SERVICE MANUAL
OF
ASD 14
STEERING AND TRIM CYLINDERS

SPECIFICATION NUMBERS 1006614 & 1006612

Twin Disc Incorporated
1328 Racine Street
Racine, Wisconsin 53403-1758
U.S.A.

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GENERAL INFORMATION

GENERAL

This publication provides the information necessary for the service and adjustment of the product specified on the cover of this manual. Specific engineering details can be obtained from the Product Service Department of Twin Disc, Incorporated.

SAFETY

Safe operating practices must be employed by all people servicing this unit. Twin Disc is not responsible for any personal injury resulting from unsafe and careless use of hand tools, power tools, lifting equipment or unsafe practices.

Because of the possible danger to people or property from accidents which may result from the use of manufactured products, it is important that correct procedures be followed. Products must be used in accordance with the information specified.

Proper installation procedures must be used. Proper safety devices such as guards may be required as specified in applicable codes. Safety devices are not provided by Twin Disc nor are they the responsibility of Twin Disc.

WARRANTY

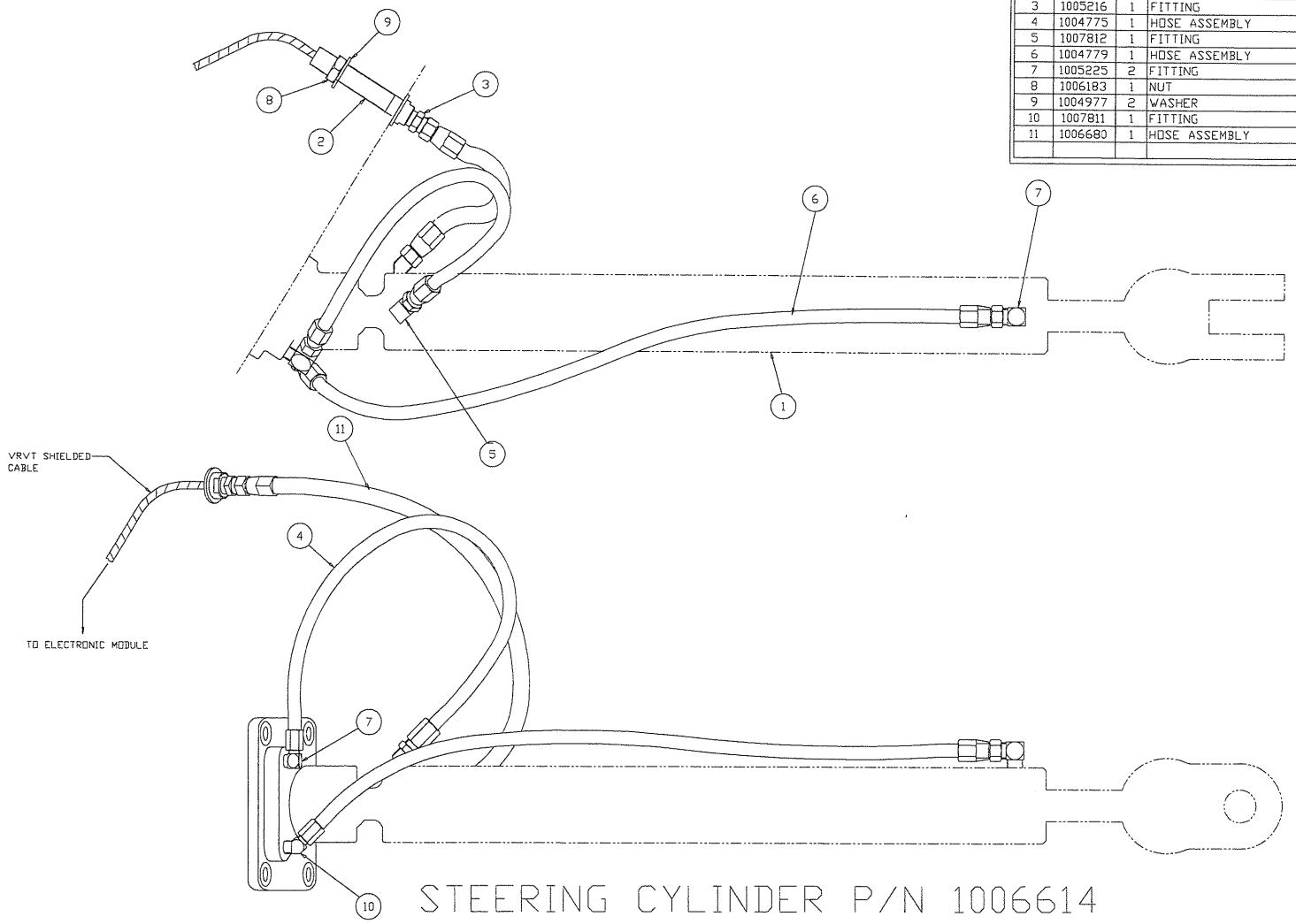
Equipment for which this manual was written has a limited warranty. See Twin Disc for details.

SERVICE INFORMATION

Each series of manuals issued by Twin Disc is current at the time of printing. Changes are made to reflect advances in technology and improvement in state of the art when required. **All revisions and design improvements are subject to change without notice.**

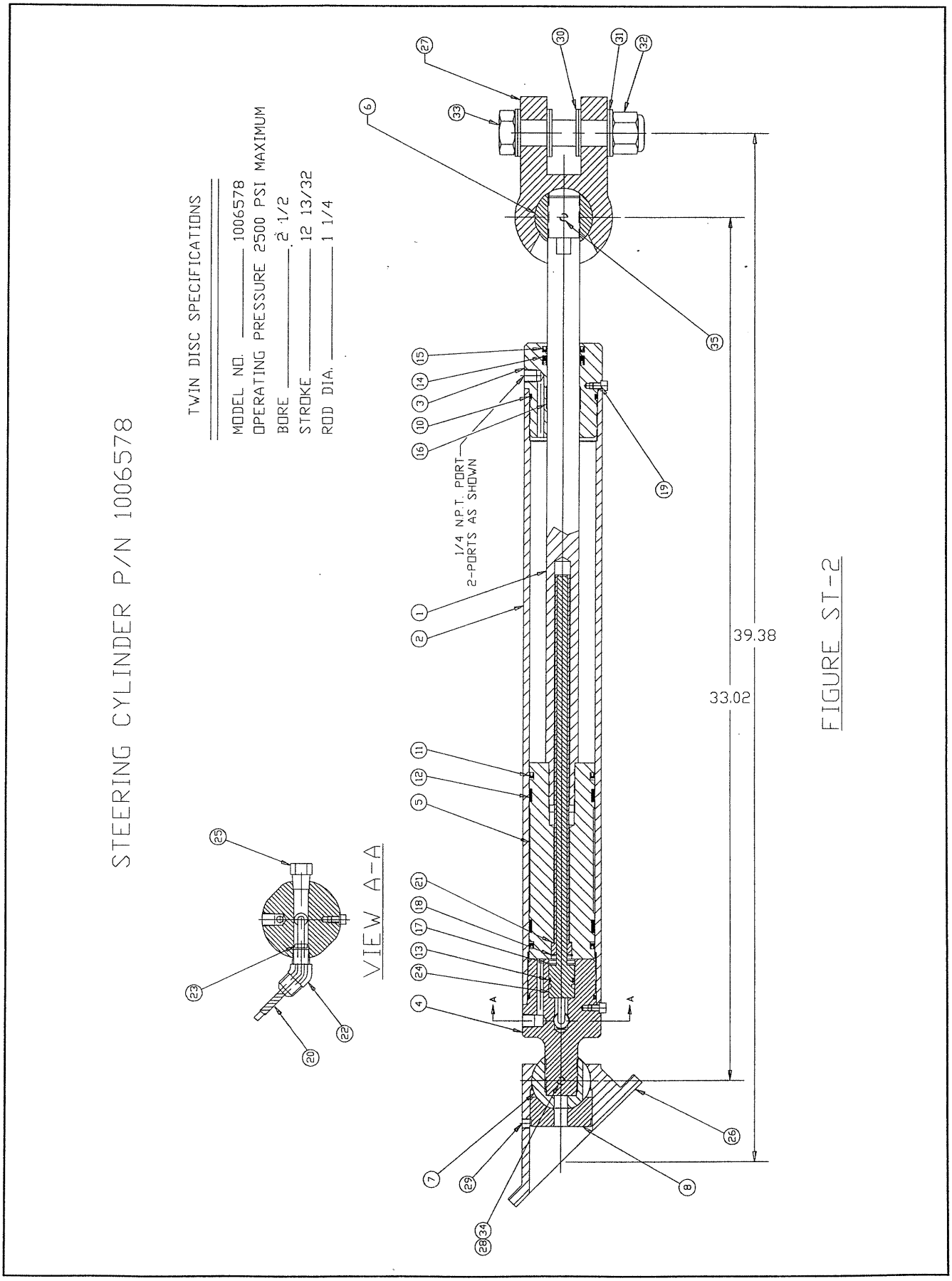
Individual product service bulletins are issued to provide the field with immediate notice of new service information. These service bulletins are distributed to all Twin Disc distributors through the United States and many foreign countries. Contact your nearest Twin Disc distributor for the latest service information.

STEERING CYLINDER P/N 1006614				
ITEM NO.	PART NO.	QTY.	PART DESCRIPTION	REMARKS
1	1006578	1	STEERING CYLINDER ASSEMBLY	
2	1006181	1	FITTING	
3	1005216	1	FITTING	
4	1004775	1	HOSE ASSEMBLY	
5	1007812	1	FITTING	
6	1004779	1	HOSE ASSEMBLY	
7	1005225	2	FITTING	
8	1006183	1	NUT	
9	1004977	2	WASHER	
10	1007811	1	FITTING	
11	1006680	1	HOSE ASSEMBLY	



STEERING CYLINDER P/N 1006614

FIGURE ST-1


STEERING CYLINDER P/N 1006578
TWIN DISC SPECIFICATIONS
MODEL NO. 1006578
OPERATING PRESSURE 2500 PSI MAXIMUM
BORE 2 1/2
STROKE 12 13/32
ROD DIA. 1 1/4
1/4 N.P.T. PORT
2-PORTS AS SHOWN
39.38
33.02
VIEW A-A
FIGURE ST-2

1006578 STEERING CYLINDER

ITEM NO.	PART NO.	QTY.	PART DESCRIPTION	REMARKS
1	1006653	1	ROD (B-11725-A)	
2	1006654	1	TUBE (C-11725-B)	
3	1006655	1	GUIDE (C-11725-C)	
4	1006656	1	CAP (C-11725-D)	
5	1006657	1	PISTON (C-11725-E)	
6	1006075	1	PIVOT (24050)	
7	1008530	1	BALL (SOCKET)(08362)	
8	1006051	1	RETAINER (21119)	
9	1006592	1	SEAL KIT (RKX-11725)	NOT SHOWN
10	-------	2	RING,"O"	KIT 1006592
11	-------	2	SEAL	KIT 1006592
12	-------	2	RING, (WEAR)	KIT 1006592
13	-------	2	RING,"O"	KIT 1006592
14	-------	1	SEAL	KIT 1006592
15	-------	1	WIPER	KIT 1006592
16	-------	1	RING, (WEAR)	KIT 1006592
17	-------	1	RING, RETAINING	KIT 1006592
18	-------	1	RING, RETAINING	KIT 1006592
19	-------	2	SCREW (A-11725-J)	
20	-------	1	WRAPPING, WIRE (A-11725-J)	
21	-------	1	SPRING (A-11725-J)	
22	-------	1	FITTING (A-AA725-J)	
23	-------	1	CLAMP (A-SPL11725)	
24	1006652	1	TRANSDUCER	
25	1007240	1	PLUG (P06N000LC)	
26	1008994	1	BRACKET (BRONZE)(08359C)	
27	1006126	1	CLEVIS (44042-1)	
28	1004803	2	SCREW (A05C0040C)	
29	1006346	1	SCREW (B06C0050C)	
30	1006436	2	WASHER (F160000TC)	
31	1004996	2	WASHER (F1600000C)	
32	1006509	1	NUT (J16C0000B)	
33	1004906	1	BOLT (C16C0800C)	
34	1006060	1	SCREW (22034)	
35	1006342	1	SCREW (B05C0120C)	

STEERING CYLINDER

The cylinder plumbing group includes the steering cylinder along with the hoses and fittings as shown in Figure ST-1. The hoses should be removed prior to servicing the cylinder.

Important: Hose assembly (item 11) is used to seal and protect the transducer cable. The transducer cable connects the transducer inside the cylinder to the electronic module inside the vessel. **The transducer cable must be disconnected from the electronic module prior to removing the cylinder from the vessel.** Care should be taken to loosen the hose from the fittings on both ends and gently remove the hose over the cable.

Drain the oil through the two pipe ports by manually extending and retracting the cylinder.

STEERING CYLINDER DISASSEMBLY PROCEDURE

Refer to Figure ST-2 for part identification throughout the service procedure for the steering cylinder.

Prior to disassembly, mark the end of the symmetrical cylinder tube (item 2) with respect to the rod guide (item 3). This should be done with a marker to prevent any damage to the plated tube surfaces. This will ensure the guide and cylinder tube will be oriented properly when assembled.

Support the cylinder in a V-block support or a means to prevent any damage to the cylinder components.

1) Remove clevis (item 27), set screw (item 35) and pivot (item 6) from the cylinder rod.

2) Remove the two socket head cap screws (item 19) which secures the guide (item 3) and cap (item 4) to the cylinder tube.

Before performing the following step, study figure ST-3 and note the two piece transducer (item 24) identified as the body and sleeve core. The body of the transducer is retained in the guide, the sleeved core is retained in the piston.

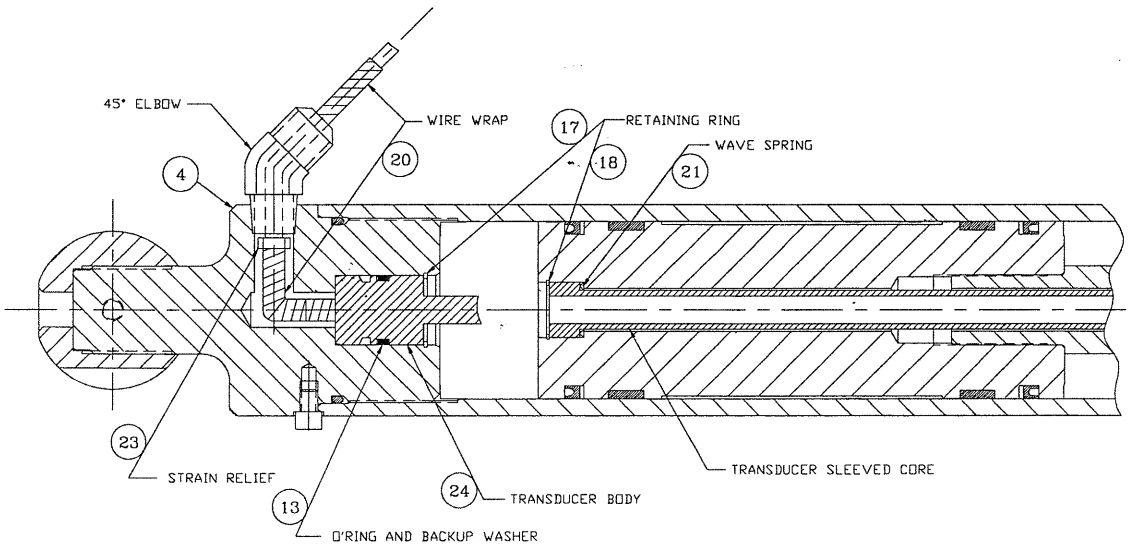


FIGURE ST-3

3) Using the flats on the cylinder cap (item 4), remove the cap from the cylinder tube by loosening in a counter clockwise direction. Before removing the cap completely from the cylinder tube, be sure to support the cap to prevent damage to the transducer body or sleeve core. Remove the cap with transducer body straight away from the cylinder tube.

4) Using the flats on the rod guide (item 3), remove the guide from the cylinder tube by loosening in a counter clockwise direction. Once loose, slide the guide up to the machined threads and gently rotate the guide past the threads on the rod.

5) Remove the piston/rod assembly (items 1&5) from the cylinder tube by pushing or pulling the assembly out of the cylinder tube.

OPTIONAL DISASSEMBLY

Transducer Replacement

6A) Remove retainer (item 17) from the transducer body as shown in figure ST-3. Gently pull the transducer body from the cap while feeding the transducer cable through the end cap.

6B) Remove the retainer (item 18) which fastens the sleeved core into the piston. Remove the sleeved core and wave spring (item 21) from the piston.

Piston/Rod Replacement

7) Remove the two seals (item 11) and two wear rings (item 12) from the piston. The piston is assembled to the rod with non-removable Loctite. To aid in removal, heat the threaded area between the piston and rod joint to 400 degrees F to age cure the Loctite. Disassemble by loosening the piston in a counter clockwise direction.

CLEAN AND INSPECTION

Do not use any solvents on the transducer core or core sleeve. Remove all seals, o-rings, wiper rings and wear rings from the cylinder components. Be extremely careful not to damage any internal machined surfaces while removing the seals. Do not use sharp objects which may scratch the internal bores of the components. A scratch on the rod or rod guide I.D. will cause the cylinder to leak! Carefully clean all components to prepare for a pre assembly inspection.

Inspect the inside diameter of the bronze cylinder tube. The internal tube should be highly polished and show no scratches or wear. Deep scratches (finger nail test) will cause an internal leak path in the cylinder. Inspect the rod, piston, rod guide, etc. for abnormal wear or wear zones. Polish or buff minor imperfections. Inspect all threads and remove any burrs or repair any damage which will create an assembly problem.

STEERING CYLINDER ASSEMBLY PROCEDURE

OPTIONAL ASSEMBLY (PROCEDURE 1&2)

1) Transducer Assembly

Crimp the strain relief clamp (item 23) onto the cable 1.5 inches from the body of the transducer as shown in Figure ST-3. Spiral wrap between the strain relief clamp and the body of the transducer. Spiral wrap the cable from the strain relief clamp outward along the cable for approximately 6 inches.

Lightly oil the o-ring and back up washer (item 13) and install on to the transducer body. Lead the wire cable through the cap (item 4). Pull all the wire through until the transducer seats in the cap. Secure the transducer in place with the retainer ring (item 17). Apply Teflon tape or other good quality pipe sealer on the 45 fitting (item 22). Route the cable through the

45 fitting and secure to the cylinder.

Note: With the spiral wrap in place, the 45 degree fitting may be loosened or tightened without damaging the cable. To loosen or tighten the fitting, grasp the cable while turning the fitting.

2) Piston/Rod Assembly
The aluminum piston (item 5) is attached to the stainless steel rod (item 1) using permanent Loctite thread locker number 271. Use all applicable solvents, primers and activators to aid in applying the thread locker.

3) Piston/rod seal assembly.
Lightly grease and install both scarf cut wear rings (item 12) onto to the piston as shown in Figure ST-4. Install one (rod end of the piston) of the two seals with a back up ring (item 11) to the piston. Note the orientation of the seal as shown in step 1, Figure ST-4. Lightly oil the outside of the seal only and slide the assembly into the cylinder tube and push through until the forward groove on the piston extends beyond the tube as shown in figure ST-4, step 2. Install the second seal and once again oil the outside only and pull the assembly back into the cylinder tube.

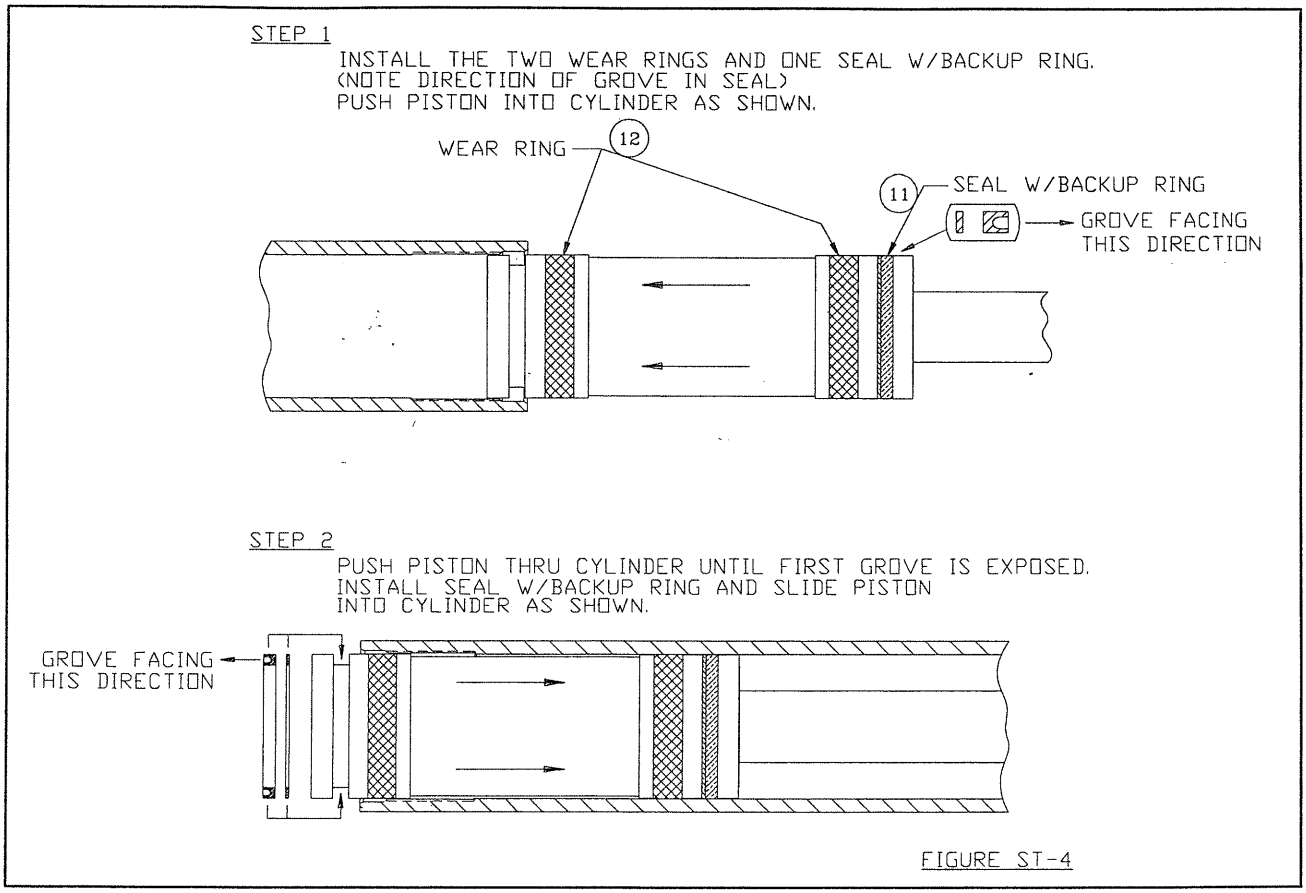


FIGURE ST-4

4) Guide Assembly

Lightly grease and install the scarf cut wear ring (item 16) into the rod guide (item 3) as shown in figure ST-5. Install the rod seal (item 14) and wiper seal (item 15) into the rod guide. Care should be taken not to damage any of the internal bores in the rod guide. Install the o-ring (item 10) onto the guide. Lightly lubricate the inside of the seals and gently rotate guide past the threaded portion of the rod.

Note: Do not apply oil in the seal groove areas. This may cause the seals to rotate in the bore when the guide is assembled over the cylinder rod.

Apply a small amount of removable Loctite thread locker number 242 to the thread on the guide. Use all applicable solvents, primers and activators to aid in applying the thread locker. Lightly lubricate o-ring and tighten to the cylinder tube. Lock in place using the socket head cap screw (item 19) with thread locker 242.

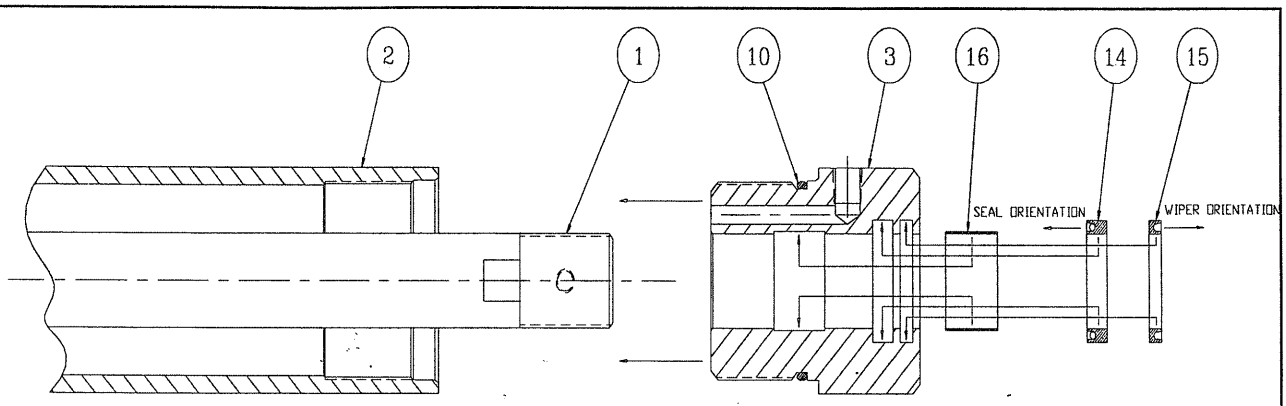


FIGURE ST-5

5) End Cap Assembly

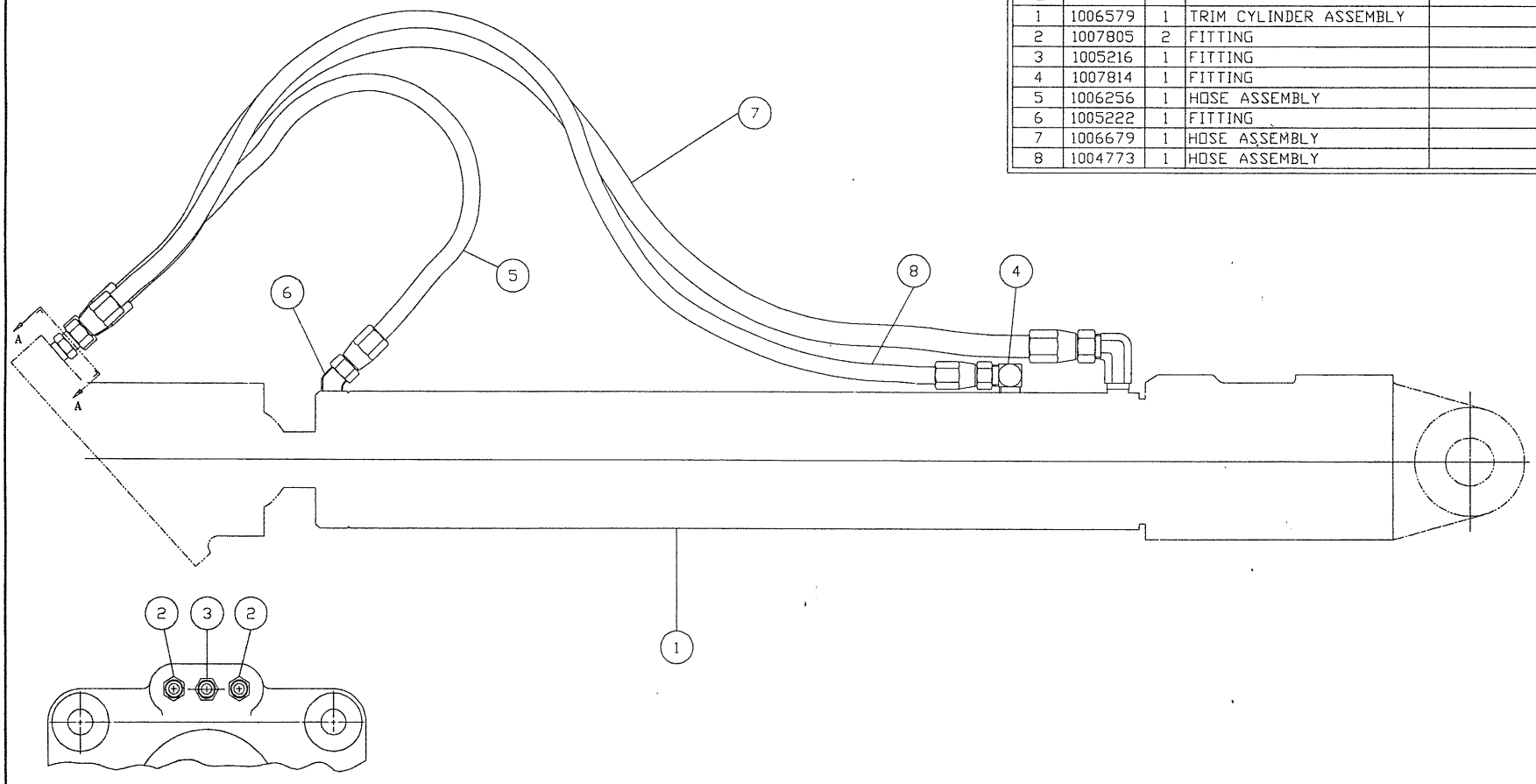
Install o-ring (item 10) on to end cap (item 4) and lightly lubricate the outside of the o-ring. Apply a small amount of removable Loctite thread locker number 242 to the thread. Use all applicable solvents, primers and activators to aid in applying the thread locker. Be sure the transducer core aligns with the core sleeve freely and tighten cap to the cylinder tube. Lock in place with the socket head cap screw (item 19) with thread locker 242.

6) Clevis and Bracket

Be sure that no burrs or other damage exists on the threaded rod or the cylinder pivot (item 6). Any burrs or other thread damage may cause the components to gall together prior to full thread engagement. Coat threads liberally with a copper based anti seize compound. Lock in place with set screw (item 35). This same procedure to be followed if the transom bracket assembly was disassembled.

TRIM CYLINDER P/N 1006612

TRIM CYLINDER 1006612				
ITEM NO.	PART NO.	QTY.	PART DESCRIPTION	REMARKS
1	1006579	1	TRIM CYLINDER ASSEMBLY	
2	1007805	2	FITTING	
3	1005216	1	FITTING	
4	1007814	1	FITTING	
5	1006256	1	HOSE ASSEMBLY	
6	1005222	1	FITTING	
7	1006679	1	HOSE ASSEMBLY	
8	1004773	1	HOSE ASSEMBLY	



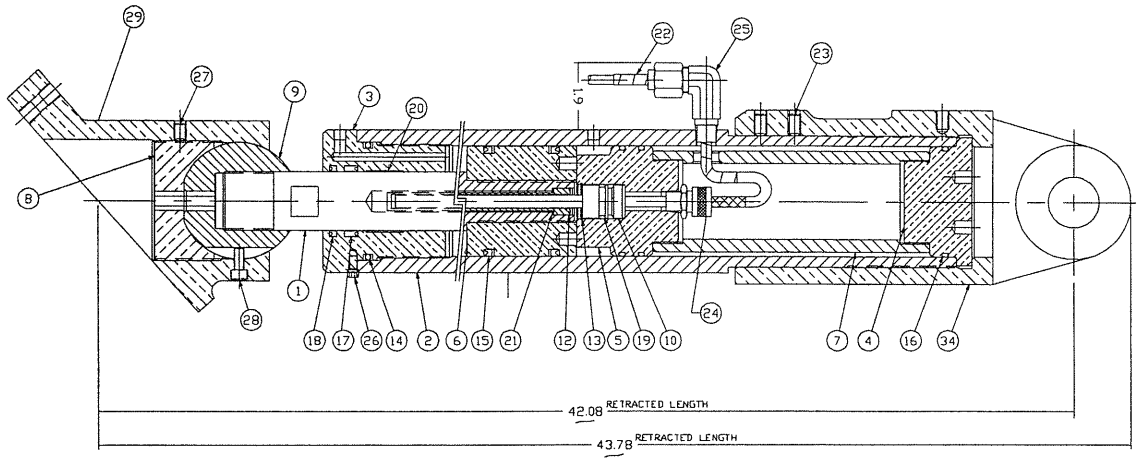
VIEW A-A

FIGURE TR-1

TRIM CYLINDER P/N 1006579

TWIN DISC SPECIFICATIONS

MODEL NO. ——— 1006578
OPER. PRESS. ——— 2500 P.S.I. MAX.
BORE ——— 3 1/4
STROKE ——— 4.95
ROD DIA. ——— 1 3/4



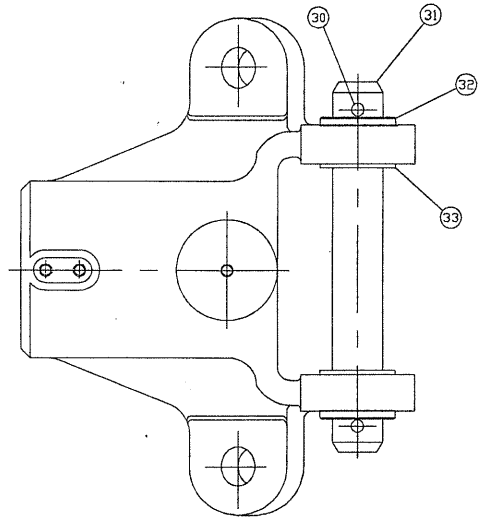


FIGURE TR-2

TRIM CYLINDER 1006579

ITEM NO.	PART NO.	QTY.	PART DESCRIPTION	REMARKS
1	1006638	1	ROD (C-11735-A)	
2	1006639	1	TUBE (C-11735-B)	
3	1006644	1	GUIDE (C-11735-C)	
4	1006645	1	CAP (C-11735-D)	
5	1006646	1	CARRIER (C-11735-E)	
6	1006647	1	PISTON (B-11735-F)	
7	1006648	1	TUBE (TRIM SPACER)(B-11735-G)	
8	1006649	1	NUT, LOCK (B-11735-H)	
9	1006650	1	BALL (BRACKET)(B-11735-J)	
10	1006651	1	TRANSDUCER	
11	1006591	1	SEAL KIT (RKX-11735)	NOT SHOWN
12	-------	1	RING, RETAINING (A-SPL11735)	KIT (1006591)
13	-------	1	RING, RETAINING (A-SPL11735)	KIT (1006591)
14	-------	1	RING,"O"	KIT (1006591)
15	-------	2	SEAL	KIT (1006591)
16	-------	3	RING,"O"	KIT (1006591)
17	-------	1	SEAL	KIT (1006591)
18	-------	1	WIPER	KIT (1006591)
19	-------	1	RING,"O"	KIT (1006591)
20	-------	1	RING (WEAR)	KIT (1006591)
21	-------	1	SPRING (A-SPL11735)	
22	-------	1	WRAPPING, WIRE (A-SPL11735)	
23	-------	2	SCREW, SET (A-SPL11735)	
24	-------	1	CONNECTOR (A-SPL11735)	
25	-------	1	FITTING (A-SPL11735)	
26	-------	1	SCREW (A-SPL11735)	
27	1006351	3	SCREW, SET (A-SPL11735)	
28	1006060	1	SCREW (22034)	
29	1006609	1	BRACKET	
30	1007550	2	PIN, COTTER (V0600640C)	
31	1006087	1	PIN (27008)	
32	1006077	2	SPACER (TRIM YOKE)(24052)	
33	1006076	2	WASHER (24051)	
34	1009874	1	YOKE	

TRIM CYLINDER

The cylinder plumbing group includes the trim cylinder along with the hoses and fittings as shown in Figure TR-1. The hoses should be removed prior to servicing the cylinder.

Important: Hose assembly (item 7) is used to seal and protect the transducer cable. The transducer cable connects the transducer inside the cylinder to the electronic module inside the vessel. **The transducer cable must be disconnected from the electronic module prior to removing the cylinder from the vessel.**

Care should be used to loosen the hose from the fittings on both ends and gently remove the hose over the cable. Drain oil from both hydraulic ports by manually cycling the cylinder.

TRIM CYLINDER DISASSEMBLY

Refer to Figure TR. for an assembly drawing with item numbers for part identification.

Support the cylinder in a V-block support or a means to prevent any damage to the cylinder components.

1) Remove the lock nut (item 8) and the ball (item 9) from the cylinder rod. Both the lock nut and ball have a machined hex slot for removal.

2) Loosen the 90 degree hydraulic fitting (item 25). Leave the wire wrap (item 22) in the fitting and feed the cable through the fitting into the stop tube cavity as shown in figure TR-3, step 1.

3) Remove two set screws (item 23) and remove the yoke (item 34) from the tube by rotating in a counter clockwise direction.

Examine Figure TR-3, step 2 before proceeding with the next procedure. Note the two piece transducer (item 10) identified as the body and sleeve core. The unit must be removed straight from the tube to prevent damage to the transducer.

4) Remove the cap screw (item 26) which retains the rod guide (item 3). Using the flats on the rod guide, remove the guide

from the cylinder tube by loosening in a counter clockwise direction. Once loose, slide the guide up to the machined threads and gently rotate the guide past the threads on the rod.

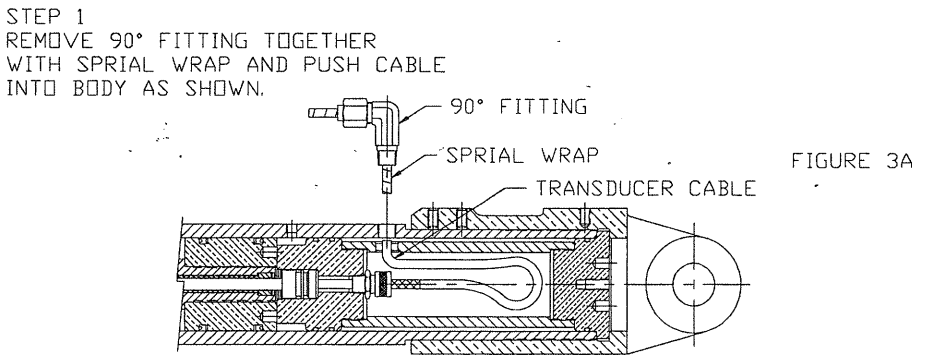


FIGURE 3A

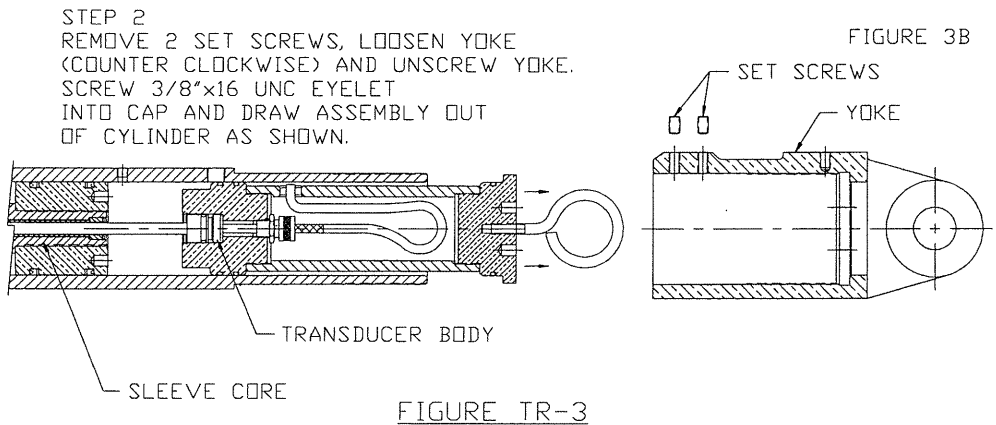


FIGURE 3B

FIGURE TR-3

5) Pull the stop tube assembly (items 4,7&5) from the tube by inserting a 3/8-16 eye bolt into the center of the cap (item 4). The eye bolt will be used to pull the assembly straight out of the tube. The pull force required will be overcoming the resistance of the two o-ring seals (item 16) on the carrier (item 5) and 1 o-ring on the cap (item 4). Remove the assembly with transducer body straight away from the cylinder tube.

6) Remove the piston/rod assembly from the cylinder tube by pulling the assembly through the tube.

OPTIONAL DISASSEMBLY

Transducer Replacement Only

7A) The stop tube assembly removed in operation 5 must be

disassembled to replace the transducer. The carrier (item 5) has machined flats and the cap (item 4) has two spanner holes. Remove both the carrier and cap from the spacer tube (item 7).

7B) Refer to figure TR-4. Loosen the strain relief connector (item 24). Remove the retaining ring (item 13) and gently pull the transducer body from the carrier while feeding the transducer cable through the carrier.

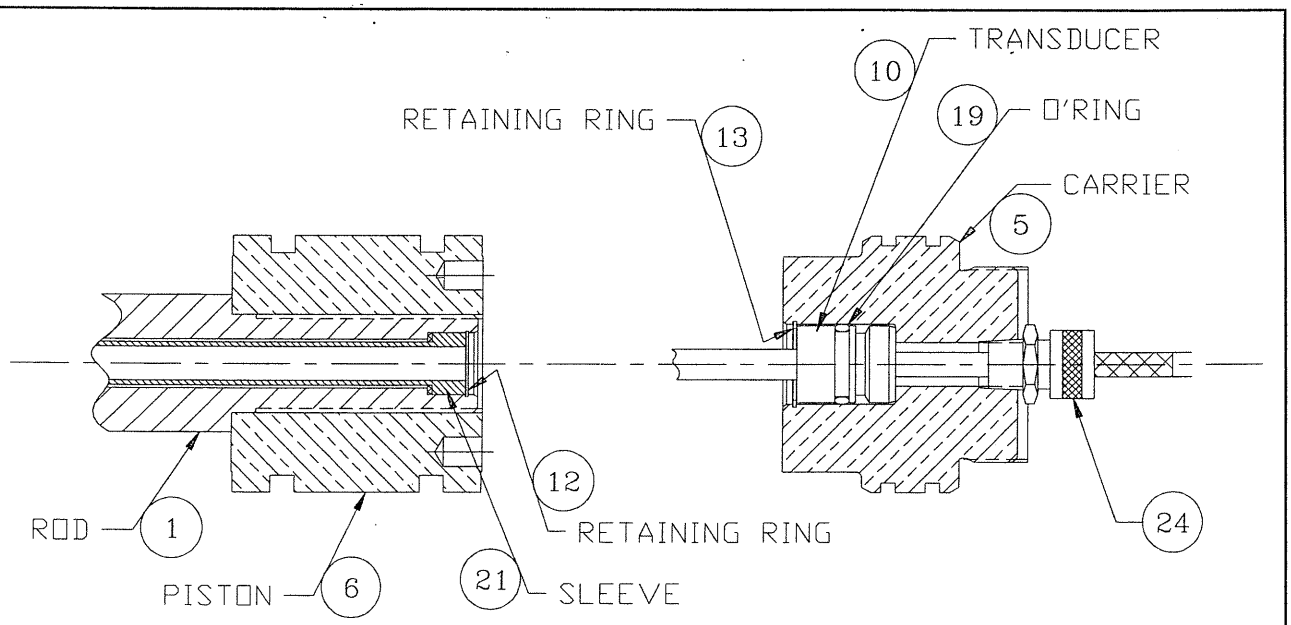


FIGURE TR-4

7C) Remove the retaining ring (item 12) which holds the sleeve core into the piston. Remove the sleeve core and wave spring from the piston.

Piston/rod replacement

8) The piston is originally assembled to the rod with non-removable Loctite. Remove the seals (item 15) from both ends of the piston. Heating of the joint to 400 degrees F is required to age cure the loctite. Disassemble by loosening the piston in a counter clockwise direction.

CLEAN AND INSPECTION

Do not use any solvents on the transducer core or core sleeve.

Remove all seals, o-rings, wiper rings and wear rings from the cylinder components. Be extremely careful not to damage any internal machined surfaces while removing the seals. Do not use sharp objects which may scratch the internal bores of the components. A scratch on the rod or rod guide I.D. will cause the cylinder to leak! Carefully clean all components to prepare for a pre assembly inspection.

Inspect the inside diameter of the stainless steel cylinder tube. The internal tube should be highly polished and show little or no scratches or wear. Deep scratches (finger nail test) will cause an internal leak path in the cylinder. Inspect the rod, piston, rod guide, etc. for abnormal wear or wear zones. Polish or buff minor imperfections. Inspect all threads and remove any burrs or repair any damage which will create an assembly problem.

TRIM CYLINDER ASSEMBLY PROCEDURE

OPTIONAL ASSEMBLY (PROCEDURE 1&2)

1) Optional piston/rod assembly
The bronze piston is attached to the stainless steel rod using permanent Loctite thread locker number 271. Use all applicable solvents, primers and activators to aid in applying the thread locker.

2) Optional transducer assembly
Lightly oil the o-ring (item 19) and install on to the transducer body. Lead the wire cable through the carrier (item 5) and pull all the wire through until the transducer seats in the cap (see figure TR-4). Secure the transducer in place with the retainer ring (item 13). Feed the cable through the strain relief connector and tighten snugly. Insert wave spring (item 21) into machined bore in the rod. Insert the sleeve core into the rod and secure with retainer ring (item 12).

3) Piston/rod seal assembly.
Install one of the seals and back up rings onto the bore end of the cylinder piston as shown in figure TR-5. Start the piston/rod assembly and pull through the cylinder tube. Care must be used to slide the seals past the two pipe tapped ports in the cylinder barrel. The seal must be guided past the ports with the aid of a dull instrument. The piston/rod assembly should be pulled out of the cylinder past the first seal groove as shown in figure TR-5. Again, install the piston seal and back up ring (item 15) onto the piston. Lightly oil inside diameter of the seal and slide assembly into the cylinder.

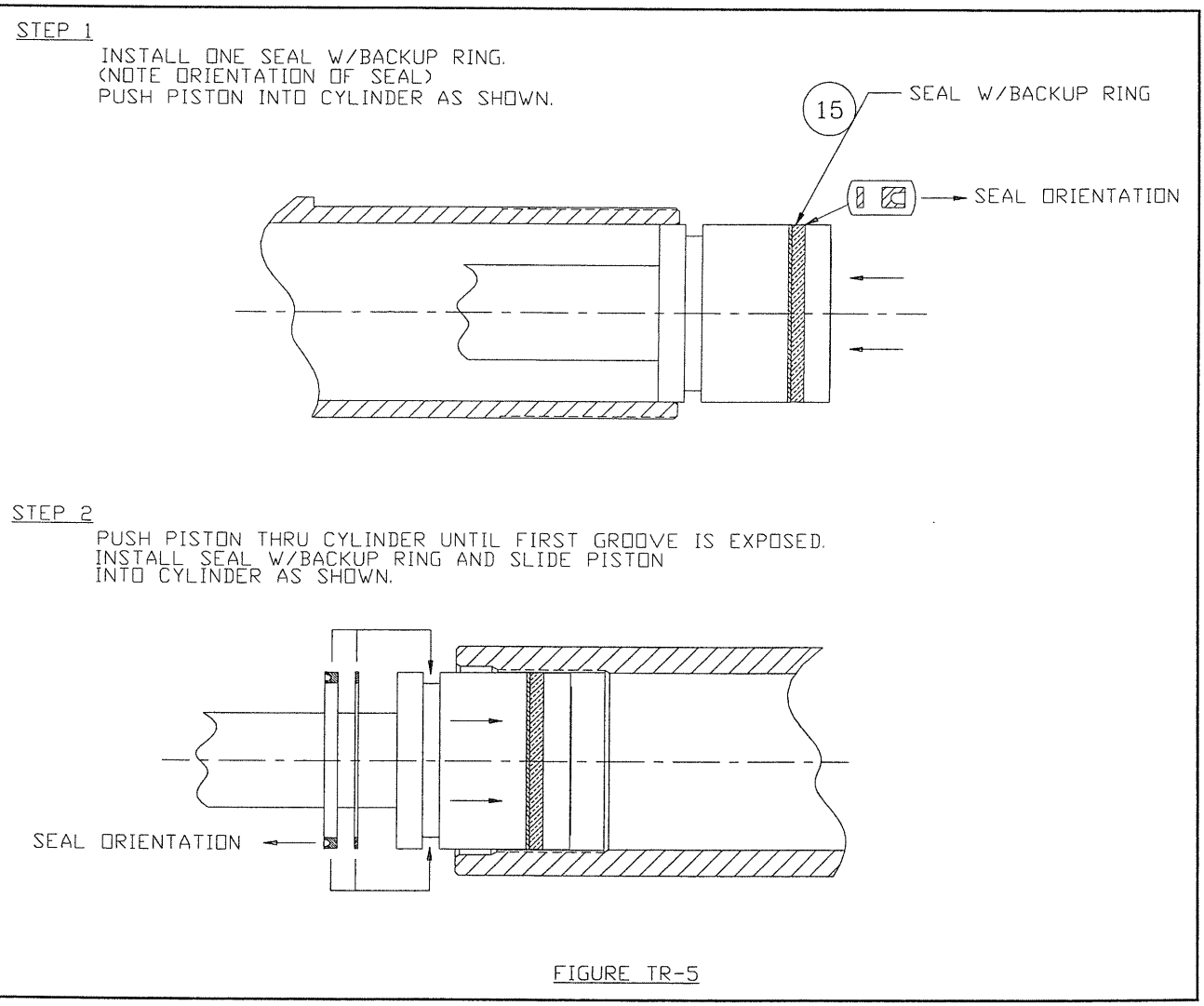


FIGURE TR-5

4) Rod guide.
Install the seal (item 17) and wiper (item 18) into the rod guide as shown in figure TR-6. Note the orientation of both the seal and wiper. Install the scarf cut wear ring (item 20) into the rod guide. A light film of grease may be used to retain the wear ring in the guide. Lightly oil the inside diameter of the seal and wiper to ease installation over the threaded rod.

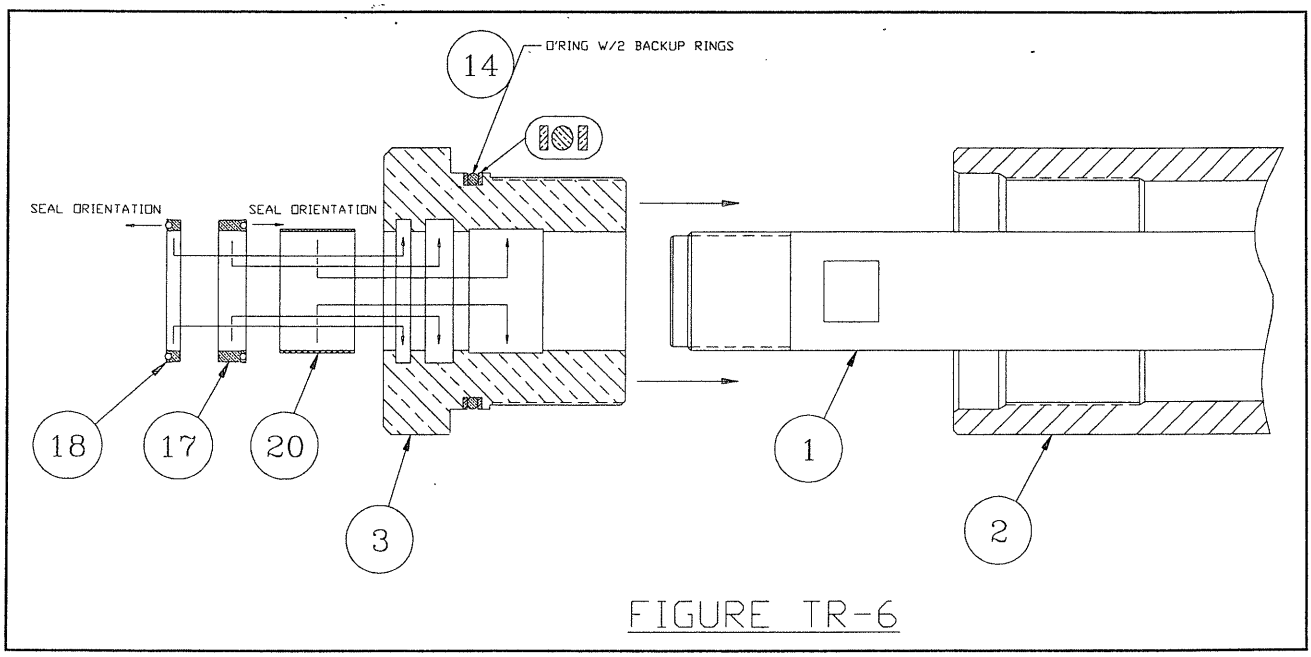


FIGURE TR-6

Install the o-ring and backup ring (item 14) onto the guide and lightly oil the outside diameter. Apply a small amount of removable Loctite threadlocker number 242 to the thread on the guide. Use all applicable solvents, primers and activators to aid in applying the threadlocker. Rotate the guide over the threaded section of the rod and tighten onto the cylinder barrel. Lock in place using the socket head cap screw (item 26) with threadlocker 242.

5) Stop Tube Assembly.
Complete the stop tube assembly by installing the cap (item 4). Install the o-ring (item 16). Apply a small amount of removable Loctite threadlocker number 242 to the thread. Use all applicable solvents, primers and activators to aid in applying the threadlocker. Tighten the stop tube ends with the use of the flats on the carrier and the spanner holes on the cap. Install the two o-rings (item 21) onto the carrier. Orient the stop tube assembly cable port with the 1/2 in pipe port on the cylinder

tube. Lightly oil the outside of the assembly and slide into the cylinder tube.

6) Gently pull all the cable from the stop tube cavity. A piece of 3/8 tube will be required to prevent the stop tube assembly from rotating in the cylinder bore. Lead the cable though the tube and position as shown in figure TR-7. Apply a copper based anti seize compound onto the yoke threads (item 34) and install onto the cylinder barrel. Lock in place with the two set screws (item 23). Apply a small amount of removable Loctite threadlocker number 242 to the thread. Use all applicable solvents, primers and activators to aid in applying the threadlocker.

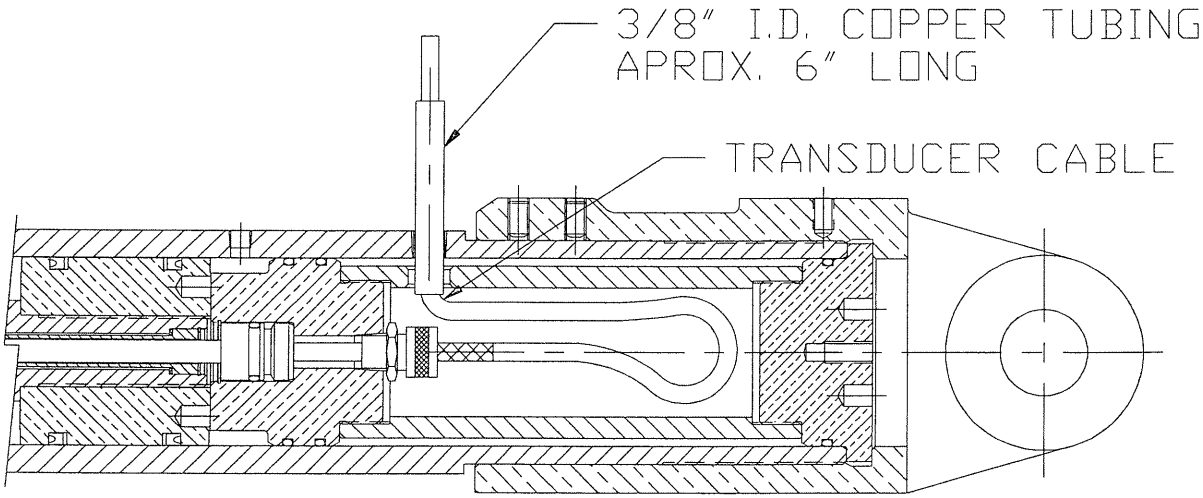


FIGURE TR-7

7) Feed the cable through the 90 degree fitting. Apply the wire wrap (item 22) over the cable and work through the entire fitting. Leave approximately 6 inches of loose cable between the fitting and strain relief connector. Rotate the cable 4 full turns in a counter clockwise direction. Tighten the fitting in a clockwise direction. The reverse winding of the cable prior to installation prevents the cable from being twisted in the final installed position.

8) Install the transom ball (item 9) onto the rod. Coat the threads with a copper based anti-seize compound prior to assembly.