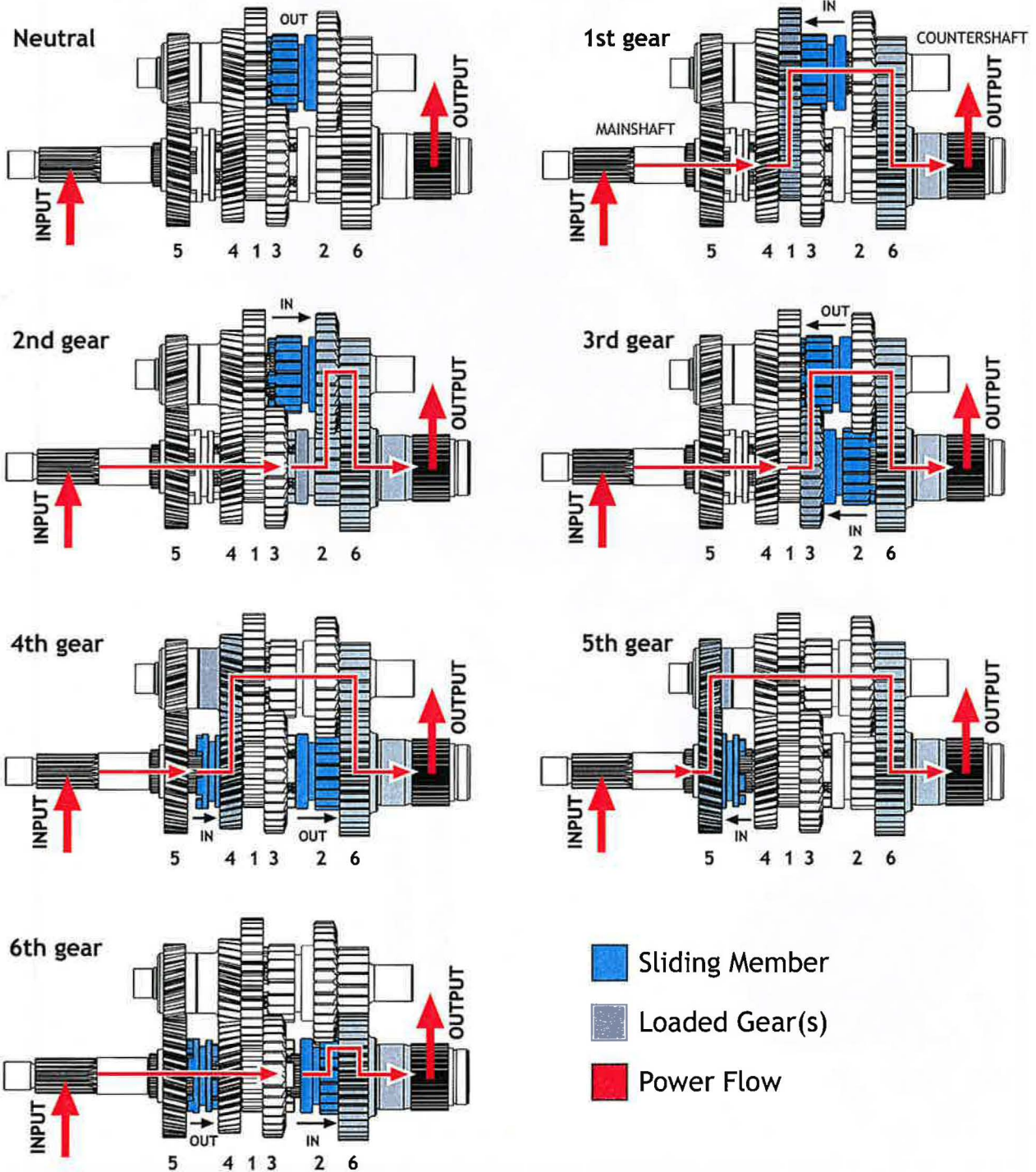
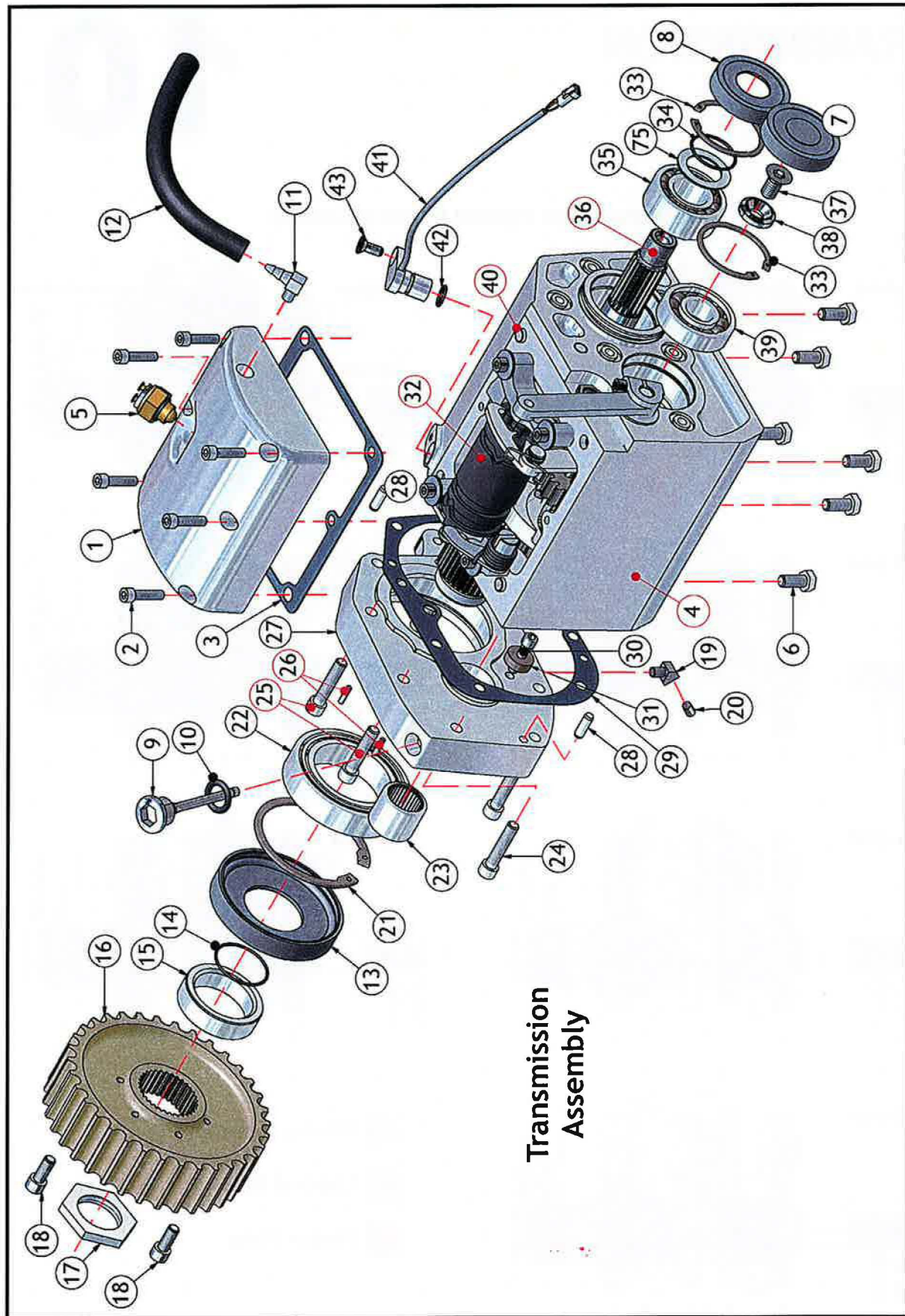


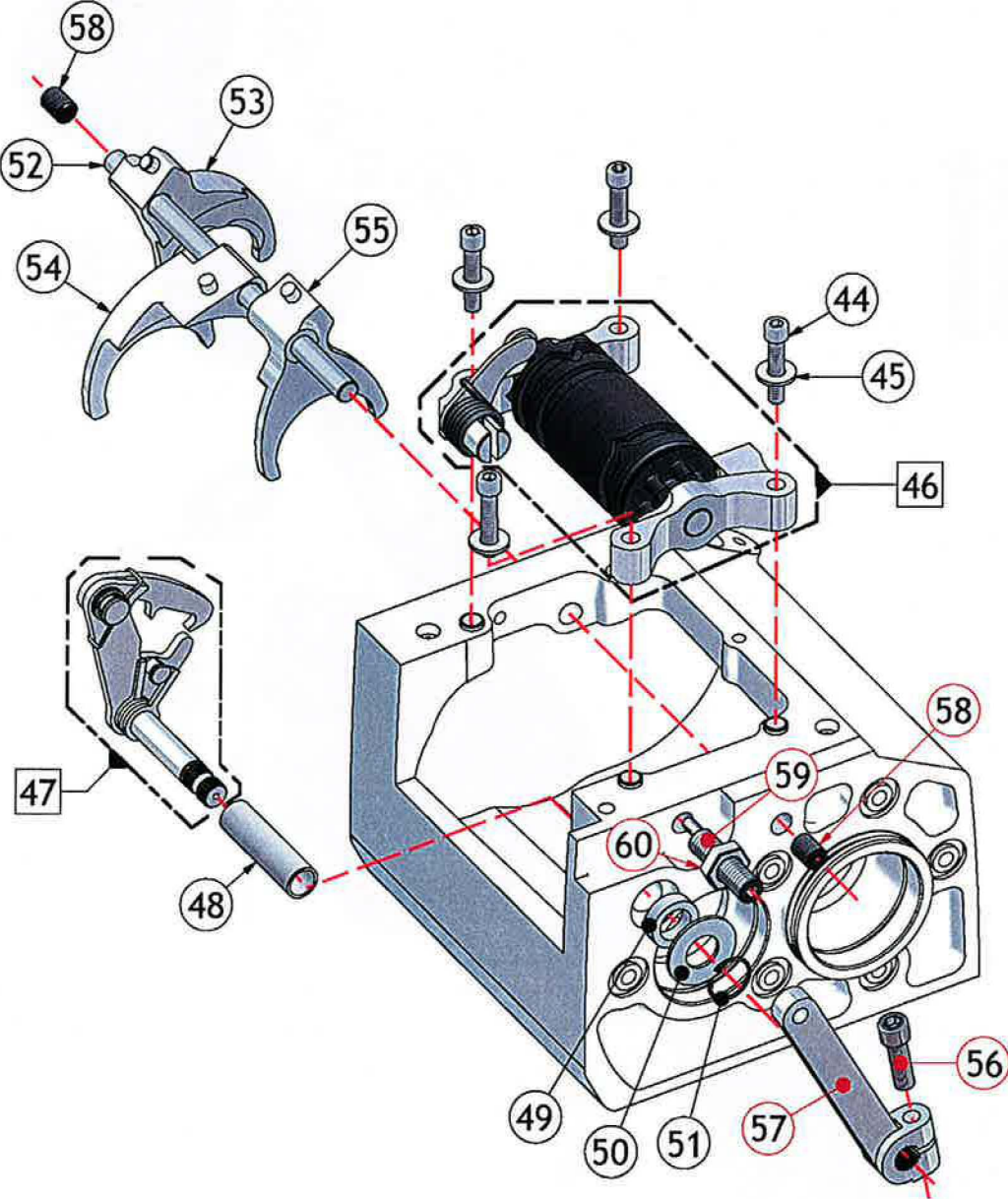
TRANSMISSION

TRANSMISSION POWER FLOW DIAGRAM

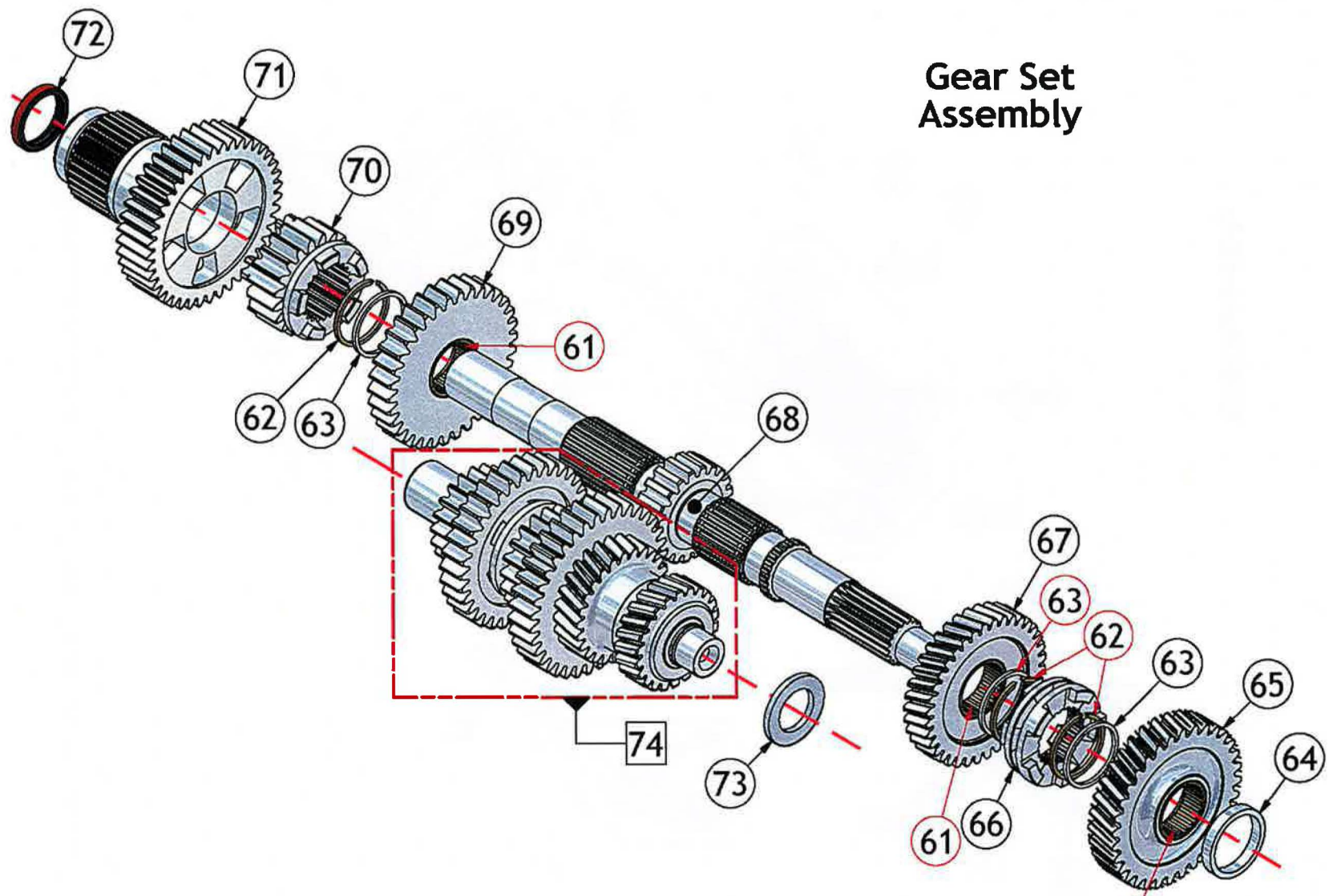




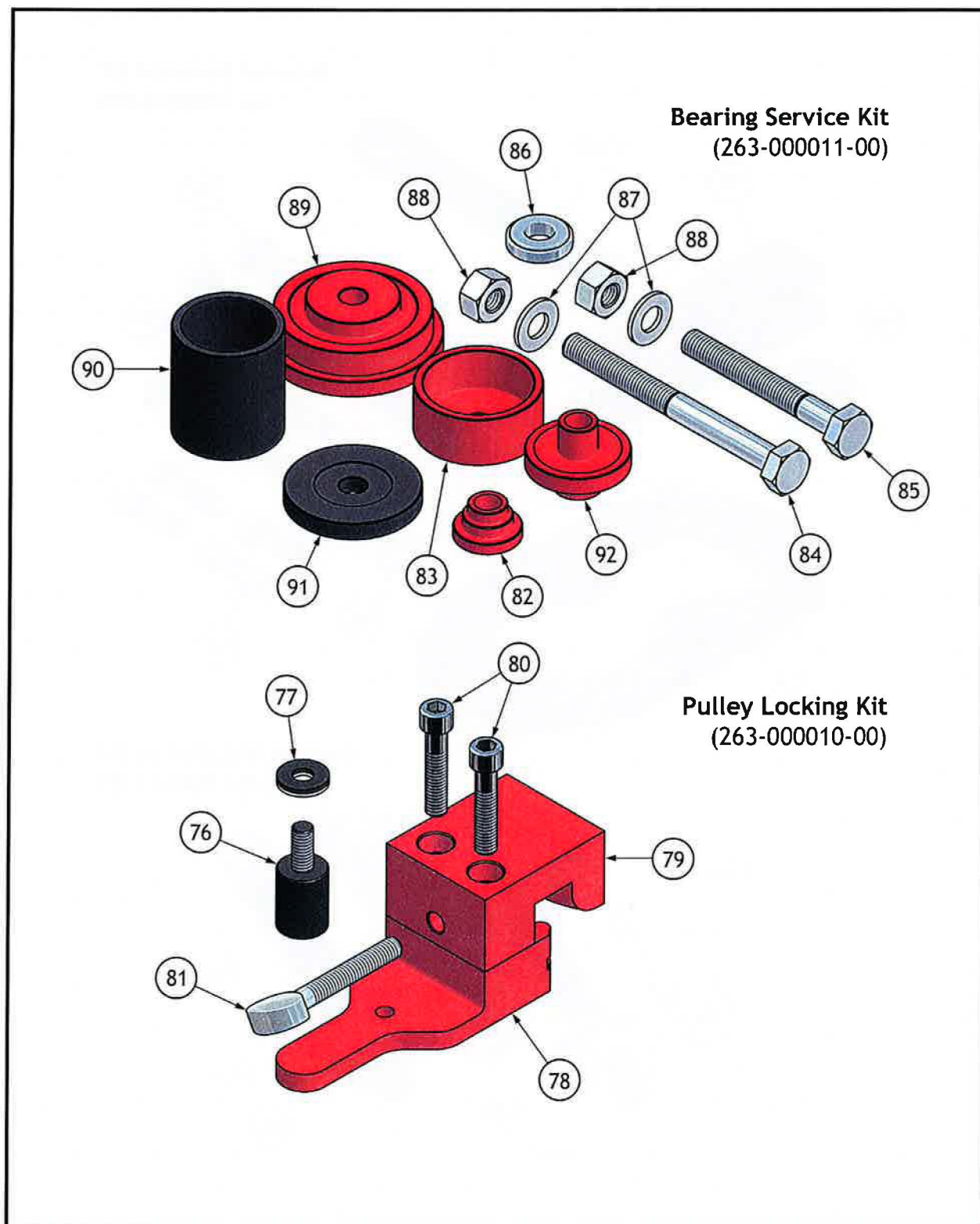
Shift Assembly

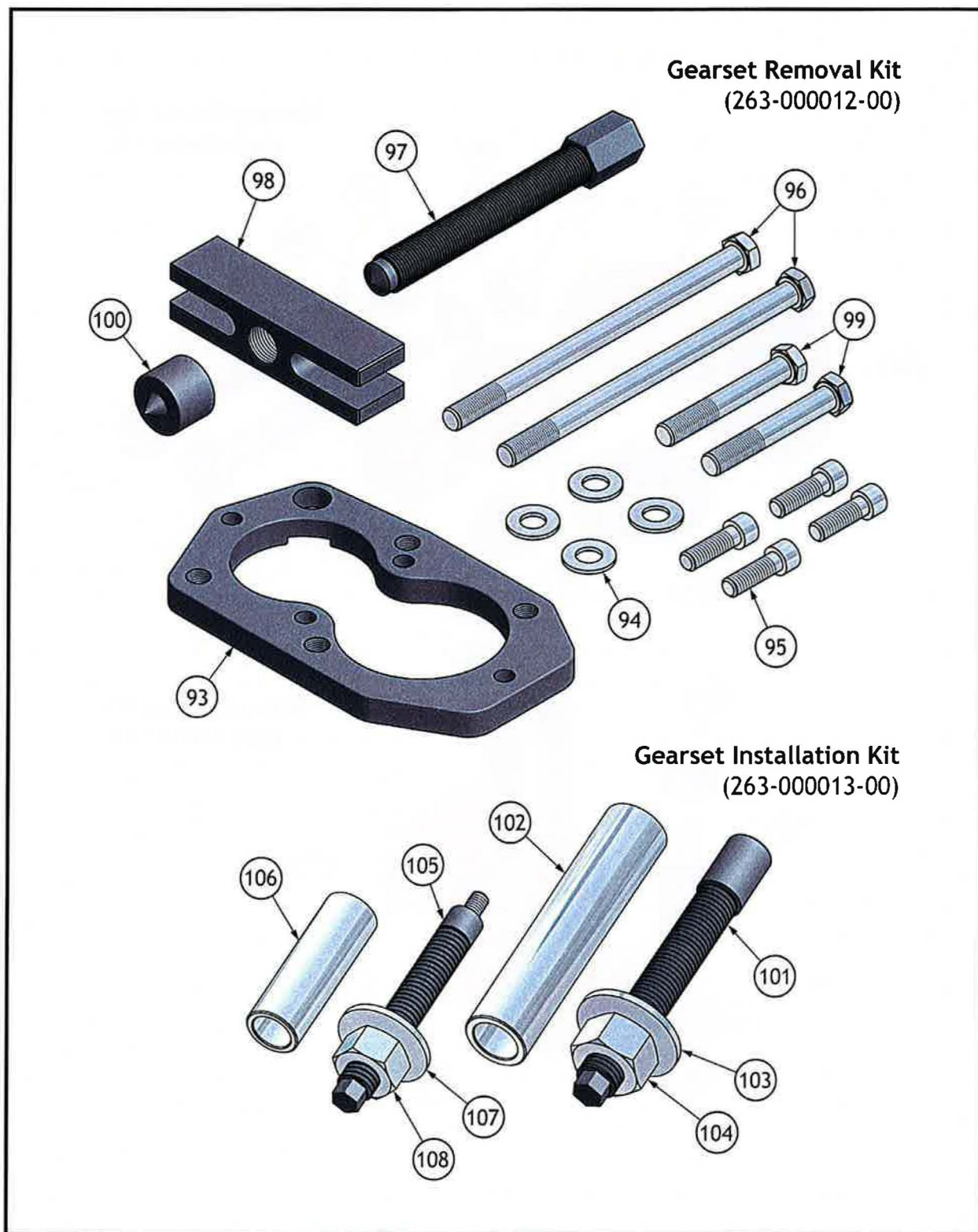


Gear Set Assembly



Item 61 - Needle bearing
typical 3 places in Main shaft ass'y





PARTS LIST – MANUAL TRANSMISSION ASSEMBLY

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Top cover	1	55	4-5 shifter fork	1
2	Top cover screws, 1/4-20 x 1" SHCS, SS, polished	6	56	Screw, shifter arm, 5/16-24 x 1" SHCS	1
3	Top cover gasket	1	57	Shift lever, SS	1
4	Transmission case	1	58	1/2-20 x 1/2" setscrew (1 each end)	2
5	Neutral switch with O-ring	1	59	Shift pawl eccentric adjuster cam	1
6	Transmission mounting screws, 7/16-14 x 3/4" flange screw, zinc	6	60	Shift pawl lock nut, 7/16-14	1
7	Seal, C/S left side	1	61	Needle bearing	3
8	Seal, M/S left side	1	62	Retaining ring	3
9	Filler dipstick	1	63	Thrust washer, 0.070"	3
10	Filler dipstick O-ring, #115	1	64	Shaft spacer	1
11	90° street elbow	1	65	5 th gear, M/S	1
12	Vent hose	1	66	4-5 dog clutch	1
13	Oil seal	1	67	4 th gear, M/S	1
14	Quad seal	1	68	M/S with 1 st gear	1
15	Pulley spacer	1	69	3 rd gear, M/S	1
16	34-tooth drive pulley	1	70	2 nd gear, M/S	1
17	Pulley nut (left-hand thread)	1	71	Main drive gear assembly	1
18	1/4-20 x 5/8" SHCS	2	72	Main drive gear seal	1
19	45° elbow	1	73	Thrust washer, M/S 22.225 x 36.513 x 3.2 mm	1
20	1/8" NPT drain plug	1	74	C/S gear assembly	1
21	Snap ring, 3-11/32", main bearing	1	75	Shim (use as needed)	1
22	Main bearing, 45 x 85 x 19 mm	1	76	Stop pulley lock	1
23	Countershaft bearing, 25 x 32 x 26 mm	1	77	Bonded sealing washer	1
24	5/16-18 x 1-1/2" SHCS, SS, polished	6	78	Inner sprocket lock tool	1
25	5/16-18 x 1-1/4" SHCS, SS, polished	2	79	Outer sprocket lock tool	1
26	Dowel pin, 3/16 x 1/2"	2	80	5/16-18 x 1-3/4" SHCS, chrome	2
27	Transmission bearing door	1	81	5/16-18 x 2" thumb screw, zinc	1
28	Dowel pin, 1/4 x 3/4"	2	82	Bearing remover insert	1
29	Gasket, bearing door	1	83	Bearing remover cup	1
30	1/4-20 x 1" SHCS	1	84	1/2-13 x 5-1/2" hex screw, zinc	1
31	Magnet	1	85	1/2-13 x 4" hex screw	1
32	Shift assembly	1	86	Ball thrust bearing	1
33	Snap ring, left side case	2	87	1/2" flat washer, zinc	2
34	O-ring, clutch to transmission	1	88	1/2-13 hex nut	2
35	Bearing, M/S, left side case	1	89	Main bearing installer	1
36	Gear set	1	90	Main drive gear installation cup	1
37	C/S retaining screw, 3/8-16 x 1" FHCS	1	91	Main drive gear plate	1
38	C/S retaining washer	1	92	Bearing installer	1
39	C/S bearing, left side case	1	93	Puller plate	1
40	Alignment pin, 5/16 x 3/8"	6	94	3/8" flat washer, zinc	4
41	Speed sensor	1	95	5/16-18 x 1" SHCS, zinc	4
42	O-ring, speedometer sensor	1	96	3/8-24 x 6" HHCS	2
43	Screw, speed sensor	1	97	Puller screw	1
44	1/4-20 x 1-1/4" SHCS	4	98	Puller bar	1
45	Washer, flat, 3/16" USS	4	99	3/8-24 x 2-1/2" HHCS	2
46	Pillow block/shift drum assembly	1	100	Puller screw tip	1
47	Assembly, shifter pawl	1	101	M/S inner race installer extension	1
48	Bushing, shifter pawl shaft	1	102	M/S inner race tube installer	1
49	Seal, shifter pawl	1	103	7/8" washer, plain	1
50	Washer, shifter pawl	1	104	7/8-9 hex nut, zinc	1
51	Snap ring	1	105	C/S puller, threaded	1
52	Fork rod	1	106	C/S puller tube	1
53	2M shift fork	1	107	3/4" flat washer, zinc	1
54	3C shift fork	1	108	3/4-10 hex nut, grade 5, zinc	1

TORQUES VALUES

DESCRIPTION	ITEM	TORQUE	LOCTITE
Top cover screws	(2)	110 in•lbs (9 ft•lbs)	2440
Neutral switch	(5)	15 ft•lbs	None
Transmission mounting screws	(6)	40 ft•lbs	None
Pulley nut	(17)	60 ft•lbs + additional 35 to 45°	2760
Pulley nut lock screws	(18)	9 ft•lbs	2440
Drain plug	(20)	48 in•lbs	567 PST
Bearing door screws	(24)	16 ft•lbs	2440
Countershaft screw	(37)	37 ft•lbs	2760
Pillow block screws	(44)	9 ft•lbs	2440
Shifter arm screw	(56)	18 ft•lbs	2440
Shifter pawl adjuster lock nut	(60)	20 ft•lbs	2440
Pulley cover screws	See Clutch/Primary Chapter	20 ft•lbs	2440
Ball ramp cover screws		24 in•lbs	2440
Clutch pushrod lock nut		30 ft•lbs	None

TRANSMISSION SERIAL NUMBER CODEExample serial number: **AAG0818605**

AA	G	08	186	05
Baker part number	Revision	Year	Day of year	Daily build sequence

TRANSMISSION SPECIFICATIONS**INTERNAL GEAR RATIOS**

1 st	2 nd	3 rd	4 th	5 th	6 th
3.45:1	2.56:1	1.87:1	1.44:1	1.15:1	1/00:1

SHIFT PATTERN1st ↓ N 2nd ↑ 3rd ↑ 4th ↑ 5th ↑ 6th ↑**CLEARANCES**

Shift drum end play	Not adjustable
Mainshaft runout	0.000-0.003"
Mainshaft end play	Not adjustable
Countershaft runout	0.000-0.003"
Countershaft end play	Not adjustable
Shift fork taper	0.000-0.020"

FLUIDS

Transmission fluid	20 oz.
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NOTE: Thoroughly clean threads of all screws removed prior to assembly. Thoroughly clean internal threads at all screw locations. Use Loctite products as indicated. Use torque values specified.

NOTE: Before performing **any** of the following procedures, disconnect battery, ground cable **first**.

WARNING! TO PREVENT SPARKING, ALWAYS DISCONNECT GROUND CABLE FIRST AND RECONNECT LAST. SPARKS MAY CAUSE FLAMMABLE SUBSTANCES TO IGNITE OR EXPLODE.

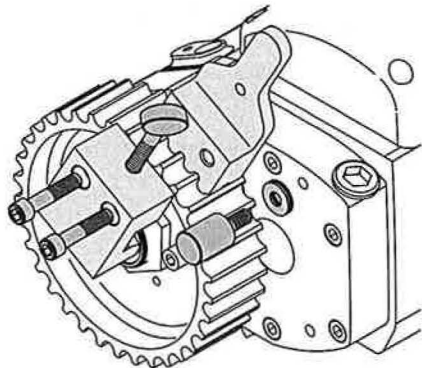
ADJUSTMENTS

The Balance-Drive transmission only requires two adjustments. Shift lever adjustment, and shifter pawl adjustment. Note that the shift drum (46) rotates on a fixed spindle and no endplay shimming is required.

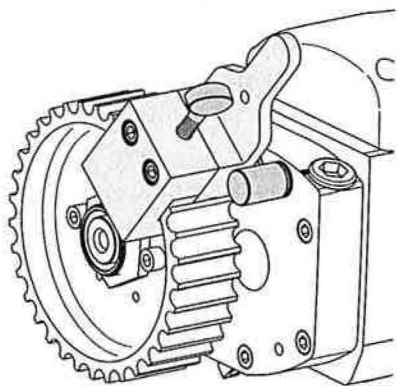
TRANSMISSION REMOVAL

1. Place motorcycle on suitable lift and support upright and level.
2. Remove the exhaust system (see **Chapter 11, Exhaust**).
3. Place a suitable jack under motorcycle and lift until pressure is off the rear wheel.
4. Drain primary and transmission fluids.
5. Remove axle cap covers, remove the two axle adjuster set screws and then loosen the axle adjuster screws.
6. Loosen rear axle.
7. Slide clutch cable adjuster boot away from adjusting hardware.
8. Turn clutch cable adjuster to provide maximum slack in cable.
9. Remove clutch adjuster cover.
10. Remove clutch push rod.

11. Remove the three Allen screws retaining the front pulley cover.
12. Remove drive belt from front pulley.
13. Install stop pulley lock tool (76) and bonded sealing washer (77) into one of the three 5/16-18 pulley cover screw holes located on the bearing door. Note that the rubber side of the bonded sealing washer should be towards the bearing door.



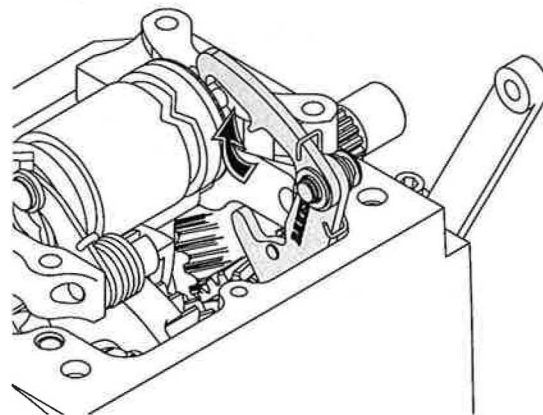
14. Install the inner sprocket locking tool (78) and outer sprocket locking tool (79) with hardware (80, 81) to lock pulley.



15. Remove the pulley nut retaining screws (18).
16. Remove front pulley nut (17) (left-handed threads on M/S only).
17. Remove outer and inner primary assembly (see **Clutch/Primary** chapter).
18. Remove six top cover screws (2).

SHIFT DRUM REMOVAL AND INSTALLATION

1. Remove top cover (1) and gasket (3).
2. Remove the four socket head cap screws (44) and washers (45) from the pillow blocks. Gently lift the shifter pawl arm upwards.



Typical

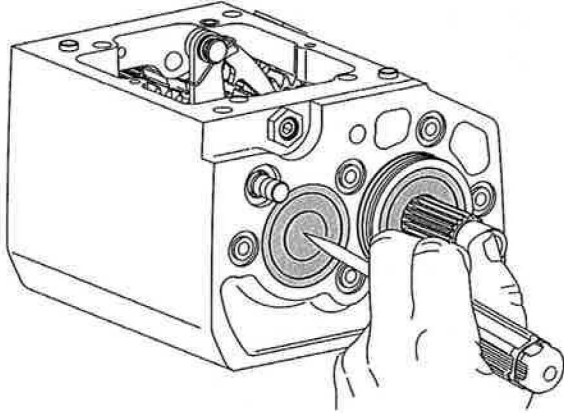
NOTE: Do not apply pressure to the spring. Lifting the arm too high will damage the spring and prevent accurate adjustment.

3. Lift the drum and pillow blocks as an assembly (46).
4. Installation is reverse of removal.

SHIFT FORK REMOVAL AND INSTALLATION

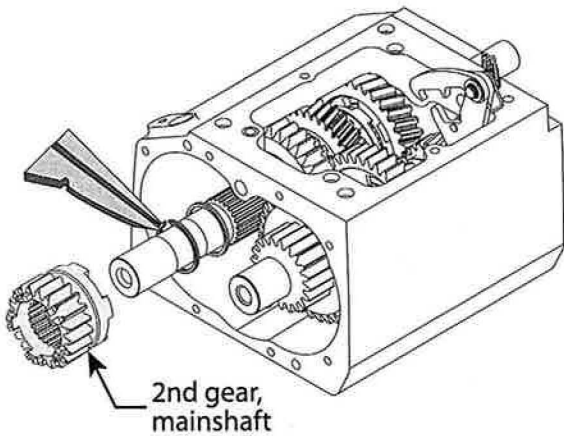
1. Remove the 1/2-20 x 1/2" setscrew (58) located behind the pulley in the top center of the bearing door.
2. Slide out fork rod (52) and remove forks (53, 54, 55).
3. Clean and inspect forks for wear and alignment.
4. Installation is reverse of removal.
5. Ensure shift forks are fully seated in the shift fork groove on the appropriate gears. Install shift rod fork, ensuring all three shift forks move smoothly on shift fork rod.
6. Apply Loctite 567 thread sealant onto threads of the 1/2-20 x 1/2" setscrew (58) and install screw into transmission case (1).
7. Remove C/S seal and M/S seal from the left side of the transmission and discard.

NOTE: To avoid damaging other parts, punch a hole in the center of the seals to remove.

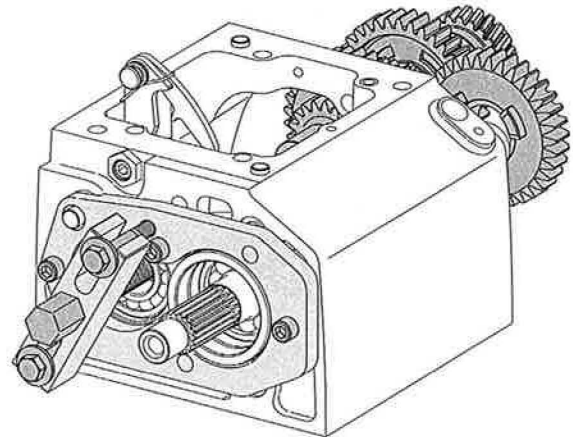
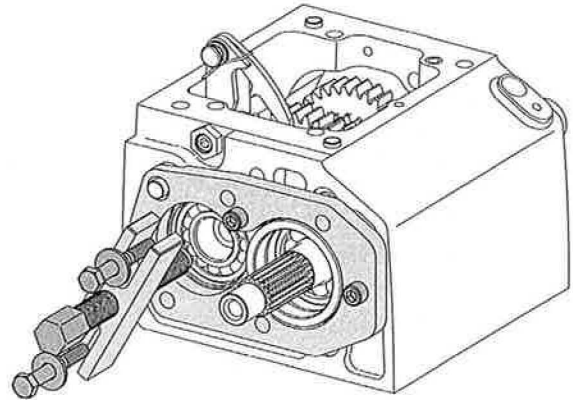


GEAR SET REMOVAL

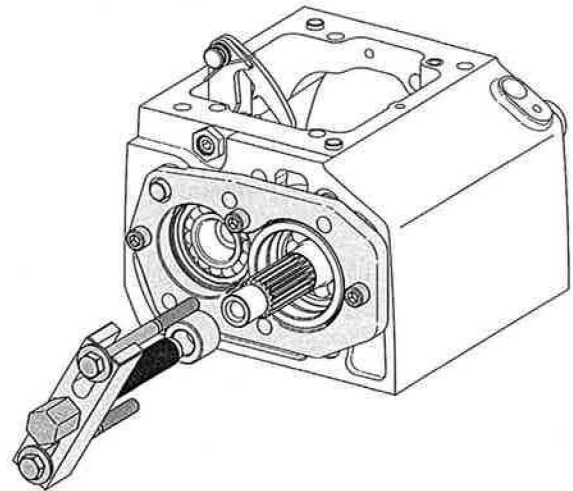
1. Remove C/S retaining screw (37) and retaining washer (38).
2. Remove bearing door. The main drive gear is removed with the bearing door.
3. Remove 2nd gear from M/S.



4. Remove the retaining ring and thrust washer from 3rd M/S.
5. Mount puller plate (93) with hardware supplied to left side of transmission.



6. Use the puller screw (97), puller bar (98), washers (94) and 3/8-24 x 2-1/2" long HHCS (99) to remove C/S and 3rd gear on M/S at the same time by tightening puller screw inward, pressing shaft from bearing.
7. Use the puller screw (97), puller bar (98), puller screw tip (100), washers (94) and 3/8-24 x 6" long HHCS (96) to remove the M/S.

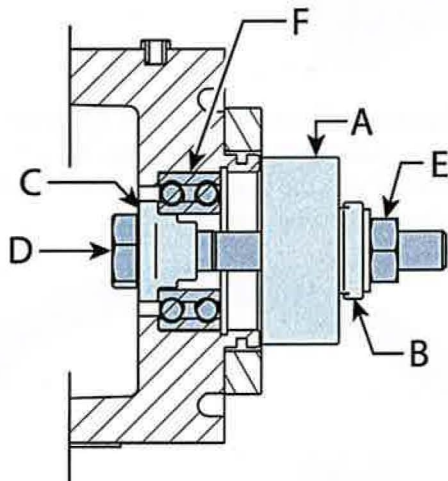


8. Remove the retaining clip (51), washer (50) and shifter arm (57) from shifter pawl (47).

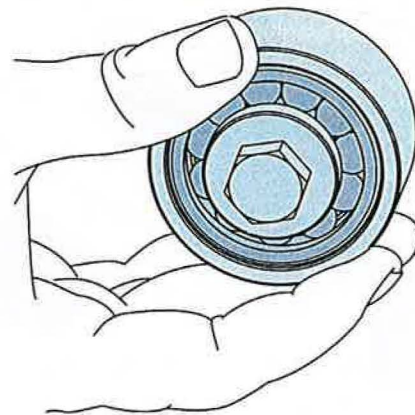
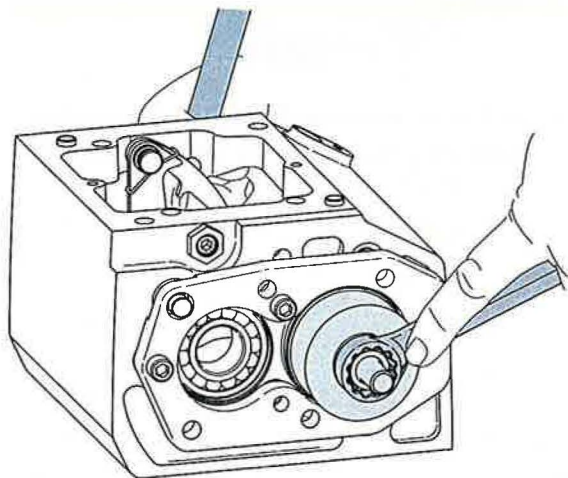
9. Inspect shifter pawl seal (49) and replace if needed.
10. Slide and remove pawl assembly from transmission case (4).
11. Installation is reverse order of removal.

BEARING REMOVAL

1. Remove the snap rings retaining the M/S and C/S bearings.
2. Remove the M/S bearing by assembling the bearing remover insert (82), bearing remover cup (83), ball thrust bearing (86), 1/2-13 x 4" long hex bolt (85) and 1/2-13 hex nut (88) through bearing. Tighten remover insert outward, holding nut behind cup until bearing slides out.



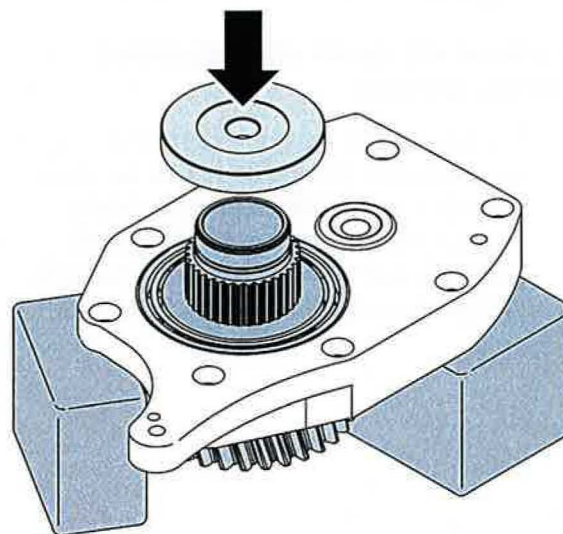
(A) Bearing remover cup, (B) ball thrust bearing, (C) remover insert, (D) 1/2-13 hex bolt, (E) 1/2-13 hex nut, (F) bearing.



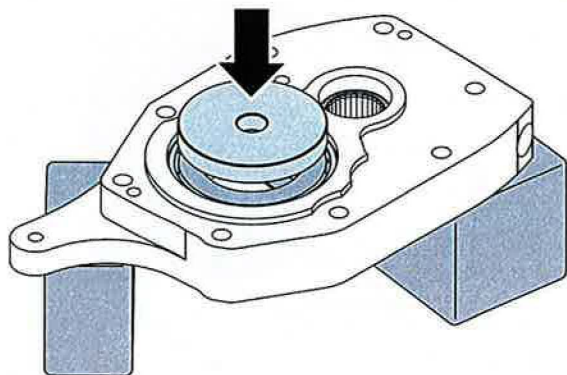
3. Remove the C/S bearing by assembling the bearing remover insert (82), bearing remover cup (83), ball thrust bearing (86), 1/2-13 x 4" long hex bolt (85) and 1/2-13 hex nut (88) through bearing. Tighten remover insert outward, holding nut behind cup until bearing slides out.

MAIN DRIVE GEAR AND BEARING REMOVAL FROM BEARING DOOR

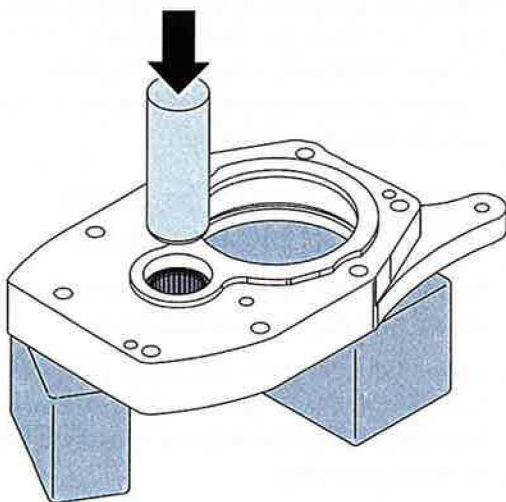
1. Remove pulley spacer (15), quad seal (14) and oil seal (13) from bearing door.
2. Use a hydraulic press and metal press blocks to support the bearing door. Press the main drive gear out of the bearing door with the installer plate (91).



3. Remove the main bearing snap ring.
4. Use a hydraulic press and metal press blocks to support the bearing door. Press the main bearing out of the bearing door with the installer plate (91).

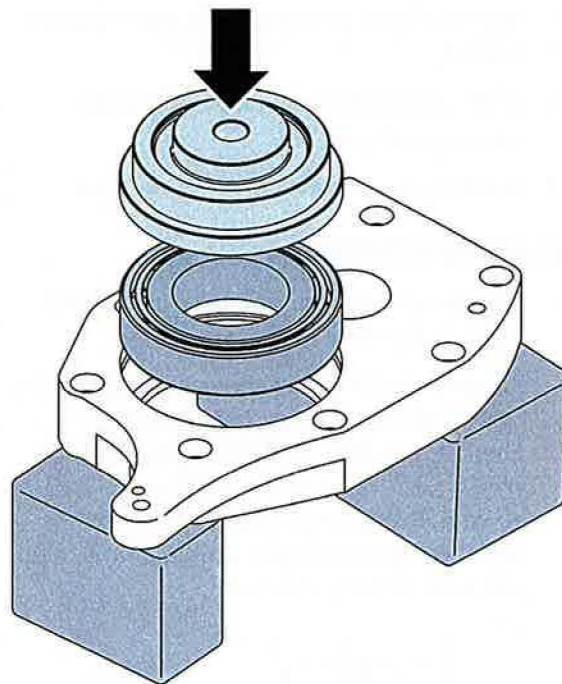


5. Support bearing door with metal press blocks. Press C/S bearing from bearing door using an appropriate size plug.

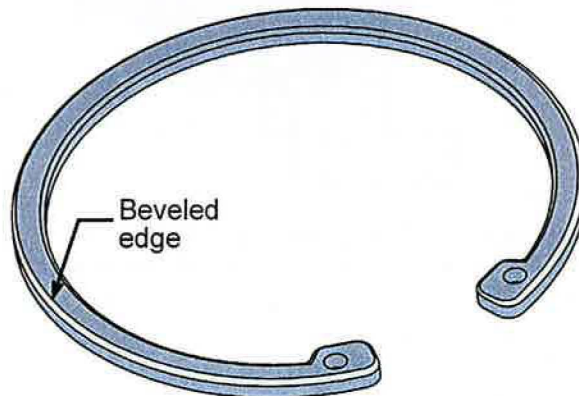


MAIN DRIVE GEAR AND BEARING INSTALLATION

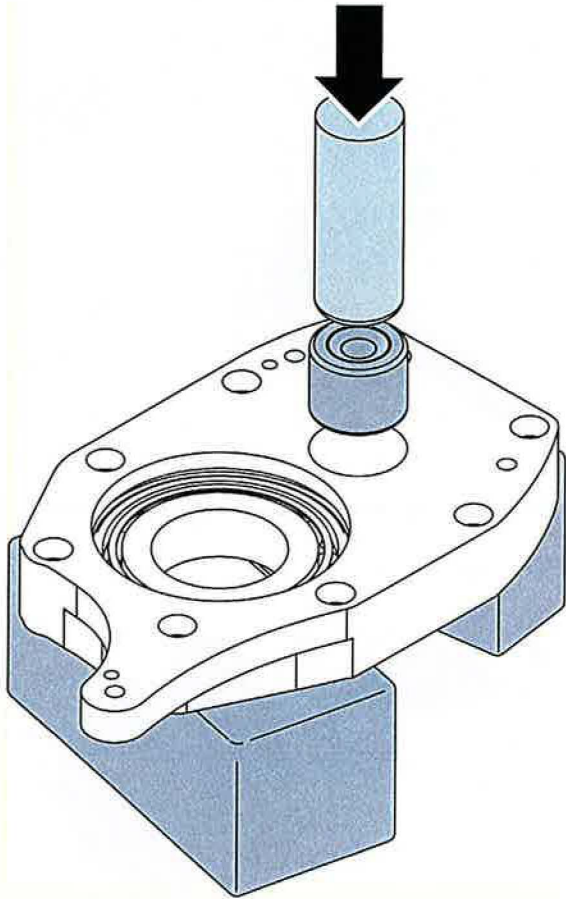
1. Use a hydraulic press and metal press blocks to support the bearing door. Use the main bearing installer (89) to press the main bearing into the bearing door until fully seated. Install main bearing snap ring with the beveled edge of snap ring facing out.



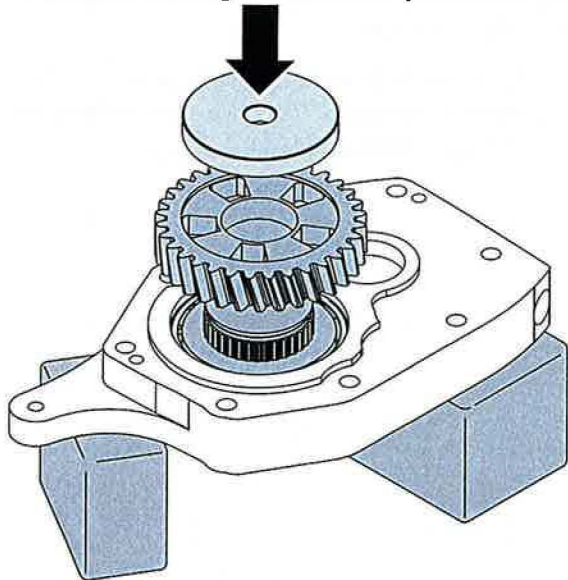
2. Support the bearing door in a hydraulic press using metal press blocks. Press C/S bearing into the bearing door until flush, using an appropriate size plug.



3. Install snap ring with beveled edge facing towards primary. Ensure snap ring is fully seated in groove.



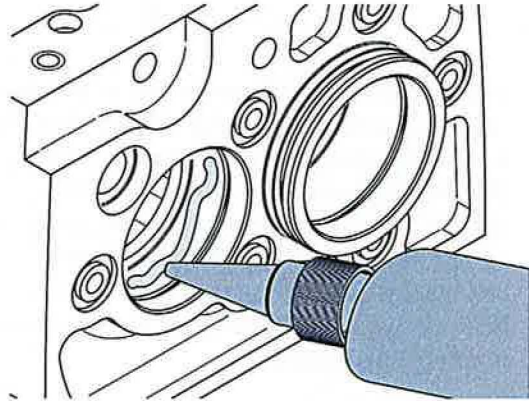
4. Support the bearing door in a hydraulic press using metal press blocks. Use the installer plate (91) to press the main gear into the bearing door until fully seated.



5. Install the quad seal (14). **It is important that the seal is not twisted, and is in full contact with the bearing surface.**
6. Install the oil seal (13).
7. Install the pulley spacer (15) (chamfered edge of pulley spacer faces in).

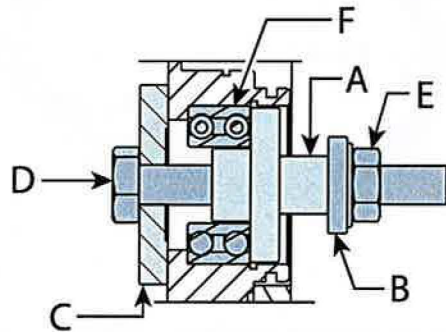
BEARING INSTALLATION

1. Apply a thin bead of Loctite 620 to bearing surface in transmission case as shown.

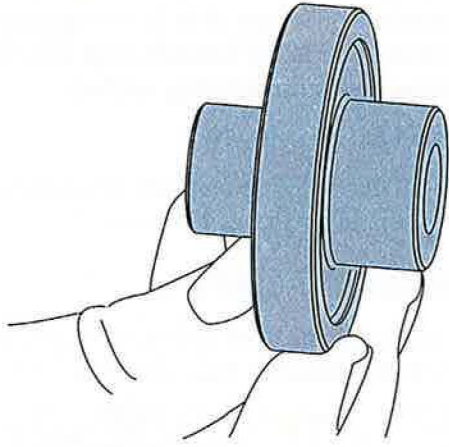


2. Install the M/S bearing by assembling the bearing installer (92), installer plate (91), ball thrust bearing (86), 1/2-14 x 5" long hex bolt (84) and 1/2-13 hex nut (88) through bearing. Tighten hex nut against bearing installer, holding hex bolt against installer plate, until bearing is completely seated.

NOTE: The larger bearing installer diameter is for use with M/S bearing and the smaller bearing installer diameter is for use with C/S bearing.



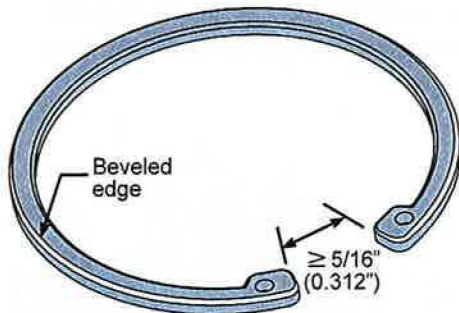
(A) M/S & C/S bearing installer, (B) ball thrust bearing, (C) installer plate, (D) 1/2-13 hex bolt, (E) 1/2-13 hex nut (F) bearing.



3. Apply a thin bead of Loctite 620 to bearing surface in transmission case. Install the C/S bearing by assembling the bearing installer (92), installer plate (1), ball thrust bearing (86), 1/2-13 x 5" long hex bolt (84) and 1/2-13 hex nut (88) through bearing. Tighten hex nut against bearing installer, holding hex bolt against installer plate, until bearing is completely seated.

NOTE: The smaller bearing installer diameter is for use with C/S bearing and the larger bearing installer diameter is for use with M/S bearing.

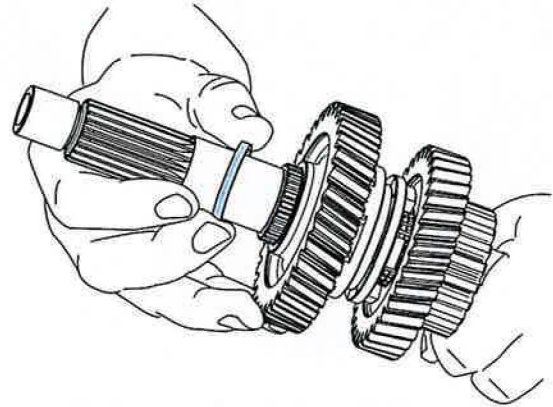
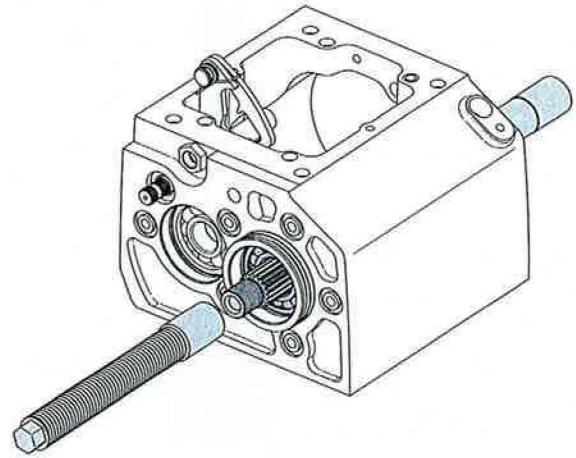
4. Install both snap rings that retain the M/S and C/S bearings. The beveled edge of the snap rings should face towards the primary. Once installed, a 5/16" gap should exist between the snap ring ends.



Typical.

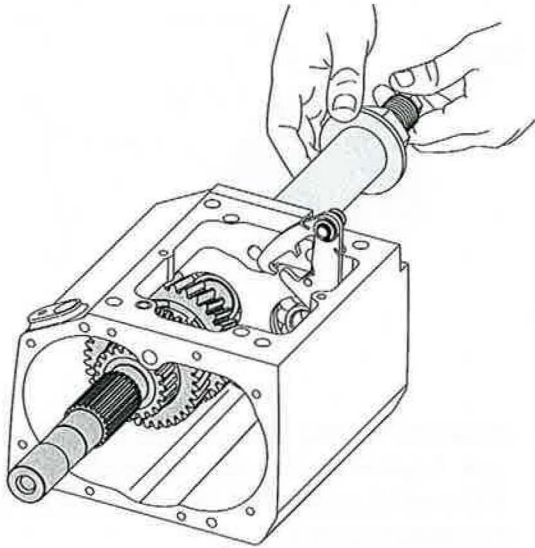
GEAR CLUSTER INSTALLATION

1. Slide the mainshaft through the new M/S bearing. Thread M/S installer tool (101) onto the end of the mainshaft.

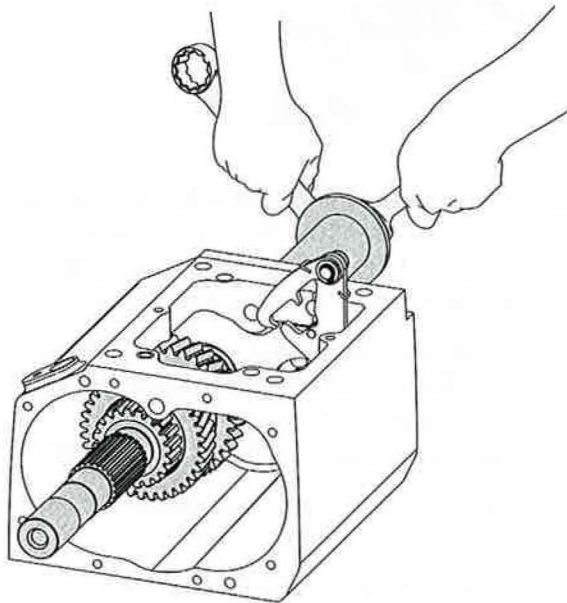


NOTE: Before installation of the M/S apply a small amount of grease to the M/S shaft spacer (64) to prevent its falling off the M/S, causing assembly problems.

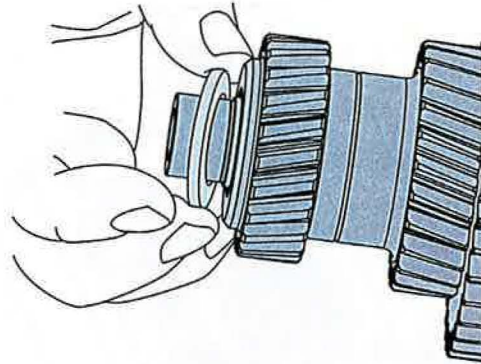
2. Place the M/S installer tube (102), 7/8" flat washer (103) and 7/8-9 hex nut (104) on the M/S installer tool (101).



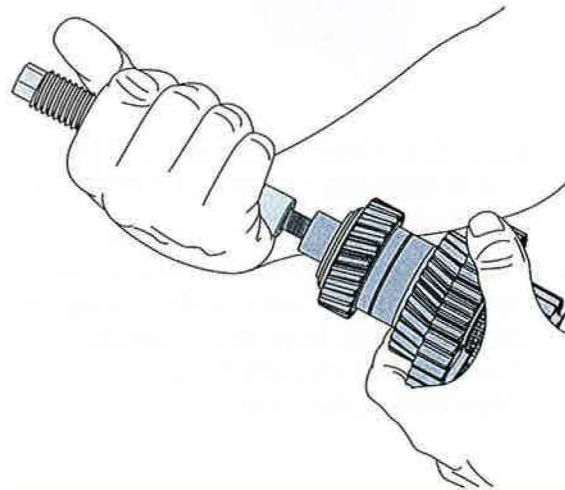
3. Pull the M/S through the new bearing by tightening the M/S installer while holding the hex nut in place. Make sure that the shaft spacer does not slip from the larger diameter surface and remains in contact with the 5th gear M/S while pulling the mainshaft through the bearing.

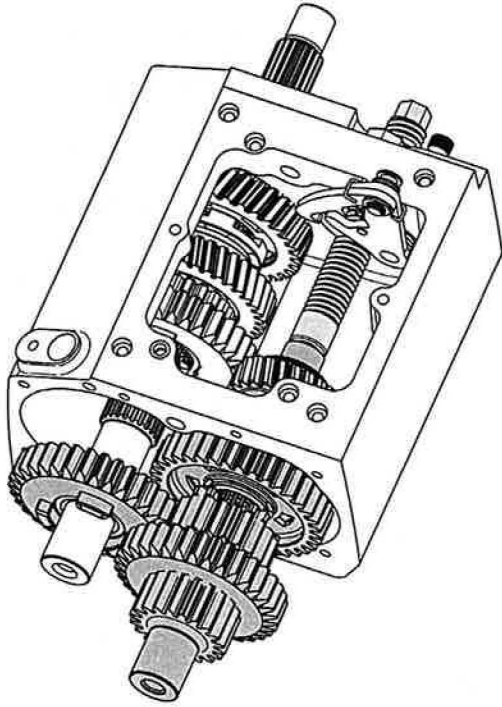


NOTE: Before installation of the C/S apply a small amount of grease to the thrust washer (73) to prevent its falling off the C/S, causing assembly problems.

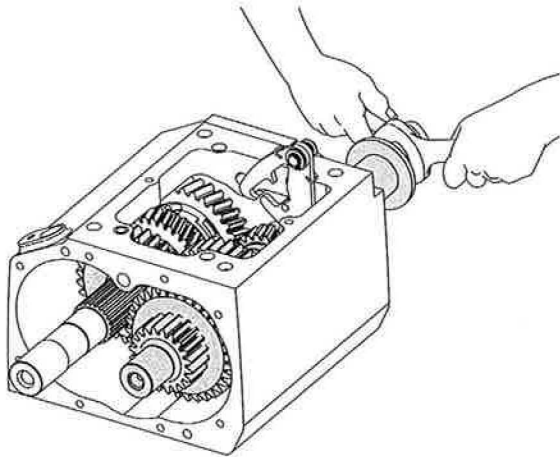


4. Thread the C/S puller (105) onto the end of the countershaft. Slide the countershaft through the new C/C bearing, making sure the teeth between shafts are engaging properly. Install 3rd gear M/S at the same time.





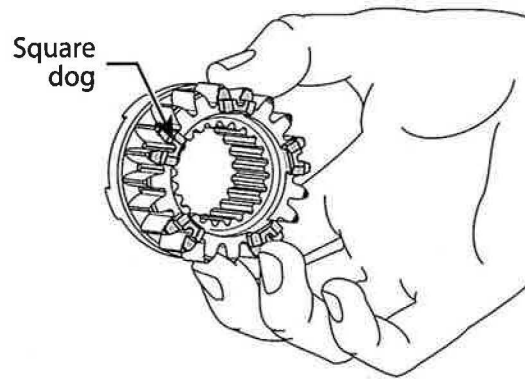
5. Place the C/S puller tube (106), 3/4" flat washer (107) and 3/4-10 hex nut (108) on the C/S puller tool (105).
6. Pull the C/S through the new bearing by tightening the C/S puller while holding the hex nut in place. Start the pull slowly, checking tooth engagement and proper thrust washer placement.



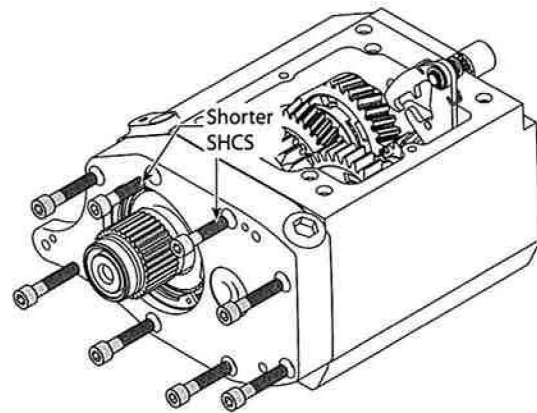
7. Install thrust washer and **new** retaining ring on 3rd gear M/S.

NOTE: Install with a **new** retaining ring.

8. Install 2nd gear on M/S. Make sure square dogs are to the outside and rounded dogs to the inside.



9. Install the bearing door with the main drive gear. Tighten bearing door screws to 16 ft•lbs with Loctite 2440. Note location of the two shorter screws.

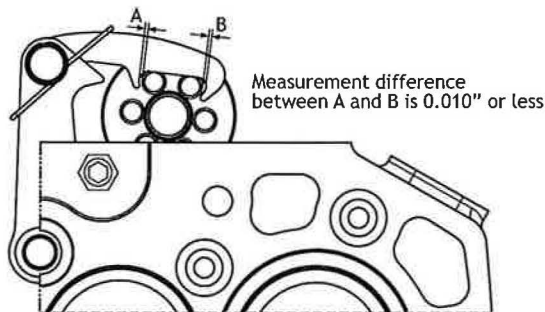


10. Apply Loctite 2760 to both the internal, and screw threads of the flat head retaining screw (37). Install retaining washer (38) and retaining screw (37). Tighten to 37 ft•lbs.
11. Install new countershaft seal (7) flush with case. Take care to not deform seal. If center area of seal is deformed inward during installation, remove, discard and replace.
12. Install the shim and O-ring on the left side M/S.
13. Install M/S seal on the left side of transmission.
14. Install shift forks and shift drum. Tighten to 9 ft•lbs with Loctite 2440.
15. Adjust shifter pawl.

SHIFTER PAWL ADJUSTMENT

1. Shifter pawl adjustment is visual. Top cover (1) must be removed and lock nut (60) loosened for adjustment.

2. Lift rear wheel.
3. Shift transmission into 3rd gear.
4. Loosen lock nut (60).



Typical

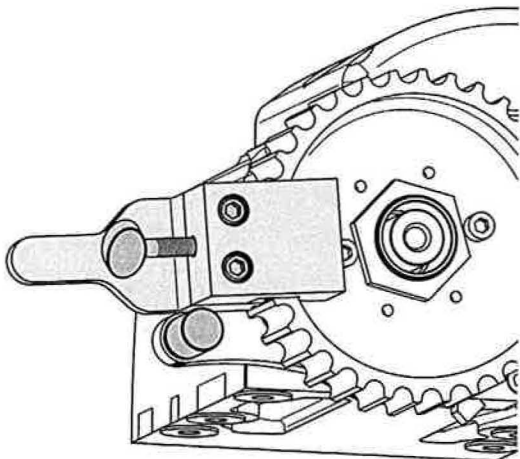
5. Position the shift pawl eccentric adjuster cam (59) at the approximate eleven o'clock position to obtain equal distance from shift lever center.

NOTE: Do not apply pressure to the spring.
Lifting the arm too high will damage the spring and prevent accurate adjustment.

6. Tighten lock nut (60).
7. Install top cover (1) with a new gasket (3).
8. Apply Loctite 2440 to the threads of the top cover screws (2) and tighten to 9 ft•lbs.

PULLEY INSTALLATION

1. Use the pulley lock and install front pulley nut (17). Apply Loctite 2760 and tighten to 60 ft•lbs, plus additional 35-45 degrees.



2. Install the two pulley nut retaining screws (18) and tighten to 9 ft•lbs with Loctite 2440.

3. Install transmission top cover and tighten screws to 9 ft•lbs with Loctite 2440.
4. Install front pulley cover and tighten cover screws to 20 ft•lbs with Loctite 2440.
5. Install inner and outer primary assembly (see **Chapter 9, Clutch/Primary**).
6. Install clutch pushrod and adjust clutch.
7. Install drain plug (20). Apply a Teflon tape or sealing compound to plug threads.
8. Add primary and transmission fluids (32 ounces of primary fluid and 22-24 ounces of transmission fluid).
9. Install front pulley cover.
10. Adjust rear axle alignment and belt tension (see **Chapter 6, Alignment**).
11. Install exhaust system (see **Chapter 11, Exhaust**).

TRANSMISSION CASE REMOVAL

NOTE: if it becomes necessary to remove the transmission case from the frame, perform the following:

1. Drain transmission fluid. Drain plug is located at bottom center of transmission trap door.
2. Remove exhaust, primary drive cover and pulley cover. Adjust the rear wheel forward to relieve tension on the drive belt. Remove final drive belt from front pulley.
3. Disconnect the neutral switch (5) from the transmission and remove the speed sensor (41).
4. Remove shift linkage from shift arm.
5. Remove the six mounting screws (6) from the underside of the transmission mounting plate.

NOTE: Keep track of any transmission shims and their locations for reinstallation of transmission in frame.

6. Remove transmission from the frame.

CAUTION: EACH TIME THE LEFT SIDE TRANSMISSION FACE IS EXPOSED, INSPECT COUNTERSHAFT SEAL (7). IF SEAL IS NOT FLUSH WITH CASE, OR IF

SEAL SURFACE IS BELOW OR BEYOND
FLUSH WITH CASE, REMOVE AND
DISCARD. TO AVOID DAMAGE TO THE
BEARING, PUNCH A HOLE IN THE
CENTER OF THE SEAL (7) AND REMOVE.

7. Installation is reverse of removal.