

FILLING AND PURGING THE SYSTEM

Read First

NOTICE

If system is fitted with SeaStar Power Assist, please refer to your Power Assist Installation Manual for bleeding instructions.

NOTICE

If using a Liquid Tie bar Valve, part # HA5471-2, please refer to the bleeding instructions included with the liquid tie bar valve.

These instructions show how to fill and purge a Single Station Front Mount Cylinder System. The same steps apply to Single Station Side Mount / Splashwell Mount Systems, the difference being which bleeder to open and close and the direction the cylinder rod moves. These variations are shown in inset diagrams at each step. For twin station and/or twin cylinder filling and purging instructions refer to instructions on page 39 first and then proceed with instructions on this page.

This procedure requires two people. One person may not be able to remove all the air from the system which will result in spongy, unresponsive steering.

During the entire filling procedure, oil **must** be visible in the filler tube. **DO NOT** allow the oil level to disappear into the helm pump, as this may introduce air into the system and increase your filling time.

Hydraulic Oil Requirements

2 bottles (2 quarts or liters) for single station and single cylinder systems.
1 additional bottle for each additional helm, cylinder, or auto pilot.

NOTICE

Oil can be re-used if filtered through a fine mesh screen such as used for gasoline. If unable to filter oil, an additional bottle of oil is required.

NOTICE

"Bleeder" may refer to cylinders fitted with bleed tee fittings or bleed screws. If fitted with bleed tee fitting, open bleeder by unscrewing bleed nipple nut two turns.

NOTICE

Filling the helm full of oil can be done faster if oil is poured into the helm prior to connecting filler tube and oil bottle to the helm. Part # HA5438.

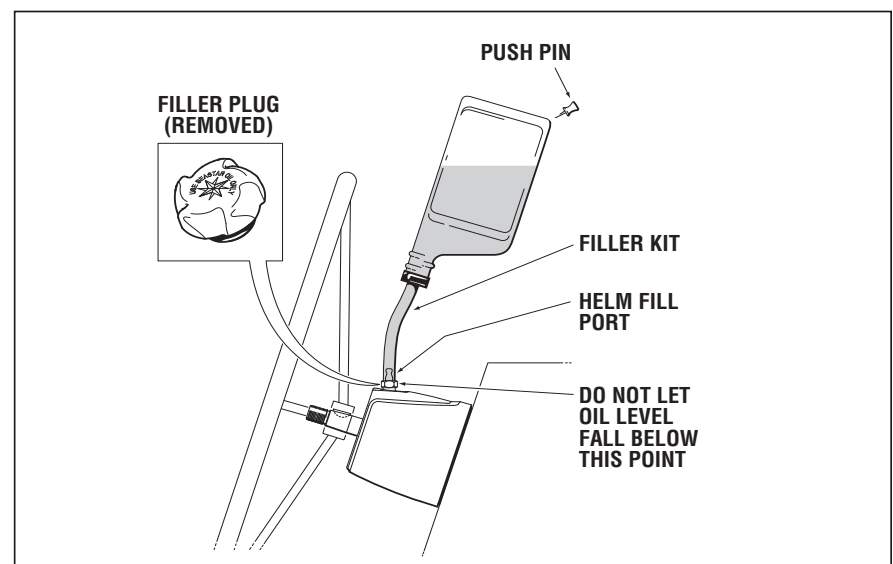


Figure 35.

NOTICE

In the following pages you are instructed to hold cylinder body with your hand, if the cylinder is mounted to an engine, use the engine to hold the body in position.

HYDRAULIC STEERING

FILLING AND PURGING

Hydraulic Fluid

Recommended oils for your steering system are:

- SeaStar Hydraulic Fluid, part no. HA5430 (1 quart), HA5440 (1 Gal.)
- Texaco H015
- Aero Shell Fluid #41
- Esso Univis N15
- Chevron Aviation Fluid A
- Mobil Aero HFA
- Fluids meeting Mil H5606 specifications.
- Automatic transmission fluid Dexron II may be used in an emergency.

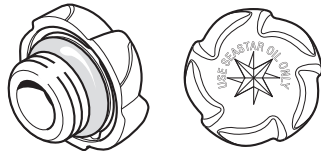
⚠ CAUTION

Never use brake fluid. Any non-approved fluid may cause irreparable damage, loss of steering, and cancellation of warranty.

In cases of extreme emergency any non-toxic, non-flammable fluid may provide temporary steering.

Fill Plugs for SeaStar Helms

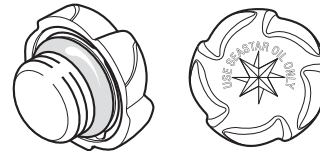
VENT PLUG - Part No. HA5431



SUPPLIED WITH SEASTAR HELM PUMP

- MUST BE USED WITH HELM PUMP ON ALL SINGLE STEERING STATION SYSTEMS.
- MUST BE USED ON UPPERMOST HELM PUMP ON MULTI STEERING STATION SYSTEMS.

NON-VENT PLUG - Part No. HA5432

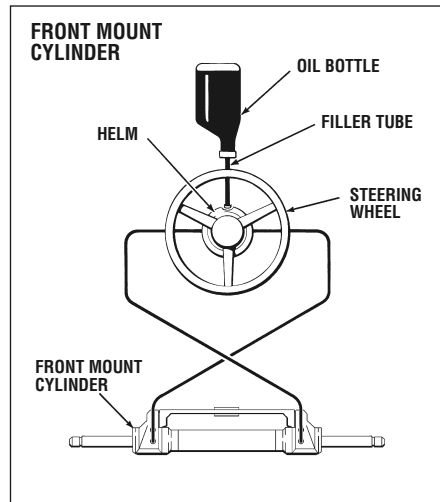


- MUST BE USED ON ALL HELM PUMPS OTHER THAN UPPERMOST HELM PUMP ON MULTI STEERING STATION SYSTEMS.
- THIS NON-VENT PLUG IS SUPPLIED WITH ADDITIONAL STATION FITTING KIT NO. HF5501 AND HF5502.

Figure 36.

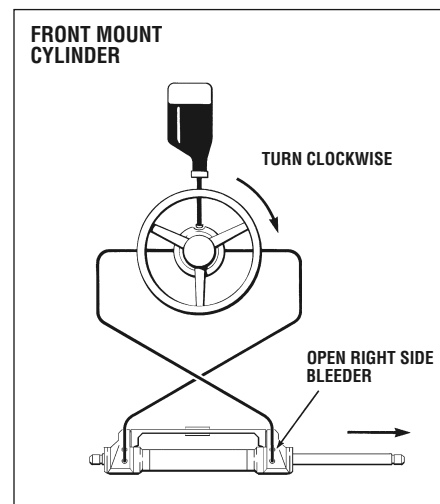
Single Station One Cylinder

Step 1



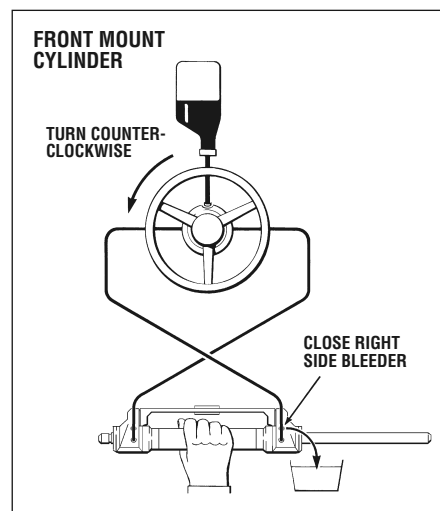
- Screw the threaded end of the filler tube into the helm filler port.
- Remove the cap from the oil bottle and holding upright screw into the filler tube bottle cap. Poke hole in the bottom of the bottle.
- Fill the helm pump full of hydraulic oil so that it is visible in the filler tube. Oil should always be visible in the filler tube. Use the next bottle of fluid at any time during the procedure in order to maintain the oil level. **DO NOT** proceed with step two until helm is full.

Step 2



- Turn the steering wheel clockwise until the cylinder rod is fully extended on the right side of the cylinder.
- Open right side bleeder.

Step 3

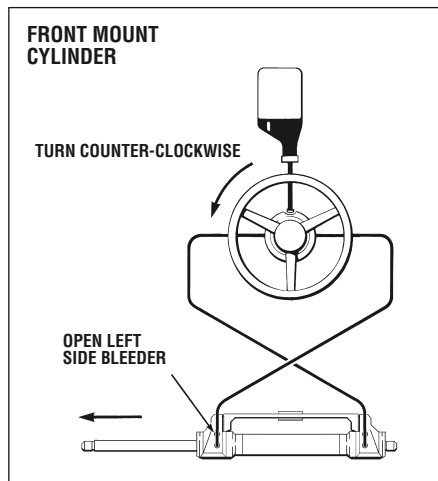


- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel counter-clockwise until a steady stream of air free oil comes out of the bleeder. (Drain approx. 1/2 bottle of oil or as required).
DO NOT use anything other than your hands to restrain the cylinder body/rod.
- While continuing to turn the wheel close the right side bleeder and let go of the cylinder body/rod.

HYDRAULIC STEERING

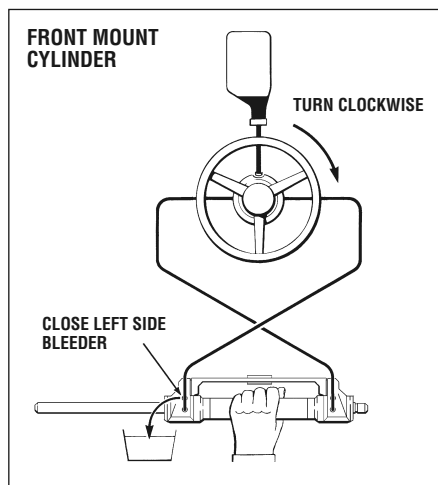
FILLING AND PURGING

Step 4



- Continue turning the steering wheel counter-clockwise until the cylinder rod is fully extended to the left. (Steering wheel will come to a stop).
- Open the left bleeder.

Step 5



- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel clockwise until a steady stream of air free oil comes out of the bleeder.
- While continuing to turn the wheel close the left side bleeder and let go of the cylinder body/rod.

⚠ CAUTION

Prior to operating system, perform Oil Level System Check, refer to page 40.

No. Steering Wheel Turns	Front Mount	Side Mount	Splashwell Mount
SeaStar 1.7	4.5	4.9/5.8	5.5/6.5
SeaStar 2.4	3.25	3.5/4.1	3.9/4.6
SeaStar Pro 2.0	4.0	N/A	N/A

When steering system has been properly bled, steering wheel turns will be as shown in the chart.

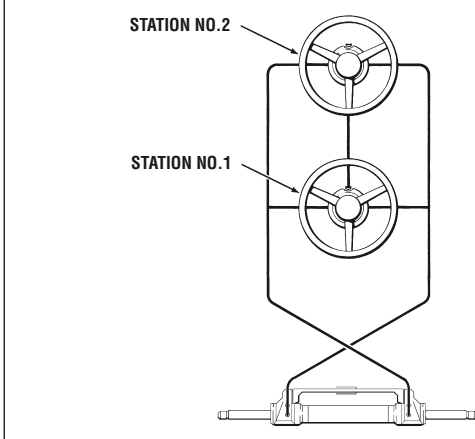
Twin Station Single Cylinder

Perform steps 1 through 5 at station no. 1. Then repeat steps 1-5 at station no. 2.

Oil requirements 4-5 bottles.

Note: Refer to Oil Level and System Check page 40.

When properly bled, steering wheel turns will be as shown in the chart.



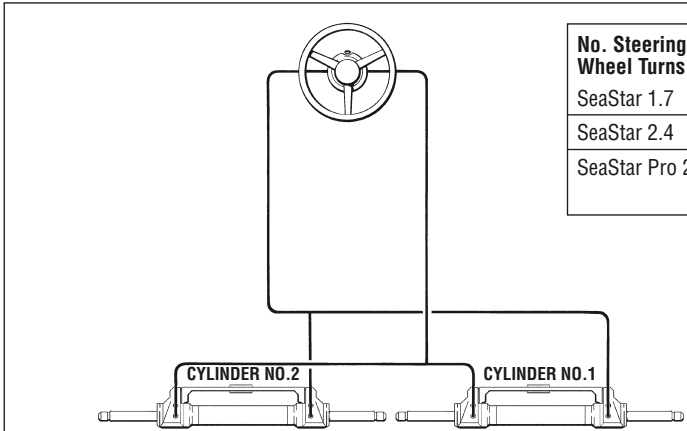
No. Steering Wheel Turns	Front Mount
SeaStar 1.7	4.5
SeaStar 2.4	3.25
SeaStar Pro 2.0	4.0

Single Station Twin Cylinder

When performing steps 1 through 5, perform instructions in each step first on cylinder no. 1 and then on cylinder no. 2, before proceeding to the next step. ie: Perform instructions referring to right side of cylinder first on cylinder no. 1 and then on cylinder no. 2.

Oil requirements 4-5 bottles.

Note: Refer to Oil Level and System Check on page 40. Steering wheel turns will be as shown in the chart.

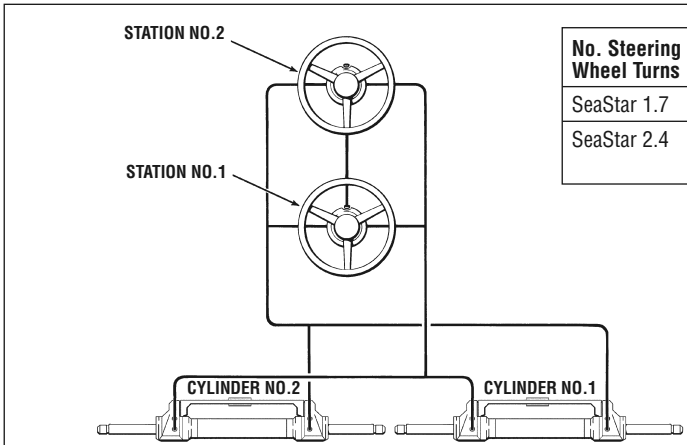


No. Steering Wheel Turns	Front Mount x 2
SeaStar 1.7	9.2
SeaStar 2.4	6.5
SeaStar Pro 2.0	7.8

Twin Station Twin Cylinder

Follow same procedure as instructed for single station-twin cylinders, beginning at station no. 1, and repeat entire procedure at station no. 2.

Note: When properly bled, steering wheel turns will be as shown in the chart.



No. Steering Wheel Turns	Front Mount x 2
SeaStar 1.7	9.2
SeaStar 2.4	6.5

Oil Level and System Check

Step 1 – Oil level Setting

⚠ WARNING The oil level **MUST** be checked and maintained **BEFORE EACH** use to ensure safe steering operation. Failure to adhere to this warning may lead to loss of steering control resulting in persons being ejected from vessel or collision with an obstacle, leading to property damage, personal injury and/or death.

⚠ CAUTION

Side mount and Splashwell mount cylinder are unbalanced. To set the oil level in the helm pump the cylinder rod **MUST** be fully “retracted (cylinder shaft all the way in the cylinder body). Failure to adhere to this caution **WILL** result in oil spillage at the helm filler port and/or stiff steering operation.

- For helms mounted with the wheel shaft completely horizontal **MUST** be filled to the bottom of filler hole **AT ALL TIMES**. **DO NOT** allow oil level to drop more than 1/4” below filler threads.
- For helms mounted on a 20 degree angle, or, with wheel shaft in the vertical position, oil level should be within 1/2” of filler hole.

Step 2 – System Check

⚠ WARNING The system check **MUST** be completed after installation. Doing so will ensure the safe operation of your steering system and will any fault/leak will show at this time. Failure to adhere to this warning/check may result in the loss of steering control leading to ejection from the vessel, or, collision with an obstacle resulting in property damage, personal injury and/or death.

- Turn steering wheel hard over to hard over to confirm unrestricted movement of the steering system and hoses. Repeat this procedure in ALL trim/tilt positions of the engine(s). If interference occurs, or, hoses are being stretched this **MUST** be removed prior to operating your boat.
- Confirm that engine(s) are deflecting to the proper direction when steering wheel is turned.
- If no interference is noticed, or, any interference is corrected, go to next step.
- Take steering wheel hard over to starboard (any helm can be used on a multi-station boat). Once the wheel reaches its stop point (cylinder is fully stroked out), continue to force the wheel one (1) full turn past stop. Leave wheel in this position while you check all **PORT** side connections, fittings, seals and hoses for leaks.

NOTICE *This step will NOT harm the system and any noise made during this step should not be considered a fault in the steering system.*

- If leaks are noticed they **MUST** be repaired prior to operating boat. After repair repeat bleeding procedures as outlined in this manual
- Repeat to the Port direction and inspect ALL starboard side connections, fittings, seals and hoses for leaks.

NOTICE *This step will NOT harm the system and any noise made during this step should not be considered a fault in the steering system.*

- If leaks are noticed they **MUST** be repaired prior to operating boat. After repair repeat bleeding procedures as outlined in this manual.

⚠ WARNING

Failure to complete the above noted step or, failure to correct a problem may result in loss of steering control leading to ejection from the vessel or collision with an obstacle resulting in property damage, personal injury and/or death.

ROUTINE MAINTENANCE

⚠ WARNING

Following the routine maintenance schedules as outlined below, in the time frame noted will ensure years of service from your SeaStar Steering System, as well as keep you and your passengers safe from the dangers that are present on and off the water.

1. Owner(s) (End Users)

Prior to every use.

1. Check Fluid level in highest helm pump (see page 35 for proper fluid level setting).
2. Verify immediate steering response when turning steering wheel(s). (Ensure engine turns when steering wheel is turned.)
3. Visually inspect all steering hoses and fittings for wear, kinking and/or leaks.
4. Check for binding, loose, worn or leaking steering components.

⚠ WARNING

DO NOT operate boat if any component is not in proper working condition.

2. Qualified Marine Mechanic

After first 20 hours, then every 100 hours or 6 months thereafter (which ever comes first).

1. All points noted above.
2. Check tightness of ALL fasteners/fittings throughout the steering system. Tighten to correct torque specifications as required.
3. Check for mechanical play or slop throughout steering system, correct as required.
4. Check for signs of corrosion. If corrosion is present contact your dealer or SeaStar Solutions.

After every 200 hours or 12 months (which ever comes first).

1. All points noted above.
2. Remove support rod from engine steering/tilt tube. Clean engine steering/ tilt tube and re-grease using a good quality marine grease.
3. Grease support rod liberally
4. Grease all contact points shown in Figure 37. DO NOT remove tiller bolt to re-grease.
5. Remove steering wheel and re-grease wheel shaft using a good quality marine grease.
6. Inspect hydraulic oil for cleanliness, flush if required.

⚠ WARNING

Any work being performed with the steering system **MUST** be completed by a qualified mechanic with the working knowledge of the system.

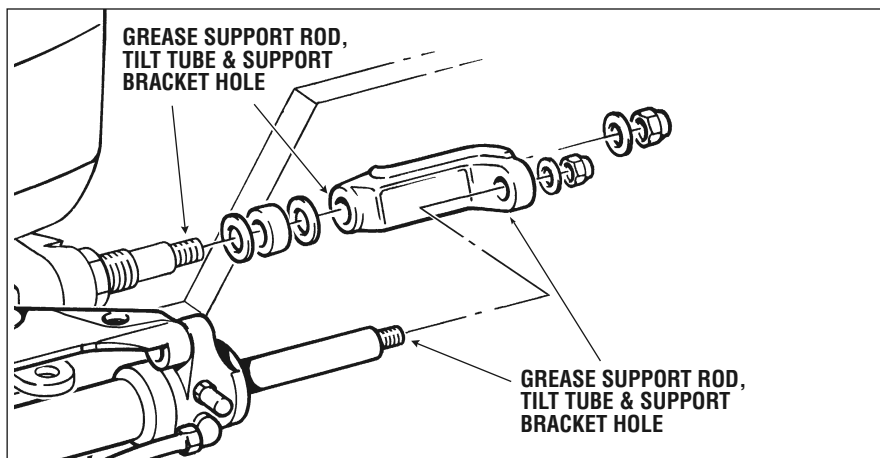


Figure 37.

TROUBLESHOOTING GUIDE

If properly installed and maintained, your SeaStar Steering System will provide years of safe and reliable performance. Our systems have been designed with protection against over-pressure situations by a pressure relief valve. Most faults occur when installation instructions have not been followed and in most cases will present themselves immediately upon filling the system. Below are the most common faults and their likely cause and solution. Extreme caution must be exercised when diagnosing and correcting a fault. These troubleshooting guides may seem simple in text, however these MUST be completed by a qualified marine mechanic that has working knowledge of the steering system.

WARNING

SeaStar Solutions does NOT recommend disassembly of a helm pump, or, removing a steering cylinder rod/shaft at any time. Doing so may cause more damage, leading to irreparable damage and costly replacements.

FAULT	CAUSE	SOLUTION
1. During filling, helm becomes completely locked up.	<ul style="list-style-type: none"> Mechanical interference with other components. Blockage in the steering lines. Tilting mechanism not installed properly. Engine(s) are restricted. Power Assist H1, or H2 line crossed with R line. 	<ul style="list-style-type: none"> Check ALL areas for interference, correct as required. Remove all steering lines. Blow air through lines. Any line not allowing good air flow may should be replaced. Confirm tilt mechanism is installed correctly. Confirm that engines are able to be moved freely with cylinder not connected. Confirm system is plumbed correctly.
2. System is very difficult to fill, air keeps burping out top of helm, even after system appears full.	<ul style="list-style-type: none"> Air remaining in system. Bleed fitting leaking. Coiled hose. Reservoir/compensating lines not purged free of air. 	<ul style="list-style-type: none"> Bleed steering system again. Tighten bleeder, replace if leak continues. DO NOT cut hoses. Lessen coil, or, replace with shorter lines. Bleed air from reservoir/compensating lines.
3. Steering is hard to turn even when boat is not moving and engines are OFF.	<ul style="list-style-type: none"> Adjusting nut on support rod is over tightened. Restrictions on hoses (see Fault 1). Mechanical interference with other components (see Fault 1). Air in system (yes, air will lead to heavy steering). Incorrect fluid has been used to fill system. 	<ul style="list-style-type: none"> Nut should be hand-tight. See fault 1. See fault 1. Bleed Steering System. Drain and flush, fill and bleed with SeaStar fluid.

3. Continued.

Steering is hard to turn even when boat is not moving and engines are OFF.

- Damaged steering cylinder body.
- Too small of a steering hoses being used.
- Steering wheel is too small.
- Tilt bellows interference.
- Cylinder installation procedure not followed correctly.
- Cylinder mounting plate is too tight.
- Replace steering cylinder(s) completely.
- Remove and re-plumb system using SeaStar outboard hoses.
- Wheel should be 15" & larger (MAX 26").
- Confirm no interference with rubber tilt bellows on steering wheel hub.
- Remove cylinder, re-install as per the steps noted.
- With cylinder not connected, the plate must move UP/DOWN freely. Replace if hard to move.

4. One helm in system is very bumpy and requires too many turns.

- Air in system.
- Dirt/debris in system.
- Dirt/debris in autopilot (if fitted).
- Bleed system.
- Replace helm pump, flush system (DO NOT attempt repair of helm).
- Replace autopilot pump.