MERCURY Racing **Service Bulletin**

☐ Warranty Information ☑ Service Information Sterndrive No. 2003-01

☐ Parts Information OEM No. 2003-01

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Bleeding Air from Integrated Transom System (ITS) Power Steering & Availability of Bleeder Valve Kit 891589A01.

Models Affected

While this procedure is specifically designed for power steering systems with 525 EFI engines, it can be used on any ITS application.

Situation

When a boat builder rigs a boat with a fully hydraulic steering system, two hydraulic lines (supply and return) run from the power steering pump to the helm. Two lines (port and starboard) then run from the helm to the drives(s). These lines are full of air unless pre–filled prior to engine installation.

When the engine is started for the first time, it runs at cold start (1500 to 1800 RPM). The power steering fluid can be pumped into the empty lines faster than the reservoir is refilled. This causes air to be pumped into the system. Once air is mixed with oil in the system, it is difficult to remove.

Air in this system can cause cavitation in the power steering pump. Other components may also become unbalanced as a result of excess air in the lines. These factors may adversely affect handling and performance. This air must be bled from the system, restoring normal operating conditions.

Some power steering systems have bleeder valves installed in the adapter block mounted on the inner transom plate. The procedure in this bulletin is designed for systems that have these valves.

A special kit (891589A01) is available that comes with two bleeder valves and other components for systems that do not have bleeder valves installed on the adapter block. The kit also has specific instructions for bleeding. At the end of the process, the power steering system is converted to one that has bleeder valves installed in the adapter block.

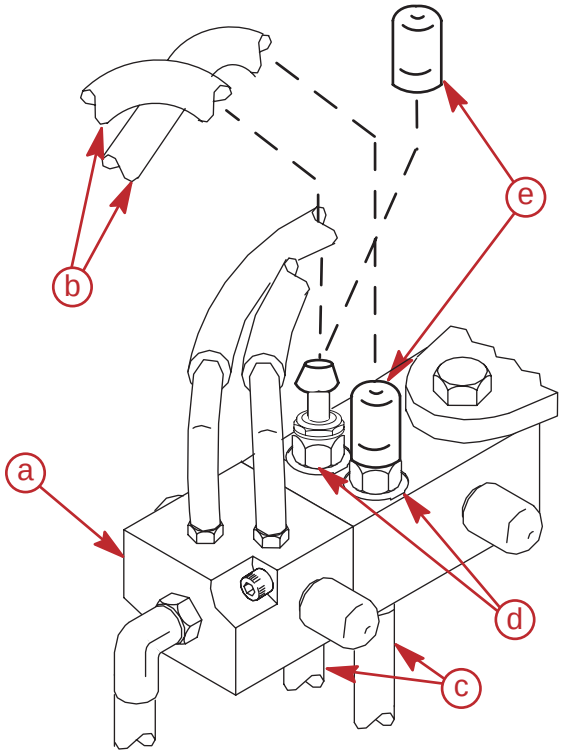
The instructions found in this bulletin and the kit address three possible configurations described in the following table.

1 Engine	1 Pump	1 Reservoir (Traditional configurations)
2 Engines	1 Pump	1 Reservoir (Systems with pump on one engine)
2 Engines (or more)	2 Pumps	3 Reservices (Systems with common reservoir)

Procedure for Bleeding Air from Hydraulic Power Steering System

The following procedure represents the steps by which air can be bled from the system. Two lengths of temporary tubing are needed. Perform this operation with the engine(s) and steering system installed.

1. Remove the protective covers from the bleeder valves.
2. Secure temporary tubing on each bleeder valve long enough to reach the resevoir(s).



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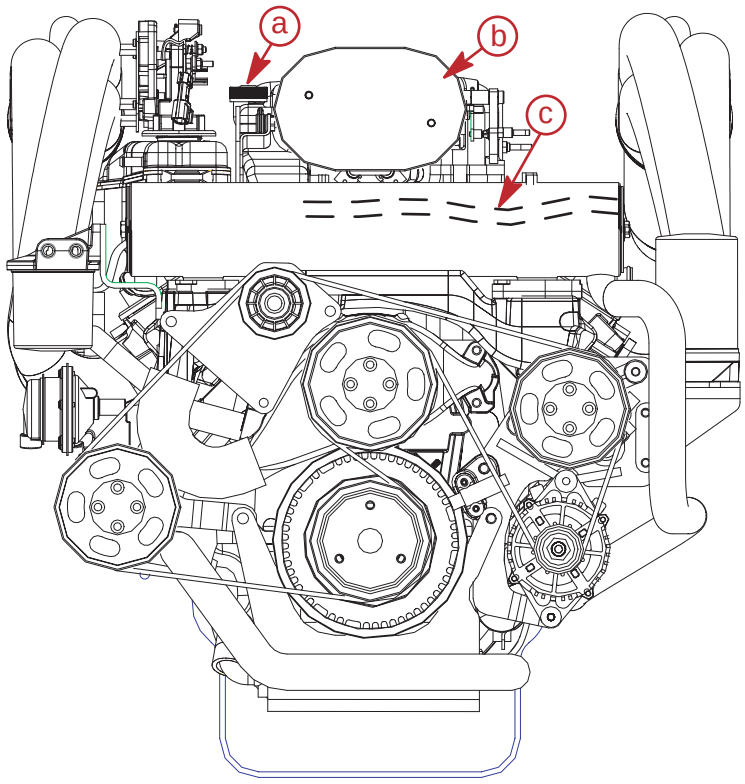
a - Adapter block
b - Temporary tubing
c - Lines to drive
d - Bleeder valve assemblies (X2)
e - Protective covers (X2)

3. Open each bleeder valve approximately 1/2 turn, counter–clockwise.
4. If this is a single pump application, go to step 9. If this is dual pump application with a common reservoir, go to the next step.
5. Remove the cap to the common reservoir and fill to near the top.
6. Insert a funnel into the mouth of the reservoir.
7. Place shop towels around the mouth of each reservoir to absorb any spillage.
8. One at a time, vent the engine power steering reservoirs until they are full. When fluid is observed coming out of the vented caps, seal the vents. Add fluid to the common reservoir as needed and go to step number 13.
9. Remove the cover to the power steering reservoir and place to the side.
10. Insert a funnel into the mouth of the reservoir.

11. Run temporary tubing from the bleeder valves over to the funnel. (See Single Pump System Schematic or Dual Pump Schematic as appropriate.)
12. Place shop towels around the mouth of the reservoir to absorb any spillage.
13. Locate the return line that runs between the H block and the power steering cooler. On 525 EFI engines, it can be easily accessed near the port side of the flame arrestor. Approximately six inches from the flame arrestor, place a hose–clamp pliers on this line. (Snap–On P/N PHP1, YA965 or equivalent) This allows fluid to be drawn through the pump by the helm. If this is a dual pump system, place two hose–clamp pliers as shown in Dual Pump Schematic.



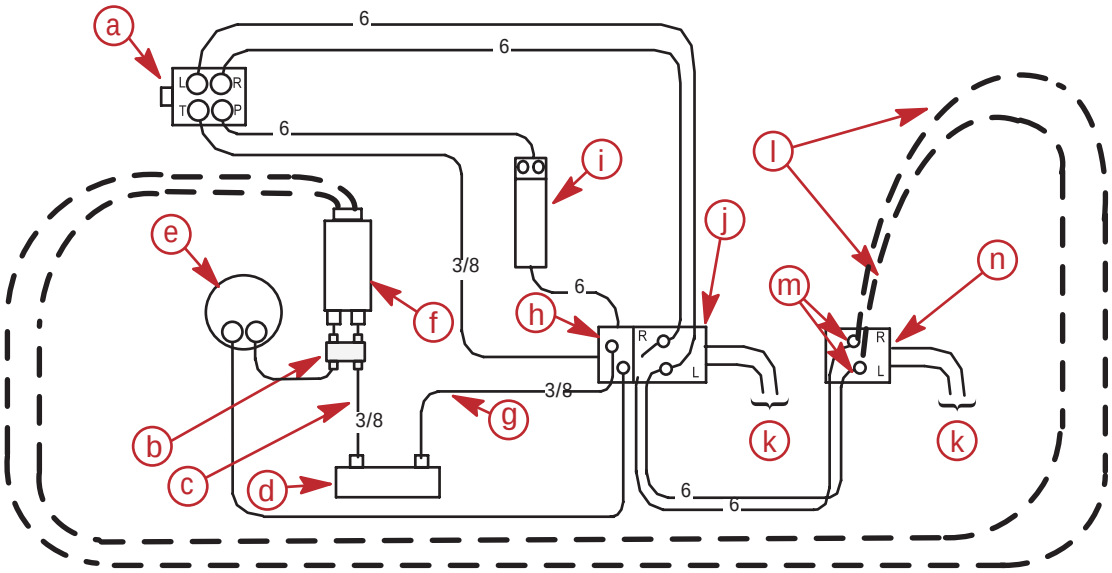
a - Reservoir
b - Flame arrestor
c - Return line to pump

NOTE: *Some 525 EFI engines and all other power packages, are not equipped with H block. On these systems, assure that the return line to the pump is clamped at some point in the circuit.*

IMPORTANT: Do NOT allow the fluid level to drop too low in the reservoir. It is critical that air not be introduced into the system through the reservoir during this process.

14. Turn the helm steadily to port until a steady stream of fluid can be observed running into the funnel. This could require as many as twenty–five to forty helm revolutions, depending on the helm used and number of pumps. As air in the lines is displaced by hydraulic fluid, the helm will become increasingly more difficult to turn. The helm may not completely come to a stop. Add fluid as needed to maintain proper level in the reservoir.

15. Remove the hose–clamp pliers. This allows the return line(s) to be fully bled.



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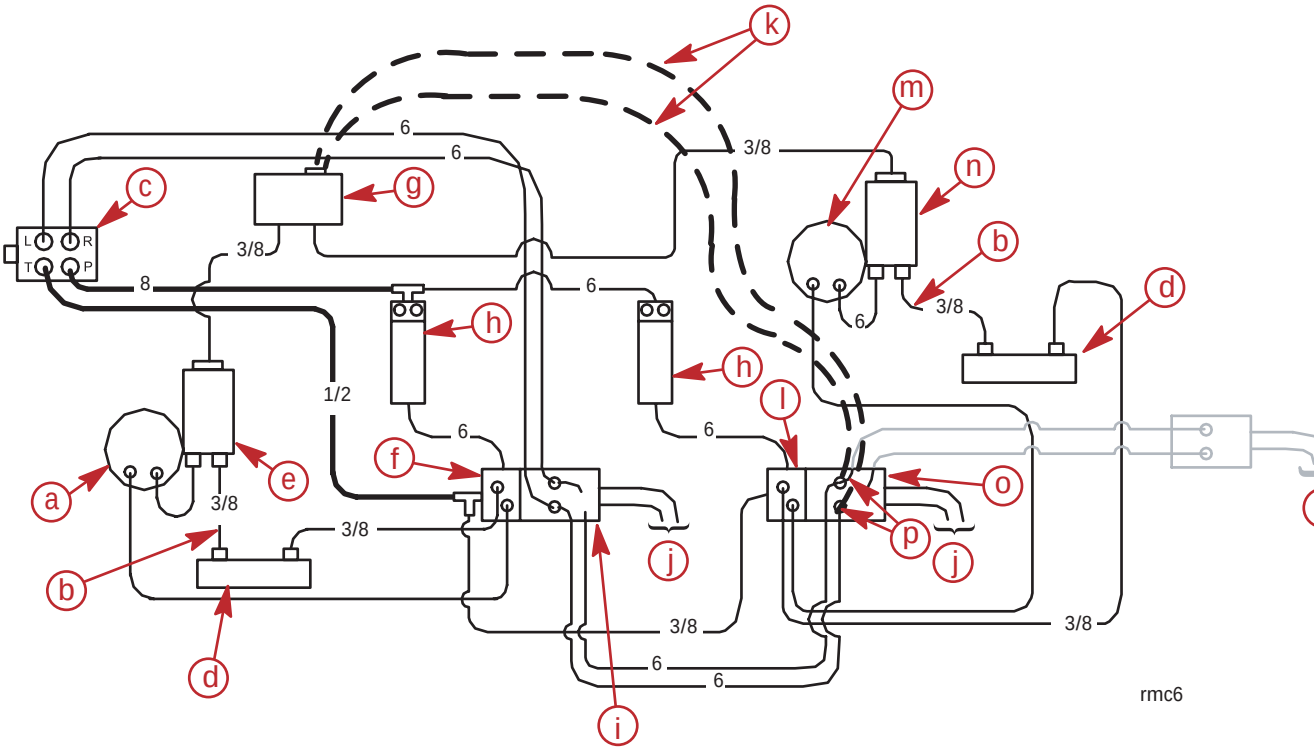
Single Pump System Schematic

- **a -** Helm steering pump
- **b -** H block
- **c -** Location of hose–clamp pliers
- **d -** Power steering cooler
- **e -** Power steering pump
- **f -** Power steering reservoir
- **g -** Return line
- **h -** Pump adapter block
- **i -** Filter
- **j -** Adapter block (located on the inner transom plate)
- **k -** Lines to the drive (from R&L ports at the adapter block)
- **l -** Temporary bleeder lines
- **m -** Bleeder valve fittings
- **n -** Pump adapter block for 2nd drive

16. Turn the helm steadily to starboard until a steady stream of fluid can be observed running into the funnel. This should require relatively fewer helm revolutions than that required by the port movement. Add fluid as needed to maintain proper level in the reservoir.
17. While maintaining pump reservoir fluid level, turn the helm four to six times (or until helm refuses further movement) in each direction until a steady stream of fluid can be observed entering the funnel.

18. If this is a single pump application, go to the next step. If this is dual pump application with a common reservoir, go to step 22.



Dual Pump System Schematic

- **a -** Port power steering pump
- **b -** Location of hose–clamp pliers
- **c -** Helm steering pump
- **d -** Port power steering cooler
- **e -** Port power steering reservoir
- **f -** Port adapter block
- **g -** Common reservoir
- **h -** Port filter
- **i -** Port pump adapter block
- **j -** Lines to the drive (from R&L ports at the adapter blocks)
- **k -** Temporary bleeder lines
- **l -** Starboard pump adapter block
- **m -** Starboard power steering pump
- **n -** Starboard power steering reservoir
- **o -** Starboard pump adapter block
- **p -** Bleeder valve fittings

19. Start the engine and wait for normal idle of 750 RPM. Do NOT move the helm until the engine falls to normal idle.
20. While maintaining pump reservoir fluid level, turn the helm four to six times (or until helm refuses further movement) in each direction until a steady stream of fluid can be observed entering the funnel.
21. Go to step 26.
22. Start and idle each engine separately for approximately two minutes. Run only one engine at a time.
23. Start both engines and wait for normal idle of 750 RPM. Do NOT move the helm until the engine falls to normal idle.

24. While maintaining pump reservoir fluid level, turn the helm three to six revolutions in each direction or until the helm nearly refuses further movement.
25. Repeat the previous step until little or no air is being passed through the tubing.
26. Stop the engine(s). At this point in the process, the fluid in the reservoir should have little or no foam.

IMPORTANT: If large amounts of foam can be seen in the fluid, do not continue to the next step. The bleeding process will need to be repeated. Allow air to separate from the fluid over a period of at least sixty minutes and start this process again at step number 13.

27. Close bleeder valves by turning clockwise until tight.
28. Remove and discard temporary tubing.
29. Place the cover back onto the reservoir and remove shop towels.
30. Place the two protective caps over the bleeder valves.
31. Start the engine(s) and check for leaks.