DOMETIC

HYDRAULIC STEERING SYSTEMS

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Dometic Hydraulic Steering Systems

Troubleshooting Guide

⚠ WARNING

Cancer and Reproductive Harm
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[**REVISION B**] Form No. SL61501 |

Thank you for choosing Dometic Hydraulic Steering. You have chosen a state of the art steering system that will provide years of effortless and trouble free steering performance.

About this Book

This book contains:

- the troubleshooting information for Dometic hydraulic steering systems.

All information, illustrations and specifications in this manual are based on the latest information available at the time of publishing. The illustrations used in this manual are intended as representative reference views only. Moreover, because of our continuous product improvement policy, we may modify information, illustrations and/or specifications to explain and/or exemplify a product, service or maintenance improvement. We reserve the right to make any change at any time without notice.

California
Proposition 65 Warning

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

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1 Important safety information

This troubleshooting guide is written using years of experience troubleshooting the most common problems associated with our steering systems. Most faults are directly related to installation and operating manual(s) not being followed or incorrect parts being used.

The purpose of this troubleshooting guide is to systematically work your way through the system, centering in on the most likely problem.

When you find a fault, it is good practice to determine “how” the fault was created and “what” can be done to prevent this in the future.

Please carefully read and follow all instructions, guidelines and warnings included in this product manual in order to ensure that you install, use and maintain the product properly at all times. By using the product, you hereby confirm that you have read this disclaimer, all instructions, guidelines and warnings carefully and that you understand and agree to abide by the terms and conditions as set forth herein. You agree to use this product only for the intended purpose and application and in accordance with the instructions, guidelines and warnings as set forth in this product manual as well as in accordance with all applicable laws and regulations.

A failure to read and follow the instructions and warnings set forth herein may result in an injury to yourself and others, damage to your product or damage to other property in the vicinity. Dometic accepts no liability for any loss, damage or injury incurred, directly or indirectly, from the installation, use or maintenance of the product not in compliance with the instructions and warnings in the product manual.

This troubleshooting guide, including the instructions, guidelines and warning, and related documentation may be subject to changes and updates. For up-to-date product information, please visit: https://documents.dometic.com and https://www.dometic.com

1.1 Explanation of symbols

The symbols below are used throughout this publication to alert you to potential hazards involved with the operation and installation of this product. Observe these warnings and notices carefully. The safety alerts alone cannot eliminate hazards; strict compliance with any special instructions during installation, operation, and maintenance, along with common sense operation, are important measures to prevent hazardous situations.

DANGER!
Safety instruction: Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING!
Safety instruction: Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION!
Safety instruction: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE!
Indicates a situation that, if not avoided, can result in property damage.

NOTE
Supplementary information for operating the product.

1.2 Safety considerations and safe operation

WARNING!
The safety information provided throughout this publication is intended to inform you of the dangers that may be present during installation and use. It is critical that you read and understand all the points noted.

If you have any questions regarding any of these warnings, contact Dometic.

Before installation

The safe operation of the steering system is dependent upon proper installation & maintenance, common sense, safe judgment and the knowledge/expertise of the operator. Every installer/user should know the following requirements before installing/using the steering system.

1. Read and understand the installation and operating manual provided with your motor, steering system, and associated components.
2. Ensure that all components required to complete the installation are on hand.
3. Dometic components are highly engineered and safety tested to ensure system integrity; do not substitute any component with non-Dometic components as this may compromise system performance/reliability.

CAUTION!
Helms and cylinders that end with the suffix -3 use ORB fittings only. Do not use NPT fittings. Irreparable damage will occur.

During installation

1. Install components as directed in all Installation Instructions.
2. Do not modify or substitute any component in any way without written consent from Dometic.
3. Comply with all system ratings/regulations (boat/engine, U.S.C.G.).
   - cylinder must be compatible with engine(s) installed.
   - cylinder must be rated for use on the engine(s) installed.
4. Confirm that there is no interference between the steering cylinder(s), tiebars and the transom, splashwell, outboard engine(s) or jackplate or any combination of these parts by performing the following steps;
   a. With engine fully tilted down, turn steering wheel from hard over to hard over and confirm that no interference occurs.
      - If using a hydraulic jack plate the above must also be performed at all the positions of the jackplate.
   b. Repeat step 4a) with engine(s) tilted up.
   c. Perform step 4a) with each engine in down/up positions confirming that independent trim/tilt can be done without any interference.
5. Confirm that the steering cylinder(s) can be fully stroked in both directions as well as full tilt and trim without stretching, chafing, rubbing and/or kinking of the hydraulic hoses.

6. Outboard Systems: Confirm that extruded nylon tubing has not been substituted for SeaStar steering hose.
7. Do not use a wire coil type trim switch with a hydraulic steering system as the wire can wind up tight around the steering wheel shaft and prevent further steering.
8. Conduct oil level and system check as outlined in the component's installation manual.

NOTICE!
Do not operate boat if any component is not in proper working condition.

Prior to every use

1. Check fluid level in highest helm pump. (Refer to installation and operating manual for correct 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.

NOTICE!
Do not operate boat if any component is not in proper working condition.

During use

1. Rinse off steering system thoroughly using 'fresh, clean water only'.
   - Cleaning fluids containing ammonia, acids or any other corrosive ingredients must not be used for cleaning any part of the hydraulic steering system.

After use

1. Rinse off steering system thoroughly using 'fresh, clean water only'.
   - Cleaning fluids containing ammonia, acids or any other corrosive ingredients must not be used for cleaning any part of the hydraulic steering system.

Maintenance

1. Maintain steering system at a minimum of twice per year.
2. See maintenance section in the component's installation manual.

2 How to use this manual

Each fault will be labeled as a "Symptom" at the top of the page, followed by possible "Causes", and then followed by possible "Solutions".

- Symptom = Problem reported
- Causes = Most likely cause that can lead to the symptom
- Reasons/Solutions = Cures for the symptoms

In cases where there are multiple "causes" a series of checks and tests will be required. Go through these checks/tests in the order that they appear. Doing so will quickly narrow in on specific areas. Skipping steps will only lead to more time diagnosing the problem.

3 Common terms and definitions

Helm Pump – Located at all steering locations. The steering wheel is mounted to the helm pump.

Steering cylinder – Mounted to engine(s), rudder(s) and/or outdrive(s).

Manual System – Consists of helm(s), steering cylinder(s) and hoses only.

Power Assist – Electrically driven power pump plumbed into a manual system.

Balanced System – A steering cylinder that the piston rod goes in and out of both sides of the barrel.

Unbalanced System – A steering cylinder that the piston rod only goes in and out of one side of the barrel. NOTE: Cannot be used with a Pro helm.

Autopilot Pump (A/P Pump) – External pump plumbed into the steering system and used in conjunction with an autopilot controller.

4 Manual troubleshooting

4.1 Loss of fluid/fluid level not visible in helm pump

Causes

A. Leak in steering system.

B. Air remaining in system/system not properly bled originally/fluid level set too low.

Solutions

WARNING!
Repair all leaks prior to use.

A. Check all fitting connections, hoses and steering components for any signs of a leak. See system pressure test on page 18 to pinpoint source of leak.

B. Bleed system free of air. Reference "Checking for air in the steering system" on page 17. Fluid level is to be set be tween 1/4" – 1/2" below the filler port threads.

Refer to section 4.3 If having difficulty purging.

NOTICE!
When using an unbalanced cylinder the fluid level is to be set and inspected with the cylinder shaft fully "retracted". Failure to have cylinder rod fully retracted will result in fluid leakage at the helm filler port.

Root Causes

- Damage to a cylinder shaft (dings, dents, corrosion and/or scratches) will lead to the tearing of a seal resulting in a leak. Replace any damaged shaft and/or end gland.

NOTICE!
Replacement shafts are not available for purchase. Contact Authorized Service Center for repair, or, replace steering cylinder(s).

4.2 Helm locks up completely

Causes

A. PRO helm used with "unbalanced" steering cylinder.

B. Mechanical interference.

C. Restriction in hose/helm.

Solutions

A. A SeaStar PRO helm cannot be used with any unbalanced cylinder, this will result in the steering wheel locking up completely.

B. Mechanical interference (see checks below).

C. Restriction in steering lines or helm (see checks below).

Checks

Mechanical interference:

B-1. Using an assistant, turn steering wheel from hard-over to hard-over. Visually inspect steering cylinder(s) and engine(s) for any signs of interference with any other object. Check is to be completed throughout the trim/tilt positions of the engine(s), including jackplates.

This check should be done while underway as well.

B-2. Tilt Helm Installations

a. Confirm that the steering wheel hub is not interfering with the tilt cover. Correct as required.

b. Disassemble tilt covers and inspect tilt mechanism for any loose or separated components. Inspect socket head bolts holding the coupler together to make sure they are tight and not allowed to contact any other parts of the steering assembly. Correct as required.

Hose/Helm Restrictions:

a. Mark and remove hoses from steering cylinder.

b. Place hoses in a catch can.

c. While filling helm with fluid, turn 1 turn to port, then 2 turns to starboard.

- If the steering wheel cannot be turned in one direction, swap steering lines at rear of the helm pump and repeat above.
- If the problem moves to the other side, replace that side steering line.
- If the problem persists, replace helm pump.

CAUTION!
Any interference must be corrected prior to use.

4.3 Difficulty purging the air from the system

Causes

A. Incorrect bleeding procedure being followed.

B. Looping of steering hoses.

C. System plumbed incorrectly.

D. Cylinder prevented from hitting hard-over.

E. Clogged filter(s) in power purge unit (dealer/builder tool).

Solutions

A. Refer to installation and operating manual and/or web site for proper bleeding procedures. Use only Dometic printed or video instructions.

B. Steering hoses MUST be installed with a gradual rise with no loops. If installation has several loops, re-route or replace hoses with shorter lengths. Lay loops flat on deck until purging has been completed.

C. Refer to your Installation Manual to confirm system is plumbed properly.

D. Steering cylinder MUST hit hard-over.

E. Remove power pump from power purge unit. Clean screen filters located on pump pick up tubes (inside the reservoir).

Dometic recommends the use of Power Purge service kit part # HP6125 for this procedure.

Root Causes

A. There are several variations (catamarans) as well as additions (autopilots and power assist pumps). Each system may have a unique step added for bleeding the air out of the system

B. Hoses are too long.

C. Plumbing schematics not followed correctly.

D. Mechanical restriction preventing steering cylinder from reaching hard-over.

E. Contaminated fluid in power purge reservoir. Refer to power purge flushing details.

NOTICE!
In multiple stations, autopilots and power assist applications there MUST be a compensating line installed.

4.4 Steering wheel(s) are hard to turn at dock

Causes

A. Mechanical interference.

B. Cylinder Adjusting nut over-tightened.

C. Restriction in steering hoses.

D. Wrong fluid being used to fill system.

E. Cylinder not installed correctly, or, incorrect cylinder used for the application.

F. Steering wheel is too small for use, ensure engine moves freely.

G. Length of hoses or the use of tubing.

H. The way the system is plumbed.

Solutions

A. Check for mechanical interferences. See section 4.2.

B. Loosen cylinder adjusting nut confirm heavy steering is still present.

C See section 4.2 (C) "Restriction in hose".

D. Use of any other fluid may lead to heavier steering. Use SeaStar steering fluid only.

E. Consult with Installation and Operating Manual confirming that the cylinder is the correct one for the application and is installed correctly.

F. Disconnect steering cylinder from engine, then, using your hands push engine back and fourth. You should "easily" be able to swing the engine throughout its turning arc. If engine is NOT easy to turn throughout the turning arc, locate the restriction and correct.

G. If using tubing try SeaStar hoses. The length of hoses can result in harder steering.

H. Check to see if your system is plumbed in series or parallel.

Checks

- Disconnect steering cylinder from engine. If wheel becomes easy to turn, check the engine for restriction.

4.5 Steering wheel(s) are hard to turn while underway (easy at dock)

NOTICE!
All outboard engines create propeller torque that want to turn the engine, making it easy to turn the wheel 1-direction (typically starboard), and hard to turn the other (typically port). Each engine/boat combination will have different effort. The following causes and solutions can reduce this effort.

Causes

A. Torque tab not adjusted properly.

B. Engine not being trimmed properly when underway, or engine mounted too low.

C. Excessive steering loads from prop(s).
NOTE: the use of chopper and cleaver props are not advised.

D. Steering system is not adequately sized for boat/user performance.

Solutions

A. Check different settings with the torque tab to narrow in on the boat's "sweet spot".
If after trying all possible positions the steering is still heavy one direction it is recommended that a "Torque Tamer" is installed.

B. Confirm that the engine is being trimmed properly, and that the cavitation plate is set correctly for the hull.

C. See Solution B.

D. Reduce steering effort by increasing your mechanical advantage (add more wheel turns) by
- decreasing your helm displacement
- adding additional steering cylinder (if possible)
- installing a SeaStar power assist for fingertip steering
- install larger steering wheel.

4.6 Steering wheel(s) freewheel(s) to one/both direction(s)

Causes

A. Air in the system (most common cause). Refer to the "quick reference turns" tables on page 17 and page 18 to confirm lock to lock turns.

B. Dirt or debris in helm pump valves.

C. Internal bypass in steering cylinder and/or autopilot pump.

Solutions

A. Confirm that system is full of fluid and bled free of air. Refer to installation and operating manual for filling and purging procedures.

B. Check fluid condition for signs of milky, dirty or contaminated fluid. Flush system as noted on page 21.

C. Conduct the cylinder/helm pump test on page 20.

CAUTION!
A system that is not responding must be diagnosed and corrected prior to use.

WARNING!
Dometic does not recommend the disassembly of any helm pump. Contact an Authorized Service Center, or, replace helm pump.

NOTICE!
On multiple helm applications, there is a possibility to enter a slow freewheel situation if 1–helm is turned 1–direction and then the opposite helm is slowly turned the opposite direction. This is normal and can be stopped by performing a quick, partial turn of the wheel to fully close a hydraulic valve.

4.7 Steering wheel(s) are bumpy when turning either direction

Causes

A. Air in the system (most common cause).

B. Incorrect steering cylinder installed.

C. Faulty tilt mechanism.

D. Faulty check valves in helm pump.

E. Timing issue with helm pump.

Solutions

A. Confirm system has been bled free of all air. Refer to installation and operating manual for filling and purging procedures.

B. Consult with selection guide and/or website to ensure proper cylinder has been installed.

C. Check following:

a. Confirm tilt mechanism has been installed correctly.

b. Check all possible tilt settings.

NOTICE!

If the problem goes away in other tilt settings, replace tilt mechanism.

D. Replace and/or repair helm pump.

E. Replace and/or repair helm pump.

NOTE: A timing issue within a helm pump is very rare. Most timing related problems are felt immediately after installation and purging.

WARNING!

Dometic does not recommend the disassembly of any helm pump. Contact an authorized service center, or, replace helm pump.

4.8 Boat drifts to one side or the other while underway

Causes

A. Air in the system (most common cause).

B. Dirt or debris in helm pump valves.

C. Internal bypass in steering cylinder and/or autopilot pump.

Solutions

A. Confirm that system is full of fluid and bled free of air. Refer to installation and operating manual for filling and purging procedures.

B. Check fluid condition for signs of milky, dirty or contaminated fluid. Flush system as noted on page 17.

C. Conduct the cylinder/helm pump test on page 20.

CAUTION!
A system that is not responding must be diagnosed and corrected prior to use.

WARNING!
Dometic does not recommend the disassembly of any helm pump. Contact an Authorized Service Center, or, replace helm pump.

NOTICE!
On multiple helm applications, there is a possibility to enter a slow freewheel situation if 1–helm is turned 1–direction and then the opposite helm is slowly turned the opposite direction. This is normal and can be stopped by performing a quick, partial turn of the wheel to fully close a hydraulic valve.

NOTICE!
If helm/cylinder pass the test and there is not autopilot on board the boat should be sea trialed while conducting the following test.

Test

If possible, carefully take boat into an area free from obstruction.

- Run boat straight and then put in neutral. Do not turn wheel.
- Using a felt marker, mark cylinder shafts on both ends at gland seals.
- Do not turn wheel, bring boat up to a safe speed to determine if boat veers off course.
- Shut down engine.

If the marks that you made did NOT move, this is a sign that the steering system is holding course. In this case the steering system is not at fault. Boat balance and hull design should be looked into.

5 Power Assist system troubleshooting

5.1 Steering wheel(s) “lock up” to one or both directions

Causes

A. Mechanical interference.

B. Pro helm used with “unbalanced” cylinder.

C. Blockage or restriction in steering hoses between helm pump and power assist pump.

D. Power Assist spool valve stuck or seized.

E. See advisory notice on page 27 for power assist pumps.

Solutions

A. Mechanical interference. See 4.2.

B. A Pro helm cannot be used with an unbalanced cylinder. See section 4.2.

C. Mark and remove hoses from power assist pump. Pump 1/2 bottle of steering fluid through helm and out of the hoses. If the wheel locks up to one side only inspect the hose on that side of the system.

Status light on power assist is ON, electric motor does NOT run.

Causes

A. Fuse at battery or in rear of power assist blown.

B. Blown breaker.

C. Incorrect wiring to/from battery.

D. Low battery voltage.

E. Faulty electronics.

Solutions

A. Check fuse located at battery as well as fuses installed behind the rear cover of the power assist pump.

B. Check all breakers for proper working condition.

C. Check that all wiring is correct and in good working order (consult installation and operating manual).

D. Confirm all batteries are in good working order.

E. Test power assist voltage. Refer to page 29.

NOTICE!
The on status light on the power assist is triggered by the ignition lead. If the fuse at the battery or, the fuses in the rear of the power assist are blown, the status light will still be turned on or may turn to red. See how to test the power assist unit on page 29.

5.2 Power Assist motor runs but NO Power Assist

Causes

A. Air in system.

B. Faulty/damaged coupler.

Solutions

A. Bleed system as outlined in the power assist installation and operating manual.

B. Inspect coupler for wear and/or damage (see inspection details below).

Inspection

- Turn ignition OFF.
- Disconnect power assist from battery.
- Loosen and remove two 5/16" hex head screws from top of power assist motor.
- Lift motor straight UP. Hold top and bottom to ensure motor does not come apart.
- Inspect coupling that joins the motor to the valve body.
- Replace if worn and/or broken.

Item	Description
1	5/16" Hex Head Screw
2	Wire - Do not disconnect
3	0-Rings (x2) — Ensure O-rings are in place prior to installation
4	Valve Body
5	Coupling — Install smaller slot facing down towards the valve body. Larger slot up towards the motor

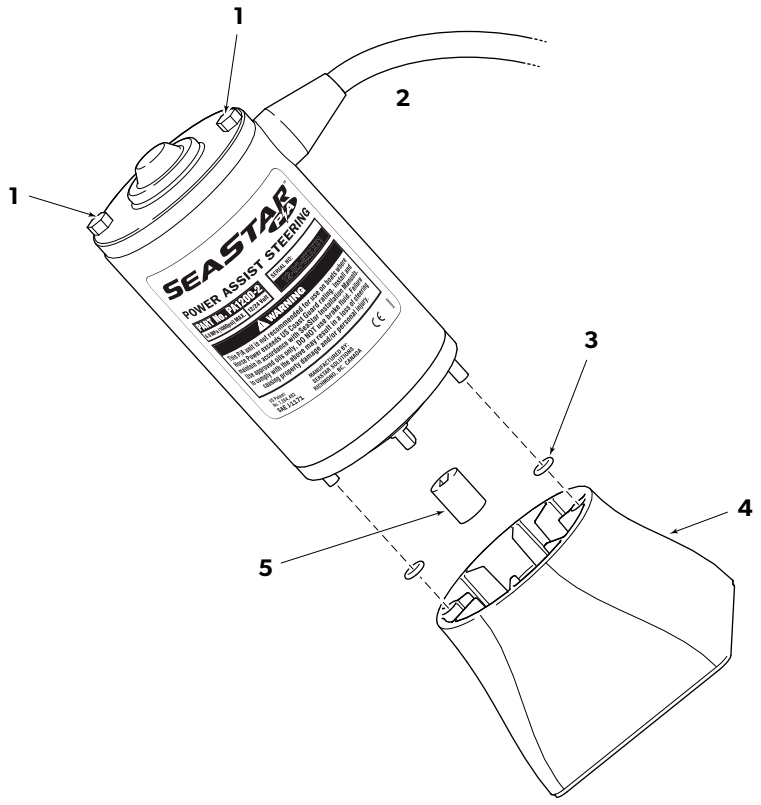

Figure 5-1.

5.3 Bumpy feeling at steering wheel(s) with Power Assist turned ON

Causes

A. Air in system.

$ Hoses between power assist and helm pump too short.

Solutions

A. Confirm that return line from power assist has been bled free of air. Refer to power assist installation and operating manual for proper filling and purging details.

B. Hoses installed between the helm pump and power assist should be at least 6 feet long.

NOTICE!
Above Causes and Solutions are under the assumption that the bumpy feeling only happens when the power assist is turned on. For bumpy feeling with the power assist on/off see section 4.7.

6 System checks

6.1 Checking for air in the steering system

Air in a steering system is the leading cause for faults. Air MUST be ruled out in most cases to prevent costly replacement of good parts.

There are several ways to check for air remaining in the steering system. Below are the quickest and easiest ways to determine if you have air in the system. Long hose runs can affect the outcome of the following tests.

Engine push test

- Center engine.
- Using your hands, push engine back and fourth.
- While pushing, watch the steering cylinder body move.

Results

- If the cylinder body moves more than 1/4" you have air remaining in the system and further bleeding is required.

Wheel turn test

- Note your helm pump and steering cylinder part number.
- Count your steering wheel(s) turns from hard-over to hard-over consult the "quick reference turns" tables below.

Results

Wheel turns should be very close to the wheel turn chart numbers. If you are well over these numbers, further bleeding is required.

If your wheel turns are at the correct number and the Engine push test results in 1/4" or less cylinder body movement, contact technical support for further testing.

		Good	Optimal
		BayStar Helm Disp. (In^3/Rev)	
Outboard cylinders	**Disp. (in^3)**	**1.1**	**1.4**
HC4645H/47H/48H/58H and -3 models	7.3	6.6	5.2
Inboard cylinders	**Disp. (in^3)**		
BA125-6.25	6.7	6.1	4.8
BA100-6	3.53	3.2	2.5

Table 6-1.

		Good		Optimal	
		SeaStar Helm Disp. (In³/Rev)			
Front Mount, Outboard Pivot cylinders* **	**Disp. (in³)**	**1.4**	**1.7**	**2.0**	**2.4**	**3.0**
Single	8.3	5.9	4.9	4.2	3.5	2.8
Dual**	16.6	11.9	9.8	8.3	6.9	5.5*
Triple**	24.9	17.8	14.6	12.5	10.4	8.3*
Quad**	33.3	23.7	19.5	16.6	13.8	11.1*

Table 6-2.

		Good		Optimal	
		SeaStar Helm Disp. (In³/Rev)			
Front Mount, Outboard Pivot cylinders* **	**Disp. (in³)**	**1.4**	**1.7**	**2.0**	**2.4**	**3.0**
BA125-7	7.2	5.1	4.2	3.6	3.0	2.4*
BA135-7	8.2	5.9	4.8	4.1	3.4	2.7*
BA150-7	10.2	7.3	6.0	5.1	4.3	3.4*
BA175-7	13.7	9.8	8.1	6.9	5.7	4.6*
BA150-9	13.1	9.4	7.7	6.6	5.5	4.4*
BA175-9	17.7	12.6	10.4	8.9	7.4	5.9*
BA200-7	18.9	13.5	11.1	9.5	7.9	6.3*
BA200-9	12.25	15.2	12.5	10.6	8.9	7.1*
BA200-11	29.7	21.2	17.5	14.9	12.4	9.9

Table 6-3.

* Any system using a helm greater than 2.4 in3/rev & power assist, requires dual SPA's in parallel.

** Displacement is total effective cylinder volume (assumes cylinders are plumbed in parallel not series).

*** Includes Tournament Series and -3 outboard cylinders.

6.2 System pressure test

The test noted below is to assist with locating a leak within the steering system, any leak that is found within the steering system MUST be corrected prior to use. Even the smallest leak may lead to loss of steering control.

- Clean and wipe dry ALL connections. Ensure helm is filled with steering fluid.
- Turn steering hard-over to the port side.
- After the wheel stops, force it 1 turn past the stop point. Leave wheel in this position for at least 5 minutes. Inspect ALL areas for signs of a leak. If leak is not visible feel for a leak. Any oily feel is a leak.
- Repeat turning hard-over in the starboard direction.

6.3 Cylinder/helm pump check

- Center engine
- Trim engine UP
- Turn steering wheel 1 turn to the starboard side
- Let go of wheel
- Let engine fall over to the side
- While the engine is falling, watch the steering wheel (place a piece of tape on the wheel)
- Repeat the above turning to the port side

Results

- If at any time the steering wheel turns “on its own” then the helm pump is at fault and will have to be replaced.
- If the engine falls to “one side only”, then the helm pump (or autopilot) is at fault.
- If the engine falls over all the way to one side only then further testing is required. See below for further testing. If engine falls over only partially then air is in the system.
- If the engine falls to both directions quickly, then the cylinder (or autopilot) is at fault and will need to be replaced. See further testing.
- Remove autopilot from the system and repeat the tests. If problem stops, replace autopilot. If problem continues replace helm/cylinder.

Further testing

- Assuming system is free of air remove hoses from fittings on the cylinder. Quickly cap off fittings on cylinder with p/n HF5524.
- Try and push engine from side to side in both directions.
- If you are able to push engine in one or both direction all the way the cylinder is at fault and must be repaired or replaced.
- If the cylinder “locks up” in both directions replace or repair the helm.

6.4 Helm/cylinder & power assist checks

1. **Verify if the steering system is sticky/inconsistent**
   - Perform test with the power assist unit turned off (Ignition turned off).
   - Turn steering wheel from hard over to hard over. While turning, feel for a smooth, responsive turn in both directions. If bumpy, sticking, or inconsistent in either direction or when reversing direction, you have verified that the system is sticky/inconsistent.

NOTICE!
A slight ticking sound from the helm is not to be confused with stickiness.

2. **Check the steering system for air**

NOTE
Both of the following tests are to be performed with the power assist unit turned off (ignition off).

   - Test #1: Manually push engines back and fourth by hand. While pushing, watch for movement of the steering cylinder body. Any movement that exceeds 1/4" on the steering cylinder is a sign that there is air in the steering system.
   - Test #2: Count steering wheel turns from hard over to hard over. If wheel turns exceed the number noted in the tables on page 17 and page 18 by more than 1/2 turn (with the power assist OFF), this is a sign that there is air in the system.

3. **Bleed steering system**
   - Consult with your power assist owner's manual for bleeding details.

4. **Torque end glands**
   - Using a torque wrench, and the pin wrench available from Dometic, torque ALL end glands to 50 ft-lb.

5. **Check cylinders for leaks**
   - Visually inspect ALL areas of the steering cylinder (end glands, hose bleeder fittings etc.) for any signs of a leak. Signs of leaks include, oil residue found in area around cylinder, oil collecting in transom area.

6. **Check cylinder shaft for; pitting, corrosion or marks**
   - Visually inspect ALL areas of the steering cylinder shaft for any signs of pitting, corrosion or marks.

NOTE
Please check all around cylinder, even in the hard to see areas. Even the slightest impurities of the cylinder shaft should be considered as a potential problem.

   - Run fingernail along shaft, feeling for any burrs or scratches.

7. Replace steering cylinders

- If cylinder replacement is required then replace with the same cylinder or updated -3 model. Consult with your owner's and installation instruction manual for part numbers.

8. Cure fluid leak

- If the cylinder shafts are clean and free of any pitting, corrosion or marks, and, the cylinder end glands are leaking. Replace seals with appropriate seal kit.
- If you see fluid leaks coming from the elbow hose fittings (see figure 8-2, item 5). Remove elbow fitting completely, clean off threads of elbow fitting, then apply a "liquid" Teflon based pipe sealant to the threads going into the cylinder body only. Torque fitting to the appropriate value.
- If you see fluid leaks coming from the bleeder fittings. Tighten bleeder fitting. If leak persists, replace bleeder fitting with part # HF5548.

9. Flush steering system

NOTE
Regardless of the nature of the contamination, proper and complete flushing of the steering system is critical to avoid future down time and repairs.

NOTE
Do not use a SeaStar power purge unit to flush the system if there are signs of contamination. Doing so may damage the power purge unit and re-introduce contaminants into the system.

- DO NOT re-use any of the fluid used to flush the system out. Dexron III ATF can be used for flushing, but should not be used for the final bleeding procedures. Dispose of fluid in a manner consistent with your local regulations.
- Flushing can be achieved via running several bottles of fluid through the system, pumping fluid and contamination out of the cylinder hoses (cylinder hoses to be removed). Once several bottles of fluid `have been run through the system, in both the starboard and port directions, it is highly suggested that the steering lines are blown out using air pressure.

10. Ground Strap

- Installation of a ground strap on every cylinder in the system will assist with the prevention of stray current corrosion. Stray current corrosion is the leading contributor to pitting of the steering cylinder shafts. Part # HA5477 contains one ground strap for non -3 cylinders. For -3 cylinders contact Dometic technical services.

7 Routine maintenance

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

Owner(s) and end user(s)

WARNING!
Do not operate boat if any component is not in proper working condition.

Prior to every use:

1. Check fluid level in highest helm pump (see installation/owner's manual for proper fluid level setting).
2. Verify immediate steering response when turning steering wheel (ensure engines move 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.

Qualified Marine Mechanic

After first 20 hours, then every 100 hours or 6 months thereafter (whichever 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 Dometic.

After every 200 hours or 12 months (whichever 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 below.
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!
Do not remove tiller bolt unless obvious wear or damage to tiller bolt is seen.

Item	Description
1	Grease Support ROD, tilt tube and support bracket HOLE

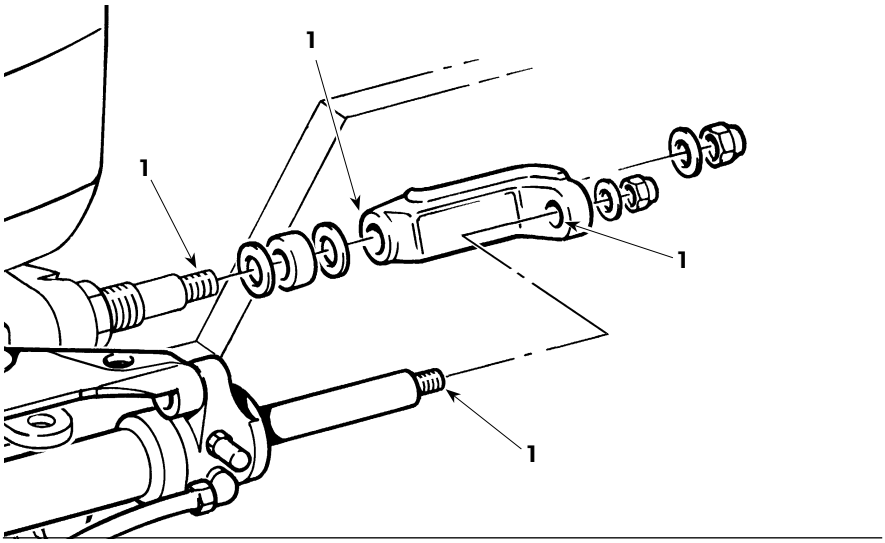

Figure 7-1.

8 Specifications and replacement parts

8.1 BayStar

Front mount pivot cylinders

NOTICE!
H and -3 models (i.e. HC4645H and HC4645-3)
Covers part numbers: HC4645H, HC4647H, HC4648H and HC4658H

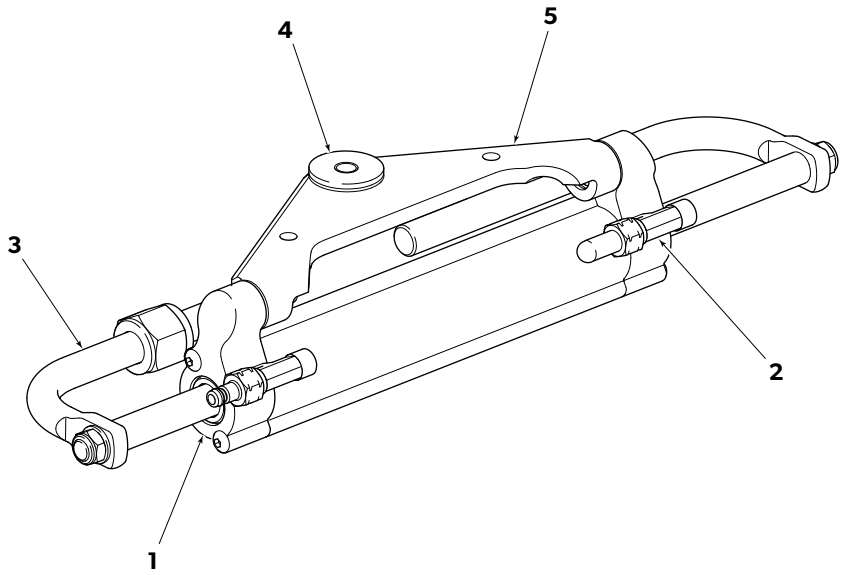

Figure 8-1.

SPECIFICATIONS
Outboard use only (150HP max)
Volume: 7.24 cu.in.
Design: Balanced cylinder

Item	Description
1	Seal kits: P/N HP4600: H models P/N HP4601: -3 models (both kits do NOT include the center/internal seal)
2	Bleed/Hose fittings: P/N HF4202: H models (2 per kit) P/N HF4203: -3 models (2 per kit)
3	'L' Support rod: P/N HP6050 (2 per kit, comes with mounting nut and clip)
4	Tiller bushing kit: P/N HA5820
5	Pivot mount plate kits: various parts: HC4645H = P/N HA4640 HC4647H = P/N HA4641 HC4648H = P/N HA4642 HC4658H = P/N HA4643

8.2 SeaStar

Front mount pivot cylinders

NOTICE!
Covers part numbers: HC5345, HC5347, HC5348, HC5375 and HC5358 (includes -3 models).

Any difference in part numbers will be noted in replacement parts list.

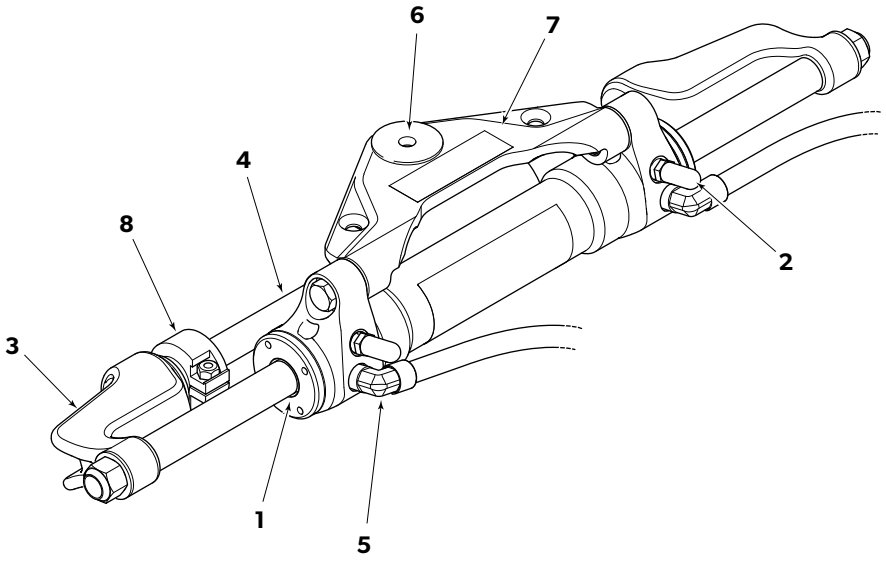

Figure 8-2.

SPECIFICATIONS
Outboard use only
Volume: 8.3 cu.in.
Design: Balanced cylinder

Item	Description
1	Seal kits: P/N HS5157 (includes wrench, does NOT include center/internal seal) P/N HS5167 (does NOT include wrench, or center/internal seal)
2	Bleeder fittings: P/N HF5548 (2 per kit) – covers not included
3	Support brackets: P/N HP6018 (2 per kit) HP6014: -3 models – Support brackets (ships with support rod) Support rod: P/N HP6016 HP6014: -3 models – Support brackets (ships with support rod)
5	Hose elbow fittings: P/N HF6145: non -3 cylinders P/N HF6004: -3 cylinders
6	Tiller bushing kit: P/N HA5820: non -3 cylinders P/N HF5829: -3 cylinders (Both kits come with high strength tiller bolt)
7	Pivot mount plate: N/A *if damaged cylinder is to be replaced
8	Spacer/adjusting nut kit: P/N HP6033

8.3 Fitting identification

Typical NPT fittings

NOTICE!
Liquid thread sealant is used on the NPT side of these fittings only.

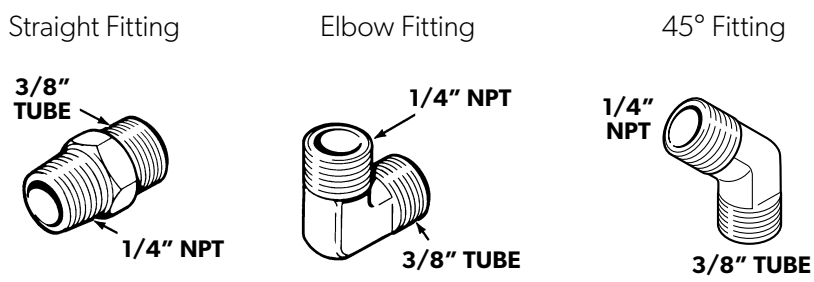

Figure 8-3.

Typical ORB fittings

NOTICE!
No sealant is used on either side of ORB fittings.

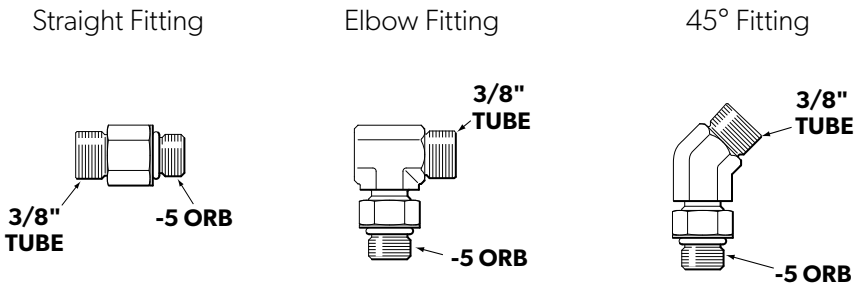

Figure 8-4.

Typical ORB fittings

NOTICE!
The 3/8 tube side of the fittings are the same for NPT and ORB fittings and SeaStar hoses will fit both.

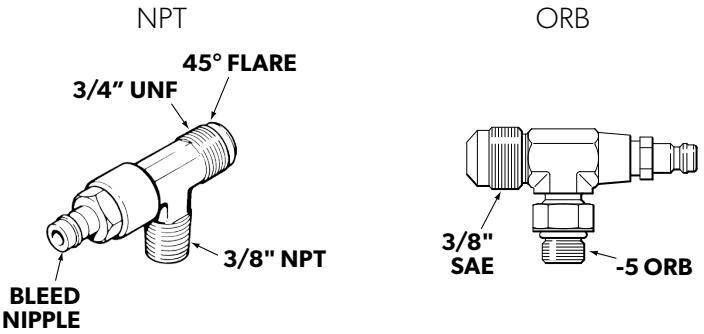

Figure 8-5.

9 Advisory notice

9.1 Power Assist pumps

We at Dometic have become aware of a few isolated cases where the SeaStar power assist causes the steering wheel to stick when coming out of a full (hard over) turn. This has been traced to a batch of rubber seals in 2012.

Although very rare, this condition typically presents itself on boats that are performing a lot of full (hard over) steering maneuvers (for example patrol, rental boats, etc. that frequently turn the wheel until it stops).

The sticking condition is typically described as follows:

- Boat is at slow speed (typically docking the boat).
- Operator turns wheel into the full (hard over) stop (in either direction).
- Operator slowly turns the wheel out of the turn (i.e. the opposite direction).
- Steering wheel turns 1/2 a turn then sticks.

NOTICE!
Steering wheel can unstick if the operator simply reverses the steering wheel and turns back into the original turn direction, then again turns out of the turn.

9.2 How to determine if your Power Assist is affected

1. Inspect the colored cap (shown in figure 9-1 item 3).
   a. If blue, no further action is required.
   b. If black, proceed to item 2 below.
2. Inspect Part No./Serial No. (shown in figure 9-1 item 1 and item 2).
   a. If your Part No./Serial No. is listed in table 9-1, have your dealer contact Dometic warranty department and follow instructions below to disable the power assist.
   b. If your Part No./Serial No. is not listed in table 9-1, no further action is required.

PA1200-2	12-02-108218 or higher
PA1206-2	12-02-600636 or higher
PA1225-2	12-02-400680 or higher
PA6010	12-01-500144 or higher
PA6020	12-01-600058 or higher
Other	Not affected

Table 9-1.

Item	Description
1	Part Number
2	Serial Number
3	Coloured Cap

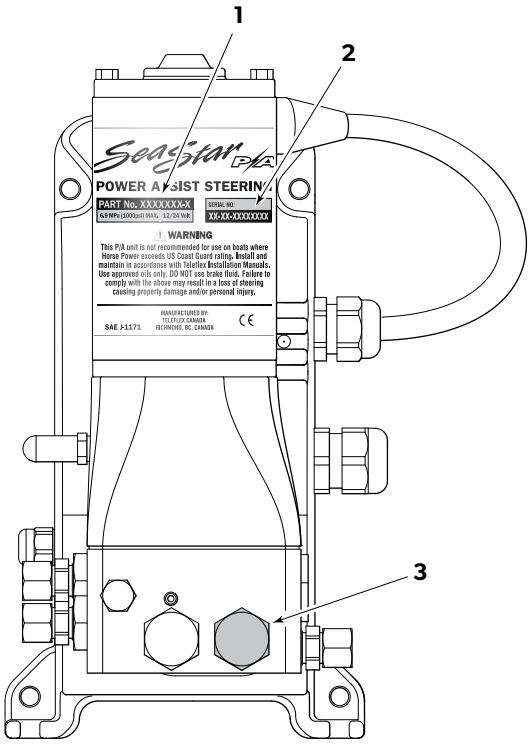

Figure 9-1.

9.3 How to disable the power assist

If your pump is amongst the numbers listed in table 9-1, and if you want to operate your boat before it has been serviced, we recommend you disable the power assist by removing the fuse or breaker. This will put your steering in manual steering mode, resulting in higher steering effort. If you need assistance with this, contact our marine technical support Department at 604-248-3858

9.4 How to obtain a service kit

End User: Contact dealer for service kit.

Dealer: Contact Dometic. Dometic will provide a service kit (HA1220) and a predetermined cost of labour to service the unit.

10 How to test the SeaStar Power Assist

10.1 Test procedure

WARNING!
The power assist must remain connected to the boat's electrical and hydraulic systems at all times during this procedure.

CAUTION!
Care must be taken to ensure no kinking, twisting or any other damage occurs to the hoses while testing.

1. Access the power assist's rear cover and remove the screws that hold it in place. Remove the rear cover.
2. At point (A). With the key or remote switch in the 'on' position, check to ensure there is between 12.5 & 14.5 VDC battery voltage.
3. If there is low or no voltage at this point you must trace the wires and resolve any issue.
4. At point (B). Check to ensure there is between 12.5 & 14.5 VDC battery voltage.
5. If there is low or no voltage at this point, check that the battery connections and fuse are clean and in good working order. Repair and/or replace as required. Record the voltage.
6. At point (C). With an assistant turning the steering wheel, check the voltage. The voltage should be variable. Before the wheel is turned, voltage should be near zero. The voltage should rise as the wheel is turned.
7. Turn the wheel quickly and note the maximum voltage. This reading should be comparable with that recorded at point (B).
8. If there is low or no voltage at this point contact Dometic technical support.

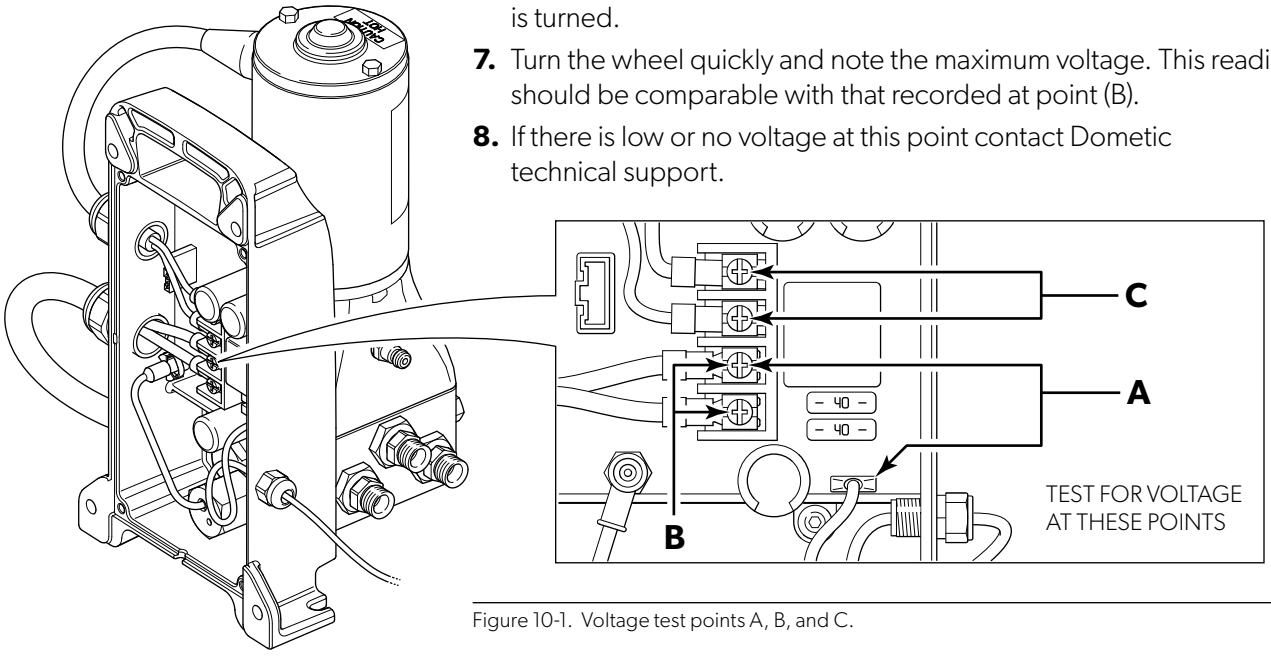

Figure 10-1. Voltage test points A, B, and C.

Notes

YOUR LOCAL DEALER

dometic.com/dealer

YOUR LOCAL SUPPORT

dometic.com/contact

YOUR LOCAL SALES OFFICE

dometic.com/sales-offices

A complete list of Dometic companies, which comprise the Dometic Group, can be found in the public filings of:
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