# 1250V–1275V

## SeaStar® VARIABLE TURNS HYDRAULIC STEERING

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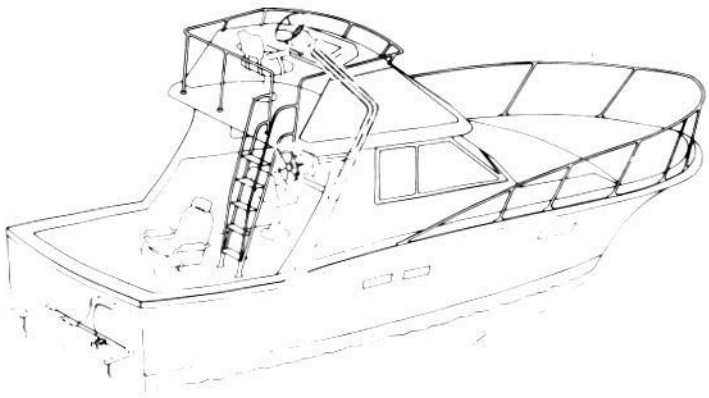


Phase one of the **SeaStar** philosophy is now incorporated into the Capilano 1250V and 1275V steering systems...known worldwide for their ruggedness and reliability.

The internals of the pump have been redesigned to eliminate potential air traps and to enhance air removal.

Cylinders are fitted with engineered bleed fittings to facilitate our OEM automatic purging device and to further enhance air removal for individual filling and purging requirements.

Helm pumps feature a variable displacement enabling the helmsman to adjust the steering wheel turns to suit various manoeuver and weather conditions.

**SeaStar** 1250V and 1275V systems are designed to meet ABS, Lloyds and Det Norske Veritas specifications. The systems are not pressurized by air, eliminating concerns about air leakage or pressure drops. A separate reservoir is not required as each helm contains its own reservoir. Built-in pressure relief valves in the helm protect the system from the effects of thermal expansion.

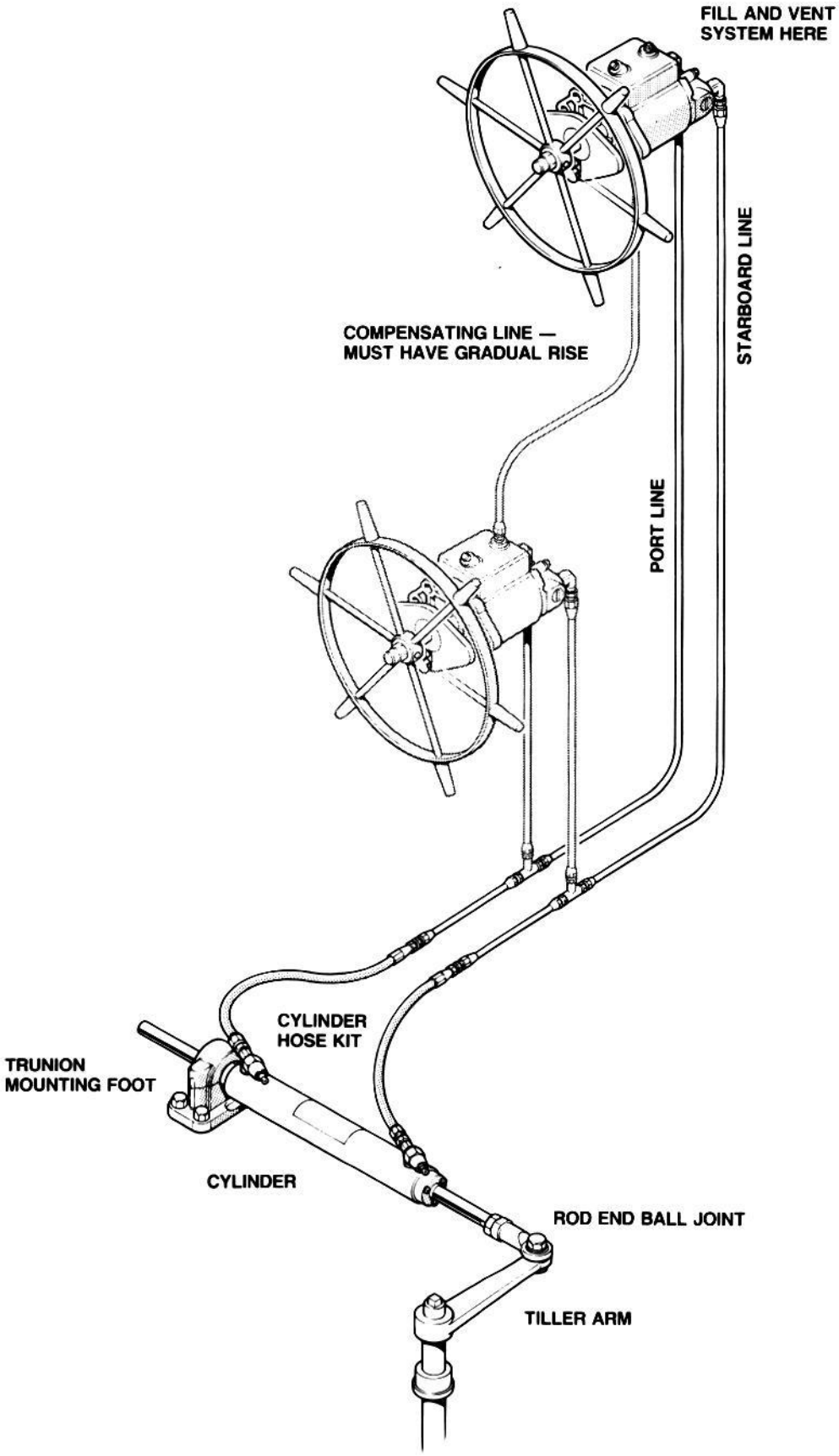
**SeaStar** hydraulic steering is a total commitment to quality, performance and simplicity.

**SeaStar**, the hydraulic steering system that is...

- *Easy to install...*
  - Only two components; helm and cylinder.
  - Clear, complete installation instructions.
- *Easy to fill and purge...*
  - Engineered bleed fittings on cylinder.
  - A helm and lock valve design that enhances air removal.
  - A no-mess filler device.
  - A filling and purging time of normally less than 30 minutes.
- *Easy to check for proper installation...*
  - Easy system check.
  - No searching for difficult to find air leaks.
- *Easy to turn...*
  - Ball bearing piston race.
- *Designed to provide many years of service...*
  - Precision built.
  - No corrosive materials exposed to marine environment.
  - Field replaceable helm and cylinder shaft seals.
  - A no hassle 2 year user warranty.

**SeaStar**! **SIMPLY** THE BEST.

# SYSTEM DIAGRAM




## HELM PUMP

A unique variable displacement feature on the helm allows the number of steering wheel turns to be adjusted by the helmsman to his preference within a pre-determined range.

| PART NO. | DESCRIPTION |
|---|---|
| HH 5250 | MODEL 1250V |
| HH5275 | MODEL 1275V |

## CYLINDERS

Cylinders are made from bronze and stainless steel. Cylinders are available with stainless rod and ball joints, models TMB, or bronze rod and clevises, models TMC. All models feature special engineered bleed fittings. Cylinders fitted with ball joints feature two axis articulation.

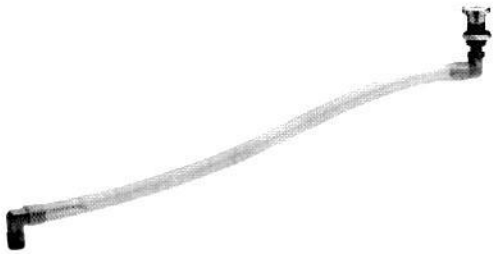
| PART NO. | DESCRIPTION |
|---|---|
| HC5349 | CYLINDER BA 150-7 TMB Bronze - Brass, rod end ball joint type |
| HC5350 | CYLINDER BA 175-7 TMB Bronze - Brass, rod end ball joint type |
| HC5351 | CYLINDER BA 200-7 TMB Bronze - Brass, rod end ball joint type |
| HC5352 | CYLINDER 150-7 TMB Bronze - Brass, rod end ball joint type |
| HC5353 | CYLINDER 175-7 TMB Bronze - Brass, rod end ball joint type |
| HC5354 | CYLINDER 200-7 TMB Bronze - Brass, rod end ball joint type |
| HC5355 | CYLINDER BA 150-7 TMC, rod end clevis type |
| HC5356 | CYLINDER BA 175-7 TMC, rod end clevis type |
| HC5357 | CYLINDER BA 200-7 TMC, rod end clevis type |
| HC5359 | CYLINDER BA 200-11 TMC, rod end clevis type |
| HC5360 | CYLINDER 150-7 TMC, rod end clevis type |
| HC5361 | CYLINDER 175-7 TMC, rod end clevis type |
| HC5362 | CYLINDER 200-7 TMC, rod end clevis type |

## CYLINDER HOSES

Steering systems installed with copper tubing require short pieces of flexible hose to accommodate slight cylinder movement. Hoses are supplied with 1/2" swivel flare nuts on each ends.

Hoses are sold as a pair of 18 inch (.45m) length for single cylinder applications and 2,3,4,5 and 6 foot (.6, .9, 1.2, 1.5 and 1.8m) length to handle the variables of twin cylinder installations.

| PART NO. | DESCRIPTION |
|---|---|
| HA5731 | CYLINDER HOSE KIT, two hoses 18" - .45m long<br>THE FOLLOWING HOSES ARE FOR TWIN CYLINDER INSTALLATIONS, SELECT FOUR HOSES AS REQUIRED. |
| HA5732 | CYLINDER HOSE, one hose 2' - .6m long |
| HA5733 | CYLINDER HOSE, one hose 3' - .9m long |
| HA5734 | CYLINDER HOSE, one hose 4' - 1.2m long |
| HA5735 | CYLINDER HOSE, one hose 5' - 1.5m long |
| HA5736 | CYLINDER HOSE, one hose 6' - 1.8m long |



## FILL AND VENT PLUG KIT

This kit will facilitate filling and purging of the steering system at a more convenient and accessible area than at the helm pump. A through dash fitting, complete with a water proof vent plug, 18 inches (.45m) of vinyl tube and elbow fittings are supplied with this kit.

| | |
|---|---|
| HA5450 | FILL AND VENT PLUG KIT |

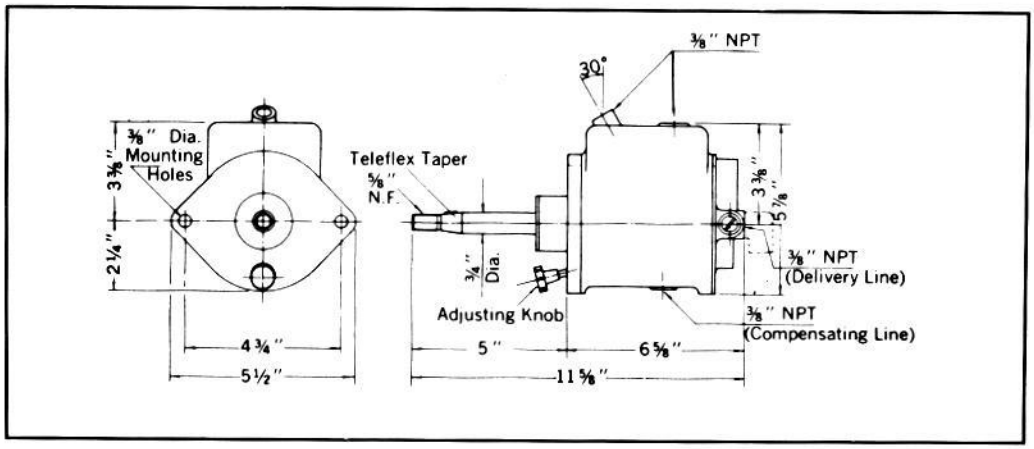
## FITTING KITS

Single steering station and additional steering station S.A.E. flare tube fitting kits are available for use with 1/2" O.D. and 5/8" O.D. copper tubing.

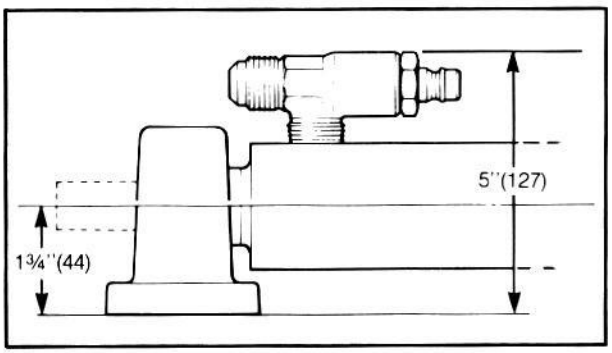
| PART NO. | DESCRIPTION |
|---|---|
| HF5590 | FITTING KIT, single station, ½" copper tube |
| HF5591 | FITTING KIT, additional station, ½" copper tube |
| HF5592 | FITTING KIT, single station, 5/8" copper tube |
| HF5593 | FITTING KIT, additional station, 5/8" copper tube |

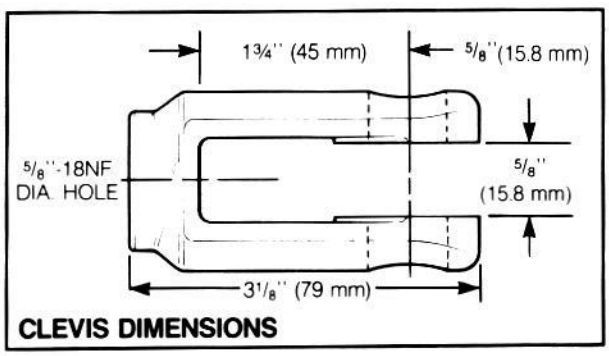
# GENERAL DIMENSIONS

**MODEL 1250V - 1275V HELM PUMPS**

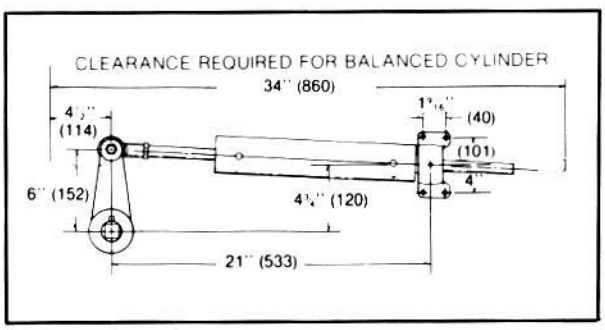


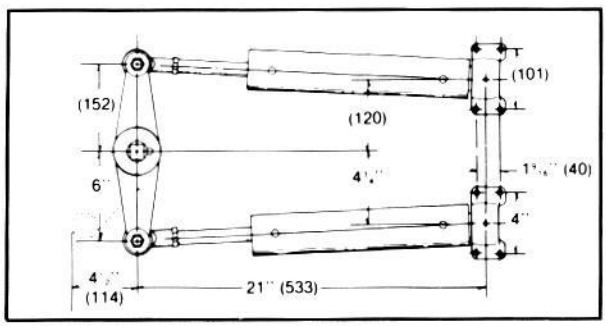

**CYLINDER DIMENSIONAL DATA** All 7" Models

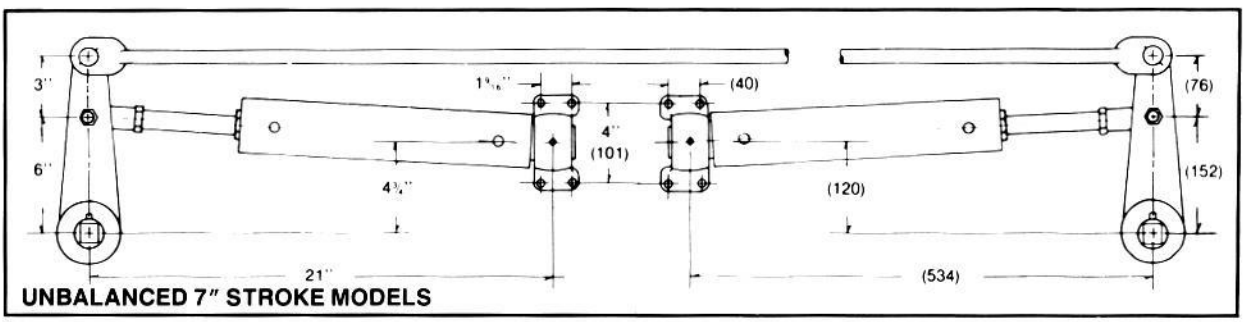



**CLEVIS DIMENSIONS**



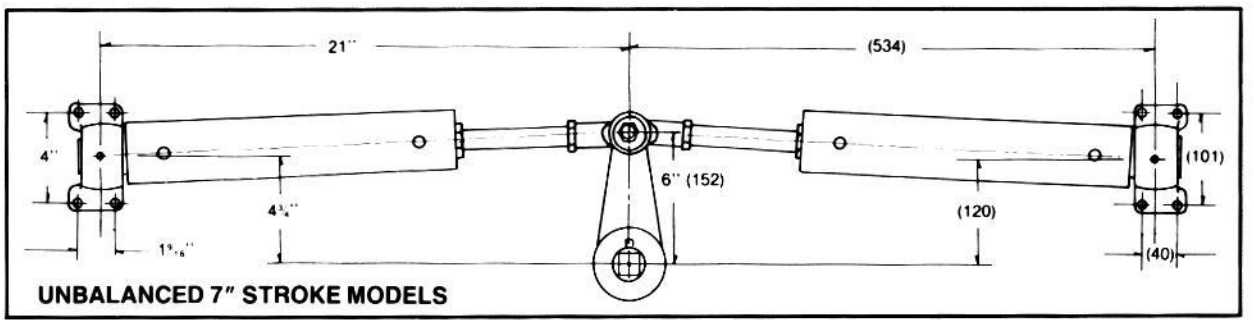



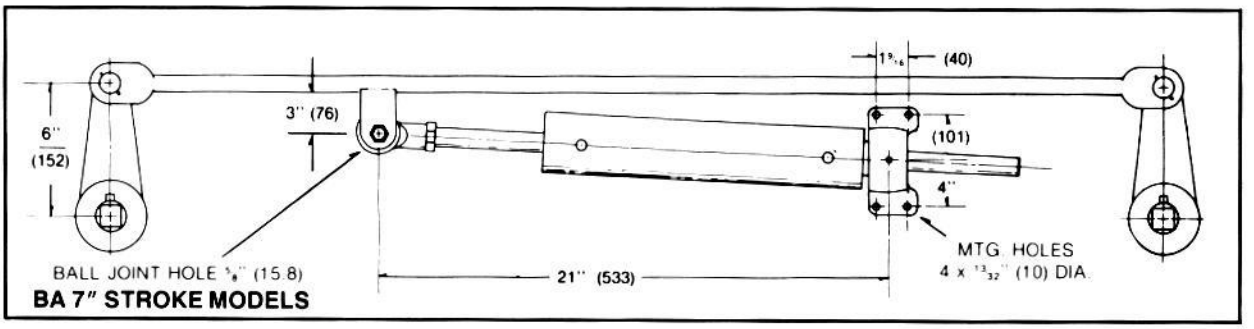

**UNBALANCED 7" STROKE MODELS**

# GENERAL DIMENSIONS

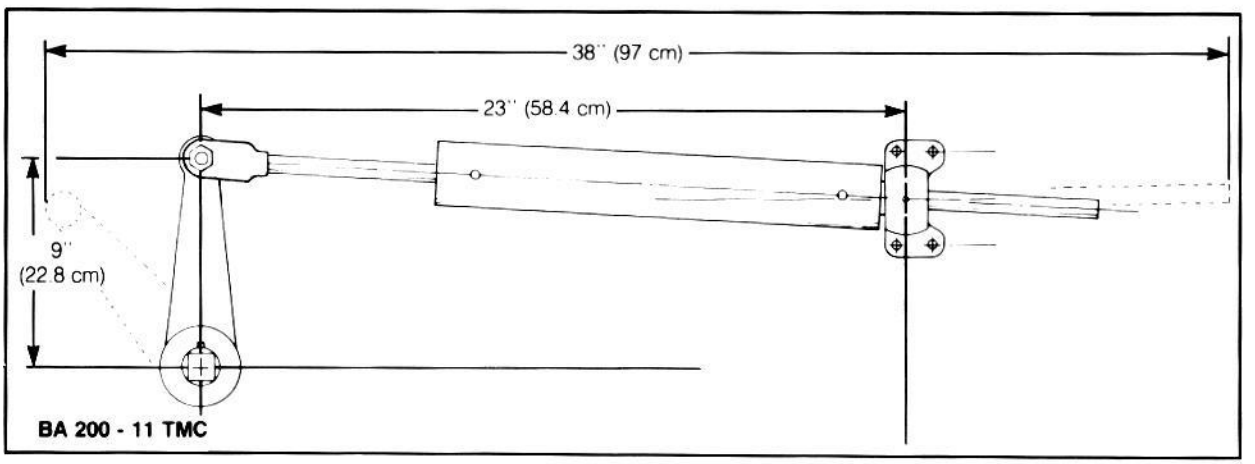
## CYLINDER DIMENSIONAL DATA




**UNBALANCED 7" STROKE MODELS**




**BA 7" STROKE MODELS**



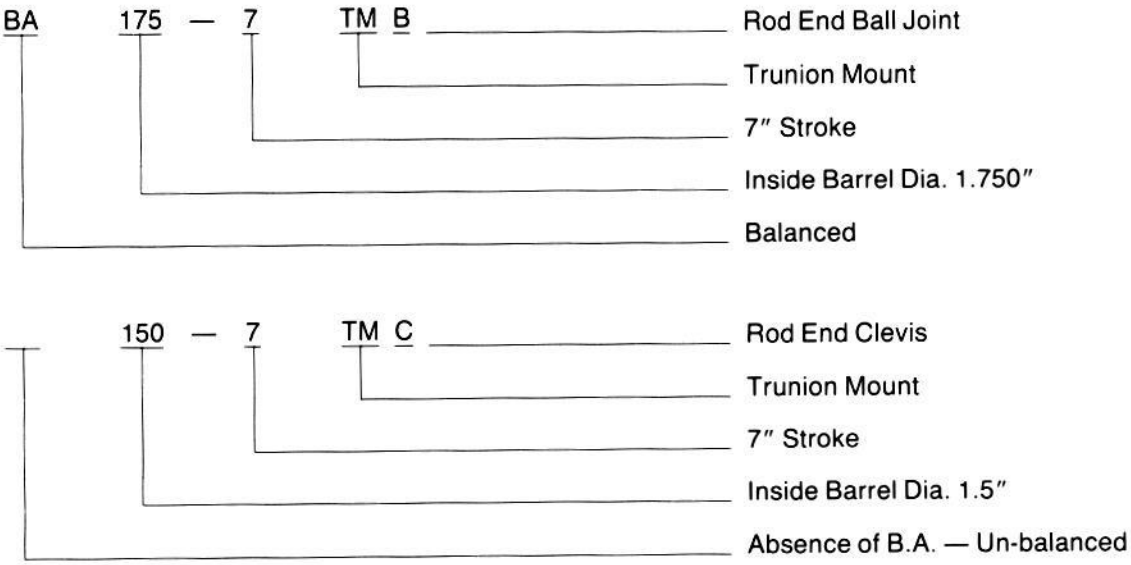

**BA 200 - 11 TMC**

# TECHNICAL INFORMATION

| HELM PUMP | DISPLACEMENT | RELIEF VALVE | PORTS |
|---|---|---|---|
| SeaStar 1250V | 1.7 cu.in. - 3.4 cu.in.<br>27.8 cc - 55.7 cc | 1000 PSI - 70 BAR | 3/8 NPT |
| SeaStar 1275V | 2.7 cu. in. - 5.4 cu. in.<br>44.2 cc - 88.4 cc | 1000 PSI - 70 BAR | 3/8 NPT |

Helm Pump Shaft — 3/4 standard taper, 1" per foot
5/8 NF threads, 3/16" Woodruff Key

## CYLINDERS MODEL SPECIFICATION




| CYL. MODEL | VOL. | TORQUE @ 1000 PSI — 70 BAR @ 35° | |
|---|---|---|---|
| BA 150-7 models | 10.2 cu. in. - 167 cc | 7117 in/lbs | 81 kgm |
| BA 175-7 models | 13.7 cu. in. - 225 cc | 9569 in/lbs | 110 kgm |
| BA 200-7 models | 18.9 cu. in. - 310 cc | 13200 in/lbs | 151 kgm |
| BA 200-11 models | 29.7 cu. in. - 486 cc | 19900 in/lbs | 228 kgm |
| 2X 150-7 models | 23 cu. in. - 377 cc | 15800 in/lbs | 181 kgm |
| 2X 175-7 models | 31 cu. in. - 508 cc | 21400 in/lbs | 245 kgm |
| 2X 200-7 models | 41 cu. in. - 672 cc | 28700 in/lbs | 329 kgm |

| CYLINDERS | INSIDE DIAMETER | STROKE |
|---|---|---|
| BA 150-7, 150-7 TMB, TMC | 1.50" – 38.1 mm | 7" – 178 mm |
| BA 175-7, 175-7 TMB, TMC | 1.75" – 44.4 mm | 7" – 178 mm |
| BA 200-7, 200-7 TMB, TMC | 2.00" – 50.8 mm | 7" – 178 mm |
| BA 200-11 TMC | 2.00" – 50.8 mm | 11" – 279 mm |

# SELECTING STEERING SYSTEM COMPONENTS

The application guide line should be used with discretion.

The table below is a guide to selecting a steering system. A steering system manufacturer cannot anticipate all the variables in boat-rudder design that affect steering loads. It is the final reponsibility of the boat designer-builder to specify maximum expected steering loads.

If the required information is not available, contact our customer service department with rudder dimensions, vessel size and anticipated maximum vessel speed.

| MAXIMUM OUTPUT TORQUE | | HELM PUMP MODEL | STEERING WHEEL TURNS ADJUSTABLE | | REQUIRES CYLINDER MODELS | FOR APPROXIMATE VESSEL SIZE | |
|---|---|---|---|---|---|---|---|
| LB. IN. | KG M | | MIN. | MAX. | | PLANING HULL UP TO | DISPLACEMENT HULL UP TO |
| 6,548 | 75 | 1250V | 3 | 6 | BA 150-7TM | 35′ — 11 m | 30′ — 9 m |
| 8,795 | 100 | 1250V | 4 | 8 | BA 175-7TM | 40′ — 12 m | 38′ — 11.5 m |
| 12,134 | 140 | 1250V | 5.5 | 11 | BA 200-7TM | 50′ — 15 m | 45′ — 14 m |
| 12,134 | 140 | 1275V | 3.5 | 7 | BA 200-7TM | 50′ — 15 m | 45′ — 14 m |
| 14,766 | 170 | 1275V | 4 | 8 | 2X 150-7TM | 50′ — 15 m | 45′ — 15 m |
| 19,900 | 230 | 1275V | 5.5 | 11.0 | BA 200-11TM | 55′ — 17 m | 50′ — 15 m |
| 19,902 | 230 | 1275V | 5.5 | 11.0 | 2X 175-7TM | 55′ — 17 m | 50′ — 15 m |
| 26,322 | 300 | 1275V | 7.5 | 15 | 2X 200-7TM | 60′ — 18 m | 55′ — 17 m |

### TUBING/HOSES

The use of soft refrigeration type copper tubing is recommended for optimum performance. If hydraulic hose must be used, select a hydraulic hose that is rated for 1000 PSI - 70 bar working pressure, and has a very low volumetric expansion rating. A hydraulic hose that expands too much at 500 PSI - 35 bar will make the steering spongy.

Recommended tubing — hose diameter

For systems using model 1250V

- — ½ in O.D. copper tubing
- — ½ in I.D. hydraulic tubing

If the line run from cylinder to furthest helm is longer than 40 feet (12 m) use

- — 5/8 in O.D. copper tubing
- — 5/8 in I.D. hydraulic hose

For systems using model 1275V

- — 5/8 in O.D. copper tubing
- — 5/8 in I.D. hydraulic hose

MANUFACTURED BY

Teleflex (Canada) Ltd.

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# INSTALLATION INSTRUCTIONS

4

# SeaStar

## 1250V AND 1275V HYDRAULIC STEERING FOR INBOARD POWER VESSELS

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and

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TRADE NAME

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

## SYSTEM DIAGRAM

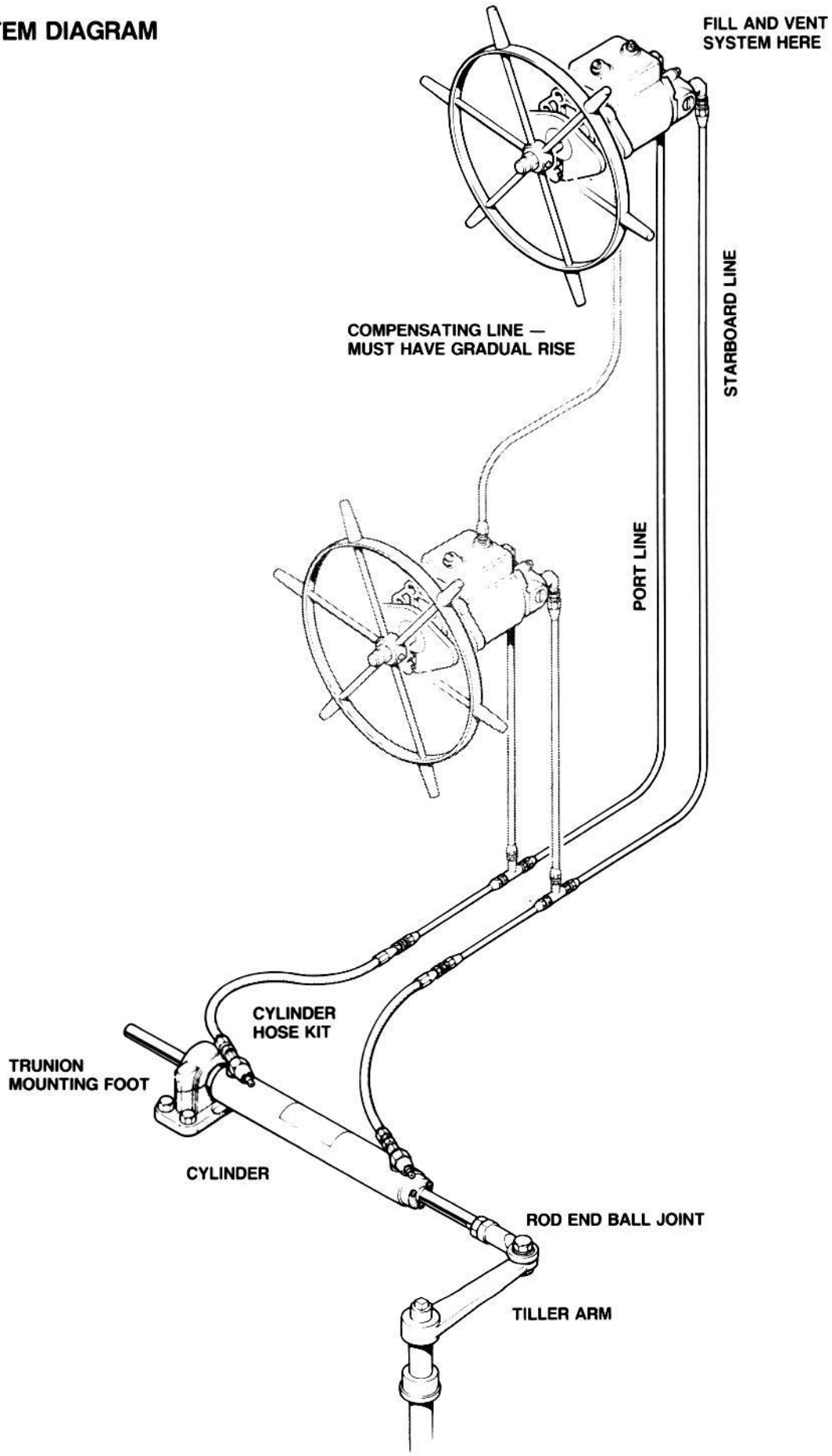



FIG. 1

# SEASTAR HYDRAULIC STEERING

**The SeaStar Steering System has been designed for pleasure and commercial vessels.**

**Please read these instructions thoroughly before you start the installation. Teleflex 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.**

## TOOLS

You will need the following tools for installing your steering system: Refer to Mounting Template.

- Helm Mounting Bolt Holes . . . . . $^{13}/_{32}$" (10 mm) dia. drill
- Helm Mount Holes . . . . . $2^{1}/_{8}$" drill (540 mm)
  . . . . . $^{3}/_{4}$" drill (190 mm)
  . . . . . Keyhole Saw
- $^{1}/_{2}$", $^{5}/_{8}$" Copper Tube Flaring Tool
- $^{1}/_{2}$", $^{5}/_{8}$" Copper Tube Cutter
- $^{1}/_{2}$", $^{5}/_{8}$" Flare Nut Wrenches

**CAUTION:** A high quality Teflon base pipe thread sealant must be used on all pipe threads. Use Loctite P.S.T. (Pipe Sealant with Teflon) or equivalent.

## TUBING AND FITTINGS

The use of copper tubing is recommended. There is no performance substitute for rigid tubing. Flexible hose, no matter what quality, will degrade your steering systems performance to some extent. If flexible hose is required, use a hose that has a minimum 1,000 PSI (70 bar) operating pressure rating, a burst pressure rating of minimum 5000 PSI and the lowest available volumetric expansion factor, such as Aeroquip No. 2651 or equivalent.

Use seamless soft annealed refrigeration copper tubing, type L.

For 1250V systems use $^{1}/_{2}$" O.D.
For 1275V systems use $^{5}/_{8}$"O.D.

SAE 45 degree flare fittings should be used.

Fitting kits available from Teleflex/Flexatrol contain brass SAE 45 degree flare fittings.

HF5590 fitting kit, single station, for $^{1}/_{2}$" copper tube
HF5591 fitting kit, additional station

HF5592 fitting kit, single station, for $^{5}/_{8}$" copper tube
HF5593 fitting kit, additional station

## CYLINDER HOSE KITS

**WARNING:** Do not connect copper tube directly to cylinder fittings. Short sections of hoses are required to allow for cylinder movement when the tiller arm swings through its arc.

### SINGLE CYLINDER INSTALLATION

Two 18" (460) hoses are available from Teleflex/Flexatrol. Specify part no. HA5731.

### TWIN CYLINDER INSTALLATION

To handle the various mounting configurations of twin cylinders, the following cylinder hoses are available.

HA5732, one hose, 2 feet ( .6m) long
HA5733, one hose, 3 feet ( .9m) long
HA5734, one hose, 4 feet (1.2m) long
HA5735, one hose, 5 feet (1.5m) long
HA5736, one hose, 6 feet (1.8m) long

**NOTE:** All cylinder hoses are supplied with SAE $^{1}/_{2}$" female flare swivel nuts.

**NOTE:** Twin cylinder installations require four (4) hoses for connections to port and starboard delivery lines. Refer to sketch no. 4.

## MOUNTING THE HELM

The SeaStar 1250V/1275V helms can be mounted with the helm shaft being horizontal, vertical or any angle in between.

The helm pumps must always be mounted with the mounting holes in a horizontal plane.

**CAUTION:** Dirt and foreign matter introduced into the steering system during installation or during the filling and purging of the steering system may cause malfunction. Cleanliness is extremely important. If installation is interrupted, prevent dust and dirt entry into component fitting ports, etc..

Determine desired mounting location(s) for helm pump(s). Chect for adequate space behind dash for helm pump, fittings and line connections.

**IMPORTANT NOTE:** Provision should be made to allow for proper filling and air removal of the steering system. Refer to fig. 14. Fill and vent plug kit, part no. HA5450, will provide a thru dash fill and vent capacity.

Use the helm mounting template, drill and cut out as indicated on the template.

Mount the helm pump, bezel and adjusting knob.

**WARNING:** Do not drill into the helm pump when predrilling holes for helm pump bezel.

Remove all red plastic shipping plugs from helm pump. See warning page 7.

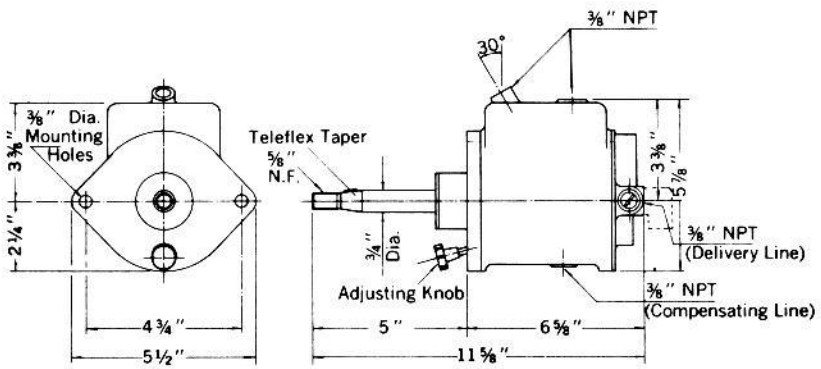



**FIG. 2**

## CYLINDER INSTALLATION

### GENERAL NOTES

- Capilano cylinders are engineered and manufactured for heavy duty marine usage and are suitable for commercial and pleasure boat applications. Capilano cylinders are also designed to meet A.B.S., Lloyds and D.N.V. specifications.
- Please read these instructions thoroughly before attempting installation. Teleflex (Canada) Ltd. cannot accept responsibility for installations where instructions have not been followed, where substitute parts are used or where modifications have been made to our product.
- Proper cylinder installation is the key to the successful operation of the hydraulic steering system. An incorrectly installed cylinder is subject to rapid seal and bearing wear and nonrepairable damage.
- Minimum side loading of cylinder rod and maximum cylinder performance can be achieved by observing sketch no. 1.

An imaginary line drawn through the tiller arm hole at both hard over positions will create the cylinder centre line.

With tiller arm at hard over positions, angle X and Y should be the same.

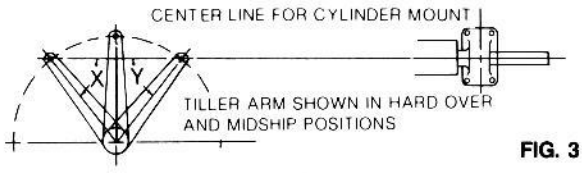



**FIG. 3**

- Select the diagram and dimensional data that corresponds with your cylinder model. Note, not all possible cylinder mounting configurations are shown, however, all necessary dimensions are shown regardless of mounting configurations.
- Mount the tiller arm(s) to rudder post(s). All slack or free play must be eliminated.
- Connect the cylinder ball joint or clevis to tiller arm. With tiller arm in midship position and with cylinder rod extended to its center position determine the anchoring position of cylinder mounting foot. A mounting bracket may be required.
- Swing rudder to ensure free movement of cylinder and tiller arm.

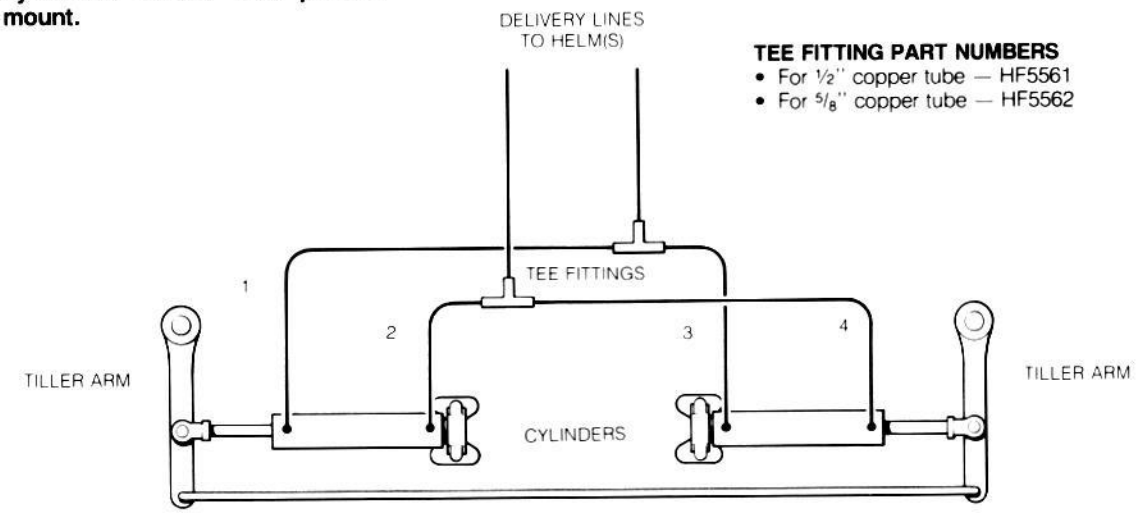
**CAUTION:** Cylinders should always be secured with thru bolts, not with lag screws.

Cylinder ports for hose connection should always be in the uppermost position. If this is absolutely not possible, cylinder should be left disconnected until the steering system is filled and purged free of air, while leaving cylinder ports in an uppermost position to assist air removal from the cylinder(s), then reconnect.

## HOSE KIT CONNECTIONS

Never attach copper tubing or any rigid tube or pipe directly to cylinder(s). Cylinders articulate during the hard over to hard over movement and require a flexible hose to compensate for the articulation. Refer to sketch for twin cylinder hose connection. The same connection procedure applies to cylinders mounted parallel.

**Hose kit connection for twin cylinders. In-line and parallel mount.**




**TEE FITTING PART NUMBERS**

- For ½" copper tube — HF5561
- For 5/8" copper tube — HF5562

**FIG. 4**

## CYLINDER MODEL INFORMATION

Cylinder models with letters BA are balanced and are normally used as a single unit. (If space permits, balanced cylinders may be used in pairs as an alternative to unbalanced cylinders). The absence of letters BA indicate that the cylinder is unbalanced, and must be used in pairs only. Using a single unbalanced cylinder will result in very stiff and hard steering.

| CYLINDER MODEL | CYLINDER VOLUME | |
|---|---|---|
| BA 150 - 7 TM | ---10.2 cu. in | 167 cu. cm |
| BA 175 - 7 TM | ---13.7 | 225 |
| BA 200 - 7 TM | ---18.9 | 310 |
| BA 200 - 7 TM | ---23 | 377 |
| 2X 150 - 7 TM | ---31 | 508 |
| 2X 175 - 7 TM | ---41 | 672 |
| BA 200 - 11 TM | ---29.5 | 483 |

The letters TMB indicate a trunion mount, ball joint rod end type. This cylinder can articulate in two planes (axis) to a total of 16 degrees.

The letters TMC indicate a trunion mount, clevis rod end type. This cylinder can articulate in one plane (axis) only to 16 degrees.

## CYLINDER DIMENSIONAL DATA All 7" Models

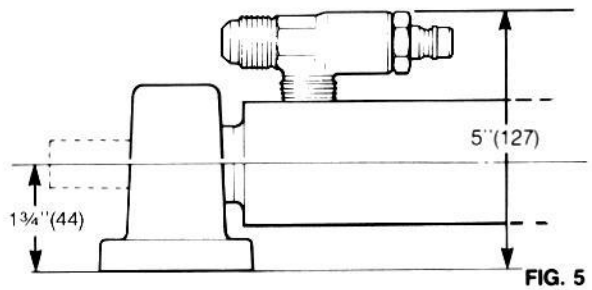
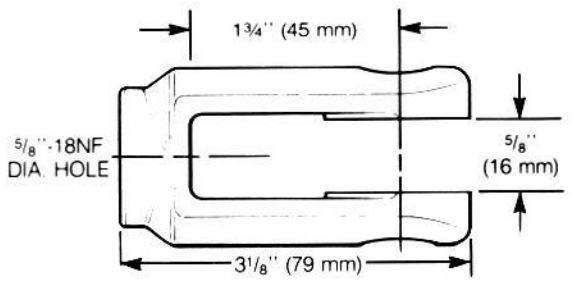



**FIG. 5**




**CLEVIS DIMENSIONS** **FIG. 6**

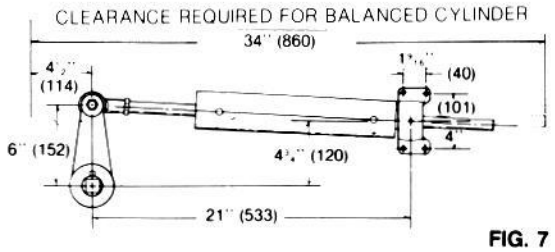


FIG. 7

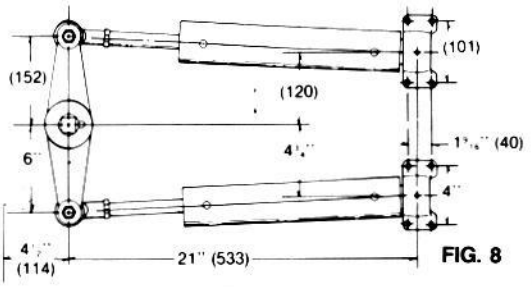


FIG. 8

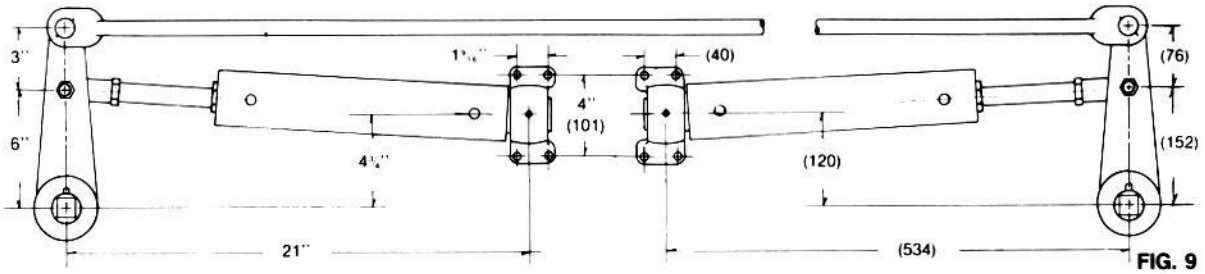


FIG. 9

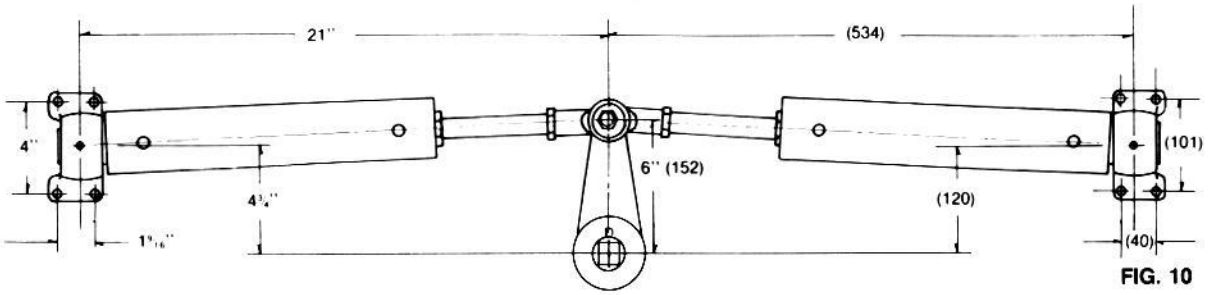


FIG. 10

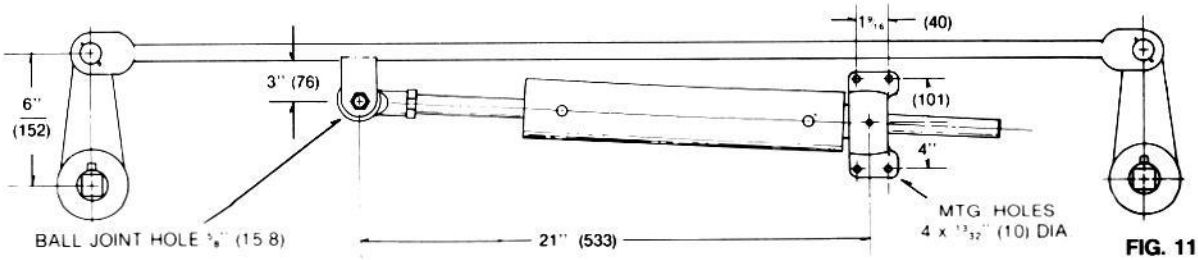
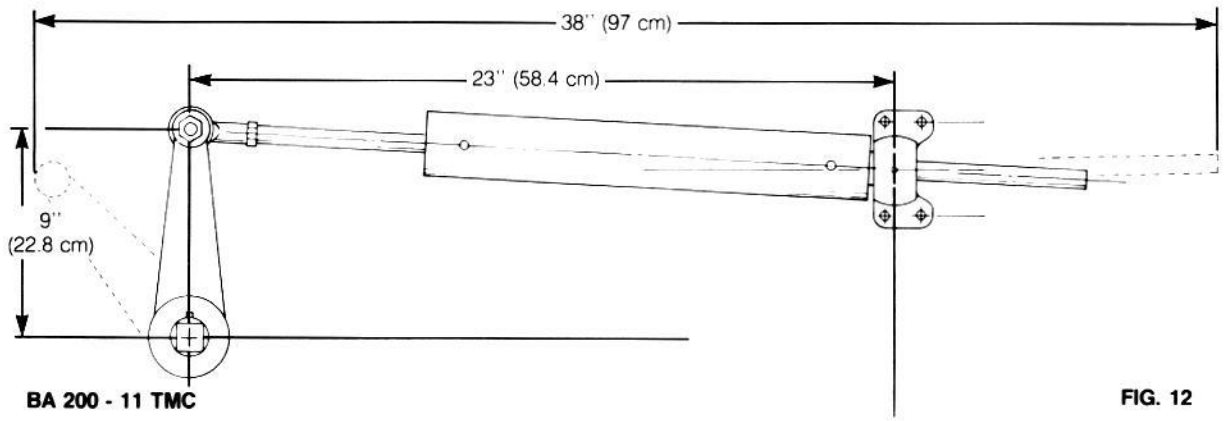


FIG. 11

**Cylinder dimensional data for BA 200-11 TMC are the same as those of the BA 200-7 TMC with the exceptions as follows. See Fig. 12 next page.**




**BA 200 - 11 TMC**

**FIG. 12**

## TUBING INSTALLATION

Route the tubing so that it will not interfere with hatch ways or other functional equipment.

Do not allow tubing to kink or collapse while routing through vessel. Any piece of tubing that has collapsed must be replaced.

In multi steering station systems helm pump reservoirs must be connected via a compensating line. The compensating line must run from the top of the lowest helm, to the bottom of the next highest helm, etc..

The purpose of a compensating line is to prevent an air lock in lower station helms and to supply oil to lower station helms. Compensating lines must be installed with a gradual rise to enable air to rise from a lower helm up to a higher helm and to allow oil to run from a higher helm to a lower helm.

**NOTE:** If a compensating line cannot be installed with a gradual rise, provision must be made at the lower helm(s) to allow periodic air bleeding during filling and purging. This can be accomplished by installing a tee fitting on top of the lower station helm pump. Connect compensating line to one end and an automotive type petcock valve to the branch end of the tee fitting.

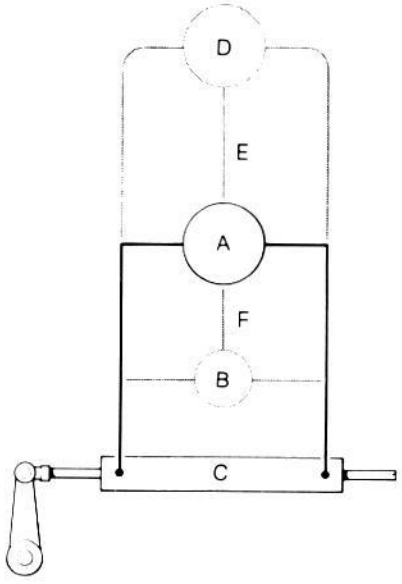
**NOTE:** The compensating line is not subjected to steering load pressures. Any oil resistant type hose-tubing will do. The inside diameter of the compensating line should be close to that of system tubing, to facilitate oil flow during filling and purging.

## SYSTEM CONNECTION

Refer to system diagram for general connection of tubing and components. See fig. no. 1 and 13.

A quality teflon base thread sealer, such as Loctite P.S.T. or equivalent should be used on all pipe threads. Failing to do so could result in leaks. DO NOT USE TAPE TYPE THREAD SEALERS.

An autopilot compensating line may be teed into an existing compensating line between two helms or directly into the bottom return helm pump port.




A = Single Station Helm
B = Auto Pilot (Optional)
C = Cylinder
D = Additional Helm (Optional)
E = Compensating Line
F = Auto Pilot Compensating Line

**FIG. 13**

## FILLING AND PURGING THE SYSTEM

The SeaStar 1250V/1275V system is designed to operate with ATF, automatic transmission fluid type A or Dexron II as used in automobiles.

**WARNING:** Before proceeding, ensure that all plastic shipping plugs in the helm pump(s) have been replaced with steel or brass pipe plugs. Plastic shipping plugs will deteriorate in time.

The filling and purging procedure is best accomplished by two persons. One person to fill the steering system and one person to open and close bleed fitting on the cylinder as required.

During the entire filling and purging procedure, the fill and vent helm (upper helm in multi station systems) must always be full of oil. If the oil level inside the helm is too low, air will automatically be reintroduced into the steering system. This will needlessly prolong the filling procedure.

The female thread of the filler-vent plug kit is ¼" NPT (national pipe thread).

Connect a large funnel or filling container to the filler-vent fitting as illustrated on fig. no. 14. SeaStar filler kit, part no. HA5438 may also be used. It is a short piece of vinyl tube with a ¼ NPT male fitting on one end, and a bottle cap that will accept the threaded bottle spout of the plastic type ATF Dexron II automatic transmission fluid bottles. (North America Only).

**CAUTION:** On occasion, air purged out of the system may cause a sudden rise or spurting of oil. A funnel or filling container will prevent spillage of oil.

To fill and purge the system, proceed as follows.

### STEP 1

Fill helm pump full with oil (upper helm on multi station system).

As the system fills with oil and air bubbles rise up into the funnel or filling container add more oil as required.

**NOTE:** Each helm pump reservoir has an approximate oil capacity of ¾ quarts (.75 litres).

Slide vinyl bleed tubes onto cylinder bleed fitting nipples and place other end of bleed tube into a container. Container should be large enough to hold at least one gallon (4 litres).

Now open all cylinder bleed fitting nipples by turning bleed nipple hex 1½ turns anti clockwise. See fig. no. 16.

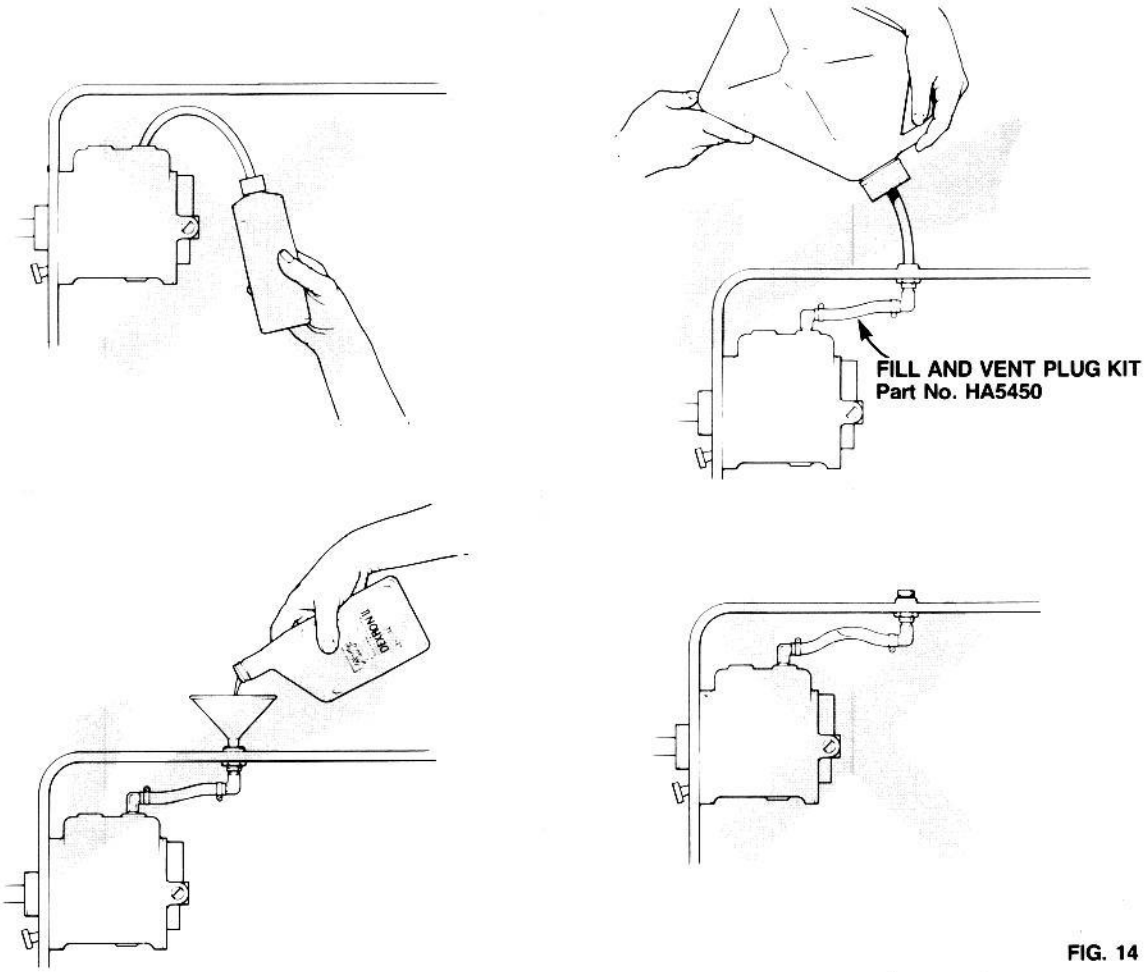



**FIG. 14**

**IMPORTANT NOTE:** Before proceeding, make certain that steering helm pumps are set at their highest displacement. Adjusting knob below helm pump steering wheel shaft must be turned clockwise as far as it will go.

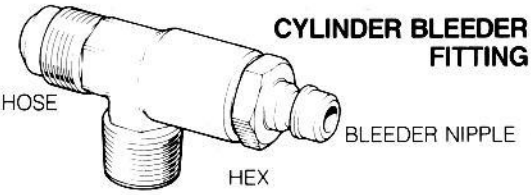



**FIG. 16**

Turn the steering wheel at upper station helm to starboard (right) until a steady stream of oil comes out of starboard bleed hose. Then turn the steering wheel to port (left) until a steady stream of oil comes out of port bleed tube.

For single station steering system proceed to step 3.

For multi station steering system repeat step 2 at next lower helm and again at lowest helm, if more than two helm stations are installed. An auto pilot must be considered as a steering station. The autopilot hydraulic power pump must be turned on to pump oil out of cylinder bleed fittings in proper sequence depending on where the auto pilot power pump is connected into the steering system.

**STEP 3**
Close cylinder bleed tube nipples. See fig. no. 16.

**STEP 4**
Starting at the upper steering station turn the steering wheel to hard over starboard (right). With as much force as possible, continue to turn the wheel to starboard and leave it in that position for one minute.

**NOTE:** If pressure build up exceeds 1,000 PSI - 70 BAR, the steering wheel will slip due to opening of the pressure relief valve. This will not harm the helm pump.

When the steering wheel is forced into the hard over position, air bubbles will once again rise up into the filling container.

Now force the steering wheel hard over to port (left) and leave in that position for one minute.

Alternating between port and starboard, (left and right), repeat this procedure about 6 to 10 times at the upper station helm.

**STEP 5**
Repeat STEP 4 at each additional helm in multi station steering systems.

**STEP 6**
Check the steering system for complete air removal by forcing the steering wheel into both hard over positions at upper steering station. If there is no noticeable drop and rise of the oil in the filling container, the steering system is correctly filled and purged.

A noticeable drop and rise of the oil level indicates that air is still present in the system. If so, repeat steps 4, 5 and 6.

**CAUTION:** Do not re-use oil that has been circulated through the steering system unless it is properly filtered. Automotive type gasoline, oil type fine mesh funnel filters are acceptable to filter the oil.

## OIL LEVEL SETTING AND SYSTEM CHECK

To set the correct oil level in the fill and vent helm proceed as follows:

Open starboard bleed nipple on cylinder fitting (only one on twin cylinder installations).

Turn steering wheel to starboard until oil level from filling container has reached the fill and vent fitting.

Now continue to turn the steering wheel to starboard 1½ turns for 1250V helm or 1 turn for 1275V helm.

Close starboard bleed fitting.

This procedure will provide for sufficient air space to accommodate fluid expansion.

At this time the steering system should be checked for proper connections of hose, tube and fittings, and possible leaks. To do so, turn steering wheel (any one on multi-steering station system) and pressurized very hard to port. Apply enough force to the wheel to exceed pressure relief valve pressure. You will not harm the helm or system. While pressure is maintained on steering wheel, check all port (left) fittings and line connections. Repeat procedure by turning wheel to starboard.

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

Inspection of the following is required at least two times every year by a qualified marine mechanic.

Check oil level at the fill and vent helm. Refer to "oil level setting" section in this manual for guidance on how to set the oil level correctly. Oil level should always be within ½" — 12 mm from inside top of helm pump reservoir.

Check mechanical linkages and connections. Tighten loose parts and replace badly worn parts.

Check for leaks.

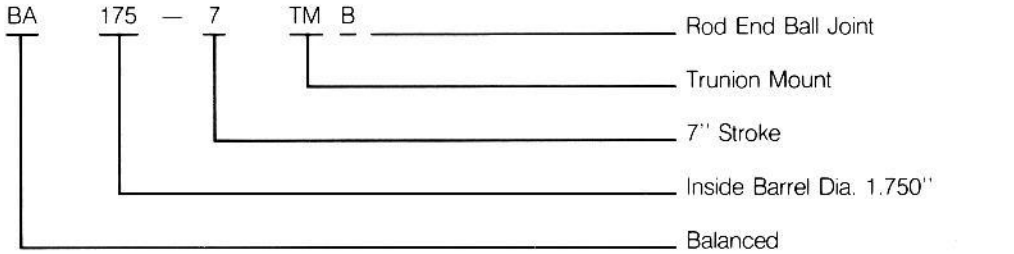
Check hoses/tubing for chafing/rubbing marks, and replace if required.

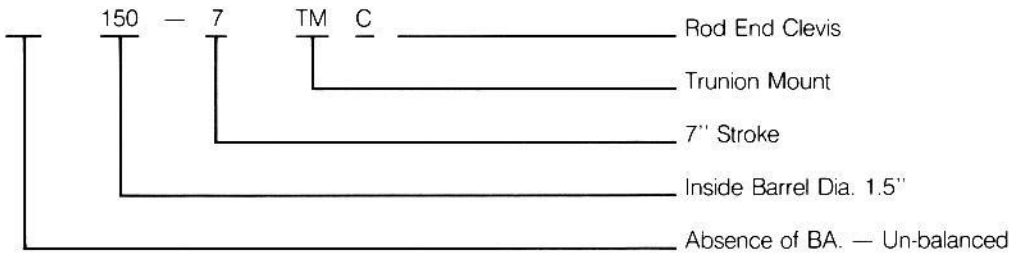
## TECHNICAL INFORMATION

| HELM PUMP | DISPLACEMENT | RELIEF VALVE | PORTS |
|---|---|---|---|
| SeaStar 1250V | 1.7 cu.in. - 3.4 cu.in.<br>27.8 cc - 55.7 cc | 1000 PSI - 70 BAR | 3/8 NPT |
| SeaStar 1275V | 2.7 cu.in. - 5.4 cu.in.<br>44.2 cc - 88.4 cc | 1000 PSI - 70 BAR | 3/8 NPT |

Helm Pump Shaft — 3/4" standard taper, 1" per foot
5/8" NF threads, 3/16" Woodruff Key

## CYLINDERS MODEL SPECIFICATION




| CYL. MODEL | VOL. | TORQUE @ 1000 PSI — 70 BAR @ 35° | |
|---|---|---|---|
| BA 150-7 models | 10.2 cu. in - 167 cc | 7117 in/lbs | 81 kgm |
| BA 175-7 models | 13.7 cu. in - 225 cc | 9569 in/lbs | 110 kgm |
| BA 200-7 models | 18.9 cu. in - 310 cc | 13200 in/lbs | 151 kgm |
| BA 200-11 models | 29.7 cu. in - 486 cc | 19900 in/lbs | 228 kgm |
| 2X 150-7 models | 23 cu. in - 377 cc | 15800 in/lbs | 181 kgm |
| 2X 175-7 models | 31 cu. in - 508 cc | 21400 in/lbs | 245 kgm |
| 2X 200-7 models | 41 cu. in - 672 cc | 28700 in/lbs | 329 kgm |

# TROUBLE SHOOTING GUIDE

- 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, and against the effects of contamination 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 hard over 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 lockspool in the system.

## WARNING — CAUTION

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 and repairs.

1. **FAULT** • DURING FILLING, THE HELM BECOMES COMPLETELY JAMMED.

   Cause • blockage in the line between the helms and the cylinder(s).

   Solution • Make certain that 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.

   Cause • Lines not installed correctly.

   Solution • check runs of lines; refer to installation diagram. Make certain that all port lines are hooked up to the port connections on helms and cylinder(s), and all starboard lines are connected to the starboard connections on helms and cylinder(s). If the compensating line is identical to the delivery lines, it could have been mistaken as either a port or starboard line.

2. **FAULT** • SYSTEM IS VERY DIFFICULT TO FILL. AIR KEEPS BURPING OUT TOP OF HELM EVEN AFTER SYSTEM APPEARS FULL.

   Cause • cylinder(s) has been mounted upside down. This causes air to be trapped in the cylinder(s).

   Solution • mount cylinder(s) correctly, according to cylinder installation instructions. Ports should always be kept in uppermost position.

   Cause • air in system.

   Solution • review filling instructions.

3. **FAULT** • STEERING IS STIFF AND HARD TO TURN, EVEN WHEN THE VESSEL IS NOT MOVING.

   Cause • rudder post glands are too tight or rudder post is bent, causing mechanical binding. The same applies to tiller arm and linkage on outdrives.

   Solution • 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.

   Cause • restrictions in hose, copper tubing, piping or fittings.

   Solution • find restriction and correct.

   NOTE: Collapsing of copper tubing during bending is enough to cause restrictions.

   Cause • air in oil.

   Solution • see filling instructions supplied with helm units.

4. **FAULT** • STEERING IS EASY TO TURN AT THE DOCK, BUT BECOMES HARD TO TURN WHEN VESSEL IS UNDERWAY.

   Cause • steering wheel is too small.

   Solution • 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.

   Cause • cylinder(s) too small.

   Solution • replace with larger cylinder(s).

   Cause • incorrectly designed or adjusted rudders, causing binding on rudder post and/or tie bar at cruising speeds.

   Solution • seek professional help. Have competent, qualified marine mechanic correct problem.

5. **FAULT** • RUDDER DRIFTS TO PORT OR STARBOARD WHILE VESSEL IS UNDERWAY, EVEN WHEN WHEEL IS NOT BEING TURNED.

   Cause • dirt in check valves.

   Solution • remove check valve plugs. These are the larger plugs on either side on rear of helm. Clean ball seats and balls and re-assemble. (See sketch overleaf)

   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.

6. **FAULT** • ONE HELM UNIT IN SYSTEM IS VERY BUMPY AND REQUIRES TOO MANY TURNS FROM HARD-OVER TO HARD-OVER.

   Cause • dirt in inlet check of helm pump.

   Solution • dismantle helm pump and remove contaminant from one or more piston inlet checks.

7. **FAULT** • TURNING ONE WHEEL CAUSES SECOND STEERING WHEEL TO ROTATE.

   Cause • See fault No. 5

   Solution • See fault No. 5

8. **WORN SEALS**

   Seal kits are available for the replacement of worn seals such as helm pump and cylinder shaft seals.

   For Helm Pumps 1250V and 1275V order Seal Kit ..... HS5161

   For Cylinder Models 150-7 Type order Seal Kit ..... HS5182

   For Cylinder Models 175-7 Type order Seal Kit ..... HS5183

   For Cylinder Models 200-7 Type order Seal Kit ..... HS5184

   For Cylinder Models 200-II Type* order Seal Kit ..... HS5185

   *Seal Kit good for cyl. model BA200-II TMC only.

   For individual shaft seals only order:

   Shaft Seal for 1250V, 1275V Helm Pump ..... 010322

   Shaft Seal for Cyl. Models 150 ..... 007320

   Shaft Seal for Cyl. Models 175 ..... 010322

   Shaft Seal for Cyl. Models 200 ..... 010322

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