INSTALLATION INSTRUCTIONS
AND OWNER'S MANUAL

www.seastarsolutions.com

Hydraulic Steering for Outboard
Powered Vessels

Front Mount Tournament Cylinder HC6845

Before you do it your way,
please try it our way
To the Installer and End User (Owner)

Thank you for choosing SeaStar Steering Systems by SeaStar Solutions. This Installation and Owner’s Manual contains all the information that you and others will require for the safe installation and use of your steering system and MUST remain on board the boat. Throughout this manual, information for the safe installation and operation of the steering system will be distinguished in one of the following ways:

<table>
<thead>
<tr>
<th>WARNING</th>
<th>Hazards or unsafe practices which could result in severe personal injury or death.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to adhere to a warning may lead to loss of steering control. Loss of steering control may result in unpredictable boat behavior, leading to ejection from boat causing property damage, personal injury and/or death.</td>
<td></td>
</tr>
</tbody>
</table>

| CAUTION | Hazards or unsafe practices which could result in minor injury or product or property damage. |

| NOTICE | Important information in regards to installation, use and maintenance of the steering components. |

| NOTICE | Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS is referred to as SeaStar Solutions throughout this publication. |

These safety alerts alone cannot eliminate all of the hazards that may be present while on the water. SeaStar Solutions recommends that all users of the steering system take an accredited 'boating safety course', follow safe boating practices and are made aware of the environment that they will be in.
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1.0 SAFETY INFORMATION

The safety information provided below is intended to inform you of the dangers that may be present before, during and after the installation. It is critical that you read and understand ALL the points noted.

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

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

To reduce risk of severe injury or death. Always wear a Coast Guard Approved personal flotation device (PFD) and use an engine shut-off cord (lanyard).

Before installation

1. Read and understand the Installation and Owner's Manuals provided with your steering components.
2. Ensure that all components required to complete the installation are on hand (including hoses, fittings, oil and the proper tools required for the installation).
3. SeaStar components are highly engineered and safety tested to ensure system integrity, DO NOT substitute any component with non-SeaStar components as this may compromise system performance/reliability.

Installation

1. Install components as directed in all Installation Manuals (including helm pumps, hoses and fitting kits).
2. DO NOT modify or substitute any component in any way without written consent from SeaStar Solutions.
   - 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 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 jack plate.
   b) Repeat step 4a) with engines 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 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. 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 on page 32 of this manual.
Safety Information Continued

The safety information provided below is intended to inform you of the dangers that may be present before, during and after use. It is critical that you read and understand ALL the points noted.

Prior to every use

1. Check Fluid level in highest helm pump (see page 32 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.

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

During use

1. WEAR A COAST GUARD-APPROVED PERSONAL FLOTATION DEVICE (PFD).
2. ATTACH ENGINE SHUT-OFF CORD (LANYARD) TO YOUR PDF.
3. Never allow anyone not familiar with the operation of the steering system operate the boat at any time.
4. Know and adhere to the operator restrictions for your area including;
   - Federal Laws/Regulations,
   - State Laws/Regulations and
   - Municipal Laws/Regulations.

DO NOT OPERATE BOAT IF ANY COMPONENT IS NOT IN PROPER WORKING CONDITION.

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.
   - See Maintenance, page 33 of this manual.

Keep our waters clean for all current and future users. Dispose of ALL fluids in accordance with your local regulations.
Safety Information Continued

**WARNING**
The safety information provided below is intended to inform you of the warning information on your products. Contact SeaStar Solutions if labels are missing.

**Important Labels**

**WARNING**
Failure to adhere to these warnings may result in loss of steering control, leading to possible ejection from vessel causing property damage, personal injury and/or death. www.seastarsolutions.com 828966

**NOTICE**
Many figures throughout this manual show blanking plates installed onto the cylinder. The steering cylinder is NOT shipped with these plates. The purchase of an additional "hardware" kit is required regardless of your application.

**CAUTION**
Prior to removing end glands, both bolts (item 1) must be removed. Failure to remove will lead to irreparable damages to the cylinder.

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Figure 1.
2.0 INTRODUCTION

2.1 Important Information/Technical Support Contact

To assist with the installation and maintenance of this steering system, SeaStar Solutions recommends that;

• You read and understand ALL installation manuals before your start the installation process (cylinders, helms, power assist, etc.). Knowing the correct order of installation and location of components will drastically reduce installation time as well as inform you of common installation errors.

• Read and understand ALL Safety Information that is noted in this manual and ALL other Installation Manuals.

If you run into any problems before, during or after the installation of the steering system, please contact Technical Support for assistance.

Technical Support
Web: www.seastarsolutions.com
Email: seastar@seastarsolutions.com
Phone: 604.248.3858
Fax: 604.279.2202

2.2 Parts List

Before proceeding, confirm that you have all the necessary components required to complete the installation of the steering system.

• Helm Pump(s).
• Power Assist and Autopilot Pumps (if applicable).
• Steering Hoses.
• Steering Cylinder(s).
• Tiebar(s).
• Hardware Kits.
• Appropriate Fittings.
• Fluid.

NOTE: SeaStar Solutions recommends the use of SeaStar Steering Fluid ONLY.
• Steering Wheel(s).
2.3 Tools Required

The following tools are required to complete this installation. Having tools on site and ready will decrease installation time drastically.

**NOTICE**

These tools are 'in addition' to the tools required to mount your helm pump and steering hoses.

- 9/16", 1/2", 5/8" and 3/4" Open end or box type wrench
- Torque wrench
- 5/8", 3/4" Socket
- 9/16" Long Socket and socket extension
- Good quality marine grease

2.4 Tournament Series Application Guide, all engine makes – 200+ HP

<table>
<thead>
<tr>
<th>CONFIGURATION</th>
<th>CYLINDER</th>
<th>HARDWARE KIT</th>
<th>TIEBAR</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>SINGLE ENGINE – SINGLE CYLINDER</td>
<td>HC6845</td>
<td>1</td>
<td>HA6801</td>
<td>1</td>
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<td>TWIN ENGINE – SINGLE CYLINDER (Starboard)</td>
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<td>HA6802</td>
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<td>TRIPLE ENGINE – DUAL CYLINDER</td>
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<td>HA6804</td>
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<td>QUAD ENGINE – DUAL CYLINDER</td>
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<td>HA6806</td>
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<tr>
<td>QUINTUPLLET ENGINE (Plus)</td>
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**NOTES**

1. Installation may vary according to the following factors: engine mounting height, transom thickness, use of transom savers, tiller bolt location, engine tilt range, and engine size.
2. For center engine drops greater than 3 inches (76mm), please consult SeaStar Solutions Technical Service.
3. Tiebar length may vary depending on toe in/toe out setup. To allow for toe, add or subtract from your nominal engine center to center distance.
4. Based on recommended engine manufacturer minimum center to center distances. Deviating from these recommendations may require stroke limiting cylinders and/or engine tilt limiting, please consult SeaStar Solutions Technical Service.
5. Cylinder’s must be plumbed in parallel only, no series connections. Only exception is if cylinders are utilizing a liquid tie bar.
6. Maximum drop: ≤ 3 inches (76mm).
Single Engine – Single Cylinder

Twin Engine – Single Cylinder (Starboard)

**NOTICE**

This application requires installation of the drive bracket "BEFORE" installing the steering cylinder onto the engine. (Refer to page 9.)

**NOTICE**

Configuration cannot be used on Yamaha 3.3L or any Mercury engine applications.
Twin Engine – Dual Cylinder

Figure 4.

Triple Engine – Dual Cylinder

Figure 5.
3.0 INSTALLATION

3.1 System Installation Overview

Step 1 – Component Installation
1. If you are running a Twin Engine – Single cylinder, install drive bracket (see page 6) onto steering cylinder (see section 3.2 on page 9 for more information).
2. Install steering cylinder(s) onto engine as per Section 3.3, page 10 of this manual.
3. Install "Bracket(s)" as per Section 3.4, page 14 of this manual.
4. Install "Tiebar(s)" as per Section 3.5, page 18 of this manual.
5. Install Helm pump(s), Power Assist Pumps and/or Autopilot pumps.
6. Install steering hoses as per Section 3.6, page 21 of this manual.

Step 2 – Filling and Purging
1. Refer to page 26 for general filling and oil requirements.
2. Power Purge users refer to Section 3.9.2, page 26 of this manual.

Step 3 – Final System Check/Inspections
1. Refer to Section 3.10, page 32 of this manual for setting oil level in helm pump and performing the 'system pressure test' to ensure steering system is ready for use.
2. Conduct interference inspections as per Section 3.11, page 32 of this manual.
3.2 Drive Bracket Installation

**NOTICE**

*Used only in a Twin Engine – Single Cylinder installation. Cylinder is to be installed onto the starboard engine only. Except with kit # HA6807.*

**NOTICE**

*Requires kit # HA6802.*

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**NOTICE**

*Configuration cannot be used on Yamaha 3.3L or any Mercury engine applications.*

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**WARNING**

*Blanking plates (item 7) MUST be installed prior to use.*

---

**WARNING**

*Thread locker MUST be installed onto all four bolts (item 7). Failure to do so may lead to separation of components.*

---

**ITEM** | **QTY** | **DESCRIPTION** | **NOTES**
---|---|---|---
1 | 1 | Cylinder Cap Plug | Ships installed in cylinder
2 | 1 | Drive Bracket Assembly
3 | 2 | SS Washer
4 | 2 | Mounting Bolt | Custom bolts, DO NOT substitute
5 | 1 | Loctite® 263
6 | 4 | Mounting Bolts | Custom bolts, DO NOT substitute
7 | 2 | Blanking Plates
8 | 1 | Steering Cylinder

1. Using a 3/8" Allen Socket, remove cap plug (item 1) from cylinder.
2. Apply thread locker to threads of drive bracket assembly (Item 2). **NOTE:** Thread locker (item 5) is included with the hardware kit.
3. Thread drive bracket assembly onto cylinder and torque to 30ft-lb.
4. Apply thread locker to the threads of item 4. Install washer and bolts torque to 20ft-lb.
5. Apply thread locker (item 5) to the threads of item 6.
6. Mount blanksing plates (item 7) to both sides of the steering cylinder (item 8) as shown in figure 6.
7. Torque bolts (item 6) to 50 ft-lb.
3.3 Cylinder Installation

**NOTICE**
Refer to page 12 – page 13 for your specific engine.

**NOTICE**
If used in a saltwater application, install end of ground strap to midsection steering bracket hole (see Figure 7, page 11).

**⚠️ WARNING**
If engine manufacturer has installed caps, plugs, and/or screws into the tiller arm, these caps, plugs and/or screws MUST be removed prior to installation of the steering cylinder.

**Step 1**
Using a good quality marine grease with anti-corrosion additives, liberally lubricate the engine steering/tilt tube and support rod(s) (item 9). Slide lubricated support rod(s) into engine steering/tilt tube.

**⚠️ WARNING**
WARNING
If engine manufacturer has installed caps, plugs, and/or screws into the tiller arm, these caps, plugs and/or screws MUST be removed prior to installation of the steering cylinder.

**Step 2**
Lightly grease the tiller bolt (item 2) and thread into the appropriate engine tiller arm hole. Ensure tiller bolt threads completely through the tiller arm hole. Remove bolt.

**Step 3**
NOTE: Locate the correct orientation of your steering cylinder(s) and tiller nut/bolt as shown in Figures 8 through 9.
1. Lightly grease tiller bolt.
2. Install steering cylinder onto the correct side of the tiller arm.
3. Thread tiller bolt fully into tiller arm and torque to 21ft-lb.
4. While holding tiller bolt with a wrench to prevent loosening, install and torque tiller nut (item 1) to 21ft-lb.

**⚠️ WARNING**
The tiller bolt (item 2) is a custom, high strength tiller bolt. DO NOT substitute with any other bolt. Ensure tiller bolt is properly torqued and does NOT loosen when installing nut (item 1).

**Step 4**
1. Thread adjusting nut (item 10) completely onto steering/tilt tube.
2. Install stainless steel washers (item 11) onto both sides of the support rod (item 9).
3. Install plastic spacers (items 7 and 8) as per your engine details.
4. To assist with the installation grease and install keys (item 14) into support rod (item 9).
5. Grease and secure support brackets (item 12) to the support rod and the cylinder rod.
6. Install washers (items 3 and 4)
7. If using a ground strap, complete install of strap as shown in Figure 7, page 11.
8. Install nuts (item 5 and 6) torque to 50ft-lb.

**Step 5**
Eliminate free play in the support rod by rotating the adjusting nut "counter-clockwise" until all the slack is remove from support rod hardware. Lock the adjusting nut in place by tightening the hexagon set screw.
**Ground Strap Installation**

SeaStar Solutions strongly recommends use of a ground strap on any outboard hydraulic steering cylinder with an exposed shaft (such as SeaStar tournament steering cylinders), especially where the vessel will be used in salt water. This ground strap will provide added protection against corrosion caused by stray current.

1. Attach end terminal to the starboard side lower midsection steering bracket hole (wire facing downwards) using correct fasteners. Torque to 94 in-lb.

2. Route ground strap UNDER the tilt tube. Install ground strap large end terminal to cylinder as per Figure 7.

3. Install cylinder shaft nut and torque to 50 ft-lb.

4. Attach small middle terminal to unused hole in rear of cylinder support bracket. Orient terminal as shown in Figure 7. Torque to 45 in-lb.

5. Ensure there is enough slack in the strap to allow the engine to pivot freely in ALL trim/tilt positions and throughout the entire steering range of the engine.

---

**CAUTION**

Ensure ground strap is routed 'under' the tilt tube. Installation of the strap 'above' the tilt tube may lead to a hang up, or restriction.

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*Figure 7. Ground Strap Installation.*
### HYDRAULIC STEERING
### TOURNAMENT CYLINDERS

<table>
<thead>
<tr>
<th>ENGINE MFG.</th>
<th>YEAR</th>
<th>MODEL</th>
<th>CYLINDER</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>EVINRUDE</td>
<td>2007 TO DATE</td>
<td>3.3L, V6, 200–250HP 3.4L, V6, 250–300HP</td>
<td>HC6845</td>
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<tr>
<td>SUZUKI</td>
<td>1986 TO DATE</td>
<td>3.6/4.0L, V6, 200–300HP</td>
<td>HC6845</td>
<td></td>
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</tbody>
</table>

**ITEM** | **QTY** | **DESCRIPTION** |
---|---|---|
1 | 1 | Nut, 3/8” NF Nyloc®, SS |
2 | 1 | 3/8” UNJF x 1.35 HS (High Strength) |
3 | 2 | 1/2” Washer, Flat, SS, Thick |
4 | 2 | 1/2” Washer, Flat, SS, Thin |
5 | 2 | 1/2” NF Nut, Thick |
6 | 2 | 1/2” NF Nut, Thin |
7 | 2 | Plastic Spacer, Thick |
8 | 0 | Plastic Spacer, Thin *(Not Used)* |
9 | 1 | Support Rod |
10 | 1 | Adjusting Nut |
11 | 2 | 5/8” Washer, Flat, SS |
12 | 2 | Support Bracket |
13 | 1 | Steering Cylinder |
14 | 2 | Key |

**WARNING**
*ITEM 2 is a custom, high strength tiller bolt. DO NOT substitute with any other bolt.*

---

**G = GREASE POINT**

**MOUNT UNDER TILLER ARM AND IN REAR HOLE**

---

Figure 8.
## HYDRAULIC STEERING

### TOURNAMENT CYLINDERS

<table>
<thead>
<tr>
<th>ENGINE MFG.</th>
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<th>MODEL</th>
<th>CYLINDER</th>
<th>NOTES</th>
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<td>YAMAHA</td>
<td>2007 TO DATE</td>
<td>F200–250HP, V6 3.3L, F225–300HP, 4-Stroke, V6 4.2L, F300–350HP, 4-Stroke, V8, 5.3L</td>
<td>HC6845</td>
<td>Req. ONE cylinder on ALL engines</td>
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<tr>
<td>MERUCRY</td>
<td>2002 TO DATE</td>
<td>OPTIMAX V6, 3.0/3.2L, 200–300HP, 200–250HP, PRO XS</td>
<td>HC6845</td>
<td>Req. ONE cylinder on ALL engines</td>
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<td>HONDA</td>
<td>2000 TO DATE</td>
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<td>HC6850</td>
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**ITEM** | **QTY** | DESCRIPTION
---|---------|------------------
1 | 1 | Nut, 3/8" NF Nyloc®, SS
2* | 1 | 3/8" UNJF x 1.35 HS (High Strength)
3 | 2 | 1/2" Washer, Flat, SS, Thick
4 | 2 | 1/2" Washer, Flat, SS, Thin
5 | 2 | 1/2" NF Nut, Thick
6 | 2 | 1/2" NF Nut, Thin
7 | 2 | Plastic Spacer, Thick
8 | 1 | Plastic Spacer, Thin
9 | 1 | Support Rod
10 | 1 | Adjusting Nut
11 | 2 | 5/8" Washer, Flat, SS
12 | 2 | Support Bracket
13 | 1 | Steering Cylinder
14 | 2 | Key

---

**WARNING**

* ITEM 2 is a custom, high strength tiller bolt. DO NOT substitute with any other bolt.*

---

**Figure 9.**

---

G = GREASE POINT

---

**MOUNT OVER TILLER ARM AND IN REAR HOLE**

---

**SEE WARNING**
3.4 Bracket Installation

**Single Engine – Single Cylinder**

*NOTICE*

Requires Kit # HA6801.

*WARNING*

Blanking plates MUST be installed prior to use.

1. Apply thread locker (item 2) to the threads of item 1. **NOTE:** Thread locker (item 2) is included with the hardware kit.

*WARNING*

Thread locker MUST be installed onto all four bolts (item 1). Failure to do so may lead to separation of components.

2. Mount blanking plates (item 3) to both sides of steering cylinder (item 4) as shown in Figure 10.

3. Torque bolts to 50ft-lb.

*NOTICE*

Depending on engine, the cylinder may be mounted different than shown here.

---

**ITEM** | **QTY** | **DESCRIPTION** | **NOTES**
---|---|---|---
*1 | 4 | Mounting Bolt | Custom bolts, DO NOT substitute
2 | 1 | Thread Locker | Must be applied
3 | 2 | Blanking Plate | Must be installed
4 | 1 | Steering Cylinder |
Twin Engine – Single Cylinder

**NOTICE**

This application requires installation of the drive bracket "BEFORE" installing the steering cylinder onto the engine. (Refer to page 9.)

**NOTICE**

Requires Kit # HA6802.

**Blanking Plate Installation (items 1–3)**

1. Apply thread locker (item 2) to the threads of item 1.
   
   **NOTE:** Thread locker (item 2) is included with the hardware kit.

**WARNING**

Thread locker MUST be installed onto all four bolts (item 1). Failure to do so may lead to separation of components.

2. Mount blanking plates (item 3) to both sides of steering cylinder (item 4) as shown in Figure 11.

3. Torque bolts to 50ft-lb.

**Engine Bracket Installation (items 5–7)**

1. Mount engine bracket (item 5) to the port engine tiller arm (see inset).

2. Lightly grease item 6 (a and b). Thread 6a into far aft hole and 6b into forward hole in engine tiller arm and torque to 21ft-lb.

3. While holding the head of the bolt (items 6a and 6b) with a wrench, tighten and torque nuts (items 7) to 21ft-lb.

**WARNING**

Item 6a & 6b are custom, high strength tiller bolts. **DO NOT** substitute with any other bolt.

---

**Figure 11.**

---

**NOTICE**

Depending on engine, the cylinder may be mounted different than that shown here.

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<thead>
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<th>ITEM</th>
<th>QTY</th>
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<th>NOTES</th>
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<td>Mounting Bolt</td>
<td>Custom bolts, <strong>DO NOT</strong> substitute</td>
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<td>2</td>
<td>1</td>
<td>Thread Locker</td>
<td><strong>Must be applied</strong></td>
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<tr>
<td>3</td>
<td>2</td>
<td>Blanking Plate</td>
<td><strong>Must be installed</strong></td>
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<tr>
<td>4</td>
<td>1</td>
<td>Steering Cylinder</td>
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<tr>
<td>5</td>
<td>1</td>
<td>Engine Bracket</td>
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<td>7</td>
<td>2</td>
<td>3/8” Locking Nut</td>
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Twin Engine – Dual Cylinder

Requires Kit # HA6804.

1. Apply thread locker (item 2) to the threads of item 1.
   NOTE: Thread locker (item 2) is included with the hardware kit.

** WARNING **
Thread locker MUST be installed onto all eight bolts (item 1). Failure to do so may lead to separation of components.

2. Mount tiebar and blanking plates (item 3 and 4) to both sides of steering cylinder (item 5) as shown in Figure 12.

3. Torque bolts to 50ft-lb

<table>
<thead>
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<th>ITEM</th>
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<th>NOTES</th>
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<td>Mounting Bolt</td>
<td>Custom bolts, DO NOT substitute</td>
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<td>Port/Starboard Plate</td>
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</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Steering Cylinder</td>
<td></td>
</tr>
</tbody>
</table>
Triple Engine – Dual Cylinder

**NOTICE**
Requirements Kit # HA6806.

**Tiebar Bracket Installation (items 1–4)**
1. Apply thread locker (item 2) to the threads of item 1.
   **NOTE:** Thread locker (item 2) is included with the hardware kit.

**WARNING**
Thread locker **MUST** be installed onto all eight bolts (item 1). Failure to do so may lead to separation of components.
2. Mount tiebar and blanking plates (item 3 and 4) to both sides of steering cylinder (item 8) as shown in Figure 13.
3. Torque bolts to 50ft-lb.

**Engine Bracket Installation (items 5–7)**
1. Mount engine bracket (item 5) to the center engine tiller arm.
2. Lightly grease item 6 (a and b). Thread 6a into far aft hole and 6b into forward hole in engine tiller arm and torque to 21ft-lb.
3. While holding the head of the bolt (items 6a and 6b) with a wrench, tighten and torque nuts (items 7) to 21ft-lb.

**WARNING**
Item 6a & 6b are custom, high strength tiller bolts. **DO NOT** substitute with any other bolt.

---

**Item QTY DESCRIPTION NOTES**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>Mounting Bolt</td>
<td>Custom bolts, <strong>DO NOT</strong> substitute</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Thread Locker</td>
<td><strong>Must be applied</strong></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Blanking Plate</td>
<td><strong>Must be installed</strong></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Port/Starboard Plate</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Engine Bracket</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Bracket Tiller Bolt</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>3/8&quot; Locking Nut</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>Steering Cylinder</td>
<td></td>
</tr>
</tbody>
</table>

---

*NOTE ORIENTATION OF ENGINE BRACKET WHEN INSTALLING*

G = GREASE POINT

ENGINE BRACKET = YAMAHA, HONDA, MERCURY
B = SUZUKI

---

**NOTICE**
Depending on engine, the cylinder may be mounted different than that shown here.

Figure 13.
3.5 Tiebar Adjustment and Installation

3.5.1 Tiebar Adjustment

1. Determine engine center distance. **Note:** Ensure that any toe IN/OUT is taken into account.
2. Adjust tiebar to correct distance by rotating as shown in Figure 14.

**WARNING**

If a RED O’ring appears during the tiebar adjustment you MUST order a longer tiebar to complete the installation. **DO NOT** install tiebar if the RED O’ring appears.
3. Install adjusted tiebar onto steering cylinder/bracket as per 3.5.2/3.5.3.

---

3.5.2 Tiebar to Drive Bracket Installation

**Twin Engine – Single Cylinder**

1. Install bushing into tiebar joint.
2. Slide tiebar (with bushing installed) into drive bracket.
3. Install shoulder bolt and nut, torque to 11ft-lb.

---

**NOTICE**

* Parts included with hardware kit.
3.5.3 Tiebar to Cylinder Installation

YAMAHA, HONDA, MERCURY

1. Position tiebar in place.
2. Apply thread locker to shoulder bolt SHORT and install. Torque to 70ft-lb.
3. While holding shoulder bolt SHORT with your key/wrench, install and tighten nut to 50ft-lb.

**NOTICE**
* Parts included with hardware kit.

EVINRUDE

1. Position tiebar in place.
2. Install .150" spacer for Evinrude.
3. Apply thread locker to shoulder bolt SHORT and install. Torque to 70ft-lb.
4. While holding shoulder bolt SHORT with your key/wrench, install and tighten nut to 50ft-lb.

**NOTICE**
* Parts included with hardware kit.

Figure 16. Yamaha, Honda, Mercury Tiebar to Cylinder Installation.

Figure 17. Suzuki Tiebar to Cylinder Installation.
3.5.4 Tiebar to Engine Bracket Installation

**Twin Engine – Single Cylinder**

1. Note installation hole as per your engine make (A or B) see figure 18.
2. Install .100" spacer.
3. Position tiebar into appropriate hole.
4. Apply thread locker to shoulder bolt LONG and install. Torque to 70ft-lb.
5. While holding shoulder bolt LONG with your key/wrench, install and tighten nut to 50ft-lb.

---

**NOTICE**

* Parts included with hardware kit.

---

**Triple Engine – Dual Cylinder**

1. Note installation hole as per your engine make (A, B, or C).
2. Install .350" spacer.
3. Position tiebar into appropriate hole.
4. Apply thread locker to shoulder bolt LONG and install. Torque to 70ft-lb.
5. While holding shoulder bolts LONG with your key/wrench, install and tighten nut to 50ft-lb.

---

**NOTICE**

* Parts included with hardware kit.
3.6 Hose Installation

Steering hoses and how they are installed are critical to the safe operation of your steering system. SeaStar Solutions recommends the use of SeaStar Steering hoses ONLY. Use of any other hose may drastically reduce system performance and safety.

⚠️ WARNING

**Do not cut SeaStar steering hoses, cutting these hoses will render them useless.**

Before continuing on with the installation of your steering hoses, please ensure that you read and understand the important points shown below;

- **DO NOT** install any pipe sealant onto the "hose" side of a fitting.
- **DO NOT** remove protective end covers until the hoses have been routed and are ready to be connected to the helm pump, hose fitting or steering cylinder(s).
- Before, during and after installation the hoses MUST be protected from chaffing, rubbing, and contact or interference with assembly screws or sharp edges of any type.
- **DO NOT** install hoses in an area where they will be exposed to high heat, such as engine manifolds, engine compartments or highly corrosive areas such as battery fumes or electrical connections.
- If possible, route hoses through a protective PVC cover.
- Secure hoses in minimum 2’ increments.
- **DO NOT** bend hoses tighter than a 3-1/2” (89mm) radius.
- Provide sufficient hose lengths to allow for cylinder movement throughout the turning arc and UP/DOWN trim/tilt settings of the engine(s).
- **DO NOT** allow hoses to hang free in an area where they could become a safety hazard.
- **DO NOT** use extruded nylon tubing for plumbing an outboard system. Extruded nylon tubing can only be used for return/compensating lines between power assist and/or autopilot pumps and the helm pump.
- Where possible, route hoses in an area where they can be easily inspected for wear on a regular basis.

⚠️ WARNING

**Continuous kinking, rubbing, chafing or twisting of a steering hose may eventually weaken the hose(s) to a point where it could rupture. Rupture of a hose will lead to loss of steering control.**

**NOTICE**

Your SeaStar helm and steering cylinder(s) are shipped with the appropriate hose fittings and are for use with SeaStar Steering hoses only. All SeaStar Steering components are highly engineered and safety tested to ensure system integrity, do NOT substitute any component with non-SeaStar components as this may compromise system performance/reliability.
Hose Installation Continued

**Step 1 – Set Up**

1. See figures 22 through 25 on the following pages to locate your plumbing diagrams.

2. Mark each end of the hose to ensure proper connection.

**NOTICE**

*Hoses are crossed from the helm pump(s) to the steering cylinder(s). Port side helm connection will be installed onto the starboard fitting on the cylinder, and the Starboard side helm connection will be installed onto the port side fitting on the cylinder.*

**Step 2 – Routing**

**CAUTION**

Throughout the hose installation, ensure the protective caps remain installed onto the end of the hoses. Doing so will prevent contamination from entering the system.

1. Route steering hoses so that the hose bend restrictor will be located at the steering cylinder(s).

2. Route steering hoses so that they have a gradual rise from the steering cylinder(s) to the helm pump.

3. If routing hoses through a blind area, ensure that the area is free and clear of any sharp edge, screw or any other object that may damage the hose.

4. Secure hoses every 2’.

**NOTICE**

*When securing hoses, ensure that the securing device being used does NOT crimp down too tight on the steering hoses. This may lead to a restriction in the system.*

**CAUTION**

The hose fitting port on the steering cylinder is that of an ORB and NOT an NPT. Installing an NPT fitting into an ORB port will result in irreparable damage to the steering cylinder.

If you wish to re-orientate the hose fitting, please refer to page 23 of this manual for the re-orientation steps.

**WARNING**

Substituting brass fittings into the steering cylinder may result in galvanic corrosion and irreparable damage to the cylinder as well as affect system integrity.

**Step 3 – Hose to fitting installation**

1. Remove protective covers.

2. Install hose end fitting onto intended fitting, tighten hand tight.

3. While holding the receiving fitting with a wrench, tighten hose fitting to 15ft-lb.

**WARNING**

When installed, confirm that the hoses are not being pulled or kinked over by pushing the engine(s) back and fourth. Hoses must NOT be pulled on at any time.
3.7 ORB Hose Fitting Reorientation

**If required**

1. Back off lock nut (item 1, Figure 20), counter-clockwise, until it stops.
2. Thread fitting into cylinder body until fitting washer (item 2, Figure 20) contacts the face of the cylinder port. Tighten hand tight, DO NOT TORQUE FITTING INTO GLAND.
3. Position fitting to desired orientation by turning it counter-clockwise to a MAXIMUM of 1 full turn.
4. While holding fitting with a wrench, tighten the locknut (item 1, Figure 20) and torque to 40–43ft-lb.

**WARNING**

Failure to properly tighten the locknut (item 1, Figure 20) 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.

**WARNING**

SeaStar Solutions recommends that the hose and hose fittings are checked on a regular basis to ensure the safe operation of the steering system.

**NOTICE**

Complete removal of hose fitting requires the cylinder bleed nipple to be removed.
3.8 Hose Installation Plumbing Diagrams

The plumbing diagrams shown in the following pages outline typical ways to plumb a SeaStar Steering system fitted with autopilot and power assist pumps. Wheel turns are counted with the Power Assist Pump turned OFF.

Single Cylinder Applications
*(including Twin Engine – Single Cylinder)*

**SINGLE CYLINDER MANUAL SYSTEM**

**SINGLE CYLINDER POWER ASSIST WITH AUTOPILOT**

<table>
<thead>
<tr>
<th>ITEM</th>
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<tbody>
<tr>
<td>1</td>
<td>As Req.</td>
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<td>2</td>
<td>As Req.</td>
<td>SeaStar Steering Lines</td>
</tr>
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<td>As Req.</td>
<td>Steering Cylinder*</td>
</tr>
<tr>
<td>4</td>
<td>As Req.</td>
<td>SeaStar Power Assist Pump</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>Autopilot Pump</td>
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</table>

**HELM PUMP MODEL & DISPLACEMENT**

**WHEEL TURNS REQUIRED**

<table>
<thead>
<tr>
<th>HELM PUMP</th>
<th>WHEEL TURNS</th>
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<tr>
<td>1.7 cu.in. per revolution</td>
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</tr>
<tr>
<td>2.0 cu.in. per revolution</td>
<td>4</td>
</tr>
<tr>
<td>2.4 cu.in. per revolution</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Figure 22.

Figure 23.
Dual Cylinder Applications
(Including Triple/Quad Engines – Dual Cylinder)

Dual Cylinder Applications

DUAL CYLINDER
MANUAL, PLUMBED IN PARALLEL

![Diagram of Dual Cylinder Manual System](image1)

DUAL CYLINDER
POWER ASSIST WITH AUTOPILOT,
PLUMBED IN PARALLEL

![Diagram of Dual Cylinder Power Assist System](image2)

**Figure 24.**

**Figure 25.**

<table>
<thead>
<tr>
<th>ITEM</th>
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<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
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<td>As Req.</td>
<td>Helm Pump, various styles and displacements</td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>As Req.</td>
<td>Steering Cylinder*</td>
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<tr>
<td>4</td>
<td>As Req</td>
<td>Power Assist Pump</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>Autopilot Pump</td>
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</table>

**ITEM**

<table>
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<tr>
<th>HELM PUMP MODEL &amp; DISPLACEMENT</th>
<th>WHEEL TURNS REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7 cu.in. per revolution</td>
<td>10</td>
</tr>
<tr>
<td>2.0 cu.in. per revolution</td>
<td>8</td>
</tr>
<tr>
<td>2.4 cu.in. per revolution</td>
<td>7</td>
</tr>
</tbody>
</table>
3.9 Filling and Purging

3.9.1 Hydraulic Oil Requirements

- 2 bottles (2 quarts or liters) for single station and single cylinder systems. One additional bottle for each cylinder, helm, power assist and/or autopilot pump added to the system.

**NOTICE**
Longer hose runs will require more fluid than that shown above.

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

**NOTICE**
"Bleeder" refers to cylinder or P/A unit fitted with bleed fittings. Bleed fittings can be opened by unscrewing bleed nipple nut two turns.

**NOTICE**
Protect your boating environment by ensuring that all used oil is disposed of properly.

Recommended oils for your steering system are:
SeaStar Solutions only recommends the use of SeaStar Steering Fluid. 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**
Use of non-standard fluids will require an immediate and complete system flush using approved fluids, by an approved steering technician.

### VENT PLUG – Part No. HA5431

- Supplied with SeaStar Helm
- 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. HF6007 and HF6010.

Figure 26.

3.9.2 Power Purge Users

#### Step 1 – Removing Air from Return Line

**NOTICE**
If the application is NOT fitted with a SeaStar Power Assist, start at Step 2, point 2.

**CAUTION**
Refer to your Power Purge installation manual for important Warnings and Notices while using the Power Purge Units.

- Install the helm adapter into the helm pump and attach the helm hose from the power purge unit.
- Connect one of the fluid return hoses (cylinder lines) from the Power Purge unit to the Reservoir bleed fitting on the P/A unit. (see Figure 27 on page 28 for bleed fitting location).
- Using a 1/2" wrench open reservoir bleed fitting 1-turn.

---

SeaStar Hydraulic Steering
These instructions show how to fill and purge a SeaStar Steering System with the P/A unit installed. The same steps apply to ALL cylinders with the exception of which bleed fitting to open and close and the direction the cylinder rod moves. These variations are shown in inset diagrams at each step. For multiple steering stations, start with the lowest station while going through Steps 1 – 7, repeat at each higher station until complete.
**CAUTION**

DO NOT turn ON P/A unit until manual portion is completed. 
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 oil level to disappear into the helm pump, as this may introduce air into the system and increase your filling time.

### 3.9.4 Single Station One Cylinder

**NOTICE**

**BEFORE bleeding the main steering system (helm, hoses and cylinders), the RETURN line will need to be purged.**

**Step 1 – Removing Air from Return Line**

1. Install the fill tube and fluid fill bottle into the helm pump. 

   **NOTICE**

   Filling the helm full of fluid prior to connecting the filler tube and oil bottle will decrease purge time. 

2. Open the manual bleed valve and reservoir bleed fitting (see Figure 27) on the power assist unit. The manual bleed valve should be opened two full turns. 

3. Fill helm with fluid, then, turn steering wheel to the starboard side until a steady stream of "air-free" oil comes out of the reservoir bleed fitting on the Power Assist Unit. 


5. Continue to turn the wheel to starboard another 15 turns after closing the reservoir bleed fitting and prior to closing the manual bleed valve. 

**Step 2**

1. Turn the steering wheel clockwise until the cylinder rod is fully extended on the right side of the cylinder.
2. Open bleed fitting as per your installation.

![Figure 28. Tournament, Front Mount Cylinder.](image)

**Step 3**

1. Holding the cylinder body to prevent the body 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).

   **CAUTION**

   Do not use anything other than your hands to restrain the cylinder body.
2. While continuing to turn the wheel close the bleed fitting for your application and let go of the cylinder body.

![Figure 29. Tournament, Front Mount Cylinder.](image)
Step 4
1. Continue turning the steering wheel counter-clockwise until the cylinder rod is fully extended to the left. (Steering wheel will come to a stop).
2. Open bleed fitting as per your installation.

![Figure 30. Tournament, Front Mount Cylinder.](image)

Step 5
1. Holding the cylinder body to prevent the body from moving, turn the steering wheel clockwise until a steady stream of air free oil comes out of the bleeder.
2. While continuing to turn the wheel close the bleed fitting for your application and let go of the cylinder body.

![Figure 31. Tournament, Front Mount Cylinder.](image)

**Notice**
Be sure to remove ALL air from the autopilot reservoir line.
If the system has an autopilot installed, ensure that the autopilot pump is run for at least 10 seconds in both directions during Step 3 & Step 5.

**Caution**
Prior to operating system, perform Oil Level System Check, refer to page 32.

Step 6
2. Repeat Steps 2 – 5 of purging instructions with the P/A unit "ON".
3.9.5 Twin Station Single Cylinder

Perform Steps 1 – 6 at station no. 1. Then repeat Steps 2 – 5 at station no. 2.

**Note:** Refer to Oil Level & System Check on page 32.

3.9.6 Single Station Dual Cylinder

When performing Steps 2 – 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.

**Note:** Refer to Oil Level & System Check on page 32.

3.9.7 Twin Station Dual 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:** Refer to Oil Level & System Check on page 32.
3.10 Oil Level and System Check

**NOTICE**

Refer to your helm pump installation manual for proper fluid level setting.

At this time the steering system must be checked for proper connections hose and fittings, possible leaks, and air removal. Please complete the following steps with the P/A Unit OFF.

**1.** Turn steering wheel to hard over, then force the wheel another one quarter to one half turn past the stop point. Check all connections including the following areas for evidence of a leak.

- Helm fitting connections.
- P/A fitting connections
- Cylinder fitting connections

**2.** Repeat above steps to the other steering direction.

**3.** Any sign of a leak MUST be repaired prior to operating the boat.

**4.** While turning steering wheel observe fluid level in the helm pump. If fluid level drops and rises as the wheel is being turned there is still air in the system. Complete bleeding instructions again until no obvious fluid level change is noticed.

3.11 Interference Inspections

**WARNING**

The following steps MUST be completed with an assistant BEFORE operating the boat. Failure to conduct this important step may lead to damage or separation of components. ANY fault and/or interference with any other object MUST be corrected prior to use.

**1.** Confirm that there is no interference between the steering cylinder(s), tiebars and the transom, splashwell, outboard engine 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 jack plate.
   b) Repeat step 1a) with engines tilted UP.
   c) Perform step 1a) with each engine in DOWN/UP positions confirming that independent TRIM/TILT can be done without any interference.

**2.** 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.

**3.** Confirm that the steering wheel can rotate freely from hard over to hard over.

If using tilt type helms, this step must be performed in all tilt positions.
# 4.0 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 32 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 the cylinder and tiebar installations ‘G’. 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.

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

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.

<table>
<thead>
<tr>
<th>FAULT</th>
<th>CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
</table>
| 1. During filling, helm becomes completely locked up. | • 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. | • 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. even after system appears full. | • Air remaining in system.  
• Bleed fitting leaking.  
• Coiled hose.  
• Reservoir/compensating lines not purged free of air. | • 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. | • Adjusting nut on support rod is overtightened.  
• Restrictions on hoses (see Fault 1).  
• Mechanical interference with other components (see Fault 1). | • Nut should be hand-tight.  
• See fault 1.  
• See fault 1. |

**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

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

### CAUSE

- Air in system (yes, air will lead to heavy steering).
- Incorrect fluid has been used to fill system.
- 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.
- Support rod/bracket key not seated correctly.

### SOLUTION

- Bleed Steering System.
- Drain and flush, fill and bleed with SeaStar fluid.
- 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.
- Disassemble steering cylinder, ensure key is seated correctly.

### 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.
6.0 REPLACEMENT PARTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART #</th>
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<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>HP6162</td>
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<td>Support Bracket (Includes mounting hardware)</td>
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<td>HF5548</td>
<td>2</td>
<td>Bleeder Nipple</td>
</tr>
<tr>
<td>3</td>
<td>HF6004</td>
<td>2</td>
<td>Hose Fitting (ORB fitting.)</td>
</tr>
<tr>
<td>4</td>
<td>HA5820</td>
<td>1</td>
<td>Tiller Bushing Kit (c/w High strength tiller bolt.)</td>
</tr>
<tr>
<td>5</td>
<td>Various</td>
<td>N/A</td>
<td>Hardware Kits (Refer to Application Chart, page 5 for details.)</td>
</tr>
<tr>
<td>6</td>
<td>HP6161</td>
<td>1</td>
<td>Support Rod (c/w mounting hardware and keys)</td>
</tr>
<tr>
<td>7</td>
<td>HP6063</td>
<td>4</td>
<td>Tiebar Plate Bolts</td>
</tr>
<tr>
<td>8</td>
<td>HP6160</td>
<td>2</td>
<td>End Gland Seal Kit</td>
</tr>
</tbody>
</table>

**CAUTION**
Prior to removing end glands, both bolts (item 7) must be removed. Failure to remove will lead to irreparable damages to the cylinder.
7.0 WARRANTY

7.1 Statement of Limited Warranty

We warrant to the original retail purchaser that Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS (herein forward referred to as SeaStar Solutions) products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from date of purchase, excepting that where SeaStar Solutions products are used commercially or in any rental or income producing activity, then this warranty is limited to one year from the date of purchase.

We will provide replacement product without charge, for any SeaStar Solutions product meeting this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such product were purchased, or to us at the appropriate address. In such a case SeaStar Solutions products found to be defective and covered by this warranty, will be replaced at SeaStar Solutions’ option, and returned to the customer.

The above quoted statement is an extract from the complete SeaStar Solutions products warranty statement. A complete warranty policy is available in our SeaStar Solutions products catalogue.

7.2 Return Goods Procedure

Prior to returning product to SEASTAR SOLUTIONS under warranty, please obtain a Return Goods Authorization number (claim number).

Be sure to label the goods with:
a) the name and address of the sender, and
b) the return goods authorization number (claim number)

Please address the returned goods as follows:

From U.S.A.
RGA # ?
SeaStar Solutions
c/o UPS-SCS
19308 70th Ave S.
Kent, WA 98032

From Canada
RGA # ?
SeaStar Solutions
3831 No.6 Road
Richmond, B.C.
Canada V6V 1P6