly, make sure to replace the O-rings (D) and (E).

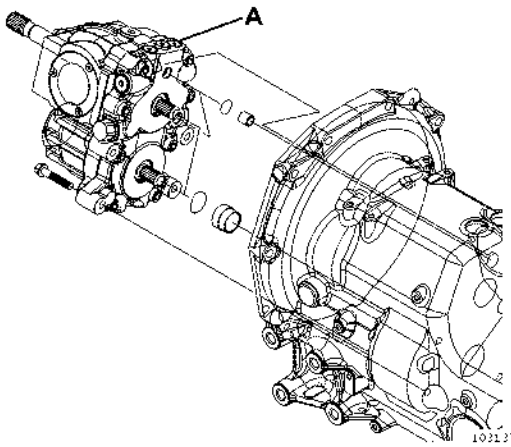
(A) HST
(B) Collars (12 x 16 x 17) (x2)
(C) Collars (29 x 35 x 24) (x2)
(D) O-rings, 1AP16.0 (x2)
(E) O-rings, 1AP 34.0 (x2)

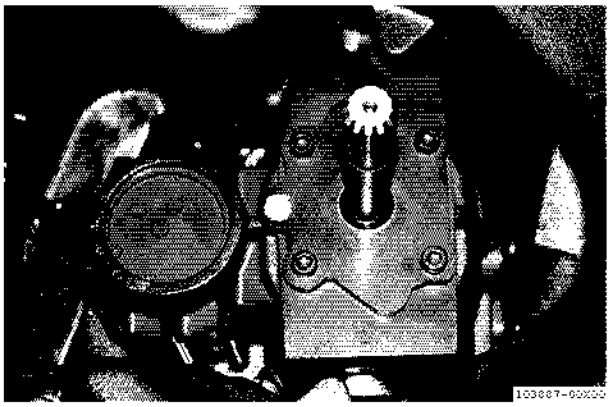




(3) Mount the HST (A) to the clutch housing case.

(A) HST

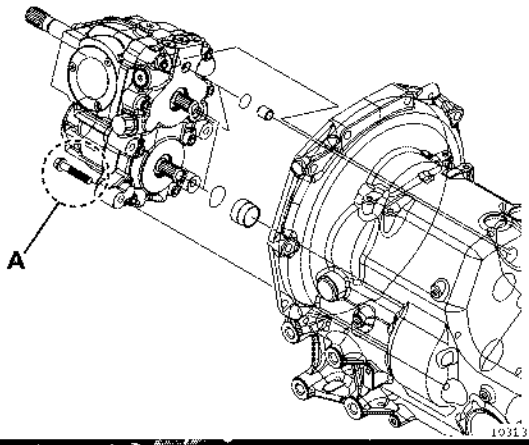


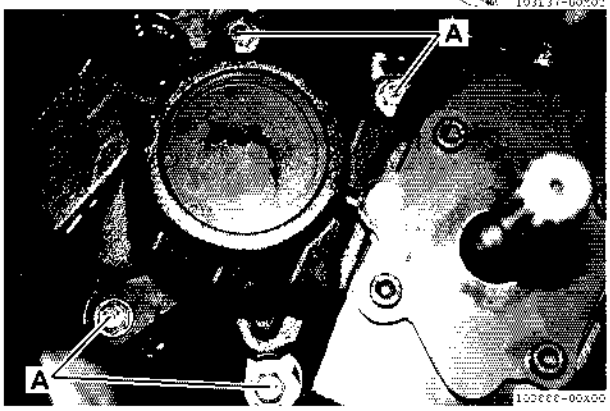


(4) Tighten the bolts (A).

(A) M10 x 55 plated bolts (x4)

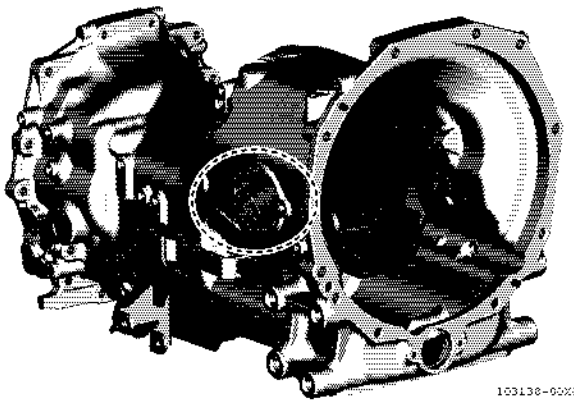
Tightening torque: 44 to 59 N· m

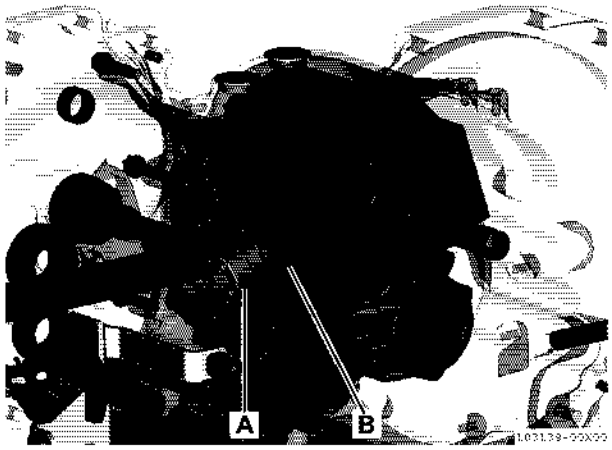




2. Mount the trunnion arm.
   (1) Mount the HST trunnion boss (A).

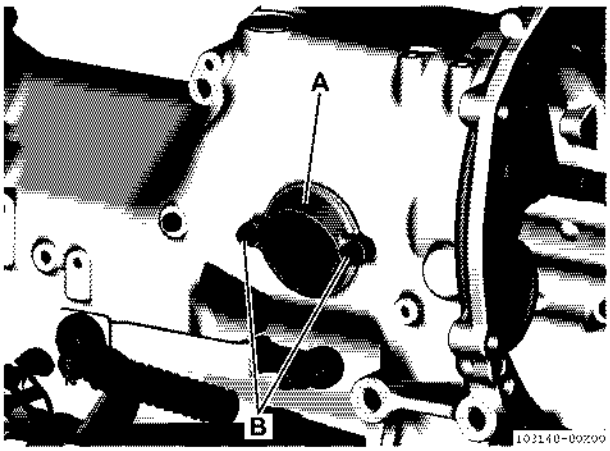
(A) HST trunnion boss
(B) M8 x 25 plated bolt (x1)
Tightening torque: 26 ±3 N· m



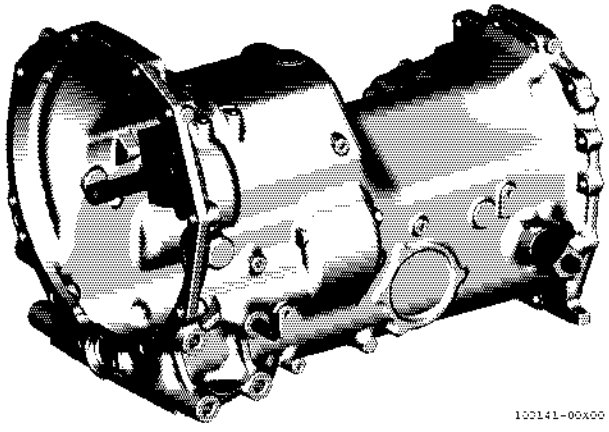


   (2) Mount the seal case (A).

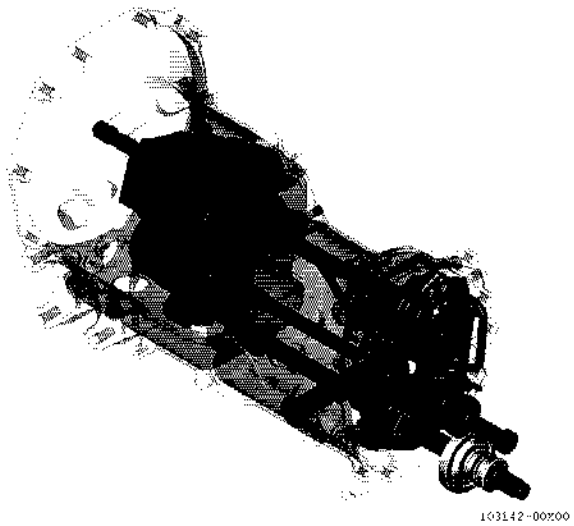
(A) Seal case
(B) M8 x 25 plated bolts (x2)



3. Place the housing case horizontally.

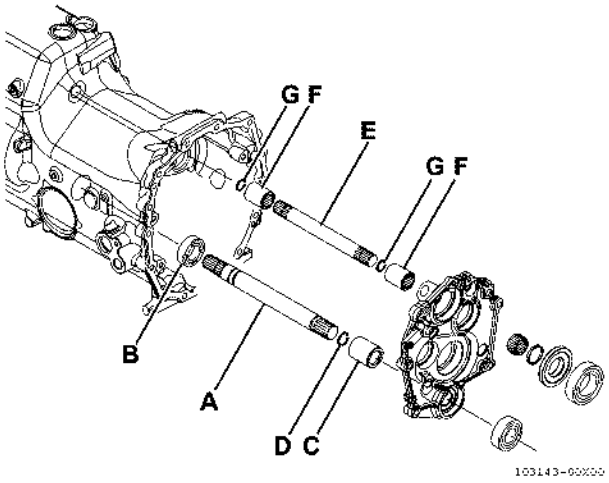


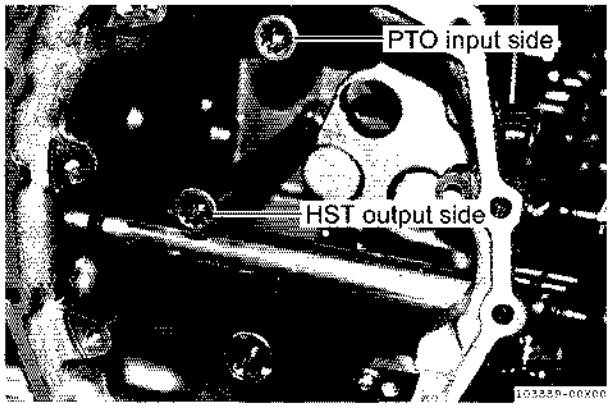
4. Mount the following parts to the clutch housing.

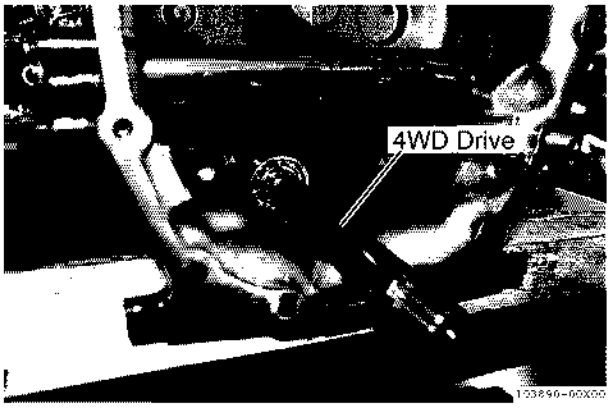


- 4WD drive:
  (A) Connect shaft
  (B) Ball bearing (6005)
  (C) PTO coupling
  (D) Ring (22)

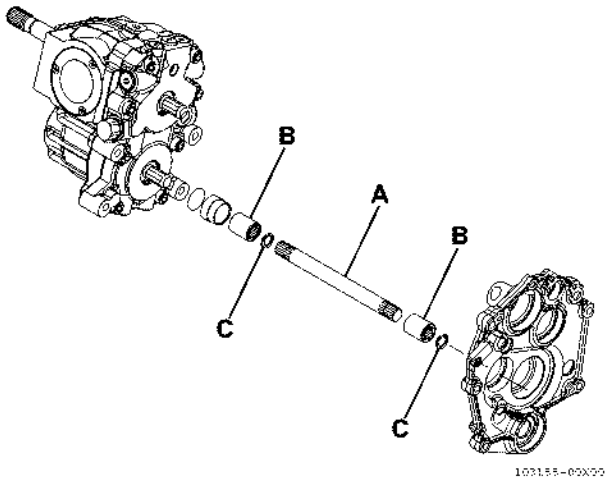
- PTO inputs:
  (E) Connect shaft
  (F) Joints (x2)
  (G) Rings (17) (x2)







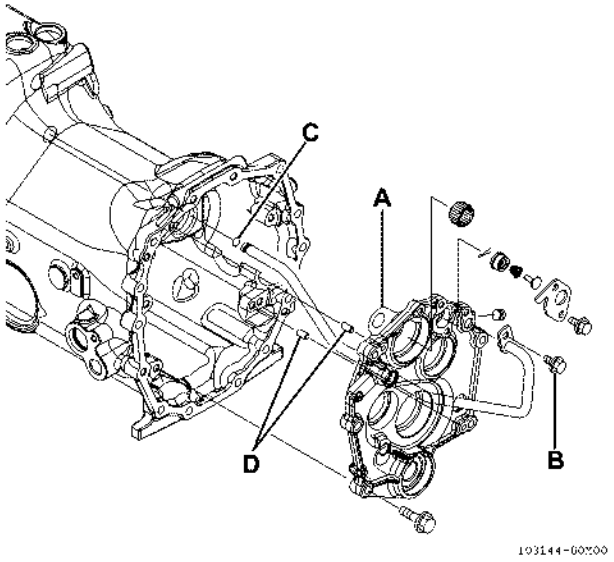
- HST output shaft:
  (A) Connect shaft
  (B) Joints (x2)
  (C) Rings (17) (x2)



5. Loosen the tank pipe mounting bolts (B) on the bearing retainer assembly (A), and mount the clutch housing.

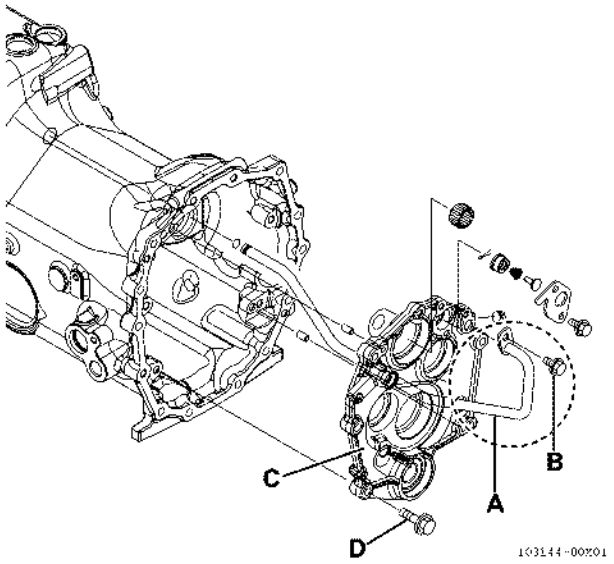
IMPORTANT
- During assembly, make sure to replace the O-ring (C).
- During assembly, align the knock pin (D) positions (x2).

(A) Bearing retainer assembly
(B) M8 x 16 plated bolt (x1)
(C) O-ring, 1AS 10.0
(D) Knock pins (x2)



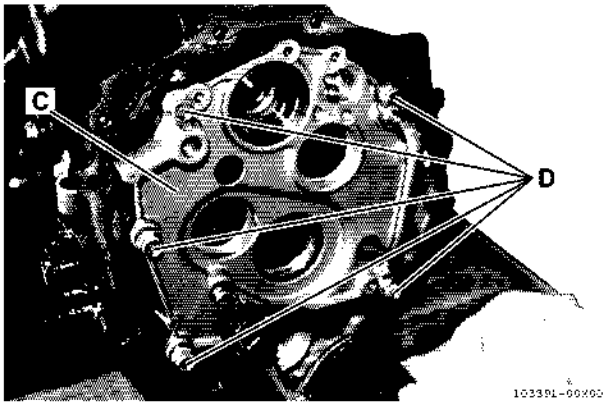
6. Completely secure the tank pipe (A).

(A) Tank pipe
(B) M8 x 16 plated bolt (x1)



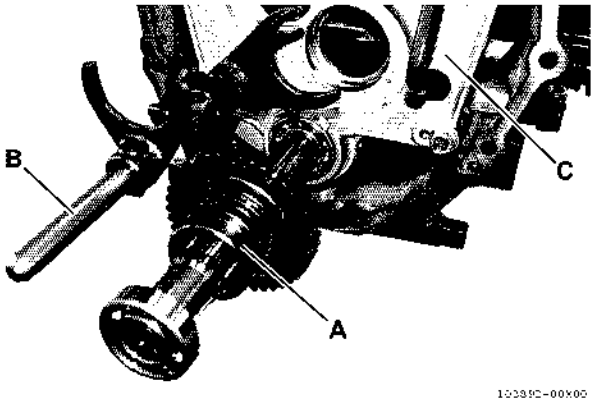
7. Secure the bearing retainer assembly (C).

(C) Bearing retainer assembly
(D) M10 x 35 plated bolts (x5)



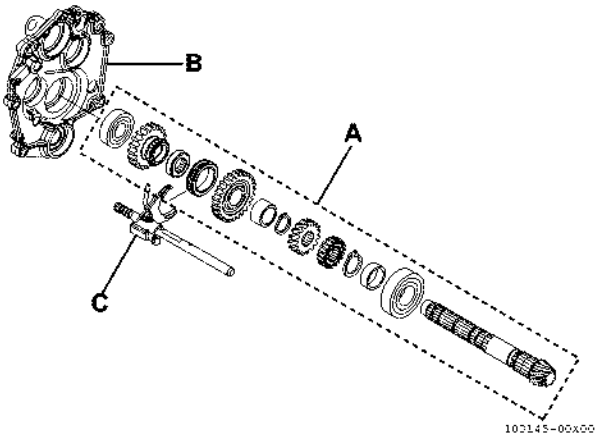
8. Mount the front drive shaft assembly (A) and the sub shift assembly (B) to the bearing retainer assembly (C).

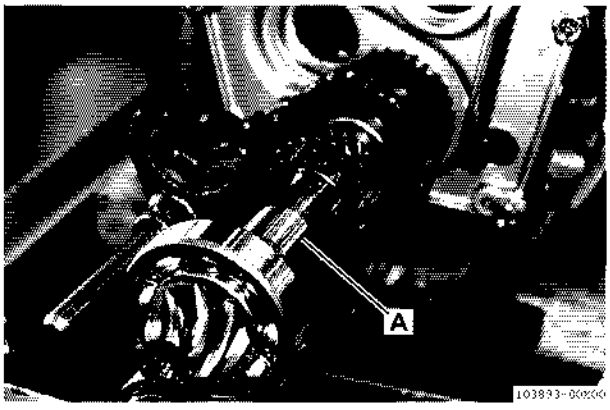
(A) Front drive shaft assembly
(B) Sub shift assembly
(C) Bearing retainer assembly



9. Mount the counter shaft assembly (A) to the bearing retainer assembly (B).
At this time, engage the shift fork (C) of the sub shift while mounting.

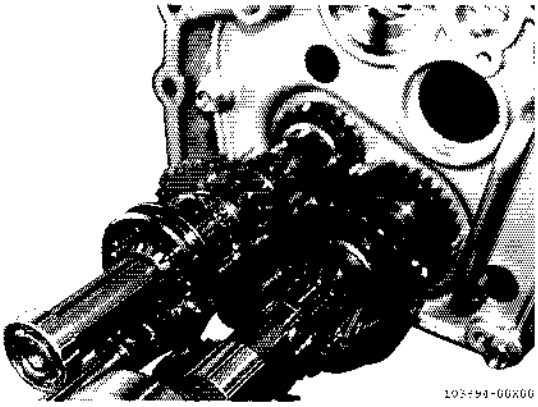
(A) Counter shaft assembly
(B) Bearing retainer assembly
(C) Shift fork

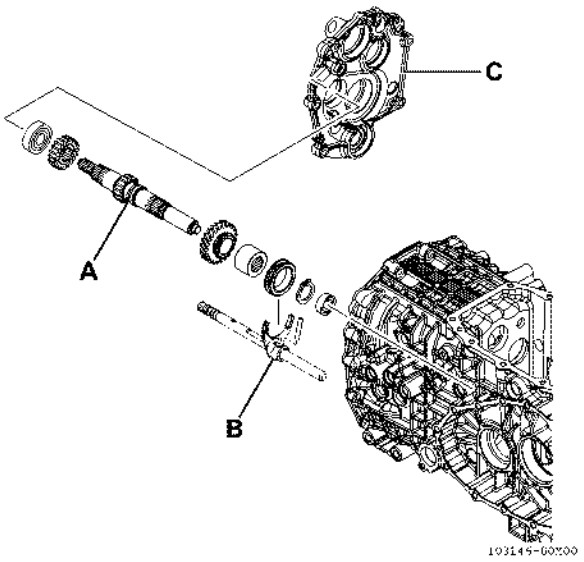




10.Mount the bearing retainer assembly (C) while mounting the shift fork (B) of the sub shift to the reduction shaft (A).

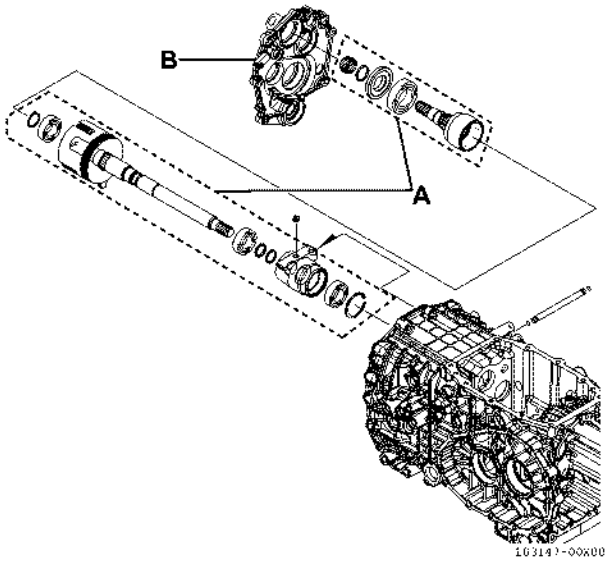
(A) Reduction shaft
(B) Shift fork
(C) Bearing retainer assembly



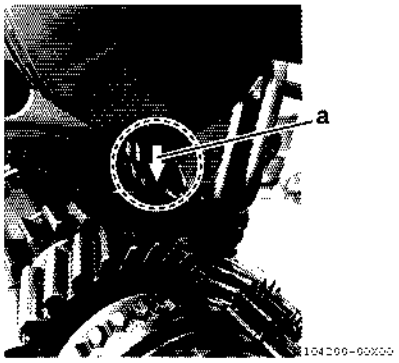


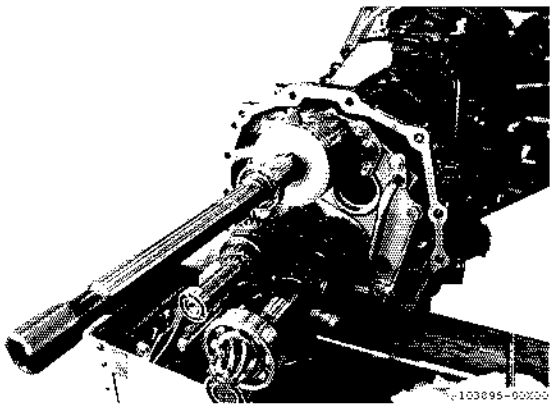
11.Mount the PTO clutch shaft (A) to the bearing retainer assembly (B).

(A) PTO clutch shaft
(B) Bearing retainer assembly



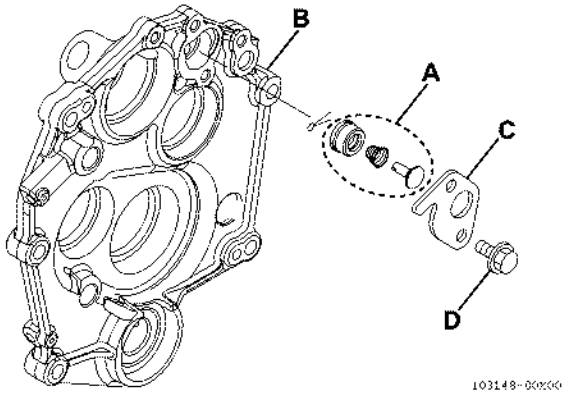
12.Mount the PTO clutch and inertia brake ear (a) facing downwards.

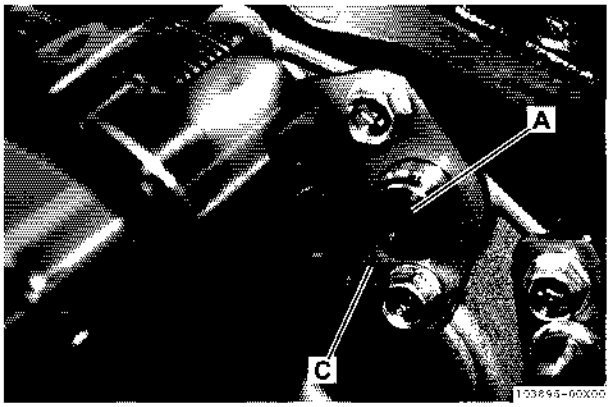




13.Mount the 2nd relief valve (A) to the bearing retainer assembly (B), and then mount the retainer plate (C).

(A) 2nd relief valve
(B) Bearing retainer assembly
(C) Retainer plate
(D) M8 x 16 plated bolts (x2)





14.Apply liquid packing 1207B to the surface between the clutch housing case and the transmission case.

IMPORTANT
- Do not forgot to mount the M8 x 14 parallel pin (A).

(A) M8 x 14 parallel pin

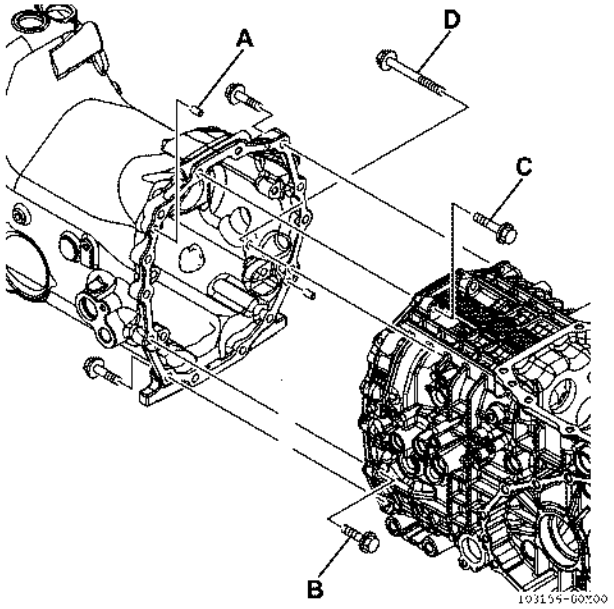
15.Mount the clutch housing case and the transmission case, and tighten the bolts.

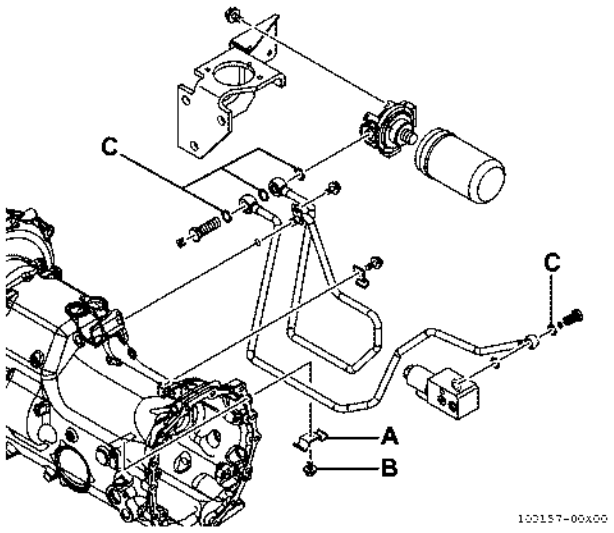
(B) M10 x 40 plated bolts (x11)
(C) M10 x 50 plated bolts (x2)
(D) M10 x 90 plated bolt (x1)
Tightening torque: 44 to 59 N· m

16.Mount the hydraulic pipes connected to the PTO valve from the line cylinder.
Tightening torque: 30.4 to 37.3 N· m

IMPORTANT
- Mount the rip clamp (A) to the underside of the clutch housing.
- During assembly, make sure to replace the copper packing (C) with a new part.

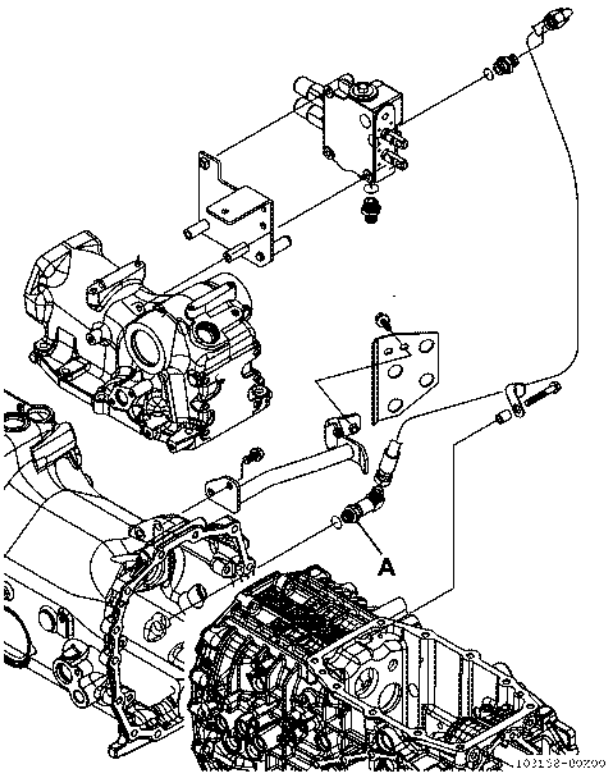
(A) Rip clamp
(B) M8 x 16 plated bolt (x1)
(C) Copper packing





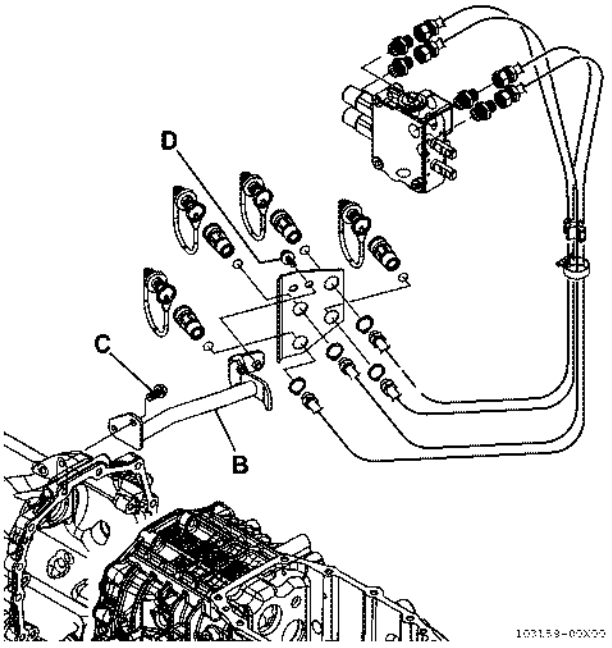
17.Mount the hydraulic pipes connected to the clutch housing from the loader valve.

(A) Hydraulic pipes
Tightening torque: 30.4 to 37.3 N· m



18.Mount the SCV stay assembly (B) for the loader hydraulic vent to the clutch housing.

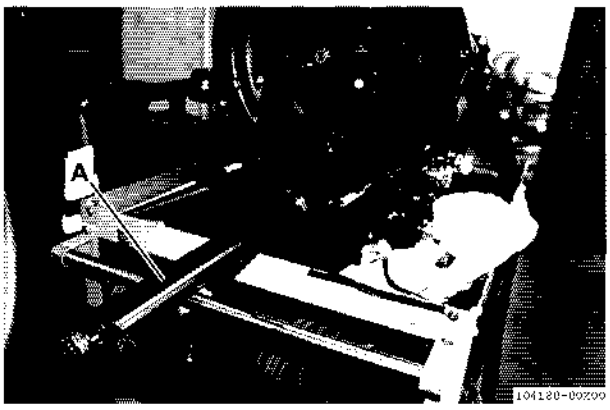
(B) SCV stay assembly
(C) M10 x 20 plated bolts (x2)
(D) M8 x 16 plated bolts (x2)



19.Add the regulation amount of transmission oil.

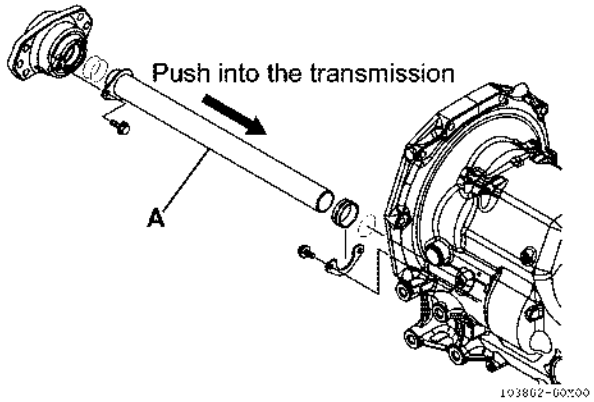
22. Bonding the Clutch Housing and the Engine

1. Mount the drive shaft cover (A) to the transmission.

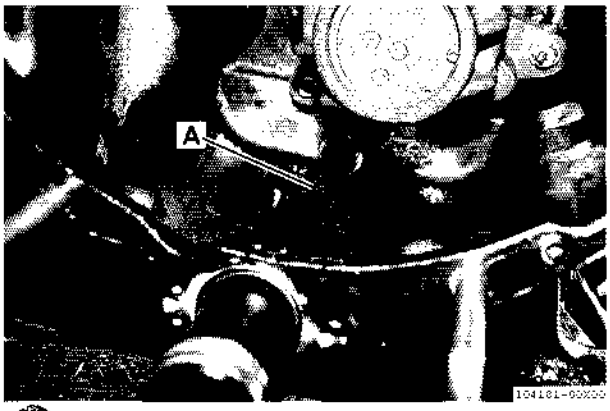


NOTE
- Make sure that the drive shaft cover (A) is slightly pushed into the transmission.

(A) Drive shaft cover

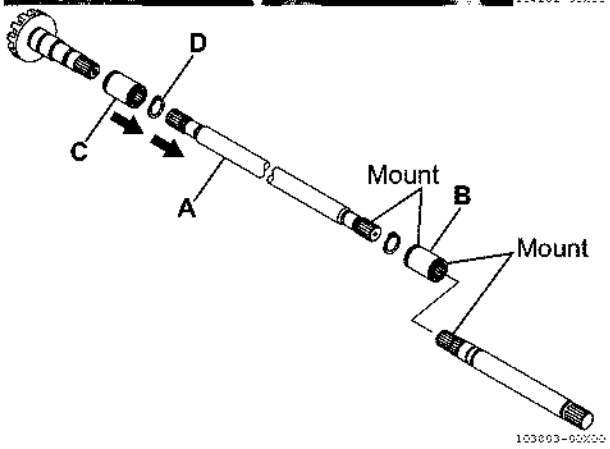


2. Thread the drive shaft (A) through the bottom of the engine.



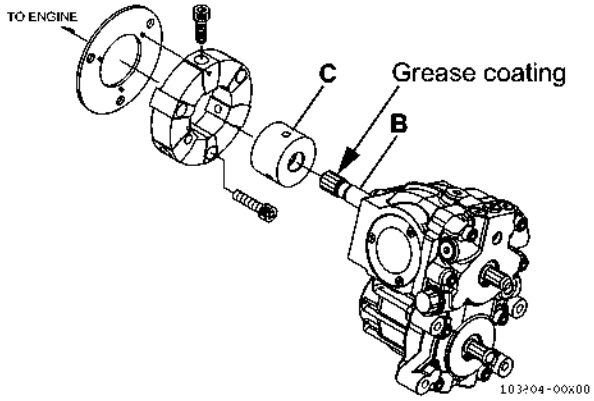
NOTE
- Tie the transmission coupling so that it is not lost.
- With front axle ring 22 having been slid to the transmission, also slide the coupling to the transmission to assemble temporarily.

(A) Drive shaft
(B) Coupling (transmission)
(C) Coupling (front axle)
(D) Ring 22 (front axle)



3. Coat the aligned housing surfaces (A) with a bonding agent (1207B).
   Further, apply grease to the HST input shaft (B) and flywheel coupling (C).

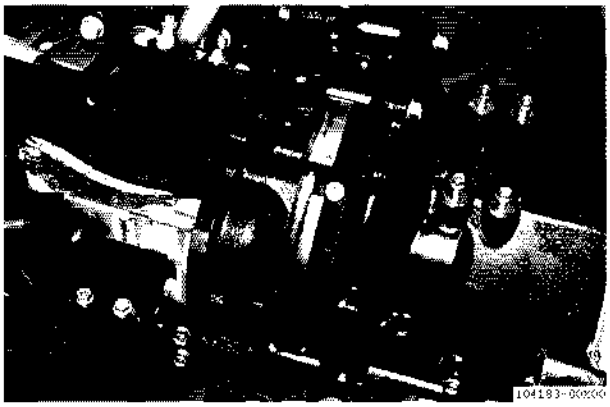
   (A) Aligned housing surfaces
   (B) HST input shaft
   (C) Flywheel coupling



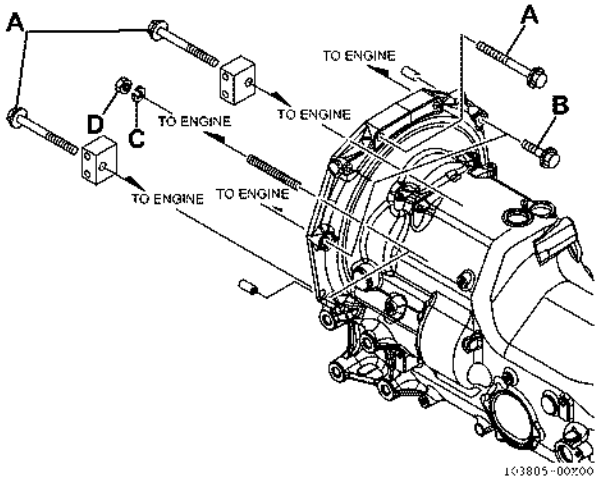
4. Dock the clutch housing and engine.

IMPORTANT
● Coat the nuts with LOCTITE.

Tightening torque: 78 to 98 N•m

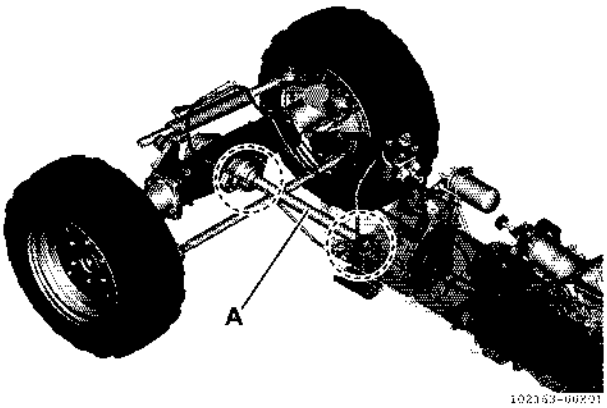


(A) M12 x 120 bolts (x4)
(B) M12 x 50 bolts (x3)
(C) Spring washers 12 (x2)
(D) Nuts 12 (x2)



5. Mount the front wheel drive shaft (A).

(A) Front wheel drive shaft



Mount the front propeller shaft.

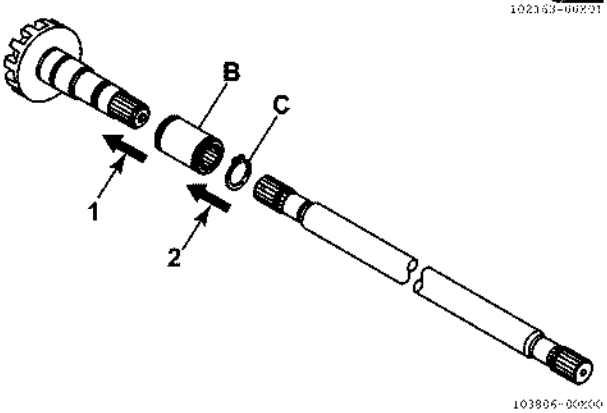
Front:

(1) Slide the spline collar (B) to the front axle.

(2) Also slide the circlip.

Pull out the shaft cover assembly (D) to the front axle, and secure using M8 x 16 plated bolts (E).

(A) Spline collar
(B) Circlip
(C) Shaft cover assembly
(D) M8 x 16 plated bolt (x1)

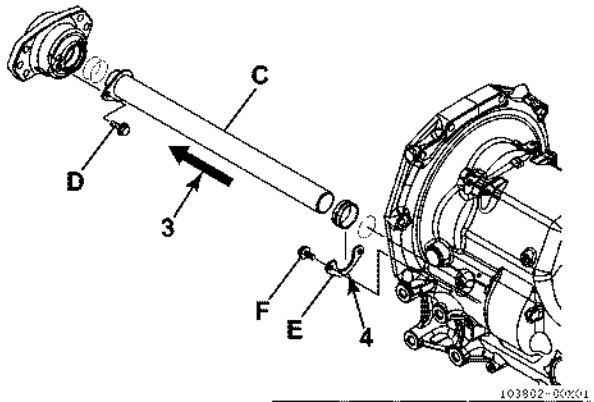


Rear:

(3) Pull out the shaft cover assembly (D) to the front axle, and secure using M8 x 16 plated bolts (E).

(4) Mount the plate using M8 x 16 plated bolts (G) (x2), and secure the shaft cover assembly (D).

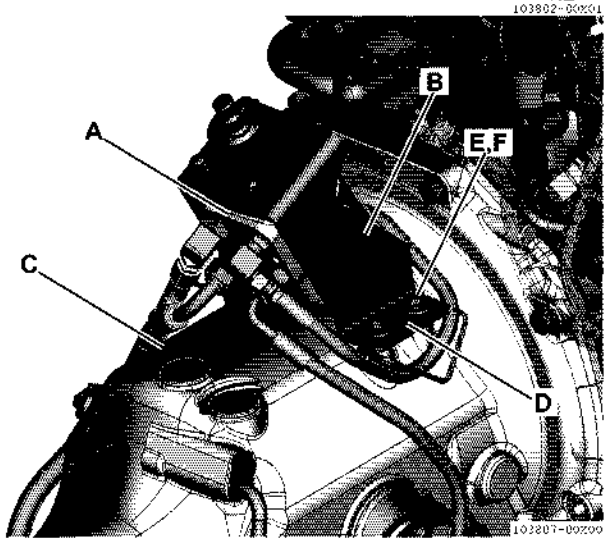
(E) Hangers
(F) M8 x 16 plated bolts (x2)



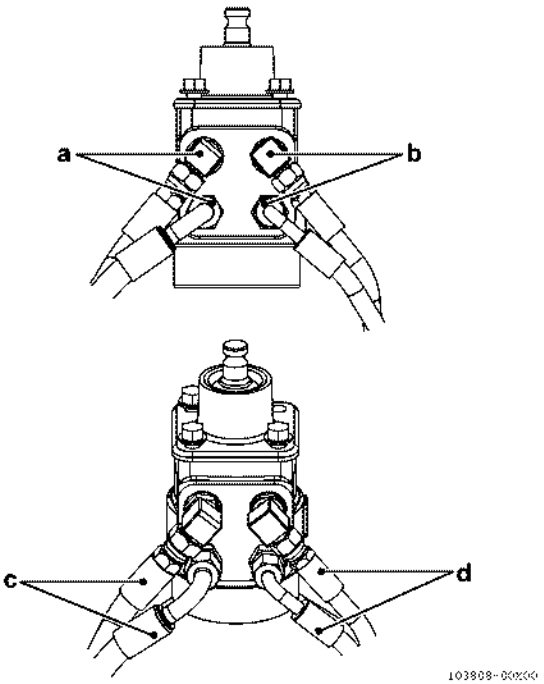
6. Mount the power steering valve (A).

- With the brackets (B) mounted, mount the power steering valve to the housing case (C).
- Thread the left turning hose inside the steering pipe guide (D).

(A) Power steering valve
(B) Bracket
(C) Housing case
(D) Pipe guard
(E) M8 x 25 plated bolts (x4)
(F) Washers 4 (x4)

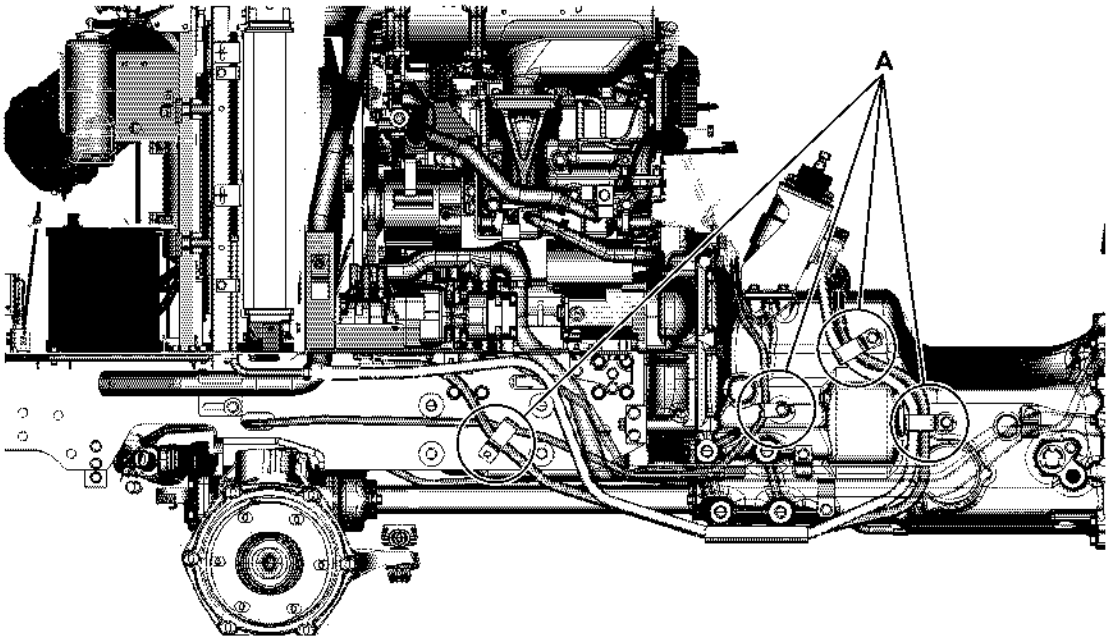


Tightening torque
(a) 30.4 to 37.3 N·m
(b) 30.4 to 37.3 N·m
(c) 34 to 44 N·m
(d) 2.6 to 27.5 N·m

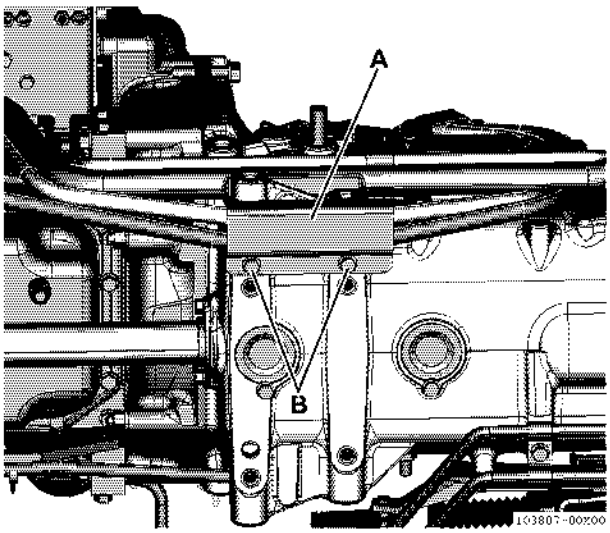


7. Mount the power steering valve hose.
Left: x4
• Mount the hose clamps (x3).

(A) M8 bolts (x3)



• Mount the suppression cover (A) from under the housing case.



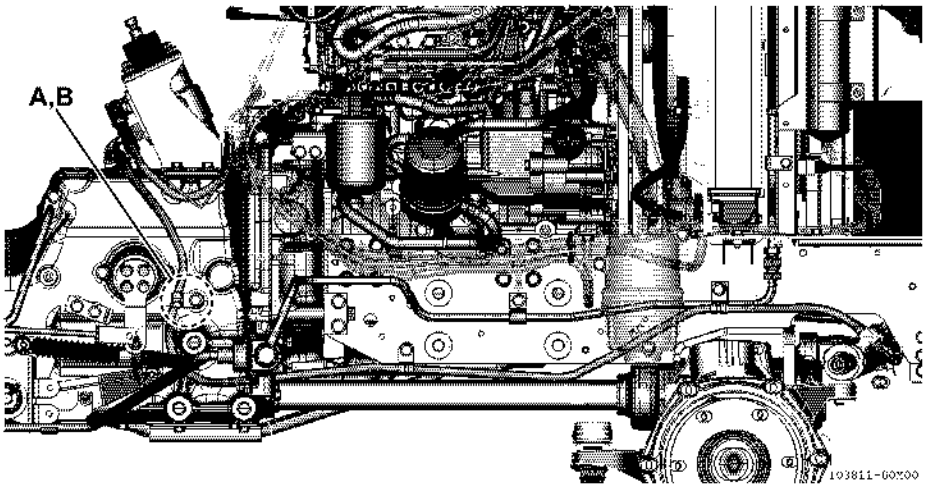
(A) Suppression cover
(B) M8 bolts (x2)

Right:

• Mount the right turning hose.

(A) Hose clamp (x1)
(B) M8 bolt (x1)

Tightening torque: 30.4 to 37.3 N·m



8. Mount the low-pressure pipe (a) connected to the hydraulic pump from the suction filter and the high-pressure pipe (b) connected to the hydraulic lift case from the hydraulic pump.

Low-pressure pipe (a):

(A) Clamp (x1)
(B) M8 x 16 bolt

High-pressure pipe (b):

(C) Clamps (x2)
(D) M8 x 16 bolts (x2)

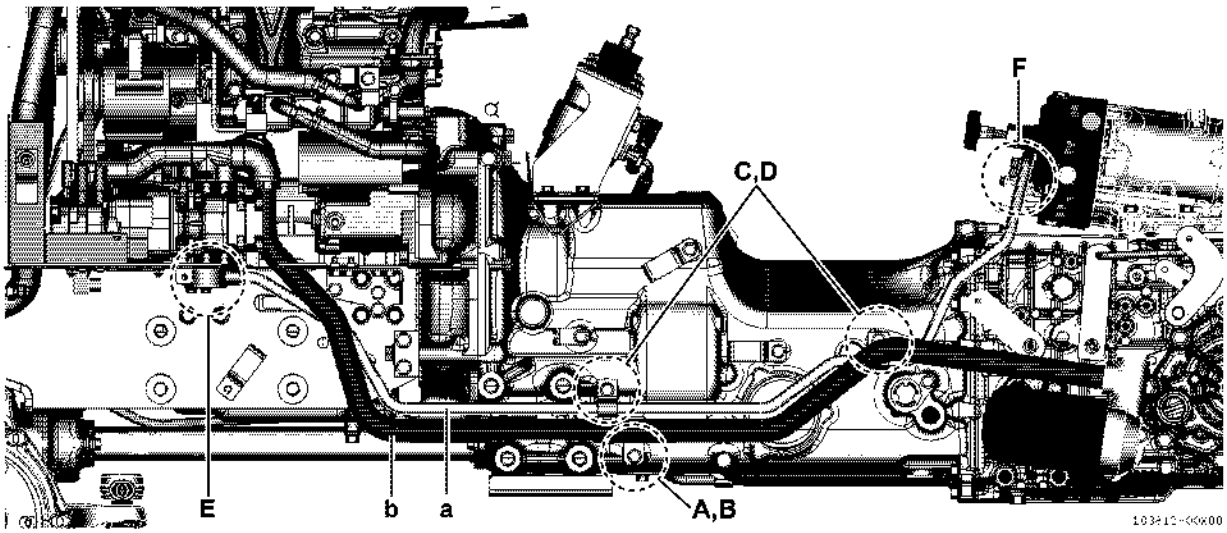
Hydraulic pump:
(E) M6 x 40 plated bolts (x3)

Hydraulic lift:

(F) Tightening torque: 68.6 to 78.5 N·m

3

IMPORTANT
- Make sure to replace the copper packing with a new part.



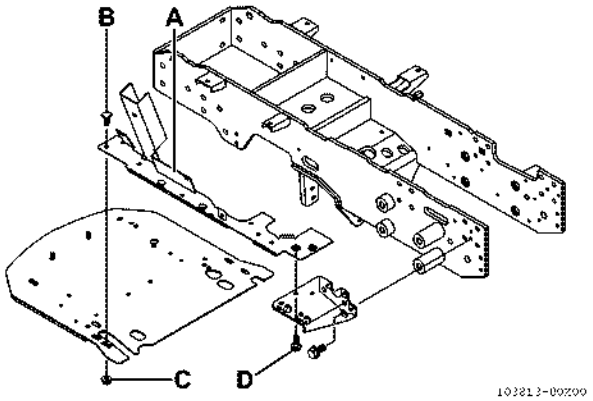
9. Return the current plate assembly (A).

- Front

(A) Current plate assembly
(B) M6 x 16 bolt (x1)
(C) M6 nut (x1)

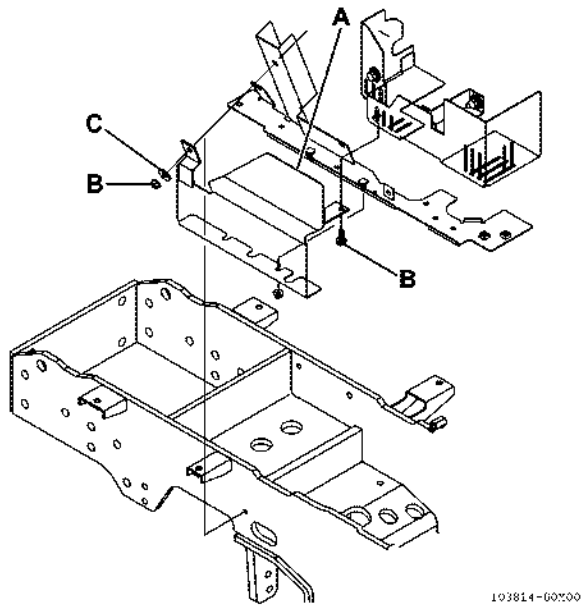
- Rear

(D) M6 x 16 plated bolts (x2)



10.Mount the hydraulic pump cover (A).

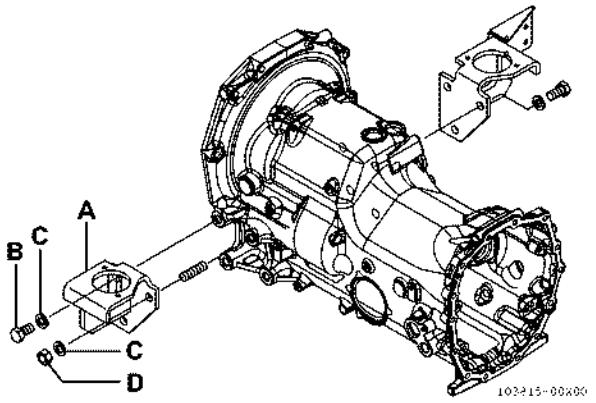
(A) Hydraulic pump cover
(B) M6 bolts (x3)
(C) M6 nut (x1)



11.Mount the floor mount (A).

(A) Floor mount
(B) M16 x 30 plated bolts (x2)
(C) Spring washers (x2)
(D) M16 nut (x1)

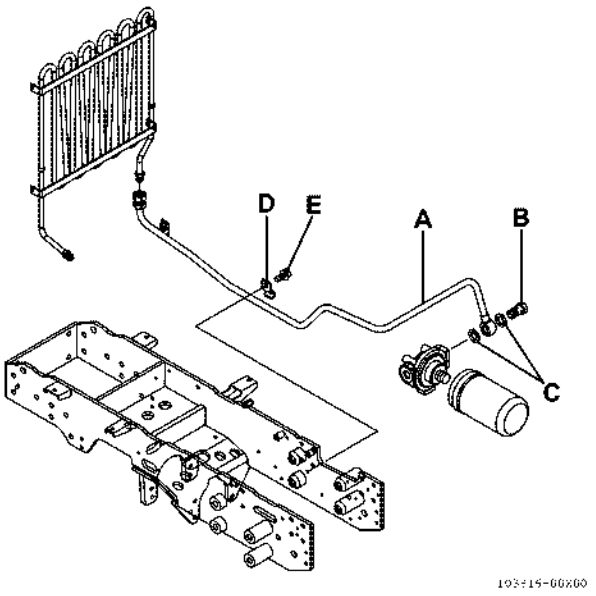
Tightening torque: 167 to 206 N·m



12.Mount the hydraulic pipe (A) that connects the line filter to the oil cooler.

IMPORTANT
- During assembly, make sure to replace the copper packing (B) with a new part.
  Joint PF3/8 tightening torque: 30.4 to 37.3 N•m

(A) Pipe assembly, filter
(B) Joint PF3/8 (x1)
(C) Gasket 17 (x2)
(D) Clamp, pipe (x1)
(E) M8 x 16 bolt (x1)

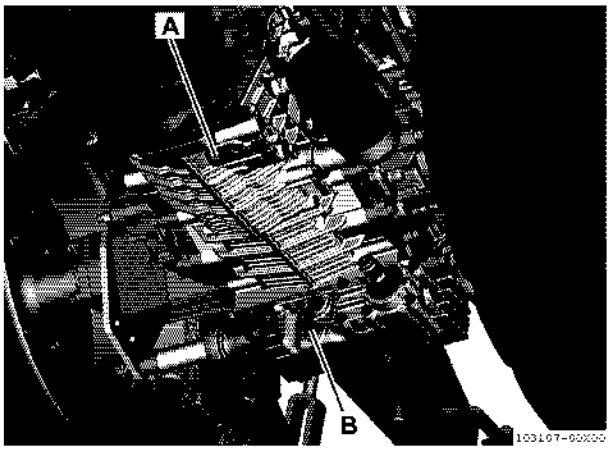


23. Disassembling and Assembling the PTO Case

1. Disassembling the PTO Case

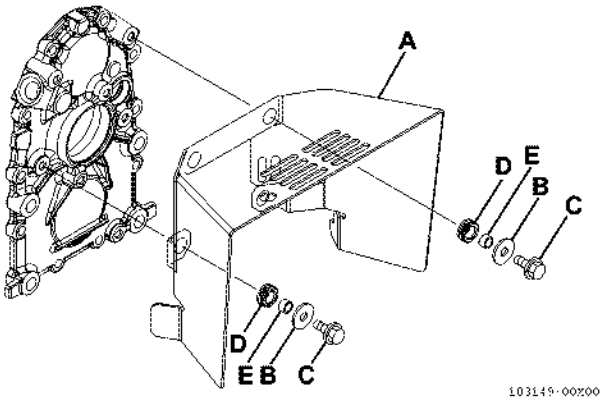
1. Remove the transmission drain plug (A) and mid-PTO output case drain plug (B), and vent the transmission oil.

   (A) Transmission drain plug
   (B) Mid-PTO output case drain plug



2. Remove the PTO guard (A).

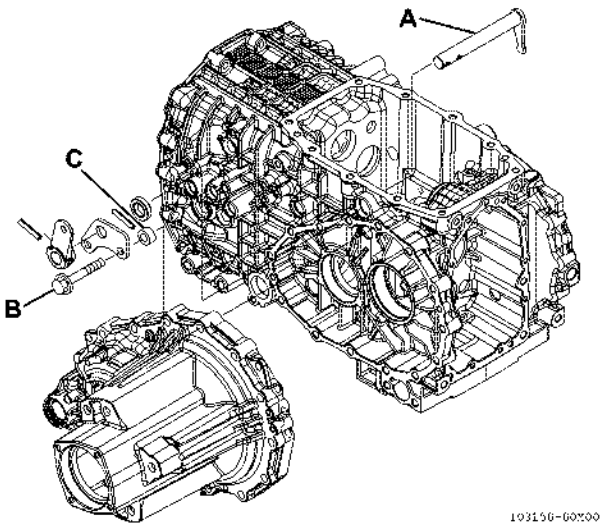
   (A) PTO guard
   (B) 8 washers (x2)
   (C) M8 x 20 plated bolts (x2)
   (D) 12.0 x 4 grommets (x2)
   (E) 8.8 x 12 x 6.5 collars (x2)



3. Pull out the shift PTO arm assembly (A) from the transmission case.

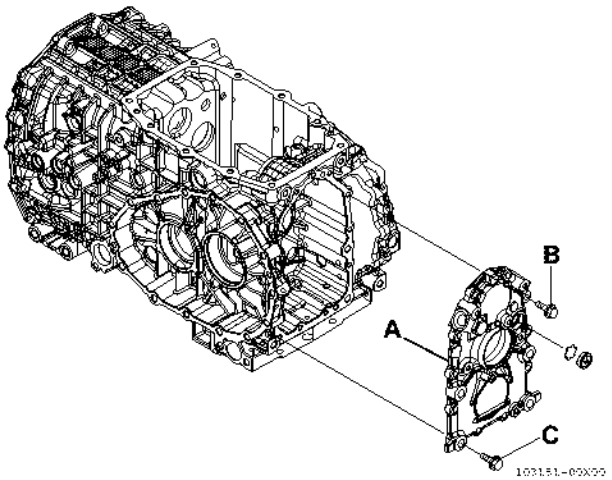
   (A) Shift PTO arm assembly
   (B) M10 x 65 plated bolts (x2)
   (C) Collars 11 x 20 x 10 (x2)

NOTE
- Be careful not to lose the collars 11 x 20 x 10.



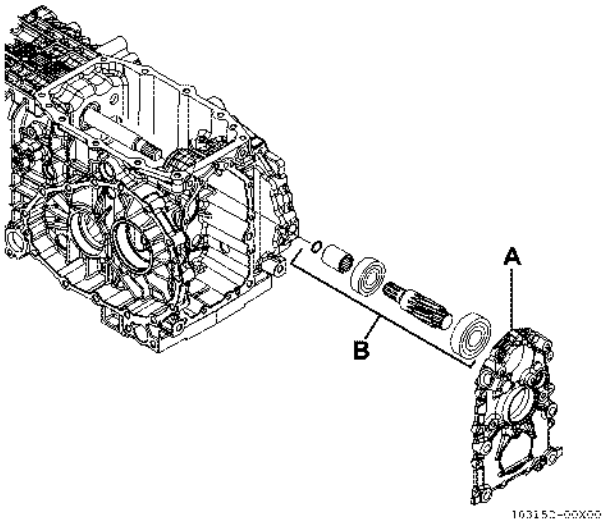
4. Remove the mounting bolts from the PTO rear cover (A).

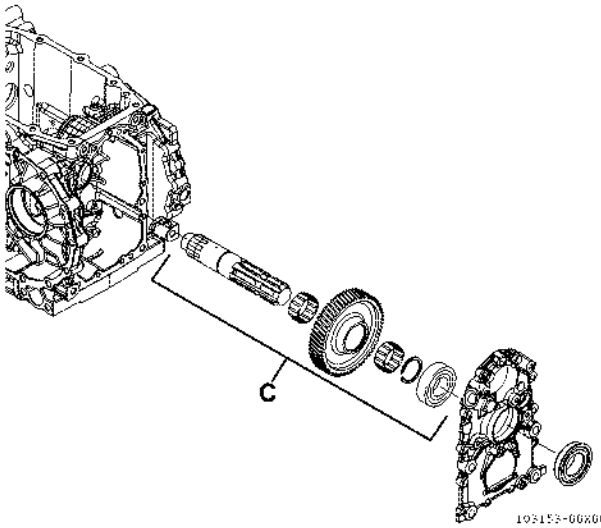
(A) PTO rear cover
(B) M8 x 25 plated bolts (x10)
(C) M12 x 45 plated bolts (x2)

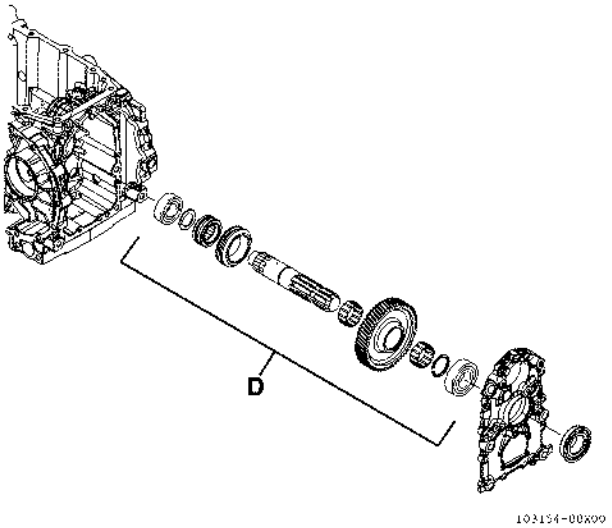


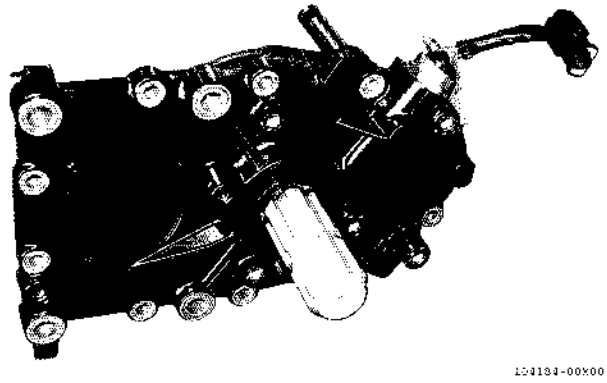
5. Remove the PTO rear cover (A) using the assembly with gears and shafts.

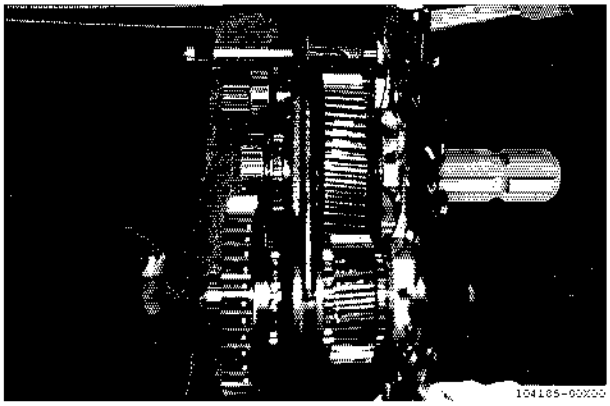
(A) PTO rear cover
(B) PTO drive shaft assembly
(C) PTO shaft assembly
(D) Mid-PTO idle shaft assembly





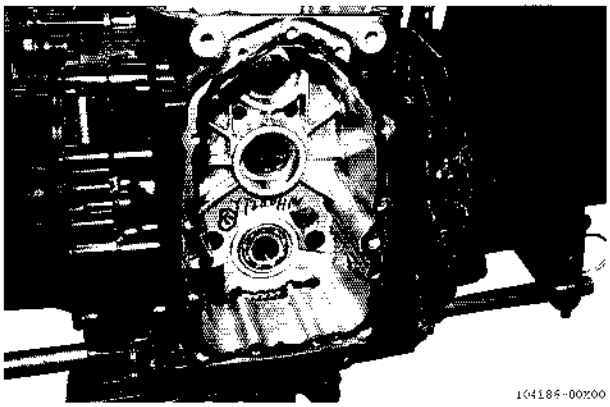






2. Assembling the PTO Case

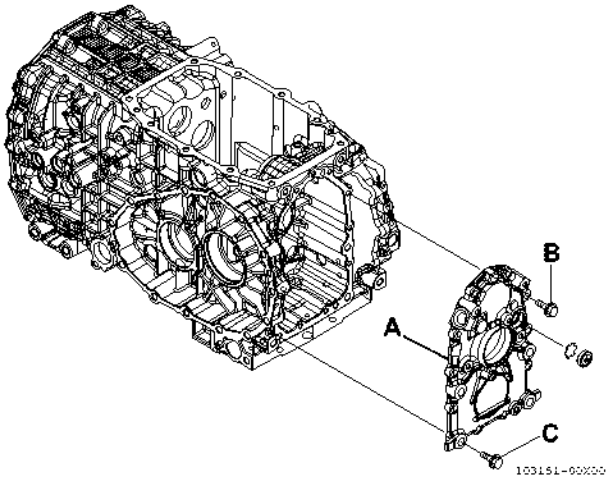
1. Coat the aligned PTO case surfaces with a bonding agent (1207B).



2. Mount the PTO rear case (A).

(A) PTO rear case
(B) M8 x 25 plated bolts (x10)
Tightening torque: 23 to 29 N·m

(C) M12 x 45 plated bolts (x2)
Tightening torque: 78 to 98 N·m

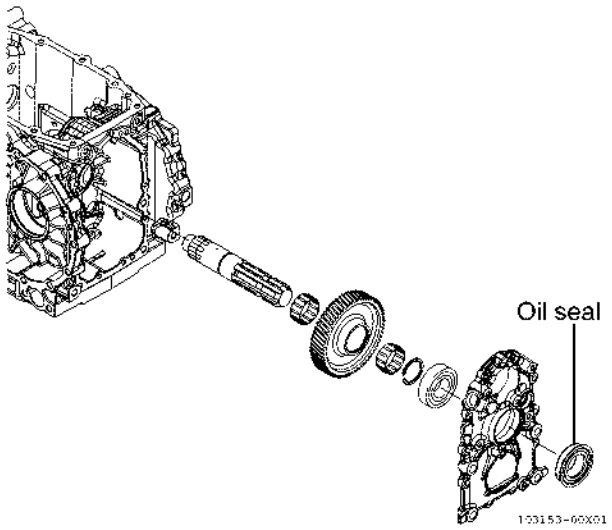


IMPORTANT
- There are 2 knock pins.

3. Mount the shift PTO arm assembly (A).

NOTE
- When replacing the PTO shaft oil seals, apply a flat screwdriver from the outside to enable replacement without disassembling the PTO rear cover.

4. Mount the PTO guard.
5. Add the regulation amount of transmission oil.

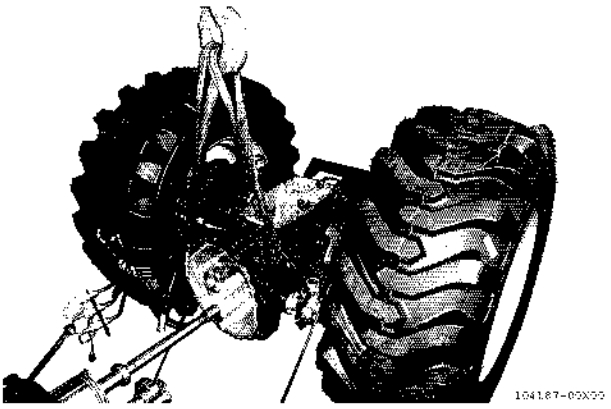


24. Disassembling and Assembling the Differential

1. Disassembling the Differential

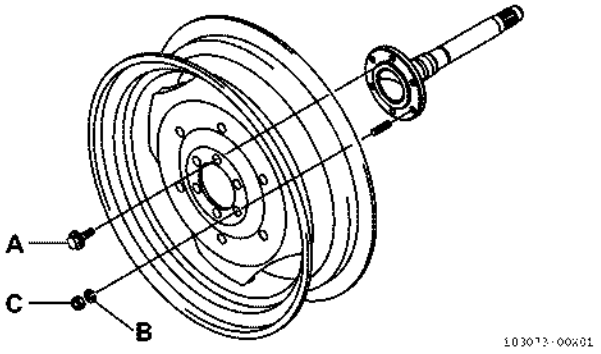
Differential Disassembly Preparations
(1) Separating the Cabin (See page 3-63)
(2) Separating the Rear Axle Housing and the Center Plate (See page 3-155)
(3) Separating the Hydraulic Lift Assembly (See page 3-119)
After completing the tasks described above, disassemble the differential.

1. Secure and hang the rear axle housing in two places front and back.



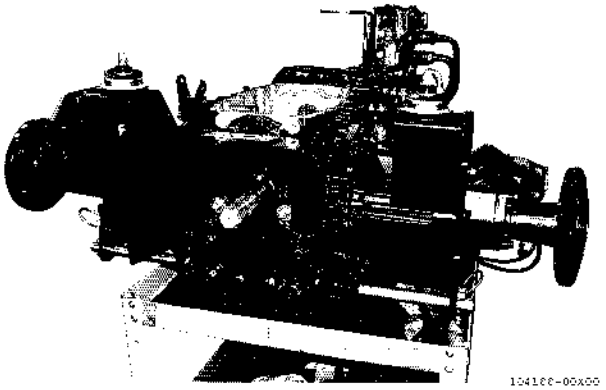
2. Remove the right-and left rear tires.

(A) M14 x 24 bolts (right and left x4 each)
(B) Washer lock 14 (right and left x2 each)
(C) Nuts M14 (right and left x2 each)



3. Place the rear axle housing on a flat, stable surface.

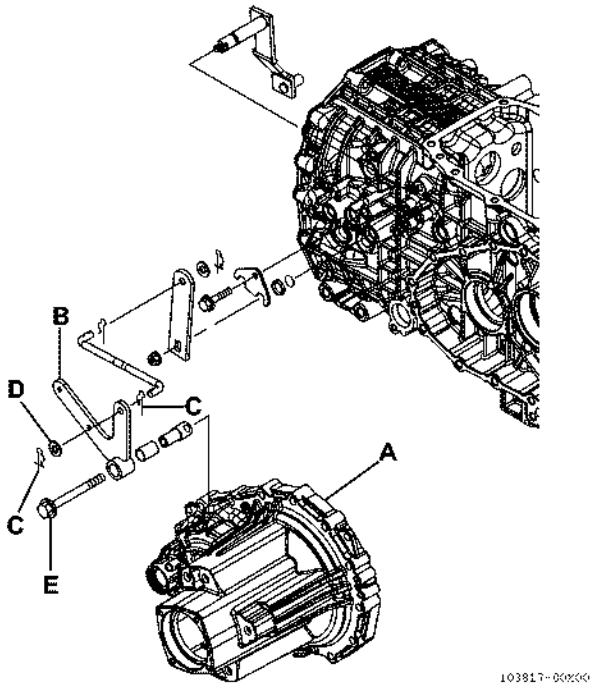
IMPORTANT
- Make sure to balance well so that the rear axle housing does not tilt or topple.



4. Remove the left rear axle housing (A).

(1) Remove the 4WD shift arm assembly (B).

(A) Rear axle housing
(B) 4WD shift arm assembly
(C) Snap 8 pin (x1)
(D) 10 washer (x1)
(E) M10 x 95 plated bolt (x1)



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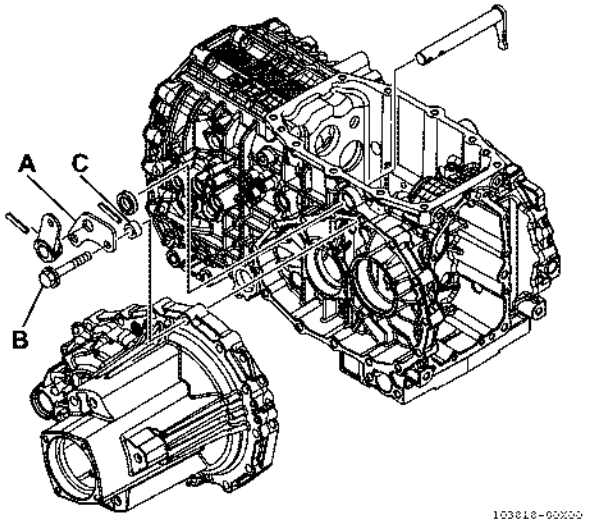
(2) Remove the PTO shift arm plate (A).

IMPORTANT
- Be careful not to drop the internal collars (C) (x2).

(A) Shift arm plate
(B) M10 x 65 plated bolts (x2)
(C) Collars (x2)



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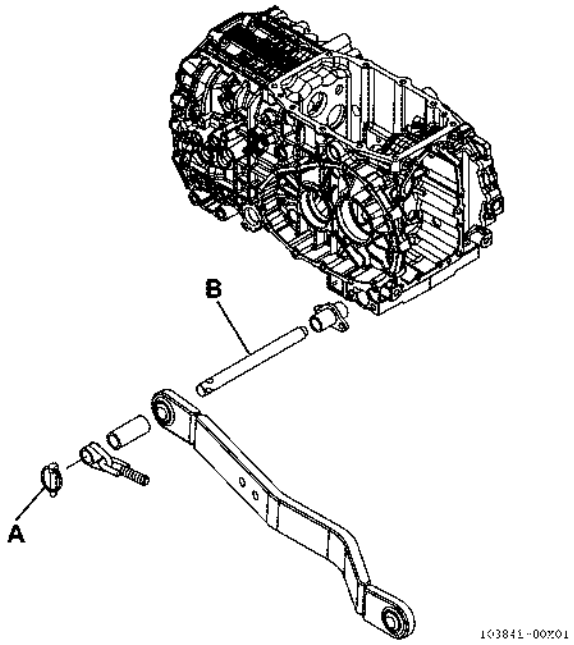
(3) Remove the left lower link pin (A).
Remove the pin assembly ball (B), and pull out the lower link pin (A).

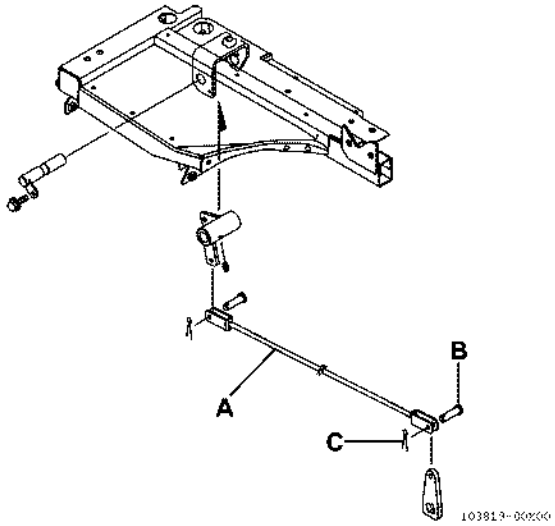
(A) Lower link pin
(B) Pin assembly ball

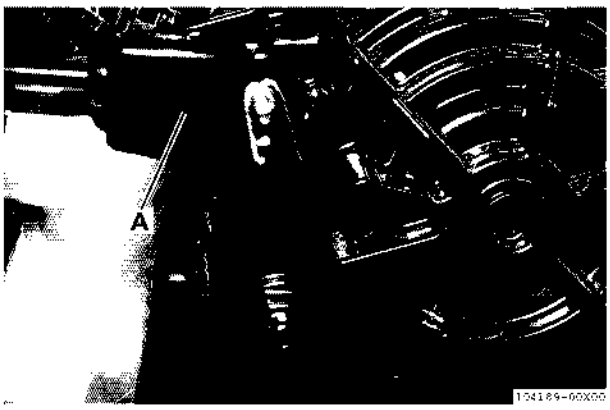


(4) Remove the left brake rod assembly (A).

IMPORTANT
- During assembly, make sure to replace the cotter pin.

(A) Brake rod assembly
(B) Cotter 2.5 x 30 pin (x1)
(C) 8 x 24 pin (x1)

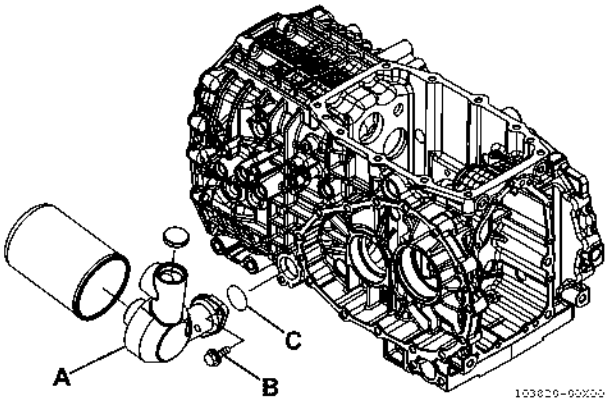




(5) Remove the hydraulic filter cover (A).

IMPORTANT
- Be careful not to lose the O-ring (C).

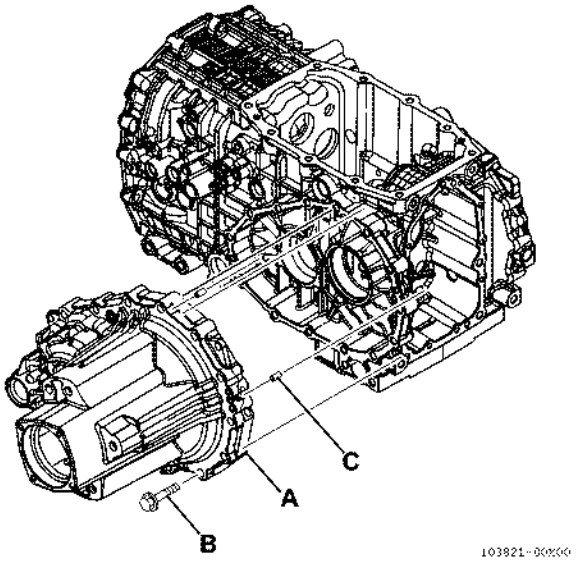
(A) Hydraulic filter cover
(B) M8 x 25 plated bolts (x2)
(C) O-Ring LAP34.0



(6) Remove the left rear axle case assembly (A).

IMPORTANT
- Be careful not to lose the parallel M8 x 14 pins (C) (x2).

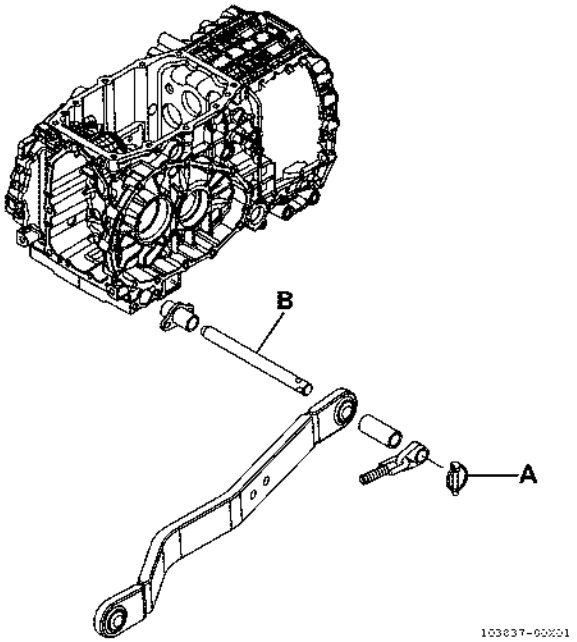
(A) Rear axle case assembly
(B) M10 x 50 plated bolts (x11)
(C) Parallel M8 x 14 pins (x2)



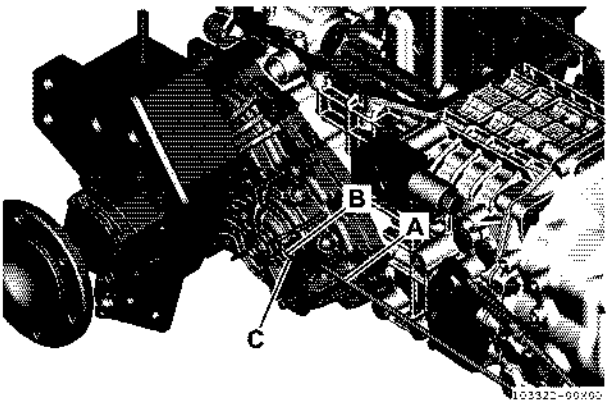
5. Remove the right lower link pin (A).

(1) Remove the pin assembly ball (B), and pull out the lower link pin (A).

(A) Lower link pin
(B) Pin assembly ball



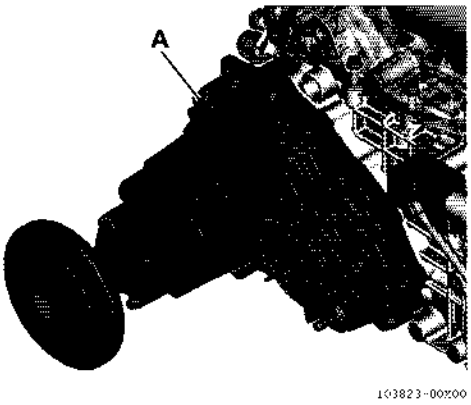
(2) Remove the right brake rod assembly (A).



IMPORTANT
- During assembly, make sure to replace the cotter pin.

(A) Brake rod assembly
(B) Cotter pin 2.5 x 30 (x1)
(C) 8 x 24 pin (x1)

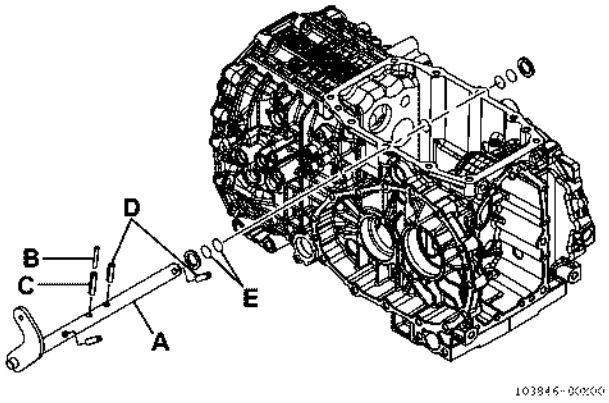
(3) Remove the right rear axle case assembly.



IMPORTANT
- Be careful not to lose the parallel M8 x 14 pins (x2).

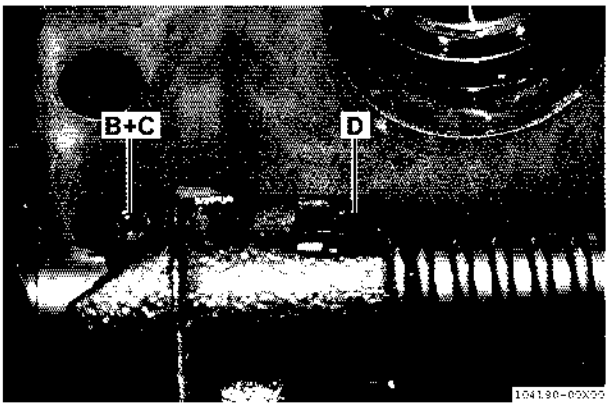
(A) M10 x 50 plated bolts (x14)

6. Remove the differential lock shaft assembly (A).



NOTE
- Remove the roll pins (C) and (D) (x3).
- The left edge roll pins (B) and (C) are doubles.

IMPORTANT
- Be careful not to lose the O-ring 1AP20.0 (D).
- During assembly, note the roll pin (B), (C), and (D) orientations.

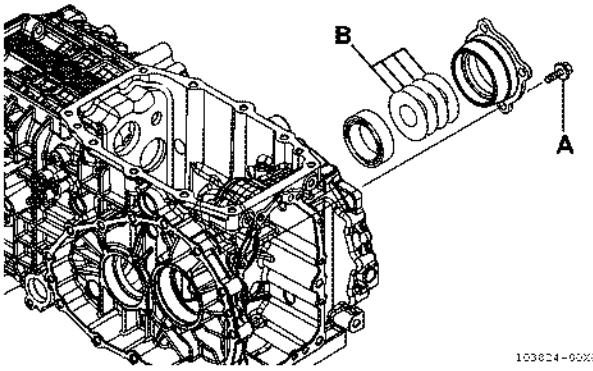


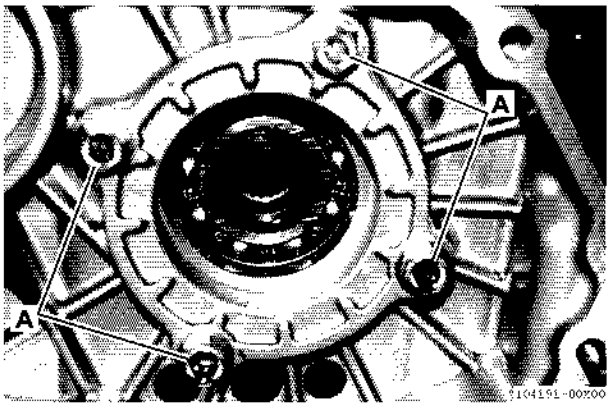
(A) Differential lock shaft assembly
(B) Spring 5.0 x 40 pin (x1)
(C) Spring 8.0 x 40 pin (x1)
(D) Spring 8.0 x 32 pins (x2)
(E) O-ring 1AP20.0

7. Remove the differential carrier mounting bolts (A).

IMPORTANT
- Be careful not to lose because of the shim (B). *The shim (B) is for adjusting bevel gear backlash.

(A) M10 x 25 plated bolts (x4)
(B) Shim

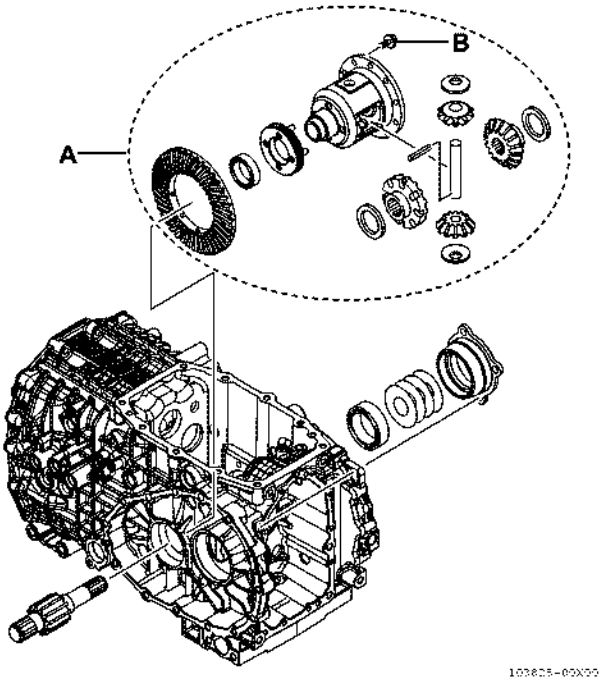




8. Remove the differential assembly (A) upwards.

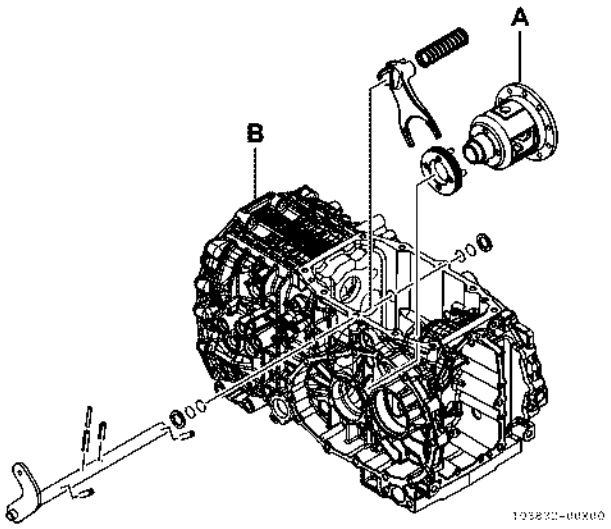
IMPORTANT
- When mounting after disassembling the differential, coat the M8 x 16 plated bolts (B) with LOCTITE.

(A) Differential assembly
(B) M8 x 16 plated bolts (x10)



2. Assembling the Differential

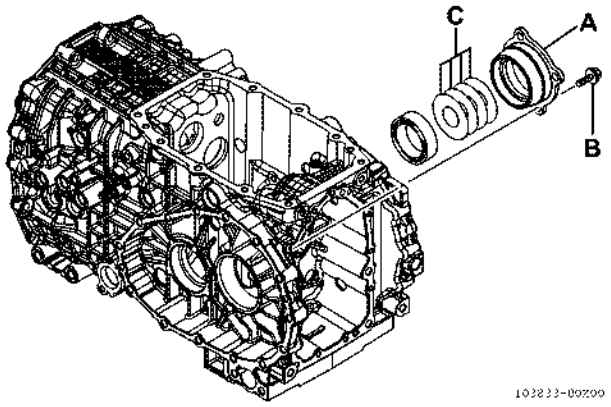
1. Mount the differential assembly (A) to the rear axle case (B) from above.



(A) Differential assembly
(B) Rear axle case

2. Mount the differential carrier (A).

IMPORTANT
- Insert the shim (C) with the removed status as is.
- Measure the bevel backlash, and if it is not within the range 0.13 to 0.18 mm, adjust by increasing or decreasing the shim (C).



(A) Differential carrier
(B) M10 x 25 plated bolts (x4)
Tightening torque: 44 to 59 N·m

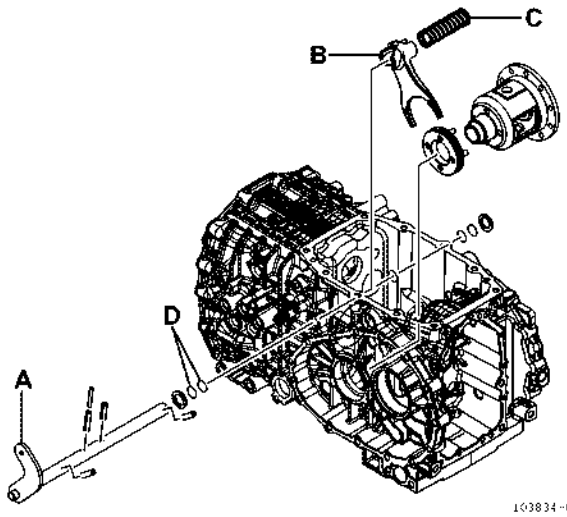
(C) Shim

3. Mount the differential lock shaft (A).
   (1) Temporarily mount the differential lock fork (B) and return spring (C) inside the case.

   (2) Thread the differential lock shaft (A) from the left of the case.

IMPORTANT
- During assembly, make sure to replace the O-ring (D) with a new product.

(A) Differential lock shaft
(B) Differential lock fork
(C) Return spring
(D) O-rings (x2)



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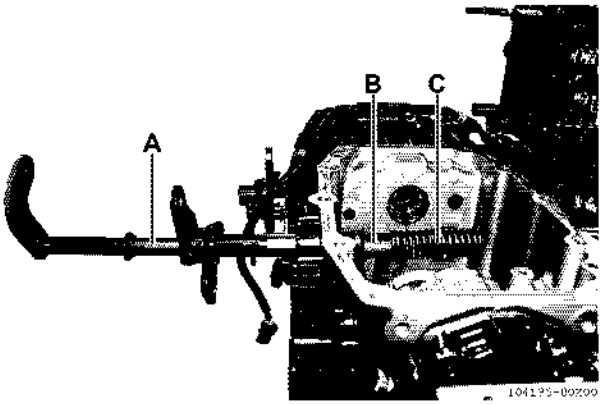

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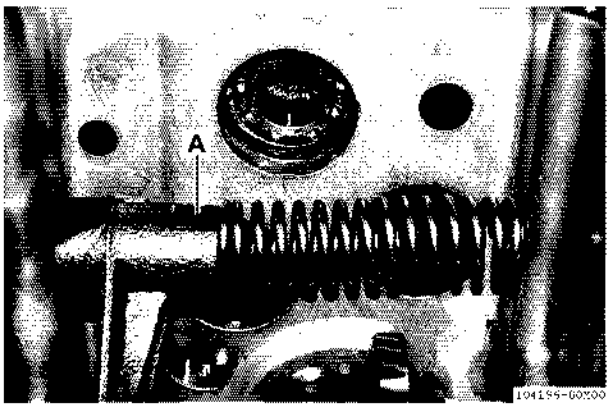
4. Pound in the roll pin (A).

IMPORTANT
- During assembly, note the roll pin mounting orientation.

(A) Roll pin



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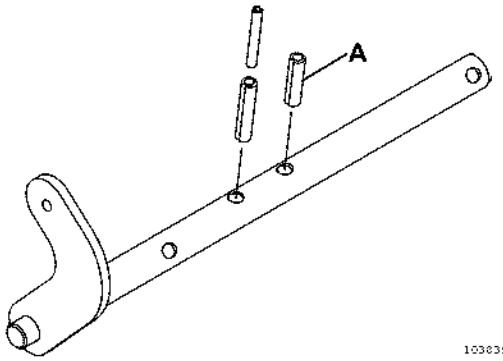

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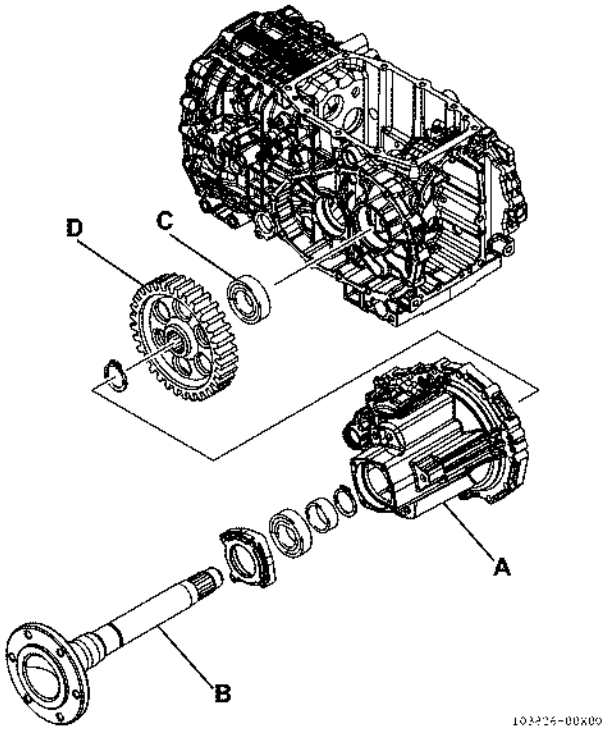
25. Disassembling the Brake

Brake Disassembly Preparations

- Separating the rear axle housing (A) from the transmission case (See page 3-143)
  After completing the tasks described above, disassemble the brake.

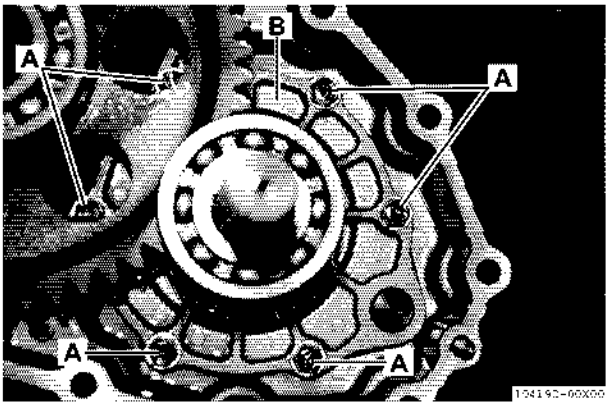
1. Remove the ball bearing 6307(C) and final gear (D) from the rear axle shaft (B).

   (A) Rear axle housing
   (B) Rear axle shaft
   (C) Ball bearing 6307
   (D) Final gear



2. Remove the brake bearing holder mounting bolts (A), and remove the bearing holder (B).

   (A) M8 x 20 plated bolts (x6)
   (B) Bearing holder

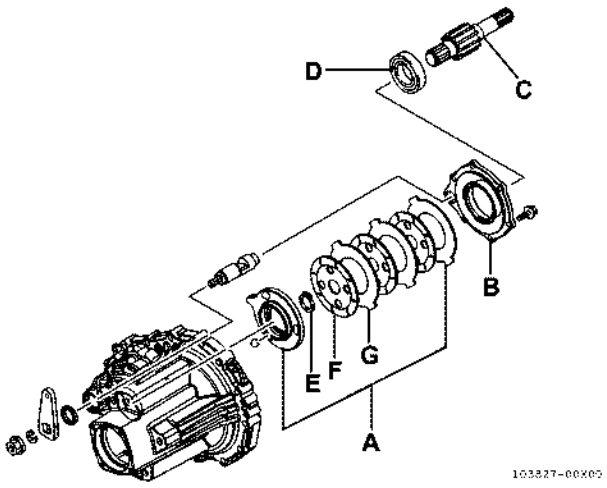


3. Use the assembly to remove the brake kit (A), bearing holder (B), final 9T pinion (C), ball bearing 6306 (D).

(A) Brake kit
(B) Bearing holder
(C) Final 9T pinion
(D) Ball bearing 6306

4. Remove ring 26 (E), and then remove the friction disks (F) and steel plates (G).

(E) Ring 26
(F) Friction disks (x3)
(G) Steel plates (x3)



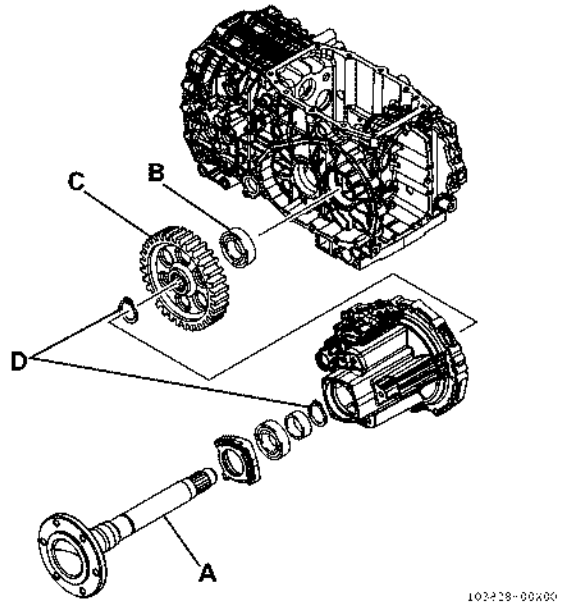
26. Replacing the Axle Oil Seal

1. Remove the ball bearing 6307 (B) and final gear (C) from the rear axle shaft (A).

   (A) Rear axle shaft
   (B) Ball bearing 6307
   (C) Final gear

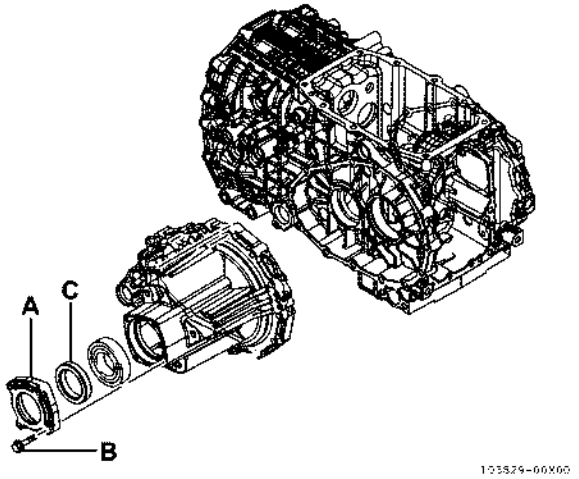
2. Remove the circlip 45 (D), and pull out the rear axle shaft (A).

   (D) Circlip 45



3. Remove the oil seal case (A) mounting bolts (B) together with the oil seal (C).

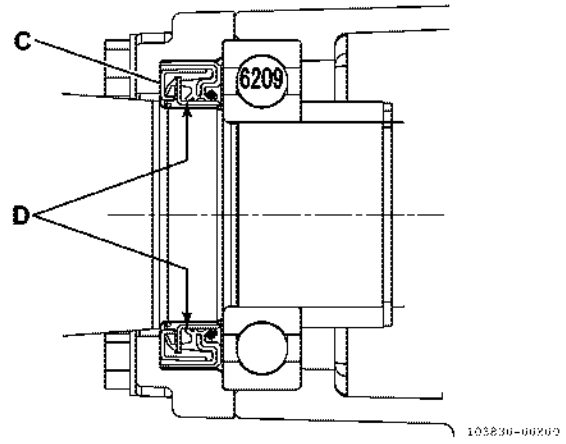
   (A) Oil seal case
   (B) M8 x 40 plated bolts (x4)
   (C) Seal QLNYY 527514.5



4. Replace the oil seal (C).

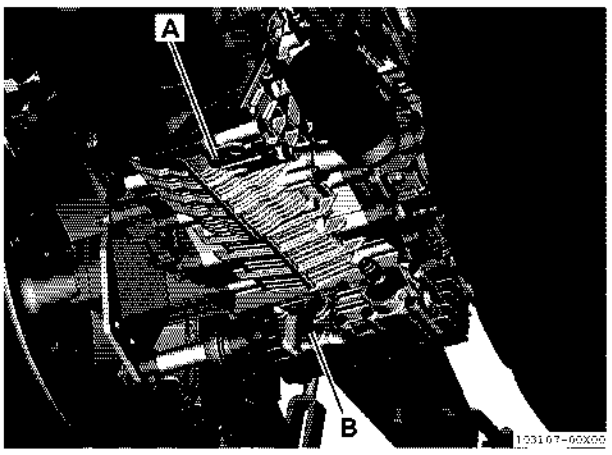
IMPORTANT
- During assembly, note the oil seal mounting orientation. (See the diagram on the right)
- Coat the oil seal lip (C) with grease.

(C) Oil Seal QLNYY527514.5
(D) Oil seal lip



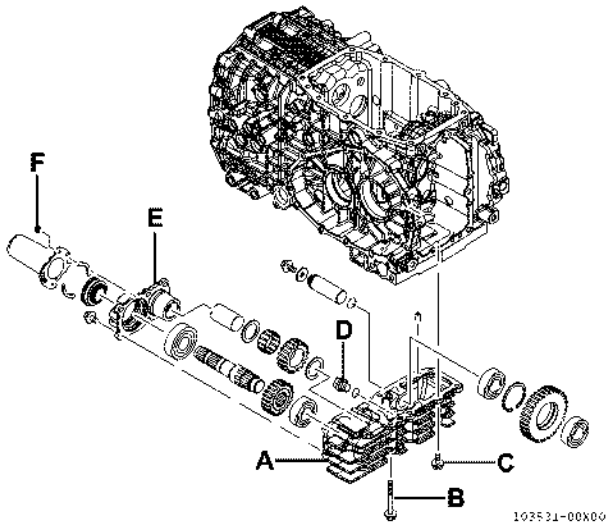
27. Disassembling the Mid-PTO Case

1. Remove the transmission drain plug (A) and mid-PTO output case drain plug (B), and vent the transmission oil.



(A) Transmission drain plug
(B) Mid-PTO output case drain plug

2. Remove the mid-PTO case assembly (A).



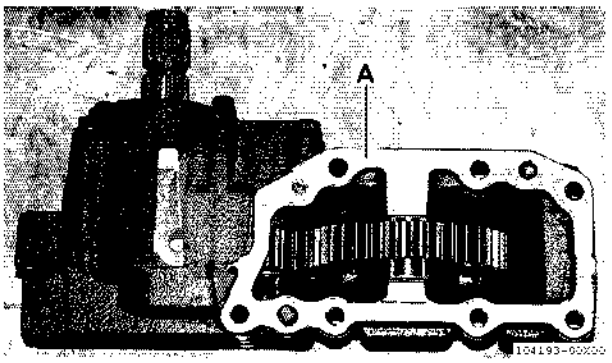
(A) Mid-PTO case assembly
(B) M8 x 75 plated bolts (x2)
(C) M8 x 25 plated bolts (x5)

3. Mount the mid-PTO case (A).

IMPORTANT

- Apply liquid packing to the aligned surfaces of the mid-PTO case (A) and mid-PTO case cover (E).
- Coat the cover hook pin (F) with LOCTITE.
- Apply liquid packing to the aligned surfaces of the mid-PTO case (A) and the transmission case.
- Plug (14) tightening torque: 25 to 31 N·m

(D) Plug (14) (x1)
(E) Mid-PTO case cover
(F) Cover hook pin

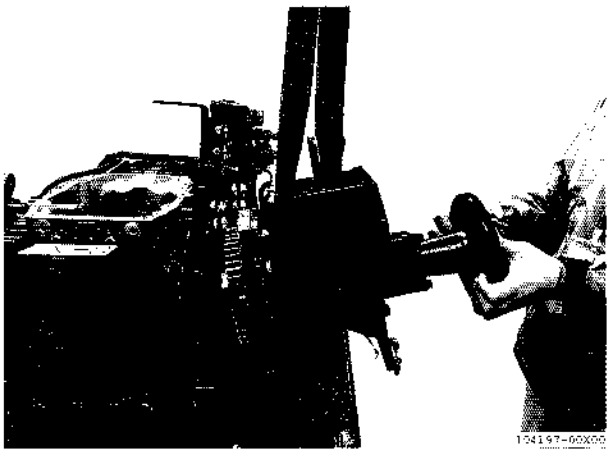


4. After mounting, add transmission oil, and check that there are no oil leaks.

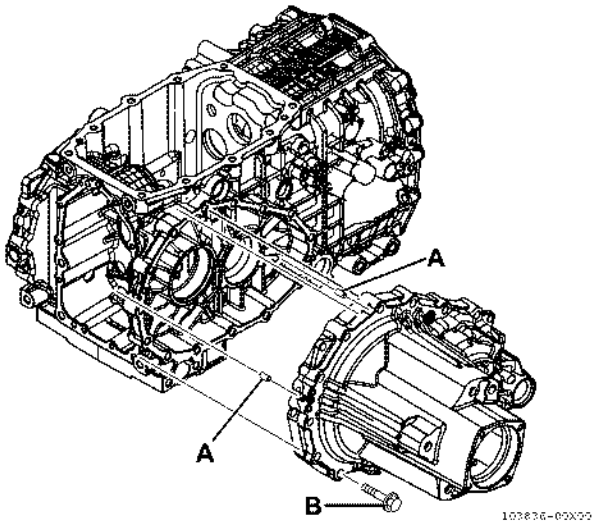
28. Mounting the Rear Axle Case to the Transmission Case

1. Mount the right rear axle case assembly.
   (1) Apply liquid packing 1207B to the aligned surfaces.
   (2) Do not forget to incorporate M8 x 14 parallel pins (A) (x2) into the transmission case.
   (3) Secure the transmission case using M10 x 50 plated bolts (B) (x14).

   Tightening torque: 44 to 59 N·m

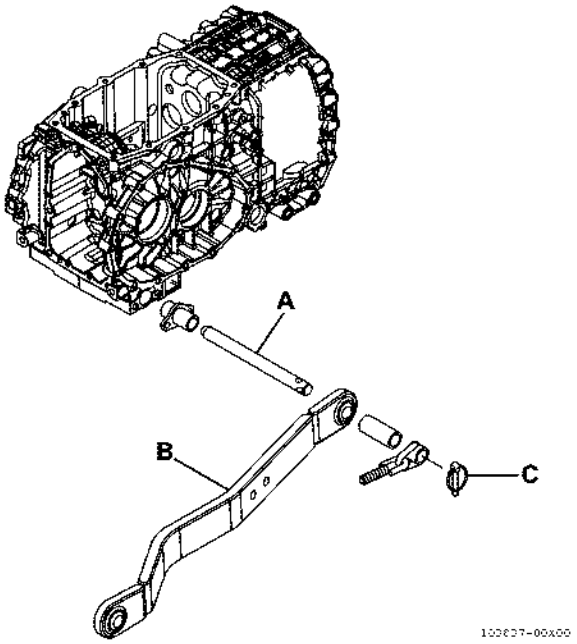


(A) M8 x 14 parallel pins (x2)
(B) M10 x 50 plated bolts (x14)
Tightening torque: 44 to 59 N·m



(4) Mount the lower link pin (A).
Secure the lower link using a mounting ball pin.

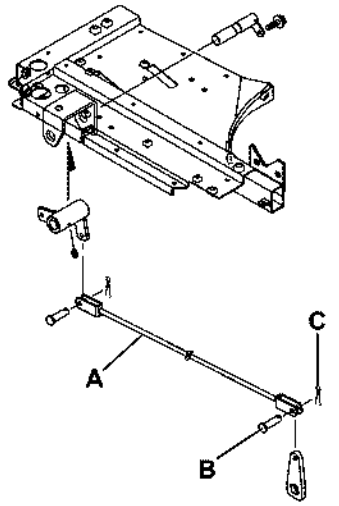
(A) Lower link pin
(B) Lower link
(C) Ball pin



(5) Mount the brake rod (A).

IMPORTANT
- During assembly, make sure to replace the cotter pin (C) with a new part.

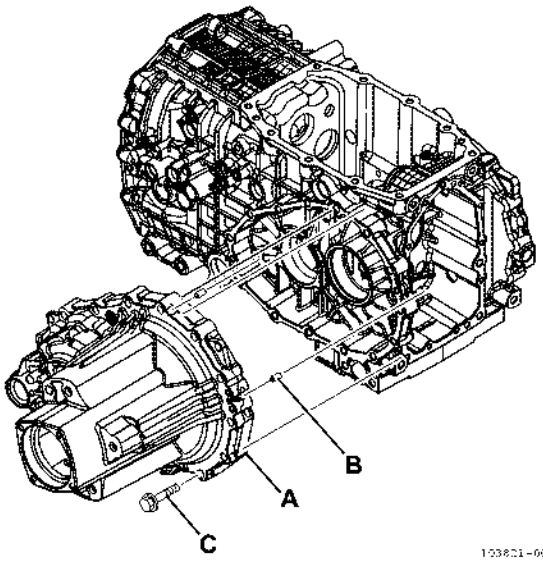
(A) Brake rod
(B) Pin 8 x 24
(C) Cotter pin 2.5 x 30



103838-00X00

2. Mount the left rear axle case assembly (A).
   (1) Apply liquid packing 1207B to the aligned surfaces.
   (2) Do not forget to incorporate M8 x 14 parallel pins (A) (x2) into the transmission case.
   (3) Secure the transmission case using M10 x 50 plated bolts (B) (x11).

(A) Left rear axle case assembly
(B) M8 x 14 Parallel pins (x2)
(C) M10 x 50 Plated bolts (x11)
Tightening torque: 44 to 59 N·m

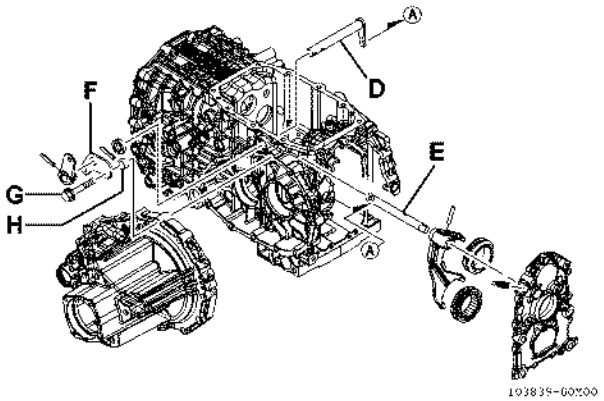


103821-00X01

(4) Mount the shift PTO arm assembly (D).
(5) Mount the shift PTO arm assembly (D) to the shift PTO fork (E) groove.
(6) Mount the shift arm plate (F).

IMPORTANT
- At this time, make sure to mount 11 x 20 x 10 collars (H) (x2).

(D) Shift PTO arm assembly
(E) Shift PTO fork
(F) Shift arm plate
(G) M10 x 65 plated bolts (x2)
(H) 11 x 20 x 10 collars (x2)



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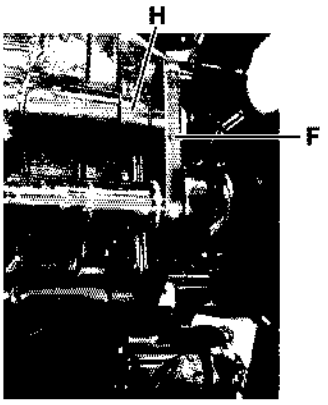

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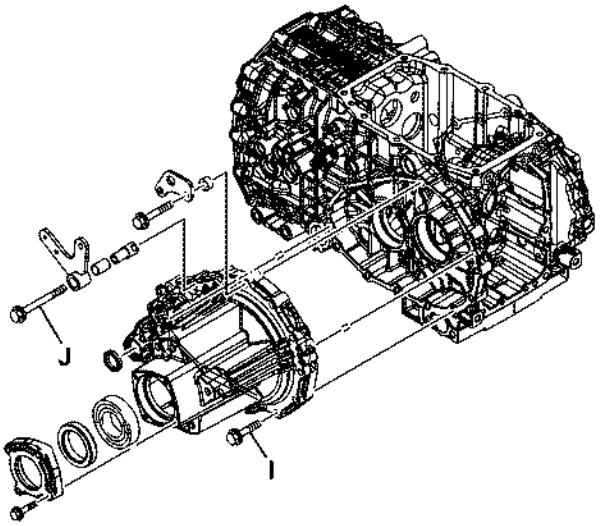
(7) Mount the front wheel drive speed change link rotation support.
To mount, use M10 x 50 plated bolts (I).

(I) M10 x 50 plated bolts (x13)
Tightening torque (44 to 59 N·m)
(J) M10 x 95 plated bolt (x1)



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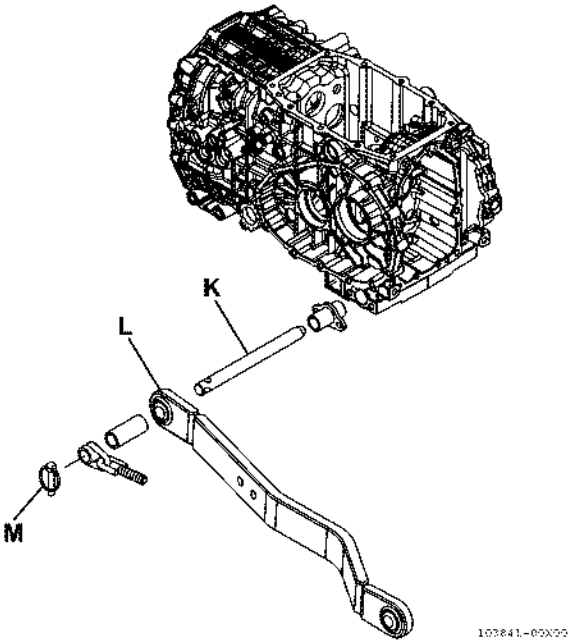
(8) Mount the lower link pin (K).

(K) Lower link pin
(L) Lower link
(M) Ball pin



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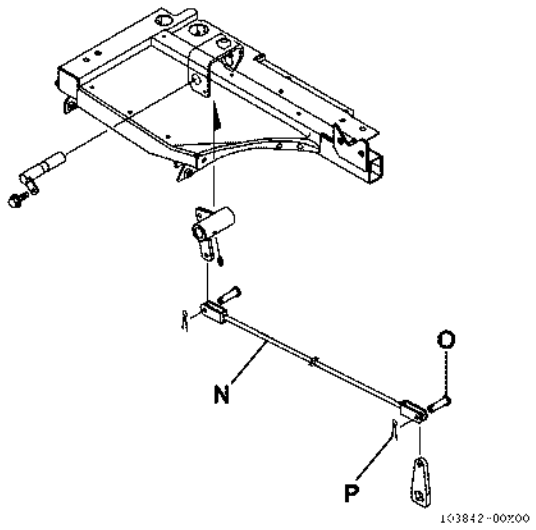
(9) Mount the brake rod (N).

IMPORTANT

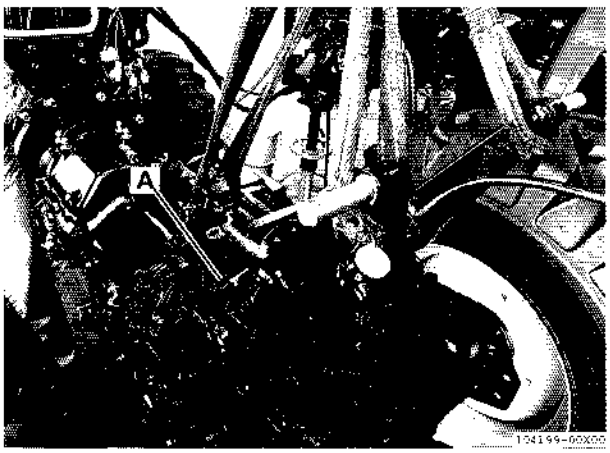
- During assembly, make sure to replace the cotter pin (P) with a new part.

(N) Brake rod
(O) Pin 8 x 24
(P) Cotter pin 2.5 x 30



29. Mounting the Hydraulic Lift Assembly

1. Place and mount the hydraulic lift assembly (A) to the rear case.

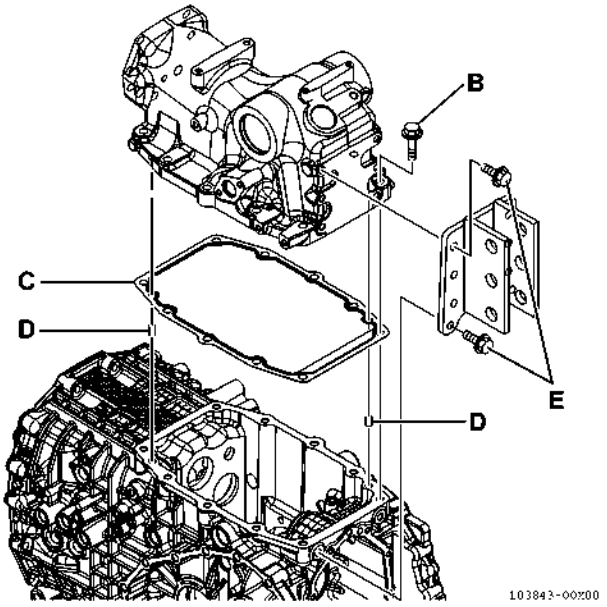


IMPORTANT
- Make sure to replace the alignment plate packing (C) with a new part.
  Packing (C): 1A8310-42180
  Gasket, cylinder case
- Do not forget to mount the M8 x 14 parallel pins (D) (x2) to the transmission case.

(A) Hydraulic lift assembly
(B) M10 x 40 plated bolts (x10)
Tightening torque: 44 to 59 N·m
(C) Packing
(D) M8 x 14 parallel pins (x2)

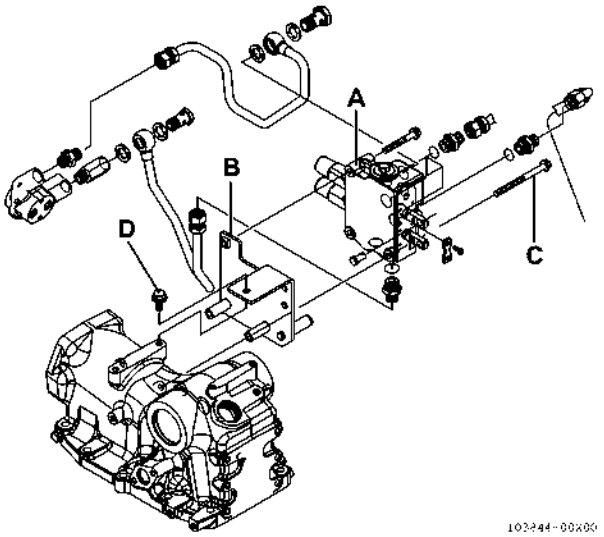
2. Tighten the top link hinge assembly mounting bolts (E).

(E) M10 x 25 plated bolts (x2)



3. Mount the loader valve (A) and bracket (B) to the hydraulic lift case using the assembly.

(A) Loader valve
(B) Bracket
(C) M8 x 16 plated bolt (x1)
(D) M8 x 100 plated bolts (x2)
Tightening torque: 23 to 29 N·m



4. Mount the hydraulic pipes (x2) to the loader valve from the hydraulic case head.

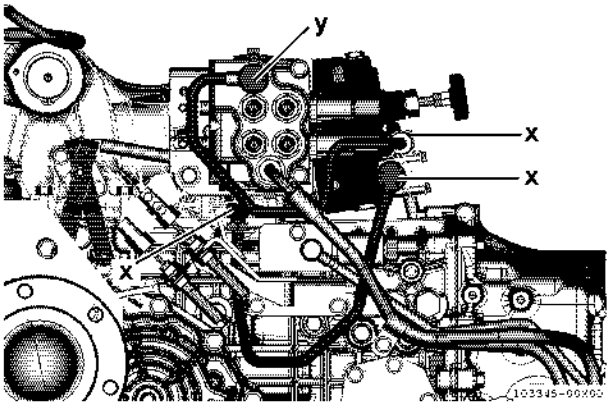
IMPORTANT

- Make sure to replace the copper packing with a new part.

Tightening torque:

(x) = 30.4 to 37.3 N·m

(y) = 44 to 54 N·m



4. ECO DIESEL

1. Structure and Functions

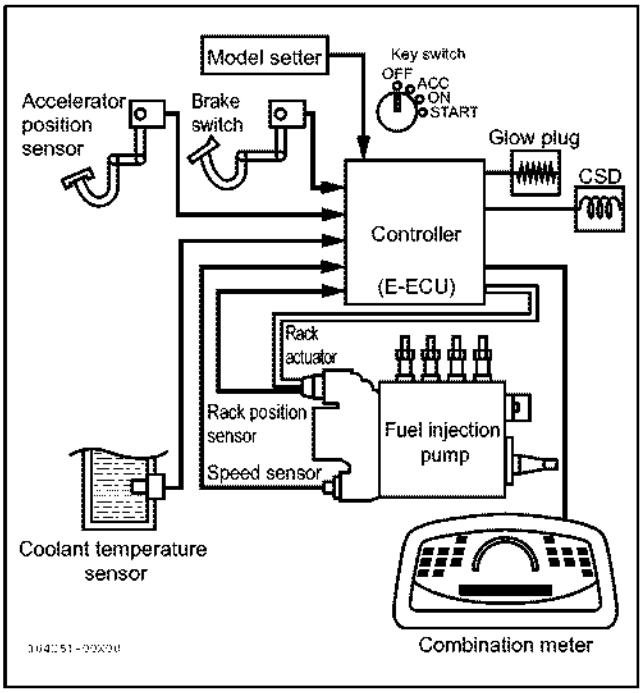
■ Outline of Eco Diesel

A system for controlling the best fuel injection amount with a microcomputer in order to draw the greatest engine output for any kind of operation.

This is provided with a isochronous control for keeping the engine at a certain speed, leading to high performance and precise operation. Moreover, besides the above said functions, this is also equipped with self-diagnosis functions that indicates alerts on the Eco view, for example.

Next, the system of eco-governor is explained.

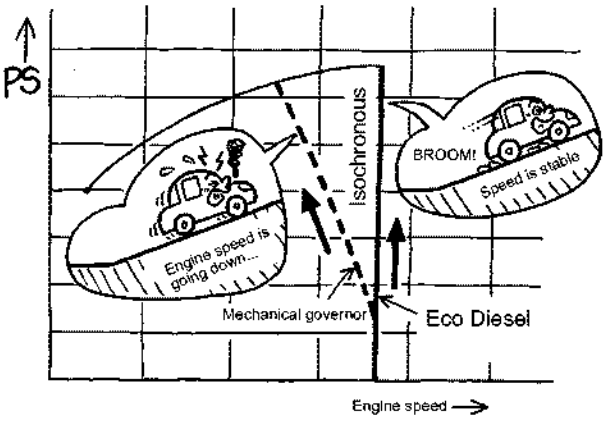
Electronic governor controller receives signals from the accelerator sensor, rack positioning sensor, and speed sensor, and then controls the rack actuator for the best engine output. Temperature sensor of cooling water is used for all kinds of control. The operating state of the engine is sent to other controllers via the CAN (Controller Area Network), which makes highly precise control.

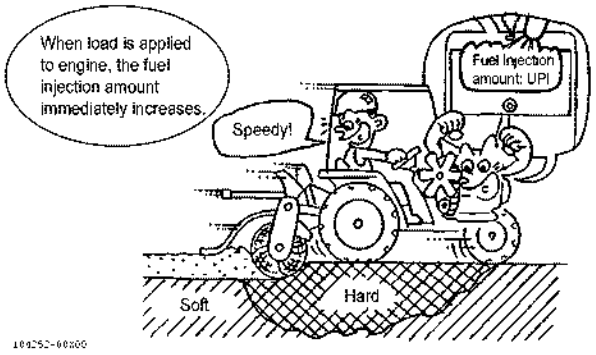


■ Function of Eco Diesel

(1) Isochronous control

This keeps the engine speed stable.
By starting the operation by setting the engine speed with the accelerator lever first, even when the engine speed decelerates by load, the computer automatically determines each information (accelerator position, rotational speed, and rack position), controls the fuel injection amount, and keeps the engine to the speed the operator has set (isochronous control), which realizes a smooth operation with stable speed even at high speed operation.
When the engine load is low, it quickly reduces the fuel injection amount, which saves fuel consumption.
When the brake is operated, this mechanism is automatically canceled, and therefore it can securely perform the brake.





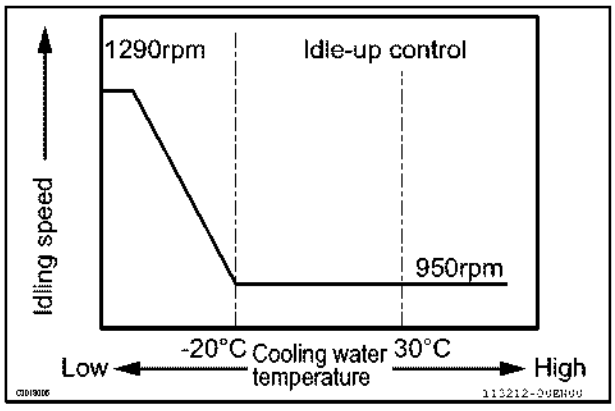
(2) Droop control

Same as the mechanical governor, this also controls the engine speed depending on the load. When the load increases, the engine speed decelerates, and when the load decreases, the engine speed accelerates.

(3) Low-temperature start control function

The following controls are for improving the engine starting performances, etc.

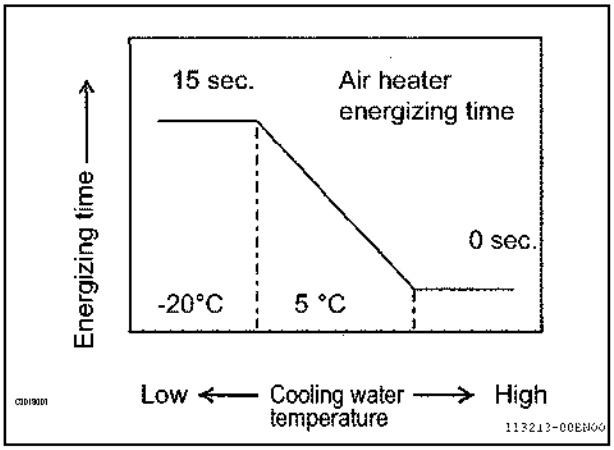
- Start injection amount control
  This finds the best fuel amount needed for start according to the cooling water temperature.
- Idling speed control
  This automatically increases the idling speed of right after the engine start depending on the cooling water temperature, in order to shorten the warm-up time of the engine and stabilize the engine speed. Note that, as the cooling water temperature rises, the idling speed automatically lowers.



- Time control of energizing the glow plug

  <ON Glow>

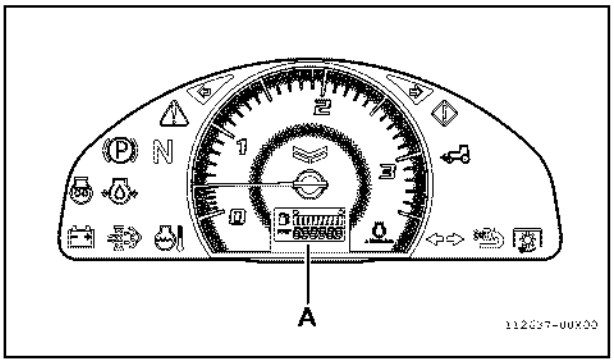
  When the key switch is turned on, at the same time, this automatically activates the glow plug for a necessary amount of time according to the temperature of the cooling water.



(4) Self diagnosis and fail-safe function

This regularly monitors the sensors used for the eco-governor system (self diagnosis function), and if any error occurs, the overview of the error is indicated on the monitor.

(A) Monitor



5. ENGINE

1. Structure and Function

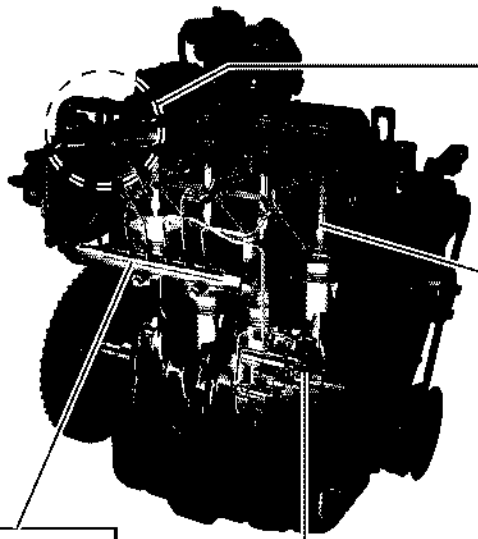
■ Common rail engines

(1) Outline

Common rail is a system that stores high pressure fuel in the fuel accumulator chamber (rail) that is shared throughout all cylinders (common). The electronic controlled injector precisely controls the fuel injection pressure, injection timing, and injection period (injection amount), for a complete combustion and high output.
With this complete combustion and electronic controlled EGR, toxic components such as fine particles (PM, black smoke) and nitrogen oxides (NOx) contained in the exhaust gas are suppressed.

Without being dependent on the engine speed, fuel is injected at ultra-high pressure.
High torque and stable output is acquired, so the operation is smooth.

With the synergism of a highly precise common rail type fuel injection control and the EGR, fuel is burnt completely, decreasing the discharging of toxic substance such as Nox, PM, etc. This lightens the burden on the operator and environment.



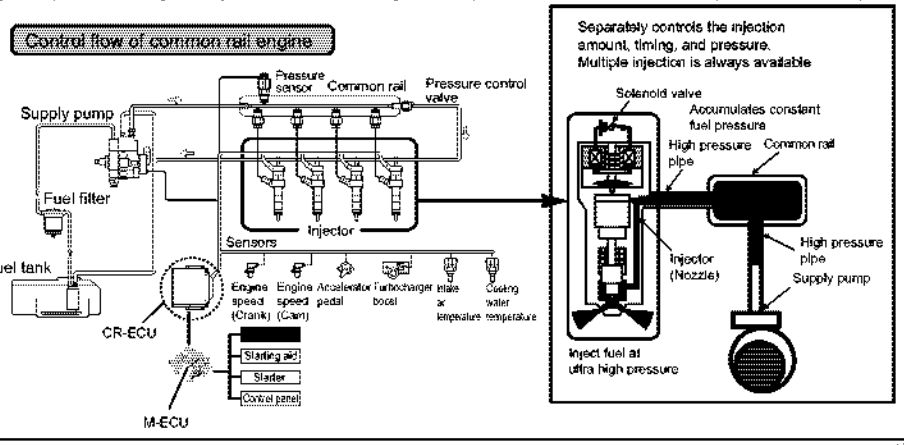
EGR
(Exhaust Gas Recirculation)
After cooling the exhaust gas, return the gas back into the combustion chamber to lower the fuel temperature. This is a system for suppressing the generation of Nox by controlling the oxidation reaction of nitrogen.

Injector
The injector injects the fuel at the best timing with the signal from the ECU. The highly accurate solenoid valve control enables multiple injection, and realizes complete injection and PM reduction.

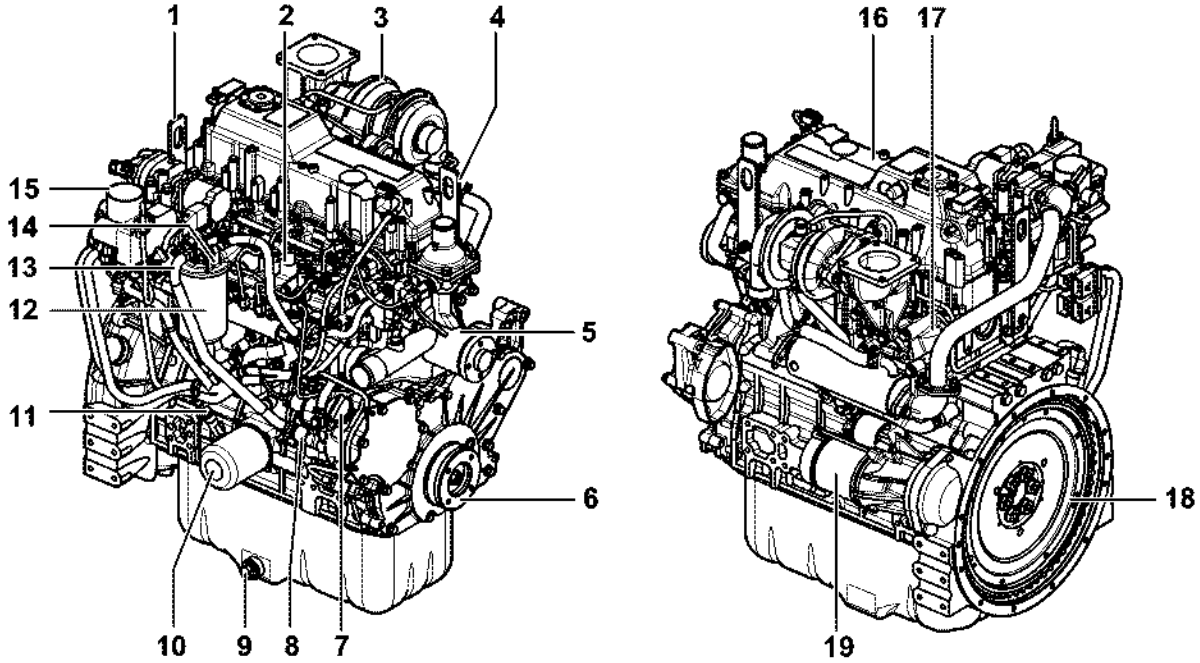
Common rail
Accumulates high pressure fuel inside the rail. Keeps the best fuel pressure at all times, realizing a stable fuel injection at all engine speed range.

Supply pump
The electronic control stabilizes supplying the high pressure fuel oil to the rail without being effected by the engine speed. The high pressure achieves a complete combustion, high output and reduction in fuel consumption.

ECU (Engine Control Unit)
Check current activities such as engine speed, accelerator opening, or intake air temperature, etc. with sensors. This is for central-controlling the fuel injection pressure, timing, and injection amount with a high accuracy so that the best output can always be acquired for operation.



(2) Names of Parts



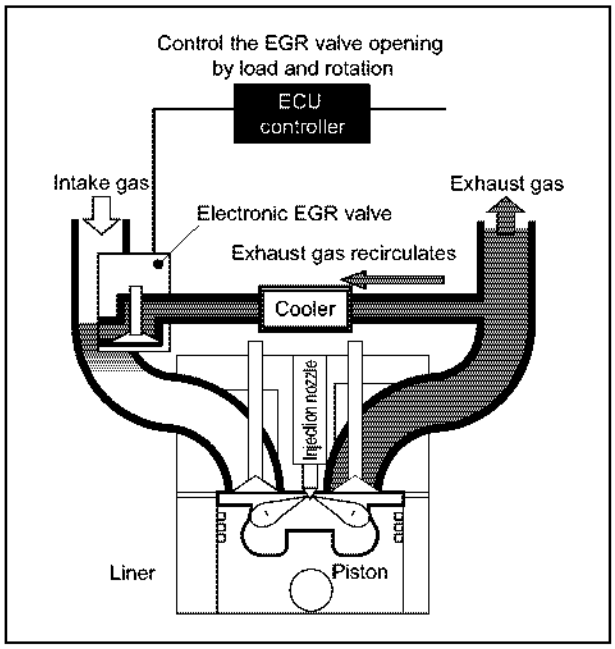
1 - Lifting Eye (flywheel end)
2 - Intake Manifold
3 - Turbocharger *1
4 - Lifting Eye (cooling fan end)
5 - Cooling Water Pump
6 - Crankshaft V-Pulley
7 - Filler Port (engine oil)
8 - Supply Pump
9 - Drain Plug (engine oil) *2
10 - Oil Filter
11 - Dipstick (engine oil)
12 - Fuel Filter
13 - Fuel Inlet
14 - Fuel Return Pipe (to fuel tank)
15 - Air Intake Port (from air cleaner)
16 - Hood
17 - Exhaust Manifold
18 - Flywheel
19 - Starter motor

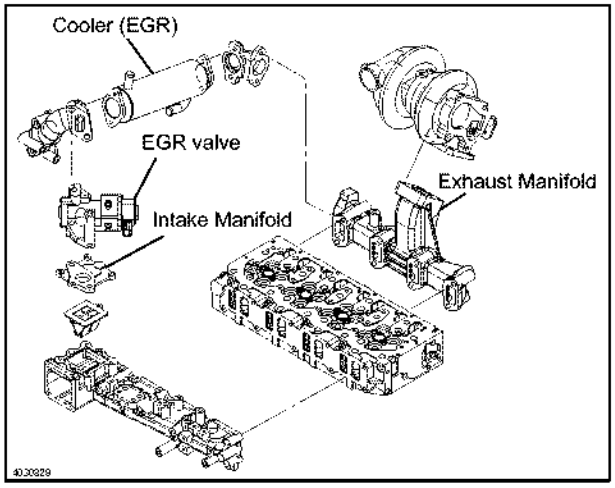
*1: It does not apply to 3TNV88C.
*2: The location of the drain plug may differ depending on the oil pan.

(3) Electronic controlled EGR

After cooling the exhaust gas, the system returns the gas back into the combustion chamber to lower the combustion temperature, and holds the oxidation reaction of nitrogen to suppress the occurrence of NOx.

A liquid-cooled type EGR cooler is set in the middle of the recirculation pipe if the EGR. This cools down the heated exhaust gas with the cooler and sends to the intake side. By lowering the intake air temperature, the combustion temperature is further lowered and can reduce NOx.

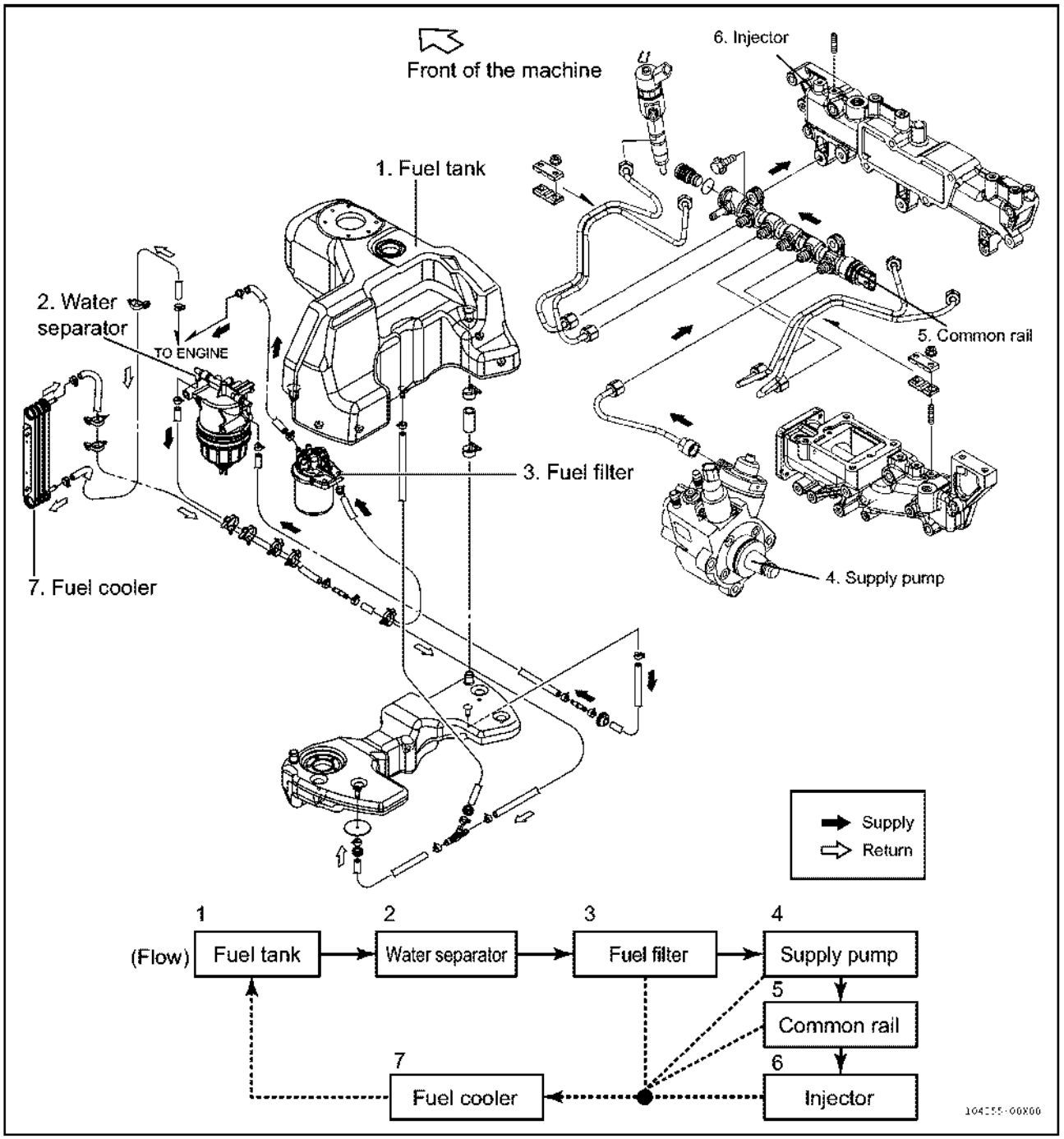




■ Fuel System

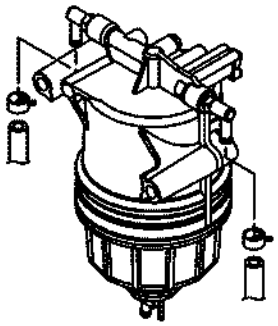
(1) Fuel Flow and Component Layout

The fuel in the fuel tank is cleaned by removing the water mixed in the fuel at the water separator. The cleaned fuel is then sucked up with the feed pump. The fuel discharged by the feed pump is cleaned by eliminating contaminations with fuel strainers, and sent to the supply pump. The fuel from the supply pump is injected inside the cylinder with the injector via the common rail. The leftover fuel from the fuel filter, supply pump, common rail, and injector, are all sent to the fuel cooler at first, and then sent back to the fuel tank.



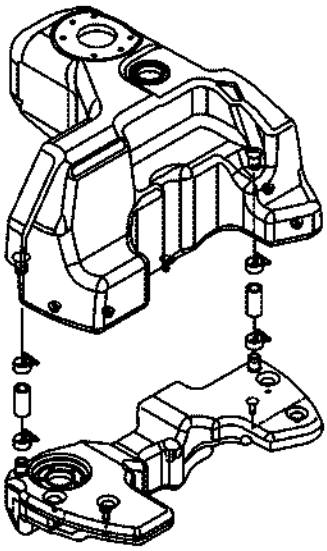
(2) Functions of the components

- Water separator
  Eliminates the water mixed into the fuel. Check the contamination by looking at the floating red O-ring inside the case.



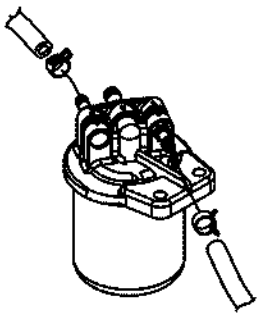
104274-00X00

- Fuel tank
  YT235 : 28 L



104275-00X00

- Fuel filter element
  The element removes impurity from the fuel oil.

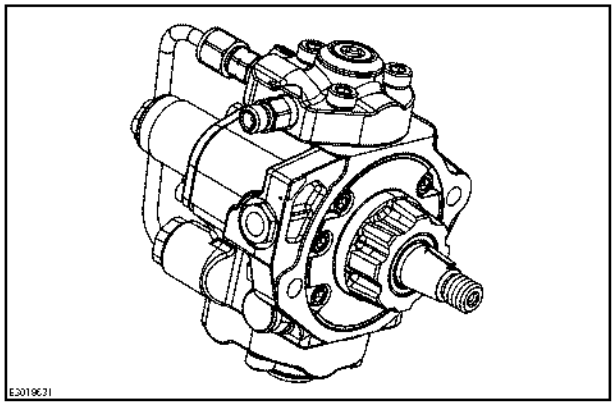


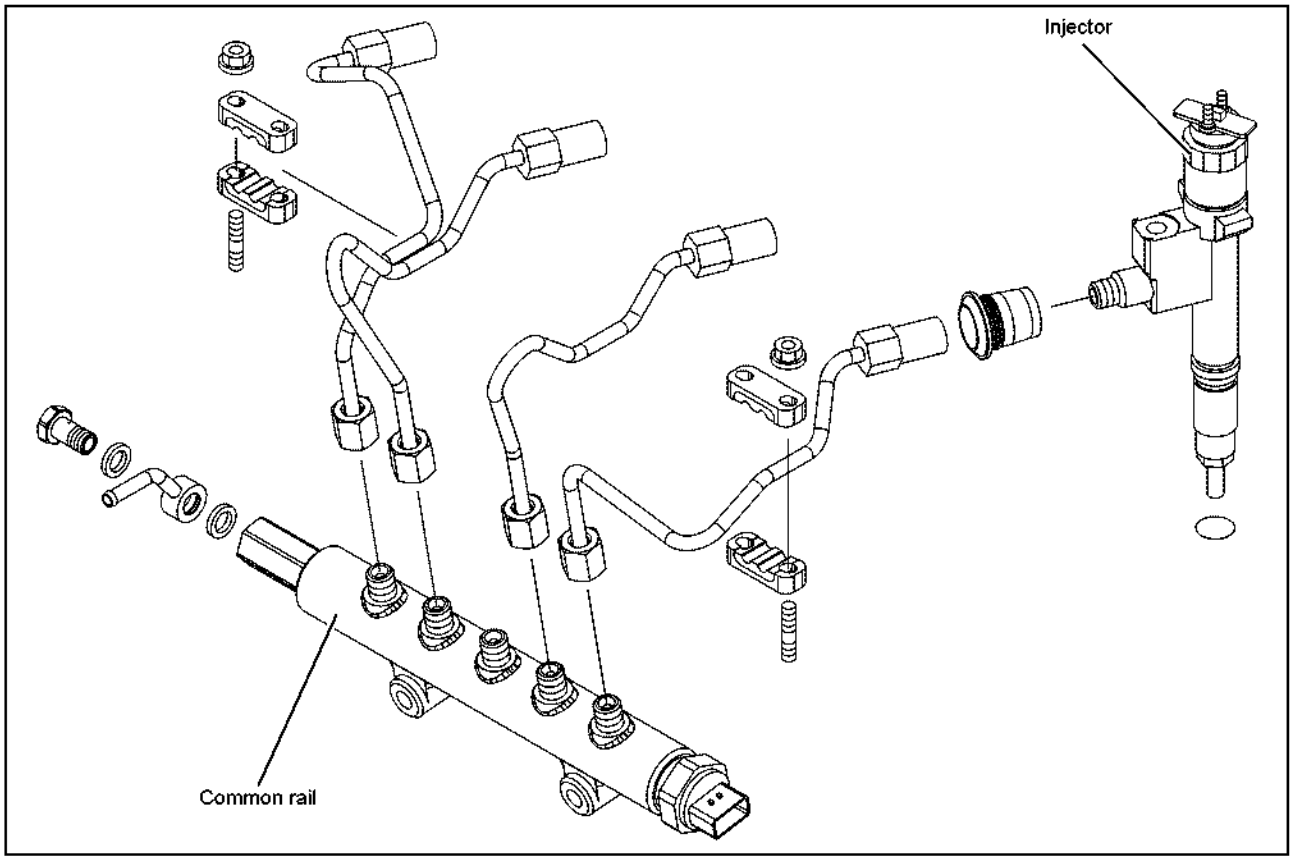
104276-00X00

- Supply pump
  Supplies fuel to the common rail.

- Common rail
  Stores the high pressure fuel fed from the supply pump, and distributes to injector of each cylinder.

- Injector
  Supplies fuel to the common rail.

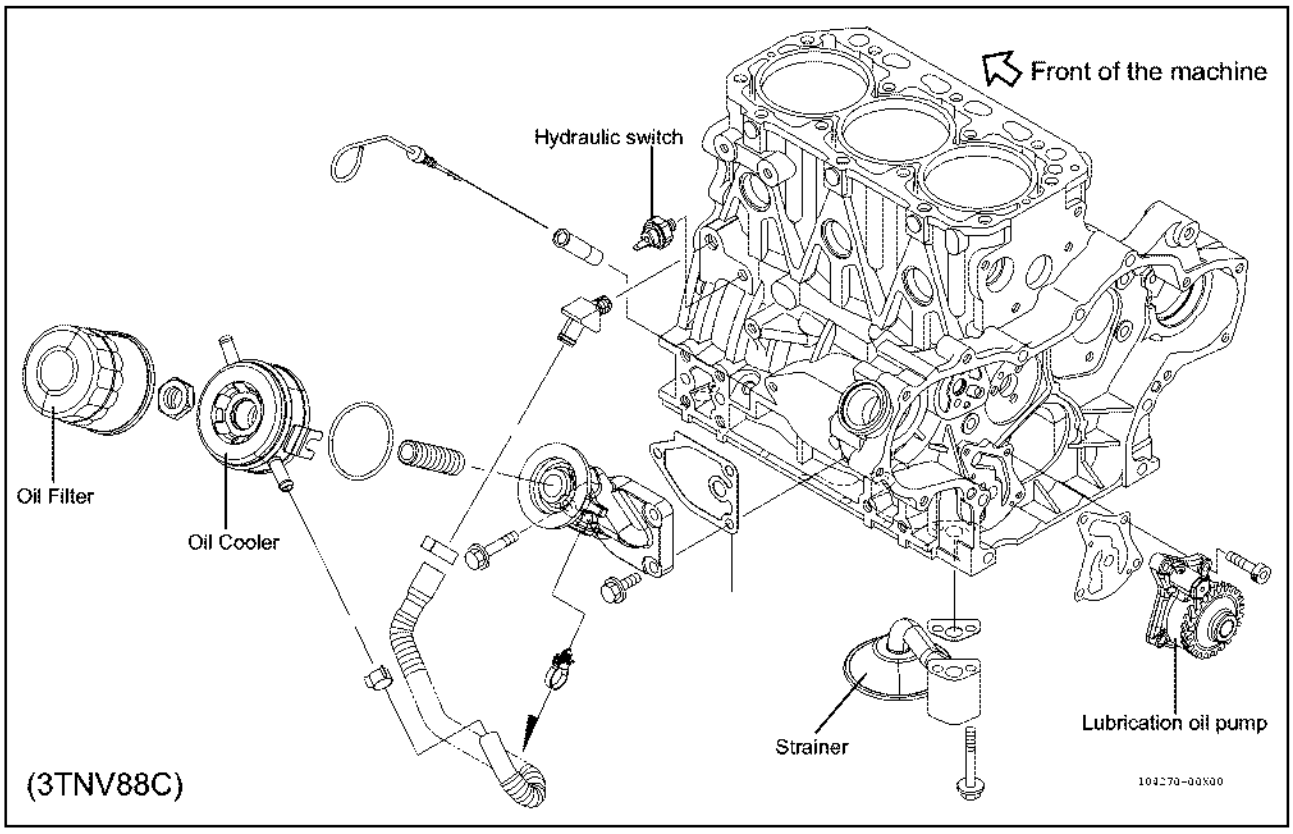


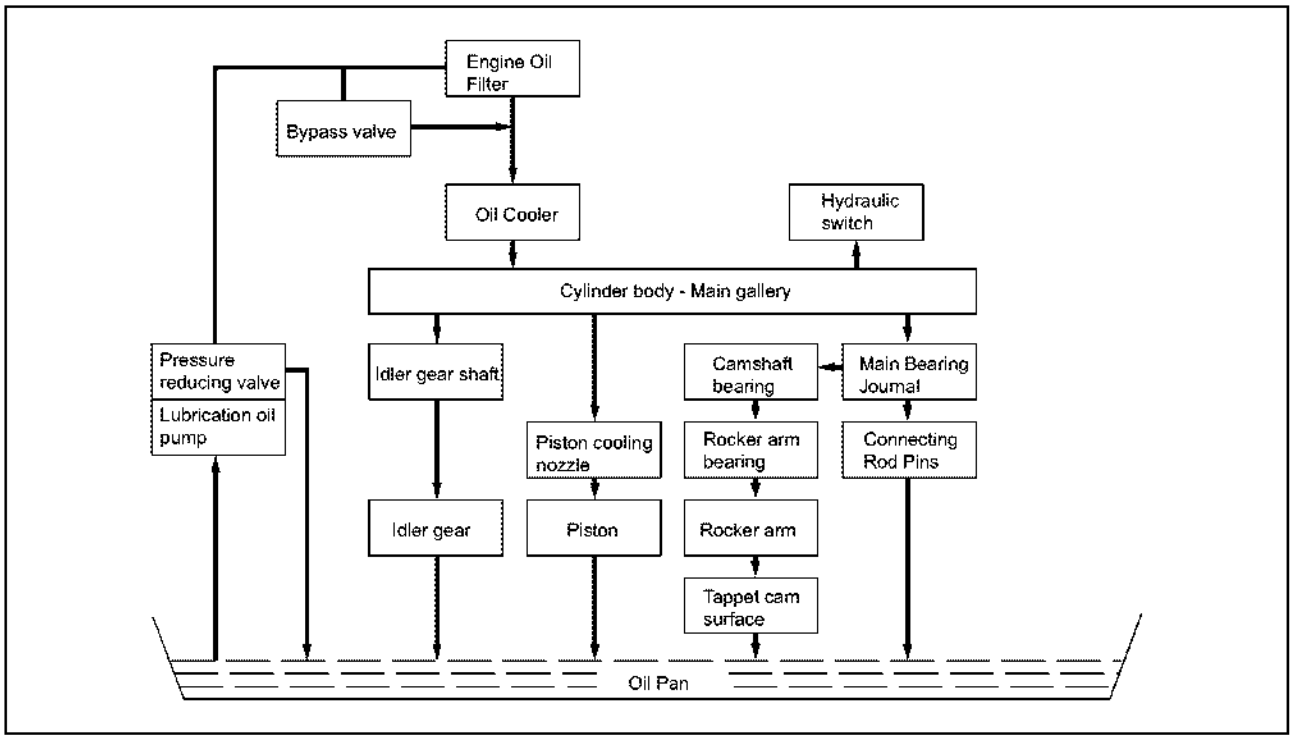


■ Lubrication System

(1) Lubrication Flow

The oil goes through the oil intake line (strainer) and is sucked up by the LO pump to lubricate each part of the engine through an LO filter.





(2) Functions of the components

- LO Pump

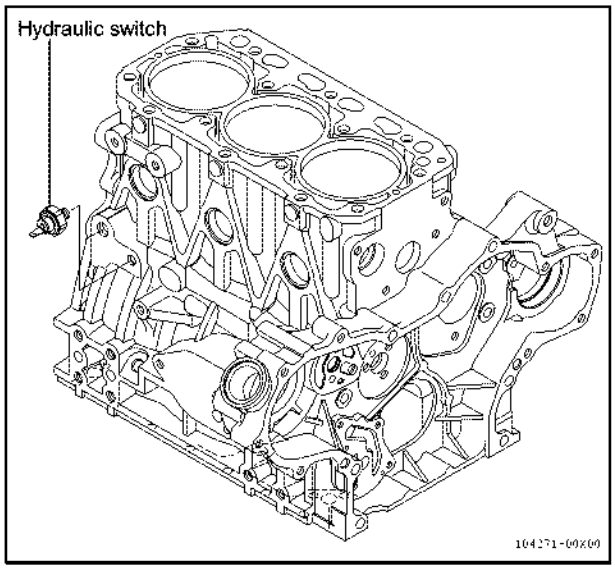
  A trochoid pump. Attached to the cylinder block and driven by crank gear. To protect the oil cooler, a regulator valve is equipped to the LO pump.

Regulator valve setting pressure	0.41±0.05MPa

- Hydraulic switch

  Set to the circuit before the regulator valve. When the lubrication oil pressure becomes lower than a certain point, the internal contact point inside the switch closes and an alarm will show. (The lamp on the meter panel turns on.)

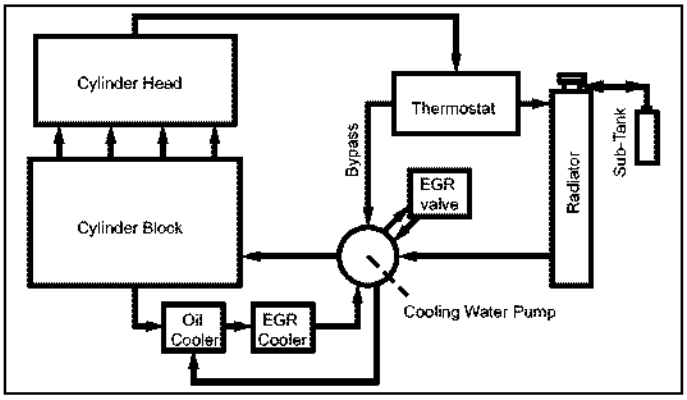
Operating pressure	0.04 to 0.06MPa

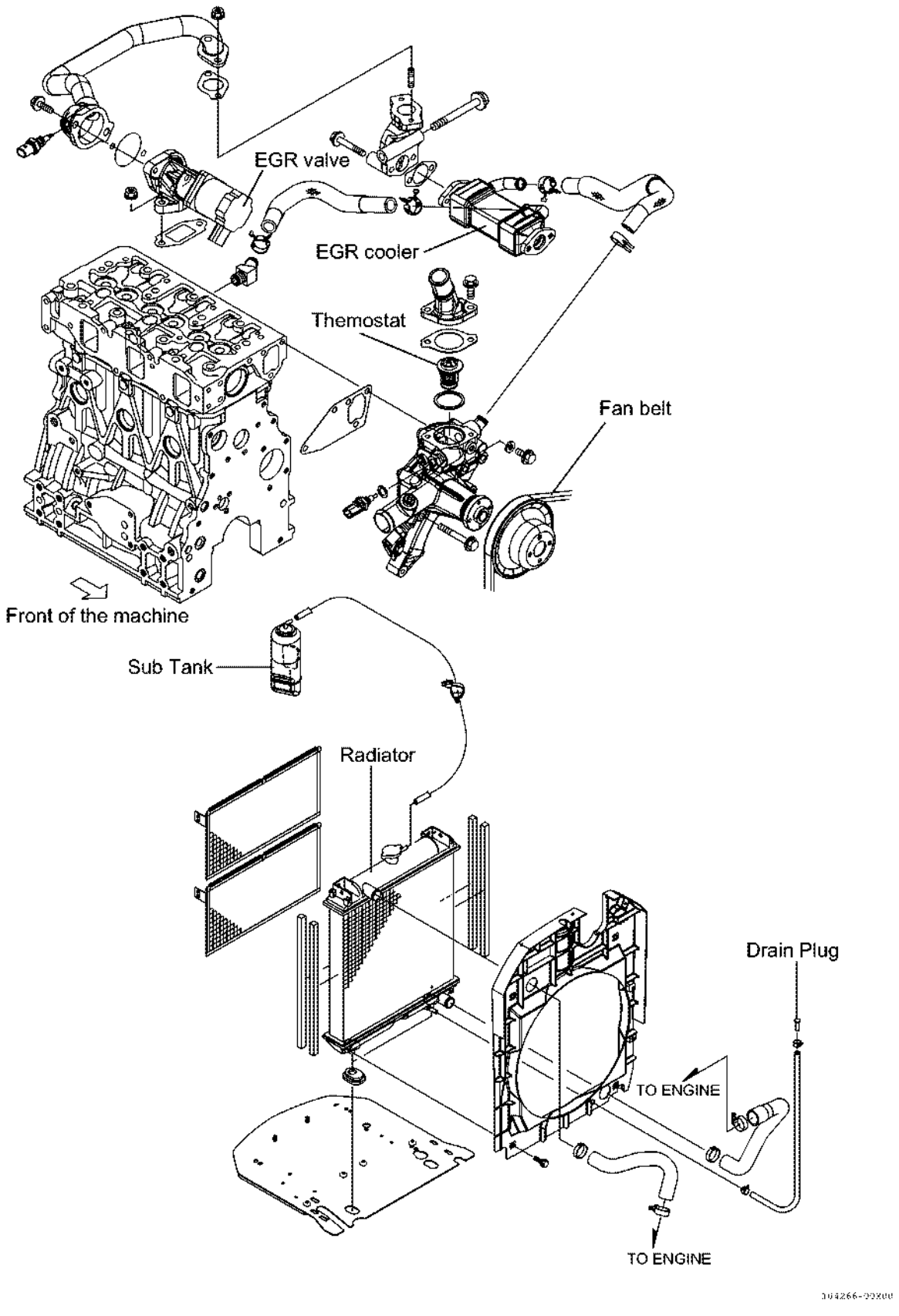


■ Coolant System

(1) Coolant Flow

Applies the forced circulation radiator system. Moreover, a thermostat is provided in the cooling system passage.




EGR valve
EGR cooler
Themostat
Fan belt
Front of the machine
Sub Tank
Radiator
Drain Plug
TO ENGINE
TO ENGINE

(2) Functions of the components

- Thermostat

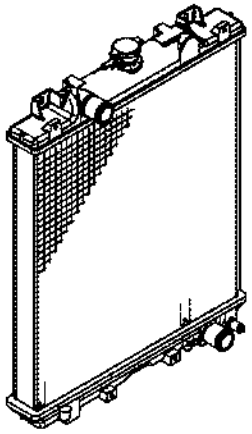
  Maintains the best coolant temperature to prevent the engine from being cooled too much.

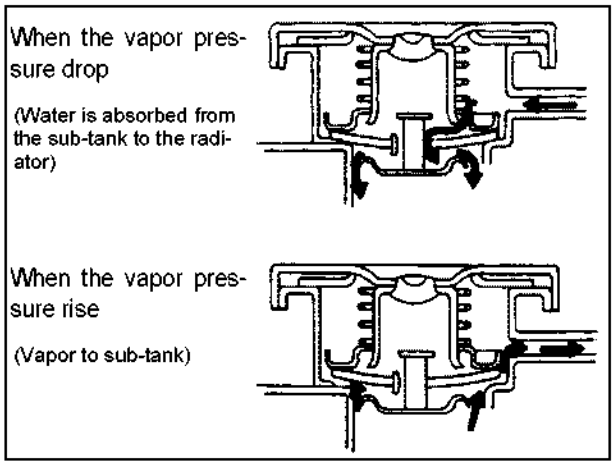
  If the water temperature is low, the thermostat closes to circulate the coolant without sending it to the radiator. When the water temperature rises, the cooling water is sent to the radiator.

- Radiator cap (with sub-tank)

  When the internal pressure in the radiator rises because of an increase in water temperature, the valve opens to send water vapor to the sub-tank (to prevent the radiator from being deformed or damaged).

  When the water temperature decreases the valve closes. When the internal pressure in the radiator reaches a negative condition, the water from the sub-tank is sucked back into the radiator.





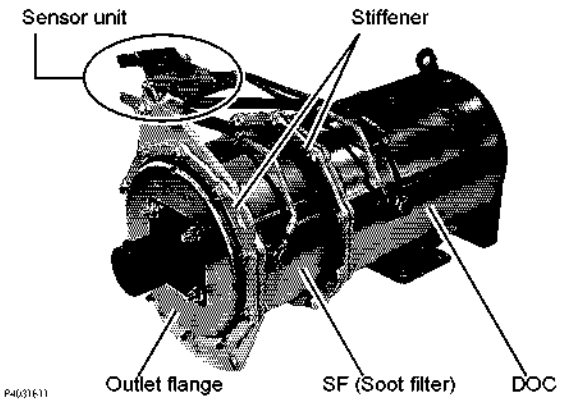
2. Exhaust filter (DPF)

■ Structure and Functions

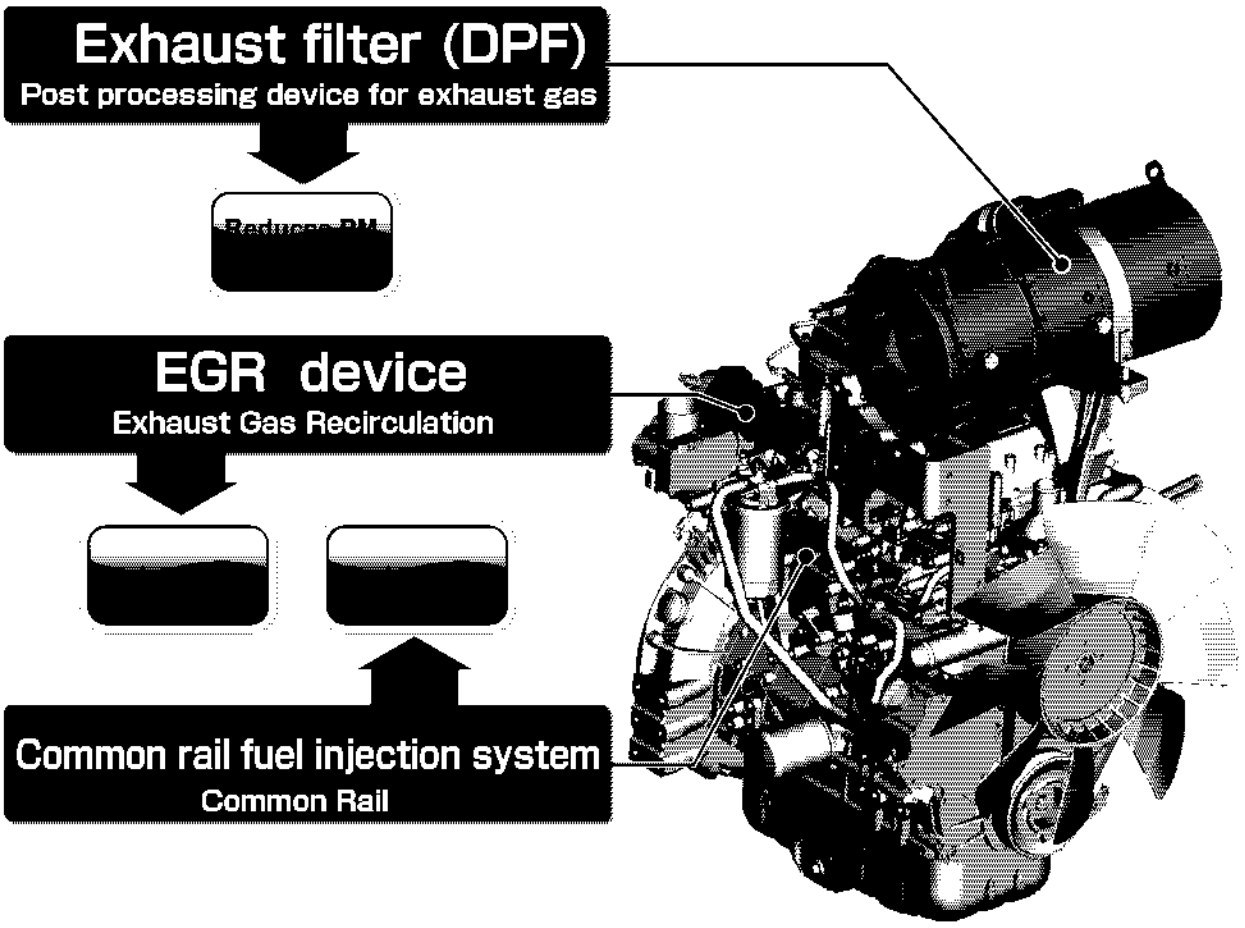
(1) Exhaust gas filter

The exhaust gas filter is configured of DOC (Diesel Oxidation Catalyst) and SF (Soot filter). The exhaust filter is a post processing device that decompose toxic components in the exhaust gas with DOC, and collects the PM (particulate matter such as soot) with SF to prevent from being released into open air.
The amount of PM discharged into the atmosphere that cause cancer and respiratory failure is reduced to about 1/10.

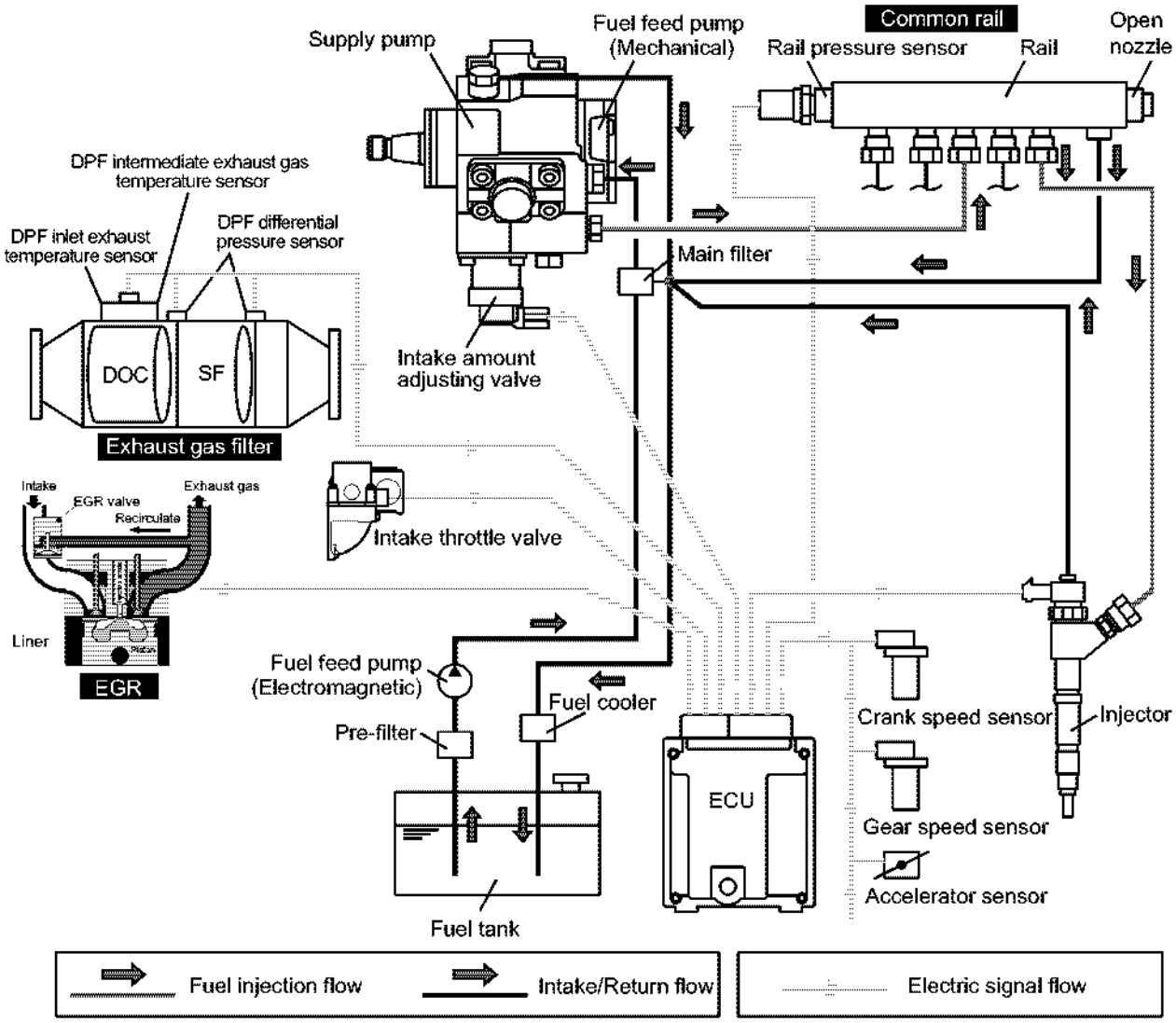
*DPF: Diesel Particulate Filter



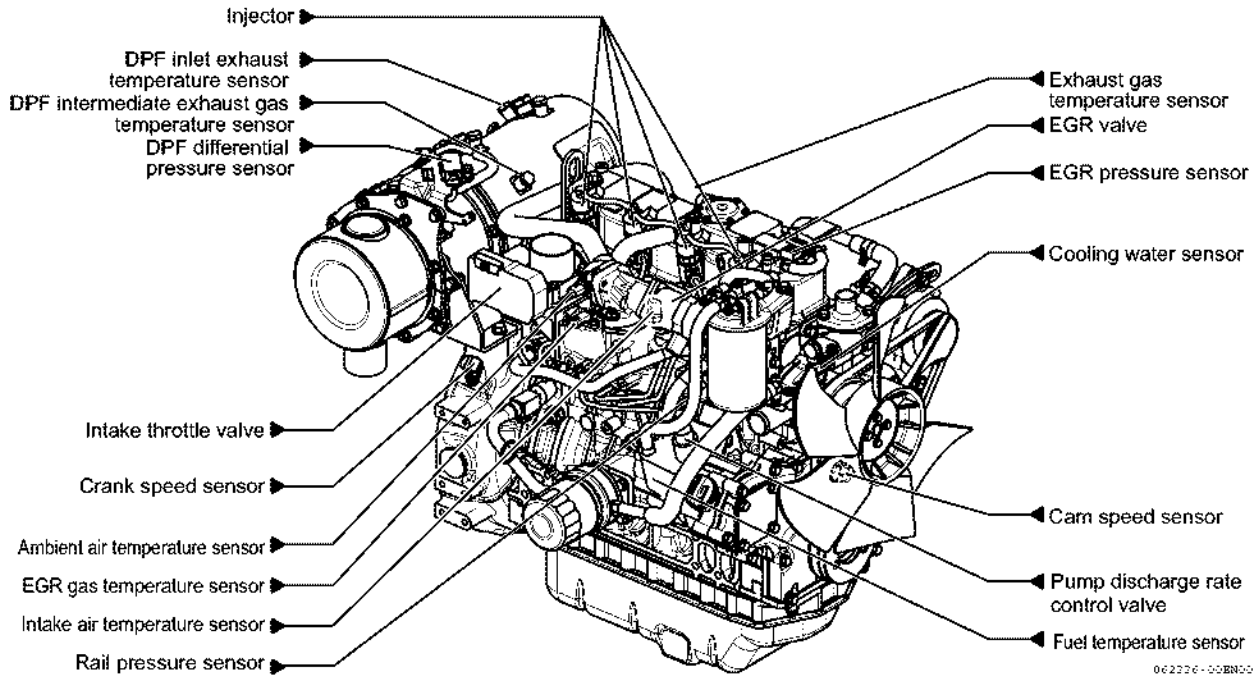
*The illustration shows an engine of a tractor.



<System diagram of electronic controlled engine>



<Engine name>

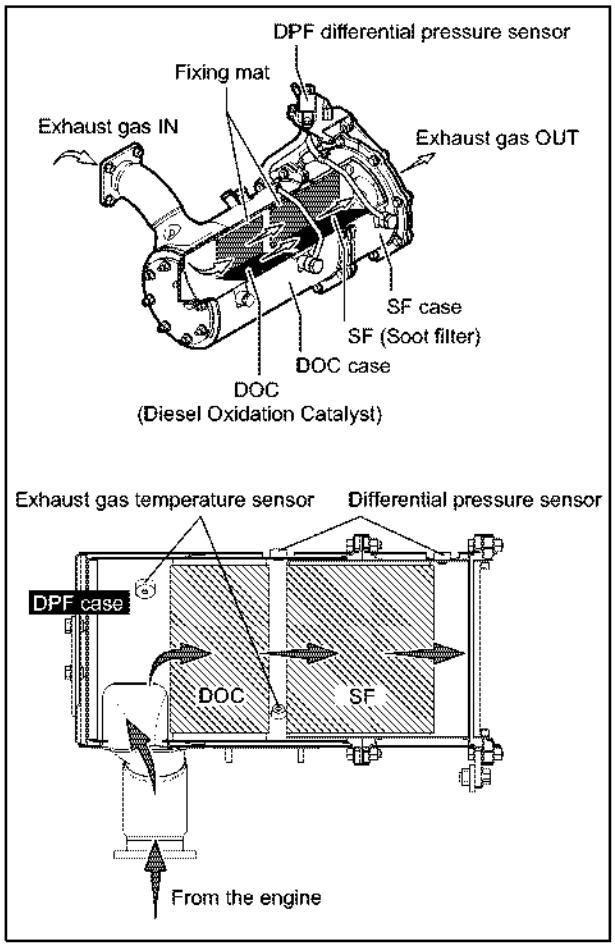

Injector
DPF inlet exhaust temperature sensor
DPF intermediate exhaust gas temperature sensor
DPF differential pressure sensor
Intake throttle valve
Crank speed sensor
Ambient air temperature sensor
EGR gas temperature sensor
Intake air temperature sensor
Rail pressure sensor
Exhaust gas temperature sensor
EGR valve
EGR pressure sensor
Cooling water sensor
Cam speed sensor
Pump discharge rate control valve
Fuel temperature sensor

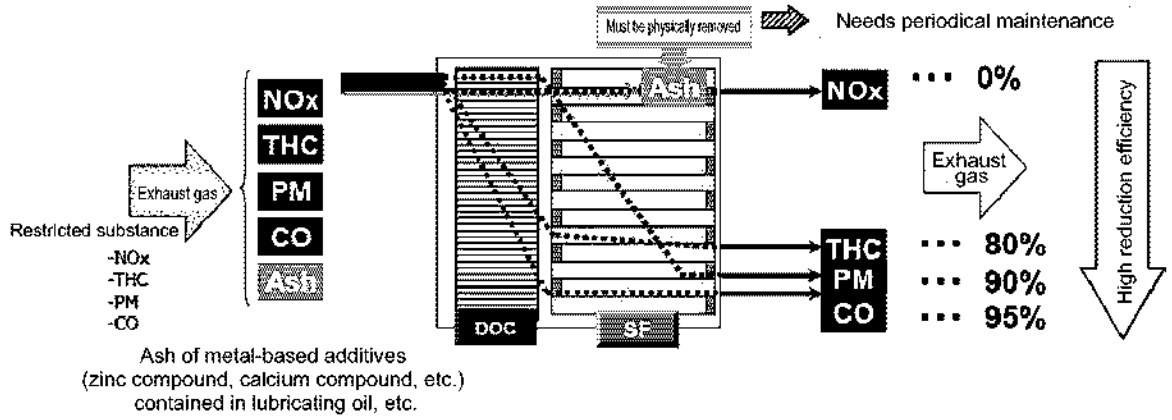
(2) Structure and function of exhaust gas filter

The exhaust gas filter is configured of a case that holds the DOC (Diesel Oxidation Catalyst) and SF (Soot Filter), and introduces exhaust gas to DOC and SF.

The exhaust filter decompose toxic components in the exhaust gas with DOC, and collects the PM with SF to prevent the PM from being released into open air. If you leave the accumulated PM in the SF, it will start clogging and degrade the engine quality. To prevent this, the collected PM will be burned out. This is called regeneration. Yanmar uses the continuously-regeneration type engine. This allows the exhaust filter to collect the PM therein and regenerate while operating. PM collected in the SF is regenerated by burning with the NO2 generated in DOC and O2 in the exhaust gas. Note that, DOC also purifies HC and CO of the exhaust gas components into H2O and CO2.

In addition, other than PM, the SF accumulates ash. This is mainly metal component of the oil additives. Some of the oil burn from high temperature inside the combustion chamber, and discharge with combustion gas. This is collected at SF together with PM. However, the amount of ashes is very little compared to PM, so the ashes do not clog the SF all of a sudden. The ash is a metal composition. Therefore, it cannot be burned in the exhaust filter like the PM. If you leave the ash in the SF for an excessively long time, the ash accumulates, the pressure loss increases, and the engine can malfunction. In this case, remove the ash-accumulated SF from the exhaust filter and clean. Yanmar recommends this cleaning maintenance at every 6000 operating hours.





5

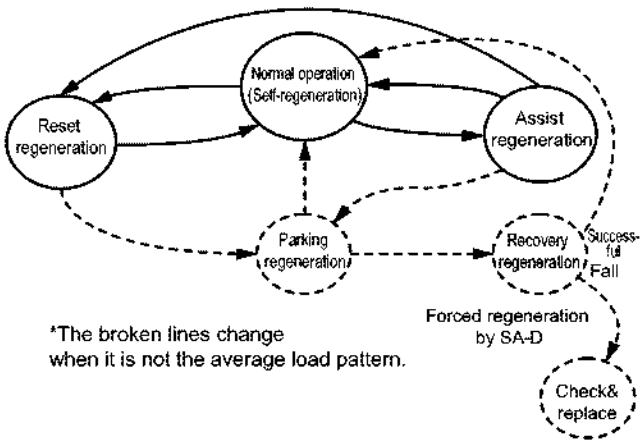
[Important]

- Always use the specified Yanmar genuine DH-2 engine oil (Low-ash oil). If you use engine oil other than the specified oil, because excessive ash may discharge, the exhaust filter clog early, and not only cause the engine output reduction and bad fuel consumption, but you will need SF maintenance in a short period of time.
- For fuel, use light oil with sulfur content of 15ppm or less (ultra low sulfur) in mass. If you use fuel other than the specified oil, the performance of the catalyst contained in the DOC suddenly degrades due to sulfur. Because the reproducing performance of the exhaust filter cannot be exerted, the PM is likely to be accumulated. Therefore, it leads to degradation of engine performance, bad fuel consumption due to frequent migration of decline and playback mode, or uncomfortable feeling.

■ Regenerating the exhaust filter

(1) State transition diagram of exhaust filter regeneration mode

Basic operation



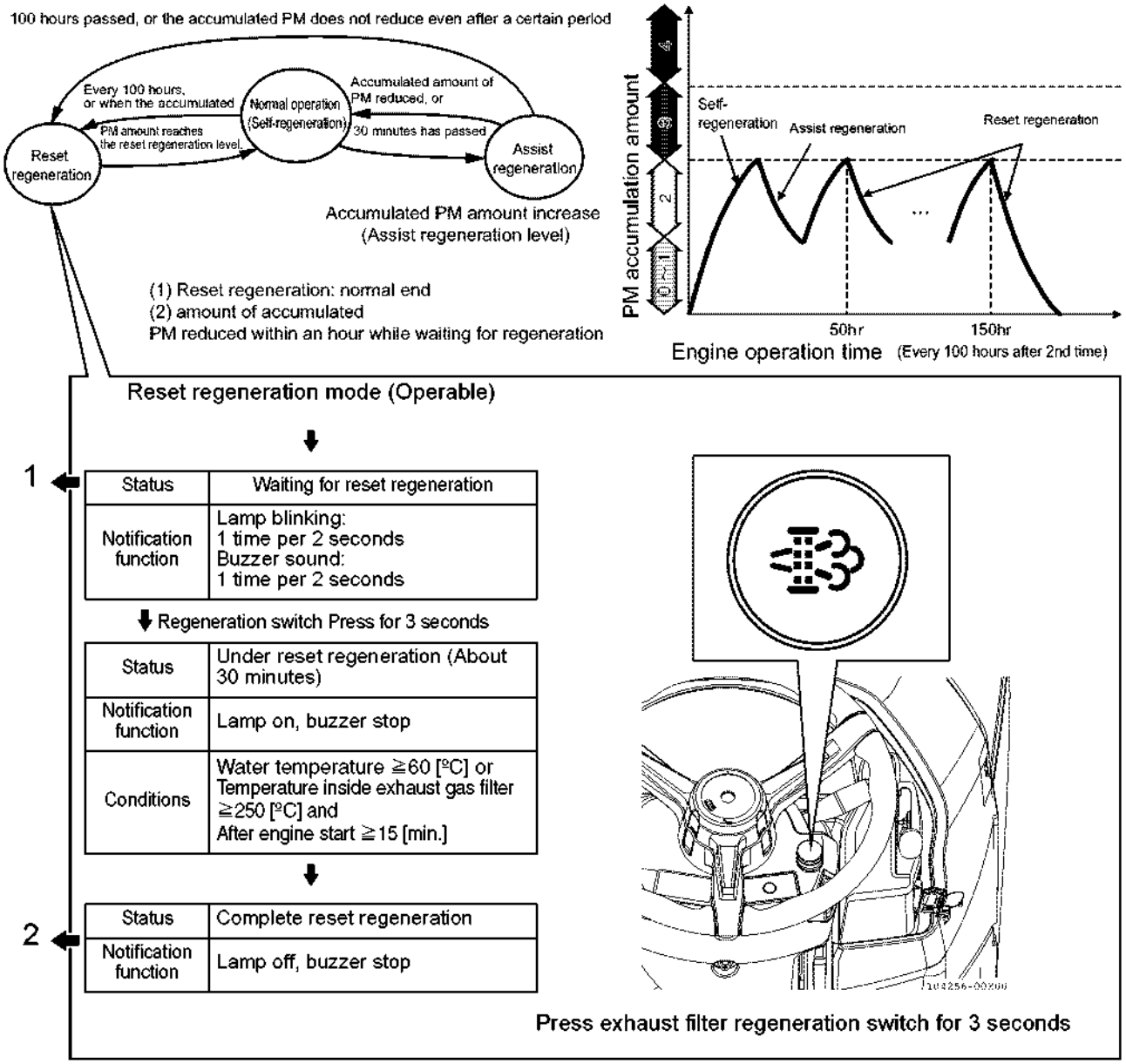
- Less than 100 hours:
  Repeats "assist regeneration" when a certain amount of PM is accumulated.

*First time: Approx. 50 hours till reset regeneration

- Every 100 hours, or when the accumulated PM amount reaches the reset regeneration level.:
  Combust and removes PM with "Reset regeneration".

(2) Regeneration mode transition diagram at normal operation

*First time: Approx. 50 hours till reset regeneration



Reset regeneration mode (Operable)

1

Status	Waiting for reset regeneration
Notification function	Lamp blinking: 1 time per 2 seconds Buzzer sound: 1 time per 2 seconds

Regeneration switch Press for 3 seconds

Status	Under reset regeneration (About 30 minutes)
Notification function	Lamp on, buzzer stop
Conditions	Water temperature ≧60 [ºC] or Temperature inside exhaust gas filter ≧250 [ºC] and After engine start ≧15 [min.]

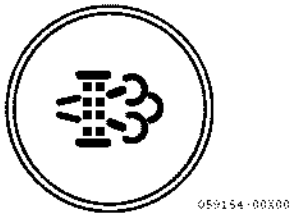
2

Status	Complete reset regeneration
Notification function	Lamp off, buzzer stop

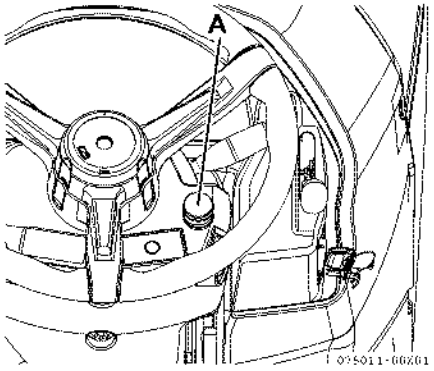
Press exhaust filter regeneration switch for 3 seconds

(3) Reset regeneration

1. The notification lamp of the exhaust filter regeneration switch blinks, and the buzzer goes off at once in 2 seconds.



2. Stop the operation.
3. Press the "Exhaust filter regeneration switch" for 3 seconds or longer.



(A) Regeneration switch

4. The buzzer stops, the regeneration starts, and the notification lamp on the switch turns on. The lamp goes off when it is finished.
   *Tractor can keep being operated.

IMPORTANT

- The reset regeneration must be done during operation.
  If it is not done during operation, the regeneration condition will not meet and the regeneration request lamp will stay on, and the regeneration may not end.
  If the reset regeneration does not end, please contact your purchased dealer.

NOTE

- In reset regeneration, the regeneration will not start at the following conditions. Warm up first when cold and increase engine load. The regeneration will start automatically start when conditions meet.
  - When engine coolant temperature is low
  - When exhaust filter temperature is low
- Regeneration will end in about 30 minutes, but the time until the end of regeneration is different depending on the external temperature. Check the remaining fuel quantity beforehand, and start the regeneration.
- If possible, continue regeneration until the end without stopping. If you need to stop the regeneration, turn the key switch to "OFF" position.
  If you stop the engine without completing the regeneration, please restart as soon as possible because the exhaust filter regeneration request warning will show the next time you start the engine.
- At reset regeneration, the condition may not meet when it is stopped at idling.
  Please try to run engine at rated speed during operation or traveling. (Even during stopping, by increasing the engine speed to rated speed, it will become easier to regenerate.)
- If message such as "Exhaust filter regenerating" is shown in the meter panel, settings on maximum traveling speed or the maximum engine rotational speed cannot be changed. The settings will be changeable when the "DISP switch" is pressed for 3 seconds and the message is deleted to return to the normal display. During exhaust filter regeneration, the notification lamp is on. The lamp goes off when it is finished.

NOTE

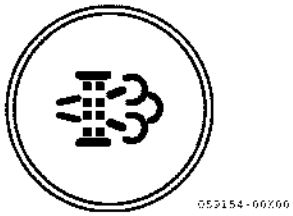
- If you operate the engine without reset regeneration, the request for parking regeneration may be displayed. In that case, carry on the parking regeneration by following the "Parking regeneration".
- While regeneration, the engine noise may change, or white smoke may occur, but it is not malfunction.
- Exhaust gas that occur during regeneration smells unusual, but it is not malfunction.
- While exhaust filter is regenerated, there may be noise occurring due to activation of intake throttle, but it is not malfunction.

Parking regeneration

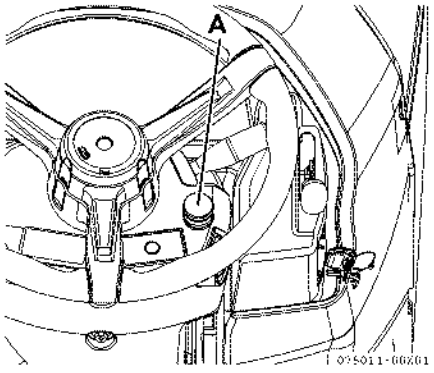
⚠ WARNING

- **If you keep the engine running while ignoring the exhaust filter regeneration (parking regeneration) request, because the PM will excessively accumulate, there may be cases where PM abnormally burn and break the exhaust filter, cause fire, and lead to injury accidents.**

1. The notification lamp of the exhaust filter regeneration switch blinks, and the buzzer goes off at once every second.



2. Park the tractor in a safe place, turn the PTO drive switch to "OFF", shift the range shift lever to "N (neutral)", apply the parking brake and set engine to idle (low speed).
3. Press the "Exhaust filter regeneration switch" for 3 seconds or longer.



(A) Regeneration switch

4. The buzzer stops, the regeneration starts, and the notification lamp on the switch turns on.
5. The lamp goes off when it is finished.

NOTE

- The engine will speed up automatically while regeneration.
- Regeneration will stop when the next operation is performed.
  - When the accelerator lever is on "" rotation side.
  - When the PTO switch in "ON" position.
  - When the range shift lever is in a position other than "N (neutral)".
  - When the parking brake lock lever is released.

NOTE

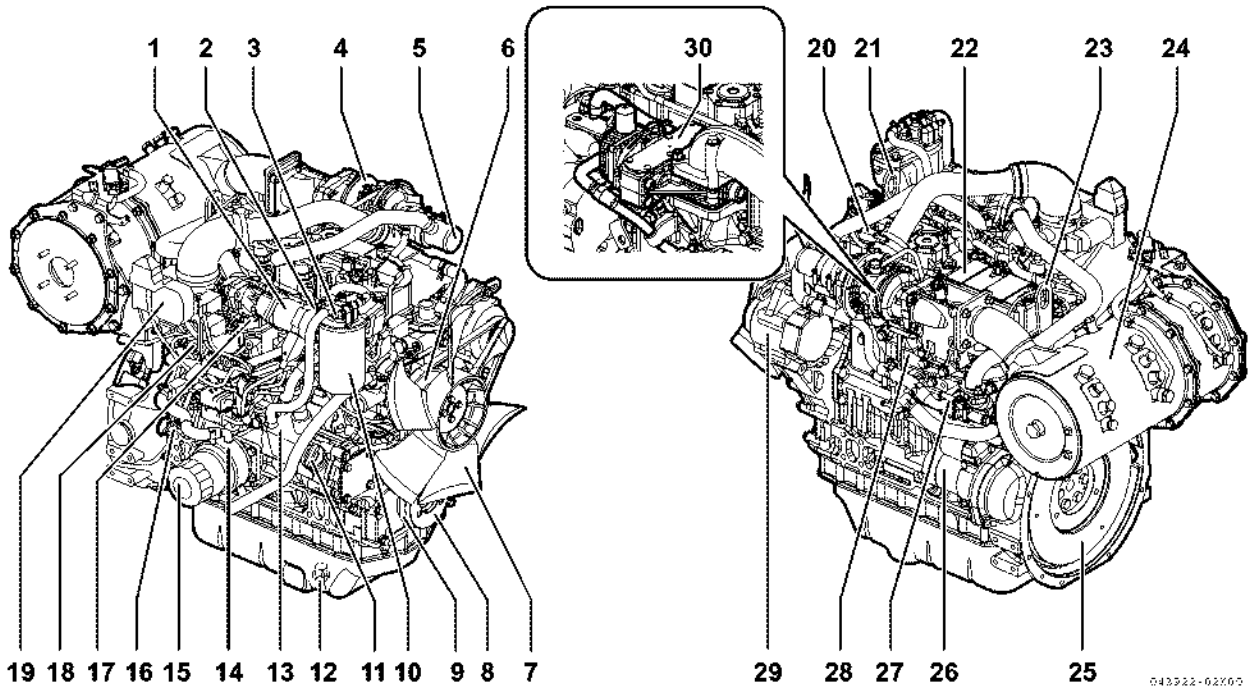
- Regeneration will end in about 30 minutes, but the time until the end of the regeneration is different depending on the external temperature. Check the remaining fuel quantity beforehand, and start the regeneration.
- If possible, continue regeneration until the end without stopping. If you need to stop the regeneration, turn the key switch to "OFF" position.
  If you stop the engine without completing the regeneration, please restart as soon as possible because the exhaust filter regeneration request indication will show the next time you start the engine.

- While regeneration, the engine noise may change, or white smoke may occur, but it is not malfunction.
- Exhaust gas that occur during regeneration smells unusual, but it is not malfunction.
- While exhaust filter regeneration, there may be noise occurring due to activation of intake throttle, but it is not malfunction.

3. COMPONENT IDENTIFICATION

■ 3TNV88C

Shows where the major engine components are located.

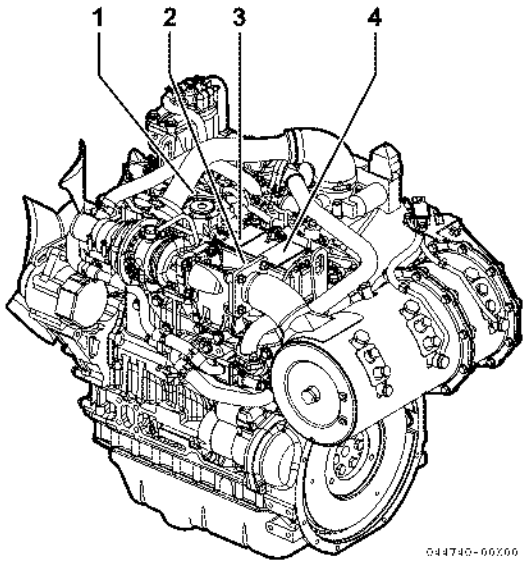


1. EGR valve
2. Fuel inlet
3. Fuel return to fuel tank
4. Turbocharger*1
5. Air intake port (from air cleaner)
6. Engine coolant pump
7. Engine cooling fan
8. Crankshaft V-pulley
9. V-belt
10. Fuel filter
11. Side filler port (engine oil)
12. Drain plug (engine oil)*2
13. Supply pump
14. Engine oil cooler*3
15. Engine oil filter
16.
17. Dipstick (engine oil)
18. Intake manifold
19. Common rail
20. Intake throttle valve
21. Top filler port (engine oil)
22. Lifting eye (engine cooling fan end)
23. Cylinder head cover
24. Lifting eye (flywheel end)
25. Diesel Particulate Filter
26. Flywheel
27. Starter motor
28. EGR cooler
29. Exhaust manifold
30. Alternator
31. Exhaust throttle*4

*1: Only applies to 3TNV86CT, 3TNV86CHT, 4TNV86CT and 4TNV86CHT. It does not apply to 3TNV88C.
*2: The engine oil drain plug location may vary based on oil pan options.
*3: This may not be equipped to some of the engines.
*4: This may be equipped to some of the engines.

4. LOCATION OF LABELS

Shows the location of engine labels and regulatory labels on YANMAR TNV series engines.



■ Location of labels/nameplates on common rail system engine

Model	Engine nameplate	EPA/ARB certification label	97/68/EC emission control label
3TNV88C, 3TNV86CT, 3TNV86CHT	On the top of the cylinder head cover (cooling fan end)	On the top of the cylinder head cover (flywheel end)	On the exhaust side of the cylinder head cover (near the flywheel)

5. Starter Motor

⚠ WARNING

Shock Hazard!

. •Turn off the battery switch (if equipped) or disconnect the negative battery cable before servicing the electrical system.

- **Check the electrical harnesses for cracks, abrasions, and damaged or corroded connectors. Always keep the connectors and terminals clean.**
- **Failure to comply could result in death or serious injury.**

Note: While starter motor design varies between models, the basic repair procedures are the same. The following procedures are typical and may differ from the stater being serviced.

Removal of Starter Motor

1. Disconnect the battery cables at the battery, negative (-) cable first.
2. Remove the electrical wires from the magnetic switch assembly.
3. Remove the starter mounting bolts (1, **<Bold>Figure 5-1**). Remove the starter motor from the flywheel housing.

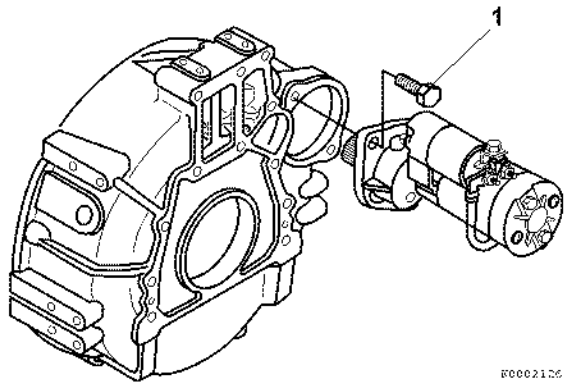


Figure 5-1

Disassembly of Starter Motor

1. Loosen the M8 nut from the magnetic switch (solenoid) assembly (**<Bold>Figure 5-2**). Disconnect the wire from the magnetic switch.

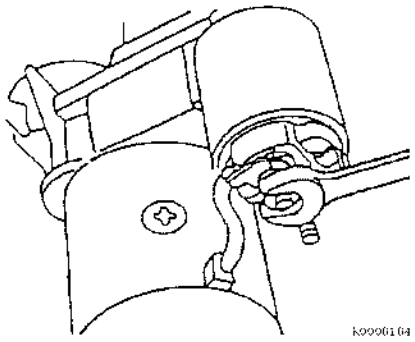


Figure 5-2

2. Remove the two M4 bolts (1, **<Bold>Figure 5-3**) securing the rear cover (2, **<Bold>Figure 5-3**) to the brush holder assembly (3, **<Bold>Figure 5-3**).

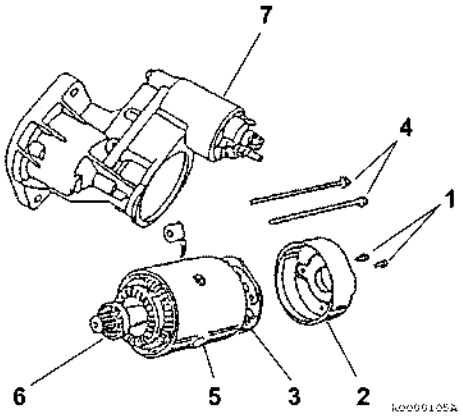


Figure 5-3

3. Remove the two M5 through bolts (4, <Bold>Figure 5-4). Separate the rear cover (2, <Bold>Figure 5-4), field coil assembly (5, <Bold>Figure 5-4) with the armature assembly (6, <Bold>Figure 5-4) from the gear housing (7, <Bold>Figure 5-4).
4. Pull the brush springs up using a brush spring puller. On the negative (-) side, bring the brush spring into contact with the side of the brush for lifting from the commutator surface. On the positive (+) side, remove the brush from the brush holder assembly (1, <Bold>Figure 5-4).

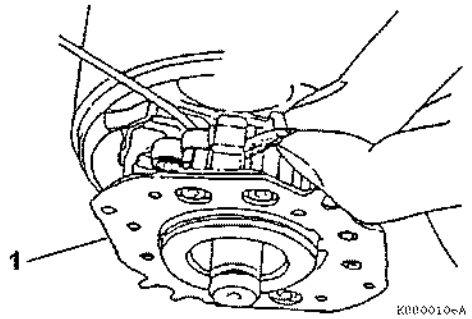


Figure 5-4

5. Remove the brush holder assembly (1, <Bold>Figure 5-5) from the armature assembly (3, <Bold>Figure 5-5).

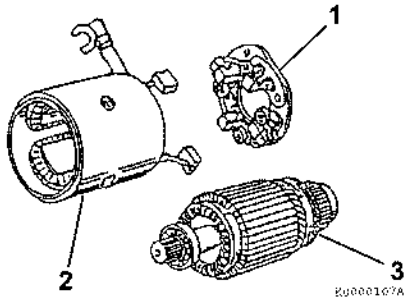


Figure 5-5

6. Pull the armature assembly (3, <Bold>Figure 5-5) out from the field coil assembly (2, <Bold>Figure 5-5).
7. Remove the two M6 bolts (1, <Bold>Figure 5-6) retaining the magnetic switch assembly (2, <Bold>Figure 5-6) to the gear housing. Remove the magnetic switch assembly, dust cover(s) (3, <Bold>Figure 5-6) and torsion spring (4, <Bold>Figure 5-6) from the gear housing.

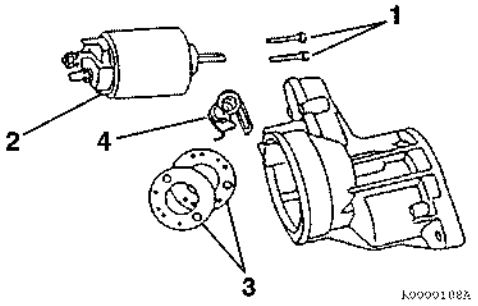


Figure 5-6

8. Disassemble the dust cover (3, <Bold>Figure 5-7) and shift the lever (4, <Bold>Figure 5-7) from the gear housing.

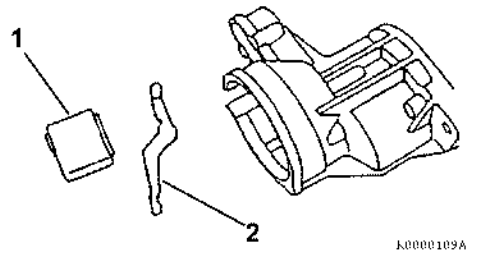


Figure 5-7

9. Remove the three M4 bolts (1, <Bold>Figure 5-8) securing the bearing retainer assembly (2, <Bold>Figure 5-8) to the gear housing. Remove the bearing retainer assembly from the gear housing.

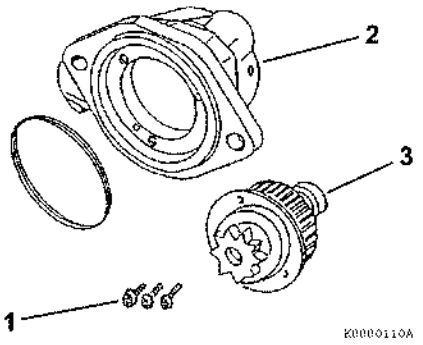


Figure 5-8

10. Remove the pinion clutch assembly (3, **<Bold>Figure 5-8**) from the bearing retainer assembly.
11. Using a flat-blade screwdriver, remove the retaining ring (1, **<Bold>Figure 5-9**) from the shaft of the pinion.

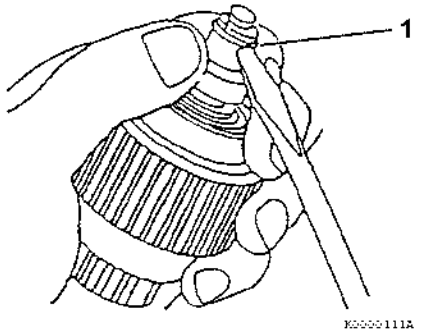


Figure 5-9

12. Disassemble the pinion stop (3, **<Bold>Figure 5-10**), return spring (**4**, **<Bold>Figure 5-10**), pinion clutch assembly (**1**, **<Bold>Figure 5-10**), and pinion shaft (5, **<Bold>Figure 5-10**).

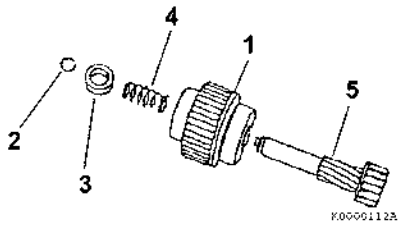


Figure 5-10

Cleaning and Inspection

n Armature

Commutator surface inspection

If the commutator surface is rough, polish the surface with a #500 to #600 emery cloth (**<Bold>Figure 5-11**).

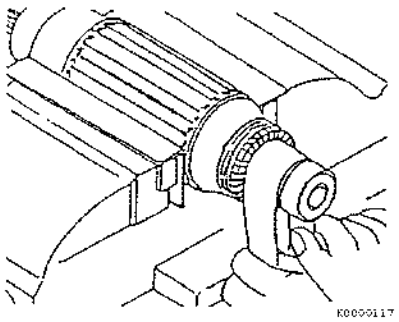


Figure 5-11

Measure commutator outside diameter

Measure the commutator outside diameter (**<Bold>Figure 5-12**). Replace the armature if the measurement is less than the limit.

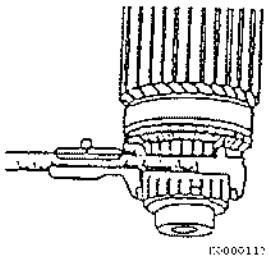


Figure 5-12

Measure commutator insulation depth

Measure the depth of the insulating material (1, <Bold>Figure 5-13) between commutator segments (2, <Bold>Figure 5-13). If the depth measures less than the limit, use a hacksaw blade (3, <Bold>Figure 5-13) to remove the insulating material until the depth is within the limit.

A normal commutator condition is indicated in (4, <Bold>Figure 5-13). An abnormal commutator condition is indicated in (5, <Bold>Figure 5-13).

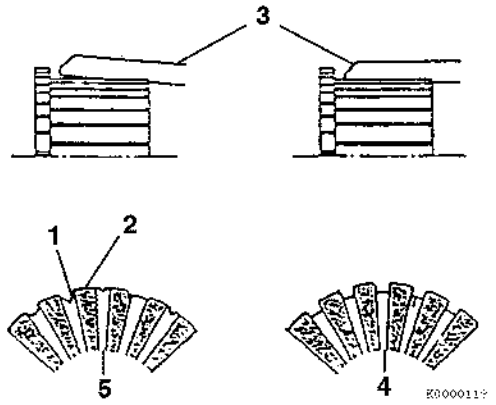


Figure 5-13

Armature coil continuity test

Check for continuity between the commutator segments using a multimeter (<Bold>Figure 5-14). The multimeter should indicate continuity.

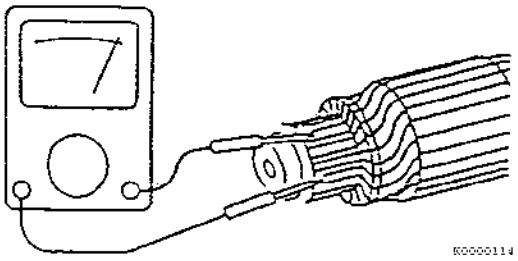


Figure 5-14

If the multimeter does not indicate continuity, replace the armature.

Armature coil insulation test

Check for continuity between a commutator segment and the shaft or armature using a multimeter (<Bold>Figure 5-15). The multimeter should not indicate continuity.

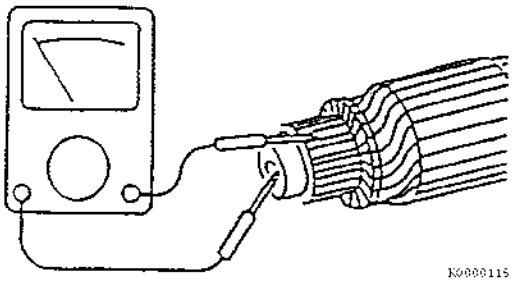


Figure 5-15

If the multimeter indicates continuity, replace the armature.

Measure armature and commutator run-outs

Measure the armature core run-out and the commutator run-out using a dial indicator (<Bold>Figure 5-16). Replace the armature if either of the measurements is less than the limit.

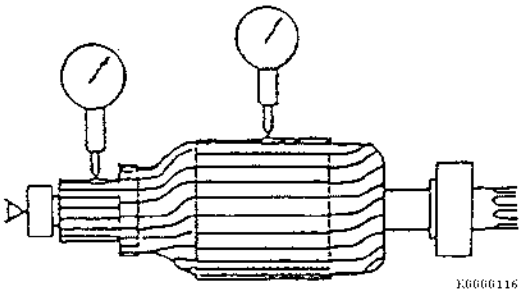


Figure 5-16

■ Field coil

Field coil continuity test

Check for continuity between the field coil terminals using a multimeter (<Bold>**Figure 5-17**). The multimeter should indicate continuity.

If the multimeter does not indicate continuity, replace the field coil assembly.

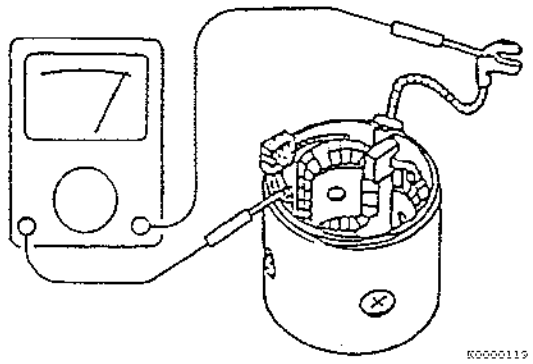


Figure 5-17

Field coil insulation test

Check for continuity between the field coil terminal and the yoke using a multimeter (<Bold>**Figure 5-18**). The multimeter should not indicate continuity.

If the multimeter indicates continuity, replace the field coil assembly.

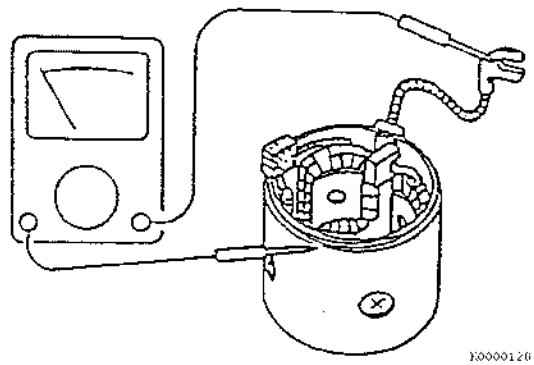


Figure 5-18

Measure brush length

Measure the length of the brush (<Bold>**Figure 5-19**). Replace the brush if the length is less than the limit.

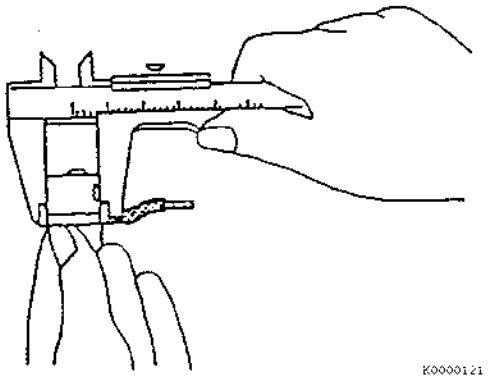


Figure 5-19

■ Magnetic switch

If the starter motor becomes wet, replace the magnetic switch even if the magnetic switch assembly function is normal.

Shunt coil continuity test

Check for continuity between the "S" terminal and the switch body using a multimeter (<Bold>**Figure 5-20**). The multimeter should indicate continuity.

If the multimeter does not indicate continuity, replace the magnetic switch.

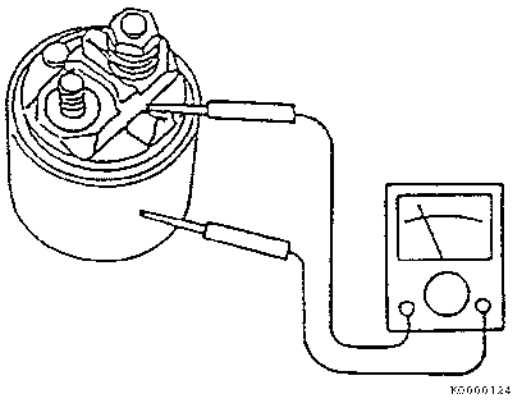


Figure 5-20

Series coil continuity test

Check for continuity between the "S" and "M" terminals using a multimeter (<Bold>**Figure 5-21**). The multimeter should indicate continuity.

If the multimeter does not indicate continuity, replace the magnetic switch.

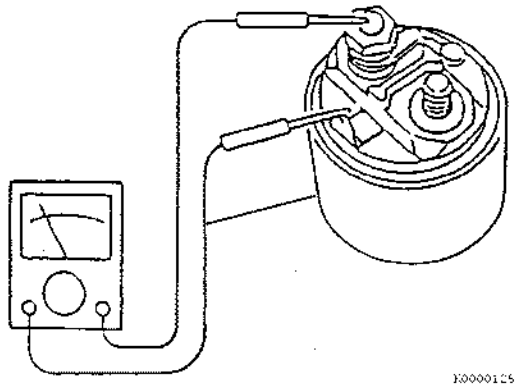


Figure 5-21

Contact continuity test

Depress the plunger at the bottom of the magnetic switch. Check for continuity between the "B" and "M" terminals using a multimeter (<Bold>**Figure 5-22**). The multimeter should indicate continuity.

If the multimeter does not indicate continuity, replace the magnetic switch.

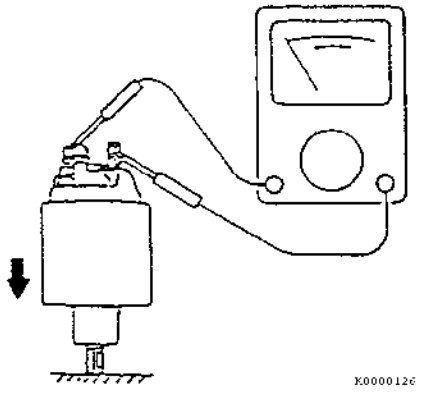


Figure 5-22

■ Pinion clutch assembly

Pinion clutch assembly inspection

Manually rotate the pinion clutch assembly in the drive direction (<Bold>**Figure 5-23**). It should rotate freely in the drive direction and is locked by turning it in the opposite direction. Replace the pinion clutch assembly if the results are different.

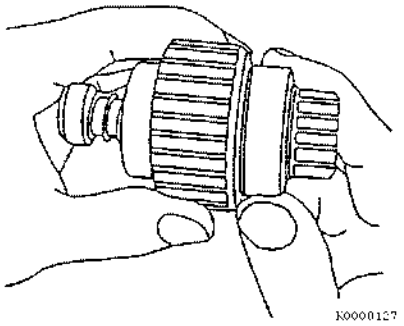


Figure 5-23

Slide the pinion clutch assembly on the shaft. It should slide smoothly on the shaft (<Bold>**Figure 5-24**). Rust, too much grease or damage could prevent the pinion clutch from sliding smoothly. If the pinion clutch assembly does not slide smoothly, clean the shaft and pinion clutch assembly or replace the damaged component.

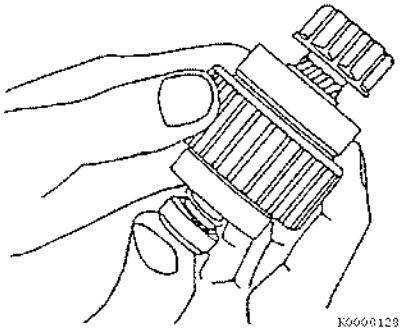


Figure 5-24

Ball bearing inspection

Rotate each ball bearing while holding the pinion clutch assembly (<Bold>**Figure 5-25**). Replace the ball bearing if it does not rotate smoothly or has excessive play.

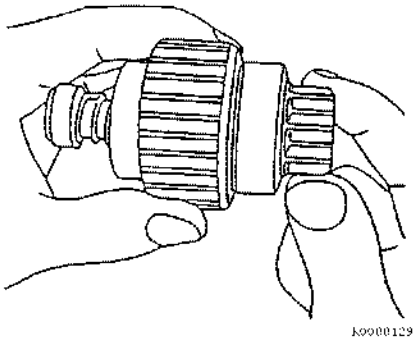


Figure 5-25

Reassembly of Starter Motor

1. Apply the appropriate starter bendix grease (obtain locally) to the pinion shaft. Reassemble the pinion shaft (5, **<Bold>Figure 5-26**), pinion clutch assembly (1, **<Bold>Figure 5-26**), return spring (4, **<Bold>Figure 5-26**) and pinion stop (3, **<Bold>Figure 5-26**). Reinstall the retaining ring (2, **<Bold>Figure 5-26**) in the groove in the pinion shaft. Slide the piston stop over the retaining ring.

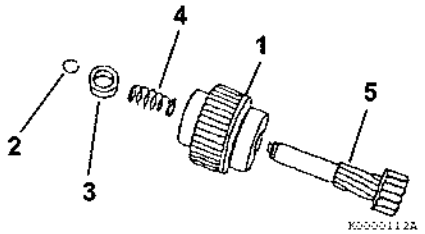


Figure 5-26

2. Reinstall the pinion clutch assembly into the bearing retainer assembly.
3. Reinstall the bearing retainer assembly and pinion assembly to the gear housing. Reinstall and tighten the three M4 bolts.
4. Apply a small amount of high temperature lithium grease (obtain locally) to the sliding portions of the shift lever (1, **<Bold>Figure 5-27**). Reassemble the torsion spring (2, **<Bold>Figure 5-27**), shift lever and dust cover(s) (3, **<Bold>Figure 5-27**), plunger (**4, <Bold>Figure 5-27)**) and magnetic switch assembly (5, **<Bold>Figure 5-27**).

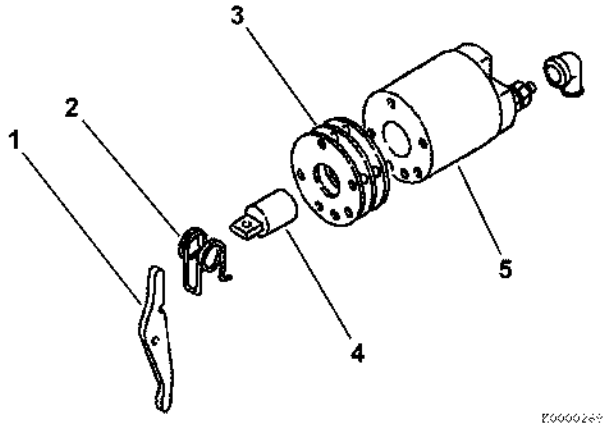


Figure 5-27

5. Reassemble the magnetic switch assembly to the gear housing. Pry the pinion away from the gear housing to allow installation of the magnetic switch assembly (**<Bold>Figure 5-28**).

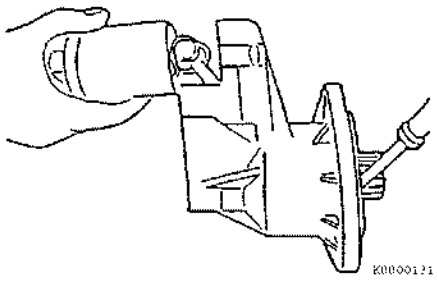


Figure 5-28

6. Secure the magnetic switch assembly to the gear housing using the two M6 bolts.
7. Carefully install the armature assembly (1, **<Bold>Figure 5-29**) into the field coil assembly (2, **<Bold>Figure 5-29**).

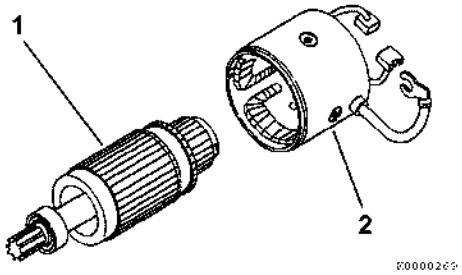


Figure 5-29

8. Position the brush springs in brush holders (**<Bold>Figure 5-30**). Reinstall the brushes in the brush holders. Reversing the brushes will cause the starter motor to turn backwards.

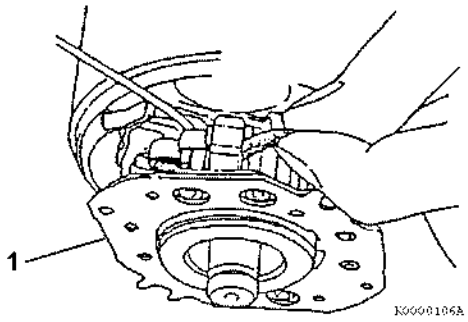


Figure 5-30

9. Carefully install the brush holder assembly to the armature assembly.
10. Reinstall the field coil assembly with the armature assembly to the gear housing.
11. Reinstall the rear cover to the brush holder assembly. Securely tighten the two bolts.

12. Reinstall the two M4 through bolts (<Bold>Figure 5-31). Securely tighten the through bolts. Reconnect the wire to the magnetic switch assembly. Tighten the M8 nut. Reinstall the cover over the connection.

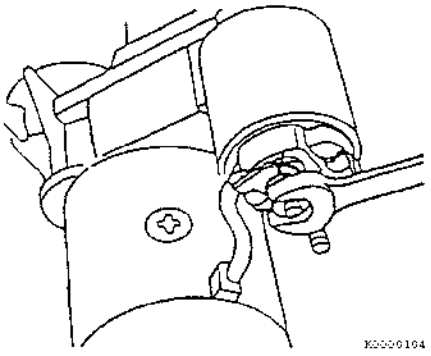


Figure 5-31

Check Pinion Projection Length

1. Connect the positive (+) lead from a battery to the "S" terminal.
2. Connect the negative (-) lead to the "M" terminal.
3. Lightly pull the pinion away from the gear housing.
4. Turn the switch ON and measure the pinion moving distance L in the thrust direction (<Bold>Figure 5-32). Perform this test within 10 seconds.

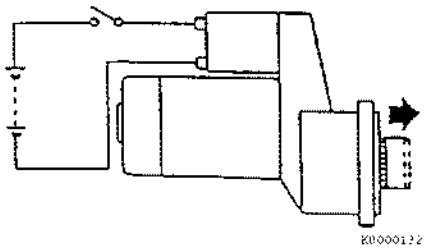


Figure 5-32

5. If the measured L dimension is outside the standard range, adjust the dust covers to obtain the standard range. Dust covers (1, <Bold>Figure 5-33) are available in 0.5 mm and 0.8 mm thicknesses.

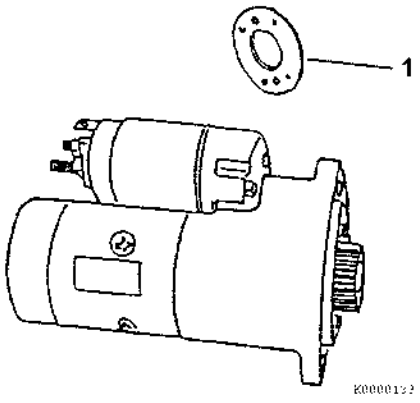


Figure 5-33

No-Load Test

Test the characteristics of the starter motor by performing a no-load test.

NOTE

The starter motor can be damaged if operated continuously longer than 10 seconds while performing the no-load test.

1. Secure the starting motor in a vise or other suitable fixture.
2. Connect an ammeter (1, **<Bold>Figure 5-34**) in series between the battery positive (+) terminal (2, **<Bold>Figure 5-34**) and the main positive (+) terminal (3, **<Bold>Figure 5-34**) on the starter motor.

   Note: The ammeter and all wire leads used in this test must have a capacity equal to or greater than the amperage draw specification for the starter motor being tested.

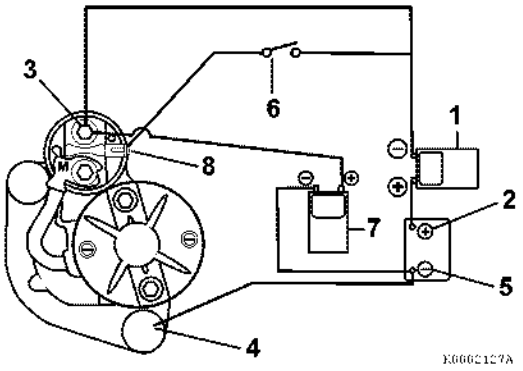


Figure 5-34

3. Connect a wire lead between the mounting base of the starter motor (4, **<Bold>Figure 5-34**) and the battery negative terminal (5, **<Bold>Figure 5-34**).
4. Connect a voltmeter (7, **<Bold>Figure 5-34**) to the battery negative (-) terminal (5, **<Bold>Figure 5-34**) and the main positive (+) battery terminal (3, **<Bold>Figure 5-34**) on the starter motor.
5. Install a switch (6, **<Bold>Figure 5-34**) in a circuit between the battery positive (+) terminal (2, **<Bold>Figure 5-34**) and the starter magnetic switch (solenoid) terminal (8, **<Bold>Figure 5-34**) on the starter motor.
6. Use a suitable tachometer to monitor the rpm of the starter.
7. Turn the switch to the ON position. Monitor the rpm, amperage draw and voltage.

Installation of Starter Motor

1. Reinstall the starter motor to the flywheel housing.
2. Reinstall the starter mounting bolts (1, **<Bold>Figure 5-35**). Tighten the bolts to specification.

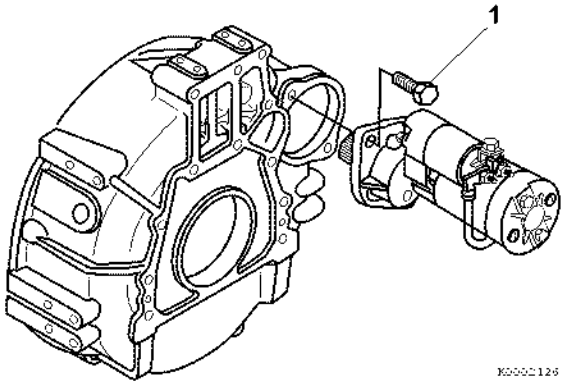
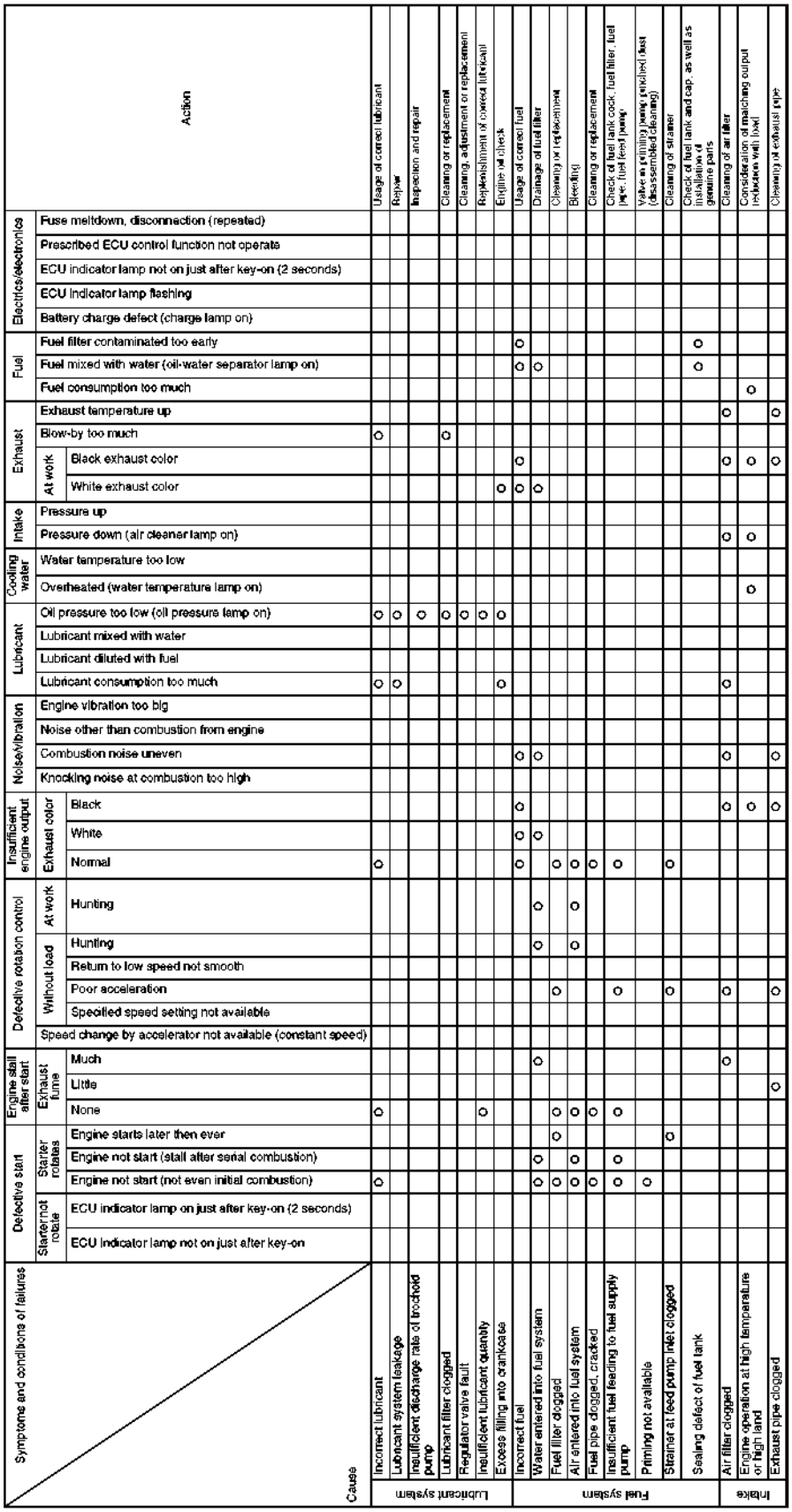


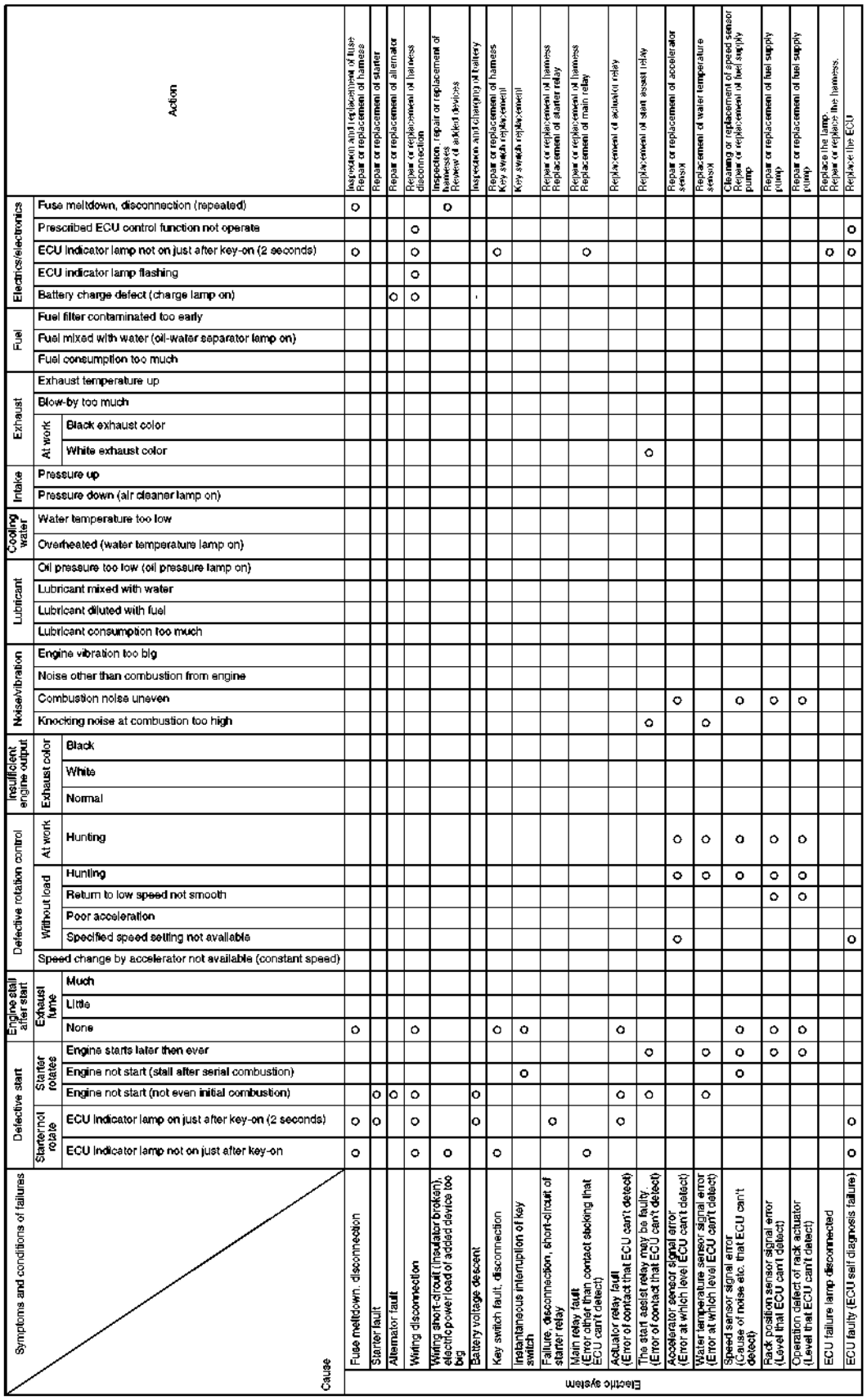
Figure 5-35

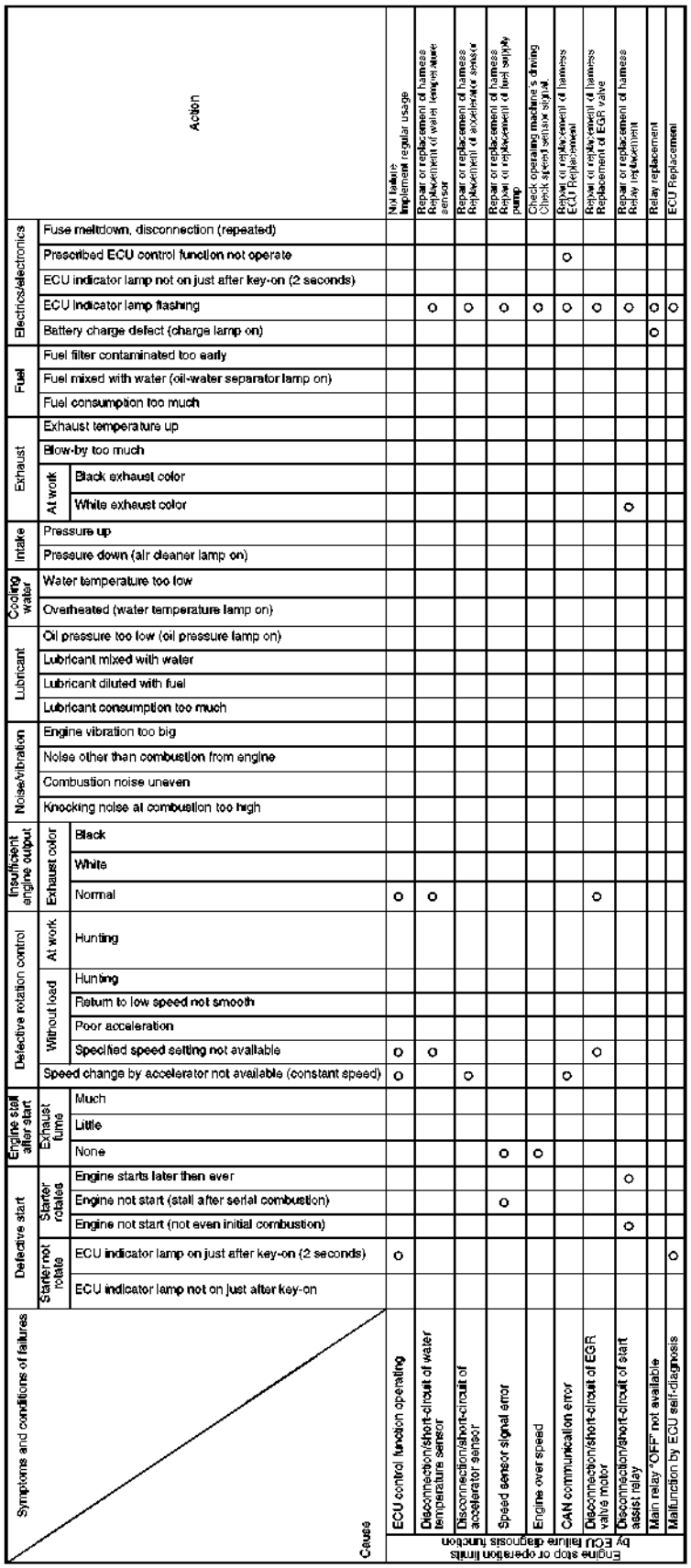
3. Reconnect the electrical wires to the magnetic switch assembly (solenoid). Be sure to place the cover over the battery positive (+) cable connection.

6. Failure Diagnostic List

Symptoms and conditions of failures / Cause				Defective start			Engine stall after start		Defective rotation control				Insufficient engine output			Noise/vibration			Lubricant				Cooling water		Intake	Exhaust			Fuel				Electrics/electronics					Action
				Starter not rotate		Starter rotates	Exhaust fume		Without load			At work	Exhaust color																										
				ECU indicator lamp on just after key-on (2 seconds)	ECU indicator lamp not on just after key-on	Engine not start (not even initial combustion)	Engine starts later then ever	Engine not start (stall after serial combustion)	Speed change by accelerator not available (constant speed)	Specified speed setting not available	Poor acceleration	Return to low speed not smooth	Hunting	Normal	White	Black	Knocking noise at combustion too high	Combustion noise uneven	Noise other than combustion from engine	Engine vibration too big	Lubricant consumption too much	Lubricant diluted with fuel	Lubricant mixed with water	Oil pressure too low (oil pressure lamp on)	Overheated (water temperature lamp on)	Water temperature too low	Pressure down (air cleaner lamp on)	Pressure up	At work: White exhaust color	At work: Black exhaust color	Blow-by too much	Exhaust temperature up	Fuel consumption too much	Fuel mixed with water (oil-water separator lamp on)	Fuel filter contaminated too early	Battery charge defect (charge lamp on)	ECU indicator lamp flashing	ECU indicator lamp not on just after key-on (2 seconds)	Prescribed ECU control function not operate	Fuse meltdown, disconnection (repeated)	
Engine system	Intake/exhaust valve clearance incorrect					○		○						○					○								○			○								Valve clearance adjustment
	Compression failure at valve seat					○								○					○								○			○								Valve seat facing
	Intake/exhaust valve seizure					○						○		○					○								○			○								Correction or replacement of intake/exhaust valve
	Cylinder head gasket blow-out													○										○														Gasket replacement
	Piston ring sticking or breakage					○					○			○					○		○			○														Piston ring replacement
	Wear of piston ring, piston or cylinder					○								○					○		○							○										Honing work and usage of over-sized parts
	Seizure of crank pin metal or bearing parts					○					○	○							○									○										Repair or replacement
	Closed gap position fault of piston ring													○						○																		Correction of closed gap position
	Reverse assembling of piston ring													○						○								○										Correction of assembling
	Wear of crank pin metal and journal metal											○							○				○															Measurement and replacement
	Connecting rod bolt loose																			○		○																Tightening at specified torque
	Foreign material entered into combustion chamber					○														○																		Disassembling and repair
	Gear backlash too big																																					Gear mesh adjustment
	Wear of intake/exhaust valve guide														○					○																		Measurement and replacement
	Open/close timing failure of intake/exhaust valve					○								○					○									○										Valve clearance adjustment
	Engine vibration isolating support loose, damage											○							○																			Repair or replacement of faulty parts
Turbocharger	Blower contamination															○														○								Flow cleaning
	Operation defect of waste gate															○														○								Disassembling and inspection
	Wear of radial metal														○													○										Disassembling and inspection
Cooling water system	Radiator super cooled																								○			○										Thermostat replacement
	Insufficient radiator cooling															○								○					○										Thermostat replacement or check for fan belt loose
	Insufficient cooling water quantity															○								○					○										Water leak inspection of cooling water system
	Water jacket cracks																							○														Repair or replacement
	Fan belt elongation															○																						Adjustment of belt tension
	Thermostat fault															○								○					○										Inspection or replacement


Symptoms and conditions of failures
Cause
Action
Defective start
Starter not rotate
Starter rotates
Engine start after start
Defective rotation control
Without load
At work
Insufficient engine output
Noise/Vibration
Lubricant
Cooling water
Intake
Exhaust
At work
Fuel
Electrics/electronics
Lubricant system
Fuel system
Intake
Starter not rotate
ECU indicator lamp on just after key-on (2 seconds)
ECU indicator lamp not on just after key-on
Engine not start (not even initial combustion)
Engine not start (stall after serial combustion)
Engine starts later then ever
None
Little
Much
Speed change by accelerator not available (constant speed)
Specified speed setting not available
Poor acceleration
Return to low speed not smooth
Hunting
Hunting
Normal
White
Black
Knocking noise at combustion too high
Combustion noise uneven
Noise other than combustion from engine
Engine vibration too big
Lubricant consumption too much
Lubricant diluted with fuel
Lubricant mixed with water
Oil pressure too low (oil pressure lamp on)
Overheated (water temperature lamp on)
Water temperature too low
Pressure down (air cleaner lamp on)
Pressure up
White exhaust color
Black exhaust color
Blow-by too much
Exhaust temperature up
Fuel consumption too much
Fuel mixed with water (oil-water separator lamp on)
Fuel filter contaminated too early
Battery charge defect (charge lamp on)
ECU indicator lamp flashing
ECU indicator lamp not on just after key-on (2 seconds)
Prescribed ECU control function not operate
Fuse meltdown, disconnection (repeated)
Incorrect lubricant
Lubricant system leakage
Insufficient discharge rate of trochoid pump
Lubricant filter clogged
Regulator valve fault
Insufficient lubricant quantity
Excess filling into crankcase
Incorrect fuel
Water entered into fuel system
Fuel filter clogged
Air entered into fuel system
Fuel pipe clogged, cracked
Insufficient fuel feeding to fuel supply pump
Priming not available
Strainer at feed pump inlet clogged
Sealing defect of fuel tank
Air filter clogged
Engine operation at high temperature or high land
Exhaust pipe clogged
Usage of correct lubricant
Repair
Inspection and repair
Cleaning or replacement
Cleaning, adjustment or replacement
Replenishment of correct lubricant
Engine oil check
Usage of correct fuel
Drainage of fuel filter
Cleaning or replacement
Bleeding
Cleaning or replacement
Check of fuel tank cock, fuel filter, fuel pipe, fuel feed pump
Valve clearance (engine stopped) adjustment (disassembled cleaning)
Cleaning of strainer
Check of fuel tank and cap, as well as installation of genuine parts
Cleaning of air filter
Consideration of matching output (reduction with load)
Cleaning of exhaust pipe


Symptoms and conditions of failures
Cause
Electric system
Starter not rotate
Defective start
Starter rotates
Engine not start (not even initial combustion)
Engine not start (stall after serial combustion)
Engine starts later then ever
Engine start stall after start
Exhaust fume
None
Little
Much
Speed change by accelerator not available (constant speed)
Defective rotation control
Without load
Specified speed setting not available
Poor acceleration
Return to low speed not smooth
Hunting
At work
Hunting
Insufficient engine output
Exhaust color
Normal
White
Black
Noise/vibration
Knocking noise at combustion too high
Combustion noise uneven
Noise other than combustion from engine
Engine vibration too big
Lubricant
Lubricant consumption too much
Lubricant diluted with fuel
Lubricant mixed with water
Oil pressure too low (oil pressure lamp on)
Cooling water
Overheated (water temperature lamp on)
Water temperature too low
Intake
Pressure down (air cleaner lamp on)
Pressure up
Exhaust
At work
White exhaust color
Black exhaust color
Blow-by too much
Exhaust temperature up
Fuel
Fuel consumption too much
Fuel mixed with water (oil-water separator lamp on)
Fuel filter contaminated too early
Electrics/electronics
Battery charge defect (charge lamp on)
ECU indicator lamp flashing
ECU indicator lamp not on just after key-on (2 seconds)
Prescribed ECU control function not operate
Fuse meltdown, disconnection (repeated)
Action
ECU indicator lamp not on just after key-on
ECU indicator lamp on just after key-on (2 seconds)
Engine not start (not even initial combustion)
Engine not start (stall after serial combustion)
Engine starts later then ever
None
Little
Much
Speed change by accelerator not available (constant speed)
Specified speed setting not available
Poor acceleration
Return to low speed not smooth
Hunting
Hunting
Black
White
Normal
Knocking noise at combustion too high
Combustion noise uneven
Noise other than combustion from engine
Engine vibration too big
Lubricant consumption too much
Lubricant diluted with fuel
Lubricant mixed with water
Oil pressure too low (oil pressure lamp on)
Water temperature too low
Overheated (water temperature lamp on)
Pressure down (air cleaner lamp on)
Pressure up
White exhaust color
Black exhaust color
Blow-by too much
Exhaust temperature up
Fuel consumption too much
Fuel mixed with water (oil-water separator lamp on)
Fuel filter contaminated too early
Battery charge defect (charge lamp on)
ECU indicator lamp flashing
ECU indicator lamp not on just after key-on (2 seconds)
Prescribed ECU control function not operate
Fuse meltdown, disconnection (repeated)
Inspection and replacement of fuse
Repair or replacement of harness
Repair or replacement of starter
Repair or replacement of alternator
Repair or replacement of harness
Inspection, repair or replacement of harnesses
Review of added devices
Inspection and charging of battery
Repair or replacement of harness
Key switch replacement
Repair or replacement of harness
Replacement of starter relay
Repair or replacement of harness
Replacement of main relay
Replacement of actuator relay
Replacement of start assist relay
Repair or replacement of accelerator sensor
Replacement of water temperature sensor
Cleaning or replacement of speed sensor
Repair or replacement of fuel supply pump
Repair or replacement of fuel supply pump
Replace the lamp.
Repair or replace the harness.
Replace the ECU
Fuse meltdown, disconnection
Starter fault
Alternator fault
Wiring disconnection
Wiring short-circuit (insulator broken), electric power load of added device too big
Battery voltage descent
Key switch fault, disconnection
Instantaneous interruption of key switch
Failure, disconnection, short-circuit of starter relay
Main relay fault (Error other than contact sticking that ECU can't detect)
Actuator relay fault (Error of contact that ECU can't detect)
The start assist relay may be faulty. (Error of contact that ECU can't detect)
Accelerator sensor signal error (Error at which level ECU can't detect)
Water temperature sensor signal error (Error at which level ECU can't detect)
Speed sensor signal error (Cause of noise etc. that ECU can't detect)
Rack position sensor signal error (Level that ECU can't detect)
Operation defect of rack actuator (Level that ECU can't detect)
ECU failure lamp disconnected
ECU faulty (ECU self diagnosis failure)



Symptoms and conditions of failures				Causes	Engine stop or operation limits by ECU failure diagnosis function	Action
						Not failure: Implement regular usage
Defective start	Starter not rotate			ECU control function operating	○	
				Disconnection/short-circuit of water temperature sensor		Repair or replacement of harness Replacement of water temperature sensor
				Disconnection/short-circuit of accelerator sensor		Repair or replacement of harness Replacement of accelerator sensor
				Speed sensor signal error		Repair or replacement of harness Replacement of fuel supply pump
				Engine over speed		Check operating machine's driving Check speed setting signal
				CAN communication error		Repair or replacement of harness ECU Replacement
				Disconnection/short-circuit of EGR valve motor		Repair or replacement of harness Replacement of EGR valve
				Disconnection/short-circuit of start assist relay		Repair or replacement of harness Relay replacement
				Main relay "OFF" not available		Relay replacement
				Malfunction by ECU self-diagnosis	○	ECU Replacement
		ECU indicator lamp not on just after key-on				
		ECU indicator lamp on just after key-on (2 seconds)			○	
	Starter rotate	Engine not start (not even initial combustion)				
		Engine not start (stall after serial combustion)			○	
		Engine starts later than ever				
Engine stall after start	Exhaust fume	None				
		Little				
		Much				
Defective rotation control	Without load	Specified speed setting not available			○	
		Poor acceleration				
		Return to low speed not smooth				
		Hunting				
	At work	Hunting				
Insufficient engine output	Exhaust color	Normal			○	
		White				
		Black				
Noise/vibration		Knocking noise at combustion too high				
		Combustion noise uneven				
		Noise other than combustion from engine				
		Engine vibration too big				
Lubricant		Lubricant consumption too much				
		Lubricant diluted with fuel				
		Lubricant mixed with water				
		Oil pressure too low (oil pressure lamp on)				
Cooling water		Overheated (water temperature lamp on)				
		Water temperature too low				
Intake		Pressure down (air cleaner lamp on)				
		Pressure up				
Exhaust	At work	White exhaust color				
		Black exhaust color				
		Blow-by too much				
		Exhaust temperature up				
Fuel		Fuel consumption too much				
		Fuel mixed with water (oil-water separator lamp on)				
		Fuel filter contaminated too early				
Electrics/electronics		Battery charge defect (charge lamp on)				
		ECU indicator lamp flashing			○	
		ECU indicator lamp not on just after key-on (2 seconds)				
		Prescribed ECU control function not operate				
		Fuse meltdown, disconnection (repeated)				

7. Troubleshooting

DTC (Diagnostic Trouble Codes) General Description

DTC code list

* Note that, SPN hexadecimal + FMI decimal are used to indicate the error codes on the meter panels of YT235.

DTC code				Number of the lamp flashes	Error item		Reference page	
P code	SPN*		FMI*		Part	State	Description	Failure diagnosis
	Decima number	Hexa-decimal number	Decima number					
P0336	522400	7F8A0	2	MIL + AWL	Crank speed sensor	Crank signal malfunction	P5-42	P5-290
P0337			5	MIL + AWL		No crank signal	P5-44	P5-290
P0341	522401	7F8A1	2	MIL + AWL	Cam speed sensor	Cam signal malfunction	P5-46	P5-293
P0342			5	MIL + AWL		No cam signal	P5-48	P5-293
P1341			7	MIL + AWL		Angle offset failure	P5-50	-
P0008	523249	7FBF1	5	MIL + RSL	Crank speed, Cam speed sensor	No signal on both crank and cam speed sensor	P5-52	P5-290, P5-293
P0123	91	0005B	3	MIL + AWL	Accelerator sensor 1	Accelerator sensor 1 (Excessive sensor output)	P5-53	P5-297
P0122			4	MIL + AWL		Accelerator sensor 1 (Insufficient sensor output)	P5-55	P5-297
P02E9	51	00033	3	MIL + RSL	Intake throttle opening sensor	Intake throttle opening sensor fault (High voltage)	P5-57	P5-301
P02E8			4	MIL + RSL		Intake throttle opening sensor fault (Low voltage)	P5-59	P5-301
P0238	102	00066	3	MIL + RSL	EGR low pressure side sensor	EGR low pressure side sensor fault (High voltage)	P5-61	P5-304
P0237			4	MIL + RSL		EGR low pressure side sensor fault (Low voltage)	P5-63	P5-304
P0236			13	MIL + RSL		EGR low pressure side sensor (Abnormal learning value)	P5-65	P5-304
P0473	1209	004B9	3	MIL + RSL	EGR high pressure side sensor	EGR high pressure side sensor fault (High voltage)	P5-67	P5-307
P0472			4	MIL + RSL		EGR high pressure side sensor fault (Low voltage)	P5-69	P5-307
P0471			13	MIL + RSL		EGR high pressure side sensor (Abnormal learning value)	P5-71	P5-307
P0118	110	0006E	3	MIL + AWL	Cooling water temperature sensor	Cooling water temperature sensor fault (High voltage)	P5-73	P5-310
P0117			4	MIL + AWL		Cooling water temperature sensor fault (Low voltage)	P5-75	P5-310
P0217			0	Select by application		Cooling water temperature sensor temperature abnormal high (Overheat)	P5-77	P5-310
P0113	172	000AC	3	MIL + AWL	New air temperature sensor	New air temperature sensor fault (High voltage)	P5-79	P5-314
P0112			4	MIL + AWL		New air temperature sensor fault (Low voltage)	P5-81	P5-314
P0193	157	0009D	3	MIL + RSL	Rail pressure sensor	Rail pressure sensor fault (High voltage)	P5-83	P5-318
P0192			4	MIL + RSL		Rail pressure sensor fault (Low voltage)	P5-85	P5-318
P2455	3251	00CB3	3	MIL + RSL	DPF differential pressure sensor	DPF differential pressure sensor fault (High voltage)	P5-87	P5-321
P2454			4	MIL + RSL		DPF differential pressure sensor fault (Low voltage)	P5-89	P5-321
P2452			0	MIL + RSL		DPF differential pressure sensor differential pressure abnormal high	P5-91	P5-321
P2453			13	MIL + RSL		DPF differential pressure sensor (Abnormal learning value)	P5-93	P5-321
P1455	3609	00E19	3	MIL + RSL	DPF high pressure side sensor	DPF high pressure side sensor fault (High voltage)	P5-95	P5-321
P1454			4	MIL + RSL		DPF high pressure side sensor fault (Low voltage)	P5-97	P5-321
P1428	3242	00CAA	3	MIL + RSL	DPF inlet temperature sensor	DPF inlet temperature sensor fault (High voltage)	P5-99	P5-325
P1427			4	MIL + RSL		DPF inlet temperature sensor fault (Low voltage)	P5-101	P5-325
P1436			0	MIL + AWL		DPF inlet temperature sensor temperature abnormal high	P5-103	P5-325

DTC code				Number of the lamp flashes	Error item		Reference page	
P code	SPN*		FMI*		Part	State	Description	Failure diagnosis
	Decima number	Hexa-decimal number	Decima number					
P1434	3250	00CB2	3	MIL + RSL	DPF intermediate temperature sensor	DPF intermediate temperature sensor fault (High voltage)	P5-104	P5-329
P1435			4	MIL + RSL		DPF intermediate temperature sensor fault (Low voltage)	P5-106	P5-329
P0420			1	MIL + AWL		DPF intermediate temperature sensor temperature abnormal low temperature	P5-108	P5-329
P1426			0	MIL + RSL		DPF intermediate temperature sensor temperature abnormal high (Post-injection failure)	P5-109	P5-329
P2229	108	0006C	3	MIL + AWL	Atmospheric pressure sensor	Atmospheric pressure sensor fault (High voltage)	P5-110	P5-386
P2228			4	MIL + AWL		Atmospheric pressure sensor fault (Low voltage)	P5-111	P5-386
P1231			10	MIL + AWL		Atmospheric pressure sensor characteristic fault	P5-112	P5-386
P041D	412	0019C	3	MIL + AWL	EGR gas temperature sensor	EGR gas temperature sensor fault (High voltage)	P5-114	P5-334
P041C			4	MIL + AWL		EGR gas temperature sensor fault (Low voltage)	P5-116	P5-334
P040D	105	00069	3	MIL + RSL	Intake manifold temperature sensor	Intake manifold temperature sensor fault (High voltage)	P5-118	P5-338
P040C			4	MIL + RSL		Intake manifold temperature sensor fault (Low voltage)	P5-120	P5-338
P0546	173	000AD	3	MIL + AWL	Exhaust manifold temperature sensor	Exhaust manifold temperature sensor fault (High voltage)	P5-122	P5-342
P0545			4	MIL + AWL		Exhaust manifold temperature sensor fault (Low voltage)	P5-124	P5-338
P068B	1485	005CD	7	MIL + AWL	Main relay	Main relay contact stuck	P5-126	P5-346
P068A			2	MIL + AWL		Main relay early opening	P5-128	P5-346
P0543	522243	7F803	5	MIL + AWL	Startup assist relay	Startup assist relay interrupted	P5-130	P5-350
P0541			6	MIL + AWL		Startup assist relay GND interrupted	P5-132	P5-350
P0204 (4TNV)	651 (4TNV)	0028B (4TNV)	5	MIL + RSL	Injector 1 4TNV: Cyl No. 4 Corresponding port 4TNV: 1 - 2	Injector 1 open circuit (Inherent location of the injector)	P5-134	P5-358
P0271 (4TNV)			6	MIL + RSL		Injector 1 coil short circuit	P5-136	P5-358
P1271 (4TNV)			3	MIL + RSL		Injector 1 short circuit	P5-138	P5-362
P0202	653	0028D	5	MIL + RSL	Injector 2 4TNV: Cyl No. 2 Corresponding port 4TNV: 2 - 1	Injector 2 open circuit (Inherent location of the injector)	P5-140	P5-358
P0265			6	MIL + RSL		Injector 2 coil short circuit	P5-142	P5-358
P1265			3	MIL + RSL		Injector 2 short circuit	P5-144	P5-362
P0201	654	0028E	5	MIL + RSL	Injector 3 4TNV: Cyl No. 1 Corresponding port 4TNV: 2 - 2	Injector 3 open circuit (Inherent location of the injector)	P5-146	P5-358
P0262			6	MIL + RSL		Injector 3 coil short circuit	P5-148	P5-358
P1262			3	MIL + RSL		Injector 3 short circuit	P5-150	P5-362
P0203	652	0028C	5	MIL + RSL	Injector 4 4TNV: Cyl No. 3 Corresponding port 4TNV: 1 - 1	Injector 4 open circuit (Inherent location of the injector)	P5-152	P5-358
P0268			6	MIL + RSL		Injector 4 coil short circuit	P5-154	P5-358
P1268			3	MIL + RSL		Injector 4 short circuit	P5-156	P5-362
P0611	4257	0010A1	12	MIL + RSL	Injector (common)	Injector drive IC error	P5-158	–
P1146	2797	00AED	6	MIL + RSL		Injector drive circuit (Bank1) short circuit (4TN: Common circuit for No. 1, No. 4 and all 3TN cylinders)	P5-159	P5-362
P1149	2798	00AEE	6	MIL + RSL		Injector drive circuit (Bank 2) short circuit (4TN: Circuit for No. 2 and No. 3 cylinders)	P5-161	P5-362
P1648	523462	7FCC6	13	MIL + RSL	Injector (correction value)	IQA corrected injection amount for injector 1 error	P5-163	–
P1649	523463	7FCC7	13	MIL + RSL		IQA corrected injection amount for injector 2 error	P5-164	–
P1650	523464	7FCC8	13	MIL + RSL		IQA corrected injection amount for injector 3 error	P5-165	–
P1651	523465	7FCC9	13	MIL + RSL		IQA corrected injection amount for injector 4 error	P5-166	–

DTC code				Number of the lamp flashes	Error item		Reference page	
P code	SPN*		FMI*		Part	State	Description	Failure diagnosis
	Decima number	Hexa-decimal number	Decima number					
P1641	522571	7F94B	3	MIL + RSL	SCV (MPROP)	High-pressure pump drive circuit (Low side VB short-circuit)	P5-167	P5-364
P1643			6	MIL + RSL		High-pressure pump drive circuit (Low side GND short-circuit)	P5-168	P5-364
P0629	633	00279	3	MIL + RSL		High-pressure pump drive circuit (High side VB short-circuit)	P5-170	P5-364
P1642			6	MIL + RSL		High-pressure pump drive circuit (High side GND short-circuit)	P5-172	P5-364
P0627			5	MIL + RSL		High-pressure pump drive circuit (Open circuit)	P5-173	P5-364
P062A	522572	7F94C	6	MIL + RSL		High-pressure pump drive circuit (Drive current (high level))	P5-174	P5-364
P1645			11	MIL + RSL		High-pressure pump drive circuit (Pump overload error)	P5-176	P5-364
P0088	157	0009D	0	MIL + RSL	Abnormal rail pressure	Actual rail pressure rise error	P5-178	-
P0094			18	MIL + RSL		Rail pressure deviation error during the actual rail pressure drop	P5-180	-
P0093			15	MIL + RSL		Rail pressure deviation error during the actual rail pressure rise	P5-182	-
P000F			16	MIL + RSL	PLV (Common rail pressure limit valve)	PLV open valve	P5-184	-
P1666	523469	7FCCD	0	MIL + RSL		Rail pressure fault (The times of PLV valve opening error)	P5-186	-
P1667	523470	7FCCE	0	MIL + RSL		Rail pressure fault (The time of PLV valve opening error)	P5-188	-
P1668	523489	7FCE1	0	MIL + RSL		Rail pressure fault (The actual rail pressure is too high during PRV limp home)	P5-190	-
P1665	523468	7FCCC	9	MIL + RSL		Rail pressure fault (Controlled rail pressure error after PLV valve opening)	P5-192	-
P1669	523491	7FCE3	0	MIL + RSL	Rail pressure control	Rail pressure fault (Injector B/F temperature error during PLV4 limp home)	P5-194	-
P1670	523460	7FCC4	7	MIL + RSL		Rail pressure fault (Operation time error during RPS limp home)	P5-196	-
P0219	190	000BE	16	MIL + RSL	Overspeed	Overspeed	P5-285	P5-389
P0660	2950	00B86	5	MIL + AWL	Intake throttle drive circuit	No-load of throttle valve drive H bridge circuit	P5-197	P5-367
P1658			3	MIL + AWL		Power short circuit of throttle valve drive H bridge output 1	P5-198	P5-367
P1659			4	MIL + AWL		GND short circuit of throttle valve drive H bridge output 1	P5-199	P5-367
P1660			6	MIL + AWL		Overload on the drive H bridge circuit of throttle valve	P5-200	P5-367
P1661	2951	00B87	3	MIL + AWL		VB Power short circuit of throttle valve drive H bridge output 2	P5-201	P5-367
P1662			4	MIL + AWL		GND short circuit of throttle valve drive H bridge output 2	P5-202	P5-367
U0292	522596	7F964	9	MIL + AWL	CAN2	TSC1 (CAN message) reception time out (SA1)	P5-223	P5-382
U1301	522597	7F965	9	MIL + AWL		TSC1 (CAN message) reception time out (SA2)	P5-225	P5-382
U1292	522599	7F967	9	MIL + AWL		Y_ECR1 (CAN message) reception time out	P5-227	P5-382
U1293	522600	7F968	9	MIL + AWL		Y_EC (CAN message) reception time out	P5-229	P5-382
U1294	522601	7F969	9	MIL + AWL		Y_RSS (CAN message) reception time out	P5-231	P5-382
U1300	522609	7F971	9	MIL + AWL		Y_ETCP1 (CAN message) reception time out	P5-233	P5-382
U1302	522618	7F97A	9	MIL + AWL		EBC1 (CAN message) reception time out	P5-235	P5-382
U1303	522619	7F97B	9	MIL + AWL		Y_DPFIF (CAN message) reception time out	P5-237	P5-382
U010B	522610	7F972	9	MIL + AWL	CAN1	CAN1 (for EGR). Reception time out	P5-221	P5-378
U1107	522611	7F973	9	TBD		Exhaust throttle (CAN message from the exhaust throttle time out)	P5-222	P5-378

DTC code				Number of the lamp flashes	Error item		Reference page	
P code	SPN*		FMI*		Part	State	Descrip-tion	Failure diagnosis
	Decima number	Hexa-decimal number	Decima number					
P0404	2791	00AE7	0	MIL + AWL	EGR valve	EGR over-voltage fault	P5-203	P5-372
P1404			1	MIL + AWL		EGR under-voltage fault	P5-204	P5-372
P1409			7	MIL + AWL		EGR feedback malfunction	P5-205	P5-376
U0401			9	MIL + AWL		EGR ECM data fault	P5-206	P5-376
P0403			12	MIL + AWL		Open circuit between the EGR motor coils	P5-207	P5-376
P1405	522579	7F953	12	MIL + AWL		Short circuit between the EGR motor coils	P5-208	P5-376
P0488	522580	7F954	12	MIL + AWL		EGR position sensor malfunction	P5-209	P5-376
P148A	522581	7F955	7	MIL + RSL		EGR stuck open valve malfunction	P5-210	P5-376
P049D	522582	7F956	7	MIL + RSL		EGR initialization malfunction	P5-211	P5-376
P1410	522183	7F957	1	MIL + AWL		EGR high temperature thermistor malfunction	P5-213	P5-376
P1411	522184	7F958	1	MIL + AWL		EGR low temperature thermistor malfunction	P5-214	P5-376
U1401	522617	7F979	12	MIL + AWL		EGR target value out of range	P5-212	P5-376
P1438	522746	7F9FA	12	TBD	Exhaust throttle	Exhaust throttle (Voltage fault)	P5-215	-
P1439	522747	7F9FB	12	TBD		Exhaust throttle (Motor fault)	P5-216	–
P1440	522748	7F9FC	12	TBD		Exhaust throttle (Sensor system fault)	P5-217	–
P1441	522749	7F9FD	12	TBD		Exhaust throttle (MPU fault)	P5-218	-
P1442	522750	7F9FE	12	TBD		Exhaust throttle (PCB fault)	P5-219	–
P1443	522751	7F9FF	19	TBD		Exhaust throttle (CAN fault)	P5-220	–
P0601	630	00276	12	MIL + RSL	EEPROM	EEPROM memory deletion error	P5-239	P5-386
P160E	522576	7F950	12	MIL + RSL		EEPROM memory read error	P5-240	P5-386
P160F	522578	7F952	12	MIL + RSL		EEPROM memory writing error	P5-241	P5-386
P1613	522585	7F959	12	MIL + RSL	ECU internal fault	CY146 SPI communication fault	P5-242	P5-386
P1608	522588	7F95C	12	MIL + RSL		Excessive voltage of supply 1	P5-243	P5-386
P1617	522589	7F95D	12	MIL + RSL		Insufficient voltage of supply 1	P5-244	P5-386
P1609	522590	7F95E	12	None		Sensor supply voltage error 1	P5-245	-
P1618	522591	7F95F	12	None		Sensor supply voltage error 2	P5-246	-
P1619	522592	7F960	12	None		Sensor supply voltage error 3	P5-247	-
P1626	522744	7F9F8	4	MIL + AWL		Actuator drive circuit 1 short to ground	P5-248	–
P1633	522994	7FAF2	4	MIL + AWL		Actuator drive circuit 2 short to ground	P5-249	-
P1467	523471	7FCCF	6	MIL + AWL		Actuator drive circuit 3 short to ground	P5-250	-
P1469	523473	7FCD1	12	MIL + RSL		AD converter fault 1	P5-251	P5-386
P1470	523474	7FCD2	12	MIL + RSL		AD converter fault 2	P5-252	P5-386
P1471	523475	7FCD3	12	MIL + RSL		External monitoring IC and CPU fault 1	P5-253	P5-386
P1472	523476	7FCD4	12	MIL + RSL		External monitoring IC and CPU fault 2	P5-254	P5-386
P1473	523477	7FCD5	12	MIL + RSL		ROM fault	P5-255	P5-386
P1474	523478	7FCD6	12	MIL + RSL		Shutoff path fault 1	P5-256	P5-386
P1475	523479	7FCD7	12	MIL + RSL		Shutoff path fault 2	P5-257	P5-386
P1476	523480	7FCD8	12	MIL + RSL		Shutoff path fault 3	P5-258	P5-386
P1477	523481	7FCD9	12	MIL + RSL		Shutoff path fault 4	P5-259	P5-386
P1478	523482	7FCDA	12	MIL + RSL		Shutoff path fault 5	P5-260	P5-386
P1479	523483	7FCDB	12	MIL + RSL		Shutoff path fault 6	P5-261	P5-386
P1480	523484	7FCDC	12	MIL + RSL		Shutoff path fault 7	P5-262	P5-386
P1481	523485	7FCDD	12	MIL + RSL		Shutoff path fault 8	P5-263	P5-386
P1482	523486	7FCDE	12	MIL + RSL		Shutoff path fault 9	P5-264	P5-386
P1483	523487	7FCDF	12	MIL + RSL		Shutoff path fault 10	P5-265	P5-386
P1484	523488	7FCE0	0	MIL + RSL		Recognition error of engine speed	P5-266	-

DTC code				Number of the lamp flashes	Error item		Reference page	
P code	SPN*		FMI*		Part	State	Description	Failure diagnosis
	Decimal number	Hexadecimal number	Decimal number					
P1562	167	000A7	5	Select by application	Charge switch	Charge switch open circuit	P5-267	P5-354
P1568			1	Select by application		Charge alarm	P5-269	P5-354
P1192	100	00064	4	Select by application	Oil pressure switch	Oil pressure switch open circuit	P5-271	P5-354
P1198			1	Select by application		Low oil pressure fault alarm	P5-273	P5-354
P2463	522573	7F94D	0	Not turned on	DPF	Overaccumulation (Method C)	P5-275	–
P1463	522574	7F94E	0	Not turned on		Overaccumulation (Method P)	P5-276	–
P2458	522575	7F94F	7	Not turned on		Regeneration defect (Stationary regeneration failure)	P5-277	–
P2459	522577	7F951	11	Not turned on		Regeneration defect (Stationary regeneration not performed)	P5-278	–
P242F	3720	00E88	16	MIL + AWL	DPF OP interface	Ash cleaning request 1	P5-279	–
P1420			0	MIL + RSL		Ash cleaning request 2	P5-280	–
P1421	3719	00E87	16	MIL + AWL		Stationary regeneration standby	P5-281	–
P1424			0	MIL + RSL		Backup mode	P5-282	–
P1445	3719	00E87	9	MIL + RSL		Recovery regeneration failure	P5-283	–
P1446			7	MIL + RSL		Recovery regeneration prohibition	P5-284	–

Description

P code	P code	Name	Error name
SPN/FMI	SPN/FMI		

● **DTC detection criteria**

1. Prerequisite, 2. Judgment criteria	Check points
1. Prerequisite for detecting the malfunction. 2. Condition for detecting the malfunction.	Check points to specify the cause of the malfunction. For details, refer to "Diagnosis Content".

● **Actions when a malfunction occurs**

Fault mode	[Continuous operation] / [Limited operation] / [Engine stop]: Describes the engine operation when a malfunction is detected. * [Continuous operation]: The engine continues to operate without limitations after the malfunction is detected. Engine control is not obstructed. [Limited operation]: The engine operation continues, but the high idle speed and engine power are limited. The engine output is limited. [Engine stop]: The engine stops immediately when the malfunction is detected. If the malfunction is detected prior to starting the engine, the starter does not turn.
Limited operation	Yes/No: The details of limited operation at the time of the malfunction are listed.
Reset criteria	Yes/No: The condition to release the fault mode is listed.
Remarks	Safety precautions are listed.

● **Presumed cause of the malfunction or the abnormal condition**

Judging from the detected DTC, the presumed location and cause of the error (e.g. open circuit of sensor wiring) or the abnormal condition of the system (e.g. abnormal increase of coolant temperature) are listed.

* Malfunctions related to the detected DTC are listed.

● **Diagnosis**

The method and procedure of the failure diagnosis are listed.

For initial diagnosis using a diagnosis tool, use YANMAR's tool "SMART ASSIST-Direct (SA-D)".

Note: If replacing the ECU, sensor or actuator fixes the malfunction, re-install the presumably broken parts and confirm that the malfunction re-occurs.

Sensor related

■ Crank speed sensor

P0336: Crank signal malfunction

P code	P0336	Name	Crank signal malfunction
SPN/FMI	7F8A0/2		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Abnormal pulse detected for a constant number of times (15 times).	Connector Wire harness Crank speed sensor ECU Pulser

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited. (The operation continues with only the cam.)
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

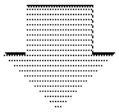
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Crank speed sensor failure
4. ECU internal circuit fault
5. Pulser fault and sensor installation condition fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-290.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the crank speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the crank speed sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the crank speed sensor resistance value. • Check the conduction of the wire harness. • Check the crank speed sensor installation condition and the pulse. * For details on the diagnosis method and procedure, see P5-290.

P0337: No crank signal

P code	P0337	Name	No crank signal
SPN/FMI	7F8A0/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. No crank pulser input while the cam is rotating for a certain number of rotations (2 rotations).	Connector Wire harness Crank speed sensor ECU Pulser

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited. (The operation continues with only the cam.)
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

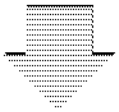
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Crank speed sensor failure
4. ECU internal circuit fault
5. Pulser fault and sensor installation condition fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-290.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the crank speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the crank speed sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the crank speed sensor resistance value. • Check the conduction of the wire harness. • Check the crank speed sensor installation condition and the pulse. * For details on the diagnosis method and procedure, see P5-290.

■ Cam speed sensor

P0341: Cam signal malfunction

P code	P0341	Name	Cam signal malfunction
SPN/FMI	7F8A1/2		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Incorrect cam pulser rotation or position detected while the crank is rotating for a certain number of rotations (2 rotations).	Connector Wire harness Cam speed sensor ECU Pulser

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed. (The operation continues with only the crank.)
Limited operation	No
Reset criteria	Yes:The fault mode is released when the ECU power is turned off.
Remarks	

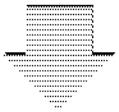
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Cam speed sensor fault
4. ECU internal circuit fault
5. Pulser fault and sensor installation condition fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-293.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the cam speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the cam speed sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the ECU output voltage. * For details on the diagnosis method and procedure, see P5-293.

P0342: No cam signal

P code	P0342	Name	No cam signal
SPN/FMI	7F8A1/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. No cam pulser input while the crank is rotating for a certain number of rotations (2.2 rotations).	Connector Wire harness Cam speed sensor ECU Pulser

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed. (The operation continues with only the crank.)
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

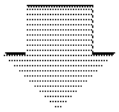
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Cam speed sensor fault
4. ECU internal circuit fault
5. Pulser fault and sensor installation condition fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-293.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the cam speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the cam speed sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the ECU output voltage. * For details on the diagnosis method and procedure, see P5-293.

P1341: Angle offset failure

P code	P1341	Name	Angle offset failure
SPN/FMI	7F8A1/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The condition with the phase difference of 30 degrees or larger, or -20 degrees or smaller between the cam and the crank is detected for 2 times.	Connector Wire harness Cam speed sensor ECU Pulser

● Actions when a malfunction occurs

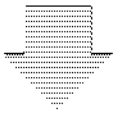
Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

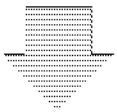
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Cam speed sensor fault
4. ECU internal circuit fault
5. Pulser fault and sensor installation condition fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the crank speed sensor, cam speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the cam speed sensor wiring is disconnected or the wiring coating is peeled.



3. Pulser check	• Before beginning your work, be sure to turn off the ECU power. • Check that there is no abnormality in distance and displacement of the pulser and the sensor.

4. Failure diagnosis	• Check the conduction of the wire harness. • Check the ECU output voltage.

P0008: No signal on both crank and cam speed sensor

P code	P0008	Name	No signal on both crank and cam speed sensor
SPN/FMI	7FBF1/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. No.	Connector Wire harness Crank speed, Cam speed sensor ECU Pulser

● Actions when a malfunction occurs

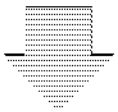
Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

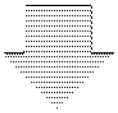
1. Crank speed sensor fault and cam speed sensor fault occur at the same time
2. Starter system fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-290, P5-293.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the power switch. • Check the pin of the crank speed sensor, cam speed sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the crank speed sensor, cam speed sensor wiring is disconnected or the wiring coating is peeled. • If the starter is turned on but the engine does not turn, check the starter system.



3. Failure diagnosis	• Perform the failure diagnosis on the crank speed sensor and cam speed sensor.

■ Accelerator sensor

P0123: Accelerator sensor 1 (Excessive sensor output)

P code	P0123	Name	Accelerator sensor 1 (Excessive sensor output)
SPN/FMI	0005B/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The sensor voltage is 4.6 V or higher.	Connector Wire harness Accelerator sensor ECU

● Actions when a malfunction occurs

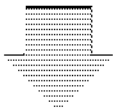
	Backup accelerator sensor function	
	No	Yes
Fault mode	[Limited operation]: The engine is operated at the constant rotation speed.	[Continuous operation]: Switched to the engine operation by the spare accelerator sensor.
Limited operation	Yes: The target rotation speed is set to "target rotation speed when a malfunction occurs (by map setting)" or "target rotation speed prior to detecting a malfunction".	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off while the normal voltage value (0.2 V to 4.6 V) is supplied.	Yes: The fault mode is released when the ECU power off is detected.
Remarks		

● Presumed cause of the malfunction or the abnormal condition

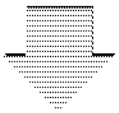
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Accelerator sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-297.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the connector pin of the accelerator sensor 2 for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the accelerator sensor wiring is cut or the wiring coating is peeled.



3. Failure diagnosis	• Check the accelerator sensor resistance value. • Check the conduction of the wire harness. • Check the accelerator sensor output voltage. * For details on the diagnosis method and procedure, see P5-297.

P0122: Accelerator sensor 1 (Insufficient sensor output)

P code	P0122	Name	Accelerator sensor 1 (Insufficient sensor output)
SPN/FMI	0005B/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The sensor voltage is 0.2 V or lower.	Connector Wire harness Accelerator sensor ECU

● Actions when a malfunction occurs

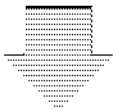
	Backup accelerator sensor function	
	No	Yes
Fault mode	[Limited operation]: The engine is operated at the constant rotation speed.	[Continuous operation]: Switched to the engine operation by the spare accelerator sensor.
Limited operation	Yes: The target rotation speed is set to "target rotation speed when a malfunction occurs (by map setting)" or "target rotation speed prior to detecting a malfunction".	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off while the normal voltage value (0.2 V to 4.6 V) is supplied.	Yes: The fault mode is released when the ECU power off is detected.
Remarks		

● Presumed cause of the malfunction or the abnormal condition

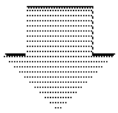
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Open circuit or GND short circuit of sensor 5 V
3. Accelerator sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-297.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the connector pin of the accelerator sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the accelerator sensor wiring is cut or the wiring coating is peeled.



3. Failure diagnosis	• Check the accelerator sensor resistance value. • Check the conduction of the wire harness. • Check the accelerator sensor output voltage. * For details on the diagnosis method and procedure, see P5-297.

■ Intake throttle opening sensor

P02E9: Intake throttle opening sensor fault (High voltage)

P code	P02E9	Name	Intake throttle opening sensor fault (High voltage)
SPN/FMI	00033/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness Intake throttle opening sensor ECU

● Actions when a malfunction occurs

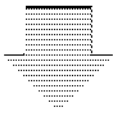
Fault mode	[Limited operation]: The engine operation is limited by setting the intake throttle opening to the default value 100 %.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

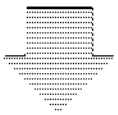
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Intake throttle opening sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-301.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the connector pin of the intake throttle opening sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the intake throttle opening sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the intake throttle opening sensor resistance value. • Check the conduction of the wire harness. • Check the intake throttle opening sensor output voltage. * For details on the diagnosis method and procedure, see P5-301.

P02E8: Intake throttle opening sensor fault (Low voltage)

P code	P02E8	Name	Intake throttle opening sensor fault (Low voltage)
SPN/FMI	00033/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness Intake throttle opening sensor ECU

● Actions when a malfunction occurs

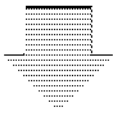
Fault mode	[Limited operation]: The engine operation is limited by setting the intake throttle opening to the default value 100 %.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

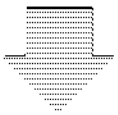
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Intake throttle opening sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-301.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the connector pin of the intake throttle opening sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the intake throttle opening sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the intake throttle opening sensor resistance value. • Check the conduction of the wire harness. • Check the intake throttle opening sensor output voltage. * For details on the diagnosis method and procedure, see P5-301.

■ EGR low pressure side sensor

P0238: EGR low pressure side sensor fault (High voltage)

P code	P0238	Name	EGR low pressure side sensor fault (High voltage)
SPN/FMI	00066/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness EGR pressure sensor ECU

● Actions when a malfunction occurs

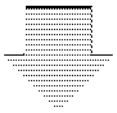
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR low pressure side pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

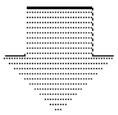
1. Poor connection of the connector
2. Wiring failure of the wire harness
   • GND short circuit of the sensor signal wire
3. EGR pressure sensor failure
   • Sensor output failure caused by a GND short circuit of the EGR pressure sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-304.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-304.

P0237: EGR low pressure side sensor fault (Low voltage)

P code	P0237	Name	EGR low pressure side sensor fault (Low voltage)
SPN/FMI	00066/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness EGR pressure sensor ECU

● Actions when a malfunction occurs

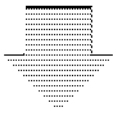
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR low pressure side to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

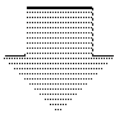
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-304.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-304.

P0236: EGR low pressure side sensor (Abnormal learning value)

P code	P0236	Name	EGR low pressure side sensor (Abnormal learning value)
SPN/FMI	00066/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. • Before engine startup is completed. • Atmospheric pressure sensor voltage is normal. • EGR low-pressure side sensor voltage is normal. • Atmospheric pressure characteristics do not fall into problem. * The above conditions are prerequisites for the calculation of the final offset value of intake manifold pressure. 2. The final offset value of the intake manifold pressure is less than the threshold value. Or, the final offset value of the intake manifold pressure is greater than the threshold value.	

● Actions when a malfunction occurs

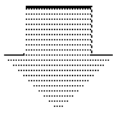
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

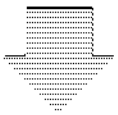
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-304.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-304.

■ EGR high pressure side sensor

P0473: EGR high pressure side sensor fault (High voltage)

P code	P0473	Name	EGR high pressure side sensor fault (High voltage)
SPN/FMI	004B9/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness EGR pressure sensor ECU

● Actions when a malfunction occurs

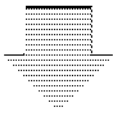
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR high pressure side pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

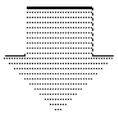
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-307.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-307.

P0472: EGR high pressure side sensor fault (Low voltage)

P code	P0472	Name	EGR high pressure side sensor fault (Low voltage)
SPN/FMI	004B9/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness EGR pressure sensor ECU

● Actions when a malfunction occurs

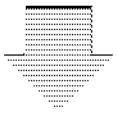
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR high pressure side pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

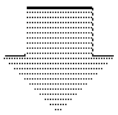
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-307.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-307.

P0471: EGR high pressure side sensor (Abnormal learning value)

P code	P0471	Name	EGR high pressure side sensor (Abnormal learning value)
SPN/FMI	004B9/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. • Before engine startup is completed. • Atmospheric pressure sensor voltage is normal. • EGR low-pressure side sensor voltage is normal. • Atmospheric pressure characteristics do not fall into problem. * The above conditions are prerequisites for the calculation of the final offset value of intake manifold pressure. 2. The final offset value of the exhaust manifold pressure is less than the threshold value. Or, the final offset value of the exhaust manifold pressure is greater than the threshold value.	

● Actions when a malfunction occurs

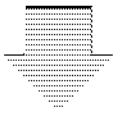
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

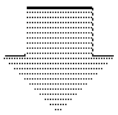
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-307.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the EGR pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the EGR pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-307.

■ Cooling water temperature sensor

P0118: Cooling water temperature sensor fault (High voltage)

P code	P0118	Name	Cooling water temperature sensor fault (High voltage)
SPN/FMI	0006E/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness Cooling water temperature sensor ECU

● Actions when a malfunction occurs

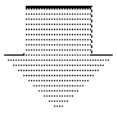
Fault mode	[Limited operation]: The engine operation is limited by setting the cooling water temperature to the default value of 50 °C (-15 °C at engine start).
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

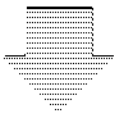
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Open circuit or power short circuit of the sensor GND wire
   - Open circuit or power short circuit of the sensor signal wire
3. Cooling water temperature sensor fault
   - Sensor output failure caused by an open circuit of the cooling water temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-310.



2. Connector/wiring check	• Before beginning your work, turn off the ECU power. • Check the pin of the cooling water temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the cooling water temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the cooling water temperature sensor resistance value. • Check the conduction of the wire harness. • Check the cooling water temperature sensor output voltage. * For details on the diagnosis method and procedure, see P5-310.

P0117: Cooling water temperature sensor fault (Low voltage)

P code	P0117	Name	Cooling water temperature sensor fault (Low voltage)
SPN/FMI	0006E/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness Cooling water temperature sensor ECU

● Actions when a malfunction occurs

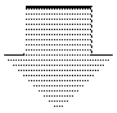
Fault mode	[Limited operation]: The engine operation is limited by setting the cooling water temperature to the default value of 50 °C (-15 °C at engine start).
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

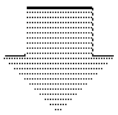
1. Poor connection of the connector
2. Wiring failure of the wire harness
   • GND short circuit of the sensor signal wire
3. Cooling water temperature sensor fault
   • Sensor output failure caused by a GND short circuit of the cooling water temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-310.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the cooling water temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the cooling water temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the cooling water temperature sensor resistance value. • Check the conduction of the wire harness. • Check the cooling water temperature sensor output voltage. * For details on the diagnosis method and procedure, see P5-310.

P0217: Cooling water temperature sensor temperature abnormal high (Overheat)

P code	P0217	Name	Cooling water temperature sensor temperature abnormal high (Overheat)
SPN/FMI	0006E/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The cooling water temperature sensor is normal, and 60 sec have passed since completion of the engine start. 2. Cooling water temperature 110 °C or above is continued for 20 sec.	Engine cooling water level Engine cooling equipment Cooling water temperature sensor system

● Actions when a malfunction occurs

	Settings of the actions during a "cooling water temperature high" alarm	
	No	Yes
Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.	[Limited operation]: The engine operation is limited.
Limited operation	No	Yes: • The high idle speed or the maximum injection quantity is limited. (Actions differ by the customer setting.) • The EGR is fully closed.
Reset criteria	Yes: • The fault mode is released when the ECU power off is detected. • Automatic recovery is made when the cooling water temperature 105 °C or below.	Yes: • The fault mode is released when the ECU power off is detected. • Automatic recovery is made when the cooling water temperature 105 °C or below continues for 60 sec.
Remarks		

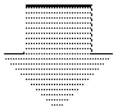
● Presumed cause of the malfunction or the abnormal condition

1. Engine overheat
2. Insufficient engine cooling water
3. Engine cooling equipment fault
4. Cooling water temperature sensor system fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-310.

2. Engine check	• Turn off the ECU power and stop the engine. • Check the engine cooling equipment. • After a few moments, turn on the ECU power and check whether DTC is detected.



3. Failure diagnosis	• Check the cooling water temperature sensor system. * For details on the diagnosis method and procedure, see P5-310.

■ New air temperature sensor

P0113: New air temperature sensor fault (High voltage)

P code	P0113	Name	New air temperature sensor fault (High voltage)
SPN/FMI	000AC/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.85 V.	Connector Wire harness New air temperature sensor ECU

● Actions when a malfunction occurs

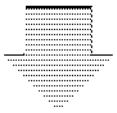
Fault mode	[Limited operation]: The engine operation is limited by setting the new air temperature to the default value 25 °C.
Limited operation	Yes: The reset of ash accumulation value is prohibited.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

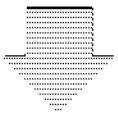
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Open circuit or power short circuit of the sensor GND wire
   - Open circuit or power short circuit of the sensor signal wire
3. New air temperature sensor fault
   - Sensor output failure caused by an open circuit of the new air temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-314.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the new air temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the new air temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the new air temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the new air temperature sensor. * For details on the diagnosis method and procedure, see P5-314.

P0112: New air temperature sensor fault (Low voltage)

P code	P0112	Name	New air temperature sensor fault (Low voltage)
SPN/FMI	000AC/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.15 V.	Connector Wire harness New air temperature sensor ECU

● Actions when a malfunction occurs

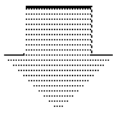
Fault mode	[Limited operation]: The engine operation is limited by setting the new air temperature to the default value 25 °C.
Limited operation	Yes: The reset of ash accumulation value is prohibited.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

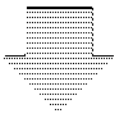
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - GND short circuit of the sensor signal wire
3. New air temperature sensor fault
   - Sensor output failure caused by a GND short circuit of the new air temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-314.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the new air temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the new air temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the new air temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the new air temperature sensor. * For details on the diagnosis method and procedure, see P5-314.

■ Rail pressure sensor

P0193: Rail pressure sensor fault (High voltage)

P code	P0193	Name	Rail pressure sensor fault (High voltage)
SPN/FMI	0009D/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.75 V.	Connector Wire harness Rail pressure sensor ECU

● Actions when a malfunction occurs

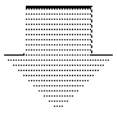
Fault mode	[Limited operation]: The engine operation is limited by setting the rail pressure to the default value of 160 MPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The rail pressure back-up control functions. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

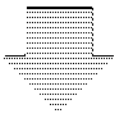
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Rail pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-318.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the key switch. • Check the pin of the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the rail pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the ECU output voltage. • Check the rail pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-318.

P0192: Rail pressure sensor fault (Low voltage)

P code	P0192	Name	Rail pressure sensor fault (Low voltage)
SPN/FMI	0009D/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.24 V.	Connector Wire harness Rail pressure sensor ECU

● Actions when a malfunction occurs

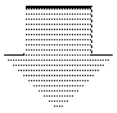
Fault mode	[Limited operation]: The engine operation is limited by setting the rail pressure to the default value of 160 MPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The rail pressure back-up control functions. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

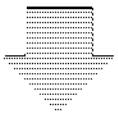
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Rail pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-318.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is removed. • Check whether the rail pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the ECU output voltage. • Check the rail pressure sensor output voltage. * For details on the diagnosis method and procedure, see P5-318.

■ DPF differential pressure sensor

P2455: DPF differential pressure sensor fault (High voltage)

P code	P2455	Name	DPF differential pressure sensor fault (High voltage)
SPN/FMI	00CB3/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness DPF differential pressure sensor ECU

● Actions when a malfunction occurs

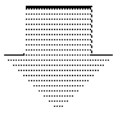
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF differential pressure to the default value 0 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

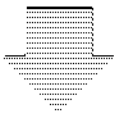
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF differential pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF differential pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF differential pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF differential pressure sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF differential pressure sensor. * For details on the diagnosis method and procedure, see P5-321.

P2454: DPF differential pressure sensor fault (Low voltage)

P code	P2454	Name	DPF differential pressure sensor fault (Low voltage)
SPN/FMI	00CB3/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness DPF differential pressure sensor ECU

● Actions when a malfunction occurs

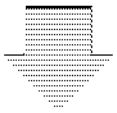
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF differential pressure to the default value 0 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

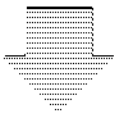
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF differential pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF differential pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF differential pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF differential pressure sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF differential pressure sensor. * For details on the diagnosis method and procedure, see P5-321.

P2452: DPF differential pressure sensor differential pressure abnormal high

P code	P2452	Name	DPF differential pressure sensor differential pressure abnormal high
SPN/FMI	00CB3/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. After the completion of startup. 2. DPF differential pressure is 50 kPa or more for a given period of time (15 s) after the completion of the engine start.	

● Actions when a malfunction occurs

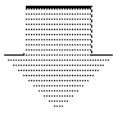
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

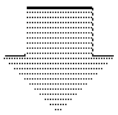
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF differential pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the key switch. • Check the pin of the DPF differential pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF differential pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the output voltage of the DPF differential pressure sensor. * For details on the diagnosis method and procedure, see P5-321.

P2453: DPF differential pressure sensor (Abnormal learning value)

P code	P2453	Name	DPF differential pressure sensor (Abnormal learning value)
SPN/FMI	00CB3/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. • Before engine startup is completed. • DPF differential pressure sensor voltage is normal. * The above conditions are prerequisites for the calculation of the offset value of DPF differential pressure. 2. The final DPF differential pressure offset value is less than the threshold value of XX hPa. Or, the final DPF differential pressure offset value is greater than the threshold value of YY hPa.	

● Actions when a malfunction occurs

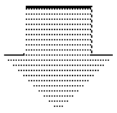
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

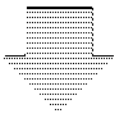
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR pressure sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF differential pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF differential pressure sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the output voltage of the DPF differential pressure sensor. * For details on the diagnosis method and procedure, see P5-321.

■ DPF high pressure side sensor

P1455: DPF high pressure side sensor fault (High voltage)

P code	P1455	Name	DPF high pressure side sensor fault (High voltage)
SPN/FMI	00E19/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness DPF high pressure side sensor ECU

● Actions when a malfunction occurs

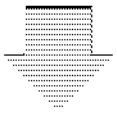
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF high pressure side pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

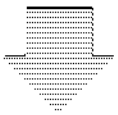
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF high pressure side sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF high pressure side sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF high pressure side sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF high pressure side sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF high pressure side sensor. * For details on the diagnosis method and procedure, see P5-321.

P1454: DPF high pressure side sensor fault (Low voltage)

P code	P1454	Name	DPF high pressure side sensor fault (Low voltage)
SPN/FMI	00E19/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness DPF high pressure side sensor ECU

● Actions when a malfunction occurs

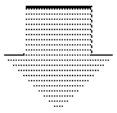
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF high pressure side pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

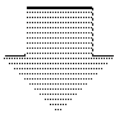
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF high pressure side sensor failure
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-321.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF high pressure side sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF high pressure side sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF high pressure side sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF high pressure side sensor. * For details on the diagnosis method and procedure, see P5-321.

■ DPF inlet temperature sensor

P1428: DPF inlet temperature sensor fault (High voltage)

P code	P1428	Name	DPF inlet temperature sensor fault (High voltage)
SPN/FMI	3242/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness DPF inlet temperature sensor ECU

● Actions when a malfunction occurs

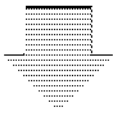
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF inlet temperature to the default value 350 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

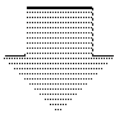
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Open circuit or power short circuit of the sensor GND wire
   - Open circuit or power short circuit of the sensor signal wire
3. DPF inlet temperature sensor fault
   - Sensor output failure caused by an open circuit of the DPF inlet temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-325.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF inlet temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF inlet temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF inlet temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF inlet temperature sensor. * For details on the diagnosis method and procedure, see P5-325.

P1427: DPF inlet temperature sensor fault (Low voltage)

P code	P1427	Name	DPF inlet temperature sensor fault (Low voltage)
SPN/FMI	00CAA/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness DPF inlet temperature sensor ECU

● Actions when a malfunction occurs

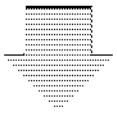
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF inlet temperature to the default value 350 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

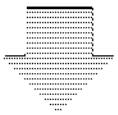
1. Poor connection of the connector
2. Wiring failure of the wire harness
   • GND short circuit of the sensor signal wire
3. DPF inlet temperature sensor fault
   • Sensor output failure caused by a GND short circuit of the DPF inlet temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-325.



2. Connector/wiring check	• Before beginning your work, turn off the ECU power. • Check the pin of the DPF inlet temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF inlet temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF inlet temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF inlet temperature sensor. * For details on the diagnosis method and procedure, see P5-325.

P1436: DPF inlet temperature sensor temperature abnormal high

P code	P1436	Name	DPF inlet temperature sensor temperature abnormal high
SPN/FMI	00CAA/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. DPF inlet temperature sensor normal 2. The DPF inlet temperature is 700 °C or more for a given period of time (15 s).	Connector Wire harness DPF inlet temperature sensor ECU Injector Exhaust piping

● Actions when a malfunction occurs

Fault mode	[Limited operation]: he engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF inlet temperature sensor system fault
4. ECU internal circuit fault
5. Blow by combustion gas
   • Piping damage in the passage to DOC
6. Injector defect
   • Decrease in injection quantity
   • Injection timing malfunction

■ DPF intermediate temperature sensor

P1434: DPF intermediate temperature sensor fault (High voltage)

P code	P1434	Name	DPF intermediate temperature sensor fault (High voltage)
SPN/FMI	00CB2/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness DPF intermediate temperature sensor ECU

● Actions when a malfunction occurs

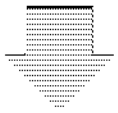
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF intermediate temperature to the default value 350 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

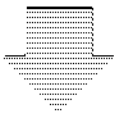
1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Open circuit or power short circuit of the sensor GND wire
   • Open circuit or power short circuit of the sensor signal wire
3. DPF intermediate temperature sensor fault
   • Sensor output failure caused by an open circuit of the DPF intermediate temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-329.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF intermediate temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF intermediate temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF intermediate temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF intermediate temperature sensor. * For details on the diagnosis method and procedure, see P5-329.

P1435: DPF intermediate temperature sensor fault (Low voltage)

P code	P1435	Name	DPF intermediate temperature sensor fault (Low voltage)
SPN/FMI	00CB2/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness DPF intermediate temperature sensor ECU

● Actions when a malfunction occurs

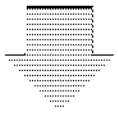
Fault mode	[Limited operation]: The engine operation is limited by setting the DPF intermediate temperature to the default value 350 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

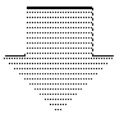
1. Poor connection of the connector
2. Wiring failure of the wire harness
   • GND short circuit of the sensor signal wire
3. DPF intermediate temperature sensor fault
   • Sensor output failure caused by a GND short circuit of the DPF intermediate temperature sensor internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-329.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the DPF intermediate temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the DPF intermediate temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the DPF intermediate temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the DPF intermediate temperature sensor. * For details on the diagnosis method and procedure, see P5-329.

P0420: DPF intermediate temperature sensor temperature abnormal low temperature

P code	P0420	Name	DPF intermediate temperature sensor temperature abnormal low temperature
SPN/FMI	00CB2/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. DPF regeneration defect timer is more than the constant value (1200 s).	Connector Wire harness DPF intermediate temperature sensor system ECU Injector DOC Piping

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF intermediate temperature sensor system fault
4. ECU internal circuit fault
5. DOC deterioration due to the external factor such as sulfur poisoning
   • Increase in activated temperature
6. Blow by combustion gas
   • Catalytic damage
   • Piping damage in the passage to DOC
7. Injector defect
   • Decrease in injection quantity
   • Injection timing malfunction

P1426: DPF intermediate temperature sensor temperature abnormal high (post-injection failure)

P code	P1426	Name	DPF intermediate temperature sensor temperature abnormal high (post-injection failure)
SPN/FMI	00CB2/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Regeneration is active. 2. The DPF intermediate temperature 700 deg. or more is continued for a given period of time (30 s).	

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. DPF intermediate temperature sensor system fault
4. ECU internal circuit fault
5. Injector defect
   - Increase in injection quantity
   - Injection timing malfunction

■ Atmospheric pressure sensor

P2229: Atmospheric pressure sensor fault (High voltage)

P code	P2229	Name	Atmospheric pressure sensor fault (High voltage)
SPN/FMI	0006C/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Atmospheric pressure sensor ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited by setting the atmospheric pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ECU internal atmospheric pressure sensor fault
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.

P2228: Atmospheric pressure sensor fault (Low voltage)

P code	P2228	Name	Atmospheric pressure sensor fault (Low voltage)
SPN/FMI	0006C/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Atmospheric pressure sensor ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited by setting the atmospheric pressure to the default value 900 hPa.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ECU internal atmospheric pressure sensor fault
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.

P1231: Atmospheric pressure sensor characteristic fault

P code	P1231	Name	Atmospheric pressure sensor characteristic fault
SPN/FMI	0006C/10		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. 2. The intake manifold pressure final offset quantity 5 kPa or more and the exhaust manifold pressure final offset quantity 5 kPa or more continue for 600 ms.	Atmospheric pressure sensor ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

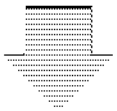
● Presumed cause of the malfunction or the abnormal condition

1. ECU internal atmospheric pressure sensor fault
2. ECU internal circuit fault
3. ∗ Simultaneous characteristic malfunction of EGR high pressure side sensor and low pressure side sensor
4. Blockage or icing caused by foreign matters in the sensor parts

∗ This error can be detected by the simultaneous characteristic malfunction of EGR high pressure side sensor and low pressure side sensor. However, the possibility of the occurrence of the characteristic malfunction at the same time is low. So, if the error is not released after replacing the ECU, perform failure diagnosis on EGR high pressure side sensor and EGR low pressure side sensor, respectively.

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.



2. Diagnosis for EGR high pressure side sensor and low pressure side sensor	• Check the sensor resistance value. • Check the conduction of the wire harness. • Check the sensor output voltage. * For details on the diagnosis method and procedure, see P5-386.

■ EGR gas temperature sensor

P041D: EGR gas temperature sensor fault (High voltage)

P code	P041D	Name	EGR gas temperature sensor fault (High voltage)
SPN/FMI	0019C/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness EGR gas temperature sensor ECU

● Actions when a malfunction occurs

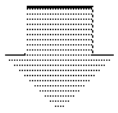
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR gas temperature to the default value 30 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

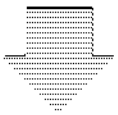
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR gas temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-334.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR gas temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the EGR gas temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the EGR gas temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the EGR gas temperature sensor. * For details on the diagnosis method and procedure, see P5-334.

P041C: EGR gas temperature sensor fault (Low voltage)

P code	P041C	Name	EGR gas temperature sensor fault (Low voltage)
SPN/FMI	0019C/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness EGR gas temperature sensor ECU

● Actions when a malfunction occurs

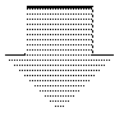
Fault mode	[Limited operation]: The engine operation is limited by setting the EGR gas temperature to the default value 30 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

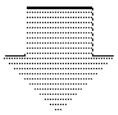
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. EGR gas temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-334.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR gas temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the EGR gas temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the EGR gas temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the EGR gas temperature sensor. * For details on the diagnosis method and procedure, see P5-334.

■ Intake manifold temperature sensor

P040D: Intake manifold temperature sensor fault (High voltage)

P code	P040D	Name	Intake manifold temperature sensor fault (High voltage)
SPN/FMI	00069/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness Intake manifold temperature sensor ECU

● Actions when a malfunction occurs

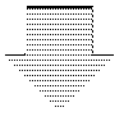
Fault mode	[Limited operation]: The engine operation is limited by setting the intake air temperature to the default value 100 °C (200 °C in the case with turbo).
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

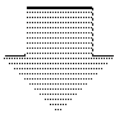
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Intake manifold temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-338.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the intake manifold temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the intake manifold temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the intake manifold temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the intake manifold temperature sensor. * For details on the diagnosis method and procedure, see P5-338.

P040C: Intake manifold temperature sensor fault (Low voltage)

P code	P040C	Name	Intake manifold temperature sensor fault (Low voltage)
SPN/FMI	00069/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness Intake manifold temperature sensor ECU

● Actions when a malfunction occurs

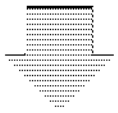
Fault mode	[Limited operation]: The engine operation is limited by setting the intake air temperature to the default value 100 °C (200 °C in the case with turbo).
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • The calculation by DPF differential pressure on PM deposit amount terminates. • The reset of ash accumulation value is prohibited. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

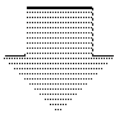
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Intake manifold temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-338.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the intake manifold temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the intake manifold temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the intake manifold temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the intake manifold temperature sensor. * For details on the diagnosis method and procedure, see P5-338.

■ Exhaust manifold temperature sensor

P0546: Exhaust manifold temperature sensor fault (High voltage)

P code	P0546	Name	Exhaust manifold temperature sensor fault (High voltage)
SPN/FMI	000AD/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is above 4.8 V.	Connector Wire harness Exhaust manifold temperature sensor ECU

● Actions when a malfunction occurs

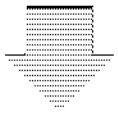
Fault mode	[Limited operation]: The engine operation is limited by setting the exhaust temperature to the default value of 550 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

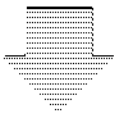
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Exhaust manifold temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-342.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the exhaust manifold temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the exhaust manifold temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the exhaust manifold temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the exhaust manifold temperature sensor. * For details on the diagnosis method and procedure, see P5-342.

P0545: Exhaust manifold temperature sensor fault (Low voltage)

P code	P0545	Name	Exhaust manifold temperature sensor fault (Low voltage)
SPN/FMI	000AD/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No judgment is made during the engine start recognition. 2. The sensor voltage is below 0.2 V.	Connector Wire harness Exhaust manifold temperature sensor ECU

● Actions when a malfunction occurs

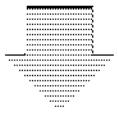
Fault mode	[Limited operation]: The engine operation is limited by setting the exhaust temperature to the default value of 550 °C.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The reset of ash accumulation value is prohibited. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

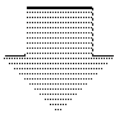
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Exhaust manifold temperature sensor fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the sensor voltage value. * For details on the diagnosis method and procedure, see P5-342.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the exhaust manifold temperature sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the exhaust manifold temperature sensor wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the resistance value of the exhaust manifold temperature sensor. • Check the conduction of the wire harness. • Check the output voltage of the exhaust manifold temperature sensor. * For details on the diagnosis method and procedure, see P5-342.

Contact output related

■ Main relay

P068B: Main relay contact stuck

P code	P068B	Name	Main relay contact stuck
SPN/FMI	005CD/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. A judgment is made when the ECU is shut off. 2. The main relay does not open after the elapse of 150 ms at the time of shutting off the ECU.	Connector Wire harness Main relay ECU

● Actions when a malfunction occurs

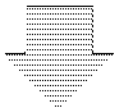
Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

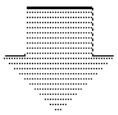
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - GND short circuit of the main relay coil side downstream wire
3. Main relay contact fault
   - Main relay contact stuck
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check whether you can log in to the SMART ASSIST-Direct (SA-D) after turning off the power switch and the elapse of a given period of time. * For details on the diagnosis method and procedure, see P5-346.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the main relay connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the main relay wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the main relay contact. • Check the main relay resistance value. • Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-346.

P068A: Main relay early opening

P code	P068A	Name	Main relay early opening
SPN/FMI	005CD/2		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Judgment is made when the ECU is initialized. 2. ECU power shutdown without performing the after run (EEPROM write process after turning off the key switch).	Connector Wire harness Main relay ECU

● Actions when a malfunction occurs

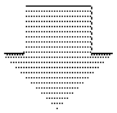
Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

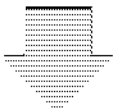
1. Poor connection of the connector
2. Wiring failure of the wire harness
   - GND short circuit of the main relay coil side downstream wire
3. Main relay contact fault
   - Main relay contact stuck
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the main relay connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the main relay wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the main relay contact. • Check the main relay resistance value. • Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-346.

■ Startup assist relay

P0543: Startup assist relay interrupted

P code	P0543	Name	Startup assist relay interrupted
SPN/FMI	7F803/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Current is OFF in the startup assist relay. 2. IC open circuit inside the ECU is detected.	Connector Wire harness Startup assist relay ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

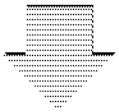
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Open circuit of startup assist relay power
   - Power short circuit of startup assist relay power
3. Startup assist relay fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-350.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the startup assist relay for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the startup assist relay wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the startup assist relay resistance value. • Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-350.

P0541: Startup assist relay GND interrupted

P code	P0541	Name	Startup assist relay GND interrupted
SPN/FMI	7F803/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Current is OFF in the startup assist relay. 2. IC open circuit inside the ECU is detected.	Connector Wire harness Startup assist relay ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

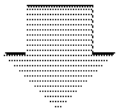
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - GND short circuit of startup assist relay power
3. Startup assist relay fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-350.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the startup assist relay for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the startup assist relay wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the startup assist relay resistance value. • Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-350.

CRS (common rail system) related

■ Injector 1

P0204 (4TNV): Injector 1 open circuit (Inherent location of the injector)

P code	P0204 (4TNV)	Name	Injector 1 open circuit (Inherent location of the injector)
SPN/FMI	0028B/5 (4TNV)		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the drive circuit, the detection is made as an open circuit of the high side or low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

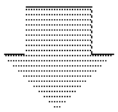
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system open circuit
3. ECU internal circuit fault
4. Open circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P0271 (4TNV): Injector 1 coil short circuit

P code	P0271 (4TNV)	Name	Injector 1 coil short circuit
SPN/FMI	0028B/6 (4TNV)		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the injector coil, the detection is made as a short circuit of the high side and low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

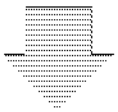
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P1271 (4TNV): Injector 1 short circuit

P code	P1271 (4TNV)	Name	Injector 1 short circuit
SPN/FMI	0028B/3 (4TNV)		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. + B short circuit in the low side is detected in the drive circuit.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

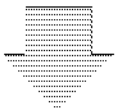
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

■ Injector 2

P0202: Injector 2 open circuit (Inherent location of the injector)

P code	P0202	Name	Injector 2 open circuit (Inherent location of the injector)
SPN/FMI	0028D/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the TWV drive circuit, the detection is made as an open circuit of the high side or low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

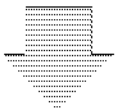
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system open circuit
3. ECU internal circuit fault
4. Open circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P0265: Injector 2 coil short circuit

P code	P0265	Name	Injector 2 coil short circuit
SPN/FMI	0028D/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the injector coil, the detection is made as a short circuit of the high side and low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

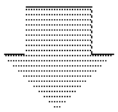
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P1265: Injector 2 short circuit

P code	P1265	Name	Injector 2 short circuit
SPN/FMI	0028D/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. + B short circuit in the low side is detected in the drive circuit.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

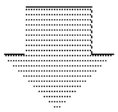
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

■ Injector 3

P0201: Injector 3 open circuit (Inherent location of the injector)

P code	P0201	Name	Injector 3 open circuit (Inherent location of the injector)
SPN/FMI	0028E/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the drive circuit, the detection is made as an open circuit of the high side or low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

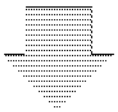
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system open circuit
3. ECU internal circuit fault
4. Open circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P0262: Injector 3 coil short circuit

P code	P0262	Name	Injector 3 coil short circuit
SPN/FMI	0028E/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the injector coil, the detection is made as a short circuit of the high side and low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

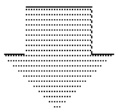
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P1262: Injector 3 short circuit

P code	P1262	Name	Injector 3 short circuit
SPN/FMI	0028E/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. + B short circuit in the low side is detected in the drive circuit.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

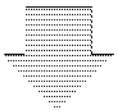
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

■ Injector 4

P0203: Injector 4 open circuit (Inherent location of the injector)

P code	P0203	Name	Injector 4 open circuit (Inherent location of the injector)
SPN/FMI	0028C/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the drive circuit, the detection is made as an open circuit of the high side or low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

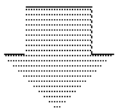
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system open circuit
3. ECU internal circuit fault
4. Open circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P0268: Injector 4 coil short circuit

P code	P0268	Name	Injector 4 coil short circuit
SPN/FMI	0028C/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the injector coil, the detection is made as a short circuit of the high side and low side.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

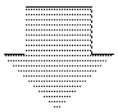
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-358.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-358.

P1268: Injector 4 short circuit

P code	P1268	Name	Injector 4 short circuit
SPN/FMI	0028C/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. + B short circuit in the low side is detected in the drive circuit.	Connector Wire harness ECU Injector

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The fuel injection of failed cylinder terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

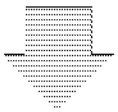
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Injector drive system short circuit
3. ECU internal circuit fault
4. Short circuit of the injector internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

■ Injector (common)

P0611: Injector drive IC error

P code	P0611	Name	Injector drive IC error
SPN/FMI	010A1/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. ECU detects the drive IC fault.	

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The failed bank injection terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

P1146: Injector drive circuit (Bank1) short circuit

P code	P1146	Name	Injector drive circuit (Bank1) short circuit
SPN/FMI	00AFD/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the drive circuit, the detection is made as a GND short circuit of the high side or low side, or +B short circuit of the high side.	Connector Wire harness Injector ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The failed bank injection terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

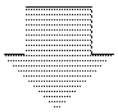
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Power short circuit of the high side of the injector bank1
   - GND short circuit of the high side of the injector bank1
   - Power short circuit of the low side of the injector bank1
   - GND short circuit of the low side of the injector bank1
3. Injector fault by power short circuit
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

P1149: Injector drive circuit (Bank2) short circuit

P code	P1149	Name	Injector drive circuit (Bank2) short circuit
SPN/FMI	00AEE/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Cam/crank pulse is detected. 2. In the drive circuit, the detection is made as a GND short circuit of the high side or low side, or +B short circuit of the high side.	Connector Wire harness Injector ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The failed bank injection terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

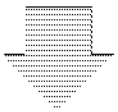
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Power short circuit of the high side of the injector bank2
   - GND short circuit of the high side of the injector bank2
   - Power short circuit of the low side of the injector bank2
   - GND short circuit of the low side of the injector bank2
3. Injector fault by power short circuit
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-362.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the injector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the injector wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the injector resistance value. * For details on the diagnosis method and procedure, see P5-362.

P1648: IQA corrected injection amount for injector 1 error

P code	P1648	Name	IQA corrected injection amount for injector 1 error
SPN/FMI	7FCC6/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During EEPROM initialization or value input. 2. The injector corrected value is not or mistakenly entered, and the EEPROM cannot be read.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Input failure of the injector correction value
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. Input the injector correction value again. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1649: IQA corrected injection amount for injector 2 error

P code	P1649	Name	IQA corrected injection amount for injector 2 error
SPN/FMI	7FCC7/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During EEPROM initialization or value input. 2. The injector corrected value is not or mistakenly entered, and the EEPROM cannot be read.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Input failure of the injector correction value
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. Input the injector correction value again. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1650: IQA corrected injection amount for injector 3 error

P code	P1650	Name	IQA corrected injection amount for injector 3 error
SPN/FMI	7FCC8/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During EEPROM initialization or value input. 2. The injector corrected value is not or mistakenly entered, and the EEPROM cannot be read.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Input failure of the injector correction value
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. Input the injector correction value again. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1651: IQA corrected injection amount for injector 4 error

P code	P1651	Name	IQA corrected injection amount for injector 4 error
SPN/FMI	7FCC9/13		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During EEPROM initialization or value input. 2. The injector corrected value is not or mistakenly entered, and the EEPROM cannot be read.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Input failure of the injector correction value
2. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. Input the injector correction value again. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

■ SCV (MPROP)

P1641: High-pressure pump drive circuit (Low side VB short-circuit)

P code	P1641	Name	High-pressure pump drive circuit (Low side VB short-circuit)
SPN/FMI	7F94B/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The low side VB short circuit in the high pressure pump drive circuit continues for a given period of time (300 s).	Connector Wire harness Injector ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Power short circuit of the SCV (MPROP) low side
3. SCV (MPROP) fault by the power short circuit
4. ECU internal circuit fault

P1643: High-pressure pump drive circuit (Low side GND short-circuit)

P code	P1643	Name	High-pressure pump drive circuit (Low side GND short-circuit)
SPN/FMI	7F94B/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. GND short-circuit continues for fixed number of tests (5 times) at a fixed interval (1.0 seconds).	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

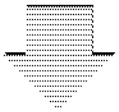
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • GND short circuit of the low side wiring of SCV (MPROP)
3. SCV (MPROP) low side GND short circuit
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-364.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) wiring is shorted to the ground line or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the SCV (MPROP) resistance value. * For details on the diagnosis method and procedure, see P5-364.

P0629: High-pressure pump drive circuit (High side VB short-circuit)

P code	P0629	Name	High-pressure pump drive circuit (High side VB short-circuit)
SPN/FMI	00279/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. VB short-circuit continues for a fixed time (300 ms).	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

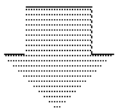
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Power short circuit of SCV (+) output
   - Power short circuit of SVC (-) output
3. SCV fault caused by a coil short circuit
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-364.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the power switch. • Check the pin of the SCV for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the SCV resistance value. * For details on the diagnosis method and procedure, see P5-364.

P1642: High-pressure pump drive circuit (High side GND short-circuit)

P code	P1642	Name	High-pressure pump drive circuit (High side GND short-circuit)
SPN/FMI	00279/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. GND short-circuit continues for fixed number of tests (5 times) at a fixed interval (1.0 seconds).	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Power short circuit of the SCV (MPROP) high side
3. SCV (MPROP) fault by the power short circuit
4. ECU internal circuit fault

P0627: High-pressure pump drive circuit (Open circuit)

P code	P0627	Name	High-pressure pump drive circuit (Open circuit)
SPN/FMI	00279/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The high pressure pump drive circuit detects the open circuit.	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • SCV (MPROP) open circuit
3. SCV (MPROP) fault by the open circuit
4. ECU internal circuit fault

P062A: High-pressure pump drive circuit (Drive current (high level))

P code	P062A	Name	High-pressure pump drive circuit (Drive current (high level))
SPN/FMI	7F94C/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The drive current is greater than threshold value.	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

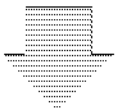
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. SCV (MPROP) fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-364.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the SCV (MPROP) resistance value. * For details on the diagnosis method and procedure, see P5-364.

P1645: High-pressure pump drive circuit (Pump overload error)

P code	P1645	Name	High-pressure pump drive circuit (Pump overload error)
SPN/FMI	7F94C/11		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Abnormal heating in drive circuit is detected.	Connector Wire harness SCV (MPROP) ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

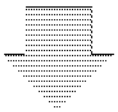
● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
3. SCV (MPROP) fault
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-364.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the SCV (MPROP) resistance value. * For details on the diagnosis method and procedure, see P5-364.

■ Abnormal rail pressure

P0088: Actual rail pressure rise error

P code	P0088	Name	Actual rail pressure rise error
SPN/FMI	0009D/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. When the specified time (5 s) is continued with the rail pressure 170 MPa or more.	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

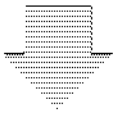
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

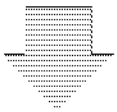
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV stuck open
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P0094: Rail pressure deviation error during the actual rail pressure drop

P code	P0094	Name	Rail pressure deviation error during the actual rail pressure drop
SPN/FMI	0009D/18		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The actual rail pressure is smaller than the target rail pressure and the difference of 20 MPa or more is continued for a given period of time (3 s).	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

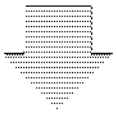
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

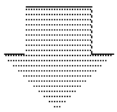
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV closed sticking
5. SCV intermittent fault
6. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P0093: Rail pressure deviation error during the actual rail pressure rise

P code	P0093	Name	Rail pressure deviation error during the actual rail pressure rise
SPN/FMI	0009D/15		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The actual rail pressure is larger than the target rail pressure and the difference of 20 MPa or more is continued for a given period of time (5 s).	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

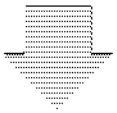
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

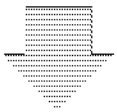
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

■ PLV (Common rail pressure limit valve)

P000F: PLV open valve

P code	P000F	Name	PLV open valve
SPN/FMI	0009D/16		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Common rail pressure limit valve opens.	Fuel system Supply pump

● Actions when a malfunction occurs

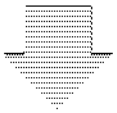
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

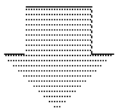
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P1666: Rail pressure fault (The times of PLV valve opening error)

P code	P1666	Name	Rail pressure fault (The times of PLV valve opening error)
SPN/FMI	7FCCD/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The opening times of the pressure control valve of common rail exceeds 50.	Fuel system Supply pump Rail pressure sensor ECU

● Actions when a malfunction occurs

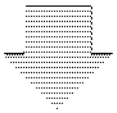
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

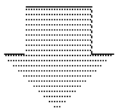
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. Exchange the PLV. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P1667: Rail pressure fault (The time of PLV valve opening error)

P code	P1667	Name	Rail pressure fault (The time of PLV valve opening error)
SPN/FMI	7FCCE/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The cumulative opening time of the pressure control valve of common rail exceeds 5 hours.	Fuel system Supply pump Rail pressure sensor ECU

● Actions when a malfunction occurs

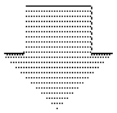
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

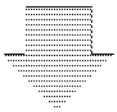
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. Exchange the PLV. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P1668: Rail pressure fault (The actual rail pressure is too high during PRV limp home)

P code	P1668	Name	Rail pressure fault (The actual rail pressure is too high during PRV limp home)
SPN/FMI	7FCE1/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The pressure control valve of common rail fails to open when abnormally high pressure of common rail occurred (rail pressure of 160 MPa or higher continues for 10 seconds or longer).	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

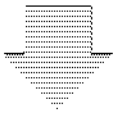
Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

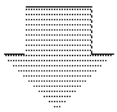
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P1665: Rail pressure fault (Controlled rail pressure error after PLV valve opening)

P code	P1665	Name	Rail pressure fault (Controlled rail pressure error after PLV valve opening)
SPN/FMI	7FCCC/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. Rail pressure deviates from the range from 50 to 120 MPa after common rail pressure control valve is opened.	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

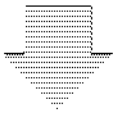
Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

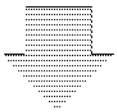
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

■ Rail pressure control

P1669: Rail pressure fault (Injector B/F temperature error during PLV4 limp home)

P code	P1669	Name	Rail pressure fault (Injector B/F temperature error during PLV4 limp home)
SPN/FMI	7FCE3/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. The fuel temperature exceeds 80 °C after common rail pressure control valve is opened.	Fuel system Supply pump Rail pressure sensor

● Actions when a malfunction occurs

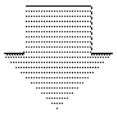
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • The DPF regeneration terminates. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

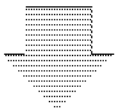
1. Rail pressure sensor system failure
2. SCV drive circuit system failure
3. SCV open sticking
4. SCV intermittent fault
5. Fuel system failure
   - Air intrusion
   - Insufficient gas

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the SCV (MPROP) and the rail pressure sensor for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the SCV (MPROP) and the rail pressure sensor wiring is disconnected or shorted to the power/ground line, or the wiring coating is peeled.



3. Failure diagnosis	• Check the fuel system, common rail system, and supply pump. • If needed, exchange the parts of the fuel system or common rail system, supply pump.

P1670: Rail pressure fault (Operation time error during RPS limp home)

P code	P1670	Name	Rail pressure fault (Operation time error during RPS limp home)
SPN/FMI	7FCC4/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Rail pressure sensor is normal. 2. Either of the following is true. • The rail pressure sensor and the high-pressure pump drive circuit (MPROP) are abnormal. • The rail pressure sensor is abnormal.	Connector Wire harness SCV (MPROP) ECU

5

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Rail pressure sensor failure or that wiring failure
2. SCV failure or that wiring failure
3. Fuel temperature sensor failure or that wiring failure

● Diagnosis

• Refer to "Rail pressure sensor fault (high voltage) or (low voltage)"
• Refer to "SCV(MPROP) fault"

Actuator

■ Intake throttle drive circuit

P0660: No-load of throttle valve drive H bridge circuit

P code	P0660	Name	No-load of throttle valve drive H bridge circuit
SPN/FMI	00B86/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. No-load (open circuit) of drive circuit is detected.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - High side open circuit of the intake throttle drive circuit
   - Low side open circuit of the intake throttle drive circuit
3. Intake throttle fault due to open circuit
4. ECU internal circuit fault

P1658: Power short circuit of throttle valve drive H bridge output 1

P code	P1658	Name	Power short circuit of throttle valve drive H bridge output 1
SPN/FMI	00B86/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Output terminal 1 of drive circuit is VB short circuit.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • High side power short circuit of the intake throttle drive circuit
3. Intake throttle fault due to open circuit
4. ECU internal circuit fault

P1659: GND short circuit of throttle valve drive H bridge output 1

P code	P1659	Name	GND short circuit of throttle valve drive H bridge output 1
SPN/FMI	00B86/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Output terminal 1 of drive circuit is GND short circuit.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • High side GND short circuit of the intake throttle drive circuit
3. Intake throttle fault due to GND short circuit
4. ECU internal circuit fault

P1660: Overload on the drive H bridge circuit of throttle valve

P code	P1660	Name	Overload on the drive H bridge circuit of throttle valve
SPN/FMI	00B86/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The component temperature of the drive circuit exceeds the threshold value.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Insulation failure of the connector
2. Wiring failure of the wire harness
   - High side short circuit of the intake throttle drive circuit
   - Low side short circuit of the intake throttle drive circuit
3. Intake throttle fault due to short circuit
4. ECU internal circuit fault

P1661: VB Power short circuit of throttle valve drive H bridge output 2

P code	P1661	Name	VB Power short circuit of throttle valve drive H bridge output 2
SPN/FMI	00B87/3		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Output terminal 2 of drive circuit is VB short circuit.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Low side power short circuit of the intake throttle drive circuit
3. Intake throttle fault due to power short circuit
4. ECU internal circuit fault

P1662: GND short circuit of throttle valve drive H bridge output 2

P code	P1662	Name	GND short circuit of throttle valve drive H bridge output 2
SPN/FMI	00B87/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Output terminal 2 of drive circuit is GND short circuit.	Connector Wire harness Intake throttle ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • The air Intake throttle is fully opened. • The DPF regeneration terminates. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   • Low side GND short circuit of the intake throttle drive circuit
3. Intake throttle fault due to GND short circuit
4. ECU internal circuit fault

■ EGR

P0404: EGR over-voltage fault

P code	P0404	Name	EGR over-voltage fault
SPN/FMI	00B87/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Supply voltage to EGR is detected for more than 18 V for 5 seconds. 2. Supply voltage to EGR valve is more than 18 V for more than 5 seconds.	Battery EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Overcharge of the battery
2. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Failure diagnosis	• Check the conduction of the wire harness. • Check the battery voltage.

P1404: EGR under-voltage fault

P code	P1404	Name	EGR under-voltage fault
SPN/FMI	00AE7/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Supply voltage to EGR is detected for less than 8 V for 13 seconds. 2. Supply voltage to EGR valve is less than 8 V for more than 13 seconds.	Wire harness Battery EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Deterioration of the battery
2. Power wire short-circuit of the EGR valve
3. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Failure diagnosis	• Check the conduction of the wire harness. • Check the battery voltage.

P1409: EGR feedback malfunction

P code	P1409	Name	EGR feedback malfunction
SPN/FMI	00AE7/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Drive duty at 95 % is continued for 3 sec. 2. Motor drive duty at the excessive condition is continued for a give period of time.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

U0401: EGR ECM data fault

P code	U0401	Name	EGR ECM data fault
SPN/FMI	00AE7/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Transmission signal from ECU to ERG is lost for more than 1 second. 2. Instruction packet cut-off from ECU is detected.	EGR valve

● Actions when a malfunction occurs

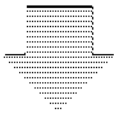
Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

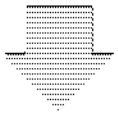
1. Poor connection of the connector
2. Wiring failure of the wire harness
3. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the EGR valve for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the EGR valve or EGR valve relay wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or EGR valve.

P0403: Open circuit between the EGR motor coils

P code	P0403	Name	Open circuit between the EGR motor coils
SPN/FMI	00AE7/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Open circuit is detected in one of the phases of UVW. 2. Open circuit condition with the motor is detected.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. DC motor failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P1405: Short circuit between the EGR motor coils

P code	P1405	Name	Short circuit between the EGR motor coils
SPN/FMI	7F953/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Overcurrent 18 A is detected. The energization is stopped after the detection and the energization starts again after 1 sec. Malfunction is notified after it is detected for 3 times. 2. Overcurrent between the motor coils caused by short circuit is detected.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. DC motor failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P0488: EGR position sensor malfunction

P code	P0488	Name	EGR position sensor malfunction
SPN/FMI	7F954/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Signal output is excessive or dropped. 2. Excessive or dropped position sensor signal voltage is detected.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P148A: EGR stuck open valve malfunction

P code	P148A	Name	EGR stuck open valve malfunction
SPN/FMI	7F955/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. There are 45 steps or more in the stopper all closed position and the open valve starting point at the time of initialization. 2. The number of steps between all opening and all closed at the time of initialization is fault.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Sticking of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P049D: EGR initialization malfunction

P code	P049D	Name	EGR initialization malfunction
SPN/FMI	7F956/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Output signal of position sensor does not change in 64 ms or 128 ms or continuously changes in 1.6 sec or more. 2. The completion time of initialization exceeds the specified range.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Internal circuit failure of the EGR valve
2. Malfunction of the EGR valve
3. Sticking of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

U1401: EGR target value out of range

P code	U1401	Name	EGR target value out of range
SPN/FMI	7F979/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The target position information from ECU is out of range for 10 - 40 hours. 2. The direction opening from ECU is out of range for a given period of time.	EGR valve ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ECU software fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P1410: EGR high temperature thermistor malfunction

P code	P1410	Name	EGR high temperature thermistor malfunction
SPN/FMI	7F957/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Thermistor output at 0.2 V or below is continued for 3 sec or more. 2. The high temperature side thermistor inside the control unit is below 0.2 V.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

P1411: EGR low temperature thermistor malfunction

P code	P1411	Name	EGR low temperature thermistor malfunction
SPN/FMI	7F958/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. Thermistor output at 0.2 V or below is continued for 3 sec or more. 2. The low temperature side thermistor inside the control unit is below 0.2 V.	EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the EGR valve.

■ Exhaust throttle

P1438: Exhaust throttle (Voltage fault)

P code	P1438	Name	Exhaust throttle (Voltage fault)
SPN/FMI	7F9FA/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When the power supply voltage becomes either of the following: • The situation that the detected voltage is less than or equal to 6 V continues for 10 seconds. • The situation that the detected voltage is greater than or equal to 16 V continues for 1 second.	

● Actions when a malfunction occurs

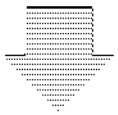
Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the battery
2. Internal circuit failure of the EGR valve

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication".



2. Failure diagnosis	• Check the conduction of the wire harness. • Check the battery voltage.

P1439: Exhaust throttle (Motor fault)

P code	P1439	Name	Exhaust throttle (Motor fault)
SPN/FMI	7F9FB/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When any of the following is true: • For every calculation cycle (5 ms) of control, The situation that IPD DIAG output is equal to Low Edge input is detected for more than 4 times or 2 times consecutively. • In a 4 ms cycle, The situation of high-level output of IPD is detected for 10 times consecutively. • Full-close learning voltage is greater than or equal to 0.295, and less than or equal to 0.803. • Full-open learning voltage is greater than or equal to 4.070, and less than or equal to 4.578. • The situation that motor drive duty is greater than ±90 % continues for 10 seconds.	

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

● Diagnosis

P1440: Exhaust throttle (Sensor system fault)

P code	P1440	Name	Exhaust throttle (Sensor system fault)
SPN/FMI	7F9FC/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When any of the following is true: • The situation that the TPS supply voltage is less than or equal to 4.496 V continues for 100 ms. • The situation that the TPS supply voltage is greater than or equal to 5.501 V continues for 100 ms. • The situation that TPS is less than or equal to 0.295 V continues for 100 ms. • The situation that TPS is greater than or equal to 4.578 V continues for 100 ms. • The situation that the current position is less than or equal to (target value - 20AD) or the current position is greater than or equal to (target value - 20AD) continues for 10 seconds.	

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

● Diagnosis

P1441: Exhaust throttle (MPU fault)

P code	P1441	Name	Exhaust throttle (MPU fault)
SPN/FMI	7F9FD/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When any of the following is true: • ALU is abnormal. • Mismatch in the checksum value of the ROM area used. • The values written in and read by RAM don't match. • Register is abnormal. • ADC is abnormal. • Status is abnormal. • WDT is abnormal.	

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

● Diagnosis

P1442: Exhaust throttle (PCB fault)

P code	P1442	Name	Exhaust throttle (PCB fault)
SPN/FMI	7F9FE/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When any of the following is true: • The ambient temperature thermistor is greater than or equal to 160 °C and it continues for 100 ms. • The ambient temperature thermistor is less than or equal to 50 °C and it continues for 100 ms.	

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

● Diagnosis

P1443: Exhaust throttle (CAN fault)

P code	P1443	Name	Exhaust throttle (CAN fault)
SPN/FMI	7F9FF/19		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When any of the following is true: • An initialization error of A CAN controller is detected. • Any of the following is detected for 125 times. • A CAN BusOff error is detected. • A CAN CheckSum Diag error is detected. • A CAN Reliability error is detected. • A CAN Err Passive error is detected. • A CAN reception time-out is detected. • A CAN ACK error is detected.	

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

● Diagnosis

Communication related

■ CAN1

U010B: CAN1 (for EGR): Reception time out

P code	U010B	Name	CAN1 (for EGR): Reception time out
SPN/FMI	7F972/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	ECU Connector Wire harness EGR valve

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Open-circuit or short-circuit of the wire harness
3. ECU internal circuit fault
4. EGR valve internal circuit fault

U1107: Exhaust throttle (CAN message from the exhaust throttle time out)

P code	U1107	Name	Exhaust throttle (CAN message from the exhaust throttle time out)
SPN/FMI	7F973/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. 2 seconds after the key switch was turned ON. 2. No.	ECU Connector Wire harness Exhaust throttle

● Actions when a malfunction occurs

Fault mode	
Limited operation	
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Open-circuit or short-circuit of the wire harness
3. ECU internal circuit fault
4. Exhaust throttle internal circuit fault

■ CAN2

U0292: TSC1 (CAN message) reception time out (SA1)

P code	U0292	Name	TSC1 (CAN message) reception time out (SA1)
SPN/FMI	7F964/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • TSC1 message reception recoveries.
Remarks	

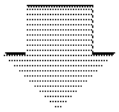
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1301: TSC1 (CAN message) reception time out (SA2)

P code	U1301	Name	TSC1 (CAN message) reception time out (SA2)
SPN/FMI	7F965/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

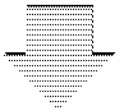
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1292: Y_ECR1 (CAN message) reception time out

P code	U1292	Name	Y_EGR1 (CAN message) reception time out
SPN/FMI	7F967/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • Y_ECR1 message reception recoveries.
Remarks	

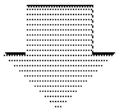
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1293: Y_EC (CAN message) reception time out

P code	U1293	Name	Y_EC (CAN message) reception time out
SPN/FMI	7F968/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • Y_EC message reception recoveries.
Remarks	

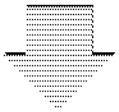
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1294: Y_RSS (CAN message) reception time out

P code	U1294	Name	Y_RSS (CAN message) reception time out
SPN/FMI	7F969/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • Y_RSS message reception recoveries.
Remarks	

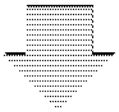
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1300: Y_ETCP1 (CAN message) reception time out

P code	U1300	Name	Y_ETCP1 (CAN message) reception time out
SPN/FMI	7F971/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • Y_ETCP1 message reception recoveries.
Remarks	

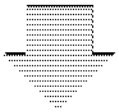
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1302: EBC1 (CAN message) reception time out

P code	U1302	Name	EBC1 (CAN message) reception time out
SPN/FMI	7F97A/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • 2 seconds passes after the key switch was turned ON. • Not in cranking status. • ECU power is not OFF. • Voltage value is 10 V or higher. 2. A fixed time passes after a reception time out was detected for certain times. Count resets after normal communication.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: • ECU power OFF. • EBC1 message reception recoveries.
Remarks	

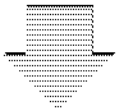
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

U1303: Y_DPFIF (CAN message) reception time out

P code	U1303	Name	Y_DPFIF (CAN message) reception time out
SPN/FMI	7F97B/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The following conditions are all true: • Key switch is ON. • Not in cranking status. • Battery voltage is 10 V or higher. 2. A reception time out is detected at a fixed time.	Connector Wire harness Controller of machine side ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The following operations are selectable by application settings. • ECU power OFF. • Y_DPFIF message reception recoveries.
Remarks	

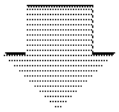
● Presumed cause of the malfunction or the abnormal condition

1. CAN communication error of the machine side controller
2. Poor connection of the connector
3. Open-circuit or short-circuit of the wire harness
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. * For details on the diagnosis method and procedure, see P5-378.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the CAN communication connector for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the wiring of CAN communication connector is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. * For details on the diagnosis method and procedure, see P5-378.

ECU related

■ EEPROM

P0601: EEPROM memory deletion error

P code	P0601	Name	EEPROM memory deletion error
SPN/FMI	00276/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. When page (sector) switches. 2. EEPROM deletion malfunctions. The EEPROM has two pages and uses them alternately. When the first page becomes full, the second page will be cleared for writing into. Similarly, when the second page becomes full, the first page will be cleared for writing into. This error occurs when the page fails to be cleared during page switching.	ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.

P160E: EEPROM memory read error

P code	P160E	Name	EEPROM memory read error
SPN/FMI	7F950/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. When read-accessing. 2. EEPROM reading malfunctions. This error is determined based on the check sum, and this is performed on all EEPROM.	ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.

P160F: EEPROM memory writing error

P code	P160F	Name	EEPROM memory writing error
SPN/FMI	7F952/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. When write-accessing. 2. EEPROM writing malfunctions. This error occurs when there are 3 failed attempts to write one data.	ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The EGR is fully closed. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. * For details on the diagnosis method and procedure, see P5-386.

■ ECU internal fault

P1613: CY146 SPI communication fault

P code	P1613	Name	CY146 SPI communication fault
SPN/FMI	7F959/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. A communication fault between the CPU and the H bridge control IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1608: Excessive voltage of supply 1

P code	P1608	Name	Excessive voltage of supply 1
SPN/FMI	7F95C/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The 5 V supply voltage to the actuator drive is excessive.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1617: Insufficient voltage of supply 1

P code	P1617	Name	Insufficient voltage of supply 1
SPN/FMI	7F95D/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The 5 V supply voltage to the actuator drive is insufficient.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1609: Sensor supply voltage error 1

P code	P1609	Name	Sensor supply voltage error 1
SPN/FMI	7F95E/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The 5 V supply voltage of sensor exceeds the threshold value.	Connector Wire harness ECU

● Actions when a malfunction occurs

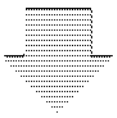
Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

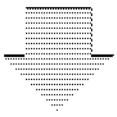
1. Poor connection of the connector of the sensor that uses sensor power supply 1(K43 or K44 terminal)
2. Wiring failure of the wire harness
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of sensor that uses sensor power supply 1 (K43 or K44 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the sensor that uses sensor power supply 1 wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1618: Sensor supply voltage error 2

P code	P1618	Name	Sensor supply voltage error 2
SPN/FMI	7F95F/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The 5 V supply voltage of sensor exceeds the threshold value.	Connector Wire harness ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector of the sensor that uses sensor power supply 2 (K45 or A08 terminal)
2. Wiring failure of the wire harness
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of sensor that uses sensor power supply 2 (K45 or A08 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the sensor that uses sensor power supply 2 wiring is disconnected or the wiring coating is peeled.

3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1619: Sensor supply voltage error 3

P code	P1619	Name	Sensor supply voltage error 3
SPN/FMI	7F95F/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The 5 V supply voltage of sensor exceeds the threshold value.	Connector Wire harness ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector of the sensor that uses sensor power supply 3 (A07 terminal)
2. Wiring failure of the wire harness
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of sensor that uses sensor power supply 3 (A07 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the sensor that uses sensor power supply 3 wiring is disconnected or the wiring coating is peeled.

3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1626: Actuator drive circuit 1 short to ground

P code	P1626	Name	Actuator drive circuit 1 short to ground
SPN/FMI	7F9F8/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The overcurrent in UB2 terminal is detected by IC in the ECU.	Connector Wire harness ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector of the actuator that uses 12 V power supply 1 (UB2: K68 terminal)
2. Wiring failure of the wire harness
   - GND short circuit of the 12 V power supply 1 (UB2: K68 terminal) wire
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the actuator that uses 12 V power supply 1 (UB2: K68 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the actuator that uses 12 V power supply 1 wiring is disconnected or the wiring coating is peeled.

3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1633: Actuator drive circuit 2 short to ground

P code	P1633	Name	Actuator drive circuit 2 short to ground
SPN/FMI	7FAF2/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The overcurrent in UB3 terminal is detected by IC in the ECU.	Connector Wire harness ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector of the actuator that uses 12 V power supply 2 (UB3: K90 or A50 terminal)
2. Wiring failure of the wire harness
   - GND short circuit of the 12 V power supply 2 (UB3: K90 or A50 terminal) wire
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.

2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the actuator that uses 12 V power supply 2 (UB3: K90 or A50 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the actuator that uses 12 V power supply 2 wiring is disconnected or the wiring coating is peeled.

3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1467: Actuator drive circuit 3 short to ground

P code	P1467	Name	Actuator drive circuit 3 short to ground
SPN/FMI	7FCCF/6		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The overcurrent in UB5 terminal is detected by IC in the ECU.	Connector Wire harness ECU

● Actions when a malfunction occurs

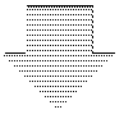
Fault mode	[Continuous operation]: Engine control is not obstructed.
Limited operation	No
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

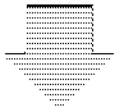
1. Poor connection of the connector of the actuator that uses 12 V power supply 3 (UB5: K73 terminal)
2. Wiring failure of the wire harness
   - GND short circuit of the 12 V power supply 3 (UB5: K73 terminal) wire
3. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the actuator that uses 12 V power supply 3 (UB5: K73 terminal) for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the actuator that uses 12 V power supply 3 wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the fault indication again. • If this DTC is detected again, exchange the harness or ECU.

P1469: AD converter fault 1

P code	P1469	Name	AD converter fault 1
SPN/FMI	7FCD1/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. A pulse error is detected through diagnosis of the AD converter.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1470: AD converter fault 2

P code	P1470	Name	AD converter fault 2
SPN/FMI	7FCD2/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. A voltage error is detected through diagnosis of the AD converter.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1471: External monitoring IC and CPU fault 1

P code	P1471	Name	External monitoring IC and CPU fault 1
SPN/FMI	7FCD3/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. An error is detected through mutual diagnosis of the external monitoring IC and the CPU.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1472: External monitoring IC and CPU fault 2

P code	P1472	Name	External monitoring IC and CPU fault 2
SPN/FMI	7FCD4/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. A communication error is detected between the external monitoring IC and the CPU.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1473: ROM fault

P code	P1473	Name	ROM fault
SPN/FMI	7FCD5/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. ECU power self-maintains after the key switch was turned OFF. 2. The checksum of the all ROM areas is abnormal.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1474: Shutoff path fault 1

P code	P1474	Name	Shutoff path fault 1
SPN/FMI	7FCD6/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. A response error from CPU to the external monitoring IC is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1475: Shutoff path fault 2

P code	P1475	Name	Shutoff path fault 2
SPN/FMI	7FCD7/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An operation error of shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1476: Shutoff path fault 3

P code	P1476	Name	Shutoff path fault 3
SPN/FMI	7FCD8/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. A response time error of shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1477: Shutoff path fault 4

P code	P1477	Name	Shutoff path fault 4
SPN/FMI	7FCD9/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. A communication error of shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1478: Shutoff path fault 5

P code	P1478	Name	Shutoff path fault 5
SPN/FMI	7FCDA/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An insufficient value of voltage in shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1479: Shutoff path fault 6

P code	P1479	Name	Shutoff path fault 6
SPN/FMI	7FCDB/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An error of the external monitoring IC in shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1480: Shutoff path fault 7

P code	P1480	Name	Shutoff path fault 7
SPN/FMI	7FCDC/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An error of OS call time in shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1481: Shutoff path fault 8

P code	P1481	Name	Shutoff path fault 8
SPN/FMI	7FCDD/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An error of positive test of shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1482: Shutoff path fault 9

P code	P1482	Name	Shutoff path fault 9
SPN/FMI	7FCDE/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An error of operation time of shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1483: Shutoff path fault 10

P code	P1483	Name	Shutoff path fault 10
SPN/FMI	7FCDF/12		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. During shutoff path test (operation diagnosis of the isolation function of injector current) by the external monitoring IC, which is implemented after turning on the ECU power. 2. An excessive value of voltage in shutoff path test is detected by the external monitoring IC.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

P1484: Recognition error of engine speed

P code	P1484	Name	Recognition error of engine speed
SPN/FMI	7FCD0/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. An error is detected through mutual diagnosis of engine speed.	ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Malfunction of the ECU internal circuit

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power on and off. • If this DTC is detected again, exchange the ECU.

■ Charge switch

P1562: Charge switch open circuit

P code	P1562	Name	Charge switch open circuit
SPN/FMI	000A7/5		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The power switch is turned on and the judgment completion criteria is incomplete. 2. The charge switch is turned off continuously for 1 sec and the judgment is formed.	Connector Wire harness Charge switch ECU

● Actions when a malfunction occurs

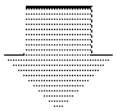
Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the charge switch is turned on. Or released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

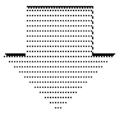
1. Poor connection of connector
2. Wiring failure of the wire harness
   • Open circuit or power short circuit of the charge switch wiring
3. Charge switch malfunction
   • Open circuit or power short circuit of the charge switch internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check whether the input signal of the charge switch is correctly recognized. * For details on the diagnosis method and procedure, see P5-354.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the charge switch for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the charge switch wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the wire harness. • Check the operation of the charge switch. * For details on the diagnosis method and procedure, see P5-354.

P1568: Charge alarm

P code	P1568	Name	Charge alarm
SPN/FMI	000A7/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite 2. The power switch is turned on and the charge switch is turned on and * (engine speed > 600 min^{-1}) continues for 10 sec after the completion of the engine start. * The CAL value allows switching between "after the completion of the engine start" and "engine speed > 600 min^{-1}".	Alternator Connector Wire harness Charge switch ECU

● Actions when a malfunction occurs

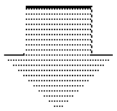
	Setting of the charge alarm operation	
	No	Yes
Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.	[Limited operation]: The engine operation is limited.
Limited operation	No	Yes: The high idle speed or the maximum injection quantity is limited. (Actions differ by the customer setting.)
Reset criteria	Yes: The fault mode is automatically released when the charge switch is turned off. Or released when the ECU power is turned off.	Yes: The fault mode is automatically released when the charge switch is turned off.
Remarks		

● Presumed cause of the malfunction or the abnormal condition

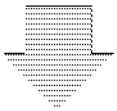
1. Battery charge malfunction
2. Alternator malfunction
3. Wiring failure of the wire harness
   • GND short circuit of the charge switch wiring
4. Charge switch malfunction
   • GND short circuit of the charge switch internal wiring
5. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check whether the input signal of the charge switch is correctly recognized. * For details on the diagnosis method and procedure, see P5-354.



2. Engine check	• Turn off the ECU power and stop the engine. • Check the engine charging equipment. • After checking, turn on the power switch and check for the DTC detection.



3. Failure diagnosis	• Check the charge switch system. * For details on the diagnosis method and procedure, see P5-354.

■ Oil pressure switch

P1192: Oil pressure switch open circuit

P code	P1192	Name	Oil pressure switch open circuit
SPN/FMI	00064/4		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The power switch is turned on and the battery voltage ≥ 9 V and the judgment completion criteria is incomplete. 2. Judged when the oil pressure SW-OFF condition continues for 1 sec.	Connector Wire harness Oil pressure switch ECU

● Actions when a malfunction occurs

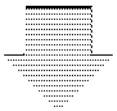
Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the oil pressure switch is turned on. Or released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

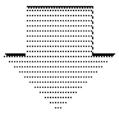
1. Poor connection of connector
2. Wiring failure of the wire harness
   • Open circuit or power short circuit of the oil pressure switch wiring
3. Oil pressure switch fault
   • Open circuit or power short circuit of the oil pressure switch internal wiring
4. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check whether the input signal is correctly recognized. * For details on the diagnosis method and procedure, see P5-354.



2. Connector/wiring check	• Before beginning your work, be sure to turn off the ECU power. • Check the pin of the oil pressure switch for deformation and cracks, the condition of the connection, and whether the retainer is loose or removed. • Check whether the oil pressure switch wiring is disconnected or the wiring coating is peeled.



3. Failure diagnosis	• Check the conduction of the oil pressure switch. • Check the conduction of the wire harness. • Check the operation of the oil pressure switch. * For details on the diagnosis method and procedure, see P5-354.

P1198: Low oil pressure fault alarm

P code	P1198	Name	Low oil pressure fault alarm
SPN/FMI	00064/1		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. The key switch is turned on ∗ and the engine speed > 600 min^{-1} after the completion of the engine start and the battery voltage is 9 V or more. 2. The oil pressure switch is turned on for a certain amount of time. ∗ The CAL value allows switching between "after the completion of the engine start" and "engine speed > 600 min^{-1}".	Oil pressure equipment Wire harness Oil pressure switch ECU

● Actions when a malfunction occurs

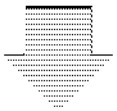
	Settings of the actions during a low oil pressure alarm	
	No	Yes
Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.	[Limited operation]: The engine operation is limited.
Limited operation	No	Yes: The high idle speed or the maximum injection quantity is limited. (Actions differ by the customer setting.)
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.	Yes: The fault mode is released when the ECU power is turned off.
Remarks		

● Presumed cause of the malfunction or the abnormal condition

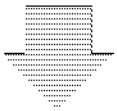
1. Oil pressure low
2. Oil pressure equipment malfunction
3. Wiring failure of the wire harness
   • GND short circuit of the oil pressure switch wiring
4. Oil pressure switch fault
   • GND short circuit of the oil pressure switch internal wiring
5. ECU internal circuit fault

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check whether the input signal is correctly recognized. * For details on the diagnosis method and procedure, see P5-354.



2. Engine check	• Turn off the ECU power and stop the engine. • Check the lubrication system. • After checking, turn on the power switch and check for the DTC detection.



3. Failure diagnosis	• Check the oil pressure switch system. * For details on the diagnosis method and procedure, see P5-354.

Post treatment control

■ DPF

P2463: Overaccumulation (Method C)

P code	P2463	Name	Overaccumulation (Method C)
SPN/FMI	7F94D/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When the transition is made to the recovery regeneration mode due to the overaccumulation judgment of PM accumulated quantity (method C).	DPF intermediate temperature sensor system

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the recovery is made from the condition in which the recovery regeneration is requested.
Remarks	When this error occurred, the "recovery regeneration standby" error is detected at the same time.

● Presumed cause of the malfunction or the abnormal condition

1. Insufficient regeneration capability due to the low operation load
2. Regeneration for the stationary regeneration request is not performed
3. * DPF intermediate temperature sensor system fault

* There are cases in which this error occurs due to the low estimation of the regeneration quantity due to "DPF intermediate temperature sensor abnormal low temperature". When this occurs at the same time, be sure to perform the failure diagnosis for "DPF intermediate temperature sensor temperature abnormal low temperature" in advance.

P1463: Overaccumulation (Method P)

P code	P1463	Name	Overaccumulation (Method P)
SPN/FMI	7F94E/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When the transition is made to the recovery regeneration mode due to the overaccumulation judgment of PM accumulated quantity (method P).	DPF differential pressure sensor system

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the recovery is made from the condition in which the recovery regeneration is requested.
Remarks	When this error occurred, the "recovery regeneration standby" error is detected at the same time.

● Presumed cause of the malfunction or the abnormal condition

1. Insufficient regeneration capability due to the low operation load
2. Regeneration for the stationary regeneration request is not performed
3. ∗ DPF differential pressure sensor fault

∗ There are cases in which this error occurs due to the high estimation of the method P regeneration quantity due to "DPF differential pressure sensor differential pressure abnormal rise". When this occurs at the same time, be sure to perform the failure diagnosis for "DPF differential pressure sensor differential pressure abnormal rise" in advance.

P2458: Regeneration defect (Stationary regeneration failure)

P code	P2458	Name	Regeneration defect (Stationary regeneration failure)
SPN/FMI	7F94F/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When the transition is made to the recovery regeneration mode due to incomplete stationary regeneration within the specified time.	DPF intermediate temperature sensor system Injector DOC

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the recovery is made from the condition in which the recovery regeneration is requested.
Remarks	When this error occurred, the "recovery regeneration standby" error is detected at the same time.

● Presumed cause of the malfunction or the abnormal condition

1. ∗ DPF intermediate temperature sensor system fault
2. DOC deterioration or DOC breakage due to the external factor such as sulfur poisoning
3. Injector defect
   - Decrease in injection quantity
   - Injection timing malfunction

∗ There are cases in which this error occurs due to the regeneration defect judgment caused by "DPF intermediate temperature sensor temperature abnormal low temperature". When this is detected at the same time, be sure to perform the failure diagnosis for "DPF intermediate temperature sensor temperature abnormal low temperature" in advance.

P2459: Regeneration defect (Stationary regeneration not performed)

P code	P2459	Name	Regeneration defect (Stationary regeneration not performed)
SPN/FMI	7F951/11		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When the transition is made to the backup mode due to the stationary regeneration not performed in the specified time during the stationary regeneration request.	Connector Wire harness Regeneration request lamp Regeneration request switch ECU

● Actions when a malfunction occurs

Fault mode	[Continuous operation]: The engine continues to operate without limitations after the malfunction is detected.
Limited operation	No
Reset criteria	Yes: The fault mode is automatically released when the recovery is made from the condition in which the recovery regeneration is requested.
Remarks	When this error occurred, the "recovery regeneration standby" error is detected at the same time.

● Presumed cause of the malfunction or the abnormal condition

1. Poor connection of the connector
2. Wiring failure of the wire harness
   - Regeneration for the stationary regeneration request is not performed
   - Oversight due to the regeneration request lamp malfunction
   - Regeneration not performed due to the regeneration request switch malfunction
3. When the engine speed is dropped to low idling during regeneration and abandoned
4. ECU internal circuit fault

■ DPF OP interface

P242F: Ash cleaning request 1

P code	P242F	Name	Ash cleaning request 1
SPN/FMI	00E88/16		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The ash accumulation density is greater than or equal to 50 g/L, and less than 60 g/L.	DPF ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: The maximum engine torque is limited to 85 %.
Reset criteria	Yes: The fault mode is automatically released when the ash cleaning request is not detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ECU internal circuit fault
2. ∗ Increase in the actual differential pressure of the soot filter
   • Ash is accumulated

∗ There are cases in which the differential pressure does not rise drastically and the actual ash accumulation is little. When this error occurs, it is highly possible that the engine has not been used for a long time. In such a case, it is required to perform the DPF maintenance.

P1420: Ash cleaning request 2

P code	P1420	Name	Ash cleaning request 2
SPN/FMI	00E88/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. Ash accumulation density is 60 g/L or more.	DPF ECU

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is automatically released when the ash cleaning request is not detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ECU internal circuit fault
2. ∗ Increase in the actual differential pressure of the soot filter
   • Ash is accumulated

∗ There are cases in which the differential pressure does not rise drastically and the actual ash accumulation is little. When this error occurs, it is highly possible that the engine has not been used for a long time. In such a case, it is required to perform the DPF maintenance.

P1421: Stationary regeneration standby

P code	P1421	Name	Stationary regeneration standby
SPN/FMI	00E87/16		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The transition is made to the stationary regeneration mode for the factors except for the SW/CAN direction from the outside during the stationary regeneration.	Injector ECU DOC Piping

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • Engine derates further after 120 min. • The maximum engine torque is limited to 50 %.
Reset criteria	Yes: The fault mode is automatically released when the stationary regeneration standby is not detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Insufficient regeneration capability due to the low operation load
2. Because the conditions of reset regeneration and regeneration forbidden switch turned on are continued for a given period of time
3. ECU internal circuit fault
4. DOC deterioration due to the external factor such as sulfur poisoning
   • Increase in activated temperature
5. Blow-by of combustion gas
   • Catalytic damage
   • Piping damage in the passage to DOC
6. Injector defect
   • Decrease in injection quantity
   • Injection timing malfunction

P1424: Backup mode

P code	P1424	Name	Backup mode
SPN/FMI	00E87/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The transition is made to the recovery regeneration mode and while the recovery regeneration is not performed.	Injector ECU DOC Piping

● Actions when a malfunction occurs

Fault mode	[Limited operation]: The engine operation is limited.
Limited operation	Yes: • Engine derates immediately during sensor fails. • The maximum engine torque is limited to 85 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}]. • The EGR is fully closed. • Engine derates further after 15 min. • The maximum engine torque is limited to 50 %. • The engine speed is limited to the [maximum torque speed +200 min^{-1}].
Reset criteria	Yes: The fault mode is automatically released when the recovery regeneration standby is not detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. It is abandoned for a given period of time in the stationary regeneration standby emergency mode
2. ECU internal circuit fault
3. DOC deterioration due to the external factor such as sulfur poisoning
   • Increase in activated temperature
4. Blow-by of combustion gas
   • Catalytic damage
   • Piping damage in the passage to DOC
5. Injector defect
   • Decrease in injection quantity
   • Injection timing malfunction

Note: When this error is detected, the "overaccumulation (method C)", "overaccumulation (method P)", "regeneration defect (stationary regeneration failure)", "regeneration defect (stationary regeneration not performed)" are detected at the same time. Be sure to perform the failure diagnosis for the respective part.

P1445: Recovery regeneration failure

P code	P1445	Name	Recovery regeneration failure
SPN/FMI	00E87/9		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The recovery regeneration fails.	DPF intermediate temperature sensor system Injector DOC

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. ∗ DPF intermediate temperature sensor system fault
2. DOC deterioration or DOC breakage due to the external factor such as sulfur poisoning
3. Injector defect
   - Decrease in injection quantity
   - Injection timing malfunction

∗ There are cases in which this error occurs due to the regeneration defect judgment caused by "DPF intermediate temperature sensor temperature abnormal low temperature". When this is detected at the same time, be sure to perform the failure diagnosis for "DPF intermediate temperature sensor temperature abnormal low temperature" in advance.

P1446: Recovery regeneration prohibition

P code	P1446	Name	Recovery regeneration prohibition
SPN/FMI	00E87/7		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. When recovery regeneration occurs, either of the following conditions is true: • "DPF PM accumulation density (C method)" is greater than or equal to the threshold value of "PM accumulation density (for prohibition determination of recovery regeneration)" and it continues for the time same to the "prohibition determining time of recovery regeneration (C method)". • "DPF PM accumulation density (P method)" is greater than or equal to the threshold value of "PM accumulation density (for prohibition determination of recovery regeneration)" and it continues for the time more than the "prohibition determining time of recovery regeneration (P method)".	SF

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power is turned off.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

The PM is overaccumulated and the recovery regeneration cannot be performed.

Others

■ Overspeed

P0219: Overspeed

P code	P0219	Name	Overspeed
SPN/FMI	000BE/0		

● DTC detection criteria

1. Prerequisite, 2. Judgment criteria	Check points
1. No prerequisite. 2. The engine speed is greater than the following threshold value. YMR standard: • Maximum idling speed + 600 min^{-1}. JD exclusive: • NV2 engine: 3,800 min^{-1}. • NV3 engine: 3,300 min^{-1}.	Crank speed sensor Cam speed sensor Injector ECU

● Actions when a malfunction occurs

Fault mode	[Engine stop]: The engine operation stops.
Limited operation	Yes: Fuel injection stops.
Reset criteria	Yes: The fault mode is released when the ECU power off is detected.
Remarks	

● Presumed cause of the malfunction or the abnormal condition

1. Crank speed sensor fault
   - Temporary failure caused by external factors such as radio waves
2. Cam speed sensor fault
   - Temporary failure caused by external factors such as radio waves
3. ECU internal circuit fault
4. Injector failure

● Diagnosis

1. Initial diagnosis with the diagnosis tool	• Check the fault indication. • Check the fault indication again by turning the ECU power ON and OFF. * For details on the diagnosis method and procedure, see P5-42.

Method and Procedure of Failure Diagnosis

Description

● Related DTC

The related DTCs are listed.

P code	P code	Name	Error name
SPN/FMI	SPM/FMI		

● Workflow

The workflow for failure diagnosis is listed.

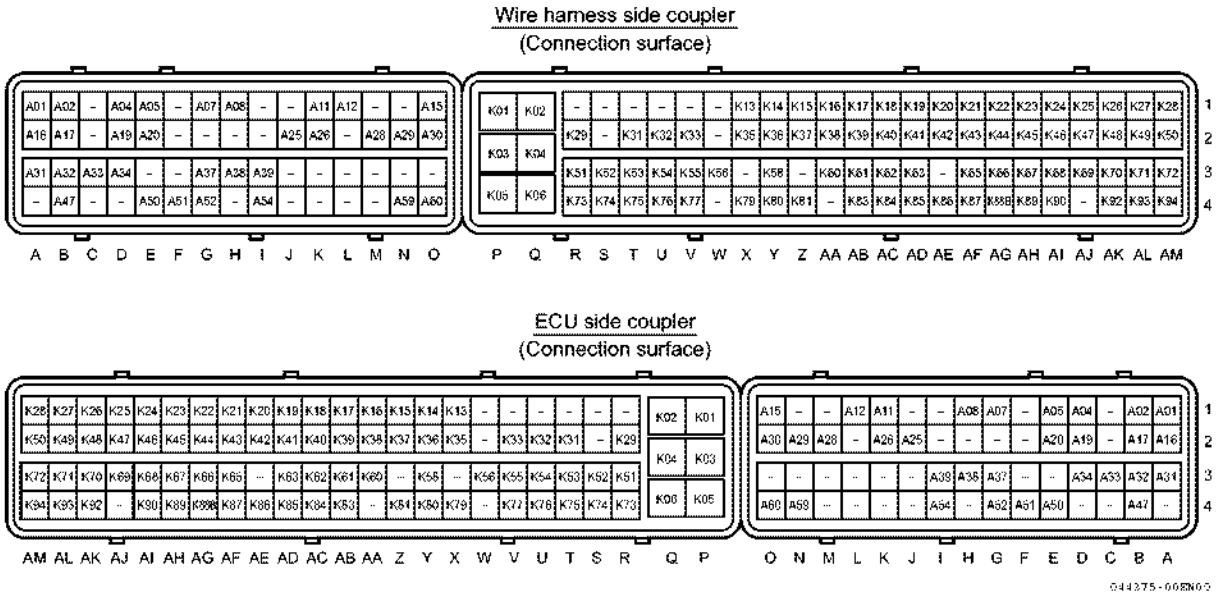
● Wire diagram

The wire diagram for the parts related to faults is listed.

● Work description

The corrective action and procedure for failure diagnosis is listed.

● ECU pin layout diagram



No.		Terminal function name	Code
A01	1-A	Injector L	INJL1 - 4
A02	1-B	Injector L	INJL1 - 4
A04	1-D	SCV H	MPROP-H
A05	1-E	SCV L	HPPSOL
A07	1-G	Sensor 5 V	5VS
A08	1-H	Sensor 5 V	5VS
A11	1-K	FO temperature sensor	TFO
A12	1-L	DPF hi-side pressure sensor	PDPFH
A15	1-O	FO temperature sensor	REOP2
A16	2-A	Injector L	INJL1 - 4
A17	2-B	Injector L	INJL1 - 4
A19	2-D	Intake valve motor	IVDCM-H, L
A20	2-E	Intake valve motor	IVDCM-H, L
A25	2-J	Analog GND	A-GND
A26	2-K	Rail pressure	PRAIL
A28	2-M	CW temperature sensor	TW
A29	2-N	Analog GND	A-GND
A30	2-O	External 12 V	UB5
A31	3-A	Injector H	INJH1 - 4
A32	3-B	Injector H	INJH1 - 4
A33	3-C	Injector H	INJH1 - 4
A34	3-D	Reserve	REOP1
A37	3-G	Cam speed	CMSPD
A38	3-H	Analog GND	A-GND
A39	3-I	Crank speed	CKSPD

No.		Terminal function name	Code
A54	4-I	Crank speed	CKSPD
A59	4-N	intake manifold temperature sensor	TIAIR
A60	4-O	External 12 V	UB2
K01	1-P	VB	VB
K02	1-Q	ECU GND	GND
K03	2-P	VB	VB
K04	2-Q	ECU GND	GND
K05	3-P	VB	VB
K06	3-Q	ECU GND	GND
K13	1-X	Speed selection enable	APP-IP6
K14	1-Y	Starter permission 1	APP-IP9
K15	1-Z	LO pressure switch	LOPSW
K16	1-AA	Speed 2	APP-IP4
K17	1-AB	Hi-idle speed select	APP-IP8
K18	1-AC	DPF regeneration request	REGSW
K19	1-AD	Speed 1	APP-IP3
K20	1-AE	Intake valve sensor	IVPS
K21	1-AF	Analog GND	A-GND
K22	1-AG	Accelerator pedal	PDLSW
K23	1-AH	Sensor 5 V	5VS
K24	1-AI	Sensor 5 V	5VS
K25	1-AJ	DPF regeneration request	DPF-M1
K26	1-AK	Iso-chronous lamp	APP-OP2
K27	1-AL	DPF regeneration inhibit lamp	DPF-M2
K28	1-AM	Starter relay	STR-RLY

No.		Terminal function name	Code
A47	4-B	Injector H	INJH1 - 4
A50	4-E	External 12 V	UB3
A51	4-F	Analog GND	A-GND
A52	4-G	Analog GND	A-GND
K35	2-X	Key switch start	STARTSW
K36	2-Y	Reserve analog	REAN
K37	2-Z	Droop	APP-IP1
K38	2-AA	Starter permission 2	APP-IP2
K39	2-AB	EGR low-side pressure sensor	PEGRL
K40	2-AC	Water separator sensor	WSSW
K41	2-AD	Air cleaner sensor	ACLSW
K42	2-AE	Hi-idle limit enable	APP-IP5
K43	2-AF	Sensor 5 V	5VS
K44	2-AG	Sensor 5 V	5VS
K45	2-AH	Sensor 5 V	5VS
K46	2-AI	Sensor 5 V	5VS
K47	2-AJ	Load ratio monitor	LOAD-M
K48	2-AK	Red engine stop lamp	REOP4
K49	2-AL	CWT warning lamp	OVHT-LMP
K50	2-AM	Pre-heat lamp	PREHT-LMP
K51	3-R	External 12 V	UB3
K52	3-S	Analog GND	A-GND
K53	3-T	CAN-L2	CAN2L
K54	3-U	CAN-H1	CAN1H
K55	3-V	Analog GND	A-GND
K56	3-W	Exhaust gas temperature sensor	TEXMN
K58	3-Y	Accelerator sensor 3	APS3
K60	3-AA	Analog GND	A-GND
K61	3-AB	Accelerator sensor 1	APS1
K62	3-AC	Analog GND	A-GND
K63	3-AD	DPF differential pressure sensor	PDPF
K65	3-AF	Analog GND	D-GND
K66	3-AG	Alternator L terminal	CHGSW

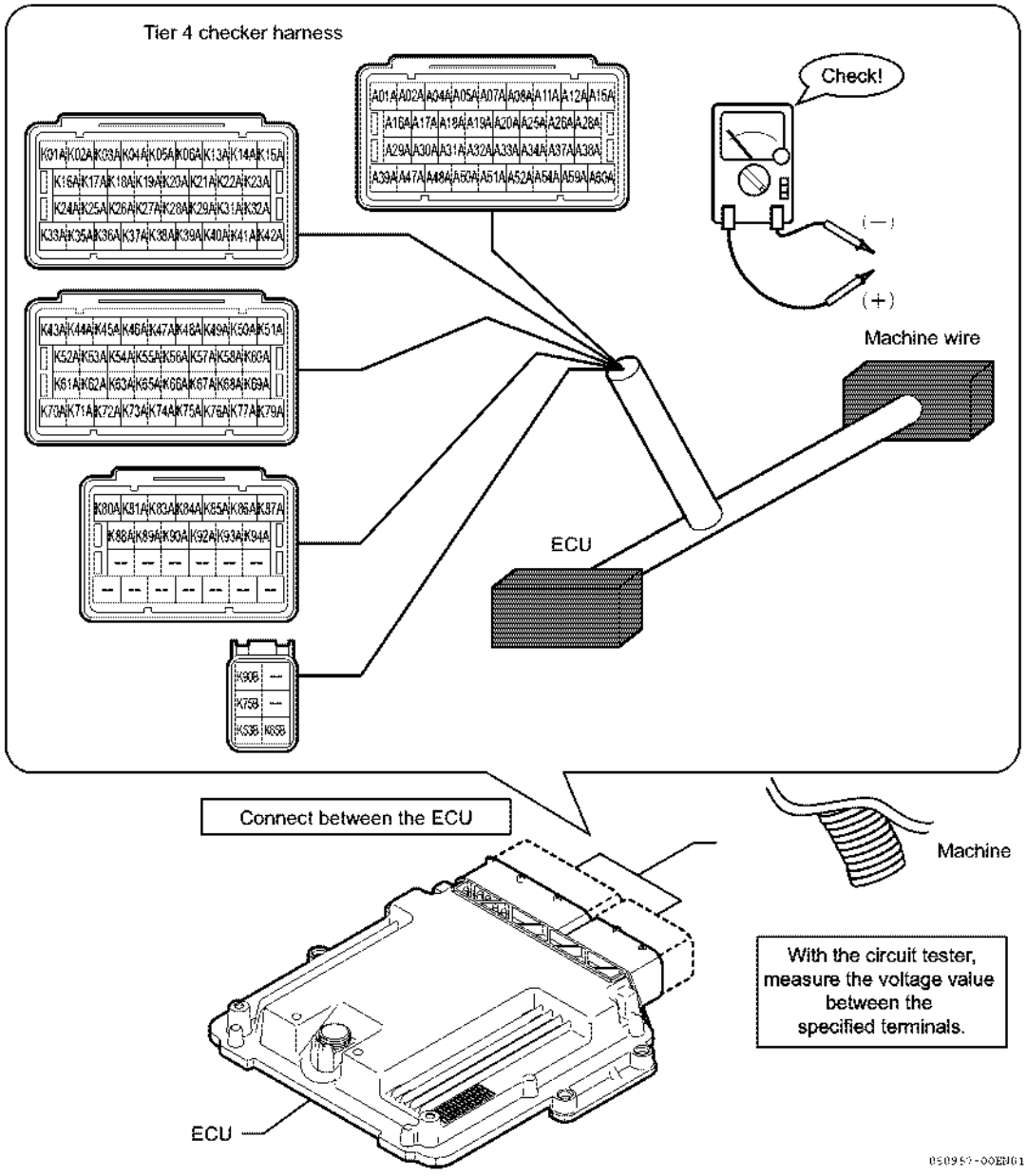
No.		Terminal function name	Code
K29	2-R	External 12 V	UB2
K31	2-T	DPF regeneration inhibit	REGMSW
K32	2-U	Engine stop 1	SHUDNSW
K33	2-V	EGR gas temperature sensor	TEGR
K67	3-AH	Engine stop 2	APP-IP7
K68	3-AI	External 12 V	UB2
K69	3-AJ	EGT lamp	DPF-M3
K70	3-AK	Starting aid relay	SAID-RLY
K71	3-AL	DPF regeneration acknowledge lamp	DPF-M4
K72	3-AM	Amber warning lamp	REOP3
K73	4-R	External 12 V	UB5
K74	4-S	Analog GND	A-GND
K75	4-T	CAN-H2	CAN2H
K76	4-U	CAN-L1	CAN1L
K77	4-V	Analog GND	A-GND
K79	4-X	Fresh air temperature sensor	TFAIR
K80	4-Y	DPF inside temperature sensor	TDPFM
K81	4-Z	DPF inlet temperature sensor	TDPFI
K83	4-AB	Accelerator sensor 2	APS2
K84	4-AC	Analog GND	A-GND
K85	4-AD	EGR hi-side pressure sensor	PEGR
K86	4-AE	Regeneration interlock	WDSBSW
K87	4-AF	Analog GND	D-GND
K88B	4-AG	Key switch on	IGNSW
K89	4-AH	External 12 V	UB3
K90	4-AI	External 12 V	UB3
K92	4-AK	Failure lamp	FAIL-LMP
K93	4-AL	Speed selection lamp	APP-OP1
K94	4-AM	Speed monitor	NRPM-M

■ How to use the Tier 4 checker harness

When you perform the ECU related failure diagnosis, use the Tier 4 checker harness to measure the voltage value. Therefore, remove the ECU and the machine wire harness and connect the Tier 4 checker harness between the ECU and the machine wire harness prior to the failure diagnosis.

Note • For the details of the failure diagnosis on each part, refer to the following description.

• Use the circuit tester to measure the voltage value in accordance with the following table as a reference.



Sensor related

■ Crank speed sensor

● Related DTC

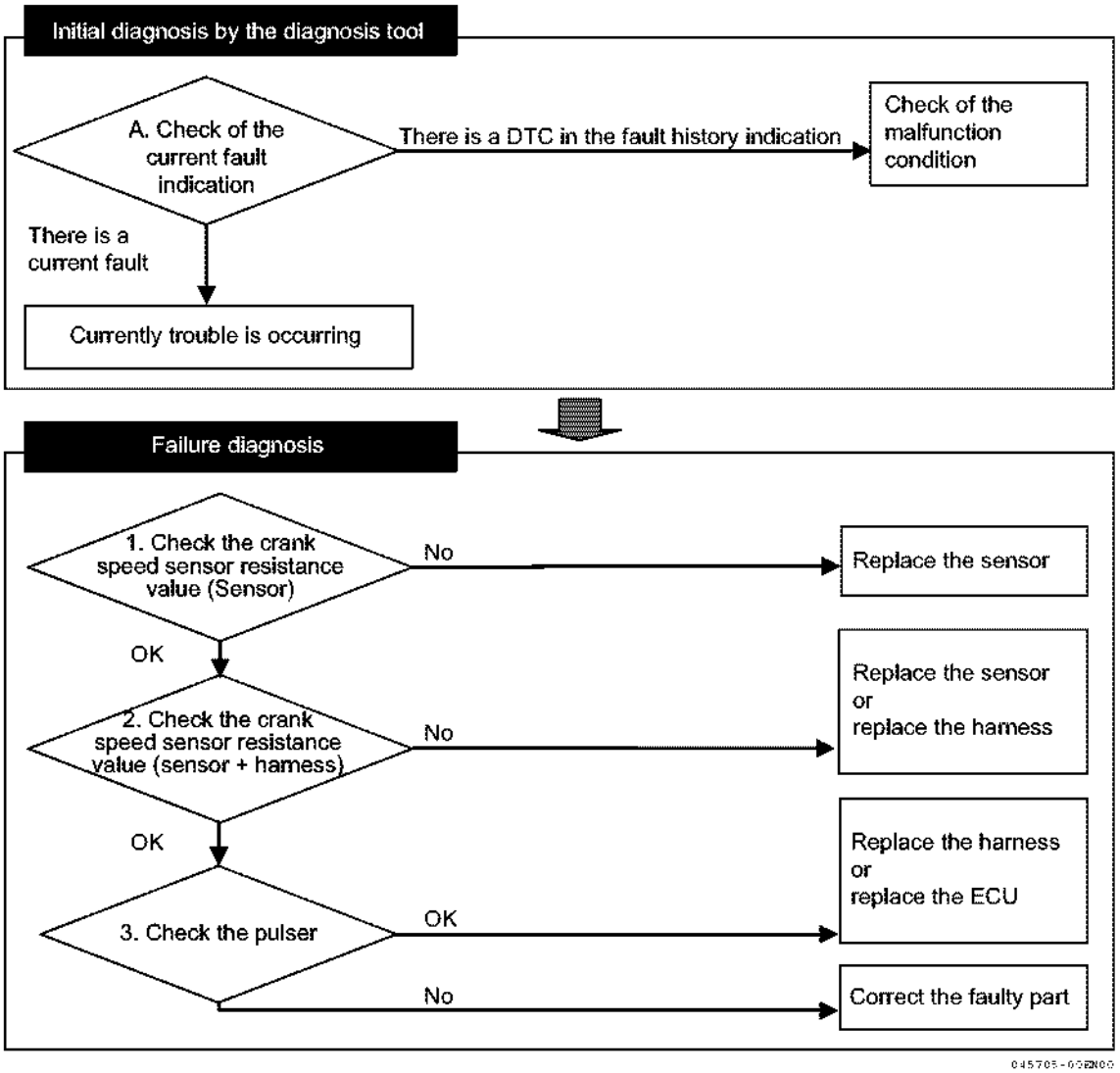
P code	P0336	Name	Crank signal malfunction
SPN/FMI	7F8A0/2		

P code	P0337	Name	No crank signal
SPN/FMI	7F8A0/5		

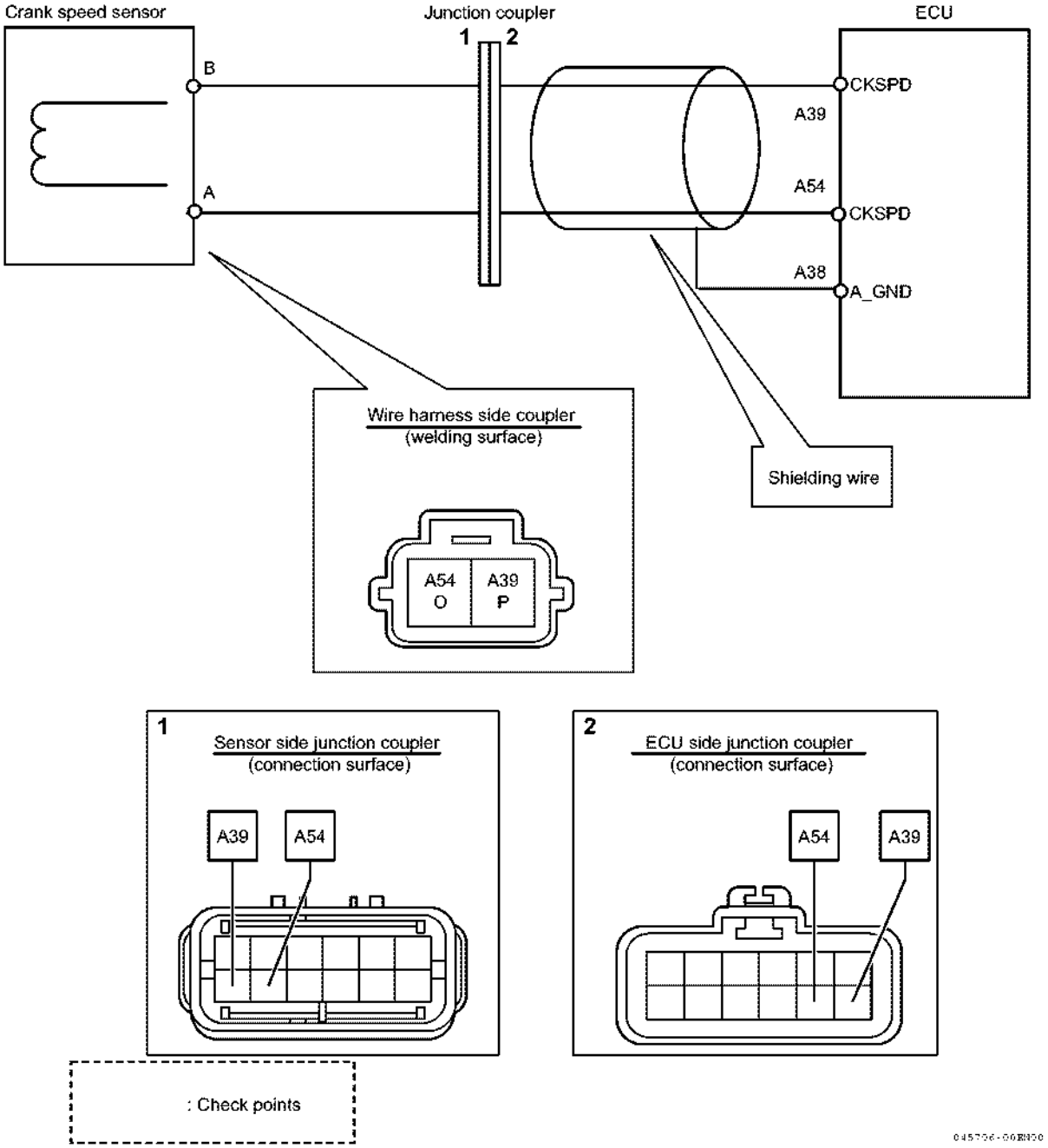
P code	P0008	Name	No signal on both crank and cam speed sensor
SPN/FMI	7FBF1/5		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Checking the crank speed sensor resistance value (sensor):
   1- Remove the wire harness from the accelerator speed sensor.
   2- Use the circuit tester to measure the resistance value between the crank speed sensors A and B.

Reference: The resistance value between the crank speed sensor terminals

Terminal	Specification
Sensor A - B	1050 Ω (Error 10 %)

Not OK	Replace the crank speed sensor.
OK	Refer to "Checking the crank speed sensor resistance value (sensor + harness):"

2. Checking the crank speed sensor resistance value (sensor + harness):
   1- Remove the ECU from the harness while the crank speed sensor and the harness are connected.
   2- Use the circuit tester to measure the resistance value between the harness side ECU connector terminals A39 - A54.
   Note: Refer to the above-mentioned reference "The resistance value between the crank speed sensor terminals".

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Checking the pulser:"

3. Checking the pulser:
   1- Check the pulser condition (cracks, metallic sticking, and distortion).

Not OK	Correct the faulty parts.
OK	• A coupler failure between the ECU and the harness may be caused. Replace the wire harness. • Replace the ECU.

■ Cam speed sensor

● Related DTC

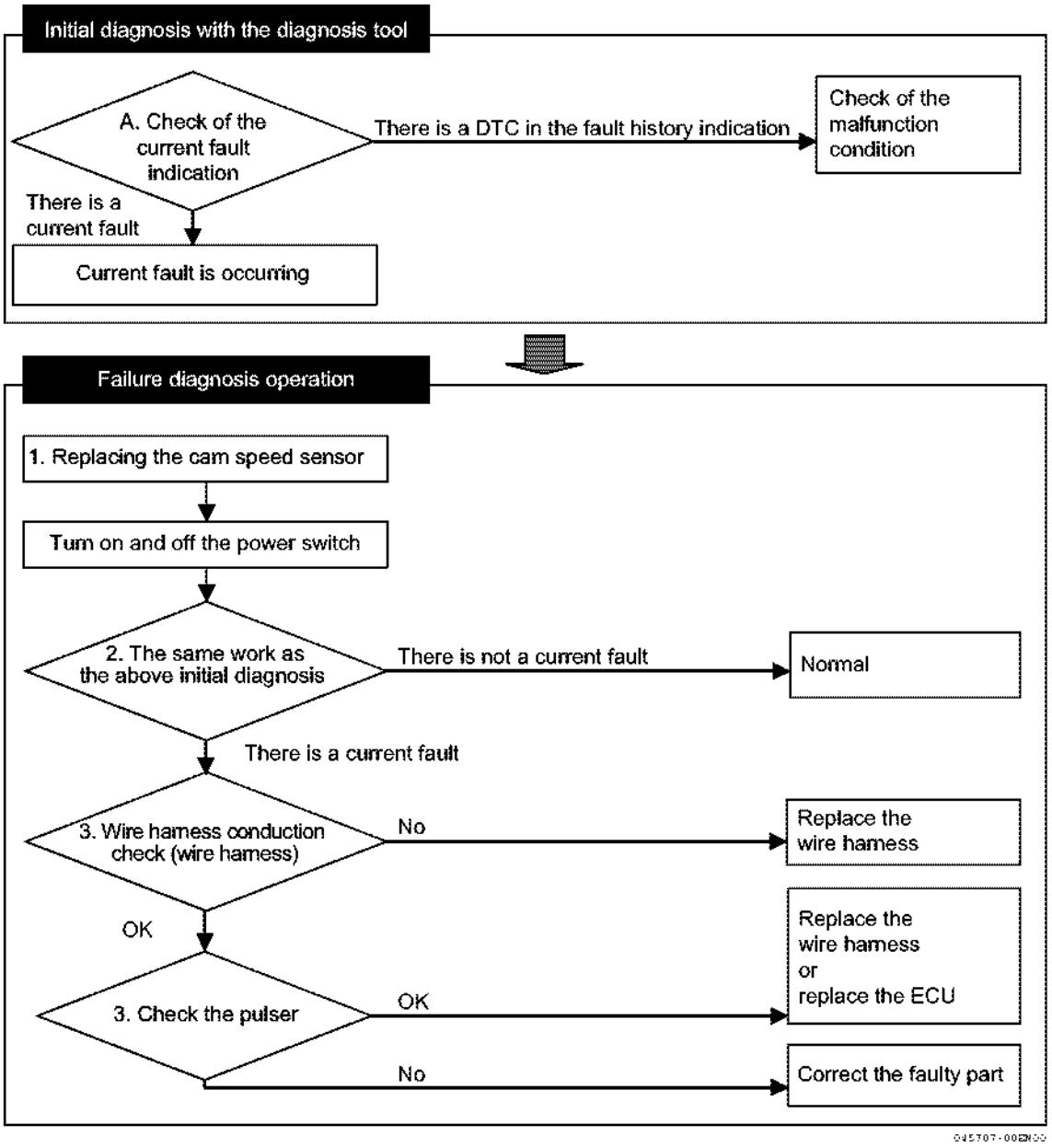
P code	P0341	Name	Cam signal malfunction
SPN/FMI	7F8A1/2		

P code	P0342	Name	No cam signal
SPN/FMI	7F8A1/5		

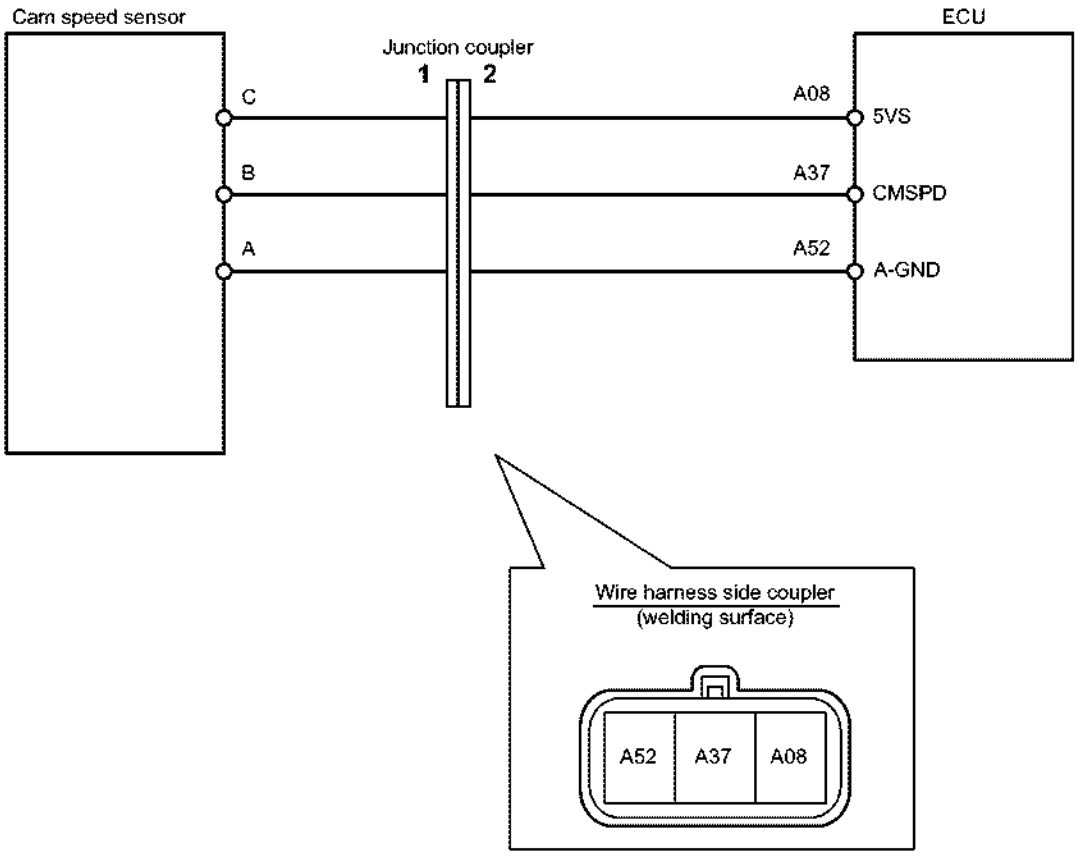
P code	P0008	Name	No signal on both crank and cam speed sensor
SPN/FMI	7FBF1/5		

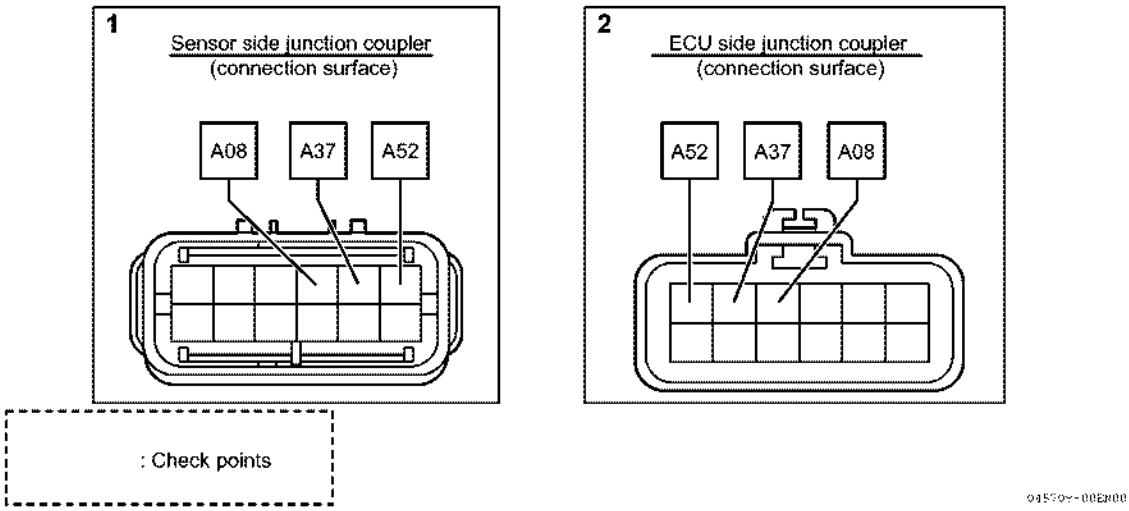
● **Workflow**

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram





Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Replacing the cam speed sensor:
   1- Remove and replace the cam speed sensor from the wire harness.
2. Using the diagnosis tool:
   1- Turn off the power switch. Turn on the power switch and start the engine.
   2- Connect the SMART ASSIST-Direct (SA-D) and check the Active Diagnostic Trouble Code for the error detection.

No	Normal
Applied	Refer to "Check the wire harness conduction:"

3. Check the wire harness conduction:
   1- Remove the wire harness from the cam speed sensor and the ECU. Here, keep the junction coupler connected.
   2- Perform the wire harness conduction check between the terminal 1 and the terminal 2 in the below table while referring to P5-287 ECU pin layout diagram.

Reference: Cam speed sensor conduction check pattern 1

Terminal 1 (ECU side wire harness connector)	Terminal 2 (cam speed sensor side wire harness connector)	Conduction	Condition
A08	Cam speed sensor terminal C	No	Not OK: Abnormal
		Yes	OK: Normal
A37	Cam speed sensor terminal B	No	No
		Yes	Yes
A52	Cam speed sensor terminal A	No	No
		Yes	Yes

Reference: Cam speed sensor conduction check pattern 2

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
A08	All other terminals	Yes	Not OK: Abnormal
		No	OK: Normal
A37		Yes	Not OK: Abnormal
		No	OK: Normal
A52		Yes	Not OK: Abnormal
		No	OK: Normal

Not OK	Interrupted or short circuited between the wire harnesses. Replace the wire harness.
OK	Refer to "Checking the pulser:"

4. Checking the pulser:
   1- Check the pulser condition (cracks, metallic sticking, and distortion).

Not OK	Correct the faulty parts.
OK	• Replace the wire harness. • Replace the ECU.

■ Accelerator sensor

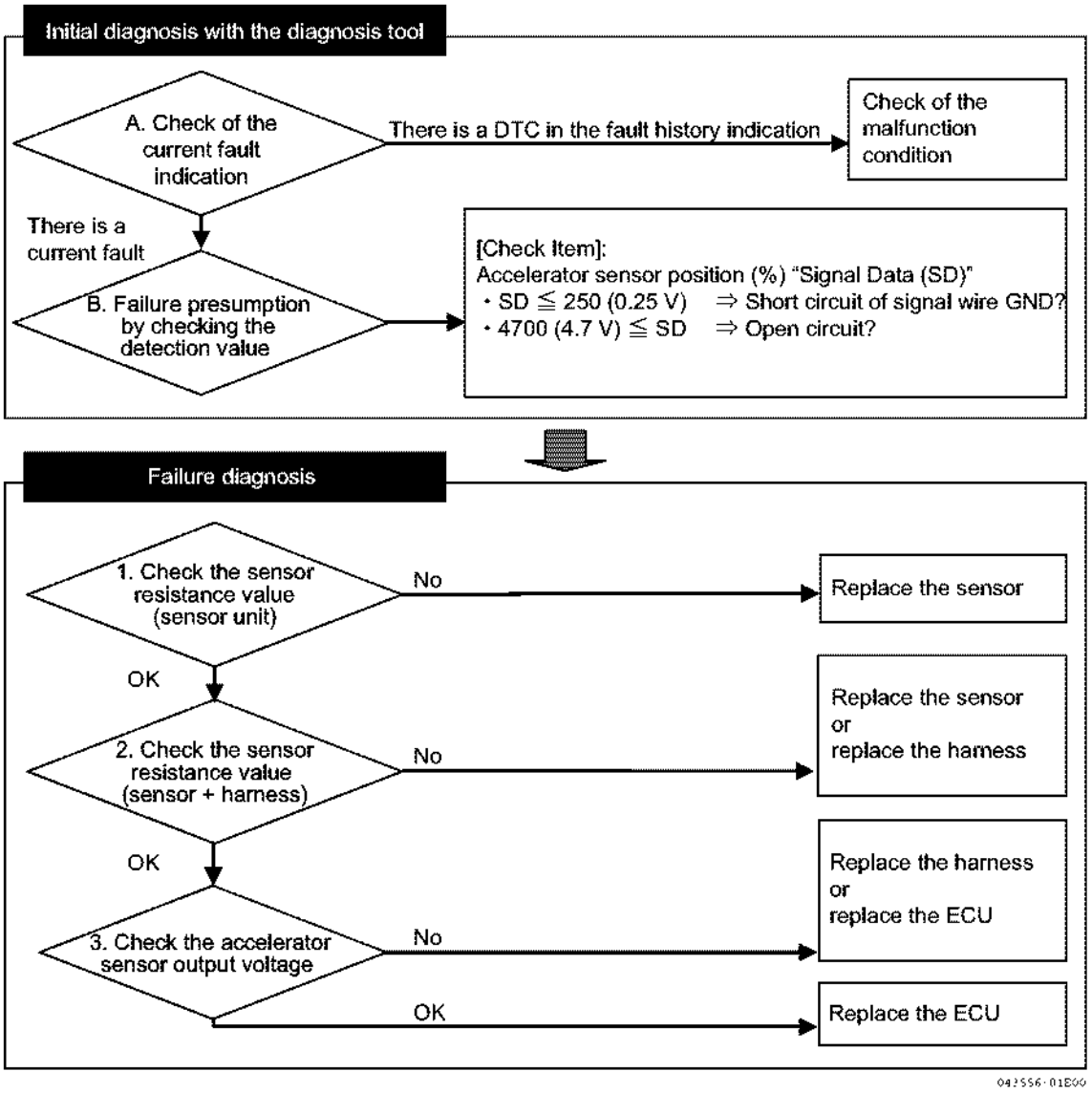
● Related DTC

P code	P0123	Name	Accelerator sensor 1 (Excessive sensor output)
SPN/FMI	0005B/3		

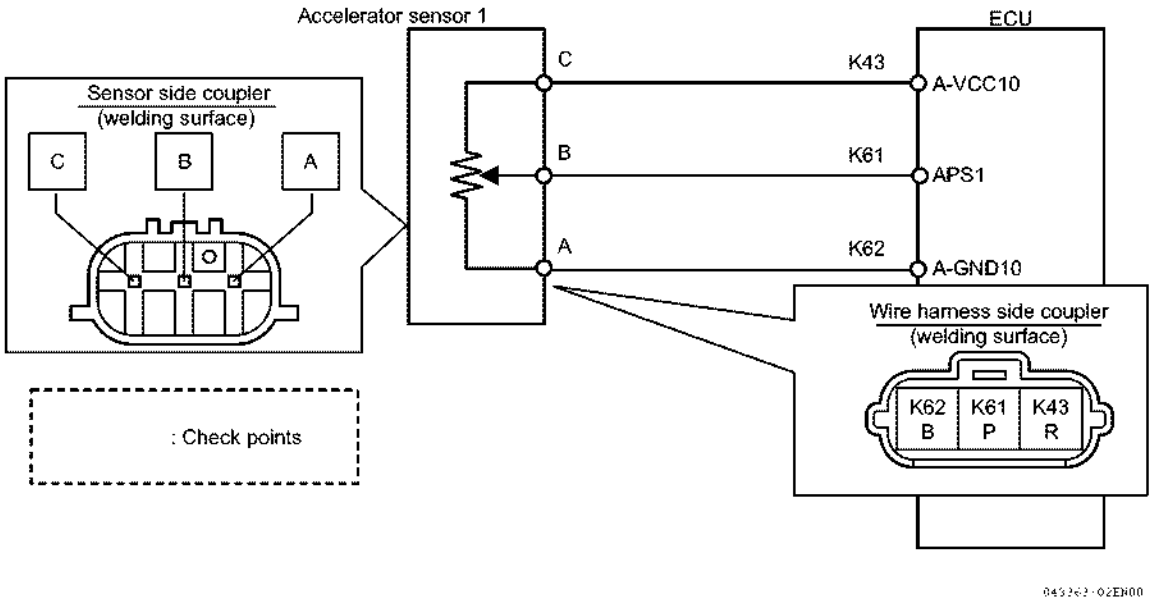
P code	P0122	Name	Accelerator sensor 1 (Insufficient sensor output)
SPN/FMI	0005B/4		

● **Workflow**

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Checking the sensor resistance value (sensor unit):

● Between the accelerator sensor1 terminals A and C (sensor3 terminals G and I) (total resistance value)

1- Remove the wire harness from the accelerator sensor.

2- Use the circuit tester to measure the resistance value (total resistance value) between the sensor terminals A and C.

Reference: Total resistance value of the YANMAR standard accelerator sensor

Terminal	Name
Sensor A - C	5 ± 1.5 kΩ

Not OK	Replace the accelerator sensor.
OK	Refer to "Between the accelerator sensor terminals A and B"

● Between the accelerator sensor terminals A and B

1- Use the circuit tester to measure the resistance value between the accelerator sensor terminals A and B.

2- Move the acceleration throttle to check whether or not the resistance value between the accelerator sensor terminals A and B changes.

Not OK	Replace the accelerator sensor.
OK	Refer to "Checking the sensor resistance value (sensor + wire harness):"

2. Checking the sensor resistance value (sensor + wire harness):

● Between the wire harnesses K43 and K62 (total resistance value)

1- Connect the accelerator sensor and the wire harness. Remove the wire harness from the ECU.

2- Use the circuit tester to measure the resistance value (total resistance value) between the wire harness side ECU connectors K43 and K62.

Note: Refer to the above-mentioned reference "Total resistance value of the YANMAR standard accelerator sensor".

Not OK	• A coupler failure between the sensor and the wire harness may be caused. Replace the sensor. • Replace the wire harness.
OK	Refer to "Between the wire harnesses K61 and K62 (K83 and K84) (K58 and K55)"

● Between the wire harnesses K61 and K62

1- Use the circuit tester to measure the resistance value between the ECU connectors K61 - K62.

2- Move the acceleration throttle to check whether or not the resistance value between the ECU connectors K61 - K62 changes.

Not OK	• A coupler failure between the sensor and the wire harness may be caused. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check the output voltage of the accelerator sensor:"

■ Intake throttle position sensor

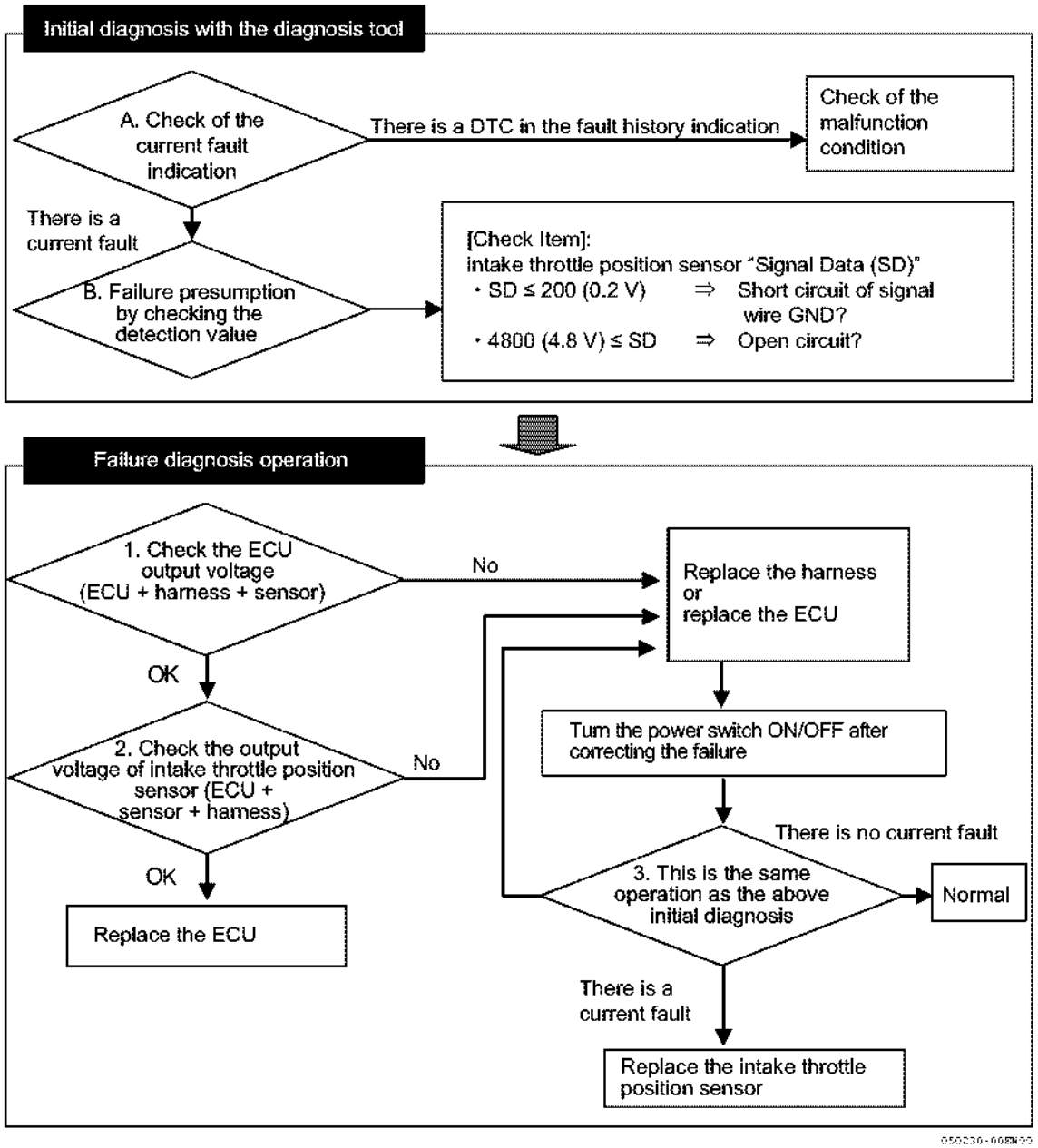
● Related DTC

P code	P02E8	Name	Intake throttle opening sensor fault (Low voltage)
SPN/FMI	00033/4		

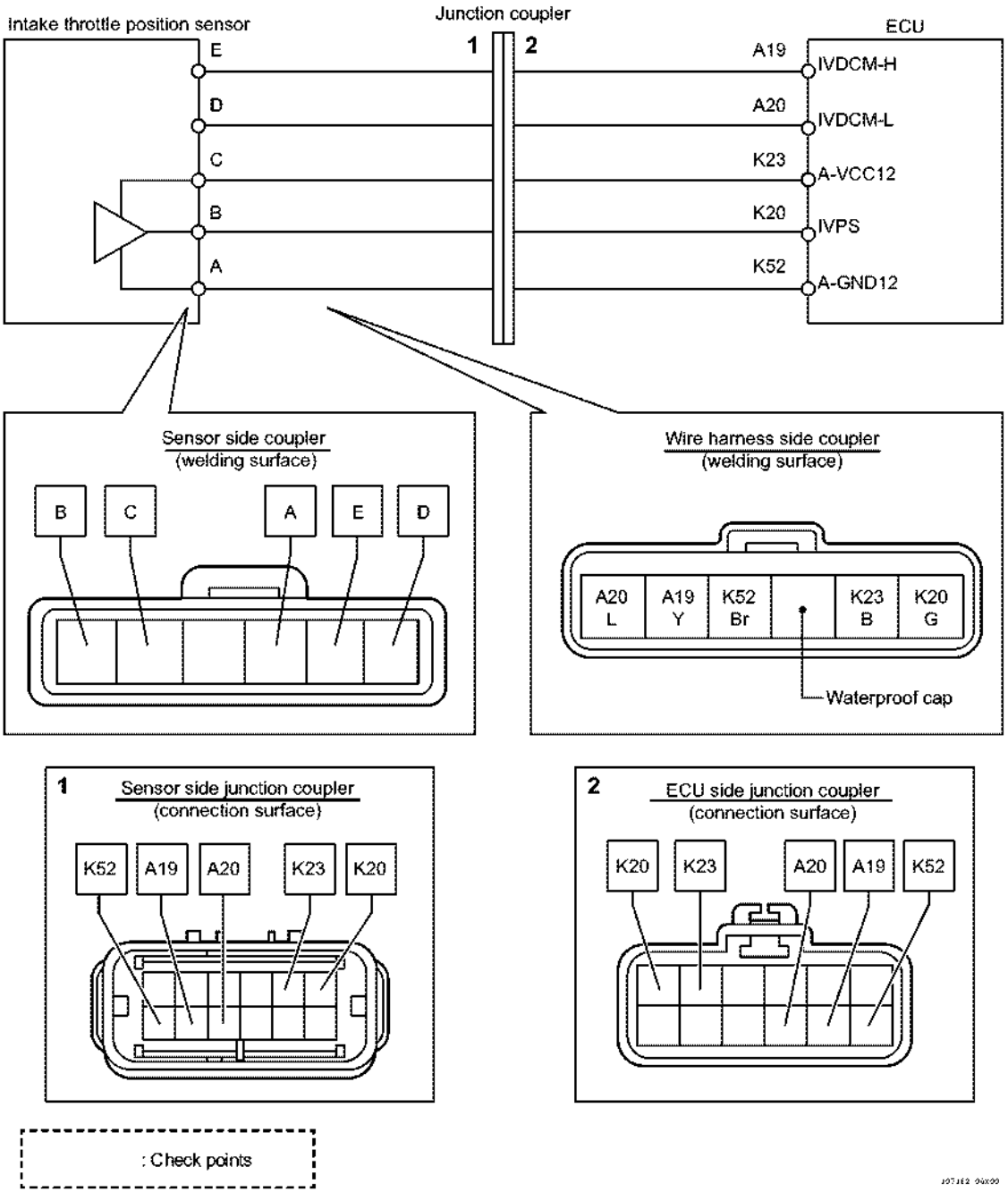
P code	P02E9	Name	Intake throttle opening sensor fault (High voltage)
SPN/FMI	00033/3		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● **Work description**

1. Check the ECU output voltage:
   1- Connect the checker wire harness between the ECU and the wire harness on the equipment. Also, connect all connectors (sensors and wire harness ECU).
   2- Use the circuit tester to measure the voltage value between the intake throttle position sensor 5 V K23 - K52.

Voltage value	Condition	Corrective action
K23 < 4.375 V	Not OK	• Replace the wire harness. • Replace the ECU.
4.375 V ≤ K23 ≤ 5.625 V	OK (Normal range)	Check the output voltage of the intake throttle position sensor.
5.625 V < K23	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the wire harness or the ECU. Turn the power switch OFF/ON and perform the diagnosis using the SMART ASSIST-Direct (SA-D).
OK	Refer to "Check the output voltage of the intake throttle position sensor:"

2. Check the output voltage of the intake throttle position sensor:
   1- Connect the checker wire harness between the ECU and the wire harness on the equipment. Also, connect all connectors (sensors and wire harness ECU).
   2- Use the circuit tester to measure the voltage value between the sensor signals K20 - K52.

Voltage value	Condition	Corrective action
K20 < 0.6 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.65 V ≤ K20 ≤ 4.4 V	OK (Normal range)	Replace the ECU.
4.4 V < K20	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the wire harness or the ECU. Turn the power switch OFF/ON and perform the diagnosis using the SMART ASSIST-Direct (SA-D).
OK	Replace the ECU.

3. Using the diagnosis tool:
   1- Turn off the power switch. Turn on the power switch and start the engine.
   2- Connect the SMART ASSIST-Direct (SA-D) and check the Active Diagnostic Trouble Code for the error detection.

No	Normal
Applied	Replace the intake throttle position sensor.

■ EGR low pressure side sensor

● Related DTC

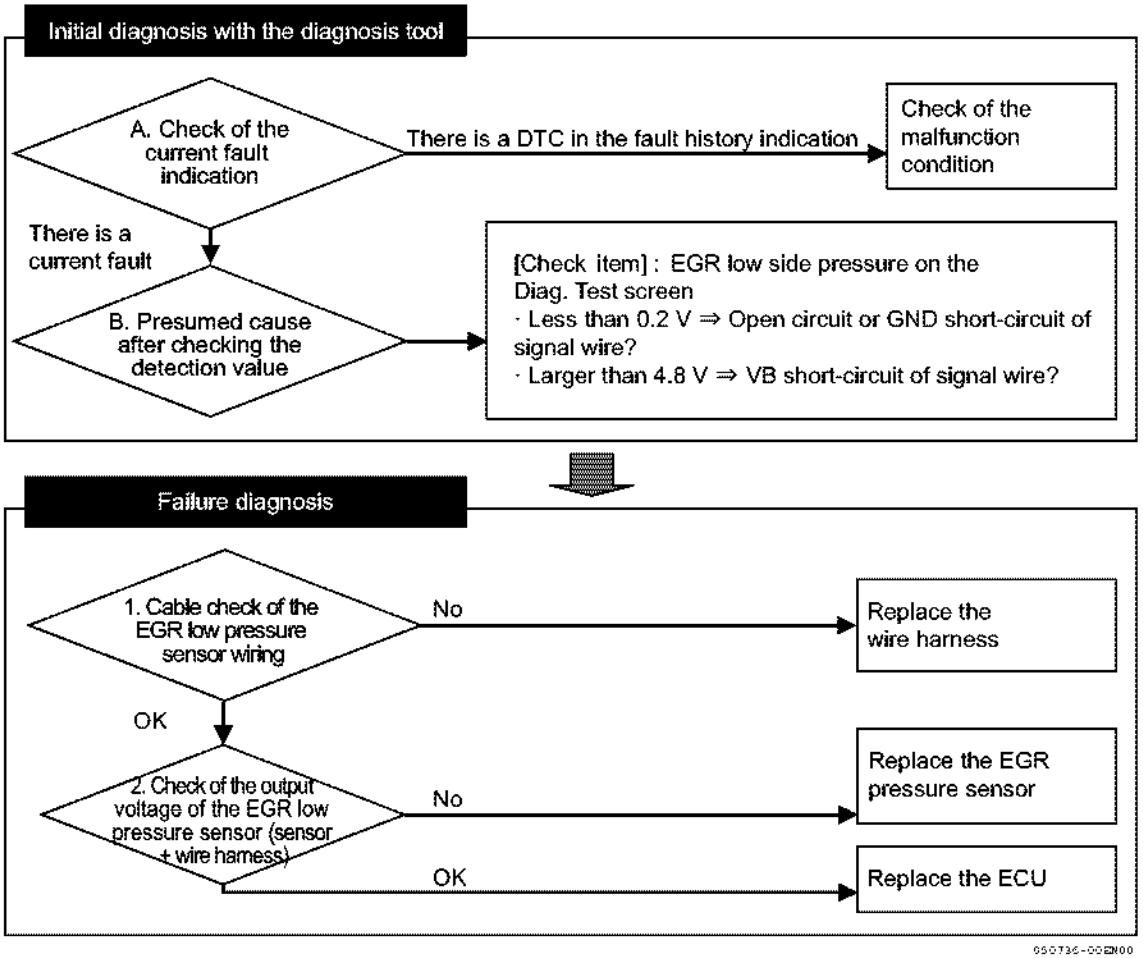
P code	P0238	Name	EGR low pressure side sensor fault (High voltage)
SPN/FMI	00066/3		

P code	P0237	Name	EGR low pressure side sensor fault (Low voltage)
SPN/FMI	00066/4		

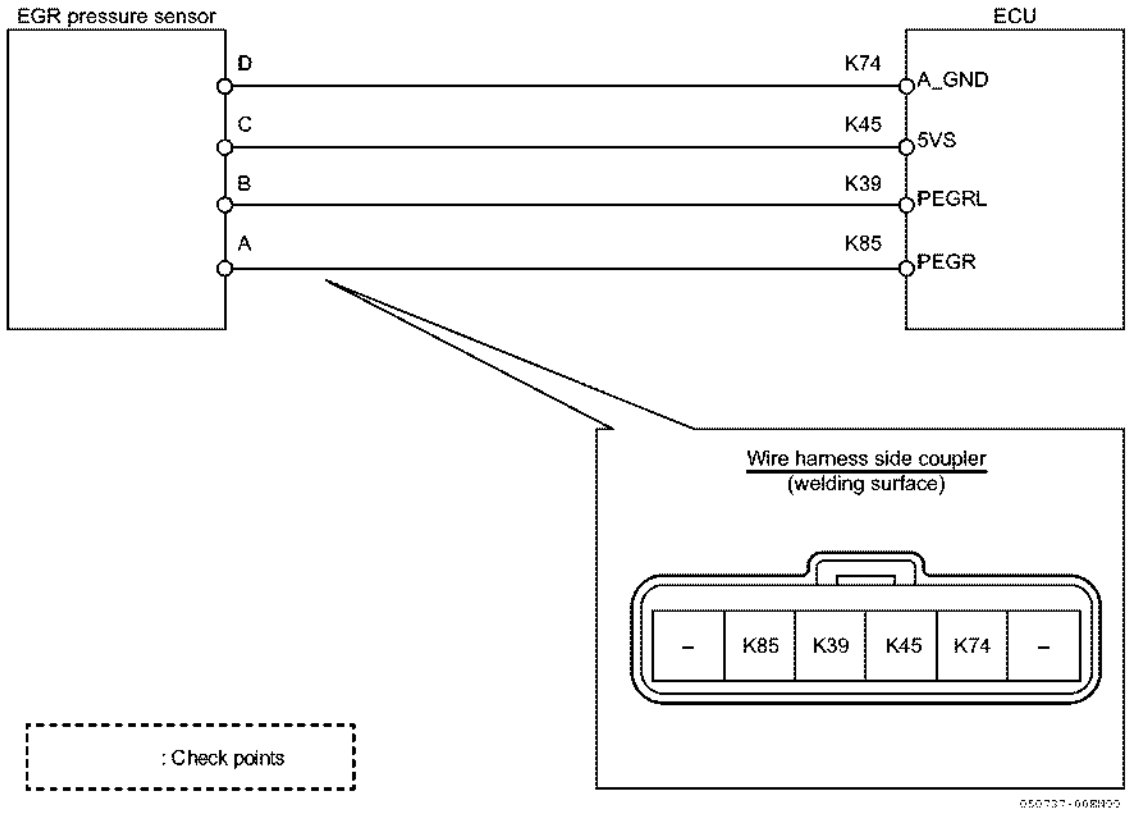
P code	P0236	Name	EGR low pressure side sensor (Abnormal learning value)
SPN/FMI	00066/13		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Cable check of the EGR low pressure sensor wiring:
   1- Remove the wire harness from the EGR pressure sensor and the ECU.
   2- Using the circuit tester, check the cable of the wire harness.

Terminal	Cable check	Condition
Between B and K39	OK	Normal
	Not OK	Wire harness failure
Between C and K45	OK	Normal
	Not OK	Wire harness failure
Between D and K74	OK	Normal
	Not OK	Wire harness failure

Not OK	• Check if the wire harness is damaged or there is mis-wiring. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the EGR low pressure sensor. (sensor + wire harness):"

2. Check of the output voltage of the EGR low pressure sensor. (sensor + wire harness):
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the EGR low pressure sensor signals K39 and K74.

Voltage value	State	Treatment
K39 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K39 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K39	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the EGR pressure sensor. Then, check the output voltage again.
OK	Replace the ECU.

■ EGR high pressure side sensor

● Related DTC

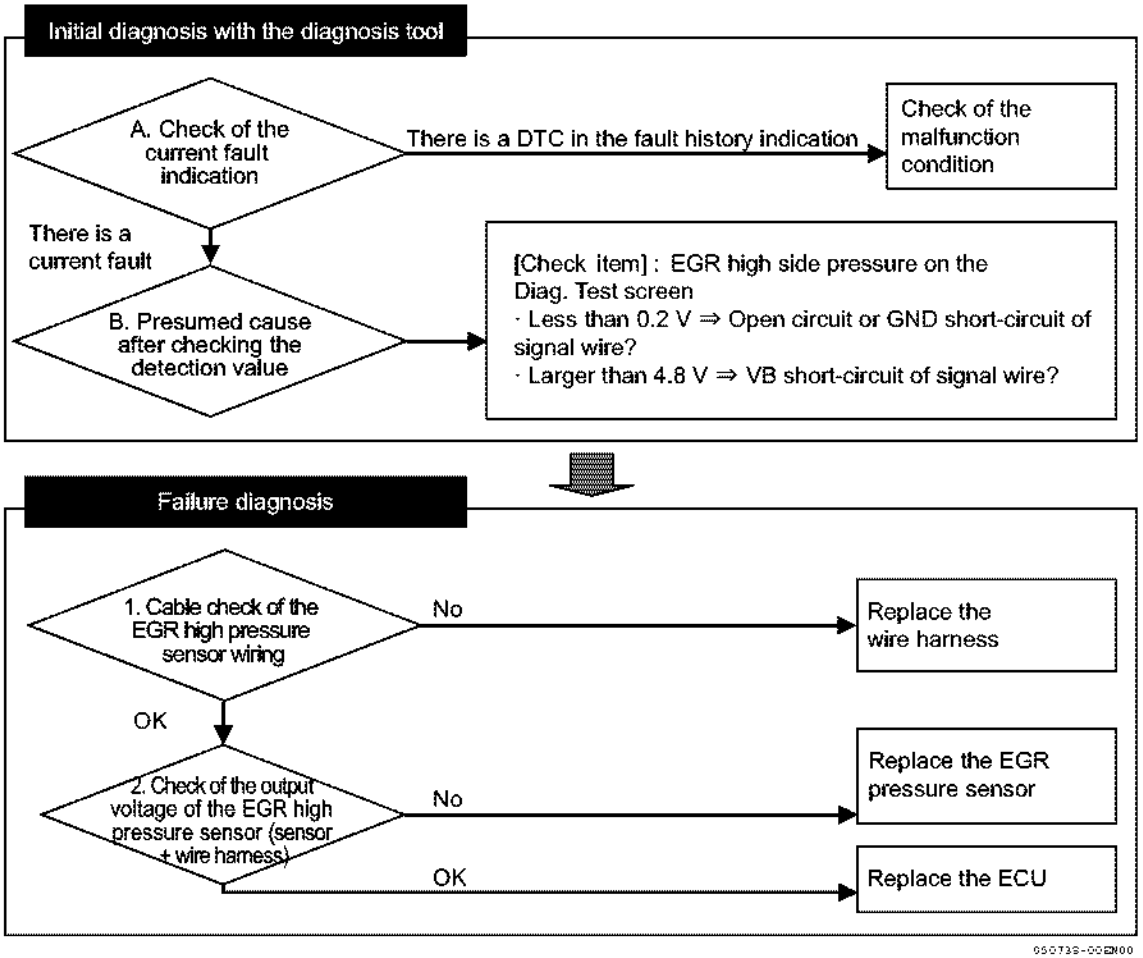
P code	P0473	Name	EGR high pressure side sensor fault (High voltage)
SPN/FMI	004B9/3		

P code	P0472	Name	EGR high pressure side sensor fault (Low voltage)
SPN/FMI	004B9/4		

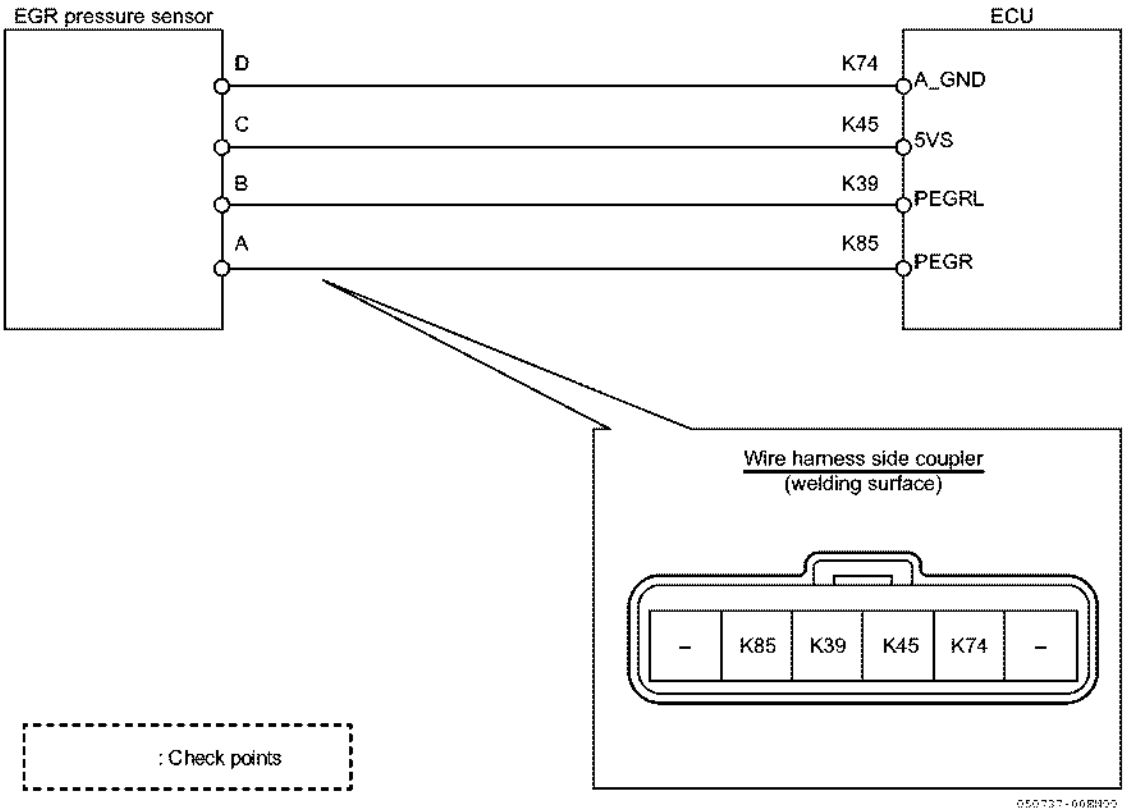
P code	P0471	Name	EGR high pressure side sensor (Abnormal learning value)
SPN/FMI	004B9/13		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Cable check of the EGR high pressure sensor wiring:
   1- Remove the wire harness from the EGR pressure sensor and the ECU.
   2- Using the circuit tester, check the cable of the wire harness.

Terminal	Cable check	Condition
Between A and K85	OK	Normal
	Not OK	Wire harness failure
Between C and K45	OK	Normal
	Not OK	Wire harness failure
Between D and K74	OK	Normal
	Not OK	Wire harness failure

Not OK	• Check if the wire harness is damaged or there is mis-wiring. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the EGR high pressure sensor. (sensor + wire harness):"

2. Check of the output voltage of the EGR high pressure sensor. (sensor + wire harness):
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the EGR high pressure sensor signals K85 and K74.

Voltage value	State	Treatment
K85 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K85 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K85	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the EGR pressure sensor. Then, check the output voltage again.
OK	Replace the ECU.

■ Cooling water temperature sensor

● Related DTC

P code	P0117	Name	Cooling water temperature sensor fault (low voltage)
SPN/FMI	0006E/4		

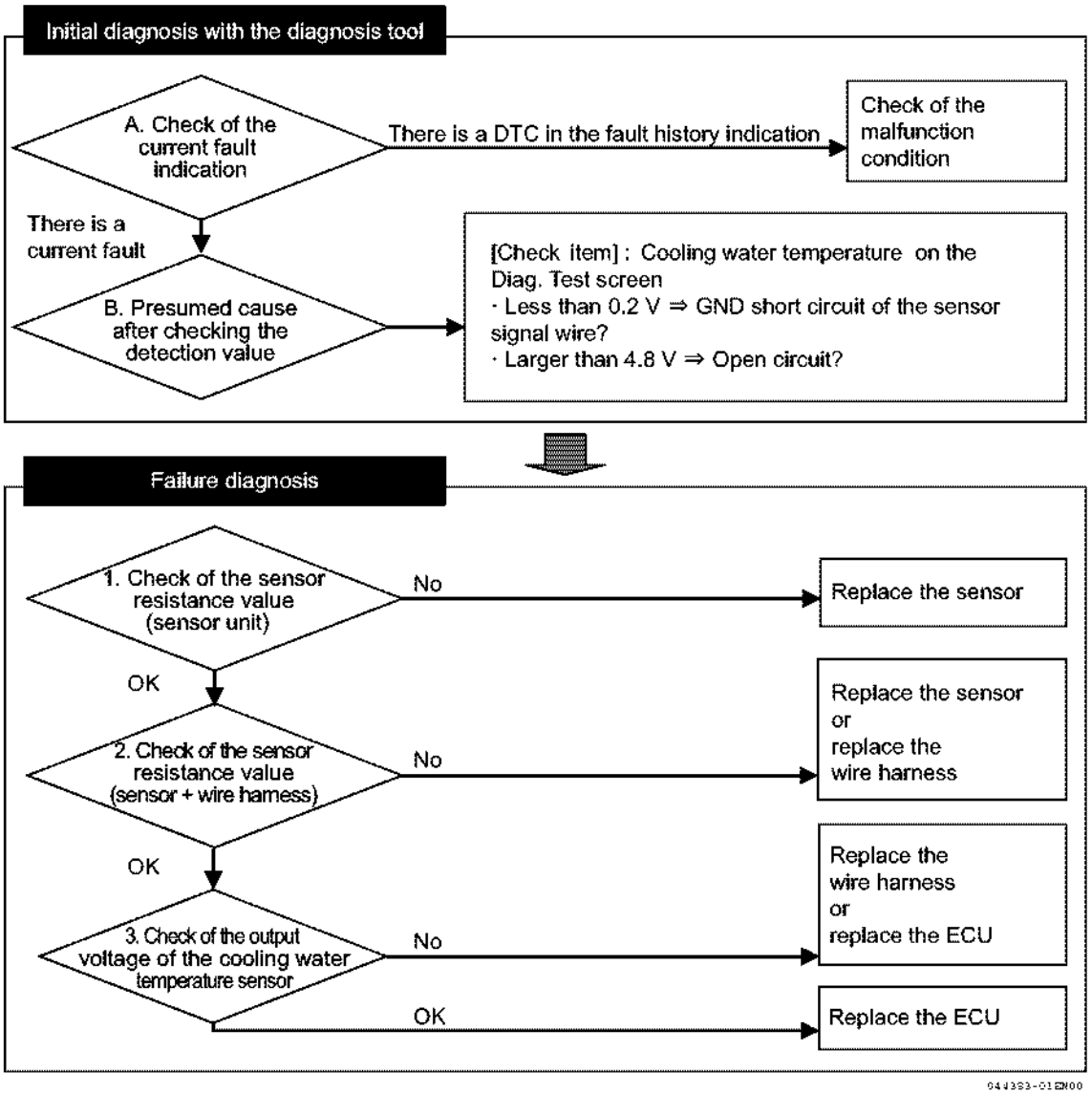
P code	P0118	Name	Cooling water temperature sensor fault (high voltage)
SPN/FMI	0006E/3		

P code	P0217	Name	Cooling water temperature sensor temperature abnormal high (overheat)
SPN/FMI	0006E/0		

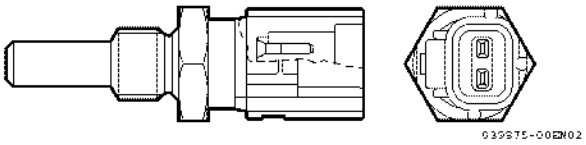
5

● Workflow

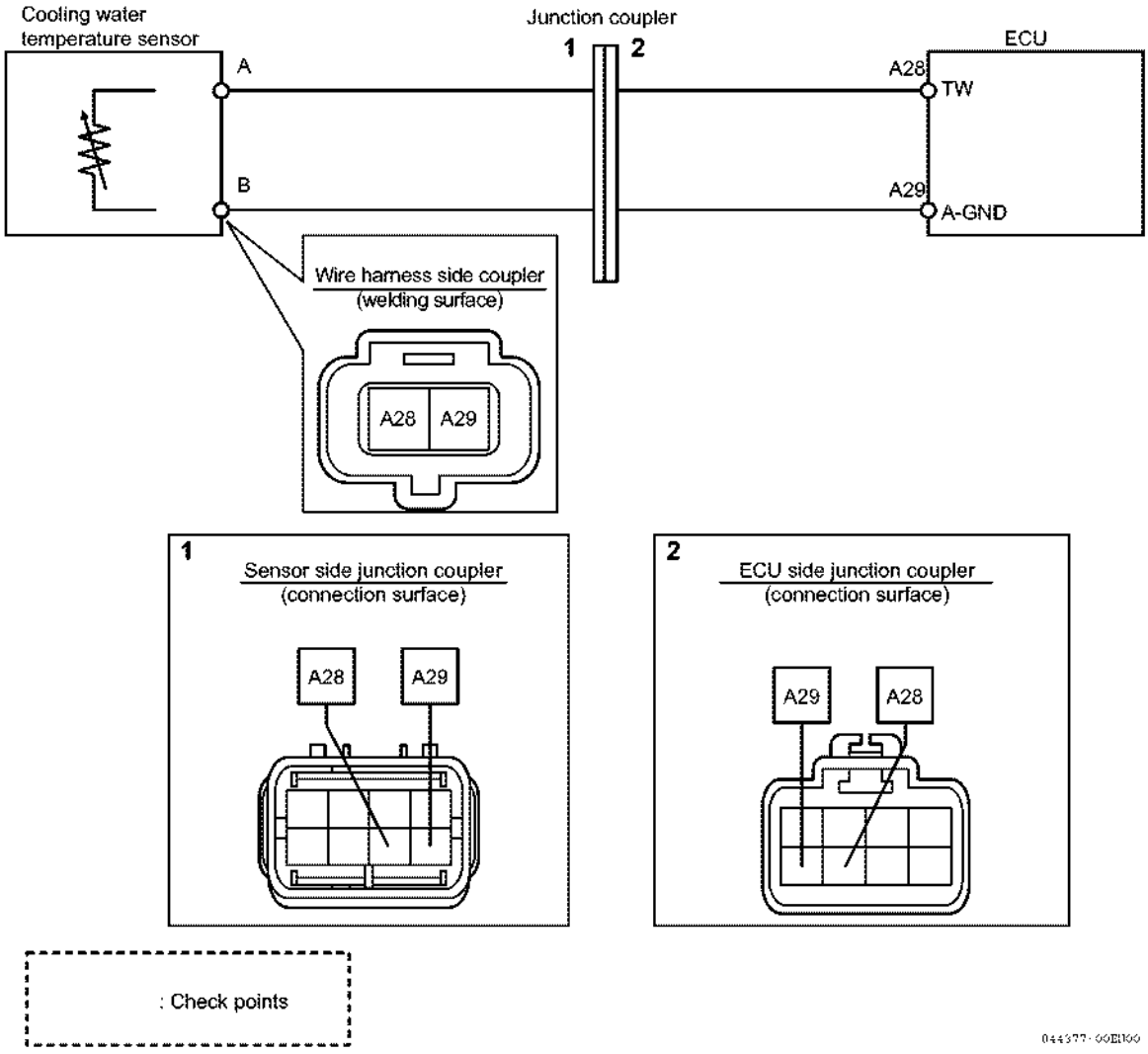
Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Sensor diagram



● Wire diagram

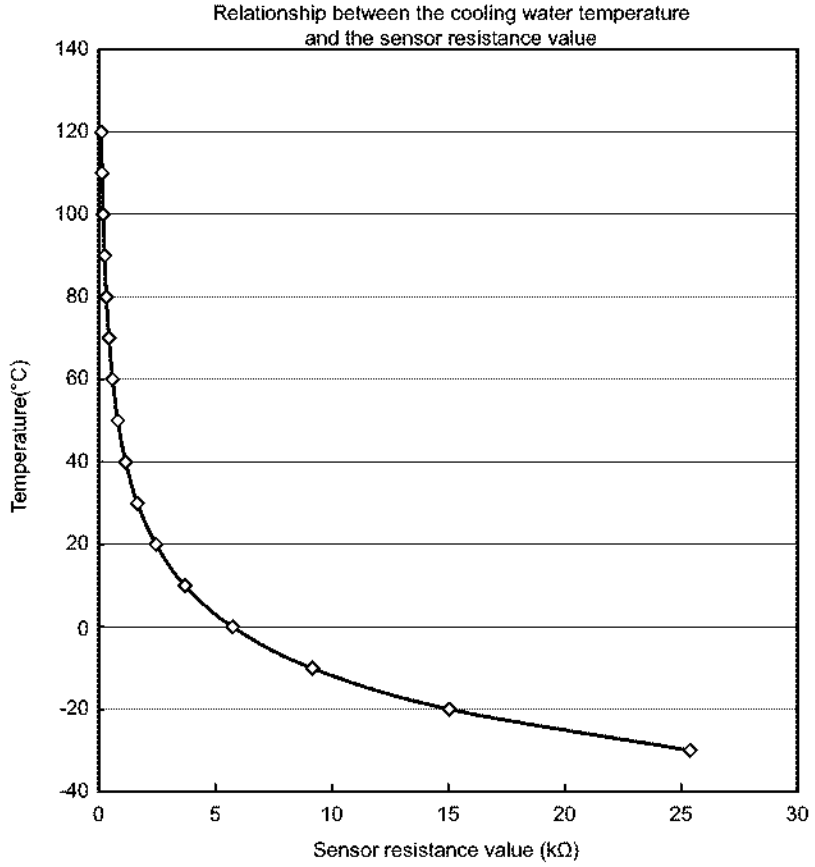


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the cooling water temperature sensor.
   2- Using the circuit tester, measure the resistance value between the cooling water temperature sensor terminals A and B.
   3- Refer to the following diagram "Cooling water temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Cooling water temperature sensor characteristics



Temp. (°C)	Resistance (kΩ)
-30	25.4
-20	15.04
-10	9.16
0	5.74
10	3.7
20	2.45
30	1.66
40	1.15
50	0.811
60	0.584
70	0.428
80	0.318
90	0.24
100	0.1836
110	0.1417
120	0.1108

113C14-00EN00

Not OK	Replace the cooling water temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire-harness):"

2. Check of the sensor resistance value (sensor + wire-harness):
   1- Connect the cooling water temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the wire harness side ECU connector terminals A28 and A29.
   3- Refer to the above diagram "Cooling water temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the cooling water temperature sensor:"

3. Check of the output voltage of the cooling water temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the cooling water temperature sensor signals A28 and A29.

Voltage value	State	Treatment
A28 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ A28 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < A28	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ New air temperature sensor

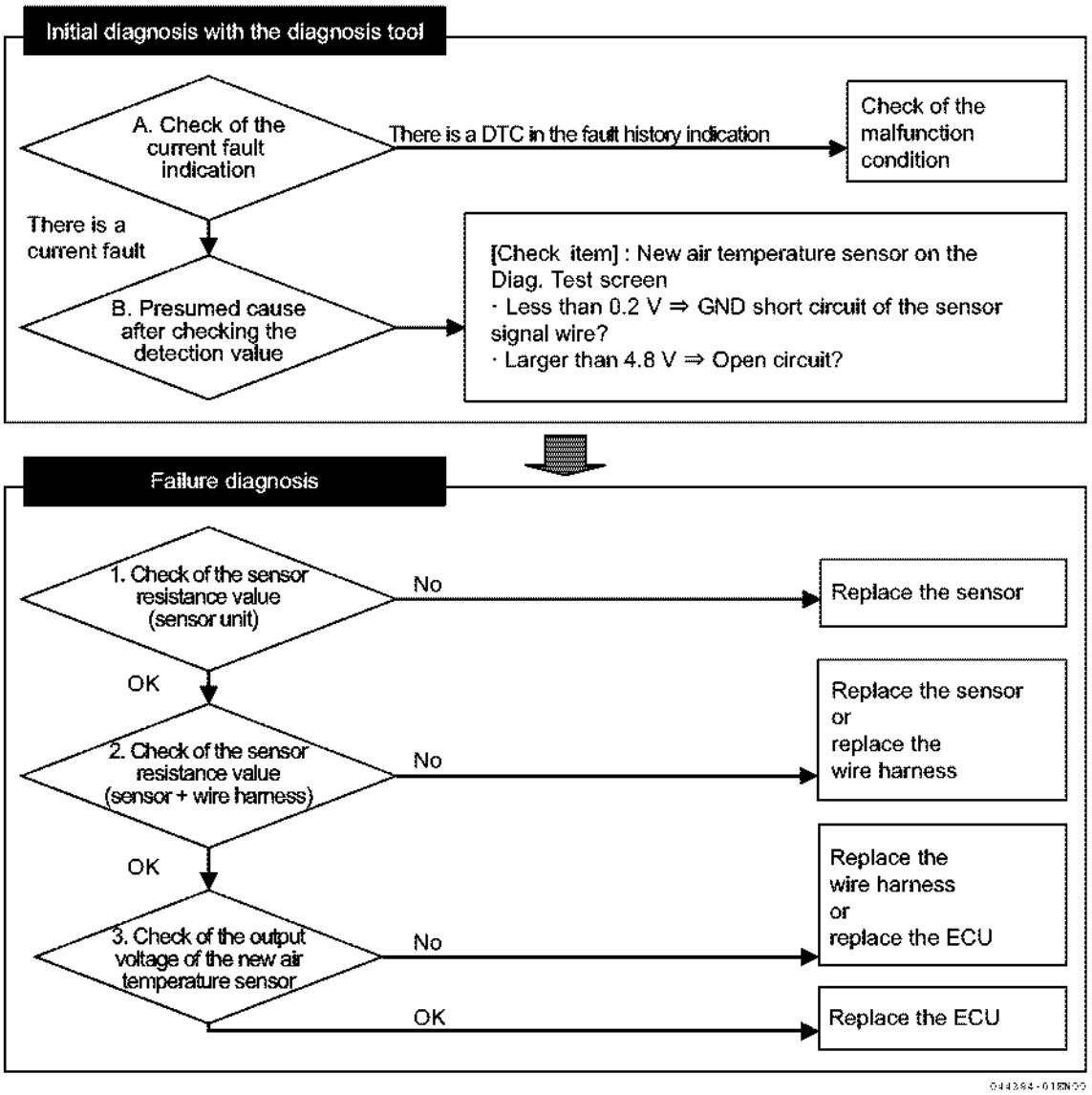
● Related DTC

P code	P0112	Name	New air temperature sensor fault (low voltage)
SPN/FMI	000AC/4		

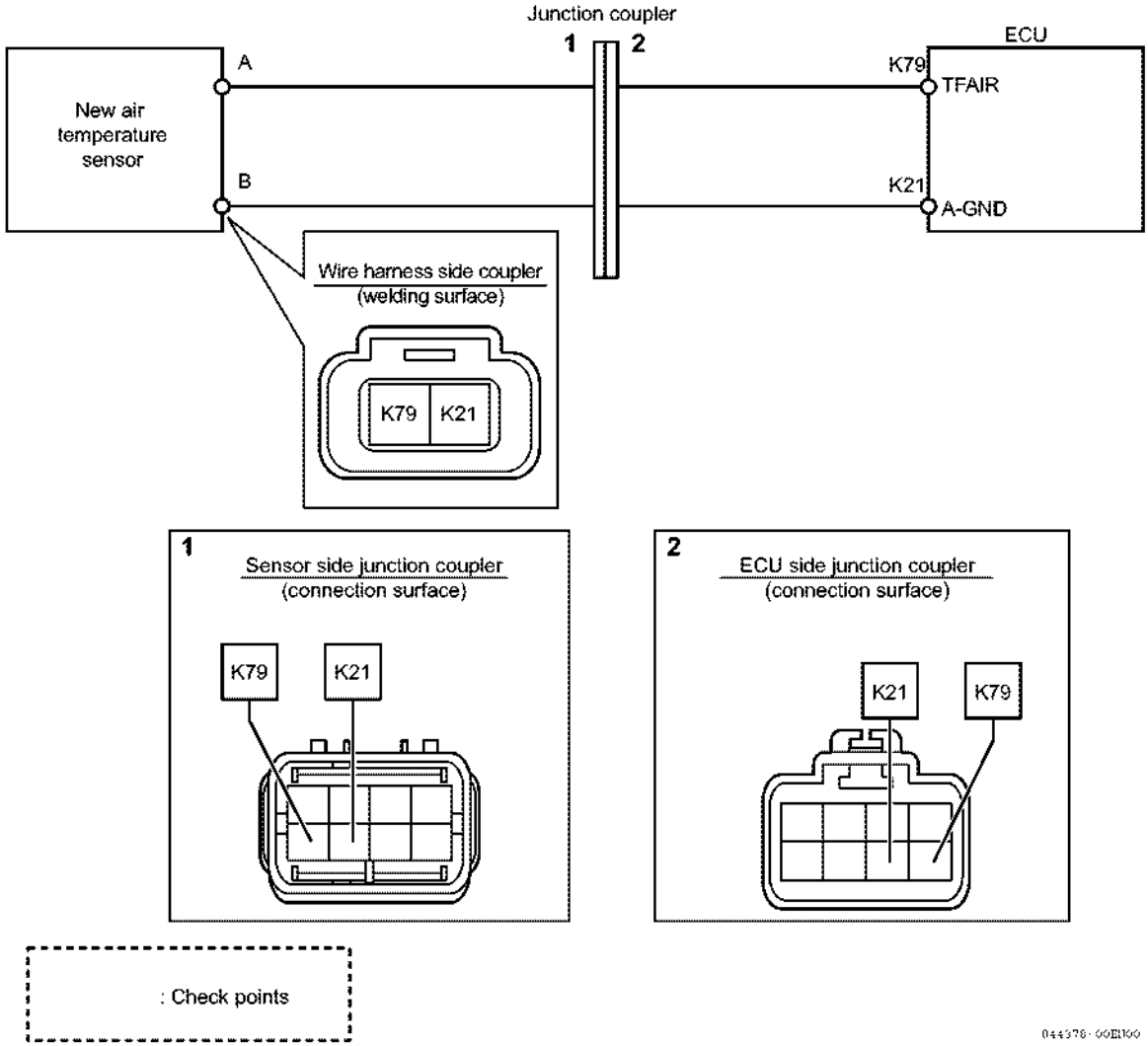
P code	P0113	Name	New air temperature sensor fault (high voltage)
SPN/FMI	000AC/3		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram

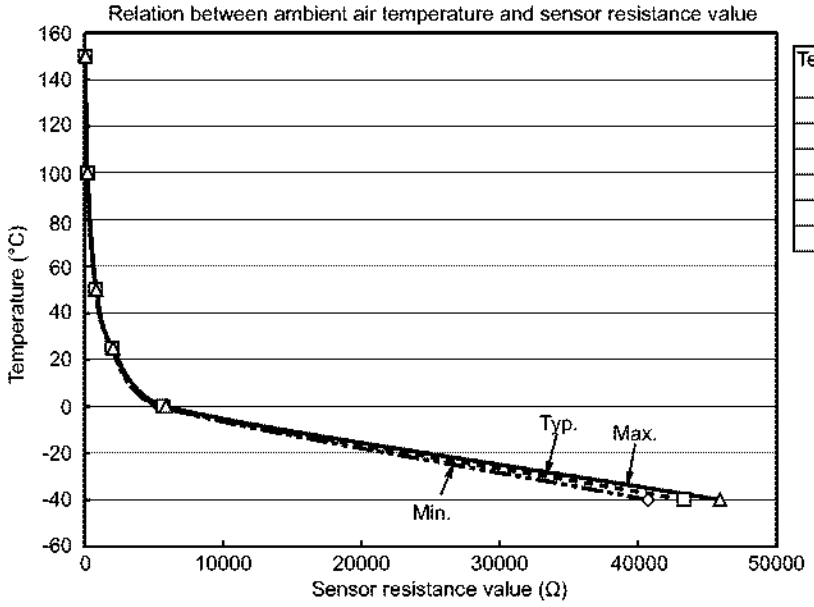


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the new air temperature sensor.
   2- Using the circuit tester, measure the resistance value between the new air temperature sensor terminals A and B.
   3- Refer to the following diagram "New air temperature sensor characteristics" to check that the measured resistance value is in the normal range.

New air temperature sensor characteristics



Temperature (°C)	Sensor resistance value (Ω)		
	Min.	Typ.	Max.
-40	40720	43318	45918
0	5417	5652	5886
25	1940	2000	2060
50	783.6	812.8	842.1
100	177.1	186	194.4
150	54.48	57.96	61.44

113215-00EN00

Not OK	Replace the new air temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire-harness):"

2. Check of the sensor resistance value (sensor + wire-harness):
   1- Connect the new air temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K79 and K21.
   3- Refer to the above diagram "New air temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the new air temperature sensor:"

3. Check of the output voltage of the new air temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the new air temperature sensor signals K79 and A21.

Voltage value	State	Treatment
K79 < 0.15 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.15 V ≤ K79 ≤ 4.85 V	OK (Normal range)	Replace the ECU.
4.85 V < K79	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ Rail pressure sensor

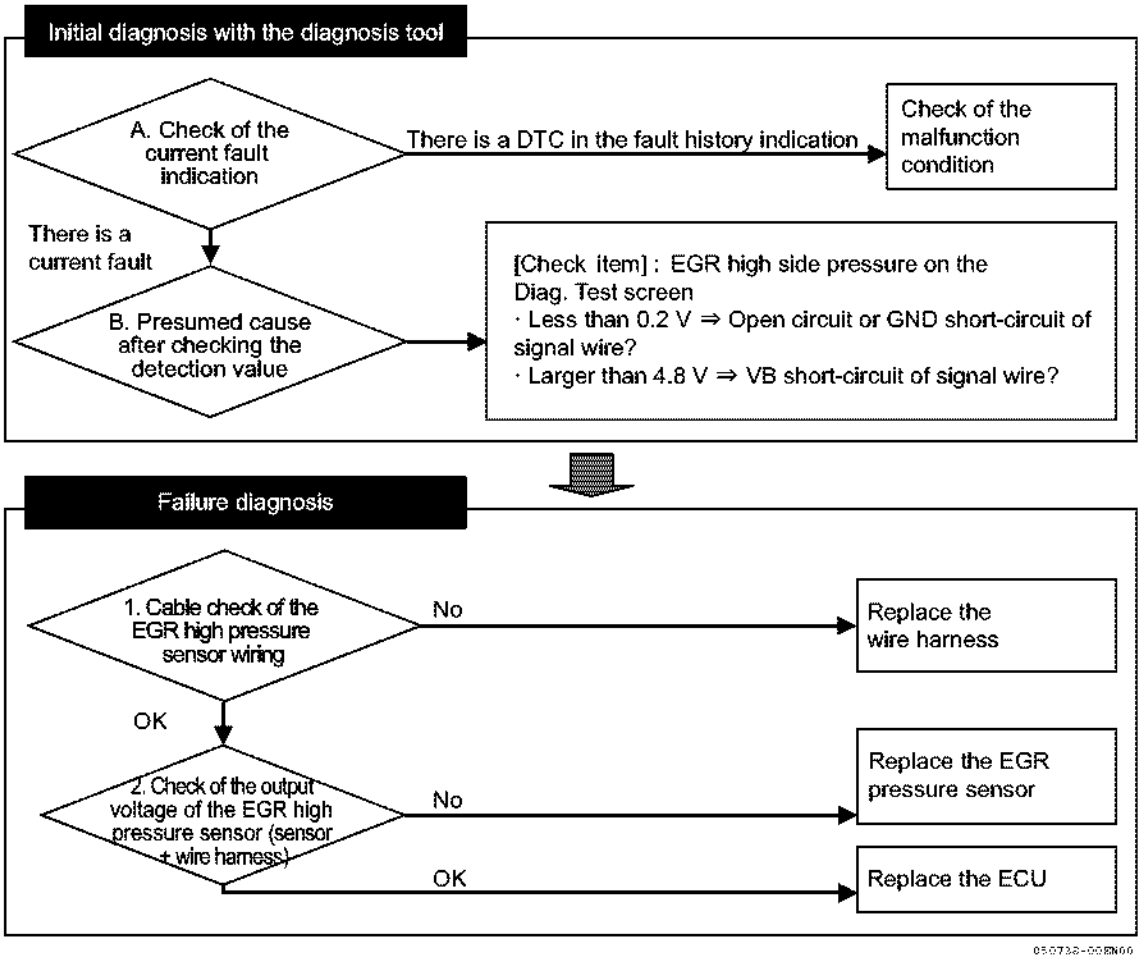
● Related DTC

P code	P0193	Name	Rail pressure sensor fault (High voltage)
SPN/FMI	0009D/3		

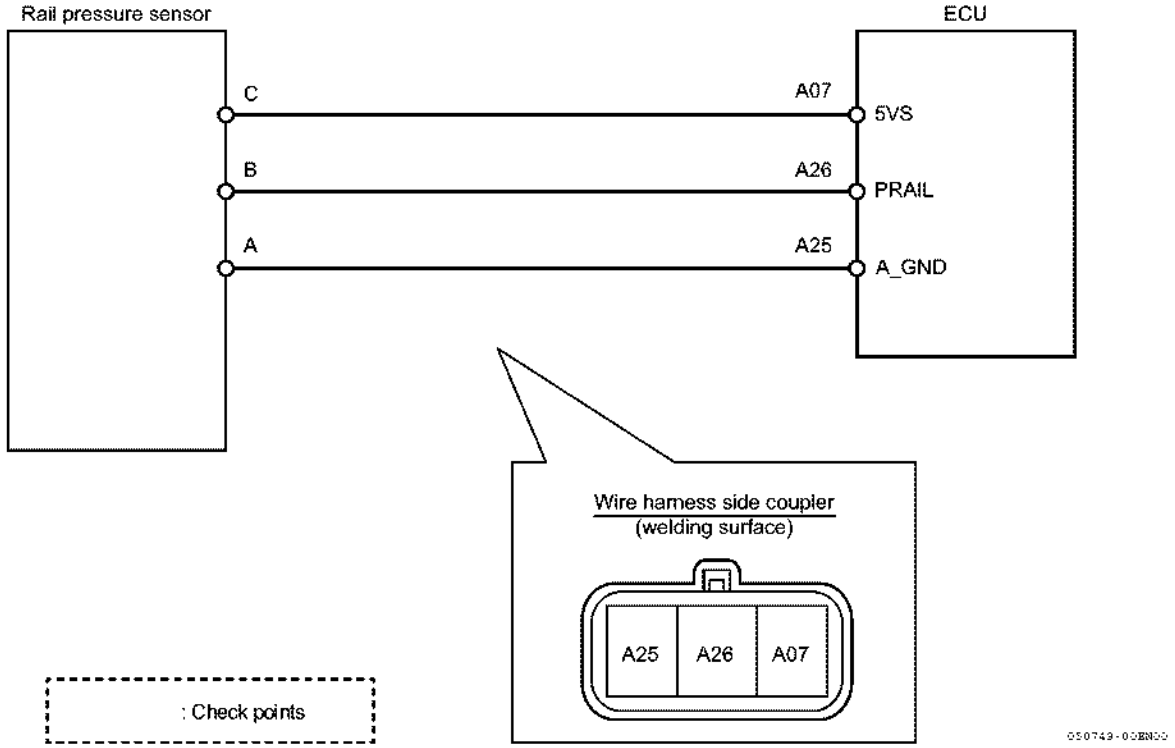
P code	P0192	Name	Rail pressure sensor fault (Low voltage)
SPN/FMI	0009D/4		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Cable check of the rail pressure sensor wiring:
   1- Remove the wire harness from the rail pressure sensor and the ECU.
   2- Using the circuit tester, check the cable of the wire harness.

Terminal	Cable check	Condition
Between A and A25	OK	Normal
	Not OK	Wire harness failure
Between B and A26	OK	Normal
	Not OK	Wire harness failure
Between C and A07	OK	Normal
	Not OK	Wire harness failure

Not OK	• Check if the wire harness is damaged or there is mis-wiring. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the rail pressure sensor. (sensor + wire harness):"

2. Check of the output voltage of the rail pressure sensor. (sensor + wire harness):
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the rail pressure sensor signals K26 and K25.

Voltage value	State	Treatment
A26 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ A26 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < A26	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the rail pressure sensor. Then, check the output voltage again.
OK	Replace the ECU.

■ DPF differential pressure sensor

● Related DTC

P code	P2454	Name	DPF differential pressure sensor fault (Low voltage)
SPN/FMI	00CB3/4		

P code	P2455	Name	DPF differential pressure sensor fault (High voltage)
SPN/FMI	00CB3/3		

P code	P1454	Name	DPF high pressure side sensor fault (Low voltage)
SPN/FMI	00E19/4		

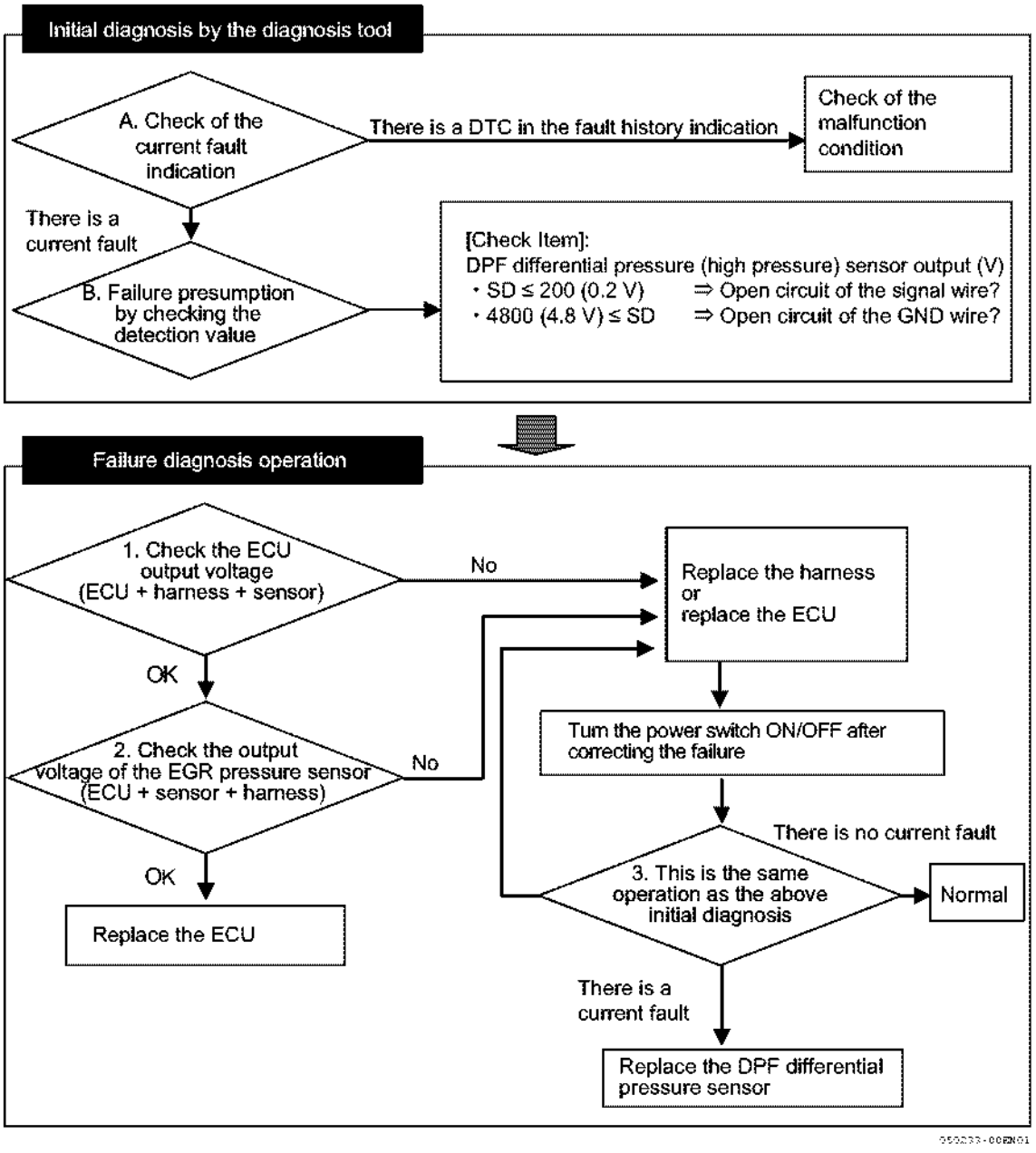
P code	P1455	Name	DPF high pressure side sensor fault (High voltage)
SPN/FMI	00E19/3		

P code	P2453	Name	DPF differential pressure sensor (Abnormal learning value)
SPN/FMI	00CB3/13		

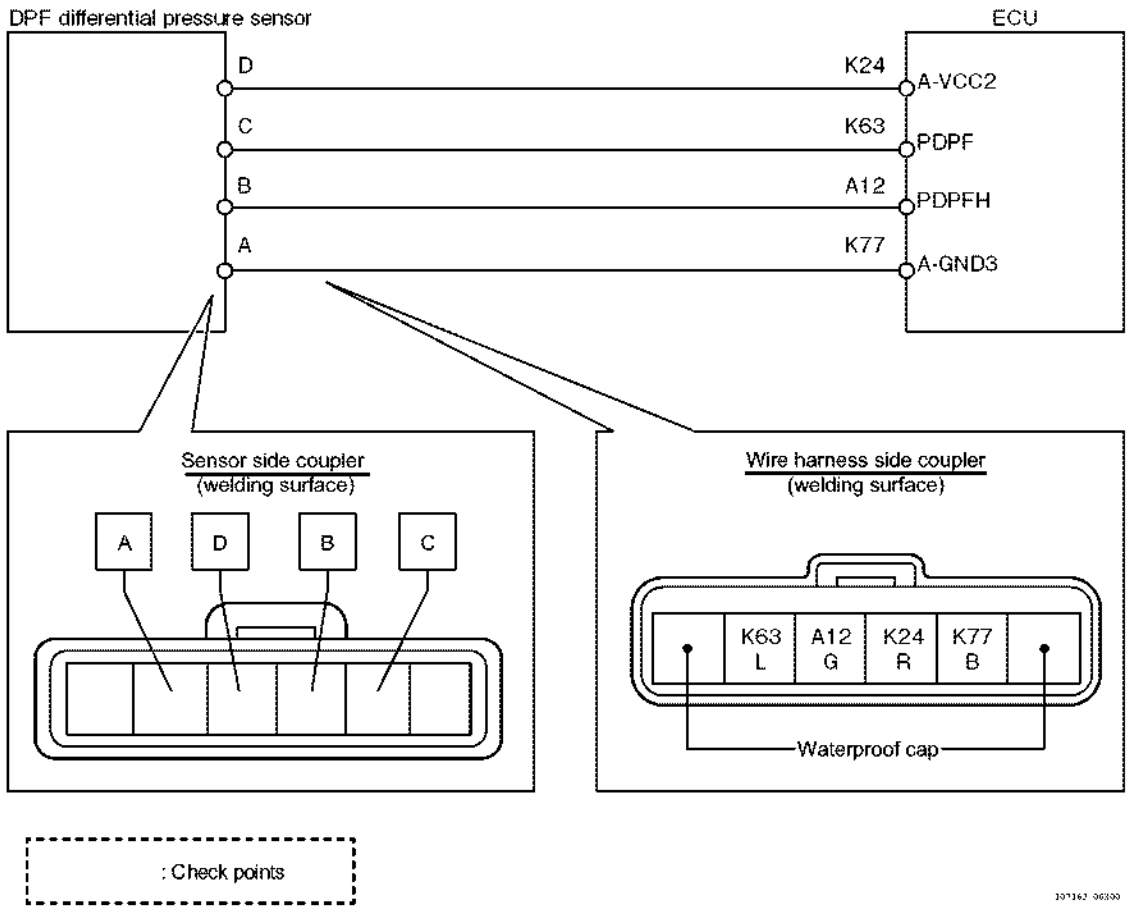
P code	P2452	Name	DPF differential pressure sensor differential pressure abnormal high
SPN/FMI	00CB3/0		

● **Workflow**

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check the ECU output voltage:
   1- Connect the checker wire harness between the ECU and the wire harness on the equipment. Also, connect all connectors (sensors and wire harness ECU).
   2- Use the circuit tester to measure the voltage value between the DPF differential pressure sensor 5 V K24 - K77.

Voltage value	Condition	Corrective action
K24 < 4.375 V	Not OK	• Replace the wire harness. • Replace the ECU.
4.375 V ≤ K24 ≤ 5.625 V	OK (Normal range)	Check the output voltage of the DPF differential pressure sensor.
5.625 V < K24	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the wire harness or the ECU. Turn the power switch OFF/ON and perform the diagnosis using the SMART ASSIST-Direct (SA-D).
OK	Refer to "Check the output voltage of the DPF differential pressure sensor:"

2. Check the output voltage of the DPF differential pressure sensor:
   1- Connect the checker wire harness between the ECU and the wire harness on the equipment. Also, connect all connectors (sensors and wire harness ECU).
   2- Use the circuit tester to measure the voltage value between the sensor signals K63 - K77.

Voltage value	Condition	Corrective action
K63 < 0.5 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.5 V ≤ K63 ≤ 4.5 V	OK (Normal range)	Replace the ECU.
4.5 V < K63	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	Replace the wire harness or the ECU. Turn the power switch OFF/ON and perform the diagnosis using the SMART ASSIST-Direct (SA-D).
OK	Replace the ECU.

3. Check the output voltage of the DPF high pressure sensor:
   1- Connect the checker wire harness between the ECU and the wire harness on the equipment. Also, connect all connectors (sensors and wire harness ECU).
   2- Use the circuit tester to measure the voltage value between the sensor signals A12 - K77.

Voltage value	Condition	Corrective action
A12 < 0.5 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.5 V ≤ A12 ≤ 4.5 V	OK (Normal range)	Replace the ECU.

■ DPF inlet temperature sensor

● Related DTC

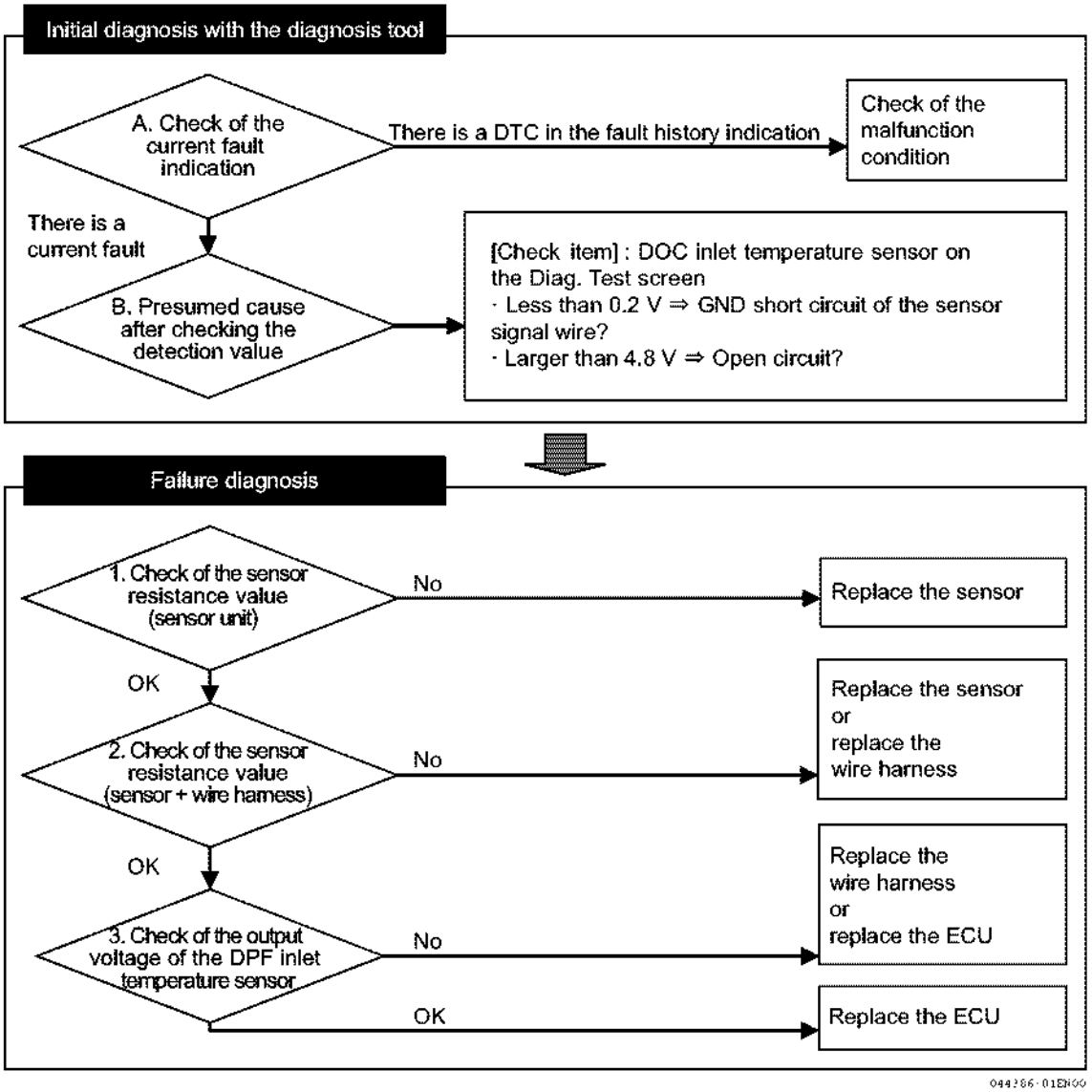
P code	P1427	Name	DPF inlet temperature sensor fault (low voltage)
SPN/FMI	00CAA/4		

P code	P1428	Name	DPF inlet temperature sensor fault (high voltage)
SPN/FMI	00CAA/3		

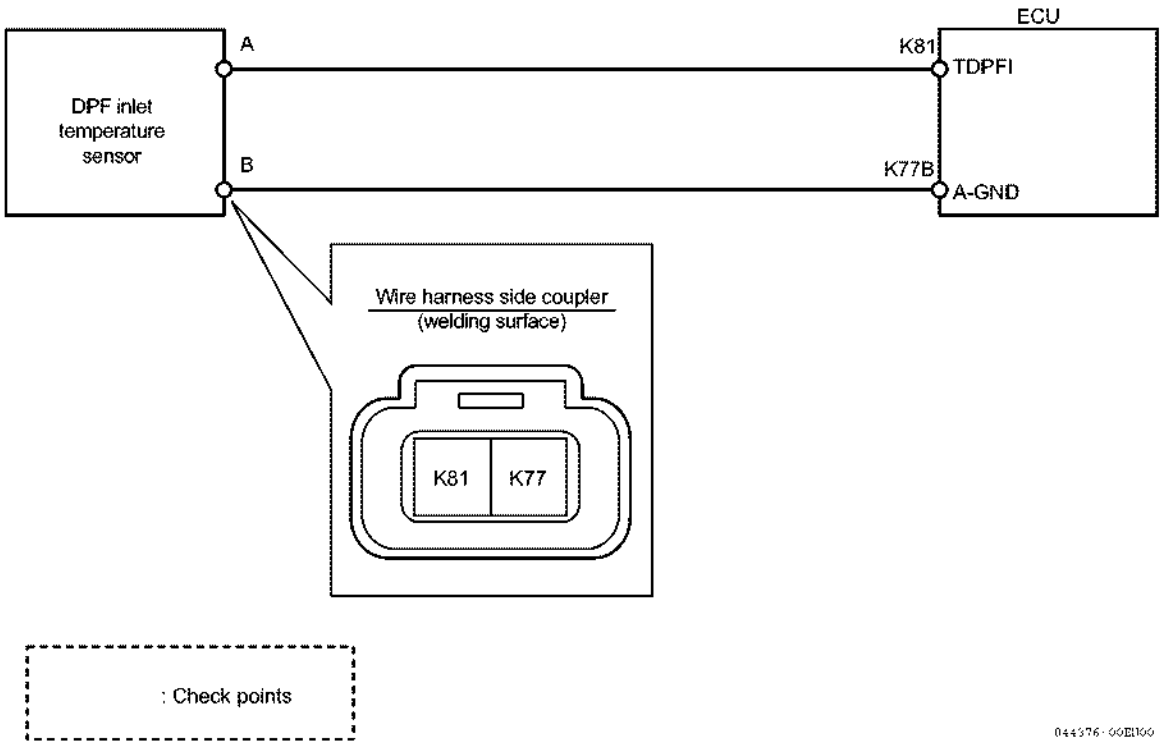
P code	P1436	Name	DPF inlet temperature sensor temperature abnormal high
SPN/FMI	00CAA/0		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**

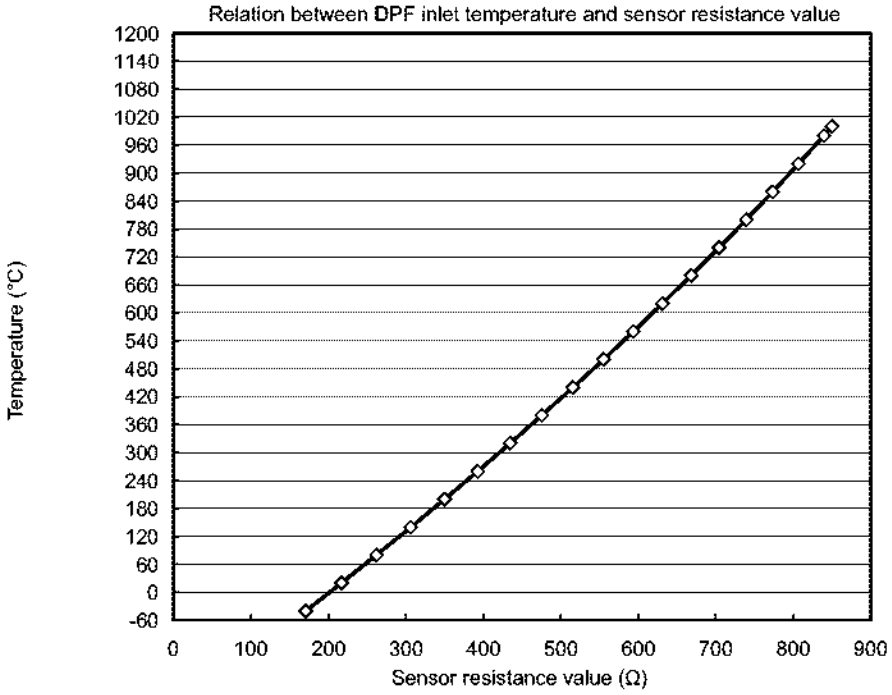


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the DPF inlet temperature sensor.
   2- Using the circuit tester, measure the resistance value between the DPF inlet temperature sensor terminals A and B.
   3- Refer to the following diagram "DPF inlet temperature sensor characteristics" to check that the measured resistance value is in the normal range.

DPF inlet temperature sensor characteristics



Temp. (°C)	Resistance[Ω]
-40	170.68
20	216.77
80	262.01
140	306.40
200	349.96
260	392.67
320	434.54
380	475.57
440	515.76
500	555.10
560	593.60
620	631.26
680	668.08
740	704.05
800	739.18
860	773.47
920	806.92
980	839.52
1000	850.20

11322U-00EN00

Not OK	Replace the DPF inlet temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire-harness):"

2. Check of the sensor resistance value (sensor + wire-harness):
   1- Connect the DPF inlet temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K81 and K77B.
   3- Refer to the above diagram "DPF inlet temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the DPF inlet temperature sensor:"

3. Check of the output voltage of the DPF inlet temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the DPF inlet temperature sensor signals K81 and K77B.

Voltage value	State	Treatment
K81 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K81 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K81	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ DPF intermediate temperature sensor

● Related DTC

P code	P1435	Name	DPF intermediate temperature sensor fault (low voltage)
SPN/FMI	00CB2/4		

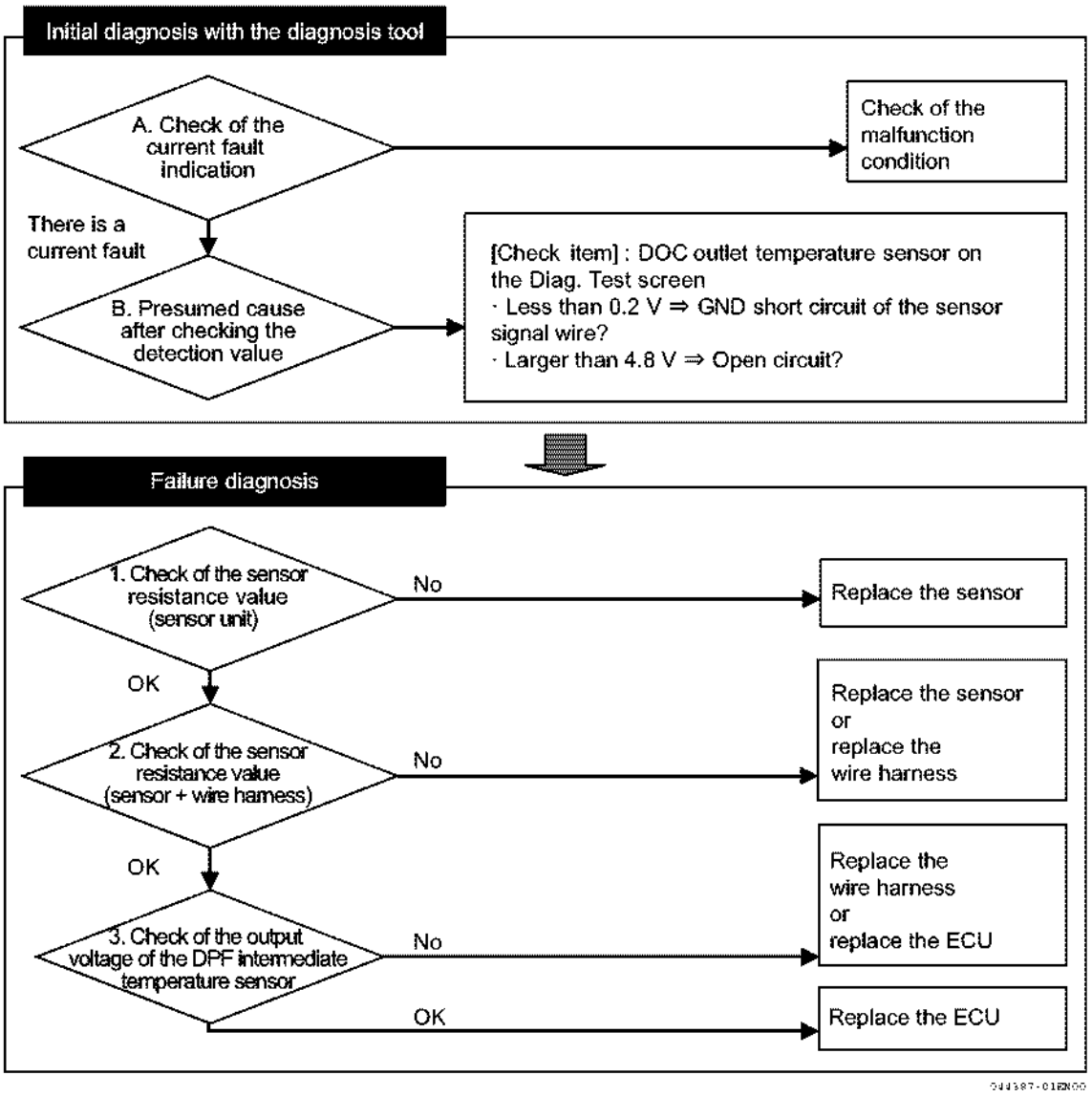
P code	P1434	Name	DPF intermediate temperature sensor fault (high voltage)
SPN/FMI	00CB2/3		

P code	P0420	Name	DPF intermediate temperature sensor temperature abnormal low temperature
SPN/FMI	00CB2/1		

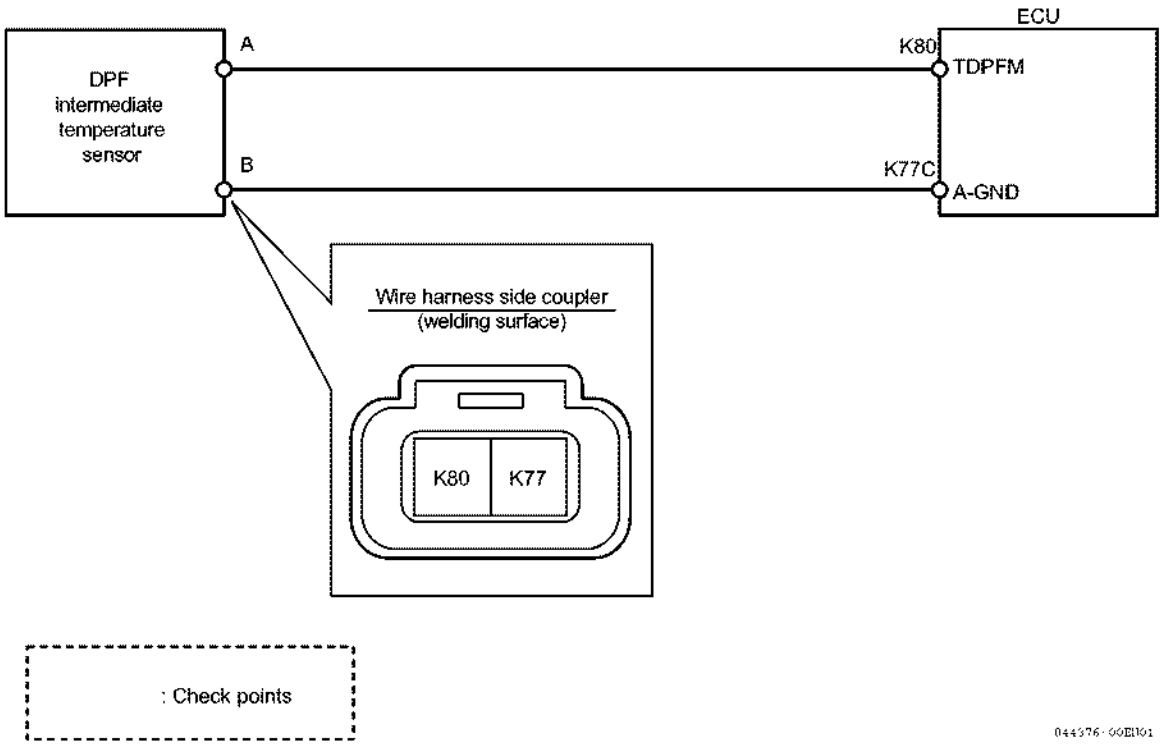
P code	P1426	Name	DPF intermediate temperature sensor temperature abnormal high (post-injection failure)
SPN/FMI	00CB2/0		

● **Workflow**

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**

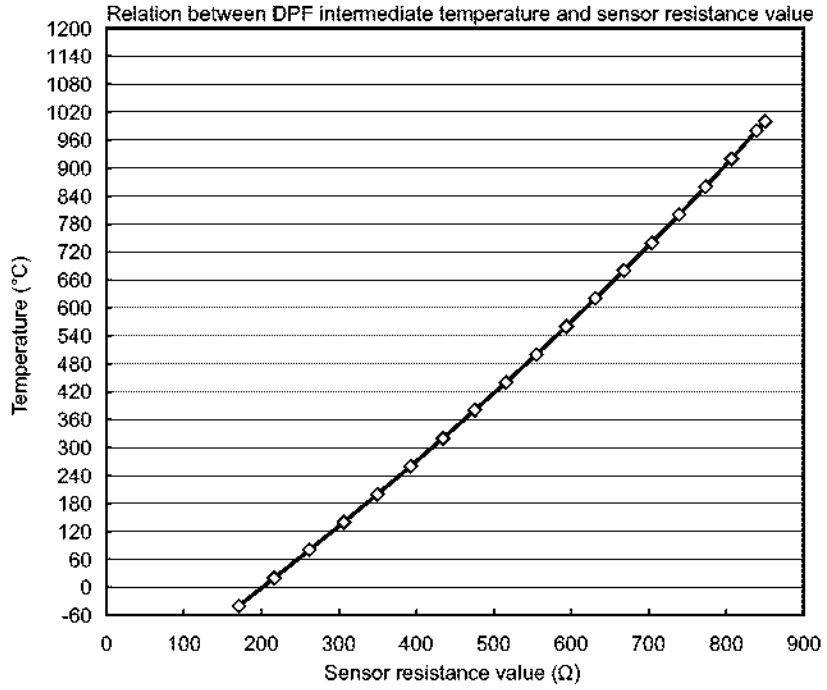


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the DPF intermediate temperature sensor.
   2- Using the circuit tester, measure the resistance value between the DPF intermediate temperature sensor terminals A and B.
   3- Refer to the following diagram "DPF intermediate temperature sensor characteristics" to check that the measured resistance value is in the normal range.

DPF intermediate temperature sensor characteristics



Temp. (°C)	Resistance[Ω]
-40	170.68
20	216.77
80	262.01
140	306.40
200	349.96
260	392.67
320	434.54
380	475.57
440	515.76
500	555.10
560	593.60
620	631.26
680	668.08
740	704.05
800	739.18
860	773.47
920	806.92
980	839.52
1000	850.20

112457-00EN00

Not OK	Replace the DPF intermediate temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire harness):"

2. Check of the sensor resistance value (sensor + wire harness):
   1- Connect the DPF intermediate temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K80 and K77C.
   3- Refer to the above diagram "DPF intermediate temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the DPF intermediate temperature sensor:"

3. Check of the output voltage of the DPF intermediate temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the DPF intermediate temperature sensor signals K80 and K77C.

Voltage value	State	Treatment
K80 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K80 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K80	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ EGR gas temperature sensor

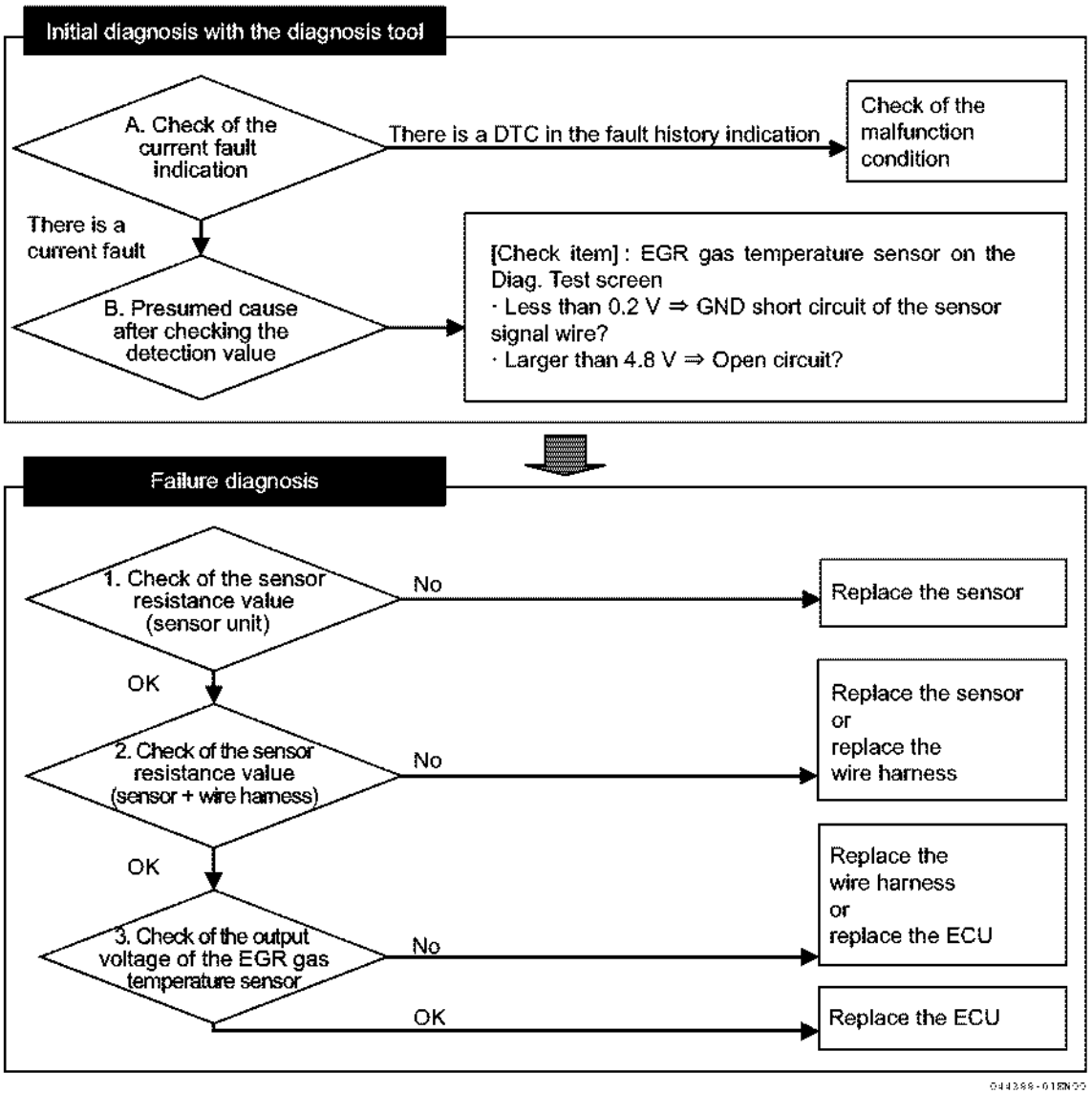
● Related DTC

P code	P041C	Name	EGR gas temperature sensor fault (low voltage)
SPN/FMI	0019C/4		

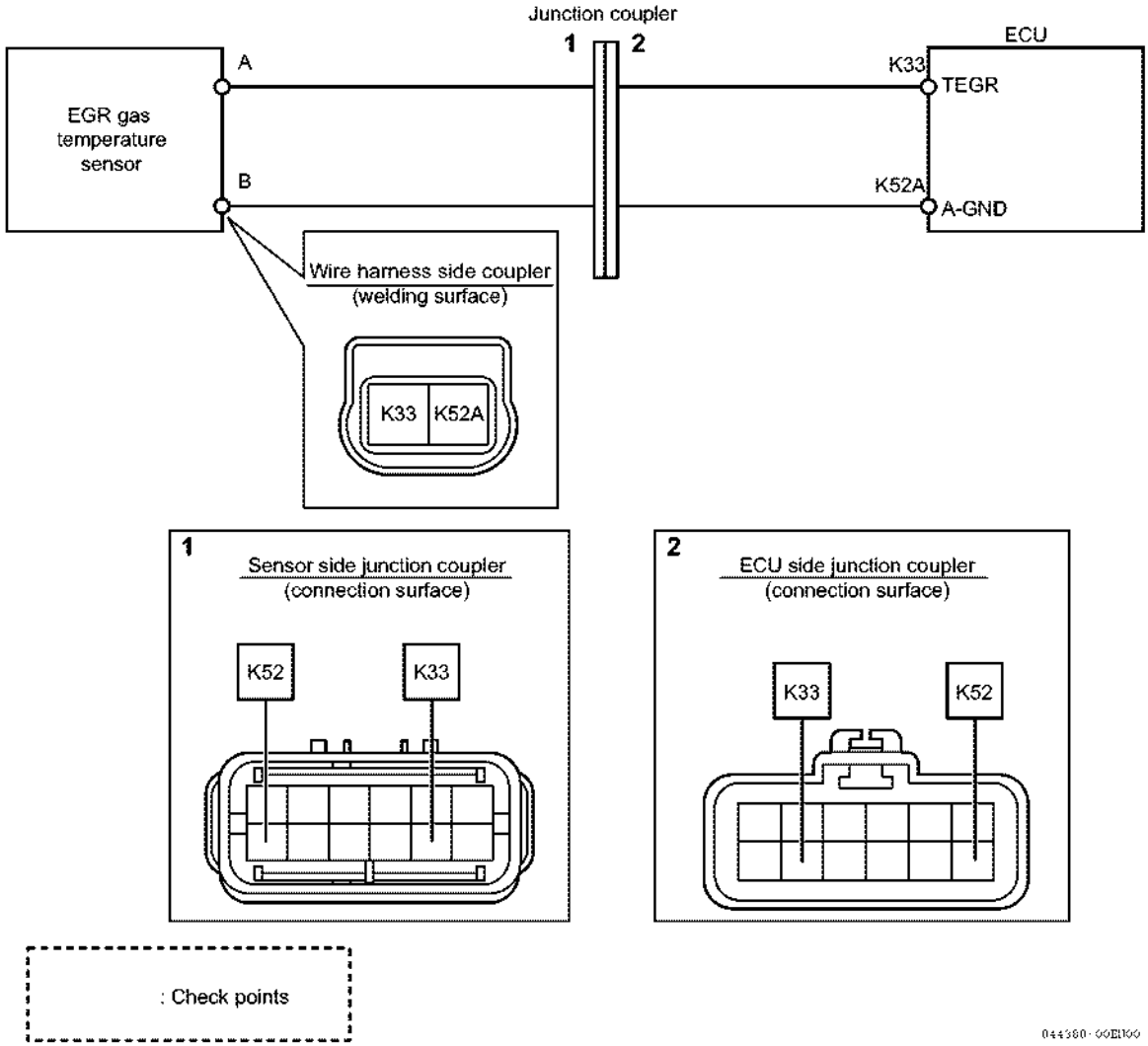
P code	P041D	Name	EGR gas temperature sensor fault (high voltage)
SPN/FMI	0019C/3		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram

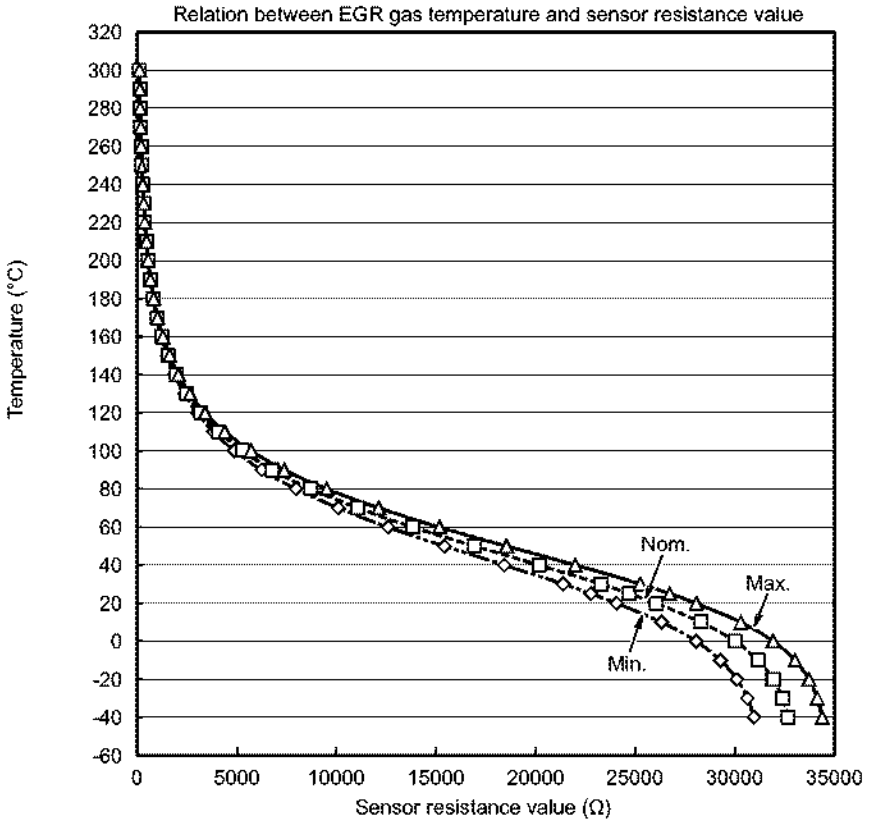


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the EGR gas temperature sensor.
   2- Using the circuit tester, measure the resistance value between the EGR gas temperature sensor terminals A and B.
   3- Refer to the following diagram "EGR gas temperature sensor characteristics" to check that the measured resistance value is in the normal range.

EGR gas temperature sensor characteristic



Temperature (°C)	Sensor resistance value (Ω)		
	Min.	Nom.	Max.
-40	30968	32683	34388
-30	30647	32402	34144
-20	30117	31926	33719
-10	29286	31159	33019
0	28057	29995	31927
10	26319	28308	30298
20	24067	26055	28069
25	22771	24727	26728
30	21380	23288	25253
40	18422	20169	21995
50	15421	16936	18541
60	12590	13838	15172
70	10081	11062	12120
80	7966	8708	9511
90	6245	6794	7385
100	4881	5277	5702
110	3816	4098	4398
120	2992	3191	3401
130	2357	2496	2641
140	1869	1964	2063
150	1491	1555	1623
160	1197	1241	1286
170	968.7	996.9	1026.7
180	789.3	807.5	826.0
190	647.7	658.6	669.6
200	535.2	541.0	546.7
210	440.2	447.4	454.7
220	364.6	372.5	380.6
230	303.9	312.1	320.5
240	255.0	263.2	271.6
250	215.2	223.2	231.3
260	182.7	190.3	198.3
270	156.0	163.2	170.8
280	133.8	140.7	147.8
290	115.5	121.8	128.5
300	100.1	106.1	112.2

113221-00E000

Not OK	Replace the EGR gas temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire harness):"

2. Check of the sensor resistance value (sensor + wire harness):
   1- Connect the EGR gas temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K33 and K52A.
   3- Refer to the above diagram "EGR gas temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the EGR gas temperature sensor:"

3. Check of the output voltage of the EGR gas temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the EGR gas temperature sensor signals K33 and K52A.

Voltage value	State	Treatment
K33 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K33 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K33	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ Intake manifold temperature sensor

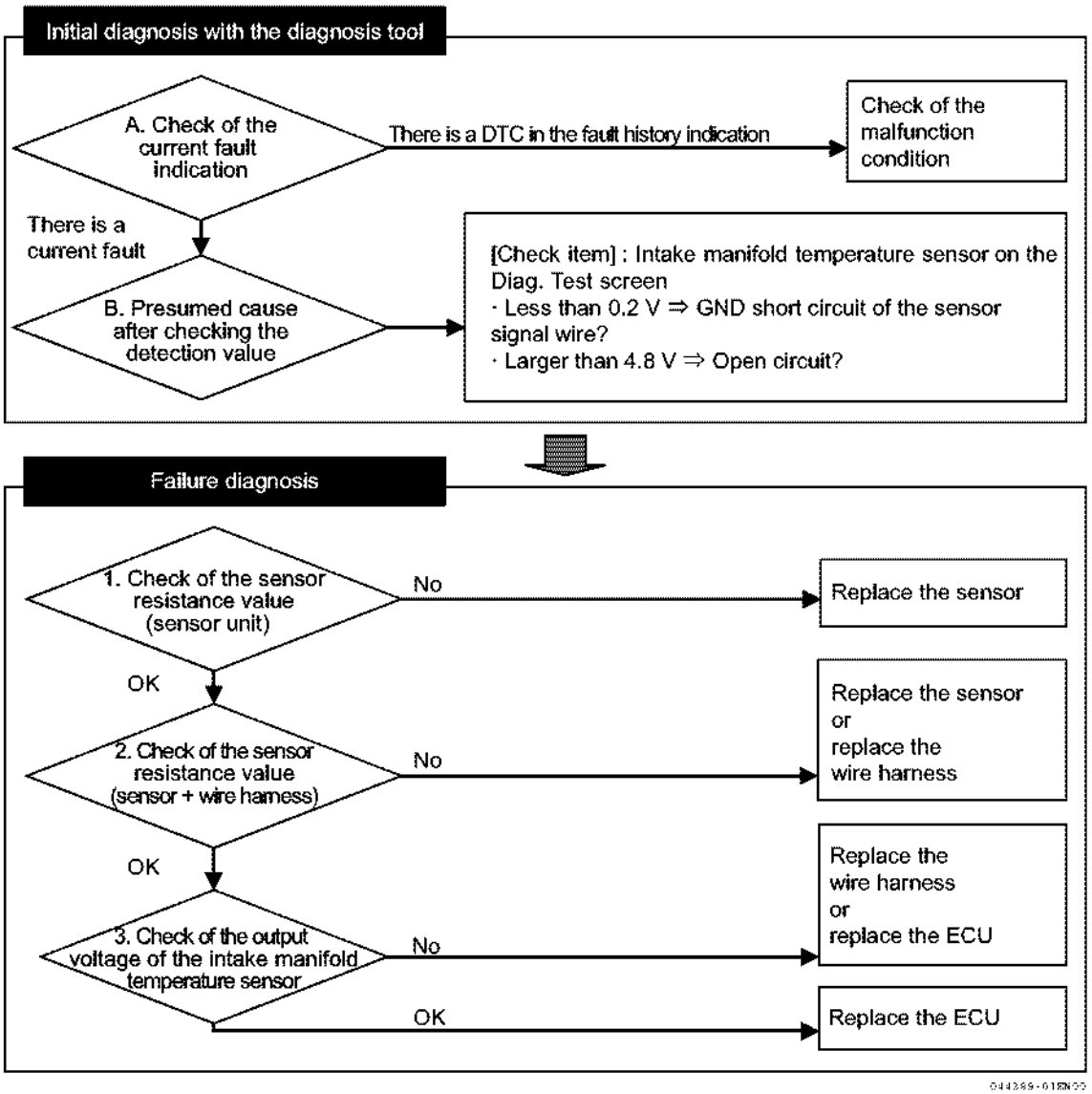
● Related DTC

P code	P040C	Name	Intake manifold temperature sensor fault (low voltage)
SPN/FMI	00069/4		

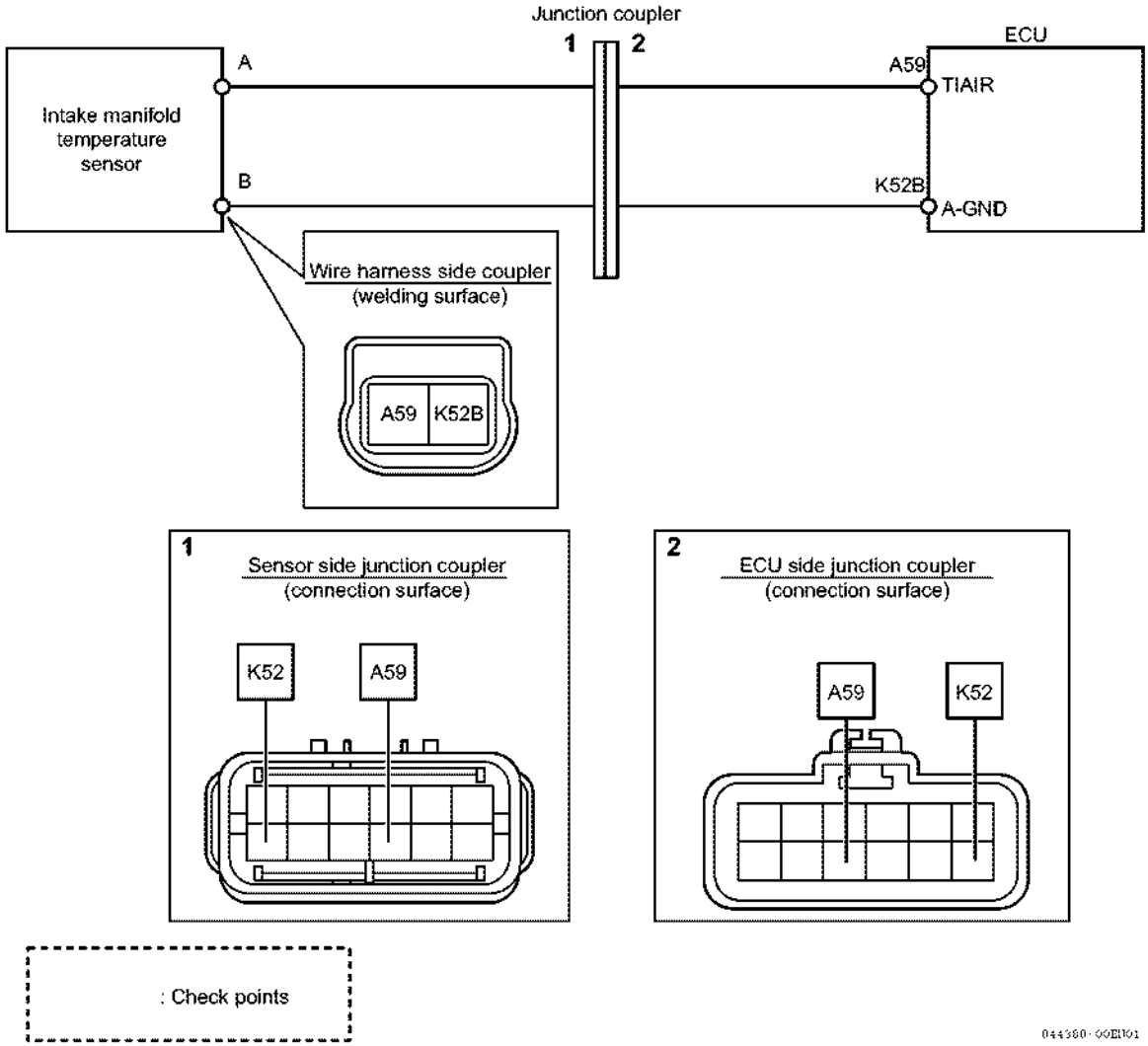
P code	P040D	Name	Intake manifold temperature sensor fault (high voltage)
SPN/FMI	00069/3		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram

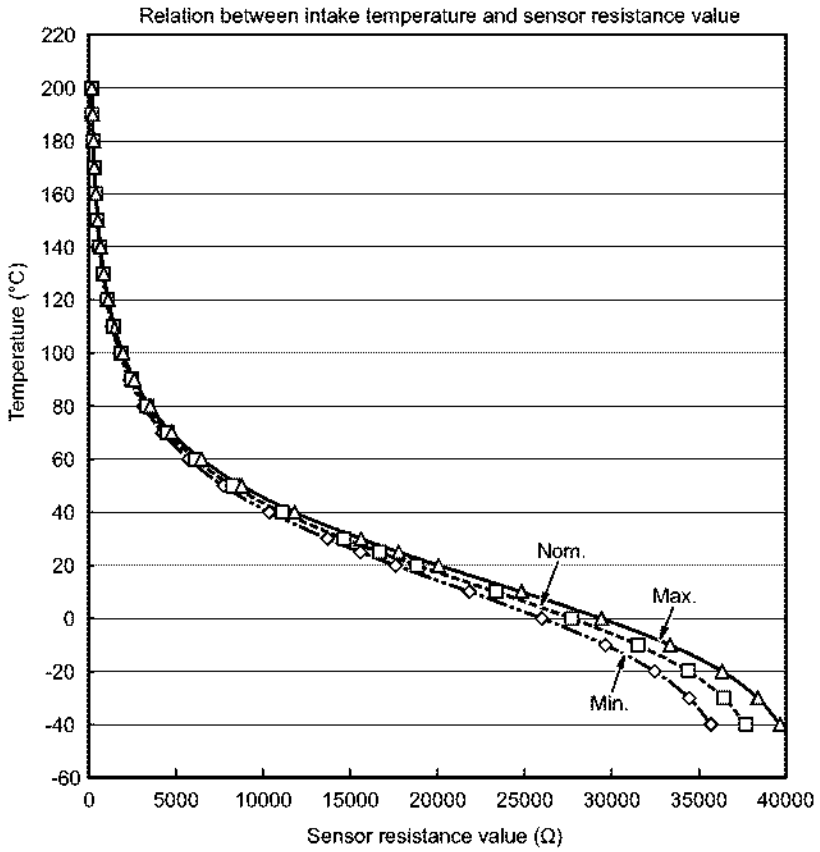


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the intake manifold temperature sensor.
   2- Using the circuit tester, measure the resistance value between the intake manifold temperature sensor terminals A and B.
   3- Refer to the following diagram "Intake manifold temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Intake manifold temperature sensor characteristics



Temp. (°C)	Resistance[Ω]		
	Min.	Nom.	Max.
-40	35699	37683	39656
-30	34434	36412	38374
-20	32455	34400	36325
-10	29633	31496	33339
0	26009	27723	29420
10	21858	23354	24838
20	17614	18847	20073
25	15595	16691	17782
30	13701	14664	15623
40	10386	11106	11825
50	7750	8273	8795
60	5742	6116	6488
70	4252	4516	4780
80	3162	3347	3534
90	2366	2499	2631
100	1787	1881	1975
110	1362	1431	1498
120	1050	1098	1148
130	816.2	852.3	888.3
140	641.2	667.8	694.6
150	508.9	528.5	548.1
160	405.3	422.1	438.9
170	325.9	340.2	354.4
180	264.4	276.5	288.7
190	216.2	226.6	236.9
200	178.2	187.1	196.1

113458-00EN0U

Not OK	Replace the intake manifold temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire harness):"

2. Check of the sensor resistance value (sensor + wire harness):
   1- Connect the intake manifold temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K59 and K52B.
   3- Refer to the above diagram "Intake manifold temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the intake manifold temperature sensor:"

3. Check of the output voltage of the intake manifold temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the intake manifold temperature sensor signals A59 and K52B.

Voltage value	State	Treatment
A59 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ A59 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < A59	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

■ Exhaust manifold temperature sensor

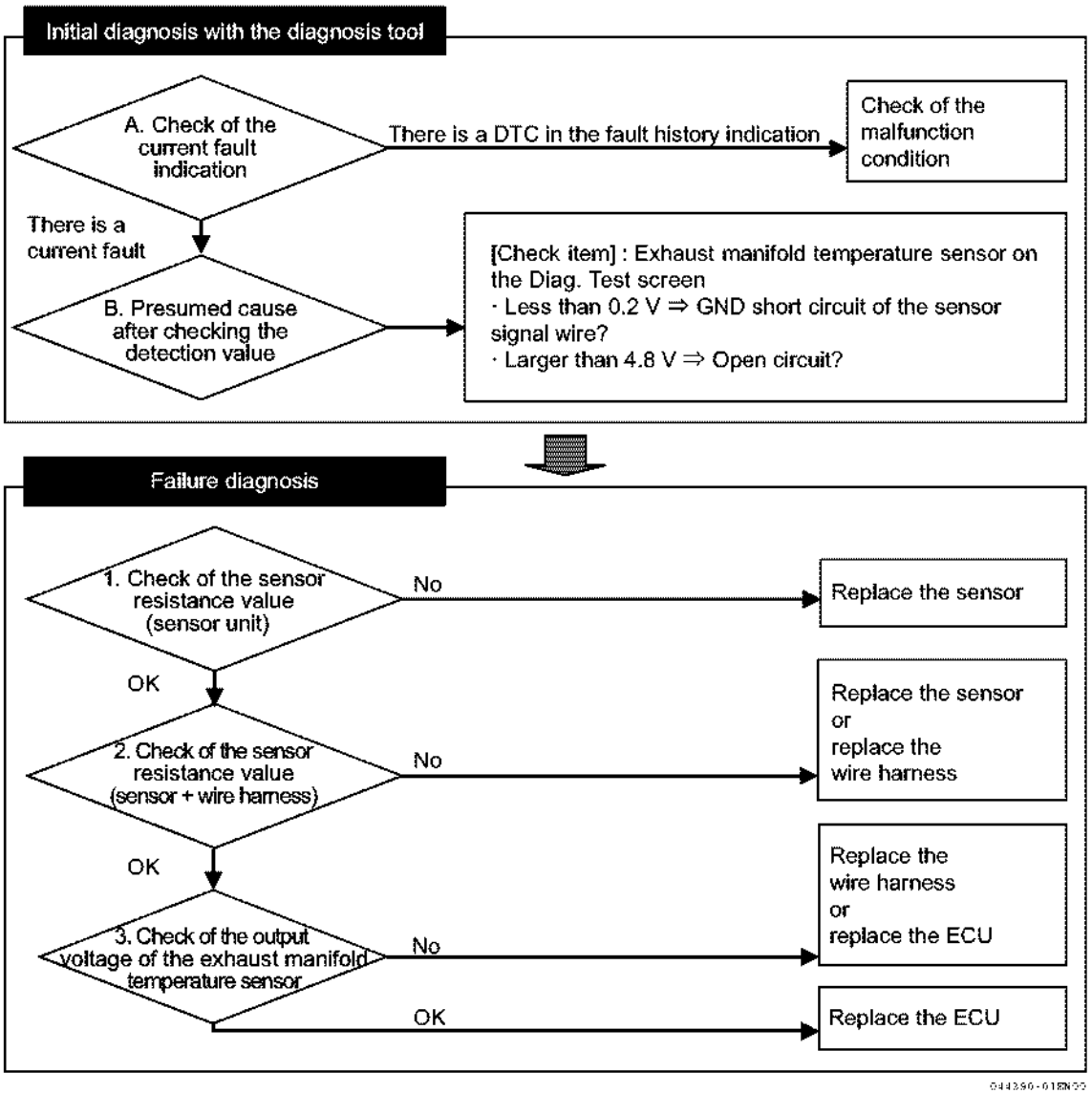
● Related DTC

P code	P0545	Name	Exhaust manifold temperature sensor fault (low voltage)
SPN/FMI	000AD/4		

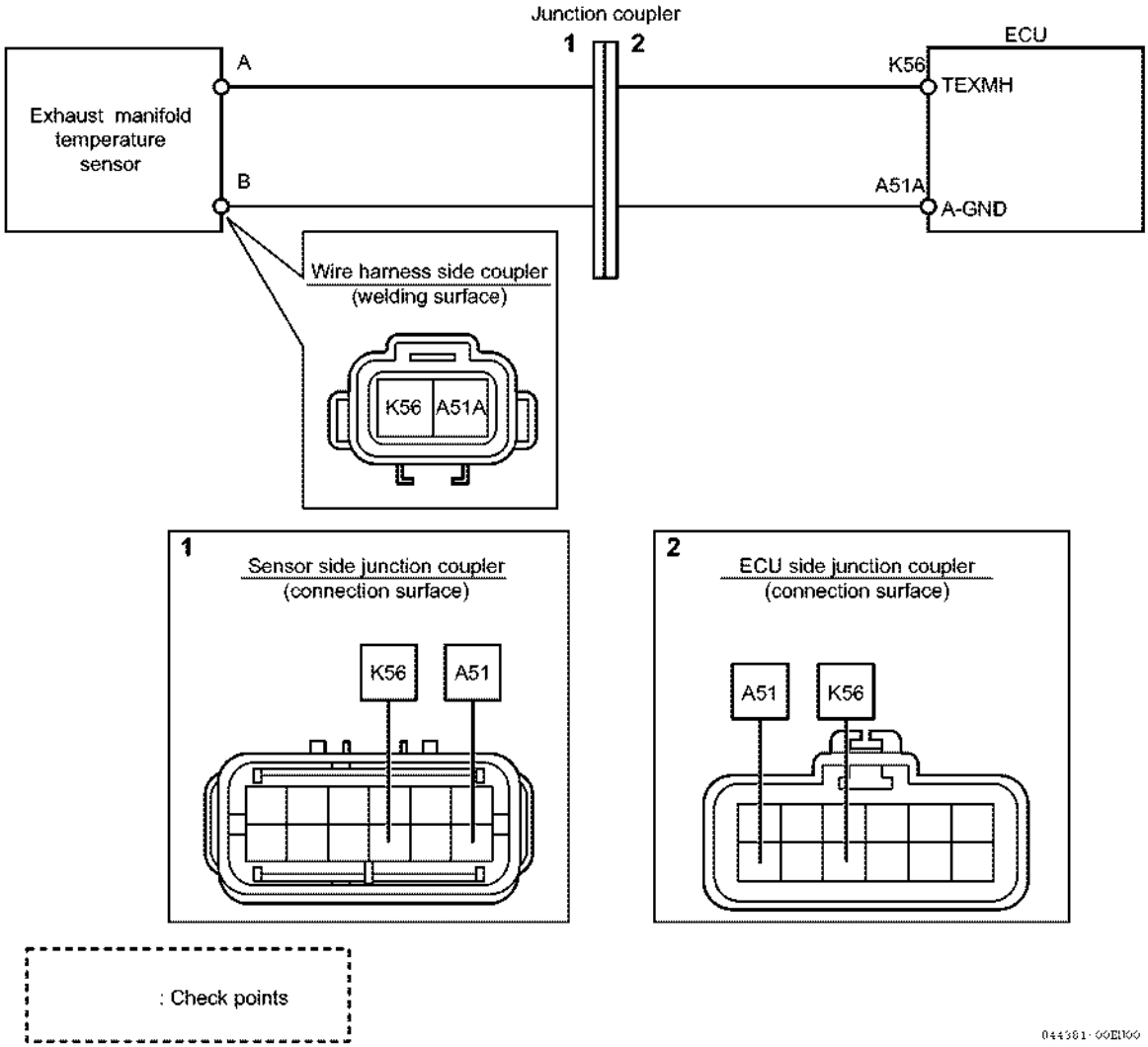
P code	P0546	Name	Exhaust manifold temperature sensor fault (high voltage)
SPN/FMI	000AD/3		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram

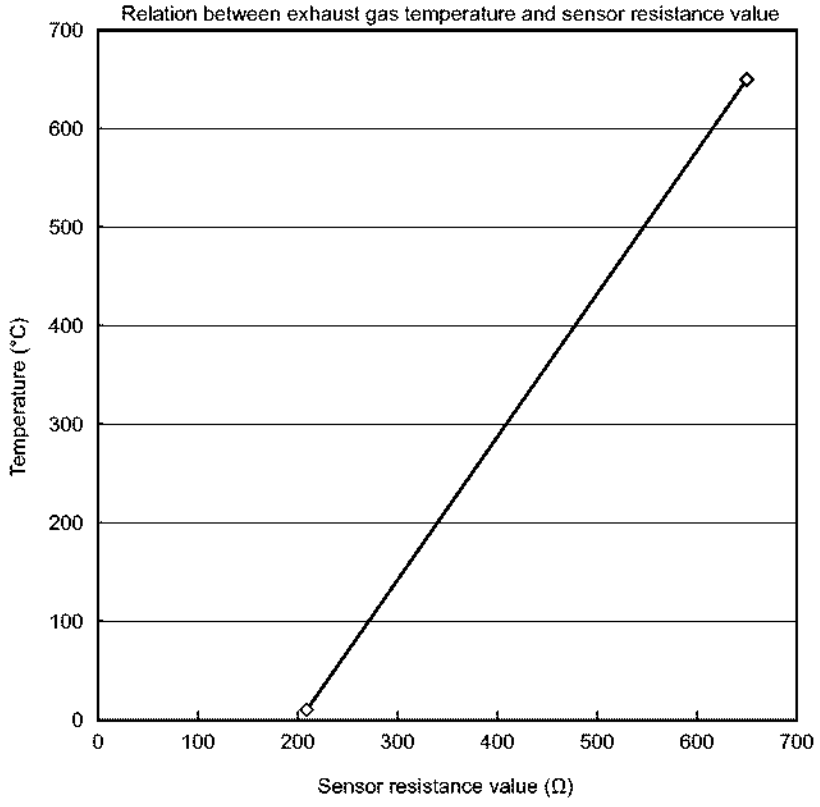


Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the sensor resistance value (sensor unit):
   1- Remove the wire harness from the exhaust manifold temperature sensor.
   2- Using the circuit tester, measure the resistance value between the exhaust manifold temperature sensor terminals A and B.
   3- Refer to the following diagram "exhaust manifold temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Exhaust manifold temperature sensor characteristics



Temperature (°C)	Sensor resistance value (Ω)
10	209.15
650	649.77

113222-00EN0U

Not OK	Replace the exhaust manifold temperature sensor.
OK	Refer to "Check of the sensor resistance value (sensor + wire harness):"

2. Check of the sensor resistance value (sensor + wire harness):
   1- Connect the exhaust manifold temperature sensor and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value between the ECU side wire harness connector terminals K56 and A51A.
   3- Refer to the above diagram "exhaust manifold temperature sensor characteristics" to check that the measured resistance value is in the normal range.

Not OK	• The coupler between the sensor and the wire harness may be defective. Replace the sensor. • Replace the wire harness.
OK	Refer to "Check of the output voltage of the exhaust manifold temperature sensor:"

3. Check of the output voltage of the exhaust manifold temperature sensor:
   1- Connect the checker harness between the ECU and the machine wire harness. Also, connect all connectors (sensor and ECU).
   2- Using the circuit tester, measure the voltage value between the exhaust manifold temperature sensor signals A56 and A51A.

Voltage value	State	Treatment
K56 < 0.2 V	Not OK	• Replace the wire harness. • Replace the ECU.
0.2 V ≤ K56 ≤ 4.8 V	OK (Normal range)	Replace the ECU.
4.8 V < K56	Not OK	• Replace the wire harness. • Replace the ECU.

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

Contact output related

■ Main relay

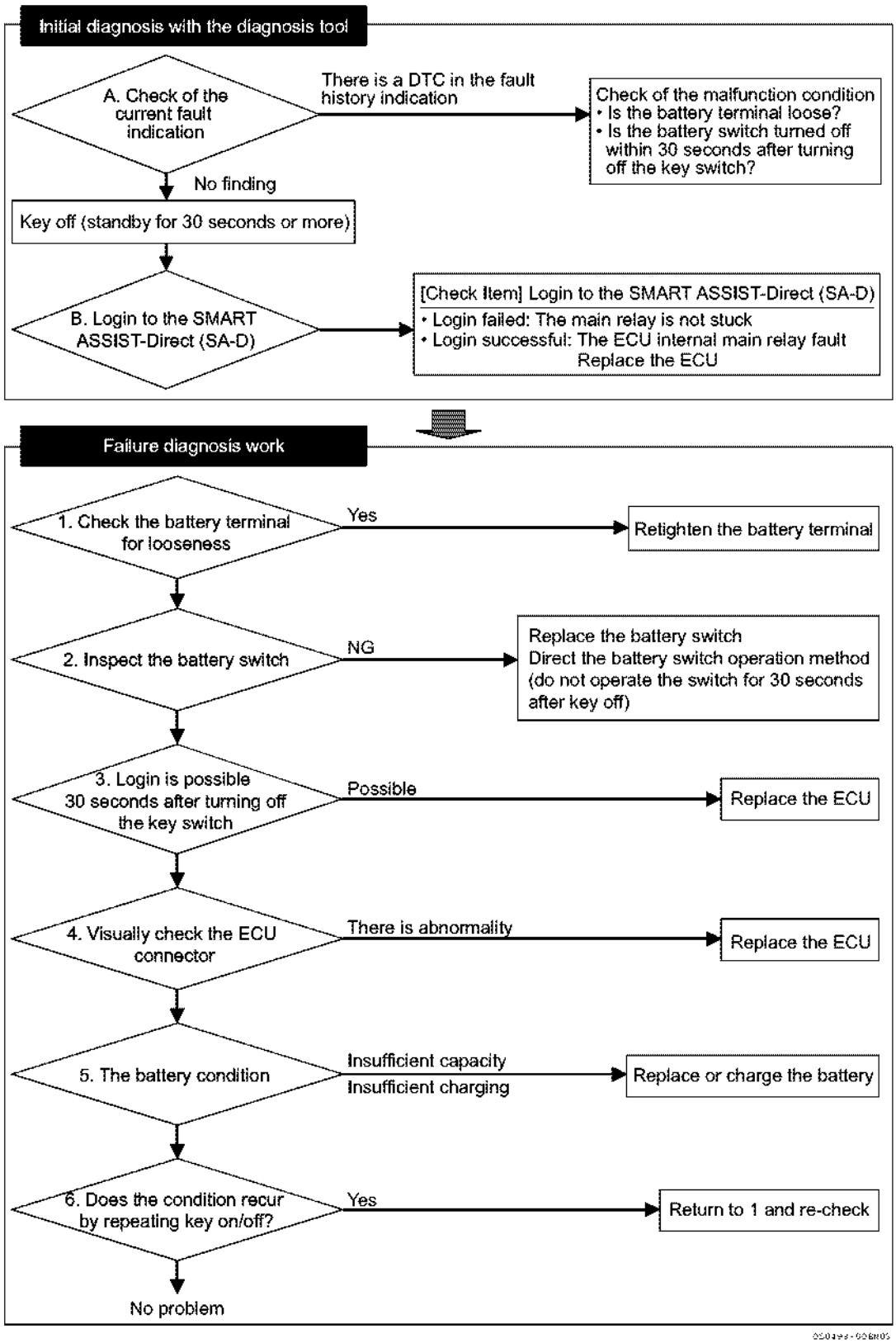
● Related DTC

P code	P068B	Name	Main relay contact stuck
SPN/FMI	0005CD/7		

P code	P068A	Name	Main relay early opening
SPN/FMI	0005CD/2		

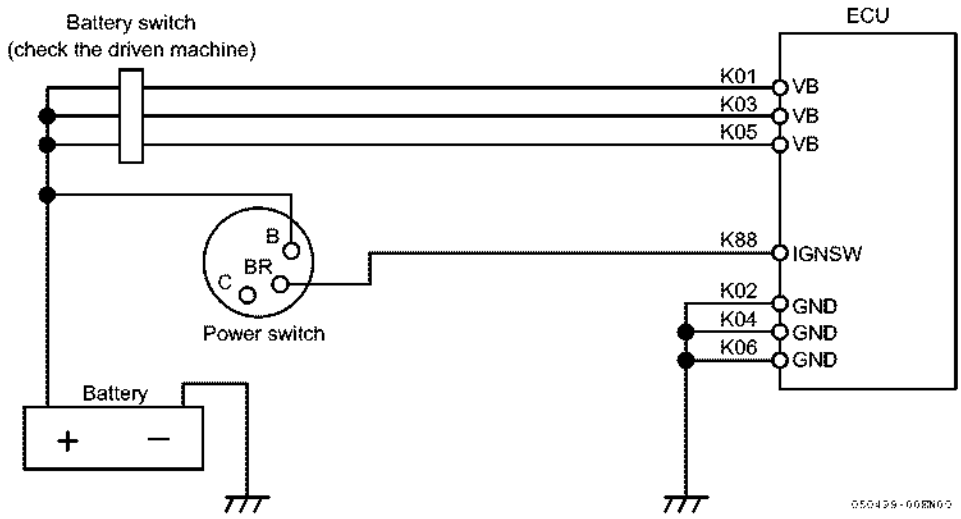
● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**

Note: The main relay is equipped with an ECU.



Note: For the ECU pin layout, refer to P5-287.

● **Work description**

1. Check the battery terminal for looseness
   - Check whether or not the wiring from the battery to the ECU VB terminal is loose or damaged.
   - Check whether or not the joints to the battery GND terminal and the frame are loose.
   - Check whether or not the wiring from the ECU GND terminal to the frame GND is loose or damaged.
   - Check whether or not the wiring from the ECU IGN terminal to the key switch is loose or damaged.

2. Inspect the battery switch
   Depending on the driven machine, there is a battery switch for the purpose of long-term storage besides the key switch. For details, contact the driven machine manufacturer.
   - Check the wiring of the battery switch for looseness.
   - Check the battery switch for abnormality.
   - Do not perform the cutoff operation of the battery switch within 30 seconds after the key off. Direct the operation method to the operator.

3. Login check to the SMART ASSIST-Direct (SA-D)
   When 30 seconds or more are elapsed after turning off the key switch, the ECU operation stops completely. Connect the SMART ASSIST-Direct (SA-D) after the elapse of 30 seconds or more after the key off and check whether or not you can login. If you can login after the elapse of 30 seconds or more, there is a possibility that the ECU internal main relay is faulty. Replace the ECU.

4. Visually check the ECU connector
   Visually check the VB pins (K01, K03, K05) and the GND pins (K02, K04, K06) of the ECU connector. If there is broken or bent pin, replace the ECU.

5. The battery condition
   The insufficient battery charging or the battery capacity reduction may lead to the supply voltage reduction, resulting in the early opening abnormality of the main relay. Inspect the battery.

6. Check the recurrence
   Repeat turning on/off the key switch for a few times and check that the concerned abnormality does not recur. If the abnormality recurs, perform the inspection again from Step 1. If the abnormality does not recur, there is no problem with the main relay.

■ Startup assist relay (Glow relay)

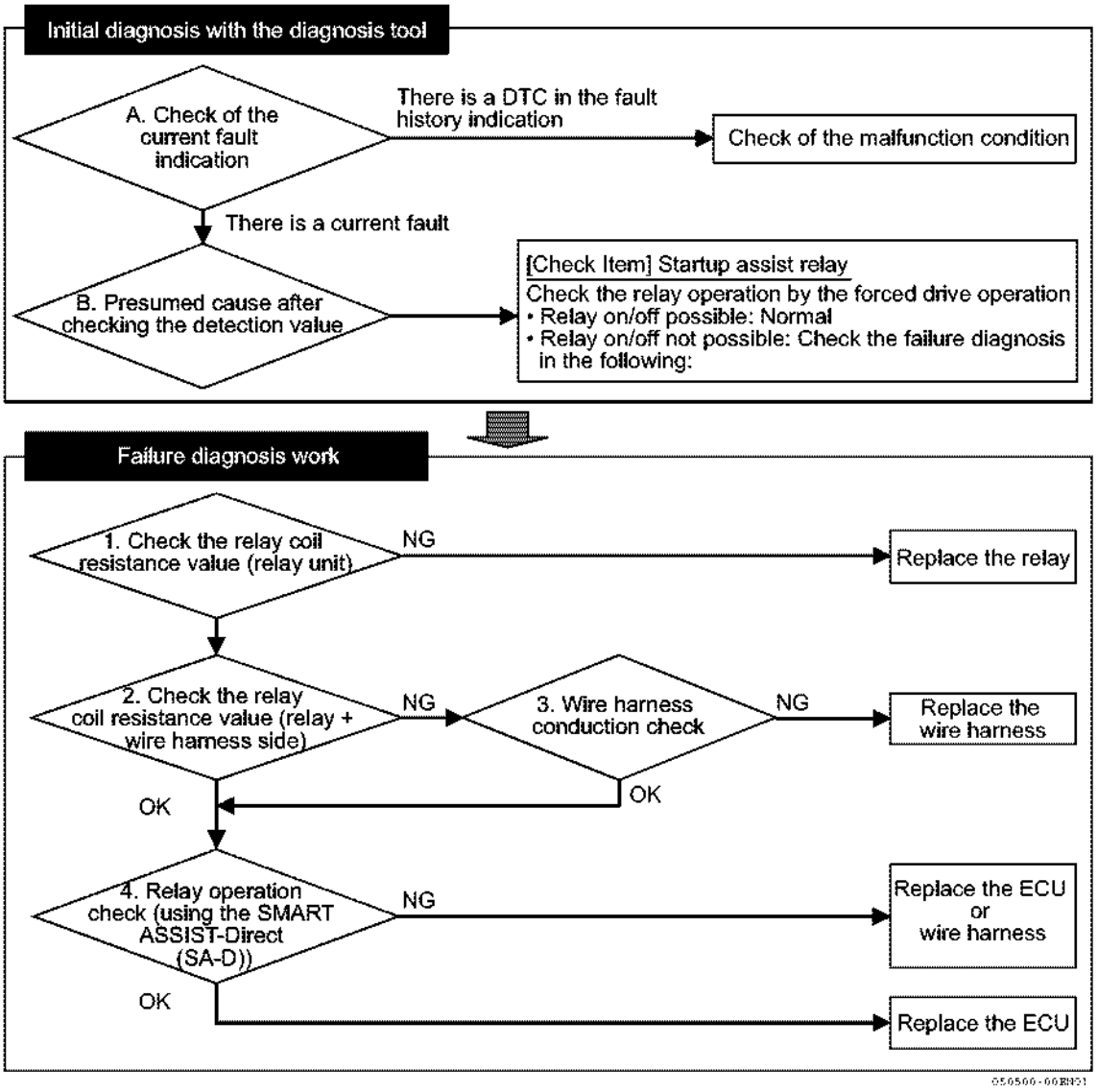
● Related DTC

P code	P0543	Name	Startup assist relay interrupted
SPN/FMI	7F803/5		

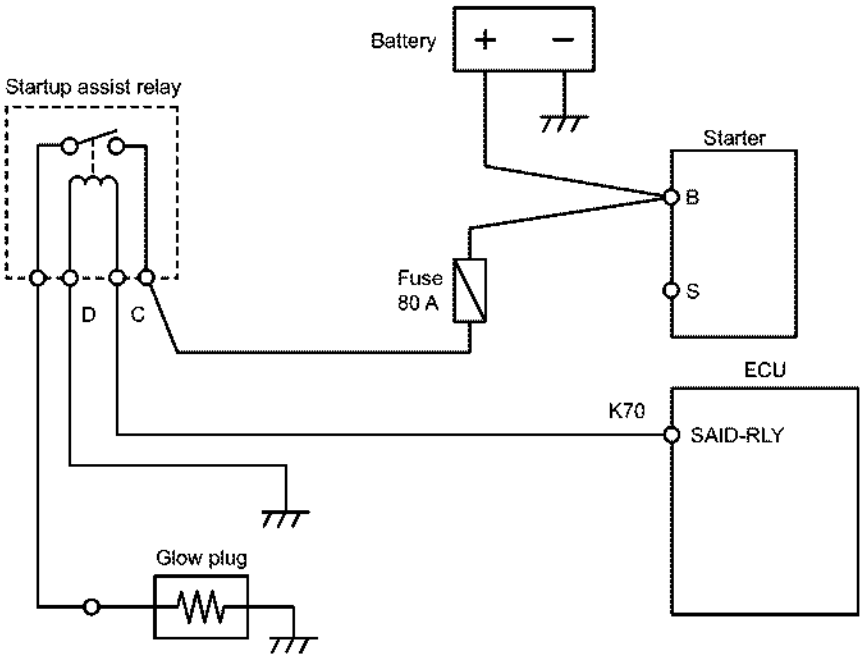
P code	P0541	Name	Startup assist relay GND interrupted
SPN/FMI	7F803/6		

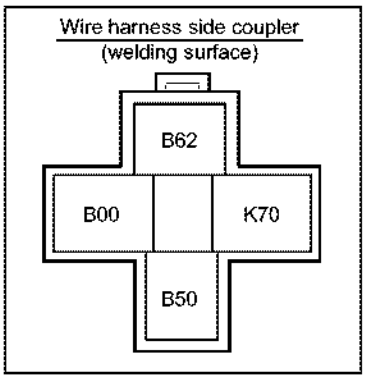
● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**





050501-00EN00

: Check points

Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check the relay coil resistance value (relay unit)
   1- Remove the wire harness from the startup assist relay.
   2- Use the circuit tester to measure the resistance value between the relay side terminals C - D.

Reference: Total resistance value of the YANMAR standard startup assist relay

Relay	Terminal	Specification
129927-77930 (40 A)	Relay coil side C - D	103 Ω ± 10 % (at 20 °C)
129927-77920 (70 A)	Relay coil side C - D	103 Ω ± 10 % (at 20 °C)
129927-77900 (90 A)	Relay coil side C - D	80 Ω (at 20 °C)

NG	Replace the startup assist relay.
OK	Check the relay coil resistance value while the startup assist relay and the wire harness are connected. Refer to "Check the relay coil resistance value (relay + wire harness side)"

2. Check the relay coil resistance value (relay + wire harness side)
   1- Connect the startup assist relay to the wire harness. Remove the ECU from the wire harness.
   2- Use the circuit tester to measure the resistance value between the ECU connectors K70 - K02.

Note: Refer to the above-mentioned reference "Total resistance value of the YANMAR standard startup assist relay".

NG	Check the wire-harness conduction. Refer to "Wire harness conduction check".
OK	Use the SMART ASSIST-Direct (SA-D) to check the operation of the startup assist relay. Refer to "Relay operation check".

3. Wire harness conduction check
   1- Remove the wire harness from the startup assist relay and the ECU.
   2- Use the circuit tester to measure the wire harness conduction.

Terminal	Conduction	Condition
Relay coil E70 side (between ECU and relay connector)	Yes	OK: Normal
	No	NG: Wire harness open circuit
Relay coil E00 side (between ECU and relay connector)	Yes	OK: Normal
	No	NG: Wire harness open circuit
Between K70 - GND/K02/K04/K06	No	OK: Normal
	Yes	NG: Wire harness open circuit
Between E70 - VB/K01/K03/K05	No	OK: Normal
	Yes	NG: Wire harness open circuit

NG	• Check the wire harness for damage. Check the wiring for mis-connection. • Replace the wire harness.
OK	Use the SMART ASSIST-Direct (SA-D) to check the operation of the startup assist relay. Refer to "Relay operation check".

4. Relay operation check

1- Connect the checker harness between the ECU and the machine wire harness (For details, refer to "How to use the Tier 4 checker harness" on page P5-289). Also, connect all connectors (startup assist relay, ECU).

2- Turn on the key switch. Login to the SMART ASSIST-Direct (SA-D).

3- Operate the startup assist relay on the "Diagnosis Test: Forced Drive" of the SMART ASSIST-Direct (SA-D). At this time, measure the voltage between the terminals K70 - K02.

ON/OFF setting condition	Voltage value	Voltage value
ON	2.5 V or more	OK: Normal
	Less than 2.5 V	NG: Wire harness GND short circuit or ECU failure
OFF	1.75 V or below	OK: Normal
	Over 1.75 V	NG: Wire harness power short circuit or ECU failure

NG	• Check the wire harness for damage. Check the wiring for mis-connection. • Replace the wire harness.
OK	Replace the ECU.

Contact input related

■ Contact input related 1 (Oil pressure switch/Charge switch)

● Related DTC

P code	P1192	Name	Oil pressure switch open circuit
SPN/FMI	00064/4		

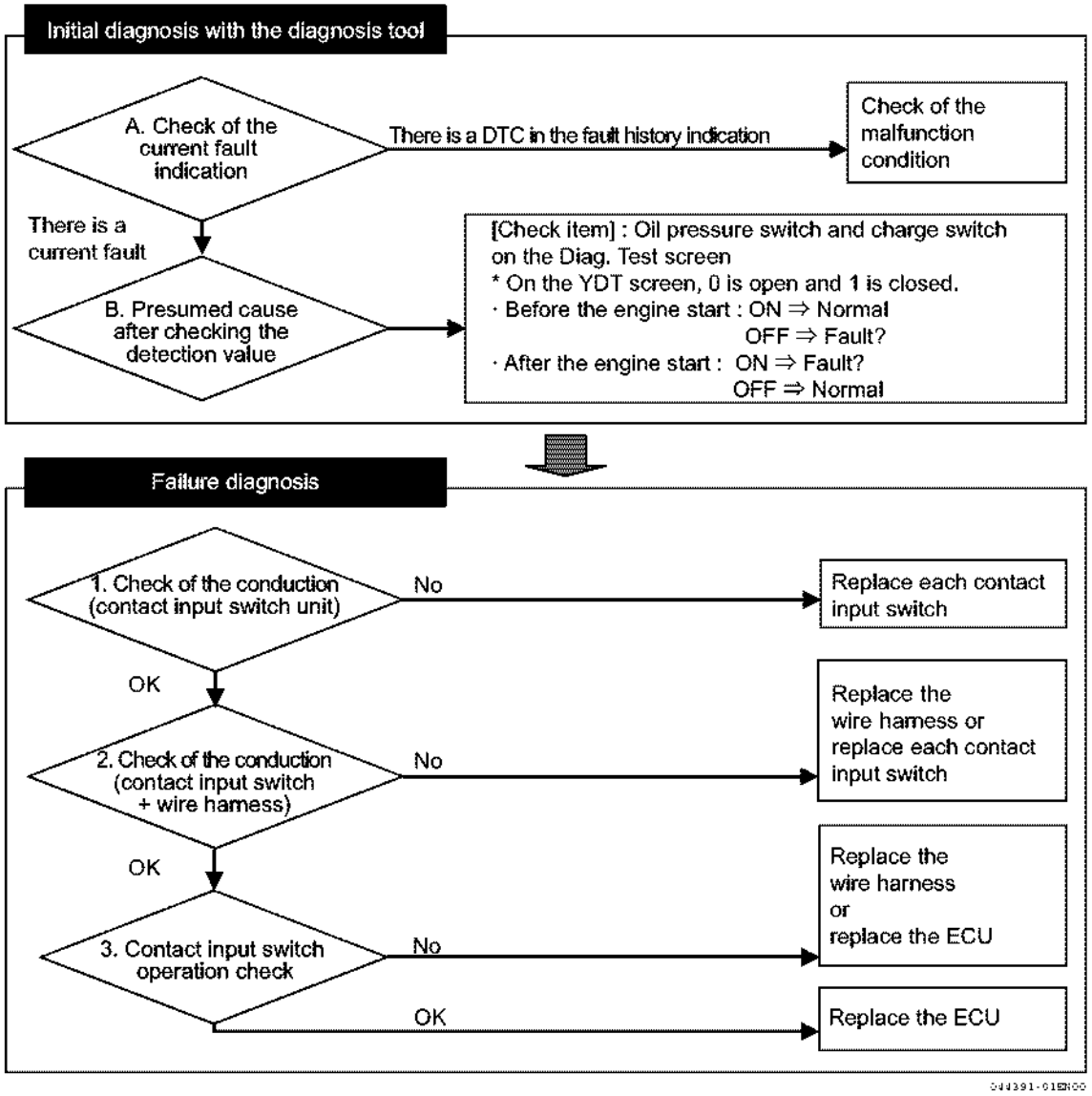
P code	P1198	Name	Low oil pressure fault alarm
SPN/FMI	00064/1		

P code	P1562	Name	Charge switch open circuit
SPN/FMI	000A7/5		

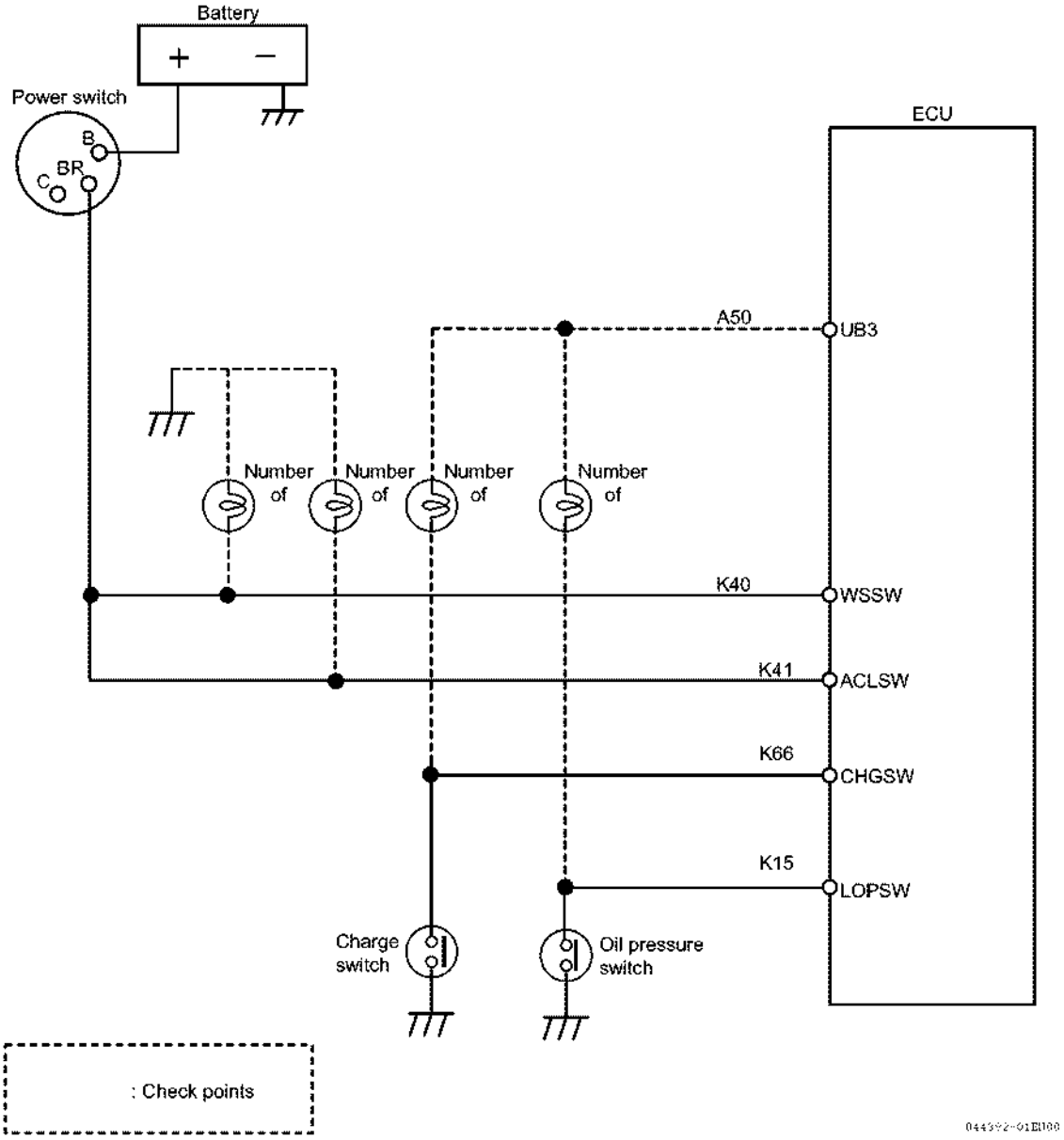
P code	P1568	Name	Charge alarm
SPN/FMI	000A7/1		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wire diagram**



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the conduction (contact input switch unit):
   1- Turn off the ECU power.
   2- Remove the wire harness from each contact input switch.
   3- Using the circuit tester and seeing the below table, check the conduction between the contact input terminal and the body frame.

Item	Terminal No.	Conduction (Between the terminal and the body frame)	State
Oil pressure switch	K15	Yes	OK: Normal
		No	NG: Abnormal
Charge switch	K66	No	OK: Normal
		Yes	NG: Abnormal

Not OK	Replace the contact input switch.
OK	Refer to "Check of the conduction (contact input switch + wire harness):"

2. Check of the conduction (contact input switch + wire harness):
   1- Connect the contact input switch and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the conduction between the ECU connector terminal and the body frame of the wire harness. For the number of the terminal that is checked, refer to 1. above.

Not OK	• The coupler between the contact input switch and the wire harness may be defective. Replace the contact input switch. • Replace the wire harness.
OK	Refer to "Contact input switch operation check:"

3. Contact input switch operation check:
   1- Connect all connectors (contact input switch, ECU, junction coupler).
   2- Connect the SMART ASSIST-Direct (SA-D) and login to the SMART ASSIST-Direct (SA-D) after turning on the power switch.
   3- Monitor each item on the "Diagnosis Test: Digital input, etc. Diag. Test" and check the ON/OFF display of the contact input switch in the specified condition.

Item	Check condition	ON/OFF indication	State
Oil pressure switch	Before engine start	ON (1)	OK: Normal
		OFF (0)	NG: Abnormal
	During engine operation	OFF (0)	OK: Normal
		ON (1)	NG: Abnormal
Charge switch	Before engine start	ON (1)	OK: Normal
		OFF (0)	NG: Abnormal
	During engine operation	OFF (0)	OK: Normal
		ON (1)	NG: Abnormal

Not OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.
OK	Replace the ECU.

CRS (common rail system) related

■ Injector

Injector open circuit and coil short circuit

● **Related DTC**

P code	P0204 (4TNV)	**Name**	**Injector 1 open circuit (inherent location of the injector)**
SPN/FMI	0028B/5 (4TNV)		

P code	**P0202**	**Name**	**Injector 2 open circuit (inherent location of the injector)**
SPN/FMI	**0028D/5**		

P code	**P0201**	**Name**	**Injector 3 open circuit (inherent location of the injector)**
SPN/FMI	**0028E/5**		

P code	**P0203**	**Name**	**Injector 4 open circuit (inherent location of the injector)**
SPN/FMI	**0028C/5**		

P code	P0271 (4TNV)	**Name**	**Injector 1 coil short circuit**
SPN/FMI	0028B/6 (4TNV)		

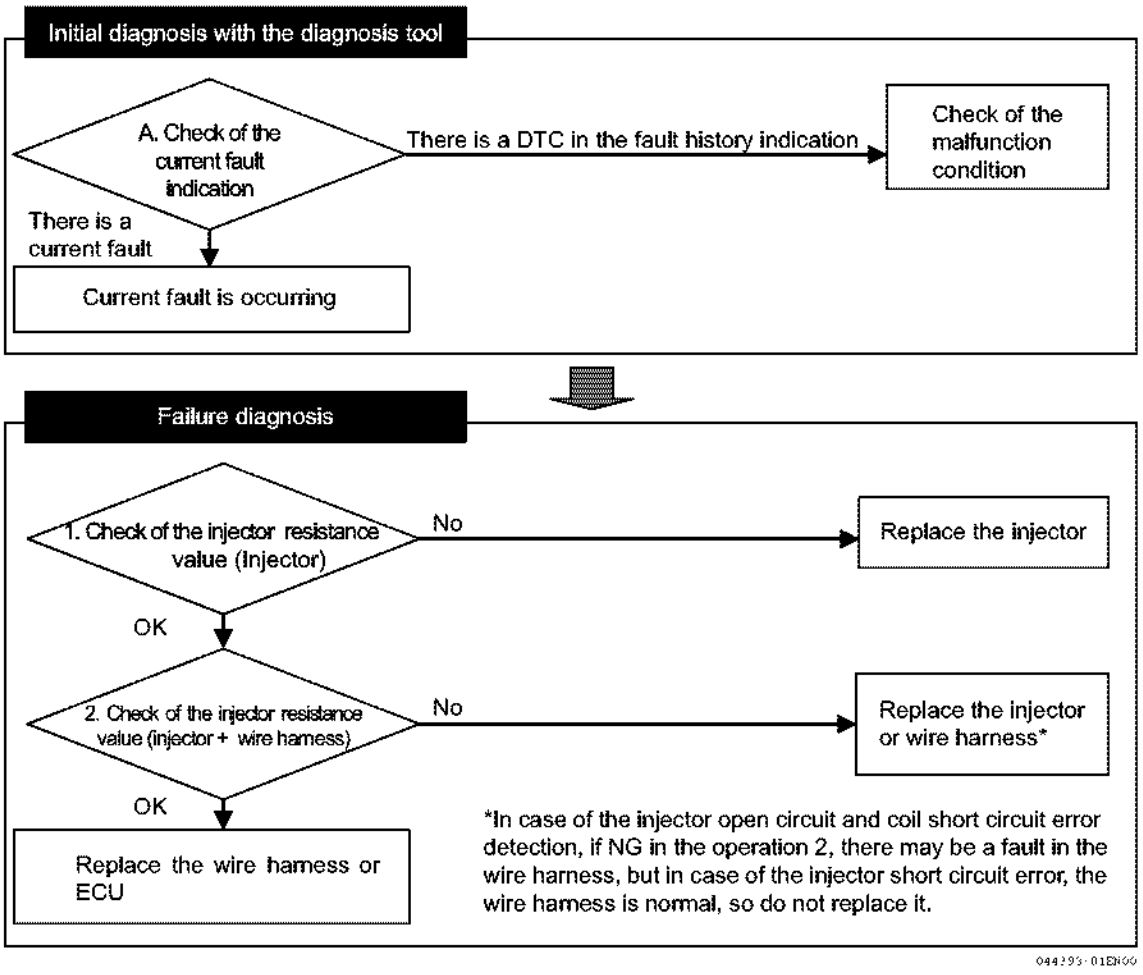
P code	**P0265**	**Name**	**Injector 2 coil short circuit**
SPN/FMI	**0028D/6**		

P code	**P0262**	**Name**	**Injector 3 coil short circuit**
SPN/FMI	**0028E/6**		

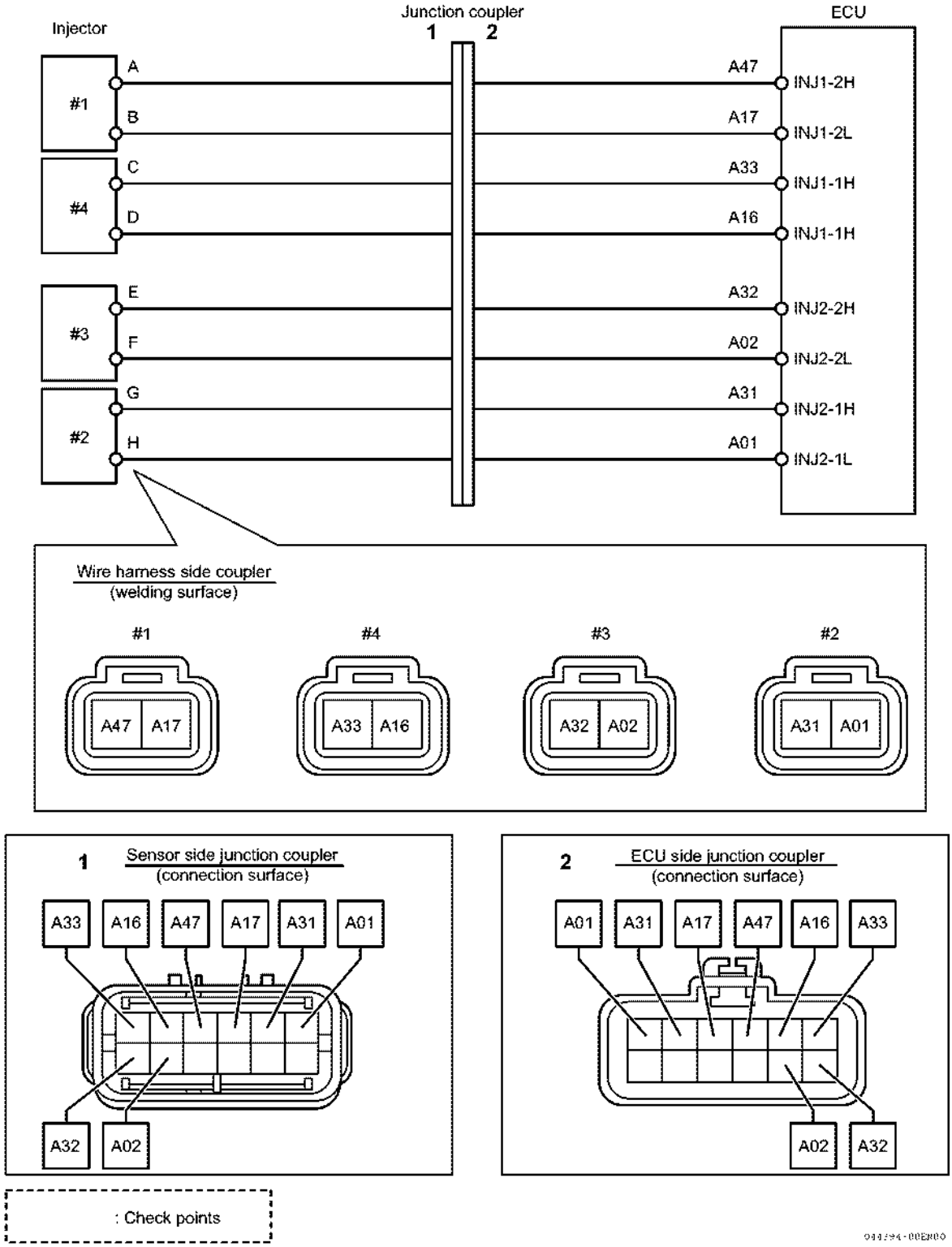
P code	**P0268**	**Name**	**Injector 4 coil short circuit**
SPN/FMI	**0028C/6**		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Wire diagram



Note: For the ECU pin layout, refer to P5-287.

● **Work description**

1. Check of the injector resistance value (injector unit):
   1- Remove the wire harness from the injector.
   2- Using the circuit tester, measure the resistance value (total resistance) between the injector terminals A and B, E and F, and G and H.

Reference: Total resistance of the injector

Terminal	Specification
Between the injector terminals	TBD

Not OK	Replace the injector
OK	Refer to "Check of the injector resistance value (injector + wire harness):"

2. Check of the injector resistance value (injector + wire harness):
   ● Junction coupler is not connected
   1- Connect the injector and the wire harness and remove the ECU from the wire harness. Here, refer to the above wire diagram and remove the wire harness of the junction coupler (2) side from the wire harness of the junction coupler (1) side.
   2- Using the circuit tester, measure the resistance value (total resistance) between A47 and A17, A33 and A16. A32 and A02, and A31 and A01 of the junction coupler (1) side wire harness.
   Note: Refer to the above-mentioned reference "Total resistance of the injector".

Not OK	• The coupler between the injector and the wire harness may be defective. Replace the injector. • Replace the wire harness.
OK	Refer to "Junction coupler is connected"

   ● Junction coupler is connected
   1- Connect the injector and the wire harness and remove the ECU from the wire harness. Here, refer to the above wire diagram and remove the wire harness of the junction coupler (2) side to the wire harness of the junction coupler (1) side.
   2- Using the circuit tester, measure the resistance value (total resistance) between A47 and A17, A33 and A16. A32 and A02, and A31 and A01 of the ECU side wire harness.
   Note: Refer to the above-mentioned reference "Total resistance of the injector".

Not OK	The junction coupler may be defective. Replace the wire harness.
OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.

Injector short circuit

● Related DTC

P code	P1271 (4TNV)	**Name**	**Injector 1 short circuit**
SPN/FMI	0028B/3 (4TNV)		

P code	**P1265**	**Name**	**Injector 2 short circuit**
SPN/FMI	**0028D/3**		

P code	**P1262**	**Name**	**Injector 3 short circuit**
SPN/FMI	**0028E/3**		

P code	**P1268**	**Name**	**Injector 4 short circuit**
SPN/FMI	**0028C/3**		

P code	**P1146**	**Name**	**Injector drive circuit (Bank1) short circuit**
SPN/FMI	**00AED/6**		

P code	**P1149**	**Name**	**Injector drive circuit (Bank2) short circuit**
SPN/FMI	**00AEE/6**		

● Workflow

Refer to “Injector open circuit and coil short circuit”

● Wire diagram

Refer to “Injector open circuit and coil short circuit”

● **Work description**

1. Check of the injector resistance value (injector unit):
   1- Remove the wire harness from the injector.
   2- Using the circuit tester, measure the resistance value (total resistance) between the injector terminals A and B, C and D, E and F, and G and H.

Reference: Total resistance of the injector

Terminal	Specification
Between the injector terminals	TBD

Not OK	Replace the injector
OK	Refer to "Check of the injector resistance value (injector + wire harness):"

2. Check of the injector resistance value (injector + wire harness):
   ● Junction coupler is not connected
   1- Connect the injector and the wire harness and remove the ECU from the wire harness. Here, refer to the above wire diagram and remove the wire harness of the junction coupler (2) side from the wire harness of the junction coupler (1) side.
   2- Using the circuit tester, measure the resistance value (total resistance) between A47 and A17, A33 and A16. A32 and A02, and A31 and A01 of the junction coupler (1) side wire harness.
   Note: Refer to the above-mentioned reference "Total resistance of the injector".

Not OK	Replace the wire harness.
OK	Refer to "Junction coupler is connected"

   ● Junction coupler is connected
   1- Connect the injector and the wire harness and remove the ECU from the wire harness. Here, refer to the above wire diagram and remove the wire harness of the junction coupler (2) side to the wire harness of the junction coupler (1) side.
   2- Using the circuit tester, measure the resistance value (total resistance) between A47 and A17, A33 and A16. A32 and A02, and A31 and A01 of the ECU side wire harness.
   Note: Refer to the above-mentioned reference "Total resistance of the injector".

Not OK	Replace the wire harness.
OK	• The coupler between the wire harness and the ECU may be defective. Replace the wire harness. • Replace the ECU.

■ High-pressure pump (MPROP)

● Related DTC

P code	P1641	Name	High-pressure pump drive circuit (Low side VB short-circuit)
SPN/FMI	7F94B/3		

P code	P1643	Name	High-pressure pump drive circuit (Low side GND short-circuit)
SPN/FMI	7F94B/6		

P code	P0629	Name	High-pressure pump drive circuit (High side VB short-circuit)
SPN/FMI	00279/3		

P code	P1642	Name	High-pressure pump drive circuit (High side GND short-circuit)
SPN/FMI	00279/6		

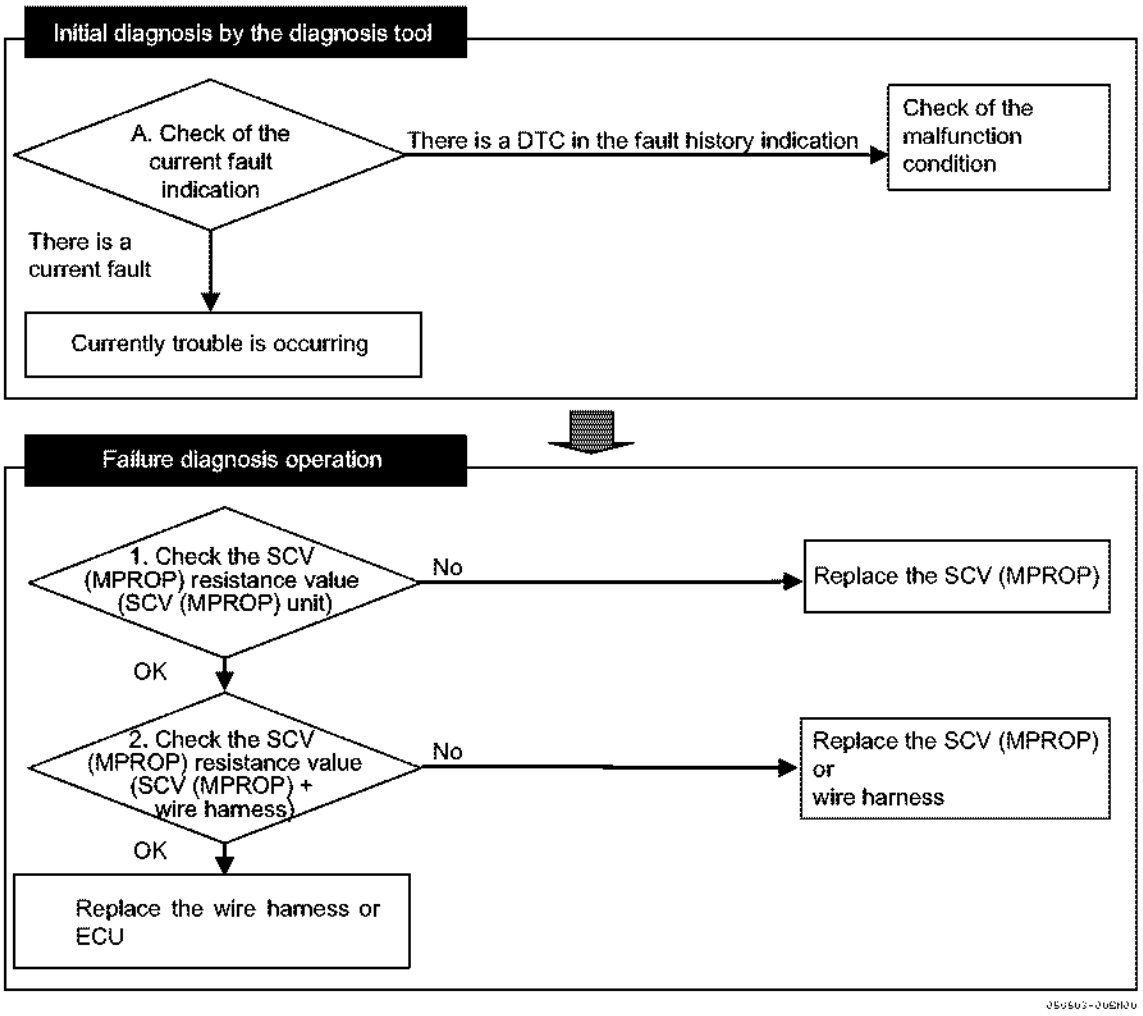
P code	P0627	Name	High-pressure pump drive circuit (Open circuit)
SPN/FMI	00279/5		

P code	P1645	Name	High-pressure pump drive circuit (Pump overload error)
SPN/FMI	7F94C/11		

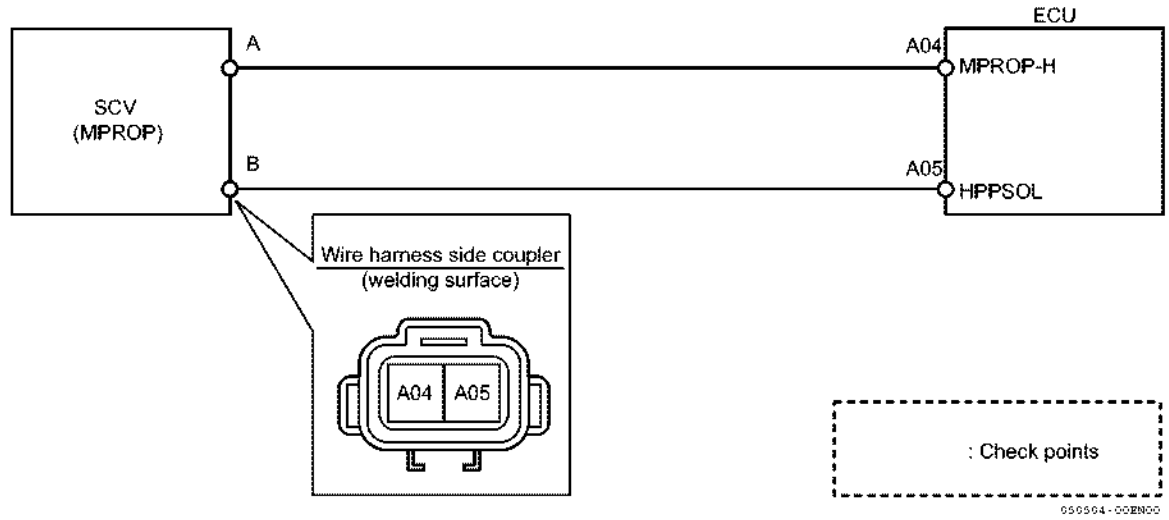
P code	P062A	Name	High-pressure pump drive circuit (Drive current (high level))
SPN/FMI	7F94C/6		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the SCV (MPROP) resistance value (SCV (MPROP) unit):
   1- Remove the wire harness from the SCV (MPROP).
   2- Using the circuit tester, measure the resistance value (total resistance) between the SCV (MPROP) terminals A and B.

Reference: Total resistance of the SCV (MPROP)

Terminal	Specification
Between the SCV (MPROP) terminals	2.60 - 3.15 Ω

Not OK	Replace the SCV (MPROP).
OK	Refer to "Check of the SCV (MPROP) resistance value (SCV (MPROP) + wire harness):"

2. Check of the SCV (MPROP) resistance value (SCV (MPROP) + wire harness):
   1- Connect the SCV (MPROP) and the wire harness and remove the ECU from the wire harness.
   2- Using the circuit tester, measure the resistance value (total resistance) between A04 and A05 of the ECU side wire harness.
   Note: Refer to the above-mentioned reference "Total resistance of the SCV (MPROP)".

Not OK	The wire harness may be defective. Replace the wire harness.
OK	Replace the ECU.

Actuator

■ Intake throttle drive circuit

● Related DTC

P code	P0660	Name	No-load of throttle valve drive H bridge circuit
SPN/FMI	00B86/5		

P code	P1660	Name	Overload on the drive H bridge circuit of throttle valve
SPN/FMI	00B86/6		

P code	P1658	Name	Power short circuit of throttle valve drive H bridge output 1
SPN/FMI	00B86/3		

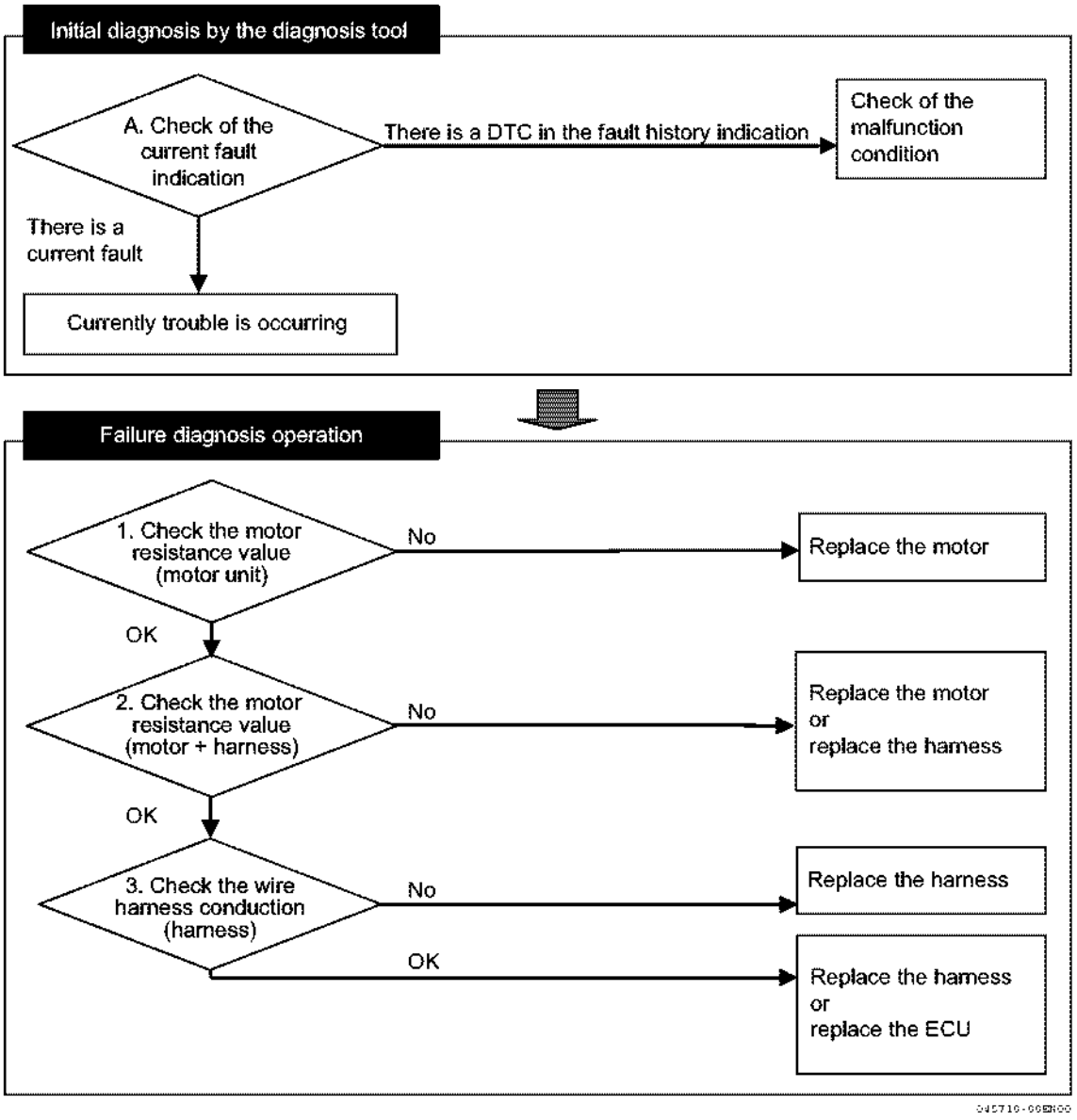
P code	P1661	Name	Power short circuit of throttle valve drive H bridge output 2
SPN/FMI	00B87/3		

P code	P1659	Name	GND short circuit of throttle valve drive H bridge output 1
SPN/FMI	00B86/4		

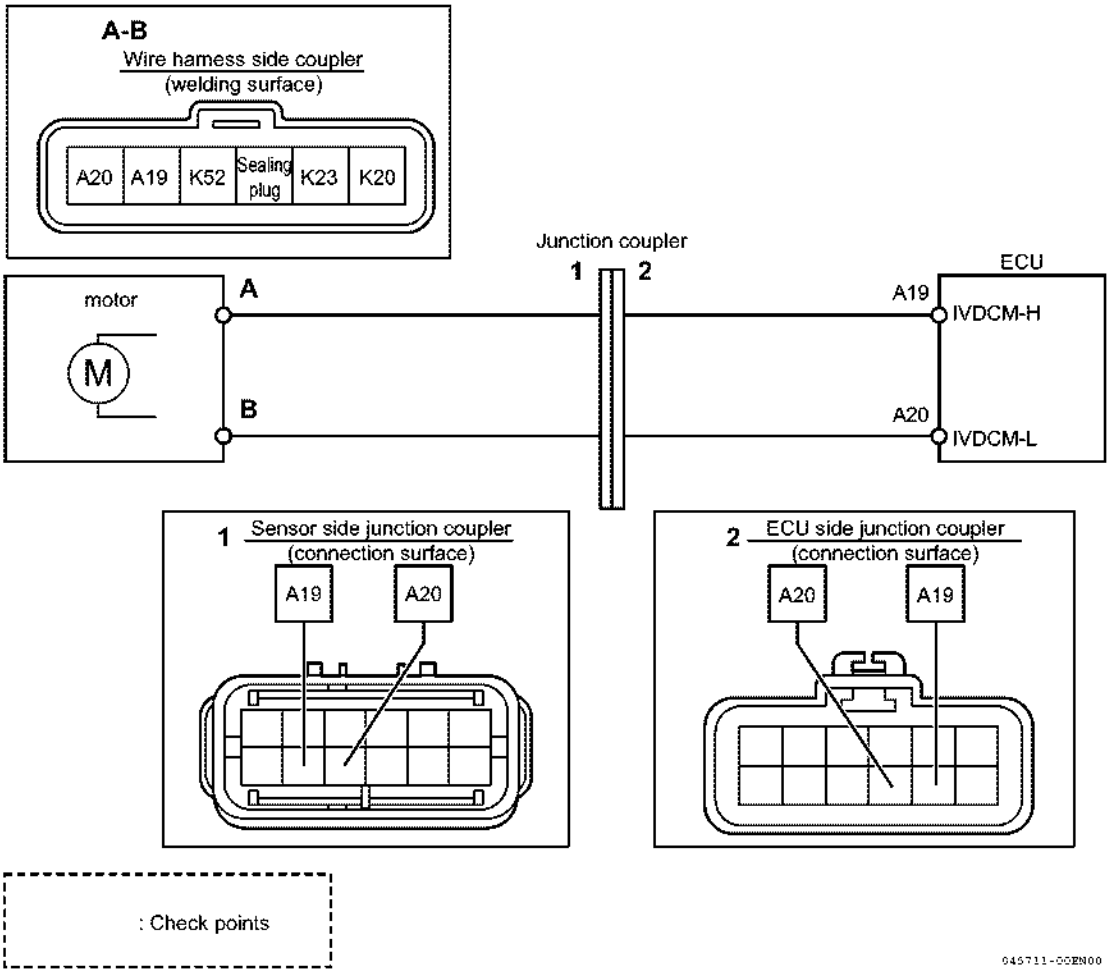
P code	P1662	Name	GND short circuit of throttle valve drive H bridge output 2
SPN/FMI	00B87/4		

● **Workflow**

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check of the motor resistance value (motor unit):
   1- Remove the motor from the wire harness.
   2- Use the circuit tester to measure the resistance value (total resistance value) between the motor terminals A and B.

Reference: Total resistance of the motor

Terminal	Specification
Between terminal A and B	Under investigation

Not OK	Replace the motor.
OK	Refer to "Check of the motor resistance value (motor + wire harness):"

2. Check of the motor resistance value (motor + wire harness):
   1- Connect the motor and the wire harness. Remove the ECU from the harness.
   2- Use the circuit tester to measure the resistance value (total resistance value) between the ECU side wire harness connectors A19 and A20.
   Note: Refer to the above-mentioned reference "Total resistance of the motor".

No	• A coupler failure between the motor and the wire harness may be caused. Replace the motor. • Replace the wire harness.
Applied	Refer to "Check the wire harness conduction:"

3. Check the wire harness conduction:
   1- Remove the wire harness from the motor and the ECU. Here, keep the junction coupler connected.
   2- Perform the wire harness conduction check between the terminal 1 and the terminal 2 in the below table while referring to P5-287 ECU pin layout diagram.

Detection error	Check method
No-load of throttle valve drive H bridge circuit	Perform the check pattern 1
Power short circuit of throttle valve drive H bridge output 1	Perform the check pattern 2
Power short circuit of throttle valve drive H bridge output 2	Perform the check pattern 3
GND short circuit of throttle valve drive H bridge output 1	Perform the check pattern 4
GND short circuit of throttle valve drive H bridge output 2	Perform the check pattern 5

Reference: Intake throttle drive circuit conduction check pattern 1

Terminal 1 (ECU side wire harness connector)	Terminal 2 (DC motor side wire harness connector)	Conduction	Condition
A19	Motor terminal A	Yes	OK: Normal
		No	Not OK: Abnormal
A20	Motor terminal B	Yes	OK: Normal
		No	Not OK: Abnormal

Reference: Intake throttle drive circuit conduction check pattern 2

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
A19	VB terminal	Yes	Not OK: Abnormal
		No	OK: Normal

Reference: Intake throttle drive circuit conduction check pattern 3

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
A20	VB terminal	Yes	Not OK: Abnormal
		No	OK: Normal

Reference: Intake throttle drive circuit conduction check pattern 4

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
A19	GND terminal	Yes	Not OK: Abnormal
		No	OK: Normal

Reference: Intake throttle drive circuit conduction check pattern 5

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
A20	GND terminal	Yes	Not OK: Abnormal
		No	OK: Normal

Not OK	Interrupted or short circuited between the wire harnesses. Replace the wire harness.
OK	• A coupler failure between the ECU and the wire harness may be caused. Replace the wire harness. • Replace the ECU.

■ EGR valve

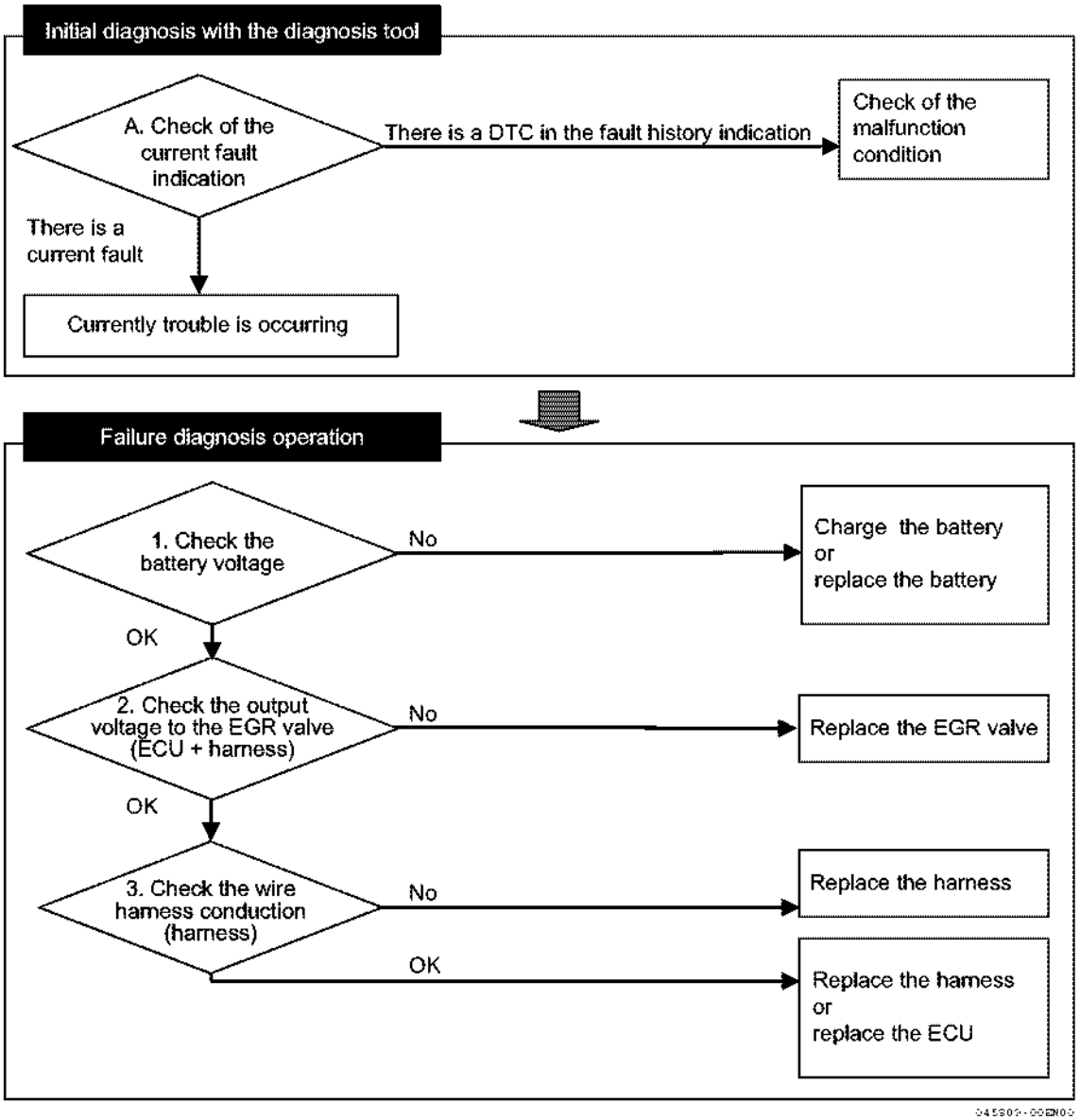
● Related DTC

P code	P0404	Name	EGR over-voltage fault
SPN/FMI	00AE7/0		

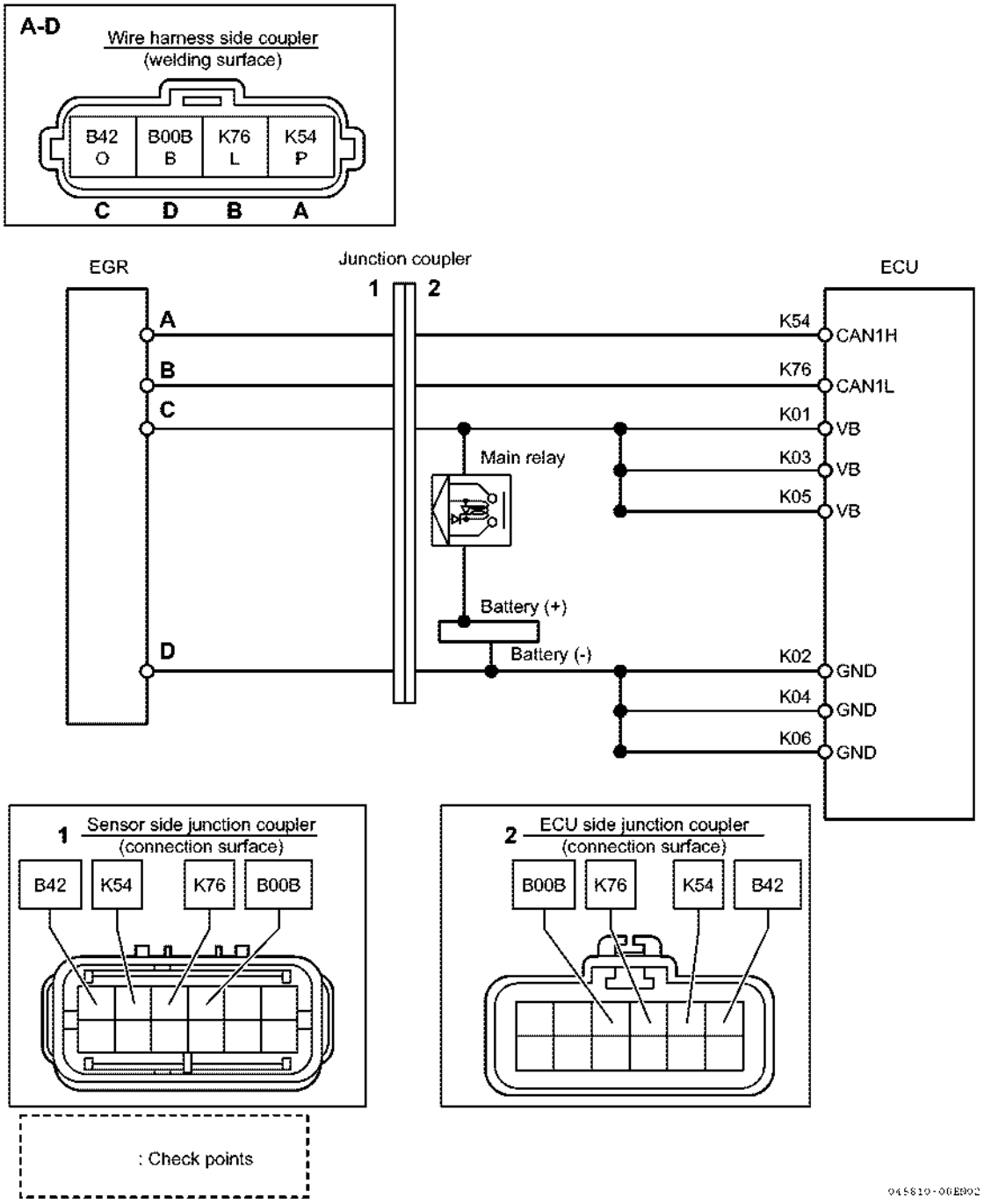
P code	P1404	Name	EGR under-voltage fault
SPN/FMI	00AE7/1		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● **Work description**

1. Check the battery voltage:

Turn on the power switch and check the battery voltage.

1- Check whether or not the battery voltage is reduced due to the battery life.

2- Check whether or not the battery output is too high.

Reference: Battery voltage check pattern 1

Terminal 1 (battery)	Terminal 2 (battery)	Voltage value	Condition
Battery (+)	Battery (-)	8 V or below	Not OK: Abnormal
		8 V - 16 V	OK: Normal
		16 V or above	Not OK: Abnormal

Not OK	Charge or replace the battery.
OK	Check the actions of the other ECU.

2. Check the output voltage to the EGR valve:

1- Remove the EGR valve from the wire harness.

2- Turn on the power switch and check the battery voltage. Refer to the wire diagram and measure the wire harness between C and D.

Reference: Battery voltage check pattern 2

Terminal 1 (EGR valve side wire harness connector)	Terminal 2 (EGR valve side wire harness connector)	Voltage value	Condition
C (B42)	D (B00B)	8 V or below	Not OK: Abnormal
		8 V - 18 V	OK: Normal
		18 V or above	Not OK: Abnormal

Not OK	Refer to "Check the wire harness conduction:".
OK	Replace the EGR valve.

3. Check the wire harness conduction:
   1- Remove the wire harness from the EGR valve and the ECU.
   2- Perform the wire harness conduction check between the terminal 1 and the terminal 2 in the below table while referring to P5-287 ECU pin layout diagram.

Reference: EGR valve conduction check pattern 1

Terminal 1 (ECU side wire harness connector)	Terminal 2 (EGR valve side wire harness connector)	Conduction	Condition
K01/K03/K05	EGR valve terminal C	Yes	OK: Normal
		No	Not OK: Abnormal
K02/K04/K06	EGR valve terminal D	Yes	OK: Normal
		No	Not OK: Abnormal
K54*1	EGR valve terminal A	Yes	OK: Normal
		No	Not OK: Abnormal
K76*1	EGR valve terminal B	Yes	OK: Normal
		No	Not OK: Abnormal

**1: Although it is not a battery line, the abnormal signal may be transmitted due to open circuit/short circuit. Check for precaution.*

Reference: EGR valve conduction check pattern 2

Terminal 1 (EGR valve side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
EGR valve terminal C	All terminals except for the below: K01, K03, K05	Yes	Not OK: Abnormal
		No	OK: Normal
EGR valve terminal D	All terminals except for GND	Yes	Not OK: Abnormal
		No	OK: Normal
EGR valve terminal A*1	All terminals except for K54	Yes	Not OK: Abnormal
		No	OK: Normal
EGR valve terminal B*1	All terminals except for K76	Yes	Not OK: Abnormal
		No	OK: Normal

**1: Although it is not a battery line, the abnormal signal may be transmitted due to open circuit/short circuit. Check for precaution.*

Not OK	Interrupted or short circuited between the wire harnesses. Replace the wire harness.
OK	• A coupler failure between the ECU and the wire harness may be caused. Replace the wire harness. • Replace the ECU.

■ EGR valve

● Related DTC

P code	P0403	Name	Open circuit between the EGR motor coils
SPN/FMI	00AE7/12		

P code	P1405	Name	Short circuit between the EGR motor coils
SPN/FMI	7F953/12		

P code	P0488	Name	EGR position sensor malfunction
SPN/FMI	7F954/12		

P code	P1409	Name	EGR feedback malfunction
SPN/FMI	00AE7/7		

P code	P148A	Name	EGR stuck open valve malfunction
SPN/FMI	7F955/7		

P code	P049D	Name	EGR initialization malfunction
SPN/FMI	7F956/7		

P code	U0401	Name	EGR ECM data fault
SPN/FMI	00AE7/9		

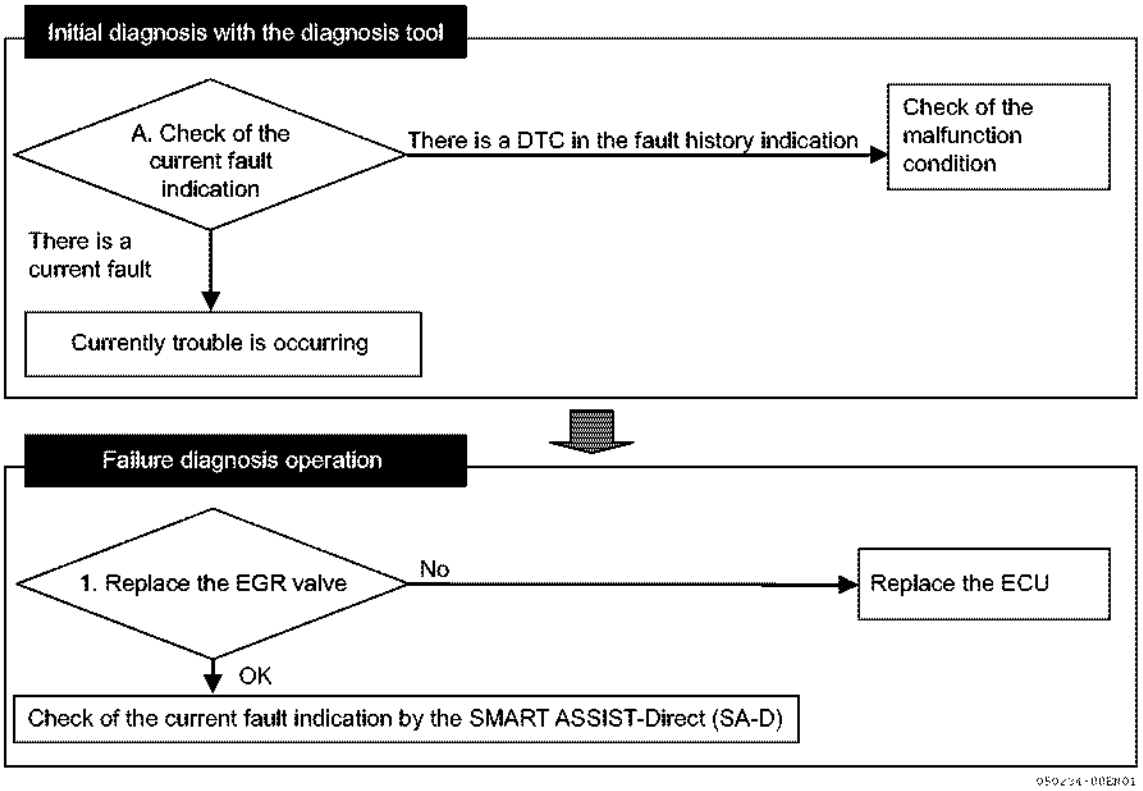
P code	U1401	Name	EGR target value out of range
SPN/FMI	7F979/12		

P code	P1410	Name	EGR high temperature thermistor malfunction
SPN/FMI	7F957/1		

P code	P1411	Name	EGR low temperature thermistor malfunction
SPN/FMI	7F958/1		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Work description

1. Replace the EGR valve

   There is a possibility of the internal circuit failure of the EGR valve.

   Replace the EGR valve.

Not OK	Replace the ECU.
OK	Check of the current fault indication by the SMART ASSIST-Direct (SA-D).

Communication related

■ CAN1

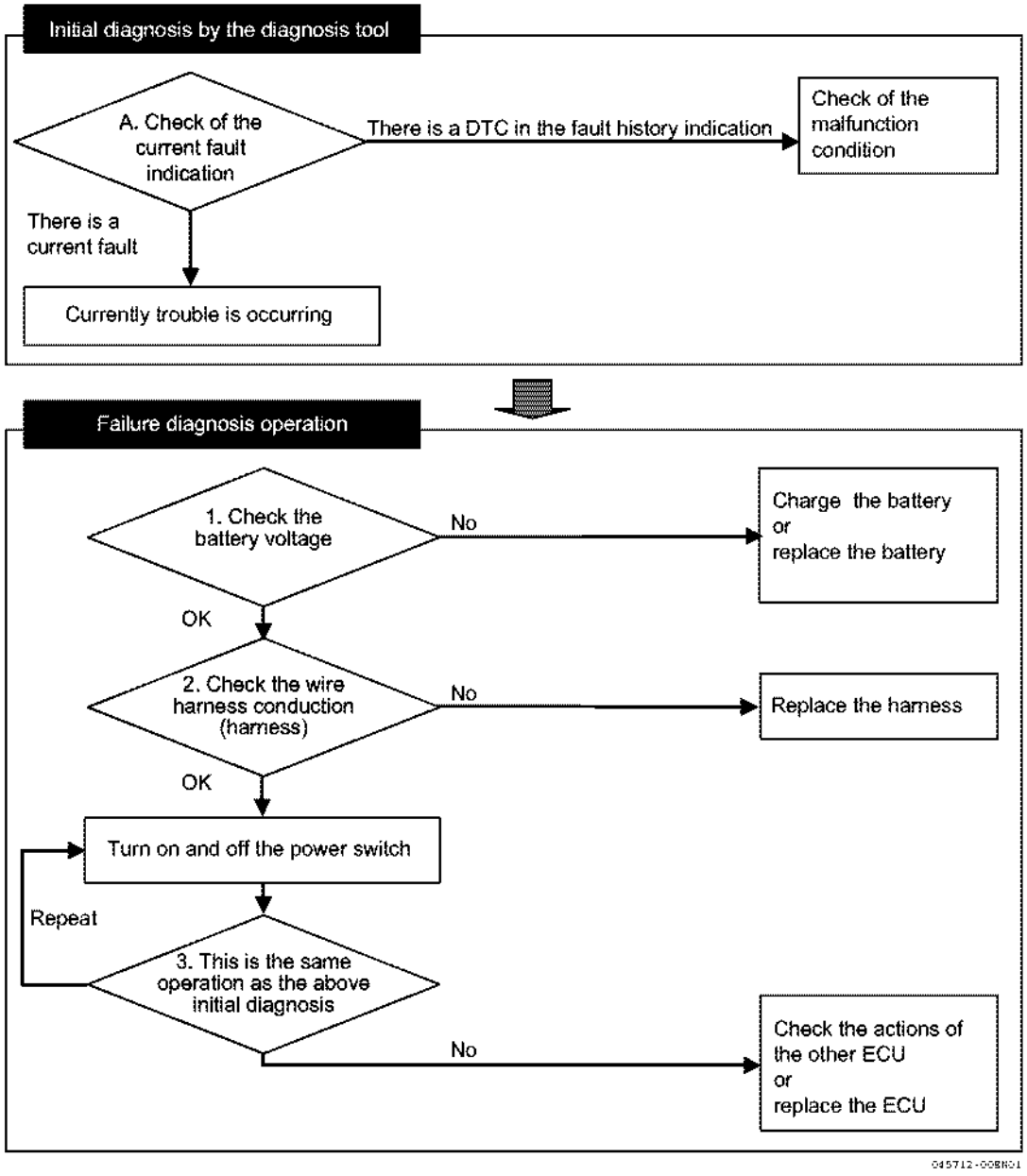
● Related DTC

P code	U010B	Name	CAN1 (for EGR): Reception time out
SPN/FMI	7F972/9		

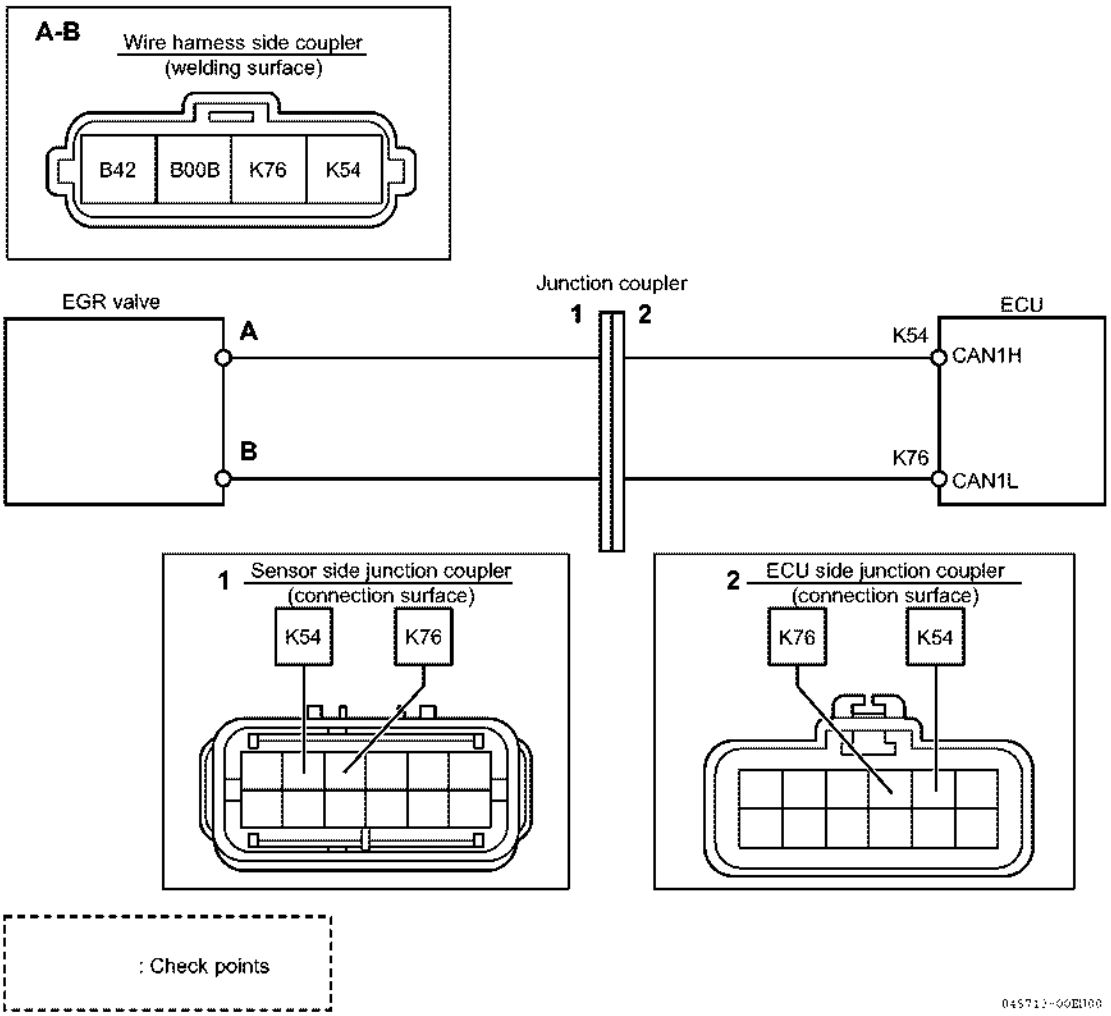
P code	U1107	Name	Exhaust throttle (CAN message from the exhaust throttle time out)
SPN/FMI	7F973/9		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● Wiring diagram



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check the battery voltage:

Turn on the power switch and check the battery voltage.

1- Check whether or not the battery voltage is reduced due to the battery life.

2- Check whether or not the battery output is too high.

Not OK	Charge or replace the battery.
OK	Refer to "Check the wire harness conduction:"

2. Check the wire harness conduction:

1- Remove the wire harness from the driven machine side ECU and the ECU.

2- Perform the wire harness conduction check between the terminal 1 and the terminal 2 in the below table while referring to P5-287 ECU pin layout diagram.

Reference: CAN1 line conduction check pattern 1

Terminal 1 (ECU side wire harness connector)	Terminal 2 (Driven machine ECU side wire harness connector)	Conduction	Condition
K54	Driven machine ECU terminal A	Yes	OK: Normal
		No	Not OK: Abnormal
K76	Driven machine ECU terminal B	Yes	OK: Normal
		No	Not OK: Abnormal

Reference: CAN1 line conduction check pattern 2

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
V54	All terminals except for V54 and V76	Yes	Not OK: Abnormal
		No	OK: Normal
V76	All terminals except for V54 and V76	Yes	Not OK: Abnormal
		No	OK: Normal

Not OK	Interrupted or short circuited between the wire harnesses. Replace the wire harness.
OK	Refer to "Using the diagnosis tool:"

3. Using the diagnosis tool:

1- Turn off the power switch. Turn on the power switch and start the engine.

2- Connect the SMART ASSIST-Direct (SA-D) and check whether an error is detected or not on the current fault indication.

No	Normal
Applied	• Check the operation of the other ECU. • Replace the ECU.

■ CAN2

● Related DTC

P code	U0292	Name	TSC1 (CAN message) reception time out (SA1)
SPN/FMI	7F964/9		

P code	U1301	Name	TSC1 (CAN message) reception time out (SA2)
SPN/FMI	7F965/9		

P code	U1292	Name	Y_ECR1 (CAN message) reception time out
SPN/FMI	7F967/9		

P code	U1293	Name	Y_EC (CAN message) reception time out
SPN/FMI	7F968/9		

P code	U1294	Name	Y_RSS (CAN message) reception time out
SPN/FMI	7F969/9		

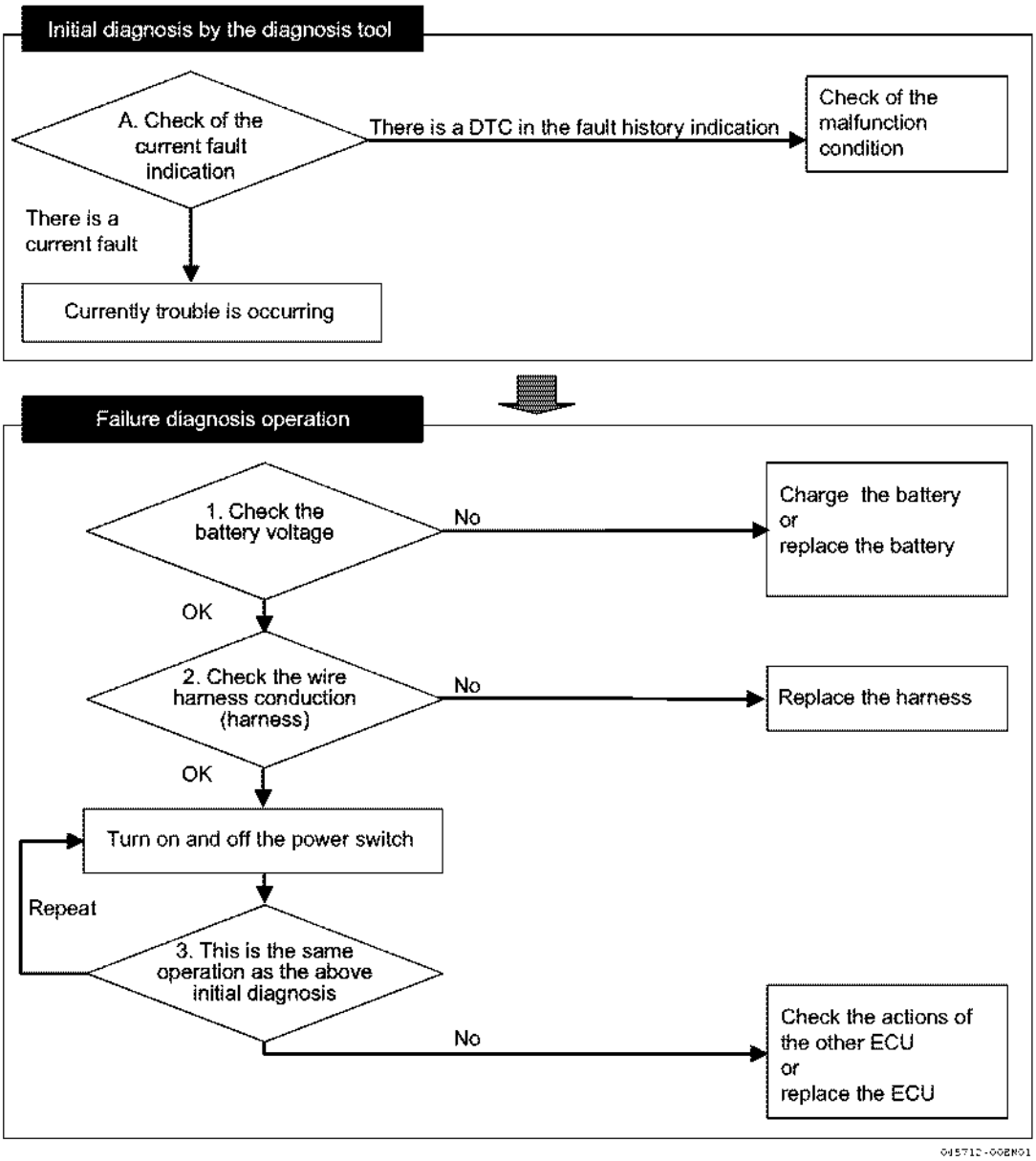
P code	U1300	Name	Y_ETCP1 (CAN message) reception time out
SPN/FMI	7F971/9		

P code	U1303	Name	Y_DPFIF (CAN message) reception time out
SPN/FMI	7F97B/9		

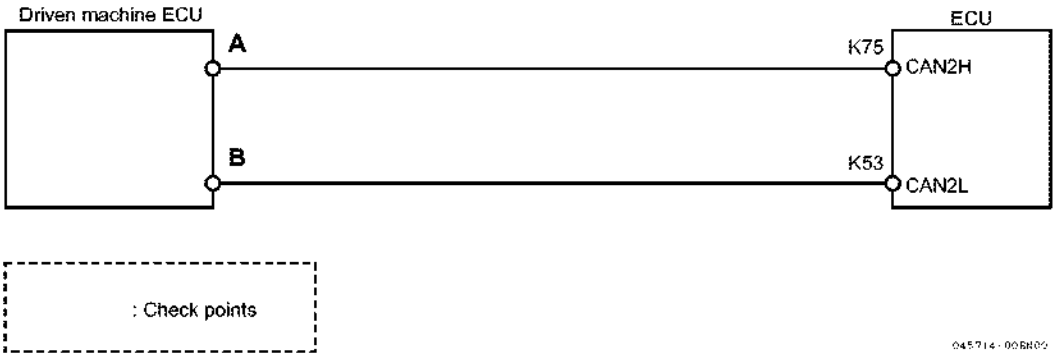
P code	U1302	Name	EBC1 (CAN message) reception time out
SPN/FMI	7F97A/9		

● Workflow

Note: For the work details, refer to "Work description" below. For operating procedure of the diagnosis tool, refer to the separate "SMART ASSIST-Direct operation manual".



● **Wiring diagram**



Note: For the ECU pin layout, refer to P5-287.

● Work description

1. Check the battery voltage:

Turn on the power switch and check the battery voltage.

1- Check whether or not the battery voltage is reduced due to the battery life.

2- Check whether or not the battery output is too high.

Not OK	Refer to "Check the wire harness conduction:"
OK	Check the actions of the other ECU.

2. Check the wire harness conduction:

1- Remove the wire harness from the driven machine side ECU and the ECU.

2- Perform the wire harness conduction check between the terminal 1 and the terminal 2 in the below table while referring to P5-287 ECU pin layout diagram.

Reference: CAN2 line conduction check pattern 1

Terminal 1 (ECU side wire harness connector)	Terminal 2 (Driven machine ECU side wire harness connector)	Conduction	Condition
V75	Driven machine ECU terminal A	Yes	OK: Normal
		No	Not OK: Abnormal
V53	Driven machine ECU terminal B	Yes	OK: Normal
		No	Not OK: Abnormal

Reference: CAN2 line conduction check pattern 2

Terminal 1 (ECU side wire harness connector)	Terminal 2 (ECU side wire harness connector)	Conduction	Condition
V75	All terminals except for V75	Yes	Not OK: Abnormal
		No	OK: Normal
V53	All terminals except for V53	Yes	Not OK: Abnormal
		No	OK: Normal

Not OK	Interrupted or short circuited between the wire harnesses. Replace the wire harness.
OK	Refer to "Using the diagnosis tool:"

3. Using the diagnosis tool:

1- Turn off the power switch. Turn on the power switch and start the engine.

2- Connect the SMART ASSIST-Direct (SA-D) and check whether an error is detected or not on the current fault indication.

No	Normal
Applied	• Check the operation of the other ECU. • Replace the ECU.

ECU related

● Related DTC

P code	P0601	Name	EEPROM memory deletion error
SPN/FMI	00276/12		

P code	P160E	Name	EEPROM memory read error
SPN/FMI	00276/12		

P code	P160F	Name	EEPROM memory write error
SPN/FMI	00276/12		

P code	P2228	Name	Atmospheric pressure sensor fault (low voltage)
SPN/FMI	0006C/4		

P code	P2229	Name	Atmospheric pressure sensor fault (high voltage)
SPN/FMI	0006C/3		

P code	P1231	Name	Atmospheric pressure sensor characteristic fault
SPN/FMI	0006C/10		

P code	P1613	Name	CY146 SPI communication fault
SPN/FMI	7F959/12		

P code	P1608	Name	Excessive voltage of supply 1
SPN/FMI	7F95C/12		

P code	P1617	Name	Insufficient voltage of supply 1
SPN/FMI	7F95D/12		

P code	P1469	Name	AD converter fault 1
SPN/FMI	7FCD1/12		

P code	P1470	Name	AD converter fault 2
SPN/FMI	7FCD2/12		

P code	P1471	Name	External monitoring IC and CPU fault 1
SPN/FMI	7FCD3/12		

P code	P1472	Name	External monitoring IC and CPU fault 2
SPN/FMI	7FCD4/12		

P code	P1473	Name	ROM fault
SPN/FMI	7FCD5/12		

P code	P1474	Name	Shutoff path fault 1
SPN/FMI	7FCD6/12		

P code	P1475	Name	Shutoff path fault 2
SPN/FMI	7FCD7/12		

P code	P1476	Name	Shutoff path fault 3
SPN/FMI	7FCD8/12		

P code	P1477	Name	Shutoff path fault 4
SPN/FMI	7FCD9/12		

P code	P1478	Name	Shutoff path fault 5
SPN/FMI	7FCDA/12		

P code	P1479	Name	Shutoff path fault 6
SPN/FMI	7FCDB/12		

P code	P1480	Name	Shutoff path fault 7
SPN/FMI	7FCDC/12		

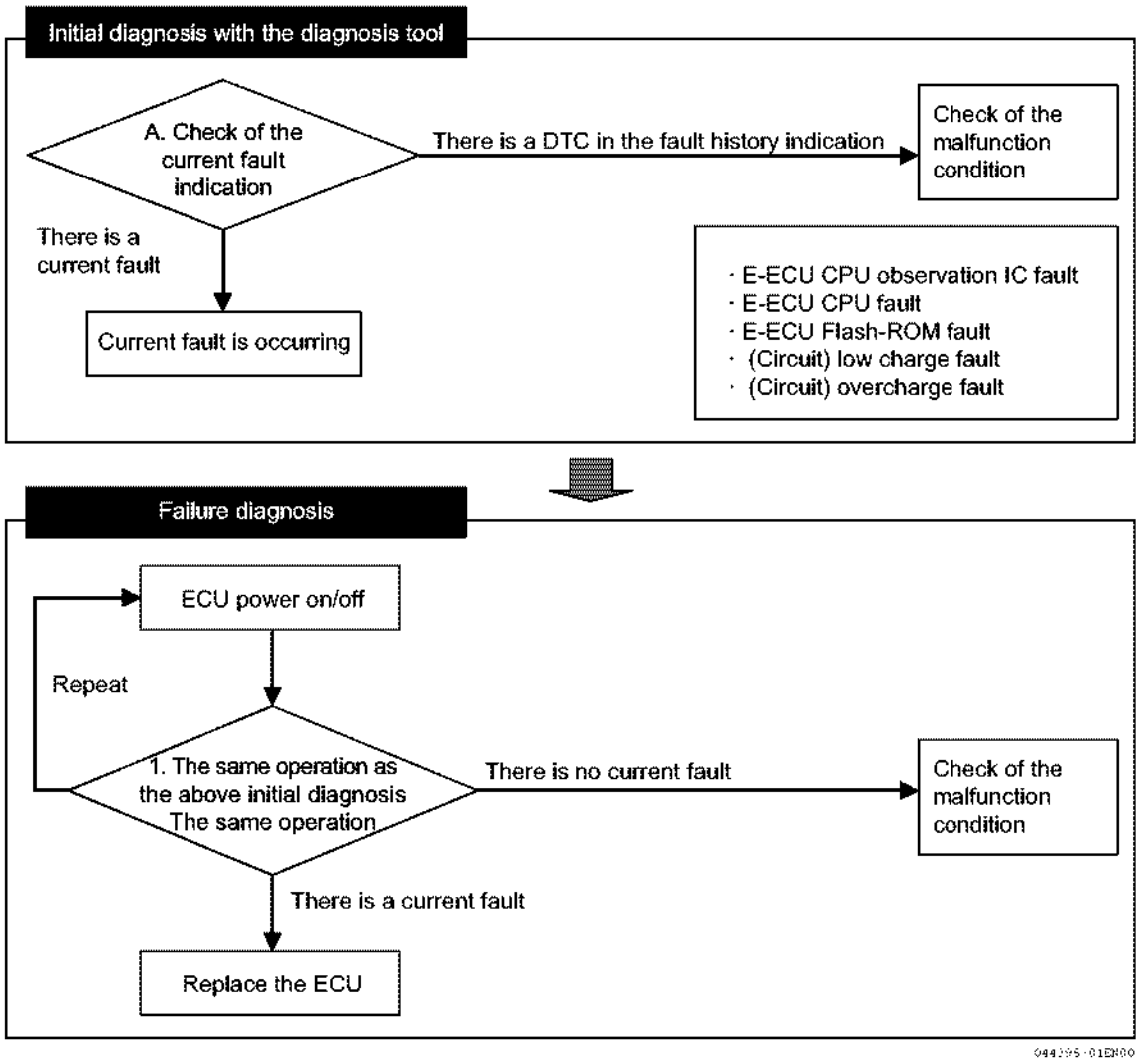
P code	P1481	Name	Shutoff path fault 8
SPN/FMI	7FCDD/12		

P code	P1482	Name	Shutoff path fault 9
SPN/FMI	7FCDE/12		

P code	P1483	Name	Shutoff path fault 10
SPN/FMI	7FCDF/12		

● Workflow

Note: For the details of work, refer to the following "Work description". For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● Work description

1. Using the diagnosis tool:
   1- Turn off the ECU power and then turn the key switch on again.
   2- Connect the SMART ASSIST-Direct (SA-D) and check whether an error is detected or not on the current fault indication.

No	Check the fault history indication and if there is an indication, check the malfunction condition.
Yes	• Turn the ECU power on and off again and perform operation 1. • Replace the ECU.

Others

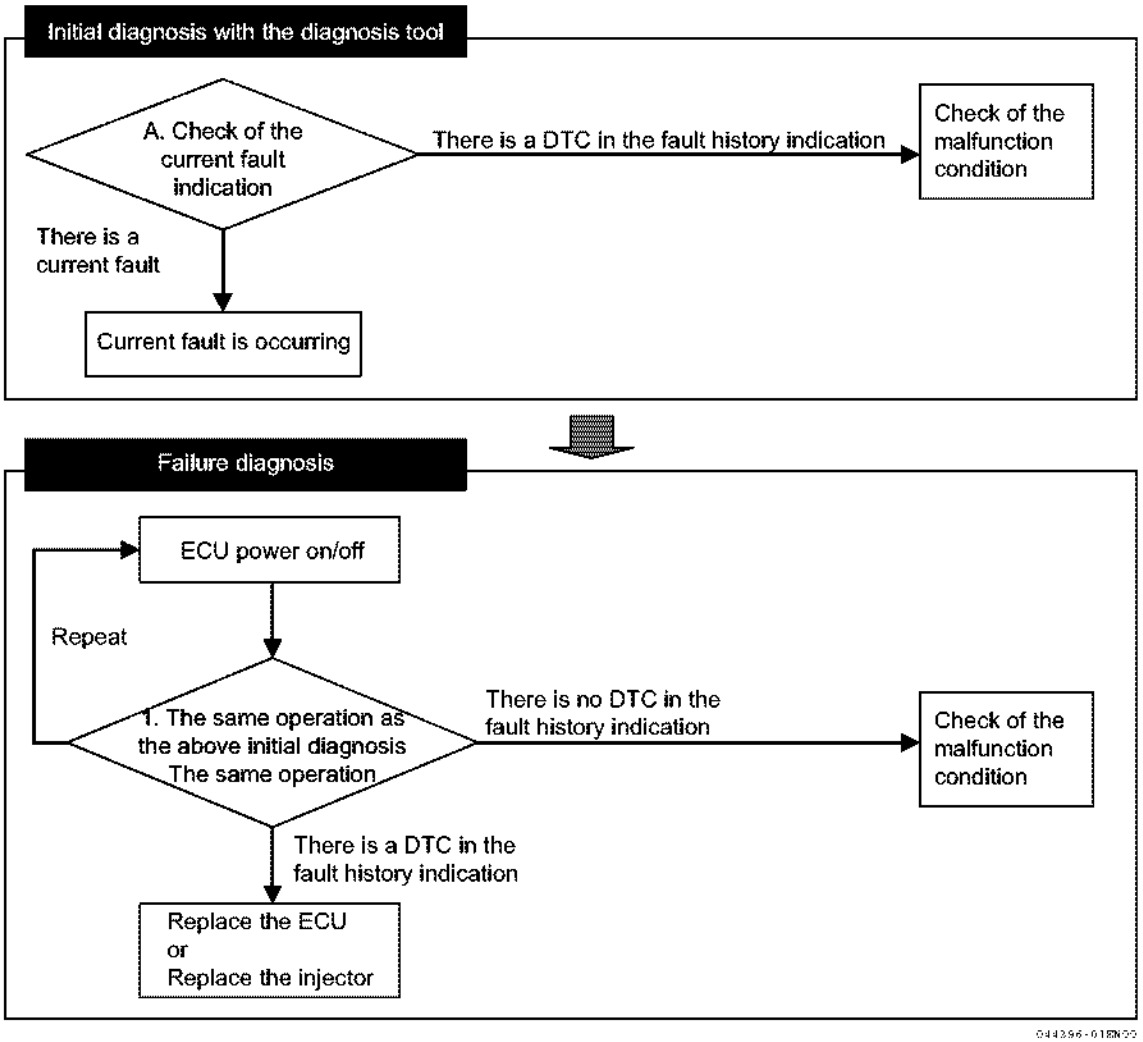
■ Overspeed

● Related DTC

P code	P0219	Name	Overspeed
SPN/FMI	000BE/0		

● Workflow

Note: For the details of work, refer to the following <Work description>. For the operation method of the diagnosis, refer to the separate "SMART ASSIST-Direct operation manual".



● **Work description**

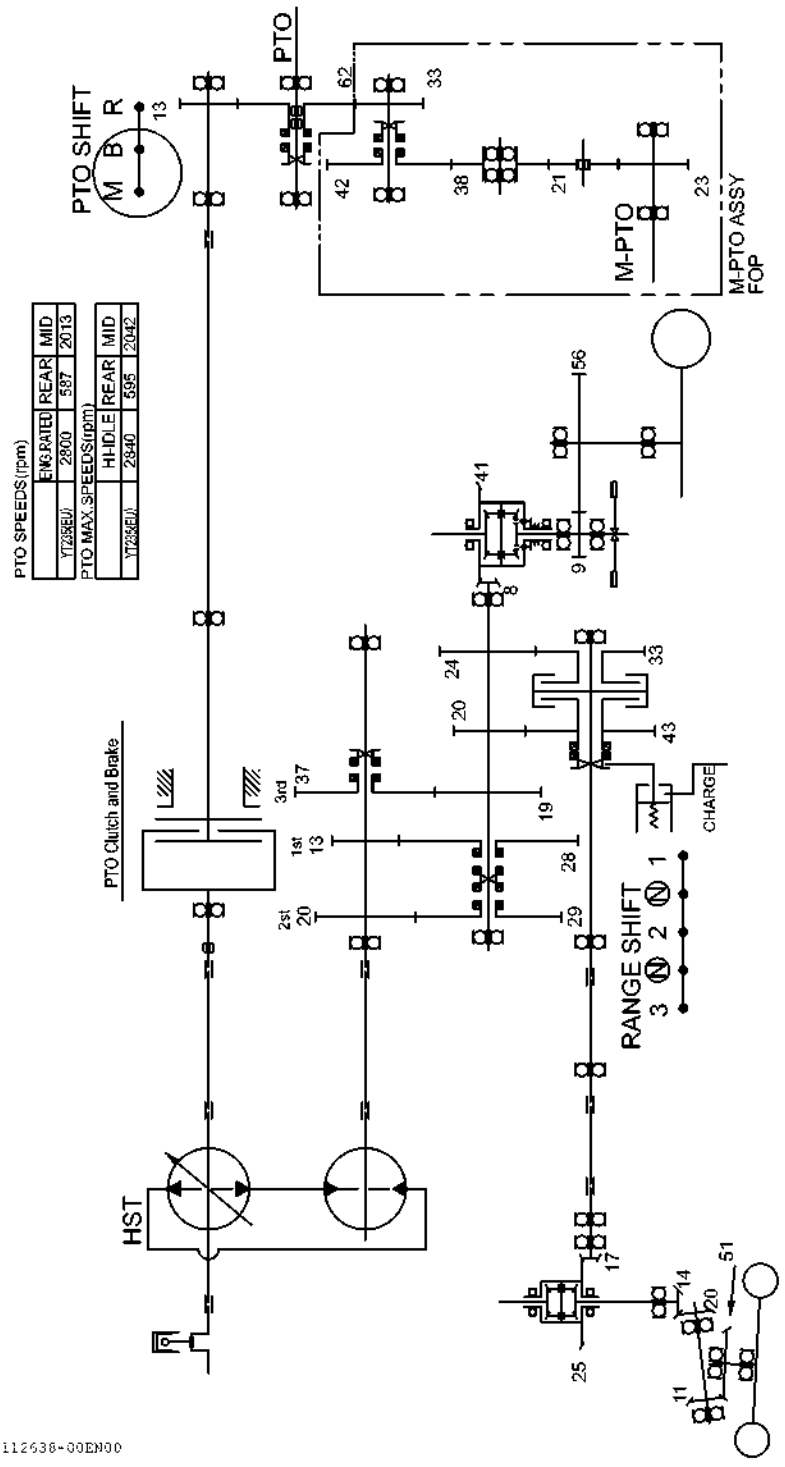
1. Using the diagnosis tool:
   1- Turn off the ECU power and start the engine after turning the power switch on again.
   2- Connect the SMART ASSIST-Direct (SA-D) and check whether an error is detected or not on the current fault indication.

No	Check the fault history indication and if there is an indication, check the malfunction condition.
Yes	• Turn the ECU power on and off again and perform operation 1. • Replace the ECU or injector.

6. TRANSMISSION

1. Structure and Function

1. Transmission mechanism diagram



PTO SPEEDS(rpm)

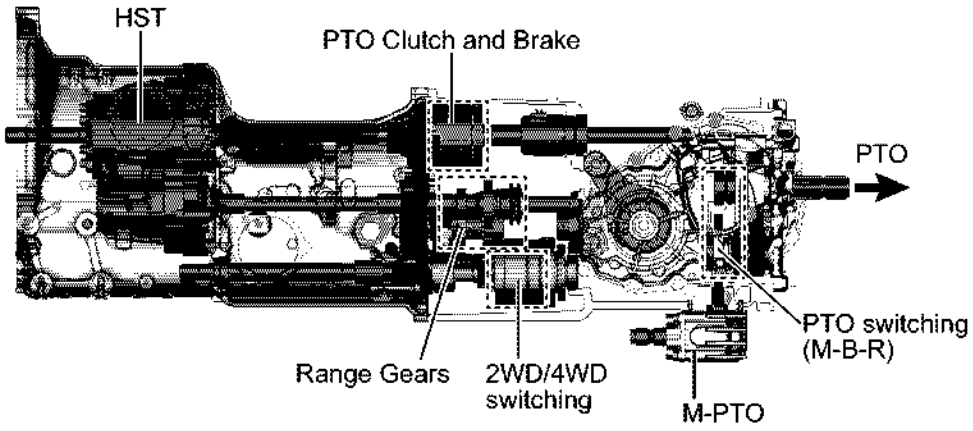
	ENG.RATED	REAR	MID
YT235(EU)	2800	587	2013

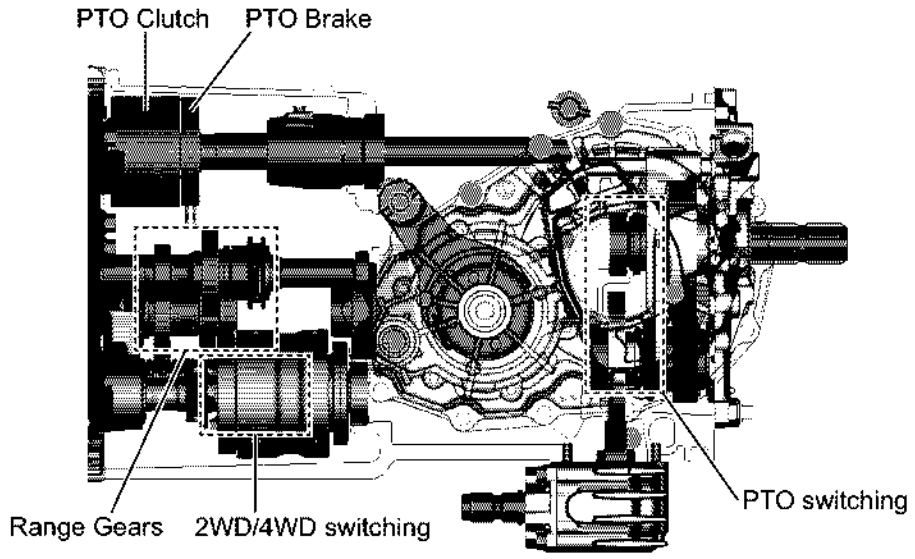
PTO MAX.SPEEDS(rpm)

	HI-IDLE	REAR	MID
YT235(EU)	2840	595	2042

		FRONT TIRE			REAR TIRE		
MODEL	TYPE		RR	SLR		RR	SLR
YT235(EU)	R1 (AG)	6-14 -6PLY	311		9.5-22 -6PLY	482	
YT235(EU)	R3 (TURF)	24x8.50-12 -6PLY	291		315/80D-16 -6PLY	436	
YT235(EU)	R4 (IND)	25x8.50-14 -6PLY	313	292	15-19.6 -6PLY	473	450

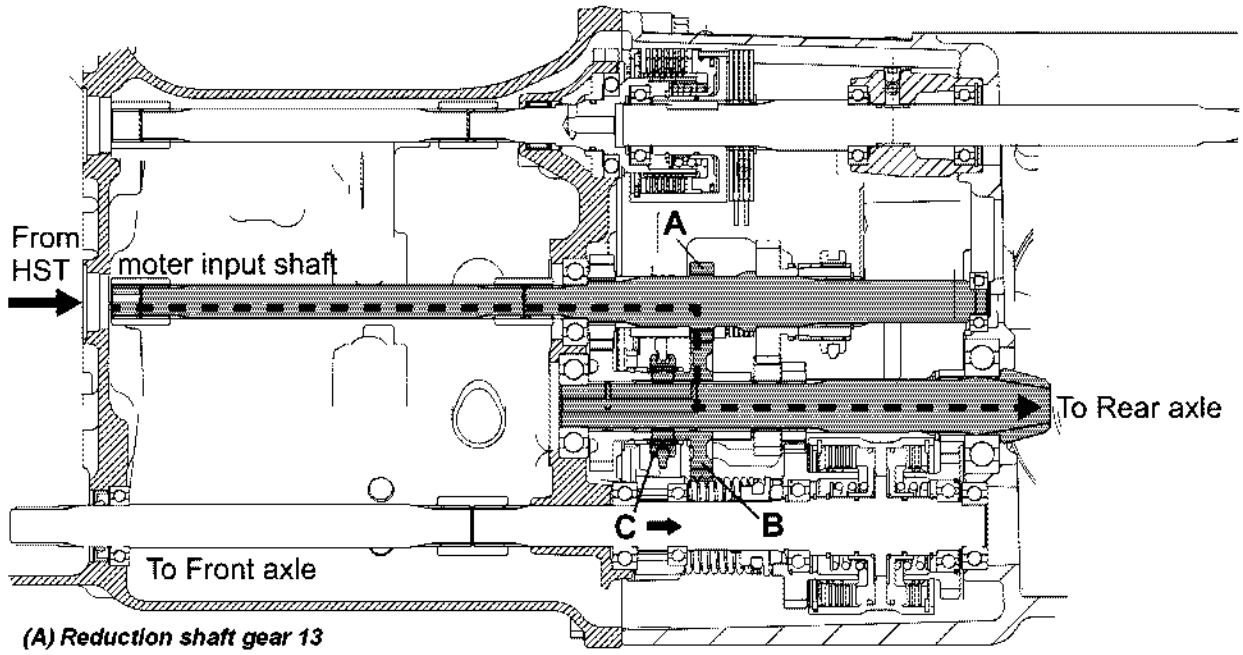
2. Gear shift and power transmission passage





112639-00EN02

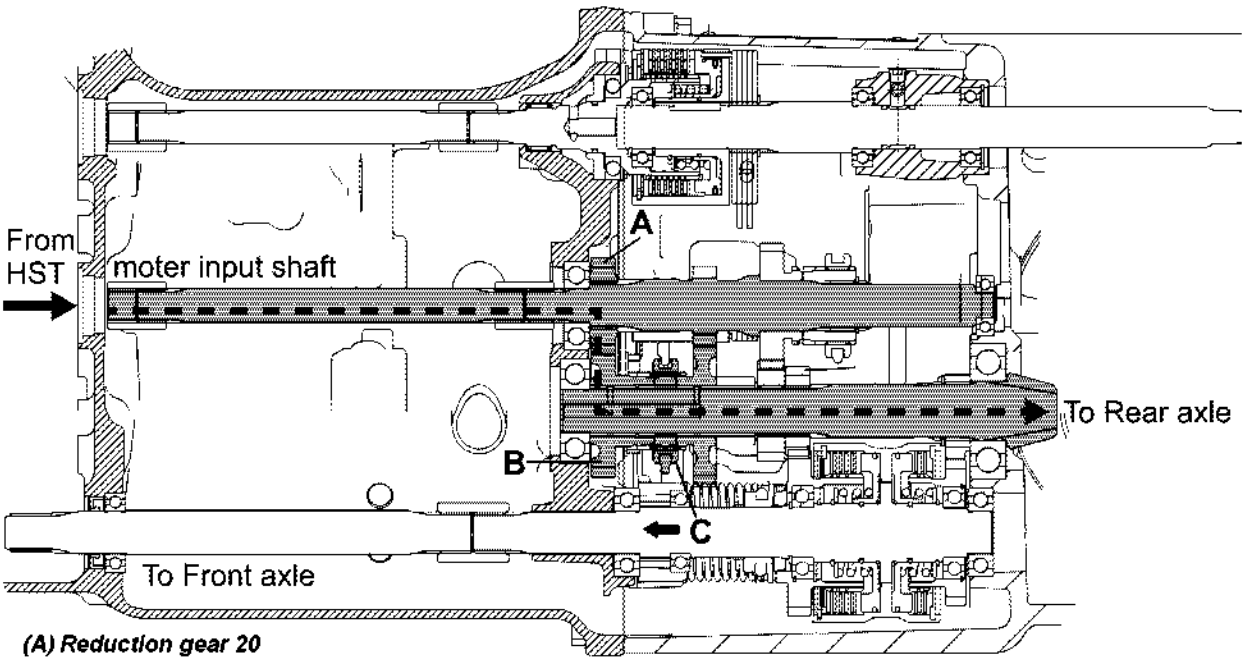
■ Range shift lever [1st gear]



(A) Reduction shaft gear 13
(B) Counter gear 28
(C) Shifter

112641-00EN00

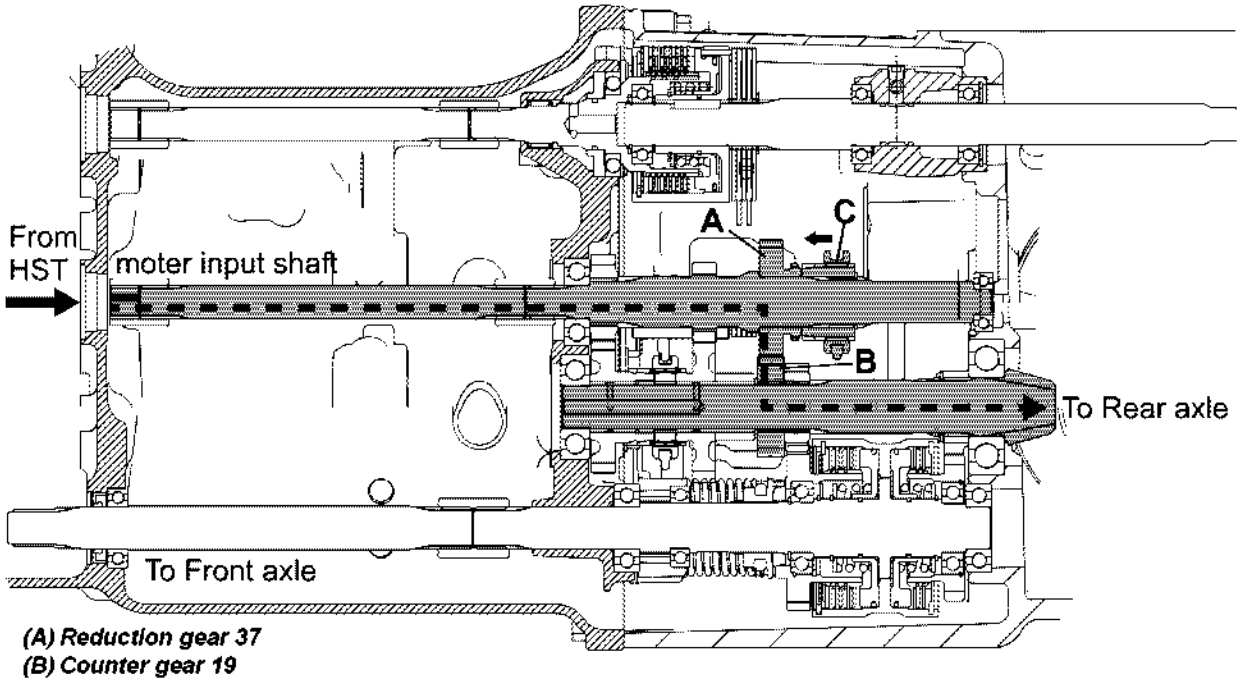
■ Range shift lever [2nd gear]



(A) Reduction gear 20
(B) Counter gear 29
(C) Shifter

112642-00EN00

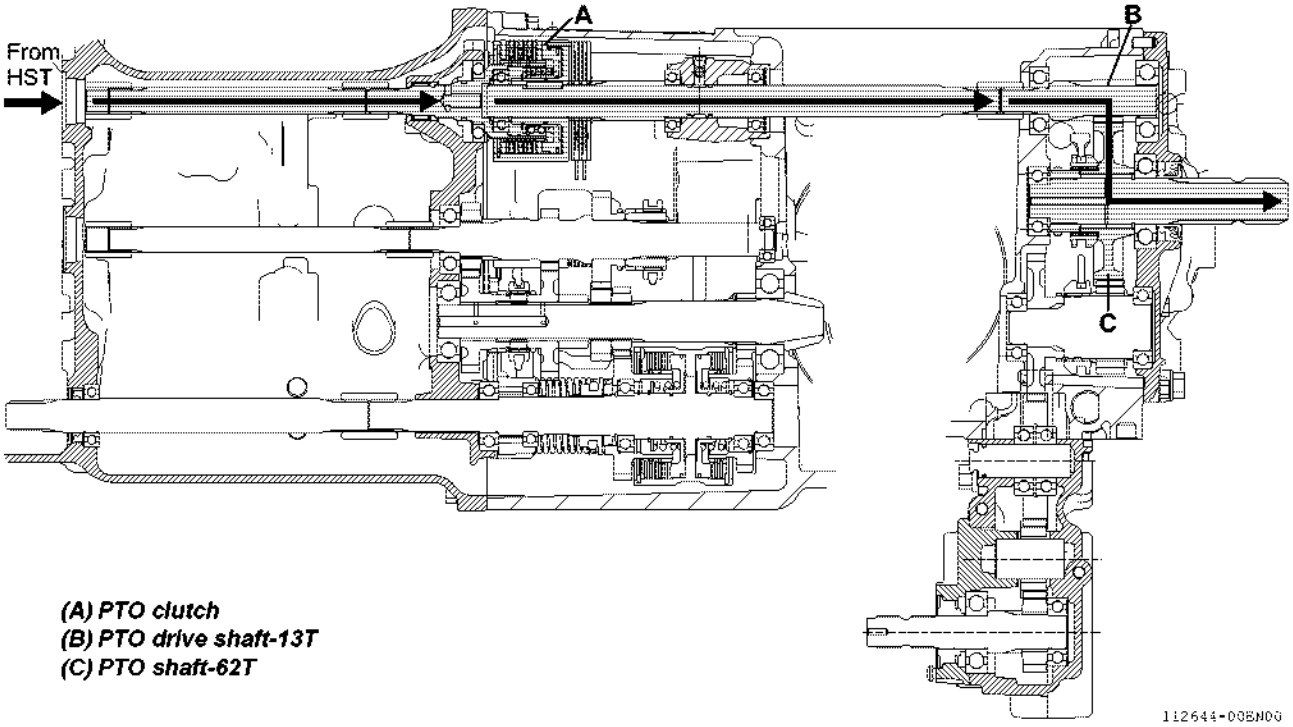
■ Range shift lever [3rd gear]



(A) Reduction gear 37
(B) Counter gear 19
(C) Shifter

112643-00EN00

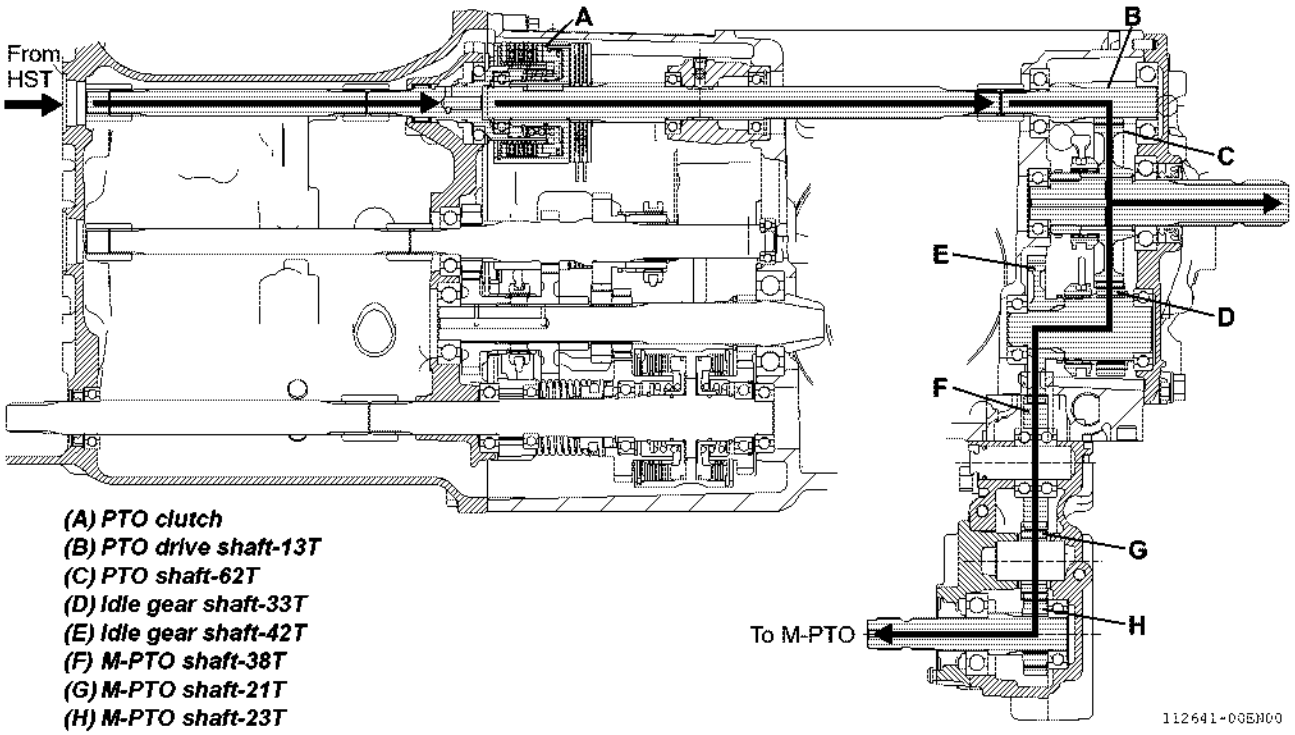
■ PTO R-position



(A) PTO clutch
(B) PTO drive shaft-13T
(C) PTO shaft-62T

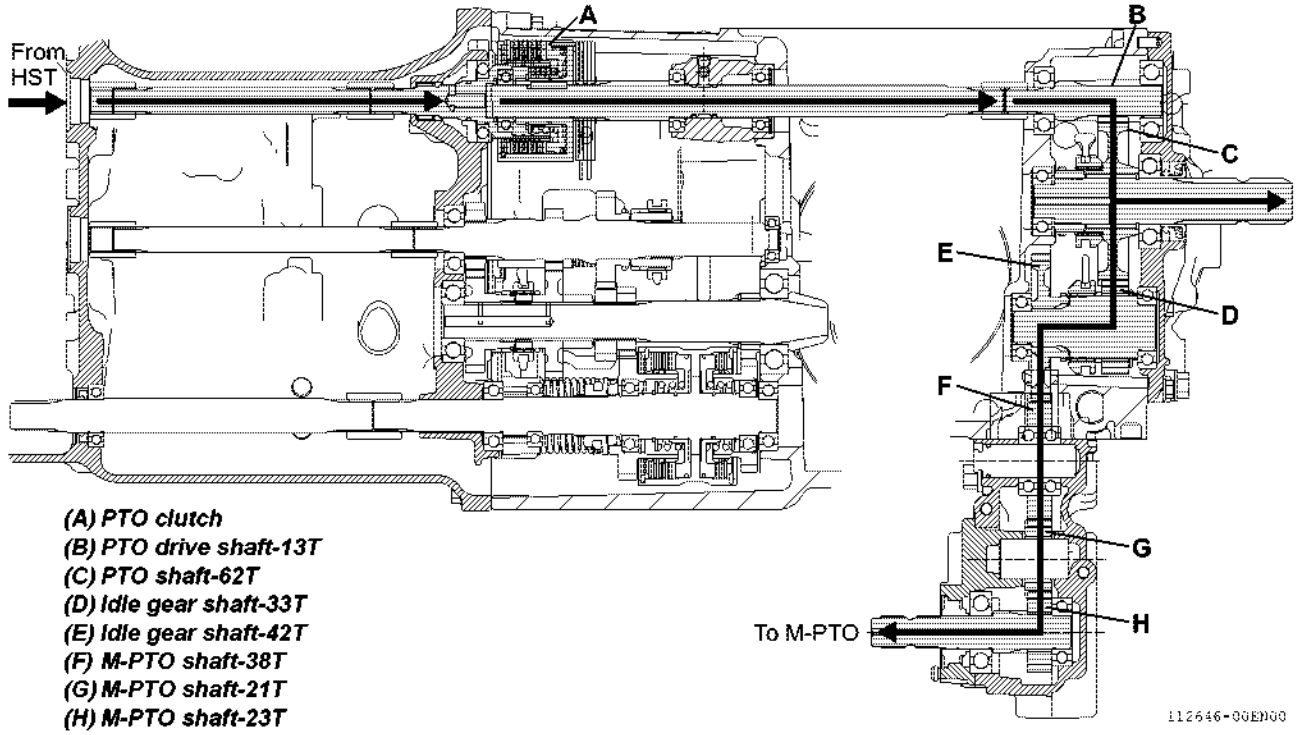
112644-00EN00

■ PTO B-position



(A) PTO clutch
(B) PTO drive shaft-13T
(C) PTO shaft-62T
(D) Idle gear shaft-33T
(E) Idle gear shaft-42T
(F) M-PTO shaft-38T
(G) M-PTO shaft-21T
(H) M-PTO shaft-23T

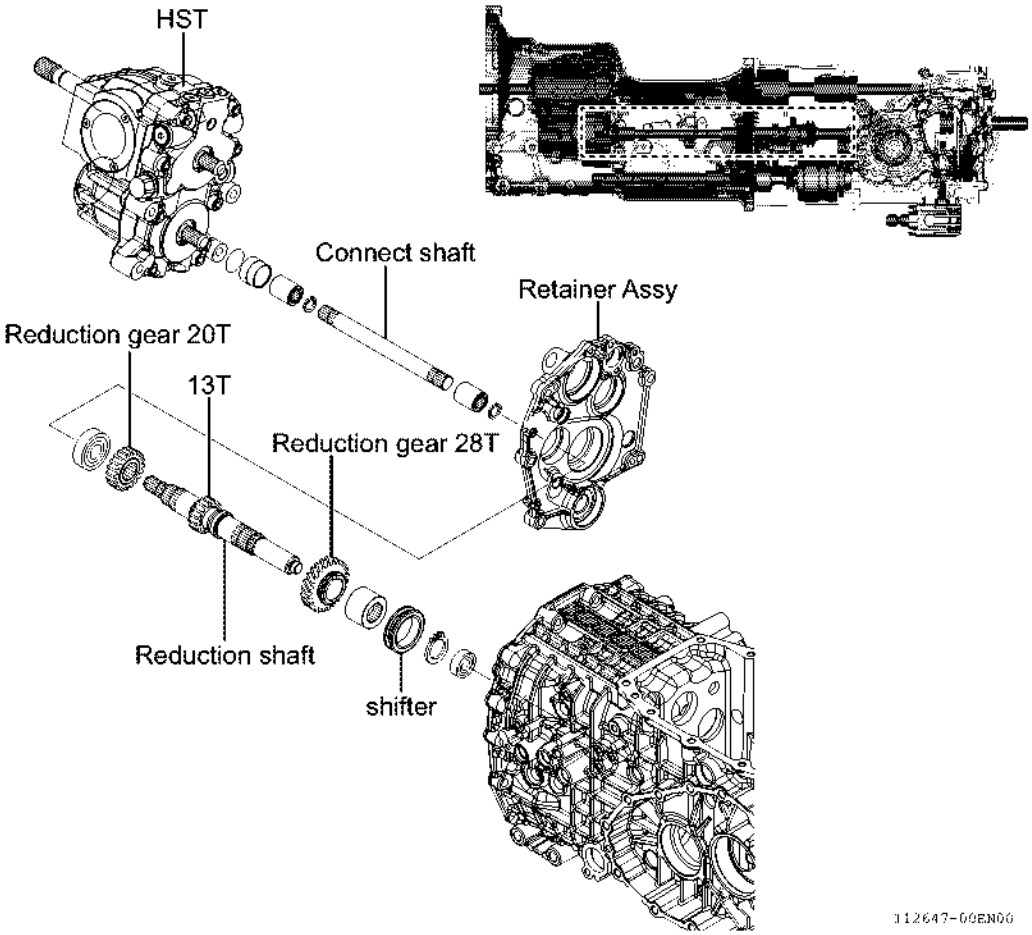
■ PTO M-position



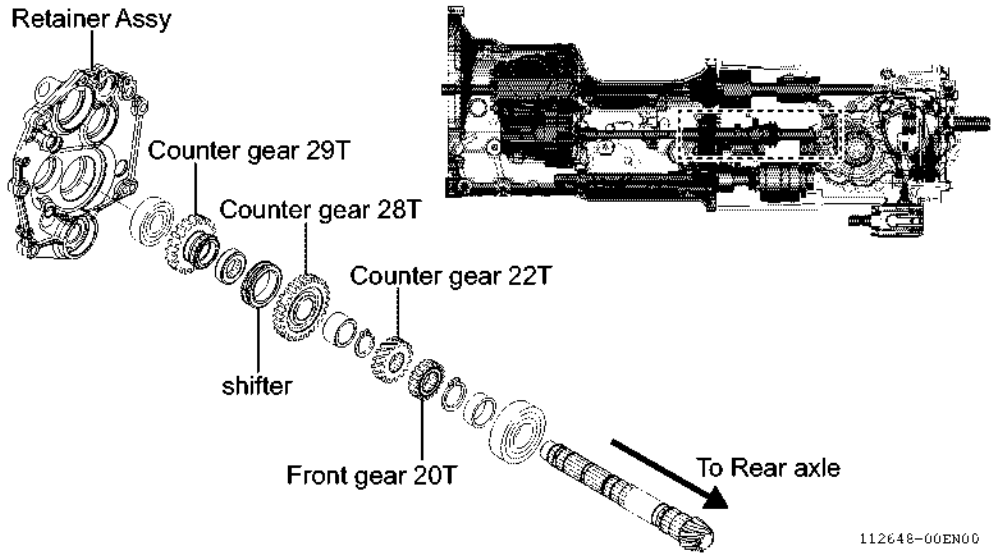
(A) PTO clutch
(B) PTO drive shaft-13T
(C) PTO shaft-62T
(D) Idle gear shaft-33T
(E) Idle gear shaft-42T
(F) M-PTO shaft-38T
(G) M-PTO shaft-21T
(H) M-PTO shaft-23T

2. Disassembly and Reassembly

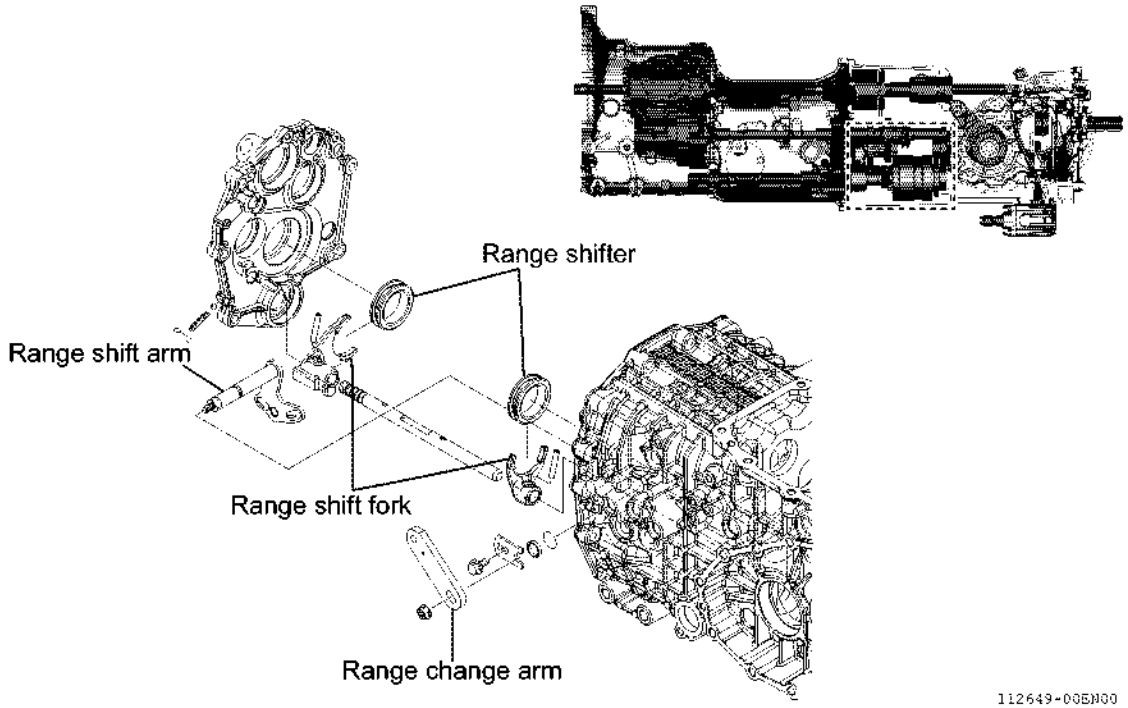
1. Reduction shaft



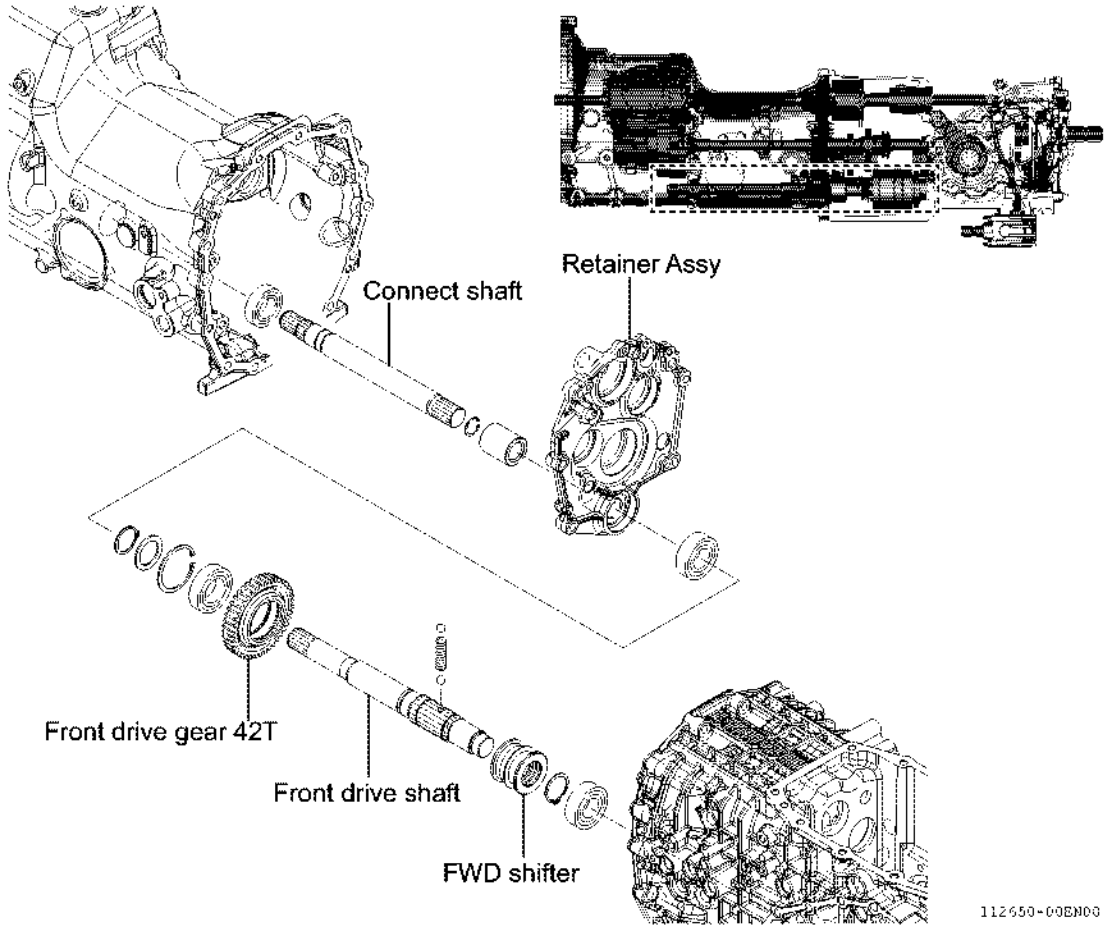
2. Counter shaft



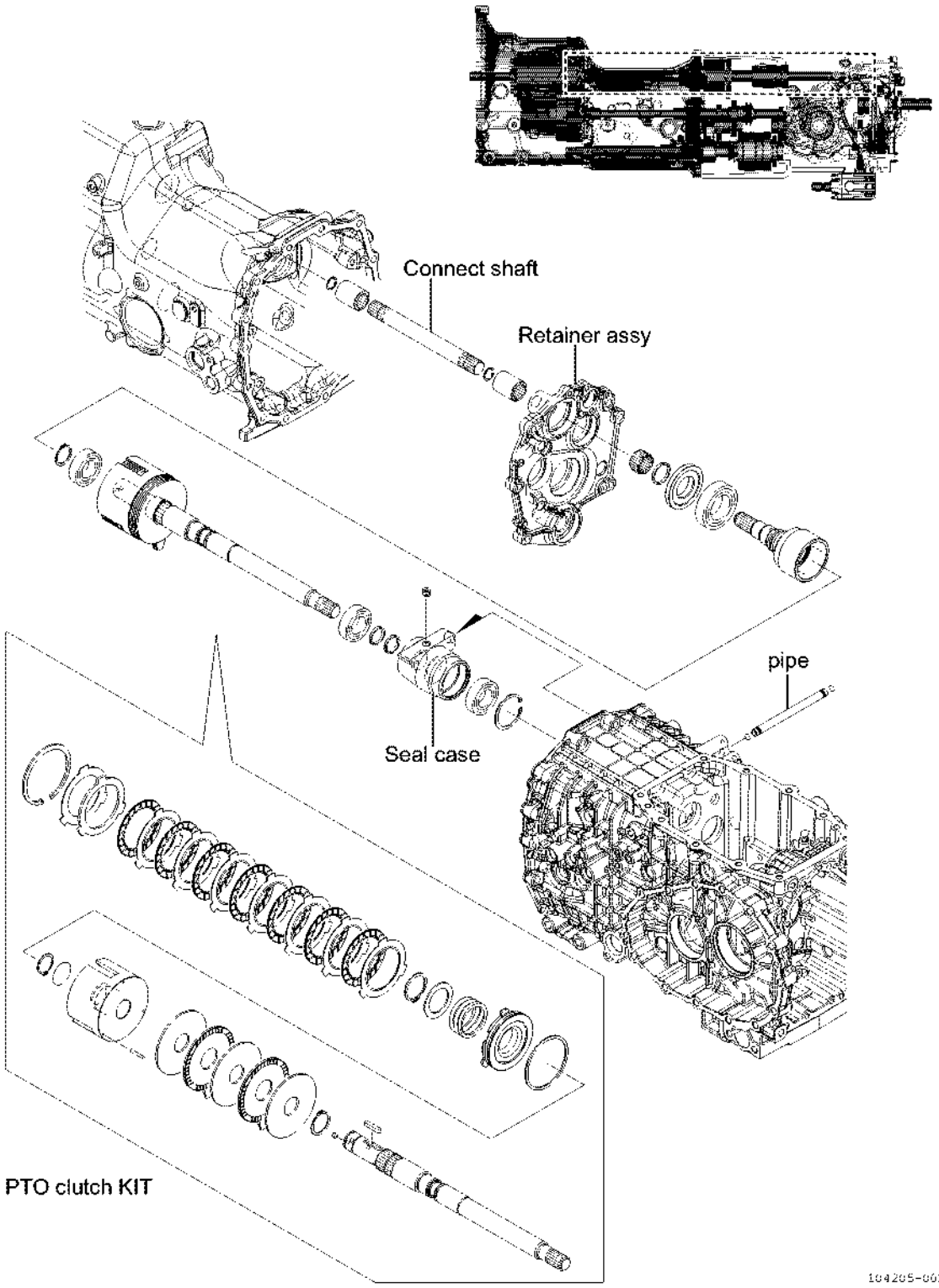
3. Sub shift



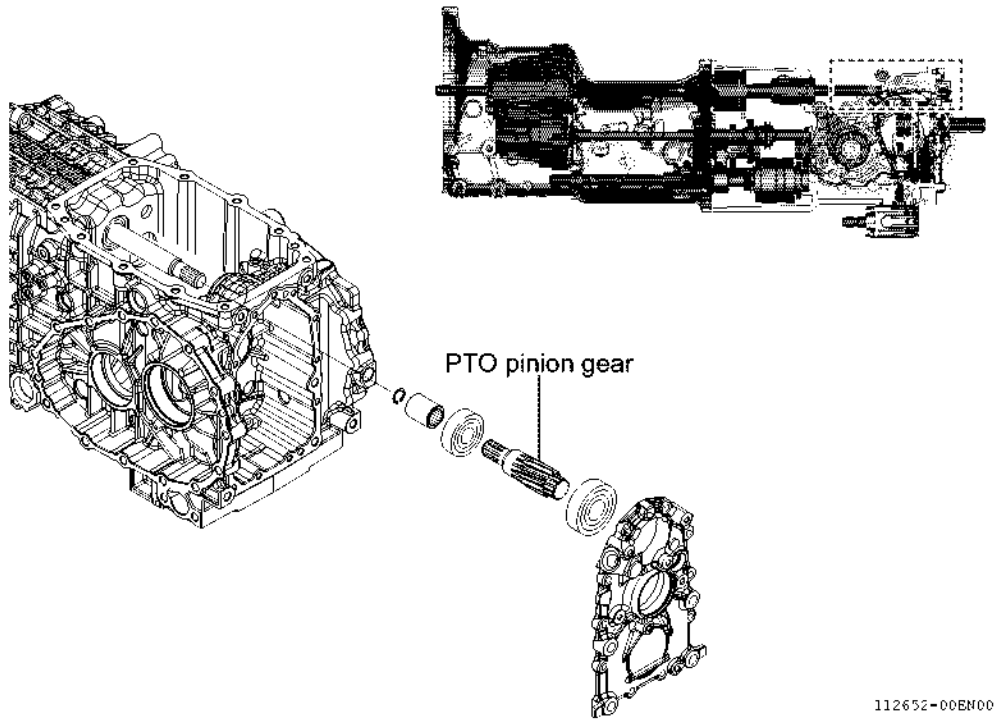
4. 4WD drive



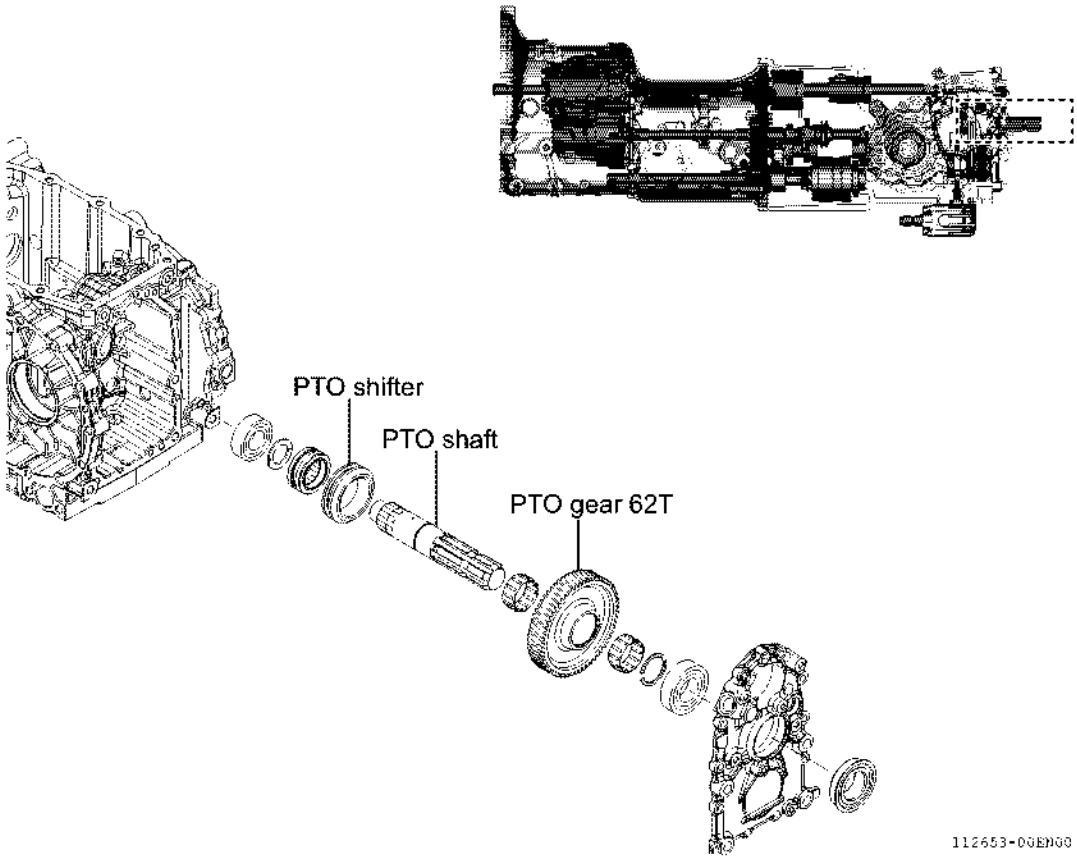
5. PTO drive shaft



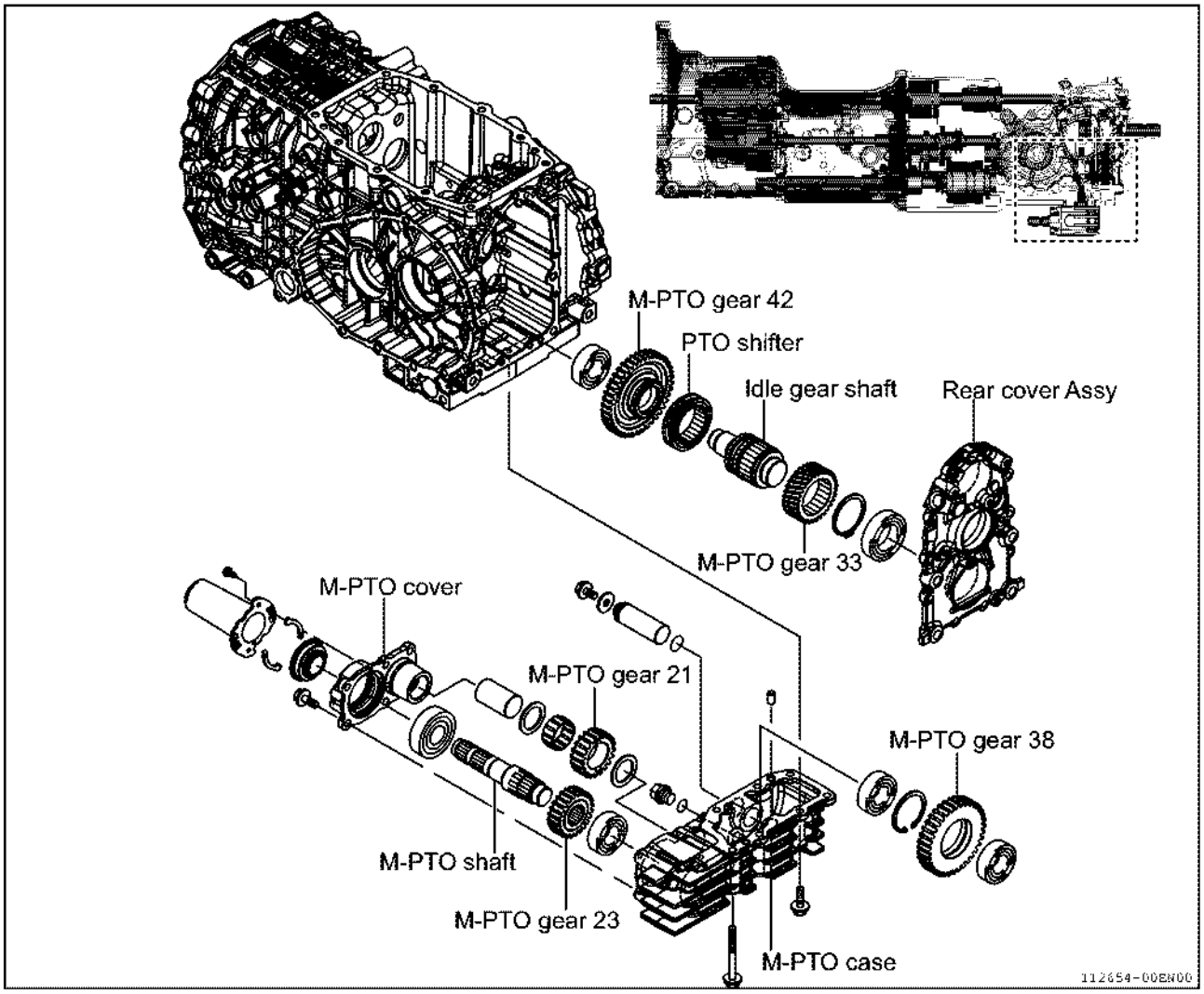
6. PTO drive shaft

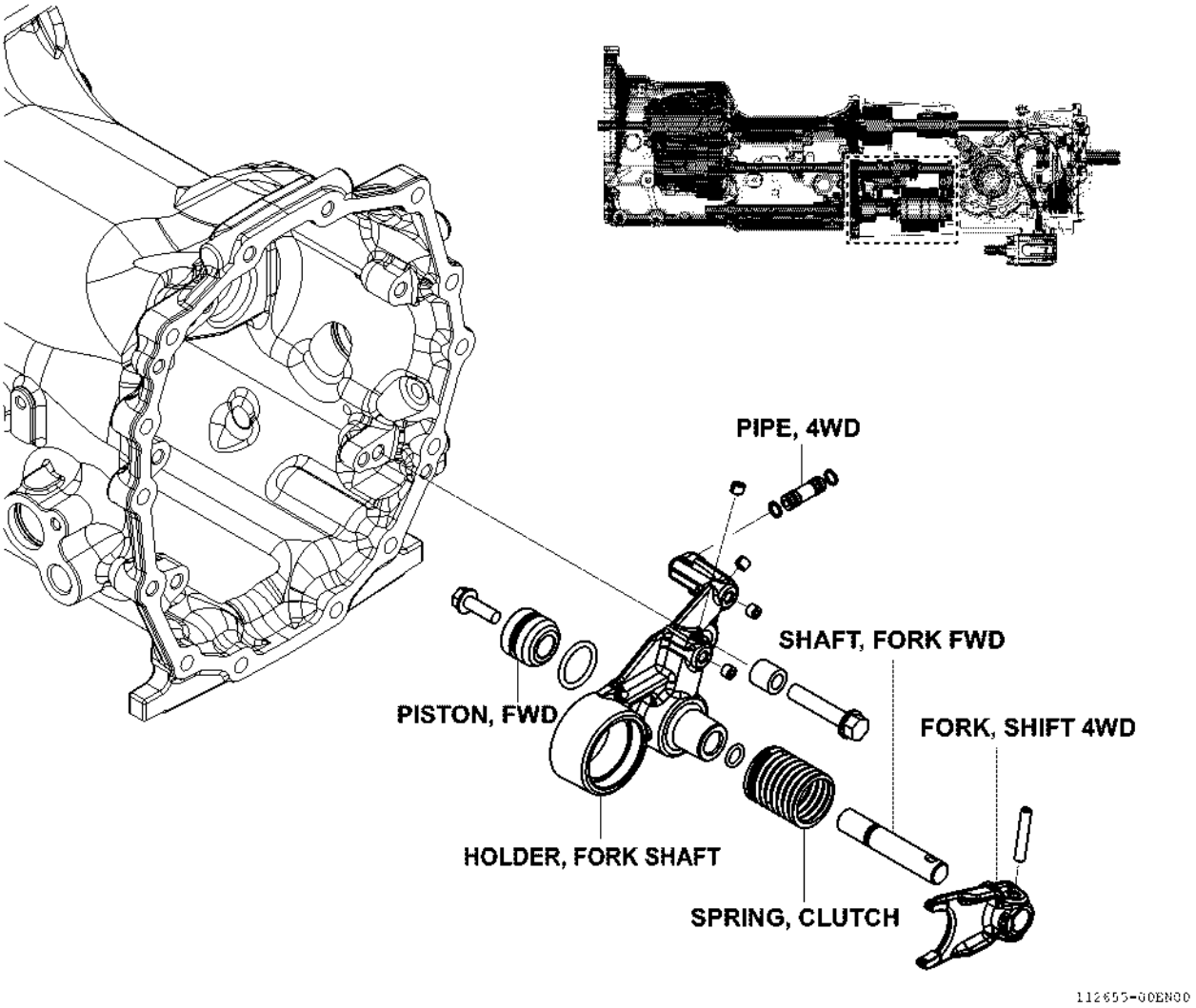


7. PTO shaft

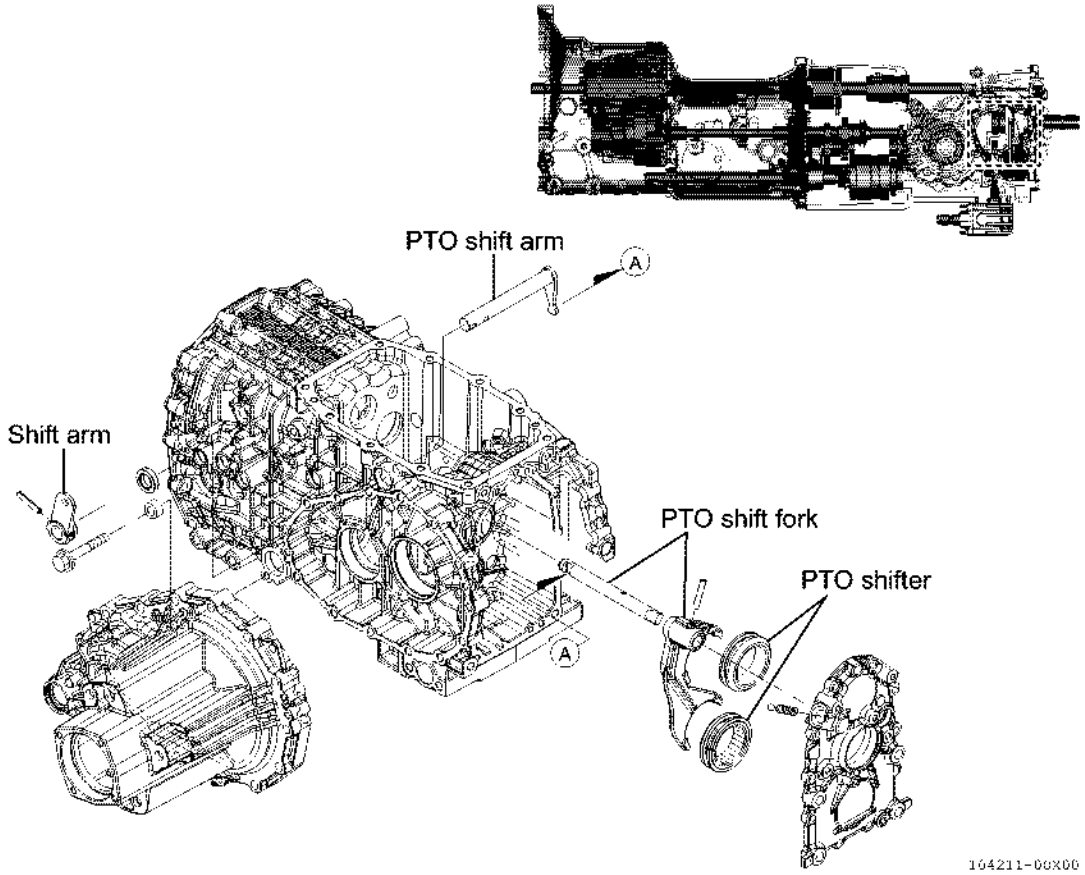


8. M.I.D PTO


M-PTO gear 42
PTO shifter
Idle gear shaft
Rear cover Assy
M-PTO gear 33
M-PTO cover
M-PTO gear 21
M-PTO gear 38
M-PTO shaft
M-PTO gear 23
M-PTO case
112654-00EN00


PIPE, 4WD
SHAFT, FORK FWD
PISTON, FWD
FORK, SHIFT 4WD
HOLDER, FORK SHAFT
SPRING, CLUTCH
112655-00EN00

9. PTO shift


PTO shift arm
A
Shift arm
PTO shift fork
PTO shifter
A
104211-00X00

3. Theory of Operation

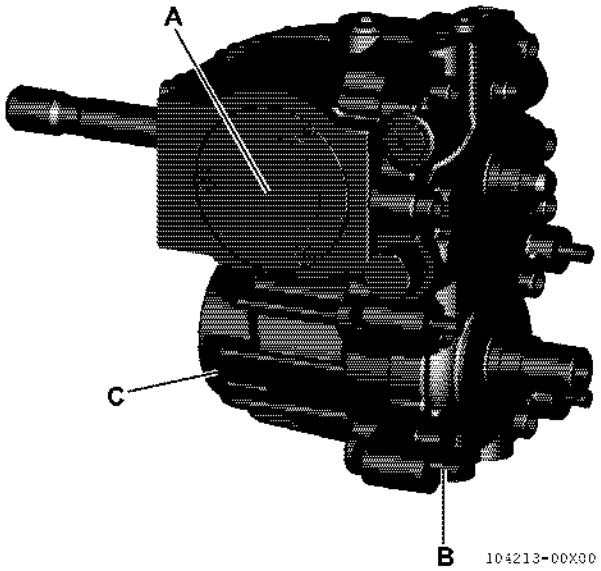
1. Hydrostatic Transmission (HST)

General Function:

- The hydrostatic transmission (HST) is driven by the engine. It allows the driver to continuously vary the speed of the tractor in the forward or reverse direction.
- The output power of the hydrostatic transmission (HST) is fed to the single range gear.

Major Components:

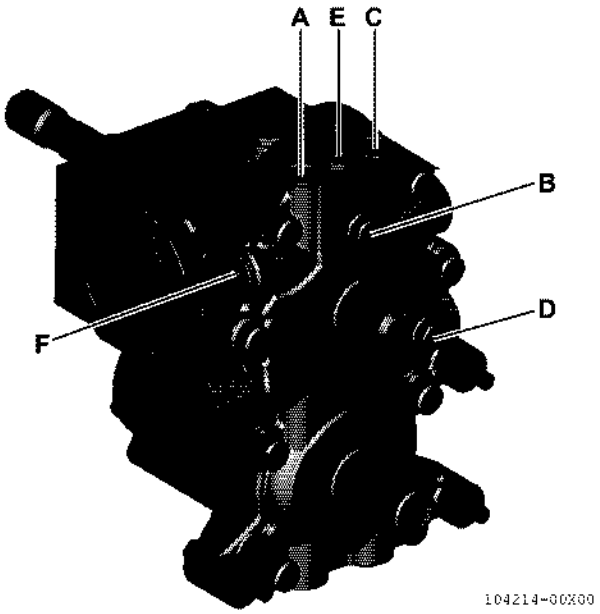
- The major components of the hydrostatic transmission (HST) are the hydrostatic pump (A) which receives power from the engine, the hydrostatic center case (B) which houses the hydraulic valves and oil galleries connecting the pump and motor and the hydrostatic motor (C) which drives the range gears.



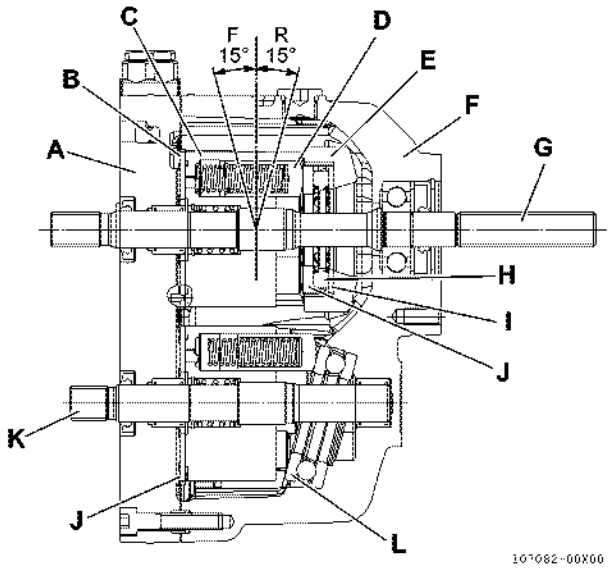
(A) Hydrostatic pump
(B) Hydrostatic center case
(C) Hydrostatic motor

Structure

- HST is an acronym of Hydrostatic Transmission. HST is essentially a non-stage transmission comprising a hydraulic pump and a hydraulic motor



(A) HST test port (reverse)
(B) HST charge port
(C) HST test port (forward)
(D) Tank port
(E) HST charge relief valve
(F) HST relief valve

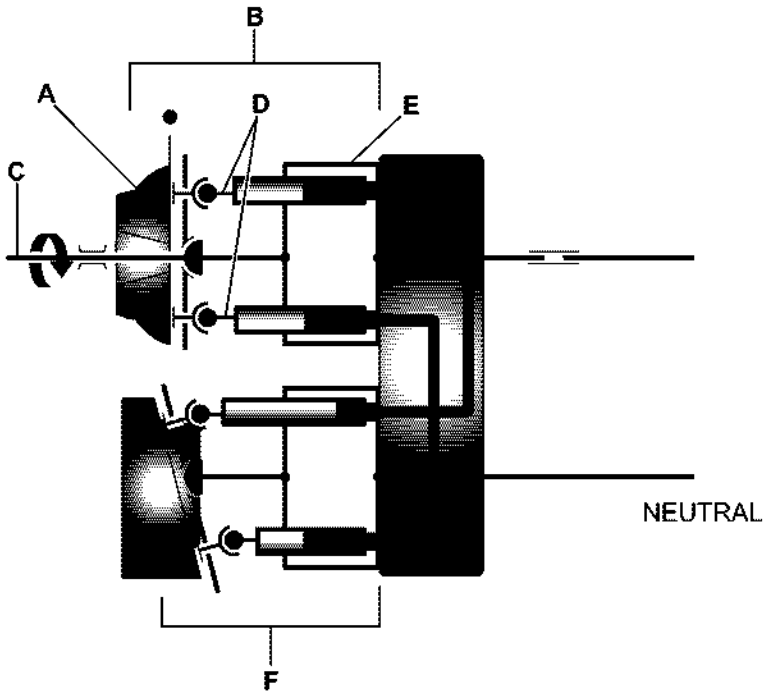


(A) Hydrostatic center case
(B) Pump valve plate
(C) Plunger block assembly
(D) Piston
(E) Swash plate
(F) Hydrostatic Transmission (HST) housing
(G) Pump shaft
(H) Thrust roller bearing
(I) Thrust bearing
(J) Motor valve plate
(K) Motor shaft
(L) Thrust plate

■ Theory of Operation:

1. Hydrostatic Transmission (HST) in N (neutral) Position

When the hydrostatic transmission (HST) is in N (neutral) position, the swash plate (A) of the hydrostatic pump (B) is perpendicular to the pump shaft (C). In this position all the plungers (D) are of equal distance from the plunger block (E). Under this condition the rotating motion of the pump shaft does not produce any pumping action. Hydrostatic oil is not pumped to the hydrostatic motor (F) which consequently does not turn.

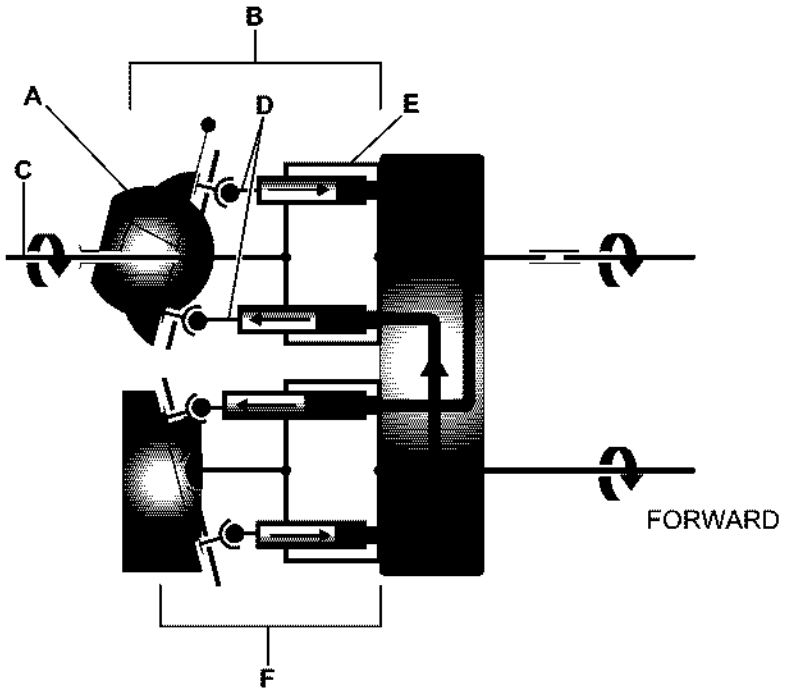


167683-00200

(A) Swash plate
(B) Hydrostatic pump
(C) Pump shaft
(D) Plunger
(E) Plunger block
(F) Hydrostatic motor

2. Hydrostatic Transmission (HST) in Forward Position

When the operator depresses the forward pedal, the hydrostatic transmission (HST) is moved from the neutral to the forward position. The swash plate (A) of the hydrostatic pump (B) is inclined versus the pump shaft (C). In this condition, the plungers (D) are at different distances from the plunger block (E). The rotating pump shaft now causes the plungers to push oil out of the plunger block as the rotation of the pump shaft shifts plungers from a point that is further from the plunger block to a point that is closer to the plunger block. The hydrostatic pump starts to pump oil to the hydrostatic motor (F) which now starts to turn. At a given engine speed, the speed at which the hydrostatic motor turns is determined by the volume per minute of oil pumped. As the operator depresses the forward pedal further, the inclination of the hydrostatic pump swash plate from neutral becomes larger. This causes a larger volume of oil to be pumped, resulting in an increased speed of the hydrostatic motor.

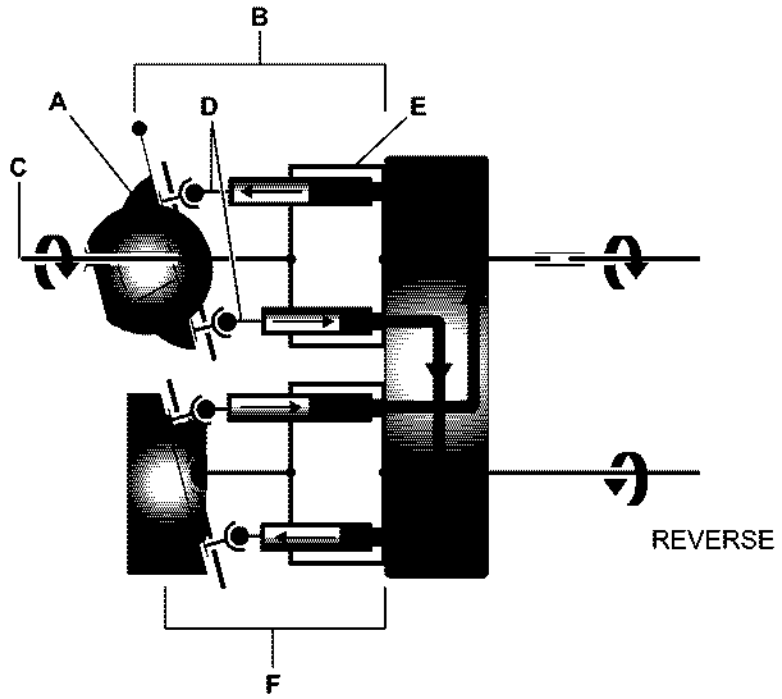


167684-00400

(A) Swash plate
(B) Hydrostatic pump
(C) Pump shaft
(D) Plunger
(E) Plunger block
(F) Hydrostatic motor

3. Hydrostatic Transmission (HST) in Reverse Position

When the operator depresses the reverse pedal, the hydrostatic transmission (HST) is moved from the neutral to the reverse position. The swash plate (A) of the hydrostatic pump (B) is inclined versus the pump shaft (C). In this condition, the plungers (D) are at different distances from the plunger block (E). The rotating pump shaft now causes the plungers to push oil out of the plunger block as the rotation of the pump shaft shifts plungers from a point that is further from the plunger block to a point that is closer to the plunger block. The hydrostatic pump starts to pump oil to the hydrostatic motor (F) in the opposite direction which now starts to turn in reverse. The speed at which the hydrostatic motor turns is determined by the volume per minute of oil pumped. As the operator depresses the reverse pedal further, the inclination of the hydrostatic pump swash plate from neutral becomes larger. This causes a larger volume of oil to be pumped, resulting in an increased speed of the hydrostatic motor.

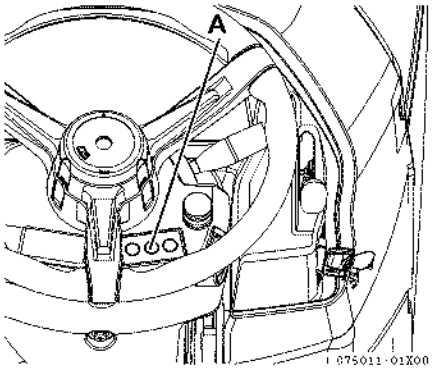


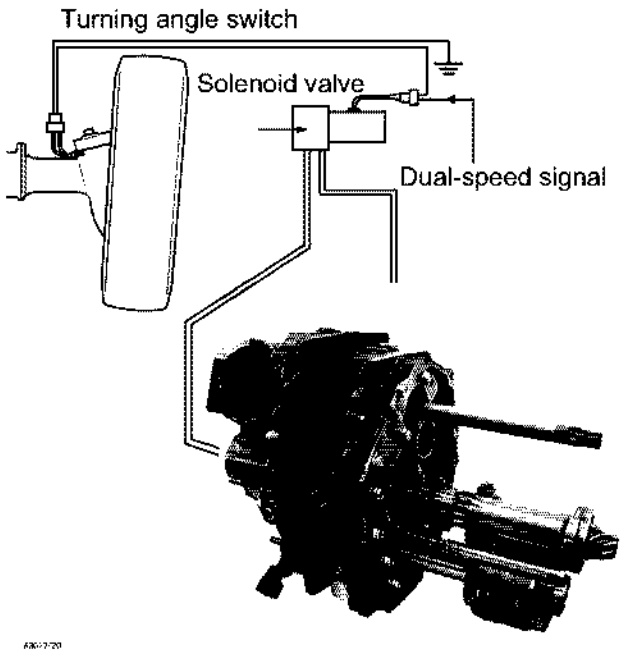
(A) Swash plate
(B) Hydrostatic pump
(C) Pump shaft
(D) Plunger
(E) Plunger block
(F) Hydrostatic motor

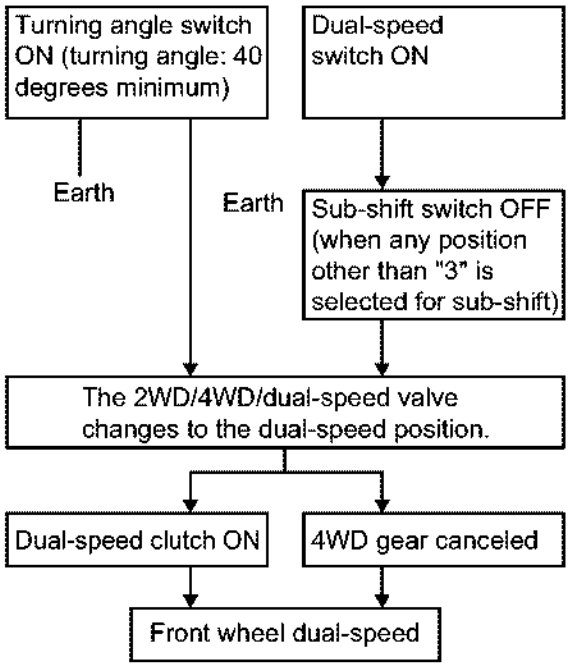
4. Dual Speed Turn

1. Dual Speed Turn

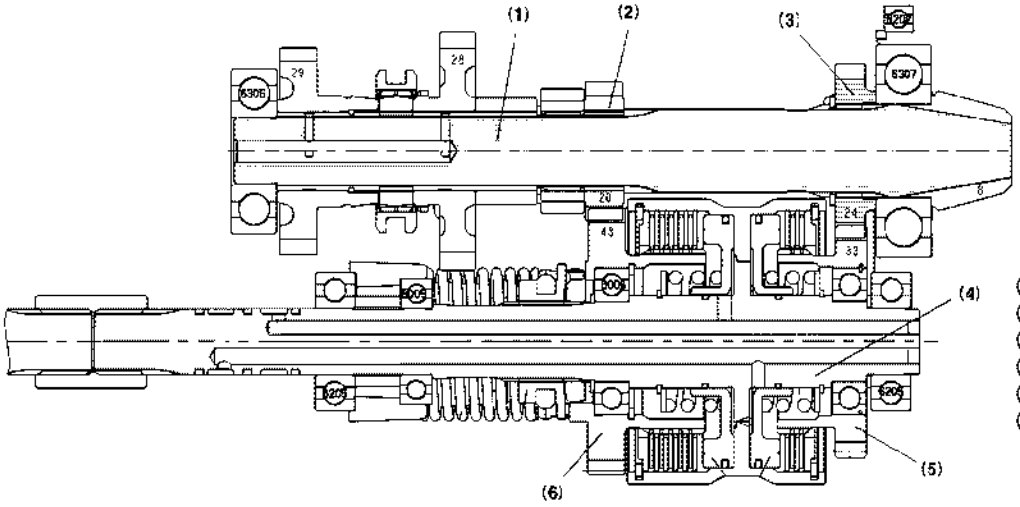
In selecting the two-wheel drive mode, the four-wheel drive mode, or the front dual-speed mode, a hydraulic clutch with a solenoid valve is used. Therefore, even if you are working or driving the tractor, you may select the two-wheel drive mode or the four-wheel drive mode and turn ON/OFF the dual-speed mode. In addition, you can accurately switch between the four-wheel drive mode and the dual-speed mode since there is no neutral zone between them. If you change the sub-shift lever to "3" when you are working in the dual-speed mode, the dual-speed mode is automatically canceled and the four-wheel drive mode is selected. This ensures safety during traveling of the tractor.





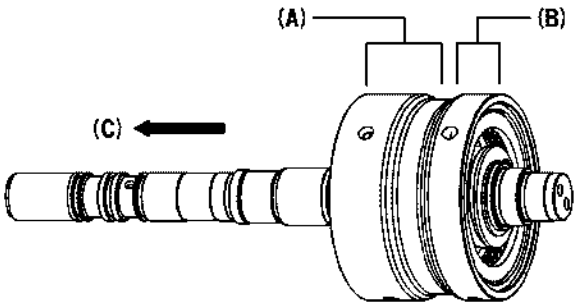


2. Structure of four-wheel drive/dual-speed clutch



(1) Counter shaft
(2) Front gear 20
(3) Front gear 24
(4) 4WD clutch kit
(5) Front clutch gear 33
(6) Front clutch gear 43

112659-00ENOO



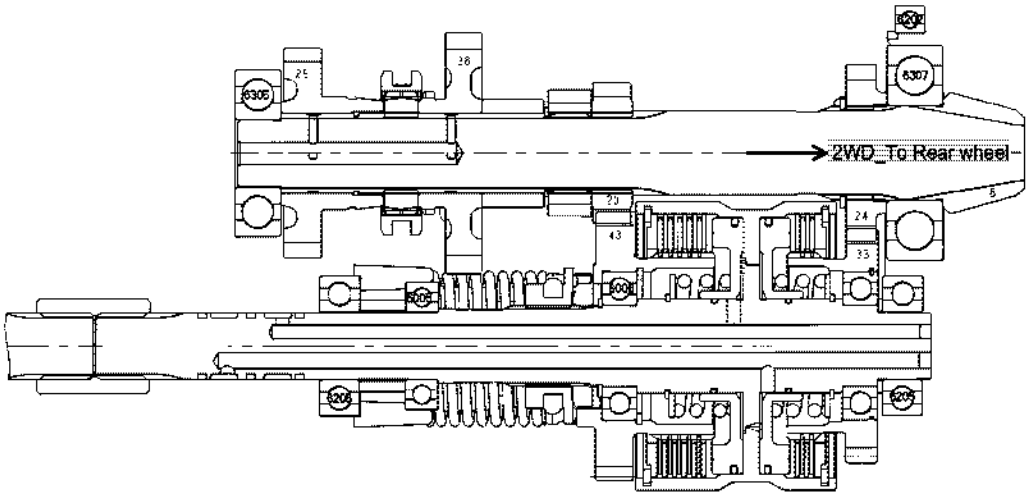
(A) Four-wheel drive hydraulic clutch
(B) Dual-speed hydraulic clutch
(C) Front right side of tractor

112660-00ENOO

<Two-wheel drive mode>

The power that has been shifted by the HST and the sub-transmission is transmitted to two front gears on the counter shaft.

At this time, the hydraulic pressure is not supplied to the 4WD kit, so the power to the front wheels is cut off. Only the rear wheels are driven. (2WD)



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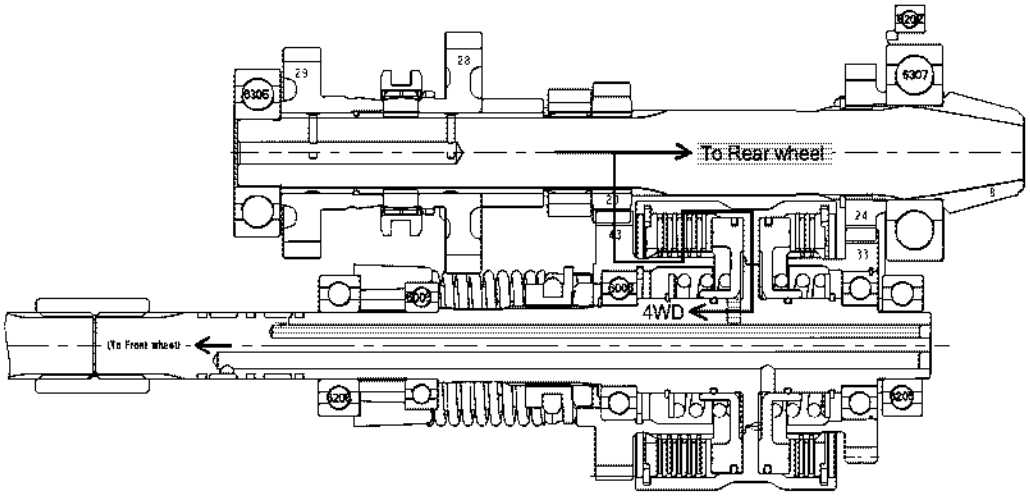
<Four-wheel drive mode>

The power that has been shifted by the HST and the sub-transmission is transmitted to two front gears on the counter shaft.

At this time, hydraulic pressure is supplied to the 4WD line of the shaft of the clutch kit, and the clutch piston (front) operates.

The front clutch gear 43 is driven by this pressure, and power from the counter shaft is transmitted to the front wheel drive shaft via the clutch kit.



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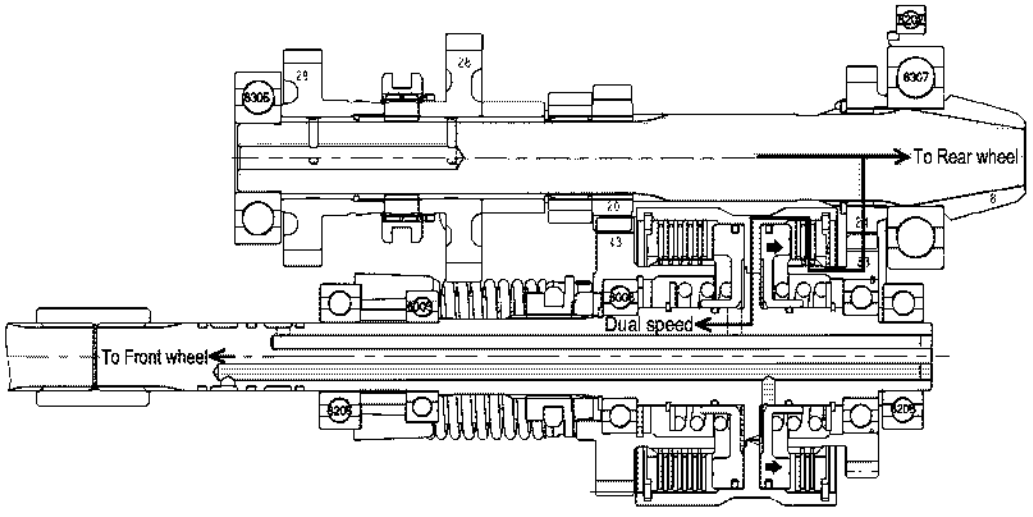
<Dual-speed mode>
When the condition of the dual speed mode is satisfied, the 4WD solenoid valve operates, the hydraulic oil switches from the 4WD line of the clutch kit shaft to the Dual speed line, and the clutch piston (rear) operates.

As a result, the power that has been input to the front clutch gear 33 is transmitted to the front-wheel drive shaft via the clutch kit at a revolution speed about two times higher than that in the four-wheel drive mode.



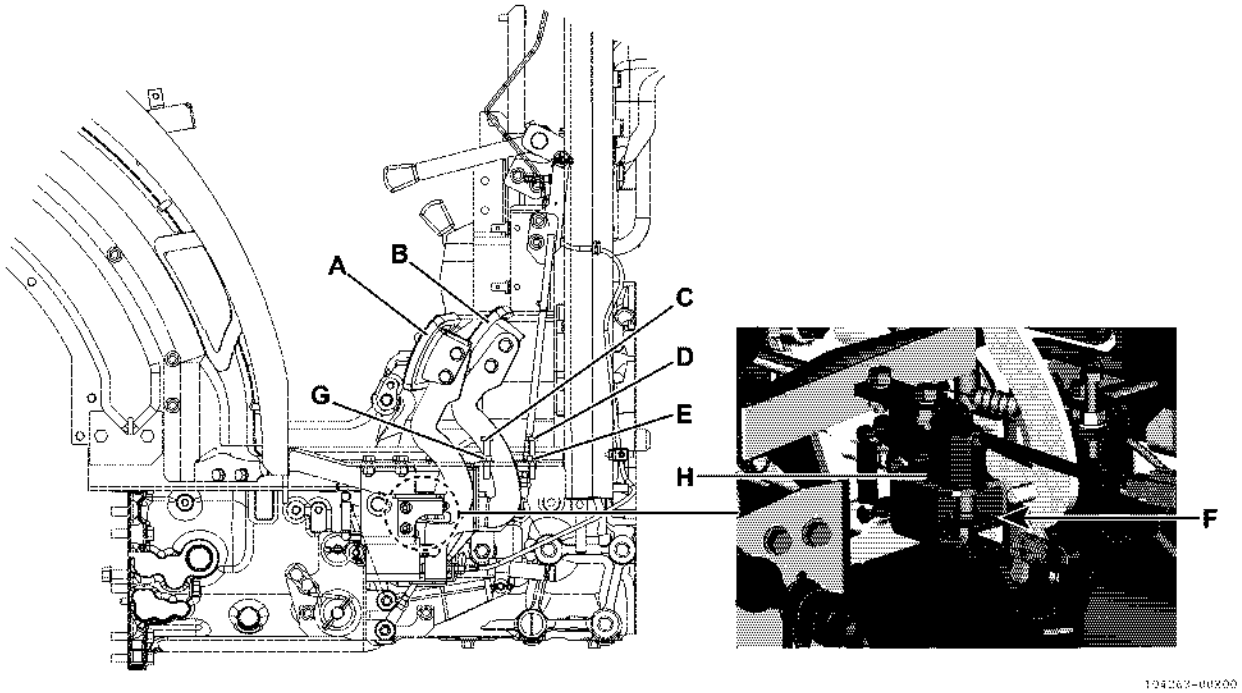
5. Adjust pedals and levers

1. Assembling and adjusting the HST pedal unit

1. Left side: Move the HST pedal (B) to the T/M stopper (D), loosen the bolt by 1/4 rotation from where the bolt head of (D) and the pedal are in contact, and lock the bolt using the nut (E).
2. Right side: For HST pedal (A), adjust the height of the bolt head of (C) to 31.51 mm, and lock the bolt using the nut (G).

2. Adjusting the HST pedal stopper

After assembling the HST pedal unit, mount part H so that the gap with F is 0.



6. Hydrostatic Transmission (HST) Neutral Adjustment

When HST assembly was removed from clutch housing and reassembled, HST neutral adjustment is necessary to ensure the neutral position of HST pump swash plate angle.
You can perform a quick test by lifting up the rear wheels from the ground.

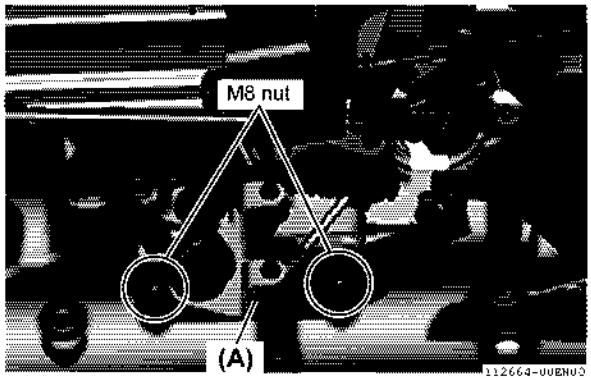
⚠ WARNING

Avoid injury!
- Do not touch the cooling fan or other rotating parts.

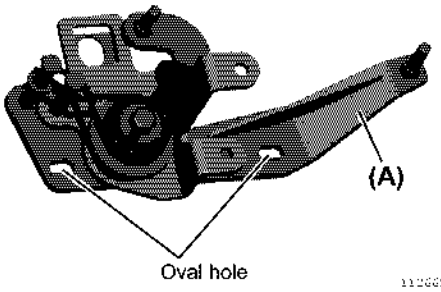
1. Shut off the engine.
2. Lift the rear wheels.

NOTE
- Make sure to use a suitable lifting device.
- Make sure the rear wheels are off the ground.
- Make sure to support the rear axle with suitable jack stands.
- Make sure that the range gear lever is in gear position.
- Make sure to disengage the 4-wheel drive.

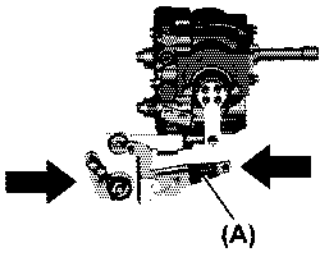
3. Disengage 4WD, jumper the seat switch to start the engine. The 3rd gear of range shift can provide the most visibility to see if the rear wheels are rotating.
4. If the rear wheels are rotating, neutral position adjustment is necessary. Go on to the next step.
5. To ensure the neutral position of HST, perform the following procedure.
   1. Release the parking brake.
   2. Start the engine.
   3. Loosen the two M8 nuts.



The holes in assembly (A) are oval so it can move back and forth.

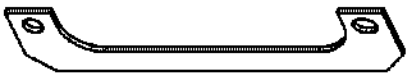


4. Hit the assembly (A) from rear or front with a plastic hammer to move it back or forth, until it is located in the neutral position and the rear wheels stop completely.



⚠ WARNING

- Do not hit the u-shape stay.

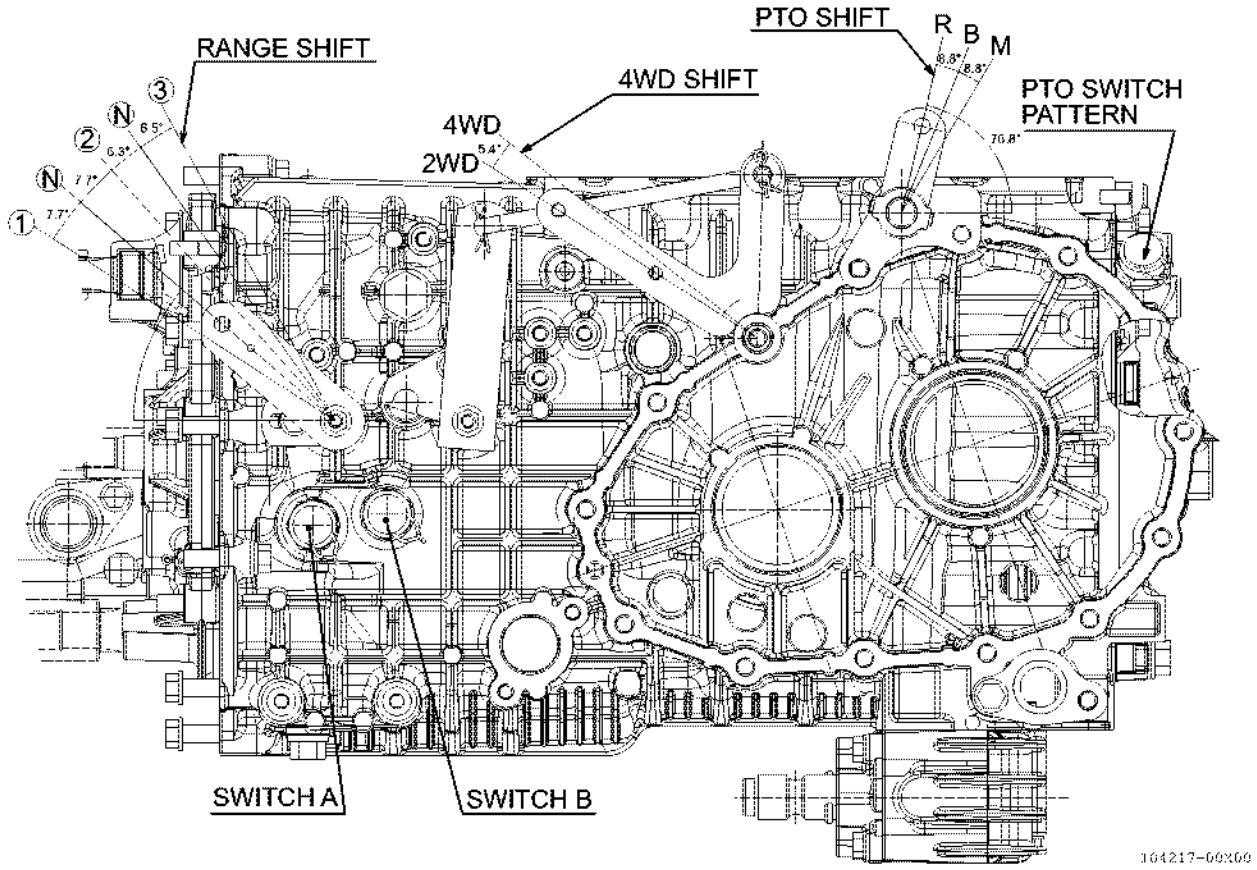


- Do not use a steel hammer.

5. Tighten the two M8 nuts.
6. Shut off the engine.
6. Lower the rear wheels so they touch the ground. Double check if the adjustment is good now with both of the rear wheels on the ground.

1. Mounting position of each shift arm

Mount each shift arm as shown in the diagram.



Range switch pattern

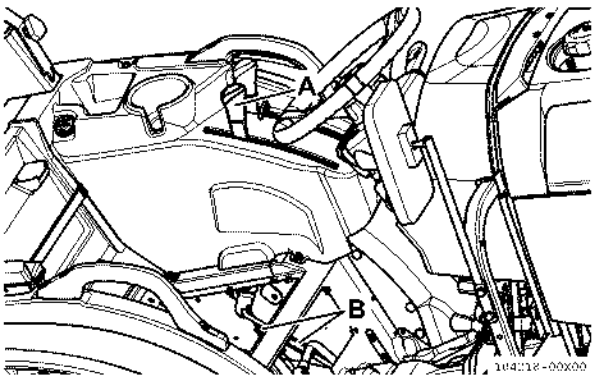
Rang	Switch A	Switch B
1	ON	OFF
N	ON	ON
2	OFF	ON
N	ON	ON
3	OFF	OFF

PTO switch pattern

Rang	Switch
R	ON
B	OFF
M	OFF

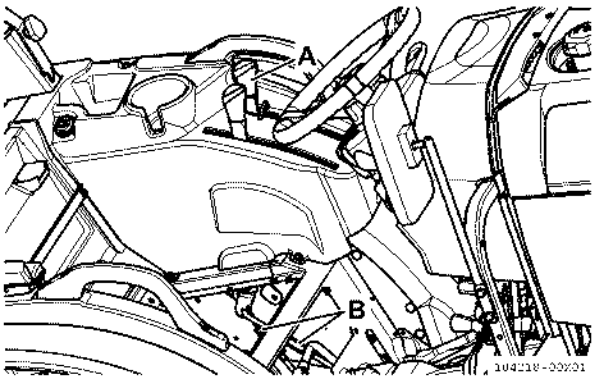
2. Inspecting and adjusting the shift lever

Use the adjusting rods (B) to adjust the shift lever (A) to match the speed positions on the nameplate.



3. Inspecting and adjusting the PTO lever

Use the adjusting rods (B) to adjust the PTO lever (A) to match the speed positions on the nameplate.



7. FRONT AXLE

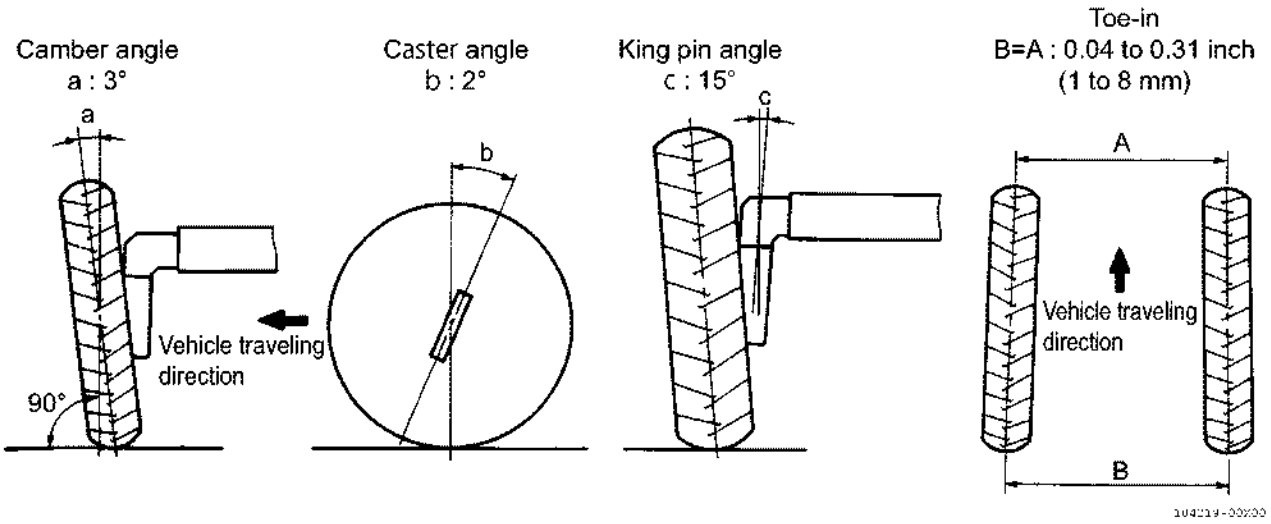
1. Structure and Function

1. Front wheel alignment

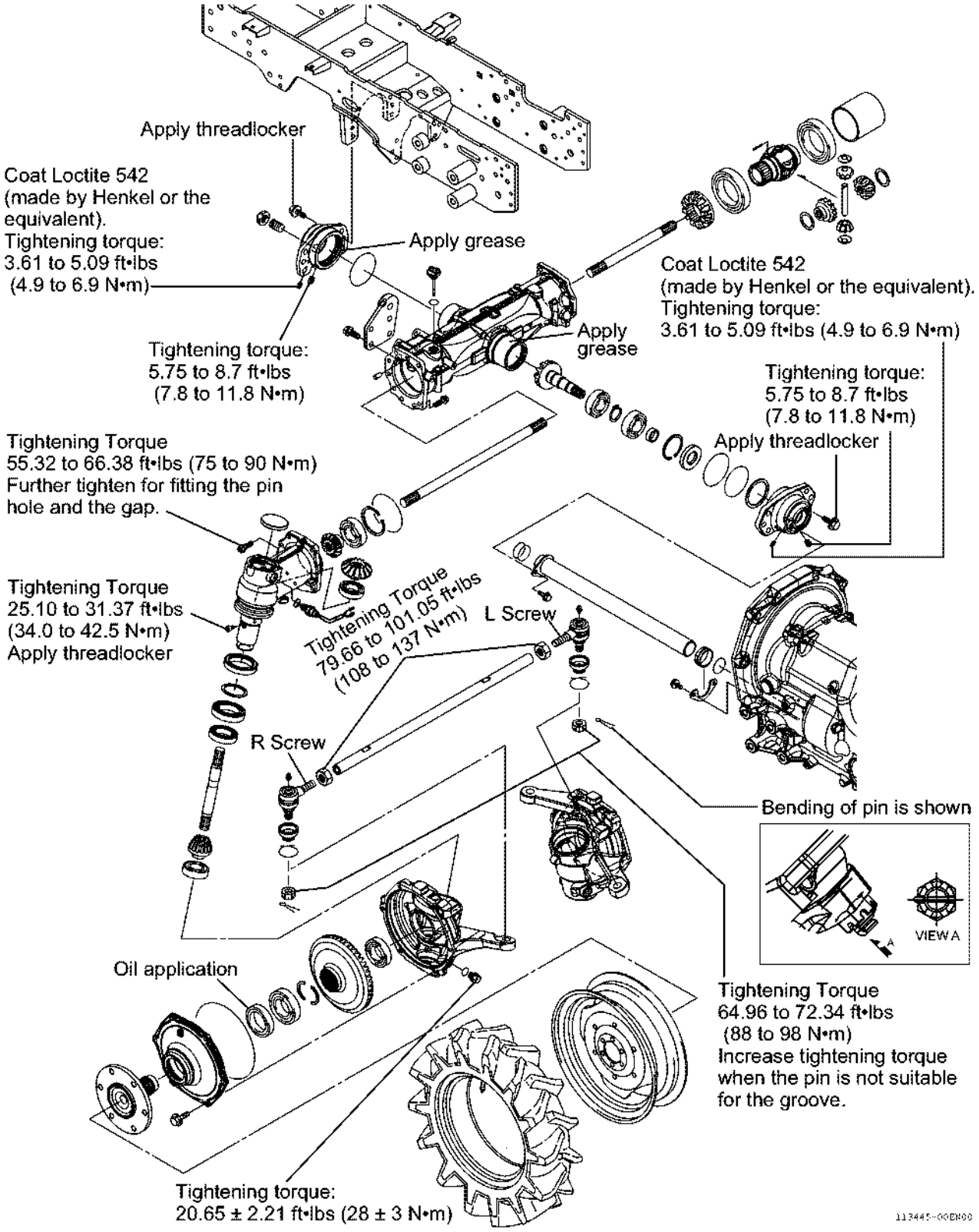
The front wheels of the tractor are aligned in a certain angle to the left-right-front-rear, in order to have less wearing of the tires and also for improving the steering to be light, stable, restoring, and straight forward. This is called the front wheel alignment, and is cosisted of the following 4 elements.

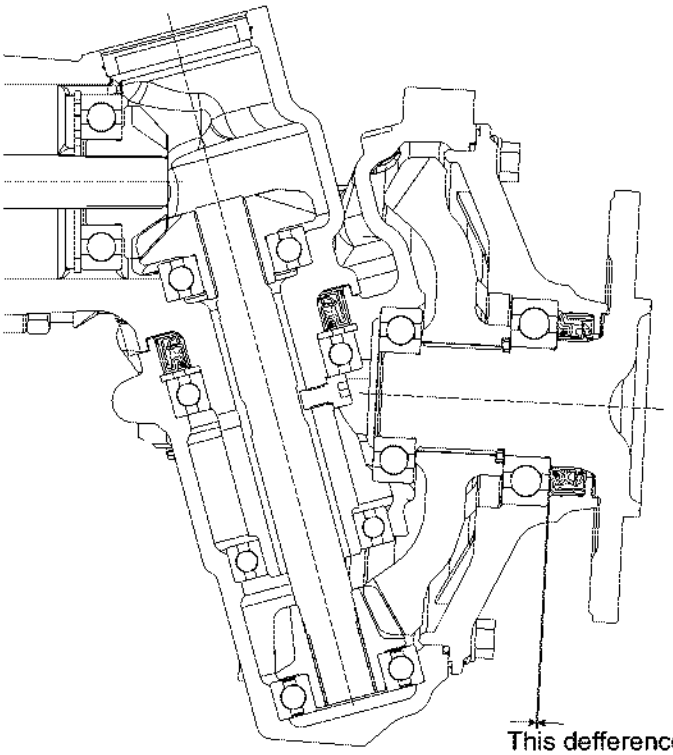
- Camber
- Caster
- Angle of inclination of king pin
- Toe-in

Each of the angles in this tractor is as below



2. Development view





This defference is 0.5±0.5 mm
To become -0.5 mm (become deep),
jig is produced.

104264-00X00

3. Disassembly and Reassembly

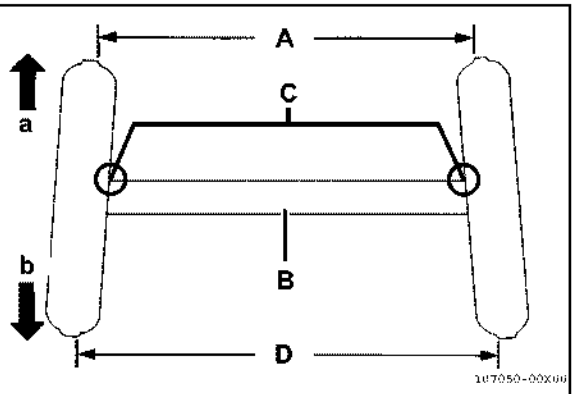
■ Maintenance Standards

Item	Reference value	Adjusted limit value
Toe-in	1 to 8 mm	
Camber angle [Reference]	3°	
King pin angle [Reference]	15°	
Caster angle [Reference]	2°	
Swing angle	7°	
Drive pinion starting torque	0.314 to 1.57 N·m	Adjusted with pre-load of taper roller bearing

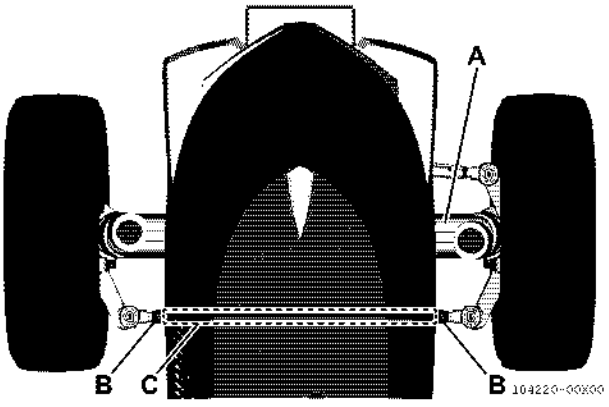
1. Inspect and Adjust the Toe-in

NOTE
- Poorly adjusted toe-in can cause difficulty in steering action or abnormal sway of the steering wheel.

1. Mark the center line of the front end of the two front tires.
2. Mark the center line of the rear end of the two front tires.
3. Measure the distance between the marks at the rear end of the tire as D.
4. Measure the distance between the marks at the front end of the tire as A.
5. Get the difference of the distance measurements: D minus A.
   - The difference of the distance measurements must be limited to 4 to 8 mm.
6. If the difference of the distance measurement is not within the limits.
   - Loosen the lock nut of the left and right tie-rods.
   - Adjust the length of the threaded portion of the left and right tie rods.
   - Do the preceding procedures 3, 4 and 5.
7. If the difference of the distance measurement is within the limits.
   - Hold the tie rod and tighten the lock nut.



(A) Front tire (front end)
(B) Front axle
(C) Tie rod
(D) Front tire (rear end)
(a) Front
(b) Rear

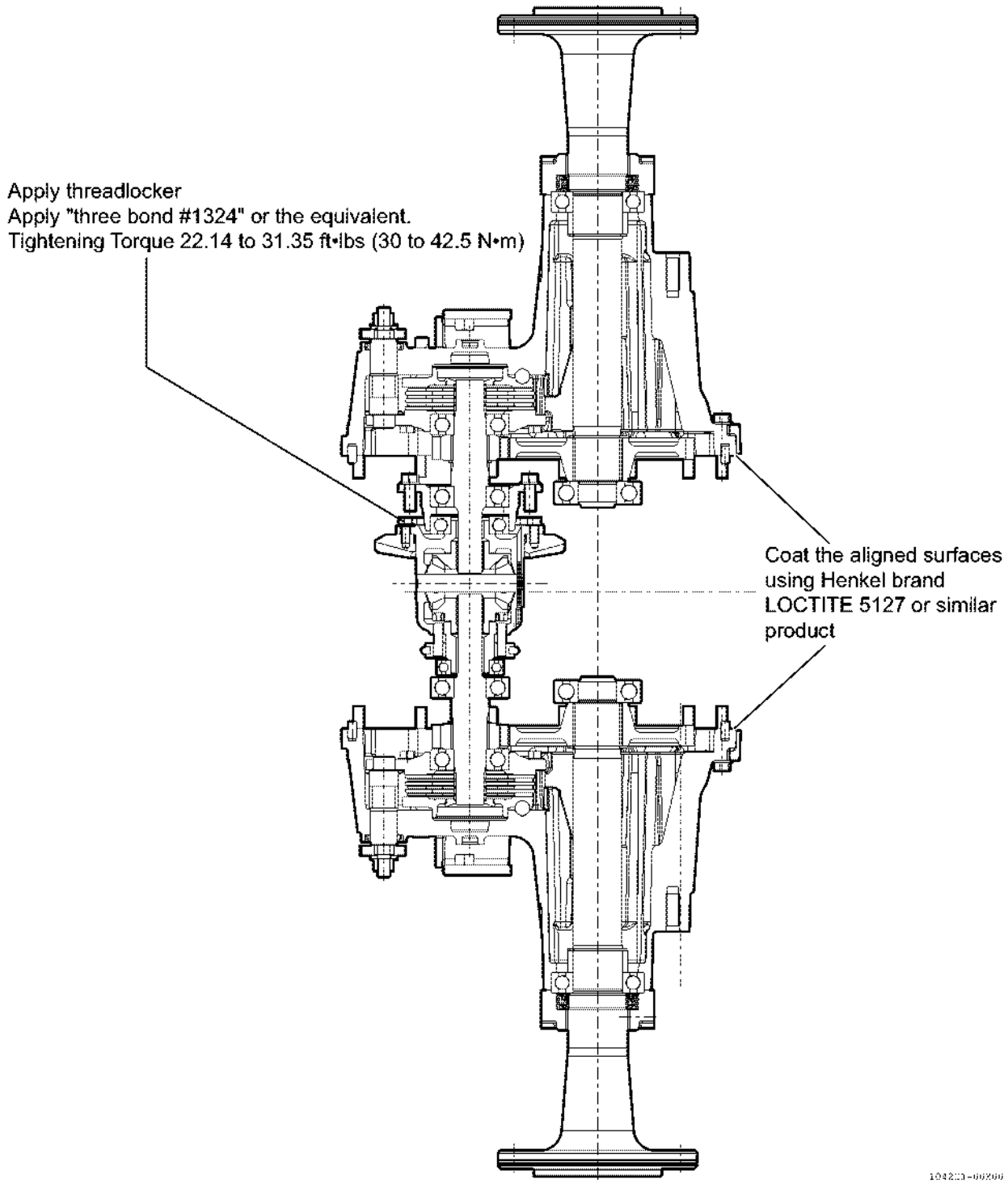


(A) Front axle
(B) Tie rod
(C) Lock nut

8. REAR AXLE

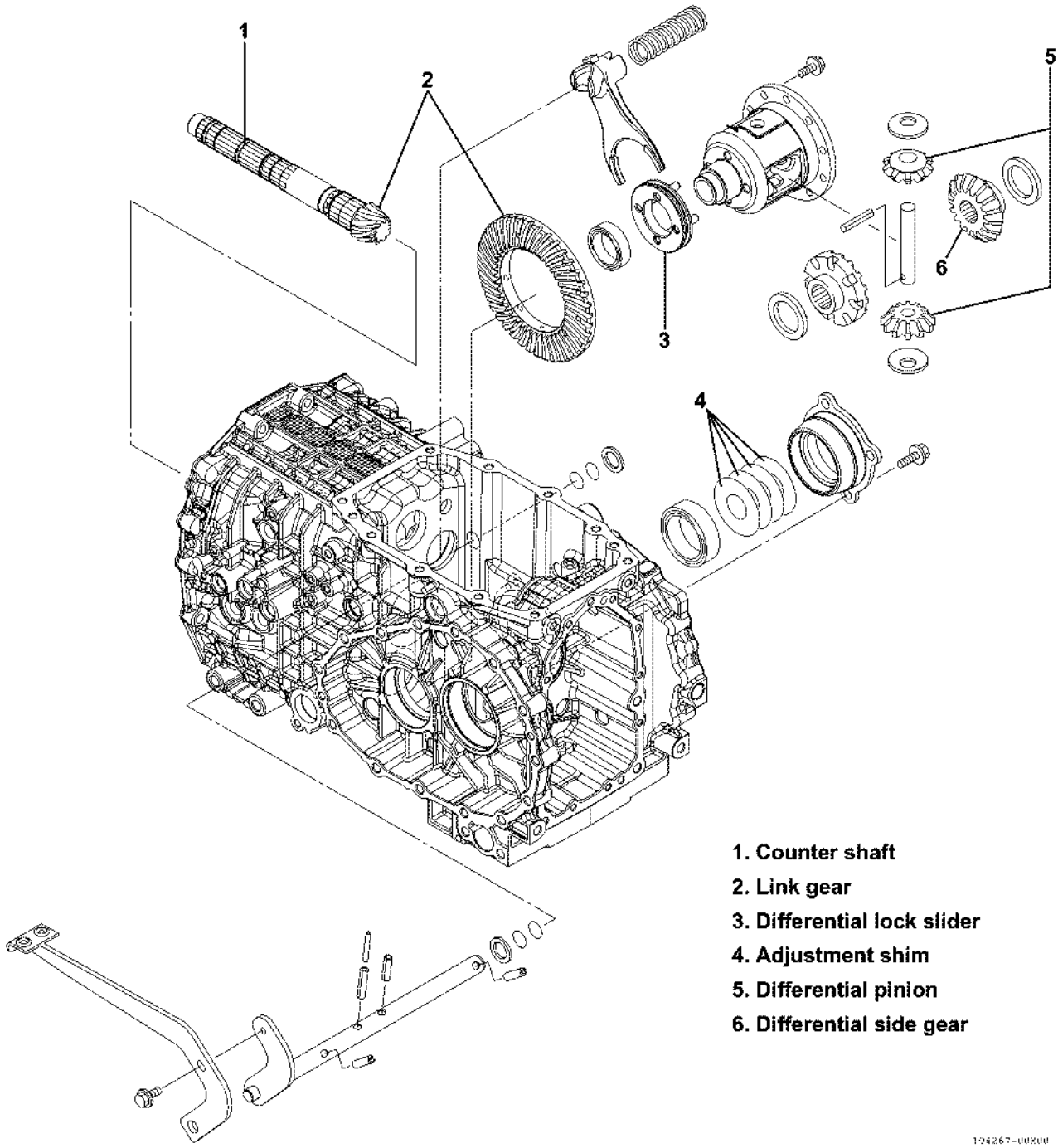
1. Structure and Function

■ Configuration view



■ Configuration view of differential gear

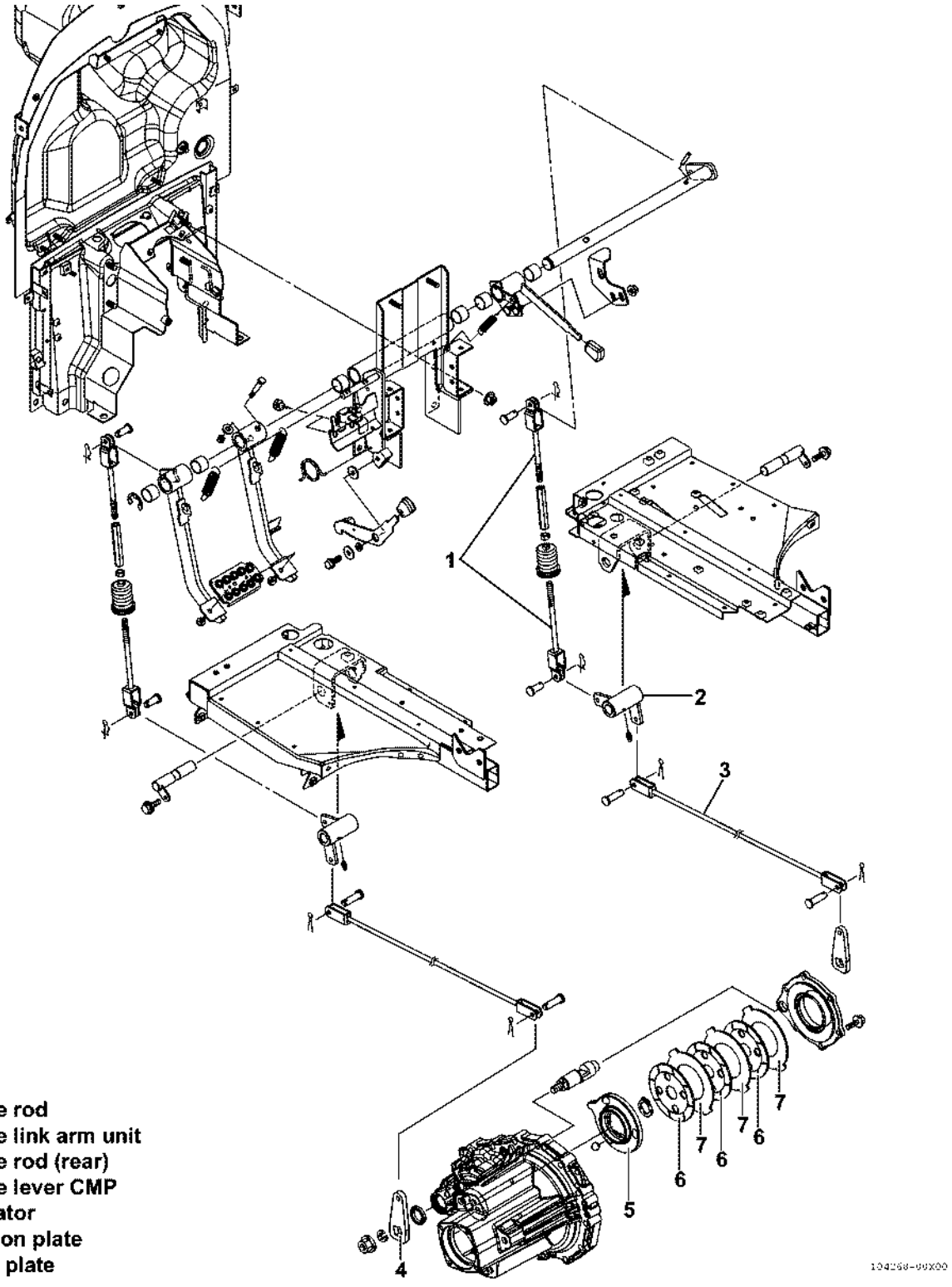
A differential gear is a device for applying a different speed to the left and right while adding even torque to both the drive wheels. This makes the tractor to turn or curve smoothly. Also, when one wheel slips under a certain condition and cannot move, there is a differential lock device for fixing the differential gear to stop activating. The differential gear of this tractor is 2-pinion type, and the differential lock is pin type.



1. Counter shaft
2. Link gear
3. Differential lock slider
4. Adjustment shim
5. Differential pinion
6. Differential side gear

■ Braking device configuration view

The brakes are independent right and left mechanical wet disk brakes (cam brakes). They are located between the differential and the final speed reducer, and are immersed in transmission oil.
When you press the brake pedal, this pulls the brake rod, rotating the brake arm, causing the actuator to apply pressure to the friction plate and initiate braking. The parking brake is applied when you pull the brake lock lever while depressing the pedal.



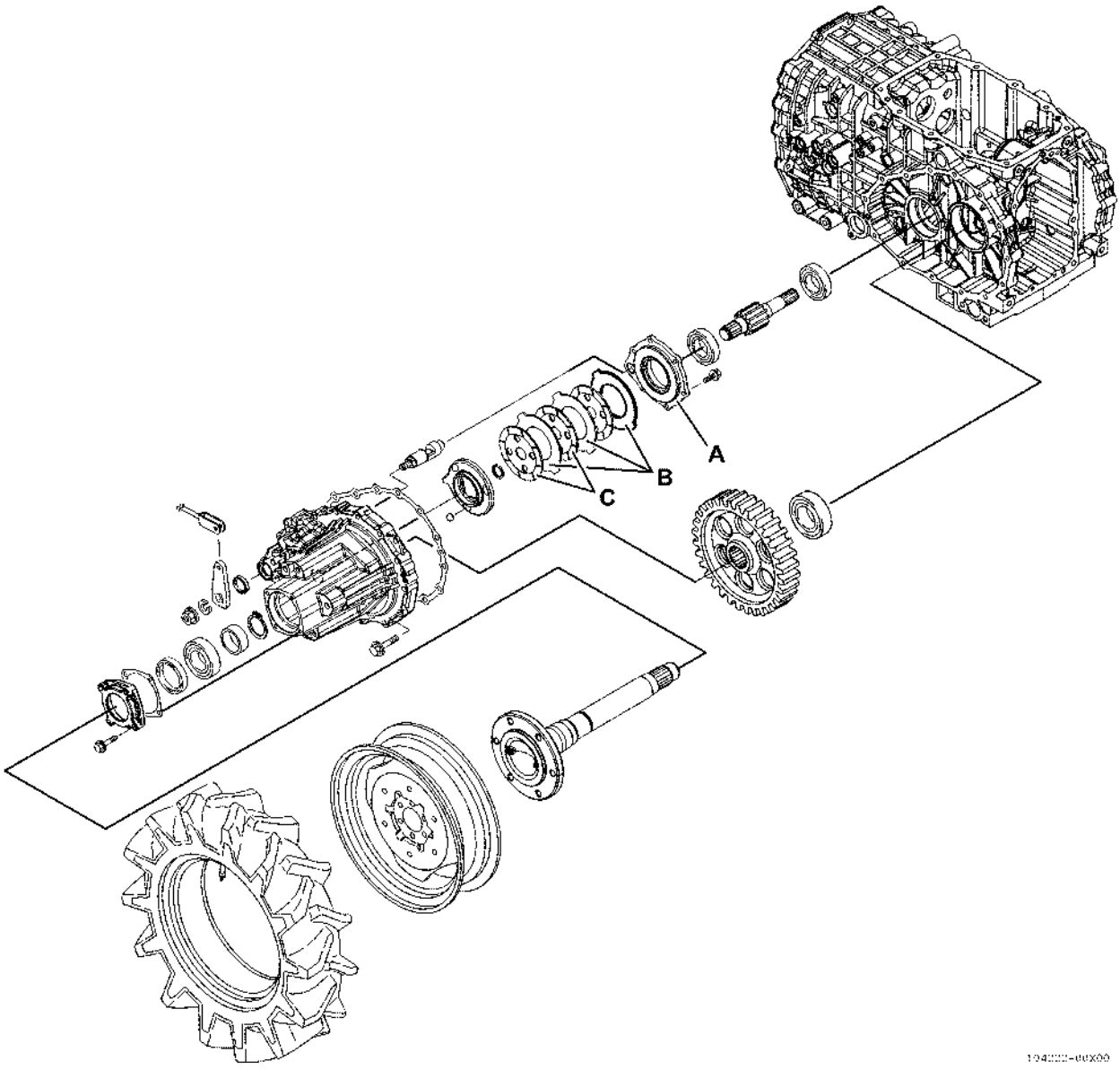
1. Brake rod
2. Brake link arm unit
3. Brake rod (rear)
4. Brake lever CMP
5. Actuator
6. Friction plate
7. Steel plate

2. Inspection and Adjustment

1. Maintenance Standards

Item	Reference value	Adjusted limit value
Spiral bevel gear backlash	0.13 to 0.18 mm	Adjust shims before mounting differential lock shaft fork
Brake friction plate thickness	3.5 mm	Replace if 3.1 mm or less

2. Expanded view

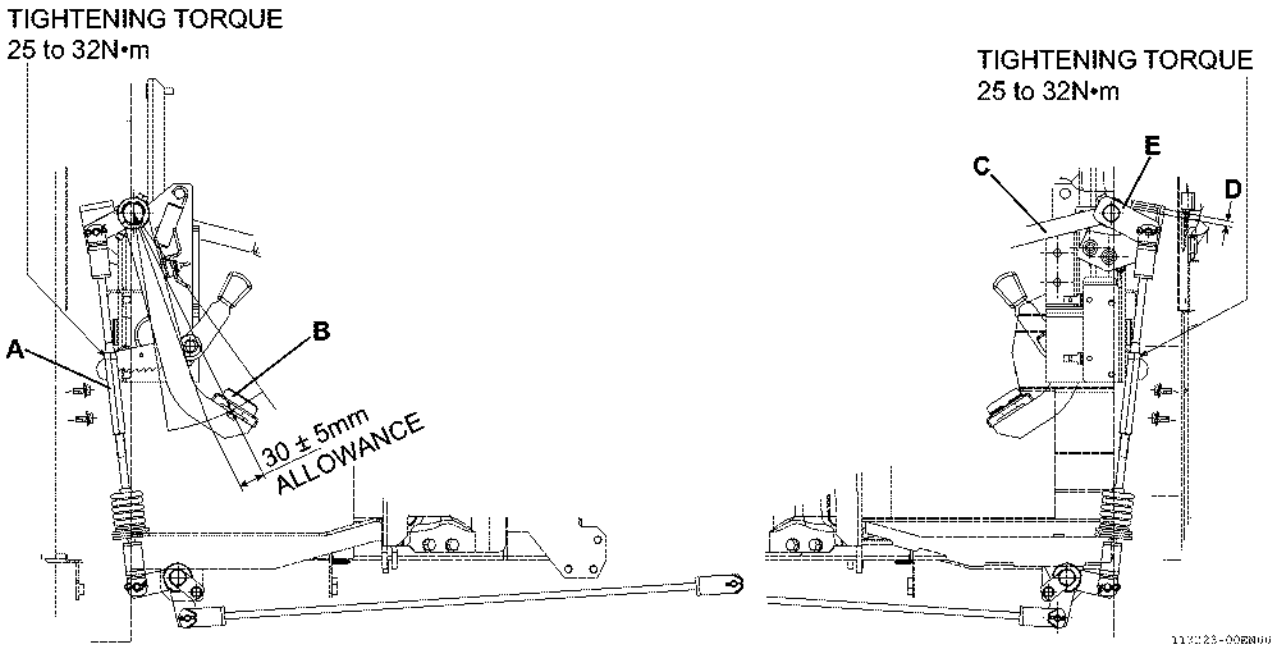


(A) Actuator
(B) Steel plate
(C) Friction plate

3. Adjustment of brake pedal

1. adjust the turn buckle (A) so that the allowance of brake pedal head (B) stroke is 30 ± 5 mm on that condition, difference of a right-and-left pedal head shall be 2 mm or less.

2. With the HST cruise lever (C) ON, mount part E so the gap (D) is within 1 mm.



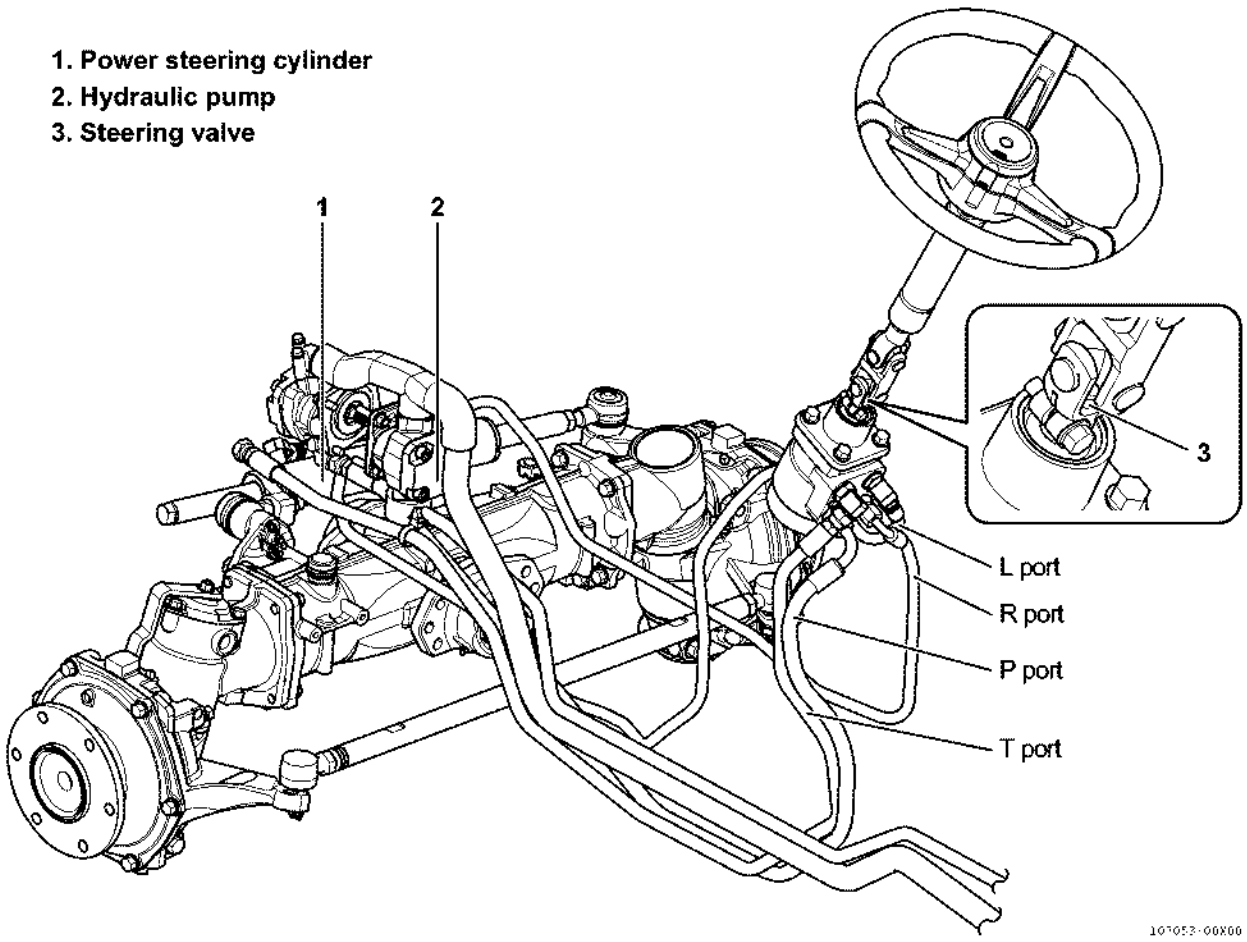
(A) Turn buckle
(B) Brake pedal hed
(C) HST cruise lever
(D) Gap

9. POWER STEERING

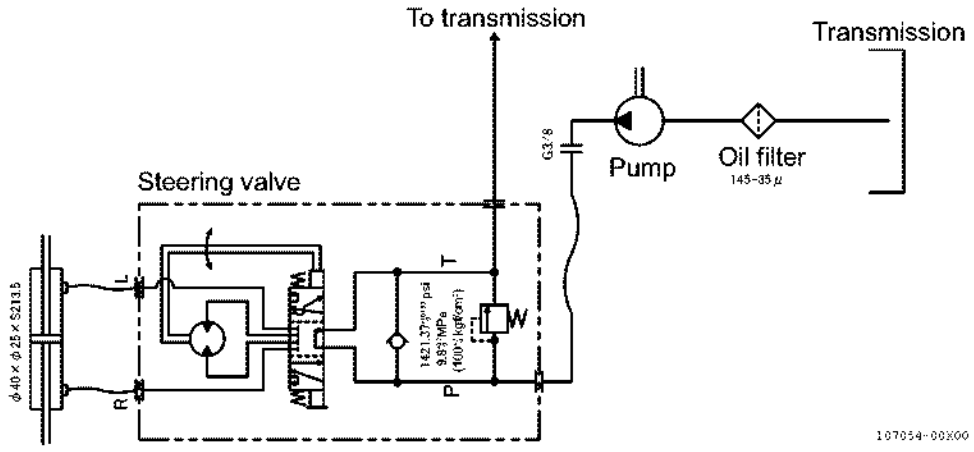
1. Structure and Function

■ Configuration view

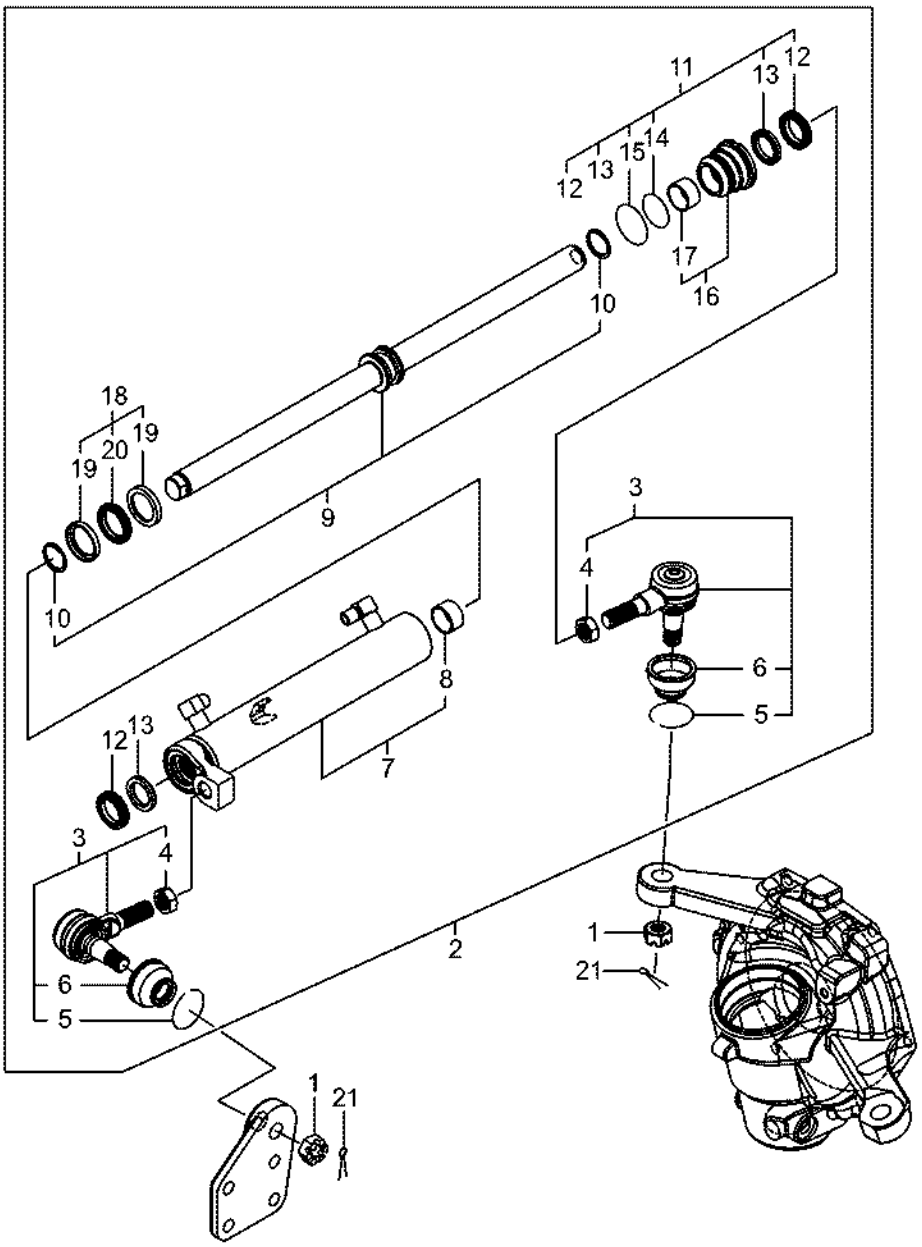
1. Power steering cylinder
2. Hydraulic pump
3. Steering valve



■ Hydraulic Circuit Diagram

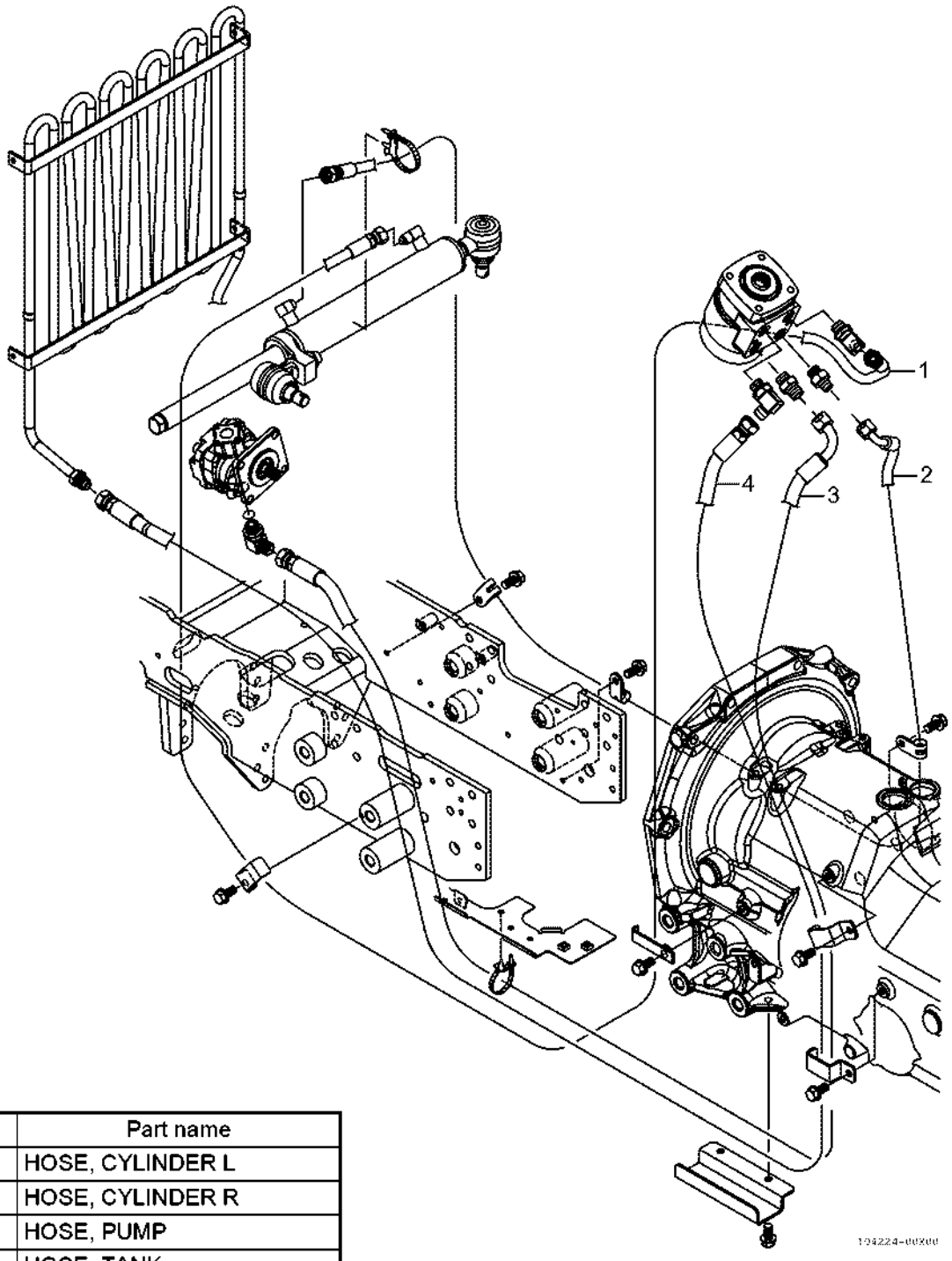


■ Power steering cylinder



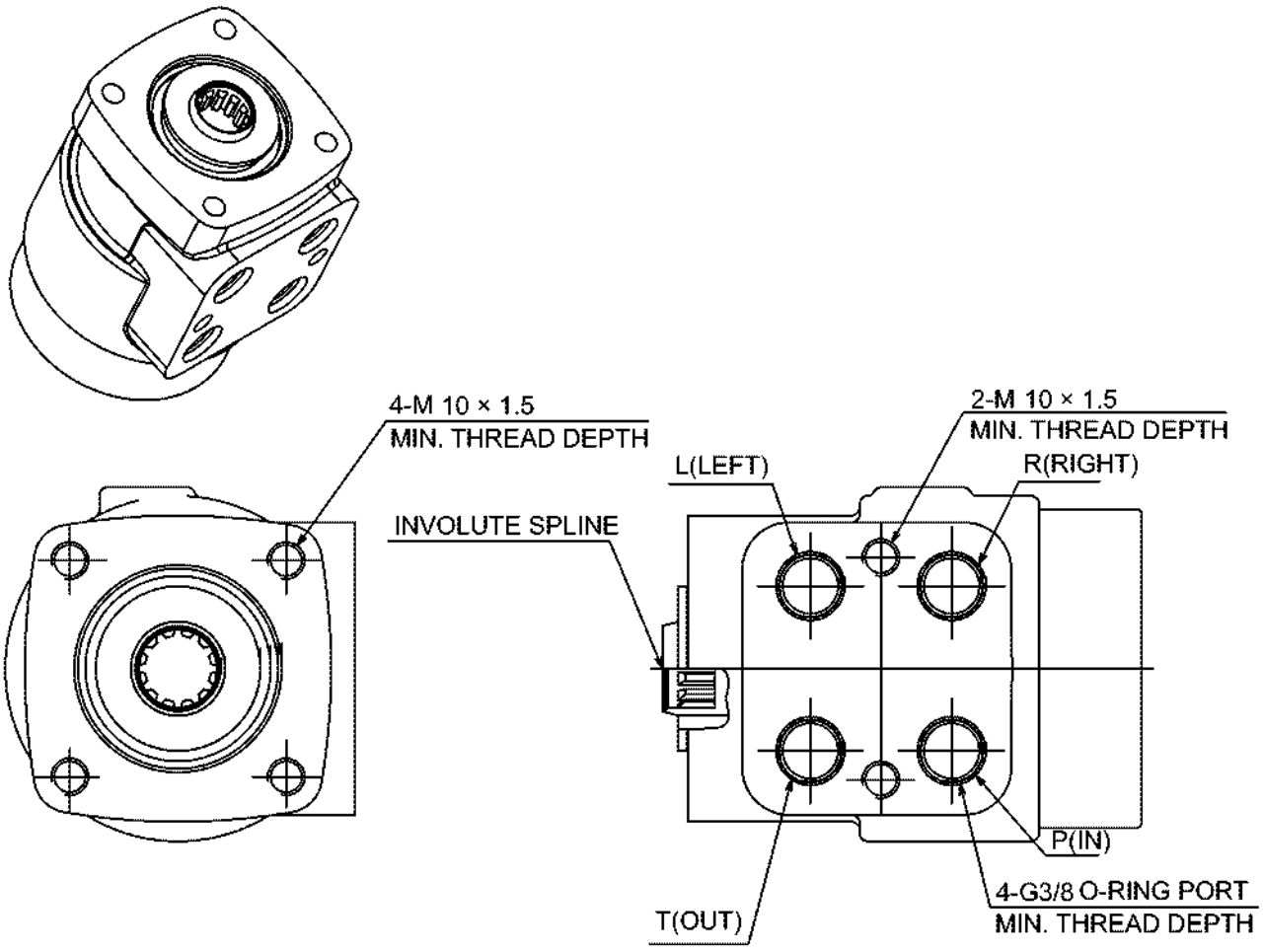
No.	Parts No.	Part name	No.	Parts No.	Part name
1	194180-12471	NUT, CASTLE M16	12	1A8400-17140	SCRAPER, 25
2	1A8405-17300	CYLINDER ASSY, PST	13	1A8400-17150	PACKING, 25
3	1A8310-12651	END ASSY RH-B	14	24315-000350	O-RING, 1BP35.0
4	1A8310-12540	NUT, 16 R	15	24341-000420	O-RING, 1AS42.0
5	1A8310-12610	BAND, BOOTS	16	1A8400-17110	CAP ASSY
6	1A8310-12640	COVER, DUST	17	24550-025150	BUSH, 25 × 15
7	1A8400-17020	TUBE ASSY, CYLINDER	18	1A8400-17200	SEAL KIT, B
8	24550-025150	BUSH, 25 × 15	19	172156-72340	BEARING
9	1A8400-17050	ROD ASSY, STEERING	20	1A8400-72810	SEAL, PACKING 40
10	22292-000250	RING, S-25	21	22417-400250	PIN, COTTER 4.0 × 25
11	1A8400-17100	SEAL KIT, A			

■ Positions of PST hoses and clamps



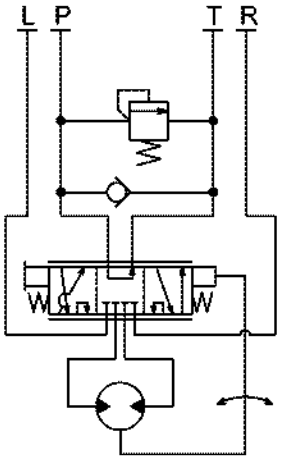
No.	Part name
1	HOSE, CYLINDER L
2	HOSE, CYLINDER R
3	HOSE, PUMP
4	HOSE, TANK

■ Valve assy, PST: 1A8400-17500



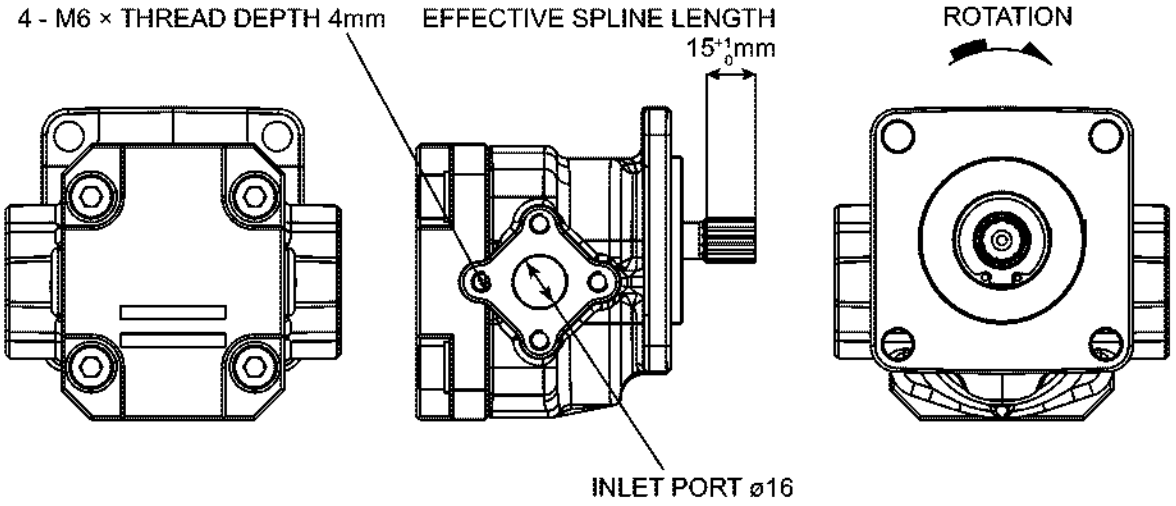
SPECIAL INTEGRAL ORBITROLL SPECIFICATION

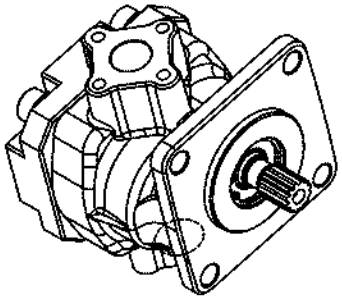
VALVE SYSTEM	OPEN-CENTER NON LOAD-REACTION
	INTERNAL RELIEF TYPE
RELIEF SET PRESSURE	$9.8^{+0.7}_{0}$ MPa at 8 L/min
CAPACITY	51 cm^3/rev
MAXIMUM PRESSURE	16.7 MPa
PERMISSIBLE BACKPRESSURE	2.0-2.5 MPa (20-26 kgf/cm^2)
MAXIMUM OIL TEMPERATURE	95 °C
INPUT TORQUE	1.5±0.5 N-m (0.15±0.05 kgf-m) (REFERENCE)
IN NORMAL STEERING	1.5±0.5 N-m (0.15±0.05 kgf-m) (REFERENCE)
SPECIAL SPECIFICATION	LOW SLIP SPECIFICATION



HYDRAULIC CIRCUIT

■ Punp assy, 6: 1A8400-41110





Replacement seal kit
Seal kit code: 1A8400-4200

USE CONDITION

DISPLACEMENT	6.07 cm^3/rev
USE PRESSURE	RELIEF PRESSURE: 9.8+0.7/0 MPa
USE ROTATION	MAX SPEED: 2704 min^{-1} MIN SPEED: 853 min^{-1}
USE OIL	HYDRAULIC FLUID
OIL TEMPERATURE	OPERATING TEMPERATURE: -20~100 °C
SUCTION PRESSURE	MIN -0.03 MPa WHEN COLD START: MIN -0.09 MPa (SHORT TIME)
FILTER	SUCTION: 35μ (NOMINAL)

■ Operation of the power steering valve and the flow of oil

<When moving straight forward>

1. The pressured oil sent from the hydraulic pump enters the steering valve.
2. The steering valve is "Neutral". Therefore the oil flows from the tank side to the transmission side.

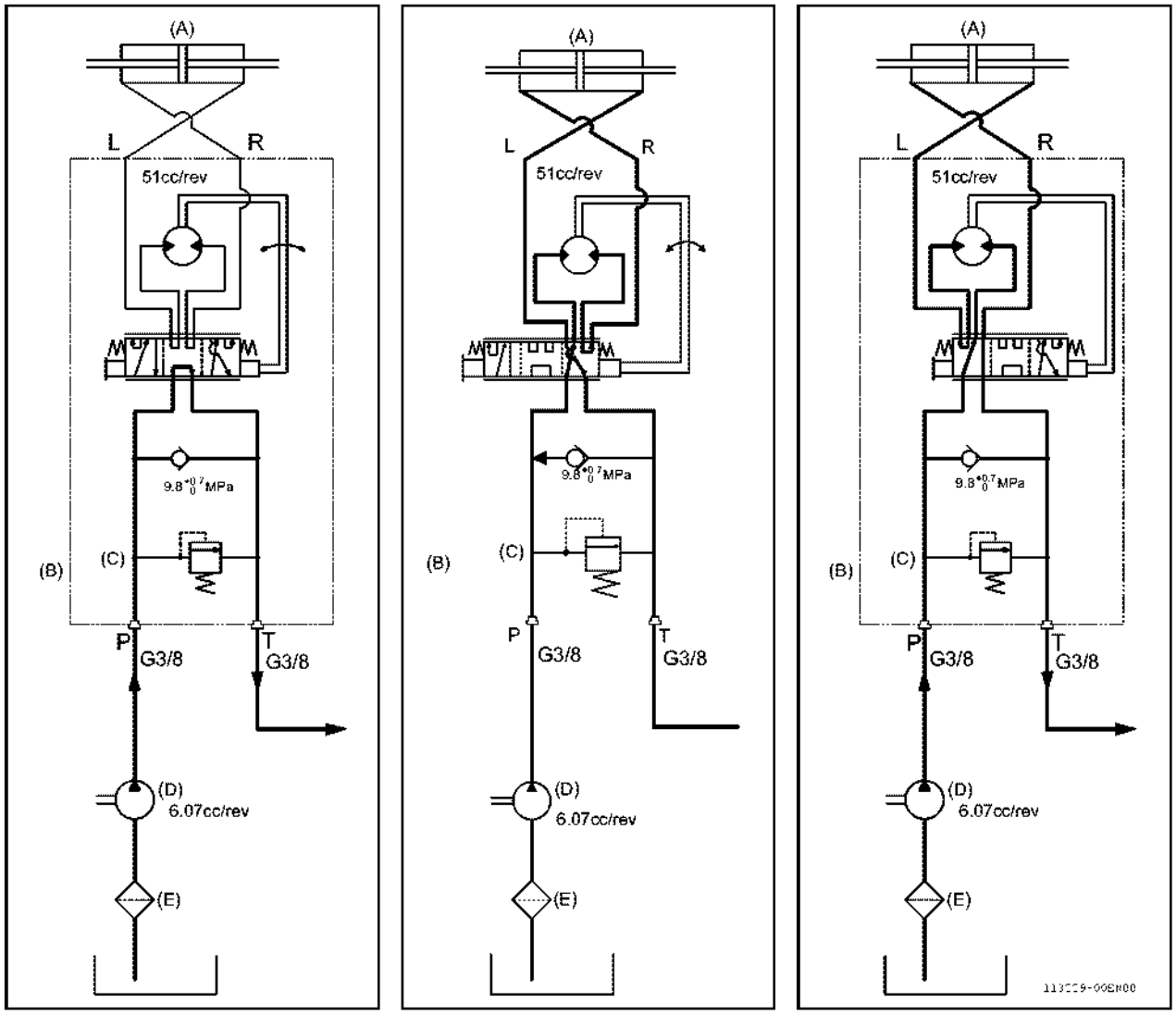
(A) Cylinder
(B) Orbit-roll CMP
(C) Relief valve
(D) Power steering pump 6.07 cc / rev
(E) Line filter

<Turning (Right turn)>

1. When steering to the right, the steering valve moves to open the circuit.
2. The pressured oil from the hydraulic pump flows through the steering valve and is sent into the auto orbit-roll, which reduces the steering wheel operation, and then enters the L port of the power steering cylinder.
3. The oil on the R port side of the power steering cylinder passes through the steering valve, and flows into the transmission side.

<Manual turning (Left turn)>

At hydraulic pump failure, or when the engine is stopped, by turning the steering wheel (for example, to the left), the steering valve moves and opens the circuit. If you keep turning the steering wheel, the gerotor sucks in the oil from the cylinder L through the check valve, and pumps into cylinder R to turn to the Left.



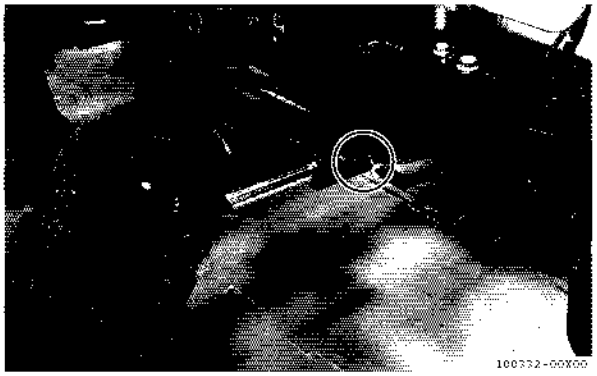
Shown without cabin in the diagram

2. Inspection and Adjustment

■ Measuring the power steering relief pressure

Measuring the pressure

Attach the oil pressure measuring plug (three-way joint) to the position indicated in the drawing. Use the pressure gauge between 0 to 24.5 MPa.



<Measurement procedure>

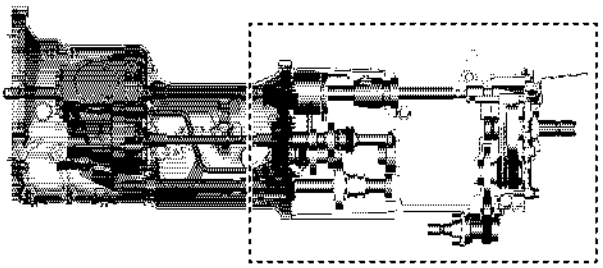
1. Set the engine to rated rotations.
2. Put the range shift lever in neutral [N].
3. Once the nipple is connected to the HP pipe (PSTR) side as in the photo, turn the steering fully to the left to measure the relief pressure.

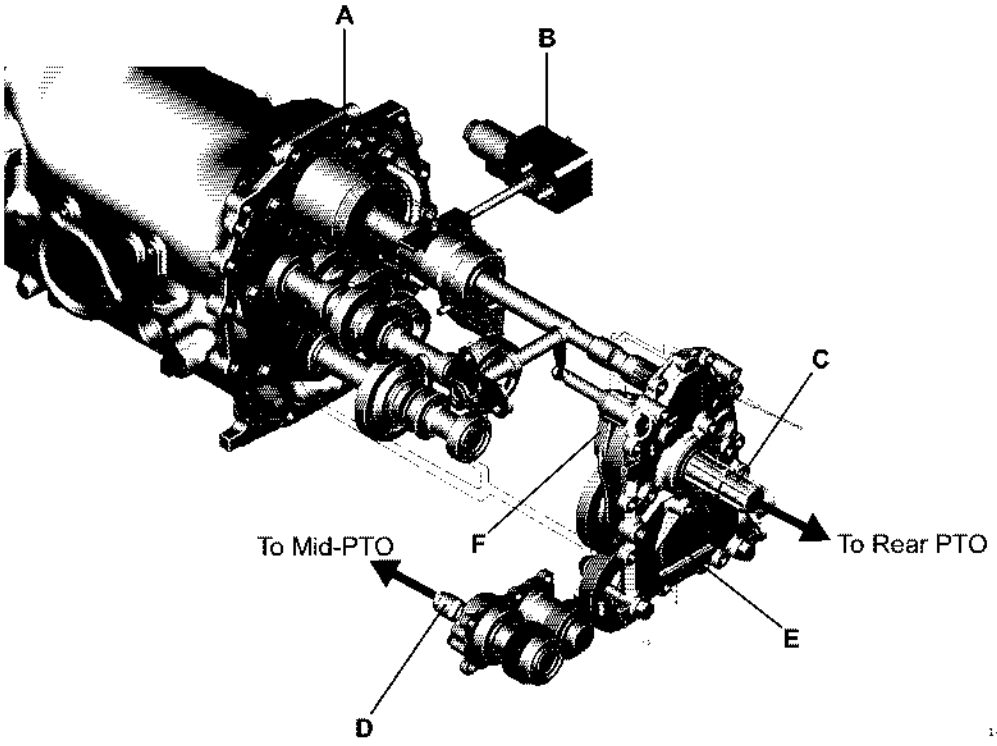
Power steering relief pressure: 9.8^{+7} MPa

10. INDEPENDENT PTO

1. Structure and Function

■ Configuration view

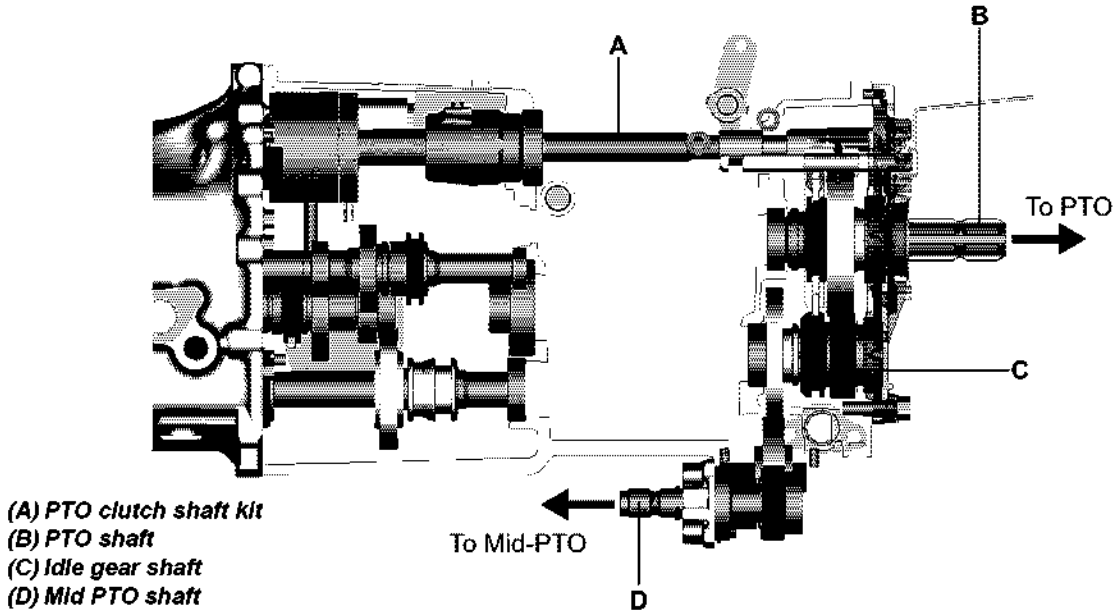




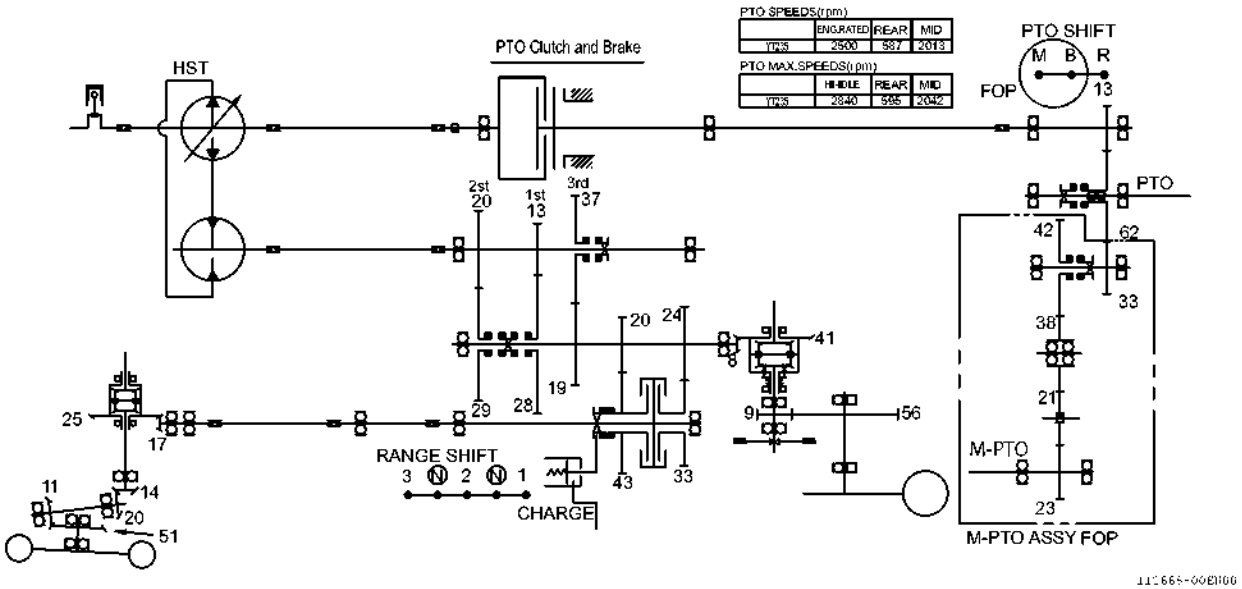
(A) PTO clutch shaft kit
(B) PTO valve
(C) PTO shaft
(D) Mid PTO shaft
(E) Idle gear shaft
(F) Shift PTO fork

2. Gear shift and power transmission passage

1. Transmission mechanism diagram

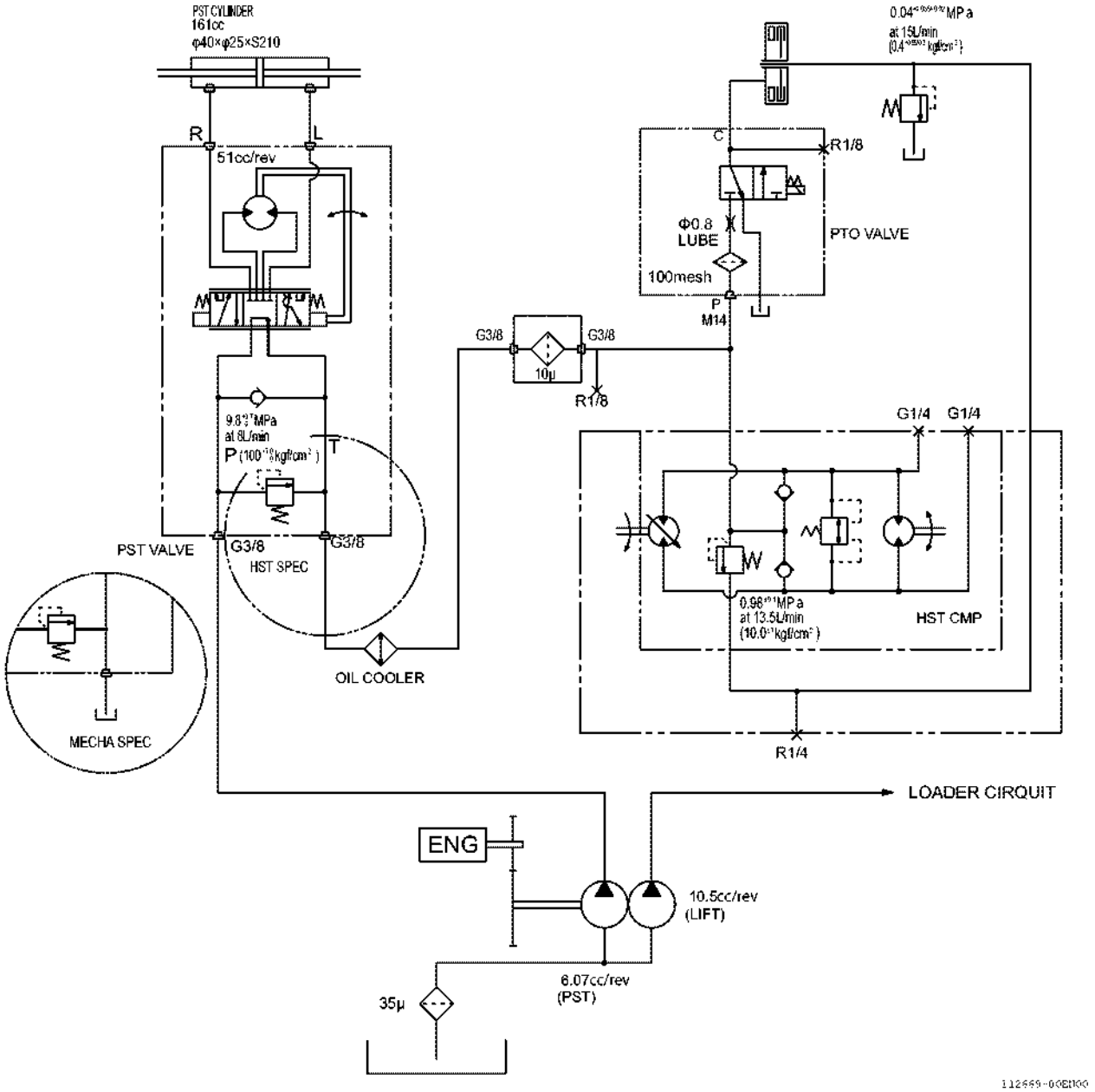


(A) PTO clutch shaft kit
(B) PTO shaft
(C) Idle gear shaft
(D) Mid PTO shaft

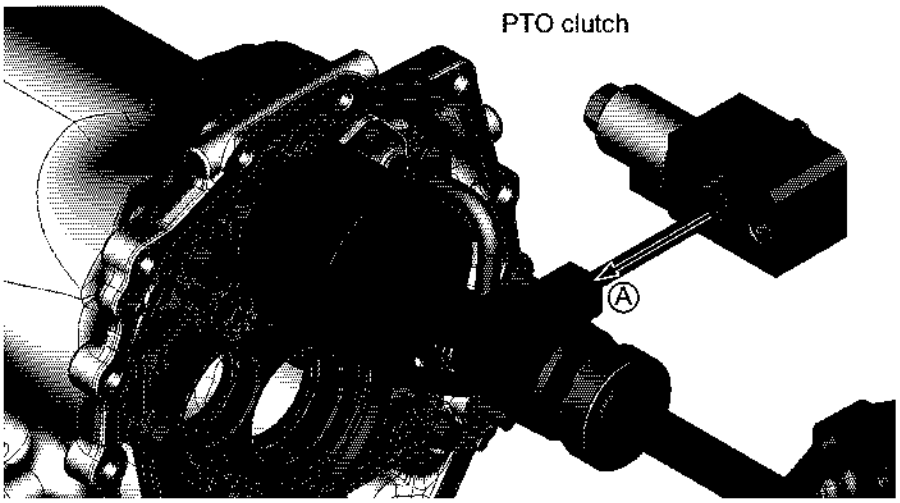


2. Hydraulic circuit diagram

(A) PTO clutch
(B) PTO valve



■ Structure of PTO clutch and oil flow



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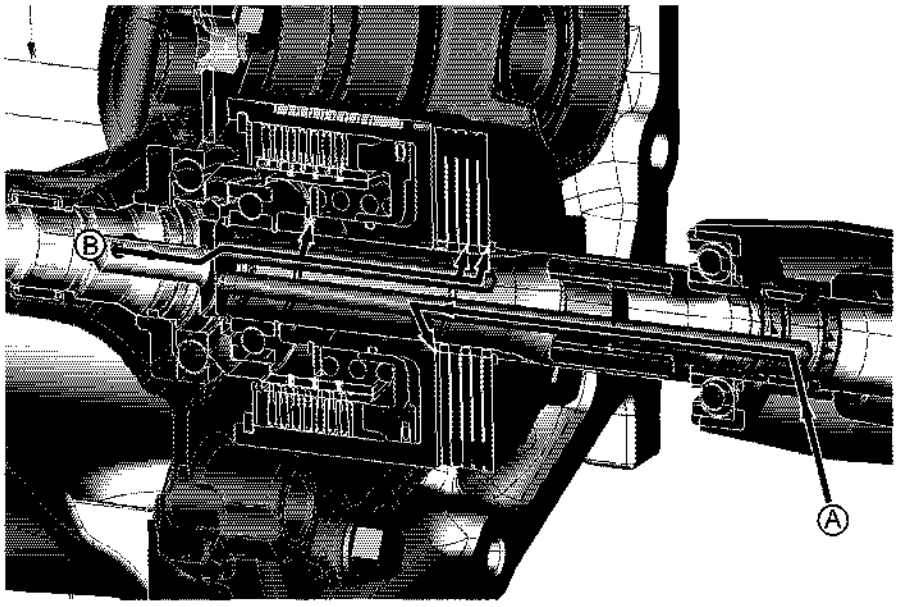

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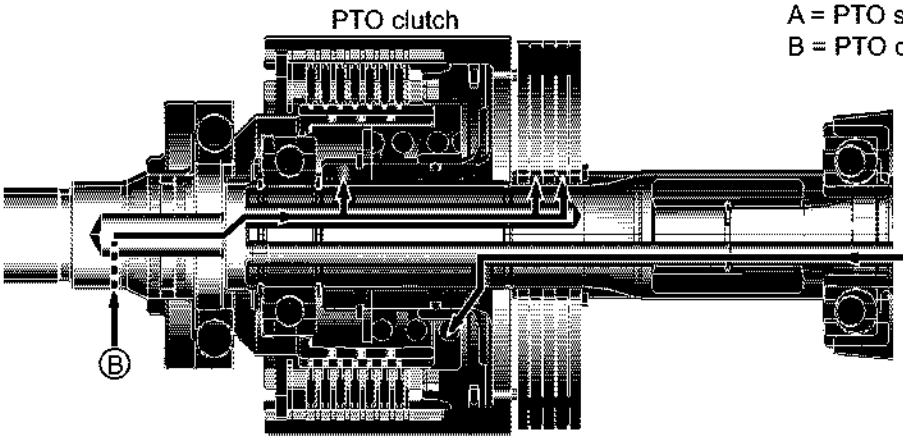

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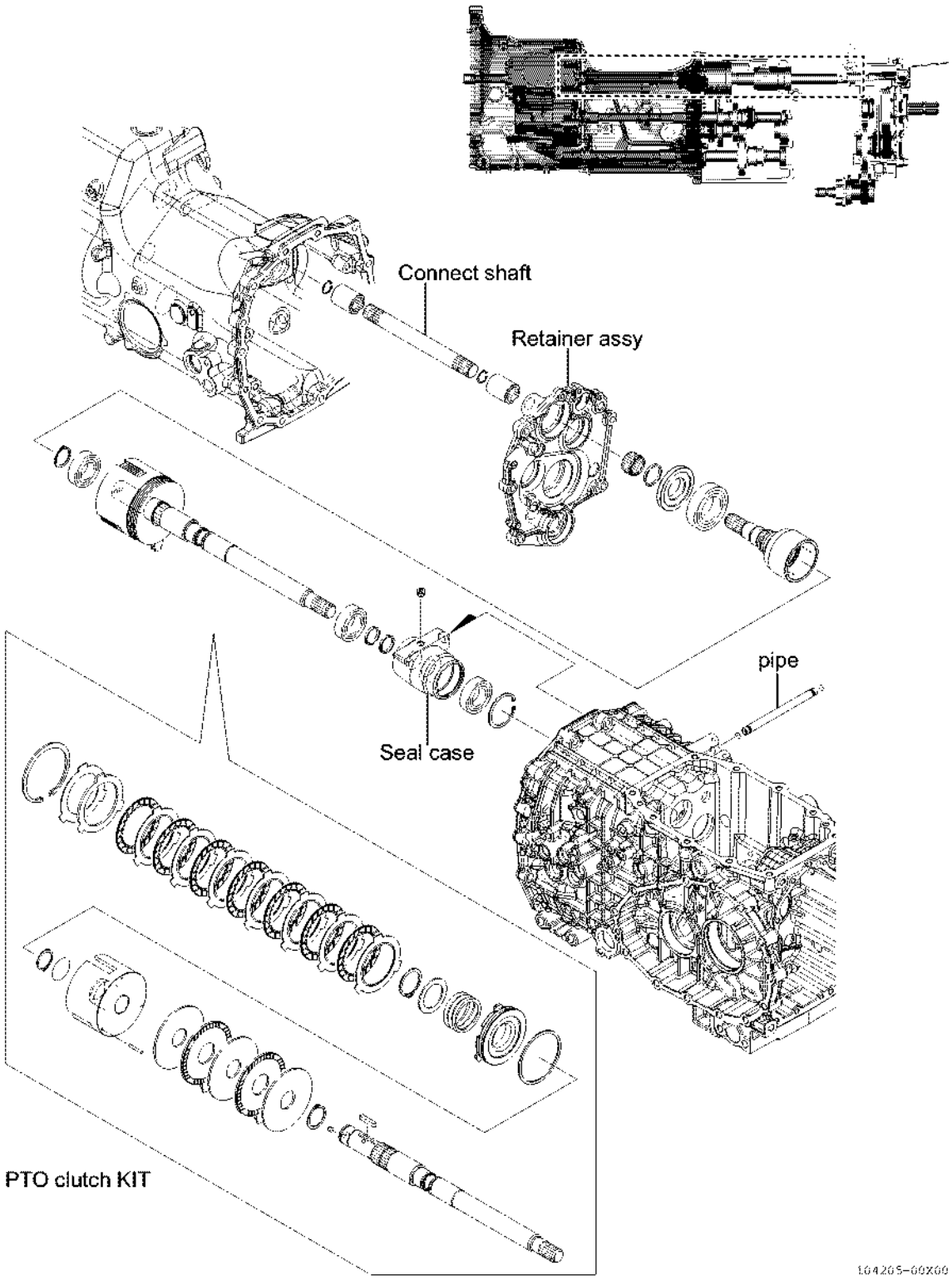
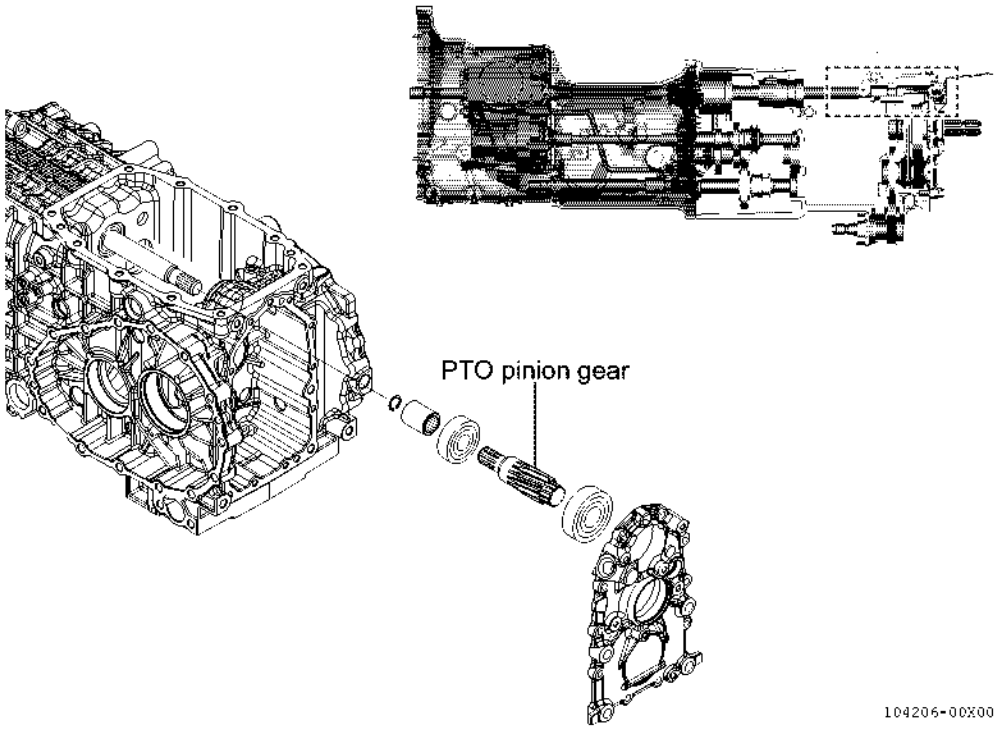
3. Positions and functions of the components

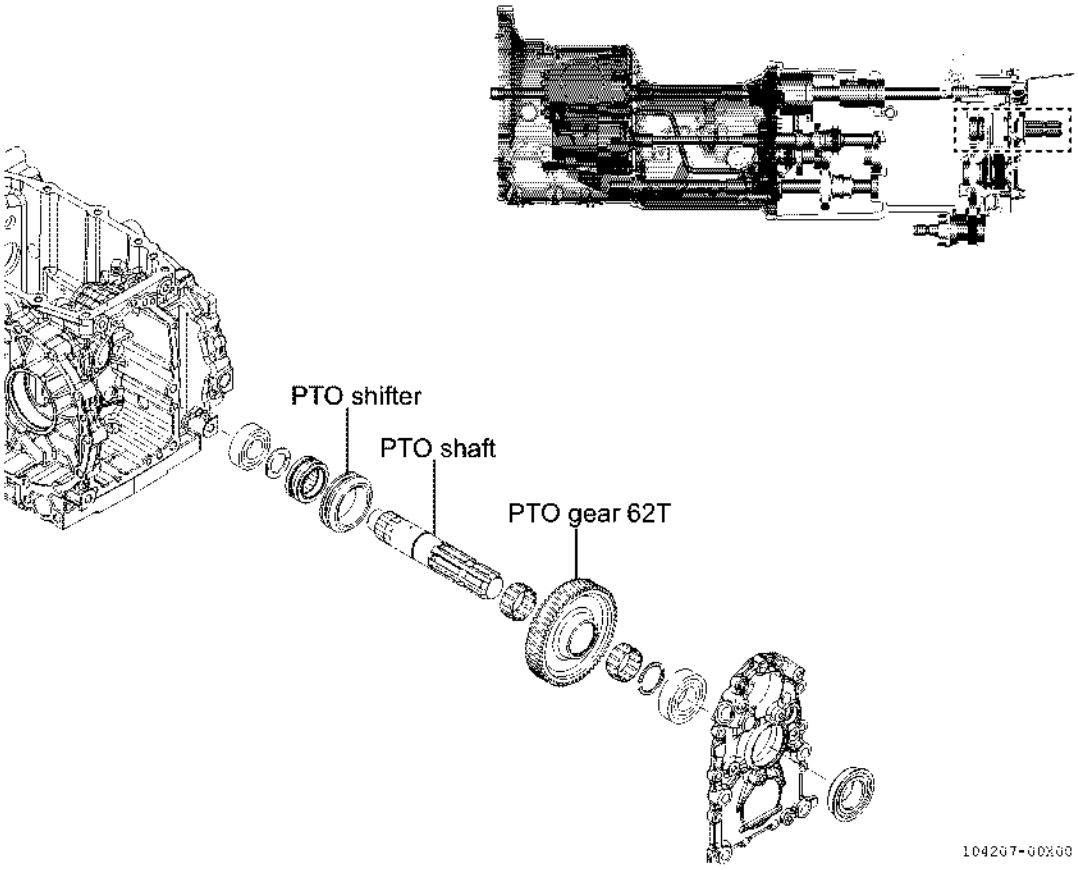
1. PTO clutch



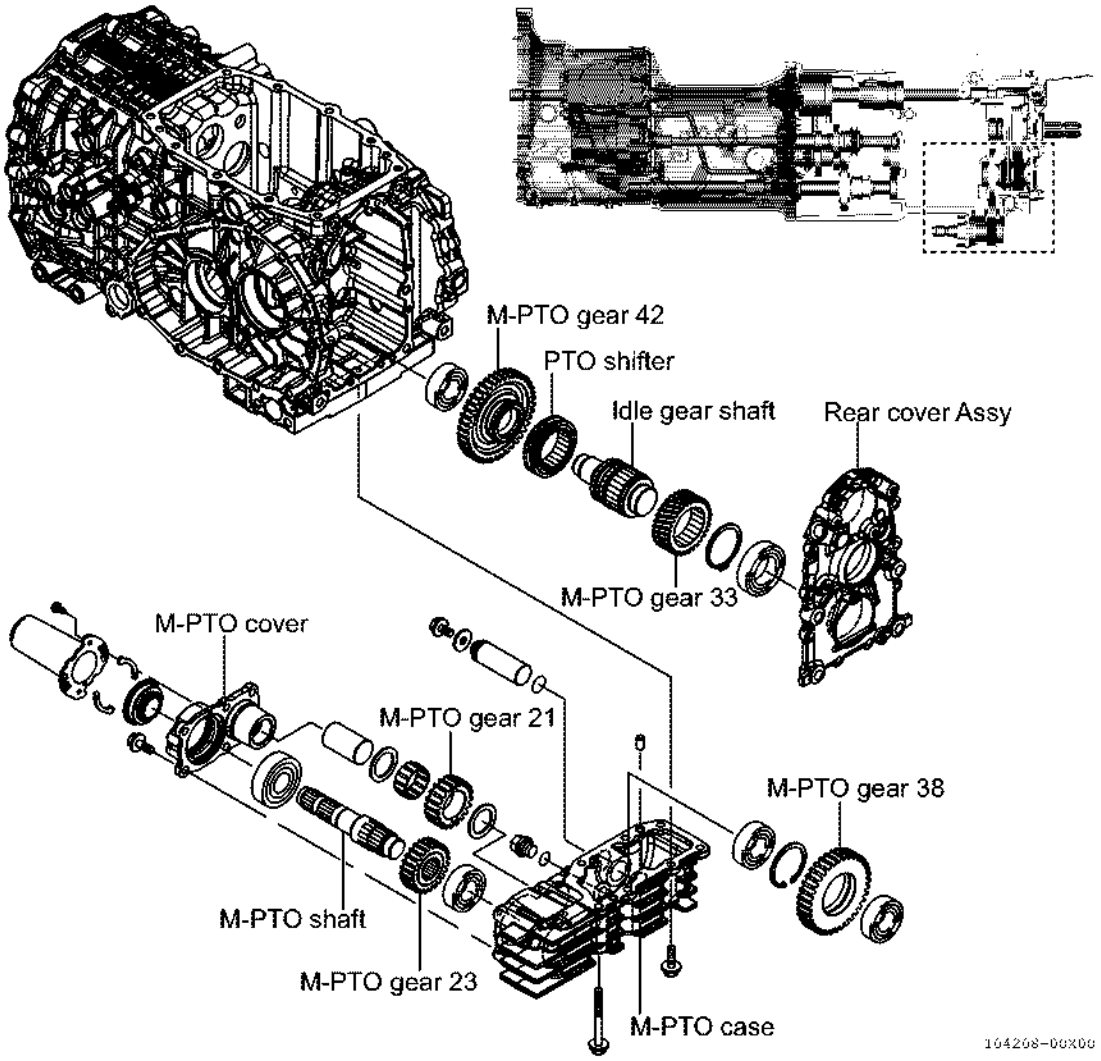
2. PTO drive shaft



3. PTO shaft

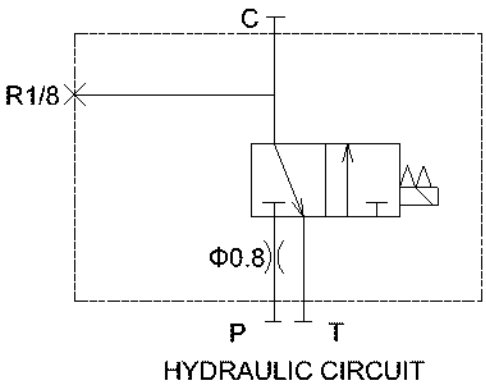


4. M.I.D PTO

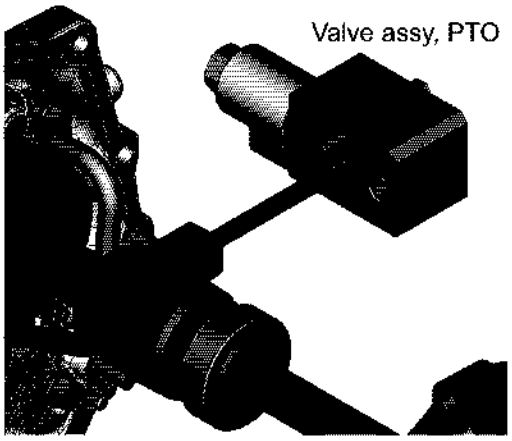

M-PTO gear 42
PTO shifter
Idle gear shaft
Rear cover Assy
M-PTO gear 33
M-PTO cover
M-PTO gear 21
M-PTO gear 38
M-PTO shaft
M-PTO gear 23
M-PTO case
104208-00X00

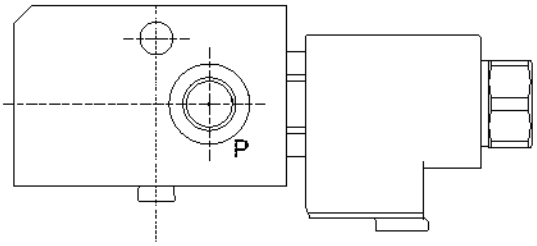
4. Inspection and Adjustment

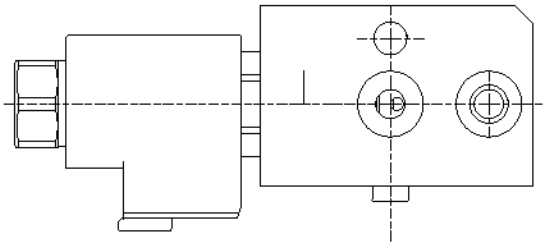
■ Valve assy, PTO: 1A8415-26810

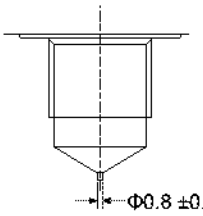


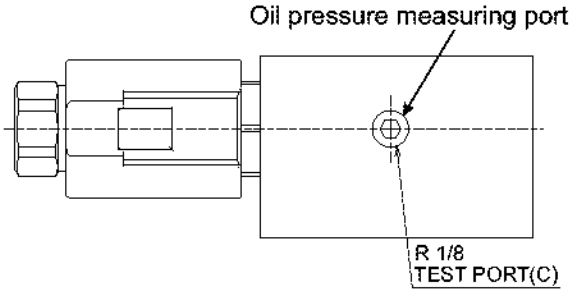
HYDRAULIC CIRCUIT











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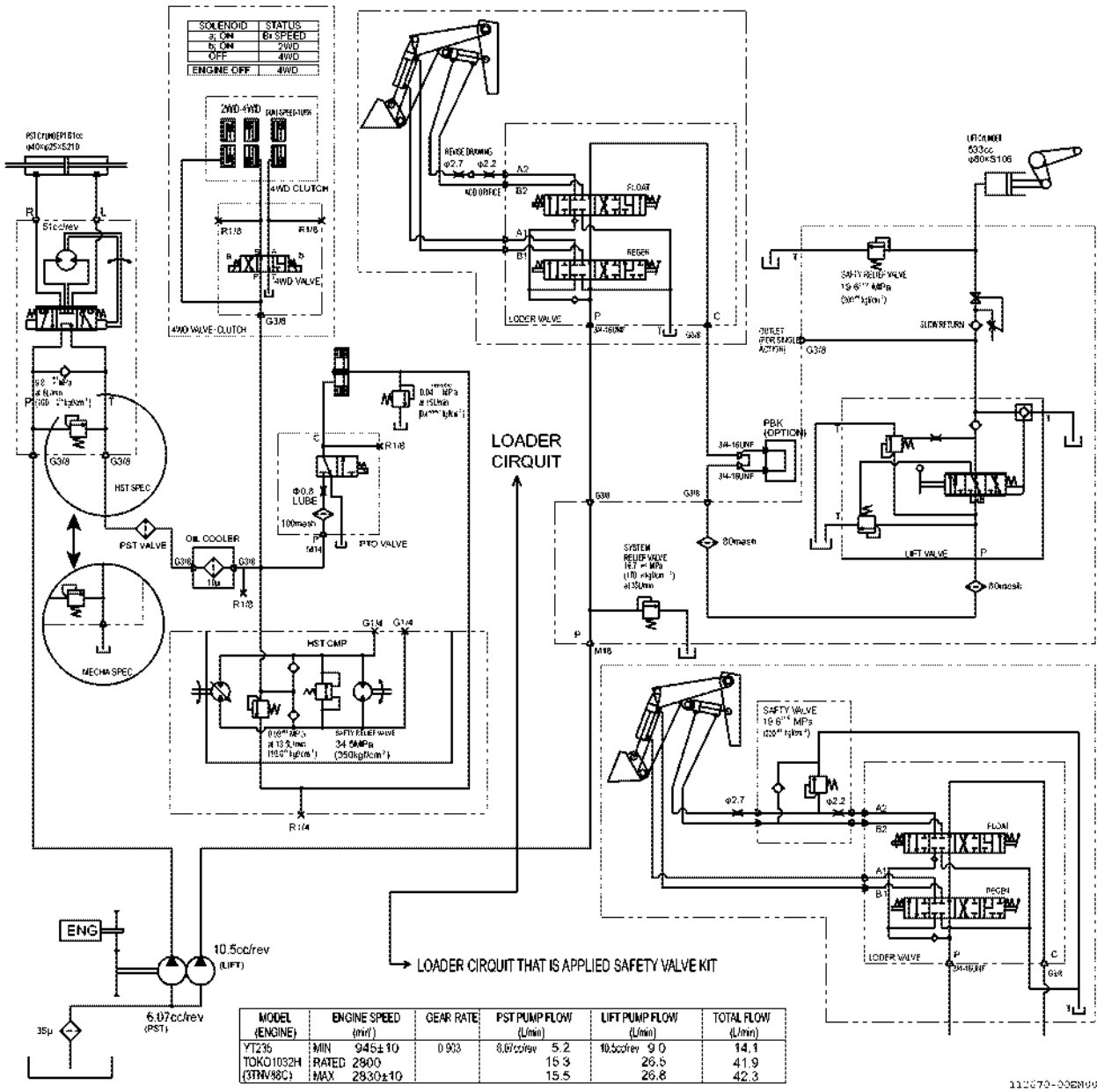
11. HYDRAULICS

1. Structure and Function

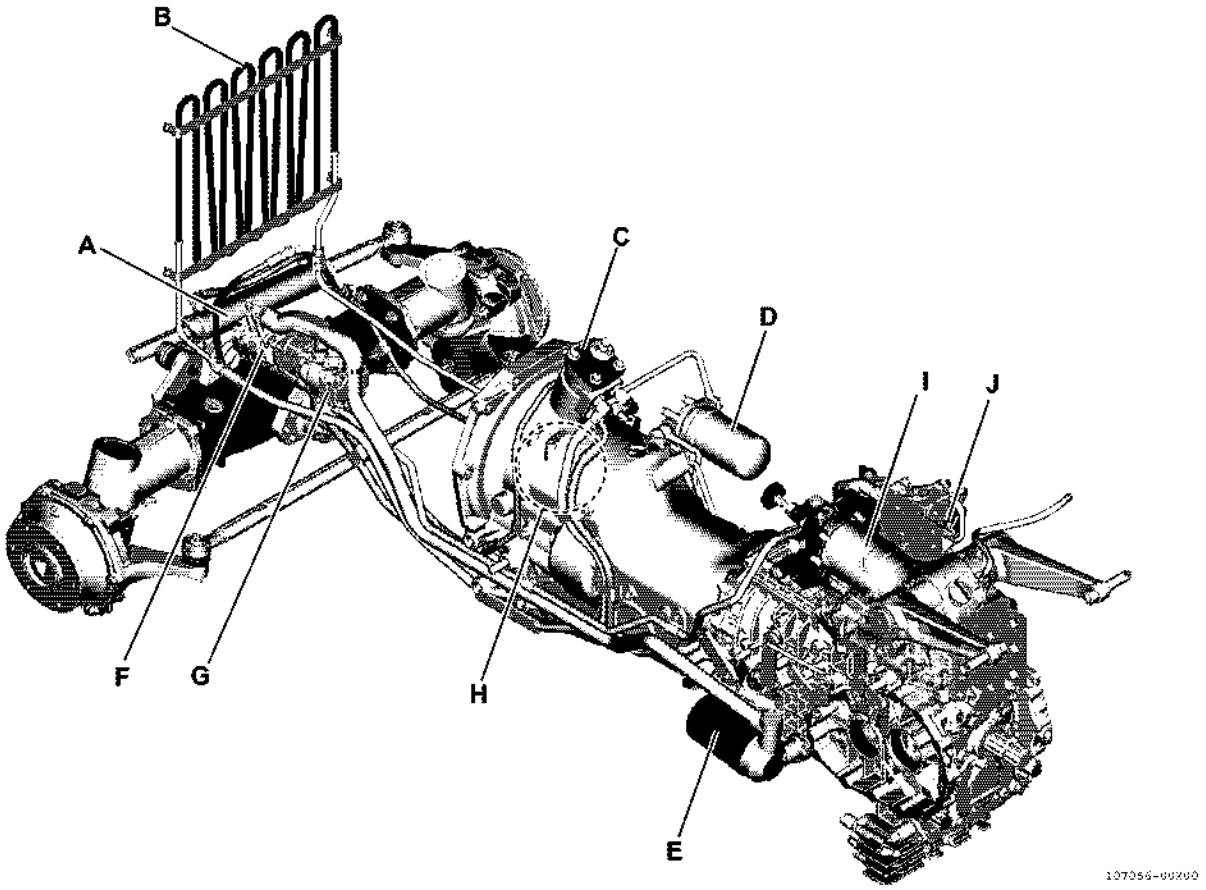
1. Hydraulics (General)

The hydraulic system provides the following functions.

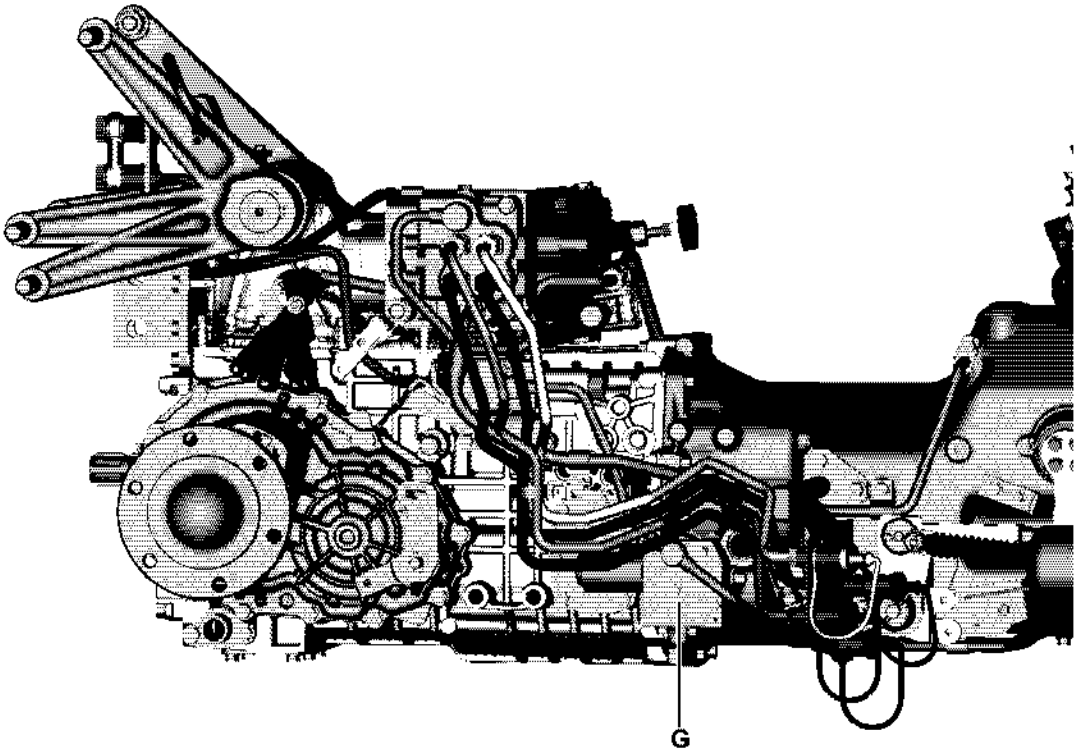
- Hydraulics to operate the power steering system.
- Hydraulics to operate the transmission (HST).
- Hydraulics to turn the PTO clutch on/off.
- Hydraulics to raise and lower the hydraulic lift.
- Hydraulics to operate equipment connected to the loader valve's work port.

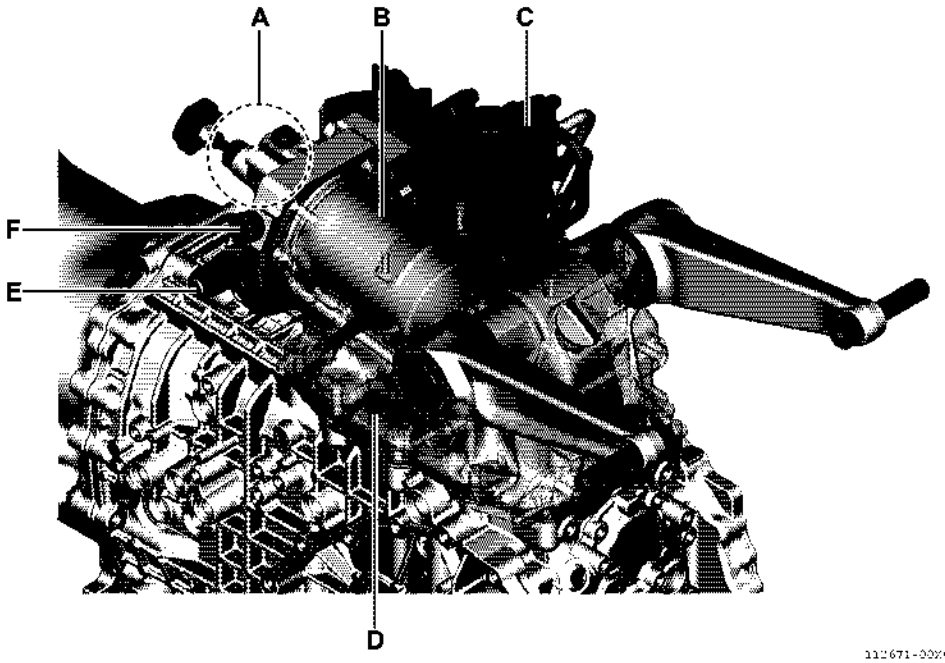


MODEL (ENGINE)	ENGINE SPEED (min⁻¹)		GEAR RATE	PST PUMP FLOW (L/min)	LIFT PUMP FLOW (L/min)	TOTAL FLOW (L/min)
YT235	MIN	945±10	0.903	6.97cc/rev 5.2	10.5cc/rev 9.0	14.1
TOKO1032H (3TNV88C)	RATED	2800		15.3	26.5	41.9
	MAX	2930±10		15.5	26.8	42.3



(A) PST cylinder
(B) Oil cooler
(C) PST valve
(D) Line filter 10 μ
(E) Filer 35 μ
(F) Hydraulic pump 6.07 cc/rev
(G) Hydraulic pump 10.5 cc/rev
(H) HST
(I) Piston
(J) Loader valve





(A) Stop valve
(B) Piston
(C) Loader valve
(D) Control valve
(E) Relief valve
(F) Safety valve
(G) 4WD valve

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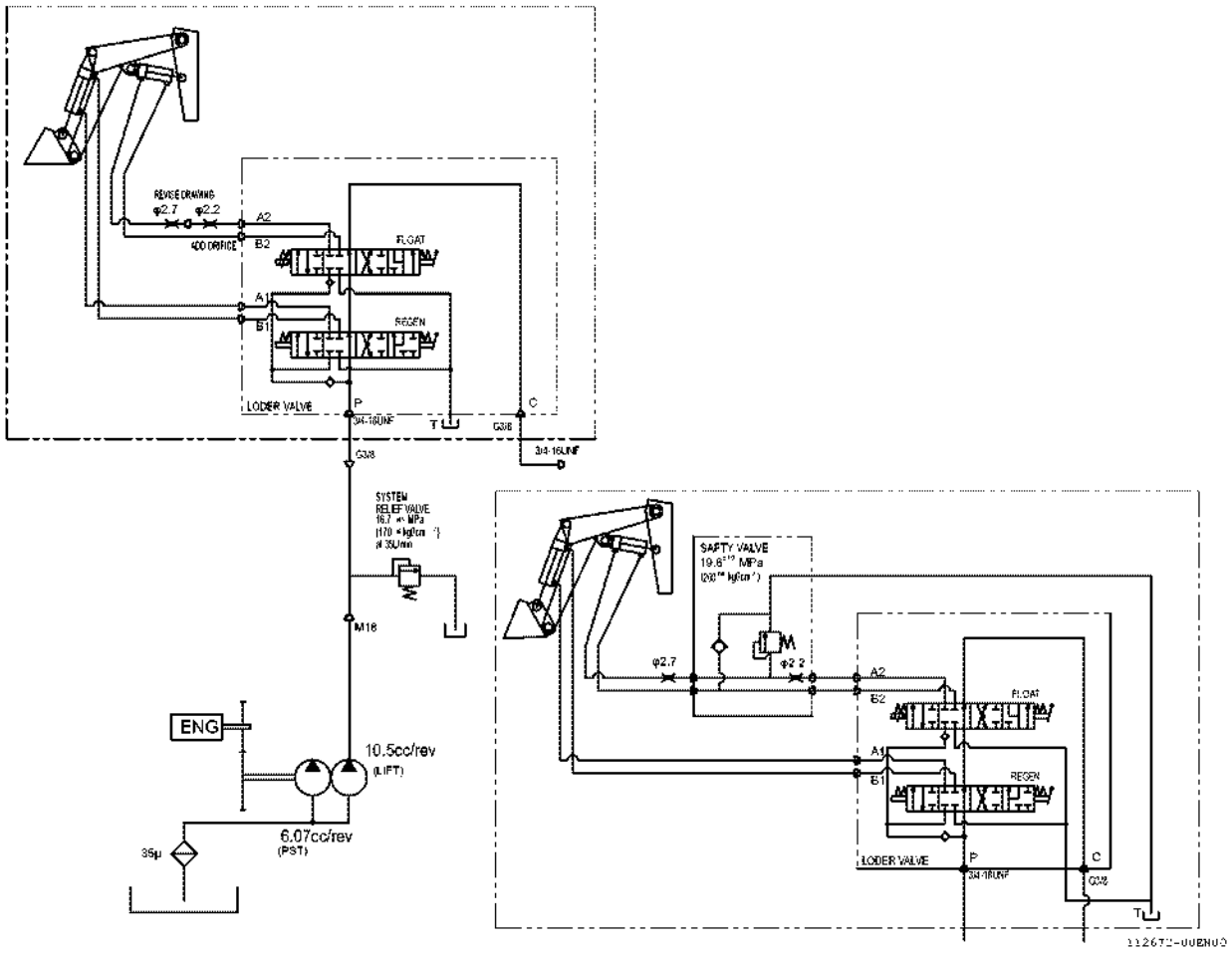
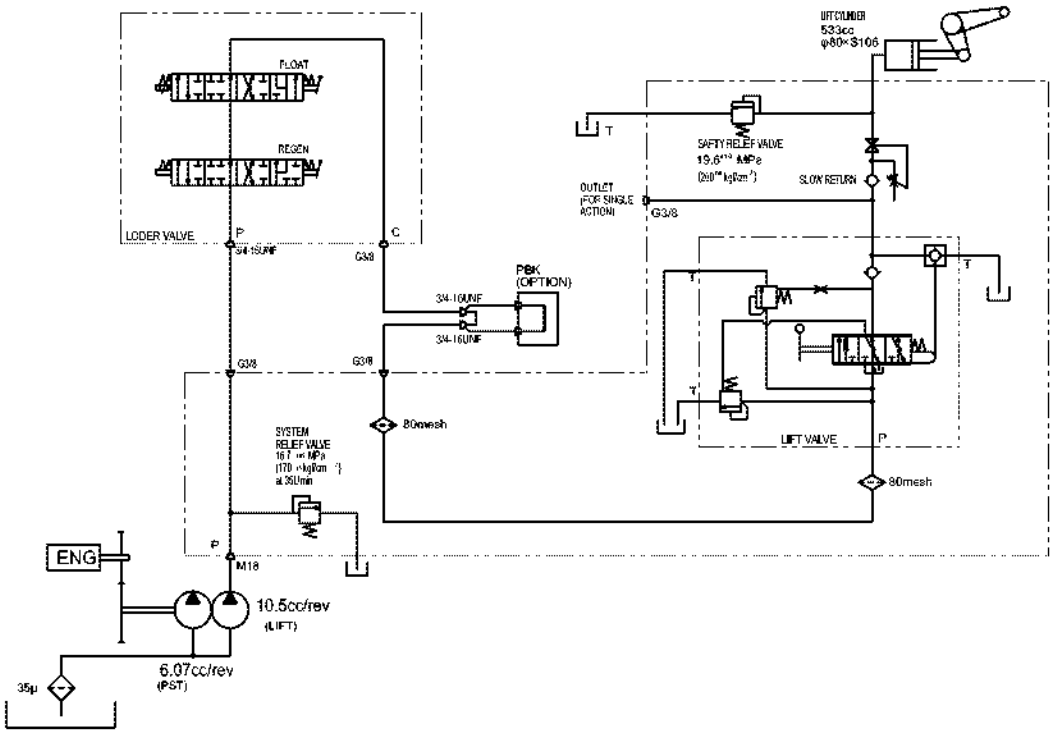
2. Hydraulics (loader valve)

- **Function:**
  - The loader valve allows the operator using a control lever to operate equipment attached to the quick connect work ports.
- **Major components:**
  - Hydraulic pump
  - 2 spool valve
  - Control lever
- **Theory of operation:**
  - Hydraulic oil pressure is generated by a gear-driven hydraulic pump.
  - The hydraulic pump is on the left side of the engine.
  - The hydraulic pump draws hydraulic oil from the rear transmission sump via a 35 micron filter.
  - Hydraulic oil pressure is supplied to the loader valve then the hydraulic lift control valve.
  - The loader valve is operated by a control lever on the right side of the operator seat.
  - The control lever is connected to the two spools of the loader valve.
  - Operating the control lever allows the operator to control the flow of hydraulic oil by choosing which spool to open or close.
  - This hydraulic oil pressure is then delivered to the equipment connected to the corresponding quick connect work port.
  - If the pressure inside the hydraulic circuit rises rapidly due to the influence of the front loader or any other reason, the safety valve will release hydraulic oil to prevent damage.
  - A mechanical safety locking device on the control lever allows the operator to prevent the control lever from being accidentally operated when not in use.



3. Hydraulic Lift

- **Function:**
  - The hydraulic lift allows the operator to raise or lower the equipment attached to the three point hitch.
  - It also allows the operator to adjust the operating height of the equipment.
- **Major components:**
  - Hydraulic pump
  - Hydraulic lift control lever
  - Hydraulic piston
  - Hydraulic lift control valve
- **Theory of operation:**
  - Hydraulic oil pressure is generated by hydraulic pump.
  - The hydraulic pump is on the left side of the engine.
  - The hydraulic pump draws hydraulic oil from the rear transmission sump via a 35 micron filter.
  - Hydraulic oil pressure is supplied to the inlet port of the hydraulic lift via the loader valve.
  - The hydraulic lift control valve is located inside the hydraulic lift housing.
  - The control valve is connected via mechanical linkages to the hydraulic lift control lever and the hydraulic lift arm.
  - The mechanical linkage opens and closes the control valves allowing hydraulic oil pressure to flow in and out depending on the position of the control lever and the hydraulic lift arm.
  - The hydraulic lift housing also has an adjustable rate of drop control, a lift cylinder, position control valve, and a safety pressure relief valve.
  - By operating the hydraulic lift control lever located to the right side of the operator seat, the operator can move the hydraulic lift up or down and adjust the height of the equipment.
  - Moving the lift control lever forward will allow the control valve to release oil out of the lift cylinder and lower the lift arms.
  - Moving the lift control lever backwards will allow the control valve to let hydraulic oil pressure flow into the cylinder and raise the lift arms.
  - An adjustable mechanical stopper on the lift control lever allows the range of movement of the hydraulic lift to be set by the operator.
  - This allows the operator to repeatedly set the operating the height of the equipment.



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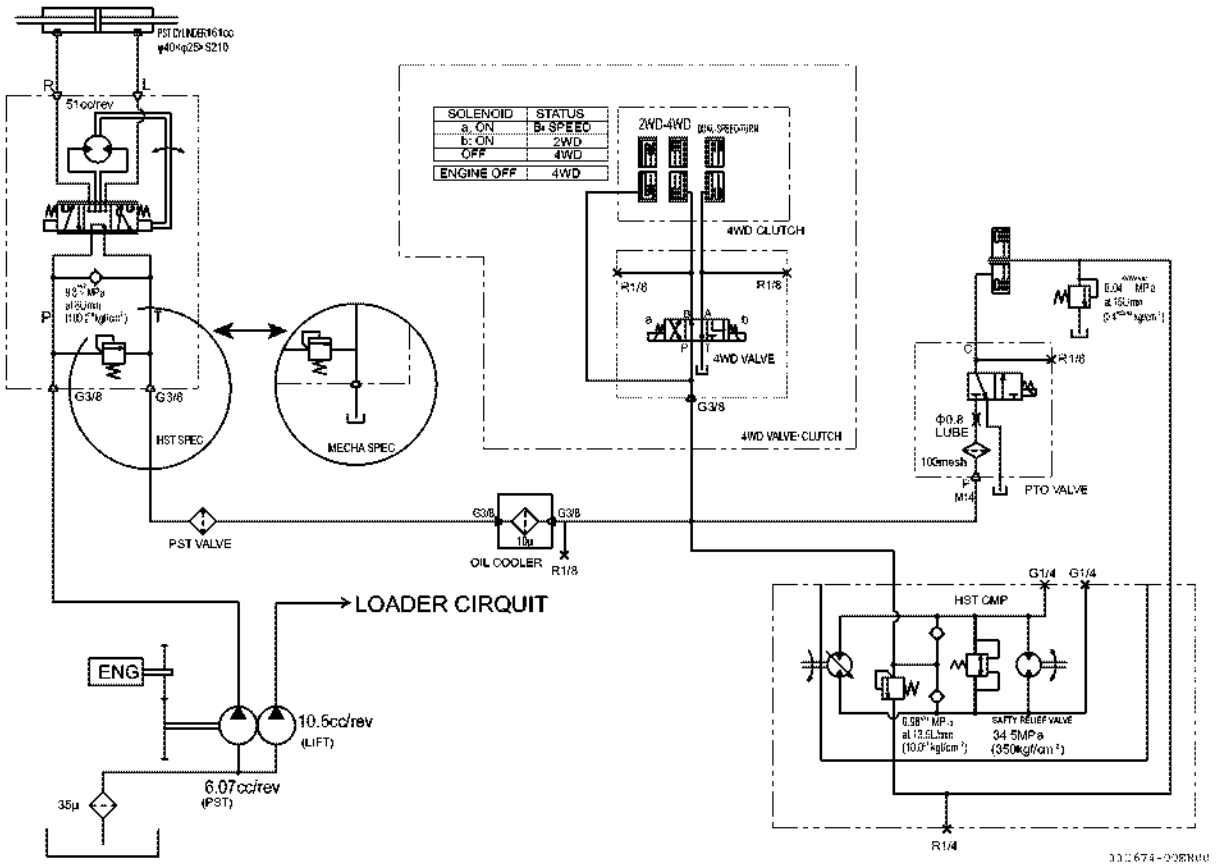
4. Steering

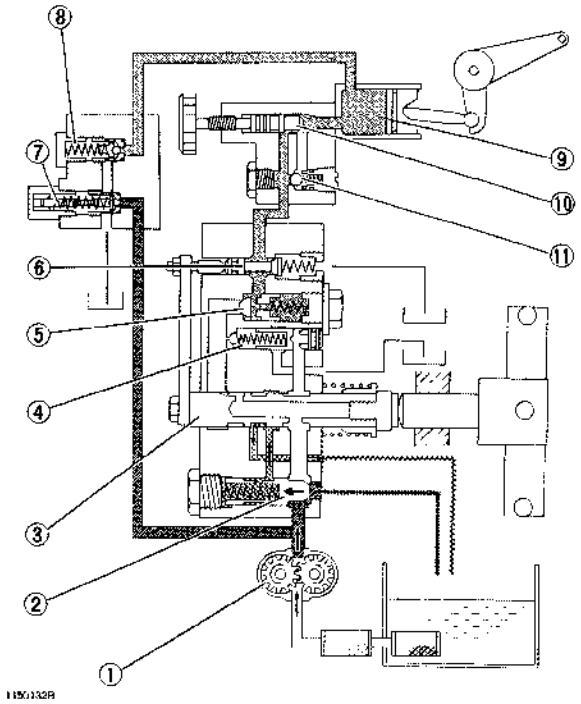
- **Function:**
  - The steering system allows the operator with the aid of hydraulic power from hydraulic gear pump to easily turn the steering wheel and control the direction of the tractor.
- **Major components:**
  - Hydraulic pump
  - Steering (Orbitrol) valve
  - Steering cylinder
- **Theory of operation:**
  - Hydraulic oil pressure is generated by hydraulic pump (steering pump) coupled to the engine.
  - The hydraulic pump is on the left side of the engine.
  - The hydraulic pump draws oil from the rear transmission sump via a 35 micron filter and supplies hydraulic oil pressure to steering (Orbitrol) valve.
  - When the operator turns the steering wheel in one direction, the steering (Orbitrol) valve directs the flow of hydraulic oil pressure to one side of the steering cylinder which turns the front tractor wheels.
  - Turning the steering wheel in the opposite direction will cause the steering (Orbitrol) valve to direct hydraulic oil pressure to the opposite side of the steering cylinder and cause the wheels to be turned in the opposite direction.
  - The right end of the steering cylinder is connected to the right front gearbox. The tie rod is connected to both gearboxes.
  - The steering (Orbitrol) valve has a relief valve.
  - The steering (Orbitrol) valve and control cylinder are not serviceable without specialized equipment and must be replaced as complete units.
  - Excess oil from the steering (Orbitrol) valve flows to the Power Take Off (PTO) clutch and HST oil charge circuit.



5. Position control valve operation and oil flow

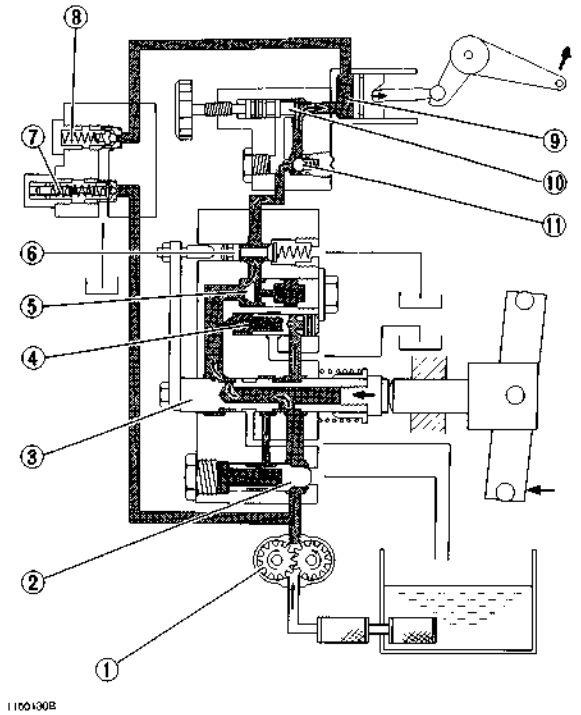
When in neutral

- Oil propelled by the pump enters the control valve, pushes open the unload valve (2), and all returns to the transmission case.
- Oil behind the unload valve returns to the transmission case through the main spool (3).
- The oil in the hydraulic cylinder (9) is held in by the load check valve (5), mechanical check valve (6), and safety valve (8), thereby maintaining the working equipment at a fixed height.
- At this time, unevenness of the road and other factors jolt the working equipment, applying force to the lift arm and impact pressure to the oil inside the hydraulic cylinder (9) via the hydraulic piston. The safety valve (8) opens to prevent the pressure from damaging the cylinder or seal line.



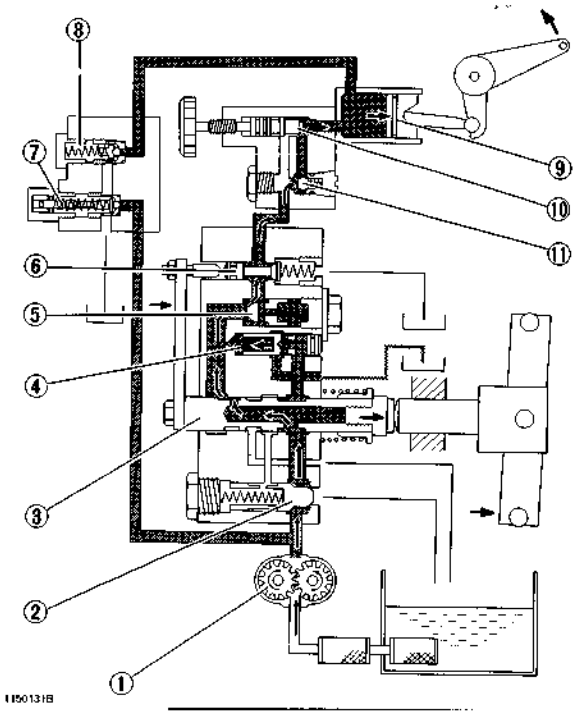
When raising

- Moving the 3-point hitch control lever into the up position moves the main spool (3) in the direction of the arrow.
- Oil propelled by the pump flows to behind the unload valve (2), closing the unload valve.
- The oil pushes open the load check valve (5) and is sent through the check valve (11) to the hydraulic cylinder (9) to raise the working equipment.
- When mounting equipment heavier than the available hydraulic lift power or when, for any reason, the working equipment cannot be raised, the relief valve (7) opens at the set pressure to protect the seal line and other parts.



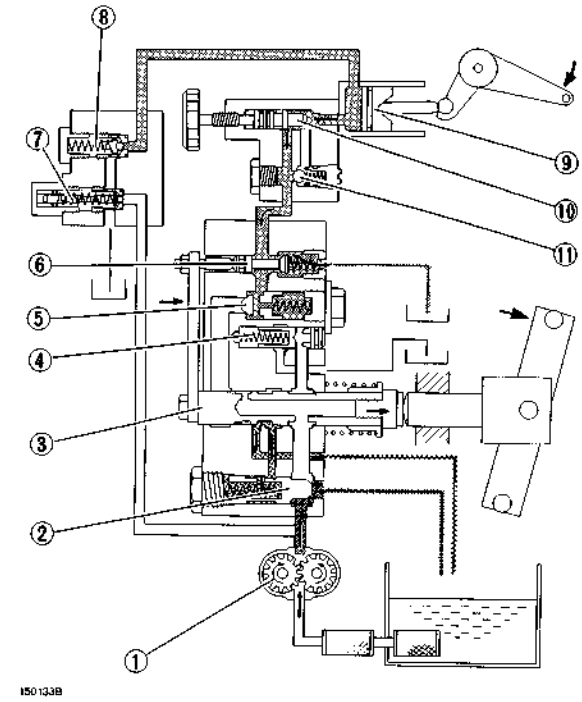
Raise gradually (Up → Neutral) (2 motions)

1. When the working equipment starts to rise, the pressure of the lift arm feedback rod on the spool pin relaxes and the spring moves the main spool (3) close to neutral position.
2. As it approaches the neutral position, it approaches the choke on the main spool, this leads to an oil pressure imbalance around the main spool. The flow control valve (4) then moves in the direction of the arrow and pressure from the pump gradually reduces. This eases the shock from stopping after raising the working equipment to a specified height.
3. The main spool goes into neutral, and the flow control valve returns oil to the transmission case until the pressure around the unload valve (2) is released and the unload valve opens.



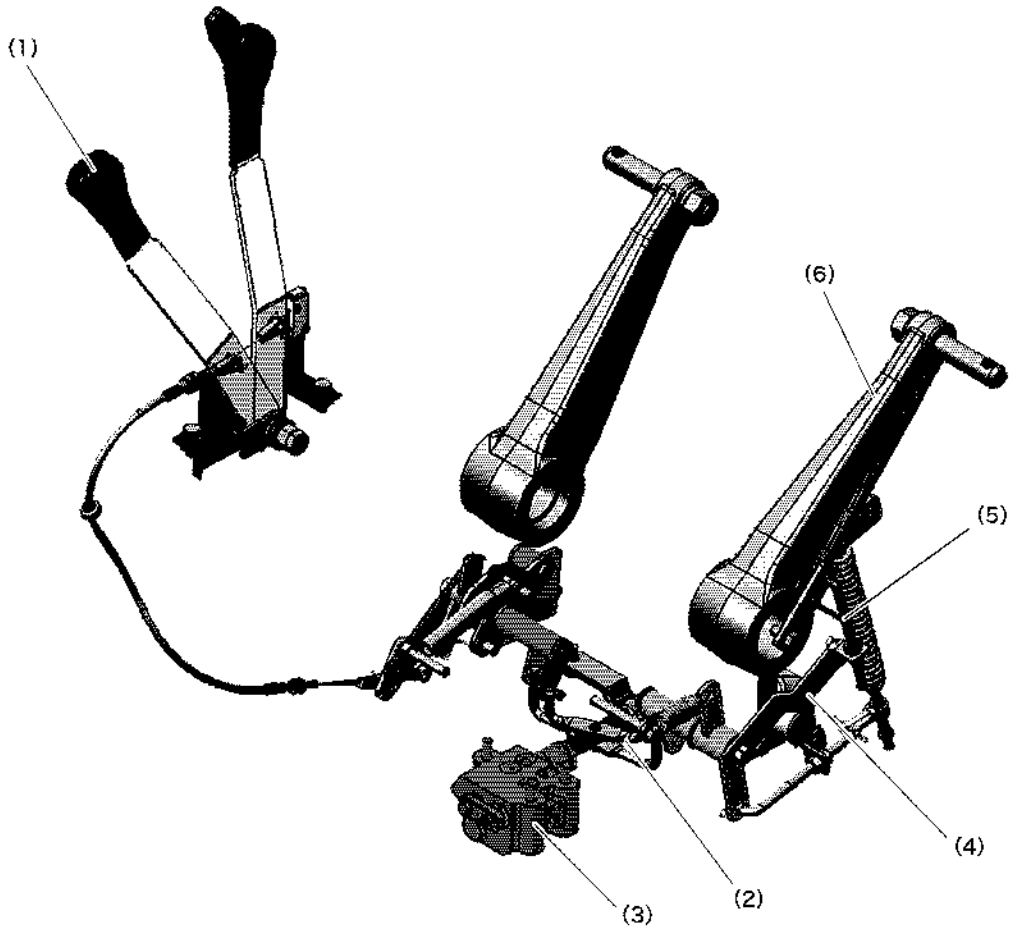
When lowering

1. Moving the 3-point hitch control lever into the down position relaxes the force pressing on the spool pin, allowing the spring to move the main spool (3) in the direction of the arrow.
2. The push bar mounted on the main spool forces the mechanical check valve (6) open.
3. The oil in the hydraulic cylinder is pushed out by the weight of the working equipment and flows back to the transmission case through the mechanical valve, lowering the working equipment.
4. Oil propelled by the hydraulic pump pushes open the unload valve and returns to the transmission case.



6. Position control

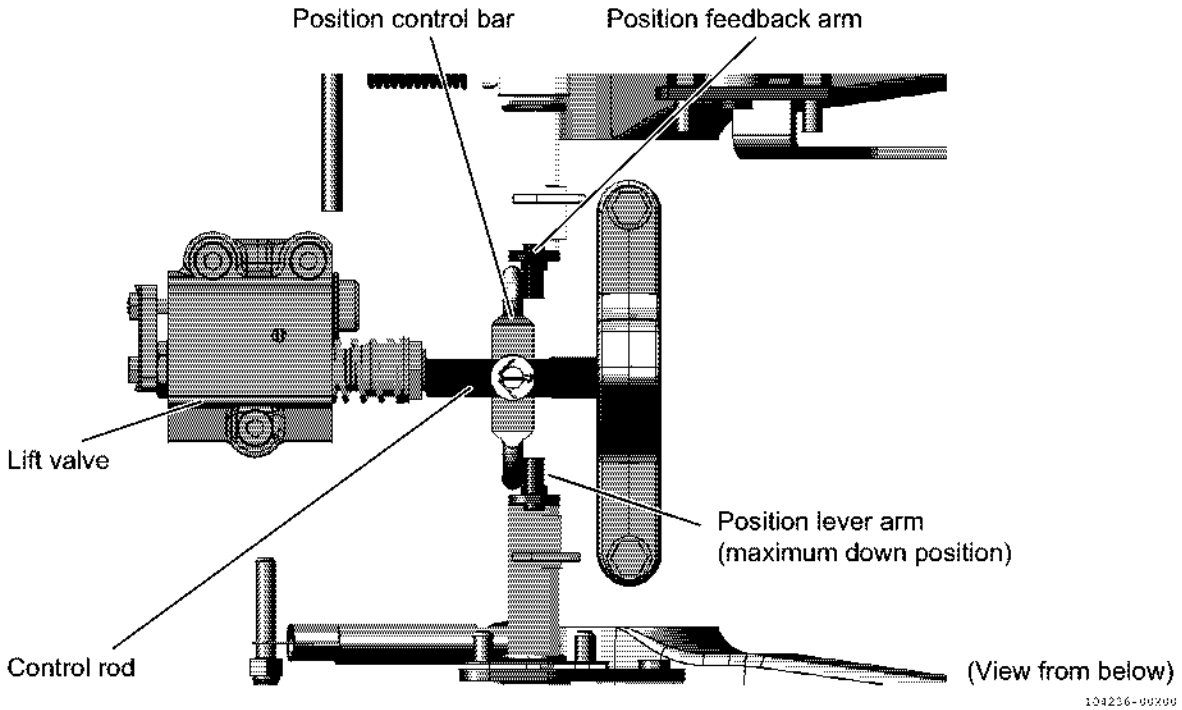
Position control is a method of hydraulic control to raise and lower the working equipment in proportion to the position of the 3-point hitch control lever, and hold it in a given position.



(1) 3-point hitch control lever
(2) Position control bar
(3) Lift valve
(4) Position feedback arm
(5) Position feedback rod
(6) Lift arm

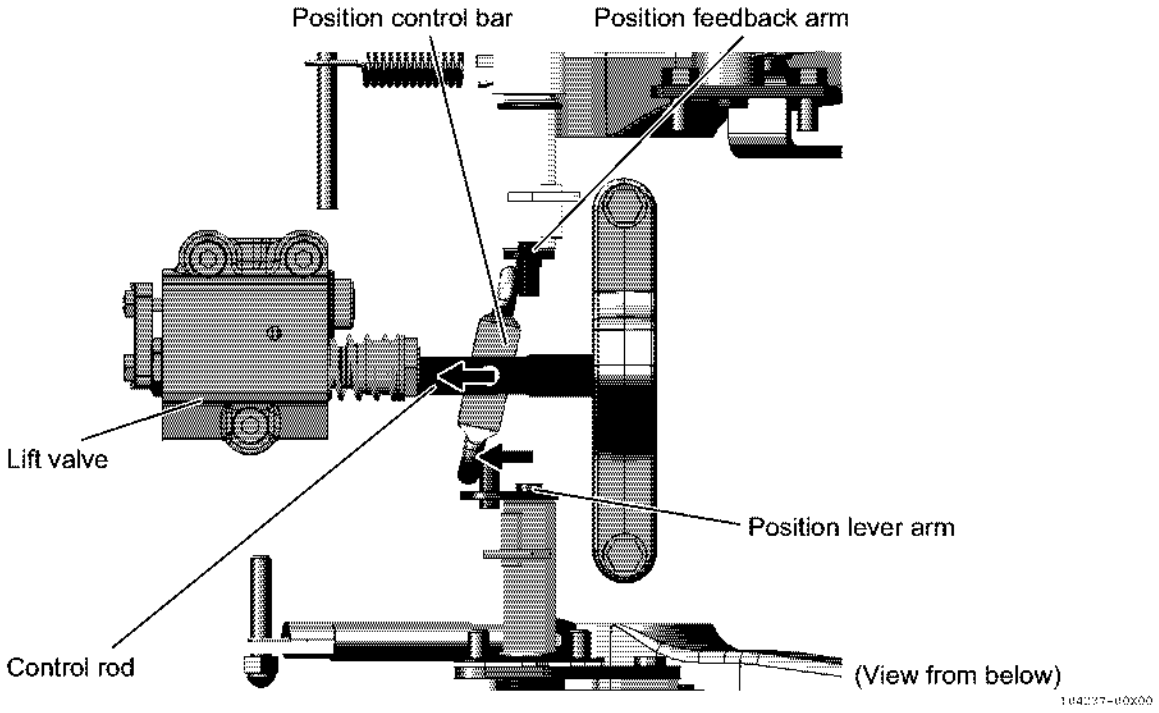
■ 3-point hitch control lever maximum down position

When the lift arm is in the maximum down position, the lift valve is in the 'lower' position.



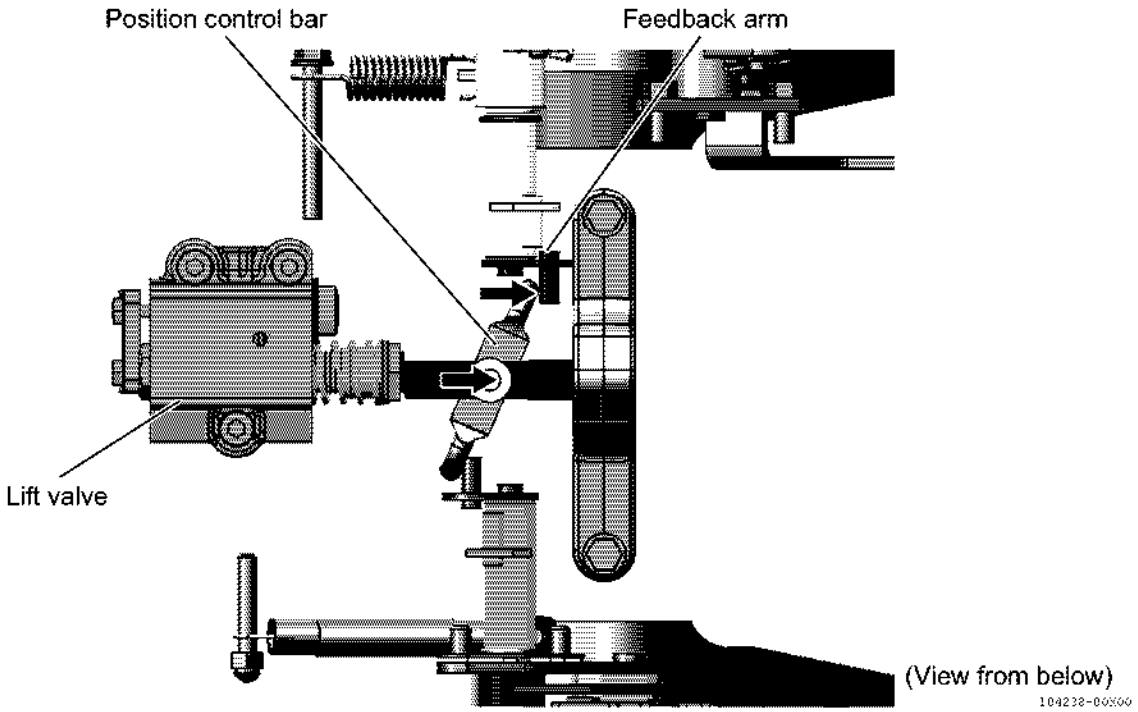
■ 3-point hitch control lever maximum up position

When the lift arm is in the maximum down position and you switch the 3-point hitch control lever to 'raise', the control rod pushes the lift valve main spool, switching the lift valve to 'raise'.



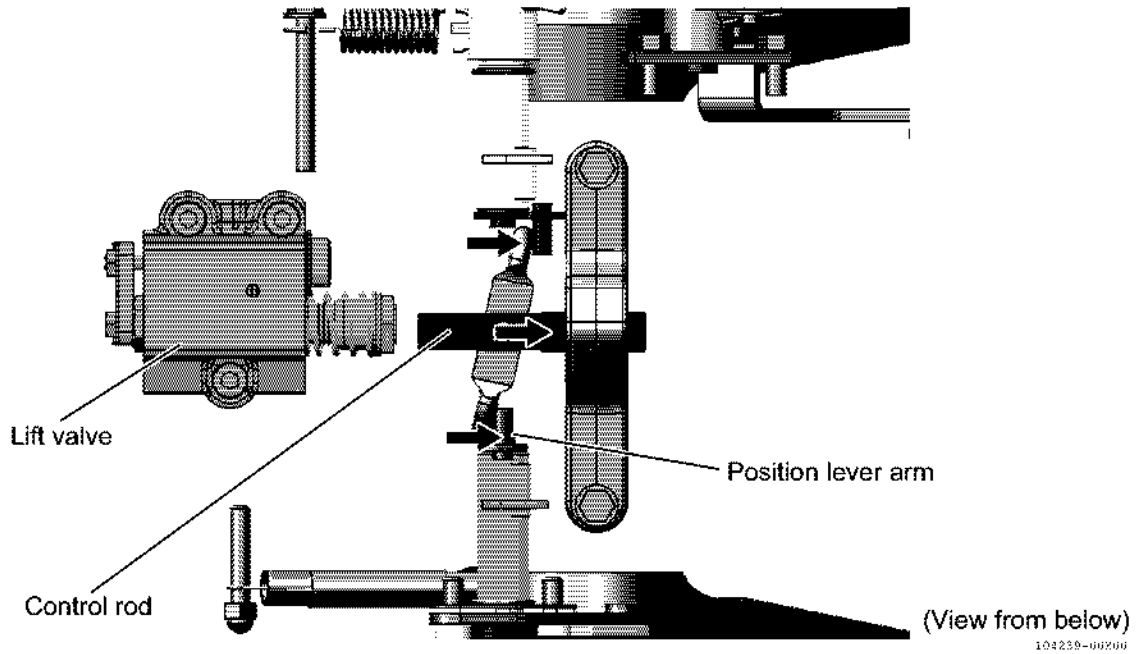
■ 3-point hitch control lever maximum up position

The lift arm side feedback arm moves backward, this moves the control rod backward and causes the lift valve main spool to return to the neutral position.

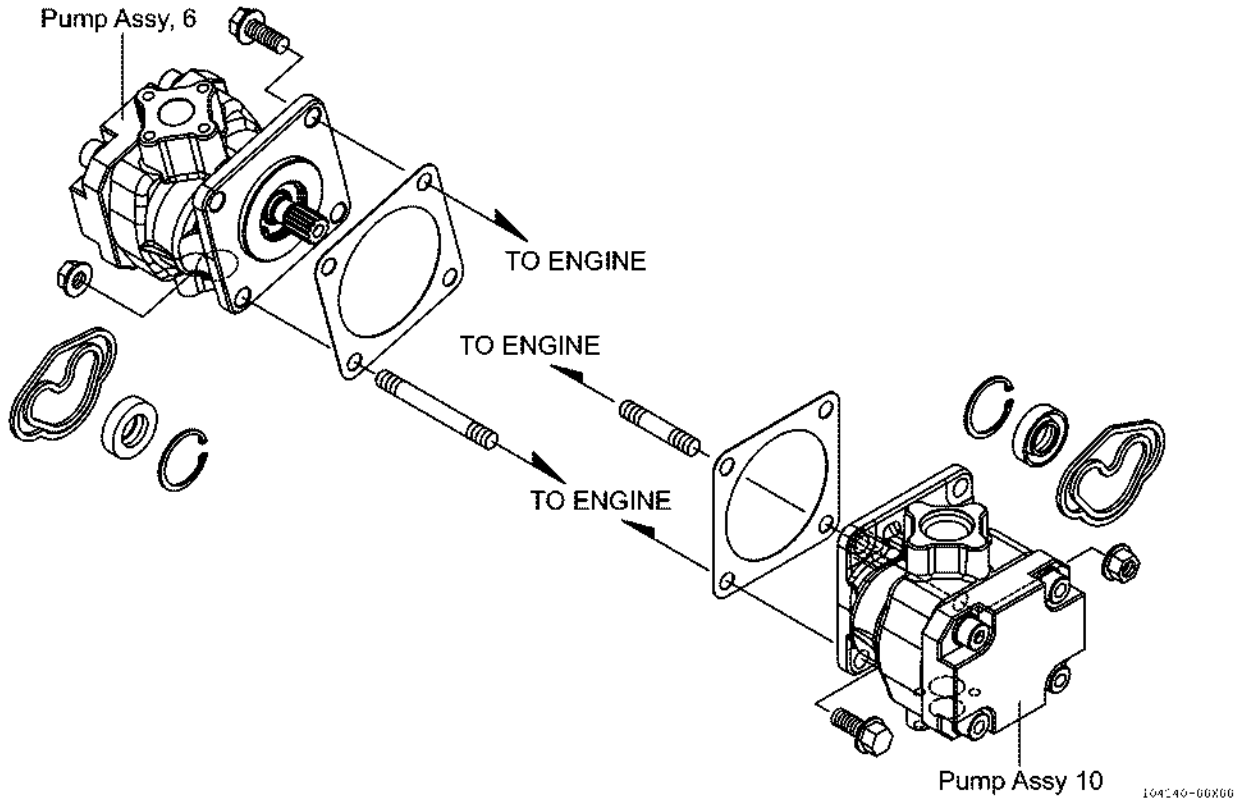


■ 3-point hitch control lever maximum down position

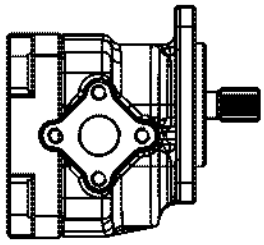
When you switch the 3-point hitch control lever to 'lower', the lever side 3-point hitch control lever arm moves backward, which moves the lift valve main spool backward out of neutral position and switches it to 'lower'.

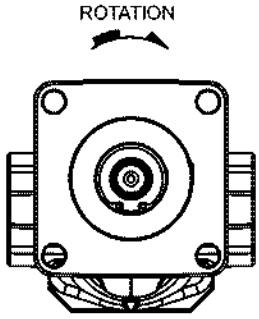


■ Hydraulic pump



■ Pump Assy, 6: 1A8400-41110 (for charging HST, PTO and power steering)



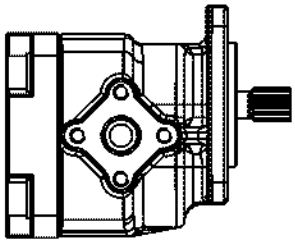


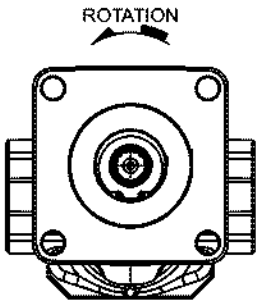
USE CONDITION

DISPLACEMENT	6.07 cm^3/rev
USE PRESSURE	RELIEF PRESSURE: 9.8+0.7/0 MPa
USE ROTATION	MAX SPEED: 2704 min^{-1} MIN SPEED: 853 min^{-1}
USE OIL	HYDRAULIC FLUID
OIL TEMPERATURE	OPERATING TEMPERATURE: -20 to 100 °C
SUCTION PRESSURE	MIN -0.03 MPa WHEN COLD START: MIN -0.09 MPa (SHORT TIME)
FILTER	SUCTION: 35 μ (NOMINAL)
OTHER	

Seal kit code: 1A8400-41200

■ Punp Assy, 10: 1A8400-41150 (for loader and hydraulic lift)





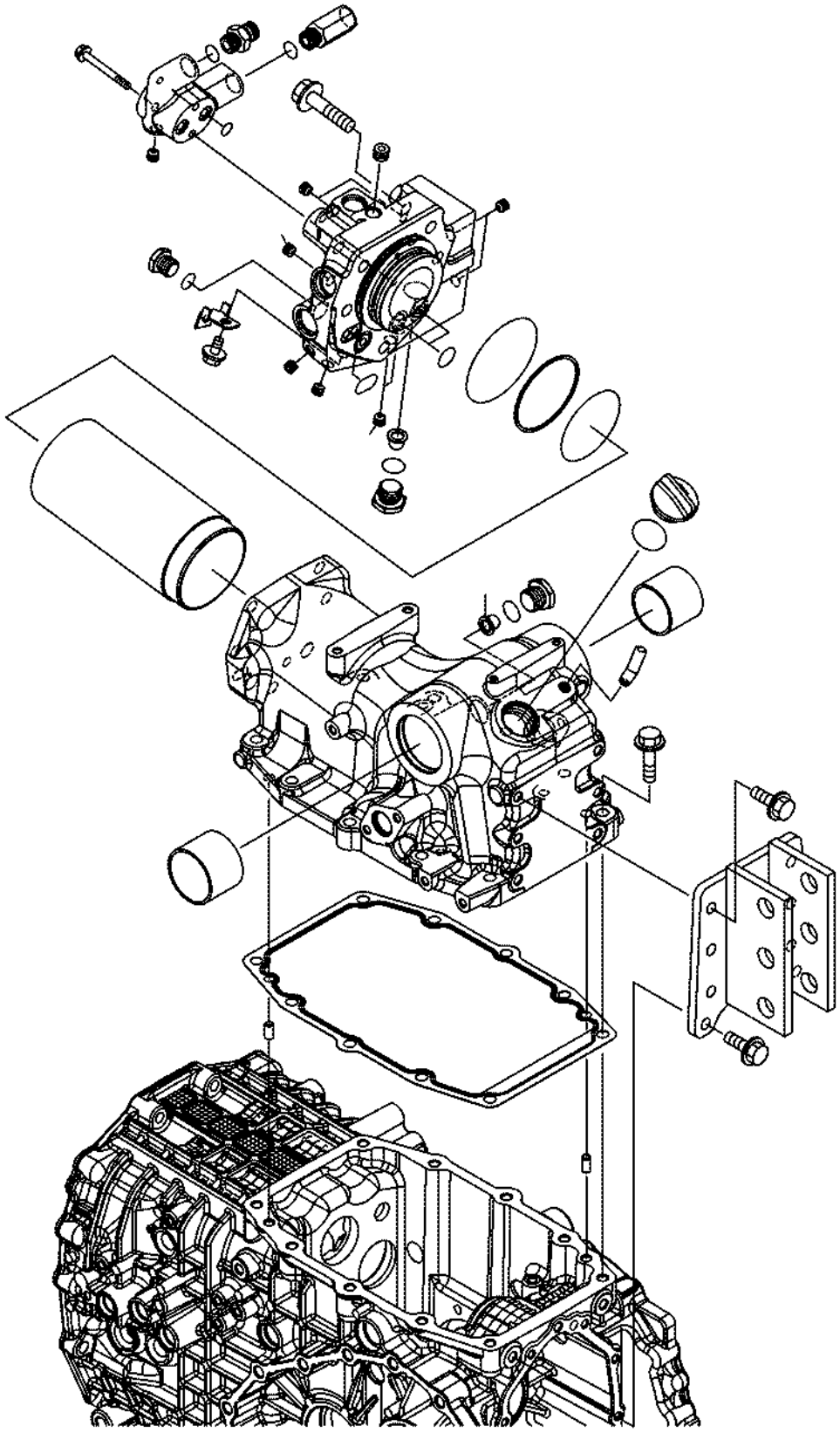
USE CONDITION

Seal kit code: 1A8400-41200

DISPLACEMENT	10.5 cm^3/rev
USE PRESSURE	RELIEF PRESSURE: 16.7±0.5 MPa
USE ROTATION	MAX SPEED: 2704 min-1 MIN SPEED: 853 min-1
USE OIL	HYDRAULIC FLUID
OIL TEMPERATURE	OPERATING TEMPERATURE: -20 to 100 °C
SUCTION PRESSURE	MIN -0.03 MPa WHEN COLD START: MIN -0.09 MPa (SHORT TIME)
FILTER	SUCTION: 35 μ (NOMINAL)
OTHER	

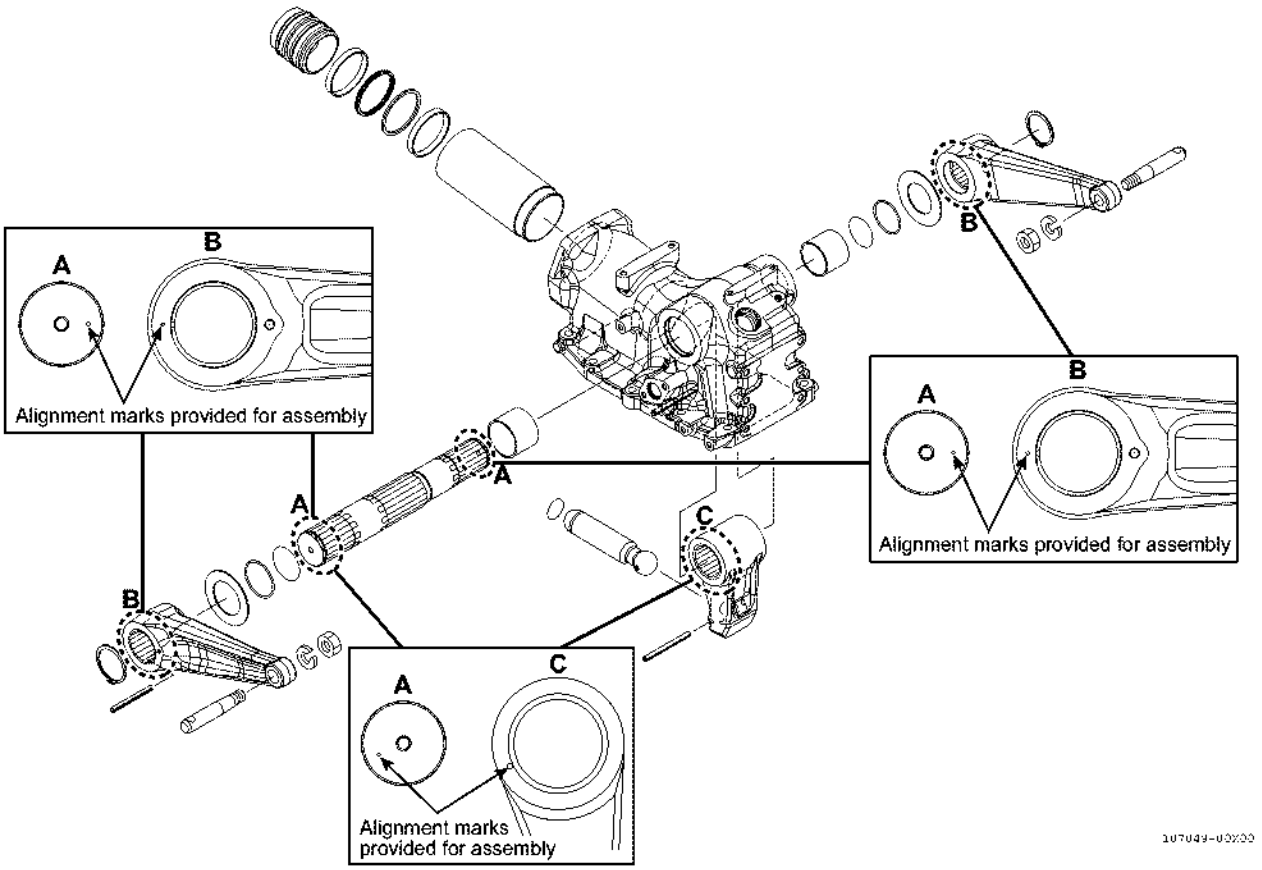
107061-00000

■ HYDRAULIC CYLINDER CASE

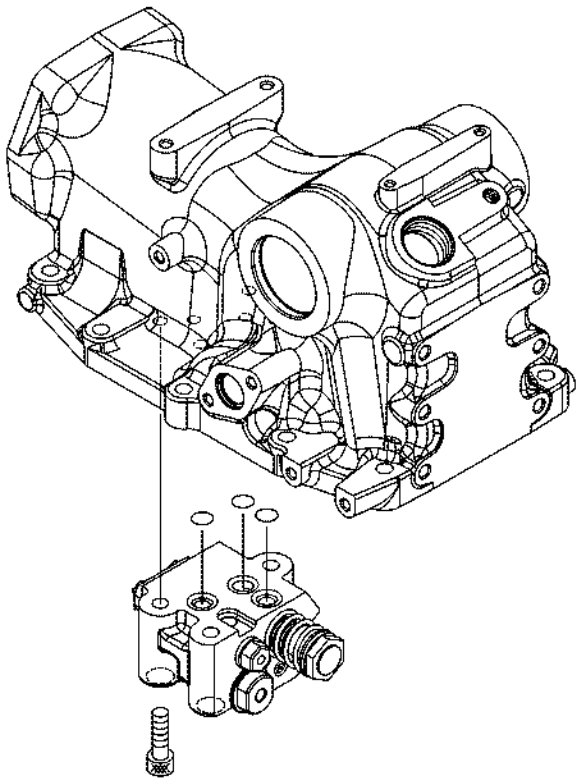


164241-00400

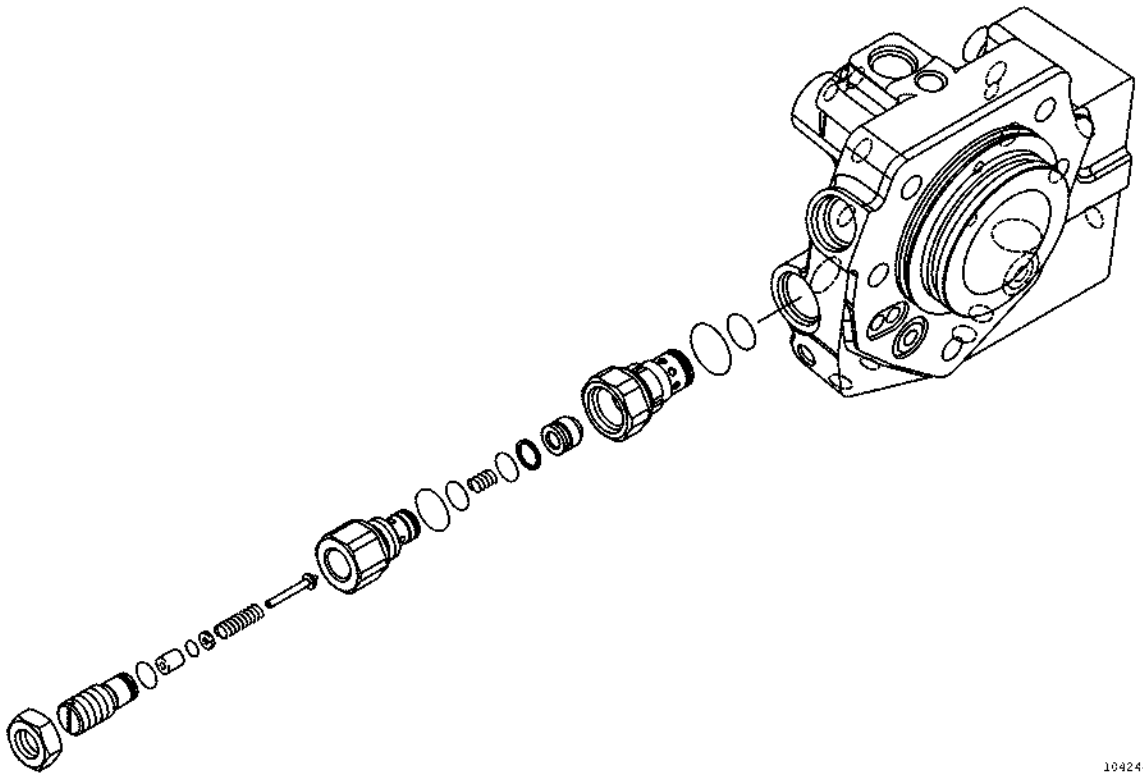
■ Lift crank



■ Control valve

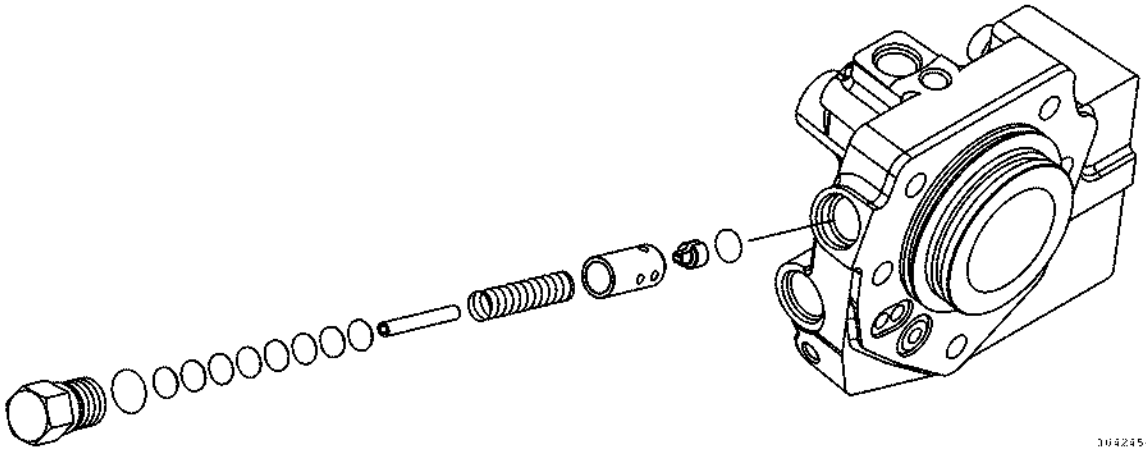


■ **Relief valve**



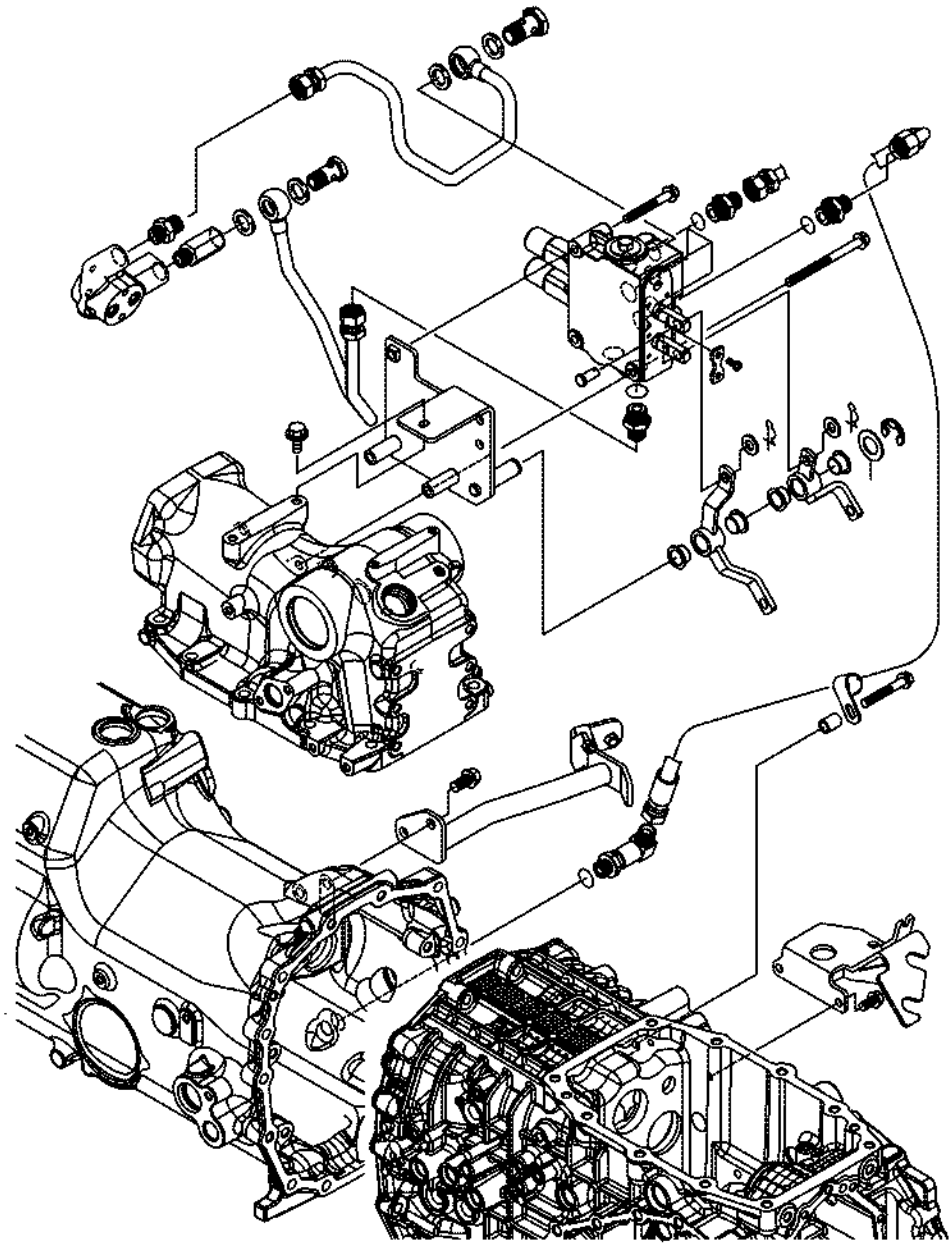
104244-00X00

■ **Safety valve**

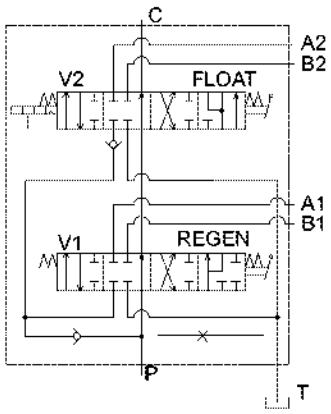


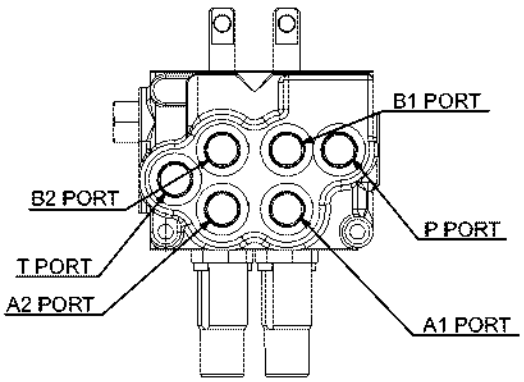
104245-00X00

■ Lorder valve



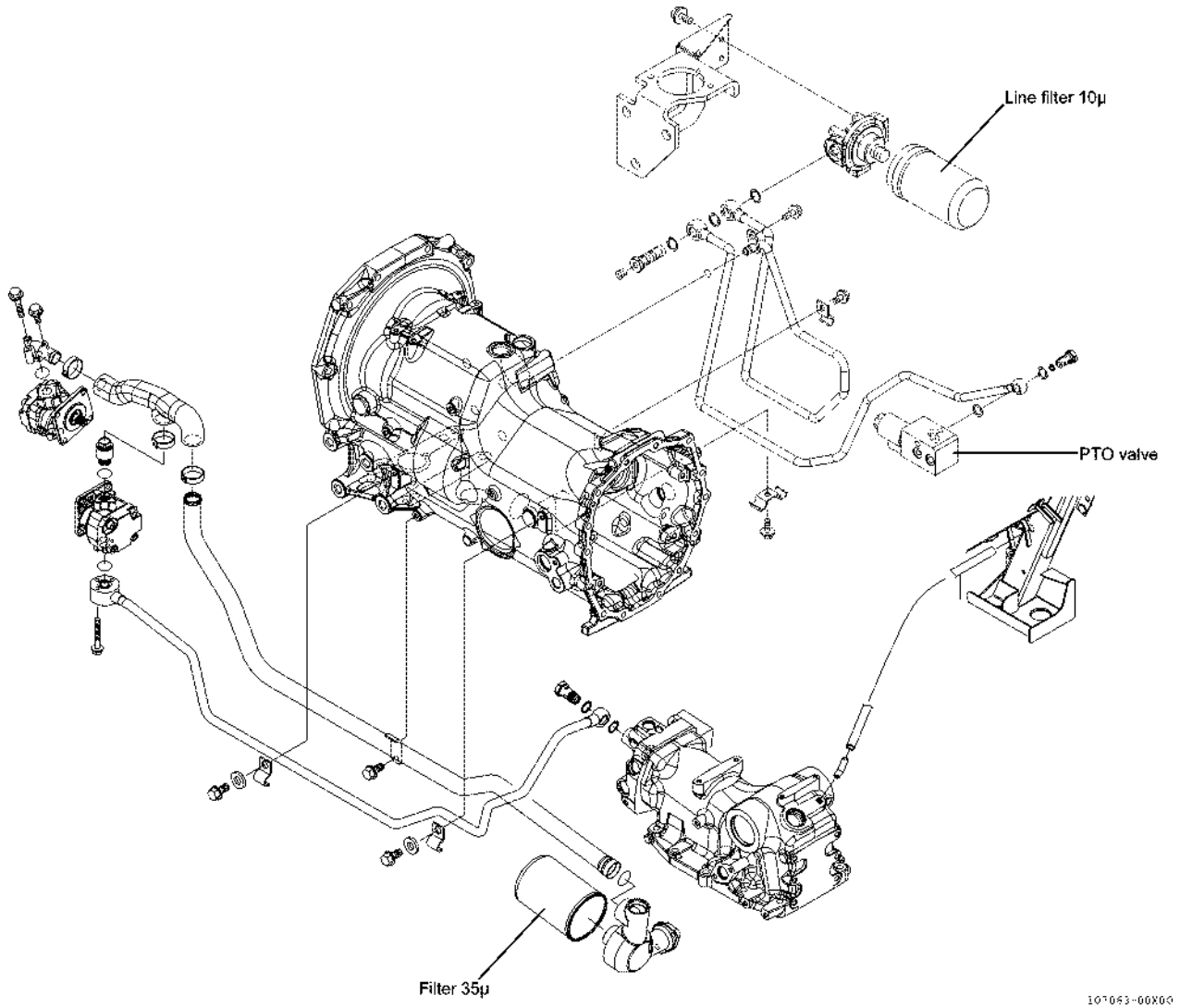
Loader valve assy, : 1A8330-46600





USE CONDITION
OIL FLOW RATE: 6 - 30 L/min
RELIEF PRESSURE: 16.7 MPa
MAX. PRESSURE: 25 MPa
USE OIL: HYDRAULIC FLUID
(EQUAL TO VG56)
USE TEMPERATURE: -20°C - 100°C

■ Hydraulic piping

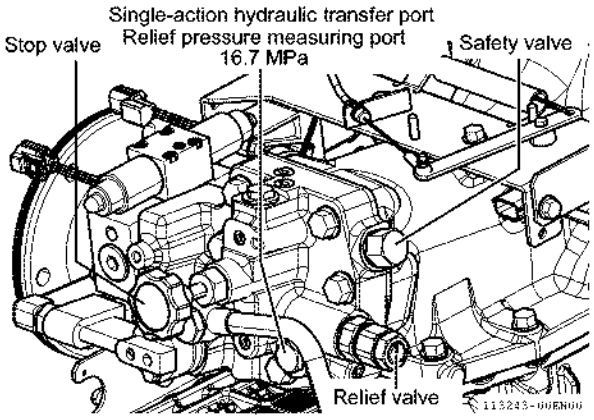


2. Inspection and Adjustment

1. Checking the lift pressure

<Pressure measurement>
Remove the cover under the seat and measure from the single-action outlet.
The pressure gauge of 0 to 24.50 MPa should be used.

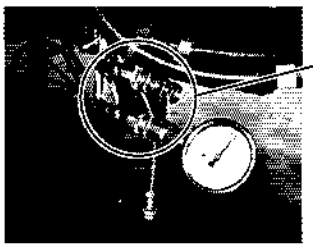
Relief pressure: 16.7 ±0.5 MPa



<Measurement procedure>
1. Start the engine and set to rated rotations.
2. Lower the lift arm.
3. Close the stop valve.
4. Move the 3-point hitch control lever to the up position and measure the relief pressure.
5. If the measured relief pressure is not as specified, use the relief valve to adjust the pressure.

2. Hydraulic Pressure Test (Main Relief (System) Pressure)

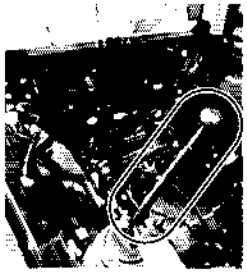
<Pressure measurement>
Set up the hydraulic gauge onto the quick coupler of loader valve (Test Port A).



Install the gauge into any port of the Test Port A.

113675-00EN00

<Measurement procedure>
1. Start the engine and run it at 3000 rpm.
2. Warm up the hydraulic oil temperature to 60°C.
3. Shift the implement control lever to activate the main relief valve.



113676-00X00

4. Measure the relief pressure.
   Main Relief Pressure: 16.7 ±0.5 MPa

11

<Adjustment procedure>

If the measured relief pressure is not as specified, use the Main Relief Valve to adjust the pressure.

1. Check each part of the main relief valve adjustment port (ex: Spool, Spring).
2. Loosen the nut (A).
3. Turn the screw clockwise to increase the pressure, or anti-clockwise to decrease the pressure ±12 MPa/rev.

⚠ CAUTION

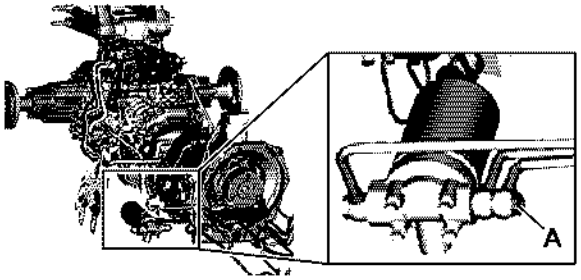
- Do not turn the screw drastically.

112677-00000

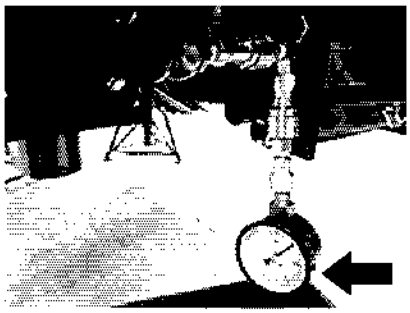
3. Hydraulic Pressure Test (HST Charge Relief Pressure, PTO Clutch Pressure)

<Pressure measurement>

Set up the hydraulic gauge onto the test port B (A), located at the merging section of the oil pipe around the oil filter (Plug Size R1/8).



112678-00000

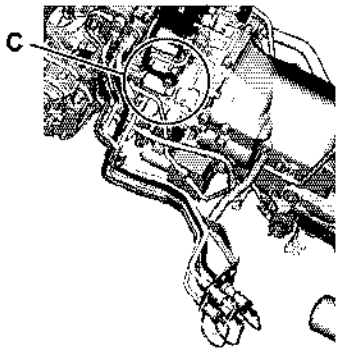


112679-00000

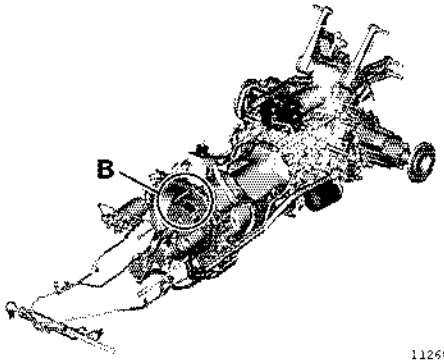
<Measurement and adjustment procedure>

1. Start the engine and run it at 2800 rpm.
2. Warm up the hydraulic oil temperature to 60°C.
3. Measure each of the pressures.
   HST Charge Relief Pressure, PTO Clutch Pressure: 9.8 ±0.1 MPa

4. If the measured pressure is not as specified, use the HST Charge Valve (B) or the PTO Clutch Valve (C) to adjust the pressure.



112680-00X00

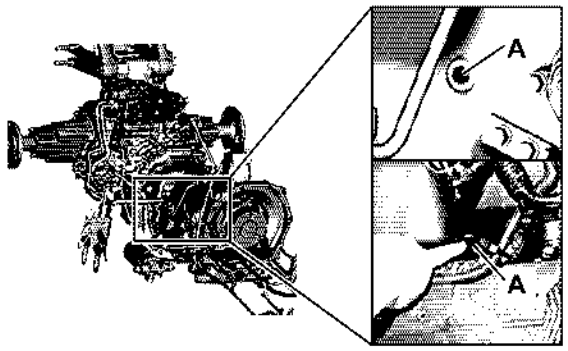


112681-00X00

4. Hydraulic Pressure Test (PTO Lubrication Relief Pressure)

<Pressure measurement>

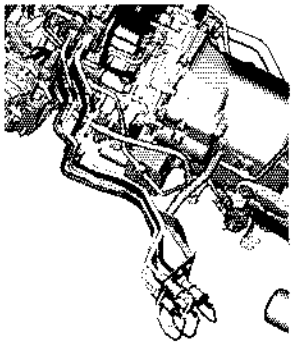
Set up the hydraulic gauge onto the test port C (A), located on the clutch housing (Plug Size R1/4).



112682-00X00

<Measurement and adjustment procedure>

1. Start the engine and run it at 2800 rpm.
2. Warm up the hydraulic oil temperature to 60°C.
3. Measure the PTO Lubrication Relief pressure.
   PTO Lubrication Relief Pressure: 0.04 +0.055/-0.02 MPa
4. If the measured pressure is not as specified, use the PTO Lubrication Valve (B) to adjust the pressure.

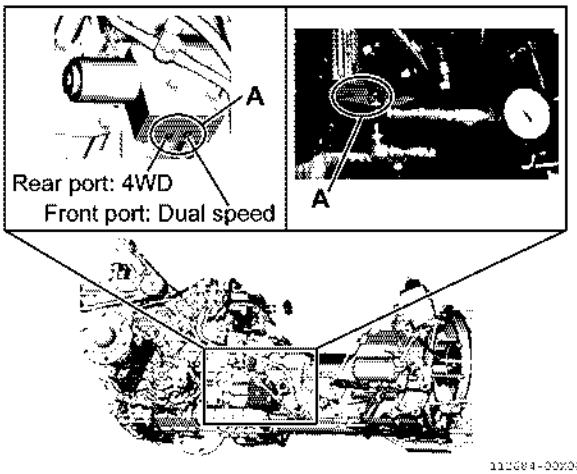


112683-00X00

5. Hydraulic Pressure Test (Dual Speed Turn Valve Pressure)

<Pressure measurement>

Set up the hydraulic gauge onto the test port D (A), located under the 4WD/dual speed turn valve (Plug Size R1/8).



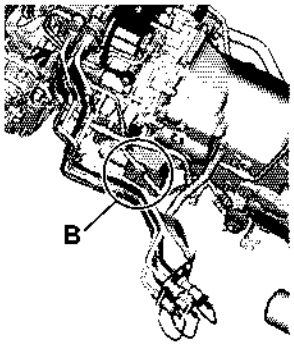
<Measurement and adjustment procedure>

1. Start the engine and run it at 2800 rpm.
2. Warm up the hydraulic oil temperature to 60°C.
3. Measure the Dual Speed Turn Valve pressure.
   Dual Speed Turn Valve Pressure: 9.8 ±0.1 MPa

NOTE

- If Port D show different value from Port B, something is wrong with 4WD/Dual Speed Turn Valve.

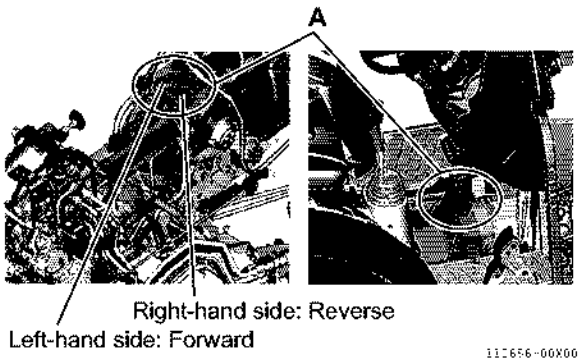
4. If the measured pressure is not as specified, use the Dual Speed Turn Valve (B) to adjust the pressure.



6. HST Main Circuit Pressure Test

<Pressure measurement>

1. Remove the dust covers on the tractor floor.
2. Remove the rubber grommet.
3. Set up the hydraulic gauge onto the test port C (A), located on the front top clutch housing (Rubber grommet) (Plug Size R1/4).



4. Lift up the rear wheels from the ground.
5. Disengage 4WD.
6. Apply parking brake.

<Measurement procedure>

1. Start the engine and run it at 2800 rpm.
2. Warm up the hydraulic oil temperature to 60°C.
3. Depress the forward/reverse pedal with load applied to HST motor.
4. Measure the HST Main Circuit pressure.

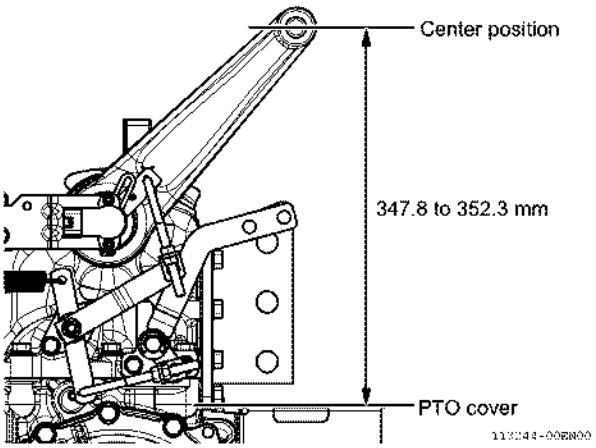
HST Main Circuit Pressure: 34.3 ±1.49 MPa

7. Adjusting the position feedback rod

1. Start the engine and put the 3-point hitch control lever into the maximum up position.
2. For the length of the position feedback rod, the height of the lift arm should be 347.8 to 352.3 mm above the top of the PTO cover.

NOTE

- Always measure the height after lowering the 3-point hitch control lever and then pushing it to the maximum up position.

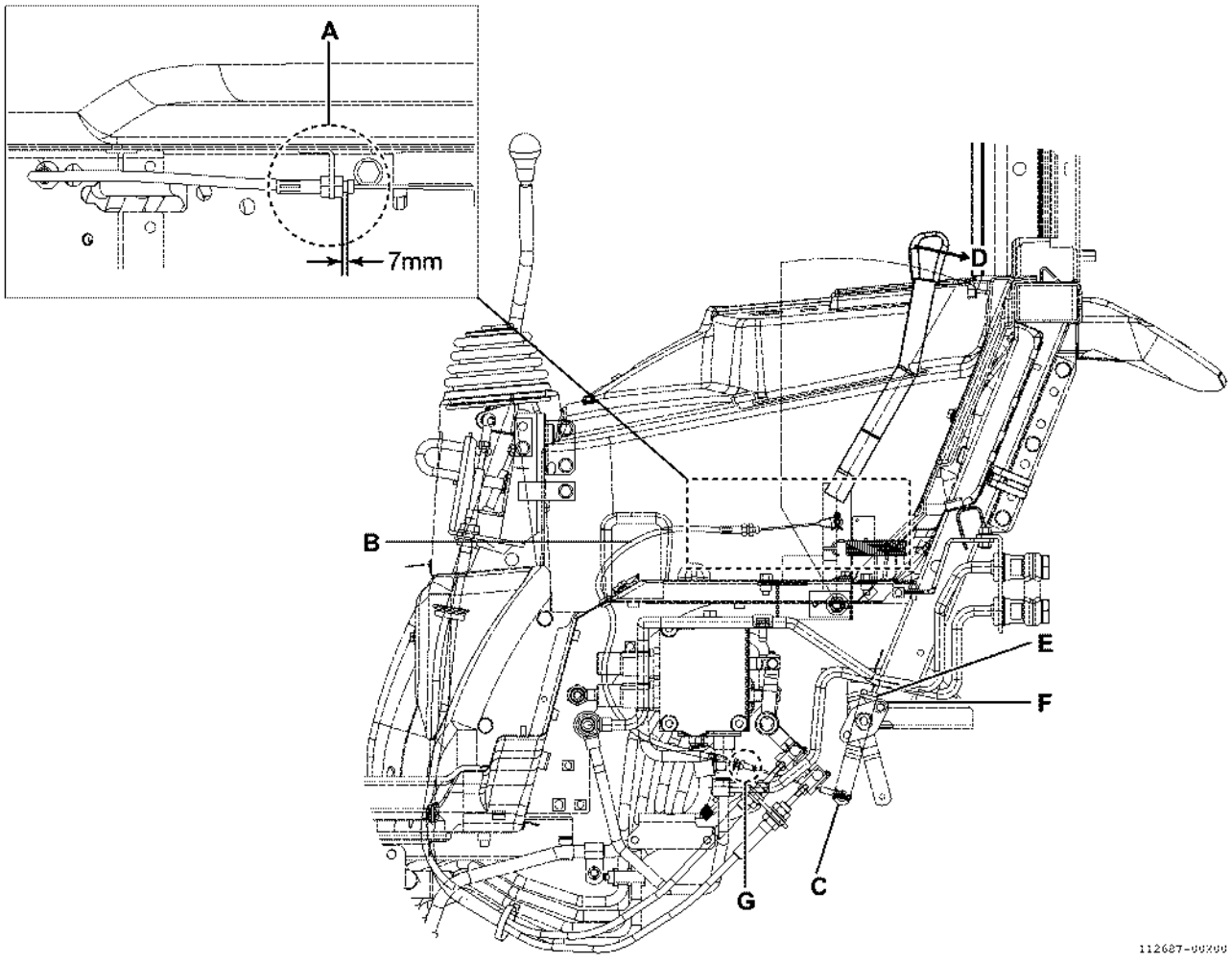


8. 3-point hitch control lever

Remove the right-rear tire for easier operation.

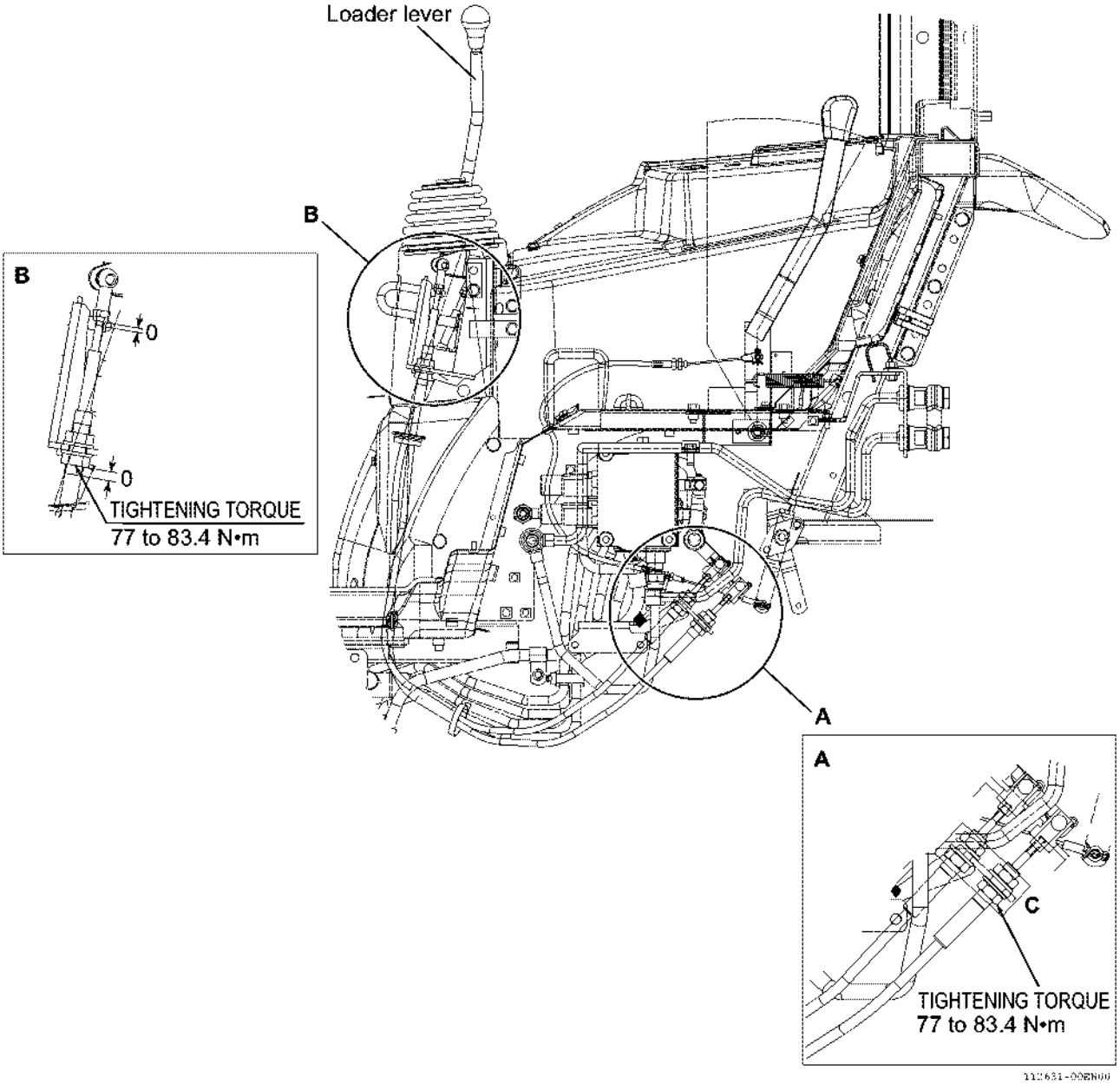
<Adjustment procedure>

1. Tighten the nut of the wire on the lever side as shown in A.
2. Mount the position wire (B) to the lift side of the arm (P lever) (C).
3. Set the 3-point hitch control lever to the maximum up position (D).
4. Move the arm (P lever) (E) until it touch the stopper (collar) (F).
5. Tighten the nut of the hydraulic lift wire (G). At this time, make no gap between the arm (P lever) (E) and the stopper (collar) (F).



9. Loader lever

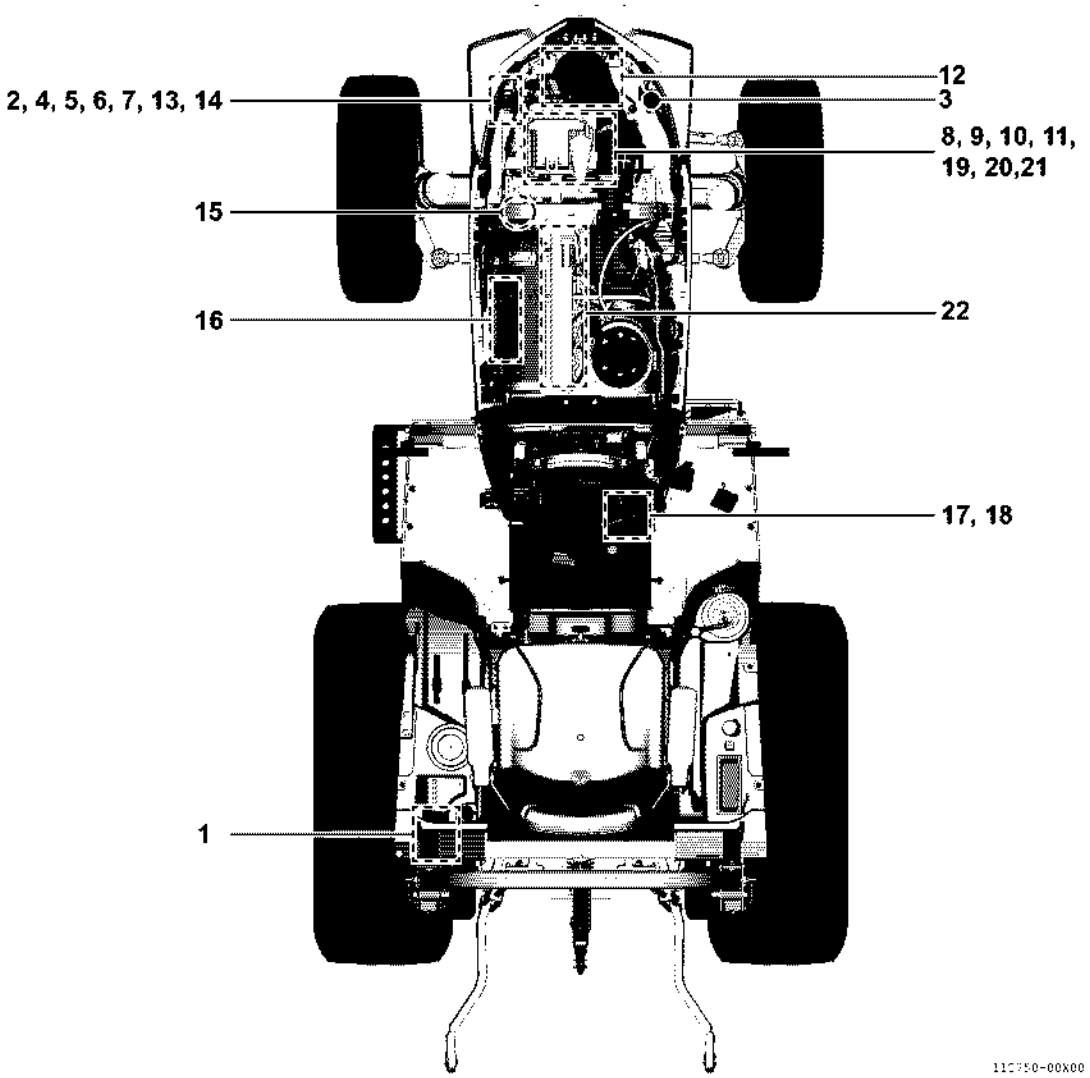
1. Adjust the wire to the dimensions of figure B. At this time, set the loader lever to the locked position.
2. Adjust C part to be able to lock the loader lever when set to the neutral position.



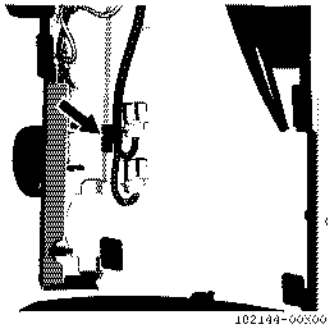
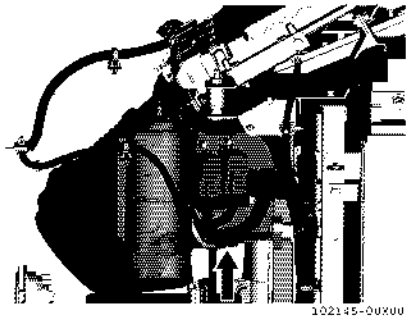
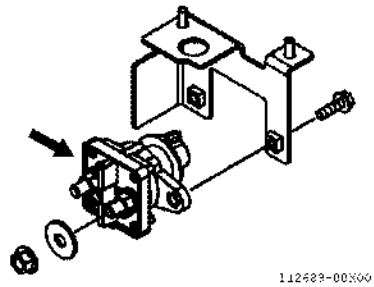
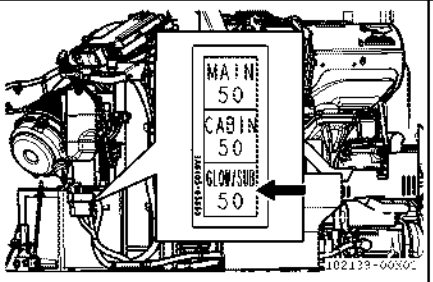
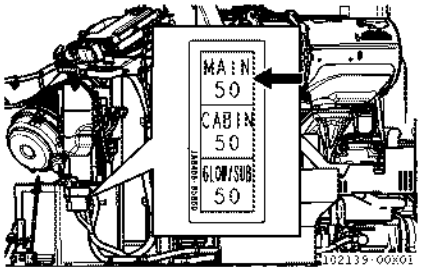
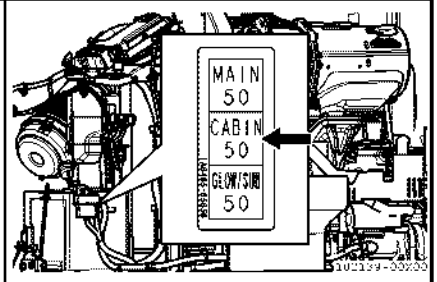
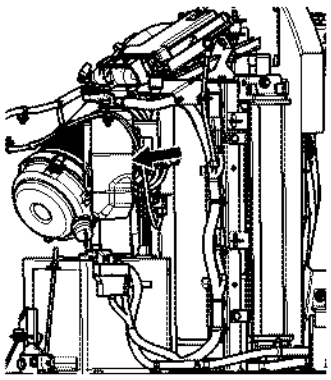
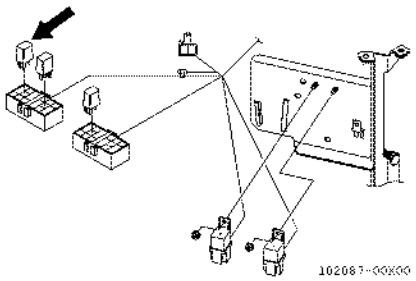
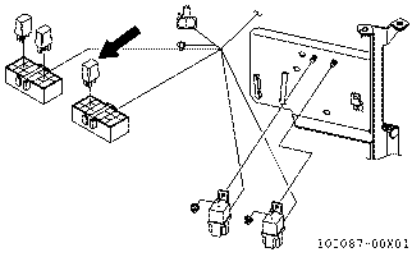
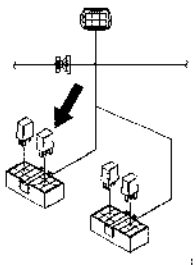
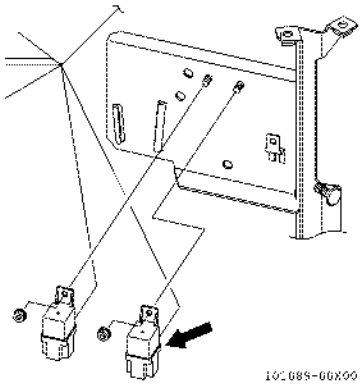
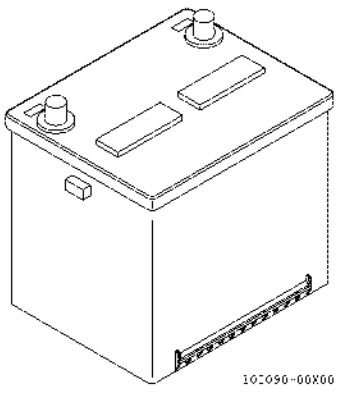
12. ELECTRONIC CONTROL COMPONENTS

1. Power and charging circuit

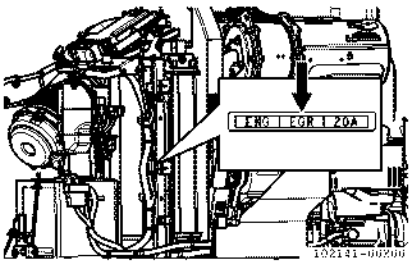
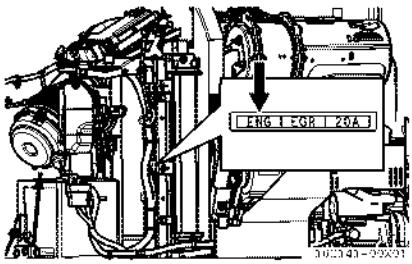
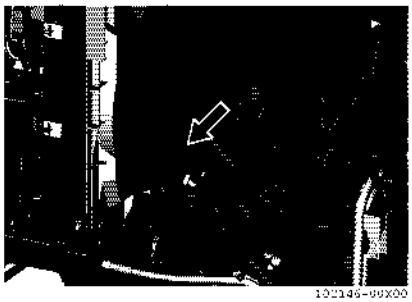
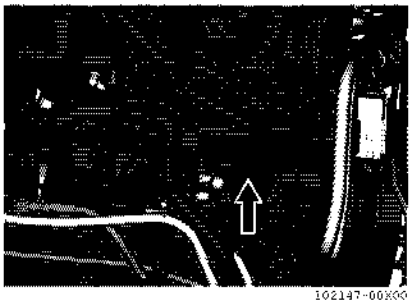
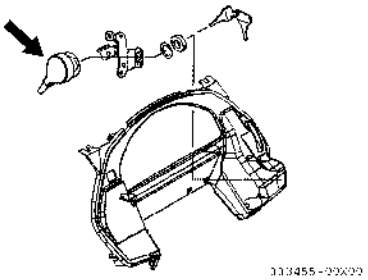
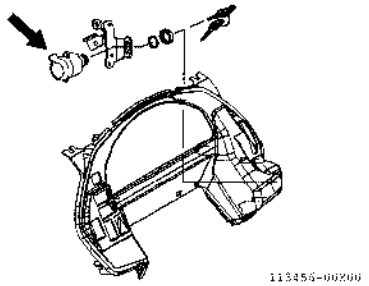
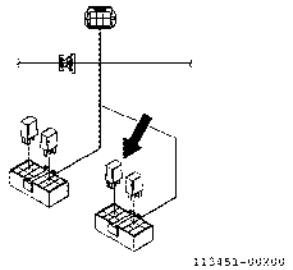
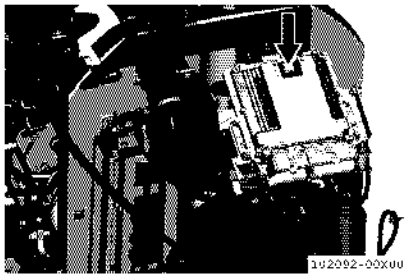
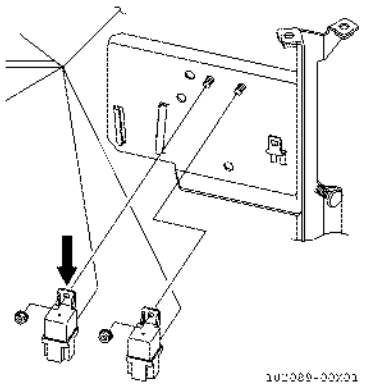
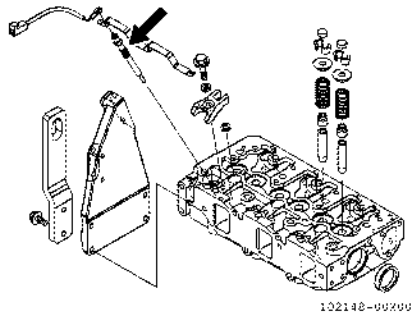
1. Positions and functions of the components
Common in CAB and ROPS



1 DIODE, CAB (For CAB)
2 DIODE, POWER RELAY
3 SW, BATTERY CUTOFF
4 SLOW BLOW FUSE, GLOW/SUB 50A (For Cabin only)
5 SLOW BLOW FUSE, MAIN 50A
6 SLOW BLOW FUSE, CABIN 50A
7 SLOW BLOW FUSE, CHARGE 80A
8 RELAY, LAMP (For CAB)
9 RELAY, MAIN (For CAB)
10 RELAY, CAB (For CAB)
11 RELAY, STARTER
12 BATTERY
13 FUSE, EGR
14 FUSE, ENGINE ECU
15 GENERATOR, 12V-55A
16 STARTER
17 KEY SWITCH (For ROPS)
18 KEY SWITCH (For CAB)
19 RELAY, BLOWER MAIN
20 ENGINE, CR ECU
21 RELAY, GLOW
22 GLOW PLUG×3 cylinders

1. DIODE, CAB (For CAB)	2. DIODE, POWER RELAY	3. SW, BATTERY CUTOFF
		
4. SLOW BLOW FUSE, GLOW/SUB	5. SLOW BLOW FUSE, MAIN	6. SLOWBLOW FUSE, CABIN
		
7. SLOW BLOW FUSE, CHARGE	8 RELAY, LAMP (For CAB)	9. RELAY, MAIN (For CAB)
		
10. RELAY, CAB (For CAB)	11. RELAY, STARTER	12. BATTERY
		

12

13. FUSE, EGR	14. FUSE, ENGINE ECU	15. GENERATOR, 12V-55A
		
16. STARTER	**17. KEY SWITCH (For ROPS)**	**18. KEY SWITCH (For CAB)**
		
19. RELAY, BLOWER MAIN	**20. ENGINE CR ECU**	**21. RELAY, GLOW**
		
22. GLOW PLUG×3 cylinders		
		

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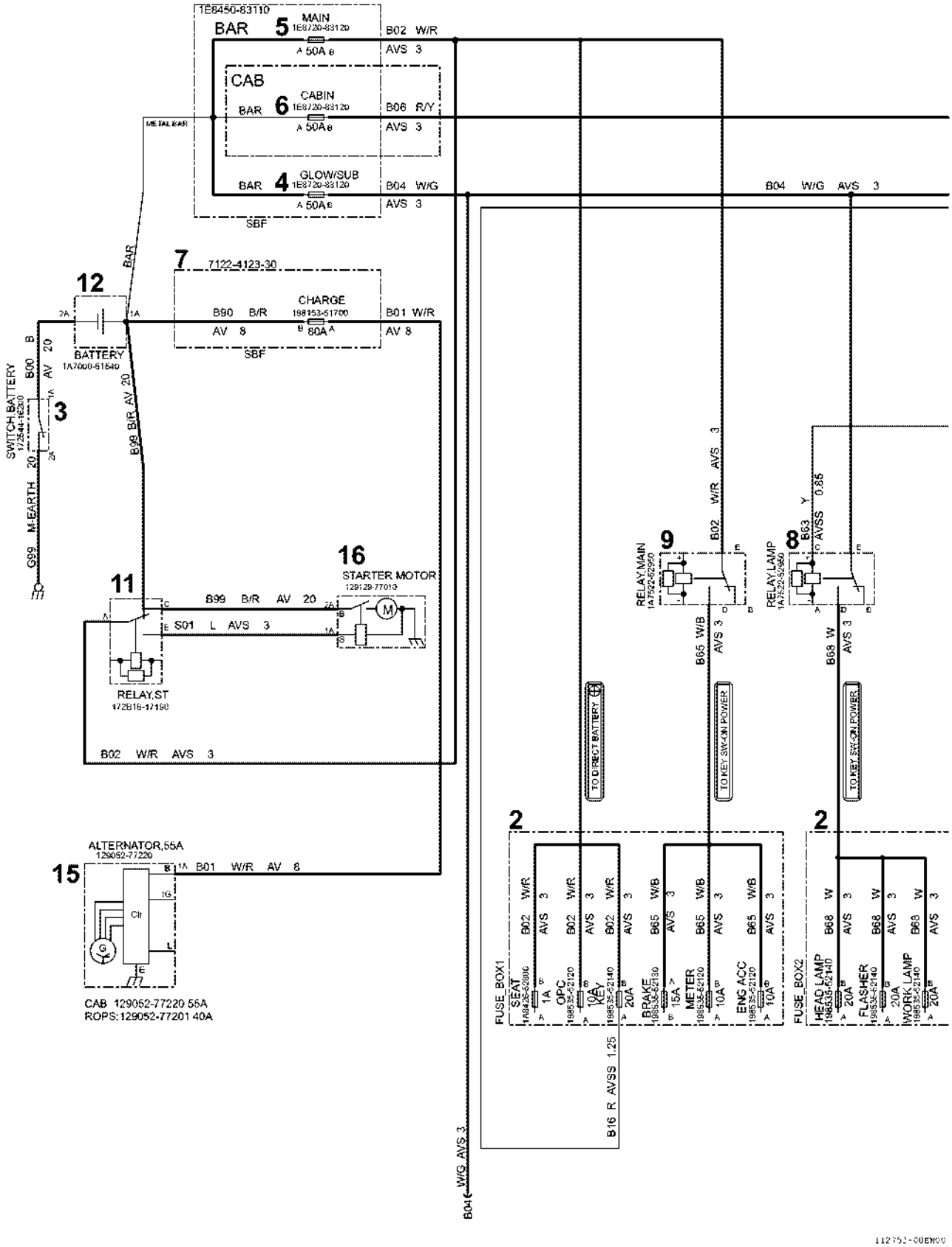
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Left rear of cabin	1	DIODE, CAB (For CAB)	DIODE, CAB RELAY (For CAB) 1E8235-84910	Prevents backflow of current to the relay (CAB). (prevents connecting the battery in opposite direction)
Engine front	2	DIODE, POWER RELAY	DIODE, POWER RELAY 1E8235-84910	Prevents backflow of current to the relay (MAIN). (prevents connecting the battery in opposite direction)
Engine front	3	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Engine front	4	SLOW BLOW FUSE, GLOW/SUB	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Engine front	5	SLOW BLOW FUSE, MAIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Engine front	6	SLOW BLOW FUSE, CABIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Engine front	7	SLOW BLOW FUSE, CHARGE	FUSE, 80A 198153-51700	Protects each electric circuit.
Engine front	8	RELAY, LAMP (For CAB)	RELAY (MAIN (For CAB) 1A7522-52950	Supplies power to the security circuit.
Engine front	9	RELAY, MAIN (For CAB)	RELAY (MAIN (For CAB) 1A7522-52950	Supplies power to all circuits.
Engine front	10	RELAY, CAB (For CAB)	RELAY, CAB (For CAB) 1A7522-52950	Supplies power to the CAB circuit.
Engine front	11	RELAY, STARTER	RELAY, ST 172B16-17190	Supplies power to the starter.
Engine front	12	BATTERY	BATTERY, 80D26R 1A7000-51540	Supplies 12V power.
Engine front	13	FUSE, EGR	FUSE, 20A 198535-52140	Protects the EGR circuit.
Engine front	14	FUSE, ENGINE ECU	FUSE, 20A 198535-52140	Protects the engine circuit.
Engine left	15	GENERATOR, 12V-55A	ALTERNATOR, 55A 129052-77220	Generates power while running the engine. Stores electricity to the battery.
Engine left	16	STARTER	STARTER MOTOR 129407-77010	Operates with the key switch “ST,” the reverser lever “N,” and the PTO lever “N.”
Steering column right	17	KEY SWITCH (For ROPS)	KEY SWITCH ASSY (For ROPS) 198162-52110	Switches between ON and OFF of the battery power to each circuit.
Steering column right	18	KEY SWITCH (For CAB)	KEY SWITCH CMP (For CAB) 1A7850-52110	Switches between ON and OFF of the battery power to each circuit.
Engine front	19	RELAY, BLOWER MAIN	RELAY, BLOWER MAIN 1A7522-52950	Supplies power to the blower.

Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Engine front	20	ENGINE, CR ECU	CR ECU 1R1797-00101-3cyl	Communicates signal with each sensor and actuators to control the common rail engine.
Engine front	21	RELAY, GLOW	RWLAY, GLOW 172816-17190	Supplies power to the glow circuit.
Engine front	22	GLOW PLUG×3 cylinders	GLOW PLUG 129008-77800	Improves cold-start performance to pass current in the cold situation.

*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

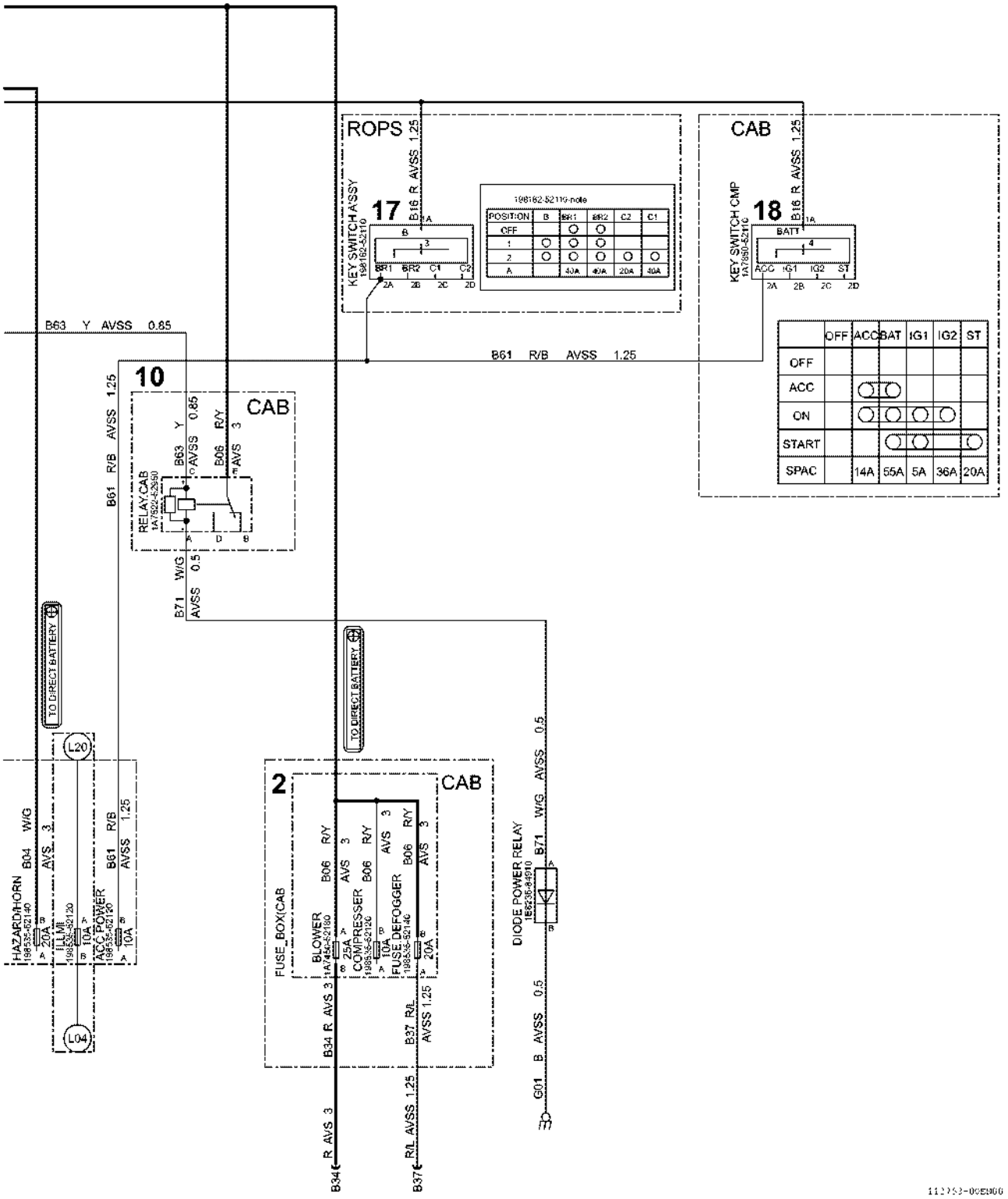
*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram
(Rops spec Only)

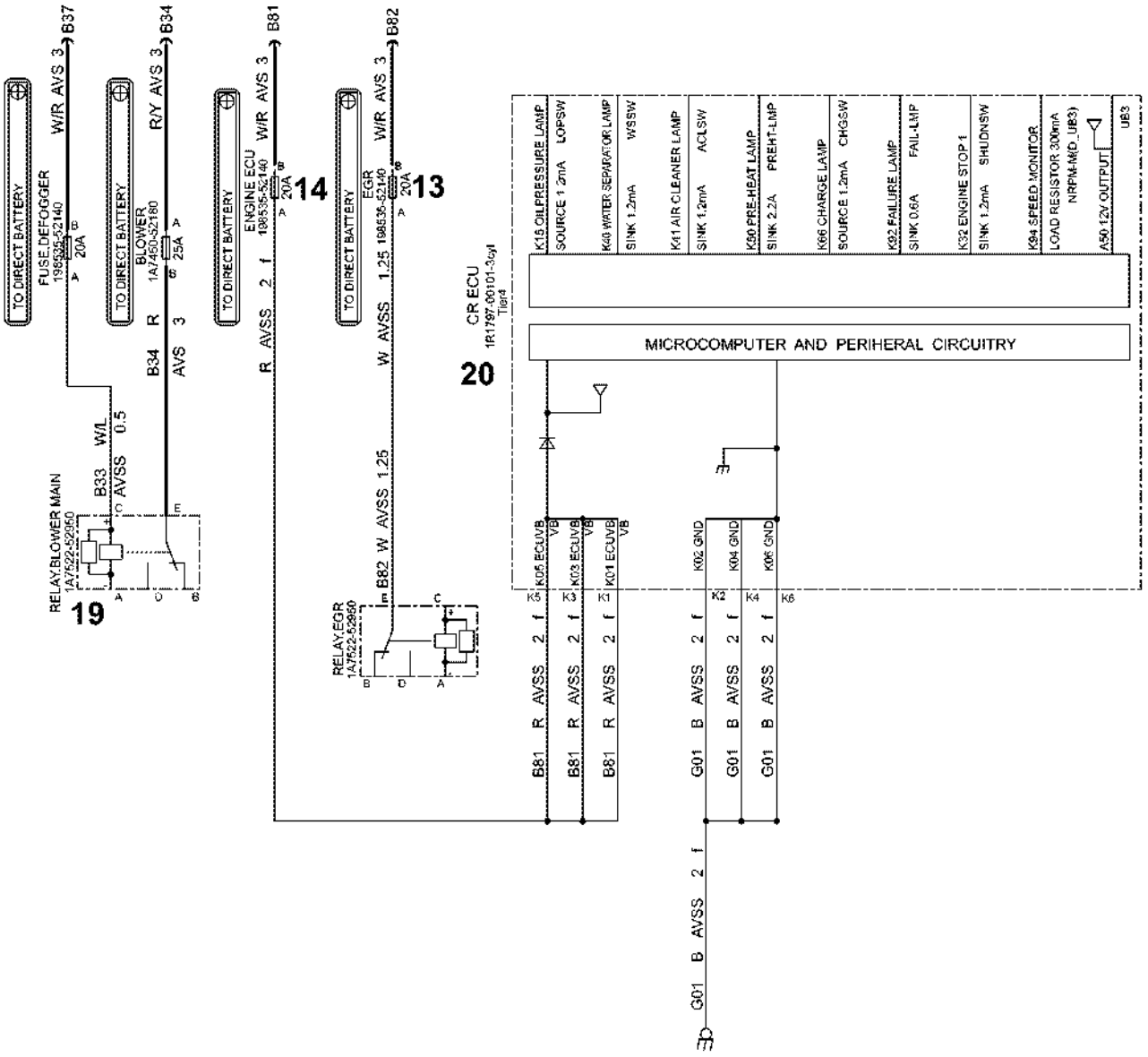


112752-00EN00

(Cab spec Only)



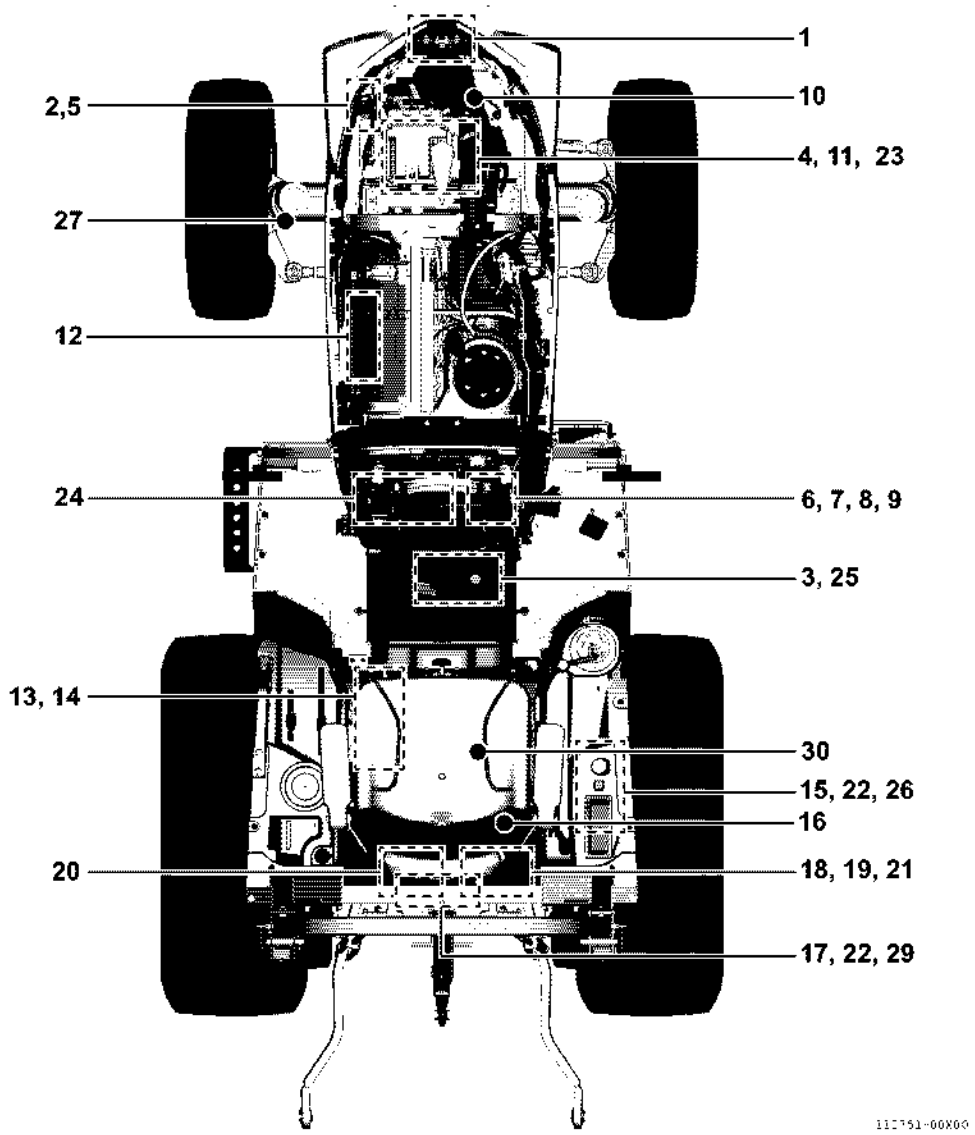
(Rops and Cab spec)



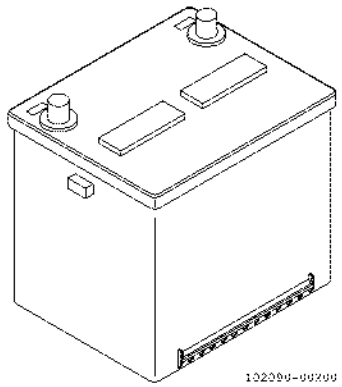
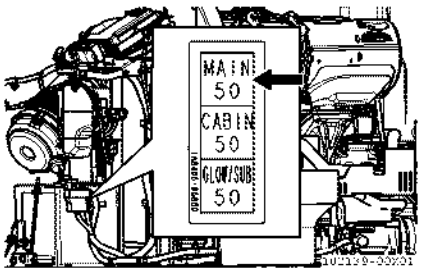
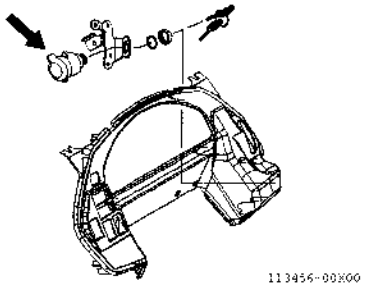
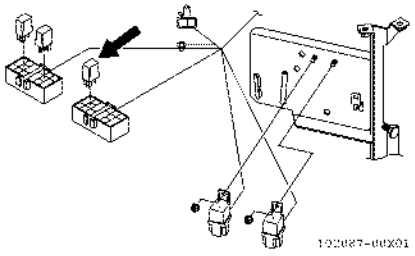
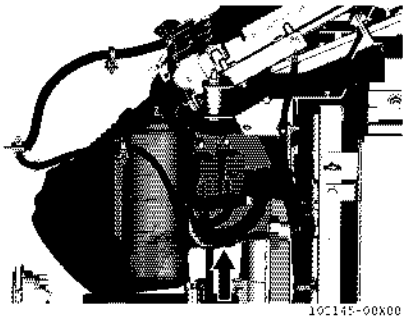
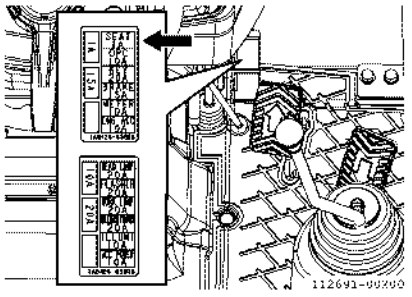
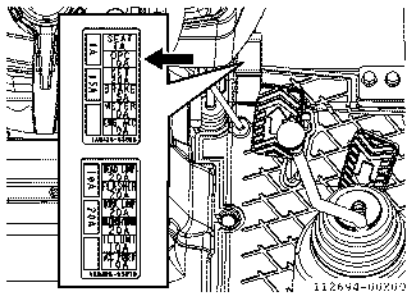
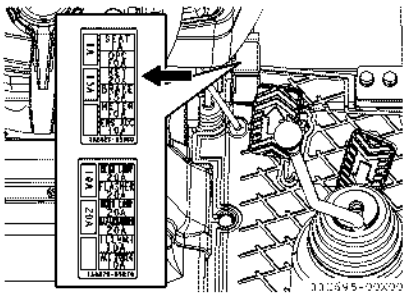
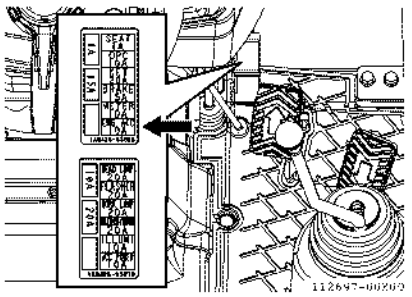
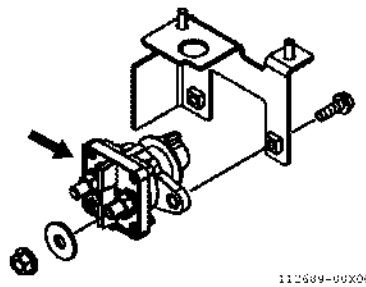
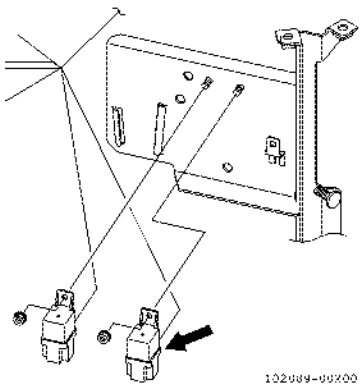
11275-1-06E000

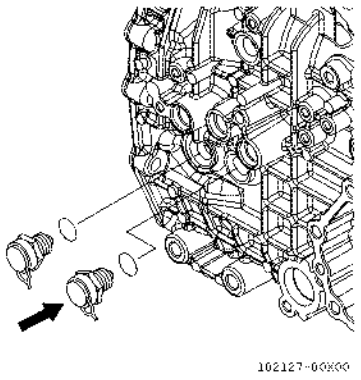
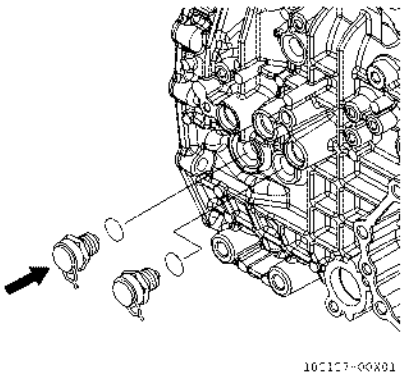
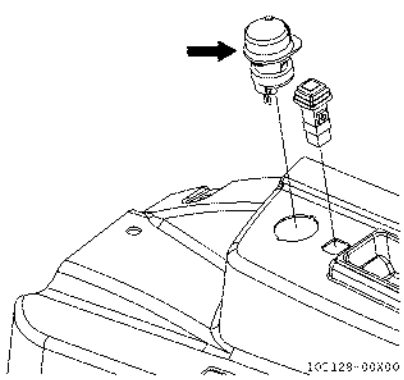
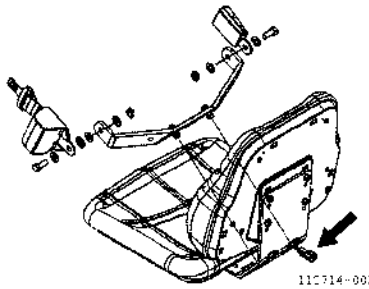
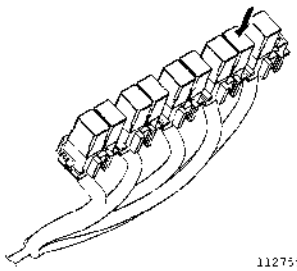
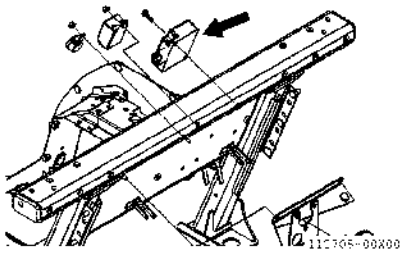
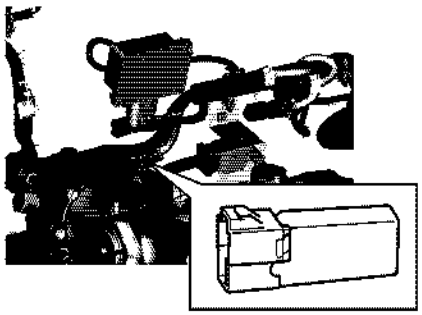
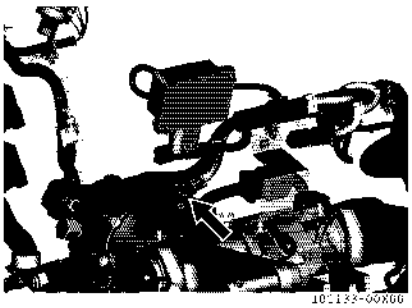
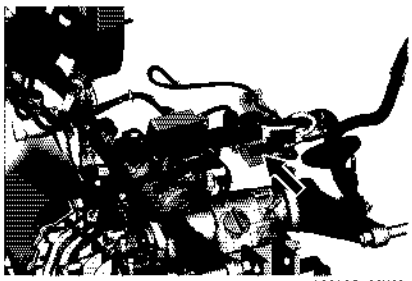
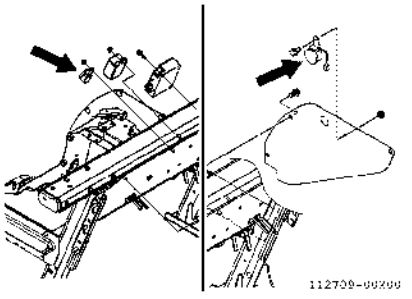
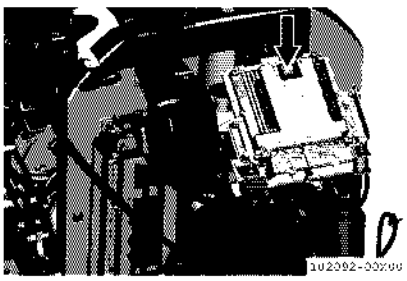
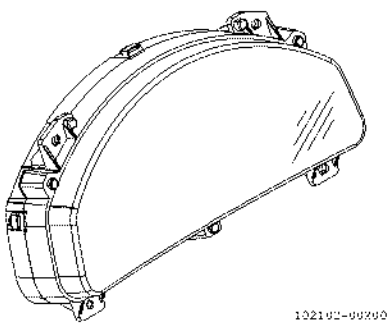
2. Engine Start/Stop Circuit

1. Positons and functions of the components

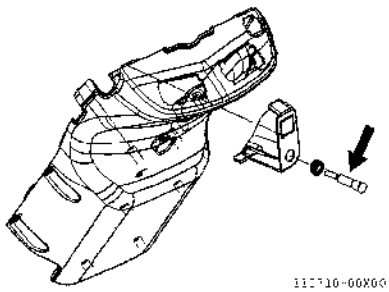
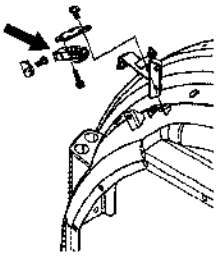
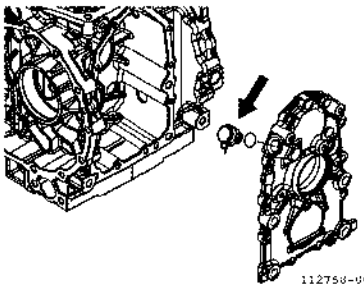
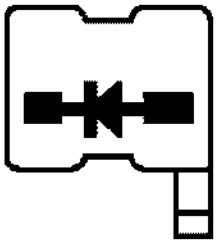
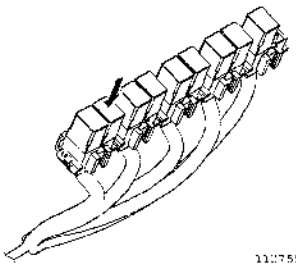
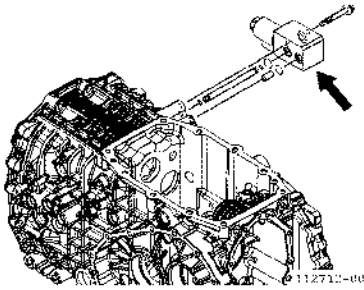


1.BATTELY
2.SLOW BLOW FUSE, MAIN 50A
3.KEY SWITCH
4.RELAY, MAIN
5.DIODE, POWER RELAY
6.FUSE, SEAT 1A
7.FUSE, OPC 10A
8.FUSE, KEY 20A
9.FUSE, ENG ACC 10A
10.SW, BATTERY CUTOFF
11.RELAY, STARTER
12.STARTER
13.SW, SUB GEAR REAR
14.SW, SUB GEAR FRONT
15.SW, PTO
16.SW, SEAT
17.RELAY, OPC
18.UNIT, OPC
19.RESISTOR, REVERSER-N SW
20.RESISTOR, PTO SW
21.RESISTER,PARKING-SW
22.BUZZER, ALEAT
23.ENGINE, CR ECU
24.METER
25.LED, ALERT
26.SWITCH, LIFT LOWER LIMIT
27.SWITCH, MID/BOTH-PTO
28.DIODE, OPC UNIT
29.RELAY, SUB GEAR
30.VALE, PTO

1. BATTERY	2. SLOW BLOW FUSE, MAIN	3. KEY SWITCH
		
4. RELAY, MAIN	**5. DIODE, POWER RELAY**	**6. FUSE, SEAT 1A**
		
7. FUSE, OPC 10A	**8. FUSE, KEY 20A**	**9. FUSE, ENG ACC 10A**
		
10. SW, BATTERY CUTOFF	**11. RELAY, STARTER**	**12. STARTER**
		

13. SW, SUB GEAR REAR	14. SW, SUB GEAR FRONT	15. SW, PTO
		
16. SW, SEAT	17. RELAY, OPC	18. UNIT, OPC
		
19. RESISTOR, REVERSER-N SW	20. RESISTOR, PTO SW	21. RESISTER, PARKING-SW
		
22. BUZZER, ALEAT	23. ENGINE, CR ECU	24. METER
		

12

25. LED, ALERT	26. SWITCH, LIFT LOWER LIMIT	27. SWITCH, MID/BOTH-PTO
		
28. DIODE, OPC UNIT	29. RELAY, SUB GEAR	30. VALE, PTO
 The diode is fixed to the harness with tape.		

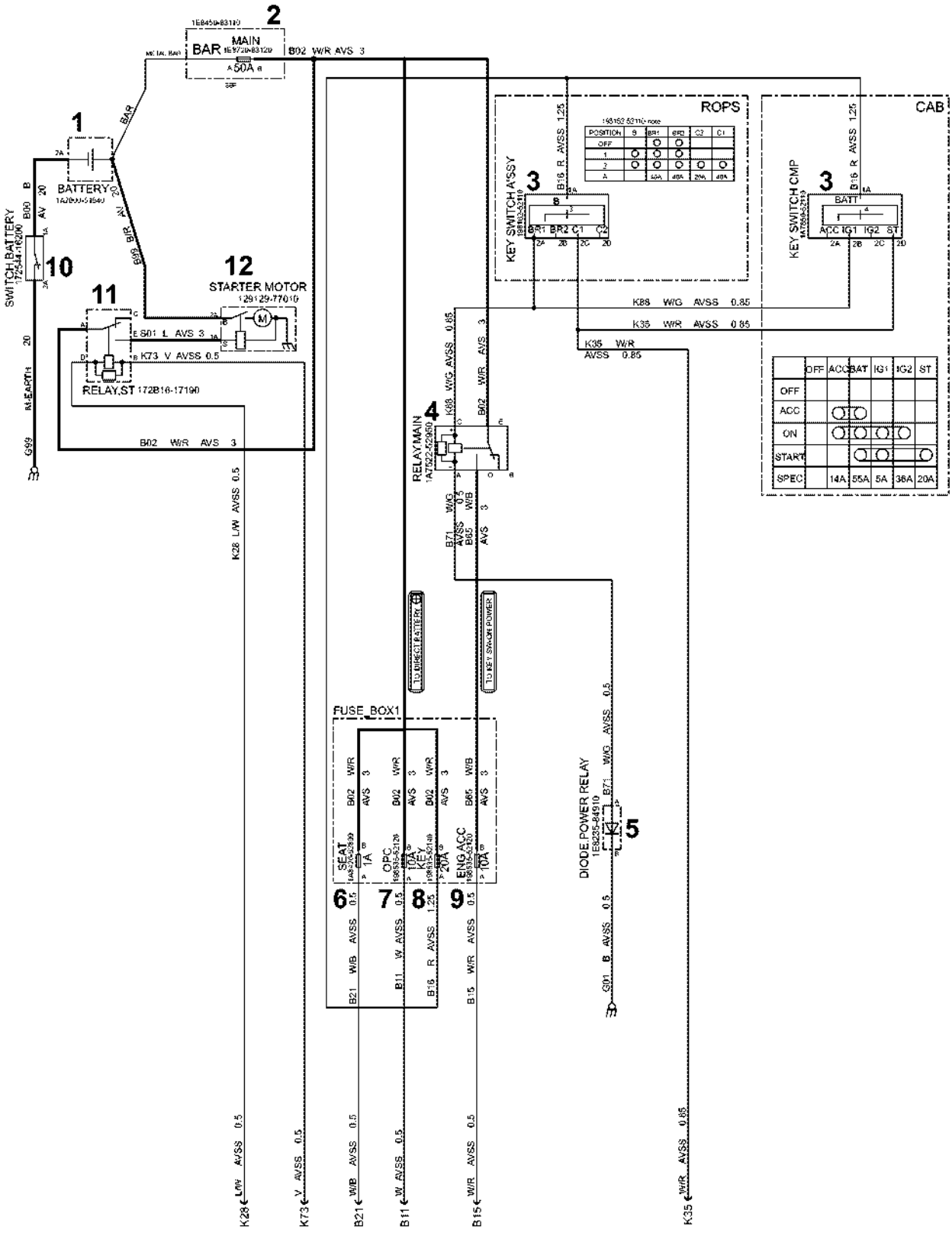
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Engine front	1	BATTERY	Battery 80D26R 1A7000-51540	Supplies 12V power.
Engine front	2	SLOW BLOW FUSE, MAIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Steering column right	3	KEY SWITCH	KEY SWITCH ASSY (For ROPS) 198162-52110 KEY SWITCH CMP (For CAB) 1A7850-52110]	Switches between ON and OFF of the battery power to each circuit.
Engine front	4	RELAY, MAIN	RELAY (MAIN (For CAB) 1A7522-52950	Supplies power to all circuit.
Engine front	5	DIODE, POWER RELAY	DIODE POWER RELAY 1E8235-84910	Prevents connecting the battery in opposite direction
Steering column right	6	FUSE, SEAT 1A	FUSE, SEAT 1A 1A8426-52800	Protects each electric circuit.
Steering column right	7	FUSE, OPC 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Steering column right	8	FUSE, KEY 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Engine front	9	FUSE, ENG ACC 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Engine front	10	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Engine front	11	STARTER, RELAY	RELAY, ST 172B16-17190	Supplies power to the starter.
Engine left	12	STARTER	STARTER MOTOR 129407-77010	Operates with the key switch “ST,” the reverser lever “N,” and the PTO lever “N.” Performs engine cranking.
Transmission left	13	SW, SUB GEAR REAR	SWITCH, SUB GEAR REAR 198269-52190	Detects “N” of the sub gear rear.
Transmission left	14	SW, SUB GEAR FRONT	SWITCH, SUB GEAR FRONT 198269-52190	Detects “N” of the sub gear front.
Right side of seat	15	SW, PTO	PTO-SW 1A7340-52290	Switches on and off of the PTO.
Under the Seat	16	SW, SEAT	SWITCH, SEAT 1A8426-52300	Detects that the operator is seated in the driver’s seat. The engine cannot start when no driver is seated.
Back side seat	17	RELAY, OPC	RELAY, OPC 1A7522-52950	Supplies power to the OPC system.
Back side seat	18	UNIT, OPC	UNIT, OPC 1A8476-57103	Outputs according to the input signal from each switch.

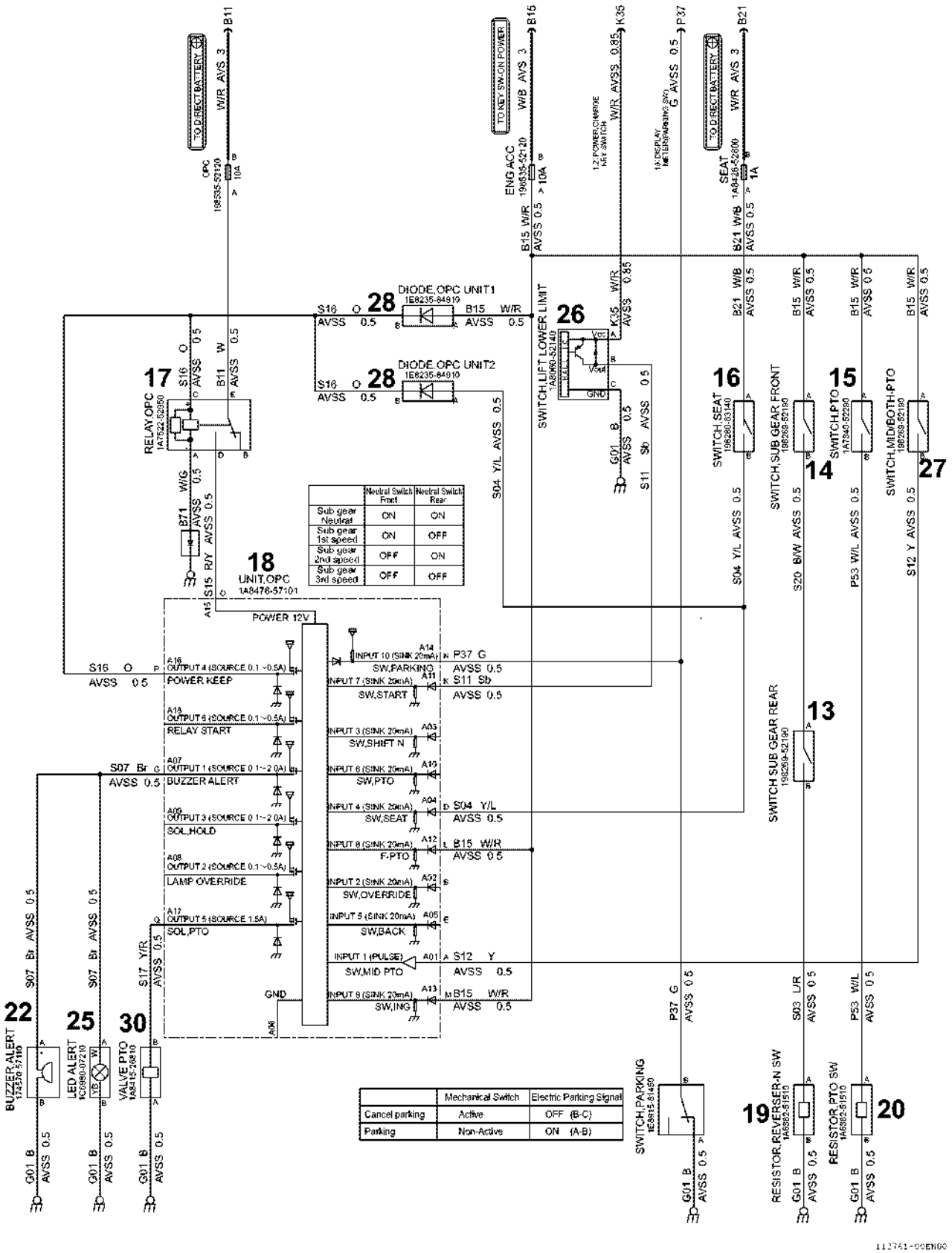
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Back side seat	19	RESISTOR, REVERSER-N SW	RESISTOR-N, SW 1A6382-51510	Adjusts the voltage difference between each circuit.
Rear of cabin	20	RESISTOR, PTO SW	RESISTOR, PTO SW 1A6382-51510	Adjusts the voltage difference between each circuit.
Rear of cabin	21	RESISTER, PARKING-SW	RESISTER, PARKING-SW 1A6382-51510	Stabilizes the parking switch signal input to the relay unit.
Engine front	22	BUZZER, ALEAT	BUZZER, ALEAT 174570-57110	Stabilizes the signal between the engine control unit and relay unit.
Engine front	23	ENGINE, CR ECU	CR ECU 1R1797-00101-3cyl	Communicates signal with each sensor and actuators to control the common rail engine.
Inside the steering column	24	METER	METER ASSY, COMBINATION 1A8405-56900	Indicates various information and alarm messages.
Steering column	25	LED, ALERT	LAMP, PILOT LED 1C6980-07210	The alarm is activated after the operator leaves the seat and the park brake is not applied.
Right side of seat	26	SWITCH, LIFT LOWER LIMIT	SWITCH, INTERLOCK 1A8060-52140	It turns "ON" when the magnet of the switch detects iron.
Transmission left	27	SWITCH, MID/BOTH-PTO	SWITCH, SAFETY 198269-52190	Detects the movement of the shift arm and switches the circuit.
Back side seat	28	DIODE, OPC UNIT	DIODE, OPC UNIT 1E8235-84910	Prevents connecting the battery in opposite direction
Back side seat	29	RELAY, SUB GEAR	RELAY, SUB GEAR 1A7522-52950	Supplies power to the sub gear circuit.
Transmission right	30	VALVE, PTO	VALVE ASSY, PTO 1A8415-26810	When receiving the current signal,move the spool with the solenoid valve and switch the PTO hydraulic circuit.

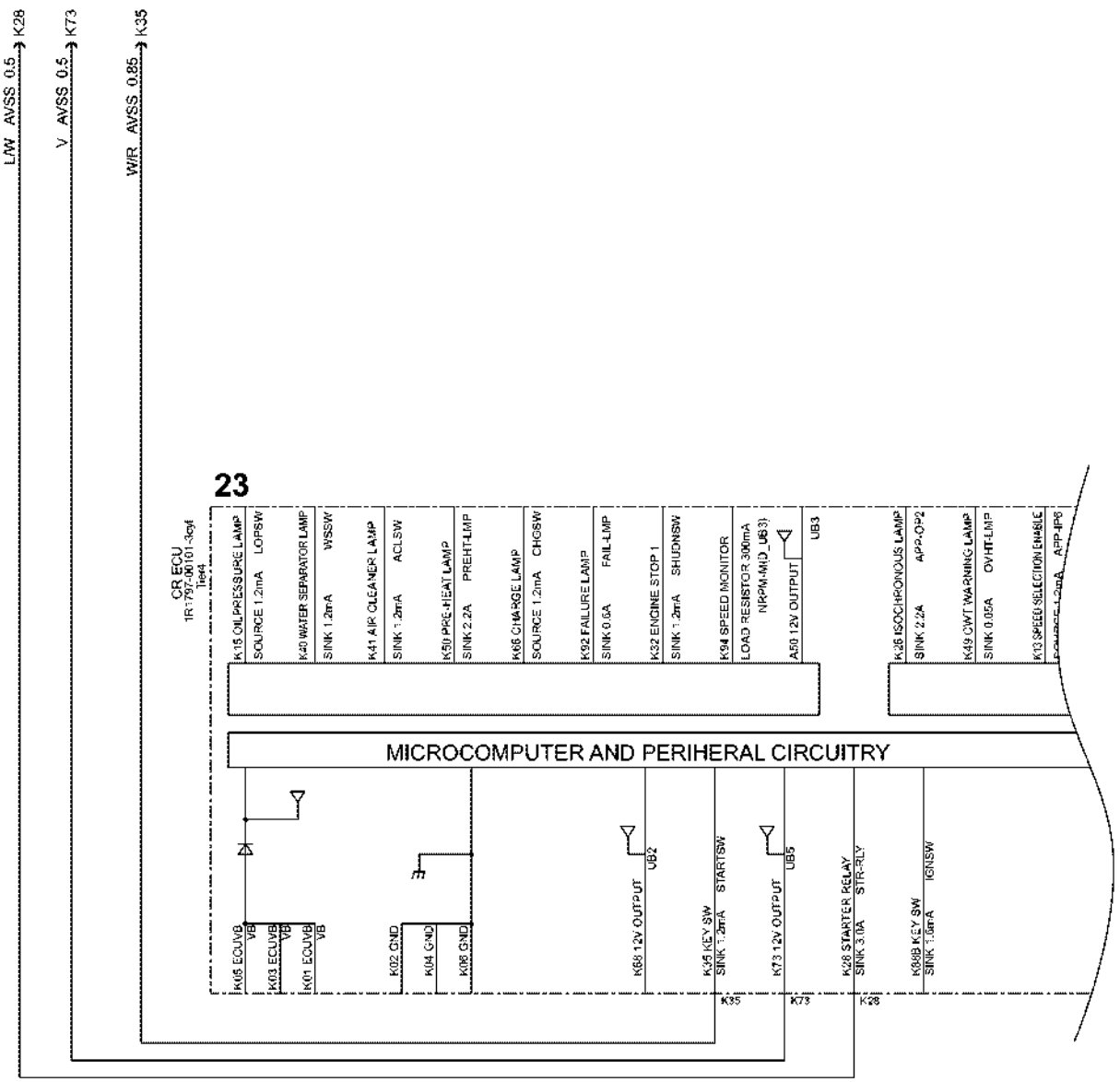
*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram

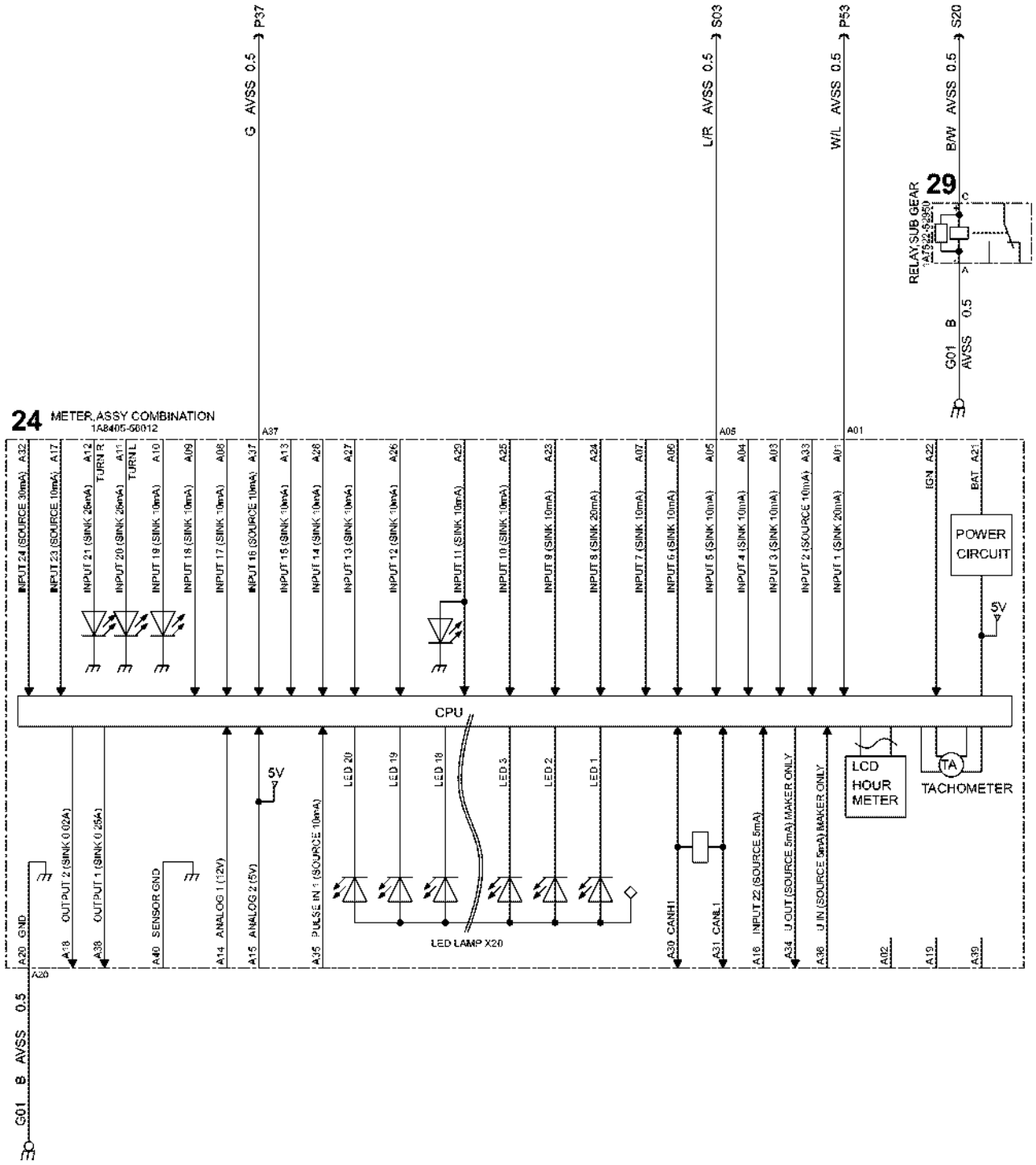



TO DIRECT BATTERY
TO KEY SW-ON POWER
ENG ACC
SEAT
DIODE,OPC UNIT1
DIODE,OPC UNIT2
SWITCH,LIFT LOWER LIMIT
RELAY,OPC
UNIT,OPC
POWER 12V
POWER KEEP
RELAY START
BUZZER ALERT
SOL,HOLD
LAMP OVERRIDE
SOL,PTO
SW,PARKING
SW,START
SW,SHIFT N
SW,PTO
SW,SEAT
F-PTO
SW,OVERRIDE
SW,BACK
SW,MID PTO
SW,ING
SWITCH,SEAT
SWITCH,SUB GEAR FRONT
SWITCH,PTO
SWITCH,MID/BOTH-PTO
SWITCH SUB GEAR REAR
SWITCH,PARKING
RESISTOR,REVERSER-N SW
RESISTOR,PTO SW
BUZZER ALERT
LED ALERT
VALVE PTO
Neutral Switch Front
Neutral Switch Rear
Sub gear Neutral
Sub gear 1st speed
Sub gear 2nd speed
Sub gear 3rd speed
Mechanical Switch
Electric Parking Signal
Cancel parking
Parking
Active
Non-Active
OFF (B-C)
ON (A-B)



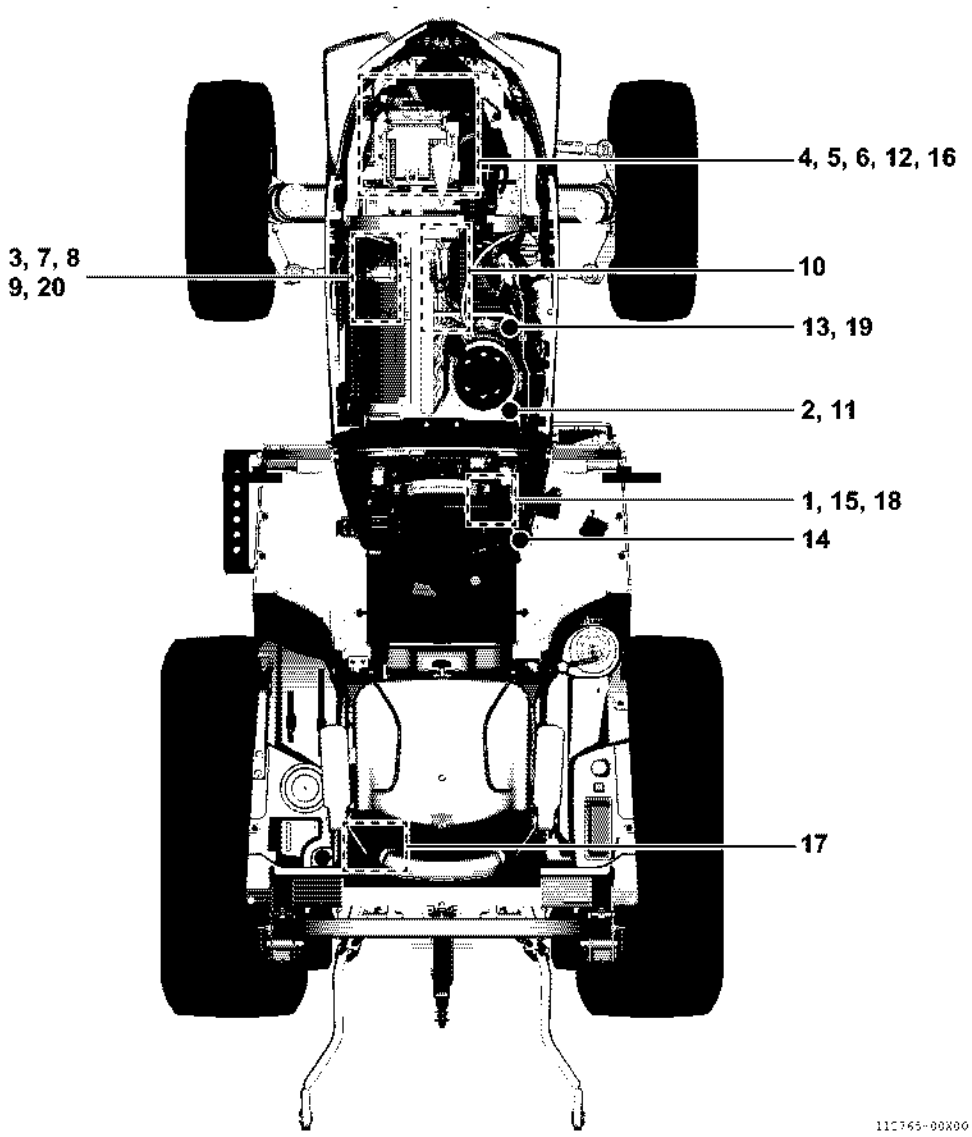
112762-00EN00

12

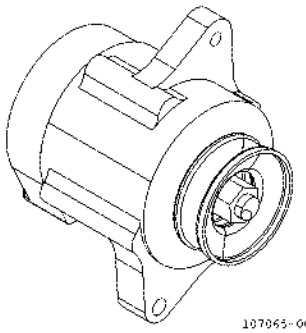
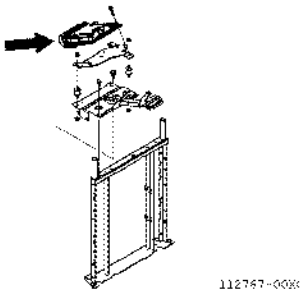
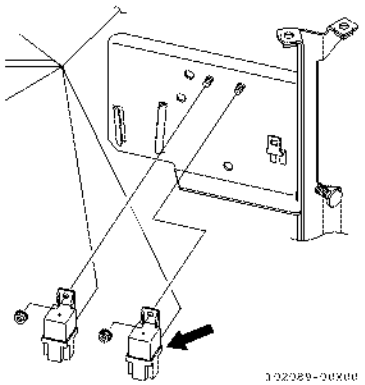
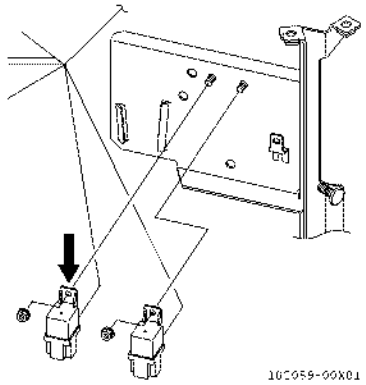
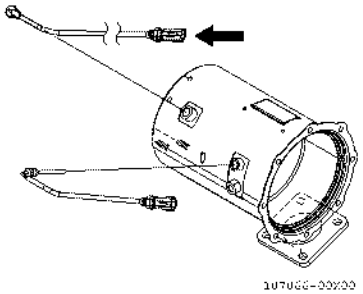
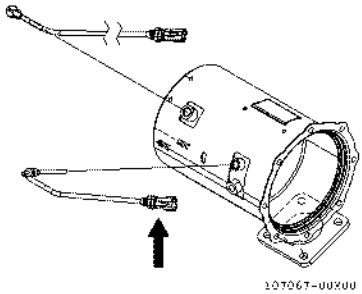
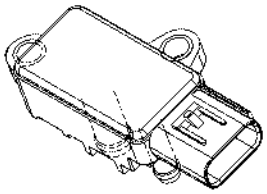
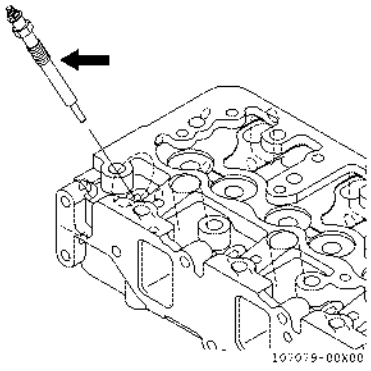
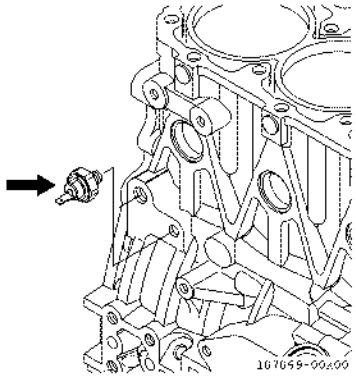
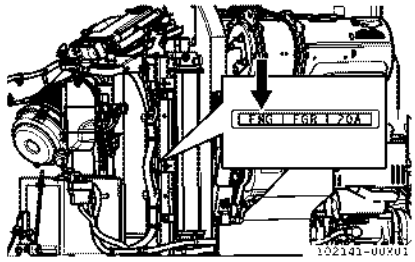
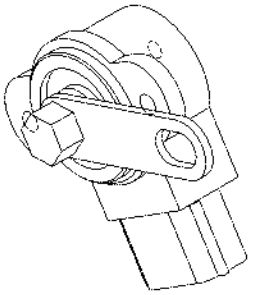
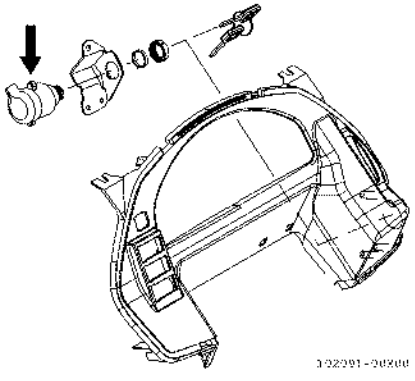

24 METER, ASSY COMBINATION
1A8405-68012
G AVSS 0.5
L/R AVSS 0.5
W/L AVSS 0.5
B/W AVSS 0.5
29
RELAY, SUB GEAR
G01 B AVSS 0.5
CPU
POWER CIRCUIT
5V
LCD HOUR METER
TACHOMETER
LED LAMP X20
GND
SENSOR GND
CANH1
CANL1

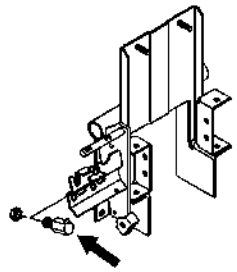
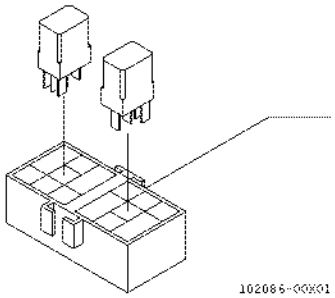
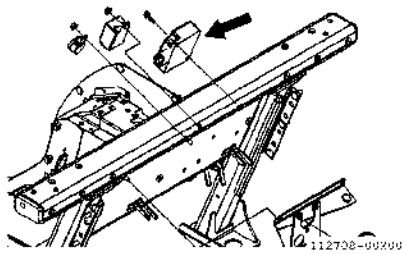
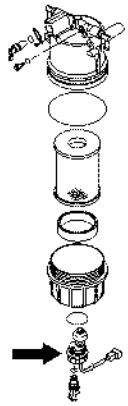
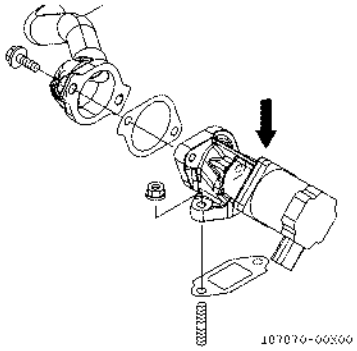
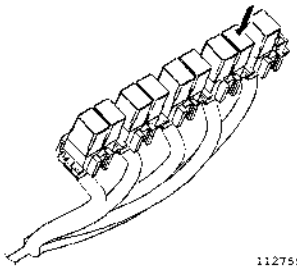
3. Engine circuit

1. Positions and functions of the components



1 RESISTA, F-PTO
2 RESISTA, OIL SW (120
3 GENERATOR (12V-55A
4 CR ECU
5 RELAY, GLOW
6 RELAY, STARTER
7 SENSOR, DPF INLET TEMP
8 SENSOR, DPF INSIDE TEMP
9 SENSOR, DPF DIFF PRESSURE
10 GLOW PLUG×3 cylinders
11 SW, OIL PRESSURE
12 FUSE, ENGINE ECU
13 SENSOR, ACCEL
14 KEY SWITCH (For ROPS)
15 SWITCH, BRAKE PEDAL (L,R)
16 RELAY, EGR VALVE
17 UNIT, OPC
18 SA-D CONNECTOR
19 SW, WATER SEPARATOR
20 EGR
21 RELAY, OPC

3. GENERATOR (12V-55A	4. CR ECU	5. RELAY, GLOW
		
6. RELAY, STARTER	7 SENSOR, DPF INLET TEMP	8. SENSOR, DPF INSIDE TEMP
		
9. SENSOR, DPF DIFF PRESSURE	10. GLOW PLUG×3 cylinders	11. SW, OIL PRESSURE
		
12. FUSE, ENGINE ECU	13. SENSOR, ACCEL	14. KEY SWITCH (For ROPS)
		

15. SWITCH, BRAKE PEDAL	16. RELAY, EGR VALVE	17. UNIT, OPC
		
19. SW, WATER SEPARATOR	20. EGR	21. RELAY, OPC
		

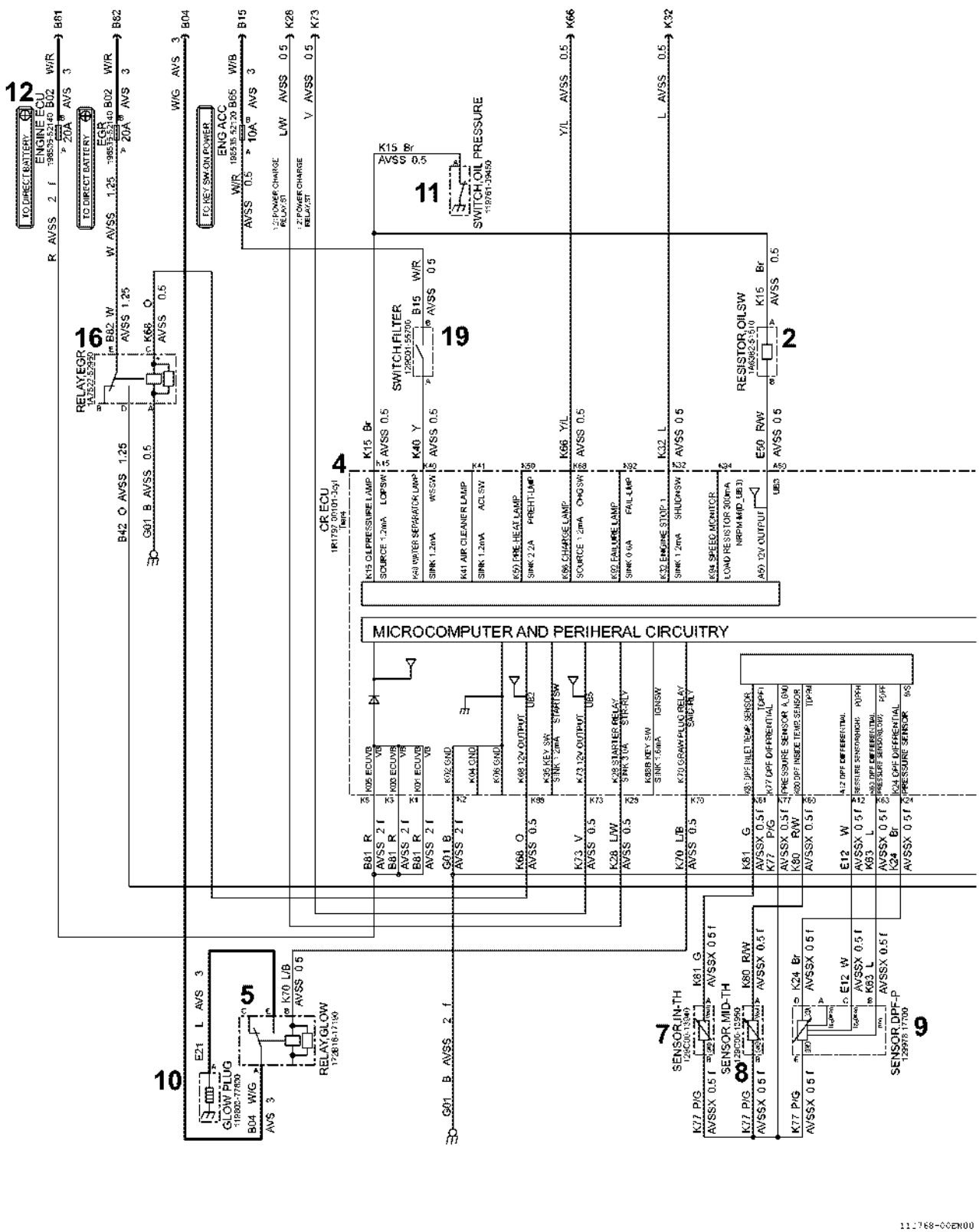
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Steering column right	1	RESISTA, F-PTO	RESISTA, F-PTO 1A6382-51510	Adjusts the voltage difference between each circuit.
Engine front	2	RESISTA, OIL SW (120	REGISTER, OIL SW 1A6382-51510	Adjusts the voltage difference between each circuit.
Engine left	3	GENERATOR (12V-55A	ALTERNATOR, 55A 129052-77220	Generates power while running the engine. Stores electricity to the battery.
Engine front	4	CR ECU	CR ECU 1R1797-00101-3cyl	Communicates signal with each sensor and actuators to control the common rail engine.
Engine front	5	RELAY, GLOW	RELAY, GLOW 172B16-17190	Operates the suction side coil of the fuel cut solenoid to inject fuel from the fuel feed pump when engine starts.
Engine front	6	RELAY, STARTER	RELAY (ACM13221M19 172B16-17190	Supplies power to the starter.
DPF	7	SENSOR, DPF INLET TEMP	SENSOR, IN-TH 129C00-13940	Measure the exhaust temperature at the inlet of the exhaust filter.
DPF	8	SENSOR, DPF INSIDE TEMP	SENSOR, MID-TH 129C00-13950	Measure the exhaust temperature inside the exhaust filter.
Engine upper	9	SENSOR, DPF DIFF PRESSURE	SENSOR, DPF-P 129978-17700	Measure the exhaust pressure inside the exhaust filter.
Engine upper	10	GLOW PLUG× 3 cylinders	GLOW PLUG 129A00-77820	Electric heater placed in the combustion chamber to improve engine starting performance by rising the temperature of gas that has been compressed.
Engine right	11	SW, OIL PRESSURE	OIL PRESSURE SW 119761-39450	Makes the engine oil lamp blink when the engine oil pressure become lower level.
Engine front	12	FUSE, ENGINE ECU	FUSE, 20A 198535-52140	Protects each electric circuit.
Steering column right	13	SENSOR, ACCEL	SENSOR, ACC 1A8060-55600	Detects the position of the accelerator level.
Steering column right	14	KEY SWITCH (For ROPS)	KEY SWITCH ASSY (For ROPS) 198162-52110	Switches between ON and OFF of the battery power to each circuit.
Floor	15	SWITCH, BRAKE PEDAL	SWITCH ASSY, LAMP 198223-52151	Detects the ON/OFF of the brake.
Cabin left	16	RELAY, EGR VALVE	RERAY, EGR 1A7522-52950	Supplies power to the EGR system.
Back side seat	17	UNIT, OPC	UNIT, OPC 1A8476-57103	Outputs according to the input signal from each switch.
Steering column right	18	SA-D CONNECTOR	SA-D_CONNECTOR	Connects the interface box cable of the Smart assist-direct.

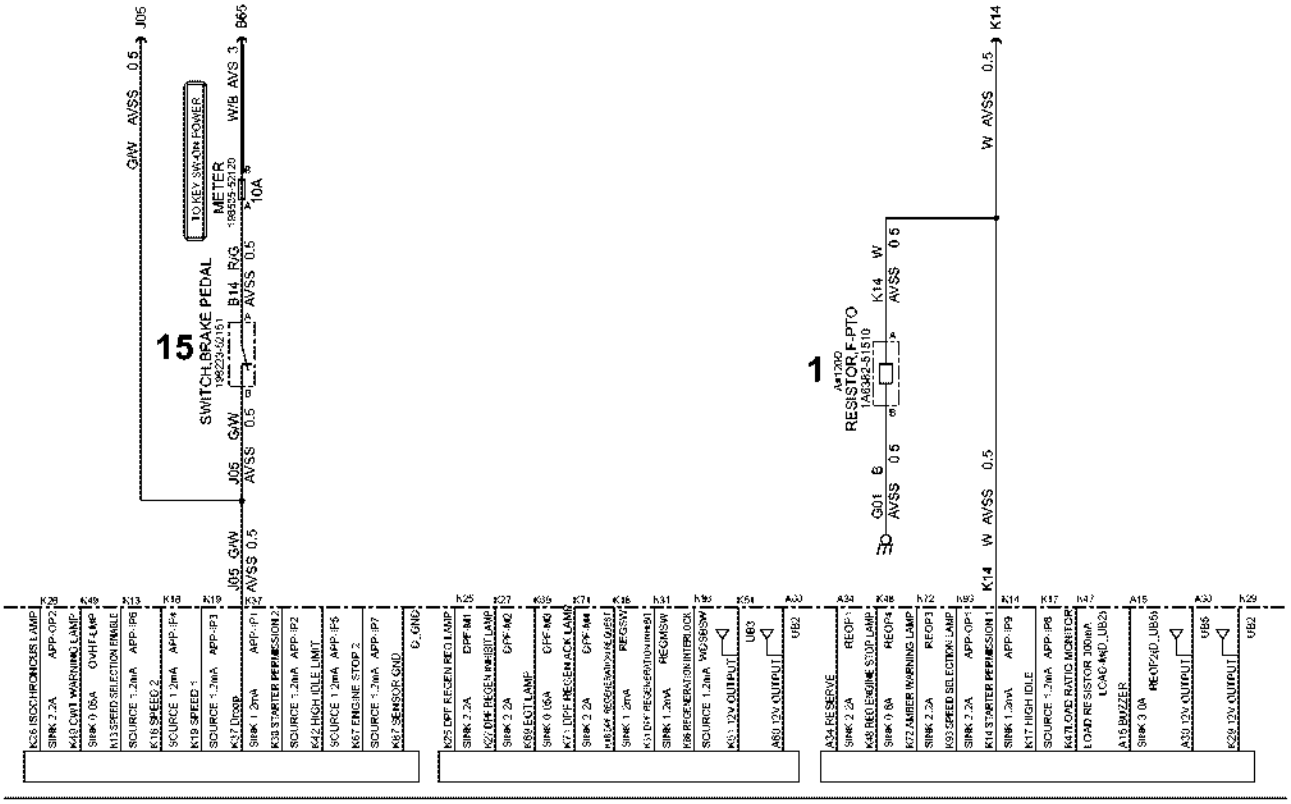
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Engine right	19	SW, WATER SEPARATOR	SW, FILTER 126C04-55700	Detects the water level in the water separator to protect the injection parts of the common rail engine.
Upper Engine	20	EGR	EGR 198535-52140	This is a system for suppressing the generation of Nox by recirculation of the exhaust gas into the combustion chamber.
Back side seat	21	RELAY, OPC	RELAY, OPC 1A7522-52950	Supplies power to the OPC system.

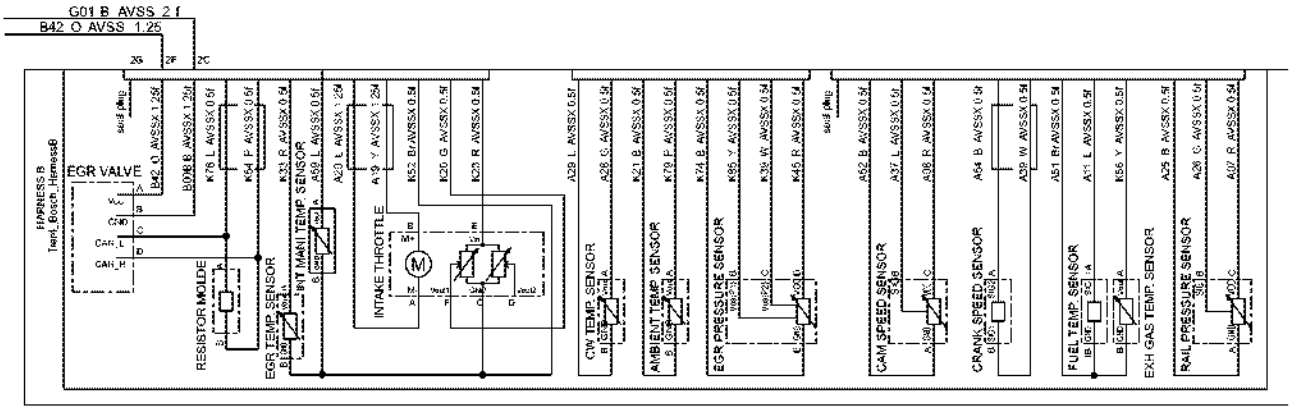
*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram

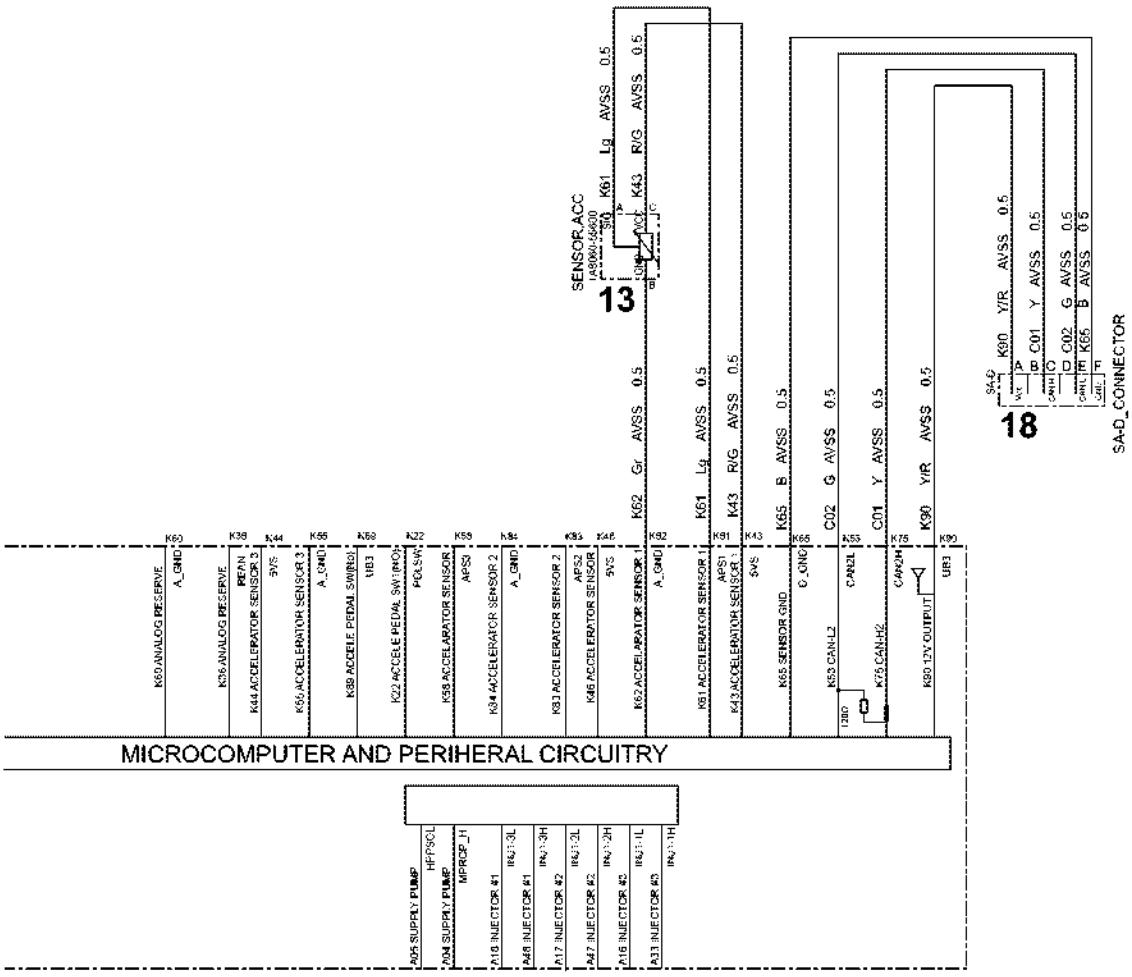


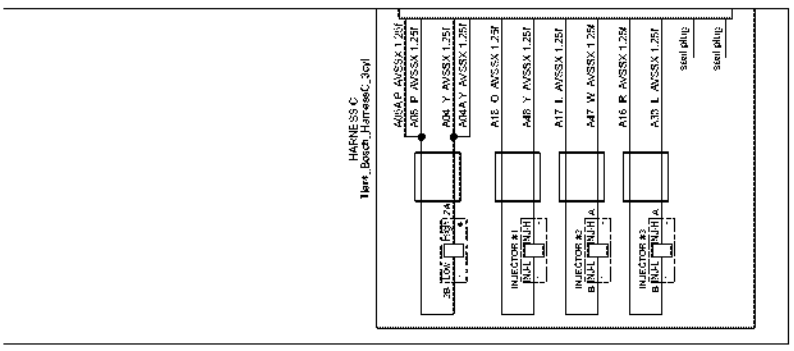




112769-000100

12





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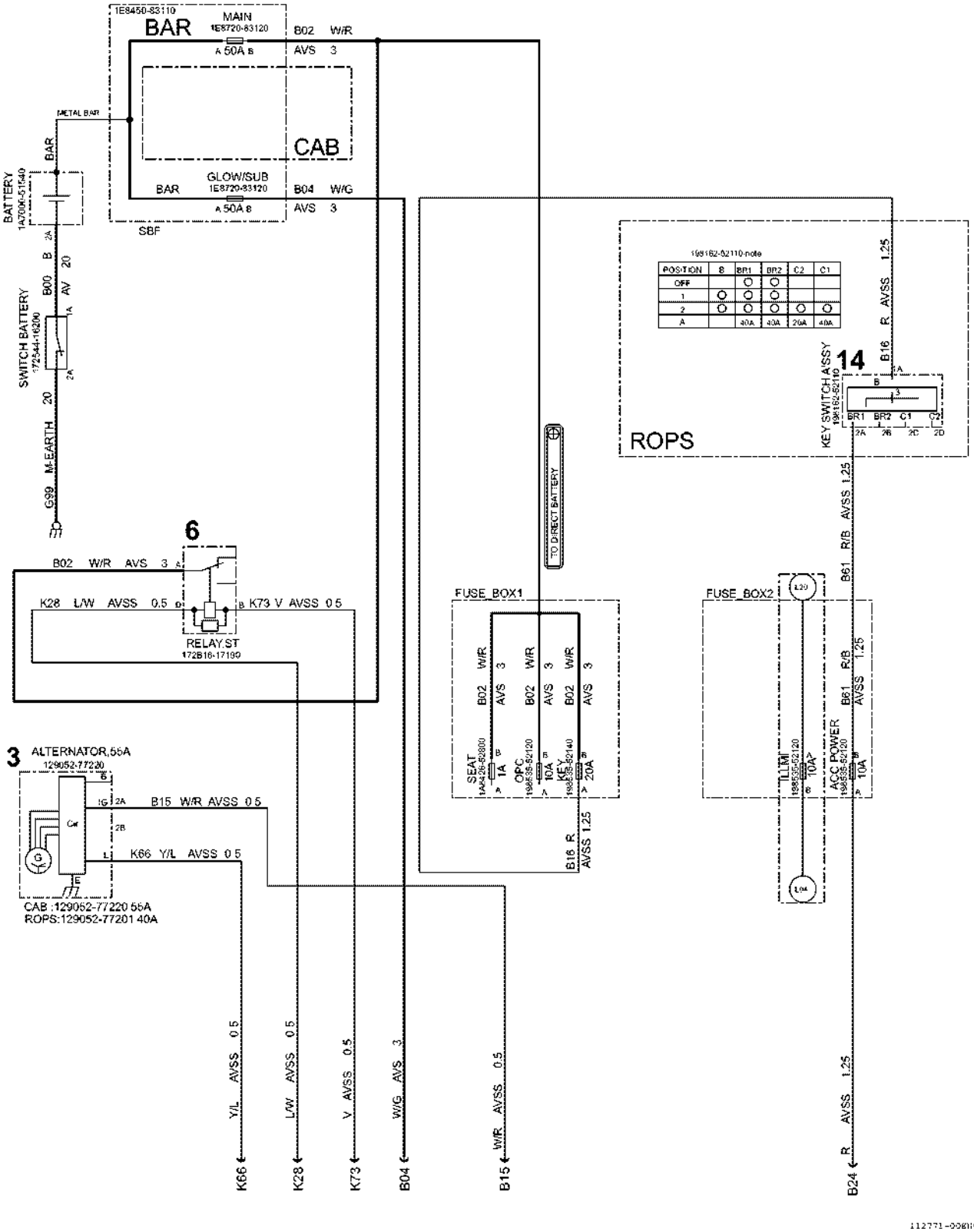

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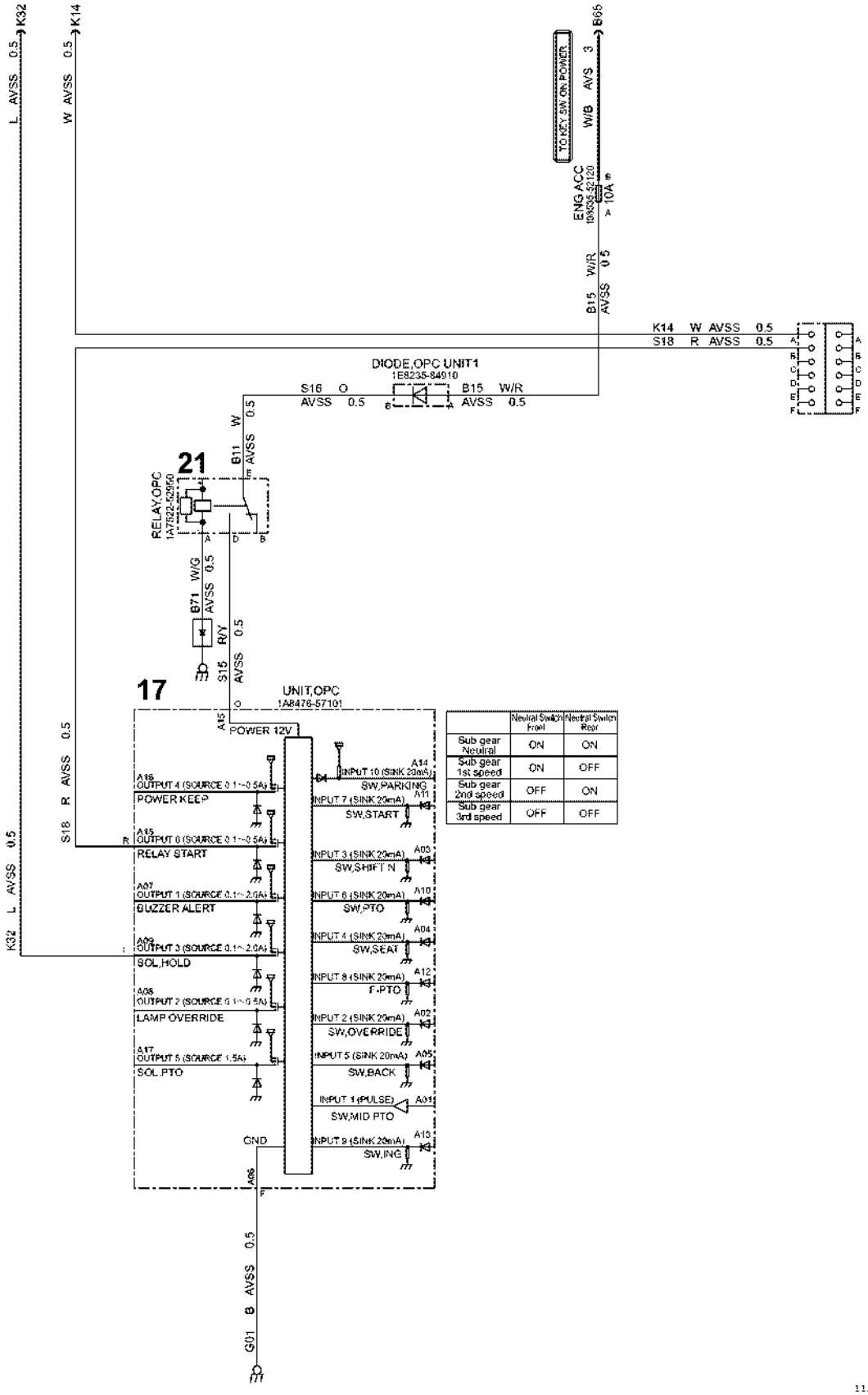
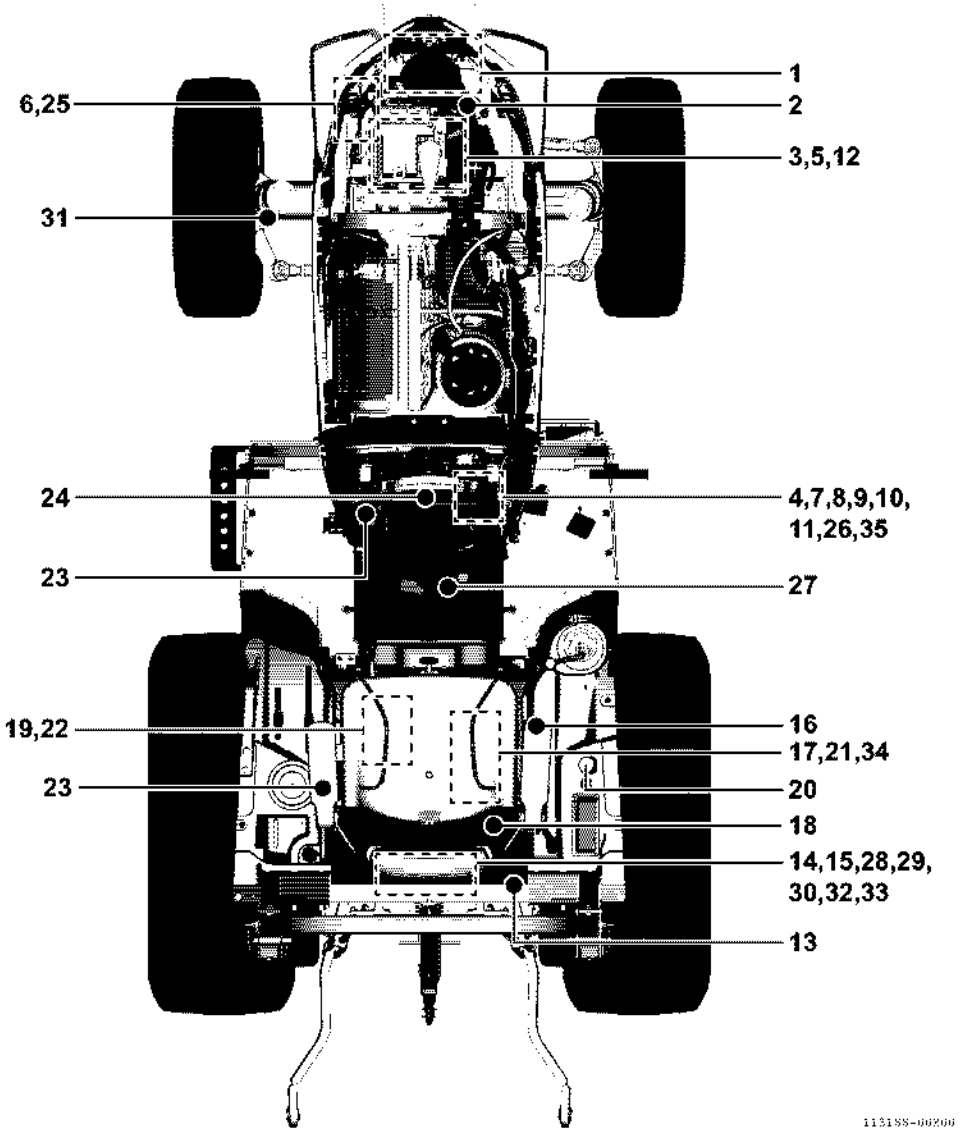
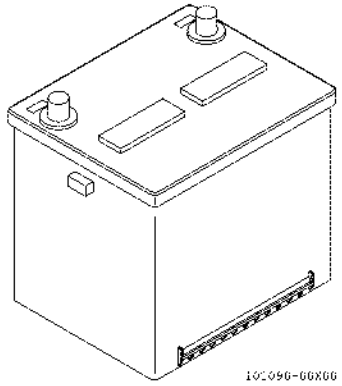
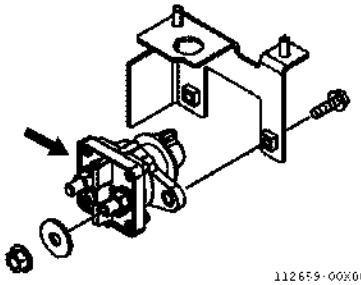
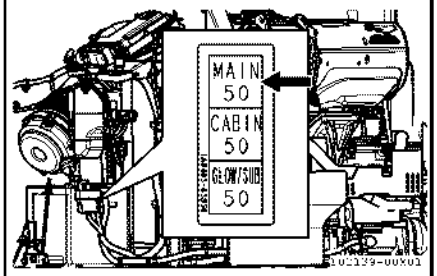
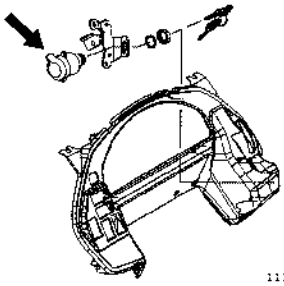
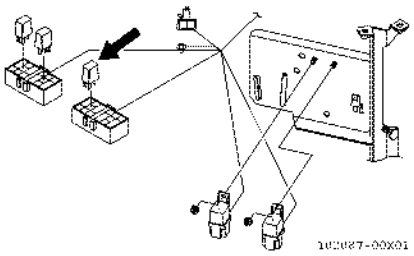
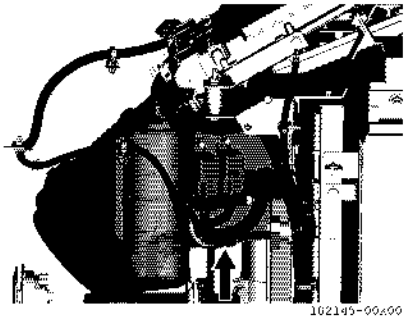
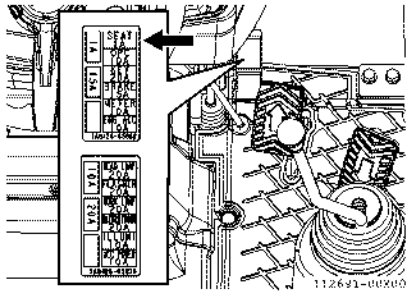
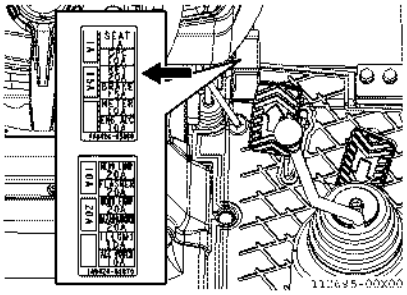
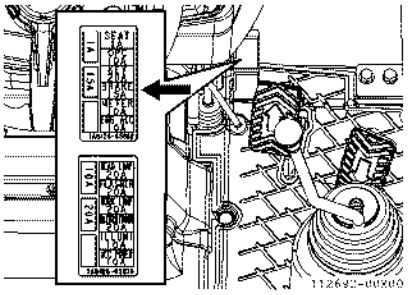
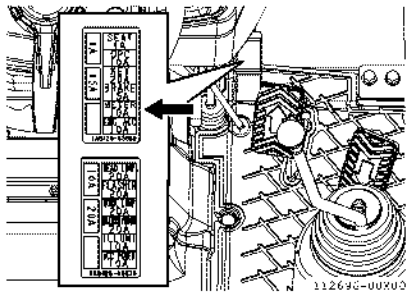
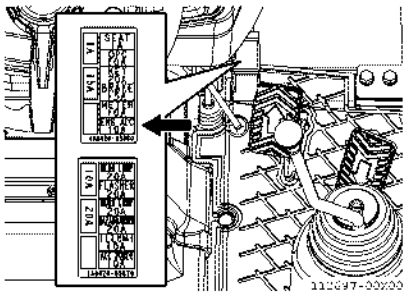
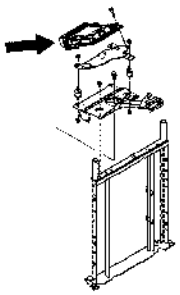

TO KEY SW ON POWER
ENG ACC
DIODE,OPC UNIT1
1E8235-84910
RELAY,OPC
UNIT,OPC
1A8476-57101
POWER 12V
POWER KEEP
RELAY START
BUZZER ALERT
SOL,HOLD
LAMP OVERRIDE
SOL,PTO
SW,PARKING
SW,START
SW,SHIFT N
SW,PTO
SW,SEAT
F.PTO
SW,OVERRIDE
SW,BACK
SW,MID PTO
SW,ING
GND
Neutral Switch Front
Neutral Switch Rear
Sub gear Neutral
Sub gear 1st speed
Sub gear 2nd speed
Sub gear 3rd speed

4. Dual Speed Turn Circuit

1. Positions and functions of the components



1.BATTELY
2.SW, BATTERY CUTOFF
3.SLOW BLOW FUSE, MAIN
4.KEY SWITCH
5.RELAY, MAIN
6.DIODE, POWER RELAY
7.FUSE, SEAT 1A
8.FUSE, KEY 20A
9.FUSE, BRAKE 15A
10.FUSE, METER 10A
11.FUSE, ENG ACC 10A
12.CR ECU
13.UNIT, OPC
14.RELAY, OPC
15.DIODE, OPC UNIT
16.SWITCH, LIFT LOWER LIMIT
17.VALVE, PTO
18.SWITCH, SEAT
19.SW, SUB GEAR FRONT
20.SWITCH, PTO
21.SWITCH, MID/BOTH-PTO
22.SW, SUB GEAR REAR
23.SWITCH, PARKING
24.METER
25.RELAY, EGR VALVE
26.SWITCH, BRAKE PEDAL
27.SWITCH, DISPLAY
28.RELAY, SW-HG
29.RELAY, SAB GEAR
30.RELAY, 4WD
31.SWITCH, STEERING
32.RELAY, H-G SPEED
33.DIODE, VALVE H-G SPEED
34.VALVE, H-G SPEED
35.FUSE, OPC 10A

1.BATTELY	2.SW, BATTERY CUTOFF	3.SLOW BLOW FUSE, MAIN
		
4.KEY SWITCH	**5.RELAY, MAIN**	**6.DIODE, POWER RELAY**
		
7.FUSE, SEAT 1A	**8.FUSE, KEY 20A**	**9.FUSE, BRAKE 15A**
		
10.FUSE, METER 10A	**11.FUSE, ENG ACC 10A**	**12.CR ECU**
		

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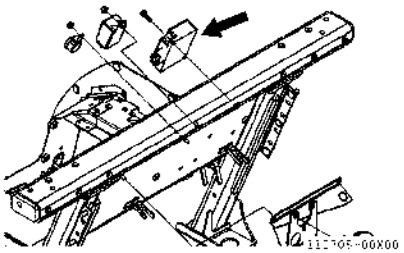
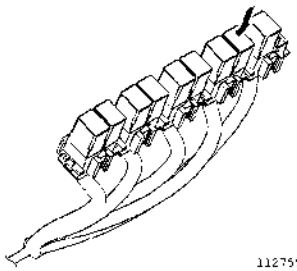
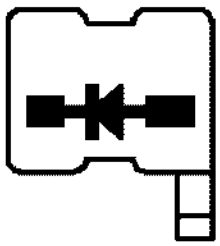
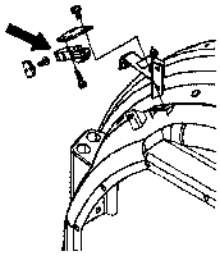
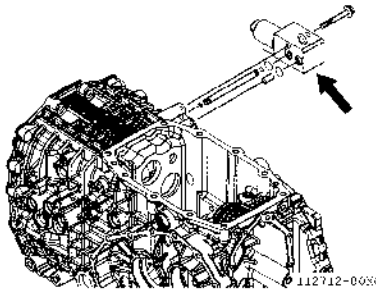
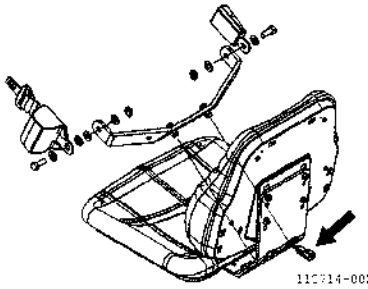
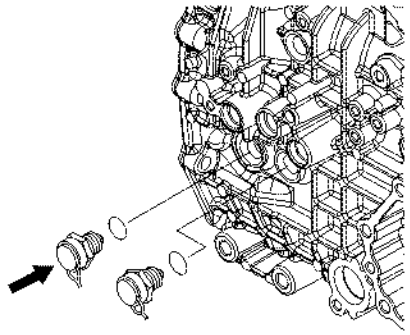
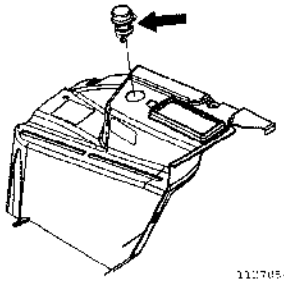
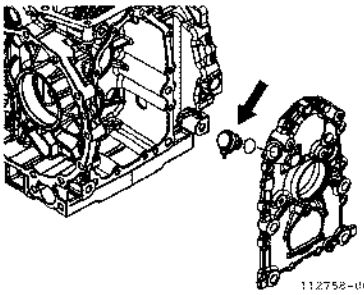
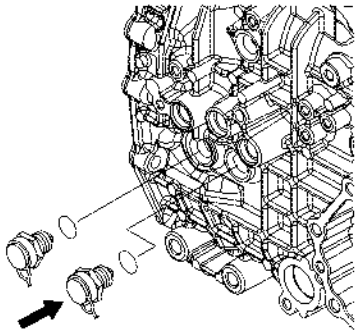
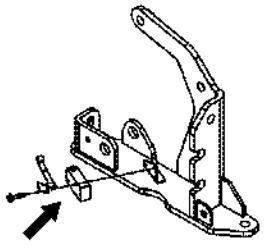
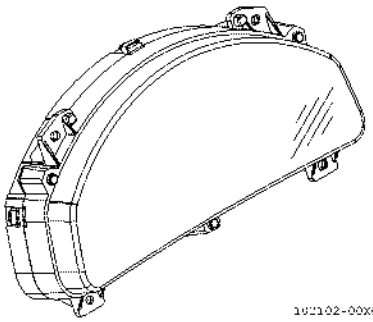
13.UNIT, OPC	14. RELAY, OPC	15.DIODE, OPC UNIT
		 The diode is fixed to the harness with tape.
16.SWITCH, LIFT LOWER LIMIT	17.VALVE, PTO	18.SWITCH, SEAT
		
19.SW, SUB GEAR FRONT	20.SWITCH, PTO	21.SWITCH, MID/BOTH-PTO
		
22.SW, SUB GEAR REAR	23.SWITCH, PARKING	24.METER
		

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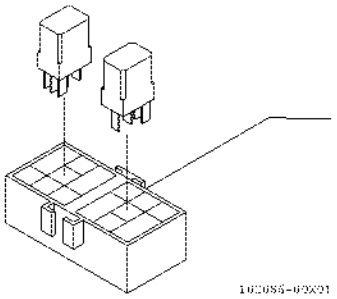
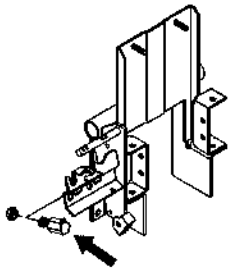
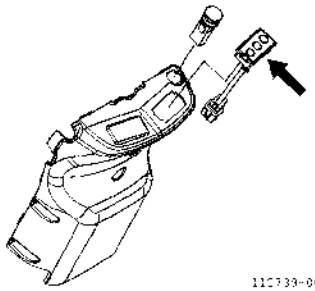
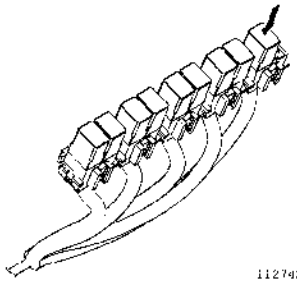
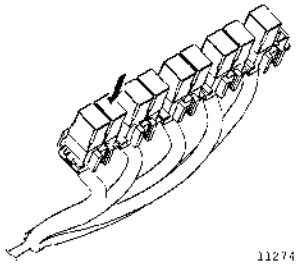
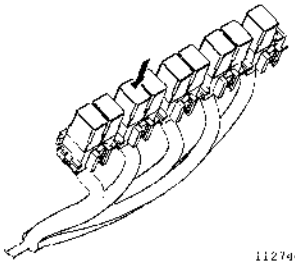
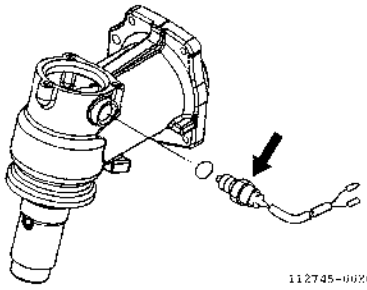
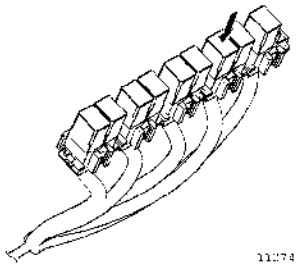
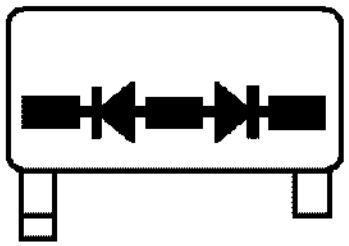
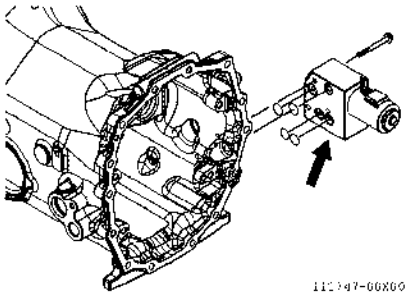
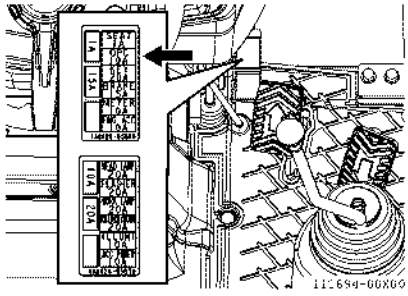
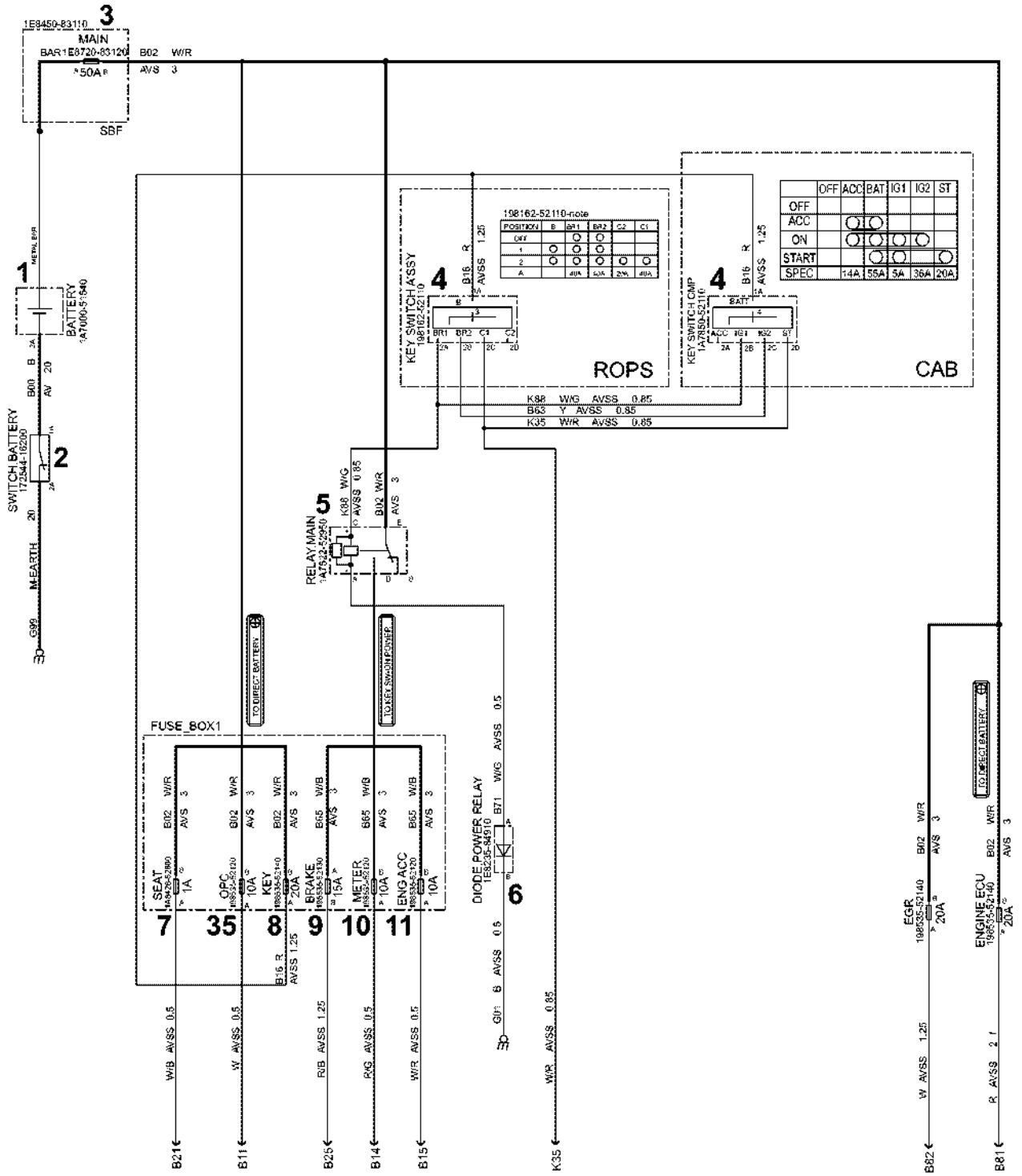
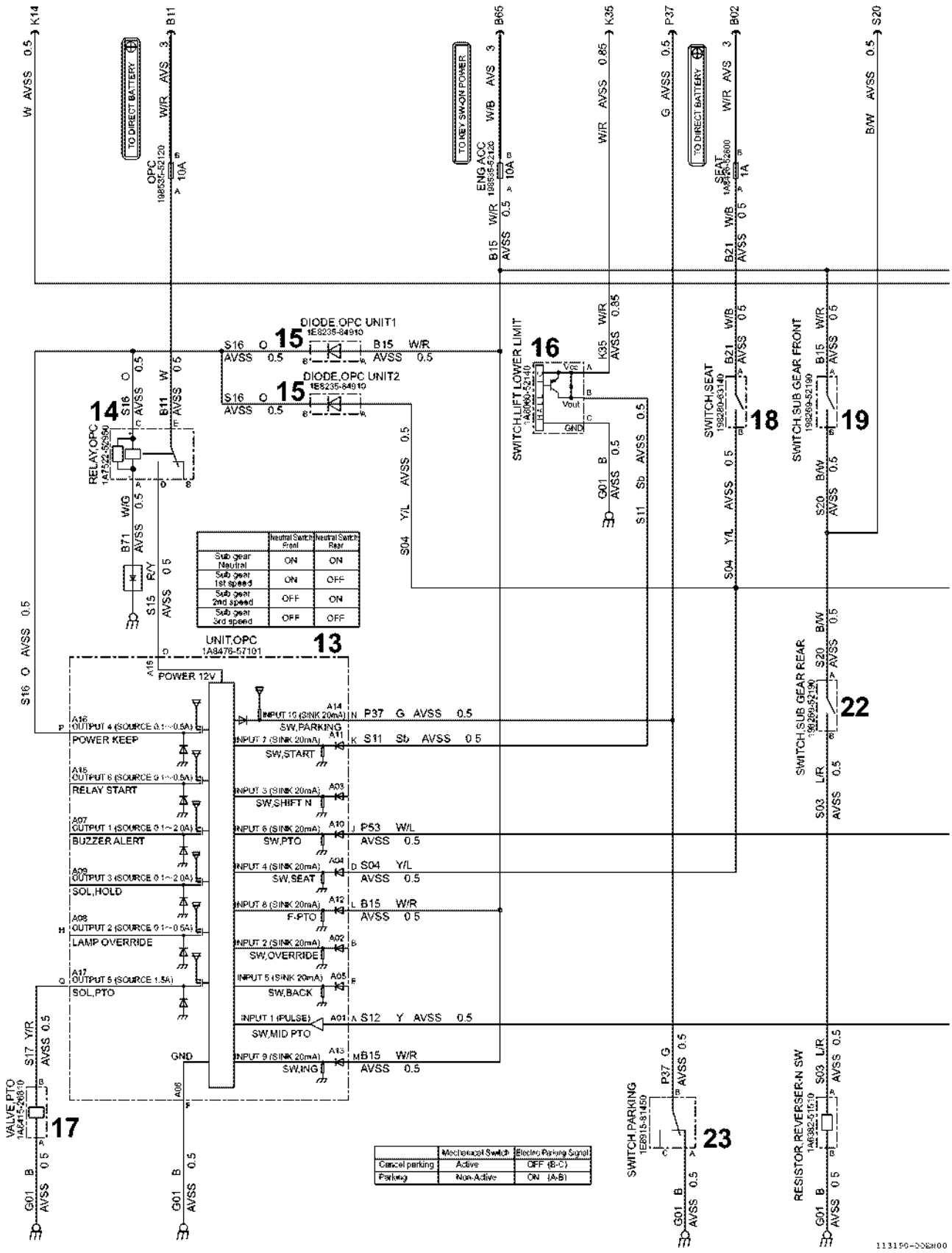
25.RELAY, EGR VALVE	26.SWITCH, BRAKE PEDAL	27.SWITCH, DISPLAY
		
28.RELAY, SW-HG	29.RELAY, SAB GEAR	30.RELAY, 4WD
		
31.SWITCH, STEERING	32.RELAY, H-G SPEED	33.DIODE, VALVE H-G SPEED
		 The diode is fixed to the harness with tape.
34.VALVE, H-G SPEED	35.FUSE, OPC 10A	
		

Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Engine front	1	BATTELY	Battery 80D26R 1A7000-51540	Supplies 12V power.
Engine front	2	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Engine front	3	SLOW BLOW FUSE, MAIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Steering column right	4	KEY SWITCH	SWITCH, STARTING (For ROPS) 198162-52110 SWITCH ASSY, STARTER (For CAB) 1A7850-52110	Switches between ON and OFF of the battery power to each circuit.
Engine front	5	RELAY, MAIN	MAIN RELAY 1A7522-52950	Supplies power to the main circuit.
Engine front	6	DIODE, POWER RELAY	DIODE POWER RELAY 1E8235-84910	Prevents backflow of current to the relay (MAIN). (prevents connecting the battery in opposite direction)
Steering column right	7	FUSE, SEAT 1A	FUSE, SEAT 1A 1A8426-52800	Protects the seat circuit.
Steering column right	8	FUSE, KEY 20A	FUSE, 20A 198535-52140	Protects the key circuit.
Steering column right	9	FUSE, BRAKE 15A	FUSE, 15A 198535-52130	Protects the brake circuit.
Steering column right	10	FUSE, METER 10A	FUSE, 10A 198535-52120	Protects the meter circuit.
Steering column right	11	FUSE, ENG ACC 10A	FUSE, 10A 198535-52120	Protects the ENG ACC circuit.
Engine front	12	CR ECU	CR ECU 1R1797-00101-3cyl	Communicates signal with each sensor and actuators to control the common rail engine.
Back side seat	13	UNIT, OPC	UNIT, OPC 1A8476-57103	Outputs according to the input signal from each switch.
Back side seat	14	RELAY, OPC	RELAY, OPC 1A7522-52950	Supplies power to the OPC system.
Back side seat	15	DIODE, OPC UNIT	DIODE, OPC UNIT 1E8235-84910	Prevents connecting the battery in opposite direction
Right side of seat	16	SWITCH, LIFT LOWER LIMIT	SWITCH, INTERLOCK 1A8060-52140	Move the spool with the solenoid valve and switch the hydraulic circuit
Transmission right	17	VALVE, PTO	VALVE ASSY, PTO 1A8415-26810	When receiving the current signal,move the spool with the solenoid valve and switch the PTO hydraulic circuit.

Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Engine front	18	SW, SEAT	SWITCH, SEAT 1A8426-52300	Detects that the operator is seated in the driver's seat. The engine cannot start when no driver is seated.
Engine front	19	SW, SUB GEAR FRONT	SWITCH, SAFETY 198269-52190	Detects "N" of the sub gear front.
Right side of seat	20	SWITCH, PTO	SWITCH, PTO IN-OFF 1A7340-52290	Switches on and off of the PTO.
Transmission left	21	SWITCH, MID/BOTH-PTO	SWITCH, SAFETY 198269-52190	Detects the movement of the shift arm and switches the circuit.
Transmission left	22	SW, SUB GEAR REAR	SWITCH, SAFETY 198269-52190	Detects "N" of the sub gear rear.
Right side of seat	23	SWITCH, PARKING	SWITCH, MICRO 1E8915-81450	Detects that the parking brake is applied. The engine cannot start when no parking brake is applied.
Inside the steering column	24	METER	METER ASSY, COMBINA 1A8405-56002	Indicates various information and alarm messages.
Cabin left	25	RELAY, EGR VALVE	RERAY, EGR 1A7522-52950	Supplies power to the EGR system.
Floor	26	SWITCH, BRAKE PEDAL	SWITCH ASSY, LAMP 198223-52151	Detects the ON/OFF of the brake.
Steering column	27	SWITCH, DISPLAY	SWITCH, TRAVELING 1A8426-52551	Switches the displayed information on the combination meter.
Back side seat	28	RELAY, SW-HG	RELAY, SW-HG 1A7522-52950	Supplies power to the SW-HG circuit.
Back side seat	29	RELAY, SAB GEAR	RELAY, SAB GEAR 1A7522-52950	Supplies power to the sab gear circuit.
Back side seat	30	RELAY, 4WD	RELAY, 4WD 1A7522-52950	Supplies power to the 4WD circuit.
Front axle	31	SWITCH, STEERING	SWITCH, STEERING 198071-52190	Detects the front steering angle. Turns ON if the steering angle exceeds about 35 degrees.
Back side seat	32	RELAY, H-G SPEED	RELAY, H-G SPEED 1A7522-52950	Supplies power to the H-G SPEED circuit.
Back side seat	33	DIODE, VALVE H-G SPEED	DIODE, VALVE H-G SPEED 1E8450-84900	Prevents connecting the battery in opposite direction
Clutch housing right	34	VALVE, H-G SPEED	VALVE ASSY, 4WD 1A8416-28540	When receiving the current signal,move the spool with the solenoid valve and switch the hydraulic circuit of 2WD and 4WD.
Steering column right	35	FUSE, OPC 10A	FUSE, 10A 198535-52120	Protects each electric circuit.

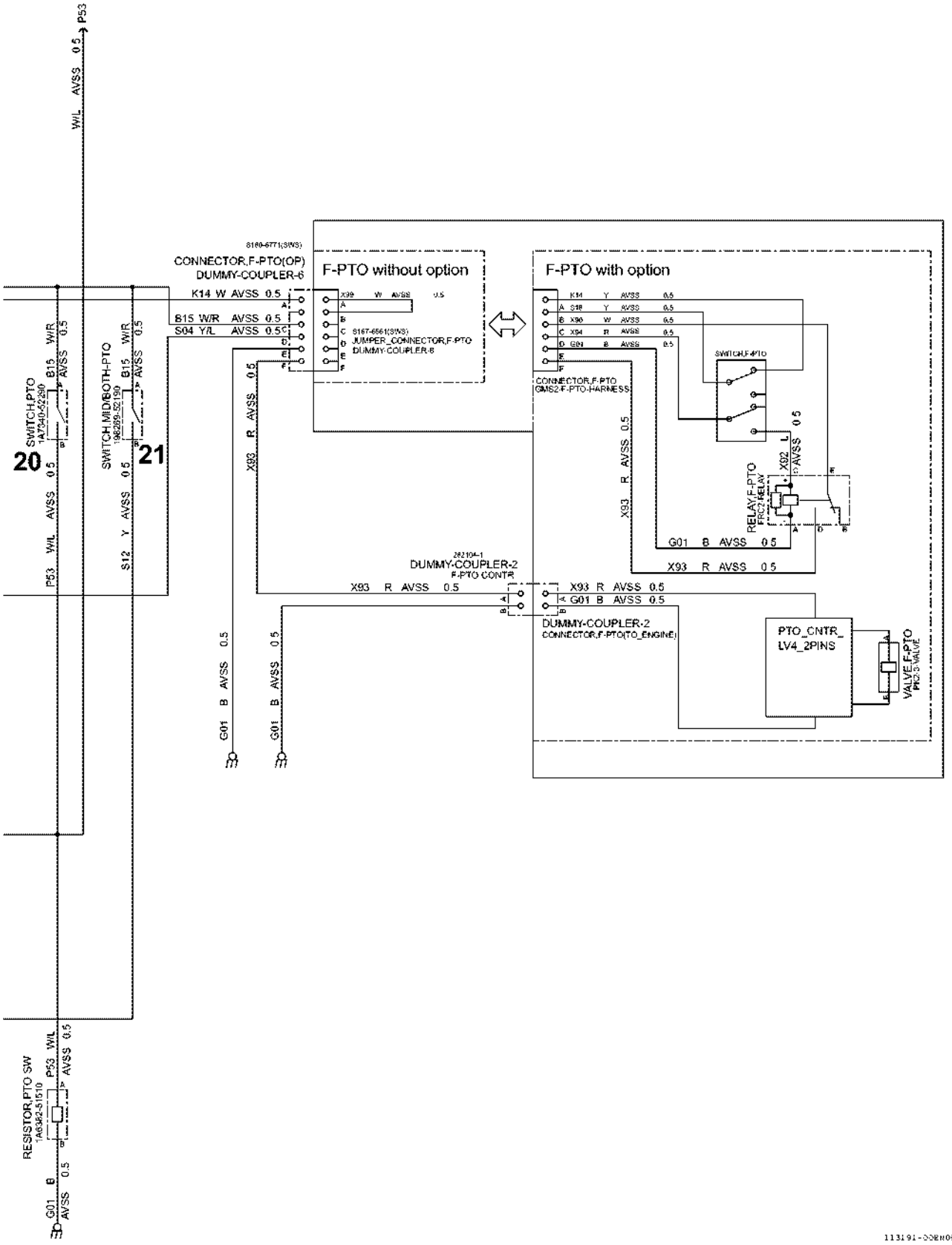
2. Electric circuit diagram

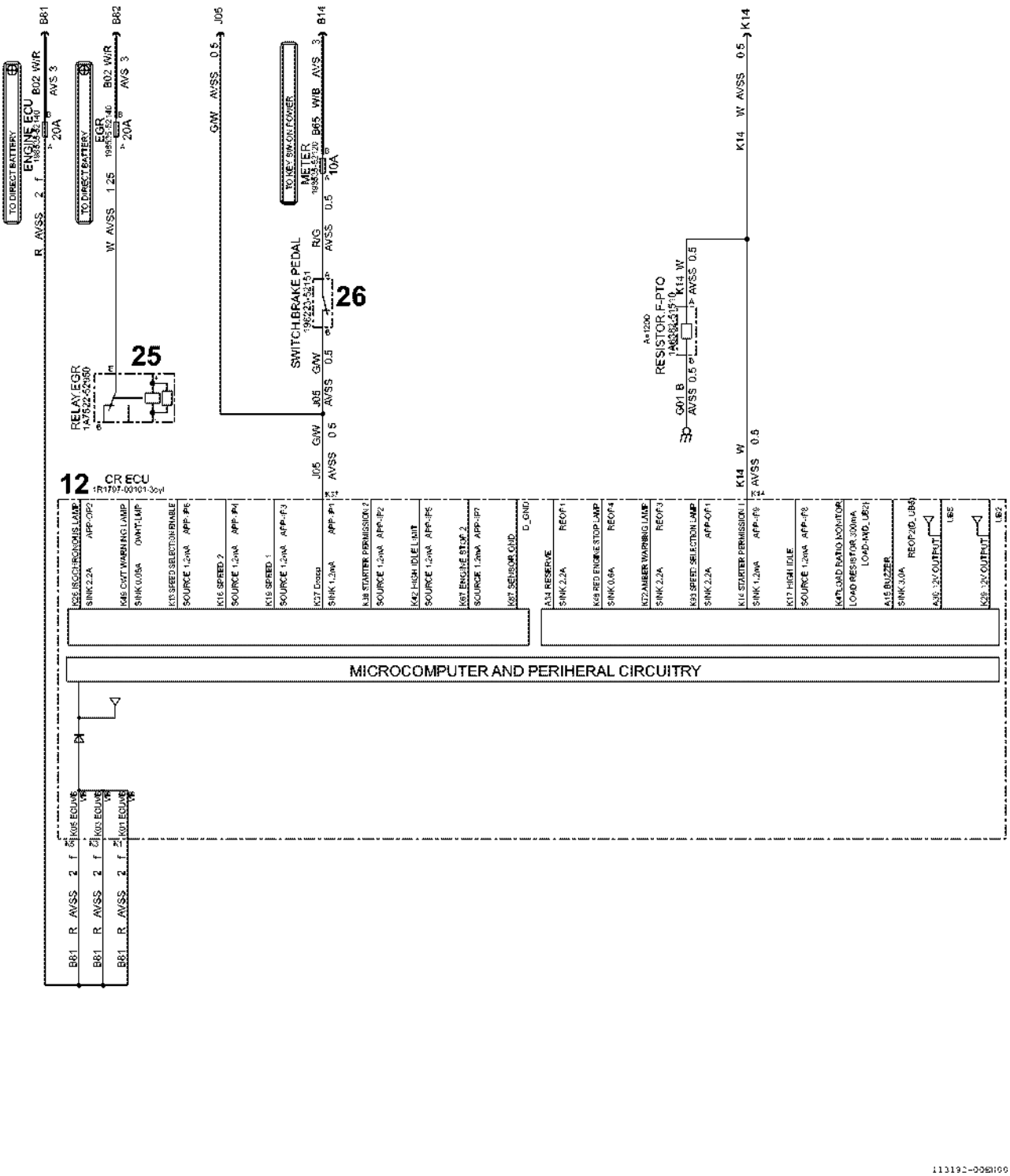


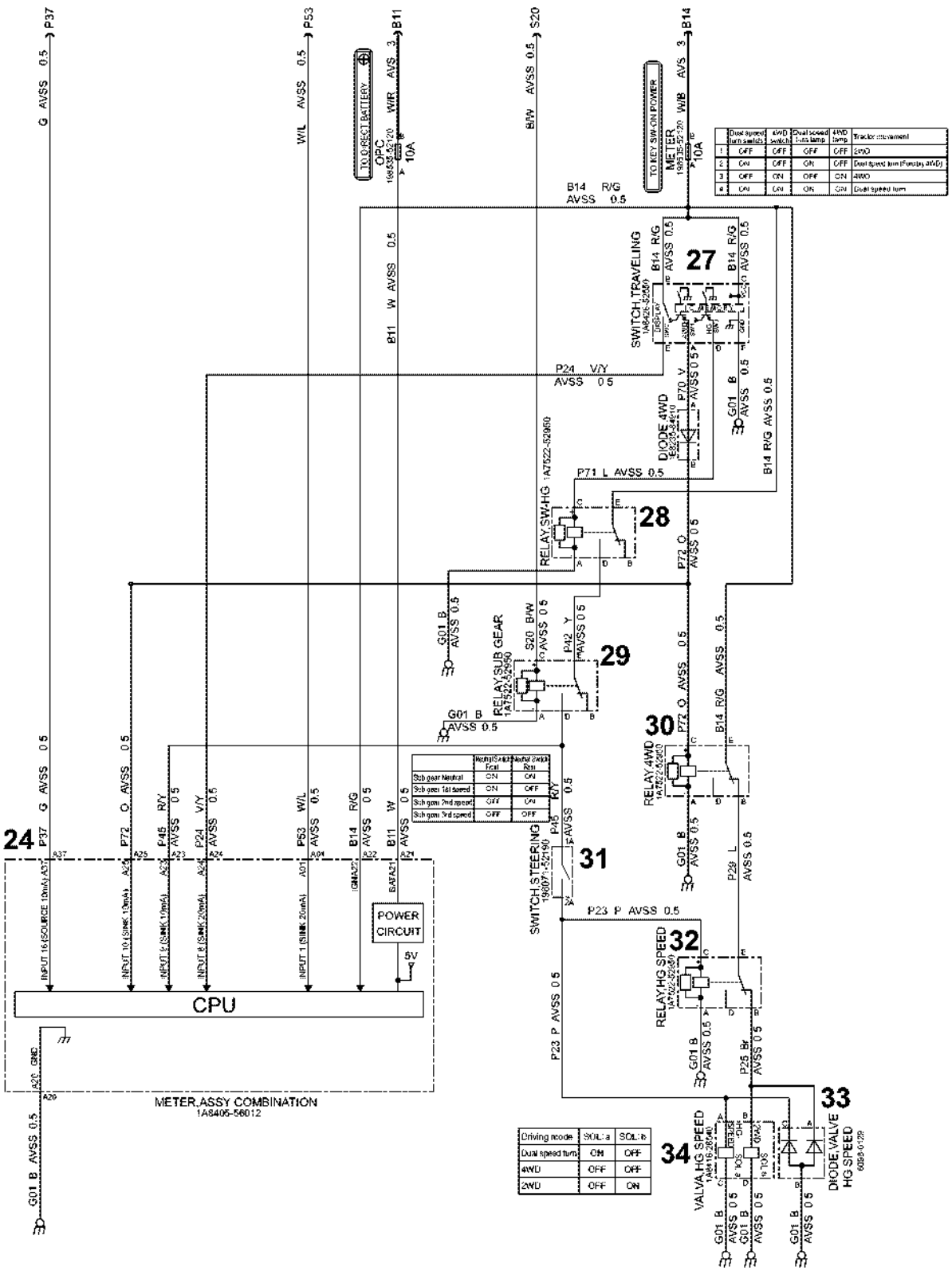


	Neutral Switch Front	Neutral Switch Rear
Sub gear Neutral	ON	ON
Sub gear 1st speed	ON	OFF
Sub gear 2nd speed	OFF	ON
Sub gear 3rd speed	OFF	OFF

	Mechanical Switch	Electric Parking Signal
Cancel parking	Active	OFF (B-C)
Parking	Non-Active	ON (A-B)

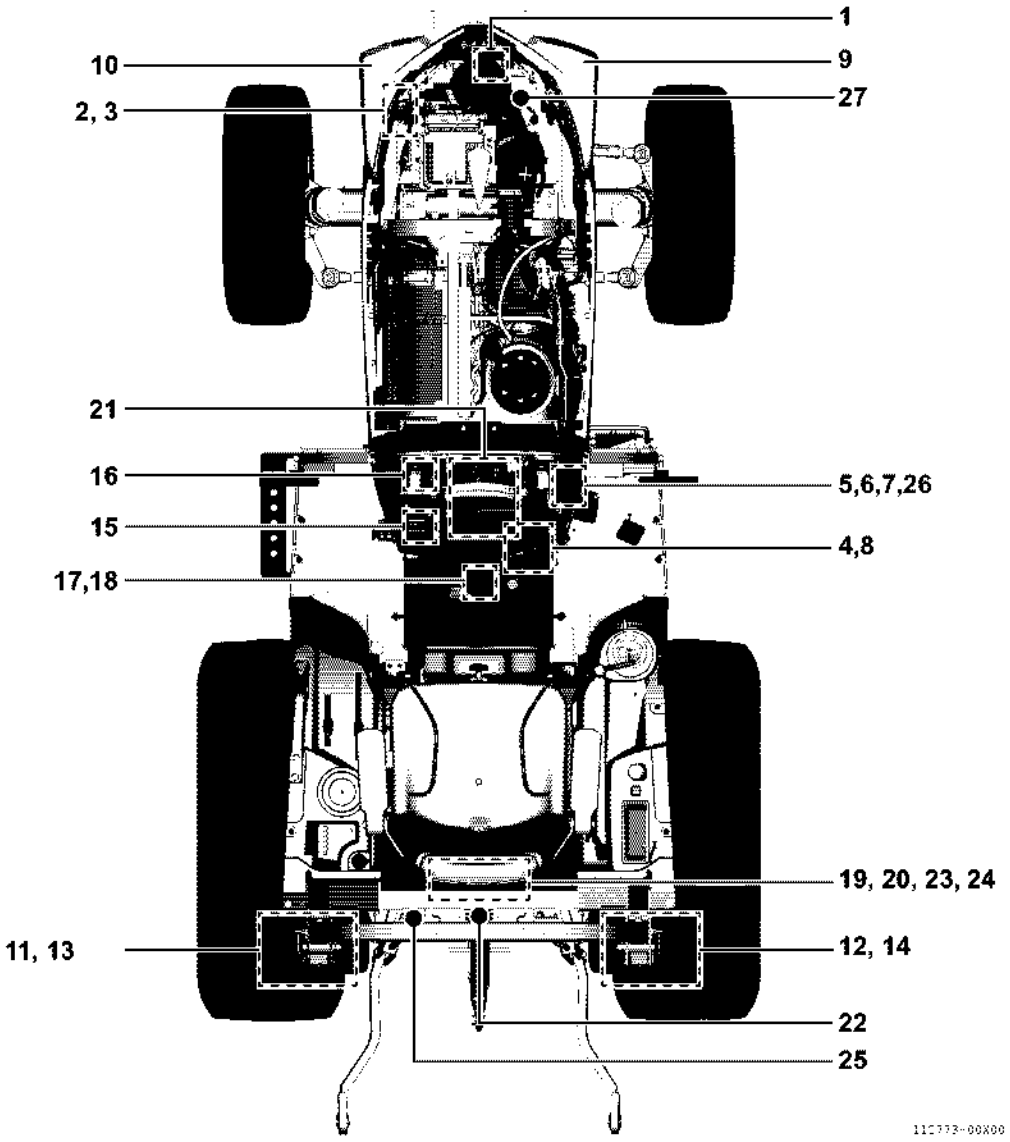

F-PTO without option
F-PTO with option
CONNECTOR,F-PTO(OP)
DUMMY-COUPLER-6
SWITCH,PTO
SWITCH,MID/BOTH-PTO
RESISTOR,PTO SW
DUMMY-COUPLER-2
F-PTO CONTR
CONNECTOR,F-PTO
GMS2-F-PTO-HARNESS
SWITCH,F-PTO
RELAY,F-PTO
PTO_CNTR_
LV4_2PINS
VALVE,F-PTO
20
21


ENGINE ECU
EGR
METER
RELAY EGR
SWITCH BRAKE PEDAL
RESISTOR F-PTO
25
26
12
CR ECU
MICROCOMPUTER AND PERIHERAL CIRCUITRY

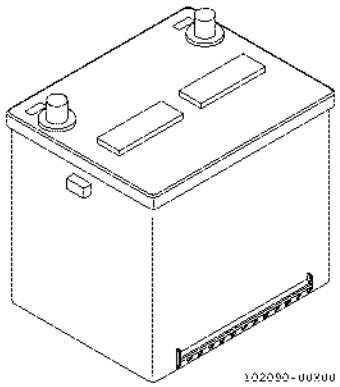
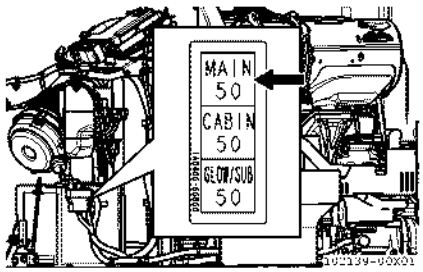
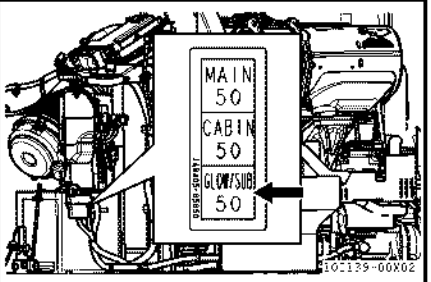
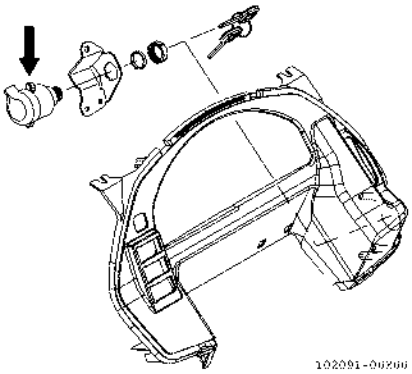
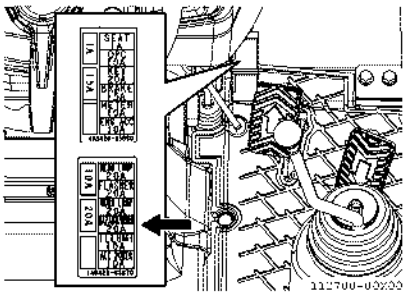
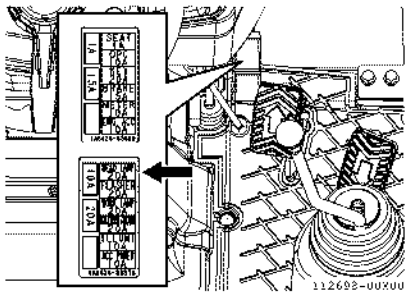
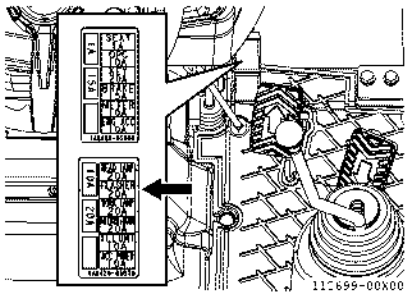
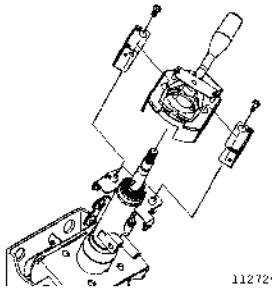
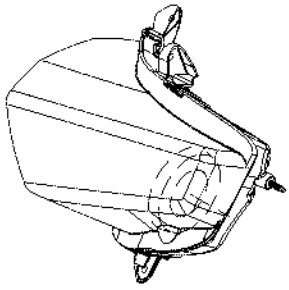
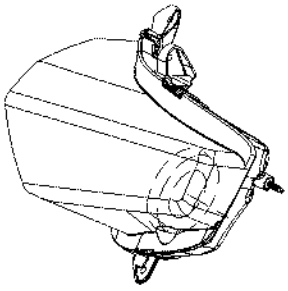
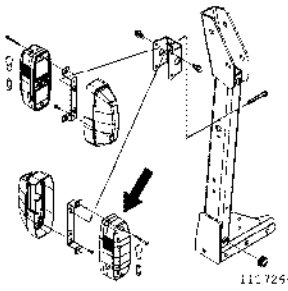
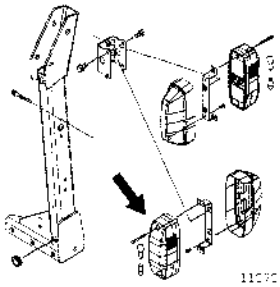

CPU
POWER CIRCUIT
METER ASSY COMBINATION
1A8405-56012
SWITCH,TRAVELING
SWITCH,STEERING
RELAY,SUB GEAR
RELAY,4WD
RELAY,HG SPEED
DIODE,4WD
DIODE,VALVE HG SPEED
VALVE,HG SPEED
24
27
28
29
30
31
32
33
34

5. Security circuit

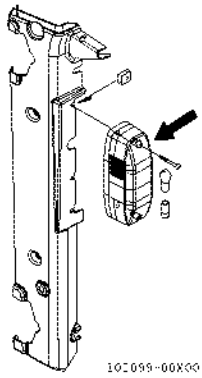
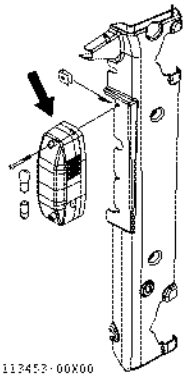
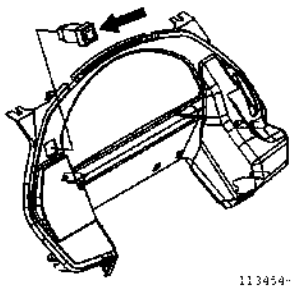
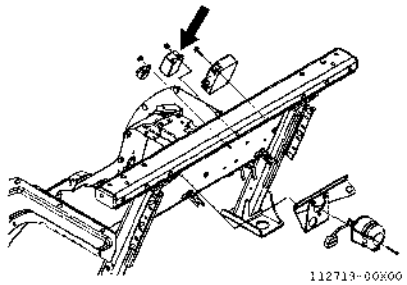
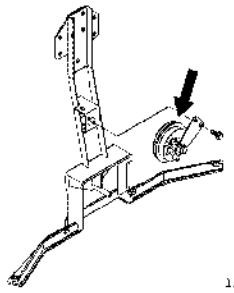
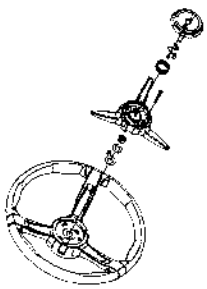
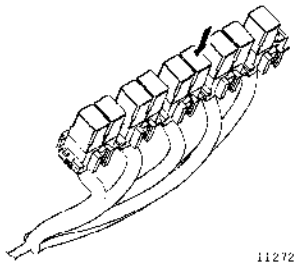
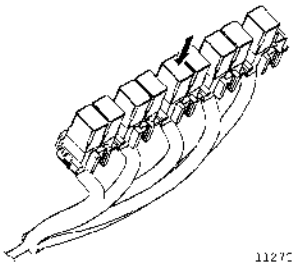
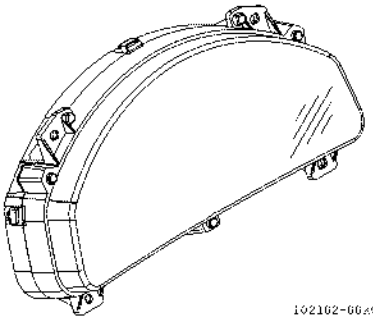
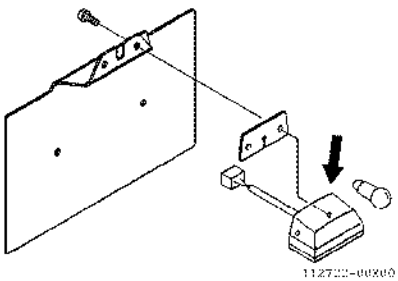
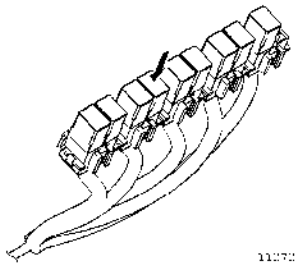
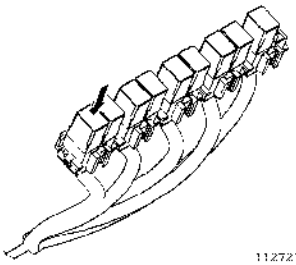
1. Positions and functions of the components
Common in CAB and ROPS



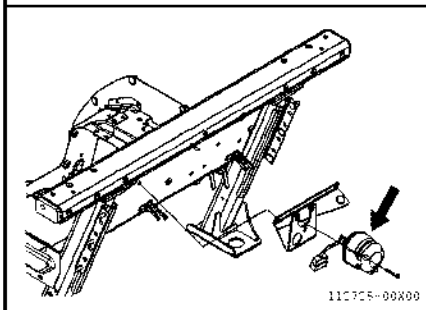
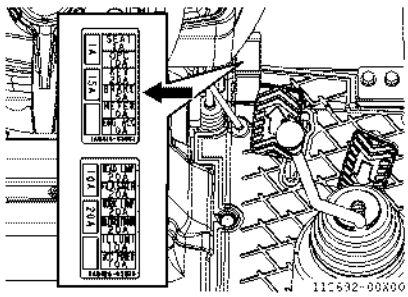
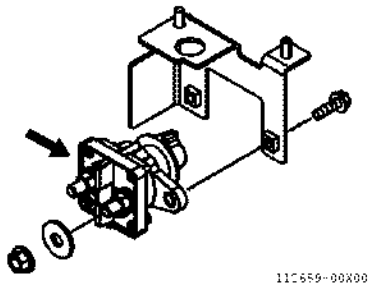
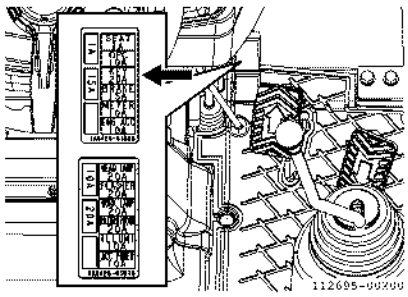
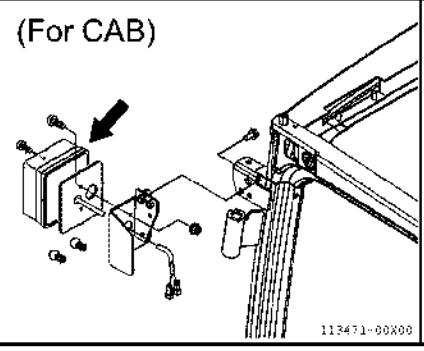
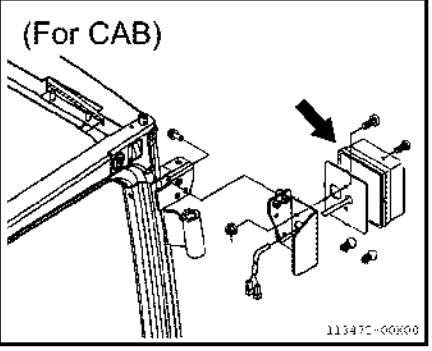
1 BATTERY
2 SLOW BLOW, MAIN 50A
3 SLOW BLOW, GLOW/SUB 50A
4 KEY SWITCH
5 FUSE, HAZARD/HORN 20A
6 FUSE, HEAD LAMP 20A
7 FUSE, FLASHER 20A
8 SWITCH, LIGHTING
9 LAMP, HEAD R 35W(2.92A)
10 LAMP, HEAD L 35W(2.92A)
11 LAMP, COMBINATION L (For ROPS)
12 LAMP, COMBINATION R (For ROPS)
13 LAMP, R-COMBI L (For CAB)
14 LAMP, R-COMBI R (For CAB)
15 SW, HAZARD LAMP
16 RELAY, FLASHER
17 HORN
18 SWITCH, HORN
19 RELAY, HAZARD L
20 RELAY, HAZARD R
21 METER
22 LAMP, LICENSE
23 RELAY, BRAKE LAMP
24 RELAY, H-T SWITCHING
25 CONNECTOR, TRAILER EU
26 FUSE, BRAKE 15A
27 SW, BATTERY CUTOFF
28 FUSE, KEY 20A
29 LAMP, F-COMBI L (For CAB)
30 LAMP, F-COMBI R (For CAB)

1. BATTERY	2. SLOW BLOW FUSE, MAIN 50A	3. SLOW BLOW, GLOW/SUB 50A
		
4. KEY SWITCH	**5. FUSE, HAZARD/HORN 20A**	**6. FUSE, HEAD LAMP 20A**
		
7. FUSE, FLASHER 20A	**8. SWITCH, LIGHTING**	**9. LAMP, HEAD R 35W(2.92A)**
		
10. LAMP, HEAD L 35W(2.92A)	**11. LAMP, COMBINATION L (For ROPS)**	**12. LAMP, COMBINATION R (For ROPS)**
		

12

13. LAMP, R-COMBI L (For CAB)	14. LAMP, R-COMBI R (For CAB)	15. SW, HAZARD LAMP
		
16. RELAY, FLASHER	17. HORN	18. SWITCH, HORN
		
19. RELAY, HAZARD L	20. RELAY, HAZARD R	21. METER
		
22. LAMP, LICENSE	23. RELAY, BRAKE LAMP	24. RELAY, H-T SWITCHING
		

12

25. CONNECTOR, TRAILER EU	26. FUSE, BRAKE 15A	27. SW, BATTERY CUTOFF
		
28. FUSE, KEY 20A	**29. LAMP, F-COMBI L (For CAB)**	**30. LAMP, F-COMBI R (For CAB)**
	 (For CAB)	 (For CAB)

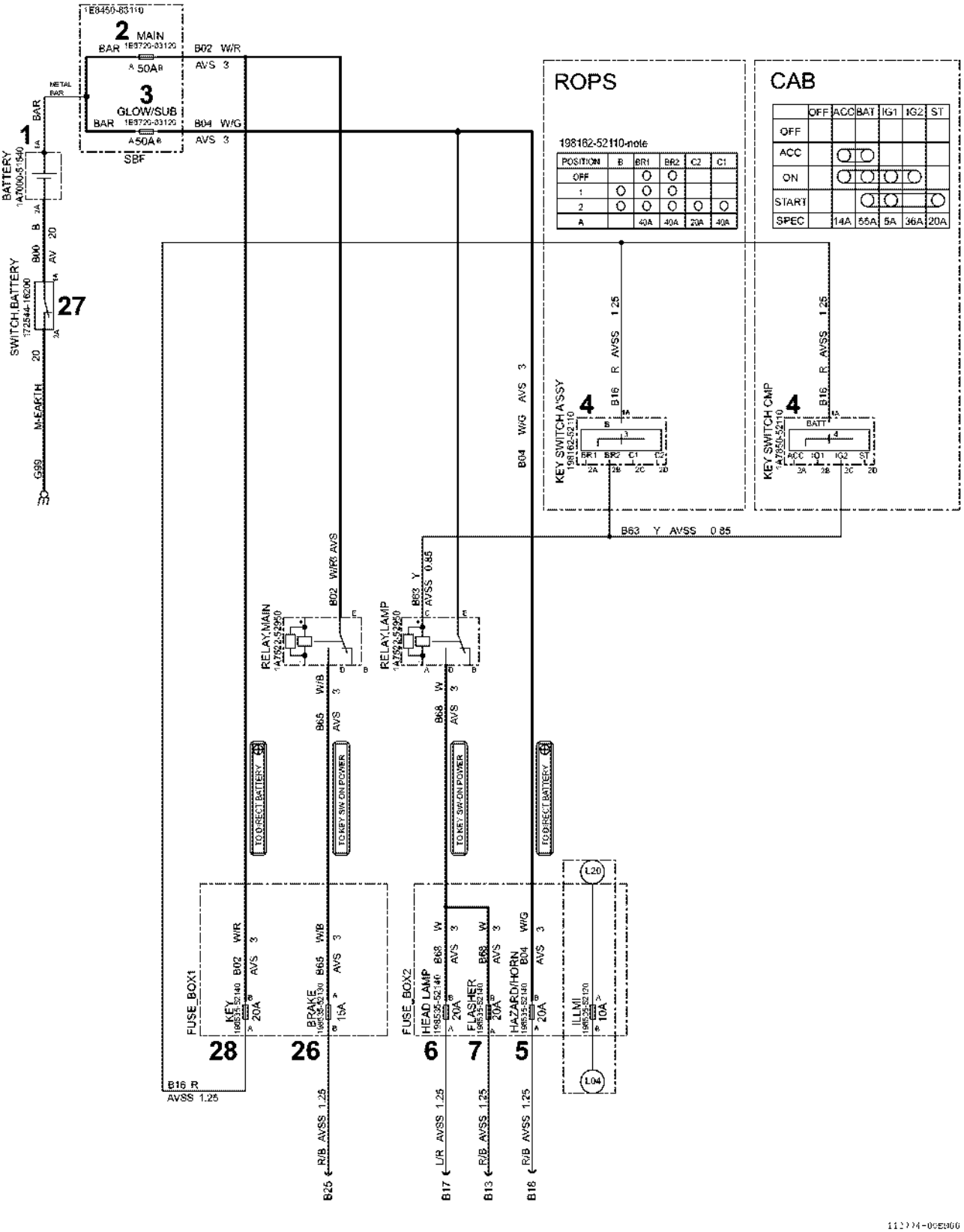
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Front in the hood	1	BATTERY	BATTERY, 80D26R 1A7000-51540	Supplies 12V power.
Front in the hood	2	SLOW BLOW FUSE, MAIN 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Front in the hood	3	SLOW BLOW FUSE, GLOW/SUB 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Steering column right	4	KEY SWITCH	KEY SWITCH ASSY 198162-52110 (For ROPS) 1A7850-52110 (For CAB)	Switches between ON and OFF of the battery power to each circuit.
Steering column right	5	FUSE, HAZARD/HORN 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Steering column right	6	FUSE, HEAD LAMP 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Steering column right	7	FUSE, FLASHER 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Steering column	8	SWITCH, LIGHTING	LEVER, COMBINATION 1A8400-52140	Switches ON and OFF of the head lamp.
Front right of the hood	9	LAMP, HEAD R 35W(2.92A)	LAMP (HEAD R 1A8400-53200	Left head lamp
Front left of the hood	10	LAMP, HEAD L 35W(2.92A)	LAMP (HEAD L 1A8400-53100	Right head lamp
Rear left of the ROPS	11	LAMP, COMBINATION L (For ROPS)	LAMP ASSY, REAR COMB (For ROPS) 1A8043-53600	Combination lamp on the rear left side
Rear right of the ROPS	12	LAMP, COMBINATION R (For ROPS)	LAMP ASSY, REAR COMB (For ROPS) 1A8043-53600	Combination lamp on the rear right side
Rear left of the cabin	13	LAMP, R-COMBI L (For CAB)	LAMP, REAR COMBINATION L (For CAB) 1A8043-53600	Combination lamp on the rear left side
Rear right of the cabin	14	LAMP, R-COMBI R (For CAB)	LAMP, REAR COMBINATION R (For CAB) 1A8043-53600	Combination lamp on the rear right side
Dashboard left	15	SW, HAZARD LAMP	HAZARD SW 1A7335-52120	Switches blinking and off of the hazard lamp.
Inside left of the dashboard	16	RELAY, FLASHER	RELAY, FLASHER 1A7510-57200	On/off switch of the hazard lamp and the turn signal lamp (R/L)
Engine front	17	HORN	HORN ASSY 1C7100-08151	Audible alarm that calls attention to the surrounding people
Inside the steering column	18	SWITCH, HORN	SWITCH, HORN 1A8060-15700	Switch the horn "on" and "off".
Back side seat	19	RELAY, HAZARD L	RELAY, HAZARD L 1A7522-52950	Supplies power to the hazard circuit.

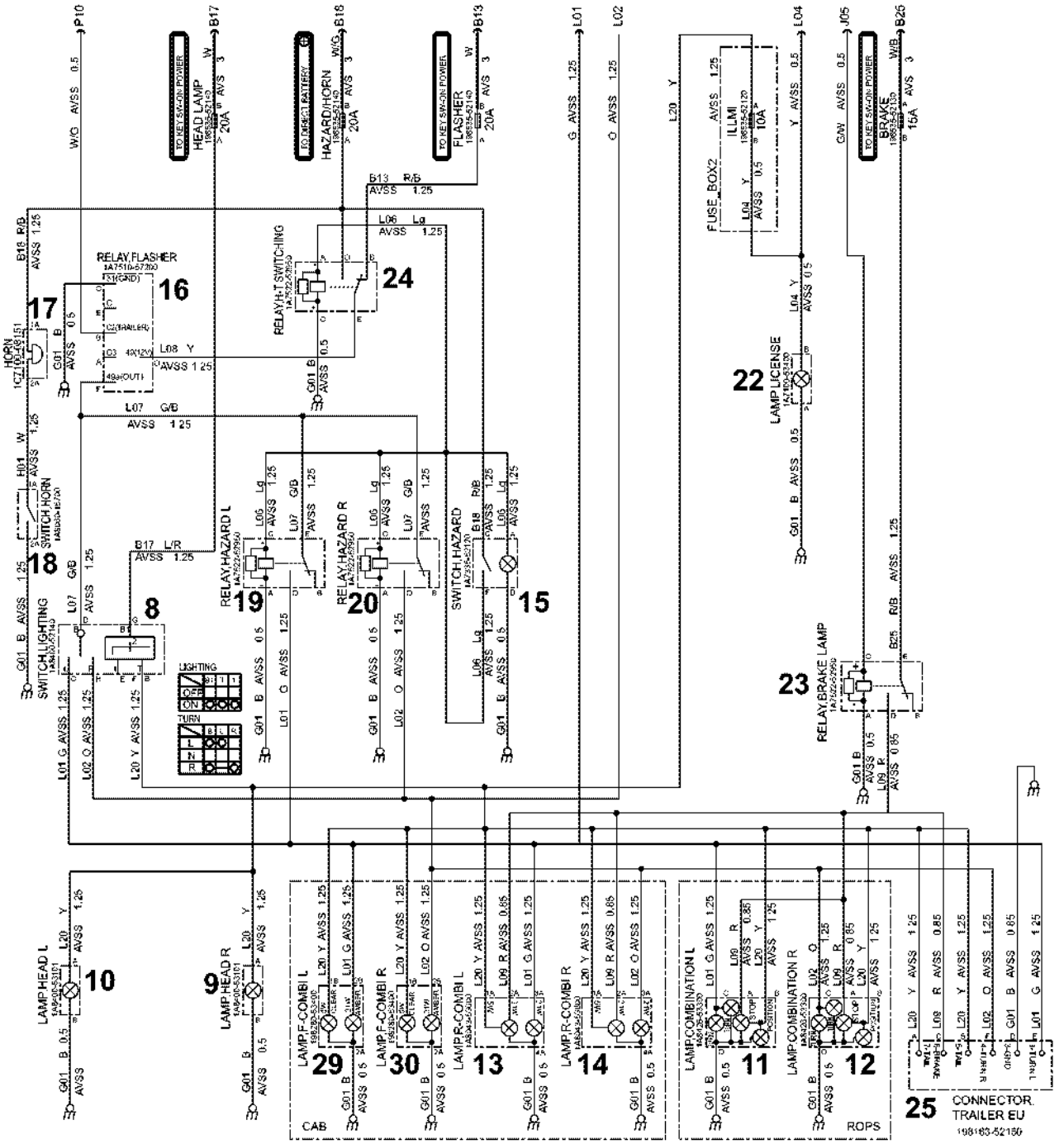
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Back side seat	20	RELAY, HAZARD R	RELAY, HAZARD R 1A7522-52950	Supplies power to the hazard circuit.
Dashboard	21	METER	METER ASSY, COMBINATION 1A8405-56002	Indicates various information and alarm messages.
Back side seat	22	LAMP, LICENSE	LAMP ASSY, LICENSE 1A7100-53400	Illuminate the license plate
Back side seat	23	RELAY, BRAKE LAMP	RELAY, BRAKE LAMP 1A7522-52950	Supplies power to the brake lamp circuit.
Back side seat	24	RELAY, H-T SWITCHING	RELAY, H-T SWITCHING 1A7522-52950	Supplies power to the H-T switching circuit.
Back side seat	25	CONNECTOR, TRAILER EU	COUPLER SET, TRAILER 198163-52150	Supplies power to the trailer
Steering column right	26	FUSE, BRAKE 15A	FUSE, 15A 198535-52130	Protects each electric circuit.
Engine front	27	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Steering column right	28	FUSE, KEY 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Front left of the cabin	29	LAMP, F-COMBI L (For CAB)	LAMP, F COMBINATION 198280-53400	Combination lamp on the front left side
Front right of the cabin	30	LAMP, F-COMBI R (For CAB)	LAMP, F COMBINATION 198280-53400	Combination lamp on the front right side

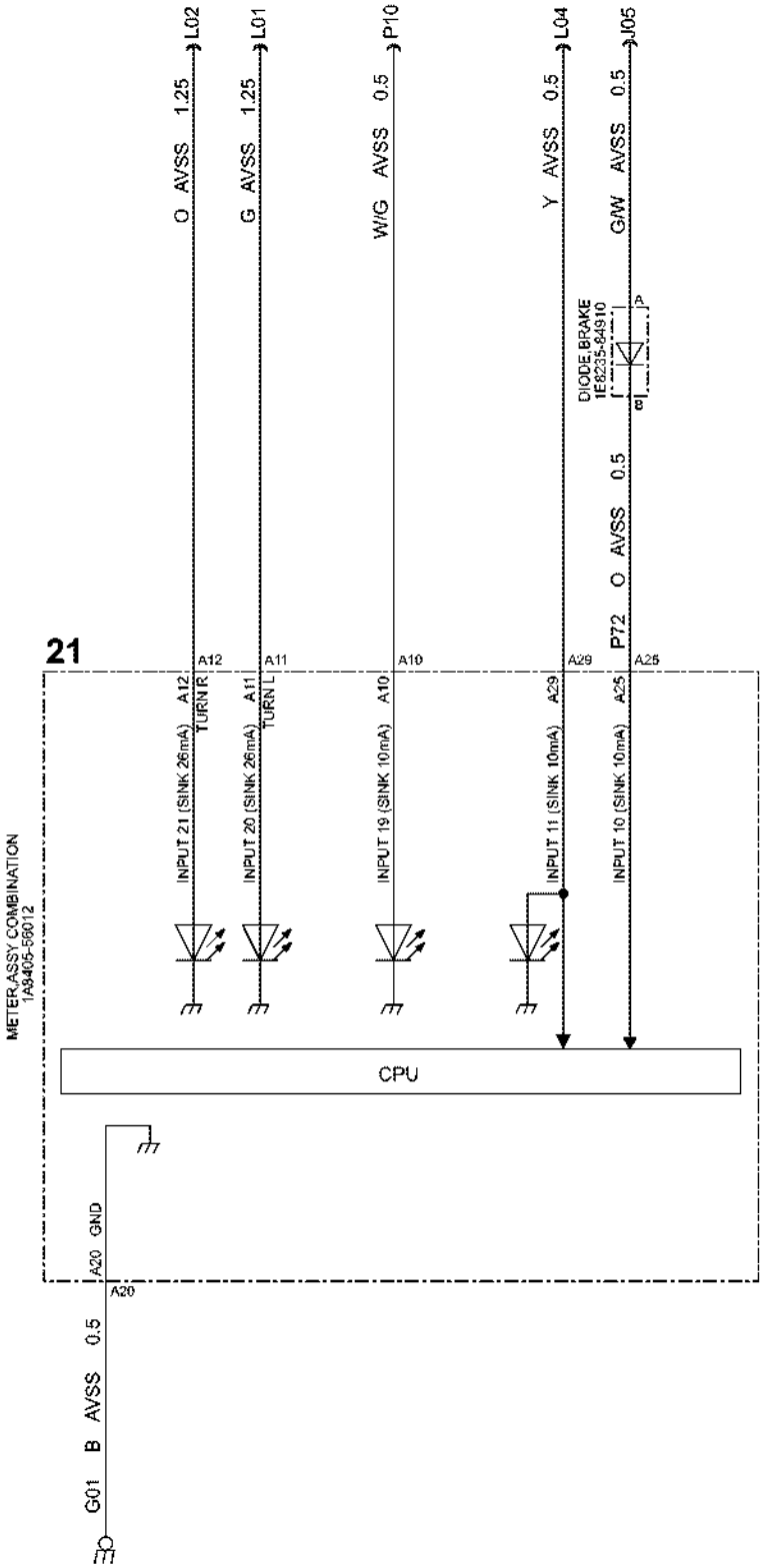
*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram

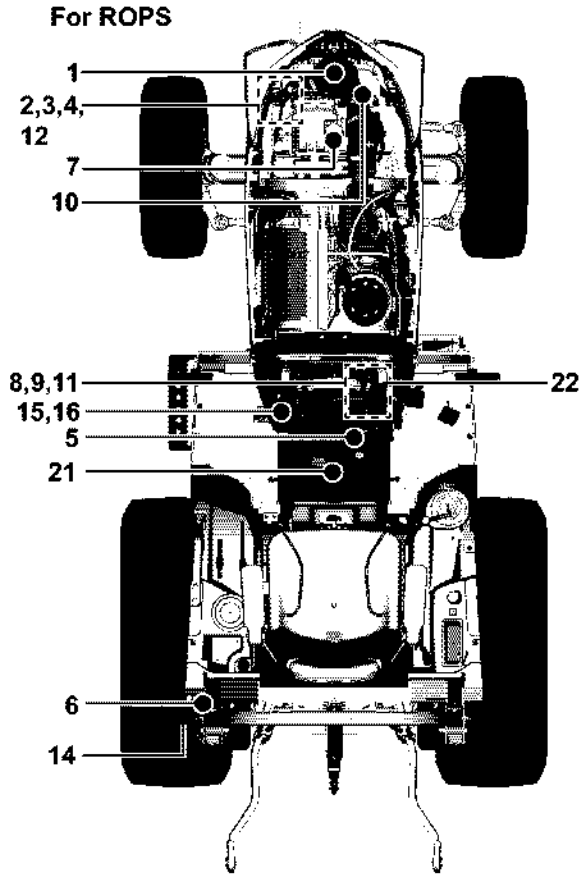


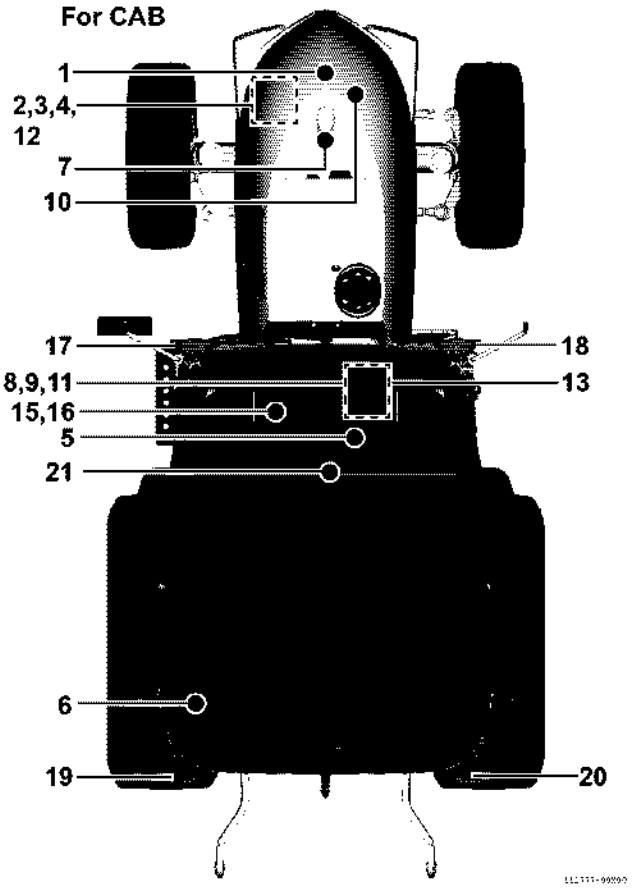

RELAY,FLASHER
HEAD LAMP
HAZARD/HORN
FLASHER
RELAY,H-T SWITCHING
SWITCH,LIGHTING
SWITCH,HORN
RELAY,HAZARD L
RELAY,HAZARD R
SWITCH,HAZARD
FUSE_BOX2
ILLMI
LAMP,LICENSE
RELAY,BRAKE LAMP
BRAKE
LAMP,HEAD L
LAMP,HEAD R
LAMP,F-COMBI L
LAMP,F-COMBI R
LAMP,R-COMBI L
LAMP,R-COMBI R
LAMP,COMBINATION L
LAMP,COMBINATION R
CAB
ROPS
CONNECTOR, TRAILER EU
198163-52150


21
METER ASSY COMBINATION
1A8405-56012
A12
A11
A10
A29
A25
A20
INPUT 21 (SINK 26mA)
INPUT 20 (SINK 26mA)
INPUT 19 (SINK 10mA)
INPUT 11 (SINK 10mA)
INPUT 10 (SINK 10mA)
TURN R
TURN L
CPU
GND
O AVSS 1.25 L02
G AVSS 1.25 L01
W/G AVSS 0.5 P10
Y AVSS 0.5 L04
G/W AVSS 0.5 J05
O AVSS 0.5 P72
DIODE,BRAKE
1E8235-64910
B AVSS 0.5 G01

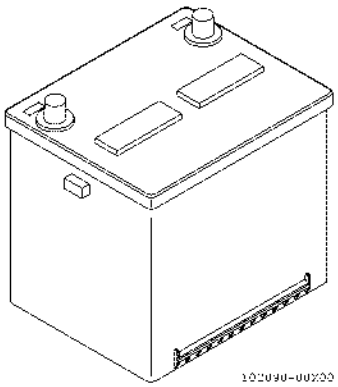
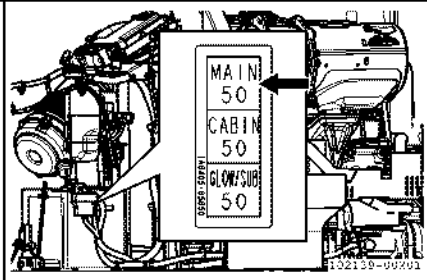
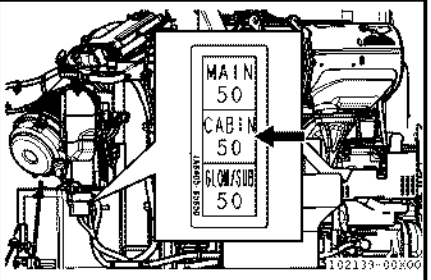
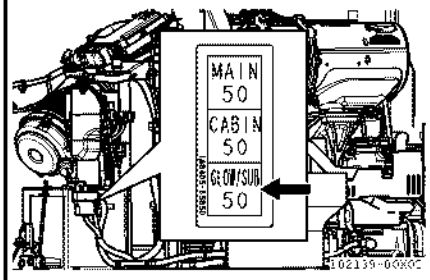
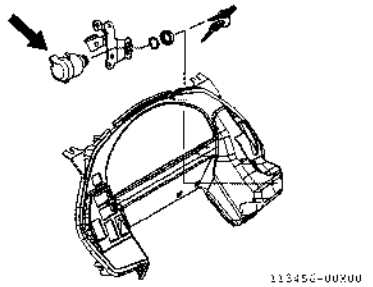
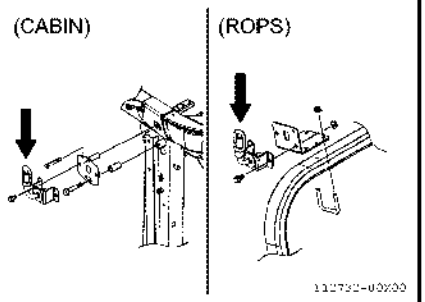
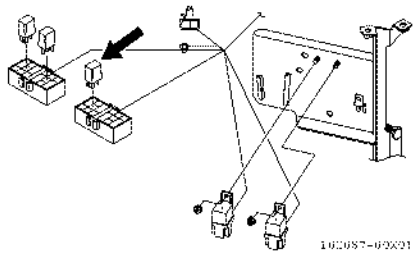
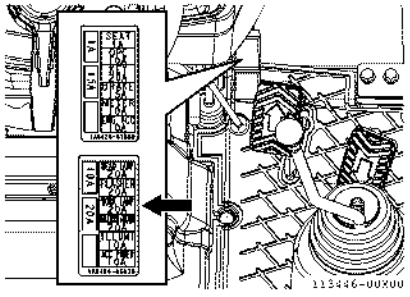
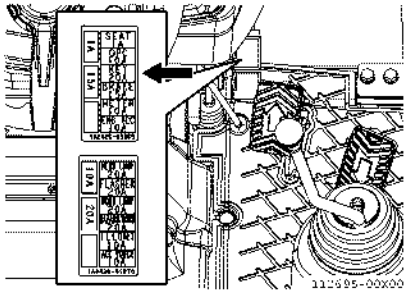
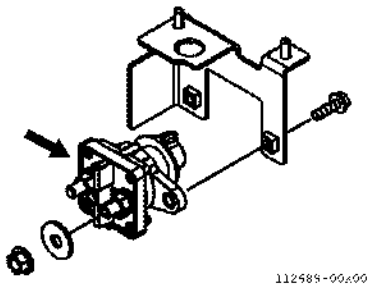
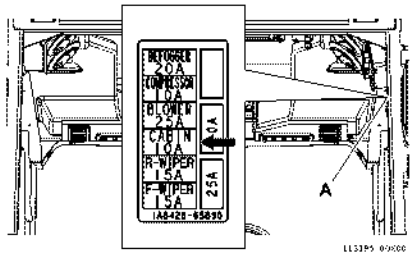
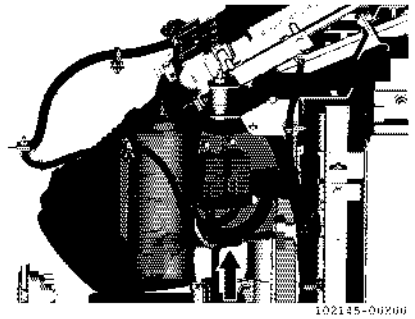
6. Work light circuit

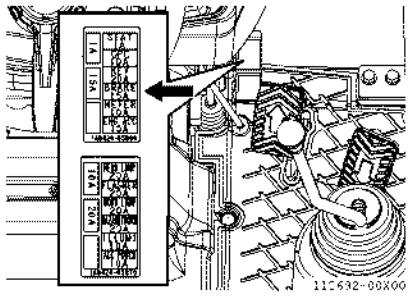
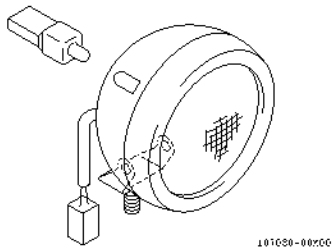
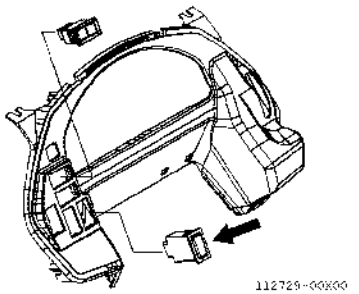
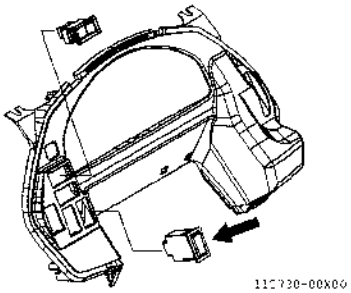
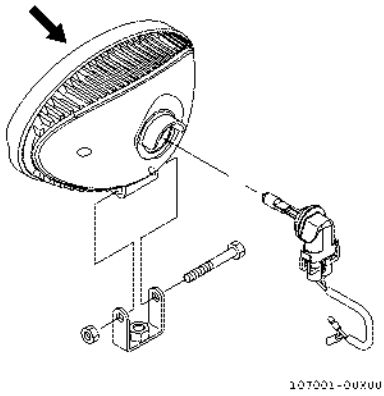
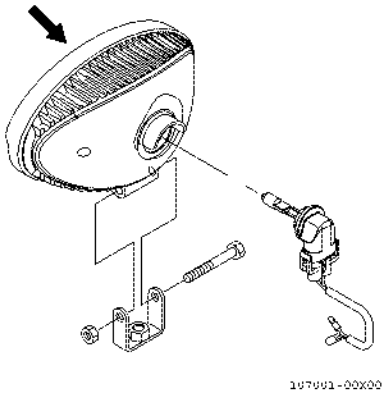
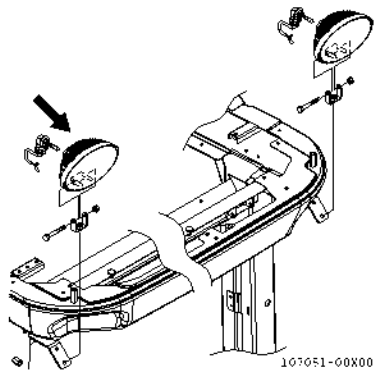
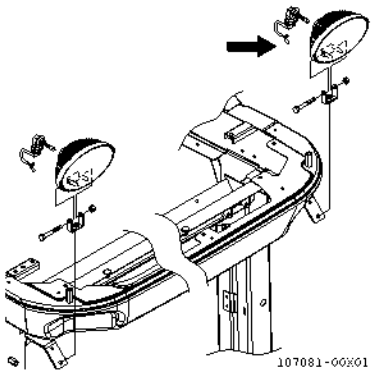
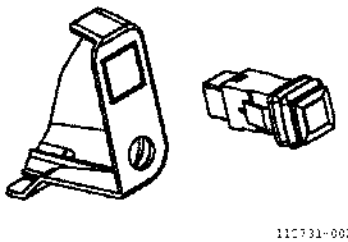
1. Positions and functions of the components





1 BATTERY
2 SLOW BLOW FUSE, MAIN 50A
3 SLOW BLOW FUSE, CABIN 50A
4 SLOW BLOW FUSE, GLOW/SUB 50A
5 KEY SWITCH
6 LAMP, BEACON
7 RELAY, MAIN
8 FUSE, WORK LAMP 20A
9 FUSE, KEY 20A
10 SW, BATTERY CUTOFF
11 FUSE, CABIN 10A (For CAB)
12 DIODE, POWER RELAY
13 FUSE, BRAKE 15A
14 LAMP, WORK L(For Rops)
15 SWITCH, WORK LAMP F
16 SWITCH, WORK LAMP R
17 LAMP, FRONT WORK L (For CAB)
18 LAMP, FRONT WORK R (For CAB)
19 LAMP, REAR WORK L (For CAB) (Optional)
20 LAMP, REAR WORK R (For CAB) (Optional)
21 SWITCH, BEACON

1. BATTERY	2. SLOW BLOW FUSE, MAIN 50A	3. SLOW BLOW FUSE, CABIN 50A
		
4. SLOW BLOW FUSE, GLOW/ SUB 50A	**5. KEY SWITCH**	**6. LAMP, BEACON**
		
7. RELAY, MAIN	**8. FUSE, WORK LAMP 20A**	**9. FUSE, KEY 20A**
		
10. SW, BATTERY CUTOFF	**11. FUSE, CABIN 10A (For CAB)**	**12. DIODE, POWER RELAY**
		

13. FUSE, BRAKE 15A	14. LAMP, WORK L (For Rops)	15. SWITCH, WORK LAMP F
		
16. SWITCH, WORK LAMP R	17. LAMP, FRONT WORK L (For CAB)	18. LAMP, FRONT WORK R (For CAB)
		
19. LAMP, REAR WORK L (For CAB) (Optional)	20. LAMP, REAR WORK R (For CAB) (Optional)	21. SWITCH, BEACON
		

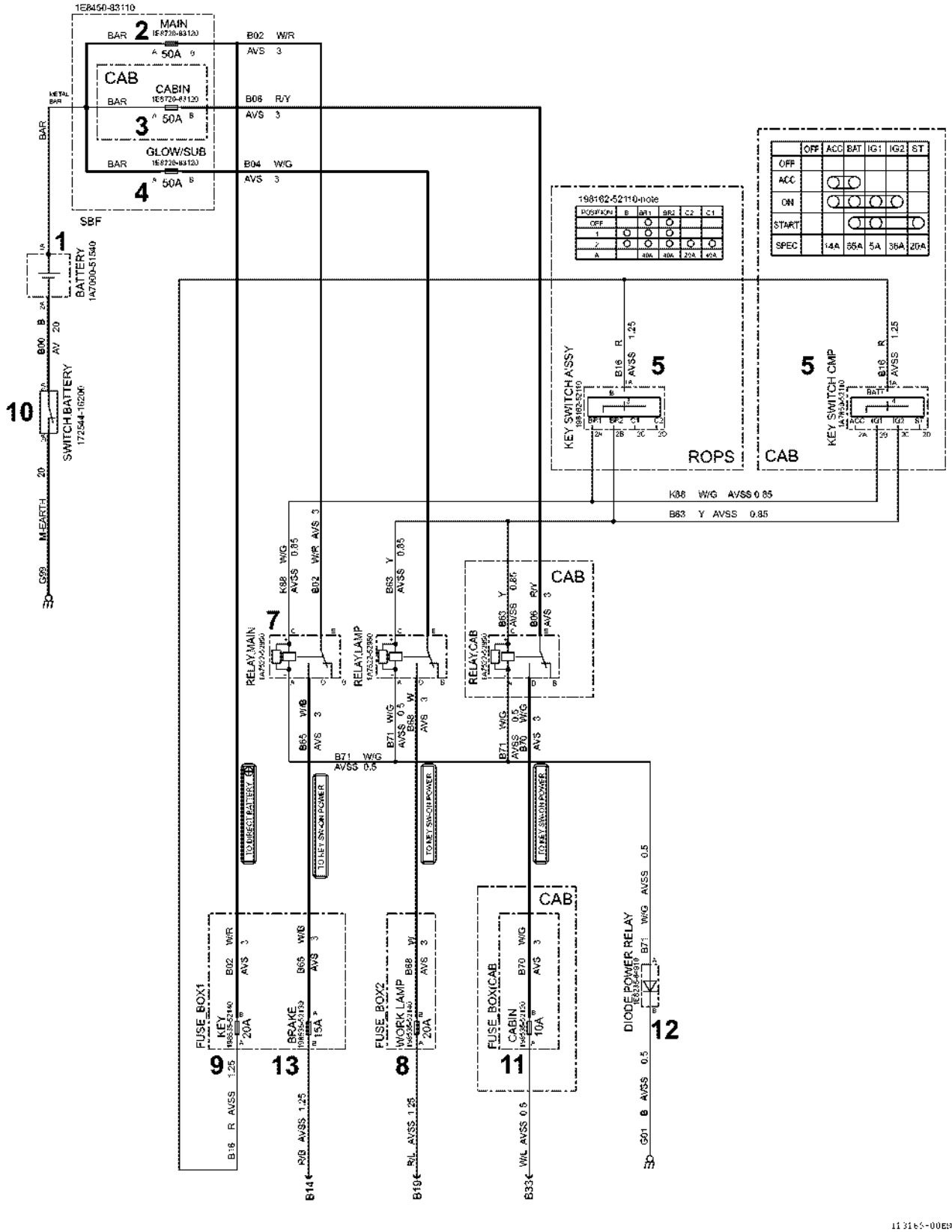
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Front in the hood	1	BATTERY	BATTERY, 80D26R 1A7000-51540	Supplies 12V power.
Front in the hood	2	SLOW BLOW FUSE, MAIN 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Front in the hood	3	SLOW BLOW FUSE, CABIN 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Front in the hood	4	SLOW BLOW FUSE, GLOW/SUB 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Steering column right	5	KEY SWITCH	KEY SWITCH ASSY (For ROPS) 198162-52110 KEY SWITCH CMP (For CAB) 1A7850-52110	Switches between ON and OFF of the battery power to each circuit.
Outside the frame at rear left of the cabin	6	LAMP, BEACON	LAMP, WARNING 1A8476-54500	Rotate the lamp when traveling on the road
Front in the hood	7	RELAY, MAIN	RELAY (MAIN (For CAB) 1A7522-52950	Supplies power to all circuits.
Steering column right	8	FUSE, WORK LAMP 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Steering column right	9	FUSE, KEY 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Engine front	10	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Front in the hood	11	FUSE, CABIN 10A (For CAB)	FUSE, 10A 198535-52120	Protects each electric circuit.
Inside the hood	12	DIODE, POWER RELAY	DIODE, POWER RELAY 1E8235-84910	Prevents backflow of current to the relay (MAIN). (prevents connecting the battery in opposite direction)
Steering column right	13	FUSE, BRAKE 15A	FUSE, 15A 198535-52130	Protects each electric circuit.
Front left of the cabin	14	LAMP, WORK L (For ROPS)	LAMP (WORK L 1A7340-54100	Work lamp on the left side.
Dashboard left	15	SWITCH, WORK LAMP F	SWITCH, WORK LAMP 1A7805-52550	Switches ON and OFF of the work lamp.
Dashboard left	16	SWITCH, WORK LAMP R	SWITCH, WORK LAMP 1A7805-52550	Switches ON and OFF of the work lamp.
Front left of the cabin	17	LAMP, FRONT WORK L (For CAB)	LAMP, FRONT WORK L (For CAB) 1A8484-54200	Work lamp on the front left side.
Front right of the cabin	18	LAMP, FRONT WORK R (For CAB)	LAMP, FRONT WORK R (For CAB) 1A8484-54200	Work lamp on the front right side.
Rear left of the cabin	19	LAMP, REAR WORK L (For CAB) (Optional)	LAMP, REAR WORK L (For CAB) 1A8484-54200	Work lamp on the rear left side. (optional)

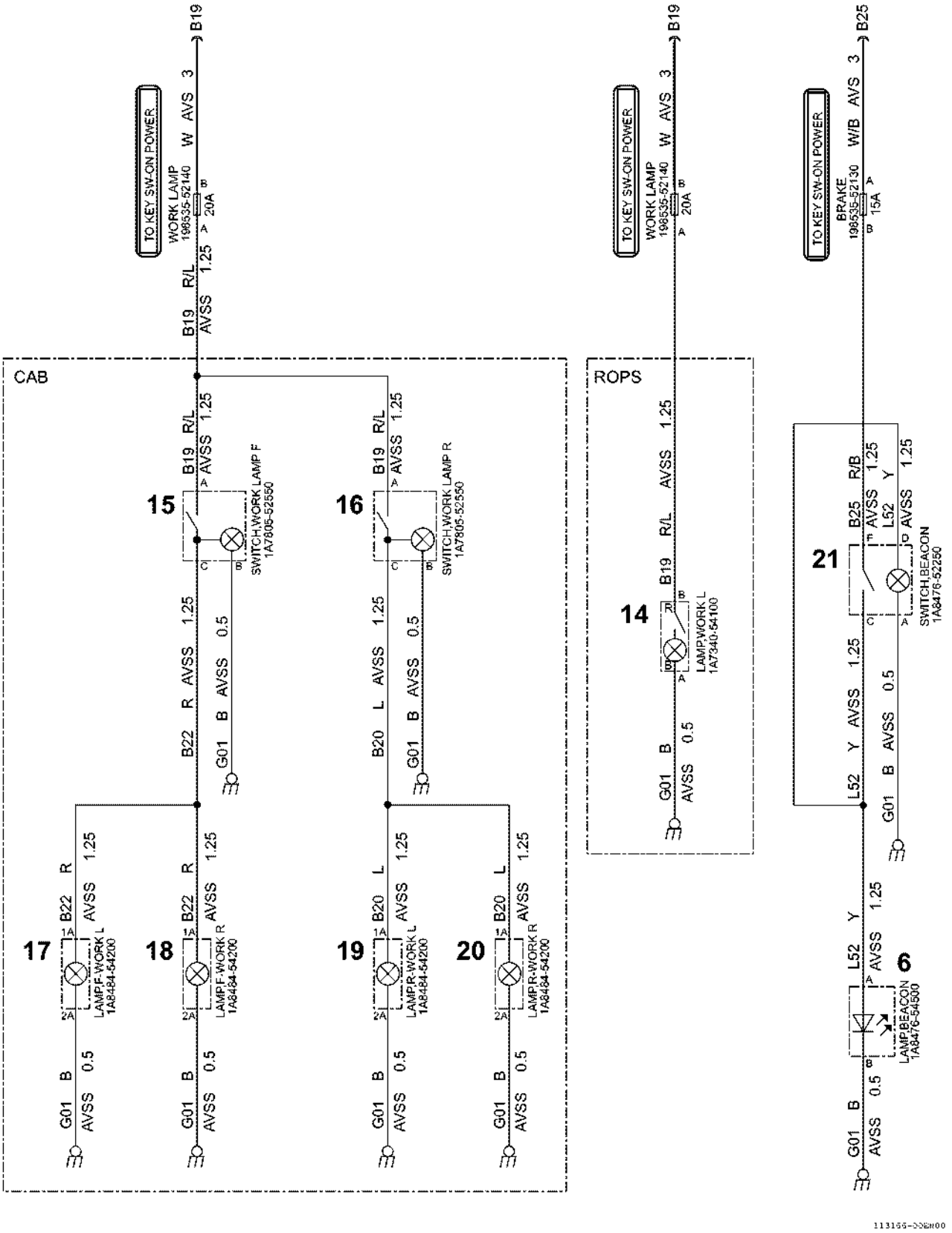
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Rear right of the cabin	20	LAMP, REAR WORK R (For CAB) (Optional)	LAMP, REAR WORK R (For CAB) 1A8484-54200	Work lamp on the rear right side. (optional)
Steering column	21	SWITCH, BEACON	SWITCH ASSY,BEACON 1A8476-52250	Switches ON and OFF of the beacon.

*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram

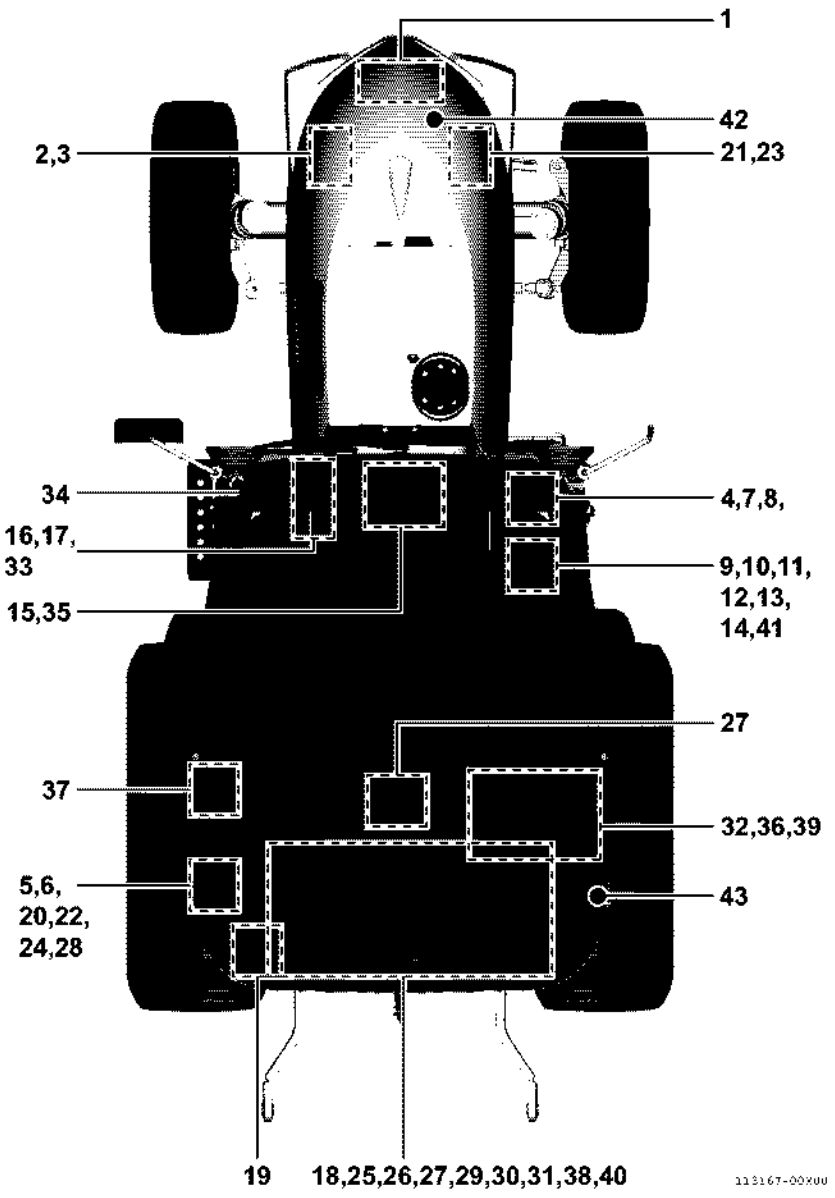


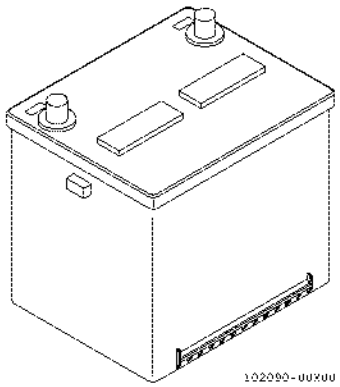
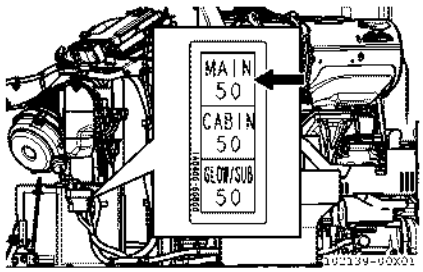
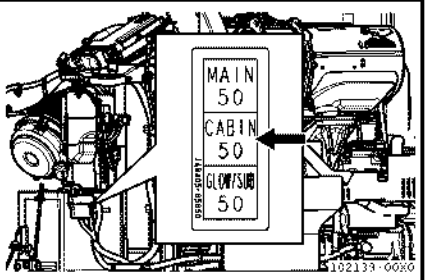
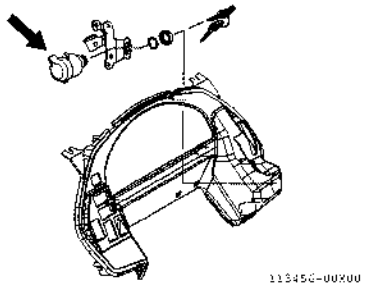
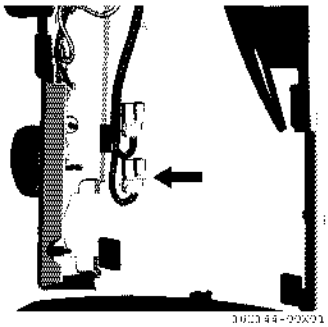
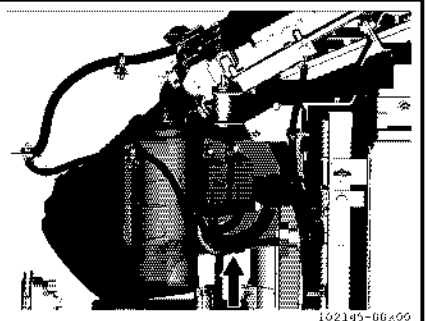
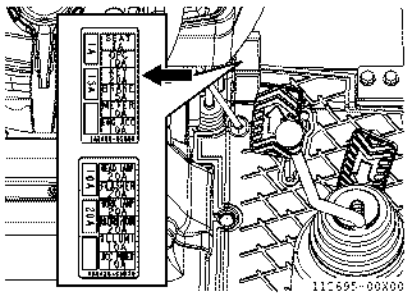
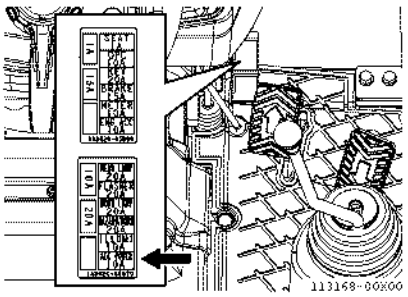
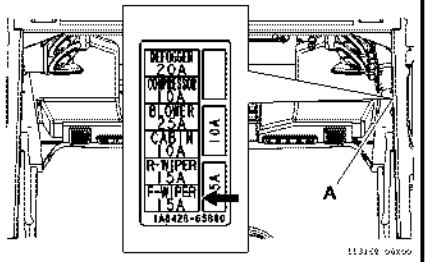
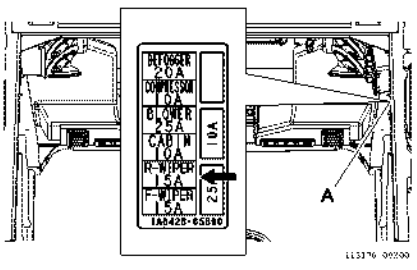
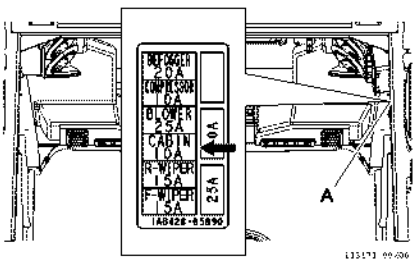
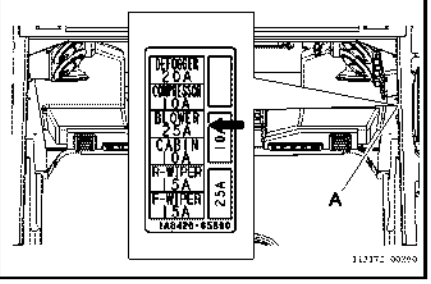

TO KEY SW-ON POWER
WORK LAMP
198535-52140
20A
B19 W AVS 3
B19 R/L AVSS 1.25
CAB
ROPS
15
16
17
18
19
20
14
21
6
SWITCH,WORK LAMP F
1A7805-52550
SWITCH,WORK LAMP R
1A7805-52550
LAMP,F-WORK L
1A8484-54200
LAMP,F-WORK R
1A8484-54200
LAMP,R-WORK L
1A8484-54200
LAMP,R-WORK R
1A8484-54200
LAMP,WORK L
1A7340-54100
SWITCH,BEACON
1A8476-52250
LAMP,BEACON
1A8476-54500
BRAKE
198535-52130
15A
B25 W/B AVS 3
B25 R/B AVSS 1.25
L52 Y AVSS 1.25
G01 B AVSS 0.5
B22 R AVSS 1.25
B20 L AVSS 1.25
113155-00EN00

7. Cabin circuit

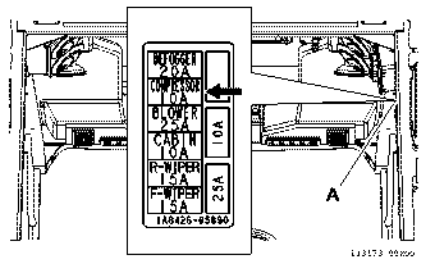
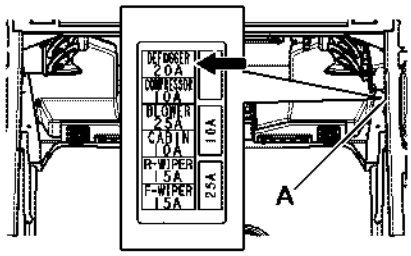
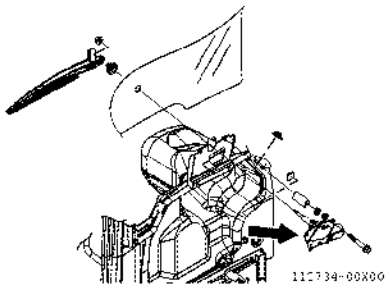
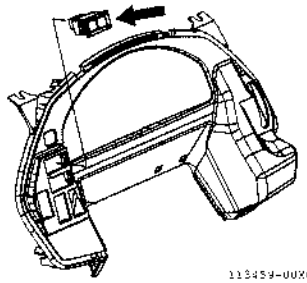
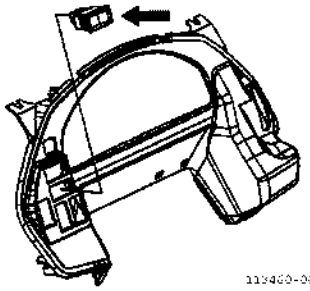
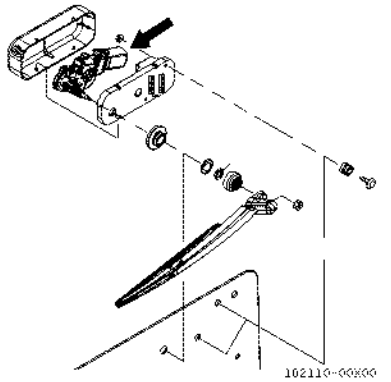
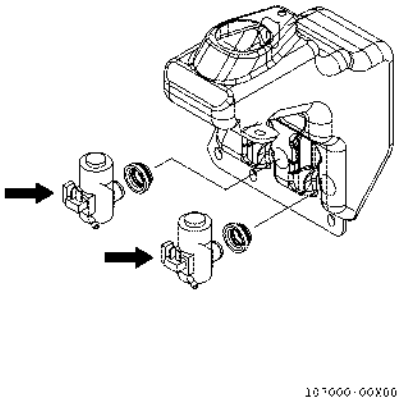
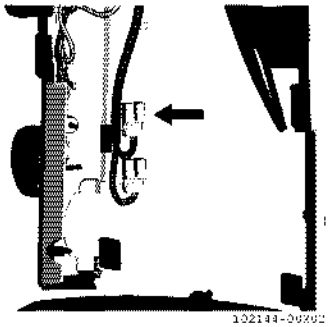
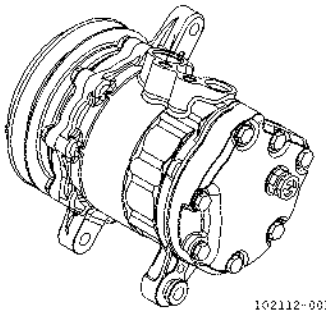
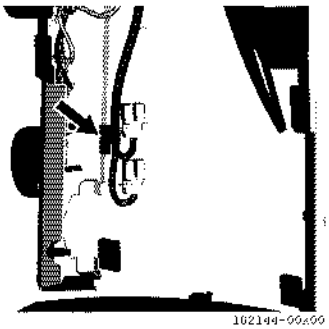
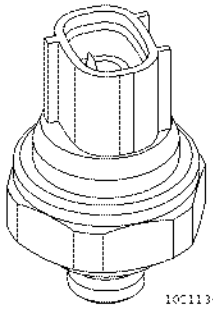
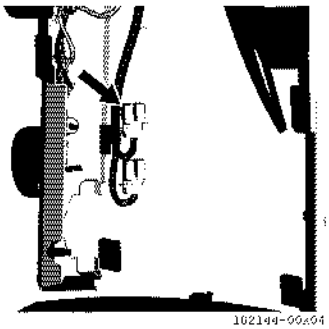
1. Positions and functions of the components

1 BATTERY
2 SLOW BLOW FUSE, FUSE, MAIN
3 SLOW BLOW FUSE, FUSE, CABIN
4 KEY SWITCH
5 MAIN RELAY, CAB
6 DIODE, POWER RELAY
7 FUSE, KEY 20A
8 FUSE, ACC POWER 10A
9 FUSE, FRONT WIPER 15A
10 FUSE, REAR WIPER 15A
11 FUSE, CABIN 10A
12 FUSE, BLOWER 25A
13 FUSE, COMPRESSOR 10A
14 FUSE, DEFFOGER 20A
15 MOTOR, FRONT WIPER
16 SW, FRONT WIPER
17 SW, REAR WIPER (OPTIONAL)
18 MOTOR, REAR WIPER
19 PUMP, WASHER
20 RELAY, COMPRESSOR
21 COMPRESSOR
22 DIODE, COMPRESSOR
23 SW, PRESSURE
24 RELAY, BLOWER MAIN
25 MOTOR, BLOWER
26 BLOWER, RESISTER
27 MOTOR, SERVO MODE
28 VALVE, WATER
29 THERMISTOR, FROST
30 AMP, A/C
31 CONTROL, A/C MANUAL
32 ACTUATOR, AIR MIX
33 SWITCH, DEFOGGER
34 ANTENNA
35 CD RADIO
36 SPEAKER L
37 SPEAKER R
38 LAMP, ROOM
39 RELAY, DEFOGGER
40 DEFOGGER
41 FUSE, OPC 10A
42 SW, BATTERY CUTOFF
43 COIL, NOISE CUT



1. BATTERY	2. SLOW BLOW FUSE, MAIN	3. SLOW BLOW FUSE, CABIN
		
4. KEY SWITCH	**5. MAIN RELAY, CAB**	**6. DIODE, POWER RELAY**
		
7. FUSE, KEY 20A	**8. FUSE, ACC POWER 10A**	**9. FUSE, FRONT WIPER 15A**
		
10. FUSE, REAR WIPER 15A	**11. FUSE, CABIN 10A**	**12. FUSE, BLOWER 25A**
		

12

13. FUSE, COMPRESSOR 10A	14. FUSE, DEFFOGER 20A	15. MOTOR, FRONT WIPER
		
16. SW, FRONT WIPER	17. SW, REAR WIPER (OPTIONAL)	18. MOTOR, REAR WIPER
		
19. PUMP, WASHER	20. RELAY, COMPRESSOR	21. COMPRESSOR
		
22. DIODE, COMPRESSOR	23. SW, PRESSURE	24. RELAY, BLOWER MAIN
		

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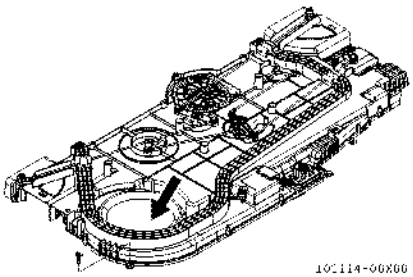
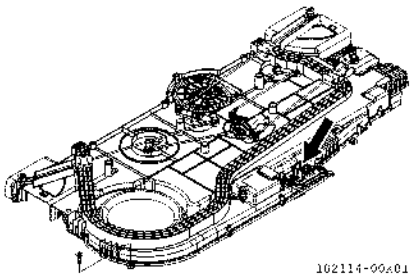
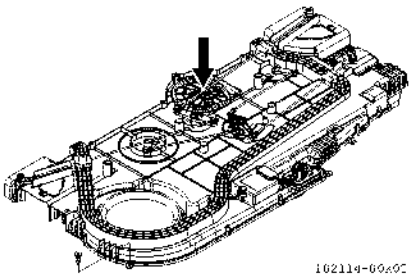
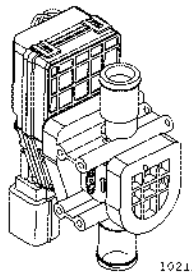
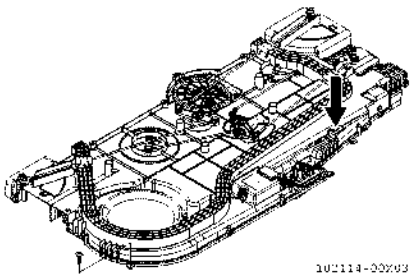
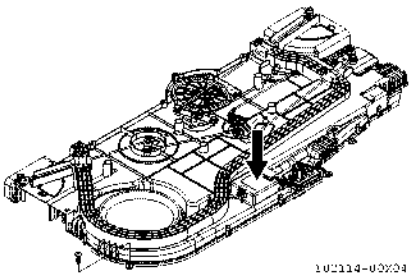
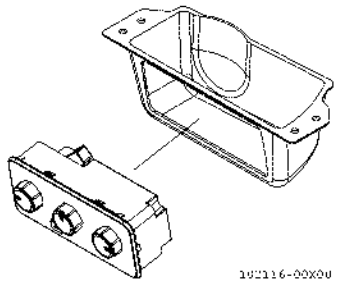
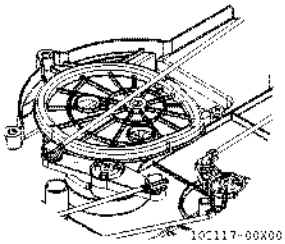
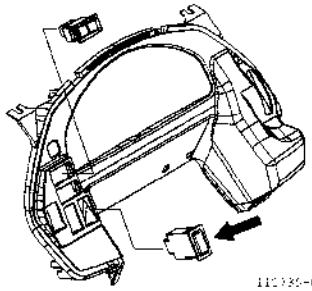
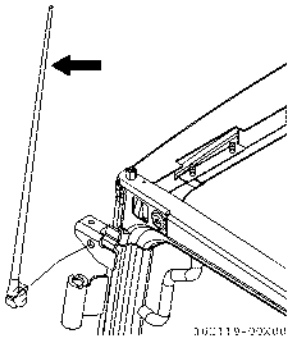
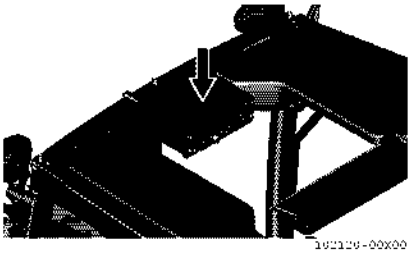
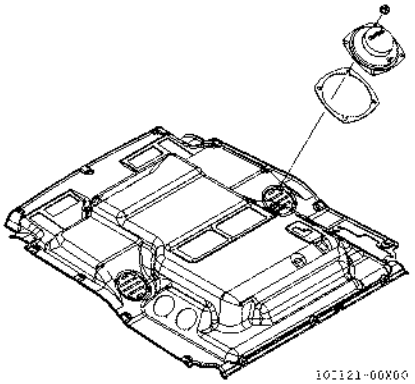
		
28. VALVE, WATER	29. THERMISTOR, FROST	30. AMP, A/C
		
31. CONTROL, A/C MANU	32. ACTUATOR, AIR MIX	33. SWITCH, DEFOGGER
		
34. ANTENNA	35. CD RADIO	36. SPEAKER L
		

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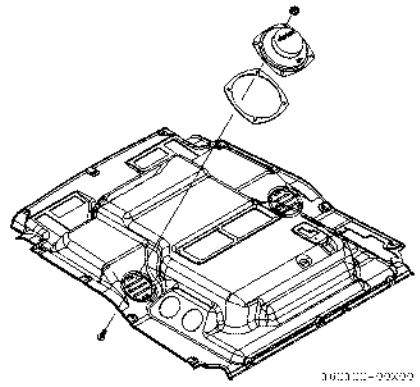
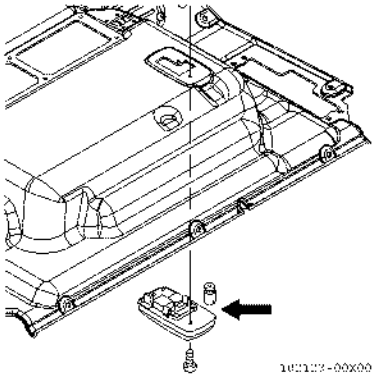
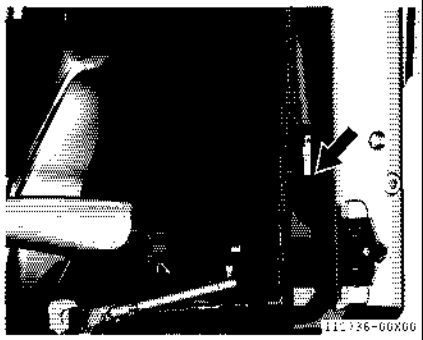
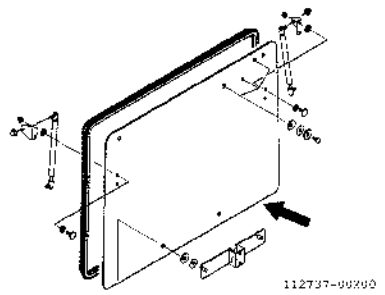
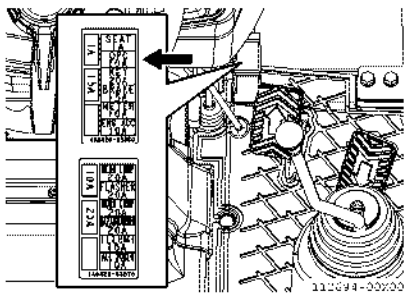
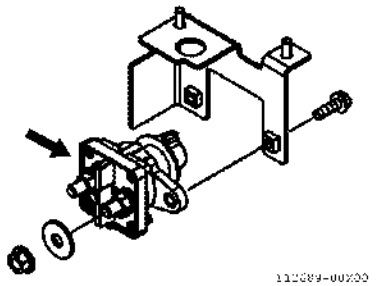
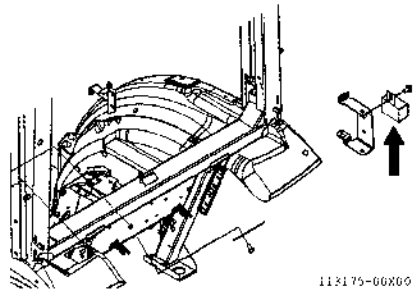
37. SPEAKER R	38. LAMP, ROOM	39. RELAY, DEFOGGER
		
40. DEFOGGER	**41. FUSE, OPC 10A**	**42.SW, BATTERY CUTOFF**
		
43. COIL, NOISE CUT		
		

Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Front in the hood	1	BATTERY	BATTERY 80D26R 1A7000-51540	Supplies 12V power.
Front in the hood	2	SLOW BLOW FUSE, SBF, MAIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Front in the hood	3	SLOW BLOW FUSE, SBF, CABIN	FUSE, 50A 1E8720-83120	Protects each electric circuit.
Steering column right	4	KEY SWITCH	KEY SWITCH CMP (For CAB) 1A7850-52110	Switches between ON and OFF of the battery power to each circuit.
Inside the frame at rear left of the cabin	5	RELAY, CAB	RELAY, CAB (For CAB) 1A7522-52950	Supplies power to the back buzzer circuit.
Engine front	6	DIODE, POWER RELAY	DIODE, POWER RELAY 1E8235-84910	Prevents backflow of current to the relay (MAIN). (prevents connecting the battery in opposite direction)
Dashboard bottom right	7	FUSE, KEY 20A	FUSE, 20A 198535-52140	Protects each electric circuit.
Dashboard bottom right	8	FUSE, ACC POWER 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Inside the frame at front right of the cabin	9	FUSE, FRONT WIPER 15A	FUSE, 15A 198535-52130	Protects each electric circuit.
Inside the frame at front right of the cabin	10	FUSE, REAR WIPER 15A	FUSE, 15A 198535-52130	Protects each electric circuit.
Inside the frame at front right of the cabin	11	FUSE, CABIN 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Inside the frame at front right of the cabin	12	FUSE, BLOWER 25A	FUSE, 25A 1A7450-52180	Protects each electric circuit.
Inside the frame at front right of the cabin	13	FUSE, COMPRESSOR 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Inside the frame at front right of the cabin	14	FUSE, DEFFOGER 20A	FUSE, 5A 198535-52140	Protects each electric circuit.
Windshield	15	MOTOR, FRONT WIPER	WIPER MOTOR (FRONT 1A7210-86610	Drives the windshield wipers.
Dashboard left	16	SW, FRONT WIPER	SWITCH, FRONT WIPER 1A8400-52530	Operates the windshield wipers and washer fluid.
Dashboard left	17	SW, REAR WIPER (Optional)	SW, REAR WIPER 1A8060-52530	Operates the rear window wipers and washer fluid. (Optional)
Rear window	18	MOTOR, REAR WIPER	WIPER MOTOR(REAR (For CAB) 1A7210-86300	Drives the rear window wipers. I(Optional)
Rear left of the cabin	19	PUMP, WASHER	PUMP WASHER 198127-86710	Tank and pump for washer fluid of the front and rear (optional) windows.

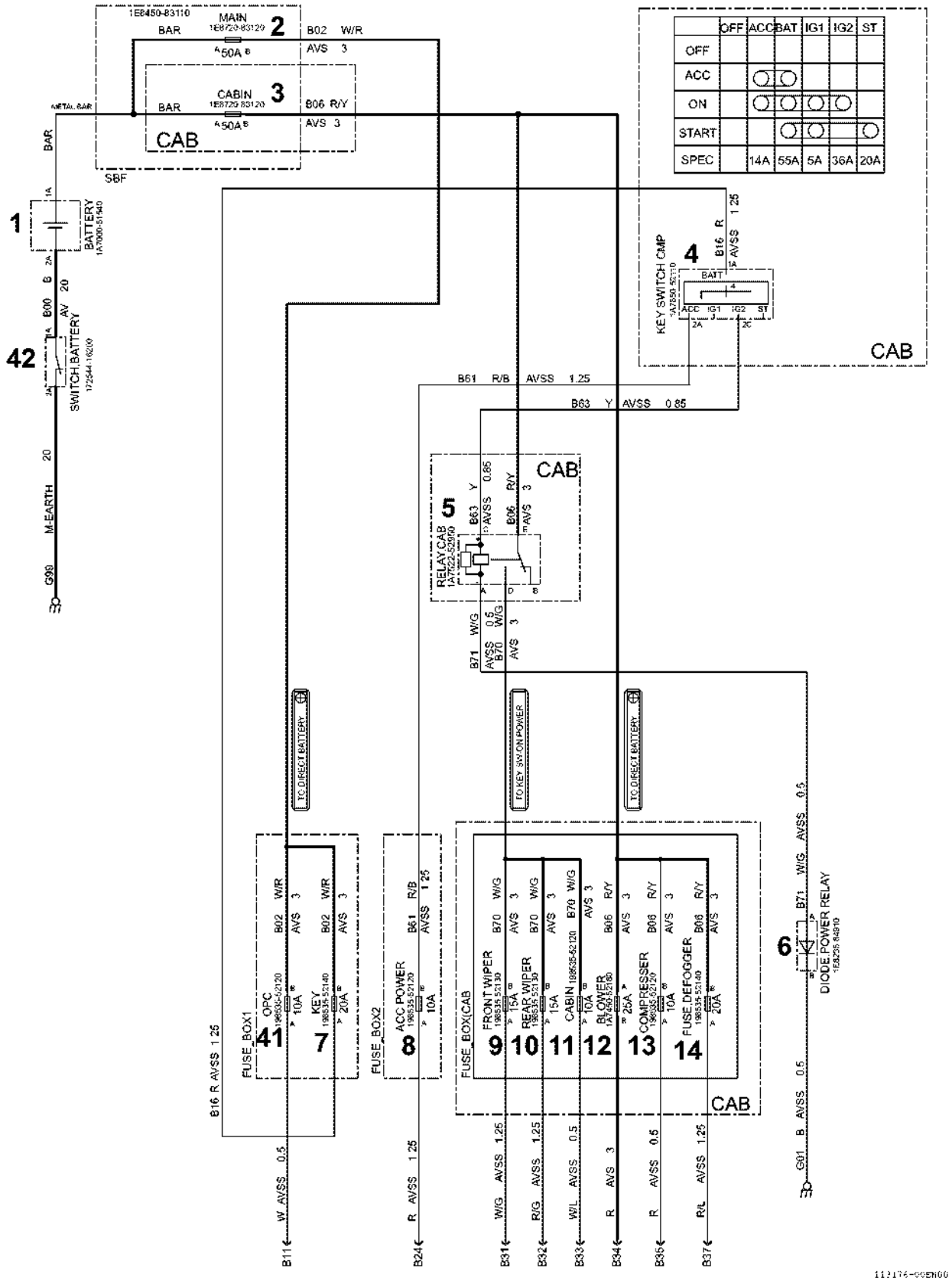
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Inside the frame at rear left of the cabin	20	RELAY, COMPRESSOR	COMPRESSOR RELAY 1A7522-52950	Supplies power to the compressor circuit.
Inside the engine room	21	COMPRESSOR	COMPRESSOR ASSY 1A8484-87900	Compresses the refrigerant evaporated inside the evaporator, and discharges to the condenser.
Inside the hood	22	DIODE, COMPRESSOR	DIODE 3A, SURGE ABSOBER 1E8235-84910	Absorbs the surge pressure of the compressor.
Inside the engine room	23	SW, PRESSURE	SWITCH, PRESSURE 1A8484-87310	Detects the pressure inside the receiver dryer. When detecting a malfunction, stops the compressor.
Inside the frame at rear left of the cabin	24	RELAY, BLOWER MAIN	RELAY, BLOWER MAIN 1A7522-52950	Supplies power to the air conditioner blower circuit.
Rear on the ceiling	25	MOTOR, BLOWER	MOTOR, BLOWER 1A8484-87260	Drives the blower.
Cabin rear	26	BLOWER, RESISTER	BLOWER, REGISTER 1A8484-87320	Controls the current of the blower circuit.
Rear on the ceiling	27	MOTOR, SERVO MODE	MOTOR, SERVO MODE 1A8484-87410	Switches the blow-out port of the air conditioner.
Cabin rear	28	VALVE, WATER	VALVE, WATER 1A8484-87280	Controls the flow in the heater hose for the air conditioner.
Rear on the ceiling	29	THERMISTOR, FROST	EVAP SENSER 1A8484-87270	Senses the temperature change of the evaporator.
Upper rear of the cabin	30	AMP, A/C	AMP, A/C 1A8484-87330	Controls the air conditioner.
Under the right side of the seat	31	CONTROL, A/C MANUAL	CONTROL, A/C MANU 1A8420-87300	Switches ON/OFF and controls blow power of the air conditioner. (manual type)
Rear on the ceiling	32	ACTUATOR, AIR MIX	ACTUATOR, AIR MIX 1A8485-87500	Changes the proportion of the warm and cold air
Left of dashboard	33	SWITCH, DEFOGGER	SWITCH, DEFOGGER 1A7805-52600	Switches ON and OFF of the defogger.
Front left of the roof	34	ANTENNA	ANTENNA 198463-86771	Antenna
Upper left inside the cabin	35	CD RADIO	CD RADIO 1A8485-86000	Radio with CD player (optional)
Rear left on the ceiling	36	SPEAKER L	SPEAKER L (For CAB) 1A8110-86920	Left speaker
Rear left on the ceiling	37	SPEAKER R	SPEAKER R (For CAB) 1A8110-86920	Right speaker
Rear left on the ceiling	38	LAMP, ROOM	LAMP (ROOM 1A7470-86750	Room lamp
Inside the frame at rear left of the cabin	39	RELAY, DEFOGGER	RELAY, DEFOGGER 1A7522-52950	Supplies power to the defogger circuit.

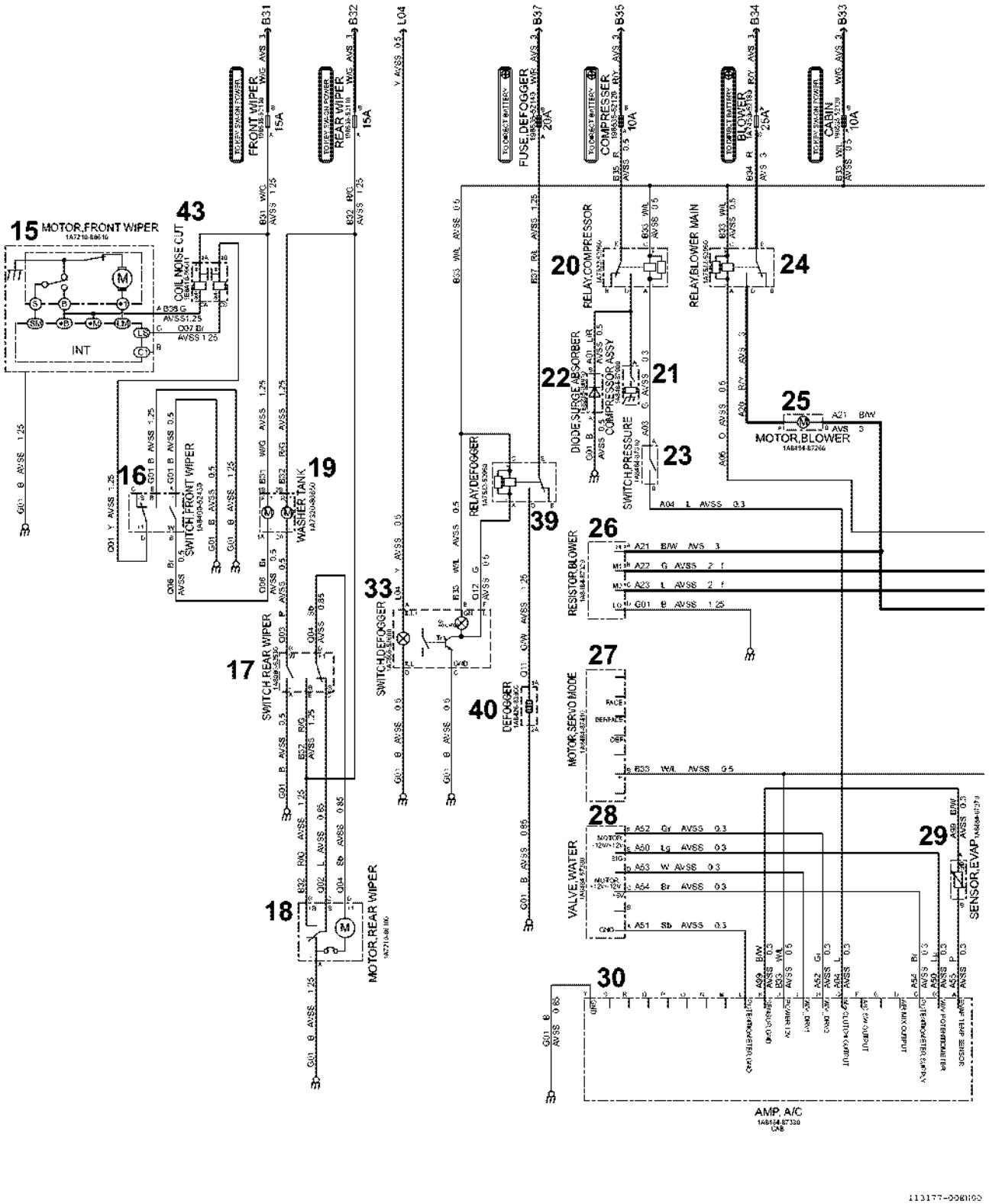
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Rear window glass of cabin	40	DEFOGGER	DEFOGGER 1A8426-83600	Anti-fogging of rear window
Fuse box-1	41	FUSE, OPC 10A	FUSE, 10A 198535-52140	Protects each electric circuit.
Engine front	42	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Windshield	43	COIL, NOISE CUT	COIL, NOISE CUT 1E6A10-99011	Prevent radio noise from the motor

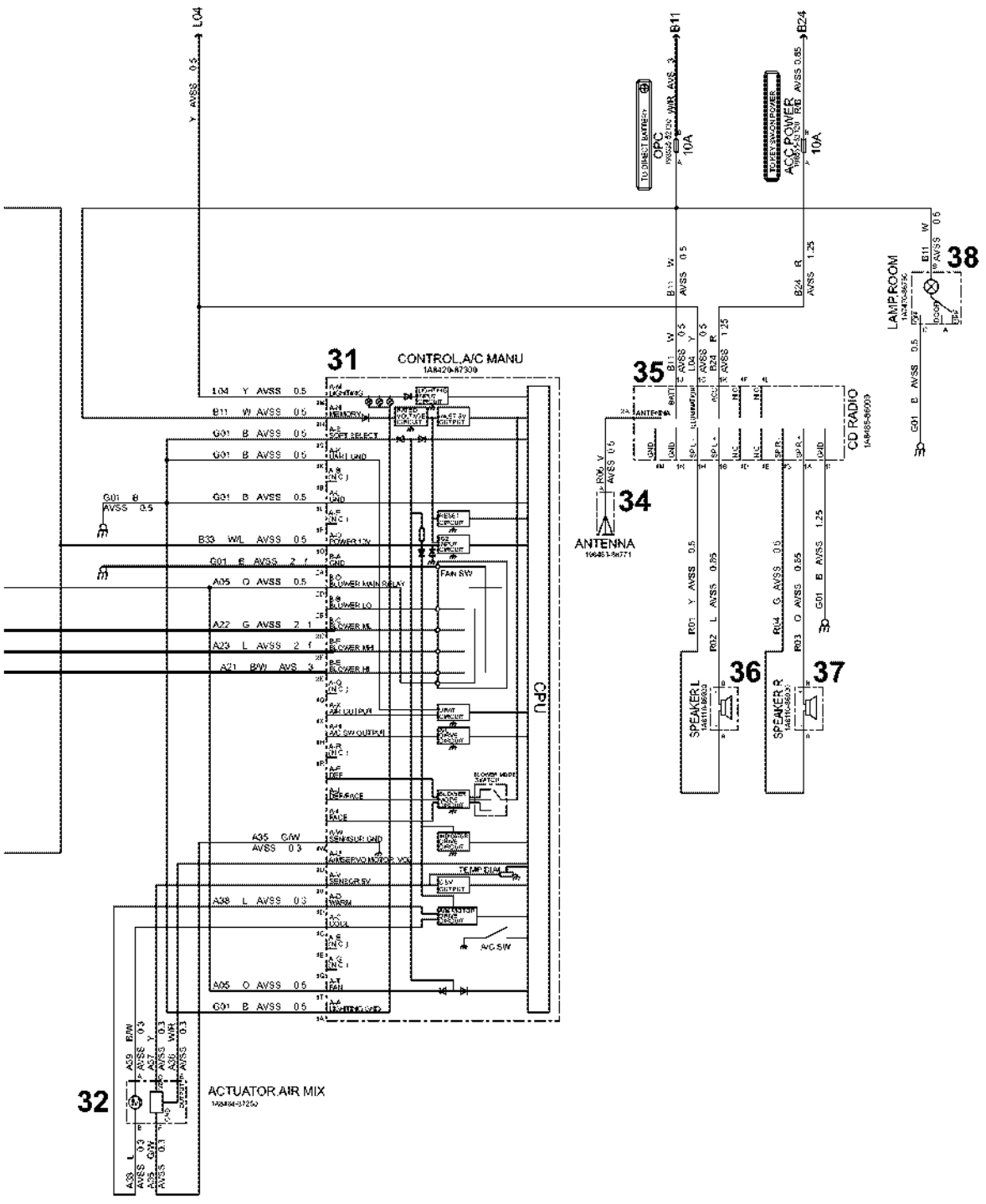
*Parts code is noted for reference. Refer to the parts catalog when ordering parts.

*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram



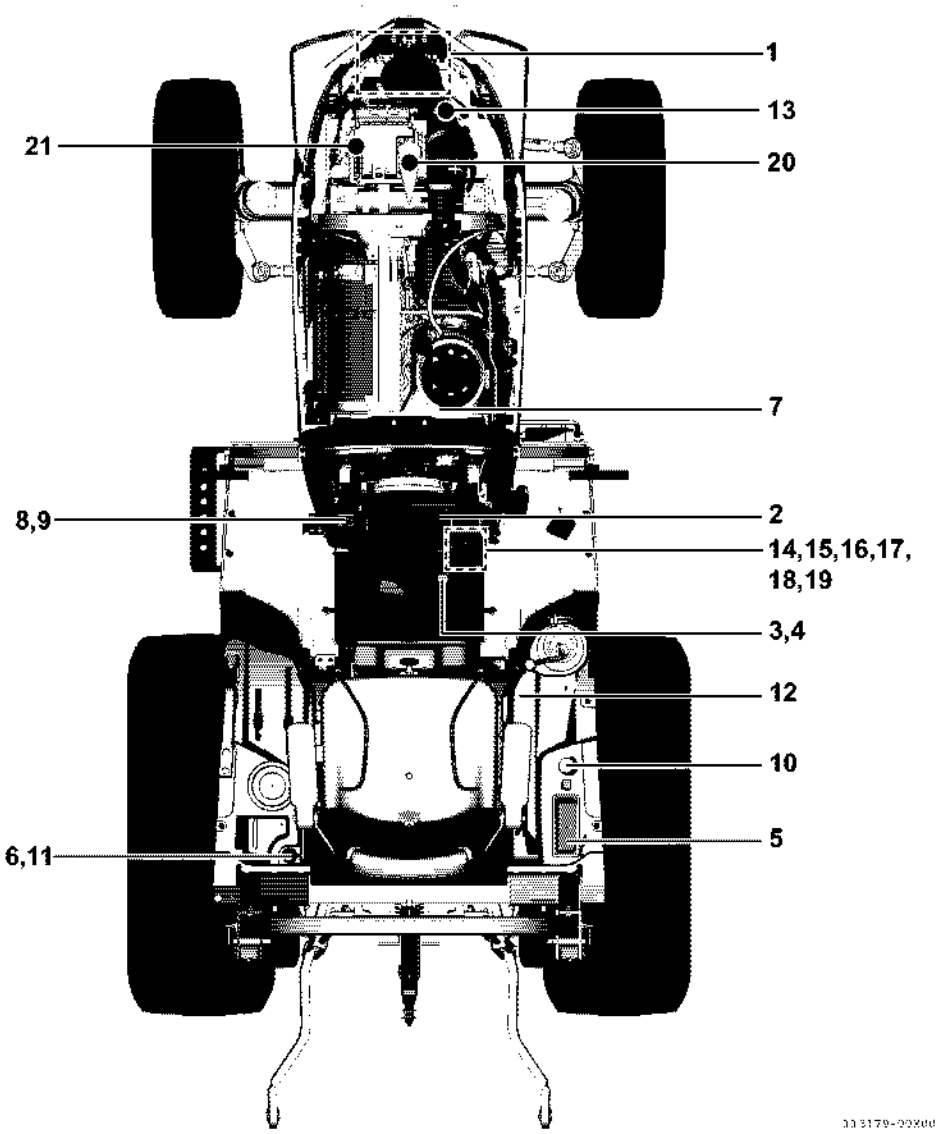

15 MOTOR,FRONT WIPER
43 COIL,NOISE CUT
INT
16 SWITCH,FRONT WIPER
19 WASHER TANK
17 SWITCH,REAR WIPER
18 MOTOR,REAR WIPER
33 SWITCH,DEFOGGER
RELAY,DEFOGGER
40 DEFOGGER
39
FUSE,DEFOGGER 20A
COMPRESSER 10A
BLOWER 25A
CABIN 10A
FRONT WIPER 15A
REAR WIPER 15A
20 RELAY,COMPRESSOR
22 DIODE,SURGE ABSORBER
COMPRESSOR ASSY
21
SWITCH,PRESSURE
23
RELAY,BLOWER MAIN
24
25 MOTOR,BLOWER
26 RESISTOR,BLOWER
27 MOTOR,SERVO MODE
28 VALVE,WATER
29 SENSOR,EVAP
30
AMP,A/C
113177-0060100



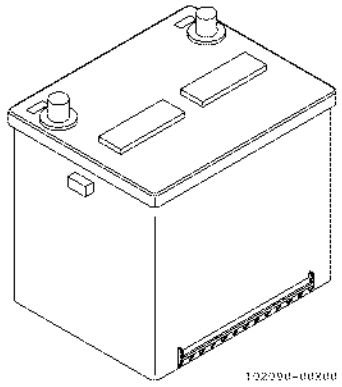
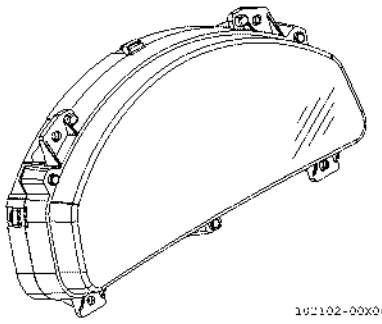
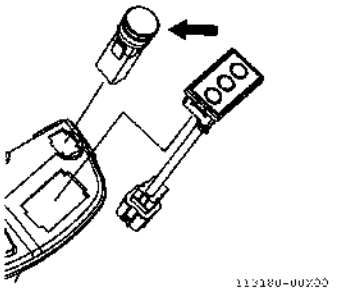
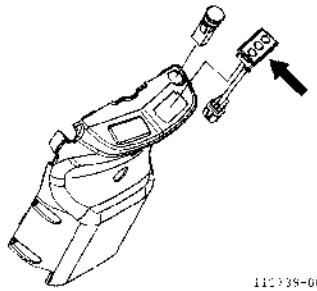
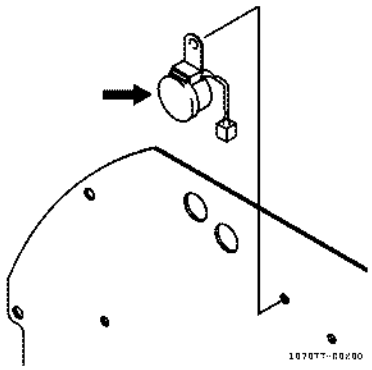
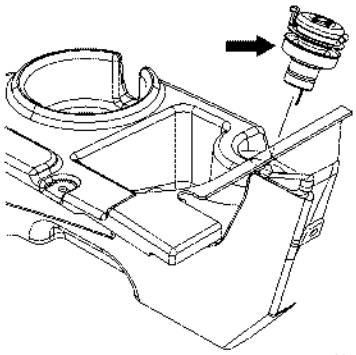
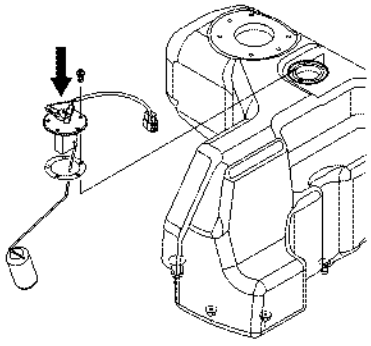
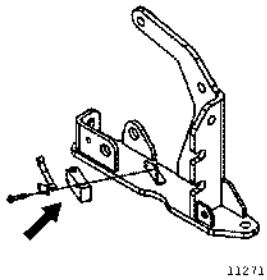
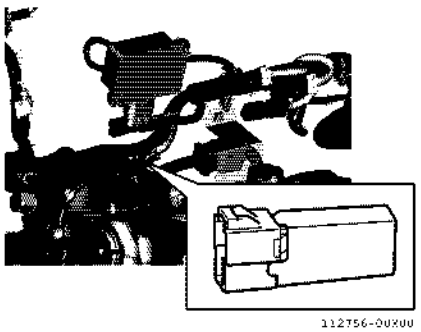
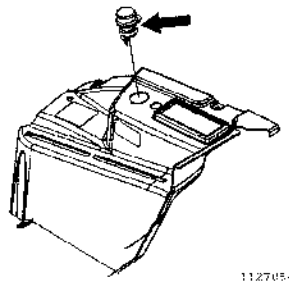
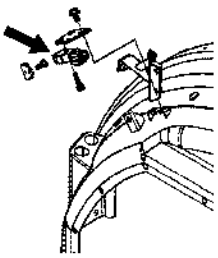
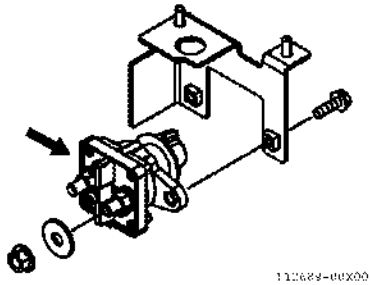
113178-000100

8. Display circuit

1. Positions and functions of the components



1 BATTERY
2 METER, COMBINATION
3 SW, DPF REGENERATION
4 SW, DISPLAY
5 BUZZER, BACK
6 SOCKET, POWER SOURCE
7 SENSOR, FUEL GAUGE
8 SW, PARKING
9 REVERSER-N, SW
10 SW, PTO
11 RESISTOR, PTO SW
12 SW, 3-POINT HITCH CONTROL LEVER
13 SW, BATTERY CUTOFF
14 FUSE, METER 10A
15 FUSE, ILLMI 10A
16 KEY SWITCH
17 FUSE, OPC 10A
18 FUSE, ENG ACC 10A
19 FUSE, ACC POWER 10A
20 RELAY, MAIN
21 SLOW BLOW FUSE, MAIN 50A

1. BATTERY	2. METER, COMBINATION	3. SW, DPF REGENERATON
		
4. SW, DISPLAY	5. BUZZER, BACK	6. SOCKET, POWER SOURCE
		
7. SENSOR, FUEL GAUGE	8. SW, PARKING	9. RESISTOR, REVERSER-N SW
		
10. SW, PTO	12. SW, 3-POINT HITCH CONTROL LEVER	13. SW, BATTERY CUTOFF
		

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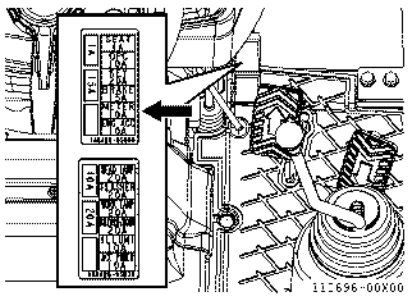
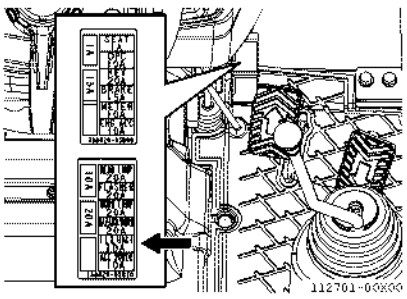
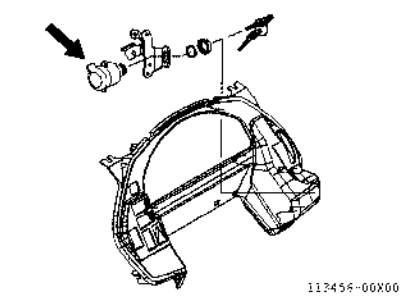
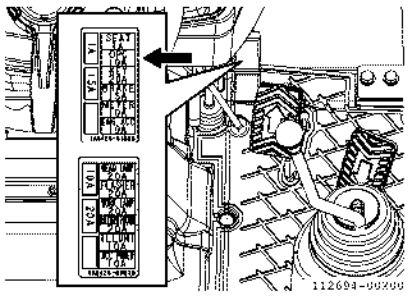
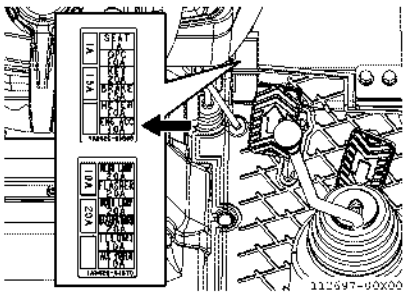
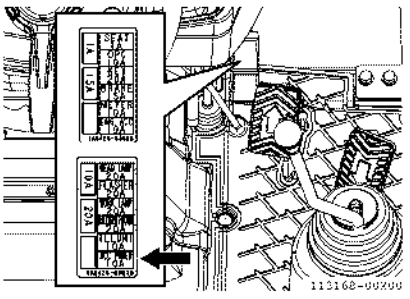
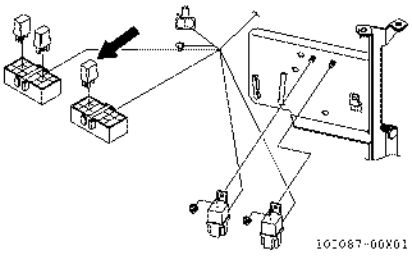
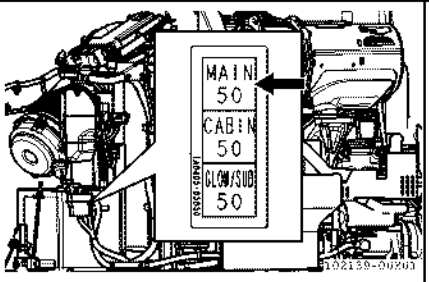
14. FUSE, METER 10A	15. FUSE, ILLMI 10A	16. KEY SWITCH
		
17.FUSE, OPC 10A	**18.FUSE, ENG ACC 10A**	**19.FUSE, ACC POWER 10A**
		
20.RELAY, MAIN	**21 SLOW BLOW FUSE, MAIN**	
		

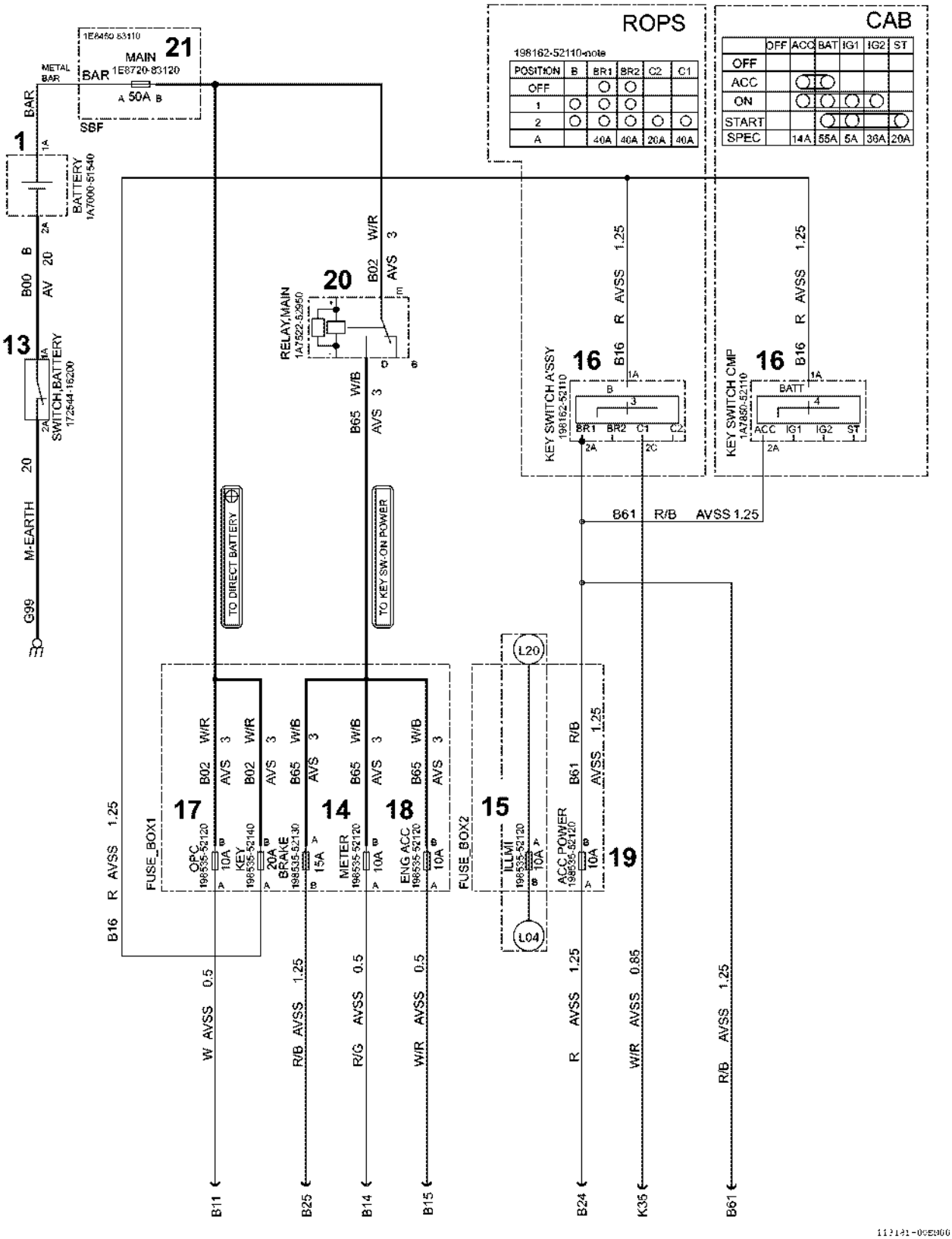
12

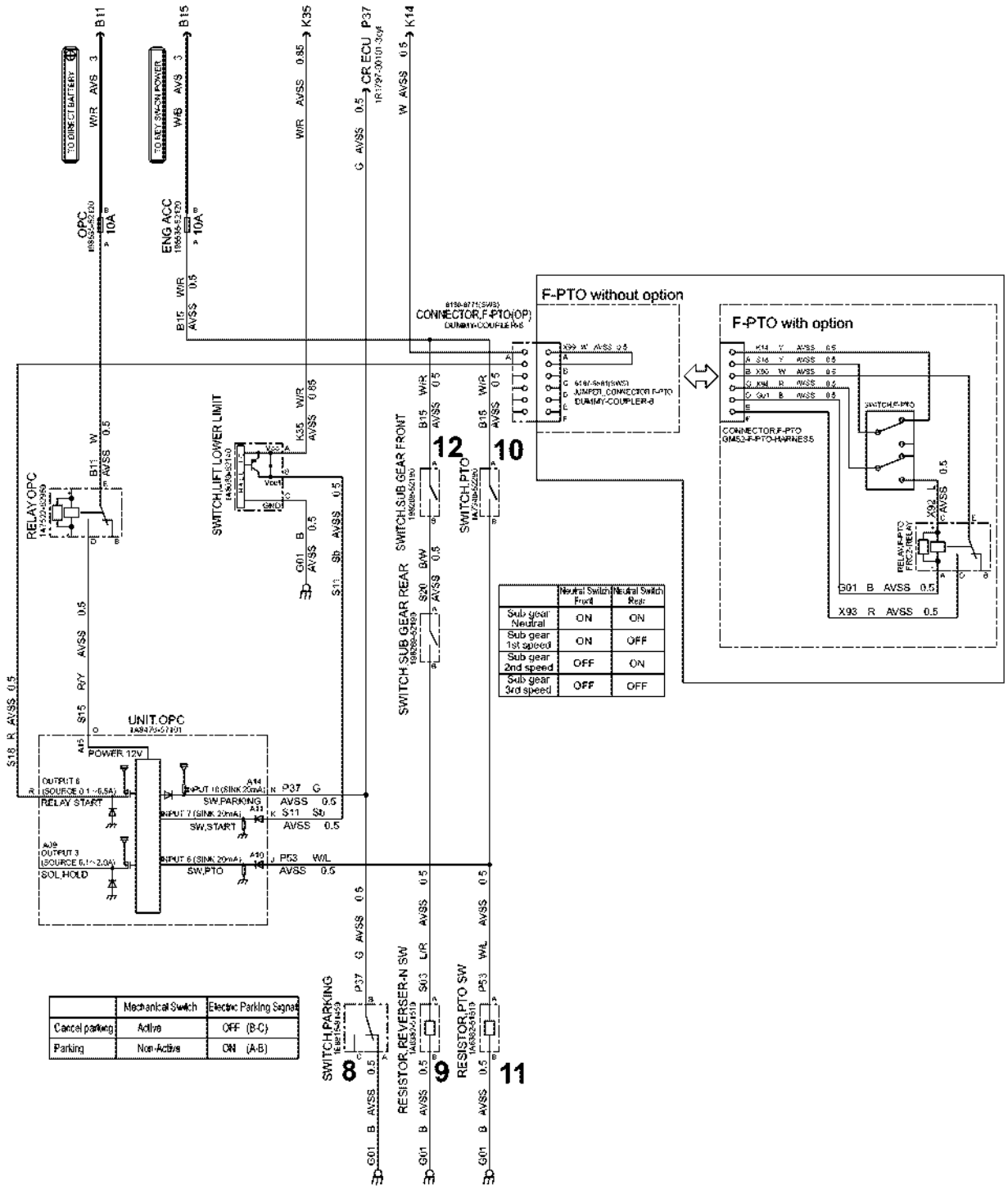
Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Front in the hood	1	BATTERY	BATTERY, 80D26R 1A7000-51540	Supplies 12V power.
Dashboard	2	METER, COMBINATION	METER ASSY, COMBINATION 1A8405-56010	Displays various information and alarm messages.
Steering column	3	SW, DPF REGENERATION	DPF REGENERATION SW 1E6C20-81300	Regenerates the DPF exhaust filter.
Steering column	4	SW, DISPLAY	SWITCH, TRAVELING 1A8426-52551	Switches the displayed information on the combination meter.
Bottom right of the seat	5	BUZZER, BACK	BUZZER (BACK 174570-57110	An alarm buzzer for when backing up the vehicle.
Rear left of the seat	6	SOCKET, POWER SOURCE	POWER OUTPUT (For ROPS) 1D4270-17650	Socket for taking out the 12 V external power
Upside of the fuel tank	7	SENSOR, FUEL GAUGE	FUEL GAUGE SENSOR 1A8400-56600	Detects the remaining amount of fuel and displays it on the combination meter.
Above the Steering column	8	SW, PARKING	SWITCH, MICRO 1E8915-81450	Switches on and off of the parking brake. When switching on, the parking brake lamp lights on the combination meter.
Back side seat	9	RESISTOR, REVERSER- SW	RESISTOR, REVERSER- SW 1A6382-51510	Adjusts the voltage difference between each circuit.
Right lever guide	10	SW, PTO	SWITCH, PTO IN-OFF 1A7340-52290	Switches on and off of the PTO. When switching on, the PTO lamp lights on the combination meter.
Right lever guide	11	RESISTOR, PTO	RESISTOR, PTO SW 1A6382-51510	Adjusts the voltage difference between each circuit.
Right fender	12	SW, 3-POINT HITCH CONTROL LEVER	SWITCH, INTERLOCK 1A8060-52140	Disables starting engine if 3-point hitch control lever is not in the lowest position.
Engine front	13	SW, BATTERY CUTOFF	SWITCH ASSY, BATTERY 172544-16200	Disconnects battery electrically to reduce power loss during a long storage period.
Steering column right	14	FUSE, METER 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Steering column right	15	FUSE, ILLMI 10A	FUSE,10A 198535-52120	Protects each electric circuit.
Steering column right	16	KEY SWITCH	KEY SWITCH ASSY (For ROPS) 198162-52110 KEY SWITCH CMP (For CAB) 1A7850-52110	Switches between ON and OFF of the battery power to each circuit.
Steering column right	17	FUSE, OPC 10A	FUSE, 10A 198535-52120	Protects each electric circuit.

Classification	No.	Name	Name in parts catalog Number in parts catalog	Function/Other
Steering column right	18	FUSE, ENG ACC 10A	FUSE,10A 198535-52120	Protects each electric circuit.
Steering column right	19	FUSE, ACC POWER 10A	FUSE, 10A 198535-52120	Protects each electric circuit.
Front in the hood	20	RELAY, MAIN	RELAY, MAIN 1A7522-52950	Supplies power to all circuits.
Front in the hood	21	SLOW BLOW FUSE, MAIN 50A	FUSE, 50A 1E8720-83120	Protects each electric circuit.

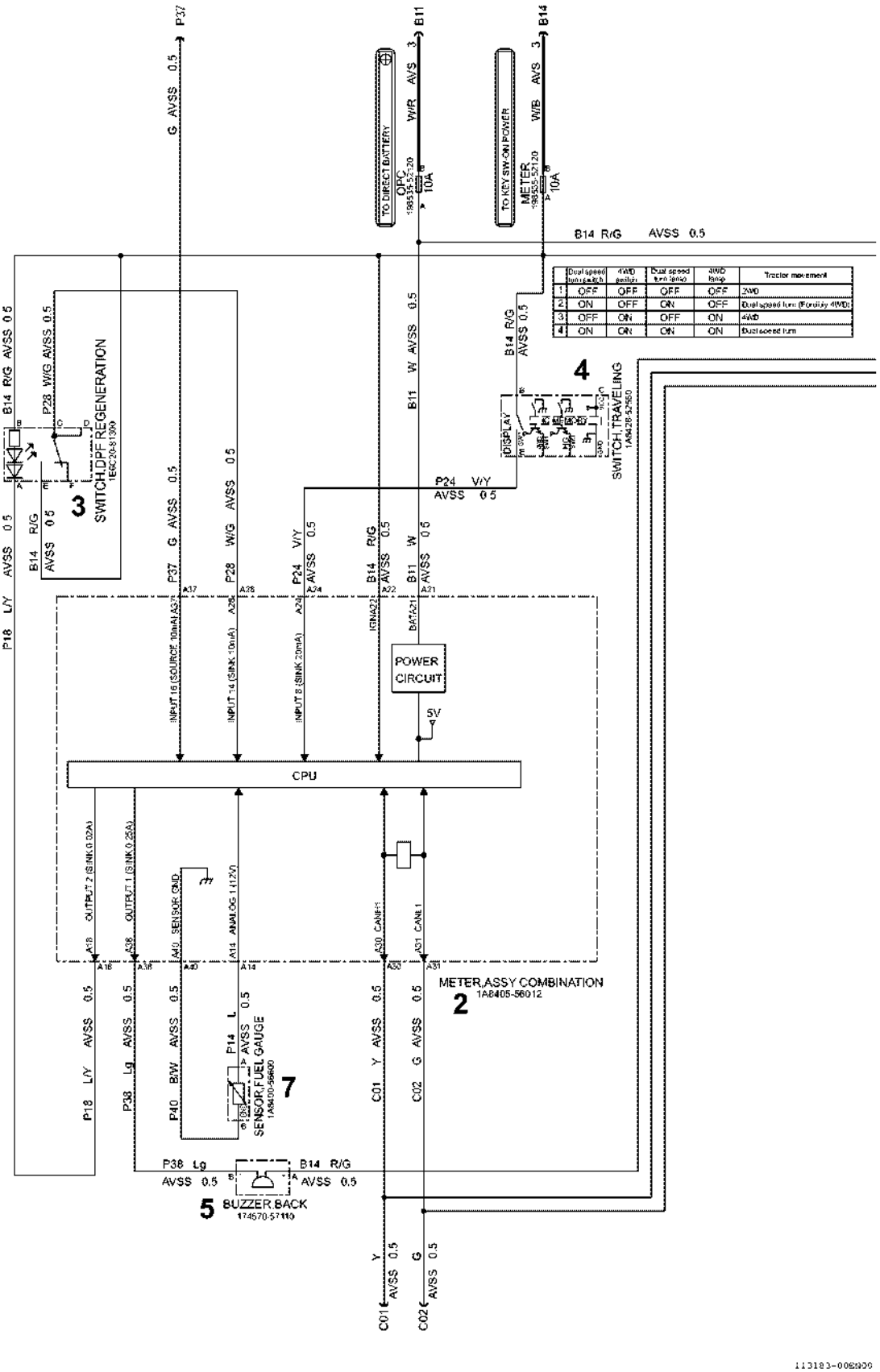
*Parts code is noted for reference. Refer to the parts catalog when ordering parts.
*Refer to "10. Electronic control components check" on page 12-89 for checking each part or component.

2. Electric circuit diagram

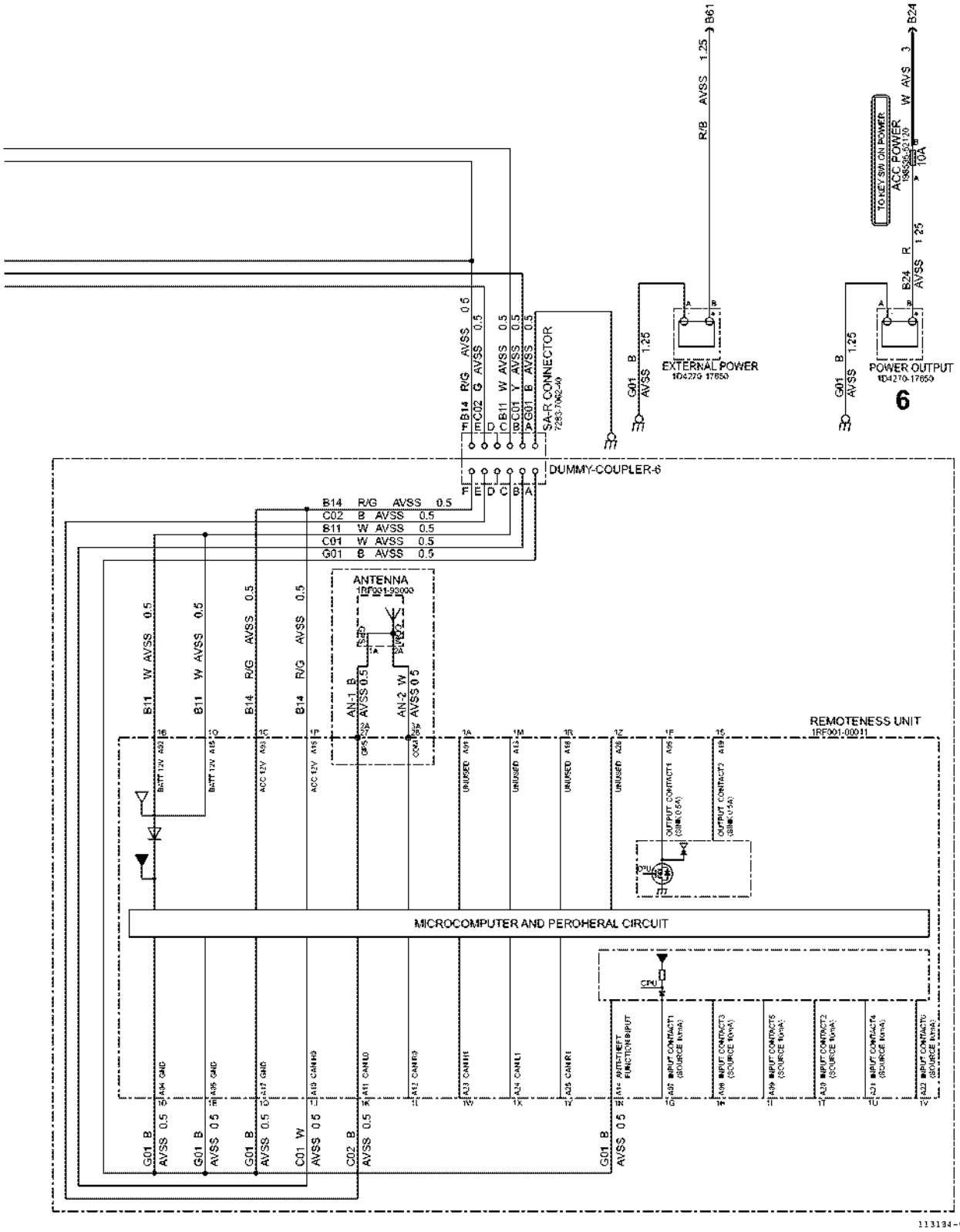




111182-00EN00



113183-00GN00


DUMMY-COUPLER-6
SA-R CONNECTOR
EXTERNAL POWER
POWER OUTPUT
ACC POWER
ANTENNA
REMOTENESS UNIT
MICROCOMPUTER AND PEROHERAL CIRCUIT
CPU
B14 R/G AVSS 0.5
C02 B AVSS 0.5
B11 W AVSS 0.5
C01 W AVSS 0.5
G01 B AVSS 0.5

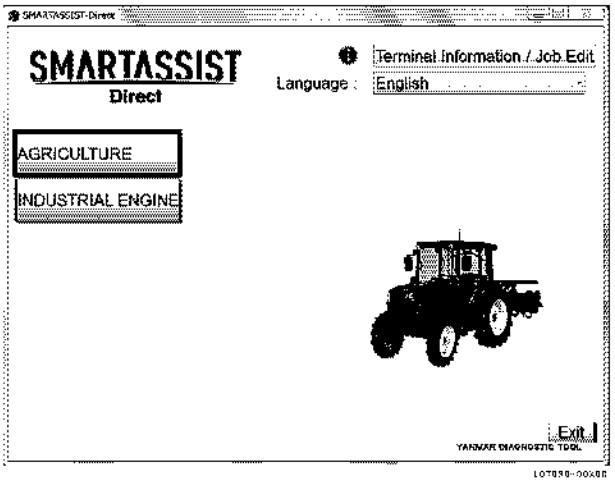
9. Adjustment and diagnosis using SMARTASSIST Direct

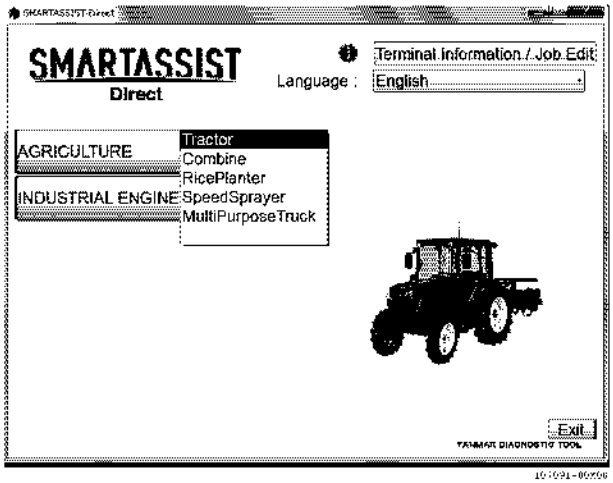
■ Adjustment and diagnosis

Using the SMARTASSIST-Direct (SA-D) allows you to adjust, diagnose, or forcibly drive parts such as sensors related to each controller or monitor.

1. Launch SA-D.
   Click the SA-D icon on the desktop of your computer and enter your user ID and password.

2. When the initial screen of SMARTASSIST Direct appears, select [AGRICULTURE] > [Tractor].

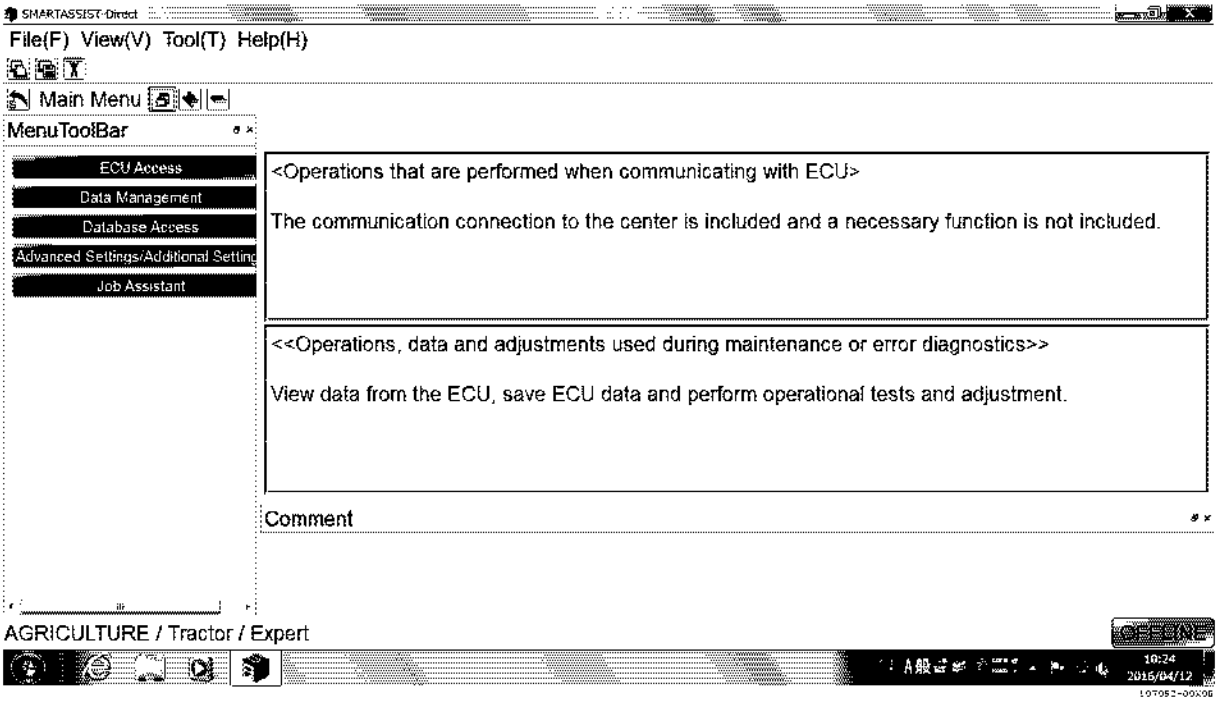


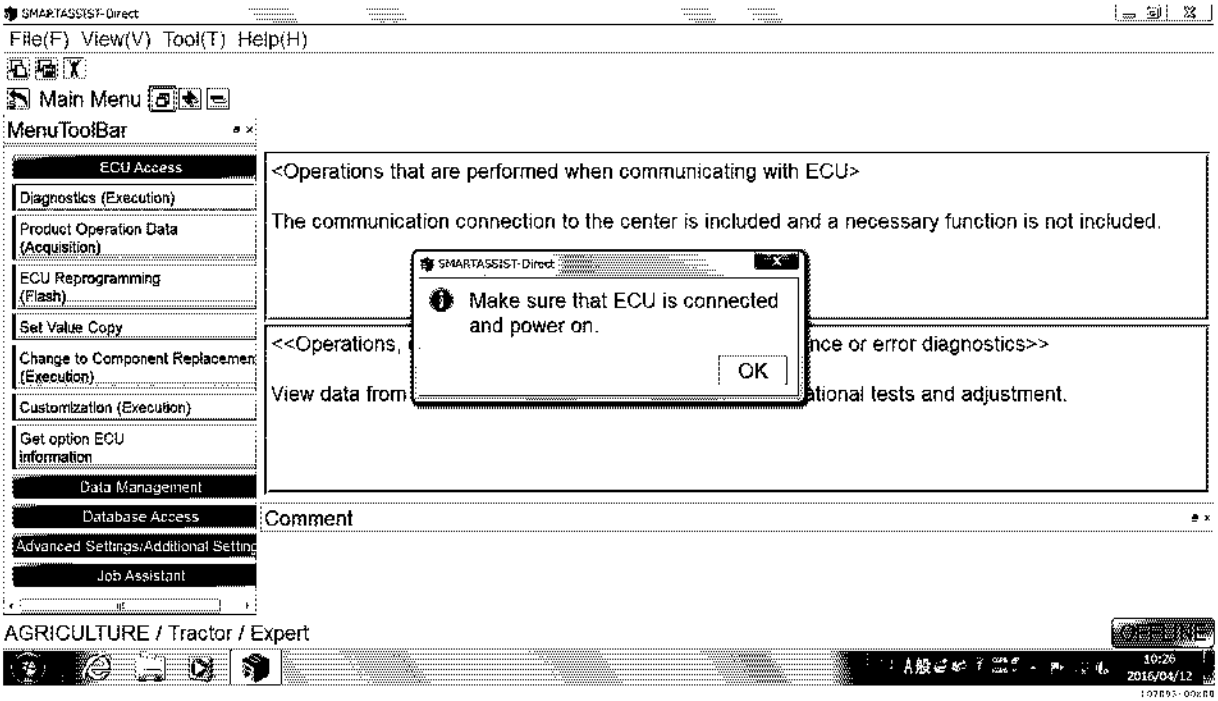


12

The following is the procedure for failure diagnosis using SA-D.

3. Select [ECU Access]. Connect the tractor and your computer using SA-D, and turn on the tractor's key switch.

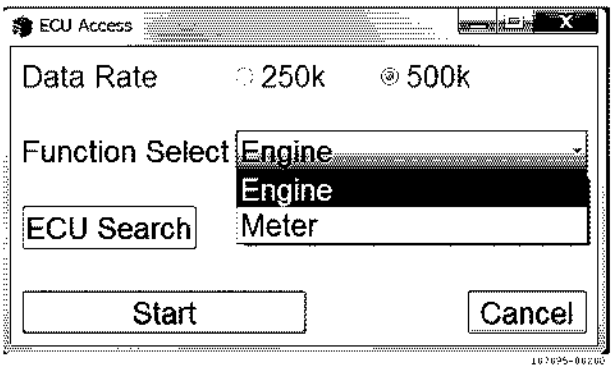


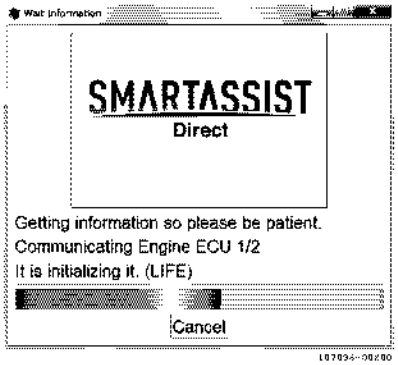


12

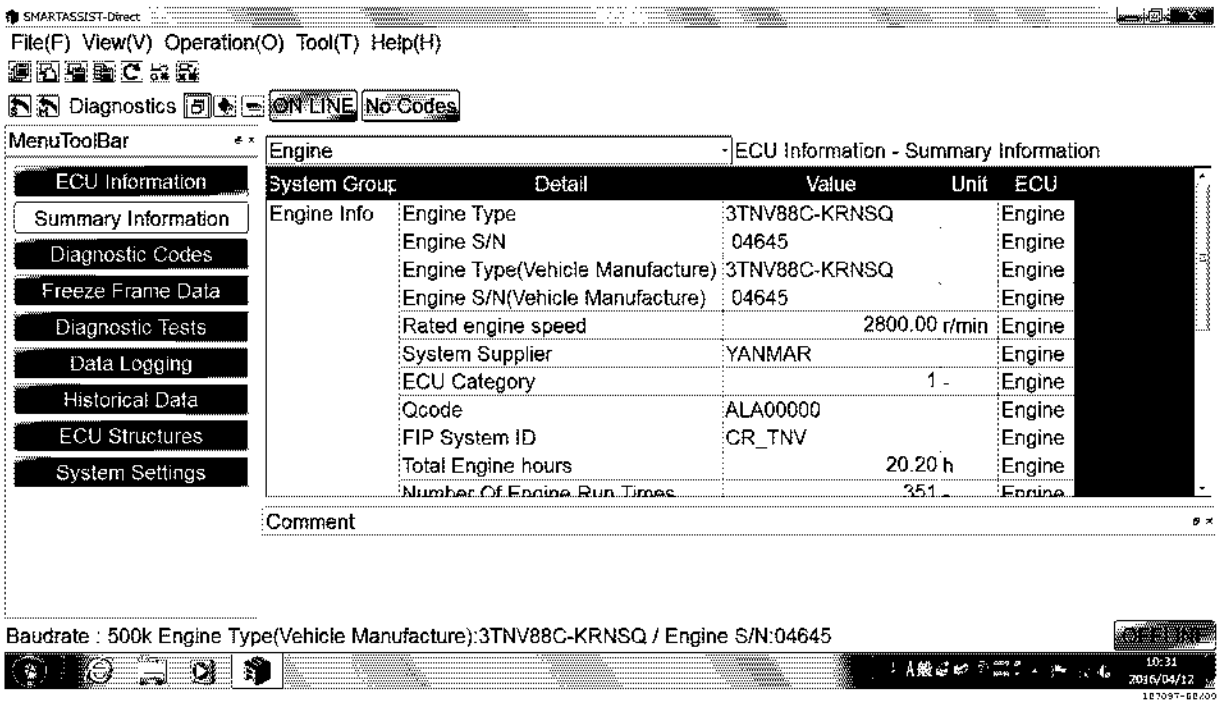
4. Wait until communication with the ECU starts.

5. Select the circuit to be checked ([Engine] or [Meter]), and click [Start]. ([Engine] is selected in this example.)
Wait until communication with the ECU starts.

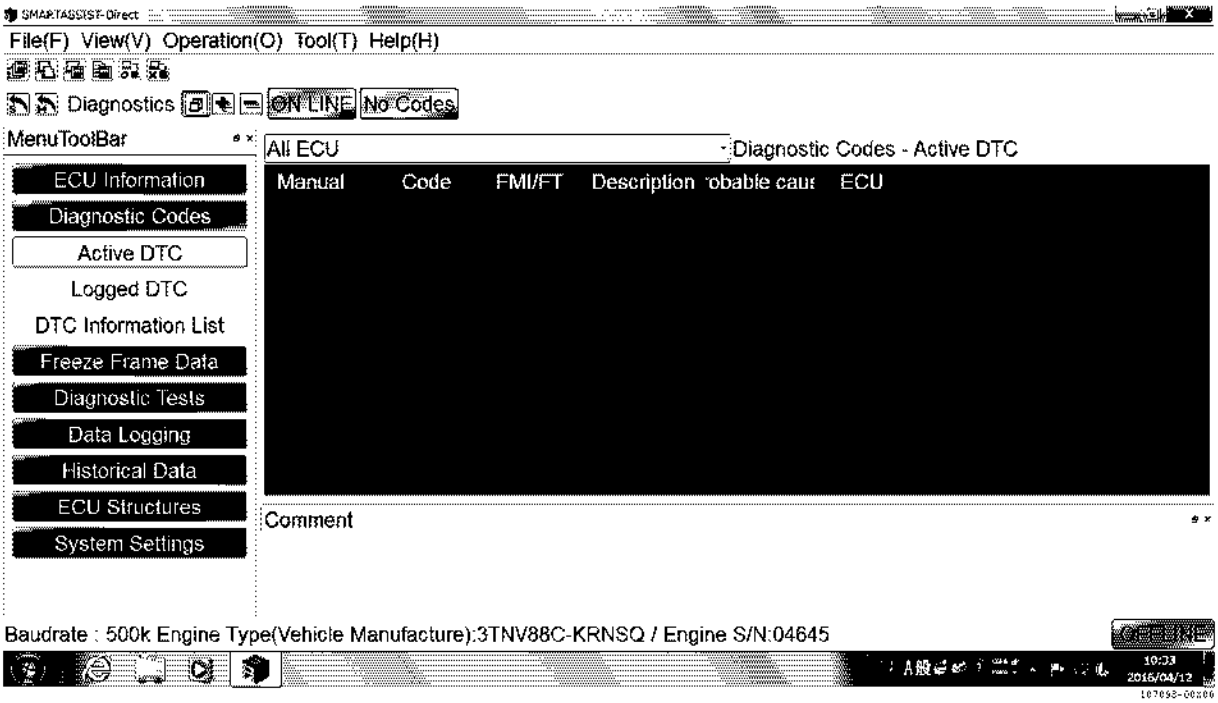




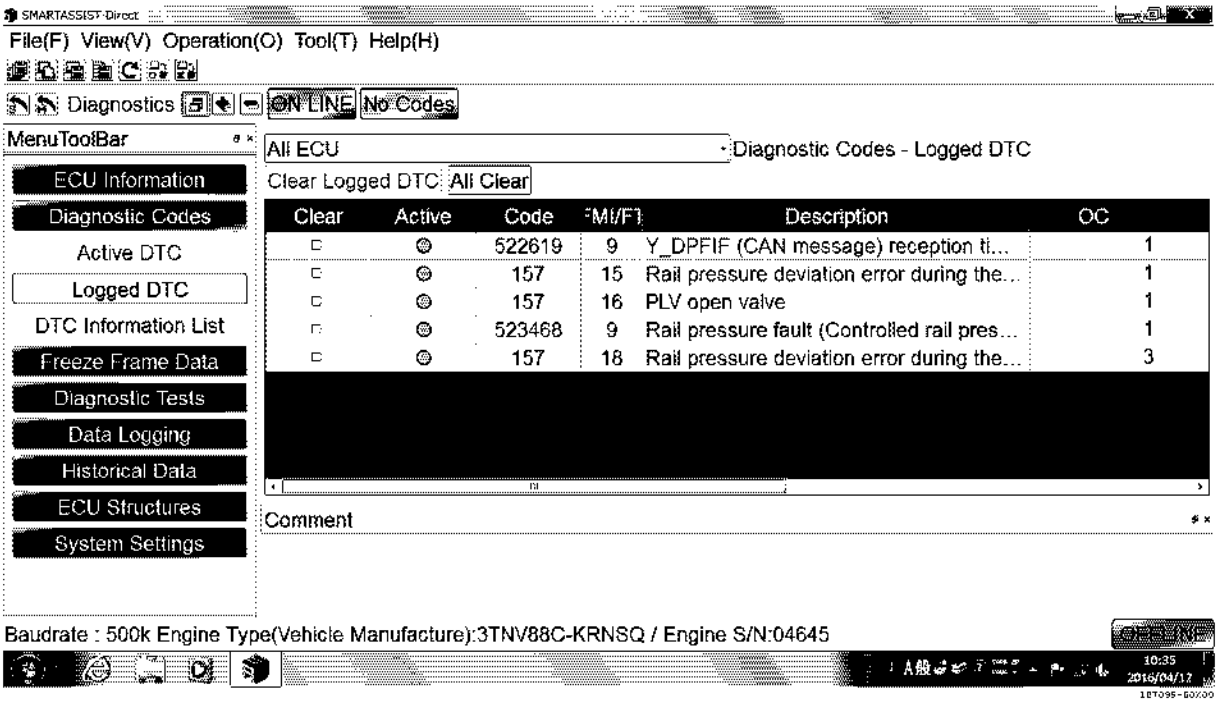
6. You can access ECU information in [Summary Information] under [ECU Information].
For example, if the engine model number label is difficult to check due to the cabin layout, you can use this function to check the model number.
Engine Type 3TNV88-KRNSQ Engine S/N 04645



7. Select [Diagnostic Codes] > [Active DTC] to view the details of any currently active error codes. If there is no active error, no entry is displayed in the list as shown below.

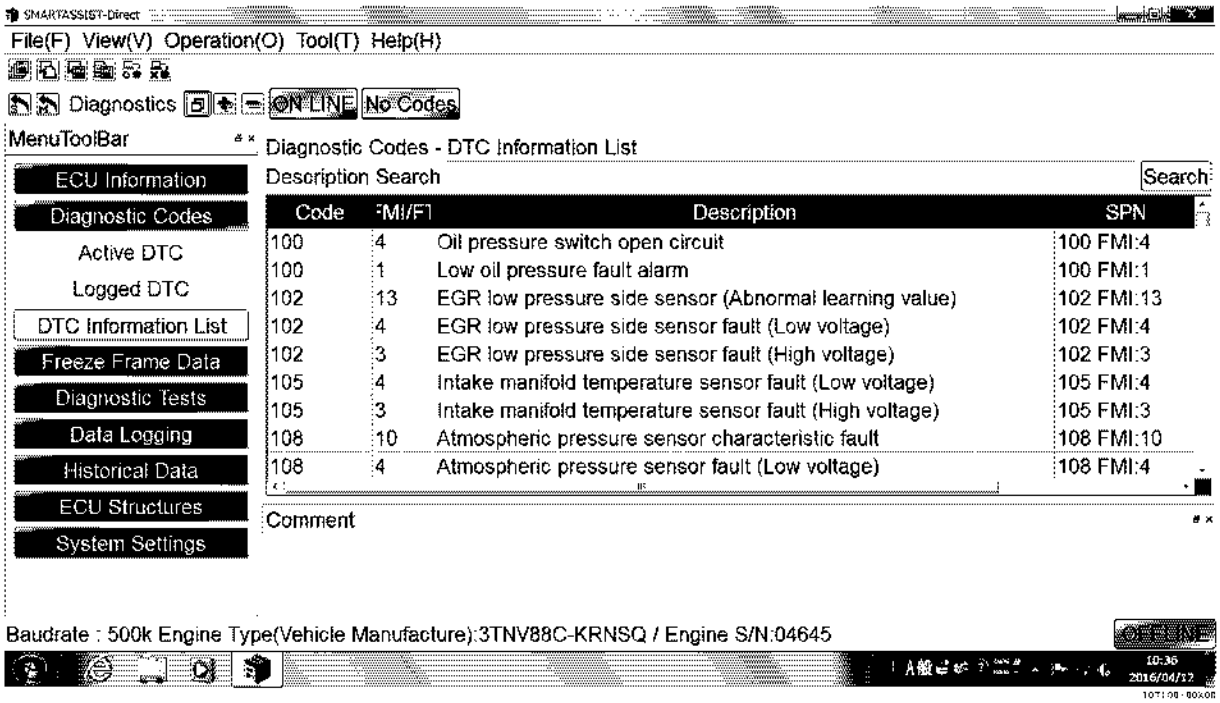


8. Select [Diagnostic Codes] > [Logged DTC] to view the history and details of previous error codes. You can clear the error code history by clicking [All Clear].

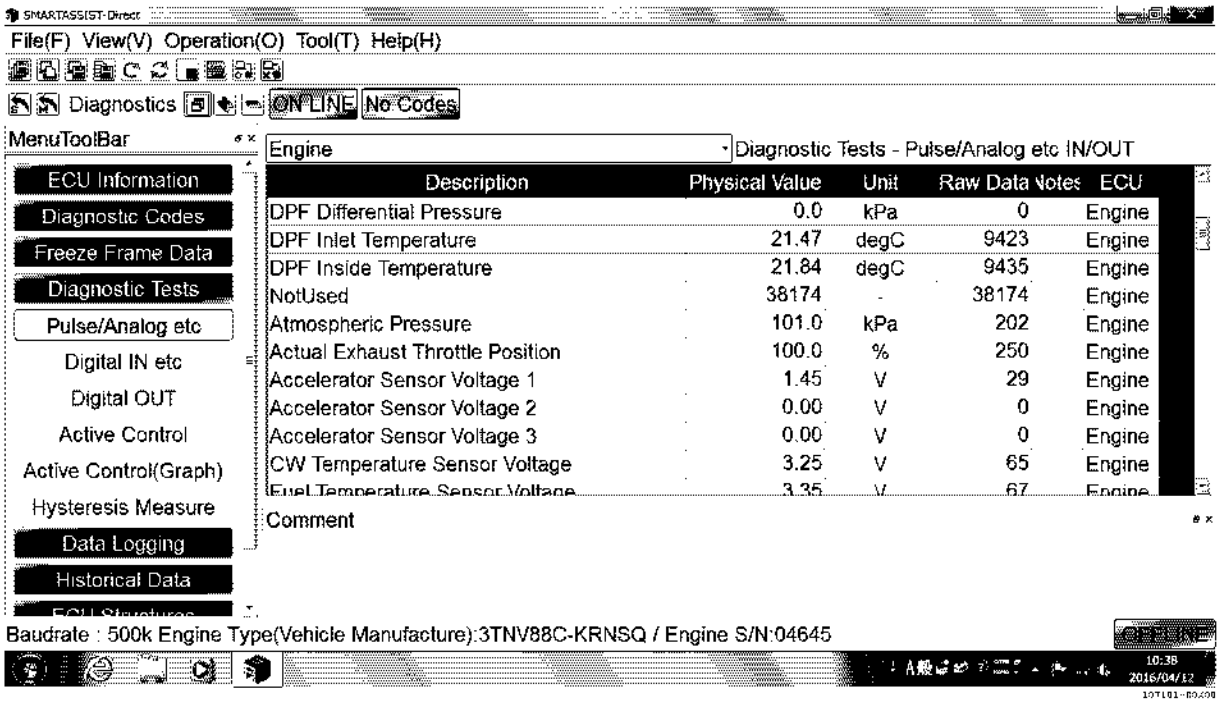


12

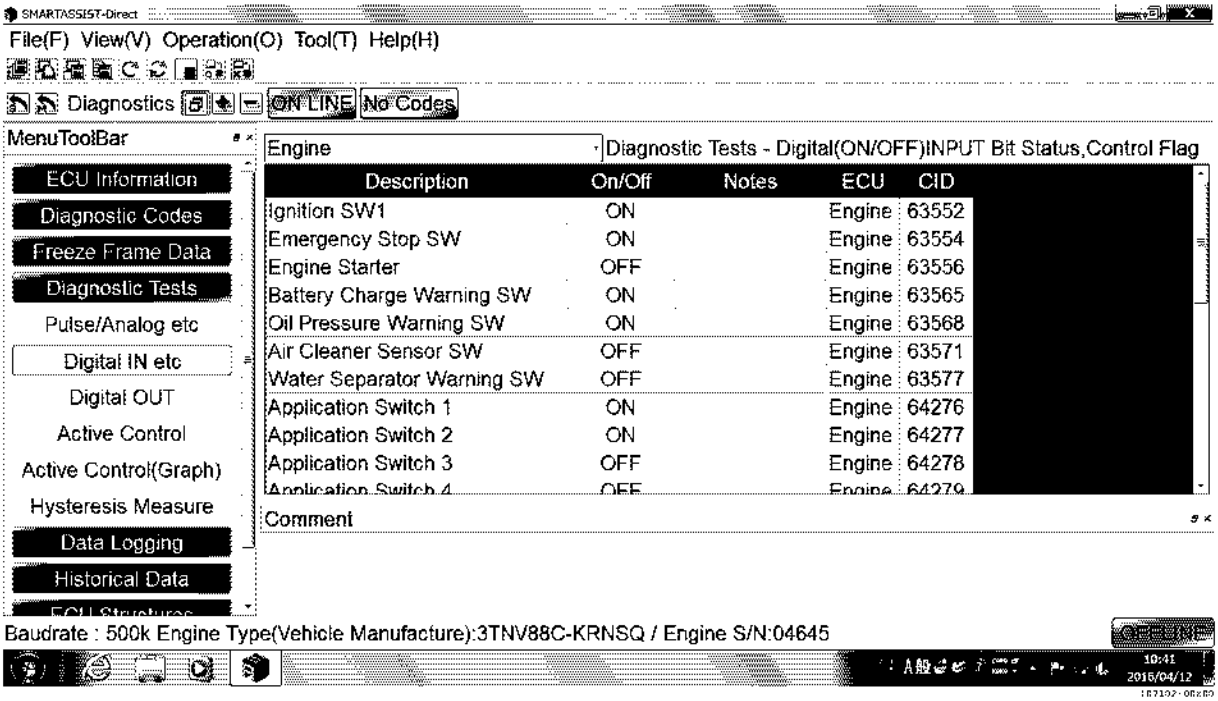
9. Select [Diagnostic Codes] > [DTC Information List] to view the registered list of error codes and descriptions that may appear in (7) and (8) above.



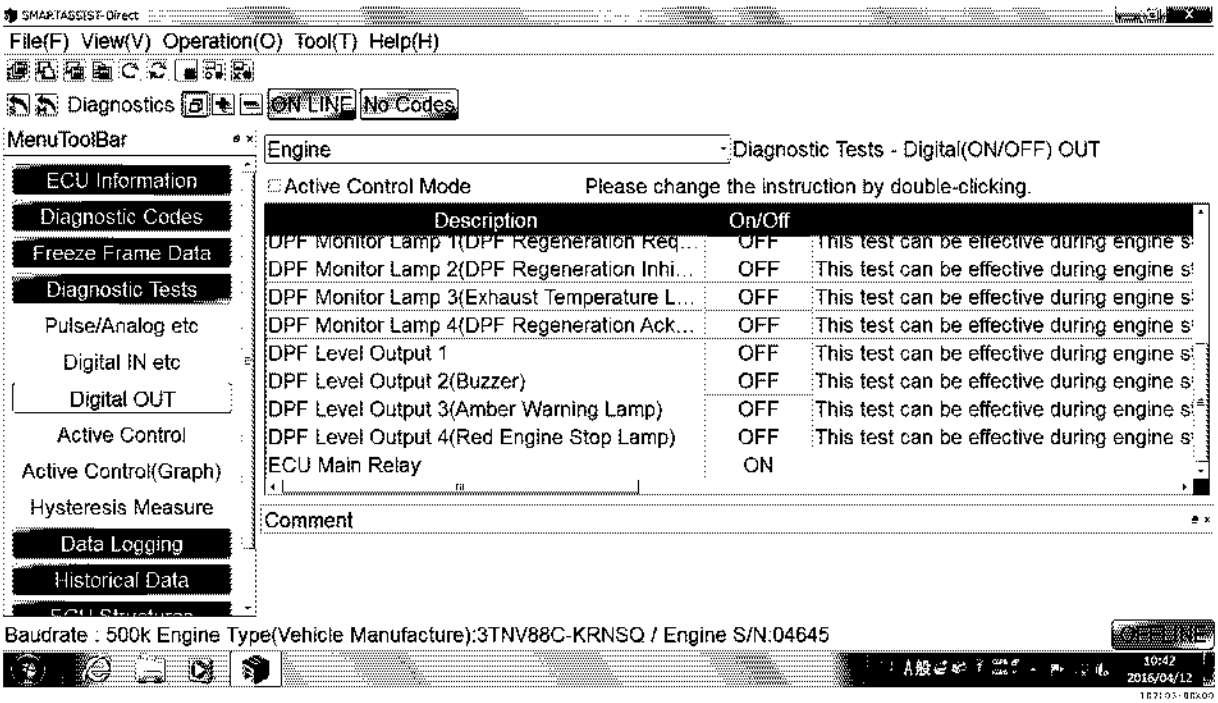
10. Select [Diagnostic Tests] > [Pulse/Analog etc] and perform diagnostic tests.
Examples of testing:
- DPF Inlet Temperature is displayed—this temperature value increases when the engine is started.
- Operating the accelerator lever (accelerator sensor) changes the voltage value of Accelerator Sensor Voltage 1 accordingly.



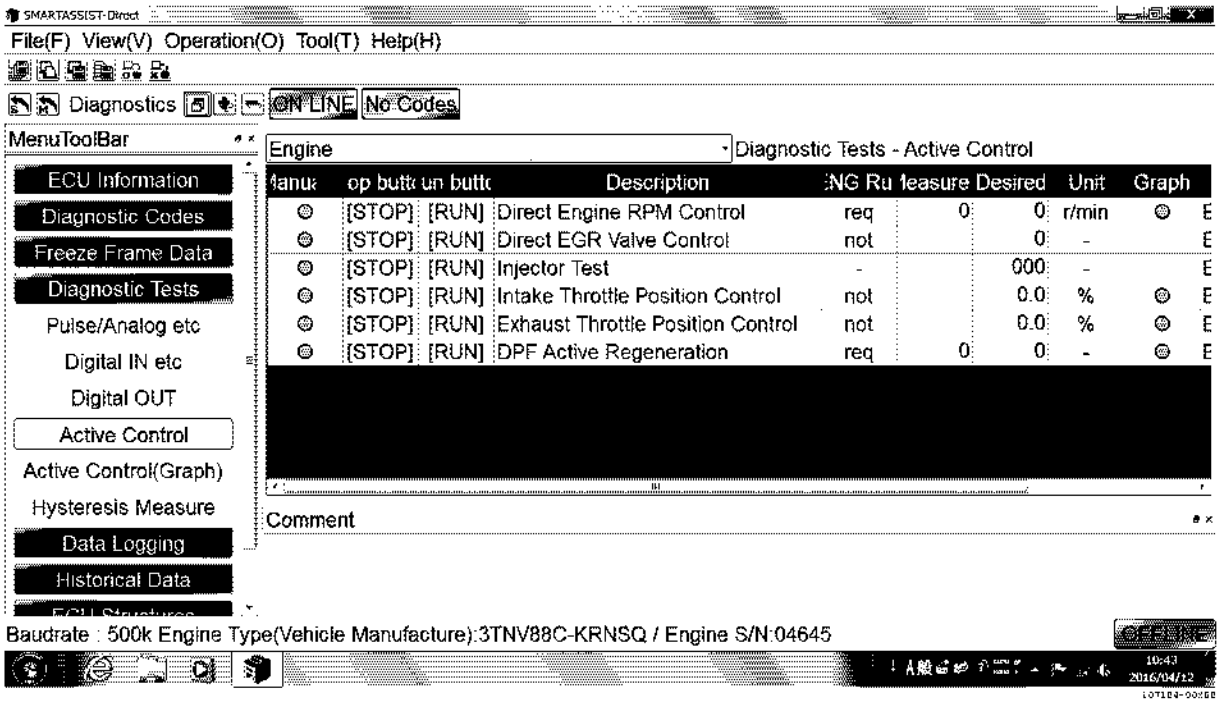
11. Select [Diagnostic Tests] > [Digital IN etc] and perform diagnostic tests.
Example of testing: Oil Pressure Warning SW should be [ON] when the engine is stopped. When the engine is started, the switch is pushed by the engine's hydraulic pressure and the SW indication should change to [OFF].

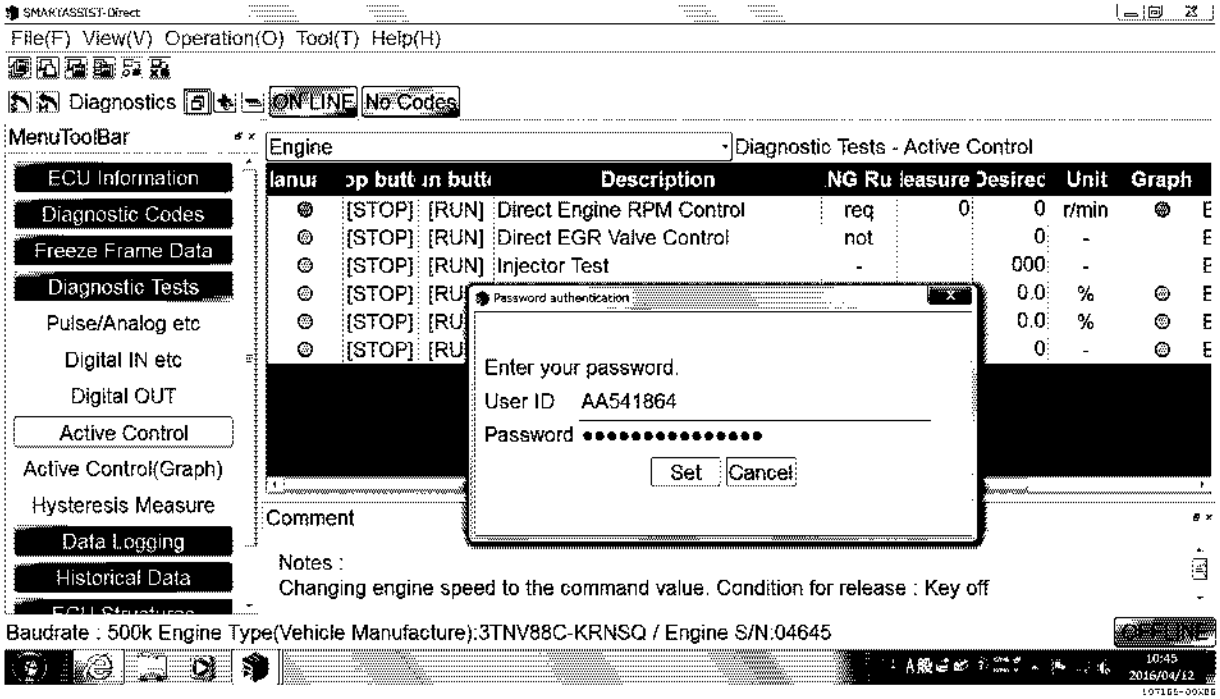


12. Select [Diagnostic Tests] > [Digital OUT] to view the current state of outputs.
The current state of ECU controls is listed in the display.

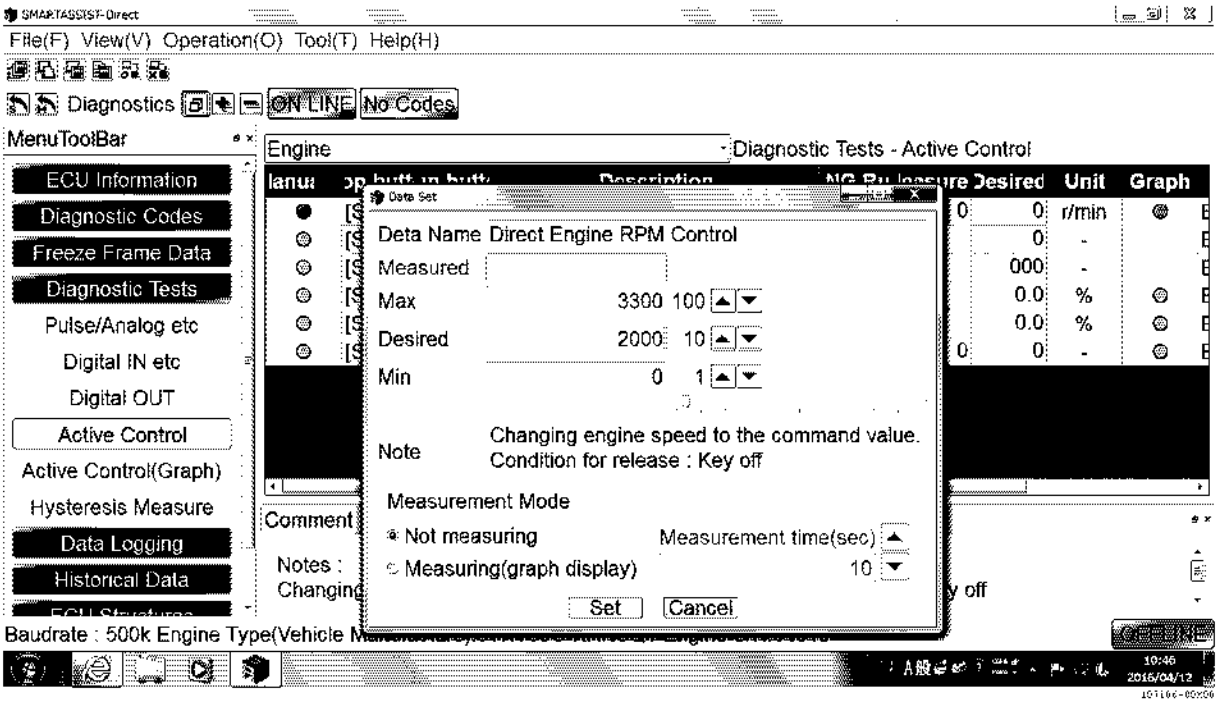


13. Select [Diagnostic Tests] > [Active Control] to drive certain components.
This function allows you to forcibly drive components controlled by the ECU.
Before using Active Control, ensure safety around the tractor as this function can set the vehicle into motion and/or change its state.
As a precaution, password entry is requested again to access Active Control. Enter your password to proceed.

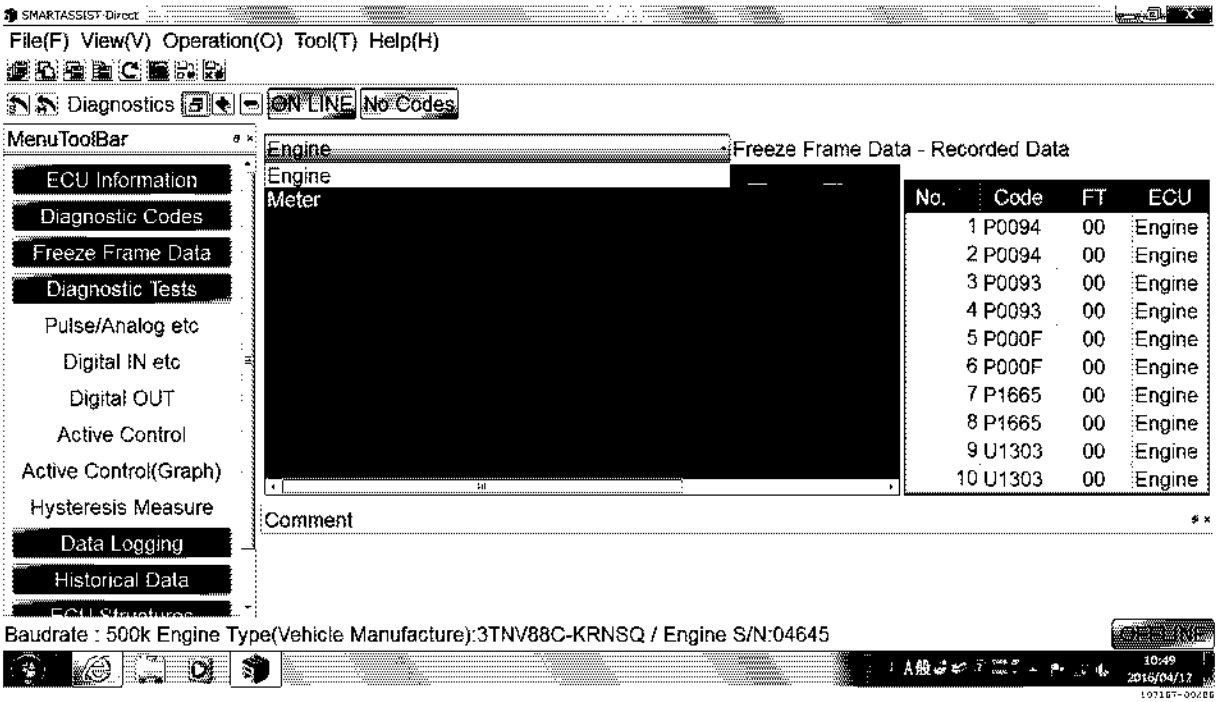




14.As an example of testing, operate the Direct Engine RPM Control.
Enter the engine speed in the [Desired] field and click [Set] to drive the engine at the specified speed.



15.Diagnostic tests are also available for meter circuits as with the engine circuits.
Switch [Engine] to [Meter]. Use the same procedures as provided in (7) through (14) above for testing, etc.



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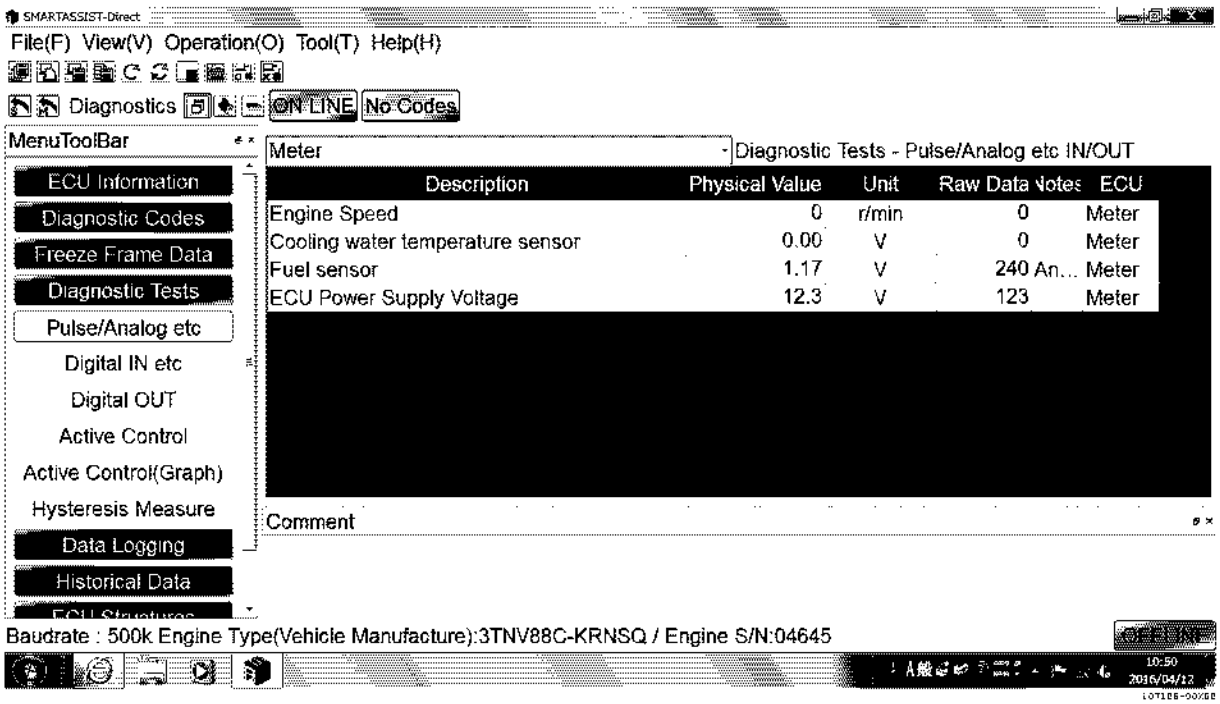
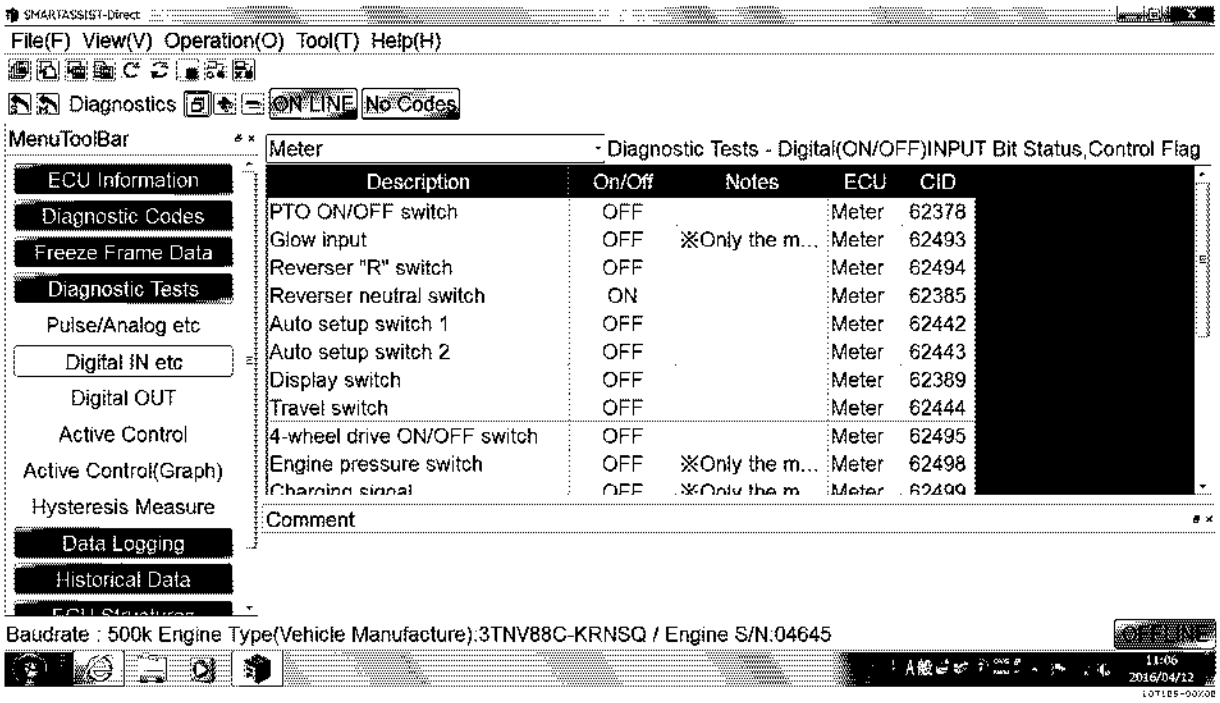
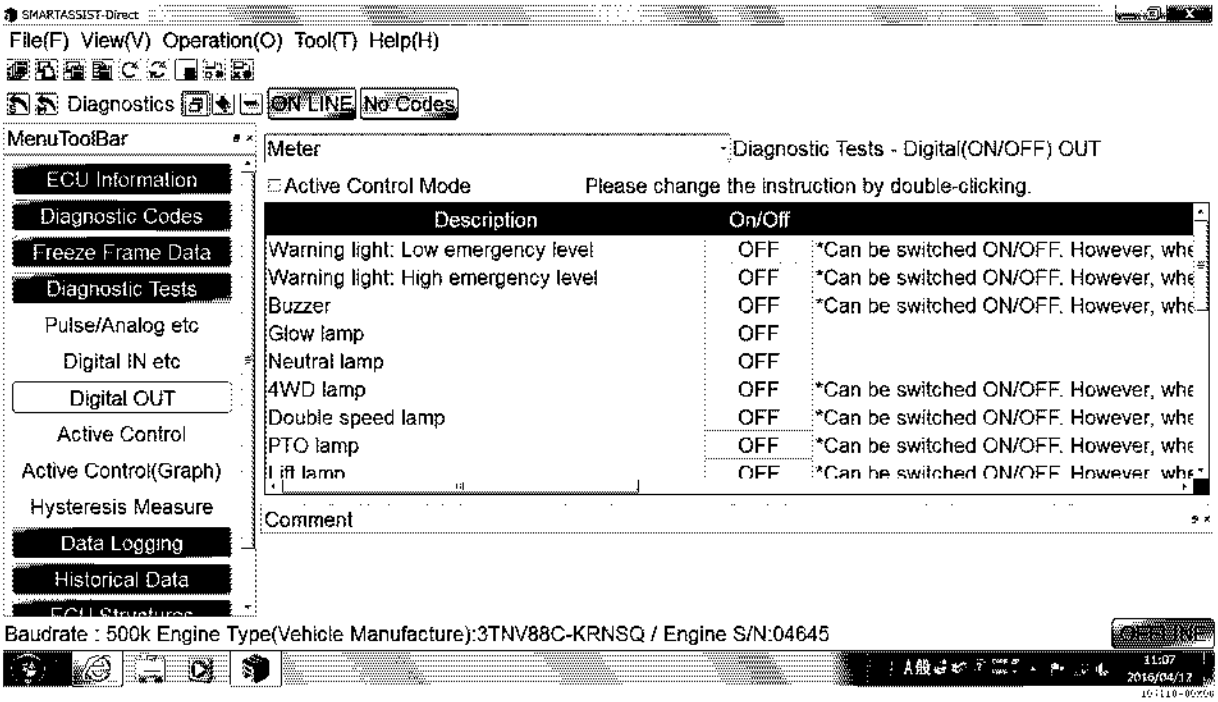

SMARTASSIST-Direct
File(F) View(V) Operation(O) Tool(T) Help(H)
Diagnostics
ON LINE
No Codes
MenuToolBar
ECU Information
Diagnostic Codes
Freeze Frame Data
Diagnostic Tests
Pulse/Analog etc
Digital IN etc
Digital OUT
Active Control
Active Control(Graph)
Hysteresis Measure
Data Logging
Historical Data
Meter
Diagnostic Tests - Pulse/Analog etc IN/OUT
Description
Physical Value
Unit
Raw Data
Notes
ECU
Engine Speed 0 r/min 0 Meter
Cooling water temperature sensor 0.00 V 0 Meter
Fuel sensor 1.17 V 240 An... Meter
ECU Power Supply Voltage 12.3 V 123 Meter
Comment
Baudrate : 500k Engine Type(Vehicle Manufacture):3TNV88C-KRNSQ / Engine S/N:04645
OFF LINE
10:50
2016/04/12


SMARTASSIST-Direct
File(F) View(V) Operation(O) Tool(T) Help(H)
Diagnostics
ON LINE
No Codes
MenuToolBar
ECU Information
Diagnostic Codes
Freeze Frame Data
Diagnostic Tests
Pulse/Analog etc
Digital IN etc
Digital OUT
Active Control
Active Control(Graph)
Hysteresis Measure
Data Logging
Historical Data
Meter
Diagnostic Tests - Digital(ON/OFF)INPUT Bit Status,Control Flag
Description
On/Off
Notes
ECU
CID
PTO ON/OFF switch OFF Meter 62378
Glow input OFF ※Only the m... Meter 62493
Reverser "R" switch OFF Meter 62494
Reverser neutral switch ON Meter 62385
Auto setup switch 1 OFF Meter 62442
Auto setup switch 2 OFF Meter 62443
Display switch OFF Meter 62389
Travel switch OFF Meter 62444
4-wheel drive ON/OFF switch OFF Meter 62495
Engine pressure switch OFF ※Only the m... Meter 62498
Comment
Baudrate : 500k Engine Type(Vehicle Manufacture):3TNV88C-KRNSQ / Engine S/N:04645
OFF LINE
11:06
2016/04/12

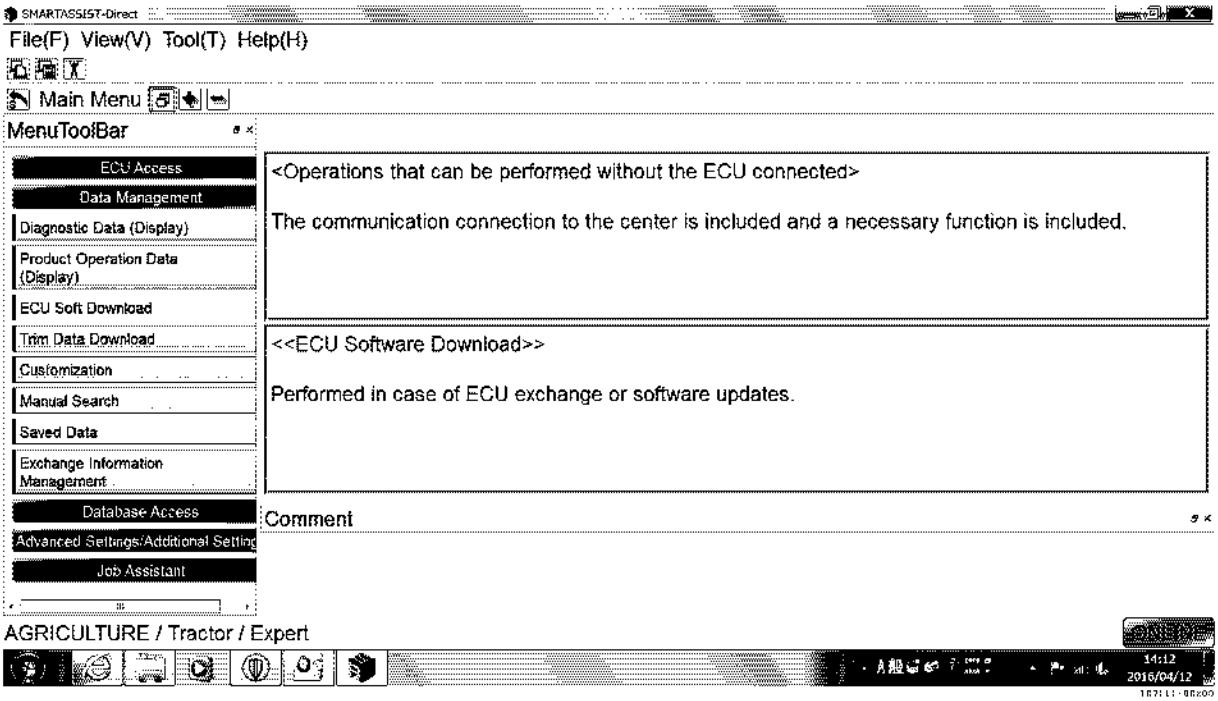


■ How to write/update data in the ECU controller

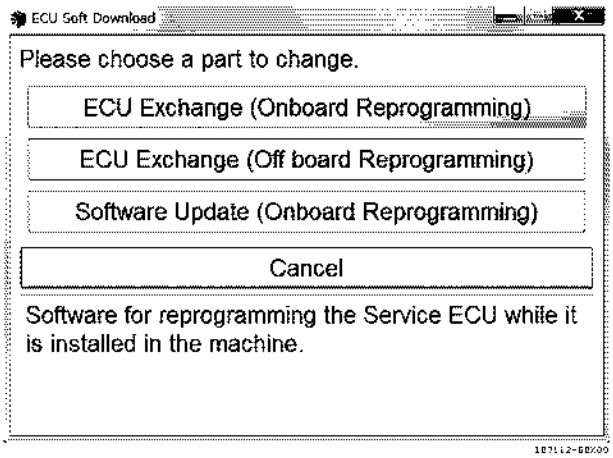
- **First, download the relevant data to your computer.**

1. Establish an Internet connection on your computer before launching SA-D.
   Note: Connecting to the Internet after launching SA-D prevents you from proceeding to download.

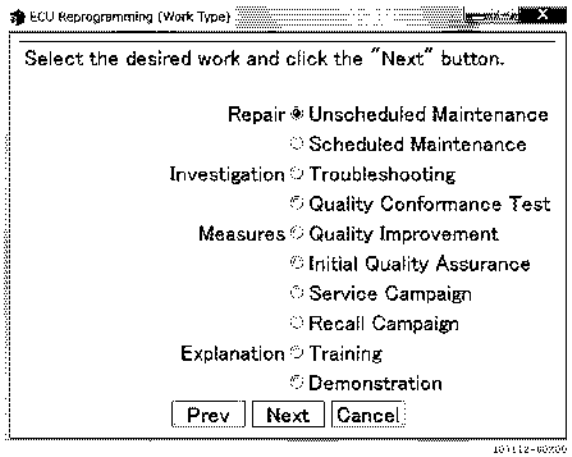
2. Select [Data Management] > [ECU Soft Download].



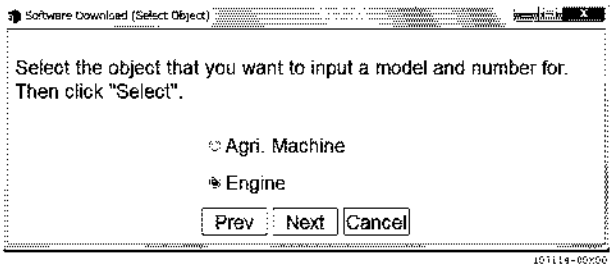
3. ECU Exchange (Onboard Reprogramming)
   ECU Exchange (Off board Reprogramming)
   Software Update (Onboard Reprogramming)
   Select one of the above.



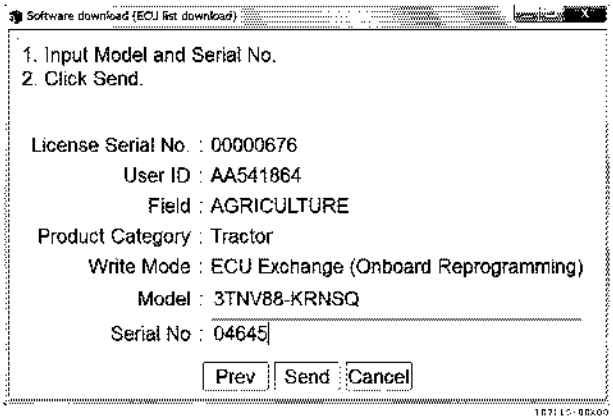
4. Select which task to perform and click [Next].



5. Select [Engine] or [Agri. Machine] and click [Next]. ([Engine] is selected in this example.)



6. Enter the model and serial no. and click [Send]. This initiates data download to your computer.



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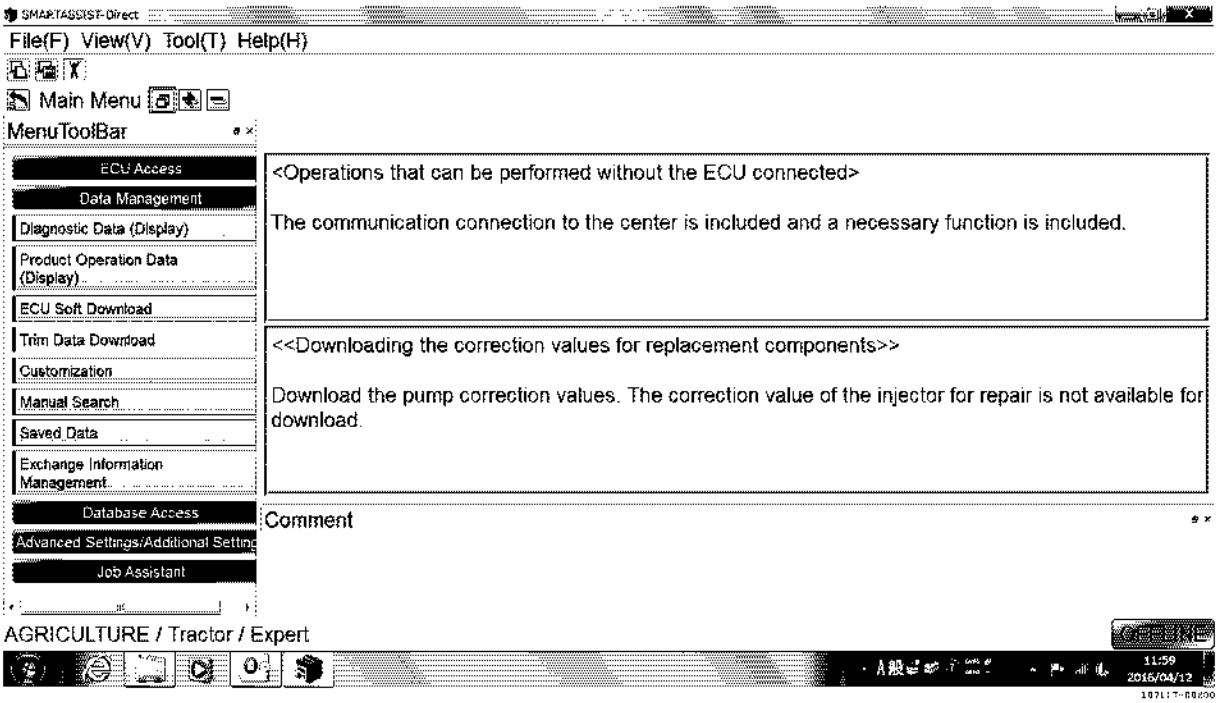
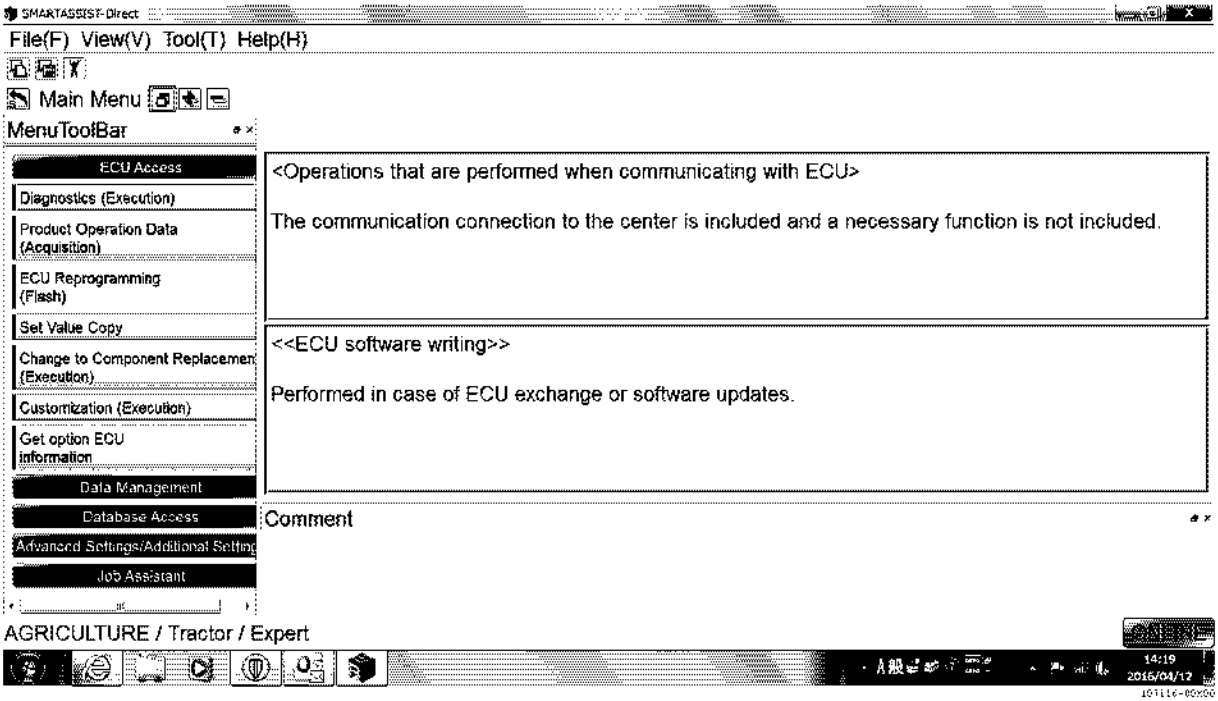
7. If you replaced the fuel supply pump, select [Data Management] > [Trim Data Download] to download the current pump values to your computer.



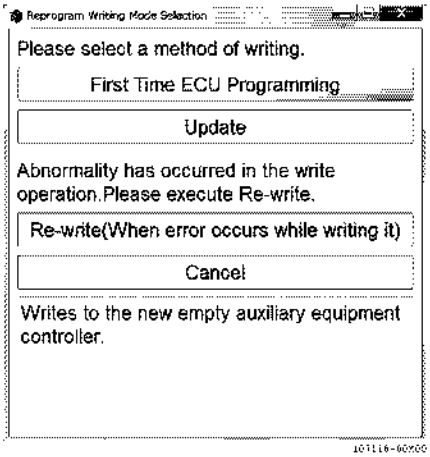
■ Write the data downloaded to your computer to the ECU.

1. Select [ECU Access] > [ECU Reprogramming (Flash)].

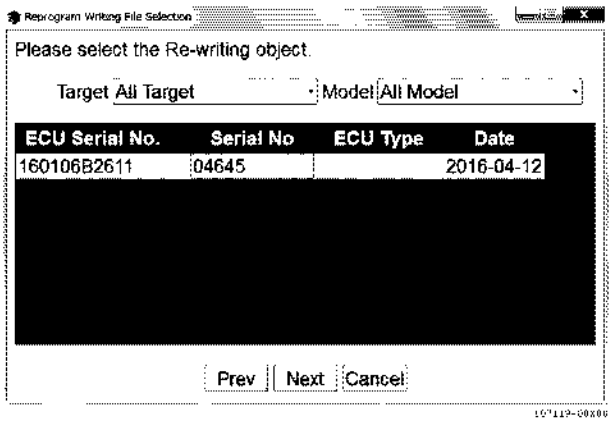


12

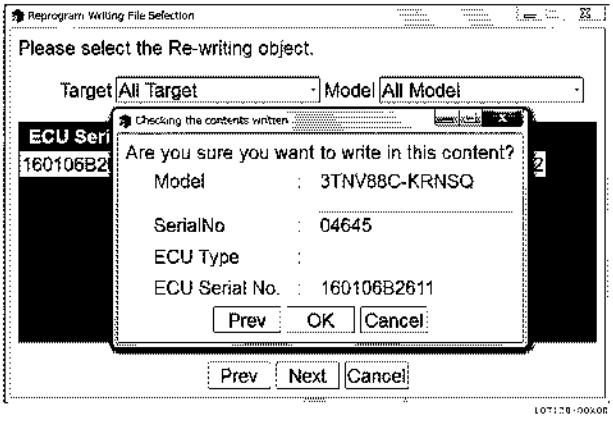
2. Select the type of data write.



3. The data downloaded to your computer is indicated in the display. If this is the intended data, click [Next].



4. The following screen appears. Click [OK] to start writing data to the ECU. Writing the data may take a few minutes.
If this process ends with no error, data write has been completed.



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10. Electronic control components check

1. Parts list

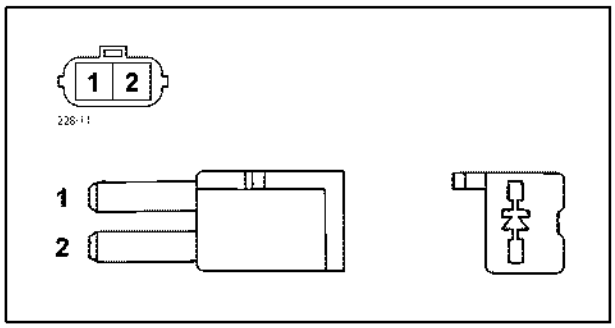
No.	Part name	Name in parts catalog	No. in parts catalog
1	DIODE, CAB RELAY (For CAB)	DIODE, 090 31	1E8235-84910
2	POWER RELAY (For ROPS) EXTERNAL COMPRESSOR RELAY	RELAY, ACM13221M19	1A7522-52950
3	ALTERNATOR, 55A	GENERATOR ASSY, 55A	129052-77220
4	STARTER MOTOR	STARTER ASSY	129129-77010
5	KEY SWITCH ASSY (For ROPS)	SWITCH, STARTING	198162-52110
6	KEY SWITCH CMP (For CAB)	SWITCH ASSY, STARTER	1A7850-52110
7	ENGINE, CR ECU	ECU ASSY,SERVICE YMR	129A00-75910
8	RWLAY RELAY, GLOW STARTER RELAY	RELAY, CB C TYPE	172B16-17190
9	GLOW PLUG	PLUG, GLOW	129008-77800
10	SWITCH, SUB GEAR REAR	SWITCH, SAFETY	198269-52190
11	SW, PTO	SWITCH, PTO IN-OFF	1A7340-52290
12	SWITCH, SEAT	SWITCH, SEAT	1A8426-52300
13	SWITCH, PARKING	SWITCH, MICRO	1E8915-81450
14	RESISTER, SEAT-SW	RESISTER, SEAT-SW RESISTANCE, 2W R120	1A6382-51510
15	METER ASSY, COMBINATION	METER ASSY, COMBINA METER ASSY, SERVICE	1A8405-56002 1A8405-56902
16	SWITCH, LIGHTING	LEVER, COMBINATION	1A8400-52140
17	LAMP, REAR COMBINATION L	LAMP ASSY, REAR COMB	1A8043-53600
18	SWITCH, DEFOGGER	SWITCH, DEFOGGER	1A7805-52600
19	MOTOR, FRONT WIPER	MOTOR ASSY, WIPER	1A7210-86610
20	SW, FRONT WIPER	SWITCH, FRONT WIPER	1A8400-52430
21	SW, REAR WIPER	SWITCH, REAR WIPER	1A8060-52530
22	WIPER MOTOR (REAR (For CAB)	MOTOR ASSY	1A8110-86310
23	PUMP, WASHER	PUMP WASHER	198127-86710
24	CMPCOMPRESSOR	COMPRESSOR ASSY	1A8484-87900
25	SW, PRESSURE	SWITCH, PRESSUR	1A8484-87310
26	MOTOR, BLOWER	MOTOR, BLOWER	1A8484-87260
27	BLOWER, REGISTER	BLOWER, REGISTER	1A8484-87320
28	MOTOR, SERVO MODE	MOTOR, SERVO MODE	1A8484-87410
29	VALVE, WATER	VALVE, WATER	1A8484-87280
30	THERMISTOR, FROST	EVAP SENSER	1A8484-87270
31	AMP, A/C	AMP, A/C	1A8484-87330
32	CONTROL, A/C MANU	CONTROL, A/C MANU	1A8420-87300
33	ACTUATOR, AIR MIX	ACTUATOR ASSY, MODE	1A8485-87500
34	POWER OUTPUT	SOCKET, POWER SOUCE	1D4270-17650
35	ANTENNA	ANTENNA ASSY	198463-86771
36	RADIO CMP (CD	CD RADIO	1A8485-86000
37	SPEAKER L/R (For CAB)	SPEAKER	1A8110-86920
38	LAMP (ROOM	LAMP ASSY, ROOM	1A7470-86750

No.	Part name	Name in parts catalog	No. in parts catalog
39	SENSOR, IN-TH	SENSOR, EXH.TEMP	129C00-13940
40	SENSOR, MID-TH	SENSOR, EXH.TEMP	129C00-13950
41	SENSOR, DPF-P	SENSOR, PRESSURE	129978-17700
42	SW, OIL PRESSURE	SWITCH, HYDRAULIC	119761-39450
43	SENSOR, ACC	SENSOR, ACCELERATOR	1A8060-55600
44	WATER SEPARATOR	SENSOR, ASSY LEVEL	129917-55821
45	LAMP, FRONT WORK L/R (For CAB)	LAMP ASSY,WORK 37.5W	1A8484-54200
46	LAMP (WORK L	LAMP ASSY, WORKING	1A7340-54100
47	DPF REGENERATION SW	SWITCH,LAMP OR NL	1E6C20-81300
48	SWITCH, TRAVELING	SWITCH, TRAVELING	1A8426-52551
49	BUZZER (BACK	BUZZER, ALARM	174570-57110
50	FUEL GAUGE SENSOR	GAUGE ASSY, FUEL	1A8400-56600
51	SW, BATTERY CUTOFF	SWITCH ASSY,BATTERY	172544-16200
52	SWITCH, LIFT LOWER LIMIT	SWITCH, INTERLOCK	1A8060-52140
53	UNIT, OPC	RELAY UNIT,EU	1A8476-57103
54	RELAY, OPC	RELAY, OPC	1A7522-52950
55	BUZZER, ALEAT	BUZZER, ALARM	174570-57110
56	LED, ALERT	LAMP, PILOT LED	1C6980-07210
57	RELAY, FLASHER	RELAY, FLASHER	1A7510-57200
58	CONNECTOR, TRAILER EU	COUPLER SET, TRAILER	198163-52150
59	SWITCH, WORK LAMP	SWITCH, WORK LAMP	1A7805-52550
60	SWITCH, BEACON	SWITCH ASSY,BEACON	1A8476-52250
61	LAMP, BEACON	LAMP, WARNING	1A8476-54500
62	RELAY, SW-HG	RELAY, SW-HG	1A7522-52950
63	RELAY, SAB GEAR	RELAY, SAB GEAR	1A7522-52950
64	RELAY, 4WD	RELAY, 4WD	1A7522-52950
65	RELAY, OPC	RELAY, OPC	1A7522-52950
66	VALVE, H-G SPEED	VALVE ASSY, 4WD	1A8416-28540
67	SWITCH, STEERING	SWITCH, HIGH GRIP	198071-52190

2. Check reference

1. DIODE, POWER RELAY

DIODE, 090 31: 1E8235-84910



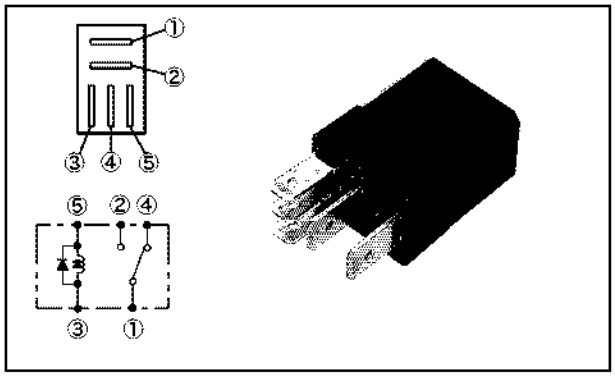
Individual item checks

Range	Measuring location		Results
	Tester probe "+"	Tester probe "-"	
Diode check	2	1	0.4 to 0.7 V (forward direction)
	1	2	OF. (reverse direction)

(Use a digital tester)

2. POWER RELAY (For ROPS)
EXTERNAL COMPRESSOR RELAY

RELAY, ACM13221M19: 1A7522-52950



Individual items

Range	Test points		Results
Conduction	1	4	Conduction
	2	4	No conduction
Resistor	3	5	Approximately 120Ω

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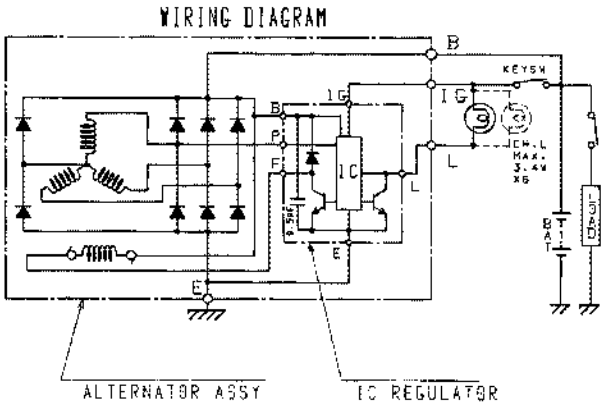
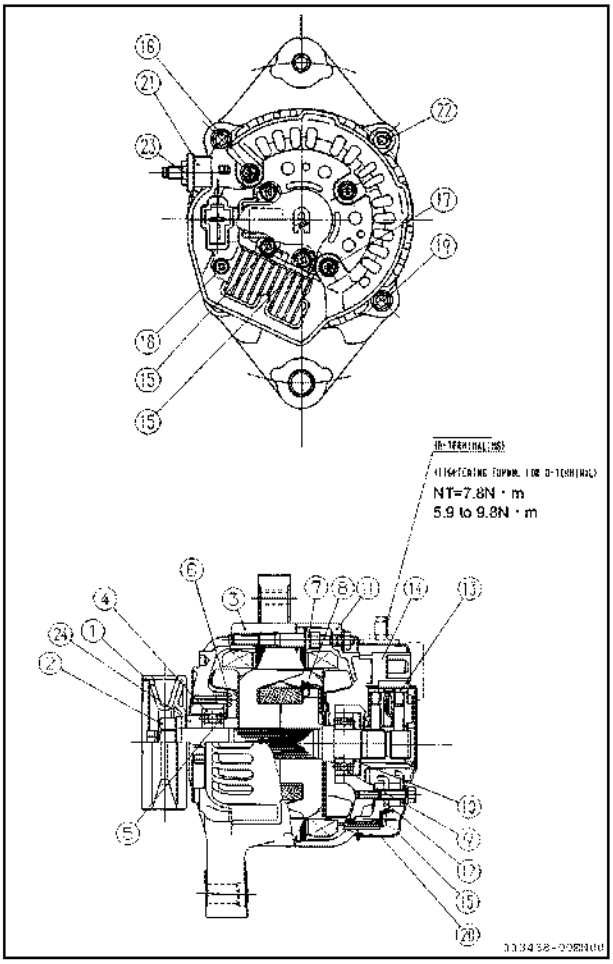
3. ALTERNATOR, 55

AGENERATOR ASSY, 55A: 129052-77220



REGULATED VOLTAGE	14.2~14.8V/ 5000rpm 10A



SYM	ND PART NO.	PART NAME	QTY
1	021041-6840	PULLEY	1
2	949056-2900	NUT	1
3	121400-4070	FRAME ASSY,DRIVE END	1
4	949100-3731	BEARING,BALL	1
5	021411-0500	PLATE,RETAINER	1
6	949006-5200	SCREW	4
7	949043-2120	BOLT,STUD	2
8	021200-5140	ROTOR ASSY	1
9	949100-3660	BEARING,BALL	1
10	021506-0070	COVER,BEARING	1
11	021501-5250	FRAME,END,RR	1
12	021580-4310	HOLDER SUB-ASSY,RECTIFIER	1
13	021620-2201	HOLDER SUB-ASSY,BRUSH	1
14	126000-1160	REGULATOR ASSY	1
15	949006-5460	SCREW	6
16	949006-5470	SCREW	1
17	949046-2040	BOLT	3
18	91310-04251	SCREW,W/WASHER	2
19	949044-4270	BOLT	2
20	021551-1120	COVER,END,RR	1
21	021605-1700	INSULATION BUSH,TERMINAL	1
22	949056-2481	NUT	2
23	949056-1001	NUT	1
24	021045-0700	COLLAR,SPACE	1

4. STARTER MOTOR

STARTER ASSY: 129129-77010

For details of check, refer to page 5-23 in 5. ENGINE.

5. KEY SWITCH ASSY (For ROPS)

6. KEY SWITCH CMP (For CAB)

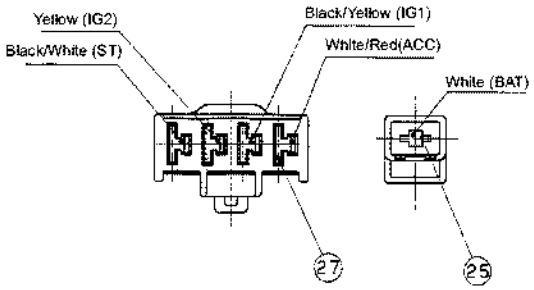
STARTER ASSY: 198162-52110 (For ROPS)

SWITCH ASSY, STARTER: 1A7850-52110 (For CAB)

(For CAB)

Terminal / Active part	ACC	BAT	IG1	IG2	ST
OFF					
ACC	○	○			
ON	○	○	○	○	
START		○	○		○
Wire size	AVS3	AVS5	AVS3	AVS5	AVS3
Wire color	W/R	W	B/Y	Y	B/W
Rated current (Max)	14A	55A	5A	36A	20A

Connection chart for switch

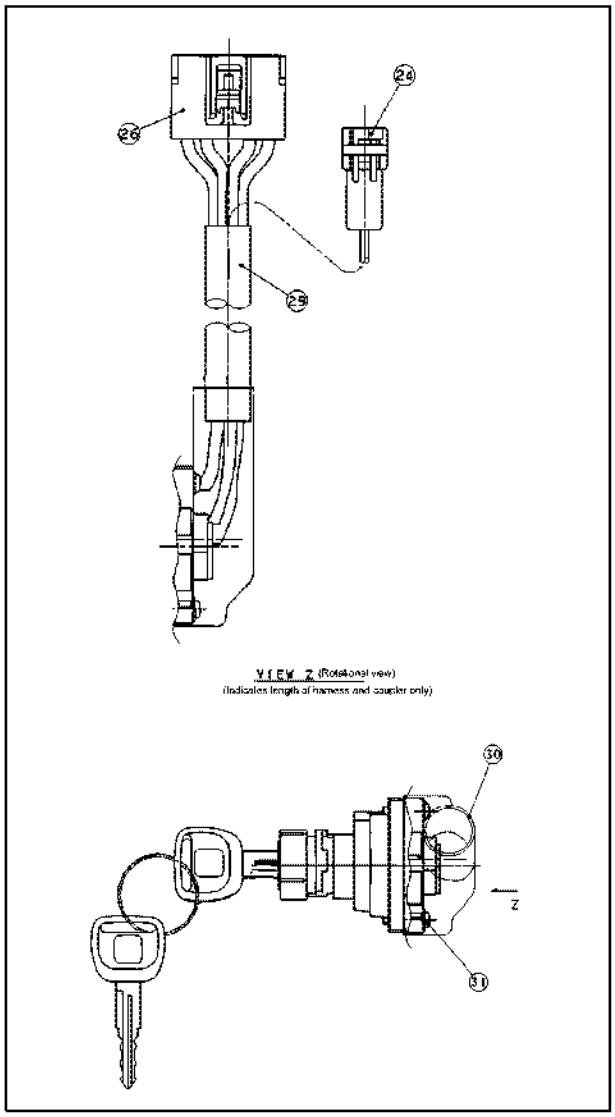


(For ROPS)

Terminal / Position	B	BR1	BR2	C2	C1
OFF		○	○		
1	○	○	○		
2	○	○	○	○	○
Rated current (Max)		40A	40A	20A	40A

Connection chart for switch

113461-00X00



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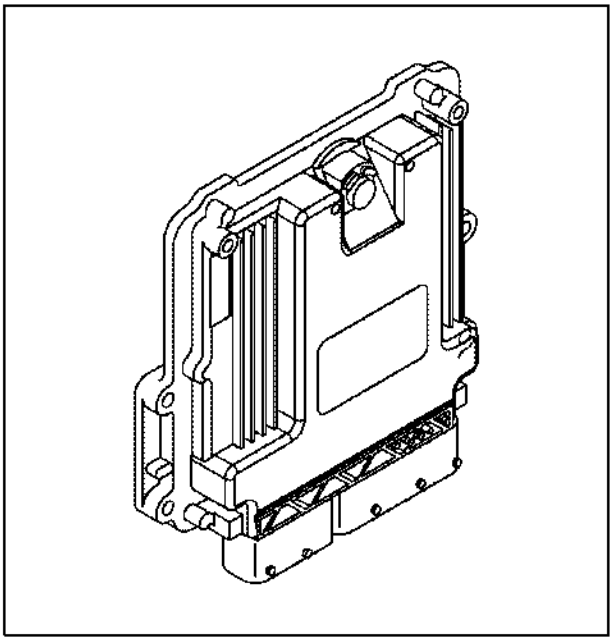
7. ENGINE CR-ECU

ECU ASSY, SERVICE YMR: 129A00-75910

Individual items cannot be checked.

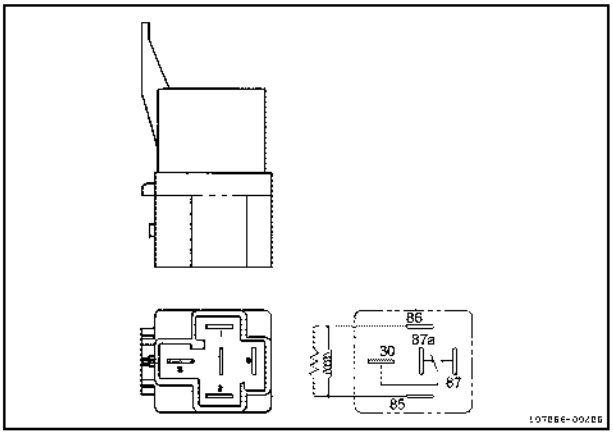
Remarks:
(1) Eco ECU
This part cannot be ordered.
Replace the part using a Service ECU with the proper engine information installed.
(2) Service ECU
When replacing this part, it is necessary to update the software of the ECU using the designated service tool.
Please refer to the Service Manual for details.



8. RWLAY RELAY, GLOW / STARTER RELAY

RERAY, CB C TYPE: 172B16-17190

Range	Test points		Results
	Tester rod "+"	Tester rod "-"	
Conduction	30	87a	Conduction
	30	87	No conduction
Resistor	85	86	Approximately 100Ω



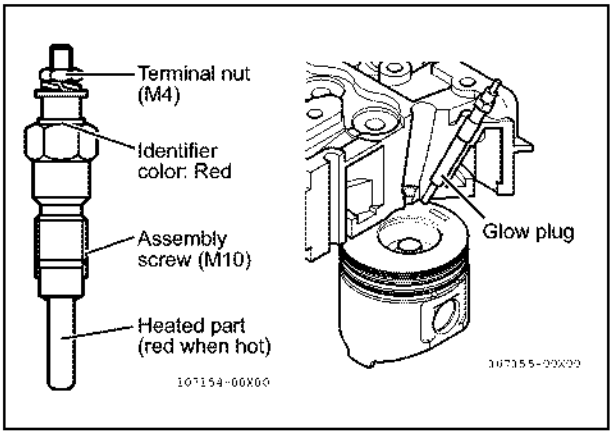
9. GLOW PLUG

PLUG, GLOW: 129008-77800

44. GLOW PLUG

CONNECTOR, GLOW PLUG: 129A00-77820

Nominal voltage	12 V
Model name	Standard glow plug
Standard preheat time (second)	15
Rated capacity (V/A)	11 / 7.0
Identifier color	Black



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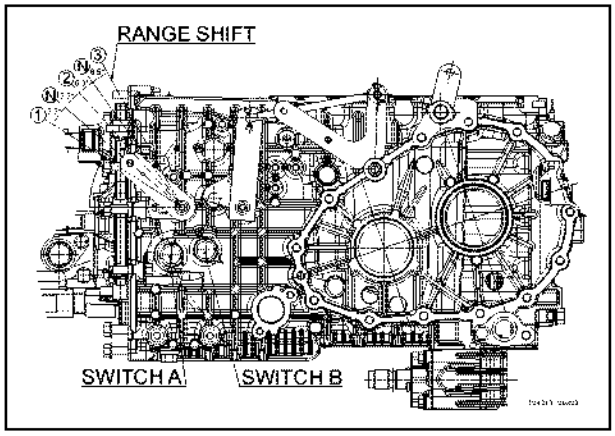
10.SWITCH, SUB GEAR REAR

SWITCH, SAFETY: 198269-52190

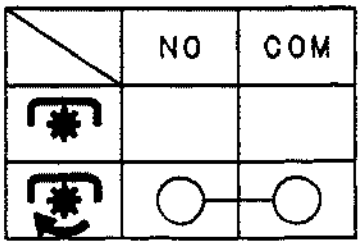
Range switch pattern

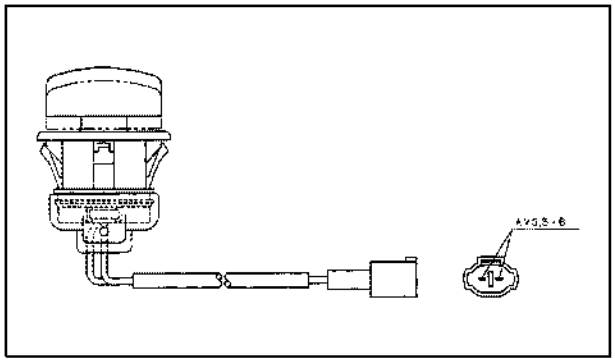
Rang	Switch A	Switch B
1	ON	OFF
N	ON	ON
2	OFF	ON
N	ON	ON
3	OFF	OFF



11.PTO SW

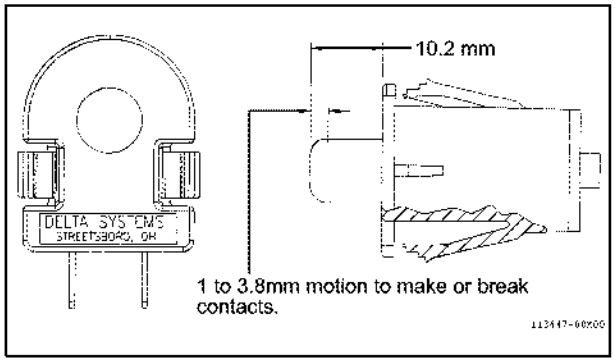
SWITCH, PTO IN-OFF: 1A7340-52290





12.SEAT SW

SWITCH, SEAT: 1A8426-52300



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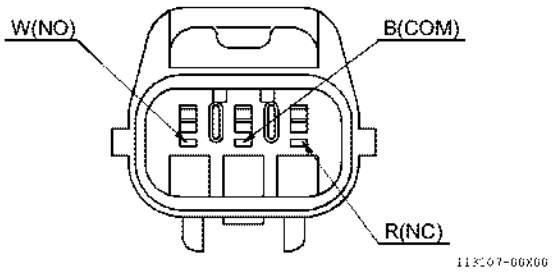
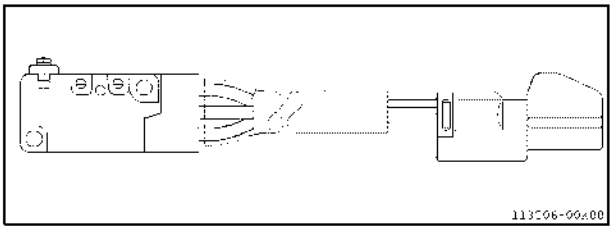
13.SWITCH, PARKING

SWITCH PARKING: 1E8915-81450

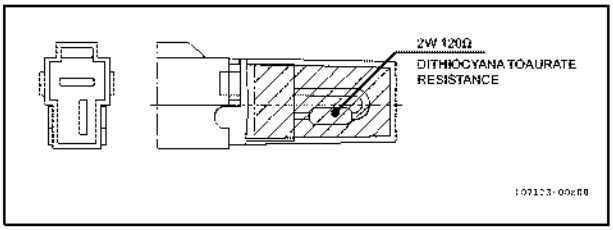




14.RESISTER, SEAT-SW

RESISTER, SEAT-SW: 1A6382-51510

RESISTANCE, 2W R120: 1A6382-51510



12

15.METER ASSY, COMBINATION

(1) METER ASSY, COMBINA: 1A8405-56002
(For YT235)

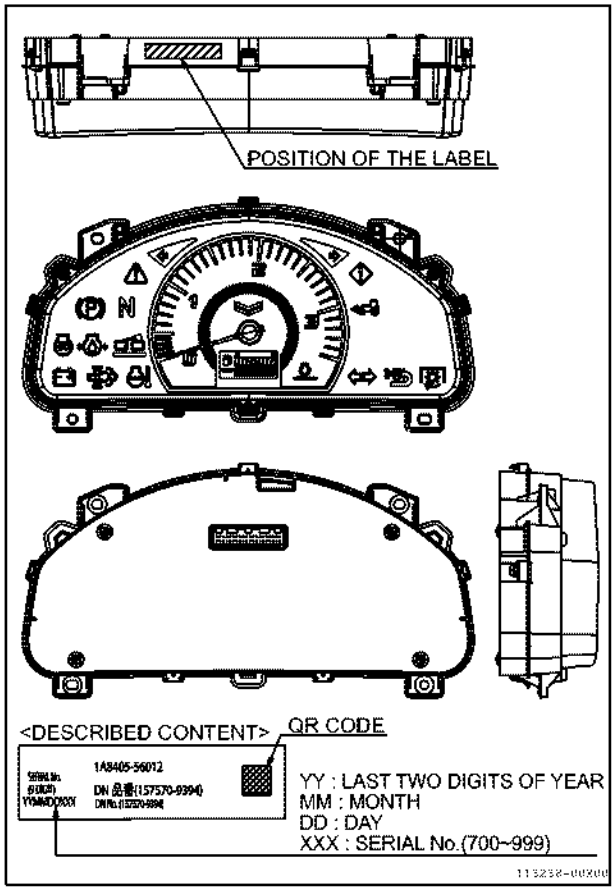
(2) METER ASSY, SERVICE: 1A8405-56902 (For service)
Individual items cannot be checked.

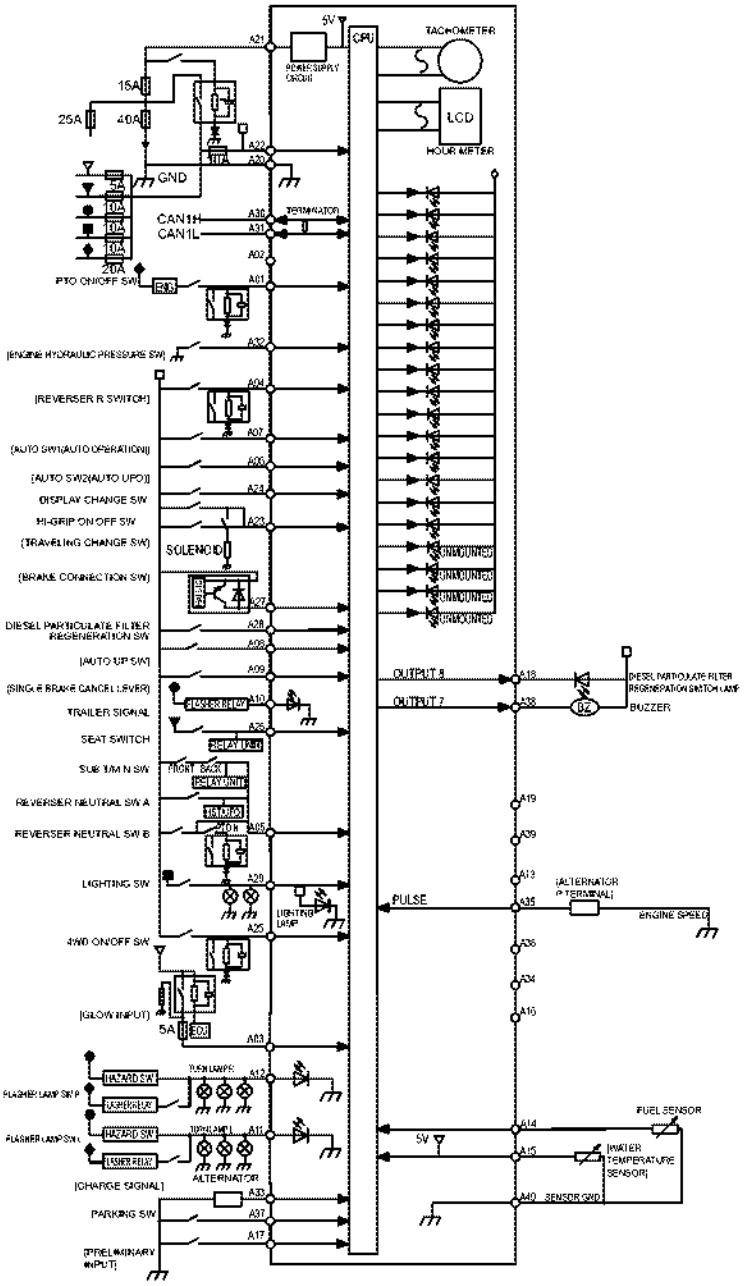
Remarks:

(1) Eco Meter
This part cannot be ordered.
Replace the part using a Service Meter with the proper tractor information installed.

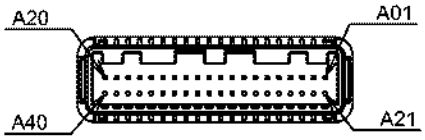
(2) Service Meter
If the proper information is not installed, the tractor will not operate.
To install proper information, go on an authorized distributor.

*When you replace the meter panel, use SA-D for initial setting. Refer to page 12-76





<SIGNAL CONNECTION LAYOUT>
CONNECTOR 40 PIN
METER SIDE CONNECTOR PART CODE:
1747642-1(AMP)
VEHICLE SIDE CONNECTOR PART NUMBER:
1674312-1(AMP)



NO.	TERMINAL NAME	NO.	TERMINAL NAME
A01	PTO ON/OFF SW	A21	POWER SOURCE FOR MEMORY
A02	EMPTY	A22	IGN
A03	[GLOW INPUT]	A23	[TRAVELING CHANGE SW] /HI-GRIP ON OFF SW
A04	[REVERSER R SW]	A24	DISPLAY CHANGE SW
A05	REVERSER N SW/SUB T/M N SW	A25	4WD ON OFF SW
A06	[AUTO SW2(AUTO UFO)]	A26	SEAT SWITCH
A07	[AUTO SW1(AUTO OPERATION) /TURN UP]	A27	[BRAKE CONNECTION SW]
A08	[AUTO UP SW/BACK UP]	A28	DIESEL PARTICULATE FILTER REGENERATION SW
A09	[SINGLE BRAKE CANCEL LEVER]	A29	LIGHTING SW
A10	TRAILER SIGNAL	A30	CAN1 H
A11	FLASHER LAMP SWITCH L	A31	CAN1 L
A12	FLASHER LAMP SWITCH R	A32	[ENGINE HYDRAULIC PRESSURE SW]
A13	[PRELIMINARY INPUT]	A33	[CHARGE SIGNAL]
A14	FUEL SENSOR	A34	[U OUT]
A15	[WATER TEMPERATURE SENSOR]	A35	[ALTERNATOR P TERMINAL]
A16	[TEST SW/TEST 1]	A36	[U IN]
A17	[PRELIMINARY INPUT]	A37	PARKING SW
A18	DIESEL PARTICULATE FILTER REGENERATION SWITCH LAMP	A38	BUZZER
A19	EMPTY	A39	EMPTY
A20	GND	A40	SENSOR GND

SIGNAL MARKED WITH [ ]:UNUSED AND MOUNTED

113239-00X00

16.SWITCH, LIGHTING

LEVER, COMBINATION: 1A8400-52140

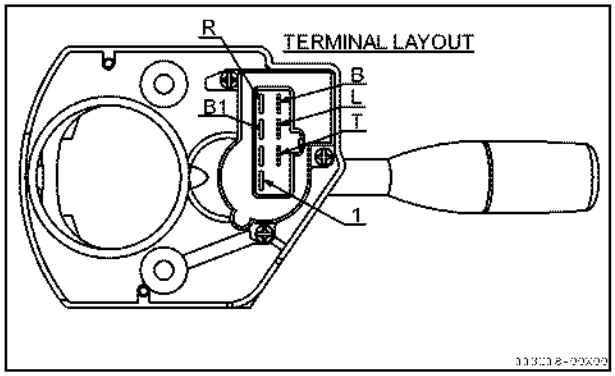
LIGHTING

SWITCHING	B1	T	1
OFF			
ON	⊖	⊖	○

TURN

SWITCHING	B	L	R
L	⊖	○	
N			
R	⊖		○

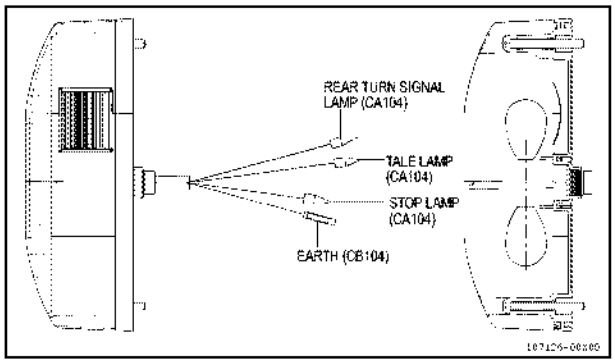
113219-00X00



17.LAMP, REAR COMBINATION L

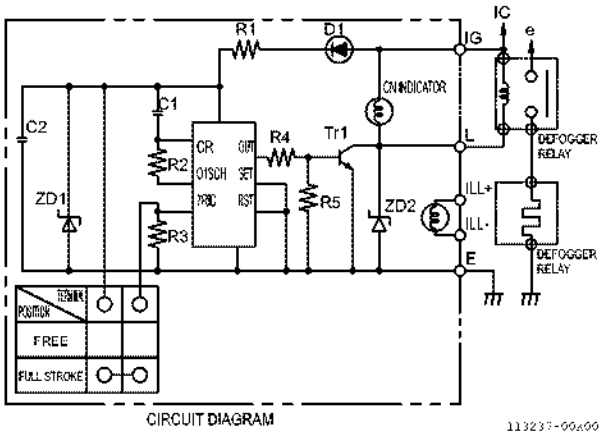
LAMP ASSY, REAR COMB: 1A8043-53600

Electricity consumption
Rear turn signal lamp; 21 W
Stop lamp; 21 W
Tale lamp; 5W



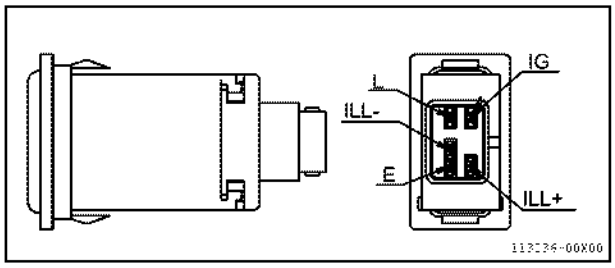
18.SWITCH, DEFOGGER

SWITCH, DEFOGGER: 1A7805-52600



CIRCUIT DIAGRAM

113237-00X00

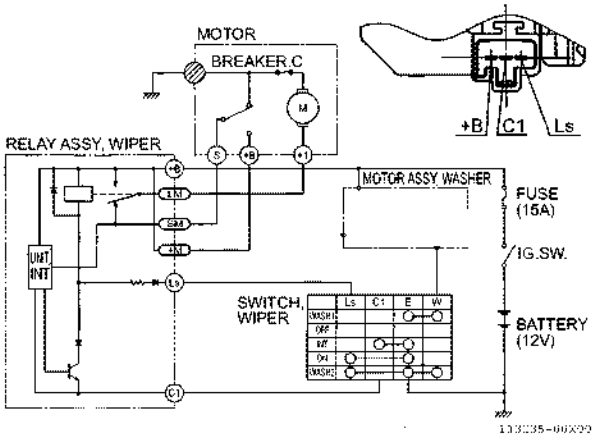


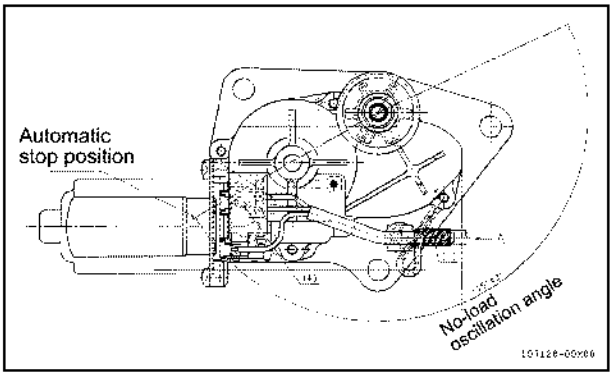
113236-00X00

12

19.WIPER MOTOR (FRONT

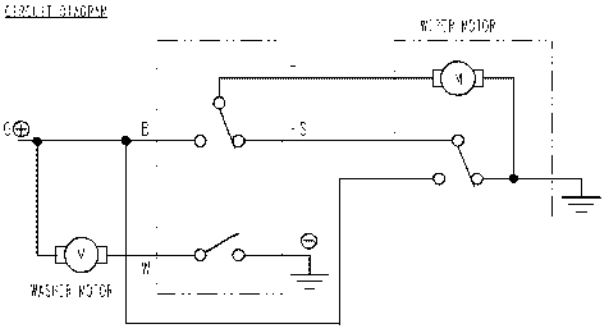
MOTOR ASSY, WIPER: 1A7210-86610



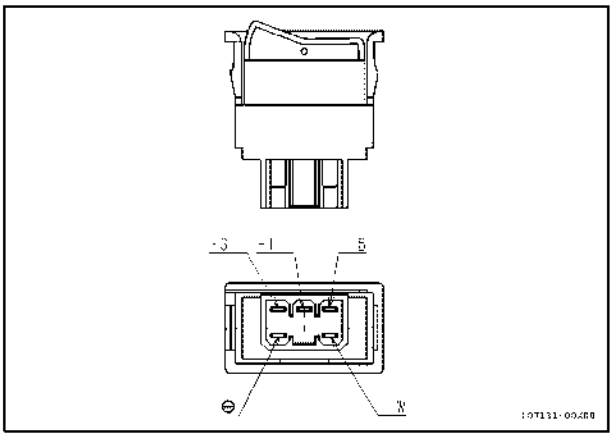


20.SWITCH, FRONT WIPER

SWITCH, FRONT WIPER: 1A8400-52430



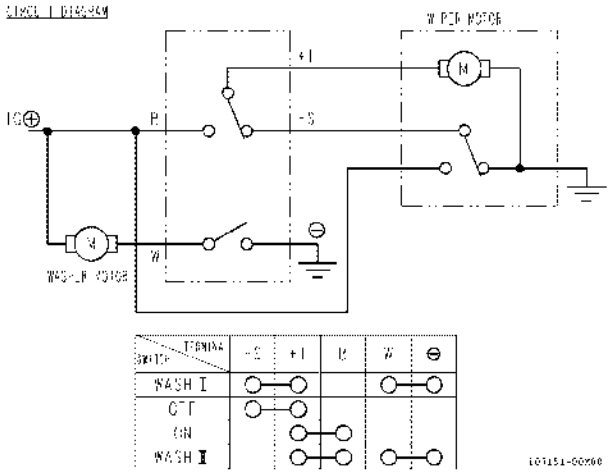
TERMINAL / SWITCH	S	I	B	W	⊖
WASH I	○	○		○	○
OFF	○	○			
INT		○	○		
ON		○	○		
WASH II		○	○	○	○

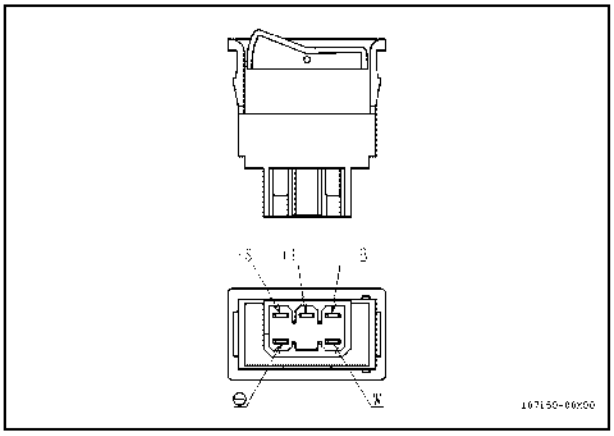


12

21.SW, REAR WIPER

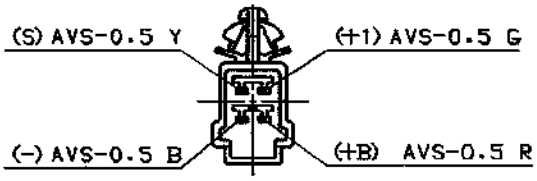
SWITCH, REAR WIPER: 1A8060-52530

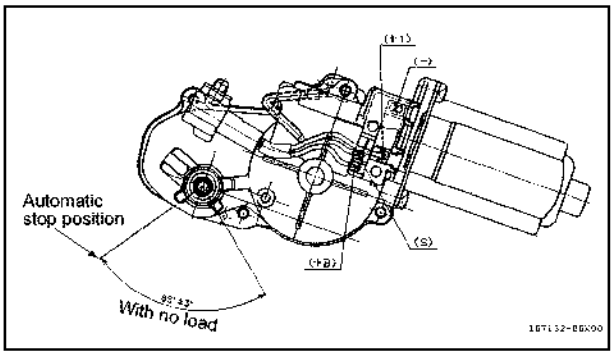


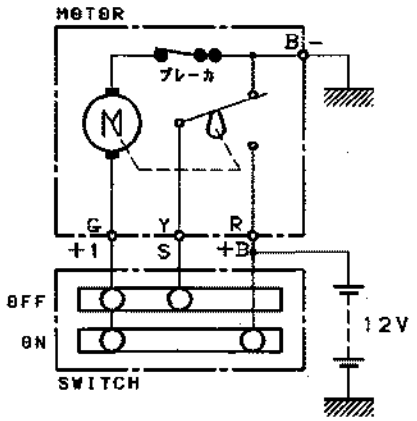


22.WIPER MOTOR (REAR (For CAB)

MOTOR ASSY: 1A8110-86310





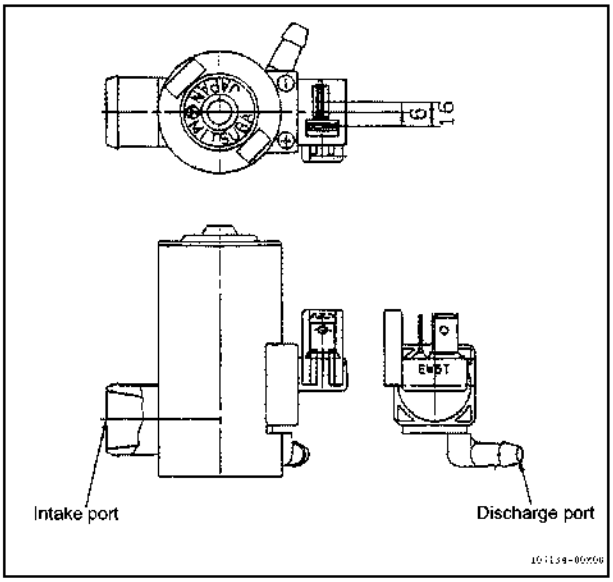


CONNECTING DIAGRAM
(STOP POSITION OF MOTOR)

12

23.PUMP, WASHER

PUMP, WASHER: 198127-86710



24.COMPRESSOR ASSY

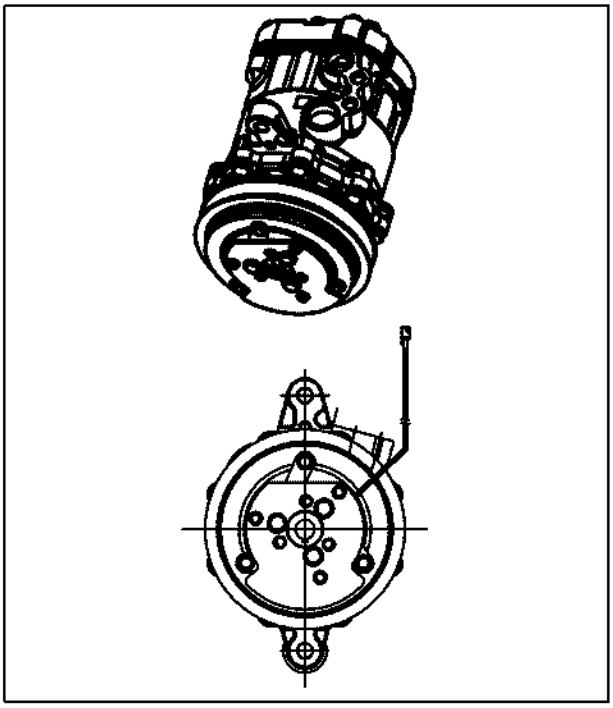
COMPRESSOR ASSY: 1A8484-87900

COMPRESSOR SPECIFICATIONS

BORE	n25.4mm
STROKE	22.2mm
NUMBER OF CYLINDERS	7
DISPLACEMENT PER REVOLUTION	78.9 cm³ /rev
MAXIMUM ALLOWABLE CONTINUOUS SPEED	6500 rpm
MAXIMUM DOWNSHIFT SPEED	9300 rpm
REFRIGERANT	R-134a
OIL CHARGE(SP -10 OR EQUIV)	70±0.5 mm
ROTATION (CLUTCH SIDE VIEW)	CLOCKWISE
MASS	2.54kg
MODEL	SD7B08
TYPE	PISTON

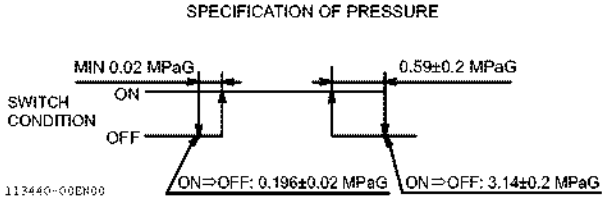
CLUTCH SPECIFICATIONS

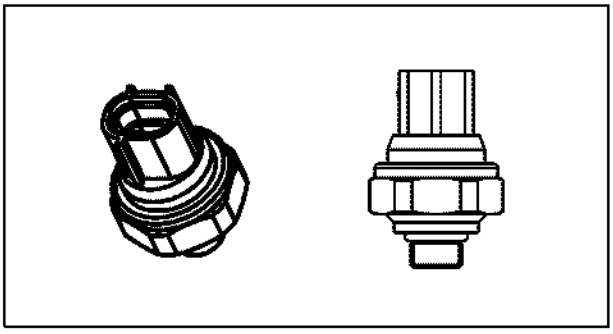
RATED VOLTAGE	DC 12V
MINIMUM BREAKAWAY TORQUE	18.6 N·m
MINIMUM ENGAGEMENT VOLTAGE	DC 7.5V
MAXIMUM POWER CONSUMPTION	43W (Cu)
MAXIMUM ALLOWABLE CONTINUOUS SPEED	6500 rpm
MAXIMUM DOWNSHIFT SPEED	9300 rpm
BELT TYPE	A TYPE
PULLEY DIAMETER	n115mm
MASS	1.5kg



25.SW, PRESSURE

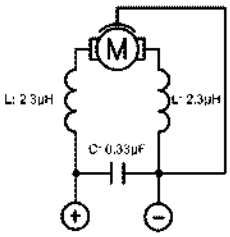
SWITCH, PRESSUR: 1A8484-87310



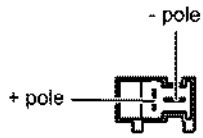


26.BLOWER, MOTOR

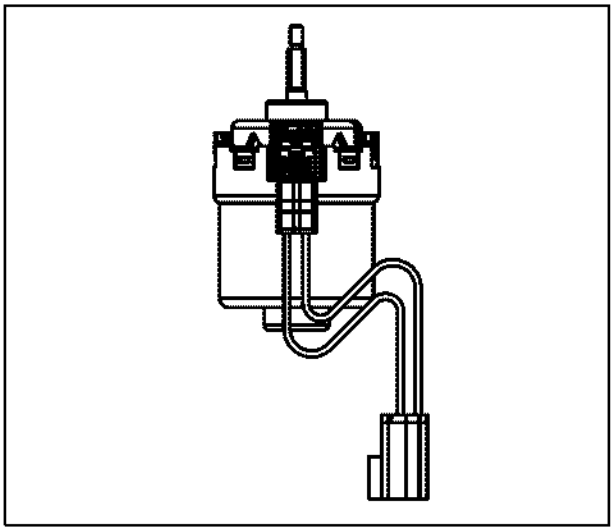
MOTOR, BLOWER: 1A8484-87260



ELECTRIC CIRCUIT 107150-00X00

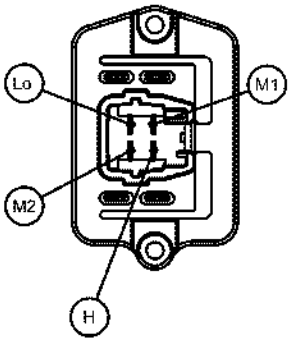


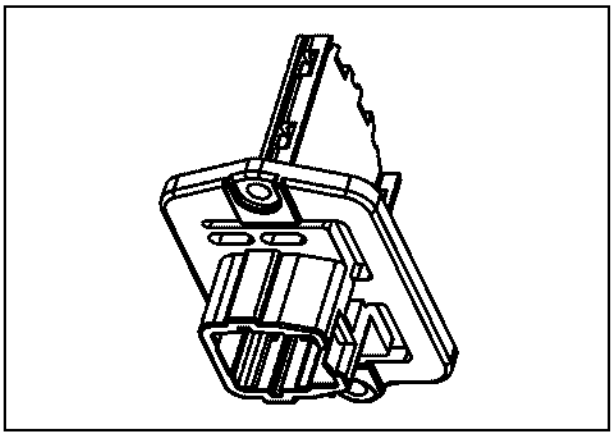
OUTLINE THE INSTALLATION OF LEAD WIRE 107160-00X00

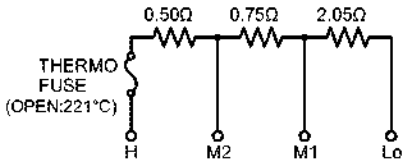


27.BLOWER, RESISTER

BLOWER, REGISTER: 1A8484-87320





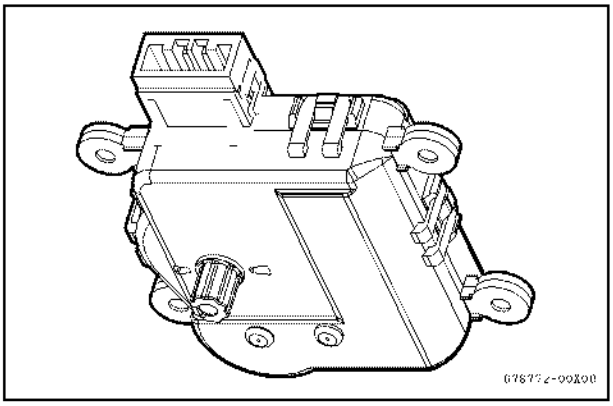


CIRCUIT DIAGRAM 113441-00E000

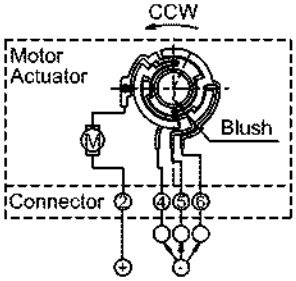
12

28.MOTOR, SERVO MODE

MOTOR, SERVO MODE: 1A8484-87410



Circuit diagram



*Refer to operating chart

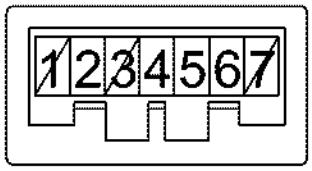
Operating chart

2	4	5	6	Position
+	-			A
+		-		B
+			-	C

← (delivered set position)

Connector

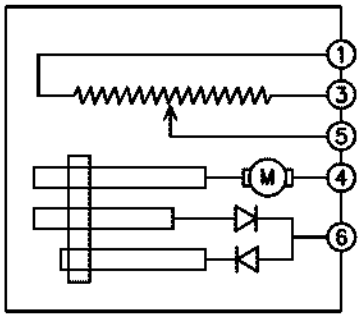
IL-AG5-7P-S3LS(JAE) equivalent



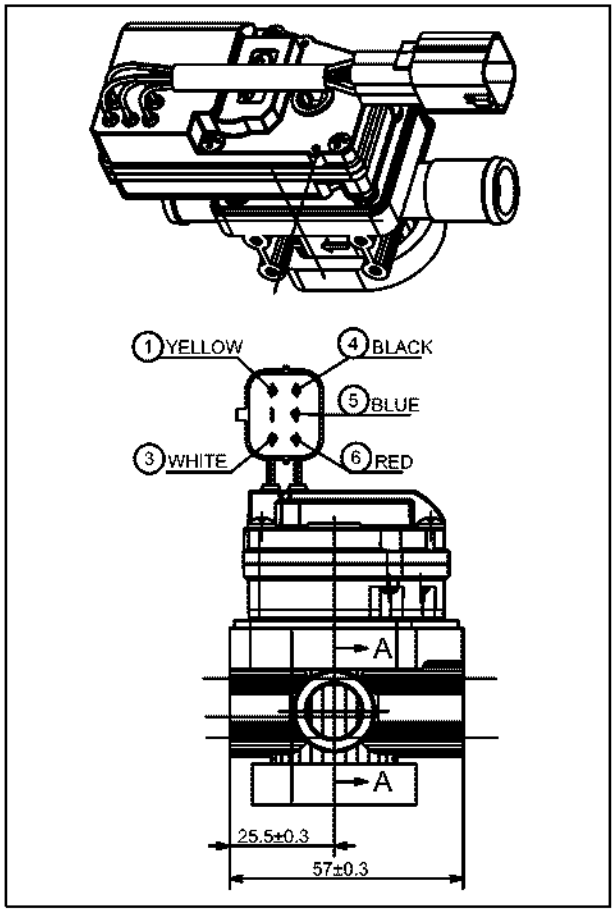
29.VALVE, WATER

VALVE, WATER: 1A8484-87280

TERMINAL LAYOUT ⑥ ④ ③ ① ⑤					ROTATION DIRECTION	STOP POSITION	FEEDBACK VOLTAGE [V]
RED	BLACK	WHITE	YELLOW	BLUE			
-12V	+12V	+5V	GND	SIG	CCW	P2(OPEN)	0.4±0.1
+12V	-12V				CW	P1(CLOSE)	4.6±0.1



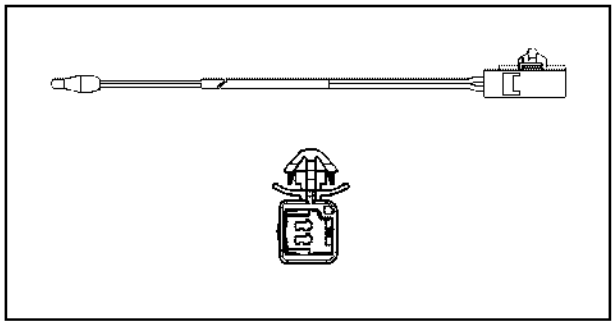
CIRCUIT DIAGRAM



30.THERMISTOR, FROST

EVAP SENSER: 1A8484-87270

RESISTANCE LEVEL	R0; 6.65KΩ±3% AT 32°F (0°C) R25; 2.0KΩ±7% AT +77°F (+25°C)

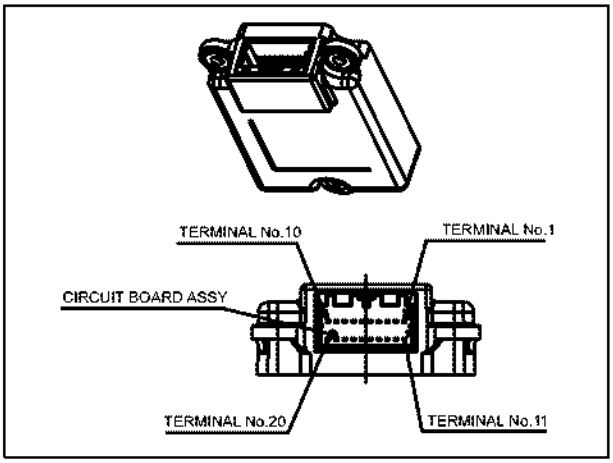


12

31.AMP, A/C

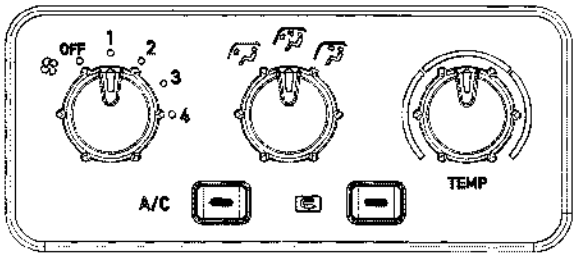
AMP, A/C: 1A8484-87330

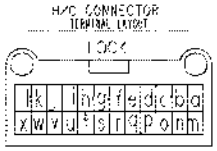
TERMINAL No	SIGNAL NAME	TERMINAL No	SIGNAL NAME
1	EVAP TEMP SENSOR	11	EVAP SENSOR GND
2	W/V POTENTIOMETER	12	W/V POTENTIOMETER GND
3	W/V POTENTIOMETER SUPPLY(5V)	13	
4	AIR MIX OUTPUT	14	
5		15	
6	A/C SW OUTPUT	16	
7	Mg-CLUTCH OUTPUT	17	
8	W/V DRV 2	18	
9	W/V DRV 1	19	
10	IGN POWER 12V	20	GND



32.CONTROL, A/C MANU

CONTROL, A/C MANU: 1A8420-87300





H/C CONNECTOR
TERMINAL LAYOUT

TERMINAL No.	TERMINAL NAME	TERMINAL No.	TERMINAL NAME
a	LIGHTING	m	LIGHT
b	ENGINE	n	MEMORY
c	COOL	o	ACC(12V)
d	WARM	p	IN C1
e	DEF	q	IN C2
f	DEF	r	IN C3
g	IRS	s	※1 SOFT SELECT
h	A/C SW OUTPUT	t	FAN
i	FACE	u	AIR SERVO MOTOR VOLTAGE
j	DEF/FACE	v	SENSOR 5V
k	UART Rx1	w	SENSOR EARTH
l	GND	x	AIRMIX OUTPUT

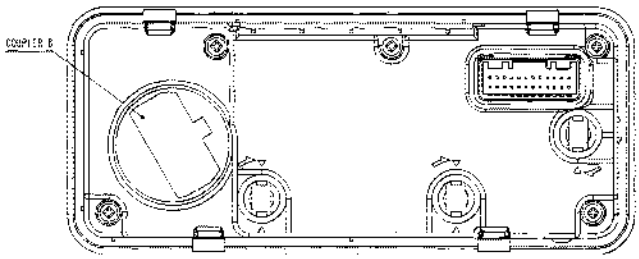
FAN SW CONNECTOR
TERMINAL LAYOUT

LOCK

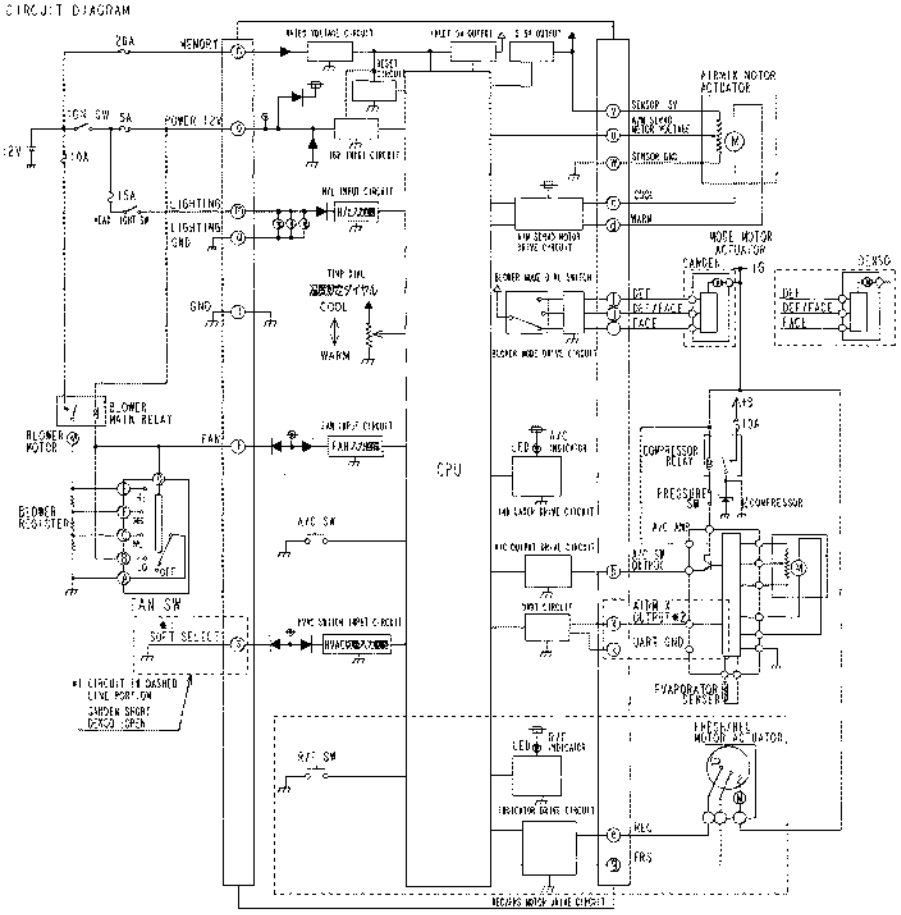
C	B	A
F	E	D

COUPLER B : YAZAKI 7322-2865 EQUIVALENT
MATING COUPLER : YAZAKI 7323-2865

TERMINAL No.	TERMINAL NAME
A	GND
B	BLOWER LO
C	BLOWER ML
D	BLOWER MAIN RELAY
E	BLOWER MH
F	BLOWER MR

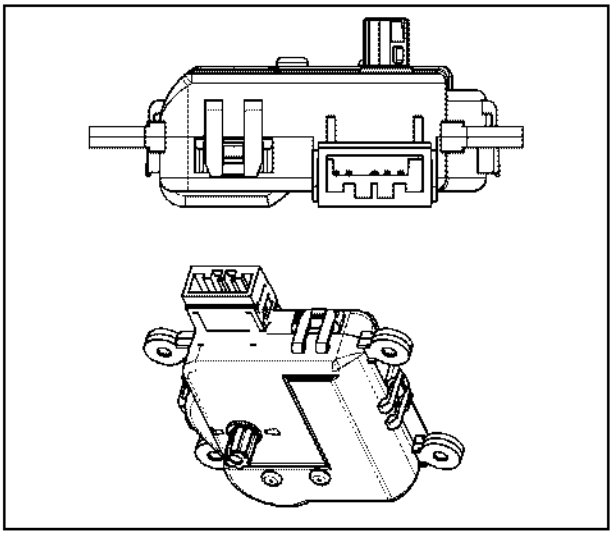


CIRCUIT DIAGRAM

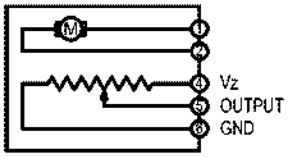


33.ACTUATOR, AIR MIX

ACTUATOR ASSY, MODE: 1A8485-87500



CONNECTOR
IL-AG5-7P-S3L2(JAE) EQUIVALENT



CIRCUIT DIAGRAM

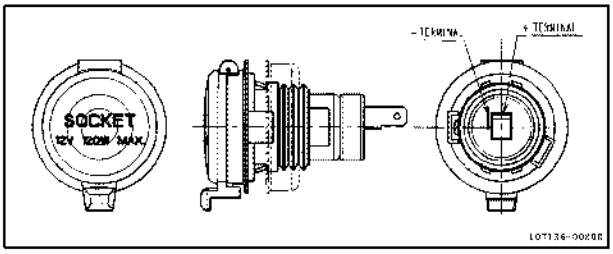
MOTOR GENERAL SPECIFICATION	RATED LOAD	0.3 N· m
	TRAVEL ANGEL	90°±0.3°
	RATED CURRENT	0.1A MAX AT DC12V,0.3N·m, ROOM TEMPERATURE 23±5°C
	STARTING VOLTAGE	DC 7V MAX AT 0.3N·m, ROOM TEMPERATURE 23±5°C
	STALL CURRENT	0.45A MAX AT DC12V, ROOM TEMPERATURE 23±5°C
	NO-LOAD CURRENT	0.05A MAX AT DC12V, ROOM TEMPERATURE 23±5°C
	WORKING SPEED	NO-LOAD: 5rpm, RATED LOAD: 4.4rpm
	RESISTANCE	4.7kΩ±940Ω (④ to ⑥)

OPERATING CHART

	CW	CCW
①	+	-
②	-	+

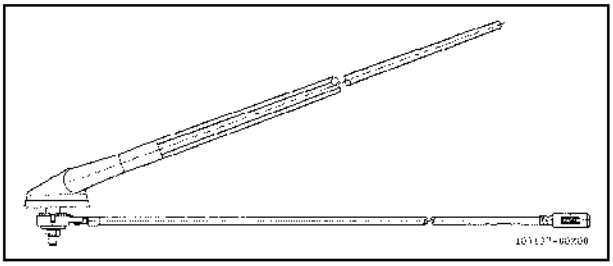
34.POWER OUTPUT

SOCKET, POWER SOUCE: 1D4270-17650



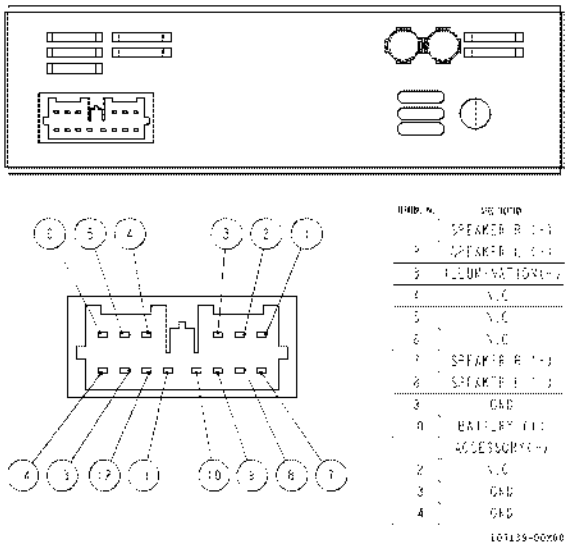
35.ANTENNA CMP

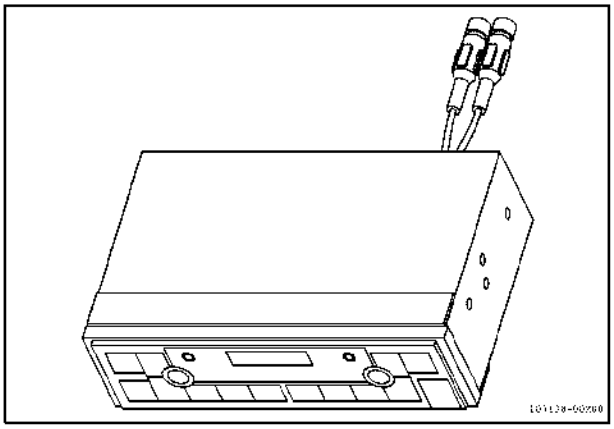
ANTENNA ASSY: 198463-86771



36.RADIO CMP (CD

CD RADIO: 1A8485-86000





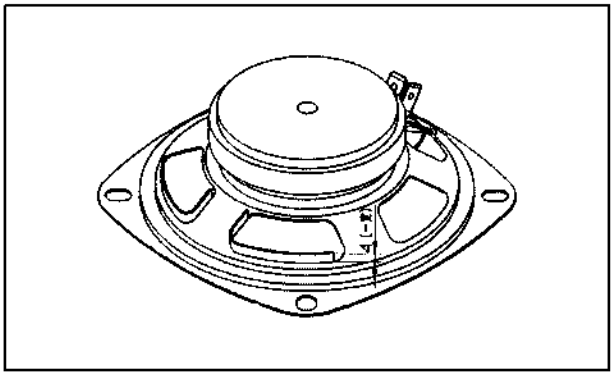
37.SPEAKER (L / R)

SPEAKER: 1A8110-86920

Individual items cannot be checked.

Specification (Speaker)

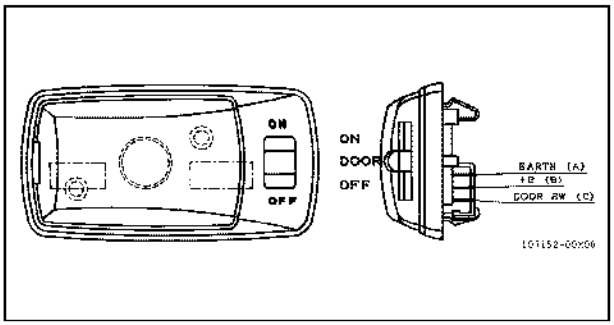
1	Rated input	15 W
2	Maximum input	25 W
3	Impedance	8 Ω ±1.2Ω (At 400 Hz, 1V)
4	Output sound pressure level	86 db ±2dB (Measured: 1 m, 1 W) Average value of 300, 400, 500, 600 Hz
5	Lowest resonance frequency	124 Hz ±25 Hz
6	Audio playback frequency range	fo - 13 kHz (Measured: 1 m, 1 W)

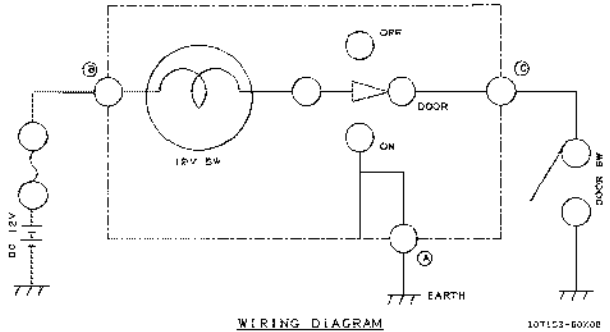


38.LAMP (ROOM

LAMP ASSY, ROOM: 1A7470-86750

BULB, H13 12 V 35W:
1A7470-86270
V316230-0003





WIRING DIAGRAM

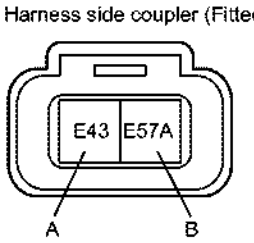
12

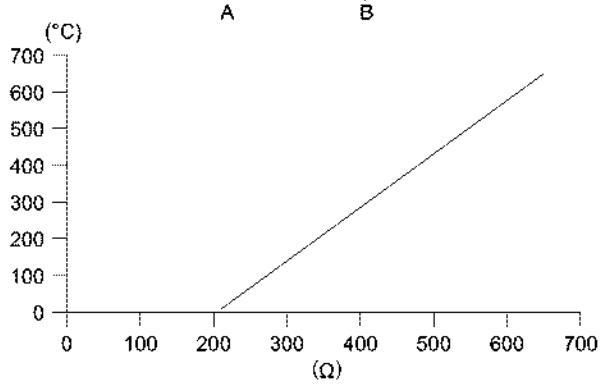
39.SENSOR, IN-TH

SENSOR, EXH.TEMP: 129C00-13940

Individual items

Temperature (°C)	A-B Sensor resistance value (Ω)
10	209.15
650	649.77

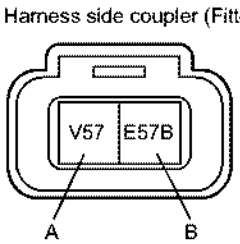


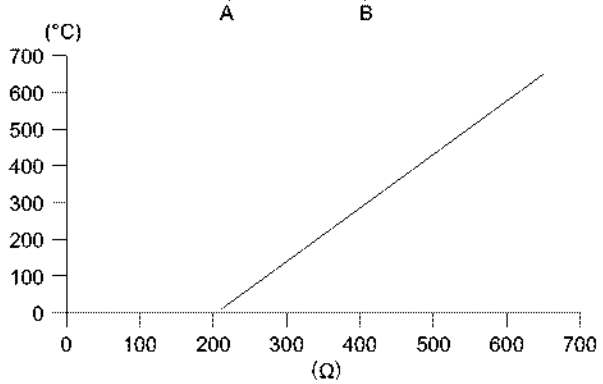


*The sensor check is done by SA-D. Refer to page 12-76

40.SENSOR, MID-TH

SENSOR, EXH.TEMP: 129C00-13950





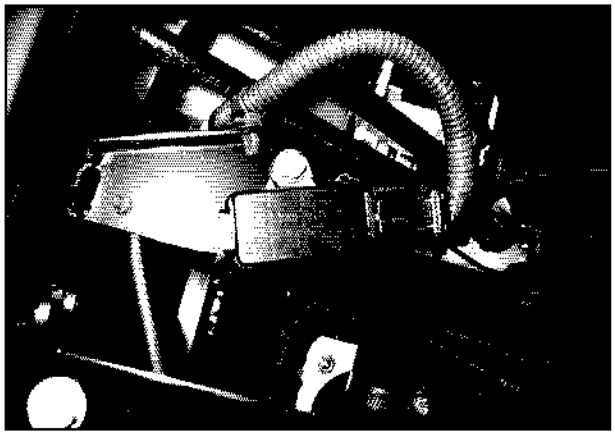
*When you replace the sensor, use SA-D for initial setting. Refer to page 12-76

41.SENSOR, DPF-P

SENSOR, PRESSURE: 129978-17700

Individual items cannot be checked.

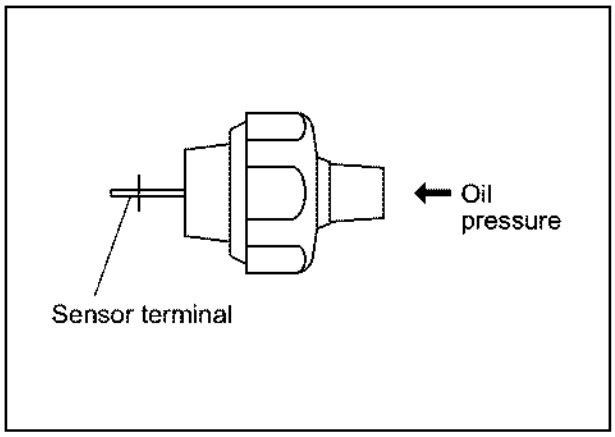
*When you replace the sensor, use SA-D for initial setting. Refer to page 12-76



42.SW, OIL PRESSURE

SWITCH, HYDRAULIC: 119761-39450

The hydraulic sensor will turn off when the engine starts and generates oil pressure up to 49±10 KPa or higher. If the pressure is the same or lower, the spring force inside the sensor turns the sensor on.



Inspecting the oil pressure sensor

Detach the harness from the oil pressure switch and check with the sensor terminals.

Individual items

Range	Test points	Meaning	Results
Conduction	Terminals and chassis	Engine stop	No conduction
	Terminals and chassis	Engine speed	Conduction

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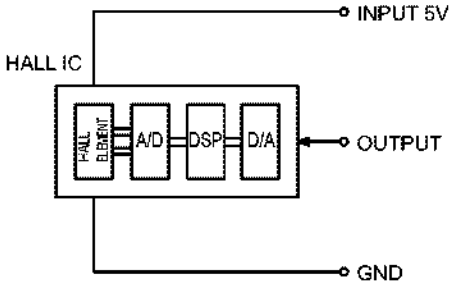
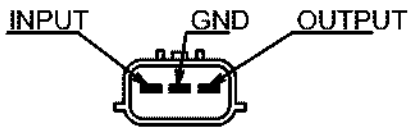
43.SENSOR, ACC

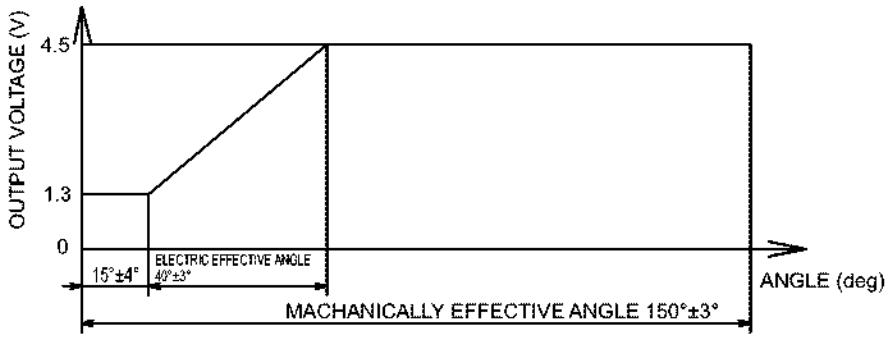
SENSOR, ACCELERATOR: 1A8060-55600



CIRCUIT CONFIGURATION



TERMINAL LAYOUT



OUTPUT CHARACTERISTICS

*When you replace the sensor, use SA-D for initial setting. Refer to page 12-76

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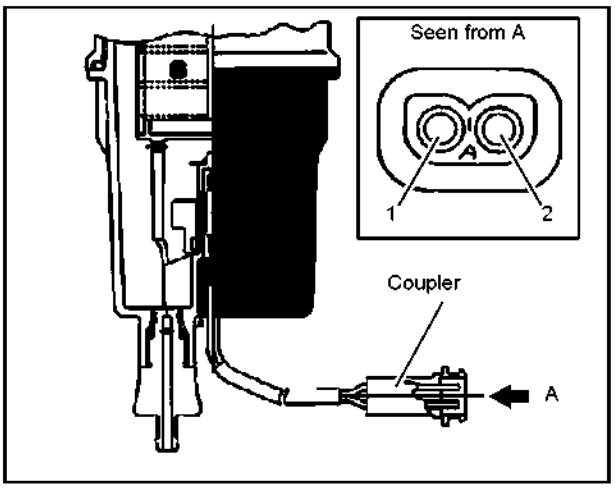
44.WATER SEPARATOR

SENSOR ASSY, LEVEL: 129917-55821

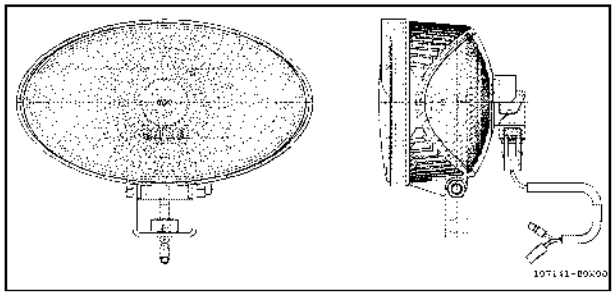
Individual items

Range	Test points		Meaning	Results
Conduction	1	2	Normal state	No conduction
	1	2	Make the water separator CMP upside down without removing fuel horse.	Conduction



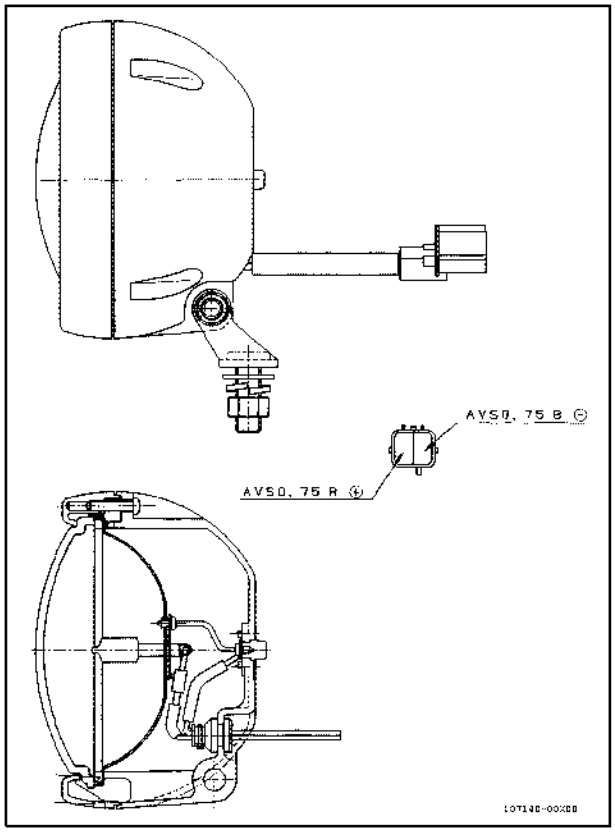
45.LAMP, FRONT WORK L/R (For CAB)
LAMP ASSY, WORK 37.5W: 1A8484-54200

Electricity consumption: 37.5 W / 12 V



46.LAMP (WORK L
LAMP ASSY, WORKING: 1A7340-54100

BULB, H13 12 V 35W:
1A7470-86270
V316230-0003

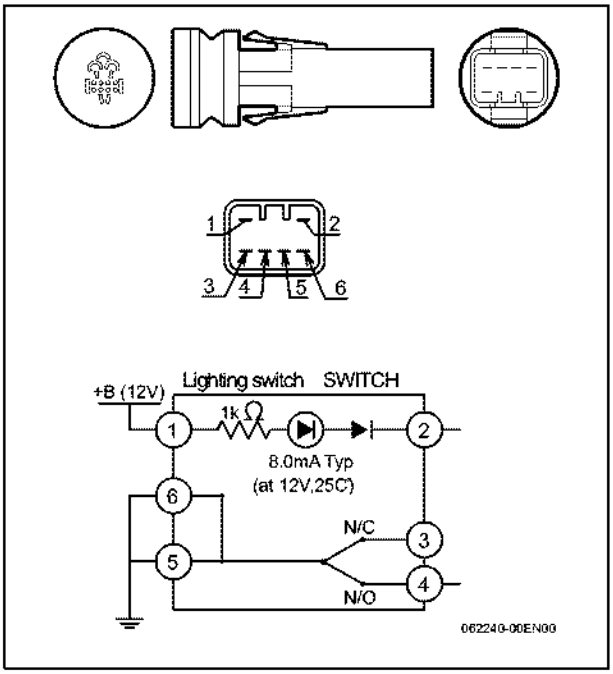


47.DPF REGENERATION SW

SWITCH, LAMP OR NL: 1E6C20-81300

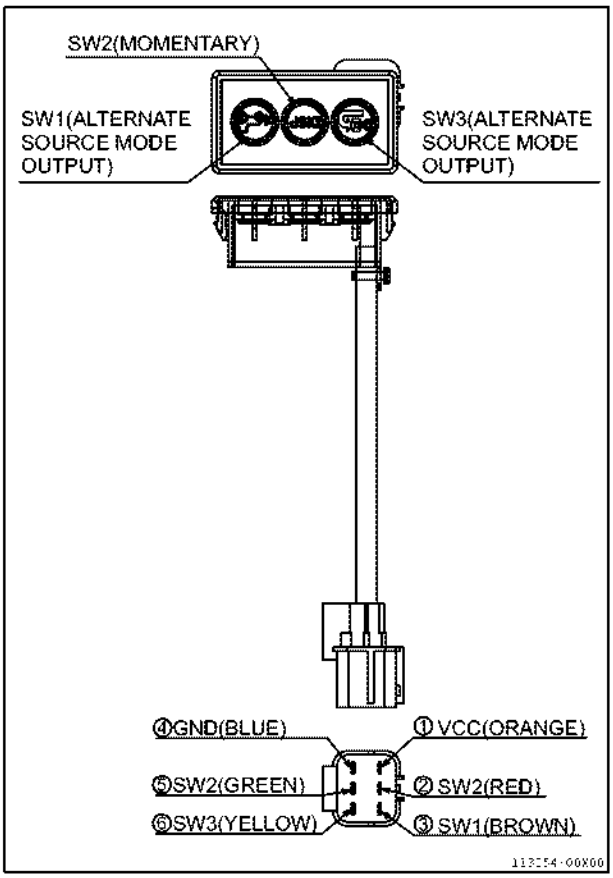
Individual items cannot be checked.

Check with the checker mode.



48.SWITCH, TRAVELING

SWITCH, TRAVELING: 1A8426-52551



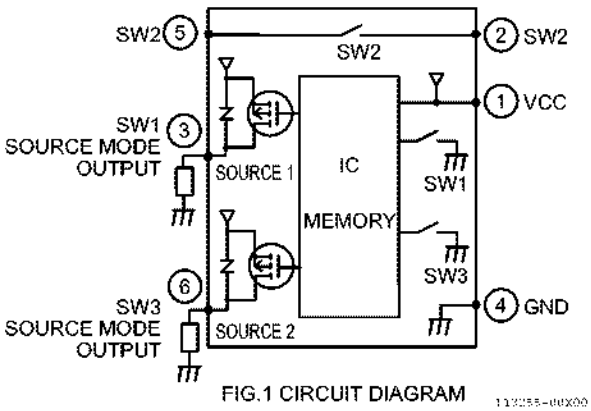
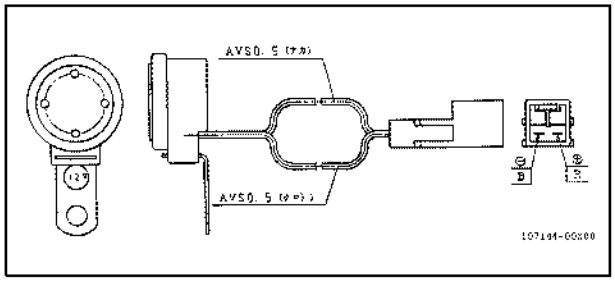


FIG.1 CIRCUIT DIAGRAM

49.BUZZER (BACK

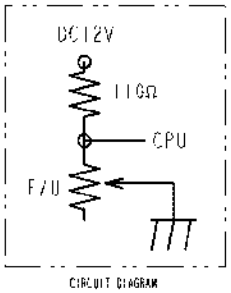
BUZZER, ALARM: 174570-57110

RATED VOLTAGE	DC 12 V
CURRENT (CONSUMPTION)	50 mA / max
FUNDAMENTAL FREQUENCY	3.0 kHz ~ 4.0 kHz
SOUND PRESSURE	85dB ~ 95 dB /1m
OPERATING RANG	9 V ~ 15 V

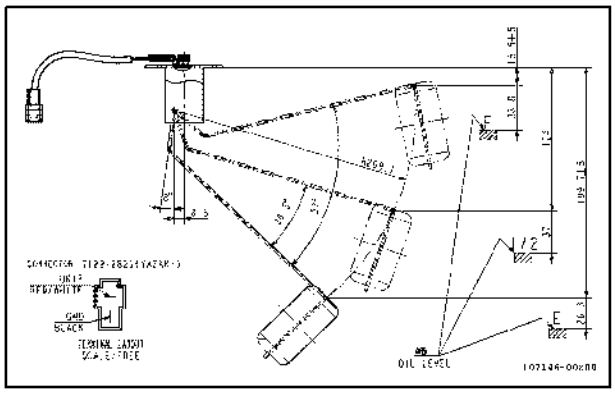


50.FUEL GAUGE SENSOR

GAUGE ASSY, FUEL: 1A8400-56600



CIRCUIT DIAGRAM



Indicator specifications

FLOAT POSITION	FULL	1/2	EMPTY
RESISTANCE(Ω)	3	(32.5)	110
TOLERANCE (Ω)	±2	(±5)	±7

107145-00X00

12

51.SW, BATTERY CUTOFF

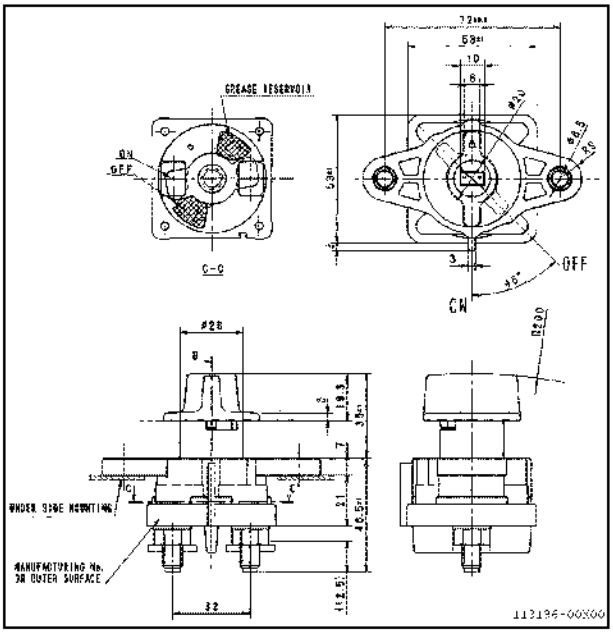
SWITCH ASSY,BATTERY: 172544-16200

SPECIFICATIONS
(1) RATED VOLTAGE DC12V
(2) WORKING VOLTAGE RANGE DC10V~DC16V
(3) CURRENT RATING 60A CONNECTED
90A MAX 1.5h
300A MAX 1s
1100A MAX 50ms
(4) OPERATION TENPERATURE -20℃~+80℃
(5) STORAGE TEMPERATURE -30℃~+80℃
(6) MOVEMENT LIST

	TERMINAL G	TERMINAL H
OFF		
ON	○	○

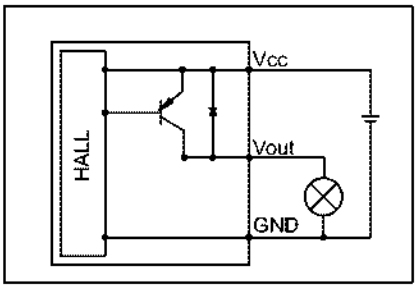
(7) INSTALLATION PANEL TIGHTENING TORQUE:M6, 3.4~4.1N·m,
(8) TERMINAL TIGHTENING TORQUE:M8, 4.5~6.5N·m
(9) TERMINAL STRENGTH:LATERAL PULLING LOAD, MORE THAN 150N.

113197-00X00



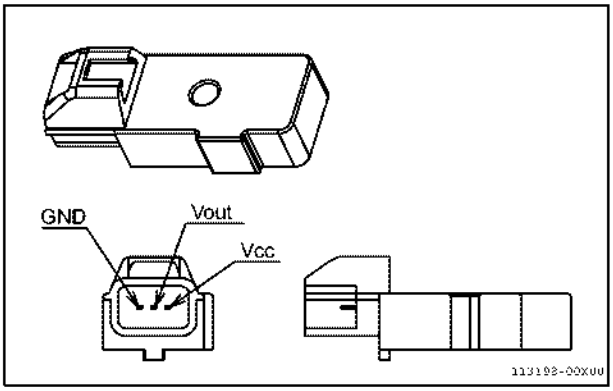
52.SWITCH, LIFT LOWER LIMIT

SWITCH, INTERLOCK: 1A8060-52140



CIRCUIT DIAGRAM

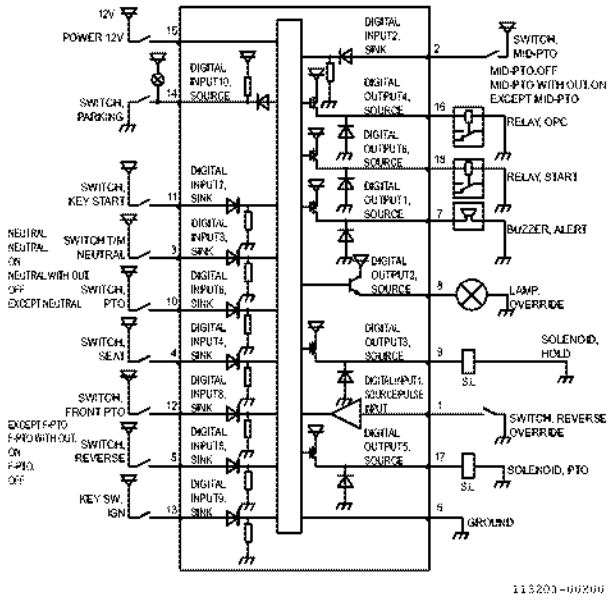
113199-00X00



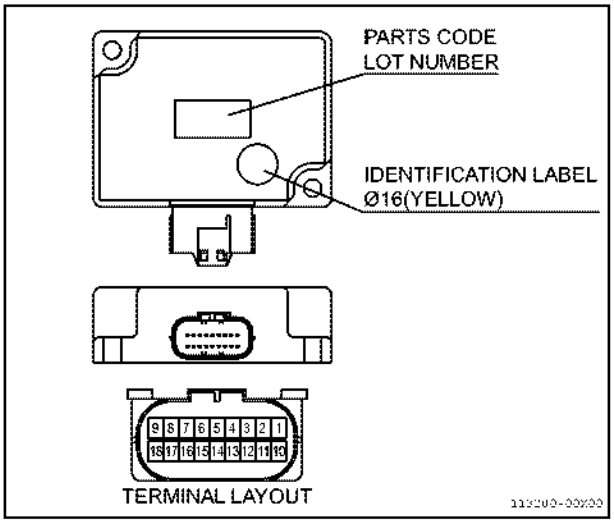
12

53.UNIT, OPC

RELAY UNIT,EU: 1A8476-57103



113200-00200



113200-00200

CONNECTOR TERMINAL NO.	FUNCTION CATEGORY	ELECTRICAL CHARACTERISTIC	TERMINAL NAME
1	DIGITAL INPUT1,PULSE INPUT	SOURCE	SWITCH, REVERSE OVERRIDE
2	DIGITAL INPUT2	SINK	SWITCH, MID-PTO
3	DIGITAL INPUT3	SINK	SWITCH T/M NEUTRAL
4	DIGITAL INPUT4	SINK	SWITCH, SEAT
5	DIGITAL INPUT5	SINK	SWITCH, REVERSE
6	GND		GROUND
7	DIGITAL OUTPUT1	SOURCE	BUZZER, ALERT
8	DIGITAL OUTPUT2	SOURCE	LAMP, OVERRIDE
9	DIGITAL OUTPUT3	SOURCE	SOLENOID, HOLD
10	DIGITAL INPUT6	SINK	SWITCH, PTO
11	DIGITAL INPUT7	SINK	KEY START SWITCH
12	DIGITAL INPUT8	SINK	SWITCH, FRONT PTO
13	DIGITAL INPUT9	SINK	KEY SWITCH, IGN
14	DIGITAL INPUT10	SOURCE	PARKING SWITCH
15	POWER		POWER 12V
16	DIGITAL OUTPUT4	SOURCE	RELAY, OPC
17	DIGITAL OUTPUT5	SOURCE	PTO SOLENOID
18	DIGITAL OUTPUT6	SOURCE	RELAY, STARTER

SUMMRY OF DIGITAL OUTPUT 1~6 < 5A

113476-00ENG00

OPC Unit Check Using the Test Wire Harness (For Reference)

- **Equipment Required:**
  - Multi tester
  - Test wire harness (1A8275-99810)
- **The battery voltage must be 12V or more.**

- **The following procedure uses the test wire harness to test the OPC unit.**
  - Install the test wire harness.
  - remove the OPC unit (A, Fig. 1) from the OPC unit connector (B, Fig. 1)
  - connect the test wire harness (C, Fig. 2 and 3) to the OPC unit connector (B, Fig. 3)
  - insert the connector A (D, Fig. 2 and 3) of the test wire harness (C, Fig. 2 and 3) to the OPC unit connector (B, Fig 1 and 3)
  - insert the test wire harness connector B (E, Fig. 2 and 3) to the OPC unit (A, Fig. 1 and 3)
  - test the OPC unit using test connector (F, Fig. 2 and 3)

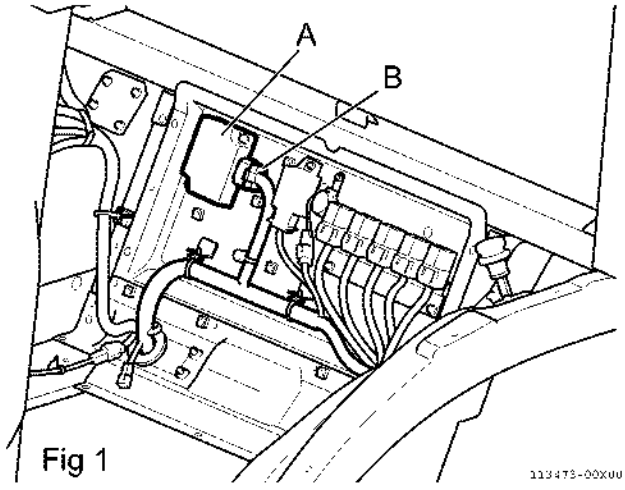


Fig 1

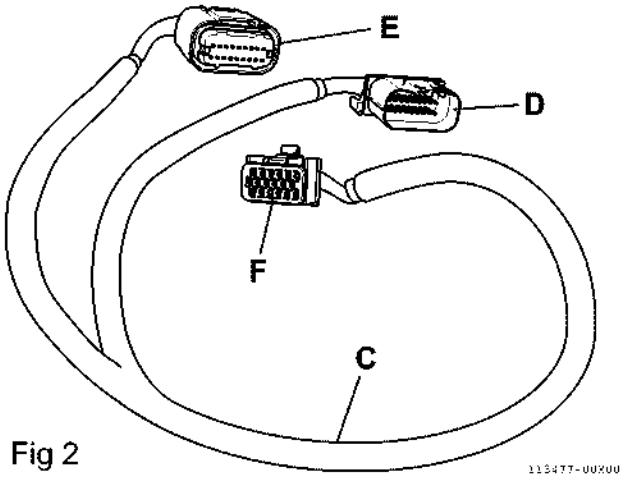


Fig 2

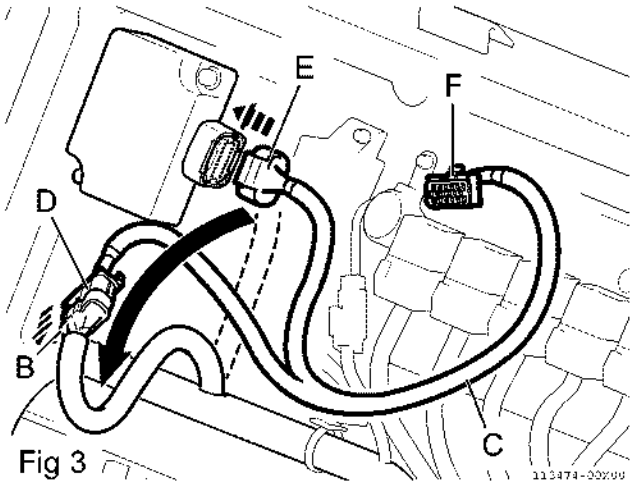
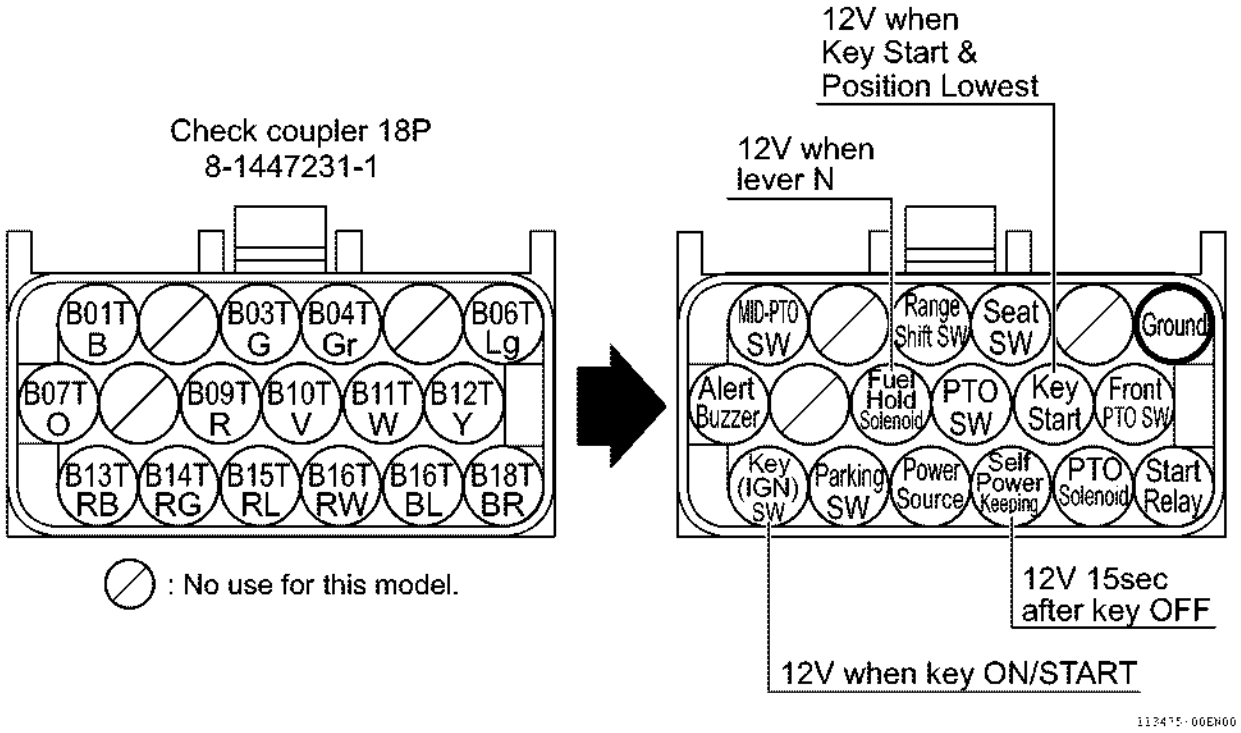


Fig 3

A - OPC unit
B - OPC unit connector
C - Test wire harness
D - Connector A
E - Connector B
F - Test connector

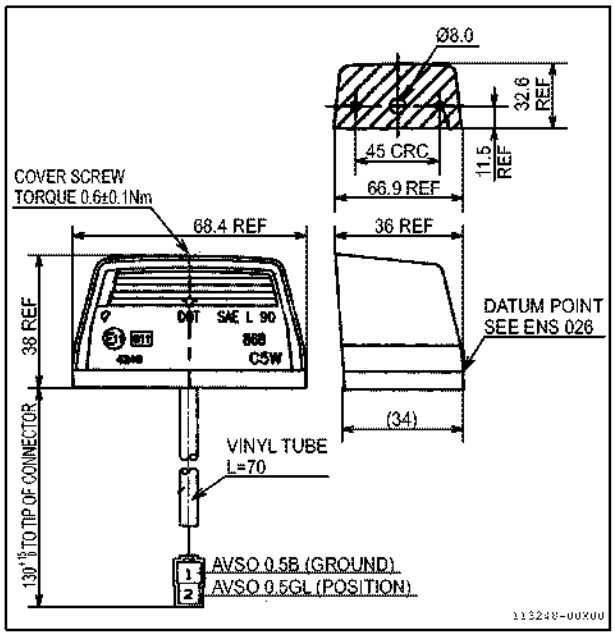
How to connect terminals

1. Connect negative terminal of multimeter on B06 Lg.
2. Connect positive terminal of multimeter on which you would like to check.
3. Check if 12 voltage comes to the wire you want to check.



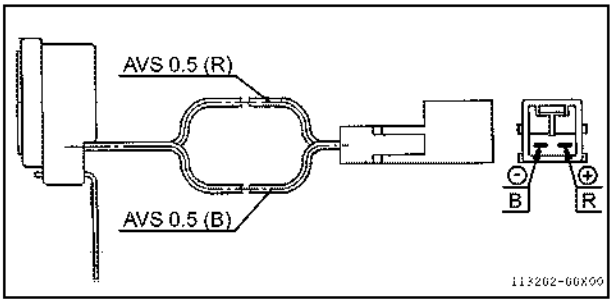
54.LAMP, LICENSE

LAMP ASSY, LICENSE: 1A7100-53400



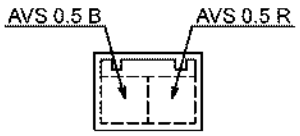
55.BUZZER, ALEAT

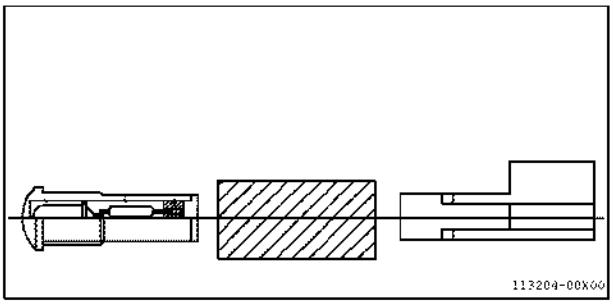
BUZZER, ALARM: 174570-57110



56.LED, ALERT

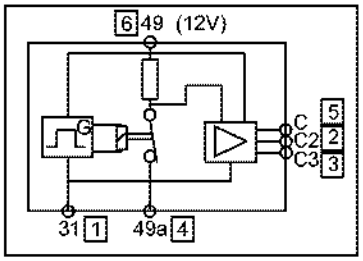
LAMP, PILOT LED: 1C6980-07210



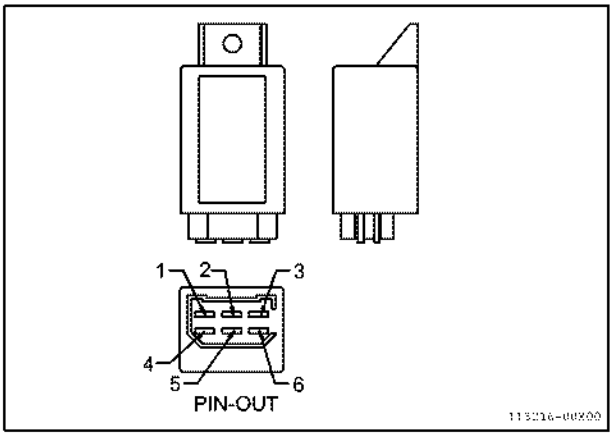


57.RELAY, FLASHER

RELAY, FLASHER: 1A7510-57200



WIRING DIAGRAM



CONNECTOR PIN OUT AND ELECTRICAL LOADS.

PIN		FUNCTION	NOTE
1		GND GROUND	GND GROUND
2	OUT	OUTPUT FOR FIRST TRAILER WARNING LIGHT	ACTIVE OUTPUT, MAX. 250mA
3	OUT	OUTPUT FOR SECOND TRAILER WARNING LIGHT	ACTIVE OUTPUT, MAX. 250mA
4	OUT	OUTPUT FOR INDICATOR LIGHTS	ACTIVE OUTPUT, MAX. 21 A
5	OUT	OUTPUT FOR INDICATOR LIGHTS WARNING LIGHT	ACTIVE OUTPUT, MAX. 250mA
6	POWER	POWER	18 V ~ 8 V

113217-00X00

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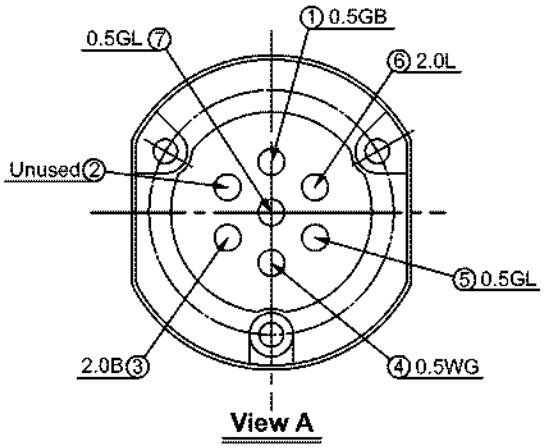
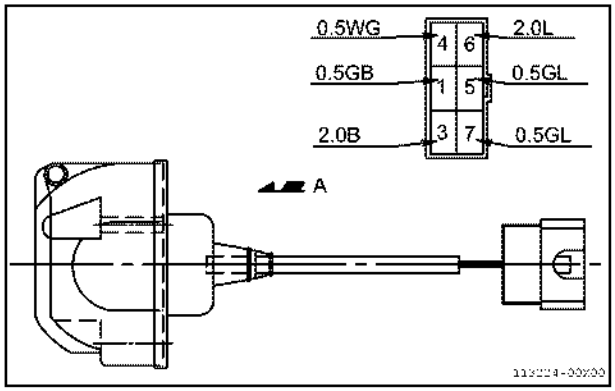
58.CONNECTOR, TRAILER EU

COUPLER SET, TRAILER: 198163-52150



No.	Wire diameter	Color	Note
1	0.5	GB	Turn L
2			Unused
3	2.0	B	Ground
4	0.5	WG	Turn R
5	0.5	GL	Position
6	2.0	L	Brake
7	0.5	GL	Position

113225-00X00



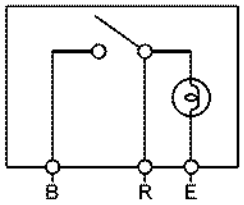
59.SWITCH, WORK LAMP

SWITCH, WORK LAMP: 1A7805-52550

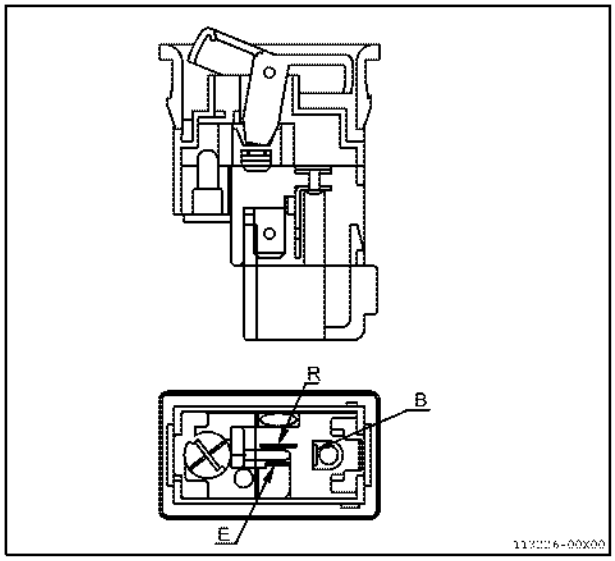
CONNECTION TABLE

SWITCH \ TERMINAL	B	R	E
ON	○	○	○
OFF		○	○

CIRCUIT DIAGRAM



113227-00X00



113226-00X00

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60.SWITCH, BEACON

SWITCH ASSY,BEACON: 1A8476-52250

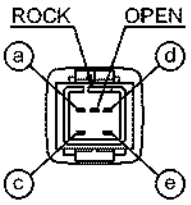
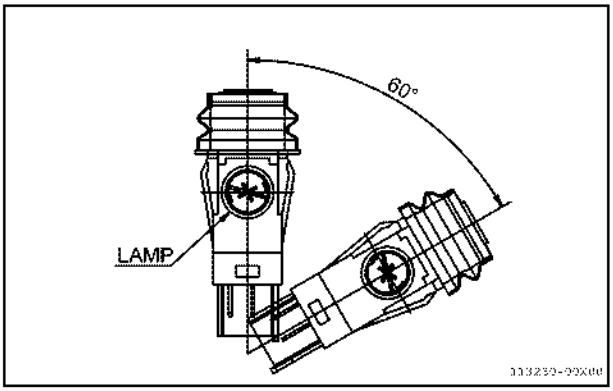


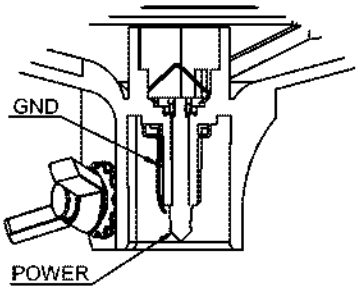
FIG.1

	a	c	d	e
FREE			⊕	
LOCK	o	o		

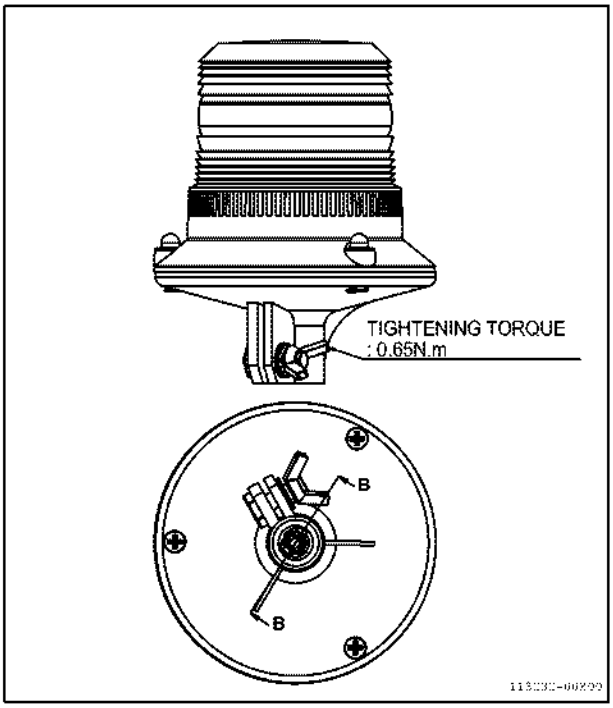


61.LAMP, BEACON

LAMP, WARNING: 1A8476-54500



SECT. B-B



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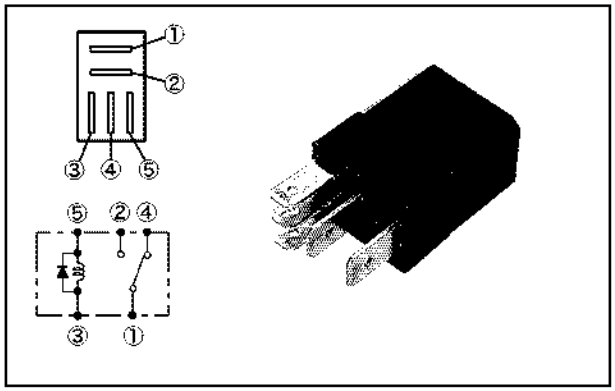
62.RELAY, SW-HG
63.RELAY, SAB GEAR
64.RELAY, 4WD
65.RELAY, OPC
RELAY, SW-HG: 1A7522-52950
RELAY, SAB GEAR: 1A7522-52950
RELAY, 4WD: 1A7522-52950
RELAY, OPC: 1A7522-52950

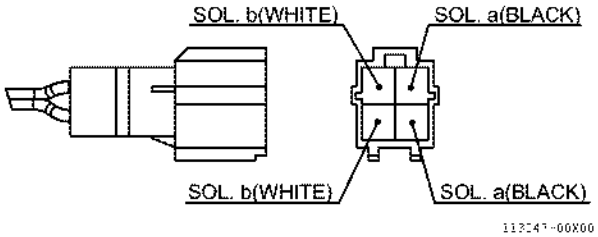
RELAY, ACM13221M19: 1A7522-52950

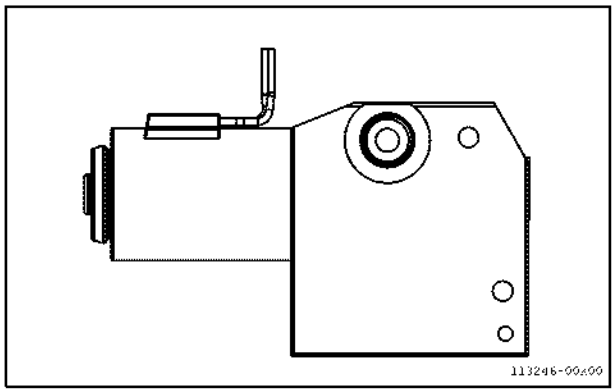


Individual items

Range	Test points		Results
Conduction	1	4	Conduction
	2	4	No conduction
Resistor	3	5	Approximately 120Ω

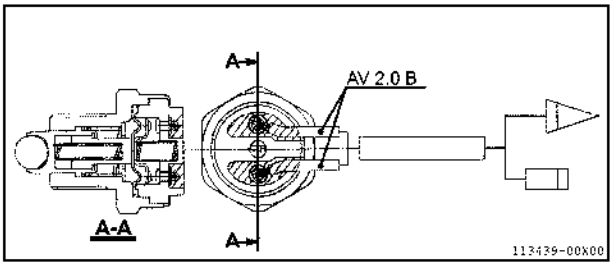
66.VALVE, H-G SPEED
VALVE ASSY, 4WD: 1A8416-28540





67.SWITCH, STEERING

SWITCH, HIGH GRIP: 198071-52190

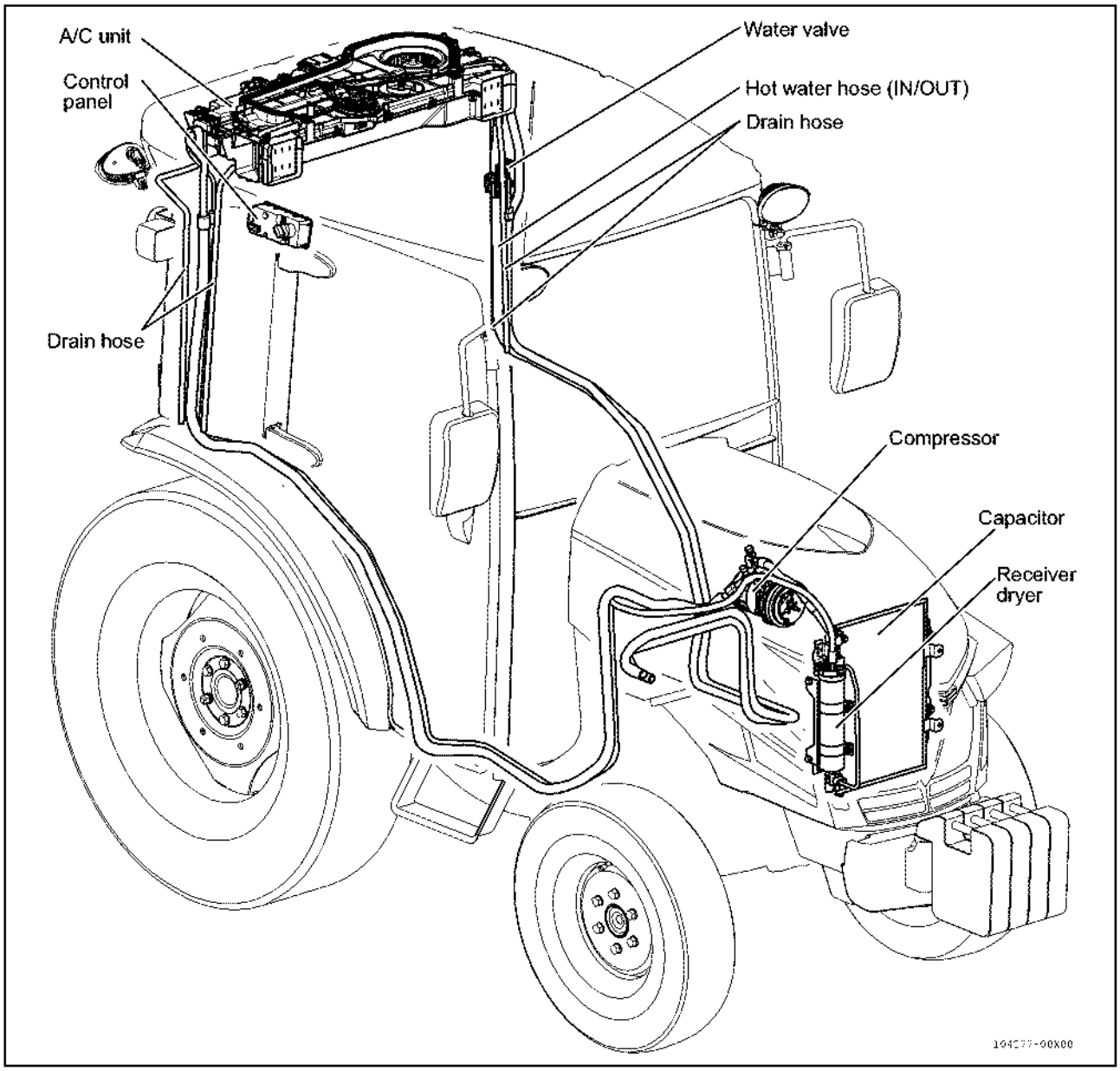


13. AIR CONDITIONING

1. Structure and Function

1. Outline

The compressor, which is a major component of the A/C, is a scroll type and is mounted under the cabin (E/G upwards). The A/C unit is placed behind the ceiling, and the dial operations enable the user to switch voluntarily from cold to hot to create a pleasant workspace in the cabin using cooling, dehumidification, and heating, etc. The cooling to heating control is implemented using dial operations (temperature control) and fan switches (4 levels). Further, a dial can also be used to switch the air vent in 3 levels from the operator side, front glass side, or both grilles. The diagram below shows the mounting position and pipe layout of the main A/C components.



2. Control Method Classifications

This device is a "manual air conditioner" that the operator controls and adjusts manually.

The operator adjusts the manual A/C as they desire. The switches and dials on the A/C panel are used to adjust the vent temperature and air flow, switch the vents, and switch between internal and external air, etc. If the desired temperature in the cabin is too high or too low, it is necessary to adjust the temperature and air flow accordingly.

3. List of Main A/C Parts

	Name	Code No.
1	A/C unit (manual:	1A8485-87200
2	Evaporator	1A8485-87230
3	Compressor CMP	1A8484-87900
4	Capacitor CMP	1A8484-87110
5	Control (A/C MANU	1A8420-87300
6	Dryer (receiver	1A8420-87690
7	Actuator CMP (mode	1A8485-87500

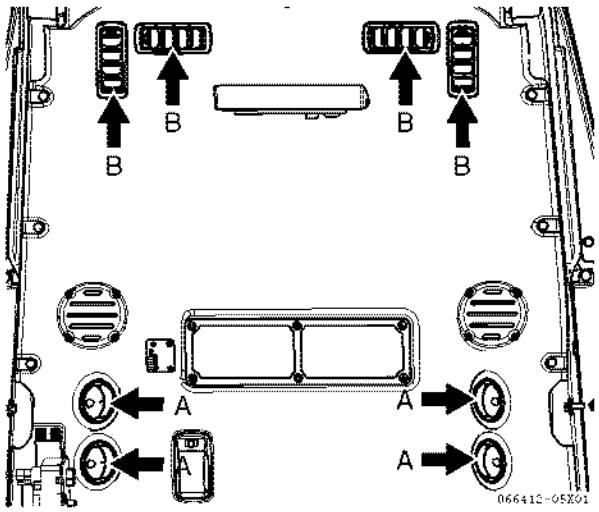
Use medium	HFC134a (R134a)
Medium filler amount	900 ±50 g

2. Operations and Handling

1. Vent and Operations Parts

The orientation of vents (A) and (B) can be changed.

(A) FACE
(B) DEF



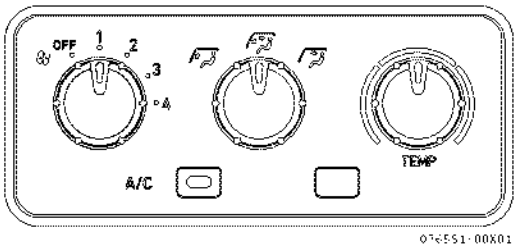
REFERENCE
- The bottom of the illustration shows the front of the tractor.

2. Description of Operations Parts

Blower settings dial

Use to adjust the air flow.

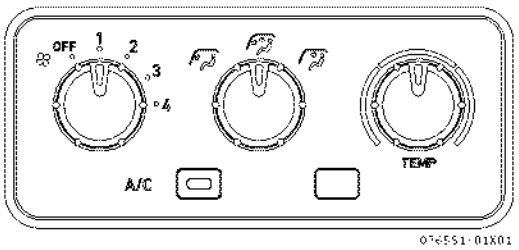
OFF	The blower stops.
1-4	Set the air flow manually.



A/C switch

Use to turn ON and OFF the A/C functions.

ON	The A/C lamp turns ON and the A/C functions operate.
OFF	The A/C lamp turns OFF.



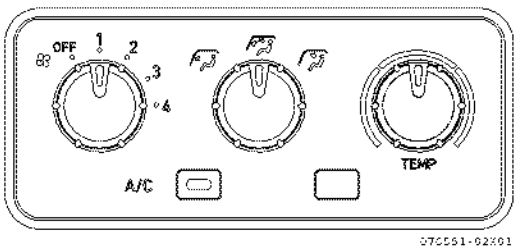
REFERENCE

- The A/C switch can be operated when the blower settings dial is not in the "OFF" position.
- Set the blower settings dial to a position other than "OFF" to start control when set to the previous "OFF" position.

Temperature adjustment dial

The temperature can be adjusted from low 64.0°F (18°C) to high (89.6°F (32°C)) in 33.8°F (1°C) units.

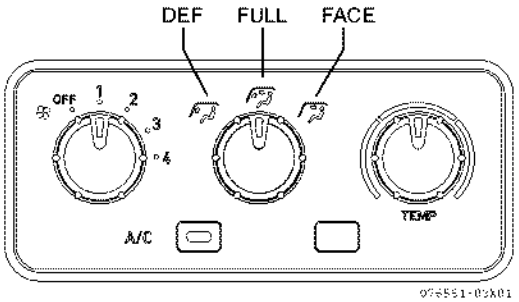
Turn to the right	Raises the set temperature.
Turn to the left	Lowers the set temperature.



Vent switching dial

Use to switch between hot and cold vents.

DEF position	Ventilates to the front glass.
FULL position	Ventilates to the front glass and driver's seat.
FACE position	Ventilates to the driver's seat.



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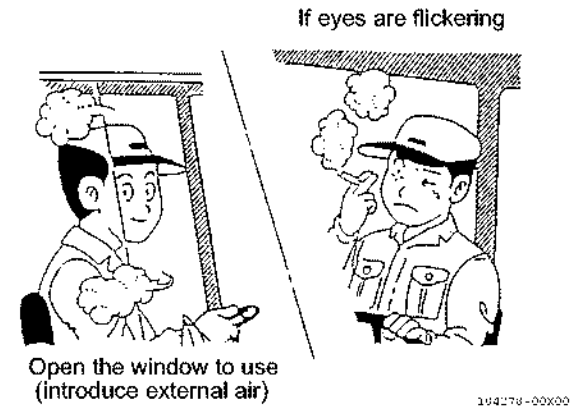
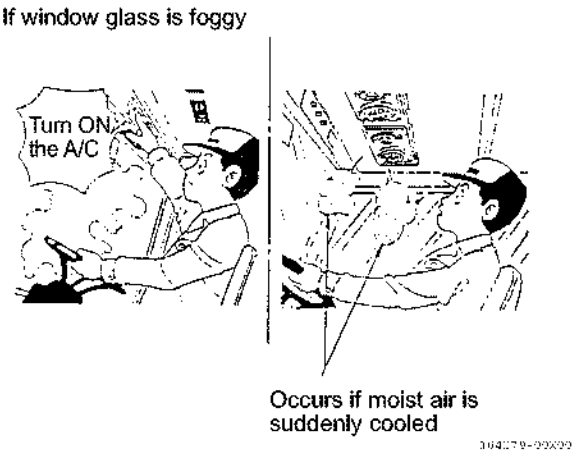
3. Using the A/C and Precautions

- Start the engine and wait until the engine is running smoothly before using the A/C to make sure that no unnecessary force is applied to the compressor.
- If leaving the A/C to idle under fierce heat, open the window to allow air circulation within the cabin.
- Smoking while using the A/C may irritate the eyes. In such cases, open a window, and allow clean air from outside to circulate. Using the cooler may reduce the humidity and dry the corneas, so tobacco smoke is particularly irritating.
- If the humidity is high, the window glass may fog. At such times, use the A/C and allow outside air to circulate to remove the fog.

IMPORTANT
- During cooling, condensation may very occasionally been seen emerging from the vents, but this occurs when damp air is suddenly cooled, and is not an error.



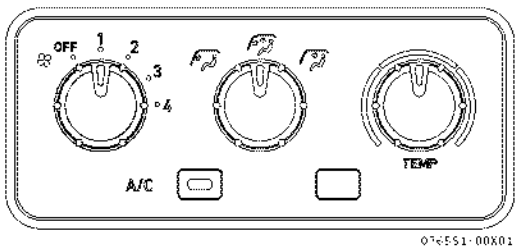


4. Handling the A/C

● Using the A/C after a long period of disuse
Inspect the A/C according to "4.Inspections and Maintenance" --> "4-1.A/C Inspections and Repairs Table".

● Not using the A/C for a long period of time
Add the regulation amount of coolant gas to the A/C cycle.
Operate the A/C with the engine idling for approx. 5 to 10 mins. once or twice every 2 to 3 weeks, and make sure that the oil in the compressor and A/C cycle parts does not run dry. Further, do not suddenly accelerate the engine to high speed with the A/C ON.

● When the A/C is not in use
Set the A/C switch to the "OFF" position, and then set the blower settings dial to the "OFF" position.



13

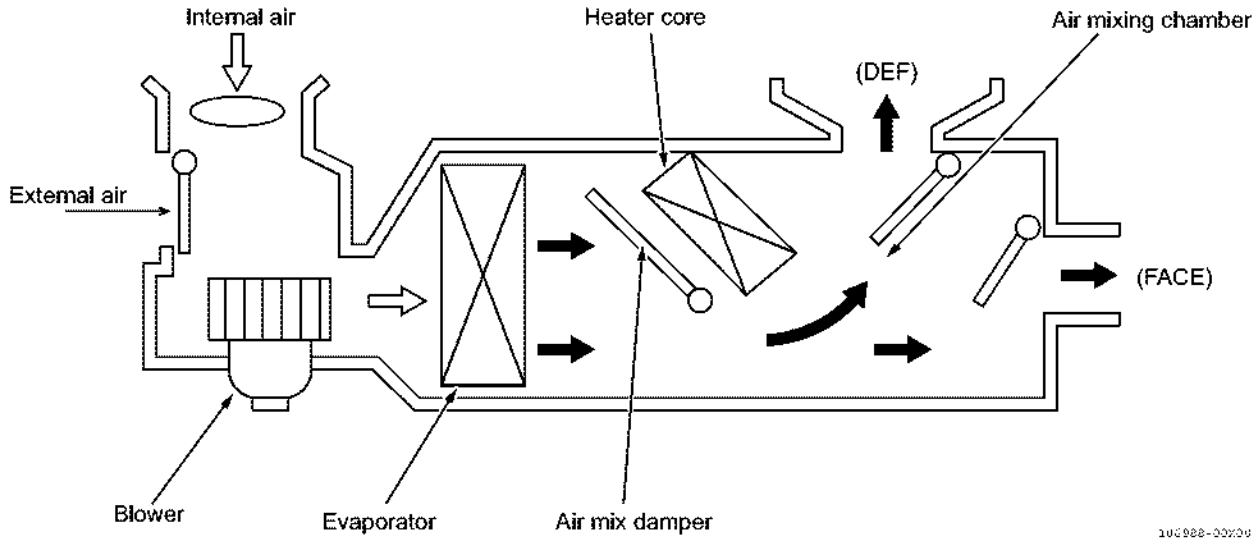
3. Structure, Operations, and Control

1. Structure

● Air cycle

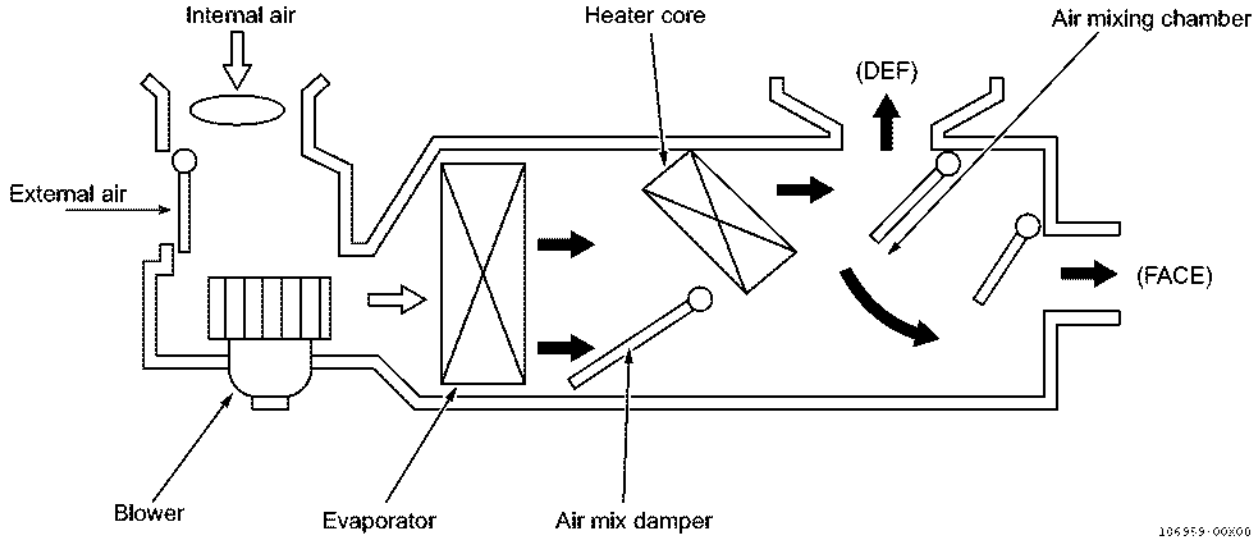
Cooling

Air is taken into the cabin from the inlet, and heat exchanged (dehumidified and cooled) using the A/C unit evaporator, and this cooled air is then fed to the cabin from the air vents.



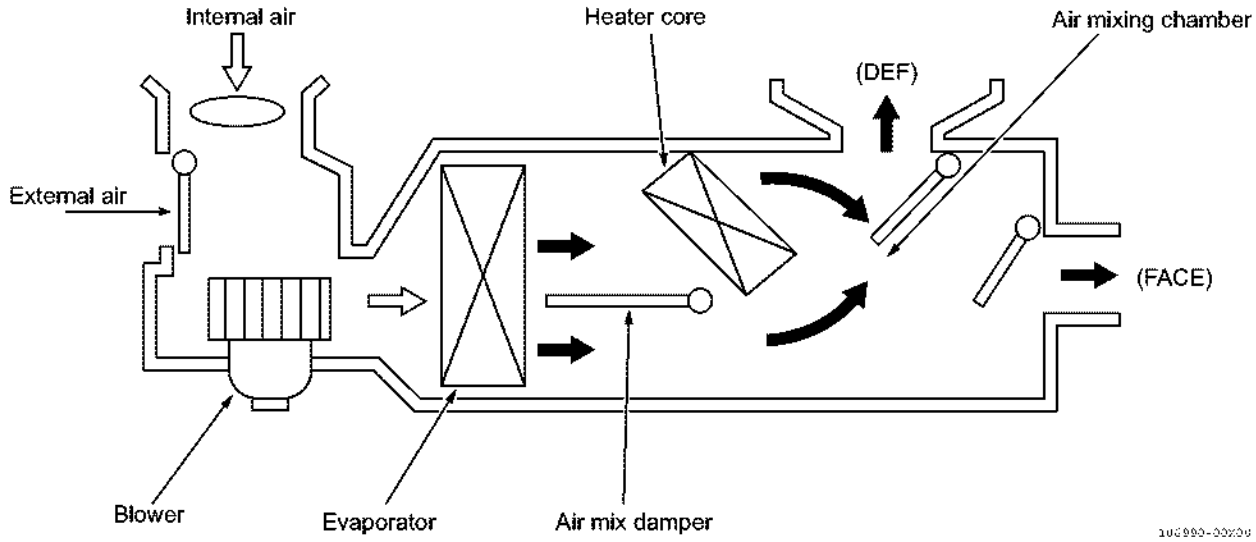
Heating

Air is taken into the cabin from the inlet, and heat exchanged (heated) using the A/C unit heater core, and this heated air is then fed to the cabin from the air vents.



Dehumidification

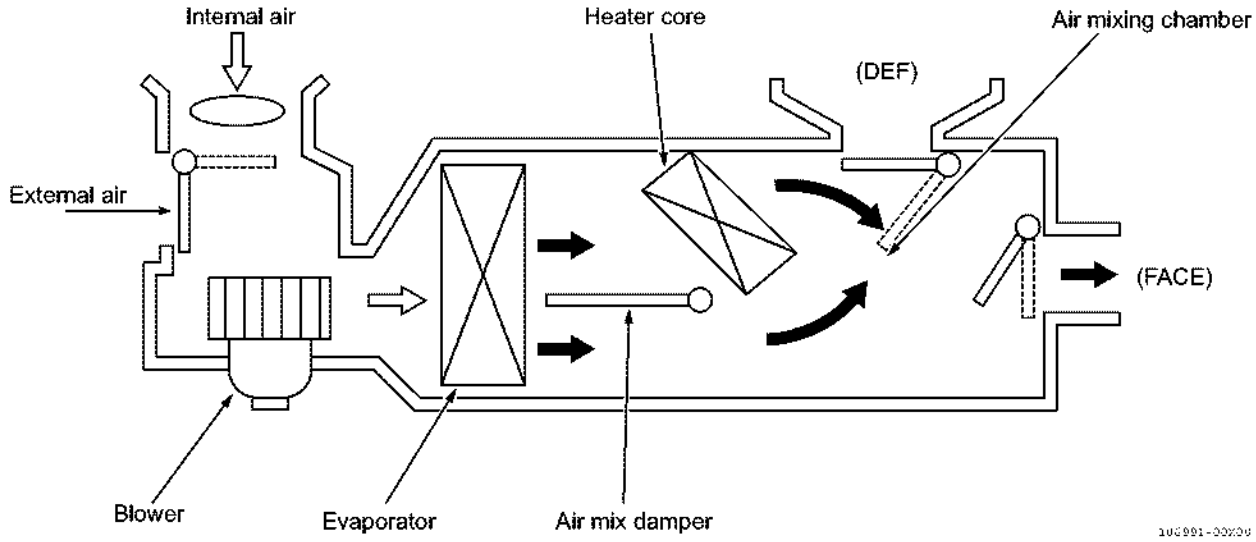
Air is taken into the cabin from the inlet, and heat exchanged (dehumidified) using the A/C unit evaporator, and this low humidity air is then fed to the cabin from the air vents.



Vents and internal/external air switching

Operating the vent switching dial on the control panel enable switching the cold (and hot) air flows to be switched between FACE/DEF/FULL.

Further, operating the internal/external air switching lever enables switching between introducing external air and internal air circulation.



● **Compressor assembly**

Compressor

The compressor compresses the gaseous medium, which was gasified by using the evaporator to snatch heat from inside the cabin, into high pressure and high temperature, which is then fed back into the high-pressure circuit.

The compressor used in this tractor is a sliding vane compressor.

The sliding vane compressor is the name used when disassembling the compressor structure, and is one type of vane compressor. Differing from through-vane compressors, the rotor does not pierce all the way through the vane.

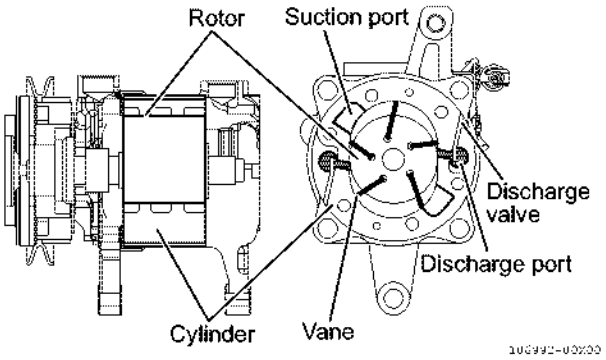
This simple structure has a compact and lightweight design for excellent mounting capability. Compared to swash plate compressors, it is characterized by a smaller number of parts.

As the friction slide resistance between the vane and cylinder is great, the compressor's motor power is large.

Sliding vane compressor structure

The Sliding vane compressor configured using a "cylinder" with an elliptical cross-section and a "rotor" to which multiple vanes are mounted. Vanes are mounted to the grooves on the rotors and are pushed into the cylinder when the rotor rotates.

There are two suction ports, which inhale the medium, and two discharge ports, which expel the medium, each on the cylinder, and a discharge valve is mounted at the end of the outlet on the discharge ports.



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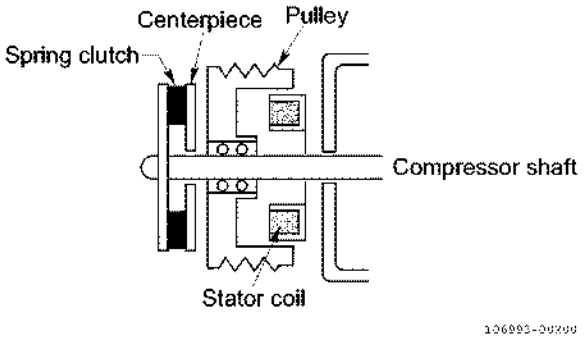
● **Magnet clutch**

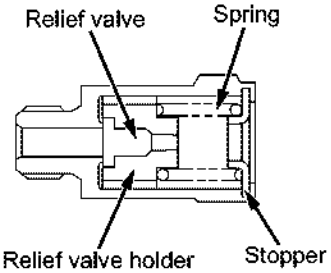
The magnet clutch works to stop and drive the compressor when the A/C switch is turned "ON" while the engine is rotating, and when the evaporator fin temperature reaches the set temperature.



● **Relief valve**

If the pressure during the cooling cycle becomes abnormally high, the relief valve opens to vent some of the coolant.
Open pressure: 3.43 to 4.14 MPa
Closed pressure: 2.75 MPa min.

Relief valve

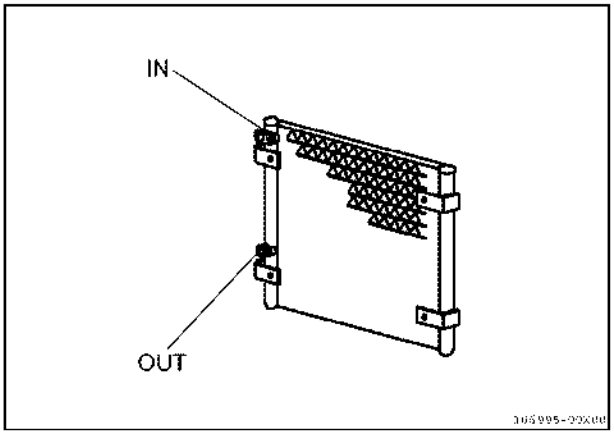


IMPORTANT

- In the rare event that the relief valve operates, replace with new parts promptly. Do not reuse.

● **Capacitor**

The role of the capacitor is to return high-pressure and high-temperature coolant gas to liquid form. Consequently, if the capacitor's external air cooling ability is poor, cooling performance will be affected and the A/C will malfunction.



MPORTANT

- Jamming the capacitor may raise the A/C gas pressure and cause defective cooling. Further, the compressor may be scorched or its belt slip, damaging cooling functions.
  Make sure to clean the capacitor during daily inspections.

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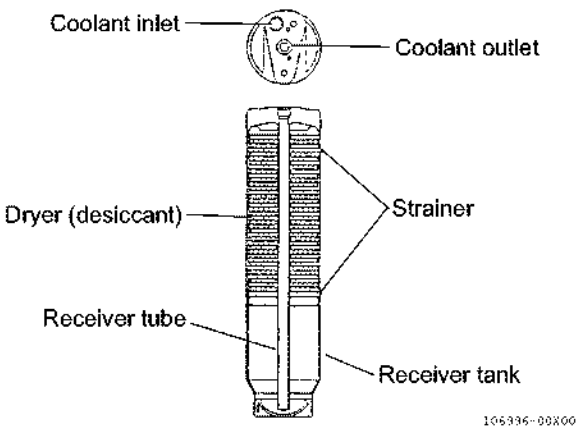
● **Receiver tank**

The number of compressor rotations in the A/C changes along with fluctuations in the number of engine rotations. Consequently, the suitable amount of coolant in the cooling circuit also fluctuates. It is the receiver tank that accepts this fluctuation. If it is not necessary to use much coolant in the cooling circuit, the coolant is temporarily stockpiled, and when much coolant is required, coolant is supplied to the cooling circuit from the receiver tube. The tank also functions to balance the coolant filler and to stockpile excess coolant that leaks in trace amounts due to permeation from the rubber hose.



● **Dryer (Desiccant)**

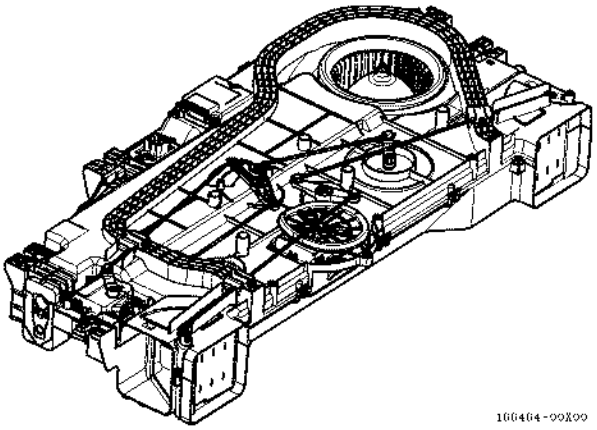
If water contaminates the cooling circuit, it will cause the compressor valve and oil to deteriorate, corrosion to the metal parts that configure the circuits, and malfunctions due to its freezing inside the expansion valve and jamming the circuit. The A/C uses a desiccant suitable for the circuit. The desiccant absorbs the water that contaminates the circuit during installation and replenishing the coolant.
If the expansion valve is freezes (ices) due to the water, desiccant absorption performance is lost, so replace the receiver dryer.

IMPORTANT

- Removing and leaving the cooling circuit removed for a long period of time during repairs, etc., will cause the desiccant to absorb moisture from the air and lose absorption performance, so it is necessary to replace the receiver dryer. Make sure to close the aperture valve or cover the aperture with a polythene bag to prevent external water and dust contamination.

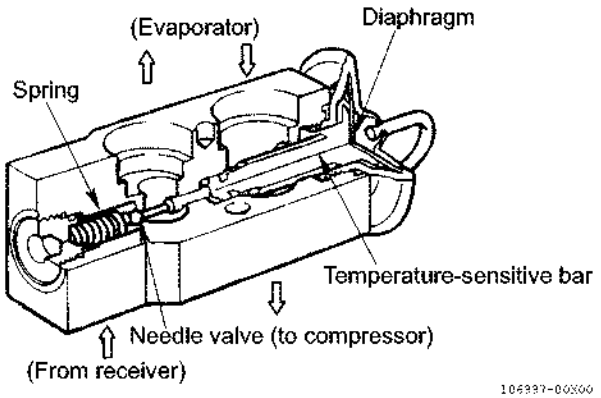
● **Air conditioning unit**

Configured using parts such as the evaporator, heater core, expansion valve, blower motor, and A/C. The evaporator cools the fins using a low-pressure and low-temperature coolant mist fed from the expansion valve, and which snatches heat and moisture from the cabin air fed from the blower motor. Further, the heater core in front of the evaporator warms the heater core to supply heat using the hot water in the engine. Combining its use with the evaporator dehumidifying function also enables dehumidification and heating.



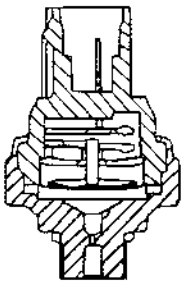
● **Expansion valve**

The expansion valve uses a squeezing action to turn high-pressure and high-temperature liquid coolant fed from the receiver dryer into low-pressure and low-temperature coolant mist. Further, this squeezing action changes the degree of squeezing according to the temperature load in the cabin to automatically control the amount of coolant fed to the evaporator.



● **Pressure switch**

If an error is detected in the high-pressure coolant pressure of the cooling circuit, the pressure switch stops the compressor to forestall damage to the cooling circuit devices.
There are two types of high-pressure switches, high and low pressure, which each operate as described below.



Switch	Function	Switching pressure MPa	Switch operations check method	Abnormal pressure cause
High pressure	If the pressure between the compressor and the expansion valve is abnormally high, conduction to the compressor magnet clutch turns OFF to protect the circuit.	Contact ON 0.59 3.14 OFF	Conductance between terminals	Insufficient heat release due to a jammed capacitor
Low pressure	If the pressure between the compressor and the expansion valve is abnormally cool due to coolant leaks, conduction to the compressor magnet clutch turns OFF to prevent scorching to the compressor due to insufficient compressor oil, which reduces together with the coolant.	Contact ON 0.23 OFF 0.2	Conductance between terminals	Coolant leaks from circuit parts

13

4. Inspections and Maintenance

To enable the optimal use of the A/C for the customer, instruct on the necessity for "daily inspections and handling" and "periodic inspections and repairs" (which requires a fee).

1. A/C Inspections and Repairs Table

What/Where to inspect			Inspection details	Daily inspection	Periodic inspection			Note
				Inspection period				
				Weekly	Every year	Every 2 years	Every 8 years	
Cooler-related	Engine periphery	Compressor	Abnormal sound, oil leak		○			
		Magnet clutch	Abnormal sound		○			
		Compressor V belt	Damage, stretch, wear	○				Replacement depends on manufacturer standards
		High/low-pressure hose	Damage, wear		○			
	Unit	Blower motor	Rotation status, abnormal sound		○		◎	
		Air filter	* Jam, cleaning	○				
	Capacitor	Fin	* Jam, cleaning	○				
		Receiver dryer	Replace				◎	
	Others	Wire harness	Damage, connector corrosion		○			
		Coolant pipe system	Gas leak		○			
		Control system	Operations status		○			
		Sight glass	* Coolant filler amount	○				
Heater-related	Hot water hose		Damage, water leak				◎	
	Antifreeze		Replace			◎		
	Water valve		opening and closing operations status		○			

1U6YY8-00X00

○ : Inspect and adjust ◎ : Replace

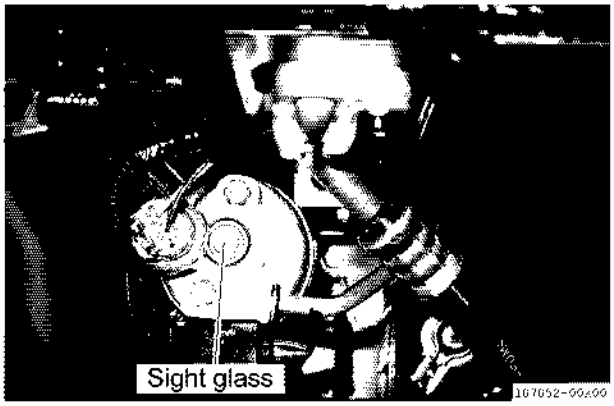
IMPORTANT

- Instruct the client to make sure to inspect items marked with a * daily.

2. A/C Daily Inspections and Handling

● Coolant Amount Inspections

View the flow of coolant air bubbles from the receiver dryer sight glass (inspection window) to inspect the coolant amount.

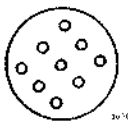
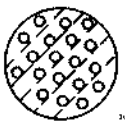
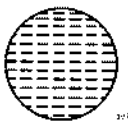
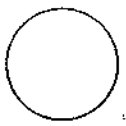


Inspection Preparations

1. Start the engine and set to rated rotations.
2. Turn ON the A/C switch, and set the blower settings dial to the Hi (5) position.
3. Set the temperature settings dial on the control panel to the 18°C (left full) position.

IMPORTANT

● If implementing after having left to stand alone for a long period of time (2 to 3 weeks), leave the engine to turn idly for 10 mins. minimum for acclimatization before implementing the inspection.

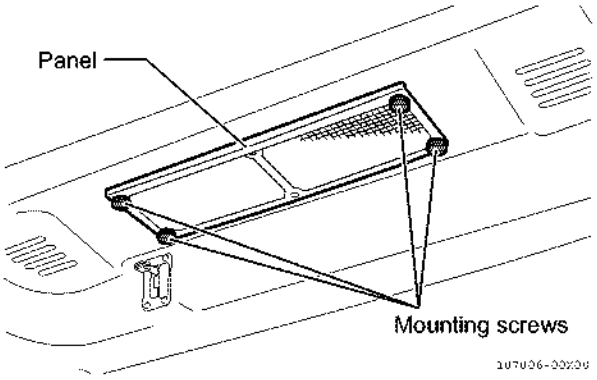
A/C status	No abnormalities	Abnormality detected		
High/low pressure valve temperature	High pressure valve is hot, and low pressure valve is cold. There is a clear temperature difference. Compressor discharge temperature 158°F (70°C) Compressor suction temperature 41°F (5°C)	High pressure valve is warm, and low pressure valve is slightly cool. Almost no temperature difference.	Unable to feel almost any temperature difference in the high and low-pressure valves.	High pressure valve is hot, and low pressure valve is slightly warm, so there is almost no temperature difference.
Sight glass status	Nearly clear, and even if bubbles can be seen flowing, becomes clear by increasing and decreasing engine rotations. *1 	Air bubble flow is always visible. There are times with clear or white bubbles. 	Dew-like substance seems to be flowing, but it is barely perceptible. 	Fan is rotating at maximum, and the window is fully open and the engine is idling, but no bubbles are visible. *2 
Valve connector status	No abnormalities.	Some places are dirty with oil.	Oil dirt is conspicuous in some parts.	No abnormalities.
The status of this A/C	Coolant is sufficient with no abnormalities.	Possible small leak somewhere.	Apparently so much coolant has leaked that there is almost none left.	Too much coolant.

IMPORTANT

*1: If the external air temperature is low, air bubbles may be visible even if the amount of coolant filler is suitable.
*2: If the coolant is 0 (zero), check the temperature difference (Zero) between the high and low-pressure pipes.
... If there is absolutely no cooling.

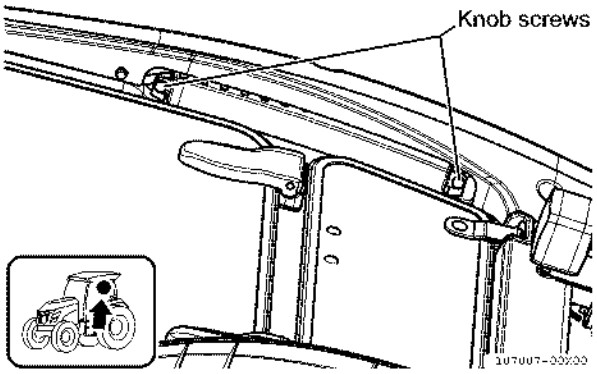
● **Inspecting the internal suction inlet**

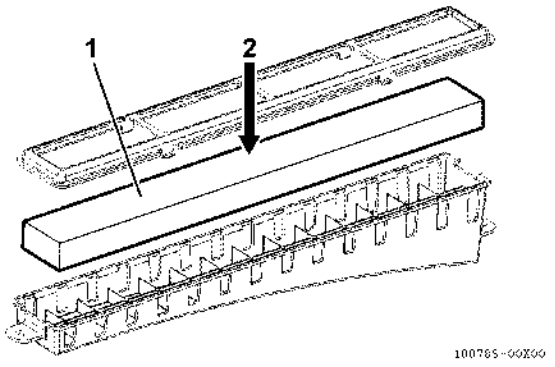
Loosen the mounting screws and remove the filter, and clean using compressed air. If there is conspicuous dirt or jamming, apply lukewarm water into which a neutral household detergent has been dissolved, and clean while moving up, down, left, and right, and rinse thoroughly using clean water before leaving to completely dry naturally.



● **Inspecting the external suction inlet**

Remove the 2 knob screws, and remove the panel and filter. Blow compressed air on the filter from downwind of the airflow direction to clean. Using water to clean the filter is strictly prohibited. If the dirt is severe, replace with a new filter.





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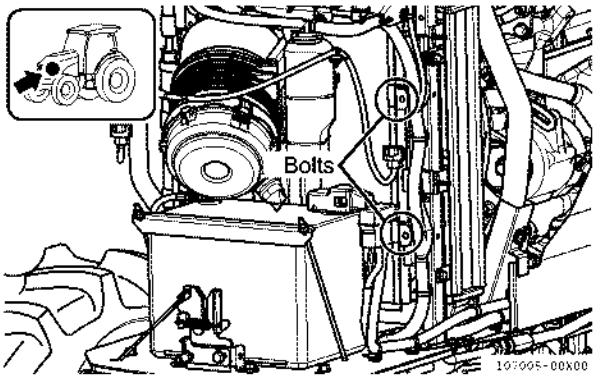
● **Inspecting the capacitor**

Mud, dirt, or cut grass adhering to the capacitor will eliminate the A/C performance. Clean according to the instructions below. Remove the capacitor screen in front of the capacitor, and inspect for any mud, dirt, or cut grass adhesions.

If there are mud, dirt, or cut grass adhesions, remove the capacitor filter, and use a soft brush to clean. If using compressed air to clean, be careful not to break the fins. Restore any broken fins.



1. Open the hood.
2. Loosen the bolts that secure the capacitor.
3. Pull out the capacitor screen to the left.
4. Use a soft brush and water to wash away any adhesions such as mud, dirt, or cut grass.
5. If there is dirt, etc., adhering to the capacitor fins (at the back of the capacitor screen), clean using compressed air.

IMPORTANT

● When cleaning the capacitor using compressed air, be careful not to damage the fins. (Restore any broken fins.) Broken fins reduce cooling performance.

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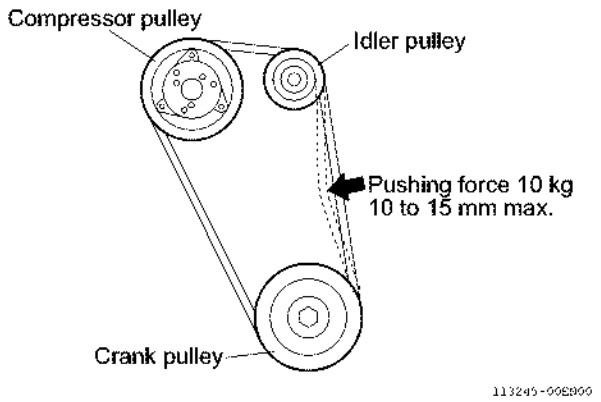
● **Inspecting and adjusting the compressor drive belt**

1. Use a finger to press on the midway position between the idler pulley and the clamp pulley, and check that the sag amount of the bet (pushing pressure 10 kg) is 10 to 15 mm.
   If the amount of belt sag is unsuitable, adjust the belt tightness.
2. Check that the belt is not damaged.
   If the belt is not damaged, replace with a new compressor drive belt.



● **Pipes and joints**

- Check visually that there is no oil residue, dirt, or dust adhering to the pipes or connectors.
- If there are dirt or dust adhesions, etc., examine using a gas leak detector.
- If tightening the pipe connectors, make sure to use a double spanner.

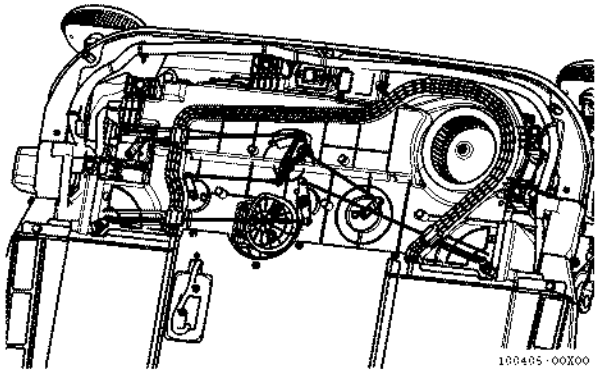
● **Cycle parts and mounts**

- Check visually there cycle parts, and mounting bolts and screws, are not loose and that there is no breakage.
- Tighten any looseness, and replace any cracked or damaged parts.

● **Distance between cycle parts and vehicle parts**
- As a rule, maintain a distance between the A/C parts and vehicle parts with different vibration systems of 25 mm min.
- As a rule, maintain a distance between the A/C parts and exhaust pipe of 25 mm min., and if air flow is particularly bad, maintain a distance of 40 mm min.
- As a rule, maintain a distance between the A/C parts and vehicle parts other than those described above of 20 mm min.

● **Heater pipes water leak inspections**
- If the water hose is damaged, replace the hose.
- If the water leak is due to a defective water hose clamp, either repair or replace the clamp.
- If the heater core is damaged, replace the core.

IMPORTANT
- Use a LLC concentration of 30% to 50%.
- Use a non-acidic LLC type.
- Make sure that the water pressure to the heater core is 0.196 Mpa max.
- Use low-carbon products in the heater hose as they are not subject to electrical wear.



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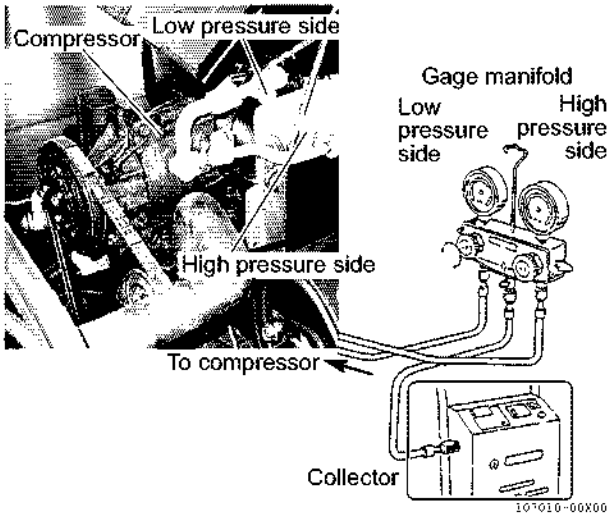
3. Maintenance

IMPORTANT
- Before removing the A/C parts, use a coolant collector to collect the coolant gas in the A/C circuits.
- Stop the engine, and remove the battery terminals before implementing maintenance.

Use medium	Medium filler amount
HFC134a (R134a)	900 ±50 g

IMPORTANT
- The Law Concerning the Discharge and Control of Fluorocarbons has been implemented, obligating machine managers (customers) to implement simple inspections, and keep records.
- Discharging coolant gas into the atmosphere is a violation of the law.



● Compressor

1. Remove the battery (-) terminal.
2. Loosen the tension on the compressor drive belt, and remove the belt.
3. Remove the harness connectors for the magnet clutch.
4. Remove the high and low-pressure hoses connected to the compressor. At this time, mount caps to the tips of the removed hoses to seal them.
5. Remove the compressor from the compressor bracket.
6. Implement the same procedure in reverse to mount.

[Tightening torque]
Compressor mounting bolts 24.5 to 29.4 N·m

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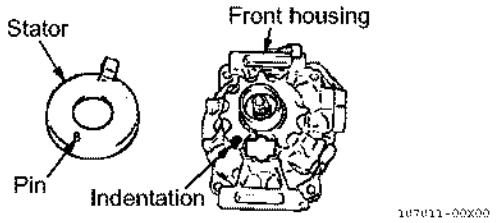
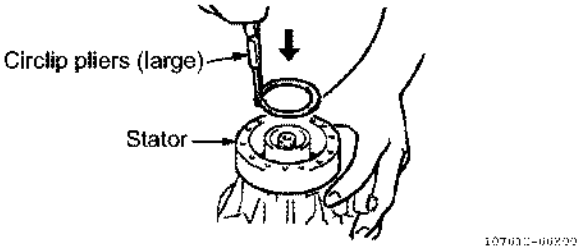
● **Remounting Procedure when Replacing the Magnetic Clutch**

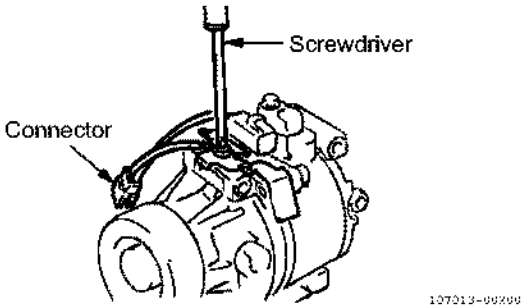
1. Mount the stator to the front housing. At this time, align the stator pin and the front housing indentation.)



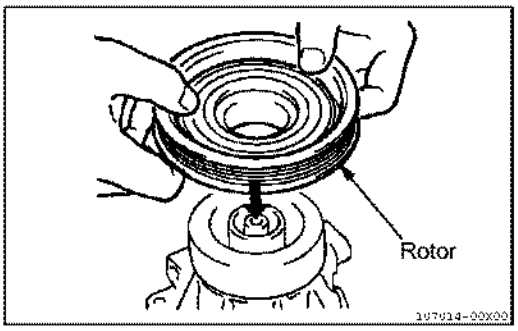
2. Mount the snap ring. Replace with a new snap ring.



3. Mount the stator connector.



4. Mount the rotor to the front housing.



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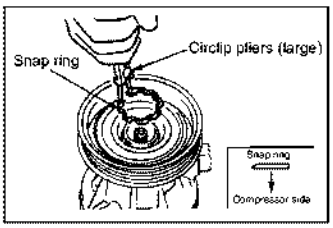
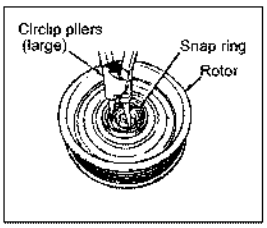
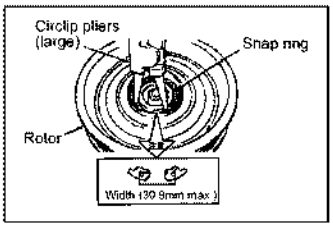
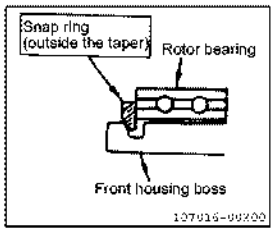
5. Mount the snap ring to the (open) circlip pliers. With the snap ring mounted to the circlip pliers, apply to the compressor boss. Minimize the snap ring width, and insert into the compressor boss.





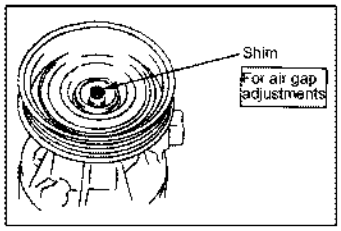
IMPORTANT
- The snap ring has a correct direction for mounting. Assemble so that the taper is on the outside.
- If the snap ring is too wide, its grip strength is reduced, so use a width of 30.9 mm max.
- After mounting the snap ring, check that the fitting to the boss groove is secure.



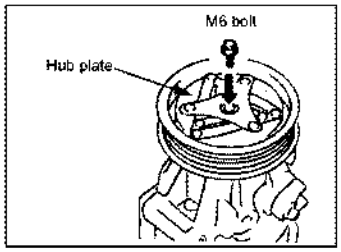


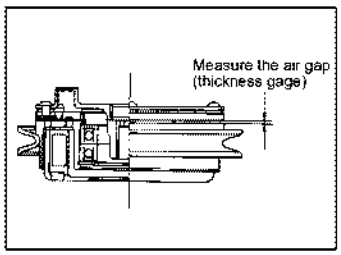
6. Mount the air gap adjustment shim to the top of the shaft. Mount the hub plate to the shaft, and secure using bolts.

Bolt tightening torque: 13.2 N·m
Air gap: 0.25 to 0.60 mm



IMPORTANT
- Make sure to use 3 adjustment shims max.





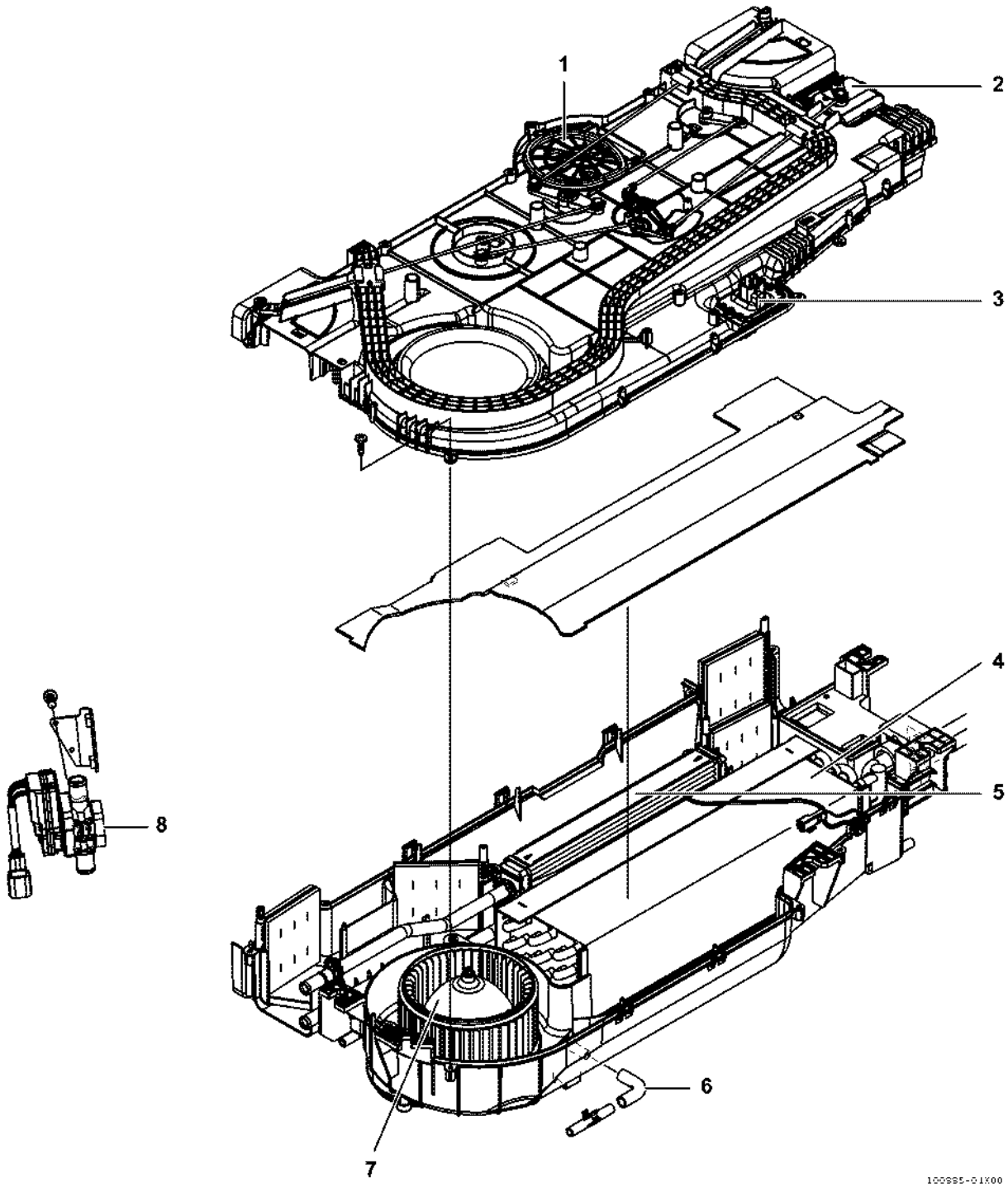
● **Air conditioning unit**

1. Vent the engine coolant.
2. Remove the rear work lights (left and right).
3. Remove the stud bolts (x2) at the back of the roof left and right.
4. Remove the cover (work light) R (bolts x5).
5. Remove the front work light coupler.
6. Lift up the roof.

IMPORTANT

● The roof is heavy. Make sure that minimum of 2 people implement the task.

● **Maintaining the air conditioning unit**



No.	Name	No.	Name
1	Actuator CMP (mode	5	Core CMP (heater
2	Actuator CMP (air mixer	6	Hose (drain
3	Amplifier (blower	7	Fan CMP (blower
4	Evaporator CMP	8	Valve (water

4. Workplace precautions

● Special cooler oil

- The A/C uses special cooler oil ND-OIL8 as new coolant HFC134a (R134a).
  ND-OIL8 is characterized by absorbing water easily, so there is a risk of it attacking paints and resins, so beware of the following points.
- Do not leave open any new compressors or pipe connectors that help configure the mounted cooling circuit. (Remove the valves and caps from the compressor pipe mouths immediately before connecting the pipes. If removing pipe connections for repairs, cap both ends of the connector promptly.
- Make sure that no ND-OIL8 adheres to painted or resin surfaces. If any adhesion does occur, wipe away promptly.

● Receiver dryer

A desiccant is enclosed to absorb water inside the pipe, so remove the pipe mount valve immediately before connecting the pipes.

● Tightening torque

- Pipe joints
  When connecting pipe joints, coat the O-rings with special oil (ND-OIL8), and use a double spanner to tighten to the tightening torque described in the table on the right.
- Screw and bolt types
  Tighten to the tightening torque described in the table on the right.

Connector	Tube size Or bolt size	Tightening torque N·m
Nut type	Ø8 pipe (Liquid)	11.8 to 14.7
	D1/2 pipe (Discharge)	19.6 to 24.5
	D5/8 pipe (Suction)	29.4 to 34.3
Block Joint	Receiver M6 bolt (4T)	3.92 to 6.86
	Not described above M6 bolt (6T)	7.85 to 11.8

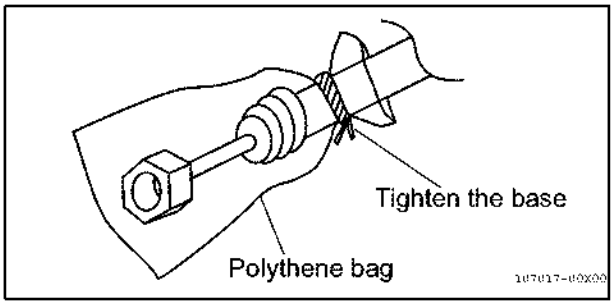
Screw size	Tightening torque N·m
Screw, M4	0.8 to 1.2
Screw, M5	2.0 to 2.5
M6	9.8 to 11.8
M8	11.8 to 15.7

● Compressor oil amount

110 cm^3 of oil is enclosed with compressor SV07E. Too little oil amount may cause scorching or reduced service life during high-speed rotations. Further, too little oil amount may reduce the cooling performance. If replacing the parts described in the table on the right to disperse oil to a certain extent inside the cooling circuit once A/C operations have started, adjust the oil amount as shown in the table.

- Stop the engine for each task, and make sure to turn OFF all A/C-related power supplies before starting work.
- After work has finished, turn ON the A/C, and check that the nonconforming parts have been completely repaired.
- If removing pipe connections for repairs, cap both ends of the connector promptly using a cap or plastic bag, and make sure that no external water or dirt intrudes.

Part to be replaced	Filler amount
Evaporator	40 cm^3
Capacitor	40 cm^3
Compressor	Wipe away any oil from the new compressor so that the amount is the same as the oil amount in the compressor to be replaced.



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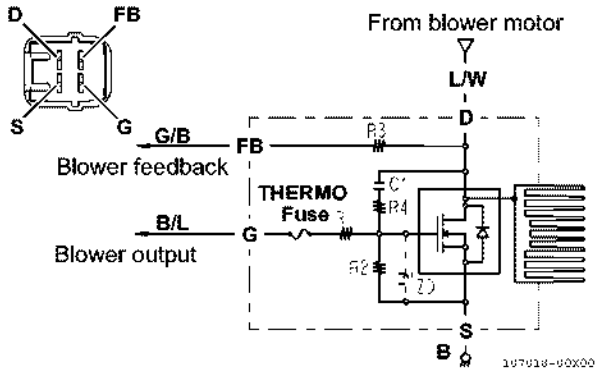
5. Single Product Checks

Electrical products

Amplifier (blower

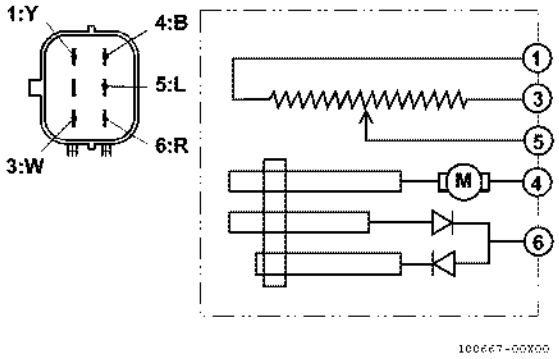
No.	Function (Connection devices)	Wire color
D	Blower motor	L/W
FB	Blower feedback	G/B
G	Blower output	B/L
S	GND	B



Valve (water

Single product checks

Range	Measuring site		Result
	Circuit tester probe	Circuit tester probe	
Resistance	1	3	5 kΩ ±1 kΩ



Connector terminal array					Rotation direction	stop position	Feedback voltage
6 R	4 B	3 W	1 Y	5 L			
-12 V	+12 V	+5 V	GND	SIG	CCW	P2 (OPEN)	0.4 ±0.1
+12 V	-12 V	+5 V	GND	SIG	CW	P1 (CLOSE)	4.6 ±0.1

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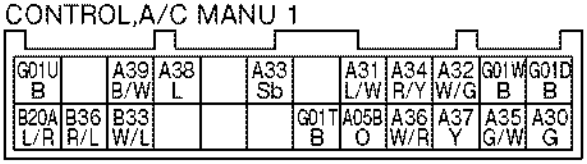
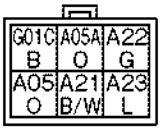
A/C controller (manual

Control (A/C MANU: 1A8420-87300

CONTROL,A/C MANU 1



CONTROL,A/C MANU 2



1J1071-00EN00

MANU 1		
No.	Terminal name	Wire color
G01U	LIGHTING GND	B
A39	COOL	B/W
A38	WARM	L
A33	DEF	Sb
A31	A/C SW OUTPUT	L/W
A34	FACE	R/Y
A32	DEF/FACE	W/G
G01W	UART GND	B
G01D	GND	B
B20A	LIGHTNIG	L/R
B36	MEMORY	R/L
B33	POWER 12V	W/L
G01T	SOFT SELECT	B
A05B	FAN	O
A36	A/M SERVO	W/R
A37	SENSOR 5V	Y
A35	SENSOR GND	G/W
A30	AIR OUTPUT	G

MANU 2		
No.	Terminal name	Wire color
G01C	GND	B
A05A	BLOWER LO	O
A22	BLOWER ML	G
A05	BLOWER MAIN RELAY	O
A21	BLOWER HI	B/W
A23	BLOWER MH	L

5. Troubleshooting

1. Checks Using the Panel

Use the A/C control panel to diagnose malfunctions in the A/C.

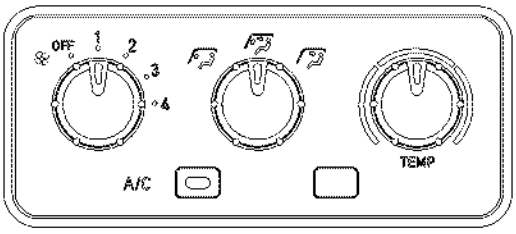
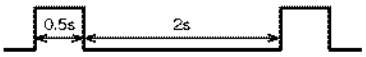
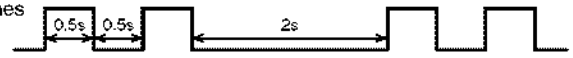
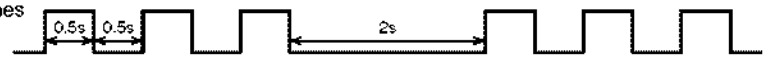
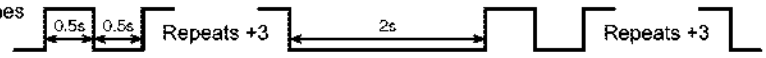
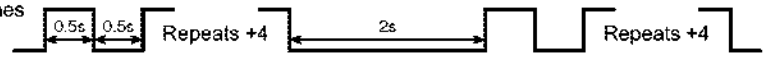
Check methods

1. Turn "OFF" the key switch.
2. Turn "OFF" the blower settings dial.
3. Press and hold the A/C switch while turning "ON" the key switch, and hold for 5 s.

This will switch to diagnostic display (check status).

Diagnostic display

If there is a non-conformance in the A/C control parts, the A/C lamps will display as described below.

Error details	Display image
	[A/C] switch indicator flashing pattern shows information. [Internal/external air switching] switch indicator is OFF. 
No target	1 flash 
Temperature adjustment error (motor actuator/motor valve error)	2 flashes 
Evaporator sensor error	3 flashes 
Internal air sensor error	4 flashes 
Water temperature sensor error	5 flashes 
No abnormalities	Continuously ON

107019-00000

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2. Troubleshooting Using the Gage Manifold

● **Normal**

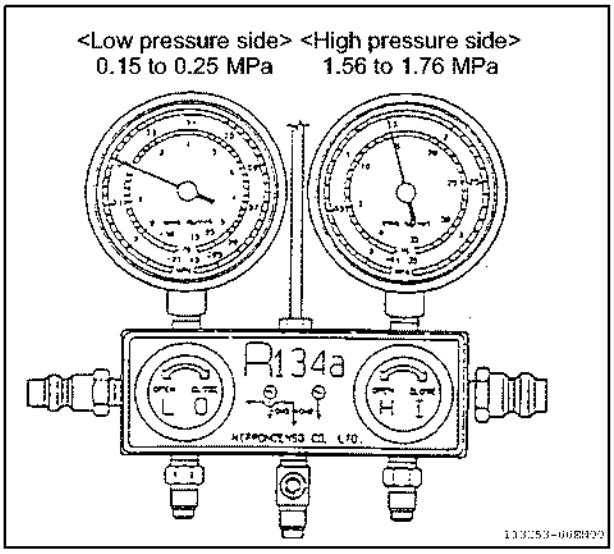
Condition

Operate the engine heater, and then check the following conditions.

Door	: Fully open
Engine speed	: Rating
Air conditioning inlet temperature	: 86 to 95°F (30°C to 35°C)
Blower speed	: Hi
Temperature control	: Max. cooling

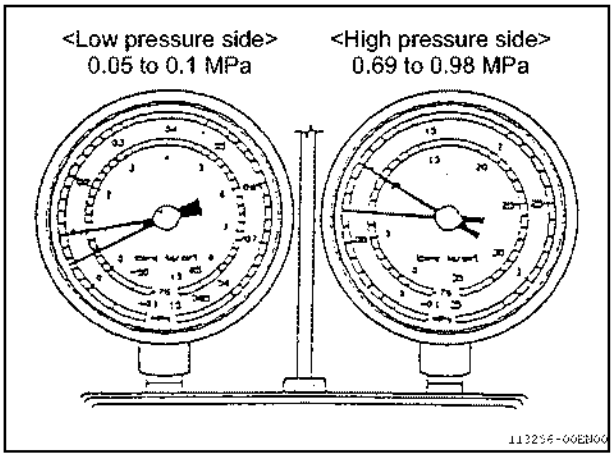
Normal gage pressure command value

Pressure on low pressure side	: 1.5 to 2.5 kg/cm^2
Pressure on high pressure side	: 16 to 18 kg/cm^2



● **Insufficient cooler filler amount**

Failure	Cause	Inspection and measures points
● Both low and high pressure are low ● Air bubbles continuously pass through the sight glass ● Outlet temperature is not cool	● Coolant amount is low ● Gas leak	● Inspect and repair site of gas leak ● Replenish coolant ● If the pressure command value when the gage is connected is close to "0", inspect and repair the leak site, and then implement suction.



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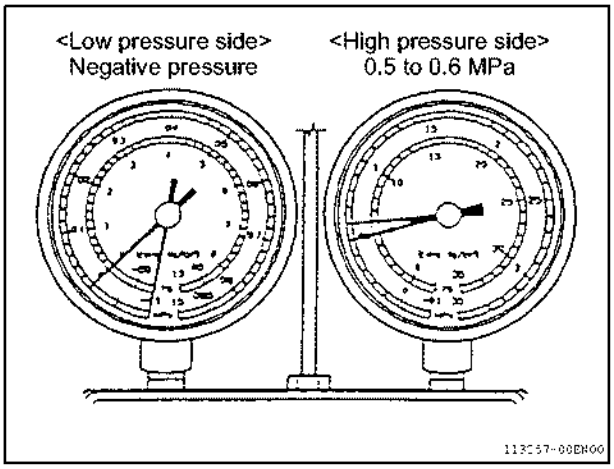
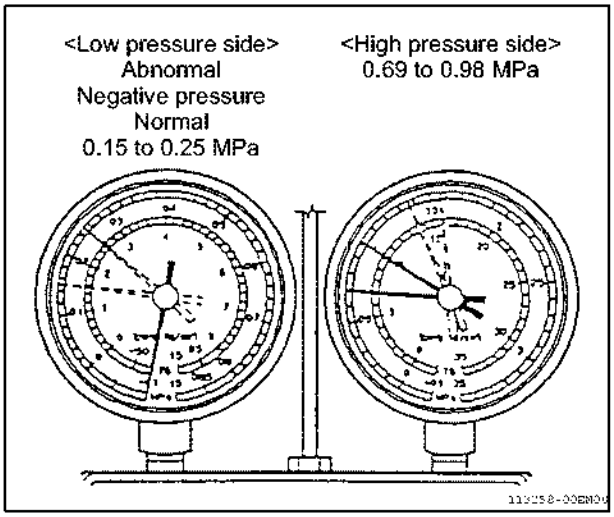
● **Coolant does not circulate (Cycle Jam)**

Failure	Cause	Inspection and measures points
● If the jam is complete, the low pressure side immediately orders negative pressure If the jam is partial, the low pressure side orders gradual negative pressure	● A/C cycle jam	● Inspecting receiver and expansions valves, etc. --> Temperature difference occurs between IN and OUT of the nonconforming part ● Make sure to implement vacuuming when work is complete



● **Water contamination in cycle**

Failure	Cause	Inspection and measures points
● The A/C operates normally at the start, but after a while the low pressure side orders negative pressure	● Frozen expansion valve due to water contamination	● Inspecting expansions valves, etc. ● Replacing the receiver dryer ● Make sure to implement vacuuming when work is complete



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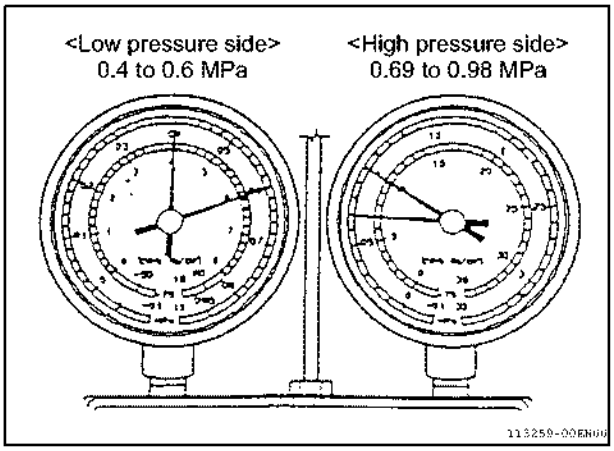
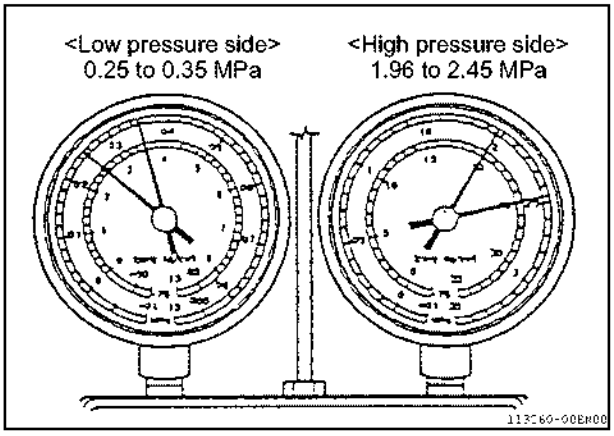
● **Defective compressor pressure**

Failure	Cause	Inspection and measures points
● Low pressure side pressure is high, and high pressure side is low ● Turn OFF the A/C, and the high and low pressures immediately become the same pressure	● Defective compressor	● Compressor inspection --> If the compressor pressure is defective, the compressor is not hot even to the touch



● **Too much coolant/capacitor cooling defective**

Failure	Cause	Inspection and measures points
● Both low and high pressure are high ● Even lowering the number of engine rotations, no air bubbles are visible in the sight glass ● Poor cooling	● Too much coolant ● Defective capacitor cooling	● Inspecting the coolant filler amount ● Normalize the coolant amount ● Inspecting and Repairing the Capacitor ● Inspect the vehicle coolant systems (motorized fan, fluid couplings, radiator), etc.



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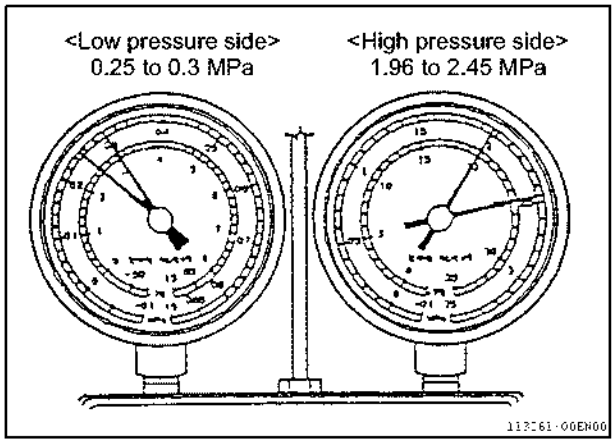
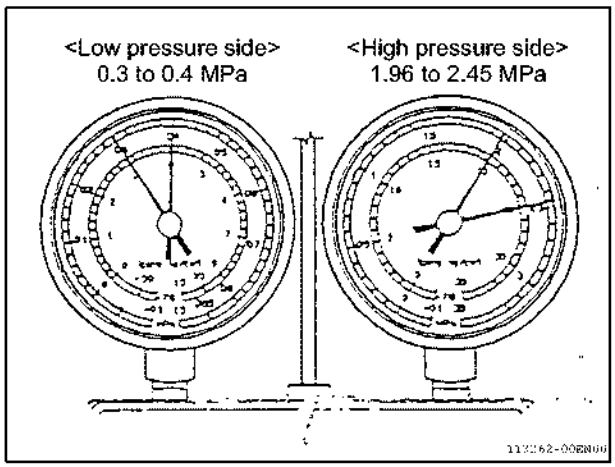
● **Air contamination in the A/C cycle**

Failure	Cause	Inspection and measures points
● Both low and high pressure are high ● Low-pressure pipes are not cool even to the touch ● Air bubbles pass through the sight glass	● Air contamination	● Replace coolant ● Make sure to implement vacuuming when work is complete



● **Expansion valve too open**

Failure	Cause	Inspection and measures points
● Both low and high pressure are high ● Frost (dew) adhering to the low-pressure pipes	● Defective expansion valve	● Inspecting expansions valves, etc. ● Inspect the thermal barrel mounting status --> Often occurs after replacing the expansion valve



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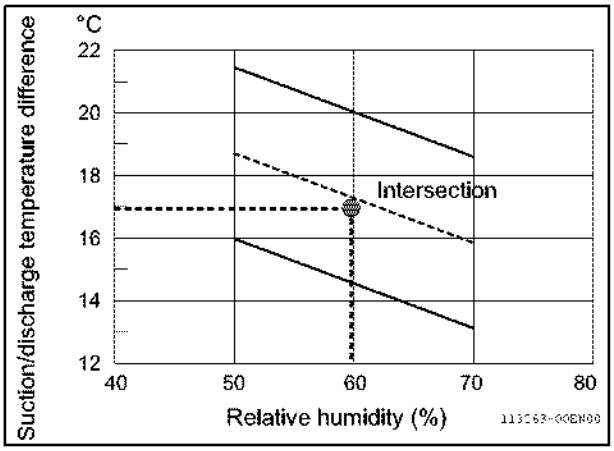
Viewing the performance table

Calculate the temperature difference (between the inlet temperature and outlet temperature) as a result of the test to determine the humidity at the time. (Determine from the psychrometric diagram.) Next, consult the standard performance table, and if the change for the better that links both values in at right angles is within the oblique lines in the diagram, they are normal.



IMPORTANT

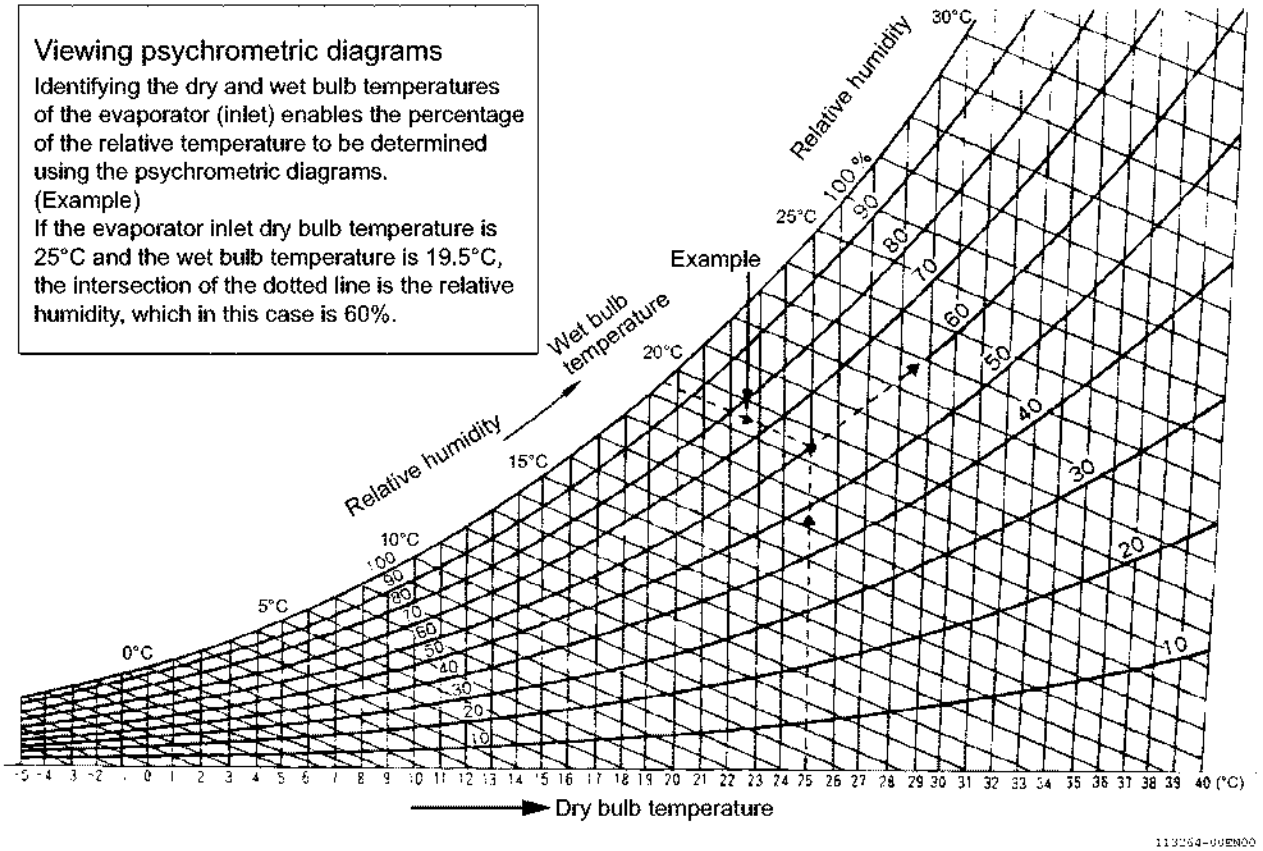
- If the values are not inside the oblique lines, operations are not normal, so inspect and repair, and then implement the tests once again.

Psychrometric diagram

Determine the relative humidity using the diagram below.

Viewing psychrometric diagrams

Identifying the dry and wet bulb temperatures of the evaporator (inlet) enables the percentage of the relative temperature to be determined using the psychrometric diagrams.
(Example)
If the evaporator inlet dry bulb temperature is 25°C and the wet bulb temperature is 19.5°C, the intersection of the dotted line is the relative humidity, which in this case is 60%.



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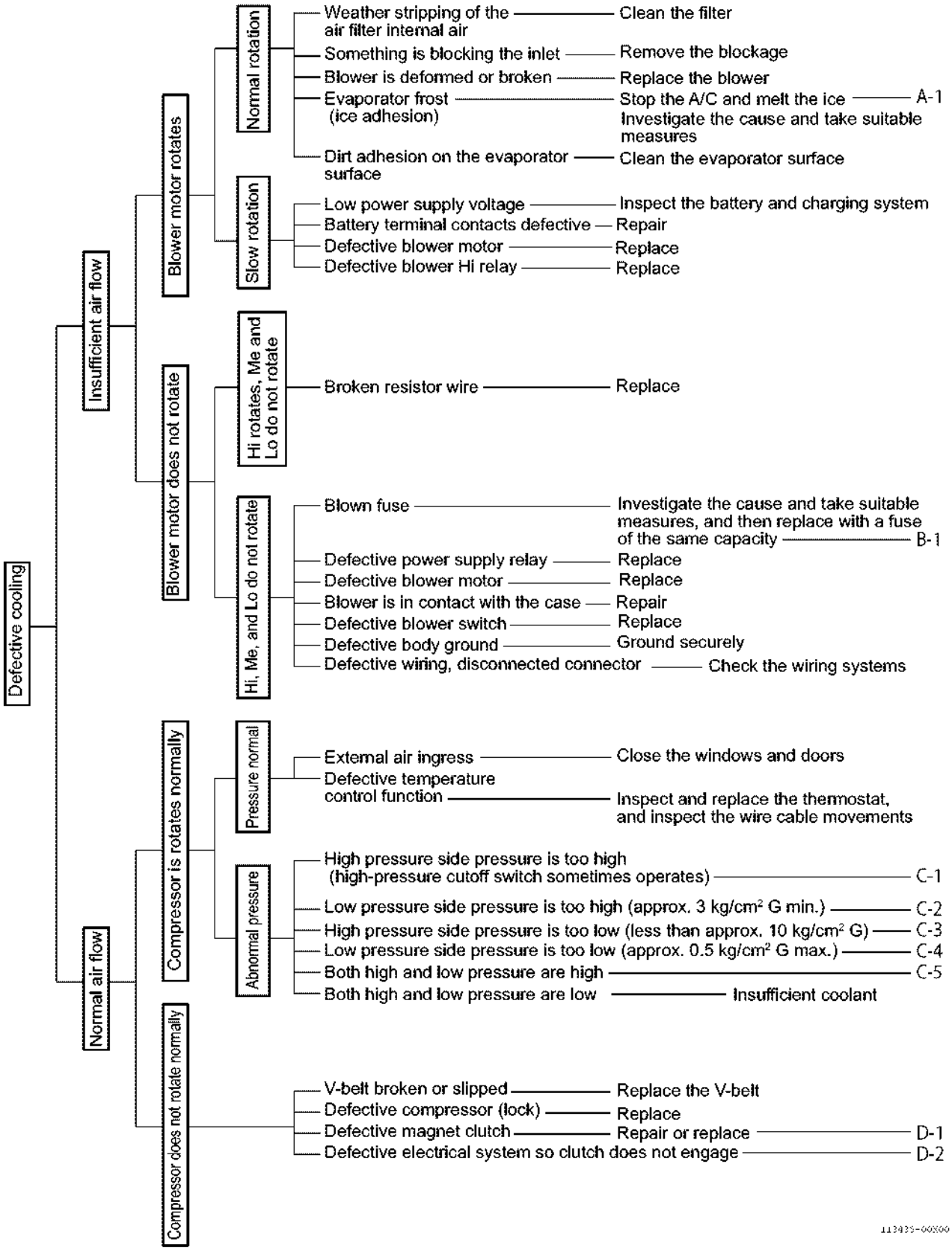
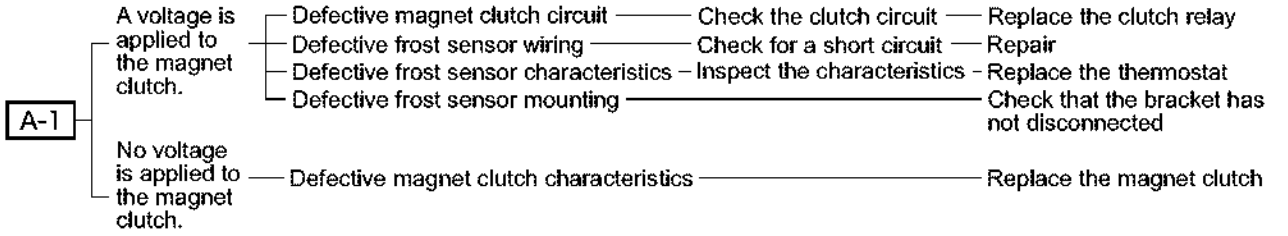
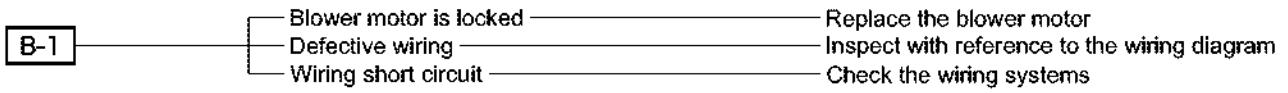
3. Failure Diagnosis Table

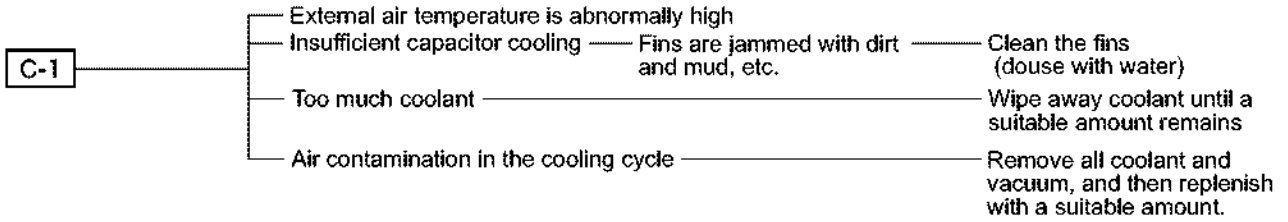
Cooling

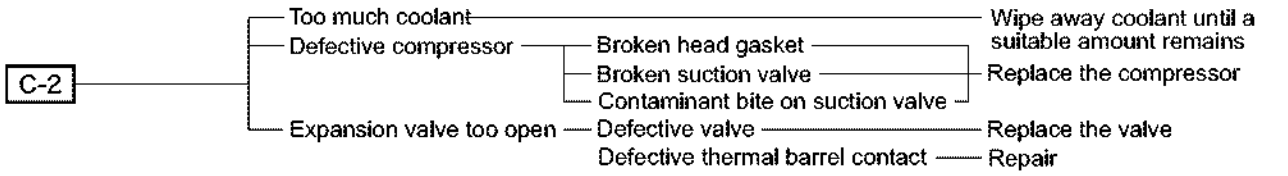


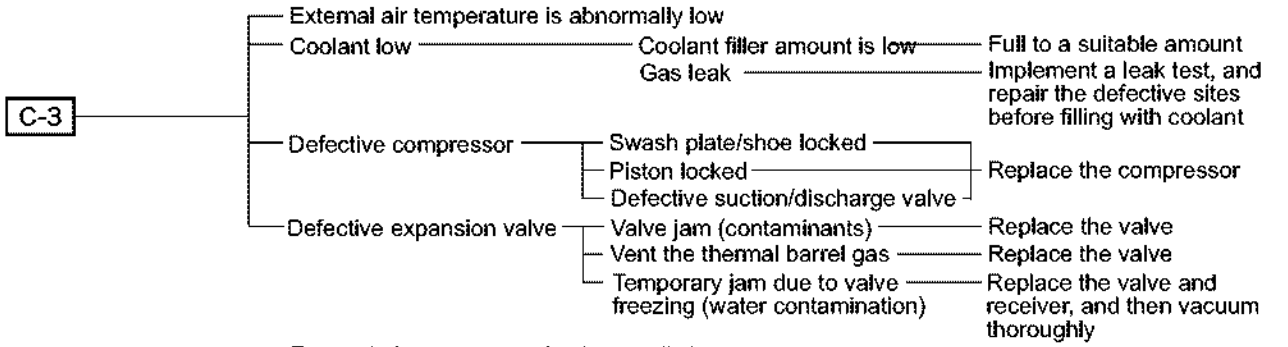


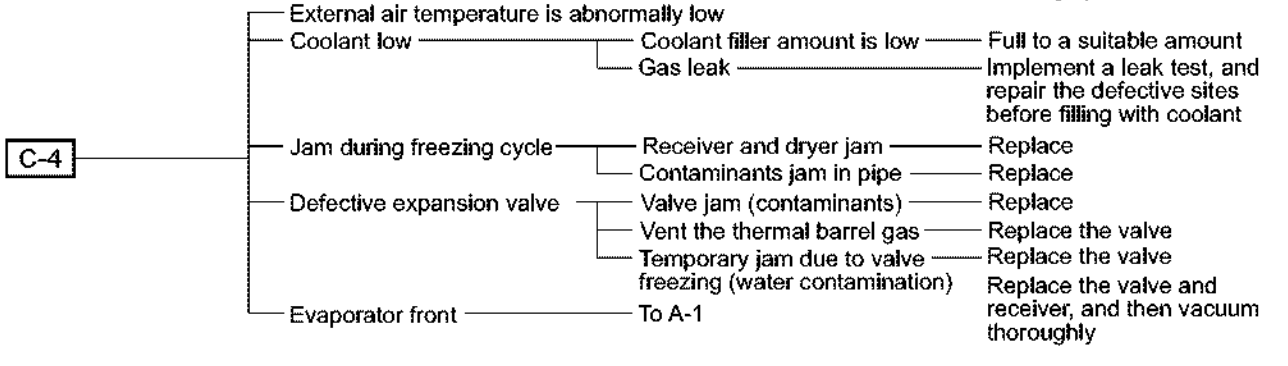
<Note> A-1 is when the compressor does not turn "OFF" even though the evaporator is frosted (i.e., sensor ambient temperature has fallen).

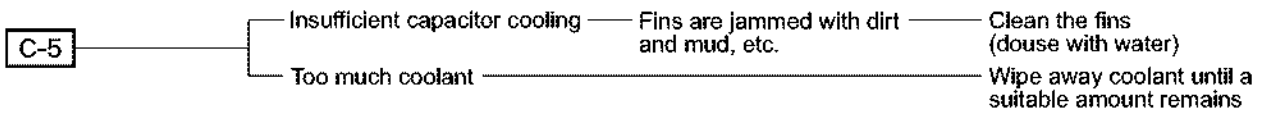












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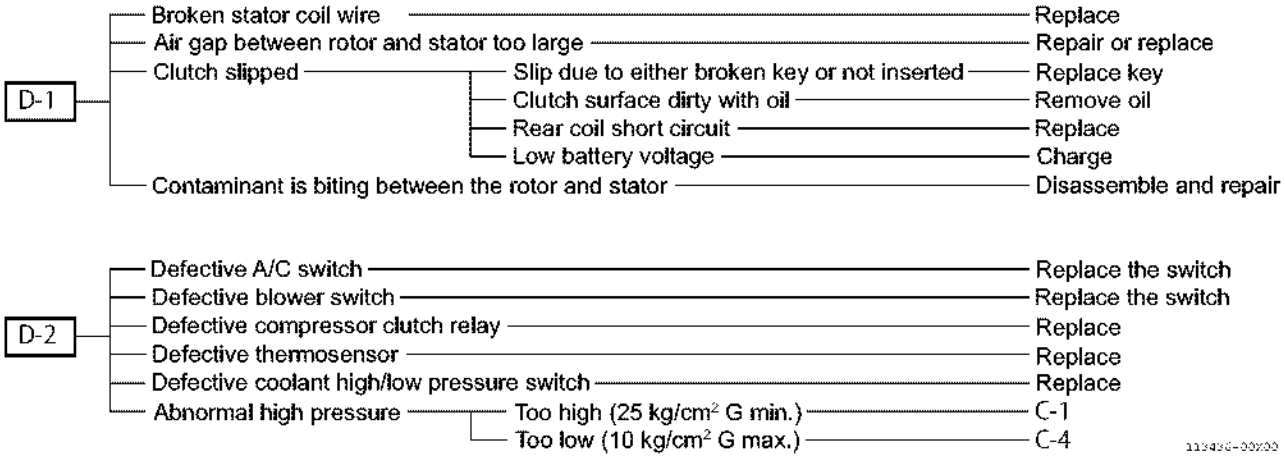
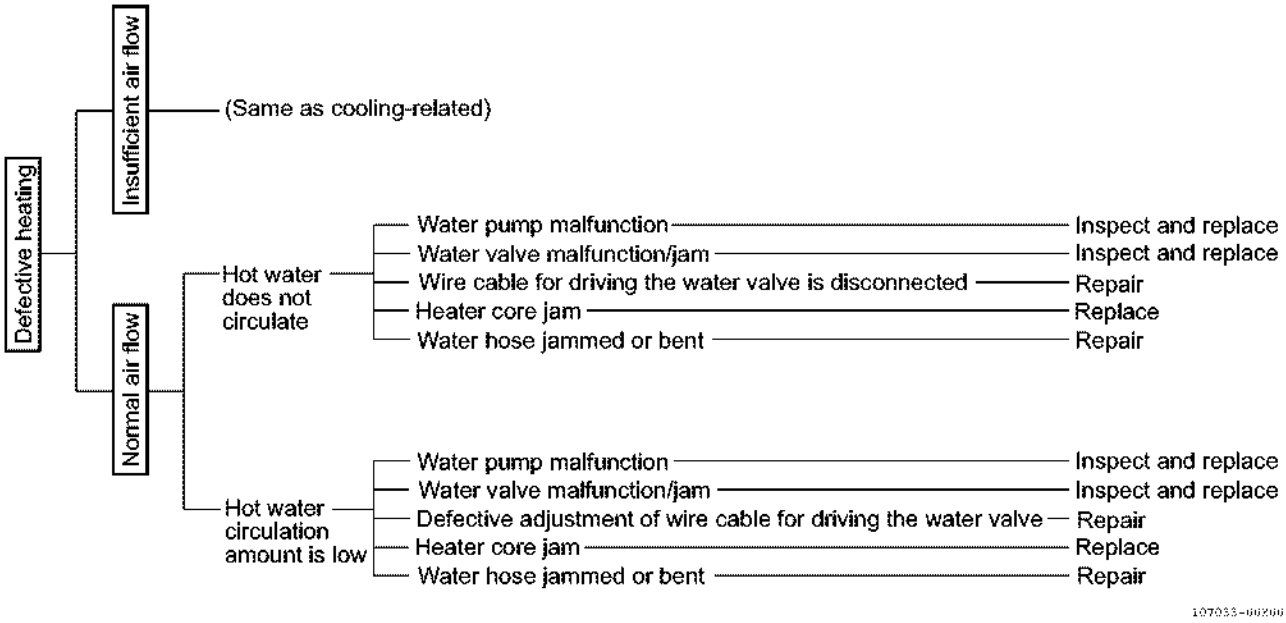

D-1
Broken stator coil wire
Replace
Air gap between rotor and stator too large
Repair or replace
Clutch slipped
Slip due to either broken key or not inserted
Replace key
Clutch surface dirty with oil
Remove oil
Rear coil short circuit
Replace
Low battery voltage
Charge
Contaminant is biting between the rotor and stator
Disassemble and repair
D-2
Defective A/C switch
Replace the switch
Defective blower switch
Replace the switch
Defective compressor clutch relay
Replace
Defective thermosensor
Replace
Defective coolant high/low pressure switch
Replace
Abnormal high pressure
Too high (25 kg/cm² G min.)
C-1
Too low (10 kg/cm² G max.)
C-4

● **Heating**


Defective heating
Insufficient air flow
(Same as cooling-related)
Normal air flow
Hot water does not circulate
Water pump malfunction
Inspect and replace
Water valve malfunction/jam
Inspect and replace
Wire cable for driving the water valve is disconnected
Repair
Heater core jam
Replace
Water hose jammed or bent
Repair
Hot water circulation amount is low
Water pump malfunction
Inspect and replace
Water valve malfunction/jam
Inspect and replace
Defective adjustment of wire cable for driving the water valve
Repair
Heater core jam
Replace
Water hose jammed or bent
Repair

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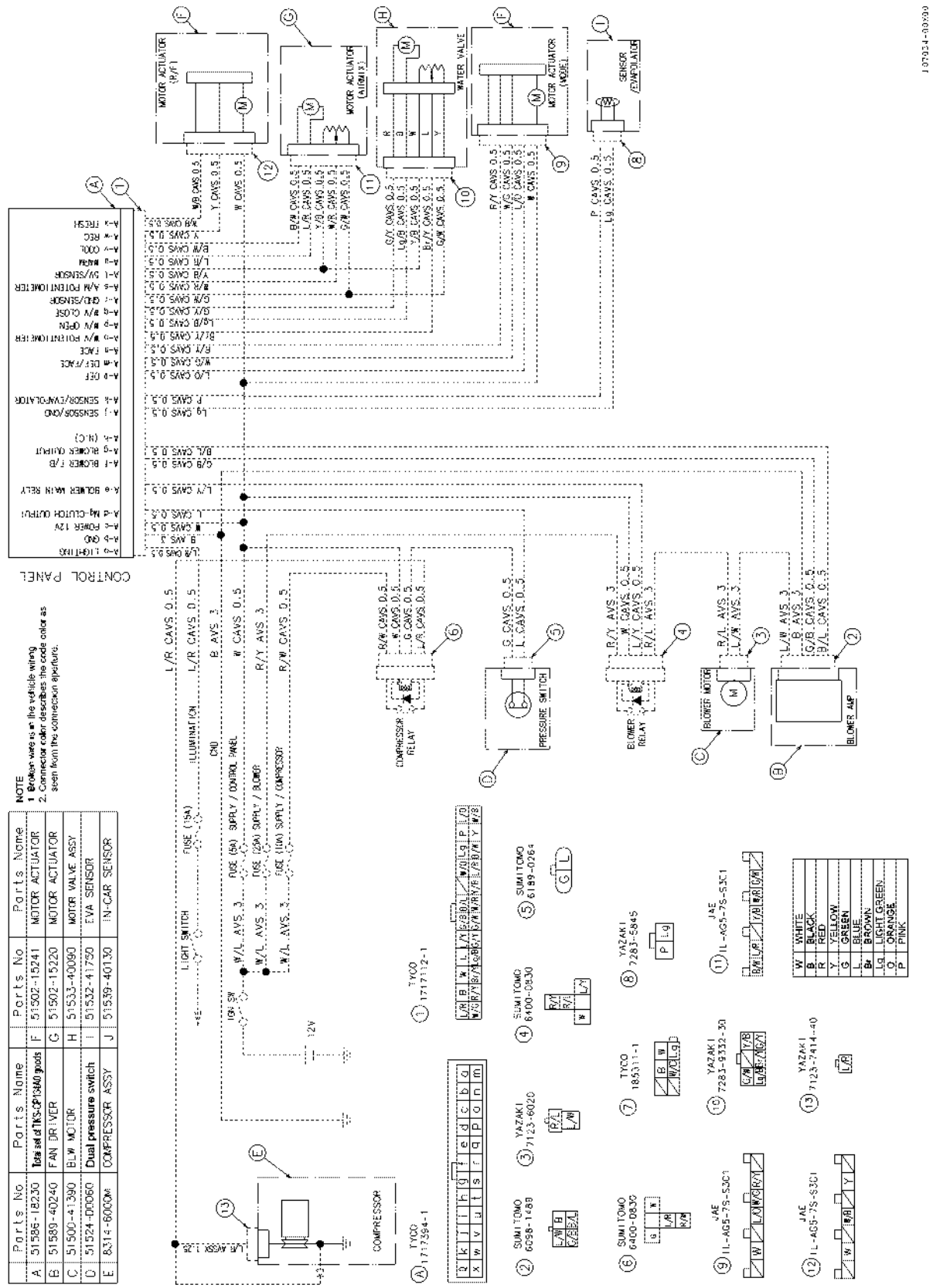
6. Reference Material

Electrical circuit diagram



Parts No.	Parts Name
A 51596-18230	Total set of TNS-CP13A40 goods
B 51580-40240	FAN DRIVER
C 51500-41390	BLW MOTOR
D 51524-00060	Dual pressure switch
E 8314-6000M	COMPRESSOR ASSY

Parts No.	Parts Name
F 51502-15241	MOTOR ACTUATOR
G 51502-15220	MOTOR ACTUATOR
H 51533-40090	MOTOR VALVE ASSY
I 51532-41750	EVA SENSOR
J 51539-40130	IN-CAR SENSOR

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YT235

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0B042-EN0120
Aug. 2018 (YTSK)
PRINTED IN JAPAN