Bleeding of Seastar outboard hydraulic steering systems

**Set-up a gravity feed steering fluid fill bottle**

Cut the bottom off an empty SeaStar steering fluid bottle. Securely mount (or hang) the bottle upside down above the highest helm on the boat. Remove the plug from the top of the helm pump and connect the bottle to the fitting with a clear hose and appropriate fitting adapters. Fill the bottle with steering fluid to within a couple of inches of the top. Make sure you can visually see and easily check the fluid level in the bottle and in the clear tube going down to the helm pump.

**Important:** During this entire bleed procedure never allow the helm fill bottle to run out of steering fluid. Have plenty of extra fluid handy and be prepared to top the bottle off frequently. If it ever runs out of fluid during the job the entire bleed process must be started over from the beginning.

**Bypass the cylinder, bleed the helm, lines and pilot pump**

Disconnect the two hydraulic hoses from the engine steering cylinder. Connect the two hoses to each other using a brass 3/8" compression union fitting (Ace hardware #4337366 or equiv). On multi-engine boats remove and connect hoses from the steering cylinder that is furthest from the helm pump first (we'll call this engine #1).

Turn the helm pump (steering wheel) in one direction only at least 30-40 turns (even more turns on boats with long hose runs). This will circulate all the fluid in the lines back to the helm pump where the air bubbles will escape out the clear fill tube and up into the fluid bottle. Keep turning the wheel in the same direction until all traces of air (bubbles and foam) are purged. Top off the fill bottle as necessary. Now reverse the wheel direction and rotate it the same amount of turns in the opposite direction to evacuate any remaining air that may have been trapped somewhere in the system and was not removed during the initial wheel spin.

**If this is a single helm, single engine boat without an auto pilot pump** you are finished bleeding the helm pump and lines. Reconnect the two hoses to the steering cylinder on the engine and move on to the **Bleed the steering cylinders instructions** on page 2.

**If this is a single helm, multi-engine boat without an auto pilot pump** you are finished bleeding the lines for engine #1. Reconnect the two hoses to the steering cylinder on engine #1 and then repeat the above process for engine #2 and so on until all engines are done. When you have finished all engines and all hoses are reattached to their respective cylinders move on to the **Bleed the steering cylinders** instructions on page 2.

**If the boat is equipped with more than one helm station and/or is equipped with an autopilot pump** perform the additional steps below before reattaching cylinder hoses and moving on to the cylinder bleeding process.

On boats with an autopilot it is recommended to run the pilot pump in order to clear out any bubbles caught in the pump and its lines. If the pilot pump is lower than your helm(s) purge it first then do the helms. Run the pilot pump for at least 30 to 45 seconds in one direction continuously then the opposite direction for an equal amount of time.

On multi-helm boats turn all the helms in the manner described above, 30 turns or more continuously in the same direction, then reversing direction for an equal number of turns, starting with the lowest helm first.

When all helms and the pilot pump have been purged reconnect the engine hoses to the cylinder on engine #1 and, if necessary, repeat the above described process for the other engines on multi engine
boats. When you have finished all engines and all hoses are reattached to their cylinders move on to the Bleed the steering cylinders instructions on page 2.

Note: During the line bleeding procedures outlined above try to turn the wheels or run the pilot pump only when a pair of engine steering cylinder hoses are connected together with the flare union.

Bleed the Engine Steering Cylinders

During the cylinder bleeding process remember to keep the fill bottle at the helm topped off so air is not allowed back into the system. Steering cylinders will be bled one at a time on multi-engine boats.

Attach clear vinyl hoses to the bleed fittings of the engine steering cylinder to be bled. Have the other ends of the hoses terminating into bottles or jars partially filled with fluid so that the ends of the hoses are submerged in the fluid. Make the hoses long enough so they don't get pulled out of the bottles when the engines are turned.

Slowly rotate the highest wheel to put the engine all the way over to the stops in a turn to Starboard. Secure the engine in that position so it can't move with either a rope or (better) a two piece 3/4” split steel shaft collar installed on the cylinder shaft next to the cylinder housing. Locate the bleed valve that is at the Port end of the steering cylinder and prepare to loosen it with a wrench. Have your helper slowly and continuously turn the wheel to Port while you partially open (crack) the Port cylinder bleed fitting. Allow fluid to flow from the bleed valve to the bottle as the wheel continues to be turned to Port. When the fluid flowing from the bleed valve appears to be free of bubbles or foam close the bleed valve. One side of the cylinder is now air free and your assistant can now stop turning the wheel. Recheck the fluid fill bottle at the helm for sufficient reserves of fluid.

To bleed the other side of the cylinder remove whatever method you were using to keep the motor from turning in the first step (rope, shaft collar). With the steering wheel put the engine all the way over to its stops in a turn to Port. Secure it in that new position so it can't move. Locate the bleed valve that is at the Starboard end of the steering cylinder and prepare to loosen it with a wrench. Have your helper slowly and continuously turn the wheel to Starboard while you partially open (crack) the Starboard cylinder bleed fitting. Allow fluid to flow from the bleed valve to the bottle as the wheel continues to be turned to Starboard. When the fluid flowing from the bleed valve appears to be free of bubbles or foam close the bleed valve.

If this is the only steering cylinder you need to bleed or if it is the last cylinder you need to bleed you might take this opportunity to empty the contents of the fill bottle by pumping its remaining fluid through the system and into your bleed jar. Just continue turning the wheel to Starboard with the bleed valve open until the excess fluid in the helm bottle and fill tube has drained down into the helm. Close the Starboard bleed valve and stop turning the wheel immediately upon seeing that the bottle and tube have emptied so as to not create an air pocket in the helm pump.

Your steering system is now bled and problems associated with air trapped in the lines, pumps and cylinders should be solved.

Carefully remove the empty fill bottle from the helm pump. Have a rag handy to mop up spills. Re-install the helm plug, the helm should have a vented style plug.