PART 5

CONTENTS

SUPER SNIPE, IMPERIAL, AND HAWK

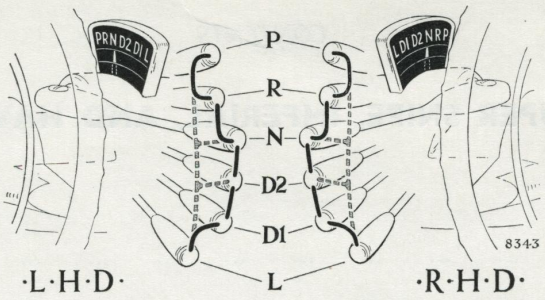


Fig. 1. *Selector lever positions L—D1—D2—N—R—P*

INTRODUCTION

Parts 1 to 4 of this manual cover the Borg Warner 35 automatic transmission units, having the five selector lever positions L—D—N—R—P fitted to:—

Minx and Super Minx

Gazelle and Vogue

Alpine and Sceptre

These pages, as Part 5, cover the DIFFERENCES on the Borg Warner 35 automatic transmission with the six selector lever positions L—D1—D2—N—R—P, which is fitted to:—

Super Snipe, Imperial, and Hawk

Part 5 is therefore used in conjunction with Parts 1 to 4; and the General Data Section, when information is needed on B.W. 35 units fitted to Super Snipe, Imperial, and Hawk. For example, exploded views of the front and rear clutches are shown in Figs. 23 and 27 of Part 4, and the number of clutch plates used on Super Snipe, Imperial, and Hawk is given on page 9 of Part 5.

The method used to identify the various Borg Warner 35 units, covered by this manual, is given in the General Data Section and a summary of the differences between them on the next page.

DRIVING

Selected lever positions (see Fig. 1)

The six selector lever positions L—D1—D2—N—R—P are shown by a pointer on the quadrant above the steering column.

As shown in Fig. 1 the selector lever can be moved freely between N, D2 and D1, but must be lifted towards the steering wheel before L or R can be engaged. To engage, or disengage, the P (Park) position the selector lever must be lifted by its maximum amount.

All these selector positions, EXCEPT D2 are used in the the same way as for cars with the five selector positions L—D—N—R—P because D1 operates in exactly the same way as D.

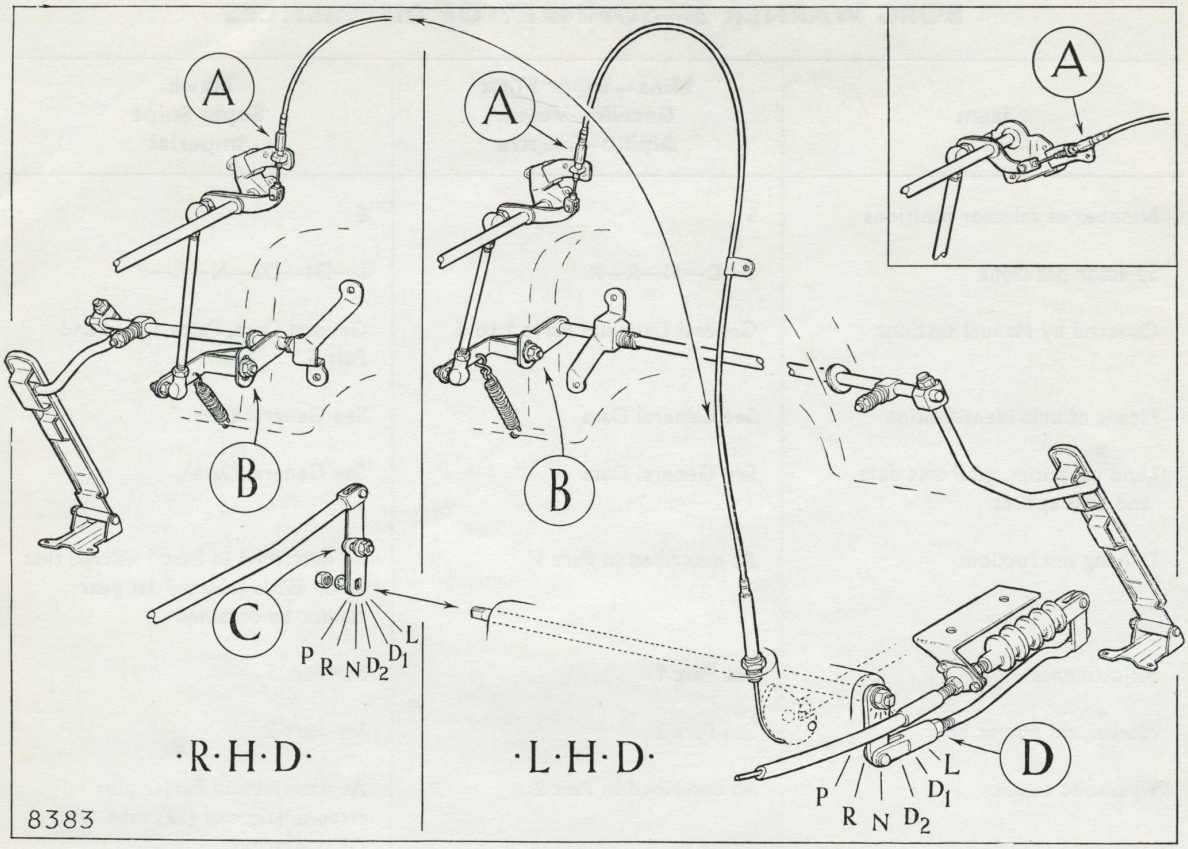
Using D2 position

When D2 is selected the transmission starts in second (intermediate) gear and then operates as an automatic two speed convertor transmission, because it NEVER engages or changes into first (low), while D2 is used.

D2 should be selected for all normal conditions of operation; it will also reduce the tendency to wheelspin on ice or loose surfaces. D1 can be used with advantage if maximum acceleration is required, and when increased fuel consumption, due to the operation of first (low) gear, is not objected to.

BORG WARNER 35—SUMMARY OF DIFFERENCES

Item	Minx—Super Minx Gazelle—Vogue Alpine—Sceptre	Hawk Super Snipe Imperial
Number of selector positions	5	6
Selector positions	L—D—N—R—P	L—D1—D2—N—R—P
Covered by Manual sections	General Data and Parts 1 to 4	General Data, Parts 1 to 4 and Part 5
Means of unit identification	See General Data	See General Data
Fluid capacities, stall test data and shift speeds	See General Data	See General Data
Driving instructions	As described in Part 1	As described in Part 1 except that when D2 is selected 1st gear cannot be obtained
Adjustments	See Part 1	See Part 5
Mechanical power flow	See Part 2	See Part 2
Hydraulic circuits	As described in Part 2	As described in Part 2 plus circuits (12) and (22) used with D2 operation
Valve block identification	Marked EP	Marked 3EG—Hawk Marked 9EP—Super Snipe Marked 9EP—Imperial
Valve block springs	See General Data	See General Data
Valve block particulars	As described in Part 2	As described in Part 2 plus an extra D1 and D2 control valve which prevents engagement of 1st gear when D2 is selected, and a six position manual control valve
Convertor fluid return	See Fig. 14 Part 2—from (21) into valve block by short straight pipe	From convertor by (21) through a bent steel pipe to a union on the left-front side of the transmission case—then by an external steel pipe to a union on the rear left end of the transmission case
Front clutch	See Fig. 23 Part 4	See page 9 Part 5
Rear clutch	See Fig. 27 Part 4	See page 9 Part 5



A — DOWNSHIFT VALVE CABLE ADJUSTMENT
INSET SHOWS HAWK DETAIL
B — ACCELERATOR PEDAL ADJUSTMENT POINT
C and D — SELECTOR LEVER LINKAGE ADJUSTMENT POINTS

Fig. 2. *Downshift cable, selector linkage and accelerator pedal adjustment positions*

ADJUSTMENTS

Downshift valve cable

This cable is adjusted as described in Part 2 Page 9. Its adjustment positions are shown at (A) in Fig. 2.

Accelerator pedal linkage full throttle adjustment

This adjustment is shown at (B) in Fig. 2. It should be set so that full throttle is obtained when the accelerator pedal is depressed to within 1 in. (25 mm.) of the floor covering. This ensures that the downshift valve cam passes over the "hard spot" and comes into the position shown in Fig. 10 Part 2.

If the accelerator pedal to carburettor full throttle position is not correct "forced throttle" and "kickdown" changes will not be obtained even when the downshift valve cable is correctly adjusted.

Selector lever linkage adjustment—see Fig. 2

This linkage is adjusted so that the six positions in the selector gate, at the lower end of the selector lever shaft, match the six detent positions inside the transmission. These positions can be distinguished by feel as the selector lever is moved through the L—D1—D2—N—R—P positions.

On R.H.D. cars this adjustment is made by using the slot between the two levers (C) on the right hand side of the transmission. A finer adjustment point is provided by the turnbuckle between the lever at the lower end of the control shaft and the relay lever.

On L.H.D. cars adjustment is made at the point (D), by means of the clevis on the end of the push rod that operates the lever on the left hand side of the transmission.

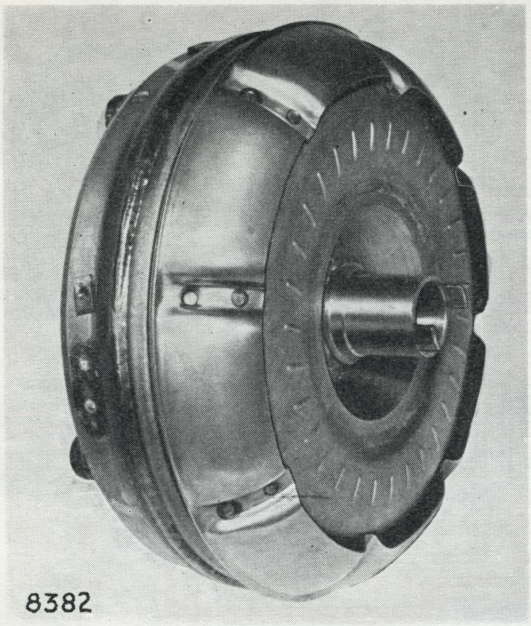


Fig. 3. *11 in. Torque Convertor*

TORQUE CONVERTOR

This unit is of a larger diameter and can be recognised from its illustration shown in Fig. 3. Its stall test figures are given in the Data Section under Stall Test Data.

HYDRAULIC SYSTEM

Hydraulic circuits

The hydraulic circuits operate as described in Part 2 EXCEPT when D2 is selected.

The differences between the hydraulic circuits and those described in Part 2 can be seen by comparing Figs. 24 and 27 in Part 2 to Figs. 4 and 8 on the following pages.

From these it will be seen that the valve body incorporates an additional shuttle valve (D1 and D2 control valve), interposed in the governor circuit (2) acting on the 1—2 shift valve. In the D1 selector position, the D1 and D2 control valve permits governor pressure (2) to reach the large area of the 1—2 shift valve (22) to render the 1—2 shift point sensitive to road speed. In the D2 selector position, line pressure (12) directed through an additional port in the separating plate moves the D1 and D2 control valve thus preventing governor pressure (2) from reaching the 1—2 shift valve. Instead, line pressure (12) now acts upon the large area of the 1—2 shift valve (22), hydraulically latching it in the 2nd gear position.

To provide optimum shift quality, the servo orifice control valve spring is omitted.

Table of hydraulic circuits—additions

Two circuits (12) and (22) are additional to those given on Page 42 Part 2.—See table below.

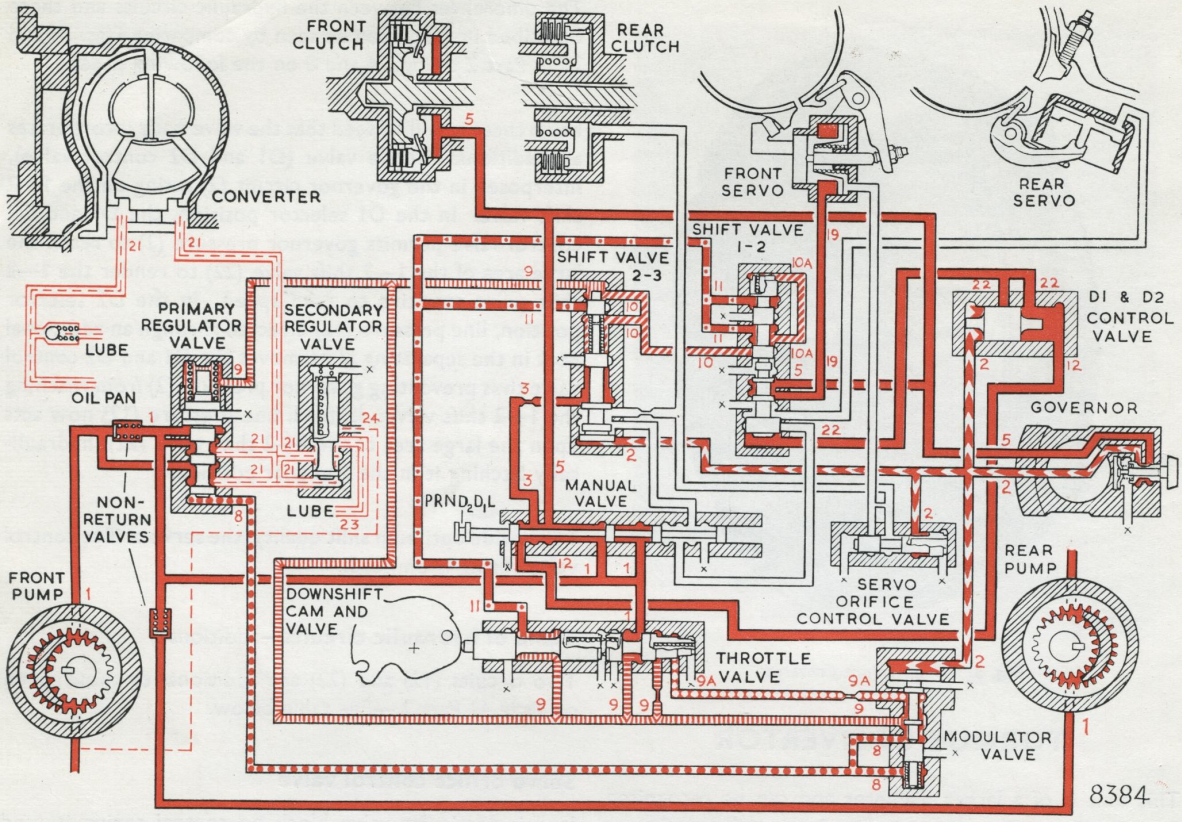
Servo orifice control valve

In this particular valve block no control spring is used between the larger diameter end of this valve bore and the hollow end of the valve itself. See Fig. 8.

Manual control valve

This valve now directs, or exhausts, line pressure to or from the SIX positions used to obtain L—D1—D2—N—R—P.

Circuit No.	Name of pressure	From	To	Theoretical pressure range p.s.i.	Remarks
12	Directed line pressure	Manual control valve	D1 and D2 control valve	57—160—78 Hawk 62—170—85 Super Snipe and Imperial	
22	Governor pressure	D1 and D2 control valve	1—2 shift valve	0—70	With D1 selected
22	Directed line pressure	D1 and D2 control valve	1—2 shift valve	57—160—78 Hawk 62—170—85 Super Snipe and Imperial	With D2 selected



LINE OR DIRECTED LINE PRESSURE

CONVERTOR PRESSURE

GOVERNOR PRESSURE

THROTTLE PRESSURE

FORCED THROTTLE PRESSURE

MODULATED THROTTLE PRESSURE

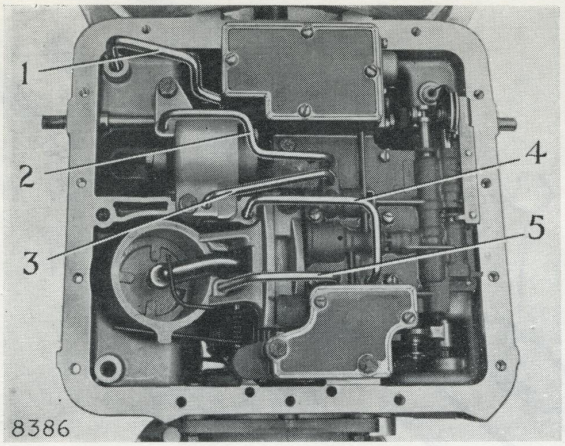
THROTTLE PRESSURE CONTROLLED BY MODULATOR VALVE

SHIFT VALVE PLUNGER PRESSURE

EXHAUST

8384

Fig. 4. *Operation of hydraulic circuit in D2—intermediate—with D2 selected*



1. CONVERTOR "OUT"
2. FRONT SERVO RELEASE
3. FRONT SERVO APPLY
4. REAR CLUTCH
5. REAR SERVO

Fig. 5. *Location of oil tubes below valve body*

Convertor fluid return

The convertor fluid return pipe annotated by the letter (B) in Fig. 5 of Part 3 is replaced by a longer pipe (1) in Fig. 5 above, that connects the convertor drain hole to the underside of a union on the left hand front inside of the transmission case. The outside of this union is connected by an external jumper pipe to a union on the rear left hand end of the transmission case, so that all fluid returning from the convertor drains into the rear end of the transmission sump.

VALVE BLOCK

Identification

Valve blocks used on Super Snipe and Imperial are marked with the letters 9EP and those used on Hawk 3EG. Valve blocks having any other letter marking MUST NOT be fitted to transmissions used on these cars.

To remove and refit

The valve body removal and refitting procedure is similar to that already given in Part 3. Fig. 5 shows the connecting tubes below the valve block. Fig. 6 shows that three connecting tubes and a different convertor drain pipe are used on this transmission instead of the four connecting tubes shown in Fig. 5 Part 3.

To dismantle and reassemble (see Fig. 7)

Except for the following details on the D1 and D2 control valve this follows the procedure given in Part 4. The D1 and D2 control valve assembly replaces the governor line plate used on valve blocks marked EP.

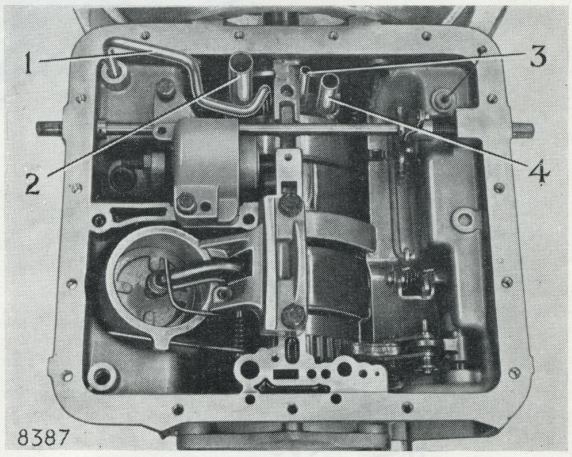
To dismantle this valve assembly remove the four screws holding it to the lower valve body. Remove the stop (H) from the rectangular slot in the body. Remove the cylindrical spacer (G) and D1 and D2 shuttle type control valve (F).

Reassembly of the D1 and D2 control valve assembly follows the reverse order for dismantling. The cylindrical spacer (G) and control valve (F) may be fitted either way round.

Valve block springs

Details of the correct springs to use in these valve blocks are given in the Data Section. No other springs may be used.

The fitting of incorrect springs will cause harsh gear changes, clutch or band slip, overheating, and incorrect gear change points.



1. CONVERTOR "OUT"
2. FRONT PUMP INLET
3. CONVERTOR "IN"
4. FRONT PUMP OUTLET

Fig. 6. *Location of oil tubes above valve body*

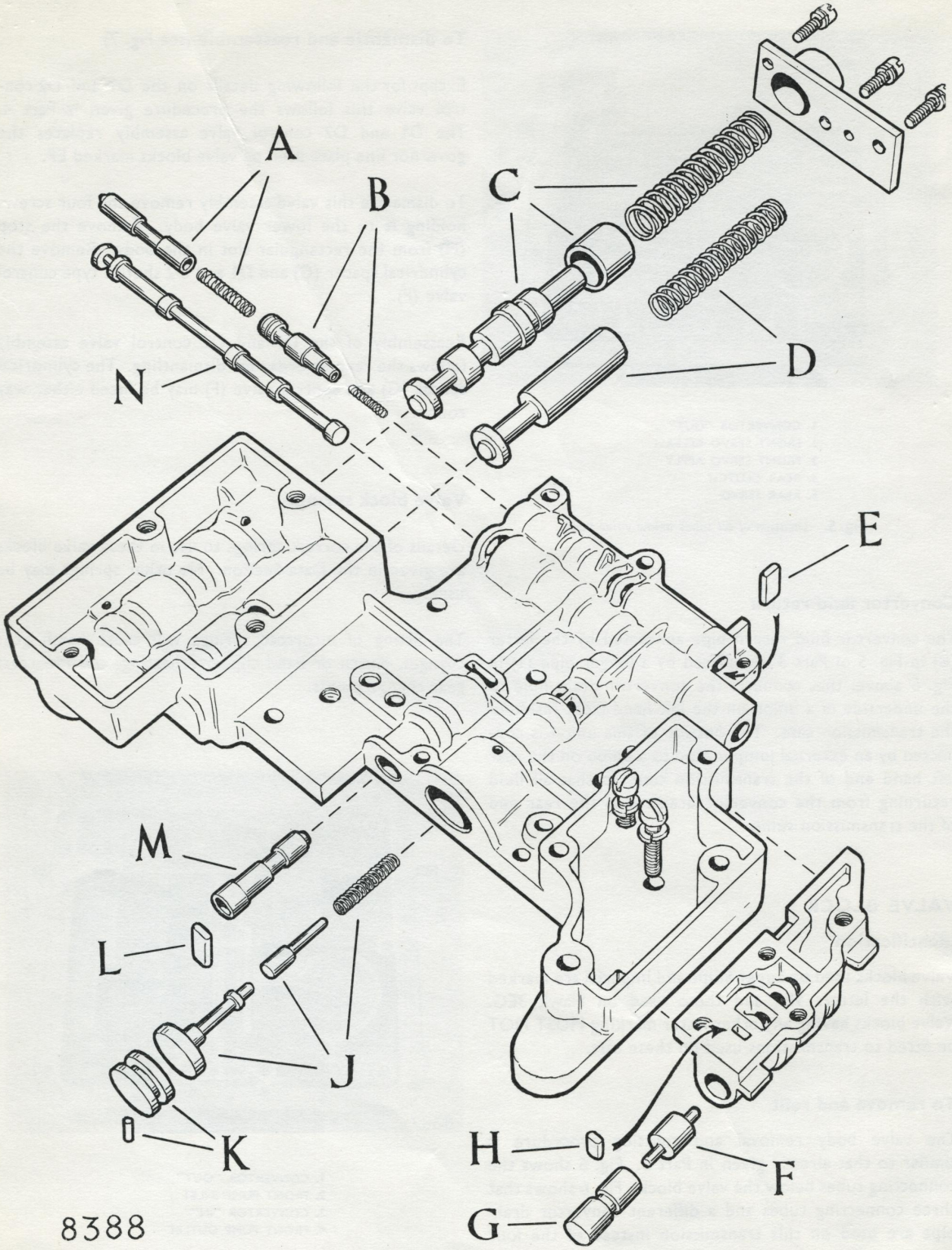


Fig. 7. *Lower valve body and D1—D2 control valve—exploded view*

Key to Fig. 7.

A — DOWNSHAFT VALVE AND SPRING (OPERATED BY DOWNSHIFT VALVE CABLE)

B — THROTTLE VALVE AND SPRING

C — PRIMARY REGULATOR VALVE, SLEEVE AND SPRING

D — SECONDARY REGULATOR VALVE AND SPRING

E — THROTTLE VALVE SPRING RETAINER

F — D1—D2 CONTROL VALVE

G — CYLINDRICAL SPACER

H — SPACER RETAINER

J — MODULATOR VALVE, PLUG AND SPRING

K — MODULATOR VALVE RETAINER AND RETAINER PIN

— SERVO ORIFICE CONTROL VALVE RETAINER

M — SERVO ORIFICE CONTROL VALVE

N — MANUAL CONTROL VALVE (OPERATED BY SELECTOR LEVER)

FRONT AND REAR CLUTCHES

These clutches differ in the number of plates used as shown in the following summary. They are dismantled and assembled as described in Part 4.

It should be noted that the outer plates of the rear clutch are coned (dished). When they are fitted the coning of the outer plates may be either way round in the clutch drum but must be in the same direction on each outer plate.

Vehicle	Front Clutch		Rear Clutch	
	Inner plates	Outer plates	Inner plates	Outer plates
Hawk—7EP	4	3	4	4
Super Snipe and Imperial—9EP	5	4	5	5

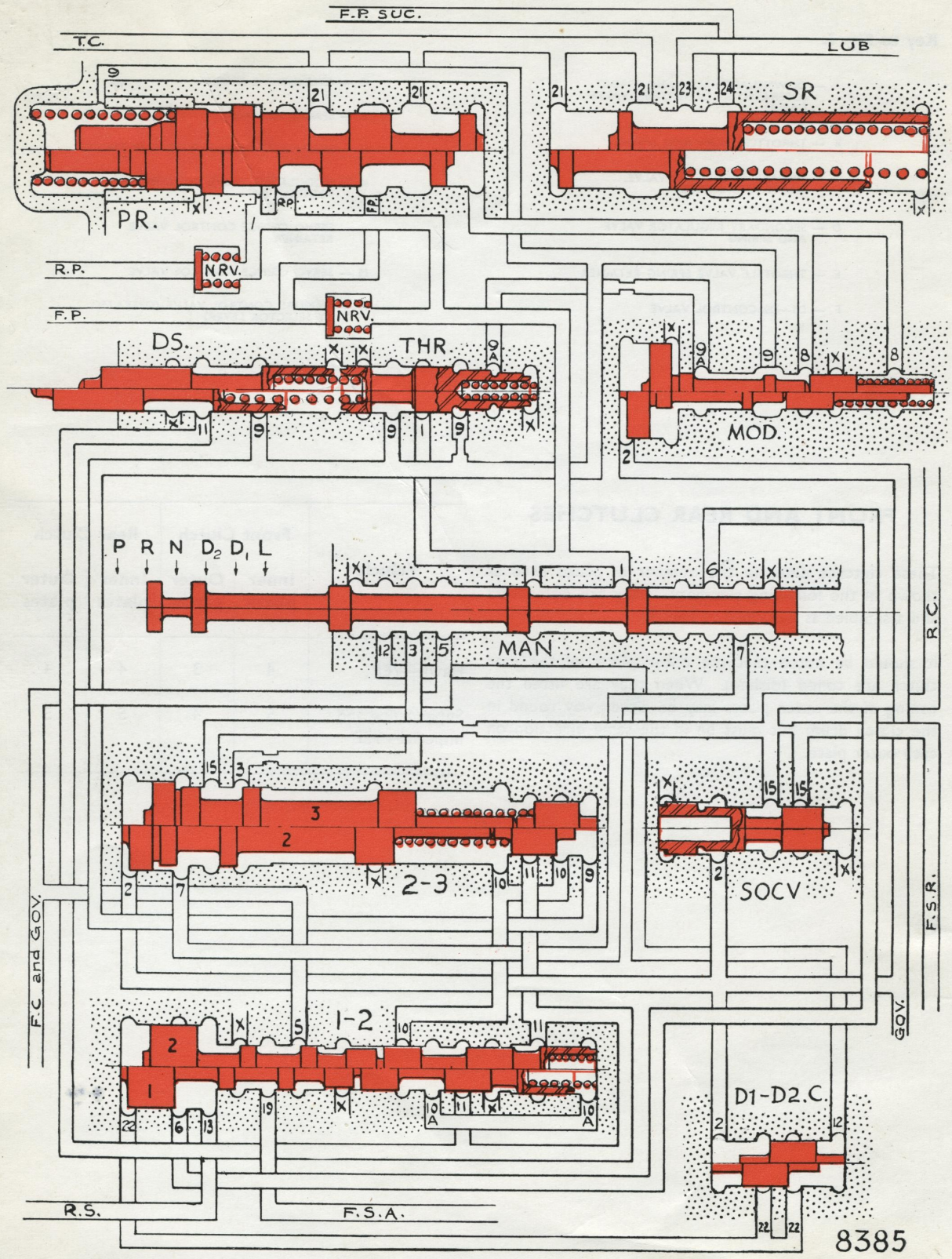


Fig. 8. *Hydraulic control system passages in valve body assembly with D1—D2 control valve—schematic*

Key to Fig. 8

TC	— TO CONVERTER
FP SUC	— FRONT PUMP SUCTION
LUB	— LUBRICATION
PR	— PRIMARY REGULATING VALVE
SR	— SECONDARY REGULATING VALVE
X	— EXHAUST
RP	— REAR PUMP FEED
FP	— FRONT PUMP FEED
NRV	— NON RETURN VALVES
DS	— DOWNSHIFT VALVE
THR	— THROTTLE VALVE
MOD	— MODULATOR VALVE
P R N D_2 D_1 L	— SELECTOR LEVER POSITIONS. PARK—REVERSE—NEUTRAL—DRIVE 2—DRIVE 1—LOCK-UP
MAN	— MANUAL VALVE
2—3	— 2—3 SHIFT VALVE—2ND GEAR POSITION TO LEFT, 3RD GEAR POSITION TO RIGHT
SOCV	— SERVO ORIFICE CONTROL VALVE
RC	— REAR CLUTCH
FSR	— FRONT SERVO RELEASE
GOV	— GOVERNOR
FC AND GOV	— FRONT SERVO AND GOVERNOR FEED
1—2	1—2 SHIFT VALVE—1ST GEAR POSITION TO LEFT, 2ND GEAR POSITION TO RIGHT
RS	— REAR SERVO
FSA	— FRONT SERVO APPLY
D1—D2 C	— D1 AND D2 CONTROL VALVE

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