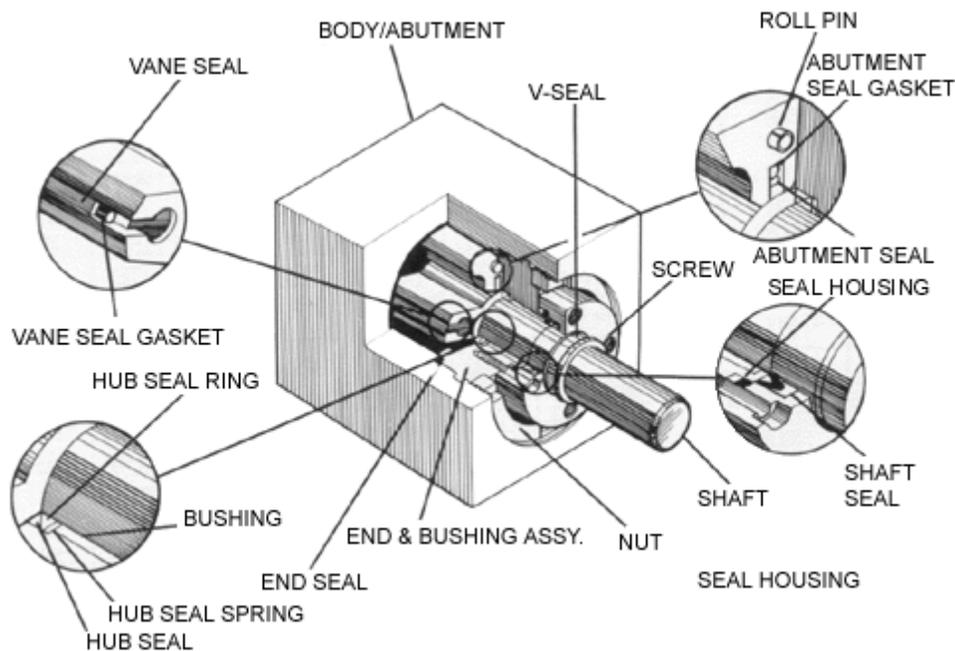


Repair of Hyd-ro-ac Actuators

OVERHAUL INSTRUCTIONS

SS-.2A-1V
SS-.5A-1V
SS-.5A-2V

Read the entire contents of these instructions before installing the actuator and before making any connections to the actuator. These instructions must be followed in all respects to avoid damage to the actuator and associated components and/or injury to personnel.



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1. INTRODUCTION.

- a. These instructions provide overhaul instructions and parts list for all standard SS-.2A and SS-.5A Hyd-ro-ac Rotary Actuators.
- b. Do not attempt to overhaul an actuator without having a seal kit on hand. Refer to the parts list for information regarding seal kits. The parts list should also be used as a specific guide in determining the parts used in a particular assembly. The exploded view drawing, figure 4, should be used for reference in following the overhaul instructions.

2. DISASSEMBLY.

Disassemble in the same order as the key index numbers assigned to the exploded view illustration. Read the special instructions below before proceeding.

- a. Hold the rotary actuator in a heavy duty vise with special protection to avoid marring or distorting the body
- b. Use Assembly wrench (P/N 221054) to remove end ring nuts (2) from body (19). (Assembly torque is 250 ft. lbs.). Tap end of wingshaft (14) to remove end (7).
- c. Bushings (13) in ends (7) are "DX" (identify by yellow color). Replacement should be governed by the following criteria.
 1. Bushings do not require replacement unless worn or damaged.
 2. If replacement is required. bushings must be machined out of the ends. If this procedure is used. use care to avoid damaging the ends.
 3. "DX" bushings are normally installed at the factory as they are a press fit in the ends and must be machined after installation to match the wingshaft diameter with a diametric clearance of 0.001 inch to 0.001 inches and concentric with the shaft relief diameter within 0.001 inch. (see figure 1).
 4. Ends supplied as repair parts contain "DX" bushings properly machined to fit the wingshaft diameter.
- d. Use a straight even pull when removing wingshaft (14) from the body.

Important: Do not **allow** wingshaft (14) to **cock** as this may break the sharp edges on the body causing internal leakage during operation.

3. CLEANING

Clean all parts by degreasing in a suitable solvent and dry with compressed air. Check that all drilled ports in the parts are clean and free of foreign matter.

4. INSPECTION.

- a. Inspect bushings in ends (7) for scoring and wear.
- b. Visually inspect the wingshaft, (14), ends (7), body (19) and abutment areas for cracks, nicks or scratches.
- c. Inspect the inner diameter of body (19) the inner faces and diameters of ends (7) the outer diameters of wingshaft (14), for evidence of scratches, scores or galling.
- d. Inspect all threads for condition and cleanliness.

5. REPAIR OR REPLACEMENT.

- a. Minor scratches may be removed by hand stoning the effected areas. Stone just enough to remove rough edges or burrs. If the scratches are deep enough to form leakage paths the parts should be replaced.
- b. Replace all parts in the seal kit.
- c. Replace all damaged or broken parts.

6. LUBRICATION.

Lubricate all O-rings sparingly with petroleum jelly or other suitable lubricant compatible with the O-ring material. and with the hydraulic fluid being used.

7. REASSEMBLY.

- For the SS-.2A unit, machine ends to .7595/.7605 in. diameter to accept the "DX" bushings.
- For the SS-.5A unit, machine ends to .884/.885 in diameter to accept the "DX" bushings.
- Press the new "DX" bushings into the ends and then machine to match the wingshaft diameter with a diametrical clearance of 0.001 to 0.003 inches. If facilities are not available for machining, procure replacement ends with "DX", bushings (see parts list). See figure 1 for machining requirements of "DX" bushings

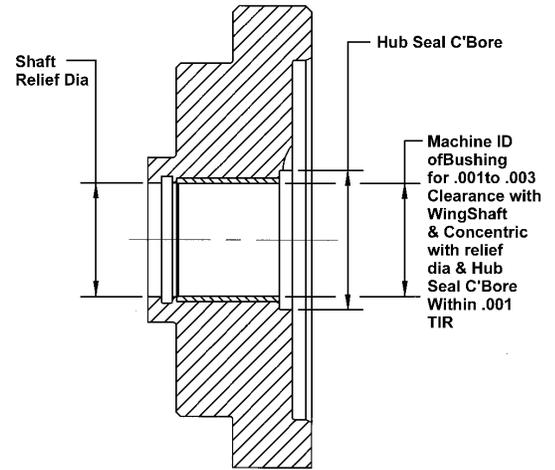


Figure 1. Bushing Machining Requirements

NOTE: Bushings must be fully seated and must not protrude into the hub seal area.

- Install the dummy end tool (P/N 220153) into body (19) with end ring nut (2). Place the body (19) on flat surface with dummy end down.
- Insert abutment gasket (18) and seals (17) in abutment slots in housing (19). Place the vane seal protector (P/N 220150) in housing (19).

TOOLS - Assembly tools are required to reassemble the Hyd-ro-ac's

	SS-.2A	SS.5A
Spanner Wrench	220154-002	220154-005
Shaft Seal Protector	220151-002	220151-005
Abutment Seal Protector	220152-002	220152-005
Vane Seal Protector	220150-002	220150-005
Dummy End	220153-002	220153-005

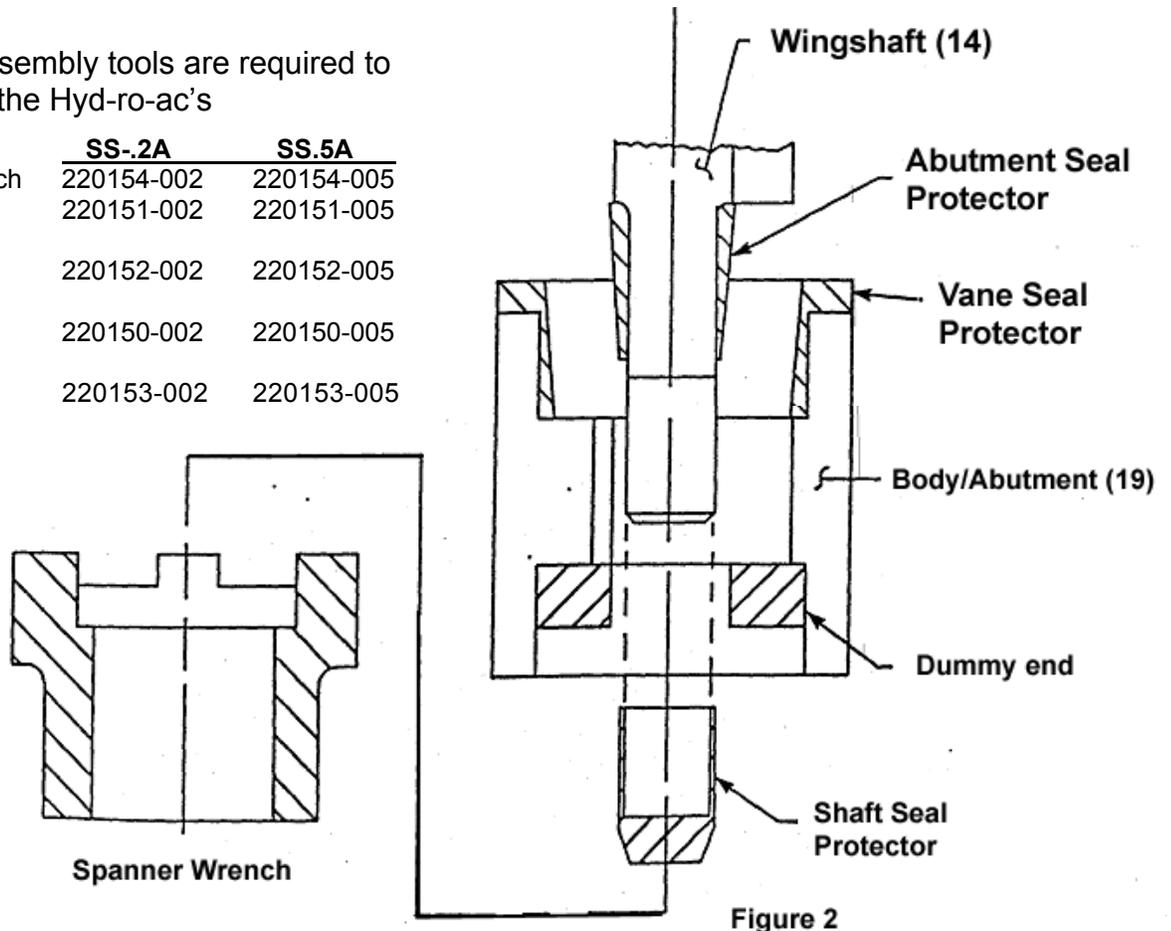
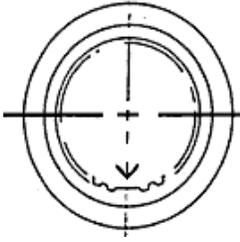


Figure 2



For single vane units. Wingshaft is in mid position of travel when the "arrow" of the index mark is at the bottom of the vertical centerline (6 o'clock). For double vane units the mid position is 90 degrees from shown, (3 or 9 o'clock position).

Figure 3. Wingshaft and Body Assembly Relationship

- f. Insert vane seal gaskets (16) and "C" type vane seals (15) in wingshaft (14) lubricate to hold seals in position. Use care to avoid nicking or cutting the vane seal. All seat corners must remain sharp. Place the abutment seal protector (P/N 220152) on wingshaft (14).
- g. Slide the wingshaft into the body until the vane is fully installed and rests on dummy end tool. Remove vane seal protector and abutment seal protector.

Important: Do not allow vane seal (15) to be scratched, cut or shaved when installing the wingshaft as this **will** cause internal leakage during operation.

- h. The wingshaft (14) must be positioned properly to assure correct rotation. Use mark on end of wingshaft as a reference point and rotate the wingshaft until the mark is opposite inlet ports for single vane units. The wingshaft, when located in this manner, is in the mid travel position. Refer to figure 3 for proper assembly relationship of wingshaft and body.

- i. Place both ends (7) on a flat surface. Install dowel pin (9) and "O" ring packing (8) in each end (7). Position hub seal spring (12) hub seal ring (11) and hub seal (10) in each end. Note that the hub seal is free to move axially under pressure of hub seal spring (12). Apply a liberal coating of lubricant to the hub seal, sufficient to maintain the seal in position when the end is inverted and installed in the body.
- j. Invert end (7) and carefully slide it down over the wing shaft. Pin (9) in end must line up with and fit into hole in abutment area of body (19). Install end ring nut(2) into body using assembly wrench (P/N 220154) tighten by hand.
- k. Turn actuator over, remove dummy end (P/N 220153) and assemble end (7) to body (19) as in (h) above.
- l. Hold the actuator in a heavy duty vice with padding to protect the surface of the body. Using assembly wrench (P/N 220154) tighten both end ring nuts (2) to 350 foot pounds.
- m. Install shaft seal (6) and "O" ring gasket (5) into each seal housing (4).
- n. Install shaft seal protector (P/N 220151) on end of wingshaft or wrap a single layer of transparent tape around the serrations on wingshaft (14) and coat liberally with lubricant. The tape acts to protect the shaft seals from being cut by the sharp edges on the wingshaft serrations. Invert seal housing (4) carefully slide it down over the wingshaft.
- o. For the SS-.2A unit, torque four S.H.C.S. to 12 in. lb.
- p. For the SS-.5A unit, torque four S.H.C.S. to 25 in. lb.

Important: Do not hammer on the end or allow the hub seal to become dislodged from its cavity as the end is mated to the body.

8. TEST PROCEDURE

- a. Apply 150 psig air or hydraulic pressure (normal operating fluid) to one of the inlet ports. The applied, pressure should move the wingshaft until it is stopped by the abutment.
- b. Pressurize one of the ports with hydraulic fluid at a pressure equal to the pressure at which the actuator is used (not to exceed 2250 psig). Check for leakage at the opposite port. Leakage should not exceed the value listed in table below. Reverse the fluid flow and recheck the internal leakage. Leakage should not exceed the value listed in table below. If leakage exceeds specifications, it is likely that the seals are not fully seated. Cycle the actuator 5 or 6 times and recheck internal leakage. Finally pressurize both ports to the test pressure with hydraulic fluid and check for external leakage. NO external leakage is allowed.

TEST SPECS	
Model	Max Leakage
SS-.2A-1V	150 cc/min at 2250 psi
SS-.5A-1V	180 cc/min at 2250 psi
SS-.5A-2V	200 cc/min at 2250 psi
Refer to catalog for leakage at other pressures	

Trouble Shooting Chart		
TROUBLE	PROBABLE CAUSE	REMEDY
External Leakage at Shaft	Defective shaft seals (6).	Replace defective parts.
	Wingshaft (14) scored or worn. Bushings (13) defective.	Repair wingshaft or replace! defective parts.
External Leakage at Joint Between End 7 and Body 1	Defective O-rings (8) or (5), or damaged sealing surface on end (7) or body (19).	Repair defective O-ring. Repair or replace damaged parts.,
Wingshaft Binds.	Foreign material in actuator working chambers.	Disassemble and clean thoroughly.
	Improperly seated abutment seal (17), "C" type vane seal (15) and/or hub seals (10).	Disassemble and replace improperly seated seal making sure it seals properly at assembly.
	Ends not properly seated or misaligned.	Remove end (7). Check pin (9) is seated in body (19) and end rests on shoulder in body.
External Leakage	Cap screws (3) not tightened sufficiently.	Tighten to recommended torque.
Excessive Internal Leakage	Defective abutment seal (17), "C" type vane seal (15), Gasket (18), and/or vane seal gasket (16).	Replace defective parts.
	Defective hub seal (10). hub seal ring (11). or hub seal spring (12).	Replace defective parts:
	Worn or scratched end faces in end (7) or body(19).	Repair or replace.
	Deep scratches in body (19).	Repair or replace.
	Worn bushings (13).	Replace bushings.
	"C" type vane seal not seated properly (applicable to units immediately after overhaul only).	Operate through full cycles for a few minutes to attempt to seat seals.
	Damaged, or non-flat, surfaces on end of body(19).	Lap damaged surfaces eat. Remove as little as possible otherwise actuator will bind requiring replacement of body (19).

PARTS LIST

1. Identify the assembly part Hyd-ro-ac to be overhauled.
2. Locate the assembly part number in one of the column headings. The standard model being overhauled uses all parts listed under the appropriate column heading.
3. Do not overhaul a unit without having a seal kit on hand. Seal kits are listed last in the parts list and contain all parts having (S.K.) in the Nomenclature column.
4. The exploded view, figure 4 covers the variations of the SS-.2A and SS-.5A actuators. Some parts shown apply only to one particular part number (refer to the parts list for details).
5. When ordering parts, list the part number and serial number, of the assembly as well as the part numbers of the items desired

FIG. 4

INDEXNO.	DESCRIPTION	1V Unit QTY	2V Unit QTY
-1	V-RING (S.K.)	2	2
-2	NUT-END RING	2	2
-3	SHCS No 4-40X1/2	12	12
-4	SEAL HOUSING	2	2
-5	O-RING-SEAL HOUSING(SK)	2	2
-6	SHAFT SEAL (SK)	2	2
-7	END & BUSHING ASSY(Includes Bushing Index 13 Index)	2	2
-8	O-RING-END (SK)	2	2
-9	ROLL PIN-END 1/8 x .38	2	2
-10	HUB SEAL (SK)	2	2
-11	HUB SEAL RING	2	2
-12	HUB SEAL SPRING	2	2
-13	BUSHING (Part of End & Bushing Assembly Index No 7)	2	2
-14	WINGSHAFT	1	1
-15	"C" TYPE WINGSHAFT VANE SEAL (SK)	1	2
-16	VANE SEAL GASKET (SK)	1	2
-17	ABUTMENT SEAL (SK)	1	2
-18	ABUTMENTSEAL GASKET (SK)	1	2
-19	BODY/ABUTMENT	1	1

- NOTES:**
- 1 All Seal Kits contain all the items having (SK) in the nomenclature column
 - 2 Parts identified by an asterisk (*) are standard Different P/N's are assigned to modified parts Contact factory for information

Figure 4
Exploded View

