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INSTALLATION INSTRUCTIONS

AND OWNER'S MANUAL

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SEASTAR[™]

PIA

Hydraulic Power Assist for SeaStar
Steering Systems

Including: **SEASTAR[™]**
PRO PIA



SEASTAR
SOLUTIONS[®]

*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;

WARNING

Hazards or unsafe practices which could result in severe personal injury or death.

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.

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.

SAFETY INFORMATION

WARNING

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, fluid 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

CAUTION

-3 steering cylinders are fitted with ORB hose fittings. DO NOT use NPT fittings. irreparable damage to cylinder WILL occur.

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.
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 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 jackplate the above must also be performed at all the positions of the jackplate.
 - 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 Fluid Level and System Check as outlined on page 22 of this manual.

Safety Information Continued

WARNING

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 18 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 PFD.
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.

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

INTRODUCTION

Before proceeding with the installation, read these instructions thoroughly. SeaStar Solutions cannot accept responsibility for installations where instructions have not been followed, where substitute parts have been used, or modifications have been made to our products. Warranty may be void if products other than SeaStar Solutions products are used with this system.

NOTICE

Due to a small amount of internal hydraulic slip, a “master spoke” or “centered” steering wheel cannot be maintained with a Hydraulic Steering System. For best results, use an equal distance spoke steering wheel.

⚠ WARNING

DO NOT use a wire coil type trim switch with a hydraulic steering system. Wire coil can wind up tight around the steering wheel shaft and prevent further steering!

⚠ WARNING

SeaStar PRO Power Assist units are to be used with SeaStar PRO Helms ONLY!

PRO Trim offers fingertip trim or jackplate control with a column-mounted switch, enabling you to keep both hands on the steering wheel and concentrate on your driving. PRO Trim PT1000 controls trim or jackplate only. PRO Trim Dual PT2000 controls both functions.

NOTICE

This installation manual covers the entire, SeaStar and SeaStar PRO PA Series. Notes are made, when required, to cover any differences between the part numbers.

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The following Power Assist Units are covered in this installation manual. PA1200-2, PA1225-2 and PA1315-2.

BEFORE OPERATING YOUR BOAT

WARNING

The SeaStar P/A unit has been designed and tested for use with Marine Hydraulic Steering ONLY. It is not recommended for any other use. Not complying with this warning may result in property damage and/or personal injury or death.

Ensure that the following check list is carried out

1. With the P/A unit "OFF" (ignition off) perform a system pressure test by turning the helm all the way to hard over and then forcing the helm another one quarter to one half turn past the stop point.

Inspect the following areas for leaks.

- Inspect helm fittings
- Inspect P/A fittings
- Inspect cylinder fittings

Look for evidence of a leak. This test is to be done in BOTH directions. Any leak that is noticed will need to be repaired before operating the boat.

2. **Confirm that extruded nylon tubing has NOT been substituted for SeaStar/SeaStar PRO Hydraulic Steering hose.**
3. Confirm that there is no interference between the steering cylinder and the transom, splashwell or jackplate or any combination of these parts by performing these simple steps:
 - If installed on an outboard engine, with the engine fully titled, turn steering from hard over to hard over and confirm that NO interference occurs. If you are using a hydraulic jackplate this also must be performed at the top and bottom position of the jackplate. *(If interference is present, it **MUST** be eliminated with trim limiting switches and/or jackplate restrictors. Contact Jackplate manufacturer for advice if required.)*
 - Confirm that the steering cylinder can be stroked fully in both directions as well as full tilt and trim without stretching and/or kinking the hydraulic hoses.
 - Confirm that the hydraulic hose/tube are not subjected to chafing, rubbing or stretching. Stretched, kinked or chafed hose/tube will fail over a period of time leading to loss of steering control.

WARNING

Failure to comply with the above may result in loss of steering control, leading to collision with obstacle(s), ejection from vessel resulting in property damage and/or personal injury or death.

WARNING

Stretched, kinked or chafed hose will fail over a period of time.

CAUTION

If power to the unit is lost, the SeaStar Power Assist and SeaStar Power Assist PRO will revert to manual steering, requiring substantially more effort to turn the wheel.

WARNING

When working in an area where fumes from fuel are present, allow the fumes to disperse completely BEFORE doing any electrical connection to the battery. Failure to do so may result in an explosion and or fire.

SeaStar P/A Compatibility Chart

The P/A and P/A PRO are designed for use in recreational marine applications in conjunction with SeaStar and SeaStar PRO steering systems. Optimal performance will be obtained when used with SeaStar, or SeaStar PRO 1.4, 1.7 and 2.0 Helm pumps.

⚠ CAUTION

SeaStar nylon tube may **ONLY** be used for the compensating line. **DO NOT** use SeaStar Nylon tube to plumb any other portion of the steering system.

SeaStar P/A PRO is NOT to be used with SeaStar Hydraulic Steering, performance will be compromised. ONLY use P/A PRO with a SeaStar PRO Hydraulic steering system and ensure that SeaStar PRO (1500 psi) hose is used to plumb the entire system. (Nylon tubing may be used for the compensating/return line ONLY.

Tools

NOTICE

Use **ONLY** SeaStar products with the P/A units with ALL SeaStar systems. Failure to do so may void your warranty.

You will need the following tools to complete your installation.

- 1/2", 5/8", and 3/4" open end wrench.
- Electrical cut and crimp pliers.
- All other tools noted with your Helm Pump and Steering Cylinder Installation Instructions.

Specifications

NOTICE

The SeaStar Power Assist will automatically recognize the voltage level once it is connected to an on board power source (refer to page 14 for electrical connections).

⚠ WARNING

ONLY use SeaStar PRO Power Assist with a SeaStar PRO helm. DO NOT exceed peak operating pressure. 1000psi – Standard, 1500psi – Pro.

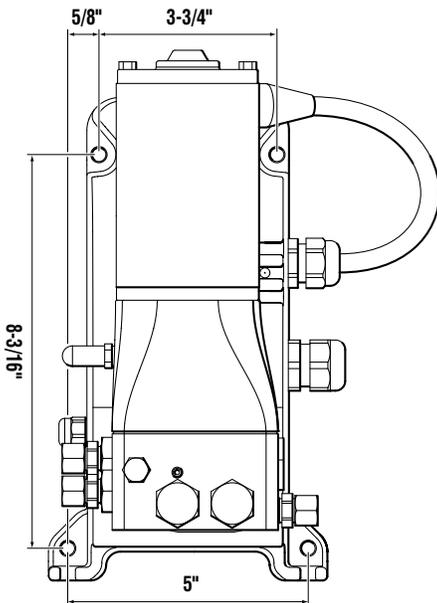


Figure 1.

SEASTAR POWER ASSIST 12/24V (PA1200-2 AND PA1225-2)

- 12/24 Volts (automatically recognizes)
- 1000psi MAX system peak pressure (500psi working loads)
- Relief pressure 2000psi
- MAX Current Draw = 50 amps
- Typical current draw = ~ 3 amps
- Purple ignition wire MAX current draw = 1 amp

SEASTAR PRO POWER ASSIST, 12/24V (PA1315-2)

- 12/24 Volts (automatically recognizes)
- 1500psi MAX system peak pressure (500psi working loads)
- Relief pressure 2000psi
- MAX Current Draw = 50 amps
- Typical current draw = ~ 3 amps
- Purple ignition wire MAX current draw = 1 amp

Part No.	Harness Length	Voltage (auto recognized)
PA1200-2	15'	12/24 Volt
PA1225-2	25'	12/24 Volt
PA1315-2	15'	12/24 Volt

HOW THE SYSTEM WORKS

SeaStar P/A (Power Assist) steering uses an electronically controlled hydraulic pump to provide “Power” for your SeaStar Hydraulic Steering system.

The SeaStar P/A system is comprised of two circuits: a hand operated manual system, which is the control element, and a hydraulic power pump, which is the working element.

The manual system consists of a helm pump with internal relief and check valves, as well as a built in reservoir. Two steering lines and a compensating line which provide a routing for fluid to transmit through the system, and a steering cylinder which moves the steering device on the boat from side to side.

The power system, is an electronically controlled hydraulic pump that boosts the fluid being sent from the helm pump to the steering cylinder (this will result in much easier effort at the wheel—even when under heavy loads). A compensating line connects the P/A unit to the helm pump, allowing the P/A unit to share fluid with the helm reservoir.

The SeaStar P/A is compatible with multiple steering stations, and with the use of an autopilot. In the event of a P/A power loss or failure the hydraulic system will automatically revert to a manual hydraulic system.

Typical installations shown (please refer to you cylinder installation manual for proper hose installation diagrams).

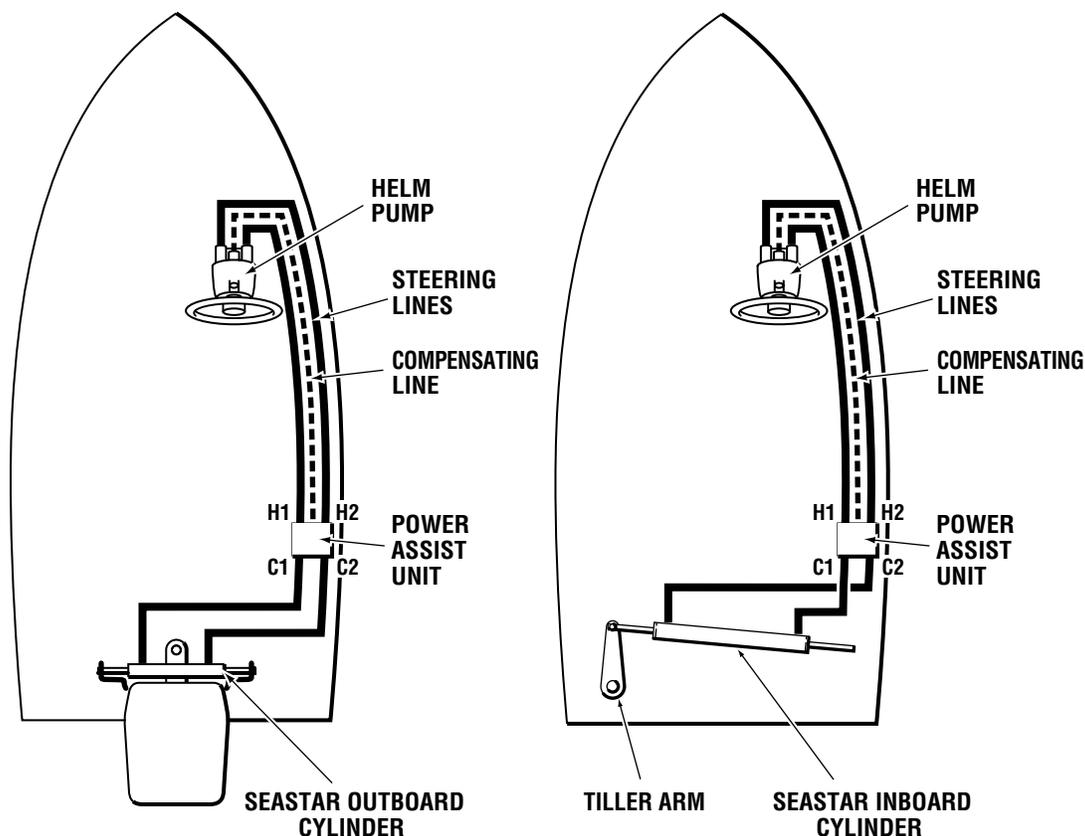


Figure 2.

THINGS YOU NEED TO KNOW

WARNING

SeaStar/SeaStar PRO Steering hoses **CANNOT** be cut. Cutting these hoses will render them useless. Failing to comply may result in possible loss of steering causing property damage, personal injury and/or death.

CAUTION

DO NOT use SeaStar Nylon tube with P/A unit, other than to plumb the compensating line. Use of SeaStar or SeaStar PRO steering hose is the **ONLY** hose recommended for use with the P/A unit.

CAUTION

Confirm that all components needed to complete the installation are purchased, including: helm pump, steering cylinder, hoses, fluid, fittings and pipe sealant such as Loctite PST, **NEVER USE TEFLON TAPE.**

CAUTION

Take **EXTREME** care not to allow any foreign material or contamination to enter the hydraulic system. Contamination is the main cause for a hydraulic system to wear and or fail. Keep protective caps on hose ends until ready to install onto the fitting.

NOTICE

*The SeaStar and SeaStar PRO Power Assist pump will automatically recognize the power source output (12/24Volt). If connecting SeaStar, or SeaStar PRO Power Assist directly to the battery, the connection **MUST** be fused in compliance with ABYC specifications.*

WARNING

The Power Assist Pump **MUST** be mounted in a **DRY** location. Care must be taken to avoid any gathering of water/moisture on or around the power assist unit. Failure to mount the Power Assist in a **DRY** location may result in irreparable damage to the unit and/or shorting of the battery which may result in property damage, personal injury and/or death.

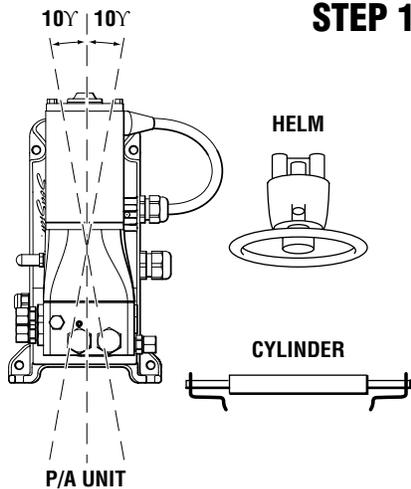
BEFORE STARTING

Study this manual and the other manuals provided with your SeaStar Steering system carefully, and thoroughly to familiarize yourself with all of the components and their intended or required mounting locations. Ensure there is adequate space available for installation of all components, hydraulic lines, and easy access for service. It is good practice to mount all components first, before running hoses. This allows port to port connection with less chance of an error. If you must run hoses first, a system of marking the various lines must be used. ALL hose ends must be closed with tape or similar material to prevent contamination. **Contamination is the most common cause of system failure.**

Read ALL bold print text, notes and cautions. Reading them now will help prevent unexpected surprises during the installation.

These instructions have been made as complete as possible, but as brief as practical. If you have any questions, contact your Distributor or SeaStar Solutions.

SYSTEM INSTALLATION OVERVIEW



STEP 1

System Installation

- Install SeaStar Helm pump onto the dash using installation instructions provided with your helm pump.
- Install Steering Cylinder into boat using the installation instructions provided with your steering cylinder.
- The P/A unit will make a noise similar to that of an autopilot; this should be taken into consideration if installing the P/A unit into a center console and/or in an area where noise is preferred to be limited. Install the P/A unit in a vertical position (see diagram) as close the steering cylinder as possible.

DO NOT mount the P/A unit in a horizontal position.

⚠ WARNING The P/A motor may be **HOT to the touch, DO NOT mount P/A in an area where fabrics and/or any other flammable material may come in contact with the P/A motor.**

- Install steering hoses using diagrams noted on page 8 through page 12, using your specific application.

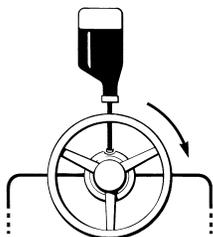
⚠ WARNING The SeaStar PRO system must use SeaStar PRO steering hoses.

NOTICE Due to the different cylinders options available with SeaStar Steering, be sure that you choose the correct installation diagram noted in this book.

NOTICE Hoses **MUST** be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

⚠ CAUTION

-3 Helm pumps are fitted with positionable O-ring style hose fittings. Do NOT attempt to install an NPT pipe fitting into a -3 helm hose fitting port. Doing so will lead to irreparable damage to the helm. **ONLY** use SeaStar Solutions O-ring style hose fittings.

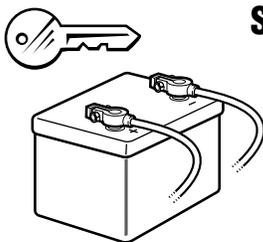


STEP 2

Filling and Purging Procedure

- Refer to steps 1 through 5, located on page 17 of this manual.

⚠ CAUTION **DO NOT** run the P/A unit until the SeaStar Steering System has been bled free of air. Failure to do so may result in non-repairable damage to the P/A unit.



STEP 3

Electrical Installation

- Refer to page 14 of this manual for electrical connection.

STEP 4

Final Purge and System Check

- Turn ignition ON and continue with the filling and purging instructions step 6 on page 20 of this manual.

SeaStar Outboard Front Mount Cylinders and I/O Cylinder

Outboard Front Mount Cylinders:

HC5345, HC5445, HC5375, HC5347, HC5348, HC6845, HC6345, HC6358, HC6845S and HC67XX (All Versions)

NOTE: includes -3 Models.

I/O Cylinder:
HC5332

⚠ CAUTION

ALL hose connections MUST be torqued to 15 ft-lb (20.34Nm).

NOTICE

Hoses MUST be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

HELM PUMP MODEL & DISPLACEMENT	WHEEL TURNS
1.7 cu.in. per revolution	5
2.0 cu.in. per revolution	4
2.4 cu.in. per revolution	3.5

⚠ WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

Single Cylinder Installations

Hose connection is as follows.

- Helm to P/A = S (helm) to H1 (P/A), P (helm) to H2 (P/A), lower R port (helm) to R (P/A).
- P/A to cylinder = C2 (P/A) to starboard side (cylinder), C1 (P/A) to port side (cylinder).

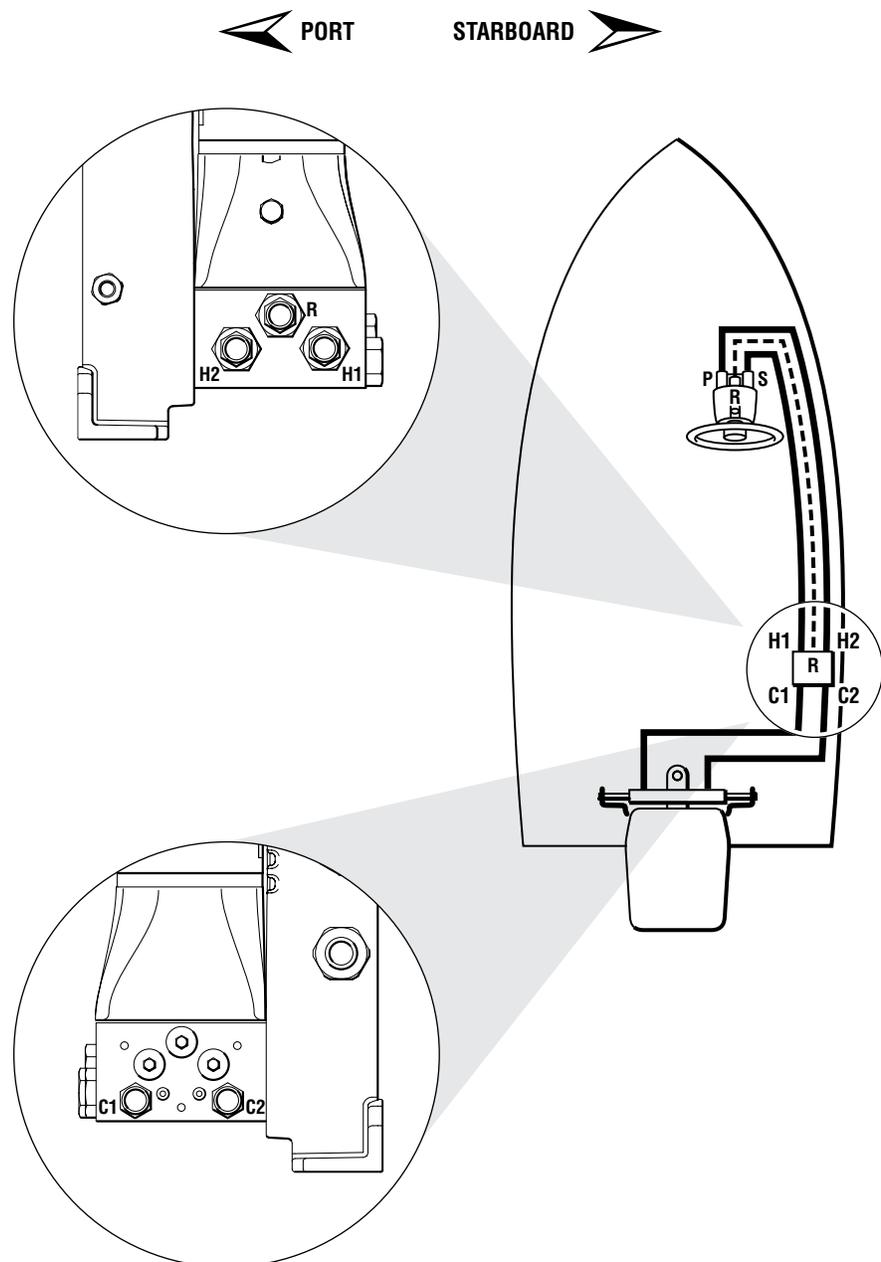


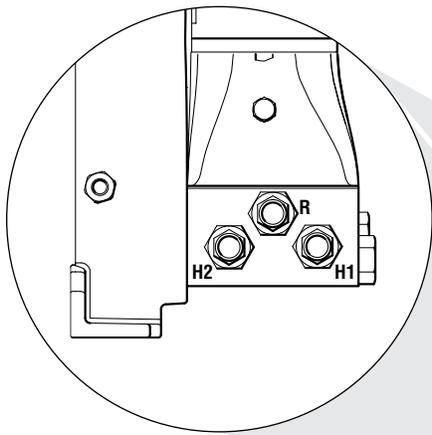
Figure 3.

Dual Cylinder Installations

NOTICE

Hoses *MUST* be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

HELM PUMP MODEL & DISPLACEMENT	WHEEL TURNS CONFIG. A 'PARALLEL'	WHEEL TURNS CONFIG. B 'SERIES'
1.7 cu.in. per revolution	10	5
2.0 cu.in. per revolution	8	4
2.4 cu.in. per revolution	6	3.5



CAUTION

ALL hose connections **MUST** be torqued to 15 ft-lb (20.34Nm).

WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

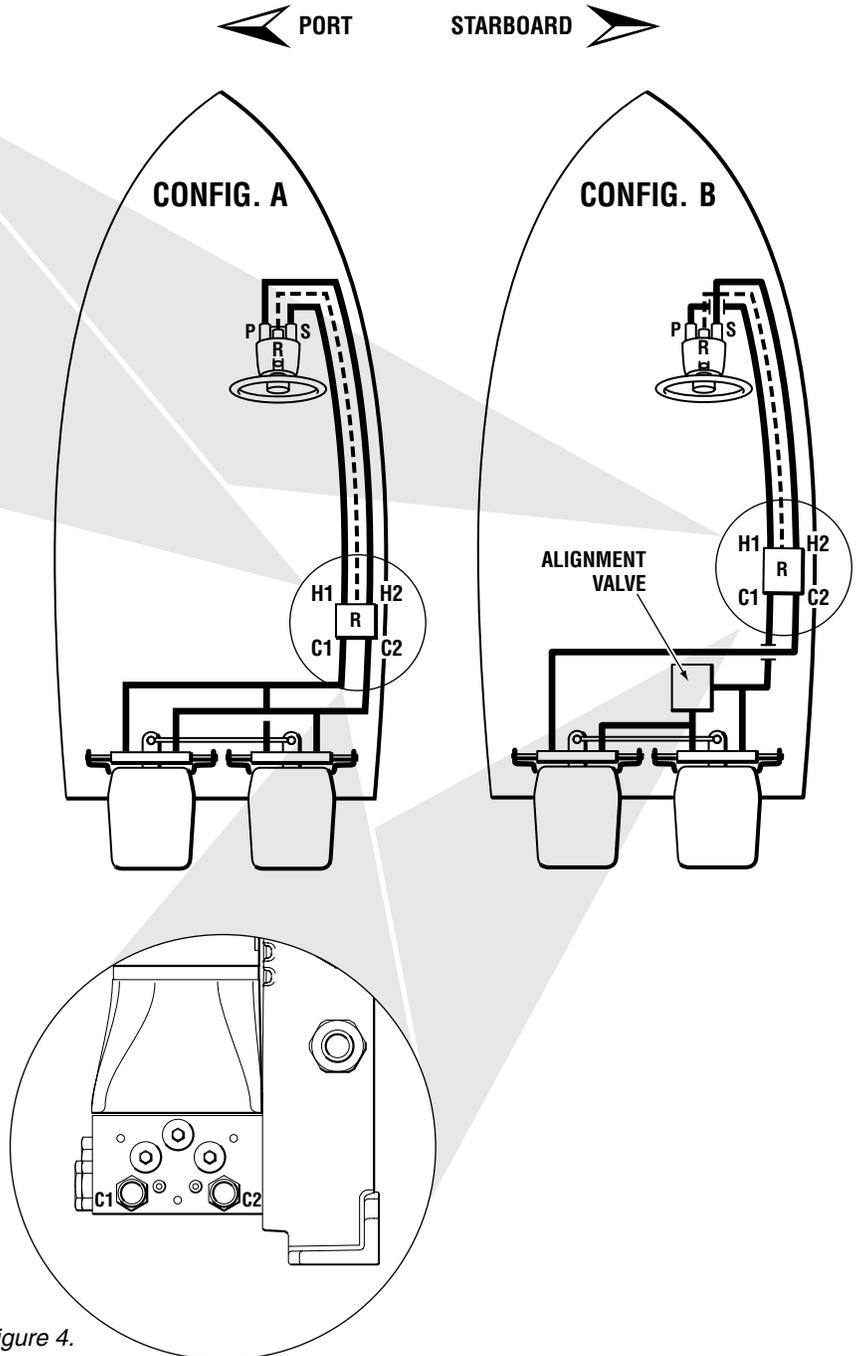


Figure 4.

SEASTAR POWER ASSIST

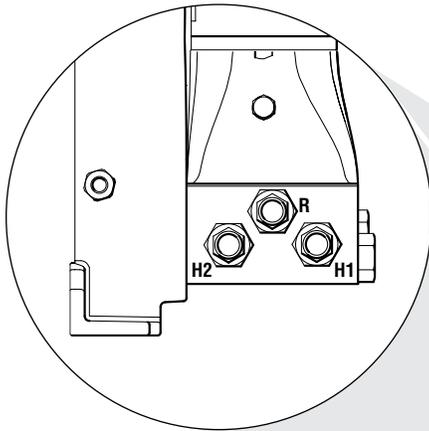
SYSTEM INSTALLATION

NOTICE

Hoses **MUST** be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

Triple Cylinder Installations

HELM PUMP MODEL & DISPLACEMENT	WHEEL TURNS CONFIG. C 'PARALLEL'	WHEEL TURNS CONFIG. D 'SERIES'
1.7 cu.in. per revolution	14.5	10
2.0 cu.in. per revolution	12.5	8
2.4 cu.in. per revolution	10.3	6



CAUTION

ALL hose connections **MUST** be torqued to 15 ft-lb (20.34Nm).

WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

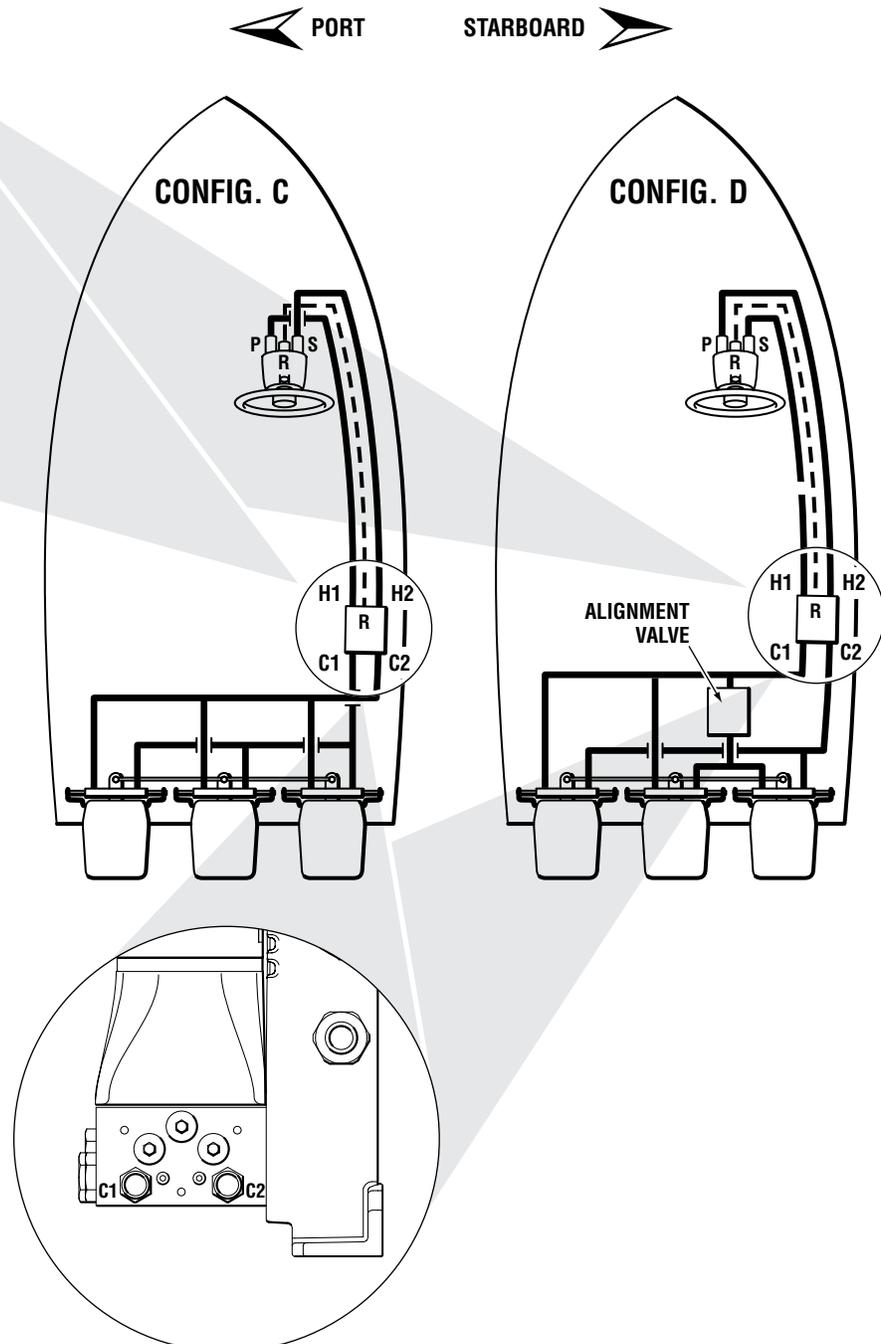


Figure 5.

SeaStar Outboard Side Mount and Splashwell Mount Cylinders

Side Mount Cylinder:
HC5370 and HC5370-3

Splashwell Cylinder:
HC5380 and HC5380-3

Hose connection is as follows.

- Helm to P/A = S (helm) to H1 (P/A), P (helm) to H2 (P/A), lower R port (helm) to R (P/A).
- P/A to cylinder = C1 (P/A) to starboard side (cylinder). C2 (P/A) to port side (cylinder).

NOTICE

Unbalanced cylinder will result in unequal wheel turns.

HELM PUMP MODEL & DISPLACEMENT	WHEEL TURNS HC5370	WHEEL TURNS HC5380
1.7 cu.in. per revolution	4.8/5.7	5.5/6.5
2.0 cu.in. per revolution	4.0/4.8	4.6/5.5
2.4 cu.in. per revolution	3.5/4.0	3.9/4.6

⚠ WARNING

DO NOT use SeaStar PRO systems with HC5370 side mount and/or HC5380 Splashwell mount cylinders as SeaStar PRO systems are not compatible with any unbalanced cylinder.

NOTICE

Hoses **MUST** be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

⚠ CAUTION

ALL hose connections **MUST** be torqued to 15 ft-lb (20.34Nm).

⚠ WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

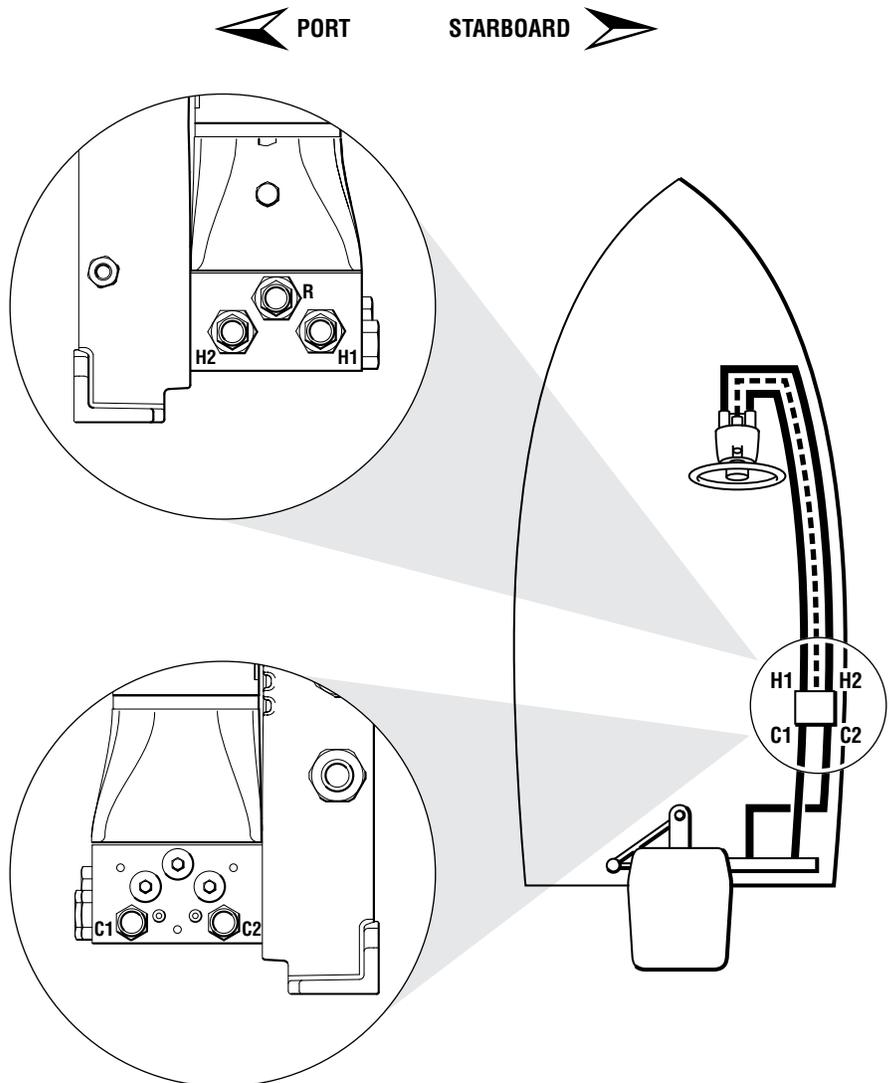


Figure 6.

SeaStar Inboard and Sterndrive Cylinders ALL

All Inboard & Sterndrive

Except: HC5332

Hose connection is as follows.

- Helm pump to P/A = S (helm) to H1 (P/A), P (helm) to H2 (P/A), lower R port (helm) to R (P/A).
- P/A to cylinder = C1 (P/A) to starboard side (cylinder), C2 (P/A) to port side (cylinder).

NOTICE

Hoses **MUST** be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

HELM PUMP MODEL & DISPLACEMENT	WHEEL TURNS				
	HC5312-2	HC5313	HC5314	HC5318	HC5319
1.7 cu.in. per revolution	4.2	5	6	6	8
2.0 cu.in. per revolution	3.6	4	5	5	6.8
2.4 cu.in. per revolution	3	3.5	4.2	4.2	5.7

CAUTION

ALL hose connections **MUST** be torqued to 15 ft-lb (20.34Nm).

WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

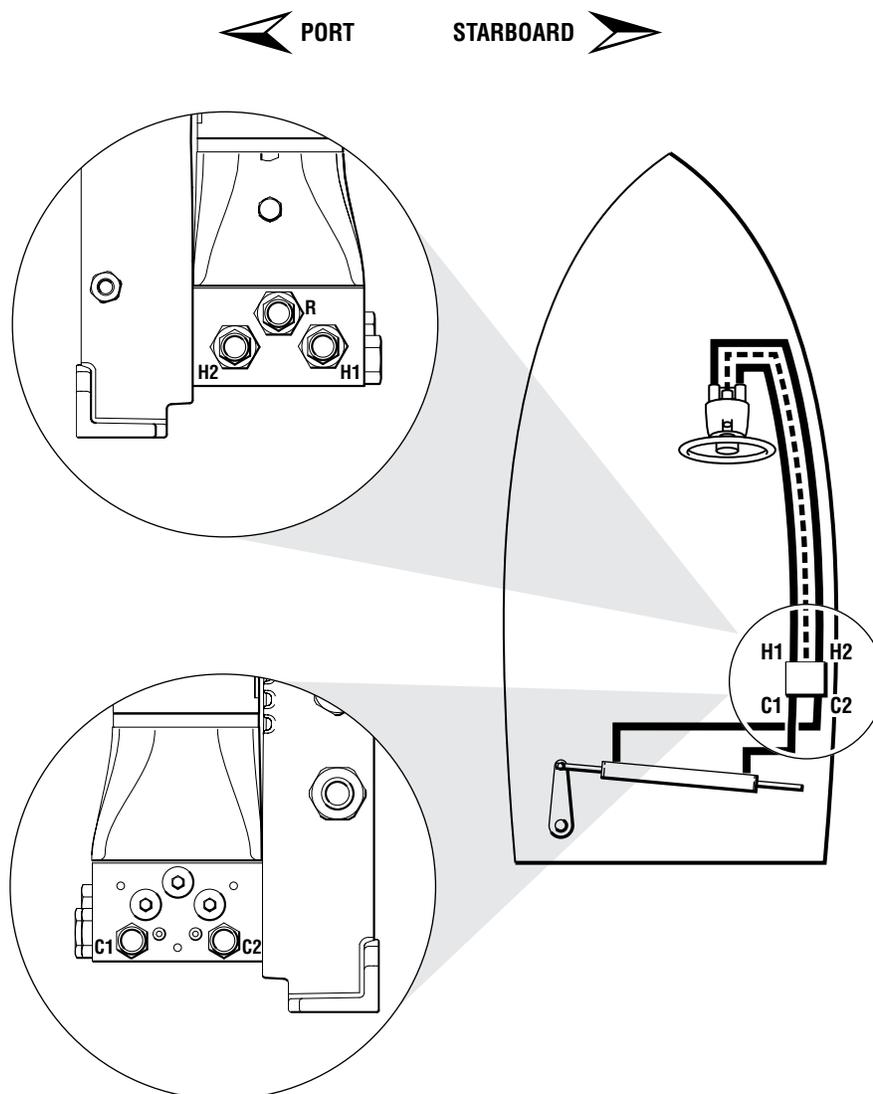


Figure 7.

Autopilot Connection Detail

NOTICE

Installation and operation can be simplified with the purchase of a SeaStar AutoPilot Pump and adapter kit HA1207. Contact SeaStar Solutions to ensure this will work with your autopilot controller.

NOTICE

Hoses MUST be at least 6' in length from the power assist to the helm pump, or, from the power assist to the cylinder(s).

⚠ WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

Hose connection is as follows.

- **Autopilot pump MUST be connected to the steering lines AFTER the P/A (see diagram below). The return R line MUST be tee'd into the system in front of the P/A unit (see diagram below).**
- Refer to page 8 through page 12 for you cylinder application.
- When bleeding, ensure that the autopilot Reservoir line is bled free of air at the same time the Power Assist Reservoir line is bled free of air. Autopilot pump must be run in both directions during the bleeding procedure, refer to page 20 for details.

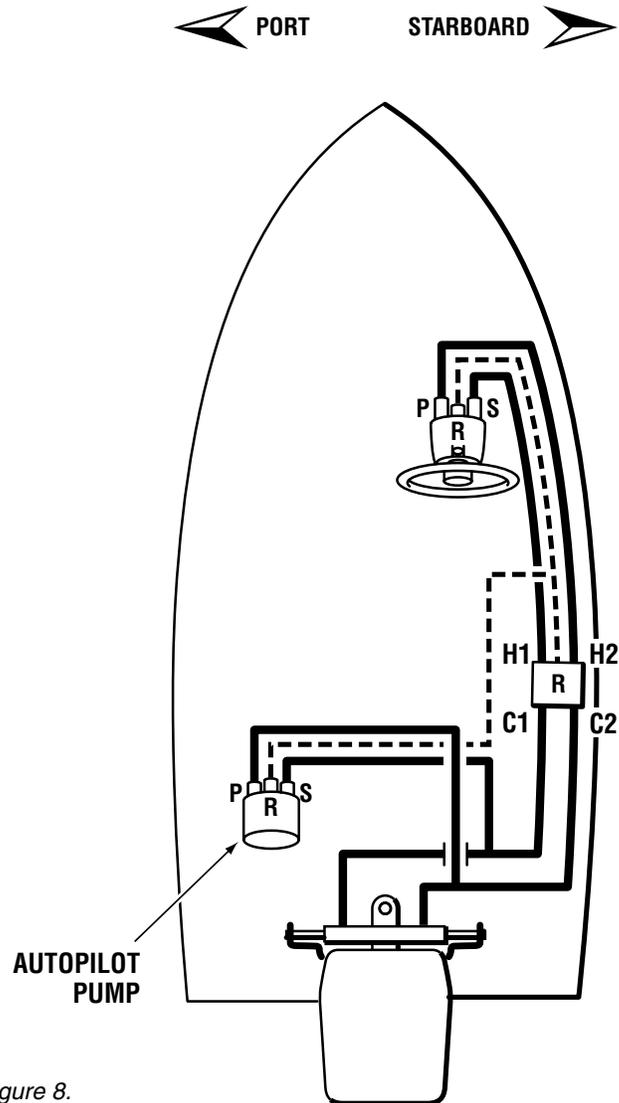


Figure 8.

Electrical Installation

⚠ WARNING

ALWAYS use ABYC compliant components in electrical installations of the Power Assist and any other electrical device being installed on board the vessel. Failure to do so may result in a fire and/or explosion leading to property damage, personal injury and/or death.

⚠ WARNING

Any electrical harness less than 72" in total length does not require an overcurrent protection device as per ABYC E11.12 OVERCURRENT PROTECTION. Any harness length EXCEEDING 72" in total length **MUST use an overcurrent protection device as per ABYC E11.12. Failure to **NOT** protect a harness may result in a fire and/or explosion leading to property damage, personal injury and/or death.**

It is good electrical practice to protect any harness, regardless of length, with an overcurrent protection device. SeaStar Solutions offers two options, both of which meet ABYC E11.12 OVERCURRENT PROTECTION.

- HA1206, in-line MAXI fuse
- HA1207, battery mount fuse

Referring to the wiring diagram on page 15 of this manual.

- Connect Red wire (+ positive) to the positive (+) supply
- Connect Black wire (– negative) to the negative (–) supply
- Connect purple wire (Power) to the ignition of the boat. Use of a two-position ON/OFF switch is recommended, use a fuse protected switch **ONLY**. Use of this switch will allow the helmsman to turn the Power Assist OFF in the case of power supply being limited.

NOTICE

The Power Assist wiring may be cut to length as per your installation.

NOTICE

Always use appropriate wiring terminals as per ABYC requirements.

NOTICE

If applicable, complete the wiring from the distribution panel to the boat battery in accordance to ABYC E-11.10 Load Calculation and E-11.16 System wiring.

Wiring Diagram

NOTICE

For multiple engine applications it is advisable to install a Dual Ignition Control Kit (part# HA1201). This kit will enable the Power Assist to work in the event an engine(s) may not be running.

! WARNING

DO NOT run the wires or hoses in areas where they may come in contact with battery acid or excessive heat, i.e. engine exhaust, manifolds or any other area that may damage the wires or hoses.

NOTICE

2 x 40 amp ATO/ATC fuses are located inside the rear panel of the SeaStar Power Assist Pump.

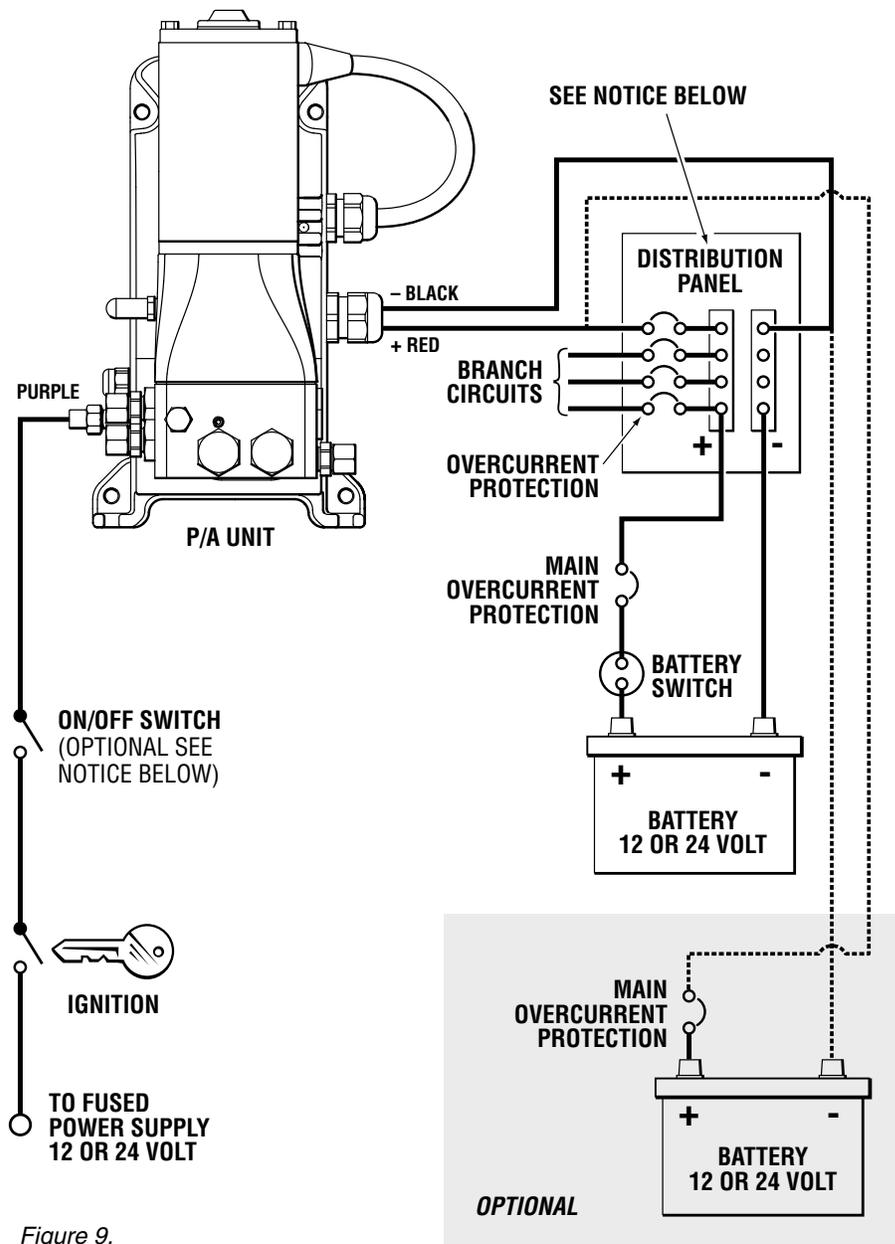


Figure 9.

NOTICE

Boats fitted with noise sensitive electrical equipment should run a separate distribution panel, or, connect directly to the battery as a good grounding practice.

NOTICE

It is recommended that a two position switch is purchased to allow the P/A unit to be turned off to help conserve battery power in a situation where battery power is limited. In order to prevent accidental P/A shut down, SeaStar Solutions recommends the use of a 12-Volt, 15 amp, ON/OFF, rocker style or push button style switch. ON/OFF switches are not available from SeaStar Solutions.

POWER PURGE FILLING AND PURGING THE SYSTEM

NOTICE

If system is plumbed with an 'Alignment Valve' as shown in Config. B (page 9), or Config. D (page 10) consult with your 'Liquid Alignment/tiebar Valve' Installation Manual (Book 9.1) for bleeding details.

NOTICE

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

Step 1

⚠ CAUTION

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

Removing Air from Return Line

- 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 10 on page 18 for bleed fitting location).
- Open reservoir bleed fitting 1 turn.

NOTICE

DO NOT OPEN MANUAL BLEED VALVE WHEN USING A POWER PURGER

- Turn ON the Power Purge unit and continue to run until NO air is visible leaving the P/A unit.
- Turn OFF Power Purge unit.
- Close reservoir bleed fitting and continue on with the following steps.

Step 2

- Ensure the reservoir bleed fitting is closed then remove the hose from the reservoir bleed fitting and connect to the steering cylinder bleeder fittings. Ensure the quick connect is locked onto the fitting.
- Open ALL Cylinder bleed fittings 1-1/2 turn.

NOTICE

DO NOT OPEN MANUAL BLEED VALVE WHEN USING POWER PURGE UNITS

- Turn Power Purge unit ON.
- Fluid should flow into and out of the helm pump. Wait twenty seconds for the helm to fill with fluid.
- Turn the steering wheel clockwise until the cylinder rod is fully extended (you may have to manually push the cylinder rod). SLOWLY continue to turn the wheel to hold the cylinder in this position for approximately 30 seconds. Ensure there are NO air bubbles escaping through the cylinder hoses.
- Turn the steering wheel counter-clockwise until the cylinder rod is fully extended (you may have to manually push the cylinder rod). SLOWLY continue to turn the wheel to hold the cylinder in this position for approximately 30 seconds. Ensure there are NO air bubbles escaping through the cylinder hoses.
- Turn OFF Power Purge unit.
- Tighten ALL bleed fittings on the steering cylinder(s).
- Repeat above steps with the Power Assist unit ON.

Step 3

Continue on with Fluid Level and System Check on page 22.

MANUAL FILLING AND PURGING THE SYSTEM

Read First

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

Hydraulic Fluid Requirements

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

NOTICE

Fluid can be re-used if filtered through a fine mesh screen such as that used for gasoline. If unable to filter fluid, 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 fluid is disposed of properly.

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

- 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 fluid bottle will decrease purge time.

- Open the manual bleed valve (see Figure 10) and reservoir bleed fitting (see Figure 10) on the power assist unit. The manual bleed valve should be opened two full turns.

SEASTAR POWER ASSIST

FILLING AND PURGING

- Fill helm with fluid, then, turn steering wheel to the starboard side until a steady stream of “air-free” fluid comes out of the reservoir bleed fitting on the Power Assist Unit.
- Close reservoir bleed fitting.
- Continue to turn the wheel to starboard another 15 turns after closing the reservoir bleed fitting and prior to closing the manual bleed valve.
- Close manual bleed valve and continue with Steps 2 – 5.

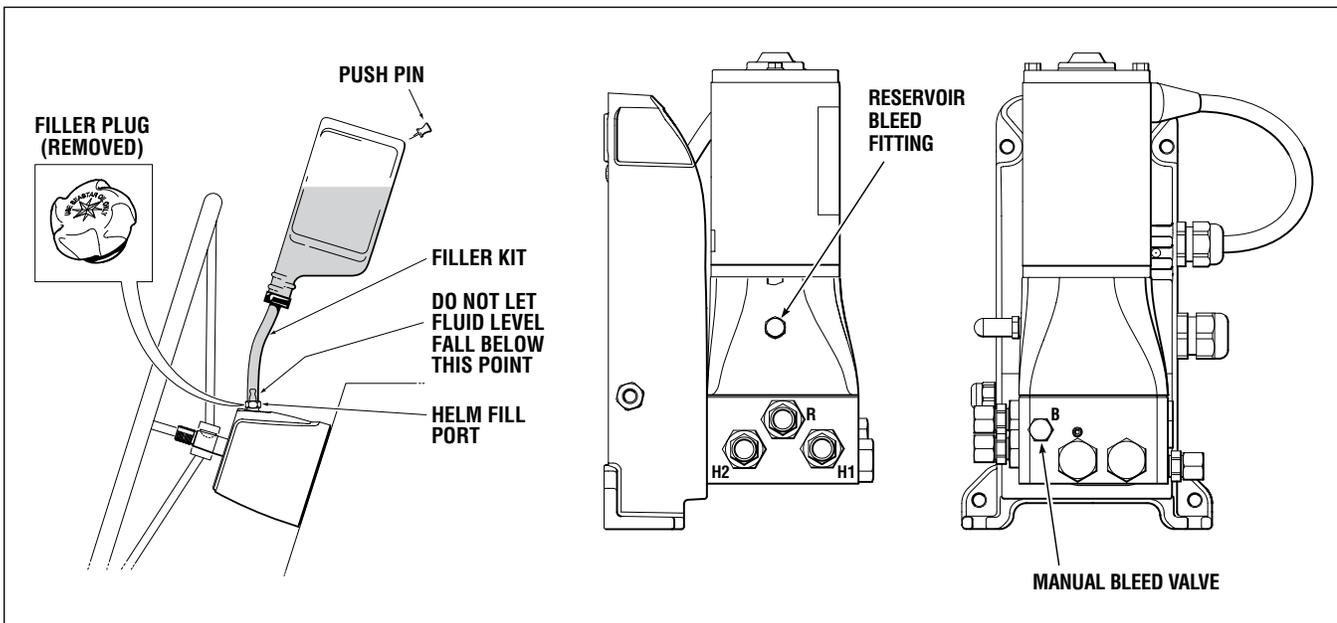
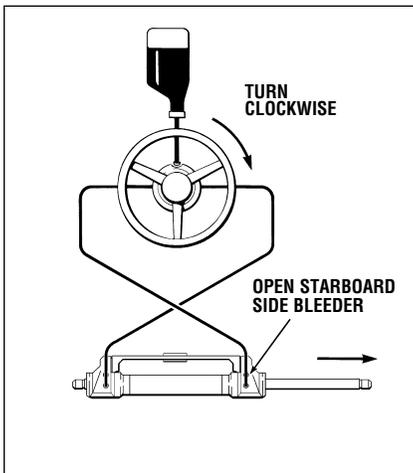


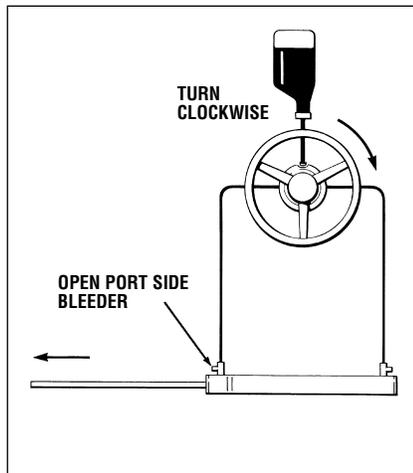
Figure 10.

Step 2

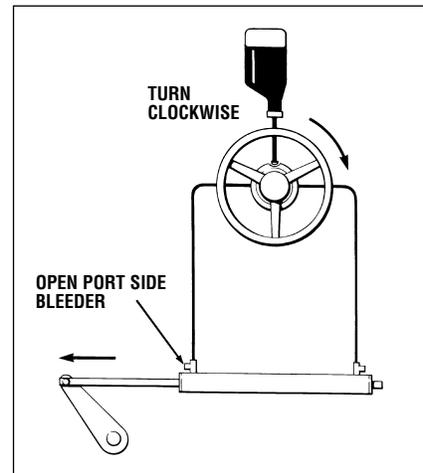
- Turn the steering wheel clockwise until the cylinder rod is fully extended on the proper side of the cylinder as shown below.
- Open bleed fitting as per your installation.



Outboard Front Mount & HC5332 Cylinder.



Side Mount / Splashwell Mount Cylinder.



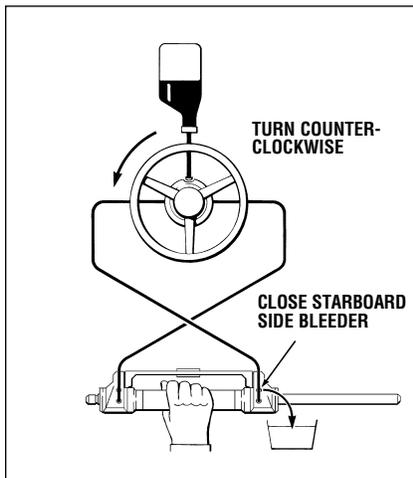
All Balanced Cylinder. Inboard & Sterndrive Cylinders.

Step 3

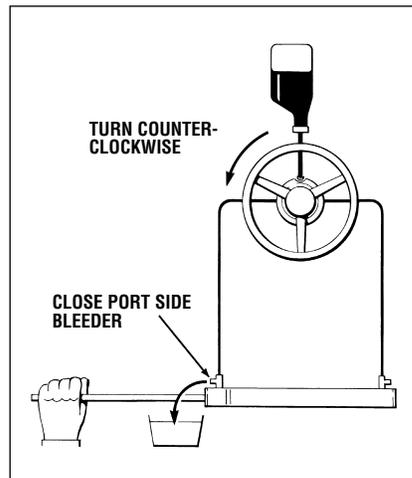
- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel counter-clockwise until a steady stream of air free fluid comes out of the bleeder. (Drain approx. 1/2 bottle of fluid or as required).

Do not use anything other than your hands to restrain the cylinder body/rod.

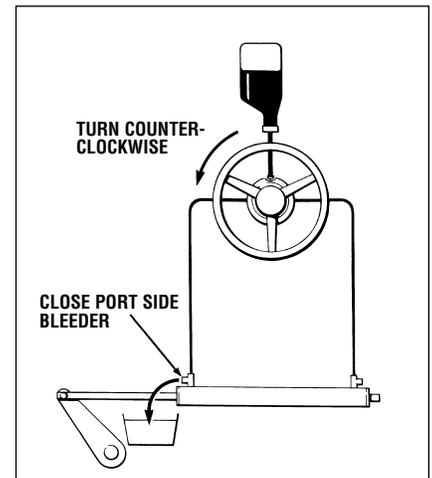
- While continuing to turn the wheel close the bleed fitting for your application and let go of the cylinder body/rod.



Outboard Front Mount & HC5332 Cylinder.



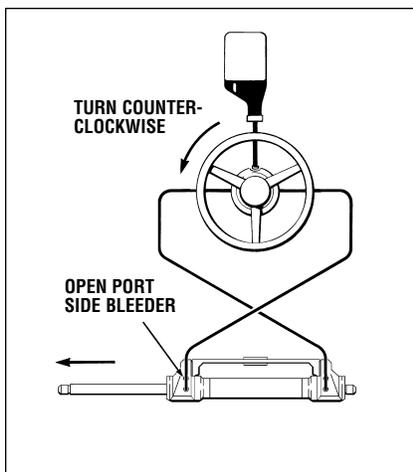
Side Mount / Splashwell Mount Cylinder.



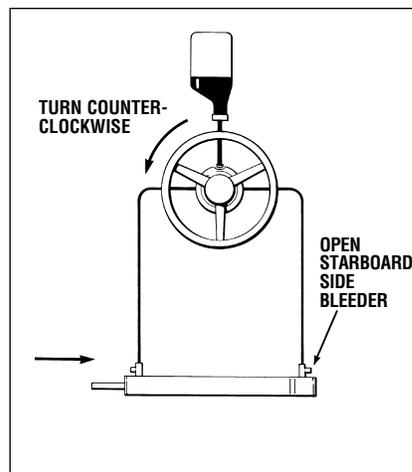
All Balanced Cylinder. Inboard & Sterndrive Cylinders.

Step 4

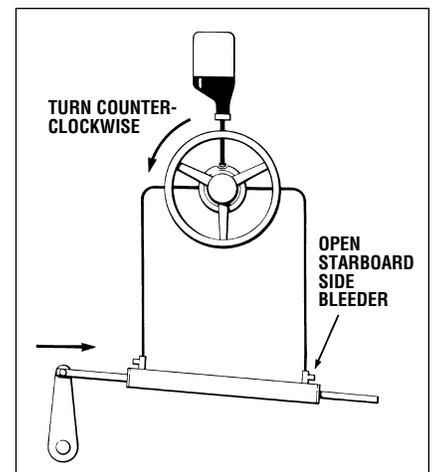
- Continue turning the steering wheel counter-clockwise until the cylinder to the rod is fully extended proper side of the cylinder as shown below. (Steering wheel will come to a stop).
- Open bleed fitting as per your installation.



Outboard Front Mount & HC5332 Cylinder.



Side Mount / Splashwell Mount Cylinder.



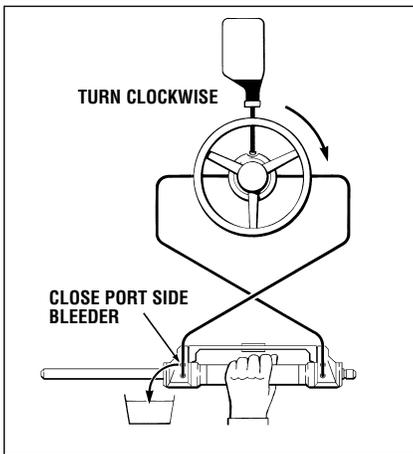
All Balanced Cylinder. Inboard & Sterndrive Cylinders.

Step 5

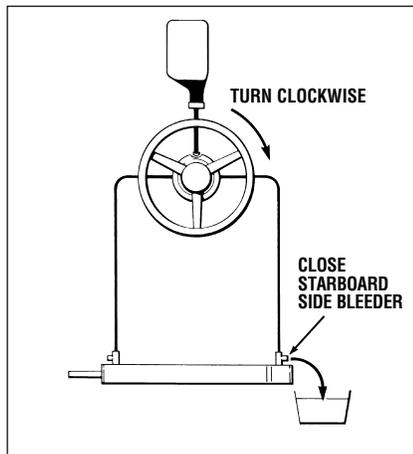
- Holding the cylinder body (Front Mount cylinder) or rod (Side Mount cylinder) to prevent the body/rod from moving, turn the steering wheel clockwise until a steady stream of air free fluid comes out of the bleeder.
- While continuing to turn the wheel close the bleed fitting for your application and let go of the cylinder body/rod.

⚠ CAUTION

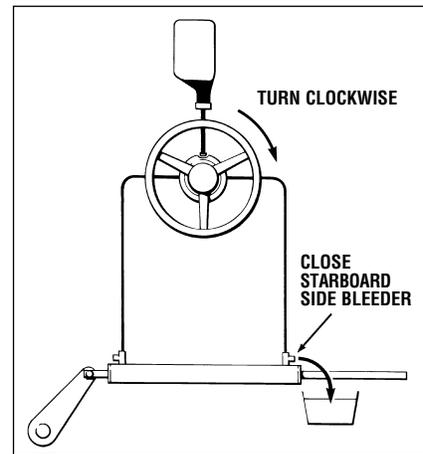
Prior to operating system, perform Fluid Level and System Check, refer to page 22.



Outboard Front Mount & HC5332 Cylinder.



Side Mount / Splashwell Mount Cylinder.



All Balanced Cylinder. Inboard & Sterndrive Cylinders.

Step 6

- Complete electrical connections as outlined in your Installation Owner's Manual.
- Repeat Steps 2 – 5 of purging instructions with the P/A unit "ON"

NOTICE

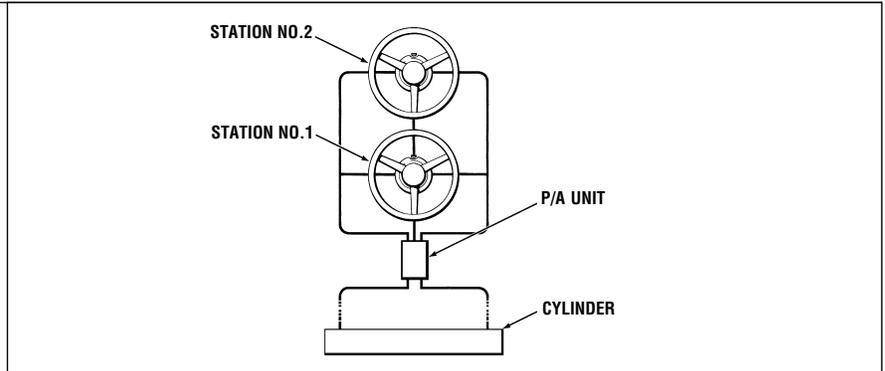
Be sure to remove ALL air from the autopilot reservoir line.

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 and Step 5.

Twin Station Single Cylinder

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

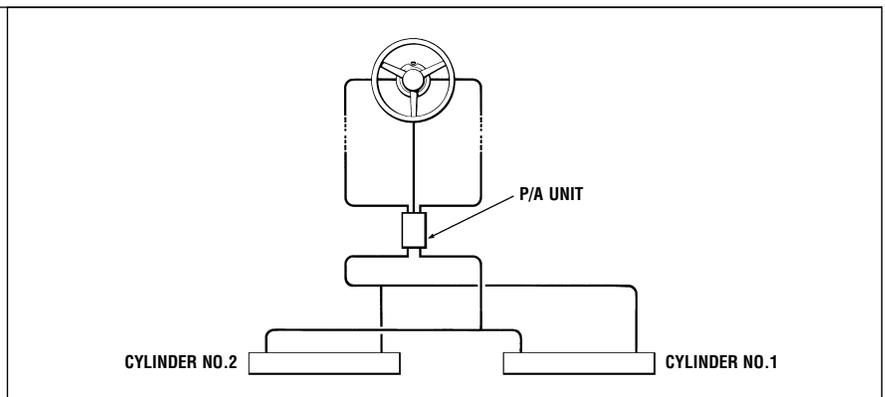
Note: Refer to Fluid Level and System Check on page 22.



Single Station Twin 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 starboard side of cylinder first on cylinder no. 1 and then on cylinder no. 2.

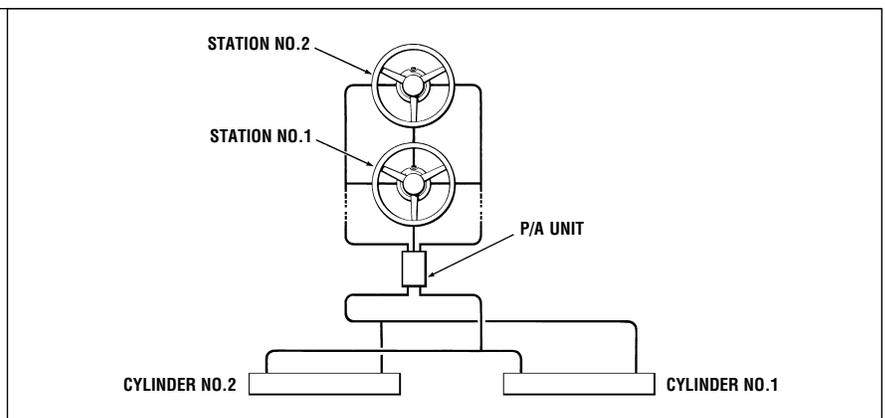
Note: Refer to Fluid Level and System Check on page 22.



Twin Station Twin 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 Fluid Level and System Check on page 22.



Fluid Level and System Check

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.

- Turn steering wheel to hard over, then force the wheel another one quarter to one half turn past the stop point. Check the following areas for evidence of a leak.
 - Helm fitting connections
 - P/A fitting connections
 - Cylinder fitting connections
- Repeat above steps to the other steering direction.
- Any sign of a leak **MUST** be repaired prior to operating the boat.
- 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.

NOTICE

Helms mounted with the wheel shaft completely horizontal must be filled to the bottom of the filler hole at all times. Do NOT allow the fluid level to drop more than one-quarter inch below the filler hole.

NOTICE

Helms mounted on a 20 degree angle or with the wheel shaft vertical MUST have the fluid level within 1/2" of the filler hole, refer to the diagram below.

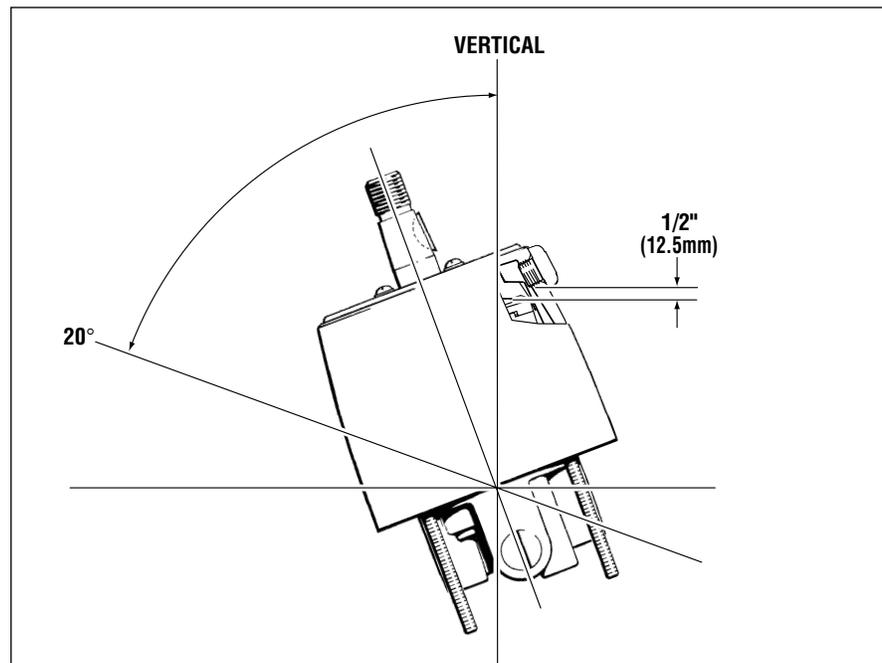


Figure 11.

TROUBLESHOOTING GUIDE

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.

WARNING

SeaStar Solutions does NOT recommend disassembly of a Power Assist, 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	CAUSE	SOLUTION
1. P/A unit does not turn on.	Blown Fuse/Breaker	Replace 'external' fuse if blown first. Replace 'internal' fuse if blown second. Or, reset breaker. NOTICE 2 x 40 amp ATO/ATC fuses are located inside the rear panel of the SeaStar Power Assist Pump. WARNING If it is necessary to replace the fuse(s) in the Power Assist Unit, ensure the Power Assist Unit is turned OFF.
	Wrong electrical connections	Refer to wiring diagram and location of fuse on on page 15.
2. Turns the wrong way	Lines reversed	Review the plumbing diagrams for your system noted on page 8 through page 12, confirm that your hoses are hooked up correctly.
3. Wheel is bumpy	Air in system	Re-Bleed. Concentrate on remaining air in the P/A unit. Autopilot has not been bled as per instructions.
4. Helm locks up in both directions	Hoses installed in the wrong ports.	Review the plumbing diagrams for your system noted on page 8 through page 12, confirm that your hoses are hooked up correctly.
	Kinked or collapsed line	Check ALL lines for sign of a collapsed or kinked line.
5. Helm only turns in one direction and free wheels in the other	Port or Starboard line is connected to the reservoir R port on the P/A unit.	Review the plumbing diagrams for your system noted on page 8 through page 12, confirm that your hoses are hooked up correctly.

FAULT	CAUSE	SOLUTION
6. Steering is very hard (stiff)	P/A unit is not turned on. Partially kinked or collapsed line. H1, H2 or R port screen filters are plugged with contamination.	See fault #1 Check ALL lines for a sign of a collapsed or kinked line Remove H1, H2 and R hose and fittings. Clean screens located in the adapter fittings.
7. No Power Assist, Lights are blinking.	Note sequence of blinking lights	See this page for details
8. After hitting hard over and/or running at high loads with the SeaStar PRO Power Assist, the effort at the wheel increasing dramatically.	Helm is super charging	Super charging is a normal occurrence with ALL PRO systems, while running at higher loads and/or hitting the hard over point. This should not be taken as a fault in the system.
9. The power assist unit is really hot to the touch.	Motor operating	This is a normal occurrence with the Power Assist unit; mount the P/A in an area where it can not easily be handled and away from flammable materials.
10. Lock to lock wheel turns are different with the power assist “off” than with the power assist “on”.	Hitting hard-over causing hose expansion. Power assist is pressurizing system.	This is a normal occurrence when using the power assist system. This is a normal occurrence when using a power assist.
11. Noise interference through radio, VHF, stereo or sonar devices when the power assist is turned ON and operating.	Power Assist wired to same distribution panel as noise sensitive equipment. Sensitive equipment is not meeting immunity standards.	Wire Power Assist to separate distribution panel or direct to the battery. Add noise suppression/isolation between power source and sensitive equipment.

NOTICE

The Green and Red lights are used to show the status of the SeaStar Power Assist Units. Below is a quick list as to what the lights refer to. Any fault within the Power Assist Unit will be acknowledged via the RED light flashing in the sequences noted below.

- **GREEN. Steady (no flash)**
Normal operation.
- **RED. Two flashes, long pause**
Standby mode, lack of calibration.
SOLUTION: Contact SeaStar Solutions.
- **RED. Three flashes, long pause**
Calibration mode.
SOLUTION: Turn OFF ignition, after one minute, turn ignition ON. If problem persists, contact SeaStar Solutions.
- **RED. Four flashes, long pause**
Tuning mode.
SOLUTION: Turn OFF ignition, after one minute, turn ignition ON. If problem persists, contact SeaStar Solutions.
- **RED. Five flashes, long pause**
Over-voltage mode.
SOLUTION: Check ignition and battery voltage. MUST be less than 32Volts, correct as required.

ACCESSORIES

SeaStar P/A Dual Ignition Control Kit Part# HA1201

NOTICE

For each and every engine fitted after two (triples, quads... etc.), you will require one more HA1201 kit per engine being added.

The Dual Ignition Control Kit is designed to connect the P/A unit's ignition wire to two engines allowing one engine to be turned off and retain power assist control.

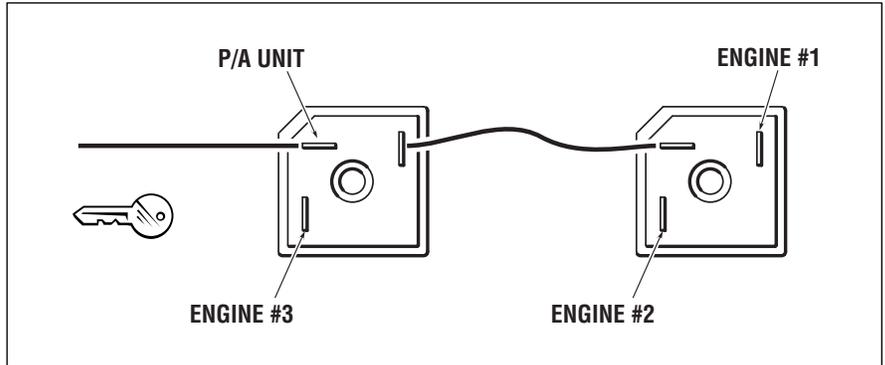


Figure 12.

SeaStar Power Purge JR Part# HA5445-2

SeaStar®/BayStar™ Power Purge Jr. is the quickest way to bleed a SeaStar®/ BayStar™ system in the field and assure a rock-solid steering feel every time!

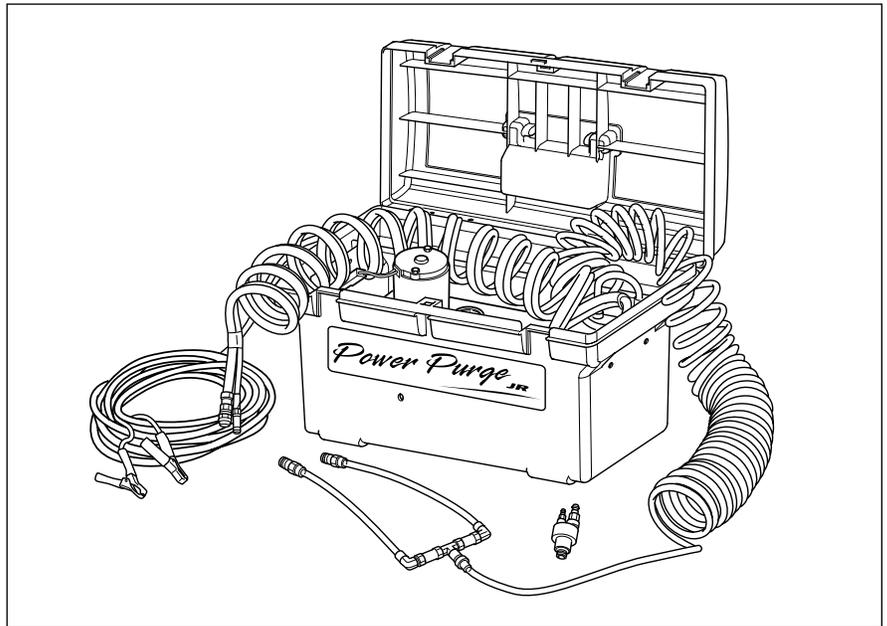
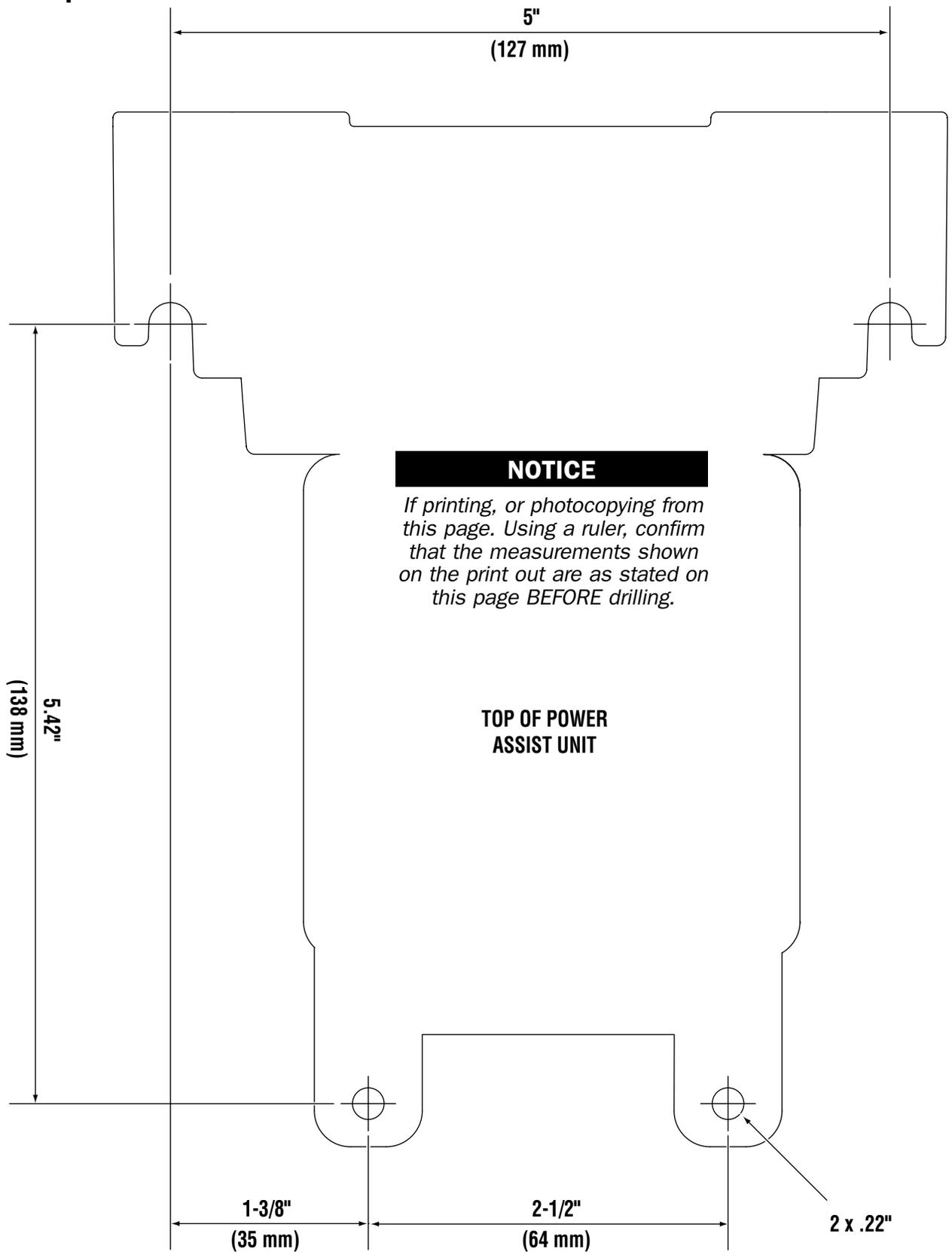


Figure 13.

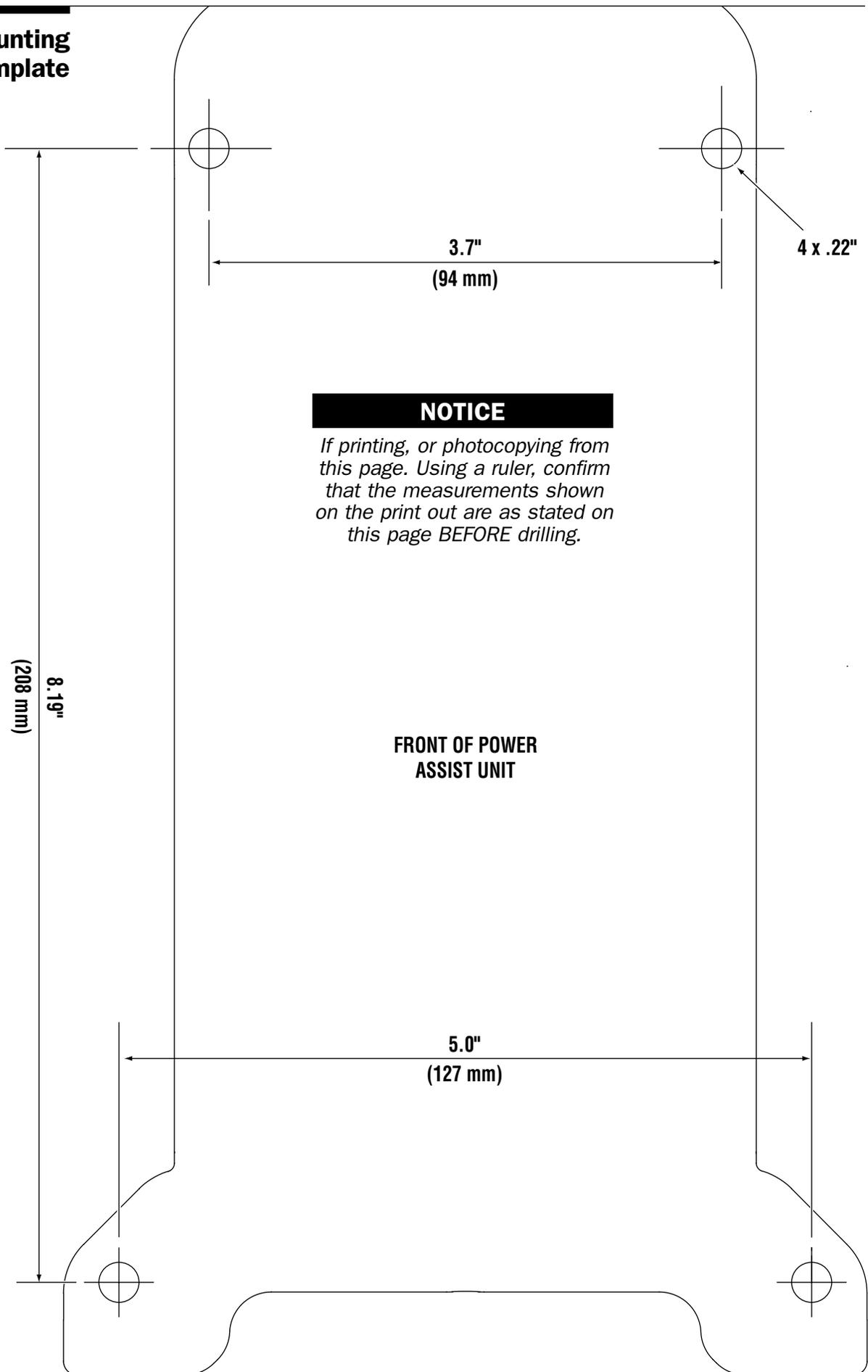
Advantages:

- Steering feel is solid every time
- Complete Fill & Purge in 10 minutes or less
- Fast and efficient
- Easy to operate
- Screens contaminants from fluid
- Quick connect fittings
- Convenient portable size
- Convenient electrical hook-up utilizing 12 volt boat battery
- Optional Dual Cylinder Purging Kit HA5461 available
- Optional 50' Hose Extension Kit HA5462, for longer runs

Floor Mounting Template



Wall Mounting Template



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.

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

Technical Support

Phone: 604-248-3858

email: seastar@seastarsolutions.com

Hours: Monday - Friday 05:00 – 15:30 PST

Web: www.seastarsolutions.com



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ISO 10592



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