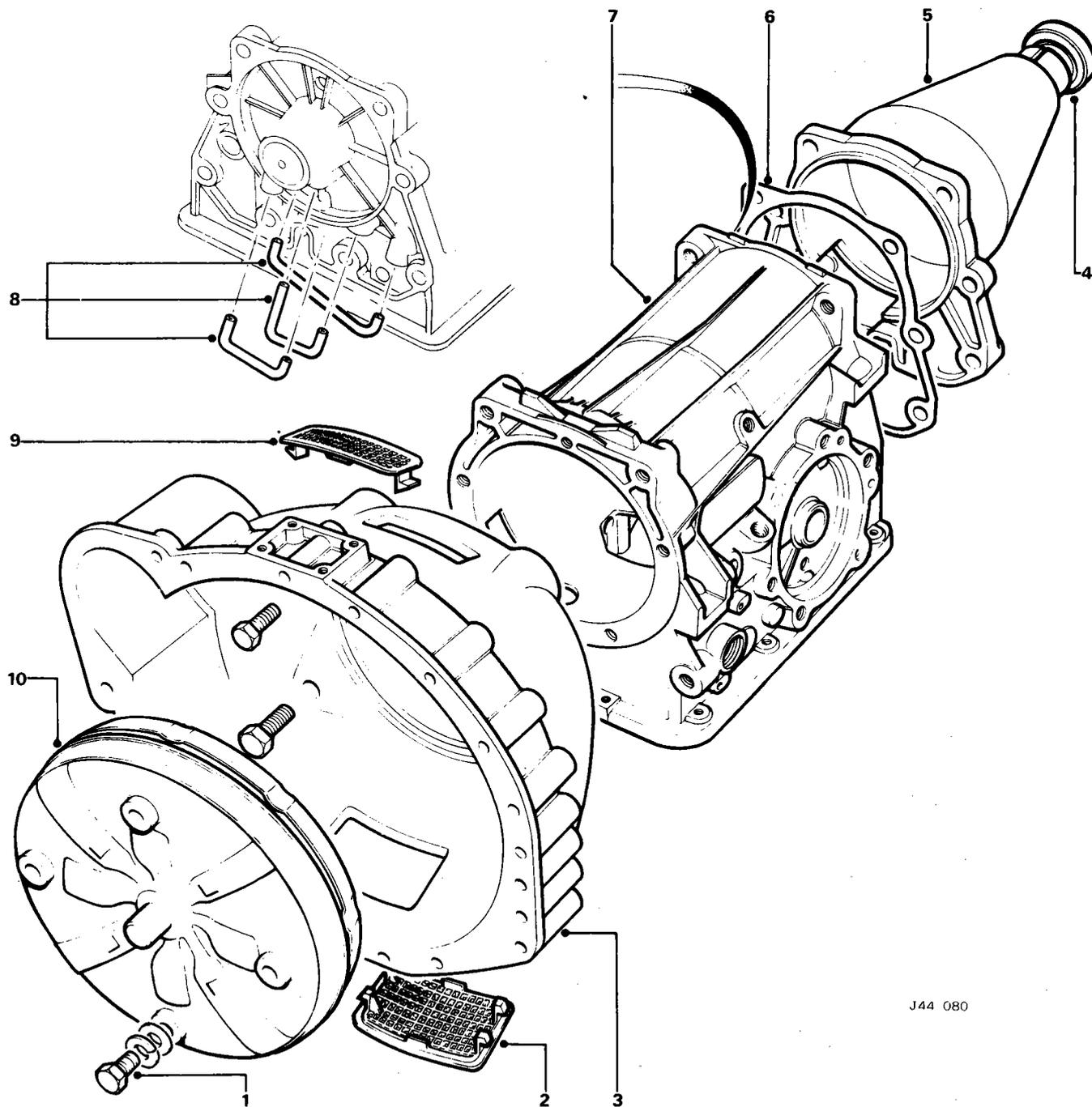


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LIST OF COMPONENTS

1. Converter securing bolt
2. Stoneguard
3. Converter housing
4. Rear oil seal
5. Rear extension housing
6. Gasket
7. Transmission case
8. Governor feed, lubrication and return pipes
9. Stoneguard
10. Converter



J44 080

Fig. 1

DESCRIPTION

TORQUE CONVERTER

The torque converter is of the three-element, single-phase type. The three elements are: impeller, connected to the engine crankshaft; turbine, connected to the gearbox input shaft, and stator, mounted on a one-way clutch on the stator support projecting from the gearbox case. The converter provides torque multiplication of from 1:1 to 2.3:1 and the speed range during which this multiplication is obtained varies with the accelerator position.

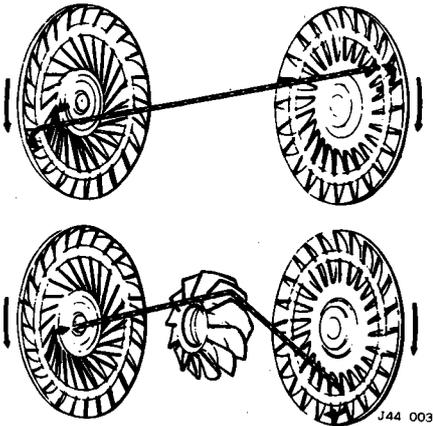


Fig. 3

GEAR SET

The planetary gear set consists of two sun gears, two sets of pinions, a pinion carrier and a ring gear.

Power enters the gear set via the two sun gears, the forward sun gear driving in forward gears, the reverse sun gear driving in reverse gear. The ring gear, attached to the output shaft, is the driven gear. The planet wheels connect driving and driven gears, two sets of planet wheels being used in forward gears and one set in reverse.

The planet carrier locates the planet wheels relative to sun and ring gears, also serving as a reaction member.

CLUTCHES

The gearbox input shaft is connected to the torque converter turbine at the front end and is therefore known as the turbine shaft. The rear end of the shaft is connected to the front and rear clutches; (the clutches are of the multi-disc type operated by hydraulic pressure). Engagement of the front clutch connects the turbine shaft to the forward sun gear. Engagement of the rear clutch connects the turbine shaft to the reverse sun gear.

BRAKE BANDS

The brake bands, operated by hydraulic servos, are used to hold drive train components stationary in order to obtain low, intermediate and reverse gears. The front band is clamped

around the rear clutch outer drum to hold the reverse sun gear stationary. The rear band is clamped around the planet carrier to hold the planet carrier stationary.

ONE-WAY CLUTCH

The one-way clutch is situated between the planet carrier and the gearbox case. Rotation of the planet carrier and the gearbox against engine direction is prevented so providing the reaction member for low gear (drive). Rotation of the planet carrier in engine direction is allowed (free-wheeling) providing smooth changes from low to intermediate and intermediate to low gears.

MECHANICAL POWER FLOWS

Neutral and Park

In neutral the front and rear clutches are off, and no power is transmitted from converter to the gear set. The front and rear bands are also released. In 'P' the rear servo circuit is pressurized while the engine is running, so that the rear band is applied.

First gear ('D') selected

The front clutch is applied, connecting converter to the forward sun gear. The one-way

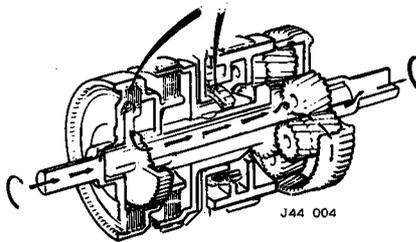


Fig. 4

clutch is in operation, preventing the planet carrier from rotating anti-clockwise. When the vehicle is coasting, the one-way clutch overruns and the gear set free-wheels.

First gear ('1') selected

The front clutch is applied, connecting converter to forward sun gear. The rear band is applied, holding the planet carrier stationary.

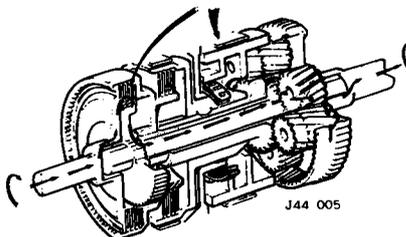


Fig. 5

Planet pinions drive ring gear, and reverse sun gear rotates freely in the opposite direction to the forward sun gear.

Second gear ('D', '2' or '1' selected)

Again the front clutch is applied, connecting converter to forward sun gear. The front band

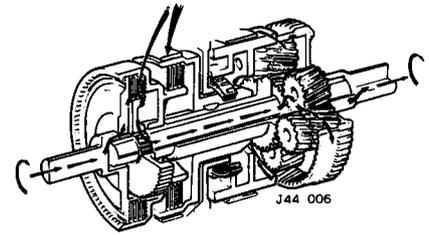


Fig. 6

is applied, holding the reverse sun gear stationary. Combined rotation of planet pinions and carrier drive the ring gear.

Third gear ('D') selected

Again the front clutch is applied, connecting converter to forward sun gear. The rear clutch is applied, connecting the converter also to the

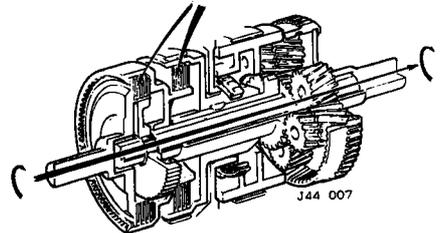


Fig. 7

reverse sun gear; thus both sun gears are locked together and the gear set rotates as a unit, providing a ratio of 1:1.

Reverse gear ('R') selected

The rear clutch is applied, connecting converter to reverse sun gear. The rear band is

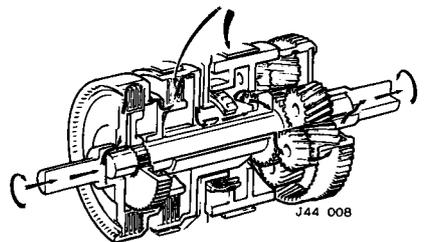


Fig. 8

applied, holding planet carrier stationary. Planet pinions drive ring gear in an opposite direction to engine rotation.

IDENTIFICATION

The Model 66 Automatic Gearbox was introduced on the Series III 6-cylinder Jaguar and Daimler Cars.

The two initial production transmissions were:

1. 066L transmission for use with the Jaguar XJ6 4.2. This can be identified by the yellow name-plate which will have 'Model 66' and the number 6066 in raised, polished figures.
2. 067H transmission for use with the Jaguar XJ6 3.4. This can be identified by the golden brown name-plate which will have 'Model 66' and the number 6067 in raised, polished figures.

Listed below are some of the improvements and modifications which have been built into this transmission.

CONVERTER

The Model 66 converter turbine hub has an increased spline size to take the larger input shaft.

The stator one-way clutch inner race has a revised profile and increase in hardness.

A Torrington race has been introduced into the impeller side of the stator.

The impeller blades have a rib formed in them to give added strength; this will be introduced into all 11 in torque converters.

Six impeller blades are welded in two places, equally spaced, to the impeller shell, again giving added strength.

The blower ring has been deleted on Model 66 converters, and the converter mounting bosses will be CO₂-welded to the front cover.

PUMP

A groove has been added to the pump/converter bush to improve lubrication of the bush. The groove stops short of the front edge of the bush (oil seal side) to prevent the oil seal being swamped.

A tin/aluminium pump drive gear bush, has also been introduced.

The new stator support will have an increased diameter bush to accommodate the increased diameter input shaft.

A large pump suction tube has been introduced to ensure that the end of the tube is immersed in oil under all conditions.

INPUT SHAFT AND FRONT CLUTCH ASSEMBLY

An increased diameter input shaft is being introduced on the Model 66 transmission.

REAR CLUTCH AND FRONT DRUM ASSEMBLY

To improve the lubrication path to the rear clutch and front band, changes have been made to this assembly. They are:

The rear clutch piston face (clutch plate side) will have four slots at right angles to one

another to improve the oil flow from the inside diameter to outside diameter of the clutch pack.

The four wide grooves on the inside diameter of the front drum (steel clutch plate splines area) have been deepened to enable more oil flow around the plates.

Between the outside and inside diameter of the front drum, so that they line up with the four deepened grooves, four holes have been drilled to enable an oil feed to the front band to be maintained.

The rearmost lubrication groove between the three sealing ring grooves of the front drum has been deepened and the holes size increased in order to improve the oil flow.

The lubrication feed hole in the reverse sun gear has been increased in diameter.

ONE-WAY CLUTCH ASSEMBLY

An updated 1st speed one-way clutch assembly has been introduced which will have 30 sprags instead of the 24 sprags on existing assemblies.

The centre support of the transmission has an increased diameter rear clutch and lubrication drillings.

CARRIER ASSEMBLY

An improved lubrication oil-flow has been achieved by introducing a wider bush into the carrier cover which has opposing helical oil grooves.

Non-crowned, shaved, short pinions have been introduced. In order to improve their durability, these pinions have no identification groove.

OUTPUT SHAFT

The lubrication hole in the output shaft has an increased diameter on Model 66 transmissions.

MAINCASE AND SERVOS

The front clutch and governor feed hole in the rear of the maincase has been increased to 5.0 mm.

The rear servo piston and cover have been strengthened.

OIL-PAN

In order to improve cooling and to ensure that the pump suction pipe is at all times below the fluid level a deep oil-pan is being used on the transmission.

VALVE BLOCK

An adjustable cam bracket is fitted.

A transmission oil filter spacer is being used on the transmission now that a deep oil-pan is employed.

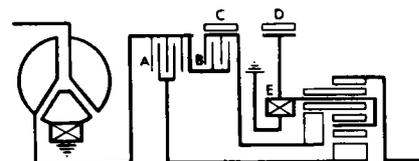
MISCELLANEOUS

A 5 mm spirol pin, secured by a split pin in the transmission cross-shaft is now fitted.

With the deep oil-pan, as fitted to the Model 66, the total fluid capacity, from dry, is approximately 7.9 litres (14 pints; 17 U.S. pints).

CLUTCH AND BAND APPLICATION CHART

- A. Front clutch
- B. Rear clutch
- C. Front band
- D. Rear band
- E. One-way clutch



	A	B	C	D	E
1 (first gear)	●			●	
D (first gear)	●				●
2&D (sec. gear)	●		●		
D (third gear)	●	●			
R (rev. gear)		●		●	

J44 082

KEY TO COMPONENTS SHOWN ON HYDRAULIC CHARTS

- | | |
|----------------------|--------------------------------|
| A. Torque converter | J. Secondary regulator |
| B. Front clutch | K. 2-3 shift valve |
| C. Rear clutch | L. 1-2 shift valve |
| D. Front servo | M. Servo orifice control valve |
| E. Rear servo | N. Manual valve |
| F. Governor | P. Down-shift valve |
| G. Pump | Q. Throttle valve |
| H. Primary regulator | R. Modulator valve |

KEY TO HYDRAULIC CHART COLOUR CODE

- | | |
|-----------------|--------------------------|
| Red line | — Pump pressure |
| Red cross hatch | — To torque converter |
| Blue line | — Governor line pressure |
| Yellow line | — Throttle valve |
| Green line | — Pump suction |

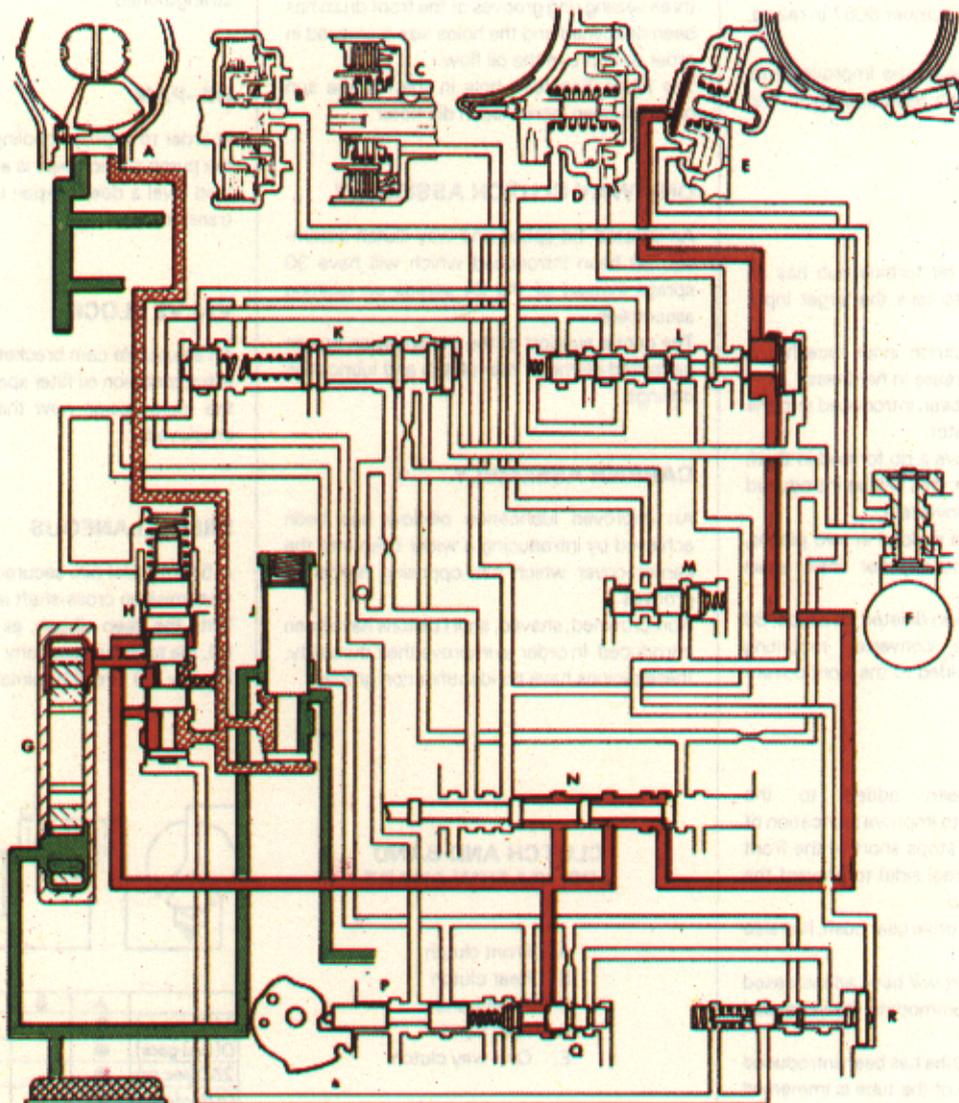
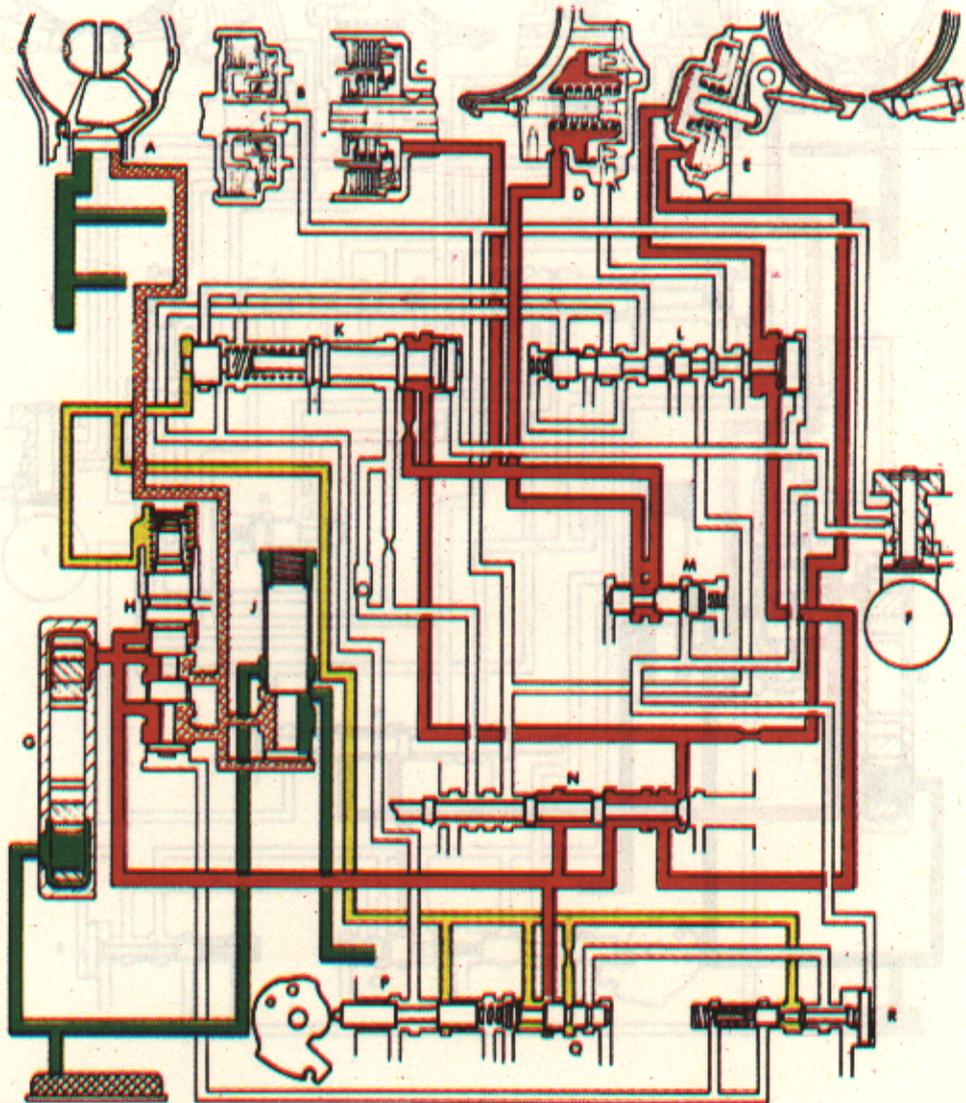


Fig. 9

**HYDRAULIC OPERATION IN 'P'
(PARK—Fig. 9)**

Coupled to the manual valve operating lever is a linkage incorporating a pawl; movement of this lever to the 'Park' position engages the pawl with the toothed outer surface of the ring gear, so locking the output shaft to transmission case. The rear servo is energized in 'P' selection but, as both the front and rear clutches are not energized, drive is impossible and the transmission remains inoperative.



J44010

Fig. 10

**HYDRAULIC OPERATION IN 'R'
(REVERSE—Fig. 10)**

Throttle pressure applied to spring end of primary regulator valve increases line pressure proportional to engine output. Manual valve directs line pressure through 1-2 shift valve to apply rear servo and through 2-3 shift valve to release front servo and apply rear clutch.

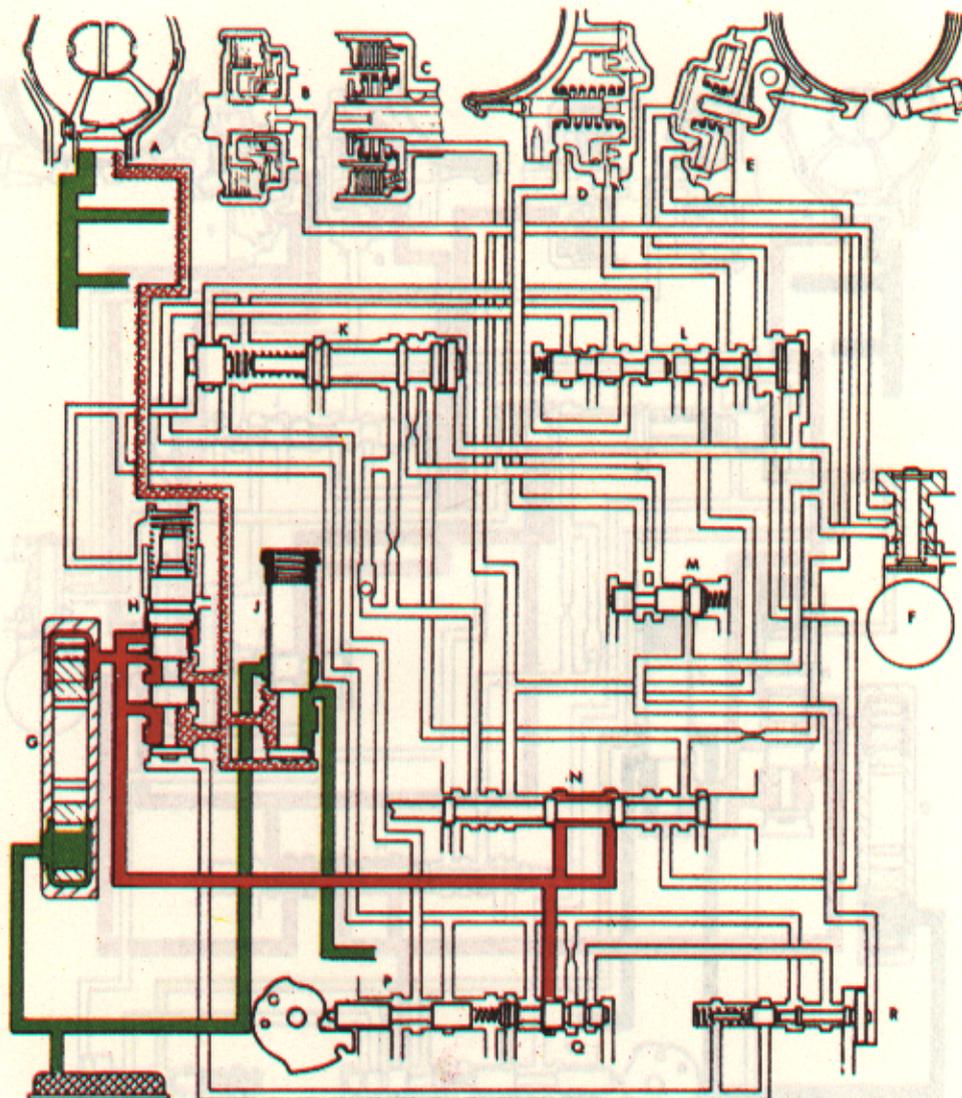


Fig. 11

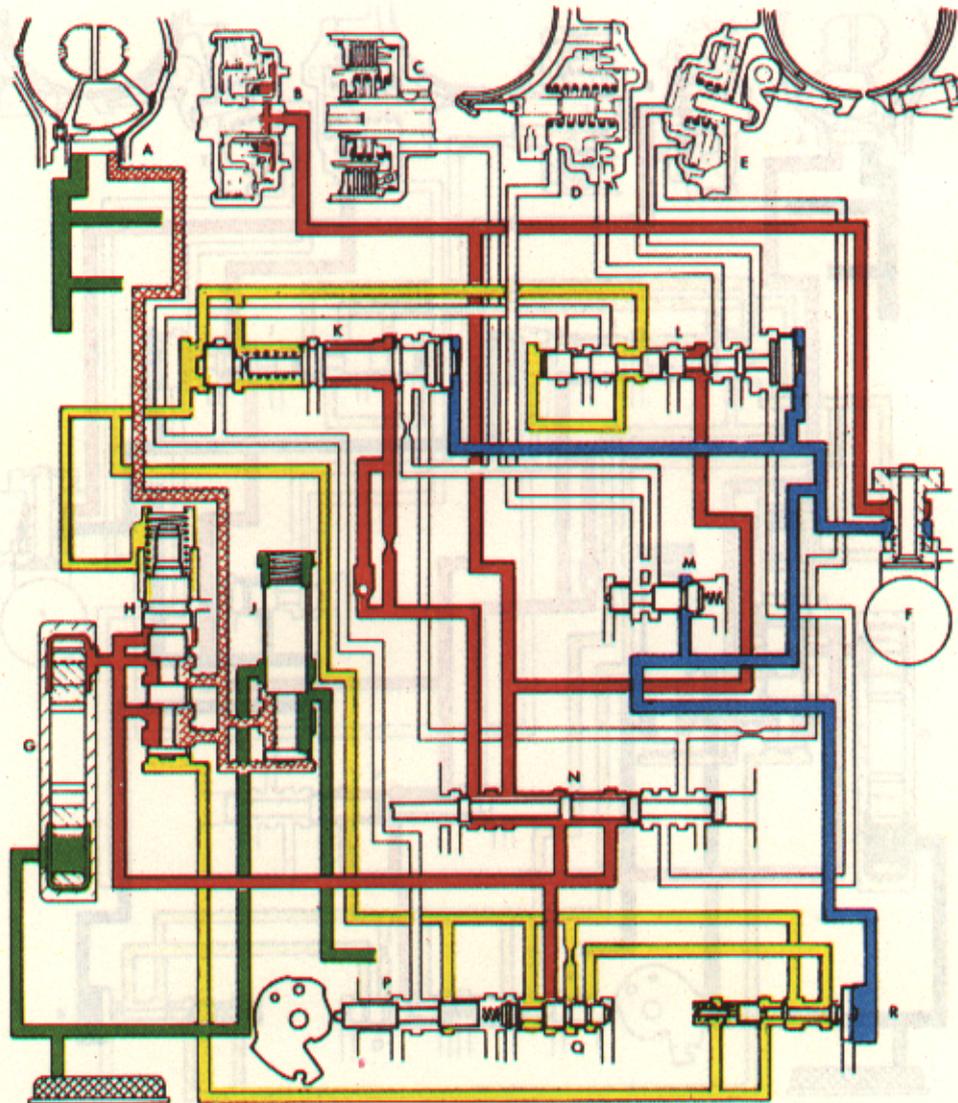
J44011

**HYDRAULIC OPERATION IN 'N'
(NEUTRAL—Fig. 11)**

With the engine running, the pump supplies fluid to the primary regulator which regulates line pressure.

Spill from the primary regulator supplies the torque converter and lubrication requirements. This supply is regulated by the secondary regulator.

The line pressure supplied to the manual and throttle valves is blocked by a land on the valves so that neither governor, clutches nor servos are energized.



J44012

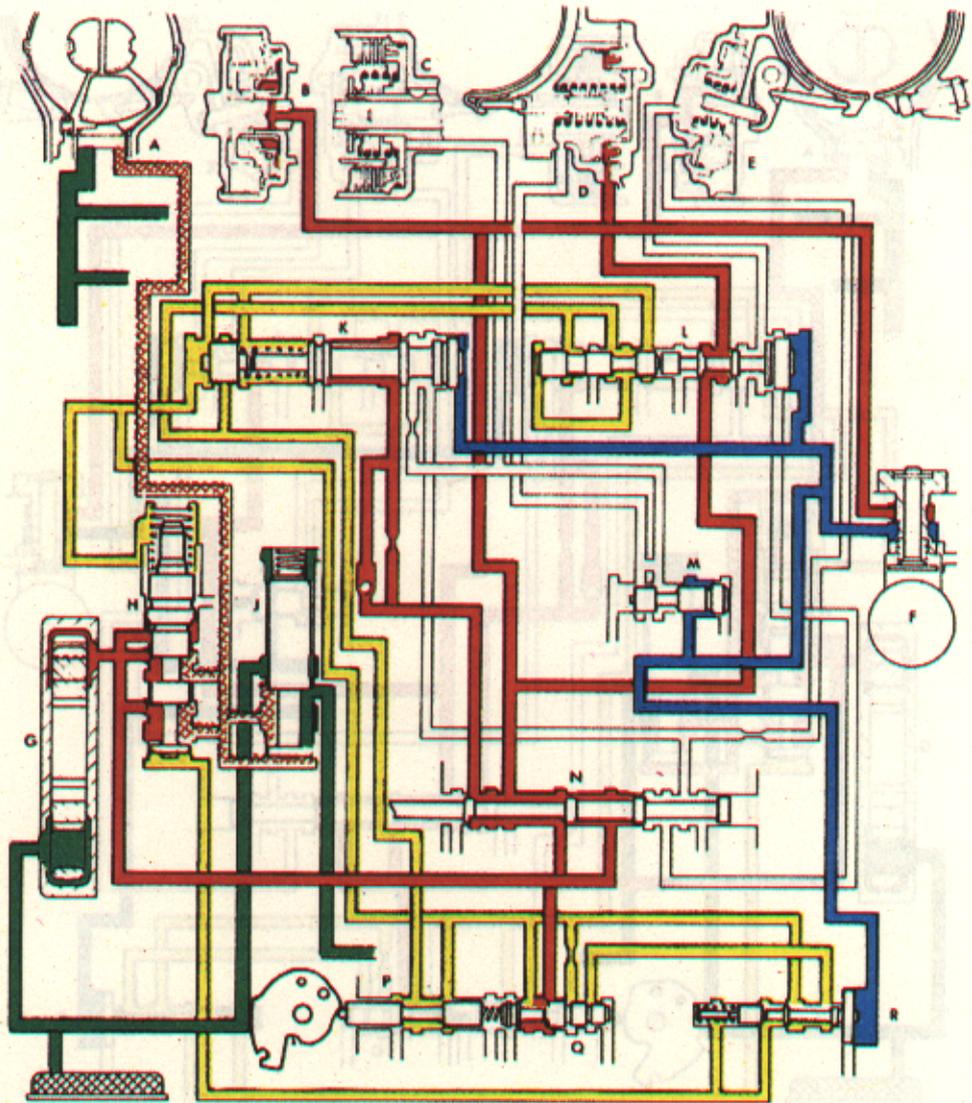
Fig. 12

**HYDRAULIC OPERATION IN 'D'
(FIRST GEAR)**

Throttle pressure is applied to spring end of primary regulator valve. When throttle valve is in full throttle position, modulator valve plug applies regulated line pressure to other end of primary regulator valve thereby controlling shift quality.

Manual valve directs line pressure to apply front clutch thereby enabling vehicle to move off in first gear.

Manual valve also directs line pressure to governor feed and to 1-2, 2-3 shift valves for subsequent upwards gear-shifts.



J44013

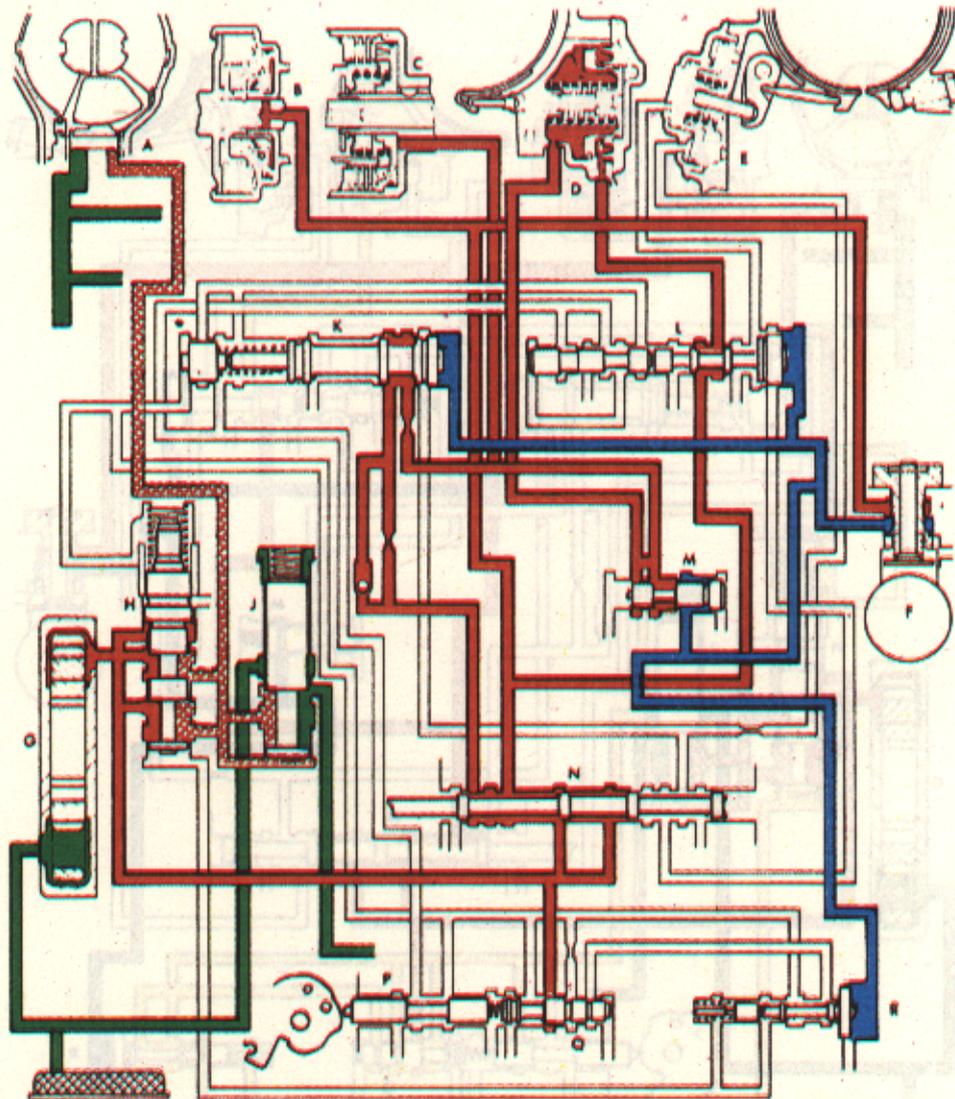
Fig. 13

**HYDRAULIC OPERATION IN 'D'
(SECOND GEAR—Fig. 13)**

Pressure control by primary regulator valve functions as described in 'D' (First gear).

When governor pressure exceeds throttle pressure, 1-2 shift valve moves and directs line pressure to front servo which applies front brake band. Front clutch being applied, transmission operates in second gear.

When down-shift valve is in forced throttle (kick-down) position, forced throttle pressure acts upon 1-2 and 2-3 shift valves thereby delaying up-shifts or, if governor pressure is low, causes a 2-1 down-shift.



J44014

Fig. 14

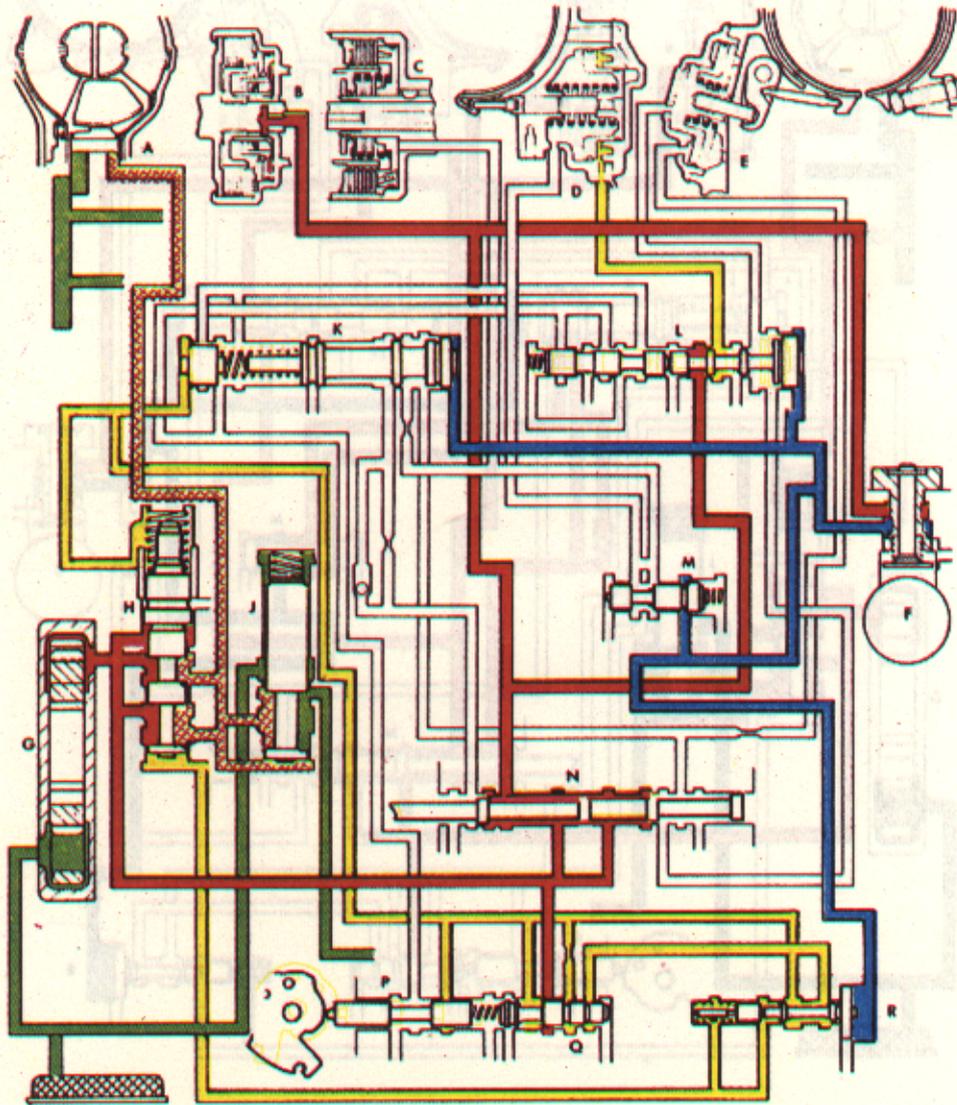
**HYDRAULIC OPERATION IN 'D'
(THIRD GEAR—Fig. 14)**

Pressure control by primary regulator valve functions as described in 'D' (First gear).

2-3 shift occurs early at light throttle or late at full throttle depending upon balance between governor and throttle pressure.

When governor pressure exceeds throttle pressure, 2-3 shift valve directs line pressure to rear clutch and also to 'release' side of front servo via servo orifice control valve.

The timed relationship between rear clutch 'apply' and front servo 'release' is dependent on governor pressure which in turn is controlled by road speed. A high governor pressure closes servo orifice control valve so directing front servo 'release' fluid through a restrictor thereby delaying front servo 'release' in relation to rear clutch 'apply'.

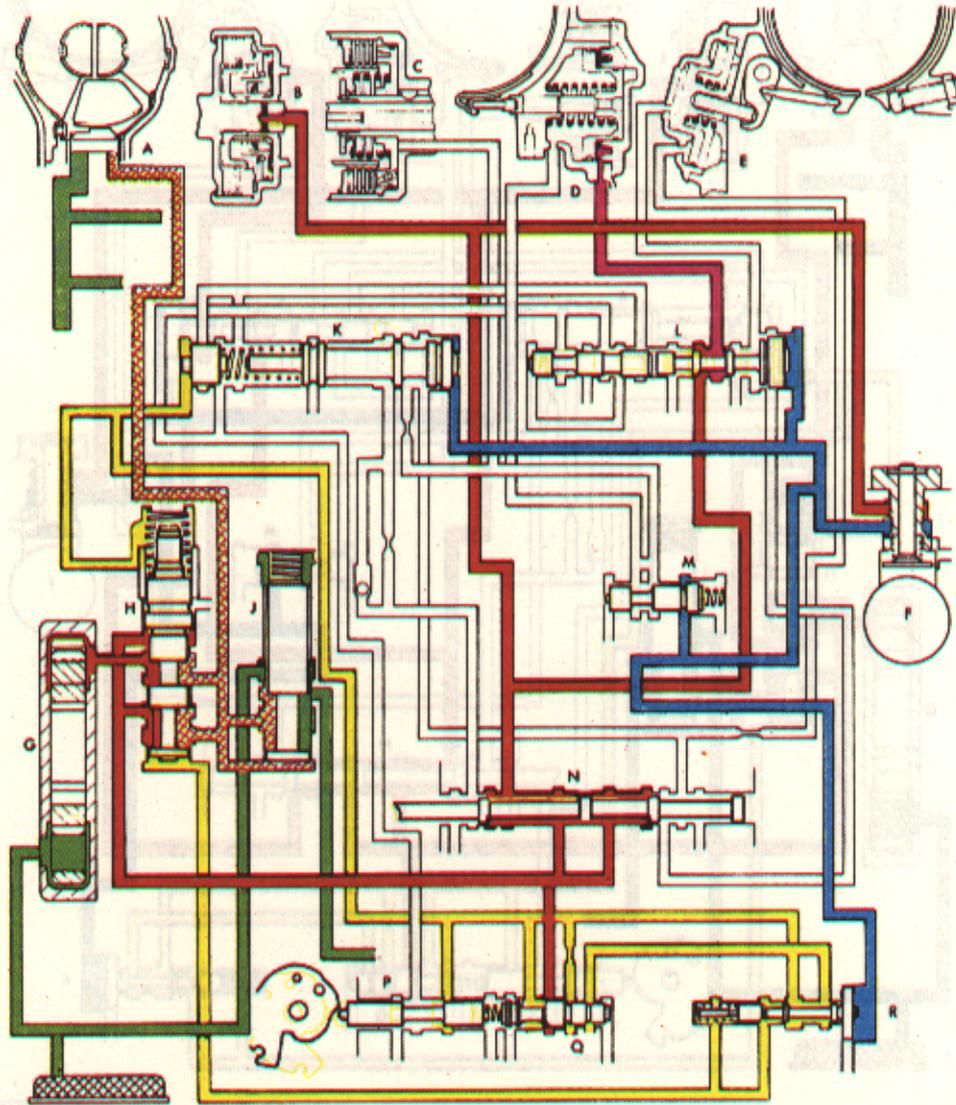


J44015

Fig. 15

**HYDRAULIC OPERATION IN '2'
(LOW GEAR)—Fig. 15**

Pressure control by primary regulator valve functions as described in 'D' (First gear). Front clutch is applied but as engine speed is low, governor pressure causes 1-2 shift valve to remain closed thereby blocking feed from modulator valve.

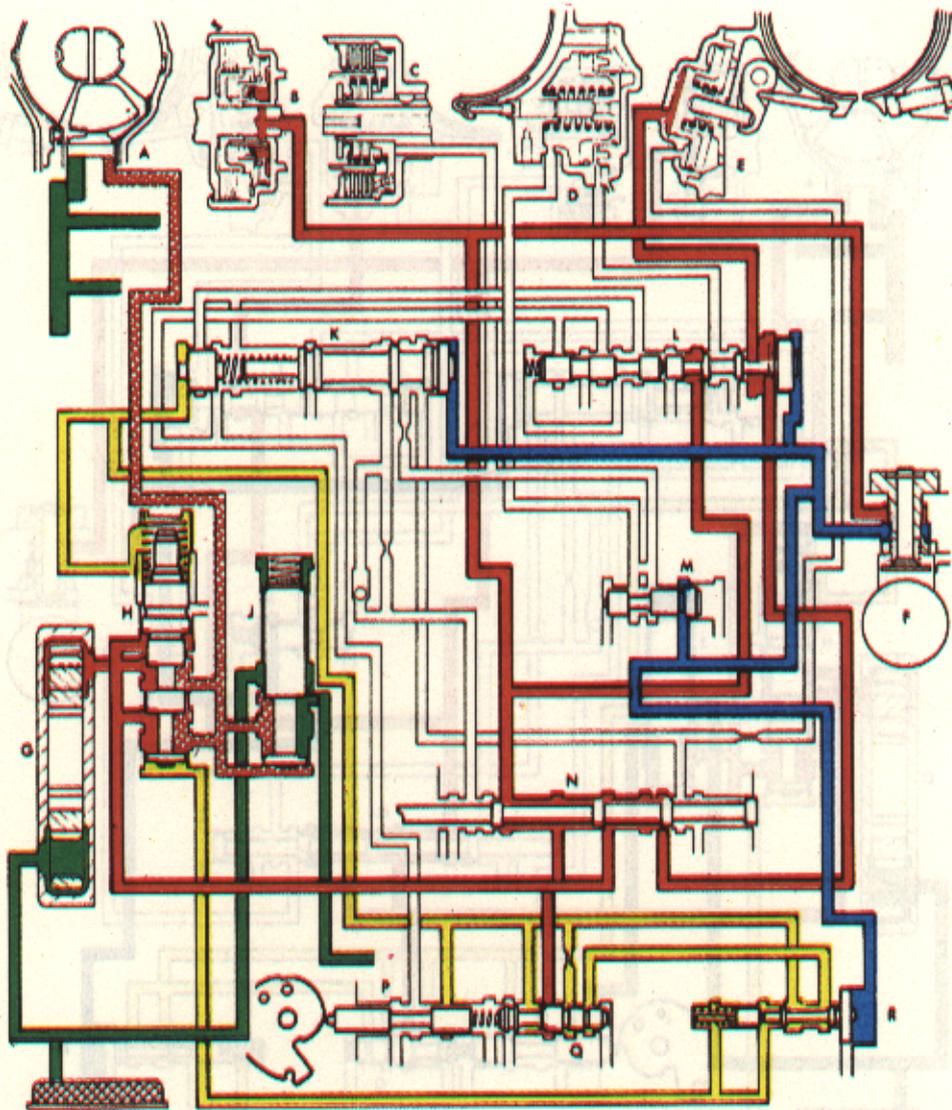


J44016

Fig. 16

**HYDRAULIC OPERATION IN '2'
(SECOND GEAR)—Fig. 16**

Front clutch is still applied and as engine speed increases, governor pressure rises and moves 1-2 shift valve. This allows pressure from manual valve to front servo 'apply'.



J44017

Fig. 17

**HYDRAULIC OPERATION IN '1'
(LOW GEAR)—Fig. 17**

Pressure control by primary regulator valve functions as described in 'D' (First gear). Manual valve directs line pressure to front clutch governor feed and 1-2 shift valve. Pressure is also directed to enlarged end of 1-2 shift valve so opposing governor pressure and hydraulically locking the valve. Rear servo is also applied and no up-shift can occur.

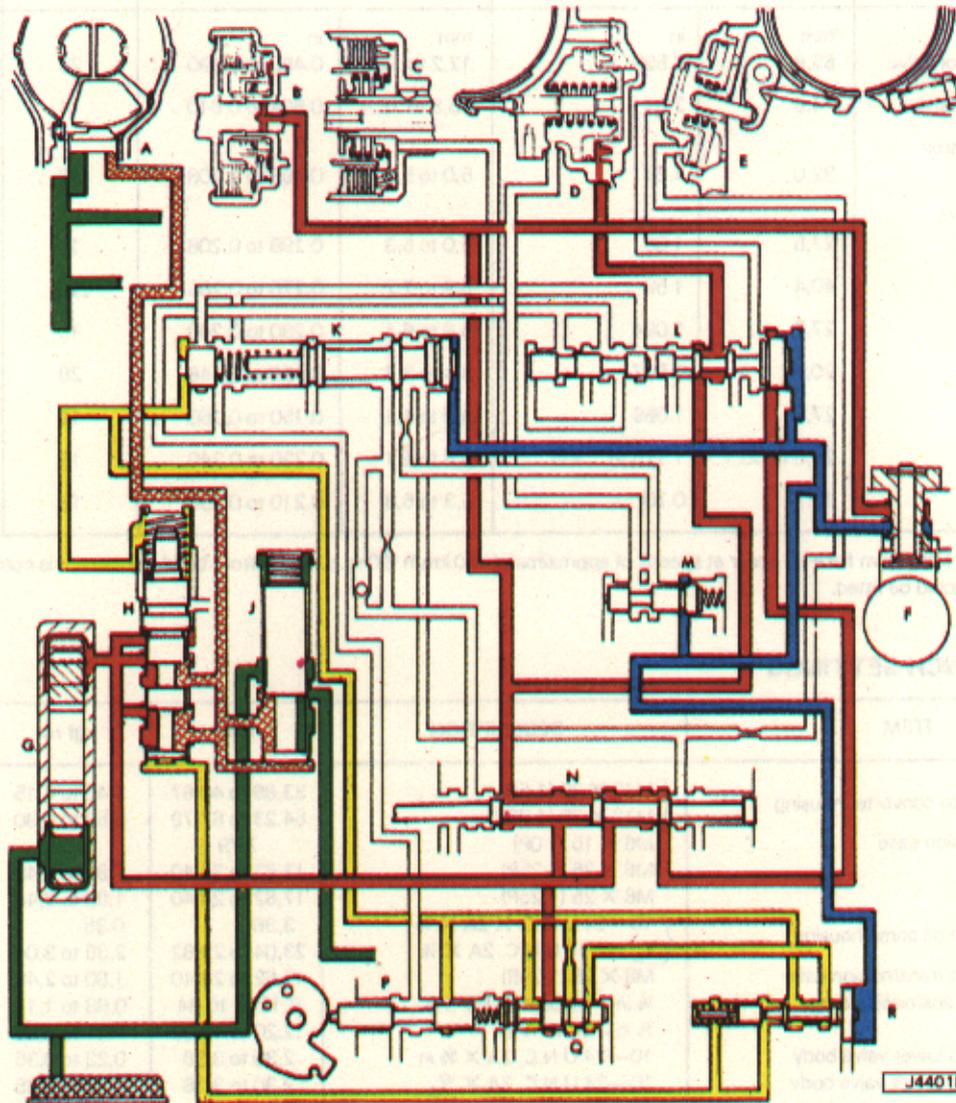


Fig. 18

**HYDRAULIC OPERATION IN '1'
(SECOND GEAR)—Fig. 18**

When selector lever is moved to position '1' at speed, front servo and a down-shift from high to intermediate gear occurs. A further down-shift to low gear occurs when vehicle speed falls sufficiently.

VALVE SPRING IDENTIFICATION

The following spring identification table is given to assist in identifying valve springs when overhaul work is being carried out. When valve block is dismantled, springs should be compared with dimensions given. Any spring which is distorted or coil bound **must** be replaced.

DESCRIPTION	LENGTH		DIAMETER		NUMBER OF COILS	COLOUR
	mm	in	mm	in		
Secondary regulator valve	65,8	2.593	12,2 to 12,4	0.480 to 0.490	23	Blue
Primary regulator valve	74,6	2.94	15,3 to 15,5	0.604 to 0.610	14	Blue
*Servo orifice control valve—Model 65	32,0	1.281	5,0 to 5,3	0.198 to 0.208	17	Yellow
Servo orifice control valve—Model 66	27,5	1.08	5,0 to 5,3	0.198 to 0.208	17	Yellow
2-3 shift valve	40,4	1.59	6,9 to 7,2	0.275 to 0.285	22.5	Yellow
1-2 shift valve	27,7	1.094	5,8 to 6,1	0.230 to 0.240	13	Plain
Downshift valve	20,5	0.807	3,4 to 3,7	0.136 to 0.146	28	Yellow
Modulator valve	27,1	1.069	3,8 to 4,1	0.150 to 0.160	19	Plain
Throttle valve	29,8 to 30,1	1.175 to 1.185	5,8 to 6,1	0.230 to 0.240	18	Green
Dump ball valve	17,7	0.70	5,3 to 5,8	0.210 to 0.230	16	Plain or white

***NOTE:** Should 3-2 kick-down flare-up occur at speeds of approximately 80 km/h (50 m.p.h.) and front band adjustment is correct, the shorter spring (Model 66), should be fitted.

TORQUE WRENCH SETTINGS

SECTION 44

ITEM	DESCRIPTION	Nm	kgf m	lbf ft
Transmission case to converter housing	{ M10 X 30 (1.5P) M12 X 30 (1.75P)	33,89 to 40,67 54,23 to 67,79	3,46 to 4,15 5,53 to 6,90	25 to 30 40 to 50
Oil pan to transmission case	M6 X 15 (1.0P)	7,79	0,80	5.75
Front servo cover	M8 X 25 (1.25P)	17,62 to 24,40	1,80 to 2,48	13 to 18
Rear servo cover	M8 X 25 (1.25P)	17,62 to 24,40	1,80 to 2,48	13 to 18
Oil pump adaptor to oil pump housing	{ 10—24 U.N.C. X 2A X 5/16 5/16 in—18 U.N.C. 2A X 7/16	3,38 23,04 to 29,82	0,35 2,35 to 3,04	2.5 17 to 22
Oil pump adaptor to transmission case	M8 X 25 (1.25P)	17,62 to 24,40	1,80 to 2,48	13 to 18
Pressure point on transmission case	1/8 in—27 Dryseal N.P.T.F.	8,13 to 10,84	0,83 to 1,11	6 to 8
Oil pan drain plug	3/8 in—24 X 3/8 in	12,20 to 16,26	1,24 to 1,66	9 to 12
Upper valve body to lower valve body	10—24 U.N.C. 2A X 5/16 in	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
Lower valve body to upper valve body	10—24 U.N.C. 2A X 15/16	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
Lower valve body to upper valve body	10—24 U.N.C. 2A X 1 1/8 in	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
Suction tube assembly to lower valve body	10—24 U.N.C. 2A X 3/8 in	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
Oil tube plate to lower valve body	{ 10—24 U.N.C. 2A X 5/16 in 10—24 U.N.C. 2A X 15/16 in	2,30 to 3,38 2,30 to 3,38	0,23 to 0,35 0,23 to 0,35	1.7 to 2.5 1.7 to 2.5
End plate to lower valve body	10—24 U.N.C. 2A X 5/16 in	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
End plate to upper valve body	10—24 U.N.C. 2A X 3/8 in	2,30 to 3,38	0,23 to 0,35	1.7 to 2.5
Lower valve body to transmission case	1/4 in—20 U.N.C. 2A X 1 1/4 in	6,77 to 10,84	0,69 to 1,11	5 to 8
Lower valve body to cam bracket	No. 10 U.N.F. bolt	2,71 to 4,74	0,27 to 0,48	2 to 3.5
Tube location plate	M5 bolt (0.8P)	2,30 to 2,71	0,23 to 0,27	1.7 to 2.0
Detent spring to lower valve body		2,30 to 2,71	0,23 to 0,27	1.7 to 2.0
Servo adjusting screw locknuts	5/16 in U.N.C. nut	40,67 to 54,23	4,15 to 5,55	30 to 40
Oil cooler connector	1/4 in N.P.T.F.	27,11 to 29,82	2,77 to 3,04	20 to 22
Extension housing to case	7/16 in U.N.F. bolt	54,23 to 67,79	5,55 to 6,90	40 to 50
Extension housing to case	7/16 in U.N.C.	40,67 to 67,79	4,15 to 6,90	30 to 50
Inhibitor switch to main case	No. 10 U.N.C. bolt	5,42 to 6,77	0,55 to 0,69	4 to 5
Park cam plate to main case	M6 bolt (1.0P)	6,77 to 10,84	0,69 to 1,11	5 to 8
Coupling flange nut	M20 nut (1.5P)	98,02 to 117,68	10,0 to 12,0	72,3 to 86,8
Governor retainer	M24 bolt	20,33 to 24,40	2,07 to 2,49	15 to 18
Coupling flange	5/8 in U.N.C. nut	77,57 to 81,34	7,60 to 8,29	55 to 60
Centre support fixing	3/8 in U.N.C. bolt	13,55 to 20,33	1,38 to 2,07	10 to 15
Connector	1/2 in U.N.S. nut	13,55 to 16,26	1,38 to 1,66	10 to 12
Coupling flange	1/2 in U.N.F. bolt	54,23 to 67,79	5,55 to 6,90	40 to 50
Dipstick tube attachment	7/8 in U.N.S. nut	37,96 to 43,38	3,87 to 4,42	28 to 32

GEAR-CHANGE SPEEDS

	LIGHT THROTTLE		FULL THROTTLE		KICK DOWN		DOWN SHIFT 3—2*	ROLL OUT 2—1
	1—2	2—3	1—2	2—3	3—2	3—1		
3,4 litre k.p.h. m.p.h. 3.54:1 axle	11 to 16 7 to 10	25 to 29 16 to 18	55 to 60 34 to 38	96 to 106 60 to 66	96 to 105 60 to 65	55 to 60 34 to 37	70 to 74 44 to 46	8 to 11 5 to 7
4,2 litre k.p.h. m.p.h. 3,31:1 axle	13 to 19 8 to 12	21 to 29 13 to 18	66 to 82 41 to 51	117 to 130 73 to 81	101 to 117 63 to 73	40 to 56 25 to 35	51 to 67 32 to 42	8 to 16 5 to 10
4,2 litre k.p.h. m.p.h. 3.07:1 axle	13 to 19 8 to 12	21 to 30 13 to 19	67 to 85 42 to 53	120 to 134 75 to 84	104 to 120 65 to 75	42 to 59 26 to 37	53 to 69 33 to 43	8 to 16 5 to 10
4,2 litre k.p.h. m.p.h. 3.058:1 axle	14 to 19 9 to 12	21 to 30 13 to 19	67 to 85 42 to 53	120 to 136 75 to 85	104 to 120 65 to 75	42 to 59 26 to 37	53 to 69 33 to 43	8 to 16 5 to 10
4,2 litre k.p.h. m.p.h. 2.88:1 axle	14 to 21 9 to 13	22 to 32 14 to 20	72 to 90 45 to 56	128 to 144 80 to 90	110 to 128 69 to 80	45 to 62 28 to 39	56 to 74 35 to 46	8 to 18 5 to 11

* Part throttle kick down

NOTE: The figures in these tables are theoretical and actual figures may vary slightly from those quoted due to such factors as tyre wear, pressures, etc.

CAUTION

Ensure that when the downshift cable is disconnected from the throttle linkage the crimp stop gap must be reset to achieve correct gearbox pressures. If there is no crimp fitted to the cable, the gearbox pressures must be reset using the appropriate special equipment. Failure to carry out the above procedure could lead to a rapid deterioration of gearbox condition.

GENERAL DATA

Gear train end-float	0,21 to 0,73 mm	0.008 to 0.029 in
Pinion end-float	0,25 to 0,51 mm	0.010 to 0.020 in
Minimum clutch plate coning	0,25 mm	0.010 in
Thrust washer sizes: Standard	1,72 mm	0.068 in
Alternative	2,03 mm	0.080 in
Control pressure	4,2 to 6,33 kgf/cm ²	60 to 90 lbf/in ²
Stall speed (normal)	1,950 to 2,100 rev/min	
Cooling capacity of oil cooler	up to VIN 352906 2,8 Kw	
	from VIN 352906 5,3 Kw	

ROAD TEST AND FAULT DIAGNOSIS

The following points should be checked before proceeding with the road test.

1. Fluid level.
2. Engine idle speed.
3. Manual lever adjustment.

ROAD TEST

The road speed figures for the tests listed below are to be found under 'GENERAL DATA—GEAR CHANGE SPEEDS'.

Road testing should follow the complete sequence detailed below. Transmission should be at normal working temperature, i.e. after being driven on road or rollers.

1. With brakes applied and engine idling, move selector from:
 - 'N' to 'R'
 - 'N' to 'D'
 - 'N' to '2'
 - 'N' to '1'
 Engagement should be felt with each selection.
2. Check stall speed.
3. Select 'D', accelerate with minimum throttle opening and check speed of first gear to second gear shift.
4. Continue with minimum throttle and check speed of second gear to third gear shift.
5. Select 'D', accelerate with maximum throttle opening (kick-down) and check speed of first gear to second gear shift.
6. Continue with maximum throttle and check speed of second gear to third gear shift.
7. Check for kick-down shift third gear to second gear.
8. Check for kick-down shift second gear to first gear.
9. Check for kick-down shift third gear to first gear.
10. Check for 'roll-out' down-shift with minimum throttle, second gear to first gear.
11. Check for part throttle down-shift, third gear to second gear.

Should a fault be apparent during road test, first identify the problem from the list printed in the Fault Diagnosis Chart. The reference numbers shown opposite each fault may be translated by reference to the list headed 'TRANSMISSION FAULT KEY'.

TRANSMISSION FAULT KEY

ACTIONS

- | | |
|----|---|
| 1 | Check fluid level. |
| 2 | Check manual selector/adjustment. |
| 3 | Reduce engine idle speed. |
| 4 | Check down-shift throttle cable/adjustment.
If pressure cannot be corrected, dismantle and clean valve bodies.
For low pressure also check strainer, alloy suction pipe, 'O' ring and pump. |
| 5 | Check front brake band adjustment. |
| 6 | Check rear brake band adjustment. |
| 7 | Check front servo seals and fit of pipes. |
| 8 | Check rear servo seals and fit of pipe. |
| 9 | Examine front clutch, support housing and forward sun gear shaft seals. |
| 10 | Check rear clutch feed pipe. |
| 11 | Strip valve bodies and clean. |
| 12 | Strip governor valve and clean. |
| 13 | Examine output shaft rings and governor pressure tube seals. |
| 14 | Check front brake band for wear. |
| 15 | Check rear brake band for wear. |
| 16 | Adjust/examine parking pawl, linkage, and gear. |
| 17 | Renew one-way clutch. |
| 18 | Examine pump gears and converter nose bush. |
| 19 | Strip and examine gear train. |
| 20 | Replace torque converter. |
| 21 | Examine rear clutch and sealing rings. |
| 22 | Test inhibitor switch, circuit, and check for operation. |
| 23 | Check one-way clutch (possibly fitted backwards). |
| 24 | Ball check valve in forward sun gear shaft faulty, no detriment to performance. |

FAULT DIAGNOSIS

STATIONARY TEST FINDINGS

ACTION

Starter will not operate in 'P' or 'N' or operates in all positions	22
Faulty operation of reverse lights	22
Excessive bump on engagement of 'D', '1' and 'R'	3, 4
Drives in 'N' also giving judder or no drive in 'R' depending on degree of front clutch seizure	2, 9

STALL TEST FINDINGS

Stall test shows over 2 100 rev/min (transmission slip), with possible squawk in '1' and 'R'	4
a. only in '1'	9
b. only in 'R'	6, 8, 10, 21, 15
Stall test shows under 1 300 rev/min (slipping stator)	20

DRIVING TEST FINDINGS

Selection faults

Incorrect selection of all positions except 'P'	2
Parking pawl does not hold vehicle	16

Ratio faults

No drive in 'D', '2', '1' or 'R' but 'P' operates	1, 2, 4
No drive in 'D', '2' or '1'	12, 13, 9
No drive in 'D' 1st ratio	17
No drive in '1' and transmission binding during shift from '1' to 'D'	23
No second ratio	5, 7, 11
No D3 (Reverse indicating rear clutch normal)	11
Drag in 'D'	6
Drag in 'D', '1' and reverse	5
No engine braking in '1' and no drive in reverse ratio	6, 8, 15
Moves off in 2nd ratio in 'D' and '1' and no drive in reverse or engine braking in '1'	11

Shift point faults

Incorrect or erratic 'kick-down' and/or light throttle shift points	4, 12, 13
1-2 shift only incorrect	11
2-3 shifts only incorrect	11
No up-shifts	12, 13
Lack of 'up-shifts' and no reverse ratio	11
Moves off with possible transmission slip	12
Reduced maximum speed in all ratios, more so in 'D', and severe converter overheating	20

Shift quality faults

Bumpy and possibly delayed shifts	4
Slip (engine 'flare-up') shifting into and out of second ratio	5, 7, 11, 14
Slip (engine 'flare-up') on 2-3 and 3-2 shifts*	10, 11, 21

Noise faults

Whining noise from converter area, continuous whenever the engine is running	18
Irregular (possibly grating) noises from gearbox but not in 'D'	19
Whine from converter, for short period following engine starting after vehicle has been standing for, say, not less than 12 hours	24

* See Note on page 44-17.

DOWN-SHIFT CABLE

Remove and refit 44.15.01

Service tool: Down-shift cable remover tool CBW 62

Removing

Unscrew the union nut (1, Fig. 19), withdraw the dipstick tube; drain and discard fluid. Remove the bolts and plain washers (2, Fig. 19) securing oil pan to transmission case. Lower the oil pan (3, Fig. 19) remove and discard the gasket.

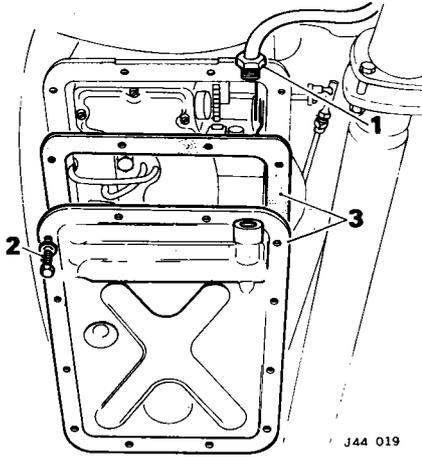


Fig. 19

Disconnect cable from cam. Position cable remover tool CBW 62 on plastic ferrule, push the tool upwards until the ferrule, together with the cable is pressed out of the transmission case. Remove the split pin, washer and clevis pin (1, Fig. 20) securing clevis to throttle linkage; discard the split pin. Slacken the locknut (2, Fig. 20), withdraw down-shift cable.

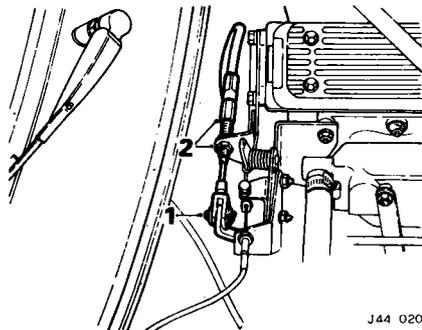


Fig. 20

Refitting

If old cable is being refitted, renew the 'O' ring on ferrule. Lubricate the ferrule with clean transmission fluid.

CAUTION: Do not lubricate the inner cable.

Press the ferrule into the gearcase; connect cable to cam. Connect clevis to throttle linkage; use a new split pin. With the accelerator pedal released and the throttle levers resting on the idle speed screws, adjust the cable until the heel of the down-shift cam just makes contact with the down-shift valve. With the accelerator pedal depressed, check that the lobe of the cam fully depresses the down-shift valve. Refit the oil pan, smear the new gasket with grease. Tighten bolts by diagonal selection to the specified torque figure.

CAUTION: Due to the method of construction it is not possible to completely drain the transmission fluid, and this should be taken into account when the transmission is being refilled.

Fill the transmission to the 'MAX' mark on the dipstick. Apply the handbrake and select 'P' position. Run the engine until it reaches normal operating temperature. With the engine still running, withdraw the dipstick (1, Fig. 21), wipe clean and replace. Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick (2, Fig. 21). If necessary, add fluid to bring the level on the dipstick to 'MAX' (3, Fig. 21).

NOTE: The difference between the 'MAX' and 'MIN' marks on the dipstick represents approximately 0,75 litre (1½ pints, 2 U.S. pints).

Carry out the down-shift cable pressure check, see 44.30.03.

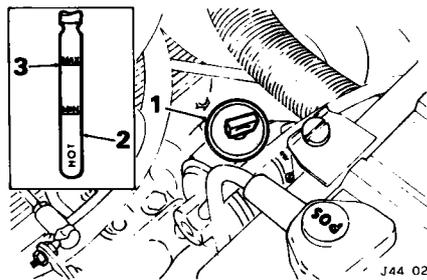


Fig. 21

GEAR SELECTOR CABLE

Remove and refit 44.15.08

Removing

This operation requires the removal of the centre console side casing, details of which are to be found in Section 76.

Place the quadrant selector lever in '1'. Unscrew the gear selector knob (1, Fig. 22). Remove the four nuts (2, Fig. 22) securing the selector indicator assembly; withdraw the indicator assembly over the selector lever (3, Fig. 22). Remove the split pin and washer (4, Fig. 22) securing the cable to selector lever; detach the cable (5, Fig. 22). Unscrew the front locknut (6, Fig. 22) securing the cable to abutment bracket. Lift the carpet from left-hand side of transmission tunnel. Remove the screws (7, Fig. 22) securing the cable shroud to the transmission tunnel; withdraw the shroud. Withdraw the cable from the abutment bracket.

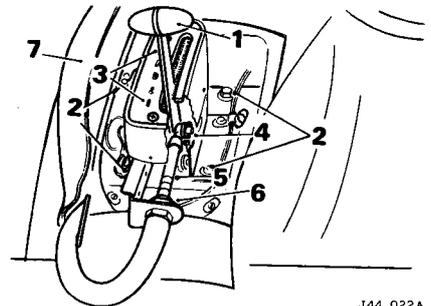


Fig. 22

Remove the screws securing the access panel to the transmission tunnel. Withdraw the panel; clean off old sealing compound. Ensure that the gearbox selector lever is in '1'. Remove the nut securing the selector cable to the gearbox selector lever; detach the cable. Remove the bolt and spring washer (1, Fig. 23) securing the trunnion block. Withdraw the cable (2, Fig. 23).

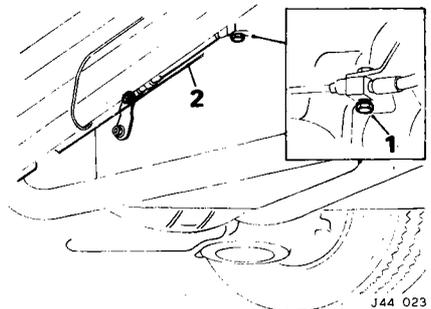


Fig. 23

Refitting

Refit the cable and position the selector lever in '1'.

Refit the panel, shroud and carpet.

CAUTION: Seal the access panel and the hole in the shroud with a suitable sealing compound.

Fit the front locknut (1, Fig. 24) to the cable but do not tighten at this stage.

Ensure that the gearbox selector and quadrant selector levers are in '1'.

Adjust the front (1, Fig. 24) and rear (2, Fig. 24) locknuts until the cable can be connected to the quadrant lever without either quadrant or gearbox lever being disturbed.

Tighten the locknuts, secure the cable with a new split pin (3, Fig. 24).

Refit the selector indicator assembly and gear knob.

Place the selector lever in 'P' and replace the console as detailed in 76.25.01.

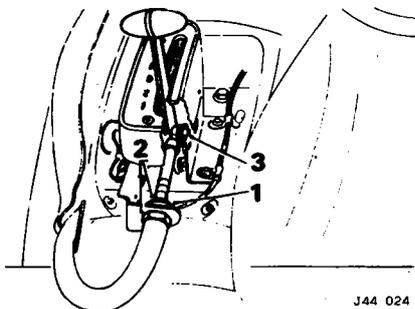


Fig. 24

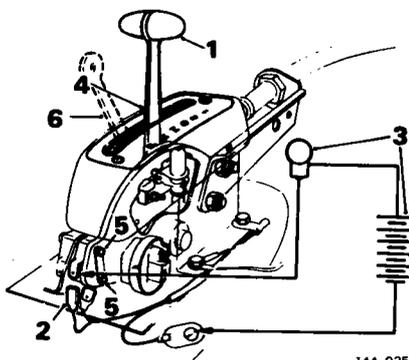


Fig. 25

Refit the gear selector knob and reconnect the battery.

Check operation of the window switches and cigar lighter.

TRANSMISSION UNIT

Remove and refit 44.20.01

Includes:

Torque converter—remove and refit 44.17.07

Torque converter housing—remove and refit 44.17.01

Service tools: Engine support bracket MS 53A, transmission unit lift.

Removing

Drive the vehicle onto a ramp and disconnect the battery.

Remove the dipstick from the dipstick tube; remove the bolt securing the dipstick tube to the manifold.

Remove the bolts securing the upper fan cowl to the lower fan cowl. Slacken the bolts securing the cowl bracket to the radiator, to facilitate the removal of the top cowl.

Remove and discard the split pin securing the kick-down cable to the throttle bell-crank, withdraw the clevis pin and washer; slacken the locknut and disconnect the cable.

Raise the ramp.

Undo the union nut securing the dipstick tube to the transmission unit sump pan. Remove the dipstick tube; plug the ends to prevent the ingress of dirt. Drain and discard the transmission fluid.

Disconnect the exhaust intermediate pipe from the down-pipe, remove the olive. Remove the exhaust heat shields from the floor pan.

Position the transmission unit lift under the transmission unit, and take the weight. Secure the transmission unit to the lift.

Remove the bolts securing the crash plate to the transmission case studs, undo the nut securing the crash plate to the rear mounting spigot bolt.

Remove the bolts, spacers and washers securing the rear engine mounting to the floor pan.

Remove the bolts securing the propeller shaft tunnel spreader plate to the floor pan.

Chock the front wheels.

Using a ramp jack raise the rear wheels. This will enable the propeller shaft to be rotated and the propeller shaft to output flange fixings removed.

Move the propeller shaft clear of the output flange.

Lower the transmission unit lift to the position required for transmission unit removal; **DO NOT REMOVE** the transmission unit at this stage.

CAUTION: Take care not to damage the water heater valve.

Position the engine support bracket, MS 53A, and locate the hook to the engine rear lifting eye. Turn the adjusting nut to take the weight of the engine (Fig. 26).

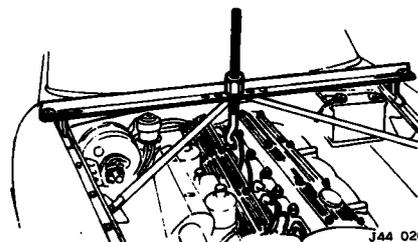


Fig. 26

Lower the ramp jack under rear of car.

Remove the rubber pad from the top of the transmission unit.

Remove the nut securing the selector lever bell-crank to the cross-shaft and remove the bell-crank.

Remove the bolt securing the selector cable trunnion to the mounting bracket.

Remove the bolts securing the tie-plate to the engine sump pan and transmission converter housing front cover-plate and remove the cover-plate.

Rotate the engine until a torque converter securing bolt is accessible; knock back the lock tab and remove the bolt; repeat this procedure for the three remaining torque converter securing bolts.

Remove and discard the tab washers.

Remove the bolt and washer securing the breather pipe clip.

Remove the screw securing the oil cooler pipe clamp plate to the sump bracket.

Disconnect the oil cooler and breather pipes from the transmission casing; plug or tape broken connections to prevent the ingress of dirt.

Disconnect the speedometer cable from the drive pinion (early models).

For later models fitted with electronic speedometer disconnect 2 pin connector only.

Disconnect the cables from the starter motor and solenoid.

Ensure that the transmission unit is secured to the unit lift and that the platform is at the correct angle.

Remove the nuts, bolts and washers securing the torque converter housing to the cylinder block; withdraw the starter motor and spacer. Withdraw the transmission unit lift rearwards and lower.

Remove the torque converter from the input shaft.

Remove the bolts and washers securing the torque converter housing to the transmission case.

continued

Refitting

Refit the torque converter housing to the transmission case and tighten the securing bolts to the correct torque.

Refit the torque converter to the input shaft, ensuring that the drive dogs are correctly engaged.

Position and secure the transmission unit onto the transmission unit lift platform.

Position the rubber pad on the top of the transmission unit.

Manoeuvre the unit lift into position and raise to correctly position the transmission unit.

Refit the bolts securing the torque converter housing to the engine; do not tighten until the starter motor and spacer have been fitted.

Align the torque converter to drive plate fixing holes, fit the bolts, with new tab washers; DO NOT tighten until all four bolts are fitted. Bend over the tab washers.

Reconnect the cables to the starter motor and solenoid.

Refit the oil cooler pipes to the transmission unit, and refit clamp plate.

Refit the breather pipe.

Refit the converter front cover, and the tie-plate between the engine sump pan and the converter housing.

Raise the rear of the vehicle, using a ramp jack, to allow the propeller shaft to be refitted to the output flange; secure with the bolts and new self-locking nuts.

Refit the gear selector bell-crank to the cross-shaft, fit and tighten the nut to secure.

Align the gear selector lever trunnion to the mounting plate; fit and tighten the bolt to secure.

Reconnect the speedometer cable to the drive pinion, tighten the knurled nut (early models).

On later models connect 2 pin electrical connector.

Raise the unit, refit the propeller shaft tunnel spreader plate, the exhaust heat shield, and the rear engine mounting.

Refit the crash plate, tighten the nuts securing the plate to the transmission case studs and spigot bolt.

Release the transmission unit from the unit lift and lower the lift. Remove the unit lift and engine support bracket MS 53A from the car. Lower and remove the ramp jack from the rear of the car.

Refit the intermediate exhaust pipe, smear the sealing olive with 'Fire Gum'. Fit and tighten the flange bolts.

Refit the dipstick tube to the oil pan and tighten the union nut.

Lower the ramp.

Refit the dipstick tube securing bolt to the manifold.

Refit the upper fan cowl.

Reconnect the kick-down cable, secure using a new split pin and adjust as described in operation 44.30.03.

Refill the transmission—refer to 44.24.02.

Road test the car.

TRANSMISSION ASSEMBLY

NOTE: WHERE ANY BENCHWORK IS UNDERTAKEN CBW-35-65 BENCH CRADLE MUST BE USED.

Overhaul 44.20.06

Service tools: Mainshaft end-float gauge

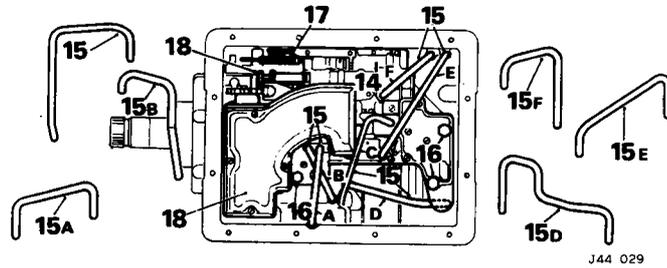


Fig. 28

CBW 87; circlip pliers 18G 1004; clutch spring compressor 18G 1016; torque screwdriver 18G 631; screwdriver bit adaptors CBW 547A-50-2A; torque wrench CBW 547 B-75; rear clutch piston replacer 18G 702; front clutch piston replacer 18G 107; kick-down cable ferrule remover CBW 62; bench cradle CBW-35-65.

CAUTION: Only Gamlen 265 or Rochem Electrosol Quick Dry Solvent should be used for cleaning transmission components.

NOTE: The numbers on the pictures refer to the sequential numbering on the L.H.S. of the text.

Dismantling

1. Remove the torque converter housing, see 44.17.07.
2. Thoroughly clean the exterior of the gearcase.
3. Remove the dipstick tube and breather assembly; drain the fluid from the gearbox.
4. Invert the transmission.
5. Position the selector lever in 'P' (Park) (Fig. 27).
6. Remove the speedometer driven gear housing together with the driven gear, remove and discard the 'O' ring (Fig. 27).
7. Remove the bolt and plain washer securing the output flange; withdraw the flange (Fig. 27).
8. Note the fitted position of the bolts, stud bolts and spacers. Remove the bolts, stud bolts, plain washers and spacers securing the rear extension housing to the transmission case (Fig. 27).

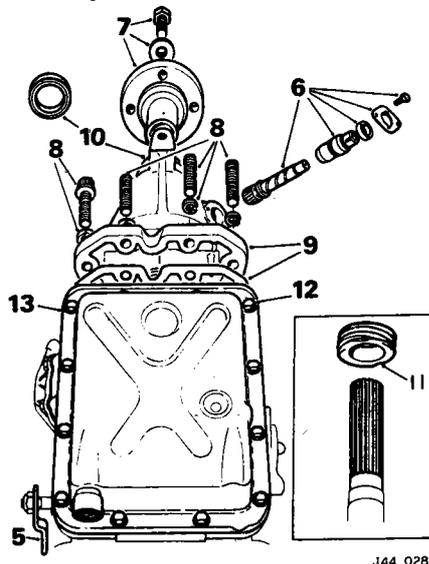


Fig. 27

9. Withdraw the rear extension housing, remove and discard the gasket (Fig. 27).
10. Remove and discard the oil seal (Fig. 27).
11. Slide the speedometer drive gear off the output shaft (Fig. 27).
12. Remove the bolts and spring washers securing the oil pan to the transmission case (Fig. 27).
13. Lift off the oil pan; remove and discard the gasket (Fig. 27).
14. Remove the magnet from the valve block (Fig. 28).
15. Note the fitted positions of the oil tubes (Fig. 28) and using a suitable screwdriver, carefully lever the tubes, with the exception of tube 15D, out of the transmission.
16. Remove the bolts and spring washers securing the valve block (Fig. 28), noting that the shortest bolt is fitted at the front of the valve block.
17. Disconnect the kick-down cable from the cam (Fig. 28).
18. Lift off the valve block (Fig. 28), taking care that the manual valve is not displaced; remove tube 15D as described in operation 15.

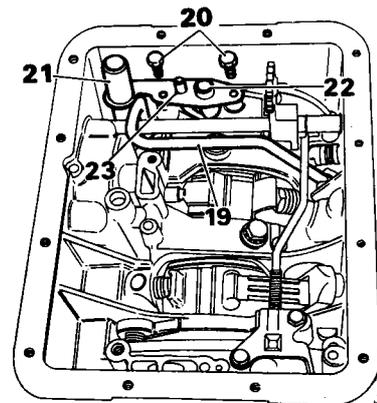


Fig. 29

19. Carefully lever the oil cooler tube from the transmission (Fig. 29).
20. Remove the bolts (Fig. 29) retaining oil tube retaining plate; withdraw the plate.

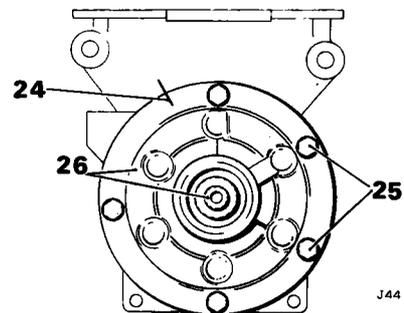


Fig. 30

21. Using suitable long-nosed pliers, withdraw the pump inlet tube; remove and discard the 'O' ring (Fig. 29).
22. Withdraw the pump outlet pipe (Fig. 29).
23. Withdraw the converter feed tube (Fig. 29).
24. Scribe alignment marks on the transmission case and oil pump (Fig. 30).
25. Remove the bolts and wave washers securing the oil pump to the transmission case (Fig. 30).
26. Support the stator tube and withdraw the oil pump (Fig. 30).
27. Take care when withdrawing the pump that the stator tube is not displaced.
28. Remove and discard the gasket.
29. Remove and discard the bronze thrust washer.
30. Remove the plug and spring washer securing the governor on the output shaft (Fig. 31).

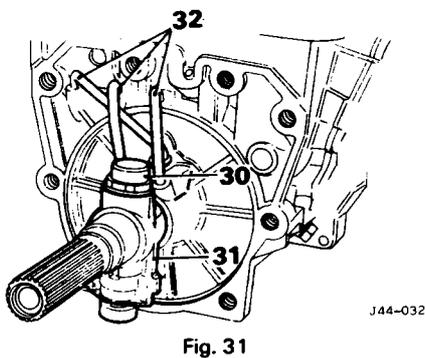


Fig. 31

31. Note the fitted position of the governor; slide the governor off the output shaft (Fig. 31).
32. Carefully lever the governor feed tube, governor return tube and lubrication tube out of the transmission case (Fig. 31).
33. Slacken the locknut and unscrew the front brake band adjuster screw; recover brake band strut (Fig. 32).

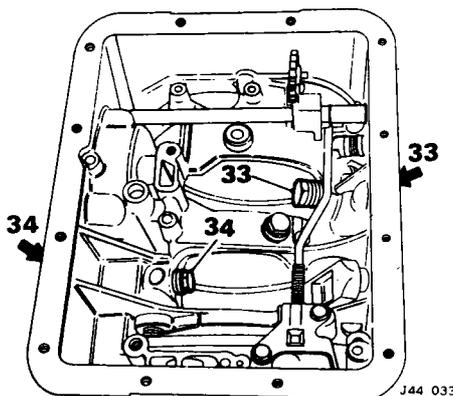


Fig. 32

34. Slacken the locknut and unscrew the rear brake band adjuster screw; recover the brake band strut (Fig. 32).
35. Withdraw the front clutch assembly together with the input shaft (Fig. 33).
36. Remove the steel backing washer and the bronze thrust washer; discard the thrust washer (Fig. 33).
37. Withdraw the rear clutch assembly; remove and discard the sealing rings (Fig. 33).

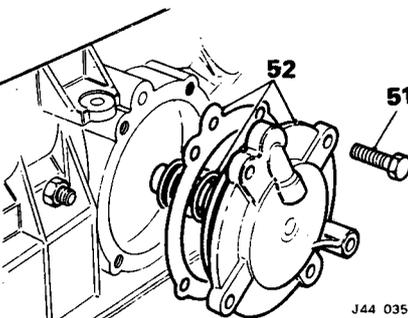


Fig. 34

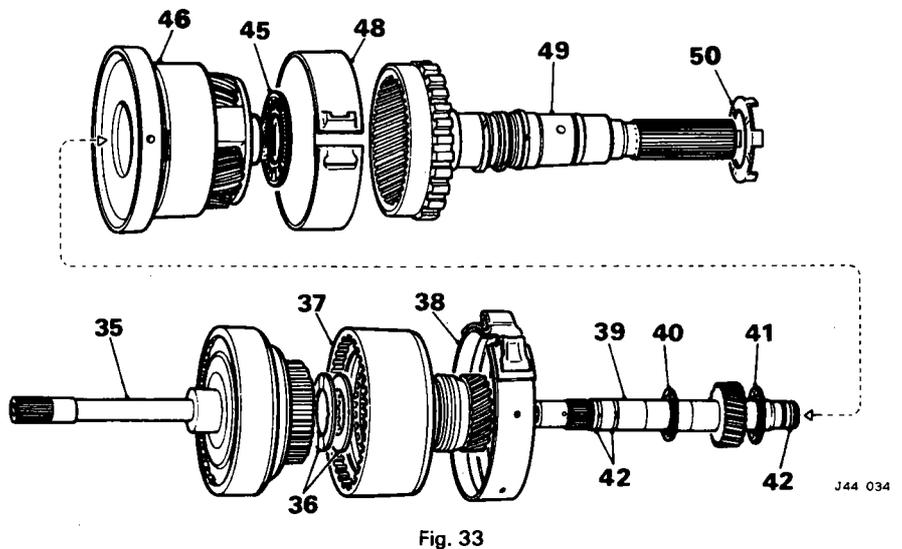


Fig. 33

38. Note the fitted position of the front brake band; compress and withdraw the brake band (Fig. 33).
39. Withdraw the forward sun gear shaft (Fig. 33).
40. Remove the small needle-roller bearing from the input end of the shaft (Fig. 33).
41. Recover the flanged backing washer and large needle-roller bearing from the output end of the shaft (Fig. 33).

NOTE: These components may remain in the sun gear assembly but should still be removed.

42. Remove and discard the two sintered metal sealing rings from the input end and one fibre sealing ring from the output end of the shaft (Fig. 33).
43. Remove the bolts and lock washers securing the centre support.
44. Push the output shaft forwards to displace the centre support and sun gear assembly.
45. Withdraw the centre support and planet carrier from the transmission case; remove the needle-roller bearing from the input end of the planet carrier assembly (Fig. 33).
46. Separate the centre support from the sun-gear assembly (Fig. 33).
47. Pull the output shaft rearwards.
48. Note the fitted position of the rear brake band; compress and withdraw the brake band (Fig. 33).
49. Withdraw the output shaft and ring gear assembly (Fig. 33).

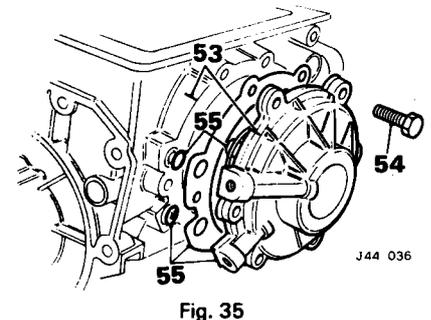


Fig. 35

50. Remove and discard the bronze thrust washer (Fig. 33).
51. Remove the bolts securing the front servo to transmission case (Fig. 34).
52. Withdraw the front servo, operating rod and spring; remove and discard the gasket (Fig. 34).
53. Scribe alignment marks on the rear servo and transmission case (Fig. 35).
54. Remove the bolts securing the rear servo to the transmission case (Fig. 35).
55. Withdraw the rear servo together with operating rod and spring; remove and discard the 'O' rings and gasket (Fig. 35).
56. Remove the bolts securing the plate retaining parking brake pawl and rear servo operating lever pivot pin; remove the plate (Fig. 36).
57. Withdraw the pivot pin and rear servo operating lever (Fig. 36).

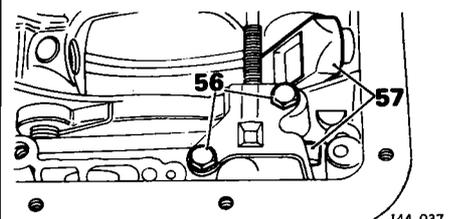


Fig. 36

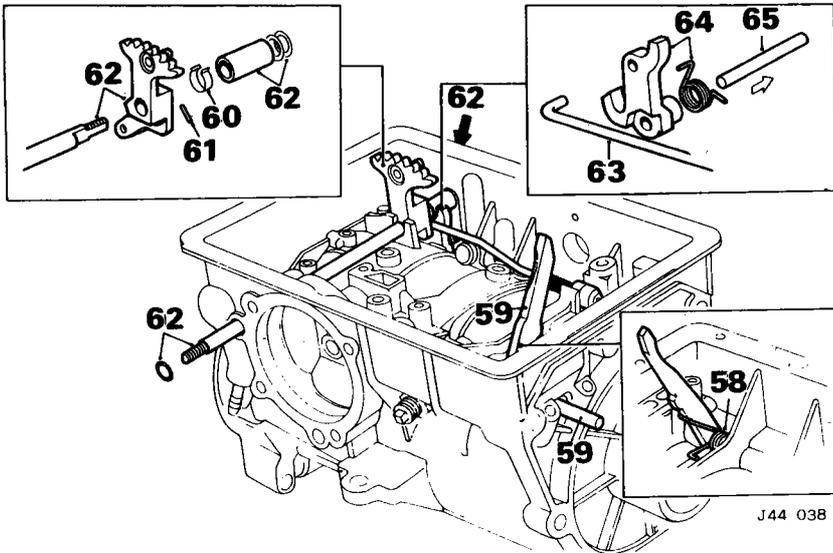


Fig. 37

If it is found necessary to dismantle parking pawl assembly, carry out items 58 to 65 inclusive.

- 58. Note the fitted position of the parking pawl torsion spring; release the spring from the pawl (Fig. 37).
- 59. Withdraw the parking pawl pivot pin, collect the pawl and torsion spring (Fig. 37).
- 60. Release the clip locating manual valve lever (Fig. 37).
- 61. Withdraw the pin locating the manual valve lever (Fig. 37).
- 62. Withdraw detent shaft, collect manual valve lever, spacer and plain washers; remove and discard 'O' ring and oil seal (Fig. 37).
- 63. Release parking brake rod assembly from parking pawl (Fig. 37).
- 64. Note fitted position of parking brake rod operating lever and torsion spring, release spring from lever (Fig. 37).
- 65. Using suitable punch, drive out operating lever pivot pin; withdraw lever and spring (Fig. 37).

If it is found necessary to remove kick-down cable assembly, carry out items 66 and 67.

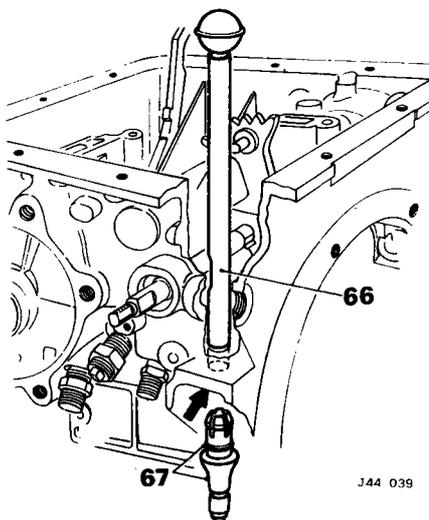


Fig. 38

66. Using Service tool CBW 62, compress lugs of the cable retaining plug (Fig. 38).

67. Withdraw the kick-down cable assembly; remove and discard the 'O' ring (Fig. 38).

CAUTION: It is not possible to remove retaining plug from the kick-down cable assembly and if lugs are broken, cable assembly must be renewed.

VALVE BLOCK

Overhaul

44-40-04

CAUTION: Ensure that all working surfaces are clean. Use only lint-free cloth and clean transmission fluid for lubricating.

Dismantling

- 68. Withdraw the manual valve (Fig. 39).
- 69. Remove the screws securing the suction tube assembly to the lower valve body (Fig. 39).
- 70. Lift off the tube assembly; remove and discard the gasket (Fig. 39).
- 71. Remove the six upper valve body securing screws from the lower valve body (Fig. 39).
- 72. Invert the valve body and remove the four screws securing the upper valve body and cam (Fig. 39) mounting arm; remove the mounting arm (Fig. 39).
- 73. Extract the down-shift valve and spring (Fig. 39).
- 74. Lift off the upper valve body (Fig. 39).
- 75. Remove the screws securing both end plates to the upper valve body; carefully remove the end plates (Fig. 39).
- 76. Extract the spring, 1-2 shift valve and plunger (Fig. 39).
- 77. Extract the 2-3 shift valve, spring and plunger (Fig. 39).
- 78. Remove the eight screws securing the collector plate to the lower valve body; lift off the collector plate (Fig. 39).
- 79. Slacken, but do not remove the four screws securing the governor line plate (Fig. 39).
- 80. Hold the separator plate in contact with the valve body, remove the governor line plate securing screws and lift off the governor line plate (Fig. 39).

81. Note the fitted position of the ball valve and carefully slide the separator plate off the valve body (Fig. 39).

CAUTION: The ball valve is spring loaded; ensure that the ball is not displaced during this operation.

- 82. Remove the ball valve; extract the spring (Fig. 39).
- 83. Note the fitted position of the check valve (if fitted), remove the valve (Fig. 39).
- 84. Withdraw the retainer, extract the spring and servo orifice control valve (Fig. 39).
- 85. Withdraw the retaining pin, extract the plug, modulator valve and spring (Fig. 39).
- 86. Withdraw the throttle valve spring retainer (Fig. 39).
- 87. Withdraw the throttle valve retainer (Fig. 39).
- 88. Extract the spring and throttle valve (Fig. 39).
- 89. Remove the screw securing the detent spring and roller assembly, detach the assembly; collect the spacer (Fig. 39).

NOTE: The roller arm may be peened to valve body. If so, swing the arm clear of the screws securing the regulator valve retaining plate.

- 90. Remove the screws securing the regulator valve retaining plate; remove the plate slowly until the spring loading is no longer felt (Fig. 39).
- 91. Extract the spring, sleeve and primary regulator valve (Fig. 39).
- 92. Extract the spring and secondary regulator valve (Fig. 39).

Inspection

- 93. Check the springs with the data shown in spring identification table, see page 44—19; renew springs which are distorted or shorter than the specified length.
- 94. Check all valves for burrs or scoring. Check that valves move freely in valve bodies.

CAUTION: In the event of valves and/or valve bodies being damaged, valve block assembly must be renewed.

Reassembling

Reverse instructions 68 to 92, ensure that all components are scrupulously clean and that tightening torque figures are adhered to.

CAUTION: A new gasket must be used when refitting the suction tube assembly.

PLANET CARRIER

CAUTION: No overhaul of the planet carrier is possible. In the event of any of the following defects being discovered, the planet carrier assembly must be renewed.

Inspection

- 95. Check gear teeth for chipping or scoring; light scoring may be disregarded (Fig. 40).
- 96. Check that end-float of gears is not excessive and that gears turn smoothly when spun by hand.
- 97. Check the bush for scores or evidence of metal transfer (Fig. 40).

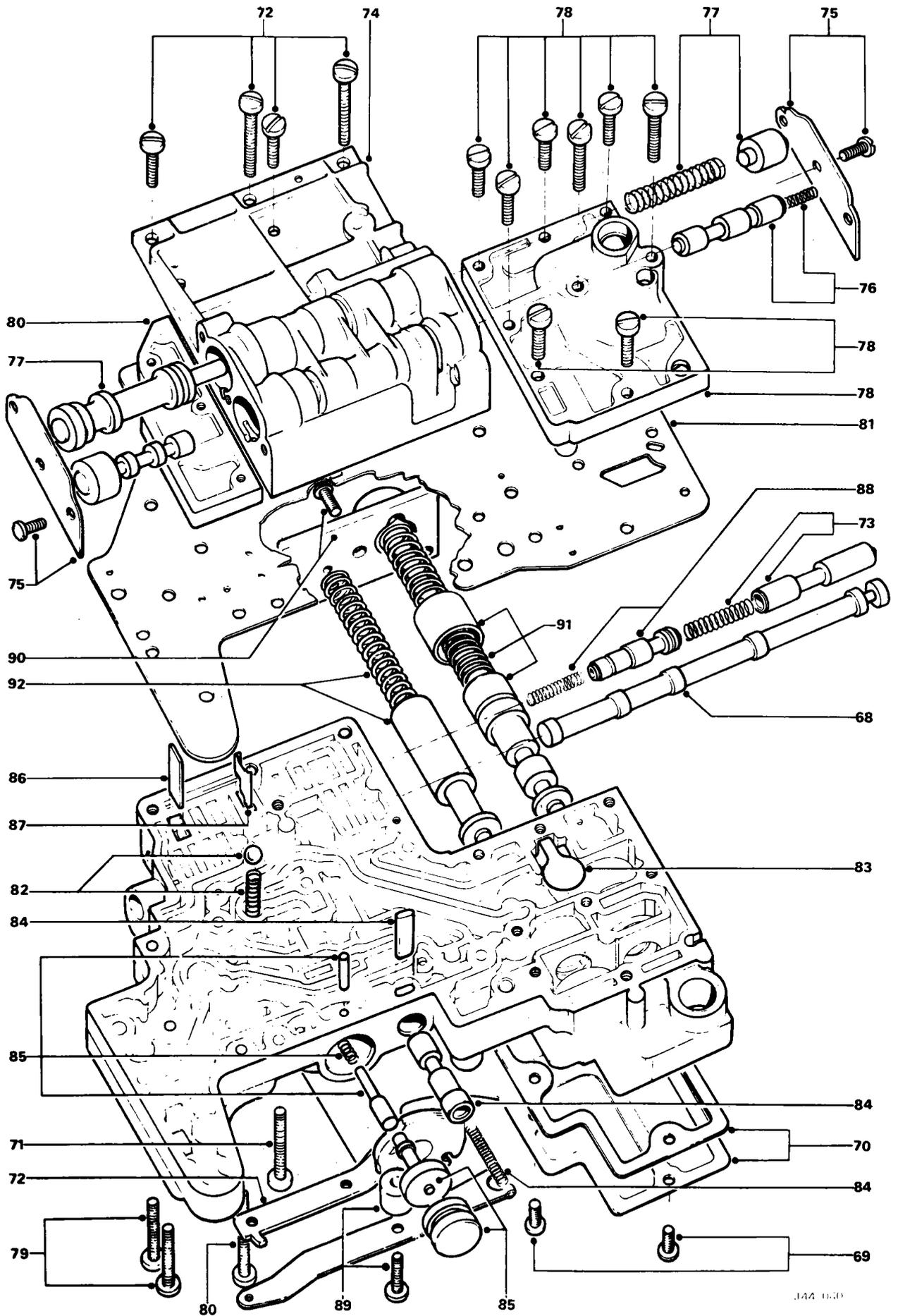


Fig. 39

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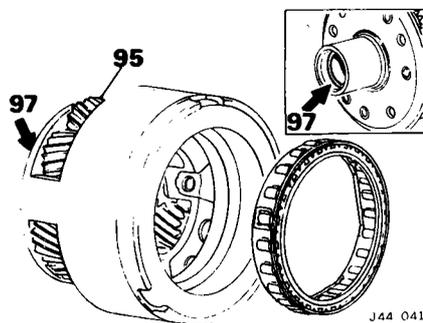


Fig. 40

ONE-WAY CLUTCH

CAUTION: No overhaul of the one-way clutch is possible. In the event of any of the following defects being discovered, the one-way clutch must be renewed.

Dismantling

- 98. Note the fitted position of the one-way clutch.
- 99. Withdraw the clutch from the planet carrier (Fig. 41).

Inspection

- 100. Check the sprag faces for flat spots indicating wear (Fig. 41).
- 101. Check the sprag cage for flat spots indicating wear (Fig. 41).

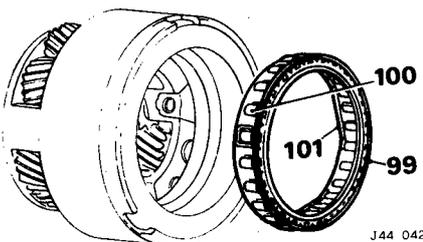


Fig. 41

Reassembling

- 102. Push the one-way clutch into the planet carrier, ensure that the lip faces outwards and that the clutch is fully seated in the recess.

FORWARD SUN GEAR SHAFT

Inspection

- 103. Check the drillings in the shaft for obstruction; clear with compressed air only (Fig. 42).
- 104. Check the splines, sealing ring grooves and gear teeth for burrs or signs of damage; renew if damaged (Fig. 42). Minor burrs may, however, be removed with a very fine abrasive.
- 105. Examine the large and small needle-roller bearings; renew if either show signs of wear or damage.

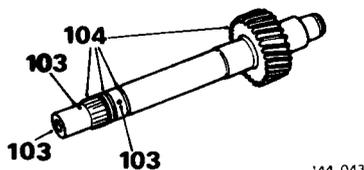


Fig. 42

REAR CLUTCH

Overhaul

Dismantling

- 106. Place the rear clutch assembly over the central spindle of the clutch spring compressor 18G 1016 reverse the sun gear down (Fig. 43).
- 107. Fit spring compressor over spindle (Fig. 43).
- 108. Compress the spring and remove the snapping (Fig. 43).
- 109. Slowly release the pressure and remove the compressor.
- 110. Remove the retainer and spring.
- 111. Remove the snap-ring retaining pressure plate (Fig. 44).
- 112. Remove the pressure plate (Fig. 44).
- 113. Remove the inner and outer clutch plates (Fig. 44).

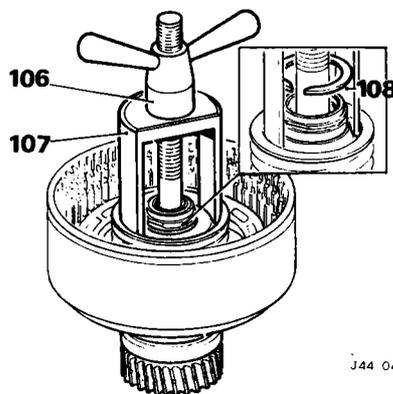


Fig. 43

NOTE: Five outer and five inner clutch plates are fitted.

- 114. Remove the piston by applying air pressure to the supply hole in the clutch housing pedestal (Fig. 44).
- 115. Remove and discard the piston seal (Fig. 44).

Inspection

- 116. Check clutch drum and bearing surfaces for scores or burrs; replace drum if damaged (Fig. 44).
- 117. Check the fluid passage for obstructions, clear passages with compressed air only.
- 118. Inspect the piston check valve for free operation.
- 119. Check the clutch release spring for distortion; renew if distorted.
- 120. Check the inner clutch plates for flatness and that facings are undamaged.
- 121. Check that coning on outer clutch plates is not less than 0.25 mm (0.010 in) (Fig. 45).
- 122. Check the outer clutch plates for scores or burrs; renew if damaged. Minor scores or burrs may, however, be removed with a very fine abrasive.

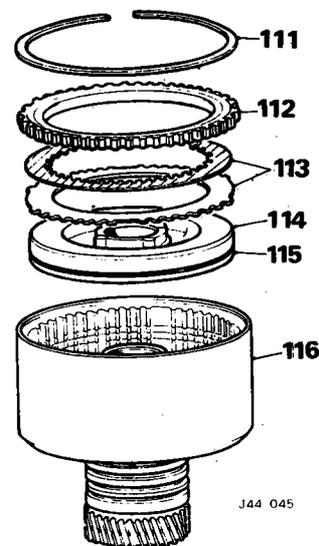


Fig. 44

- 123. Check needle bearings and bush in clutch housing for signs of wear, scores or evidence of metal transfer. If damaged the clutch hub must be renewed.

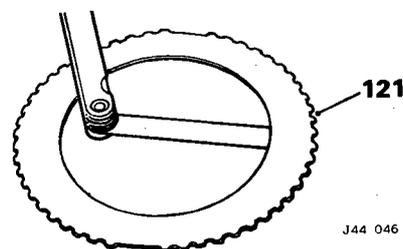


Fig. 45

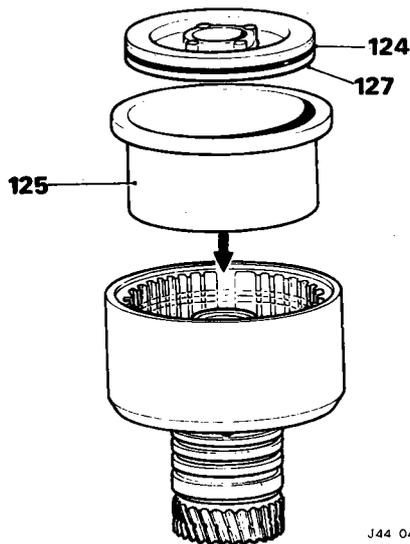


Fig. 46

Reassembling

- 124. Smear the new piston seal with petroleum jelly and fit to the piston (Fig. 46).
- 125. Position the rear clutch piston replacer tool 18G 702 in the clutch drum (Fig. 46).
- 126. Lubricate the piston and replacer tool with clean transmission fluid.
- 127. Install the piston; remove the tool.
- 128. Reverse operations 106 to 113.

CAUTION: Outer clutch plates must be assembled with cones facing in same direction.

- 129. Smear the large needle bearing with petroleum jelly and position it on output end of forward sun gear shaft (Fig. 47).
- 130. Position the backing washer, flange leading in planet carrier (Fig. 47).
- 131. Insert the forward sun gear shaft in the planet carrier; fit new fibre sealing ring on output end of shaft (Fig. 47).
- 132. Position the centre support in the planet carrier (Fig. 47).

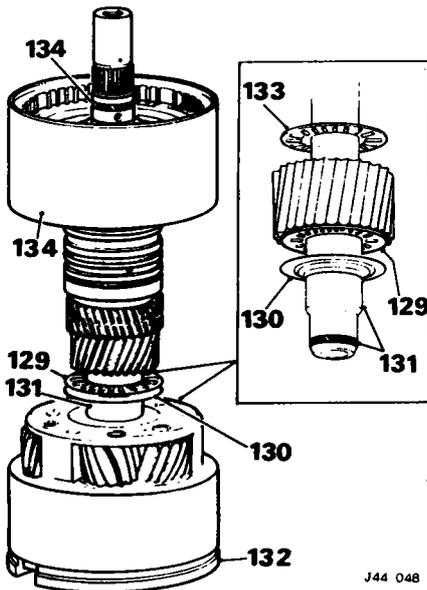


Fig. 47

- 133. Smear the small needle-roller bearing with petroleum jelly and position it on the forward sun gear shaft (Fig. 47).
 - 134. Position the rear clutch assembly on the forward sun gear shaft; fit new sintered sealing rings on the input end of the shaft (Fig. 47). Ensure that gaps in sealing rings are staggered.
- CAUTION:** Do not remove the rear clutch assembly and forward sun gear shaft from the planet carrier.

FRONT CLUTCH

Overhaul

Dismantling

- 135. Remove the snap-ring and withdraw the turbine shaft (Fig. 48)
 - 136. Remove and discard the bronze thrust washer (Fig. 48).
 - 137. Remove the clutch hub (Fig. 48).
 - 138. Remove the inner and outer clutch plates and ring gear (Fig. 48).
- NOTE:** Four outer and five inner clutch plates are fitted.
- 139. Remove the snap-ring and diaphragm (Fig. 48).
 - 140. Remove the piston by applying air pressure to the supply hole in the clutch housing pedestal (Fig. 48).

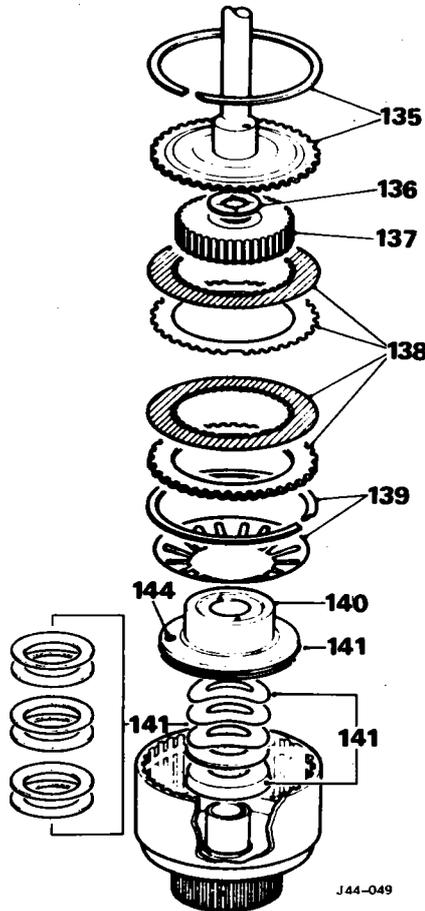


Fig. 48

- 141. Remove the plain and Belleville washers; remove and discard the seal and 'O' ring (Fig. 48).

NOTE: On later cars, six Belleville washers are used, with no plain washer.

Inspection

- 142. Check the clutch drum and bearing surfaces for scores or burrs; replace the drum if damaged.
 - 143. Check the fluid passages for obstruction; clear passages with compressed air only.
 - 144. Inspect the piston check valve for free operation (Fig. 48).
 - 145. Check the clutch release diaphragm for cracks or distortion; renew if damaged.
 - 146. Check the inner clutch plates for flatness and that the facings are undamaged.
- NOTE:** There is no coning on the clutch plates.
- 147. Check outer clutch plates for flatness, scores or burrs, renew if damaged. Minor scores or burrs may, however, be removed with a very fine abrasive.
 - 148. Check the bush in the turbine shaft for scores or evidence of metal transfer. If damaged, the turbine shaft must be renewed.

Reassembling

- 149. Smear the new 'O' ring with petroleum jelly and fit to the piston (Fig. 49).

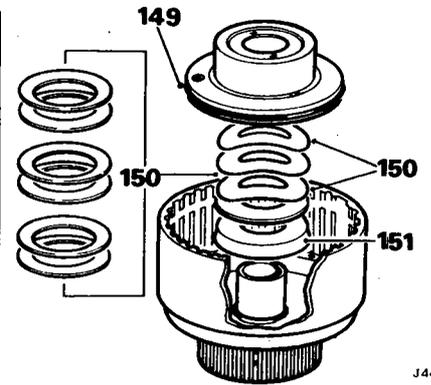


Fig. 49

- 150. Position the Belleville and plain washers in the piston (Fig. 49), retain the washers with a smear of petroleum jelly.

NOTE: Later cars are fitted with six Belleville washers and no plain washers. Replace these in three opposing pairs, the inner diameters of the washers in each pair being in contact. This washer arrangement may be used to replace the earlier assembly, but if this is done the plain washer originally fitted must be discarded.

- 151. Soak the new oil seal in clean transmission fluid and insert in the piston (Fig. 49).

NOTE: Open end of seal faces outwards.

- 152. Position the front clutch piston replacer tool 18G 1107 in the clutch drum (Fig. 50).
- 153. Lubricate the piston and replacer tool with clean transmission fluid.
- 154. Install the piston (Fig. 50); remove the tool.

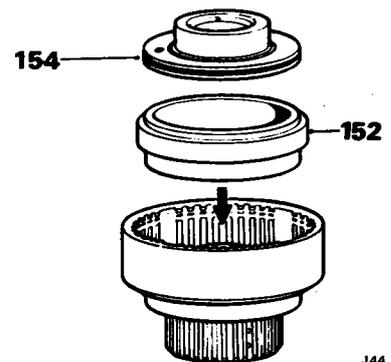


Fig. 50

- 155. Fit the release diaphragm (Fig. 51).
- 156. Fit the snap-ring (Fig. 51); ensure that the ring is correctly seated in the groove.
- 157. Fit the steel backing washer and new bronze thrust washer on the forward sun gear shaft (Fig. 51); ensure that the backing washer is seated correctly.
- 158. Ensure that the gaps in the sealing rings on the input end of the forward sun gear shaft are staggered (Fig. 51).
- 159. Check to ensure that the teeth of the rear clutch inner plates are in alignment.
- 160. Carefully lower the front clutch hub and piston assembly over the shaft and into rear clutch (Fig. 51).

continued

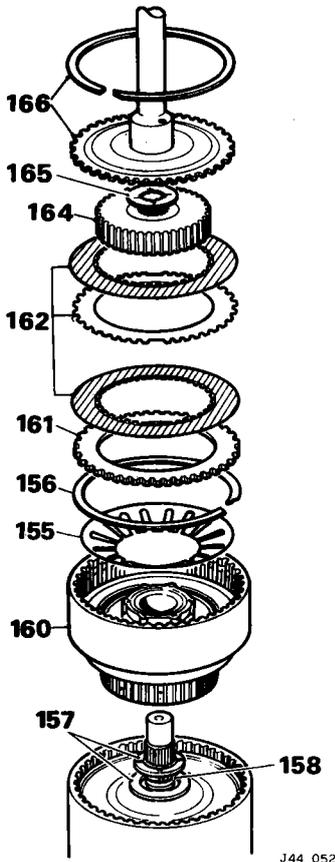


Fig. 51

NOTE: To facilitate engagement of gear with the rear clutch plates, the front clutch should be moved backwards and forwards slightly.

161. Fit the ring gear (Fig. 51).

162. Position the inner and outer clutch plates in the clutch drum (Fig. 51).

NOTE: For identification purposes, two pairs of teeth at 180° have been omitted on the outer clutch plates.

163. Check to ensure that the teeth of the inner clutch plates are in alignment.

164. Fit the clutch hub; ensure that the hub fully engages all clutch plates (Fig. 51).

165. Position the new bronze thrust washer in the recess in the clutch hub (Fig. 51).

166. Fit the turbine shaft and the snap-ring; ensure that the snap-ring is correctly seated in groove (Fig. 51).

CAUTION: On no account should the front and rear clutch assemblies be separated as damage to the sealing rings on the forward sun gear shaft will result.

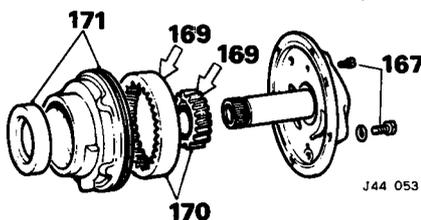


Fig. 52

PUMP

Overhaul

Dismantling

167. Remove the bolts, screw and spring washers securing the pump adaptor to the pump body (Fig. 52).

168. Hold the pump body and using a hide mallet, gently tap the converter tube.

CAUTION: Take care that the gears are not displaced when the adaptor and body separate.

169. Mark the mating surfaces of the gears with die marker. **DO NOT** use a punch or scriber (Fig. 52).

170. Remove the gears from the pump body (Fig. 52).

171. Remove and discard the 'O' ring and oil seal (Fig. 52).

Inspection

172. Check the bearing surfaces, gears, splines and bushes for damage or wear. Should any component show signs of damage, etc., the oil pump assembly must be renewed.

Reassembling

173. Soak the new oil seal in clean transmission fluid and press carefully into the pump body; ensure that the seal is squarely seated.

174. Soak the new 'O' ring in clean transmission fluid and position in the groove in the periphery of the pump body.

175. Reverse operations 167 to 170 ensuring that reference marks on gears, adaptor and body are in alignment.

176. Progressively tighten the bolts to a torque of 35 kgf m (2.5 lbf ft).

FRONT SERVO

Overhaul

Dismantling

177. Remove the piston return spring (Fig. 53).

178. Withdraw the piston from the servo body; remove and discard the 'O' rings (Fig. 53).

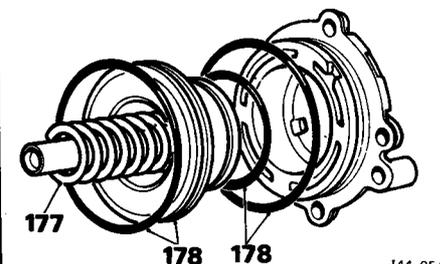


Fig. 53

Inspection

179. Check the return spring for distortion; renew if necessary. Check fluid passage for obstruction; clear the passage with compressed air only.

Reassembling

Reverse operations 177 and 178; coat the new 'O' rings with petroleum jelly prior to fitting.

REAR SERVO

Overhaul

Dismantling

180. Withdraw the piston from the servo body; remove and discard the 'O' rings (Fig. 54).

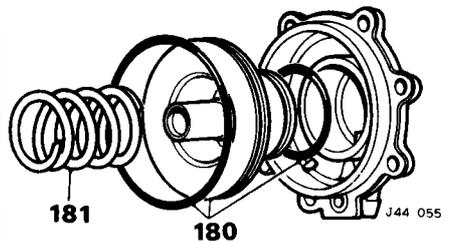


Fig. 54

Inspection

181. Check the return spring removed during operation 55 for distortion; renew, if necessary (Fig. 54).

182. Check the fluid passages for obstruction; clear the passages with compressed air only.

Reassembling

Reverse operation 180; coat the new 'O' rings with petroleum jelly prior to fitting.

GOVERNOR

Overhaul

Dismantling

183. Depress the governor weight stem to expose the circlip.

184. Remove the circlip and weight, discard the circlip (Fig. 55).

185. Withdraw the stem, spring and valve from the governor body (Fig. 55).

Inspection

186. Check all components for signs of damage and additionally, check the spring for distortion. In the event of any component being found unsatisfactory, governor assembly must be removed.

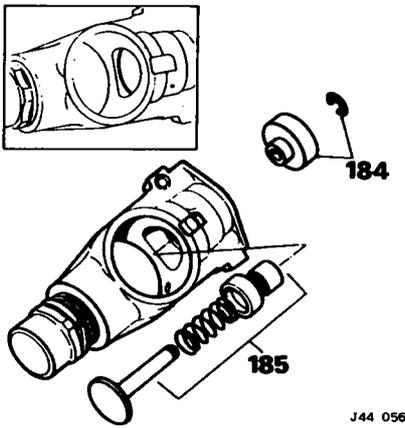


Fig. 55

Reassembling

187. Reverse operations 183 to 185; use a new circlip.
 188. Check the weight stem for free movement.

CAUTION: If the weight stem shows signs of sticking, the governor assembly must be renewed.

BRAKE BANDS

Inspection

189. Check the front and rear brake bands for damage or distortion.
 190. Check the linings for uneven or excess wear.

CAUTION: Bands must be renewed if any of the defects detailed above are apparent or if doubt exists as to their condition.

OUTPUT SHAFT AND RING GEAR

Overhaul

Dismantling

191. Remove and discard the sealing rings from the output shaft (Fig. 56).
 192. Remove the snap-ring retaining the output shaft; withdraw the shaft (Fig. 56).

Inspection

193. Check the drillings in the output shaft for obstruction; clear with compressed air only.
 194. Check the splines, sealing ring grooves and gear teeth for burrs or signs of damage; renew if damaged. Minor burrs may, however, be removed with a very fine abrasive.
 195. Check bush for scores or evidence of metal transfer. Should damage be evident, output shaft must be renewed.

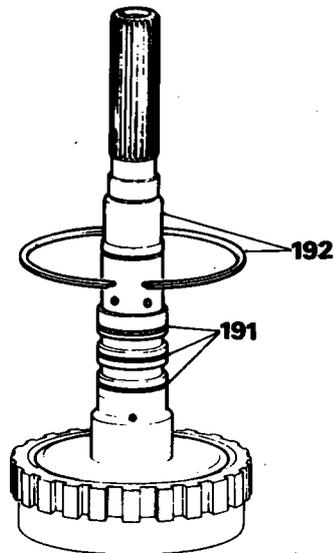


Fig. 56

Reassembling

Reverse operations 191 and 192.

CAUTION: Ensure that the gaps in the sealing rings are staggered.

GEAR CASE

Inspection

196. Remove oil cooler return union together with non-return valve assembly (if fitted) (Fig. 57).

197. By means of a piece of thin wire, check the operation of the ball valve. The valve should operate smoothly and seat fully. Check the bush in the gear case for scores, burrs or transfer of metal (Fig. 57).

NOTE: Smear threads of union with Loctite Grade AV before refitting.

198. Reverse operations 56 to 65 as applicable, lightly smearing the manual lever shaft and its bore in the servo housing with lithium-based grease.

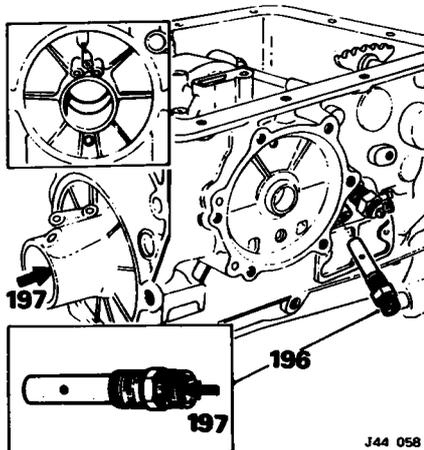


Fig. 57

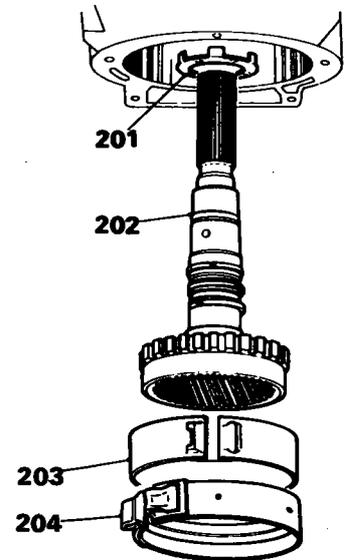


Fig. 58

TRANSMISSION ASSEMBLY

Reassembling

199. If the kickdown cable was removed, smear the new 'O' ring with petroleum jelly; position the 'O' ring on retaining plug.

200. Pass the cable into the gearcase and push the retaining plug fully home. Ensure that the lugs of the retaining plug are correctly located in the gearcase.

201. Smear the large bronze thrust washer with petroleum jelly and position the thrust washer, lugs leading, in the gearcase. Ensure that the lugs on the thrust washer are located on the gearcase (Fig. 58).

202. Fit the output shaft and ring gear assembly, taking care that the thrust washer is not displaced (Fig. 58).

203. Position the rear brake band in the gearcase (Fig. 58).

204. Position the front brake band in the gearcase (Fig. 58).

205. Rotate the centre support until the oil holes in outer periphery of support will be in approximate alignment with the oil holes in the transmission case when the clutch assemblies are fitted.

206. Hold the front and rear clutch assemblies firmly together and checking the alignment between the oil holes in the centre support and the gearcase enter the assembly into the gearcase through the rear aperture.

CAUTION: On no account allow clutch assemblies to separate as this will cause damage to the sealing rings on the forward sun gear shaft.

207. Ensure that the planet carrier gears are fully engaged with the output shaft ring gear.

208. Rotate the centre support, ensuring that the alignment of the oil holes is correct, until the securing bolts and lockwashers can be fitted. Tighten the securing bolts evenly.

209. Position the new bronze thrust washer on the oil pump; ensure that the lugs on the washer face towards the pump (Fig. 59).

continued

NOTE: This thrust washer is selective and determines the amount of gear train end-float. Two thrust washers of different thickness are available and experience has shown that if the thinner of the two washers is selected, the correct end-float is usually obtained. It is recommended therefore that this washer be used.

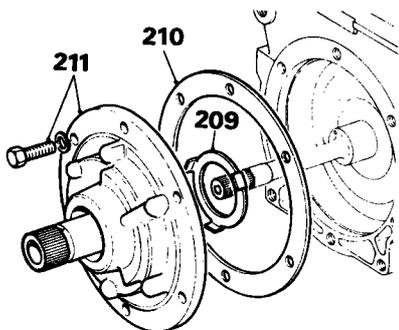


Fig. 59

210. Smear the new oil pump gasket with grease, position the gasket on the oil pump (Fig. 59).

211. Fit the oil pump ensuring that the stator tube is not displaced. **Do not** tighten the oil pump securing bolts at this stage (Fig. 59).

212. Position the new 'O' ring on the oil pump inlet tube; smear the 'O' ring with clean transmission fluid.

213. Fit the oil pump inlet and outlet tubes; also the converter feed tube. Ensure that the tubes are correctly seated (Fig. 60).

NOTE: The oil pump may be rotated slightly to achieve this.

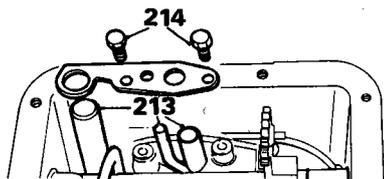


Fig. 60

214. Fit the oil tube retaining plate; tighten the bolts to a torque of 0,24 kgf m (1.75 lbf ft) (Fig. 60).

215. Tighten the oil pump securing bolts by diagonal selection to a torque of 2,63 kgf m (19 lbf ft).

216. Fit the governor feed tube, governor return tube and lubrication tube into the transmission case; ensure that the tubes are correctly seated (Fig. 61).

CAUTION: Do not use undue force when pushing the tubes into the oil holes.

217. Slide governor onto the output shaft, fit the plug and spring washer, ensure that the plug enters BLIND hole in output shaft. Tighten the plug to 2,28 kgf m (16.5 lbf ft) (Fig. 61).

218. Slide the speedometer drive gear onto the output shaft (Fig. 62).

219. Coat the new oil seal with clean transmission fluid; press the seal into the recess in the extension case. Ensure that the seal is correctly seated (Fig. 62).

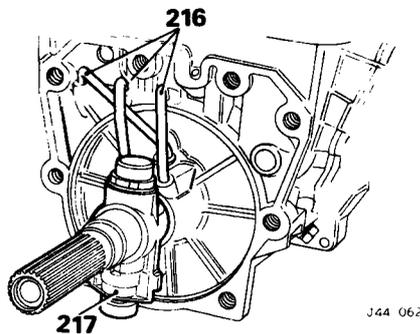


Fig. 61

220. Smear the new extension case gasket with grease, position the gasket on the extension case ensuring that the holes in the gasket and case are in alignment (Fig. 62).

221. Fit the extension case ensuring that the splines of the output shaft do not damage the oil seal and that the extension case does not foul the oil pipes (Fig. 62).

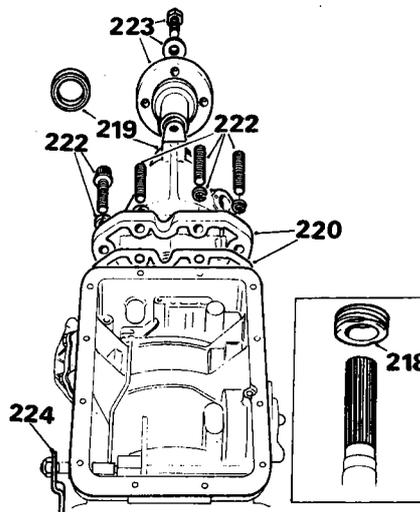


Fig. 62

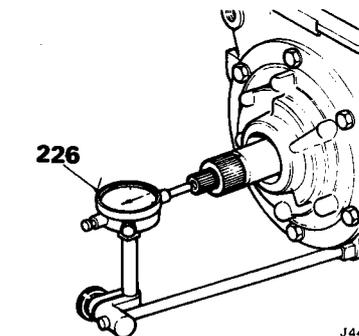


Fig. 63

222. Fit the bolts, stud bolts, washers and spacers (Fig. 62). Tighten the bolts by diagonal selection to a torque of 5,88 kgf m (42.5 lbf ft).

223. Slide the output flange onto the output shaft; fit the plain washer and nut. Do not tighten the nut at this stage (Fig. 62).

224. Move the selector lever until the parking pawl engages with the ring gear (Fig. 62).

225. Tighten the output flange securing bolt to a torque of 5,53 to 6,90 kgf m (40 to 50 lbf ft).

226. Assemble end-float gauge CBW 87 to the gearcase with the stylus contacting the end of the turbine shaft (Fig. 63).

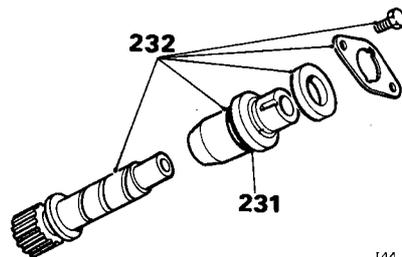


Fig. 64

227. Insert a suitable lever between the front clutch and the front of the gearcase. Ease the gear train to the rear of the gearcase and zero end-float gauge.

228. Insert the lever between the ring gear and rear clutch; ease the gear train to the front of the gearcase.

229. Note the reading on the gauge which should be between 0,20 mm and 0,73 mm (0.008 and 0.029 in).

CAUTION: If end-float exceeds 0,73 mm (0.029 in), reverse operations 217 to 225 and 209 to 215 and 217 to 229.

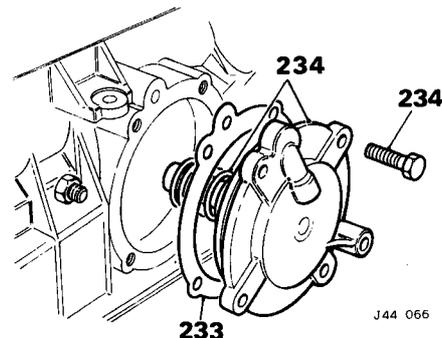


Fig. 65

230. Remove end-float gauge.

231. Smear the new 'O' ring with petroleum jelly, position the 'O' ring in the groove in the speedometer driven gear shaft (Fig. 64).

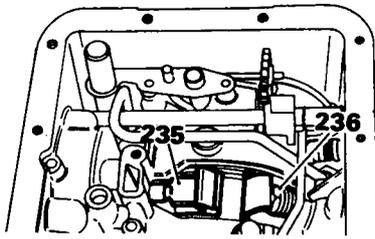
232. Fit the speedometer driven gear; ensure that the driven gear meshes with the drive gear; do not overtighten the securing bolts (Fig. 64).

233. Smear the new front servo gasket with grease, position the gasket on the servo body (Fig. 65).

234. Fit the front servo and spring (Fig. 65). Tighten the bolts by diagonal selection to a torque of 2,63 kgf m (19 lbf ft).

235. Position the front brake band strut in the gearcase. Ensure the spigot on the strut is located in the detent in the servo rod and that the brake band is correctly positioned (Fig. 66).

236. Screw in the front brake band adjusting screw until contact is made with the brake band. Do not tighten the locknut at this stage (Fig. 66).



J44 067

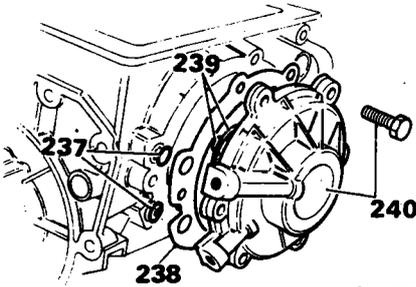
Fig. 66

237. Smear the new 'O' rings with clean transmission oil; position the 'O' rings in the rear servo body oil holes (Fig. 67).

238. Smear the new rear servo gasket with grease, position the gasket on the servo body (Fig. 67).

239. Position the servo operating rod and spring in the servo (Fig. 67).

240. Fit the servo assembly ensuring that the operating rod is located in the detent in the operating lever. Do not tighten the securing bolts at this stage (Fig. 67).

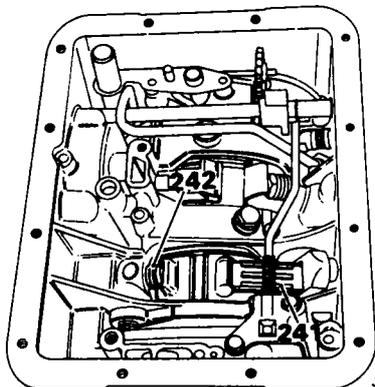


J44 068

Fig. 67

241. Position the rear brake band strut in the gearcase; ensure that the brake band is correctly positioned (Fig. 68).

242. Screw in the rear brake band adjusting screw until contact is made with the brake band. Do not overtighten the locknut at this stage (Fig. 68).



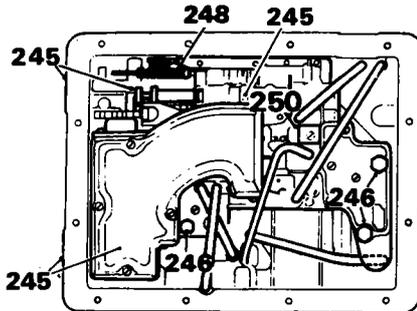
J44 069

Fig. 68

243. Tighten rear servo securing bolts by diagonal selection to a torque of 2,63 kgf m (19 lbf ft).

244. Fit tube 15D; do not use undue force.

245. Position the valve block in the transmission case, ensure that the spigot on the detent lever is located in the groove in the manual valve and that the valve body fits on the oil tubes (Fig. 69).



J44 070

Fig. 69

246. Fit the valve block securing bolts noting that the shortest bolt is fitted at the front of the valve block (Fig. 69).

247. Tighten the valve block securing bolts to a torque of 0,93 kgf m (6.75 lbf ft).

248. Connect the kick-down cable to the cam (Fig. 69).

249. Fit the oil tubes; see operation 15. Do not use undue force when fitting the tubes.

250. Position the magnet on the valve block in the position shown.

251. Smear the new oil pan gasket with grease; position the gasket on the gearcase.

252. Fit the oil pan; tighten the bolts by diagonal selection to a torque of 0,80 kgf m (5.75 lbf ft).

253. Reverse operations 1, 3 and 4, but do not fill the gearbox with fluid.

254. Tighten the front and rear brake band adjusting screws to a torque of 0,7 kgf m (5 lbf ft), and then back off the screws three-quarters of a turn.

255. Tighten each adjusting screw locknut to a torque of 4,8 kgf m (35 lbf ft).

CAUTION: Ensure the screws do not move during this operation.

REAR EXTENSION HOUSING

Remove and refit 44.20.15

Service tool: Torque wrench CBW 547 B-75; engine support tool MS 53A

Removing

Disconnect the battery. Position service tool MS 53A across rear engine lifting eye and set the hook to support the engine. Remove the nut at the centre of the mounting and recover the plain washer. Remove the nuts and washers securing the forward end of the tie-plate to the rear of the transmission casing. Remove the fastenings securing the heat shield. Locate the jack to support the mounting plate and release the four setscrews and washers.

Lower the jack and remove the mounting plate. Recover the spring washers, spacers and rubber rings.

Remove the screws securing the intermediate heat shield; withdraw the shield.

Remove the screws securing the rear heat shield to the rear engine mounting support plate. Remove the six bolts and special washers securing the rear engine mounting support plate to the floor pan.

Remove the bolts and special washers securing the rear engine mounting support plate to the transmission tunnel.

Remove the self-locking nuts and bolts securing the propeller shaft to the gearbox output flange; swing the propeller shaft to one side.

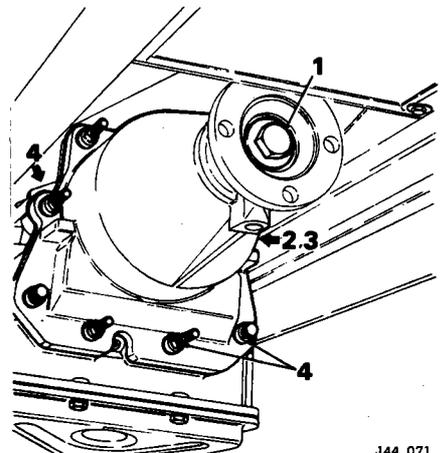
NOTE: This operation will be greatly facilitated if one rear wheel (both wheels if 'Powr-Lok' differential is fitted) is raised and the gear selector placed in 'N' (Neutral), thereby enabling the propeller shaft to be rotated.

WARNING: Chock both front wheels to prevent the vehicle moving

Using engine support tool lower the rear of the engine slightly.

CAUTION: Ensure that the engine does not foul the heater water valve.

Place the selector lever in 'P' (Park). Remove the bolt and plain washer (1, Fig. 70) securing the gearbox output flange; withdraw the flange.



J44 071

Fig. 70

Disconnect the speedometer right-angle drive (early models).

On later models slacken knurled nut securing transducer and withdraw from speedometer drive retaining plate.

Remove the bolts (2, Fig. 70) securing the speedometer drive retaining plate; withdraw the plate.

Withdraw the speedometer driven gear (3, Fig. 70); remove and discard the 'O' ring.

Remove the bolt securing the selector cable trunnion to the mounting bracket.

Note the fitted position of the stud bolts, bolts and nuts (4, Fig. 70). Remove these fixings, withdraw the trunnion mounting bracket and remove two further stud bolts and spacers.

Withdraw the rear extension; remove and discard the gasket.

Priase the oil seal out of the rear extension housing; discard the oil seal.

continued

Refitting

Lightly score the oil seal recess in the rear extension housing.

Smear the new oil seal with clean transmission fluid and gently tap the seal into the recess. Ensure that the seal is fully seated.

Using a new gasket, refit the extension housing. Tighten the fixing to the specified torque figure.

Refit the selector cable, reconnect the speedometer cable transducer using a new 'O' ring on the speedometer driven gear.

Refit the output flange.

Refit the rear engine mounting after replacing any rubber rings which are damaged.

Run the engine until it reaches normal operating temperature.

With the engine still running, withdraw the dipstick, wipe it clean and replace it.

Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick. If necessary, add fluid to bring the level on the dipstick to 'MAX'.

NOTE: The difference between the 'MAX' and 'MIN' marks on the dipstick represents approximately 0,75 litre (1½ pints, 2 U.S. pints).

REAR EXTENSION HOUSING OIL SEAL

Remove and refit 44.20.18

Removing

WARNING: Chock both front wheels to prevent the vehicle moving.

Service tool: Torque wrench CBW 547 B-75; engine support tool MS 53A

Disconnect the battery.

Position service tool MS 53 (A) across the rear engine lifting eye and set the hook to support the engine.

Remove the nut at the centre of the mounting and recover the plain washer. Remove the nuts and washers securing the forward end of the tie-plate to the rear of the transmission casing. Remove the fastenings securing the heat shield. Locate the jack to support the mounting plate and release the four setscrews and washers.

Lower the jack and remove the mounting plate. Recover the spring washers, spacers and rubber rings.

Remove the locknuts from the bolts securing the forward and rear brackets of the mounting, and recover the spacing tubes.

Remove the locknuts securing the mounting rubbers to centre bracket.

Remove the screw securing the intermediate heat shield; withdraw the shield.

Remove the screws securing the rear heat shield to the rear engine mounting support plate.

Remove the six bolts and special washers securing the rear engine mounting support plate to the floor pan.

Remove the bolts and special washers securing the rear engine mounting support plate to the transmission tunnel.

Remove the self-locking nuts and bolts securing the propeller shaft to the gearbox output flange; swing the propeller shaft to one side.

NOTE: This operation will be greatly facilitated if one rear wheel (both wheels if 'Powr-Lok' differential is fitted) is raised and the gear selector placed in 'N' (Neutral), thereby enabling the propeller shaft to be rotated.

Using engine support tool, lower rear of engine slightly.

CAUTION: Ensure that the engine does not foul the heater water valve.

Place the selector lever in 'P' (Park).

Remove the bolt and plain washer (1, Fig. 71) securing the gearbox output flange (2, Fig. 71); withdraw the flange.

Prise the oil seal (3, Fig. 71) out of the rear extension housing; discard the seal.

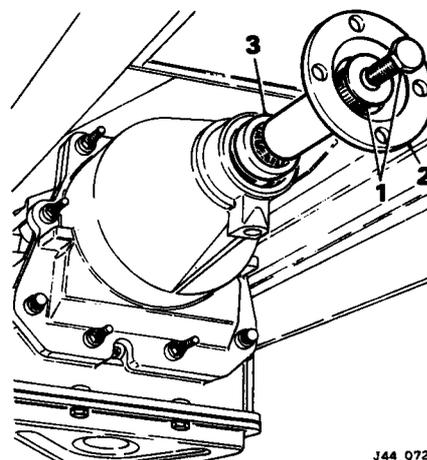


Fig. 71

Refitting

Lightly score the oil seal recess in the rear extension housing.

Smear the new oil seal with clean transmission fluid and gently tap the seal into the recess. Ensure that the seal is fully seated.

GOVERNOR

Remove and refit 44.22.01

Removing

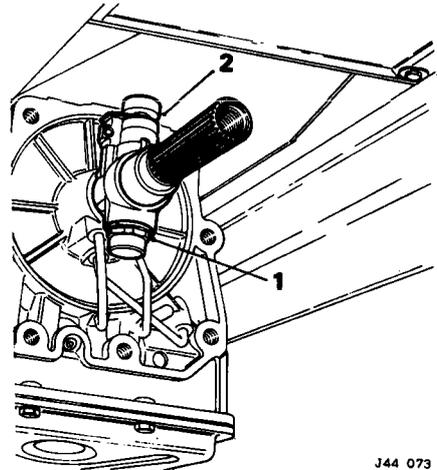
Prior to carrying out the following operation, the rear extension will have to be removed, see operation 44.20.15.

Slide the speedometer drive gear off the output shaft.

Position the selector lever in 'N' (Neutral). If necessary, rotate the output shaft to gain access to the governor securing plug.

Note the fitted position of the governor and remove the plug and spring washer (1, Fig. 72) securing the governor to the output shaft.

Slide the governor (2, Fig. 72) off the output shaft.



J44 073

Fig. 72

Refitting

Slide the governor onto the output shaft, noting the location of the blind hole in the shaft.

Fit the governor securing plug and spring washer; ensure that the domed end of the plug enters the blind hole in the output shaft.

Tighten the plug to the specified torque.

Slide the speedometer drive gear onto the output shaft.

Refit the rear extension housing.

CAUTION: Always fit a new rear seal.

LUBRICATION SYSTEM

Drain and refill 44.24.02

CAUTION: Due to the method of construction, it is not possible to completely drain the transmission fluid, and this should be taken into account when the transmission is being filled. As it should only be necessary to carry out the following operations preparatory to carrying out work on the transmission which will involve removal of oil pan, the following procedure should be followed.

Draining

Unscrew the union nut, withdraw the dipstick tube (1, Fig. 73), drain and discard the fluid.

Remove the bolts and plain washers (2, Fig. 73) securing the oil pan to the transmission case.

Lower the oil pan, remove and discard the gasket (3, Fig. 73).

Allow the fluid to drain and using a new gasket coated with grease, refit the oil pan.

Tighten the securing bolts by diagonal selection and reconnect the dipstick tube.

Refill the transmission with fluid to the 'MAX' mark on the dipstick.

Apply the handbrake and select 'P' position. Run the engine until it reaches normal operating temperature.

With the engine still running, withdraw the dipstick (1, Fig. 74), wipe it clean and replace it. Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick. If necessary, add fluid to bring the level on the dipstick to 'MAX'.

NOTE: The difference between the 'MAX' (3, Fig. 74) and 'MIN' (2, Fig. 74) marks on the dipstick represents approximately 0,75 litre (1½ pints, 2 U.S. pints).

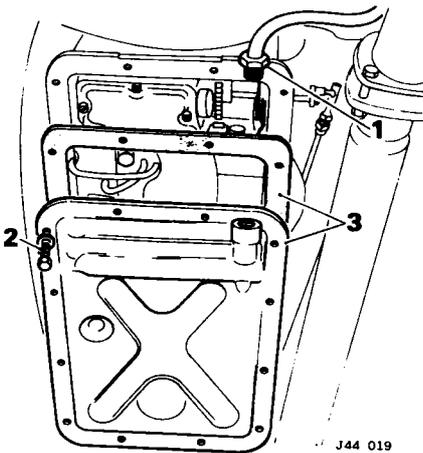


Fig. 73

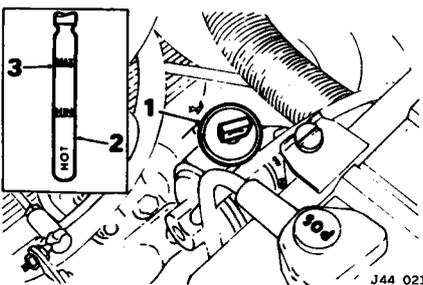


Fig. 74

OIL PAN

- Remove and refit including filter** 44.24.04
- Remove and refit** 44.24.07

Removing

Unscrew the union nut (1, Fig. 73), withdraw the dipstick tube; drain and discard the fluid. Remove the bolts and plain washers (2, Fig. 73) securing the oil pan to the transmission case. Lower the oil pan, remove and discard gasket (3, Fig. 73).

NOTE: If the filter is to be removed, carry out the following:

Remove the screws (1, Fig. 75) securing the suction tube to the valve block. Lower the suction tube (2, Fig. 75), remove and discard the gasket, extract the filter.

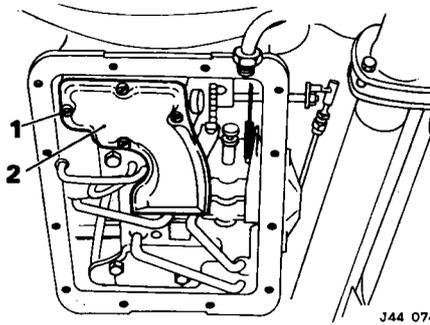


Fig. 75

Smear a new gasket with clean transmission fluid, refit the filter and suction tube.

Having refitted the filter, proceed as follows: smear a new gasket with grease and refit the oil pan.

Tighten the bolts by diagonal selection and refit the dipstick tube.

Fill the transmission with fluid to the 'MAX' marks on the dipstick.

Apply the handbrake and select 'P' position. Run the engine until it reaches normal operating temperature.

With the engine still running, withdraw the dipstick, wipe it clean and replace it.

Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick. If necessary, add fluid to bring the level on the dipstick to 'MAX'.

NOTE: The difference between the 'MAX' and 'MIN' marks on the dipstick represents approximately 0,75 litre (1½ pints, 2 U.S. pints).

DOWN-SHIFT CABLE

Pressure check and adjust 44.30.03

Service tools: Pressure gauge CBW 1C; gearbox adaptor CBW 1C-5.

Check engine tune, i.e. cylinder compressions, spark plugs, ignition timing, carburetters. Using a suitable Allen key, remove the blanking plug (1, Fig. 76) from the gearcase.

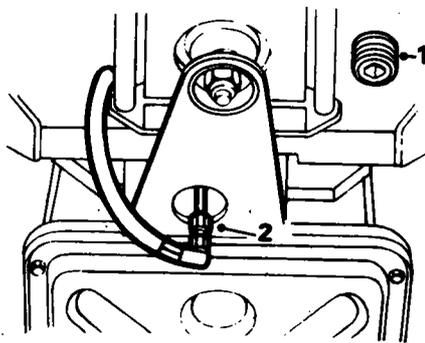


Fig. 76

CAUTION: On later cars, a bracket is fitted between the gearbox and the rear mounting. Access to the blanking plug is through the hole in the bracket and under no circumstances may the bracket be removed.

Connect the pressure gauge to the gearbox, using appropriate adaptor.

CAUTION: Do not overtighten adaptor.

Taking care to ensure that the hose is kept clear of the exhaust system, route the hose around the outside of the car and into the passenger's window.

Run the engine until it reaches normal operating temperature.

Check the wheels and apply hand- and foot-brakes.

Select 'D'; pressure gauge should read 3,85 to 5,3 kgf/cm² (55 to 75 lbf/in²) at idling speed. Increase engine speed by 500 rev/min.

New engines:

Gauge should read 5,3 to 8,1 kgf/cm² (75 to 115 lbf/in²). The lower figure must not exceed 5,3 kgf/cm² (75 lbf/in²).

Run-in engines:

Gauge should read 5,3 to 6,9 kgf/cm² (75 to 100 lbf/in²). The lower figure must not exceed 5,3 kgf/cm² (75 lbf/in²).

If above readings are not obtained, proceed as follows:

WARNING: Engine must be switched off and selector lever in 'N' before carrying out adjustment.

Slacken the locknut (1, Fig. 77) on the down-shift cable. By means of abutment nut (2, Fig. 77) on the outer cable, adjust the length of the cable to alter the pressure.

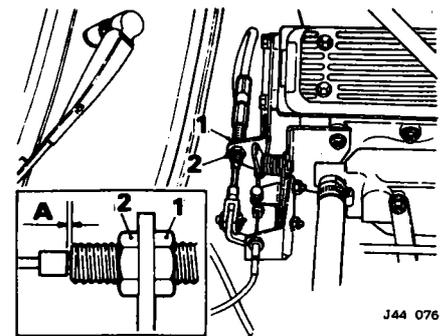


Fig. 77

NOTE: Increasing the length of the cable causes an increase in pressure; decreasing the length of the cable causes a decrease in pressure. The ferrule crimped on the inner cable should be between 0,51 and 0,76 mm (0,020 and 0,030 in.) from the threaded portion of the outer cable (dimension 'A' Fig. 77).

When the pressure is correct, tighten the locknut.

Remove the pressure gauge and adaptor, refit the blanking plug and, if necessary, top-up the transmission fluid.

CAUTION: Do not overtighten the plug.

Road-test the car as detailed on page 44. 13.

FRONT BRAKE BAND

Adjust

44.30.07

Service tools: Torque wrench CBW 547 B-75; adaptor CBW 547-50-2A

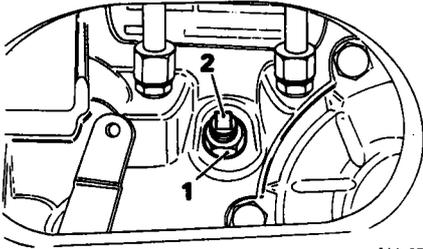


Fig. 78

Remove the self-locking nut securing the selector lever to the selector shaft; withdraw the lever.

Slacken the locknut (1, Fig. 78) securing the brake band adjuster screw.

Slacken the adjuster screw (2, Fig. 78) two or three turns.

Using torque wrench CBW 547 B-75, suitable in drive straight extension and adaptor CBW 547-50-2A, tighten the brake band adjuster screw to a torque of 0,80 kgf m (5 lbf ft) and then back off the screw two and one half flats.

Tighten the locknut to a torque of 4,8 kgf m (35 lbf ft).

CAUTION: Ensure the adjuster screw does not turn during this operation.

REAR BRAKE BAND

Adjust

44.30.10

Service tools: Torque wrench CBW 547 B-75; adaptor CBW 547A-50-2A

Slacken the locknut (1, Fig. 79) securing the brake band adjuster screw.

Slacken the adjuster screw (2, Fig. 79) two or three turns.

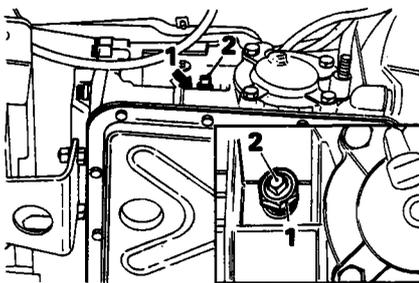


Fig. 79

Using torque wrench CBW 547 B-75 and adaptor CBW 547A-50-2A, tighten the brake band adjuster screw to a torque of 0,80 kgf m (5 lbf ft) and then back off the screw two and one half flats.

Tighten the locknut to a torque of 4,8 kgf m (35 lbf ft).

CAUTION: Ensure that the adjuster screw does not turn during this operation.

STALL SPEED

Test

44.30.13

The results of this test indicate the condition of the gearbox and converter.

Stall speed is maximum engine revolutions recorded whilst driving the impeller against the stationary turbine. Stall speed will vary with both engine and transmission conditions, so before attempting a stall speed check, engine condition must be determined. Engine and transmission must be at normal operating temperature before commencing check.

Apply handbrake.

Apply footbrake.

Start engine.

Select 'D'.

Fully depress accelerator.

Note tachometer reading.

CAUTION: To avoid overheating of transmission do not stall for more than 10 seconds at a time or for a total of one minute in any half-hour period.

Rev/min	Condition indicated
Under 1300	Stator free wheel slip
1950 to 2100	Normal
Over 2,500	Clutch slip

FRONT SERVO

Remove and refit

44.34.07

Service tools: Torque wrench CBW 547 B-75; adaptor CBW 547A-50-2A

Removing

Position the selector lever in 'P'
Remove bolts (1, Fig. 80) securing the servo to the transmission case.

Withdraw the servo (2, Fig. 80) together with the push-rod and spring.

Remove and discard the gasket (3, Fig. 80).

NOTE: If the front servo is to be overhauled, carry out operation 44.20.06, instructions 177 to 179.

Refitting

Smear a new gasket with grease, position the gasket on the servo body.

Position the brake band strut in the transmis-

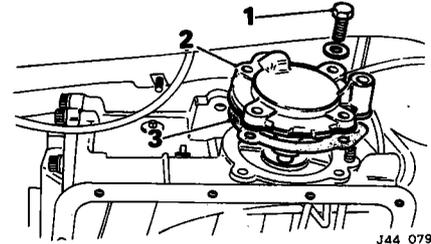


Fig. 80

sion case, ensuring that the strut is correctly located on the brake band.

Insert the servo push-rod and spring in the transmission, ensuring that the spigot on the brake band strut is located in the hole in the push-rod.

Position the servo on the transmission case, ensuring that the push-rod and spring are correctly located.

Fit and tighten the servo securing bolts by diagonal selection to the specified torque figure.

Top up the transmission fluid to the 'MAX' mark on the dipstick.

Run the engine until it reaches normal operating temperature.

With the engine still running, withdraw the dipstick (1, Fig. 81), wipe it clean and replace it.

Immediately withdraw the dipstick and note the reading on the 'HOT' (2, Fig. 81) side of the dipstick. If necessary, add fluid to bring the level on the dipstick to 'MAX' (3, Fig. 81).

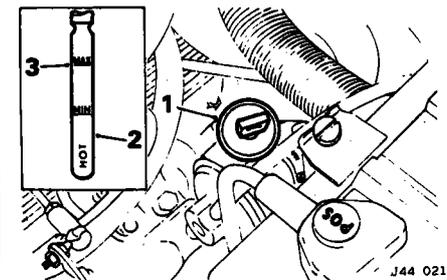


Fig. 81

NOTE: The difference between the 'MAX' (3, Fig. 81) and 'MIN' marks on the dipstick represents approximately 0,75 litre (1½ pints, 2 U.S. pints).

Remove the self-locking nut securing the selector lever to the selector shaft; withdraw the lever.

Slacken the locknut securing the brake band adjuster screw.

Slacken the adjuster screw two or three turns. Using torque wrench CBW 547 B-75, suitable in drive straight extension and adaptor CBW 547A-50-2A, tighten the brake band adjuster screw to a torque of 0,80 kgf m (5 lbf ft) and then back off the screw three-quarters of a turn.

Tighten the locknut to a torque of 4,8 kgf m (35 lbf ft).

CAUTION: Ensure the adjuster screw does not turn during this operation.

REAR SERVO

Remove and refit 44.34.13

Service tools: Torque wrench CBW 547 B-75; adaptor CBW 547A-50-2A

Removing

Remove nuts, bolt and washers securing intermediate exhaust pipe to front pipe.

Separate the intermediate pipe from the front pipe; remove the sealing olive.

Remove the screws and special washers securing the left-hand heat shield to the body; withdraw the heat shield.

Remove the self-locking nut securing the selector lever to the selector shaft; withdraw the lever and selector cable assembly. Mark the relative position of rear servo body (1, Fig. 82) to transmission case.

Remove the bolts (2, Fig. 82) securing the servo to the transmission case, withdraw the servo, push-rod and spring.

Remove and discard the gasket and two 'O' rings (3, Fig. 82).

NOTE: If the rear servo is to be overhauled, carry out operation 44.20.06, items 180 to 182.

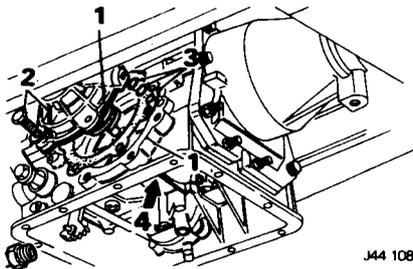


Fig. 82

Refitting

Smear new 'O' rings with clean transmission fluid, position an 'O' ring in each recess in the servo body.

Smear a new gasket with grease, position the gasket on the servo body.

Refit the selector lever to the shaft.

Refit the left-hand heat shield; smear sealing olive with 'Firegum' before refitting.

Top up the transmission with fluid to the 'MAX' mark on the dipstick.

Run the engine until it reaches normal operating temperature.

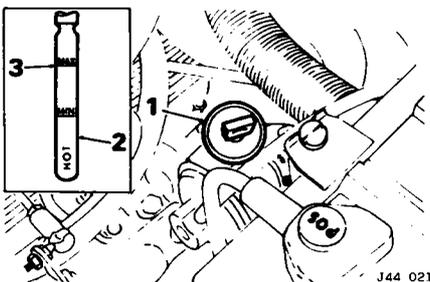


Fig. 83

With engine still running, withdraw the dipstick (1, Fig. 83), wipe it clean and replace it.

Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick (2, Fig. 83). If necessary, add fluid to bring the level on the dipstick to 'MAX' (3, Fig. 83).

NOTE: The difference between the 'MAX' and 'MIN' marks on the dipstick represents approximately 0.75 litre (1½ pints, 2 U.S. pints).

Slacken the locknut securing brake band adjuster screw.

Slacken the adjuster screw two or three turns. Using torque wrench CBW 547 B-75, and adaptor CBW 547A-50-2A, tighten the brake band adjuster screw to a torque of 0,80 kgf m (5 lbf ft) and then back off the screw three-quarters of a turn. Tighten the locknut to a torque of 4,8 kgf m (35 lbf ft).

CAUTION: Ensure that adjuster screw does not turn during this operation.

VALVE BLOCK

Remove and refit 44.40.01

Service tool: Torque wrench CBW 547 B-75

Removing

Position the selector lever in 'P' (Park).

Unscrew the union nut (1, Fig. 84), withdraw the dipstick tube, drain and discard the fluid.

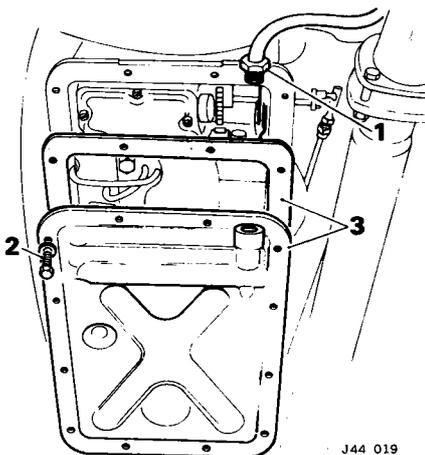


Fig. 84

Remove the bolts and plain washers (2, Fig. 84) securing the oil pan to the transmission case. Lower the oil pan (3, Fig. 84), remove and discard the gasket.

Disconnect the kick-down cable from the cam. Note the fitted position of the oil tubes (see operation 44.20.06, item 15) and using a suitable screwdriver, lever tubes out of the transmission.

Note the fitted position of the magnet; withdraw the magnet.

Remove the bolts securing the valve block to the transmission, noting that the shortest bolt is fitted at the front.

Pull the valve block downwards, ensuring that the manual valve is not displaced

CAUTION: Extreme care must be taken to ensure that the action of removal does not damage the converter feed, pump feed or pump outlet pipes.

NOTE: If the valve block is to be overhauled, carry out operation 44.20.06, items 68 to 94.

Refitting

Ensure that the converter feed, pump feed and pump outlet pipes are not damaged; push each pipe upwards to ensure correct location is maintained.

Locate the valve block in the transmission case ensuring that the tubes are correctly located in the valve block.

NOTE: The valve block may be tapped gently with a hide mallet to ensure correct location is obtained.

Ensure that the spigot on the detent lever engages with the groove machined in the manual valve.

Refit the valve block securing bolts, ensuring that the shortest bolt is fitted at the front. Reconnect the kick-down cable to the cam.

Smear a new oil pan gasket with grease and refit the oil pan. Tighten the securing bolts by diagonal selection.

Refit the dipstick tube and fill the transmission with fluid to the 'MAX' mark on the dipstick. Run the engine until it reaches normal operating temperature.

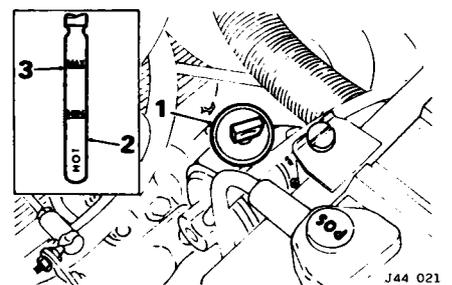


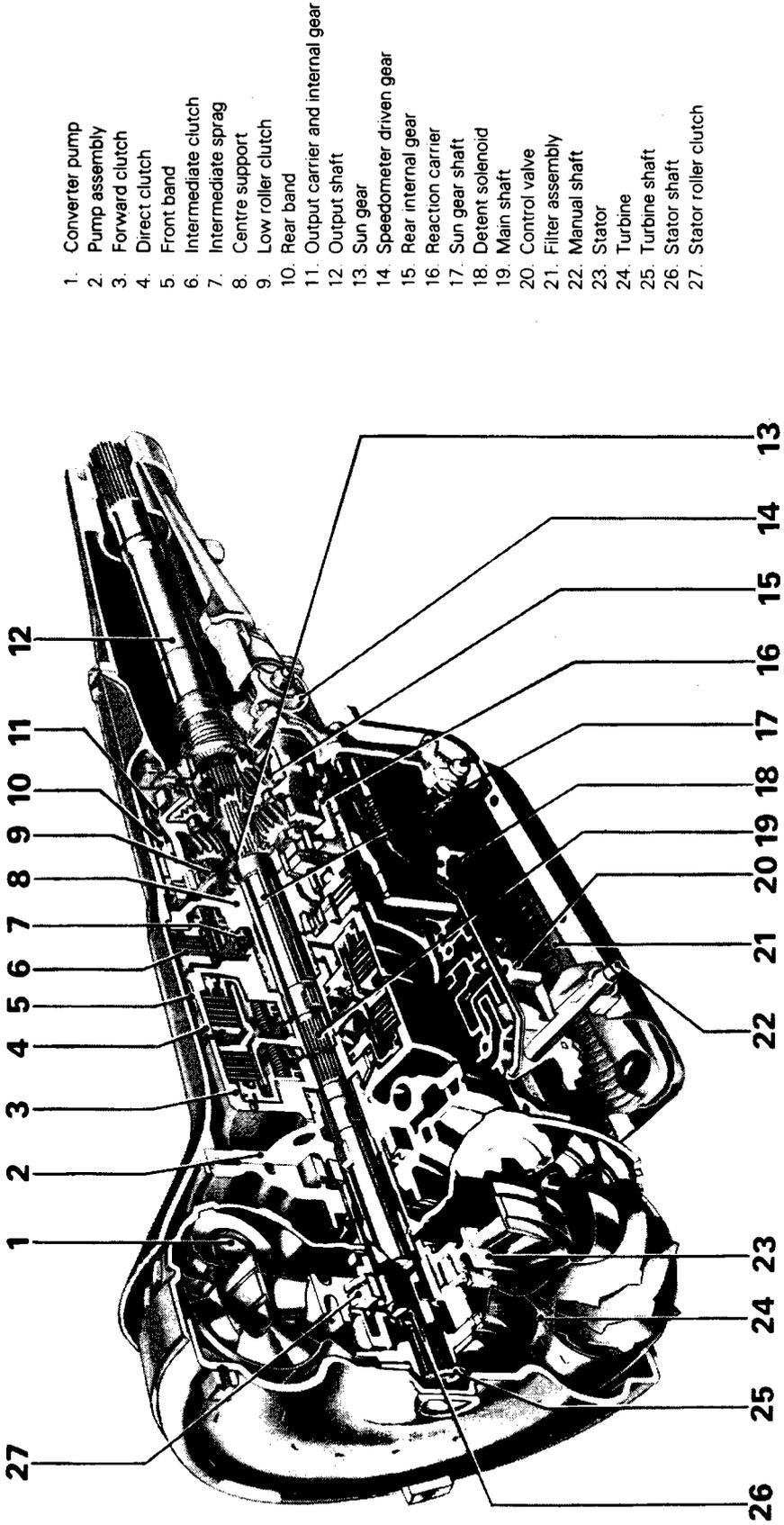
Fig. 85

With the engine still running, withdraw the dipstick (1, Fig. 85), wipe it clean and replace it. Immediately withdraw the dipstick and note the reading on the 'HOT' side of the dipstick (2, Fig. 85). If necessary, add fluid to bring the level on the dipstick to 'MAX' (3, Fig. 85).

NOTE: The difference between the 'MAX' and 'MIN' marks on the dipstick represents approximately 0.75 litre (1½ pints, 2 US pints).

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- 1. Converter pump
- 2. Pump assembly
- 3. Forward clutch
- 4. Direct clutch
- 5. Front band
- 6. Intermediate clutch
- 7. Intermediate sprag
- 8. Centre support
- 9. Low roller clutch
- 10. Rear band
- 11. Output carrier and internal gear
- 12. Output shaft
- 13. Sun gear
- 14. Speedometer driven gear
- 15. Rear internal gear
- 16. Reaction carrier
- 17. Sun gear shaft
- 18. Detent solenoid
- 19. Main shaft
- 20. Control valve
- 21. Filter assembly
- 22. Manual shaft
- 23. Stator
- 24. Turbine
- 25. Turbine shaft
- 26. Stator shaft
- 27. Stator roller clutch

Fig. 1

DESCRIPTION

The GM 400 Hydramatic transmission is fully automatic and consists of a three-element-type torque converter and a compound epicyclic planetary gear set.

Three multiple disc clutches, two one-way clutches and two brake bands provide the friction elements required to obtain the necessary gear ratios.

The torque converter couples the engine power to the transmission and hydraulically provides additional torque multiplication when the engine and transmission are subjected to high loads.

The compound planetary gear set provides three forward ratios and one reverse. Gear-changing is fully automatic relative to vehicle and engine speed and engine torque input. A vacuum modulator is used to automatically sense engine torque input to the transmission. Engine torque sensed by the modulator is transmitted to the pressure regulator, thus ensuring that the correct gear-shifts are obtained at the relevant throttle positions. Gear or torque ratios of the transmission are as follows:

- First 2.48 : 1
- Second 1.48 : 1
- Third 1.1 : 1
- Reverse 2.07 : 1

The gear selection quadrant has six positions 'P', 'R', 'N', 'D', '2', '1'.

An easily recognizable feature on cars fitted with this transmission is the increased length of selector lever travel between 'P' and 'R'.

- 'P' Park enables the transmission output shaft to be locked, thereby preventing movement of the vehicle, 'P' **must not** be engaged whilst the vehicle is in motion. The engine can be started in this position.
- 'R' Enables the vehicle to be driven in the reverse direction.
- 'N' Neutral position, enables the engine to be started and run without driving the transmission.
- 'D' Drive for all normal driving conditions and maximum economy. It has three gear ratios. Forced down-shifts are available for safe and rapid acceleration by quickly depressing the accelerator pedal to the full throttle position.
- '2' '2' has the same starting ratio as 'D' but prevents the transmission changing up from second gear, thereby retaining this gear for acceleration and engine braking. '2' can be selected at any road speed, as there is no safety override.
- '1' '1' first gear ratio can be selected at any speed from 'D' or '2' but the transmission will shift to second gear and will remain in this gear until the vehicle speed is reduced sufficiently to allow first gear to be engaged.

GLOSSARY OF TERMS

1 ACCUMULATOR

Controls shift quality by delaying the full drive pressure applied to a clutch or band.

2 MANUAL VALVE

The main line fluid pressure distributing valve, directing fluid to all main components.

3 GOVERNOR ASSEMBLY

Responsible for timing the gear-changes in accordance with output shaft speed.

4 VACUUM MODULATOR VALVE

The vacuum modulator valve, activated by manifold vacuum, senses engine torque. The modulator ensures that the correct gear-shifts are obtained at relevant throttle positions. Pressure from the modulator is applied to the 1-2 shift valve, compensating governor pressure, and to the pressure regulator valve in order to vary line pressure.

Governor pressure directed to the modulator reduces line pressure at high road speeds, when engine torque is minimal, thereby making it unnecessary for high pump output and resulting in a greater fuel economy for the unit.

5 PRESSURE REGULATOR

Controls main line pressure.

6 1-2 SHIFT VALVE

Controls the 1-2 and 2-3 shift patterns.

7 1-2 REGULATOR VALVE

Regulates modulator pressure to a proportional pressure and tends to hold the 1-2 shift valve in the down-shift position.

8 1-2 DETENT VALVE

This valve serves regulated modulator pressure and tends to hold the 1-2 shift valve in the down position shift and provides an area for detent pressure for 2-1 detent changes.

9 2-3 MODULATOR VALVE

This valve is sensitive to modulator pressure and applies a variable force on the 2-3 shift valve; tending to hold the valve in the down position.

10 3-2 VALVE

This prevents modulator pressure from acting on the shift valves after the direct clutch has been applied, thereby preventing a down-shift from third gear should wide throttle openings be used. If detent or modulator pressure rises above 6.5 kgf/cm² (92 lbf/in²) however, this pressure will then be directed to the shift valves to effect a down-shift.

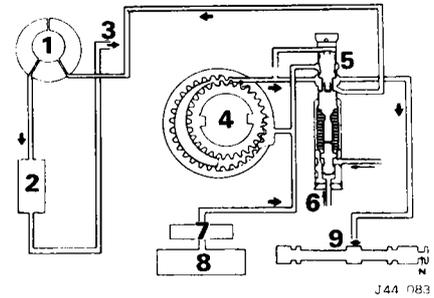


Fig. 2

1. Torque converter
2. Oil cooler
3. Oil to transmission
4. Oil pump
5. Pressure regulator valve
6. From modulator or throttle valve
7. Oil filter
8. Oil sump
9. Manual valve

CAUTION: Only Gamlen 265 or Rochem Electrical Quick Dry Solvent should be used for cleaning transmission components.

CLUTCH AND BAND APPLICATION CHART							
Selector position	Forward Clutch	Direct Clutch	Front Band	Intermediate		Clutch	Rear Band
				Clutch	Clutch		
Park — Neutral							
Drive 1	●					●	
D 2	●			●	●		
3	●	●		●			
Intermediate							
2 1st	●					●	
2nd	●		●	●	●		
Lock-up							
1 1st	●					●	●
Reverse		●					●

CLUTCH PLATE IDENTIFICATION						
	Forward Clutch		Direct Clutch		Intermediate Clutch	
	Pressure Plates	Friction Plates	Pressure Plates	Friction Plates	Pressure Plates	Friction Plates
Flat	5	5	5	5	3	—
Waved	—	—	—	—	—	3
Dished	1	—	1	—	—	—

NOTE: The direct clutch has one plate of 2.2 mm (0.091 in) thickness, the other four being of 1.9 mm (0.077 in) thickness.

SHIFT SPEEDS

NOTE: The figures in the following table refer only to the following:

1. All cars with a 3.31:1 final drive ratio.
2. Cars with a final drive ratio of 3.07:1 prior to transmission No. 79ZA2411.

All are pre HE vehicles.

For HE vehicles see page 44—34.

Light Throttle		Full Throttle		Full Throttle Kick-down		Kick-down		Down-shift		Roll Out	
1-2	2-3	1-2	2-3	1-2	2-3	3-2	3-1	Manual 2-1	PTKD* 3-2	3-2	2-1
5-10 m.p.h.	10-20 m.p.h.	45 ± 5 m.p.h.	60 ± 5 m.p.h.	55 ± 5 m.p.h.	85 ± 5 m.p.h.	80 ± 5 m.p.h.	28-35 m.p.h.	13-18 m.p.h.	40-50 m.p.h.	8-12 m.p.h.	3-8 m.p.h.
8-16 km/h	16-32 km/h	72 ± 8 km/h	96 ± 8 km/h	88 ± 8 km/h	136 ± 8 km/h	128 ± 8 km/h	43-56 km/h	21-29 km/h	64-80 km/h	13-19 km/h	5-13 km/h

*PTKD = Part Throttle Kick-down

AUTOMATIC TRANSMISSION — GM 400

NOTE: The figures in the following table refer only to cars with a final drive ratio of 3.07:1 built from transmission No. 79ZA2411 and are pre HE vehicles — for HE vehicles see page 44—34.

Light Throttle		Full Throttle		Full Throttle Kick-down		Kick-down		Down-shift		Roll Out	
1-2	2-3	1-2	2-3	1-2	2-3	3-2	3-1	Manual 2-1	PTKD* 3-2	3-2	2-1
5-12 m.p.h.	12-20 m.p.h.	40-50 m.p.h.	50-70 m.p.h.	50-60 m.p.h.	80-95 m.p.h.	70-85 m.p.h.	28-38 m.p.h.	13-18 m.p.h.	40-50 m.p.h.	8-12 m.p.h.	3-8 m.p.h.
8-19 km/h	19-32 km/h	64-80 km/h	80-113 km/h	80-96 km/h	129-153 km/h	113-137 km/h	45-62 km/h	21-29 km/h	64-80 km/h	13-19 km/h	5-13 km/h

*PTKD = Part Throttle Kick-down

VALVE SPRING IDENTIFICATION FOR PRE HE VEHICLES

VALVE SPRING IDENTIFICATION CHART				
Function	Colour	Free Length	No. of Coils	Outside Diameter
1-2 accumulator valve	Dark Green	1.648 in	12.5	0.480 in
Pressure regulator	Light Blue	3.343 in	13	0.845 in
Front servo piston	Natural	1.129 in	4	1.257 in
Rear accumulator	Yellow	2.230 in	8.5	1.130 in
Governor	Dark Green	0.933 in	9.5	0.316 in
	Red	0.987 in	8.5	0.306 in
1-2 regulator	Pink	0.936 in	13.5	0.241 in
2-3 valve	Red	1.491 in	17.5	0.328 in
2-3 valve	Gold	1.555 in	18.5	0.326 in
3-2 valve	Green	2.017 in	16.5	0.400 in
Front accumulator piston	Natural	2.927 in	8.5	1.260 in
Detent regulator	Green	2.735 in	26.5	0.340 in

For HE vehicles see page 44—34.

TORQUE WRENCH SETTINGS

SECTION 44

ITEM	DESCRIPTION	Nm	kgf m	lbf ft
Control valve unit to case	¼ in dia. X 20	10.84	1,1	8
Governor cover to case	⅝ in dia. X 18	24.40	2,49	18
Line pressure plug	½ in dia. pipe	13.55	1,38	10
Manual shaft to detent lever	⅜ in dia. X 24	24.40	2,49	18
Parking pawl bracket	⅝ in dia. X 18	24.40	2,49	18
Pump body to cover	⅝ in dia. X 18	24.40	2,49	18
Pump to case	⅝ in dia. X 18	24.40	2,49	18
Rear extension	⅜ in dia. X 16	31.18	3,18	23
Rear servo cover	⅝ in dia. X 18	24.40	2,49	18
Solenoid to case	¼ in dia. X 20	16.26	1,66	12
Speedometer drive shaft nut	¼ in dia. X 28	13.55	1,38	10
Sump	⅝ in dia. X 18	16.26	1,66	12
Vacuum modulation retainer to case	⅝ in dia X 18	24.40	2,49	18

SERVICE TOOLS

- 18G 677-2 Adaptor Pressure Take-Off
- 18G 1295 Piston Accumulator Control Valve Compressor
- 18G 1296 Front Pump Remover Screws
- 18G 1297 Front Pump and Tailshaft Oil Seal Replacer
- 18G 1298 Forward and Direct Clutch Piston Replacer Inner and Outer Protection Sleeve
- 18G 1309 Intermediate Clutch Inner Seal Protection Sleeve
- 18G 1310 Band Application Pin Selection Gauge
- 18G 677 ZC Pressure Test Equipment
- 18G 1016 Clutch Spring Compressor
- 18G 1004 Circlip Pliers
- 18G 1004 J Circlip Pliers Points
- CBW 87 End-float Checking Gauge

TRANSMISSION FLUID LEVEL

Check

Ensure that the transmission is at normal operating temperature by either:

- a. Running the vehicle on a rolling road utilizing all the gear positions until fluid reaches a temperature of 80°C, or
- b. Conducting a road test of at least 24 km (15 miles).

CAUTION: Engine temperature is no indication of transmission temperature.

Check that the vehicle is on level ground. Firmly apply the hand- and footbrakes, and run the engine at a maximum speed of 750 rev/min for several minutes. To ensure that the valve block is primed, slowly move the selector lever through all the gear positions. With the engine still running, engage 'P' (Park) and withdraw the dipstick. Wipe it clean with a lint-free cloth and replace it.

Immediately remove the dipstick again, and note the level indicated on the 'HOT' scale. It should be between the 'MAX' and 'MIN' marks.

Carefully top up the fluid to the correct level, using only a Dexron 2D type fluid. Take care not to overfill.

RECOMMENDED TRANSMISSION FLUID

Dexron 2D type fluid only should be used, which must not be mixed with other transmission fluids.

NOTE: Dexron 2D Fluid is red in colour.

Fluid quantity

Transmission completely dry, but a quantity of fluid still remains in the torque converter; fill with approximately 9,12 litres (16 pints).

Fluid condition

Any moisture in the transmission fluid will cause the transmission seals to swell and will also soften friction material. If this fault is found early, the leak repaired and the fluid changed, no overhaul is needed unless there are obvious defects in the operation of the transmission.

Varnished fluid

This gives the fluid a dark brownish colour. If fluid is varnished through age or overheating, then it will have a pronounced brown colour. Once varnish starts forming it builds up on all the valves, servos, clutches, etc., and causes sticking and hardening of the seals. Eventually it will clog the filter, and pump pressure will drop. When this happens the torque converter will not fill and there will be insufficient pressure for the clutch or band to hold torque, hence the transmission will not operate.

An evaluation of the degree of varnish will decide whether an overhaul is required or just a fluid change.

Low fluid level

This can result in the pump drawing air along with the fluid, thereby making fluid spongy and compressible due to air bubbles. This can result in delayed engagement or lack of drive, slipping gear-shifts or clutch burn-outs.

Another possible fault is pump wear or governor malfunction indicated by a buzzing noise emanating from the output shaft.

High fluid level

This can cause foaming and overheating of the transmission fluid resulting in the same faults occurring as in low fluid level. Overheating causes rapid oxidation of the fluid, leading to varnish formation.

'D' DRIVE RANGE

Position the selector lever in 'D' and accelerate from rest; check speed of 1-2 and 2-3 shifts. A part throttle down-shift, 3-2 should be available at road speeds up to approximately 72 km/h (45 m.p.h.) as throttle is opened progressively. Care should be taken when checking this that transmission is not 'kicked down'. At full throttle kick-down, a down-shift into 2nd or 1st gear, depending upon road speed, should occur.

As the vehicle speed decreases, the 3-2 and 2-1 shifts should occur at speeds below 16 km/h (10 m.p.h.).

There is no engine braking in 1st or 2nd gears in this range.

Line pressure at a constant road speed/throttle opening should be 4,3 kgf/cm² (60 lbf/in²).

Line pressure during acceleration should be 7,8 to 10,5 kgf/cm² (110 to 150 lbf/in²).

'2' INTERMEDIATE RANGE

Position the selector in '2' and accelerate the car from rest; check speed of 1-2 shift.

NOTE: At no time should transmission shift into '3'.

At full throttle kick-down, a down-shift into 1st gear, at the appropriate road speed, should occur. As the car speed decreases, transmission should shift from 2 to 1 at the appropriate road speed.

NOTE: The 1-2 shift in the '2' intermediate range is somewhat firmer than in 'D'; this is normal.

Line pressure should remain steady at 10,5 kgf/cm² (150 lbf/in²).

'1' LOW RANGE

Position the selector lever in '1' and accelerate the car from rest; there should be no up-shift from '1' with the selector lever in this position.

NOTE: An up-shift to second gear will occur at an engine speed of approximately 6200 rev/min, but it is not necessary to check this.

'2nd' GEAR—OVERRUN BRAKING

Position the selector lever in 'D' and with vehicle speed at approximately 56 km/h (35 m.p.h.), closed throttle, move the selector lever to '2'. The transmission should immediately shift into '2'. There should also be an increase in engine rev/min coupled with engine braking.

Line pressure should rise from approximately 4,9 kgf/cm² (70 lbf/in²) to approximately 10,5 kgf/cm² (150 lbf/in²) as down-shift occurs.

'1st' GEAR—OVERRUN BRAKING

Position the selector lever in '2' and with vehicle speed at approximately 48 to 64 km/h (30 to 40 m.p.h.), closed throttle, move the selector lever to '1'. A down-shift from '2' to '1' should occur when the vehicle speed falls to between 64 and 32 km/h (40 and 20 m.p.h.). The 2-1 down-shift at closed throttle will be accompanied by an increase in engine rev/min coupled with engine braking.

Line pressure should be approximately 10,5 kgf/cm² (150 lbf/in²) as down-shift occurs.

'R' REVERSE

Position the selector lever in 'R' and check for reverse operation.

GOVERNOR ASSEMBLY

Check

Service tools: Pressure test equipment 18G 677ZC, adaptor set 18G 677-2.

Disconnect the vacuum pipe from the modulator and fit pressure gauge to gearbox, using adaptor 18G 677-2.

CAUTION: Do not overtighten the adaptor.

Taking care to ensure that the hose is kept clear of the exhaust system, route the hose around the outside of the car and into the passenger's window.

Run the engine until transmission fluid reaches a temperature of 80°C or drive the car for at least 24 km (15 miles).

CAUTION: Engine temperature is no indication of transmission temperature.

Support the car on suitable 'wheel-free' equipment and raise the driving wheels clear of the ground.

Start the engine, select 'D', and with the brakes released, check the line pressure at 1000 rev/min; this should be approximately 11 kgf/cm² (150 lbf/in²).

Slowly increase engine speed to 3000 rev/min and check if a line pressure drop of 0,7 kgf/cm² (10 lbf/in²) occurs.

If no pressure drop occurs, inspect the governor for:

1. Sticking valve
2. Sticking weight
3. Restricted orifice in governor valve
4. Scored or cracked bore
5. Restricted feed pipe or filter

STALL SPEED

Test **44.30.13**

Service tools: Pressure test equipment 18G 677 ZC, pressure take-off adaptor 18G 677-2.

CAUTION: The test **MUST NOT** last longer than 10 seconds. Always allow the engine to idle for at least two minutes between tests to allow the transmission to cool down. Do not carry out more than six tests without allowing the engine to cool down for at least half an hour.

The results of this test indicate the condition of the transmission and torque converter.

Stall speed is the maximum engine revolutions recorded whilst driving the impeller against the stationary turbine. Stall speed will vary with both engine and transmission conditions, so before attempting a stall speed check, engine condition must be determined. Engine and transmission must be at normal operating temperature before commencing check.

Fit the oil pressure test equipment 18G 677 ZC and the pressure take-off adaptor to the transmission.

Chock the road wheels and firmly apply both foot- and handbrake.

Start the engine and engage 'D'. Apply full throttle and note maximum engine speed and line pressure achieved.

If transmission slip occurs, stop the engine immediately and investigate the cause.

Restart the engine and repeat the above procedure with the selector lever in 'R'.

Data

Stall speed 2100 to 2400 rev/min
 Stall pressure in 'D' 9,8 to 9,9 kgf/cm²
 (145 to 155 lbf/in²)
 Stall pressure in 'R' 15,4 to 16,8 kgf/cm²
 (240 to 260 lbf/in²)

Rev/min Condition Indicated

Under 1800 Stator slip
 1800 to 1900 Poor engine tune
 2100 to 2400 Normal
 Over 2400 Transmission slip

ROAD TEST

Service tools: Pressure test equipment 18G 677 ZC, pressure take-off adaptor 18G 677-2

Unless the fault is immediately obvious a road test should always be made to establish at first hand, preferably with the customer, what the fault symptoms are and under what conditions they occur. Experience has shown that reports of faults are not reliable and it may even be that the supposed fault is a standard feature. Check all gears, that all shifts occur, and check shift speeds and quality. The part throttle down-shift should not be mistaken as being a full throttle kick-down.

Exercise great care that further damage is not done to the transmission during test, particularly if the fault may involve slipping. Try not to let the transmission slip at all; clutches and bands can burn out in seconds.

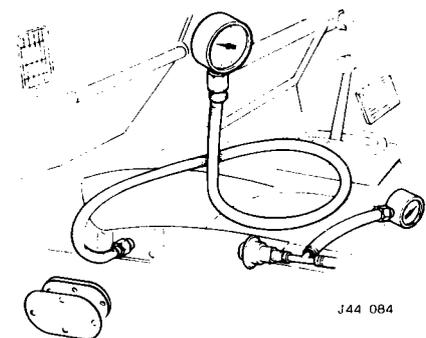
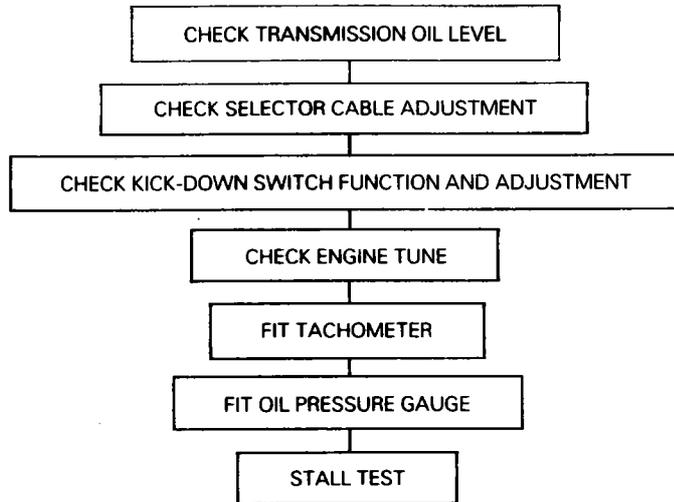


Fig. 3

FAULT-FINDING AND DIAGNOSIS

PRELIMINARY FAULT-FINDING PROCEDURE



CAUTION: Total running time for this combination must not exceed 2 minutes

Check oil pressures in the following manner			
Range	Oil Pressure		
	kgf/cm ²	lbf/in ²	
1 Neutral—brakes applied—engine at 1000 rev/min	3,8 to 4,9	55 to 70	
2 Drive—idle—set engine idle to specifications	4,2 to 5,9	60 to 85	
3 Drive—brakes applied—engine at 1000 rev/min	*4,2 to 6,3	*60 to 90	
4 2 or 1—brakes applied—engine at 1000 rev/min	9,5 to 11,2	135 to 160	
5 Reverse—brakes applied—engine at 1000 rev/min	6,7 to 10,5	95 to 150	
6 Drive—brakes applied—engine at 1000 rev/min—down-shift switch activated	6,3 to 7,7	90 to 100	
7 Governor check, see below	Drop of 0,7 kgf/cm ² or more	Drop of 10 lbf/in ² or more	
8 Drive—48 km/h (30 m.p.h.)—closed throttle on road, or on hoist	†3,8 to 4,9	†55 to 70	

* If high line pressures are experienced, check vacuum and, if necessary, the modulator.

† Vehicle on hoist, driving wheels off ground, selector in drive, brakes released; raise speed to 3000 rev/min, close throttle and read pressure between 2000 and 1200 rev/min.

PRELIMINARY DIAGNOSTIC CHART
TRANSMISSION MALFUNCTION RELATED TO OIL PRESSURE

MALFUNCTION	1	2	3	4	5	6	7	8	POSSIBLE CAUSE OF MALFUNCTION
	NEUTRAL —BRAKES APPLIED 1000 REV/MIN OIL PRESSURE	DRIVE— IDLE OIL PRESSURE	DRIVE— BRAKES APPLIED 1000 REV/MIN OIL PRESSURE	'1'— BRAKES APPLIED 1000 REV/MIN OIL PRESSURE	REVERSE —BRAKES APPLIED 1000 REV/MIN OIL PRESSURE	DRIVE—BRAKES APPLIED 1000 REV/MIN DOWN-SHIFT SWITCH ACTIVATED OIL PRESSURE	PRESSURE DROP OCCURS WHILE ENGINE REV/MIN INCREASES FROM 1000 to 3000 REV/MIN WHEELS FREE TO MOVE*	DRIVE— 48 KM/H (30 M.P.H.) CLOSED THROTTLE OIL PRESSURE	
NO 1-2 UP-SHIFT AND/OR DELAYED UP-SHIFT	Normal	Normal	Normal	Normal	Normal	Normal	0.7 kgf/cm ² (10 lbf/in ²) drop or more	Normal	Malfunction in control valve assembly
	Normal	Normal	Normal	Normal	Normal	Normal	Less than 0.7 kgf/cm ² (10 lbf/in ²) drop	Normal	Malfunction in governor or governor feed system
SLIPPING—REVERSE	Normal	High	High	Normal	Normal	Normal	Drop	High	Malfunction in detent system
	High	High	High	Normal	High	—	—	—	Malfunction in modulator or vacuum feed system to modulator
SLIPPING— 1st GEAR	Normal	Normal	Normal	Normal	Low	Normal	Drop	Normal	Oil leak in feed system to the direct clutch
DOWN-SHIFT WITH ZERO THROTTLE AND NO ENGINE BRAKING IN DRIVE	Normal	High	Normal	Normal	Normal	—	—	Low to Normal	Oil leak in feed system to the forward clutch
	Normal	Normal	Normal	Normal	Normal	—	—	High	Detent wires switched
NO DETENT DOWN-SHIFTS	Normal	Normal	Normal	Normal	Normal	Low	Normal	Normal	Malfunctions in detent system

* Drive range, vacuum line disconnected from modulator.
NOTE: A dash (—) in the above chart means that the oil pressure reading has no meaning under the test condition.

LOW LINE PRESSURE

1. **LOW TRANSMISSION OIL LEVEL**
2. **MODULATOR ASSEMBLY** — Carry out 'bellows comparison check'.
3. **FILTER**
 - a. Blocked or restricted.
 - b. 'O' ring on intake pipe and/or grommet missing or damaged.
 - c. Split or leaking intake pipe.
 - d. Wrong filter assembly.
4. **PUMP**
 - a. Pressure regulator or boost valve stuck.
 - b. Gear clearance, damaged, worn. (Pump will become damaged if drive gear is installed backwards, or if converter pilot does not enter crankshaft freely.)
 - c. Pump to case gasket wrongly positioned.
 - d. Pump body and/or cover machining error or scoring of pump gear pocket.
5. **INTERNAL CIRCUIT LEAKS**
 - a. Forward clutch leak. (Pressure normal in neutral and reverse — Pressure low in drive.)
 - 1 Check pump rings for damage.
 - 2 Check forward clutch seals for damage.
 - 3 Check turbine shaft journals for damage.
 - 4 Check stator shaft bushings for damage.
 - b. Direct clutch leak. (Pressure normal in neutral, low, intermediate and drive — Pressure low in reverse.)
 - 1 Check centre support oil seal rings for damage.
 - 2 Check direct clutch outer seal for damage.
 - 3 Check rear servo and front accumulator pistons and rings for damage.
6. **CASE ASSEMBLY**
 - a. Porosity in intake bore area.
 - b. Check case for intermediate clutch plug leak.
 - c. Low line pressure in reverse or '1'. If '1' — reverse check ball missing. This will cause no reverse and no over-run braking in '1'.

HIGH LINE PRESSURE

1. **VACUUM LEAK**
 - a. Full leak, vacuum line disconnected.
 - b. Partial leak in line from engine to modulator.
 - c. Improper engine vacuum.
 - d. Vacuum operated accessory leak (hoses, vacuum advance, etc.).
2. **DAMAGED MODULATOR**
 - a. Stuck valve.
 - b. Water in modulator.
 - c. Not operating properly.

3. DETENT SYSTEM

- a. Detent switch actuated (plunger stuck) or shorted.
- b. Detent wiring shorted.
- c. Detent solenoid stuck open.
- d. Detent feed orifice in spacer plate blocked.
- e. Detent solenoid loose.
- f. Detent valve bore plug damaged.
- g. Detent regulator valve pin short.

4. PUMP

- a. Pressure regulator and/or boost valve stuck.
- b. Pump casting porous.
- c. Pressure boost valve installed backwards.
- d. Pressure boost bushing broken.
- e. Wrong type of pressure regulator valve.

5. CONTROL VALVE ASSEMBLY

- a. Control valve to spacer gasket wrongly fitted.
- b. Gaskets installed in reverse order.

BURNED CLUTCH PLATES

1. FORWARD CLUTCH

- a. Check ball in clutch housing damaged, stuck or missing.
- b. Clutch piston cracked, seals damaged or missing.
- c. Low line pressure.
- d. Manual valve wrongly fitted.
- e. Restricted oil feed to forward clutch. (Examples: Clutch housing to inner and outer areas not drilled, restricted or porosity in pump.)
- f. Pump cover oil seal rings missing, broken or undersize; ring groove oversize.
- g. Case valve body face not flat or porosity between channels.
- h. Manual valve bent and centre land not properly ground.

2. INTERMEDIATE CLUTCH

- a. Constant bleed orifice in centre support blocked.
- b. Rear accumulator piston oil ring, damaged or missing.
- c. 1-2 accumulator valve stuck in control valve assembly.
- d. Intermediate clutch piston seals damaged or missing.
- e. Centre support bolt loose.
- f. Low line pressure.
- g. Intermediate clutch plug in case missing.
- h. Case valve body face not flat or porosity between channels.
- i. Manual valve bent and centre land not properly ground.

3. DIRECT CLUTCH

- a. Restricted orifice in vacuum line to modulator (poor vacuum response).
- b. Check ball in direct clutch piston damaged, stuck or missing.
- c. Leaking modulator bellows.
- d. Centre support bolt loose. (Bolt may be tight in support but not holding support tightly to case.)
- e. Centre support oil rings or grooves damaged or missing.
- f. Clutch piston seals damaged or missing.
- g. Front and rear servo pistons and seals damaged.
- h. Manual valve bent and centre land damaged.
- i. Case valve body face not flat or porosity between channels.

continued

- j. Intermediate sprag clutch or roller clutch installed backwards.
- k. 3-2 valve, 3-2 spring or 3-2 spacer pin installed in the wrong sequence in 3-2 valve bore.
- l. Incorrect combination of front servo and accumulator parts.
- m. Replace intermediate clutch piston seals.

NOTE: If direct clutch plates and front band are burned, check selector cable adjustment, see 44.30.04.

OIL LEAKS

NOTE: Make sure underside of transmission is clean in order to isolate oil leaks and diagnose them correctly.

1. TRANSMISSION OIL PAN LEAKS

- a. Attaching bolts not correctly torqued.
- b. Improperly installed or damaged oil pan gasket.

2. CASE EXTENSION LEAK

- a. Attaching bolts not correctly torqued.
- b. If the rear seal is suspected:
 - 1 Check seal for damage or wrong installation.
 - 2 Check slip yoke for damage.
 - 3 If oil is coming out the vent hole in end of the slip yoke, inspect output shaft 'O' ring for damage.
- c. Extension to case gasket or seal damaged.
- d. Porous casting.

3. CASE LEAK

- a. Filler pipe 'O' ring seal damaged or missing.
- b. Modulator assembly 'O' ring seal damaged.
- c. Electrical connector 'O' ring seal damaged.
- d. Governor cover, gasket and bolts damaged or loose; case face damaged or porous.
- e. Leak at speedometer driven gear housing or seal.
- f. Manual shaft seal damaged.
- g. Line pressure tap plug stripped.
- h. Vent pipe (refer to item 5).
- i. Porous case, or cracked at pressure plug boss.

4. FRONT END LEAK

- a. Front seal damaged (check converter neck for nicks, etc., also for pump bushing moved forward), garter spring missing.
- b. Pump attaching bolts loose. Sealing washers damaged.
- c. Converter leakage.
- d. Large 'O' ring pump seal damaged. Also check case bore.
- e. Porous casting (pump or case).
- f. Pump drainback hole blocked.

5. OIL LEAKS FROM VENT PIPE

- a. Transmission overfilled.
- b. Water in oil.
- c. Filter 'O' ring damaged or improperly assembled causing oil to foam.
- d. Foreign material between pump and case or between pump cover and body.
- e. Case porous, pump face improperly machined.
- f. Pump wrongly fitted.
- g. Pump to case gasket faulty.
- h. Pump breather hole blocked or missing.
- i. Hole in intake pipe.
- j. Check ball in forward clutch housing stuck open or missing.
- k. Drainback hole in case blocked or restricted.
- l. Inspect turbine shaft bushing journals and stator bushings for scoring or other faults.

6. OIL COOLER LINES

- a. Connections at cooler loose or stripped.
- b. Connections at case loose or stripped.

7. MODULATOR ASSEMBLY

- a. Vacuum diaphragm leaking.

IMPROPER VACUUM AT MODULATOR

1. ENGINE

- a Engine tune.
- b Loose vacuum fittings.
- c Vacuum operated accessory leak (hoses, vacuum advance, etc.)
- d Engine exhaust system restricted.
- e Faulty exhaust gas recirculation (E.G.R.) valve (if fitted).

2. VACUUM LINE TO MODULATOR

- a Leak
- b Loose fitting
- c Restricted orifice, or incorrect orifice size.
- d Carbon build up at modulator vacuum fitting.
- e Vacuum pipe trapped or collapsed.
- f Grease in pipe (none or delayed upshift—cold).

MODULATOR ASSEMBLY DIAGNOSTIC PROCEDURE

1. VACUUM DIAPHRAGM LEAK CHECK

Insert a pipe cleaner into the vacuum connector pipe as far as possible and check for the presence of transmission oil. If oil is found, replace the modulator. Transmission oil may be lost through diaphragm and burned in engine.

NOTE: Fuel or water condensation may settle in the vacuum side of the modulator. If this is found without the presence of oil the modulator should **not** be changed.

2. ATMOSPHERIC LEAK CHECK

Apply a liberal coating of soap solution to the vacuum connector pipe seam, the crimped upper to lower housing seam, and the threaded screw seal. Using a short piece of rubber tubing, apply air pressure to the vacuum pipe by blowing into the tube and observing for bubbles. If bubbles appear, replace the modulator.

NOTE: Do not use any method other than human lung power for applying air pressure, as pressures over 0,4 kgf/cm² (6 lbf/in²) may damage the modulator.

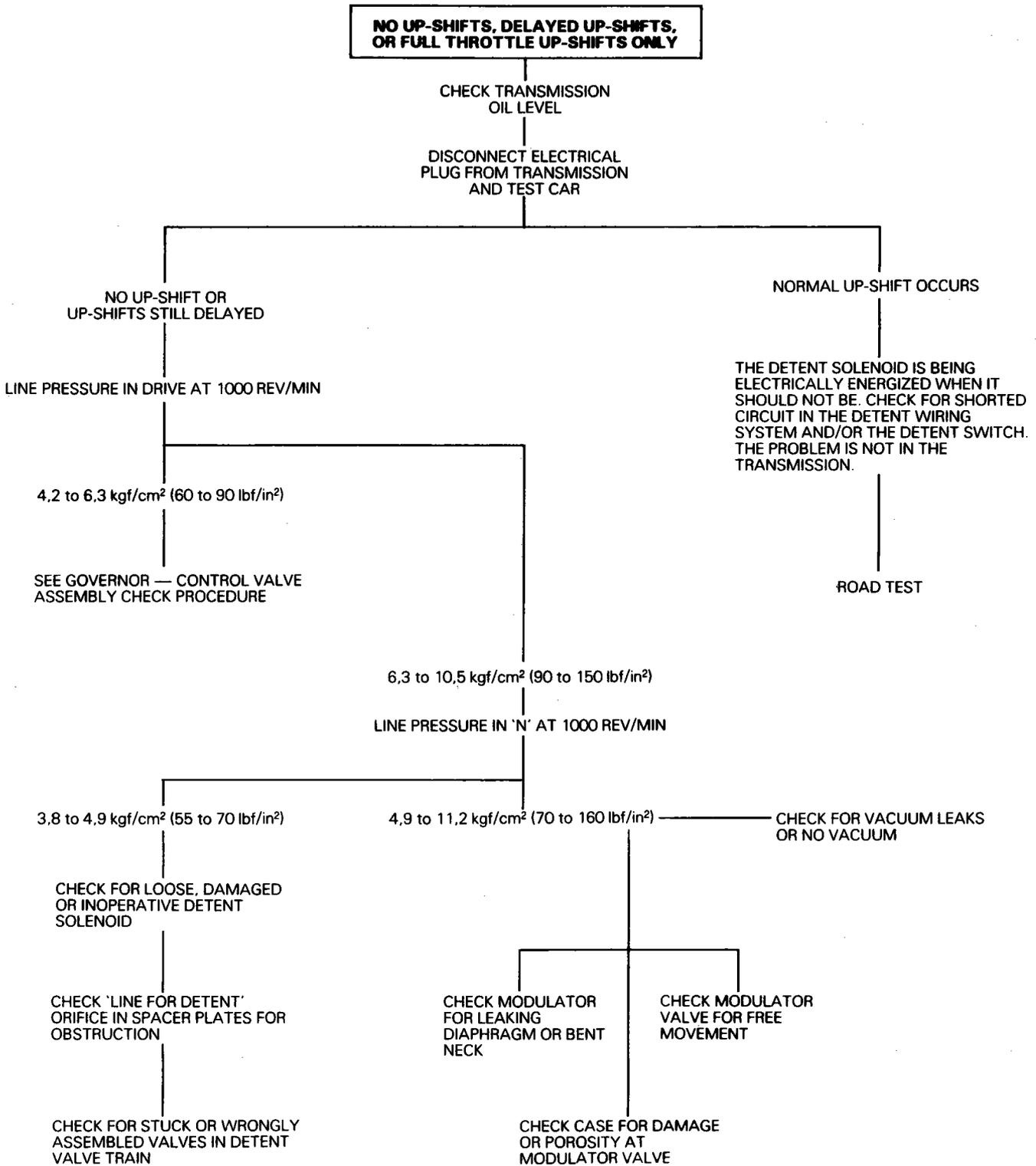
3. BELLOWS COMPARISON CHECK

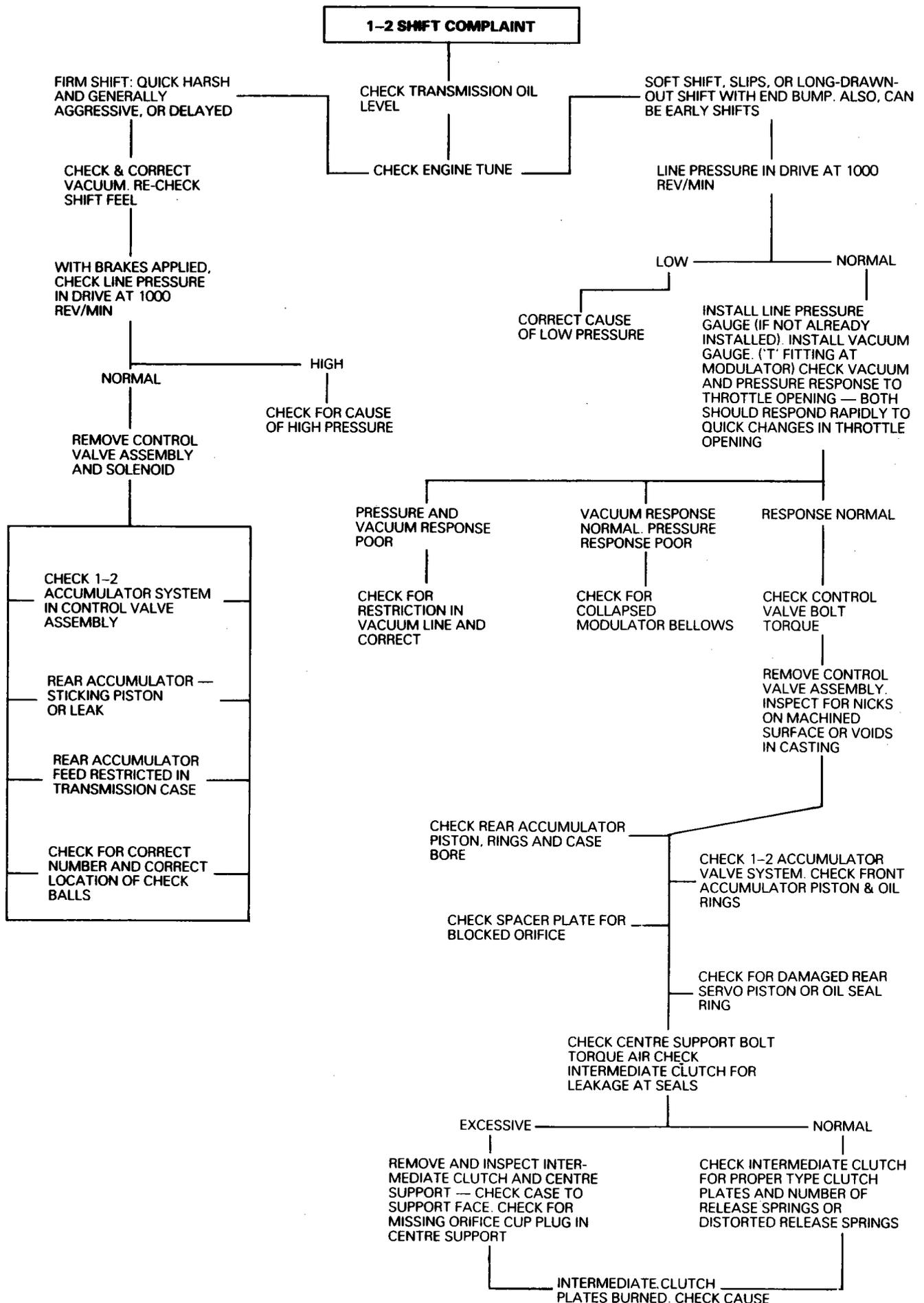
Where modulator bellows are suspect, the unit should be checked by substituting a new modulator assembly.

4. SLEEVE ALIGNMENT CHECK

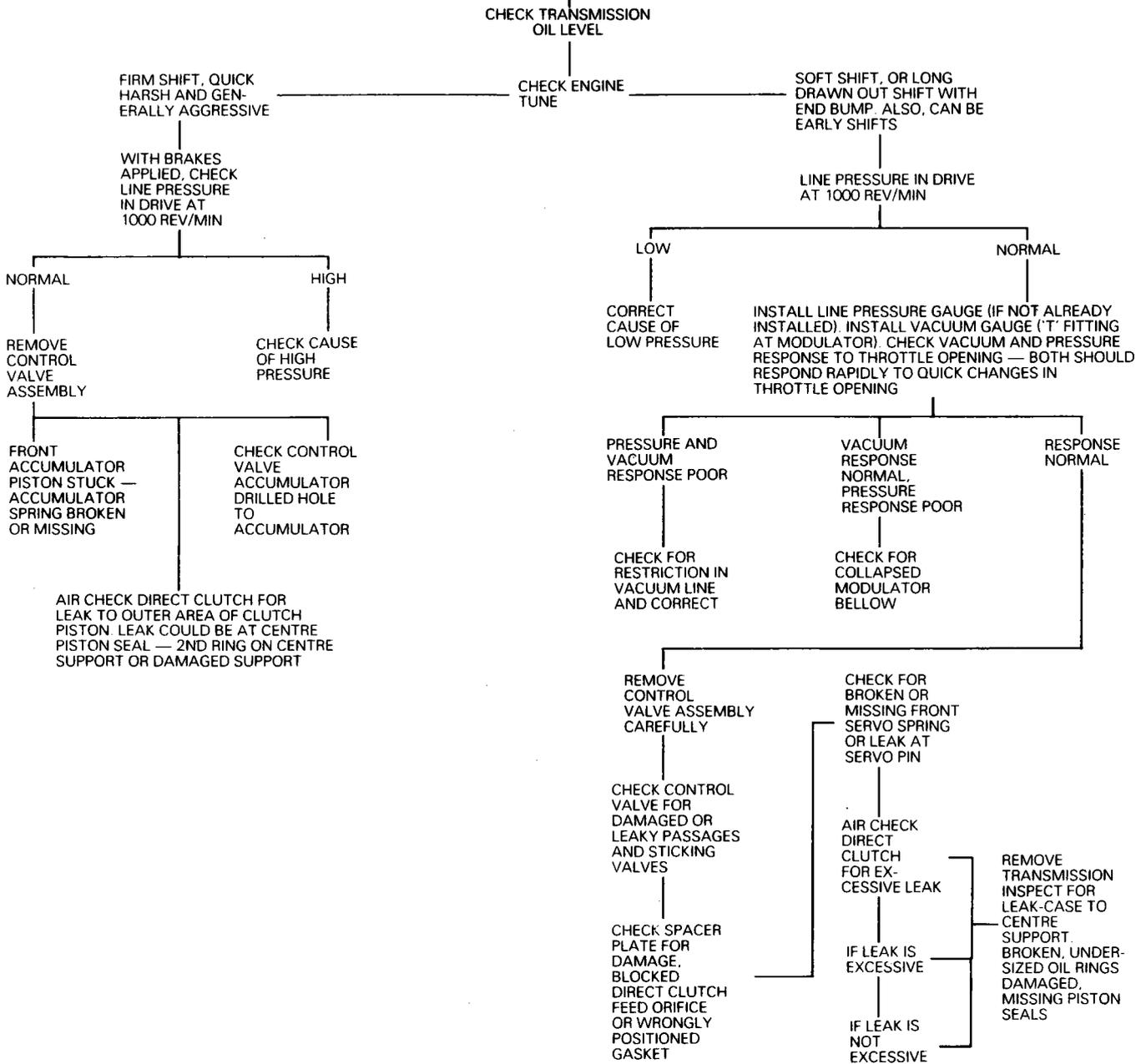
Roll the main body of the modulator on a flat surface and observe the sleeve for concentricity to the cam. If the sleeve is concentric and the plunger is free, the modulator is acceptable.

AUTOMATIC TRANSMISSION — GM 400

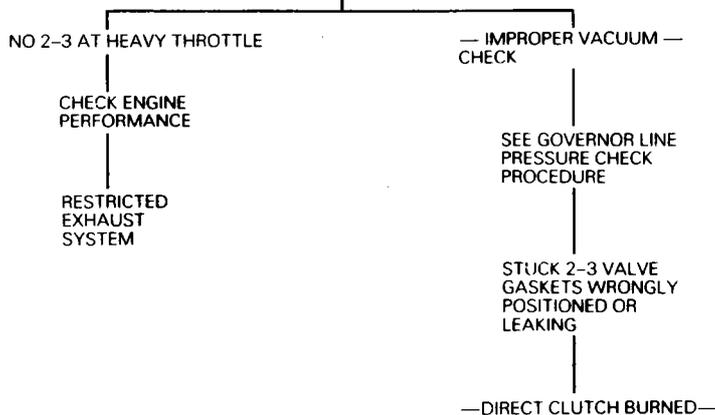


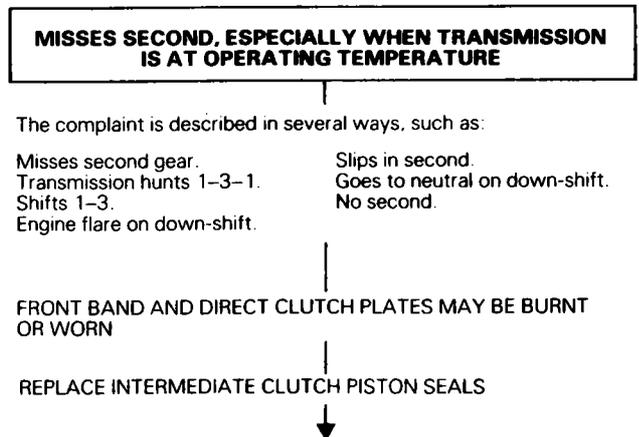
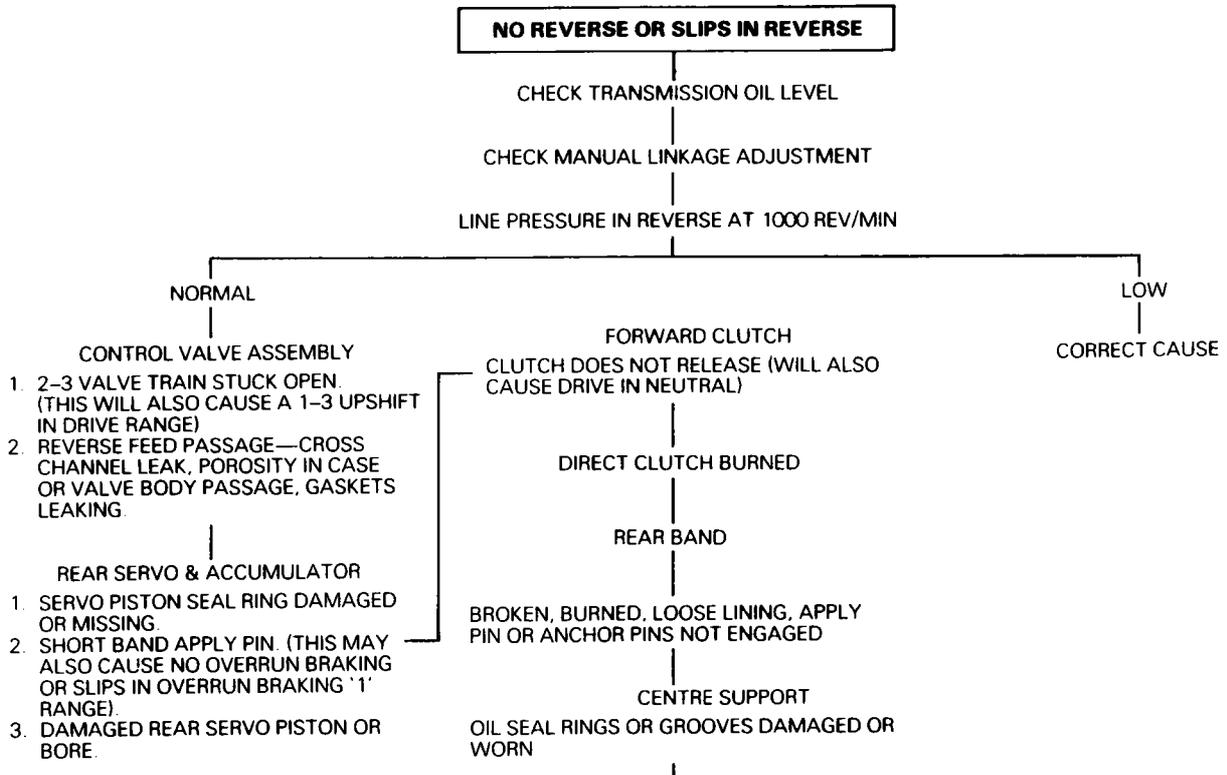
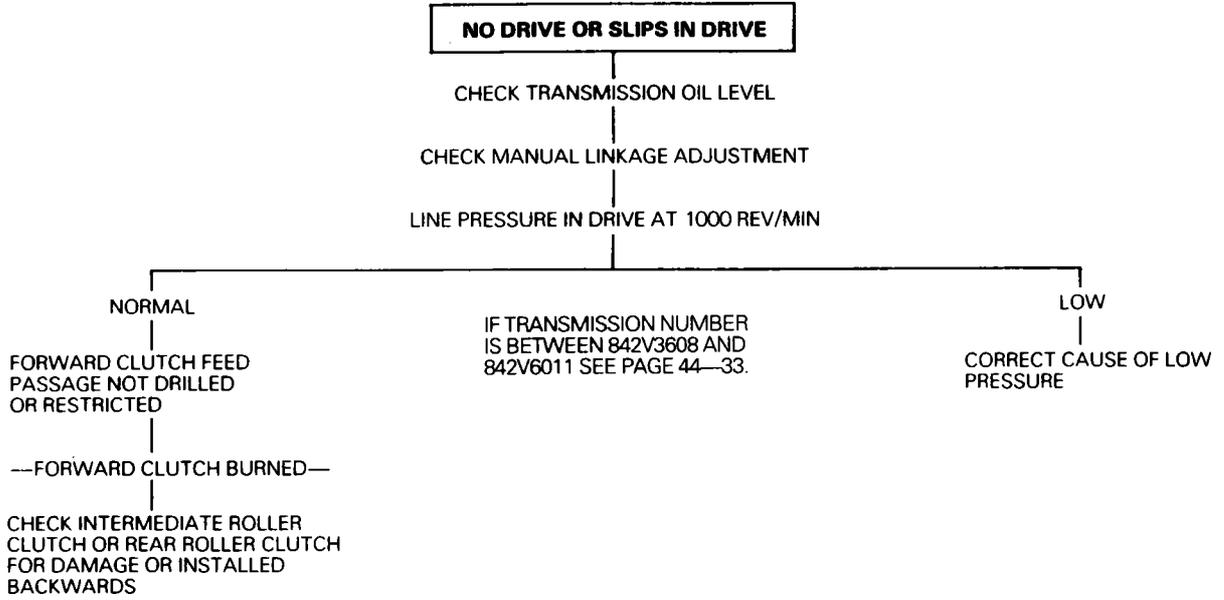


2-3 SHIFT COMPLAINT

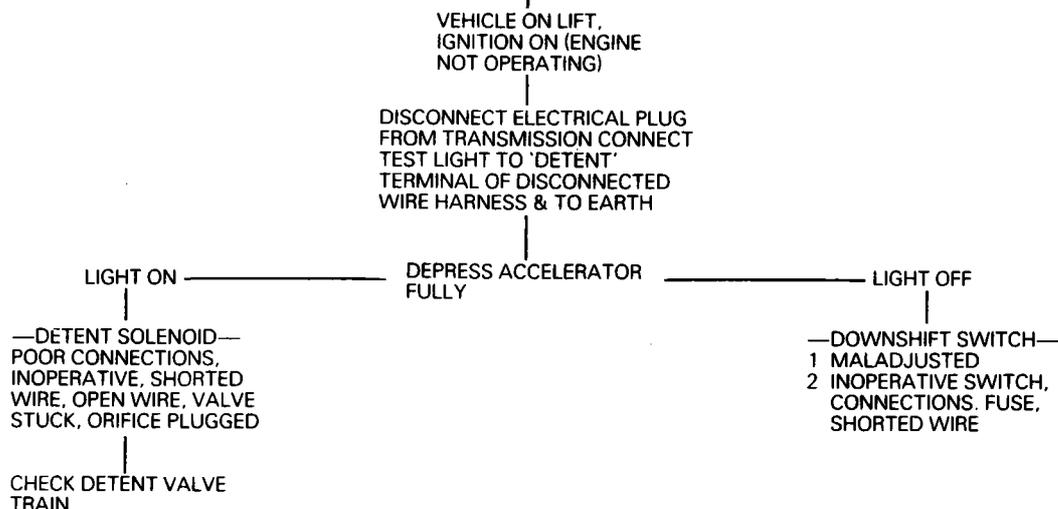


1ST AND 2ND SPEEDS ONLY, NO 2-3 OR DELAYED 2-3

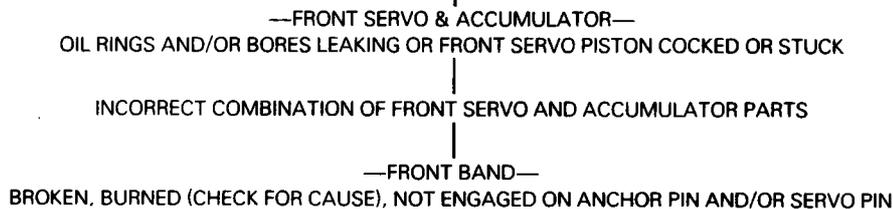




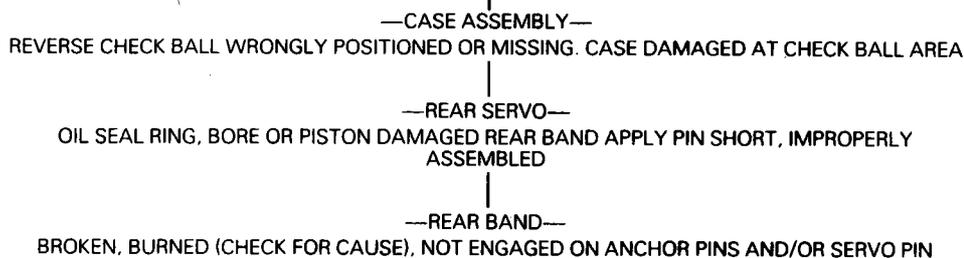
NO DETENT DOWN-SHIFTS



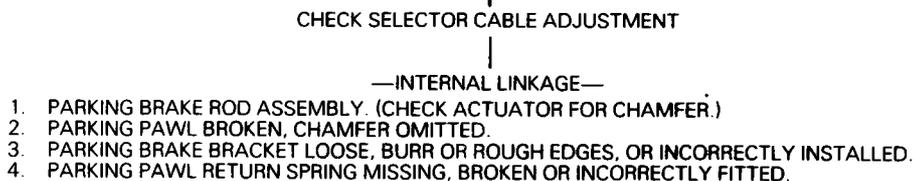
NO ENGINE BRAKING — INTERMEDIATE RANGE — SECOND GEAR



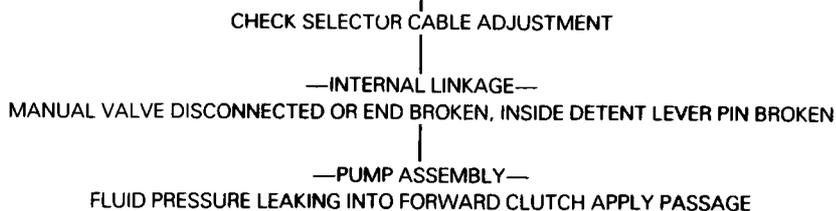
NO ENGINE BRAKING IN '1'



NO HOLD IN PARK OR NO RELEASE FROM PARK

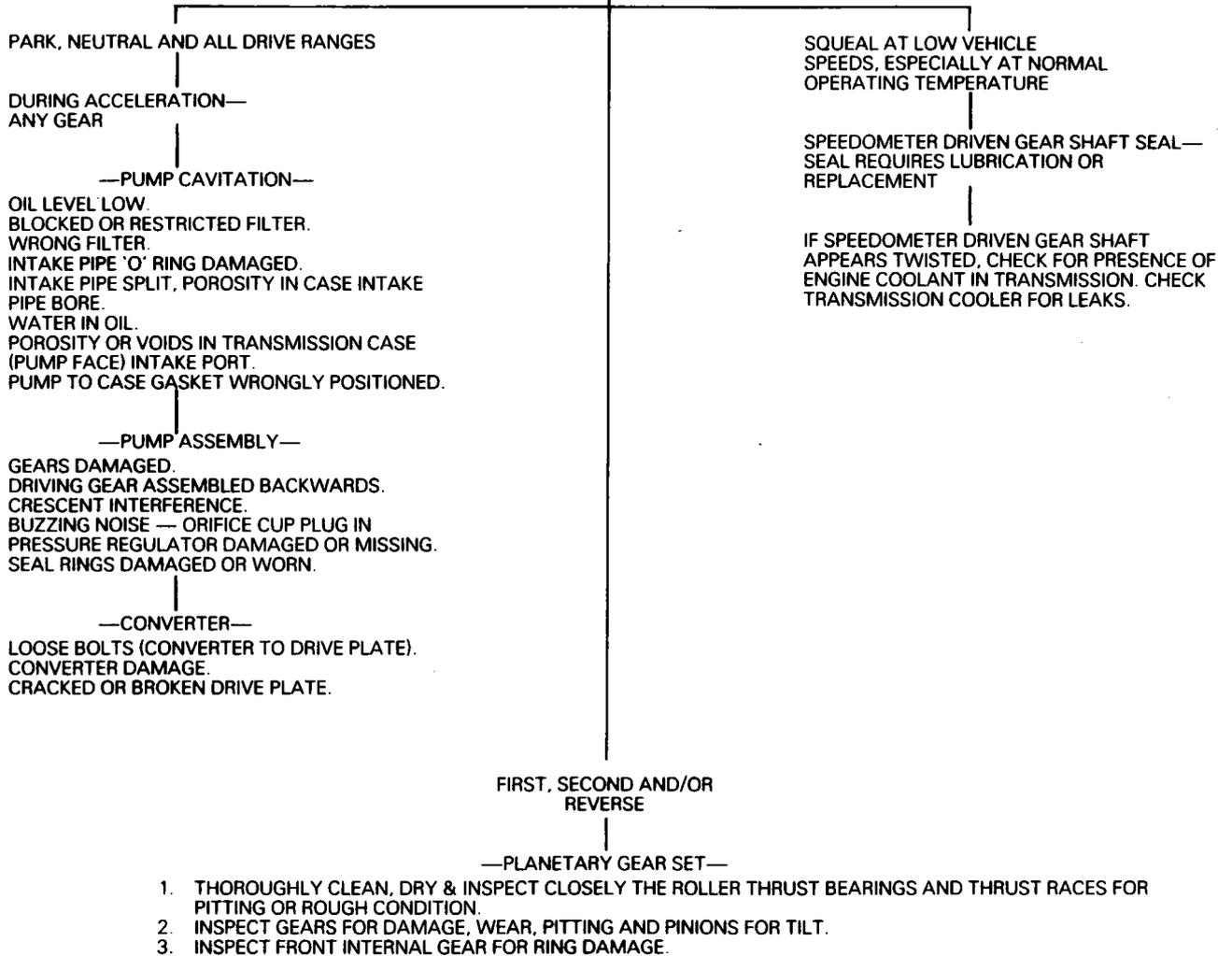


DRIVE IN NEUTRAL



TRANSMISSION NOISY

CAUTION: BEFORE CHECKING TRANSMISSION FOR WHAT IS BELIEVED TO BE 'TRANSMISSION NOISE', MAKE CERTAIN THE NOISE IS NOT FROM THE WATER PUMP, ALTERNATOR, AIR CONDITIONER, POWER STEERING, ETC. THESE COMPONENTS CAN BE ISOLATED BY REMOVING THE APPROPRIATE DRIVE BELT AND RUNNING THE ENGINE FOR NOT MORE THAN TWO MINUTES AT ONE TIME.



SELECTOR LEVER ASSEMBLY

Overhaul 44.15.05

Removing

NOTE: Prior to carrying out this operation it will be necessary to remove the selector quadrant as detailed in operation 76.25.08.

Remove the nuts (1, Fig. 4) securing the indicator bulb mounting and remove the bulb mounting bracket.

Remove the circlip and circlip washer (2, Fig. 4) from the lever pivot shaft.

Remove the selector lever assembly from the car.

Remove the nuts securing the tension spring (4, Fig. 4) and remove the spring.

Remove the split pin and washers (5, Fig. 4) securing the lever to the cam plate pivot.

Remove the selector lever (6, Fig. 4).

Holding the lever mounting plate in a vice, remove the screws securing the tapped block and illumination bulb bracket (7, Fig. 4) to the cam plate.

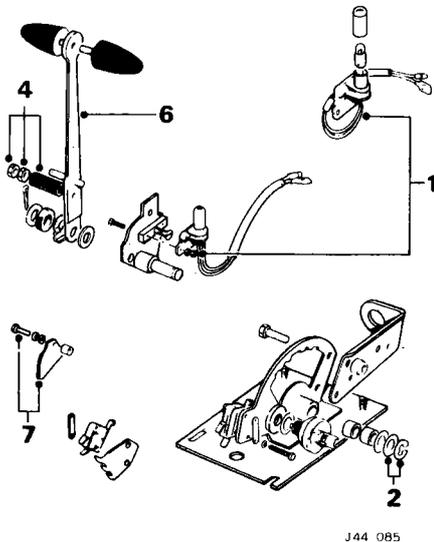


Fig. 4

Remove the tension spring screw from the tapped block and remove the block from the cam plate.

Clean all parts.

Refitting

Holding the mounting plate in a vice, refit the tapped block to the cam plate by loosely fitting the tensioning spring screw.

Align the holes of the block with those in the cam plate and fit the illumination bulb bracket without fully tightening the retaining screws.

Tighten the tensioning spring screw.

Tighten the bulb bracket screws.

Secure the tensioning spring screw with two centre dots on the mating surface of the tapped block.

Remove the mounting plate assembly from the vice.

Refit the lever to the mounting plate assembly and secure to the lever pivot with the pivot washer, washer, rubber washer, washer and split pin.

Refit the tensioning spring and spring securing nut. Reset the spring to the correct tension and refit the locknut.

Lubricate the selector lever pivot shaft.

Refit the assembly to the car.

Refit the circlip washer, shim and circlip to the lever pivot.

Refit selector quadrant, see 76.25.08.

STARTER INHIBITOR SWITCH

Check and adjust 44.15.18

Adjusting

Disconnect the battery and unscrew the gear selector knob.

Remove the screws securing the control escutcheon; withdraw the escutcheon slightly to obtain access to the cigar lighter.

Note the fitted position of the cigar lighter and door lock and window switch terminals; detach the terminals and withdraw the escutcheon.

Remove selector indicator assembly.

Detach the feed cable from the inhibitor switch.

Connect a test lamp and battery in series with the switch.

NOTE: Switch is in earthed position. Place the selector lever in 'N' position.

Slacken the locknuts (1, Fig. 5) securing the switch and adjust position of switch until the lamp lights.

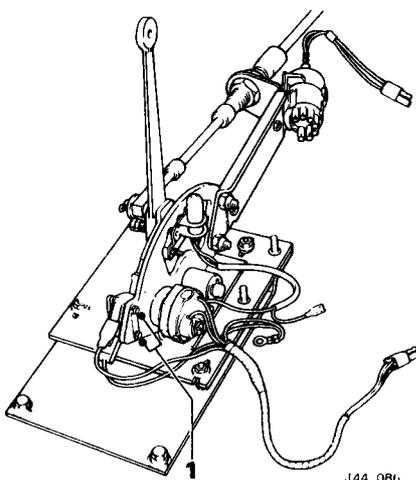


Fig. 5

Tighten the locknuts, check that lamp remains on with lever in 'P' position and is off with lever in drive position.

Remove the battery and test lamp, reconnect feed cable to switch.

Refit the selector indicator.

Refit the terminals to the cigar lighter, and window switches, refit the escutcheon.

Refit the gear selector knob, connect the battery and test the cigar lighter, door and window switches for correct operation.

REAR EXTENSION HOUSING

Remove and refit 44.20.15

Service tool: MS 53 A, engine support bracket

Removing

- 1 Drive the vehicle onto a ramp.
- 2 Remove the transmission dipstick.
- 3 Unscrew and remove the bolt securing the dipstick upper tube to the lifting eye bracket.
- 4 Remove the dipstick upper tube.
- 5 Slacken the wing stay to bulkhead securing bolt.
- 6 Remove the wing stay to wing securing bolts.
- 7 Remove the pipe to wing stay clamps.
- 8 Swing the wing stays away from the wings.
- 9 Unscrew and remove the handles from the engine lifting hooks—Tool No. MS 53 A.
- 10 Fit the hooks to the rear lifting eyes.
- 11 Fit the engine support tool.
- 12 Fit and tighten the handles to take the weight of the engine.
- 13 Raise the ramp.
- 14 Unscrew and remove the nuts/bolts securing the intermediate exhaust pipes, rotating the flanges for access.
- 15 Disconnect the exhaust pipes and remove the sealing olives.
- 16 Remove the intermediate heat shields.
- 17 Remove the rear heat shields.
- 18 Pull aside the exhaust pipes and secure.
- 19 Remove the crash bracket bolts.
- 20 Unscrew and remove the rear mounting centre nut.
- 21 Remove the spacer and crash bracket.
- 22 Using a suitable block of wood interposed between the jack head and the gearbox rear mounting, support the mounting plate.
- 23 Remove the bolts securing the rear mounting.
- 24 Remove the rear spacers.
- 25 Lower the jack.
- 26 Remove the mounting assembly.
- 27 Remove the wooden block and jack.
- 28 Unscrew the bolts securing the cross-member.
- 29 Remove the cross-member.
- 30 Disconnect the propeller shaft from the transmission and move the shaft clear.
- 31 Remove the drive flange retaining bolt, and remove the flange.
- 32 Remove the extension housing bolts, remove the housing and discard the gasket.

Refitting

33. Fit a new gasket to the extension housing.
34. Refit the extension housing to the transmission case, secure with the bolts.
35. Refit the drive flange and tighten retaining bolt; ensure that the propeller shaft bolts are fitted to the flange.
36. Connect the propeller shaft to the transmission drive flange.
37. Position and align the cross-member, fit and tighten the upper securing bolts.
38. Fit and tighten the lower securing bolts.
39. Place the ramp jack under the rear mountings, and locate the wooden block and mounting assembly in position, raise the jack and align the attachment holes.
40. Fit the rear spacers, fit and tighten the securing bolts.
41. Remove the jack and wooden block.
42. Fit the rear mounting spacer.
43. Fit crash bracket.
44. Fit and tighten rear mounting centre nut.
45. Fit and tighten crash bracket bolts.
46. Refit the front heat shields.
47. Untie the exhaust pipes and fit the rear heat shield.
48. Refit the intermediate heat shields.
49. Smear the exhaust sealing olives with 'Fir-egum', fit the olives, connect and secure the exhaust system.
50. Lower the ramp.
51. Unscrew and remove the support tool hook handles.
52. Remove the support tool, remove the hooks, fit and tighten the handles to the hooks.
53. Refit the dipstick upper tube and secure to the lifting eye bracket.
54. Reposition the wing stays and secure to the wings.
55. Tighten the wing stay/bulkhead attachment and refit the pipe clamps.
56. Fill the transmission unit with fluid and refit the dipstick.

OIL / FLUID PAN

Remove and refit **44.24.04**

Service tool: Engine support tool MS 53A

Removing

Raise vehicle on ramp or position over a pit. Remove the vacuum capsule clamp bolt and clamp, disconnect the capsule and drain the transmission fluid into a suitable container. Reconnect the capsule, refit the clamp and tighten the securing bolt. Disconnect the right-hand intermediate exhaust pipe from the down pipe, remove the olive and tie system aside.

Remove the crash bracket assembly, 3 nuts and bolts.

Remove the bolts and spring washers securing the oil pan to the transmission case. Carefully lower the oil pan and allow any oil remaining in the transmission to drain.

Remove and discard the gasket; ensure that all traces of the old gasket are removed from both oil pan and transmission case.

Refitting

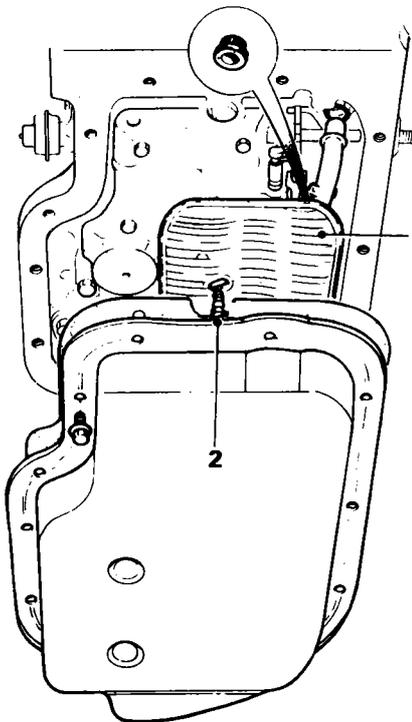
Position a new gasket on the oil pan, refit the oil pan.

Tighten the oil pan securing bolts by diagonal selection to the specified torque figure.

Refit the crash bracket.

Reconnect the exhaust system.

Refill the transmission and check for fluid leaks in the vicinity of the vacuum capsule.



J44 087

Fig. 6

OIL FILTER

Remove and refit **44.24.07**

Removing

Prior to carrying out this operation it will be necessary to remove the oil pan as detailed in operation 44.24.04. Remove the oil filter securing bolt and lower the filter.

Refitting

Fit new filter and tighten the securing bolt. Refit the oil pan and refill the transmission.

SELECTOR CABLE

Adjust **44.30.04**

Disconnect the battery.

Unscrew the gear selector knob.

Remove the screws securing the control escutcheon; withdraw the escutcheon slightly to gain access to the cigar lighter terminals.

Note the fitted position of cigar lighter and door lock switch terminals; detach the terminals.

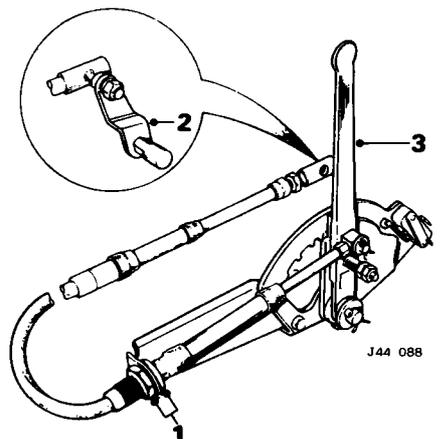
Disconnect the electric window switch harnesses; withdraw the panel and escutcheon.

Slacken the locknuts (1, Fig. 7) on the outer cable abutment bracket.

Disconnect the cable from the selector lever (2, Fig. 7) below the car.

Position both selector levers in neutral (position 'N') and adjust length of cable by means of the locknuts until cable can be connected to selector lever (2, Fig. 7) without either lever moving.

Tighten the locknuts.



J44 088

Fig. 7

NOTE: A certain amount of free play at the selector lever (3, Fig. 7) should be evident.

Re-connect the electrical harnesses, refit the control escutcheon and switch panel.

Re-connect the battery and test operation of window switches, also the cigar lighter.

Start the engine and check that there is no drive in 'P' or 'N' and that gear engagement is felt in 'D', '2' and '1'.

KICK-DOWN SWITCH

Check and adjust 44.30.12

Switch on the ignition and check that there is current at the input terminal of the switch (1, Fig. 8) (cable colour—green). Connect an earthed test lamp (2, Fig. 8) to the output terminal (cable colour—green/white). Fully depress the throttle pedal. If the test lamp fails to light, release the throttle pedal and gently depress the switch arm (3, Fig. 8).

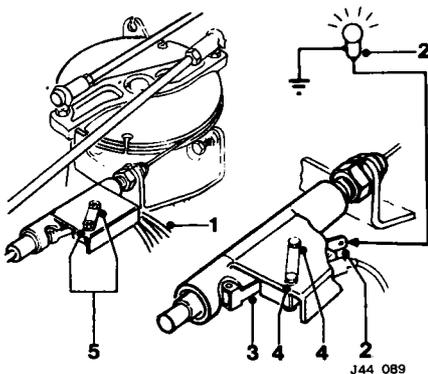


Fig. 8

If the test lamp still does not light, renew the switch (4, Fig. 8).

If, however, the lamp lights when the switch arm is depressed, slacken the securing bolts (5, Fig. 8) and move the switch towards the cable until at full throttle opening the lamp lights.

Tighten the securing bolts and re-check.

BAND APPLY PIN

Selection check 44.30.21

Service tools: 18G 1310, band application pin selection gauge; torque wrench

Remove the fluid pan as detailed in operation 44.24.04; allow the fluid to drain.

Remove the control valve assembly and governor pipes.

Remove the six rear servo cover fixing bolts, remove the cover and gasket.

Remove the rear servo assembly from the transmission case.

Remove the servo accumulator spring.

Fit service tool 18G 1310, band apply selection gauge and gauge pin, secure with two bolts.

Tighten the two bolts, ensure that the gauge pin is free to move up and down in both the tool and the servo pin bore.

Fit a 3/16 in A.F. socket to the torque wrench.

Apply a torque of 3.46 kgf m (25 lbf ft) to the hexagon nut on the gauge. Identify the land and letter on the gauge pin and select the appropriate size pin.

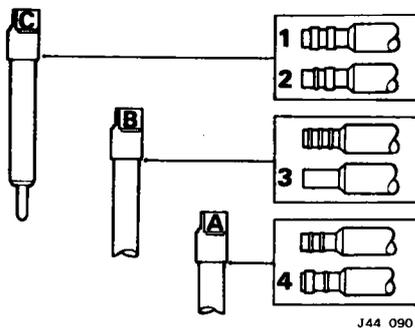


Fig. 9

NOTE: Pins 1, 2, 3 and 4 are fitted on production but are not available as spare part items. Remove the service tool 18G 1310.

Fit the servo pin as selected in the above check. Refit the servo accumulator spring and servo assembly.

Refit the servo cover and gasket, secure with the six bolts.

Refit the governor pipes and control valve assembly.

Refit the fluid pan and fill the transmission with fluid.

FRONT UNIT END-FLOAT

Check and adjust 44.30.22

Service tools: CBW 87, 18G 1296

Checking

Remove the gearbox as detailed in operation 44.20.01.

Remove the torque converter.

Remove the front pump attaching bolt and seal.

Attach clock gauge CBW 33; the end-float can now be checked.

Alternatively, CBW 87 can be used, the movement of the turbine shaft being measured with feeler gauges.

Hold the output shaft forward, whilst pushing the turbine shaft rearward to its stop.

Set the dial gauge to zero.

Pull the turbine shaft forward and note the reading obtained.

Correct end-float is 0,076 to 0,610 mm (0.003 to 0.025 in).

The selective washer which controls the end-float is a phenolic resin washer located between the pump cover and the forward clutch housing.

If the end-float is not within the above limits (preferably work to a mean tolerance reading between the above), select a new washer, referring to the chart.

Thickness

- 1,52 to 1,63 mm (0.060 to 0.064 in)
- 1,803 to 1,905 mm (0.071 to 0.075 in)
- 2,08 to 2,18 mm (0.082 to 0.086 in)
- 2,36 to 2,46 mm (0.093 to 0.097 in)
- 2,64 to 2,74 mm (0.104 to 0.108 in)
- 2,92 to 3,02 mm (0.015 to 0.119 in)
- 3,20 to 3,30 mm (0.126 to 0.130 in)

Colour

- Yellow
- Blue
- Red
- Brown
- Green
- Black
- Purple

NOTE: An oil-soaked washer may lead to discolouration. If necessary, measure the washer to ascertain the thickness.

To remove the pump, remove all the locating screws, removing them diagonally opposite each other.

Insert 18G 1296 into the two tapped holes in the pump body.

Apply a gradual equal force on each bolt until the pins force the pump out.

Fit the correct selective washer.

Refit the pump, securing the bolt and seal.

Tighten the locating screws by diagonal selection to avoid distortion.

REAR UNIT END-FLOAT

Check and adjust 44.30.23

Service tool: CBW 87.

Checking

Remove the rear extension, see operation 44.20.19.

Use CBW 87 with the slide bar inserted into the side of the governor holes (governor bolt removed).

Slide the connector on CBW 87 as near the block as possible and extend the dial gauge rod out as far as possible.

Ensure that the indicator stem registers with the end of the output shaft.

Set the gauge to zero.

Move the output shaft to and fro, noting the indicator reading to enable the correct end-float adjusting washer to be used when the transmission is assembled.

The end-float should be between 0,076 and 0,483 mm (0.003 and 0.019 in).

The adjusting washer which controls this end-float is the steel washer with three tabs located between the thrust washer and the rear face of the transmission case. The notches on the tabs serve to identify washer thickness.

Select the correct washer from the table.

Thickness	Identification Notch
1,981 to 2,083 mm (0.008 to 0.082 in)	None
2,184 to 2,286 mm (0.086 to 0.090 in)	On side of 1 tab
2,358 to 2,489 mm (0.094 to 0.098 in)	On side of 2 tabs
2,591 to 2,692 mm (0.102 to 0.106 in)	On end of 1 tab
2,794 to 2,896 mm (0.110 to 0.114 in)	On end of 2 tabs
2,997 to 3,099 mm (0.118 to 0.122 in)	On end of 3 tabs

SPEEDOMETER DRIVE PINION

Remove and refit 44.38.04

Removing

Raise the vehicle on a ramp.
Slacken the union connecting the speedometer cable angle drive to the pinion.
Disconnect the speedometer cable and place to one side.
Remove the pinion clamp bolt and clamp plate.
Remove the pinion assembly.
Remove the pinion from the housing.
Remove and discard the housing seals.
Clean the pinion and the housing.

Refitting

Refit new seals to the housing.
Lubricate the pinion.
Lubricate the 'O' ring seal.
Refit the pinion to the housing.
Refit the pinion assembly to the gearbox.
Refit the clamp plate and tighten the clamp bolt.
Re-connect the speedometer cable.
Re-tighten the union connecting the speedometer cable angle drive to the pinion.
Lower the vehicle on the ramp.

VALVE BODY ASSEMBLY

Remove and refit 44.40.01

Removing

Prior to carrying out this operation it will be necessary to remove the oil pan and filter. Reference should therefore be made to operations 44.24.04 and 44.24.07.
Disconnect the pressure switch.
Remove the bolts securing the valve body.
Remove the detent spring.
Remove the valve body assembly.
Remove and discard the gasket.

CAUTION: Front servo components may be displaced after valve block is removed so care must be taken to ensure that they are fitted correctly.

Remove the conical filter.
Remove the oil feed pipes.
Remove the front servo piston assembly.
Slacken and remove the pressure switch.
Place the valve body to one side.
Clean all the relevant parts and faces.

Refitting

Refit and tighten the pressure switch.
Lubricate the front servo piston.
Refit the servo piston assembly.
Refit the oil feed pipes.
Refit the conical oil filter.
Fit a new valve block gasket and refit the valve body assembly.
Align the oil feed pipes.
Align the front servo.
Refit the detent spring.
Refit and tighten valve body securing bolts.
Re-connect the pressure switch.
Refit the oil filter.
Refit the oil pan.

TRANSMISSION ASSEMBLY

Remove and refit 44.20.01

Service tools: MS 53A engine support bracket, Epco V1000 Unit lift

Removing

1. Drive the vehicle onto a ramp.
2. Remove the transmission dipstick.
3. Unscrew and remove the bolt securing the dipstick upper tube to the lifting eye bracket.
4. Remove the dipstick upper tube.
5. Slacken the wing stay to bulkhead securing bolt.
6. Remove the wing stay to wing securing bolts.
7. Remove the pipe to wing stay clamps.
8. Swing the wing stays away from the wings.
9. Unscrew and remove the handles from the engine lifting hooks—Tool No. MS 53A.
10. Fit the hooks to the rear lifting eyes.
11. Fit the engine support tool.
12. Fit and tighten the handles to take the weight of the engine.
13. Raise the ramp.
14. Unscrew and remove the nuts/bolts securing the intermediate exhaust pipes, rotating the flanges for access.
15. Disconnect the exhaust pipes and remove the sealing olives.
16. Remove the intermediate heat shields.
17. Remove the rear heat shield.
18. Pull aside the exhaust pipes and secure.
19. Remove the front heat shields.
20. Unscrew and remove the rear mounting centre nut and crash bracket bolts.
21. Remove the spacer and bracket.
22. Using a suitable block of wood interposed between the jack head and the gearbox rear mounting, support the mounting plate.
23. Remove the bolts securing the rear mounting.
24. Remove the rear spacers.
25. Lower the jack.

26. Remove the mounting assembly.
27. Remove the wooden block and jack.
28. Unscrew the bolts securing the cross-member.
29. Remove the cross-member.
30. Disconnect the propeller shaft from the transmission and move the shaft clear.
31. Working from above the engine compartment, slacken the hooks—10 turns only.
32. From beneath the vehicle, disconnect the speedometer cable from the transmission.
33. Unscrew the nut securing the selector pin to the lever and disconnect the cable.
34. Unscrew the bolt securing the selector cable to the support bracket and move the cable away from the transmission.
35. Disconnect the kick-down solenoid feed-wire and remove the clamp bolt securing the feed wire to the transmission.
36. Disconnect the modulator capsule vacuum tube.
37. Remove the bolt and clamp plate securing the modulator.
38. Place a suitable receptacle under the modulator, withdraw the modulator and partially drain the transmission fluid.
39. Remove and discard the modulator 'O' ring.
40. Unscrew the cooler pipe union nuts from the unions.
41. Unscrew the bolt securing the cooler pipes bracket to the engine sump, remove the spacer.
42. Disconnect and plug the cooler pipes.
43. Unscrew the bolts/nuts securing the converter access cover (and catalysts — where fitted) and remove the cover.
44. Unscrew the bolts securing the converter to the drive plate, turning the drive plate for access.
45. Remove the bolts securing the right-hand rack gaiter heat shield and remove the heat shield (U.S.A. vehicles only).
46. Unscrew the nuts securing the right-hand catalyst (where fitted) and displace the catalyst from the manifold.
47. Remove the engine/transmission securing bolts with the exception of two lower left-hand bolts and lower starter motor securing bolt.
48. Remove the dipstick tube and reposition the tube/vacuum pipe mounting bracket along the vacuum pipe.
49. Utilizing an Epco V1000 unit lift:
 - a. Remove the front and rear clamps.
 - b. Traverse the lift under the transmissions unit.
 - c. Take the weight of the transmission on the lift.
 - d. Adjust the tilt angle and side clamps.
 - e. Tighten the clamps.
 - f. Fit the chain assembly to the right-hand arm, fit the securing peg and pass the chain over the transmission into the front arm.
 - g. Tighten the chain adjuster.
50. Remove the remaining bolts securing the engine/transmission and starter motor.
51. Disconnect the transmission unit from the engine, lower the unit (easing the catalyst aside — where fitted) and traverse the transmission/unit lift from beneath the vehicle.

continued

WARNING: Ensure that torque converter does not fall off when removing the transmission.

Extra operations for replacing the transmission assembly

52. Unscrew and remove the rear mounting spigot securing bolts, and remove the mounting.
53. Remove the selector cable mounting collar.
54. Unscrew and remove the cooler pipe unions.
55. Slacken the chain adjuster and release the chain from the front arm.
56. Slacken the clamp wing nuts and release the clamps.
57. Place the transmission unit aside to drain.
58. Fit the replacement transmission unit to the lift.
59. Reposition the clamps and tighten the wing nuts.
60. Refit the chain to the front arm and tighten the chain adjuster.
61. Remove all the blanking plugs from the new transmission unit.
62. Remove the converter strap from the replacement unit and fit to the displaced unit.
63. Fit and tighten the cooler pipe unions to the replacement unit.
64. Fit the selector cable collar.
65. Fit the rear mounting; fit and tighten the securing bolts.
66. Clean the relevant mounting and attachment faces.

Refitting

67. Traverse the transmission/unit lift beneath the vehicle, raise the unit into position (easing aside the catalyst — where fitted) and place the speedometer cable, selector cable, kick-down solenoid feed wire and vacuum pipe into suitable positions.
68. Align the transmission mating flange over the locating dowels.
69. Fit and tighten three lower left-hand transmission/engine securing bolts.
70. Locate the starter motor in position and fit and tighten the securing bolts.
71. Release the unit lift clamps, slacken the chain tensioner and remove the pin from the left-hand arm, release the chain from the front arm and remove the chain assembly.
72. Lower the unit lift and remove from the working area; refit the clamps to the lift.
73. Fit and tighten the remaining engine/transmission securing bolts.
74. Position the dipstick pipe clamp on the torque converter housing and fit the lower dipstick tube.
75. Connect the dipstick tube to the transmission.
76. Pull the vacuum pipe through the bracket.
77. Fit two accessible torque converter/drive plate bolts. Do not tighten.
78. Turn the drive plate, fit two further torque converter/drive plate bolts. Do not tighten.
79. Turn the drive plate, fit and tighten final two torque converter/drive plate and bolts.

80. Turn the drive plate and tighten first four bolts.
81. Fit the torque converter cover-plate (and the strap to the right-hand catalyst — where fitted).
82. Slacken the left-hand nut securing the strap to the cover and swing the strap aside.
83. Remove the blanking plugs from the cooler pipes and connect the pipes to the transmission.
84. Position the cooler pipe mounting bracket, fit the spacer and bolt and secure the bracket to the engine sump.
85. Fit a new 'O' ring to the modulator capsule and fit the modulator to the transmission unit with the clamp plate and bolt.
86. Connect the vacuum pipe to the modulator.
87. Connect the kick-down solenoid feed wire and secure to the transmission with the clamp and bolt.
88. Fit and secure the selector cable bracket to the mounting and connect the cable to the lever. Fit and tighten the selector pin securing nut.
89. Working from above the engine compartment, tighten the hook handles to raise the engine.
90. Working from beneath the vehicle, connect the propeller shaft to the transmission flange.
91. Position and align the cross-member, fit and tighten the upper securing bolts.
92. Fit and tighten the lower securing bolts.
93. Place the ramp jack under the rear mounting, and locate the wooden block and mounting assembly in position, raise the jack and align the attachment holes.
94. Fit the rear spacers, fit and tighten the securing bolts.
95. Remove the jack and wooden block.
96. Fit the rear mounting spacer and crash bracket and secure.
97. Position the right-hand catalyst (where fitted) into the manifold and secure with the nuts.
98. Secure the converter cover strap to the catalyst (where fitted).
99. Refit the rack gaiter heat shield (where fitted).
100. Refit the front heat shields.
101. Untie the exhaust pipes and fit the rear heat shield.
102. Refit the intermediate heat shields.
103. Smear the exhaust sealing olives with 'Firegum', fit the olives, connect and secure the exhaust system.
104. Lower the ramp.
105. Unscrew and remove the support tool hook handles.
106. Remove the support tool, remove the hooks, fit and tighten the handles to the hooks.
107. Refit the dipstick upper tube and secure to the lifting eye bracket.
108. Reposition the wing stays and secure to the wings.
109. Tighten the wing stay/bulkhead attachment and refit the pipe clamps.
110. Fill the transmission unit with fluid and refit the dipstick.

TRANSMISSION ASSEMBLY

Overhaul

44.20.06

NOTE: Before commencing this operation, it is strongly recommended that the following checks are carried out and all readings noted:

Front Unit End-Float Check, see 44.30.22.

Rear Unit End-Float Check, see 44.30.23.

Rear Servo Band Apply Pin Selection Check, see 44.30.21.

CAUTION: Only Gamlen 265 or Rochem Electrical Quick Dry Solvent should be used for cleaning transmission components.

Service tools: 18G 1295 compressor piston accumulator control valve; 18G 1296 front pump remover screws; 18G 1297 front pump and tailshaft oil seal replacer; 18G 1298 forward and direct clutch piston replacer, inner and outer protection sleeve; 18G 1309 intermediate clutch inner seal protection sleeve; 18G 1310 band application pin selection gauge; 18G 677 ZC pressure test equipment; 18G 1016 clutch spring compressor; 18G 1004 circlip pliers; 18G 1004 J circlip plier points.

Dismantling

1. Remove the transmission assembly from the vehicle, see 44.20.01.
2. Thoroughly clean the transmission casing.
3. Remove the torque converter.
4. Invert transmission on to a suitable bench cradle.

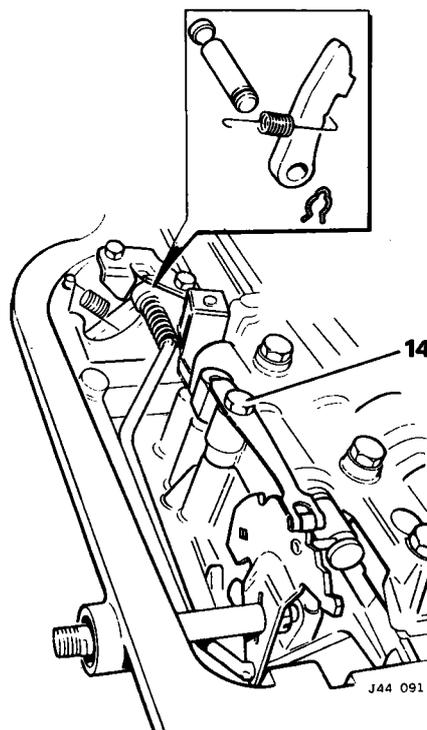


Fig. 10

5. Using a suitable flange retaining tool, undo and remove the drive flange securing bolt and remove the drive flange.
6. Remove the bolt securing the speedometer drive pinion clamp plate.
7. Remove the clamp plate and withdraw the speedometer pinion assembly.
8. Remove the four governor cover-plate securing bolts and remove the cover-plate and gasket.
9. Discard the gasket.
10. Remove the governor assembly.
11. Remove the sump bolts, sump pan and discard the gasket.
12. Remove the bolt securing the oil filter and remove the filter.
13. Remove the oil filter feed pipe.
14. Remove the bolt (Fig. 10) securing the detent spring and roller assembly to the valve block.
15. Remove the retaining bolts and withdraw the valve block with the governor pipes attached.
16. Remove the governor screen assembly from the end of the governor feed pipe, or feed pipe hole in the casing.
17. Remove the governor feed pipes from the valve block. The pipes are interchangeable.
18. Disconnect the detent solenoid wire from the case connector.
19. Depress the tabs on the case connector and remove the connector and 'O' ring. Discard the 'O' ring.
20. Remove the detent solenoid securing bolts and remove the solenoid.
21. Remove the valve block spacer plate from the casing.
22. Remove the six check balls from the transmission casing.
23. Lift the front servo piston assembly from the transmission case (Fig. 11).

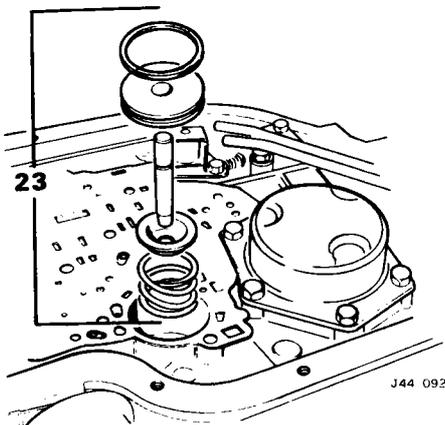


Fig. 11

24. Remove the rear servo cover retaining bolts (Fig. 12).
25. Remove the cover and gasket (Fig. 12). Discard the gasket.
26. Remove the rear servo assembly from the transmission case.
27. Remove the rear servo accumulator spring (Fig. 12).

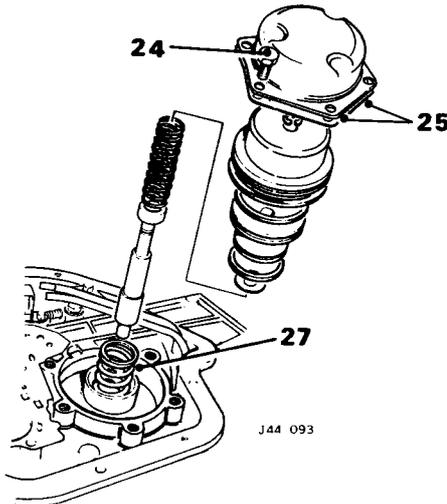


Fig. 12

28. Remove the modulator valve from the case.
29. Undo and remove the six rear extension securing bolts.
30. Remove the rear extension and gasket. Discard the gasket.
31. Turn box over.
32. Undo and remove the front pump securing bolts.
33. Insert service tools 18G 1296 into the two threaded holes in the pump body.
34. Using service tools 18G 1296, extract the pump.
35. Remove the pump assembly and discard the gasket.
36. Remove the service tools 18G 1296 from the pump body.
37. Remove the input shaft and forward clutch assembly.
38. Remove the intermediate one-way clutch assembly.
39. Remove the front band assembly.
40. Remove the intermediate clutch snap-ring.
41. Remove the intermediate clutch backing plate and clutch assembly.
42. Remove the chamfered snap-ring.
43. Undo and remove the centre support retaining peg and remove the centre support/roller clutch assembly.
44. Remove the sun gear shaft.
45. Remove the snap-ring from the bottom groove of the centre support.

46. Remove the rear brake band.
47. Remove the planet carrier assembly.
48. Remove the front internal gear ring.
49. Remove the rear thrust washer.
50. Remove the manual shaft retaining pin.
51. Release the manual shaft from the manual detent lever, remove the lever and shaft.
52. Remove the actuator rod assembly.

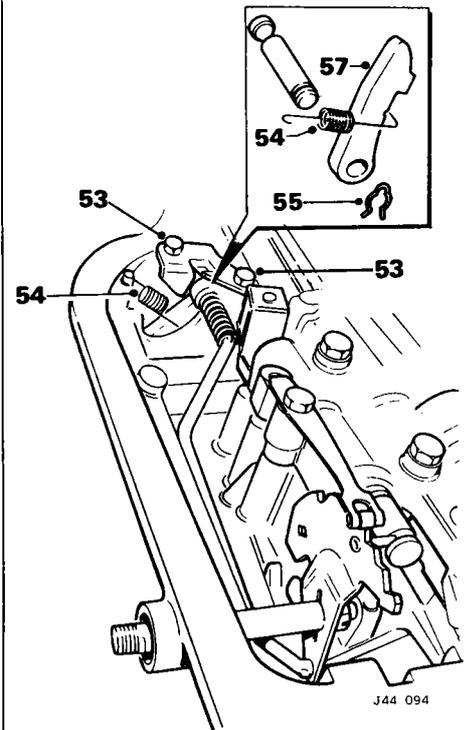


Fig. 13

53. Remove the parking pawl bracket securing bolts (Fig. 13) and remove the bracket.
54. Remove the parking pawl spring (Fig. 13).
55. Remove the spring clip (Fig. 13) securing the parking pawl to the pivot shaft.
56. Press the pivot shaft to displace the plug and remove the plug.
57. Remove the parking pawl (Fig. 13).
58. Remove the pivot shaft.
59. Remove the pressure take-off plug.
60. Remove the filter pick-up seal.
61. Remove the selector shaft seal.
62. Clean and inspect the casing.

continued

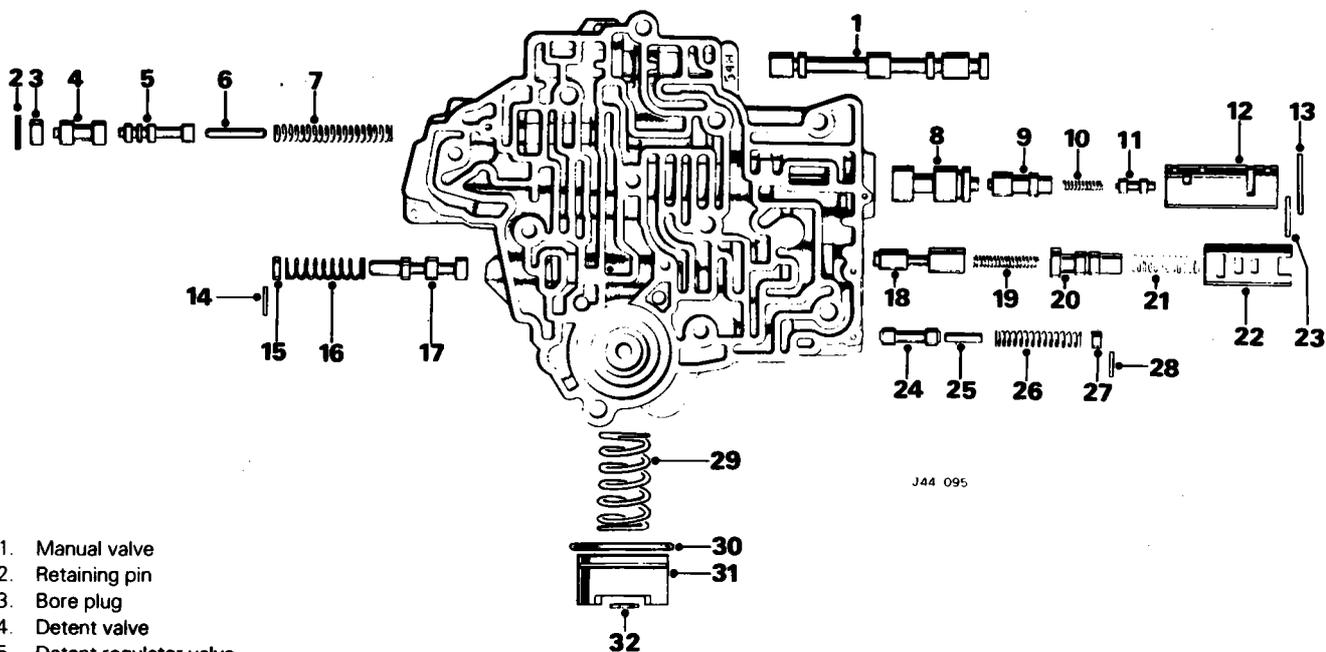


Fig. 14

1. Manual valve
2. Retaining pin
3. Bore plug
4. Detent valve
5. Detent regulator valve
6. Spacer pin
7. Detent regulator spring
8. 1-2 shift valve
9. 1-2 detent valve
10. 1-2 regulator spring
11. 1-2 regulator valve
12. 1-2 modulator bushing
13. Retaining pin
14. Grooved retaining pin
15. Bore plug
16. 1-2 accumulator secondary spring
17. 1-2 accumulator secondary valve
18. 2-3 shift valve
19. 3-2 intermediate spring
20. 2-3 modulator valve
21. 2-3 valve spring
22. 2-3 modulator bushing
23. Retaining pin
24. 3-2 valve
25. Spacer pin
26. 3-2 valve spring
27. Bore plug
28. Retaining pin
29. Accumulator spring
30. Accumulator piston oil ring
31. Accumulator piston
32. 'E'-ring retainer

VALVE BLOCK

CAUTION: During the dismantling procedure carefully identify all valves, bushes and springs, noting their relative positions.

Dismantling—see Figure 14

63. Position the valve block with the gasket face uppermost and the accumulator at the bottom. This position will be used to identify the components.

64. Remove the manual valve (1).
65. Using service tool 18G 1295, compress the accumulator piston (30) and spring (29), remove the 'E' ring retainer (32).
66. Remove the service tool, accumulator piston and spring.
67. Using a pin punch remove the 1-2 modulator bushing retaining pin (13), upper right-hand bore.
68. Remove the 1-2 modulator bushing (12), 1-2 regulator valve (11) and spring (10), 1-2 detent valve (9) and the 1-2 shift valve (8).

NOTE: The 1-2 regulator valve and spring may be inside the 1-2 modulator bushing.

69. Using a pin punch remove the 2-3 modulator bushing retaining pin (23), centre right-hand bore.
70. Remove the 2-3 modulator bushing (22), 2-3 shift valve spring (23), 2-3 modulator valve (20), 3-2 intermediate spring (19) and the 2-3 shift valve (18).
71. Using a pin punch remove the 3-2 valve retaining pin (28), lower right-hand bore.
72. Remove the bore plug (27), 3-2 valve spring (26), spacer (25) and the 3-2 valve (24).
73. Using a pin punch remove the detent valve retaining pin (2), upper left-hand bore.

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74. Remove the bore plug (3), detent valve (4), detent regulator valve (5), spacer (6) and detent regulator valve spring (7).

75. Using a pair of long-nosed pliers remove the 1-2 accumulator valve retaining pin (14), lower left-hand bore.

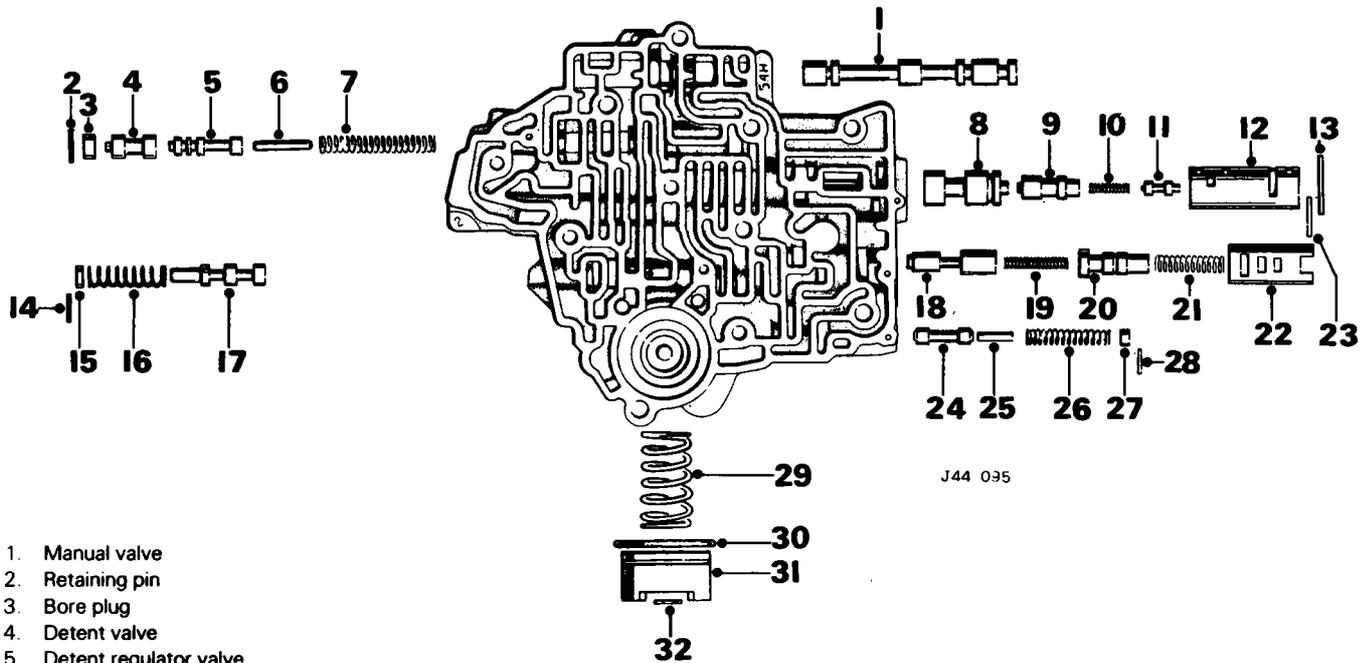
76. Remove the bore plug (15), 1-2 accumulator spring (16) and the accumulator valve (17).

Inspection

77. Wash all components in a clean solvent. Do not allow valves to bump together, as this might cause nicks and burrs.
78. Carefully check all valves and bushings for burrs and damage. Burrs should be removed with a fine stone, taking care not to round off the shoulders of the valves.
79. Check all valves and bushings for free movement in their respective bores.
80. Check the valves housing for cracks and the bores for damage and scoring.

NOTE: If any valves or bores are found to be damaged beyond repair, then a new control valve assembly must be fitted.

81. Check all the springs for distortion.
82. Check the front accumulator piston and oil ring for damage; renew as necessary.



1. Manual valve
2. Retaining pin
3. Bore plug
4. Detent valve
5. Detent regulator valve
6. Spacer pin
7. Detent regulator spring
8. 1-2 shift valve
9. 1-2 detent valve
10. 1-2 regulator spring
11. 1-2 regulator valve
12. 1-2 modulator bushing
13. Retaining pin
14. Grooved retaining pin
15. Bore plug
16. 1-2 accumulator secondary spring
17. 1-2 accumulator secondary valve
18. 2-3 shift valve
19. 3-2 intermediate spring
20. 2-3 modulator valve
21. 2-3 valve spring
22. 2-3 modulator bushing
23. Retaining pin
24. 3-2 valve
25. Spacer pin
26. 3-2 valve spring
27. Bore plug
28. Retaining pin
29. Accumulator spring
30. Accumulator piston oil ring
31. Accumulator piston
32. 'E'-ring retainer

Fig. 15

Reassembling

83. Fit the accumulator spring (29) and piston (31) into the valve body.
84. Using service tool 18G 1295, squarely compress the spring and piston.
- NOTE:** Ensure that the piston pin is correctly aligned with the hole in the piston and the oil seal ring does not foul the lip of the bore when fitting the piston.
85. Fit the 'E' ring retainer (32) and remove the service tool.
86. Fit the 1-2 accumulator valve (17) stem end out in the lower left-hand bore.
87. Fit the 1-2 accumulator secondary spring (16) over the stem.
88. Fit the 1-2 accumulator bore plug (15) to the 1-2 accumulator bore.
89. Turn over control valve assembly and fit the grooved retaining pin (14) from the cast surface side of the body, with grooved end of pin entering the hole last.
90. Tap retaining pin in control valve housing until pin is flush with cast surface. Return control valve assembly to its original position.
91. Fit spacer (6) to detent regulator valve spring (7) and fit spring and spacer into upper left-hand bore; ensure that spring seats correctly.
92. Compress the detent regulator valve spring (7), fit the detent regulator valve (5), stem end last, and detent valve (4), band first.
93. Fit the bore plug (3), hole outermost, and secure with the retaining pin (1), from the cored side of the body.
94. Fit the 3-2 valve (24), bottom right-hand bore.
95. Fit spacer (25) to the 3-2 valve spring (26) and fit the spring and spacer, bottom right-hand bore.

96. Compress the 2-3 valve spring (21), and fit the bore plug, hole end outermost; secure with retaining pin (23), from the cored side of the body.
97. Fit the 3-2 intermediate spring (19) in the open end of the 2-3 shift valve (18), fit valve and spring to the centre right-hand bore. Ensure that the valve seats correctly.
98. Fit the 2-3 modulator valve (20), hole end first, to the 2-3 modulator bushing (22), and fit both parts to the centre right-hand bore.
99. Fit the 2-3 shift valve spring (21) into the 2-3 modulator valve (20), compress the spring and fit the retaining pin (23), from the cored side of the control valve.
100. Fit the 1-2 shift valve (8), stem end outermost ensuring that the valve seats correctly, to the upper right-hand bore.
101. Fit the 1-2 regulator valve (11), large stem first, spring (10), and the 1-2 detent valve (9), hole end first, into the 1-2 bushing (12) and fit all the components to the upper right-hand bore.
102. Compress the bushing against the spring and fit the retaining pin (13) from the cored side of the control valve body.
103. Fit the manual valve (1), with the detent pin groove to the right.

REAR SERVO ASSEMBLY

Dismantling

- 104. Remove the rear accumulator piston from the rear servo piston.
- 105. Remove the 'E' (Fig. 16) ring retaining the rear servo piston to the rear band apply pin.
- 106. Remove the rear servo piston and seal (Fig. 16) from the band apply pin.
- 107. Remove the washer, spring and retainer (Fig. 16).

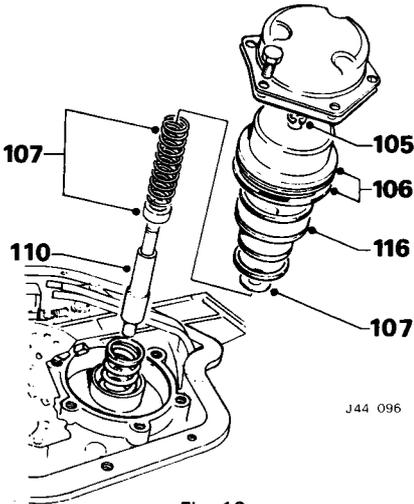


Fig. 16

Inspection

- 108. Check the freeness of the oil seal rings in the piston grooves. Renew as necessary.
- 109. Check the fit of the band apply pin in the servo piston.
- 110. Check the band apply pin (Fig. 16) for cracks and scoring.
- 111. Check that band apply pin is the correct size as determined by the pin selection check.

Reassembling

- 112. Fit the spring retainer, cup side towards the band apply servo pin, spring and washer to the servo pin.
- 113. Fit the servo piston to the pin and secure with the 'E' ring retainer.
- 114. Renew piston oil seals as necessary.
- 115. Renew accumulator piston oil seals as necessary.
- 116. Fit the accumulator piston (Fig. 16) into the bore of the servo piston.

FRONT SERVO ASSEMBLY

Inspection

- 117. Check the servo pin for damage.
- 118. Check the piston and oil seal ring (Fig. 17) for damaged oil ring groove, check that the oil ring is free to move.
- 119. Check the piston for cracks and porosity.
- 120. Check the fit of the servo pin (Fig. 17) to the piston.

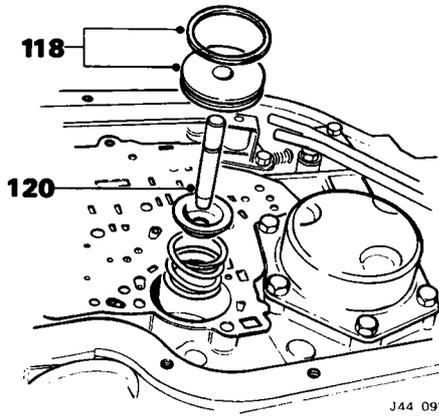


Fig. 17

Reassembling

- 121. Refit the parts of the front servo; ensure that the tapered end of the servo pin points through the spring and retainer; ensure that the retainer ring is in the servo pin groove.

OIL PUMP

Dismantling

- 122. Remove the outer seal.
- 123. Compress the regulator boost valve bushing against the regulator spring and remove the snap-ring (Fig. 18).

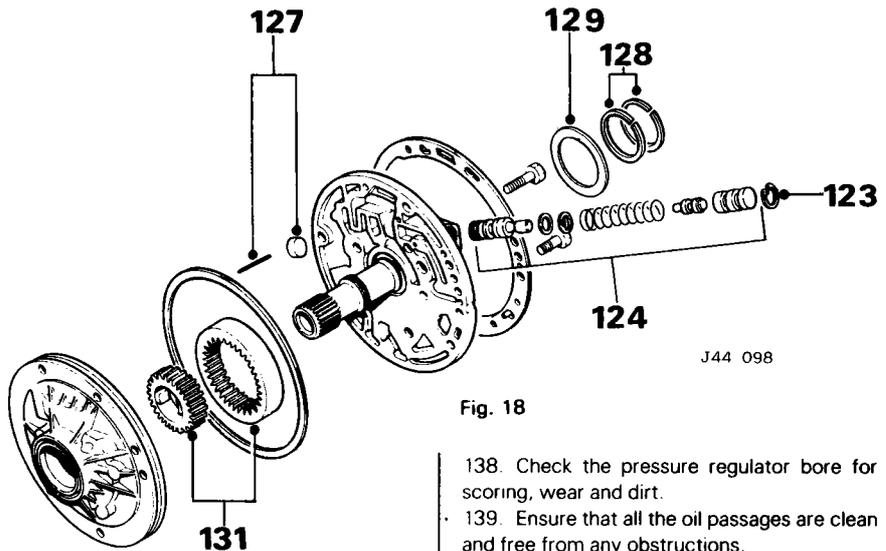


Fig. 18

- 124. Remove the regulator boost valve bushing, boost valve, pressure regulator spring, spring retainer regulator valve and spacer(s) (Fig 18).
- 125. Remove the pump body securing bolts and remove the pump cover from the body.
- 126. Note **fitted positions** of the oil pump drive and driven gears; it is not necessary to mark tooth to tooth relationship.
- 127. Remove the retaining pin and bore plug (Fig. 18) from the end of the regulator bore.
- 128. Remove the two oil rings (Fig. 18) from the pump cover.

- 129. Remove the pump to forward clutch housing thrust washer (Fig. 18).
- 130. Remove the front oil seal from the pump body.

Inspection — pump body

- 131. Check the gears for scoring, chafing and other damage (Fig. 18).
- 132. Position the pump gears in the pump body, lay a straight-edge over the gears and casing and check the clearance between the gears and the underside of the straight-edge. Clearance should be 0.0008 to 0.0035 in.

CAUTION: Ensure that gears are replaced the correct way round, i.e. lugs on driving gear must face away from torque converter and driven gear should be replaced in the same position as originally fitted.

- 133. Check the face of the pump body for scores and damage.
- 134. Ensure that all the oil passages are clean and free from any obstructions.
- 135. Check the threads in the pump body for damage.
- 136. Check that the pump body is flat and free from warps.

Inspection — pump cover

- 137. Check that the pump cover face is of uniform flatness and free from warps.

- 138. Check the pressure regulator bore for scoring, wear and dirt.
- 139. Ensure that all the oil passages are clean and free from any obstructions.
- 140. Check the pump gear face for scoring and damage.
- 141. Check the stator shaft for damaged splines or scored bushings.
- 142. Check the oil ring grooves for damage and wear.
- 143. Check the thrust washer face for wear and damage.
- 144. Fit the pump cover oil rings into the counterbore of the forward clutch housing and check for correct fit.
- 145. Ensure that the pressure regulator and boost valve operate freely.
- 146. Ensure that the air breather hole is free of any obstruction.

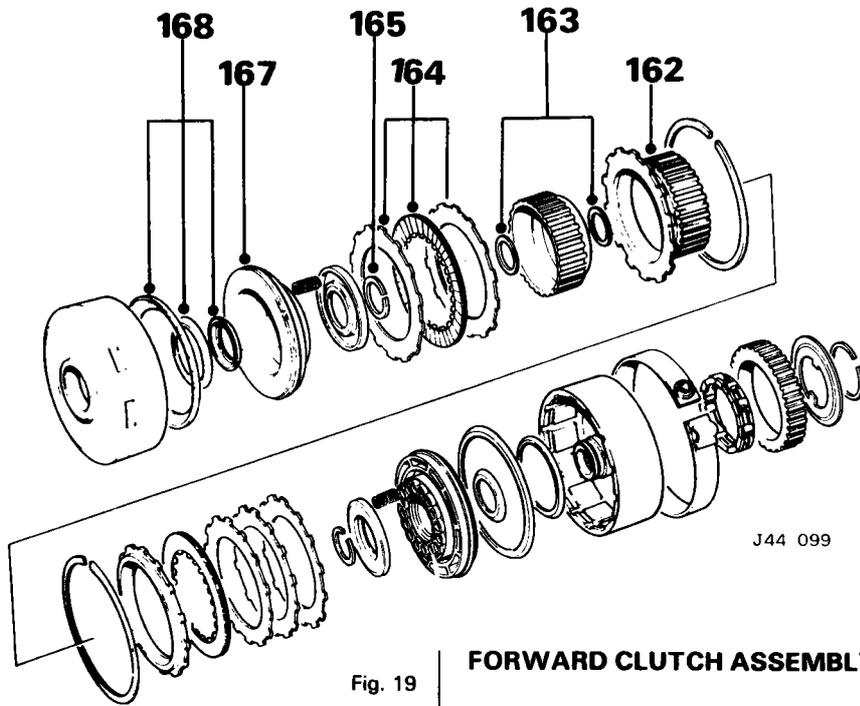


Fig. 19

FORWARD CLUTCH ASSEMBLY

Dismantling

- 161. Carefully secure the turbine shaft in a soft-jawed vice and remove the snap-ring securing the forward clutch housing to the direct clutch hub.
- 162. Remove the direct clutch hub (Fig. 19).
- 163. Remove the outer thrust washer, forward clutch hub and inner thrust washer (Fig. 19).
- 164. Remove the five composition and five steel clutch plates (Fig. 19).
- 165. Press the input shaft out of the forward clutch drum and using service tool 18G 1016, compress the spring retainer and remove the snap-ring (Fig. 19) securing the forward clutch piston assembly to the housing.
- 166. Remove the service tool 18G 1016 and withdraw the spring retainer and 16 clutch release springs.

Reassembling

- 147. Fit the pump drive and driven gears into the pump body.
- CAUTION:** Ensure that gears are replaced the correct way round, i.e. lugs on driving gear must face away from torque converter and driven gear should be replaced in the same position as originally fitted.
- 148. Fit the pressure regulator spacer(s), spring retainer and spring into the pressure regulator bore.
- 149. Fit the boost valve into the bushing, stem end out, and fit both parts into the pump cover by compressing the bushing against the spring.
- 150. Fit the retaining snap-ring.
- 151. Fit the pressure regulator valve from the opposite end of the bore, stem end first.
- 152. Fit the pressure regulator valve bore plug and retaining pin into the end of the bore.
- 153. Fit the front unit selective thrust washer over the pump cover delivery sleeve.
- NOTE:** The correct thickness was determined at the time the Front Unit End-Float Check (see 44.30.22) was carried out.
- 154. Fit the two oil seal rings to the pump cover.
- 155. Lubricate the pump gears with transmission fluid and fit the pump cover to the pump body.
- 156. Fit the pump securing bolts; do not tighten at this stage.
- 157. Using a suitable Jubilee clip around the pump assembly, tighten to align the pump cover with the pump body.
- 158. Fully tighten the securing bolts to 2,49 kgf m (18 lbf ft).
- 159. Fit a new square-cut 'O' ring to the pump.
- 160. Fit a new pump oil seal, using service tool 18G 1297.

- 167. Remove the forward clutch piston (Fig. 19) from the forward clutch housing.
- 168. Remove the seals from the piston (Fig. 19).
- 169. Remove the centre piston seal from the forward clutch housing and withdraw the clutch housing and turbine shaft from the vice.

Inspection

- 170. Check the composition-faced and steel clutch plates for signs of burning, scoring and wear.
- 171. Check the forward clutch hub and direct clutch hub for wear on the splines and thrust faces; ensure that the lubrication holes are not blocked.
- 172. Check the piston for cracks.
- 173. Check the clutch housing for wear, scoring and cracks.
Ensure that the oil passages are free from obstruction and that the check ball valve in the rear of the clutch drum is fitted and free to move.
- 174. Check the turbine shaft for cracks and distortion and the splines for damage.
- 175. Check the clutch release springs for signs of distortion.

Reassembling

- 176. Carefully secure the turbine shaft in a soft-jawed vice.
- 177. Lubricate new inner and outer clutch piston seals (Fig. 20) with new transmission fluid and fit the seals to the forward clutch piston, lips of seals facing away from spring pockets.
- 178. Fit a new centre piston seal (Fig. 20) to the forward clutch housing, lip facing upwards; lubricate with new transmission fluid.
- 179. Fit part of service tool 18G 1298 inner seal protector, to the forward clutch hub.

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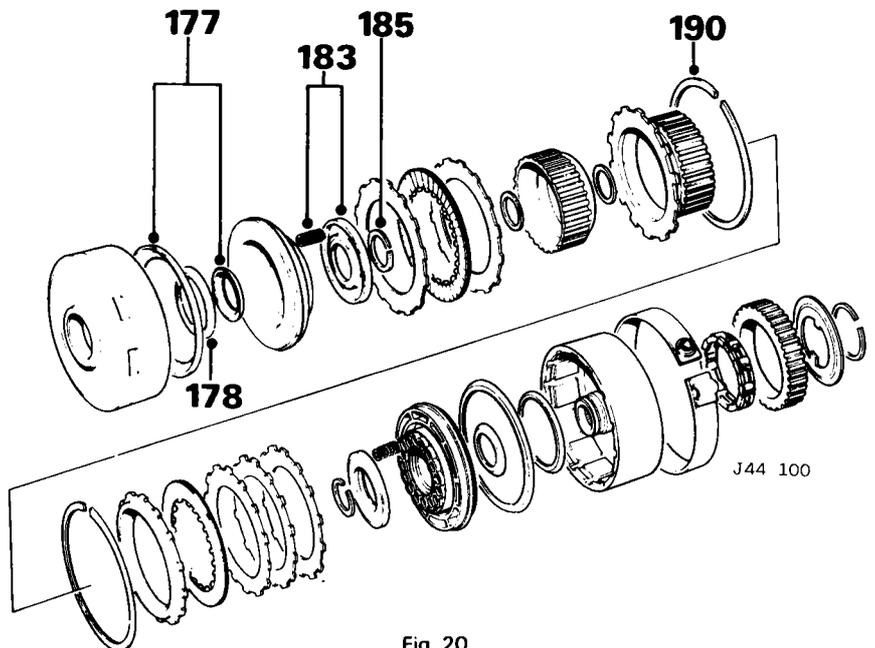


Fig. 20

180. Fit other part of service tool 18G 1298 outer seal protector, to the clutch piston, and insert assembly in forward clutch housing.
181. Fit the clutch piston by rotating it in a clockwise direction until seated.
182. Remove service tools.
183. Fit the 16 clutch release springs (Fig. 20) to the spring pockets in the clutch piston.
184. Using bench press and service tool 18G 1016 fit the spring retainer, ensuring that retainer does not foul the snap-ring groove. Refit the input shaft.
185. Fit the snap-ring (Fig. 20) and remove the service tools.
186. Ensure that the clutch release springs are correctly seated and are not leaning.
187. Fit the thrust washer to the outside face of the forward clutch hub. The bronze washer is fitted to the side of the hub which faces the forward clutch housing.
188. Fit the forward clutch hub to the forward clutch housing.
189. Fit the dished steel plate to the clutch housing. This should be fitted so that the centre portion of the plate is in contact with the piston.
- Fit a steel plate followed by a friction plate. Fit alternate steel and friction plates until a total of five steel plates are in position.

NOTE: Steel plates must be 2,3 mm (0.0915 in) thick.

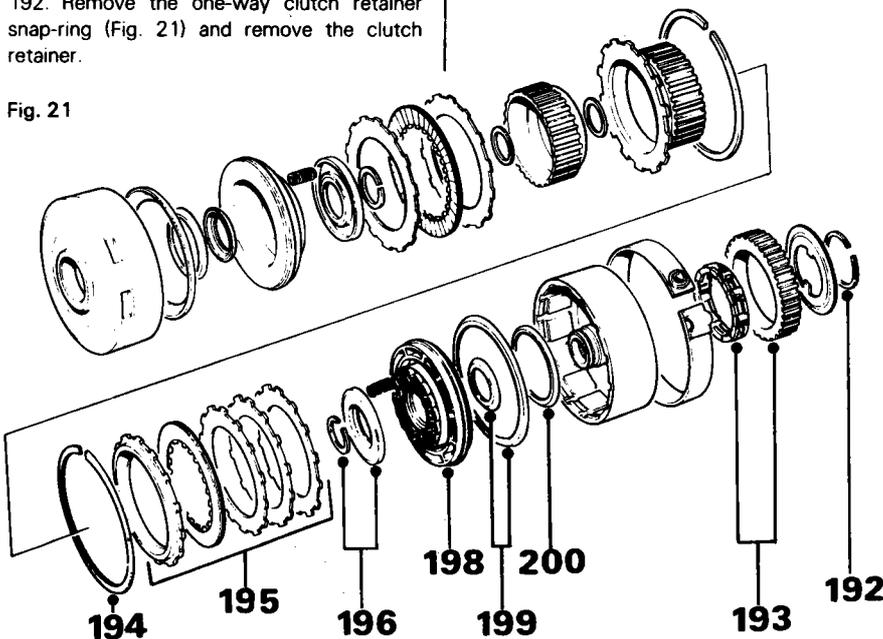
190. Fit the direct clutch hub in the forward clutch housing and secure with the snap-ring (Fig. 20).
191. Fit the forward clutch housing to the pump delivery sleeve, and applying air to the forward clutch passage in the pump, check operation of forward clutch.

DIRECT CLUTCH AND INTERMEDIATE ROLLER

Dismantling

192. Remove the one-way clutch retainer snap-ring (Fig. 21) and remove the clutch retainer.

Fig. 21



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193. Remove the roller outer race and remove the roller assembly (Fig. 21).
194. Remove the snap-ring (Fig. 21) securing the direct clutch backing plate to the clutch housing.
195. Remove the direct clutch backing plate and the six composition and six steel clutch plates (Fig. 21).
196. Using service tool 18G 1016, compress the spring retainer and remove the snap-ring (Fig. 21).
197. Remove the tool, spring retainer and 14 clutch release springs.
198. Remove the direct clutch piston (Fig. 21) from the direct clutch housing.

199. Remove the seals from the piston.
200. Remove the centre piston seal (Fig. 21) from the direct clutch housing.

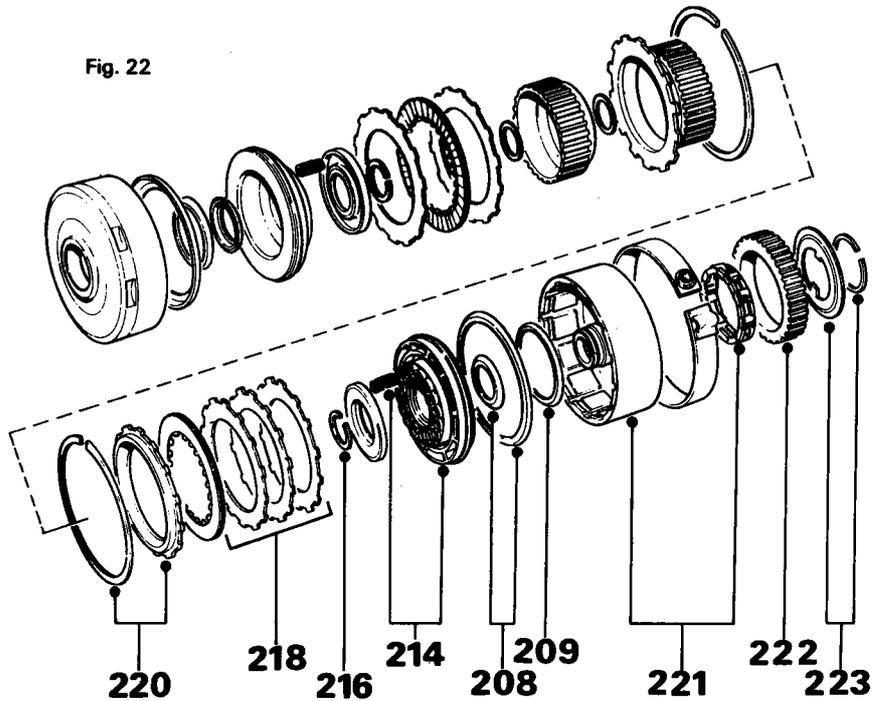
Inspection

201. Check the one-way clutch for damage, wear or scoring to the locking elements, the cage, drag strip springs and races.
202. Check the direct clutch housing outer race for wear and scoring.
203. Check the direct clutch housing for cracks, wear and blocked oil passages; also check the clutch plate drive lugs for wear.
204. Check the composition-faced and steel clutch plates for signs of wear and burning.
205. Check the back plate for scratches, scoring and other damage.
206. Check the piston for cracks, ensure that the check ball operates freely.
207. Check the springs for wear and distortion.

Reassembling

208. Lubricate new inner and outer clutch piston seals (Fig. 22) with new transmission fluid, fit the seals to the piston, seal lips facing away from spring pockets.
209. Fit a new centre piston seal (Fig. 22) to the direct clutch housing, lip facing upwards, and lubricate with new transmission fluid.
210. Fit part of service tool 18G 1298 forward and direct clutch inner seal protector, over the direct clutch hub.
211. Fit other part of service tool 18G 1298 forward and direct clutch piston outer seal protector to the clutch piston and inset assembly in the direct clutch housing.
212. Fit the clutch piston by rotating it in a clockwise direction.

Fig. 22



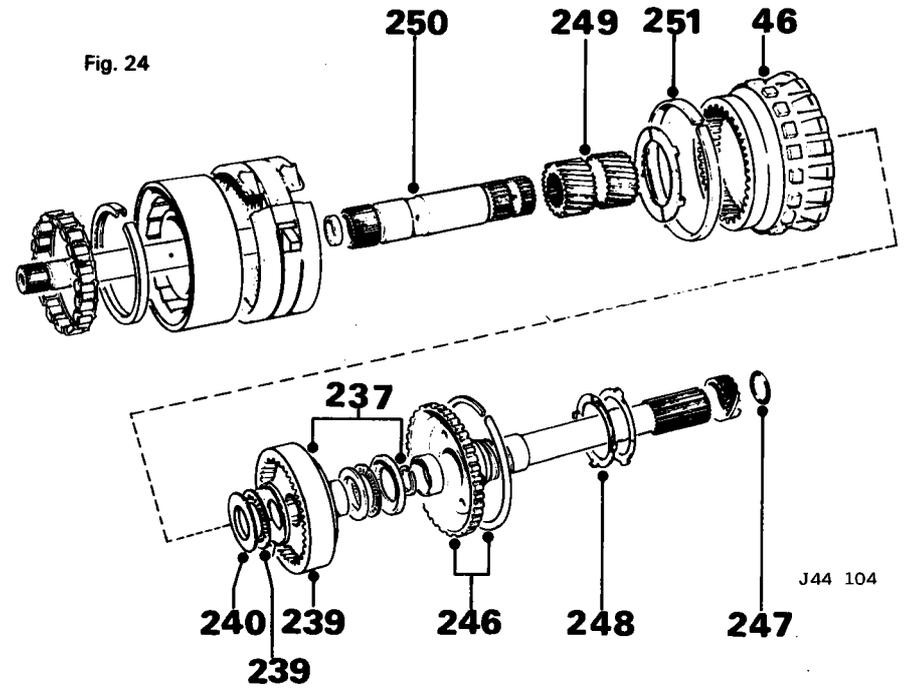
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- 213. Remove service tools.
- 214. Fit the 14 clutch release springs to the spring pockets in the clutch piston (Fig. 22).
- 215. Using bench press and service tool 18G 1016, fit the spring retainer. Ensure that the retainer does not foul the snap-ring groove.
- 216. Fit the snap-ring (Fig. 22) and remove the service tools.
- 217. Ensure that the clutch springs are correctly seated and are not leaning.
- 218. Lubricate the clutch plates (Fig. 22) with clean transmission fluid. Note that although of the five steel plates, four are 2,0 mm (0.0775 in) and one is 2,3 mm (0.0915 in) thick, there is no special order in which they must be fitted relative to each other.
- 219. Fit the dished plate followed by a steel plate and then fit alternate friction and steel plates.
- 220. Fit the direct clutch backing plate and secure with the snap-ring (Fig. 22).
- 221. Fit the one way clutch assembly to the intermediate clutch inner race (Fig. 22), on the direct clutch housing.
- 222. Fit the intermediate clutch outer race (Fig. 22). Outer race should not turn in an anti-clockwise direction.
- 223. Fit the one way clutch retainer and snap-ring (Fig. 22).
- 224. Fit the direct clutch assembly to the centre support and check operation using compressed air.

PLANET GEAR CARRIER / OUTPUT SHAFT ASSEMBLY

Dismantling

- 225. Remove the sun gear from the output carrier assembly (Fig. 23).
- 226. Remove the reaction carrier/output carrier thrust washer (Fig. 23) and the damper ring from around the output carrier.



- 227. Remove the snap-ring (Fig. 23) securing the output shaft to the output carrier and remove the output shaft.
- 228. Remove and discard the 'O' ring (Fig. 23) from the output shaft.
- 229. Remove the thrust bearing and races from the rear internal gear (Fig. 23).
- 230. Withdraw the rear internal gear and mainshaft from the output carrier (Fig. 23).
- 231. Remove the thrust bearing and races from the inner face of the rear internal gear.
- 232. Remove the snap-ring (Fig. 23) from the end of the mainshaft and remove the rear internal gear.
- 233. Remove the speedometer drive gear.

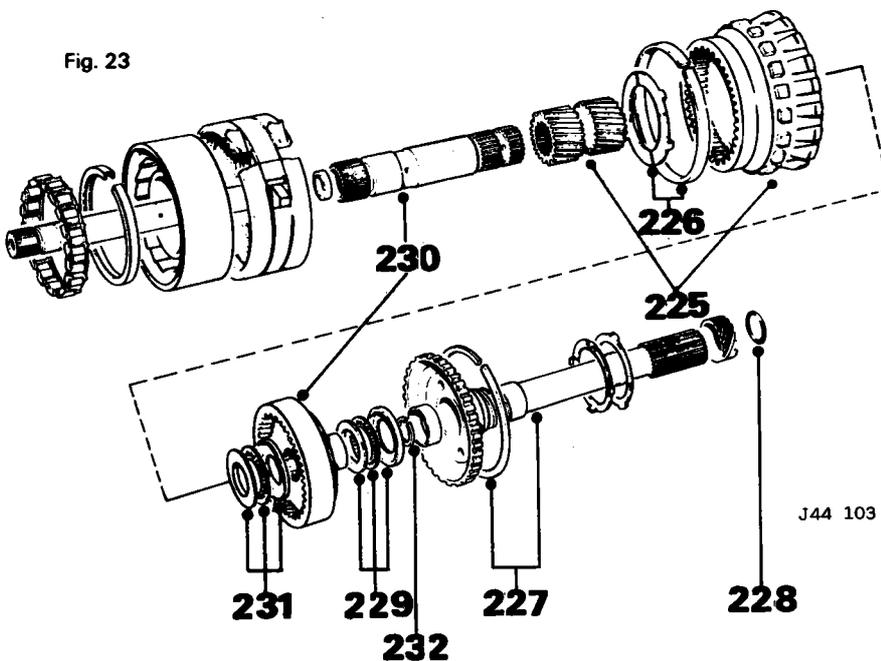
Inspection

- 234. Check the splines, 'O' ring grooves, bushes and gear teeth for burrs or signs of damage. Minor burrs can be removed with a very fine abrasive.
- 235. Check all oil drillings for obstructions and clear only with compressed air.
- 236. Examine the needle-roller assemblies, and renew if there are any signs of wear or damage.

Reassembling

- 237. Fit the rear internal gear to the end of the mainshaft that has the snap-ring groove and fit the snap-ring (Fig. 24).
- 238. Fit the large diameter race, with flanged outer edge facing outwards, to the inner face of the rear internal gear.
- 239. Fit the thrust bearing to the race (Fig. 24).
- 240. Fit the small diameter race, with flanged inner edge facing inwards, to the bearing (Fig. 24).
- 241. Lubricate the pinion gears in the output carrier with new transmission fluid and fit the output carrier to the mainshaft, meshing the pinion gears with the rear internal gear.
- 242. Insert the assembly and hold the mainshaft in a soft-jawed vice. Be careful not to damage the shaft.
- 243. Fit the small diameter race, with flanged inner edge facing outwards, to the outer face of the rear internal gear.
- 244. Fit the thrust bearing to the race.
- 245. Fit the large diameter race, with flanged outer edge facing inwards, to the bearing.

Fig. 23



continued

- 246. Fit the speedometer drive gear. Fit the output shaft into the output carrier and fit the snap-ring (Fig. 24).
- 247. Fit a new 'O' ring (Fig. 24), to the output shaft.
- 248. Fit the thrust washer to the output carrier (Fig. 24), engaging the tabs of the washer with the slots in the carrier.
- 249. Fit the sun gear (Fig. 24), chamfered internal diameter first.
- 250. Fit the sun gear shaft (Fig. 24), long splined end first.
- 251. Refit the damper ring round the output carrier.

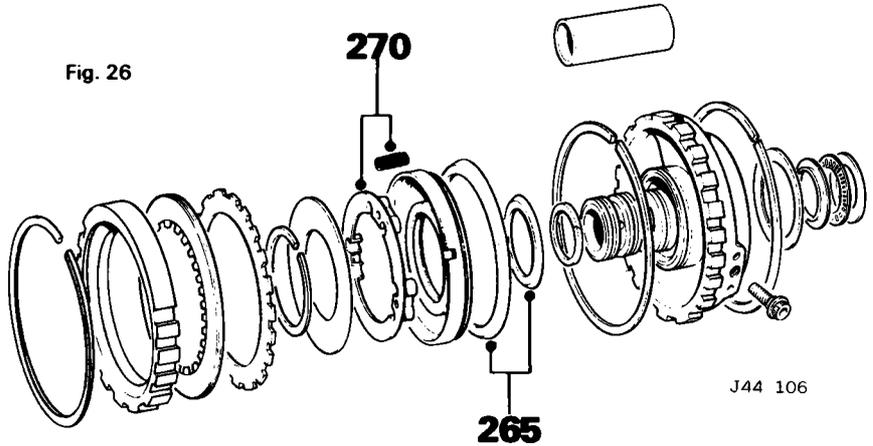
CENTRE SUPPORT AND INTERMEDIATE CLUTCH

Dismantling

- 252. Remove the four Teflon oil rings from the centre support
- 253. Compress the spring retainer and remove the snap-ring (Fig. 25).
- 254. Remove the spring retainer and the three intermediate clutch release springs (Fig. 25).
- 255. Remove the spring guide.
- 256. Remove the intermediate clutch piston from the centre support (Fig. 25).
- 257. Remove the seals from the clutch piston.

Inspection

- 258. Check the roller clutch inner race for wear or damage. Ensure that the lubrication hole is clear.
- 259. Check bushes for wear, scoring and chafing.
- 260. Check the oil ring grooves for wear or damage. Check Teflon rings for condition and renew any that are damaged.
- 261. Using compressed air, check oil passages and clear any obstructions.
- 262. Check the piston sealing surfaces for scratching and piston seal grooves for damage.
- 263. Check piston for cracks and seals for wear or damage.
- 264. Check the springs for distortion.



Reassembling

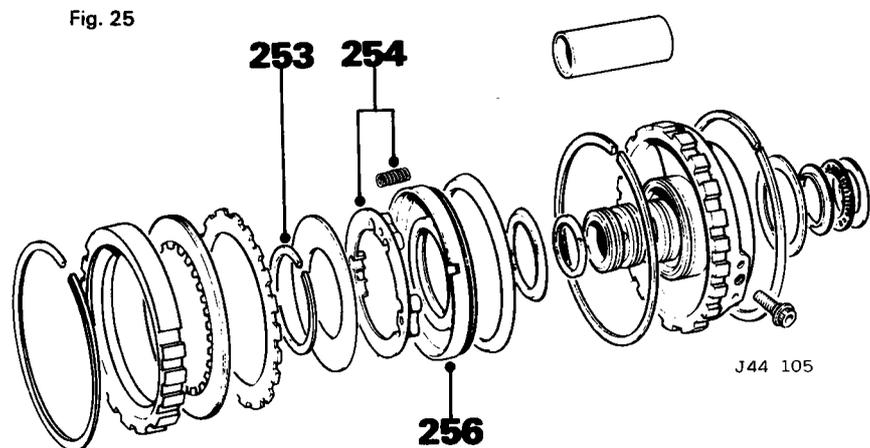
- 265. Lubricate the new inner and outer clutch piston seals with clean transmission fluid (Fig. 26).
- 266. Lubricate the seal grooves in the intermediate clutch piston and fit the seals to the piston, with the lips facing away from the spring guide.
- 267. Fit 18G 1309 intermediate clutch oil seal protector sleeve over the centre support hub, fit the intermediate clutch piston to the centre support. Ensure that it seats fully.
- 268. Remove service tool 18G 1309.
- 269. Fit the spring guide.
- 270. Fit the three clutch release springs, equally spaced in the holes in the spring guide (Fig. 26).
- 271. Fit the spring retainer and snap-ring.
- 272. Compress the spring retainer, ensuring that the retainer does not foul in the snap-ring groove; fit snap-ring.
- 273. Fit the four Teflon oil seal rings to the centre support. Ensure that the ends of the teflon rings overlap correctly.
- 274. Using compressed air, check the operation of the intermediate clutch. Apply air to the centre oil feed hole to activate the piston.

GEARBOX ASSEMBLY

Reassembling

- 275. Fit the parking pawl, tooth towards the

- centre of the transmission case, and fit the parking pawl shaft.
 - 276. Fit the parking pawl shaft retaining clip.
 - 277. Tap the parking pawl shaft plug into position, using a 9,5 mm (0.375 in) diameter rod, until the pawl shaft contacts the case rib.
 - 278. Fit the parking pawl return spring, square end to pawl.
 - 279. Fit the parking pawl bracket and secure with the two bolts.
 - 280. Check the rear brake band for distortion, cracks, damage to the ends of the anchor lugs and apply lugs. Also check the lining for cracks, flaking, burning and looseness.
 - 281. Fit the rear band assembly to the transmission case, locating the band lugs with the anchor pins.
 - 282. Fit the rear unit thrust washer, the correct size having been determined in the Rear Unit End-Float Check, see 44.30.23. Engage the lugs of the washer with the slots in the transmission case.
 - 283. Lubricate the pinion gears in the reaction carrier with clean transmission fluid and fit the reaction carrier to the output carrier; engage the pinion gears with the front internal gear.
 - 284. Fit the large diameter race, flanged outer edge facing outwards, to the sun gear.
 - 285. Fit the thrust bearing to the race.
 - 286. Fit the small diameter race, flanged inner edge facing inwards, to the thrust bearing.
 - 287. Lubricate the reaction carrier to centre support thrust washer with petroleum jelly and fit the washer to the recess in the centre support.
 - 288. Fit the roller clutch to the reaction carrier.
 - 289. Fit the centre support assembly to the roller clutch in the reaction carrier.
- NOTE:** Ensure that the centre support to reaction carrier thrust washer is correctly positioned before fitting the centre support to the roller clutch in the reaction carrier. With the reaction carrier held, the centre support should only rotate in an anti-clockwise direction.
- 290. Lubricate and fit the centre support to case snap-ring with the flat face of the ring against the centre support. Ensure that the ring is correctly located in the groove and that the gap is adjacent to the front band anchor pin.



- 291. With the transmission case held vertically, fit the gear unit, centre support and reaction carrier. Align the centre support bolt hole with the hole in the casing.
- 292. Fit the centre support to case bolt.
- 293. Check the intermediate clutch plates for scoring, wear and signs of burning.
- 294. Lubricate the three steel and three composition clutch plates with clean transmission fluid.
- 295. Fit the clutch plates commencing with a steel plate and alternate composition and steel plates.
- 296. Fit the intermediate clutch backing plate, flat machined face against clutch plates.
- 297. Fit the backing plate to case snap-ring, locate the ring gap adjacent to the front band anchor pin.
- 298. Re-check the Rear Unit End-Float, see 44.30.23.
- 299. Check the front band for cracks and distortion damage to the ends of the anchor lugs and apply lugs. Also check the lining for cracks, flaking, burning and looseness.
- 300. Fit the front band, aligning the band anchor hole and the band anchor pin with the apply lug facing the servo hole.
- 301. Fit the direct clutch housing and intermediate roller assembly. Ensure that the clutch housing hub locates on the bottom of the sun gear shaft and that the splines on the forward end of the sun gear shaft are flush with those in the direct clutch housing.
- 302. Fit the forward clutch hub to the direct clutch housing thrust washer, to the forward clutch hub.
- 303. Fit the forward clutch assembly and turbine shaft. Ensure that the end of the mainshaft locates fully in the forward clutch hub. The distance between the forward clutch and pump mounting face should be 25,4 to 31,8 mm (1.0 to 1.250 in).
- 304. Lubricate the turbine shaft journals and Teflon oil rings on the pump delivery sleeve.
- 305. Fit a new outer seal.
- 306. Fit a new gasket to the pump.
- 307. Fit the pump to the gearbox casing and secure with the bolts.
- 308. Re-check the Front Unit End-Float, see 44.30.22.
- 309. Fit a new manual shaft lip seal to the transmission case; use a 19 mm (0.75 in) diameter rod to seat the seal.
- 310. Fit the actuator rod to the manual detent lever from the side opposite the pin.
- 311. Fit the actuator rod plunger under the parking bracket and over the parking pawl.
- 312. Fit the manual shaft to the case, and insert through the detent lever.
- 313. Fit and tighten the locknut to the manual shaft.
- 314. Fit the retaining pin.
- 315. Fit a new extension housing gasket.
- 316. Check the 'O' ring on the output shaft for nicks and flattening, and renew as required.
- 317. Fit the extension housing to the case and secure with the six bolts.
- 318. If required, fit a new extension housing oil seal.
- 319. Fit the six check balls into their seat pockets in the casing.
- 320. Using two guide pins in the smaller diameter holes in the valve block casing, fit the

control valve housing spacer plate-to-case gasket, 'C' towards case.

321. Fit the control valve spacer plate.

CAUTION: Some overhaul kits contain a solenoid gasket. This gasket **MUST NOT** be fitted on Jaguar/Daimler transmissions.

322. Fit the detent solenoid assembly, with the connector facing the outer edge of the casing. **Do not** tighten the bolts.

323. Fit the front servo spring and spring retainer to the casing.

324. Fit the retaining ring to the front servo pin and fit the pin to the case, tapered end to contact band.

325. Fit the servo piston to the pin.

326. Fit a new 'O' ring to the solenoid connector.

327. Fit the connector, locate lock tabs to case.

328. Connect the detent solenoid wire to the connector terminal.

329. Lubricate the rear servo inner and outer bores. Fit the rear accumulator spring.

NOTE: Ensure that the rear band apply lug aligns with the servo pin.

330. Fit the rear servo assembly, ensure proper sealing in the bore, and fit the rear servo cover and gasket. Secure with the six bolts.

331. Fit the control valve housing assembly-to-spacer gasket with letters 'VB' towards the valve block.

332. Fit the governor pipes to the control valve assembly.

333. Fit the governor screen assembly, open end first to the feed pipe hole, i.e. the hole nearest the centre of the transmission, in the casing.

334. Fit the control valve assembly and governor pipes to the transmission, carefully align the governor feed pipe with the screen. Ensure that all gaskets and spacers are correctly positioned.

NOTE: Ensure that the manual valve properly locates with the pin on the detent lever. Check that the governor pipes are located correctly.

335. Fit the securing bolts.

336. Remove the two guide pins and fit the detent roller spring assembly and remaining bolts.

337. Tighten the detent solenoid attachment screws.

338. Fit the modulator valve, stem end outermost, into the case.

339. Fit a new 'O' ring to the vacuum modulator.

340. Fit the vacuum modulator to the case.

341. Fit the modulator retainer, curved face inboard, fit and tighten the attachment bolt.

342. Fit the governor to the case.

343. Fit a new gasket, and secure the governor cover to the case with the four bolts.

344. Fit the speedometer driven gear assembly and secure with the clamp bolt.

345. Fit a new 'O' ring to the intake pipe and fit the pipe to a new filter assembly.

346. Fit the filter and pipe assembly to the casing.

347. Fit and tighten the filter retaining bolt.

348. Fit a new gasket to the oil pan and fit the pan to the casing, secure with the attaching bolts.

349. Fit the torque converter to the turbine shaft, fully engage the converter drive hub slots with the pump olive gear lugs.

SLIPPING GEARS OR NO DRIVE ON SOME 1984 BUILT GEARBOXES

Some GM 400 transmissions manufactured during 1984 may exhibit the following faults:

Slipping in all gears, loss of drive.

If either of these symptoms is evident then the unit should be dismantled and the forward clutch ring checked to ensure that it is correctly seated. If it is found that the forward clutch snap ring is incorrectly located, or not seated correctly and that some seals have also been dislodged from their seats then the reverse boost valve must be removed from the oil pump and the depth of the bore check, see Fig. 27. If this measurement exceeds 15,8 mm ($\frac{5}{8}$ in) then the valve should be replaced with Part No. AAU 6640.

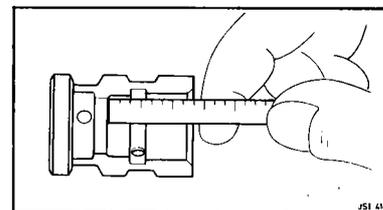


Fig. 27

The suspect transmissions are between Serial Numbers:

842V3608 - 842V6011

AUTOMATIC TRANSMISSION — GM 400

HE VEHICLES SHIFT SPEED DATA

NOTE: The figures in the following table refer only to HE cars with a final drive ratio of 2.88:1.

Light Throttle		Full Throttle		Full Throttle and Kick-down		Kick-down		Down-shift		Roll Out	
1-2	2-3	1-2	2-3	1-2	2-3	3-2	3-1	Manual 2-1	PTKD* 3-2	3-2	2-1
5-13 m.p.h.	11-21 m.p.h.	43-53 m.p.h.	60-90 m.p.h.	53-64 m.p.h.	91-101 m.p.h.	80-91 m.p.h.	32-43 m.p.h.	18-25 m.p.h.	43-53 m.p.h.	5-13 m.p.h.	3-9 m.p.h.
8-21 km/h	18-34 km/h	69-85 km/h	96-145 km/h	85-103 km/h	146-163 km/h	129-146 km/h	52-69 km/h	29-40 km/h	69-85 km/h	8-21 km/h	5-14 km/h

* PTKD = Part Throttle Kick-down

NOTE: The figures in the following table refer only to Canadian HE cars with a final drive ratio of 2.88:1.

Light Throttle		Full Throttle		Full Throttle + Kick-down		Kick-down		Down-shift	Roll Out	
1-2	2-3	1-2	2-3	1-2	2-3	3-2	2-1	Manual 2-1	3-2	2-1
7-12 m.p.h.	15-22 m.p.h.	38-48 m.p.h.	67-75 m.p.h.	60-70 m.p.h.	90-100 m.p.h.	80-90 m.p.h.	40-50 m.p.h.	20-30 m.p.h.	8-12 m.p.h.	3-8 m.p.h.
11-19 km/h	24-35 km/h	61-77 km/h	107-120 km/h	96-112 km/h	144-160 km/h	128-144 km/h	64-80 km/h	32-48 km/h	13-19 km/h	5-13 km/h

NOTE: The above figures are theoretical. Actual figures may vary slightly due to such factors as tyre pressures, road conditions etc.

HE VEHICLES VALVE SPRING IDENTIFICATION

VALVE SPRING IDENTIFICATION CHART				
Function	Colour	Free Length	No. of Coils	Outside Diameter
1-2 accumulator valve	Red	1.750 in	12.5	0.470 in
Pressure regulator	Light Blue	3.343 in	13	0.845 in
Front servo piston	Natural	1.129 in	4	1.257 in
Rear accumulator	Yellow	2.230 in	8.5	1.130 in
Governor	Dark green	0.933 in	9.5	0.316 in
	Red	0.987 in	8.5	0.306 in
1-2 regulator	Pink	0.936 in	13.5	0.241 in
2-3 valve	Red	1.491 in	17.5	0.328 in
2-3 valve	Gold	1.555 in	18.5	0.326 in
3-2 valve	Yellowy Green	2.500 in	18.5	0.400 in
Front accumulator piston	Pink	2.600 in	8.5	1.260 in
Detent regulator	Green	2.735 in	26.5	0.340 in