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MARINE

MANUFACTURED BY
TELEFLEX CANADA LIMITED
PARTNERSHIP

INSTALLATION INSTRUCTIONS

SUPPLEMENTAL

www.seastarsteering.com




SeaStar®

Traditional Tilt Helm & Sport Tilt Helm
Hydraulic Steering




*Before you do it your way,
please try it our way*

Notice to Boat Manufacturer or Installer

Throughout this publication, Warnings and Cautions (accompanied by the International Hazard Symbol ) are used to alert the manufacturer or installer to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly.

Observe Them Carefully!

These “safety alerts” alone, cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the installation and maintenance plus “common sense” operation are major accident prevention measures.

 DANGER	 WARNING	 CAUTION	NOTICE
Immediate hazards which WILL result in severe personal injury or death.	Hazards or unsafe practices which COULD result in severe personal injury or death.	Hazards or unsafe practices which COULD result in minor injury or product or property damage.	Information which is important to proper installation or maintenance, but is not hazard-related.

WARNING

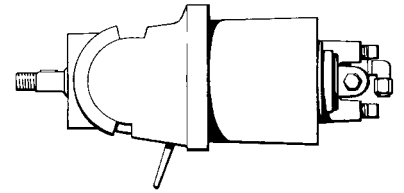
Cleaning fluids containing ammonia, acids or any other corrosive ingredients MUST NOT be used for cleaning any part of this Hydraulic Steering System. Failure to comply will cause serious damage to the steering system, resulting in possible loss of steering, causing property damage, personal injury and/or death.

Don't compromise performance... use genuine SeaStar parts only!

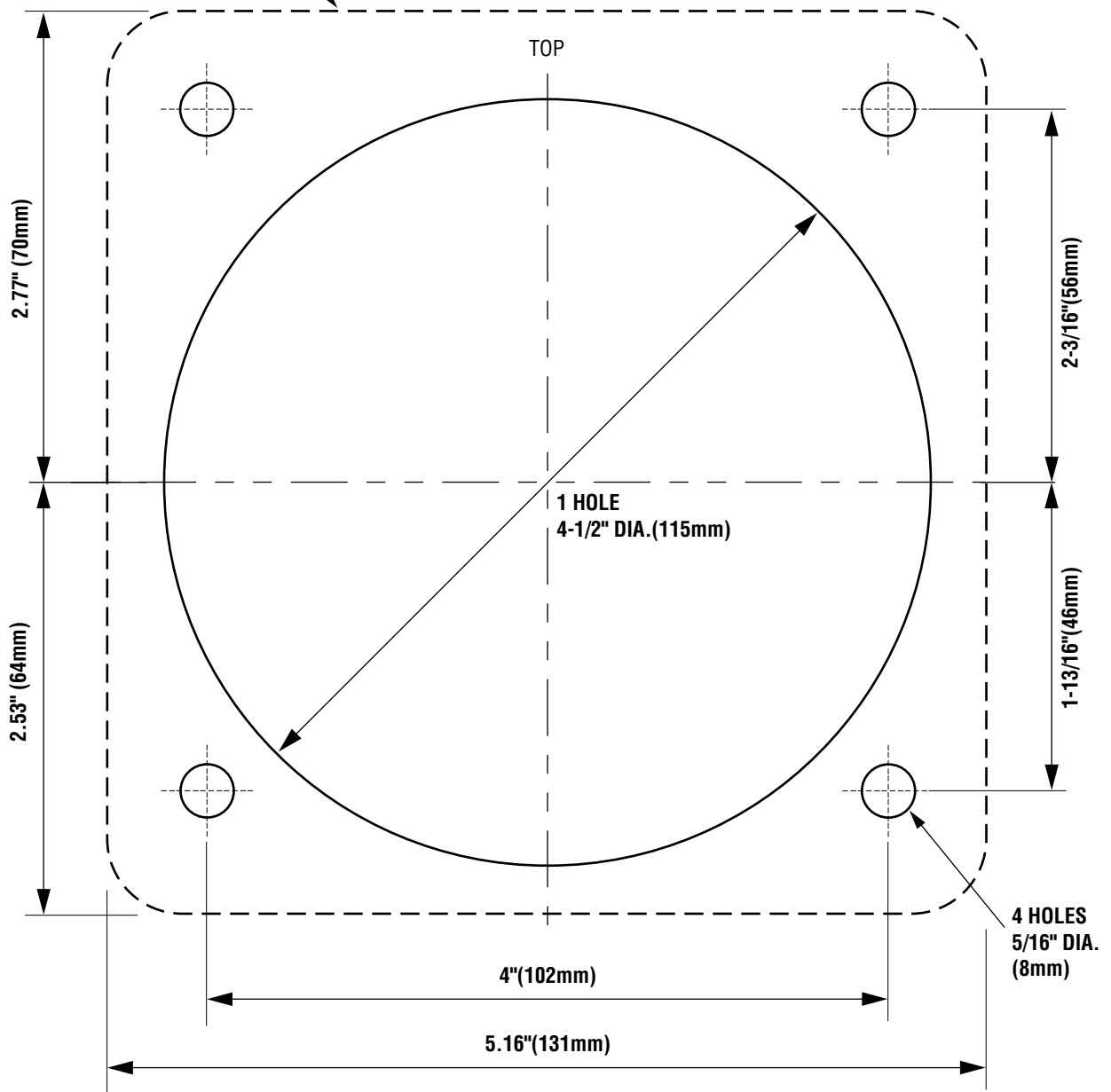
- SeaStar helms
- SeaStar hoses
- SeaStar Cylinders
- SeaStar Oil

Substituting non SeaStar parts in any part of the SeaStar hydraulic steering system, may seriously compromise system performance.

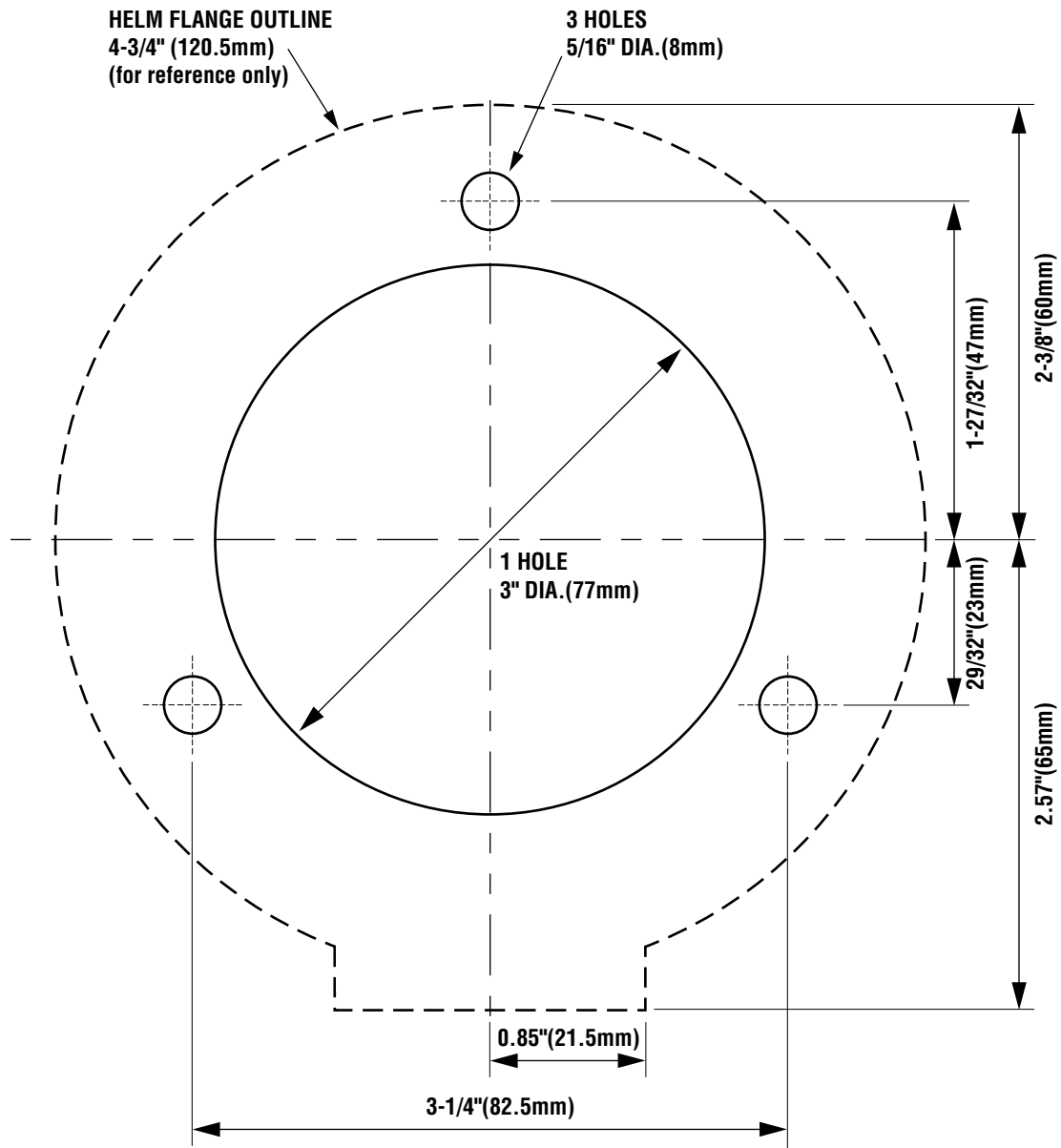
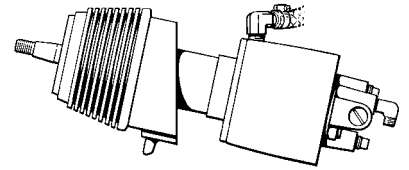
A) Traditional Tilt Helm Mounting Template



HELM FLANGE OUTLINE
 5.16" x 5.3" (131 x 135mm)
 CORNER RADIUS 0.44" (11mm)
 (for reference only)



**B) Sport Tilt Helm
Mounting Template**



MOUNTING THE HELM

⚠ WARNING

Use self-locking type fasteners only; substituting non-self locking fasteners can result in loosening or separation of equipment and loss of steering control.

Do not exceed 110 in.-lbs. (12 Nm) torque on helm nuts bolts.

Mount the SeaStar helm to the dash board as required for your model-application. Refer to instructions and use appropriate mounting template.

The helm may be mounted with the helm shaft horizontal, vertical or any angle in between.

The filler port must always be in the uppermost position.

⚠ CAUTION If more than one steering station is installed, the fill-vent plug on all but the uppermost helm must be replaced with a non-vent plug which is included in a dual station fitting kit. (Part# HA5432).

⚠ CAUTION

Fittings inserted in the rear of the helm should be installed until finger tight and then turned an additional 1-1/2 to 2-1/2 turns depending on desired orientation of fitting. **DO NOT exceed 156 in./lbs (17.6 Nm).**

Use a pipe sealant such as Loctite P.S.T. or equivalent on all pipe threads. Do not use "tape" sealers.

Dashboard Mounting Templates

Mounting templates for:

A) Traditional Tilt Helm (see page 3)

B) Sport Tilt Helm (see page 5)

1. Select the required template for your application A or B.
2. Tape Template to dash and use center punch for locating holes on dash, or photocopy if required to use as a drilling template.
3. Before drilling holes, check that helm location will allow unrestricted operation of the steering wheel in all tilt positions and will not interfere with other functional equipment.
4. Drill the required diameter center hole and the specified number and size of mounting holes, positioned as shown.

Traditional & Sport Tilt Helm Models

	Part Number	Description	Seal Kit	Shaft Seal Only
Traditional Tilt Helms (Page 8)	HH5741	1.7 SeaStar Traditional Tilt	HS5176	225226
	HH5742	2.4 SeaStar Traditional Tilt	HS5176	225226
	HH5743	2.0 SeaStar Traditional Tilt	HS5176	225226
	HH5773	1.7 SeaStar Pro Traditional Tilt	HH5176	225226
	HH5774	2.0 SeaStar Pro Traditional Tilt	HH5176	225226
	HA5253	Replacement Tilt Mech. ONLY	N/A	N/A
Sport Tilt Helms (Page 10)	HH5290	2.0 SeaStar Pro Sport Tilt	HS5176	225226
	HH5291	1.7 SeaStar Sport Tilt	HS5176	225226
	HH5292	2.4 SeaStar Sport Tilt	HS5176	225226
	HH5745	2.0 SeaStar Sport Tilt	HH5176	225226
	768446	Replacement Sport Tilt Mech.	N/A	N/A

Accessories	Part No.	Description	Part No.	Description
	HA5450	Remote Fill & Vent Kit	HA5431	Vented Filler Cap
	HA5430	SeaStar Hydraulic Fluid	HA5432	Non-Vented Filler Cap
	HA5438	Filler Kit	747521	Jam Nut (Helm Shaft)

Traditional Tilt Helm

Part #'s HH5741, HH5742, HH5773 & HH5774

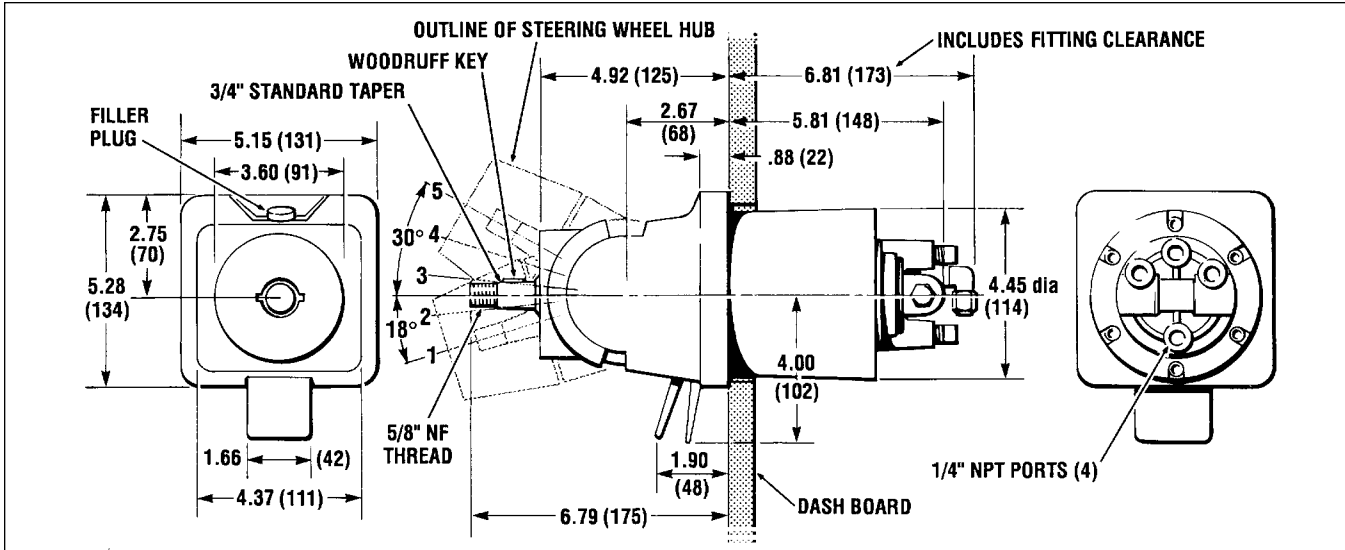


Figure 1

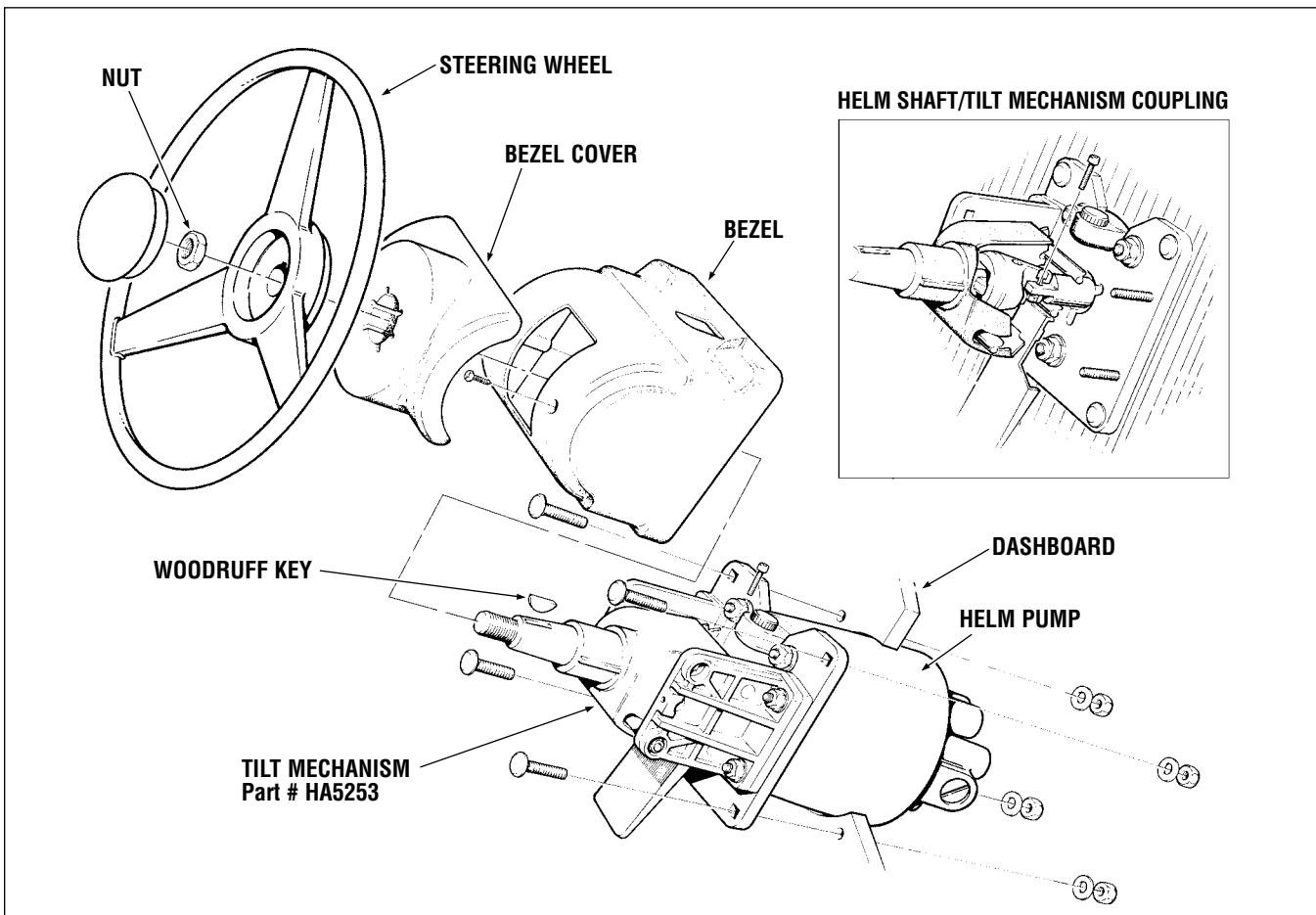


Figure 2

Traditional Tilt Helm

Step 1

Determine desired mounting position. Ensure that the steering wheel can be tilted in all 5 (five) tilt positions without interfering with other functional equipment. Check for adequate space behind dash or console to accommodate the helm pump, fittings and line connections.

Step 2

Using helm mounting template 'A', carefully drill with a hole saw or cut out the 4 1/2" (115mm) dia. hole and drill the four 5/16" (8mm) dia. mounting holes.

Step 3

Mount the tilt mechanism to the dash using the four (4) 1/4" NC x 2-1/2" long bolts, washers and self-locking nuts.

WARNING

Use self-locking fasteners provided only; substituting non-self locking fasteners can result in loosening or separation of equipment and loss of steering control.

Do not exceed 110 in.-lbs. (12 Nm) torque on helm nuts and bolts.

Step 4

Mount the tilt bezel to the tilt mechanism with the two (2) No. 6 x 3/4" screws.

Step 5

Slide the bezel cover onto the tilt mechanism wheel shaft hub.

Note: The decal on the bezel cover indicates which way up it goes. Now check the tilt mechanism for proper operation. Five (5) tilt positions are available. Make Certain that the tilt mechanism locks in each position.

Lightly **grease taper of tilt mechanism shaft.**

Mount steering wheel to Tilt mechanism.

CAUTION

Tighten steering wheel shaft nut before filling and purging the steering system. Tighten nut to 150 in.-lbs. (17 Nm). Do not exceed 200 in.-lbs. (22 Nm).

To relocate the steering wheel to any one of the other four positions, push the tilt lever forwards. This will unlock the tilt mechanism. Once the desired steering wheel position is obtained the tilt lever will click back into the locked position.

Sport Tilt Helm

Part #'s HH5290, HH5291, HH5292 & HH5745

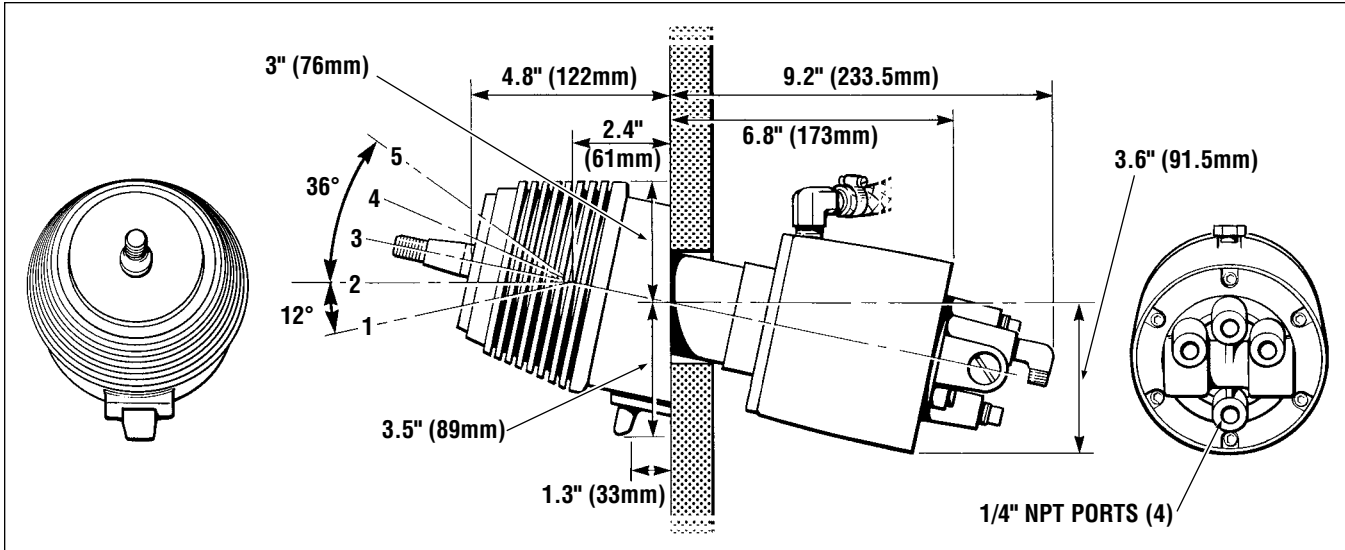


Figure 3

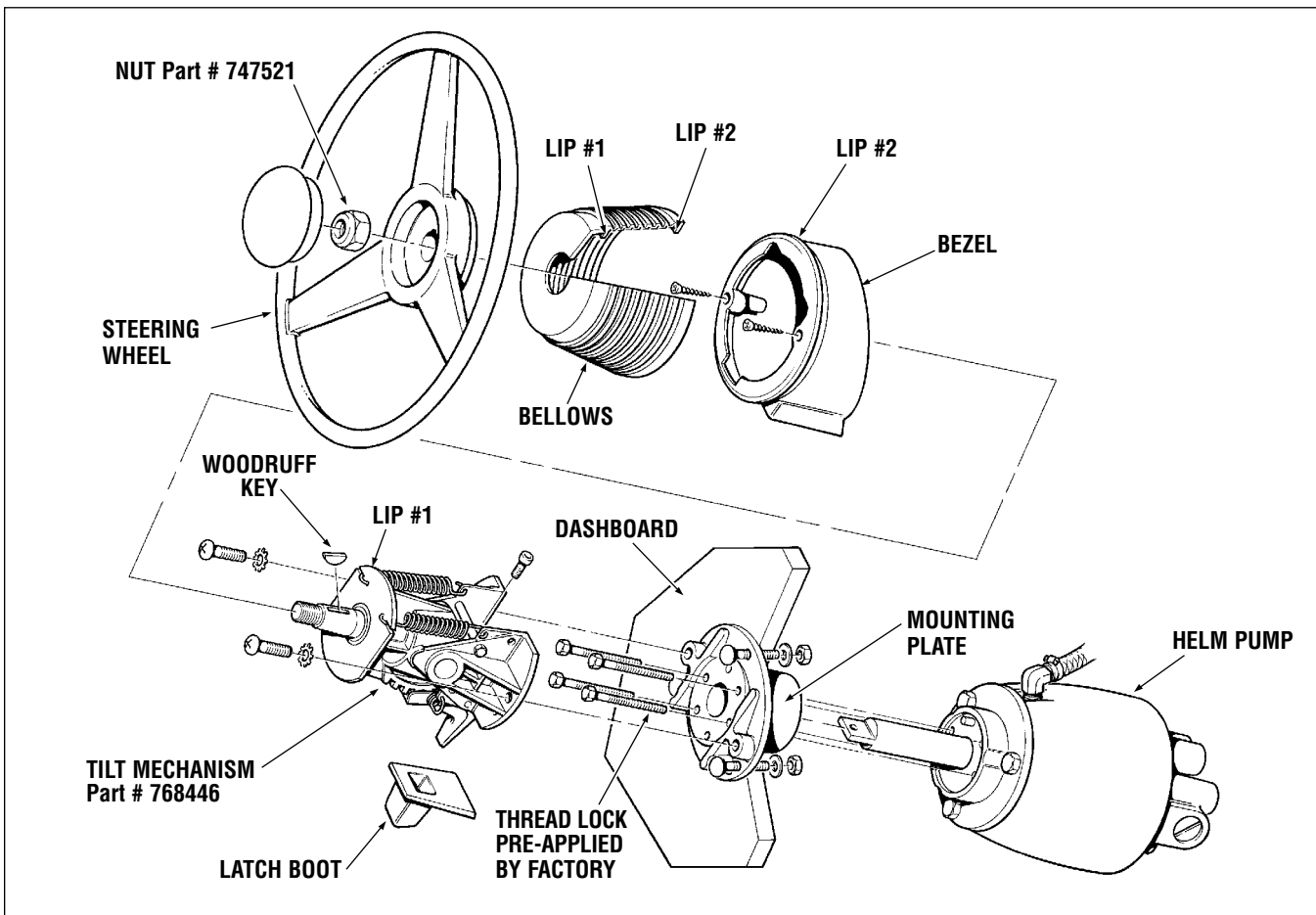


Figure 4

Sport Tilt Helm

Step 1

Determine desired mounting position. Ensure that the steering wheel will not interfere with other functional equipment with steering wheel in all tilt positions. Check for adequate space behind dash or console to accommodate the helm pump, fittings and line connections.

Step 2

Using the helm mounting template 'B', carefully drill with a hole saw or cut out the 3" (76mm) dia. hole and drill the three 5/16" (8mm) dia. mounting holes.

Step 3

Mount the tilt plate to the dash using the three (3) 1/4" NC x 2" carriage bolts, washers and self-locking nuts.

⚠ WARNING

Use self-locking fasteners provided only; substituting non-self locking fasteners can result in loosening or separation of equipment and loss of steering control.

Do not exceed 110 in.-lbs. (12 Nm) torque on helm nuts and bolts.

Step 4

Mount the helm pump from behind the dash to the tilt mounting plate, so that the four (4) helm mounting holes align with the applicable holes in the tilt mounting plate and secure with the four (4) 1/4" x 2-1/2" hex head bolts. Utilize a small amount of the supplied Loctite on each bolt.

Step 5

Mount the tilt mechanism to the dash mounting plate as per drawing on page 10. Secure with the two (2) 5/16" phillips screws and star washers.

NOTICE

If the fit of the universal joint onto the tilt mechanism shaft is tight or difficult, loosen the top screw in the universal joint by no more than 1/4 of a turn. Ensure this screw is fully tightened before installing the boot and bezel.

⚠ CAUTION Do Not exceed 150 in.-lbs (17 Nm).

Step 5 also requires the attachment of the helm shaft to the tilt mechanism coupling. Line up the coupling slot with the helm shaft tongue and secure with the No. 10-24 x 7/8" socket head cap screw. The coupling contains a captive self locking nut. Both helm shaft tongue and coupling slot must be in a horizontal plane with captive coupling nut on the bottom.

Step 6

Position the tilt unit in the middle position and mount the tilt bezel to the tilt mechanism, ensuring the latch boot is held in the slots of the bezel and secure with the two (2) No. 8 x 1" screws.

Note: The decal on the bezel cover indicates the top of the bezel.

Step 7

Fold Bellows completely inside out and stretch the Lip #1 over the tilt mechanism Lip #1. Then stretch Lip #2 over bezel Lip #2. Now check the tilt mechanism for proper operation. Five (5) tilt positions are available. Make certain that the tilt mechanism locks in ALL five (5) positions.

Lightly **grease taper of tilt mechanism shaft.**

Mount steering wheel to tilt mechanism.

⚠ CAUTION

Tighten steering wheel shaft nut before filling and purging the steering system. Tighten nut to 150in.lbs. (17 Nm). DO NOT exceed 200in.lbs. (22 Nm).

To relocate the steering wheel to any one of the other four positions, push the tilt lever forwards. This will unlock the tilt mechanism. Once the desired steering wheel position is obtained the tilt lever will click back into the locked position.

Remote Fill & Vent Plug Kit Part # HA5450

This kit will provide the means to fill and vent the steering system from above the dash or console.

This kit contains one (1) through dash fill and vent fitting, one (1) vent plug, two (2) elbow hose barb fittings, two (2) hose clamps and one (1) 21" piece of vinyl tubing.

NOTICE

Kit also contains one (1) additional straight fitting to accommodate optional hose routing.

For tilt helm pump mounting install as follows.

1. Screw one of the elbow barb fittings into the applicable helm fitting port.
2. Attach the vinyl tubing to the elbow fitting (installed in helm) and secure with hose clamp. A small amount of oil inside the vinyl tube will help slide it onto the elbow barb fitting.

Note: Use Loctite P.S.T on the elbow fittings.

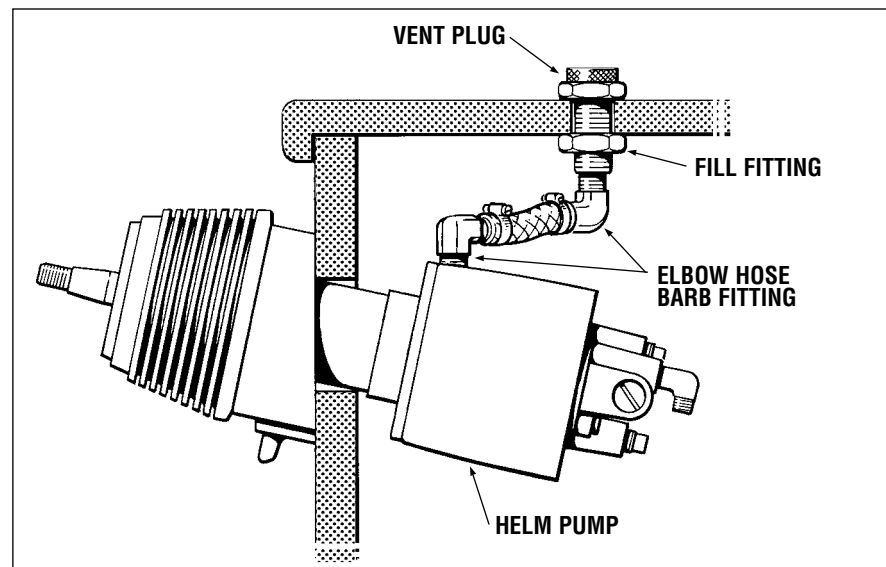


Figure 5

⚠ WARNING

Make certain that you **DO NOT** drill into any functional equipment or electric wires.

⚠ CAUTION

Vinyl hose must have a slight constant gradual rise from helm fitting to fill fitting, to allow the air to rise.

3. Direct the other end of the vinyl tube to a preferred clear area location under the dash to determine the length of tube required.
4. Drill a 3/4" (19mm) dia. hole from under or above the dash.
5. Insert fill fitting from top of dash and secure with jam nut.
Note: A spacer washer is required if mounting surface is less than 3/8" (9mm) thick.
6. Screw elbow hose barb fitting into the base of the fill fitting.
Note: Stop fill fitting from turning by holding in place with a wrench on top of dash hex. Use Loctite P.S.T.
7. Cut vinyl tube to required length and slide onto elbow hose barb fitting and secure with hose clamp.

FILLING AND PURGING THE SYSTEM

Read First

These instructions show how to fill and purge a **Single Station, Single Cylinder System**. Refer to **diagrams "A"** for Front Mount outboard cylinders, and **diagrams "B"** for all other cylinders, such as outboard Side Mount, outboard Splashwell Mount, Sterndrive and Inboard cylinders. For twin station and/or twin cylinder filling and purging instructions read instructions overleaf first and then proceed.

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** always be visible in the filler tube. **Do not** allow the oil level to disappear into the helm pump, as this may introduce air into the system and increase your purging time.

Hydraulic Oil Requirements

2 bottles (2 quarts or liters) for single station and single cylinder systems.
1 additional bottle for each additional helm, cylinder, or auto pilot.

⚠ CAUTION

These instructions will result in hydraulic oil flushed in and out of the system. Oil can be re-used if filtered through a fine mesh screen such as used for gasoline. If unable to filter oil, an additional bottle of oil is required.

NOTICE

"Bleeder" may refer to cylinders fitted with bleed tee fittings or bleed screws. If fitted with bleed tee fitting, open bleeder by unscrewing bleed nipple nut two turns.

If cylinder is fitted with bleed screws, open bleeder by removing bleed screw completely. Loosening bleed screw only will not cause sufficient oil flow to purge system.

Hydraulic Fluid

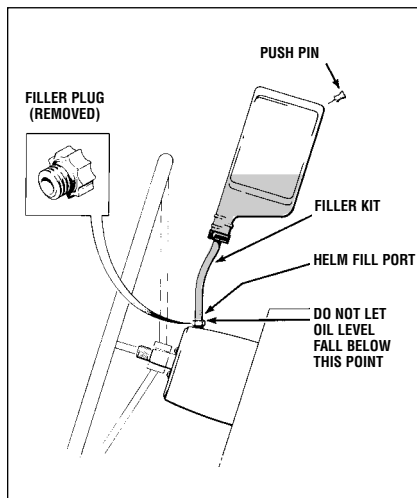


Figure 6

Recommended oils for your steering system are;

- SeaStar Hydraulic Fluid, part# HA5430
- Texaco HO15
- Esso Unis N15
- Mobil Aero HFA
- Aero Shell Fluid #41
- Chevron Aviation Fluid A
- Fluids meeting Mil H5606C specifications.
- Automatic transmission fluid Dexron II may be used in an emergency.

⚠ CAUTION **Never use brake fluid. Any non-approved fluid may cause irreparable damage, loss of steering, and cancellation of warranty.**

In cases of extreme emergency any non-toxic, non-flammable fluid may provide temporary steering.

Note: Filling the helm full of oil can be accomplished faster if oil is poured into the helm prior to connecting filler tube and oil bottle to the helm.

Step 1 Single Station One Cylinder

- Screw the threaded end of the filler tube into the helm filler hole.
- Remove the cap from the oil bottle and holding upright, screw into the filler tube bottle cap. Poke hole in the bottom of the bottle.

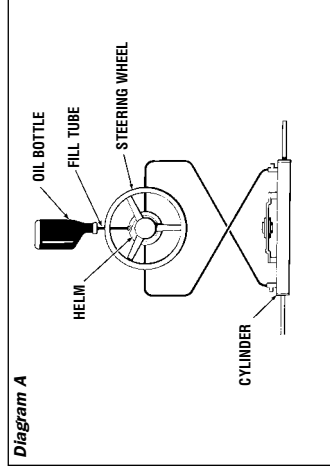
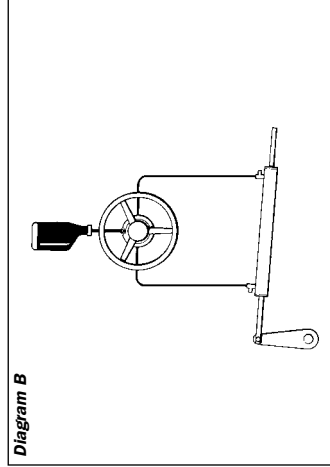


Diagram B



- Fill the helm pump full of oil (Oil should always be visible in the filler tube). Use the next bottle at any time throughout the procedure when the oil level drops in the filler tube. Do not proceed with step two until helm is full of oil.

Step 2

- When air bubbles have stopped coming out of the helm, turn the steering wheel clockwise until the cylinder rod is fully extended on one side of the cylinder.

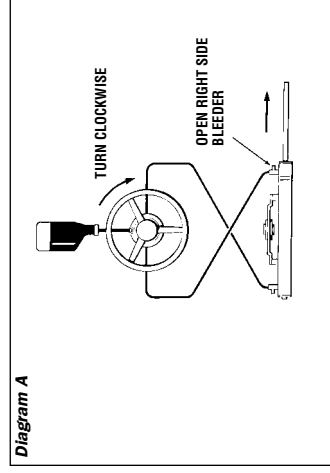
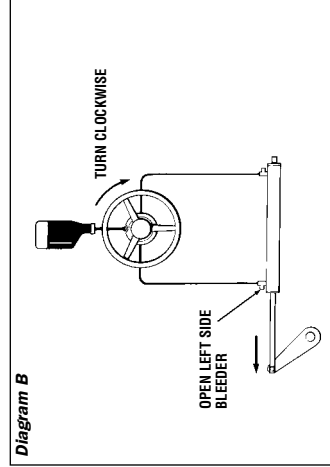


Diagram B



- Open bleeder as indicated on your applicable diagram (A or B).

Step 3

- Holding the cylinder rod (to prevent it from moving back into the cylinder) turn the steering wheel counter-clockwise until a steady stream of air free oil comes out of the bleeder. (Drain out approx. 1/2 bottle of oil or as required.)

Single Station Twin Cylinder

When performing steps 1 through 5, perform instructions in each step first on cylinder no.1 and then on cylinder no.2, before proceeding to the next step. **fe:** Perform instructions referring to right side

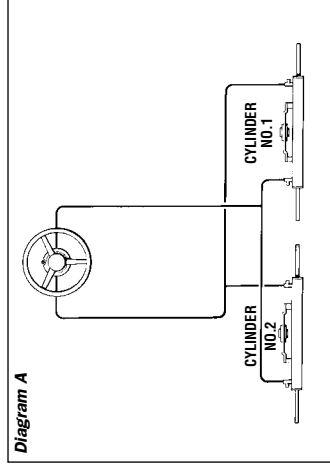


Diagram A

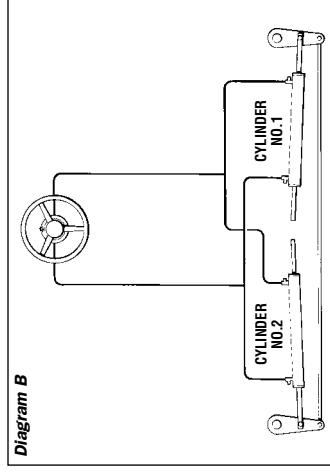


Diagram B

of cylinder first on cylinder no.1 and then on cylinder no.2. Oil requirements 4 - 5 bottles. **Note:** Refer to Oil Level and System Check.

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.

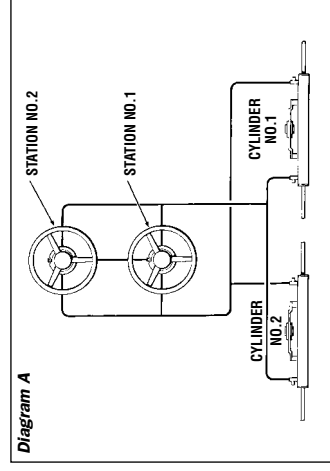


Diagram A

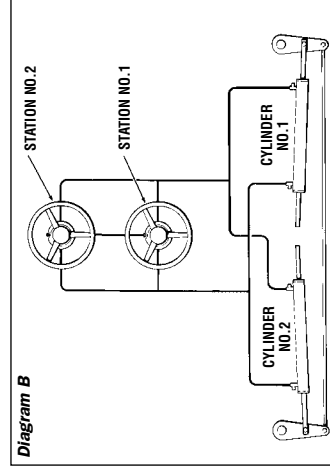
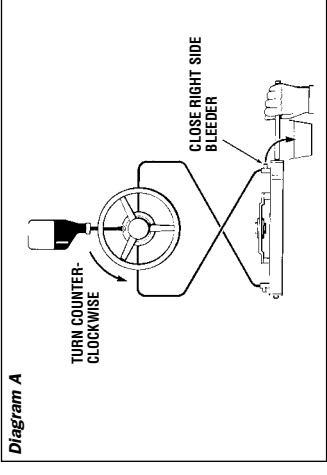
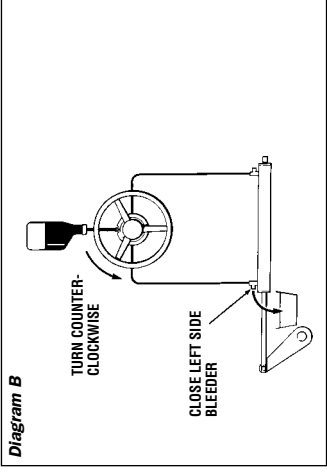
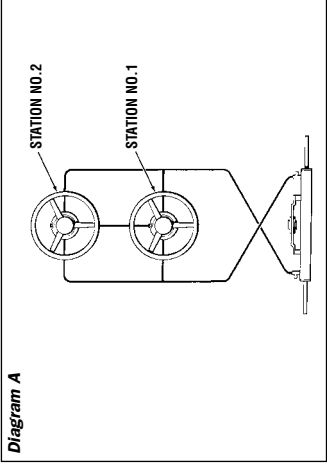
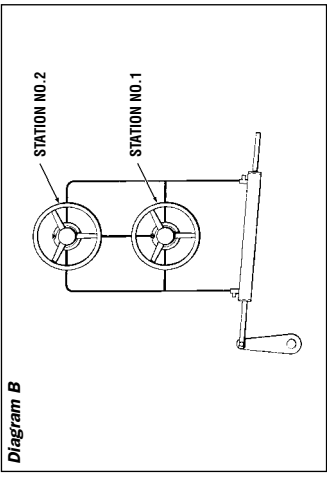


Diagram B

Twin Station Single Cylinder

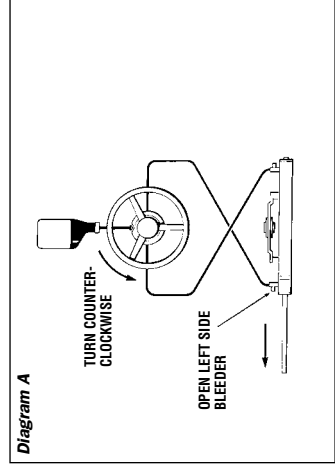
Perform steps 1 through 5 at station no.1. Then repeat steps 1 - 5 at station no.2. Oil requirements 4 - 5 bottles.

Note: Refer to Oil Level and System Check.

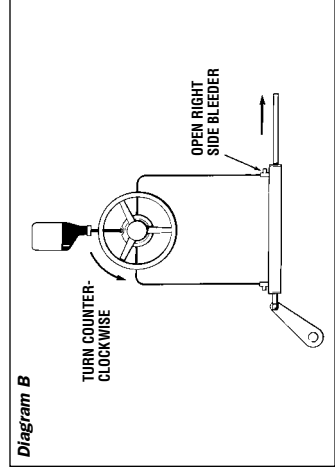


Step 4

- Continue turning the steering wheel counter-clockwise until the cylinder rod is fully extended at other side of cylinder.



- (Steering wheel will come to a stop)
- Open bleeder.

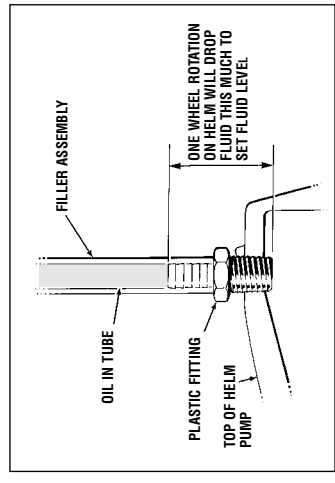


Oil Level Set

- Proper oil level set can be obtained by opening bleeder and turning steering wheel until fluid level reaches top of plastic filler fitting and then turning wheel one more full turn. As indicated in applicable diagram (A or B) in step 5.

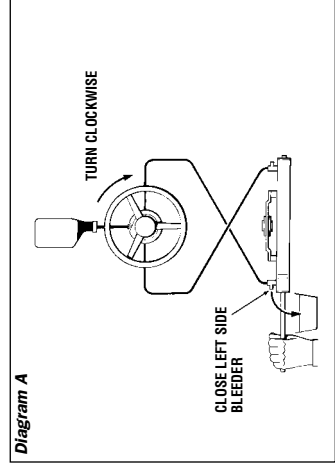
CAUTION

For unbalanced cylinders the oil level in the helm must be set with the cylinder rod fully retracted. Failing to observe this caution will result in an oil spill at the helm. Turning the wheel port (left) will retract the cylinder rod.



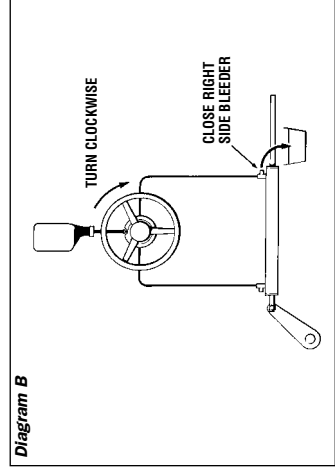
Step 5

- Holding the cylinder rod (to prevent it from moving back into the cylinder) turn the steering wheel clockwise until a steady stream of air free oil comes out of bleeder.



- While continuing to turn the wheel, close the bleeder and let go of the cylinder rod.

Fill and purge is now complete.



Oil Level and System Check

Helm mounted with wheel shaft completely horizontal must be filled to bottom of filler hole at all times. Do not allow oil level to drop more than 1/4" (6.3mm). Helms mounted on a 20° angle or with wheel shaft vertical, oil level should be within 1/2" (12.7mm) of hole. Check oil level periodically. At this time the steering system should be checked for proper connections of hose, tube and fittings, possible leaks, and air removal. To do so, turn steering wheel (any one on a multi-steering station) and pressurize very hard to port. Apply enough force to the wheel to exceed pressure relief valve pressure. You will not harm the helm or the system. While pressure is maintained on the steering wheel, check

all port (left) fittings and line connections. Repeat procedure by turning wheel to starboard. Watch the oil level in the helm pump when pressurizing the steering wheel in either hard over positions. If there is no obvious drop in oil level, air has been removed. If there is an obvious drop in oil level, you are compressing air and further filling and purging is required. Repeat Steps 1 thru 5. If no leaks are obvious, your steering system is ready for use. If leaks are found, correct before using. Failure to correct a leak can lower oil level in system and result in loss of steering.

MAINTENANCE

Maintenance requirements will vary with usage and climate. Inspection by a qualified marine mechanic is required:

- A** A minimum of two times a year.
- B** At the first sign or indication that the steering system is not operating normally or correctly.
- 1** Check the oil level in the helm pump. This should always be within 1/2" of the bottom of the filler hole.

NOTICE

SeaStar hydraulic oil is not available from your local gas station. Order a spare bottle (HA5430) from your Teleflex/SeaStar dealer.

WARNING

Failure to comply with maintenance checks may result in loss of steering, causing property damage and/or personal injury.

- 2** Check mechanical linkages and connections. Tighten loose parts and replace badly worn parts.
- 3** Check for leaks. See previous page for how to check for leaks.
- 4** Check hoses for chafing/rubbing marks, and replace if required.
- 5** Check cylinder shaft for nicks and scratches. A damaged cylinder shaft can cause seal failure and leaks. Replacing seals to a damaged cylinder shaft will not stop leaks. A damaged cylinder shaft must be replaced immediately.

TROUBLE SHOOTING GUIDE

WARNING

Whenever in the following text, a solution calls for removal from vessel and/or dismantling of steering system components, such work must only be carried out by a qualified marine hydraulic mechanic. Teleflex offers the following as a guide only and is not responsible for any consequences resulting from incorrect dismantling repairs.

SeaStar hydraulic steering will provide years of safe reliable performance with a minimum of service if properly installed with correct cylinder.

SeaStar steering systems have been designed with protection against over-pressure situations, by a pressure relief valve, to minimize the possibility of total loss of steering.

Most faults occur when the installation instructions are not followed and usually show up immediately upon filling the system. Provided below, are the most common faults encountered and their likely cause and solution. The term "Rudder" also applies to stern drives, when applicable.

Sometimes when returning the wheel from a hardover position, a slight resistance may be felt and a clicking noise may be heard. This should not be mistaken as a fault, as it is a completely normal situation caused by the releasing of the lock spool in the system.

FAULT

CAUSE

SOLUTION

1. During Filling, the helm becomes completely jammed.

- Blockage in the line between the helm(s) and the cylinder(s).

- Make certain that hose/tubing has not collapsed during installation. If so, the collapsed section must be removed and re-fitted with a new piece with the aid of tube connectors. Check fittings for incomplete holes. Fittings with incomplete holes, however, are not common.

2. System is very difficult to fill. Air keeps burping out top of helm even after system appears full.

- Cylinder(s) has been mounted upside down. This causes air to be trapped in the cylinder(s).
- Air in system.

- Mount cylinder(s) correctly, according to cylinder installation instruction. Ports should always be kept in uppermost position.
- Review purging instructions.

3. Steering is stiff and hard to turn, even when the vessel is not moving.

- Rudder post glands are too tight or rudder post is bent, causing mechanical binding. The same applies to tiller arm and linkage on outdrives and outboard engines. Cylinder interfering with engine cowling.
- Restrictions in hose, copper tubing, piping or fittings.
- Air in oil.
- Wrong oil has been used to fill steering system, like A.T.F. (automatic transmission fluid, or any other oil with a high viscosity factor).

- To test, disconnect cylinder(s) from the tiller arm and turn the steering wheel. If it turns easily, correct above-mentioned problems. Please note that excessively loose connections to tiller arm or tie-bar can also cause mechanical binding.
- Find restriction and correct. **Note:** A kinked hose or collapsing of copper tubing during bending is enough to cause restrictions.
- See filling instructions supplied with helm units.
- Drain system and fill with recommended oils.

4. One helm unit in system is very bumpy and requires too many turns from hardover to hardover.

- Dirt in inlet check of helm pump.

- Dismantle helm pump and remove contaminant from make-up checks.

HYDRAULIC STEERING

TROUBLE SHOOTING

FAULT	CAUSE	SOLUTION
5. Steering is easy to turn at the dock, but becomes hard to turn when vessel is under way.	<ul style="list-style-type: none">• Steering wheel is too small.• cylinder(s) too small.• incorrect setting of trim tab(s) on stern drive/engine.• incorrectly designed or adjusted rudders, causing binding on rudder post and/or tie bar at cruising speeds.	<ul style="list-style-type: none">• fit larger wheel if possible, see installation instructions. If the problem cannot be rectified by the above mentioned solution, proceed with next cause and solution or consult factory.• replace with larger cylinder(s).• adjust tab(s).• seek professional help. Have competent, qualified marine mechanic correct problem.
6. Rudder/Engine drifts to port or starboard while vessel is under way, even when wheel is not being turned.	<ul style="list-style-type: none">• Dirt in check valves.	<ul style="list-style-type: none">• Remove check valve plugs. These are the larger plugs on either side on rear of helm. Clean ball seats and balls and re-assemble. <p>Note: Be prepared to lose a certain amount of oil during this procedure. Have a small can available. Refill system when check balls have been re-assembled.</p>
7. Turning one wheel causes second steering wheel to rotate.	<ul style="list-style-type: none">• See fault No. 6.	<ul style="list-style-type: none">• See fault No. 6.
8. Seals will sometimes leak if steering system is not vented at uppermost helm.		<ul style="list-style-type: none">• The SeaStar helm has a field replaceable wheel shaft seal which can readily be replaced by removing the steering wheel and seal cover held in place by three small screws. quad ring no. 210 is found in SeaStar helm seal kit HS5176. <p>NOTE: Seal kits are available for SeaStar cylinders, however, these must only be used by a qualified marine mechanic.</p>

Statement of Limited Warranty

We warrant to the original retail purchaser that **Teleflex Canada Limited Partnership** 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 **Teleflex Canada Limited Partnership** 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 **Teleflex Canada Limited Partnership** 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 **Teleflex Canada Limited Partnership** products found to be defective and covered by this warranty, will be replaced at **Teleflex's** option, and returned to the customer.

The above quoted statement is an extract from the complete **Teleflex Canada Limited Partnership** products warranty statement. A complete warranty policy is available in our **Teleflex Canada Limited Partnership** products catalogue.

Return Goods Procedure

Prior to returning product to **Teleflex Canada Limited Partnership** 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 # ?
Teleflex Canada
c/o Panalpina
#8 – 14th Street
Blaine, WA 98230

From Canada

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

Teleflex®

HYDRAULIC

TELEFLEX CANADA
3831 NO.6 ROAD
RICHMOND, B.C.
CANADA V6V 1P6

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