SECTION 12 — BORG WARNER AUTOMATIC TRANSMISSION (Model 35)

SPECIFICATIONS

Type	Automatic 3 speed with Torque Converter
Torque Converter Diameter	242 mm (9½")
Cooling Method	Water—heat exchanger
Lubrication	Pump—Rotary internal/external gear type

BAND ADJUSTMENT ("Back-off" Turns)

Front (Kickdown)	4 from 1,13 Nm (10 lbs ins.)
Rear (Low/Reverse)	¾ from 13,6 Nm (10 lbs. ft.) (with tool No. BW547-502) ¾ from 7 Nm (5 lbs. ft.) (with tool No. E1294-1)

CLUTCHES

Number of front clutch plates	3 "Flat"
Number of front clutch discs	4 "Flat"
Front clutch pack clearance	0,38 mm (0.015")
Number of rear clutch plates	3 "Flat" and 3 "Dished"
Number of rear clutch discs	4 "Flat"

GEAR RATIOS

1 — low	2.39:1
2 — second	1.45:1
D—drive—direct	1.00:1
R — reverse	2.09:1

OIL PUMP

Type	Gear—rotary
Gear Train End Play	0,25-0,80 mm (0.010-0.030")
End Play Control Washers	1,55-1,60 mm (0.061-0.063")
(Selective)	1,98-2,03 mm (0.078-0.080")
Fluid Capacity	7,4 litres (13.0 imp. pts.)

FLUID TYPE

Use "Dexron"® II automatic transmission fluid for refill and top-up purposes.

STALL SPEED (r.p.m.)

Astron—2,0 litre	2,500 to 2,600
Astron—2,6 litre	2,550 to 2,650

SERVICE BUSHING FINISHING SIZES

Input Shaft Bushing	18,54-18,57 mm (0.730-0.731")
Output Shaft Bushing	34,95-34,98 mm (1.376-1.377")
Pump Adaptor Support Bushing	31,75-31,76 mm (1.250-1.251")
Pump Housing Bushing	38,09-38,11 mm (1.4995-1.5005")
Reverse Sungear Bushing and Planetary Gear Cover Bushing (Aluminium)	21,41-21,44 mm (0.843-0.844")
Transmission Case (REAR) Bushing	44,45-44,48 mm (1.750-1.751")

SPECIAL TOOLS

E1282	Front Band Spacer Gauge 6,35 mm (0.250")
E1386	Clutch Spring Compressor
E1387	Inserting Sleeve—Rear Clutch Piston
E1388	Inserting Sleeve—Front Clutch Piston
E1294-1	Rear Servo Adaptor Socket (5/16" square—3/8" drive)

SPECIAL TOOLS — (Continued)

E1299	Socket Head Adapter M.H.H. 3/16" (Hex.) A.F. (Remove and reinstall pressure take-off plug)
E1300	Torque Wrench—Screwdriver Adaptor
E1284	Front Servo Adaptor (short)
E21C65A	Hydraulic Pressure Test Gauge and Hose (use with 1/8"—27N.P.T. Fitting No. 26 Union)
E21C5C	Transmission Stand
E21C35F	Installer—Oil pump seal
E21C35G	Remover—Oil pump seal
E6604	Remover—extension housing yoke seal
E21M10B	Installer—extension housing yoke seal
E21M50	Remover and Installer—extension housing sliding spline bushing
	Pounds/inch torque wrench
	Pounds/feet torque wrench
	Circlip Pliers (2)
	Allen keys (3) 3/16", 1/4" and 7/32"

TORQUE SPECIFICATION

	Nm	lbs. ft.	lbs. ins.
Cooler line fitting nut	9		75
Converter to Drive plate bolt	47	35	
Converter drive plate to crankshaft bolt	113-122	83-90	
Converter cover plate to converter housing screw	16	12	40
Extension housing to transmission case bolt	34-47	25-35	
Converter housing to engine bolts	24-28	18-21	
Transmission case to converter housing bolt	16-24	12-18	
Governor retaining bolt	20-24	15-18	
Intermediate (centre) support to trans. case screw	20-34	15-25	
Kickdown (front) band adjusting screw lock nut	20-27	15-20	
Kickdown (Transmission Throttle) cable adaptor to case	14-16	10-12	
Kickdown (front) servo to transmission case bolt	14-20	10-15	
Low-reverse (rear) band adjusting screw lock nut	34-40	25-30	
Low-reverse (rear) servo to transmission bolt	20-34	15-25	
Manual valve shaft lever nut	14-16	10-12.5	
Oil pan drain plug	14-19	10-14	
Oil pan to transmission case screw	14-18	10-13	
Oil tube connector to case nut	9.5-13.5		84-120
Output shaft support	5.5-10.8		48-96
Pressure test plug	5.5-6.8		48-60
Pump adaptor to pump body bolt	23-30	17-22	
Pump adaptor to pump body screw	2.7-4.0		24-36
Pump adaptor to transmission case bolt	16-24	12-18	
Neutral Starter/Rev. Light switch screws	2.3-3.3		20-30
Throttle valve cam bracket	2.3-3.3		20-30
Transmission Throttle cable adaptor	13.5-16.0	10-12	
Valve body screws	2.3-3.3		20-30
Valve body to case	5.5-11.0		48-96
Selector rod adjustment locknut	8		70

SERVICE INFORMATION — PROCEDURES

The greater majority of automatic transmission service jobs can be traced back to shift quality or shift pattern irregularities. By comparison purely mechanical failures are few and far between. If a major mechanical failure does occur, chances are it was caused by an abnormal shift condition. If minor shift problems are corrected early enough, most mechanical failures can be avoided. For this reason this procedure is designed to assist in the diagnosis and correction of shift problems.

The obvious things must be checked first — fluid and service adjustments. Identify the exact nature of the complaint by road-testing the transmission. Once the trouble has been narrowed down to one of the clutches or bands, faults that could cause that one band or clutch to malfunction can be investigated.

There are four important service adjustments in the transmission:—

(1) Transmission Gearshift Control Linkage
(2) Transmission Throttle Cable
(3) Kickdown (Front) Band
(4) Low and Reverse (Rear) Band.

To ensure continued trouble-free operation, these four items should be adjusted at the recommended intervals shown in the vehicle Operation and Maintenance Schedule and the fluid level and cleanliness maintained.

The conclusion that the valve body has probably caused the trouble must not be hastily drawn just because of its complex operation and construction.

Experience has shown that most troubles start with neglected service adjustments or fluid. The great majority of transmission problems develop because one of the bands or clutches is not doing **what** it is supposed to **when** it is supposed to do it. If it is known what the bands and clutches are supposed to do in low, second, direct and reverse, the band or clutch which is not operating correctly can be found by diagnosis when road-testing the vehicle.

Fluid Level

The fluid level should be checked first on every transmission complaint. Many malfunctions, such as erratic shifting, can be traced to an incorrect fluid level. If the fluid level is low, the clutches and bands will not operate properly, while a high fluid level can result in foaming of the transmission fluid which will allow air to enter the hydraulic system and upset the operation of the control valves, band servos and clutch pistons.

Checking the Fluid Level

To carry out an accurate check on fluid level, the transmission fluid should be warmed up to normal operating temperature. Apply the parking brake and start the engine. Select each gear position to ensure all control circuits are filled with fluid, then select the Neutral position. The fluid level should never be above the "HIGH" mark or below the "LOW" mark. (Refer Fig. 10.) If any doubt exists as to the temperature of the fluid, the fluid level should be re-checked after road-testing the vehicle. The difference between the "HIGH" and the "LOW" mark is 0.6 litres (1 pint).

When checking the fluid level, note the condition of the fluid as some good clues to the probable cause or extent of the trouble can often be obtained from the condition of the fluid.

Fluid with Burnt Odour

Black or dark-coloured fluid, having a strong, burnt smell, is caused by an overheated clutch or band.

By the time this condition become apparent, loose friction material from the deteriorating band or clutch has probably worked its way into the fluid passages in the transmission, causing valves to stick. Sticking valves may cause other friction elements to fail.

Milky-Appearing Fluid

If the fluid appears milky, it may be contaminated with water. This condition is not common, but it is possible.

Since the engine coolant attacks O-rings, seals, clutches and bands, a complete overhaul is necessary. If this condition is found, ensure that the reason for coolant leakage into the transmission fluid is rectified. Check for a leak in the transmission oil cooler in the lower tank of the radiator by disconnecting the fluid lines and applying air pressure to the tank—**no more than 345 kPa (50 p.s.i.)** If a leak exists, air will bubble up through the coolant in the radiator.

Test Neutral Switch Starting Operation

Check that starter will operate only with the selector in "P" and "N" and that the reverse light operates only in "R". No adjustment is provided; where faulty, replace the switch assembly. Refer text.

Test Gearshift Control Linkage Adjustment

After checking the fluid level, take a moment to test the gearshift control linkage adjustment. With the engine running and the foot brake lightly applied, select "D" position and then the "N" position. Rev the engine. If there is a definite tendency for the car to move forward, with the transmission in neutral and the brakes released, check the gearshift control linkage adjustment.

Repeat the test by selecting "R" and then the "N" position. If the car definitely attempts to back up, the gearshift control linkage adjustment should be checked. Refer Section 14 for gearshift control linkage adjustment.

Road Test

A road test takes time, but tackling a transmission problem without identifying the exact nature of the trouble does not save time on most transmission problems. Sometimes the nature of the complaint is obvious, however, more often than not it is hard to tell from the owner's account of his trouble just what he is complaining about.

BAND AND CLUTCH APPLICATION CHART				
LOW (Breakaway)	LOW (Lock-up) No. 1 Position	SECOND (Kick-down) No. 2 Position	DIRECT	REVERSE
FRONT CLUTCH	FRONT CLUTCH	FRONT CLUTCH	FRONT CLUTCH	REAR CLUTCH
OVER-RUNNING CLUTCH	LOW AND REVERSE (REAR) BAND	KICK-DOWN (FRONT) BAND	REAR CLUTCH	LOW AND REVERSE (REAR) BAND

Identify the Complaint

Find out exactly what the owner is complaining about by having the owner drive the vehicle so he can demonstrate the transmission fault.

Start with a Normal Transmission Performance

Before attempting to diagnose a condition on road test, the normal performance and shift qualities of that transmission must be fully understood and recognised.

If they are not, time should be taken to acquaint yourself with them by driving other vehicles that are correctly tuned and adjusted.

Road Test Procedure

Very little can be learnt about normal or abnormal automatic transmission operation by taking a short "joy ride", with the transmission in "D" range. All positions must be tried, accelerate and decelerate, compare shift quality under light, medium and heavy throttle and test kickdown and part throttle downshift performance.

It is most important to learn and visualise which band or clutch is being applied for each gear.

During the road test, concentrate your thoughts on what the clutches and bands are doing, rather than the control valves and hydraulic circuits.

Reference to the above "BAND AND CLUTCH APPLICATION CHART" will assist you when forming a mental picture of the internal functions of the transmission.

Breakaway Low

When either the "D" or the number "2" positions are selected, the transmission shifts into "Breakaway Low" for good acceleration from a standing start. In this gear the front clutch is applied and the overrunning clutch locks to obtain the first gear ratio. It must be remembered that the overrunning clutch will transmit power on forward drive only.

It automatically releases on deceleration and no power is transmitted from the rear wheels to the engine. There is no engine braking and the vehicle simply coasts (refer Fig. 1).

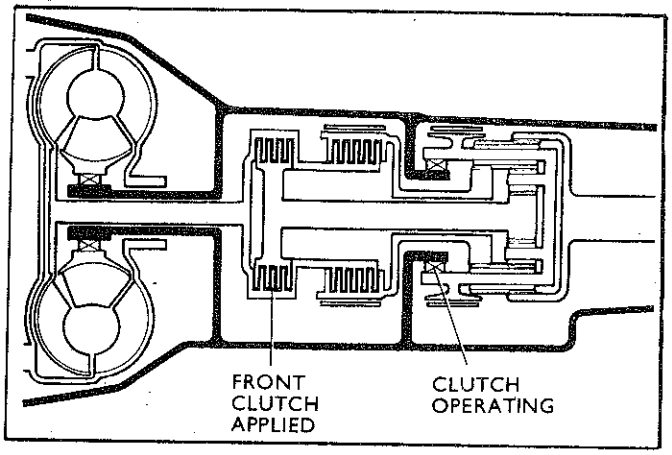


Fig. 1—Elements applied in breakaway low

Number "1" Low

When the number '1" position is selected, the front clutch is applied just as it was in breakaway.

In addition, the low and reverse (rear) band is applied (Refer Fig. 2).

The low and reverse band is a "two-way" coupling, giving a low gear ratio for both acceleration and deceleration. That is, it provides maximum engine braking whereas the over-running clutch provides **no** engine braking.

If the low-reverse band should fail to apply, the overrunning clutch would transmit the drive on acceleration giving a condition as in breakaway low in the number "1" position. As with breakaway low, there would not be any engine braking on deceleration. In addition, there would not be any power transmitted through the transmission with the reverse "R" position selected. This will be explained fully in "Reverse Gear" paragraph, Page 21 - 12 - 6.

Since the low and reverse band provides a low gear ratio for both acceleration and deceleration, the reason for employing the over-running clutch to obtain low gear ratio in breakaway low may cause some confusion. As band-to-band shifts are difficult to synchronize and are apt to be very harsh, the over-running clutch is utilized in breakaway low to ensure a smooth shift from first to second. Also a closed throttle downshift to a low gear which provided maximum engine braking would be abrupt and undesirable. This can be demonstrated by releasing the pressure from the throttle and selecting the number "1" position at 24 km/h (15 m.p.h.).

A noticeable jolt will be felt as the transmission downshifts into low gear. Part of the jolt is engine braking and part of it is from the low and reverse band application.

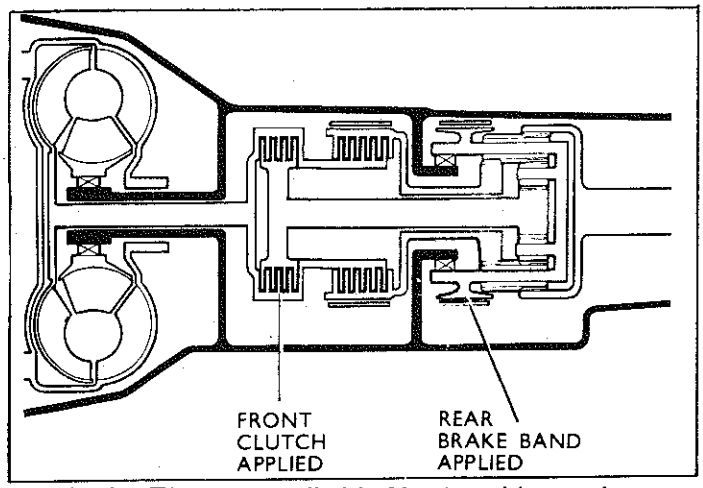


Fig. 2—Elements applied in No. 1 position — low

To eliminate the harsh shifts between low and second, the over-running clutch acts as follows:

For smooth one-two upshifts, the over-running clutch simply over-runs as soon as the kickdown band is applied. The problem of timing or synchronising the upshift is eliminated. For smooth, closed throttle downshifts, the over-running clutch simply "coasts". The shift is very smooth and the over-running clutch stands by to pick up the load automatically when the driver chooses to accelerate/drive.

Test for Front Clutch Slippage

Here is an example of how a working knowledge of bands and clutches can be applied to road test diagnosis.

If slippage exists in the low gear with the number "1" position selected, as well as in breakaway low, the trouble must be in the front clutch. The front clutch is the common drive element to both the breakaway low and number "1" low (Refer Fig. 3).

Second Gear

In second, the front clutch and the kickdown band are applied. If the transmission slips in second, but does not slip in breakaway low, or direct the trouble must be in the kickdown band application (Refer Fig. 4). At this point it will not be known whether the trouble is in the band itself or in the band apply circuit.

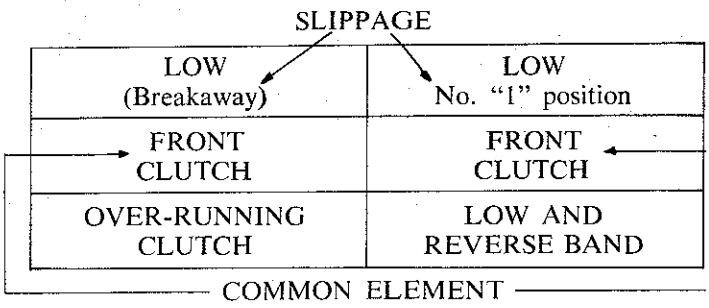


Fig. 3—Diagnosis of front clutch slippage

However, the friction element at fault is known and investigations can start at this point . . . starting with kickdown band adjustment.

Reference to Fig. 4 will show that the slippage is not in the front clutch. Eliminating the friction elements that are not giving trouble speeds up the job of diagnosis and service.

NOTE: If the transmission shifts from low to direct, missing second completely, the kickdown band is not applying.

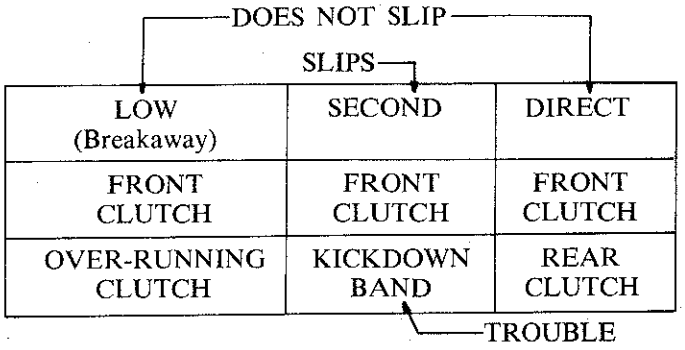


Fig. 4—Diagnosis of kickdown band slippage

Direct Drive

In direct drive the front clutch and rear clutch are both applied. The front clutch is applied in direct, second and low . . . **in all forward gears.** Therefore, if slippage occurs in direct drive but not in second or low, the front clutch can be considered satisfactory.

By the process of elimination the trouble must be with the rear clutch (Refer Fig. 5).

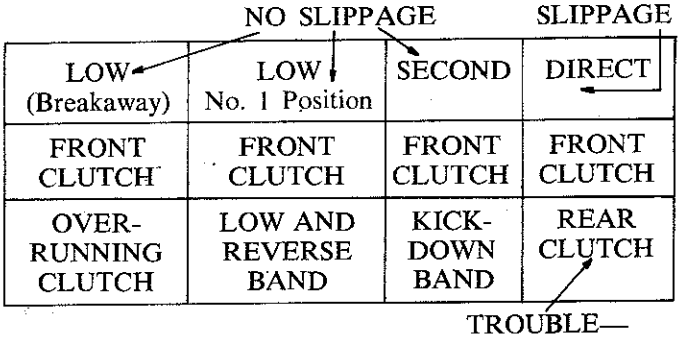


Fig. 5—Diagnosis of rear clutch slippage

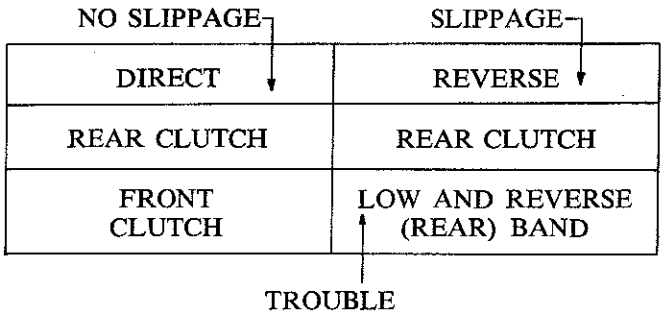


Fig. 6—Diagnosis of reverse band slippage

Reverse Gear

In reverse gear, the rear clutch and the low and reverse (rear) band are applied. The rear clutch is the friction member that is common to direct drive and reverse (Refer Fig. 6). If there is slippage in reverse but no slippage in direct drive, the trouble is most likely in the low and reverse band application.

NOTE: If the low and reverse band should fail to apply, no engine braking could be obtained with the transmission in the "LOW No. 1" position. (Refer Paragraph headed NUMBER 1 LOW.)

Diagnosis by Elimination

The clutch and band application chart shown earlier is a simple but extremely useful aid to diagnosis. The examples and explanations shown in the foregoing paragraphs illustrate how fault diagnosis is simplified when it is known which bands and clutches are applied for each gear. It is not practical in a section of this size to try and cover every conceivable type of malfunction or shift quality problem. It must be realised that occasionally a condition will be encountered where a road test will not isolate the trouble to one band or clutch.

If more than one friction element is faulty or if friction material is preventing the valves in the valve body from operating correctly, the symptoms may be confusing. However, in these cases the road test will help to confirm the suspected fault when the burnt friction material was discovered in the transmission fluid; the transmission must be completely overhauled.

On the other hand, removal of the transmission unnecessarily can be avoided if the exact trouble that the owner is complaining about is identified during the road test.

Engine Performance is very Important

The condition of the engine must not be overlooked, particularly on complaints relating to shift quality or performance. Idle speed and engine performance should be up to specifications as the shift pattern and shift quality of the transmission is tailored to normal engine performance.

The transmission **cannot** compensate for an engine which has become sluggish, it will automatically continue to carry out each shift as crisply as it should for a correctly tuned engine delivering full torque. The usual result being delayed or harsh shifts.

If the engine output is low, the driver has to open the throttle more to accelerate. Transmission throttle pressure will be too high in relation to actual engine torque, resulting in delayed, harsh shifts which resemble the trouble encountered when transmission throttle cable adjustment is advanced too much. **Under no circumstances should transmission throttle cable be adjusted to compensate for poor engine performance; correctly "tune" the engine.**

More than one shift quality complaint has been corrected by correcting engine performance and not touching the transmission.

Transmission Throttle Cable and Shift Quality

After the carburettor has been serviced, the transmission throttle cable adjustment must be checked as sufficient clearance may exist at the carburettor lower body attaching holes to allow the carburettor to be installed in a different position than it was originally. This may be just enough to upset the transmission throttle cable adjustment. (Refer Section 14 for cable adjustment).

Late Harsh Shifts

Should the transmission upshift late — at higher speeds than normal — it is possible that transmission throttle advance is leading carburettor throttle advance. (When transmission throttle pressure is too high, relative to engine torque, shifts are late and harsh.)

Early Mushy Shifts

Should the transmission upshift too soon — at lower speeds than normal — it is quite likely that the transmission throttle cable is incorrectly adjusted. Transmission throttle cable is lagging behind carburettor throttle advance, scheduling shifts sooner than normal (when transmission throttle pressure is not high enough to provide a crisp, firm shift).

Shift Speeds

The shift pattern summary chart of this section summarises shift speeds for the transmission.

Reference to this chart should be made when conducting a road test. However, it is **permissible** for shift speeds to occur just **outside** the ranges, **as long as** the shift quality is good.

Speedometer error, abnormal vehicle loading and abnormal operating conditions also affect the shift points. However, if shift speeds are appreciably outside the specified range, transmission throttle cable adjustment may be incorrect.

STALL TEST

WARNING: During test let no one stand in front of vehicle.

The stall test consist of determining the engine speed obtained at full throttle in "D" position. This test checks the torque converter stator clutch operation, and the holding ability of the transmission clutches. The transmission oil level should be checked and the engine brought to normal operating temperature before stall operation. **Both the parking and service brakes must be fully applied and front wheels blocked while making this test.**

Do not hold the throttle open any longer than is necessary to obtain a maximum engine speed reading, **and never longer than five seconds at a time.** If more than one stall check is required, operate the engine at approximately 1,000 r.p.m. in neutral for 20 seconds to cool the transmission fluid between runs. **If engine speed exceeds the maximum limits shown, release the accelerator immediately since transmission clutch slippage is indicated.**

STALL SPEED ABOVE SPECIFICATION

If stall speed exceeds the maximum specified in chart by more than 200 r.p.m., transmission clutch slippage is indicated. Follow the transmission oil pressure and air pressure checks outlined in the Service in Vehicle section to determine the cause of slippage.

STALL SPEED BELOW SPECIFICATION

Low stall speeds **with a properly tuned engine** indicate torque converter stator clutch problems. A road test will be necessary to identify the exact problem.

If stall speeds are 250-350 r.p.m. below specification and the vehicle operates properly at highway speeds but has poor through-gear acceleration, the stator overrunning clutch is slipping.

If stall speed and acceleration are normal, but abnormally high throttle opening is required to maintain highway speeds, the stator clutch has seized.

Both of these stator defects require replacement of the torque converter.

NOISE

A whining or siren-like noise due to fluid flow is normal during stall operation with some converters; however, loud metallic noises from loose parts, or interference within the assembly, indicate a defective torque converter. To confirm that the noise originates within the converter, operate the vehicle at light throttle in "D" and "N" on a hoist and listen under the transmission bell housing.

MODEL	R.P.M.
2,0ℓ	2,500-2,600
2,6ℓ	2,550-2,650

Fig 7—Stall speed chart

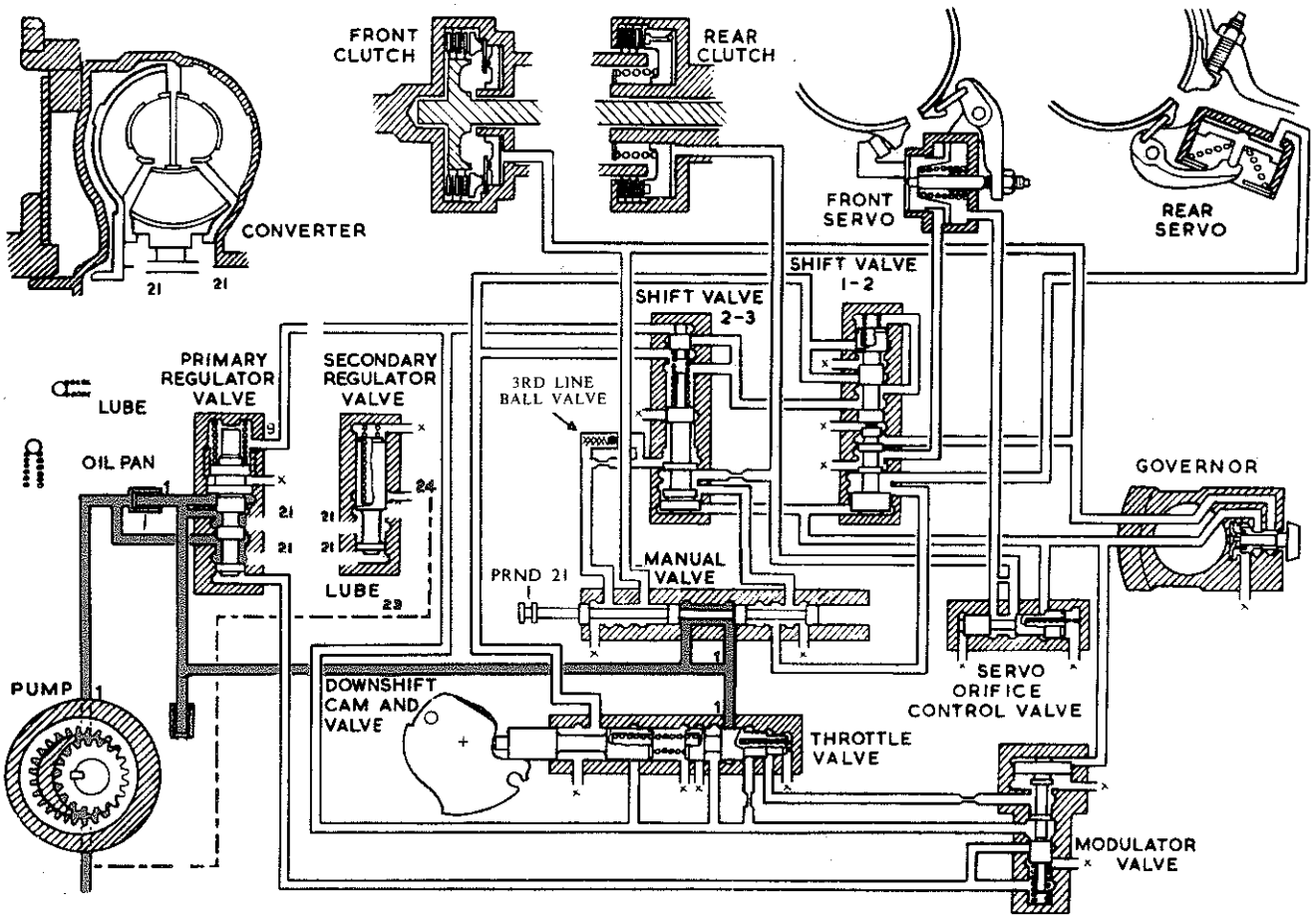


Fig. 8 – Hydraulic circuit diagram (neutral selected)

HYDRAULIC CIRCUIT

IN

N — NEUTRAL

(See Figure 8 on opposite page)

With the engine running, the pump produces hydraulic fluid pressure for whole system.

The primary regulator valve regulates line pressure (1) which is directed to the manual valve and throttle valve. It also permits fluid to reach the secondary regulator valve.

The secondary regulator valve regulates pressure to the converter and lubrication of the front end of the gear train (21). Identical pressure (23) is directed to the rear end of the gear train. The valve returns excess flow (24) to the oil pan through the pump inlet, thus partially returning the pump output.

POWER FLOW

Neutral

The front and rear clutches are off and no power is transmitted from the converter to the gear set.

The front and rear bands are also released.

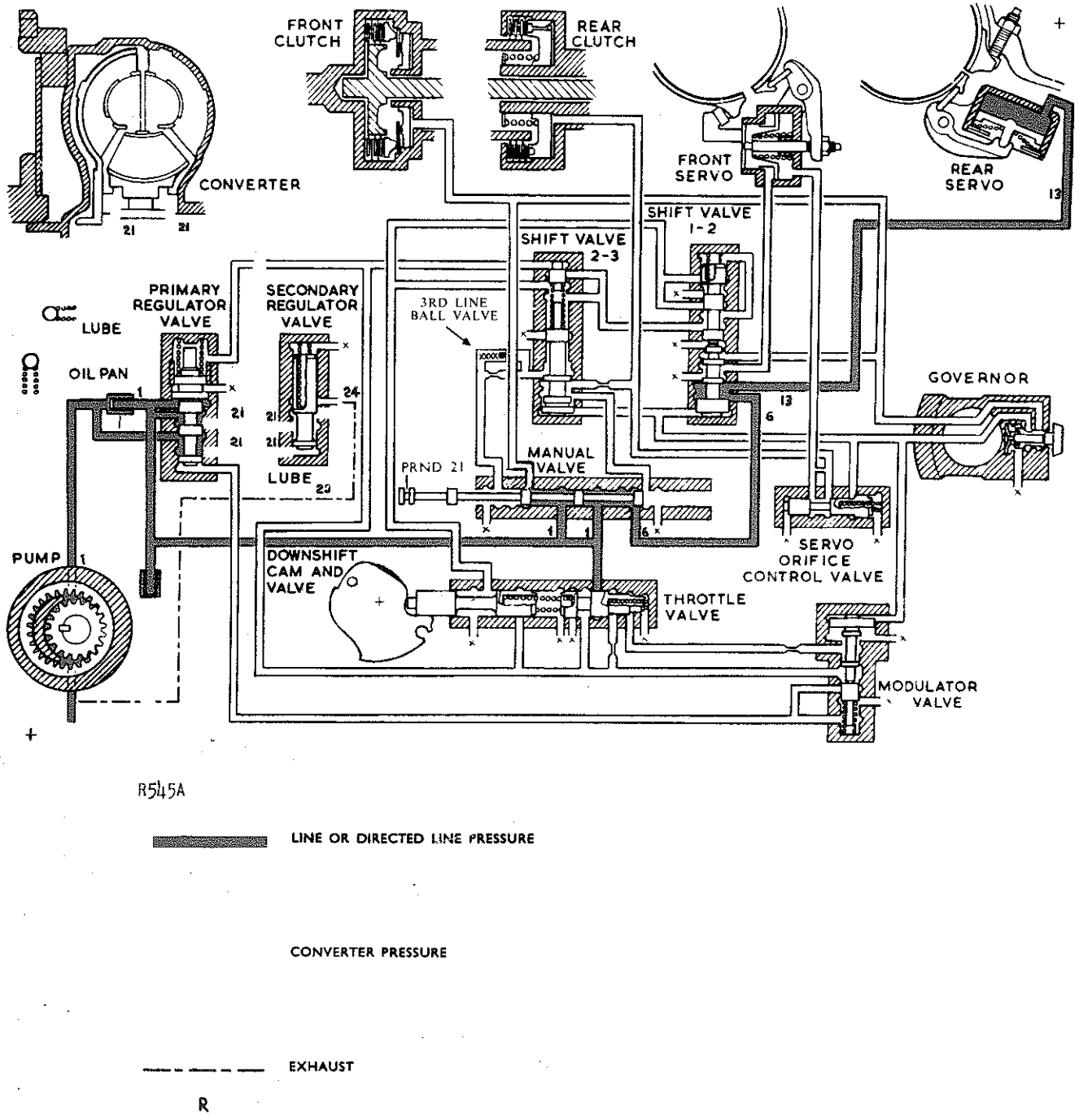


Fig. 8a – Hydraulic circuit diagram (park selected)

HYDRAULIC ACTION

IN

P — PARK

(See Figure 8A on opposite page)

An internal linkage from the manual valve detent lever engages the parking pawl with teeth formed on the outside of the driven shaft ring gear.

With the engine running, the operation of the hydraulic system is identical to N except that the manual valve directs line pressure (6) to the rear servo (13).

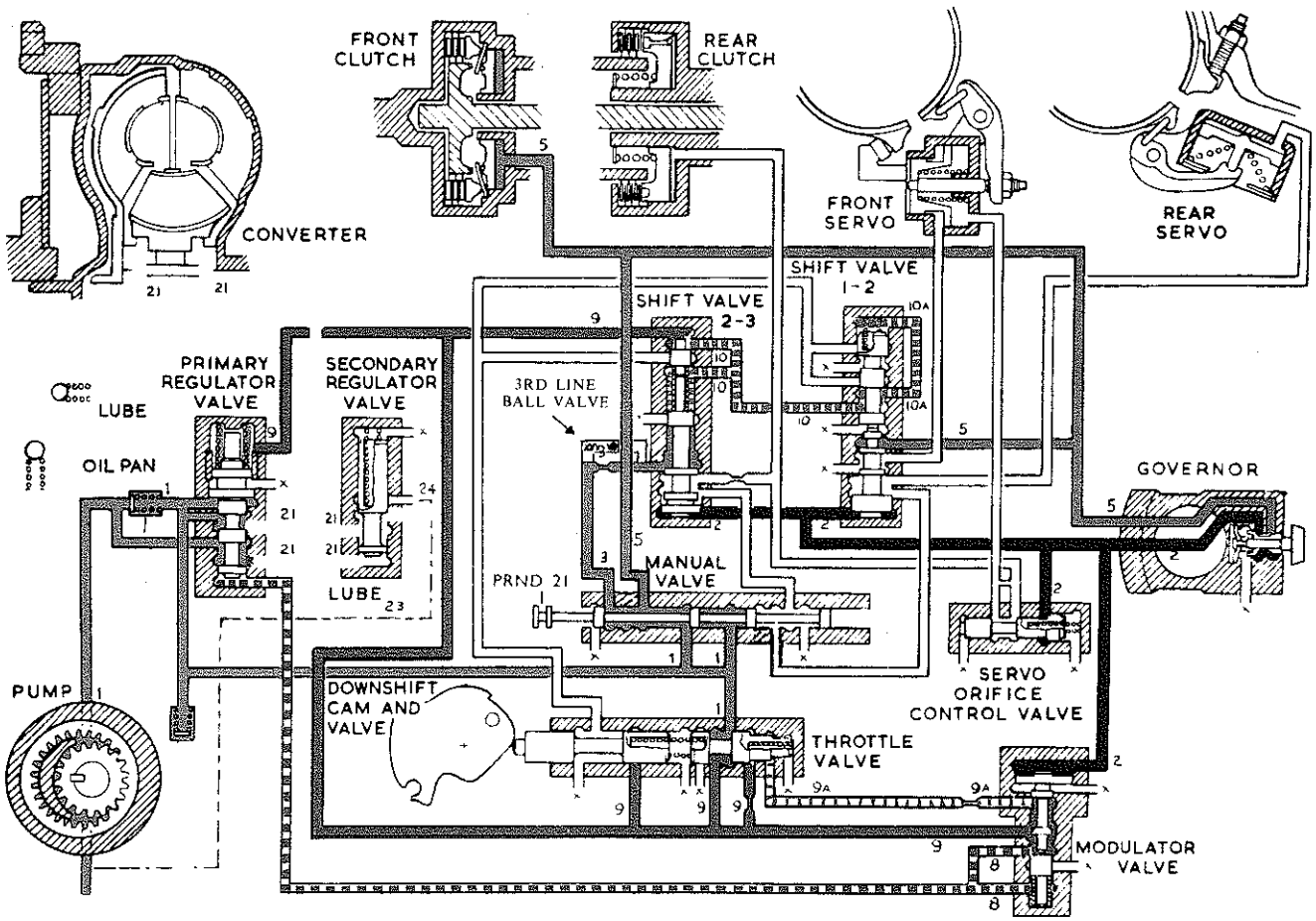
This arrangement is based upon the design of the hydraulic system without the rear servo or band performing any function in this selector position.

POWER FLOW

Park

The front and rear clutches are off and no power is transmitted from the converter to the gear set.

The front band is released. For constructional reasons the rear band is applied as long as the engine is running.



LINE OR DIRECTED LINE PRESSURE

CONVERTER PRESSURE

GOVERNOR PRESSURE

THROTTLE PRESSURE

MODULATED THROTTLE PRESSURE

THROTTLE PRESSURE CONTROLLED BY MODULATOR VALVE

SHIFT VALVE PLUNGER PRESSURE

EXHAUST

Fig. 8b – Hydraulic circuit diagram (1st gear selected)

HYDRAULIC ACTION

IN

DRIVE "1" — LOW

(See Figure 8B on opposite page)

Pressure control of the pump will be as in R (with the exception of the reverse booster mechanism) but with the throttle valve in the full throttle position as illustrated, throttle pressure (9) regulated by the modulator valve plunger (8) acts upon the primary regulator valve opposing throttle pressure (9), thus modulating line re-regulating pressure in the interest of gear shift quality.

The manual valve directs line pressure (5) to the front clutch, governor feed and 1–2 shift valve for the subsequent 1–2 shift. Line pressure (3) reaches the 2–3 shift valve for the subsequent 2–3 shift. The front clutch applied in conjunction with the one-way clutch, permits the car to move off from rest, in first gear.

DRIVE '1' (Low) — POWER FLOW

—Front clutch applied

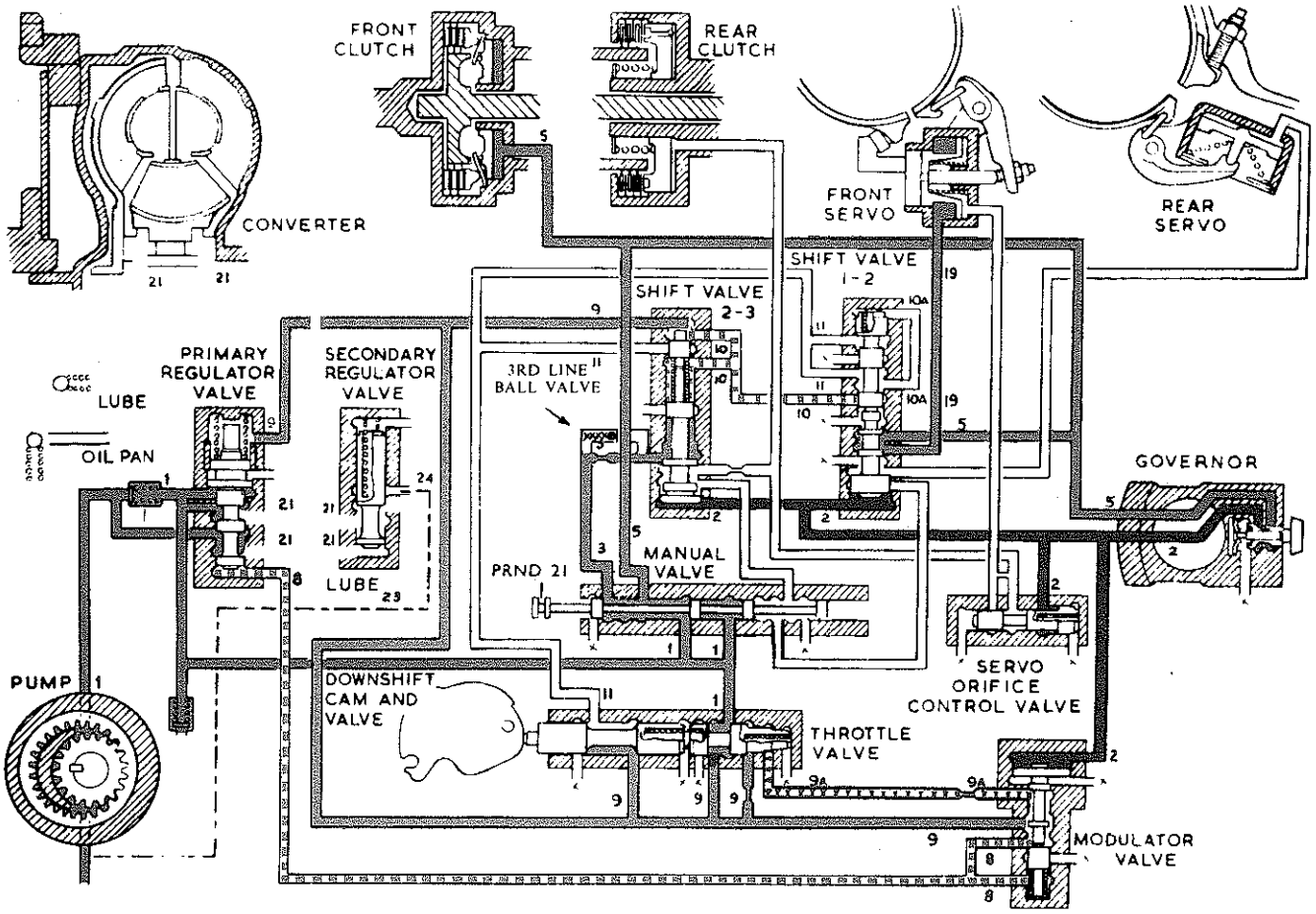
—One-way clutch in use.

—Power through front clutch drives small sun gear to short pinions, long pinions and ring gear.

—Planet carrier prevented from rotating anti-clockwise by one-way clutch.

—Ring Gear fixed to output shaft.

—Free wheeling because of one-way clutch.



LINE OR DIRECTED LINE PRESSURE

CONVERTER PRESSURE

GOVERNOR PRESSURE

THROTTLE PRESSURE

FORCED THROTTLE PRESSURE

MODULATED THROTTLE PRESSURE

THROTTLE PRESSURE CONTROLLED BY MODULATOR VALVE

SHIFT VALVE PLUNGER PRESSURE

EXHAUST

Fig. 8c – Hydraulic circuit diagram (2nd gear engaged—drive selected)

HYDRAULIC ACTION

IN

DRIVE 2 OR SELECTED 2 — INTERMEDIATE

(See Figure 8C on opposite page)

Pressure control by the primary regulator valve of the pump output provides torque converter and front lubrication requirements (21) as well as rear lubrication (23). Modulated throttle pressure (8) acts upon the primary regulator valve as in Drive 1. Shift control is provided by the 1–2 shift valve moving against spring pressure under influence of governor pressure (2). This permits line pressure (5) to reach the apply side of the front servo (19). The front band thus applied, in conjunction with the front clutch, provides 2nd gear. With the downshift valve in the forced throttle position as illustrated, forced throttle pressure (11) acts upon the 1–2 and 2–3 shift valves in addition to throttle pressure (10), thus further delaying upshifts or providing a 2–1 downshift at speeds when there is little governor pressure (2).

DRIVE 2 (Intermediate) SELECTED 2— POWER FLOW

—Front clutch applied

—Front band applied

—Power flow as in Drive '1' except front band has locked the large sun gear. This has caused the planet carrier to revolve clock-wise over-riding the one-way clutch and increasing output shaft speed.

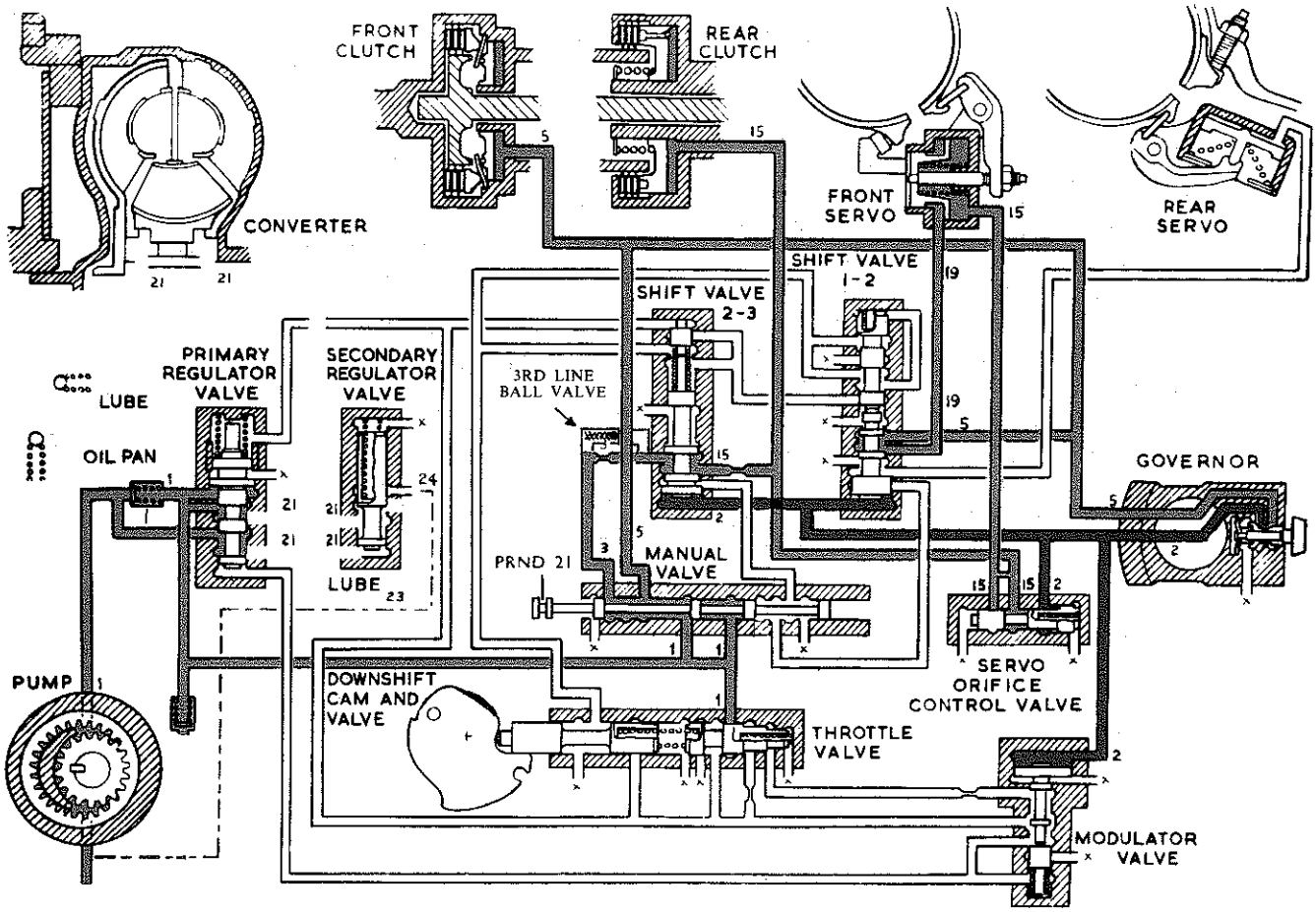


Fig. 8d – Hydraulic circuit diagram (direct drive—"D" selected)

HYDRAULIC ACTION

IN

3 — DIRECT DRIVE

(See Figure 8D on opposite page)

Pressure control is as in Drive 2 except that in the throttle valve position shown (minimum throttle) no throttle pressure or modulated throttle pressure acts upon the two ends of the primary regulator valve.

Shift control is provided by the 2-3 shift valve moving against spring pressure under influence of governor pressure (2). This permits line pressure (3) to reach the rear clutch direct (15) together with front servo release pressure directed through the servo orifice control valve. When the governor pressure is sufficiently built up about 65 km/h (41 m.p.h.) the servo orifice control valve closes, forcing front servo release oil from the servo through the 1.68-1.75 mm (.066-.069") servo orifice. This restraint on the exhaust of servo release pressure cushions the apply of the front band on 3-2 downshifts. At the higher speeds (i.e. above 65 km/h (41 m.p.h.) the servo orifice provides a greater cushioning effect to match the engine torque at those speeds. At the lower speeds (i.e. below 65 km/h (41 m.p.h.) the flow through the valve body channels provides sufficient restraint to cushion the exhausting front servo release oil and ensure acceptable band engagement for the low speed 3-2 shifts.

Because the release side of the front servo has a larger area than the apply side, the front servo will disengage the band. The rear clutch now engaged in conjunction with the front clutch provides 3rd gear.

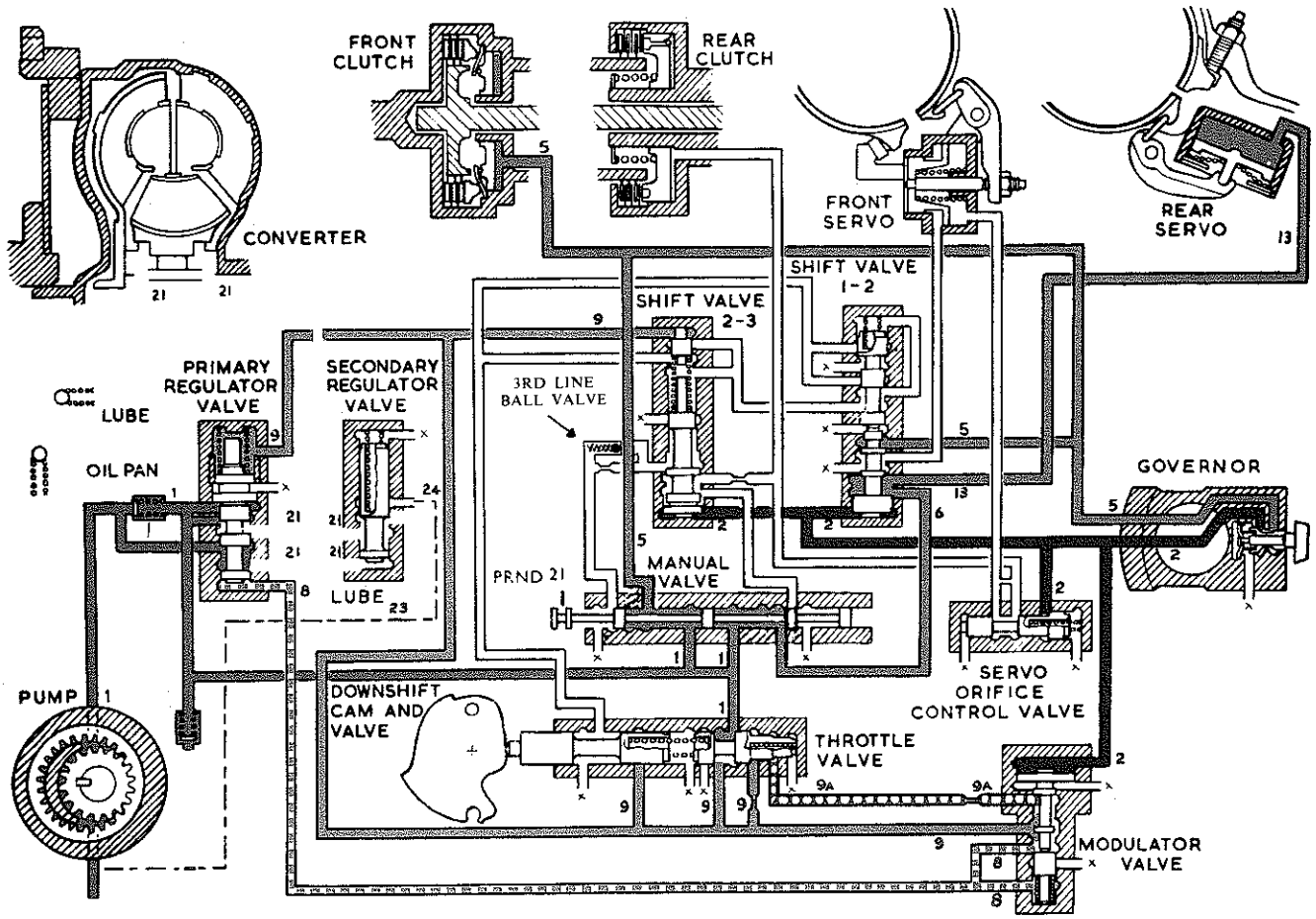
The absence of throttle pressure as mentioned above will cause the 2-3 shift valve to move early under influence of governor pressure, thus providing a low-speed 2-3 shift.

DRIVE DIRECT—POWER FLOW

—Front clutch applied

—Rear clutch applied

—Both sun gears are driven together locking up the gear train giving straight through drive.



R550

LINE OR DIRECTED LINE PRESSURE

CONVERTER PRESSURE

GOVERNOR PRESSURE

THROTTLE PRESSURE

MODULATED THROTTLE PRESSURE

THROTTLE PRESSURE CONTROLLED BY MODULATOR VALVE

EXHAUST

6550

8e – Hydraulic circuit diagram (1st gear engaged—"1" selected)

HYDRAULIC ACTION

IN

1 — (SELECTED)

(See Figure 8E on opposite page)

Pressure control of the pump will be as in Drive 1 as the same position of throttle valve (full throttle) is illustrated.

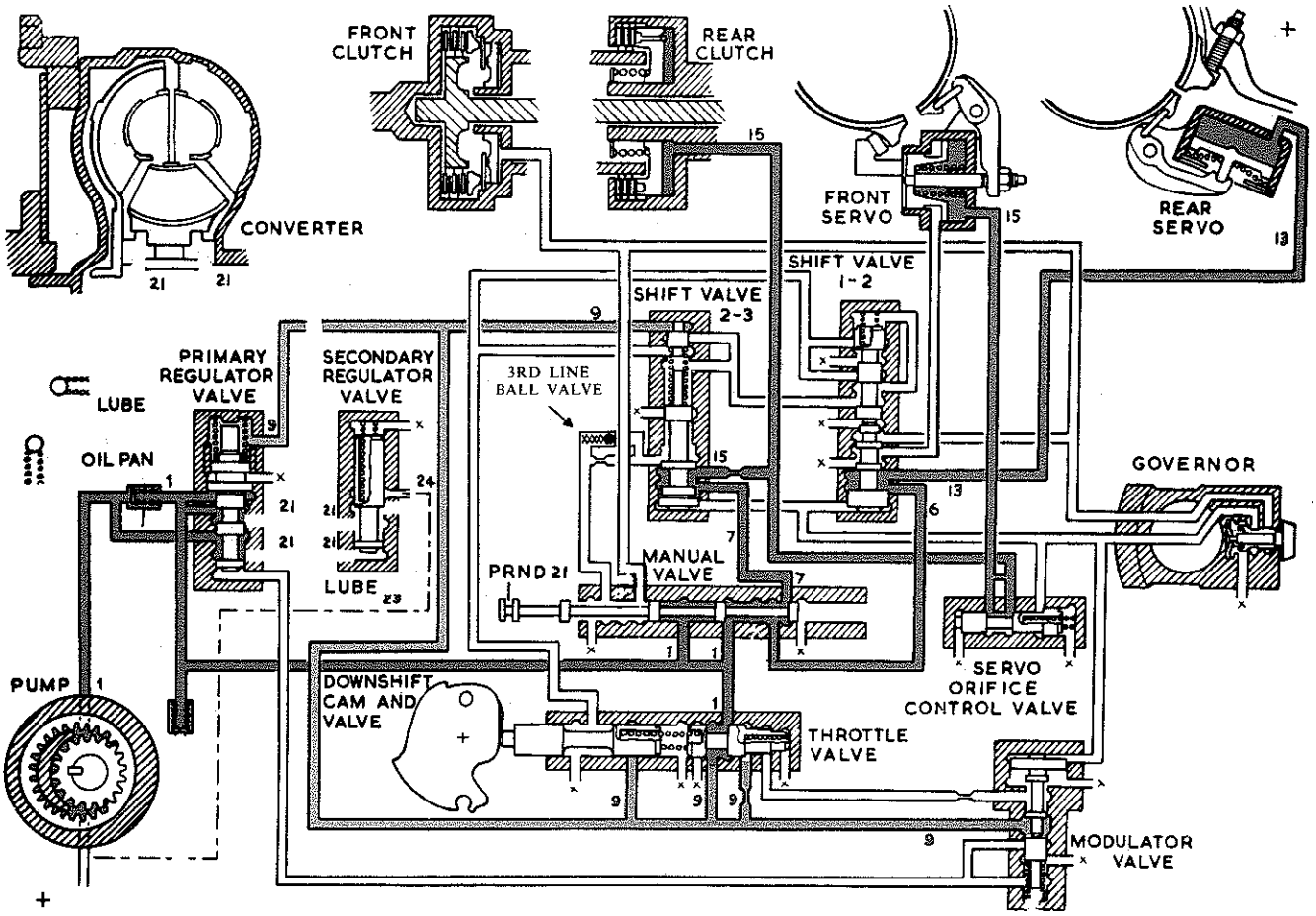
In first gear, in Selected "1", the manual valve directs line pressure (5) to the front clutch, governor feed and 1-2 shift valve. In the position illustrated, the 1-2 shift valve is subjected to insufficient governor pressure (2) to overcome spring force plus line pressure (6/13) acting on the differential area together with the spring force. The governor pressure (2) on the end area of the 1-2 shift valve cannot overcome both forces and the transmission remains locked in first gear. The result is that the valve prevents line pressure (5) from reaching the apply side of the front servo but line pressure (6) is open to the rear servo (13). For second gear in the Selected "1" position (not shown in Figure 8E), the manual valve opens to exhaust the rear clutch and front servo release circuit from the 2-3 shift valve. This causes a down-shift from 3rd gear whenever "1" or "2" is selected at speed. In this condition governor pressure (2) will move the 1-2 shift valve; the result is that line pressure (6) will then be blocked from the rear servo (13) but open (5) to the apply side of the front servo (19) as in Drive 2.

SELECTED "1" (LOCK-UP)—POWER FLOW

—Front clutch applied

—Rear band applied

—Power flow as in Drive "1" with the exception that engine braking is obtained because rear band holds planet carrier from rotating.



8f – Hydraulic circuit diagram ("R" reverse selected)

HYDRAULIC ACTION

IN

R — REVERSE

(See Figure 8F on opposite page)

Pressure control of the pump is as in P or N, however at idle speed when R is selected a trip mechanism increases line pressure in reverse to 620-965 kPa (90-140 p.s.i.), but in accordance with accelerator pedal depression, throttle pressure (9) is directed to the spring end of the primary regulating valve thus increasing line pressure (1) in accordance with torque capacity requirements.

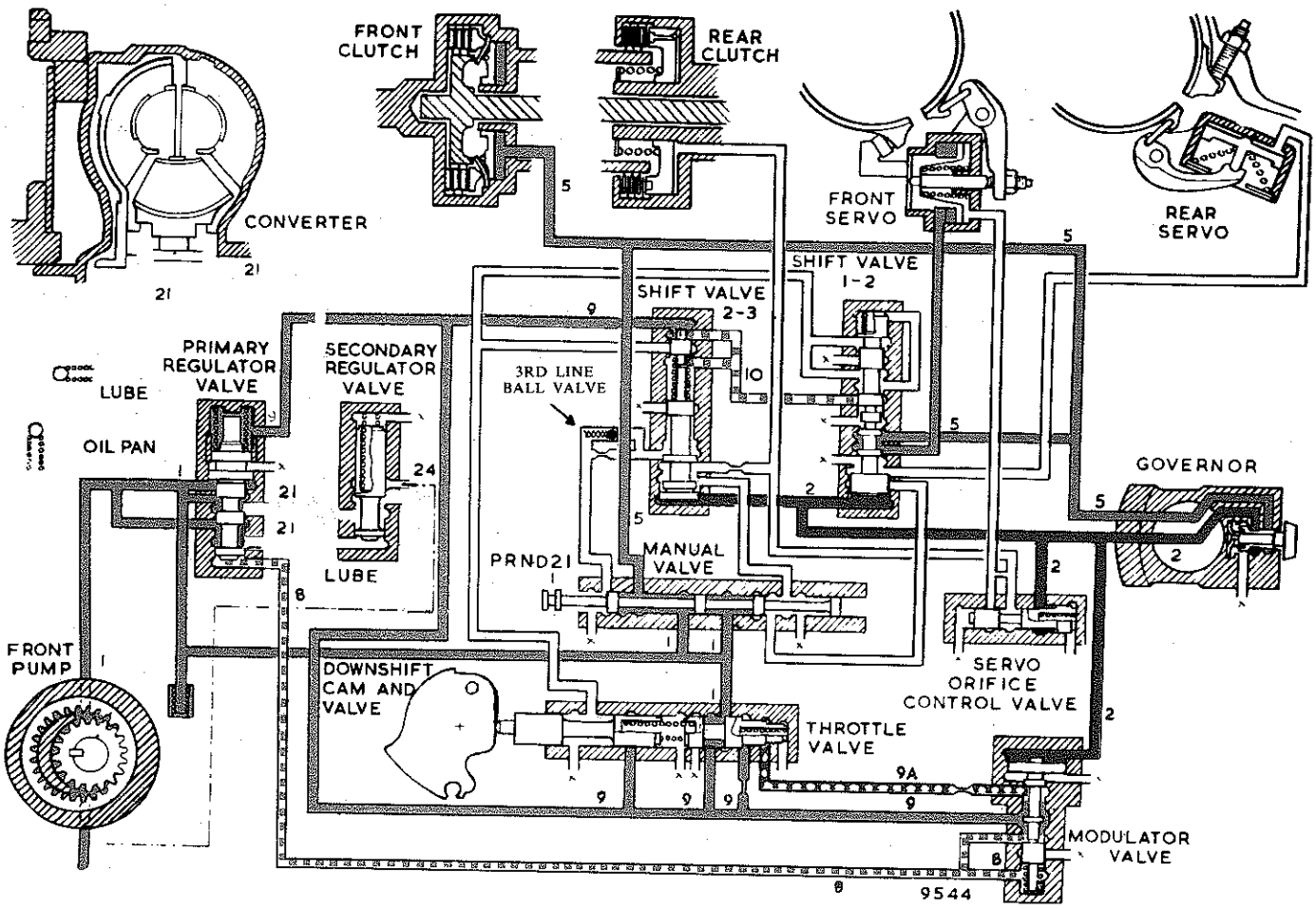
The manual valve directs line pressure (6) through the 1–2 shift valve to the rear servo (13) and line pressure (7) through the 2–3 shift valve to the rear clutch and front servo release (15). Due to absence of governor pressure the shift valves and servo orifice control valve perform no function in this selector position. The fluid passages 13 and 15 of other manual valve positions are utilised in R to simplify the hydraulic circuit.

REVERSE—POWER FLOW

—Rear clutch applied

—Rear band applied

—Power through a rear clutch drive large sun gear. Planet carrier is held by rear band, giving a step-down ratio in reverse.



LINE OR DIRECTED LINE PRESSURE

CONVERTER PRESSURE

GOVERNOR PRESSURE

THROTTLE PRESSURE

MODULATED THROTTLE PRESSURE

THROTTLE PRESSURE CONTROLLED BY MODULATOR VALVE

SHIFT VALVE PLUNGER PRESSURE

EXHAUST

The numbers refer to the hydraulic circuits on page 21 - 12 - 23

9544 A.

Fig. 8g – Hydraulic circuit diagram (2nd gear engaged—2 selected)

CIRCUIT IDENTIFICATION AND CIRCUITS

Circuit No.	Pressure	From	To	Remarks
1	Line Pressure	Pump	Primary Regulator Valve Manual Control Valve Throttle	Varies with Road Speed
2	Governor Pressure	Governor	Modulator 1–2 Shift Valve 2–3 Shift Valve Servo Orifice Control	
3	Directed Line Pressure	Manual Control Valve	2–3 Shift Valve	in D '3'
5	Directed Line Pressure	Manual Control Valve	Front Clutch Governor feed 1–2 Shift Valve	in '1' '2' and D
6	Directed Line Pressure	Manual Control Valve	1–2 Shift Valve	in '1' '2' D R and P
7	Directed Line Pressure	Manual Control Valve	2–3 Shift Valve	in R and P
8	Modulated Throttle Pressure	Modulator Valve	Primary Regulator Valve (piston end)	
9	Throttle Pressure	Throttle Valve	Modulator Valve Primary Regulator Valve (spring end) 2–3 Shift Valve Shift Valve Plunger	Doubles throttle pressure before cut-back by its absence and increases line pressure under all throttle positions to cater for torque converter torque increase when accelerating from rest. When cut-back occurs, this pressure (9a) cuts back throttle pressure and hence line pressure, since the converter has entered the coupling phase and is no longer multiplying engine torque.
9A	Throttle Pressure Controlled by Modulator Valve	Modulator Valve	Throttle Valve	
10	Shift Valve Plunger Pressure	Shift Valve Plunger	2–3 Shift 1–2 Valves	
10A	Shift Valve Plunger Pressure	Shift Valve Plunger	1–2 Shift Valve	in 1st Gear only
11	Forced Throttle Pressure	Downshift Valve	1–2 Shift 2–3 Valves	
13	Line Pressure	1–2 Shift Valve	Rear Servo Apply	
15	Line Pressure	2–3 Shift Valve	Rear Clutch and Front Servo release	
19	Line Pressure	1–2 Shift Valve	Front Servo Apply	
21	Secondary regulator valve and converter	Primary Regulator Valve	Secondary Regulator Valve	
23	Lubrication Pressure	Secondary Regulator Valve		
24	Exhaust (Vent)	Secondary Regulator	Pump Suction	

The Hydraulic System

In brief, hydraulic fluid is pumped under pressure to the control system. The control system regulates the fluid pressure and directs the fluid to the hydraulic operating units — the clutch pistons and band servos.

It is not essential to have a complete working knowledge of every valve in the control system, the road test and pressure test will provide all the clues needed to diagnose shift troubles.

The pressure supply system consists of an oil pump driven by the engine through the torque converter to supply all the pressure for hydraulic and lubrication requirements.

NOTE: It is not possible to start the engine through the transmission by pushing or towing.

Whenever the vehicle is to be towed the following precautions must be adhered to:

Transmission Inoperative

Tow the vehicle with a rear end pick-up or disconnect the propellor shaft.

Transmission Operating Properly

Because the transmission receives lubrication only when the engine is running, it is good practice to always tow a disabled vehicle with a rear end pick-up or disconnect the propellor shaft from the rear axle, then strapping the propellor shaft to body.

Hydraulic System "Lock-up"

All hydraulic circuits in the transmission are vented whenever they are not being used to apply a clutch or band. Consequently it is not possible for fluid under pressure to be trapped in an unused circuit where it could prevent the release of the operating unit.

If a clutch or band hangs up, the trouble is mechanical.

Service Adjustments and Tests

The road test will help pinpoint the trouble to one specified clutch or band. If the problem is traced to either the kickdown band or the low and reverse band, a band adjustment may be all that is needed to correct the complaint. However, if an adjustment appears to correct the complaint, ensure that a sample of the transmission fluid is checked for loose particles of band facing material before returning the vehicle to its owner.

Any evidence of deteriorating friction material necessitates a complete overhaul.

On complaints of poor shift quality, the gear shift control linkage adjustment and the transmission throttle cable adjustment must be checked. These two adjustments will correct many shift complaints and they are insurance against transmission troubles of a more serious nature.

Procedures for carrying out the following service adjustments and tests necessary for diagnosing transmission faults are outlined in the Service Information Procedure.

1. Low and reverse band adjustment.
2. Kickdown band adjustment.
3. Transmission throttle cable adjustment.
4. Line pressure check.

Important Service Precautions

An automatic transmission is a complex assembly . . . particularly the valve body. However, it is not necessary to know how every control valve and hydraulic circuit works to do an expert job of servicing the transmission. Accurate diagnosis will indicate what to concentrate on if disassembly and repair is necessary. It will also help to avoid unnecessary disassembly.

The Valve Body

The valve body is undoubtedly the one part of the transmission that technicians fear most, and because the valve body is complex and awe-inspiring many serviceable valve bodies are replaced unnecessarily.

Of course, a new valve body will cure many shift problems but a thorough cleaning of the original valve body could also cure the shift problem.

NOTE: The most common cause of valve body trouble is dirt, not worn or damaged parts.

Valve Body Service Tips

There are three important points to remember when servicing the valve body.

1. Handle all parts gently.
2. Clean all parts thoroughly, and keep them clean.
3. Assemble all parts correctly.

If the above cardinal rules of valve body service are observed and the service tips below are read, no trouble should be experienced.

Handle Parts Gently

Never clamp the valve body or any part of a body in a vice. Do not use force when removing or installing parts. The "fits" between valves and bores are close but they will go together easily if they are free from nicks and burrs and absolutely clean. Be careful not to drop any of the parts, particularly the valves.

Clean Parts Thoroughly

Since dirt is the number one enemy of the valve body assembly, it stands to reason that a thorough cleaning is the number one cure. Many technicians prefer to clean the parts in a series of solvent-filled containers, beginning with a solvent that has been used considerably. In this container, the largest deposits are removed. From there, the parts are immersed in containers having successively cleaner solvent. Finishing with a clean solvent, rinse. Dry the parts with clean, dry compressed air. Do not wipe parts with a cloth — lint will remain on the parts.

Test Valves

To ensure the valves will operate when the valve body assembly is rebuilt, test the valves, one at a time. Slip a valve into its bore in the valve body. Do not lubricate the valve or install any springs for this test. Tip the body back and forth so that the valve moves back and forth in its bore. If the valve does not move freely, remove it and inspect for burrs on the valve lands. Slight burrs can be polished down using crocus cloth, but **be careful not to round off the corners** of the lands. These sharp edges are essential for proper valve operation.

Assemble Parts Correctly

During assembly of the valve body, do not trust your memory; follow the Service instructions and illustrations contained in this section.

Inspection During Disassembly

Every part of the suspected system should be carefully examined as it is removed. Pay particular attention to the condition of the O-rings and other seals. Also examine the seal and bushings area of the impeller hub. This area should be extremely smooth to the touch. Any wear or roughness will cause seals to fail. Finally, be sure to clean and carefully inspect the pump. Since it is the only source of hydraulic pressure, it is essential that it be in good condition.

Cleanliness

The importance of doing everything possible to ensure that the transmission be kept absolutely clean cannot be overstressed. If any part of the transmission has failed, the torque converter must be flushed to ensure that fine metal particles or small fragments of friction material are are not left to circulate through the reconditioned transmission. Do not be afraid to use plenty of solvent — keep flushing until the solvent comes out clean.

Do not neglect to clean the oil cooler and its connecting lines thoroughly.

SHIFT PATTERN SUMMARY

Condition / Engine Application / Axle Ratio	2,0ℓ 3.54:1		2,0ℓ 3.42:1	2,6ℓ 3.42:1
	km/h*	km/h†	km/h	km/h
Closed Throttle 1-2 upshift	10-14	11-16	16-23	16-23
Closed Throttle 2-3 upshift	14-21	16-22	19-26	19-26
Forced (wide open Throttle 1-2 upshift)	47-58	51-64	56-69	60-72
Forced (wide open Throttle 2-3 upshift)	84-93	91-102	103-116	108-121
Kickdown limit 3-2 downshift	74-87	80-94	90-100	92-105
Kickdwn limit (incl. 2-1) 3-1 downshift	34-50	37-54	40-60	42-63
Closed Throttle 3-1 downshift in 'D'	5-11	5-13	10-16	10-16
Closed Throttle 3-1 or 2-1 downshift in low when selected, from either 'D' or '2', at speed	19-35	20-38	23-40	23-40
Part Throttle 3-2 downshift (1/3 Throttle i.e. 15 mm (0.6") Cable Movement)	14-30	16-34	—	—
Part Throttle 3-2 downshift (3/4 Throttle i.e. 33 mm (1.3") Cable Movement)	38-53	42-58	—	—
Part Throttle 3-1 downshift (3/4 Throttle)	19-40	21-43	—	—
Forced (wide open Throttle 1-2 upshift). Selector in L2	—	—	56-69	60-72
Forced (wide open Throttle 2-1 downshift). Selector in L2	—	—	40-60	42-63

* up to Serial No. 4814.
† from Serial No. 4814.

SERVICE INFORMATION — PROCEDURES

LUBRICATION

Fluid Level

The fluid level should be checked at every engine oil change period. When checking, the engine and transmission should be at normal operating temperature and the vehicle standing on a level floor. The lever indicator is located to the right of the engine (Refer Fig. 9).

(1) With the parking brake applied and the engine idling, select each gear position momentarily, ending with "N" Neutral position, allow to idle for two minutes.

(2) The fluid level should check at the "full" mark, or slightly below, but never above the "full" mark when the engine is at its normal temperature. Add or remove fluid as necessary to bring to this prescribed level (Refer Fig. 10).

NOTE: Refer specifications for correct type of transmission fluid.

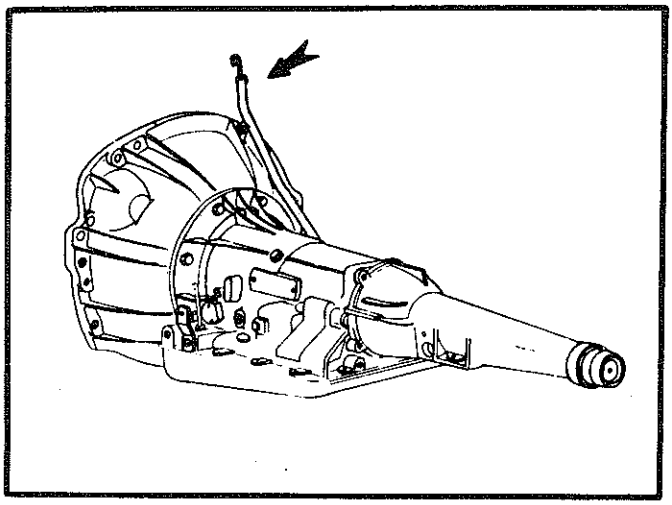


Fig. 9—Transmission fluid level indicator (dip stick)

CAUTION: To prevent dirt or water from entering transmission after checking or replenishing fluid, make certain that the dip stick cup is reseated correctly on to the filler tube.

If it is necessary to check fluid when the transmission is cold, the fluid should be not higher than 9 mm (3/8") below the "full" mark.

Fig. 10—Transmission dip stick markings (typical)

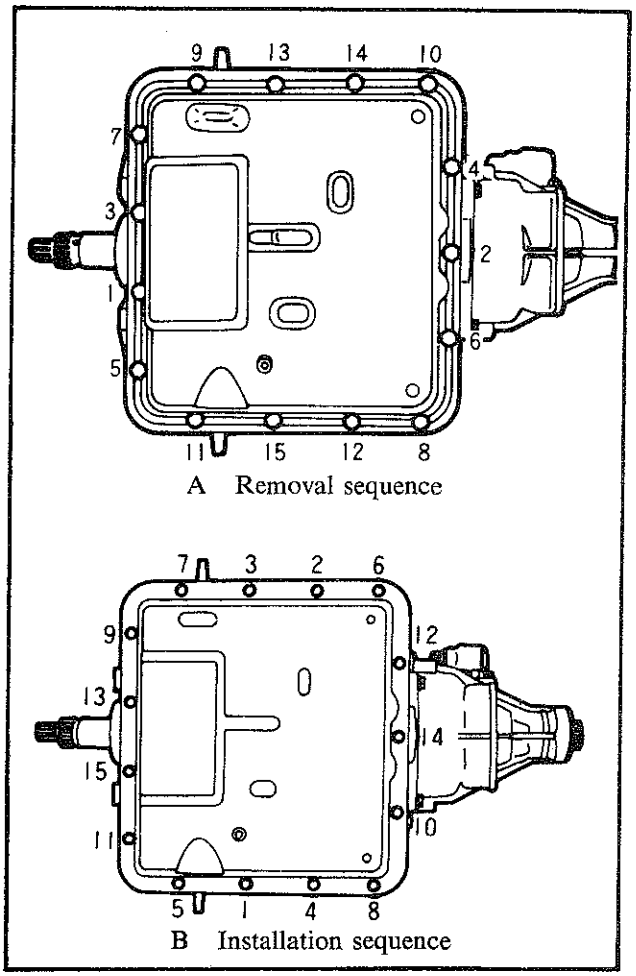


Fig. 11—Oil pan attaching bolts removal and installation sequence

DRAIN, REFILL AND PERIODIC ADJUSTMENTS

The transmission adjustments and fluid change should be made regularly as shown in the lubrication and maintenance schedule.

NOTE: For severe operating conditions (continual towing, taxi and similiar operations) the transmission adjustments and fluid change should be performed more frequently.

(1) Drain oil from transmission as follows:
Remove the transmission drain plug permitting the fluid to drain.

(2) Remove transmission oil pan — clean oil pan.

(3) Adjust reverse (rear) band. Refer band adjustments.

(4) Adjust kickdown (front) band. Refer band adjustments.

(5) Adjust gear shift control linkage. Refer Section 14, Linkage Adjustment.

(6) Install oil pan using a new gasket and tighten screws evenly to specified torque.

(7) Add 4.5 litres (8 pints) of Automatic Transmission fluid through the filler tube (the recommended fluids are listed in the specifications).

(8) Start engine and add approximately 1 litre (1 quart) of fluid whilst engine is idling.

(9) Allow engine to idle for at least two minutes, then with the parking brake applied select each drive range momentarily, ending with the Neutral position selected.

(10) Add sufficient fluid to bring the fluid level to the "add one pint" mark.

(11) Adjust engine idle to specifications.

(12) Inspect for fluid leaks, then reinstall torque converter housing cover.

(13) Adjust the transmission and carburettor throttle cables. Refer Section 14 Linkage adjustment.

(14) Test vehicle performance.

CAUTION: To prevent dirt or water from entering transmission, make certain that the dip stick cap is reseated correctly on to filler tube.

Fluid Leaks

Leaks which may be repaired with the transmission in the vehicle are: transmission output shaft oil seal, extension housing gasket, speedometer pinion seal and cable seal, oil filler tube seal, oil pan gasket, selector shaft seals, neutral starting switch seal, oil cooler line fittings and pressure take-off plug.

CAUTION: If the oil filler tube or dip stick is removed every precaution must be taken to prevent dirt from entering the transmission hole. If this event occurs, remove oil pan and clean thoroughly.

If oil is found inside torque converter housing determine whether it is transmission fluid or engine oil.

Leaks at these locations should be corrected, regardless of how slight. Correct by tightening loose screws, nuts or plugs. Where this does not remedy the situation, replace faulty gaskets, seals, plugs, or other parts as required.

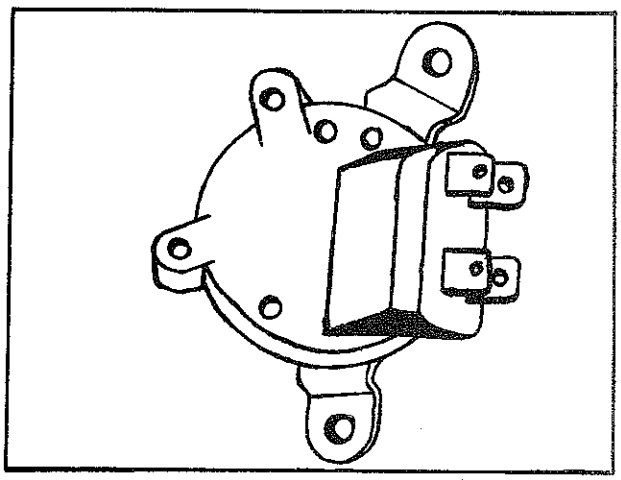


Fig. 12—Neutral starting and reverse light switch assembly

Leaks requiring removal of transmission are: porous transmission case, sand hole in oil pump housing, oil pump housing retaining screws or sealing washers damaged, oil pump housing gasket, torque converter assembly and converter impeller hub, oil seal (located in oil pump housing).

Leaks at these locations may be corrected by tightening loose bolts or replacing damaged or faulty parts. Any sharp edges on the converter impeller hub which could contact the seal during reinstallation should be removed by stoning with a fine stone.

NEUTRAL STARTING AND REVERSE LIGHT SWITCH

NOTE: The combination switch contains two pairs of contacts.

The neutral starting switch should operate in both the park and neutral selector lever positions, while the reverse lights operate only in reverse selected position.

Testing Wiring

NOTE: To prevent vehicle from moving off when operating starter motor during test procedure, disconnect the L.T. lead to the distributor and apply the handbrake.

(1) Disconnect the multi-connector from the switch.

(2) Join the red/blue lead connector cavities using a suitable bridge connection. The reversing lights should light when the ignition is turned "ON".

(3) Join the yellow/black lead terminal cavities using a suitable bridge connection. The starter motor should operate when the ignition/starter switch is operated.

Testing Switch (Installed)

NOTE: This switch is not adjustable.

(1) Select "R" — Reverse and switch ignition "ON".

(2) Use suitable bridge connection to join "white" lead connector cavity to its mating switch pin. Connect series test lamp to switch pin (normally attached to "light green" lead) and earth. The lamp should light — replace switch if faulty.

(3) Select "P" or "N".

(4) Use suitable bridge connection to join "white" lead connector cavity to "yellow" lead switch pin. Connect series test lamp between "black" lead switch pin and earth. The lamp should light — replace switch if faulty.

NOTE: The lamp should light only in park or neutral position.

(5) Reconnect the multi-connector to the switch.

Switch or Shaft Seal Replacement

The switch is secured by 2 screws to the transmission case and operated by a linkage driven shaft. The shaft seal is accessible after removing the switch and the "E" clip from the shaft.

BAND ADJUSTMENTS

Kickdown Band (Front Band)

(1) Drain transmission fluid and remove the oil pan.

(2) Loosen adjusting screw lock nut and back off the nut 5 turns (check screw for free rotation in lever).

(3) Lift the servo lever away from the servo piston and insert Tool E1282 Front band spacer gauge 6.35 mm (.250") between the adjusting screw and the servo piston pin.

(4) Tighten adjusting screw to 1.1 Nm (10 lbs. in.) torque.

(5) Tighten lock nut to 20-27 Nm (15-20 lbs. ft.) torque while maintaining screw position.

(6) Withdraw the gauge tool.

NOTE: Special Tool E1282 6.35 mm (.250") represents 4 back-off turns, exactly, if tool is not available.

(7) Reinstall oil pan using a new gasket, tighten pan to specified torque.

(8) Refill transmission with approved Fluids from containers branded with the approved number (Refer to specifications.)

Low/Reverse Band (Rear Band)

The rear band adjustment screw is located centrally in the right side of the transmission case.

(1) Loosen the adjusting screw lock nut and back off nut several turns (check screw for free rotation in case).

(2) Tighten the adjustment screw to 13.5 Nm (10 lbs. ft.) using tool No. BW-547-502 or to 6.8 Nm (5 lbs. ft.) using Tool No. E1294-1 and the torque wrench.

(3) Back off the adjust screw ¾ turn and tighten the lock nut to 34-40 Nm (25-30 lbs. ft.) torque.

THROTTLE CABLE AND TRANSMISSION CABLE ADJUSTMENTS

Throttle cable and transmission cable adjustments are described in Section 14 Linkage Adjustment.

REPLACEMENT OF TRANSMISSION THROTTLE CABLE

This operation requires the removal of the oil pan and disconnecting of the cable from the throttle cam linkage. Unscrew the cable adaptor from the transmission case. Fit a new cable, the cable retaining torque is 13-16 Nm (10-12 lbs. ft.) with a new seal ring installed.

Adjustment of the cable should be conducted as described in Section 14 and a new ferrule is to be crimped to the nylon link, after the completion of the pressure setting.

HYDRAULIC CONTROL PRESSURE TEST

Line Pressure

There is one hydraulic pressure which can be checked. This is line pressure which is set in relationship to the transmission throttle valve cable. (Refer to — Throttle Cable and Transmission Throttle Cable Adjustments).

NOTE: Refer to chart for specifications of line pressure readings for Forward drive selections or in Reverse. The reading at "cutback" (reduced line pressure controlled by the modulator valve), will occur at various speeds depending on throttle opening, road speed and axle ratio used.

Engine Type	Wide Open Throttle Line Pressure	Reduced Line Pressure or "Cutback" Pressure
2,0ℓ	1033-1378 kPa (150-200 p.s.i.)	496-586 kPa (72-85 p.s.i.)
2,6ℓ	1068-1412 kPa (155-205 p.s.i.)	537-627 kPa (78-91 p.s.i.)

AIR PRESSURE TESTS

A NO DRIVE condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands and servos can be located through a series of tests by substituting air pressure for fluid pressure (Fig. 13).

The front and rear clutches, kickdown servo, and low reverse servo may be tested by applying air pressure to their respective passages after the oil pan and valve body assembly has been removed. To make air pressure tests, proceed as follows:

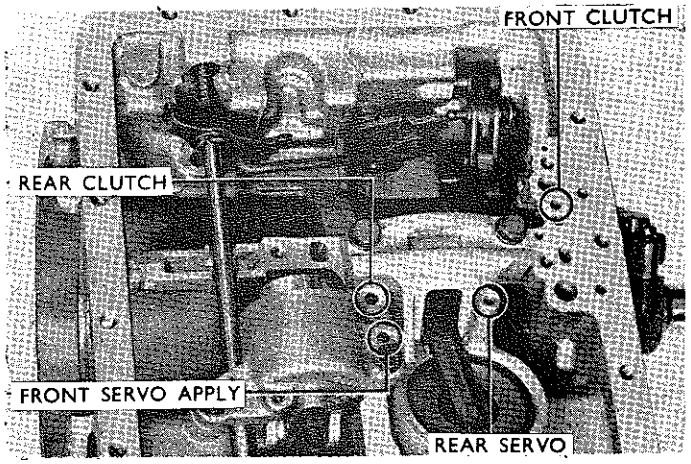


Fig. 13—Air pressure test apply locations (typical view)

CAUTON: Compressed air supply must be free of all dirt or moisture.

Front Clutch and Governor

Apply air pressure to front clutch "apply" passage and listen for a dull "thud" which indicates that front clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive oil leakage.

If the extension housing is removed, rotate the output shaft to position the governor weight to the bottom. When air is applied, the valve should move "inward".

Rear Clutch

Apply air pressure to rear clutch "apply" passage (Refer Fig. 13) and listen for a dull "thud" which indicates that rear clutch is operating. Also inspect for excessive oil leakage.

NOTE: If a dull "thud" cannot be heard in the clutches, place finger tips on clutch housing and again apply air pressure. Movement of piston can be felt as the clutch is applied.

Verify, by turning the output shaft, that the clutch is functioning. Listen for a "thump" indicating that the clutch is released when the air pressure is released.

Kickdown (Front) Servo

Direct air pressure into front servo "apply" passage (Refer Fig. 13). Servo operation is indicated by a tightening of front band. Spring tension on servo piston should release the servo and band.

Low and Reverse (Rear) Servo

Direct air pressure into rear servo tube "apply" passage (Refer Fig. 13). Observe the movement of the servo lever.

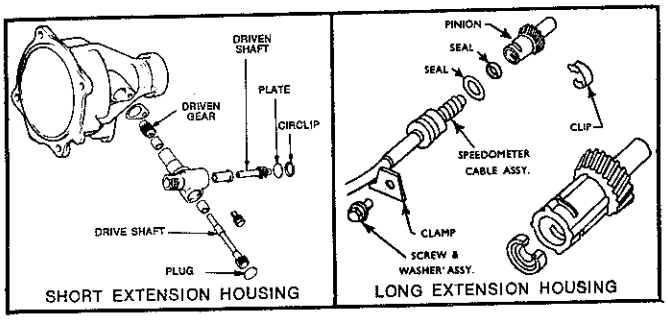


Fig. 14—Speedometer drive pinion—dis-assembled view

SERVICE OPERATIONS WITH TRANSMISSION IN VEHICLE

SPEEDOMETER DRIVE
Short Extension Housing

(1) The speedometer drive pinion assembly is retained in the extension housing with a bolt (Fig. 14).

(2) Remove drive shaft driven gear retaining pin and remove gear.

(3) Remove driven shaft circlip and plate, then remove shaft from housing.

(4) Remove drive shaft end plug and remove shaft assembly.

(5) Reassemble by reversing disassembly procedure.

(6) Install speedometer drive to transmission and tighten retaining bolt securely.

SPEEDOMETER DRIVE
Long Extension Housing

(1) The speedometer drive pinion assembly is retained in the extension housing with a clamp and screw (Fig. 14).

NOTE: Whenever transmission lubricant is found in the cable, the seal should be inspected, and replaced if unsatisfactory.

(2) Install the seal with the lips of the seal away from the pinion.

(3) Install the pinion on the cable and secure with clip in pinion while holding firmly together.

(4) Lightly lubricate the seal with Multi-purpose grease and carefully install the cable assembly in housing.

(5) Install retainer clamp and screw, tighten to 17 Nm (150 lbs. in.).

NOTE: For pinion size, refer to Speedometer pinion chart page 21 - 1 - 1.

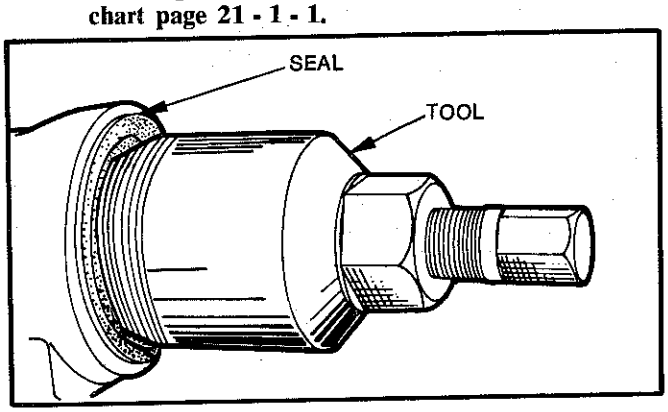


Fig. 15—Removing extension housing yoke seal

EXTENSION HOUSING YOKE SEAL REPLACEMENT

(1) Disconnect propeller shaft at rear universal joint. Carefully pull shaft yoke out of the transmission extension housing, being aware that the transmission fluid will flow from the seal when the spline is exposed. Plug opening or raise rear of vehicle.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal or installation of the shaft assembly.

(2) Remove the extension housing yoke seal (Refer Fig. 15) with Tool E6604.

(3) To install a new seal, position seal in opening of extension housing and drive it into the housing with Tool E21M10B (Refer Fig. 16).

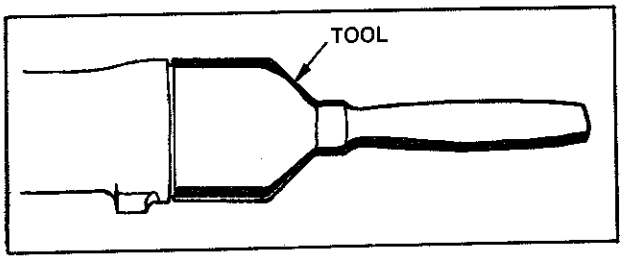


Fig. 16—Installing extension housing yoke seal

EXTENSION HOUSING AND BUSHING

Removal

(1) Raise the rear of the vehicle to prevent oil loss when the extension housing is removed.

(2) Disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(3) Remove speedometer pinion assembly (Refer Fig. 14).

(4) Remove bolts securing extension housing to the crossmember insulator. Raise transmission slightly with service jack then remove centre crossmember and support assembly.

(5) Remove extension housing to transmission bolts.

Bushing Replacement

(1) Pry or drive oil seal out of extension housing with a long blunt drift. Be sure not to mark oil seal surface in the housing.

(2) Press or drive out bushing with Tool E21M50 (Refer Fig. 17).

(3) Slide a new bushing on installing end of Tool E21M50. Align oil hole in bushing with oil slot in the housing, then press or drive bushing into place.

(4) Install a new oil seal into housing with Tool E21M10B (Refer Fig. 16).

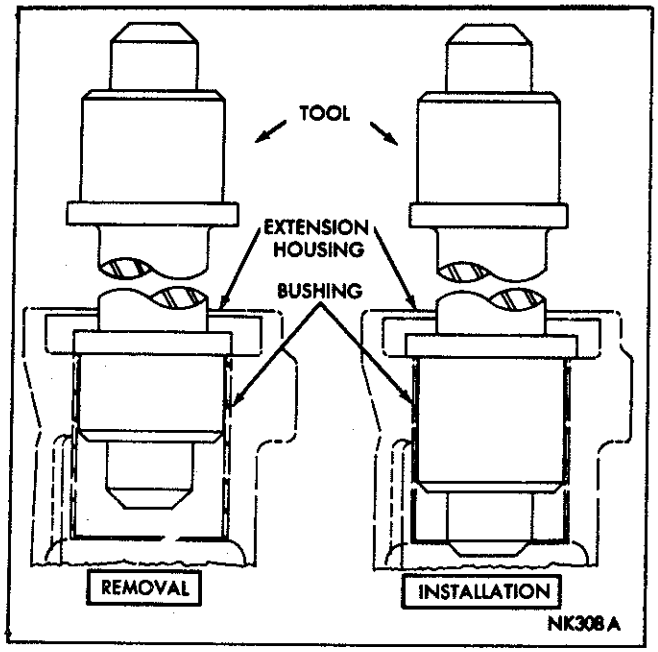


Fig. 17—Replacing extension housing bushing

SPEEDOMETER DRIVE GEAR

(1) Remove the circlip retaining the speedometer drive gear on the shaft (after the extension housing is removed).

(2) Withdraw the gear from output shaft and retrieve the 5 mm (3/16") drive ball from the shaft recess.

GOVERNOR VALVE ASSEMBLY

The governor valve, mounted on the rear of the output shaft, is a "single piece" assembly retained and driven by a large bolt in the governor housing.

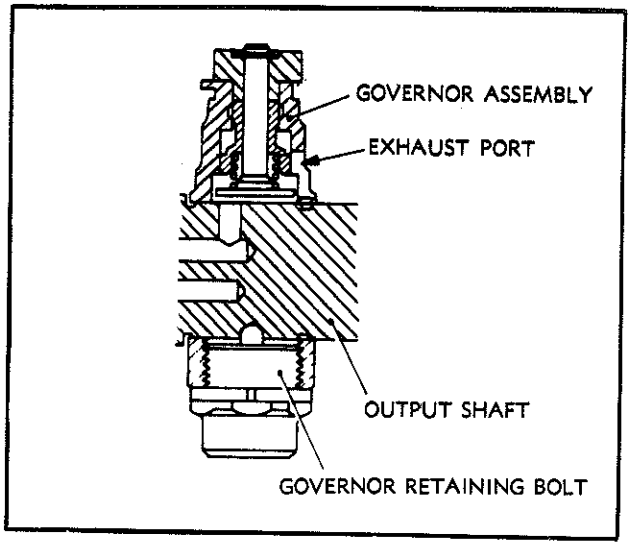


Fig. 18—Governor valve assembly on output shaft.

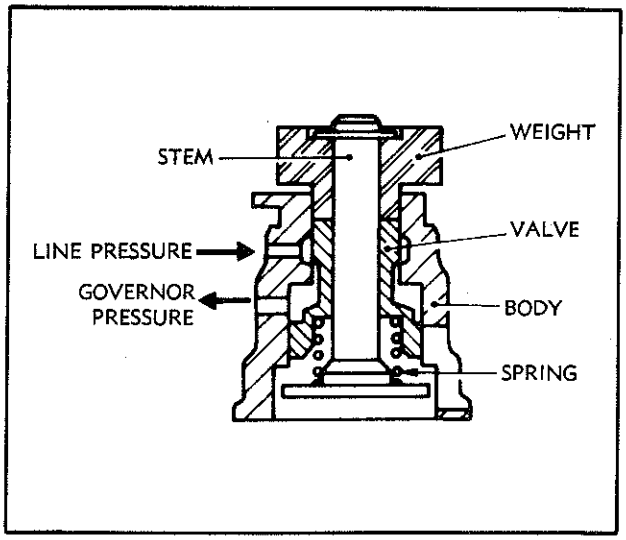


Fig. 19—Sectioned view of governor valve and weight

Removal

(1) Remove extension housing and speedometer drive gear (as previously described).

(2) Remove bolt and remove governor valve assembly from shaft.

Disassembly

(1) Remove governor valve retaining clip and remove the weight, valve, spring and stem from the valve body.

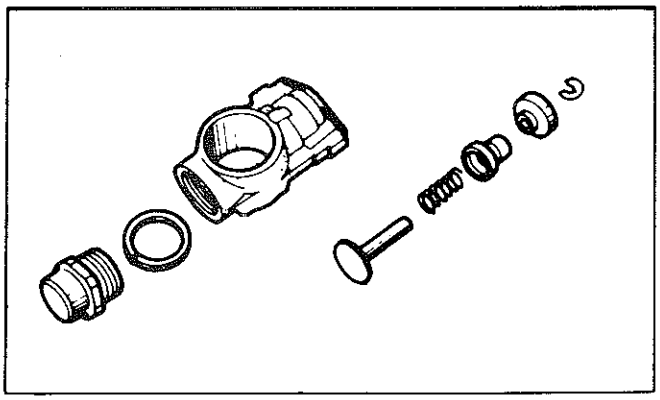


Fig. 20—Governor assembly

Cleaning and Inspection

The primary cause of governor operating failure is due to a sticking governor valve or weight. Rough surfaces may be removed with "crocus-cloth". Thoroughly clean all parts in clean solvent and inspect for free movement before assembly.

Reassembly and installation is the reversal of the removal procedure.

VALVE BODY ASSEMBLY

Removal

(1) Remove transmission oil pan drain plug, and allow fluid to drain.

(2) Remove transmission oil pan retaining screws, then remove pan.

(3) Remove the 4 exposed oil tubes carefully from their bores (Fig. 21).

NOTE: The front servo release port is fitted with a 4,76 mm (3/16") steel ball, which is peened into position in the housing.

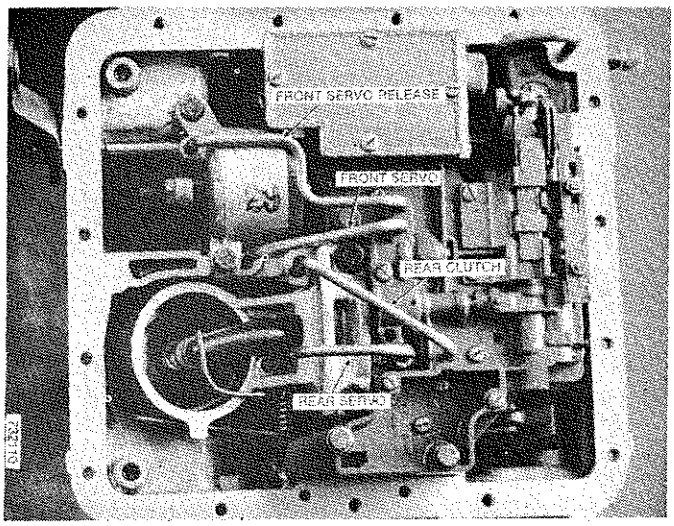


Fig. 21—Oil tubes positioned in valve body

(4) Remove the 3 valve body retaining bolts (7/16" hex. heads).

(5) Carefully detach the transmission throttle valve cable from the valve cam.

(6) Disengage the valve body assembly from the 3 supply tubes at front of the transmission. (Refer Fig. 23.)

(7) Remove the pump intake tube O-ring (from the tube or recess (Refer Fig. 23) in converter support).

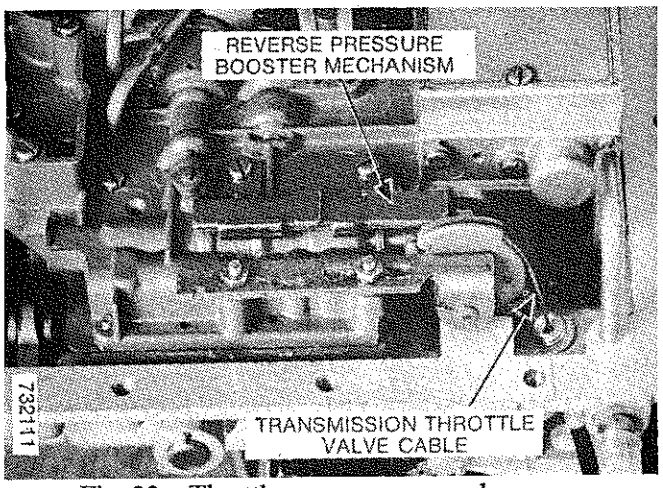


Fig. 22—Throttle pressure cam and reverse pressure booster mechanism

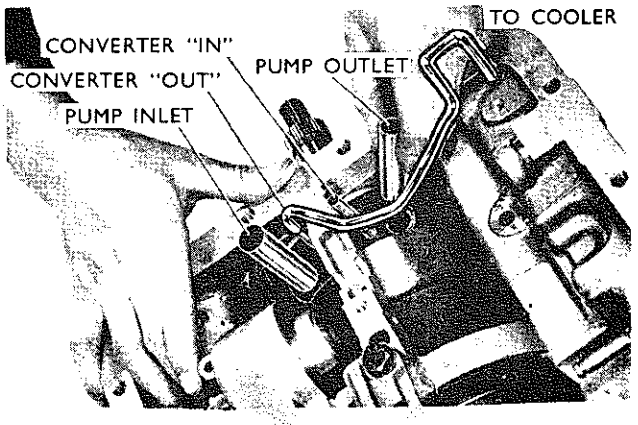


Fig. 23—Valve body to pump assembly tubes

OUTPUT SHAFT SUPPORT AND SEAL RINGS

Removal (Housing, Speedometer Gear and Governor Assembly removed)

(1) Remove the 6 screws and lock washers retaining the output shaft support to the transmission case. (Refer Fig. 24).

(2) Carefully withdraw the output shaft support from shaft.

(3) Carefully remove the 3 oil seal rings from the output shaft where necessary.

NOTE: These rings are easily broken and must be handled carefully.

Reassemble by reversing the foregoing procedures and torquing the retaining screws to specifications.

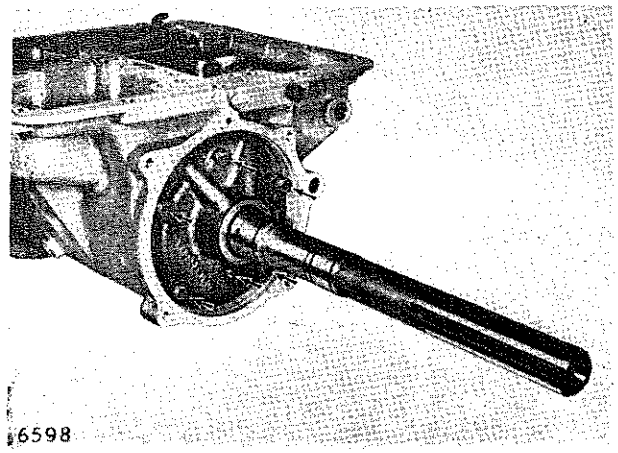


Fig. 24—Output shaft support

MANUAL SELECTOR VALVE SHAFT, LEVERS AND PARKING PAWL MECHANISM

Removal (Valve Body Removed)

Parking Sprag Toggle Lift Lever

(1) Remove the parking sprag lift lever operating rod retaining spring clip using suitable needle-nose pliers — and detach the rod from lever by positioning it inwards from lever.

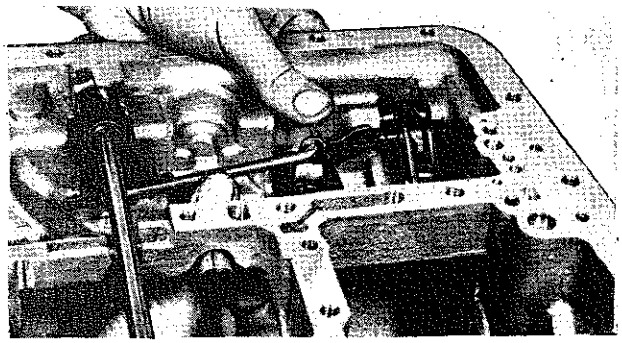


Fig. 25—Parking pawl (sprag) linkage

(2) Using a screwdriver, release the lift spring from the lift lever.

(3) Remove the lift assembly retaining spring clip from the shaft, and remove the washer, parking lever, toggle lift lever and toggle lever spring. (These parts can now be separated.)

Where removal is difficult, remove the rear band servo and retrieve the strut; release the rear band adjustment and slide the band forward, to provide additional clearance.

Reassemble by reversing the foregoing procedures, adjusting the band and torquing retaining nut to specified torque.

Parking Pawl Disassembly

(1) Drive the slotted spring pin, retaining the parking brake toggle pin, inwards using 3 mm (1/8") diameter drift.

(2) Remove the toggle anchor pin (this is the upper pin), using a small suitably hooked tool; apply force to the shoulder of the pin from the inside of the case.

(3) Remove the parking pawl pivot pin rearward.

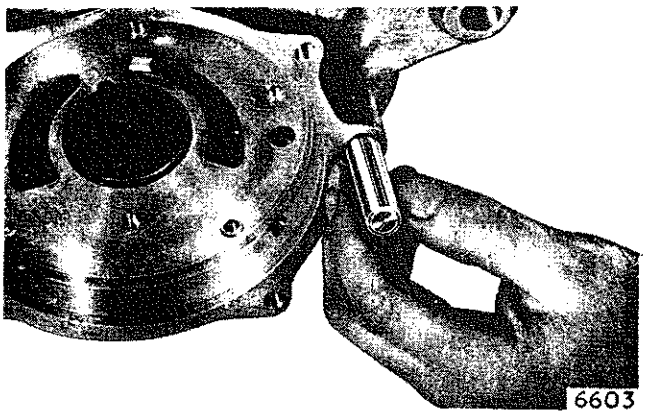


Fig. 26—Removing parking pawl pivot pin

(4) Remove the O-ring and toggle assembly.

(5) Remove the retaining spring using pliers.

(6) Remove release spring using pliers and lift off the pins. (Flanged pin, ball ended toggle link pin, parking pawl and link. The pivot shaft is part of the casing assembly.)

(7) Separate toggle lever from link.

Manual Control Shaft

Removal

(1) Remove the manual control shaft "collar roll pin" locating detent lever, using a 3 mm (1/8") pin drift.

(2) Slide the manual shaft detent lever in the direction of the spring bias, taking care that the detent ball does not eject violently, retrieve the 9.5 mm (3/8") ball and spring.

(3) Remove the remaining shaft lever pin.

(4) Remove the bias spring and manual valve detent lever assembly.

(5) Withdraw the manual valve lever shaft (where necessary).

NOTE: To obtain sufficient body clearance it may be necessary to lower the transmission support taking care not to damage the radiator hoses or similar flexible couplings.

(6) Remove the two shaft seal rings from each recess (where applicable).

Installation

(1) Install the manual valve lever shaft.

(2) Install the thrust collar, detent lever and bias spring.

(3) Install the solid pin in the detent lever end of shaft (using pliers) then engage the detent lever on to pin.

(4) Install the detent spring and 9.5 mm (3/8") ball in position and while holding the ball depressed using a suitable tube, slide the detent lever over the ball.

(5) Secure the manual valve shaft towards the case, compressing the bias spring.

(6) Position and secure the thrust collar, install a new roll pin, using suitable pliers.

(7) Install the new manual control shaft seal on to the shaft end and into the case recess.

(8) Install the manual shaft lever in the "upward" position on the shaft, and tighten the retaining nut to specified torque.

SERVO ASSEMBLIES

Removal (Valve Body and Tubes Removed)

(1) Carefully remove the retaining bolts, while suitably supporting the assembly.

(2) Retrieve the operating strut. Note that the kick-down servo rear bolt is the longer.

Installation instructions are contained in Installation of Sub Assemblies, then adjust the bands as described in Band Adjustments.

TRANSMISSION AND TORQUE CONVERTER

Removal

NOTE: The transmission and converter must be removed as an assembly; otherwise, the converter drive plate, pump bushing, and oil seal will be damaged. The drive plate will not support a load; therefore, the weight of the transmission should not be allowed to rest on the plate during removal.

(1) Connect a remote control starter switch, to starter solenoid and position switch so engine can be rotated from under the vehicle.

(2) Disconnect high tension wire from the distributor cap.

(3) Remove cover plate from in front of converter.

(4) Mark converter and drive plate to aid in reassembly. The crankshaft flange bolt circle, inner and outer circle of holes in drive plate and the tapped holes in front face of converter all have one hole offset so these parts will be installed in original position. This maintains the balance of engine and converter.

(5) Rotate engine with remote control switch to locate the converter to drive plate bolts at the bottom of the housing. Remove the bolt, rotate engine with switch and remove the remaining bolts.

NOTE: Do not rotate converter or drive plate by prying with a screwdriver or similar tool as the drive plate may become distorted. Also, starter should never be engaged if drive plate is not attached to converter with at least one bolt or if transmission case to engine bolts have been loosened.

(6) Disconnect negative (ground) cable from the battery.

(7) Remove the starting motor assembly.

(8) Disconnect wire connections from the neutral starting switch.

(9) Disconnect gearshift rod from the transmission lever. Remove the gearshift torque shaft (if fitted) from transmission housing and left side rail.

(10) Remove two bolts securing gearshift torque shaft lower bracket to the extension housing. Swing bracket out of way for transmission removal. Disconnect gearshift rod from the transmission lever (if applicable).

(11) Disconnect transmission throttle cable from the upper throttle lever and bracket.

(12) Disconnect oil cooler lines at transmission and remove oil filler tube. Disconnect the speedometer cable.

(13) Disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(14) Remove rear mount to extension housing bolts.

(15) Install engine support jack and raise the engine slightly.

(16) Remove crossmember/s attaching bolts and remove the crossmember.

(17) Place a transmission service jack under transmission to support the assembly.

(18) Attach a small "C" clamp to edge of bell housing to hold converter in place during removal of the transmission.

(19) Remove the bell housing retaining bolts. Carefully work transmission rearward off engine block dowels and disengage converter hub from end of the crank-shaft.

(20) Lower transmission jack and remove transmission and converter assembly.

(21) To remove converter assembly, remove "C" clamp from edge of bell housing, then carefully slide assembly out of the transmission.

RECONDITIONING TRANSMISSION OUT OF VEHICLE

When ordering parts for transmissions always quote Transmission Part No. from transmission case identification plate.

ALUMINIUM THREAD REPAIR

Damaged or worn thread in the aluminium transmission case and valve body can be repaired by the use of Heli-Coils. Essentially, this repair consists of drilling out the worn or damaged threads, tapping the hole with a special Heli-Coil tap and installing a Heli-Coil insert in the tapped hole. This brings the hole back to its original thread size. The table, below, lists the threaded hole sizes which are used in the aluminium case and valve body, and the necessary tools and inserts for the repair of damaged or worn threads. Heli-Coil tools and inserts are readily available from most automotive parts dealers.

NOTE: Some thread drag may occur in screwing a bolt into the installed Heli-Coil insert; therefore, a torque reading should be taken of the thread drag with torque wrench and added to the specified bolt torque, so that all bolts securing a particular part will be tightened to the same torque.

THREADED HOLE SIZES

Heli-Coil Insert			Drill Size	Tap Part No.	Inserting Tool Part No.	Extracting Tool Part No.
Thread Size	Part No.	Insert Length				
10–24	1185–3	.285"	13/64" (.203")	3 CPB	528 - 3N	1227 - 6
1/4"–20	1185–4	3/8"	17/64" (.265")	4 CPB	528 - 4N	1227 - 6
5/16"–18	1185–5	15/32"	Q (.332")	5 CPB	528 - 5N	1227 - 6
3/8"–16	1185–6	9/16"	X (.397")	6 CPB	528 - 6N	1227 - 6
7/16"–14	1185–7	21/32"	29/32" (.453")	7 CPB	528 - 7N	1227 - 16

PUMP OIL SEAL

Replacement

The pump seal can be replaced without removing pump and reaction shaft support assembly from the transmission case.

(1) Screw remover Tool E21C35G into Seal (Refer Fig. 27), then tighten screw portion of tool to withdraw the seal.

(2) To install a new seal, place a seal in opening of pump housing (lip side facing inward). Using Tool E21C35F, drive seal into housing until tool bottoms (Refer Fig. 28).

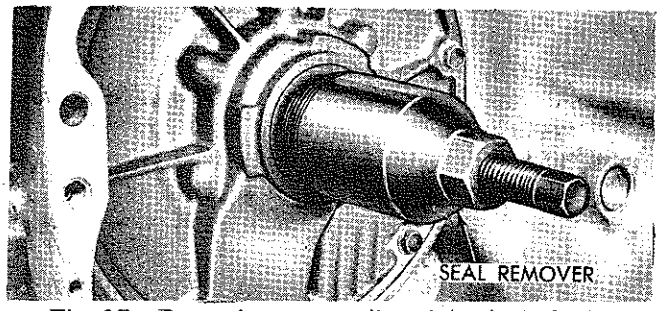


Fig. 27—Removing pump oil seal (typical view)

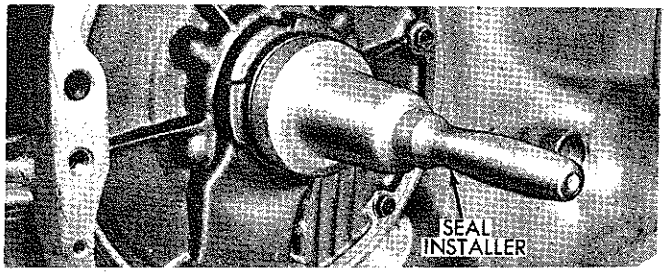


Fig. 28—Installing pump oil seal (typical view)

REMOVAL OF SUB-ASSEMBLIES

(Transmission Removed)

VALVE BODY ASSEMBLY

With the transmission mounted in the repair stand Tool E21C5C.

(1) Remove transmission oil pan retaining screws and remove pan.

(2) Remove the 4 oil tubes carefully from their bores.

(3) Remove the 3 valve body retaining bolts (7/16" hex. heads).

(4) Carefully detach the transmission throttle valve cable from the valve cam (Refer Fig. 22).

(5) Disengage the valve body assembly from the 3 supply tubes at front of the transmission — (Refer Fig. 29).

(6) Remove the pump intake tube O-ring (from the tube or recess in converter support).

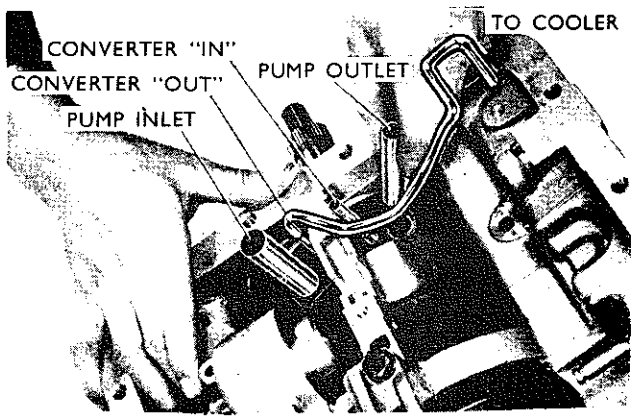


Fig. 29—Location of oil tubes, front of transmission

EXTENSION HOUSING

(1) Remove screws securing extension housing to transmission case and carefully remove the extension housing and gasket.

SERVO ASSEMBLIES (Oil Pan Removed)

Kickdown (Front) Servo Assembly

(1) Remove the 2 tubes from the front servo and valve body.

(2) Remove the 2 retaining bolts securing the servo to transmission casing.

(3) Remove the servo assembly and retrieve the strut (Refer Fig. 53).

Low/Reverse Servo Assembly (Oil Pan Removed)

(1) Remove the supply tube from the servo and valve body.
(2) Remove the 2 retaining bolts securing the servo assembly to the transmission casing.
(3) Remove the servo assembly and retrieve the strut.

PUMP ASSEMBLY

NOTE: Before the pump assembly is removed the 4 valve body to pump adaptor oil tubes must be removed (refer Valve Body Assembly). Also read and record the existing gear shaft end float, as an aid to adjustment when reassembling the transmission.

(1) Remove the 6 "fluted" head screws retaining the pump assembly to case using a 3/8" AF socket.
(2) Remove the pump assembly by pulling on the converter support while holding the input shaft inwards.
(3) Retrieve the input shaft (selective) thrust washer (tabs towards casing) and place with pump assembly.

FRONT CLUTCH ASSEMBLY (Refer Fig. 30)

(1) Remove the front clutch assembly by pulling on the input shaft.
(2) Retrieve the clutch front cylinder thrust washer (bronze) and backing washer (steel).

REAR CLUTCH (Refer Fig. 30)

(1) Remove the rear clutch together with the forward sun gear assembly by pulling on the shaft.

Kickdown (Front) Band and Servo

(1) Using fingers, squeeze the band ends together and remove the band through the pump opening.
(2) Lift out the strut.
(3) Remove the 2nd kickdown (front) servo where previously not removed, retaining bolts and spring washers. (Note that the long bolt is rearmost.)
(4) Remove the kickown servo assembly.
(5) Do not disturb the band adjustment at this time, or if so required, observe the amount of adjustment taken up for later reference.

Intermediate Support and Planet Gear Assembly

(1) Remove the 2 remaining intermediate support screws and lock washers, located in the transmission case exterior, identify the screws for (original location) replacement.
(2) Remove the low/reverse (rear) servo assembly retaining screws (front screw only), where not previously removed.
(3) Withdraw intermediate support from planet gear carrier assembly with the thrust washers.
(4) Remove the over-running clutch assembly.
(5) Using screwdriver remove the snap ring retaining the over-running clutch race in planet gear carrier assembly.

NOTE: Needle thrust bearing plate inside planet gears assembly, 39.7 mm (1-9/16") diameter, has lip located towards rear.

LOW/REVERSE (REAR) BAND AND SERVO ASSEMBLY

(1) Using fingers, compress the band ends and tilt band to withdraw it through the front end of the transmission case.
(2) Retrieve the servo strut.
(3) Remove the remaining servo retaining bolt.
(4) Remove the low/reverse servo assembly.
(5) Observe the band adjustment for later reference if "backing off" is required.

Speedometer Drive Gear

(1) Remove the retaining snap ring using snap ring pliers.
(2) Remove the drive gear and retrieve the 5 mm (3/16") drive ball.

GOVERNOR ASSEMBLY

(1) Remove the large bolt retaining the governor assembly to the shaft.
(2) Remove the governor assembly from the shaft (cover plate faces rearward).

OUTPUT SHAFT SUPPORT

(1) Remove the 6 screws and lock washers retaining the output shaft support to the transmission case (Refer Fig. 24).
(2) Carefully withdraw the output shaft support assembly.
(3) Carefully remove the 3 oil sealing rings from the output shaft (where necessary).

NOTE: These rings are easily broken and must be handled carefully.

(4) Carefully remove the output shaft forward out of the transmission case taking care not to damage the white metal bushing.

NOTE: Thrust washer with 3 tabs is located between the output shaft and rear transmission case.

MANUAL SELECTOR VALVE SHAFT, LEVERS AND PARKING PAWL (SPRAG) MECHANISM

Parking Sprag Toggle Lift Lever

(1) Remove the parking sprag lift lever operating rod retaining spring clip using suitable needle nose pliers and detach the rod from lever.
(2) Using a screwdriver, release the liftspring from the lift lever.
(3) Remove the lift lever assembly retaining spring clip from the shaft and remove the washer, parking lever, toggle lift lever and toggle lever spring (these parts can now be separated).

Parking Pawl (Sprag) Disassembly

(1) Remove the sprag pivot pin (the upper pin, retained by extension housing) by tilting the case and pushing pin from bore using a suitably hooked tool.

(2) Drive the slotted spring pin, retaining the parking brake toggle pin, inwards, using a 3 mm (1/8") diameter drift.

(3) Withdraw the parking pawl toggle pin rearward using a suitable tool.

(4) Remove the O-ring from the shaft.

(5) Remove the retaining spring clip, 6.0 mm (¼") centres, using needle nose pliers.

(6) Remove the release spring, spring retainer (flanged) parking brake washer, toggle link pin, parking pawl and toggle pin (ball ended).

(7) Separate toggle lever from link.

MANUAL CONTROL VALVE SHAFT ASSEMBLY

(1) Remove the manual control shaft collar roll pin, using a 3 mm (1/8") pin drift.

(2) Slide the manual shaft in the direction of the spring bias, **taking care** that the detent ball does not eject violently, retrieve the ball and spring.

(3) Remove the spring and manual valve detent lever assembly.

(4) Withdraw the manual lever shaft and shaft seal ring from the case recess.

Neutral Starting Switch, Linkage and Seal

(1) Remove the 2 screws retaining the switch and pin.

(2) Remove the "E" ring retaining the shaft and seal.

(3) Disconnect the linkage from the detent lever.

RECONDITIONING OF SUB-ASSEMBLIES (Removed from Transmission)

In all valve bodies a feature is incorporated which allows much faster manual 3-2 shifts. This consists of a ball check valve in the lower body (Refer Fig. 33A) which "short-circuits" an orifice in the separator plate when this shift is made. The valve must seal at all other times in order to prevent "flare".

The correct method to accomplish this is to place the spring and ball in the lower body and then to place the separator plate on top such that the ball is central in the hole. The oil tube collector plate and the governor line plate are then placed in position and their holding screws tightened to finger tightness.

The sealing of the ball check valve can then be checked by squirting A.T.F. into the hole shown in the separator plate (Refer Fig. 33). The oil should then squirt back out of the orifice marked. No oil should leak around the ball. If there is leakage, the separator plate should be repositioned until this is eliminated.

When this is achieved, the upper valve body can be placed in position and all screws tightened to the correct torque.

VALVE BODY ASSEMBLY

Disassembly Throttle Valve Cam (Refer Fig. 31)

(1) Remove the 2 screws retaining the throttle valve cam assembly to "lower" kickdown valve body, taking care that the kickdown valve does not eject when the cam is released.

NOTE: Do not remove positional tags from throttle cam bracket slots as this will alter factory set pressures.

(2) Remove the kickdown valve and spring.

(3) Discard strainer if punctured.

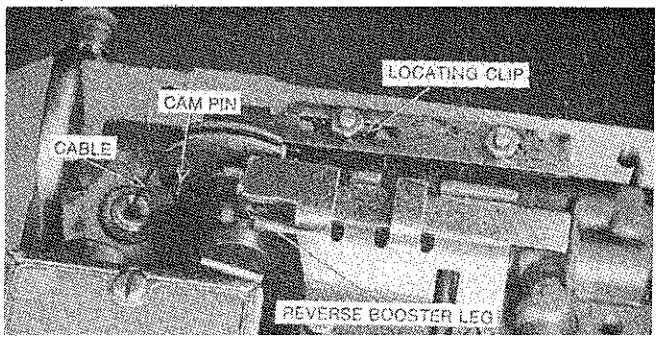


Fig. 31—Throttle valve components

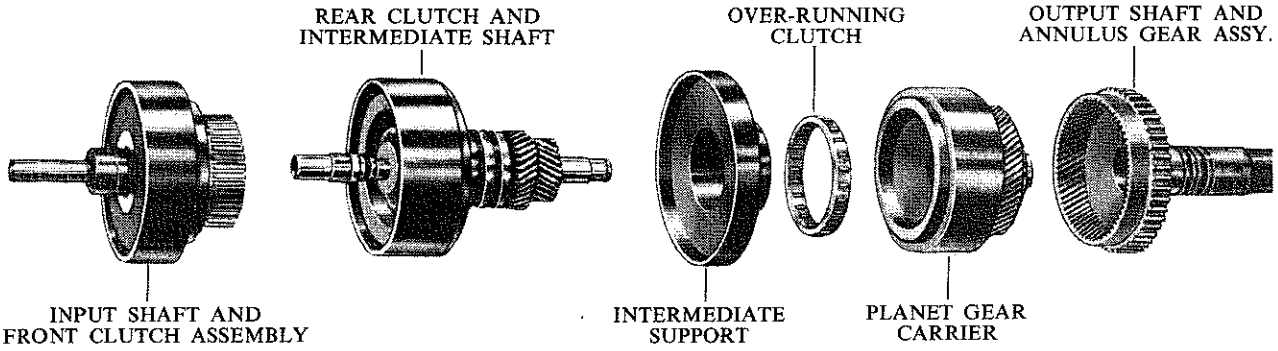


Fig. 30—Gear train components (in order of arrangement)

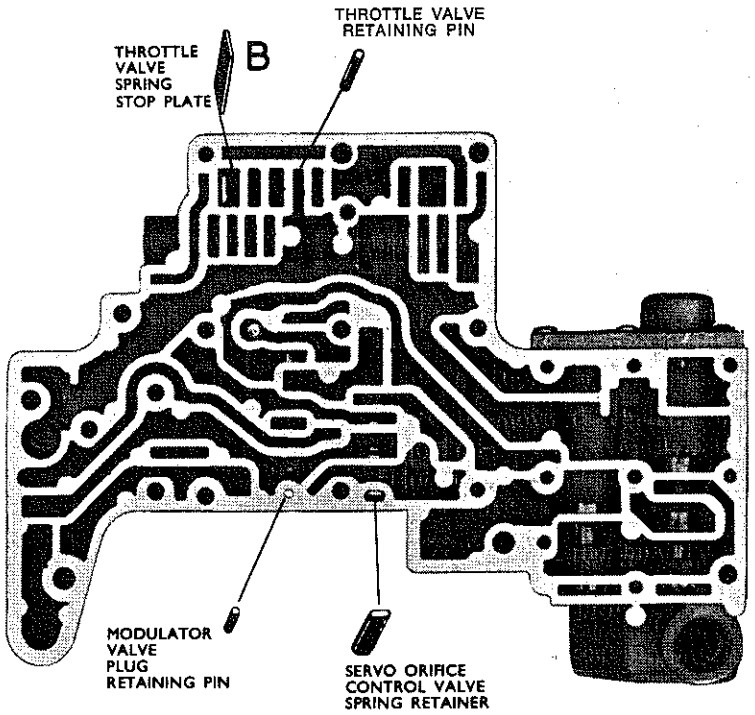


Fig. 32—Lower valve body assembly

Upper and Lower Bodies

(1) Remove 2 screws, 16 mm (5/8") long, from the "top" of the valve body.

(2) Remove 5 screws, 25 mm (1") long, and 1 screw, 35 mm (1-3/8") long, from the "lower" side of valve body, remove reverse booster mechanism, allow the halves to separate.

(3) Remove 6 screws, 17 mm (11/16") long, and 2 screws 22 mm (7/8") long, from the lower half of valve body to allow the oil tube collector to be removed.

NOTE: The tube location is nearest the manual valve.

(4) Remove 4 screws, 25 mm (1") long and 50 mm (2") long, to remove the governor line plate allowing the separating plate to be detached. Note position of 3rd line ball valve and spring (see Fig. 32).

Lower Body (Refer Fig. 35)

(5) Withdraw the manual control valve from lower body, note that the double collars protrude to engage the detent lever.

(6) Remove the kickdown and throttle valve spring and stop (if not previously removed) with kickdown valve. Note that the throttle valve large land is toward the kickdown valve.

(7) Remove the modulator valve assembly retaining dowel pin, retainer, modulator valve and plug (large land outermost) and spring.

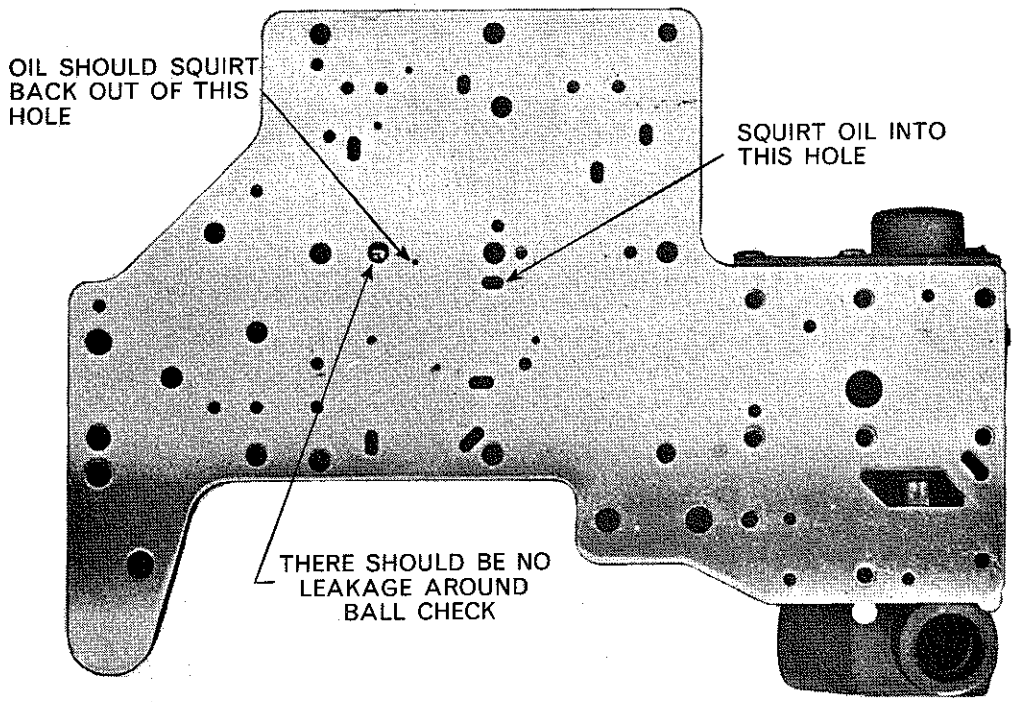
(8) Remove the servo orifice control valve retainer (stop), spring and servo orifice control valve (large land outermost).

(9) Remove 3 screws, 14 mm (9/16") long, retaining primary and secondary regulator valve and plate, remove the plate, both springs, primary regulator sleeve, and both regulator valves. Note that the primary regulator valve has the larger components and both valve lands are innermost when installed.

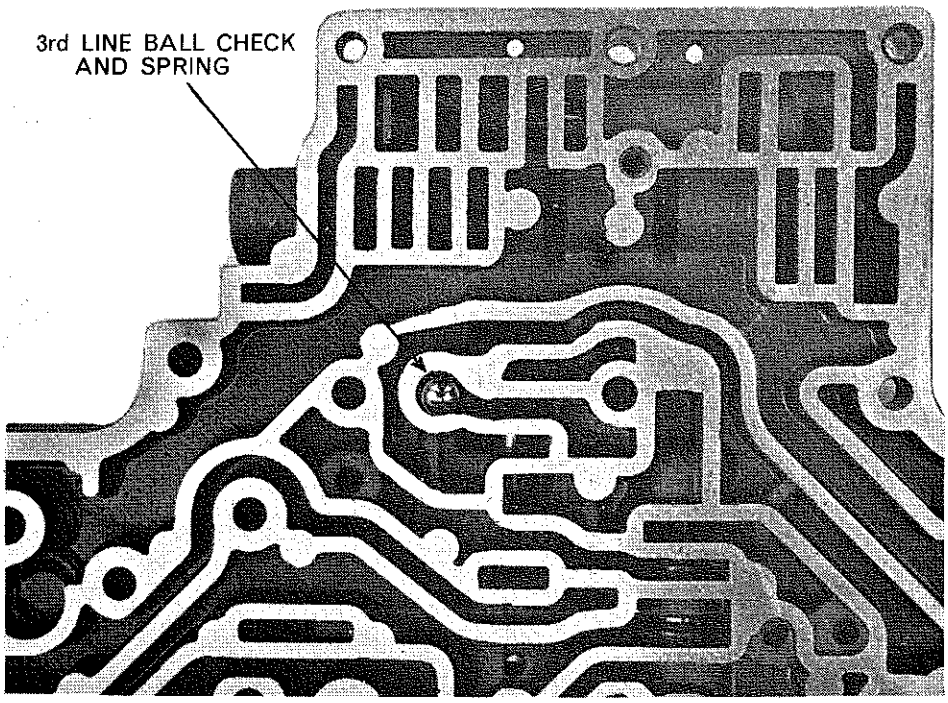
Upper Body (Shift Valves — Refer Fig. 35)

(10) Remove the 3 screws retaining each shift valve assembly and plate, which are spring loaded. Remove the larger valves. (Screws 11 mm 7/16" long.)

(11) Next largest plunger and spring (2-3 shift valve), then the smaller spring and plunger (spring between plate and plunger) as in Fig. 35.



A—Testing 3rd line ball valve seat



B—Correct location of 3rd line valve ball

Fig. 33—3rd line ball valve

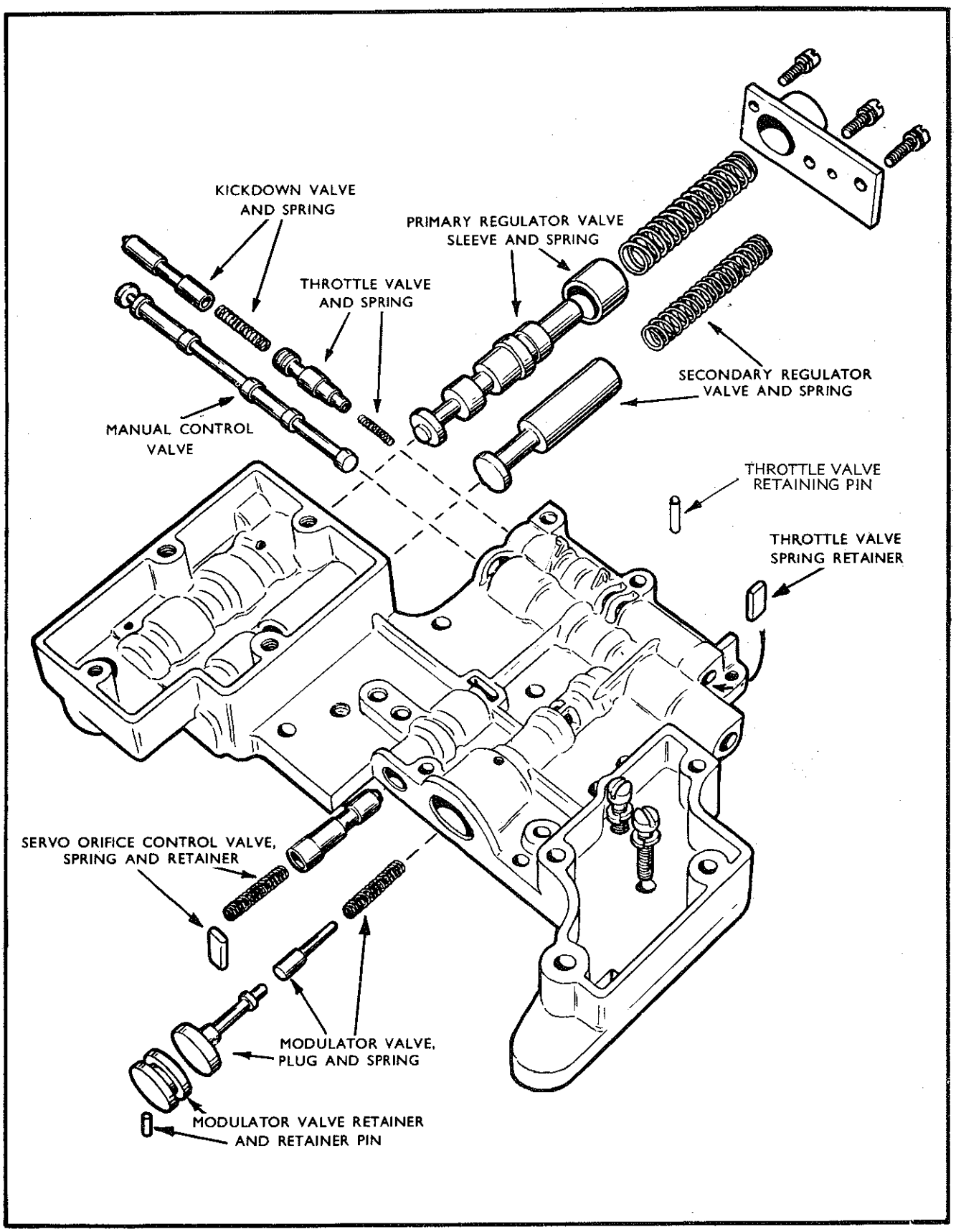


Fig. 34—Lower valve body components (disassembled, inverted view)

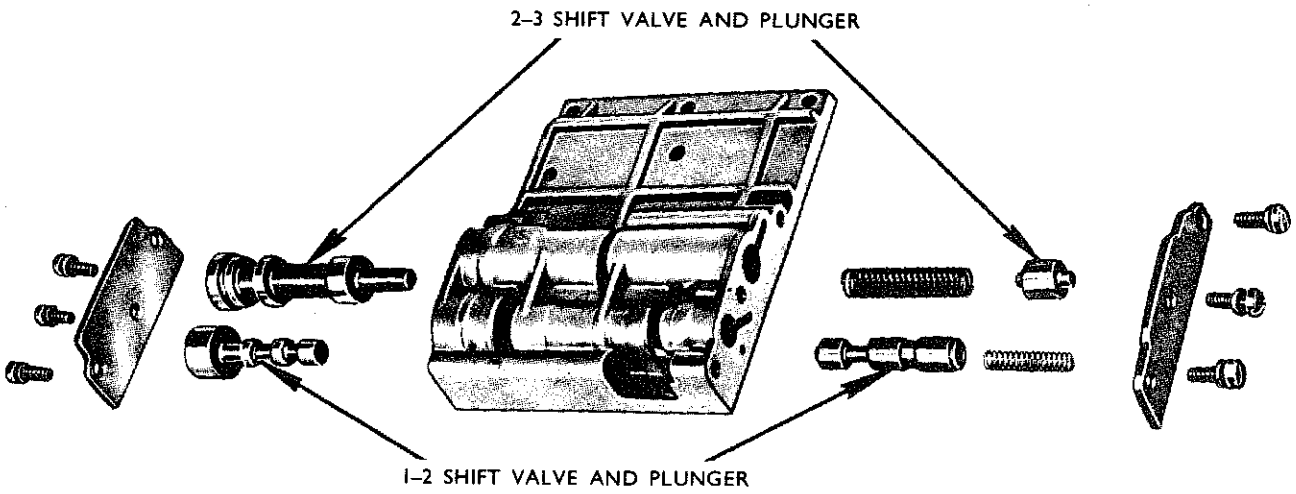


Fig. 35—Upper valve body (disassembled view)

Reassembly and installation procedures are the reversal of the foregoing instructions, ensuring that all components are completely cleaned and lubricated upon assembly and all screws correctly tightened to the specified torque of 2.3-3.3 Nm (20-30 lbs. ins.) for body screws and 5.4-10.8 Nm (4-8 lbs. ft.) for the body retaining screws.

If the valve body has to be dismantled during service the clip must not be removed from the bracket slot. If it is necessary to replace any throttle valve components, it is essential that an exhaust gap of 0,13 to 0,25 mm (0.005 to 0.010") should be visible through the rear most 2 slots cast in the lower valve body. This can be measured by feeler gauges, care must be taken not to move the valve as it is only lightly spring loaded in position. Having set the bracket in this method, a car test should then be conducted to ensure that the valve is not regulating at idle (harsh engagements, delayed shifts or roll-down 3-2, 2-1 shifts at zero throttle), nor does it have bad delay before pressure begins to rise (500 r.p.m. engine speed increase tests).

Refer to spring application identification chart to ensure that the correct spring is used.

VALVE BODY SPRING IDENTIFICATION CHART

Spring Applications	Lengths	Coils	Wire Diam.	Load
*Primary Regulator Valve	72,4 mm (2.85")	14¼	1,42 mm (0.056")	37,4/41,4 N @ 27,7 mm (8.4/9.3 lbs. @ 1.090")
	72,4 mm (2.85")	15	1,42 mm (0.056")	37,4/41,4 N @ 27,7 mm (8.4/9.3 lbs. @ 1.090")
Secondary Regulator Valve	65,9 mm (2.593")	29½	1,63 mm (0.064")	43/50 N @ 49,2 mm (9.75/11.25 lbs. @ 1.937") blue
*Kickdown Valve	30,0 mm (1.18")	14½	0,81 mm (0.032")	16/18 N @ 19,1 mm (3.66/4.04 lbs. @ 0.75") green
	30,0 mm (1.18")	18	0,81 mm (0.032")	16/18 N @ 19,1 mm (3.66/4.04 lbs. @ 0.75")
*Throttle Return	20,5 mm (0.807")	25	0,46 mm (0.018")	2,4/2,9 N @ 15,1 mm (0.55/0.65 lbs. @ 0.593")
	20,5 mm (0.807")	28	0,46 mm (0.018")	2,4/2,9 N @ 15,1 mm (0.55/0.65 lbs. @ 0.593") yellow
Servo Orifice Control Valve	30,8 mm (1.213")	20¼	0,61 mm (0.024")	6,9/7,6 N @ 19,2 mm (1.54/1.70 lbs. @ 0.754") white
Modulator Valve	27,1 mm (1.069")	19	0,71 mm (0.028")	10,5/11,6 N @ 18,6 mm (2.36/2.60 lbs. @ 0.73")
2-3 Shift Valve	40,4 mm (1.59")	22¼	0,91 mm (0.036")	5,9/6,5 N @ 29,9 mm (1.33/1.47 lbs. @ 1.178") yellow
1-2 Shift Valve	27,7 mm (1.094")	13½	0,61 mm (0.024")	8,0/9,3 N @ 12,7 mm (1.82/2.1 lbs. @ 0.50") green
Line 3 Check Valve Spring	16,5 mm (0.650")	16	0,18 mm (0.007")	0,035/0,039 N @ 7,1 mm (0.127/0.141 ozs. @ 0.28")
*Production Variation				

PUMP ASSEMBLY

Disassembly

(1) Remove 5 bolts and spring washers and 1 screw and lock washer.

(2) Separate pump body and gears from converter support assembly (using wood block if necessary).

(3) Remove the pump body and converter support gasket and O-ring (Refer Fig. 36).

(4) Remove pump drive gear assembly from housing, **making sure that** the outside faces of **gears are marked** to retain the original position.

(5) Remove O-ring from the body. (Oil suction (large) tube.)

(6) Remove the oil seal from body (may be done at disassembly). Using Tool E21C35G where required.

(7) Inspect the reaction shaft bushing for wear or damage. Reassemble by reversing the foregoing procedures after cleaning and inspection. Install new oil seal using Tool E21C35F.

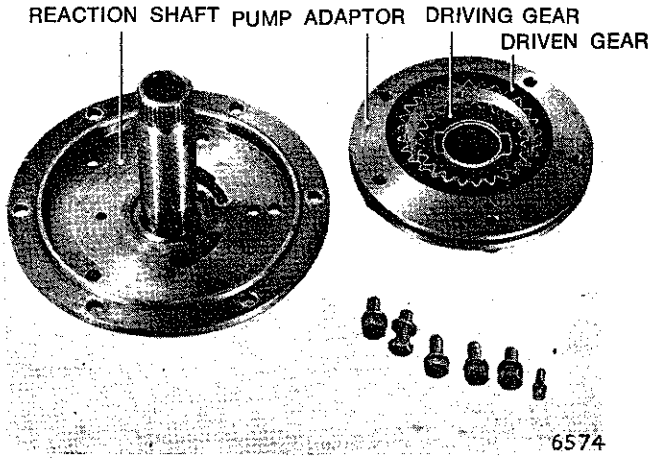


Fig. 36—Reaction shaft and pump adaptor components

Torque the small screw to 2.7-4.0 Nm (2-3 lbs. ft.) and the 5 set screws to 23-30 Nm (12-18 lbs. ft.).

FRONT CLUTCH

Disassembly

NOTE: Front clutch cylinder thrust washer (bronze) and cylinder backing washer (steel).

(1) Remove snap ring (using screwdriver) from front clutch retainer.

(2) Remove the input shaft assembly and disassemble the clutch components (Refer Fig. 37) (discs are interchangeable with rear clutch). Refer to specifications for correct number of plates and discs.

NOTE: Clutch hub thrust washer and front clutch (outer) plates are flat.

(3) Remove clutch hub and fibre thrust plate.

(4) Remove inner snap ring (with screwdriver).

(5) Remove diaphragm spring (dishing inwards) and pivot ring from piston (where replacement is necessary).

(6) Blow out piston with air pressure (at drilling in bore).

(7) Remove snap ring from inner groove.

(8) Remove piston outer rubber seal (ring) from groove.

(9) Remove seal O-ring from inside drum.

Reassemble by reversing the foregoing procedures after cleaning and inspecting. Use Tool E1388 to aid reassembly of clutch piston and then check clutch pack clearance.

Checking Clutch Pack Clearance

(1) Place the clutch assembly, excluding the input shaft and snap ring, in the vertical position.

(2) With a 2.3 kg (5 lb.) uniform mass over the clutch pack, gauge the distance between the input shaft locating step and the top friction disc. This dimension should be 0,38 mm (0.015").

(3) If the assembly exceeds the required dimension it should be adjusted by using one or more over-size clutch plates in lieu of standard clutch plates.

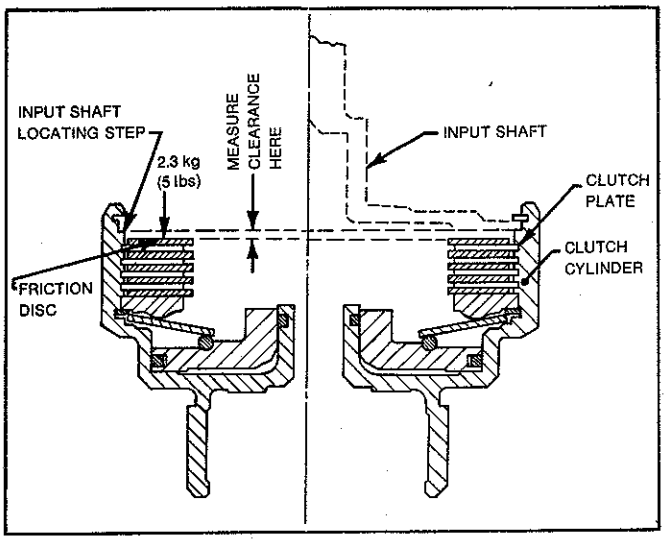


Fig. 36a—Measuring clutch pack clearance

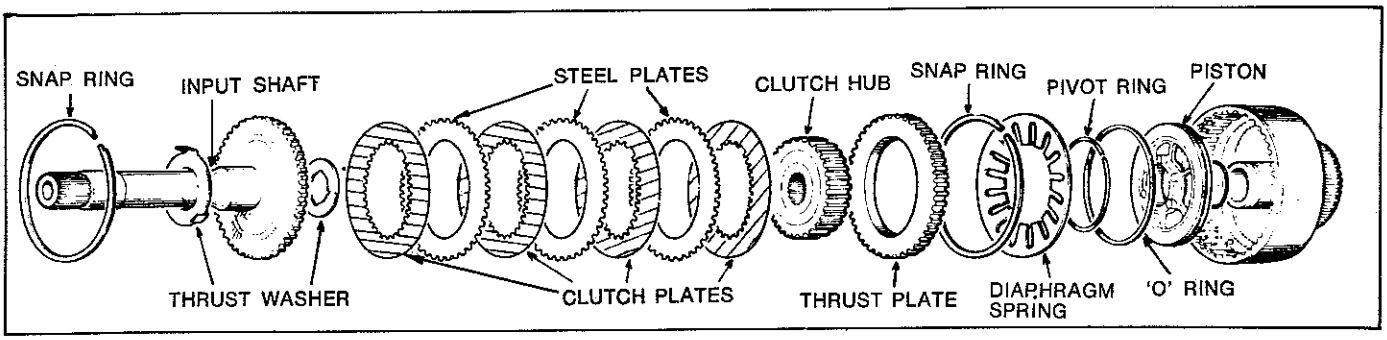


Fig. 37—Front clutch assembly (disassembled view)

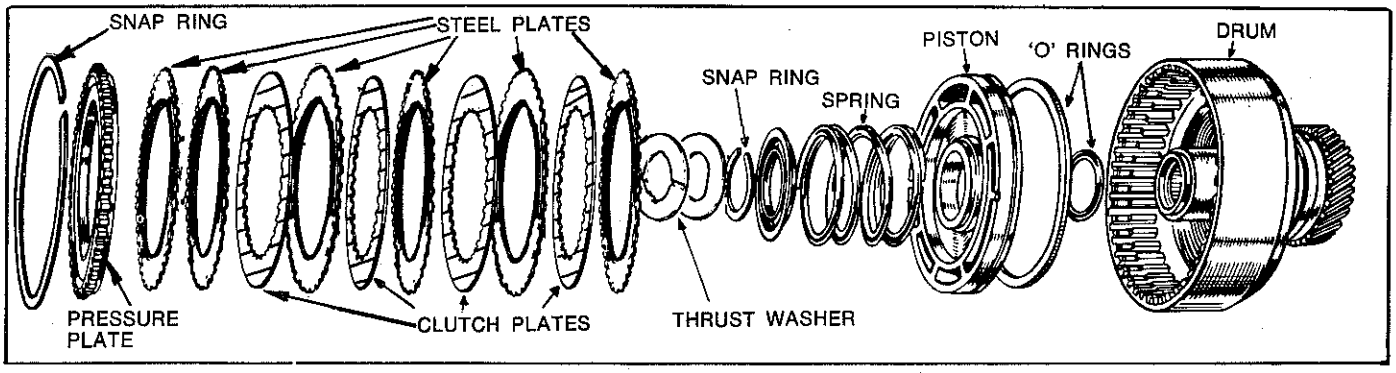


Fig. 38—Rear clutch assembly (disassembled view)

REAR CLUTCH

Removal of Sun Gear Intermediate Shaft

(Refer Fig. 30)

(1) Withdraw sun gear assembly from rear clutch retrieving needle thrust bearings each side of sun gear.

NOTE: The 38 mm (1½") O.D. bearing (30 x 1,98 mm (.078")) rollers is positioned between sun gears.

(2) Remove 2 oil rings from forward end of intermediate shaft if necessary to replace.

(3) Remove (teflon) oil ring from rear of shaft (if necessary to replace). Reassemble by reversing the foregoing procedures after cleaning and inspection.

Disassembling Rear Clutch (Refer Fig. 38)

(1) Remove snap ring retaining plate from drum with screwdriver.

(2) Remove pressure plate and plate assemblies.

NOTE: Three of the "outer" plates are dished (identified by checking plate with a straight edge), the dished or concave face should be installed facing the front of the transmission. Assemble the clutch in the following order: dished, fibre, flat, fibre, dished, fibre, flat, fibre, dished, flat, pressure plate and snap-ring—refer Fig. 38.

(3) Remove piston, using Tool E1386, to compress the spring (Refer Fig. 38).

(4) Remove spring seat retaining snap ring (accessible with ring positioned over flat on boss).

(5) Remove spring seat, spring, piston assembly, by cautiously blowing out with air pressure.

(6) Remove rubber seal ring from piston, also 'O' rings Remove the 3 seal rings from clutch drum grooves (Where necessary).

(7) Examine sun gear intermediate shaft and seal rings. The needle bearing assembly is serviced separately. Reassemble by reversing the foregoing procedures after cleaning and inspecting. Use special Tool E1387 to install the piston assembly into the cylinder.

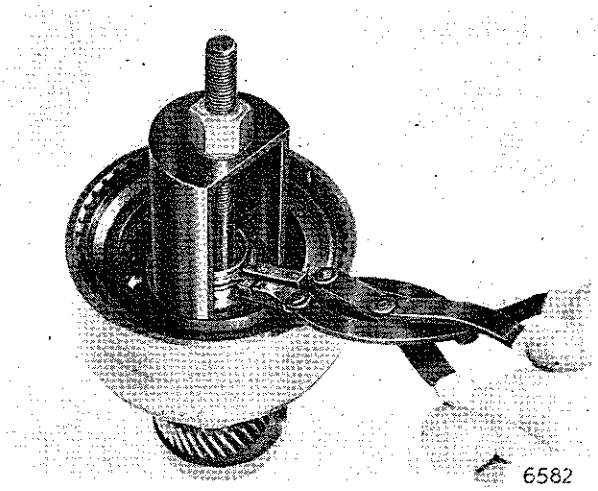


Fig. 39—Removing spring retaining snap ring.

SERVO ASSEMBLIES

Kickdown (Front) Servo Disassembly (Refer Fig. 40)

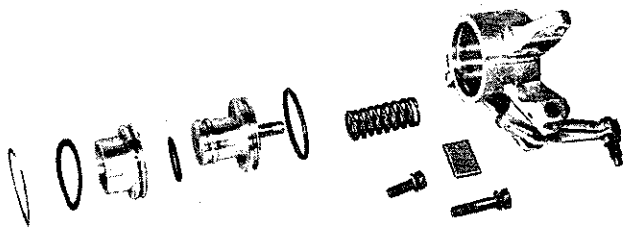


Fig. 40—Kickdown (front) servo assembly (disassembled view)

(1) Hold sleeve and piston down; remove snap ring retaining piston assembly, using a small screwdriver.

(2) Withdraw piston and sleeve assemblies from bore, retrieve spring.

(3) Withdraw piston from sleeve and remove 3 seal O-rings.

NOTE: The sleeve seal ring replacement is square sectioned.

Reassemble by reversing the foregoing procedures after cleaning and inspecting.

Low/Reverse (Rear) Servo Disassembly (Refer Fig. 41)

(1) Remove the lever return "hairpin" spring by unclipping with fingers.

(2) Suitably support the assembly, then carefully drive out the pivot pin from the housing.

(3) Separate the lever, pin and housing.

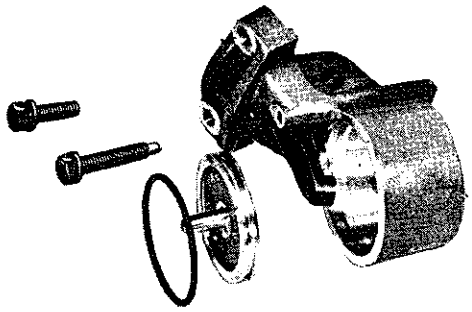


Fig. 41—Low-reverse rear servo components (disassembled view, "hairpin" spring not shown)

(4) Remove the piston assembly from the servo bore.

(5) Remove the seal, O-ring from the piston groove.

Reassemble by reversing the foregoing procedures after cleaning and inspecting.

NOTE: That the pivot pin protrudes rearward from the servo housing to locate the hairpin spring.

CLEANING AND INSPECTION

(1) Thoroughly clean all components in a suitable industrial solvent excepting rubber seals, particularly should these be required for reuse.

(2) Inspect the transmission case for damaged or stripped threaded holes.

(3) Inspect the output shaft bush, in rear of case, for excess wear or any damage, and that it is secure in case. This bushing is serviced separately.

(4) Inspect the parking brake torsion lever pin (bore) and the anchor pin for damage or looseness in case. The pivot (anchor) pin is part of the case assembly.

(5) Inspect the parking pawl toggle lever assembly, springs and clips, etc., manual shaft levers, detent and neutral starting switch linkage.

(6) Inspect the output shaft support seal ring surfaces for excess wear or damage.

(7) Inspect the band surfaces for excess wear, cracks or signs of overheating, damaged ends, etc., also inspect the adjusting screws (reference to band adjustment settings will indicate balance of service life).

(8) Inspect the clutch disc assemblies for excess wear, for flaking of facings, damaged serration edges and warpage or buckled plates.

NOTE: All "outer" plates in the front and rear clutches are flat with the exception of the three dished plates in the rear clutch. The dished plates are identified by checking with a straight edge, the amount of dishing should be 0.89 mm to 1,02 mm (0.035" to 0.040").

(9) Inspect oil tubes and mating recesses in casing and valve body for damage.

(10) Inspect pump assembly housing, bushings, gears, drive lug surfaces, and gears for excess wear or scoring, etc. Replace as required.

(11) Inspect torque converter reaction shaft support bushing and converter pump drive lugs and sealing surfaces, splined shafts, etc., and rear clutch retainer check valve condition.

(12) Inspect drums for signs of overheating, scoring or surface imperfections.

(13) Inspect the gear assemblies and shafts for chipped or scored teeth or damaged thrust bearing faces. Check for excessive wear of pinion thrust washers and sun gear shaft seal ring.

(14) Inspect the over-running clutch components for scoring, discolouration (indicating excessive heating) and sprag surfaces for scoring or "flats" — check correct operation of clutch (spring bias), holes free and open.

(15) Inspect the outer shaft cast iron sealing rings for wear and damage on seal faces, rings should be rectangular in section. Check that the ring has sufficient depth clearance in the ring groove of shaft. The rings must not spin in the casing bore.

(16) Inspect the piston rubber O-rings and square section seals for hardening, cracking or cuts. Check that the ring is an interference fit in its bore when assembled on piston.

(17) Inspect valve body and governor for damage or burring of components, scratches or scoring of valves or sealing surfaces. Check for excessive wear of contact points of the throttle cam and throttle valve components. Slight damage may be removed using crocus cloth very carefully. Make sure that the valve lands are **sharp** and **not rounded off.** Check return springs against the spring application chart. Inspect reverse pressure booster mechanism for wear.

(18) Inspect shafts and bearing surfaces for damage or scoring, excess wear or worn ring grooves; loose or damaged shaft plugs.

(19) Inspect the casing and servo castings for damage, cracks or scoring, clear drillings and passages and check gasket surfaces for cleanliness and flatness.

(20) Inspect the fluid strainer and oil pan for damage, and magnet strength.

(21) Inspect the line pressure test tapped hole for damage.

INSTALLATION OF SUB-ASSEMBLIES MANUAL VALVE LEVER SHAFT, LEVERS AND PARKING PAWL MECHANISM

Manual Valve Lever Control Shaft Assembly

(1) Mount the transmission case in the repair stand E21C5C.

(2) Install the detent spring into bore.

(3) Position the manual shaft in casing, positioning the spring and detent lever and collar on shaft as shown in Fig. 42.

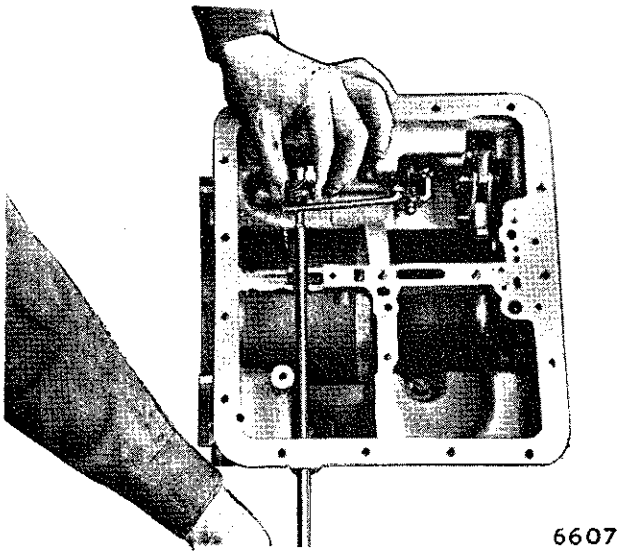


Fig. 42—Installing the manual control shaft components

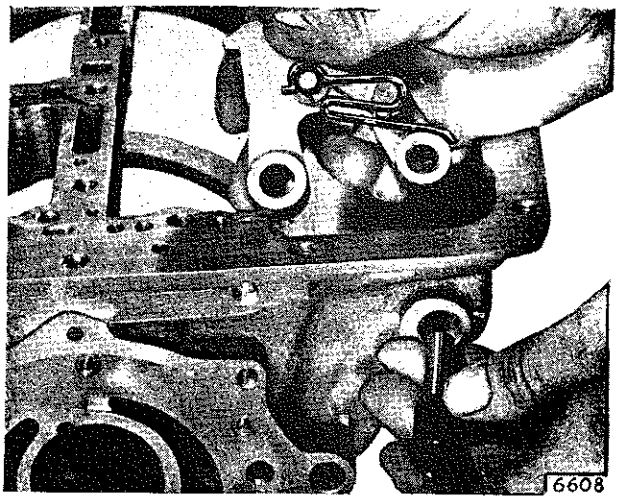


Fig. 43—Installing parking pawl toggle levers and pin

(4) Install the plain pin locating the detent lever, by forcing with pliers.

(5) Install the ball on detent spring, compressing spring and ball, using a suitable tube, while sliding the detent lever over the ball and holding it in this position.

(6) Secure the collar to shaft, using a new roll pin forced into shaft with pliers, while compressing bias spring.

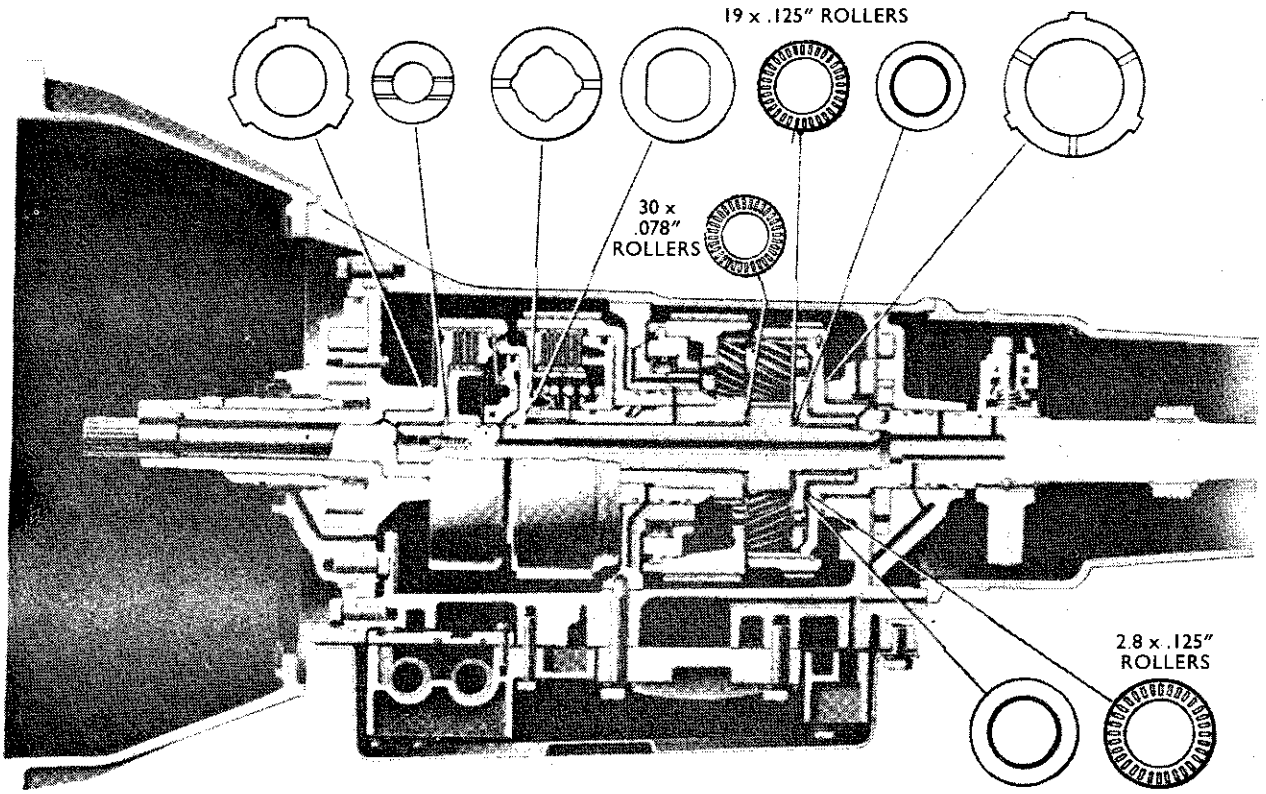


Fig. 44—Locations of thrust washers (typical view)

(7) Install a new shaft seal into the recess in casing.

(8) Install lever to shaft (bushing position up or down depending on model type) and secure with washer and nut, torque nut 14-16 Nm (10-12.5 lbs. ft.).

(9) Install the neutral starting switch shaft and seal, then secure, using a new "E" clip in shaft groove.

(10) Connect the starting switch lever link to detent lever and install the retaining clip.

Parking Pawl and Toggle Mechanism

(1) Reassemble the parking pawl, link and toggle lever (Refer Fig. 43), with ball headed pin in the toggle lever and secured with the special lift spring.

(2) Install the pawl assembly, using the toggle pivot shaft with a new seal ring in groove.

(3) Install a new roll pin to secure the shaft in the case.

(4) Install the pawl anchor (pivot) shaft. (This shaft is retained by extension housing.)

(5) Install the lift lever and spring assembly on pivot shaft, install washer and retaining spring clip.

(6) Using a screwdriver blade, lift the free end of the spring over the lift lever to spring load the lever.

(7) Install the connecting link and switch linkage and secure with spring clips.

(8) Check the correct operation of the parking pawl mechanism.

Output Shaft

NOTE: That the annulus gear is retained on the output shaft using selective snap rings to provide minimum clearance, available in 1,40 mm (.055"), 1,45 mm (.057") and 1,50 mm (.059") thickness.

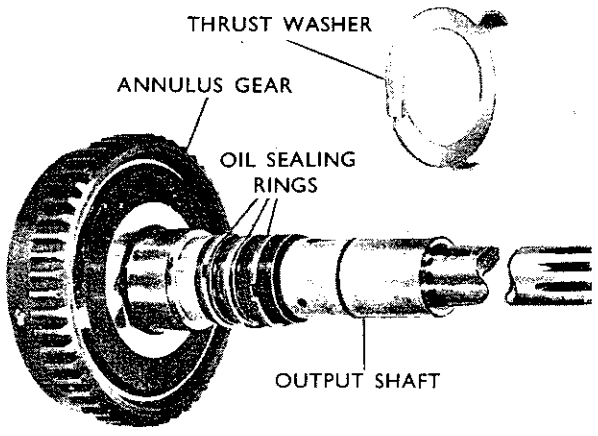


Fig. 45—Output shaft assembly and thrust washer

(1) Position the output shaft seal ring gaps uppermost in grooves, where installed.

(2) Attach the output shaft tabbed thrust washer using petroleum jelly (Petrolatum-vaseline) with the tab in the projections, on the rear face of transmission case (tab outward — Refer Fig. 45).

(3) Carefully install the output shaft rearward through the rear bearing of transmission, taking care not to damage the bearing surface with the seal rings, where installed.

Low/Reverse (Rear) Band

(1) Install the rear band with the ends together to facilitate installation (with the abutment end to casing abutment) then position against the annulus gear.

Intermediate Support and Gear Assembly (Refer Fig. 46)

(1) Insert the over-running clutch sprag assembly into the carrier assembly race (flange outwards) whilst holding the sprag assembly spring-loaded (anti-clockwise).

(2) Install the intermediate support into the over-running clutch, whilst turning the support anti-clockwise to engage sprags. Check operation of clutch and carrier assembly, then install the 52,12 mm (2.052") diameter thrust bearing and washer (lip towards output shaft) over the gear carrier journal.

(Mark the position of the oil tube port on the forward face of intermediate support.)

(3) Carefully install the gear carrier assembly into the output shaft annulus gear, turning output shaft to engage gears.

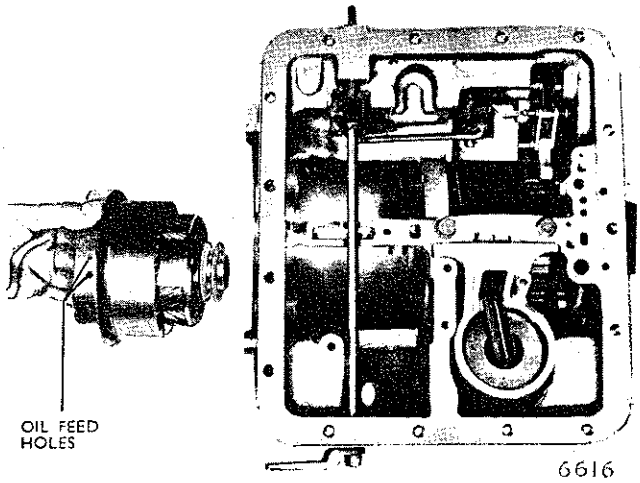


Fig. 46—Installing intermediate support and planet gear assembly

(4) Position the intermediate support to centrally align the oil feed tube with marked drilling (adjacent to the centre bolt hole); insert the feed tube to hold this position, whilst installing the 2 centre support screws and special lock washers (rolled side to screwhead — Refer Fig. 47).

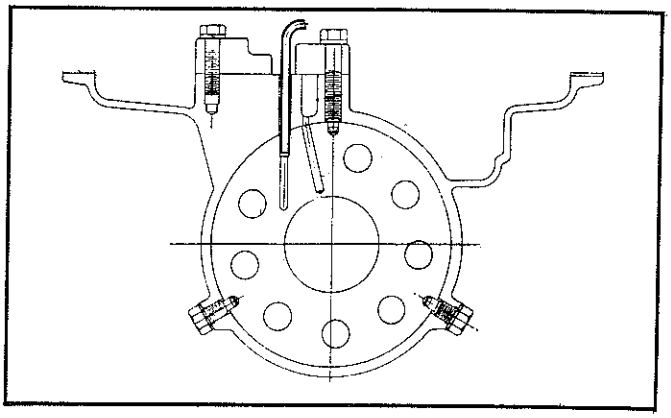


Fig. 47—Intermediate support location diagram

(5) Tighten the intermediate support set screws carefully, making sure that they do not bind or foul the drillings in the support. Torque screws to 20-34 Nm (15-25 lbs. ft.) then remove the oil tube.

Kickdown (Front) Band

(1) Install the front band by squeezing the two ends together and positioning correctly to abutment.

Rear Clutch Assembly

(1) Inspect the 2 small interlocking oil rings in the intermediate shaft and install a new teflon seal in rear groove.

(2) Install needle thrust bearing (19 x 1,98 mm (.078") rollers) and thrust plate to the rear face of the rear sun gear, with the thrust plate lip towards the output shaft. (Refer Fig. 48).

(3) Position the needle roller thrust bearing 41 mm (1-5/8") diameter against the forward face of the sun gear and install the sun gear intermediate shaft into the rear clutch assembly.

(4) Carefully install the rear clutch assembly into the gear carrier assembly (Refer Fig. 48).

Front Clutch

(1) Position the front clutch thrust washers (steel backing and bronze) on to the front clutch assembly with the steel washer located on the "driving flats" of the front clutch centre then the bronze thrust washer.

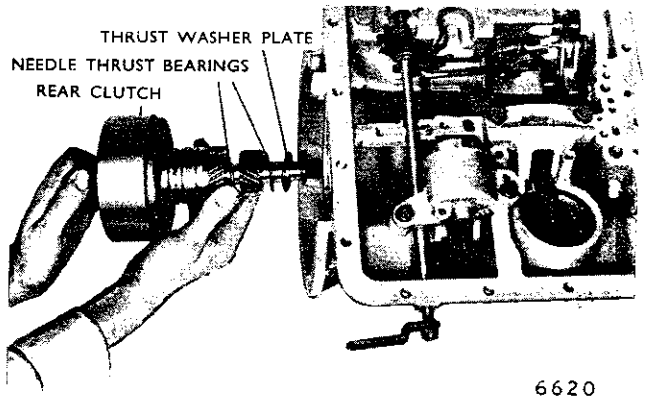


Fig. 48—Installing rear clutch retainer assembly (typical view)

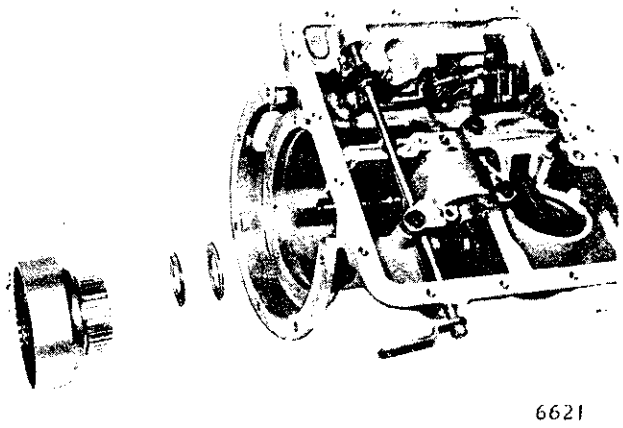


Fig. 49—Installing front clutch retainer assembly

Pump Assembly

(1) Position the selective tabbed thrust washer using vaseline to the pump assembly, locating tabs in recesses provided.

(2) Position a new gasket onto the pump housing mounting face, then carefully install assembly to transmission casing (Refer Fig. 50).

(3) Install the 6 retaining 3/8" AF head screws and washers and tighten evenly to specified torque.

Transmission Gear End Float

(1) Install the dial indicator to read the input shaft end float as shown in Fig. 51. The shaft end float should be within 0,25-0,76 mm (.010"-.030").

(2) Adjust if necessary by installing a new selective washer of correct thickness where required.

Selective thickness washers are 1,55-1,60 mm (.061"-.063") or 1,98-2,03 mm (.078"-.080").

Output Shaft Seal Rings and Support

(1) Carefully install new output shaft seal rings (where previously removed) positioning the gaps upward.

(2) Carefully install the output shaft support and plate (where equipped) making sure that the oil holes are open.

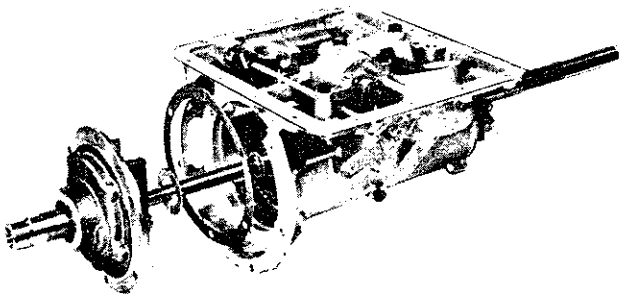


Fig. 50—Installing pump assembly

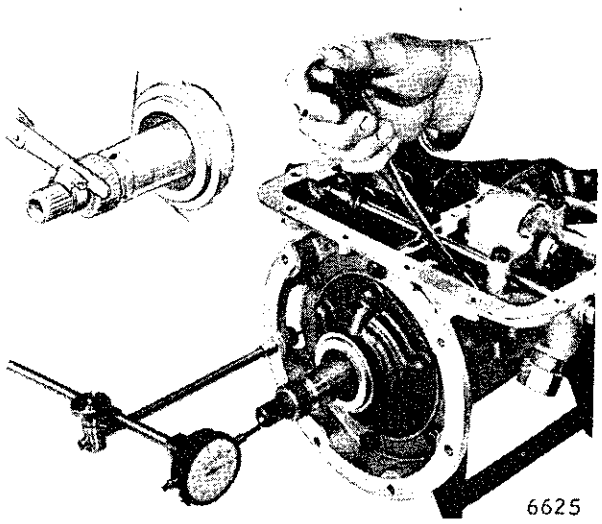


Fig. 51—Measuring input shaft end float (Inset shows alternative method using a hose clip and feeler gauges)

Governor Valve Assembly

(1) Install the 6,0 mm (¼") drive ball or roller into shaft recess, and then install the governor valve body to shaft, with plate side rearward (if fitted).

(2) Install the retaining bolt in output shaft.

(3) Install the speedometer drive 5 mm (3/16") ball into the shaft recess.

(4) Install the speedometer drive gear and retaining circlip.

Extension Housing

(1) Position a new extension housing gasket correctly on the extension housing and install the housing on the

transmission case, tightening the 7/16" head retaining screws to 34-40 Nm (25-35 lbs. ft.) torque.

Kickdown (Front) Servo

(1) Attach the strut to the front servo lever using petroleum jelly positioning the strut to obtain correct assembly of these components. (Refer Fig. 53).

(2) Install the retaining bolts, note the rear bolt is the longer and tighten evenly to 14-20 Nm (10-15 lbs. ft.) torque.

Low/Reverse (Rear) Servo

(1) Attach the strut to the band engaging slot using petroleum jelly, positioning the strut to obtain correct assembly of these components.

(2) Install the retaining screws and tighten evenly to 20-34 Nm (15-25 lbs. ft.) torque.

Valve Body

(1) Install the tube connecting the cooler line in casing from the pump adapter drilling (converter "OUT") (Refer Fig. 54).

(2) Install the pick-up tube O-ring on intake tube swaged end which is inserted into the pump adapter.

(3) Install the tubes as shown in Fig. 54.

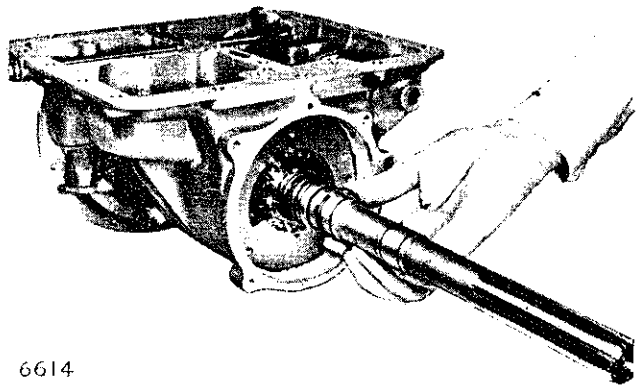


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Fig. 52—Output shaft seal rings installed

(4) Install the transmission throttle cable, using a new seal ring and tighten to 13-16 Nm (10-12 lbs. ft.).

(5) Position the valve body assembly on to the respective tube recesses carefully, then install the retaining bolts and tighten **evenly** to 5-11 Nm (4-8 lbs. ft.) torque.

(6) Connect the transmission throttle cable to the throttle valve cam.

(7) Check operation of reverse booster mechanism.

(8) Adjust the bands as previously described.

Oil Pan

(1) Install the oil pan permanent magnet to the inside of pan in the area of the strainer.

(2) Install a new pan gasket and tighten the retaining screws evenly to 14-18 Nm (10-13 lbs. ft.).

Transmission in Vehicle

(1) Install the filler tube.

(2) Install and connect the oil cooler lines, tightening union nuts to 9 Nm (75 lbs. in.).

(3) Reinstall the gear shift torque shaft selector bracket on transmission location (if fitted).

NOTE: When the transmission is installed ensure that the correct transmission fluid is added to pan and the throttle cable is correctly adjusted as described.

(4) Road test the vehicle.

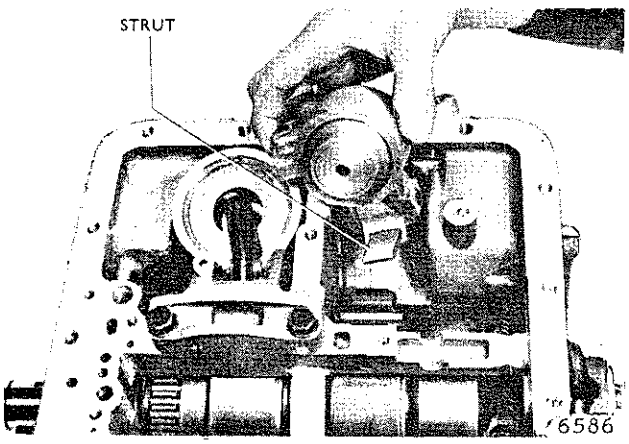


Fig. 53—Installing the front servo assembly (typical view)

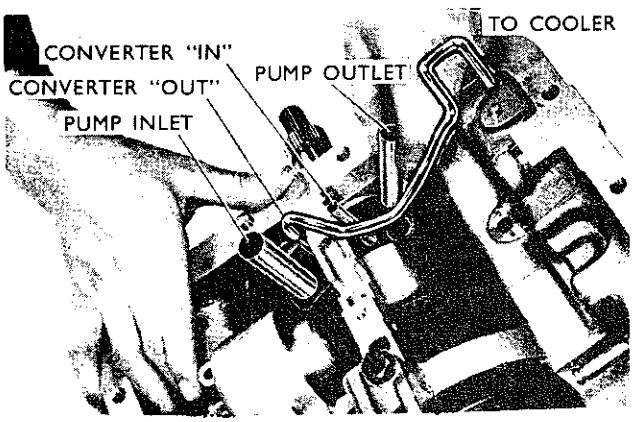


Fig. 54—Location of tubes

SECTION 14 — LINKAGE ADJUSTMENT

GEAR SHIFT CONTROL LEVER ADJUSTMENTS

Auto. Trans. (Top Mounted Detent Button)

(1) Loosen the selector lever adjusting nut at the rear of the transmission control linkage.

(2) Place the gear selector lever in the "N" position.

(3) Place the transmission selector lever in the neutral detent position (i.e. two detent positions back from the park detent position).

(4) Tighten the adjusting nut.

(5) Check that the detent locks in each gear selector lever position.

(6) Check that the starter only operates in the "P" and "N" position.

(7) Check that the reverse lights operate in the "R" position.

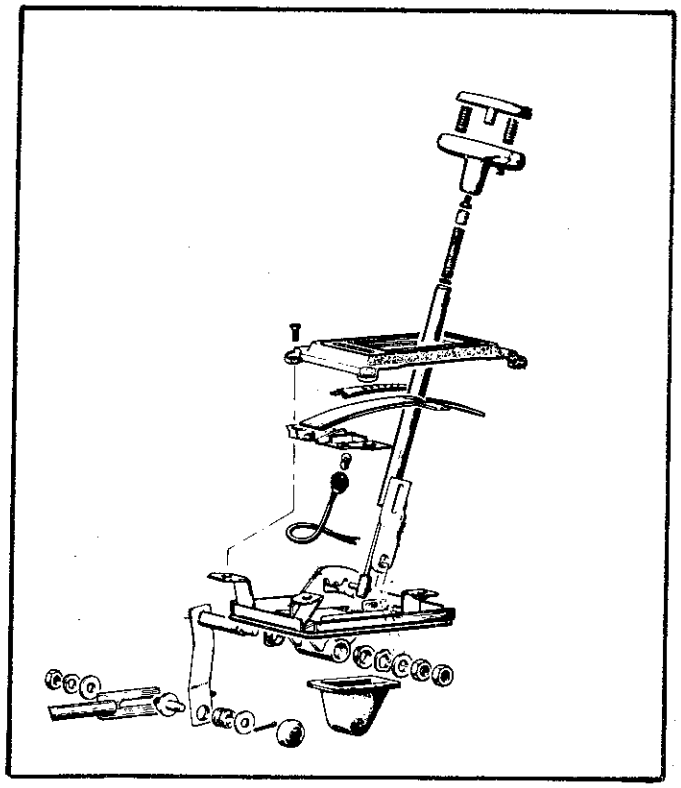


Fig. 1—Gear selector lever (top mounted detent button)

(8) The gear lever rod can be adjusted by the nut at the top of the selector lever. With the lever in the 'N' position and the handle removed, adjust the nut to the level of the lower notch in the lever, Refer Fig. 2.

Auto. Trans. (Side Mounted Detent Button)

Removal

(1) Place the selector lever in "L" and remove the transmission console.

(2) Disconnect the control rod from the control arm.

(3) Remove the selector lever assembly from the vehicle.

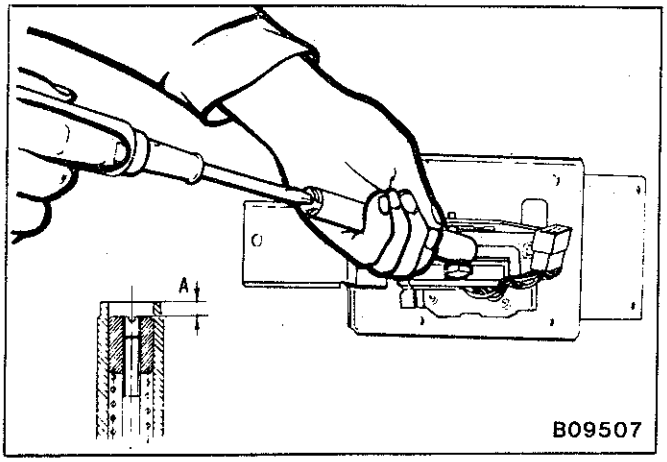


Fig. 2—Rod adjusting nut

Disassembly

(1) Remove the set screw from the rear side of the selector handle and remove the handle from the lever.

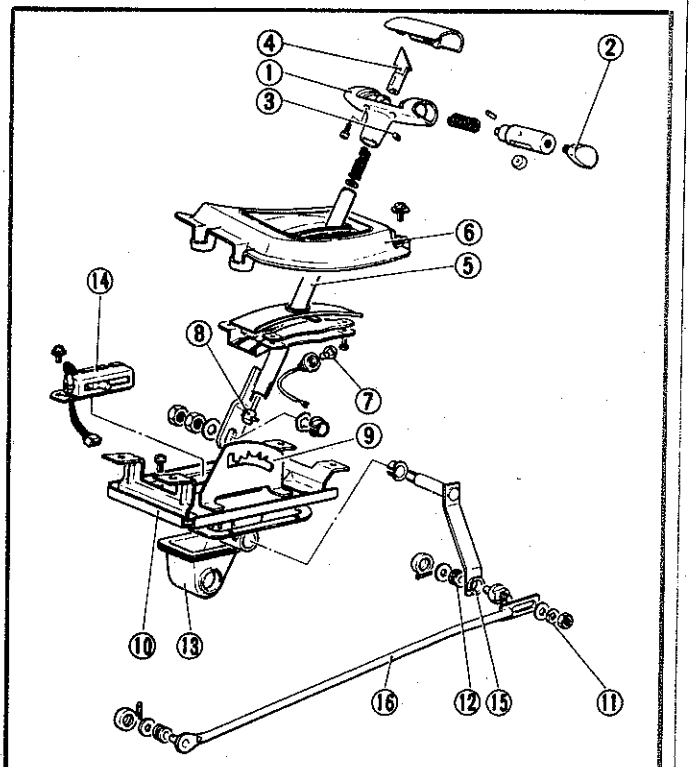


Fig. 3—Gear selector lever (side mounted detent button)

(2) Loosen the indicator panel attaching screws and remove the position indicator cover, slider and lamp holder.

(3) Remove the inhibitor switch, only if necessary (two door models).

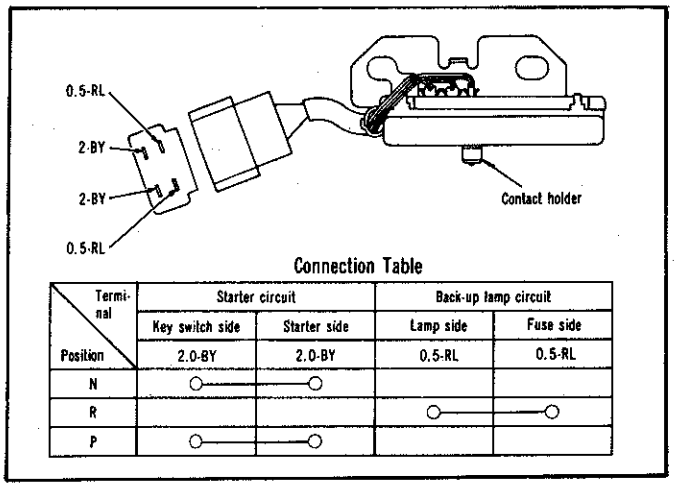
(4) Roll back the rubber lever bracket cover and disconnect the control arm from the selector lever bracket.

(5) Remove the selector lever bracket attaching screws and remove the bracket.

Inspection

(1) While sliding the contact holder of the inhibitor switch (see Fig. 4), test that the starter and back-up lamp circuits are opened or closed at the appropriate time in "P", "R" or "N" positions.

(2) Replace any worn parts or bushings.



Connection Table

Terminal / Position	Starter circuit		Back-up lamp circuit	
	Key switch side	Starter side	Lamp side	Fuse side
	2.0-BY	2.0-BY	0.5-RL	0.5-RL
N	○——	——○		
R			○——	——○
P	○——	——○		

Fig. 4—Inhibitor switch and connection table

Installation

(1) Assemble the control arm and selector lever applying grease to all sliding parts.

(2) Measure the load required to move the top end of the selector lever. The load should be between 0,5 to 1,2 kg (1.1 to 2.6 lbs.). If not, fit wave washers to bring within specifications.

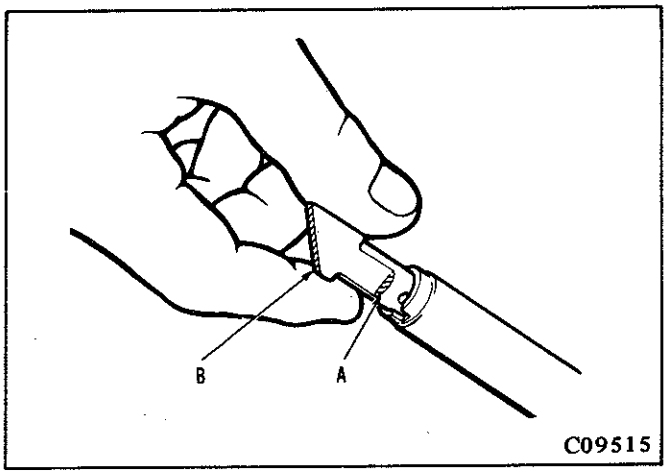


Fig. 5—Adjusting selector lever rod cam

NOTE: When measuring the selector lever load, hold the rod assembly end pin so that it will not come into contact with the detent plate.

(3) Place the selector lever in the "N" position. Install the cam on the selector lever rod and adjust until surface A of the cam (see Fig. 5) is level with the top of the selector lever tube and surface B is facing the push button side of the handle.

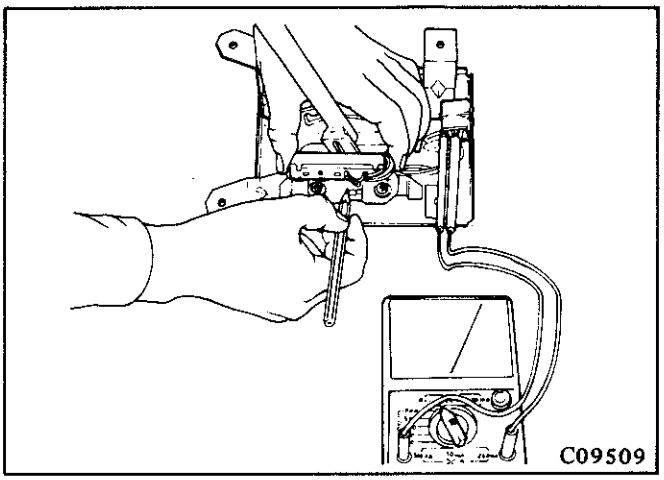


Fig. 6—Measuring the range of "N" position

(4) With the selector in "N", temporarily install the inhibitor switch (where fitted). Move the switch back and forth measuring the range of the "N" position (see Fig. 6). Mark the range on the lever bracket, position the switch so that it's in the middle of the marked range and temporarily tighten.

(5) Adjust the inhibitor switch to provide a 1,5 mm (0.060") clearance between the selector lever and switch as shown in Fig. 7. Tighten the switch attaching screws.

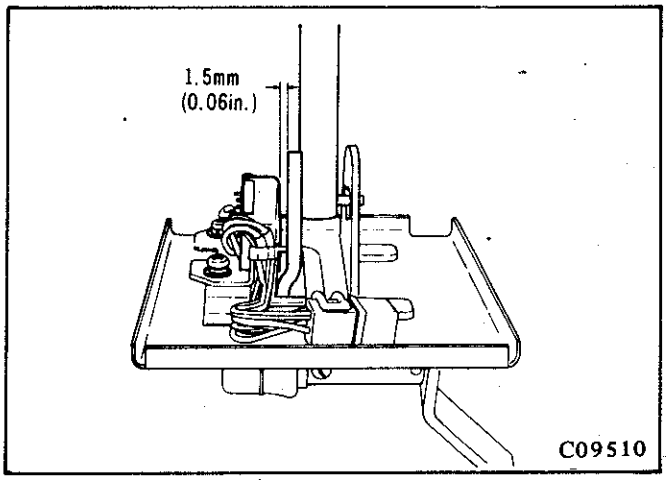


Fig. 7—Inhibitor switch attaching position

(6) Set the selector lever in "N", move the control lever to place the transmission in neutral and tighten the rod lever lock nut.

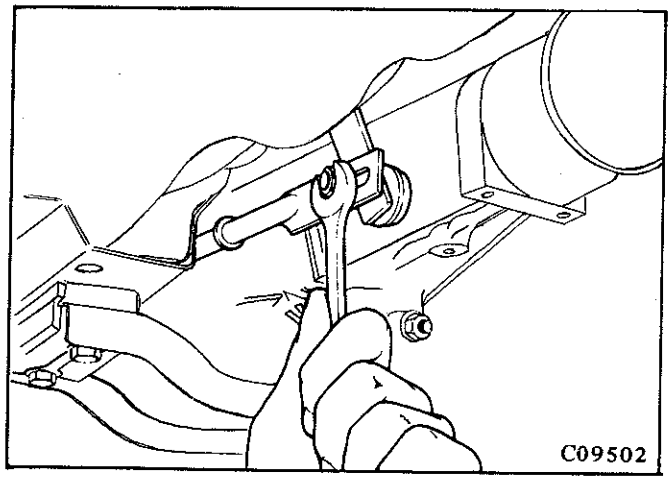


Fig. 8—Installing the control rod (two door model)

(7) Check for correct operation of the lever and that the inhibitor switch allows starting in "P" and "N" only and allows the back-up lamps to light in "R" only. If the inhibitor switch fails to operate, re-adjust or replace the switch.

(8) Install the selector handle on the selector lever tube making sure that the handle engages in the slot provided in the lever tube. Securely tighten the set screw.

THROTTLE CABLE ADJUSTMENT

(1) Apply a thin film of multi-purpose grease on the accelerator pedal shaft where it turns in the bracket, cable connection at pedal and cable connection at carburettor.

(2) If fitted with automatic transmission, lubricate transmission linkage swivel points.

(3) Ensure that the engine is at operating temperature and choke fast idle is not in operation.

(4) Loosen the cable adjusting lock nut located on the right hand side of the dash panel (engine compartment side).

(5) Adjust the cable tension by means of the adjusting sleeve, the cable must not have any slack and must move freely.

(6) Tighten the lock nut securely.

(7) Check that the carburettr throttle valves are fully open when the accelerator pedal is fully depressed.

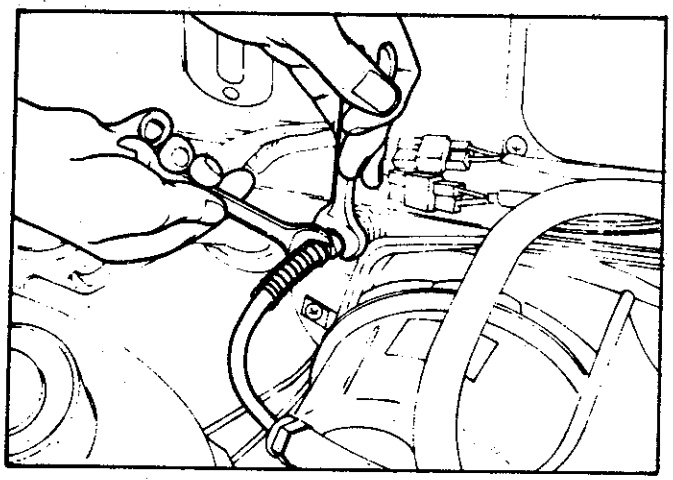


Fig. 9—Adjusting throttle cable

TRANSMISSION THROTTLE CONTROL CABLE

Astron Engine (with Borg Warner 35 Transmission)

The throttle control cable must be adjusted prior to adjusting the transmission throttle control cable.

The transmission throttle control cable is pre-lubricated and does not require additional lubrication.

Adjustment

(1) Apply parking brakes fully, and position wheel chocks.

(2) Start engine and adjust idle speed to specifications at normal operating temperature.

(3) Stop engine (for safety reasons). Adjust outer cable to provide that the cable crimped sleeve (on original cable only) just contacts the abutment.

(4) Connect tachometer to read engine R.P.M.

(5) Install a hydraulic gauge, Tool No. E21C65A to read line pressure. The gauge tapping point is located at the rear of the transmission housing to the left of the transmission centreline just above the transmission oil pan mounting flange.

(6) Start the engine and select 'D' drive range (brakes fully applied).

(7) Note the engine R.P.M. and the line pressure with the transmission at operating temperature. The line pressure should be:—344-448 kPa (50-65 p.s.i.) for 2,0ℓ transmission and 393-496 kPa (57-72 p.s.i.) for 2,6ℓ transmission.

(8) Use the accelerator pedal to increase engine speed 500 R.P.M. and note the increase in transmission pressure. The increase in pressure must be a minimum of 69 kPa (10 P.S.I.). It may be necessary to lightly shake the transmission throttle cable outer casing during the operation to overcome cable drag.

(9) To increase the pressure rise, turn the cable adjusting nuts to widen the gap between the end of the outer cable casing and the crimp on the inner cable. To decrease the pressure rise, close the gap between the end of the outer cable casing and the crimp. **Remove the crimp if correct adjustment cannot be achieved. After setting fit a new crimp.**

NOTE: Duration of test must be limited to a few seconds to prevent transmission overheating. Select 'N' Neutral and return engine to idle speed whilst making necessary cable adjustments.

TRANSMISSION THROTTLE CONTROL LINKAGE

The throttle control cable must be adjusted prior to adjusting the transmission throttle control linkage.

Astron Engine (With MA904A Transmission)

(1) Loosen the bolt connecting rods B and C.

(2) Position rod A, or the transmission throttle lever, fully forward (the stop is within the transmission).

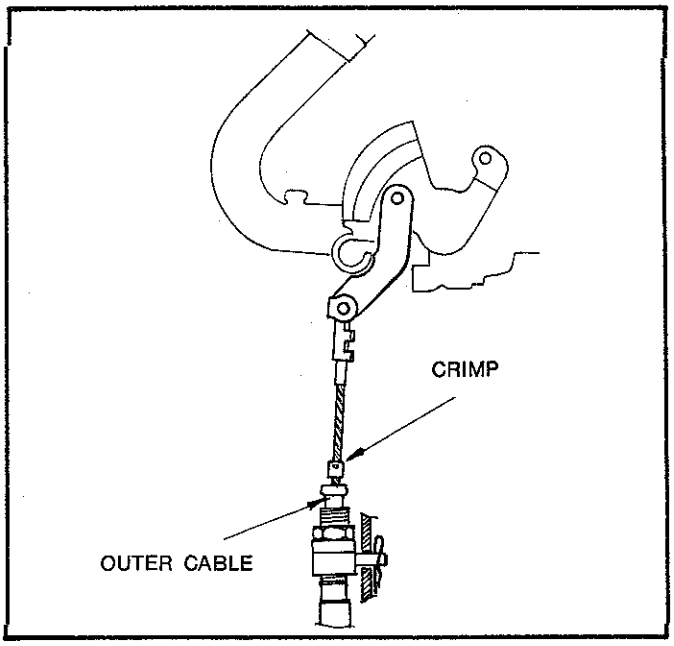


Fig. 10—Transmission cable adjustment

(3) Position rod C against the carburettor idle stop ensuring that the automatic choke is fully released. Tighten the bolt connecting rods B and C.

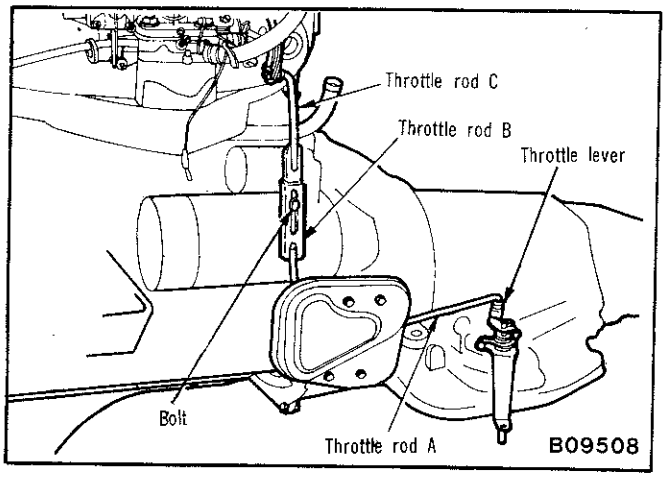


Fig. 11—Transmission throttle linkage adjustment (MA904 A)

(4) Ensure that the linkages move smoothly and freely when the carburettor throttle valve is moved to the wide open position and that extra movement of the transmission throttle linkage exists when in this position.

(5) Ensure that when the carburettor throttle linkage is returned to idle, the transmission throttle linkage completely returns to idle by spring force alone.