

AMERICAN TURBINE

UPGRADING SD-309 & SD-312 STANDARD STEERING TO HTR II

1. Remove steering nozzle assembly.
2. Remove steering cable bezel (optional)
3. Remove original shift cable.
4. Remove original throttle / shifter.
5. Drill holes in transom as shown in (Exhibit I). Existing steering cable bezel may not have to be removed.
6. Bolt steering assembly to bowl using bottom two bolts.
7. Bolt port side pivot bracket (41) and starboard side pivot bracket (33) to steering assembly as shown in the (Exploded View AA).
8. Finish installing fasteners into steering assembly torque all to 20-25 ft/lbs.
9. Install reverse bucket (60). Slide washer (73) and sleeve (37) over bolt (35) use high strength loc-tite. Thread into pivot brackets torque to 50-55 ft/lbs.
10. Bolt shift shaft bezel assembly (Exhibit J) to transom (plastic ball has no threads) use sealant.
11. Bolt steering cable bezel assembly (Exhibit K) to transom (plastic ball has threads) use sealant. (You may retain the original if the location does not interfere).
12. Insert shift shaft (48) into bezel. Machined flat on shaft is outside the transom.
13. Slide white plastic collar onto shift shaft.
14. Slide reverse lever arm (50) onto shift shaft. Orient as shown in (Exhibit L)
15. Insert shift shaft into pivot bracket (33)
16. On the inside of the transom remove the top two nuts on the suction piece flange (Exhibit M).
17. Install rod brake assembly as shown in (Exhibit N).
18. Connect lock housing (13) to shift lever arm (22). Insert lock hub (12) into lever use high strength loc-tite. Use sparingly as excessive amounts will foul proper operation. Torque to 20 ft/lbs. (Exploded View AA)
19. Insert steering cable into steering cable bezel assembly (Exhibit K).
20. Tighten cable nut onto steering tube (45) make sure cable housing is tight against steering tube.
21. Slide steering extension (71) onto cable. Fasten w / bolt & locknut provided. Torque to 25 ft/lbs.
22. Insert steering extension (71) into clevis (70). Fasten w / bolt & locknut provided. Torque to 20 ft/lbs.
23. To center steering wheel remove ball flange (31). Adjust steering tube ball (46) to center steering wheel. Replace ball flange (31). Torque bolts to 6-7 ft/lbs. (Exhibit K).
24. Connect the push-pull rod (55) to the reverse bucket (60) by inserting bolt (56) into male rod end (57), tapered sleeve (58) and then into hole in reverse bucket. Fasten w / locknut (59) and torque to 20 ft/lbs. (Exhibit L)
25. Slide reverse lever arm (50) along shift shaft (48) so that it is parallel with push-pull rod (55). Tighten taper pin (51) 15 ft/lbs. (Exhibit L)

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UPGRADING SD-309 & SD-312 STANDARD STEERING TO HTR II (CONT.)

26. Install shifter / throttle per manufacturer directions.
27. Connect shift cable to shifter per manufacturer directions.
28. Connect shift cable to rod brake assembly using 64 series cable clamp (4) and fasteners provided. Attach cable to control rod bracket (3). Use holes closest to center of boat. (Exhibit M)
29. Adjusting reverse bucket. Move lock housing as far to the left as possible (make sure reverse bucket is not contacting the steering nozzle (63). With one nut threaded all the way up on the end of the shift cable, insert the shift cable into the lock housing (13). Pull the shift lever all the way into reverse. Place nut onto end of shift cable. Use removable loc-tite. Tighten both nuts against lock housing (13). Adjust reverse bucket to "just" clear steering nozzle (63). Disconnect the push-pull rod (55) from reverse lever arm (50). Turn push-pull rod in and out so that reverse bucket "just" clears steering nozzle when turned lock to lock. Push shift lever full forward. Check if reverse bucket completely clears steering nozzle. Pull shift lever into full reverse. Check that push-pull rod (55) is resting against shift shaft (48).

Operation of HTR II steering

This system is known as reverse sense steering i.e. backing of a boat with this system will be opposite of backing an automobile.

The easiest way to learn how to back is to turn the steering wheel in the same direction as you want the bow to go.

Once you have a little "seat time" you will be able to do things with your boat that no other system can do.

You can make counter clockwise or clockwise turns without advancing the boat.

Note: Never increase the throttle without bucket in full reverse. These boats are not equipped with a neutral lockout. Always make sure the throttle is in the idle position and the shifter is in the neutral position before starting.

Always hold the shifter in the neutral position when starting.

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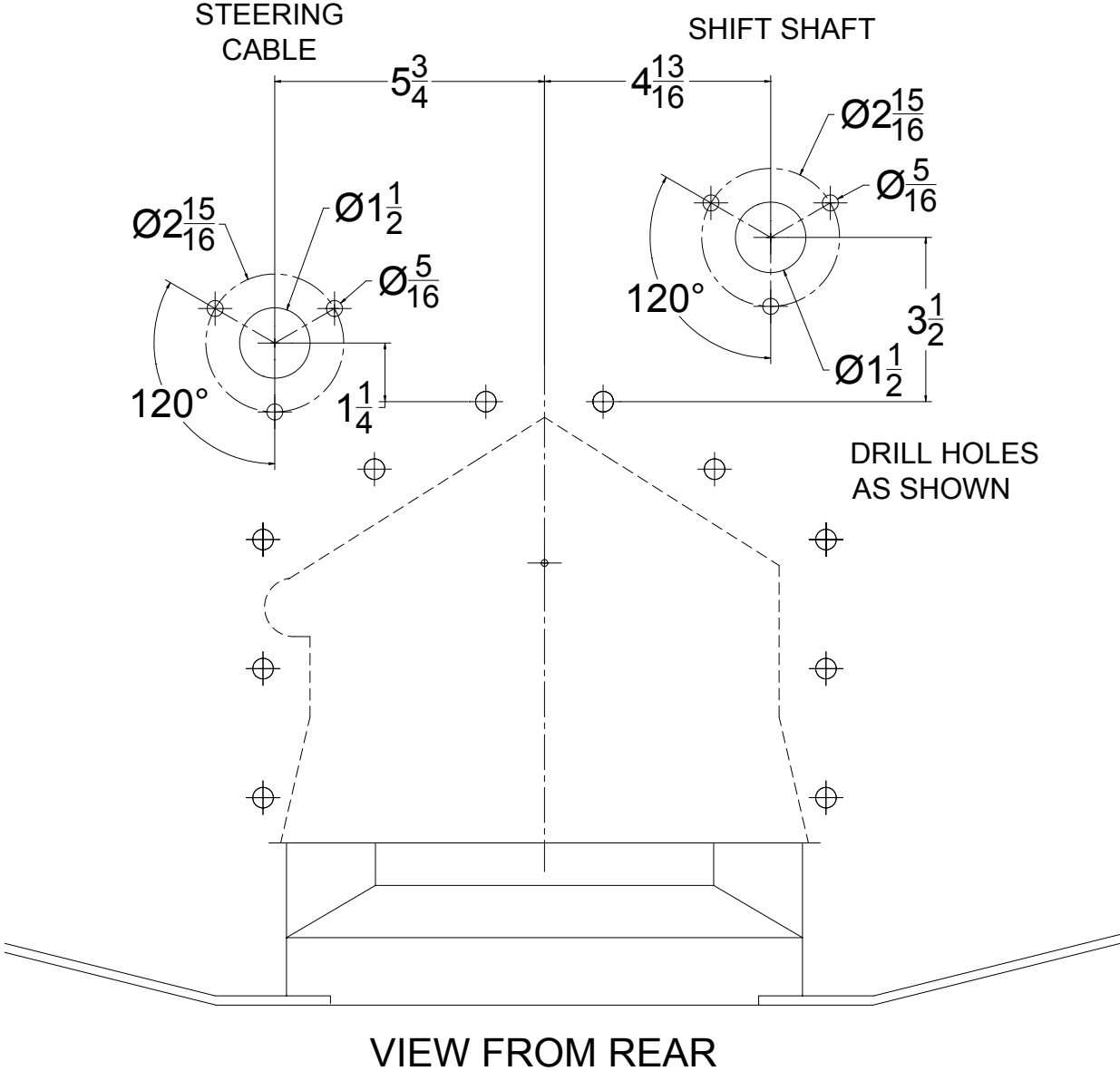


EXHIBIT I

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SHIFT SHAFT BEZEL ASSEMBLY

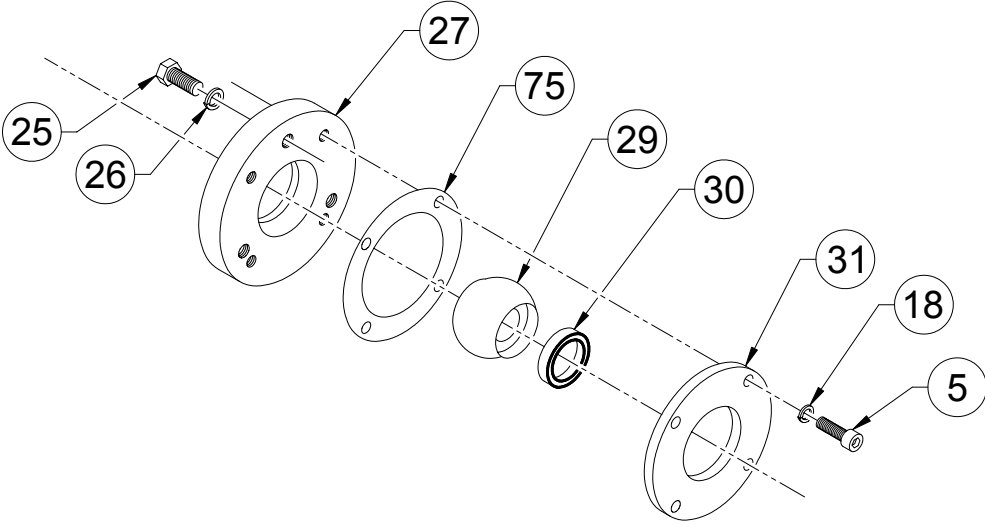


EXHIBIT J

STEERING CABLE BEZEL ASSEMBLY

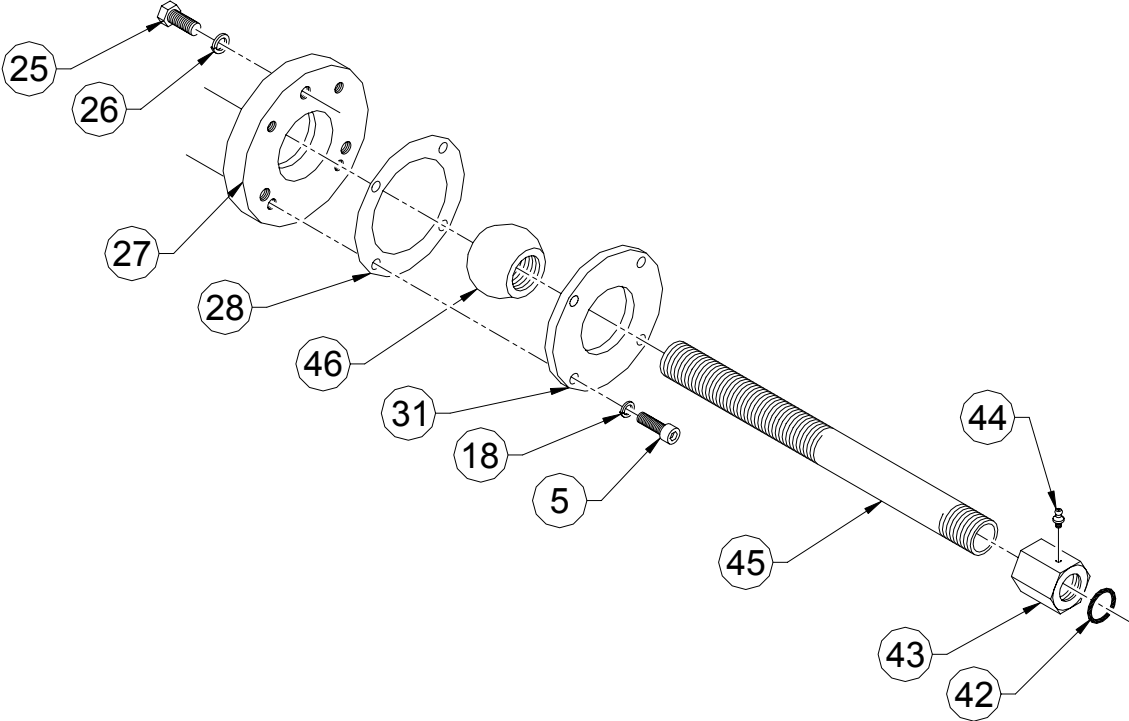


EXHIBIT K

AMERICAN TURBINE

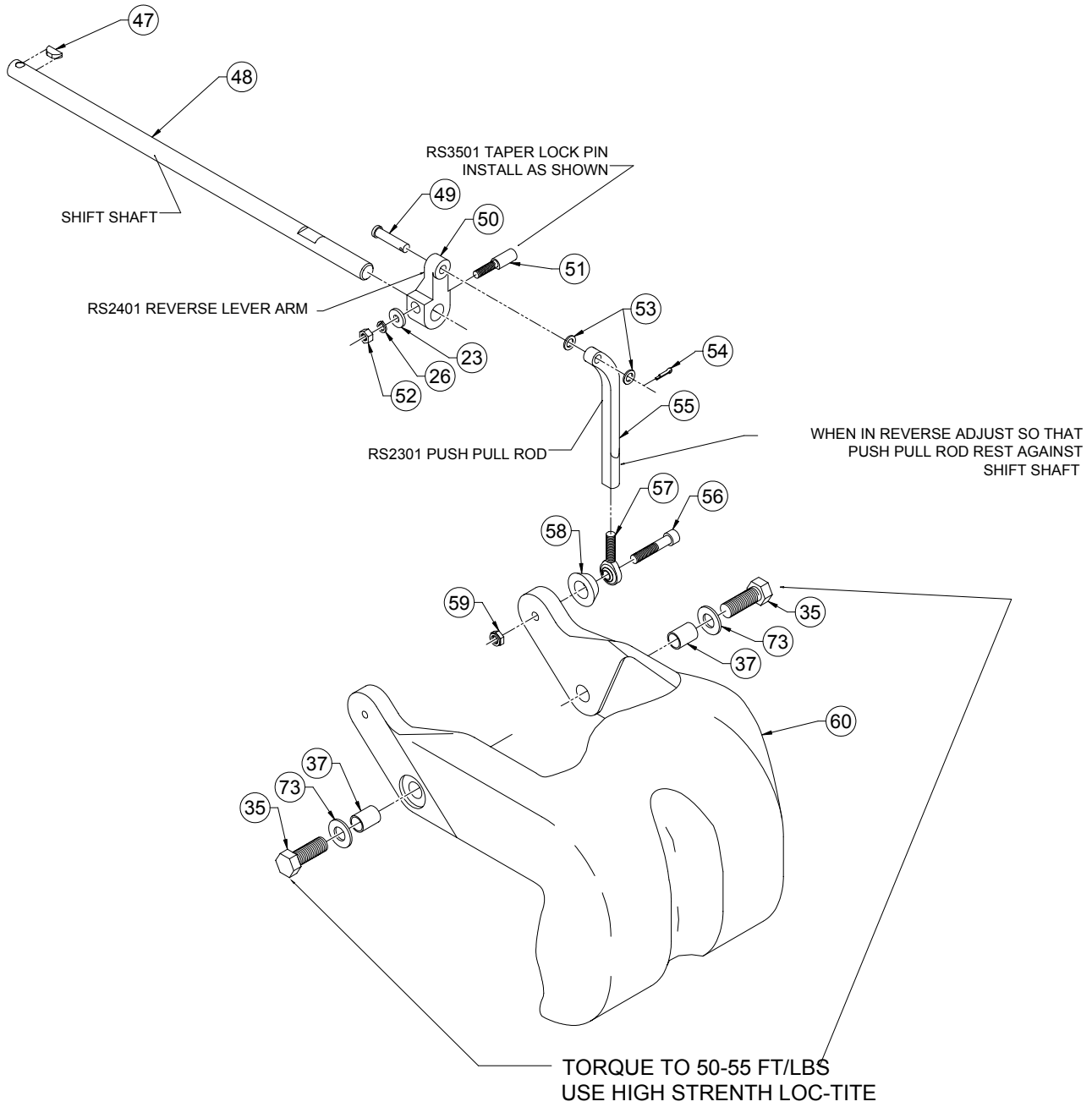


EXHIBIT L

AMERICAN TURBINE

BRAKE ROD ADJUSTMENTS

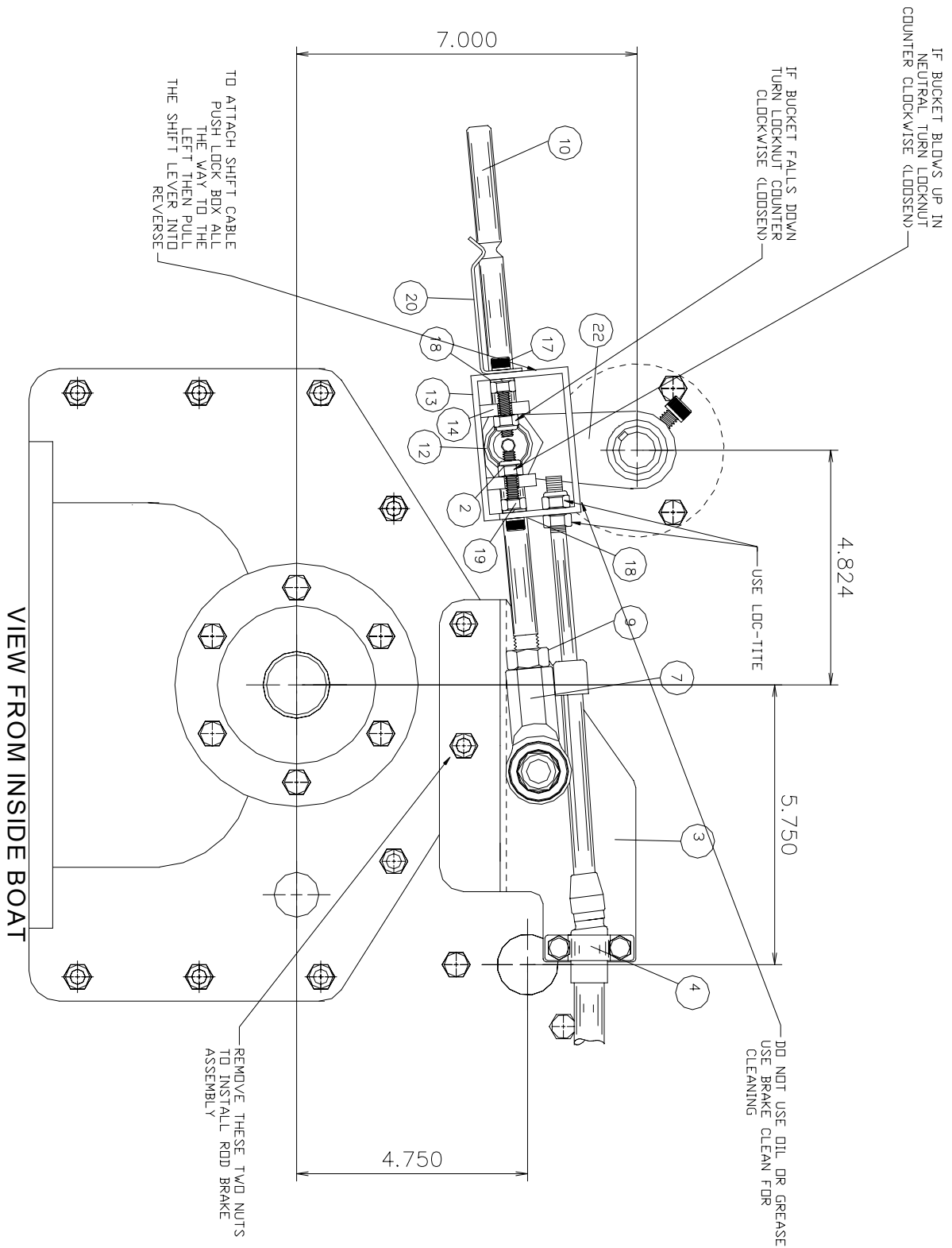
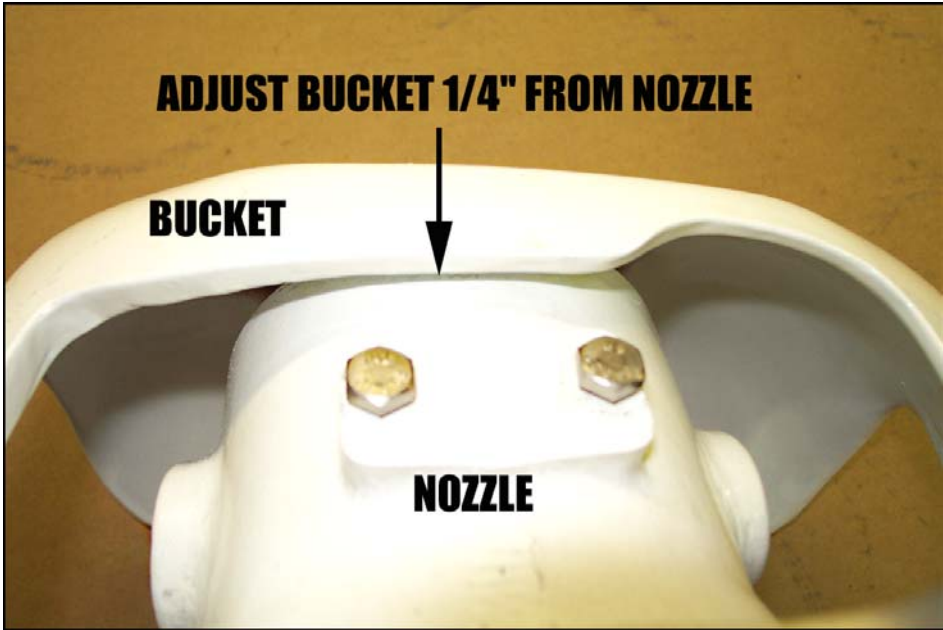
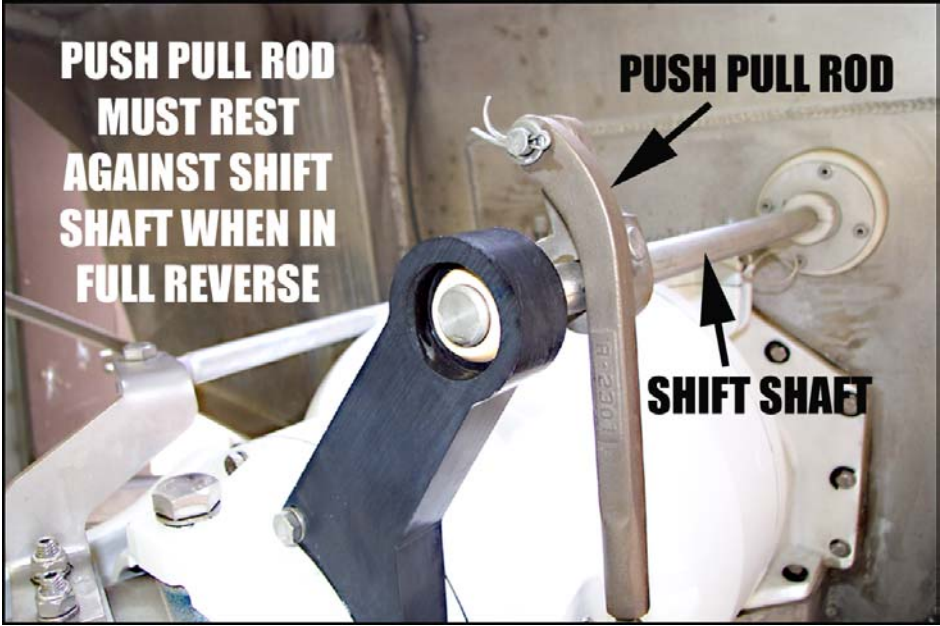


EXHIBIT M

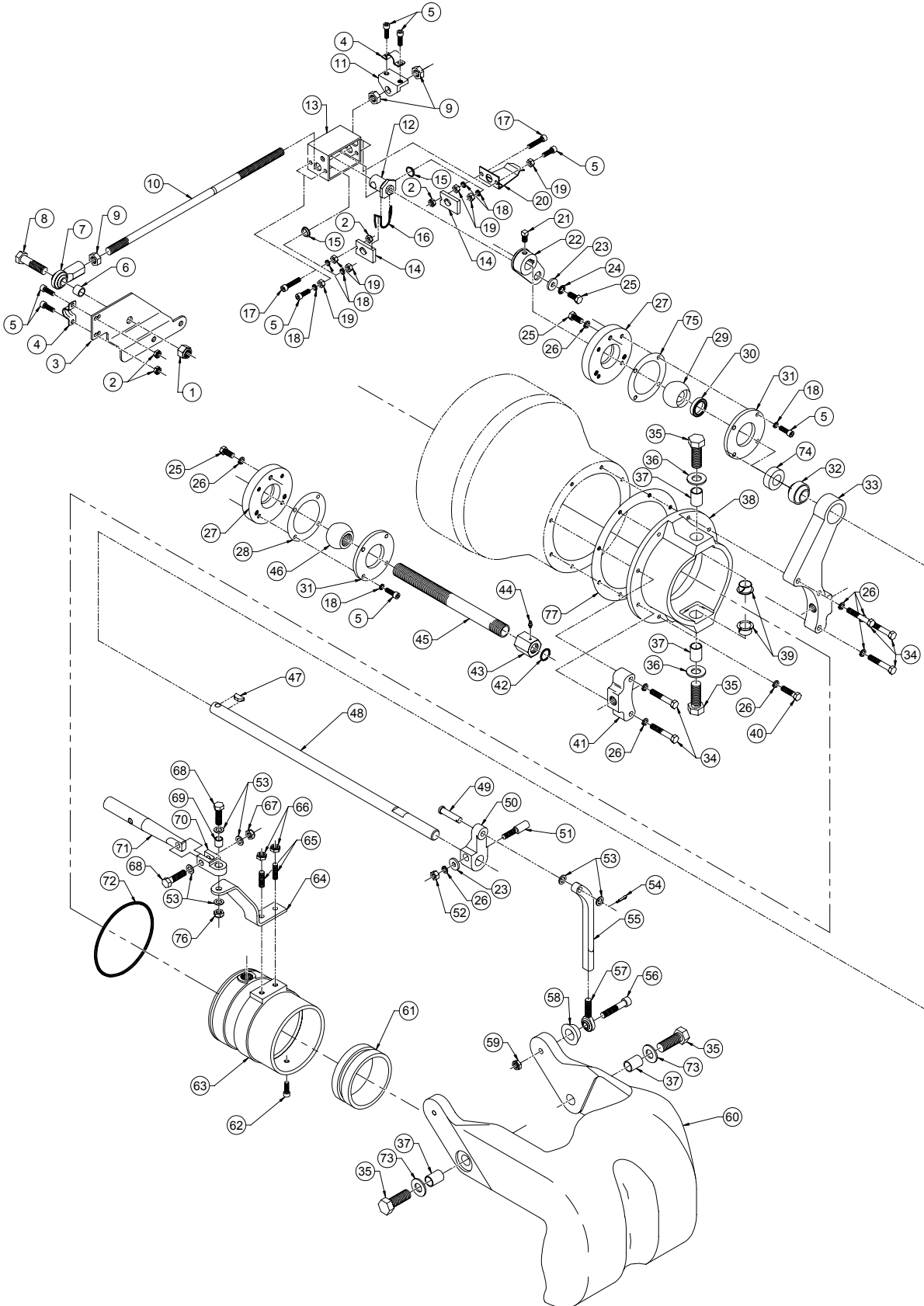
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HTR II ADJUSTMENTS



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EXPLODED VIEW AA



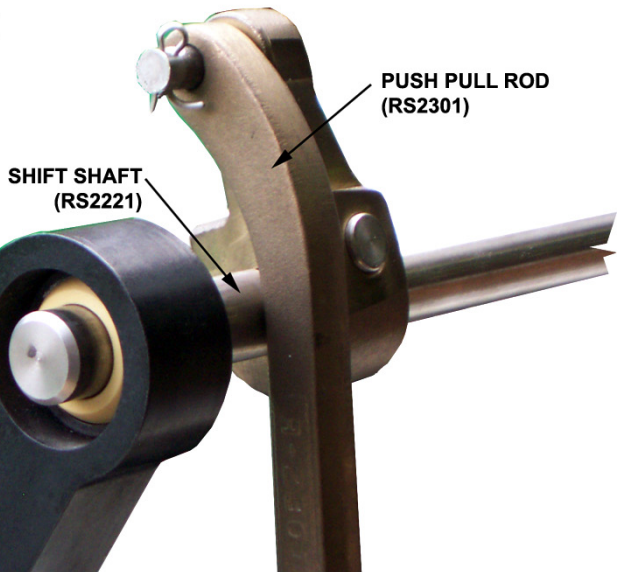
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LEGEND

SYM.	DESCRIPTION	QTY.	PART NO.	SYM.	DESCRIPTION	QTY.	PART NO.
1	LOCK NUT, 1/2-13	1	F41LN	40	HHCS, 5/16-18 X 1-1/4	4	F21CS
2	LOCK NUT, 1/4-20	4	F09LN	41	PIVOT BRACKET (PORT)	1	RS2501
3	CONTROL ROD BRACKET	1	RS1001	42	O-RING, STEERING CABLE SEAL	1	O3501
4	64 SERIES CABLE CLAMP	1	RS5801	43	STEERING TUBE SEAL	1	T3107
5	SHCS, 1/4-20 X 7/8	12	F44CS	44	GREASE ZERK	1	M4801
6	PLASTIC BUSHING	1	BN2010	45	STEERING TUBE	1	T3007
7	1/2" FEMALE ROD END	1	RS5421	46	STEERING TUBE BALL	1	T2601
8	HHCS, 1/2-13 X 1-3/4	1	F40CS	47	WOODRUFF KEY	1	R5507
9	JAMB NUT, 1/2-20	3	F40JN	48	SHIFT SHAFT	1	RS5221
10	BRAKE ROD	1	RS5101	49	CLEVIS PIN (3/8 X 1-3/8)	1	RS2351
11	CABLE BRACKET	1	RS6101	50	REVERSE LEVER ARM	1	RS2401
12	LOCK HUB	1	RS3101	51	TAPER PIN	1	RS3501
13	LOCK HOUSING	1	RS2901	52	HEX NUT, 5/16-18	1	F20HN
14	LOCK PLATE	2	RS3001	53	FLAT WASHER, 3/8 AN	6	F31FW
15	NYLINER BEARING	2	RS3201	54	COTTER PIN	1	F10CP
16	LOCK BLOCK SPRING	1	RS2802	55	PUSH PULL ROD	1	RS2301
17	SHCS, 1/4-20 X 1-3/8	2	F47CS	56	SHCS, 3/8-24 X 2	1	F46CS
18	LOCK WASHER, 1/4	13	F10LW	57	3/8 MALE ROD END	1	RS5301
19	HEX NUT, 1/4-20	6	F10HN	58	TAPERED SLEEVE	1	RS2621
20	DETENT SPRING	1	RS2701	59	LOCK NUT, 3/8-24	1	F12LN
21	SHCS, 5/16-18 X 1/2	1	F50CS	60	REVERSE BUCKET	1	RS2101
22	LEVER ARM (SHIFT SHAFT)	1	RS5201	61	NOZZLE INSERT	1	R7370
23	FLAT WASHER (LOCK HUB 5/16)	1	RS3401	62	SHCS, 5/16-18 X 1	1	F52CS
24	STAR WASHER, 5/16	1	F20SW	63	NOZZLE, STEERING	1	R2001
25	HHCS, 5/16-18 X 3/4	7	F29CS	64	TILLER ARM	1	RS2911
26	LOCK WASHER, 5/16	15	F20LW	65	STUD, 5/16-18 X 1-1/2	2	F10ST
27	BEZEL (SHIFT ROD / STEERING)	2	RS5001	66	LOCK NUT, 5/16-18	2	F20LN
28	GASKET	1	G4001	67	LOCK NUT, 3/8-24 (THIN)	1	F30LN
29	SHIFT ROD BALL	1	RS5621	68	HHCS, 3/8-24 X 1-1/2	2	F34CS
30	SHIFT ROD SEAL	1	RS5601	69	BRONZE BUSHING 3/8 X 1/2	1	RS2623
31	BALL FLANGE	2	T2701	70	CLEVIS	1	R8007
32	SPERICAL BEARING	1	RS5351	71	STEERING EXTENSION	1	R9601
33	PIVOT BRACKET (STARBOARD)	1	RS2201	72	O-RING, STEERING NOZZLE	1	O1505
34	HEX HD. CAP SCR. 5/16-18X2	4	F23CS	73	FLAT WASHER, 5/8	2	RS2121
35	HHCS, 5/8-11 X 1-3/4	4	RS2132	74	PLASTIC COLLAR	1	RS6201
36	FLAT WASHER, 5/8	2	RS2121	75	GASKET, SHIFT SHAFT	1	G4101
37	BUSHING (BUCKET PIVOT)	4	RS2131	76	LOCK NUT, 3/8-24	1	F12LN
38	NOZZLE HOUSING	1	R1007	77	NOZZLE HOUSING GASKET	1	G2507
39	NYLINER BEARING	2	B2007				

AMERICAN TURBINE HTR II REVERSE BUCKET ADJUSTMENT

FIGURE 1



1. Shift the forward reverse lever into reverse.
2. Observe that the push-pull rod is resting against the shift shaft. If it is not; disconnect the shift cable from the brake box, push the brake box to the starboard side until the push-pull rod is resting against the shift shaft. Without moving the brake box extend shift cable (see note) then re-connect to the brake box (use loctite). If the cable does not reach re-adjust the cable at the shifter. Check

reverse bucket by hand and try to move into forward.

erate you

have a shifter cable problem.)

3. Check the reverse bucket height. Shift into reverse steer to full starboard, the bucket should just touch the nozzle. If it does not; remove the clevis pin that connects the lever and the push-pull rod. Rotate CW to lower, CCW to raise.

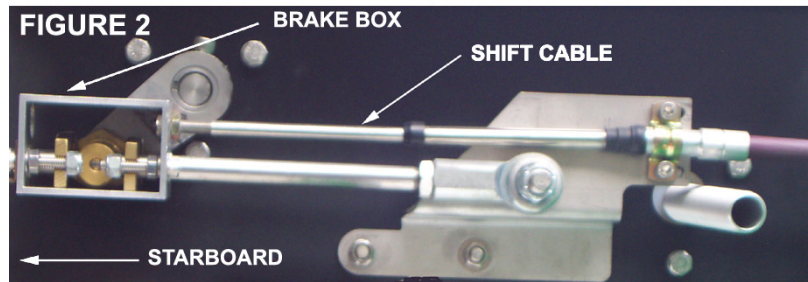
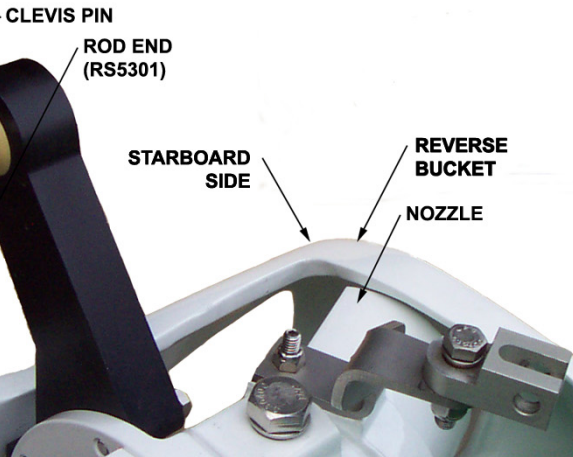


FIGURE 3



4. Observe that the push-pull rod and shift lever are not binding during the shift. If they are; loosen the taper (lock) pin, slide the shift lever along the shaft until the two do not bind. Tighten the taper (lock) pin and re-test.

5. Observe that the shaft lock collar is 3/16" from the plastic ball when the bucket is in the full forward position.

FIGURE 4

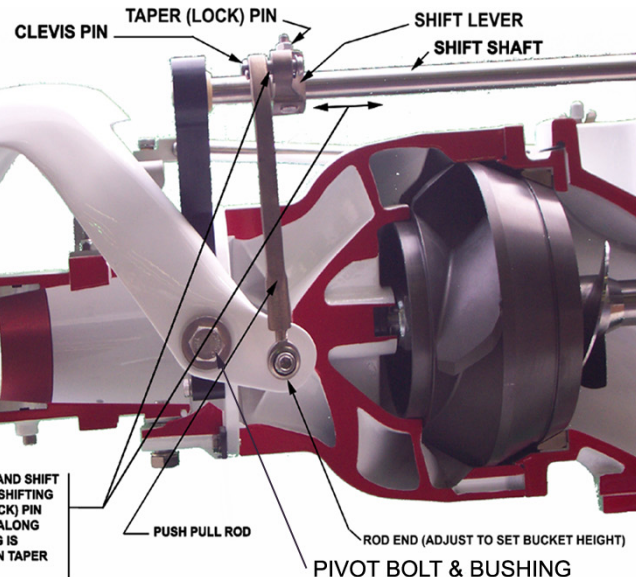
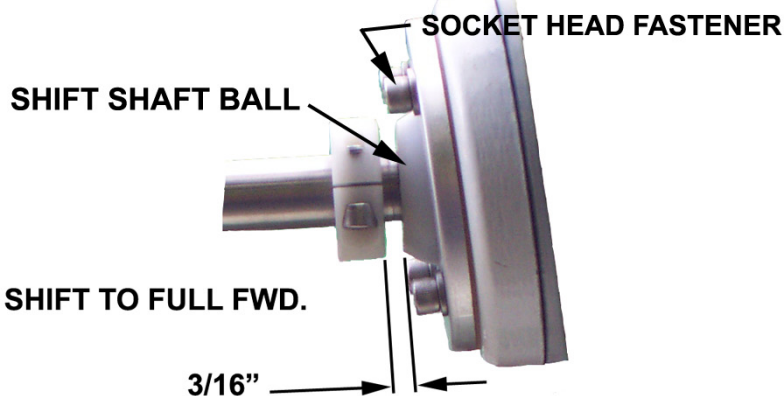


FIGURE 5



NOTE: IF PUSH PULL ROD AND SHIFT LEVER BIND WHILE SHIFTING LOOSEN TAPER (LOCK) PIN SLIDE SHIFT LEVER ALONG SHIFT UNTIL BINDING IS ELIMINATED TIGHTEN TAPER (LOCK) PIN

TROUBLE SHOOTING HTR II

HARD SHIFTING INTO REVERSE

ENGINE RUNNING

ENGINE MUST BE WARMED UP AND NOT IDLING ABOVE 750 RPM
ADJUST IDLE

IF SHIFTING CONTINUES TO BE DIFFICULT MAKE SURE THAT IN THE PROCESS OF SHIFTING THE ENGINE RPM DOES NOT INCREASE

NOTE: SOME SHIFTERS HAVE BEEN IMPARTING MOVEMENT INTO THE THROTTLE LINKAGE CAUSING THE ENGINE RPM TO INCREASE

ENGINE NOT RUNNING

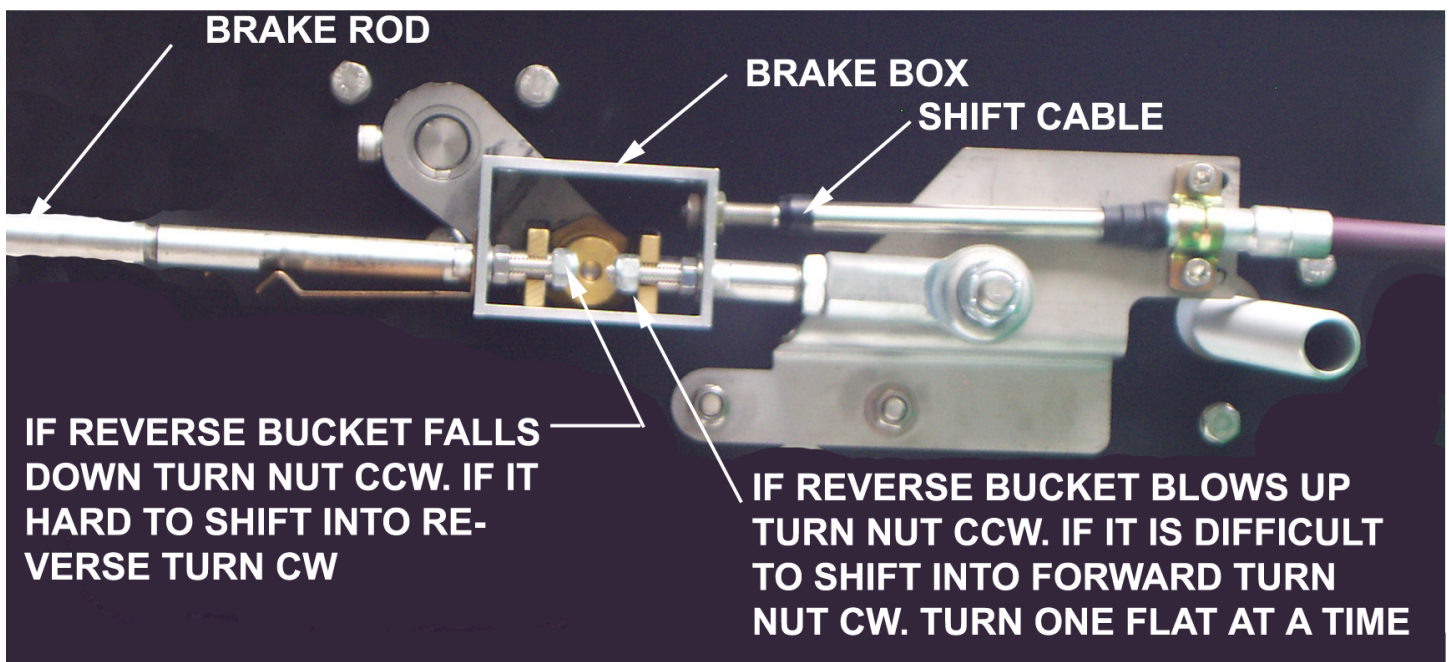
SEE FIGURES 4 & 5
IF HARD SHIFTING CONTINUES REMOVE CLEVIS PIN FROM PUSH-PULL ROD AND SHIFT LEVER. LIFT REVERSE BUCKET IT MUST MOVE FREELY, IF NOT; PIVOT BOLTS MAY HAVE BEEN OVER TIGHTENED AND SWELLED IN THE HOLE, IF SO REPLACE BUSHINGS AND TORQUE TO 45 ft/lb AND USE LOCTITE.

CHECK FOR CORROSION, CLEAN AND LUBRICATE IF NEEDED.

BEFORE RE-CONNECTING SHIFT LEVER OPERATE SHIFT LEVER AT HELM. DOES IT SHIFT WITHOUT MUCH EFFORT, IF NOT LOOSEN THE (4) SOCKET HEAD FASTENERS FIGURE (5). IF THAT EASES THE SHIFTING ADD A GASKET (G4007) AND TIGHTEN BOLTS.

SEE FIGURE 6 FOR BRAKE BOX ADJUSTMENTS

FIGURE 6



NOTE: BRAKE BOXES ARE SET AT THE FACTORY
PERFORM ALL OTHER ADJUSTMENTS FIRST

CLEAN WITH BRAKE CLEAN, DO NOT USE OIL OR GREASE.