

# SHOP MANUAL

# SUPPLEMENT



FOR

# MODEL K-53



# HYDRA-MATIC DRIVE

USE IN CONJUNCTION WITH THE KAISER-FRAZER SHOP  
MANUAL FOR MODEL K-50, K-51 AND K-52 HYDRA-  
MATIC TRANSMISSIONS, FORM NUMBER X-19531.

KAISER-FRAZER SALES CORPORATION

WILLOW RUN, MICHIGAN, U.S.A.

Litho. in U.S.A.

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## INTRODUCTION

This Supplement to the Kaiser-Frazer Hydra-Matic Shop Manual describes design changes in internal units of the Model K-53 Hydra-Matic transmission, operation of these units, and resultant oil flow changes, illustrated in simplified schematic oil flow drawings.

All improvements in the Model K-53 Hydra-Matic transmission are internal, designed to improve shifting. All selector and throttle control linkage adjustments are the same as for the Model K-52 transmissions. Although the Model K-53 servos have been modified, the band adjustment procedures are the same as for the Model K-52 transmission.

In addition, disassembly, cleaning and inspection, and assembly procedures for overhauling the new front servo and the new control valve assembly are given in this Supplement. The front servo and control valve assembly are the only units of the Model K-53 transmission that require new overhaul procedures due to design changes.

All other components of the Model K-53 transmission are similar in design to corresponding parts of the earlier Model K-52 Hydra-Matic transmission. The information for Model K-52 units provided in the K-F Hydra-Matic Shop Manual, form number X-19531 is, therefore, applicable to K-53 transmission units. Use the Hydra-Matic Shop Manual, together with this Supplement, for complete service information applicable to Model K-53 transmission, including removal and installation procedures for the new front servo and the new control valve assembly.

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# K-53 HYDRA-MATIC DRIVE

## GENERAL INFORMATION

To identify Hydra-Matic transmissions to which information in this Supplement applies, inspect the nameplate attached to the right side of the transmission and determine the model number. *Information herein applies only to Model K-53 units.*

The Model K-53 Hydra-Matic transmission has been supplied as optional equipment in 1953 Kaiser DeLuxe, Manhattan and Hardtop Dragon models since January 1, 1953. The 1953 Kaiser cars built prior to this date used Model K-52 Hydra-Matic transmissions as optional equipment.

## DESCRIPTION OF MODIFICATIONS

### TRANSMISSION CASE

In K-52 Hydra-Matic transmissions the main line exhaust valve was installed in the transmission case below the front servo. K-53 model transmissions have the line exhaust valve in the front servo valve body. The sleeve used to locate the exhaust valve in the case is not used in K-53 models and the KF-145 Sleeve Remover Tool will not be required for servicing. In its new location, the main line exhaust valve is much more accessible for service.

K-53 transmission case passages have been altered to direct 1-2 shift oil to the rear servo to close the rear servo exhaust valve. Spring pressure holds the valve in the open position. This differs from the rear servo exhaust valve in K-52 units which was held in the closed position by spring pressure and opened by "LO" range oil directed against the end of the rear servo exhaust valve.

### FRONT SERVO

The main line exhaust valve and the overrun control valve in K-53 units are located in a new servo valve body. Simplified service is provided by combining these valves in the easily accessible valve body which is attached to the front servo with three screws.

To provide improved sealing without using a gasket, three bolts are used to hold the release cylinder to the front servo body. The release cylinder formerly had two bolts attaching the cylinder to the servo body with a gasket to provide proper sealing.

The front servo piston assembly for K-52 transmissions consisted of the apply piston and the combined release and compensator pistons. The K-53 front servo apply and compensator pistons have been combined as an assembly, with the release piston a separate part. A booster spring has been added to act on the release piston, improving band release and clutch apply action.

The 4-3 downshift valve has been revised to

eliminate the orifice, the slot in the end of the valve, and the retainer. A passage, by-passing the 4-3 valve, now contains the orifice for retarding main line oil for slow front band application on a forced 4-3 downshift.

### REAR SERVO

LO range oil was used in the K-52 transmission to open the rear servo quick dump valve against spring pressure, tending to hold it in the closed position. The design and operation of this valve has been altered in the K-53 transmission so that 1-2 oil is directed to the valve to keep it closed, while spring pressure tends to hold the valve in the open position. These changes are made to provide quicker shifts from N to DR and smoother shifts from DR to LO.

### CONTROL VALVE ASSEMBLY

The 3-4 shift valve assembly of the K-52 unit consisted of a shift valve, a lockout valve assembly and an auxiliary shift spring. These control valve assembly parts have been eliminated and are replaced by a new 3-4 shift valve.

A new shuttle valve in the control valve assembly allows either detent or DR-3 oil to close the 3-4 shift valve.

A compensator auxiliary plug has been added in the outer valve body to improve shift characteristics.

A new removable leaf type check valve with a metering orifice replaces the K-52 transmission orifice which was drilled in the valve body and functioned with the 3-2 timing valve.

### REAR PUMP

The rear pump has been modified to provide greater capacity by increasing the width of the pump gears. When the engine must be started by towing or pushing, the increased rear pump capacity makes lower speed starts possible.

## CHANGES IN MODEL K-53 HYDRA-MATIC HYDRAULIC CIRCUITS

### FRONT SERVO

The change in operation of the front servo overrun control valve provides improved shift timing. When car speed is below 20 miles per hour the overrun control valve spring force is greater than the G-1 oil pressure. With the overrun control valve in this position compensator oil is directed to the compensator piston. Below 20 miles per hour line pressure is directed only to the apply piston, with the pressure to the compensator piston varied to suit the engine output (Fig. 1).

The orifice drilled through the 4-3 downshift valve



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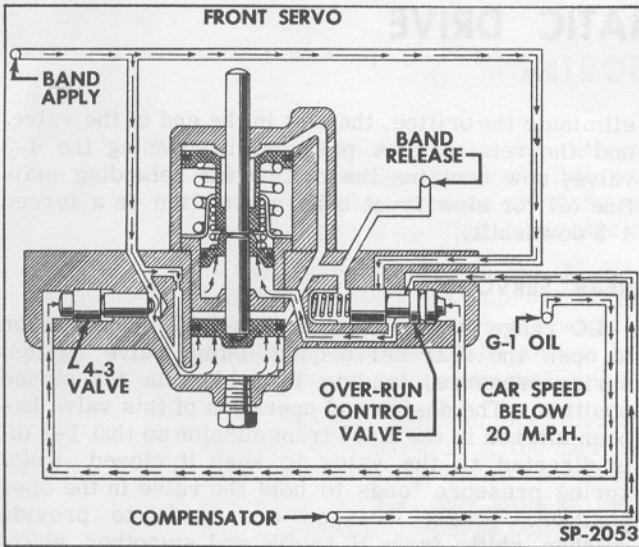


Fig. 1—Front Servo Operation—Speeds Below 20 MPH

in K-52 units has been replaced by an orifice drilled in a by-pass passage in the servo valve body. Below 25 miles per hour band apply oil holds the 4-3 valve in the open position (Fig. 1).

When car speed exceeds approximately 20 miles per hour, governor pressure exerted on the overrun control valve overcomes the spring pressure to move the overrun control valve inward, cutting off compensator oil and directing front band apply oil to the compensator piston. Therefore, at highway speeds over approximately 20 miles per hour, where overrun engine braking is desired, two servo apply areas are supplied with line pressure to prevent band slippage (Fig. 2).

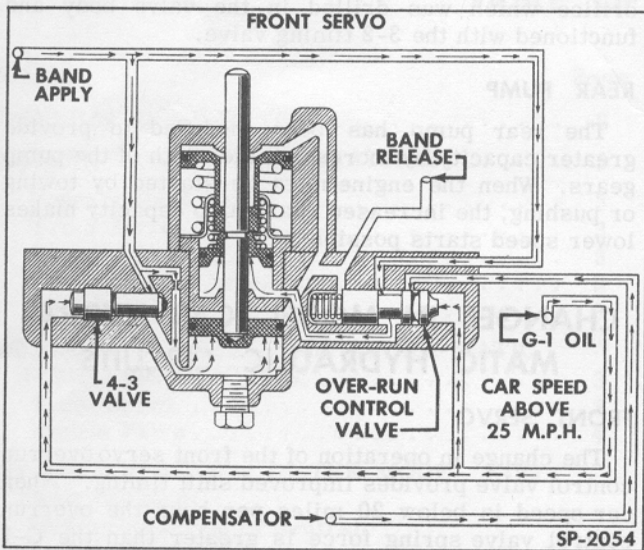


Fig. 2—Front Servo Operation—Speeds Above 25 MPH

At speeds greater than 25 miles per hour, G-1 pressure operating on a larger area, moves the 4-3 downshift valve into the passage retarding the flow of front servo apply oil to the front servo apply piston (Fig. 2).

When the front unit shifts to direct drive, front band release oil force assists the overrun control valve spring to overcome G-1 pressure. Therefore, whenever the front unit is in direct drive, only compensator oil is directed to the compensator piston regardless of car speed (Fig. 3).

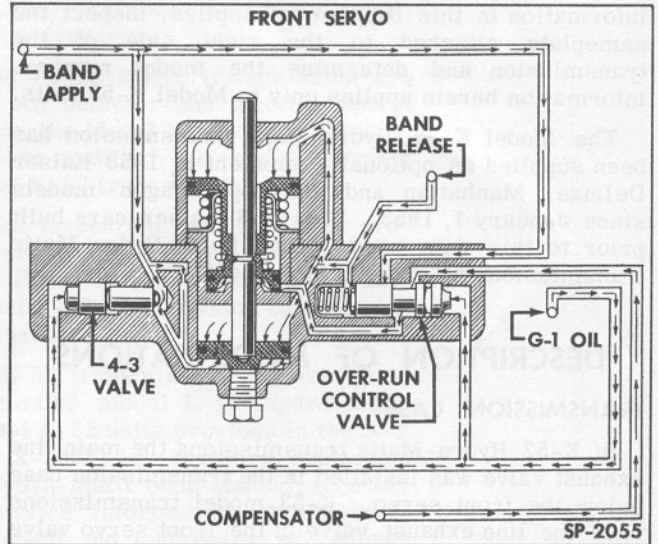


Fig. 3—Front Servo Operation—Front Unit in Direct Drive

## SHUTTLE VALVE

Addition of the shuttle valve in the K-53 control valve assembly has eliminated the need for a 3-4 lockout valve assembly and a 3-4 auxiliary spring. The shuttle valve permits the use of the same valve area for detent oil, DR-3 oil and regulated T.V. oil. When the manual valve is in the DR-3 position, DR-3 oil moves the shuttle valve away from the inner valve body, blocking the detent oil passage and allowing DR-3 oil to close the 3-4 shift valve (Fig. 4).

When the manual valve is placed in the DR-4

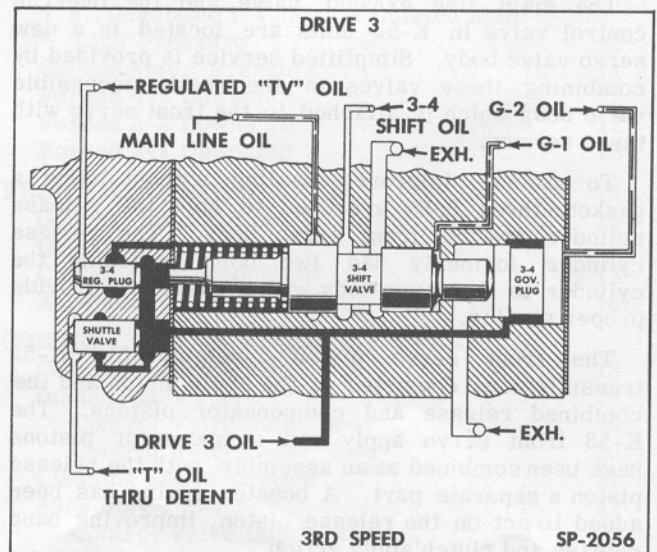


Fig. 4—Shuttle Valve Action—DR-3 Position



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position and the accelerator pedal is completely depressed for a forced 4-3 downshift, detent oil positions the shuttle valve toward the inner valve body, blocking the DR-3 oil passage and allowing detent oil to pass through the 3-4 shift valve (Fig. 5).

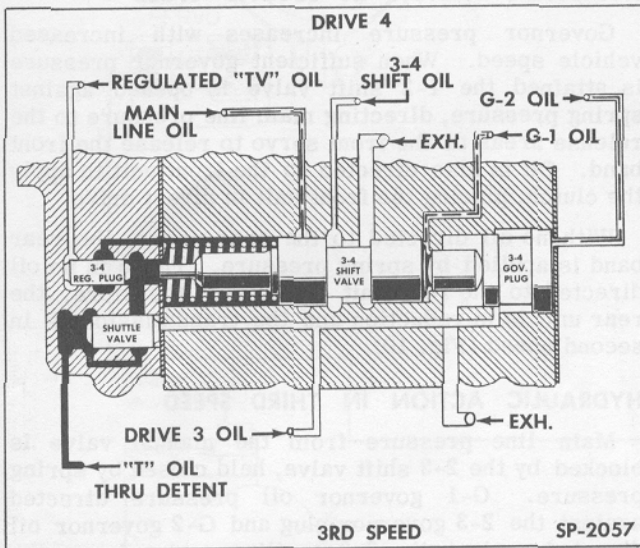


Fig. 5-Shuttle Valve Action-DR-4 Position-Forced 4-3 Downshift

Regulated T.V. action is not affected by the shuttle valve as long as detent oil and DR-3 oil are not present (Fig. 6).

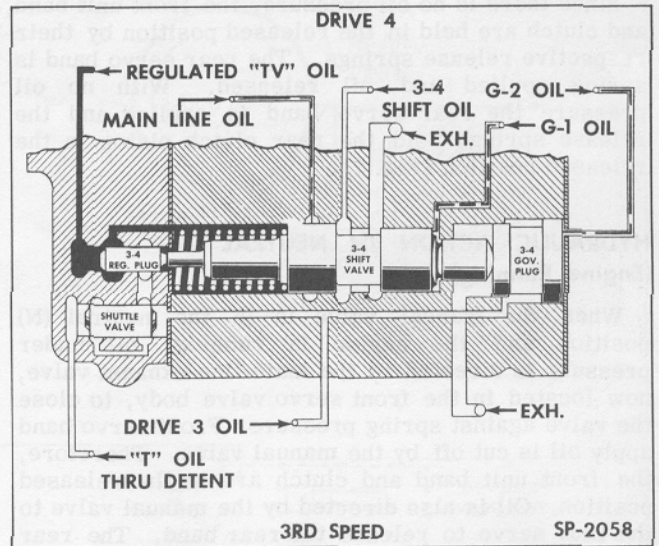


Fig. 6-Shuttle Valve-DR-4 Position-Third Speed

## HYDRAULIC ACTION IN THE MODEL K-53 TRANSMISSION

### HYDRAULIC ACTION IN NEUTRAL (Engine Not Running)

When the engine is not running and the car is standing there is no oil pressure. Basically the oil circuit is the same as for the K-52 transmission.

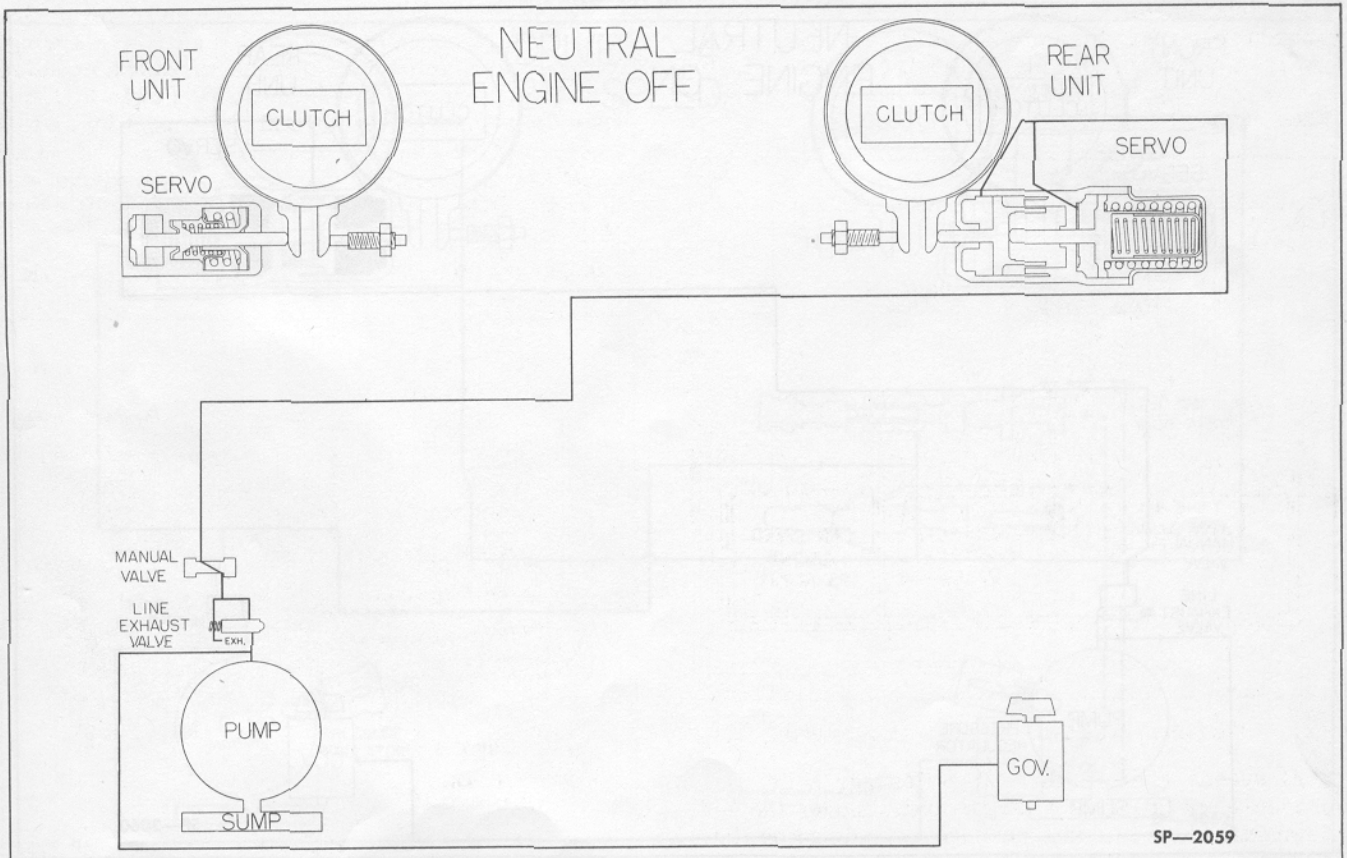


Fig. 7-Hydraulic Action in Neutral (Engine Not Running)

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Since there is no oil pressure, the front unit band and clutch are held in the released position by their respective release springs. The rear servo band is spring applied and oil released. With no oil pressure the rear servo band is applied and the release springs hold the rear clutch piston in the released position (Fig. 7).

## HYDRAULIC ACTION IN NEUTRAL (Engine Running)

When the manual valve is in the neutral (N) position and the engine is running, oil under pressure is directed to the main line exhaust valve, now located in the front servo valve body, to close the valve against spring pressure. Front servo band apply oil is cut off by the manual valve. Therefore, the front unit band and clutch are in the released position. Oil is also directed by the manual valve to the rear servo to release the rear band. The rear clutch is also released by the clutch release springs. With both bands and both clutches released the transmission is in neutral (Fig. 8).

## HYDRAULIC ACTION IN FIRST SPEED

When the manual valve is moved from neutral (N) to the DR position (either DR-3 or DR-4), oil is directed to the apply side of the front servo to apply the band and to the land of the 1-2 shift valve. Governor variable pressure is also directed to the 1-2 shift valve.

The front servo band is applied by oil pressure and the rear band is spring applied. Both the front and rear unit clutches are spring released and, therefore, the transmission is in first speed (Fig. 9).

## HYDRAULIC ACTION IN SECOND SPEED

Governor pressure increases with increased vehicle speed. When sufficient governor pressure is attained the 1-2 shift valve is opened against spring pressure, directing main line pressure to the release areas of the front servo to release the front band. Oil is also directed to the front unit to apply the clutch, placing the front unit in direct drive.

With no oil directed to the rear servo, the rear band is applied by spring pressure. There is no oil directed to the rear unit clutch and, therefore, the rear unit is in reduction and the transmission is in second speed (Fig. 10).

## HYDRAULIC ACTION IN THIRD SPEED

Main line pressure from the manual valve is blocked by the 2-3 shift valve, held closed by spring pressure. G-1 governor oil pressure directed against the 2-3 governor plug and G-2 governor oil directed against the 2-3 auxiliary valve increases with car speed to a point where it is greater than spring pressure against the 2-3 shift valve. When the shift valve opens, oil is directed to the rear unit to release the rear band and apply the clutch.

At the same time, oil is directed against the large

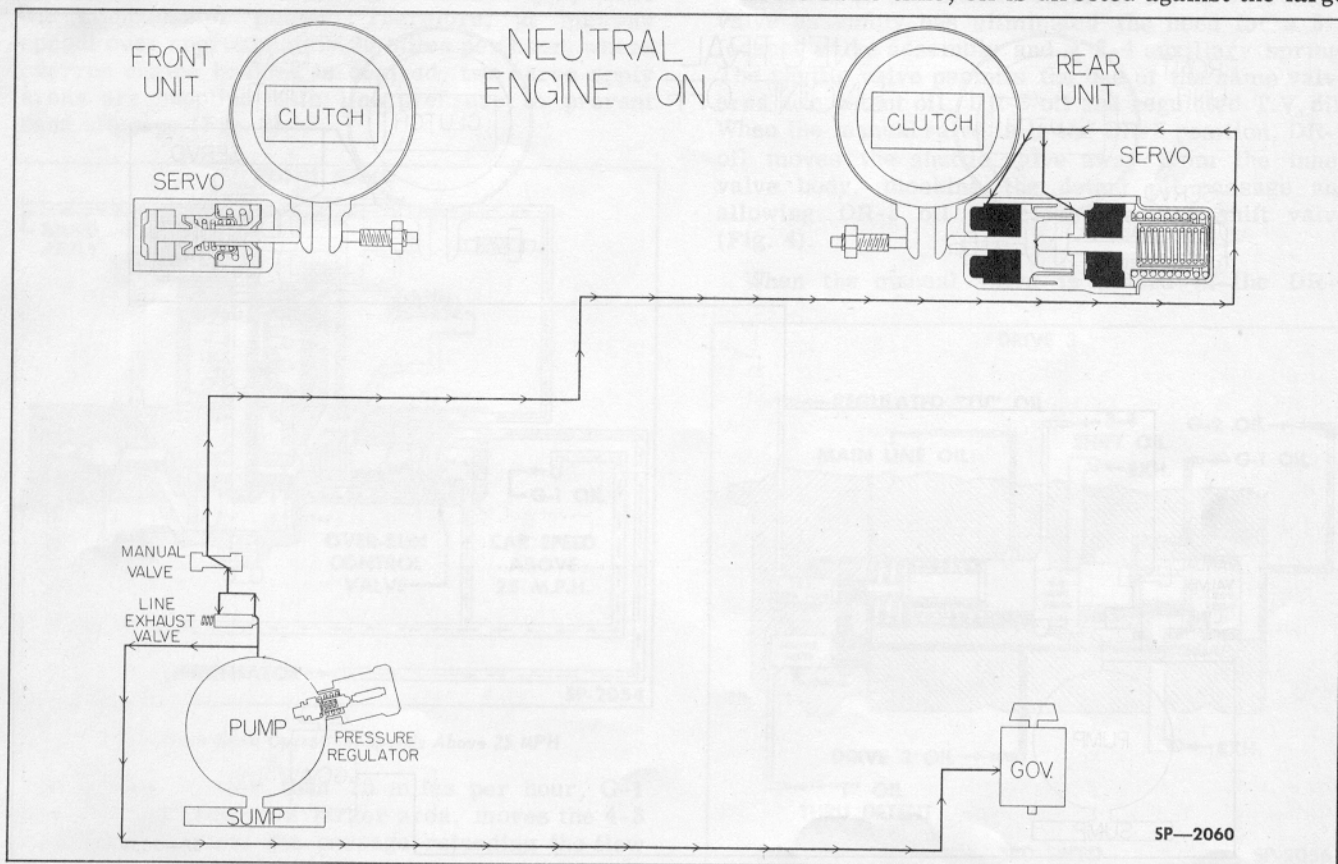


Fig. 8—Hydraulic Action in Neutral (Engine Running)

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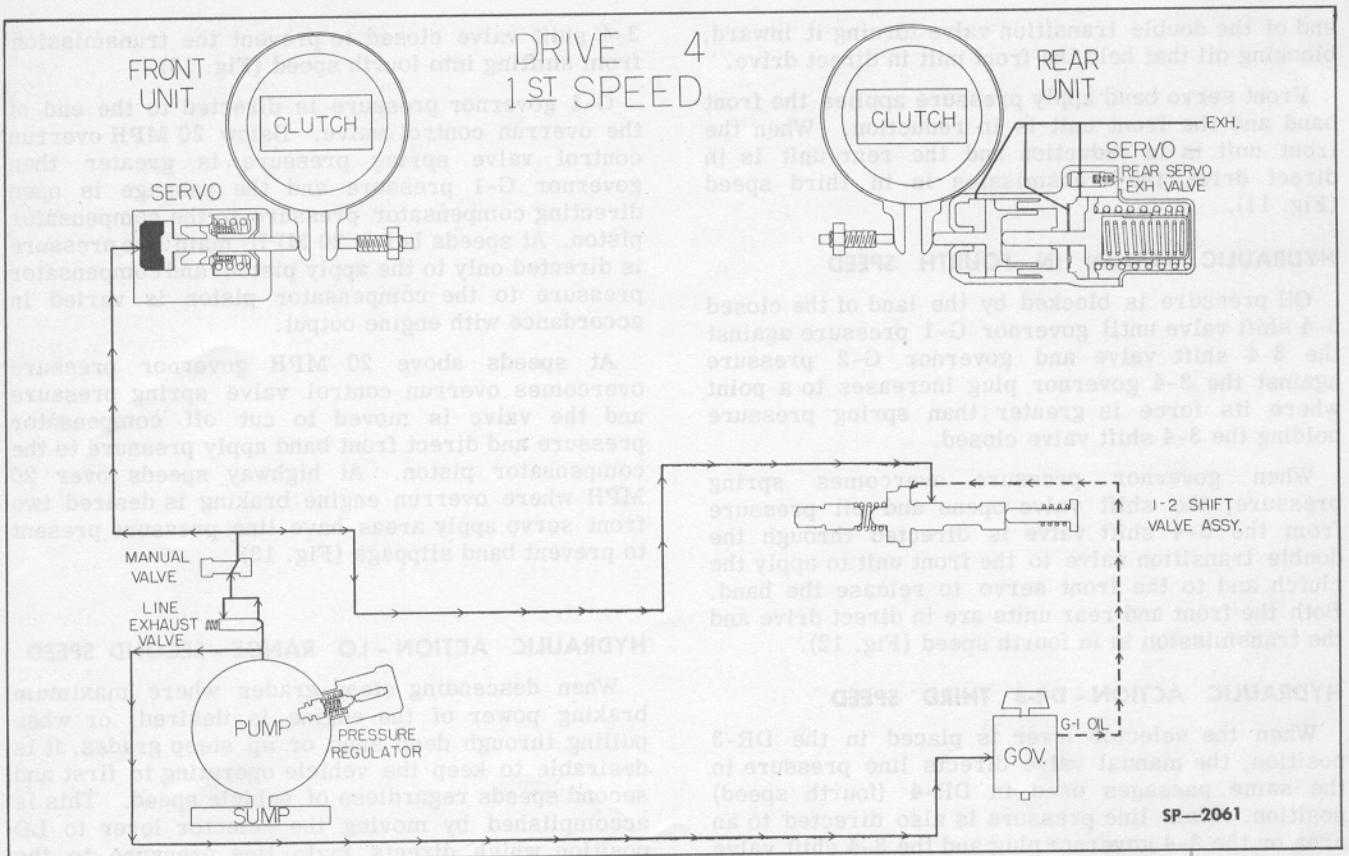


Fig. 9—Hydraulic Action in First Speed

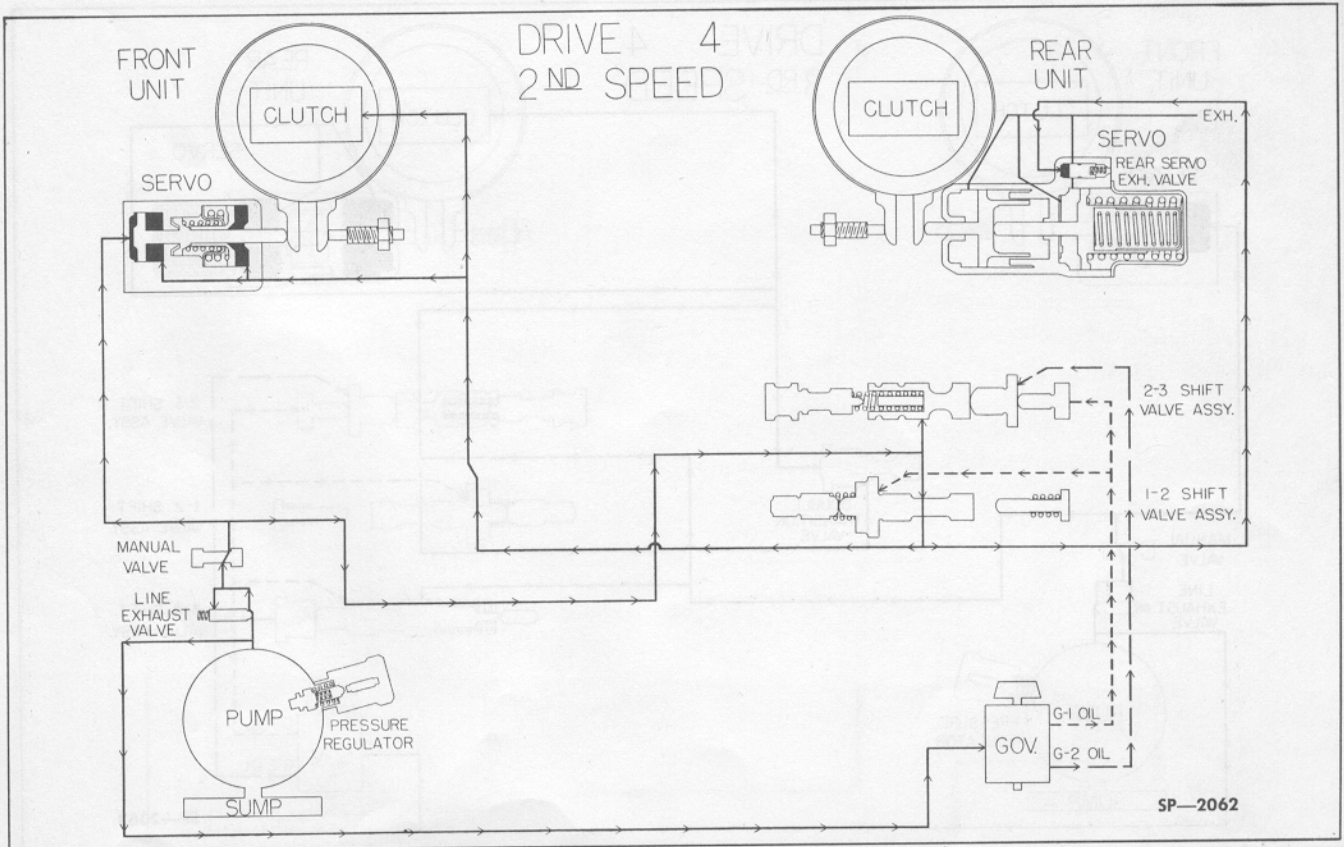


Fig. 10—Hydraulic Action in Second Speed



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end of the double transition valve forcing it inward, blocking oil that held the front unit in direct drive.

Front servo band apply pressure applies the front band and the front unit is in reduction. When the front unit is in reduction and the rear unit is in direct drive the transmission is in third speed (Fig. 11).

## HYDRAULIC ACTION IN FOURTH SPEED

Oil pressure is blocked by the land of the closed 3-4 shift valve until governor G-1 pressure against the 3-4 shift valve and governor G-2 pressure against the 3-4 governor plug increases to a point where its force is greater than spring pressure holding the 3-4 shift valve closed.

When governor pressure overcomes spring pressure, the shift valve opens and oil pressure from the 3-4 shift valve is directed through the double transition valve to the front unit to apply the clutch and to the front servo to release the band. Both the front and rear units are in direct drive and the transmission is in fourth speed (Fig. 12).

## HYDRAULIC ACTION - DR-3 THIRD SPEED

When the selector lever is placed in the DR-3 position, the manual valve directs line pressure to the same passages used in DR-4 (fourth speed) position. Main line pressure is also directed to an area on the 3-4 governor plug and the 3-4 shift valve to assist the spring and throttle pressure to hold the

3-4 shift valve closed to prevent the transmission from shifting into fourth speed (Fig. 13).

G-1 governor pressure is directed to the end of the overrun control valve. Below 20 MPH overrun control valve spring pressure is greater than governor G-1 pressure and the passage is open directing compensator pressure to the compensator piston. At speeds below 20 MPH, main line pressure is directed only to the apply piston, and compensator pressure to the compensator piston is varied in accordance with engine output.

At speeds above 20 MPH governor pressure overcomes overrun control valve spring pressure and the valve is moved to cut off compensator pressure and direct front band apply pressure to the compensator piston. At highway speeds over 20 MPH where overrun engine braking is desired two front servo apply areas have line pressure present to prevent band slippage (Fig. 13).

## HYDRAULIC ACTION - LO RANGE - SECOND SPEED

When descending steep grades where maximum braking power of the engine is desired, or when pulling through deep sand or up steep grades, it is desirable to keep the vehicle operating in first and second speeds regardless of vehicle speed. This is accomplished by moving the selector lever to LO position which directs main line pressure to the large area on the 2-3 auxiliary valve. It opposes

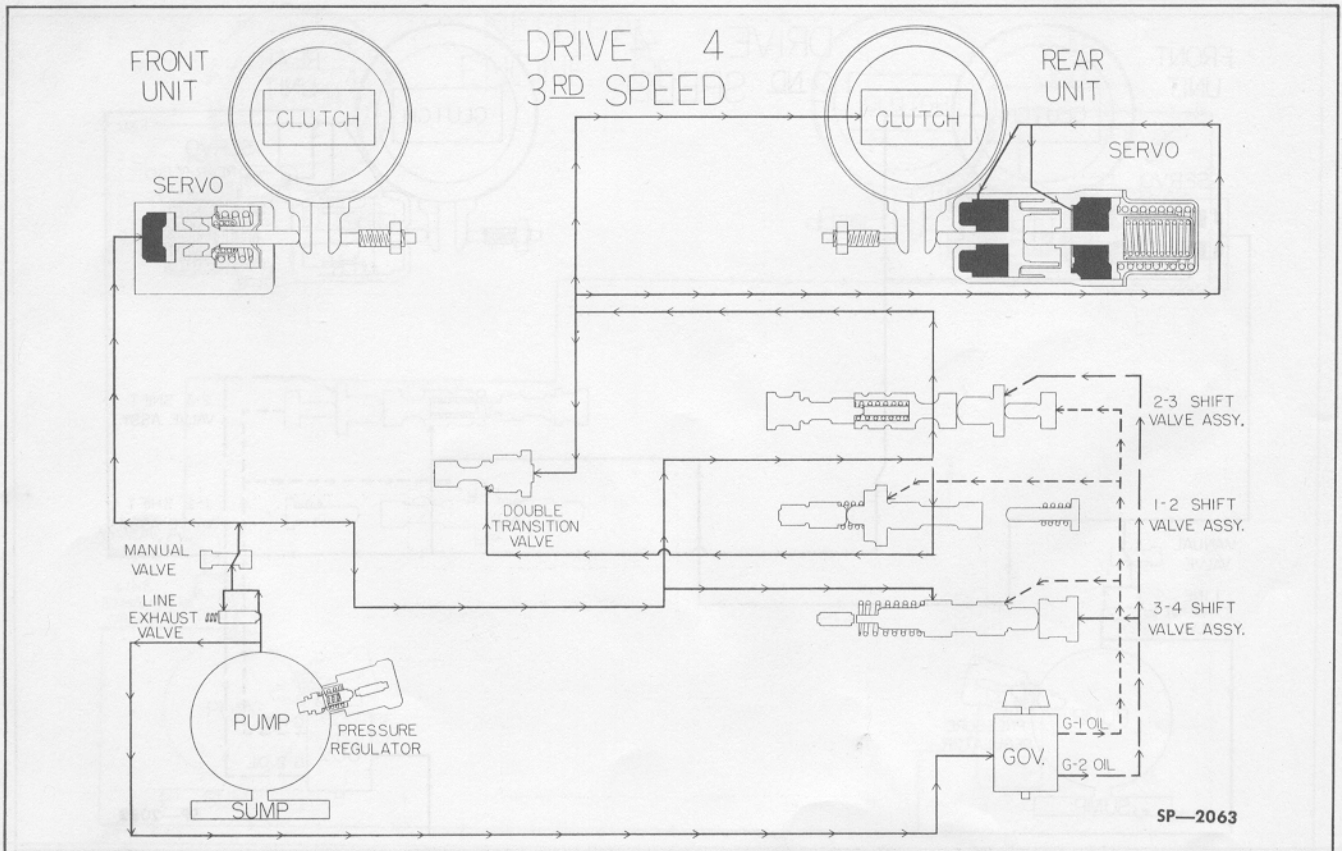


Fig. 11—Hydraulic Action in Third Speed

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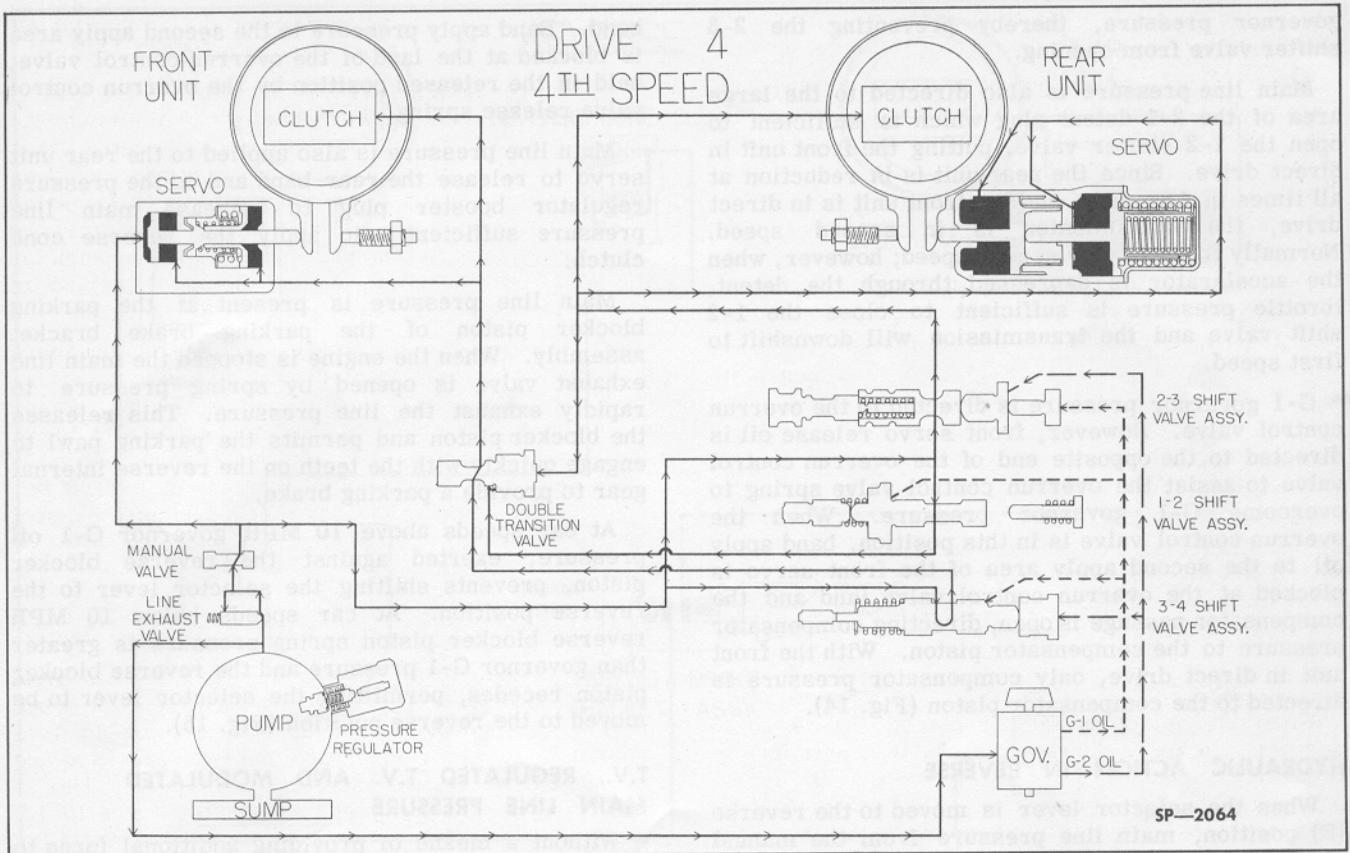


Fig. 12—Hydraulic Action in Fourth Speed

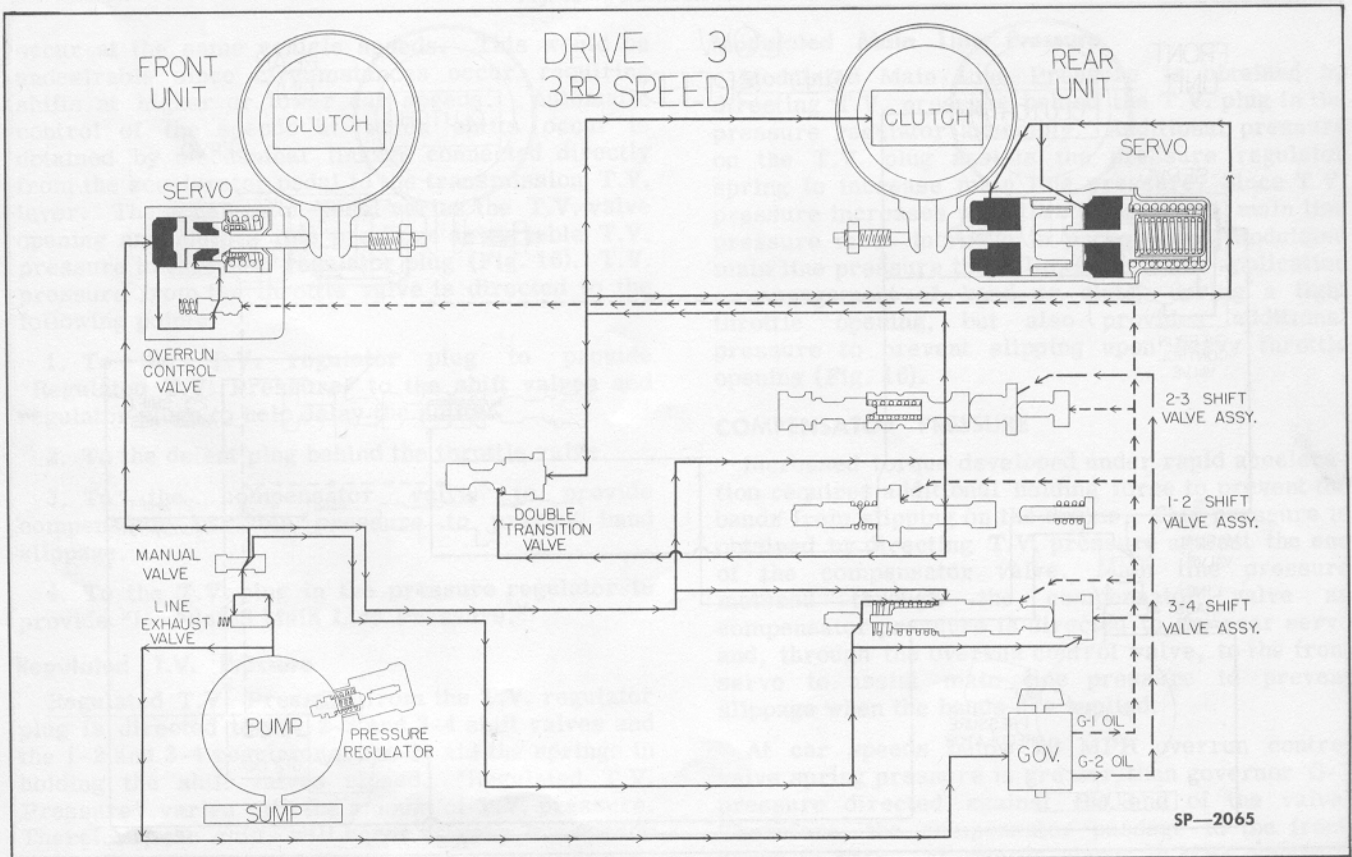


Fig. 13—Hydraulic Action—DR-3 Third Speed

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governor pressure, thereby preventing the 2-3 shifter valve from opening.

Main line pressure is also directed to the large area of the 2-1 detent plug which is sufficient to open the 1-2 shifter valve, putting the front unit in direct drive. Since the rear unit is in reduction at all times in LO range, and the front unit is in direct drive, the transmission is in second speed. Normally there is only second speed; however, when the accelerator is depressed through the detent, throttle pressure is sufficient to close the 1-2 shift valve and the transmission will downshift to first speed.

G-1 governor pressure is directed to the overrun control valve. However, front servo release oil is directed to the opposite end of the overrun control valve to assist the overrun control valve spring to overcome G-1 governor pressure. When the overrun control valve is in this position, band apply oil is blocked at the second apply area of the front servo is blocked at the overrun control valve land and the compensator passage is open, directing compensator pressure to the compensator piston. With the front unit in direct drive, only compensator pressure is directed to the compensator piston (Fig. 14).

## HYDRAULIC ACTION IN REVERSE

When the selector lever is moved to the reverse (R) position, main line pressure from the manual valve is directed to the front servo to apply the

band. Band apply pressure to the second apply area is blocked at the land of the overrun control valve, held in the released position by the overrun control valve release spring.

Main line pressure is also applied to the rear unit servo to release the rear band and to the pressure regulator booster plug to increase main line pressure sufficiently to apply the reverse cone clutch.

Main line pressure is present at the parking blocker piston of the parking brake bracket assembly. When the engine is stopped the main line exhaust valve is opened by spring pressure to rapidly exhaust the line pressure. This releases the blocker piston and permits the parking pawl to engage quickly with the teeth on the reverse internal gear to provide a parking brake.

At car speeds above 10 MPH governor G-1 oil pressure, exerted against the reverse blocker piston, prevents shifting the selector lever to the reverse position. At car speeds below 10 MPH reverse blocker piston spring pressure is greater than governor G-1 pressure and the reverse blocker piston recedes, permitting the selector lever to be moved to the reverse position (Fig. 15).

## T.V., REGULATED T.V. AND MODULATED MAIN LINE PRESSURE

Without a means of providing additional force to hold the shift valves closed, the shifts would always

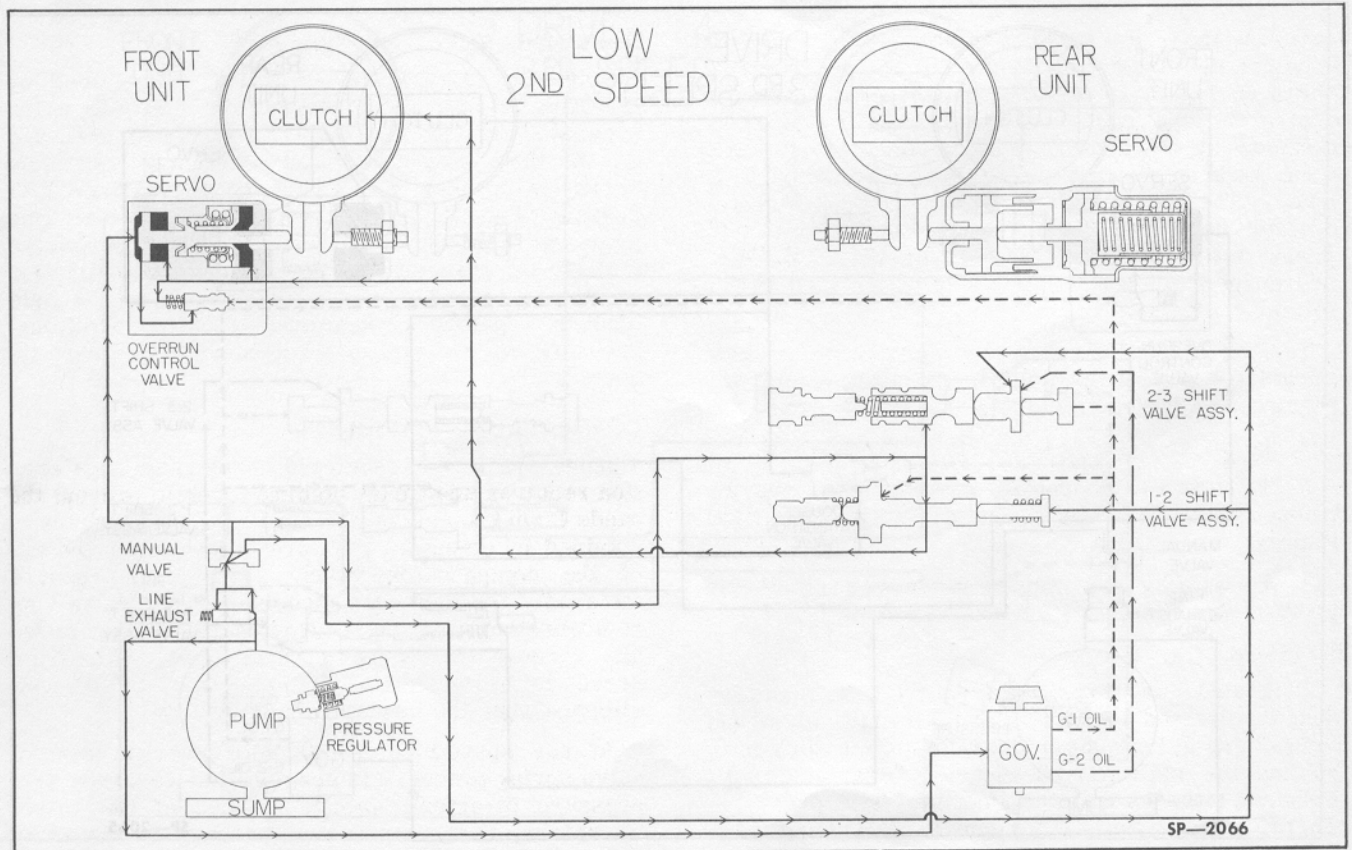


Fig. 14-Hydraulic Action-LO Range-Second Speed



# K-53 HYDRA-MATIC DRIVE

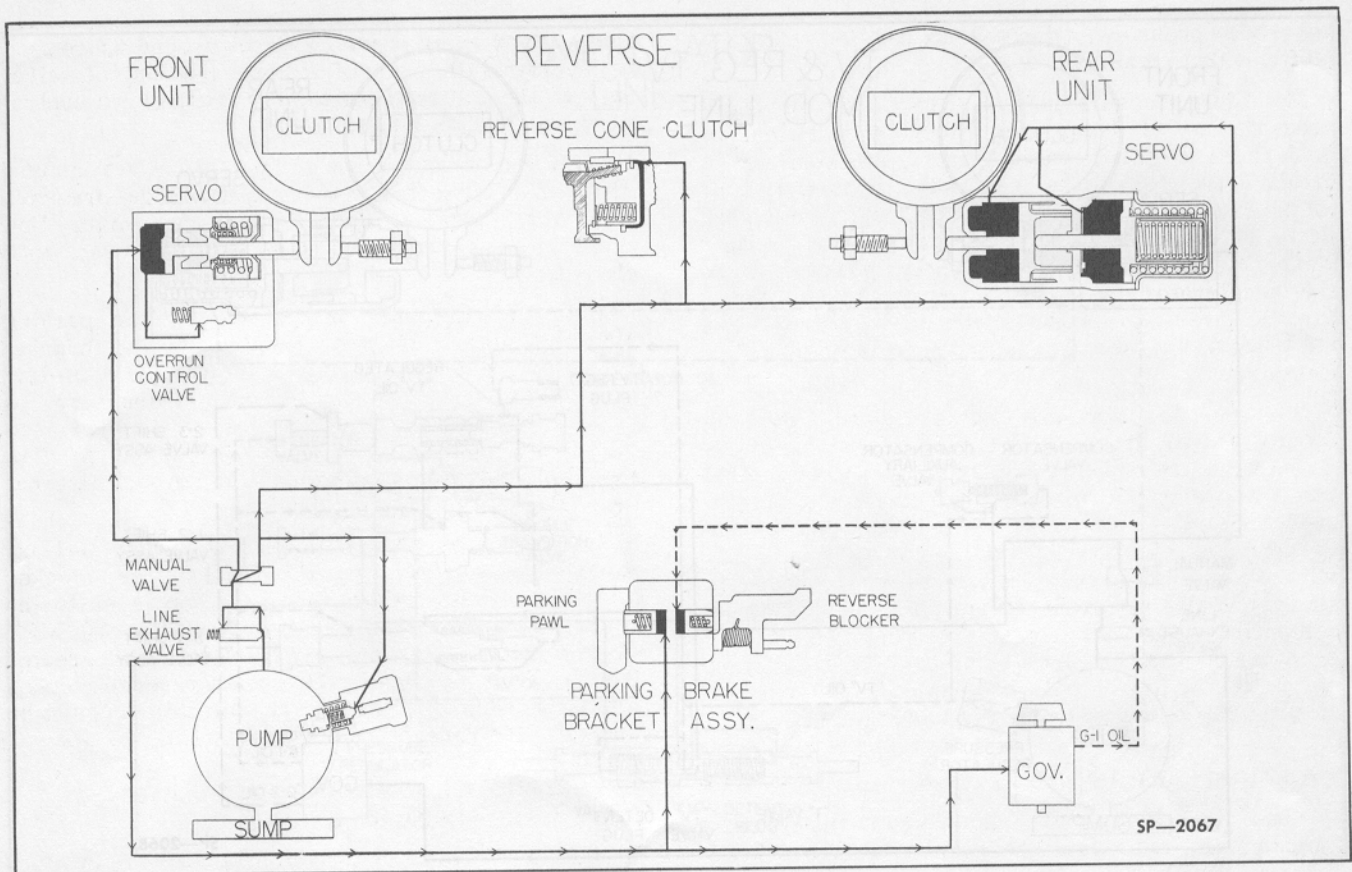


Fig. 15—Hydraulic Action in Reverse

occur at the same vehicle speeds. This would be undesirable since circumstances occur requiring shifts at higher or lower car speeds. Automatic control of the speeds at which shifts occur is obtained by mechanical linkage connected directly from the accelerator pedal to the transmission T.V. lever. The accelerator pedal varies the T.V. valve opening and meters line pressure as variable T.V. pressure to the T.V. regulator plug (Fig. 16). T.V. pressure from the throttle valve is directed to the following points:

1. To the T.V. regulator plug to provide "Regulated T.V. Pressure" to the shift valves and regulator plugs to help delay the shifts.
2. To the detent plug behind the throttle valve.
3. To the compensator valve to provide compensator variable pressure to prevent band slippage.
4. To the T.V. plug in the pressure regulator to provide "Modulated Main Line Pressure."

## Regulated T.V. Pressure

Regulated T.V. Pressure from the T.V. regulator plug is directed to the 2-3 and 3-4 shift valves and the 1-2 and 3-4 regulator plugs to aid the springs in holding the shift valves closed. "Regulated T.V. Pressure" varies with the amount of T.V. pressure. Therefore, the shifts will occur at very low speeds under light throttle and at higher vehicle speeds proportionate to the increased throttle opening (Fig. 16).

## Modulated Main Line Pressure

Modulated Main Line Pressure is obtained by directing T.V. pressure behind the T.V. plug in the pressure regulator assembly. Additional pressure on the T.V. plug assists the pressure regulator spring to increase main line pressure. Since T.V. pressure increases with throttle opening, main line pressure must increase in proportion. Modulated main line pressure then allows a smooth application or engagement of band or clutch during a light throttle opening, but also provides additional pressure to prevent slipping upon heavy throttle opening (Fig. 16).

## COMPENSATOR PRESSURE

Increased torque developed under rapid acceleration requires additional holding force to prevent the bands from slipping on the drums. This pressure is obtained by directing T.V. pressure against the end of the compensator valve. Main line pressure metered through the compensator valve as compensator pressure is directed to the rear servo and, through the overrun control valve, to the front servo to assist main line pressure to prevent slippage when the bands are applied.

At car speeds below 20 MPH overrun control valve spring pressure is greater than governor G-1 pressure directed against the end of the valve. Therefore, the compensator passage to the front servo is open. At speeds above 20 MPH governor G-1 pressure overcomes overrun control valve

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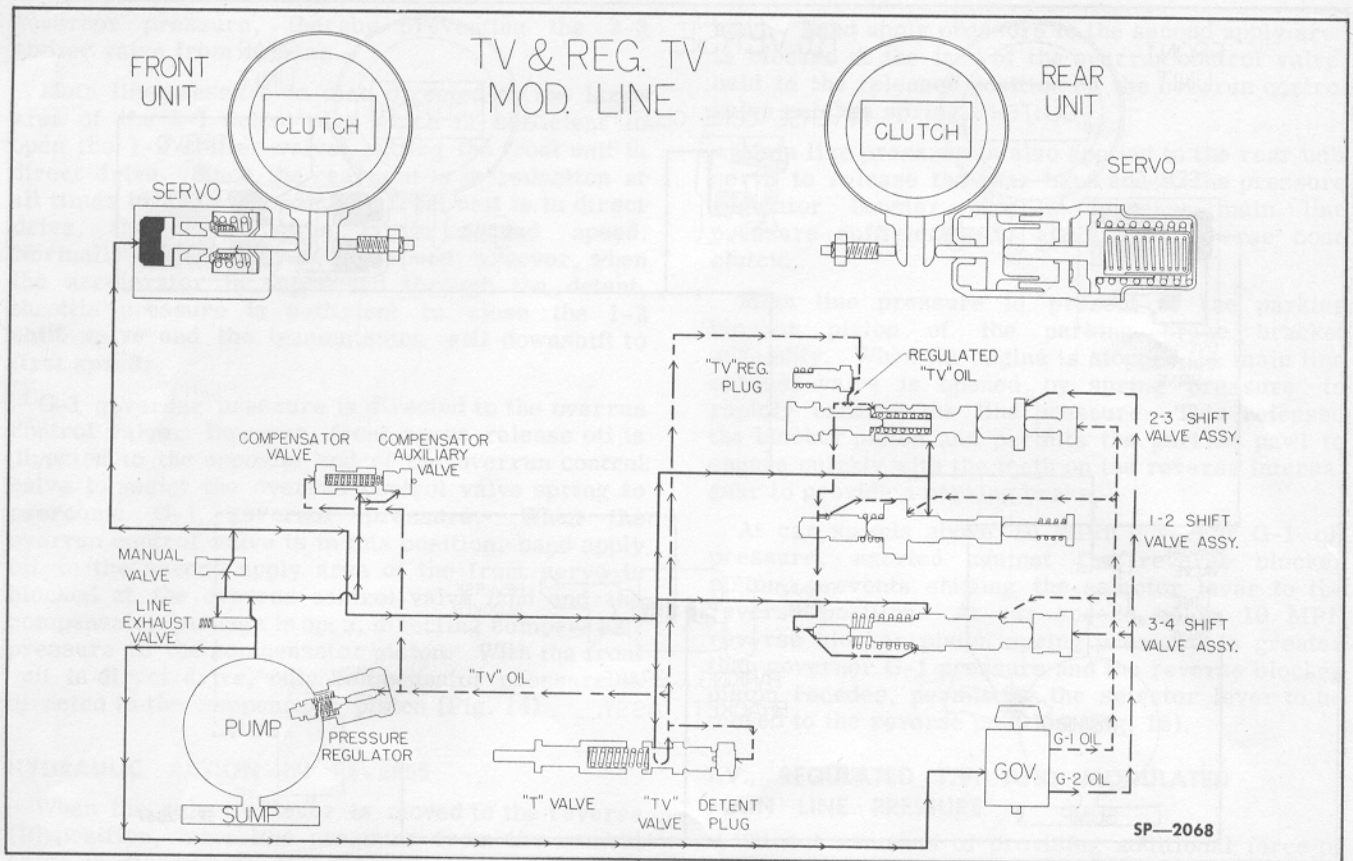


Fig. 16—T.V., Regulated T.V. and Modulated Main Line Pressure

spring pressure. The valve is then forced back, closing the compensator passage and opening a passage past the valve to direct main line pressure to the second apply area of the front servo.

Whenever the front unit is in direct drive, front band release oil is directed to the opposite end of the overrun control valve to assist the spring in opposing governor G-1 pressure. Therefore, only compensator pressure is directed to the compensator piston regardless of car speed (Fig. 17).

## FORCED 4-3 DOWNSHIFT

While driving in fourth speed it is sometimes desirable to shift the transmission to third speed to obtain rapid acceleration.

The "T" valve and the detent plug, parts of the throttle valve assembly, are utilized to accomplish the 4-3 downshift.

When the accelerator pedal is fully depressed, the throttle valve is forced back until it contacts the detent plug at the wide open throttle position. Resistance is felt at this point. Depressing the accelerator further against the detent plug, moves the "T" valve, throttle valve and detent plug back against detent pressure.

As the "T" valve is moved, it reaches a position where main line pressure is directed from the "T" valve to the shuttle valve. The shuttle valve is moved toward the inner valve body, blocking the DR-3 oil passage and opening the passage from the

shuttle valve to the back of the 3-4 shift valve, forcing it closed against governor pressure. This cuts off the pressure to the front unit clutch and the clutch is released by spring pressure. Pressure is also cut off from the release side of the front servo and the front band is applied by band apply pressure.

With the accelerator pedal fully depressed, throttle and spring pressure is sufficient to hold the valve closed until a high vehicle speed is reached. If the accelerator pedal is released, the shift from third to fourth occurs when governor pressure overcomes the spring pressure (Fig. 18).

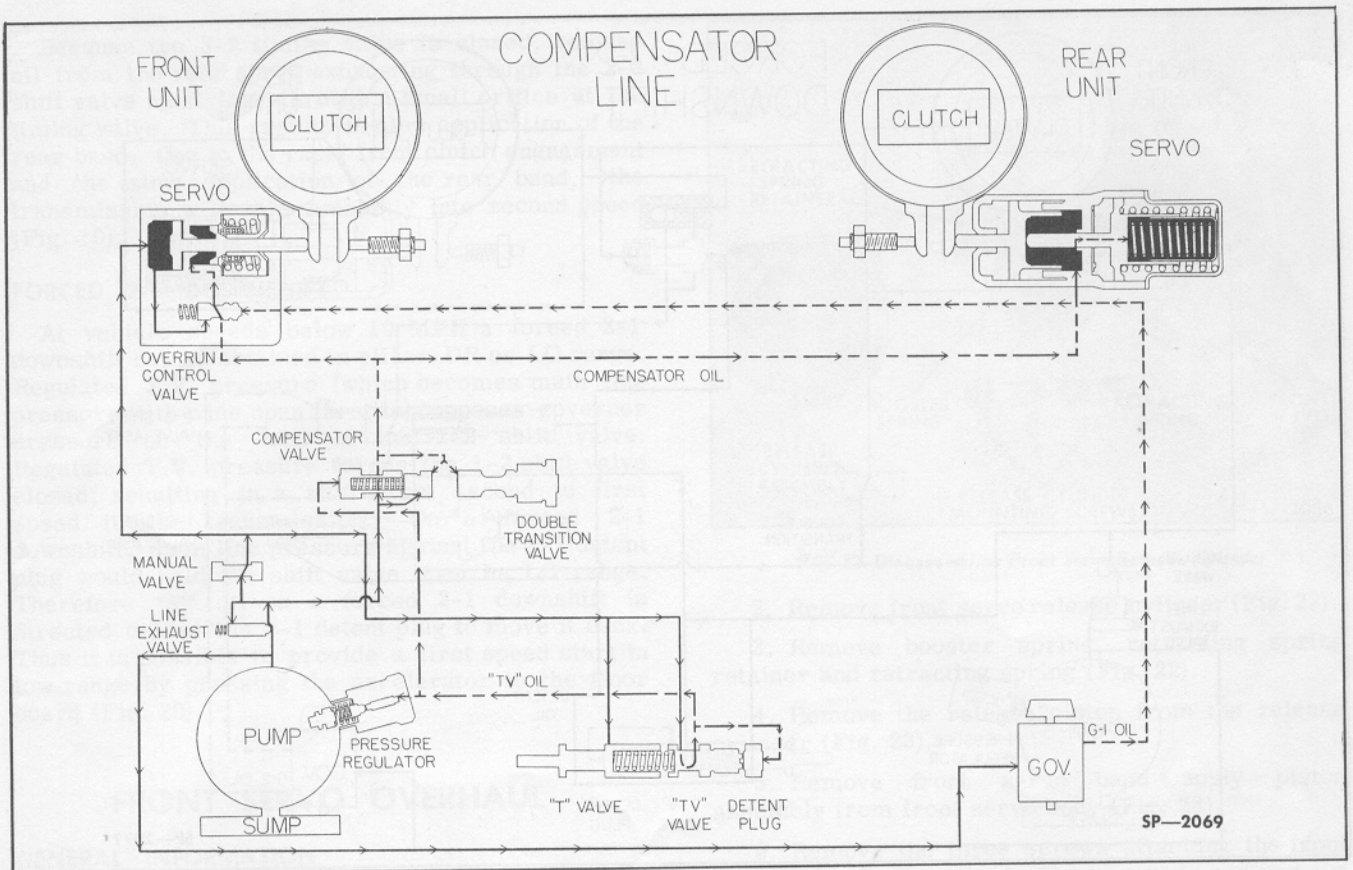
## FORCED 3-2 DOWNSHIFT

When the accelerator pedal is depressed through the detent and the car is going slowly enough to obtain a 3-2 downshift, main line pressure through the "T" valve will open the 3-2 detent plug and move the 2-3 shift valve to the closed position.

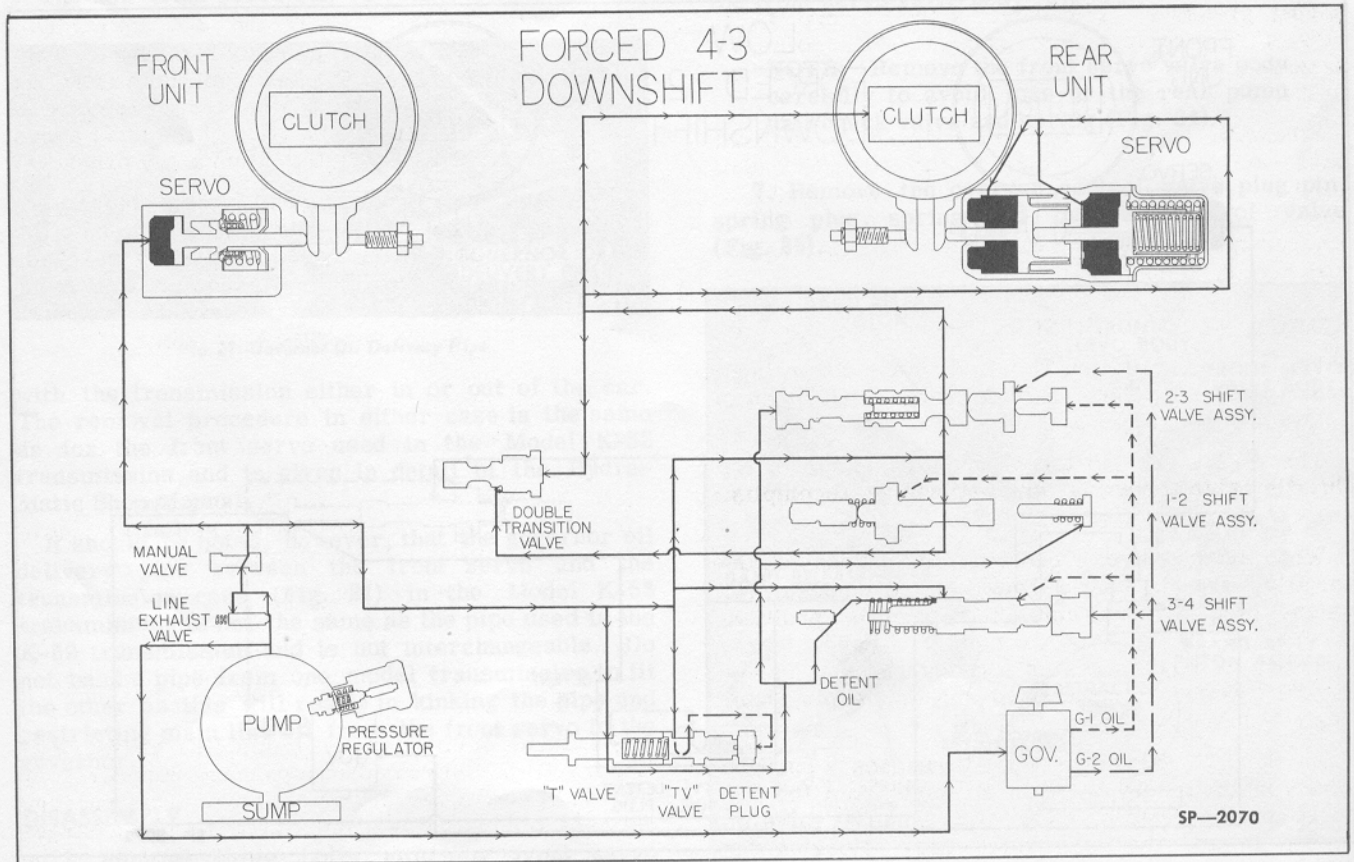
With the 3-2 detent plug opened, regulated T.V. pressure to the 2-3 shift valve is cut off. Main line pressure from the "T" valve flows past the large end of the 3-2 detent plug to close the 3-2 timing valve.

Regulated T.V. pressure (main line pressure at full throttle) is directed to a passage uncovered by the small end of the 3-2 detent plug. This passage delivers oil to the 1-2 shift valve through a larger port than normal to provide rapid application of the front clutch.

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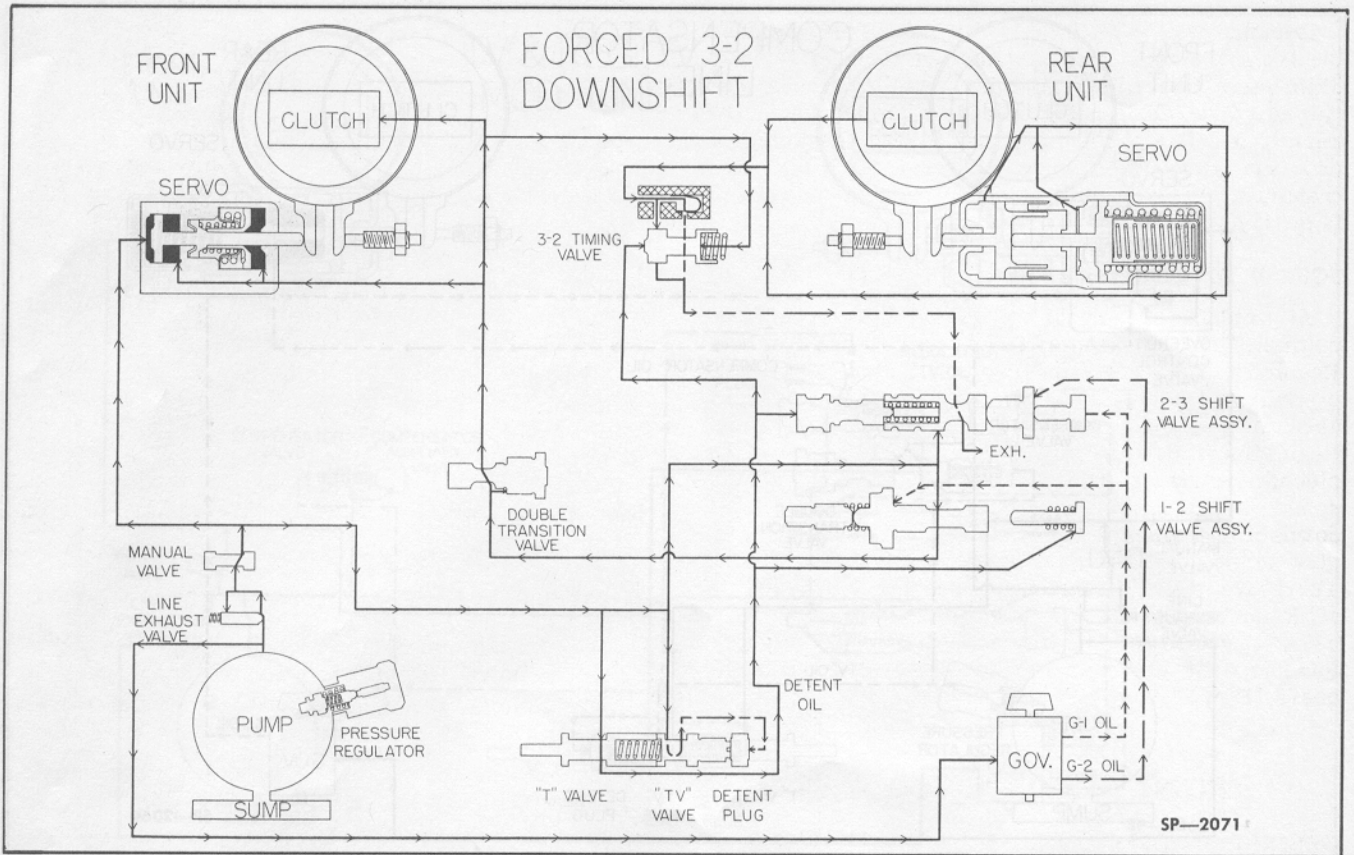
**Fig. 17-Compensator Pressure**



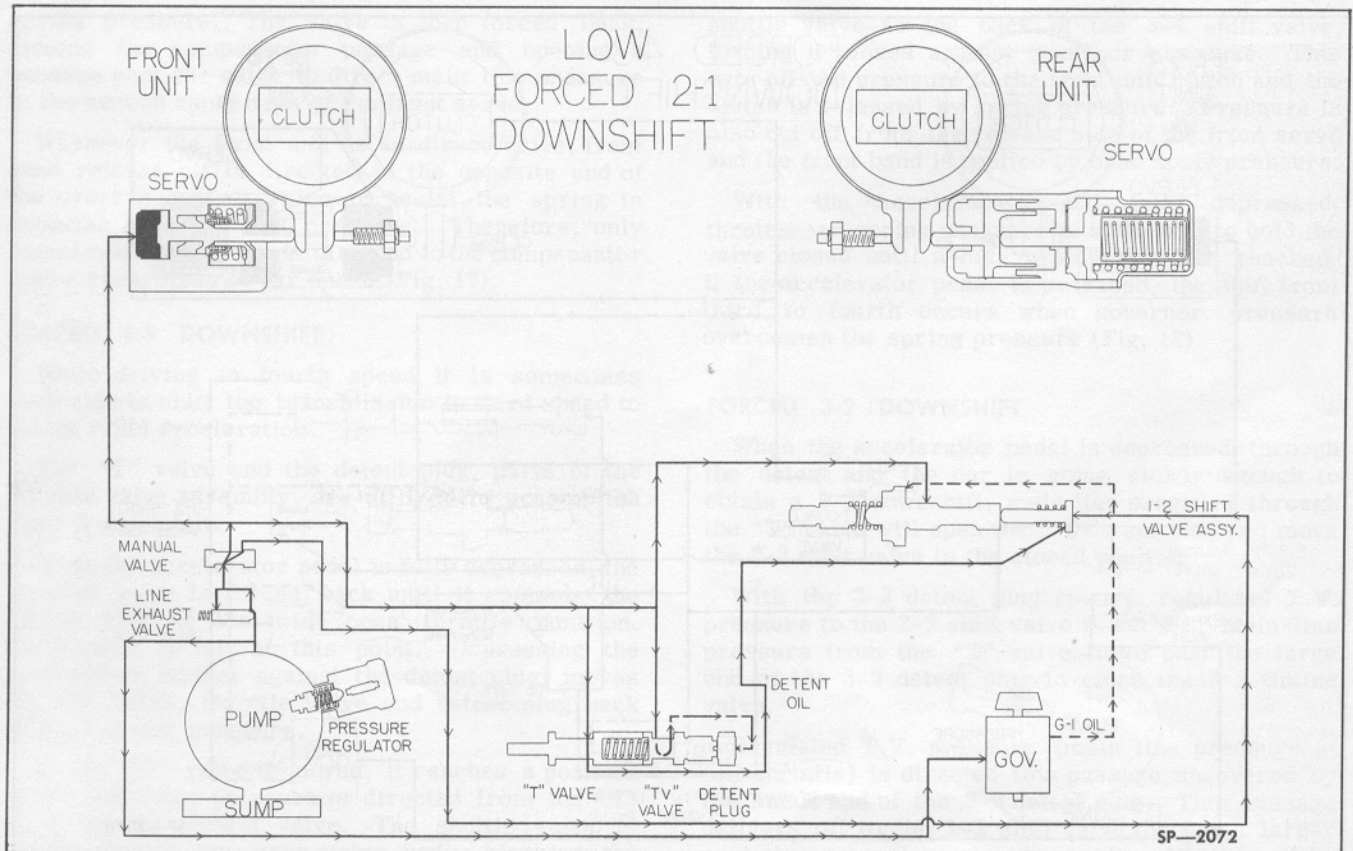
**Fig. 18-Forced 4-3 Downshift**



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**Fig. 19—Forced 3-2 Downshift**



**Fig. 20—Forced 2-1 Downshift**

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Because the 3-2 timing valve is closed, release oil from the rear servo exhausting through the 2-3 shift valve must flow through a small orifice at the timing valve. This results in slow application of the rear band. Due to the rapid front clutch engagement and the slow application of the rear band, the transmission will shift smoothly into second speed (Fig. 19).

## FORCED 2-1 DOWNSHIFT

At vehicle speeds below 10 MPH a forced 2-1 downshift can be obtained in either DR or LO range. Regulated T.V. pressure (which becomes main line pressure with wide open throttle) opposes governor pressure on the land of the 1-2 shift valve. Regulated T.V. pressure forces the 1-2 shift valve closed, resulting in a shift from second to first speed in the transmission. On a forced 2-1 downshift, main line pressure against the 2-1 detent plug would hold the shift valve open in LO range. Therefore "T" oil on a forced 2-1 downshift is directed behind the 2-1 detent plug to move it back. Thus it is possible to provide a first speed start in low range by pressing the accelerator to the floor board (Fig. 20).

## FRONT SERVO OVERHAUL

### GENERAL INFORMATION

The new front servo can be removed for overhaul

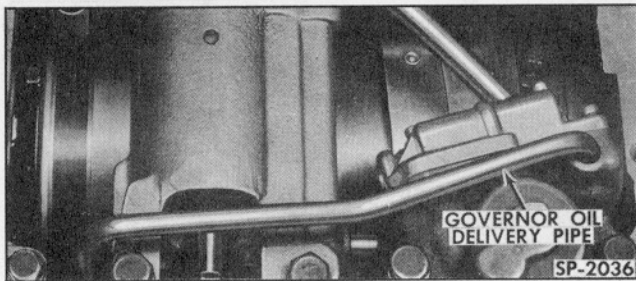


Fig. 21-Governor Oil Delivery Pipe

with the transmission either in or out of the car. The removal procedure in either case is the same as for the front servo used in the Model K-52 transmission and is given in detail in the Hydra-Matic Shop Manual.

It should be noted, however, that the governor oil delivery pipe between the front servo and the transmission case (Fig. 21) in the Model K-53 transmission is not the same as the pipe used in the K-52 transmission and is not interchangeable. Do not bend a pipe from one model transmission to fit the other as this will result in kinking the pipe and restricting main line oil from the front servo to the governor.

### DISASSEMBLY

1. Remove three bolts attaching front servo release cylinder to front servo body.

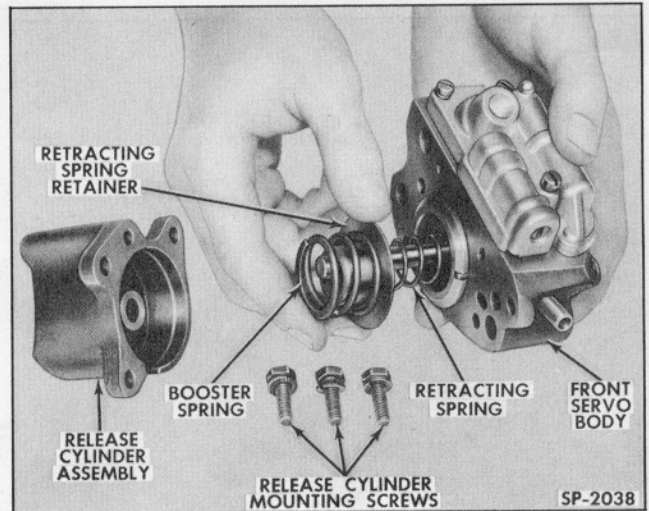


Fig. 22-Disassembling Front Servo Release Cylinder

2. Remove front servo release cylinder (Fig. 22).
3. Remove booster spring, retracting spring retainer and retracting spring (Fig. 22).
4. Remove the release piston from the release cylinder (Fig. 23).
5. Remove front servo band apply piston assembly from front servo body (Fig. 23).
6. Remove the three screws attaching the front servo valve body to the front servo body and remove the front servo valve body (Fig. 23).

NOTE: Remove the front servo valve body carefully to avoid loss of the rear pump ball check valve and spring (Fig. 24).

7. Remove the overrun control valve plug pin, spring plug, spring and overrun control valve (Fig. 25).

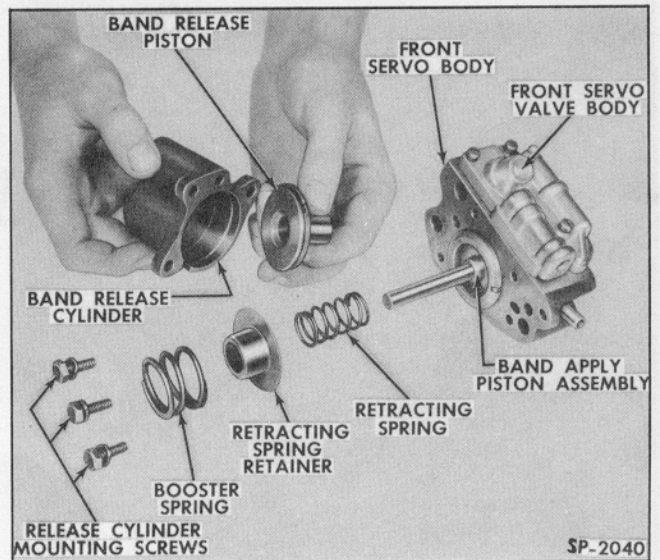


Fig. 23-Removing Release Piston



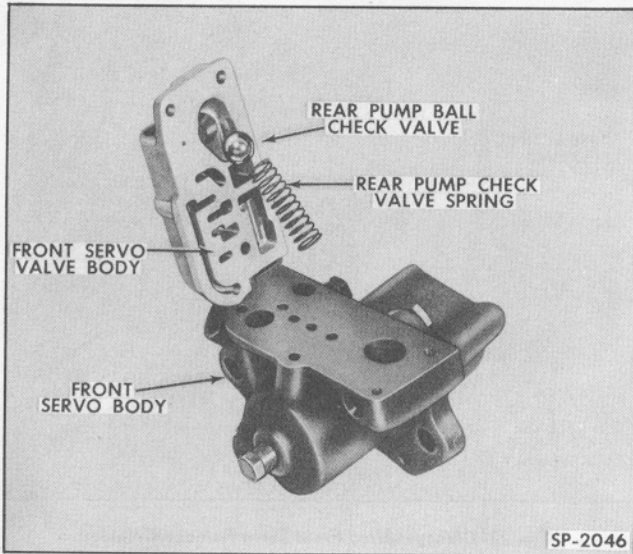


Fig. 24—Front Servo Valve Body Removed

8. Remove the line exhaust valve retainer, line exhaust valve spring and the line exhaust valve (Fig. 25).

9. Remove the 4-3 downshift valve from the front servo body (Fig. 26).

10. Remove the front servo band adjusting hole plug from the servo body (Fig. 26).

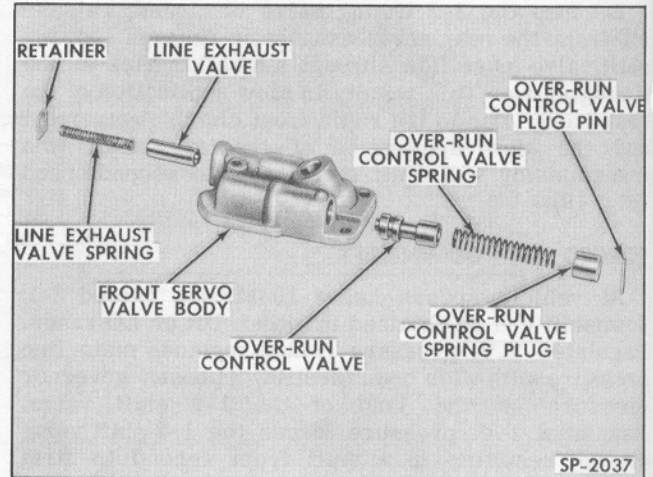


Fig. 25—Front Servo Valve Body Disassembled

### CLEANING AND INSPECTION

1. Check the machined surfaces of the servo body, release cylinder and servo valve body for roughness or scoring (Fig. 27).

2. Check for obstruction of the 3-2 timing valve restrictor orifice (Fig. 28).

3. Check servo for blocked or interconnected oil passages (Fig. 29).

4. Check front band release piston for scores, broken ring and ring freedom in release piston groove.

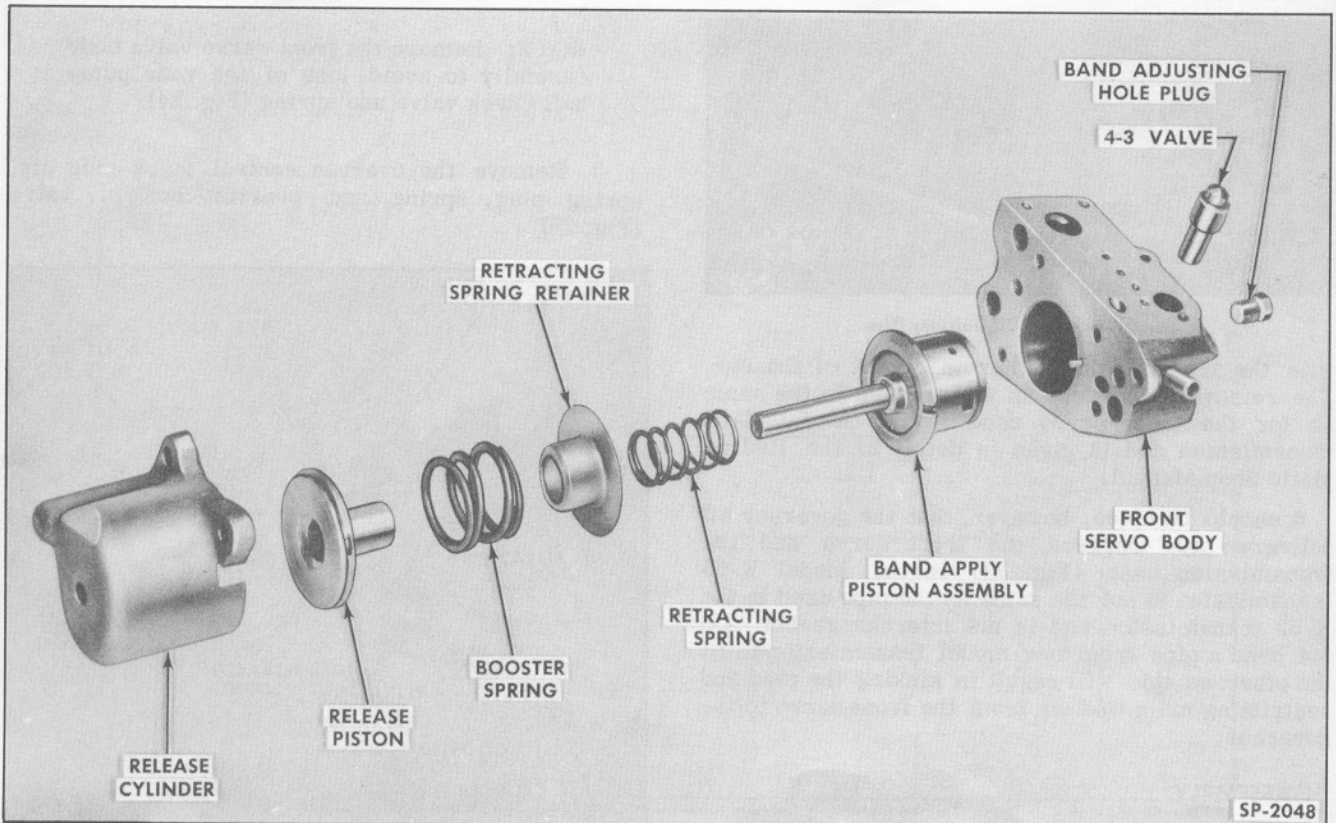
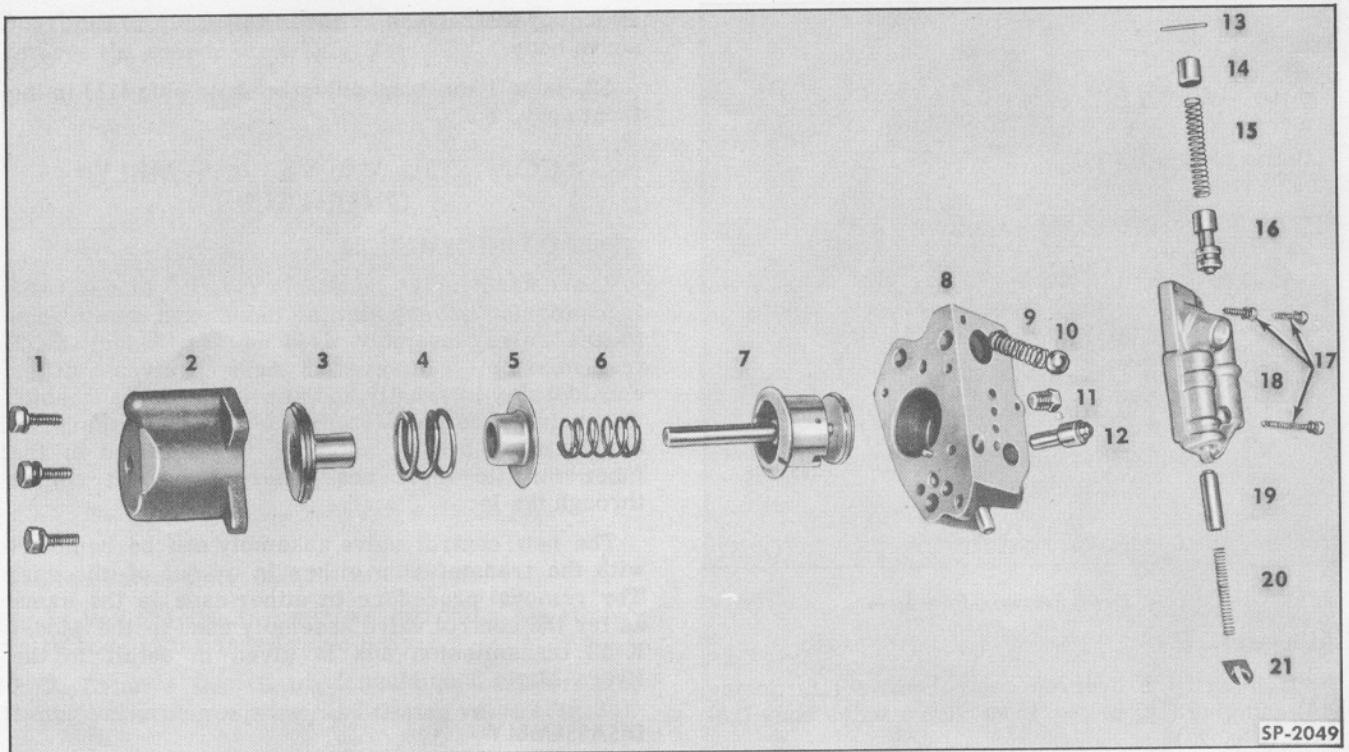


Fig. 26—Front Servo Body Disassembled



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- |                                      |                                       |                                             |
|--------------------------------------|---------------------------------------|---------------------------------------------|
| 1. Release Cylinder Attaching Screws | 8. Front Servo Body                   | 15. Overrun Control Valve Spring            |
| 2. Release Cylinder                  | 9. Rear Pump Ball Check Valve Spring  | 16. Overrun Control Valve                   |
| 3. Band Release Piston               | 10. Rear Pump Ball Check Valve        | 17. Front Servo Valve Body Attaching Screws |
| 4. Booster Spring                    | 11. Band Adjusting Hole Plug          | 18. Front Servo Valve Body                  |
| 5. Retracting Spring Retainer        | 12. 4-3 Valve                         | 19. Line Exhaust Valve                      |
| 6. Retracting Spring                 | 13. Overrun Control Valve Plug Pin    | 20. Line Exhaust Valve Spring               |
| 7. Band Apply Piston Assembly        | 14. Overrun Control Valve Spring Plug | 21. Line Exhaust Valve Retainer             |

Fig. 27—Disassembled View of Front Servo

5. Check the 4-3 downshift valve for free movement in the servo body bore.

6. Inspect the front servo retracting spring and booster spring for distortion or collapsed coils. Free length of the booster spring is 61/64 of an inch and free length of the retracting spring is 1-33/64 inches.

7. Inspect the rear pump check valve seat, ball and spring.

**NOTE:** The rear pump check valve seat has a small drill spot in the seat face. The spot acts as a rear pump pressure bleed. Be certain the check valve seat has this bleed spot drilling.

8. Check the overrun control valve for free movement in the bore, and for scoring (Fig. 25).

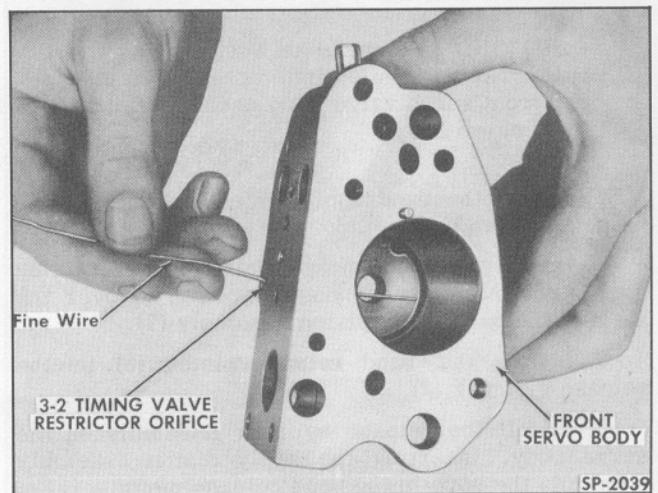
9. Check the free length of the overrun control valve spring. Free length should be approximately 1-9/64 inches.

10. Check the free length of the line exhaust valve spring. Free length should be 1-3/4 inches.

11. Check for free movement of the compensator

piston in its bore in the front servo band apply piston assembly (Fig. 27).

12. The front servo apply piston locating pin should fit snugly in the bore and should not extend beyond the machined face of the front servo apply piston (Fig. 22).



SP-2039

Fig. 28—Checking 3-2 Timing Valve Restrictor

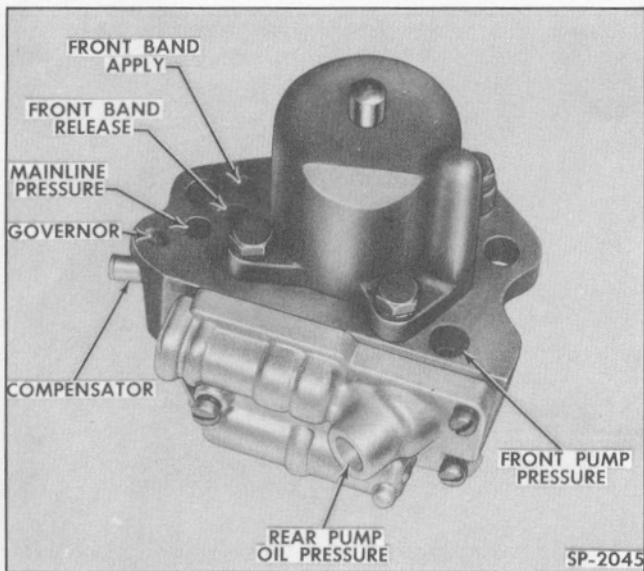


Fig. 29—Oil Passages—Front Servo

### ASSEMBLY

1. Insert the overrun control valve (16) spring (15) and plug (14) in the front servo valve body (18) bore (Fig. 27).
2. Compress the overrun control valve spring (15) by pressing on the spring plug (14) and install the overrun control valve plug pin (13).
3. Install the line exhaust valve (19) and spring (20) in the front servo valve body bore. Compress the line exhaust valve spring and install the retainer (21).
4. Install the 4-3 downshift valve (12) and the rear pump ball check valve spring (9) in their respective bores in the front servo body (8).
5. Install the rear pump ball check valve (10) in the front servo valve body (18) bore.
6. Bring the front servo body (8) and the front servo valve body (18) together. Install and tighten the three attaching screws (17).

**CAUTION:** Be careful to avoid losing the ball or spring while aligning and attaching the front servo valve body assembly to the front servo body.

7. Install the band apply piston assembly (7) in the front servo body (8).
8. Install the retracting spring (6), retracting spring retainer (5) and booster spring (4) over the stem of the band apply piston assembly (7).
9. Install the band release piston (3) in the release cylinder (2).
10. Install the release cylinder assembly on the servo body, inserting the apply piston assembly stem into the bore in the band release piston.
11. Install and tighten the three screws (1)

attaching the release cylinder assembly to the front servo body.

12. Install the band adjusting hole plug (11) in the front servo body.

## CONTROL VALVE ASSEMBLY OVERHAUL

### GENERAL INFORMATION

The control valve assembly for the Model K-53 transmission is very similar in outward appearance to the valve assembly used in the Model K-52 transmission. However, these valves differ considerably internally and are not interchangeable. The valve assembly for the K-53 transmission can be identified by the numeral "6" stamped in the inner throttle lever near where the shaft comes through the lever.

The new control valve assembly can be removed with the transmission either in or out of the car. The removal procedure in either case is the same as for the control valve assembly used in the Model K-52 transmission and is given in detail in the Hydra-Matic Shop Manual.

### DISASSEMBLY

1. Rotate the inside detent control lever slowly counter-clockwise and remove the detent plunger and spring (Fig. 30).
2. Remove the manual valve.
3. Remove the manual control shaft rubber seal and washers.
4. Remove the two screws attaching the outer valve body to the inner valve body.

**NOTE:** Carefully lift the outer valve body and spacer plate from the inner valve body. The outer valve body contains a 3-2 timing valve restrictor of the leaf type which contacts against the spacer plate. Do not lose the restrictor.

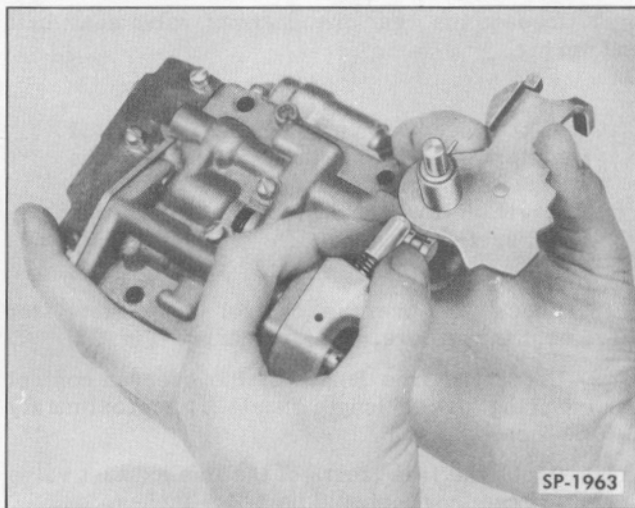


Fig. 30—Removing Detent Plunger and Spring



5. Separate the outer and inner valve bodies and remove the spacer plate (Fig. 31).

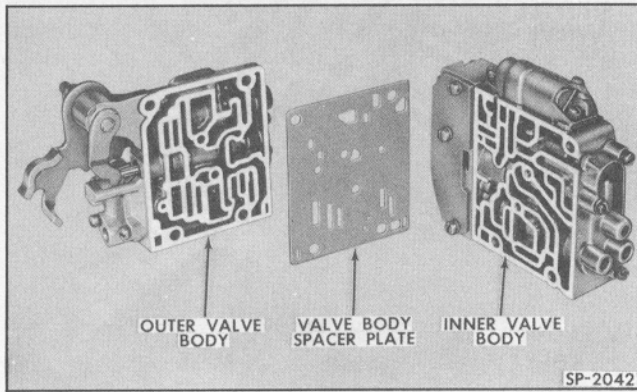


Fig. 31—Inner and Outer Valve Body and Spacer Plate

### Control Valve Inner Body

1. Remove the two screws attaching the timing valve body to the inner valve body.
2. Remove the timing valve plug retainer pin, timing valve plug, spring, and timing valve (Fig. 32).

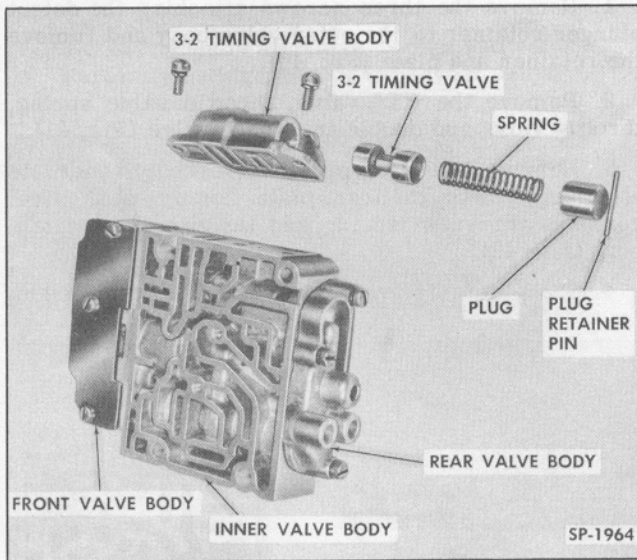


Fig. 32—Timing Valve Body Disassembled

3. Remove the three rear valve body to inner valve body attaching screws and remove the rear valve body and spacer plate (Fig. 33).

4. Remove the 3-4 governor plug, 2-1 detent plug, 2-1 detent plug spring and the 2-3 governor plug.

5. Remove the front valve body plate to inner valve body attaching screws (Fig. 34) and remove the front valve body plate, the "T" oil ball check valve and spring (Fig. 35).

6. Remove the two screws and the 3-2 detent plug plate and remove the 3-2 detent plug from the front valve body (Fig. 35).

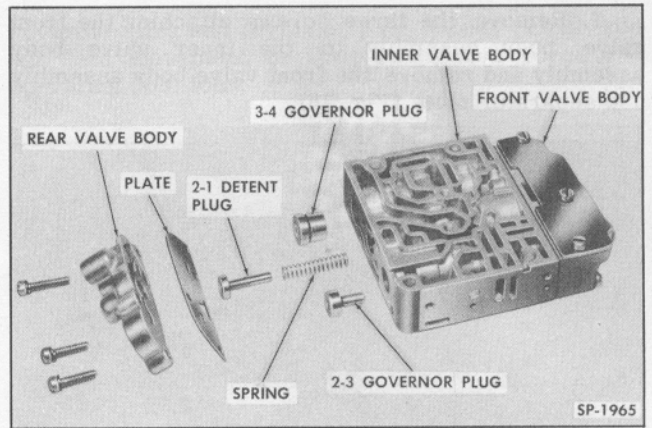


Fig. 33—Rear Valve Body Disassembled

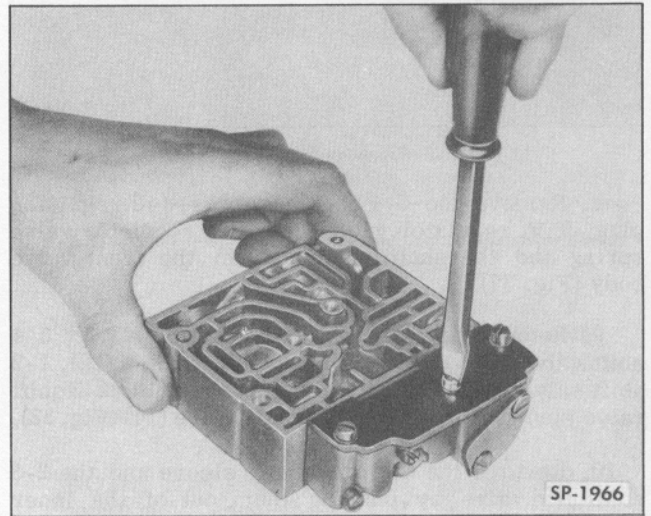


Fig. 34—Removing Front Valve Body Plate

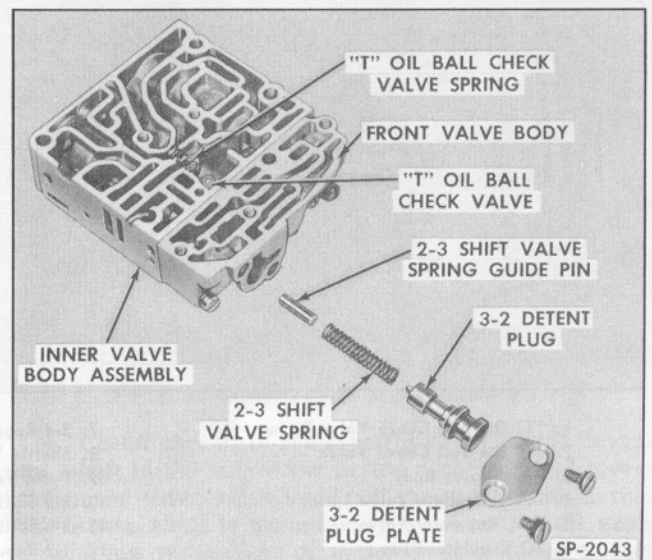


Fig. 35—Disassembled View of 3-2 Detent Plug



7. Remove the three screws attaching the front valve body assembly to the inner valve body assembly and remove the front valve body assembly and separator plate (Fig. 36).

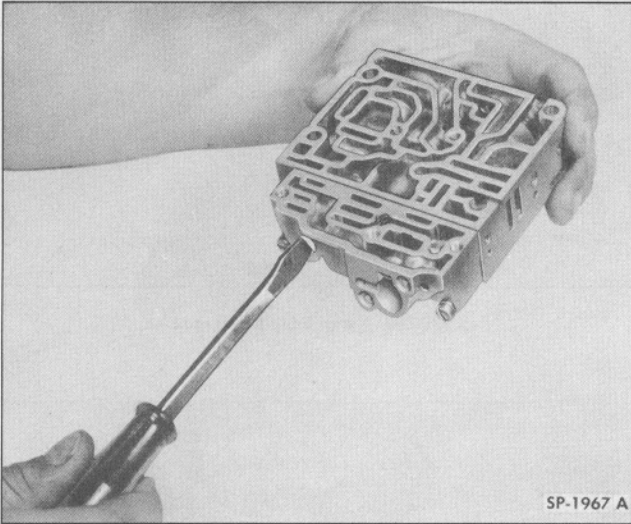


Fig. 36—Removing Front Valve Body

8. Remove the 3-4 regulator plug, 1-2 regulator plug, T.V. regulator valve, the T.V. regulator valve spring and the shuttle valve from the front valve body (Fig. 37).

9. Remove the 3-4 shift valve spring (13), 3-4 shift valve (16), 1-2 regulator plug spring (12), 1-2 shift valve (15), 2-3 shift valve guide pin (10), 2-3 shift valve spring (11) and the 2-3 shift valve (14) (Fig. 38).

10. Remove the 2-3 governor sleeve and the 2-3 auxiliary valve by pushing them out of the inner

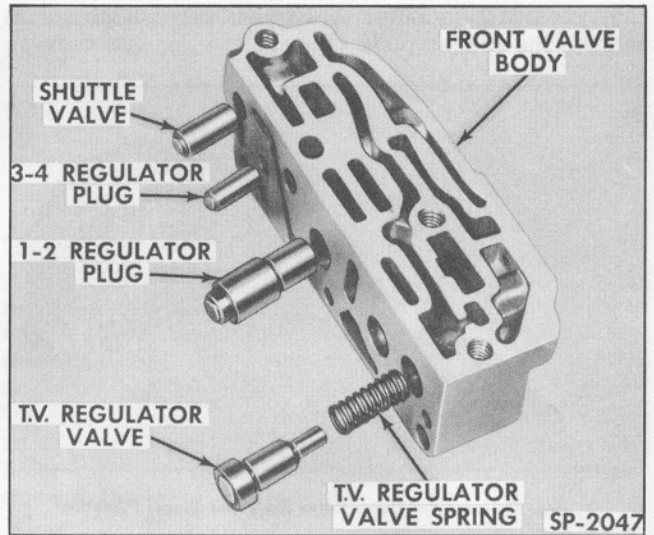


Fig. 37—Disassembled View—Front Valve Body

valve body with a lead pencil or 1/4 inch diameter brass rod (Fig. 39).

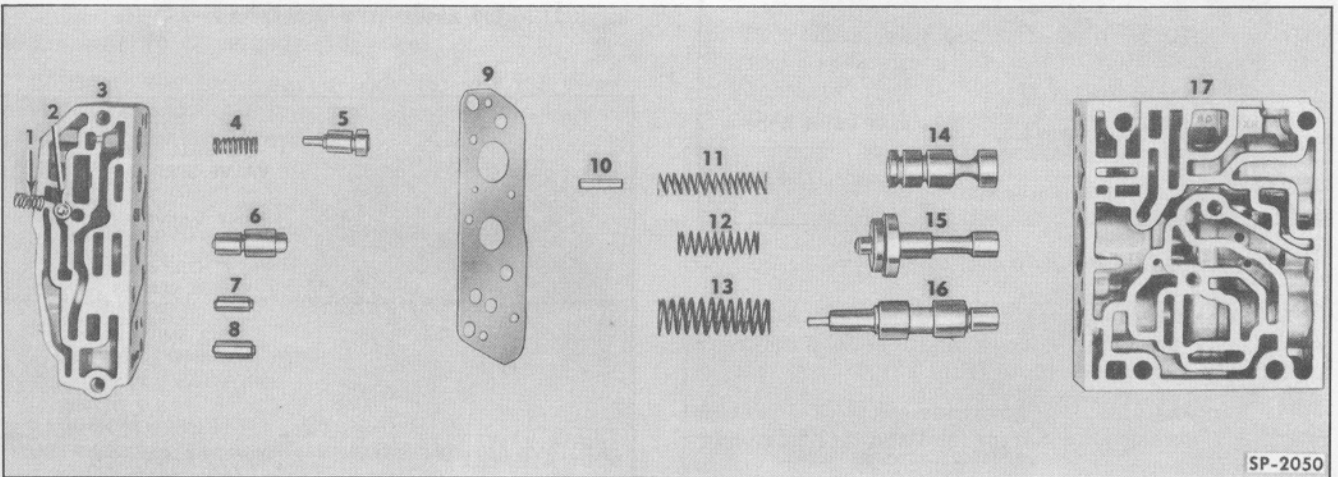
### Control Valve Outer Body

1. Remove the three screws attaching the detent plunger retainer to the outer valve body and remove the retainer and plate (Fig. 40).

2. Remove the "T" valve, throttle valve spring, throttle valve and double transition valve (Fig. 41).

3. Remove the three outer valve body front plate attaching screws, the front plate, compensator valve, compensator valve spring and throttle valve detent plug (Fig. 42).

4. Shake the outer valve body to check for freedom



- 1. "T" Oil Ball Check Valve Spring
- 2. "T" Oil Ball Check Valve
- 3. Front Valve Body
- 4. T.V. Regulator Valve Spring
- 5. T.V. Regulator Valve
- 6. 1-2 Regulator Plug

- 7. 3-4 Regulator Plug
- 8. Shuttle Valve
- 9. Front Valve Body Separator Plate
- 10. 2-3 Shift Valve Spring Guide Pin
- 11. 2-3 Shift Valve Spring
- 12. 1-2 Regulator Plug Spring

- 13. 3-4 Shift Valve Spring
- 14. 2-3 Shift Valve
- 15. 1-2 Shift Valve
- 16. 3-4 Shift Valve
- 17. Inner Valve Body

Fig. 38—Disassembled View of Inner and Front Valve Bodies

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of the compensator auxiliary plug in the outer valve body bore. If the plug is free, removal of the plug is not required. Plug can be pushed out of bore in outer valve body with a 1/8 inch diameter brass rod after removing the compensator auxiliary plug stop pin.

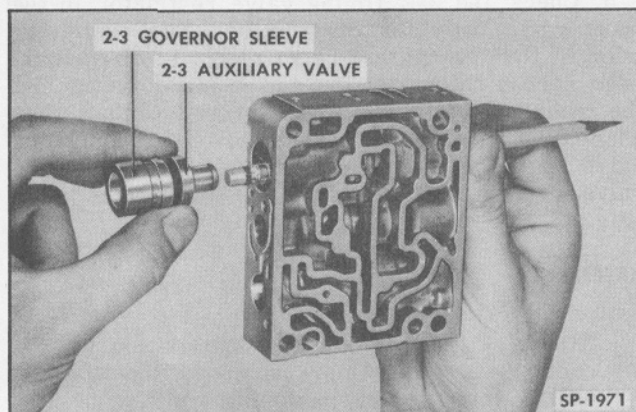


Fig. 39—Removing 2-3 Governor Sleeve and 2-3 Auxiliary Valve

## CLEANING AND INSPECTION

1. Thoroughly clean valve bodies and valves in a clean solvent.

**NOTE:** Handle all valve bodies and valves carefully during cleaning to prevent damage.

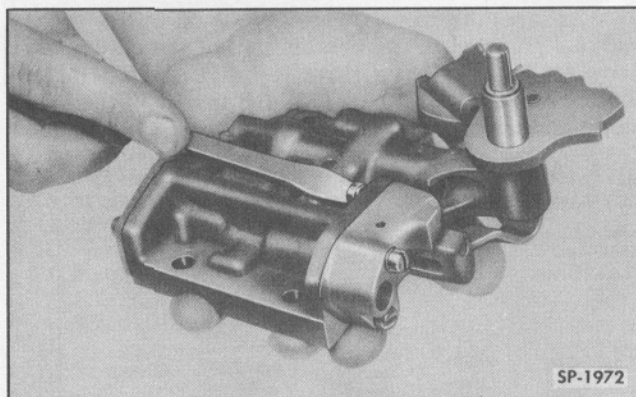


Fig. 40—Removing Detent Retainer

2. Inspect all valve bodies for scores in body bores and for freedom from burrs.

**NOTE:** Valve bodies and valve bores must be free of scratches or scores. Burrs can be removed by careful use of fine crocus cloth.

**CAUTION:** This type of valve has sharp corners to prevent dirt from wedging between the valves and valve body bores. When removing any burrs, do not round off square edges of valves.

3. After cleaning and drying, each shift valve,

governor plug and regulator plug should be checked for free movement in their respective bores and operating positions.

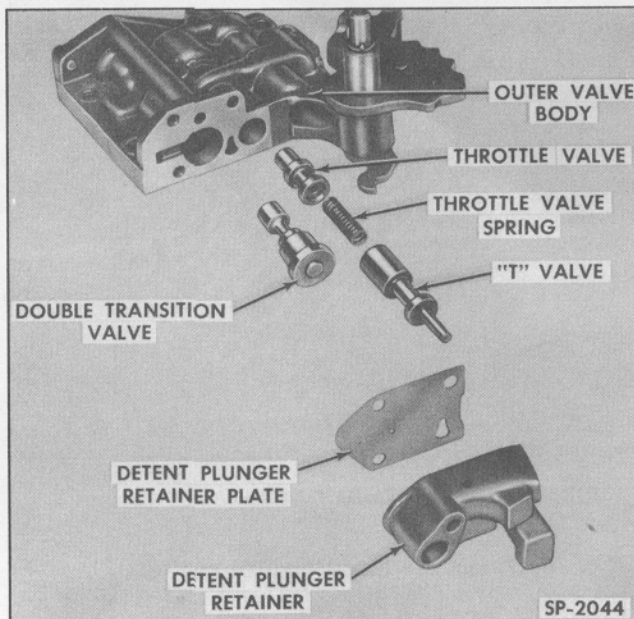


Fig. 41—"T" Valve, Throttle Valve and Double Transition Valve

**NOTE:** Valves can be assumed to be operating freely if they fall of their own weight in their respective bores when the valve body is shaken slightly. Do not drop valves.

**NOTE:** The manual valve is the only valve furnished separately. If it becomes necessary to replace one of the other valves or the inner or outer valve bodies, the complete control valve assembly should be replaced.

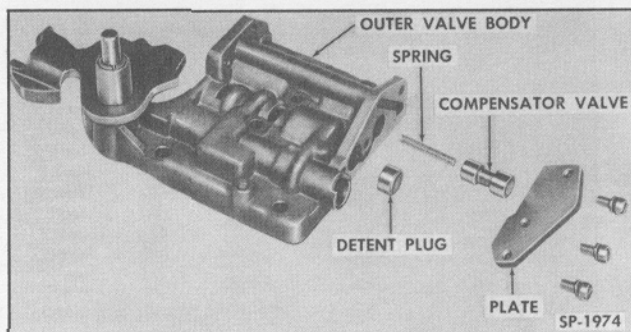


Fig. 42—Disassembled View of Compensator Valve

4. Check the fit of the throttle valve inside lever and shaft in the hub of the inside detent control lever and in the outer valve body. If the shaft binds in the hub or the shaft is excessively worn or the oil seal is missing or damaged or if the lever is loose on the shaft, the shaft and oil seal can be replaced as follows:



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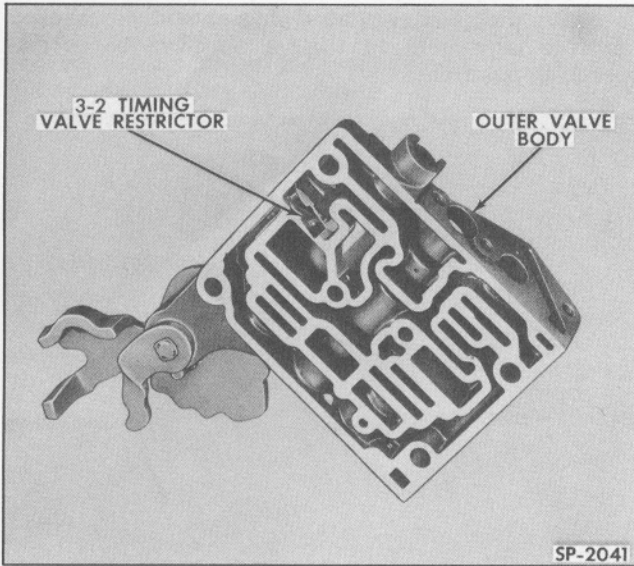


Fig. 43—Timing Valve Restrictor

- a. Drive out the throttle valve shaft pin.

**NOTE:** Support the valve shaft on a lead plate to prevent damage to the detent control lever at the outer valve body during pin removal.

- b. Install a new throttle valve inside lever and shaft through the outer valve body and through the detent lever and hub.

- c. Install a new oil seal over the valve shaft and into the counterbore of the detent lever sleeve.

- d. Install oil seal retainer washer and shaft retaining pin.

- e. Check the throttle valve inner shaft for freedom of movement.

5. Check the 3-2 timing valve restrictor in the outer valve body for obstruction. The restrictor must fit flat against the spacer plate. Lay a straight edge across the restrictor and press down against the outer valve body to check proper contact when assembled. Position the spacer plate over the outer valve body and check alignment of the restrictor valve orifice with the hole in the spacer plate (Fig. 43).

## ASSEMBLY

**NOTE:** To assure correct installation of control valve assembly springs, identify each spring by matching with the corresponding spring shown actual size in Fig. 44.

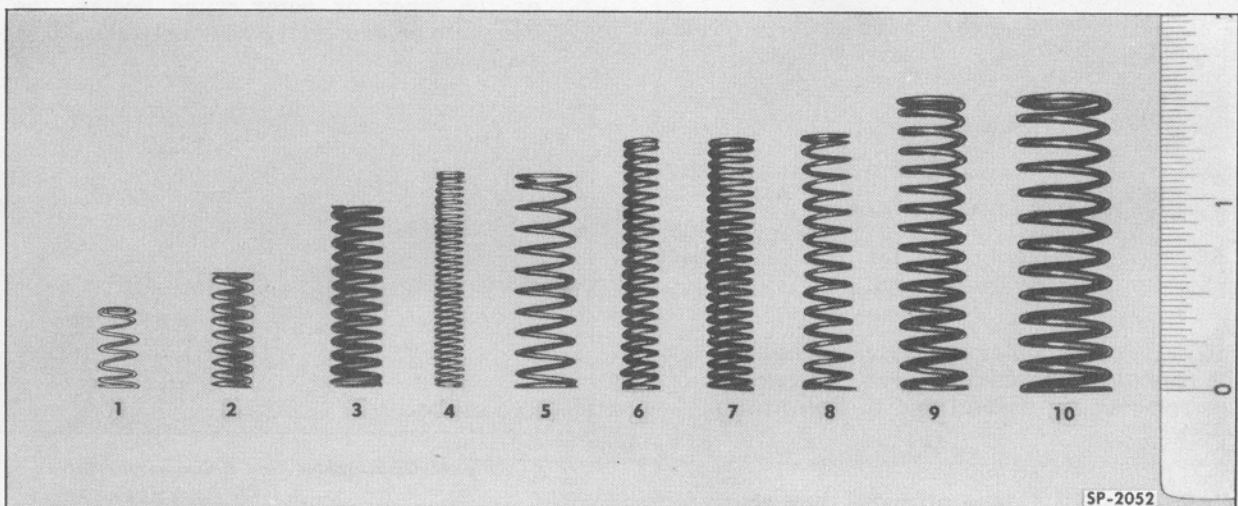
## Control Valve Outer Body

1. Install the compensator valve spring (47), compensator valve (45), detent plug (46) and the outer valve body front plate (44) with the three attaching screws (Fig. 45).

2. Install the double transition valve (55).

3. Place the throttle valve (50) on a 1/8" brass rod and position in the center bore of the outer valve body (48). Install the throttle valve spring (51) in the bore in the "T" valve (52) and insert in the outer valve body center bore.

4. Align the detent plunger retainer plate (56)



1. "T" Oil Ball Check Valve
2. T.V. Regulator
3. Throttle Valve
4. Compensator Valve

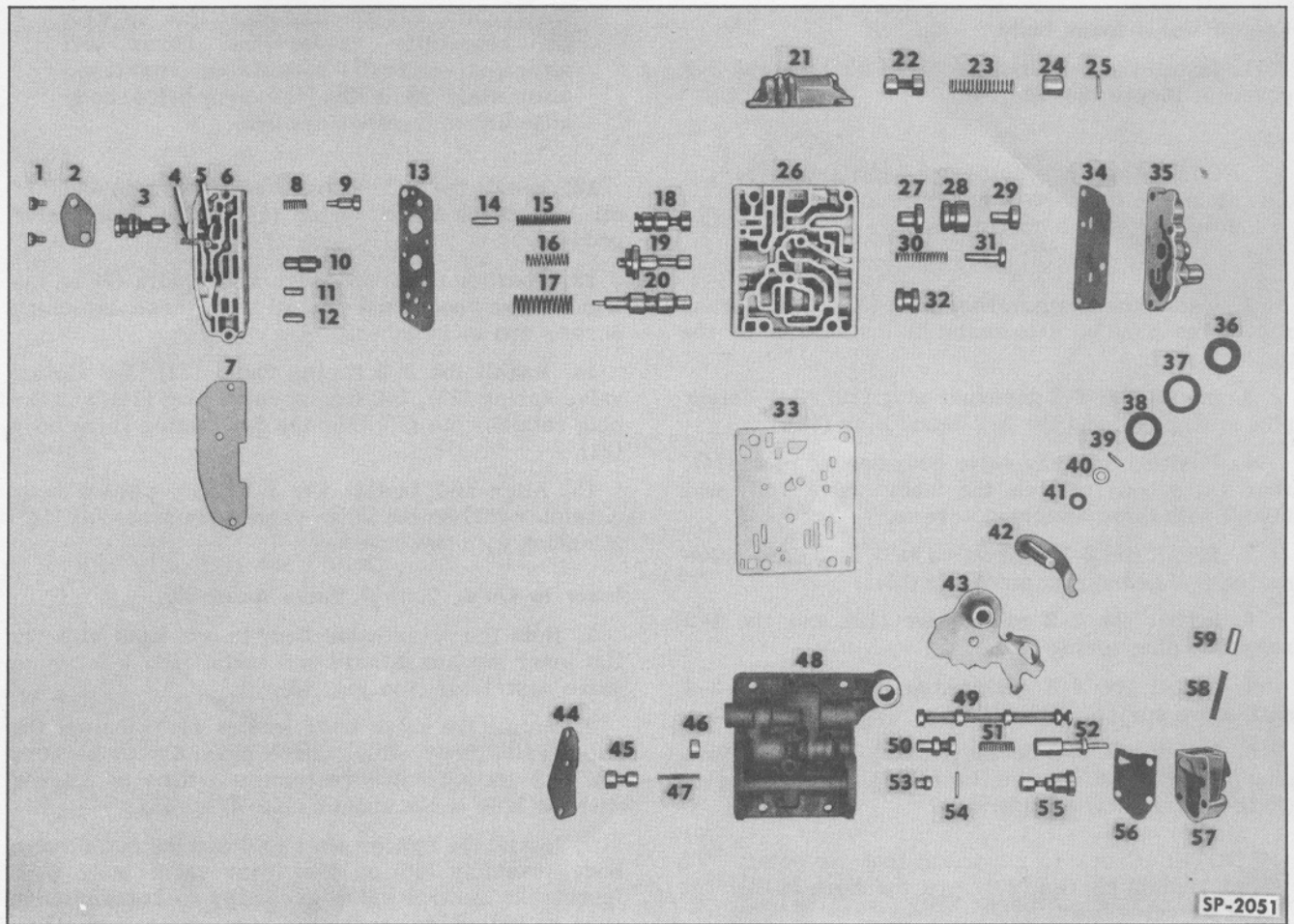
5. 1-2 Regulator Plug
6. Detent Plunger Retainer

7. 2-3 Shifter Valve
8. 2-1 Detent Plug
9. Timing Valve
10. 3-4 Shifter Valve

Fig. 44—Control Valve Assembly Spring Identification Chart



# K-53 HYDRA-MATIC DRIVE



- |                                      |                                        |                                           |
|--------------------------------------|----------------------------------------|-------------------------------------------|
| 1. 3-2 Detent Plug Plate Screws      | 21. 3-2 Timing Valve Body              | 41. Inner Control Lever Seal              |
| 2. 3-2 Detent Plug Plate             | 22. 3-2 Timing Valve                   | 42. Inner Throttle Lever                  |
| 3. 3-2 Detent Plug                   | 23. 3-2 Timing Valve Spring            | 43. Manual Shaft and Detent Control Lever |
| 4. "T" Oil Ball Check Valve Spring   | 24. 3-2 Timing Valve Plug              | 44. Outer Valve Body Front Plate          |
| 5. "T" Oil Ball Check Valve          | 25. 3-2 Timing Valve Plug Retainer Pin | 45. Compensator Valve                     |
| 6. Front Valve Body                  | 26. Inner Valve Body                   | 46. Detent Plug                           |
| 7. Front Valve Body Plate            | 27. 2-3 Auxiliary Valve                | 47. Compensator Valve Spring              |
| 8. T.V. Regulator Valve Spring       | 28. 2-3 Governor Sleeve                | 48. Outer Valve Body                      |
| 9. T.V. Regulator Valve              | 29. 2-3 Governor Plug                  | 49. Manual Valve                          |
| 10. 1-2 Regulator Plug               | 30. 2-1 Detent Plug Spring             | 50. Throttle Valve                        |
| 11. 3-4 Regulator Plug               | 31. 2-1 Detent Plug                    | 51. Throttle Valve Spring                 |
| 12. Shuttle Valve                    | 32. 3-4 Governor Plug                  | 52. "T" Valve                             |
| 13. Front Valve Body Separator Plate | 33. Valve Body Spacer Plate            | 53. Compensator Auxiliary Plug            |
| 14. 2-3 Shift Valve Spring Guide Pin | 34. Rear Valve Body Spacer Plate       | 54. Compensator Auxiliary Plug Pin        |
| 15. 2-3 Shift Valve Spring           | 35. Rear Valve Body                    | 55. Double Transition Valve               |
| 16. 1-2 Regulator Plug Spring        | 36. Manual Shaft Seal                  | 56. Detent Plunger Retainer Plate         |
| 17. 3-4 Shift Valve Spring           | 37. Manual Shaft Seal Outer Washer     | 57. Detent Plunger Retainer               |
| 18. 2-3 Shift Valve                  | 38. Manual Shaft Seal Inner Washer     | 58. Detent Plunger Retainer Spring        |
| 19. 1-2 Shift Valve                  | 39. Inner Control Lever Pin            | 59. Detent Plunger                        |
| 20. 3-4 Shift Valve                  | 40. Inner Control Lever Washer         |                                           |

Fig. 45—Disassembled View of Control Valve Assembly

and the detent plunger retainer (57) with the outer valve body and install three attaching screws.

NOTE: Check to be certain that the inner throttle lever (42) is positioned in the detent plunger retainer.

5. Install the manual valve (49), detent plunger

spring (58) and detent plunger (59).

NOTE: Align the manual valve with the inside detent control lever and rotate the control lever clockwise to index the plunger on the detent control lever assembly with the groove in the manual valve.

## Control Valve Inner Body

1. Install the 2-3 auxiliary valve (27) and the 2-3 governor sleeve (28) (Fig. 45).

**NOTE:** Carefully guide the auxiliary valve stem into the bore to prevent cocking on the governor sleeve counterbore.

2. Install the 3-4 governor plug (32). Fit a brass rod in the plug bore to assist in installation of the plug.

3. Install the 2-3 governor plug (29), 2-1 detent plug spring (30) and the 2-1 detent plug (31).

4. Position the rear valve body spacer plate (34), rear valve body (35) on the inner valve body and install with three attaching screws.

5. Install the 2-3 shift valve (18), 2-3 shift valve spring (15) and spring guide pin (14).

6. Install the 1-2 shift valve (19) and the 1-2 regulator plug spring (16).

7. Install the 3-4 shift valve (20), and the 3-4 shift valve spring (17).

8. Install the 3-2 detent plug (3), the 3-2 detent plug plate (2) and the two flat head attaching screws (1) in the front valve body (6).

**NOTE:** Check to ascertain that the detent plug plate correctly covers the bore in the front valve body.

9. Install the T.V. regulator valve spring (8), the T.V. regulator valve (9), the 1-2 regulator plug (10), the 3-4 regulator plug (11) and the shuttle valve (12) in the front valve body assembly (6).

10. Install the front valve body separator plate (13) attaching it to the front valve body with the three attaching screws.

11. Place the inner valve body assembly on a clean flat surface. Hold the front valve body (6) with one hand and bring the two assemblies together.

**CAUTION:** All springs must line up with the respective valves and bores and attaching screws should be tightened alternately to bring the two valve body assemblies together evenly.

12. Install the "T" oil ball check valve (5) and "T" oil ball check valve spring (4) in the front valve body bore.

13. Position the front valve body plate (7) on the front valve body and install the three attaching screws and lockwashers.

14. Install the 3-2 timing valve (22), 3-2 timing valve spring (23), 3-2 timing valve plug (24), and the plug retainer pin (25) into the 3-2 timing valve body (21).

15. Align and install the 3-2 timing valve body assembly (21) on the inner valve body assembly (26), attaching with two screws.

## Inner to Outer Control Valve Assembly

1. Hold the outer valve body in one hand with the flat inner surface upward and install the 3-2 timing valve restrictor (See Fig. 43).

2. Install the valve body spacer plate (33) on the outer valve body (48). Check carefully to be sure the 3-2 timing valve restrictor orifice is aligned with the hole in the spacer plate (Fig. 45).

3. Install the spacer plate (33) and the outer valve body assembly (48) on the inner valve body (26). Insert the control valve assembly to transmission case mounting bolts through the outer and inner valve bodies for alignment. Install and tighten the two outer to inner control valve body attaching screws.

4. Install the manual shaft inner steel washer (36) over the manual control shaft (with dish up).

5. Install the manual shaft seal outer steel washer (37) with the large inside diameter over the manual control shaft (42) (with dish down).

6. Install the rubber seal (38) over the shaft with the seal lip downward, extending into the inside diameter of the outer washer.