GROUP 2 TRANSMISSION

1. STRUCTURE AND WORKING PRINCIPLE OF TRANSMISSION

As illustrated in the page 2-3, figure 1, the transmission consists of transmission housing (1), large end cover (2), reverse shaft assembly (3), input shaft assembly (5), countershaft assembly (6), output shaft (8), range gear sleeve (9) and shoe brake (12).

A hydraulic clutch is attached each to reverse shaft assembly (3), input shaft assembly (5) and countershaft assembly (6).

As illustrated in figure 2, a hydraulic clutch consists of clutch driving shaft (1), clutch housing (2), piston (3), exterior friction plate (4), interior friction plate (5), return spring (6) and clutch emptying valve (7). When flow of hydraulic oil enters head end of cylinder, piston is pushed to move forward pressing drive and driven friction plate to make driving shaft and gear to rotate, cut off hydraulic oil, and thus clutch emptying valve opens automatically to press spring (6) to return.

As illustrated in figure 2, the hydraulic clutch consists of 6 clutch drive plates and 5 driven plates. The driven plate has a 0.5 mm crown and the crown side should face piston. Gap-clearance of piston ring should be ground and its width within 0.05~0.1 mm.

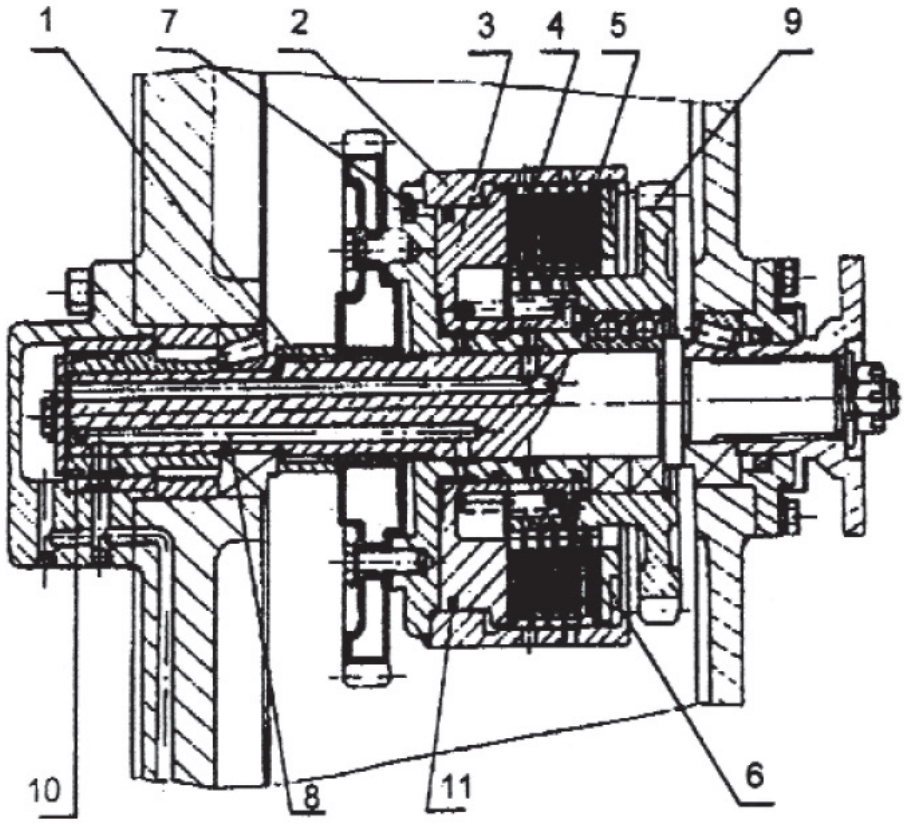


Figure 2 Structure of hydraulic clutch

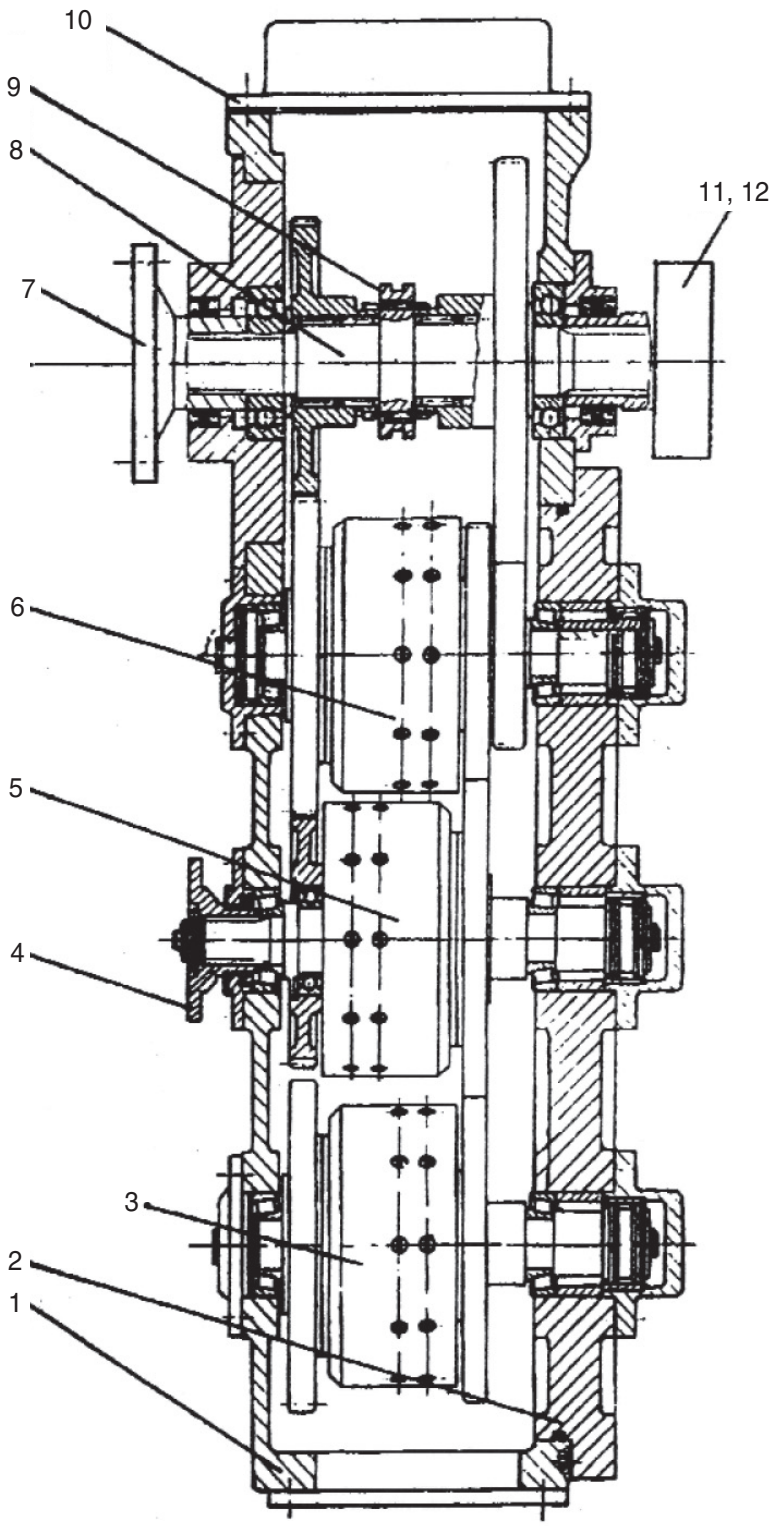


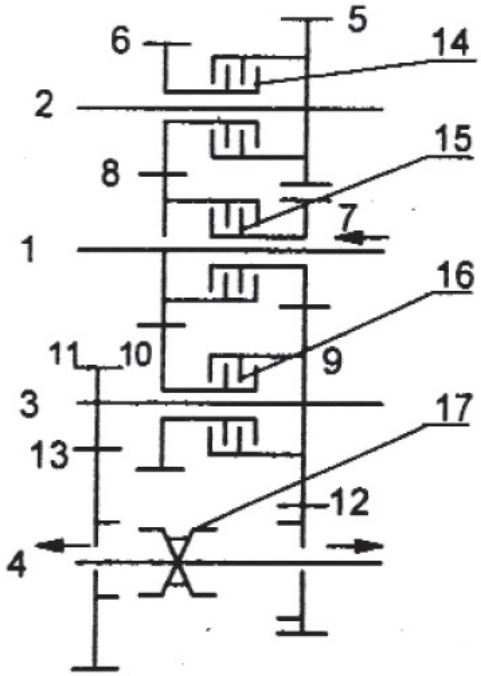
Figure 1 Structure of transmission

1	Transmission housing	5	Input shaft assembly	9	Range gear sleeve
2	Large end cover	6	Countershaft assembly	10	Oil tray
3	Reverse shaft assembly	7	Rear output flange	11	Front output flange
4	Input shaft flange	8	Output shaft	12	Shoe brake

2. WORKING OF TRANSMISSION

As enumerated in figure 3, the transmission route is as follows:

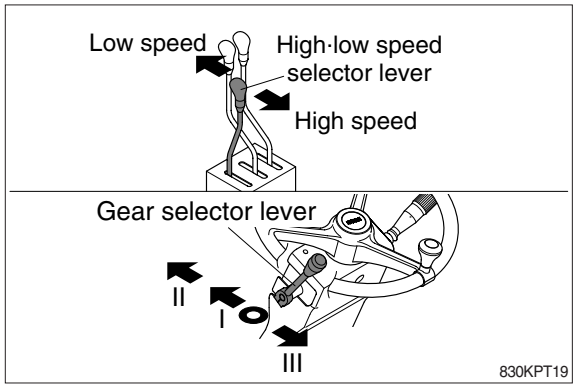
Forward gear Ⅰ transmission route : 1 - 15 - 7 - 9 - 3 - 11 - 13 - 17 - 4
Forward gear Ⅱ transmission route : 1 - 8 - 10 - 16 - 3 - 11 - 13 - 17 - 4
Forward gear Ⅲ transmission route : 1 - 15 - 7 - 9 - 12 - 17 - 4
Forward gear Ⅳ transmission route : 1 - 8 - 10 - 9 - 12 - 17 - 4
Reverse gear Ⅰ transmission route : 1 - 8 - 6 - 14 - 2 - 5 - 9 - 3 - 11-13 - 17 - 4
Reverse gear Ⅱ transmission route : 1 - 8 - 6 - 14 - 2 - 5 - 9 - 12 - 17 - 4



1 Input shaft
2 Rear gear shaft
3 Countershaft
4 Output shaft
5 Reverse shaft gear wheel
6 Reverse gear pinion
7 First & third gear input shaft
8 Second & forth gear input gear
9 First & third gear countershaft
10 Second & forth gear countershaft
11 Low gear countershaft
12 High gear output shaft
13 Low gear output shaft
14 Reverse gear clutch III
15 First & second gear clutch I
16 Second & forth gear clutch II
17 High & Low gear sliding sleeve

Figure 3 Working of transmission

Gear \ Lever	Gear selector lever Ⅰ	Ⅱ	Ⅲ	High·low speed selector lever
Forward 1	●			Low speed
2		●		F
3	●			High speed
4		●		R
Reverse 1			●	F
2			●	R



3. TECHNICAL DATA

Max. input speed	2500 rpm
Max. input torque	91.4 kgf · m (661 lbf · ft)
Max. input power	82 kW
Type of transmission housing	Countershaft, constant mesh, hydraulic fork
Transmission ratio Forward gear 1	3.82
gear 2	2.08
gear 3	1.09
gear 4	0.59
Reverse gear 1	3.05
gear 2	0.87

Oil for transmission	AFT (DEXRON Ⅲ)
Oil pump	CB32 (no in transmission box)
Operating pressure	1.4 ~ 1.6 MPa
Allowable oil temperature of oil tray	100˚C
Operating pressure of brake relief valve	>0.55 MPa

4. WORKING AND CONSTRUCTION OF HYDRAULIC OPERATING SYSTEM

Working of hydraulic operating system is as illustrated in figure 4. The right half of double dot dash line is torque converter while the left half incorporates transmission control valve, hydraulic cylinder (clutch), filter and tank (including a tank and a tray).

When charging pump of torque converter runs, pump (2) is driven by driving gear, sucking oil from tank to output hydraulic oil, which enters combined valve of torque converter. Combined valve block of torque converter consists of a reducing valve (3) and an overflow valve (4). The flow that enters the combined valve will ensure supply in priority for transmission control by reducing valve (3) and then for torque converter via reducing valve.

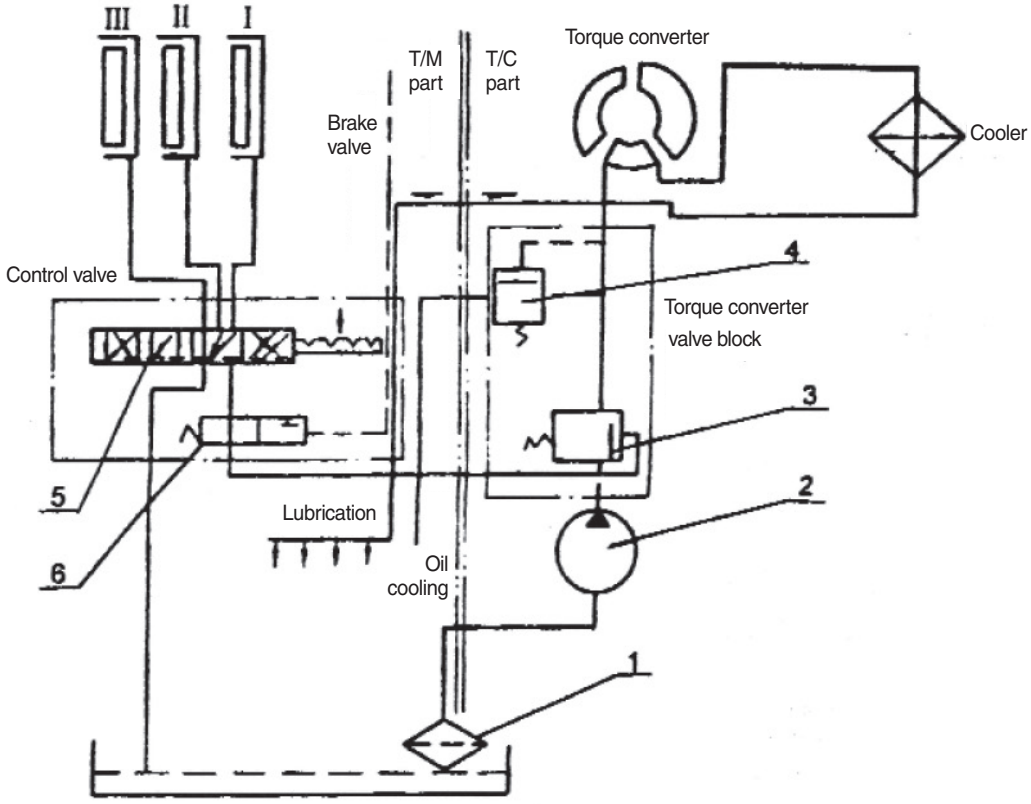


Figure 4 Schematic diagram of oil system

1 Suction filtering device
2 Transmission pump
3 Transmission pressure valve
4 Overflow valve
5 Transmission control valve
6 Brake relief valve

Transmission oil pressure and inlet oil pressure of torque converter are controlled by reducing valve (3) and overflow valve (4) respectively. Set pressure of reducing valve is 1.4~1.6 MPa while that of overflow valve is 0.5~0.65 MPa. When inlet pressure of torque converter becomes higher than the set value of overflow valve (4), the valve opens to overflow spray oil for transmission. The flow from outlet is directed to transmission lubricating system after cooling. High pressure oil delivered from pump is controlled to 1.4~1.6 MPa by reducing valve, which then enters transmission control valve (5) via brake relief valve (6) to control gear shift clutch.

5. TRANSMISSION CONTROL VALVE

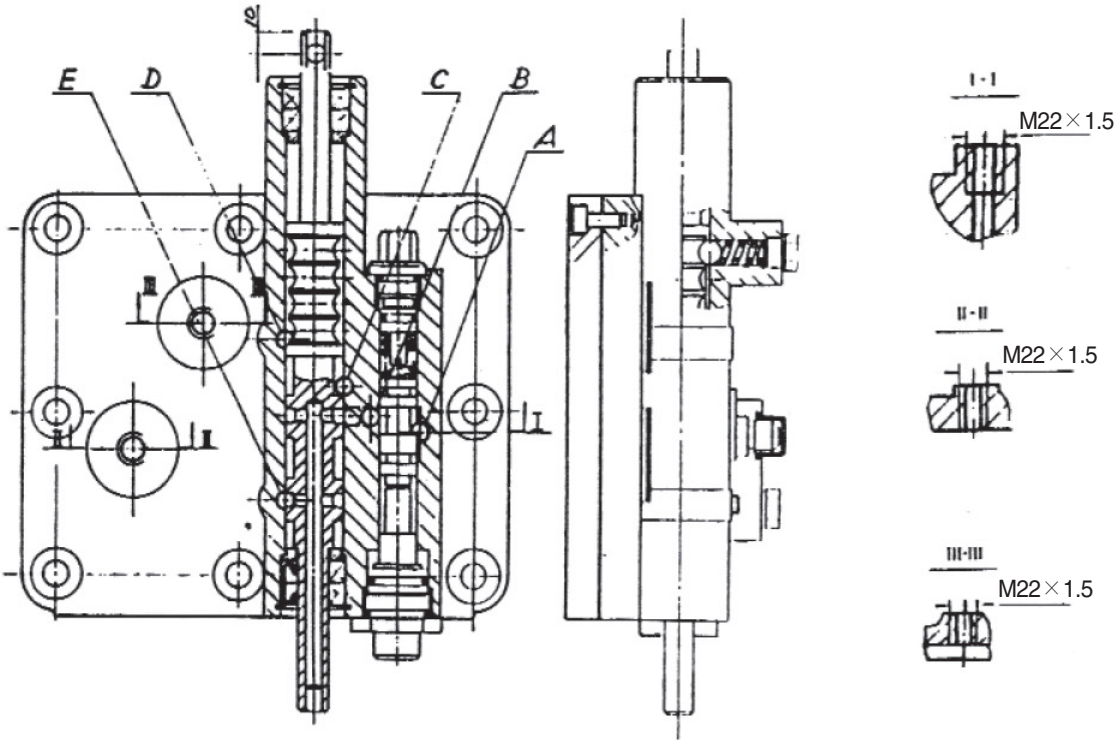


Figure 5 Transmission control valve assembly

Transmission control valve includes brake relief valve and transmission control valve. Orifice A on the valve body is connected to combined valve of transmission. When transmission valve spool moves, oil under pressure from combined valve of torque converter can flow into orifice C, D or E (C for clutch Ⅰ, D for clutch Ⅱ, E for clutch Ⅲ) to go forth or back for shift. Screw PT1/8" at E on the top of valve body is for connection of output to reverse gear.

When the brake pedal is pressed down, compressed air from the brake master cylinder has an air passage for brake valve spool to push the spool rod, cutting operating oil way (A and B is not connected). At the time, transmission is in neutral to ensure reliable braking.

6. MOUNTING

Mount the transmission housing on the frame and fix with bolts. For mounting size, refer to the page 2-12.

1) CONNECTION

Input flange of transmission is connected with torque converter by driving shaft. Front and rear flange of transmission is connected to driving shaft and front & rear axle respectively.

5 connections of transmission control valve are :

(1) Mounting sizes of transmission control valve lever are as illustrated in the figure 5. After the lever is pulled to the most outside gear, Neutral, gear I and gear II are gained in order by moving inside. The sizes are Lmax=51 mm, Lmin=15 mm and stroke per gear = 12 mm.

(2) Connection screw on the end of brake control valve is connected to the air pipe of brake master cylinder.

(3) Inlet for transmission control is located in Ⅰ-Ⅰ as illustrated in figure 5.

(4) Inlet for spray oil of transmission is located in Ⅱ-Ⅱ.

(5) Inlet for cooling transmission is located in Ⅲ-Ⅲ. (3) and (4) is connected to each correct port on combined valve of torque converter. (5) is connected to oil outlet of radiator.

For positions of shift rod of range gear, see attached figure 1. There are three gears. The outside is high gear, the inside low gear, stroke between two adjacent gears is 15 mm. Connection sizes of handle are illustrated in figure 6.

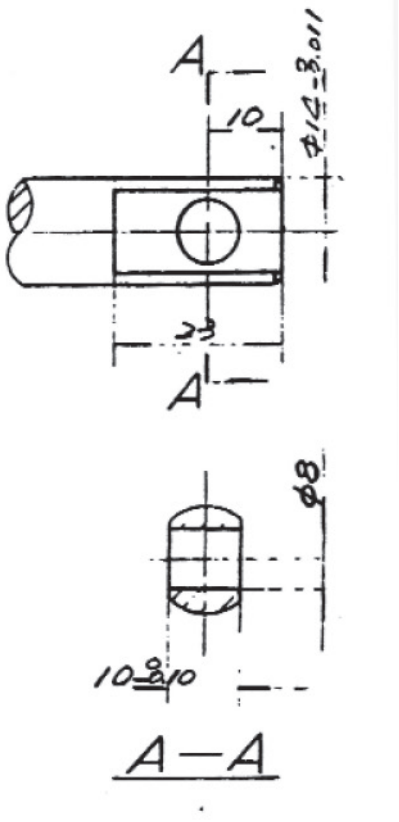


Figure 6

2) USING

After mounting the transmission on the frame, add AFT (DEXRON Ⅲ) for about 40 liter from the filler and, 5 minutes after starting the engine, check the oil level for specified position on scale. After each shift work, it's required to check the oil level of transmission.

During operation of transmission, be careful to check that its operating pressure is within 1.4~1.6 MPa, oil temperature at outlet of torque converter doesn't exceed 105˚C, and 115˚C in short time, and that in the oil tray of transmission doesn't exceed 100˚C.

Run in the transmission 12 hours after mounting on the frame, each 2 hours for 6 gears. The load in run-in period should not exceed 70% of the rated value, and frequently check oil temperature, oil level and tightness of bolts. After completion of run-in, clean the oil tray of transmission and oil-filter strainer, and renew oil.

Moving into reverse gear from a forward gear, into a forward gear from reverse gear, or moving between high and low gears must be conducted after parking.

Gear 1 and 2, or gear 3 and 4 can be changed with each other during travel.

7. MAINTENANCE AND TROUBLESHOOTING

1) MAINTENANCE

Maintenance is carried out after running for 10, 50, 250, 500,1000 and 2000 hours.

(1) 10 hours maintenance

① Check oil level in transmission.
② Check transmission for normal operation and driving gear for noise.
③ Check the bolts and nuts for good tightness and check for oil leaks.

(2) 250 hours maintenance

① Inspect operation and noise of transmission.
② Clean the filter.

(3) 500 hours maintenance

① Renew oil.

(4) 1000 hours maintenance

① Replace oil filter.

(5) 2000 hours maintenance

① Inspect operation, input power, noise, oil temperature, oil leaks, etc.
② Clean air vent caps, fasten up screws and pipe fittings.

2) TROUBLESHOOTING

Problem	Cause	Remedy
Too low oil pressure or zero	1. Transmission gear pump does not supply oil	Repair.
	2. Failed reducing valve of torque converter.	Repair.
	3. Stuck brake valve.	Repair.
	4. Oil leaks in oil circuit.	Repair.
	5. Failed piston packing of clutch.	Service and repair.
	6. Failed O-ring of transmission valve.	Replace.
	7. Seal ring is failed.	Replace.
	8. Emptying valve for clutch has fallen off.	Check and repair.
Too high oil pressure	1. Malfunction in overflow valve for torque converter.	Repair.
	2. Clogged oil circuit.	Clean.
	3. Incorrect oil is used.	Renew oil.
Too high oil temperature	1. Clogged oil cooler.	Clean.
	2. Water has gotten into the oil circuit.	Renew oil.
	3. Insufficient oil amount.	Replenish oil.
	4. Incorrect gear selection in operation.	Change to low gear.
	5. Hand brake can not be normally released or braking drag.	Adjust.
	6. Clutch friction plate can not be separated completely.	Replace.
Engine runs but vehicle will not move	1. Insufficient oil.	See “Too low oil pressure trouble”.
	2. Incorrect range gear selector fork position.	Reengage gear.
	3. Brake spool has not response.	Check brake spool.
	4. Clutch friction plate collision.	Replace.
	5. Malfunction in control valve for transmission.	Repair.
Weak traction	1. Low oil pressure.	See “Too low oil pressure trouble”.
	2. Clutch friction plate can not be separated completely and dragging.	Repair.
	3. Insufficient oil supply.	Replenish oil.

3) NOTES IN REPAIR OPERATION

Following cares should be taken to reassemble the transmission after disassembly:

(1) Paper gasket and large end cover paper gasket must be of 0.5 ㎜, or too much axial clearance of bearing may be formed to lead to damaged gear.

(2) Adjustment of bearing clearance for input shaft, countershaft and reverse shaft.
Axial clearance must be readjusted when reassembling input shaft, countershaft and reverse shaft after disassembly. Perform adjustment as followings:

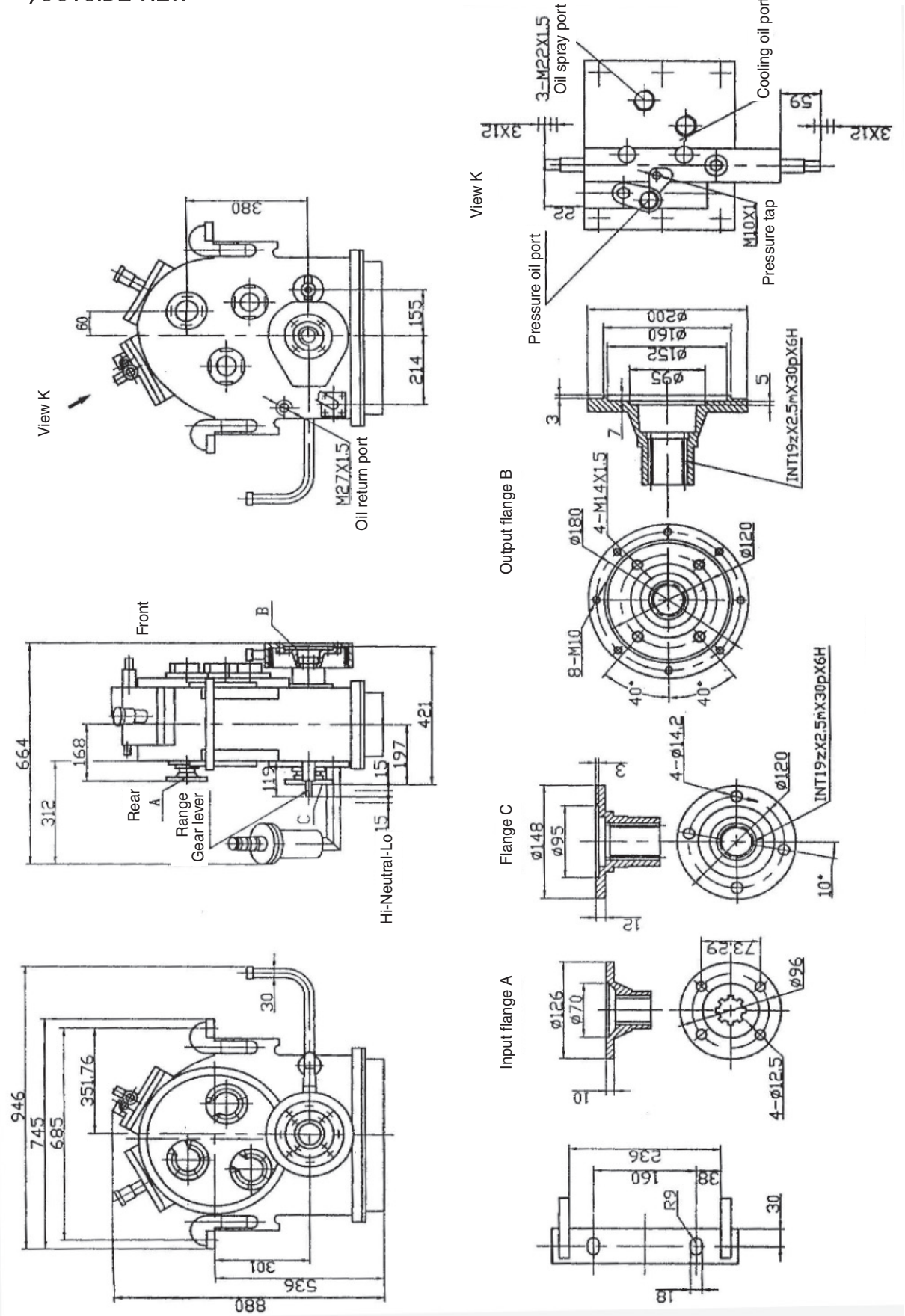
① If clearance of input shaft is too little, thickness of paper gasket may be increased or that of shaft bushing decreased.

② For adjustment of clearance for countershaft and reverse shaft, you may first loosen stop plate, and fasten adjusting screw, and then loosen a lock groove position (back for 0.125 ㎜ axial clearance) and lock up the lock plate.

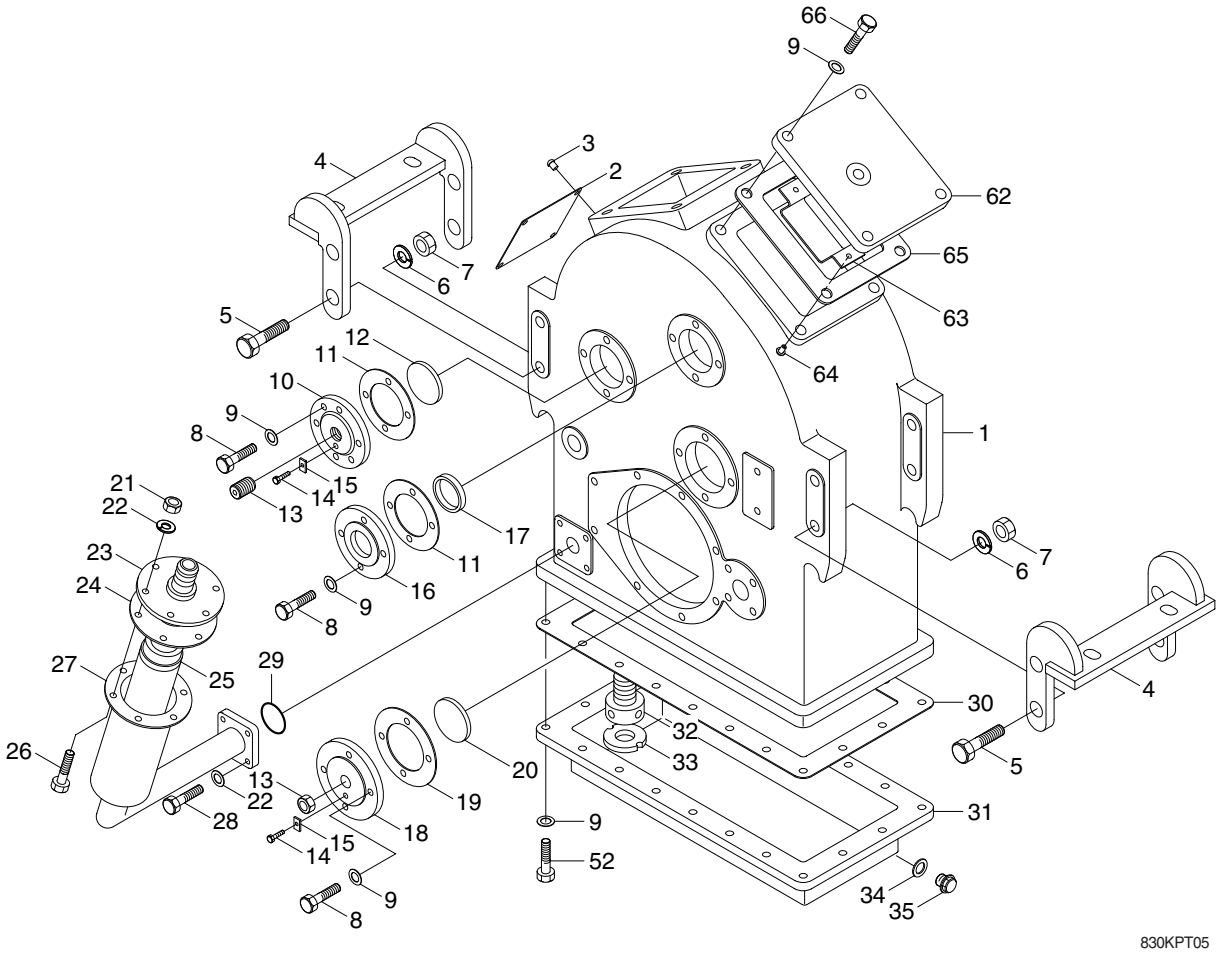
③ Normal axial play of input shaft, countershaft and reverse shaft
Normal axial play of input shaft, countershaft and reverse shaft should be 0.1~0.13 ㎜.

7. STRUCTURE

1) OUTSIDE VIEW



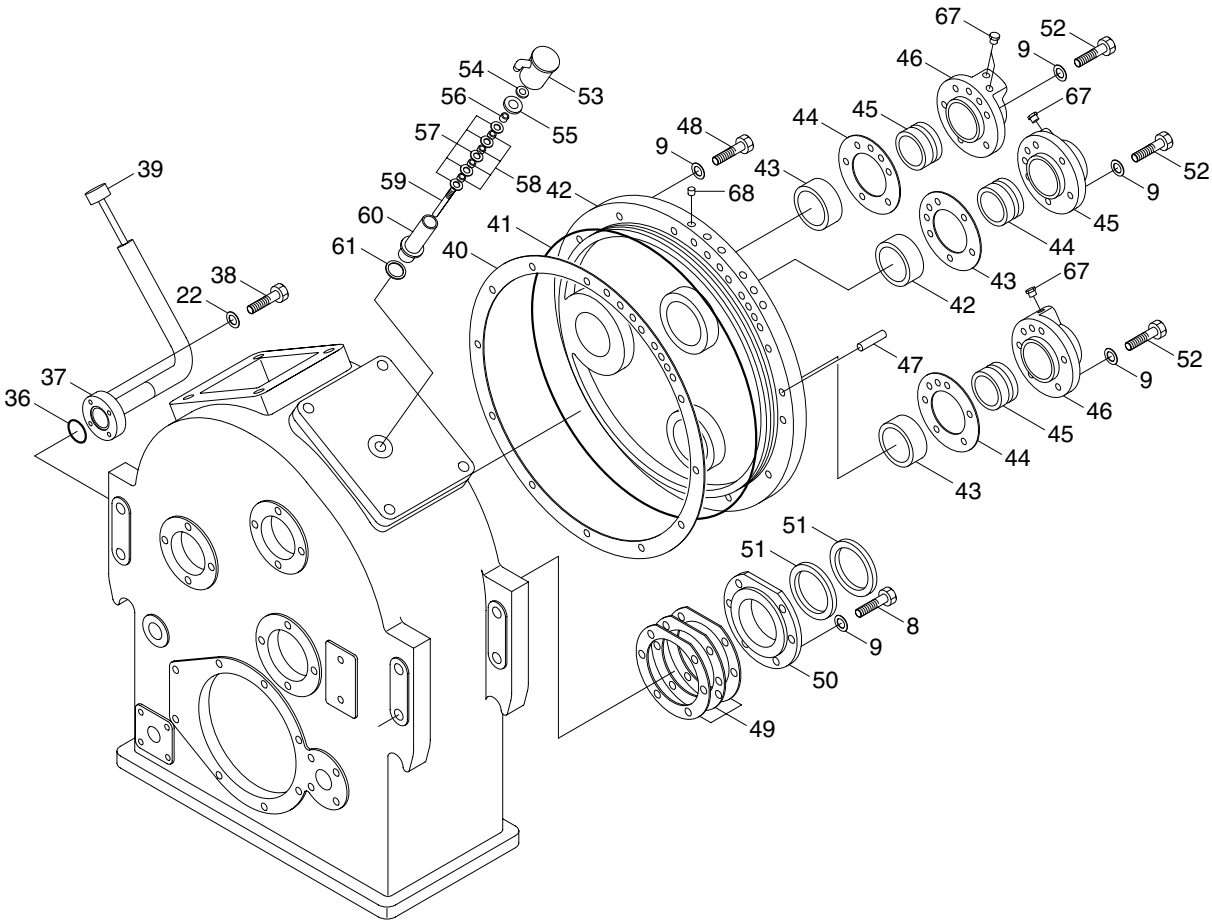
2) TRANSMISSION HOUSING (1/2)



830KPT05

1	Housing	15	Stop plate	29	O-ring
2	Name plate	16	Input shaft end cover	30	Gasket
3	Rivet	17	Seal	31	Sump
4	Bracket	18	Middle shaft end cover	32	Suction pipe
5	Hexagon bolt	19	Gasket	33	Magnetic
6	Spring washer	20	Regulating ring	34	Oring
7	Hexagon nut	21	Nut	35	Plug
8	Hexagon bolt	22	Washer	52	Hexagon bolt
9	Washer	23	Connector	62	Housing cover
10	End cover	24	Washer plate	63	Cover sheet
11	Gasket	25	Strainer core	64	Semi circular rivet
12	Regulating ring	26	Bolt	65	Gasket
13	Regulating screw	27	Flange joint	66	Hexagon bolt
14	Hexagon bolt	28	Hexagon bolt		

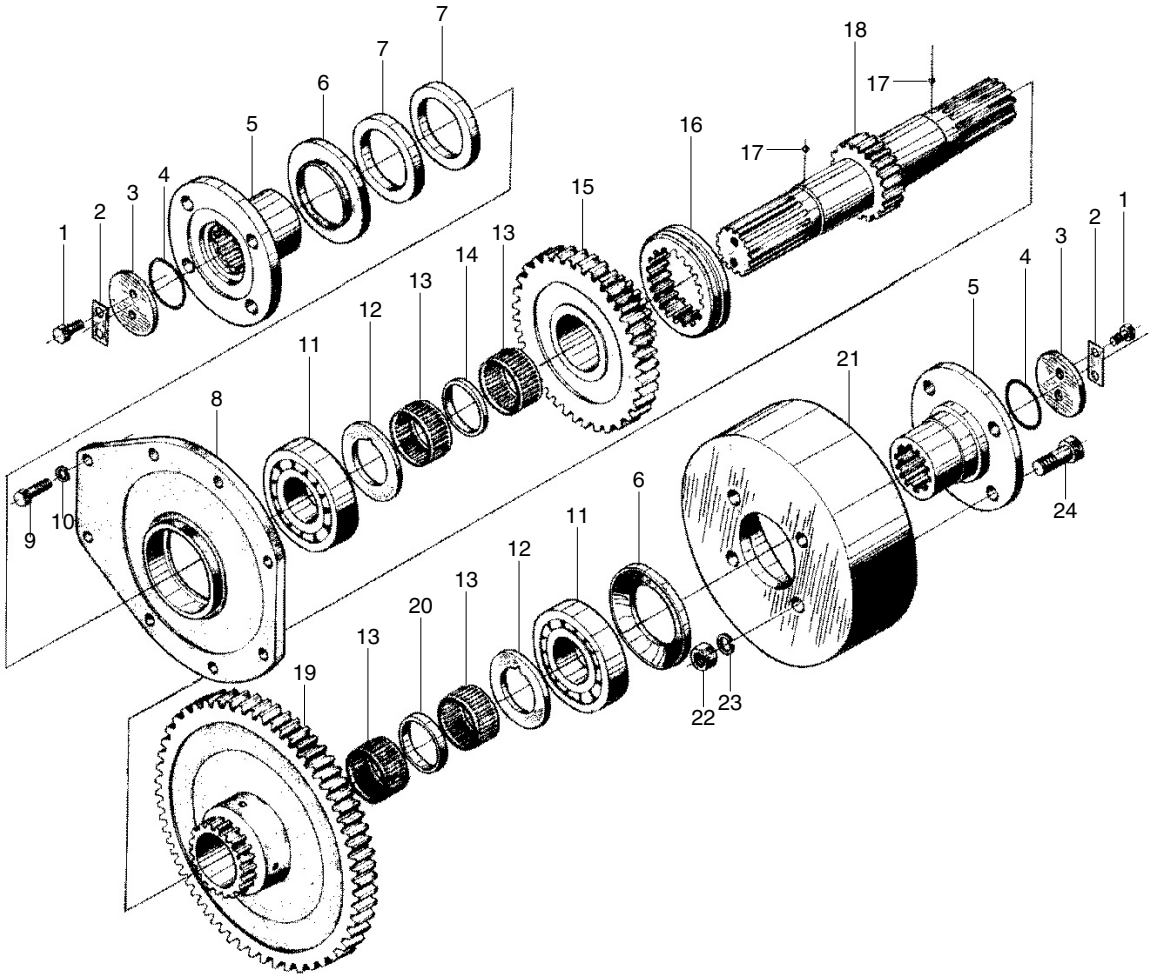
TRANSMISSION HOUSING (2/2)



830KPT06

8	Hexagon bolt	44	Washer	55	Vent plate
9	Washer	45	Bush	56	Sleeve
22	Washer	46	Input end cover	57	Plate
36	O-ring	47	Dowel pin	58	Sleeve
37	Pipe assy	48	Socket pin	59	Long screw
38	Hexagon bolt	49	Washer	60	Casing
39	Pipe & dipstick	50	Input sealing cover	61	Gasket
40	Seal	51	Input seal	67	Plug
41	O-ring	52	Hexagon bolt	68	Plug
42	Cover	53	Air vent		
43	Bush	54	Square nut		

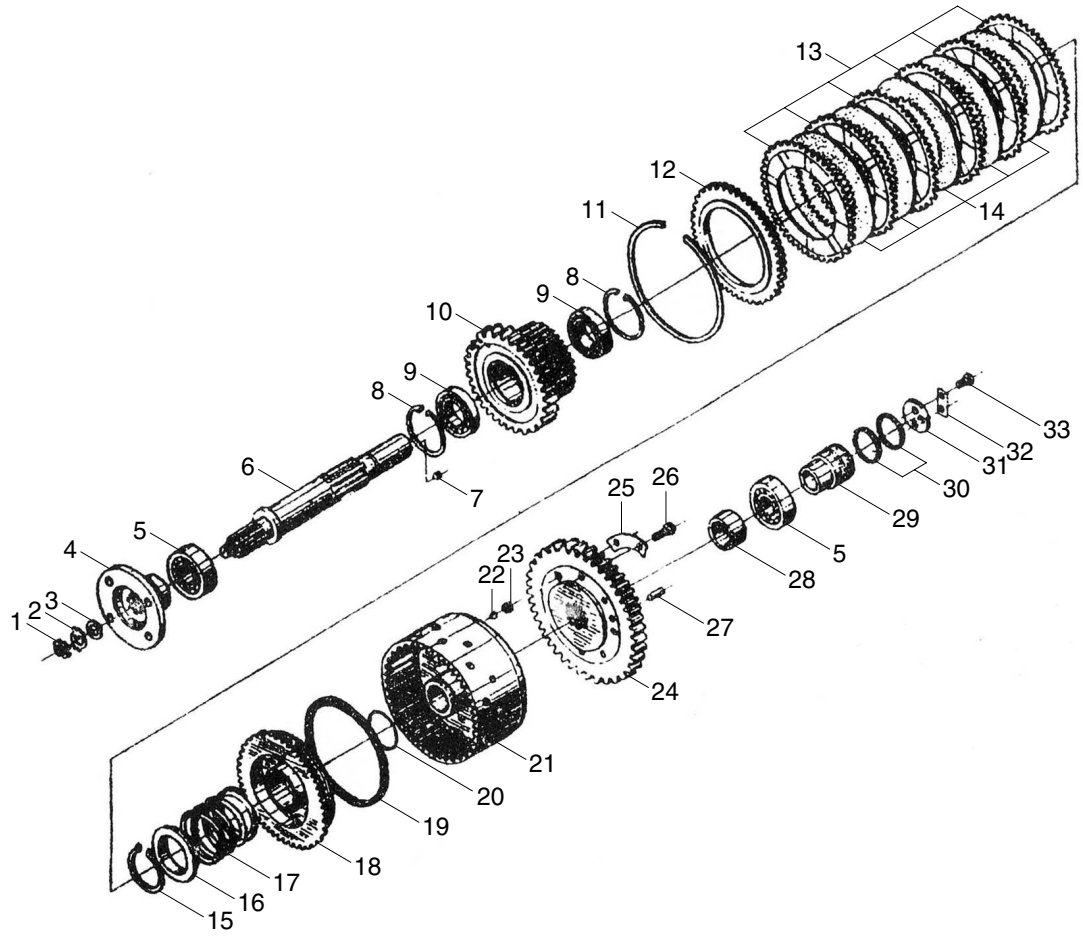
3) OUTPUT SHAFT



830KPT07

1	Hexagon bolt	9	Hexagon bolt	17	Steel ball
2	Stop pad	10	Washer	18	Output shaft
3	Pressure plate	11	Ball bearing	19	Output gear
4	O-ring	12	Thrust ring	20	Ring
5	Output flange	13	Sliding bearing	21	Brake drum
6	Dust cover	14	Ring	22	Nut
7	Seal output	15	Gear	23	Spring washer
8	Output rear end cover	16	High-low sliding sleeve	24	Bolt

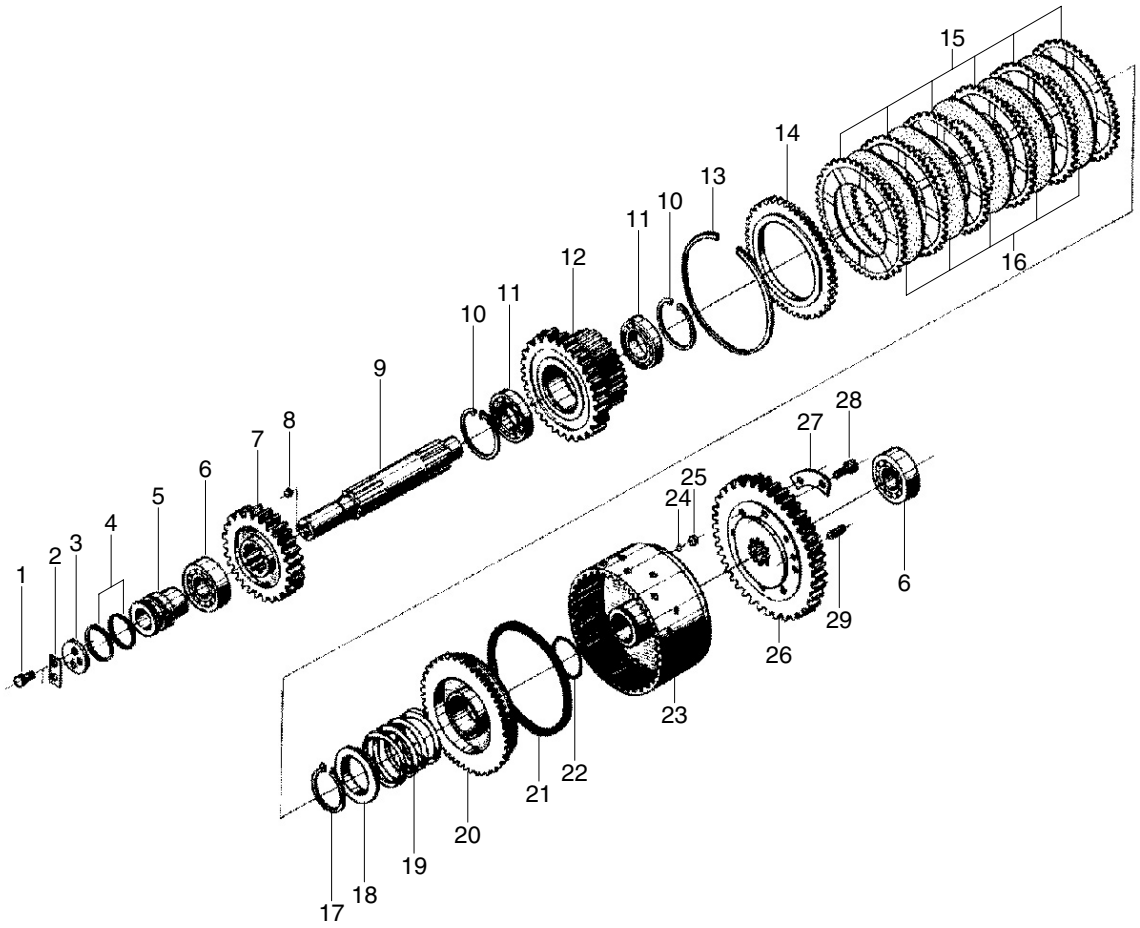
4) INTPUT SHAFT



830KPT08

1	Small ring nut	12	Outer end cover	23	Valve seat
2	Stop washer	13	External friction disc	24	Gear
3	Washer	14	Internal friction disc	25	Stop pad
4	Flange	15	Snap ring	26	Hexagon bolt
5	Taper roller bearing	16	Spring seat	27	Pin
6	Input shaft	17	Spring	28	Bush
7	Plug	18	Piston	29	Inner sealing sleeve
8	Hole ring	19	Sealing ring	30	Piston ring
9	Ball bearing	20	O - ring	31	Shaft end baffle
10	Gear	21	Clutch case assy	32	Stop pad
11	Snap ring	22	Steel ball	33	Hexagon bolt

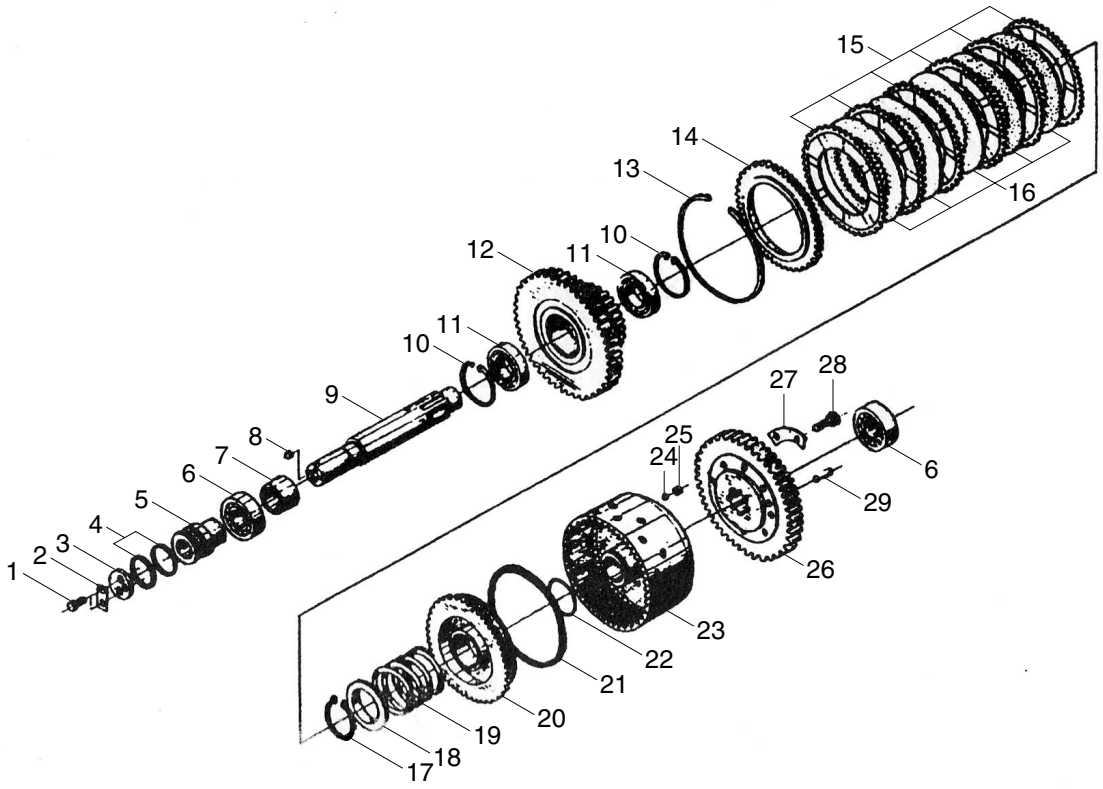
5) INTERMEDIATE SHAFT



830KPT09

1	Hexagon bolt	11	Ball bearing	21	Sealing ring
2	Stop pad	12	Gear	22	O-ring
3	Shaft end baffle	13	Snap ring	23	Clutch case assy
4	Piston ring	14	Outer end cover	24	Steel ball
5	Inner sealing sleeve	15	External friction disc	25	Valve seat
6	Roller bearing	16	Internal friction disc	26	Gear
7	Gear	17	Snap ring	27	Stop pad
8	Plug	18	Spring seat	28	Hexagon bolt
9	Intermediate shaft	19	Spring	29	Pin
10	Hole ring	20	Pistion		

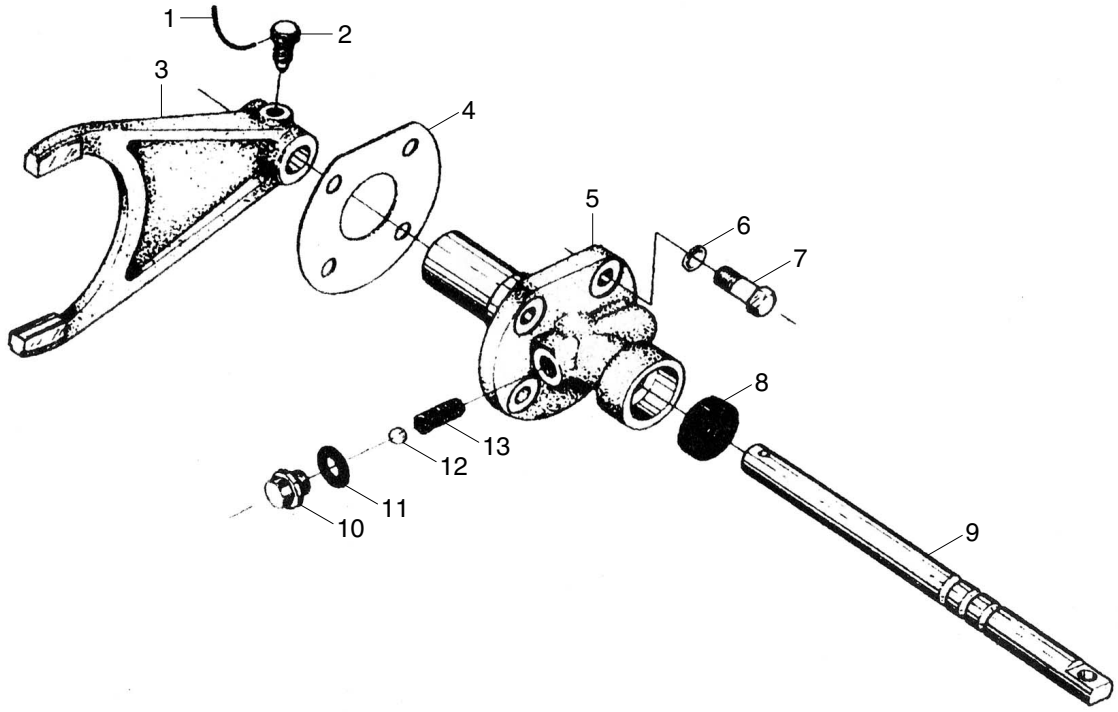
6) REVERSE SHAFT



830KPT10

1	Hexagon bolt	11	Ball bearing	21	Sealing ring
2	Stop pad	12	Gear	22	O-ring
3	Shaft end baffle	13	Snap ring	23	Clutch case aasy
4	Piston ring	14	Outer end cover	24	Steel ball
5	Inner sealing sleeve	15	External friction disc	25	Valve seat
6	Roller bearing	16	Internal friction disc	26	Stop pad
7	Sleeve	17	Snap ring	27	Hexagon bolt
8	Plug	18	Spring seat	28	Stop pad
9	Reverse shaft	19	Spring	29	Pin
10	Hole ring	20	Piston		

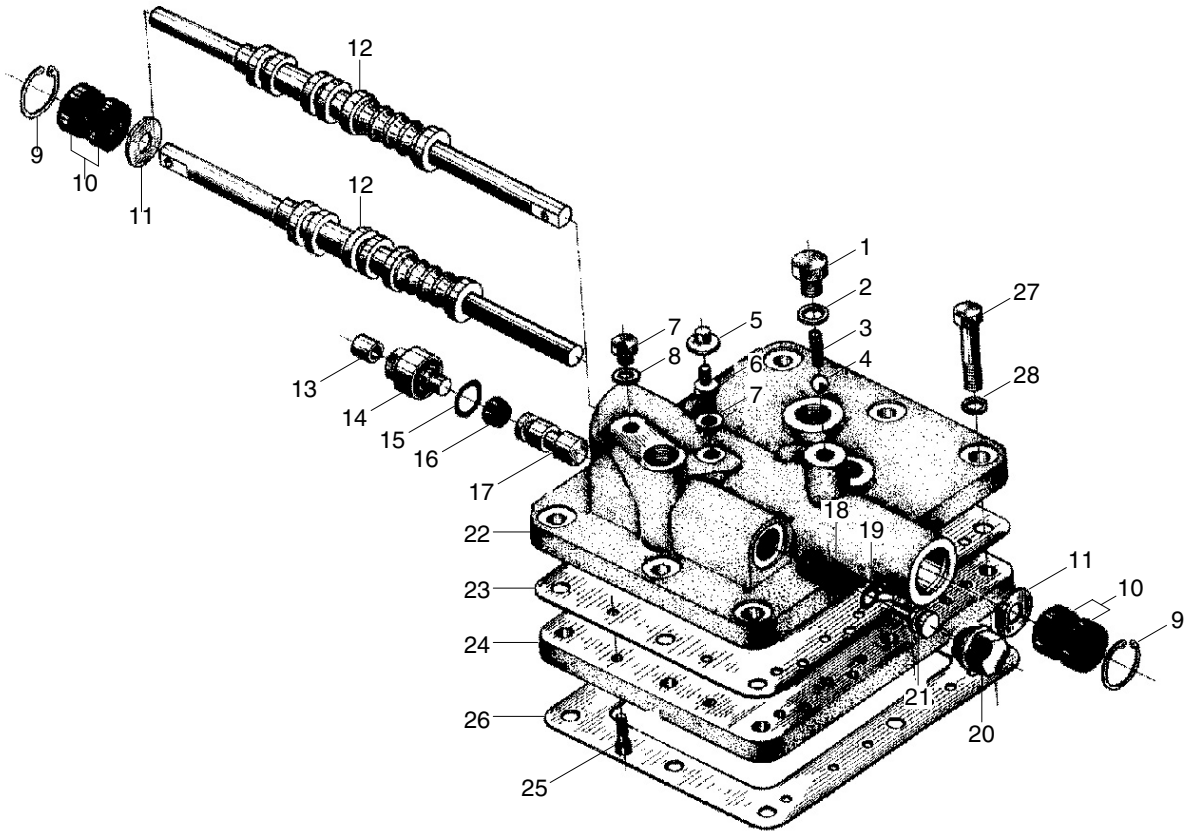
7) HIGH-LOW SPEED SHIFT FORK



830KPT11

1	Pin	6	Washer	11	Washer
2	Socket screw	7	Hexagon bolt	12	Steel ball
3	HIgh-low shift fork	8	Seal	13	Spring
4	Gasket	9	Fork shaft		
5	Fork support	10	Plug		

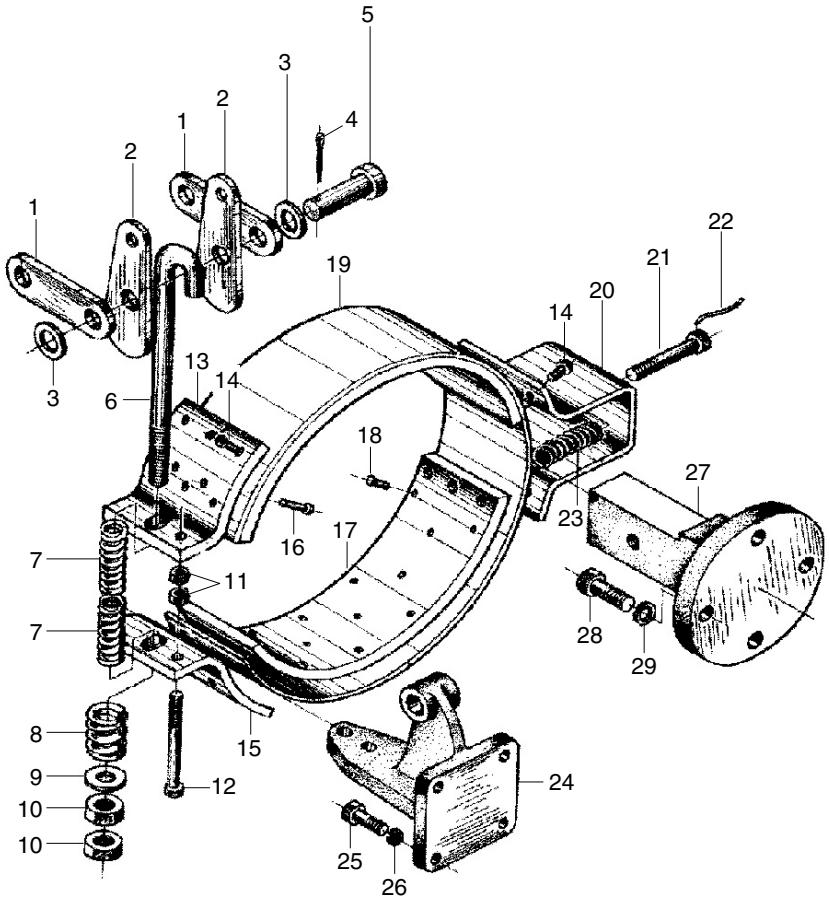
8) CONTROL VALVE



830KPT12

1	Screw	11	Regulating washer	21	Plug
2	Washer	12	Control sliding valve	22	Valve body
3	Spring	13	Dust cover	23	Gasket
4	Steel ball	14	Plug	24	Bottom plate
5	Dust cover	15	O-ring	25	Socket screw
6	Pressure tap	16	Cup	26	Screw
7	Washer	17	Brake sliding valve	27	Hexagon bolt
8	Plug	18	Spring	28	Washer
9	Snap ring	19	O-ring		
10	Seal	20	Spring seat		

9) PARKING VALVE



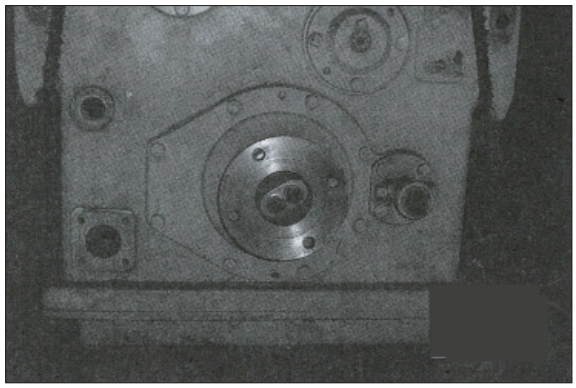
830KPT13

1	Parking brake bracket	11	Nut	21	Bolt
2	Cam plate	12	Hexagon bolt	22	Iron wire
3	Washer	13	Upper fixed plate	23	Regulating spring
4	Split pin	14	Semi circular rivet	24	Bracket
5	Axis pin	15	Lower fixed plate	25	Bolt
6	Set screw	16	Rivet	26	Washer
7	Set screw spring	17	Friction pad	27	Bracket
8	Set screw spring	18	Bracket	28	Hexagon bolt
9	Washer	19	Steel band	29	Spring washer
10	Nut	20	Bracket		

8. DISASSEMBLY

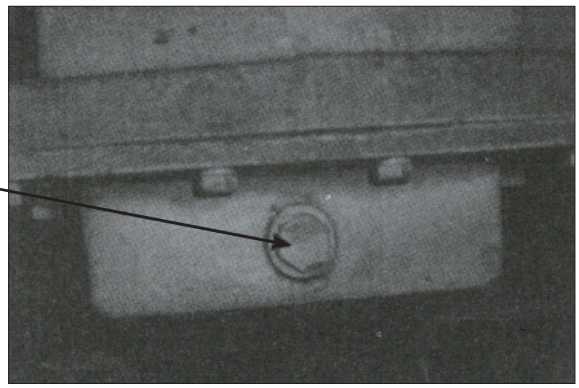
1) DRAINAGE FOR TRANSMISSION

(1) Hoist transmission up and put an oil container under it.



830KTM10

(2) Unscrew the M20×1.5 bolts on the oil pan with a spanner and make drainage fully.



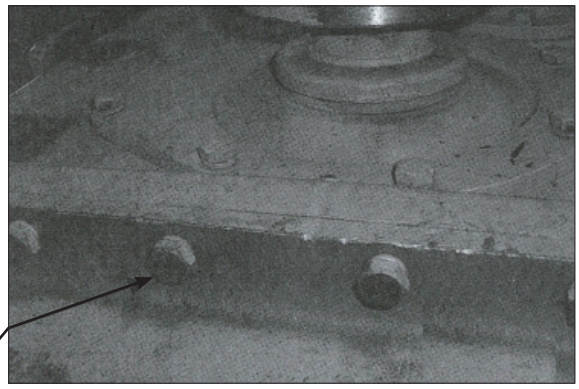
830KTM11

2) OIL PAN OF TRANSMISSION

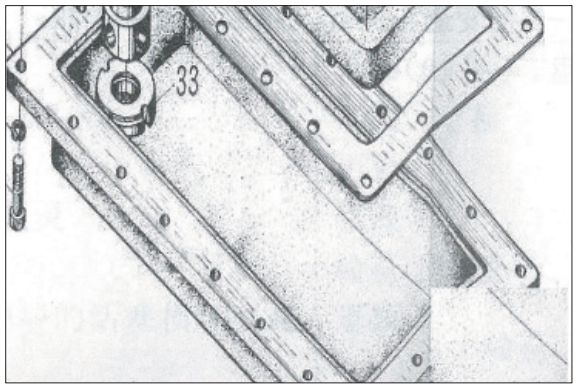
(1) Unscrew 20 - M10×30 bolts in sequence on the oil pan with a spanner. As disassembly, two diagonal bolts should be removed finally to prevent from injury to people due to falling oil pan.

(2) Be careful of remaining oil in the oil pan when the last two bolts are removed.

(3) Put the oil pan removed in a clean place.



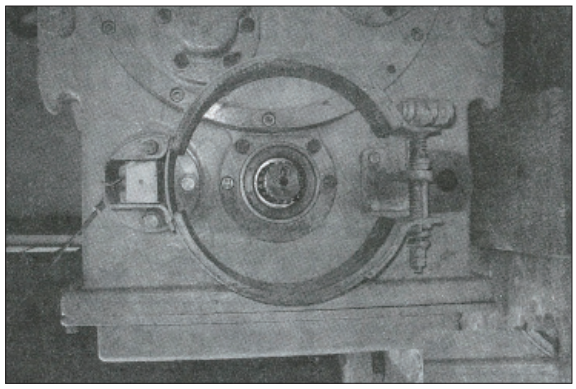
830KTM12



830KTM13

3) HAND BRAKE ASSY

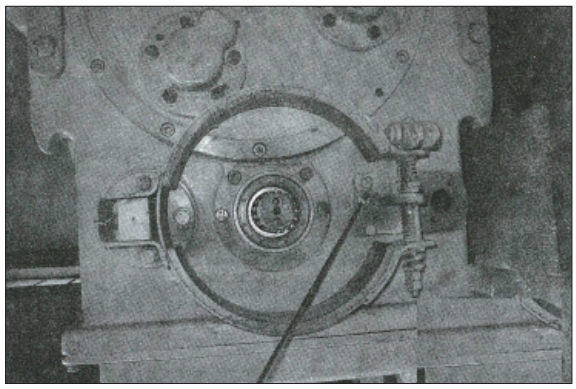
(1) Remove 4 - M12×30 bolts on the left bracket of hand brake with a spanner.



830KTM14

(2) Remove 4 - M8×25 bolts on the right bracket of handbrake with a spanner.

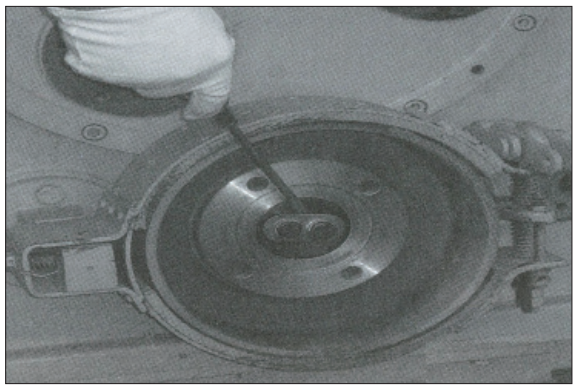
(3) Pull the total hand brake assy out and put it in a clean place.



830KTM15

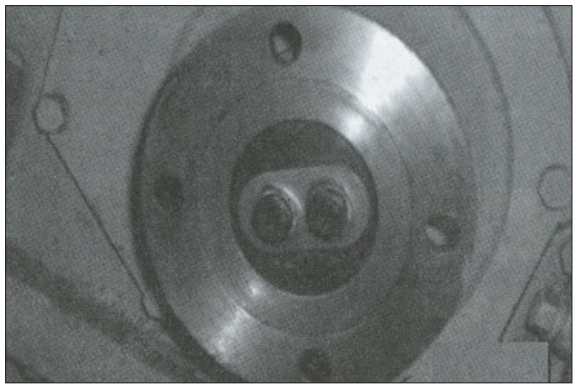
4) REMOVING FRONT & REAR OUTPUT FLANGE

(1) Remove the bolt lock plate at the front output flange with a screwdriver and unscrew 2 - M10×25 bolts inside the front output flange with a spanner. After taking the pressure plate and O-ring out, pull the front output flange assy out and place it in a clean place.



830KTM16

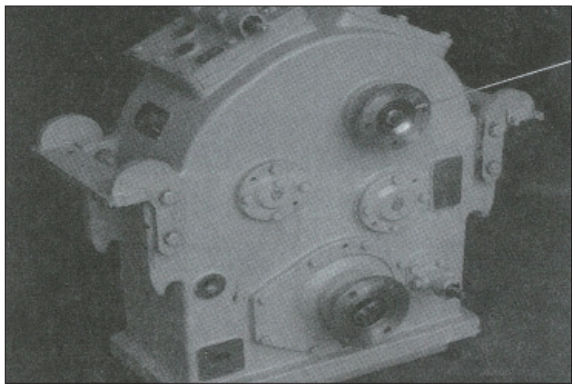
(2) Remove the bolt lock plate at the rear output flange with a screwdriver and unscrew 2 - M10×25 bolts inside the rear output flange with a spanner. After taking the pressure plate and O-ring out, pull the rear output flange assy out and place it in a clean place.



830KTM17

5) REMOVING INPUT FLANGE

(1) Release the lock of stop plate on the input shaft with a screwdriver and use a special tool or iron piece to remove M-20×1.5 round nut. After taking the pressure plate out, pull the input flange (flange assy) out and put it in a clean place.

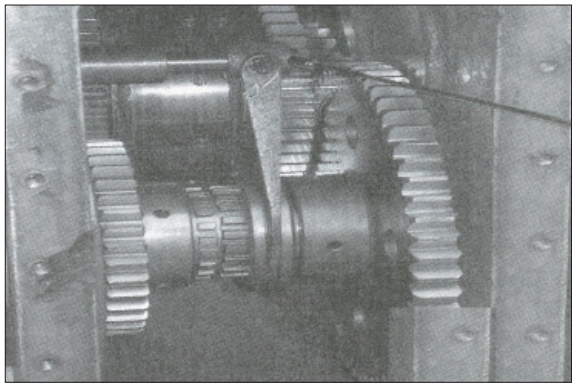


830KTM18

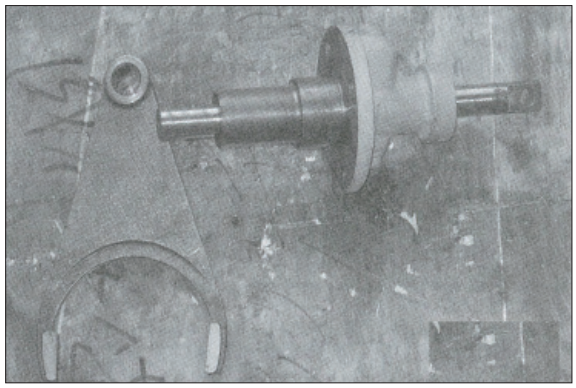
6) REMOVING GEAR SHIFT FORK (HI AND LO SPEED)

(1) Put the transmission level, release the set screw lock on the gear shift fork mount and unscrew the M10 set screw with M14 spanner.

(2) Unscrew 4-M10×30 bolts on the fork mount with a spanner and tap lightly the mount assy out with a copper bar and put it in a clean place.



830KTM19



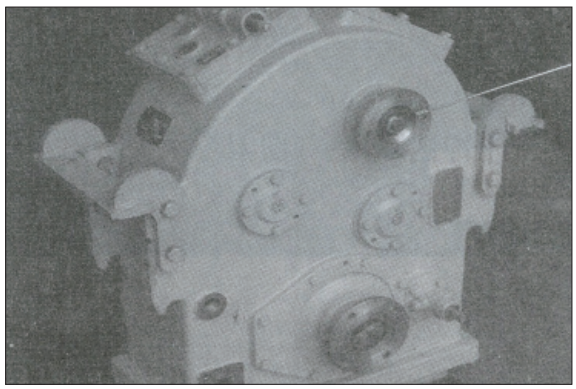
830KTM20

7) REMVING OUTER END COVER OF TRANSMISSION

(1) Put the transmission level with the input side up.

(2) Unscrew 4-M10×25 bolts on the end covers of input shaft, intermediate shaft and reverse shaft with a spanner and then use 2-M10×25 bolts to push the three end covers out and put them in a clean place.

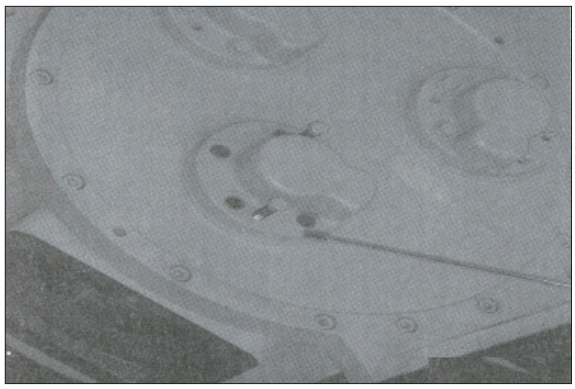
(3) Unscrew 8-M10×30 bolts on the rear end cover of output shaft and use 2 M10×30 bolts to push the rear end cover out and put it in a clean place.



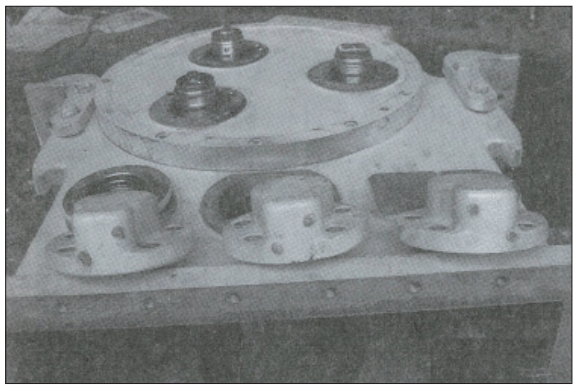
830KTM21

(4) Turn the transmission for other side and place it level.

(5) Unscrew 5 - M10×30 bolts on the oil inlet end cover of gear I, gear II and reverse gear with a spanner and then use 2-M10×30 bolts to push the three end cover out and put them in a clean place.

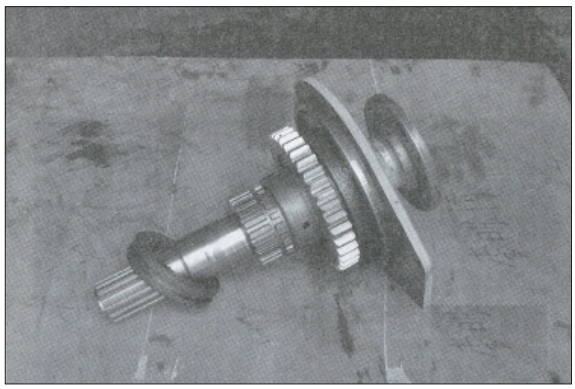


830KTM22



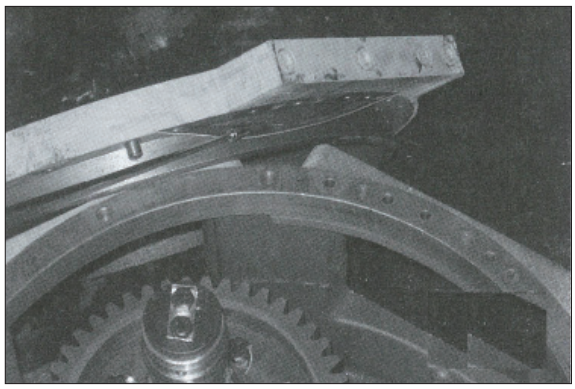
830KTM23

(6) Unscrew 4 - M10×25 bolts on the seal cap of front output shaft with a spanner and use 2 - M10×25 bolts to push it out and put in a clean place.



830KTM24

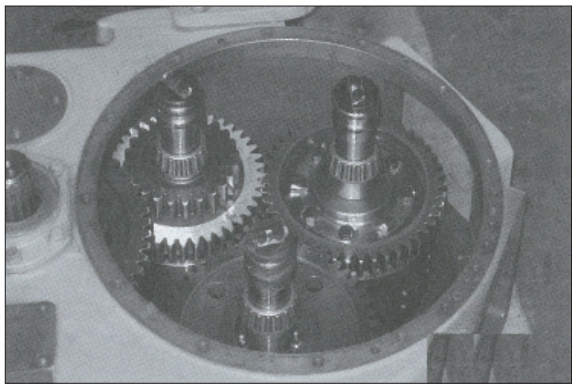
(7) Unscrew 13 - M10×30 socket bolts on the large end cover with a socket wrench and then use 2 - M10×45 bolts to push it out and put in a clean place.



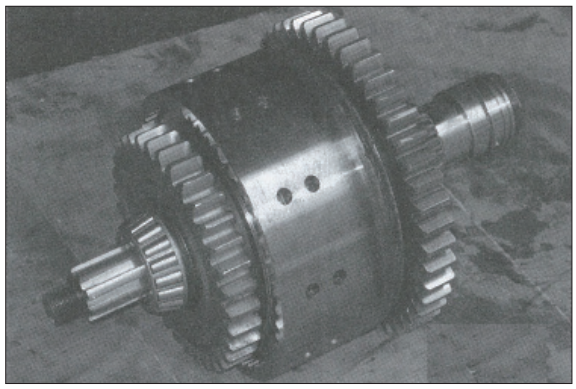
830KTM25

8) REMOVING CLUTCHES

(1) Take 3 sets of clutch parts out of transmission box and put them in a clean place and mark outer ring of bearing to prevent from miss assembly.



830KTM26



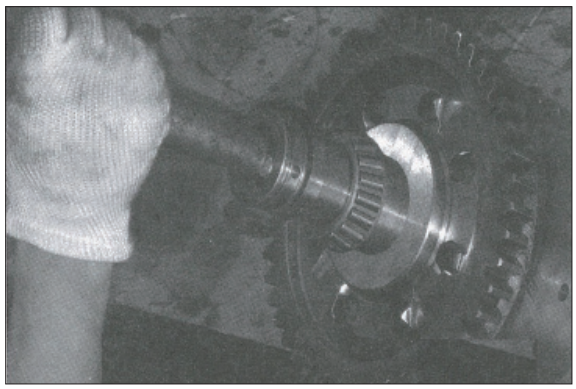
830KTM27

(2) Set the input parts up as illustrated in the figure and use a flat chisel to release two bolt locks and then unscrew 2 - M8×16 bolts with a spanner and use a copper bar to tap the input shaft out.

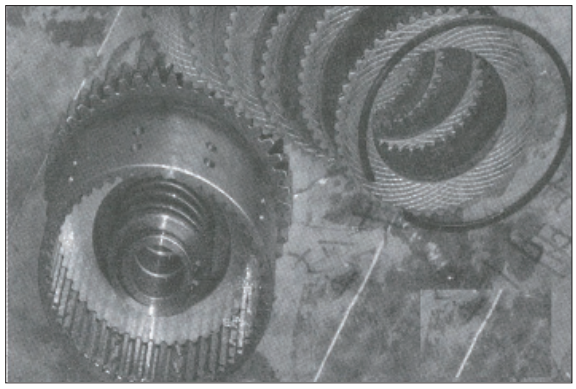
(3) Use a flat taper to release the bolt lock onthe clutch assy and unscrew 8 - M10×25 bolts with a spanner.

(4) Remove the retainer with a screwdriver, and then the outer end cover 6 outer friction plates and 5 inner plates in order.

(5) Use a tool to remove 60 retaining ring from clutch case, and then inner spring seat, spring and piston in order.



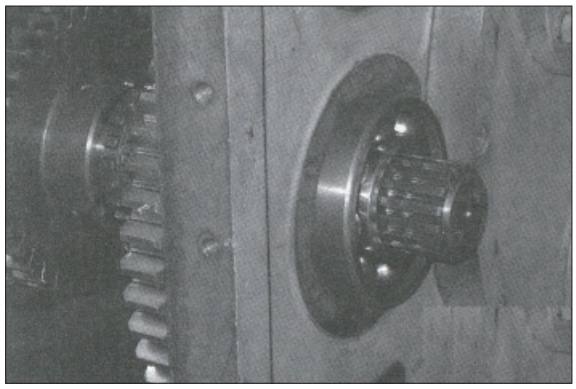
830KTM28



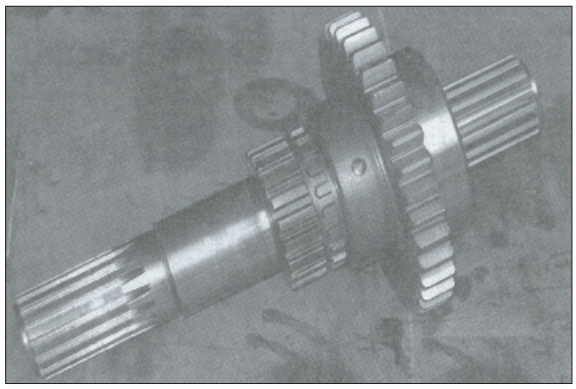
830KTM29

9) REMOVING OUTPUT SHAFT

(1) Use a copper bar to tap on to the front end of transmission to make the front end output shaft to fall out from front bearing, and then take the output shaft parts out and put in a clean place.



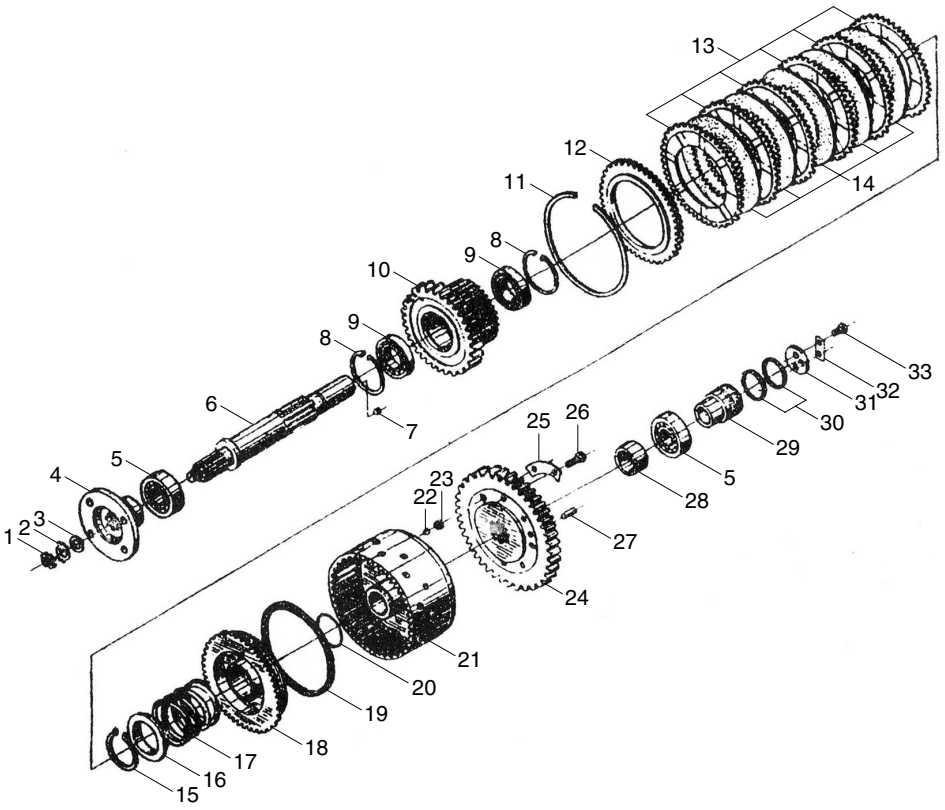
830KTM30



830KTM31

9. ASSEMBLY

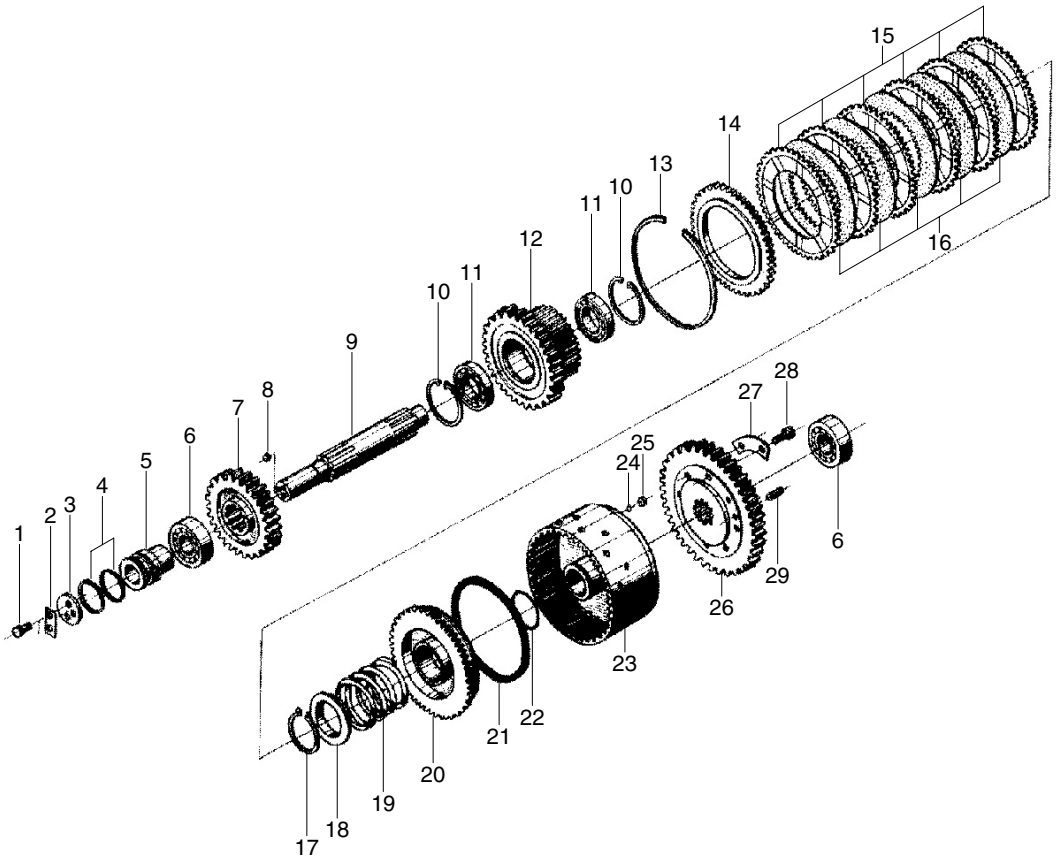
1) ASSEMBING INPUT CLUTCH PARTS



830KPT08

(1) Check the clutch valve seat (23) and internal steel ball (22) for looseness.
(2) Use a spanner to screw up 8-M10×25 bolts to fasten gear I part drive gear (24) to clutch case assy (21).
(3) Put up glue and knock in 2 straight pins (27).
(4) Unscrew 8- M10×25 bolts with a spanner and put up 4 stop plates (25) and fasten up 8-M10 ×25 bolts and lock up 4 stop plates with flat taper.
(5) Fit the oil seal ring (19) into piston (18) groove with the broken opening toward gear.
(6) Fit O-ring (20) into place on clutch case.
(7) Tap the piston assy into the oil cylinder of clutch case with a tool.
(8) Assemble the spring (17) and spring seat (16) onto the shaft of the clutch case and use the special tool to mount the circlip for shaft (6).
(9) Put up 6 outer plates (13) and 5 inner plates (14) alternatively, and assemble outer end cover (12) and retainer (11) finally.
(10) Knock 2 annular ball bearing into the bore of gear I drive gear (10) and mount two retainer (8) to set.
(11) Mount the gear I drive gear assy into the clutch assy.
(12) Insert input shaft (6) into the bore of gear I drive gear assy.
(13) Knock the bearing (5) onto the input shaft with the special tool and mark on the inner and outer ring of the bearing.
(14) Turn and mount sleeve (28) and knock the inner ring of bearing and oil seal (29) onto the input shaft respectively.
(15) Apply glue and knock stop plug (7) in and then assemble end plate (31) and then stop washer (32) and fasten up 2-M8×16 with a spanner and make the two sides lock of stop washer with a flat taper.

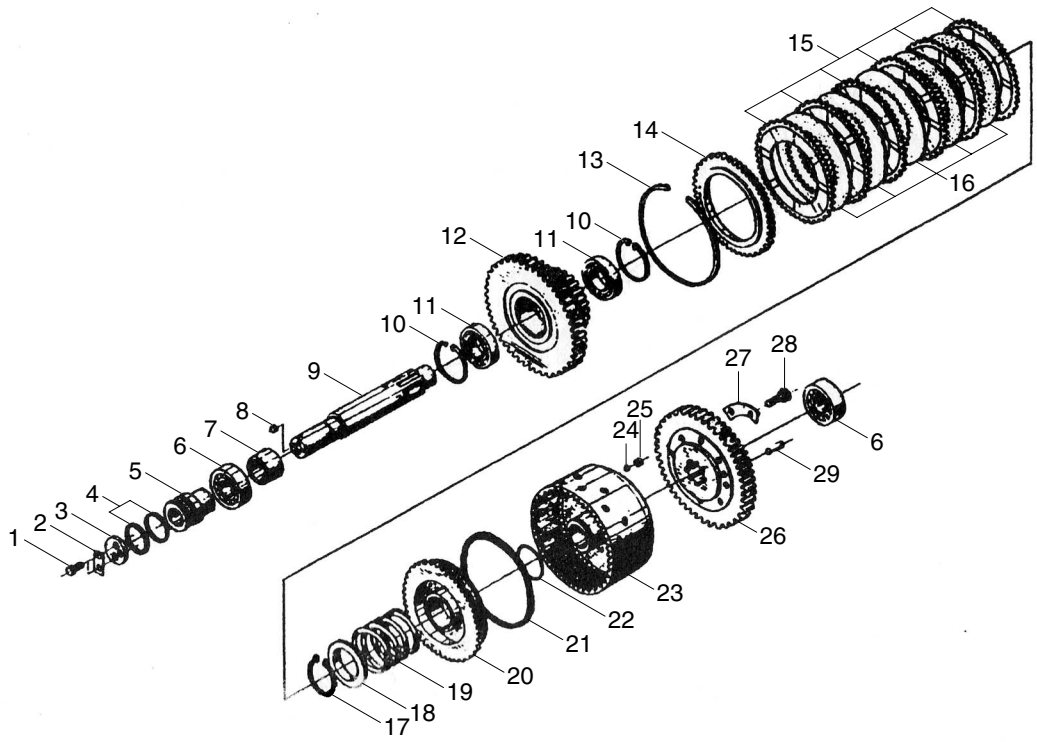
2) ASSEMBLING INTERMEDIATE SHAFT CLUTCH PARTS



830KPT09

(1) Check the valve seat (25) of clutch case assy (23) and internal steel ball (24) for looseness.
(2) Use a spanner to screw up 8 - M10×25 bolts to fasten gear II drive gear (26) to clutch case assy.
(3) Put up glue and knock in 2 straight pins (29).
(4) Unscrew 8 - M10×25 bolts with a spanner and put up 4 stop plates (27) and fasten up 8 - M10 ×25 bolts and lock up 4 stop plates with flat taper.
(5) Fit the oil seal ring (21) into piston (20) groove with the broken opening toward gear.
(6) Fit O-ring (22) into place on clutch case.
(7) Tap the piston assy into the oil cylinder of clutch case with a tool.
(8) Assemble the spring (19) and spring seat (18) onto the shaft of the clutch case and use the special tool to mount the circlip for shaft (9).
(9) Put up 6 outer plates (15) and 5 inner plates (16) alternatively, and assemble outer end cover (14) and retainer (13) finally.
(10) Knock two annular ball bearings (11) into the bore of gear II drive gear (12) and mount two retainers (10) to set.
(11) Mount the gear II drive gear assy into the clutch assy.
(12) Insert intermediate shaft (9) into the bore of gear II drive gear assy.
(13) Push gear II idler gear (7) onto the spline of intermediate shaft and knock the bearing onto the intermediate shaft with the special tool and mark on the inner and outer ring of the bearing.
(14) Knock inner seal (5) onto the intermediate shaft with special tool.
(15) Apply glue and knock stop plug (8) in and then assemble end plate (3) and then stop washer (2) and fasten up 2 - M8×16 with a spanner and make the two sides lock of stop washer with a flat taper.
(16) Put 2 piston rings (4) into inner seal groove.

3) ASSEMBLING REVERSE SHAFT CLUTCH PARTS



830KPT10

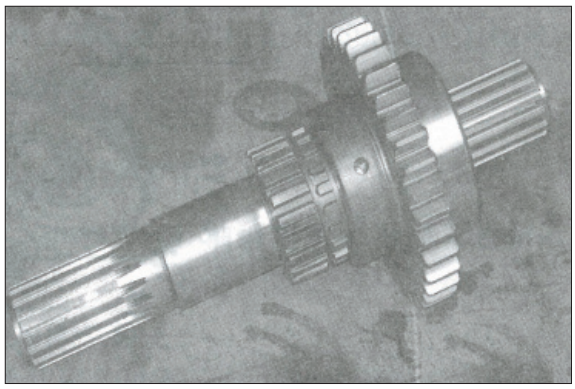
(1) Check the valve seat (25) of clutch case assy (23) and internal steel ball (24) 5 for looseness.
(2) Use M16 spanner to screw up 8 - M10 × 25 bolts to fasten reverse gear reverse gear (26) to clutch case assy.
(3) Apply glue and knock in 2 straight pins (29).
(4) Unscrew 8-M10 × 25 bolts with a spanner and put up 4 stop plates (27) and fasten up 8 - M10 × 25 bolts and lock up 4 stop plates with flat taper.
(5) Fit the oil seal ring (21) into piston (20) groove with the broken opening toward gear.
(6) Fit O-ring (20) into place on clutch case.
(7) Tap the piston assy into the cylinder of clutch case with a tool.
(8) Assemble the spring (19) and spring seat (18) onto the shaft of the clutch case and use the special tool to mount the circlip for shaft (9).
(9) Put up 6 outer plates (15) and 5 inner plates (16) alternatively, and assemble outer end cover (14) and retainer (13) finally.
(10) Knock two annular ball bearings (11) into the bore of reverse drive gear (12) and mount two retainers (10) to set.
(11) Mount the reverse drive gear assy into the clutch assy.
(12) Insert reverse gear shaft (9) into the bore of reverse drive gear assy.
(13) Push reverse gear sleeve (7) onto the reverse gear shaft and knock the bearing onto the reverse gear shaft with the special tool and mark on the inner and outer ring of the bearing.
(14) Knock inner seal (5) onto the reverse gear shaft with special tool.
(15) Apply glue and knock stop plug (8) in and then assemble end plate (3) and then stop washer (2) and fasten up 2 - M8 × 16 with a spanner and make the two sides lock of stop washer with a flat taper.
(16) Put 2 piston rings (4) into inner seal groove.

4) ASSEMBLING OUTPUT SHAFT PARTS

(1) Mount four composite bearings to high speed gear and low speed gear respectively.

830KTM35

(2) Insert high and low speed sleeve gear, high speed gear and bearing onto the output shaft.

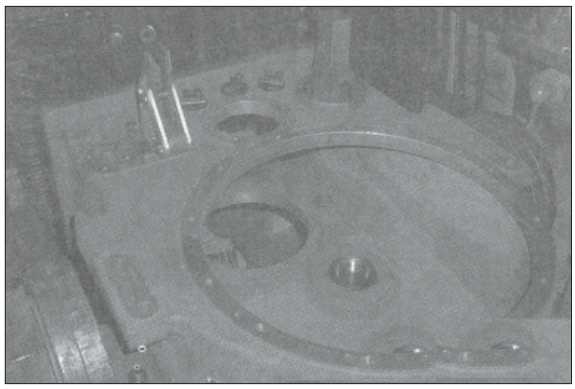


830KTM36

5) ASSEMBLY

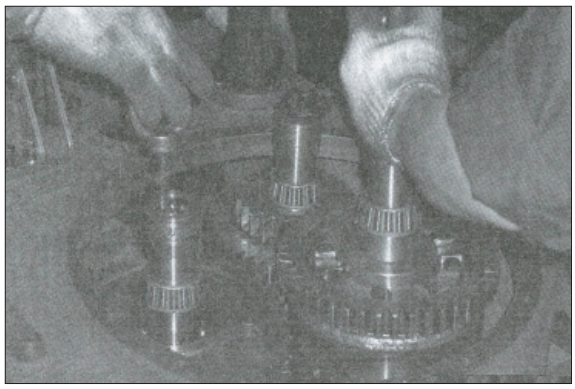
(1) Mount the left bracket and right bracket of handbrake at the output side of transmission onto the transmission box and set with four M8×25 bolts and M12×30 bolts respectively.

(2) Mount the bearing outer rings into the bearing bore respectively and mark.



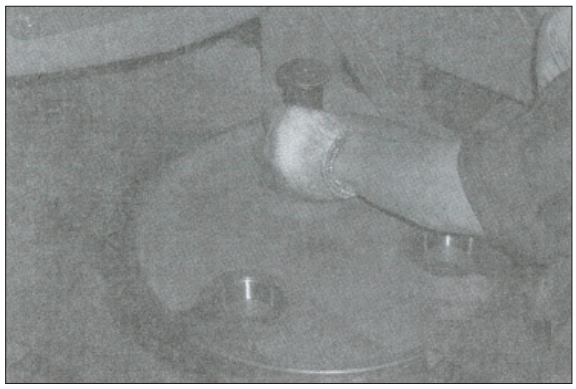
830KTM37

(3) Mount the intermediate shaft assy, reverse gear shaft assy and output shaft assy into their correct place on the box.



830KTM38

(4) Mount bearing into the bore for bearing on the large end cover.

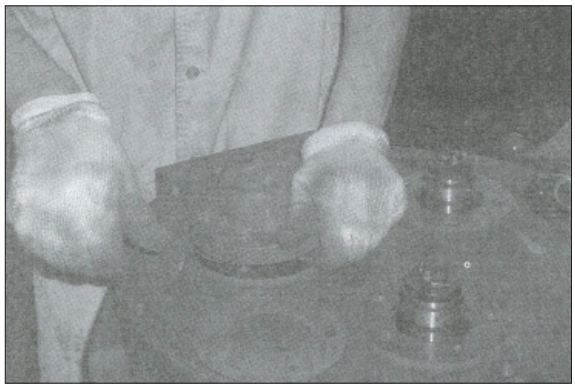


830KTM39

(5) Mount the large end cover into the box and put up a paper gasket in the middle.

(6) Assemble the outer seal into the oil inlet end cover.

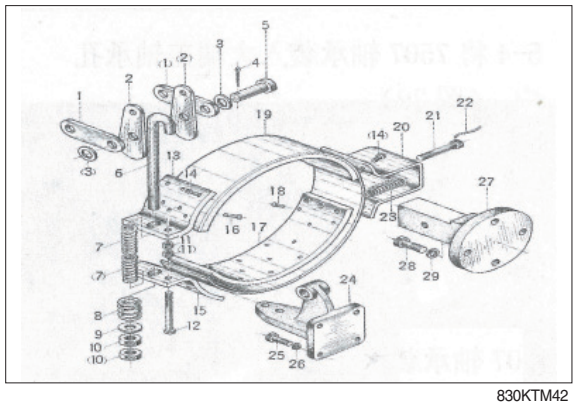
(7) Mount the oil inlet end covers in place on the box watching oil orifice position.



830KTM40

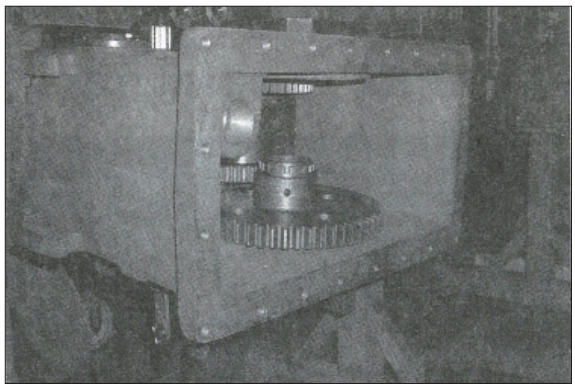
(8) Assemble the front output flange and handbrake assy.

830KTM41



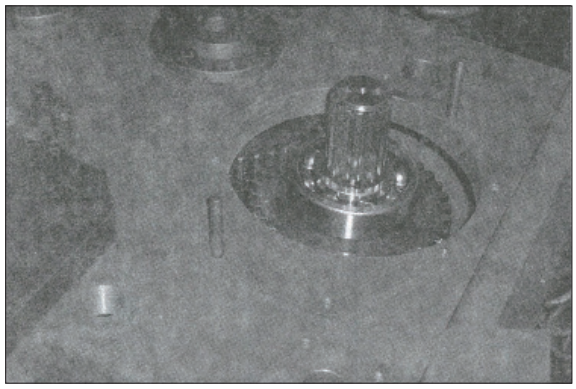
830KTM42

(9) Assemble the low speed gear assy into the box.



830KTM43

(10) Assemble the output shaft assy.



830KTM44

(11) Assemble rear end cover of output shaft and rear output flange.

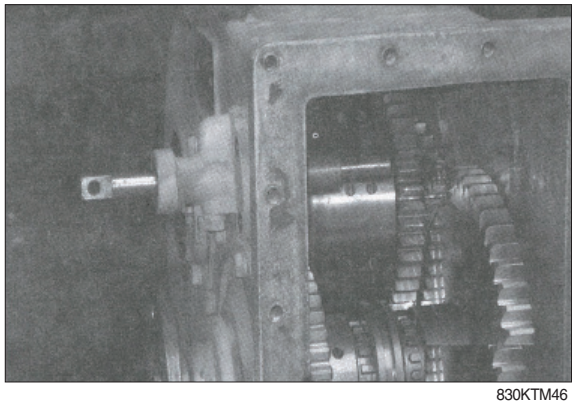
(12) Mount the output shaft rear end cover and oil seal (45×62×12) on the box and then input flange, and adjust the bearing gap at the input side to meet requirements.

(13) Mount the intermediate shaft end cover and reverse gear shaft end cover and fasten up the screws and set the stop plate.

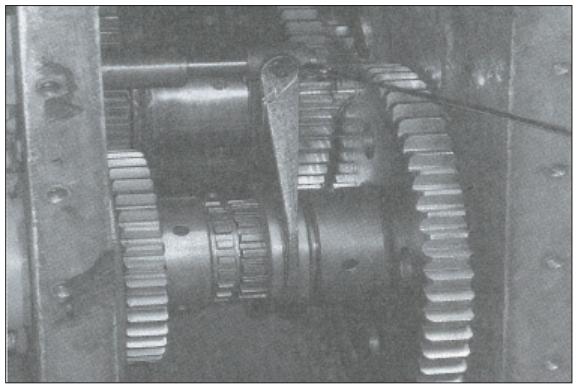
830KTM45

(14) Mount the fork shaft in the fork bracket.

(15) Mount the fork bracket assy through the holes on the box and fasten with 4-M10×30 bolts. Mount the fork for high-low shift speed by inserting the fork shaft into the fork hole and adjust the position of fork shaft to keep it perpendicularly and drill hole to match assembly.

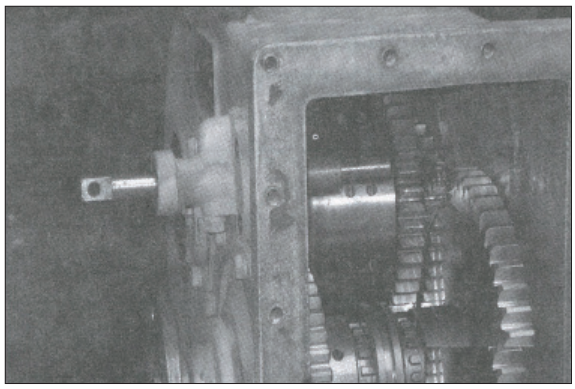


830KTM46



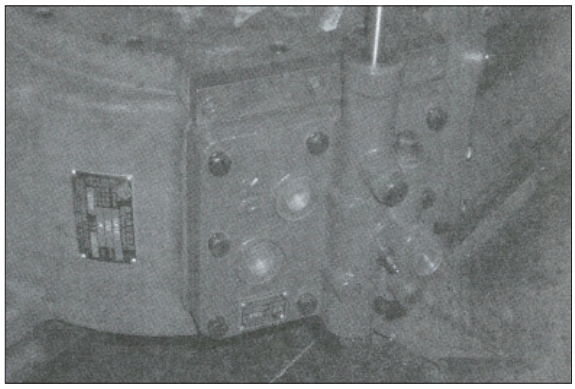
830KTM47

(16) Mount the oil pan and set with 20 - M10×30 bolts.



830KTM48

(17) Mount the control valve assy and top plate and connect with 8-M10×45 and 4 - M10×35 bolts



830KTM49