DOMETIC

BAYSTAR
FRONT MOUNT CYLINDER

EN

Hydraulic Steering for Outboard Powered Boats Rated to a Maximum of 150 HP (Total)

Installation and User Manual — Book 22.3

[**REVISION E**] Form No. 998010 | © 2022 Dometic

To the Installer and End User (Owner)

Thank you for choosing BayStar Steering Systems by Dometic. 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.

These safety alerts alone cannot eliminate all of the hazards that may be present while on the water. Dometic 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.

NOTICE

BayStar steering systems are not recommended for vessels with high steering loads. Some examples of vessels with high steering loads include Pontoon boats, Bass boats, vessels using high performance engines, engines using 4-3/4" hub propeller, or Power Assist. Customers should then consider upgrading to SeaStar/SeaStar Pro steering. This will reduce the steering effort due to the fact that SeaStar provides more output resulting in lower steering effort.

⚠ WARNING

Recommendations made in this manual are with typical installations, applications and usage. DO NOT use products in applications that they were not intended for. It is the Boat Manufacturer and the installers responsibility to ensure the components selected are sufficiently validated on the vessel application for safe and acceptable operation.

INDEX

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, please contact Dometic.

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

-4 helm pumps are fitted with positionable O-ring style hose fitting ports (referred throughout this manual as ORB). Do NOT attempt to install an NPT pipe fitting into a -4 helm hose fitting port. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar O-ring style hose fittings (ORB).

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 Dometic.
3. Comply with all system ratings/regulations (boat/engine, U.S.C.G.).
   - Cylinder MUST be compatible with engine(s) installed.
   - Cylinder MUST be rated for use on the engine(s) installed.
4. Confirm that there is no interference between the steering cylinder(s), tiebars and the transom, splashwell, outboard engine 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 26 of this manual.

⚠ 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.

Prior to every use

1. Check fluid level in highest helm pump (see page 26 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.
   - See Routine Maintenance, page 28 of this manual.

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

⚠ WARNING

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

Important Labels

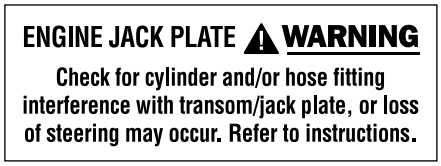


Figure 1.

INTRODUCTION

Before proceeding with the installation, read these instructions thoroughly. Dometic cannot accept responsibility for installations where instructions have not been followed, where substitute parts have been used, or where modifications have been made to our products.

⚠ WARNING

Do Not use BayStar on vessels that exceed a MAXIMUM horsepower rating of 150 HP (Total), or on smaller HP outboard engines that use wing nut type transom mount clamping screws. Warranty will be void if combined with any other product (including SeaStar steering components). Steering failure may occur causing property damage and/or personal injury or death.

NOTICE

BayStar is NOT recommended in applications with high steering effort (i.e. such as those using high performance engines or boats capable of attaining high speeds), such as Bass boats, Pontoon boats, engines using 4-3/4" hub propeller, or Power Assist. Customers should consider upgrading the system to SeaStar/SeaStar Pro steering. This will reduce the steering effort due to the fact that SeaStar steering provides more output power resulting in lower steering effort.

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 equidistant spoke steering wheel. ***Maximum steering wheel diameter = 28" (711 mm)*** *and* ***Maximum steering wheel dish = 5" (127 mm).***

⚠ WARNING

Do Not use a wire coil type trim switch with a hydraulic steering system. Wire coil can wind tightly around the steering wheel shaft and prevent further steering!

NOTICE

For salt water applications Dometic recommends the use of a cylinder ground strap kit, part # HA5477.

Before attempting installation, ensure that the splashwell of your boat has the following minimum dimensions.

Minimum Splashwell Dimensions

CYLINDER MODEL NUMBER	# OF ENGINES	A	B	C	MIN. ENGINE CENTER DISTANCE
HC4645/47H/ 48H/58H	1	21" (534 mm)	6" (153 mm)	5" (127 mm)	N/A
	2	Twin engine applications not available at this time			

NOTES:

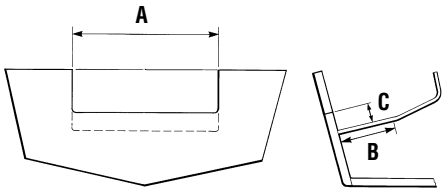
i) Ensure there is no interference between the BayStar cylinder rod and the splashwell boot or engine controls & cables.

ii) Dimensional restrictions also apply to external motor mount brackets.

iii) Ensure dimension 'A' is maintained through full trim/tilt range.

iv) Maximum transom thickness 3"(76 mm).

v) Engines less than 70 HP may require up to an additional 1"(25 mm) of splashwell clearance.



⚠ CAUTION

Do Not use BayStar on smaller HP outboard engines that use wing nut type transom mount clamping screws.

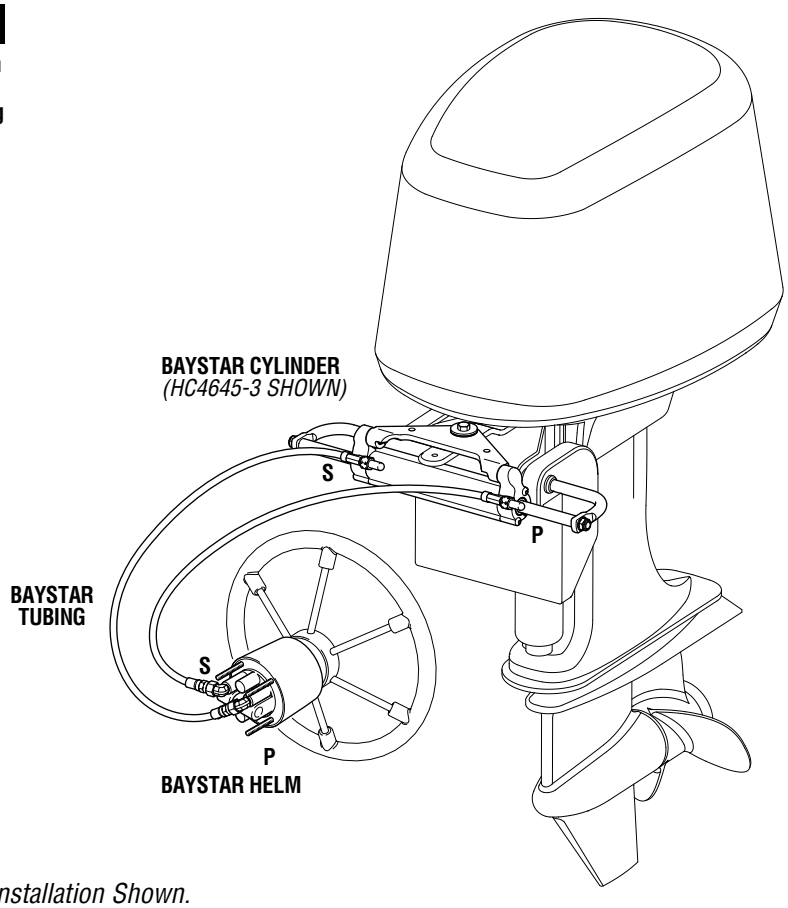


Figure 2. Typical Installation Shown.

CYLINDER	HELM PORT CONNECTION	STEERING CYLINDER CONNECTION
HC4645-3, HC4647-3, HC4648-3, and HC4658-3 (Cylinder is stationary)	Port (P)	Starboard side of cylinder
	Starboard (S)	Port Side of cylinder

HELM MOUNTING TEMPLATE

BayStar Helm
(part# HH4311-4 and HH4314-4)

Scale 1:1

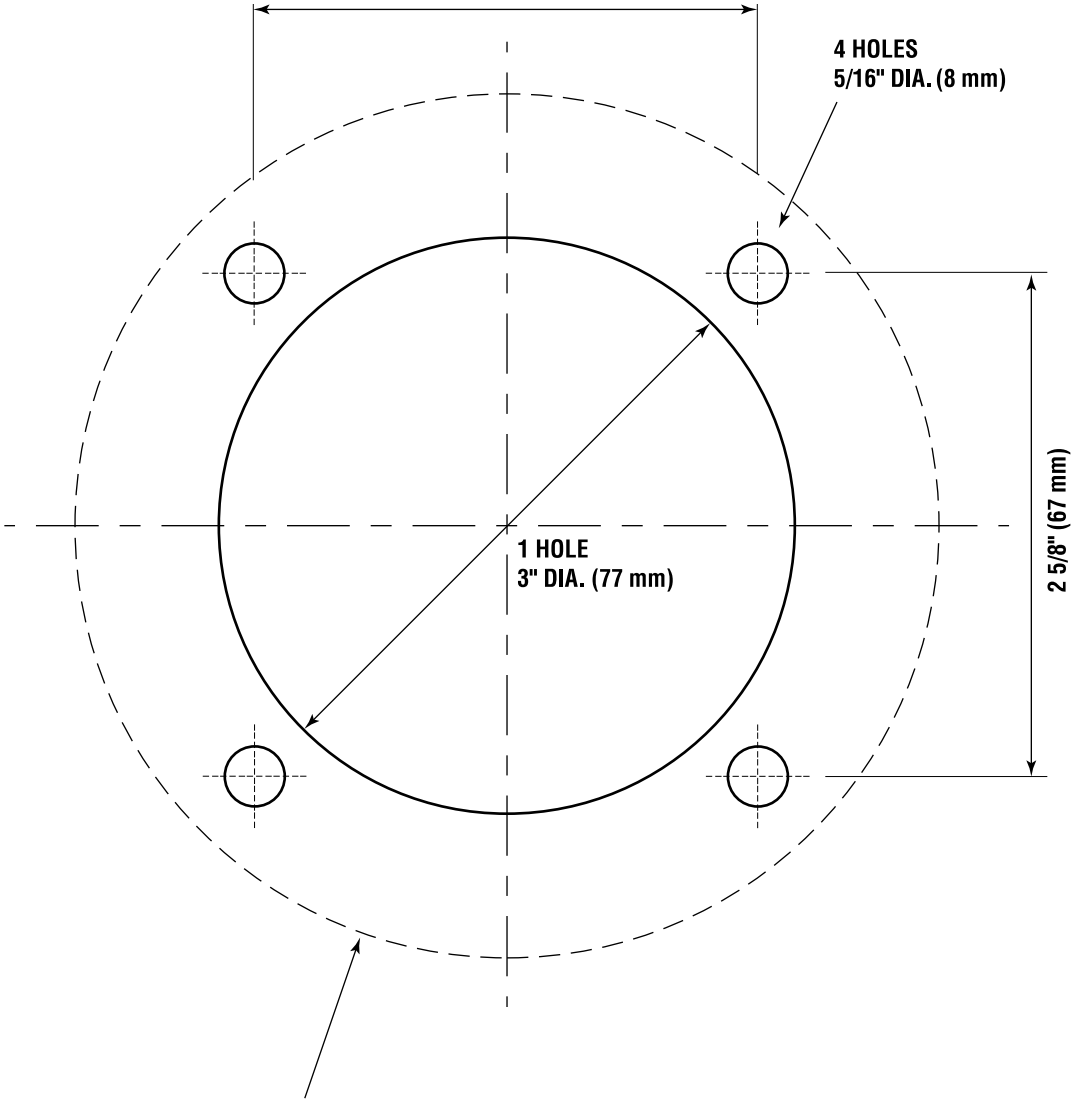


Figure 3.

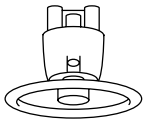
NOTICE

If you must photocopy this mounting template for use, check ALL measurements using a measuring device prior to using as a template.

Note: *This page left blank intentionally.*

SYSTEM OVERVIEW

HELM



STEP 1

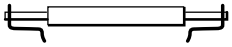
System Installation

- Install helm pump onto dash using the installation instructions noted on page 8 of this manual.

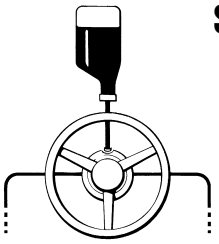
⚠ WARNING

Ensure that you read and understand ALL cautions, notices and warnings that are noted in your helm pump installation instructions.

CYLINDER



- Install steering cylinder as outlined on page 13 of this manual.
- Install steering hoses as outlined on page 10 of this manual.



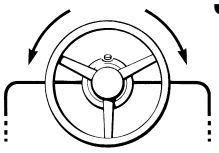
STEP 2

Filling and Purging Procedure

- Refer to fill and purge procedures as outlined on page 24 of this manual.

⚠ CAUTION

-4 helm pumps are fitted with positionable O-ring style hose fitting ports (referred throughout this manual as ORB). -4 fittings are exactly the same as -3 fittings. Do NOT attempt to install an NPT pipe fitting into a helm hose fitting port. Doing so will lead to irreparable damage to the helm. ONLY use Dometic O-ring style hose fittings (ORB).



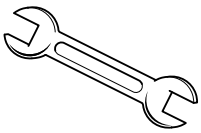
STEP 3

Fluid Level and System Check

- Refer to page 26 of this manual for setting fluid level in helm pump and performing the “system pressure test” to ensure steering system is ready for use.

⚠ WARNING

Fluid level and System check is critical to the safe operation of your boat, failure to follow this important step may lead to loss of steering control resulting in property damage, personal injury and/or death.



STEP 4

Routine Maintenance

- Refer to page 28 of this manual to become familiar with the routine maintenance that MUST be carried out in the intervals noted.

BayStar Hydraulic Steering System

Maximum 150 horsepower (Total). Not to be used in conjunction with a Power Assist.

NOTICE

Specific installation may vary from the application depicted. Ensure the engine can be fully tilted into the splashwell and turned from port (engine stop) to starboard (engine stop) without interference occurring between the steering cylinder and engine cowling, engine hook and the splashwell or transom.

⚠ WARNING

Warranty will be void if BayStar system components are combined with any other manufacturer's product. Steering failure may occur causing property damage and/or personal injury or death. MAXIMUM 150 HP (Total).

BayStar Helm Pump (Part # HH4311-4 and HH4314-4)

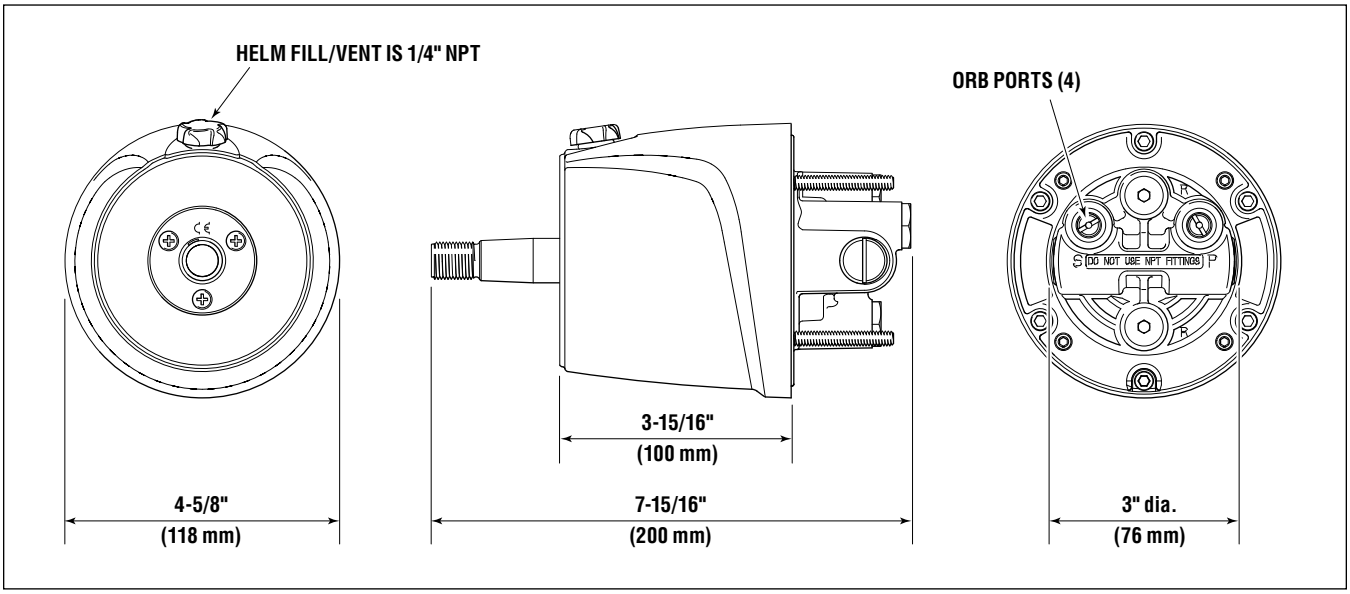


Figure 4.

BayStar Cylinder (Part # HC4645-3, HC4647-3, HC4648-3, and HC4658-3)

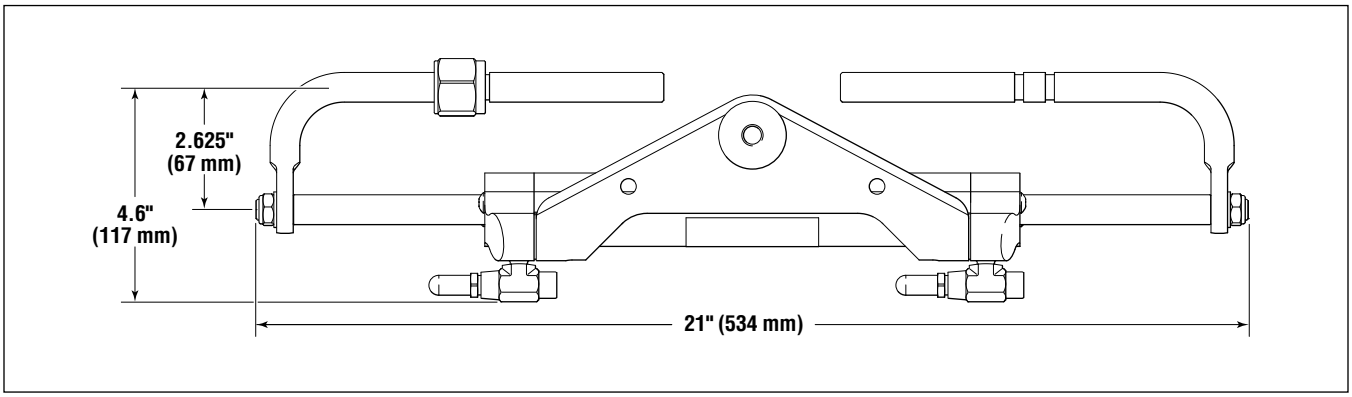


Figure 5.

Horse Power Limitations

Limited to boats rated to a MAXIMUM of 150 HP (Total). Twin engine application not available.

Engines using a 4.75" gearcase or large displacement engine de-tuned to 150 HP or less MUST use SeaStar steering. It is known that these engines generate higher steering loads that many will find unacceptable if using BayStar steering.

⚠ WARNING

Warranty void if total maximum 150 HP (Total) is exceeded.

Tools

You will need the following tools to complete your installation.

- 3” (77 mm) diameter hole saw or key hole saw
- 5/16” (9.5 mm) drill bit

Wrenches for helm installation

- 1/2” (13 mm) for mounting the helm
- 5/8” (16 mm) for tube nuts connecting tube to helm pump and fitting installation

Wrenches for HC4645-3, HC4647-3, HC4648-3, and HC4658-3 cylinder installation

- 9/16” (15 mm) for tiller bolt and fitting repositioning if needed (2 required)
- 1/2” (13 mm) for bleed fittings
- 5/8”(16 mm) for shaft nuts and fitting repositioning (2 required)
- 11/16” (18 mm) for tubing on the cylinder
- 1-1/8” (29 mm) for mounting nut

MOUNTING THE HELM

⚠ WARNING

Use only self-locking fasteners provided; 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.

⚠ 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).

Step 1:

Determine desired mounting position. Ensure that the steering wheel will not interfere with other functional equipment. Check for adequate space behind the dash for fitting and line connections.

Step 2:

Tape the mounting template (found on page 3 of this manual) to the dash and use a center punch to mark the locations of the hole.

Step 3:

Confirm that you will not be drilling into any other equipment then drill the 3” diameter center hole and the four 5/16” diameter mounting holes as shown on the template.

Step 4:

Ensuring that the fill port is in the upper position, install the four washers and four nuts onto the mounting studs of the helm pump. Torque nuts to 110 in-lbs.

Step 5:

Lightly grease taper of the helm shaft and mount steering wheel to helm.

Step 6:

Install ORB helm fittings into rear of helm, see page 9 for ORB fitting installation.

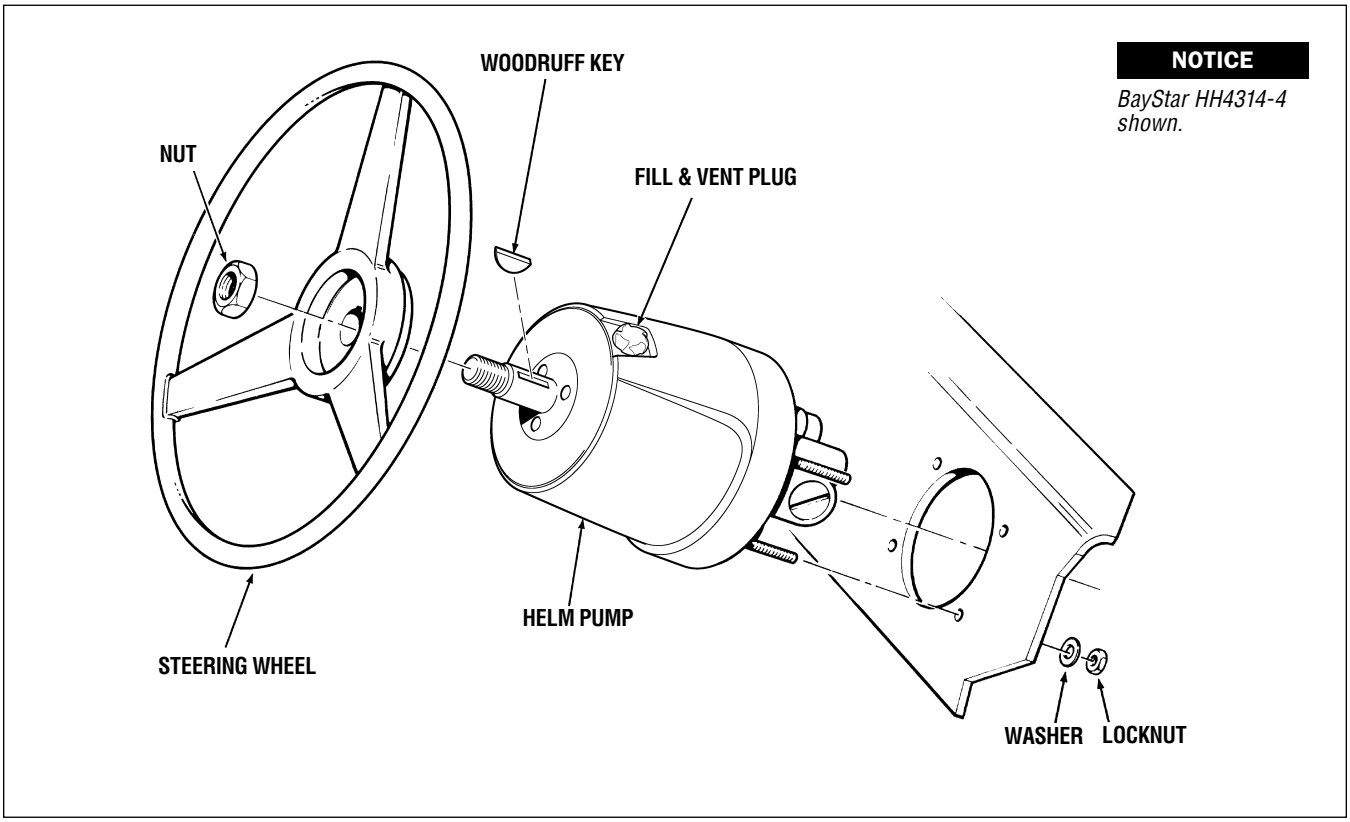


Figure 6.

Re-Positionable ORB Hose Fitting Installation

⚠ CAUTION

-4 helm pumps and cylinders are fitted with positionable O-ring style hose fitting ports (referred throughout this manual as ORB). Do NOT attempt to install an NPT pipe fitting into a -4 helm hose fitting port. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar O-ring style hose fittings (ORB), to the helm and or cylinder.

Re-Positionable Pump Fitting Installation

NOTE: for straight ORB fittings simply torque fitting to 18 ft-lbs. Fitting re-orientation not required.

1. Back off lock nut (item 1), counter-clockwise, until it stops.

   NOTE: O-ring must be fully on sealing surface and cannot contact any threads. Do not use Teflon tape or any liquid pipe sealant with ORB fittings.

2. Thread fitting into port until fitting washer (item 2) contacts the face of the port. Tighten hand tight. **DO NOT USE A WRENCH**.
3. Re-position fitting to desired orientation by turning it counter-clockwise to a MAXIMUM of 1 full turn.
4. While holding the fitting body securely with a wrench, torque the lock nut (item 1) to **18 ft-lbs**.
5. While holding the fitting body securely with a wrench, torque the hose end nut to **15 ft-lbs**.

⚠ WARNING

Failure to properly tighten the lock-nut (item 1) 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.

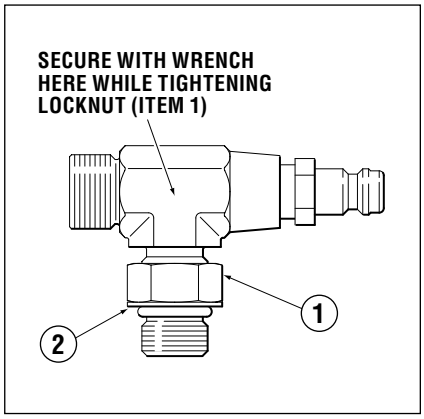


Figure 7.

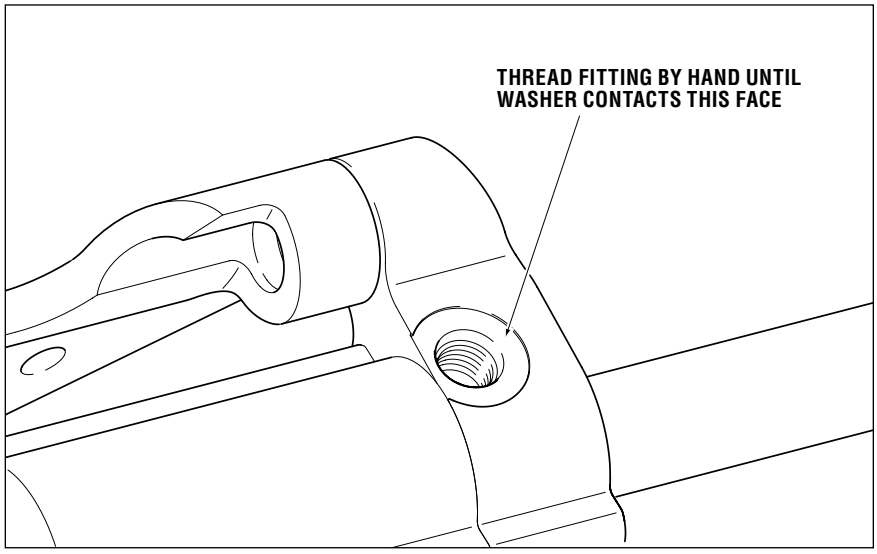


Figure 8.

⚠ WARNING

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

HYDRAULIC HOSE/TUBE INSTALLATION

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

⚠ WARNING

DO NOT cut SeaStar steering hoses, cutting these hoses will render them useless. Cutting BayStar nylon tube is acceptable but must be made with a sharp tube cutter and have no burs left behind.

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

- DO NOT apply pipe sealant of any type onto SeaStar ORB fittings. ORB fittings use O-rings to seal the connections.
- DO NOT remove protective end covers until the hoses/tubing have been routed and are ready to be connected to the helm pump, hose/tube fitting or steering cylinder(s).
- Before, during and after installation the hoses/tubing MUST be protected from chaffing, rubbing, and contact or interference with assembly screws or sharp edges of any type.
- DO NOT install hoses/tubing 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.

⚠ WARNING

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

- If possible, route hoses/tubing through a protective PVC cover.
- Secure hose/tube in minimum 2' (600 mm) increments.
- DO NOT bend hoses/tubing tighter than a 3-1/2” (89 mm) radius.
- Provide sufficient hose/tube lengths to allow for cylinder movement throughout the turning arc and UP/DOWN trim/tilt settings of the engine(s).
- DO NOT allow hoses/tubing to hang free in an area where they could become a safety hazard.
- Where possible, route hoses in an area where they can be easily inspected for wear on a regular basis.

STEP 1 Set Up

- See figure 11 to locate your plumbing diagram.
- Mark each end of the hose to ensure proper connection.

NOTICE

Hoses/tubing is 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. Refer to figure 2.

STEP 2 Routing

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

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

- Route steering hoses/tubing so that they have a gradual rise from the steering cylinder(s) to the helm pump.
- If routing hoses/tubing 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.
- Secure hoses/tubing every 2' (600 mm).

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

1. **Minimum bend radius 3-1/2" (89 mm).**
2. **If you need to re-position the cylinder fittings, refer to instructions on page 9.**
3. **Hoses should be secured to the control cable harness as they enter the splashwell through the boot.**

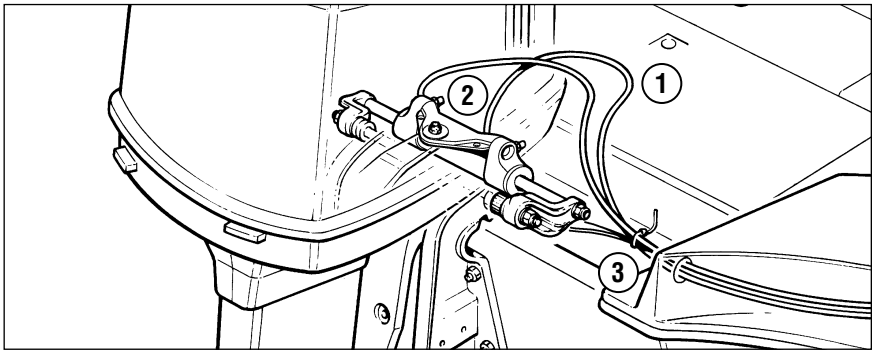


Figure 9.

STEP 3A

BayStar Tubing Installation

- Remove protective caps
- Install tube end "complete with the swage fitting and protective covering" onto the proper steering cylinder tube fitting, tighten hand-tight
- While holding fitting body with a wrench, tighten tube nut to 15 ft-lbs
- Route tubing to helm pump
- Remove protective caps
- Using a pipe cutter, cut off excess tubing
- Slide tube nut over tubing
- Push tubing into bottom of component fitting
- Hand tighten tube nut
- While holding fitting body with a wrench, tighten tube nut 1 to 1-1/4 turns to complete compression.

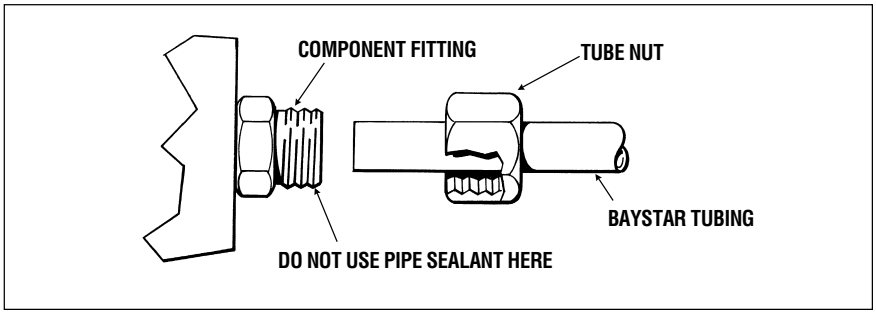


Figure 10.

STEP 3B

BayStar hose to fitting installation

- Remove protective caps.
- Install hose end fitting onto intended fitting, tighten hand tight.
- While holding the receiving fitting with a wrench, tighten hose fitting to 15 ft-lbs.

⚠ 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.

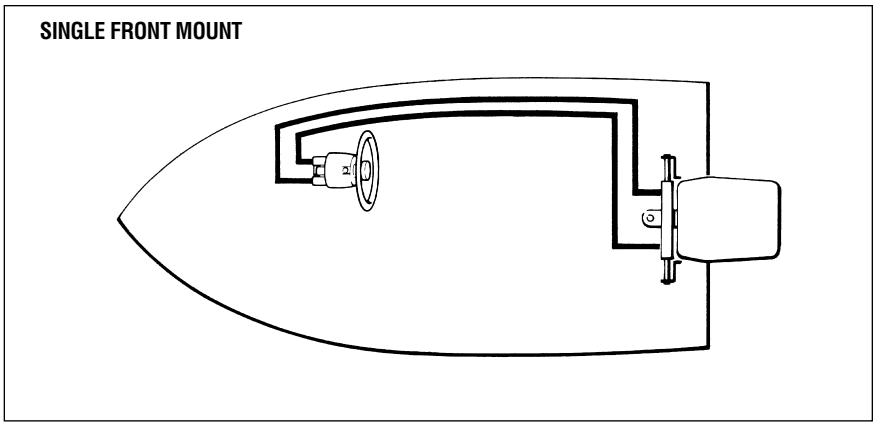


Figure 11.

Hose Inspection

DO NOT operate the vessel if ANY of the following are observed:

- Fitting slippage on hose
- Damaged, cracked, cut or abraded cover (or any reinforcement exposed)
- Hard, stiff, heat cracked, or charred hoses;
- Cracked, damaged, or badly corroded fittings;
- Leaks at fitting, or in hose;
- Kinked, crushed, flattened or twisted hose; and
- Blistered, soft, degraded, or loose cover.

CYLINDER INSTALLATION

BayStar Compact Cylinders, HC4645-3, HC4647-3, HC4648-3, and HC4658-3

On the following pages of this instruction booklet you will find the assembly drawing for your specific application.

⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

NOTICE

Before beginning installation make sure that all mounting hardware is included and that the tiller arm and the tilt tube bolt holes are clean and free from rust or burrs.

⚠ CAUTION

Engines with rigid engine mounts have been shown to cause premature wear to the pivot cylinder—therefore, please perform a complete Inspection of your steering system as outlined in the Maintenance Section at the back of this manual.

Single Engines

⚠ WARNING

Refer to page 29 for the correct torque specifications for your installation. Failure to correctly install your steering cylinder and torque all screws may result in steering failure causing property damage and/or personal injury.

Step 1:
Using a good quality marine grease (such as Evinrude Triple Guard, Quicksilver anti-corrosion, Yamaha marine grease, or equivalent), liberally lubricate the tilt tube, support rods (Item 5) and mount nut (item 7) and then slide the support rods (item 5) into engine tilt tube.

Step 2:
Lightly grease the tiller bolt (Item 2) & partially screw into the appropriate hole in the tiller arm to assure a proper fit. Remove and go to Step 3.

Step 3:
Select appropriate insert diagram from figure 12 through 16 to determine proper orientation of the cylinder assembly, the tiller bolt and the self-locking nut (Items 8, 2 and 1). Grease and install as indicated.

Step 4:
Screw lubricated mounting nut (item 7) onto tilt tube of the engine. Torque nut 20–25 ft-lbs.

Step 5:
Lightly grease the ends of the cylinder shaft and holes of the support rods (item 5). Attach and secure support rods (Item 5) to the cylinder shaft. Tighten using the nuts and washers (Items 4 & 3) as illustrated in figure 12 through 18.

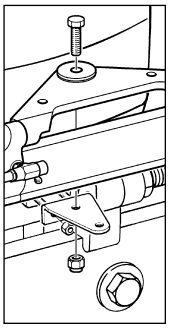
⚠ CAUTION

If installing a jackplate make sure that there is NO interference between the jackplate and your steering cylinder. If there is interference, it may occur during full tilt and you should install lift restrictors (Tilt Stop Switch). Some engine manufacturers supply these as standard equipment.

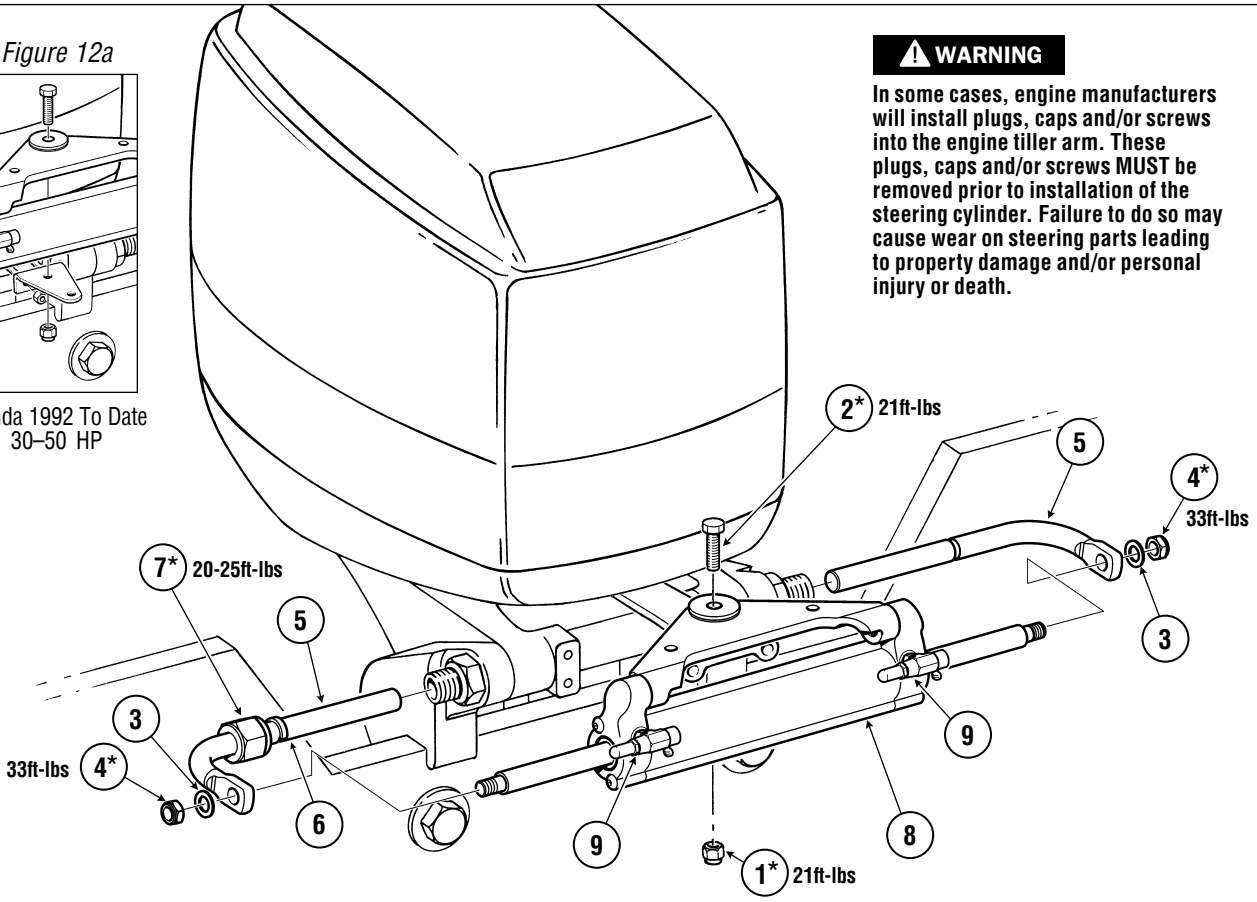
⚠ WARNING **Refer to page 29 for correct torque specifications of all installation hardware.**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
HONDA	1992 TO DATE	30–50 HP 4 Stroke	**HC4645-3**	Refer to figure 12a. Cylinder may not be centered when mounted due to short tiller tube.
	1996 TO DATE	60–90 HP 4 Stroke	**HC4645-3**	
	1998 TO 2010	115–130 HP 4 Stroke	HC4647-3	See page 15
	2003 TO DATE	135–150 HP 4 Stroke	**HC4645-3**	
	2010 TO DATE	115 HP 4 Stroke	**HC4645-3**	

Figure 12a



Honda 1992 To Date
30–50 HP



⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

⚠ WARNING

Fully tilting the engine may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

Figure 12.

***** *Refer to page 29 for correct torque specifications.*

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	590040	2	Support Bracket

ITEM	PART #	QTY	DESCRIPTION
6	N/A	1	Clip, Support Bracket
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

WARNING Refer to page 29 for correct torque specifications of all installation hardware.

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
HONDA	1998 TO 2010	115–130 HP 4 Stroke	**HC4647-3**	

⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

⚠ WARNING

Fully tilting the engine may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

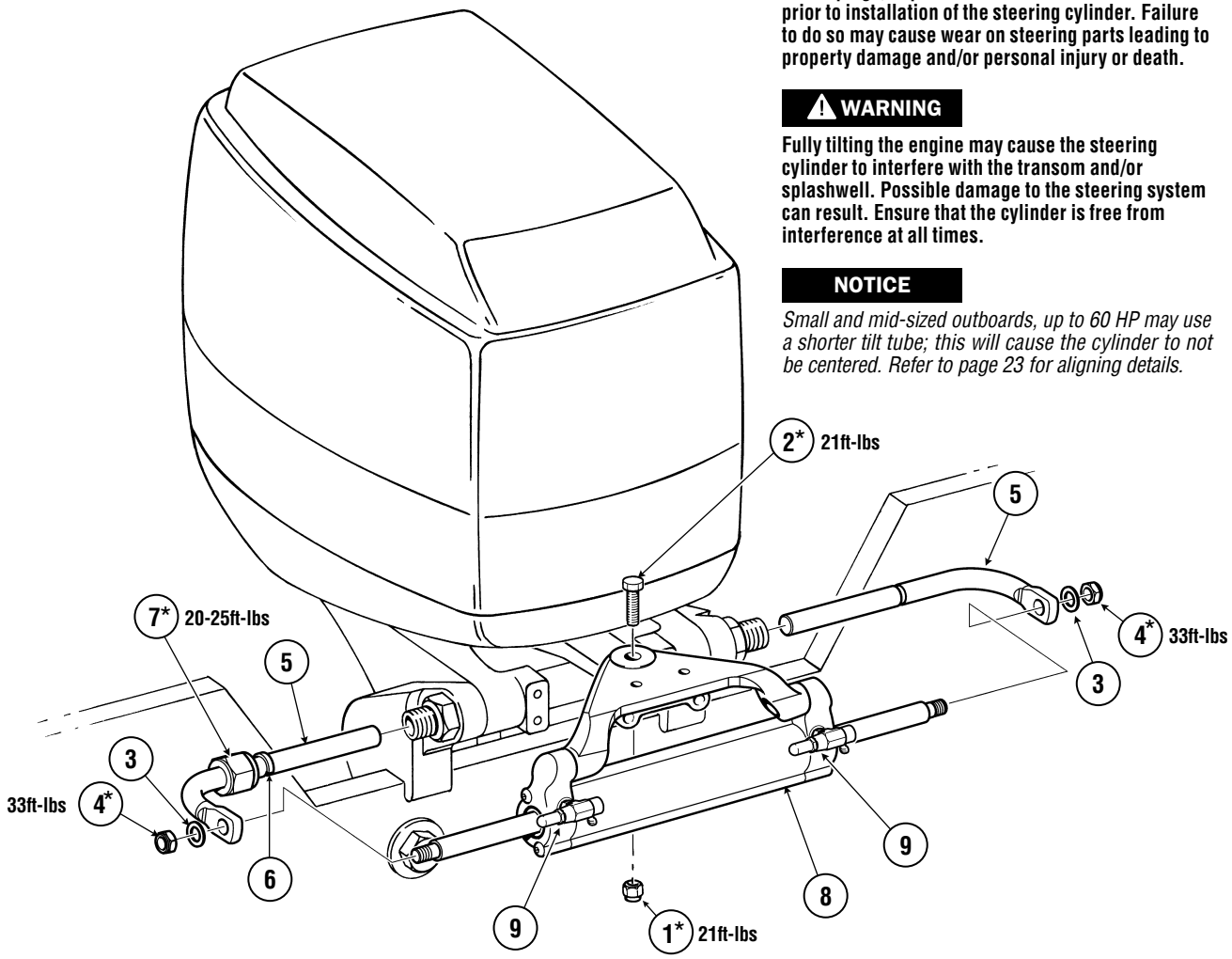


Figure 13.

***** *Refer to page 29 for correct torque specifications.*

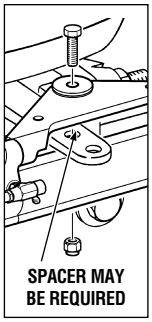
ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	590040	2	Support Bracket
6	N/A	1	Clip, Support Bracket

ITEM	PART #	QTY	DESCRIPTION
*7	N/A	1	Mount Nut, Support Bracket
8	HC4647-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

⚠WARNING **Refer to page 29 for correct torque specifications of all installation hardware.**

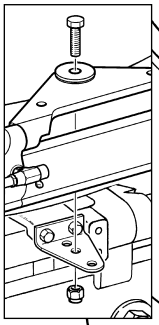
ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
MERCURY/MARINER	1984 TO 1989	75–150 HP 2 Stroke	**HC4645-3**	Refer to figure 14a
Command Thrust must use SeaStar steering, PRO XS is recommended to use PRO steering.	1990 TO 2002	75–150 HP 2 Stroke	**HC4645-3**	
	1998 TO DATE	40–60 HP 2 & 4 Stroke	HC4648-3	Refer to figure 14b. Cylinder may not be centered when mounted due to short tiller tube.
	2002 TO DATE	75–150 HP 4 Stroke	**HC4645-3**	Refer to figure 14c
	2002 TO DATE	90–115 HP Optimax	**HC4645-3**	Refer to figure 14c
NISSAN	1990 TO DATE	120–140 HP	**HC4645-3**	
TOHATSU	1990 TO DATE	120–140 HP	**HC4645-3**	

Figure 14a.



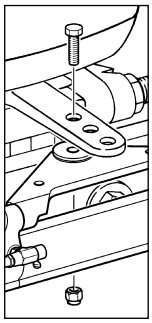
Mercury/Mariner
1984 to 1989
75–150 HP

Figure 14b.



Mercury/Mariner
1998 to Date
40–60 HP

Figure 14c.



Mercury/Mariner
2002 to Date
75–150 HP
90–115 HP

⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

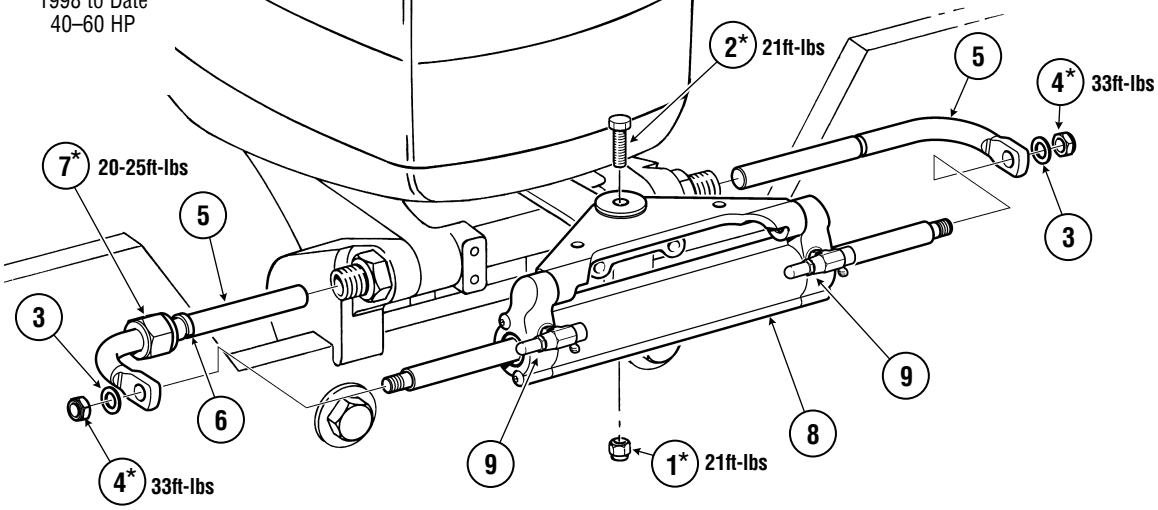


Figure 14. *NOTE: Tiller bolt can be inverted if required.* **Refer to page 29 for correct torque specifications.*

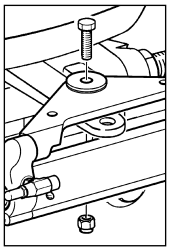
ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	590040	2	Support Bracket
6	N/A	1	Clip, Support Bracket

ITEM	PART #	QTY	DESCRIPTION
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

⚠ WARNING **Refer to page 29 for correct torque specifications of all installation hardware.**

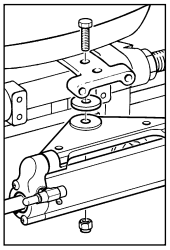
ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
JOHNSON/EVINRUDE	1977 TO 1990	65–150 HP 2 Stroke	HC4648-3	Refer to figure 15d
	1991 TO DATE	40–150 HP 2 Stroke	**HC4645-3**	Refer to figure 15a
	1997 TO DATE	115 HP FICHT	HC4658-3	Refer to figure 15c. If using cylinder HC4645-3 please invert pivot (See page 22).
	1997 TO DATE	75–150 HP FICHT	**HC4645-3**	
	1998 TO DATE	40–140 HP 4 Stroke	HC4658-3	Refer to figure 15b. Requires Spacer Kit H05090 (See page 21). If using cylinder HC4645-3 please invert pivot plate (See page 22).

Figure 15a.



Johnson/Evinrude
1991 to Date
40–150 HP

Figure 15b.



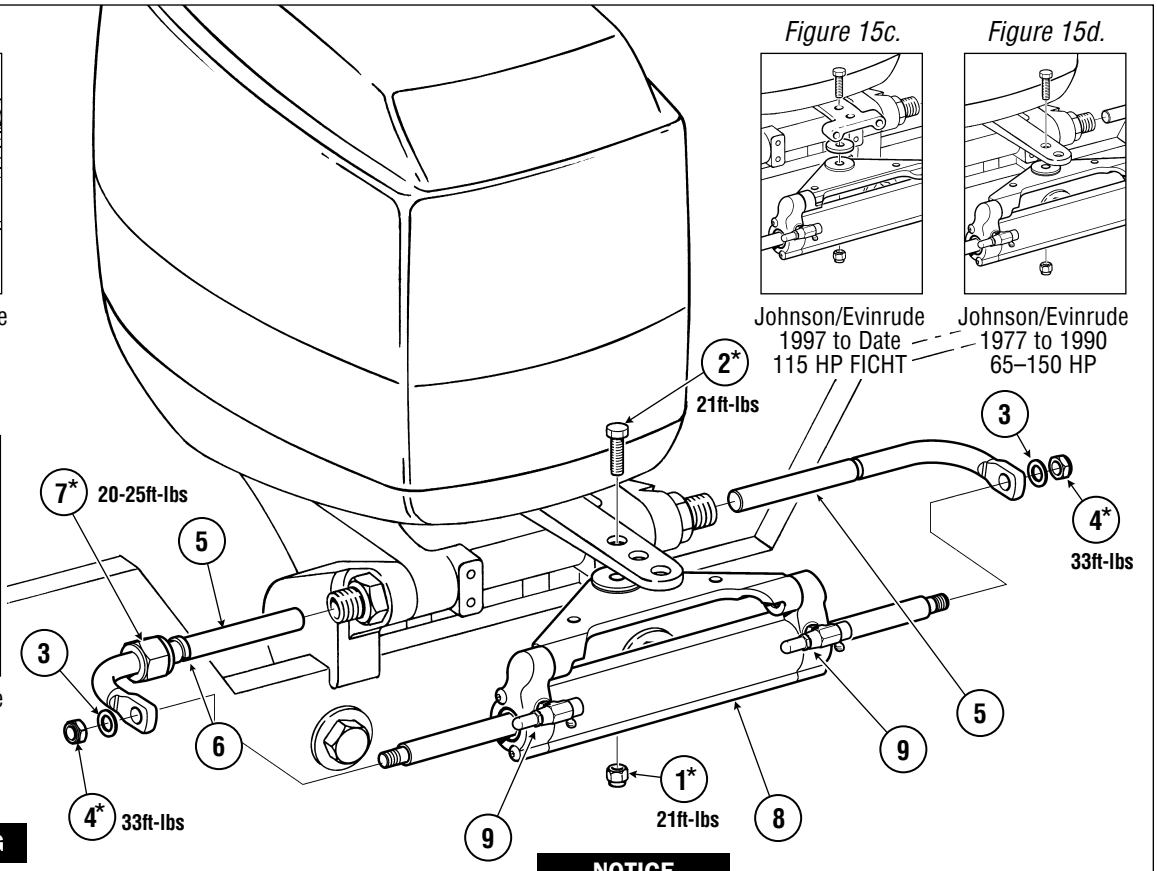
Johnson/Evinrude
1998 to Date
40–140 HP

Figure 15c.

Johnson/Evinrude
1997 to Date
115 HP FICHT

Figure 15d.

Johnson/Evinrude
1977 to 1990
65–150 HP



⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

Figure 15. *NOTE: Tiller bolt can be inverted if required.* ** Refer to page 29 for correct torque specifications.*

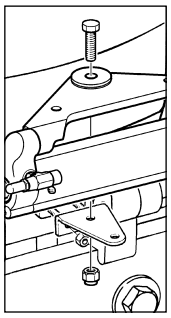
ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	590040	2	Support Bracket

ITEM	PART #	QTY	DESCRIPTION
6	N/A	1	Clip, Support Bracket
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

⚠WARNING **Refer to page 29 for correct torque specifications of all installation hardware.**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
YAMAHA	1986 TO 2003	40–50 HP 2 Stroke	**HC4645-3**	Refer to figure 16a
	1986 TO 2003	60 HP 2 Stroke	**HC4645-3**	Refer to figure 16a. Requires Steering Hook
	1986 TO 2003	70–90 HP 2 Stroke	**HC4645-3**	Requires Spacer Kit H05090 (See page 21)
	1986 TO 2003	100–150 HP 2 Stroke	**HC4645-3**	Refer to figure 16b
	1997 TO 2013	75–150 HP 4 Stroke	**HC4645-3**	Refer to figure 16b. Inc. A & SHO models
	2003 TO DATE	25–70 HP 4 Stroke	HC4648-3	Requires Spacer Kit H05090 (See page 21)
	2014 TO DATE	75–150 HP 4 Stroke	**HC4645-3**	Refer to figure 16c. Inc. B models

Figure 16a.

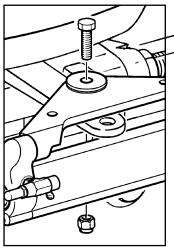


Yamaha 1986 to 2003
40–60 HP

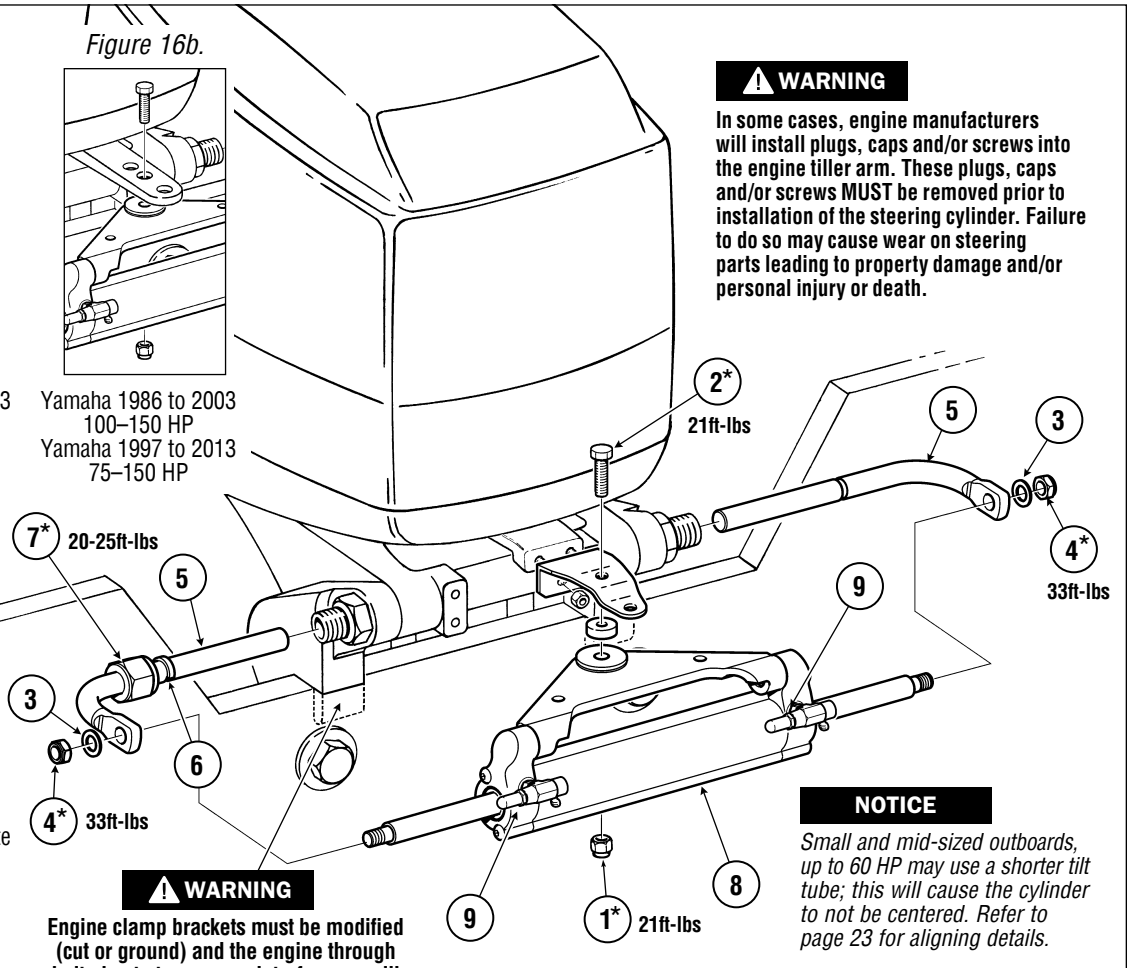
Figure 16b.

Yamaha 1986 to 2003
100–150 HP
Yamaha 1997 to 2013
75–150 HP

Figure 16c.



Yamaha 2014 to Date
75–150 HP



⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

⚠ WARNING

Engine clamp brackets must be modified (cut or ground) and the engine through bolted onto transom or interference will occur restricting engine trim & tilt.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

Figure 16. *NOTE: Tiller bolt can be inverted if required.* ***Refer to page 29 for correct torque specifications.*

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113330	1	HHCS 3/8" NF x 1-4/8" SS
			If spacer kit HO5090 used then:
	198767	1	HHCS 3/8" NF x 1-5/8" SS *(In Kit)*
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS

ITEM	PART #	QTY	DESCRIPTION
5	590040	2	Support Bracket
6	N/A	1	Clip, Support Bracket
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

⚠WARNING **Refer to page 29 for correct torque specifications of all installation hardware.**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
YANMAR	1990 TO DATE	27–36 HP Diesel	**HC4645-3**	Requires Spacer Kit HO5090 (See page 21).

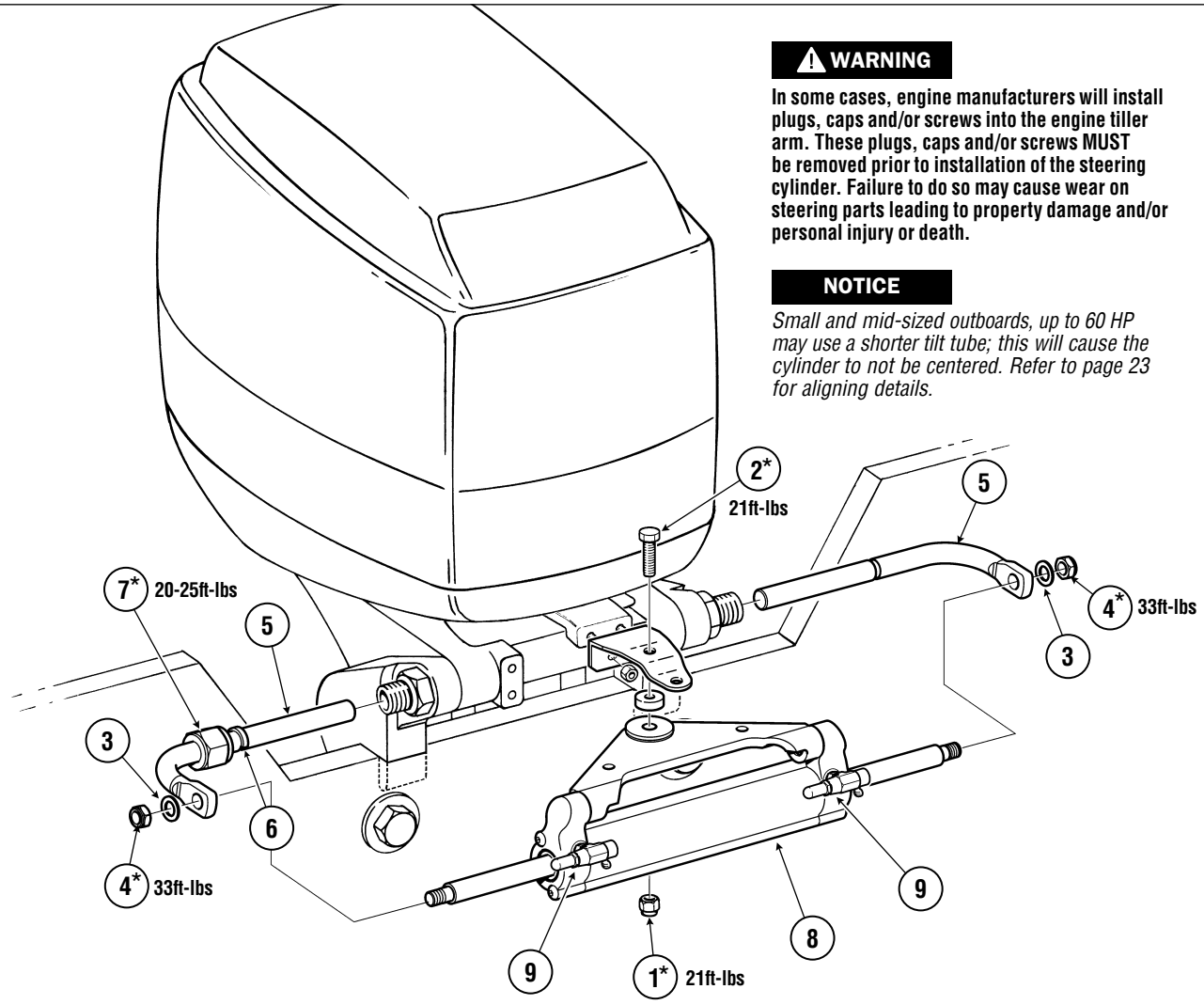


Figure 17. *NOTE: Tiller bolt can be inverted if required.* ***Refer to page 29 for correct torque specifications.***

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
			If spacer kit HO5090 used then:
	198767	1	HHCS 3/8" NF x 1-5/8" SS *(In Kit)*
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS
5	590040	2	Support Bracket

ITEM	PART #	QTY	DESCRIPTION
6	N/A	1	Clip, Support Bracket
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

⚠WARNING **Refer to page 29 or correct torque specifications of all installation hardware.**

ENGINE MANUFACTURER	YEAR	MODEL	CYLINDER	NOTE
SUZUKI	1990 TO 2000	90–100 HP 2 Stroke	**HC4645-3**	Refer to figure 18a
	1998 TO DATE	40–70 HP 4 Stroke	**HC4645-3**	Requires Spacer Kit HO5090 (See page 21)
	2001 TO DATE	90–140 HP 4 Stroke	HC4658-3	Refer to figure 18b. Requires Spacer Kit HO5090 (See page 21). If using cylinder HC4645H please invert pivot plate (See page 22)
	2010 TO DATE	90–140 HP	HC4658-3	

Figure 18.

NOTICE

Small and mid-sized outboards, up to 60 HP may use a shorter tilt tube; this will cause the cylinder to not be centered. Refer to page 23 for aligning details.

† *For ALL Suzuki 40–140 HP 4 stroke use tiller bolt supplied in spacer kit HO5090.*

* *Refer to page 29 for correct torque specifications.*

NOTE: Tiller bolt can be inverted if required.

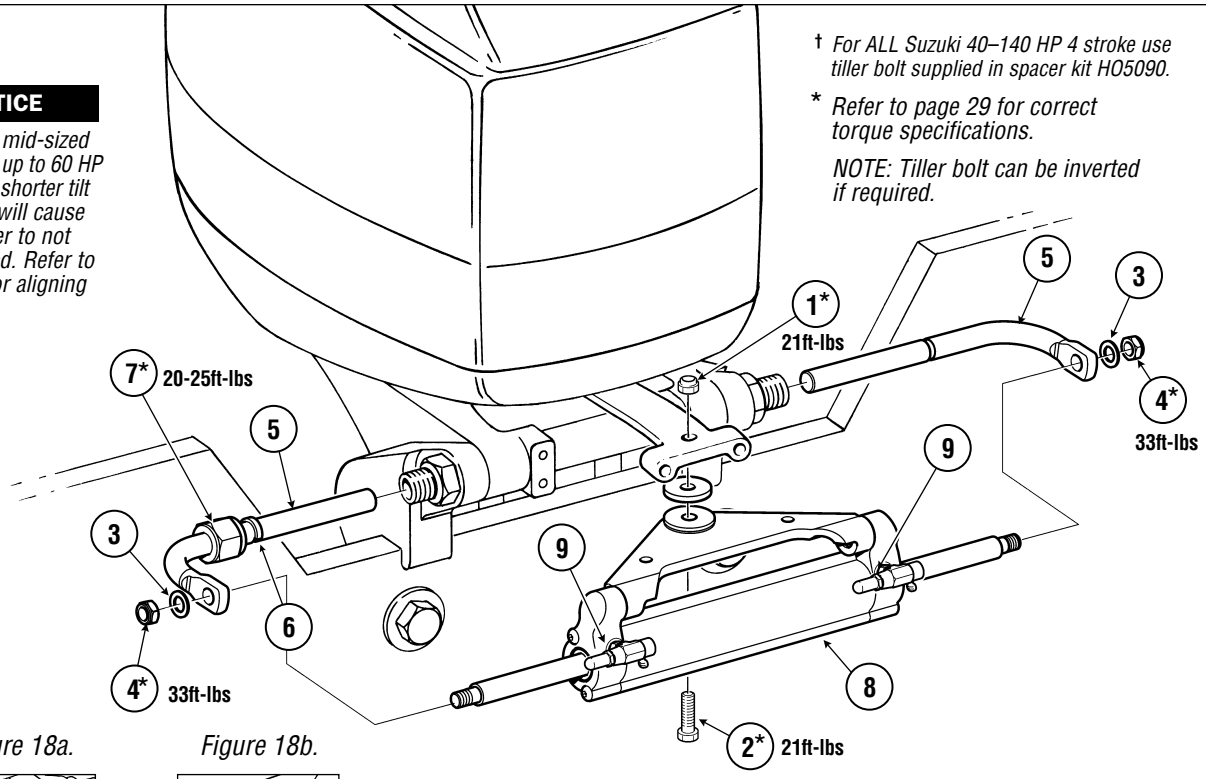
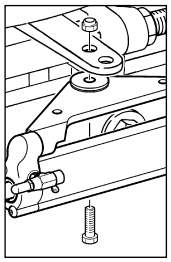
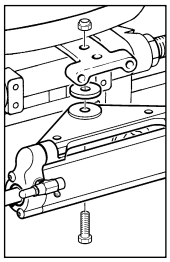


Figure 18a.



Suzuki 1990 to 2000
90–100 HP

Figure 18b.



Suzuki 2001 to Date
115–140 HP

⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

⚠ WARNING

Fully tilting the engine may cause the steering cylinder to interfere with the transom and/or splashwell. Possible damage to the steering system can result. Ensure that the cylinder is free from interference at all times.

ITEM	PART #	QTY	DESCRIPTION
*1	113529	1	Nut, 3/8" NF Nylok® SS
*2	113222	1	HHCS 3/8" NF x 1-1/4" SS
			If spacer kit HO5090 used then:
	198767	1	HHCS 3/8" NF x 1-5/8" SS *(In Kit)*
3	731625	2	Washer Flat, 7/16" SS
*4	731720	2	7/16" NF Nylok® SS

ITEM	PART #	QTY	DESCRIPTION
5	590040	2	Support Bracket
6	N/A	1	Clip, Support Bracket
*7	N/A	1	Mount Nut, Support Bracket
8	HC46XX-3	1	Cylinder Assembly
9	HF4203	1	-3 ORB Bleeder Tee Kit

HO5090 Spacer Kit

For use with BayStar hydraulic steering cylinder HC4645-3, HC4647-3, HC4647-3, and HC4658-3.

JOHNSON/ EVINRUDE	1998 to DATE	40–140 HP 4 Stroke	**Fig. 19.**
SUZUKI	2001 to DATE	115–140 HP 4 Stroke	

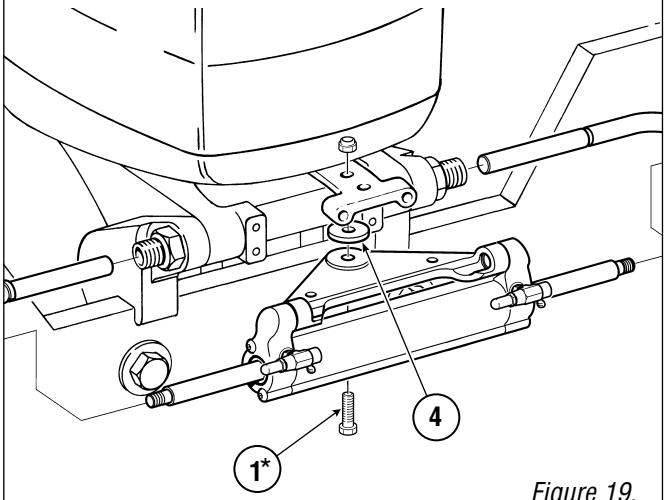


Figure 19.

SUZUKI	1998 to DATE	40 & 70 HP 4 Stroke	**Fig. 20.**

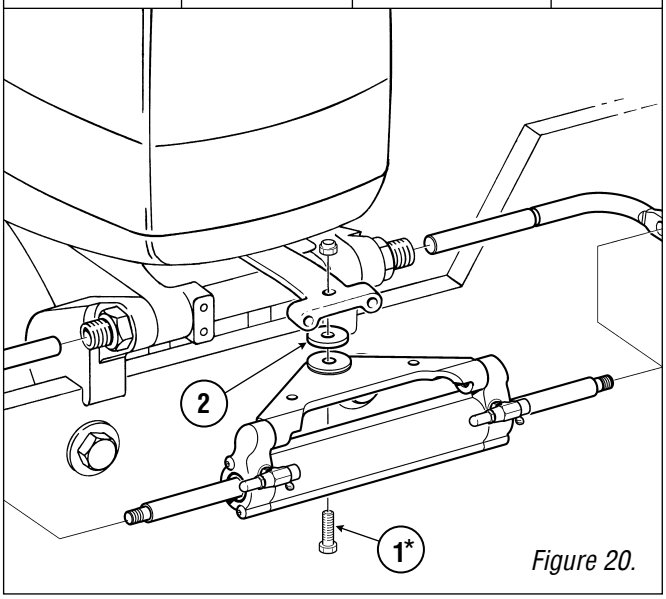


Figure 20.

⚠ WARNING

In some cases, engine manufacturers will install plugs, caps and/or screws into the engine tiller arm. These plugs, caps and/or screws MUST be removed prior to installation of the steering cylinder. Failure to do so may cause wear on steering parts leading to property damage and/or personal injury or death.

⚠ WARNING

Refer to page 29 for correct torque specifications of all installation hardware.

ITEM	PART #	QTY	DESCRIPTION
*1	688726	1	HHCS 3/8" NF x 2-1/4" SS (Tiller Bolt)
2	113600	1	SS Fender Washer
*3	113330	1	HHCS 3/8" NF x 1-3/8" SS
4	773421	1	Aluminum Spacer, 1/2"

NOTE: Tiller bolt can be inverted if required.

YAMAHA	1990 to DATE 2002 to DATE	70–90 HP 2 Stroke 25–70 HP 4 Stroke	**Fig. 21.**
YANMAR	1990 to DATE	27–36 HP	**Fig. 21.**

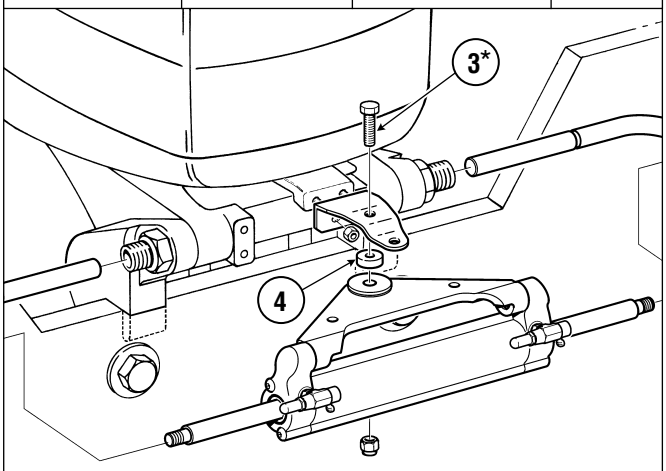


Figure 21.

***** *Refer to page 29 for correct torque specifications.*

REVERSING COMPACT CYLINDER ENGINE PLATE

Recommended Tools 5/32” Allen head socket, with extension.

1. **DO NOT** attempt to reverse the pivot plate with the cylinder installed on the engine. (This may damage the steering shaft, causing irreparable damage.)
2. Remove the two cap screws from one end of the steering cylinder using the 5/32” Allen head wrench, or socket.

⚠ CAUTION

DO NOT pull the gland off the end of the shaft, doing so may damage the seals when you try to reassemble it.

3. Remove the pivot plate and flip over end for end, placing the end hole over the shaft stub on the fixed gland.

⚠ CAUTION

4. **After removing the cap screws there will be small amounts of debris on the screw. Ensure that any loose debris is removed from inside and the face of the cylinder body.**
5. Carefully slide the loose gland back into place so that the gland stub fits into the hole on the pivot plate. Some SeaStar steering fluid applied to the O-ring on the gland may ease reinsertion into the barrel.
6. Align the screw holes on the gland with the threaded holes on the barrel, ensure that the gland face is butted tightly against the end of the barrel, with no debris in between, and fasten using the cap screws removed earlier. Tighten to torque spec 60 in-lbs (5 ft-lbs).

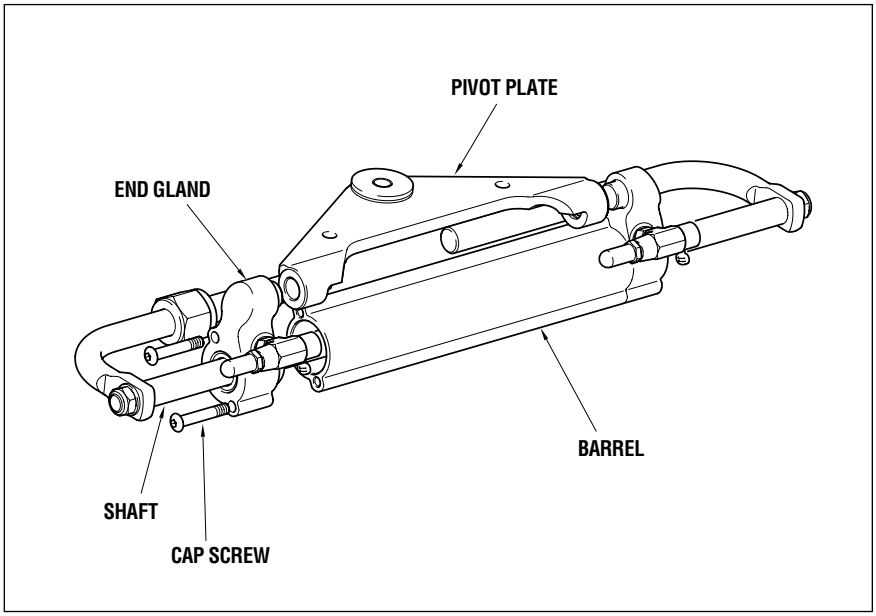


Figure 22.

MOUNTING TO OUTBOARD ENGINES UP TO 60 HP

Small and mid sized outboard engines up to 60 HP may use a shorter tilt tube causing the BayStar Compact Steering Cylinder to be NOT centered with the engine in the straight ahead position. This will create reduced steering articulation in one direction. Please follow the instructions below to center the cylinder and address this issue.

Centering Instructions

1. Mount the steering cylinder as per your installation manual and position the engine in the straight ahead position.
2. Using a measuring tape, measure the amount of steering rod on both sides of the steering cylinders. (Refer to figure 23.) If the starboard side of the rod is shorter than the port side by 11/16" or more, proceed to Step 3. If less than 11/16" your cylinder is centered, continue on with steering installation as per your installation manual.
3. Remove the support rod mounting nut (item 1), the cylinder end nut (item 2), then remove the support rod assembly.
4. Carefully remove the support rod retaining clip (item 3) using a vice, and move the clip to the inner groove (item 4).
5. Reinstall the support rod assembly and verify that the measurements taken in Step 2 are now within 11/16" side to side.
6. Continue with steering system installation as per the installation manual that was provided with your steering system.

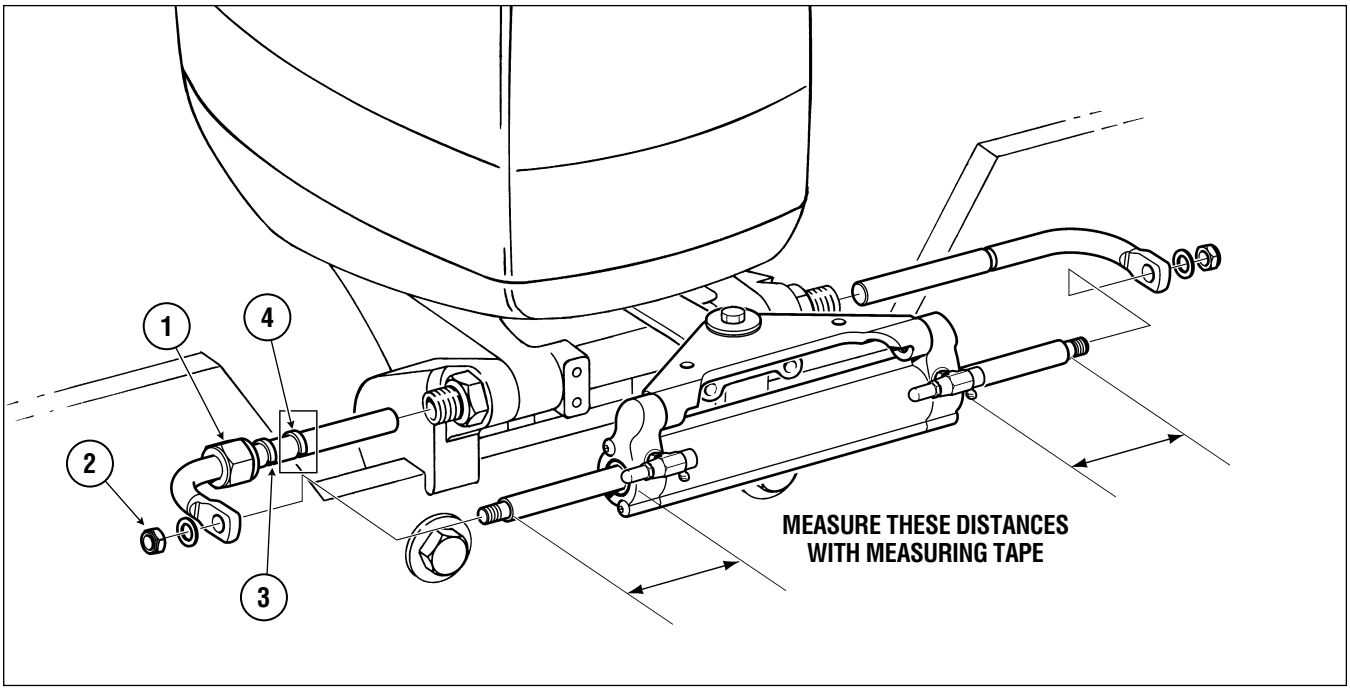


Figure 23.

FILLING AND PURGING THE SYSTEM

DEALER NOTICE

Reduce purging time to approximately 10 min per system with optional, portable Power Purge Jr. For more information reference our Website at www.seastarsolutions.com or contact your marine parts dealer.

Read First

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 the fluid level to disappear into the helm pump, as this may introduce air into the system and increase your filling time.

Hydraulic Fluid Requirements

Due to recent upgrades in our steering system components, Dometic recommends use of SeaStar steering fluid **ONLY** in our hydraulic steering systems. SeaStar steering systems have been engineered and validated using our proprietary SeaStar hydraulic steering fluid. SeaStar steering fluid is engineered with a special additive package that contains anti-foaming and anti-rusting agents, anti-oxidants, viscosity stabilizers, corrosion inhibitors, wear additives as well as water emulsification additives. It is highly recommended that SeaStar Steering Fluid be used to ensure optimum system performance and safety.

⚠ WARNING

NEVER use brake fluid. Any non-approved fluid may cause irreparable damage, loss of steering, and cancellation of warranty.

NOTICE

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

NOTICE

"Bleeder" refers to cylinder fitted with bleeder tee fittings. Open bleeder by turning fitting(s) counter clockwise.

NOTICE

Filling the helm with fluid can be done faster if fluid is poured into the helm prior to connecting filler tube and fluid bottle to the helm.

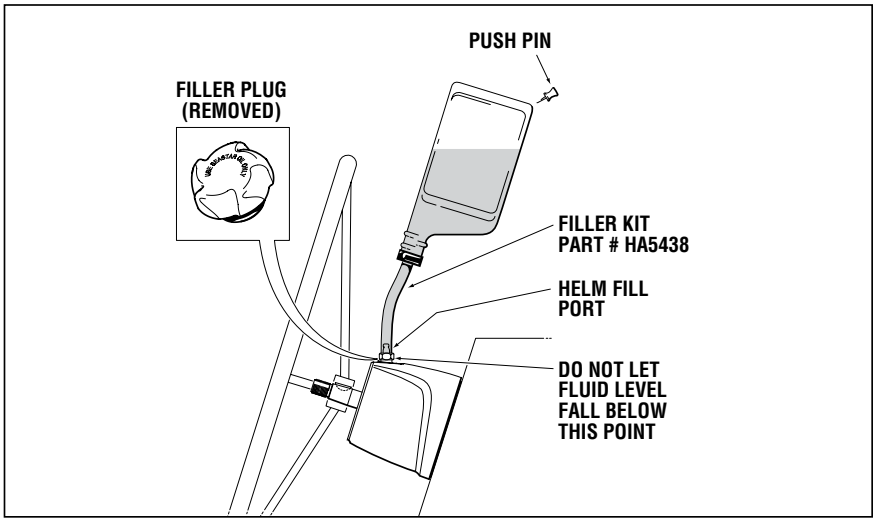
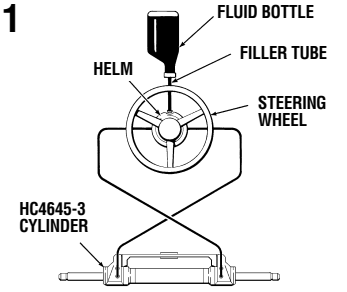


Figure 24.

NOTICE

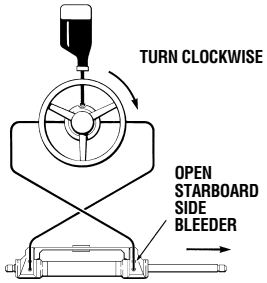
Help protect your boating environment by ensuring that all used fluid is disposed of properly.

Step 1



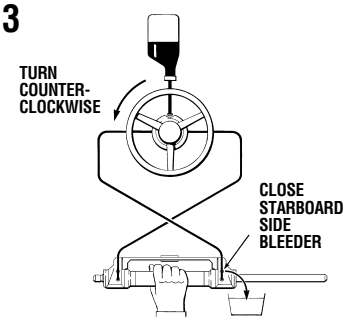
- Screw the threaded end of the filler tube into the helm filler port.
- Remove the cap from the fluid bottle and holding upright screw into the filler tube bottle cap. Poke hole in the bottom of the bottle.
- Fill the helm pump with hydraulic fluid so that it is visible in the filler tube. Fluid should always be visible in the filler tube. Use the next bottle of fluid at any time during the procedure in order to maintain the fluid level. Do not proceed with step 2 until helm is full.

Step 2



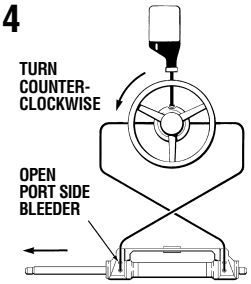
- Turn the steering wheel clockwise until the cylinder rod is fully extended.
- Open starboard side fitting.

Step 3



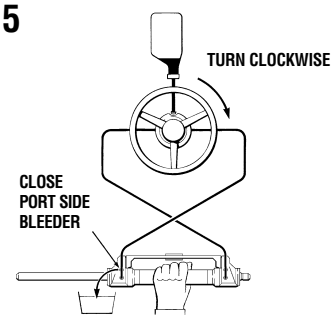
- Hold the cylinder body to prevent the rod from moving and turn the wheel counter-clockwise until a steady stream of air free fluid flows from the bleeder nipple.
  Note: If attached to engine, hold engine to prevent cylinder rod from moving.
- While continuing to turn the wheel, close the bleeder fitting.

Step 4



- Continue to turn the steering wheel counter-clockwise until the cylinder rod is fully extended. (Steering wheel will come to a stop.)
- Open Port side bleeder.

Step 5



- Hold the cylinder body to prevent the rod from moving a turn the wheel clockwise until a steady stream of air free fluid flows from the bleeder nipple.
  Note: If attached to engine, hold engine to prevent cylinder rod from moving.
- While continuing to turn the wheel, close the port side bleeder fitting.

System Air Test

- Place engine in the center position.
- Manually push engine back and fourth.
- While pushing engine back and fourth, watch the steering cylinder "body" move.

If cylinder body moves more than 1/8", this is a sign that there is still air remaining in the system and further bleeding is required.

Fluid Level and System Check

Step 1 – Fluid level Setting

⚠ WARNING The fluid level MUST be checked and maintained BEFORE EACH use to ensure safe steering operation. Failure to adhere to this warning may lead to loss of steering control resulting in persons being ejected from vessel or collision with an obstacle, leading to property damage, personal injury and/or death.

- If mounted with the wheel shaft horizontal, the helm MUST be filled to the bottom of filler hole AT ALL TIMES. DO NOT allow fluid level to drop more than 1/4" below filler threads.
- For helms mounted on a 20 degree angle, or, with wheel shaft in the vertical position, fluid level should be within 1/2" of filler hole.

Step 2 – System Check

⚠ WARNING The system check MUST be completed after installation. Doing so will ensure the safe operation of your steering system and any fault/leak will show at this time. Failure to adhere to this warning/check may result in the loss of steering control leading to ejection from the vessel, or, collision with an obstacle resulting in property damage, personal injury and/or death.

- Turn steering wheel hard over to hard over to confirm unrestricted movement of the steering system and hoses. Repeat this procedure in ALL trim/tilt positions of the engine(s). If interference occurs, or, hoses are being stretched this MUST be removed prior to operating your boat.
- Confirm that engine(s) are deflecting to the proper direction when steering wheel is turned.
- If no interference is noticed, or any interference is corrected, go to next step.
- Take steering wheel hard over to starboard (any helm can be used on a multi-station boat). Once the wheel reaches its stop point (cylinder is fully stroked out), continue to force the wheel one (1) full turn past stop. Leave wheel in this position while you check all connections, fittings, seals and hoses for leaks.

- If leaks are noticed they MUST be repaired prior to operating boat. After repair repeat bleeding procedures as outlined in this manual.
- Repeat to the Port direction and inspect ALL connections, fittings, seals and hoses for leaks.
- If leaks are noticed they MUST be repaired prior to operating boat. After repair repeat bleeding procedures as outlined in this manual.

NOTICE

This step will NOT harm the system and any noise made during this step should not be considered a fault in the steering system.

⚠ WARNING

Failure to complete the above noted step or, failure to correct a problem may result in loss of steering control leading to ejection from the vessel or collision with an obstacle resulting in property damage, personal injury and/or death.

ROUTINE MAINTENANCE

⚠ WARNING

Following the routine maintenance schedules as outlined below will ensure years of service from your BayStar 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)

⚠ WARNING

DO NOT operate boat if any component is not in proper working condition.

Prior to every use.

1. Check Fluid level in highest helm pump (see page 26 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.

2. Qualified Marine Mechanic

⚠ WARNING

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

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 Dometic.

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 figure 25. 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 fluid for cleanliness, flush if required.

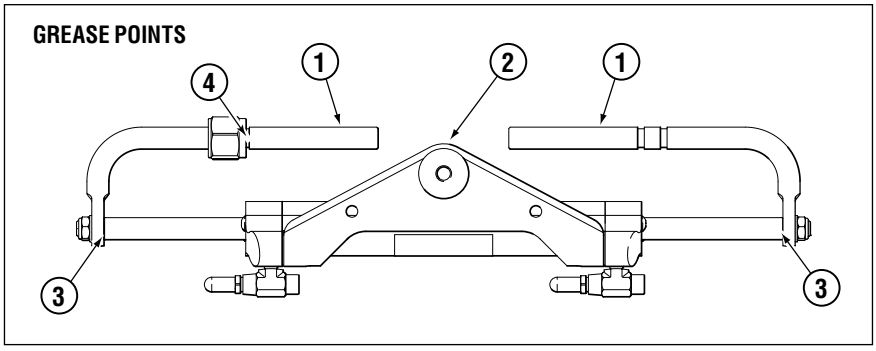


Figure 25.

1. Remove support rod completely; clean engine steering/tilt tube and re-grease with a good quality marine grease. Complete on both sides of cylinder.
   NOTE: Ensure proper torque specification is met when reinstalling.

2. Remove tiller nut; clean threads, re-grease using a good quality marine grease, then reinstall.
   NOTE: Ensure proper torque specification is met when reinstalling.
3. Remove support rod from cylinder shaft, clean and re-grease using a good quality marine grease.
   NOTE: Ensure proper torque specification is met when reinstalling.

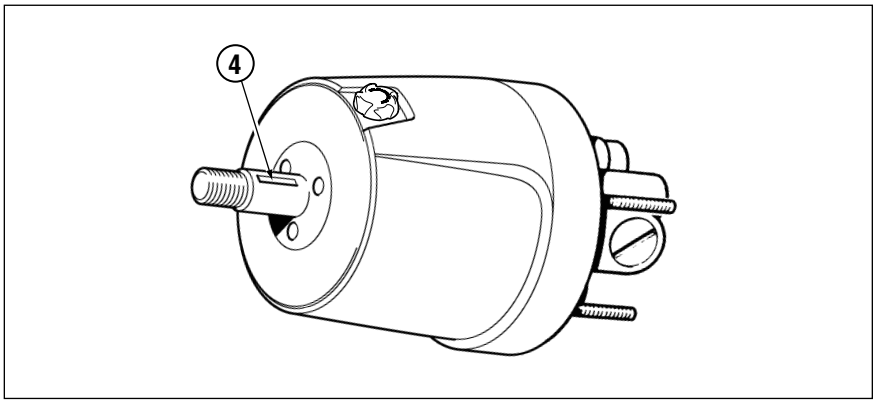


Figure 26. HH4314-4 shown.

4. Remove steering wheel; clean off helm pump shaft; re-grease using a good quality marine grease .
   NOTE: when reinstalling steering wheel, ensure proper torque specification is met.

Bolt Torque Specifications

These are the recommended maximum torque values for reusable dry bolts. Bolts should be torqued to this value +0% -20%. For lubricated bolts, multiply the dry bolt torque values by .75.

Values are stated in: **ft-lbs (Nm)**

Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass
2-56	2.5 (.282)	2.0 (.226)	6-32	9.6 (1.08)	4.9 (.554)	5/16”-18	132.0 (14.91)	107.0 (12.10)
2-64	3.0 (.338)	2.5 (.282)	6-40	12.0 (1.35)	9.9 (1.12)	5/16”-24	142.0 (16.04)	116.0 (13.11)
3-48	3.9 (.440)	3.2 (.361)	8-32	20.0 (2.25)	16.0 (1.81)	3/8”-16	236.0 (26.66)	192.0 (21.71)
3-56	4.4 (.497)	3.6 (.407)	8-36	22.0 (2.48)	18.0 (2.03)	3/8”-24	259.0 (29.20)	212.0 (23.97)
4-40	5.2 (.587)	4.3 (.486)	10-24	23.0 (2.59)	19.0 (2.14)			
4-48	6.6 (.740)	5.4 (.610)	10-32	32.0 (3.61)	26.0 (2.94)			
5-40	7.7 (.869)	6.3 (.712)	1/4”-20	75.0 (8.47)	62.0 (7.01)			
5-44	9.4 (1.06)	7.7 (.869)	1/4”-28	94.0 (10.6)	77.0 (8.70)			

Values are stated in: **ft-lbs (Nm)**

Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass	Bolt Size	18-8SS	Brass
7/16”-14	31.0 (42.00)	26.0 (35.25)	5/8”-11	93.0 (126.09)	76.0 (103.04)	1”-8	287.0 (389.12)	235.0 (318.62)
7/16”-20	33.0 (44.74)	27.0 (36.61)	5/8”-18	104.0 (141.00)	85.0 (115.24)	1”-14	259.0 (351.16)	212.0 (287.43)
1/2”-13	43.0 (58.30)	35.0 (47.45)	3/4”-10	128.0 (173.55)	104.0 (141.00)			
1/2”-20	45.0 (61.01)	37.0 (50.17)	3/4”-16	124.0 (168.12)	102.0 (138.29)			
9/16”-12	57.0 (77.28)	47.0 (63.72)	7/8”-9	194.0 (236.03)	159.0 (215.58)			
9/16”-18	63.0 (85.42)	51.0 (69.15)	7/8”-14	193.0 (261.67)	158.0 (214.22)			

NOTICE *Torque values for 18-8 stainless steel and brass bolts are taken from a torque guide by ITT Harper. All results correspond well with basic bolt equations, using a bolt factor of 0.2 and a factor of 3/4 for a reusable connection.*

TROUBLESHOOTING GUIDE

⚠ WARNING

Whenever in the following text a solution calls for removal from the vessel and/or dismantling of steering system components, the work must be carried out by a qualified marine hydraulic mechanic only.

Dometic offers the following as a guide only and will not assume any responsibility for problems resulting from incorrect repairs.

Maximum 150 HP (Total)

BayStar Hydraulic Steering will provide years of safe and reliable performance when installed and maintained correctly. As with all hydraulic steering systems, the BayStar helm is fitted with an internal pressure relief valve to protect the components of the system during over-pressure situations (such as hitting an object/ground during operation). This valve is set to 1000psi.

Most faults occur when installation instructions are not followed and in most cases will show up immediately upon filling the system. Below are the most common faults, their likely cause and possible solutions.

NOTICE *In some installations, when returning the wheel from a hardover position, a slight resistance and clicking sound may be heard. This should not be mistaken as a fault, this is a normal occurrence caused by the release of the lock-spool.*

⚠ WARNING

Warranty will be void if maximum 150 HP (Total) exceeded or if combined with any other product (including SeaStar steering components). Steering failure may occur causing property damage and/or personal injury or death.

FAULT	CAUSE	SOLUTION
1. During filling the helm becomes completely jammed.	Blockage in the line between the helm and cylinder.	Check ALL fittings for incomplete holes, replace faulty fitting. Fittings without complete holes, however, are not common. Make certain that the BayStar tube has not collapsed during installation. If so: In a system using tubing, the collapsed section will need to be removed and re-fitted with a new piece with the aid of tube connectors. In a system using Hose, the entire hose will need to be replaced, DO NOT cut Hose.
2. System is very difficult to fill. Air keeps burping out top of helm even after system appears full.	Cylinder has been mounted upside down. This causes air to be trapped in the cylinder.	Mount cylinder correctly, according to cylinder installation instructions. Ports should always be kept in uppermost position.
	Air in system.	Review filling instructions.
	Bleed fitting leaking.	Tighten bleed fitting.
	Coiled BayStar tube.	Uncoil or straighten the BayStar tube.
3. Steering is stiff and hard to turn, even when the vessel is not moving.	Restrictions in tube.	Find restriction and correct. **⚠ WARNING Kinked BayStar tube <u>MUST</u> be replaced. Failure to do so may result in a loss of steering causing personal injury, property damage or death.**
	Wrong fluid, like ATF has been used to fill the system.	Drain system and fill with BayStar fluid.
	Cylinder connecting nuts are over tightened.	Ensure proper torque specification has been met.
	Cylinder installed into wrong hole in steering arm.	Confirm proper hole as shown on your engine application.

FAULT	CAUSE	SOLUTION
4. Helm unit in system is very bumpy and requires too many turns from hardover to hardover.	Dirt in inlet check of helm pump.	Contact repair center, or replace helm pump. **⚠ WARNING DO NOT attempt to access check valves, or dismantle the helm pump in any way, doing so may lead to loss of steering control resulting in ejection from boat, or collision with an obstacle causing property damage, personal injury and/or death.**
5. Steering is easy to turn at the dock, but becomes hard to turn when vessel is underway.	Steering wheel is too small.	Fit larger steering wheel if possible, see installation instructions. If this does not correct the problem proceed with next cause and solution or consult factory. Max. wheel dia. 22”(56 cm).
	Incorrect setting of trim tab(s) engine.	Adjust tab(s).
	Air pocket in system.	Check fluid level, perform air test as instructed on page 26, fill and purge system as instructed on page 24.
	Total horsepower exceeds 150 HP.	Replace BayStar steering system with SeaStar steering system.
6. Engine drifts to port or starboard while vessel is underway, even when wheel is not being turned.	Dirt in check valves.	Contact repair center, or replace helm pump. **⚠ WARNING DO NOT attempt to access check valves, or dismantle the helm pump in any way, doing so may lead to loss of steering control resulting in ejection from boat, or collision with an obstacle causing property damage, personal injury and/or death.**
7. Turning wheel to starboard causes the boat to turn to port.	Incorrect tube connections.	Switch the port side BayStar tubing to the starboard cylinder fitting and the starboard BayStar tubing to the port side cylinder fitting. Refill and purge system.
8. My application requires me to flip or change the pivot plate on my cylinder.	Different engine applications.	Please refer to page 22 for complete instructions.
9. Cylinder is not centered when installed onto engine.	Small tilt tube.	Remove clip and install into second groove. Please refer to page 23 for details.

REPLACEMENT PARTS

NOTICE

There are lots of aftermarket parts and brands on offer from brick-and-mortar and online retailers. These options may seem very positive at first, but can quickly turn negative if you are not familiar with these brands. Unless significant research is done beforehand, it can be difficult to tell the difference between the many options available. This can result in a purchase of counterfeit or underperforming parts, despite the seller's claims.

With genuine Dometic OEM parts you won't have to study a myriad of aftermarket options. You can simply replace your original part with one provided by Dometic. This replacement will perform as effectively as the original part, you won't have to worry about its fit or reliability.

REPLACEABLE PIVOT PLATE (PART # HA4640, HA4641, HA4642, and HA4643)

Remove cylinder from the engine. Please refer to page 13 before cylinder removal.

Step 1:

Remove the two cap screws from one end of the steering cylinder using the 5/32" Allen head wrench, or socket as shown in figure 29.

⚠ CAUTION

DO NOT pull the gland off the end of the shaft, doing so may damage the seals when you try to reassemble it.

⚠ CAUTION

After removing the cap screws there will be small amounts of debris on the screw. Ensure that any loose debris is removed from inside and the face of the cylinder body.

Step 2:

Remove the pivot plate shown in figure 29 and install the correct pivot plate for your engine application from teh options available shown in figure 28.

Step 3:

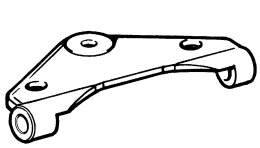
Carefully slide the loose gland back into place so that the gland stub fits into the hole on the pivot plate. Some SeaStar steering fluid applied to the O-ring on the gland may ease reinsertion into the barrel.

Step 4:

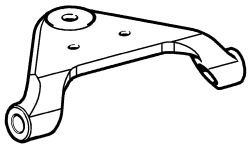
Align the screw holes on the gland with the threaded holes on the barrel, ensure that the gland face is butted tightly against the end of the barrel, with no debris in between, and fasten using the cap screws removed earlier.

Tighten to torque spec. 60 in-lbs (5 ft-lbs).

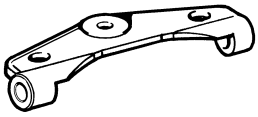
⚠ WARNING **Any maintenance/repairs on BayStar steering components must be performed by a qualified marine mechanic.**



HA4640
USE WITH CYLINDER
HC4645-3



HA4641
USE WITH CYLINDER
HC4647-3



HA4642
USE WITH CYLINDER
HC4648-3

HA4643
USE WITH CYLINDER
HC4658-3

Figure 28.

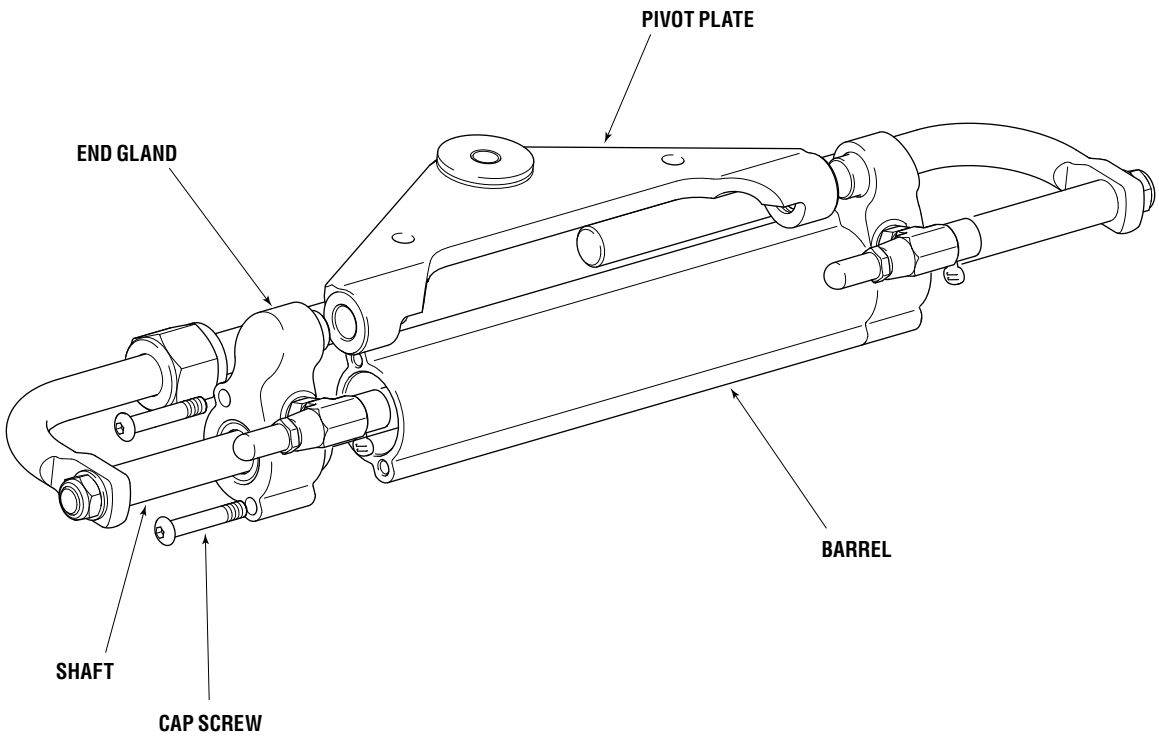
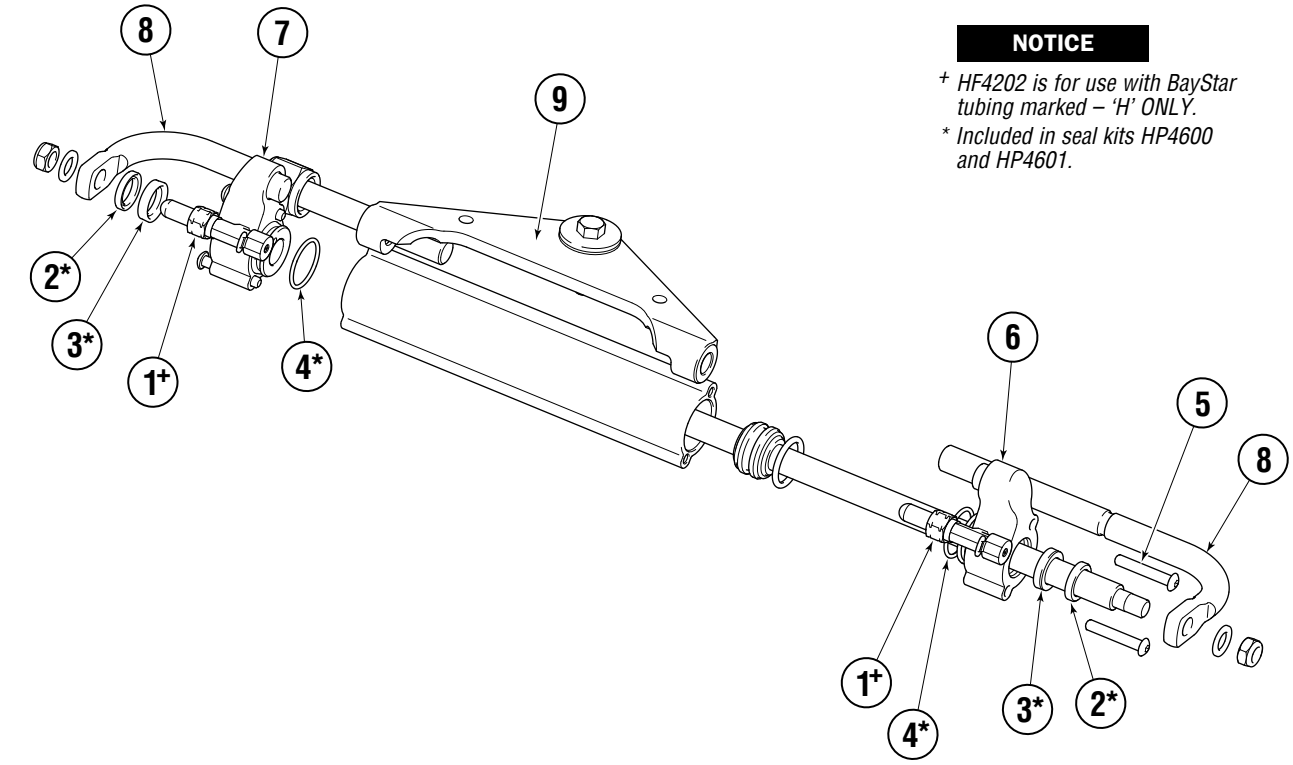


Figure 29. HA4640 plate shown.

BAYSTAR CYLINDER (PART # HC4645-3, HC4647-3, HC4648-3, HC4658-3) (PART # HC4645H, HC4647H, HC4648H, HC4658H)

⚠ WARNING **Any maintenance/repairs on BayStar steering components must be performed by a qualified marine mechanic.**



NOTICE

+ HF4202 is for use with BayStar tubing marked – 'H' ONLY.

** Included in seal kits HP4600 and HP4601.*

Figure 27.

CYLINDERS: HC4645-3, HC4647-3, HC4648-3, HC4658-3

ITEM	PART#	QTY	DESCRIPTION (ORB)
1	HF4203	1	KIT, -3 ORB Bleeder Tee Kit *(Inc. 2 x complete fittings)*
	HP4601	1	KIT, End Gland, includes:
*2		2	Wiper
*3		2	Shaft Seal
*4		2	O-Ring
*5		4	BHCS 1/4" NC x 1.5" SS
*6		1	Gland, Port Side
*7		1	Gland, Starboard Side
8	HP6050	1	KIT, Support Rod, Bent *(Inc. 2 x support rods)*
9	Various	1	Pivot Plate. See page 32 for your specific cylinder part number

CYLINDERS: HC4645H, HC4647H, HC4648H, HC4658H

ITEM	PART#	QTY	DESCRIPTION (NPT)
+1	HF4202	1	KIT, Tee Fitting *(Inc. 2 x complete fittings)*
	HP4600	1	KIT, End Gland, includes:
*2		2	Wiper
*3		2	Shaft Seal
*4		2	O-Ring
*5		4	BHCS 1/4" NC x 1.5" SS
*6		1	Gland, Port Side
*7		1	Gland, Starboard Side
8	HP6050	1	Kit, Support Rod, Bent *(Inc. 2 x support rods)*
9	Various	1	Pivot Plate. See page 32 for your specific cylinder part number

LIMITED WARRANTY
Owner's Limited Warranty Policy

This Warranty is made to a purchaser ("owner" or "you"), who acquires the Dometic Corporation ("Dometic")—manufactured product or component (the "Dometic product") for his or her own use.

1. WHAT'S COVERED

What does the Limited Warranty cover?

The Dometic products under this limited warranty are to be free from defects in material and workmanship at the time of sale and under normal use. If Dometic determines to its satisfaction that a Dometic product contains such a defect during the applicable Warranty Periods set out within **Section 4 COVERAGE PERIOD**, then Dometic shall, at Dometic's sole option, repair or replace the Dometic product, or refund the original purchase price.

Note: Where labor is included for a particular Dometic product covered under this Limited Warranty (See Section 4 COVERAGE PERIOD), Dometic is not responsible for additional labor charges associated with the removal, reinstallation, or replacement of any equipment or furnishings beyond the particular covered Dometic product. Any additional travel time is the owner's sole responsibility.

This Limited Warranty is made in lieu of all other express warranties, obligations, or liabilities on the part of Dometic. In those instances in which Dometic chooses to make a cash refund of the original purchase price, such refund shall effect the cancellation of the contract of sale without reservation of rights on the part of the owner. **Such refund shall constitute full and final satisfaction of all claims which the owner has or may have against Dometic resulting from any actual or alleged breach of warranty, either express or implied.**

IN NO EVENT SHALL DOMETIC BE LIABLE FOR EITHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

ANY IMPLIED WARRANTY, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PURPOSE, IS LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES SPECIFIC LEGAL RIGHTS, YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Dometic reserves the right to improve or change the design of any Dometic product without notice and with no obligation to make corresponding changes in Dometic products previously manufactured.

2. WHAT'S NOT COVERED

What does this Limited Warranty not cover?

We will have no obligations under this warranty for any product which:

- has been improperly installed;
- has been used in an installation other than as recommended in our installation or operation instructions or specifications;
- has failed or has been damaged due to an accident or abnormal operation including racing, misuse or alterations outside our factory;
- has been repaired or modified by entities other than Dometic;
- has been used on an engine/boat combination where the engine horsepower exceeds the rating established by the boat manufacturer;
- has been used with other or as specified in the Dometic's Owners Manual for the purchased product/product(s) which, in Dometic's opinion, are incompatible with the Dometic's product.

Installation and application of Dometic products are not warranted by Dometic because Dometic has no control or authority over the selection, location, application, or installation of Dometic products.

3. GETTING SERVICE

How do you get service?

Please read the following Warranty Procedure:

In order to obtain the benefits of this Warranty, the owner has the following three options during the applicable Warranty Coverage Period:

1. Preferred option: Have a Dometic authorized Servicing Dealer perform the work needed. The customer needs to contact Dometic Tech Support 800-730-4082, marinesupport@dometic.com for a recommendation as to the closest authorized Servicing Dealer. If the customer already knows of an authorized Servicing Dealer, the Servicing Dealer should be contacted directly.
2. Second option: If the customer contacts the Dometic Customer Service Department for an authorized Servicing Dealer and there are none in the particular area, Dometic may authorize the use of a local Servicing Dealer, in which event Dometic will work with the local Servicing Dealer to assist in any way possible.
3. Third option: The customer may send the Dometic product back to the factory to have the repair work done. Dometic will make every effort to return the equipment to the customer within a three-week time period. If the claim represents a valid warranty issue, Dometic will pay the freight both ways. Dometic prefers option one first, option two second, and option three only if option one or two are not available.

Refer to the **Dometic Tech Support** section below for contact information.

Any Dometic product returned in the manner described above will be examined by the Servicing Dealer and/or by Dometic. If it is found that the returned item was defective in material or workmanship at the time of sale, the Servicing Dealer will contact Dometic for Warranty coverage. Dometic shall, at Dometic's sole option, repair or replace the Dometic product, or refund the original purchase price. If Dometic determines that repairs to the Dometic product are to be made, then only authorized Dometic parts will be used.

Dometic does not authorize any person or company to create any Warranty obligations or liability on its behalf.

No action to enforce this Warranty shall be commenced later than ninety (90) days after the expiration of the applicable Warranty Coverage Period as set out within **Section 4 COVERAGE PERIOD**. Claims must be submitted in writing to the Dometic Marine Division Warranty Department.

4. COVERAGE PERIOD

What is the Warranty Coverage Period?

Dometic warrants its products for a period of two years from the date of original retail purchase. For Dometic products used commercially or in any rental or other income producing activity, Dometic warrants its products for a period of one year from the date of original retail purchase.

We will provide replacement product without charge for any Dometic product covered by this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such products were purchased, or to us at the appropriate address. In any such case, Dometic products found to be defective and covered by this warranty from the date of original purchase will be replaced or repaired at Dometic' option, and returned to the customer.

Dometic' sole responsibility under this warranty is limited to the repair or replacement of product which is, in Dometic' opinion, defective. Dometic is not responsible for charges connected with the removal of such product or reinstallation of replacement or repaired parts.

Dometic Tech Support

Phone: 800-730-4082

Email: marinesupport@dometic.com

NOTE: The above Limited Warranty supersedes all previous versions and is a reproduced extract from Dometic publication: L-4940. Form No. 340124 05/18 REV B. Effective 01/01/2024.

Mobile living made easy.

DOMETIC

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

www.dometic.com

ISO 10592

CE

PRINTED IN CANADA 04/24

FORM NO. 998010 REV. E

Please scan this QR code and watch our latest **Boating Safety** video.