WOLSELEY CAR CLUB INC.

The

AUTOMATIC TRANSMISSION

BORG WARNER MODEL 35

AUSTIN A/110 Mk. II, FREEWAY Mk. I and II
WOLSELEY 6/110 Mk. II, 24/80 Mk. I and II
MORRIS J2 VAN



THE BRITISH MOTOR CORPORATION (AUSTRALIA)
PTY. LIMITED

WOLSELEY CAR CLUB INC.

FISKE BROS.
BOX HILL

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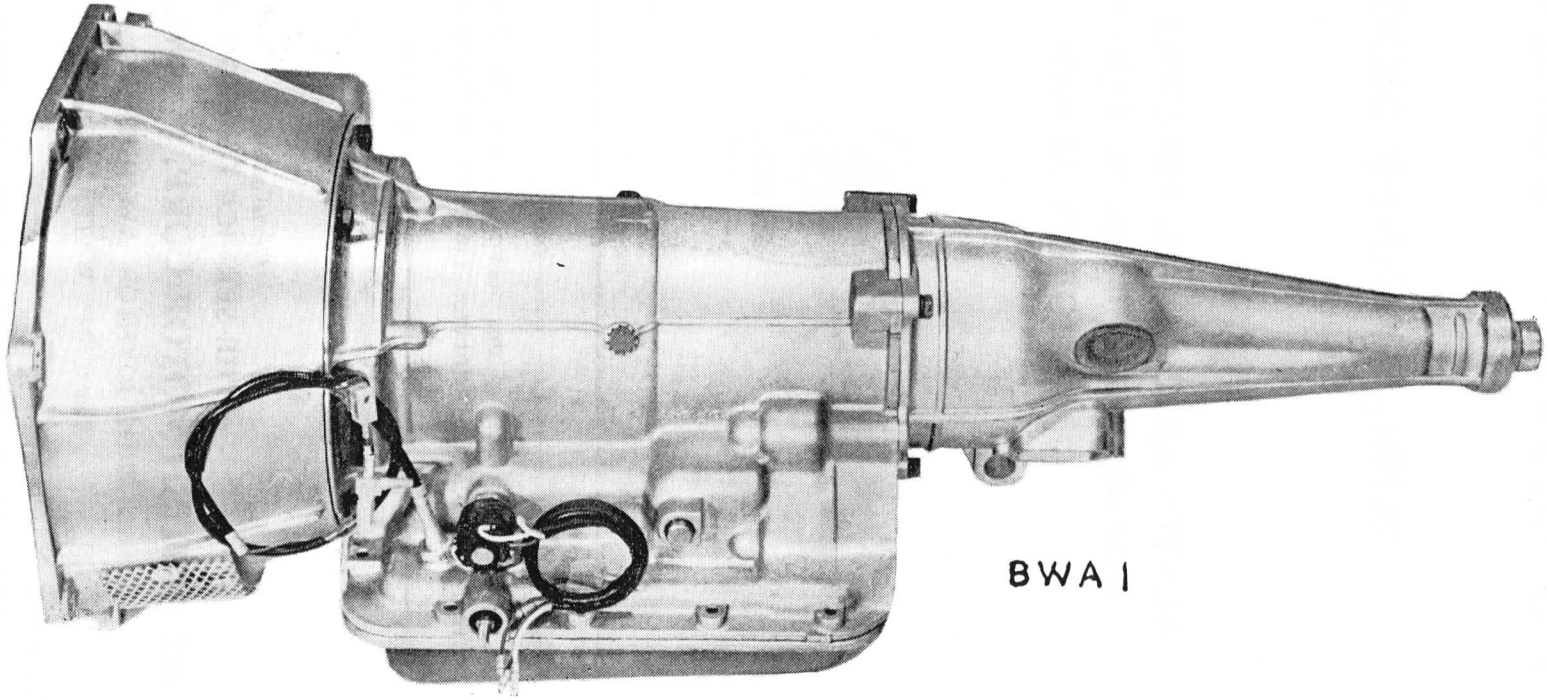
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THE AUTOMATIC TRANSMISSION

BORG WARNER MODEL 35



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FOREWORD

This Workshop Manual has been prepared by the Technical Staff of the Service Department, British Motor Corporation (Australia) Pty. Limited in order to provide essential information for the efficient operation, maintenance and repairs to the Borg Warner Model 35 Automatic Transmission fitted to the Wolseley 6/110 Mk. II; Austin A/110 Mk. II; Wolseley 24/80 Mk. I and II; Austin Freeway Mk. I and II: Morris J2 Van.

Illustrations, which are typical only, are used throughout to assist the owner, or repairer, to identify the various items and their relative position in assembly. Wherever possible each section is self contained. Where necessary sections are cross-referenced to avoid duplication when other sections are required to prevent unnecessary dismantling, etc.

Genuine replacement parts are readily available from the British Motor Corporation Distributor, Dealer and Stockist Organisation throughout the Commonwealth of Australia and overseas associates.

When ordering replacement parts from your B.M.C. Distributor, Dealer or Stockist *always* quote the Car Serial Number, which is located on the identification plate, and the Transmission Serial Number which is located on the left-hand side of the main transmission case.

The Transmission Serial Number incorporates a code reference to indicate the Model application as follows:

AS9 — 35EA	Wolseley 6/110 Mk. II Austin A/110 Mk. II	11 in. Converter
AS3 — 35EA	Wolseley 24/80 Mk. I and II Austin Freeway Mk. I and II	11 in. Converter
AS7 — 35EA	Morris J2 Van	$9\frac{1}{2}$ in. Converter



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THE AUTOMATIC TRANSMISSION

	Section
Driving, maintenance, and adjustments	A
Description and operation	B
Removing and replacing the transmission	C
Dismantling and assembling the components	D
Road test and systematic diagnosis	E
Service tools	F

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SECTION A

DRIVING, MAINTENANCE, AND ADJUSTMENTS

	Section
Adjustments	A.5
Description	A.1
Driving procedure	A.3
Maintenance	A.4
Selector	A.2

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Section A.1

DESCRIPTION

The automatic transmission incorporates a fluid torque converter coupling in place of the usual flywheel and clutch. The converter is coupled to a hydraulically operated planetary gearbox which provides three forward ratios and reverse. All forward ratios are automatically engaged in accordance with accelerator position and speed of the car.

Over-riding control with appropriate engine braking is available for the first and second gear ratios by manual selection of 'L'.

Section A.2

SELECTOR

Operation of the automatic transmission is controlled by a selector mounted beneath the steering-wheel. The position of the lever is indicated by a pointer and a quadrant, the quadrant being marked with the following five positions: 'L', 'D', 'N', 'R', 'P'. A stop plate is provided to prevent direct selection of 'P', 'R', or 'L' from either 'N' or 'D'; 'D' may be instantly engaged from 'N'.

Before engaging 'L', 'R', or 'P' pull the hand lever knob outwards. Before disengaging 'P' pull the hand lever knob outwards. Do not engage 'R' or 'P' while the car is in motion.

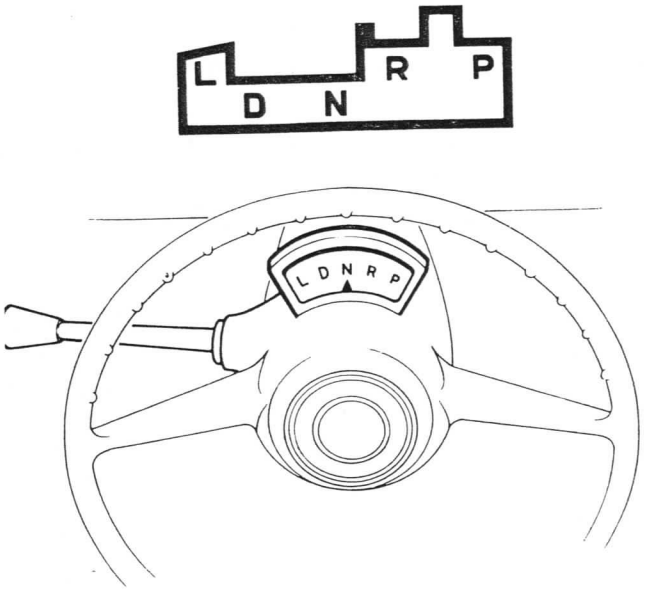


Fig. A.1

The selector lever, quadrant, and pointer.

'P' (park)

In the park position no engine power is transmitted to the rear wheels. The gearbox is mechanically locked by a parking pawl that engages with a gear on the driven shaft.

Use of the park position is recommended whenever the car is parked or when the engine is to be run for tuning or adjustment.

DO NOT SELECT 'P' WHEN THE CAR IS MOVING.

'R' (reverse)

This position provides a reverse ratio with full engine braking. DO NOT select 'R' when the car is moving forward.

'N' (neutral)

In the neutral position no engine power is transmitted to the rear wheels. The hand brake must be applied when the selector is at 'N' and the car is at rest.

'D' (drive)

The position for all normal driving. This position covers a fully automatic range of three ratios, all of which are engaged automatically and progressively up and down according to the vehicle speed and the position of the accelerator. Provided the vehicle speed is below a preset maximum, down-changes may be effected by fully depressing the accelerator past fult hrottle position (kick-down).

'L' (lock-up)

Provides over-riding control for the first or second gear ratios with appropriate engine braking.

When starting from rest with the selector in 'L' the transmission starts in first gear and will remain locked in that gear irrespective of road speed and accelerator position. This gear provides maximum engine braking.

When the transmission is in the third gear of the 'D' range the selection of 'L' will immediately give second gear ratio and moderate engine braking. A reduction in road speed to below 6 m.p.h. will automatically give first gear ratio. First gear may also be obtained at speeds of up to 20 m.p.h. by fully depressing the accelerator (kick-down).

Section A.3

DRIVING PROCEDURE

A starter inhibitor switch embodied in the gearbox ensures that the starter will only operate when the selector is in the 'P' or 'N' position. With 'N' selected, apply the hand or foot brake before starting the engine.

NOTE.—Always select 'P' or 'N' before attempting to start the engine.

When the engine has been started from cold with the use of the mixture control, stalling will be avoided if this control is left out just sufficiently to increase idling speed until the engine has warmed up. The more apparent transmission engagement under these conditions is not detrimental to the car or to the transmission.

Normal driving

After starting the engine, release the accelerator, apply the foot brake, and move the selector lever to the appropriate forward or reverse position. Release the brake and depress the accelerator.

With the selector in 'D', all forward ratios up or down will be automatically and progressively engaged as the speed of the car increases or decreases; thus,

all ratio changes are automatically made to suit the speed of the car as well as the torque demand.

Minimum accelerator pressure will result in low-speed up-changes. If the accelerator is depressed up to the detent the up-changes will occur at higher road speeds; depressing the accelerator past the detent will produce up-changes at maximum road speeds.

Irrespective of the accelerator position, starts from rest are always smooth, but the usual delicacy of accelerator control is necessary on slippery surfaces and for maximum fuel economy.

Increased acceleration

When a lower gear ratio is required for rapid overtaking or hill-climbing, kick-down changes are fully under the driver's control except that the maximum down-change speeds for the 3-2, 3-1, and 2-1 gear ratios are preset to give optimum performance without over-speeding the engine. Kick-down does not operate at speeds above 46 m.p.h. for a 3-2 change and 25 m.p.h. for a 2-1 change.

Engine braking

When descending steep hills use the foot brake to reduce the road speed to below 55 m.p.h., when 'L' may be selected. The transmission will instantly change to second gear and thus provide appropriate engine braking. See **'"L" (lock-up)'** for the first gear kick-down when maximum engine braking is required.

When the descent has been made, select 'D' and proceed as for normal driving.

Driving on soft surfaces

When the rear wheels fail to grip a surface due to snow, mud, or sand the car may be rocked backwards and forwards by alternately selecting 'R' and 'D' with a small throttle opening.

Stopping

To stop the car release the accelerator and apply the brakes in the normal way.

Parking

Stop the car, select 'P', and apply the hand brake as an additional precaution.

Emergency starting

The car may be push- or tow-started; pushing is recommended as it avoids danger of the car over-running the towing vehicle.

Select 'N', switch on the ignition, set the mixture control, and release the hand brake. Allow the car to attain a road speed of approximately 30 m.p.h., then select 'D'.

Towing for recovery

Before towing always check the fluid level in the transmission case, and top up if necessary.

If there is any reason to suspect that the transmission is faulty or damaged, the propeller shaft must be removed or, alternatively, the rear wheels lifted from the ground before towing commences.

Tow in 'N' and ensure that the hand brake has been released.

Section A.4

MAINTENANCE

In territories where ambient temperatures are unusually high, dust and/or mud must not be allowed to decrease the effective areas of the stoneguards in the converter housing.

On cars which are frequently used on unmade roads the transmission oil pan must not be allowed to remain caked in mud, which would act as a temperature insulator.

Checking fluid level

The gearbox filler tube with breather and dipstick is located under the bonnet just forward of the bulkhead; checking the level is recommended every 3,000 miles approximately.

The car should be on a level surface and the transmission should be at normal running temperature, i.e. as reached after about five miles of driving. Select 'P' and allow the engine to idle for two minutes. With the engine still idling in 'P', wipe the dipstick with a non-fluffy rag or clean paper, insert, and withdraw immediately. If necessary, add fluid to bring the level to the 'high' mark. The difference between the 'low' and 'high' marks on the dipstick is 1 Imp. pint. DO NOT OVERFILL.

Frequent need for topping up is indicative of leakage, which should be rectified immediately to prevent damage to the transmission.

Fluid changes

Periodic fluid changes are not recommended.

The transmission is filled initially with Caltex Taxamatic 4571 A Automatic Transmission Fluid and may be topped up only with a fluid which meets the specification, of Armour qualified Type A Suffix A.

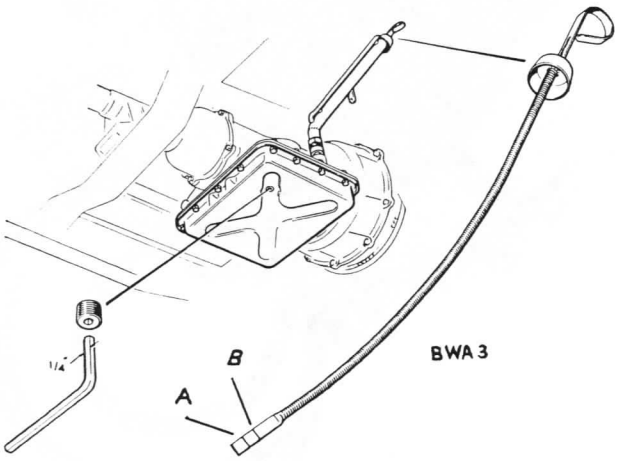


Fig. A.2

The dipstick, showing A Low mark, B High mark.

If for any reason, the transmission is to be refilled with fluid, such as after band adjustment, then one of the following fluids must be used:—

— Ampol fluid F
— Caltex Texamatic 4571A
— Golden Fleece ATF type 33
— Castrol TQF
— Shell ATF type B
— Neptune ATF—B
— Energol ATF—B

No other fluid should be used for refilling.

As further fluids are approved, they will be advised.

The initial capacity is 13 pints.

Section A.5

ADJUSTMENTS

Down-shift valve cable

Under normal operating conditions no periodic adjustments are required. The adjustment is preset by means of a crimped cable stop at the carburetter end of the inner cable.

Correct adjustment of the down-shift valve cable is most important for satisfactory operation of the transmission. It may be checked by use of an engine tachometer and a line pressure gauge connected to the transmission. First verify that the cable stop at the carburetter end is correctly located.

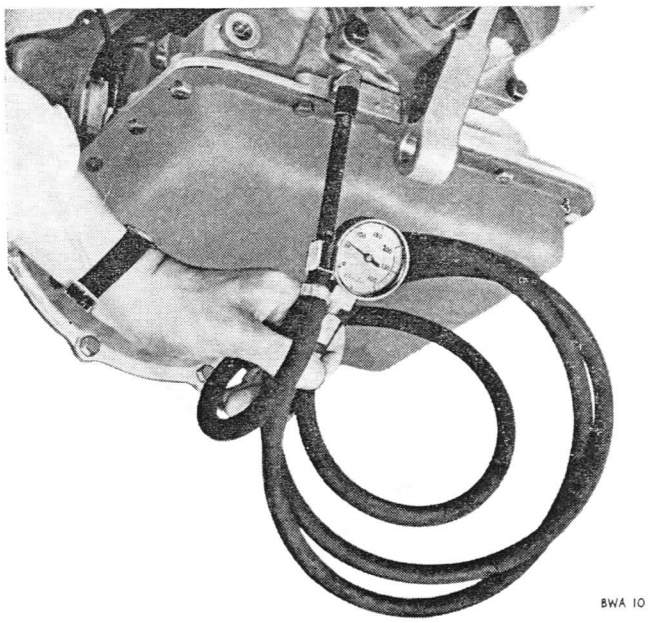


Fig. A.3
Point of attachment for line pressure gauge.

NOTE.—The cable is impregnated with graphite or molybdenum disulphide lubricant and must not be oiled.

Adjust engine idle speed to correct setting, with brakes applied select "D" and increase speed by 500 r.p.m. Line pressure should increase by 15-20 p.s.i. or in the case of Austin Freeway/Wolseley 24/80 Mk. I and II by 15-40 p.s.i. If the pressure rise is less, the effective length of the outer cable should be increased by means of the adjuster provided. Conversely if the rise in pressure is more than the specified figure, then the effective length of the cable should be decreased.

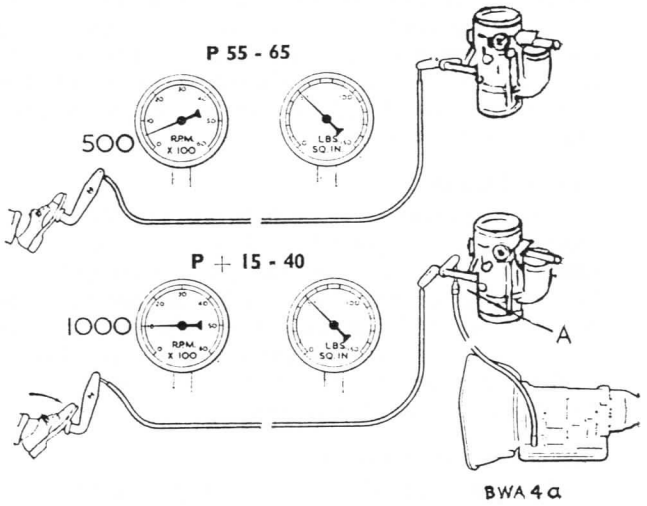


Fig. A.4

Diagramatic Down-shift cable. Adjustment A indicates adjuster.

The effects of cable maladjustment are as follows:

Outer cable too short . . (*a*) Clutch break-away noise on take-off in 'D' or 'R'.

(*b*) Difficulty in obtaining 3-2 kick-down shift at high speed.

Outer cable too long . . (*a*) Delayed and bumpy minimum and part-throttle up-shifts.

(*b*) 3-2 down-shift at 25 m.p.h. occurs before accelerator pedal detent.

Manual linkage

Disconnect the linkage from the transmission lever and select 'N' on the quadrant; place the transmission lever in the neutral position of the five. Adjust the linkage if necessary and reconnect. Check in all five positions. The linkage must never be allowed to over-ride the transmission detent, i.e. a definite 'click' must be felt in each position.

Now check that the gating is correct, i.e. 'N' and 'D' on the same level of the quadrant, pull out for 'L', 'R' and 'P', also for disengagement of 'P'.

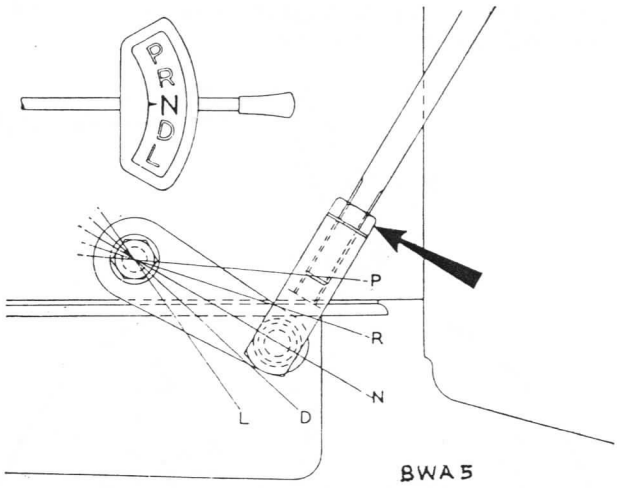


Fig. A.5

Manual linkage adjustment locknut.

Starter inhibitor switch

The switch is wired as follows:

Contact No.	*Function*	*Recognition*
1) 3)	Reversing light.	Bent lugs. 45° Angle
2) 4)	Starter inhibitor.	Yellow band 90° Angle

Note: (a) Aroung inhibitor terminals 1 and 3, the bakelite moulding is raised to facilitate identification when terminals have inadvertently become bent.

(b) Earlier switches were of 1-3/16" diameter and the 45° lugs (reversing light) were adjacent whereas they are now opposite.

In a case of malfunction disconnect the four switch leads from the vehicle wiring.

The vehicle wiring can readily be checked by joining together vehicle leads '1' with '3' and '2' with '4'. Both the starting control and reversing light should then operate in all selector positions.

Adjusting the switch

CAUTION.—Apply the brakes as the vehicle may move off if the engine is started in 'D', 'L', or 'R'. Before adjusting the switch check the manual linkage adjustment.

To adjust the switch place the selector lever in 'D' or 'L'. Place a small battery and bulb across terminals '1' and '3' and another across terminals '2' and '4'.

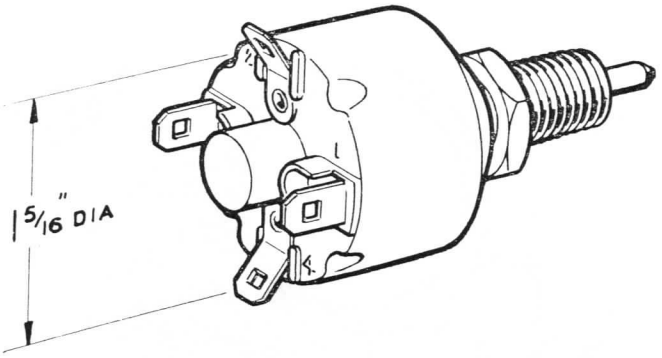


Fig. A.6

Starter inhibitor switch.

Screw the switch into the main case until contacts '2' and '4' break; note the position of the switch in relation to the case. Screw the switch in further until contacts '1' and '3' make. Then turn the switch back until it is midway between this point and the first point. Tighten

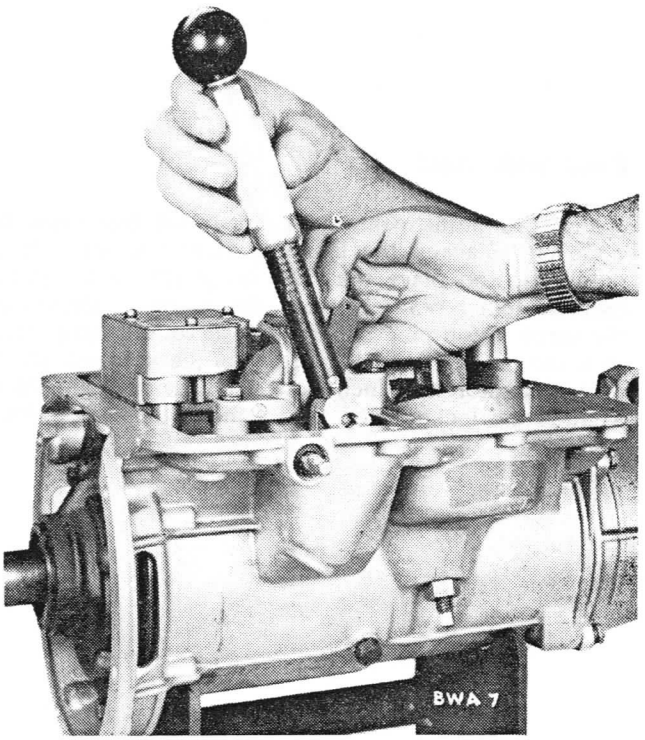


Fig. A.7

Front band adjustment.

the locknut, using Service tool BW547A-50-3, refit the switch leads to the appropriate connectors, and verify that the starting control operates only when the selector

C

is in 'P' or 'N' and not in 'D', 'L', or 'R'. Verify also that the reversing light, if fitted, operates only when the selector is in 'R'.

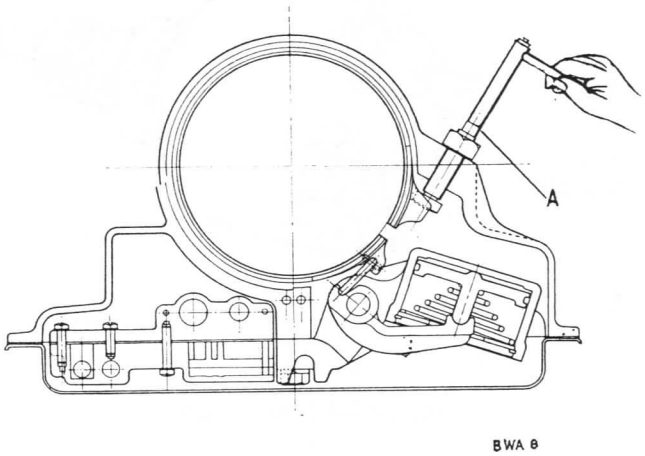


Fig. A.8

Rear band adjustment, showing the adjuster (A), *locknut and Service Tool BWA7196.*

If the switch now fails to operate correctly, renew it.

Front brake band

For this adjustment the gearbox oil pan must be removed. Slacken the locknut, move the servo lever outwards, and place the .250 in. gauge block spacer (Service tool BW34) between the adjusting screw and the servo piston pin. Tighten the servo adjusting screw to a torque of 10 lb. in., using torque spanner, screw driver adaptor and inch pound torque wrench TW1. Tighten the locknut and then remove the gauge block spacer.

Rear brake band (from Transmission Serial No. EA19203)

This band has an external adjusting screw of 9/16 in. dia. in the right-hand wall of the transmission case. Slacken the locknut and tighten the adjusting screw to a torque of 120 lb./in. using torque wrench TWI and adjuster BWA 7196. Back off the adjusting screw 3/4 of a turn and tighten the locknut.

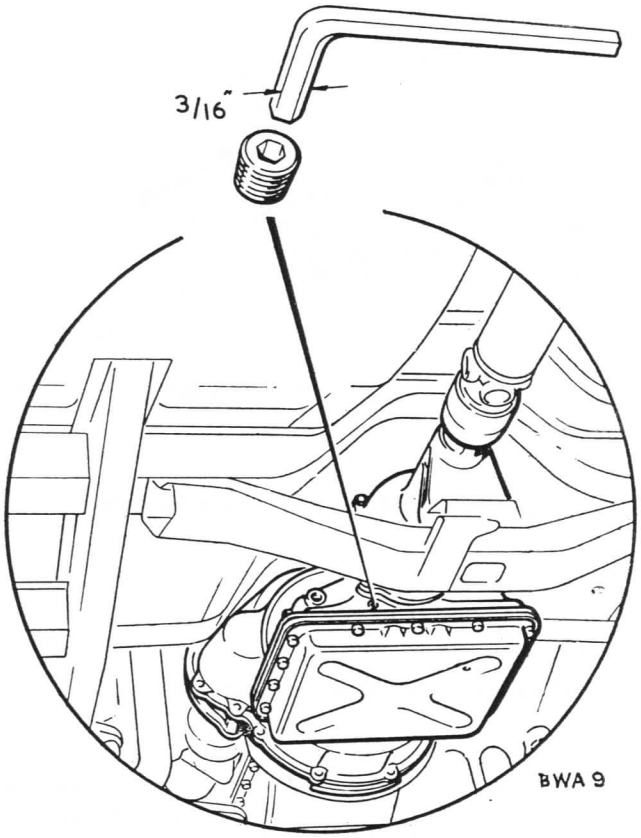


Fig. A.9

The transmission pressure take off point.

Note: Earlier models of this transmission were fitted with an adjusting screw of 7/16 in. dia. and finer thread. To adjust this type, tighten the adjusting screw to a torque of [redacted] lb./in. then back off one complete turn.
120 lb./in.

SECTION B

DESCRIPTION AND OPERATION

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Front pump	B.5
Gear set, clutches, and bands	B.2
Governor	B.7
Hydraulic system	B.4
Mechanical power flow	B.3
Rear pump	B.6
Table of hydraulic circuits	End of Section
Torque converter	B.1

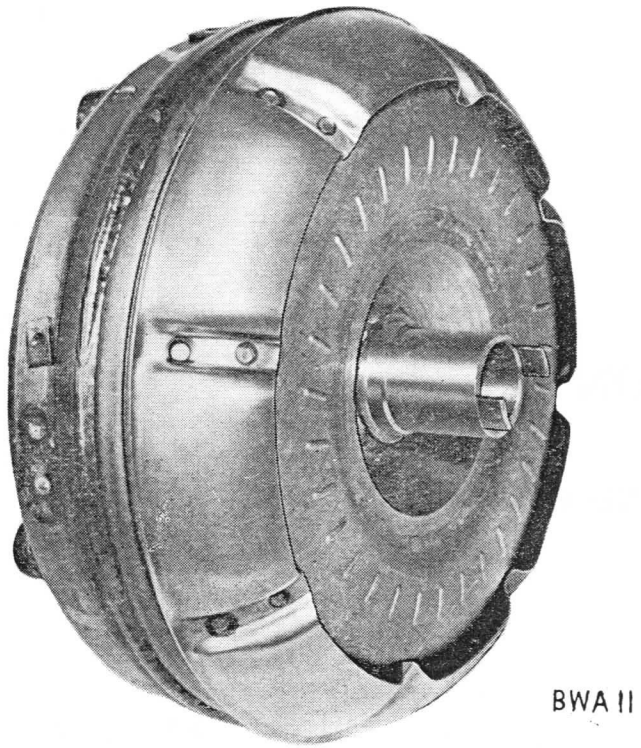


Fig. B.1
The torque converter.

Section B.1

TORQUE CONVERTER

The feature of using a hydraulic converter in conjunction with a three-speed automatic gearbox provides a means of obtaining a smooth application of engine power to the driving wheels and additional engine torque multiplication to the first and second gears of the gearbox.

The converter also provides extreme low-speed flexibility when the gearbox is in third gear, and, due to the ability of multiplying engine torque, it provides good acceleration from very low road speed without having to resort to a down-shift in the gearbox.

Torque multiplication from the converter is infinitely variable between the ratios of 2 : 1 and 1 : 1. The speed range, during which torque multiplication can be achieved, is also variable, depending upon the accelerator position.

The hydraulic torque converter for use in conjunction with the automatic gearbox is either a $9\frac{1}{2}$" or 11" in diameter.

It is of the single-phase, three-element type, comprising an impeller connected to the engine crankshaft, a turbine connected to the input shaft of the gearbox, and a stator mounted on a sprag-type, one-way clutch supported on a fixed hub projecting from the gearbox case.

Operation

The impeller is rotated by the engine and converts the engine power into hydrokinetic energy. The fluid flows from the impeller vanes to the turbine vanes and returns to the impeller through the stator vanes. The curvature of the various vanes is so designed that when a speed differential exists between the impeller and the turbine, the angle of the fluid flow from the turbine is changed by the stator vanes in such a way that the discharge of fluid from the stator assists in driving the impeller. Under such conditions, torque multiplication occurs and varies from 2 : 1 when the turbine is stalled (i.e. when the vehicle is stationary) to 1 : 1 when the turbine reaches a speed approximately 90% of the impeller. When this speed differential between the impeller and turbine is achieved, the fluid flow angle from the turbine is such that the stator is driven in the same direction as the turbine and the impeller. Under these circumstances, the converter becomes a fluid flywheel or coupling and there is no torque multiplication.

Section B.2

GEAR SET, CLUTCHES, AND BANDS

Gear set

The planetary gear set consists of two sun gears, two sets of pinions, a pinion carrier, and a ring gear. Helical, involute tooth forms are used throughout. Power enters the gear set via the sun gears. In all forward gears power enters through the primary sun gear, in reverse power enters through the secondary sun gear. Power leaves the gear set by the ring gear. The pinions are used to transmit power from the sun gears to the ring gear. In reverse a single set of pinions is used, which causes the ring gear to rotate in the opposite direction to the sun gear. In forward gears a double set of pinions is used to cause the ring gear to rotate in the same direction as the sun gear. The carrier locates the pinions in their proper positions relative to the sun gears and the ring gear (and also forms a reaction member for certain conditions). The various mechanical ratios of the gear set are obtained by the engagement of hydraulically operated multi-disc clutches and brake bands.

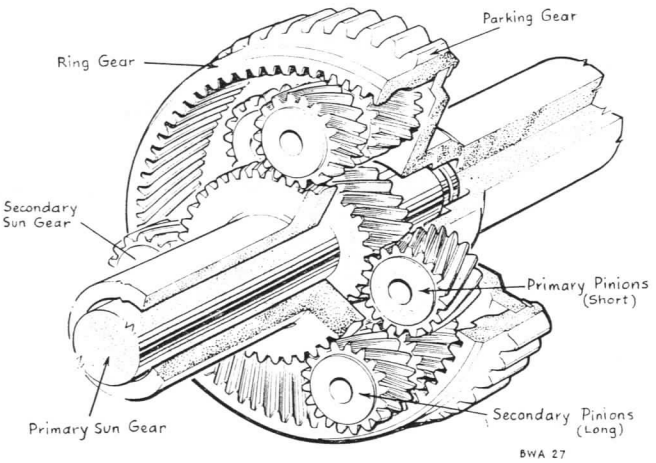


Fig. B.2

Clutches

Multi-disc clutches operated by hydraulic pistons connect the converter to the gear set. In all forward gears the front clutch connects the converter to the forward sun gear; for reverse the rear clutch connects the converter to the reverse sun gear.

Bands

Brake bands, operated by hydraulic servos, hold elements of the gear set stationary to effect an output speed reduction and a torque increase. In lock-up the rear band holds the pinion carrier stationary and provides the first gear ratio of 2.39 : 1 and, in reverse, a ratio of 2.09 : 1. The front band holds the reverse sun gear stationary to provide the second gear ratio of 1.45 : 1.

One-way clutch

In drive a one-way clutch is used in place of the rear band to prevent anti-clockwise rotation of the pinion carrier, thus providing the first gear ratio of 2.39 : 1. This one-way clutch, allowing the gear set to free-wheel in first gear, provides smooth ratio changes from first to second, and vice versa.

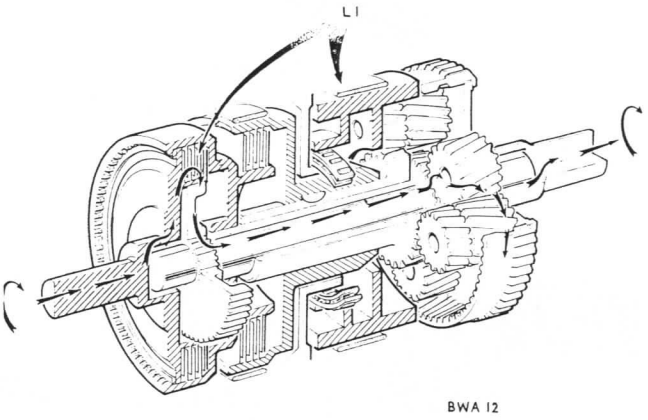


Fig. B.3
Mechanical power flow in 'L1'.

Section B.3

MECHANICAL POWER FLOW

First gear (lock-up selected) L1

The front clutch is applied, connecting the converter to the primary sun gear. The rear band is applied, holding the pinion carrier stationary; the gear set provides the reduction of 2.39 : 1. The secondary sun gear rotates freely in the opposite direction to the forward sun gear.

First gear (drive selected) D1

The front clutch is applied, connecting the converter to the forward sun gear. The one-way clutch is in operation, preventing the pinion carrier from rotating anti-clockwise; the gear set provides the reduction of 2.39 : 1. When the vehicle is coasting the one-way clutch over-runs and the gear set free-wheels.

Second gear (lock-up or drive selected) D2 & L2

Again the front clutch is applied, connecting the converter to the primary sun gear. The front band is applied, holding the secondary sun gear stationary; the gear set provides the reduction of 1.45 : 1.

Third gear D3

Again the front clutch is applied, connecting the converter to the primary sun gear. The rear clutch is applied, connecting the converter also to the secondary sun gear; thus both sun gears are locked together and the gear set rotates as a unit, providing a ratio of 1 : 1.

Neutral and park

The front and rear clutches are off, and no power is transmitted from the converter to the gear set. The front and rear bands are also released, except in 'P', where for constructional reasons the rear band is applied as long as the engine is running.

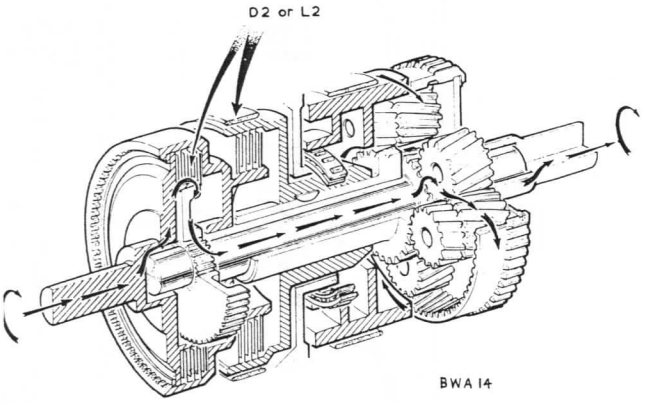


Fig. B.5
Mechanical power flow in 'D2' or 'L2'.

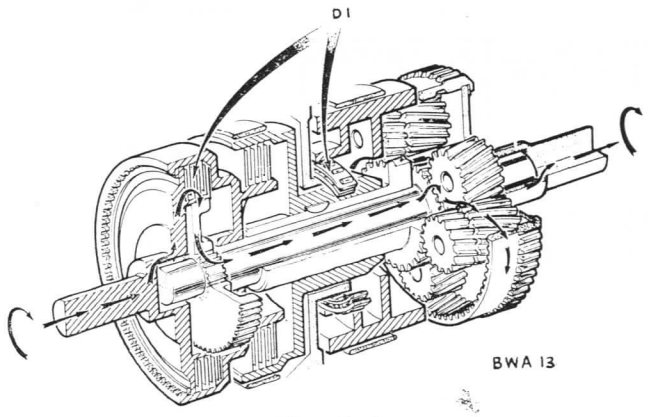


Fig. B.4
Mechanical power flow in 'D1'.

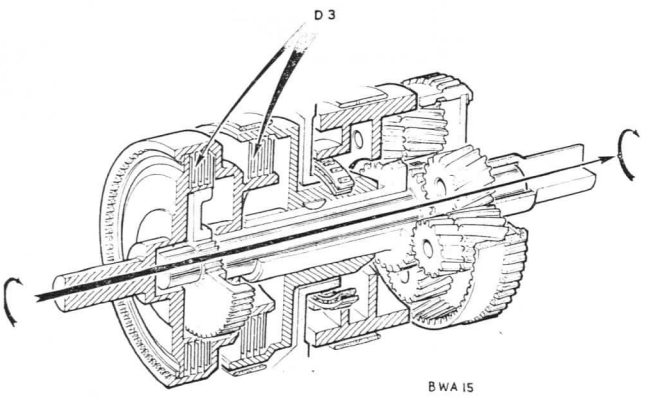


Fig. B.6
Mechanical power flow in 'D3'.

Reverse gear

The rear clutch is applied, connecting the converter to the reverse sun gear. The rear band is applied, holding the pinion carrier stationary; the gear set provides the reduction of 2.09 : 1 in the reverse direction.

Section B.4

HYDRAULIC SYSTEM

The hydraulic system contains a front and rear pump, both of the internal/external gear pattern, picking up fluid from the oil pan through separate strainers and check valves. Shift control is provided by a centrifugally operated hydraulic governor on the transmission output shaft. This governor works in conjunction with valves in the valve bodies assembly located in the base of the transmission. These valves regulate fluid pressure and direct it to appropriate transmission components.

Section B.5

FRONT PUMP

The front pump, driven by the converter impeller, is in operation whenever the engine is running. This

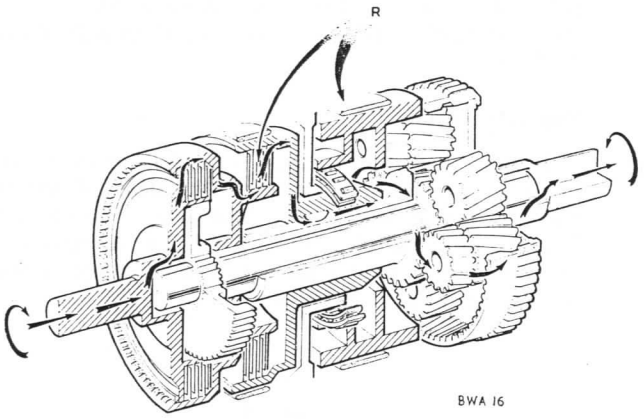


Fig. B.7
Mechanical power flow in 'R'.

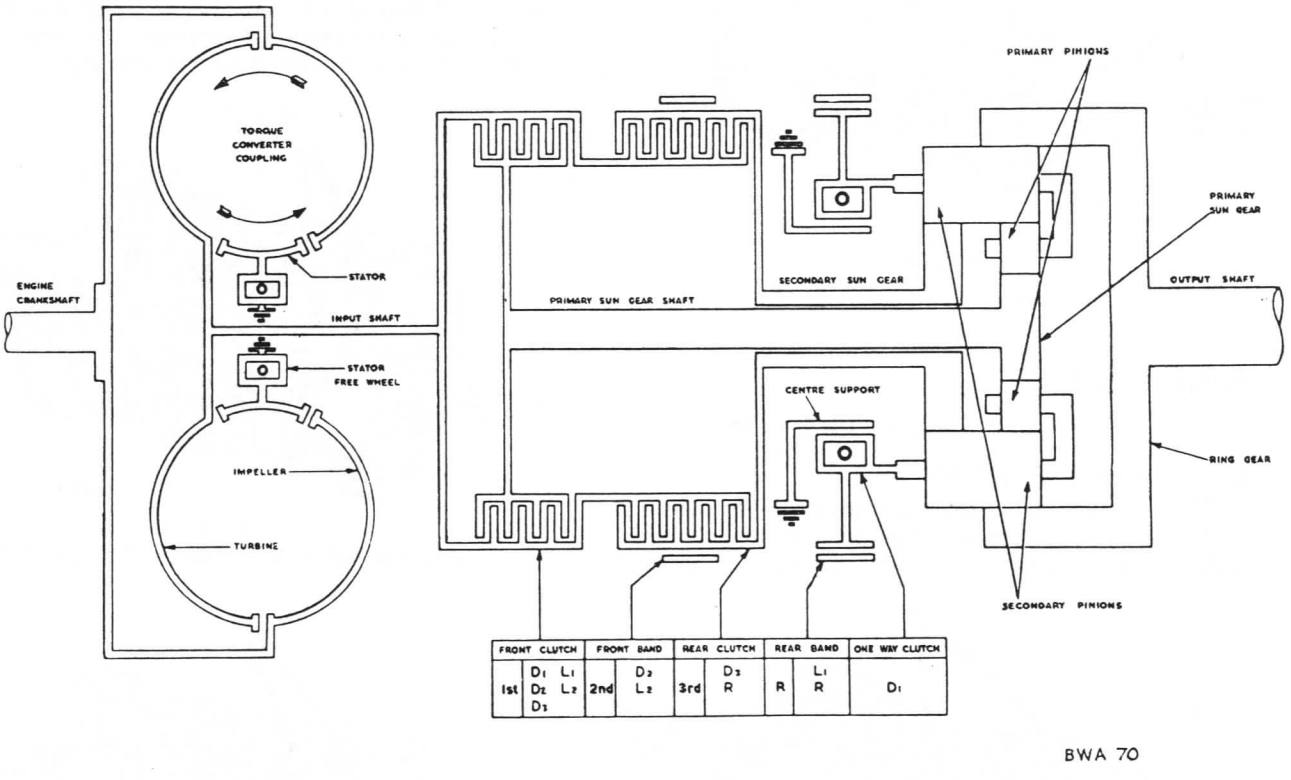


Fig. B.8
Mechanical power flow

pump, through the primary and secondary regulator valves, supplies the hydraulic requirements of the transmission with the engine running when the vehicle is stationary, as well as at low vehicle speeds before the rear pump becomes effective. When the rear pump is effective the front pump check valve closes, but a by-pass permits the pump to still supply the converter and lubrication requirements in conjunction with the rear pump; it then operates at the reduced pressure regulated by the secondary regulator valve, excess flow exhausting to inlet and thus minimizing pump losses.

Section B.6

REAR PUMP

The rear pump is driven by the output shaft of the transmission. It is fully effective at speeds above 20 m.p.h. approximately and then supplies the hydraulic requirements of the transmission. If, due to a dead engine, the front pump is inoperative, the rear pump, above 20 m.p.h., can provide all hydraulic requirements, thus enabling the engine to be started through the transmission.

Section B.7

GOVERNOR

The governor, revolving with the driven shaft, is basically a pressure-regulating valve which reduces line pressure to a value that varies with output shaft (i.e. vehicle) speed. This variable pressure is utilized in the control system to effect up- and down-shifts through the 1-2 and 2-3 shift valves. Rotation of the governor at low speeds causes the governor weight and valve to produce a centrifugal force. This outward force is opposed by an equal and opposite hydraulic force produced by governor pressure acting upon a small area of the governor valve. Because the governor valve is a regulating valve and will attempt to remain in equilibrium, governor pressure will rise in accordance with the increase in centrifugal force caused by increased rotational speed.

As speed increases, the governor weight moves outwards to a stop in the governor body, when it can move no farther. When this occurs a spring located between the weight and the governor valve becomes effective. The constant force of this spring then combines with the centrifugal force of the governor valve, the total then being opposed by governor pressure, thus rendering governor pressure less sensitive to output shaft speed variations.

Thus, the governor provides two distinct phases of regulation, the first being used for accurate control of the low-speed shift points.

Section B.8

CONTROL SYSTEM

The control system utilizes three basic types of valve: regulating valves, shuttle valves, and a manual valve.

Pressure control is provided by the primary and secondary regulator valves, the former operating in conjunction with throttle pressure acting upon the spring end and modulated throttle pressure acting on the opposite end.

Shift control is provided by 1-2 and 2-3 shift valves operated by governor pressure acting upon one end and throttle pressure acting upon the spring end, line pressure acting upon differential areas providing shift speed hysteresis.

Manual control is provided by the manual valve, which, according to the position of the selector, directs fluid to or provides an exhaust for clutch and servo pistons.

For ease of reference all hydraulic circuits are identified by numbers (see page B.15).

Primary regulator valve

This valve regulates front pump pressures during idling, reversing, and at low vehicle speeds, and rear pump pressure when, as a result of increased vehicle speed, the rear pump becomes effective. Rear pump regulation occurs when rear pump pressure exceeds front pump regulated pressure. This pressure differential opens the rear pump check valve, allowing rear pump fluid to flow to the primary regulator valve and supply the line pressure requirements. Front pump pressure is then no longer regulated by the primary regulator valve but flows through this valve to the secondary regulator valve.

Line pressure (1), operating on a small area of the valve, can be decreased by modulated throttle pressure (8) (described later) operating on one end of the valve. These forces are opposed by the primary regulator valve spring and throttle pressure (9) (described later) operating on the spring end of the valve. The line pressure thus produced varies with accelerator position as well as vehicle speed and provides the correct clutch and brake band capacity under all operating conditions. This line pressure (1) is directed to the manual valve and throttle valve.

Secondary regulator valve

This is a regulating valve which controls the values of converter pressure (21) and lubrication (23) for the components in the rear of the transmission case. Converter pressure operating on one end of the valve is opposed by spring force on the other end. When the front pump capacity increases due to increased engine speed, the valve moves to open a port that directs fluid (24) to the suction side of the front pump. Thus, at high speed excess front pump output is directed back to minimize pumping losses.

Down-shift valve and throttle valve

The down-shift valve is connected to the carburetter linkage via a cable-actuated cam. Movement of the down-shift valve compresses the throttle valve spring located between the down-shift valve and the throttle valve. This spring is opposed by the throttle return spring, combined with throttle pressure (9) acting (at

low vehicle speed) on one area of this regulating valve and at high vehicle speed on two areas (9 and 9A). Thus a throttle pressure is produced that is related to both engine torque and vehicle speed. This pressure (9) is directed to the spring end of the primary regulator valve to vary the basic line pressure (1) accordingly, thus providing correct clutch and brake band capacities and appropriate shift quality under all operating conditions.

Full movement of the down-shift valve, which is a shuttle valve, directs throttle pressure (11) to additional areas on the shift valves to further delay up-shifts or effect 3-2 or 3-1 down-shift at preset maximum vehicle speeds.

Throttle pressure (9) is directed also to the 2-3 shift plunger, which at part-throttle openings reduces the value of throttle pressure by a fixed amount. This reduced pressure (10) is directed to the 1-2 and 2-3 shift valves to render the low-speed shift points less sensitive to throttle pressure and, therefore, accelerator position.

Modulator plug and valve

The modulator plug is a regulating valve that reduces throttle pressure (9) by a fixed amount. This modulated pressure (8) operating on one end of the plug, assisted by the modulator valve spring, is opposed by throttle pressure (9) operating on the opposite end. Modulated throttle pressure (8) is directed to the primary regulator valve to vary the rate of increase of line pressure (1) relative to throttle pressure.

The modulator valve is a shuttle valve. Governor pressure (2) operating on the large end is opposed by the modulator valve spring. As governor pressure rises the valve moves, preventing the plug from regulating, and modulated throttle pressure (8) then becomes equal to throttle pressure (9). Moreover, this movement directs throttle pressure (9 and 9A) to a second area of the throttle valve, opposing throttle valve spring force. This arrangement permits high throttle and line pressure under stall (and part-throttle) conditions with a reduction in these pressures after 'cut-back'.

Servo orifice control valve

A common line (15) supplies fluid to, or exhausts fluid from, the rear clutch and the release area of the front servo to effect the 2-3 and 3-2 shifts.

The servo orifice control valve is a shuttle valve interposed in the front servo release circuit. Governor pressure (2) operating on an area of the valve is opposed by the valve spring. At a 2-3 shift with low governor pressure (i.e. low vehicle speed) fluid goes without restriction to the release side of the front servo piston. At a 2-3 shift with higher governor pressure, however, the valve moves and fluid is directed through an orifice to this side of the piston.

During up-shifts, with the servo orifice in circuit, the front band does not release too quickly relative to rear clutch engagement, thus avoiding 'run-up' during the transition from 2 to 3. During down-shifts the orifice in circuit ensures that the front band does not engage before the rear clutch releases, thus avoiding 'tie-up' on the 3-2 shift.

The servo orifice control valve, therefore, affects the relationship between the rear clutch and front servo to provide correct shift timing under all operating conditions.

1-2 shift valve and plunger

Both are shuttle valves and operate in unison in 'D' selector position. Governor pressure (2), operating on the large end of the valve, is opposed by reduced throttle pressure (10, 10A) from the 2-3 shift plunger as well as the spring operating on the opposite end of the plunger. When governor force exceeds the spring force combined with reduced throttle pressure force the valve moves to the second gear position and line pressure (5) is directed to the apply side of the front servo piston (19). Movement of the valve also introduces line pressure (5) to a differential area on the valve to further assist governor force. This allows the 2-1 down-shift to occur at a lower speed than the 1-2 up-shift. The difference between the up-shift and down-shift speed is known as 'shift point hysteresis'. When governor pressure plus line pressure are less than the spring force combined with the reduced throttle pressure force, the valve moves to the first gear position and the apply side of the front servo (19) is opened to exhaust (x).

In lock-up, with low governor pressure (2), the valve also moves to the first gear position; line pressure (6) thus directed to the rear servo (13) latches the valve hydraulically in the first gear position, preventing an up-shift.

2-3 shift valve and plunger

The 2-3 shift valve plunger is a regulating valve that reduces the value of throttle pressure (9) by a fixed amount and therefore is inoperative when throttle pressure is below this fixed amount. Throttle pressure (9), operating on one end of the plunger, is opposed by this reduced throttle pressure (10) and the 2-3 shift valve spring located between the plunger and valve. This reduced pressure is directed to the 2-3 shift valve and the 1-2 shift plunger as described under **'Down-shift valve and throttle valve'.**

The 2-3 shift valve is a shuttle valve. In the second gear position, and before the plunger begins regulating, governor pressure (2), operating on the large end of the valve, is opposed by line pressure (3) operating on an area of this valve, as well as the 2-3 shift valve spring. Once the plunger begins regulating, the spring no longer exerts a force on the valve but relays the force of the plunger to the valve. Under these conditions governor pressure (2), operating on the large end of the valve, is opposed by line pressure (3) operating on an area of the valve, reduced throttle pressure (10) operating on the small end of the valve, and throttle pressure (9) operating on the end of the plunger. This last force is relayed to the 2-3 shift valve by the valve spring.

Movement of the shift valve to the third gear position directs fluid via the common line (15) to the rear clutch, and, via the servo orifice control valve, to the release side of the front servo. This pressure causes the rear clutch to be applied. Moreover, because the

release area of the front servo is larger than the apply area it causes the front band to be released. The movement also results in an area of the valve being no longer subjected to line pressure (3); this prevents regulation of the plunger forced to the end of the valve bore. Thus reduced throttle pressure (10) is replaced by throttle pressure (9). This change in forces effects the shift point hysteresis and causes the 3-2 shift point to occur at a lower governor pressure (i.e. vehicle speed) than the 2-3 up-shift.

When the manual valve is moved to the lock-up position line pressure (15), which was directed to the 2-3 shift valve and consequently to the rear clutch and front servo release, is exhausted through a port (x) at the opposite end of the manual valve collar. This inevitably results in an immediate down-shift to second gear regardless of the position of the 2-3 shift valve and no third gear is possible.

In 'R', line pressure (7) is directed to an area of the shift valve, latching it hydraulically, and hence to the rear clutch and front servo release (15).

Manual control valve

This valve, actuated by movement of the selector, directs line pressure to, or exhausts from, the appropriate valves or components in accordance with control requirements.

Park

Movement of the selector mechanically engages the parking pawl with the externally toothed ring gear on the driven shaft, effectively immobilizing the vehicle. No fluid is directed to the front clutch or 2-3 shift valve for the rear clutch, therefore the gear set is disconnected from the converter and no engine power is transmitted to the rear wheels. Because of the arrangement of the manual control valve ports for other selector positions, line pressure (6) is directed to the rear servo (13).

Reverse

Line pressure (6) is directed to the rear servo (13) via the 1-2 shift valve and also (7) to the rear clutch (15) via the 2-3 shift valve. No pressure is directed to the governor.

Neutral

Both clutches and servos are exhausted, because circuits (3) and (5) are open to a port (x) nearest to the manual valve collar. Therefore the gear set is disconnected from the converter and no engine power is transmitted to the rear wheels.

Drive

Line pressure (5) is directed to the front clutch,

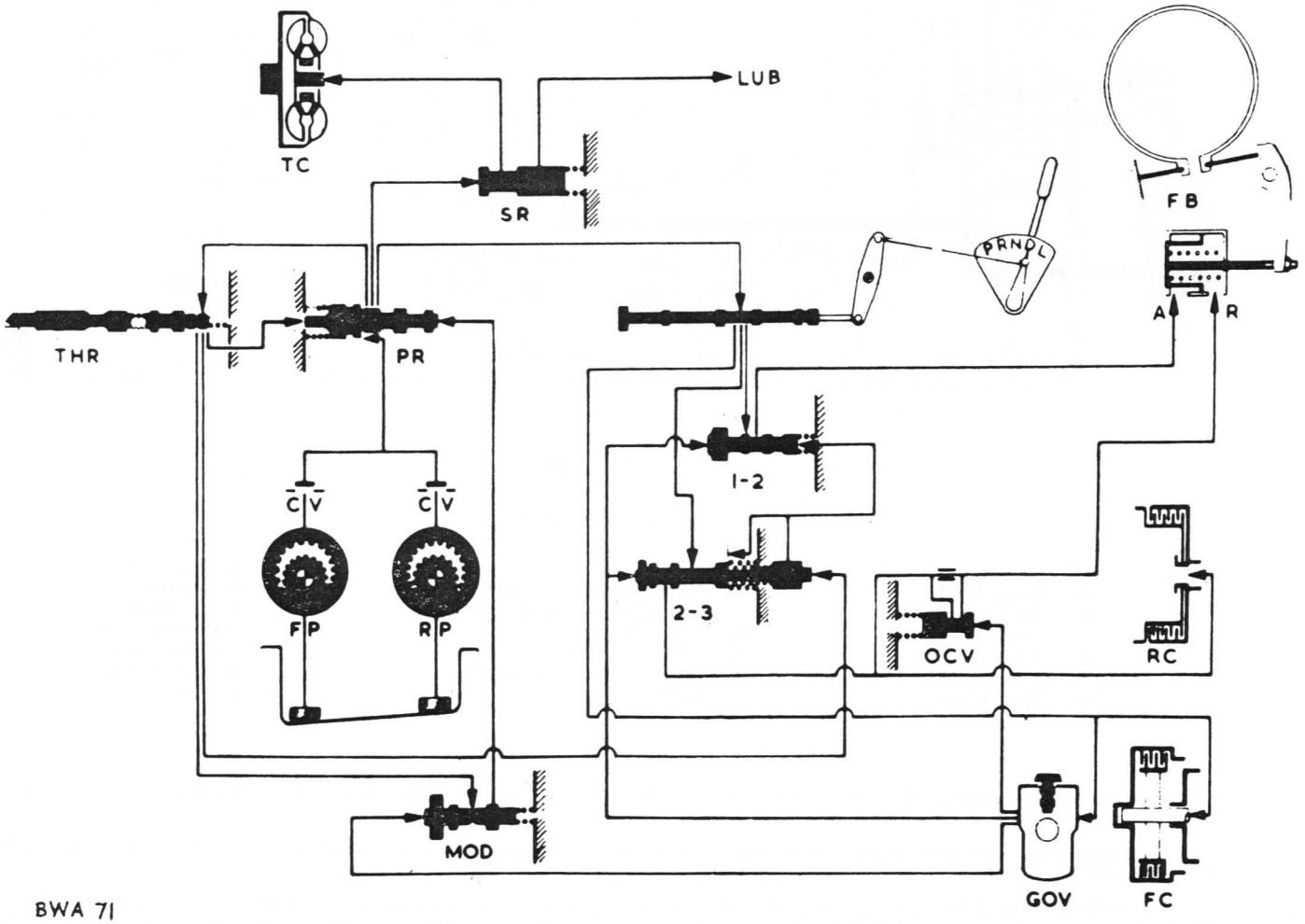


Fig. B.9

governor, and 1-2 shift valve. Line pressure is directed also to the 2-3 shift valve (3).

Lock-up

Line pressure (5) is directed to the front clutch, governor, and 1-2 shift valve, so that second gear is available.

No line pressure is directed to the 2-3 shift valve, therefore up-shifts to third gear cannot occur. When in first gear, line pressure (6) is directed to a differential area of the 1-2 shift valve to lock it in position, and hence to the rear servo (13).

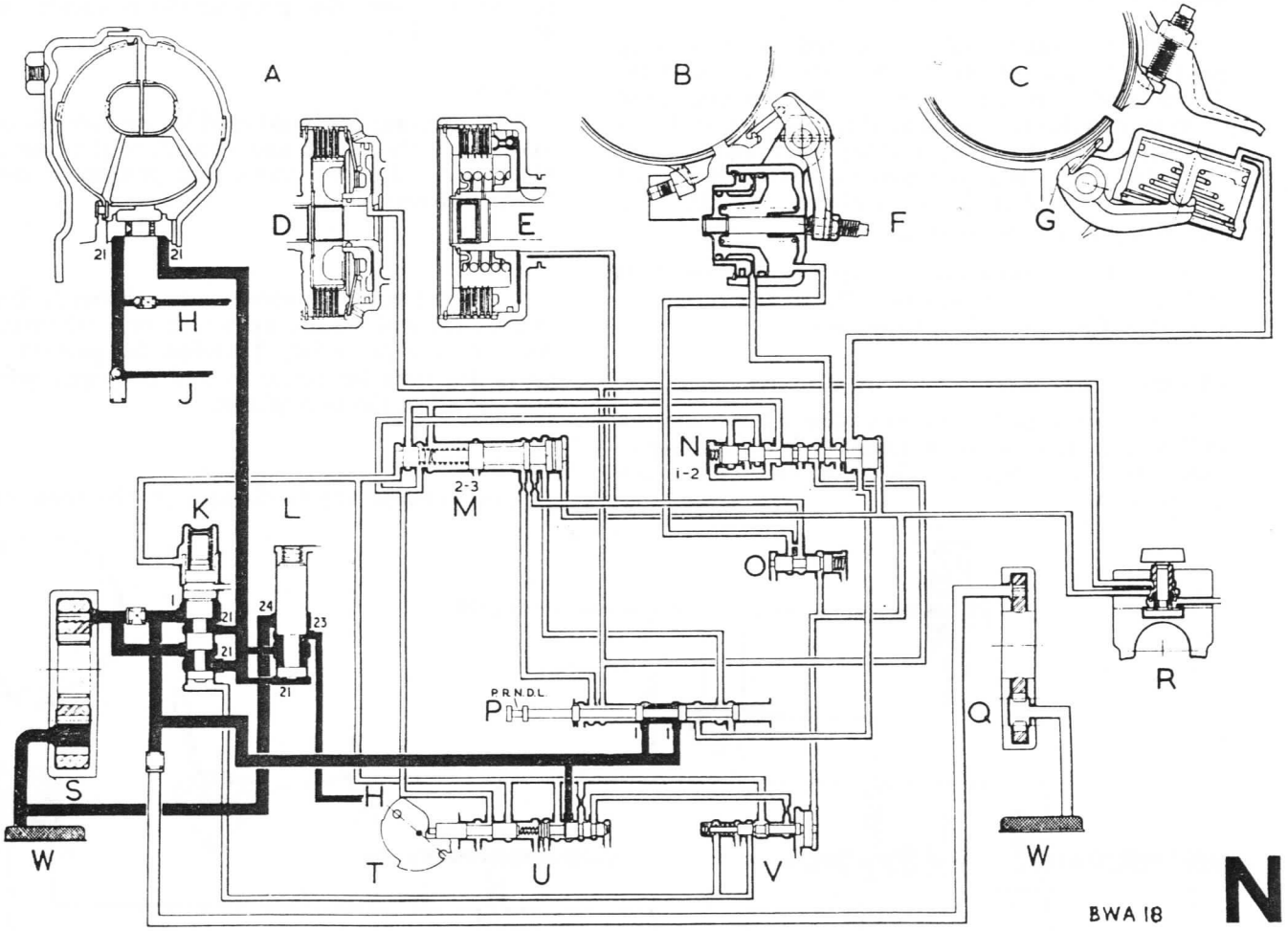


Fig. B.10

Operation in 'N'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

With the engine running, the front pump check valve is open and the rear pump check valve is closed due to absence of rear pump pressure.

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

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

The numbers refer to the hydraulic circuits listed on page B.15.

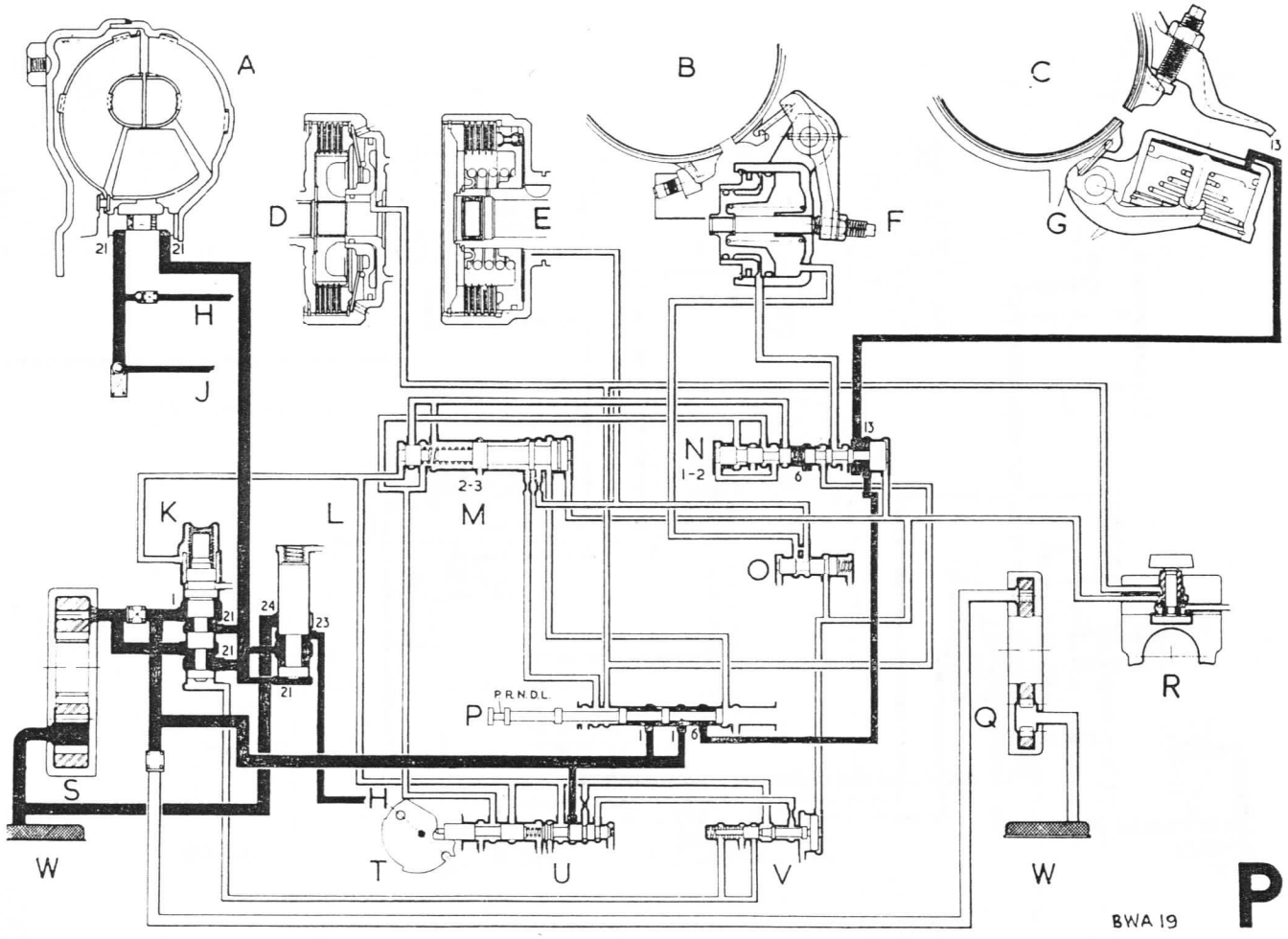


Fig. B.11

Operation in 'P'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

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

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

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

The numbers refer to the hydraulic circuits listed on page B.15.

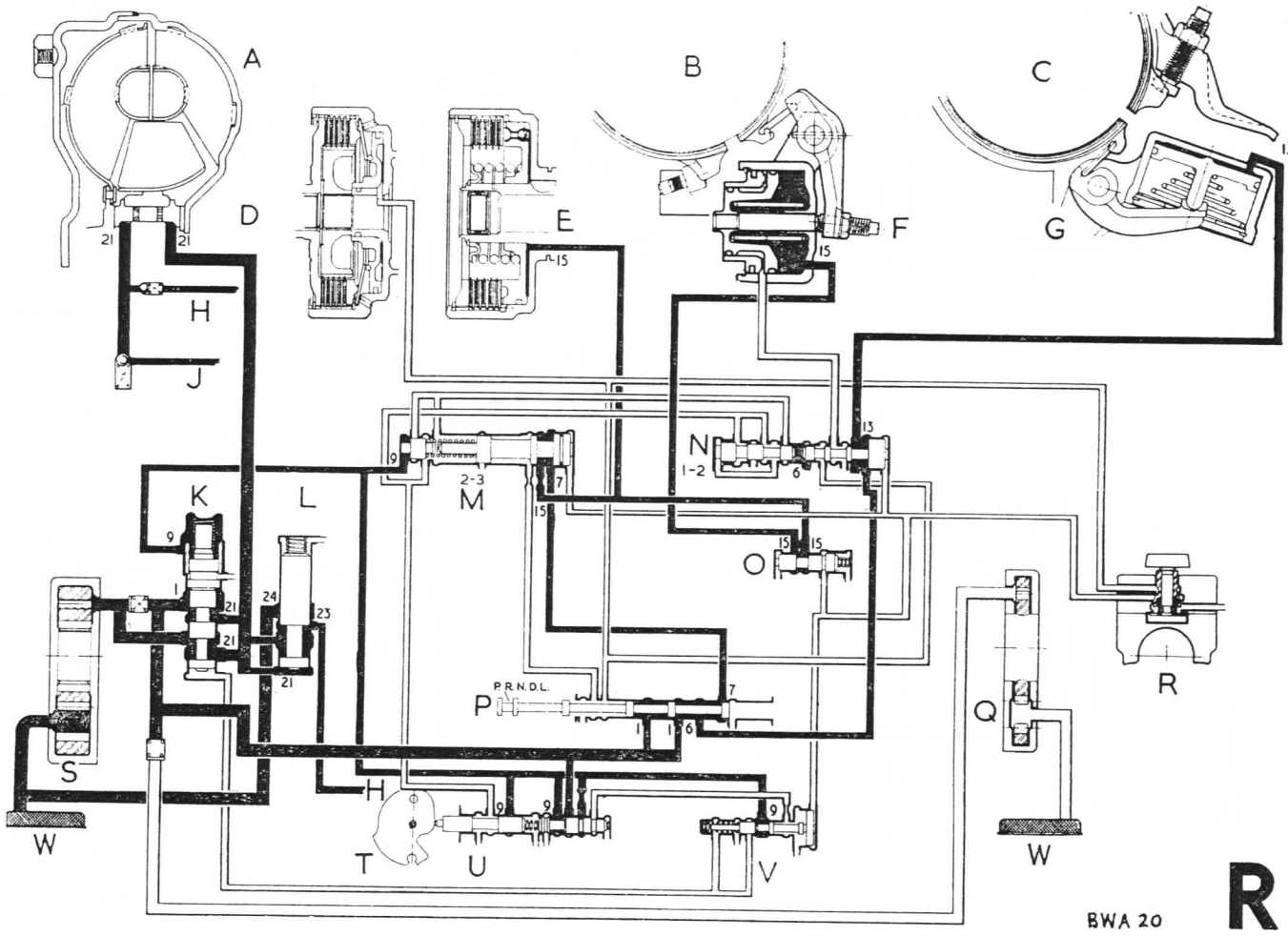


Fig. B.12

Operation in 'R'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

Pressure control of the front pump is as in 'P' or 'N', but in accordance with accelerator pedal depression, throttle pressure (9) is directed to the spring end of the primary regulating valve, thus increasing line pressure (1) in accordance with torque capacity requirements.

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

The numbers refer to the hydraulic circuits listed on page B.15.

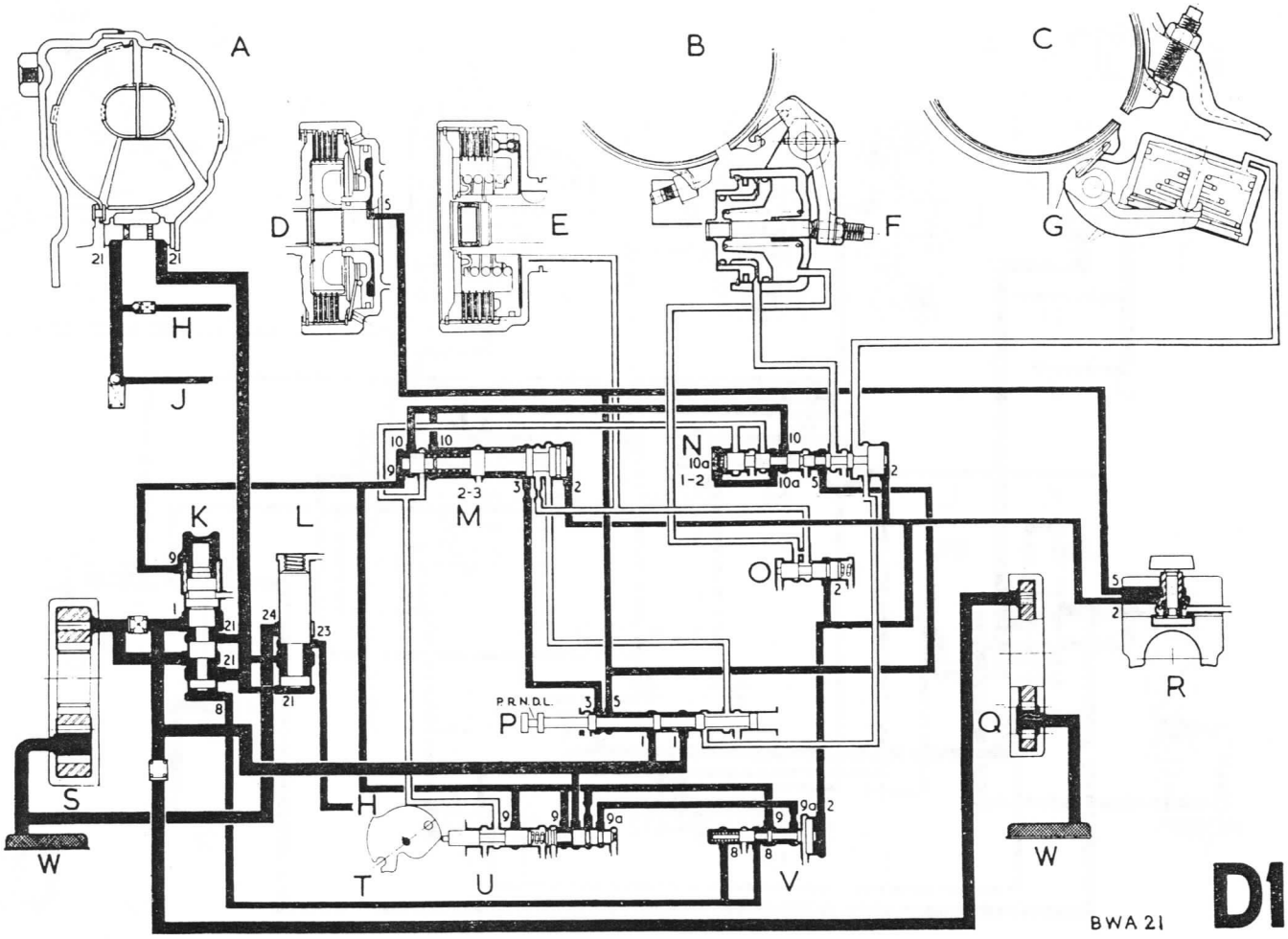


Fig. B.13

Operation in 'D1'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

Pressure control of the front and/or rear pump will be as in 'R' but with the throttle valve in the full-throttle position as illustrated; throttle pressure (9), regulated by the modulator valve plunger (8), acts upon the primary regulator valve opposing throttle pressure (9), thus modulating line pressure in the interest of shift quality.

The manual valve directs line pressure (5) to the front clutch, governor feed, and 1-2 shift valve for the subsequent 1-2 shift. Line pressure (3) reaches the 2-3 shift valve for the subsequent 2-3 shift.

The front clutch thus applied, in conjunction with the one-way clutch, permits the car to move off from rest in first gear.

The numbers refer to the hydraulic circuits listed on page B.15.

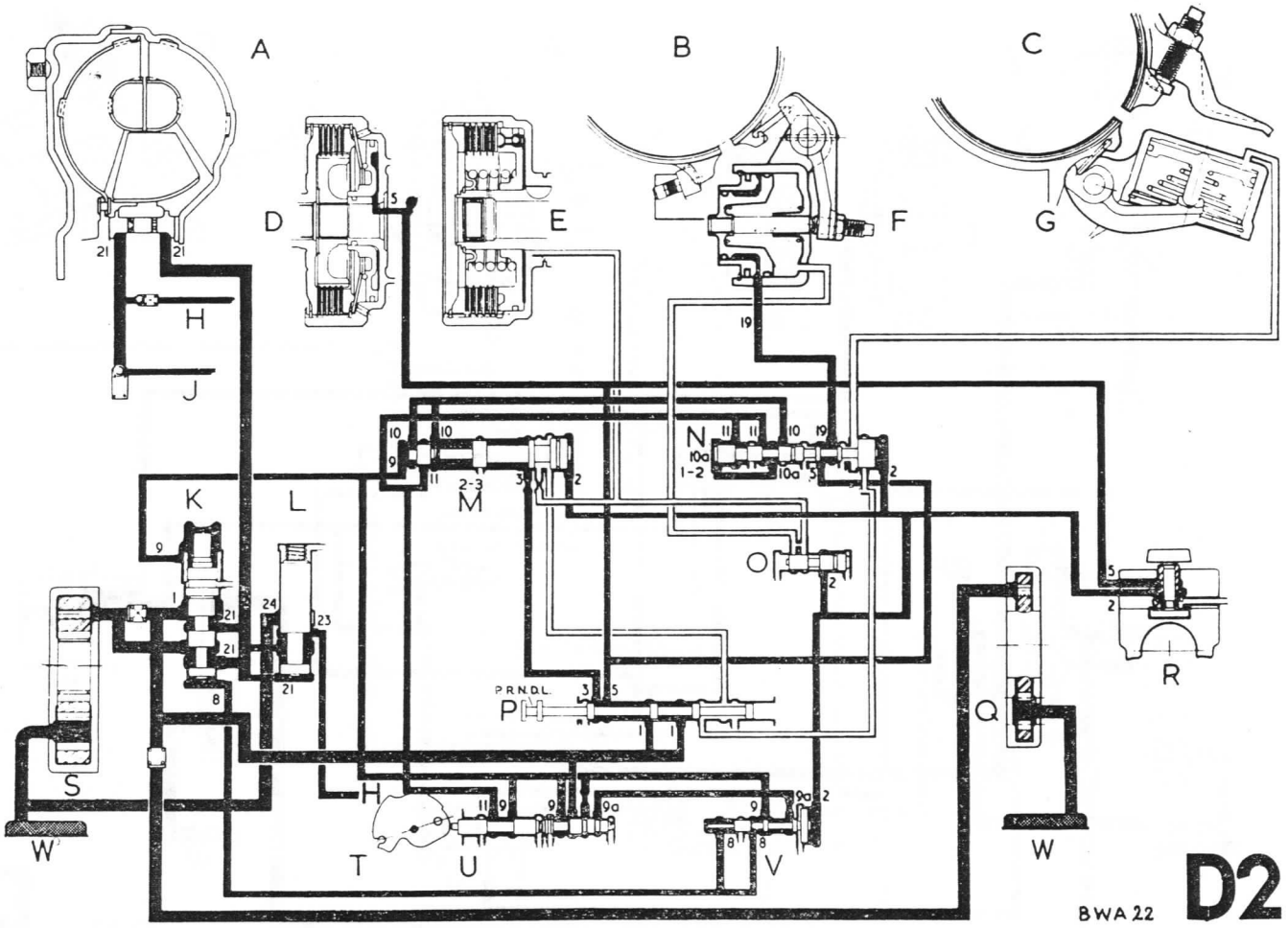


Fig. B.14

Operation in 'D2'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

Pressure control by the primary regulator valve will be of the rear pump output, the front pump providing torque converter and front lubrication requirements (21) as well as rear lubrication (23). Modulated throttle pressure (8) acts upon the primary regulator valve as in 'D1'.

Shift control is provided by the 1-2 shift valve moving against spring pressure under influence of governor pressure (2). This permits line pressure (5) to reach the apply side of the front servo (19). The front band thus applied in conjunction with the front clutch provides second gear. With the down-shift valve in the forced throttle position as illustrated, forced throttle pressure (11) acts upon the 1-2 and 2-3 shift valves in addition to throttle pressure (10), thus further delaying up-shifts or providing a 2-1 down-shift at speeds when there is little governor pressure (2).

The numbers refer to the hydraulic circuits listed on page B.15.

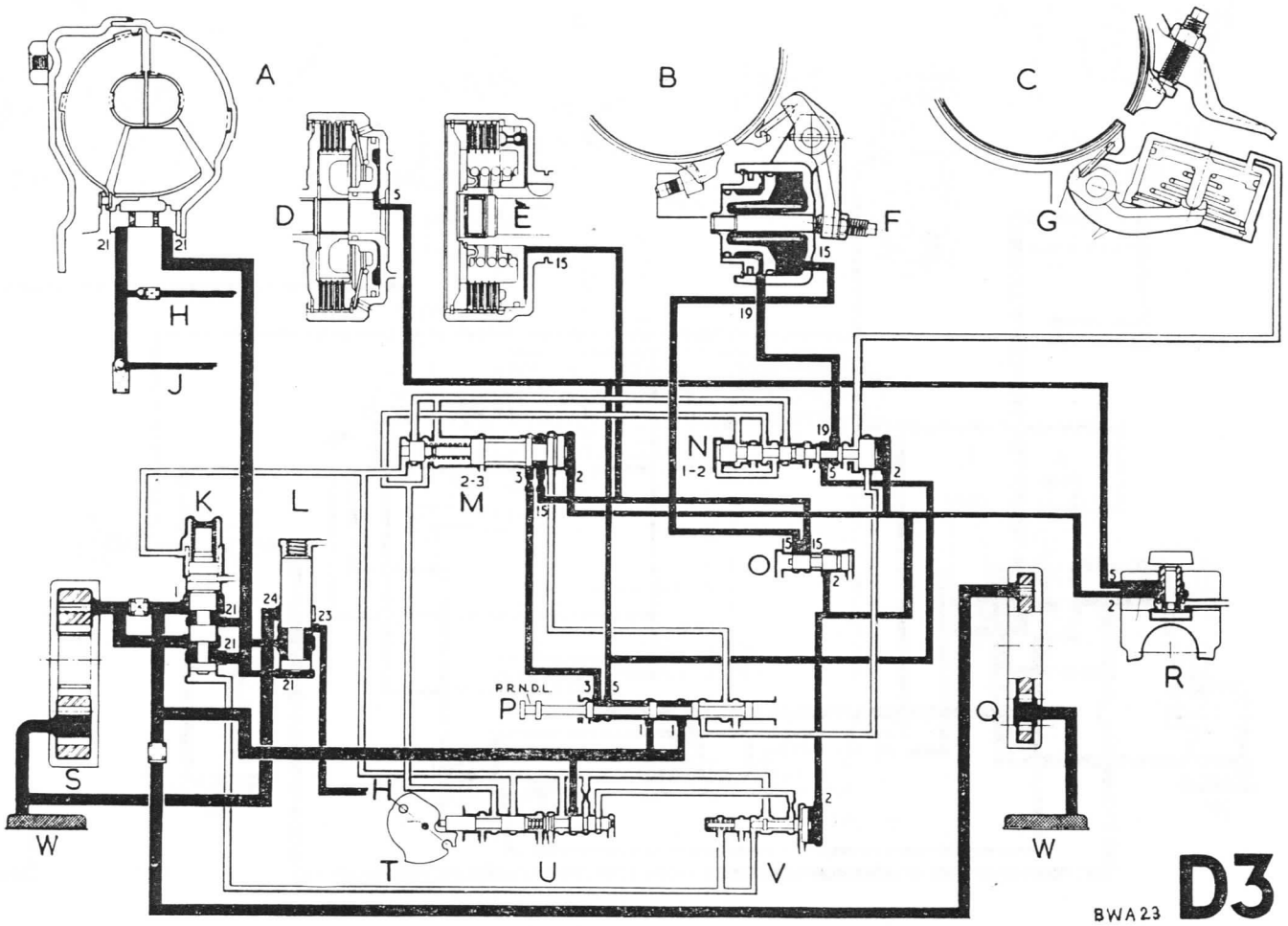


Fig. B.15

Operation in 'D3'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

Pressure control is as in 'D2', except that in the throttle valve position shown (minimum throttle) no throttle pressure or modulated throttle pressure acts upon the two ends of the primary regulator valve.

Shift control is provided by the 2-3 shift valve moving against spring pressure under influence of governor pressure (2). This permits line pressure (3) to reach the rear clutch direct (15) together with front servo release pressure directed through the servo orifice control valve. When governor pressure (2) is apparent, the servo orifice control valve closes, forcing front servo release pressure through a .052 in. orifice, which thus affects the relationship between rear clutch apply and front servo release in accordance with road speed.

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

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

The numbers refer to the hydraulic circuits listed on page B,15.

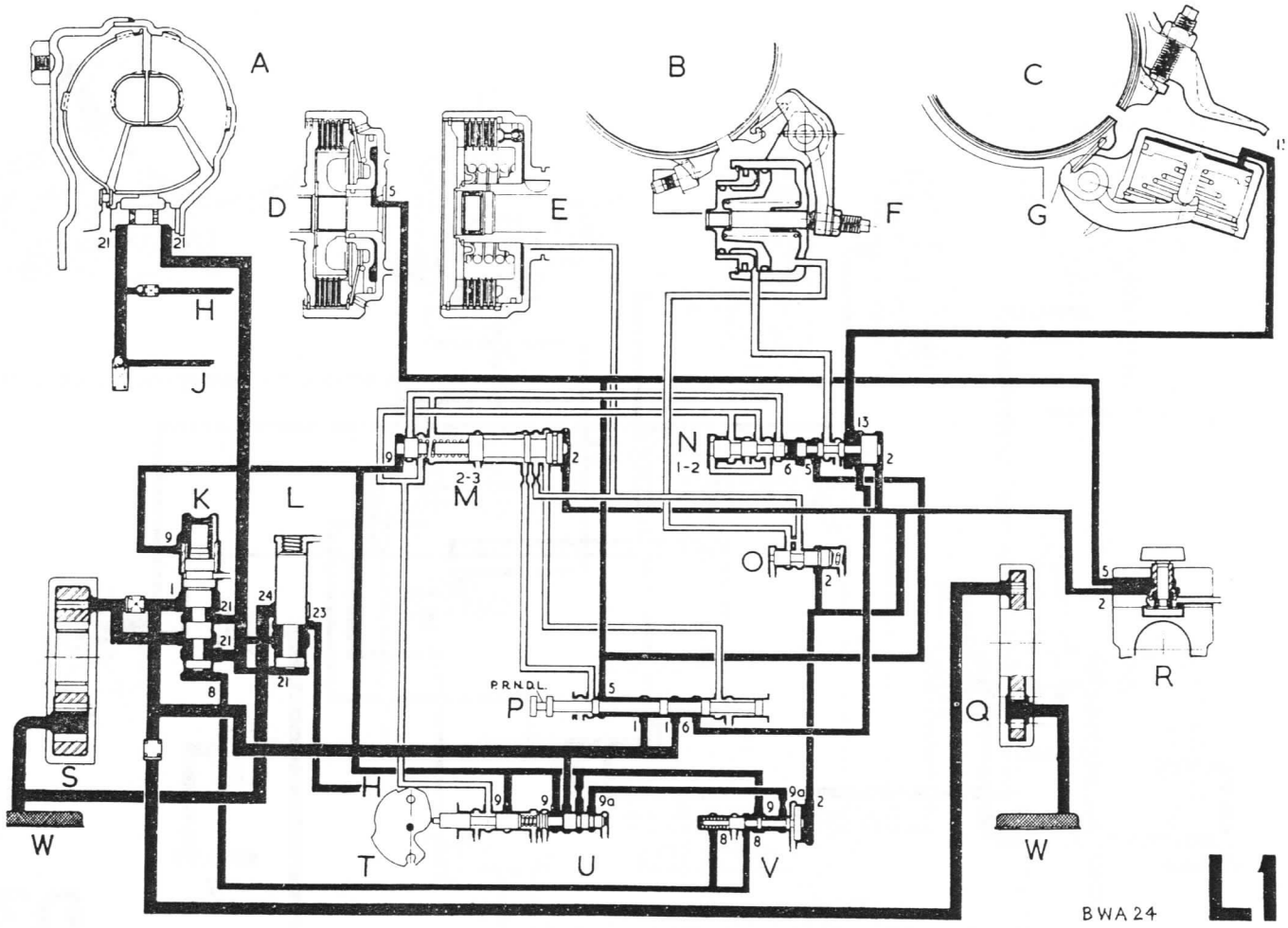


Fig. B.16

Operation in 'L1'

A. Converter.
B. Front band.
C. Rear band.
D. Front clutch.
E. Rear clutch.
F. Front servo.
G. Rear servo.
H. Lubrication.
J. To oil pan.
K. Primary regulator valve.
L. Secondary regulator valve.
M. 2-3 shift valve.
N. 1-2 shift valve.
O. Servo orifice control valve.
P. Manual valve.
Q. Rear pump.
R. Governor.
S. Front pump.
T. Down-shift valve.
U. Throttle valve.
V. Modulator valve.
W. Strainer.

Pressure control of the front and/or rear pump will be as in 'D1' as the same position of throttle valve (full throttle) is illustrated.

The manual valve directs line pressure (5) to the front clutch and governor feed, and 1-2 shift valve. In the position illustrated the 1-2 shift valve is subjected to insufficient governor pressure (2) to overcome spring pressure. The result is that the valve prevents line pressure (5) from reaching the apply side of the front servo, but line pressure (6) is open to the rear servo (13).

The manual valve opens to exhaust the rear clutch and front servo release circuit from the 2-3 shift valve. This causes a down-shift from third gear whenever 'L' is selected at speed. In this condition governor pressure (2) will move the 1-2 shift valve; the result is that line pressure (6) will then be blocked from the rear servo (13) but open (5) to the apply side of the front servo (19), as in 'D2'.

The numbers refer to the hydraulic circuits listed on page B.15.

TABLE OF HYDRAULIC CIRCUITS

Circuit No.	*Name of Pressure*	*From*	*To*	*Theoretical pressure range lb./sq. in.*	*Remarks*
1	Line pressure	Front and rear pump	Primary regulator valve Manual control valve Throttle valve	57-208-98	
2	Governor pressure	Governor	Modulator valve 1-2 shift valve 2-3 shift valve	0-70	According to road speed
3	Directed line pressure	Manual control valve	Servo orifice control valve 2-3 shift valve	57-208-98	In 'D'
5	Directed line pressure	Manual control valve	Front clutch and governor feed 1-2 shift valve	57-208-98	In 'L' and 'D'
6	Directed line pressure	Manual control valve	1-2 shift valve	57-208-98	In 'L', 'D', 'R' and 'P'
7	Directed line pressure	Manual control valve	2-3 shift valve	57-208-98	In 'R' and 'P'
8	Modulated throttle pressure	Modulator valve	Primary regulator valve (piston end)	0-135-68	
9	Throttle pressure	Throttle valve	Modulator valve Primary regulator valve (spring end) 2-3 shift valve and shift valve plug	0-135-68	
9A	Throttle pressure controlled by modulator valve	Modulator valve	Throttle valve	0-135	Doubles throttle pressure before cut-back and increases line pressure under part-throttle acceleration
10	Shift valve plunger pressure	Shift valve plunger	2-3 shift valve 1-2 shift valve	0-68	
10A	Shift valve plunger pressure	Shift valve plunger	1-2 shift valve	0-68	In first gear only
11	Forced throttle pressure	Down-shift valve	1-2 shift valve 2-3 shift valve	135	
13	Line pressure	1-2 shift valve	Rear servo apply	57-208-98	
15	Line pressure	2-3 shift valve	Rear clutch and front servo release	57-208-98	
19	Line pressure	1-2 shift valve	Front servo apply	57-208-98	Front servo release through servo orifice or valve
21	Converter pressure	Primary regulator valve	Secondary regulator valve and converter	18-25	
23	Lubrication pressure	Secondary regulator valve		18-25	
24	Exhaust	Secondary regulator valve	Front pump suction		

NOTE.—Where a pressure range consists of three figures the first value represents idling speed, the second forced throttle before cut-back, and the third forced throttle after cut-back.

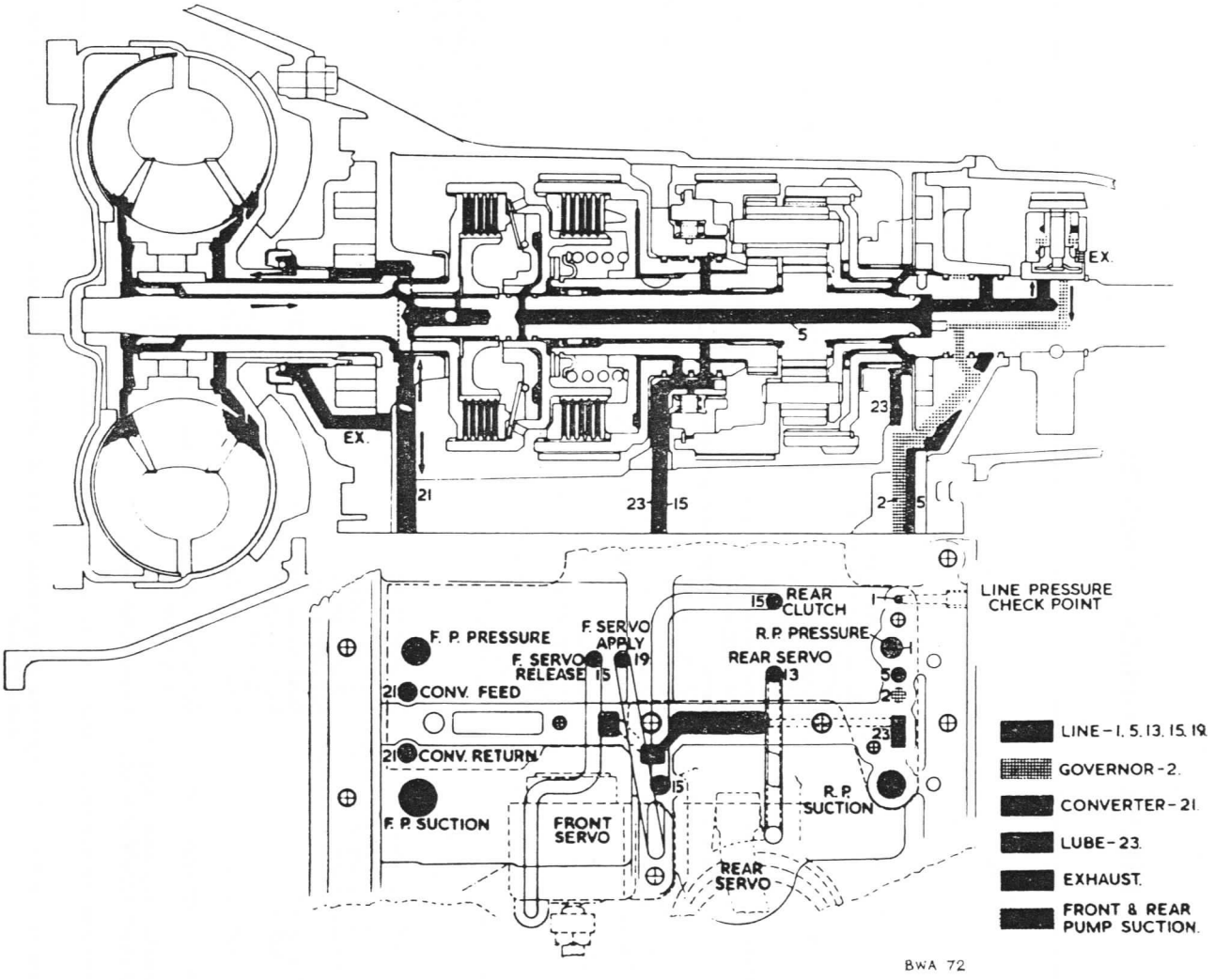


Fig. B.17

Fluid passages, transmission and face of case

A. Exhaust.
B. Front pump pressure.
C. Front servo release.
D. Front servo apply.
E. Rear clutch.
F. Line pressure check point.
G. Converter feed.
H. Rear servo.
J. Rear pump pressure.
K. Converter return.
L. Front pump suction.
M. Front servo.
N. Rear servo.
O. Rear pump suction.
P. Line—1, 5, 13, 15, 19.
Q. Governor pressure—2.
R. Converter pressure—21.
S. Lubrication pressure—23.
T. Exhaust.
U. Front and rear pump suction.

The numbers refer to the hydraulic circuits listed on page B.15

SECTION C

REMOVING AND REPLACING THE TRANSMISSION

	Section
Removing and replacing the transmission	C.1
,, ,, ,, ,, ring gear	C.2
,, ,, ,, ,, gear selector	C.3
Gear selector needle positions	C.4

Section C.1

REMOVING AND REPLACING THE TRANSMISSION

NOTE: The normal operating temperature of the fluid is between 100 and 115°C. (212 and 239°F.) approximately To avoid the possibility of scalding, extreme caution must be exercised when draining a transmission which has recently been operating.

REMOVING

Gearbox

1. Before raising the vehicle on a lift, disconnect the down-shift valve cable from the carburetter and outer cable adjuster from the bracket.
2. Isolate the battery.
3. Drain the fluid from the gearbox oil pan only if the gearbox is to be dismantled. For replacement of a ring gear or torque converter, the oil may be left in the gearbox, provided care is taken to seal final drive opening and filler tube opening to prevent loss of fluid and ingress of foreign matter.
4. Remove the propeller shaft.
5. Disconnect the rear exhaust pipe brackets and tie the exhaust to one side.
6. Remove the speedometer drive cable from the extension housing. Disconnect the wires from the starter inhibitor switch and tag for ease of recognition on reassembly.
7. Loosen the filler tube (spanner $1\frac{5}{16}$" A.F.).
8. Disconnect the manual linkage lever from the gearbox shaft. $\frac{1}{2}$" A.F. spanner.

WOLSELEY 6/110, AUSTIN A/110

Proceed as 1 to 8.

9. Disconnect the rear mounting of the tansmission from the chassis cross-member.
10. Place a jack under the converter housing to support the weight of the engine.
11. Remove the chassis rear cross-member and slightly lower the transmission.
12. Place a unit lift under the transmission.
13. Remove the gearbox retaining bolts with lock washers, commencing with the two bottom ones ($\frac{1}{2}$ in. A.F. ring spanner).
14. Place a container under the transmission to catch the fluid which will emerge from the converter when the gearbox is withdrawn.
15. Withdraw the gearbox to the rear.

NOTE: If only the gearbox is in need of attention there is no need to disturb the converter housing or converter. If, however, the diagnosis procedure has established the need for transmission replacement, then remove the transmission complete with converter and converter housing from the engine back plate and converter drive plate.

Torque converter

1. Support the engine and remove the jack from the underside of the converter housing.
2. Remove the starter motor.
3. Remove the converter housing retaining bolts with lock washers (spanner $\frac{9}{16}$ in. A.F.)

NOTE: The dowel on each side of the mounting plate for converter housing alignment.

4. Withdraw the converter housing or transmission to the rear.
5. Remove the four bolts with lock washers retaining the torque converter to the drive plate. Access is from the front through the engine mounting plate.
6. Withdraw the torque converter or transmission assembly to the rear.

WOLSELEY 24/80, AUSTIN FREEWAY Mk. 1 and II

Proceed as 1 to 8.

9. Remove rear cross member locating bolts from chassis rails. Spanner $\frac{9}{16}$" A.F.
10. Normally it is not necessary to support the gearbox separately, but if desired it may be supported but care must be exercised to ensure that the sump is not distorted which will in turn displace or damage the oil feed tubes.

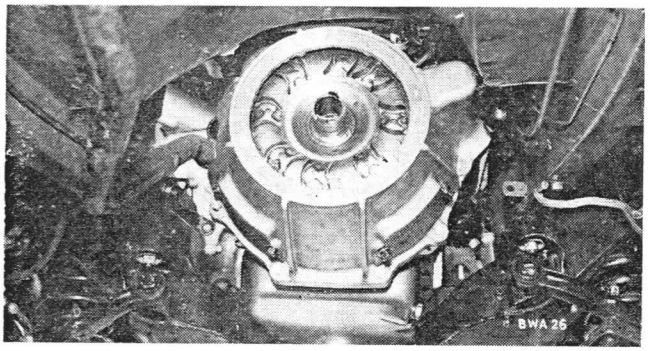


Fig. C.1

Gearbox removed showing converter in position before removed.

11. Remove the gearbox retaining bolts with lock washers, commencing with the two bottom ones. Spanner $\frac{1}{2}$" A.F. Ring.
12. Place a half gallon capacity container under the transmission to catch the fluid which will emerge from the converter when the gearbox is withdrawn.

    CAUTION HOT OIL.
13. Turn the gearbox assembly slightly in a clockwise direction to release the filler tube and then withdraw the gearbox to the rear.

NOTE: If only the gearbox is in need of attention, there is no need to disturb the converter housing or converter. If however, the diagnosis procedure has established the need for complete transmission replacement, two methods of removal are possible.

A. Removal of firstly the gearbox unit followed by the torque converter and reverse procedure for reassembly.

B. Removal of complete front suspension and power unit together with torque converter and gearbox (unless additional work on power unit or front suspension is to be carried out, the former method is recommended.).

14. Remove the converter housing retaining bolts and lock washers (spanner $\frac{9}{16}$" A.F.). To remove the bolt behind the cross shaft bracket, which secures the filler tube bracket, first remove the outer top

bolt securing the cross shaft bracket. Next, slacken the lower bracket bolt and turn the pedestal away from the block. The filler tube bracket bolt may now be removed.

NOTE: The dowel on each side of the mounting plate is for converter housing alignment.

15. Withdraw the converter housing to the rear.
16. Remove the four bolts with lock washers retaining the torque converter to the driven plate. Access is from the front through the engine mounting plate. The crankshaft may be rotated by the front damper nut, (spanner $\frac{15}{16}$" A.F.)
17. Withdraw the torque converter to the rear.

MORRIS J2 VAN

Proceed as 1 to 7.

8. Disconnect the manual linkage lever from the selector lever on the gearbox casing and remove the cable anchor bracket.
9. Disconnect the rear mounting of the transmission from the chassis cross-member.
10. Place a jack under the converter housing to support the weight of the engine.
11. Remove the chassis rear cross-member and slightly lower the transmission.
12. Place a unit lift under the transmission.
13. Remove the gearbox retaining bolts with lock washers, commencing with the two bottom ones (ring spanner $\frac{1}{2}$ in. A.F.)
14. Place a container under the transmission to catch the fluid which will emerge from the converter when the gearbox is withdrawn.
15. Withdraw the gearbox to the rear.

NOTE: If only the gearbox is in need of attention there is no need to disturb the converter housing or converter. If, however, the diagnosis procedure has established the need for transmission replacement, then remove the transmission complete with converter and converter housing from the engine back plate and converter drive plate.

Torque Converter — as for Wolseley 6/110, Austin A/110.

REPLACING (All models)

The converter, converter housing and gearbox are refitted in the reverse order of removal.

NOTE: To ensure correct engagement of the front oil pump drive, it is recommended to rotate the converter so that the drive fingers on the hub will be in the 12 o'clock and 6 o'clock positions. The slots of the front oil pump driving gear are rotated to a mating position with the aid of a screwdriver or similar tool.

Section C.2

REMOVING AND REPLACING THE RING GEAR

The procedure for removing and replacing the ring gear is identical with the procedure outlined for removing and replacing the transmission. The full disc assembly is replaced as the ring gear is not serviced separately.

Replacement units balanced during manufacture are ready for assembly.

Section C.3

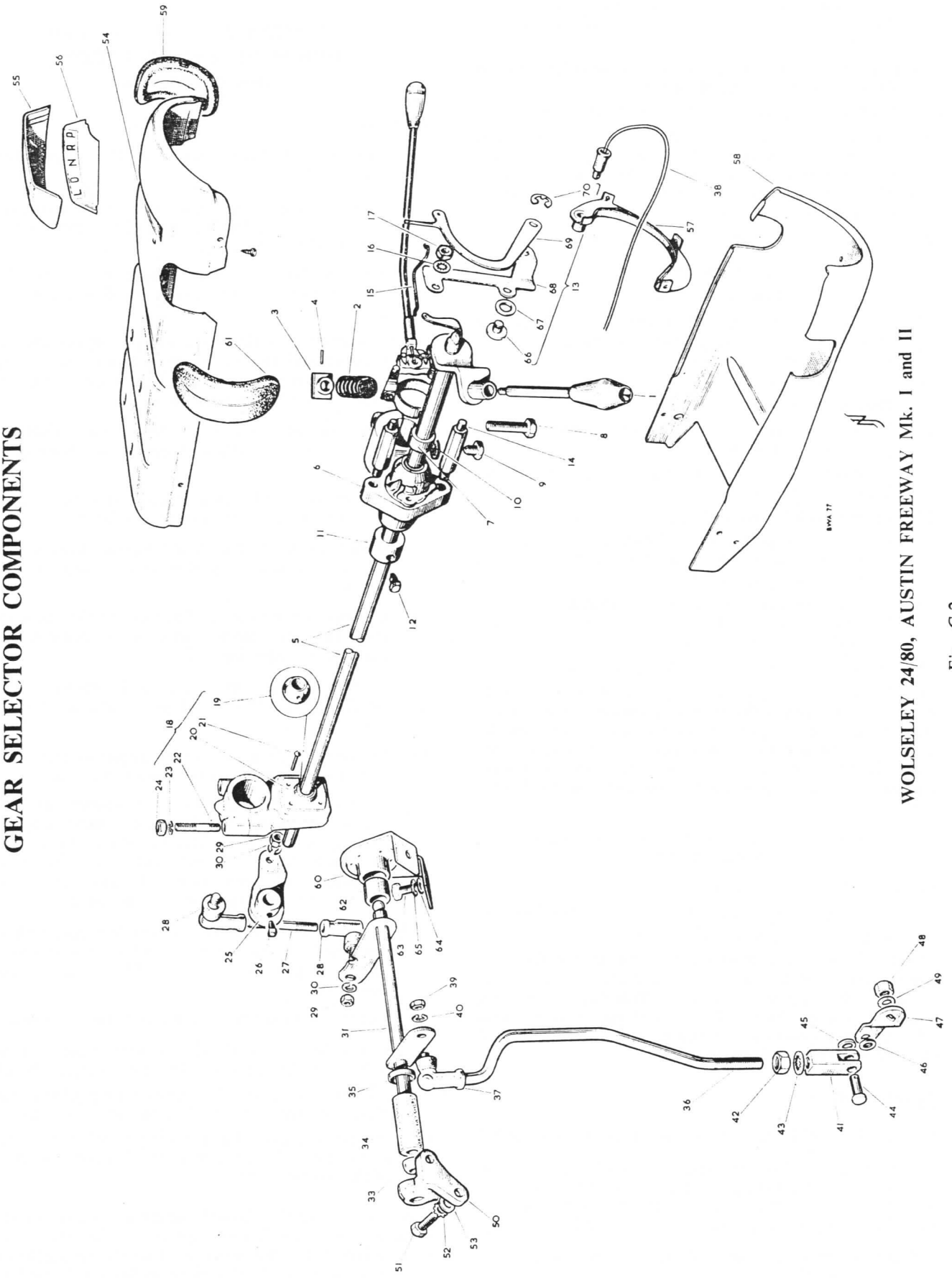
WOLSELEY 6/110, AUSTIN A/110 REMOVING AND REPLACING THE SELECTOR

Removing

1. Remove the horn-push and the steering-wheel (Section J.6).
2. Unscrew and remove the four screws securing the lower steering column cowl to the upper cowl and remove the lower cowl.
3. Slacken the direction indicator switch clamp bracket and move the switch arm down to its lowest position.
4. Remove the two bolts securing the upper cowl to its bracket and the two bolts retaining the steering-column lower clamp bracket; remove the lower bracket and its packing-piece.
5. Ease the steering-column down and withdraw the upper cowl by pulling it gently and turning it to the right.
6. Disconnect and remove the direction indicator switch and the selector indicator lamp.
7. Remove the selector upper support bracket locating screw and lock washer and slacken the clamp screw.
8. Cut the locking wire and remove the locating screw from the gear selector lever at the bottom of the hand lever operating rod.
9. Withdraw the operating rod, upper support bracket, hand lever, and gear indicator from the car.
10. Disconnect the gear selector adjusting rod shackle from the side of the transmission housing.
11. Remove the two screws, lock washers and plain washers securing the cross-shaft inner bracket to the engine rear mounting plate, and then remove the cross-shaft complete with the gear selector adjusting rod, connecting rod, gear selector lever and the spherical bush, cup, and sleeve.
12. Remove the two nuts securing the gear indicator housing to the attachment bolts screwed into the upper support bracket and lift off the housing complete.
13. Cut the locking wire and remove the locating screw and collar from the hand lever operating rod. Withdraw the rod from the upper support bracket.
14. From the upper bracket remove the peg for the stop plate, the sleeve and bush, and the stop plate.
15. Withdraw the hand lever stop pin, collar, and spring and remove the lever from the bracket on the end of the operating rod.

Assembling and refitting the selector is a reversal of the removal and dismantling sequence. After the selector has been refitted to the car ensure that the manual linkage is correctly adjusted as described in Section FFa(a).5.

GEAR SELECTOR COMPONENTS



WOLSELEY 24/80, AUSTIN FREEWAY Mk. I and II

Fig. C.2

No.	*Description*
1	Lever—hand.
2	Spring—stop rod.
3	Collar—stop rod.
4	Peg—locating—collar.
5	Rod Assembly—operating.
6	Bracket Assembly—Rod support—upper.
7	Bearing.
8	Screw—locking—support bracket.
9	Screw—locating—support bracket.
10	Washer—shakeproof—screw.
11	Collar—locating—operating rod.
12	Screw—locating—collar.
13	Bracket and Pointer Assy—Gear indicator.
14	Bolt—indicator bracket to support bracket.
15	Link—connecting—pointer to operating lever.
16	Washer—shakeproof—bolt.
17	Nut—bolt.
18	Bracket Assembly—operating rod.
19	Bush—spherical.
20	Housing—bush.
21	Rivet—housing to bracket.
22	Stud—cap to bracket.
23	Washer—spring—stud.
24	Nut—stud.
25	Lever Assembly—Gear selector.
26	Screw—locating—selector lever.
27	Rod—connecting.
28	Joint—ball—connecting rod.
29	Nut—ball joint to selector lever and cross-shaft.
30	Washer—spring—nut.
31	Shaft Assembly—cross.
33	Bush—spherical—cross-shaft.
34	Sleeve—cross—shaft.
35	Cup—sleeve.
36	Rod Assembly—Adjusting.
37	Joint—ball.
38	Wiring Harness—Quadrant illumination lamp.
39	Nut—ball joint to cross-shaft.
40	Washer—spring—nut.
41	Fork—adjusting rod.
42	Nut—fork to adjusting rod.
43	Washer—shakeproof—nut.
44	Pin—fork to gearbox lever.
45	Washer—plain—pin.
46	Washer—anti-rattle—pin.
47	Lever—adjusting rod to gearbox.
48	Nut—lever to gearbox.
49	Washer—spring—nut.
50	Bracket—change speed cross-shaft.
51	Screw—bracket to gearbox mounting plate.
52	Washer—shakeproof—screw.
53	Washer—plain—screw.
54	Cover—Steering column—upper.
55	Hood—indicator lens.
56	Lens—hood quadrant.
57	Bracket assembly—cover to steering column.
58	Cover—steering column—lower.
59	Grommet—indicator lever.
60	Bracket Assembly—change speed shaft.
61	Grommet—gear change lever.
62	Socket.
63	Screw—bracket to body.
64	Washer—plain screw.
65	Washer—spring—screw.

WOLSELEY 24/80, AUSTIN FREEWAY Mk. I and Mk. II.

REMOVING AND REPLACING THE GEAR SELECTOR

1. Isolate the battery.
   Disconnect the horn wire at the snap connector below the steering box. Cut and remove lower gear selector tie wire and remove gear selector from lower end of shaft.
2. Slacken the grub screws in the steering wheel hub and withdraw the hub centre and horn cable. Remove the steering wheel retaining nut and using the steering wheel puller withdraw the wheel from its splines.
3. Remove the rubber grommets from the cowl assembly.
4. Remove the 3 screws (Phillips Head) securing the lower half of the steering column cowl. Remove the indicator light bracket sub assembly.
5. Slacken the two screws securing the direction indicator light switch, twist downward to clear the top half of the cowl and withdraw from steering column.
6. Remove the circlip from the gear selector indicator and remove the pointer and connecting wire link or alternatively remove the indicator bracket assembly from its two mounting pillars (spanner $\frac{7}{16}$" AF.).
   Use care in dismantling to ensure that none of the linkate is bent or distorted.
7. Slacken the upper bracket assembly support clamp screw (spanner $\frac{1}{2}$" AF.) and unscrew the dowel bolt (spanner $\frac{1}{2}$" AF.) sufficiently to clear the column (three full turns).
8. Twist the bracket assembly downward to clear the top half of the cowl and withdraw from the steering column into the vehicle.
9. Cut and remove the tie wire locking the upper collar set screw and remove the set screw (spanner $\frac{1}{4}$" AF.) and collar.
10. Final dismantling of the lever is carried out by depressing the stop rod spring and removing the peg from its recess.
    Replacement of the assembly is a reversal of the above procedure. Care must be taken to ensure correct re-alignment of the selector needle. Refer Section C.4.

MORRIS J2 VAN
REMOVING AND REPLACING THE GEAR SELECTOR

Removing the selector and control rod assembly

1. Disconnect the flashing indicator leads. Extract the three grub screws from the steering-wheel centre and withdraw the horn-push and stator tube from the steering-column.
2. Unscrew the steering-wheel nut and withdraw the steering-wheel from the tapered shaft. Service tool 18G 70 can be used.
3. Slacken the upper support bracket clamp bolt and remove the bracket locating screw.
4. Remove the clevis pin from the front end of the control cable. Cut the locking wire and remove the square head screw to release the selector lever lower end of the control rod.
5. Withdraw the upper support bracket, hand lever. nd control rod upwards from the steering-columnn.

Aassembly and refitting is a reversal of the dismantlig seqnence.

After refitting ensure that the manual cable linkage is correctly adjusted (see Section FF)a).6).

Removing the selector hand lever

Extract the screw from the top of the control rod to release the pointer and cap. The hand lever complete with bearings and bearing housing can then be withdrawn and separated.

Section C.4

WOLSELEY 24/80, AUSTIN FREEWAY Mk. I and II.

GEAR SELECTOR NEEDLE POSITIONS

During service or on replacement of the selector components, difficulty may be experienced in aligning the pointer with the dial markings. The following points should be checked carefully when ascertaining the causes of mal-function of pointer operation on vehicles which are in service.

1. Examine the hand lever for indications of bending or twisting due to incorrect handling.
   Should damage be indicated the assembly must be stripped and rebuilt.
2. Examine the lever stop recesses and lugs for wear or damage. Should wear or damage be apparent the components must be replaced.
3. Examine the locating peg in the stop plate for looseness. Should looseness be apparent, re-rivet or replace the components.

Having ascertained that the components are in a satisfactory condition the following method of adjusting the needle positions should be followed.

NOTE: The Needle and the wire connecting link must never be bent.

All adjustments are carried out by a twisting movement of the black pointed centre arm which actuates the needle arm. Bending the arm is facilitated by the use of the tool shown in the Service Tool Section and figures C.3. and C.4. It is only necessary to remove the lever grommet from the cowl assembly to gain access to the mechanism.

1. Adjust the gear linkage in the L position on the gearbox and indicator. Ensure that the gear lever is held in the correct position during this operation.
2. To correct the sweep of the pointer bend as shown in Fig. C.2. This operation alters the effective length of the black prime moving arm, governing in turn, the length of the pointer, sweep. Commence at the N position for alignment and follow by checking full sweep. Finally halve any accumulated location errors over the actual width of the position indicator letters.
3. Examine linkage components to ensure that there is no binding or interference on the internal screws or lens fittings. Fig. C.3 indicates method of adjusting to move the pointer and linkage closer to or further away from the lens.
4. Finally examine carefully the position of the selector lever on the gearbox in relation to the indicator position. The gearbox selector position must be positive to ensure that band slippage and consequent failure does not result.

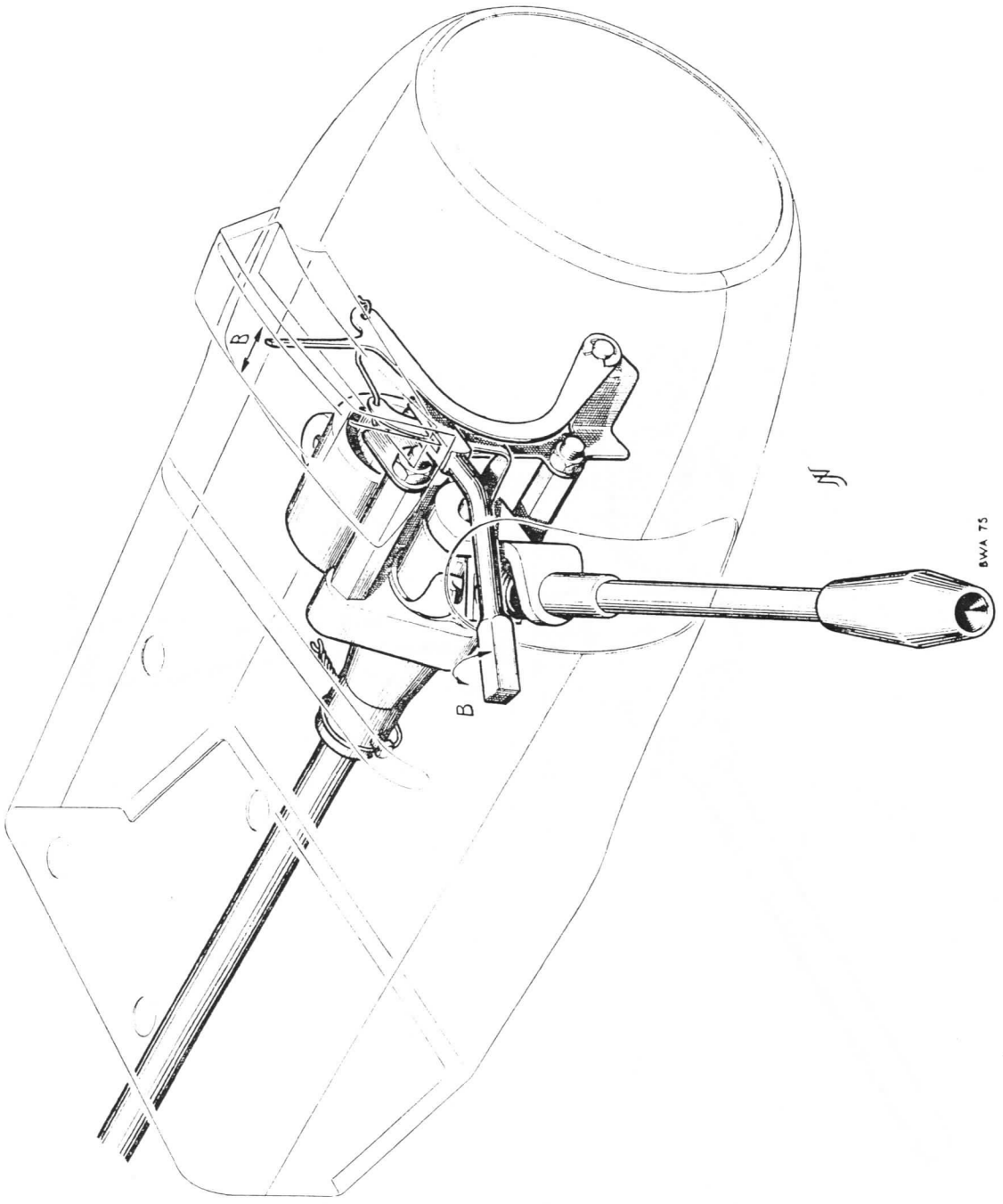


Fig. C.4
Adjusting position for pointer lens clearance.

J

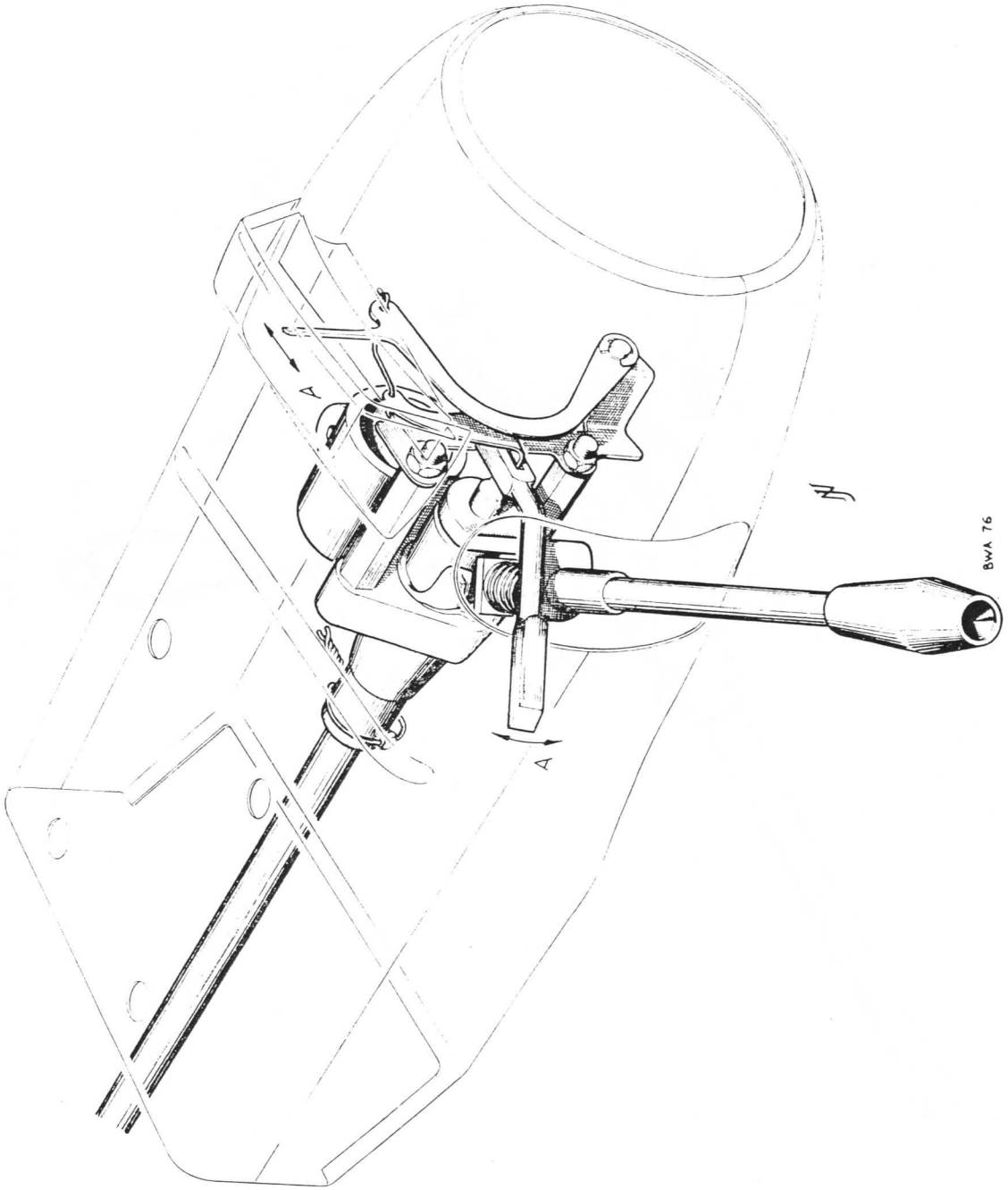


Fig. C.3
Adjusting procedure for pointer sweep.

SECTION D

DISMANTLING AND ASSEMBLING THE COMPONENTS

	Section
Air pressure checks	D.29
Assembling	
Converter housing	D.28
Extension housing	D.26
Front band and servo	D.22
Front clutch	D.24
Front pump	D.25
General	D.16
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Rear clutch	D.23
Rear pump	D.19
Running gear	D.21
Shaft, parking pawl, and levers	D.18
Transmission case	D.17
Valve bodies	D.27
Dismantling	
Centre support and planet gears	D.10
Converter housing	D.3
Extension housing	D.5
Front band and servo	D.9
Front clutch	D.7
Front pump assembly	D.6
General	D.1
Rear brake band and servo	D.11
Rear clutch	D.8
Rear pump	D.13
Shaft, parking pawl, and levers	D.14
Speedometer gear and governor	D.12
Transmission case and inhibitor switch	D.15
Valve bodies assembly	D.4
Removing and replacing the transmission and selector	D.2
Torque chart	End of Section

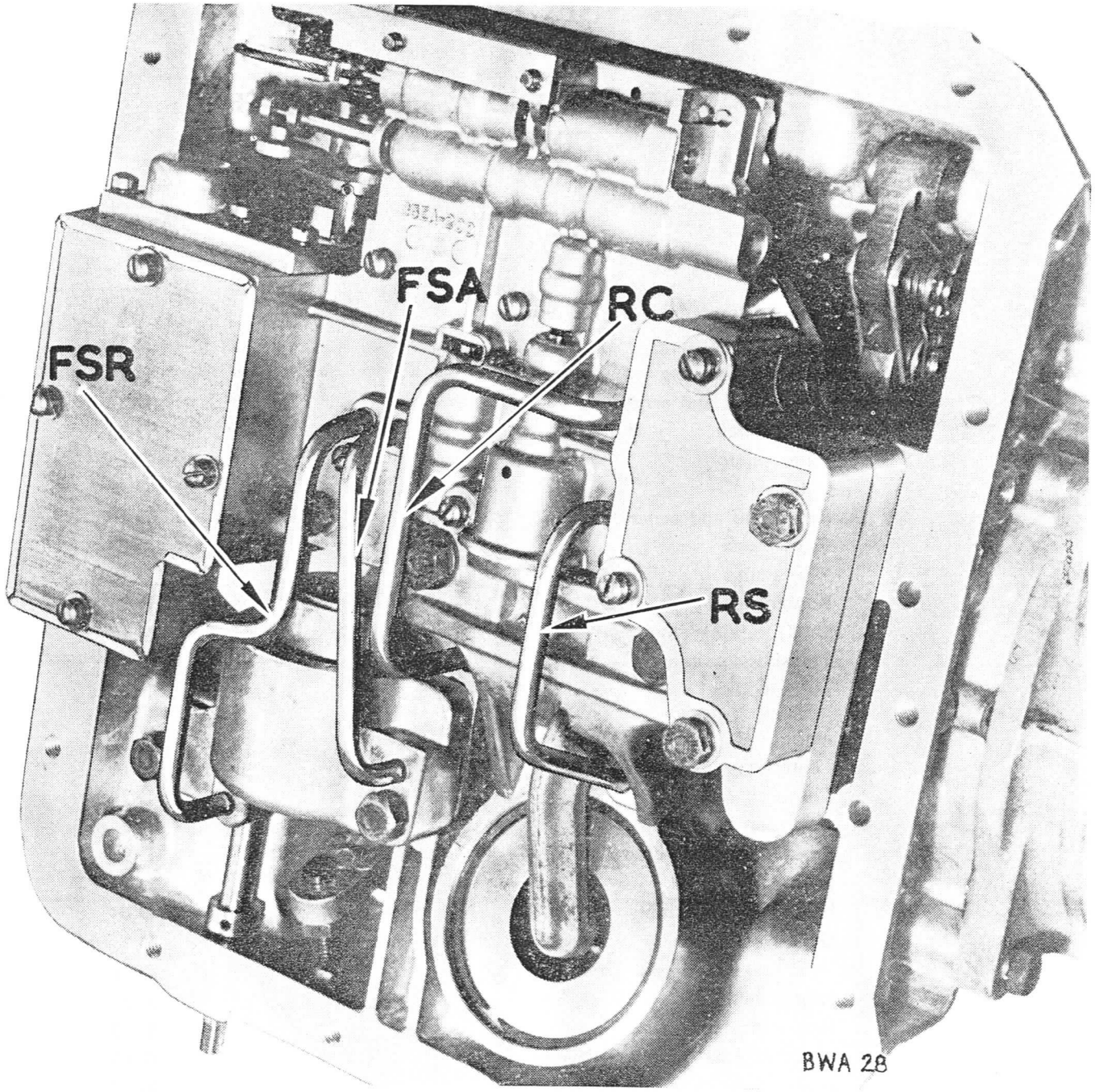


Fig. D.1

Location of the oil tubes.

FSR. Front servo release.
RC. Rear clutch.
FSA. Front servo apply.
RS. Rear servo.

Section D.1

DISMANTLING—GENERAL

No set sequence for dismantling is laid down. As a general rule, it is advisable to only dismantle those components requiring attention as indicated by road test or diagnosis procedure.

Prior to the removal of any components, the outside of the gearbox must be thoroughly washed down with petrol, paraffin, or an industrial cleaning solvent. High standards of cleanliness are required when handling or storing components, and care is necessary to avoid damage to light-alloy parts.

If complete dismantling of the gearbox is indicated, the unit should be inverted and placed on the gearbox

cradle, Service tool BW35, other Service tools being to hand as required.

Section D.2

REMOVING AND REPLACING THE TRANSMISSION AND SELECTOR

For dismantling the entire gearbox, remove complete leaving the torque converter and housing as this will facilitate subsequent installation.

The selector and torque converter are dismantled as described in Section C.

Section D.3

DISMANTLING THE CONVERTER HOUSING

If attached to the gearbox, remove the six screws with lock washers $\frac{5}{16}$—18 x $\frac{7}{8}$ in. (spanner $\frac{1}{2}$ in. A.F.) and withdraw the converter housing from its register on the transmission case.

Oil pan

Remove the 15 bolts with lock washers $\frac{5}{16}$—18 x $\frac{5}{8}$ in. hexagon head (spanner $\frac{1}{2}$ in. A.F.), the oil pan, and the gasket.

NOTE.—The oil pan supports the four oil tubes; in order to avoid damage to these tubes gearboxes must not be stacked directly on top of each other, but preferably on pallets provided with flanges to hold the oil pan on its rim.

Oil tubes

The four supply tubes, two to the front servo and one each to the rear clutch and rear servo, are a push fit in their locations. Lever out of position with a screwdriver, taking care not to distort or damage the tubes.

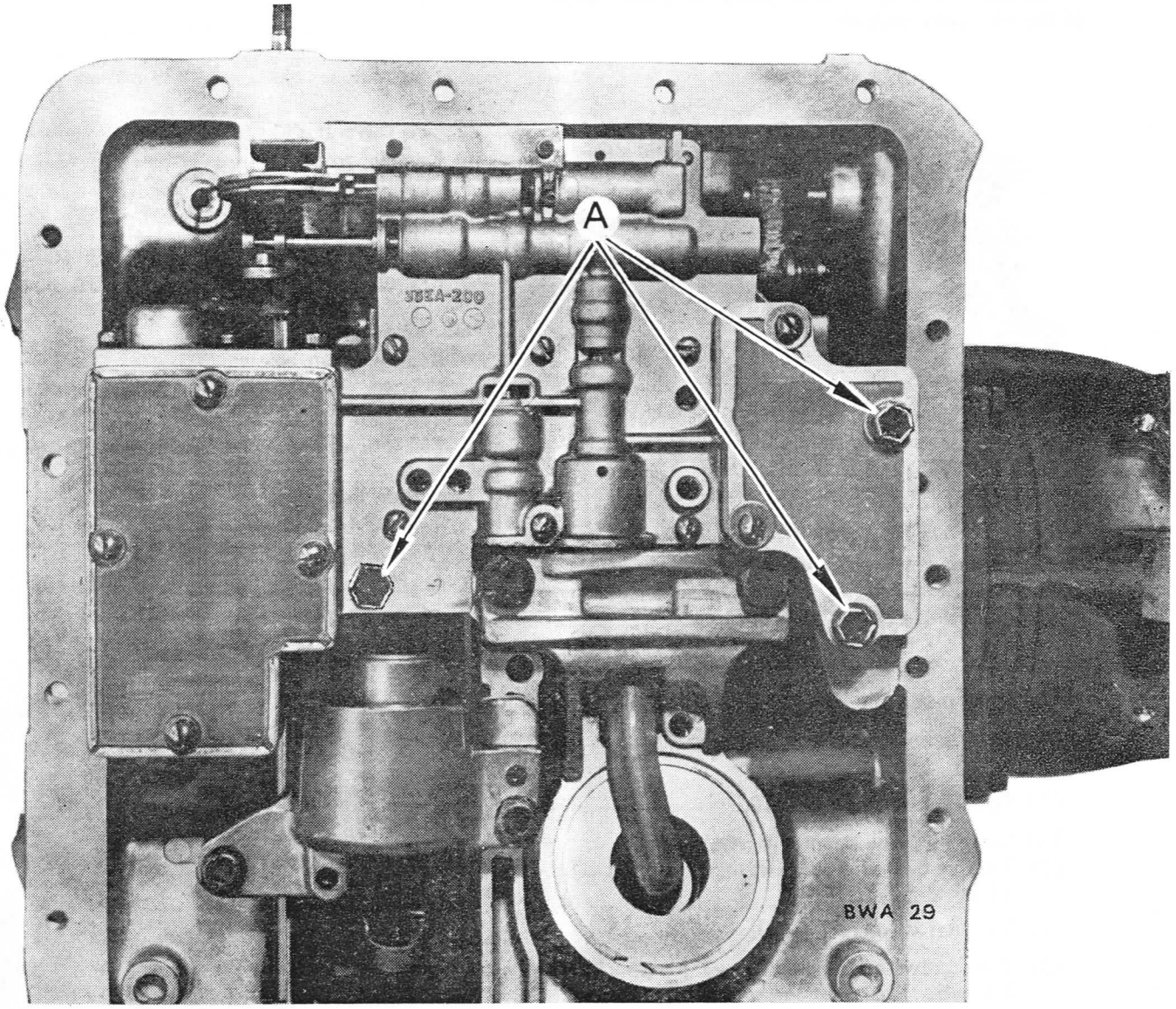


Fig. D.2

The valve bodies assembly, showing the retaining bolts (A).

Section D.4

DISMANTLING THE VALVE BODIES ASSEMBLY

To dismantle from the case remove:

(1) One bolt with spring lock washer $\frac{1}{4}$—20 x $1\frac{1}{4}$ in. ($\frac{7}{16}$ in. socket).

(2) Two bolts and spring lock washers $\frac{1}{4}$—20 x 2 in. ($\frac{7}{16}$ in. socket).

(3) Two $\frac{1}{4}$ in. flat washers.

Detach the throttle cable from the down-shift valve cam.

Lift the valve bodies assembly clear from the oil tubes at the front end of the gearbox.

NOTE.—'O' ring in front pump inlet tube location of the converter support.

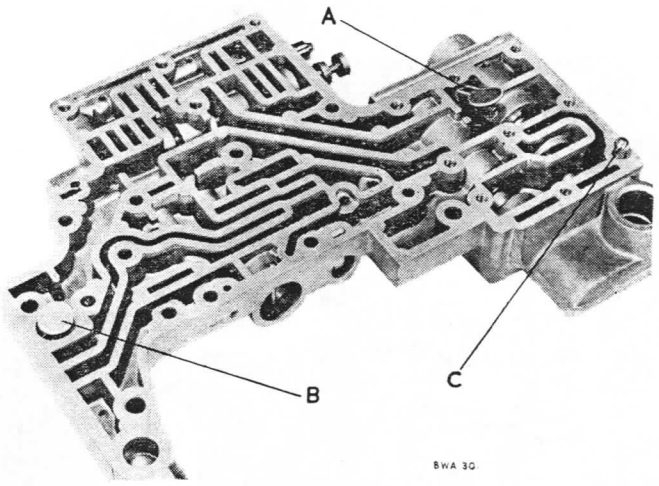


Fig. D.3

Check valves in lower valve body.

A. Front pump check valve. B. Rear pump check valve. C. Converter 'out' check valve.

Strainers

The front pump oil strainer is retained by:

(1) Four screws and lock washers No. 10—24 x $\frac{3}{8}$ in.

(2) Four flat washers No. 10.

The rear pump oil strainer is retained by:

(1) Two screws and lock washers No. 10—24 x $1\frac{3}{4}$ in.

(2) Two flat washers No. 10.

(3) Two screws and lock washers $\frac{1}{4}$—20 UNC. x 2 in.

(4) Two flat washers $\frac{1}{4}$ in.

Remove the screws, washers, lock washers, and strainers.

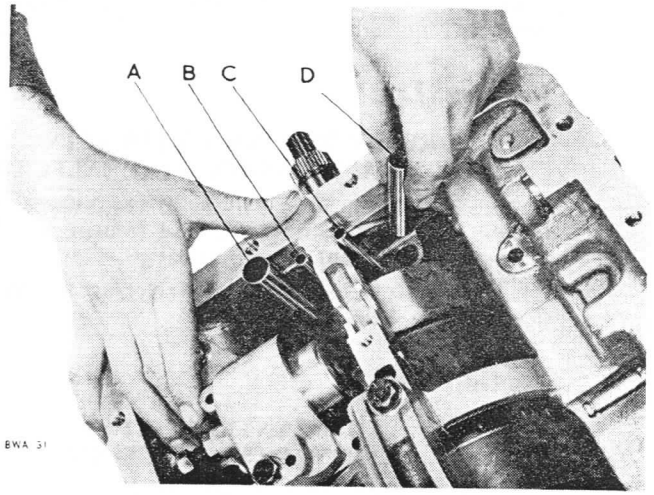


Fig. D.4

Location of the oil tubes.

A. Front pump inlet. B. Converter 'out'. C. Converter 'in'. D. Front pump outlet.

Upper valve body

Remove from the top:

(1) Four screws and washers 10—24 x $\frac{5}{8}$ in.

Remove from below:

(1) Five screws and lock washers 10—24 x 1 in.

(2) One screw and lock washer 10—24 x $1\frac{3}{8}$ in.

Oil tube collector

Remove from below:

(1) Six screws and lock washers 10—24 x $\frac{11}{16}$ in.

(2) Two screws and lock washers 10—24 x $\frac{7}{8}$ in.

The tube orifice is fitted nearest to the manual valve.

Governor line plate

Remove from the top:

(1) Two screws and spring washers 10—24 x 1 in.

(2) Two screws and spring washers 10—24 x 2 in.

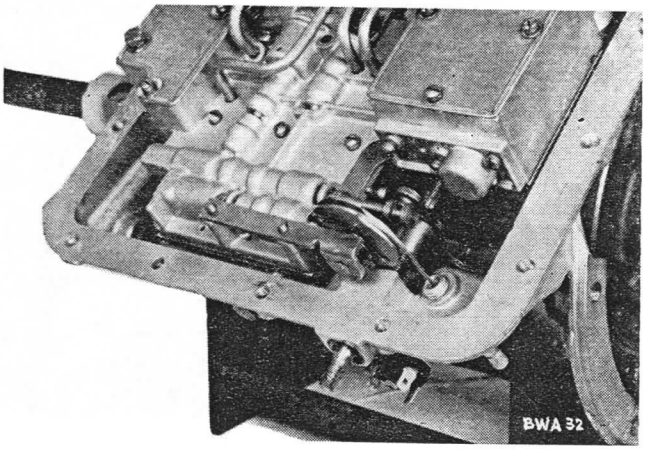


Fig. D.5

The down-shift valve cam.

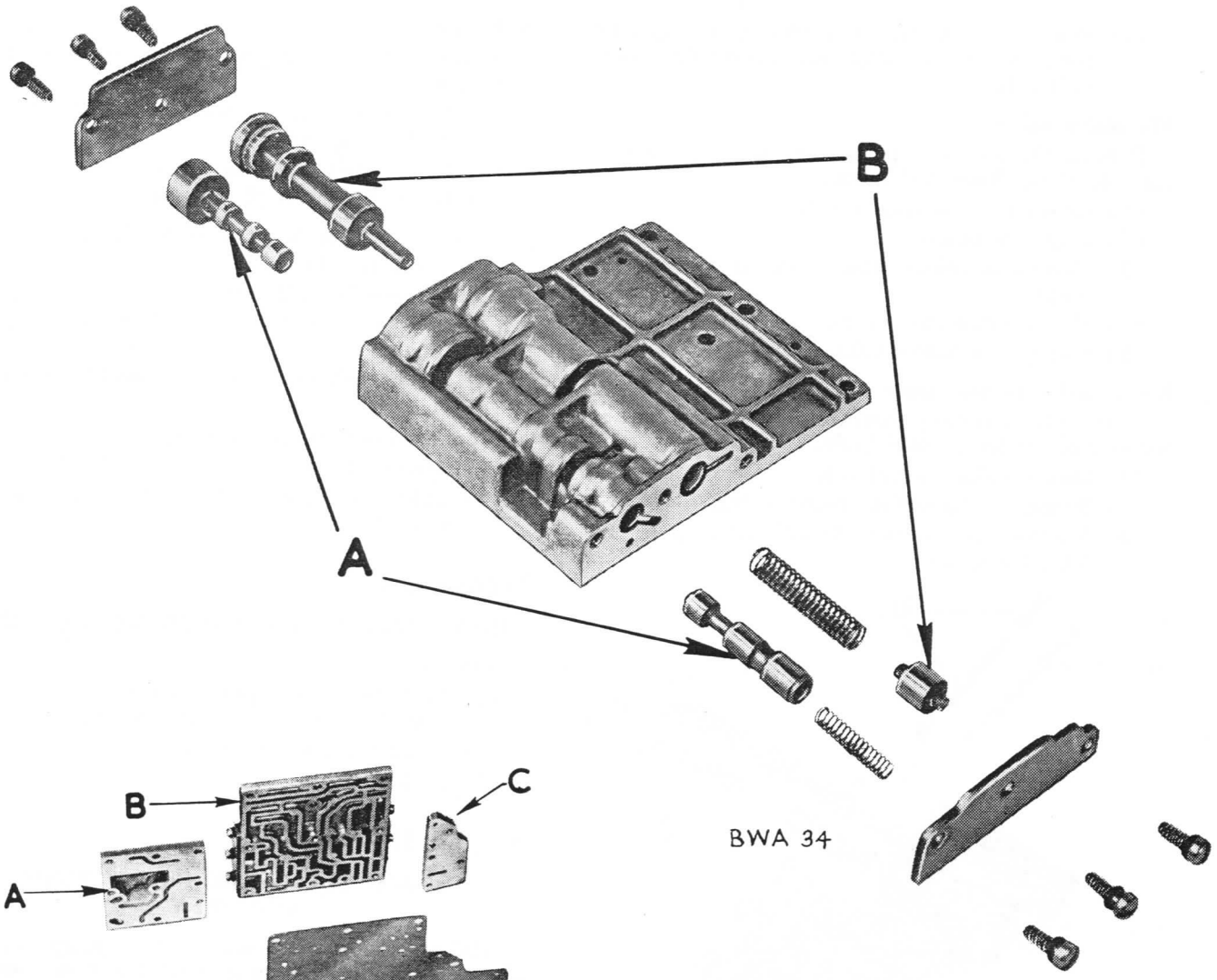


Fig. D.7

Upper valve body—exploded view.

A. 1-2 shift valve and plunger. B. 2-3 shift valve and plunger.

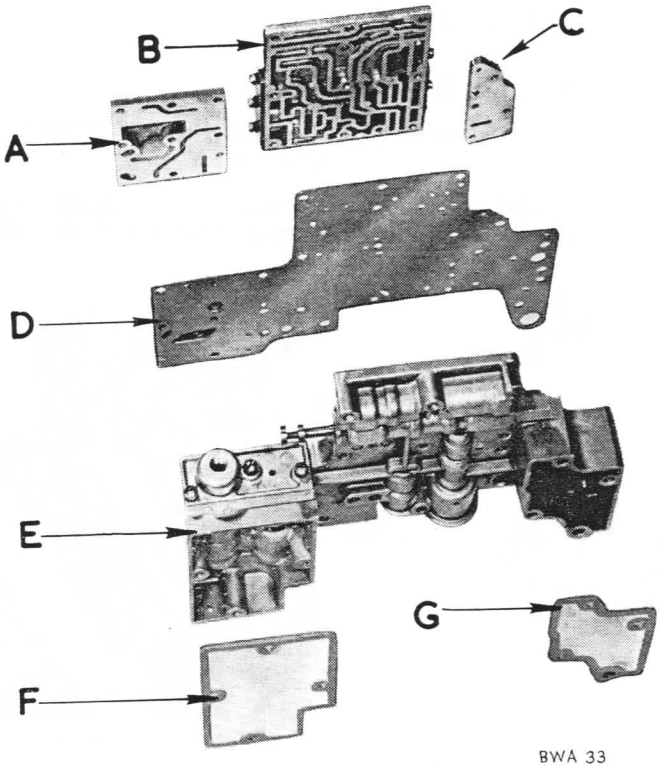


Fig. D.6

The valve bodies separated—bottom view.

A. Oil tube collector.
B. Upper valve body.
C. Governor line plate.
D. Separating plate.
E. Lower valve body.
F. Front pump strainer.
G. Rear pump strainer.

Separating components

Remove:

(1) Separating plate.
(2) Converter 'out' check valve and spring (nominal free length $\frac{5}{8}$ in.).
(3) Front pump check valve (flap type) and bridge piece (if fitted).
(4) Rear pump check valve and spring.
(5) Manual control valve—double collar faces the regulator valve. Pull the valve clear from the lower valve body.

Down-shift and throttle valve

Remove:

(1) Retainer.
(2) Throttle return valve spring.
(3) Withdraw the down-shift valve and throttle valve.

(4) Remove the throttle valve spring. The throttle valve fits with the large land towards the down-shift valve.

Modulator valve

Remove the following parts from the large bore at the side of the lower valve body:

(1) Dowel pin—modulator valve.
(2) Plug—modulator.
(3) Valve—modulator (the large land faces the plug).
(4) Spacer—modulator valve.
(5) Spring—modulator valve.

Servo orifice control valve

Remove the following parts from the smaller bore at the side of the lower valve body:

(1) Stop—orifice control valve.
(2) Spring—servo orifice control valve.
(3) Valve—servo orifice control (the open end faces the spring).

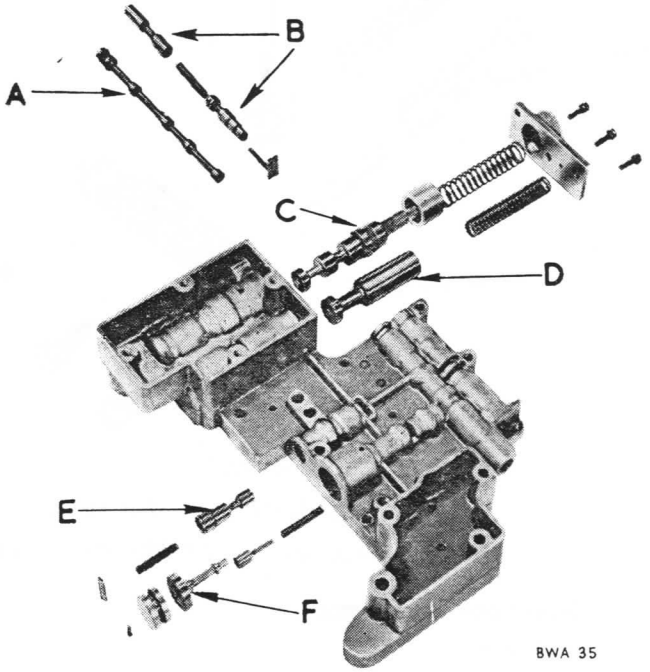


Fig. D.8

Lower valve body—exploded view.

A. Manual control valve.
B. Down-shift and throttle valve.
C. Primary regulator valve.
D. Secondary regulator valve.
E. Servo orifice control valve.
F. Modulator valve.

Primary and secondary regulator valves

From the manual valve side of the lower valve body remove the following components:

(1) Three screws and lock washers No. 10—24 x $\frac{9}{16}$ in. (spring load).
(2) Lower body end plate.
(3) Primary regulator spring.
(4) Primary regulator valve sleeve.
(5) Primary regulator valve.
(6) Secondary regulator valve spring.
(7) Secondary regulator valve.

Shift valves

Remove the following components from the upper valve body:

(1) Six screws and lock washers No. 10—24 x $\frac{7}{16}$ in. (spring load).
(2) Upper body end plate—front.
(3) Upper body end plate—rear.

Remove from the rear end of the body:

(1) 2-3 shift valve.
(2) Spring—2-3 shift valve—inner.
(3) Plunger—2-3 shift valve (installed either way round).
(4) Valve—1-2 shift (the large land faces the end plate).

From the front end of the body remove:

(1) Spring—1-2 shift.
(2) Valve—1-2 shift (the open end faces the spring).

Section D.5

DISMANTLING THE EXTENSION HOUSING

Remove:

(1) Four bolts with spring lock washer $\frac{5}{16}$—18 x 1 in. hexagon head ($\frac{1}{2}$ in. socket).
(2) Extension housing assembly.
(3) Gasket.

Section D.6

DISMANTLING THE FRONT PUMP ASSEMBLY

NOTE.—Before removing the front pump assembly always check the existing gear train end-float so that subsequently due compensation for thrust washer wear may be made on reassembly.

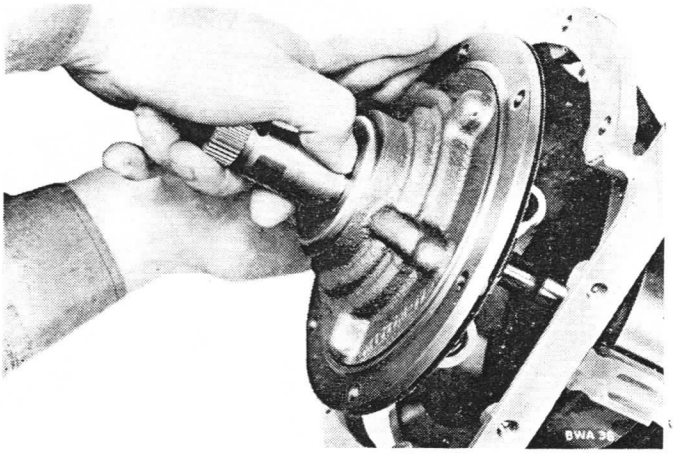


Fig. D.9

Withdrawing the front pump assembly.

To check the gear train end-float clamp Service tool BWA33 to the converter support, gently lever the gear train forward, and then adjust the tool until it contacts the end of the input shaft. Lever the front clutch back

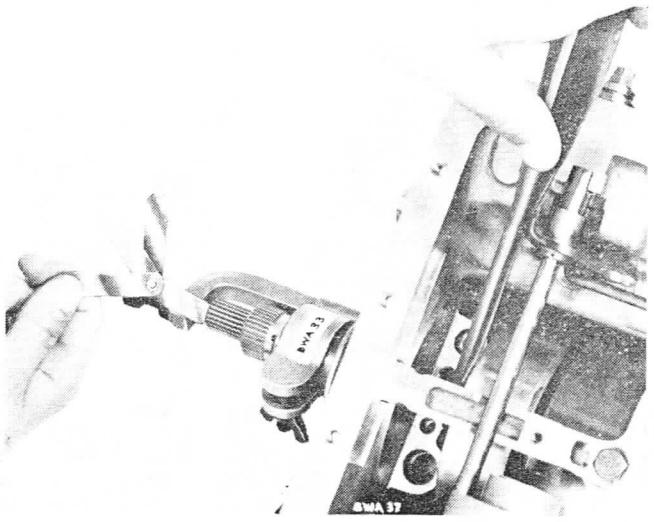


Fig. D.10

Checking the gear train end-float.

and measure the gap between the tool and the input shaft with feeler gauges as shown in Fig. D.10.

The permissible end-float is .010 to .030 in.

Remove:

(1) Front pump outlet tube.
(2) Converter in and out tubes (round-nose pliers).
(3) Front pump inlet tube.
(4) Six bolts with spring lock washers $\frac{5}{16}$—18 x $\frac{7}{8}$ in. hexagon head ($1\frac{1}{2}$ in. socket).

Remove the front pump assembly by pulling on the converter support, pushing the gearbox input shaft inwards.

NOTE.—Keep the washer—input shaft thrust (selective)—with the front pump assembly.

These washers are available in two sizes: .061 to .063 in. and .078 to .080 in.

Dismantling the front pump

Remove:

(1) Five bolts and spring lock washers $\frac{5}{16}$—18 x $\frac{7}{8}$ in. hexagon head (ring spanner $\frac{1}{2}$ in. A.F.).
(2) One screw and lock washer No. 10—24 x $\frac{3}{4}$ in. Separate the pump body and gears from the converter support (use a block of wood).
(3) Gasket—pump adaptor and converter support.
(4) Pump adaptor and converter support assembly (serviced with .750 in. and 1.250 in. bore size bushes).
(5) 'O' ring.
(6) Front pump drive gear assembly.
(7) Driven gear (mark the outside faces of the gears prior to removal).
(8) Body and bush assembly.
(9) 'O' ring.
(10) Oil seal (seats fully home in register).

NOTE.—Early production pump adaptors have the 'O' ring located in a groove for use with a plain front pump suction tube. Later adaptors are not grooved but are counterbored for 'O' ring location on a suction tube with swaged collar which is NOT interchangeable with the plain pattern suction tube.

Section D.7

DISMANTLING THE FRONT CLUTCH

NOTE.—Early production units were fitted with sintered bronze inner plates. These have now been superseded by paper-backed plates.

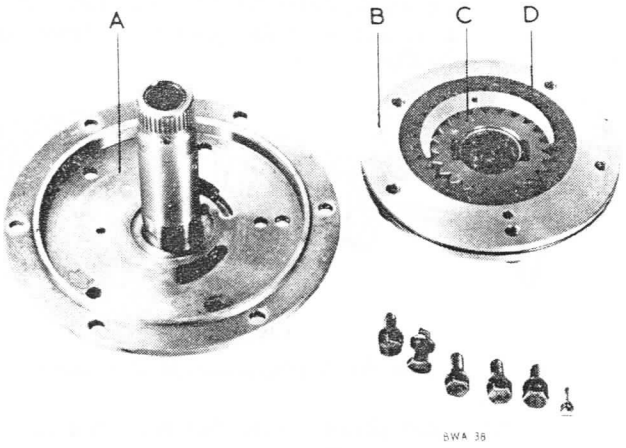


Fig. D.11

The converter support separated from the front pump.

A. Pump adaptor and converter support.
B. Body and bush assembly.
C. Driving gear.
D. Driven gear.

Clutch parts are only serviced in kit form and reference must be made to the Parts List.

Withdraw the assembly by the input shaft. **Note the bronze thrust washer and steel spacing washer.**

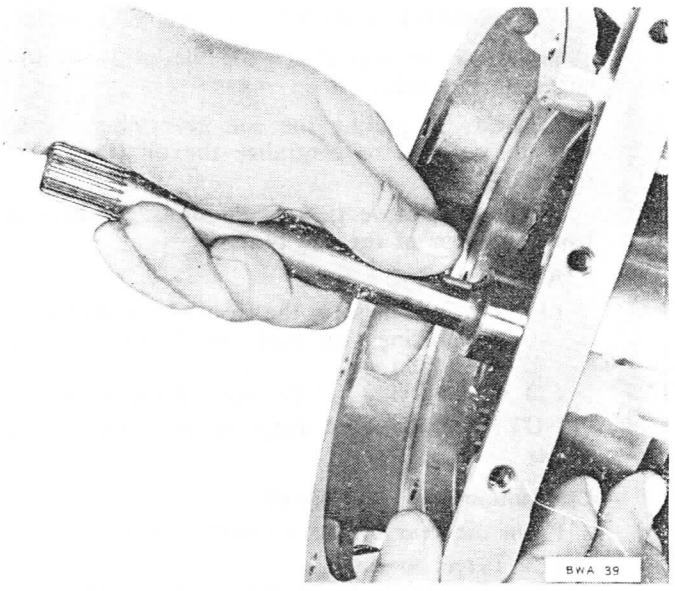


Fig. D.12

Withdrawing the front clutch assembly.

Dismantling the front clutch

Remove:

(1) Snap ring.
(2) Input shaft and bush assembly. Note the clutch hub thrust washer.
(3) Spacing plates.
(4) Inner plates (sintered material difference on early production units identified by omission of one tooth; paper-based lined plates, introduced later, are interchangeable for front and rear clutches.

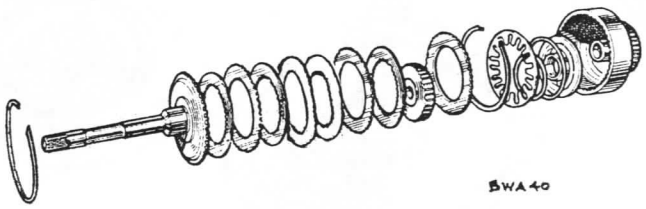


Fig. D.13

The front clutch—exploded view.

(5) Outer plates. Note that the front clutch outer plates are flat.
(6) Clutch hub.
(7) Snap ring.
(8) Spring (dishing downwards).
(9) Piston (remove with an air-line through the hole in the internal bore).
(10) Snap ring ($\frac{1}{8}$ in. dia.).
(11) Piston.
(12) Rubber lip seal.
(13) 'O' ring (in drum).

Section D.8

DISMANTLING THE REAR CLUTCH

Withdraw the rear clutch together with the forward sun gear assembly.

Separate by pulling the sun gear assembly to the rear, taking care to centralize the oil rings to avoid fracture.

NOTE.—Remove the needle thrust washers at the front and rear of the sun gear.

Also remove:

(1) Two oil rings (at the front of the shaft). Hook-ended rings on early production, butt-ended rings later.
(2) One oil ring (at the rear of the shaft).

NOTE.—Butt-ended rings to be used as replacements.

Dismantling the rear clutch

From the rear of the assembly remove:

(1) Three oil rings.

From the front end of the assembly remove:

(1) Snap ring (screwdriver).
(2) Pressure plate.
(3) Inner plates.
(4) Outer plates (coned).

NOTE.—Coning may be either way round, but must be in the same direction.

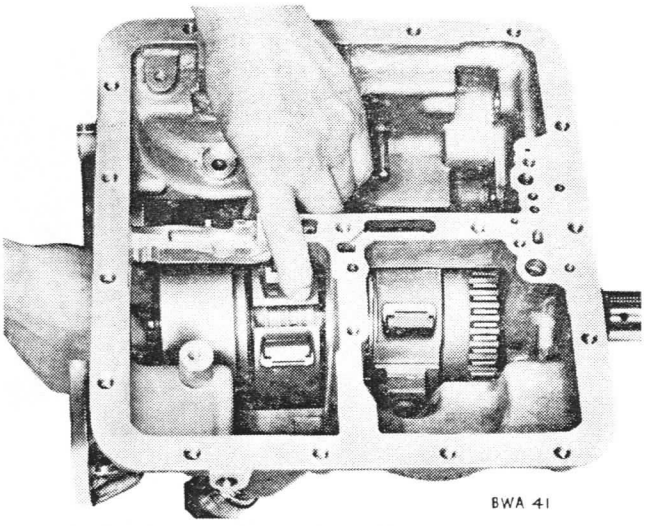


Fig. D.14

Withdrawing the rear clutch and forward sun gear group.

To remove the piston use Service tool BW37 to compress the clutch spring. Remove the following parts:

(1) Spring seat snap ring (rotate the snap ring gap to the milled flat on the drum boss).

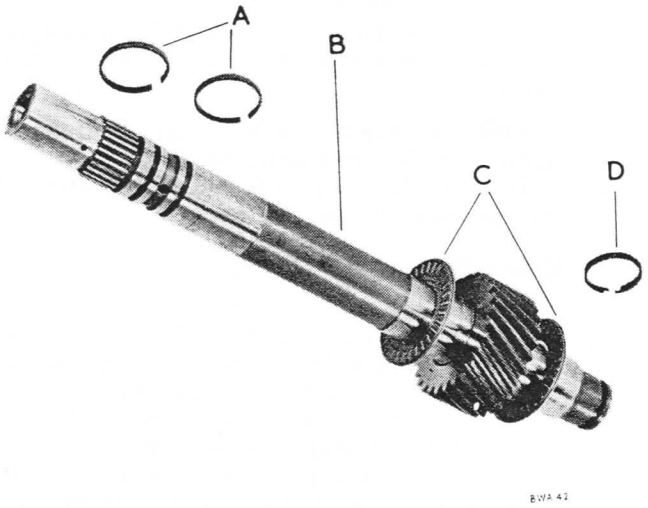


Fig. D.15

The forward sun gear components.

A. Oil sealing rings, front clutch.
B. Forward sun gear assembly.
C. Needle thrust washers.
D. Oil sealing ring, governor feed.

(2) Spring seat.
(3) Spring.
(4) Piston with ball valve.
(5) Sealing ring (rubber).
(6) 'O' ring.

NOTE.—The front and rear clutch paper based fibre inner and outer plates are interchangeable.

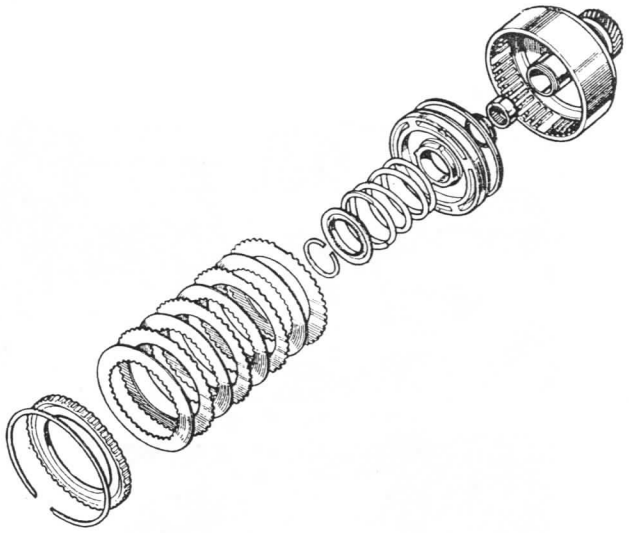


Fig. D.16
Rear clutch—exploded view.

Section D.9

DISMANTLING THE FRONT BAND AND SERVO

With the fingers, squeeze the band ends together and remove the band to the front.

Lift out the strut. Remove the two $\frac{5}{16}$—18 servo retaining bolts with spring lock washers ($\frac{1}{2}$ in. socket).

NOTE.—The rear bolt is the longer one of the two and acts as the dowel bolt.

Lift the front servo assembly clear.

Dismantling the front servo

Remove:

(1) Snap ring (small screwdriver).
(2) Piston.
(3) Large 'O' ring.
(4) Small 'O' ring.
(5) Sleeve (collar fits inwards).
(6) Oil sealing ring (square-section).

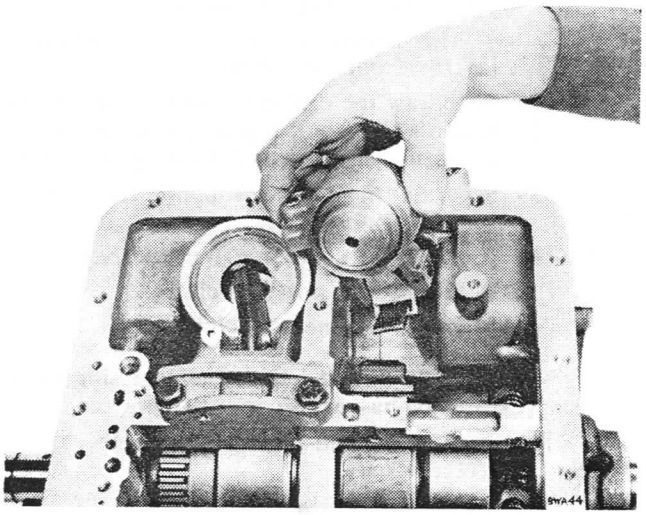
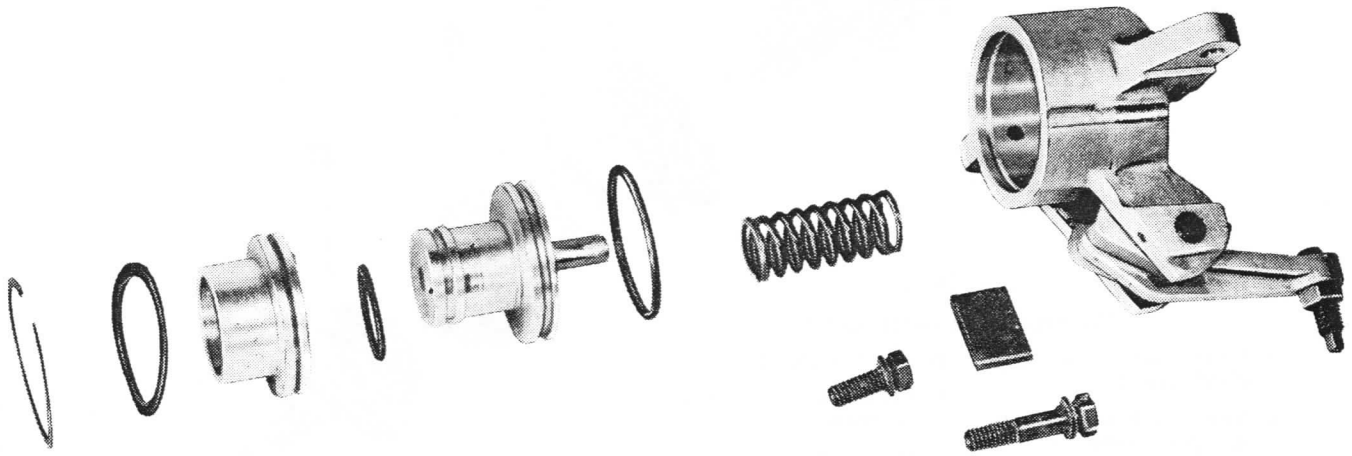


Fig. D.17
Removing the front servo assembly and strut.

(7) Spring—servo piston—retracting.
(8) Housing.
(9) Lever.
(10) Lever pivot pin.
(11) Slotted spring pin ($\frac{1}{8}$ in. dia. drift).
(12) Screw—servo adjusting.
(13) Nut $\frac{1}{8}$—16.



BWA 45

Fig. D.18
The front servo assembly dismantled.

Section D.10

DISMANTLING THE CENTRE SUPPORT AND PLANET GEARS

(1) From the outside of the transmission case remove the two centre support screws with $\frac{3}{8}$ in. lock washers ($\frac{9}{16}$ in. socket).

Also remove the rear servo retaining screw, i.e. the front one of the pair.

(2) Withdraw the centre support and plug assembly towards the front, together with the planet gear assembly, needle thrust bearing, and plate.

(3) Separate the centre support from the planet gears assembly.

(4) Remove the snap ring (screwdriver).

(5) Withdraw the one-way clutch.

(6) Remove the one-way clutch outer race.

NOTE.—The thrust bearing plate inside the planet gears assembly has its lip towards the rear.

The planet gears and rear drum assembly is serviced by replacement only.

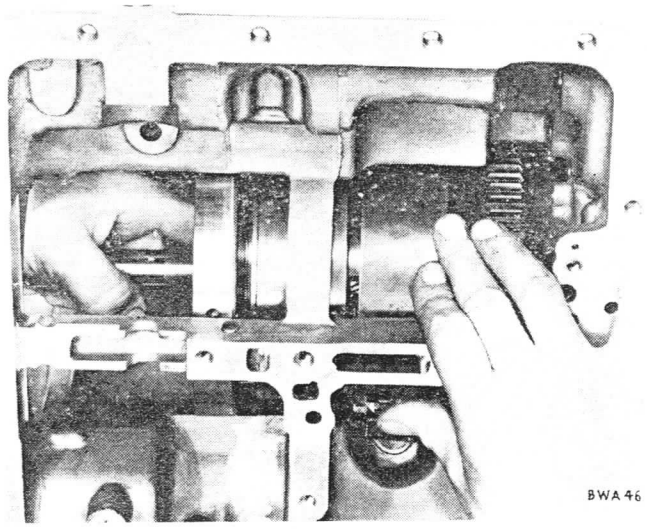


Fig. D.19
Withdrawing the centre support and planet gears.

Section D.11

REAR BRAKE BAND AND SERVO

(1) Squeezing the brake band ends with the fingers, tilt the band and withdraw it through the front end of the transmission case.

(2) Remove the rear servo strut.

(3) Remove the bolt and spring lock washer $\frac{3}{8}$—16 x $1\frac{1}{4}$ in. hexagon head ($\frac{9}{16}$ in. socket).

(4) Pull the rear servo assembly clear.

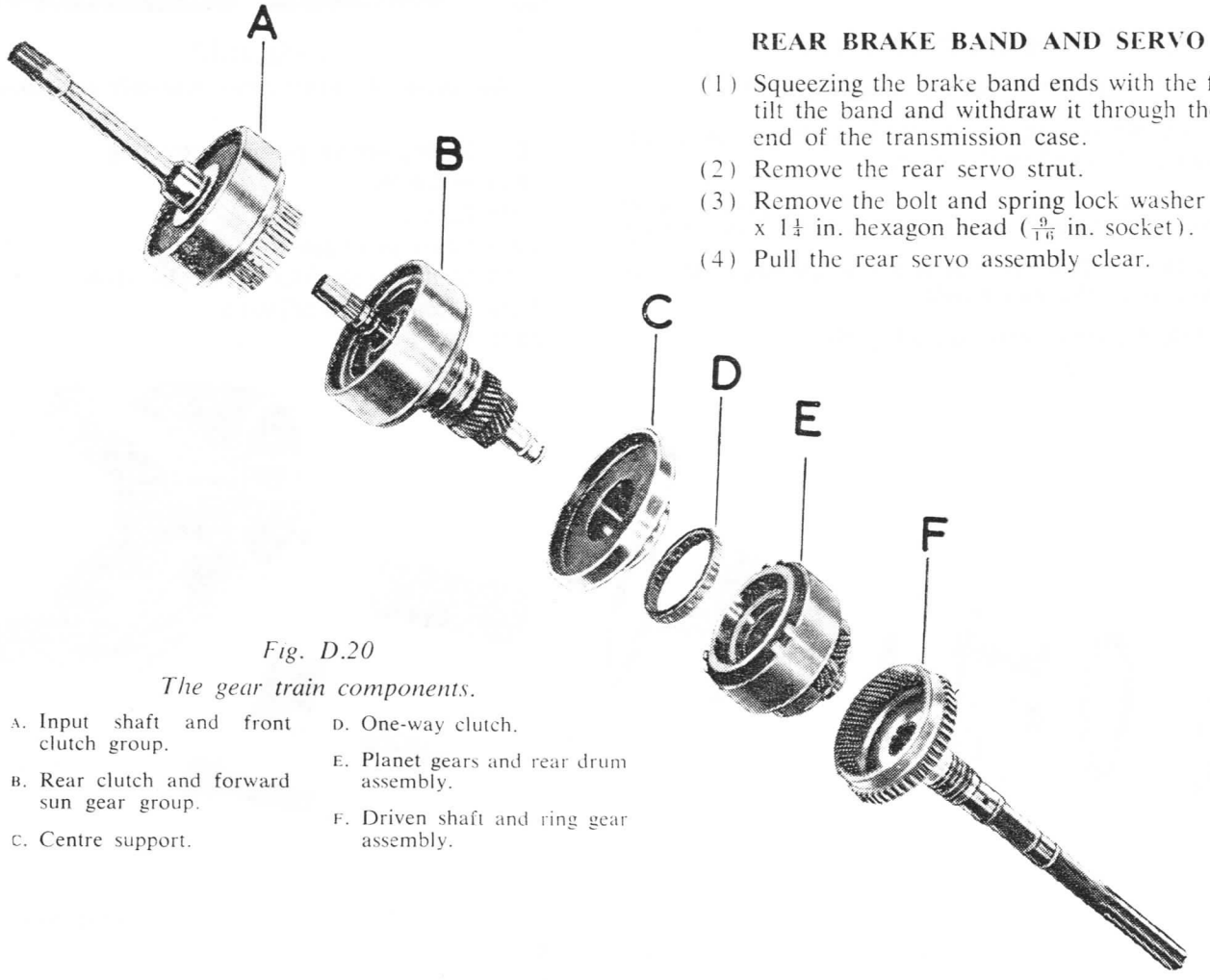


Fig. D.20
The gear train components.

A. Input shaft and front clutch group.
B. Rear clutch and forward sun gear group.
C. Centre support.
D. One-way clutch.
E. Planet gears and rear drum assembly.
F. Driven shaft and ring gear assembly.

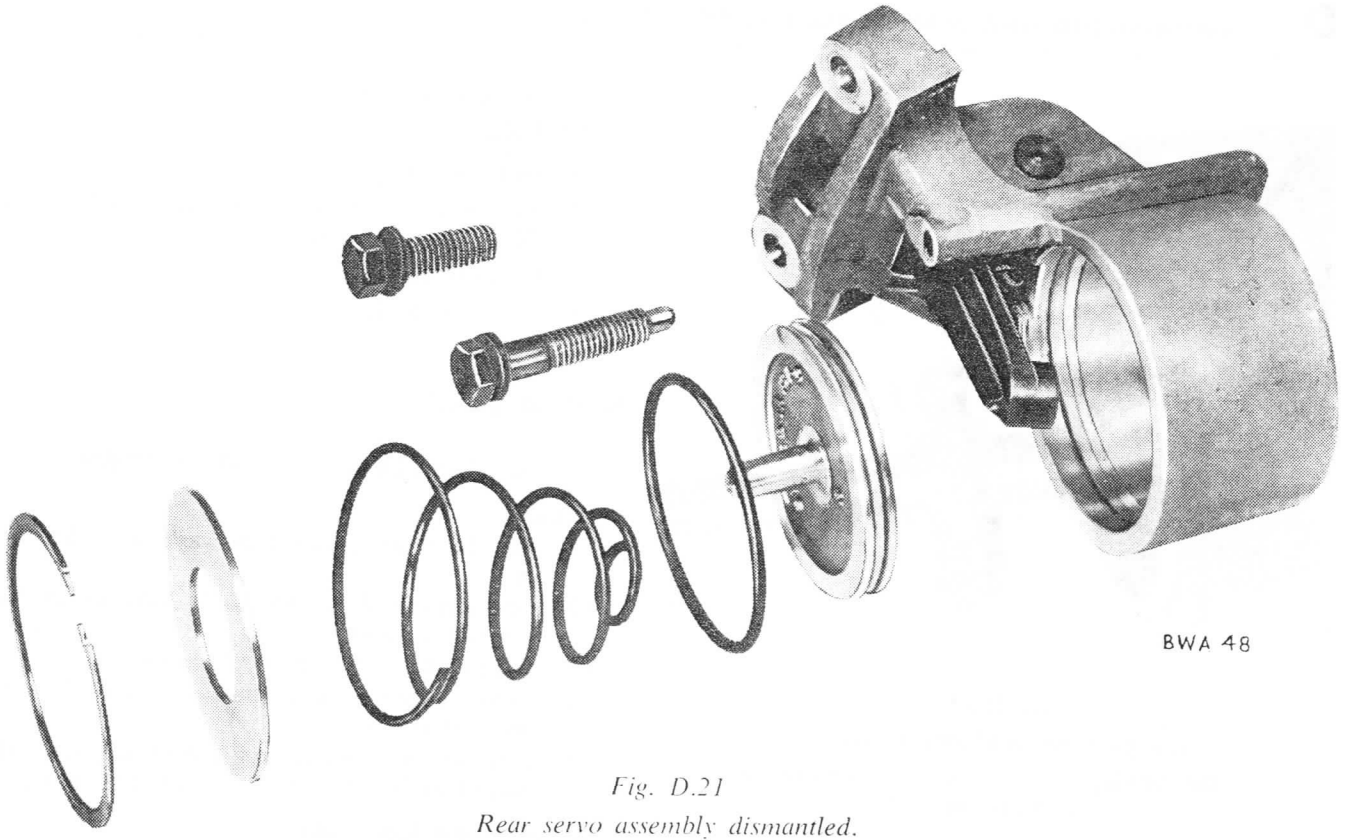


Fig. D.21
Rear servo assembly dismantled.

Dismantling the rear servo

To dismantle the rear servo assembly remove:

(1) Snap ring (screwdriver).
(2) Spring retainer.
(3) Spring (large diameter facing the retainer).
(4) Piston.
(5) 'O' ring.
(6) Slotted spring pin.
(7) Lever pivot pin.
(8) Lever.

Section D.12

DISMANTLING THE SPEEDOMETER GEAR AND GOVERNOR

Speedometer gear

Remove:

(1) Snap ring.
(2) Speedometer drive gear spacing washer.
(3) Speedometer drive gear.
(4) Woodruff key No. 2.
(5) Snap ring.

Governor

NOTE.—The governor may be serviced with the transmission *in situ* after removal of the extension housing.

Remove:

(1) Snap ring.
(2) Governor assembly (cover-plate towards the rear).
(3) Retrieve the ball bearing.
(4) Also remove the three oil sealing rings from the output shaft after removal of the rear pump.

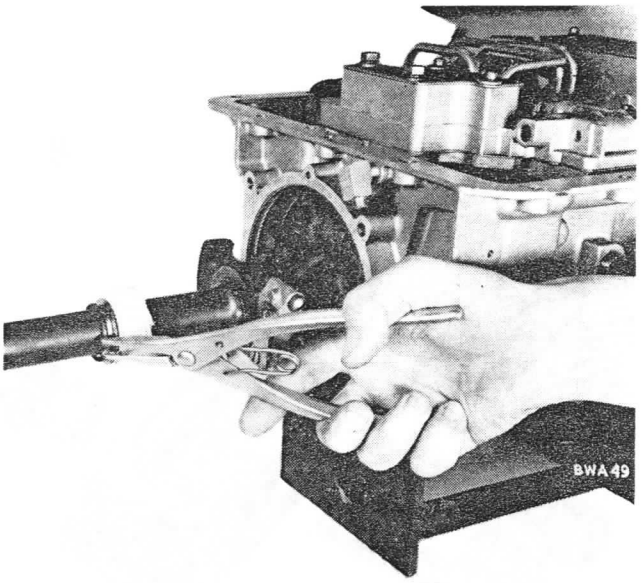


Fig. D.22
Removing speedometer gear snap ring.

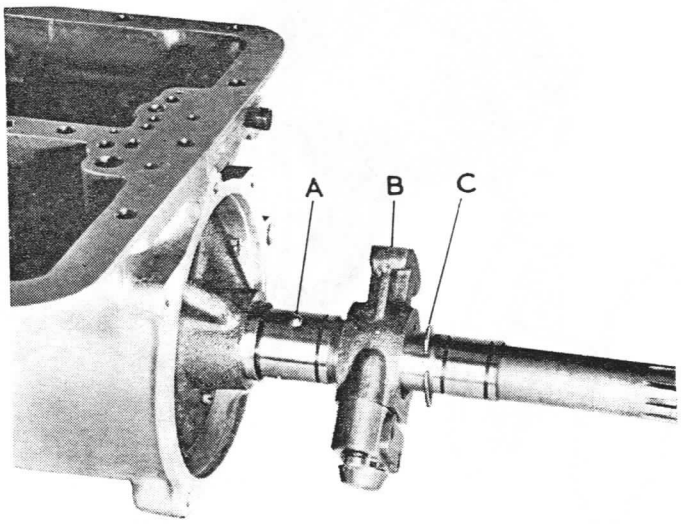


Fig. D.23

The governor and driven shaft.

A. Ball bearing. B. Governor assembly. C. Snap ring.

Dismantling the governor (unit service applies)

Remove:

(1) Two screws and spring lock washers ¼—20 x 1⅜ in.

(2) Governor sleeve.

(3) Retainer—governor spring.

(4) Spring—governor.

(5) Valve.

(6) Governor weight.

(7) Two screws and spring lock washers No. 10—24 x ⅜ in. flat head.

(8) Cover-plate.

(9) Governor body.

Section D.13

DISMANTLING THE REAR PUMP

Remove:

(1) Five bolts and spring lock washers ¼—20 x 1⅛ in.

(2) One screw and internal tooth lock washer No. 10—24 x 1⅛ in.

(3) Withdraw the rear pump housing.

(4) Driven gear (mark the outside face of this gear prior to removal).

(5) Also remove the three oil sealing rings from the output shaft after removal of the rear pump.

Dismantling the rear pump

Remove:

(1) Drive gear (mark the outside face of the pump gears prior to removal).

(2) Rear pump drive key.

(3) Rear pump plate.

(4) Driven shaft and ring gear assembly (through the front of the gearbox); do not damage the white-metal bush in the rear wall of the trans-

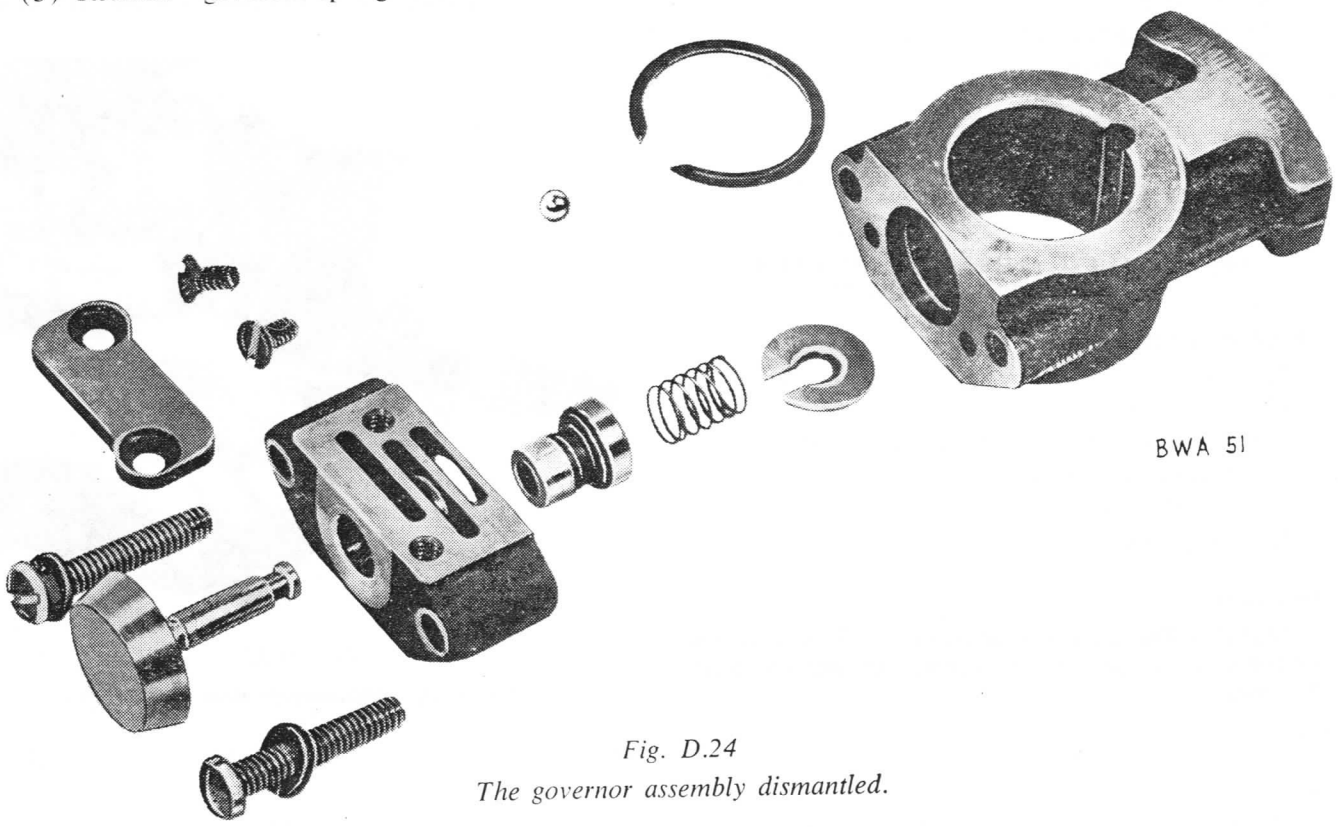


Fig. D.24

The governor assembly dismantled.

mission case. This bush is not serviced separately.

NOTE.—Remove the thrust washer with three tabs between the driven shaft and the rear wall of the transmission case.

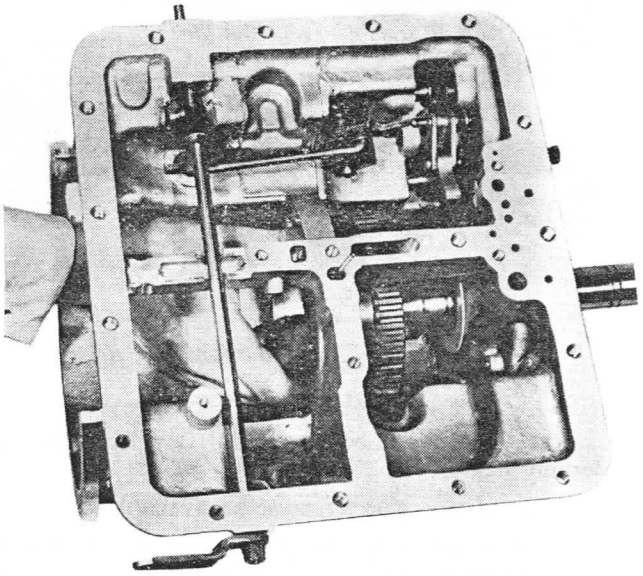
Separate:

(1) Snap ring (selective for ring gear), .055, .057, or .059 in.

(2) Transmission ring gear.

(3) Driven shaft and plug assembly.

NOTE.—The white-metal bush in the rear wall of the main case is not serviced separately.



BWA 52

Fig. D.25

Withdrawing the driven shaft and ring gear assembly.

Section D.14

SHAFT, PARKING PAWL, AND LEVERS

Remove:

(1) Two parking pawl torsion lever clips (needle-nose pliers).

(2) Leave the linkage rod in position but slightly withdraw it towards the inside of the case. With a screwdriver release the toggle lever spring from the lift lever.

(3) Now remove the linkage rod.

(4) Retaining springs ($\frac{5}{16}$ in. centres, needle-nose pliers).

(5) Washer ($\frac{5}{8}$ in. O/D).

(6) Parking brake torsion lever.

(7) Toggle lift lever assembly and toggle lever spring.

These parts can now be separated.

To dismantle the parking pawl:

(1) Remove the anchor pin. This is the lower of the two pins as viewed with the gearbox inverted. Withdraw this pin with a magnet or drop out by upending the gearbox.

(2) Next drive inwards the slotted spring pin retaining the parking brake toggle pin ($\frac{1}{8}$ in. dia. drift).

(3) Withdraw the parking brake toggle pin to the rear.

(4) Remove the 'O' ring.

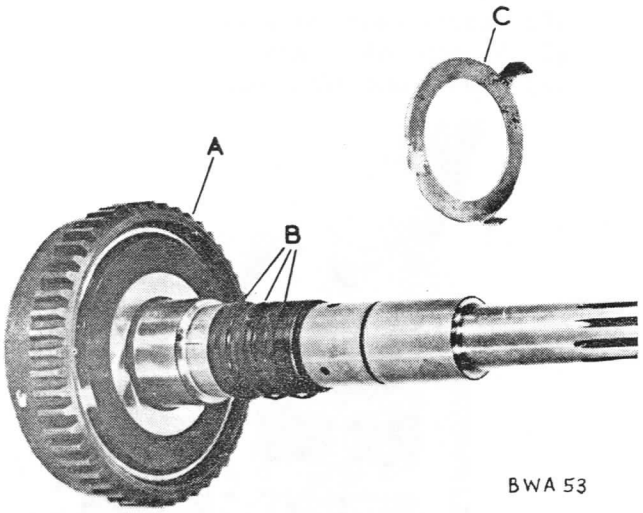


Fig. D.26

Driven shaft details.

A. Ring gear and driven shaft. B. Oil sealing rings. C. Thrust washer.

Next withdraw:

(5) Retaining spring ($\frac{1}{4}$ in. centres, needle-nose pliers).

(6) Anchor release spring.

(7) Release the spring retainer (flanged).

(8) Parking brake washer ($\frac{9}{16}$ in. O/D).

(9) Toggle link pin.

(10) Parking brake pawl.

(11) Brake toggle pin (ball-ended).

Separate:

(12) Toggle link lever.

(13) Toggle link.

The pivot shaft is not serviced separately from the main case.

Remove:

(1) Manual control shaft collar.

(2) Roll pin ($\frac{1}{8}$ in. x $\frac{5}{8}$ in.) with $\frac{1}{8}$ in. drift.

(3) Roll pin ($\frac{1}{8}$ in. x $\frac{11}{16}$ in.) with $\frac{1}{8}$ in. drift.

(4) Spring—manual shift bias.

(5) Manual valve detent lever assembly.

(6) Manual valve lever shaft.

(7) $\frac{3}{8}$ in. diameter ball.

(8) Spring—manual valve detent.

Section D.15

DISMANTLING THE TRANSMISSION CASE AND INHIBITOR SWITCH

Transmission case

Remove:

(1) Adaptor—tube connector.
(2) Washer—self-centering.
(3) Control shaft oil seals.

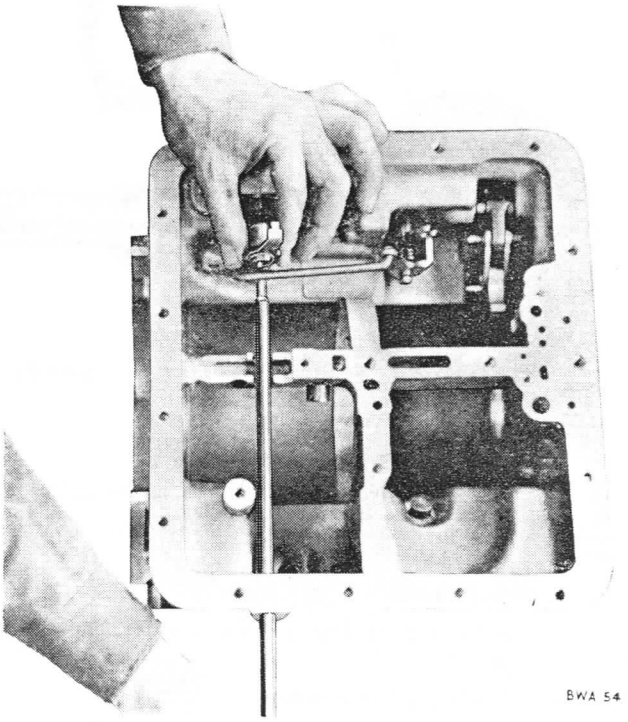


Fig. D.27
Mounting the detent lever on the manual control shaft.

(4) Rear band adjusting screw with locknut.
(5) $\frac{1}{8}$—27 Dryseal headless pipe plug.

The case has two $\frac{3}{16}$ in. bosses for nameplate attachment.

Down-shift valve cable assembly

If necessary, unscrew from the case (spanner size $\frac{3}{4}$ in. A.F.).

Starter inhibitor switch

Using Service tool BW547A-50-3, remove from the transmission case:

Inhibitor switch with locknut.

Section D.16

ASSEMBLING—GENERAL

Torque tightening figures are given on page and spring identification table on page

For all assembly operations high standards of cleanliness are essential.

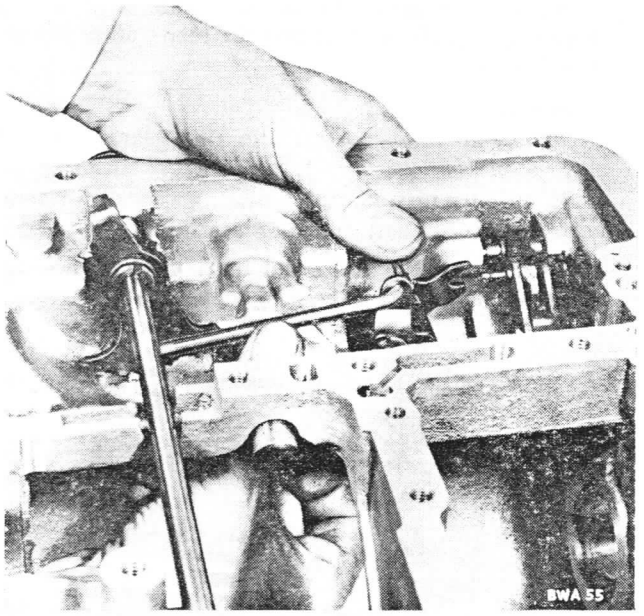


Fig. D.28
Fitting linkage rod retaining clip.

Rags used must be clean and free from lint, preferably nylon.

A set of **new** gaskets must be available.

Prior to assembly all parts must be scrupulously cleaned with petrol, paraffin, or industrial solvent. Any defective items must be renewed; lubricate parts with approved Automatic Transmission Fluid before installation.

The assembly sequence is described in such a manner that the front of the transmission is to the left of the operator.

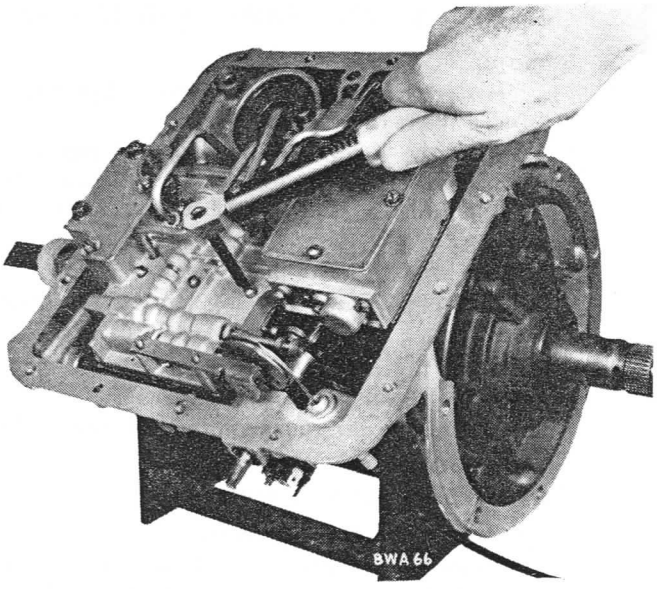


Fig. D.29
Using torque wrench and adaptor.

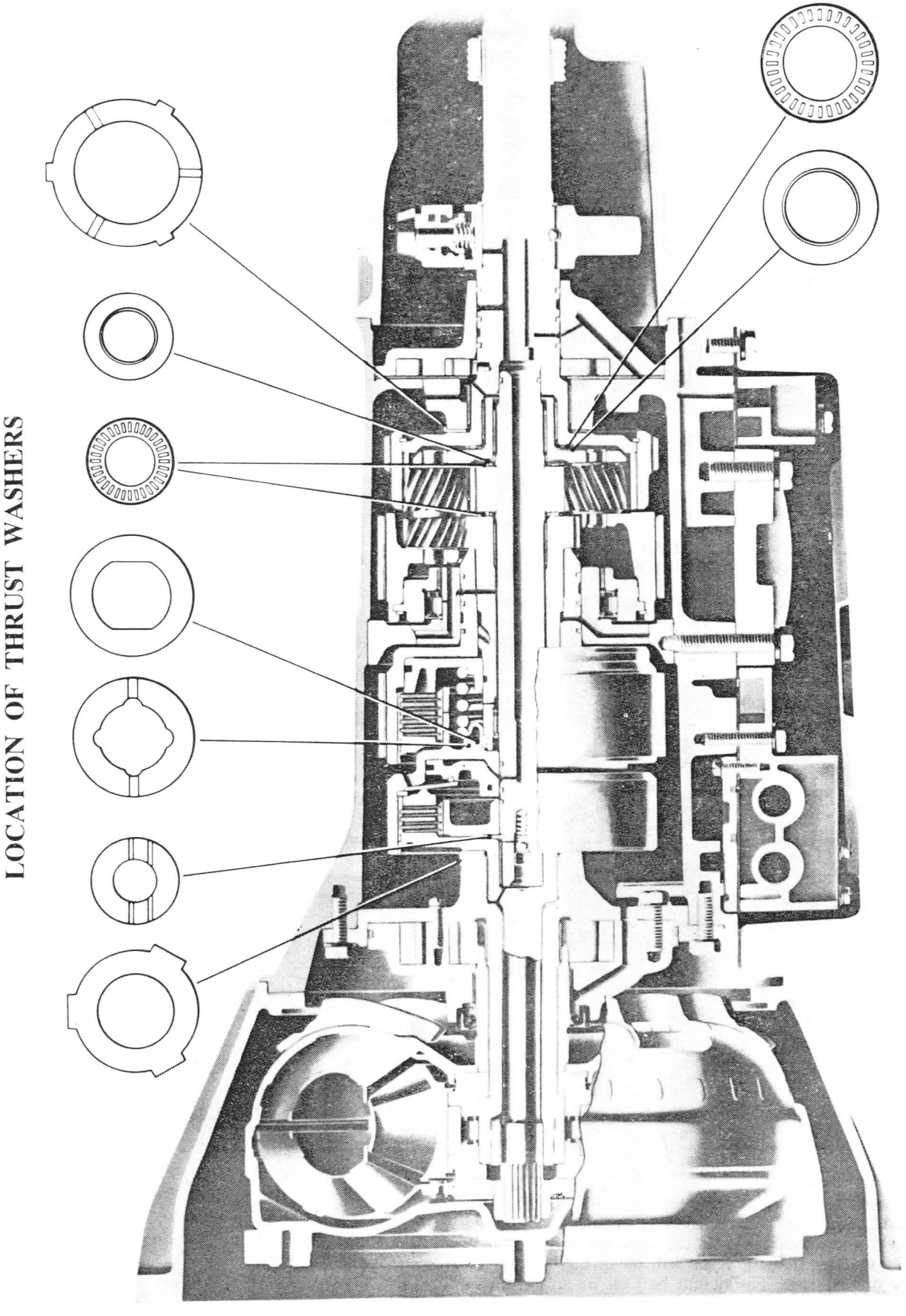


Fig. D.30

NOTE.—Except on early production units a 1.125 in. diameter spacer washer is fitted behind the speedometer drive gear.

All screws, bolts, and nuts must be tightened to the figures of the Torque Chart. Care is necessary to avoid damage to light-alloy components and their screw threads.

A sealer is used on the pressure point plug and inhibitor switch threads.

NOTE.—Items not described in this section are assembled in the reverse order of dismantling.

Spare parts are available only from B.M.C. Authorised Distributors and Dealers.

Section D.17

ASSEMBLING THE TRANSMISSION CASE

The transmission case is inverted on the bench cradle. Verify that the output shaft bush, parking brake torsion lever pin, and the brake anchor pin are tight in the case.

Section D.18

ASSEMBLING THE SHAFT, PARKING PAWL, AND LEVERS

Retention of the parking pawl toggle lever assembly is by a spring retainer which is placed in position with the fingers. Assemble the two levers with the torsion

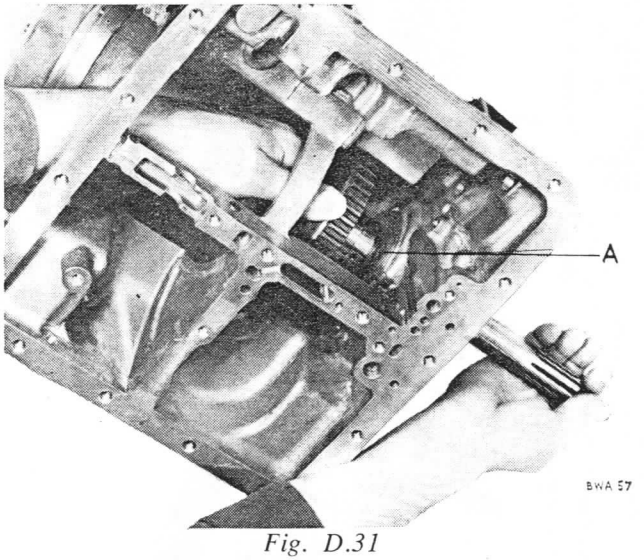


Fig. D.31

Installing the driven shaft and ring gear assembly.

A. Thrust washer.

spring on their common pin. Fit the retaining clip. Subsequently the link connecting the detent lever assembly with the torsion lever is installed. A screwdriver is then used to lever the spring into position in such a manner that the lever will be spring-loaded in a forward direction. The detent ball on its spring under the detent lever assembly is best installed using a short length of tubing to hold down the ball while the detent lever assembly is pushed outwards.

Driven shaft

The driven shaft thrust washer has three tabs and is stuck to the transmission case with some Vaseline. The tabs of the washer embrace the boss at the rear of the case in such a manner that one tab will be pointing upwards, as seen with the box inverted. The driven

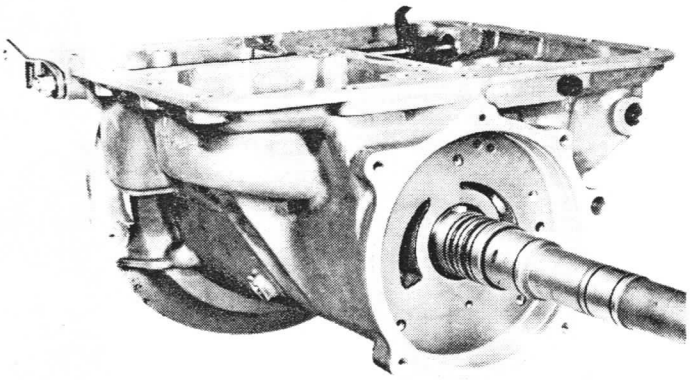


Fig. D.32

Rear pump plate correctly installed.

shaft, having been fitted previously to the ring gear by means of a selective snap ring, is then installed into the transmission case from the front.

Section D.19

ASSEMBLING THE REAR PUMP

Install the rear pump plate, taking care that its two holes, passing line pressure and governor pressure respectively, line up with those of the case. Next insert the pump drive key and install the pump driving gear. It is recommended to line up all three driven shaft oil sealing rings with their gaps uppermost, as viewed with the box inverted, thus ensuring that the gaps are below

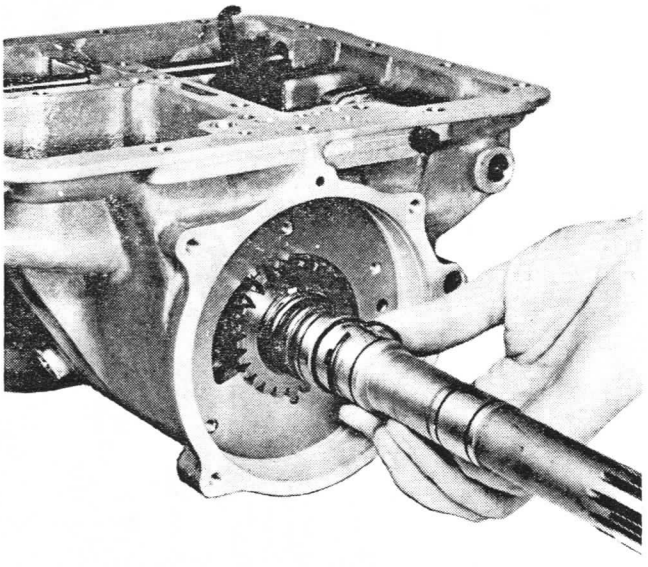


Fig. D.33

Installing the driven shaft oil rings.

the ring grooves. The pump body with driven gear is then installed and the five retaining bolts and one screw tightened on their lock washers. The governor assembly is next installed on the $\frac{1}{4}$ in. dia. ball located in the mainshaft, the governor cover-plate facing the rear. The governor snap ring is then fitted with the aid of snap ring pliers. Next fit a snap ring and install the speedometer drive gear with the spacer washer and No. 2 Woodruff key. Fit the second snap ring with snap ring pliers.

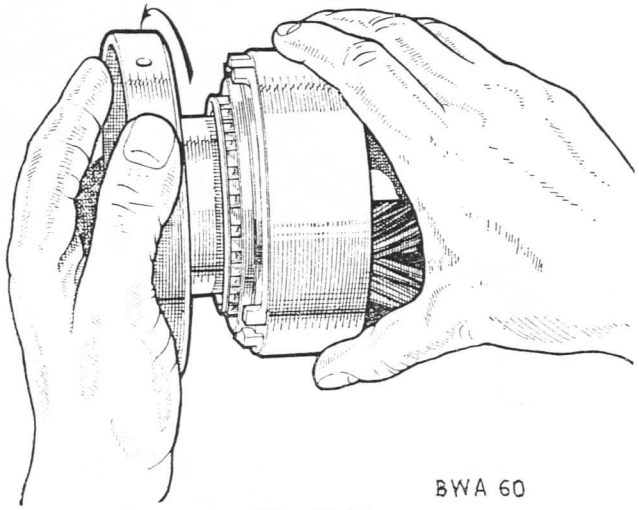


Fig. D.34

Sub-assembling the centre support, one-way clutch, and planet gears.

Section D.20

ASSEMBLING THE REAR BAND AND SERVO

Install the rear band, holding the two band ends together to facilitate installation. The rear servo assembly is now fitted. The longer rear servo screw is fitted to the front as this screw also locates the centre support. It is therefore left slack on its lock washer at this stage, but tighten the second bolt on its spring lock washer.

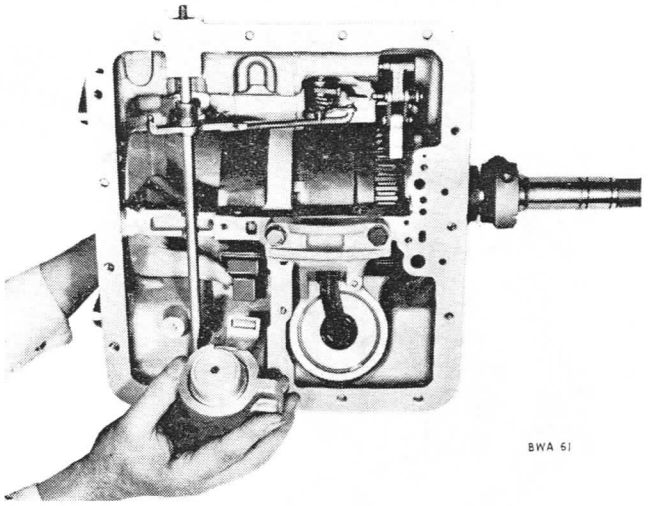


Fig. D.35

Installing the front servo.

Section D.21

ASSEMBLING THE RUNNING GEAR

The needle thrust bearing and its plate are stuck to the planet cover with some Vaseline. The assembly is then inverted for fitting of the one-way clutch (C. flange towards the front) and centre support. This group is then installed into the transmission case, making sure that the one-way clutch lubrication and rear clutch feed holes of the centre support are uppermost as viewed with the gearbox inverted. The two centre support screws are now fitted with their lock washers and tightened at the outside of the transmission case.

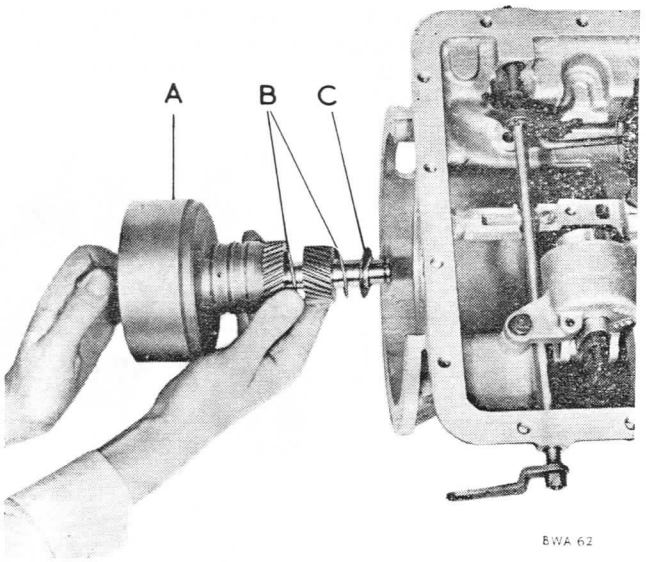


Fig. D.36

Installing the rear clutch and forward sun gear group.

A. Rear clutch. B. Needle thrust washers.
C. Needle thrust bearing plate.

NOTE.—The lock washers of the centre support screws also act as oil retainers and must be fitted with the sealing rim facing the transmission case.

Now also tighten the servo screw locating the support.

Section D.22

ASSEMBLING THE FRONT BAND AND SERVO

Install the front brake band on its anchor pin. Stick the strut to the servo lever with some Vaseline or petroleum jelly. Do not use grease. Next install the front servo assembly on its two retaining bolts with spring lock washers; the rear bolt is $\frac{3}{8}$ in. longer than the front bolt. Make sure that the servo strut is correctly engaged with the slot in the brake band.

Section D.23

ASSEMBLING THE REAR CLUTCH

If the clutch has been dismantled, check by shaking the piston assembly that the ball check valve is free and inspect for cleanliness. Reassembly on the bench commences with installation of the piston with its 'O' ring and oil sealing ring. Install one steel outer plate first, and then alternating inner and outer plates. Note that the outer plates are coned, unlike those of the front clutch.

Install the pressure plate and snap ring. Install the rear clutch spring with its spring seat. Using Service tool, compress the spring and fit the snap ring, using snap ring pliers. Place a needle thrust washer against the front face of the forward sun gear and install the forward sun gear assembly into the rear clutch assembly. Also fit a needle thrust washer to the rear face of the sun gear. This sub-assembled group is now installed into the gearbox together with the needle thrust bearing plate.

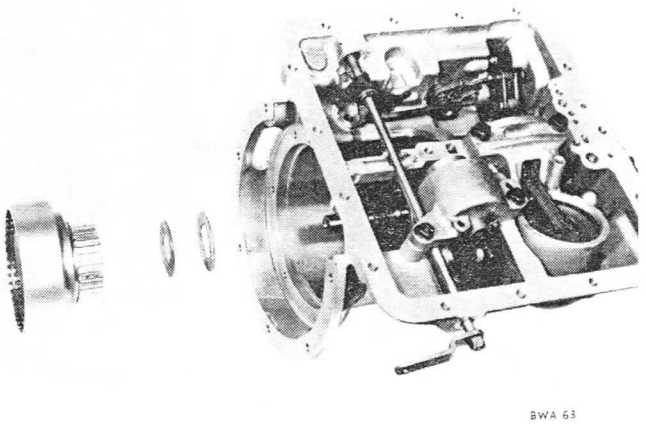


Fig. D.37

Installation sequence—thrust washers and front clutch.

Section D.24

ASSEMBLING THE FRONT CLUTCH

Fit a new 'O' ring in the drum and install the front clutch piston sealing ring. Insert the piston, and fit the front clutch spring (dishing to the rear) with its snap ring. Install the pressure plate (ridge facing the spring) and the appropriate number of inner and outer clutch plates alternately.

Install the clutch hub, rotating same to align the splines of the plates. Place this sub-assembly into the gearbox together with the bronze and steel thrust washers. Place the front clutch hub thrust washer against the clutch hub and then install the input shaft and bush assembly with its snap ring.

Section D.25

ASSEMBLING THE FRONT PUMP

If dismantled, this is sub-assembled on the bench, commencing with the installation of the driving gear onto the pump adaptor and converter support. Next the driven gear is fitted into the front pump body and

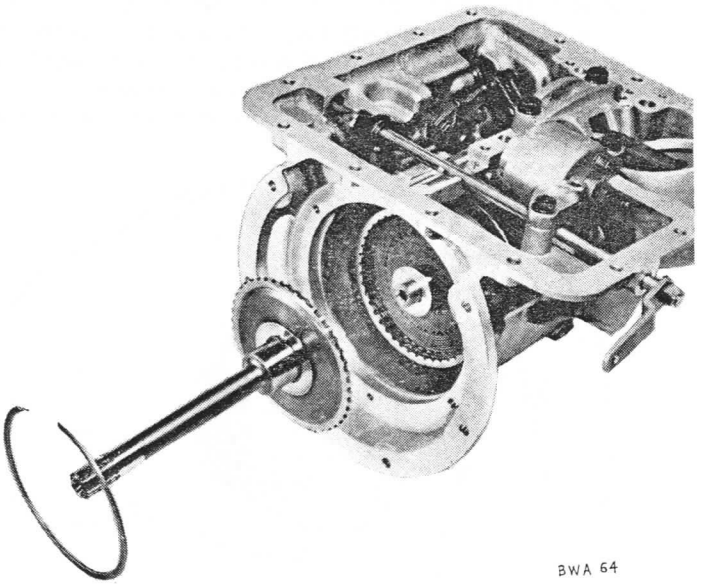


Fig. D.38

Installation sequence—front clutch snap ring, input shaft, and hub thrust washer.

bush assembly. Next the 'O' ring is fitted to the outside of this assembly. Fit the front pump body and bush assembly with driven gear to the pump adaptor and converter support. Install and tighten the five bolts and one screw on their spring lock washers. This component is now fitted to the gearbox sticking the (selective) input shaft thrust washer to the pump adaptor and converter support assembly with some Vaseline or petroleum jelly. A new paper gasket is fitted between the pump adaptor and converter support assembly and transmission case. Tighten the six bolts retaining the front pump assembly to the transmission case onto their spring lock washers. Now check the gear train end-float as described in Section D.6.

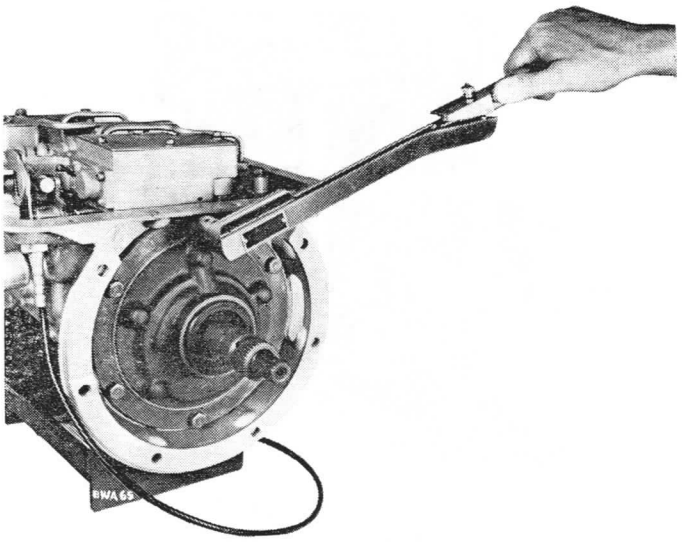


Fig. D.39

Tightening the front pump assembly.

Section D.26

ASSEMBLING THE EXTENSION HOUSING

Fit the extension housing with a new gasket and tighten the four retaining bolts on their spring lock washers.

Section D.27

ASSEMBLING THE VALVE BODIES

NOTE.—No gaskets are used in the valve bodies assembly. Torque settings where indicated must be strictly adhered to.

Component parts which have been dismantled should be scrupulously cleaned and lubricated with approved Automatic Transmission Fluid prior to reassembly in the reverse order of dismantling. Make sure that the component parts of the valve bodies assembly are correctly lined up (using two retaining bolts), otherwise difficulty will subsequently be experienced when mounting the assembly to the transmission case.

Verify the free movement of all valves in their bores.

Care is necessary to avoid stripping of screw threads in the alloy valve bodies.

Install the front pump and converter tubes into the pump adaptor and place the valve bodies assembly in position, making sure that it seats correctly on the transmission case. Fit and tighten the three retaining screws. Do not overtighten. Connect the cable to the down-shift valve cam.

Strainers must be flat to concave $\frac{1}{32}$ in. and free from kinks to ensure a complete seal when screwed down.

Oil tubes

Push the four supply tubes to the front servo, rear servo, and rear clutch fully home into their respective locations. Take care not to distort the tubes.

Oil pan

Install the oil pan with a new gasket and tighten the 15 bolts on their lock washers. Tighten the $\frac{1}{4}$ in. hexagon socket pipe plug.

Section D.28

ASSEMBLING THE CONVERTER HOUSING

If this has been removed from the car together with the gearbox, assemble the converter housing onto its register and fit the six retaining screws with lock washers from the rear. Tighten the screws.

Torque converter

When installing the torque converter at this (or any other) stage it is imperative that the drive fingers of the converter hub are in correct and full engagement with the slots in the front pump driving gear. See **'REMOVING AND REPLACING THE TRANSMISSION'.**

Section D.29

AIR PRESSURE CHECKS

Air pressure checks can be made on the gearbox assembly in determining whether the clutch and brake bands are operating. These checks can be made with the transmission in the car or on the bench. In either event, drain the fluid from the gearbox and remove the oil pan as well as the valve bodies assembly with oil tubes. (See Fig. D.37.)

Front clutch and governor feed

Apply air pressure to the passage (1) of the transmission case rear wall. Listen for a thump, indicating that the clutch is functioning; on the bench also verify by rotating the input shaft with air pressure applied. Keep air pressure applied for several seconds to check for leaks in the circuit.

If the extension housing has been removed, rotate the output shaft so that the governor weight will be at the bottom of the assembly. Verify that the weight moves inwards with air pressure applied.

Rear clutch

Apply air pressure to the passage (2) of the transmission case web. On the bench, verify by turning the input shaft that the clutch is functioning. Keep air pressure applied for several seconds to check for leaks. Then listen for a thump indicating that the clutch is releasing.

Front servo

Apply air pressure to the apply tube location (3) immediately adjacent to the rear retaining bolt. Observe the movement of the piston pin.

Rear servo

Apply air pressure to the tube location (4) of the servo body. Observe the movement of the servo lever.

Conclusions

If the clutch and bands operate satisfactorily with air pressure, faulty operation of the transmission must be due to malfunction of the hydraulic control system. The valve bodies assembly must then be dismantled, cleaned, inspected, and reassembled.

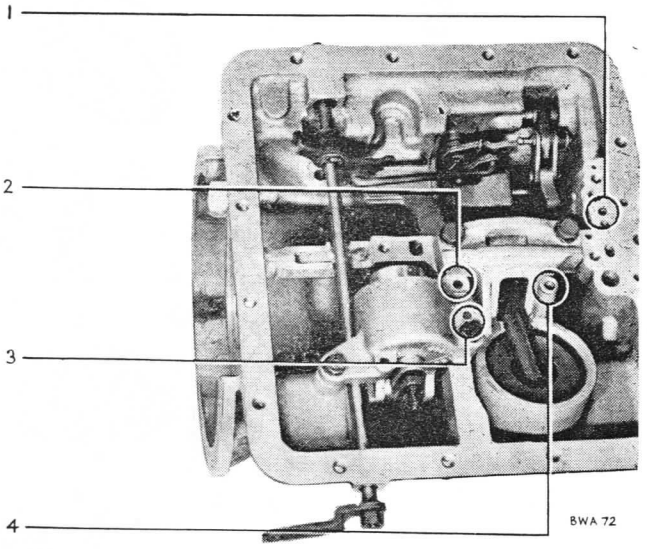


Fig. D.40

1. Front clutch and governor feed.
2. Rear clutch.
3. Front servo apply.
4. Rear servo.

PUMPS, CLUTCHES, AND GEAR ASSEMBLIES

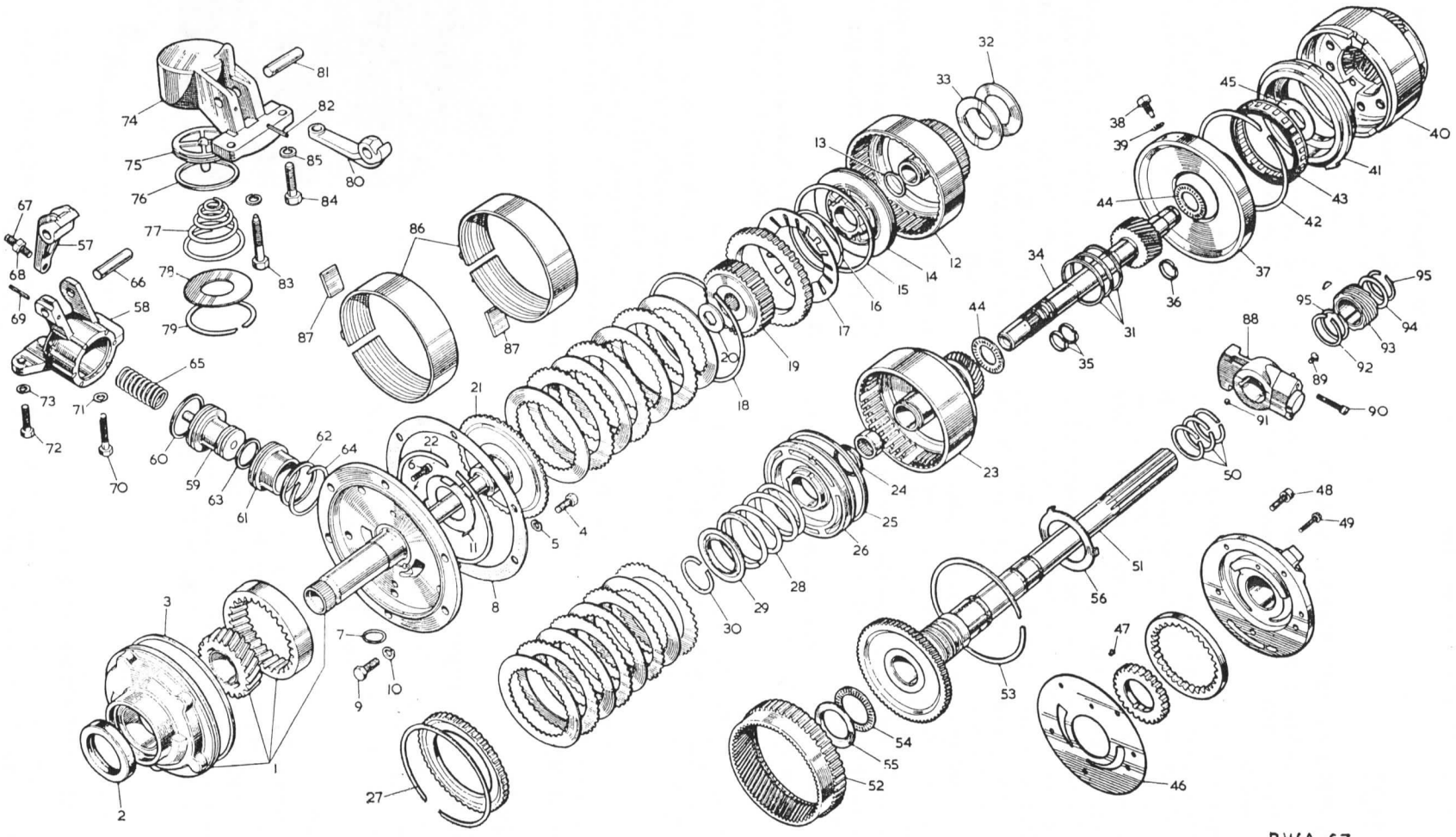


Fig. D.42

Self Adhesive Dampen and Attach

PASTE ON PAGE D20

TWO Additional plates fitted to rear clutches on 6/110, A/110 and Morris J2 Van front and rear clutches have two less plates than shown above.

KEY TO THE PUMPS, CLUTCHES, AND GEAR ASSEMBLIES

No.	Description
1.	Pump assembly—front.
2.	Seal—oil.
3.	'O' ring.
4.	Screw—pump—adaptor to front pump.
5.	Washer—spring—screw.
6.	Screw assembly.
7.	'O' ring—pump outlet tube.
8.	Gasket—adaptor and converter support.
9.	Screw—pump to case.
10.	Washer—screw.
11.	Washer—thrust—.061 to .063 in.—input shaft.
12.	Cylinder—front clutch.
13.	'O' ring—inner piston seal.
14.	Piston—front clutch.
15.	Ring—sealing—front servo.
16.	Ring—front clutch—spring bearing.
17.	Spring—front clutch.
18.	Ring—snap—front clutch—spring.
19.	Hub—front clutch.
20.	Washer—thrust—front clutch hub.
21.	Shaft and bush assembly—input.
22.	Ring—snap—front clutch.
23.	Drum assembly—front.
24.	'O' ring rear clutch—inner piston seal.
25.	Ring—sealing—rear clutch piston—outer.
26.	Piston and ball assembly—rear clutch.
27.	Ring—snap.
28.	Spring—rear clutch.
29.	Seat—spring—rear clutch.
30.	Ring—snap—clutch spring seat.
31.	Ring—oil sealing—clutch to centre support.
32.	Washer—front clutch cylinder—thrust.
33.	Washer—front clutch cylinder—thrust.
34.	Gear assembly—forward sun.
35.	Ring—oil sealing—sun gear to front clutch.
36.	Ring—oil sealing—sun gear to output shaft.
37.	Support—centre—with plug assembly.
38.	Screw—centre support.
39.	Washer—lock—screw.
40.	Planet gear and rear drum assembly.
41.	Race assembly—one-way clutch—outer.
42.	Ring—snap—one-way clutch—outer race.
43.	Clutch assembly—one-way.
44.	Bearing—needle—thrust.
45.	Plate—thrust washer—rear sun gear to planet cover.
46.	Plate—rear pump.
47.	Key—rear pump drive.
48.	Bolt assembly.
49.	Screw assembly.
50.	Ring—oil sealing—rear pump to output shaft.
51.	Shaft and plug assembly—driven.
52.	Gear—transmission ring.
53.	Ring—snap—.005 in.
54.	Washer—thrust—needle-bearing.
55.	Plate—thrust washer—output shaft to main case.
56.	Washer—thrust—driven shaft.
57.	Lever—front servo.
58.	Housing—front servo.
59.	Piston—front servo—with pin.
60.	'O' ring.
61.	Sleeve—front servo.
62.	Ring—oil sealing.
63.	'O' ring.
64.	Ring—snap.
65.	Spring—front servo.
66.	Pin—lever—pivot.
67.	Screw—servo adjusting.
68.	Nut.
69.	Pin—slotted spring.
70.	Screw.
71.	Washer—spring—screw.
72.	Screw.
73.	Washer—spring—screw.
74.	Body—rear servo.
75.	Piston—rear servo.
76.	'O' ring—rear servo piston.
77.	Spring—rear servo.
78.	Retainer—rear servo spring.
79.	Ring—snap.
80.	Lever—rear servo.
81.	Pin—lever—pivot.
82.	Pin—slotted—spring.
83.	Screw—rear servo.
84.	Bolt.
85.	Washer—spring—bolt.
86.	Band assembly—brake.
87.	Strut—servo.
88.	Governor assembly.
89.	Screw assembly.
90.	Screw assembly—body to governor sleeve.
91.	Ball.
92.	Ring—snap—governor.
93.	Gear—speedometer drive.
94.	Washer—spacer—speedometer drive gear.
95.	Ring—snap—speedometer gear.

THE GEARBOX CASE ASSEMBLY

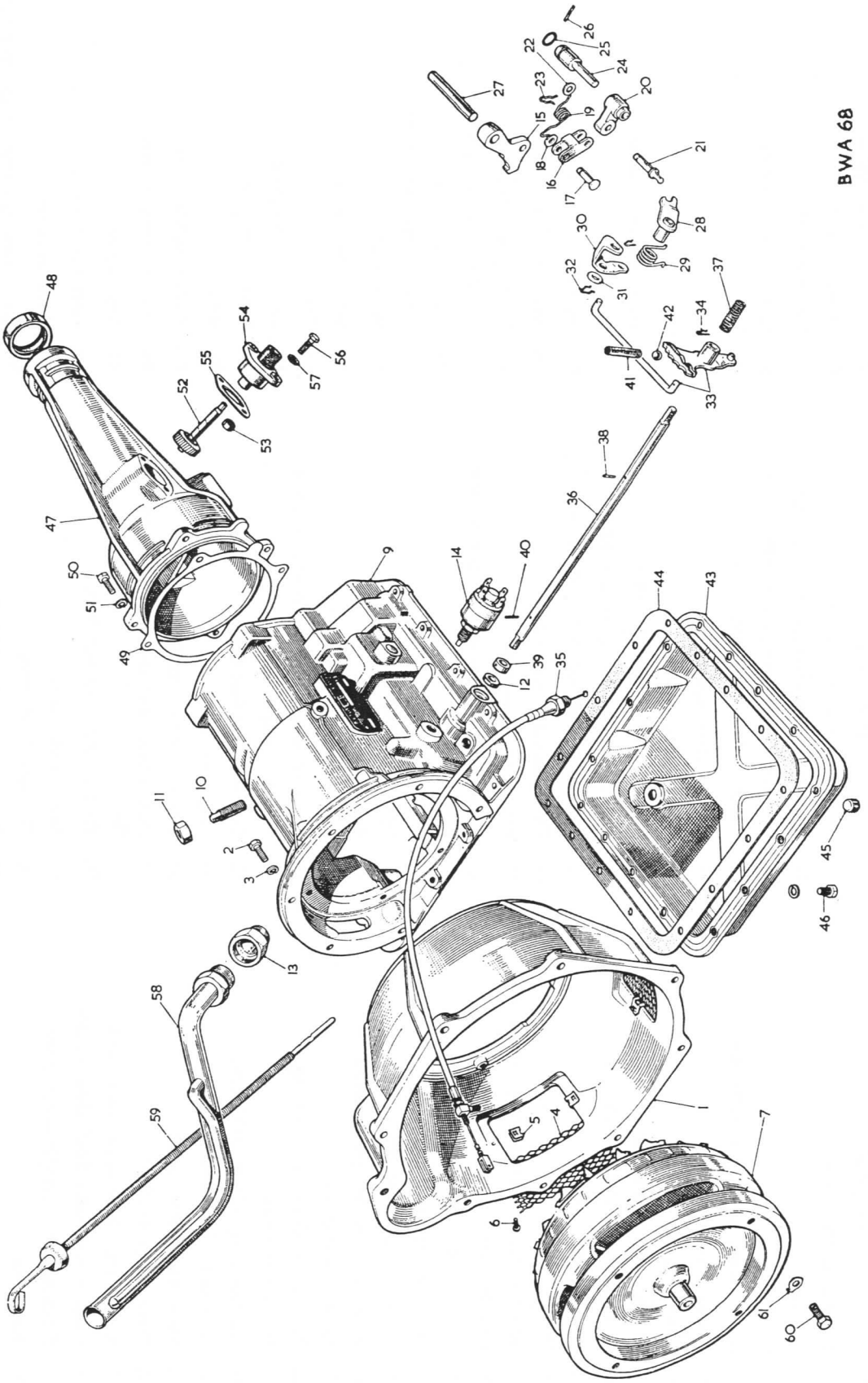


Fig. D.43

KEY TO THE GEARBOX CASE ASSEMBLY

No.	Description
1.	Housing—converter.
2.	Screw—housing to case.
3.	Washer—spring—screw.
4.	Stoneguard.
5.	Nut—captive.
6.	Screw—stoneguard to housing.
7.	Converter assembly.
9.	Case assembly.
10.	Screw—rear servo adjusting.
11.	Nut—locking—adjusting screw.
12.	Seal—oil—control shaft.
13.	Adaptor—tube connector.
14.	Switch—inhibitor.
15.	Pawl—parking brake.
16.	Link—toggle.
17.	Pin—toggle link.
18.	Washer—parking brake.
19.	Spring—parking brake release.
20.	Lever—toggle.
21.	Pin—toggle.
22.	Retainer—release spring.
23.	Spring—retaining.
24.	Pin—toggle.
25.	'O' ring—toggle pin.
26.	Pin—slotted spring.
27.	Pin—parking—brake anchor.
28.	Lever assembly—toggle lift.
29.	Spring—toggle lever.
30.	Lever—torsion.
31.	Washer.
32.	Spring—retainer.
33.	Linkage—parking brake.
34.	Clip—linkage rod.
35.	Cable assembly.
36.	Shaft—manual—valve lever.
37.	Spring—manual shaft bias.
38.	Pin roll.
39.	Collar.
40.	Pin roll.
41.	Spring—manual valve detent.
42.	Ball.
43.	Pan assembly—oil.
44.	Gasket—oil pan.
45.	Plug—drain.
46.	Bolt assembly—pan to case.
47.	Housing assembly—extension.
48.	Seal—oil.
49.	Gasket—extension to case.
50.	Screw—housing to case.
51.	Washer—spring—screw.
52.	Pinion—speedometer.
53.	Oil seal—speedometer pinion.
54.	Bush—speedometer pinion.
55.	Joint—speedometer pinion bush.
56.	Screw—speedometer pinion bush.
57.	Washer—shakeproof—screw.
58.	Tube—oil filler and breather.
59.	Rod—oil dipper.
60.	Screw—drive plate to converter.
61.	Washer—lock—screw.

KEY TO THE VALVE BODIES ASSEMBLY

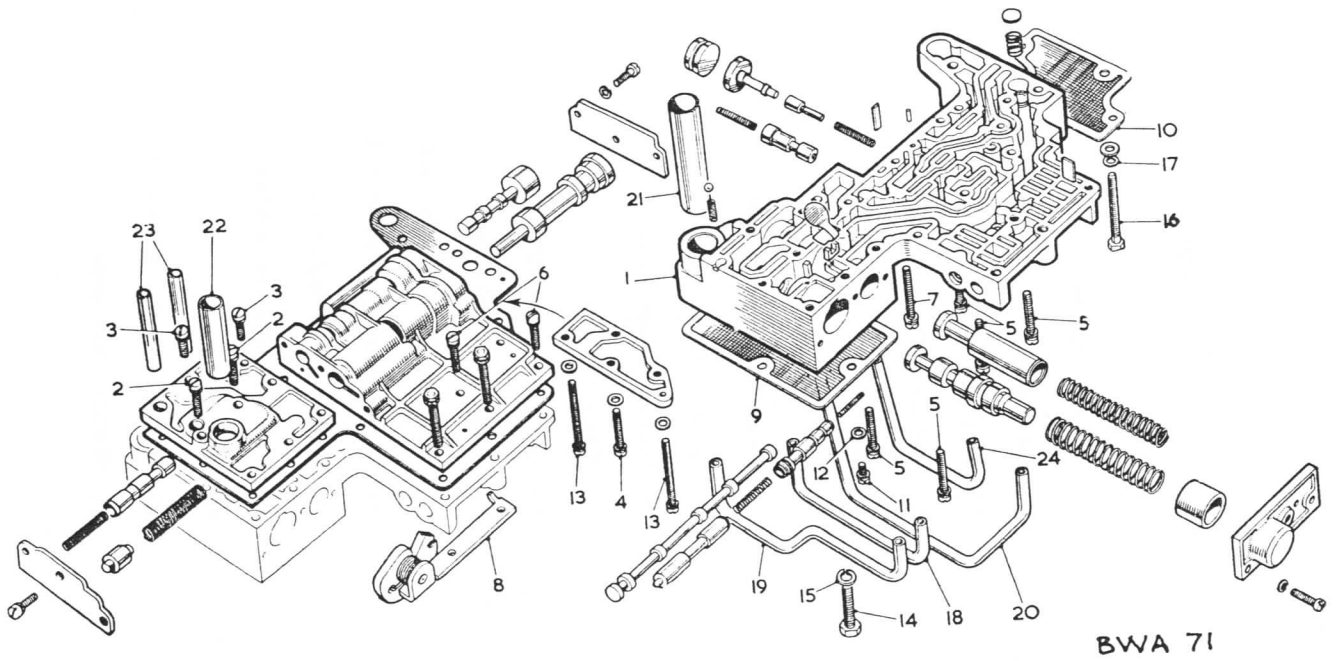


Fig. D.44

No.	*Description*
1.	Body assembly—valve.
2.	Screw assembly—oil tube collector.
3.	Screw assembly—oil tube collector.
4.	Screw assembly—governor line plate to body.
5.	Screw assembly—upper to lower body.
6.	Screw assembly—upper to lower body.
7.	Screw assembly—upper to lower body.
8.	Cam assembly—down-shift valve.
9.	Strainer—oil—front pump.
10.	Strainer—oil—rear pump.
11.	Screw assembly—strainer to lower body.
12.	Washer.
13.	Screw assembly—governor line plate to lower body.
14.	Screw—valve body to case.
15.	Washer—spring—screw.
16.	Screw—valve body to case.
17.	Washer—spring—screw.
18.	Tube—front servo apply.
19.	Tube—front servo release.
20.	Tube—rear clutch.
21.	Tube—front pump—outlet.
22.	Tube—front pump—inlet.
23.	Tube—converter—in and out.
24.	Tube—rear servo.

TORQUE CHART

Application	*Description*	*lb. ft.*	*No. off*
Torque converter to drive plate	$\frac{3}{8}$—24 UNF.	25-30	4
Transmission case to converter housing	$\frac{5}{16}$—18 UNC. 2A x $\frac{7}{8}$ in.	8-10	6
Extension housing to transmission case	$\frac{5}{16}$—18 UNC. 2A x 1 in.	8-10	4
Oil pan to transmission case	$\frac{5}{16}$—18 UNC. 2A x $\frac{5}{8}$ in.	8-10	15
Front servo to transmission case	$\frac{5}{16}$—18 UNC. 2A x 1 in.	8-10	1
	$\frac{5}{16}$—18 UNC. 2A x $1\frac{3}{8}$ in.	8-10	1
Rear servo to transmission case	$\frac{3}{8}$—16 UNC. 2A x $1\frac{1}{4}$ in.	10-13	1
	Screw—rear servo	10-13	1
Pump adaptor to front pump body	No. 10—24 UNC. 2A x $\frac{3}{4}$ in.	2-3	1
	$\frac{5}{16}$—18 UNC. 2A x $\frac{7}{8}$ in.	17-22	5
Pump adaptor to transmission case	$\frac{5}{16}$—18 UNC. 2A x $\frac{7}{8}$ in.	8-10	6
Rear pump to transmission case	$\frac{1}{4}$—20 UNC. 2A x $1\frac{1}{8}$ in.	4-5	5
	No. 10—24 UNC. 2A x $1\frac{1}{8}$ in.	1.7-2.5	1
Centre support to transmission case	Screw—centre support	10-13	2
Outer lever to manual valve shaft	$\frac{5}{16}$—24 UNF. 2B	6-7	1
Pressure point	$\frac{1}{8}$—27 Dryseal N.P.T.F. headless pipe plug	5-6	1
Oil pan drain plug	$\frac{1}{4}$—18 Dryseal N.P.T.F. headless pipe plug	10-14	1
Oil tube collector to lower body	No. 10—24 UNC. 2A x $\frac{11}{16}$ in.	1.7-2.5	6
	No. 10—24 UNC. 2A x $\frac{7}{8}$ in.	1.7-2.5	2
Governor line plate to lower body	No. 10—24 UNC. 2A x 1 in.	1.7-2.5	2
(Includes rear pump strainer)	No. 10—24 UNC. 2A x 2 in.	1.7-2.5	2
Lower body end plate to lower body	No. 10—24 UNC. 2A x $\frac{9}{16}$ in.	1.7-2.5	3
Upper body end plate front or rear to upper body	No. 10—24 UNC. 2A x $\frac{1}{2}$ in.	1.7-2.5	5
	No. 10—24 UNC. 2A x $\frac{7}{16}$ in.	1.7-2.5	1
Upper body to lower body	No. 10—24 UNC. 2A x 1 in.	1.7-2.5	5
	No. 10—24 UNC. 2A x $1\frac{3}{8}$ in.	1.7-2.5	1
	No. 10—24 UNC. 2A x $\frac{5}{8}$ in.	1.7-2.5	2
Valve bodies assembly to transmission case	$\frac{1}{4}$—20 UNC. 2A x $1\frac{1}{4}$ in.	4-5	1
(Includes rear pump strainer)	$\frac{1}{4}$—20 UNC. 2A x 2 in.	4-5	2
Front pump strainer to lower body	No. 10—24 UNC. 2A x $\frac{3}{8}$ in.	1.7-2.5	4
Rear pump strainer to lower body	No. 10—24 UNC. 2A x $1\frac{3}{4}$ in.	1.7-2.5	2
	No. 10—24 UNC. 2A x $\frac{1}{4}$ in.	1.7-2.5	2
Down-shift valve cam bracket to valve body	No. 10—32 UNF. 2A x $1\frac{7}{16}$ in.	1.7-2.5	2
Governor			
Body to governor sleeve	$\frac{1}{4}$—20 UNC. 2A x $1\frac{3}{8}$ in.	Tighten fully with large screwdriver	2
Cover-plate to governor body	No. 10—24 UNC. 2A x $\frac{3}{8}$ in.	1.7-2.5	2
Band adjustment			
Adjusting screw locknut to front servo lever	$\frac{3}{8}$—16 UNC. 2B	20-25	1
Adjusting screw locking nut rear servo to case	$\frac{7}{16}$—14 UNC. 2B	25-30	1
Special threaded parts			
Starter inhibitor switch locknut	$\frac{7}{16}$—14 UNC. 2B	8-10	1
Down-shift valve cable adaptor to transmission case	$\frac{1}{2}$—13 UNC. 2A	8-9	1
Filler tube connector sleeve to transmission case	$\frac{1}{2}$—14 Dryseal N.P.S.F.	9-10	1
Filler tube to connector sleeve nut	$1\frac{1}{16}$—16 UNC.	17-18	1
Stone-guards to converter housing	No. 8 thd. speed screw	1.4-1.6	4

SECTION E

ROAD TEST AND SYSTEMATIC DIAGNOSIS

	Section
Converter diagnosis	E.3
Fault diagnosis	E.2
Road speed change points	E.5
Road-test procedure	E.1
Stall speed tests	E.4

Section E.1

ROAD-TEST PROCEDURE

To be used in conjunction with Fault Diagnosis [Section (E).2]

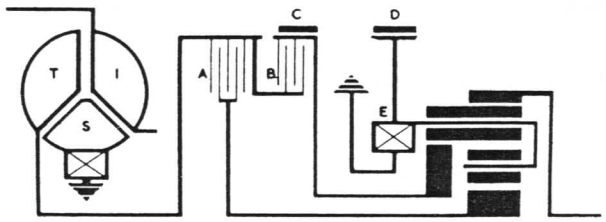
It is important to gain as much information as possible on the precise nature of any fault. In all cases the following road-test procedure should be completely carried out, as there may be more than one fault.

Test No.

1. Check that the starter will operate only with the selector in 'P' and 'N' and that the reverse light (when fitted) operates only in 'R'.
2. Apply the brakes and, with the engine at normal idling speed, 500 r.p.m., select 'N-D', 'N-L', 'N-R'. Transmission engagement should be felt in each position selected and idling speed will then be 450 r.p.m.
3. Check the engine stall speed (Section (E).4) with the transmission in 'D' 'L' and 'R'. Check for slip or clutch break-away.

   NOTE.—Do not stall for longer than 10 seconds, or the transmission will overheat.
4. With the transmission at normal running temperature select 'D'. Release the brakes and accelerate with minimum throttle opening. Check for 1-2 and 2-3 shifts.

   NOTE.—At minimum throttle opening the shifts may be difficult to detect. Confirmation that the transmission is in third gear may be obtained by selecting 'L', when a 3-2 downshift should be felt.
5. At just over 30 m.p.h. select 'N', switch off the ignition, and let the car coast. At 30 m.p.h. switch on the ignition and select 'D'. The engine should start through the rear wheels, indicating that the rear oil pump of the transmission is operating.
6. (*a*) Stop and restart, using full-throttle acceleration, i.e., accelerator at the detent. Check for 1-2 and 2-3 shifts according to the table on page (E.)4.
   (*b*) At 25 m.p.h. in third gear, depress the accelerator to full-throttle position. The car should accelerate in third gear and should not down-shift to second.
   (*c*) At 30 m.p.h. in third gear depress the accelerator to the kick-down position, i.e., through the detent. The transmission should down-shift to second gear.
   (*d*) At 15 m.p.h. in third gear depress the accelerator to the kick-down position. The transmission should down-shift to first gear.
7. (*a*) Stop and restart, using forced throttle acceleration (i.e., accelerator through the detent. Check for 1-2 and 2-3 shifts according to the table on page (E).4.
   (*b*) At 40 m.p.h. in third gear release the accelerator and select 'L'. Check for 3-2 down-shift and engine braking. Check for roll out 2-1 down-shift and engine braking.



	A	B	C	D	E
LOCK UP 1	★			★	
DRIVE 1	★				★
LOCK UP 2 DRIVE 2	★		★		
DRIVE 3	★	★			
NEUTRAL					
REVERSE		★		★	
PARK					

BWA 69

Fig. E.1

1st gear, lock-up selected .. .. Front clutch and rear band applied.
1st gear, drive selected .. .. Front clutch applied and one-way clutch is operative.
2nd gear, lock-up or drive selected .. .. Front clutch and front band applied.
3rd gear .. .. Front and rear clutches applied.
Reverse gear .. .. Rear clutch and rear band applied.

8. With 'L' engaged and using full throttle, accelerate to 20 m.p.h. Check for no slip or clutch break-away and no upshifts.

9. Stop and select 'R'. Release the brakes and reverse, using full throttle if possible. Check for no slip or clutch break-away noise.

10. Stop on brakes facing downhill on gradient and select 'P'. Release the brakes and check that the parking paul will hold the car. Re-apply brakes before disengaging the parking pawl. Repeat with car facing uphill.

    Check that the selector is trapped by the gate in 'Park' position.

Section E.2

FAULT DIAGNOSIS

(To be Used in Conjunction with 'Key to Actions' at end of section)

No.	*Fault*	*Action*
1.	Starter will not operate in 'P' or 'N'	19
	Starter operates in all selector positions	20
2.	Excessive bump on engagement of 'D', 'L', or 'R'	4, 3
3.	If stall speed higher than specified:	
	(*a*) With slip and break-away in 'L'	1, 2, 3, 13, 11
	(*b*) With slip and break-away in 'R'	1, 2, 3, 8, 13, 12
	If stall speed lower than specified, check engine performance	
	If stall speed more than 600 r.p.m. lower than specified	21
4.	No drive in 'D' (if normal in 'L' omit 11 and 13; if no drive in 'D', 'L', or 'R' add 17)	1, 2, 3, 13, 11, 16
	Delayed or no 1-2 shift	3, 14, 13, 5, 6
	Slip on 1-2 shift	2, 3, 5, 6, 7, 13
	Delayed or no 2-3 shift (if normal in 'R' omit 12)	3, 14, 13, 5, 6, 12
	Slip or engine run-up on 2-3 shift	2, 3, 5, 13, 12
	Bumpy gear shifts	3
	Drag in 'D2' and 'D3'	8
	Drag or binding on 2-3 shift	5-6
5.	Engine will not start through rear wheels	22
6.	(*a*) Slip and break-away or judder on full-throttle take-off in 'D'	1, 2, 3, 13, 11
	Loss of performance and overheating in 'D3' (seized stator)	21
	(*b*) Transmission down-shifts too easily	3
	(*c*), (*d*) Transmission will not down-shift	3, 13, 14
7.	(*a*) As test 6 (*a*) Page E.2	—
	(*b*) No 3-2 down-shift or engine braking	1, 5, 6, 7, 12
	No 2-1 down-shift or engine braking	8, 9, 10
8.	Slip and break-away or judder on take-off in 'L'	1, 2, 3, 13, 11
	Transmission up-shifts	1
9.	Slip and break-away or judder on take-off in 'R'	1, 2, 3, 13, 12
	Slip but no judder on take-off in 'R' (if engine braking available in 'L1' omit 8, 9, 10)	1, 2, 3, 8, 9, 10
	Drag in 'R'	5
	No drive in 'R' (if engine braking available in 'L1' omit 8, 9, 10)	1, 2, 3, 8, 13, 9, 10, 12
10.	No 'P'	1, 15

Miscellaneous:

Screech or whine, increasing with engine speed	17
Grinding or grating noise from gearbox	18
At high-speeds in 'D3' transmission down-shifts to 'D2' and immediately back to 'D3'	12

Key to actions

1. Check manual linkage adjustment.
2. Check fluid level.
3. Check adjustment of down-shift valve cable, using line pressure gauge and tachometer.
4. Reduce engine idling speed.
5. Check adjustment of front band.
6. Check front servo seals to fit of tubes.
7. Check front band for wear.
8. Check adjustment of rear band.
9. Check rear servo seal and fit of tubes.
10. Check rear band for wear.
11. Examine front clutch and seals, also shaft piston rings.
12. Examine rear clutch ball valve and seals. Check fit of tubes.
13. Strip valve bodies and clean.
14. Strip governor valve and clean.
15. Examine parking pawl, gear, and internal linkage.
16. Examine one-way clutch.
17. Strip and examine front pump and drive tangs.
18. Strip and examine gear train.
19. Adjust starter inhibitor switch inwards.
20. Adjust starter inhibitor switch outwards.
21. Replace torque converter.
22. Check rear pump drive pin.

Section E.3

CONVERTER DIAGNOSIS

(1) If the general vehicle performance is below standard check the engine stall speed with an accurate revolution indicator by applying maximum pressure on the foot brake pedal, selecting lock-up, and fully depressing the accelerator. If the engine stall speed is up to 300 r.p.m. below the normal the engine is not developing its full power.

(2) Inability to start on steep gradients combined with poor acceleration from rest indicates that the converter stator one-way clutch is slipping. This condition permits the stator to rotate in an opposite direction to the turbine and torque multiplication cannot occur. Check the stall speed, and if it is more than 600 r.p.m below normal the converter assembly must be renewed.

(3) Below standard acceleration in third gear above 30 m.p.h., combined with a substantially reduced maximum speed, indicates that the stator one-way clutch has locked in the engaged condition. The stator will not rotate with the turbine and impeller, therefore the fluid flywheel phase of the converter performance cannot occur. This condition will also be indicated by excessive overheating of the transmission, although the stall speed will remain normal. The converter assembly must be replaced.

(4) Stall speed higher than normal indicates that the converter is not receiving its required fluid supply or that slip is occurring in the clutches of the automatic gearbox.

NOTE.—When checking stall speeds ensure that the transmission is at normal operating temperature and the engine in first class condition. Before commencing ensure that the oil level is correct. Do not stall for longer than 10 seconds, or the transmission will overheat.

The torque converters are sealed by welding and serviced by replacement only. No drain plug is provided as replenishment of fluid is not envisaged.

Oil is supplied to the converter from the transmission when assembled.

The stone-guards in the converter housing must be unobstructed.

Section E.4

STALL SPEED TESTS

This test provides a rapid check on the correct functioning of the converter as well as the gearbox.

The stall speed is the maximum speed at which the engine can drive the torque converter impeller while the turbine is held stationary. As the stall speed is dependent both on engine and torque converter characteristics, it will vary with the condition of the engine as well as with the condition of the transmission. It will be necessary, therefore, to determine the condition of the engine in order to correctly interpret a low stall speed.

To obtain the stall speed, connect tachometer to the engine and place it where it can easily be read from the driver's seat. Allow the engine and the transmission to attain normal working temperature, set the hand brake, chock the wheels, and apply the foot brake. Select 'L' or 'R' and fully depress the accelerator. Note the reading on the revolution indicator.

NOTE.—To avoid overheating, the period of stall test must not exceed 10 seconds.

Condition	*Stall Speed*		
	Mk. I and Mk. II Wolseley 24/80, Freeway	*Mk. II Wolseley 6/110*	*J2 Van 9½" converter*
Correct	1,500 to 1,800 *r.p.m.*	1,750 to 1,850 *r.p.m.*	1,800 to 1,900 *r.p.m.*
Stator Freewheel slip	under 1,000 *r.p.m.*	under 1,000 *r.p.m.*	under 1,000 *r.p.m.*
Transmission slip	over 2,000 *r.p.m.*	over 2,000 *r.p.m.*	over 2,000 *r.p.m.*

Section E.5

APPROXIMATE ROAD SPEED CHANGE POINTS

Wolseley 24/80, Austin Freeway (Mk. I and Mk. II) — 'D' range
11 in. Converter

Range	1-2	2-3	3-2	2-1	3-1
Light Throttle	*m.p.h.* 8—12	*m.p.h.* 13—18	*m.p.h.* 6	*m.p.h.* 6	*m.p.h.* —
Full Throttle	24—28	38—45	10—15	6	—
Kick Down	28—35	48—55	40—45	20	Below 20

Wolseley 6/110 Mk. II — 'D' range
11 in. Converter

Range	1-2	2-3	3-2	2-1	3-1
Light Throttle	*m.p.h.* 3—7	*m.p.h.* 11—15	*m.p.h.* —	*m.p.h.* —	*m.p.h.* —
Full Throttle	26—29	51—54	15—20	—	3 approx.
Kick Down	38—42	63—66	54—57	24—27	24—27

J2 Van — 'D' range
9½ in. Converter

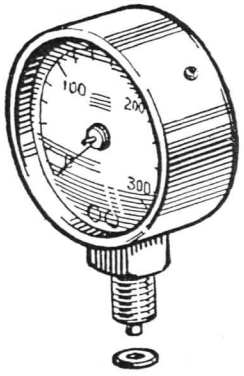
Range	1-2	2-3	3-2	2-1	3-1
Light Throttle	*m.p.h.* 3—7	*m.p.h.* 11—15	*m.p.h.* —	*m.p.h.* —	*m.p.h.* —
Full Throttle	12—15	26—30	—	—	—
Kick Down	24—27	38—42	34—37	16—19	16—19

NOTE: Maximum values are given unless otherwise indicated.

SECTION F

SERVICE TOOLS

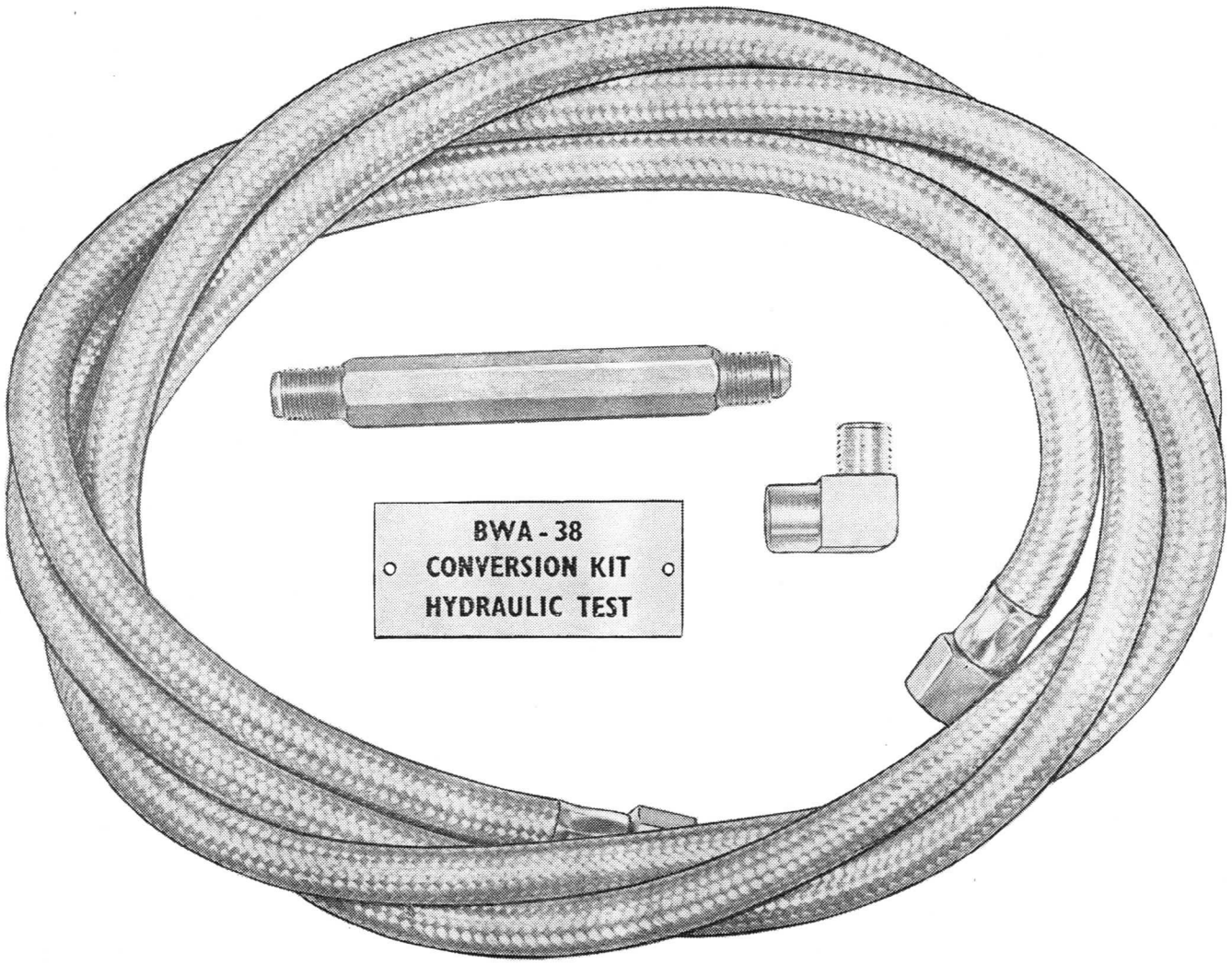
SERVICE TOOLS



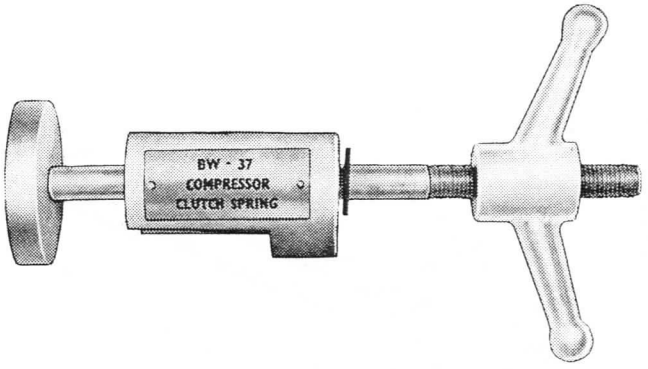
Hydraulic Pressure Gauge

Used to record hydraulic system pressure during adjustment of the down-shift valve cable.

The gauge should be capable of recording pressure up to 300 lbs.

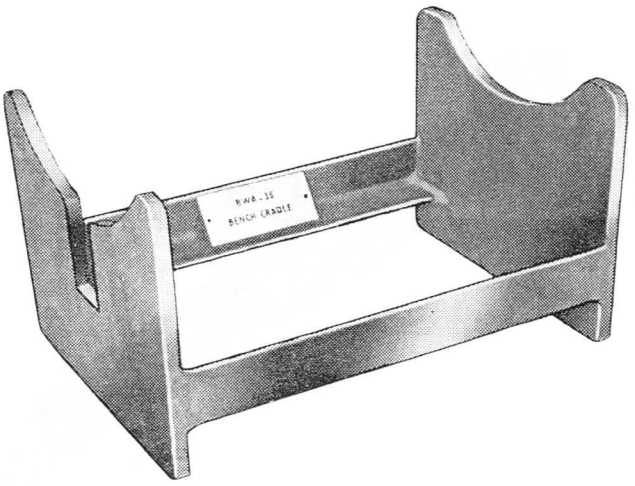


BWA38. Pressure Hose with Adaptor For use with hydraulic pressure gauge.



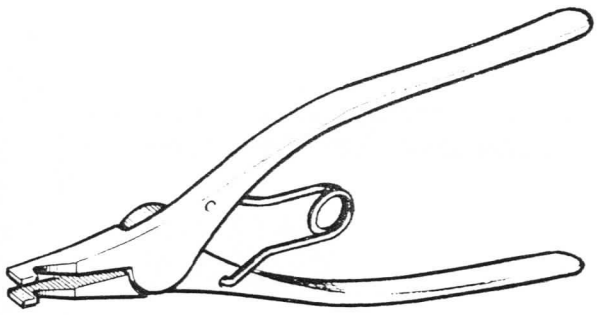
BW37. Clutch Spring Compressor

Used to compress the rear clutch spring prior to removal and replacement of the snap ring.



BWA35. Gearbox Cradle

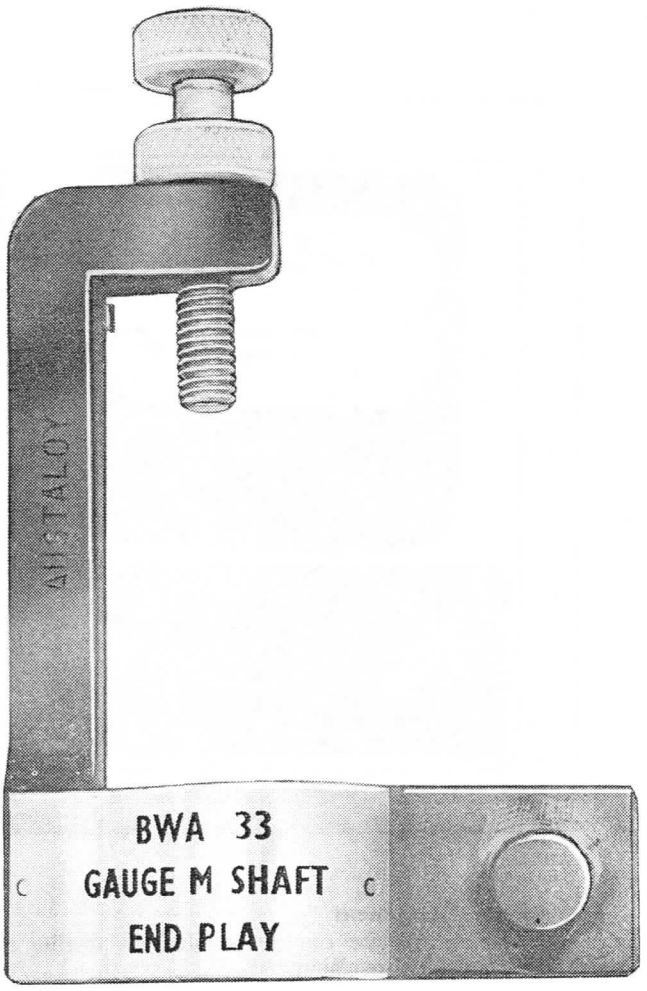
To support the gearbox during dismantling and assembly operations.



Circlip Pliers

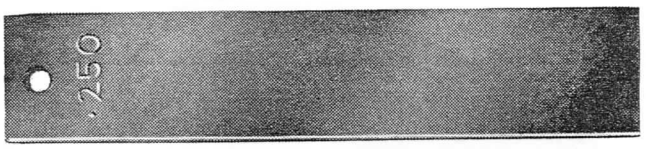
For removing and replacing snap rings.

NOTE: Nose of pliers should be as shown. This tool is a standard proprietary item obtainable at all good tool retailers.



BWA33. Gear Train End-float Checking Tool

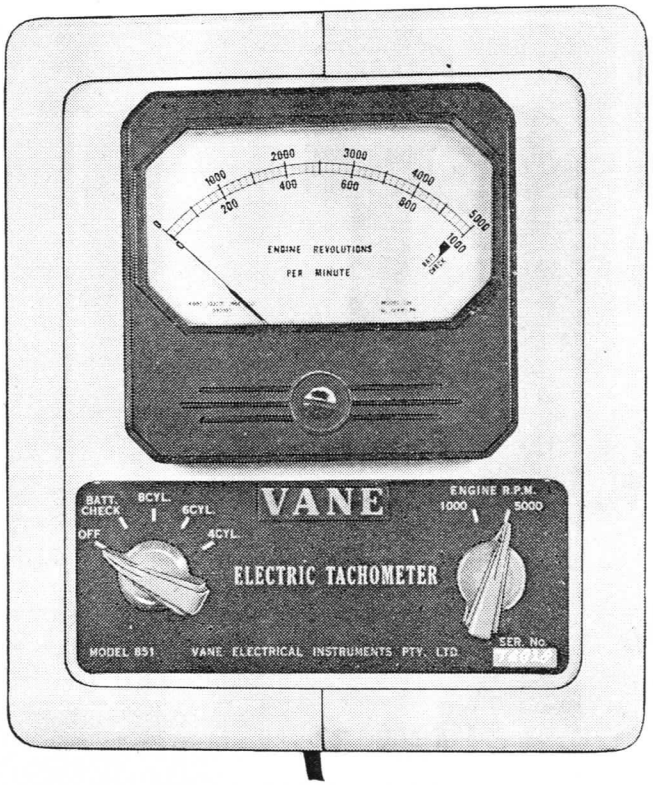
For determining the end-float on the gear train.





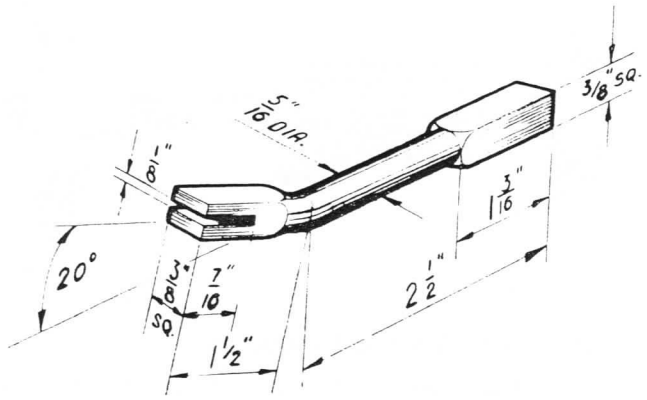
BWA34. Front Servo Gauge

Used for the correct adjustment of the front band in conjunction with torque wrench TWA1.



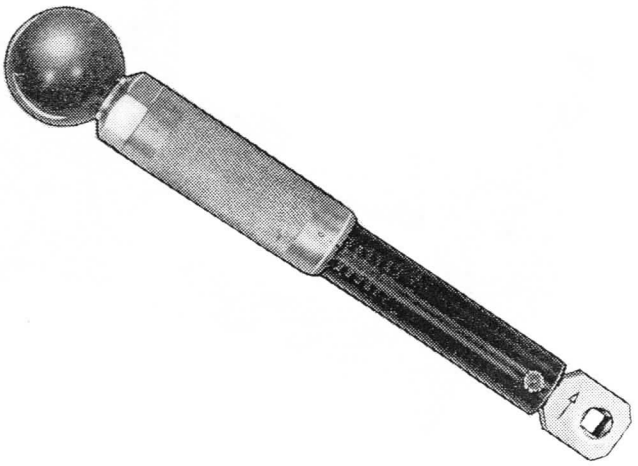
Tachometer Equipment

Used to record the engine revolutions during stall test and throttle adjustment.



Gear Selector Indicator Adjusting Tool

This tool may be manufactured to the dimensions shown on diagram.



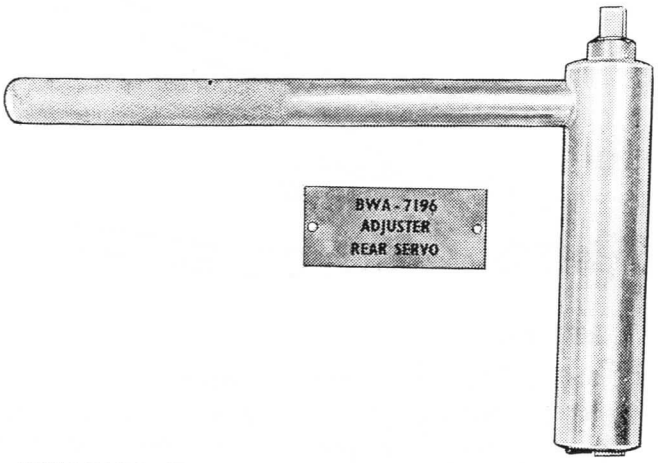
TW1. Torque Wrench

Used for tightening or adjusting front band, and in conjunction with screwdriver adaptor TWA2 for slotted screws throughout the gearbox and adjusting rear band.



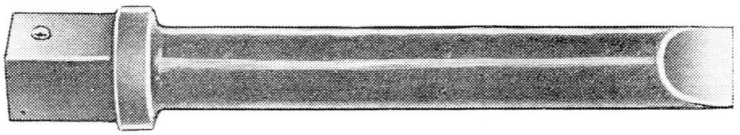
BW547A-50-3. Inhibitor Switch Adaptor.

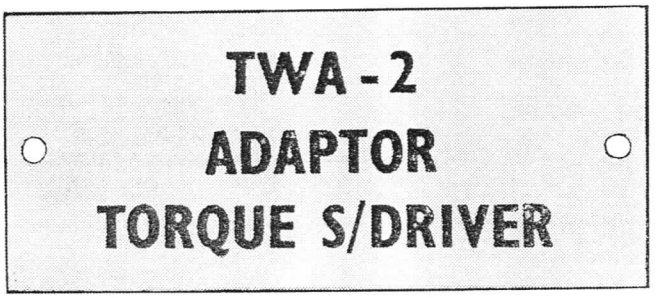
To loosen and tighten the inhibitor switch locknut with the transmission *in situ*.



BWA7196. Rear Servo Adjuster

Used to adjust the rear transmission band in conjunction with torque wrench TW11.



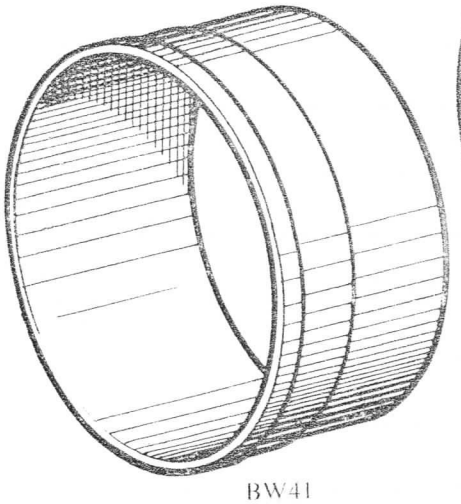


TWA2. Torque Screwdriver Adaptor

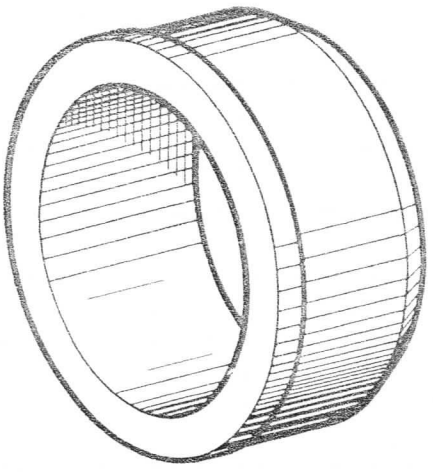
For use with torque wrench TW1.

BW 41 and BW 42 provide maximum protection for the oil seal rings during assembly of the clutch pistons into their cylinders.

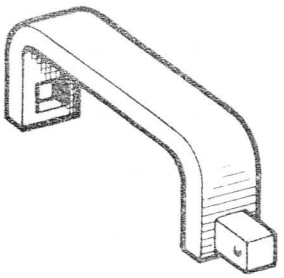
Due to changes in the adjusting screws on the front band servo, it is now necessary to use adaptor BW 548-2 with the inch pound torque wrench during a band adjustment operation.



BW41



BW42



BW548-2

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NOTES

Service Bulletin	Remarks