

MANUAL FILLING AND PURGING

NOTICE

Power Purge Users. Please refer to the instructions included with your power purge unit.

Read First

These instructions show how to fill and purge a Single Station Cylinder System.

NOTICE

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

Hydraulic Fluid

SeaStar Solutions recommends the use of **SeaStar Steering Fluid ONLY**. SeaStar Steering Systems have been engineered and validated using our proprietary SeaStar Hydraulic Fluid.

⚠ WARNING

Any non-approved fluid may cause serious damage to the steering system resulting in possible loss of steering, causing property damage, personal injury and/or death.

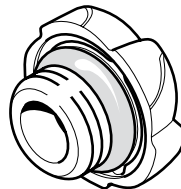
Emergency Use Fluids

In an emergency, SeaStar EPS Fluid, any MD-3/4 rated ATF or MIL-PRF-5606H equivalent fluid that is filtered through a fine mesh screen can be used. The system **MUST** be thoroughly flushed as soon as possible with genuine SeaStar Steering Fluid after using an emergency fluid. ***In an EXTREME emergency, any non-toxic, non-flammable fluid that is filtered through a fine mesh screen may provide temporary steering.***

⚠ WARNING

Never fill or mix brake fluids, triglycerides or polyalkylene glycols within a hydraulic steering system.

Vent Plug Part # HP6126 (5 per kit)



- Must be used with helm pump on all single steering station systems.
- Must be used on upper-most helm pump only on multi-steering station systems.
- Vent hole: actual size as shown.
- Colour: thread – silver / cap – black.

Figure 9.

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Hydraulic Fluid Requirements

2 bottles (2 quarts or litres) for single station and single cylinder systems.

1 additional bottle for each additional helm, cylinder, or auto pilot.

NOTICE

These instructions will result in hydraulic fluid flushed in and out of the system. Fluid can be re-used if filtered through a fine mesh screen such as used for gasoline. If unable to filter fluid, an additional bottle of fluid is required.

NOTICE

“Bleeder” refers to cylinders fitted with bleed tee fittings. If fitted with bleed tee fitting, open bleeder by unscrewing bleed nipple nut two turns.

⚠ CAUTION

Unbalanced Cylinders.

The fluid level in the helm must be set with the cylinder rod fully retracted. Failing to observe this caution will result in an fluid spill at the helm.

NOTICE

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

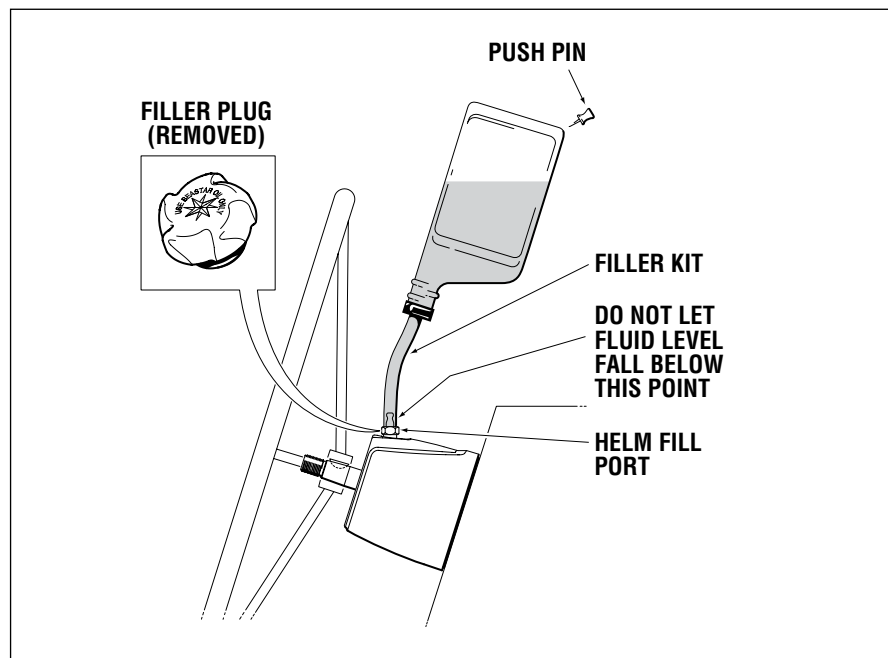


Figure 10.

Single Station One Cylinder

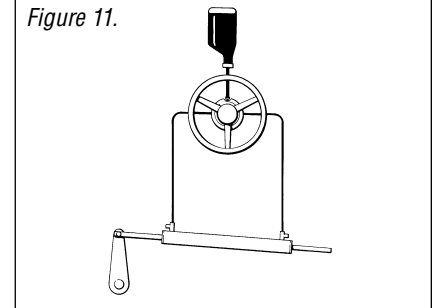
HYDRAULIC STEERING

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Step 1

- Screw the threaded end of the filler tube into the helm filler hole.
- Remove the cap from the fluid 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 fluid (fluid should always be visible in the filler tube). Use the next bottle at any time throughout the procedure when the fluid level drops in the filler tube. Do not proceed with step two until helm is full of fluid.

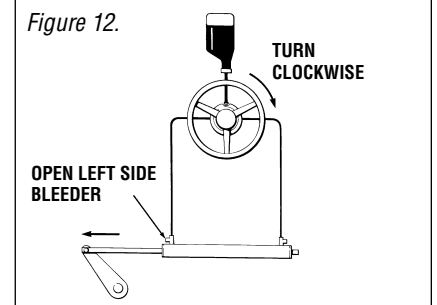
Figure 11.



Step 2

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

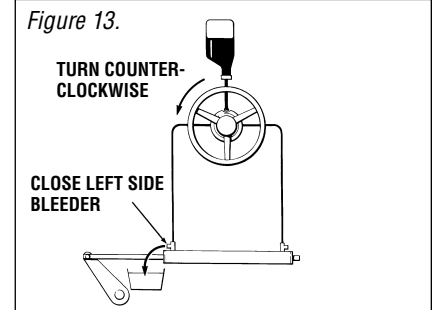
Figure 12.



Step 3

- Holding the cylinder rod (to prevent it from moving back into the cylinder) turn the steering wheel counter-clockwise until a steady stream of air free fluid comes out of the bleeder. (Drain out approx. 1/2 bottle of fluid or as required.)
- While continuing to turn the wheel, close the left side bleeder and let go of the cylinder rod.

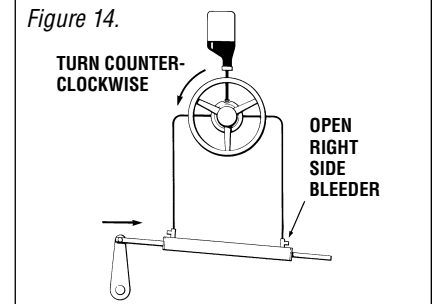
Figure 13.



Step 4

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

Figure 14.



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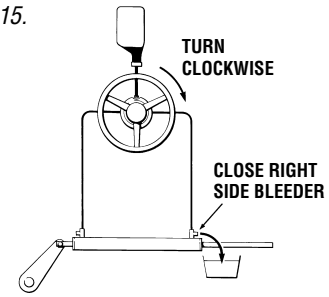
Step 5

- Holding the cylinder rod (to prevent it from moving back into the cylinder) turn the steering wheel clockwise until a steady stream of air free fluid comes out of bleeder.

- While continuing to turn the wheel, close the right side bleeder and let go of the cylinder rod.

Fill and purge is now complete.

Figure 15.



Fluid Level Set

- Proper fluid level set can be obtained by opening right bleeder and turning steering wheel to the right until fluid level reaches top of plastic filler fitting and then turning wheel one more full turn.

⚠ CAUTION

For unbalanced cylinders the fluid level in the helm must be set with the cylinder rod fully retracted. Failing to observe this caution will result in a fluid spill at the helm.

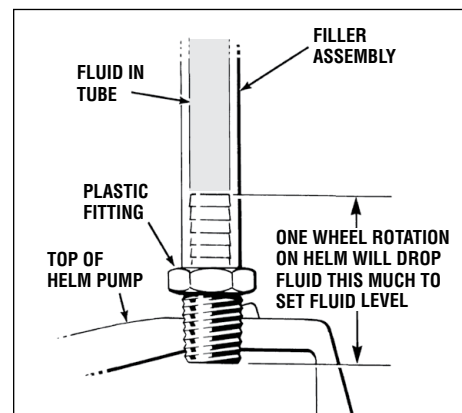


Figure 16.

FLUID LEVEL AND SYSTEM CHECK

STEP 1

WARNING

CAUTION

When setting fluid level in a system fitted with an un-balanced cylinder, the cylinder shaft **MUST** be fully retracted (IN). Failure to have cylinder shaft retracted (IN) will lead to very stiff steering and/or fluid spillage at the helm pump.

Fluid Level Setting

The fluid level **MUST** be checked and maintained **BEFORE** each use to ensure the safe operation of your steering system. Failure to adhere to this warning may lead to loss of steering control. Loss of steering control may result in unpredictable boat behavior, collision with an obstacle and/or ejection from vessel, leading to property damage personal injury and/or death.

- For helms mounted with the wheel shaft completely horizontal **MUST** be filled to the bottom of the filler hole **AT ALL TIMES**. DO NOT allow fluid level to drop more than 1/4" below the filler port threads.
- For helms mounted on a 20° angle, or, with wheel shaft in the vertical position the fluid level must be no lower than 1/2" below filler port threads and no higher than 1/8" below filler port threads.

STEP 2

WARNING

System Check

The System Check **MUST** be completed after installation. Doing so will ensure the safe operation of your steering system. Any fault (leaks or malfunction) will present itself during this check. Failure to adhere to this check may result in loss of steering control. Loss of steering control may lead to unpredictable boat behavior, leading to a collision with an obstacle and/or ejection from the boat, resulting in property damage personal injury and/or death.

- Turn steering wheel hard over to hard over to confirm unrestricted movement of steering components.

NOTICE

If equipped with a tilting helm, repeat this step in "EVERY" tilt position.

- Confirm that rudder(s) and outdrive(s) are turning to the proper direction.
- If no interference is noticed and rudder(s) and/or outdrive(s) are turning to the proper direction, go to next point
- Take steering wheel hard over to starboard. Once the wheel reaches its stop point, force the wheel another 1/4 – 1/2 turn past stop. Leave wheel in this position while you inspect ALL fittings, helms and hose/tubes for any signs of a leak.
- Repeat above step to the starboard side of each steering station
- Repeat above steps to the port side of each steering station.
- If ANY leaks are noticed they **MUST** be repaired **BEFORE** operating your boat.

WARNING

Failure to correct **ANY** problem that becomes present during the "System Check" may lead to loss of steering control. Loss of steering control can lead to unpredictable boat behavior and/or collision with obstacle and/or ejection from vessel resulting in property and/or personal injury or death.

ROUTINE MAINTENANCE

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

NOTICE

Maintenance requirements will vary depending on usage and climate. Bi-Annual inspection by a qualified marine mechanic is required.

1. Every Trip, prior to engine start up or launch

- Check Fluid level in uppermost helm pump .
- Hose/Tube. Ensure hose/tubing are in good condition and free of wear, kinks or any other signs of fatigue or damage.
*REPLACE IF DEEMED FAULTY.
- Turn steering wheel hard over to hard over to ensure rudder(s) and/or outdrive(s) are responding to input at the wheel.
Repeat on ALL steering stations on board (including autopilots).

2. Every 100 hours or 3 months (whichever comes first)

- All points noted in 1.
- Check torque value on ALL fasteners throughout the steering system. Tighten as required. See page 21 for torque specifications.

3. Every 6 months

- All points noted in Steps 1 and 2.
- Grease rod end ball joints (inboard ATM and TM cylinders).
- Remove and clean support/cable tube (Sterndrive models).
- Remove steering wheel and re-grease wheel shaft.

WARNING

Failure to adhere to the “Routine Maintenance” procedures noted above may lead to loss of steering control. Loss of steering control may lead to unpredictable boat behavior and/or a collision with an obstacle and/or ejection from boat resulting in property damage, personal injury and/or death.

TROUBLESHOOTING GUIDE

BayStar hydraulic steering will provide years of safe reliable performance with a minimum of service if properly installed with correct cylinder. BayStar steering systems have been designed with protection against over-pressure situations, by a pressure relief valve, to minimize the possibility of total loss of steering.

Most faults occur when the installation instructions are not followed and usually show up immediately upon filling the system. Provided below, are the most common faults encountered and their likely cause and solution. The term “Rudder” also applies to stern drives, when applicable.

Sometimes when returning the wheel from a hardover position, a slight resistance may be felt and a clicking noise may be heard. This should not be mistaken as a fault, as it is a completely normal situation caused by the releasing of the lockspool in the system.

WARNING

Whenever in the following text, a solution calls for removal from vessel and/or dismantling of steering system components, such work must only be carried out by a qualified marine hydraulic mechanic. SeaStar Solutions offers the following as a guide only and is not responsible for any consequences resulting from incorrect dismantling repairs.

FAULT	CAUSE	SOLUTION
1. During Filling, the helm becomes completely jammed.	<ul style="list-style-type: none">• Blockage in the line between the helm(s) and the cylinder(s).	<ul style="list-style-type: none">• Make certain that tubing has not collapsed during installation. If so, the collapsed section must be removed and re-fitted with a new piece with the aid of tube connectors. Check fittings for incomplete holes. Fittings with incomplete holes, however, are not common.
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">• Cylinder(s) has been mounted upside down. This causes air to be trapped in the cylinder(s).• Air in system.	<ul style="list-style-type: none">• Mount cylinder(s) correctly, according to cylinder installation instruction. Ports should always be kept in uppermost position.• Review filling instructions.
3. Steering is stiff and hard to turn, even when the vessel is not moving.	<ul style="list-style-type: none">• Rudder post glands are too tight or rudder post is bent, causing mechanical binding. The same applies to tiller arm and linkage on outdrives.	<ul style="list-style-type: none">• To test, disconnect cylinder(s) from the tiller arm and turn the steering wheel. If it turns easily, correct above mentioned problems. Please note that excessively loose connections to tiller arm or tie-bar can also cause mechanical binding.

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TROUBLESHOOTING

FAULT

CAUSE

SOLUTION

3. Continued

Steering is stiff and hard to turn, even when the vessel is not moving.

- Restrictions in hose, copper tubing, piping or fittings.
- Air in fluid.
- Wrong fluid has been used to fill steering system, like A.T.F. (automatic transmission fluid, or any other fluid with a high viscosity factor).

- Find restriction and correct.
Note: Collapsing of copper tubing during bending is enough to cause restrictions.
- See filling instructions supplied with helm units.
- Drain system and fill with recommended fluids.

4. Helm unit in system is very bumpy and requires too many turns from hardover to hardover.

- Dirt in inlet check of helm pump.

- Contact Authorized repair center and/or replace helm pump.

5. Steering is easy to turn at the dock, but becomes hard to turn when vessel is underway.

- Steering wheel is too small.
- cylinder(s) too small.
- incorrect setting of trim tab(s) on stern drive.
- incorrectly designed or adjusted rudders, causing binding on rudder post and/or tie bar at cruising speeds.

- Fit larger wheel if possible, see installation instructions. If the problem cannot be rectified by the above mentioned solution, proceed with next cause and solution or consult factory.
- replace with larger cylinder(s).
- adjust tab(s).
- seek professional help. Have competent, qualified marine mechanic correct problem.

6. Rudder drifts to port or starboard while vessel is underway, even when wheel is not being turned.

- Dirt in check valves.

- Contact authorized repair center and/or replace helm pump.

7. Consistent wearing of rod end ball and or mounting foot.

- Excess vibration at rudder.

- Consult with boat builder and/or Naval architect for vibration cure.