



YANMAR®

PARTS AND OWNER'S MANUAL

POWER STEERING UNIT

FOR YM1300 AND YM1300D

**Full Hydraulic - 2-inch Bore, 6-inch
Stroke Hydraulic Cylinder**



THIS SAFETY ALERT SYSTEM IDENTIFIES IMPORTANT
SAFETY MESSAGES IN THIS MANUAL.



SAFETY PRECAUTIONS



In addition to all of the safety precautions listed in your tractor Operator's Manual, the following items must be carefully followed:

1. Become familiar with your equipment and its controls by practicing on a smooth surface or roadway until you feel that you are comfortable with your new Power Steering Unit.
2. Engine stopping will cause the loss of power steering and manual steering will have to be used. This control is much more difficult. In the event of a failure in the hydraulic system the same will hold true.
3. Do not place your hands or other pieces of equipment close to the power steering unit while it is in operation or while the engine is running.
4. While moving, always avoid turning your wheels suddenly as this may cause the tractor to roll over.
5. Visually check your power steering system daily for fluid leaks, broken, missing or malfunctioning parts and make the necessary repairs. If assistance is needed, see your dealer. Never tighten hydraulic fittings or work on the unit while the engine is running.
6. Check the hydraulic system before each use for signs of leaks or wear. **ESCAPING HYDRAULIC FLUID, UNDER PRESSURE, CAN BE VERY DANGEROUS.** Hydraulic fluid escaping under pressure can have enough force to penetrate the skin or destroy eyesight. Hydraulic fluid may also cause infection of a minor cut or opening in the skin. If injured by escaping fluid, **GET MEDICAL ATTENTION AT ONCE.** Make sure that all the connections are tight and that all hoses are in good condition before applying pressure to the system. Relieve all pressure before disconnecting the lines or performing any other work on the hydraulic system. To locate small leaks use a small piece of paper, cardboard or wood . . . **NEVER USE YOUR HANDS.**
7. **KEEP YOUR EQUIPMENT CLEAN.** This will not only allow you to readily observe any signs of equipment wear or impending failure, but will also help in avoiding falls due to slippage on grease or oil.
8. Know your work area. Inspect for hidden holes, rocks, drop-offs or other obstacles and conditions which cause tractor to overturn.
9. Check transmission oil level weekly and refill if necessary.
10. Do not allow anyone to touch the steering controls while the unit is being lubricated or repaired.
11. Before starting the engine, make sure helper or observers stand clear of equipment. **NEVER** start the engine until the operator is properly seated on tractor, gears are in neutral position and parking brake is on.
12. **DO NOT TAMPER** with the relief valve setting. The relief valve is pre-set at the factory for maximum safety and steering ease. Altering setting may cause mechanical failure resulting in loss of steering and serious bodily injury to operator or others in area.
13. It is the **TRACTOR OWNERS RESPONSIBILITY** to make sure that all operators of the tractor are aware of the safe way to use the equipment and **ALL ITS CONTROLS.**
14. If safety decals become illegible or torn off, they should be replaced. See your tractor dealer for replacements.
15. This unit operates under high pressure. All parts are highly stressed and must be replaced with factory parts. The warranty is void if any parts other than factory parts are used.



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YM1300 Power Steering Upgrade

by Alex Buchanan

2013

After welding the power steering box teeth 3 different times on a YM1300D, I decided to go for broke making one myself rather than trying one of the Hoyes power steering assist setup. It's best just to eliminate it all together and go with full hydraulic steering (the kind you see on 4x4 rock crawlers or a lot of forklifts). I started out measuring the actual amount of movement the stock tie rod has when you turn the steering wheel. It was between 4.5-5-inches when the 5-inch travel at the bar started making contact with the front tire. Next, I removed all steering components down to the steering arm on the front axle. I had a steering control unit off a forklift (orbitrol valve) already. This began the mocking up. A 6-inch stroke with a hydraulic cylinder would work with the original setup using a 1-inch internal stop inside the cylinder and an external stop to allow finer tuning. So I purchased a 2-inch bore, 6-inch stroke hydraulic cylinder and set to work mocking it up.



My original thought was to place the cylinder on the floor board of the tractor (where you would rest your left foot). The cylinder wouldn't be moving and you really wouldn't hurt it. I planned on using the stock tie rod but after running the cylinder out and then moving the stock rod out to match it, it was apparent it was not going to work.



So I relocated the mounting point of the cylinder.



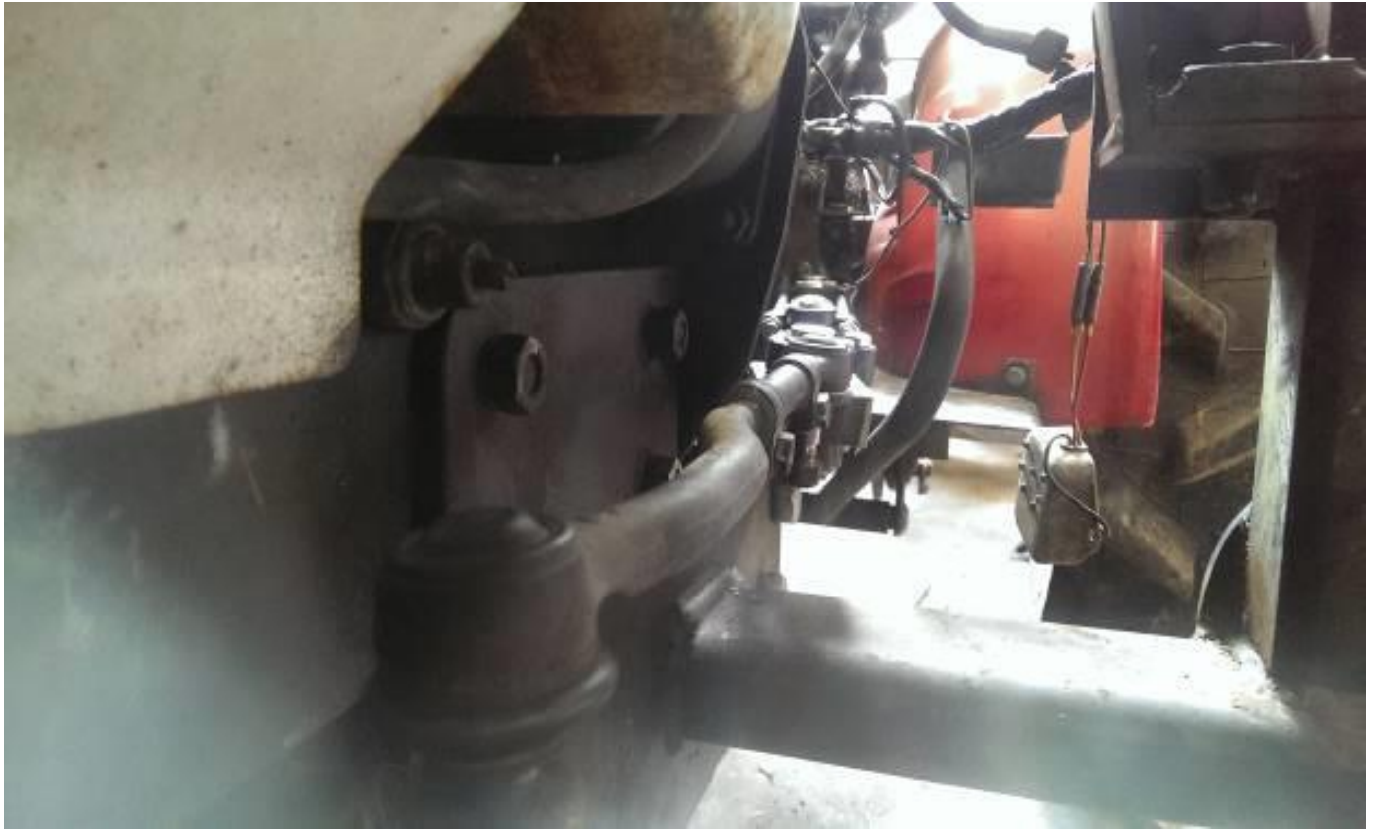
The final mounting point has under gone a few revisions and will be talked about more further down.



So then I found a tie rod off of a rack and pinion setup from a little Toyota corolla that matched the taper and size pretty well. So with my autoparts knowledge I set off to napa to look at there suspension book and find another tierod that had the same taper/dimensions but a female thread instead. I finally found it off of a Cadillac Catera (iirc) this looked like it was going to work perfect as it had some length to it and was bent similar to the original rod.



More images of the steup.



However after trying to run it in and out a few times it was evident it was going to jam. Also it was too long to relocate the mounting point off the floor board of the tractor.

So after realizing it was too long to relocate and retain a ball joint that ended up binding anyways I decided to opt out of a tie rod setup all together and ran the cylinder clevis pin through the hole of the tie rod.



This actually gave me a short enough distance to mount the cylinder off the floor board but still retain a long enough stroke to fully turn left and right.

So here is the mocked up mounting point hooked up, I used compressed air to operate the cylinder in and out. I don't have one picture, I originally had the cylinder clevis pin just ran through the mounting point you can see in the picture, without the black mount with the second pin. But the cylinder would bind at about $\frac{3}{4}$ of its movement (due to the cylinder only moving in one plane), I had to come up with a way for the cylinder to go both left and right, and up and down (to make an arc), I found this black piece at the local tractor supply store (it is for 3 point attachments and stuff, as I am sure most of you are aware). Once this was in it was just a matter of fine tuning the length to get maximum extension/retraction.



The final cut down length. Now the hydraulic cylinder was moving the steering full left and right turns.



So now on to the steering control unit setup. I started with the stock base plate and proceeded to build freehand style.



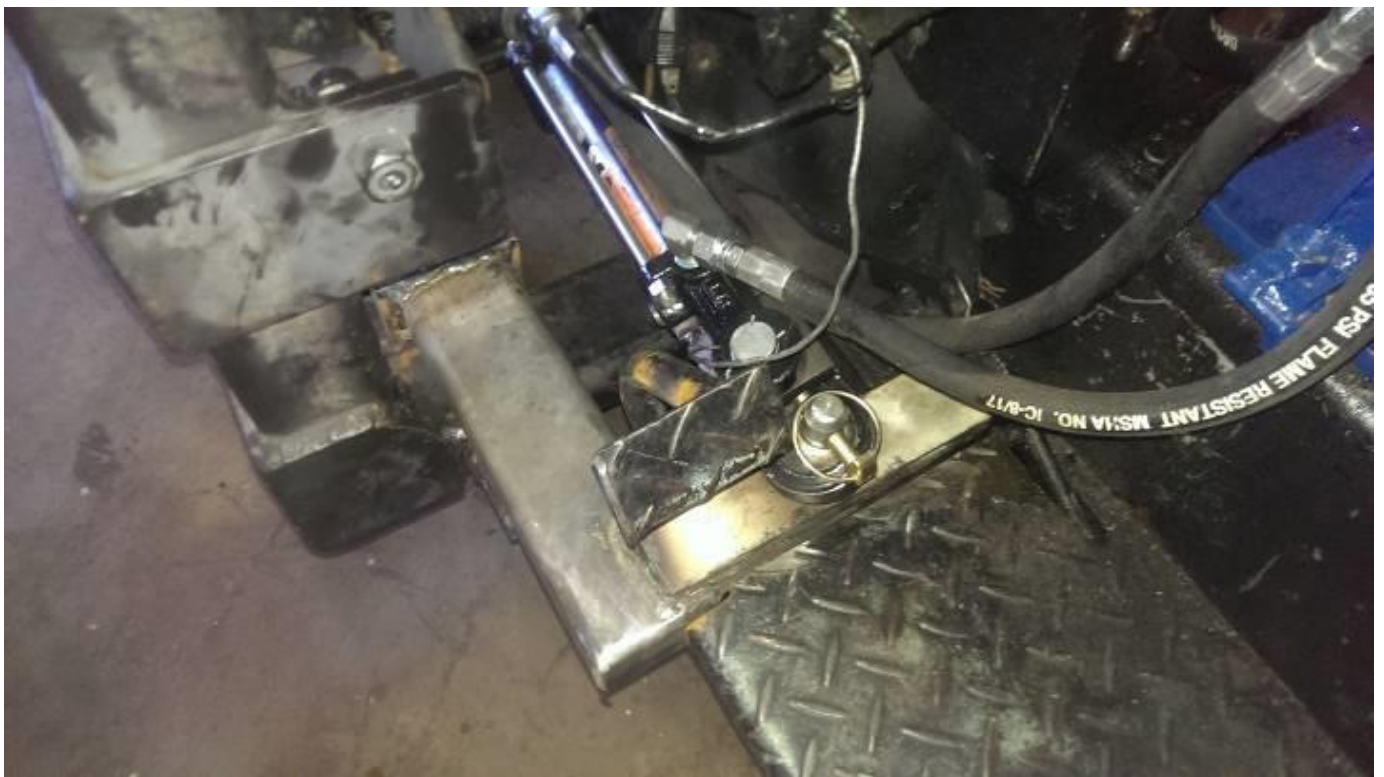


Here is the hose routing all mocked up and pretty close to the final product, there is still a lot of welding painting etc... in the last picture you can see the throttle handle, I had to cut the factory "box" down and find a way to mount it, which was not hard



After running the cylinder with weight on the tractor around my yard I noticed the angle bracket I built was flexing a little too much for my likes, so I welded a ½" thick plate to the top of the angle bracket and added the 2x3" square tubing to the brace of the FEL. I drilled and tapped the bracket I welded to the brace so that way it can all be unbolted as needed should the FEL ever need to come off, the mount for the FEL will still be on the tractor so the steering will always be there. Should the FEL mount be removed you will not have hydraulic steering anymore however I think that this would indicate the tractor being separated engine/trans etc (major work needed)





These final pictures are of the finished product, the only couple things left I have to do is get a smaller supply hose to the FEL valves as it is too long and does not sit under the “dashboard” very easily and modify the dashboard mount so the dashboard sits more level.