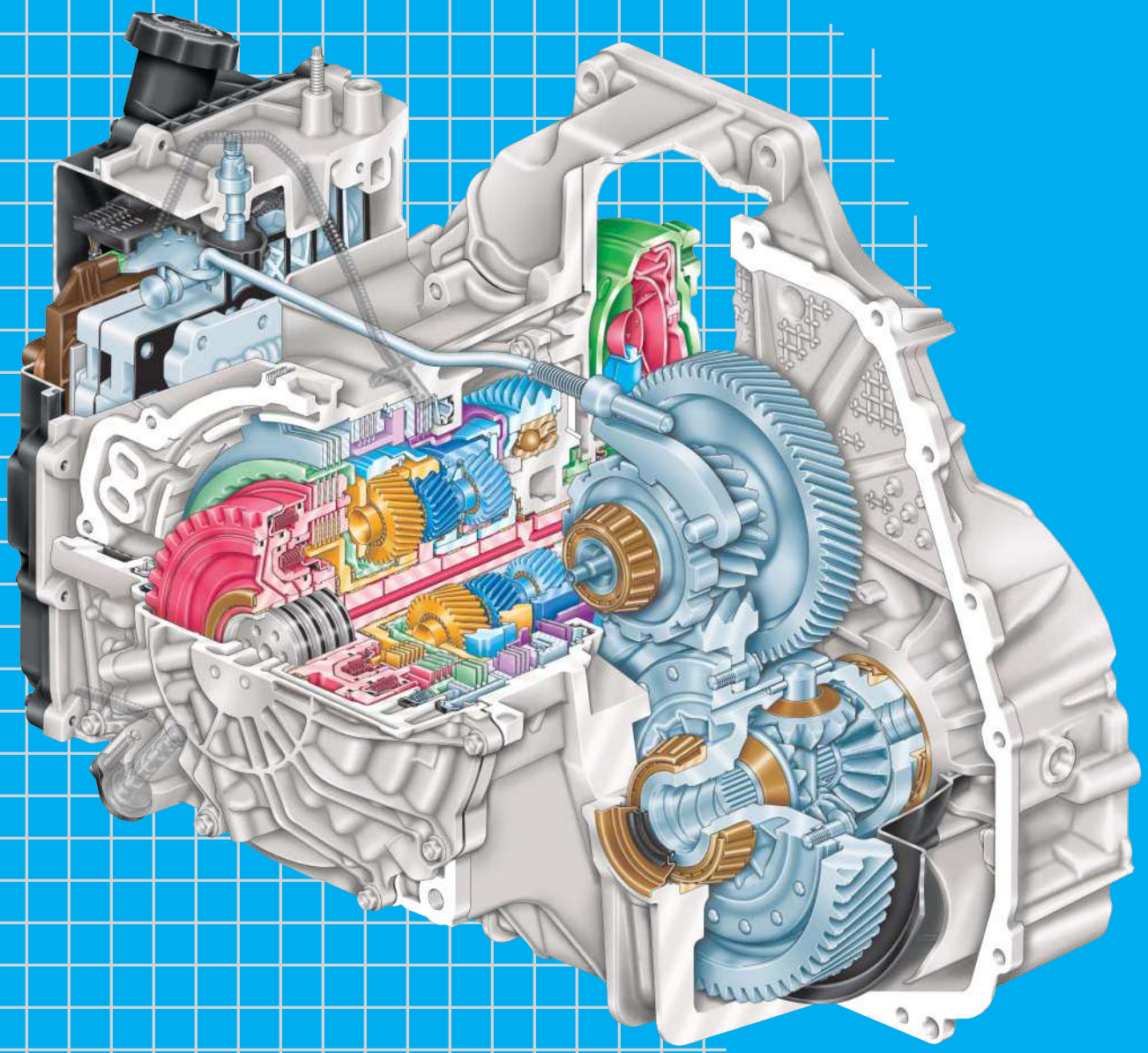
HYDRA-MATIC 6T70/75

TECHNICIAN'S GUIDE



HYDRA-MATIC 6T70/75 TECHNICIAN'S GUIDE

PREFACE

The Hydra-matic 6T70/75 Technician's Guide is intended for automotive technicians that are familiar with the operation of an automatic transmission. Technicians or other persons not having automatic transmission know-how may find this publication somewhat technically complex if additional instruction is not provided. Since the intent of this book is to explain the fundamental mechanical, hydraulic and electrical operating principles, technical terms used herein are specific to the transmission industry. However, words commonly associated with the specific transmission function have been defined in a Glossary rather than within the text of this book.

The Hydra-matic 6T70/75 Technician's Guide is also intended to assist technicians during the service, diagnosis and repair of this transmission. However, this book is not intended to be a substitute for other General Motors service publications that are normally used on the job. Since there is a wide range of repair procedures and technical specifications specific to certain vehicles and transmission models, the proper service publication must be referred to when servicing the Hydra-matic 6T70/75 transmission.

All information contained in this book is based on the latest data available at the time of publication approval. The right is reserved to make product or publication changes, at any time, without notice.

GM POWERTRAIN

6T70/75

HYDRA-MATIC

CONTENTS

INTRODUCTION

The Hydra-matic 6T70/75 Technician's Guide is another Powertrain publication from the Technician's Guide series of books. The purpose of this publication, as is the case with other Technician's Guides, is to provide complete information on the theoretical operating characteristics of this transmission. Operational theories of the mechanical, hydraulic and electrical components are presented in a sequential and functional order to better explain their operation as part of the system.

In the first section of this book, entitled "Principles of Operation", detailed explanations of the major components and their functions are presented. In every situation possible, text describes component operation during the apply and release cycle as well as situations where it has no effect at all. The descriptive text is then supported by numerous graphic illustrations to further emphasize the operational theories presented.

The second section, entitled "Power Flow", blends the information presented in the "Principles of Operation" section into the complete transmission assembly. In the first part of the Power Flow section, the mechanical transfer of torque from the engine through the transmission is graphically displayed on a full page while a narrative description is provided on the facing page. The mechanical power flow is followed by the hydraulic power flow which describes hydraulic fluid flow as it applies components or shifts valves in the system.

The third section, entitled "Complete Hydraulic Circuits", displays complete hydraulic schematics, including active fluid passages, for each operating range. Fold-out pages containing fluid flow schematics and two dimensional illustrations of major components graphically display hydraulic circuits. This information is extremely useful when tracing fluid circuits for learning or diagnosis purposes.

The "Appendix" section of this book provides additional transmission information regarding lubrication circuits, seal locations, illustrated parts lists and more. Although this information is available in current model year Service Manuals, its inclusion provides for a quick reference guide that is useful to the technician.

Production of the Hydra-matic 6T70/75 Technician's Guide was made possible through the combined efforts of many staff areas within the General Motors Powertrain Division. As a result, the Hydra-matic 6T70/75 Technician's Guide was written to provide the user with the most current, concise and usable information available regarding this product.

HOW TO USE THIS BOOK

First time users of this book may find the page layout a little unusual or perhaps confusing. However, with a minimal amount of exposure to this format its usefulness becomes more obvious. If you are unfamiliar with this publication, the following guidelines are helpful in understanding the functional intent for the various page layouts:

- Read the following section, "Understanding the Graphics" to know how the graphic illustrations are used, particularly as they relate to the mechanical power flow and hydraulic controls (see Understanding the Graphics page 6).

- Unfold the cutaway illustration of the Hydra-matic 6T70/75 (page 8) and refer to it as you progress through each major section. This cutaway provides a quick reference of component location inside the transmission assembly and their relationship to other components.

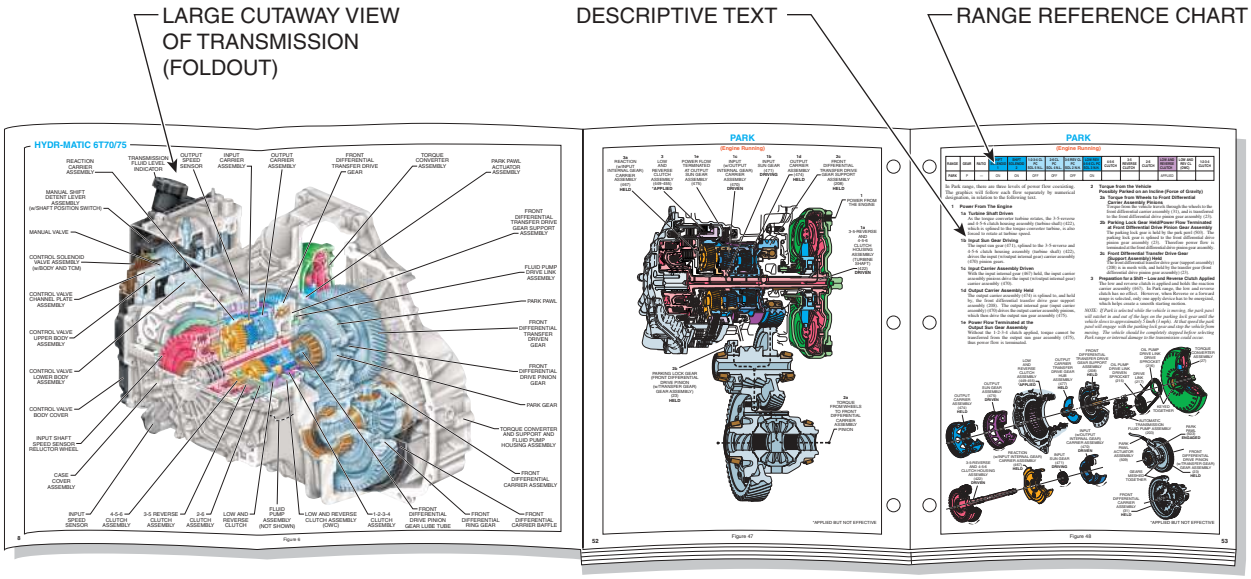
- The Principles of Operation section (beginning on page 9A) presents information regarding the major apply components and hydraulic control components used in this transmission. This section describes "how" specific components work and interfaces with the sections that follow.

- The Power Flow section (beginning on page 47) presents the mechanical and hydraulic functions corresponding to specific gear ranges. This section builds on the information presented in the Principles of Operation section by showing specific fluid circuits that enable the mechanical components to operate. The mechanical power flow is graphically displayed on a full page and is followed by a facing page of descriptive text and disassembled view illustrations. Following the mechanical power flow section is the hydraulic power flow section with schematics that show the position of valves, ball check valves, etc., as they function in a specific gear range. Also, located at the bottom of each page of hydraulic power flow text is a reference to the Complete Hydraulic Circuit section that follows.

- The Complete Hydraulic Circuits section (beginning on page 101) details the entire hydraulic system. This is accomplished by using a foldout circuit schematic with a facing page two dimensional foldout drawing of each component. The circuit schematics and component drawings display only the fluid passages for that specific operating range.

- Finally, the Appendix section contains a schematic of the lubrication flow through the transmission, disassembled view parts lists and transmission specifications. This information has been included to provide the user with convenient reference information published in the appropriate vehicle Service Manuals. Since component parts lists and specifications may change over time, this information should be verified with Service Manual information.

HOW TO USE THIS BOOK



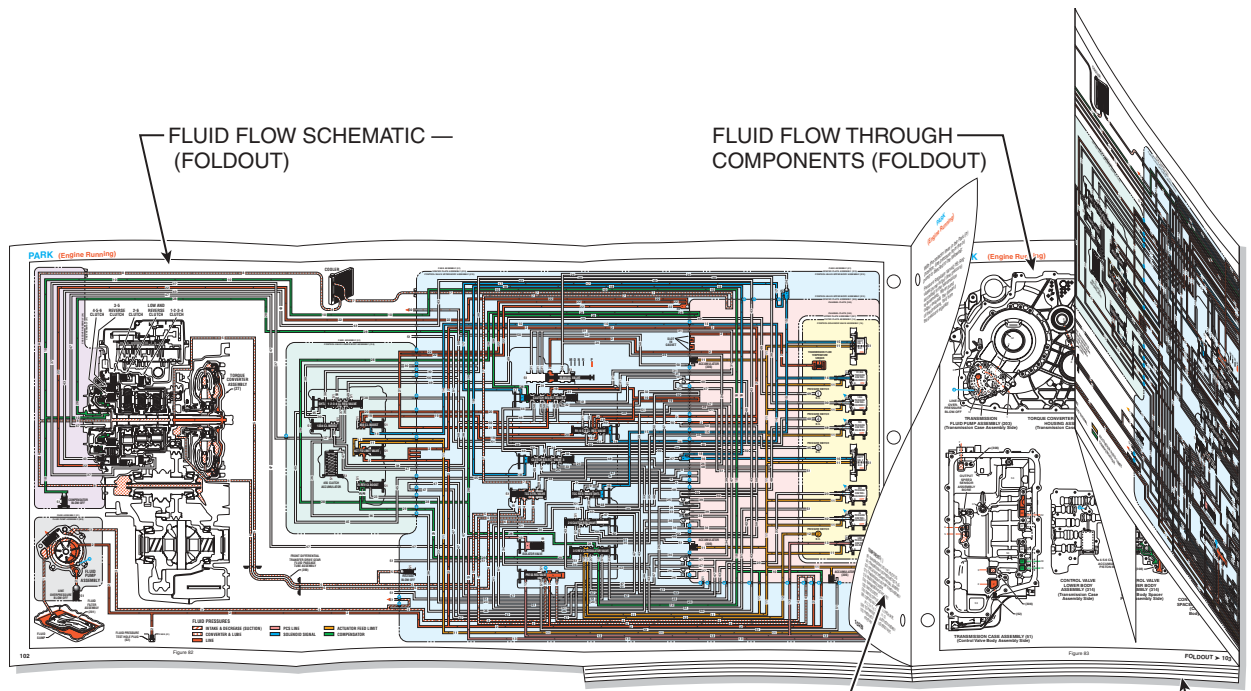


Figure 1

UNDERSTANDING THE GRAPHICS

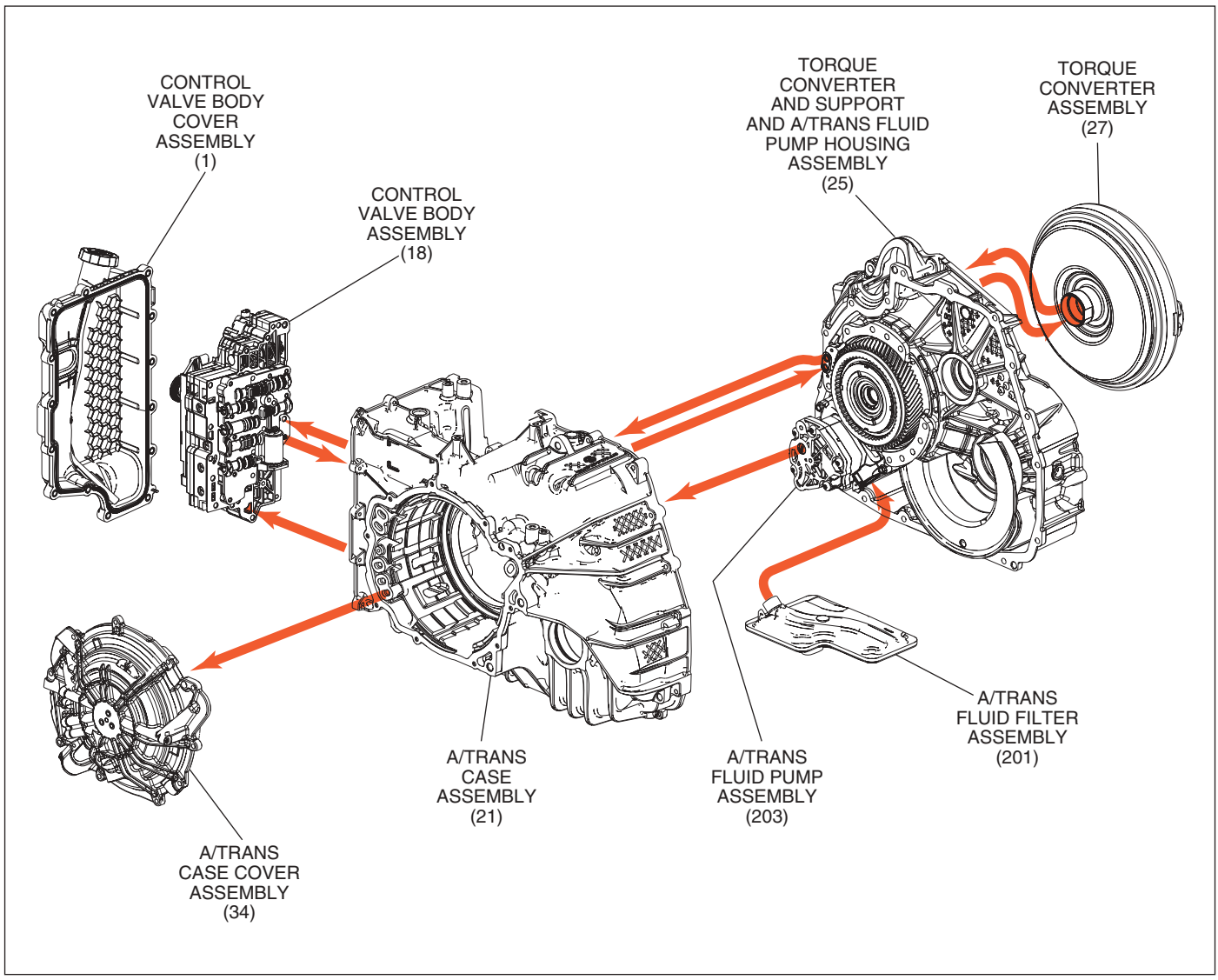


Figure 2

The flow of transmission fluid starts when the pump rotor turns and draws fluid from the bottom of the case and into the automatic transmission fluid filter assembly. When the fluid reaches the pump it is routed into the line pressure circuit. This general route for fluid flow is easily understood by reviewing the illustrations provided in Figure 2. However, fluid may pass between the control valve body, spacer plate, case and other components many times before reaching a valve or applying a clutch. For this reason, the graphics are designed to show the exact location where fluid passes through a component and into other passages for specific gear range operation.

To provide a better understanding of fluid flow in the Hydra-matic 6T70/75 transmission, the components involved with hydraulic control and fluid flow are illustrated in three major formats. Figure 3 provides an example of these formats which are:

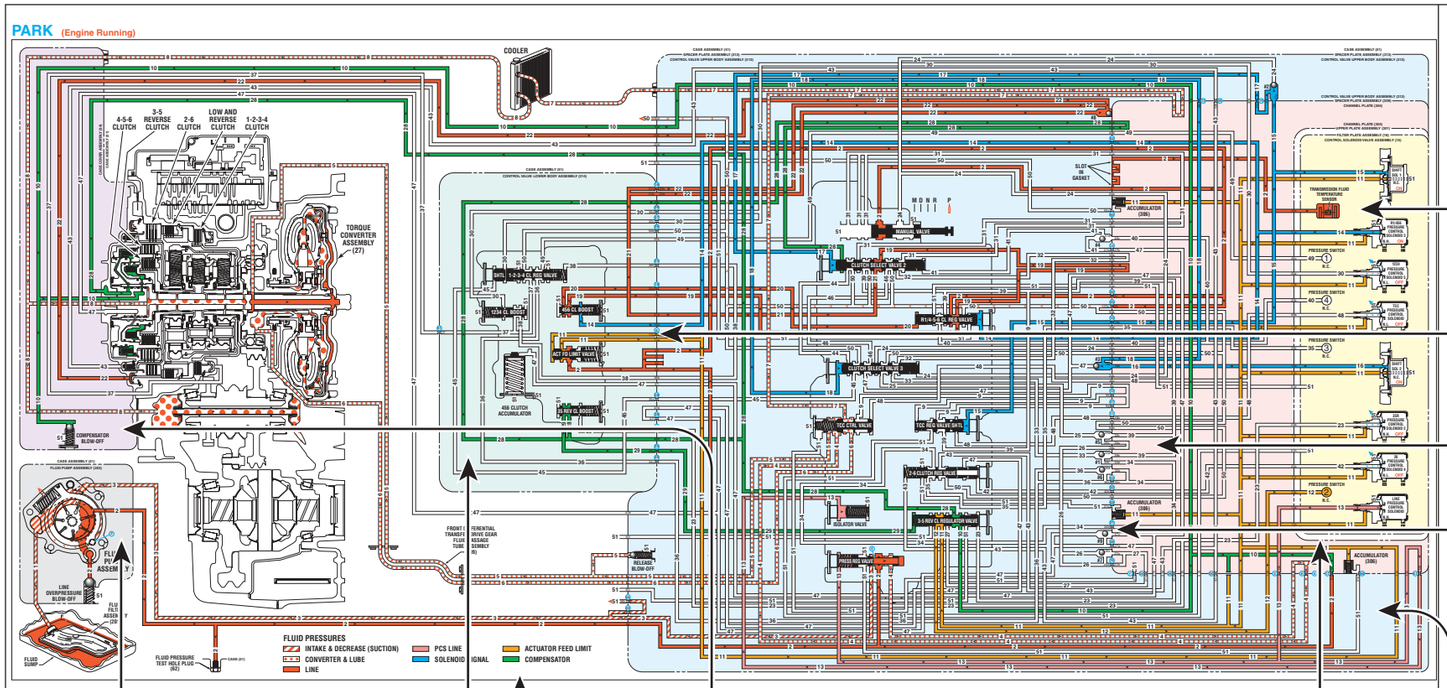
- A three dimensional line drawing of the component for easier part identification.
- A two dimensional line drawing of the component to indicate fluid passages and orifices.
- A graphic schematic representation that displays valves, ball check valves, orifices and so forth, required for the proper function of the transmission in a specific gear range. In the schematic drawings, fluid circuits are represented by straight lines and orifices are represented by indentations in a circuit. All circuits are labeled and color coded to provide reference points between the schematic drawing and the two dimensional line drawing of the components.

  Note: Once the vehicle is started, fluid is always present in all hydraulic circuits. The illustrations in this book depict fluid pressure, therefore circuits appear empty when the circuit is not pressurized or possibly under low pressure.

Figure 4 (page 7B) provides an illustration of typical valves, and their associated components. A brief description of valve operation is also provided to support the illustration.

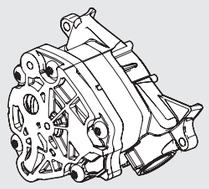
Figure 5 (page 7B) provides a color coded chart that references different fluid pressures used to operate the hydraulic control systems. A brief description of how fluid pressures affect valve operation is also provided.

UNDERSTANDING THE GRAPHICS



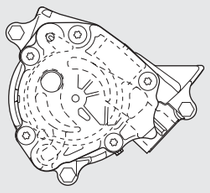
GRAPHIC SCHEMATIC REPRESENTATION

AUTOMATIC TRANSMISSION FLUID PUMP ASSEMBLY (203)



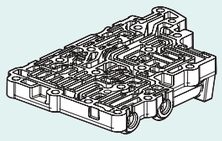
THREE DIMENSIONAL

TRANSMISSION CASE SIDE



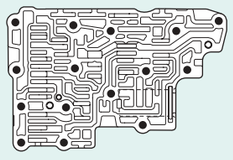
TWO DIMENSIONAL

CONTROL VALVE LOWER BODY ASSEMBLY (314)



THREE DIMENSIONAL

CONTROL VALVE LOWER BODY SPACER PLATE SIDE



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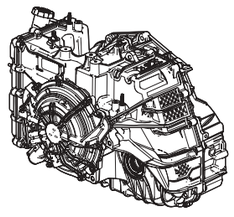
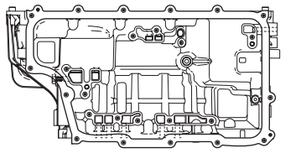
TRANSMISSION CASE ASSEMBLY (51)



THREE DIMENSIONAL

CONTROL VALVE BODY ASSEMBLY SIDE



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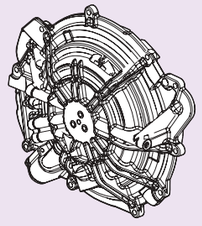
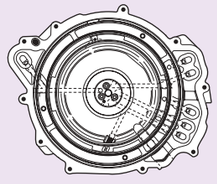
TRANSMISSION CASE COVER ASSEMBLY (34)



THREE DIMENSIONAL

TRANSMISSION CASE ASSEMBLY SIDE



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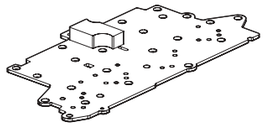
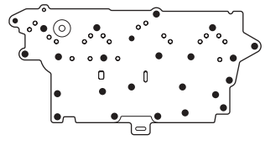
CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301)



THREE DIMENSIONAL

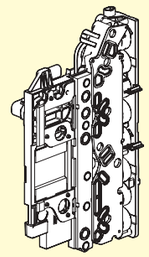
CONTROL VALVE CHANNEL PLATE SIDE



TWO DIMENSIONAL

CONTROL VALVE CHANNEL UPPER PLATE SIDE

CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15)



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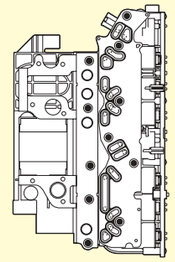
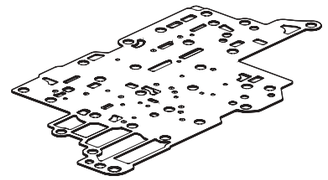


TWO DIMENSIONAL

CONTROL VALVE UPPER BODY SIDE

CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313)



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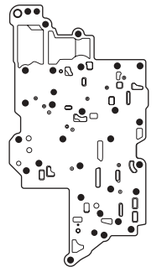
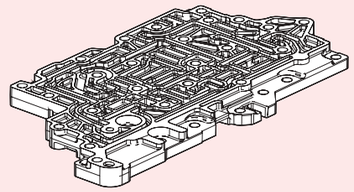


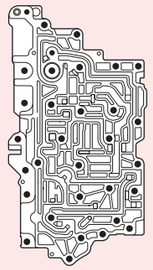
TWO DIMENSIONAL

CONTROL VALVE CHANNEL UPPER PLATE SIDE

CONTROL VALVE CHANNEL PLATE (304)



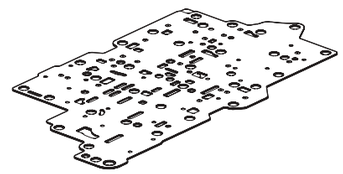
THREE DIMENSIONAL



TWO DIMENSIONAL

CONTROL VALVE UPPER BODY SIDE

CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309)



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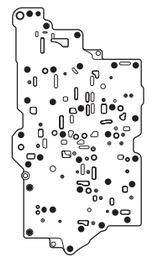

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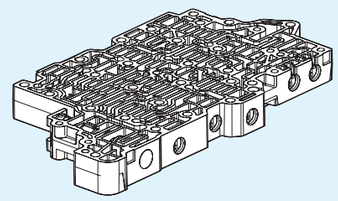
UPPER BODY SPACER PLATE SIDE

CONTROL VALVE UPPER BODY ASSEMBLY (312)



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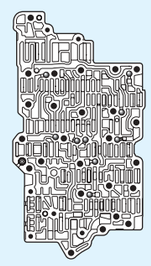

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UNDERSTANDING THE GRAPHICS

TYPICAL VALVES

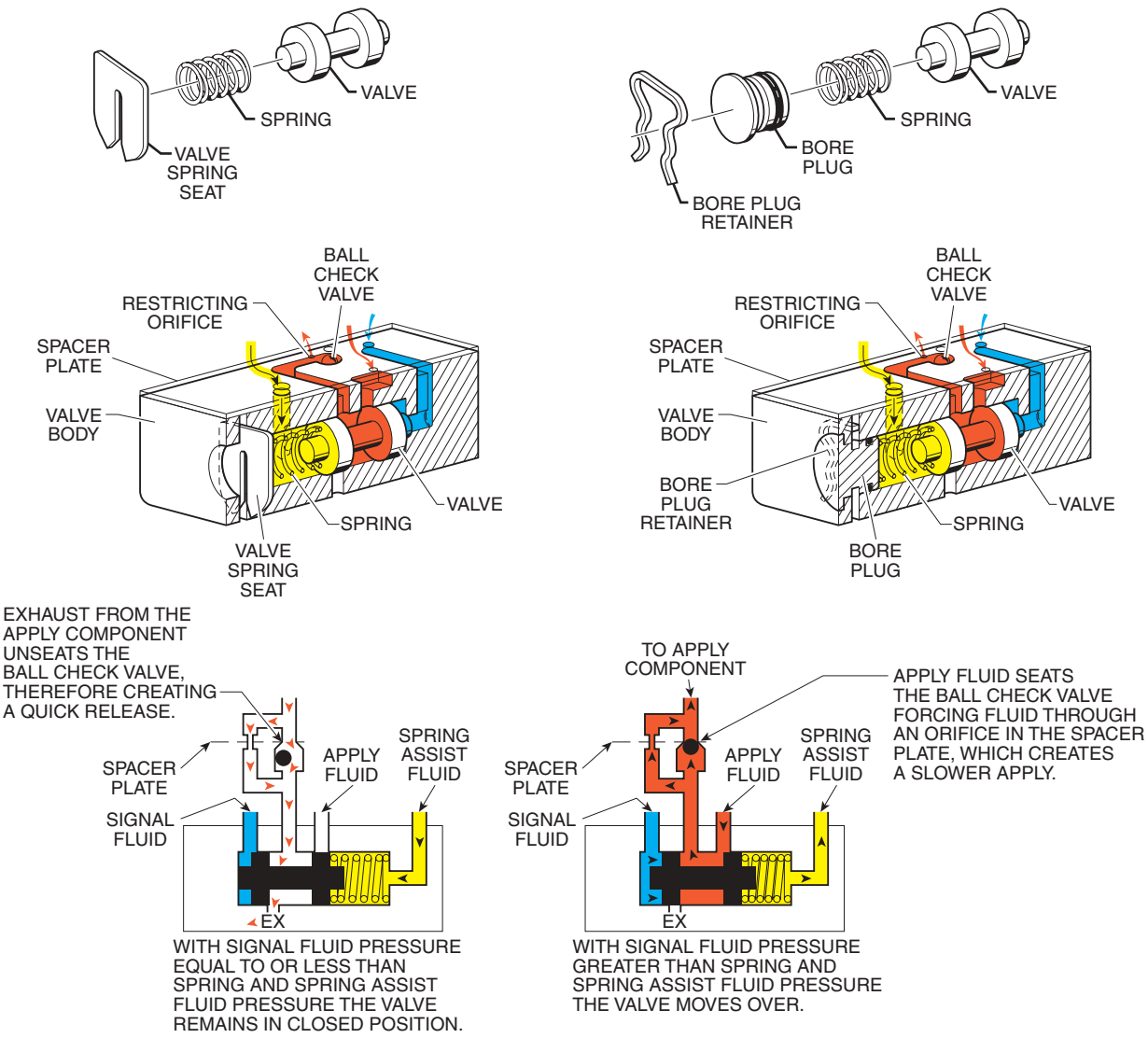
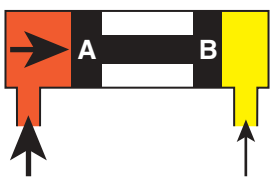


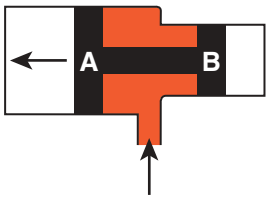
Figure 4

FLUID PRESSURES

- **INTAKE & DECREASE (SUCTION)**
- **CONVERTER & LUBE**
- **LINE**
- **PCS LINE**
- **SOLENOID SIGNAL**
- **ACTUATOR FEED LIMIT**
- **COMPENSATOR**
- **EXHAUST**
- **DIRECTION OF FLOW**



WITH EQUAL SURFACE AREAS ON EACH END OF THE VALVE, BUT FLUID PRESSURE "A" BEING GREATER THAN FLUID PRESSURE "B", THE VALVE WILL MOVE TO THE RIGHT.



WITH THE SAME FLUID PRESSURE ACTING ON BOTH SURFACE "A" AND SURFACE "B" THE VALVE WILL MOVE TO THE LEFT. THIS IS DUE TO THE LARGER SURFACE AREA OF "A" THAN "B".

Figure 5

HYDRA-MATIC 6T70/75

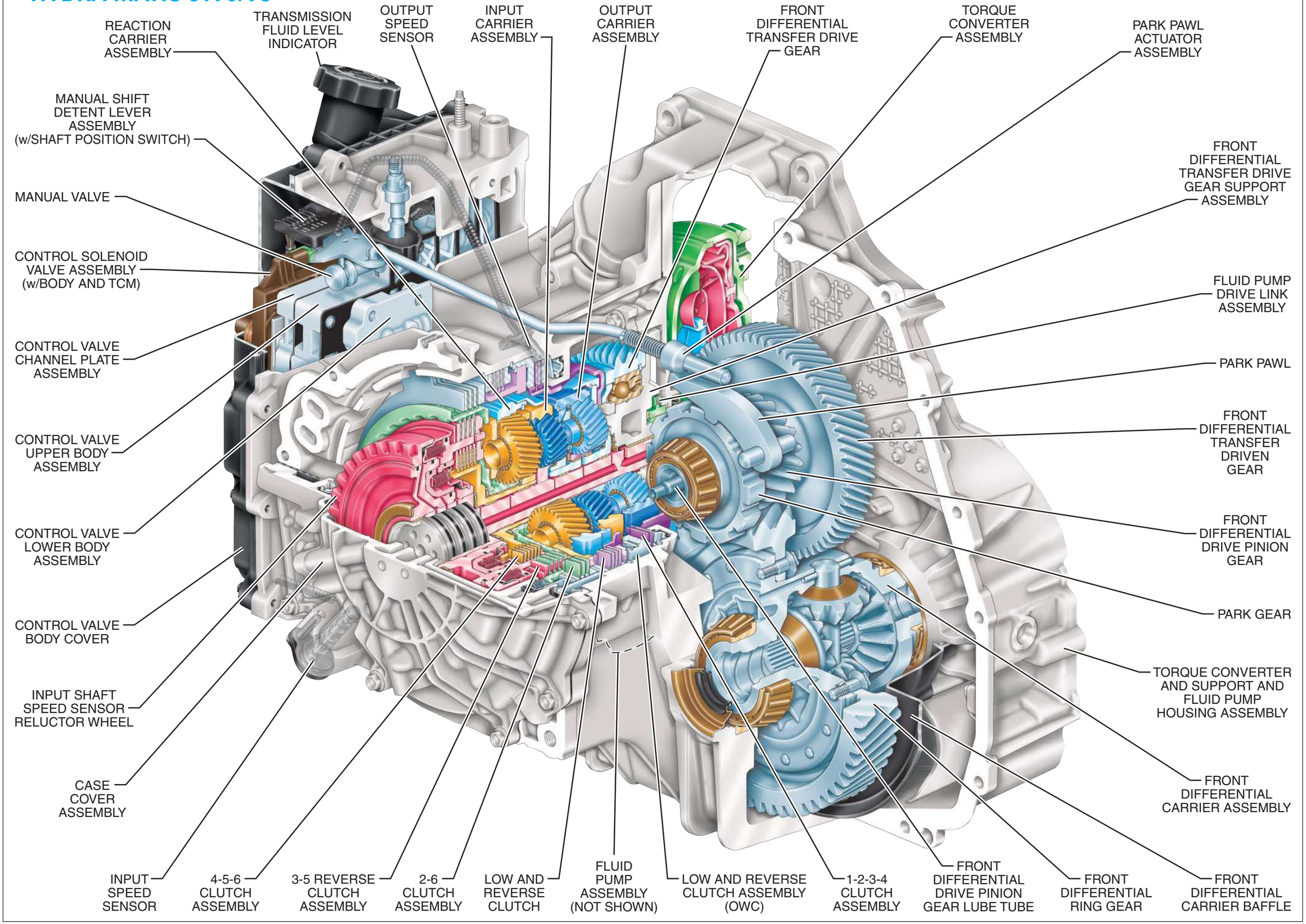
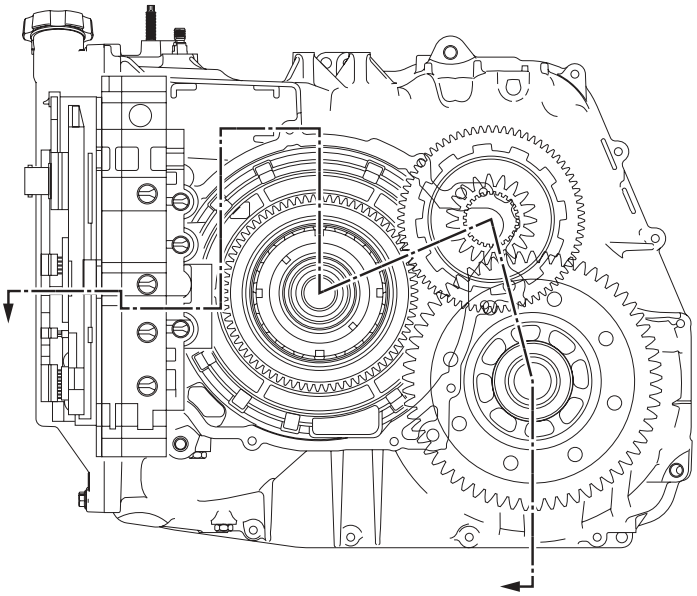


Figure 6

Note: Due to the arrangement of the axes of this transmission, the cross sectional drawing to the right may appear to be confusing if you are not familiar with this unit. This cross section was created, using the cut-line illustrated in the view below, and arranged so that the axes interact correctly together.



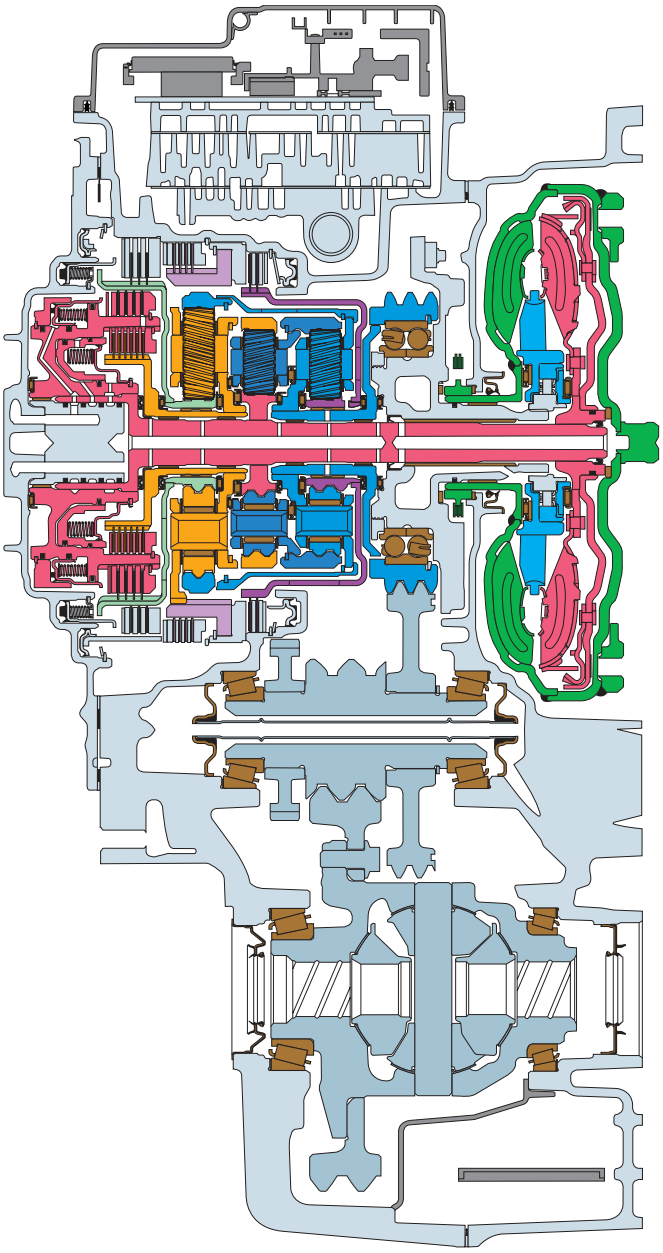


Figure 7

HYDRA-MATIC 6T70/75
CROSS SECTIONAL DRAWING

A cross sectional line drawing is typically the standard method for illustrating either an individual mechanical component or a complete transmission assembly. However, unless a person is familiar with all the individual components of the transmission, distinguishing components may be difficult in this type of drawing. For this reason, a three dimensional perspective illustration (shown on page 8) is the primary drawing used throughout this book.

The purpose for this type of illustration is to provide a more detailed graphic representation of each component and to show their relationship to other components within the transmission assembly. It is also useful for understanding the cross sectional line drawing by comparing the same components from the three dimensional perspective illustration. In this regard it becomes an excellent teaching instrument.

Additionally, all the illustrations contained in this book use a color scheme that is consistent throughout this book. In other words, regardless of the type of illustration or drawing, all components have an assigned color and that color is used whenever that component is illustrated. This consistency not only helps to provide for easy component identification but it also enhances the graphic and color continuity between sections.

GENERAL DESCRIPTION

The Hydra-matic 6T70/75 is a fully automatic, six speed, front-wheel drive, two-wheel drive and all-wheel drive capable, electronically-controlled transmission that features clutch to clutch shifting. It consists primarily of a four-element torque converter, three planetary gear sets, friction and mechanical clutches and a hydraulic pressurization and control system.

The four-element torque converter contains a pump, a turbine, a pressure plate splined to the turbine, and a stator assembly. The torque converter acts as a fluid coupling to smoothly transmit power from the engine to the transmission. It also hydraulically provides additional torque multiplication when required. The pressure plate, when applied, provides a mechanical "direct drive" coupling of the engine to the transmission.

The planetary gear sets provide the six forward gear ratios and reverse. Changing gear ratios is fully automatic and is accomplished through the use of a Transmission Control Module (TCM) located within the transmission. The TCM receives and monitors various electronic sensor inputs and uses this information to shift the transmission at the optimum time.

The TCM commands shift solenoids and variable bleed pressure control solenoids within the transmission to control shift timing. The TCM controls shift feel through the pressure control solenoid. The TCM also controls the apply and release of the torque converter clutch which allows the engine to deliver the maximum fuel efficiency without sacrificing vehicle performance.

The hydraulic system primarily consists of a vane type pump, two control valve bodies, converter housing and case. The pump maintains the working pressures needed to stroke the clutch pistons that apply or release the friction components. These friction components (when applied or released) support the automatic shifting qualities of the transmission.

The friction components used in this transmission consist of five multiple disc clutches. The multiple disc clutches combine with one mechanical one way clutch, to deliver seven different gear ratios through the gear sets. The gear sets then transfer torque through the output shaft.

EXPLANATION OF GEAR RANGES

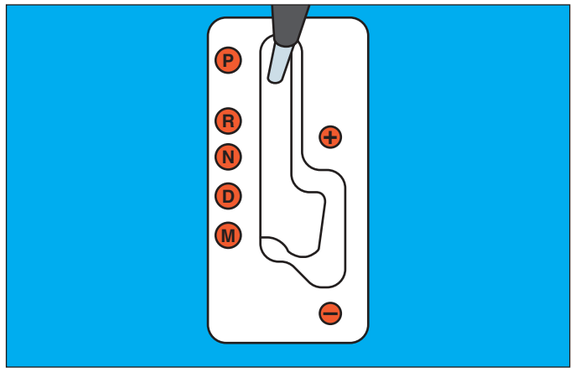


Figure 8

The transmission shift quadrants vary by model. There may be four to seven different positions shown on the shift quadrant (Figure 8 and 9). The following are a couple of examples:

P – Park position enables the engine to be started while preventing the vehicle from rolling either forward or backward. For safety reasons, the vehicle's parking brake should be used in addition to the transmission "Park" position. Since the output shaft is mechanically locked to the case through the parking pawl and rear internal gear, Park position should not be selected until the vehicle has come to a complete stop.

R – Reverse enables the vehicle to be operated in a rearward direction.

N – Neutral position enables the engine to start and operate without driving the vehicle. If necessary, this position should be selected to restart the engine while the vehicle is moving.

D – Drive range should be used for all normal driving conditions for maximum efficiency and fuel economy. Drive range allows the transmission to operate in each of the six forward gear ratios. Downshifts to a lower gear, or higher gear ratio are available for safe passing by depressing the accelerator or by manually selecting a lower gear with the shift selector. In the Drive position, the transmission will automatically upshift from first to sixth, and downshift from sixth to first, according to the normal shift pattern programmed in the TCM.

MANUAL GEAR RANGES

Some vehicles are equipped with a Driver Shift Control (DSC) version of the selector system (Figure 8). This configuration allows the driver to manually shift between forward gears.

M – In the M (Manual) position, the driver may manually select the range of gears by moving the selector lever towards "+" or "-" to cause an upshift or downshift. The transmission will shift up or down depending on the request that is made by moving the selector. Refer to the appropriate owner's manual for specific instructions.

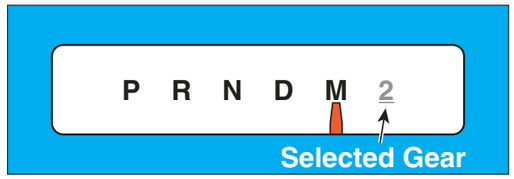


Figure 9

MANUAL SHIFT GEAR RANGES

Some vehicles are equipped with a shift quadrant that allows manual range selection. For example, manual (figure 9) can be used for conditions where it may be desirable to control the selection of gear ratios. These conditions include towing a trailer and driving on hilly terrain. These ranges are also helpful for engine braking when descending slight grades.

M – When in manual mode, the transmission's current gear range will be the highest attainable range with all the lower gears available. Plus/minus buttons may be used to select the desired range of gears for the current driving conditions.

2 – Manual 2nd adds more performance for congested traffic and hilly terrain. It has the same starting ratio (1st gear) as Drive range, but prevents the transmission from shifting above 2nd gear. Thus, Manual 2nd can be used to retain 2nd gear for acceleration and engine braking as desired. Manual 2nd can be selected at any vehicle speed, but will downshift into 2nd gear only if vehicle speed is low enough not to over-rev the engine (calibrated in TCM).

1 – Manual 1st has the same starting ratio (first gear) as Drive range, but prevents the transmission from shifting above 1st gear. Thus, Manual 1st can be used to retain 1st gear for heavy towing (creeper gear) and engine braking as desired. Manual 1st can be selected at any vehicle speed, but will downshift into 1st gear only if vehicle speed is low enough not to over-rev the engine (calibrated in TCM).

PRINCIPLES OF OPERATION

An automatic transmission is the mechanical component of a vehicle that transfers power (torque) from the engine to the wheels. It accomplishes this task by providing a number of forward gear ratios that automatically change as the speed of the vehicle increases. The reason for changing forward gear ratios is to provide the performance and economy expected from vehicles manufactured today. On the performance end, a gear ratio that develops a lot of torque (through torque multiplication) is required in order to initially start a vehicle moving. Once the vehicle is in motion, less torque is required in order to maintain the vehicle at a certain speed. When the vehicle has reached a desired speed, economy becomes the important factor and the transmission will shift into overdrive. At this point output speed is greater than input speed, and, input torque is greater than output torque.

Another important function of the automatic transmission is to allow the engine to be started and run without transferring torque to the wheels. This situation occurs whenever Park (**P**) or Neutral (**N**) range has been selected. Also, operating the vehicle in a rearward direction is possible whenever Reverse (**R**) range has been selected (accomplished by the gear sets).

The variety of gear ranges in an automatic transmission are made possible through the interaction of numerous mechanically, hydraulically and electronically-controlled components inside the transmission. At the appropriate time and sequence, these components are either applied or released and operate the gear set at a gear ratio consistent with the driver's needs. The following pages describe the theoretical operation of the mechanical, hydraulic and electrical components found in the Hydra-matic 6T70/75 transmission. When an understanding of these operating principles has been attained, diagnosis of these transmission systems is made easier.

MAJOR MECHANICAL COMPONENTS

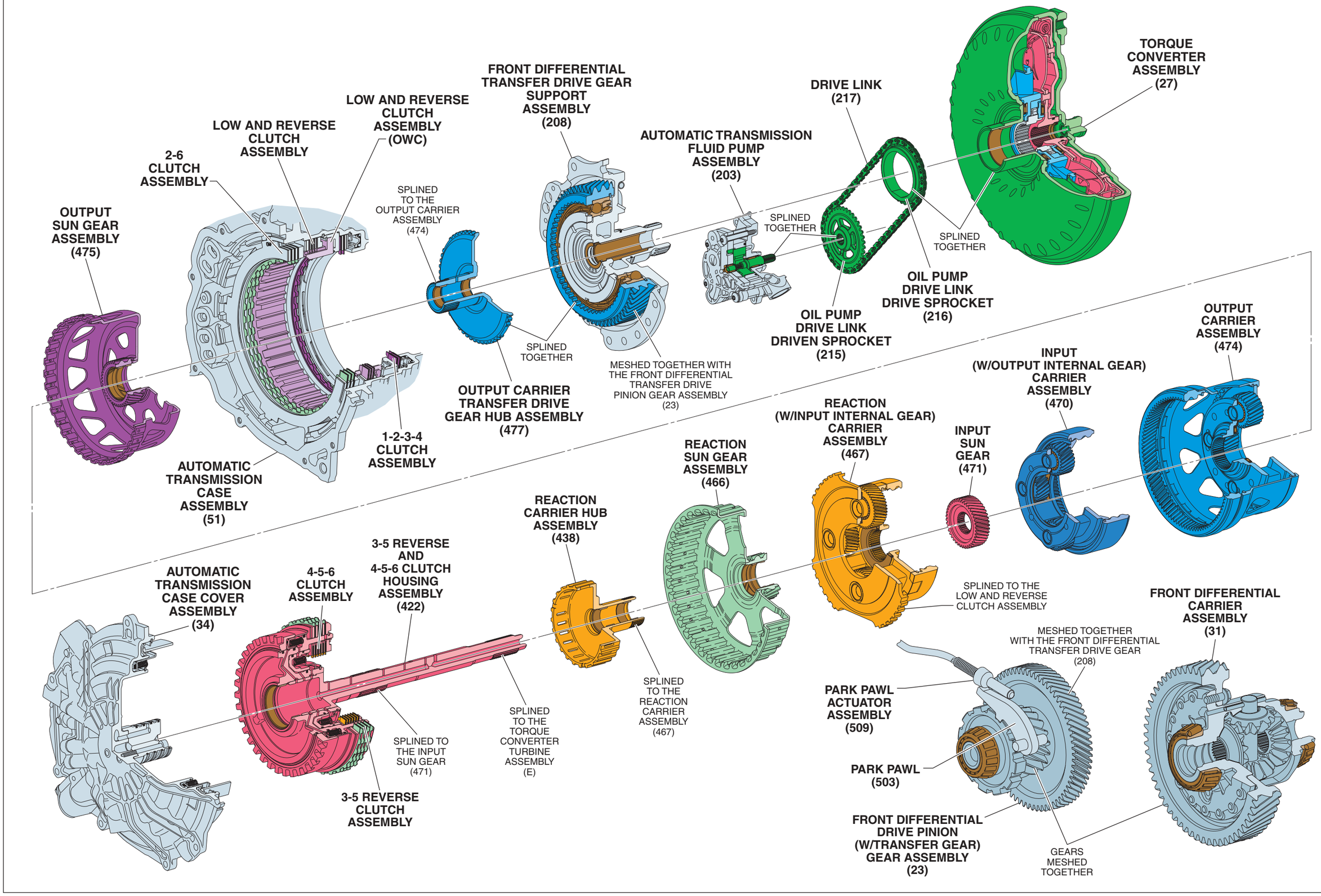


Figure 10

COLOR LEGEND

MAJOR MECHANICAL COMPONENTS

The foldout graphic on page 10 contains a disassembled drawing of the major components used in the Hydra-matic 6T70/75 transmission. This drawing, along with the cross sectional illustrations on page 8 and 8A, show the major mechanical components and their relationship to each other as a complete assembly. Therefore, color has been used throughout this book to help identify parts that are splined together, rotating at engine speed, held stationary, and so forth. Color differentiation is particularly helpful when using the Power Flow section for understanding the transmission operation.

The color legend below provides the "general" guidelines that were followed in assigning specific colors to the major components. However, due to the complexity of this transmission, some colors (such as grey) were used for artistic purposes rather than based on the specific function or location of that component.

- Components held stationary in the case or splined to the case. Examples: the Torque Converter and Differential Housing Assembly (221), the Fluid Pump Assembly (203), the Case Cover Assembly (34), and some parts of the Low and Reverse Clutch Assembly. Also includes the Stator One-Way Clutch Assembly.
- Components that rotate at engine speed. Examples: the Torque Converter Assembly (1), the Fluid Pump Rotor, and the Fluid Pump Vanes.
- Components that rotate at turbine speed. Examples: the Converter Turbine, the 3-5-Reverse and 4-5-6 Clutch Housing Assembly (422).
- Components such as the Stator in the Torque Converter Clutch Assembly (1).
- Components such as the Output Sun Gear Assembly (475).
- Components such as some parts of the Low and Reverse Clutch Assembly.
- Components such as the Output Carrier Assembly (474).
- Components such as the Reaction Sun Gear Assembly (466).
- Components such as the Reaction Carrier Hub Assembly (438), and the Reaction Carrier Assembly (467).
- Components such as the Input Carrier Assembly (470).
- Components that rotate at transmission output speed such as the Front Differential Carrier Assembly (31).
- All bearings and bushings.
- All seals

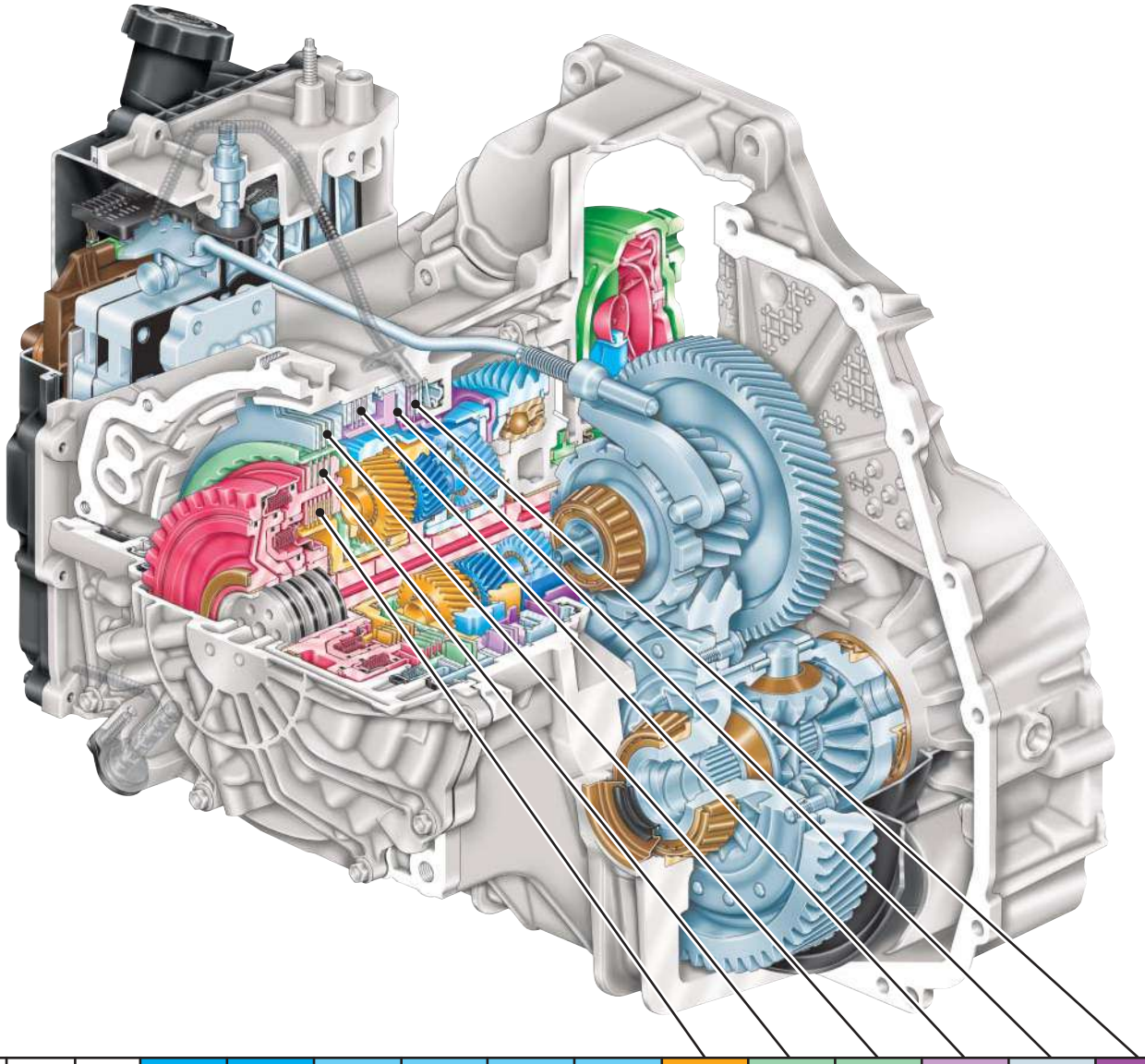
COLOR LEGEND

APPLY COMPONENTS

The Range Reference Chart on page 11, provides another valuable source of information for explaining the overall function of the Hydra-matic 6T70/75 transmission. This chart highlights the major apply components and solenoids that function in a selected gear range, and the specific component operation within that gear range.

Included as part of this chart is the same color reference to each major component that was previously discussed. If a component is active in a specific gear range, a word describing its activity will be listed in the column below that component. The row where the activity occurs corresponds to the appropriate transmission range and gear operation. An abbreviated version of this chart can also be found at the top of the descriptive text pages located in the Power Flow section. This provides for a quick reference when reviewing the mechanical and hydraulic power flow information contained in that section.

RANGE REFERENCE CHART



RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
PARK	P	—	ON	ON	OFF	OFF	OFF	ON				APPLIED*		
REV	R	2.880	ON	OFF	OFF	OFF	ON	ON		APPLIED		APPLIED		
NEU	N	—	ON	ON	OFF	OFF	OFF	ON				APPLIED*		
D	1st Braking	4.484	ON	ON	ON	OFF	OFF	ON				APPLIED	HOLDING†	APPLIED
	1st	4.484	OFF	ON	ON	OFF	OFF	OFF					HOLDING	APPLIED
	2nd	2.872	OFF	ON	ON	ON	OFF	OFF			APPLIED			APPLIED
	3rd	1.842	OFF	ON	ON	OFF	ON	OFF		APPLIED				APPLIED
	4th	1.414	OFF	ON	ON	OFF	OFF	ON	APPLIED					APPLIED
	5th	1.000	OFF	ON	OFF	OFF	ON	ON	APPLIED	APPLIED				
	6th	0.742	OFF	ON	OFF	ON	OFF	ON	APPLIED		APPLIED			

NOTE: EFFECTIVE FINAL DRIVE RATIO – 6T70/75 – 2.77/3.16

NOTE: FOR SHIFT SOLENOIDS 1 AND 2, "ON" = SOLENOID ENERGIZED (PRESSURIZED), "OFF" = SOLENOID DE-ENERGIZED (NO PRESSURE).

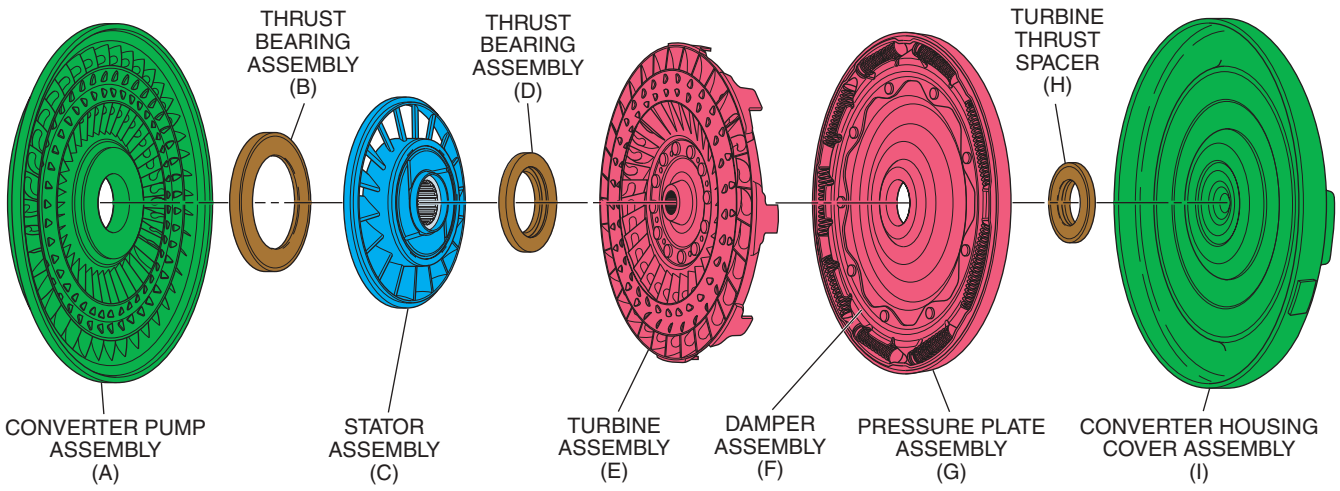
NOTE: FOR PRESSURE CONTROL (PC) SOLENOIDS, "ON" = PRESSURIZED, "OFF" = NO PRESSURE.

* APPLIED WITH NO LOAD.

† HOLDING BUT INEFFECTIVE.

Figure 11

TORQUE CONVERTER



TORQUE CONVERTER

The torque converter (27) is the primary component for transmittal of power between the engine and the transmission. It is bolted to the engine flywheel (also known as the flexplate) so that it will rotate at engine speed. Some of the major functions of the torque converter are:

- to provide for a smooth conversion of torque from the engine to the mechanical components of the transmission.
- to multiply torque from the engine that enables the vehicle to achieve additional performance when required.
- to mechanically operate the transmission fluid pump through the converter hub.
- to provide a mechanical link, or direct drive, from the engine to the transmission through the use of a torque converter clutch (TCC).

The torque converter assembly is made up of the following five main sub-assemblies:

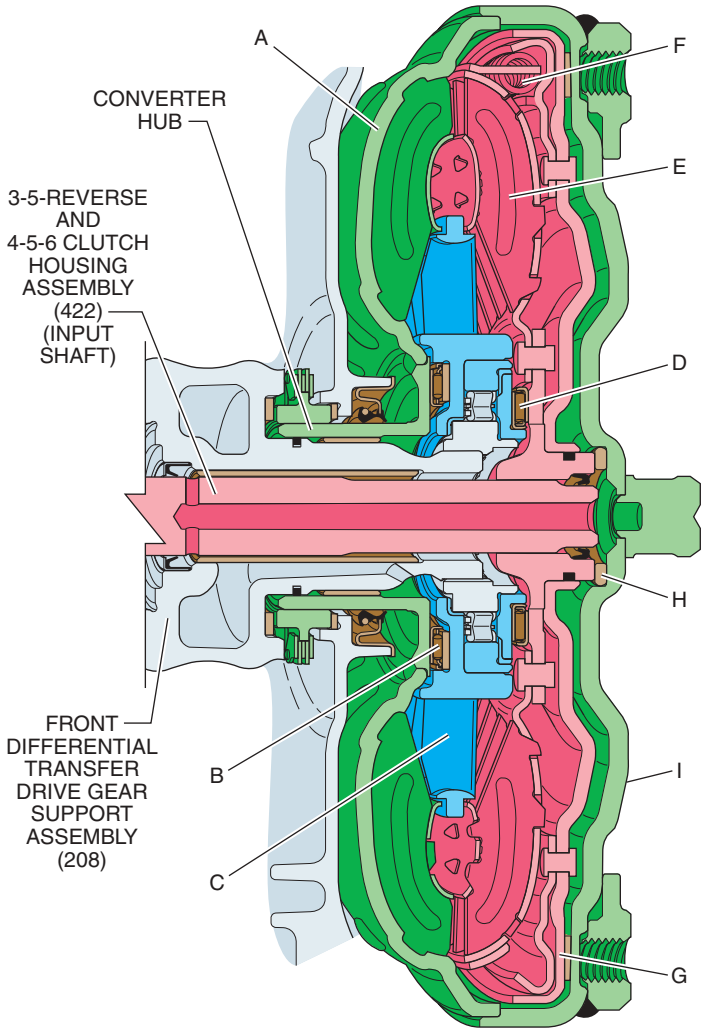
- a converter housing cover assembly (I) which is welded to the converter pump assembly (A).
- a converter pump assembly (A) which is the driving member.
- a turbine assembly (E) which is the driven or output member.
- a stator assembly (C) which is the reaction member located between the converter pump and turbine assemblies.
- a pressure plate assembly (G) splined to the turbine assembly to enable direct mechanical drive when appropriate.

CONVERTER PUMP ASSEMBLY ANDTURBINE ASSEMBLY

When the engine is running the converter pump assembly acts as a centrifugal pump by picking up fluid at its center and discharging it at its rim between the blades (see Figure 13). The force of this fluid then hits the turbine blades and causes the turbine to rotate. As the engine and converter pump increase in RPM, so does the turbine.

PRESSURE PLATE, DAMPER AND CONVERTER HOUSING ASSEMBLIES

The pressure plate is splined to the turbine hub and applies (engages) with the converter cover to provide a mechanical coupling of the engine to the transmission. When the pressure plate assembly is applied, the amount of slippage that occurs through a fluid coupling is reduced (but not necessarily eliminated), thereby providing a more efficient transfer of engine torque to the drive wheels.



Torque converter failure could cause loss of drive and or loss of power.

To reduce torsional shock during the apply of the pressure plate to the converter cover, a spring loaded damper assembly (F) is used. The pressure plate is attached to the pivoting mechanism of the damper assembly which allows the pressure plate to rotate independently of the damper assembly up to approximately 45 degrees. During engagement, the springs in the damper assembly cushion the pressure plate engagement and also reduce irregular torque pulses from the engine or road surface.

Figure 12

TORQUE CONVERTER

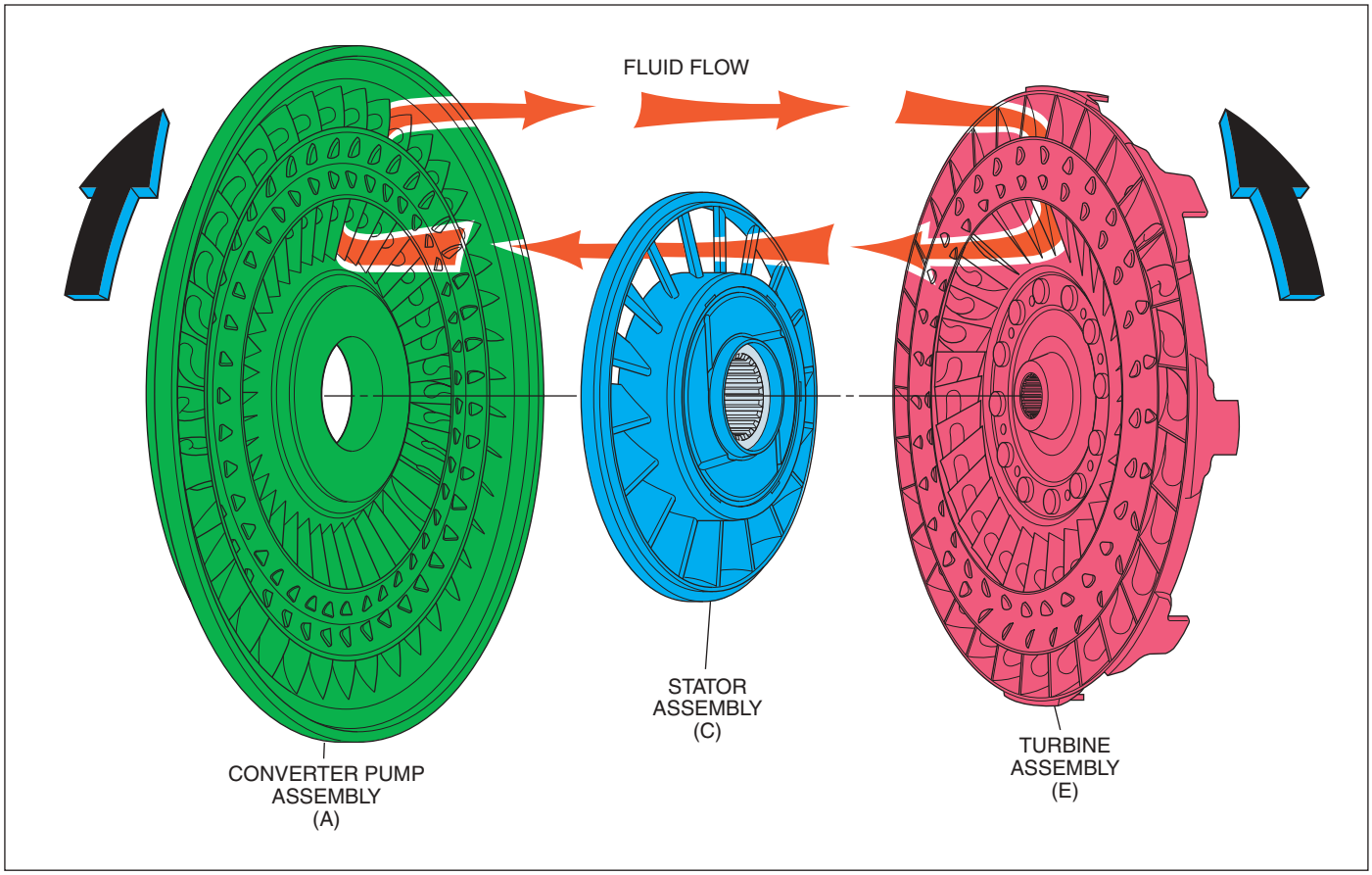


Figure 13

Stator roller clutch failure

- Roller clutch freewheeling in both directions can cause poor acceleration at low speed.
- Roller clutch locking up in both directions can cause poor acceleration at high speed.
- Overheated fluid.

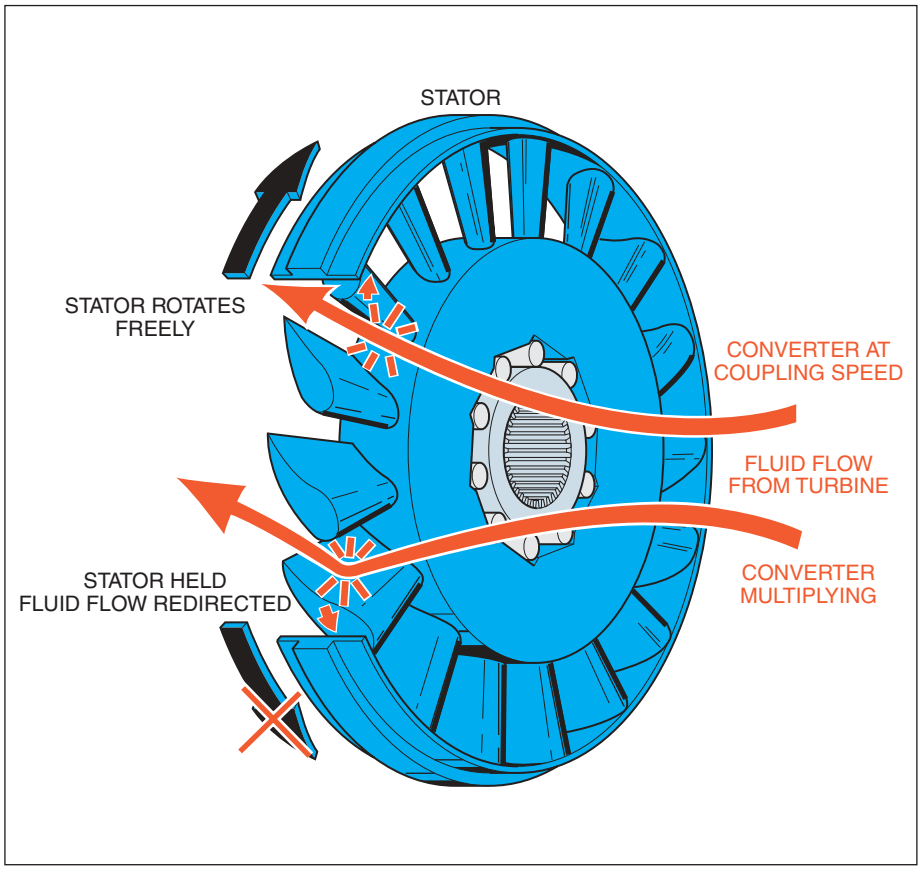


Figure 14

STATOR ASSEMBLY

The stator assembly is located between the pump assembly and turbine assembly, and is mounted on a one-way roller clutch. This one-way roller clutch allows the stator to rotate in one direction and prevents (holds) the stator from rotating in the other direction. The function of the stator is to redirect fluid returning from the turbine in order to assist the engine in turning the converter pump assembly.

At low vehicle speeds, when greater torque is needed, fluid from the turbine hits the front side of the stator blades (the converter is multiplying torque). At this time, the one-way roller clutch prevents the stator from rotating in the same direction as the fluid flow, thereby redirecting fluid to assist the engine in turning the converter pump. In this mode, fluid leaving the converter pump has more force to turn the turbine assembly and multiply engine torque.

As vehicle speed increases and less torque is required, centrifugal force acting on the fluid changes the direction of the fluid leaving the turbine such that it hits the back side of the stator blades (converter at coupling speed). When this occurs, the roller clutch overruns and allows the stator to rotate freely. Fluid is no longer being redirected to the converter pump and engine torque is not being multiplied.

TORQUE CONVERTER

TCC RELEASE

When the torque converter clutch is released, fluid is fed into the torque converter by the pump, through the TCC release fluid passage. The TCC release fluid passage is located between the stator shaft [front differential transfer drive gear support assembly (208)] and the turbine shaft [3-5-reverse and 4-5-6 clutch housing assembly (422)]. Fluid travels between the shafts and enters the release side of the pressure plate at the end of the turbine shaft. The pressure plate is forced away from the converter cover and allows the torque converter turbine to rotate at speeds other than engine speed.

The TCC release fluid then flows between the friction element on the pressure plate and the converter cover to enter the apply side of the torque converter. The fluid then exits the torque converter through the TCC apply passage, which is located between the torque converter clutch hub and the stator shaft [front differential transfer drive gear support assembly (208)], and enters the control valve upper body assembly (312). This fluid now travels to the fluid cooler.

No TCC apply can be caused by:

- Electrical connectors, wiring harness or solenoid damaged
- Torque converter internal damage
- TCC control valve and spring worn, damaged or sticking
- Turbine shaft O-ring seal cut or damaged
- TCC regulator apply valve worn, damaged or sticking

TCC APPLY

When the TCM determines that the vehicle is at the proper speed for the torque converter clutch to apply, it sends a signal to the TCC pressure control (PC) solenoid valve. The TCC PC solenoid valve then regulates line fluid from the pump into the regulated apply passage. The regulated apply fluid then feeds the apply fluid passage and applies the torque converter. The TCC apply passage is located between the converter hub and the stator shaft. The fluid flows between the shafts, then passes into the torque converter on the apply side of the pressure plate assembly. TCC release fluid is then routed out of the torque converter between the turbine shaft and the stator shaft.

TCC apply fluid pressure forces the pressure plate against the torque converter cover to provide a mechanical link between the engine and the turbine. In vehicles equipped with the Electronically Controlled Capacity Clutch (ECCC) system, the pressure plate does not fully lock to the torque converter cover. It is instead precisely controlled to maintain a small amount of slippage between the engine and the turbine, reducing driveline torsional disturbances.

The TCC may apply in Drive Range – First (without engine braking) Second, Third, Fourth, Fifth or Sixth gears (depending on the shift conditions), but should not apply until the transmission fluid and engine coolant temperatures have reached a minimum value (calibrated in TCM).

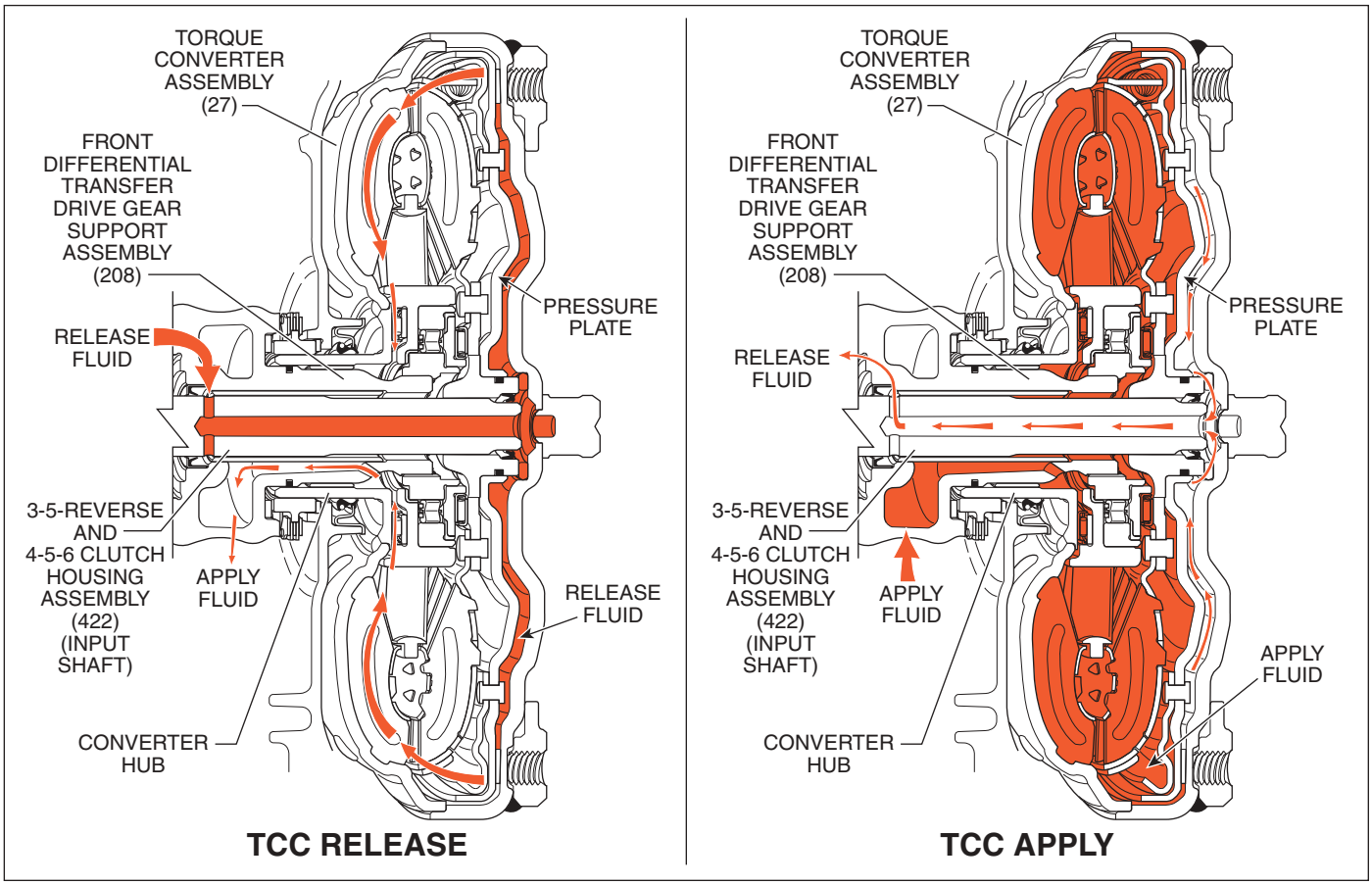


Figure 15

APPLY COMPONENTS

The Apply Components section is designed to explain the function of the hydraulic and mechanical holding devices used in the Hydra-matic 6T70/75 transmission. Some of these apply components, such as clutches, are hydraulically "applied" and "released" in order to provide automatic gear range shifting. Other components, such as a sprag clutch, often react to a hydraulically "applied" component by mechanically "holding" or "releasing" another member of the transmission. This interaction between the hydraulically and mechanically applied components is then explained in detail and supported with a graphic illustration. In addition, this section shows the routing of fluid pressure to the individual components and their internal functions when it applies or releases.

The sequence in which the components in this section have been discussed coincides with their physical arrangement inside the transmission. This order closely parallels the disassembly sequence used in the Hydra-matic 6T70/75 Unit Repair Section of the appropriate Service Manual. It also correlates with the components shown on the Range Reference Charts that are used throughout the Power Flow section of this book. The correlation of information between the sections of this book helps the user more clearly understand the hydraulic and mechanical operating principles for this transmission.

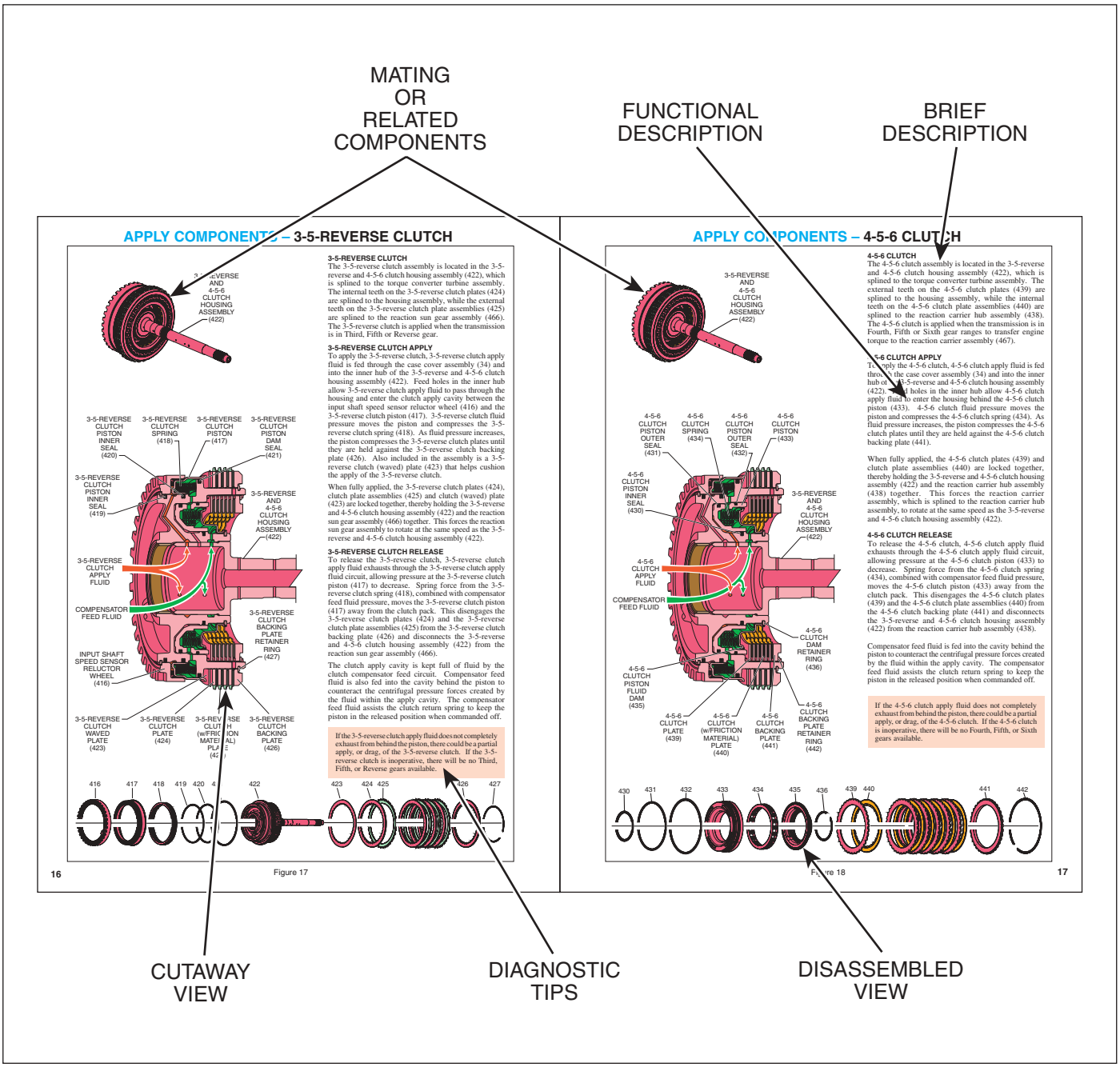
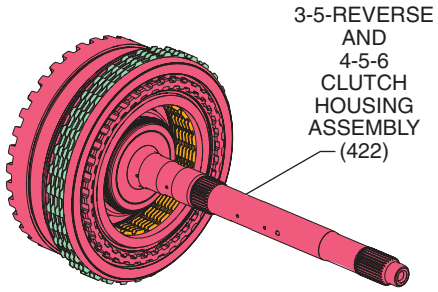
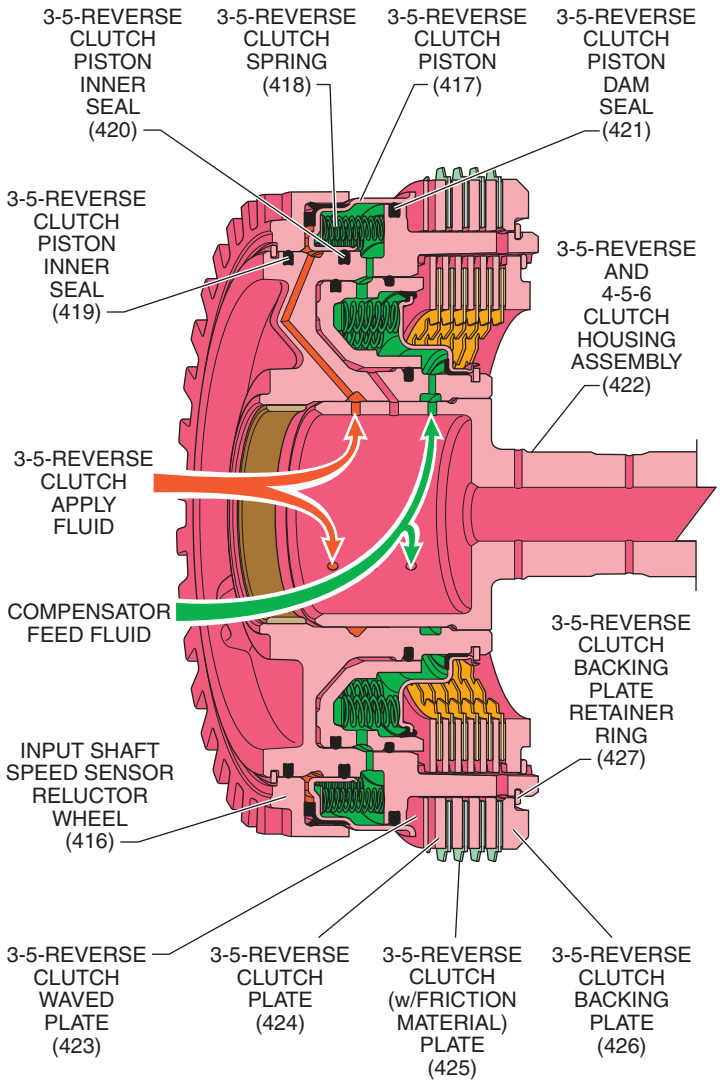


Figure 16

APPLY COMPONENTS – 3-5-REVERSE CLUTCH





3-5-REVERSE CLUTCH

The 3-5-reverse clutch assembly is located in the 3-5-reverse and 4-5-6 clutch housing assembly (422), which is splined to the torque converter turbine assembly. The internal teeth on the 3-5-reverse clutch plates (424) are splined to the housing assembly, while the external teeth on the 3-5-reverse clutch plate assemblies (425) are splined to the reaction sun gear assembly (466). The 3-5-reverse clutch is applied when the transmission is in Third, Fifth or Reverse gear.

3-5-REVERSE CLUTCH APPLY

To apply the 3-5-reverse clutch, 3-5-reverse clutch apply fluid is fed through the case cover assembly (34) and into the inner hub of the 3-5-reverse and 4-5-6 clutch housing assembly (422). Feed holes in the inner hub allow 3-5-reverse clutch apply fluid to pass through the housing and enter the clutch apply cavity between the input shaft speed sensor reluctor wheel (416) and the 3-5-reverse clutch piston (417). 3-5-reverse clutch fluid pressure moves the piston and compresses the 3-5-reverse clutch spring (418). As fluid pressure increases, the piston compresses the 3-5-reverse clutch plates until they are held against the 3-5-reverse clutch backing plate (426). Also included in the assembly is a 3-5-reverse clutch (waved) plate (423) that helps cushion the apply of the 3-5-reverse clutch.

When fully applied, the 3-5-reverse clutch plates (424), clutch plate assemblies (425) and clutch (waved) plate (423) are locked together, thereby holding the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction sun gear assembly (466) together. This forces the reaction sun gear assembly to rotate at the same speed as the 3-5-reverse and 4-5-6 clutch housing assembly (422).

3-5-REVERSE CLUTCH RELEASE

To release the 3-5-reverse clutch, 3-5-reverse clutch apply fluid exhausts through the 3-5-reverse clutch apply fluid circuit, allowing pressure at the 3-5-reverse clutch piston (417) to decrease. Spring force from the 3-5-reverse clutch spring (418), combined with compensator feed fluid pressure, moves the 3-5-reverse clutch piston (417) away from the clutch pack. This disengages the 3-5-reverse clutch plates (424) and the 3-5-reverse clutch plate assemblies (425) from the 3-5-reverse clutch backing plate (426) and disconnects the 3-5-reverse and 4-5-6 clutch housing assembly (422) from the reaction sun gear assembly (466).

The clutch apply cavity is kept full of fluid by the clutch compensator feed circuit. Compensator feed fluid is also fed into the cavity behind the piston to counteract the centrifugal pressure forces created by the fluid within the apply cavity. The compensator feed fluid assists the clutch return spring to keep the piston in the released position when commanded off.

If the 3-5-reverse clutch apply fluid does not completely exhaust from behind the piston, there could be a partial apply, or drag, of the 3-5-reverse clutch. If the 3-5-reverse clutch is inoperative, there will be no Third, Fifth, or Reverse gears available.

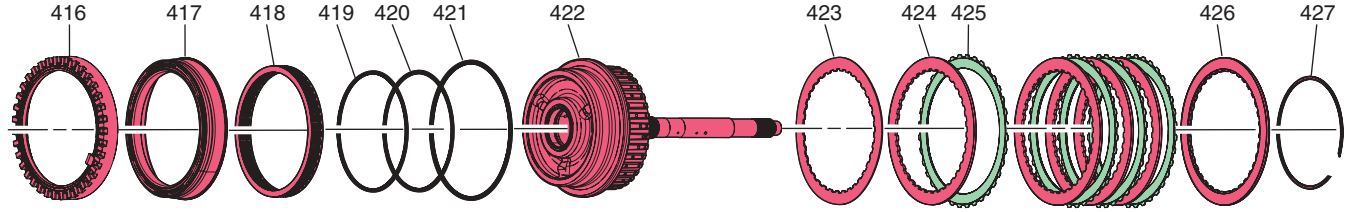
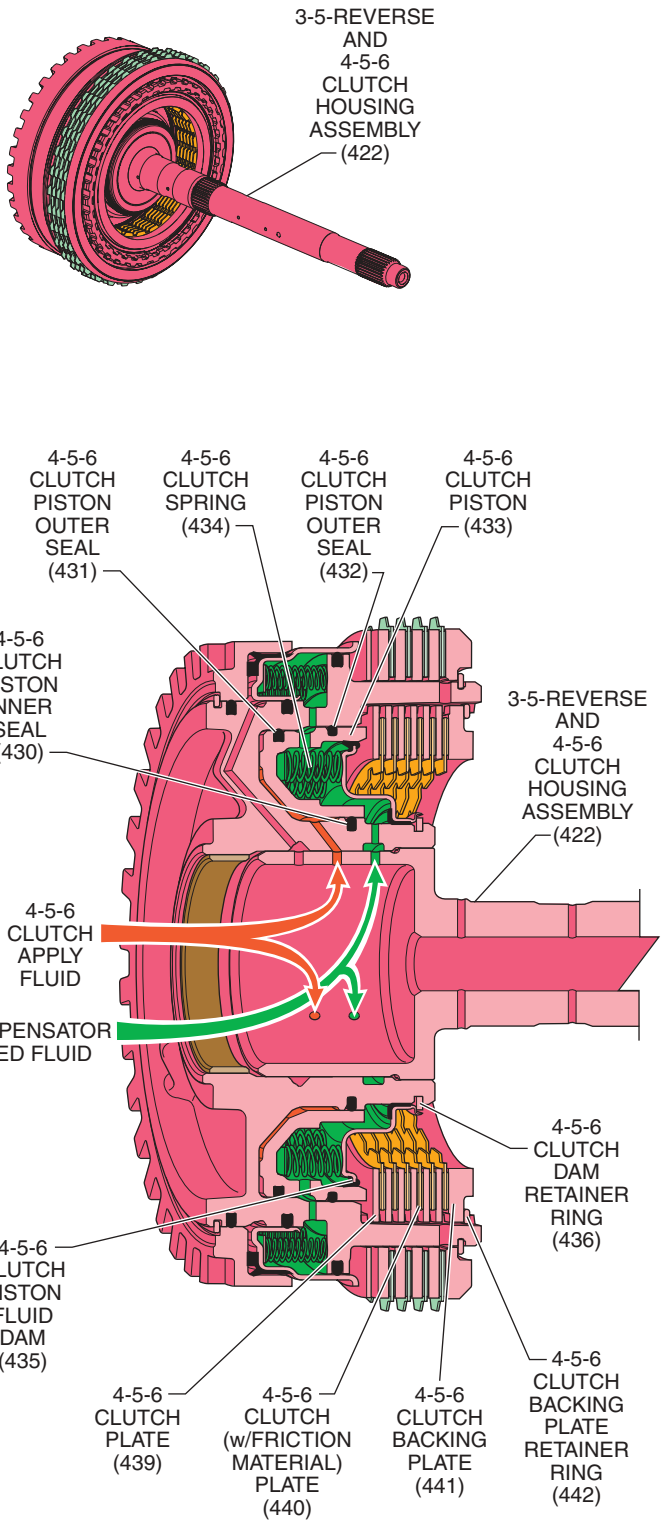


Figure 17

APPLY COMPONENTS – 4-5-6 CLUTCH



4-5-6 CLUTCH

The 4-5-6 clutch assembly is located in the 3-5-reverse and 4-5-6 clutch housing assembly (422), which is splined to the torque converter turbine assembly. The external teeth on the 4-5-6 clutch plates (439) are splined to the housing assembly, while the internal teeth on the 4-5-6 clutch plate assemblies (440) are splined to the reaction carrier hub assembly (438). The 4-5-6 clutch is applied when the transmission is in Fourth, Fifth or Sixth gear ranges to transfer engine torque to the reaction carrier assembly (467).

4-5-6 CLUTCH APPLY

To apply the 4-5-6 clutch, 4-5-6 clutch apply fluid is fed through the case cover assembly (34) and into the inner hub of the 3-5-reverse and 4-5-6 clutch housing assembly (422). Feed holes in the inner hub allow 4-5-6 clutch apply fluid to enter the housing behind the 4-5-6 clutch piston (433). 4-5-6 clutch fluid pressure moves the piston and compresses the 4-5-6 clutch spring (434). As fluid pressure increases, the piston compresses the 4-5-6 clutch plates until they are held against the 4-5-6 clutch backing plate (441).

When fully applied, the 4-5-6 clutch plates (439) and clutch plate assemblies (440) are locked together, thereby holding the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction carrier hub assembly (438) together. This forces the reaction carrier assembly, which is splined to the reaction carrier hub assembly, to rotate at the same speed as the 3-5-reverse and 4-5-6 clutch housing assembly (422).

4-5-6 CLUTCH RELEASE

To release the 4-5-6 clutch, 4-5-6 clutch apply fluid exhausts through the 4-5-6 clutch apply fluid circuit, allowing pressure at the 4-5-6 clutch piston (433) to decrease. Spring force from the 4-5-6 clutch spring (434), combined with compensator feed fluid pressure, moves the 4-5-6 clutch piston (433) away from the clutch pack. This disengages the 4-5-6 clutch plates (439) and the 4-5-6 clutch plate assemblies (440) from the 4-5-6 clutch backing plate (441) and disconnects the 3-5-reverse and 4-5-6 clutch housing assembly (422) from the reaction carrier hub assembly (438).

Compensator feed fluid is fed into the cavity behind the piston to counteract the centrifugal pressure forces created by the fluid within the apply cavity. The compensator feed fluid assists the clutch return spring to keep the piston in the released position when commanded off.

If the 4-5-6 clutch apply fluid does not completely exhaust from behind the piston, there could be a partial apply, or drag, of the 4-5-6 clutch. If the 4-5-6 clutch is inoperative, there will be no Fourth, Fifth, or Sixth gears available.

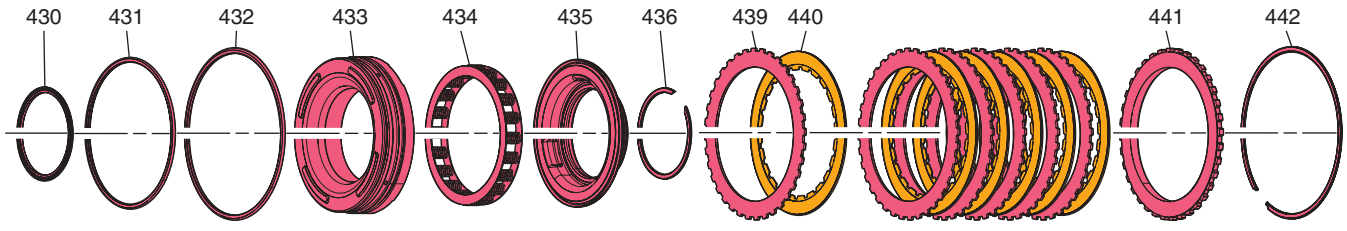
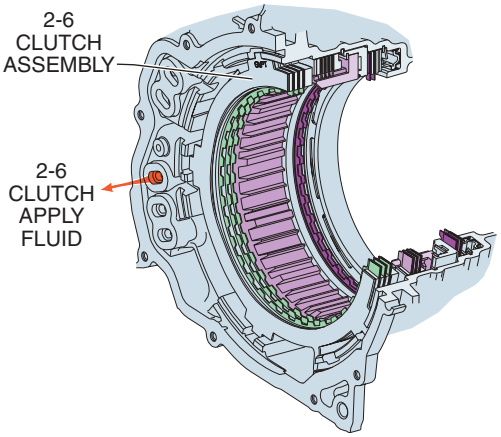


Figure 18

APPLY COMPONENTS – 2-6 CLUTCH



If the 2-6 apply fluid does not fully exhaust, the 2-6 clutch could partially apply or drag. If the 2-6 clutch is inoperative, there will be no Second or Sixth gears.

2-6 CLUTCH

The 2-6 clutch assembly is located in the case cover assembly (34) and the case assembly (51). The case cover assembly is bolted to the transmission case. The external teeth on the 2-6 clutch plates (446) are splined to the case assembly while the internal teeth on the 2-6 clutch plate assemblies (447) are splined to the reaction sun gear assembly (466). The 2-6 clutch is applied only when the transmission is in Second or Sixth gear.

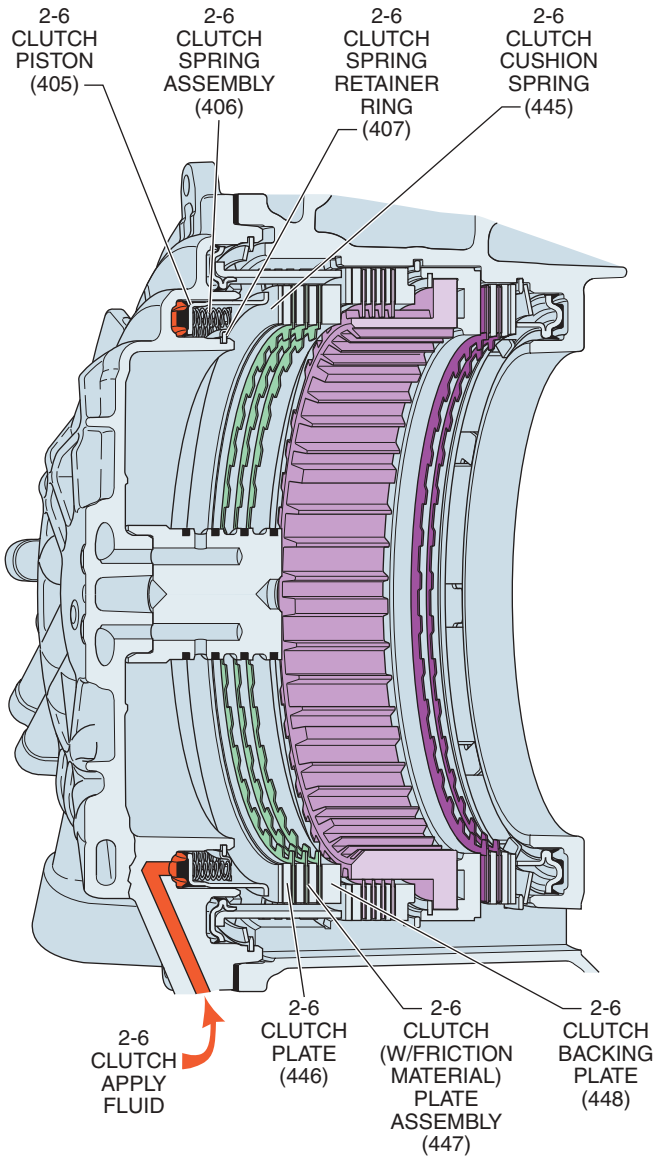
2-6 CLUTCH APPLY

To apply the 2-6 clutch, 2-6 clutch fluid is fed through the case assembly (51) into the case cover assembly (34). A feed hole in the case cover allows fluid to enter behind the 2-6 clutch piston (405). 2-6 clutch fluid pressure moves the piston and compresses the 2-6 clutch spring assembly (406). As fluid pressure increases, the piston compresses the 2-6 clutch plates together until they are held against the 2-6 clutch backing plate (448). Also included in the assembly is a 2-6 clutch cushion spring (445) that helps cushion the apply of the 2-6 clutch.

When fully applied, the 2-6 clutch cushion spring (445), the 2-6 clutch plates (446), and the 2-6 clutch plate assemblies (447) are locked together, thereby holding the reaction sun gear assembly (466) stationary to the case assembly (51).

2-6 CLUTCH RELEASE

To release the 2-6 clutch, 2-6 clutch fluid exhausts through the case cover assembly (34) and into the case assembly (51), allowing pressure at the 2-6 clutch piston (405) to decrease. In the absence of fluid pressure, spring force from the 2-6 clutch spring assembly (406) moves the 2-6 clutch piston (405) away from the clutch pack. This disengages the 2-6 clutch cushion spring (445), the 2-6 clutch plates (446), and the 2-6 clutch plate assemblies (447) from the 2-6 clutch backing plate (448), thereby allowing the reaction sun gear assembly (466) to rotate freely.



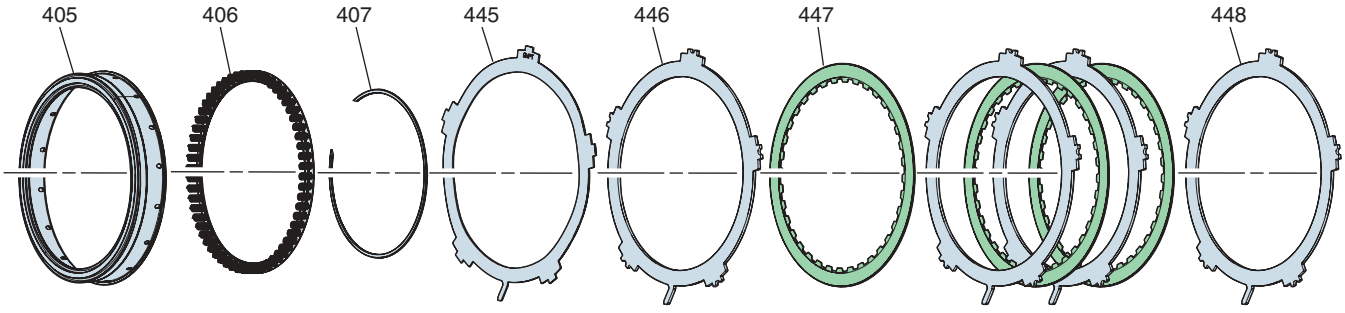
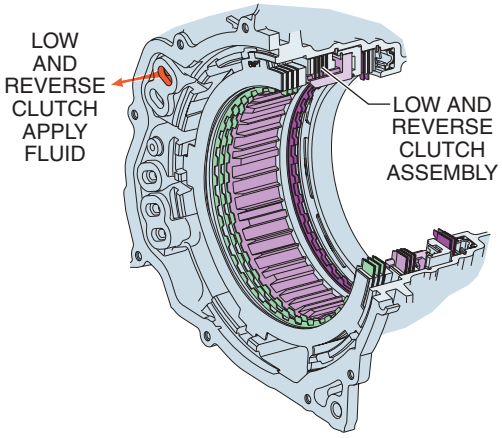


Figure 19

APPLY COMPONENTS – LOW AND REVERSE CLUTCH



LOW AND REVERSE CLUTCH

The low and reverse clutch assembly is located in the case cover assembly (34) and the case assembly (51). The case cover assembly is bolted to the transmission case. The external teeth on the low and reverse clutch plates (452) are splined to the case assembly while the internal teeth on the low and reverse clutch plate assemblies (451) are splined to the low and reverse clutch assembly (OWC) (455). The low and reverse clutch is applied and effective only when the transmission is in First gear (Engine Braking) or Reverse in order to provide maximum gear reduction and engine braking by holding the reaction carrier assembly (467) stationary.

LOW AND REVERSE CLUTCH APPLY

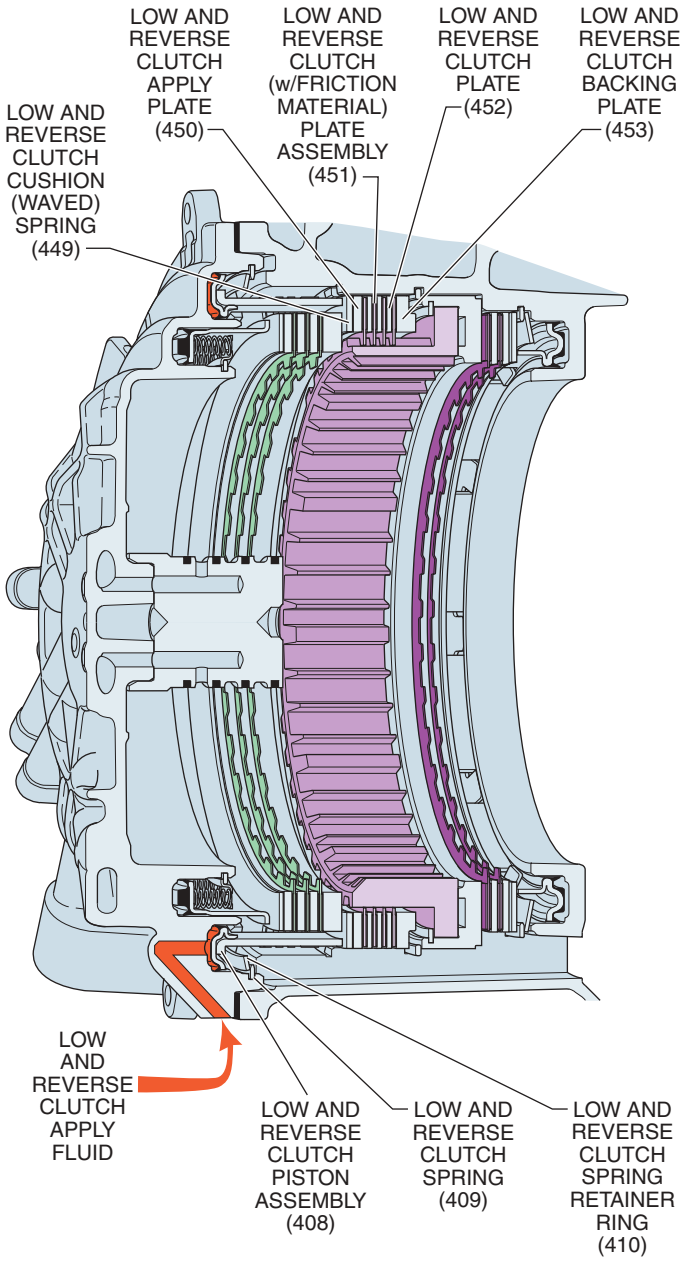
To apply the low and reverse clutch, low and reverse clutch fluid is fed through the case assembly (51) into the case cover assembly (34). A feed hole in the case cover allows fluid to enter behind the low and reverse clutch piston assembly (408). Low and reverse clutch fluid pressure moves the piston and compresses the low and reverse clutch spring (409). As fluid pressure increases, the piston compresses the low and reverse clutch plates together until they are held against the low and reverse clutch backing plate (453). Also included in the assembly are a low and reverse clutch apply plate (449), and a low and reverse clutch cushion spring (450) that helps cushion the apply of the low and reverse clutch.

When fully applied, the low and reverse clutch cushion spring (449), the low and reverse clutch apply plate (450), the low and reverse clutch plates (452), and the low and reverse clutch plate assemblies (451) are locked together, thereby holding the low and reverse clutch assembly (OWC) (455) stationary to the case assembly (51). The reaction carrier assembly (467), which is splined to the low and reverse clutch assembly (OWC) (455), is also held stationary.

LOW AND REVERSE CLUTCH RELEASE

To release the low and reverse clutch, low and reverse clutch fluid exhausts through the case cover assembly (34) and into the case assembly (51), allowing pressure at the low and reverse clutch piston assembly (408) to decrease. In the absence of fluid pressure, spring force from the low and reverse clutch spring (409) moves the low and reverse clutch piston assembly (408) away from the clutch pack. This disengages the low and reverse clutch cushion spring (449), the low and reverse clutch apply plate (450), the low and reverse clutch plates (452), and the low and reverse clutch plate assemblies (451) from the low and reverse clutch backing plate (453), thereby allowing the reaction carrier assembly (467) to rotate freely.

If the low and reverse clutch apply fluid does not fully exhaust, the low and reverse clutch could partially apply or drag. If the low and reverse clutch is inoperative, there will be no First gear or Reverse.



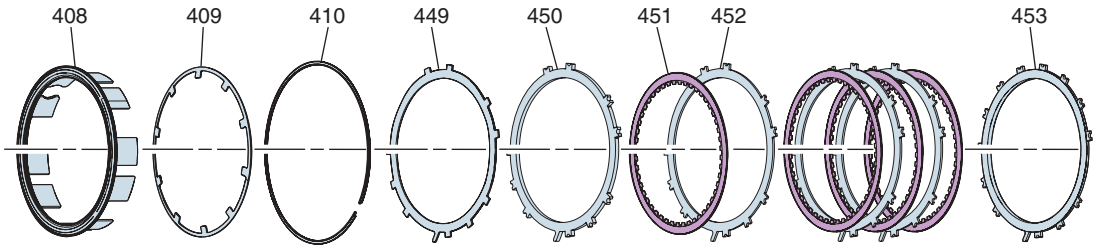
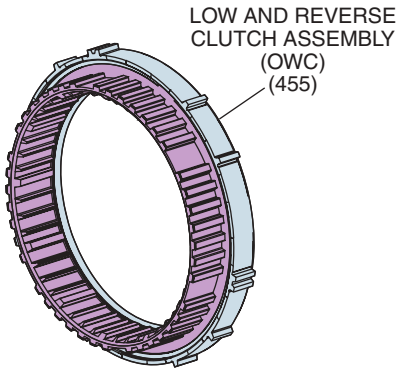
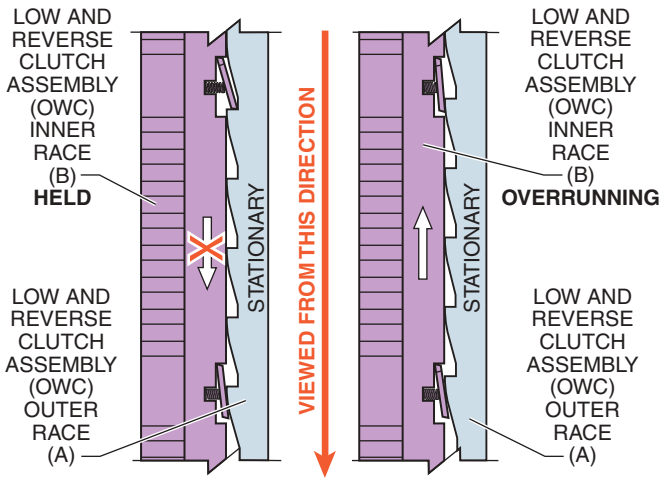


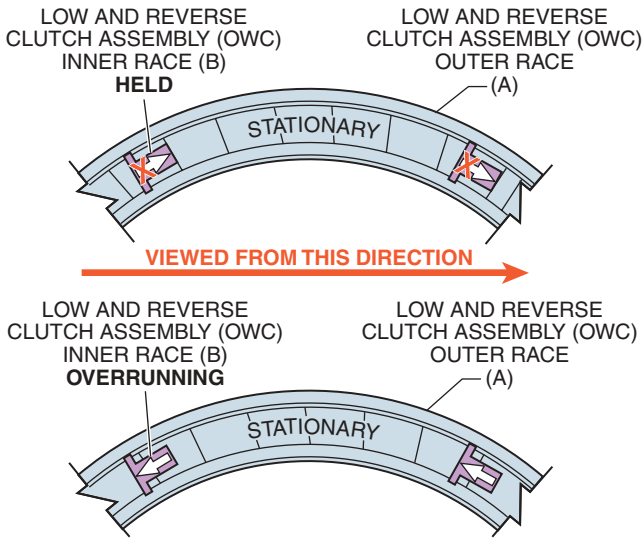
Figure 20

APPLY COMPONENTS – LOW AND REVERSE CLUTCH (OWC)





LOW AND REVERSE CLUTCH ASSEMBLY (OWC)
The low and reverse clutch assembly one way clutch (OWC) (455) is located between the low and reverse clutch assembly and the reaction carrier assembly (467). The outer race (A) of the one way clutch assembly is splined to the case assembly (51), and the inner race (B) is splined to the internal teeth of the low and reverse clutch plate assemblies (451), and to the reaction carrier assembly (467). The low and reverse clutch assembly (OWC) is a type of one-way clutch that prevents the reaction carrier assembly (467) from rotating in the direction opposite of engine rotation. The low and reverse clutch assembly (OWC) is ineffective in Reverse and First gear (Engine Braking), when the inner race (B) is held stationary by the applied low and reverse clutch. However, when the throttle is released in First, Second, Third, Fourth, Fifth, and Sixth gears, the low and reverse clutch assembly (OWC) will overrun and allow the vehicle to coast, until engine braking is required.



LOW AND REVERSE CLUTCH ASSEMBLY (OWC) HOLDING
When the throttle is released in Drive range, deceleration power flow attempts to drive the reaction carrier assembly and the inner race (B) in the direction opposite of engine rotation. This causes the sprags to spring toward, and "lock" against, the ramps on the low and reverse clutch (OWC) outer race (A).

LOW AND REVERSE CLUTCH ASSEMBLY (OWC) RELEASED
The low and reverse clutch assembly (OWC) releases when the throttle is applied and acceleration again drives the reaction carrier assembly in the direction of engine rotation. The sprags rachet in and out of the ramps on outer race, allowing the inner race to overrun the sprags.

A damaged low and reverse clutch assembly (OWC) can cause no First gear (unless the low and reverse clutch is applied).
A bound up one way clutch can cause tie up in Second, Third, Fourth, Fifth and Sixth gears.

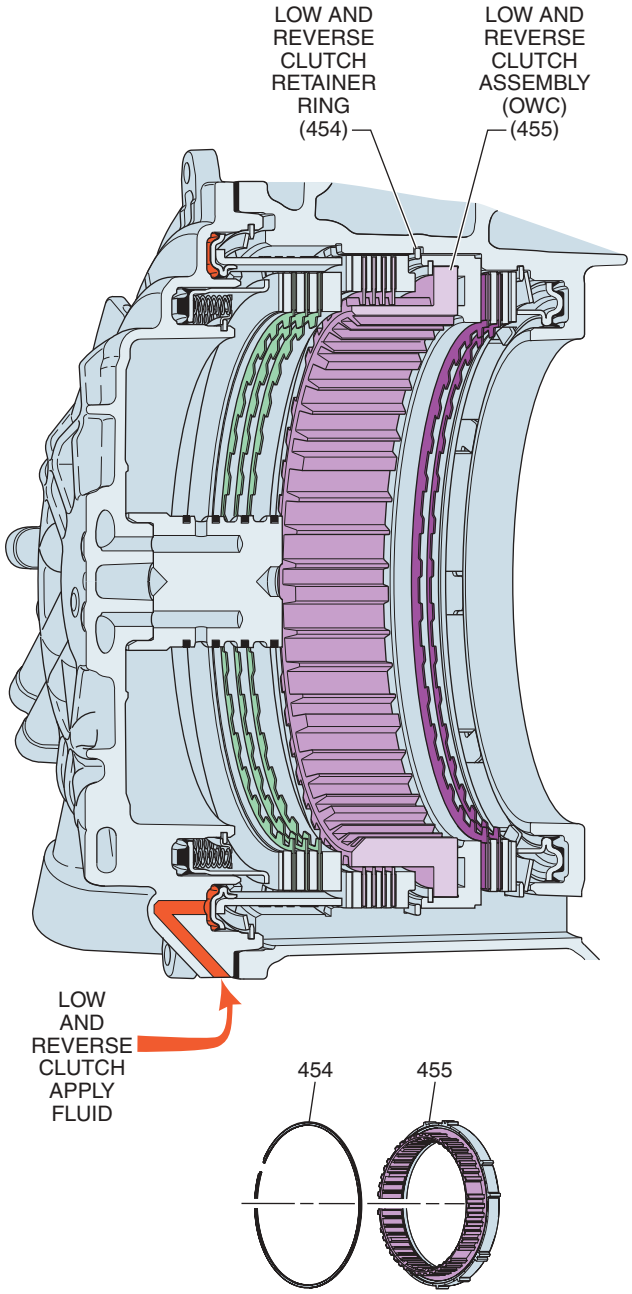
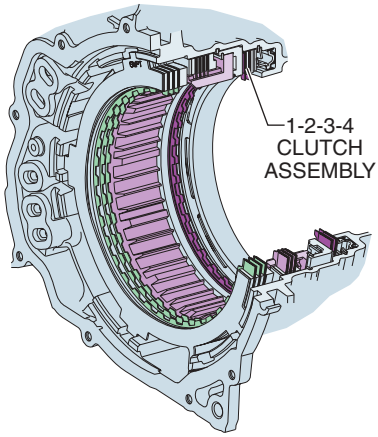


Figure 21

APPLY COMPONENTS – 1-2-3-4 CLUTCH



If the 1-2-3-4 clutch apply fluid does not completely exhaust, there could be a partial apply, or drag, of the 1-2-3-4 clutch plates. If the 1-2-3-4 clutch is inoperative, there will be no 1st, 2nd, 3rd or 4th gears available.

1-2-3-4 CLUTCH

The 1-2-3-4 clutch assembly is located in the transmission case assembly (51). The external teeth on the 1-2-3-4 clutch plates (457) are splined to the case assembly while the internal teeth on the 1-2-3-4 clutch plate assemblies (456) are splined to the output sun gear assembly (475). The 1-2-3-4 clutch is applied when the transmission is in 1st, 2nd, 3rd, and 4th gears.

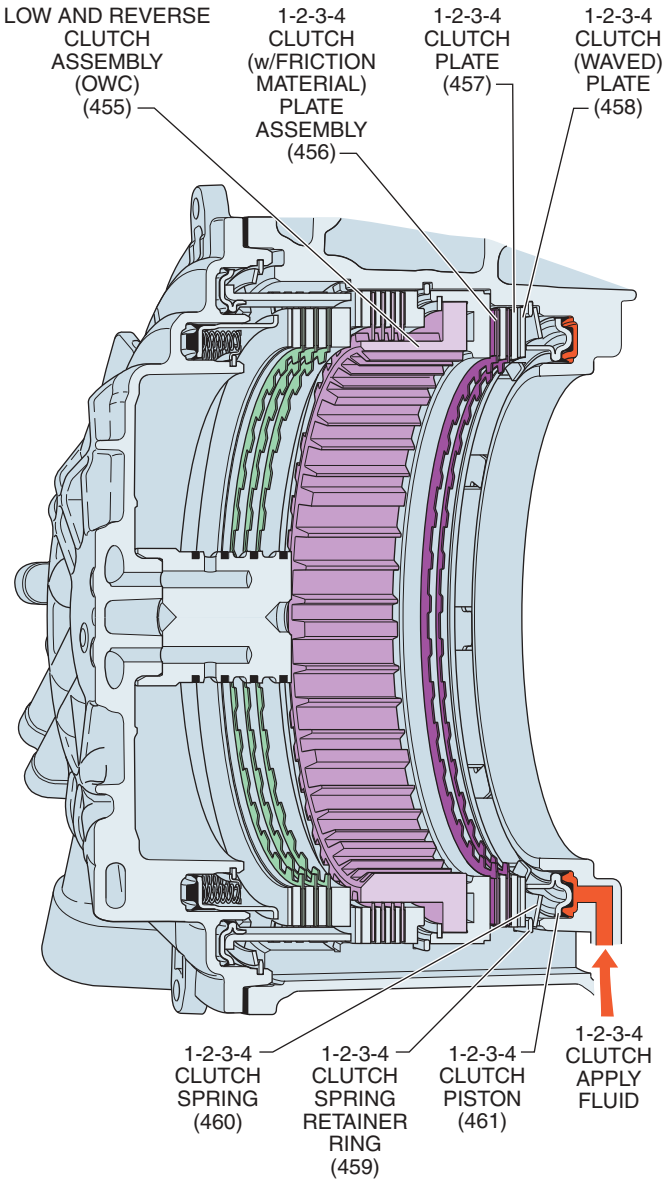
1-2-3-4 CLUTCH APPLY

To apply the 1-2-3-4 clutch, 1-2-3-4 clutch apply fluid is fed through the case cover assembly (34) and into the case assembly (51) behind the 1-2-3-4 clutch piston (461). 1-2-3-4 clutch fluid pressure moves the piston to compress the 1-2-3-4 clutch spring (460). As fluid pressure increases, the piston compresses the clutch plates until they are held against the low and reverse clutch assembly (OWC) (455). Also included in the assembly is a 1-2-3-4 clutch (waved) plate (458) that helps cushion the apply of the 1-2-3-4 clutch.

When fully applied, the 1-2-3-4 clutch plates (457), 1-2-3-4 clutch plate assemblies (456) and 1-2-3-4 clutch (waved) plate (458) are locked together, thereby holding the output sun gear assembly (475) stationary to the case assembly (51).

1-2-3-4 CLUTCH RELEASE

To release the 1-2-3-4 clutch, 1-2-3-4 clutch fluid exhausts from the piston, through the case assembly (51), the cover assembly (34), and into the control valve lower body assembly (314). Spring force from the 1-2-3-4 clutch spring (460) moves the piston away from the clutch plates. This disengages the 1-2-3-4 clutch plates (457), and 1-2-3-4 clutch plate assemblies (456) from the low and reverse clutch assembly (OWC) (455) and disconnects the output sun gear assembly (475) from the case assembly (51).



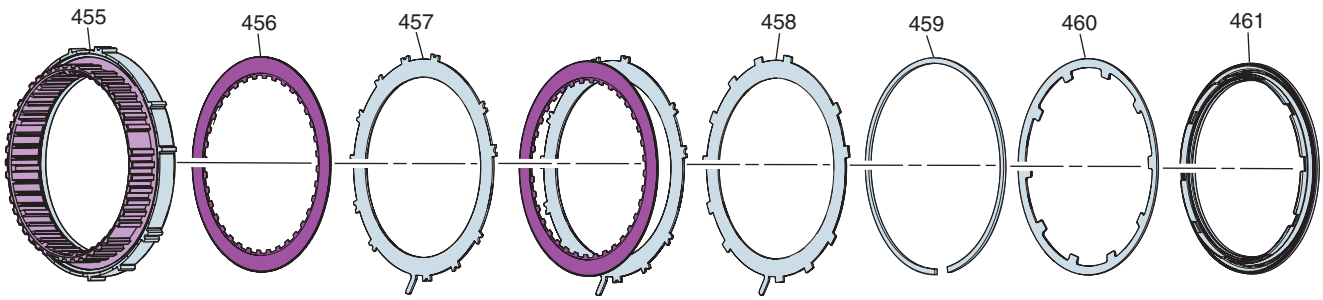


Figure 22

PLANETARY GEAR SETS

Planetary gear sets are commonly used in automatic transmissions as the primary method of multiplying the torque, or twisting force, of the engine (reduction). Planetary gear sets are also used to reverse the direction of rotation, function as a coupling for direct drive, and provide an overdrive gear ratio.

Planetary gear sets are so named because of their physical arrangement. All planetary gear sets contain at least three main components:

- a sun gear at the center of the gear set,
- a carrier assembly with planetary pinion gears that rotate around the sun gear and,
- an internal (ring) gear that encompasses the entire gear set.

The gears are designed such that several gear teeth are always in contact, or mesh, at the same time. This design distributes the energy forces over several gear teeth for greater strength and eliminates potential clash that is a common occurrence in manual transmissions when gear teeth go in and out of mesh. Another benefit of planetary gear sets is that shafts are generally used for input and output components and can be arranged on the same axis, thus providing a very compact unit.

The Hydra-matic 6T70/75 transmission uses three planetary gear sets, the input carrier assembly (470), the reaction carrier assembly (467), and the output carrier assembly (474). Figures 23, 24 and 25 show these gear sets and their respective components. These figures also graphically explain how the planetary gear sets are used to achieve each of the transmission's six forward gear ratios and Reverse.

Another gear set used in the Hydra-matic 6T70/75 transmission is the front differential carrier assembly (31). Information regarding its purpose and function is discussed on page 26.

Torque

When engine torque is transferred through a gear set, the output torque from the gear set can either increase, decrease, or remain the same. The output torque achieved depends on:

- which member of the gear set provides the input torque,
- which member of the gear set (if any) is held stationary, and,
- which member of the gear set provides the output torque.

If output torque is greater than input torque the gear set is operating in reduction (First, Second, Third, Fourth and Reverse gears). If output torque is less than input torque, then the gear set is operating in overdrive (Fifth and Sixth gear).

Torque vs. Speed

One transmission operating condition directly affected by input and output torque through a gear set is the relationship of torque with output speed. As the transmission shifts from First to Second to Third to Fourth to Fifth to Sixth gear, the overall output torque to the wheels decreases as the speed of the vehicle increases (when input speed and input torque are held constant). Higher output torque is needed at low vehicle speed (First, Second and Third gears) to provide the power to move the vehicle from a standstill. However, once the vehicle is moving and the speed of the vehicle increases (Fourth, Fifth and Sixth gears), less output torque is required to maintain that speed. This provides for a more efficient operation of the powertrain.

REDUCTION

Increasing the output torque is known as operating in reduction because there is a decrease in the speed of the output member proportional to the increase in the output torque. Therefore, with a constant input speed, the output torque increases when the transmission is in a lower gear, or higher gear ratio. Reduction occurs in Drive Range – First through Fourth gears and in Reverse. Each of these ranges uses the input carrier and reaction carrier planetary gear sets for an initial reduction step before power flow continues to the output carrier planetary gear set, where the final output ratio is achieved.

OVERDRIVE

Overdrive enables the output speed of the transmission to be greater than the input speed. This mode of operation allows the vehicle to maintain a given road speed with reduced engine speed to improve fuel economy. In Overdrive, the output speed increases while the output torque decreases proportionally. Overdrive occurs in Fifth and Sixth gears.

In Fifth gear, power flow travels directly through the input carrier assembly, the reaction carrier assembly and output carrier gear sets. Without a member of the output gear set being held (grounded), the three planetary gear sets act together as a unit and transfer engine torque to the front differential transfer drive gear (208). Power flow then travels through the transfer drive gears to achieve the final Fifth gear overdrive ratio.

In Sixth gear, the reaction carrier pinion gears, driven around the stationary reaction sun gear assembly (466), over drive the output carrier assembly. This results in a lower final output ratio, and greater fuel economy than that provided in Fifth gear.

REVERSE

A planetary gear set reverses the direction of power flow rotation when the carrier assembly is held stationary and power is applied to the sun gear. This causes the pinion gears to act as idler gears and drive the internal gear in the opposite direction. With the 3-5-reverse clutch applied, the reaction sun gear assembly (466) drives the reaction carrier pinion gears. The reaction carrier assembly pinion gears then drive the reaction internal gear (output carrier assembly) (474) in a reverse direction (opposite of engine rotation) to provide an overall transmission reduction ratio of approximately 2.880:1.

Gear ratios are dependent on the Hydra-matic 6T70/75 application, and are calculated for the components from the torque converter assembly (27) to the front differential transfer drive gear support assembly (208). Because the Hydra-matic 6T70/75 uses gears to transfer power flow from the front differential transfer drive gear support assembly (208) to the front differential carrier assembly (31), the actual final output ratio is a combination of the gear ratio and an Effective Final Drive (EFD) ratio. EFD ratio is a combination of the gear ratios between the front differential transfer drive gear (208), the front differential drive pinion gear (481), the front differential transfer driven gear (481), and the front differential ring gear (486).

See page 11 for the complete list of gear ratios.

Refer to the Power Flow section, beginning on page 47, for a complete description of clutch combinations used to hold and/or drive the planetary gear sets for each gear range.

Gear set failure can cause noise and loss of drive.

PLANETARY GEAR SETS

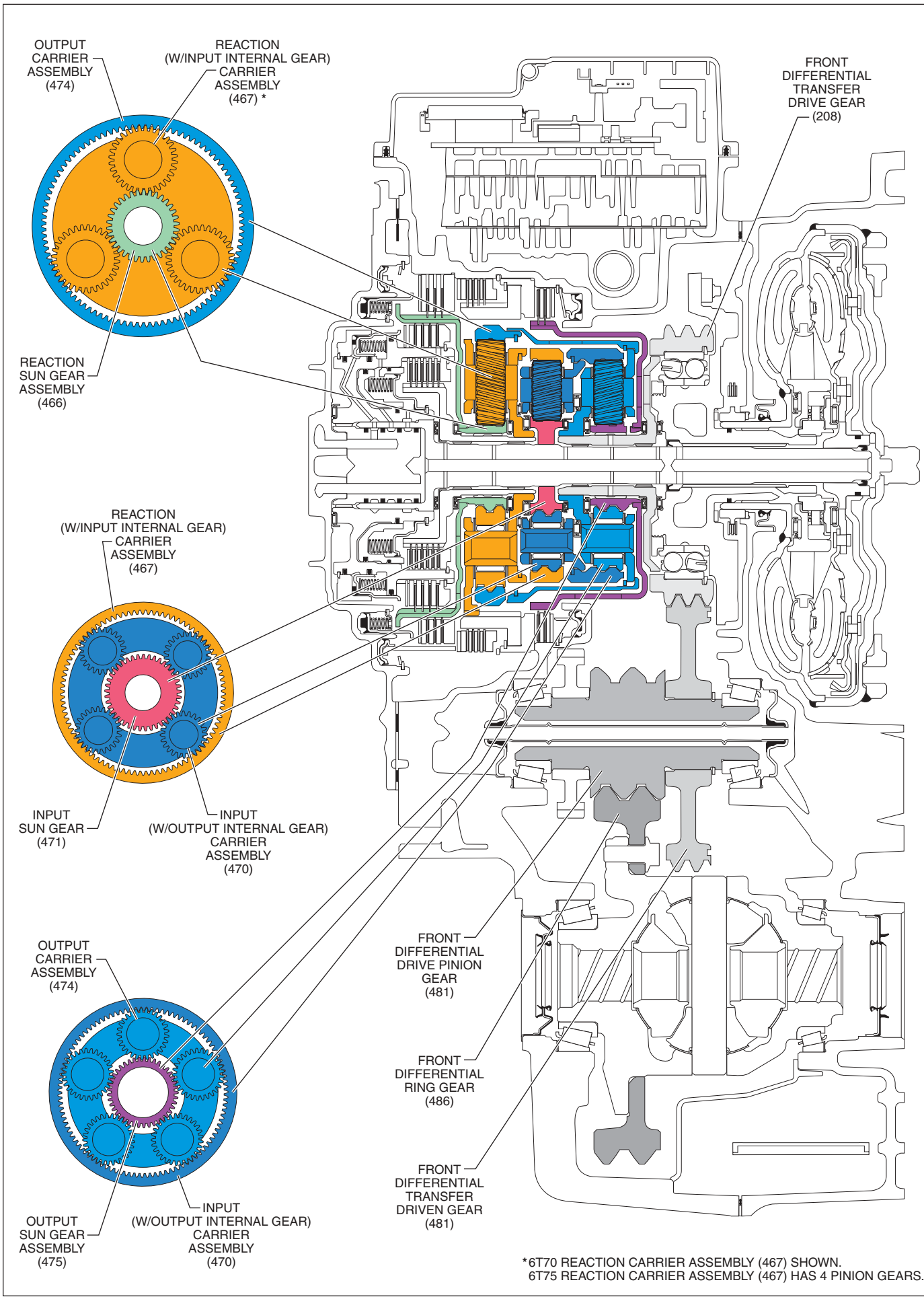


Figure 23

PLANETARY GEAR SETS

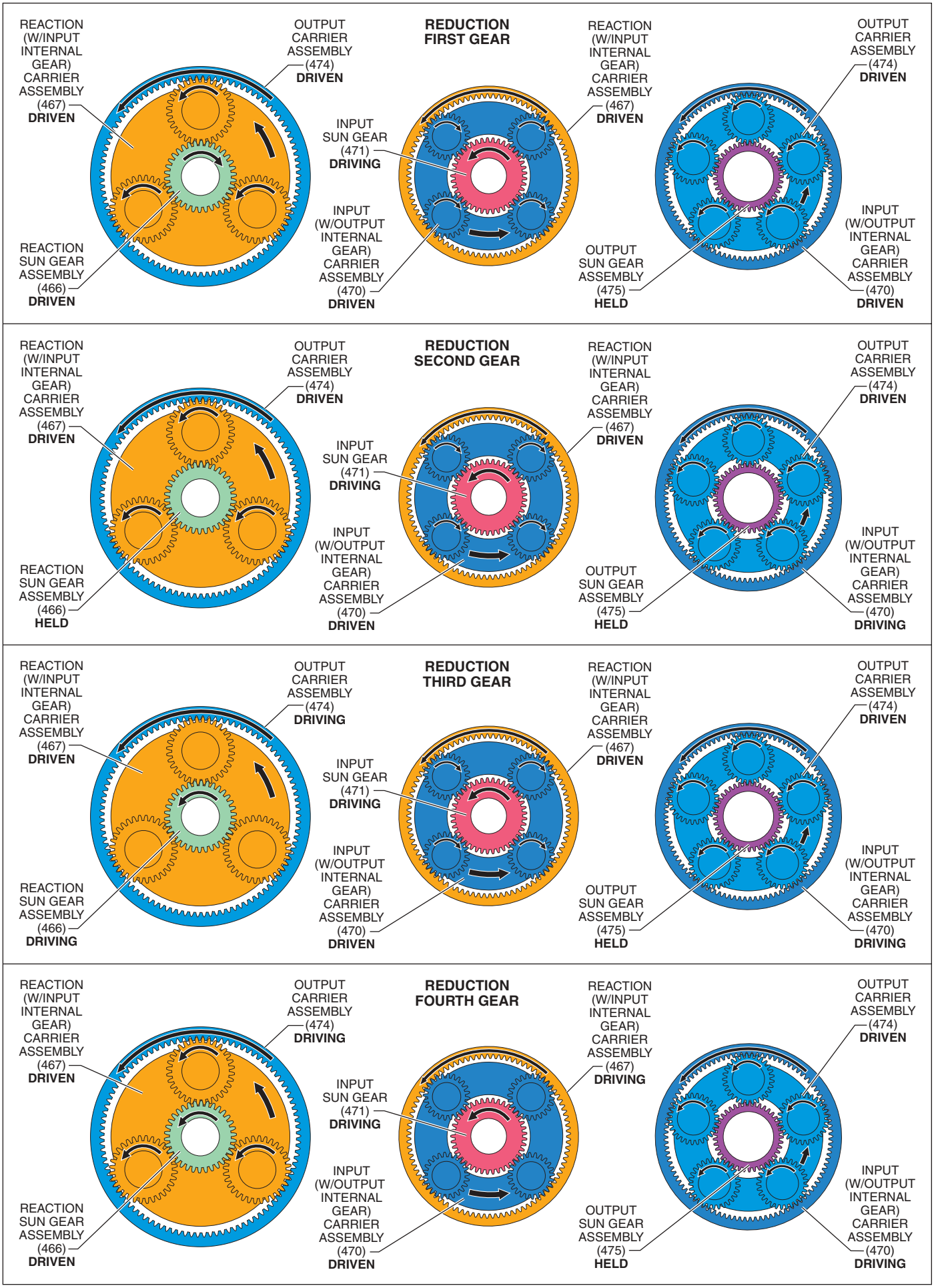


Figure 24

PLANETARY GEAR SETS

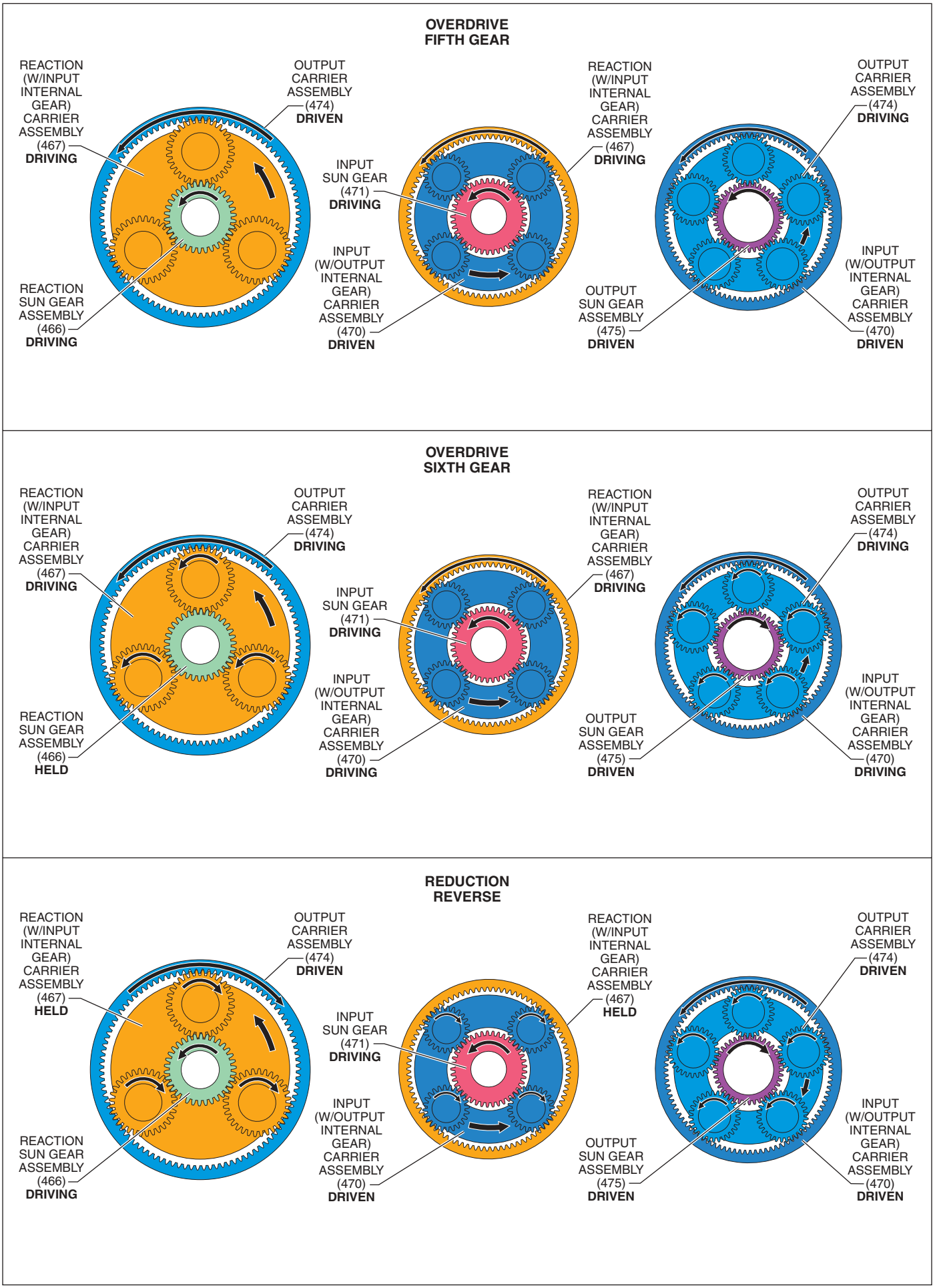
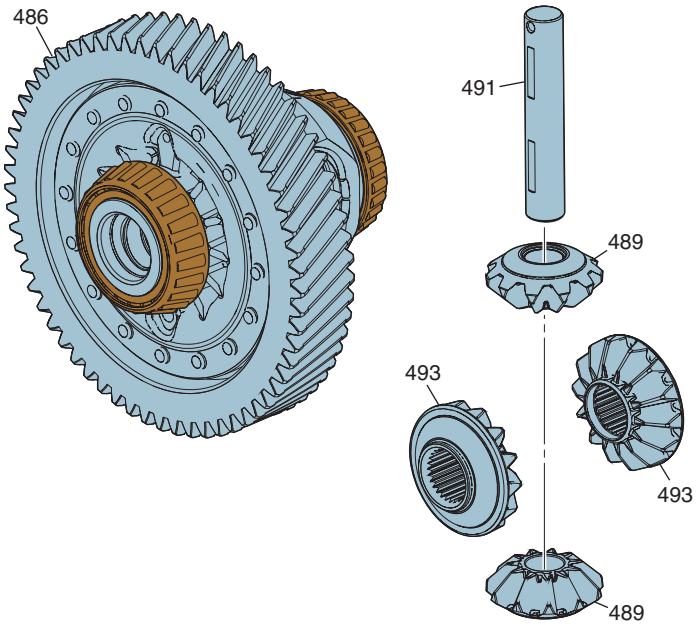


Figure 25

DIFFERENTIAL COMPONENTS

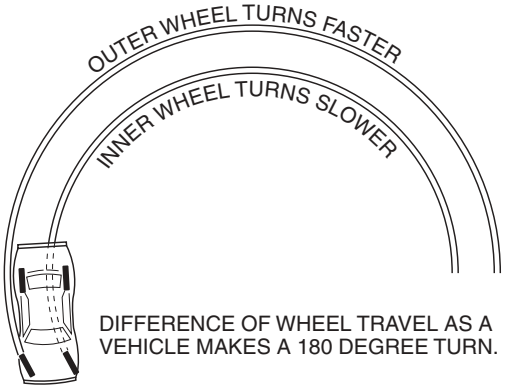
FRONT DIFFERENTIAL CARRIER ASSEMBLY

The front differential carrier assembly (31) provides the means for allowing one driving wheel to travel faster than the other when the vehicle is going around corners or curves. (The wheel on the outside of the curve has to turn faster.) The front differential carrier assembly (31) consists of: the front differential carrier assembly (486); four bevelled gears; and the front differential pinion gear shaft (491). Two bevelled gears, the front differential side gears (493), are splined to the axle shafts. The other two bevelled gears, the front differential pinion gears (489), act as idlers to transfer the power from the front differential carrier assembly (486) to the front differential side gears (493). The front differential pinion gears (489) also balance the power load between the front differential side gears (493) while allowing unequal axle rotation speeds when the vehicle is in a curve.

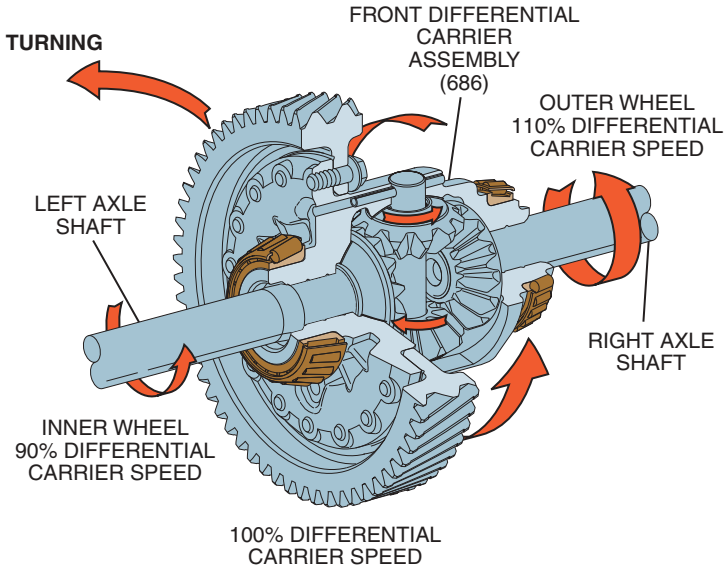


A noise condition, usually a hum (under light throttle or turns), will be associated with a front differential assembly condition.

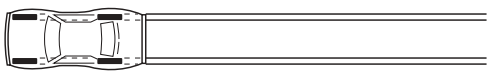
Front differential assembly failure can cause loss of drive.



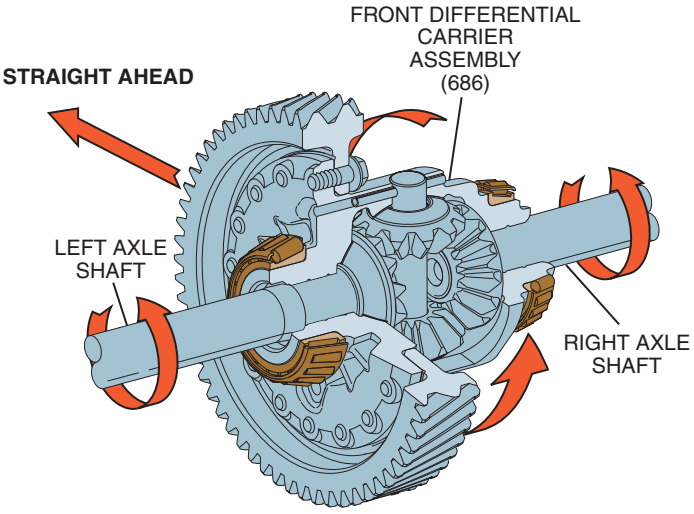
DIFFERENCE OF WHEEL TRAVEL AS A VEHICLE MAKES A 180 DEGREE TURN.



When the vehicle is driven in a straight line, the front differential pinion gears (489), front differential side gears (493) and front differential carrier assembly (486) rotate as a fixed unit. The end result is both axle shafts rotate in the same direction as engine rotation for all forward gear ranges.



BOTH WHEELS TURNING AT SAME SPEED



ALL PARTS ROTATING AT DIFFERENTIAL CARRIER SPEED

Figure 26

HYDRAULIC CONTROL COMPONENTS

The previous sections of this book were used to describe some of the mechanical component operations of the Hydra-matic 6T70/75 transmission. In the Hydraulic Control Components section a detailed description of individual components used in the hydraulic system will be presented. These hydraulic control components apply and release the clutch packs to provide automatic shifting of the transmission.

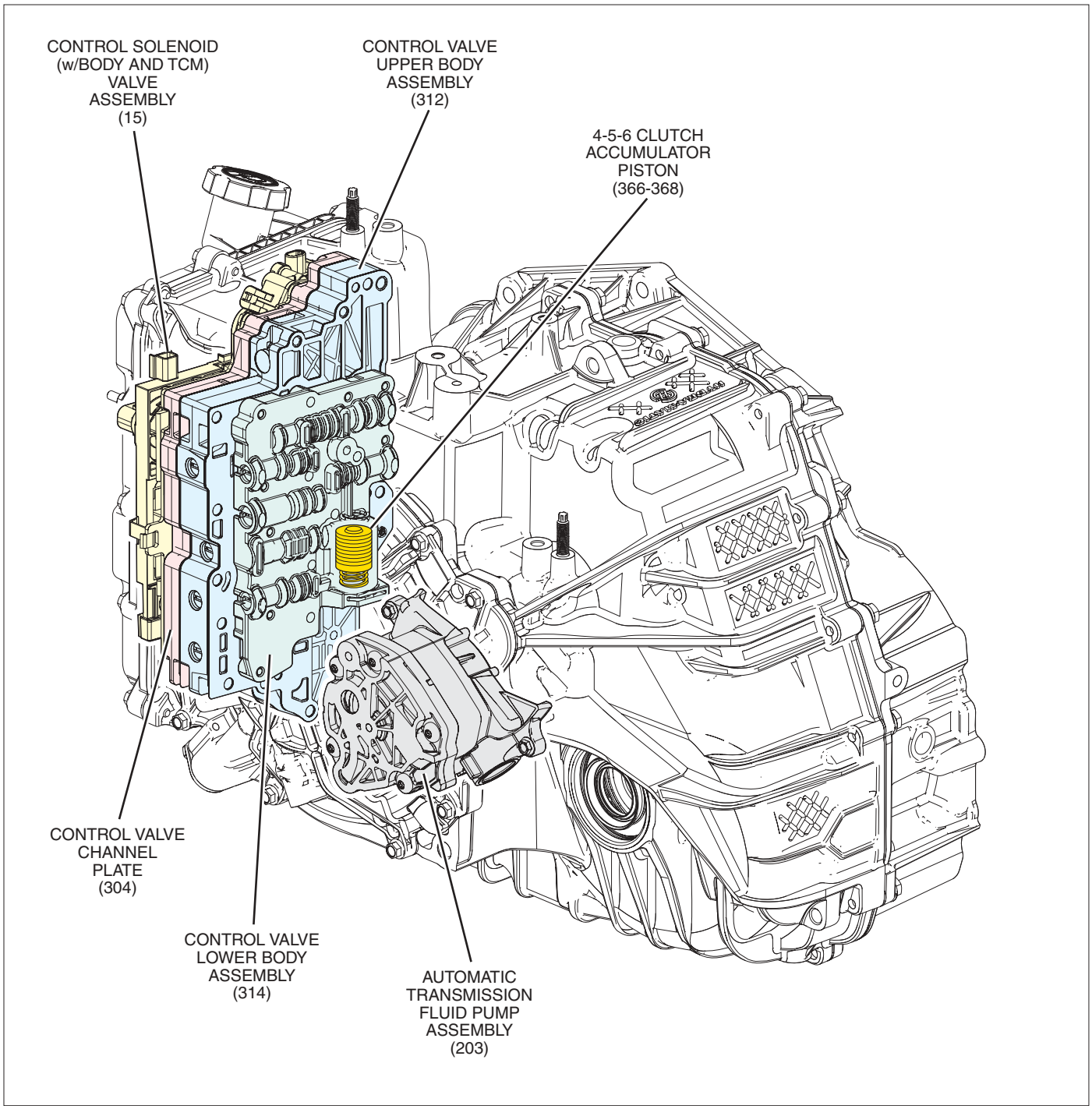
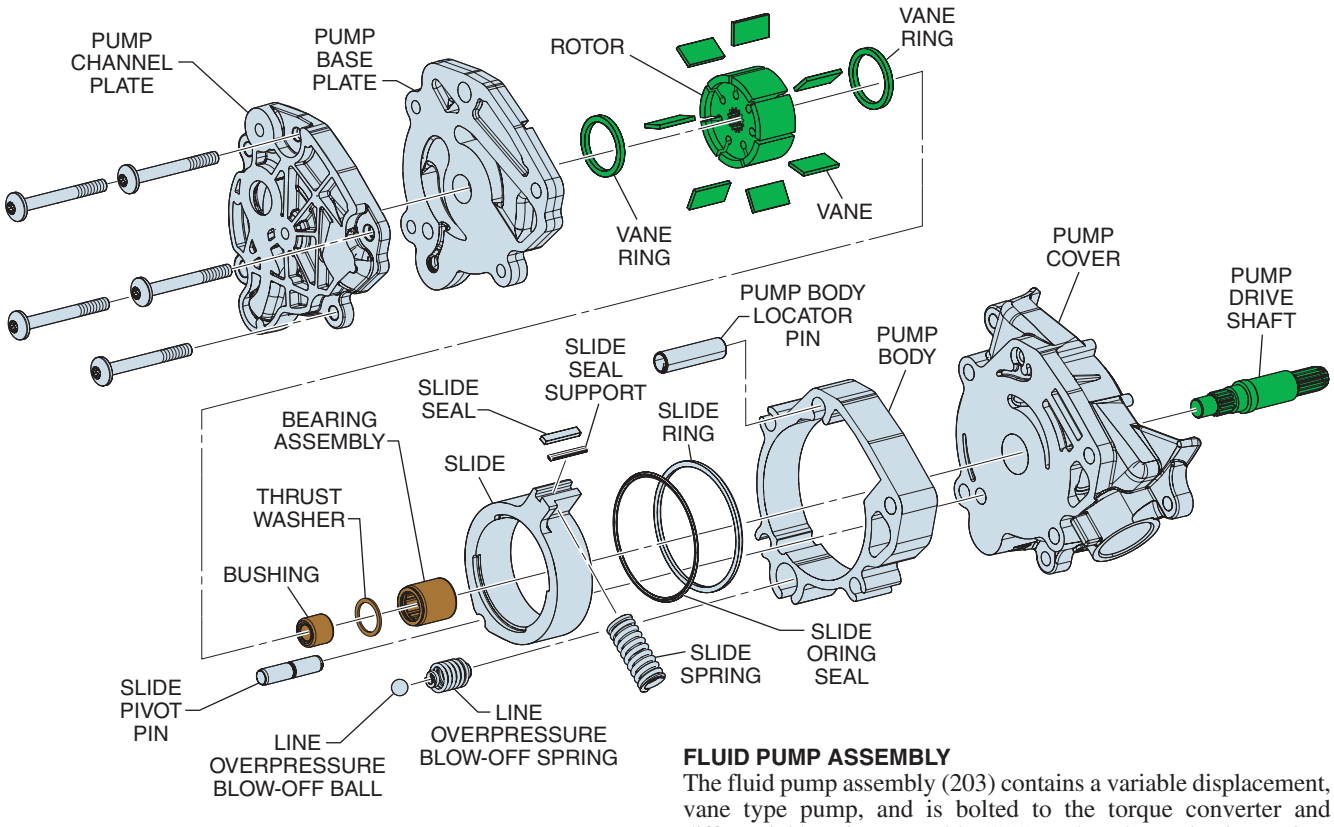
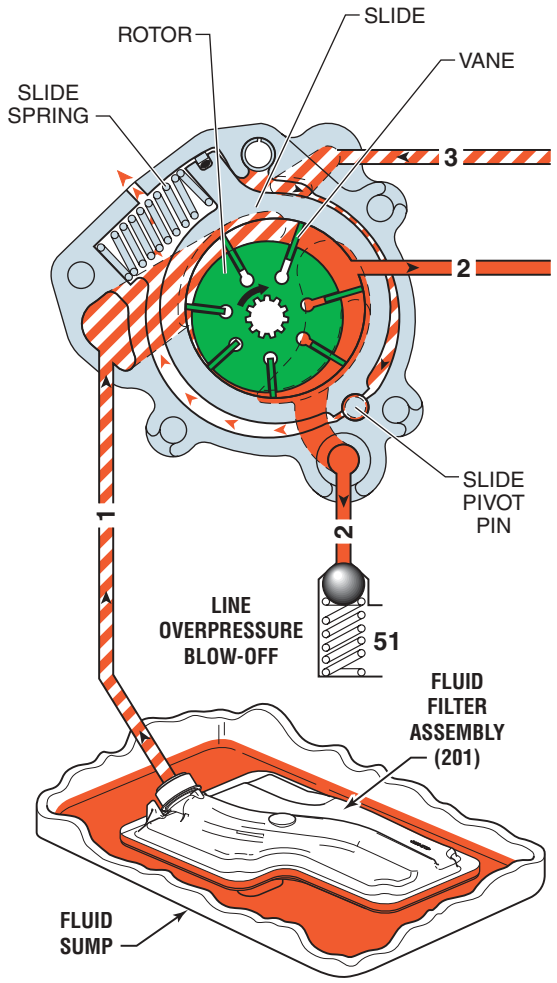


Figure 27

HYDRAULIC CONTROL COMPONENTS

FLUID PUMP ASSEMBLY





FLUID PUMP ASSEMBLY

The fluid pump assembly (203) contains a variable displacement, vane type pump, and is bolted to the torque converter and differential housing assembly (221). When the engine is running, the oil pump drive link drive sprocket (216), which is keyed to the torque converter pump hub and is in mesh with the drive link (217), turns the oil pump drive link driven sprocket (215) at engine speed. As the fluid pump rotor and the fluid pump vanes rotate, the volume of fluid between the vanes increases or expands, creating a vacuum at the pump intake port. The vacuum allows atmospheric pressure, acting on the fluid in the sump, to prime the pump quickly.

Fluid from the transmission case assembly (51) is drawn through the fluid filter assembly (201) and into the fluid pump suction (1) fluid circuit. This fluid enters a pump vane chamber and is transported to the pump outlet port where the volume between the fluid pump slide and the fluid pump rotor decreases. Decreasing the volume pressurizes the fluid, and forces the fluid into the line (2) pressure fluid circuit. Line (2) fluid is directed to the pressure regulator valve and becomes the main supply of fluid to the various components and hydraulic circuits in the transmission.

The events described above occur when the pump is operating at maximum output. Since most normal driving conditions do not require maximum output, the pressure regulator valve will move far enough against spring force to allow pressurized fluid to enter the decrease (3) fluid circuit. Decrease (3) pressure is applied to the backside of the fluid pump slide, and moves the slide against pump slide spring force to lower the output of the pump. The result is a control of the pump's delivery rate of fluid to match the hydraulic system demand.

Pump Related Diagnostic Tips

- Transmission Overheating
- Loss of drive
- High or low line pressure
- Slipping clutch or harsh apply

Figure 28

HYDRAULIC CONTROL COMPONENTS

PRESSURE REGULATION

The main components that control line pressure are the line pressure control (PC) solenoid and the pressure regulator valve. The fluid pressure required to apply the clutches varies in relation to throttle position and engine torque. At the pressure regulator valve, line (2) pressure is regulated in response to the following:

- PCS line (13) fluid pressure routed from the line PC Solenoid (this fluid pressure is proportional to engine torque – see page 44). PCS line (13) fluid pressure assists pressure regulator valve spring (338) force.
- Orificed line (2) fluid pressure acting on the end of the pressure regulator valve (337).

The pressure regulator valve routes line pressure into both the converter feed (4) and the decrease (3) fluid circuits. Converter feed (3) fluid is routed through the TCC control valve (342) to the TCC release (5) fluid circuit. Decrease (3) fluid pressure moves the fluid pump slide against the force of the pump slide spring.

Pressure Regulation

The line PC solenoid regulates fluid pressure as a function of engine torque (minimum signal pressure at low torque, maximum signal pressure at high torque). Line (2) pressure, acting on the end of the pressure regulator valve, moves the valve against spring force and PCS line (13) fluid pressure to a point where line (2) pressure enters both the converter feed (4) and the decrease (3) fluid circuits. Decrease (3) fluid pressure moves the pump slide against spring force and toward the center of the pump cavity. This decreases eccentricity between the pump slide and the rotor which, as a consequence, decreases the pump output capacity. Decrease (3) fluid pressure and the position of the pump slide constantly varies depending on driving conditions and the amount of fluid pressure and volume needed to operate the transmission.

Pressure Regulator Related Diagnostic Tips

A stuck or damaged pressure regulator valve could cause:

- High or low line pressure
- Slipping clutches or harsh apply
- Transmission overheating
- Low or no cooler/lube flow

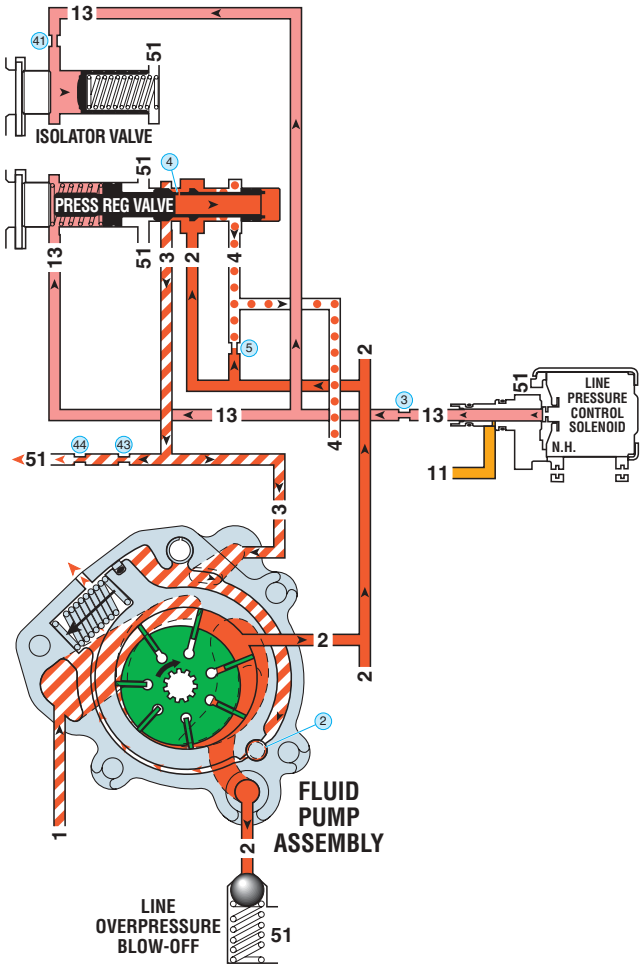


Figure 29

HYDRAULIC CONTROL COMPONENTS

VALVES LOCATED IN THE CONTROL VALVE UPPER BODY ASSEMBLY

PRESSURE REGULATOR VALVE TRAIN (337-341)

Pressure Regulator Valve (337)
Regulates line pressure in relation to vehicle operating conditions (see page 29 on Pressure Regulation). The pressure regulator valve is biased by PCS line (13) fluid pressure, pressure regulator valve spring (338) force, and line (2) pressure routed through orifice 4 to the end of the valve. Line (2) pressure is routed through the valve and into both the converter feed (4) and decrease (3) fluid circuits.

- A stuck pressure regulator valve could cause high or low fluid pressure.

Isolator Valve (340)
PCS line (13) fluid pressure moves the isolator valve against the isolator valve spring (341). The isolator valve acts as an accumulator to absorb irregularities in PCS line (13) fluid pressure and further control line pressure regulation.

Line Overpressure Blow-Off
The line overpressure blow-off ball and spring (located in the fluid pump assembly) prevent line (2) pressure from exceeding limits that may damage components within the transmission. Line (2) fluid pressure moves the ball against spring force and exhausts until line (2) pressure decreases sufficiently.

- A line overpressure blow-off ball not seated or damaged could cause high or low fluid pressure.

Torque Converter Clutch (TCC) Control Valve (342)
Controlled by the TCC pressure control (PC) solenoid state, the TCC control valve directs converter feed (4) fluid pressure to the release side of the torque converter clutch, and TCC apply (6) fluid into the cooler feed (7) circuit, when in the released position. The TCC control valve directs regulated apply (9) fluid to the apply side of the torque converter clutch, and converter feed (4) fluid into the cooler feed (7) circuit, when in the applied position. The valve is held in the released position (as shown) by torque converter clutch control valve spring (343) force when the TCC PC solenoid is OFF. With the TCC PC solenoid ON, PCS TCC (48) fluid pressure increases and moves the valve into the apply position against spring force.

If stuck, missing or binding, the TCC control valve or spring may cause:
- Incorrect TCC apply or release
- Inadequate lubrication and cooling

Clutch Select Valve 3 (345):
Responds to orificed CSV3 enable (18) fluid pressure and force from the clutch select valve 3 spring (344). In Reverse range only, the clutch select valve 3 is released to allow reverse (24) fluid pressure to pass through the valve and enter the 3-5 reverse clutch feed (25) fluid circuit. When CSV3 enable fluid pressure applies the valve, drive brake (32) fluid passes through the valve to enter the drive B (33) circuit in Drive Range – First gear (engine braking), and 456 clutch feed (46) fluid enters the 456 clutch (47) circuit in Drive Range – Fourth, Fifth and Sixth gears.

Clutch Select Valve 2 (347):
Responds to orificed CSV2 enable (17) fluid pressure and force from the clutch select valve 2 spring (346). In Park, Reverse, Neutral and Drive Range – First gear (engine braking) the clutch select valve 2 is applied (moved against spring force) to allow R1/456 clutch feed (19) fluid to be routed through the valve into the R1 supply (21) circuit, and drive (31) fluid enters the drive brake (32) circuit and is routed to the clutch select valve 3 (345). In Drive Range – First, Second, Third, Fourth, Fifth and Sixth gears CSV2 latch (41) fluid pressure, combined with clutch select valve 2 spring force, moves the valve to the released position. With the valve in this position, Drive (31) fluid from the manual valve passes through the valve and enters the Drive 1-6 (39) circuit, and R1/456 clutch feed (19) fluid is directed into the 456 clutch feed (46) circuit.

Manual Valve (348):
The manual valve is fed by line (2) pressure from the fluid pump assembly and is mechanically linked to the manual shift detent (w/ shaft position switch) lever assembly (511). When a gear range is selected, the manual valve directs line pressure into the various circuits by opening and closing feed passages. The circuits that are fed or exhausted by the manual valve are Reverse (24), and Drive (31).

Stuck, misaligned or damaged, the manual valve and linkage could cause:
- No reverse
- No Drive
- Stuck in drive or reverse

R1/4-5-6 Clutch Regulator Valve (326):
The R1/4-5-6 clutch regulator valve responds to orificed PCS R1/456 clutch (14) fluid pressure acting on one end of the valve, biased by spring force and R1 feedback (20) fluid pressure on the other end of the valve. When applied, it regulates orificed line pressure through the valve into the R1/456 clutch feed (19) fluid circuit during Park, Reverse, Neutral, Drive Range – First (engine braking), Fourth, Fifth and Sixth gears. In Drive Range – First, Second and Third gears, the valve is in the released position to allow R1 feedback (20) fluid and R1/ 456 clutch (19) fluid to be open to exhaust backfill (50). Also, when in the released position, drive 1-6 (39) fluid passes through the valve and enters the PS4 (40) circuit. PS4 fluid is then routed to pressure switch 4 and opens the switch.

Torque Converter Clutch (TCC) Regulator Apply Valve (330) and Torque Converter Clutch (TCC) Regulator Apply Shuttle Valve (331):
The TCC regulator valve is controlled by PCS TCC (48) fluid pressure on one side of the valve and TCC regulator apply valve spring (329) force at the other end. When the TCC PC solenoid is energized and PCS TCC (48) fluid pressure is present, the valve regulates Drive 1-6 (39) fluid pressure into the regulated apply (9) circuit. Regulated apply (9) fluid is then routed to the TCC control valve (342). The TCC regulator apply valve can also be applied by Solenoid 1 (15) fluid acting on the TCC regulator apply shuttle valve (331). This is done to enable a diagnostic to be run to determine if the TCC control valve is in the correct position.

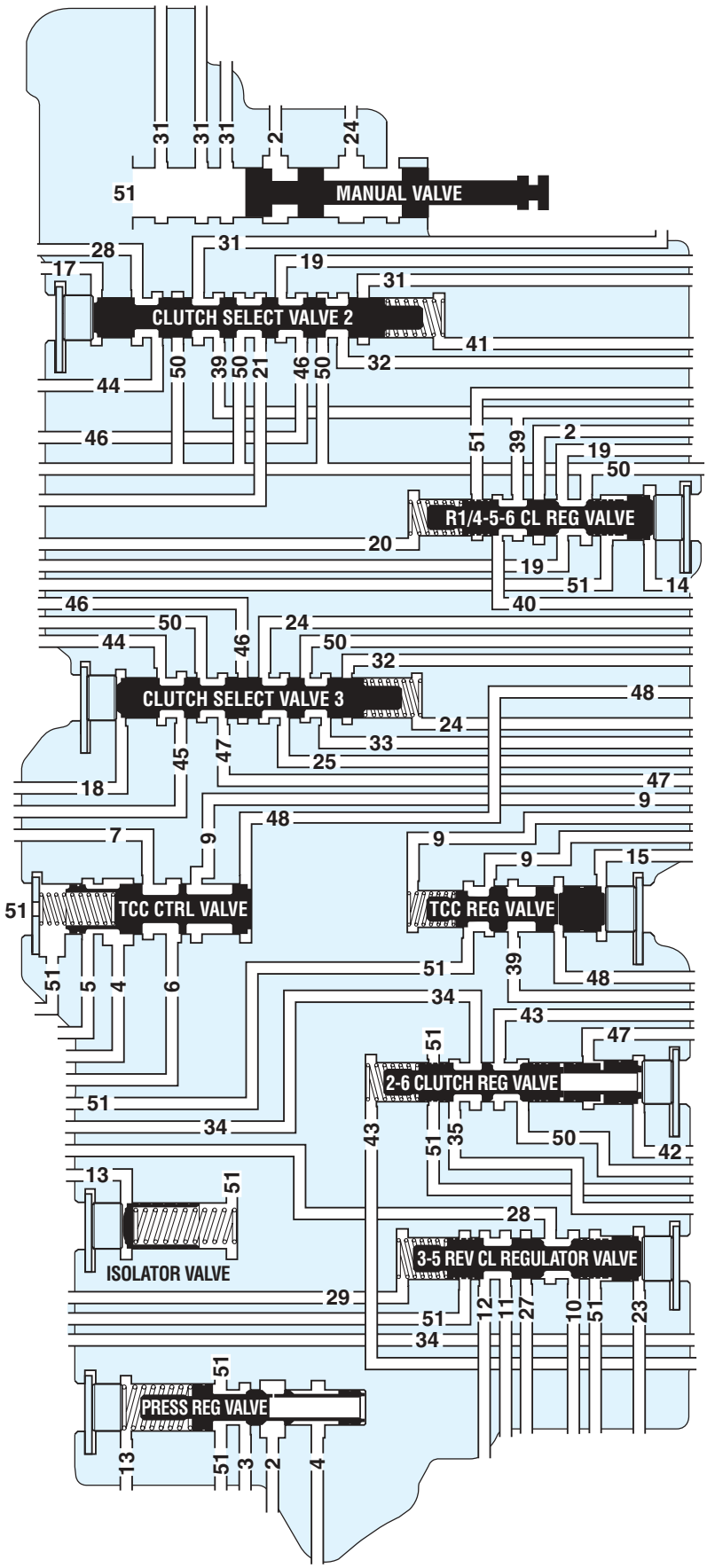
- TCC regulator apply valve stuck in the released position would cause no TCC/slip or soft apply.
- TCC regulator apply valve stuck in the applied position would cause harsh TCC apply.

2-6 Clutch Regulator Valve (333) and 2-6 Clutch Regulator Valve Gain Valve (334):
Responds to orificed PCS 2-6 clutch (42) fluid pressure acting on the 2-6 clutch regulator valve gain valve at one end of the valve, biased by spring force and orificed 26 clutch (43) fluid pressure on the other end of the valve. It regulates orificed 26 clutch/1234 clutch feed (34) fluid pressure into the 26 clutch (43) circuit during Drive Range – Second and Sixth gears. In Sixth gear, 456 clutch (47) fluid pressure acts on the 2-6 clutch regulator valve gain valve to lower the PCS 26 clutch (42) pressure to valve output pressure ratio. This allows for better control of the 5-6 shift. When in the released position it allows 26 clutch (43) fluid to exhaust through the valve into the exhaust backfill (50) fluid circuit. Also, when in the released, 26 clutch/1234 clutch feed (34) fluid passes through the valve and enters the PS3 (35) circuit. PS3 (35) fluid is then routed to pressure switch 3 and opens the switch.

3-5-Reverse Clutch Regulator Valve (336):
Responds to orificed PCS 35 reverse clutch (23) fluid pressure acting on one end of the valve, biased by 3-5-reverse clutch regulator valve (335) spring force and orificed 35 reverse clutch feedback (29) fluid pressure on the other end of the valve. When applied, it regulates orificed 35 reverse feed (27) fluid pressure into the 35 reverse clutch (28) circuit during Reverse, and Drive Range – Third and Fifth gears. When in the released position, it allows 35 reverse clutch (28) fluid pressure to exhaust through the valve into the compensator feed (10) circuit. Also, when in the released position, actuator feed limit (11) fluid passes through the valve and enters the PS2 (12) circuit. PS2 (12) fluid is then routed to pressure switch 2 and opens the switch.

HYDRAULIC CONTROL COMPONENTS

VALVES LOCATED IN THE CONTROL VALVE UPPER BODY ASSEMBLY



CONTROL VALVE UPPER BODY ASSEMBLY

Figure 30

HYDRAULIC CONTROL COMPONENTS

VALVES LOCATED IN THE CONTROL VALVE LOWER BODY ASSEMBLY

Actuator Feed Limit Valve (362):
The pressure control solenoids and the shift solenoids cannot support more than a given fluid pressure. In order not to over-pressurize the solenoids, the actuator feed limit valve regulates line (2) fluid pressure into the actuator feed limit (11) circuit. When actuator feed limit (11) pressure exceeds a given value, the valve limits flow into the circuit, keeping pressure below the given value. Orificed actuator feed limit (11) fluid pressure acting on the end of the valve, opposed by actuator feed limit valve spring (363) force, regulates line (2) fluid pressure through the valve into the actuator feed limit (11) circuit. Actuator feed limit (11) pressures will normally equal line (2) pressure when line (2) pressure is below the calibrated limiting values.

- Stuck in the released position would cause high actuator feed fluid pressure resulting in harsh shift conditions and damaged components.
- Stuck in the applied position would cause low actuator feed fluid pressure resulting in no/slipping shift conditions.

1-2-3-4 Clutch Regulator Valve (372):
Responds to orificed PCS 1234 clutch (30) fluid pressure acting on one end of the valve, biased by 1-2-3-4 clutch regulator valve spring (371) force and orificed 1234 clutch feedback (38) fluid pressure on the other end of the valve. When applied, it regulates orificed 1234 clutch feed (36) fluid pressure through the valve into the 1234 clutch (37) circuit during Drive Range – First (engine braking), First, Second, Third and Fourth gears. When in the released position, it allows 1234 clutch (37) fluid to exhaust through the valve into the exhaust backfill (50) circuit. Also, when in the released position, 1234 clutch feed (36) fluid passes through the valve and enters the PS1 (49) circuit. PS1 fluid is then routed to pressure switch 1 and opens the switch.

Default Override 1-2-3-4 Clutch (Shuttle) Valve (373):
Responds to orificed 1234 clutch default (45) fluid pressure, acting on the end of the valve, to move the 1-2-3-4 clutch regulator valve to the applied position against spring force and 1234 clutch feedback (38) fluid pressure. In the event of an electrical, TCM or other malfunction, which puts the transmission in default mode, orificed 1234 clutch default (45) fluid pressure would move the default override 1-2-3-4 (shuttle) valve and the 1-2-3-4 clutch regulator valve to the applied position. If this event occurs, the transmission will operate in Drive Range – Third or Fifth gear, dependent on when the malfunction occurs. Park, Reverse and Neutral ranges are also available when the transmission is operating in default mode.

1-2-3-4 Clutch Boost Valve (369):
Orificed PCS 1234 clutch (30) fluid pressure acts on a differential area moving the 1-2-3-4 clutch boost valve against 1-2-3-4 clutch boost valve spring (370) force. 1234 clutch (37) fluid passes through the valve and enters the 1234 clutch feedback (38) circuit. As PCS 1234 clutch (30) fluid pressure is increased to a given value, the 1-2-3-4 clutch boost valve opens the 1234 clutch feedback (38) circuit to exhaust (51). This results in the 1-2-3-4 clutch regulator valve moving to the full feed position, sending full 1234 clutch feed (36) pressure (full line pressure) to the 1-2-3-4 clutch.

3-5-Reverse Clutch Boost Valve (364):
Orificed PCS 35 reverse clutch (23) fluid pressure acts on a differential area moving the 3-5-reverse clutch boost valve against 3-5-reverse clutch boost valve spring (365) force. 35 reverse clutch (28) fluid passes through the valve and enters the 35 reverse clutch feedback (29) circuit. As PCS 35 reverse clutch (23) fluid pressure is increased to a given value, the 3-5 reverse clutch boost valve opens the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5-reverse clutch regulator valve moving to the full feed position, sending full 35 clutch reverse feed (27) pressure (full line pressure) to the 3-5-reverse clutch.

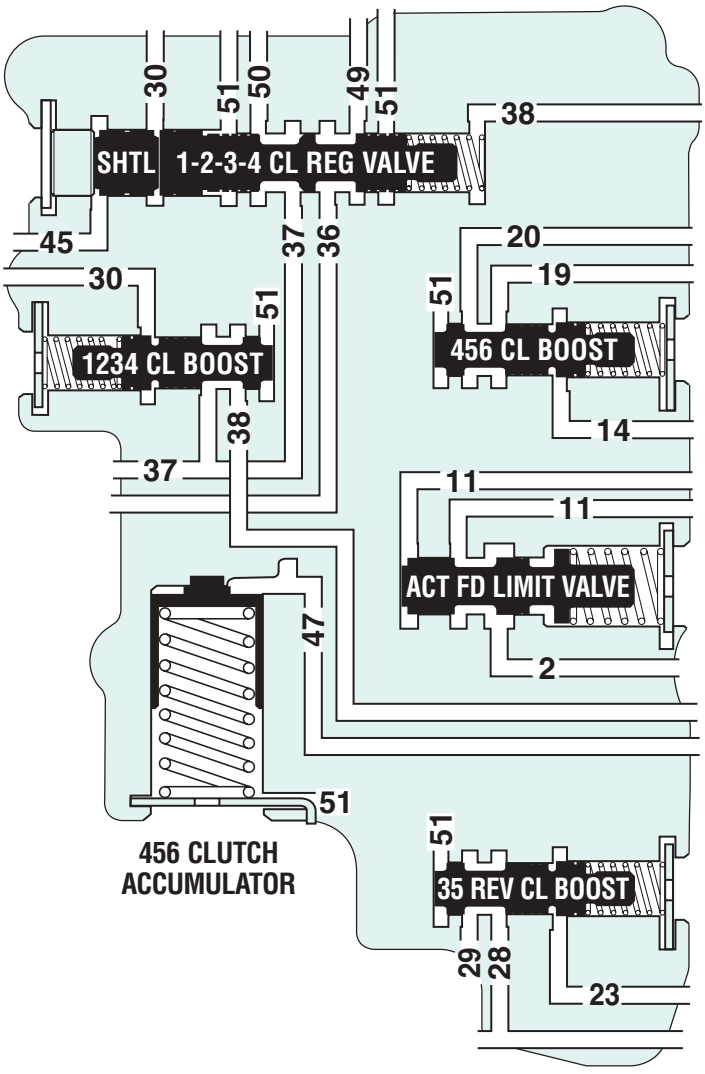
4-5-6 Clutch Boost Valve (360):
Orificed PCS R1/456 clutch (14) fluid pressure acts on a differential area moving the 4-5-6 clutch boost valve against 4-5-6 clutch boost valve spring (361) force. R1/456 clutch feed (19) fluid passes through the valve and enters the R1 feedback (20) circuit. As PCS R1/456 clutch (14) pressure is increased to a given value, the 4-5-6 clutch boost valve opens the R1 feedback (20) circuit to exhaust (51). This results in the R1/4-5-6 clutch regulator valve moving to the full feed position, sending full line (2) pressure to the 4-5-6 clutch.

4-5-6 Clutch Accumulator Piston (366):
456 clutch (47) fluid pressure acts on the 4-5-6 clutch accumulator piston in Drive Range – Fourth, Fifth and Sixth gears. This pressure moves the piston against 4-5-6 clutch accumulator piston spring (367) force, thereby dampening any pressure irregularities occurring in the 456 clutch (47) fluid circuit.

Note: Refer to the 'Power Flow' and 'Complete Hydraulic Circuit' sections for a detailed explanation of each component's operation in a specific gear range. Also, refer to the 'Electronic Components' section for a detailed description of each electronic component.

HYDRAULIC CONTROL COMPONENTS

VALVES LOCATED IN THE CONTROL VALVE LOWER BODY ASSEMBLY



CONTROL VALVE
LOWER BODY
ASSEMBLY

Figure 31

HYDRAULIC CONTROL COMPONENTS

BALL CHECK VALVES AND ACCUMULATORS LOCATION AND FUNCTION

#1 DRIVE 1-6/DRIVE BRAKING:
Located in the control valve upper body assembly, this "ball shuttle valve" style ball check valve allows drive braking fluid, in a Drive Range – First gear (engine braking) condition, to enter the 2-6 clutch/1234 clutch feed fluid circuit to apply the 1-2-3-4 clutch. When the transmission is operating in Drive Range – First, Second, Third, Fourth, Fifth or Sixth gears, drive 1-6 fluid seats the ball check valve against the drive braking passage and enters the 2-6 clutch/1234 clutch fluid feed circuit to apply the 1-2-3-4 clutch.

#2 SOLENOID 1/REVERSE:
Located in the control valve upper body assembly, this "ball shuttle valve" style ball check valve is seated against the reverse fluid passage while the transmission is operating in Park, Neutral and Drive Range – First gear (engine braking). With the ball check valve in this position, solenoid 1 fluid enters the CSV2 enable fluid circuit to apply the clutch select valve 2. When the transmission is operating in Reverse, the ball check valve seats against the solenoid 1 fluid passage to allow reverse fluid to enter the CSV2 enable fluid circuit and hold the clutch select valve 2 in the applied position.

#3 SOLENOID 2/4-5-6 CLUTCH:
Located in the control valve upper body assembly, this "ball shuttle valve" style ball check valve is seated against the 456 clutch passage while the transmission is operating in Park, Reverse, Neutral, Drive Range – First, Second and Third gears. With the ball check valve in this position, solenoid 2 fluid enters the CSV3 enable fluid circuit to apply the clutch select valve 3. When the transmission is operating in Drive Range – Fourth, Fifth or Sixth gears, the ball check valve seats against the solenoid 2 fluid passage to allow 456 clutch fluid to enter the CSV3 enable fluid circuit and hold the clutch select valve 2 in the applied position.

#4 PS4/4-5-6 CLUTCH:
Located in the control valve upper body assembly, this "ball shuttle valve" style ball check valve is seated against the 456 clutch passage by PS4 fluid while the transmission is operating in Drive Range – First, Second and Third gears. With the ball check valve in this position, PS4 fluid enters the CSV2 latch fluid circuit to hold the clutch select valve 2 in the released position. When the transmission is operating in Drive Range – Fourth, Fifth or Sixth gears, 456 clutch fluid pressure seats the ball check valve against the PS4 fluid passage to allow 456 clutch fluid to enter the CSV2 latch fluid circuit to hold the clutch select valve 2 in the released position.

#5 DRIVE 1-6/3-5 REVERSE CLUTCH FEED:
Located in the control valve upper body assembly, this "ball shuttle valve" style ball check valve is seated against the Drive 1-6 fluid passage by 35 reverse clutch feed fluid while the transmission is operating in Reverse. With the ball check valve in this position, 35 reverse clutch feed fluid enters the 35 reverse supply circuit and is routed to the #7 ball check valve. When the transmission is operating in Drive Range – First, Second, Third, Fourth, Fifth or Sixth gears, Drive 1-6 clutch fluid pressure seats the ball check valve against the 35 reverse clutch feed passage to allow Drive 1-6 clutch fluid to enter the 35 reverse supply fluid circuit.

#6 2-6 CLUTCH/1-2-3-4 CLUTCH FEED:
Located in the control valve upper body assembly, this "one way orifice control" style ball check valve is used to differentiate the flow rate of fluid between applying and releasing the 1-2-3-4 clutch. 26 clutch/1234 clutch feed fluid pressure opens the ball check valve while the transmission is operating in Drive Range – First (engine braking), First, Second, Third, Fourth, Fifth or Sixth gears. With the ball check valve in this position, 26 clutch/1234 clutch feed fluid flows freely into the 1234 clutch feed fluid passage. When Park, Reverse or Neutral range is selected after the transmission was operating in Drive range, exhausting 1234 clutch feed fluid seats the ball check valve and fluid is forced through orifice #23. This allows for a controlled exhaust of 1234 clutch feed fluid.

#7 3-5 REVERSE SUPPLY/3-5 REVERSE FEED:
Located in the control valve upper body assembly, this "one way orifice control" style ball check valve is used to differentiate the flow rate of fluid between applying and releasing the 3-5 reverse clutch. 35 reverse supply fluid pressure seats the ball check valve against the 35 reverse feed passage while the transmission is operating in Reverse, Drive Range – First, Second, Third, Fourth, Fifth or Sixth gears. With the ball check valve in this position, 35 reverse supply fluid is forced through orifice #16 before entering the 35 reverse feed fluid passage. The orifice helps control the apply rate of the 3-5 clutch when the transmission shifts into Reverse, or Drive Range – Third or Fifth gears. When Park or Neutral range is selected after the transmission was operating in Drive, or Reverse, exhausting 35 reverse feed fluid unseats the ball check valve. This allows for a faster exhaust of 35 reverse feed fluid and a quick release of the 3-5 reverse clutch.

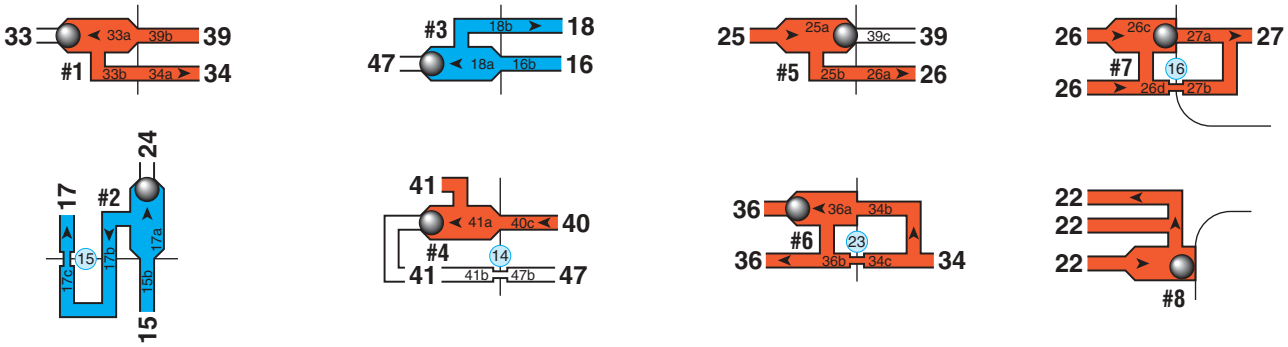
#8 R1 (Low and Reverse):
Located in the control valve upper body assembly, this "one way orifice control" style ball check valve is used to differentiate the flow rate of fluid between applying and releasing the low and reverse clutch. R1 fluid pressure unseats the ball check valve while the transmission is operating in Park, Reverse, Neutral, and Drive Range – First gear (engine braking). This allows for a quick apply of the low and reverse clutch. When the transmission shifts into Drive Range – First gear after operating in Drive Range First Gear (engine braking), exhausting R1 fluid seats the ball check valve. With the ball check valve in this position, R1 fluid is forced through orifice #18 before entering the R1 supply fluid passage. The orifice helps control the release rate of the low and reverse clutch.

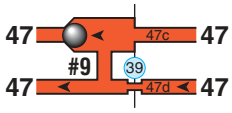
#9 4-5-6 Clutch:
Located in the control valve upper body assembly, this "one way orifice control" style ball check valve is used to differentiate the flow rate of fluid between applying and releasing the 4-5-6 clutch. 4-5-6 clutch fluid pressure seats the ball check valve while the transmission is operating in Drive Range – Fourth, Fifth and Sixth gears. With the ball check valve in this position, 4-5-6 clutch fluid is forced through orifice #39 before being routed to the 4-5-6 clutch. The orifice helps control the apply rate of the 4-5-6 clutch when the transmission shifts into Fourth, Fifth and Sixth gears. When Park, Reverse or Neutral range is selected after the transmission was operating in Drive Range – Fourth, Fifth or Sixth gear, exhausting 4-5-6 clutch fluid unseats the ball check valve. This allows for a faster exhaust of 4-5-6 clutch fluid and a quick release of the 4-5-6 clutch.

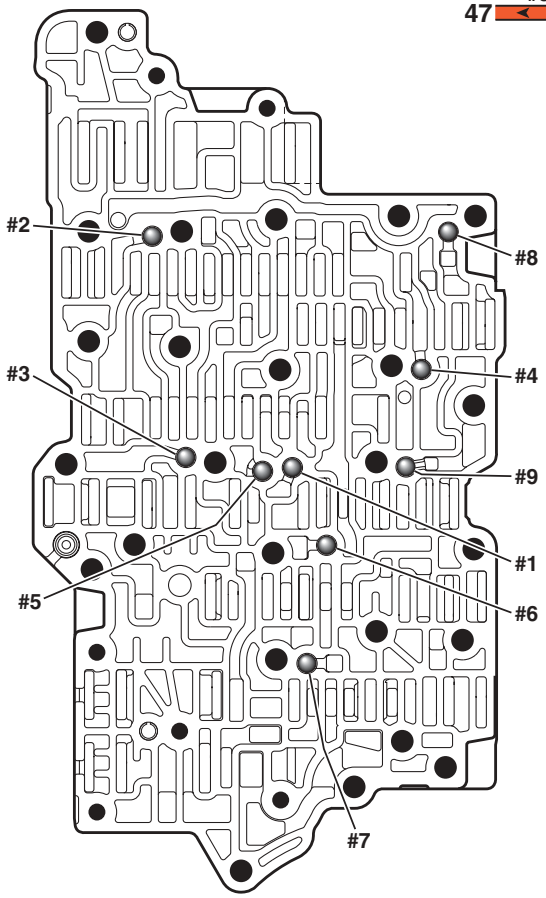
Actuator Feed Accumulator Piston (306):
Located in the control valve channel plate, three actuator feed accumulators are used to dampen any pressure irregularities occurring in the actuator feed limit (11) fluid circuit.

HYDRAULIC CONTROL COMPONENTS

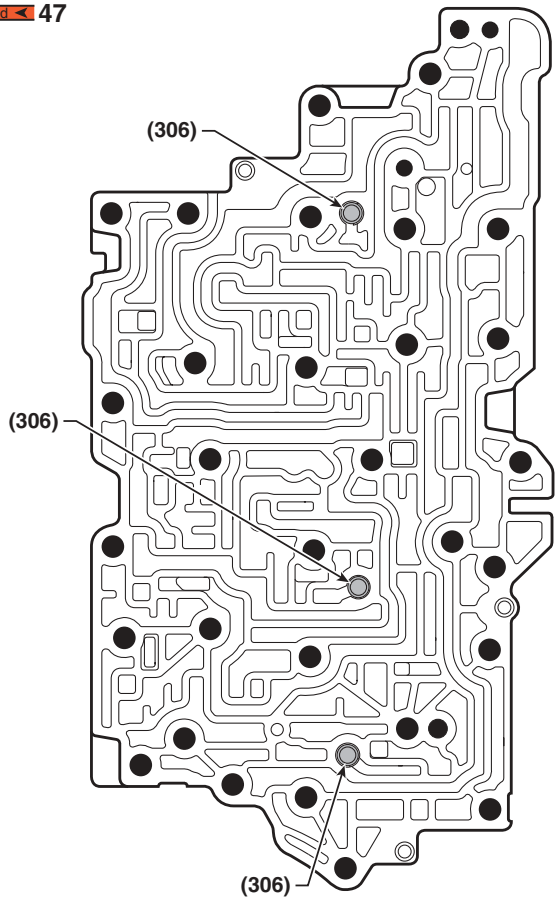
BALL CHECK VALVES AND ACCUMULATORS LOCATION AND FUNCTION



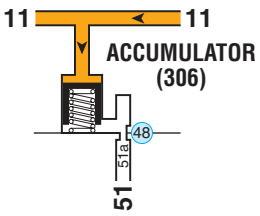


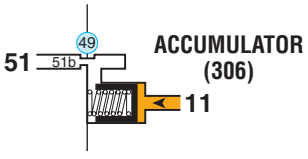


CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)





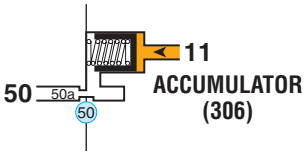


Figure 32

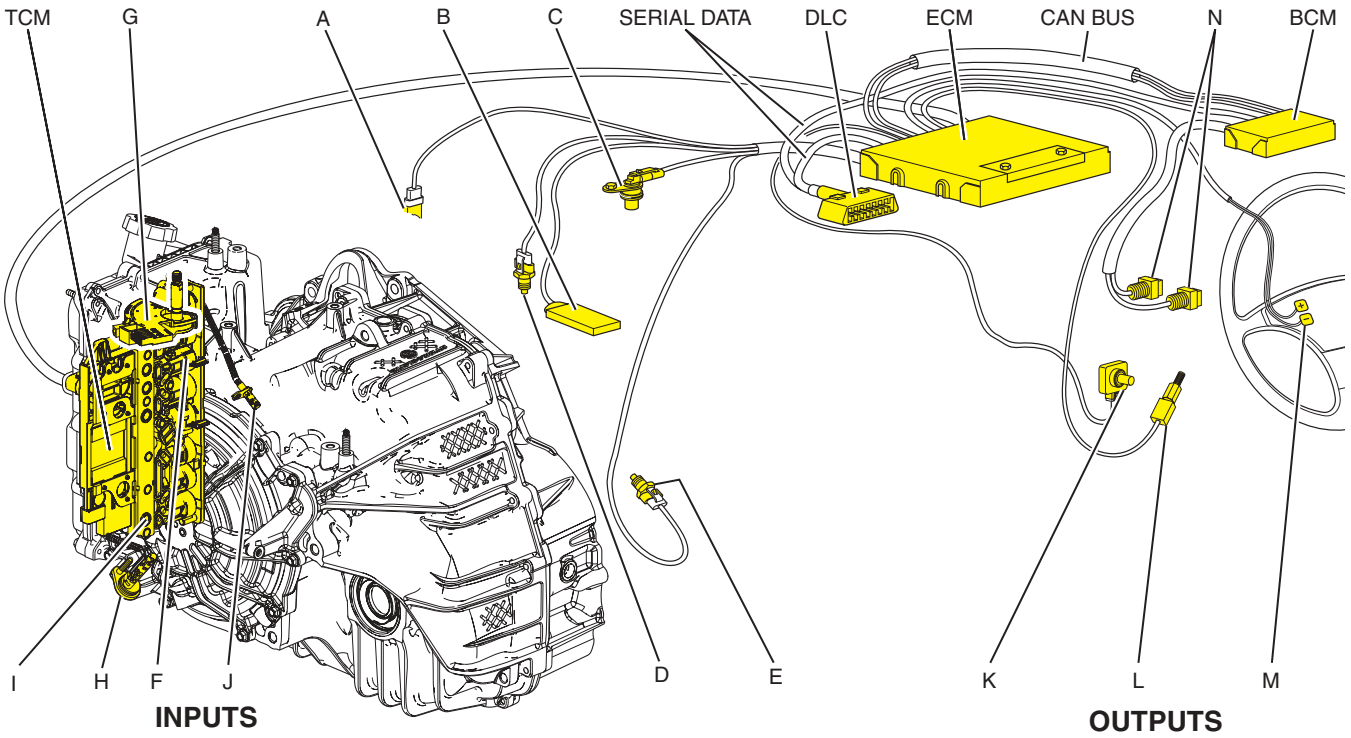
NOTES

ELECTRICAL COMPONENTS

The Hydra-matic 6T70/75 transmission incorporates electronic controls that utilize the transmission control module (TCM) to control shift points (through shift solenoids and pressure control solenoids), torque converter clutch (TCC) apply and release [through the torque converter clutch pressure control (TCC PC) solenoid] and line pressure [through the pressure control (PC) solenoid]. In the 6T70/75 transmission, the TCM and all of the shift solenoids, PC solenoids, TFT sensor and fluid pressure switches are contained in one unit, the control solenoid (w/body and TCM) valve assembly (15). Electrical signals from various sensors provide information to the TCM about vehicle speed, throttle position, engine coolant temperature, transmission fluid temperature, gear range selector position, engine speed, converter turbine speed, engine load braking and operating mode. The TCM uses this information to determine the precise moment to upshift or downshift, apply or release the TCC, and what fluid pressure is needed to apply the clutches. This type of control provides consistent and precise shift points and shift quality based on the operating conditions of the vehicle.

Adaptive shift control technology enables the TCM to continually monitor and compare shift performance to the "optimum" shift, and make adjustments to the factory settings to continually deliver excellent shift quality.

If for any reason the entire electronic control system of the transmission, or one of the electrical components within the control solenoid (w body and TCM) valve assembly becomes disabled, the transmission will default to protection mode. If the transmission is in 1st, 2nd or 3rd gear during an electrical malfunction, the transmission will default to 3rd gear. If the transmission is in 4th, 5th or 6th gear during an electrical malfunction, the transmission will default to 5th gear.



INPUTS

INFORMATION SENSORS

A. THROTTLE POSITION (TP) SENSOR
B. MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
C. ENGINE SPEED SENSOR
D. MANIFOLD AIR TEMPERATURE (MAT) SENSOR
E. ENGINE COOLANT TEMPERATURE (ECT) SENSOR
F. TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR
G. TRANSMISSION MANUAL SHIFT DETENT (W/SHIFT POSITION SWITCH) LEVER ASSEMBLY
H. TRANSMISSION INPUT SPEED SENSOR (A/T ISS)
I. TRANSMISSION FLUID PRESSURE SWITCHES
J. TRANSMISSION OUTPUT SPEED SENSOR (A/T OSS)
K.ACCELERATOR PEDAL POSITION (APP) SENSOR
L. BRAKE SWITCH
M. DRIVER SHIFT CONTROL (DSC) SWITCHES
N. OPERATING MODE SELECTION SWITCHES

ELECTRONIC CONTROLLERS

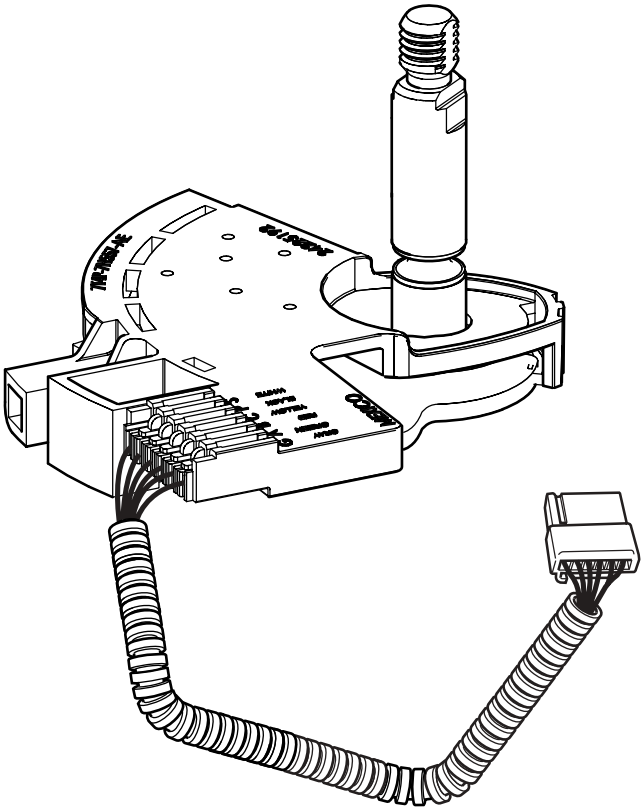
- TRANSMISSION CONTROL MODULE (TCM)
- ENGINE CONTROL MODULE (ECM)
- BODY CONTROL MODULE (BCM)
- ELECTRONIC BRAKE AND TRACTION CONTROL MODULE (EBTCM) (NOT SHOWN)
- DIAGNOSTIC LINK CONNECTOR (DLC)

OUTPUTS

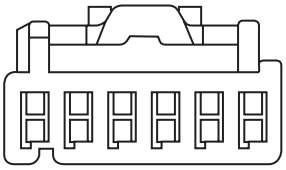
ELECTRONICALLY CONTROLLED TRANSMISSION COMPONENTS

- LINE PRESSURE CONTROL SOLENOID
- PRESSURE CONTROL SOLENOID 2
- PRESSURE CONTROL SOLENOID 3
- PRESSURE CONTROL SOLENOID 4
- PRESSURE CONTROL SOLENOID 5
- TORQUE CONVERTER CLUTCH (TCC) PRESSURE CONTROL (PC) SOLENOID
- SHIFT SOLENOID (SS) 1
- SHIFT SOLENOID (SS) 2

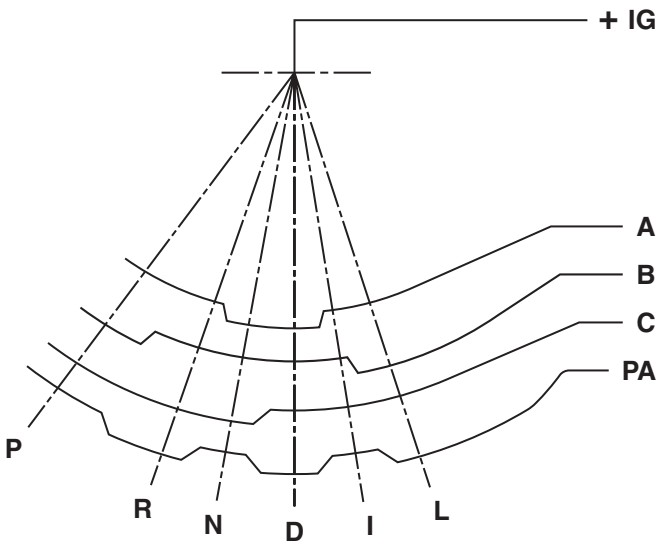
Figure 33



MANUAL SHIFT DETENT(W/SHIFT POSITION SWITCH)
LEVER ASSEMBLY
(511)



MANUAL SHIFT DETENT(W/SHIFT POSITION SWITCH)
CONNECTOR



SHAFT POSITION SWITCH [MANUAL SHIFT DETENT LEVER ASSEMBLY (511)]:

The shaft position switch [manual shift detent lever assembly (511)], sometimes referred to as an Internal Mode Switch (IMS), is a sliding contact switch attached to the manual shift shaft inside the transmission case. The four inputs to the TCM from the position switch assembly indicate which transmission gear range is selected. The state of each input is available for display on the scan tool. The four input parameters represented are Signal A, Signal B, Signal C, and Signal P (Parity).

A fifth input, signal N (P/N Start), does not input the TCM, but rather goes directly to the ECM to determine a Park/Neutral state and allow engine start. Routing Signal N to the ECM will allow the engine to be started with a dead TCM. Signal N is not a signal used by the TCM for shaft position switch logic.

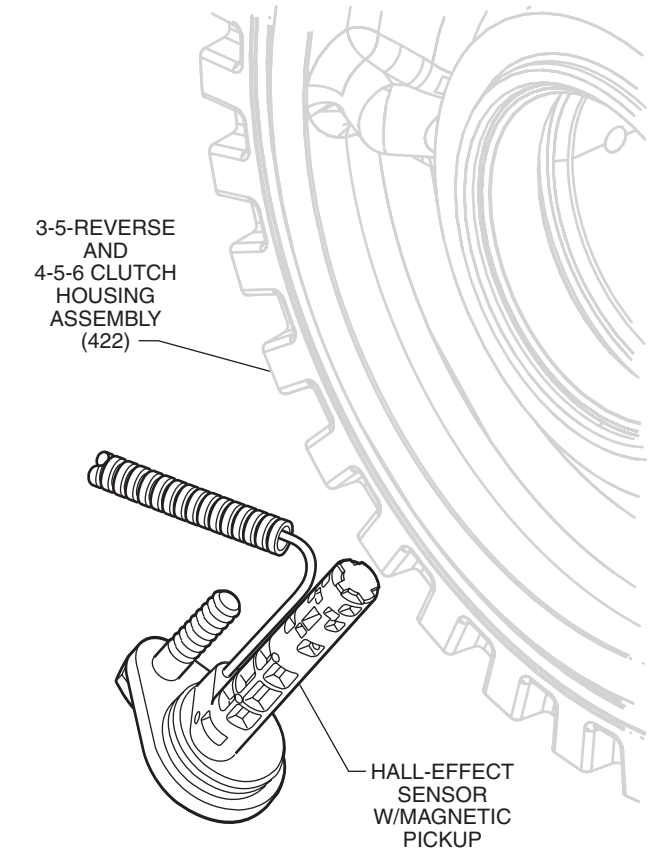
SHAFT POSITION SWITCH LOGIC

GEAR SELECTOR POSITION	SIGNAL			
	A	B	C	P
Park	LOW	HI	HI	LOW
Park/Reverse	LOW	LOW	HI	LOW
Reverse	LOW	LOW	HI	HI
Reverse/Neutral	HI	LOW	HI	HI
Neutral	HI	LOW	HI	LOW
Neutral/Drive 6	HI	LOW	LOW	LOW
Drive 6	HI	LOW	LOW	HI
Drive 6/Drive 4	LOW	LOW	LOW	HI
Drive 4	LOW	LOW	LOW	LOW
Drive 4/Drive 3	LOW	HI	LOW	LOW
Drive 3	LOW	HI	LOW	HI
Drive 3/Drive 2	HI	HI	LOW	HI
Drive 2	HI	HI	LOW	LOW
Open	HI	HI	HI	HI
Invalid	HI	HI	HI	LOW
Invalid	LOW	HI	HI	HI

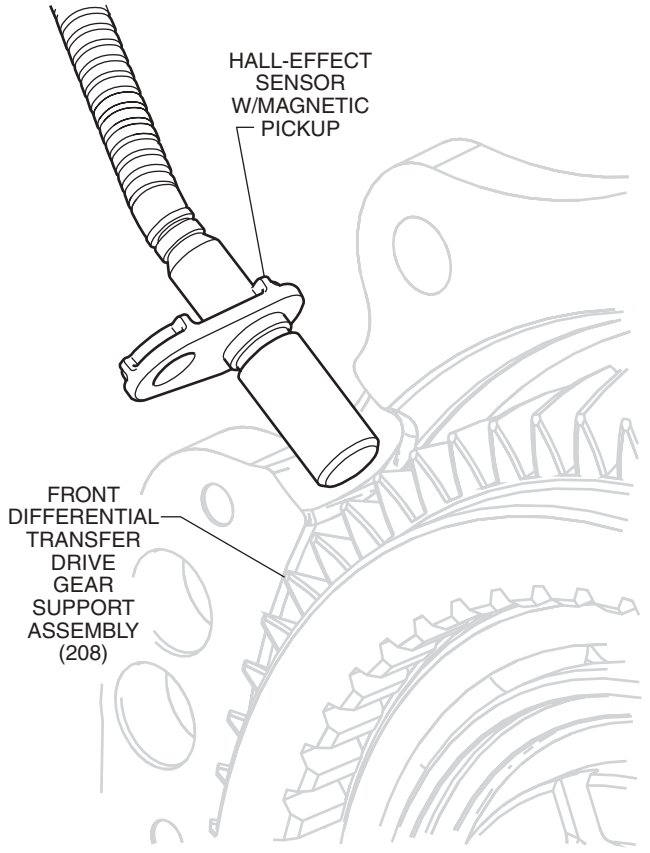
HI = Ignition Voltage
LOW = 0 Volts

If the TCM detects an improper signal from the shaft position switch (manual shift detent lever assembly), a DTC will be activated.

Figure 34



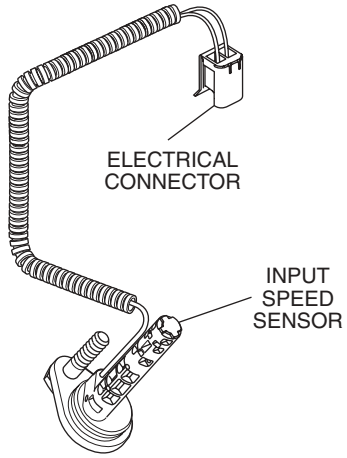
INPUT SPEED SENSOR



OUTPUT SPEED SENSOR

TRANSMISSION SPEED SENSORS

Automatic Transmission Input (Shaft) Speed (A/T ISS) Sensor Assembly (400):
The input speed sensor (ISS) is a hall-effect type sensor. The ISS is mounted inside the automatic transmission case cover assembly (403), and is connected to the control solenoid (w/body and TCM) valve assembly through a wire harness and connector. The sensor faces the automatic transmission input shaft speed sensor reluctor wheel (415) (attached to the 3-5-reverse and 4-5-6 clutch housing assembly) and is triggered by splines on the reluctor wheel outside diameter. The sensor receives 8.3–9.3 volts on the ISS/OSS supply voltage circuit from the TCM. As the reluctor wheel rotates, the sensor produces a signal frequency based on the spline profile and speed of the reluctor wheel. This signal is transmitted through the ISS signal circuit to the TCM. The TCM uses the ISS signal to determine line pressure, transmission shift timing, torque converter clutch (TCC) slip speed and gear ratio.



If the TCM detects an improper signal from the transmission input or output speed sensors, a DTC will be activated.

Automatic Transmission Output Speed (A/T OSS) Sensor Assembly (19):
The output speed sensor (OSS) is also a hall-effect type sensor. The OSS is mounted inside the automatic transmission case assembly (51), and is connected to the control solenoid (w/body and TCM) valve assembly through a wire harness and connector. The sensor faces the front differential transfer drive gear support assembly (208) and is triggered by the machined gear teeth of the front differential transfer drive gear. The sensor receives 8.3–9.3 volts on the ISS/OSS supply voltage circuit from the TCM. As the front differential transfer drive gear rotates, the sensor produces a signal frequency based on the machined gear teeth and speed of the front differential transfer drive gear. This signal is transmitted through the OSS signal circuit to the TCM. The TCM uses the OSS signal to determine line pressure, transmission shift timing, vehicle speed and gear ratio.

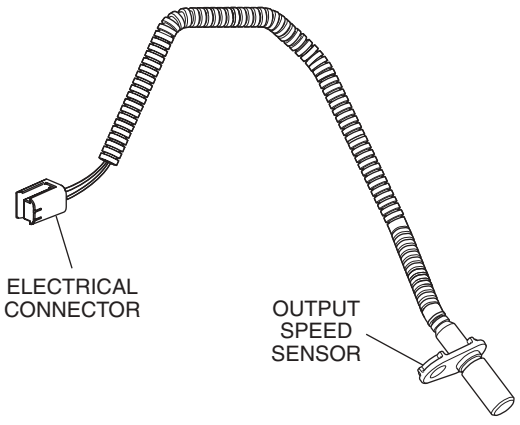
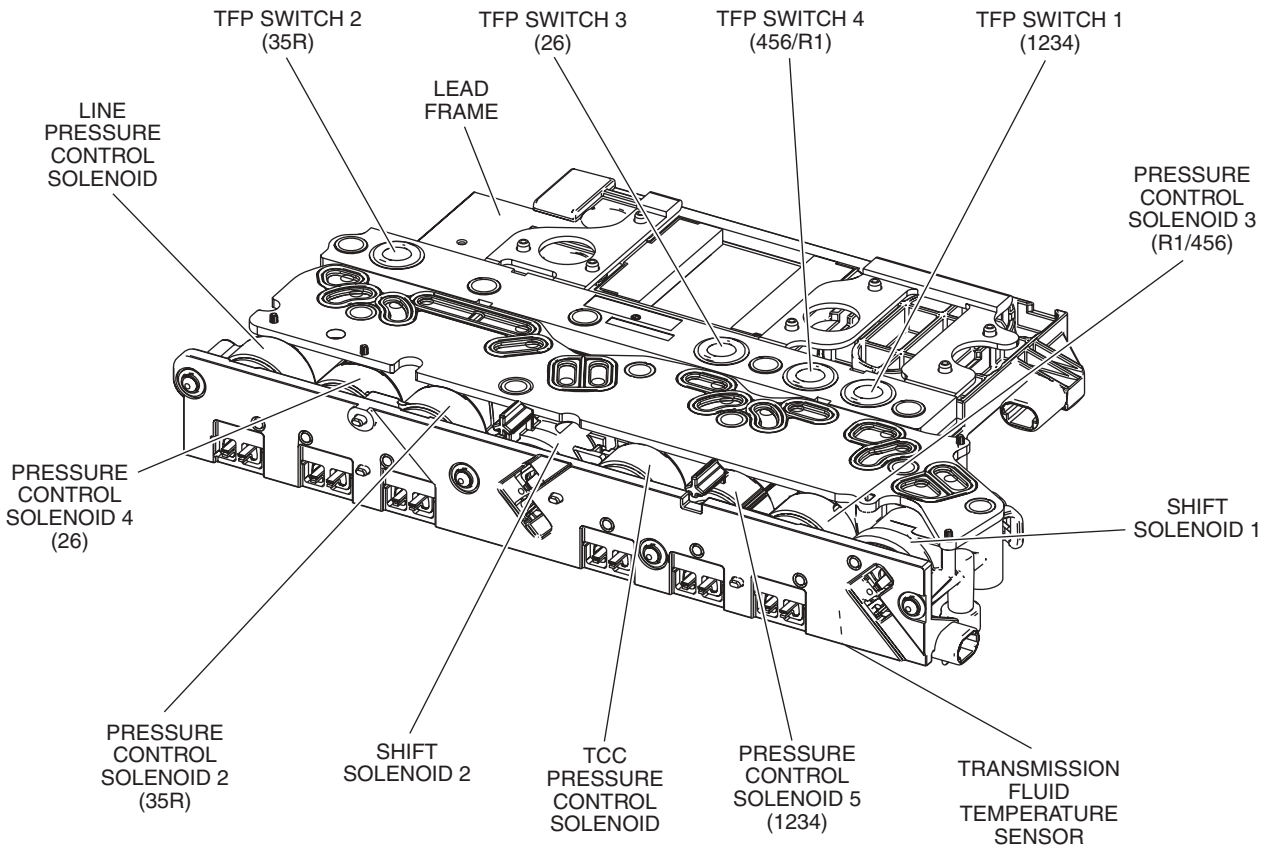


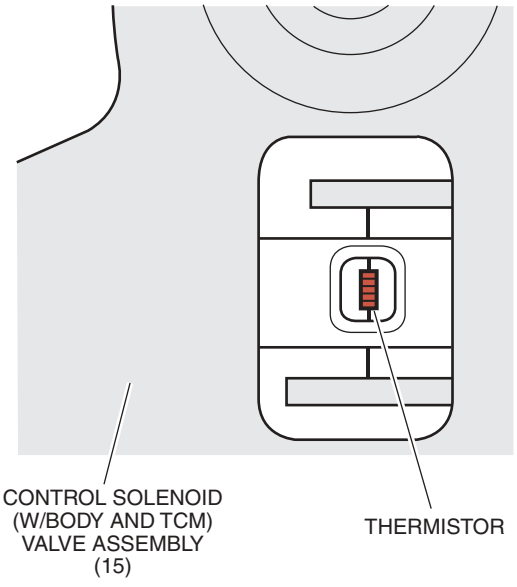
Figure 35

CONTROL SOLENOID (W/BODY AND TCM) VALVE ASSEMBLY (15)



The control solenoid (w/body and TCM) valve assembly bolts directly to the lower and upper control valve body assemblies inside the transmission. The control solenoid valve assembly utilizes a lead frame system to connect the components to the TCM. There are no wires used for these components. The control solenoid valve assembly connects to the engine harness 16-way connector via a pass-thru sleeve. All fluid passages to the switches and solenoids are protected from debris by a serviceable control solenoid filter plate assembly (16). In addition to the components shown above, there are two temperature sensors located inside the TCM that are not shown, the TCM Temperature Sensor and the Power Up Temperature Sensor.

The above components are diagnosed separately, but are serviced as an assembly.

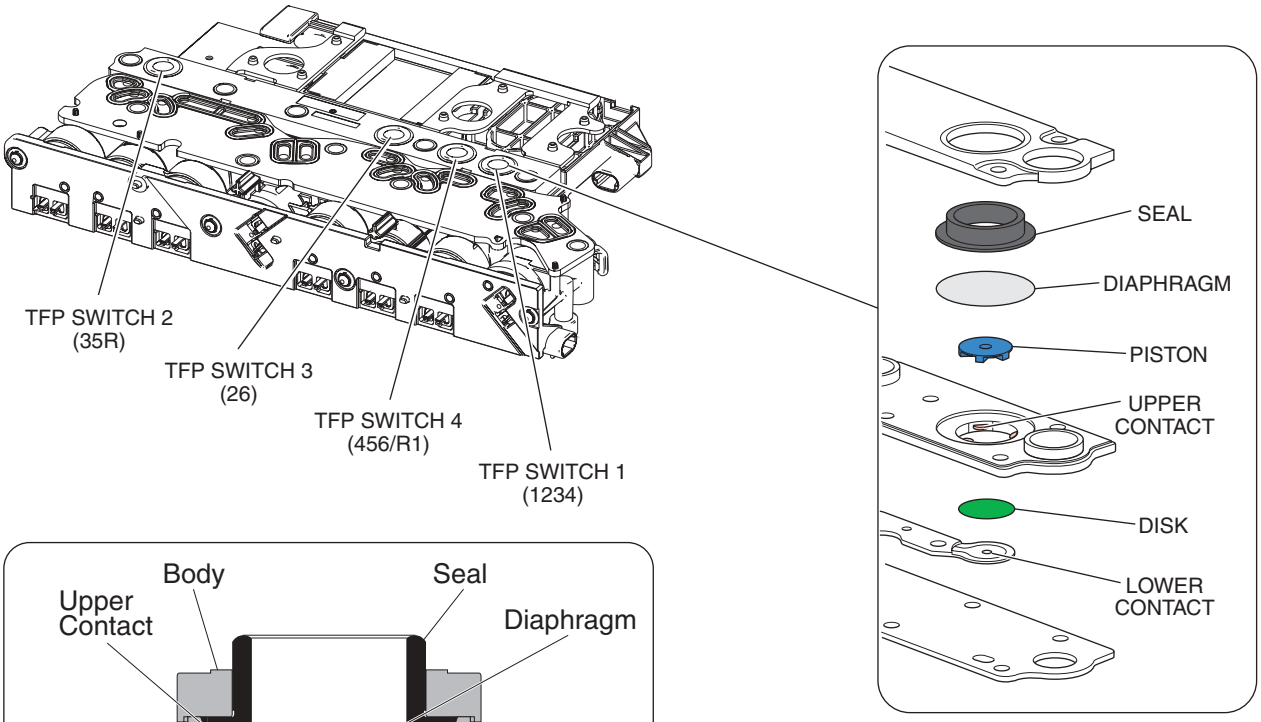


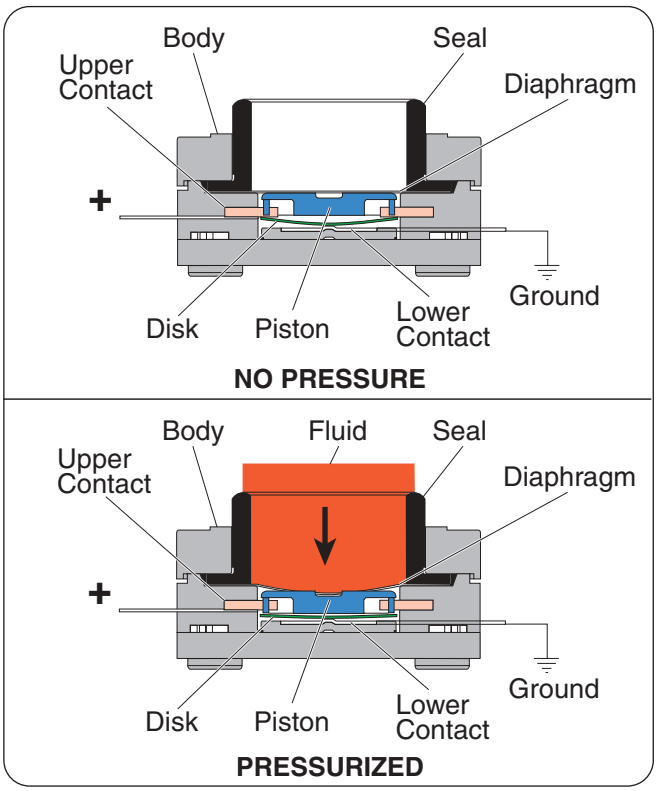
Automatic Transmission Fluid Temperature (TFT) Sensor:
The TFT sensor is part of the control solenoid (w/body and TCM) valve assembly and is not serviced separately. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The TCM supplies a voltage reference signal to the sensor and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the TCM detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The TCM uses this information to maintain shift quality and torque converter clutch apply quality over operating temperature range.

If the TCM detects an improper signal from the TFT sensor, a DTC will be activated.

Figure 36

TRANSMISSION FLUID PRESSURE SWITCHES 1, 2, 3 AND 4





FLUID PRESSURE SWITCH LOGIC

GEAR SELECTOR POSITION	SWITCH			
	1	2	3	4
Park	0	1	0	0
Reverse	0	0	0	0
Neutral	0	1	0	0
Drive 1 Engine Braking	0	1	1	0
Drive 1	0	1	1	1
Drive 2	0	1	0	1
Drive 3	0	0	1	1
Drive 4	0	1	1	0
Drive 5	1	0	1	0
Drive 6	1	1	0	0

1 = Pressurized 0 = Exhausted

The transmission fluid pressure switches, located in the control solenoid valve assembly (15), are normally-closed. When closed, these switches allow electric current to flow through the switch.

Fluid Pressure Switch Operation:
The fluid pressure switches are normally closed (contacts touching) when no fluid pressure is present, thereby allowing electrical current to flow through the switch. When fluid pressure is routed to the switch, the fluid pressure moves the diaphragm, piston and disk such that the circuit opens (no current flow).

- TFP switch 1 sends a signal to the TCM to indicate the state of the 1-2-3-4 clutch regulator valve.
- TFP switch 2 sends a signal to the TCM to indicate the state of the 3-5-reverse clutch regulator valve.
- TFP switch 3 sends a signal to the TCM to indicate the state of the 2-6 clutch regulator valve.
- TFP switch 4 sends a signal to the TCM to indicate the state of the R1 / 4-5-6 clutch regulator valve.

The transmission fluid pressure switches are part of the control solenoid (w/body and TCM) valve assembly and are not serviced separately.

Figure 37

SHIFT SOLENOIDS

The Hydra-matic 6T70/75 uses two electromagnetic shift solenoids (1 and 2) to control the two clutch select valves 2 and 3. The shift solenoids are part of the control solenoid (w/body and TCM) valve assembly and are not serviced separately.

The shift solenoids are identical, normally-closed, 3-port, ON/OFF type solenoids controlled by the TCM. These shift solenoid work in combination with the pressure control solenoids to control the various shift and clutch regulator valves. The TCM uses numerous inputs (as shown in Figure 33) to determine which solenoid state combination the transmission should be in. The following table shows the solenoid state combination required for each gear range:

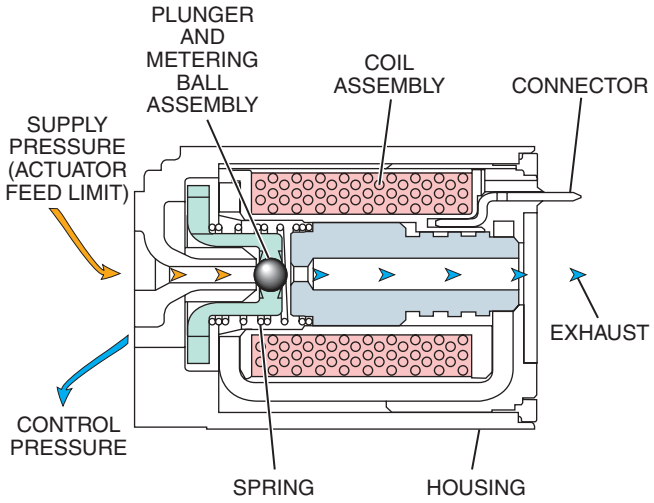
GEAR RANGE	SS 1	SS 2
Park	ON	ON
Reverse	ON	OFF
Neutral	ON	ON
Drive 1 Engine Braking	ON	ON
Drive 1	OFF	ON
Drive 2	OFF	ON
Drive 3	OFF	ON
Drive 4	OFF	ON
Drive 5	OFF	ON
Drive 6	OFF	ON

When the TCM provides a path to ground for the electrical circuit to energize (turn ON) the solenoid, current flows through the coil assembly in the solenoid and creates a magnetic field. The magnetic field moves the plunger and metering ball assembly to the right (with respect to the illustration) against the exhaust seat, thereby blocking the exhaust passage and creating signal fluid pressure.

The shift solenoids are de-energized (turned OFF) when the TCM opens the path to ground for the solenoid's electrical circuit. With the solenoid OFF, solenoid spring force moves the plunger and metering ball assembly away from the exhaust seat and against the feed seat. This blocks actuator feed limit fluid from entering the signal fluid circuit and allows any existing signal fluid pressure to flow past the metering ball and exhaust out of the solenoid as shown in the illustration.

Shift Solenoid (SS) 1:
Actuator feed limit fluid feeds the shift solenoid 1 fluid circuit to control the clutch select valve 2. When the SS 1 is energized (ON), actuator feed limit fluid is allowed to pass through the solenoid, thereby creating solenoid 1 fluid pressure (see example). Solenoid 1 fluid pressure acts against clutch select valve 2 spring force to move the clutch select valve 2 to the apply position.

When the SS 1 is de-energized (OFF), actuator feed limit fluid is blocked from feeding the solenoid 1 fluid circuit, and any existing solenoid 1 fluid pressure exhausts through the solenoid.



NORMALLY-CLOSED ON/OFF SOLENOID

Shift Solenoid (SS) 2:
Actuator feed limit fluid feeds the shift solenoid 2 fluid circuit to control the clutch select valve 3. When the SS 2 valve is energized (ON), actuator feed limit fluid is allowed to pass through the solenoid, thereby creating solenoid 2 fluid pressure (see example). Solenoid 2 fluid pressure acts against clutch select valve 3 spring force to move the clutch select valve 3 to the apply position.

When the SS 2 is de-energized (OFF), actuator feed limit fluid is blocked from feeding the solenoid 2 fluid circuit, and any existing solenoid 2 fluid pressure exhausts through the solenoid.

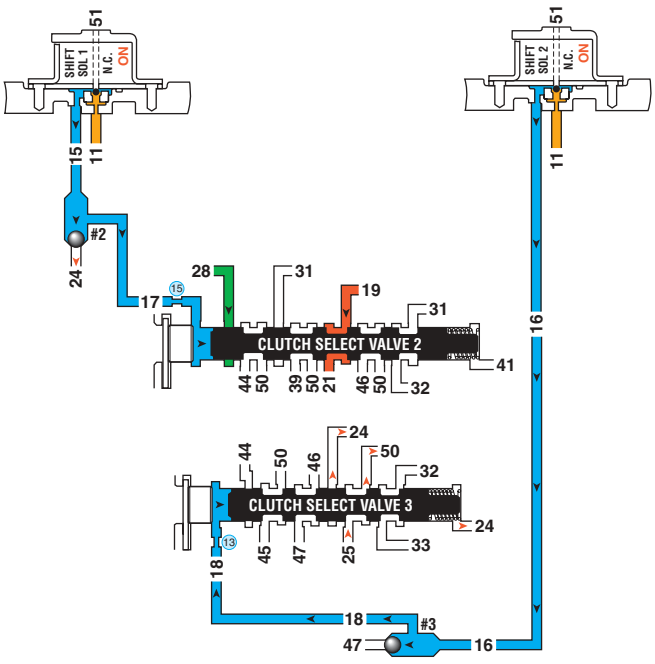
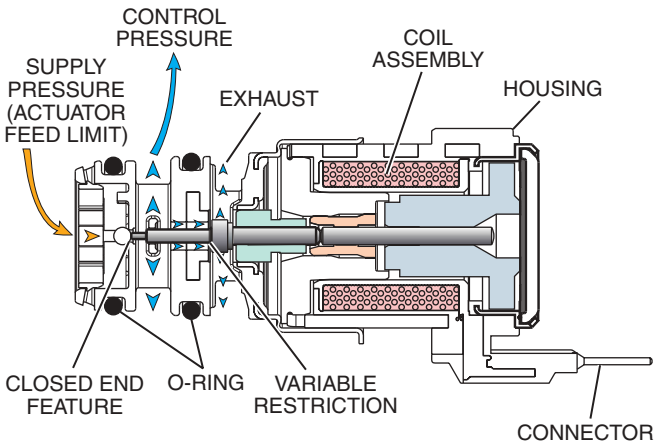


Figure 38

Torque Converter Clutch Pressure Control (TCC PC) Solenoid:
The TCC PC solenoid is a normally-low, precision electronic pressure regulator used to control the apply and release of the torque converter clutch based on current flow through its coil windings. The TCC PC solenoid is located in the control solenoid (w/body and TCM) valve assembly and is not serviced separately. The TCC PC solenoid regulates actuator feed limit fluid pressure to the TCC regulator valve located in the control valve upper body assembly and provides a signal pressure to shift the TCC control valve, also located in the control valve upper body assembly, to the apply position. When the TCM determines to apply the TCC, the TCC PC solenoid is commanded to specific pressures, dependent on vehicle operating conditions, resulting in a smooth apply or release of the TCC. The solenoid's ability to "ramp" the TCC apply and release pressures results in a smoother TCC operation.

When vehicle operating conditions are appropriate to apply the TCC, the TCM increases the current flow to allow the TCC PC solenoid to direct PCS TCC fluid pressure to move the TCC control valve to the apply position, and to move the TCC regulator valve to the regulating position in order to regulate fluid pressure proportional to TCC PC solenoid pressure. Release pressure is directed to exhaust, and regulated apply fluid is directed to the apply side of the torque converter pressure plate/damper assembly. The TCM then increases the pressure to control a slippage of 20–80 RPM between the pressure plate/damper assembly and the converter cover. This provides for improved dampening of engine vibrations and allows the TCC to apply at low engine speeds in 2nd, 3rd, 4th, 5th and 6th gear. The TCC PC solenoid is commanded to maximum pressure to fully apply the pressure plate/damper assembly.

Release of the TCC is achieved by decreasing TCC PC solenoid pressure to a level low enough to allow spring force to move the TCC control valve and the TCC regulator valve to the release position. TCC apply fluid is then directed to the cooler and converter feed fluid is directed into the TCC release circuit, to the release side of the pressure plate/damper assembly. This fluid then flows into the apply side of the pressure plate/damper assembly and out of the converter through the TCC apply circuit to the TCC control valve.



NORMALLY-LOW PRESSURE CONTROL SOLENOID

There are also some operating conditions that may prevent or enable TCC apply such as: engine temperature, transmission temperature, brake switch activation.

The TCC PC solenoid is the only electronic control component of the TCC apply and release system. The remaining components are hydraulic control or regulating valves. The illustration below shows the TCC PC solenoid and the valves that comprise the TCC control system. (For more information on TCC system operation see pages 14 & 15).

If the TCM detects that the TCC system is stuck ON or stuck OFF, a DTC will be activated.

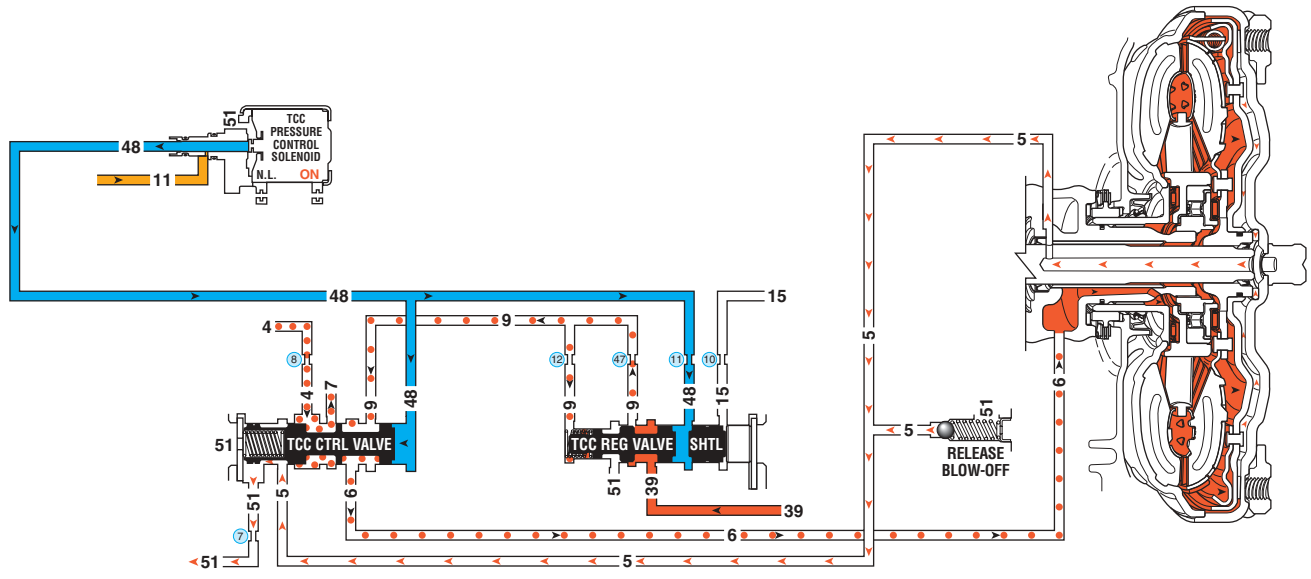
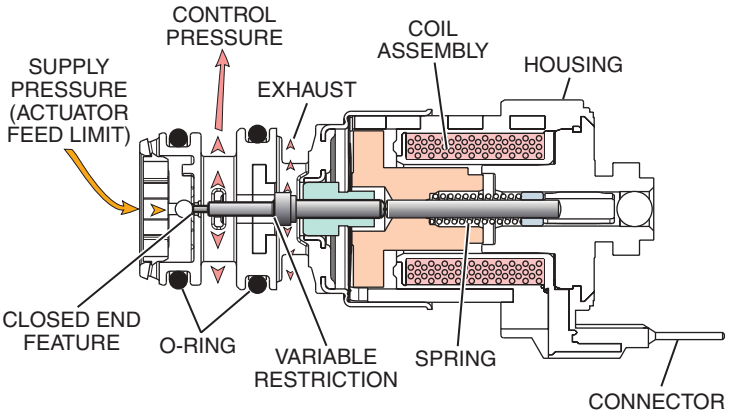


Figure 39

Line Pressure Control (PC) Solenoid:

The line pressure control (PC) solenoid is part of the control solenoid (w/body and TCM) valve assembly and is not serviced separately. The line PC solenoid is a precision electronic pressure regulator that controls transmission line pressure based on current flow through its coil windings. The TCM varies current to the normally-high line PC solenoid from approximately 0.1 amp for maximum line pressure, to 1.0 amps for minimum line pressure. As current flow is increased, the magnetic field produced by the coil moves the solenoid's variable restriction further away from the exhaust port. Opening the exhaust port decreases the output fluid pressure regulated by the line PC solenoid, which ultimately decreases line pressure. As current flow is decreased, the reduced magnetic field produced by the coil moves the solenoid's variable restriction closer to the exhaust port, increasing the output fluid pressure regulated by the line PC solenoid valve, which ultimately increases line pressure. The TCM controls the line PC solenoid based on various inputs, including throttle position, transmission fluid temperature and gear state.

The current flow to the line PC solenoid is primarily affected by throttle position (engine torque), and is also inversely proportional to throttle position (engine torque). In other words, as the throttle position (engine torque) increases, the current flow is decreased by the TCM, which increases the pressure output of the line PC solenoid.



NORMALLY-HIGH PRESSURE CONTROL SOLENOID

If the TCM detects a line pressure control solenoid valve electrical malfunction, a DTC will be activated.

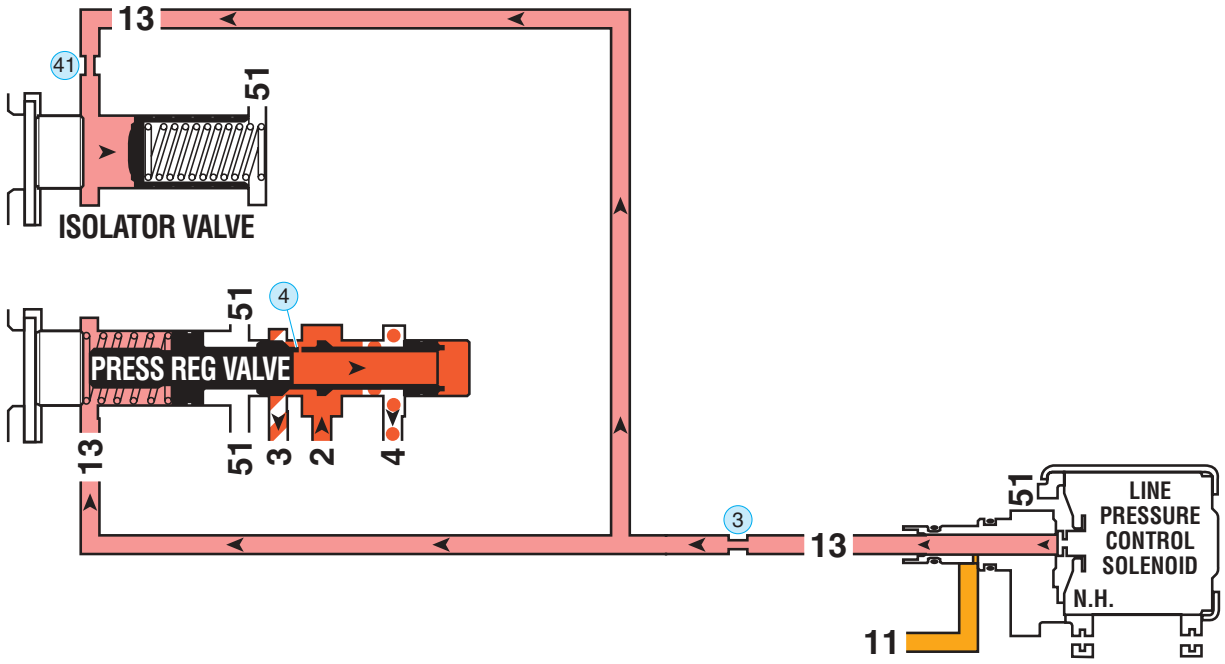


Figure 40

Clutch Pressure Control (PC) Solenoids 2, 3, 4 and 5:
The clutch pressure control (PC) solenoids 2 and 3 are normally-high PC solenoids and are identical to the line PC solenoid (page 44). The clutch PC solenoids 4 and 5 are normally-low and are the same as the TCC PC solenoid (page 43).

The clutch PC solenoid 2 controls fluid flow to the 3-5-reverse clutch regulator and 3-5-reverse clutch boost valves. When commanded, the clutch PC solenoid 2 controls the flow of exhaust fluid through the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 3-5-reverse clutch.

The clutch PC solenoid 3 controls fluid flow to the R1/4-5-6 clutch regulator and 4-5-6 clutch boost valves. When commanded, the clutch PC solenoid 3 controls the flow of exhaust fluid through the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 4-5-6 clutch.

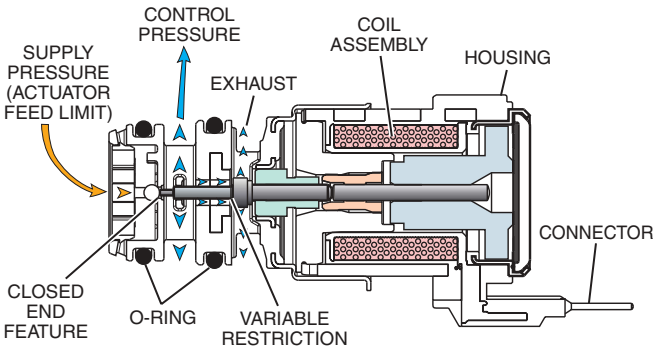
The clutch PC solenoid 4 controls fluid flow to the 2-6 clutch regulator valve. When commanded, the clutch PC solenoid 4 controls the flow of exhaust fluid through the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 2-6 clutch.

The clutch PC solenoid 5 controls fluid flow to the 1-2-3-4 clutch regulator and 1-2-3-4 clutch boost valves. When commanded, the clutch PC solenoid 5 controls the flow of exhaust fluid through the solenoid to maintain a specific commanded control pressure. This allows the TCM to control the apply and release of the 1-2-3-4 clutch.

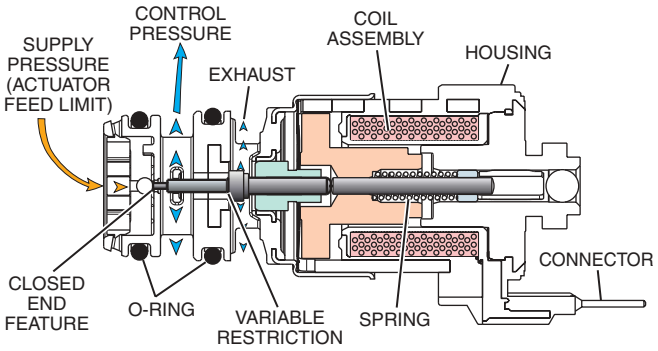
CLUTCH PRESSURE CONTROL (PC) SOLENOID LOGIC

GEAR RANGE	PC Sol 5 N.L.	PC Sol 4 N.L	PC Sol 2 N.H.	PC Sol 3 N.H.
Park	OFF	OFF	OFF	ON
Reverse	OFF	OFF	ON	ON
Neutral	OFF	OFF	OFF	ON
Drive 1 Engine Braking	ON	OFF	OFF	ON
Drive 1	ON	OFF	OFF	OFF
Drive 2	ON	ON	OFF	OFF
Drive 3	ON	OFF	ON	OFF
Drive 4	ON	OFF	OFF	ON
Drive 5	OFF	OFF	ON	ON
Drive 6	OFF	ON	OFF	ON

Transmission Adapt Function:
Programming within the TCM also allows for automatic adjustments in shift pressure that are based on the changing characteristics of the transmission components. As the apply components within the transmission wear or change over time, shift time (the time required to apply a clutch) increases or decreases. In order to compensate for these changes, the TCM adjusts the pressure commands to the various PC solenoids, to maintain the originally calibrated shift timing. The automatic adjusting process is referred to as "adaptive learning" and it is used to ensure consistent shift feel plus increase transmission durability. The TCM monitors the A/T ISS and the A/T OSS during commanded shifts to determine if a shift is occurring too fast (harsh) or too slow (soft) and adjusts the corresponding PC solenoid signal to maintain a set shift feel.



NORMALLY-LOW PRESSURE CONTROL SOLENOID



NORMALLY-HIGH PRESSURE CONTROL SOLENOID

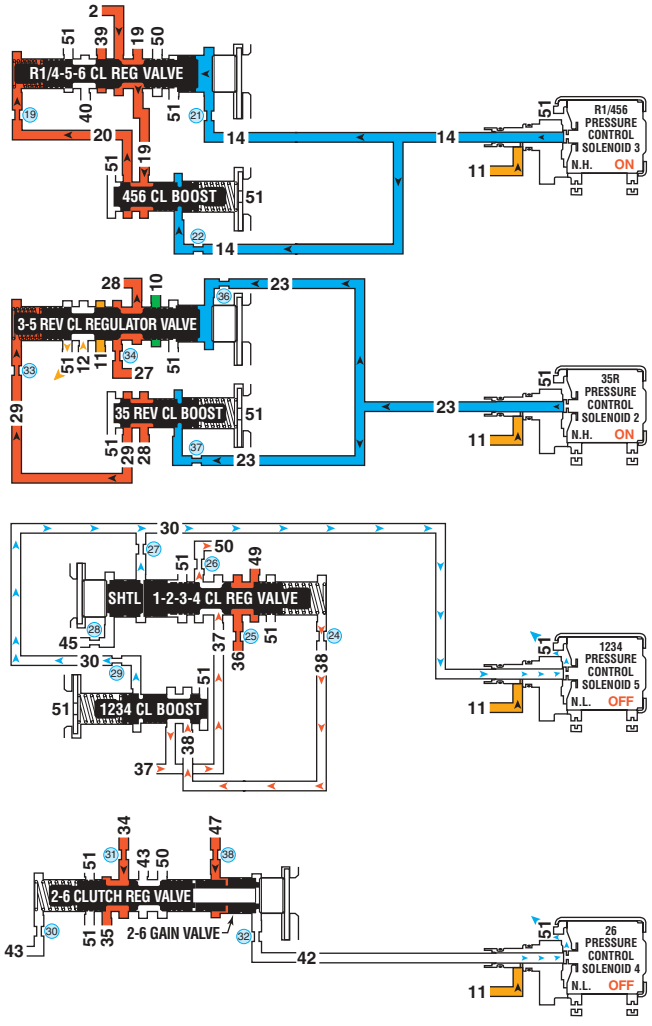


Figure 41

ELECTRICAL COMPONENTS

COMPONENTS EXTERNAL TO THE TRANSMISSION

Throttle Position (TP) Sensor: The ECM monitors the variable voltage signal from the TP sensor to calculate throttle position (angle). These input signals are then transmitted over the CAN bus to the TCM, in addition to other vehicle and transmission sensor inputs, in order to determine the appropriate line pressure, shift pattern and TCC apply and release for the transmission. In general, with greater throttle angle, upshift speeds and line pressure both increase.

Engine Speed Sensor: Monitored by the ECM through the ignition module, information from this sensor is transmitted over the CAN bus to the TCM and used to help determine shift patterns and TCC apply and release.

Manifold Absolute Pressure (MAP) Sensor: The MAP sensor measures changes relative to intake manifold pressure which results from changes in engine load and speed. These changes are converted to a voltage output which is monitored by the ECM and transmitted over the CAN bus to the TCM in order to adjust line pressure and shift timing.

Engine Coolant Temperature (ECT) Sensor: The ECM monitors the variable resistance signal from this sensor to determine engine coolant temperature. When the engine is cold, resistance is high, and when the engine is hot, resistance through the sensor is low. The ECM then transmits this information over the CAN bus to the TCM where it is used to prevent the TCC from applying when engine temperature is below approximately 20°C (68°F) (calibratable).

Manifold Air Temperature (MAT) Sensor: The ECM monitors the variable resistance signal from the MAT sensor to determine manifold air temperature. When the air is cold, resistance is high, and when the air is hot, resistance through the sensor is low. The ECM then transmits this information over the CAN bus to the TCM where it is used as a factor to determine TCC apply.

Accelerator Pedal Position (APP) Sensor: The APP sensor is monitored by the ECM in order to determine accelerator pedal position. The ECM uses this signal to open and close the throttle in response to the driver's commands. It also signals the TCM when the accelerator pedal is fully depressed, allowing forced downshifts and maximum performance.

Brake Switch: This parameter displays the state of the brake switch circuit input. This information is transmitted to the TCM where it is used as a factor to determine the apply or release state of the TCC. The scan tool will display Applied when the brake pedal is depressed and Released when the brake pedal is released.

Driver Shift Control (DSC) Switches: These switches are located either on the steering wheel or on a secondary gate within the console shift lever mechanism. The TCM uses the switch inputs to provide manual shift control to the driver. When a switch is depressed, the TCM opens a path to ground causing the transmission to shift up or down.

Operating Mode Selection Switches: Depending on the customer/application, vehicles may be equipped with switches allowing the driver to select various automatic operating modes (Economy, Performance, Winter), or manual mode (Driver Shift Control) to allow manual shifting by bumping the selector lever up and down.

Diagnostic Link Connector (DLC): The DLC is a multi-terminal connector that is located under the vehicle dashboard. The DLC is connected by serial data wires to the various control modules located throughout the vehicle. The DLC can be used to diagnose conditions in the vehicle's electrical system, TCM or PCM, and various transmission components. Refer to the appropriate Service Manual for specific electrical diagnosis information.

Controller Area Network (CAN) Bus: The CAN bus consists of two wires that connect the various vehicle control modules together, allowing them to exchange information about vehicle conditions.

Note: These are typical inputs to the controllers. The combination and usage of these inputs may vary depending on model and application.

POWER FLOW

This section of the book describes how torque from the engine is transferred through the Hydra-matic 6T70/75 transmission allowing the vehicle to move either in a forward or reverse direction. The information that follows details the specific mechanical operation, electrical, hydraulic and apply components that are required to achieve a gear operating range.

The first eleven left hand pages in this section contain cross sectional drawings to show the mechanical power flow from component to component, for each range and gear. Facing this page is the supporting mechanical power flow text and disassembled view graphics to support the cross sectional drawing.

Following the mechanical power flow pages are the hydraulic power flow pages that contain a simplified version of the Complete Hydraulic Circuit involved for each range and gear. The accompanying facing pages contain the hydraulic power flow supporting text. A page number located at the bottom of this page of text provides a ready reference to the Complete Hydraulic Circuits section of this book if more detailed information is desired.

It is the intent of this section to provide an overall simplified explanation of the mechanical, hydraulic and electrical operation of the Hydra-matic 6T70/75 transmission. If the operating principle of a clutch, band or valve is unclear, refer to the previous sections of this book for individual component descriptions.

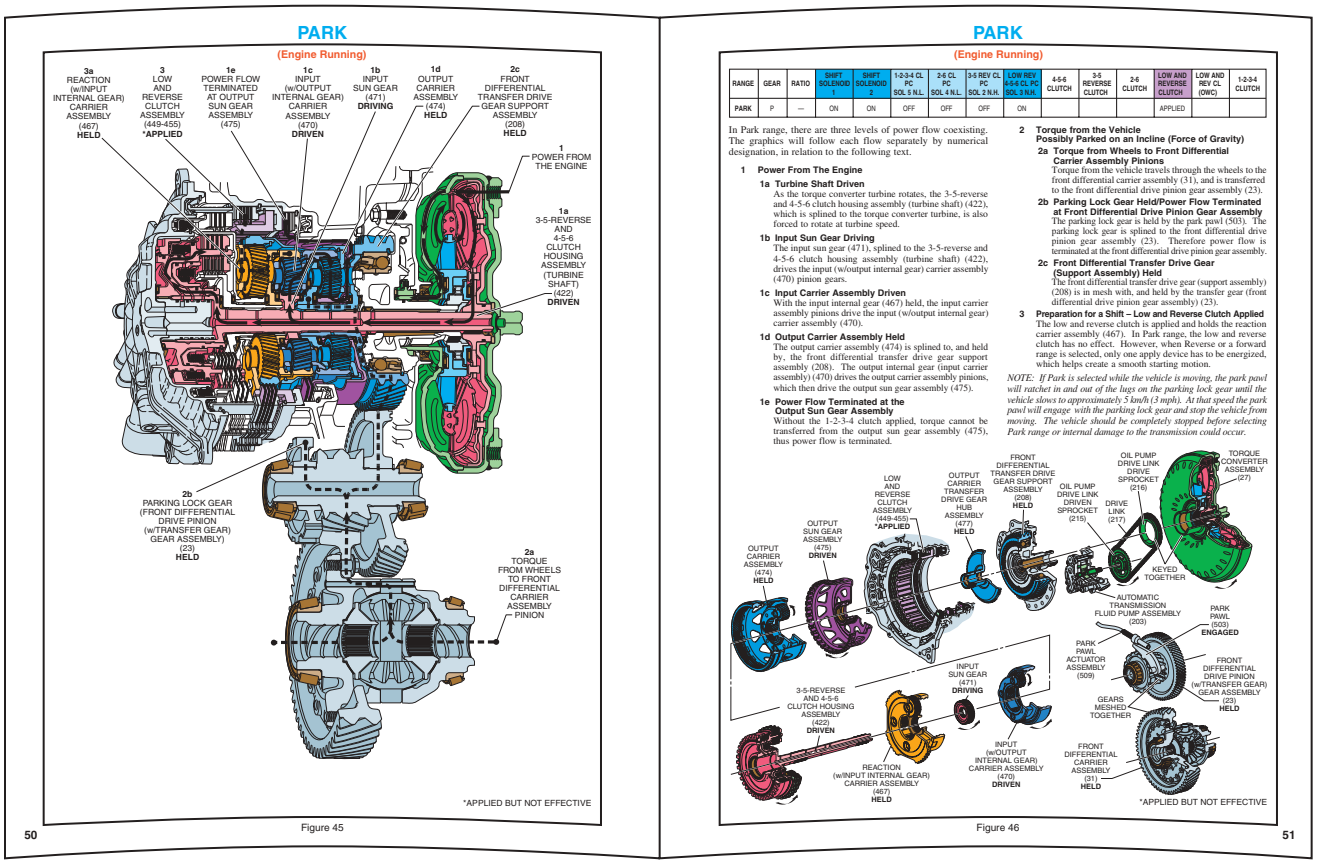


Figure 42

MECHANICAL POWER FLOW FROM THE TORQUE CONVERTER TO THE TURBINE SHAFT

(Engine Running)

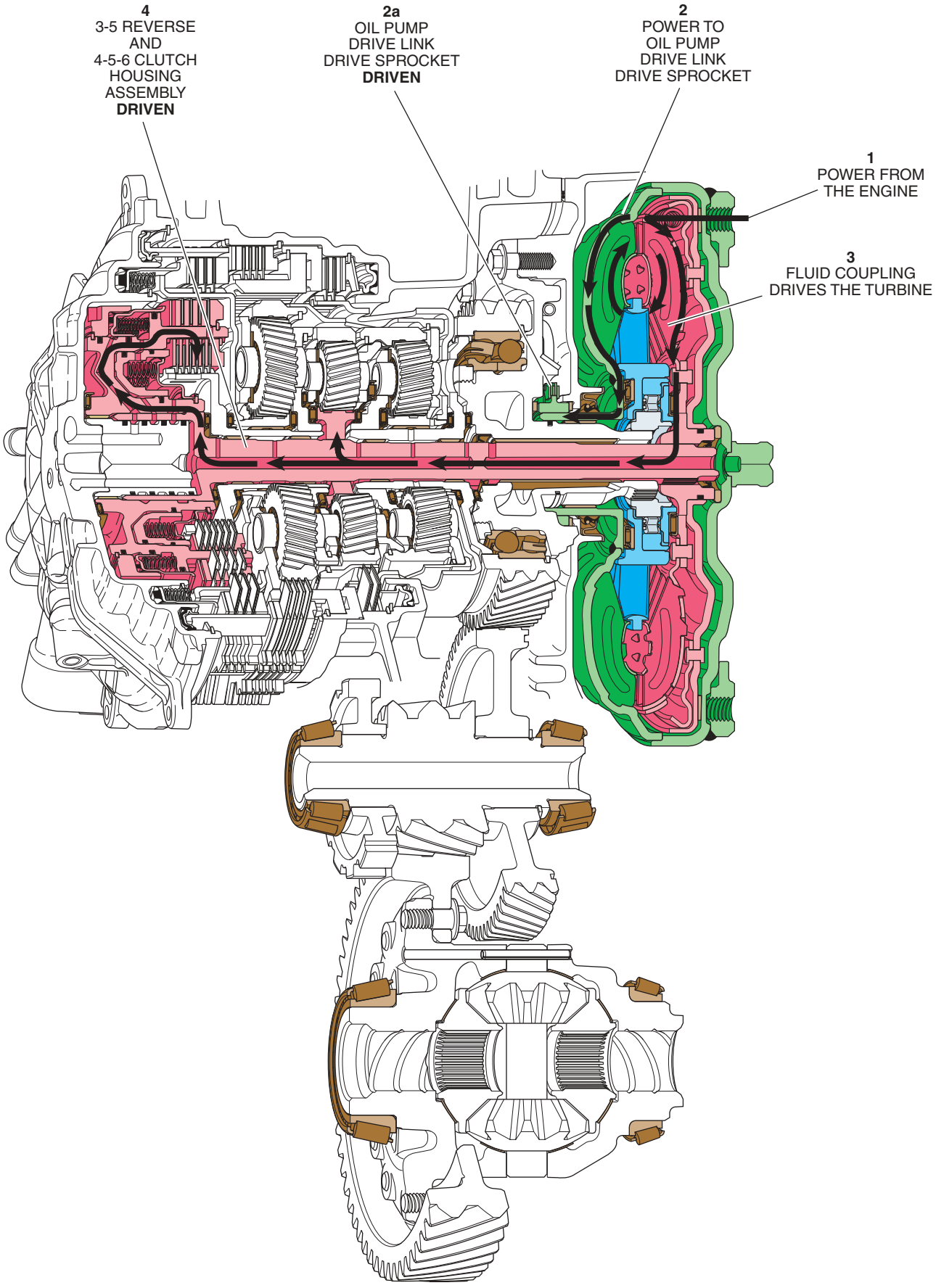


Figure 43

MECHANICAL POWER FLOW FROM THE TORQUE CONVERTER TO THE TURBINE SHAFT

(Engine Running)

The mechanical power flow in the Hydra-matic 6T70/75 transmission begins at the point of connection between the torque converter and the engine flywheel. When the engine is running, the torque converter cover (pump) is forced to rotate at engine speed. As the torque converter rotates it multiplies engine torque and transmits it to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422). The turbine shaft provides the primary link to the mechanical operation of the transmission.

The Hydra-matic 6T70/75 automatic transmission requires a constant supply of pressurized fluid to cool and lubricate all of the components throughout the unit. It also requires a holding force to be applied to the clutches during the various gear range operations. The fluid pump assembly (203), and the control valve body assembly (18) provide for the pressurization and distribution of fluid throughout the transmission.

1 **Power from the Engine**
Torque from the engine is transferred to the transmission through the engine flywheel which is bolted to the torque converter assembly (27).

2 **Power to Drive the Fluid Pump**
The oil pump drive link drive sprocket (216) is splined (keyed) to the torque converter hub. The drive link (217) is driven by the drive sprocket and in turn drives the oil pump drive link driven sprocket (215). The fluid pump drive shaft is splined to the oil pump drive link driven sprocket, therefore when the engine is running, the transmission fluid pump is operating.

3 **Fluid Coupling Drives the Turbine**
Transmission fluid inside the torque converter assembly (27) creates a fluid coupling which in turn drives the torque converter turbine.

4 **Turbine Shaft Driven**
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

NOTE: To minimize the amount of repetitive text, the remaining mechanical power flow descriptions will begin with the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422). The transfer of torque from the engine through the torque converter to the turbine shaft is identical in all gear ranges except when the torque converter clutch is applied (see pages 92-95 for a complete explanation of torque converter apply).

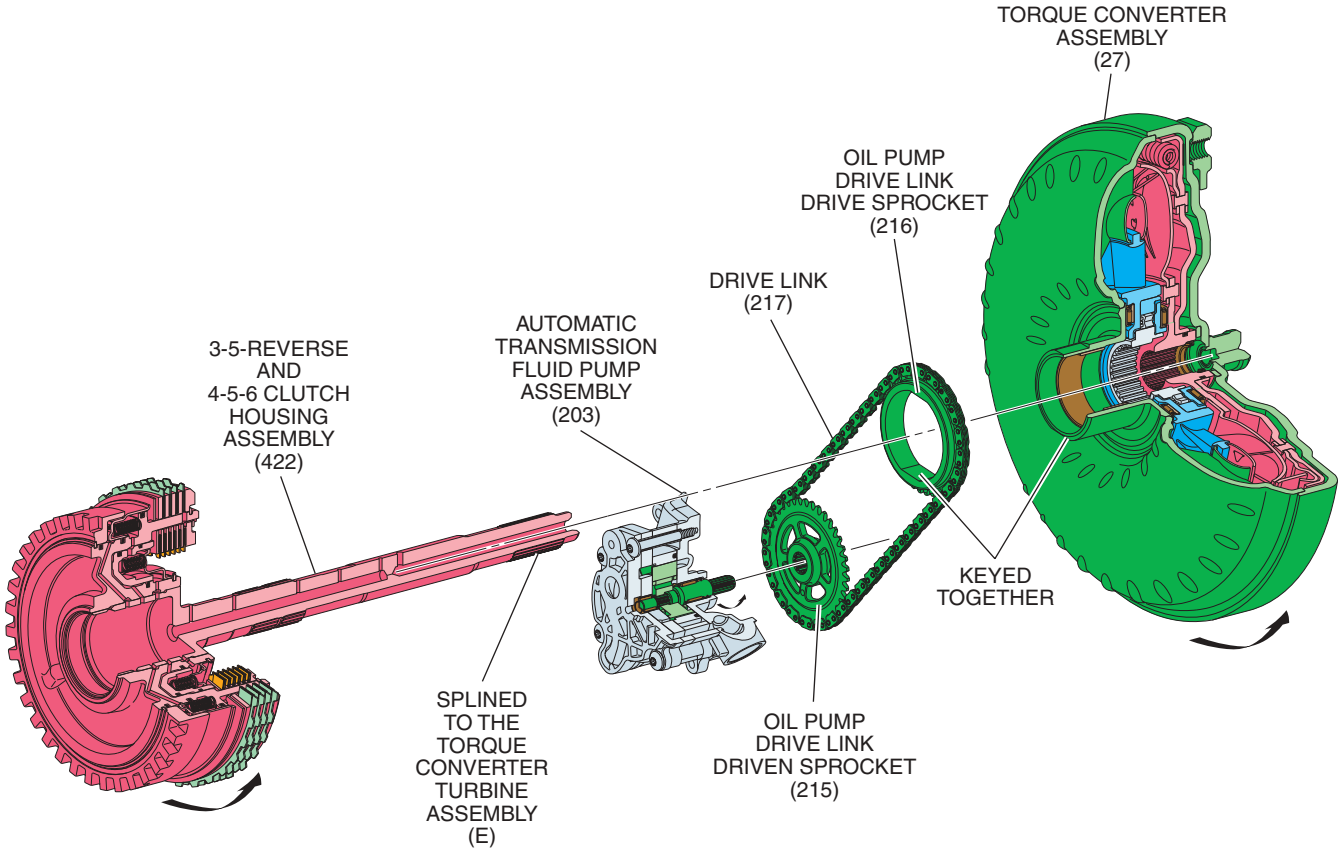


Figure 44

PARK

(Engine Running)

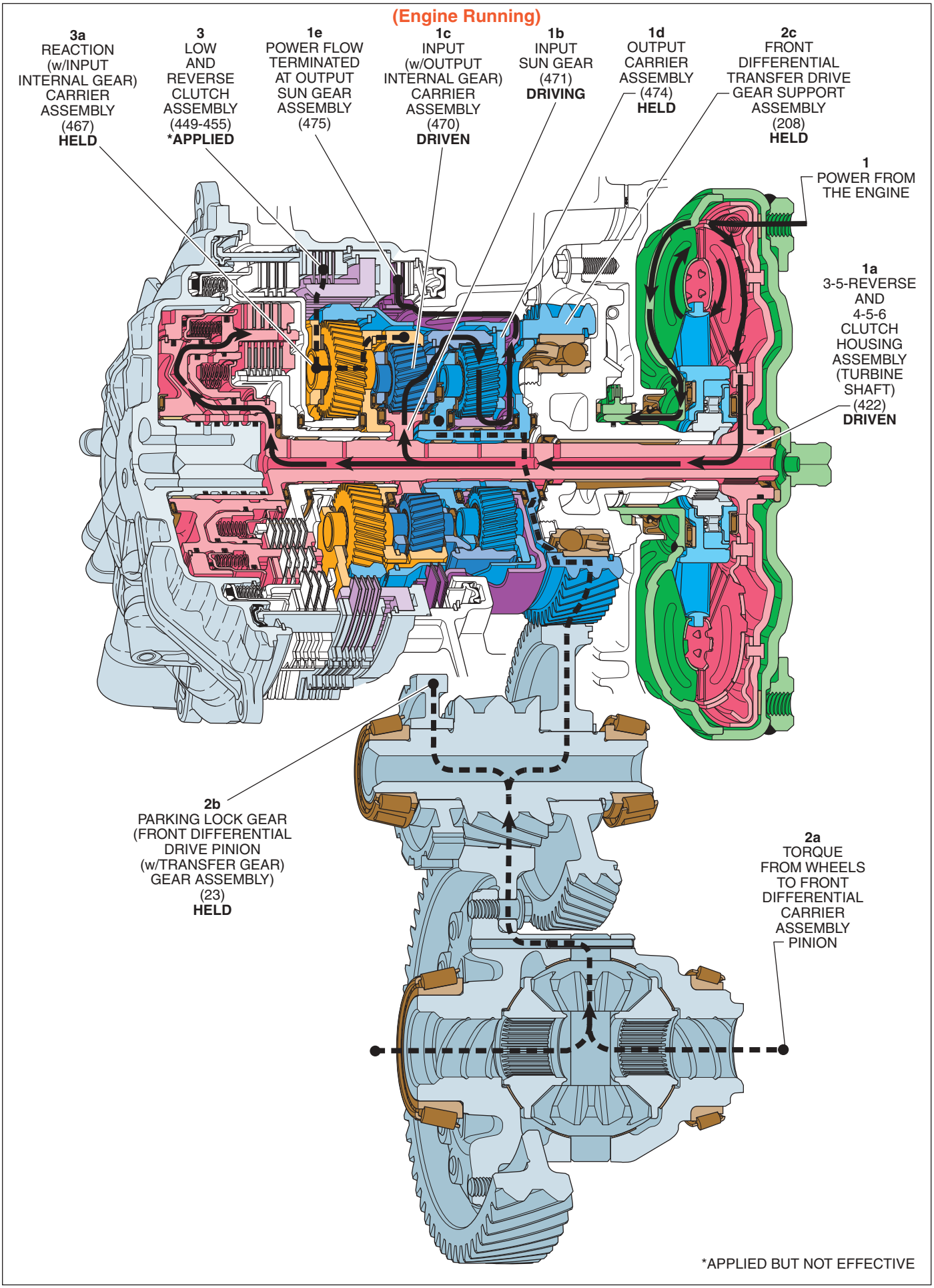


Figure 45

PARK

(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
PARK	P	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

In Park range, there are three levels of power flow coexisting. The graphics will follow each flow separately by numerical designation, in relation to the following text.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

1c Input Carrier Assembly Driven
With the input internal gear (467) held, the input carrier assembly pinions drive the input (w/output internal gear) carrier assembly (470).

1d Output Carrier Assembly Held
The output carrier assembly (474) is splined to, and held by, the front differential transfer drive gear support assembly (208). The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output sun gear assembly (475).

1e Power Flow Terminated at the Output Sun Gear Assembly
Without the 1-2-3-4 clutch applied, torque cannot be transferred from the output sun gear assembly (475), thus power flow is terminated.

2 Torque from the Vehicle Possibly Parked on an Incline (Force of Gravity)

2a Torque from Wheels to Front Differential Carrier Assembly Pinions
Torque from the vehicle travels through the wheels to the front differential carrier assembly (31), and is transferred to the front differential drive pinion gear assembly (23).

2b Parking Lock Gear Held/Power Flow Terminated at Front Differential Drive Pinion Gear Assembly
The parking lock gear is held by the park pawl (503). The parking lock gear is splined to the front differential drive pinion gear assembly (23). Therefore power flow is terminated at the front differential drive pinion gear assembly.

2c Front Differential Transfer Drive Gear (Support Assembly) Held
The front differential transfer drive gear (support assembly) (208) is in mesh with, and held by the transfer gear (front differential drive pinion gear assembly) (23).

3 Preparation for a Shift – Low and Reverse Clutch Applied
The low and reverse clutch is applied and holds the reaction carrier assembly (467). In Park range, the low and reverse clutch has no effect. However, when Reverse or a forward range is selected, only one apply device has to be energized, which helps create a smooth starting motion.

NOTE: If Park is selected while the vehicle is moving, the park pawl will ratchet in and out of the lugs on the parking lock gear until the vehicle slows to approximately 5 km/h (3 mph). At that speed the park pawl will engage with the parking lock gear and stop the vehicle from moving. The vehicle should be completely stopped before selecting Park range or internal damage to the transmission could occur.

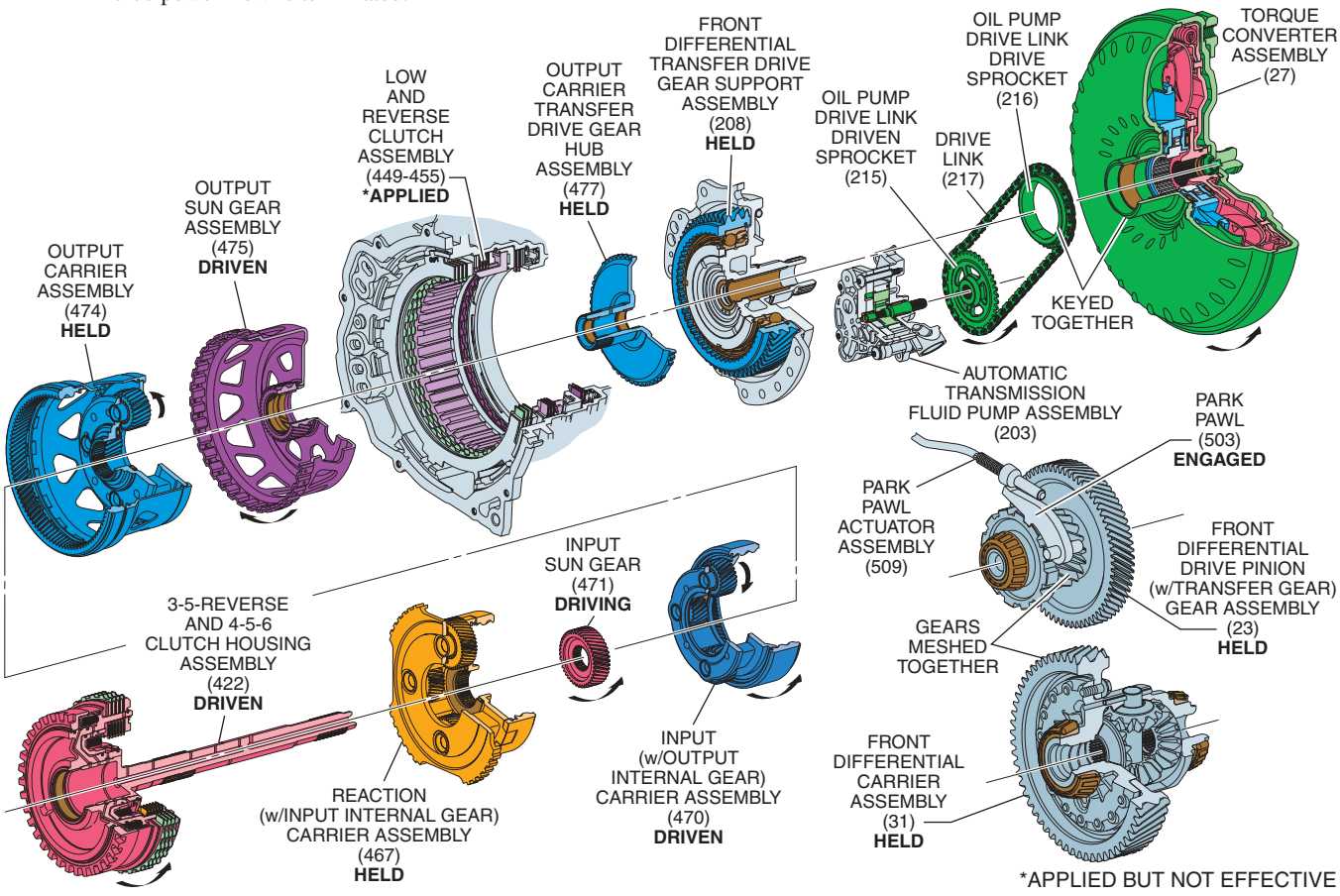


Figure 46

REVERSE

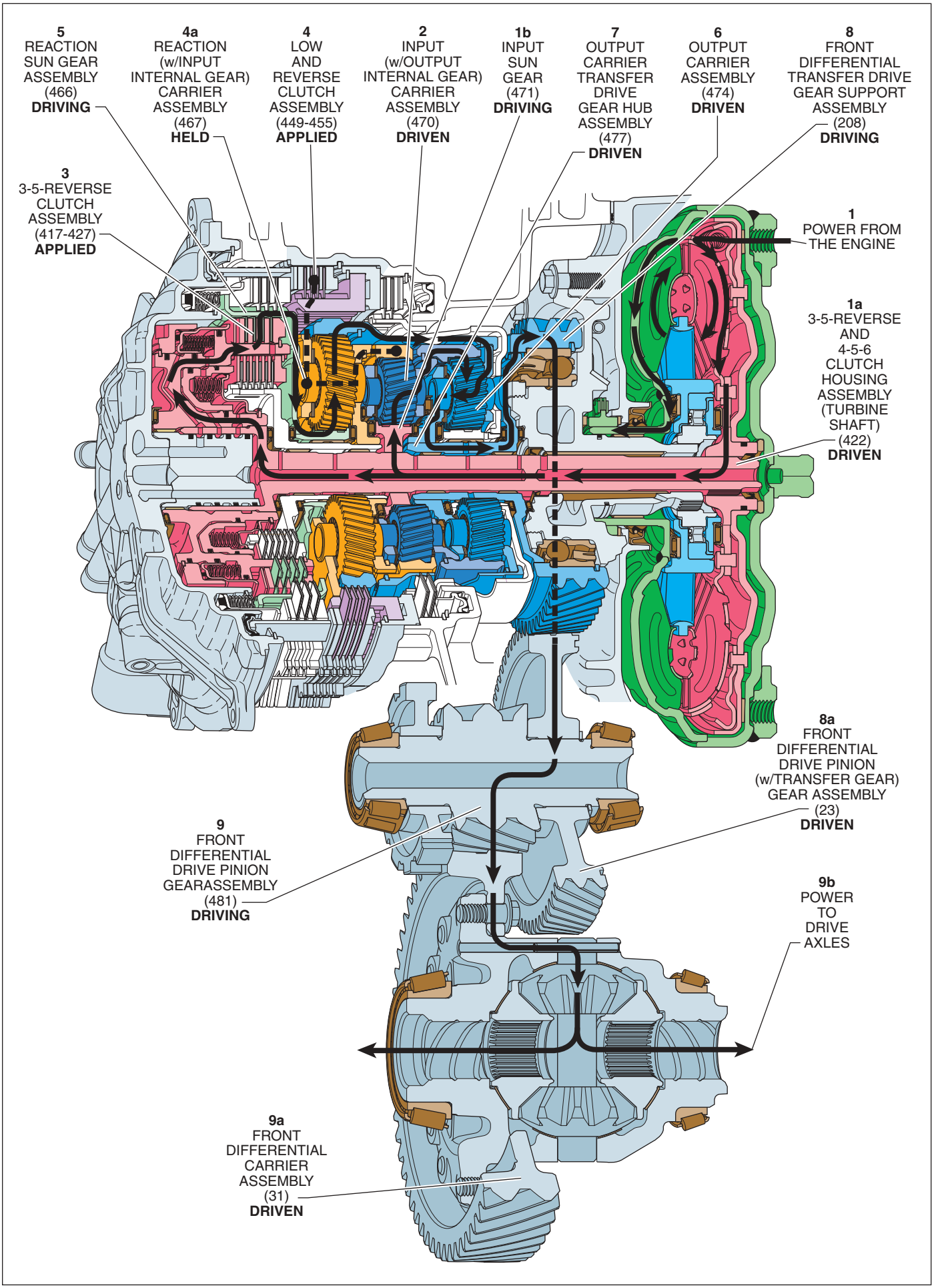


Figure 47

REVERSE

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
REV	R	2.880	ON	OFF	OFF	OFF	ON	ON		APPLIED		APPLIED		

In Reverse (R), torque from the engine is multiplied through the torque converter assembly (27), the transmission gear sets, and the front differential carrier assembly (31), thereby sending power to the vehicle's drive axles. The planetary gear sets operate in reduction and also reverse the direction of input torque. The gear ratio for Reverse gear range is 2.880:1.

- When the gear selector lever is moved into the Reverse (R) gear range, the parking pawl (503) disengages from the parking lock gear allowing the front differential drive pinion (w/transfer gear) gear assembly (23) to rotate.
- The manual shift detent (w/shaft position switch) lever assembly (511) and manual valve (348) are also moved into the Reverse gear position in order to channel the transmission fluid.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 Input Carrier Assembly Driven
The input carrier assembly pinions walk around the input internal gear (467) and drive the input (w/output internal gear) carrier assembly (470).

3 3-5-Reverse Clutch Applied
The 3-5-reverse clutch plates (417-427) are applied and connect the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422) to the reaction sun gear assembly (466).

4 Low and Reverse Clutch Applied
The low and reverse clutch is applied and holds the reaction (w/input internal gear) carrier assembly (467).

5 Reaction Sun Gear Assembly Driving
With the reaction carrier assembly (467) held by the low and reverse clutch, the reaction sun gear assembly (466) drives the reaction carrier assembly pinion gears.

6 Output Carrier Assembly Driven
The reaction carrier assembly (467) pinion gears are in mesh with, and drive, the reaction internal gear (output carrier assembly) (474) in the direction opposite of torque converter rotation to achieve reversal of direction.

7 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

8 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

9 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

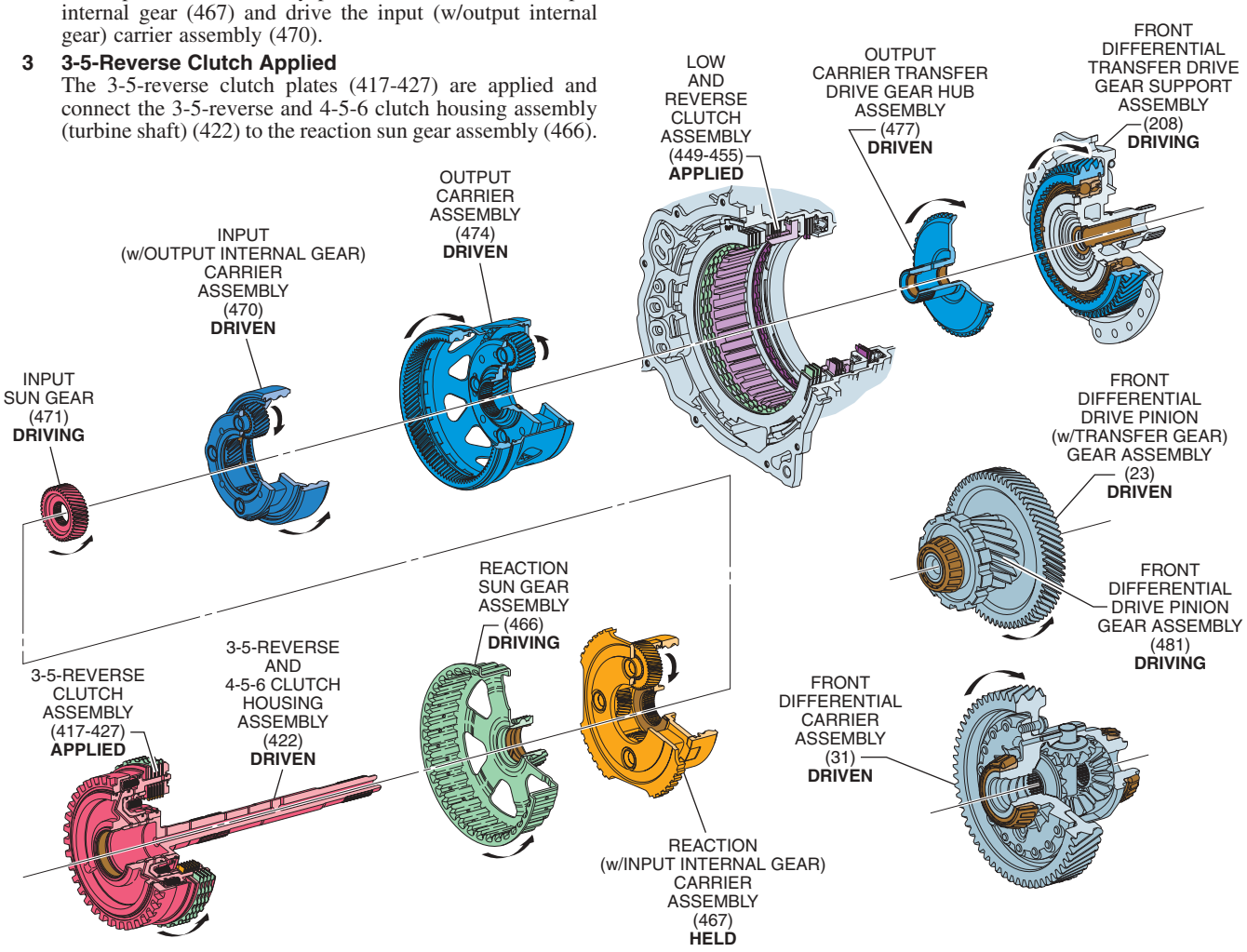


Figure 48

NEUTRAL

(Engine Running)

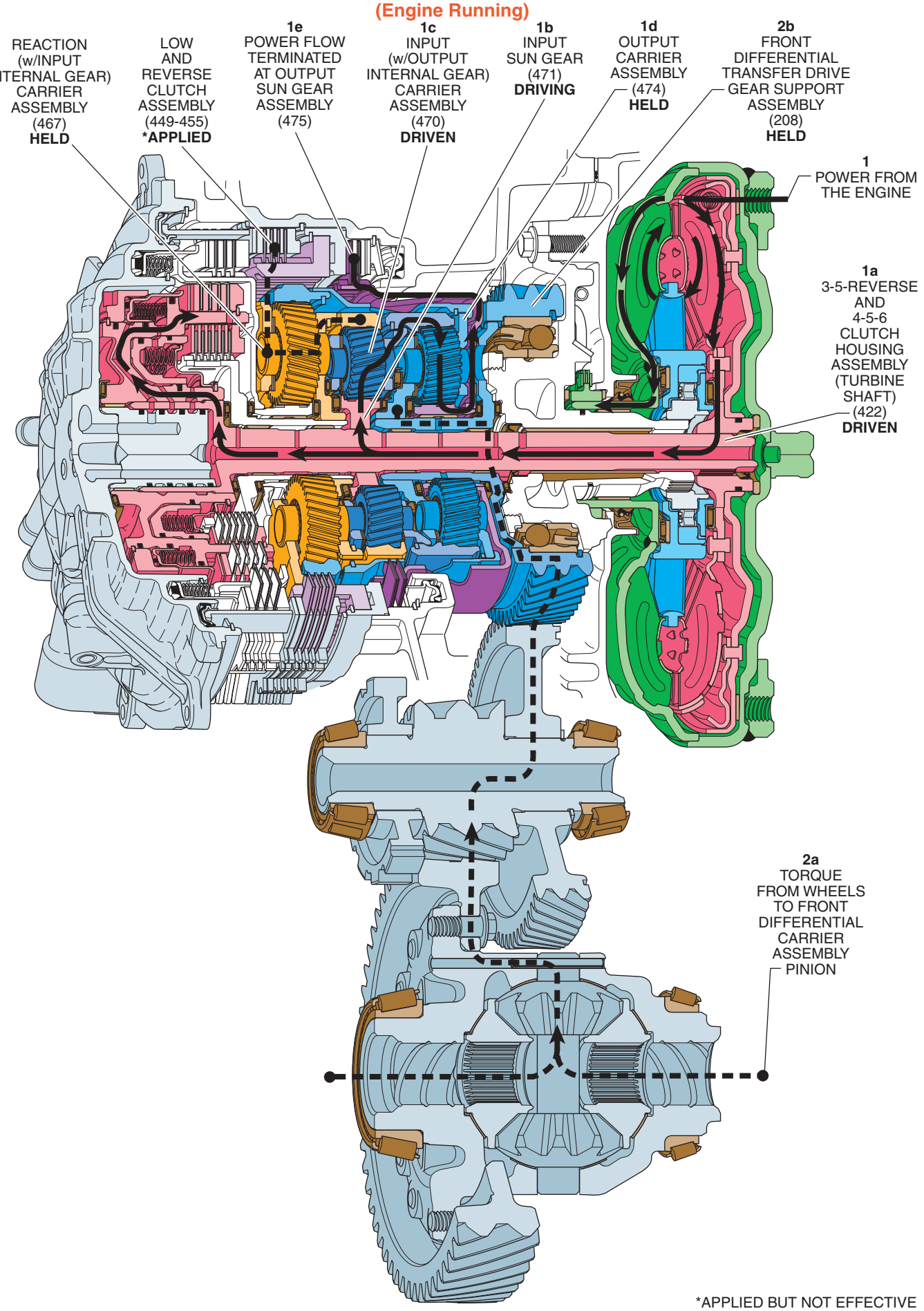


Figure 49

NEUTRAL

(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
NEU	N	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

When the gear selector lever is placed in the Neutral (N) position, the mechanical power flow through the transmission is similar to Park gear range. The primary difference is that the park pawl (503) is not engaged with the parking lock gear, which allows the front differential drive pinion (w/transfer gear) gear assembly (23) to rotate freely in either direction. Assuming that the vehicle is on level ground, the weight of the vehicle (transferred through the drive axles) holds the front differential carrier assembly (31), thus power flow does not travel to the front differential drive pinion (w/transfer gear) gear assembly (23). Under these conditions, power flow through the transmission is the same as in Park.

- The manual shift detent (w/shaft position switch) lever assembly (511) and manual valve (348) are moved into the Neutral (N) range position.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

1c Input Carrier Assembly Driven
With the input internal gear (467) held, the input carrier assembly pinions drive the input (w/output internal gear) carrier assembly (470).

1d Output Carrier Assembly Held
The output carrier assembly (474) is splined to, and held by, the front differential transfer drive gear support assembly (208). The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output sun gear assembly (475).

1e Power Flow Terminated at the Output Sun Gear Assembly
Without the 1-2-3-4 clutch applied, torque cannot be transferred from the output sun gear assembly (475), thus power flow is terminated.

2 Torque from the Vehicle Possibly Parked on an Incline (Force of Gravity)

2a Torque from Wheels to Front Differential Carrier Assembly Pinions
Torque from the vehicle travels through the wheels to the front differential carrier assembly (31), and is transferred to the front differential drive pinion gear assembly (23).

2b Power Flow Terminated at the Front Differential Drive Pinion Gear Assembly
The front differential drive pinion gear assembly (23) transfers torque to the front differential drive pinion (w/ transfer gear) gear assembly (23), which is now free to rotate in either direction, and power flow is terminated. With the shift select lever in neutral, the vehicle is capable of forward or reverse motion, due to an incline or direct force (pushing).

NOTE: Whenever adjustments or repairs are being performed and the gear selector lever is in Neutral, it is important that the vehicle's parking brake is applied and the wheels are blocked. A slight incline will cause the vehicle to roll either forward or backwards potentially causing injury or damage.

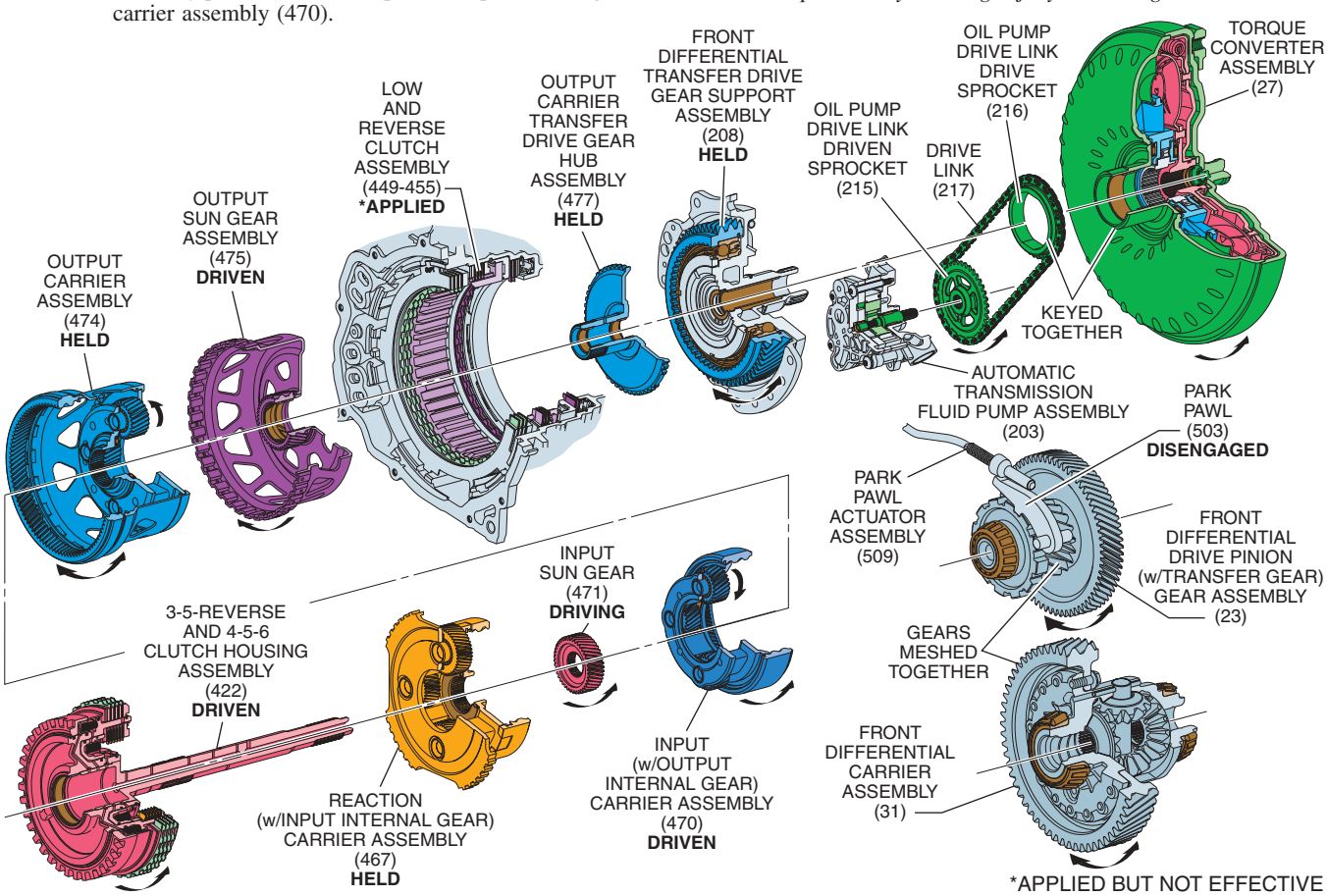


Figure 50

DRIVE RANGE – FIRST GEAR

(Engine Braking)

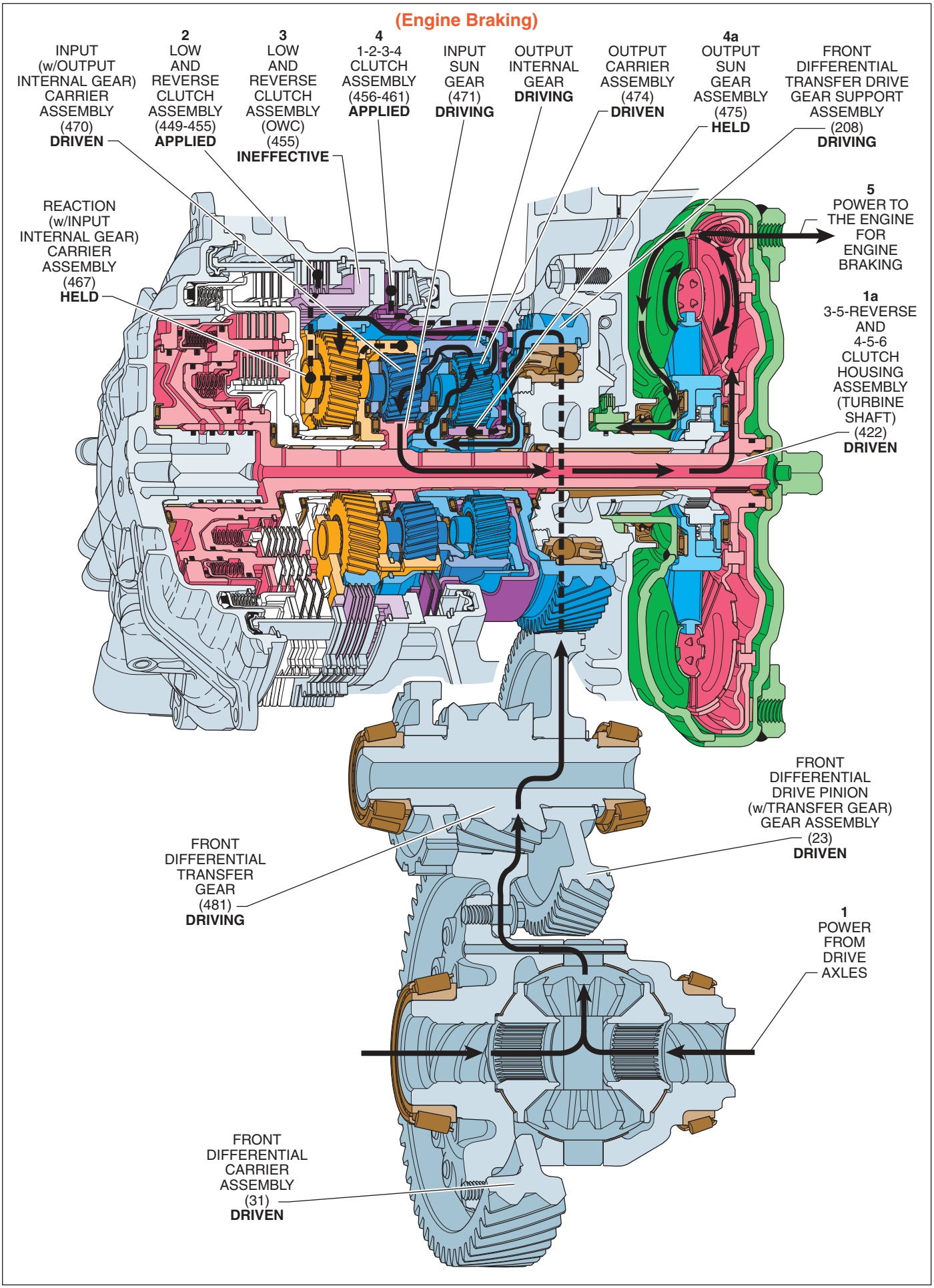


Figure 51

DRIVE RANGE – FIRST GEAR

(Engine Braking)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st Braking	4.484	ON	ON	ON	OFF	OFF	ON				APPLIED	HOLDING†	APPLIED

† HOLDING BUT INEFFECTIVE.

Drive Range (D) – First Gear (Engine Braking), is commanded by the TCM when vehicle speed is low enough not to overrev the engine (calibratable in the TCM). Drive Range – First Gear (Engine Braking) is commanded in order to achieve maximum engine compression braking for slowing the vehicle.

Note: *Transfer of engine torque during acceleration is identical to Drive Range – First Gear (refer to page 59), with the exception that the low and reverse clutch is applied, to obtain an approximate gear ratio reduction of 4.484:1 through the transmission gear sets. The power flow illustrated in Figures 51 and 52, and the following text describe the conditions during deceleration (zero or minimum throttle) and how engine compression braking is achieved.*

Vehicle speed provides the torque input to the transmission through the drive axles and the front differential carrier assembly (31). This is shown by the direction of the power flow arrows in Figure 51. Notice that this flow is identical to Drive Range – First Gear except that the arrows are in the opposite direction.

1 Power From The Drive Axles
Power flow is transferred back through the transmission from the front differential carrier assembly (31) to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422). Each of the component's function and rotation is the same as during acceleration (compare Figures 51 and 53).

2 Low and Reverse Clutch Applied
The low and reverse clutch plates (449-455), splined to the reaction (w/input internal gear) carrier assembly (467) and the transmission case assembly (51), are applied and hold the input internal gear stationary.

3 Low and Reverse One Way Clutch Assembly Ineffective
With the low and reverse clutch applied, the low and reverse clutch assembly (OWC) (455) has no effect in Drive Range – First Gear (Engine Braking).

4 1-2-3-4 Clutch Assembly Applied
The 1-2-3-4 clutch plates (456-461), splined to the output sun gear assembly (475) and the transmission case assembly (51), are applied and hold the output sun gear assembly stationary.

5 Engine Compression Braking
With the low and reverse clutch applied, the reaction (w/input internal gear) carrier assembly (467) can not overrun the low and reverse clutch assembly (OWC) (455) during deceleration, and power flow is mechanically connected between the front differential carrier assembly (31) and the torque converter turbine. This allows engine compression to slow the vehicle when the throttle is released.

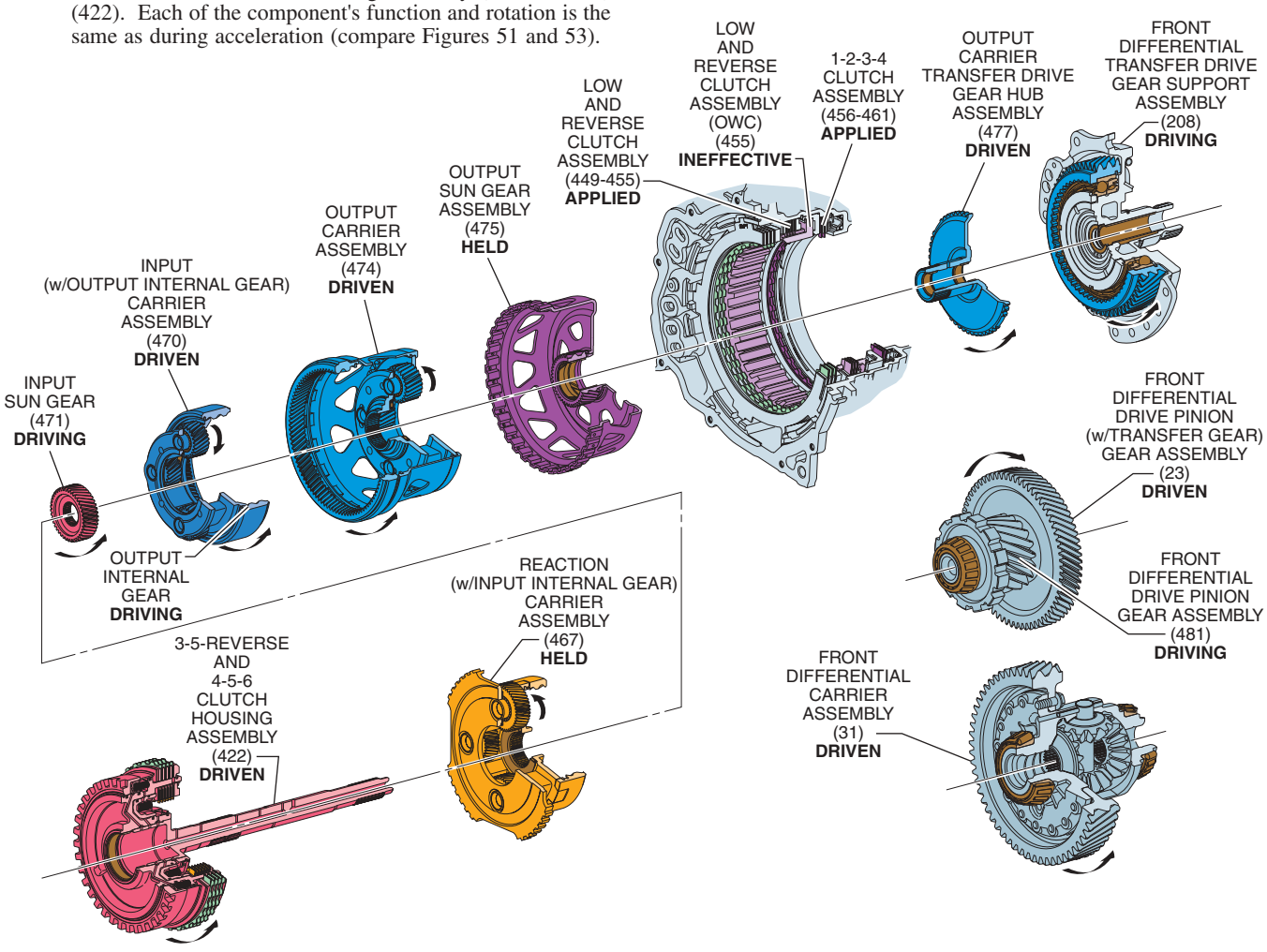


Figure 52

DRIVE RANGE – FIRST GEAR

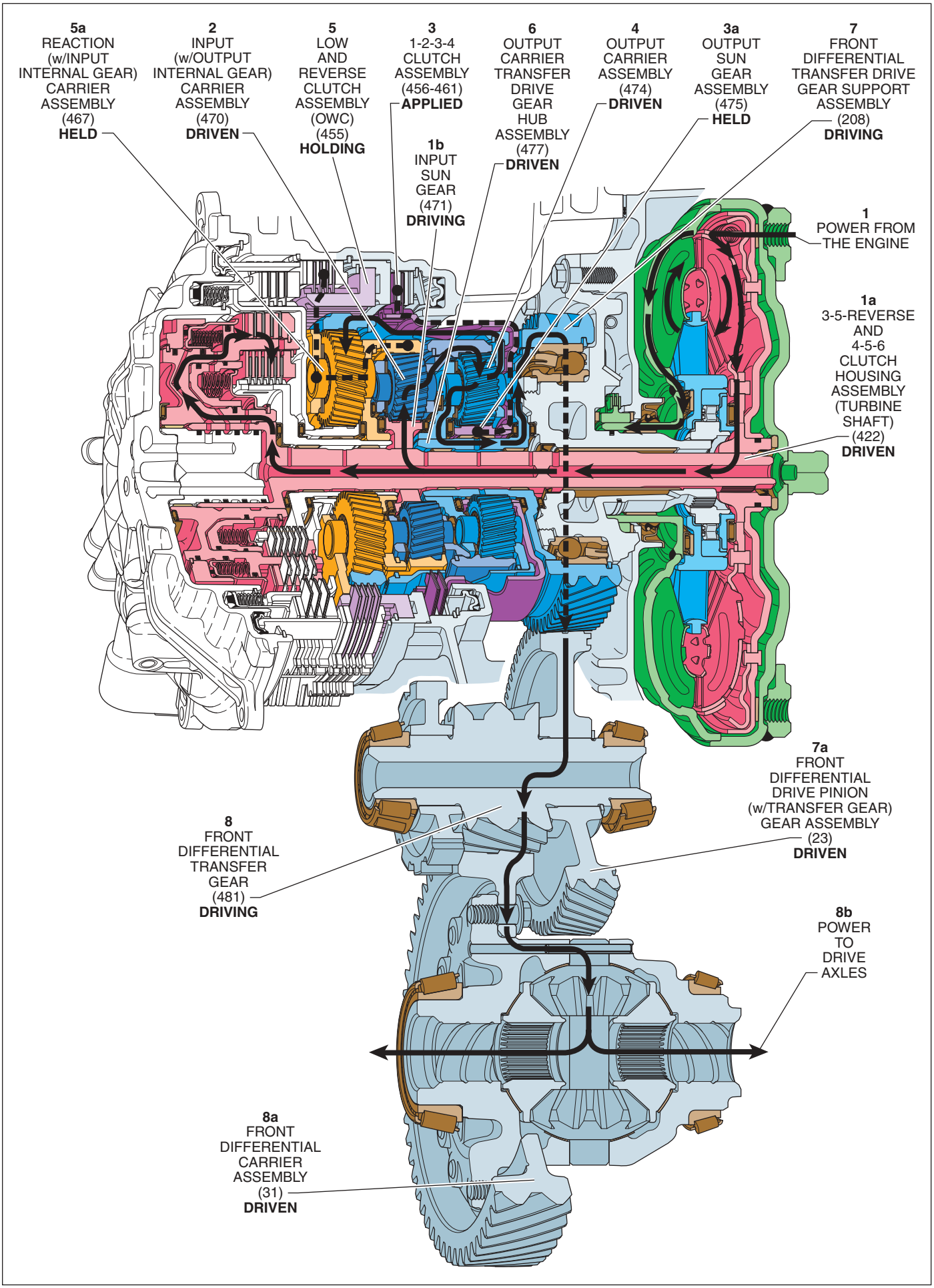


Figure 53

DRIVE RANGE – FIRST GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st	4.484	OFF	ON	ON	OFF	OFF	OFF					HOLDING	APPLIED

In Drive Range (D) – First Gear, torque from the engine is multiplied through the torque converter and transmission gear sets to the vehicle's drive axles. The planetary gear sets operate in reduction to achieve a First gear starting ratio of 4.484:1.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 Input Carrier Assembly Driven
The input carrier assembly pinions walk around the input internal gear (467) and drive the input (w/output internal gear) carrier assembly (470).

3 1-2-3-4 Clutch Assembly Applied
The 1-2-3-4 clutch plates (456-461), splined to the output sun gear assembly (475) and the transmission case assembly (51), are applied and hold the output sun gear assembly stationary.

3a Output Sun Gear Assembly Held
With the 1-2-3-4 clutch applied, the output sun gear assembly (475) is held stationary to the transmission case assembly (51).

4 Output Carrier Assembly Driven
The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output carrier assembly (474) around the stationary output sun gear assembly (475).

5 Low and Reverse One Way Clutch Assembly Holding
The input carrier assembly (470) pinion gears attempt to drive the reaction (w/input internal gear) carrier assembly (467) in the direction opposite of engine rotation, but the carrier is held stationary by the low and reverse clutch assembly (OWC) (455). When the throttle is released, however, the low and reverse clutch assembly (OWC) (455) will overrun, allowing the vehicle to coast, at least briefly, until the TCM determines that engine braking is required. At that time, the low and reverse clutch will apply and hold the low and reverse clutch assembly (OWC) inner race.

6 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

7 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

8 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

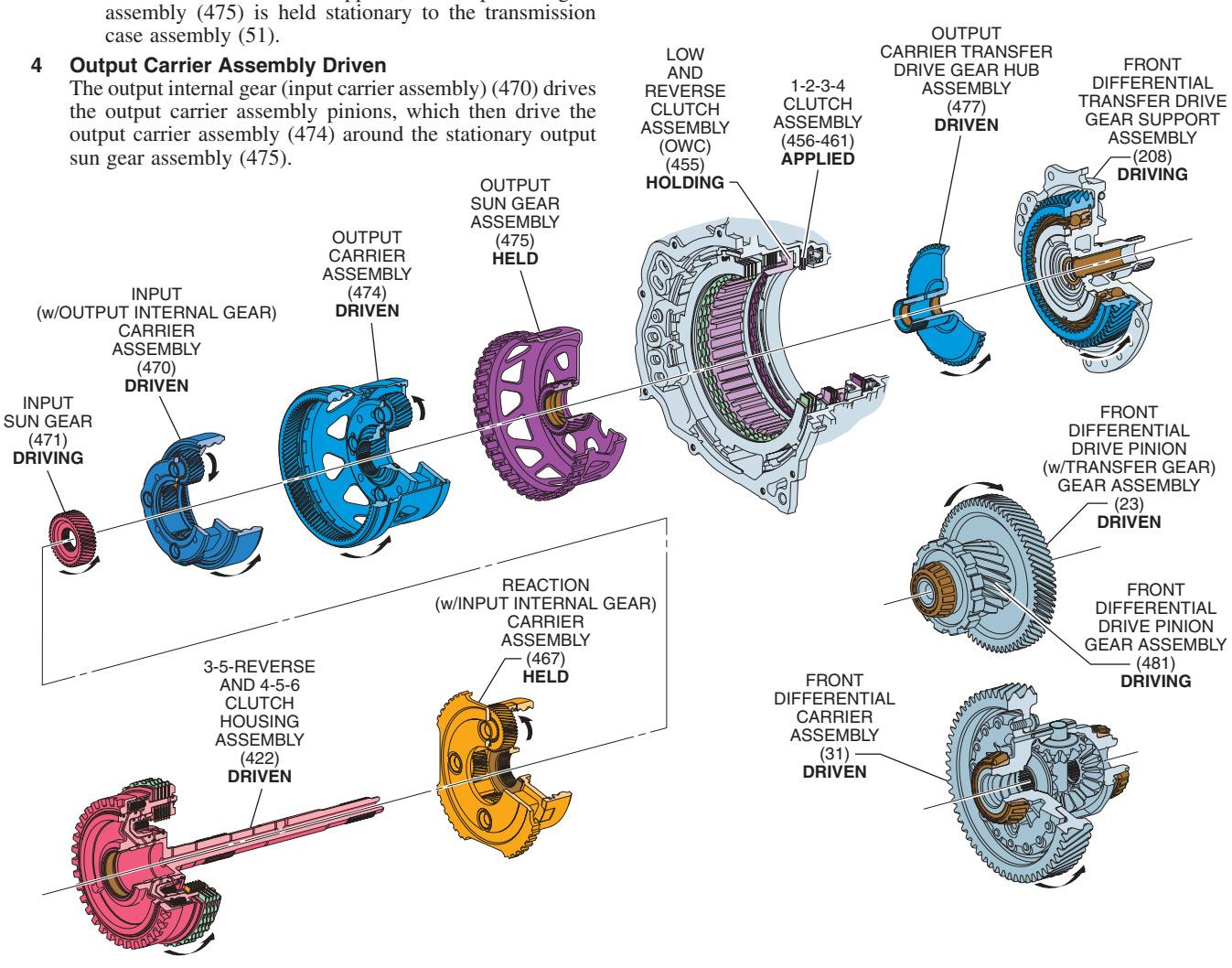


Figure 54

DRIVE RANGE – SECOND GEAR

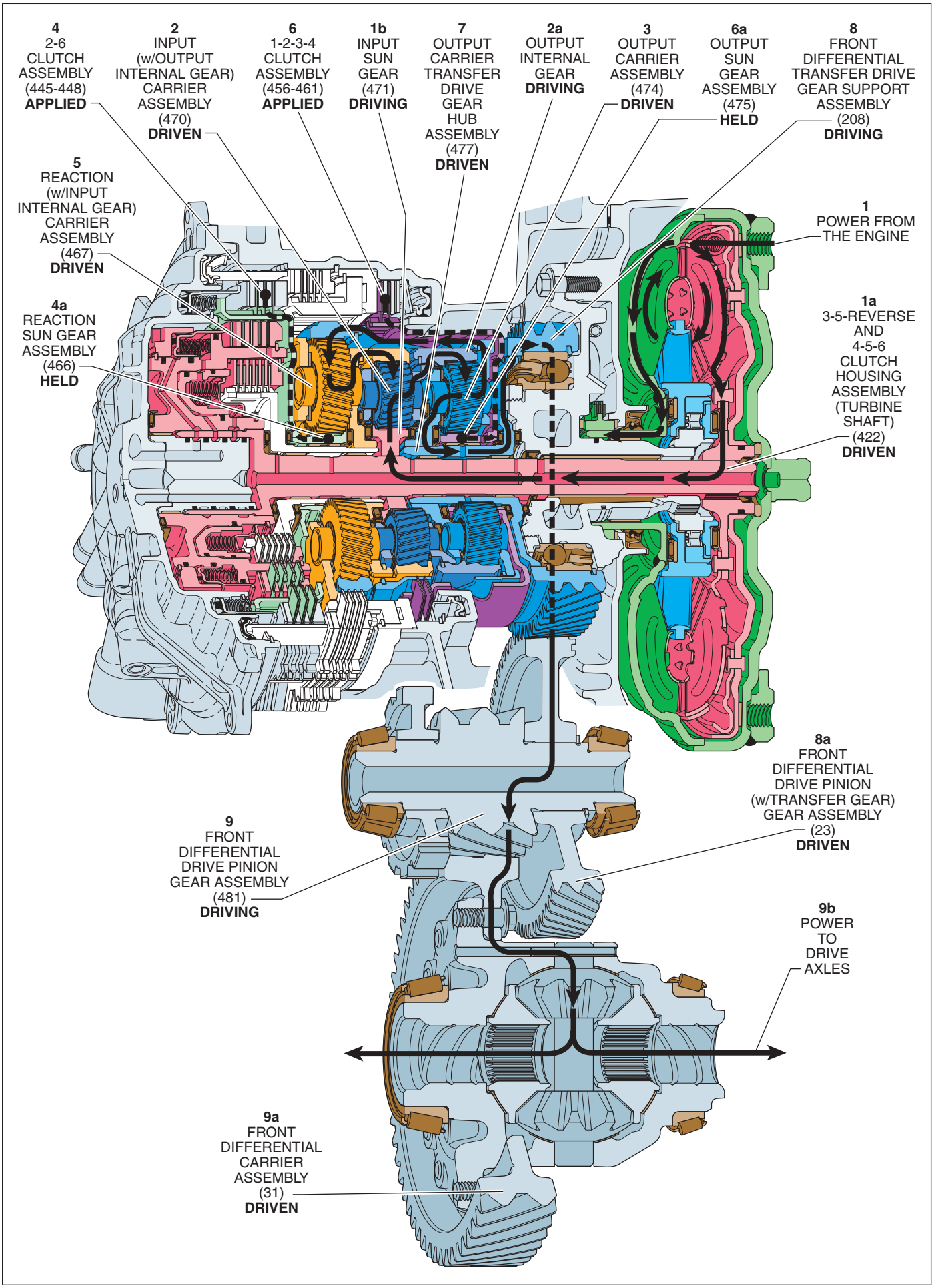


Figure 55

DRIVE RANGE – SECOND GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	2nd	2.872	OFF	ON	ON	ON	OFF	OFF			APPLIED			APPLIED

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the transmission control module (TCM). The TCM processes this information to determine the precise moment to shift the transmission into Second gear. In Second gear, the planetary gear sets continue to operate in reduction at a gear ratio of 2.872:1.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 Input Carrier Assembly Driven
The input carrier assembly pinions walk around the input internal gear (467) and drive the input (w/output internal gear) carrier assembly (470).

3 Output Carrier Assembly Driven
The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output carrier assembly (474) around the stationary output sun gear assembly (475).

4 2-6 Clutch Assembly Applied
The 2-6 clutch plates (445-448), splined to the reaction sun gear assembly (466) and the transmission case assembly (51), are applied and hold the reaction sun gear assembly stationary.

5 Reaction Carrier Assembly Driven
The reaction internal gear (output carrier assembly) (474), drives the reaction (w/input internal gear) carrier assembly (467) pinion gears. The reaction (w/input internal gear) carrier assembly (467) is also driven around the stationary reaction sun gear assembly (466) by the input carrier assembly (470) pinion gears in mesh with the input internal gear, to provide reduction through the gearsets.

6 1-2-3-4 Clutch Assembly Applied
The 1-2-3-4 clutch plates (456-461), splined to the output sun gear assembly (475) and the transmission case assembly (51), are applied and hold the output sun gear assembly stationary.

6a Output Sun Gear Assembly Held
With the 1-2-3-4 clutch applied, the output sun gear assembly (475) is held stationary to the transmission case assembly (51).

7 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

8 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

9 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

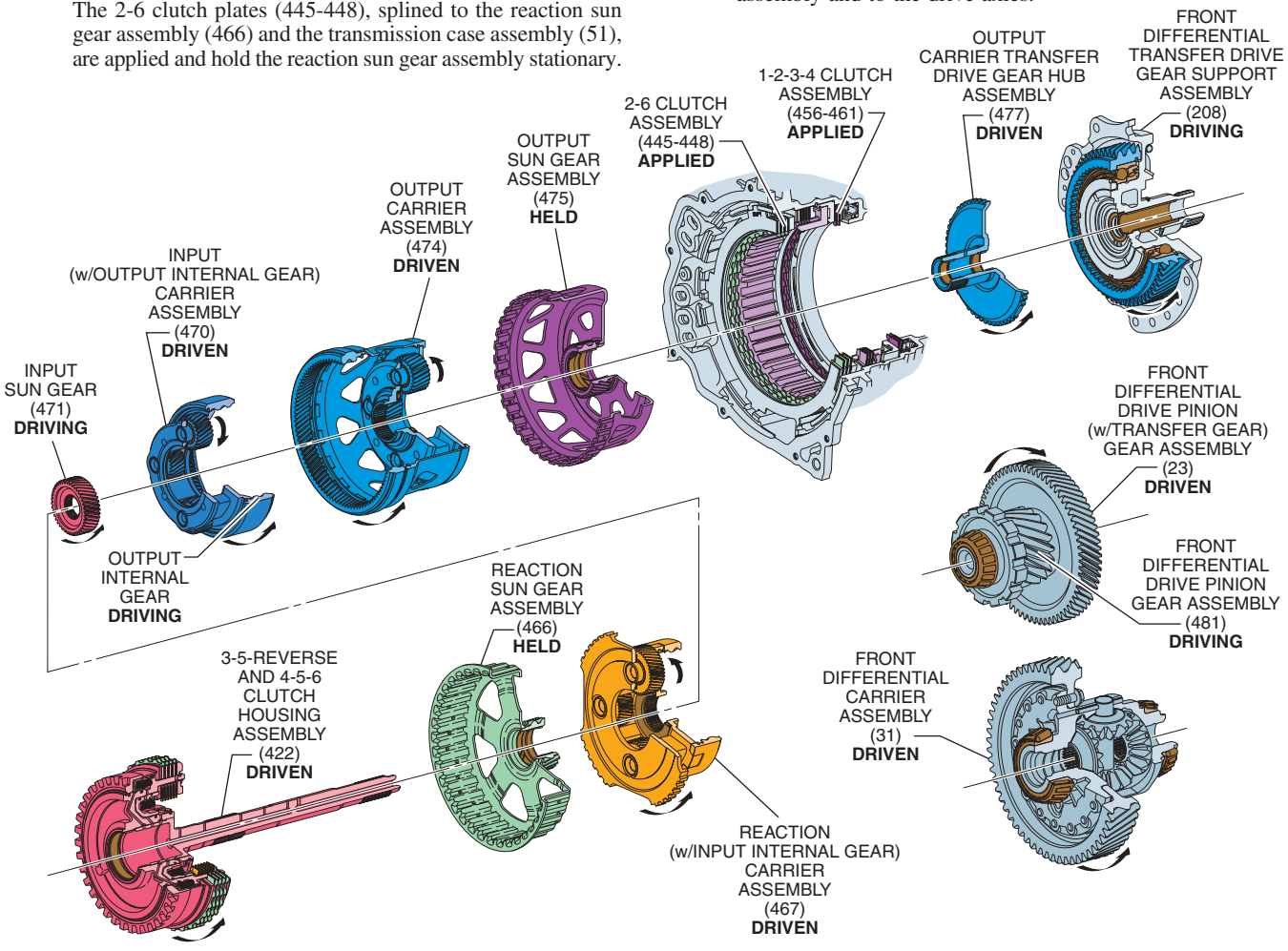


Figure 56

DRIVE RANGE – THIRD GEAR

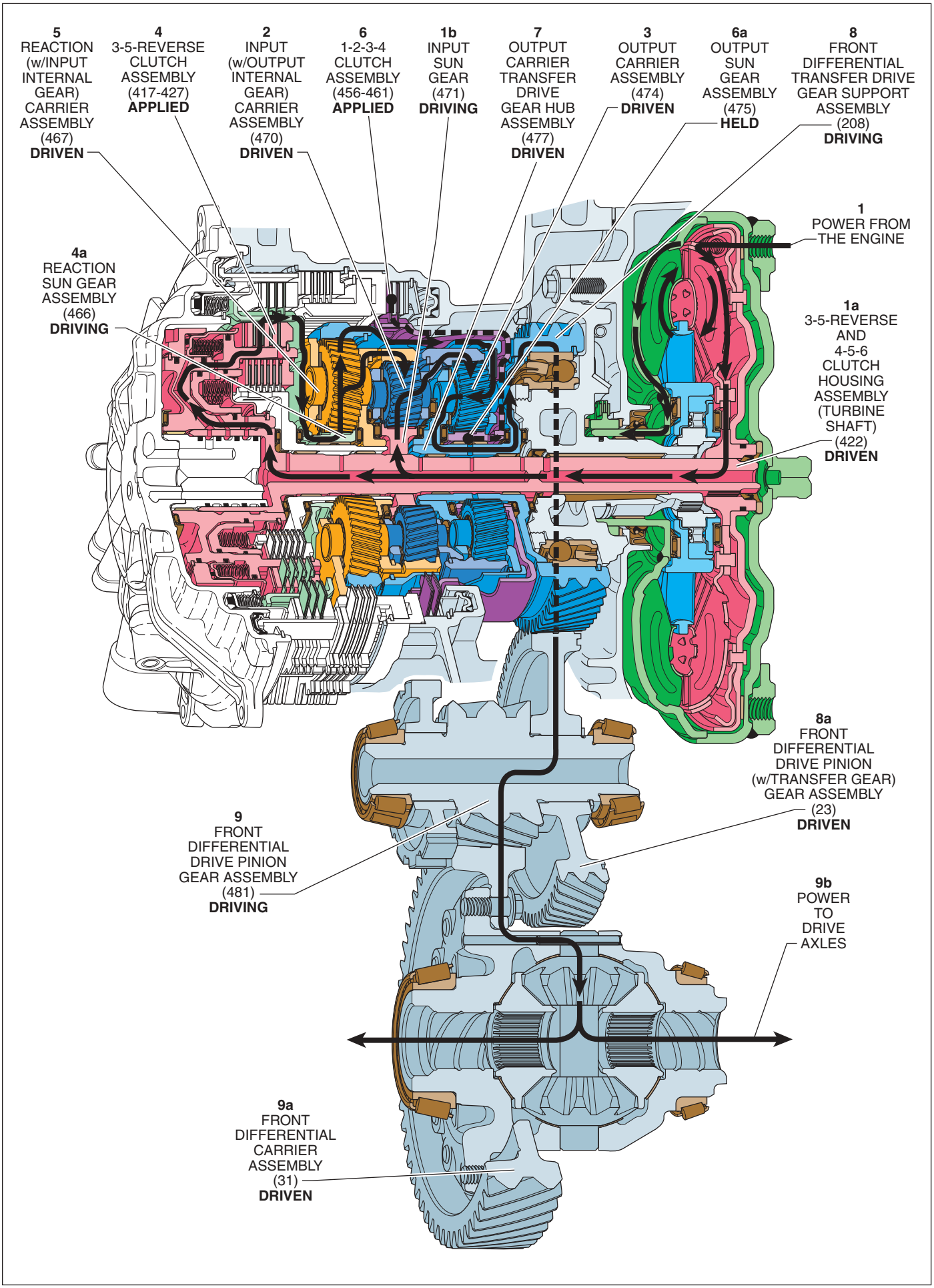


Figure 57

DRIVE RANGE – THIRD GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	3rd	1.842	OFF	ON	ON	OFF	ON	OFF		APPLIED				APPLIED

As vehicle speed increases, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the TCM. The TCM uses this information to determine the precise moment to shift the transmission into Third gear. In Third gear, the planetary gear sets continue to operate in reduction at a gear ratio of 1.842:1.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 Input Carrier Assembly Driven
The input carrier assembly pinions walk around the input internal gear (467) and drive the input (w/output internal gear) carrier assembly (470).

3 Output Carrier Assembly Driven
The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output carrier assembly (474) around the stationary output sun gear assembly (475).

4 3-5-Reverse Clutch Assembly Applied
The 3-5-reverse clutch plates (417-427), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction sun gear assembly (466), are applied and drive the reaction sun gear assembly.

5 Reaction Carrier Assembly Driven
The reaction internal gear (output carrier assembly) (474), drives the reaction (w/input internal gear) carrier assembly (467) pinion gears. The reaction (w/input internal gear) carrier assembly (467) is also driven by the reaction sun gear assembly (466), to provide reduction through the gearsets.

6 1-2-3-4 Clutch Assembly Applied
The 1-2-3-4 clutch plates (456-461), splined to the output sun gear assembly (475) and the transmission case assembly (51), are applied and hold the output sun gear assembly stationary.

6a Output Sun Gear Assembly Held
With the 1-2-3-4 clutch applied, the output sun gear assembly (475) is held stationary to the transmission case assembly (51).

7 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

8 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

9 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

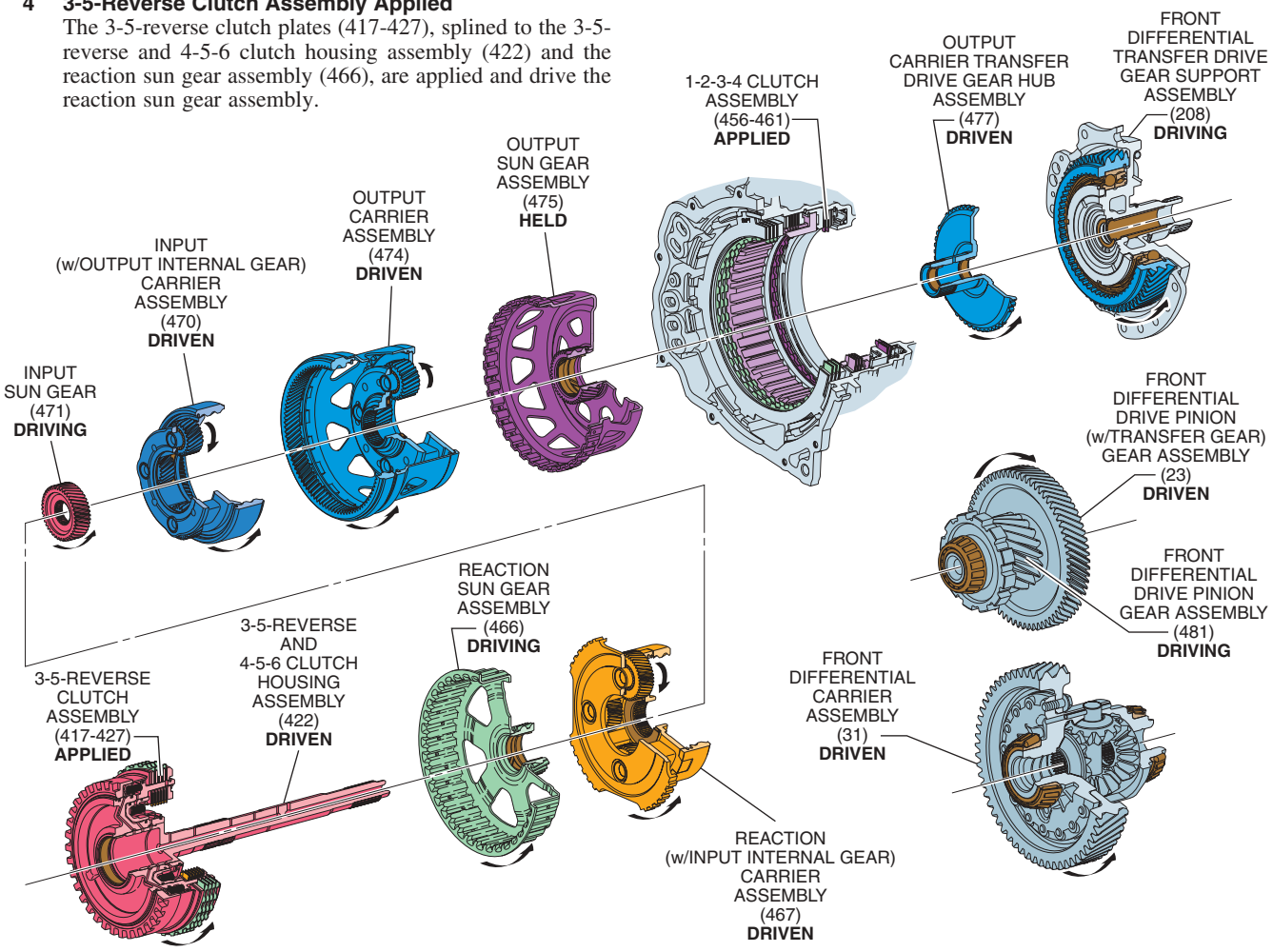


Figure 58

DRIVE RANGE – FOURTH GEAR

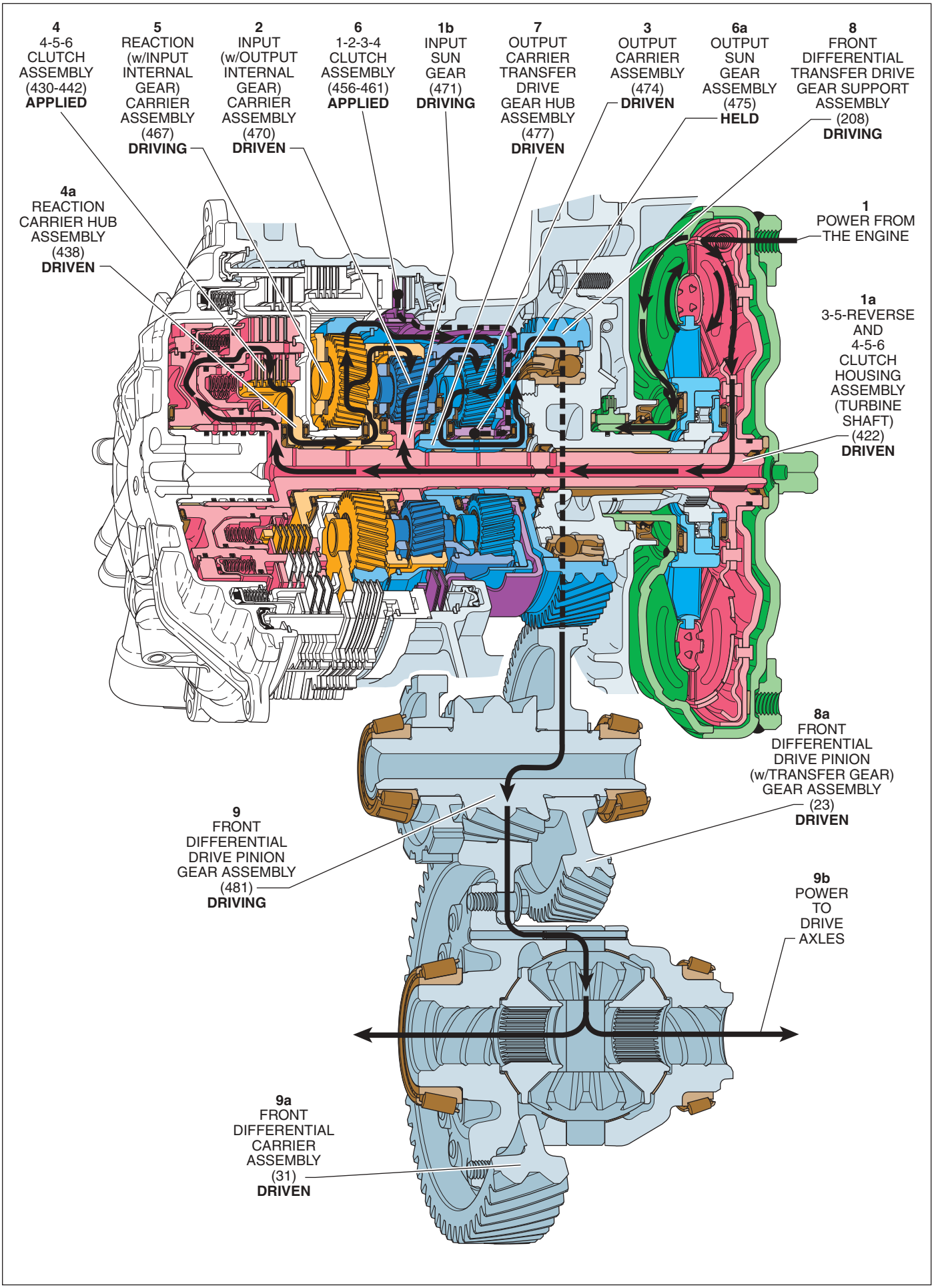


Figure 59

DRIVE RANGE – FOURTH GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	4th	1.414	OFF	ON	ON	OFF	OFF	ON	APPLIED					APPLIED

As vehicle speed increases further, input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors are sent to the TCM. The TCM uses this information to determine the precise moment to shift the transmission into Fourth gear. In Fourth gear, the planetary gear sets continue to operate in reduction at a gear ratio of 1.414:1.

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 Input Carrier Assembly Driven
The input carrier assembly pinions walk around the input internal gear (467) and drive the input (w/output internal gear) carrier assembly (470).

3 Output Carrier Assembly Driven
The output internal gear (input carrier assembly) (470) drives the output carrier assembly pinions, which then drive the output carrier assembly (474) around the stationary output sun gear assembly (475).

4 4-5-6 Clutch Assembly Applied
The 4-5-6 clutch plates (430-442), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction carrier hub assembly (438), are applied and drive the reaction carrier hub assembly.

5 Reaction Carrier Assembly Driving
The reaction carrier hub assembly (438) is splined to and drives the reaction (w/input internal gear) carrier assembly (467). The reaction (w/input internal gear) carrier assembly (467) pinion gears are driven around the reaction internal gear (output carrier assembly) (474), to provide reduction through the gearsets.

6 1-2-3-4 Clutch Assembly Applied
The 1-2-3-4 clutch plates (456-461), splined to the output sun gear assembly (475) and the transmission case assembly (51), are applied and hold the output sun gear assembly stationary.

6a Output Sun Gear Assembly Held
With the 1-2-3-4 clutch applied, the output sun gear assembly (475) is held stationary to the transmission case assembly (51).

7 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

8 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

9 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

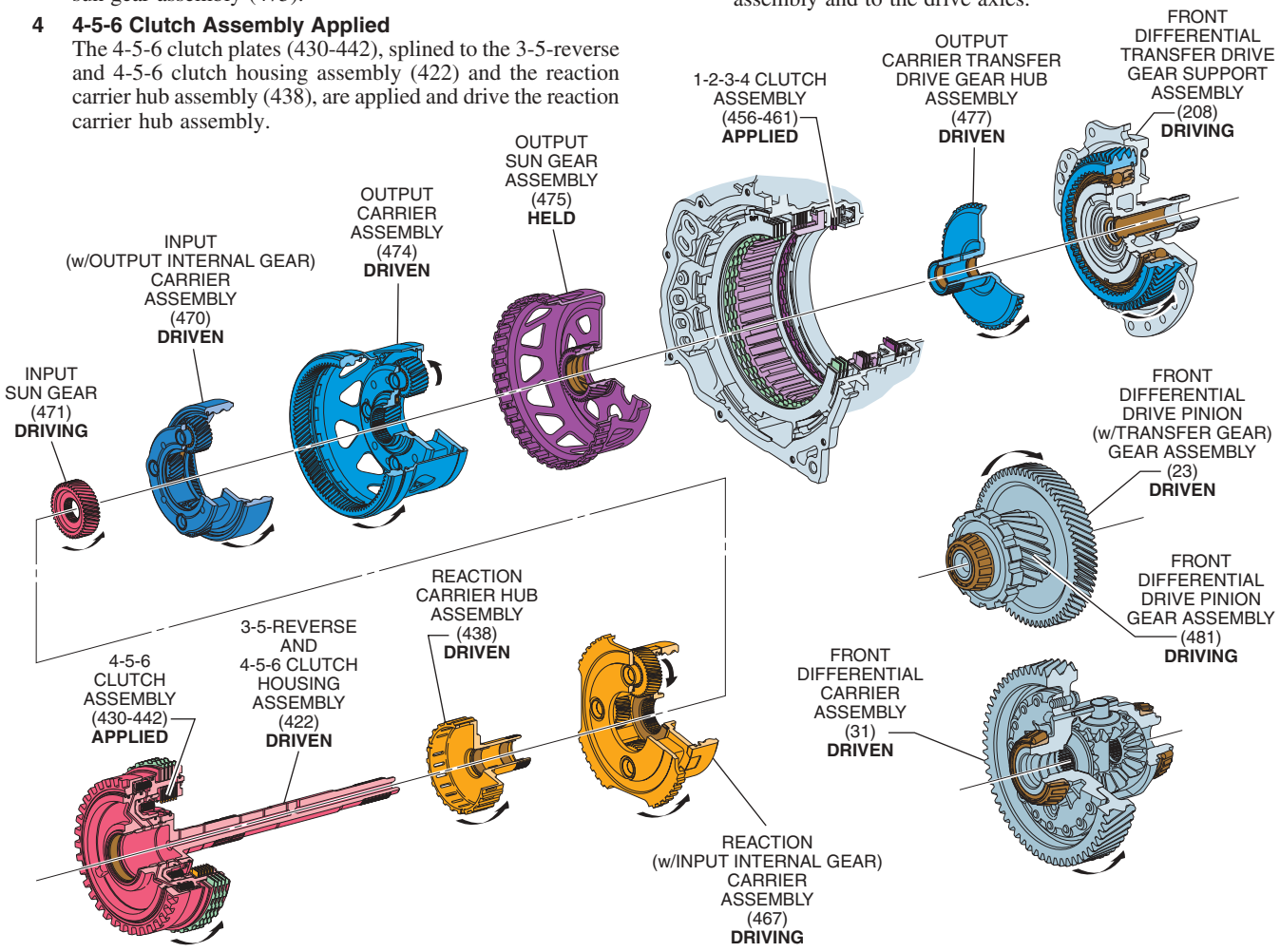


Figure 60

DRIVE RANGE – FIFTH GEAR

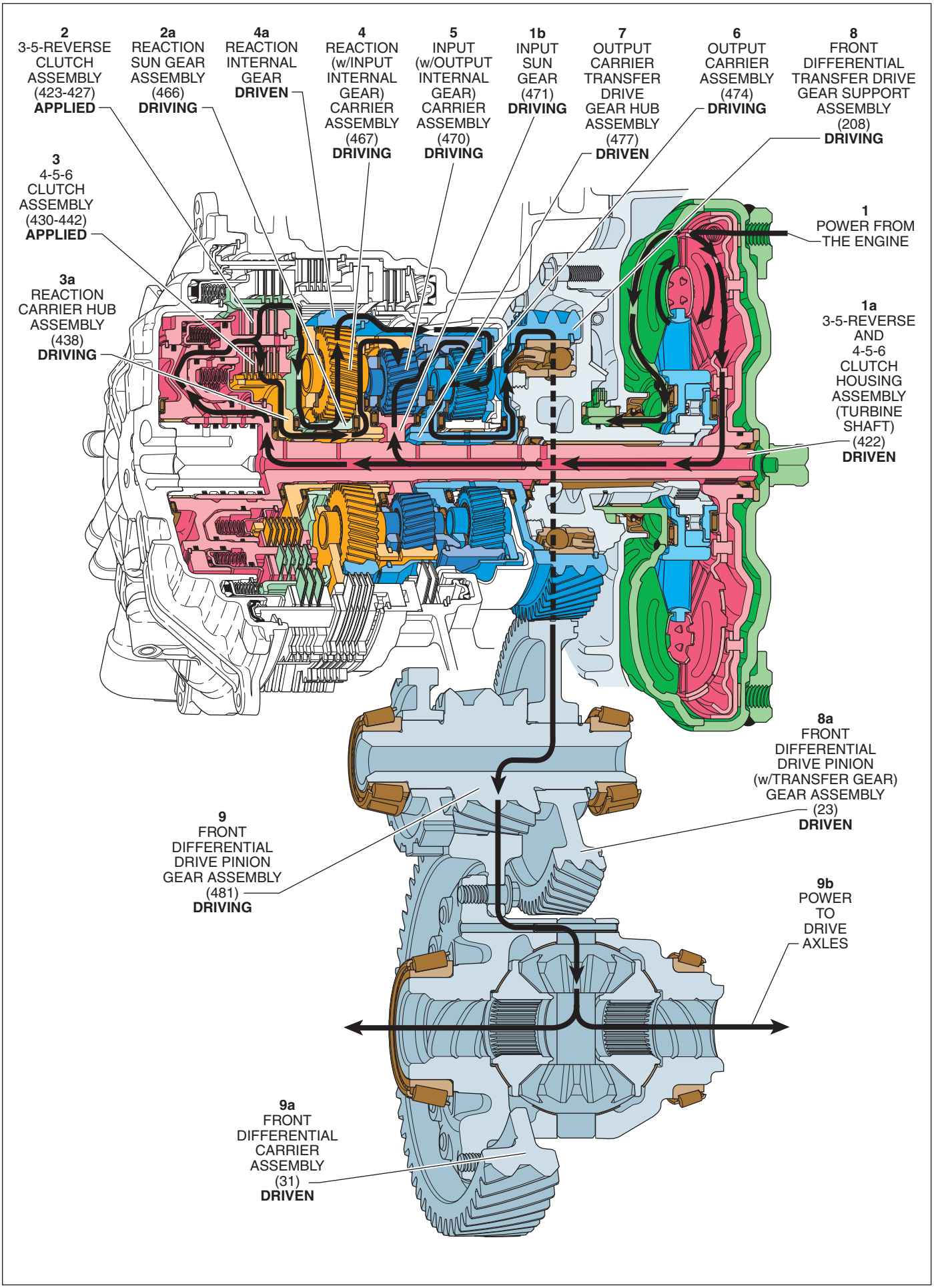


Figure 61

DRIVE RANGE – FIFTH GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	5th	1.000	OFF	ON	OFF	OFF	ON	ON	APPLIED	APPLIED				

Drive Range – Fifth Gear is used to maximize engine efficiency and fuel economy under most driving conditions. Input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors, are used by the TCM to determine the precise moment to shift the transmission into Fifth gear. In Fifth gear, the planetary gear sets rotate as a unit (direct drive), allowing the transfer gears to provide a 1.000:1 gear ratio to the front differential carrier assembly (31).

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 3-5-Reverse Clutch Assembly Applied
The 3-5-reverse clutch plates (417-427), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction sun gear assembly (466), are applied and drive the reaction sun gear assembly. The reaction sun gear assembly (466) attempts to drive the reaction (w/input internal gear) carrier assembly (467) pinion gears.

3 4-5-6 Clutch Assembly Applied
The 4-5-6 clutch plates (430-442), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction carrier hub assembly (438), are applied and drive the reaction carrier hub assembly. The reaction carrier hub assembly (438) is splined to and drives the reaction (w/input internal gear) carrier assembly (467).

4 Reaction Carrier Assembly Driving
With both the reaction sun gear assembly (466) and the reaction carrier hub assembly (438) driving at converter turbine speed, the reaction carrier assembly pinions act as wedges and provide direct drive to the reaction internal gear (output carrier assembly) (474).

5 Input Carrier Assembly Driven
With both the input internal gear (reaction carrier assembly) (467) and the input sun gear (471) driving at converter turbine speed, the input carrier pinions act as wedges to obtain direct drive through the input (w/output internal gear) carrier assembly (470).

6 Output Carrier Assembly Driving
With both the reaction carrier assembly (467) and the input carrier assembly (470) driving at converter turbine speed, the output carrier assembly (474) rotates as a unit, providing direct drive to the output carrier transfer drive gear hub assembly (477).

7 Output Carrier Transfer Drive Gear Hub Assembly Driven
The output carrier transfer drive gear hub assembly (477) is splined to, and driven by, the output carrier assembly (474).

8 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

9 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

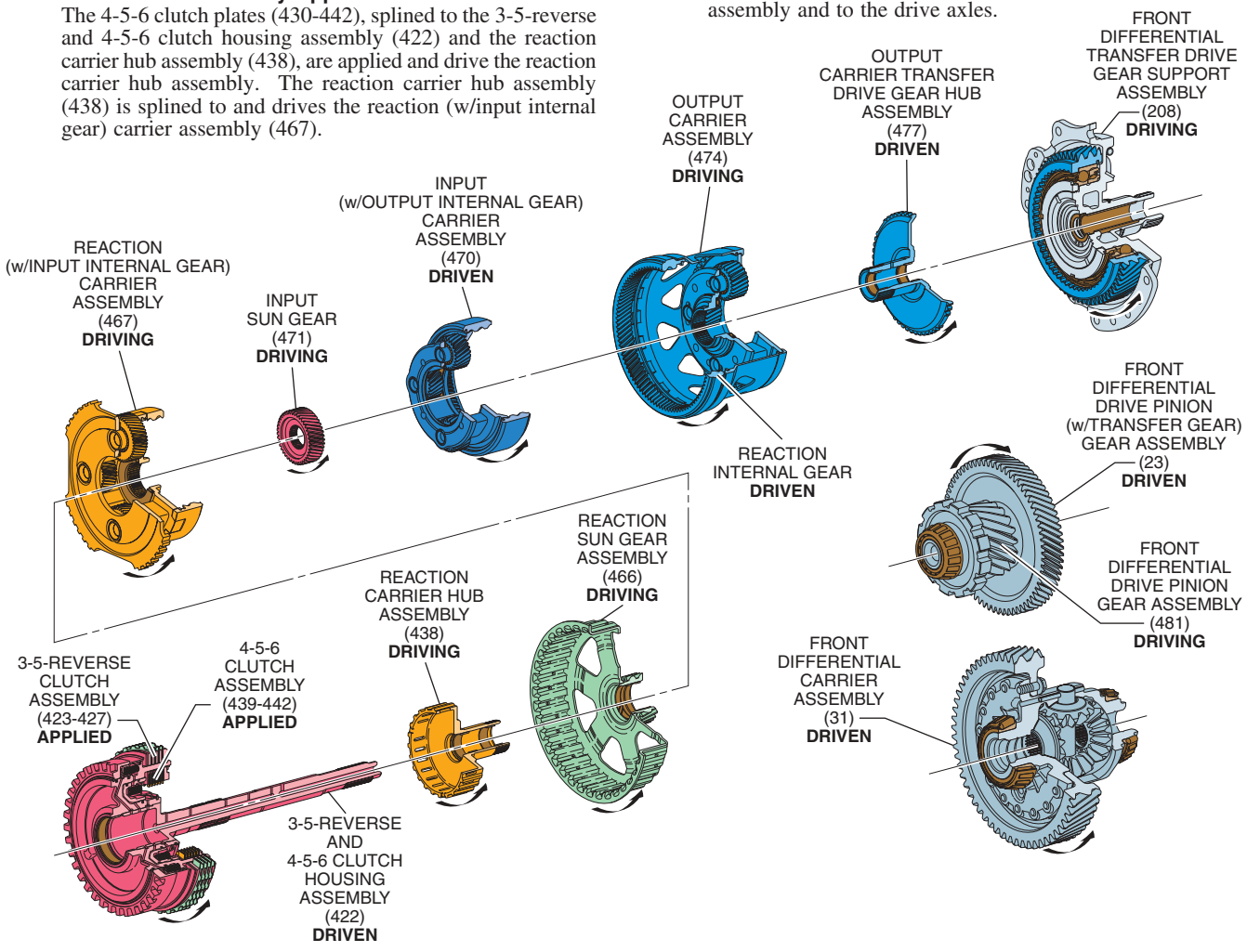


Figure 62

DRIVE RANGE – SIXTH GEAR

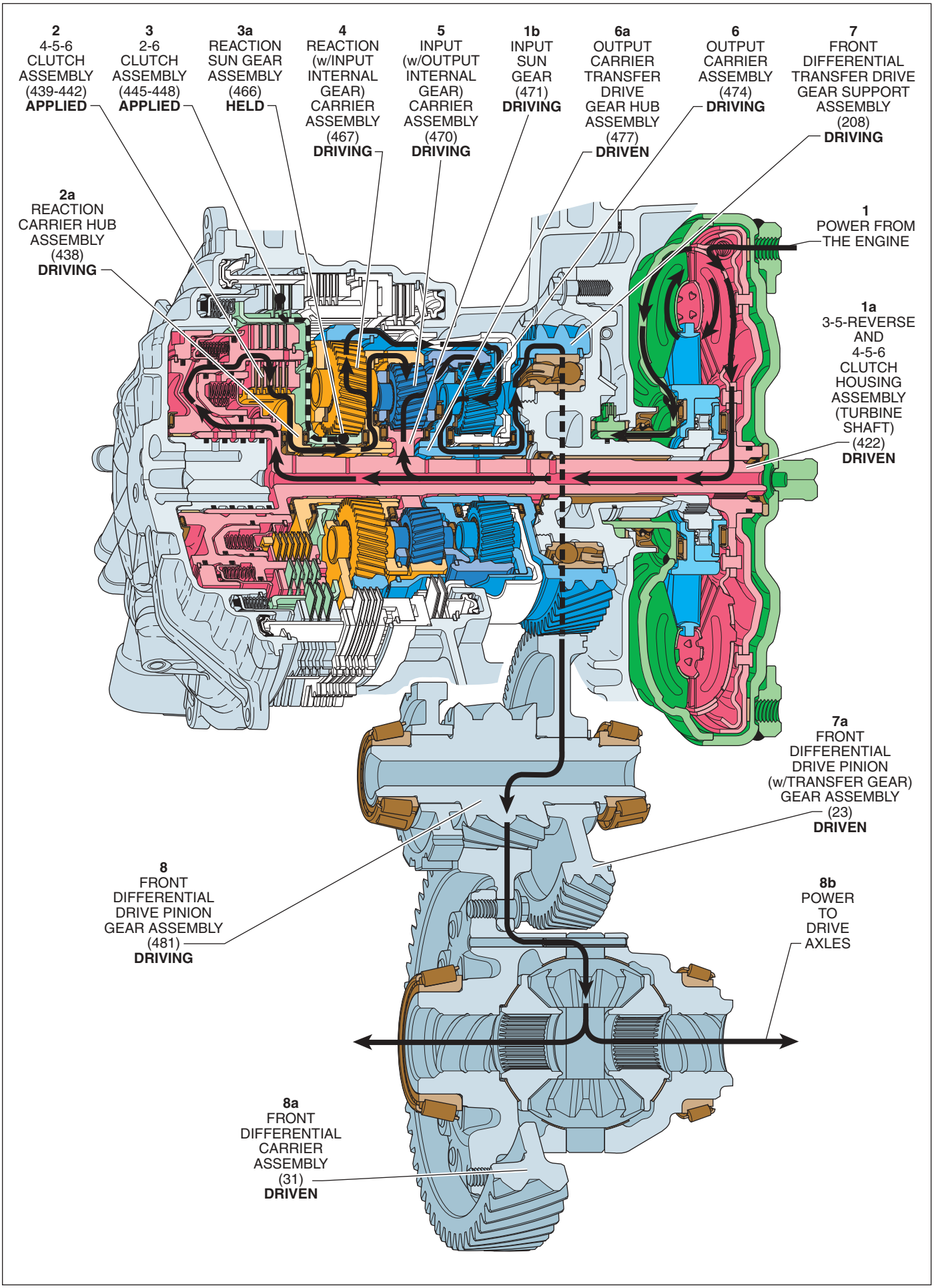


Figure 63

DRIVE RANGE – SIXTH GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	6th	0.742	OFF	ON	OFF	ON	OFF	ON	APPLIED		APPLIED			

Drive Range – Sixth Gear is used to maximize engine efficiency and fuel economy beyond Fifth gear calibrations. Input signals from the transmission speed sensors (input and output), throttle position (TP) sensor, and other vehicle sensors, are used by the TCM to determine the precise moment to shift the transmission into Sixth gear. In Sixth gear, the planetary gear sets rotate in overdrive, providing a 0.742:1 gear ratio between the torque converter turbine and the front differential carrier assembly (31).

1 Power From The Engine

1a Turbine Shaft Driven
As the torque converter turbine rotates, the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), which is splined to the torque converter turbine, is also forced to rotate at turbine speed.

1b Input Sun Gear Driving
The input sun gear (471), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (turbine shaft) (422), drives the input (w/output internal gear) carrier assembly (470) pinion gears.

2 4-5-6 Clutch Assembly Applied
The 4-5-6 clutch plates (430-442), splined to the 3-5-reverse and 4-5-6 clutch housing assembly (422) and the reaction carrier hub assembly (438), are applied and drive the reaction carrier hub assembly. The reaction carrier hub assembly (438) is splined to and drives the reaction (w/input internal gear) carrier assembly (467)

3 2-6 Clutch Assembly Applied
The 2-6 clutch plates (445-448), splined to the reaction sun gear assembly (466) and the transmission case assembly (51), are applied and hold the reaction sun gear assembly stationary.

4 Reaction Carrier Assembly Driving
The reaction (w/input internal gear) carrier assembly (467) pinion gears are driven around the stationary reaction sun gear assembly (466), and over drive the reaction internal gear (output carrier assembly) (474).

5 Input Carrier Assembly Driving
With the input internal gear (reaction carrier assembly) (467) and the input sun gear (471) both driving at converter turbine speed, the input carrier assembly pinions act as wedges to obtain direct drive to the output internal gear, which drives the output carrier assembly (474) pinions.

6 Output Carrier Assembly Driving
The output carrier assembly (474) is splined to, and drives the output carrier transfer drive gear hub assembly (477).

7 Front Differential Transfer Drive Gear Support Assembly Driving
The front differential transfer drive gear (support assembly) (208), splined to and driven by the output carrier transfer drive gear hub assembly (477), drives the front differential drive pinion gear assembly (23).

8 Front Differential Drive Pinion Gear Assembly Driving
The front differential drive pinion gear assembly (23), is in mesh with, and drives, the front differential carrier assembly (31), thus transferring power to the front differential carrier assembly and to the drive axles.

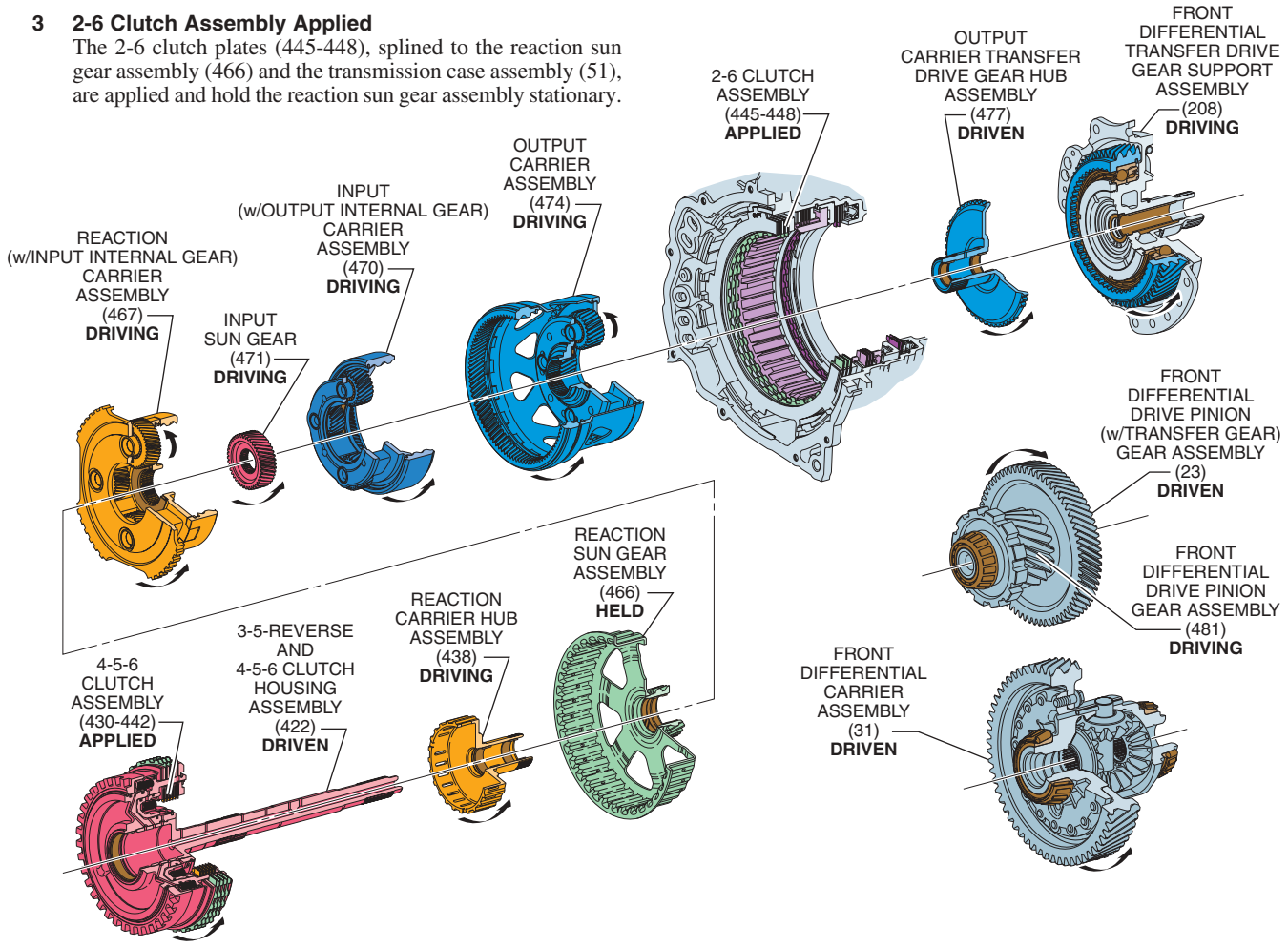


Figure 64

COMMON HYDRAULIC FUNCTIONS FOR ALL RANGES

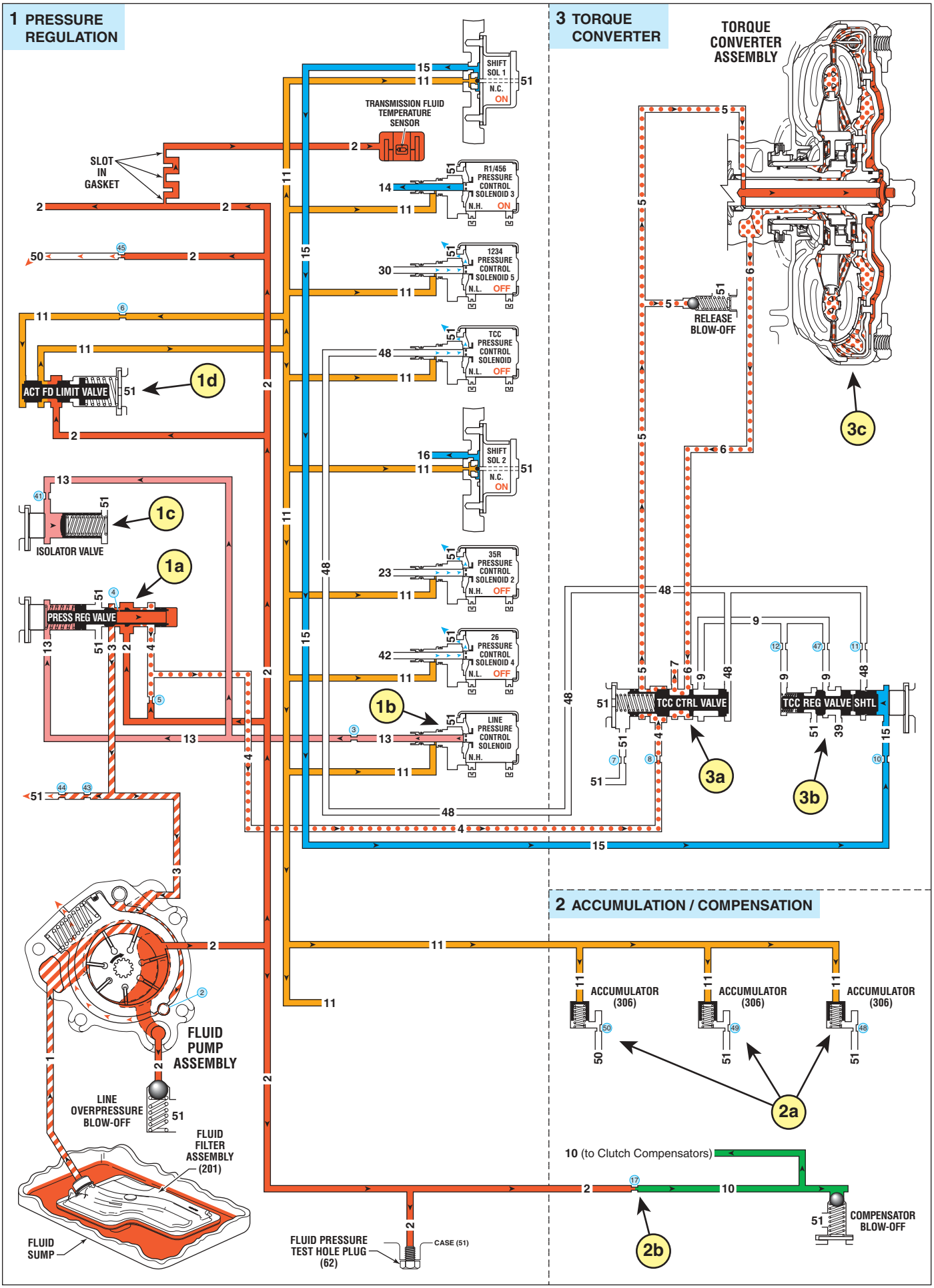


Figure 65

COMMON HYDRAULIC FUNCTIONS FOR ALL RANGES

(Engine Running)

When the gear selector lever is in the Park (P) position and the engine is running, fluid is drawn into the fluid pump assembly and line (2) pressure is directed to the pressure regulator valve.

1 PRESSURE REGULATION

1a Pressure Regulator Valve
The pressure regulator valve regulates pump output [line (2) pressure] into the converter feed (4) fluid circuit. PCS line (13) fluid pressure and spring force oppose orificed line (2) fluid pressure to regulate the amount of fluid pressure that enters the converter feed (4) circuit. Converter feed (4) pressure is directed to the TCC control valve.

1b Line Pressure Control Solenoid
Controlled by the TCM, the line pressure control solenoid regulates actuator feed limit (11) fluid pressure into the PCS line (13) fluid circuit. PCS line (13) fluid is routed to the pressure regulator valve and the isolator valve.

1c Isolator Valve
PCS line (13) fluid pressure acts on the isolator valve in all gear ranges. The isolator valve is used to dampen any pressure irregularities occurring in the PCS line (13) fluid circuit.

1d Actuator Feed Limit Valve
Line (2) pressure is routed through the actuator feed limit valve into the actuator feed limit (11) fluid circuit. The valve limits actuator feed limit (11) fluid pressure to a maximum pressure. Actuator feed limit (11) fluid is routed to the shift solenoid 1, the R1/456 pressure control solenoid 3, the 1234 pressure control solenoid 5, the TCC pressure control solenoid, the shift solenoid 2, the 35R pressure control solenoid 2, the 26 pressure control solenoid 4, the line pressure control solenoid, and the 3-5-reverse clutch regulator valve.

2 ACCUMULATION / COMPENSATION

2a Actuator Feed Limit Accumulators
Actuator feed limit (11) fluid pressure acts on three actuator feed limit accumulator pistons in all gear ranges. The accumulators are used to dampen any pressure irregularities occurring in the actuator feed limit (11) fluid circuit as solenoids are energized or de-energized to control the apply of the various clutches.

2b Clutch Compensation
Line (2) fluid pressure is regulated through orifice #17 into the compensator feed (10) circuit at 9 PSI. Compensator feed (10) fluid is routed to the compensators of the 4-5-6 clutch and 3-5 reverse clutch assemblies, where it combines with spring force to help cushion the apply of the clutches.

3 TORQUE CONVERTER (RELEASED POSITION ONLY)

3a Torque Converter Clutch (TCC) Control Valve
Converter feed (4) fluid is routed through the TCC control valve into the TCC release (5) fluid circuit. TCC apply (6) fluid from the torque converter is also directed through the TCC control valve into the cooler feed (7) circuit.

3b Torque Converter Clutch (TCC) Regulator Apply Valve
Solenoid 1 (15) fluid is routed to the TCC regulator valve, and applies the valve against spring force. In Park (P) range the TCC regulator apply valve has no effect. However, in 4th, 5th, or 6th gears, when the TCM determines that transmission operating conditions are appropriate, the applied TCC regulator valve will allow drive 1-6 (39) fluid to be regulated into the regulated apply (9) circuit in order to apply the torque converter. See Torque Converter pages 14 and 15 for more information on torque converter apply and release.

3c Torque Converter Assembly
TCC release (5) fluid pressure is routed to the torque converter assembly, maintaining a constant flow of fluid through the converter to keep it cool. Fluid leaves the converter through the TCC apply (6) circuit and passes through the TCC control valve into the cooler feed (7) circuit. Cooler feed (7) fluid is routed through the cooler and into the lube (8) fluid circuit to provide lubrication throughout the transmission.

PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

PARK

(Engine Running)

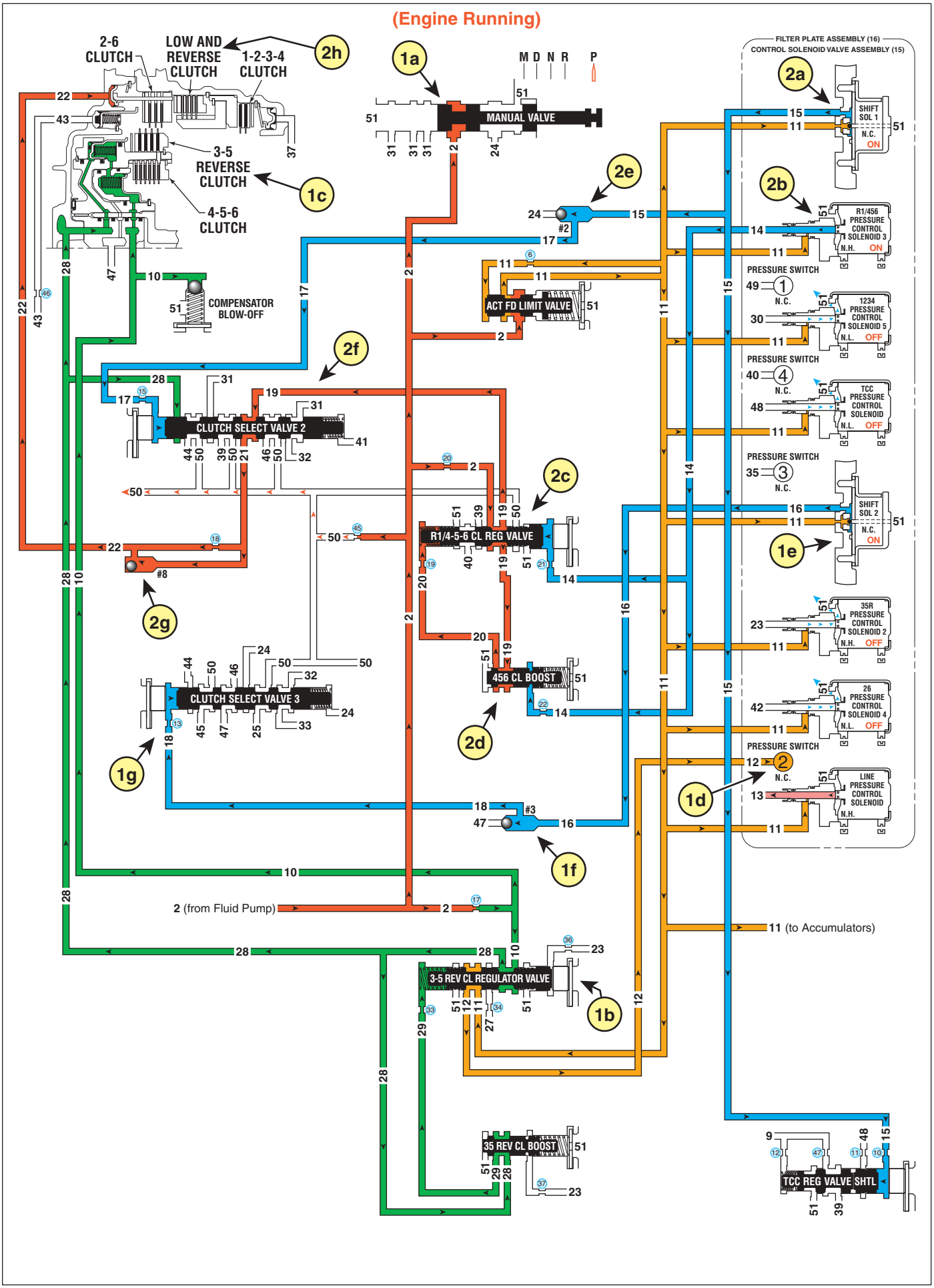


Figure 66

PARK

(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
PARK	P	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

FLUID PRESSURE DIRECTED IN PREPARATION FOR A SHIFT

1a Manual Valve
Mechanically controlled by the gear selector lever, the manual valve is in the Park (P) position and prevents line (2) pressure from the fluid pump assembly from entering the reverse (24) and drive (31) fluid circuits.

1b 3-5-Reverse Clutch Regulator Valve
Compensator feed (10) fluid passes through the 3-5-reverse clutch regulator valve into the 35 reverse clutch (28) circuit.

1c 3-5 Reverse Clutch Assembly
35 reverse clutch (28) fluid fills the 3-5 reverse clutch piston apply cavity in preparation for a shift to Reverse range. However, in Park range, 35 reverse clutch (28) pressure is limited to the compensator feed (10) pressure of 9 PSI and is not strong enough to apply the clutch.

1d #2 Pressure Switch
Actuator feed limit (11) fluid is routed through the 3-5 reverse clutch regulator valve into the PS2 (12) fluid passage. PS2 (12) fluid opens the normally closed #2 pressure switch, signalling the TCM that the transmission is in either Park or Neutral Range. The TCM then energizes, or "turns ON" the appropriate solenoids.

1e Shift Solenoid 2
The shift solenoid 2 is energized (ON) allowing actuator feed limit (11) fluid to enter the solenoid 2 (16) circuit.

1f #3 Ball Check Valve
Solenoid 2 (16) fluid seats the #3 ball check valve against the 456 clutch (47) fluid passage and enters the CSV3 enable (18) circuit. CSV3 enable (18) fluid is then routed through orifice #13 to the clutch select valve 3.

1g Clutch Select Valve #3
CSV3 enable (18) fluid applies the clutch select valve 3 against clutch select valve 3 spring force.

LOW AND REVERSE CLUTCH APPLIES

2a Shift Solenoid 1
The shift solenoid 1 is energized (ON) allowing actuator feed limit (11) fluid to enter the solenoid 1 (15) circuit. Solenoid 1 (15) fluid is routed to the #2 ball check valve, and through orifice #10 to apply the torque converter clutch (TCC) regulator apply valve and shuttle valve (SHTL).

2b R1/456 Pressure Control (PC) Solenoid 3
The R1/456 PC solenoid 3 is energized (ON) allowing actuator feed limit (11) fluid to enter the PCS R1/456 clutch (14) fluid circuit. PCS R1/456 clutch (14) fluid is then routed through orifice #22 to the 4-5-6 clutch boost valve, and through orifice #21 to the R1/4-5-6 clutch regulator valve.

2c R1/4-5-6 Clutch Regulator Valve
PCS R1/465 clutch (14) fluid at the R1/4-5-6 clutch regulator valve, opposes R1/4-5-6 clutch regulator spring force and R1 feedback (20) fluid pressure to regulate line (2) pressure into the R1/456 clutch feed (19) circuit.

2d 4-5-6 Clutch Boost Valve
PCS R1/465 clutch (14) fluid pressure acts on a differential area of the 4-5-6 clutch boost valve, moving the valve against 4-5-6 clutch boost valve spring force to regulate R1/456 clutch (19) fluid into the R1 feedback (20) circuit. As PCS R1/456 clutch (14) fluid pressure is increased to a given value, the 4-5-6 clutch boost valve opens the R1 feedback (20) circuit to exhaust (51). This results in the R1/4-5-6 clutch regulator valve moving to the full feed position, sending full R1/456 clutch (19) pressure (full line pressure) to the low and reverse clutch.

2e #2 Ball Check Valve
Solenoid 1 (15) fluid seats the #2 ball check valve against the reverse (24) fluid passage and enters the CSV2 enable (17) circuit. CSV2 enable (17) fluid is then routed through orifice #15 to the clutch select valve 2.

2f Clutch Select Valve 2
CSV2 enable (17) fluid applies the clutch select valve 2 against clutch select valve 2 spring force. This allows R1/456 clutch feed (19) fluid to pass through the valve into the R1 supply (21) circuit.

2g #8 Ball Check Valve
R1/456 (21) fluid unseats the #8 ball check valve allowing fluid to bypass orifice #18 and enter the R1 (22) fluid circuit.

2h Low and Reverse Clutch
R1 (22) fluid enters the automatic transmission case cover assembly and moves the low and reverse clutch piston against spring force to apply the low and reverse clutch plates. In Park range, the low and reverse clutch has no effect. However, when Reverse or a forward range is selected, only one apply device has to be energized, which helps create a smooth starting motion.

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

REVERSE

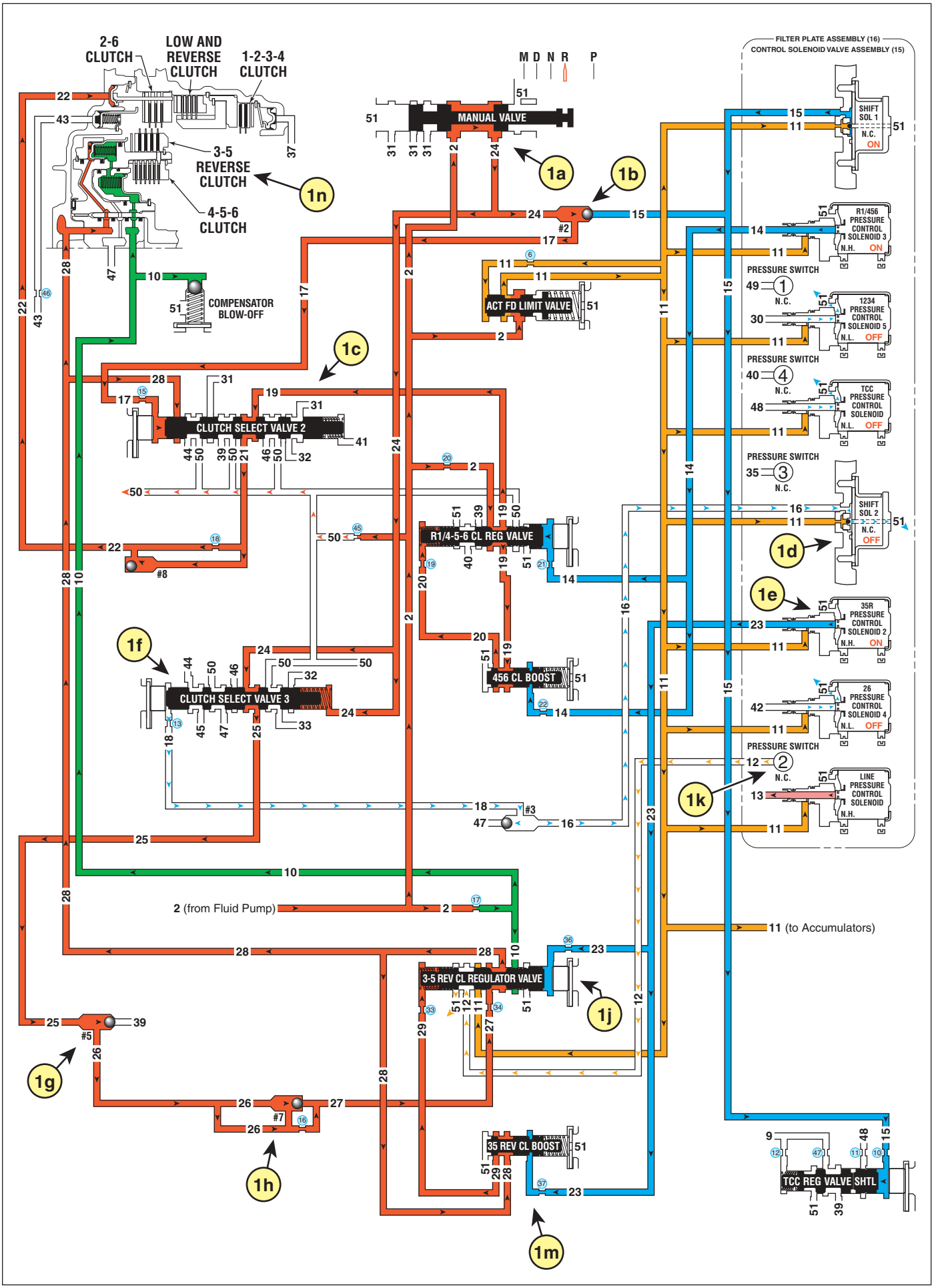

Figure 67

REVERSE

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
REV	R	2.880	ON	OFF	OFF	OFF	ON	ON		APPLIED		APPLIED		

When the gear selector lever is moved to the Reverse (R) position (from the Park position) the normally high 35R pressure control solenoid 2 is commanded ON, and the following changes occur in the transmission's hydraulic and electrical systems.

3-5 REVERSE CLUTCH APPLIES

1a Manual Valve
With the manual valve in the reverse position, line (2) pressure is directed into the reverse (24) fluid circuit.

1b #2 Ball Check Valve
Reverse (24) fluid seats the #2 ball check valve against the solenoid 1 (15) fluid passage and enters the CSV2 enable (17) circuit. CSV2 enable (17) fluid is then routed through orifice #15 to the clutch select valve 2.

1c Clutch Select Valve 2
CSV2 enable (17) fluid, present at the valve from Park position, continues to hold the clutch select valve 2 against clutch select valve 2 spring force.

1d Shift Solenoid 2
The shift solenoid 2 is de-energized (OFF) allowing solenoid 2 (16) fluid pressure to exhaust through the solenoid.

1e 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is energized (ON) allowing actuator feed limit (11) fluid to enter the PCS 35 reverse clutch (23) circuit. PCS 35 reverse clutch (23) fluid is then routed through orifice #36 to the 3-5 reverse clutch regulator valve, and through orifice #37 to the 3-5 reverse clutch boost valve.

1f Clutch Select Valve 3
Reverse (24) fluid pressure from the manual valve is routed to the clutch select valve 3 and combines with clutch select valve 3 spring force to hold the valve in the released position. This allows reverse (24) fluid to pass through the valve and enter the 3-5 reverse clutch feed (25) circuit.

1g #5 Ball Check Valve
3-5 reverse clutch feed (25) fluid seats the #5 ball check valve against the drive 1-6 (39) circuit allowing 3-5 reverse clutch feed (25) fluid to enter the 3-5 reverse supply (26) circuit.

1h #7 Ball Check Valve
3-5 reverse supply (26) fluid seats the #7 ball check valve, and is forced through orifice #16 into the 3-5 reverse feed (27) circuit. 3-5 reverse feed (27) fluid is routed through orifice #34 to the 3-5 reverse clutch regulator valve.

1j 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid, at the 3-5 reverse clutch regulator valve, opposes 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to regulate 35 reverse feed (27) pressure into the 35 reverse clutch (28) circuit.

1k #2 Pressure Switch
PS2 (12) fluid, from the normally closed #2 pressure switch, exhausts through the 3-5 reverse clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Reverse Range.

1m 3-5 Reverse Clutch Boost Valve
PCS 35 reverse clutch (23) fluid pressure acts on a differential area of the 3-5 reverse clutch boost valve, moving the valve against 3-5 reverse clutch boost valve spring force to regulate 35 reverse clutch (28) fluid into the 35 reverse clutch feedback (29) circuit. As PCS 35 reverse clutch (23) fluid pressure is increased to a given value, the 3-5 reverse clutch boost valve opens the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5 reverse clutch regulator valve moving to the full feed position, sending full 35 reverse feed (27) pressure (full line pressure) to the 3-5 reverse clutch.

1n 3-5 Reverse Clutch
3-5 reverse clutch (28) fluid enters the 3-5-reverse and 4-5-6 clutch housing, and moves the 3-5-reverse clutch piston against spring force and compensator feed (10) pressure to apply the 3-5 reverse clutch plates.

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

NEUTRAL

(Engine Running)

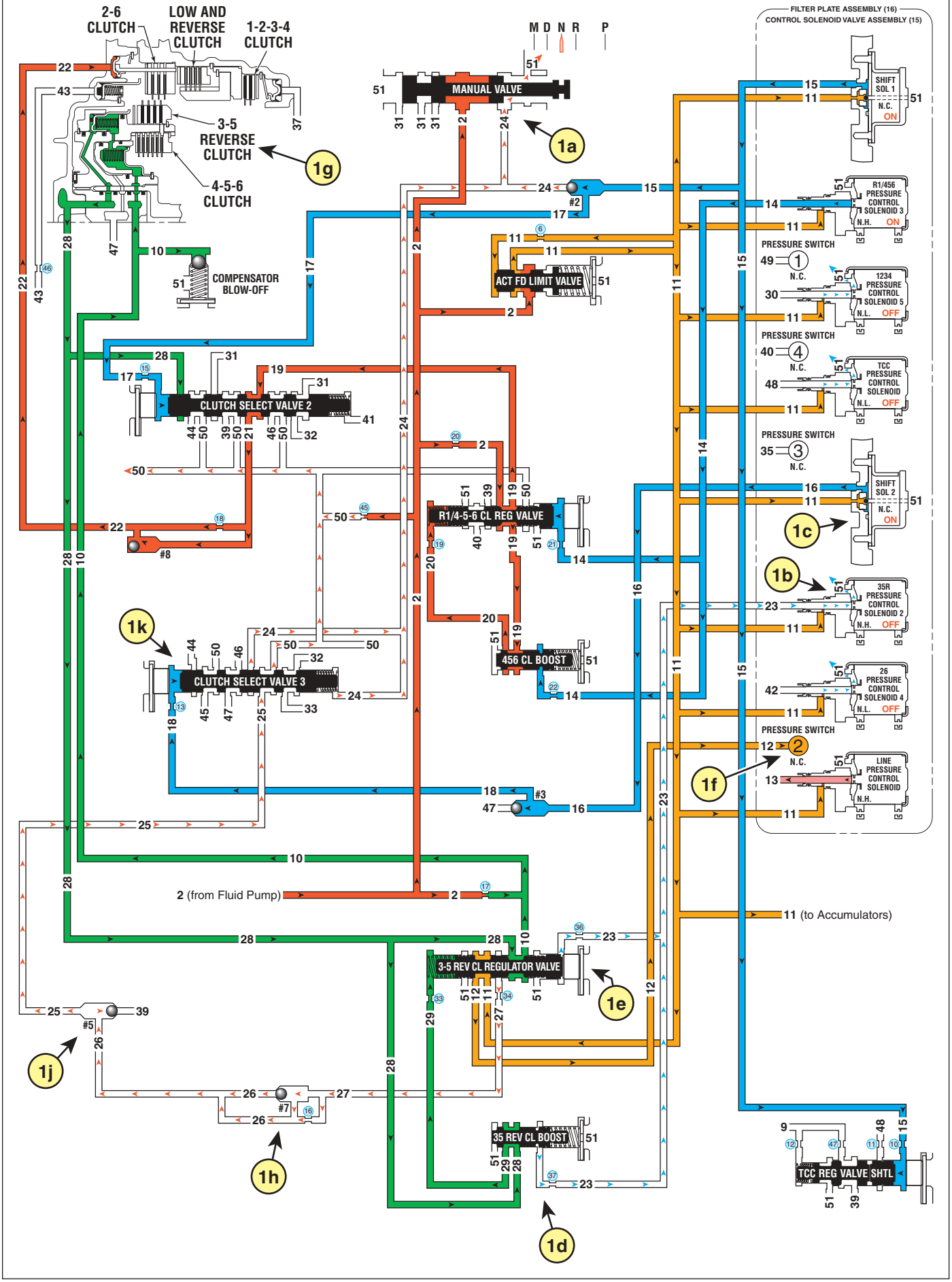

Figure 68

NEUTRAL

(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
NEU	N	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

When the gear selector is moved to the Neutral (N) position, the hydraulic and electrical system operation is identical to Park (P) range. However, if Neutral is selected after the vehicle was operating in Reverse (R), the normally high 35R pressure control solenoid 2 is commanded OFF, and the following changes would occur in the hydraulic and electrical systems.

3-5 REVERSE CLUTCH RELEASES

1a Manual Valve
The manual valve is moved to the Neutral position and blocks line (2) pressure from entering the reverse (24) and drive (31) fluid circuits. The reverse (24) fluid circuit is opened to an exhaust (51) passage at the manual valve.

1b 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch (23) fluid from the 3-5 reverse clutch boost valve and the 3-5 reverse clutch regulator valve to exhaust.

1c Shift Solenoid 2
The shift solenoid 2 is energized (ON) allowing actuator feed limit (11) fluid to enter the solenoid 2 (16) circuit.

1d 3-5 Reverse Clutch Boost Valve
3-5 reverse clutch boost valve spring force moves the 3-5 reverse clutch boost valve to the released position, allowing full 35 reverse clutch (28) fluid pressure to enter the 35 reverse clutch feedback (29) circuit. 35 reverse clutch feedback (29) fluid is routed through orifice #33 to the 3-5 reverse clutch regulator valve.

1e 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid exhausts, allowing 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to move the 3-5 reverse clutch regulator valve to the released position. This allows 35 reverse clutch (28) pressure to exhaust into the compensator feed (10) circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5 reverse clutch.

1f #2 Pressure Switch
Actuator feed limit (11) fluid is routed through the 3-5 reverse clutch regulator valve into the PS2 (12) fluid passage. PS2 (12) fluid opens the normally closed #2 pressure switch, signalling the TCM that the transmission is in either Park or Neutral Range.

1g 3-5 Reverse Clutch
35 reverse clutch (28) fluid is exhausted from the 3-5 reverse and 4-5-6 clutch housing assembly, allowing 3-5 reverse clutch spring force, assisted by compensator feed (10) pressure, to move the 3-5 reverse clutch piston and release the 3-5 reverse clutch plates.

1h #7 Ball Check Valve
Exhausting 3-5 reverse feed (27) fluid seats the #7 ball check valve, and passes into the 3-5 reverse supply (26) circuit. 3-5 reverse supply (26) fluid is routed to the #5 ball check valve.

1j #5 Ball Check Valve
3-5 reverse supply (26) fluid seats the #5 ball check valve against the drive 1-6 (39) circuit and enters the 3-5 reverse clutch feed (25) circuit. 35 reverse clutch feed fluid is routed to the clutch select valve 3.

1k Clutch Select Valve 3
When reverse (24) fluid exhausts through the manual valve, CSV3 enable (18) fluid moves the clutch select valve 3 against clutch select valve 3 spring force to the applied position. 35 reverse clutch feed (25) fluid passes through the valve into the exhaust backfill (50) circuit and exhausts.

COMPLETE HYDRAULIC CIRCUIT
Page 106

PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

DRIVE RANGE – FIRST GEAR

(Engine Braking)

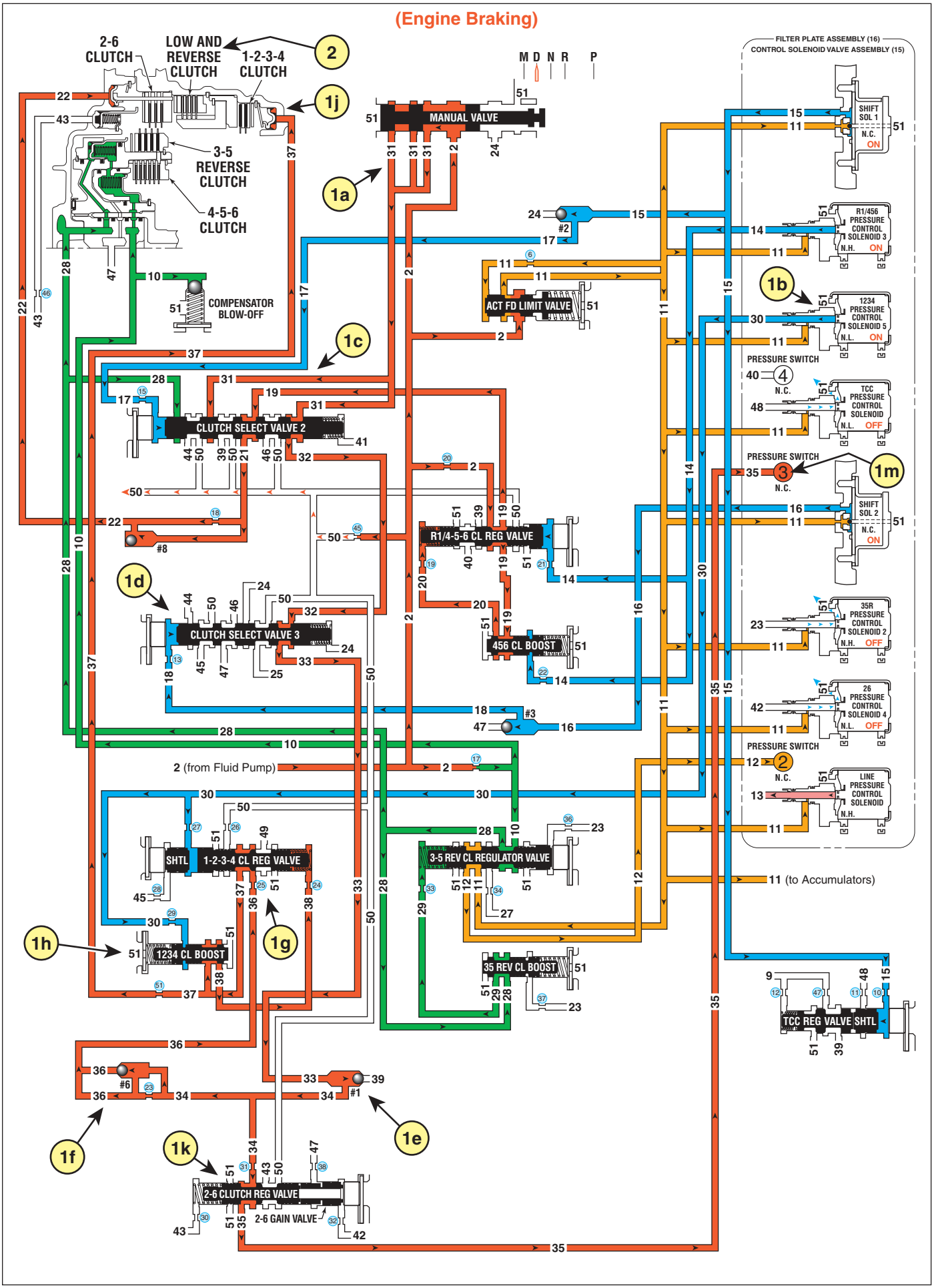

Figure 69

DRIVE RANGE – FIRST GEAR

(Engine Braking)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st Braking	4.484	ON	ON	ON	OFF	OFF	ON				APPLIED	HOLDING†	APPLIED

† HOLDING BUT INEFFECTIVE.

When the gear selector lever is moved to the Drive (D) range from the Neutral (N) position, the transmission will provide engine braking. In this operating range, the normally low 1234 pressure control solenoid 5 is commanded ON and, in the engine braking mode, the following changes occur to shift the transmission into Drive Range – First Gear.

1-2-3-4 CLUTCH APPLIES

1a Manual Valve
The manual valve is moved to the Drive (D) position and allows line (2) fluid pressure to enter the drive (31) fluid circuit. Drive (31) fluid is then routed to the clutch select valve 2.

1b 1234 Pressure Control (PC) Solenoid 5
The 1234 PC solenoid 5 is commanded ON allowing actuator feed limit (11) fluid to enter the PCS 1234 clutch (30) fluid circuit. PCS 1234 clutch (30) fluid is routed through orifice #27 to the 1-2-3-4 clutch regulator valve, and through orifice #29 to the 1-2-3-4 clutch boost valve.

1c Clutch Select Valve 2
Drive (31) fluid passes through the clutch select valve 2 and enters the drive brake (32) circuit. Drive brake (32) fluid is then routed to the clutch select valve 3.

1d Clutch Select Valve 3
Drive brake (32) fluid passes through the clutch select valve 3 and enters the drive B (33) fluid circuit. Drive B (33) fluid is then routed to #1 ball check valve.

1e #1 Ball Check Valve
Drive B (33) fluid seats the #1 ball check valve against the drive 1-6 (39) passage, and enters the 26 clutch/1234 clutch feed (34) circuit.

1f #6 Ball Check Valve
26 clutch/1234 clutch feed (34) fluid seats the #6 ball check valve, and is forced through orifice #23 into the 1234 clutch feed (36) circuit. 1234 clutch feed (36) fluid is then routed through orifice #25 to the 1-2-3-4 clutch regulator valve.

1g 1-2-3-4 Clutch Regulator Valve
PCS 1234 clutch (30) fluid, at the 1-2-3-4 clutch regulator valve, opposes 1-2-3-4 clutch regulator valve spring force and 1234 clutch feedback (38) fluid pressure to regulate 1234 clutch feed (36) pressure into the 1234 clutch (37) fluid circuit. The 1234 clutch (37) fluid is then routed to the 1234 clutch boost valve, and through orifice #51 to the 1-2-3-4 clutch.

1h 1-2-3-4 Clutch Boost Valve
PCS 1234 clutch (30) fluid pressure acts on a differential area of the 1234 clutch boost valve, moving the valve against 1234 clutch boost valve spring force to regulate 1234 clutch fluid (37) into the 1234 clutch feedback (38) circuit. As PCS 1234 clutch (30) fluid pressure is increased to a given value, the 1234 clutch boost valve opens the 1234 clutch feedback (38) circuit to exhaust (51). This results in the 1234 clutch regulator valve moving to the full feed position, sending full 1234 clutch feed (36) pressure (full line pressure) to the 1-2-3-4 clutch.

1j 1-2-3-4 Clutch
The 1234 clutch (37) fluid enters the automatic transmission case assembly and moves the 1-2-3-4 clutch piston against spring force to apply the 1-2-3-4 clutch plates.

1k 2-6 Clutch Regulator Valve
26 clutch/1234 clutch feed (34) fluid is routed through orifice #31, passes through the 2-6 clutch regulator valve and enters the PS3 (35) circuit.

1m #3 Pressure Switch
26 clutch/1234 clutch feed (34) fluid is routed through the 2-6 clutch regulator valve into the PS3 (35) fluid passage. PS3 (35) fluid opens the normally closed #3 pressure switch, signalling the TCM that the transmission is in Drive Range – First Gear with engine braking available.

LOW AND REVERSE CLUTCH REMAINS APPLIED TO PROVIDE ENGINE BRAKING

2 Low and Reverse Clutch Assembly
The low and reverse clutch remains applied until just before the 1-2 shift in order to provide engine braking.

COMPLETE HYDRAULIC CIRCUIT
Page 108

PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – FIRST GEAR

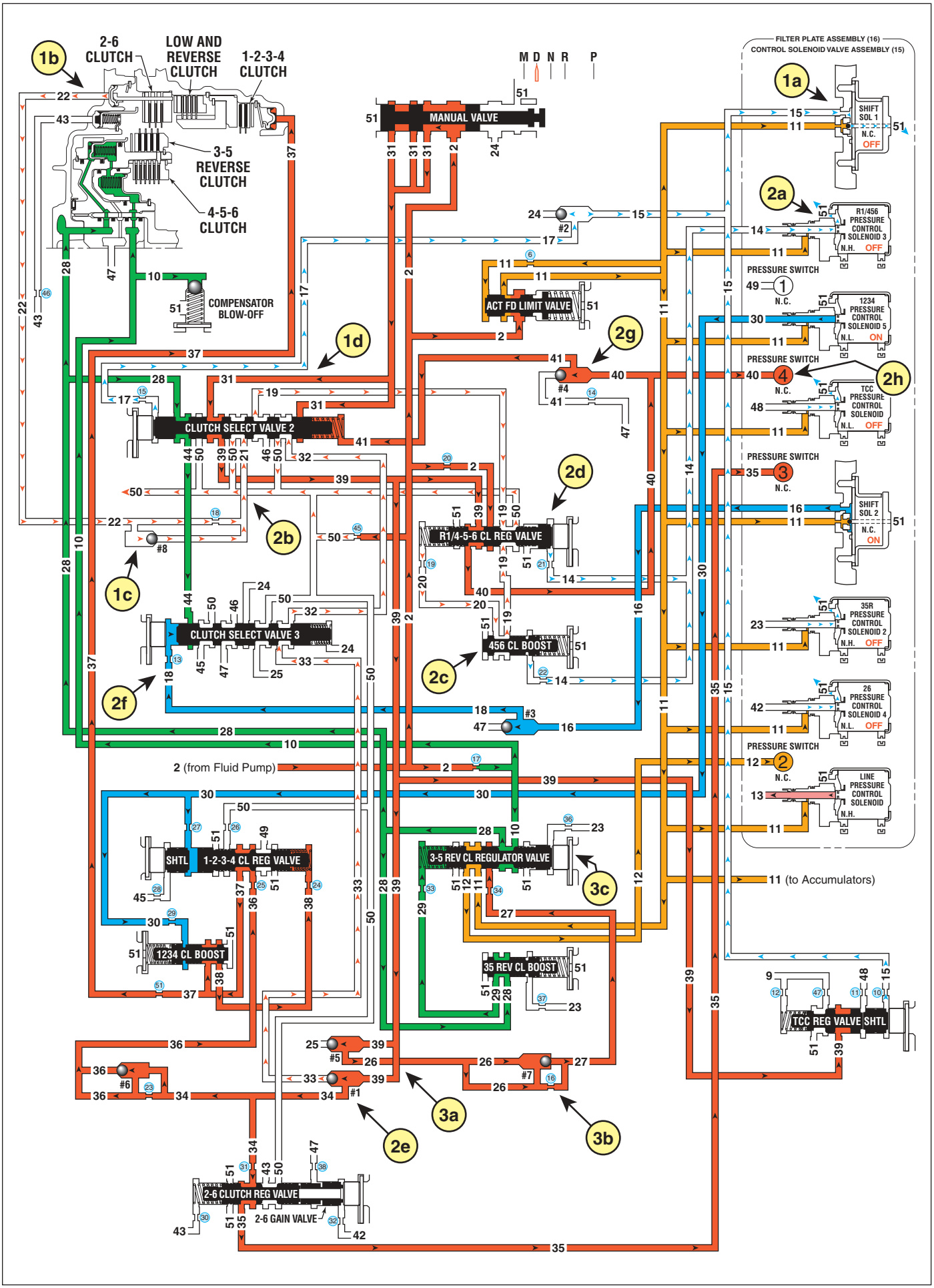

Figure 70

DRIVE RANGE – FIRST GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st	4.484	OFF	ON	ON	OFF	OFF	OFF					HOLDING	APPLIED

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, throttle position sensor and other vehicle sensors to determine the precise moment to de-energize or "turn OFF" the shift solenoid 1, and to command OFF the normally high R1/456 pressure control solenoid 3. Changes to the hydraulic and electrical systems are as follows.

LOW AND REVERSE CLUTCH RELEASES

1a Shift Solenoid 1
The shift solenoid 1 is de-energized (OFF) allowing solenoid 1 (15) fluid pressure to exhaust from the #2 ball check valve and the TCC regulator valve.

1b Low and Reverse Clutch
R1 (22) fluid is exhausted from the case cover assembly, allowing low and reverse clutch spring force to move the low and reverse clutch piston and release the low and reverse clutch plates.

1c #8 Ball Check Valve
Exhausting R1 (22) fluid seats the #8 ball check valve and is forced through orifice #18 into the R1 supply (21) fluid circuit. This orificed exhaust helps to control the low and reverse clutch release.

1d Clutch Select Valve 2
CSV2 enable (17) fluid exhausts from the clutch select valve 2 allowing clutch select valve 2 spring force and CSV2 latch (41) fluid pressure to move the valve to the released position. This allows R1 supply (21) fluid pressure to pass through the valve into the exhaust backfill (50) circuit where it exhausts.

1-2-3-4 CLUTCH REMAINS APPLIED

2a R1/456 Pressure Control (PC) Solenoid 3
The R1/456 PC solenoid 3 is commanded OFF allowing PCS R1/456 clutch (14) fluid to exhaust from the R1/4-5-6 clutch regulator valve and the 456 clutch boost valve.

2b Clutch Select Valve 2
Drive (31) fluid from the manual valve passes through the clutch select valve 2 and enters the drive 1-6 (39) fluid circuit. Drive 1-6 (39) fluid is routed to the R1/4-5-6 clutch valve and the TCC regulator valve.

2c 4-5-6 Clutch Boost Valve
4-5-6 clutch boost valve spring force moves the 4-5-6 clutch boost valve to the released position, allowing R1 feedback (20) fluid pressure to exhaust into the R1/456 clutch feed (19) circuit. R1/456 clutch feed (19) fluid is routed to the R1/4-5-6 clutch regulator valve.

2d R1/4-5-6 Clutch Regulator Valve
R1/4-5-6 clutch regulator valve spring force moves the valve to the released position, allowing R1/456 clutch feed (19) fluid to enter the exhaust backfill (50) circuit, and drive 1-6 (39) fluid to enter the PS4 (40) fluid circuit.

2e #1 Ball Check Valve
Drive 1-6 (39) fluid pressure seats the #1 ball check valve against the exhausting drive B (33) fluid passage. Drive 1-6 (39) fluid is then directed into the 26 clutch/1234 clutch feed (34) fluid circuit to replace the exhausting drive B (33) pressure.

2f Clutch Select Valve 3
Exhausting drive B (33) fluid, from the #1 ball check valve, passes through the clutch select valve 3 and enters the drive brake (32) fluid circuit. Drive brake (32) fluid is then routed to the clutch select valve 2 where it exhausts.

2g #4 Ball Check Valve
PS4 (40) fluid pressure seats the #4 ball check valve against the 456 clutch (47) fluid circuit. PS4 (40) fluid is then directed into the CSV2 latch (41) fluid circuit and routed to the clutch select valve 2. CSV2 latch (41) fluid combines with clutch select valve 2 spring force and holds the valve in the released position during all six forward gear ranges.

2h #4 Pressure Switch
Drive 1-6 (39) fluid is routed through the R1/4-5-6 clutch regulator valve into the PS4 (40) fluid passage. PS4 (40) fluid opens the normally closed #4 pressure switch, signalling the TCM that the transmission is in Drive Range – First Gear.

FLUID PRESSURE DIRECTED IN PREPARATION FOR A SHIFT

3a #5 Ball Check Valve
Drive 1-6 (39) fluid pressure seats the #5 ball check valve against the 35 reverse clutch feed (25) fluid passage. Drive 1-6 (39) fluid is then directed into the 35 reverse supply (26) circuit and routed to the #7 ball check valve.

3b #7 Ball Check Valve
35 reverse supply (26) fluid pressure seats the #7 ball check valve, forcing 35 reverse supply (26) fluid through orifice #16 into the 35 reverse feed (27) circuit. 35 reverse feed (27) fluid is then routed to the 3-5 reverse clutch regulator valve.

3c 3-5-Reverse Clutch Regulator Valve
35 reverse (27) fluid stops at the 3-5-reverse clutch regulator valve in preparation for a shift.

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – SECOND GEAR

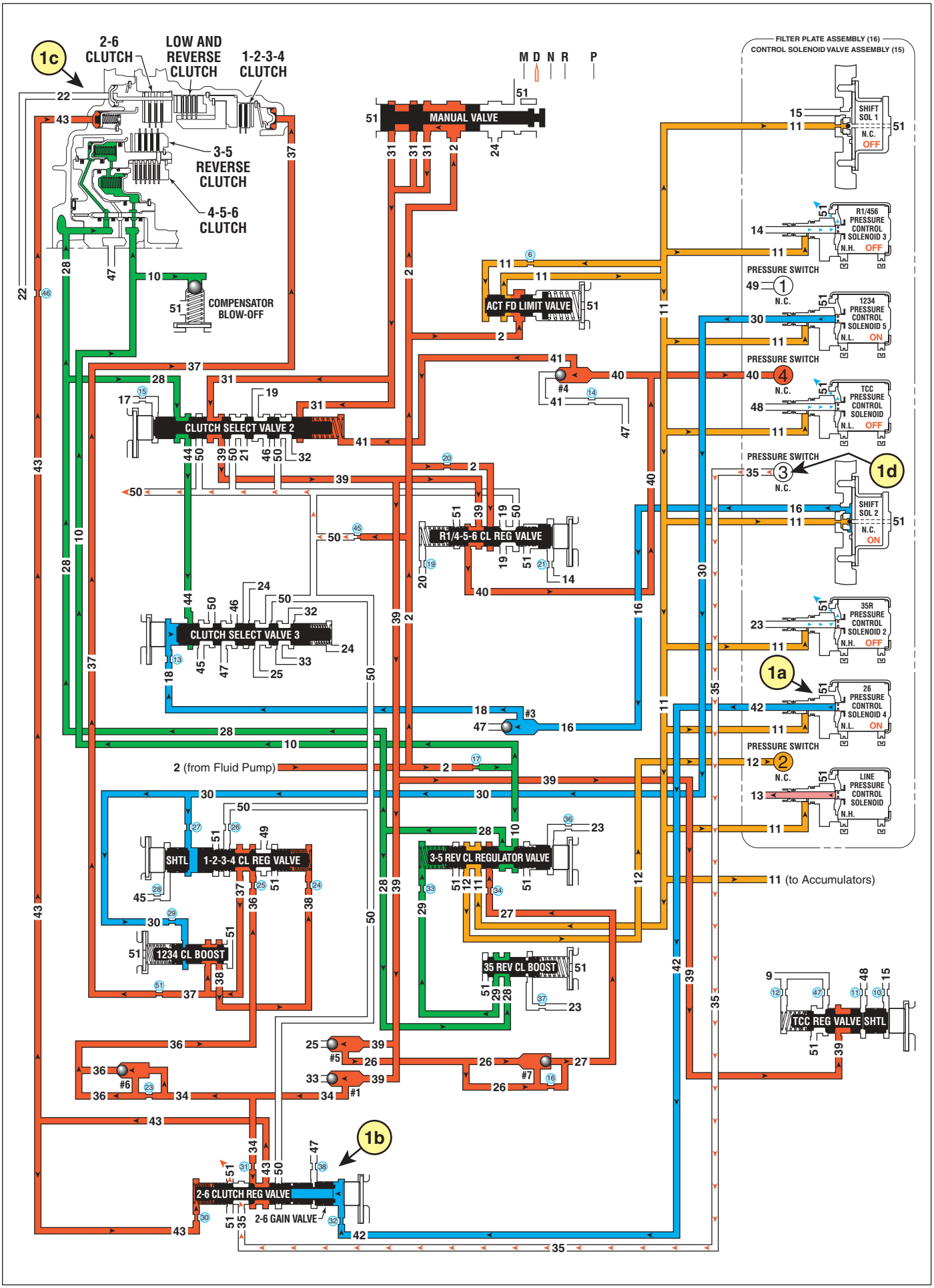

Figure 71

DRIVE RANGE – SECOND GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	2nd	2.872	OFF	ON	ON	ON	OFF	OFF			APPLIED			APPLIED

As vehicle speed increases and operating conditions become appropriate, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally low 26 pressure control solenoid 4 and shift the transmission into Second gear. The manual valve remains in the Drive (D) position and line (2) pressure continues to feed the drive (31) fluid circuit.

2-6 CLUTCH APPLIES

1a 26 Pressure Control (PC) Solenoid 4
The 26 PC solenoid 4 is commanded ON, allowing actuator feed limit (11) fluid to enter the PCS 26 clutch (42) fluid circuit. PCS 26 clutch (42) fluid is then routed through orifice #32 to the 2-6 clutch regulator valve.

1b 2-6 Clutch Regulator Valve
PCS 26 clutch (42) fluid, at the 2-6 clutch regulator valve, opposes 2-6 clutch regulator valve spring force and orificed 26 clutch (43) fluid pressure to regulate 26 clutch/1234 clutch feed (34) pressure into the 26 clutch (43) fluid circuit. 26 clutch (43) fluid is then routed through orifice #30 to the spring end of the 2-6 clutch regulator valve, and through orifice #46 to the automatic transmission case cover assembly. The movement of the 2-6 clutch regulator valve also opens the PS3 circuit to an exhaust (51).

1c 2-6 Clutch
26 clutch (43) fluid, from the 2-6 clutch regulator valve, is routed through the automatic transmission case cover assembly to the 2-6 clutch piston. 26 clutch (43) fluid pressure moves the piston against 2-6 clutch spring force to apply the 2-6 clutch plates.

1d #3 Pressure Switch
PS3 (35) fluid, from the normally closed #3 pressure switch, exhausts through the 2-6 clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Drive Range – Second Gear.

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – THIRD GEAR

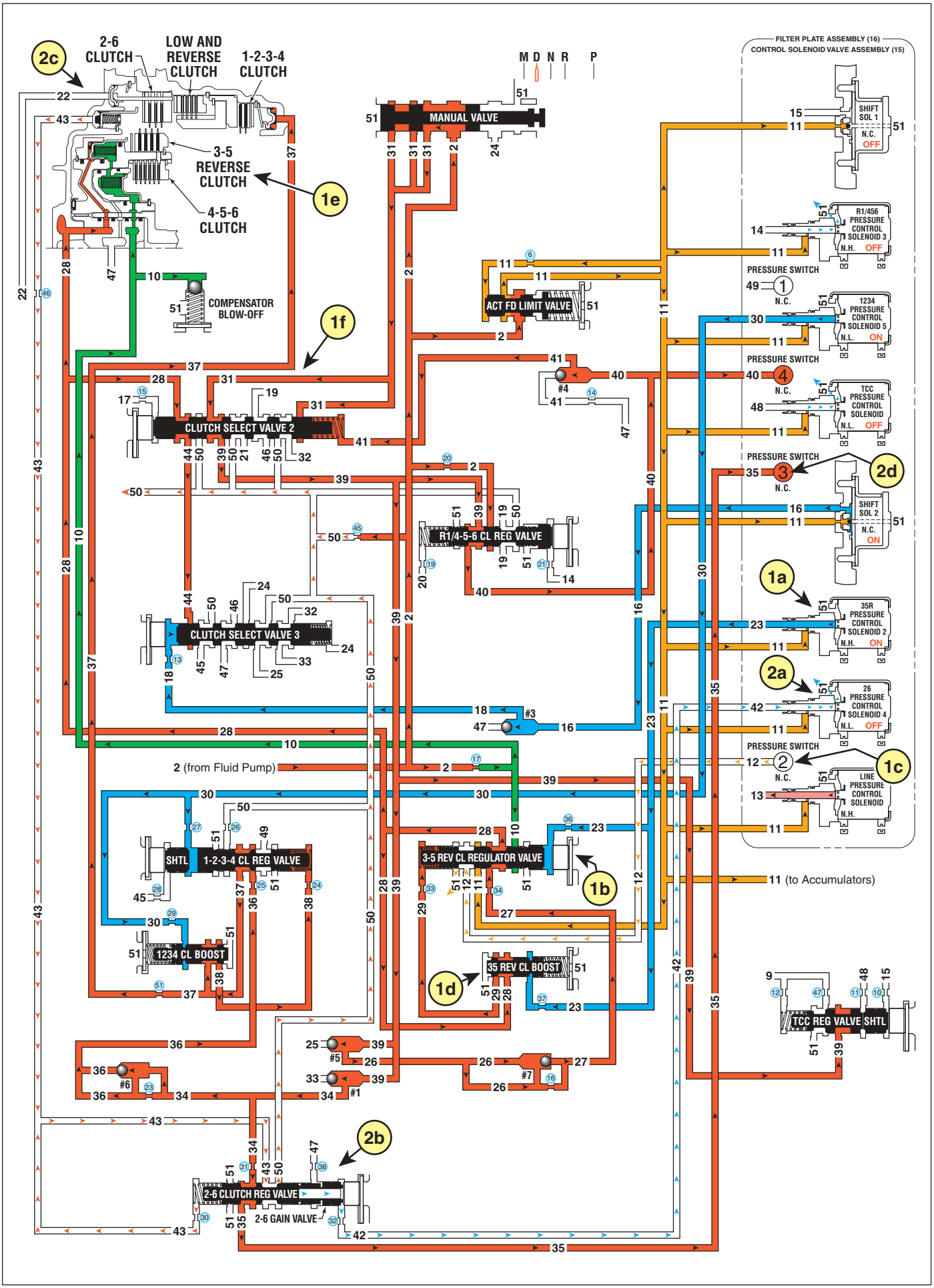

Figure 72

DRIVE RANGE – THIRD GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	3rd	1.842	OFF	ON	ON	OFF	ON	OFF		APPLIED				APPLIED

As vehicle speed increases and operating conditions become appropriate, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally high 35R pressure control solenoid 2 to regulate 3-5 reverse clutch apply. At the same time the normally low 26 pressure control solenoid 4 is also commanded OFF, and the transmission shifts into Third gear. The manual valve remains in the Drive (D) position and line (2) pressure continues to feed the drive (31) fluid circuit.

3-5 REVERSE CLUTCH APPLIES

1a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is commanded ON allowing actuator feed (11) fluid to enter the PCS 35 reverse clutch (23) circuit. PCS 35 reverse clutch (23) fluid is routed through orifice #36 to the 3-5 reverse clutch regulator valve, and through orifice #37 to the 3-5 reverse clutch boost valve.

1b 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid, at the 3-5 reverse clutch regulator valve, opposes 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to regulate 35 reverse feed (27) pressure into the 35 reverse clutch (28) circuit.

1c #2 Pressure Switch
PS2 (12) fluid, from the normally closed #2 pressure switch, exhausts through the 3-5 reverse clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Drive Range – Third Gear.

1d 3-5 Reverse Clutch Boost Valve
PCS 35 reverse clutch (23) fluid pressure acts on a differential area of the 3-5 reverse clutch boost valve, moving the valve against 3-5 reverse clutch boost valve spring force to regulate 35 reverse clutch (28) fluid into the 35 reverse clutch feedback (29) circuit. As PCS 35 reverse clutch (23) fluid pressure is increased to a given value, the 3-5 reverse clutch boost valve opens the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5 reverse clutch regulator valve moving to the full feed position, sending full 35 reverse feed (27) pressure (full line pressure) to the 3-5 reverse clutch.

1e 3-5 Reverse Clutch
3-5 reverse clutch (28) fluid enters the 3-5-reverse and 4-5-6 clutch housing, and moves the 3-5-reverse clutch piston against spring force and compensator feed (10) pressure to apply the 3-5 reverse clutch plates.

1f Clutch Select Valve 2
35 reverse clutch (28) fluid passes through the clutch select valve 2 and enters the 1234 clutch default feed (44) circuit. 1234 clutch default feed (44) fluid is then routed to the clutch select valve 3 in preparation for a possible shift to a default gear in the event of a transmission electrical failure.

2-6 CLUTCH RELEASES

2a 26 Pressure Control (PC) Solenoid 4
The 26 PC solenoid 4 is commanded OFF allowing PCS 26 clutch (42) fluid to exhaust from the 2-6 clutch regulator valve.

2b 2-6 Clutch Regulator Valve
2-6 clutch regulator valve spring force moves the 2-6 clutch regulator valve to the released position, allowing 26 clutch (43) fluid from the 2-6 clutch to exhaust through the valve, into the exhaust backfill (50) fluid circuit.

2c 2-6 Clutch
26 clutch (43) fluid is exhausted from the case cover assembly, allowing 2-6 clutch spring force to move the 2-6 clutch piston and release the 2-6 clutch plates.

2d #3 Pressure Switch
26 clutch/1234 clutch feed (34) fluid is routed through the 2-6 clutch regulator valve into the PS3 (35) fluid passage. PS3 (35) fluid opens the normally closed #3 pressure switch, signalling the TCM that the transmission is in Drive Range – Third Gear.

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – FOURTH GEAR

(Torque Converter Clutch Applied)

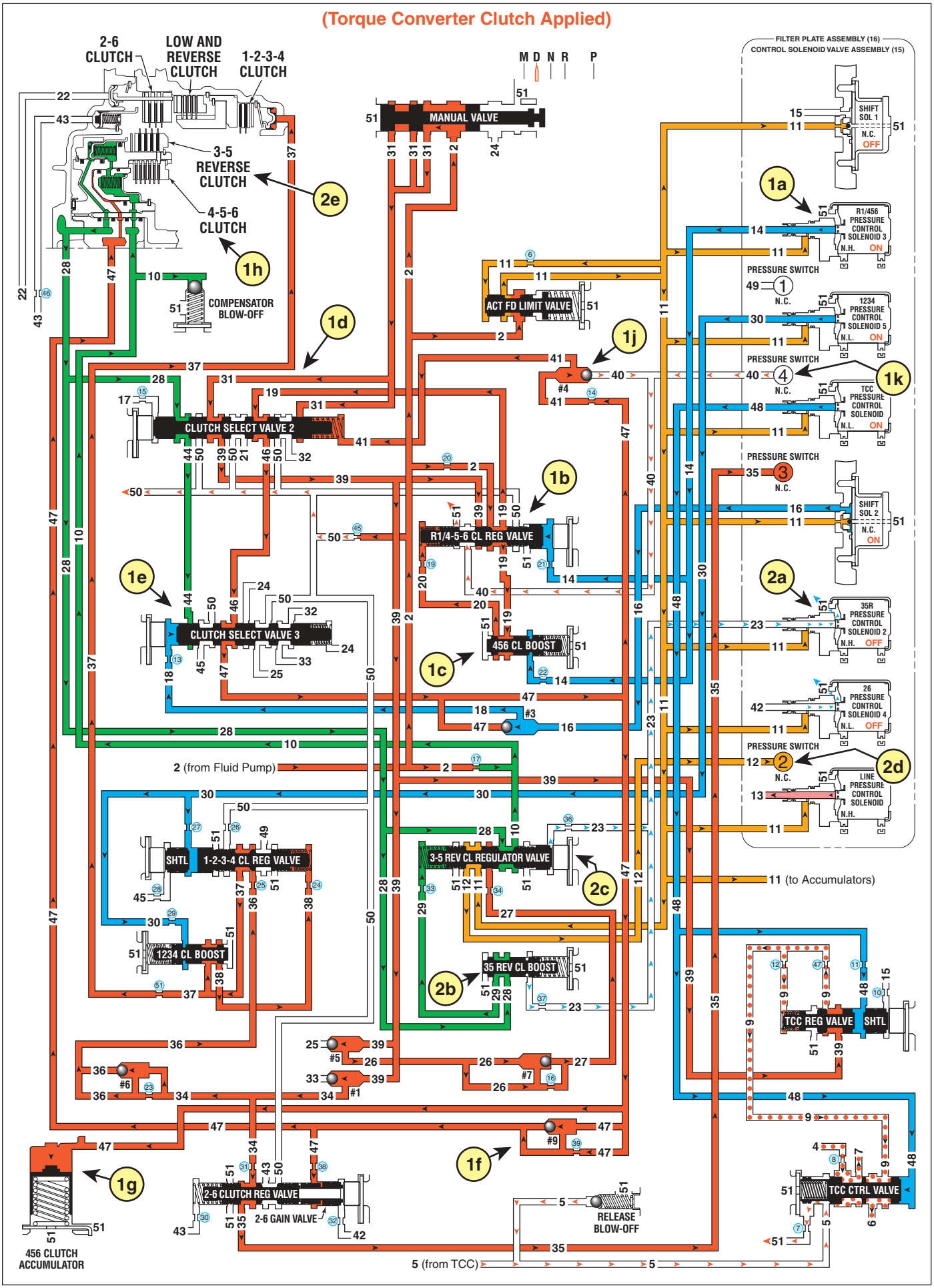

Figure 73

DRIVE RANGE – FOURTH GEAR

(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	4th	1.414	OFF	ON	ON	OFF	OFF	ON	APPLIED					APPLIED

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally low R1/456 pressure control solenoid 3 to regulate 4-5-6 clutch apply. At the same time, the normally high 35R pressure control solenoid 2 is commnded OFF and the transmission shifts into Fourth gear.

4-5-6 CLUTCH APPLIES

1a R1/456 Pressure Control (PC) Solenoid 3
The R1/456 PC solenoid 3 is energized (ON) allowing actuator feed limit (11) fluid to enter the PCS R1/456 clutch (14) fluid circuit. PCS R1/456 clutch (14) fluid is then routed through orifice #21 to the R1/4-5-6 clutch regulator valve, and through orifice #22 to the 4-5-6 clutch boost valve.

1b R1/4-5-6 Clutch Regulator Valve
PCS R1/465 clutch (14) fluid at the R1/4-5-6 clutch regulator valve, opposes R1/4-5-6 clutch regulator spring force and R1 feedback (20) fluid pressure to regulate line (2) pressure into the R1/456 clutch feed (19) circuit.

1c 4-5-6 Clutch Boost Valve
PCS R1/465 clutch (14) fluid pressure acts on a differential area of the 4-5-6 clutch boost valve, moving the valve against 4-5-6 clutch boost valve spring force to regulate R1/456 clutch (19) fluid into the R1 feedback (20) circuit. As PCS R1/456 clutch (14) fluid pressure is increased to a given value, the 4-5-6 clutch boost valve opens the R1 feedback (20) circuit to exhaust (51). This results in the R1/4-5-6 clutch regulator valve moving to the full feed position, sending full R1/456 clutch (19) pressure (full line pressure) to the 4-5-6 clutch.

1d Clutch Select Valve 2
R1/456 clutch feed (19) fluid passes through the clutch select valve 2 and enters the 456 clutch feed (46) circuit.

1e Clutch Select Valve 3
456 clutch feed (46) fluid is routed to the clutch select valve 3 where it passes through the valve and enters the 456 clutch (47) circuit.

1f #9 Ball Check Valve
456 clutch (47) fluid pressure seats the #9 ball check valve and is forced through orifice #39.

1g 4-5-6 Accumulator
456 clutch (47) fluid enters the 4-5-6 accumulator and moves the piston against spring force in order to cushion the 4-5-6 clutch piston apply.

1h 4-5-6 Clutch
456 clutch (47) fluid enters the 4-5-6 clutch housing, moving the piston against spring force and compensator feed (10) fluid pressure, to apply the 4-5-6 clutch plates.

1j #4 Ball Check Valve
456 clutch fluid passes through orifice #14 and seats the #4 ball check valve against the exhausting PS4 (40) fluid passage. 456 clutch (47) fluid is then directed into the CSV2 latch (41) circuit to replace the exhausting PS4 (40) pressure.

1k #2 Pressure Switch
PS4 (40) fluid, from the normally closed #4 pressure switch, exhausts through the R1/4-5-6 clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Drive Range – Fourth Gear.

3-5 REVERSE CLUTCH RELEASES

2a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch (23) fluid from the 3-5 reverse clutch boost valve and the 3-5 reverse clutch regulator valve to exhaust.

2b 3-5 Reverse Clutch Boost Valve
3-5 reverse clutch boost valve spring force moves the 3-5 reverse clutch boost valve to the released position, allowing full 35 reverse clutch (28) fluid pressure to enter the 35 reverse clutch feedback (29) circuit. 35 reverse clutch feedback (29) fluid is routed through orifice #33 to the 3-5 reverse clutch regulator valve.

2c 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid exhausts, allowing 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to move the 3-5 reverse clutch regulator valve to the released position. This allows 35 reverse clutch (28) pressure to exhaust into the compensator feed (10) circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5 reverse clutch.

2d #2 Pressure Switch
Actuator feed limit (11) fluid is routed through the 3-5 reverse clutch regulator valve into the PS2 (12) fluid passage. PS2 (12) fluid opens the normally closed #2 pressure switch, signalling the TCM that the transmission is in Drive Range – Fourth Gear.

2e 3-5 Reverse Clutch
35 reverse clutch (28) fluid is exhausted from the 3-5 reverse and 4-5-6 clutch housing assembly, allowing 3-5 reverse clutch spring force, assisted by compensator feed (10) pressure, to move the 3-5 reverse clutch piston and release the 3-5 reverse clutch plates.

TORQUE CONVERTER CLUTCH (TCC) APPLIED

When conditions are appropriate in Drive Range – Fourth Gear, the TCM commands the normally low TCC pressure control solenoid ON, and the TCC is applied. (See Drive Range – Sixth Gear TCC Released and Applied, pages 92-95.)

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

DRIVE RANGE – FIFTH GEAR

(Torque Converter Clutch Applied)

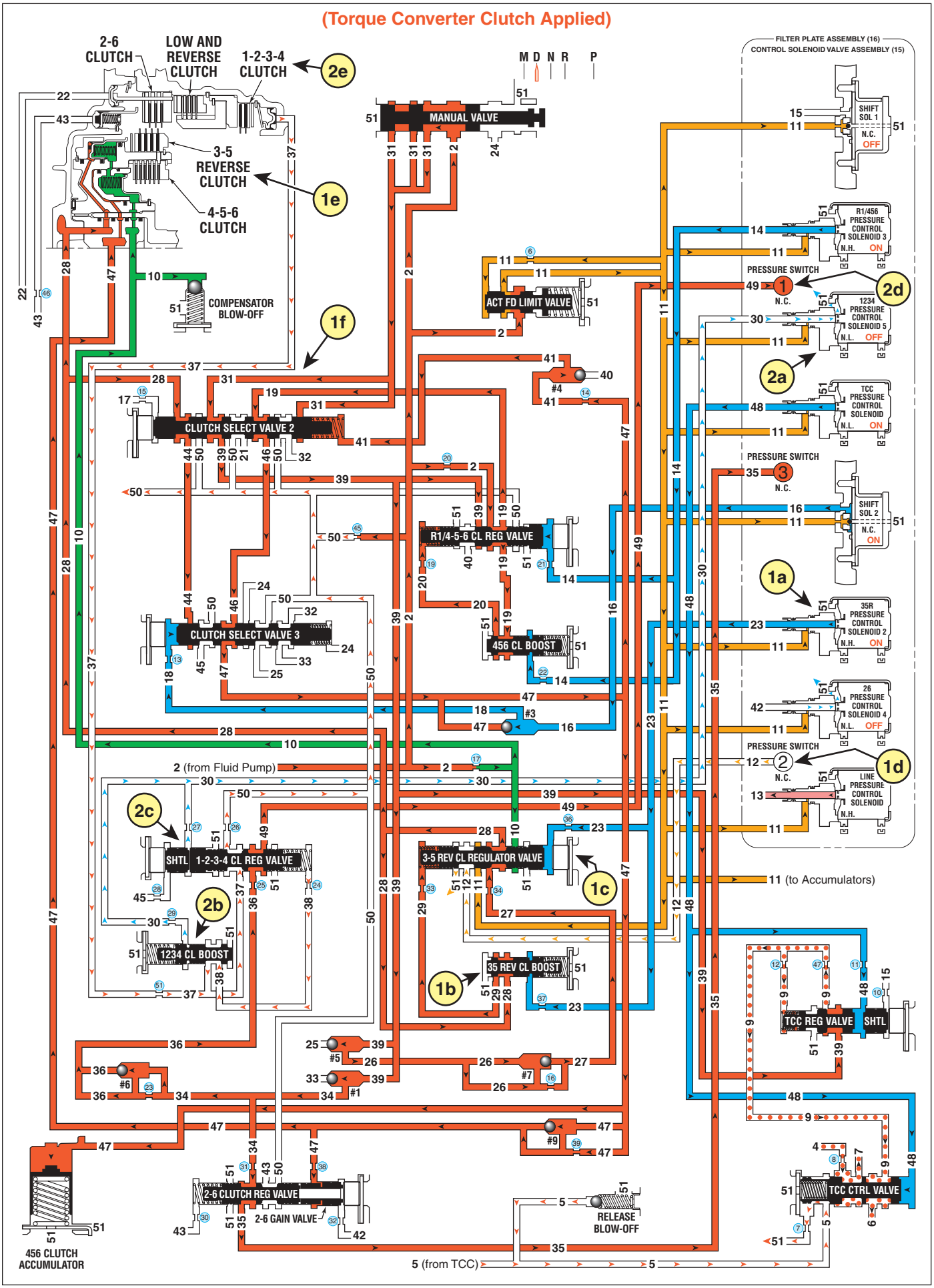

Figure 74

DRIVE RANGE – FIFTH GEAR

(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	5th	1.000	OFF	ON	OFF	OFF	ON	ON	APPLIED	APPLIED				

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally high 35R pressure control solenoid 2. At the same time, the normally low 1234 pressure control solenoid 5 is commanded OFF and the transmission shifts into Fifth gear.

3-5 REVERSE CLUTCH APPLIES

1a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is commanded ON allowing actuator feed (11) fluid to enter the PCS 35 reverse clutch (23) circuit. PCS 35 reverse clutch (23) fluid is routed through orifice #36 to the 3-5 reverse clutch regulator valve, and through orifice #37 to the 3-5 reverse clutch boost valve.

1b 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid, at the 3-5 reverse clutch regulator valve, opposes 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to regulate 35 reverse feed (27) pressure into the 35 reverse clutch (28) circuit.

1c #2 Pressure Switch
PS2 (12) fluid, from the normally closed #2 pressure switch, exhausts through the 3-5 reverse clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Drive Range – Fifth Gear.

1d 3-5 Reverse Clutch Boost Valve
PCS 35 reverse clutch (23) fluid pressure acts on a differential area of the 3-5 reverse clutch boost valve, moving the valve against 3-5 reverse clutch boost valve spring force to regulate 35 reverse clutch (28) fluid into the 35 reverse clutch feedback (29) circuit. As PCS 35 reverse clutch (23) fluid pressure is increased to a given value, the 3-5 reverse clutch boost valve opens the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5 reverse clutch regulator valve moving to the full feed position, sending full 35 reverse feed (27) pressure (full line pressure) to the 3-5 reverse clutch.

1e 3-5 Reverse Clutch
3-5 reverse clutch (28) fluid enters the 3-5-reverse and 4-5-6 clutch housing, and moves the 3-5-reverse clutch piston against spring force and compensator feed (10) pressure to apply the 3-5 reverse clutch plates.

1f Clutch Select Valve 2
35 reverse clutch (28) fluid passes through the clutch select valve 2 and enters the 1234 clutch default feed (44) circuit. 1234 clutch default feed (44) fluid is then routed to the clutch select valve 3 in preparation for a possible shift to a default gear in the event of a transmission electrical failure.

1-2-3-4 CLUTCH RELEASES

2a 1234 Pressure Control (PC) Solenoid 5
The 1234 PC solenoid 5 is commanded OFF, allowing PCS 1234 clutch (30) fluid from the 1-2-3-4 clutch regulator valve and the 1-2-3-4 clutch boost valve to exhaust.

2b 1-2-3-4 Clutch Boost Valve
1-2-3-4 clutch boost valve spring force moves the 1-2-3-4 clutch boost valve to the released position, allowing 1234 clutch feedback (38) fluid pressure to exhaust into the 1234 clutch (37) circuit. 1234 clutch (37) fluid is routed to the 1-2-3-4 clutch regulator valve.

2c 1-2-3-4 Clutch Regulator Valve
1-2-3-4 clutch regulator valve spring force moves the 1-2-3-4 clutch regulator valve to the released position, allowing 1234 clutch (37) fluid pressure from the 1-2-3-4 clutch to exhaust through the valve and enter the exhaust backfill (50) circuit. The exhaust backfill (50) fluid is routed through orifice #26 and pressure is exhausted.

2d #1 Pressure Switch
1234 clutch feed (36) fluid is routed through the 1-2-3-4 clutch regulator valve into the PS1 (49) fluid passage. PS1 (49) fluid opens the normally closed #1 pressure switch, signalling the TCM that the transmission is in Drive Range – Fifth Gear.

2e 1-2-3-4 Clutch
1-2-3-4 clutch spring force moves the 1-2-3-4 clutch piston to release the clutch plates and force 1234 clutch (37) fluid from the 1-2-3-4 clutch. The 1234 clutch (37) fluid is routed through the 1-2-3-4 clutch regulator valve where it enters the exhaust backfill (50) circuit.

TORQUE CONVERTER CLUTCH (TCC) APPLIED

When conditions are appropriate in Drive Range – Fifth Gear, the TCM commands the normally low TCC pressure control solenoid ON, and the TCC is applied. (See Drive Range – Sixth Gear TCC Released and Applied, pages 92-95.)

COMPLETE HYDRAULIC CIRCUIT
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PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch Applied)

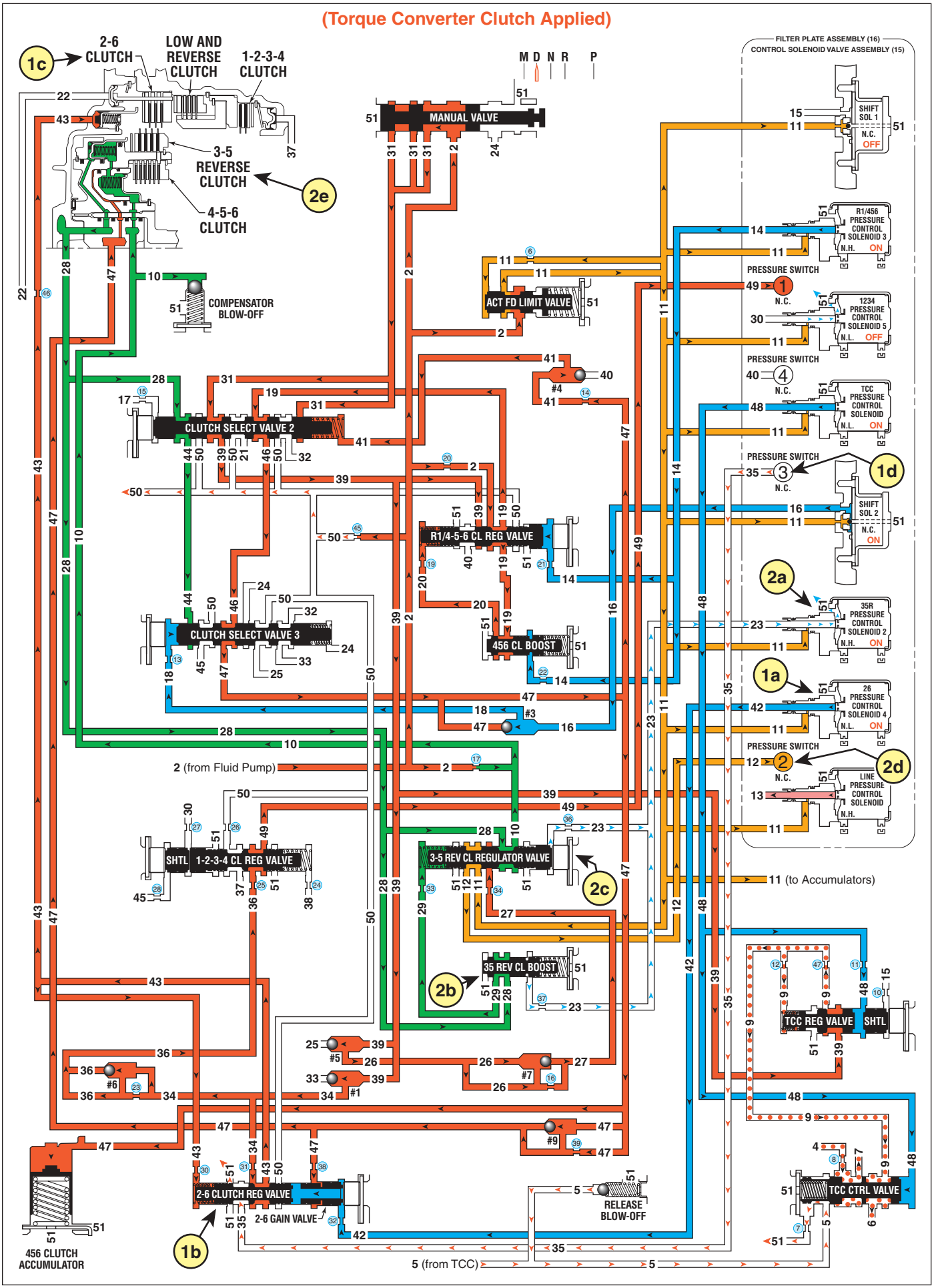

Figure 75

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	6th	0.742	OFF	ON	OFF	ON	OFF	ON	APPLIED		APPLIED			

As vehicle speed increases, the transmission control module (TCM) processes input signals from the automatic transmission input and output speed sensors, the throttle position sensor and other vehicle sensors to determine the precise moment to command ON the normally low 26 pressure control solenoid 4. At the same time, the normally high 35R pressure control solenoid 2 is commanded OFF and the transmission shifts into Sixth gear.

2-6 CLUTCH APPLIES

1a 26 Pressure Control (PC) Solenoid 4
The 26 PC solenoid 4 is commanded ON, allowing actuator feed limit (11) fluid to enter the PCS 26 clutch (42) fluid circuit. PCS 26 clutch (42) fluid is then routed through orifice #32 to the 2-6 clutch regulator valve.

1b 2-6 Clutch Regulator Valve
PCS 26 clutch (42) fluid, at the 2-6 clutch regulator valve, opposes 2-6 clutch regulator valve spring force and orificed 26 clutch (43) fluid pressure to regulate 26 clutch/1234 clutch feed (34) pressure into the 26 clutch (43) fluid circuit. 26 clutch (43) fluid is then routed through orifice #30 to the spring end of the 2-6 clutch regulator valve, and through orifice #46 to the automatic transmission case cover assembly. The movement of the 2-6 clutch regulator valve also opens the PS3 circuit to an exhaust (51).

1c 2-6 Clutch
26 clutch (43) fluid, from the 2-6 clutch regulator valve, is routed through the automatic transmission case cover assembly to the 2-6 clutch piston. 26 clutch (43) fluid pressure moves the piston against 2-6 clutch spring force to apply the 2-6 clutch plates.

1d #3 Pressure Switch
PS3 (35) fluid, from the normally closed #3 pressure switch, exhausts through the 2-6 clutch regulator valve allowing the switch to close, and signalling the TCM that the transmission is in Drive Range – Sixth Gear.

3-5 REVERSE CLUTCH RELEASES

2a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 is commanded OFF allowing PCS 35 reverse clutch (23) fluid from the 3-5 reverse clutch boost valve and the 3-5 reverse clutch regulator valve to exhaust.

2b 3-5 Reverse Clutch Boost Valve
3-5 reverse clutch boost valve spring force moves the 3-5 reverse clutch boost valve to the released position, allowing full 35 reverse clutch (28) fluid pressure to enter the 35 reverse clutch feedback (29) circuit. 35 reverse clutch feedback (29) fluid is routed through orifice #33 to the 3-5 reverse clutch regulator valve.

2c 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid exhausts, allowing 3-5 reverse clutch regulator valve spring force and 35 reverse clutch feedback (29) fluid pressure to move the 3-5 reverse clutch regulator valve to the released position. This allows 35 reverse clutch (28) pressure to exhaust into the compensator feed (10) circuit in order to assist the 3-5-reverse clutch piston spring to quickly release the 3-5 reverse clutch.

2d #2 Pressure Switch
Actuator feed limit (11) fluid is routed through the 3-5 reverse clutch regulator valve into the PS2 (12) fluid passage. PS2 (12) fluid opens the normally closed #2 pressure switch, signalling the TCM that the transmission is in Drive Range – Sixth Gear.

2e 3-5 Reverse Clutch
35 reverse clutch (28) fluid is exhausted from the 3-5 reverse and 4-5-6 clutch housing assembly, allowing 3-5 reverse clutch spring force, assisted by compensator feed (10) pressure, to move the 3-5 reverse clutch piston and release the 3-5 reverse clutch plates.

TORQUE CONVERTER CLUTCH (TCC) APPLIED

When conditions are appropriate in Drive Range – Sixth Gear, the TCM commands the normally low TCC pressure control solenoid ON, and the TCC is applied. (See Drive Range – Sixth Gear TCC Released and Applied, pages 92-95.)

COMPLETE HYDRAULIC CIRCUIT
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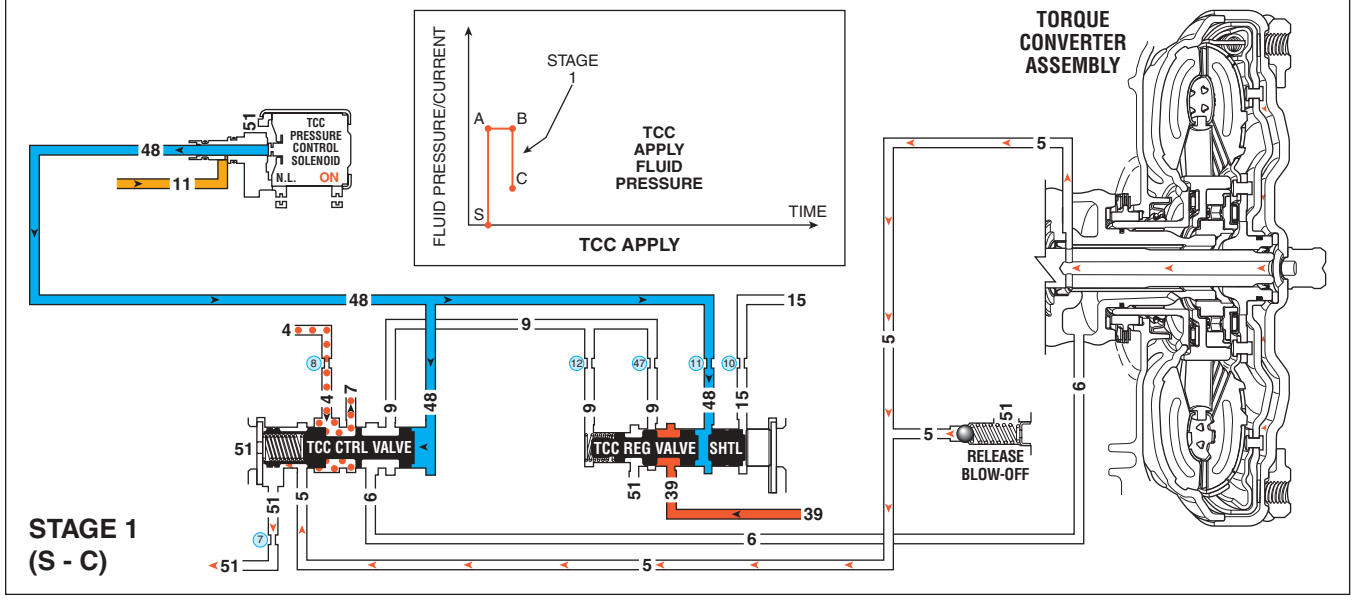
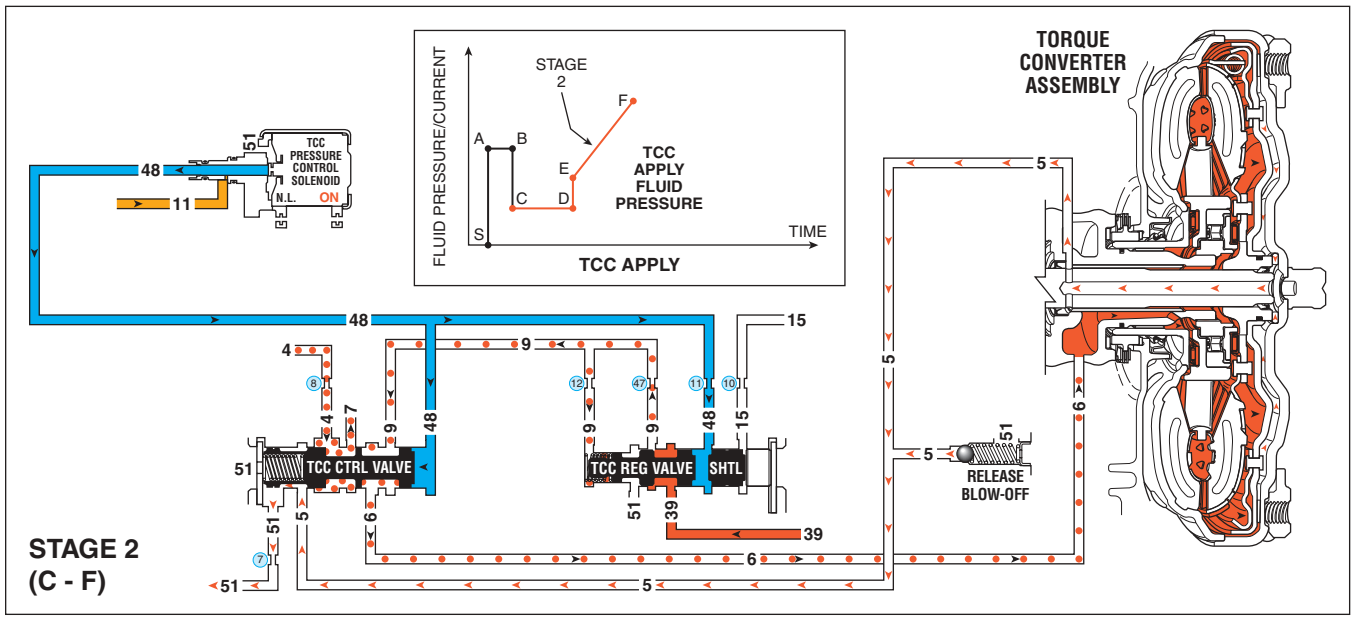
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch from Released to Applied)





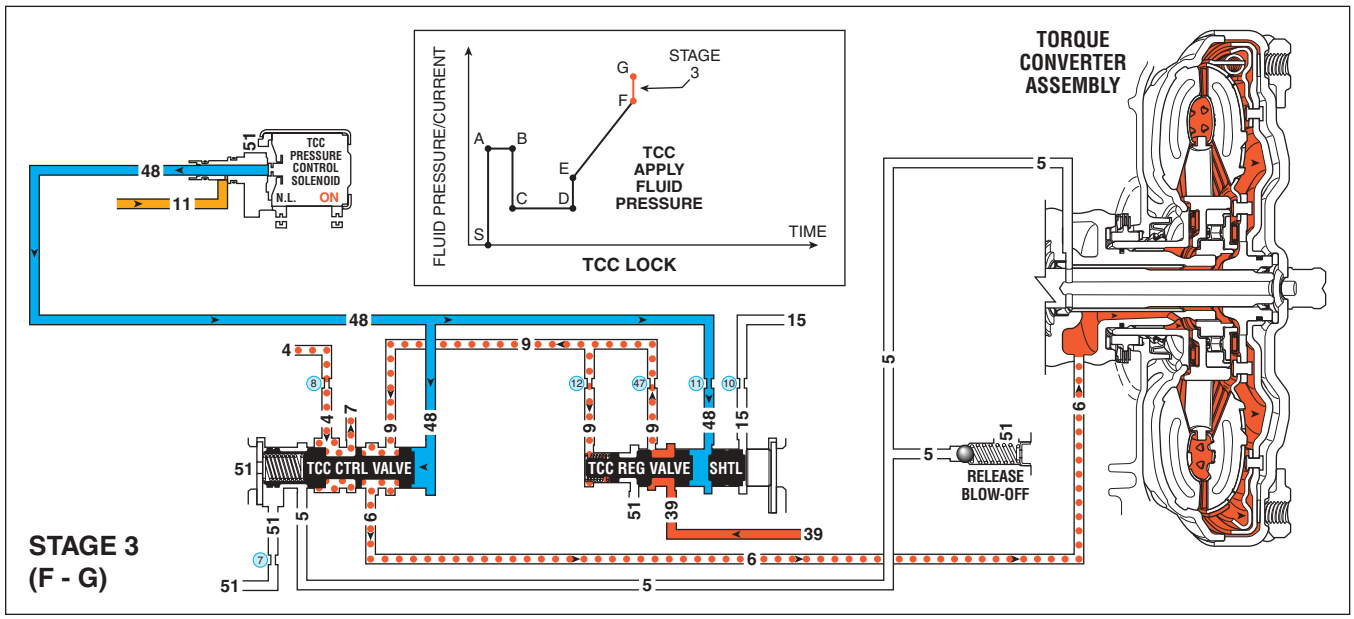


Figure 76

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch from Released to Applied)

When the transmission control module (TCM) determines that the engine and transmission are operating properly to engage the torque converter clutch (TCC), the TCM regulates the supply current of the TCC pressure control (PC) solenoid.

OFF At this time the TCC is considered to be disengaged (OFF), the TCC pressure control solenoid supply current is approximately 0.1 amp.

TCM decision to apply TCC (see page 43, in the Electrical Components section, for more information). The following events occur in order to apply the torque converter clutch:

Stage 1 The TCM increases the TCC pressure control solenoid supply current (from point **S** to point **A)** to fully stroke the TCC regulator apply valve and the TCC control valve. Actuator feed limit (11) fluid at the TCC pressure control solenoid is routed into the PCS TCC (48) fluid circuit. PCS TCC (48) fluid is then directed to the TCC regulator apply valve and the TCC control valve. The PCS TCC (48) fluid pressure at point **C** is strong enough to move the TCC regulator apply, and TCC control valves against spring force. The TCC control valve moves and allows TCC release (5) fluid to begin to exhaust from the torque converter and enter the exhaust (51) fluid circuit. The TCC regulator apply valve moves and allows drive 1-6 (39) fluid to enter the regulated apply (9) circuit. The TCM then decreases the TCC pressure control solenoid supply current to a level (point **B)** sufficient to maintain the position of the TCC control and TCC regulator apply valves. This stage is designed to move the TCC regulator apply and TCC control valves from the released position to the applied position in order to charge the circuit. However, there is not yet enough pressure to apply the TCC.

Stage 2 The TCC pressure control solenoid supply current is increased from point **D** to point **E**, and then ramped up to point **F**. Regulated apply (9) fluid pressure is now strong enough to cause the converter apply to progress. Regulated apply (9) pressure enters the TCC apply (6) circuit at the TCC control valve. The pressure value in the TCC apply (6) circuit should now be high enough to start applying the TCC pressure plate. Slip speed decreases as the current and apply fluid pressure increase.

Stage 3 The TCC pressure control solenoid supply current is increased from point **F** to point **G**. This extra pressure ensures that the apply force on the TCC pressure plate is not at the slip threshold, but in the condition of full lock up. TCC plate material is therefore protected from excessive heat.

Note: Under normal operating conditions the torque converter clutch is in the released position while the transmission is operating in Drive Range. However, when the transmission fluid temperatures exceed approximately 140°C (284°F), the TCM will apply the torque converter clutch earlier than normal operation in order to help reduce fluid temperatures.

COMPLETE HYDRAULIC CIRCUIT
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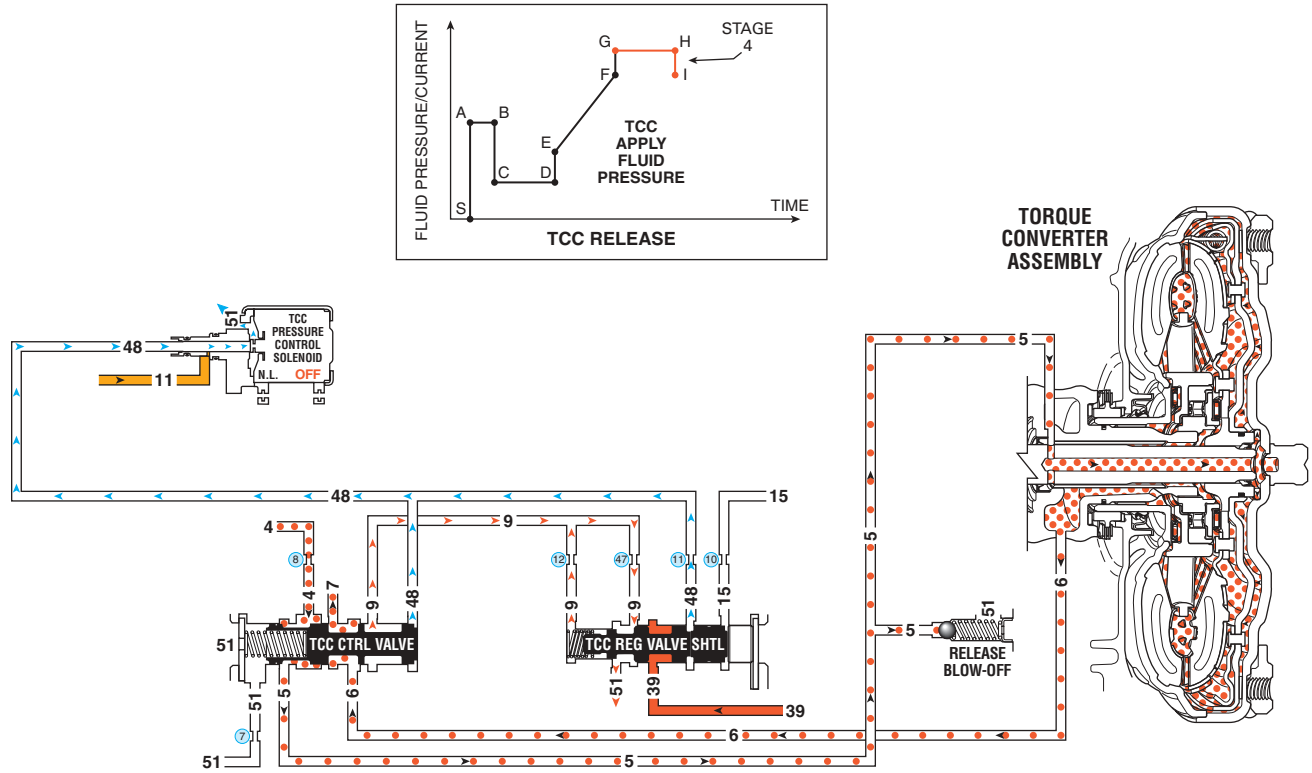
PASSAGES

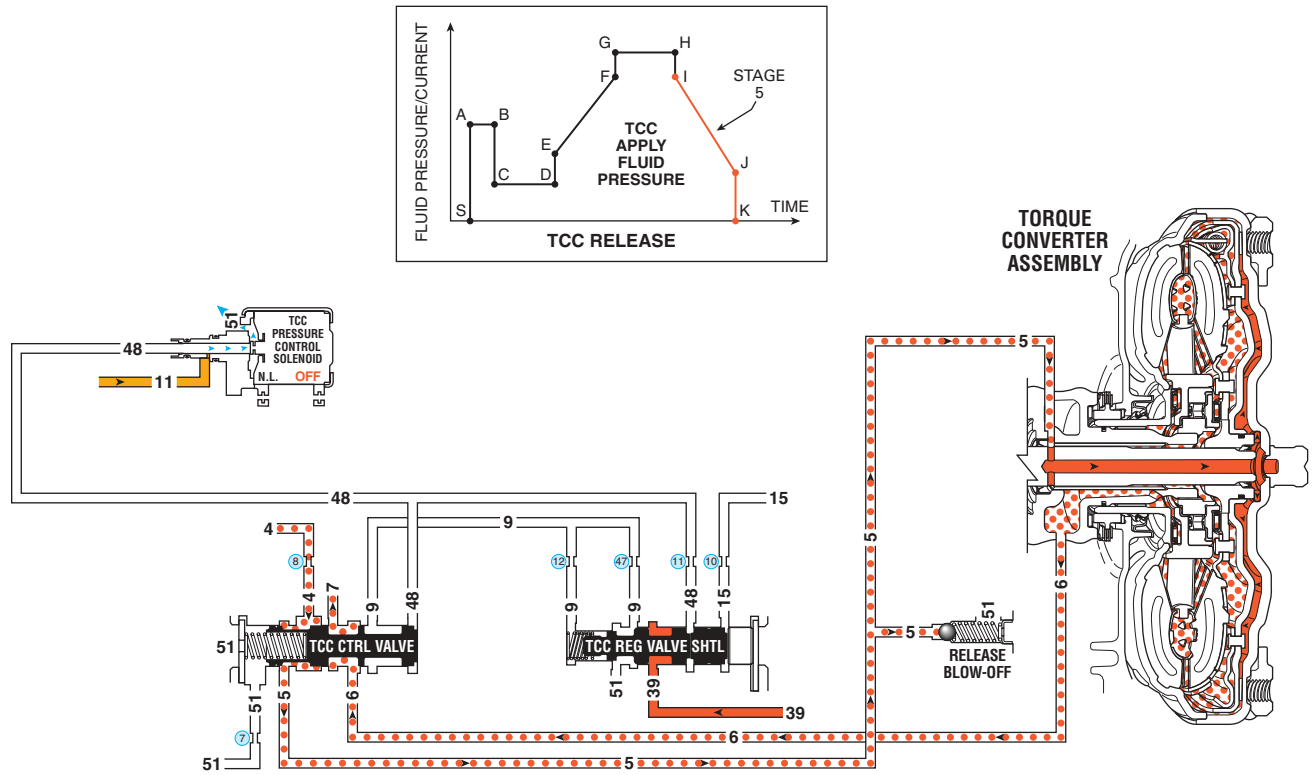
1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch from Applied to Released)



STAGE 4
(G - I)



STAGE 5
(I - K)

Figure 77

DRIVE RANGE – SIXTH GEAR

(Torque Converter Clutch from Applied to Released)

When the TCC pressure plate is applied, it is held against the torque converter cover. Since it is splined to the converter turbine hub, it provides a mechanical coupling (direct drive) of the engine to the transmission. This mechanical coupling eliminates the small amount of slippage that occurs in the fluid coupling of a torque converter, resulting in a more efficient transfer of engine torque through the transmission and to the drive wheels.

ON At this time the TCC is considered to be engaged (ON).

TCM decision to release TCC (see page 43, in the Electrical Components section, for more information). The following events occur in order to release the TCC:

Stage 4 During this stage, the TCC apply (6) fluid pressure from the TCC control valve is decreased by the TCC pressure control solenoid supply current dropping from point **H** to point **I**. Reduced PCS TCC (48) fluid pressure from the TCC pressure control solenoid allows cooler feed (7) fluid to move the TCC control valve, decreasing the flow of regulated apply (9) fluid feeding the TCC apply (6) circuit. This reduces the apply force on the TCC pressure plate to the slip threshold. This gets the TCC pressure plate ready for a smooth release.

Stage 5 The TCC pressure control solenoid supply current is ramped down from point **I** to point **J** to decrease TCC apply (6) fluid pressure and assure a smooth release. At point **J** the TCM will turn OFF current to the TCC pressure control solenoid. The TCC apply (6) pressure value from the TCC control valve at this "0" supply current (point **K**) should fully release the TCC pressure plate. Slip speed should be at the maximum value. TCC release (5) fluid is now directed back to the torque converter.

OFF At this time the TCC is considered to be disengaged (OFF).

If the TCM detects high torque converter slip when the TCC is commanded ON, then DTC P0741 sets and the TCM requests the ECM to illuminate the malfunction indicator lamp (MIL) and discontinues updating transmission adaptive pressure (TAP) memory cells.

The TCM also monitors for low TCC slip for some models. If the TCM detects low torque converter slip when the TCC is commanded OFF, then DTC P0742 sets and the TCM requests the ECM to illuminate the malfunction indicator lamp (MIL) and discontinues updating transmission adaptive pressure (TAP) memory cells. DTC P0742 will then be stored in TCM history.

If the TCM detects a continuous open, short to ground, or short to power in the TCC lock up pressure control solenoid valve circuit, then DTC P0966 or P0967 will set and the TCM will illuminate the malfunction indicator lamp (MIL) and inhibit TCC operation. DTC P0966 or P0967 will then be stored in TCM history.

COMPLETE HYDRAULIC CIRCUIT
Page 120

PASSAGES

1	SUCTION	19	R1/456 CLUTCH FEED	37	1234 CLUTCH
2	LINE	20	R1 FEEDBACK	38	1234 CLUTCH FEEDBACK
3	DECREASE	21	R1 SUPPLY	39	DRIVE 1-6
4	CONVERTER FEED	22	R1	40	PS4
5	TCC RELEASE	23	PCS 35 REVERSE CLUTCH	41	CSV2 LATCH
6	TCC APPLY	24	REVERSE	42	PCS 26 CLUTCH
7	COOLER FEED	25	35 REVERSE CLUTCH FEED	43	26 CLUTCH
8	LUBE	26	35 REVERSE SUPPLY	44	1234 CLUTCH DEFAULT FEED
9	REGULATED APPLY	27	35 REVERSE FEED	45	1234 CLUTCH DEFAULT
10	COMPENSATOR FEED	28	35 REVERSE CLUTCH	46	456 CLUTCH FEED
11	ACTUATOR FEED LIMIT	29	35 REVERSE CLUTCH FEEDBACK	47	456 CLUTCH
12	PS2	30	PCS 1234 CLUTCH	48	PCS TCC
13	PCS LINE	31	DRIVE	49	PS1
14	PCS R1/456 CLUTCH	32	DRIVE BRAKE	50	EXHAUST BACKFILL
15	SOLENOID 1	33	DRIVE B	51	EXHAUST
16	SOLENOID 2	34	26 CLUTCH/1234 CLUTCH FEED	52	TORQUE CONVERTER SEAL DRAINBACK
17	CSV2 ENABLE	35	PS3	53	VOID
18	CSV3 ENABLE	36	1234 CLUTCH FEED		

DRIVE RANGE – THIRD GEAR DEFAULT

(Torque Converter Clutch Released)

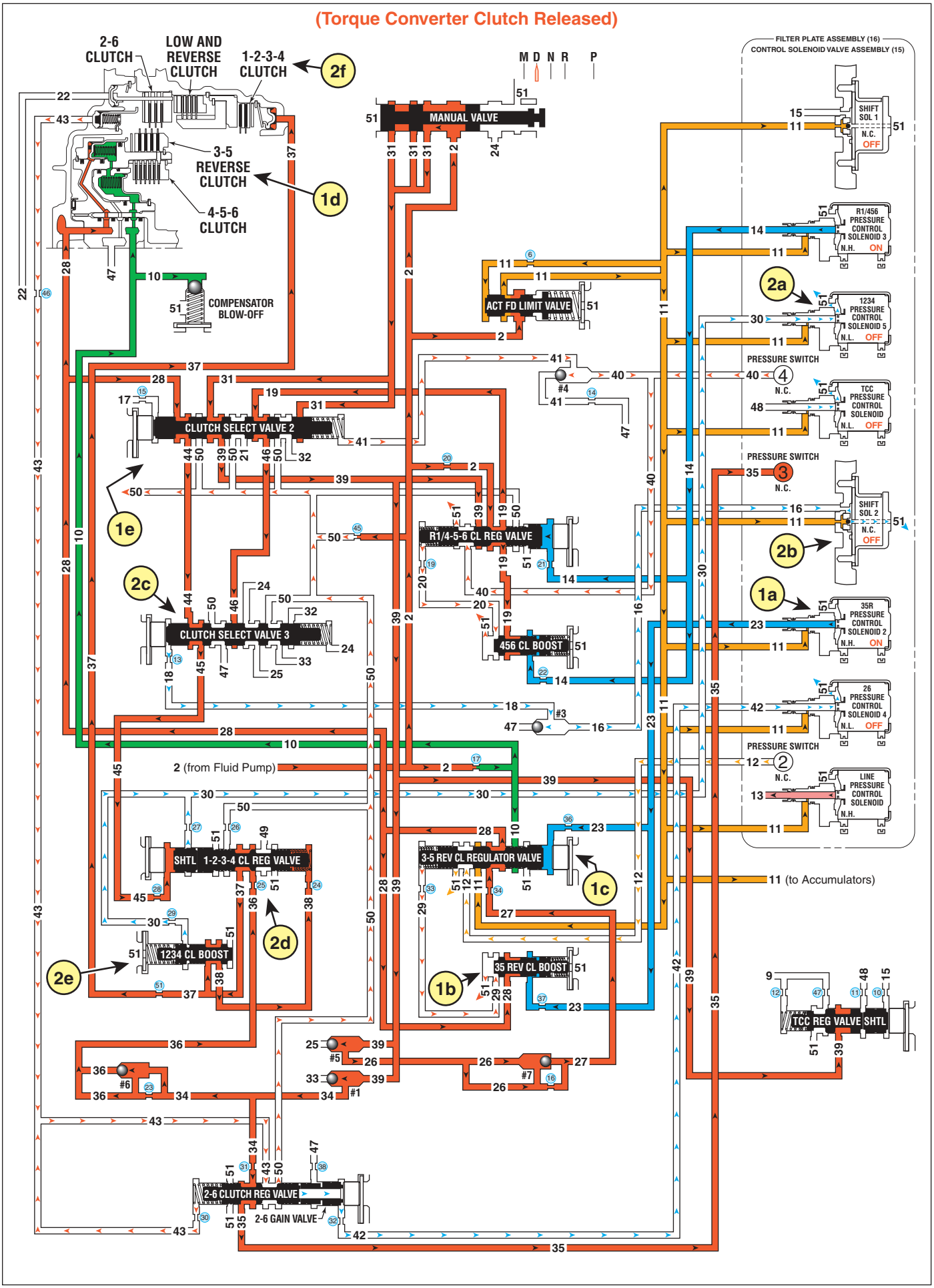


Figure 78

DRIVE RANGE – THIRD GEAR DEFAULT

(Torque Converter Clutch Released)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	3rd Def	1.842	OFF	OFF	OFF	OFF	ON	ON		APPLIED				APPLIED

If the transmission is in First, Second or Third gear during a transmission electrical component malfunction, the transmission will default to Third gear. All solenoids will default to their normal state. If the torque converter clutch is applied, it will release. This default action enables the vehicle to be safely driven to a service center.

3-5 REVERSE CLUTCH APPLIES OR REMAINS APPLIED

1a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 defaults to its normally high state (ON), allowing actuator feed (11) fluid to enter the PCS 35 reverse clutch (23) circuit. PCS 35 reverse clutch (23) fluid is routed through orifice #36 to the 3-5 reverse clutch regulator valve, and through orifice #37 to the 3-5 reverse clutch boost valve. If the transmission is operating in First or Second gear when an electrical malfunction occurs, the 3-5 reverse clutch will apply. If the transmission is operating in Third gear when the electrical malfunction occurs, the 3-5 reverse clutch remains applied.

1b 3-5 Reverse Clutch Boost Valve
PCS 35 reverse clutch (23) fluid pressure acts on a differential area of the 3-5 reverse clutch boost valve, moving the valve against 3-5 reverse clutch boost valve spring force to block 35 reverse clutch (28) fluid from entering the 35 reverse clutch feedback (29) circuit, and opening the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5 reverse clutch regulator valve moving to the full feed position, sending full 35 reverse feed (27) pressure (full line pressure) to the 3-5 reverse clutch.

1c 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid moves the 3-5 reverse clutch regulator valve, against 3-5 reverse clutch regulator valve spring force, to the applied position. This allows 35 reverse feed (27) fluid to pass through the valve into the 35 reverse clutch (28) circuit.

1d 3-5 Reverse Clutch
3-5 reverse clutch (28) fluid enters the 3-5-reverse and 4-5-6 clutch housing, and moves the 3-5-reverse clutch piston against spring force and compensator feed (10) pressure to apply the 3-5 reverse clutch plates.

1e Clutch Select Valve 2
35 reverse clutch (28) fluid passes through the clutch select valve 2 and enters the 1234 clutch default feed (44) circuit. 1234 clutch default feed (44) fluid is then routed to the clutch select valve 3.

1-2-3-4 CLUTCH REMAINS APPLIED

2a 1234 Pressure Control (PC) Solenoid 5
The 1234 PC solenoid 5 defaults to its normally low state (OFF), allowing PCS 1234 clutch (30) fluid to exhaust from the 1-2-3-4 clutch regulator valve and the 1-2-3-4 clutch boost valve.

2b Shift Solenoid 2
The shift solenoid 2 defaults to its normally closed state (OFF), and solenoid 2 (16) fluid exhausts through the solenoid.

2c Clutch Select Valve 3
When solenoid 2 (16) fluid pressure exhausts, clutch select valve 3 spring force moves the clutch select valve 3 to the released position. This allows 1234 clutch default feed (44) fluid to pass through the valve into the 1234 clutch default (45) circuit. 1234 default (45) fluid is then routed to the 1-2-3-4 clutch regulator valve.

2d 1-2-3-4 Clutch Regulator Valve
When PCS 1234 clutch (30) fluid exhausts, due to the default state of the 1234 PC solenoid 5, 1-2-3-4 clutch regulator valve spring force attempts to move the 1-2-3-4 clutch regulator valve to the released position. However, 1234 clutch default (45) fluid passes through orifice #28 and moves the 1-2-3-4 regulator shuttle valve to retain the 1-2-3-4 clutch regulator valve in the applied position.

2e 1-2-3-4 Clutch Boost Valve
1-2-3-4 clutch boost valve spring force moves the 1-2-3-4 clutch boost valve to the released position, allowing full 1234 clutch (37) fluid pressure to enter the 1234 clutch feedback (38) circuit. 1234 clutch feedback (38) fluid is routed to the 1-2-3-4 clutch regulator valve and helps regulate 1234 clutch (37) fluid pressure.

2f 1-2-3-4 Clutch
With the 1-2-3-4 clutch regulator valve still held in the applied position, the 1-2-3-4 clutch will remain applied.

2-6 CLUTCH RELEASES

If the transmission is operating in Second gear when an electrical malfunction occurs, the 26 pressure control solenoid defaults to its normally low state (OFF) and the 2-6 clutch is released. See Drive Range – Third Gear (page 85) for a complete description of 2-6 clutch release.

COMPLETE HYDRAULIC CIRCUIT
Page 122

PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

DRIVE RANGE – FIFTH GEAR DEFAULT

(Torque Converter Clutch Released)

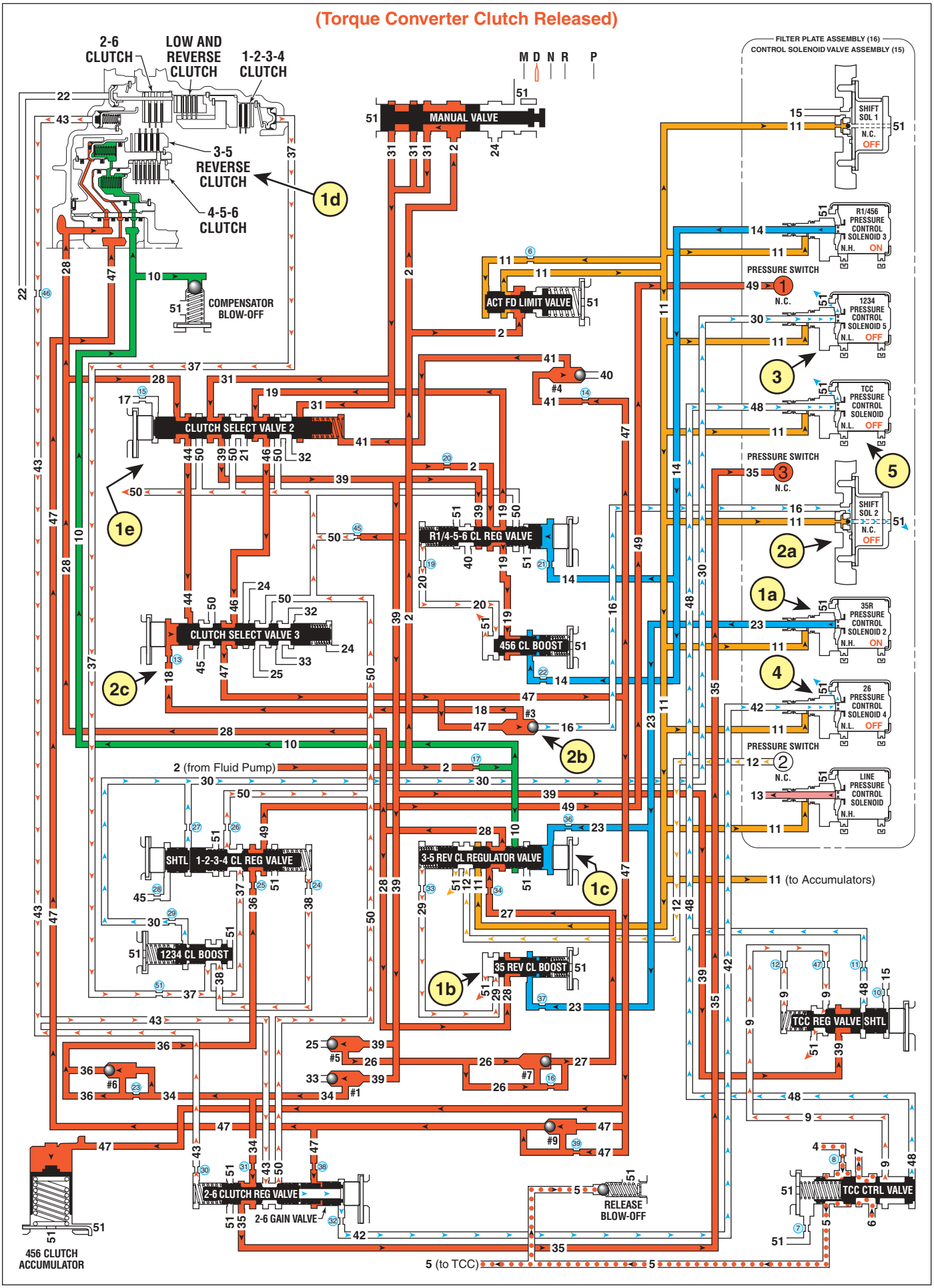


Figure 79

DRIVE RANGE – FIFTH GEAR DEFAULT

(Torque Converter Clutch Released)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	5th Def	1.000	OFF	OFF	OFF	OFF	ON	ON	APPLIED	APPLIED				

If the transmission is in Fourth, Fifth or Sixth gear during a transmission electrical component malfunction, the transmission will default to Fifth gear. All solenoids will default to their normal state. If the torque converter clutch is applied, it will release. The transmission will remain in Drive Range – Fifth Gear Default until the ignition has been turned off, or the transmission is shifted to Reverse (R). When the vehicle is restarted, and shifted back into Drive (D), the transmission will then operate in Drive Range – Third Gear Default. This default action enables the vehicle to be safely driven to a service center.

3-5 REVERSE CLUTCH APPLIES OR REMAINS APPLIED

1a 35R Pressure Control (PC) Solenoid 2
The 35R PC solenoid 2 defaults to its normally high state (ON), allowing actuator feed (11) fluid to enter the PCS 35 reverse clutch (23) circuit. PCS 35 reverse clutch (23) fluid is routed through orifice #36 to the 3-5 reverse clutch regulator valve, and through orifice #37 to the 3-5 reverse clutch boost valve. If the transmission is operating in Fourth or Sixth gear when an electrical malfunction occurs, the 3-5 reverse clutch will apply. If the transmission is operating in Fifth gear when the electrical malfunction occurs, the 3-5 reverse clutch remains applied.

1b 3-5 Reverse Clutch Boost Valve
PCS 35 reverse clutch (23) fluid pressure acts on a differential area of the 3-5 reverse clutch boost valve, moving the valve against 3-5 reverse clutch boost valve spring force to block 35 reverse clutch (28) fluid from entering the 35 reverse clutch feedback (29) circuit, and opening the 35 reverse clutch feedback (29) circuit to exhaust (51). This results in the 3-5 reverse clutch regulator valve moving to the full feed position, sending full 35 reverse feed (27) pressure (full line pressure) to the 3-5 reverse clutch.

1c 3-5 Reverse Clutch Regulator Valve
PCS 35 reverse clutch (23) fluid moves the 3-5 reverse clutch regulator valve, against 3-5 reverse clutch regulator valve spring force, to the applied position. This allows 35 reverse feed (27) fluid to pass through the valve into the 35 reverse clutch (28) circuit.

1d 3-5 Reverse Clutch
3-5 reverse clutch (28) fluid enters the 3-5-reverse and 4-5-6 clutch housing, and moves the 3-5-reverse clutch piston against spring force and compensator feed (10) pressure to apply the 3-5 reverse clutch plates.

1e Clutch Select Valve 2
35 reverse clutch (28) fluid passes through the clutch select valve 2 and enters the 1234 clutch default feed (44) circuit. 1234 clutch default feed (44) fluid is then routed to the clutch select valve 3 in preparation for a downshift to Drive Range – Third Gear Default.

4-5-6 CLUTCH REMAINS APPLIED

2a Shift Solenoid 2
The shift solenoid 2 defaults to its normally closed state (OFF), and solenoid 2 (16) fluid exhausts through the solenoid.

2b #3 Ball Check Valve
Solenoid 2 (16) fluid exhausts, allowing 456 clutch fluid to seat the #3 ball check valve against the solenoid 2 (16) passage and enter the CSV3 enable (18) circuit, thus maintaining the applied position of the clutch select valve 3.

2c Clutch Select Valve 3
The clutch select valve 3 is held in the applied position by CSV2 enable (18) fluid pressure, allowing 456 clutch feed (46) fluid to pass through the valve into the 456 clutch (47) circuit and keep the 4-5-6 clutch applied. See Drive Range – Fourth Gear (page 87) for a more complete description of 4-5-6 clutch apply.

1-2-3-4 CLUTCH RELEASES

3 1234 Pressure Control (PC) Solenoid 5
If the transmission is in 4th gear when an electrical condition commands a protection mode, the 1234 PC solenoid 5 defaults to its normally low state (OFF), allowing PCS 1234 clutch (30) fluid pressure to exhaust and the 1-2-3-4 clutch to release. See Drive Range – Fifth Gear (page 89) for a complete description of 1-2-3-4 clutch release.

2-6 CLUTCH RELEASES

4 26 Pressure Control (PC) Solenoid 4
If the transmission is in 6th gear when an electrical condition commands a protection mode, the 26 PC solenoid 4 defaults to its normally low state (OFF), allowing PCS 26 clutch (42) fluid pressure to exhaust and the 2-6 clutch to release. See Drive Range – Third Gear (page 85) for a complete description of 2-6 clutch release.

TORQUE CONVERTER CLUTCH (TCC) RELEASES

5 TCC Pressure Control (PC) Solenoid
If the TCC is applied when an electrical condition commands a protection mode, the torque converter clutch (TCC) PC solenoid defaults to its normally low state (OFF), allowing PCS TCC (48) fluid pressure to exhaust and the TCC to release. See Drive Range – Sixth Gear TCC Released and Applied (pages 92-95) for a complete description of TCC release.

COMPLETE HYDRAULIC CIRCUIT
Page 124

PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

OPERATING CONDITIONS

RANGE REFERENCE CHART

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	1 4-5-6 CLUTCH	2 3-5 REVERSE CLUTCH	3 2-6 CLUTCH	4 LOW AND REVERSE CLUTCH	5 LOW AND REV CL (OWC)	6 1-2-3-4 CLUTCH
PARK	P	—	ON	ON	OFF	OFF	OFF	ON				APPLIED*		
REV	R	2.880	ON	OFF	OFF	OFF	ON	ON		APPLIED		APPLIED		
NEU	N	—	ON	ON	OFF	OFF	OFF	ON				APPLIED*		
D	1st Braking	4.484	ON	ON	ON	OFF	OFF	ON				APPLIED	HOLDING†	APPLIED
	1st	4.484	OFF	ON	ON	OFF	OFF	OFF					HOLDING	APPLIED
	2nd	2.872	OFF	ON	ON	ON	OFF	OFF			APPLIED			APPLIED
	3rd	1.842	OFF	ON	ON	OFF	ON	OFF		APPLIED				APPLIED
	4th	1.414	OFF	ON	ON	OFF	OFF	ON	APPLIED					APPLIED
	5th	1.000	OFF	ON	OFF	OFF	ON	ON	APPLIED	APPLIED				
	6th	0.742	OFF	ON	OFF	ON	OFF	ON	APPLIED		APPLIED			

NOTE: EFFECTIVE FINAL DRIVE RATIO – 6T70/75 – 2.77/3.16

NOTE: FOR SHIFT SOLENOIDS 1 AND 2, "ON" = SOLENOID ENERGIZED (PRESSURIZED), "OFF" = SOLENOID DE-ENERGIZED (NO PRESSURE).

NOTE: FOR PRESSURE CONTROL (PC) SOLENOIDS, "ON" = PRESSURIZED, "OFF" = NO PRESSURE.

* APPLIED WITH NO LOAD.

† HOLDING BUT INEFFECTIVE.

EXPECTED OPERATING CONDITION IF COMPONENT IN COLUMN NUMBER IS INOPERATIVE:

COLUMN #	CONDITION
1	NO FOURTH, FIFTH OR SIXTH GEARS.
2	NO REVERSE, NO THIRD OR FIFTH GEARS.
3	NO SECOND OR SIXTH GEARS.
4	NO REVERSE, NO ENGINE BRAKING IN FIRST GEAR.
5	NO FIRST GEAR.
6	NO FIRST, SECOND, THIRD OR FOURTH GEARS.

Electrical failure of any shift solenoid or pressure control solenoid will result in a default to the transmission protection mode. If the transmission is in 1st, 2nd or 3rd gear during an electrical failure, the transmission will default to 3rd gear. If the transmission is in 4th, 5th or 6th gear when an electrical failure occurs, the transmission will default to 5th gear.

Mechanical failure within a shift solenoid or pressure control solenoid will again result in the transmission defaulting to a protection mode. Depending on the vehicle speed, transmission range, the component involved and position it is stuck in, the transmission will default to the optimum gear to allow safe operation.

Refer to the model specific service manual for specific codes and defaults.

Figure 80

COMPLETE HYDRAULIC CIRCUITS

The hydraulic circuitry of the Hydra-matic 6T70/75 transmission is better understood when fluid flow can be related to the specific components in which the fluid travels. In the Power Flow section, a simplified hydraulic schematic was given to show what hydraulically occurs in a specific gear range. The purpose was to isolate the hydraulics used in each gear range in order to provide the user with a basic understanding of the hydraulic system.

In contrast, this section shows a complete hydraulic schematic with fluid passages active in the appropriate component for each gear range. This is accomplished using two opposing foldout pages that are separated by a page of supporting information.

The left side foldout contains the complete color coded hydraulic circuit used in that gear range along with the relative location of valves, ball check valves and orifices within specific components. A broken line is also used to separate components such as the pump, control valve bodies, channel plate, case cover and case to assist the user when following the hydraulic circuits as they pass between them. The page of information facing this foldout lists possible conditions and component diagnostic tips. Always refer to the appropriate vehicle platform service manual when diagnosing specific concerns.

The right side foldout shows a two-dimensional line drawing of the fluid passages within each component. The active fluid passages for each gear range are appropriately colored to correspond with the hydraulic schematic used for that range. The page of information facing this foldout identifies the various fluid circuits with numbers that correspond to the circuit numbers used on the foldout page.

For a more complete understanding of the different hydraulic systems used in a specific gear range, refer to the Hydraulic Control Components section and/or Power Flow section.

PASSAGE **A** IS LOCATED IN THE FLUID PUMP ASSEMBLY (LIGHT GREY AREA)
PASSAGE **B** IS LOCATED IN THE CONTROL VALVE LOWER BODY ASSEMBLY (LIGHT GREEN AREA)
PASSAGE **C** IS LOCATED IN THE CONTROL VALVE UPPER BODY ASSEMBLY (LIGHT BLUE AREA)
PASSAGE **D** IS LOCATED ON THE SPACER PLATE ASSEMBLY (DASHED LINE)
PASSAGE **E** IS LOCATED IN THE CHANNEL PLATE (LIGHT RED AREA)
PASSAGE **F** IS LOCATED IN THE CONTROL SOLENOID (W/BODY AND TCM) VALVE ASSEMBLY (LIGHT YELLOW AREA)
PASSAGE **G** IS LOCATED IN THE CASE COVER ASSEMBLY (LIGHT PURPLE AREA)
PASSAGE **H** IS LOCATED IN THE CASE ASSEMBLY (WHITE AREA)

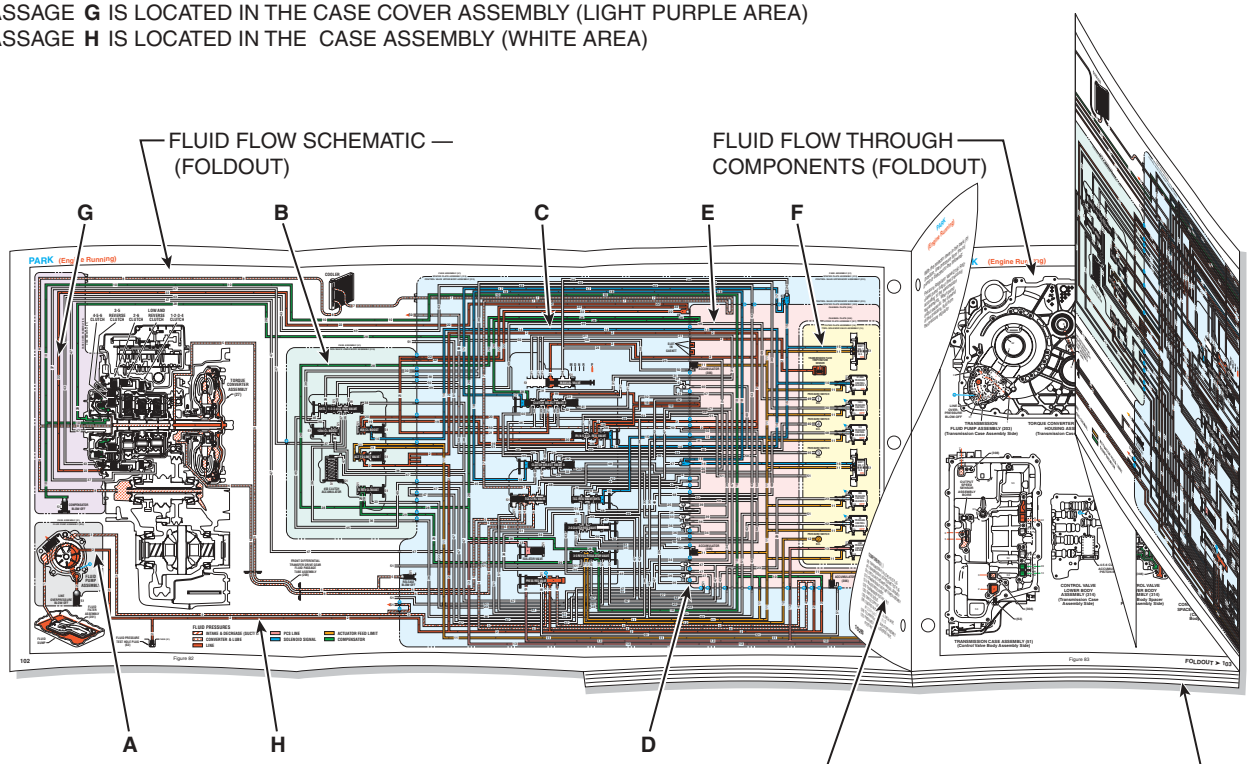


Figure 81

PARK (Engine Running)

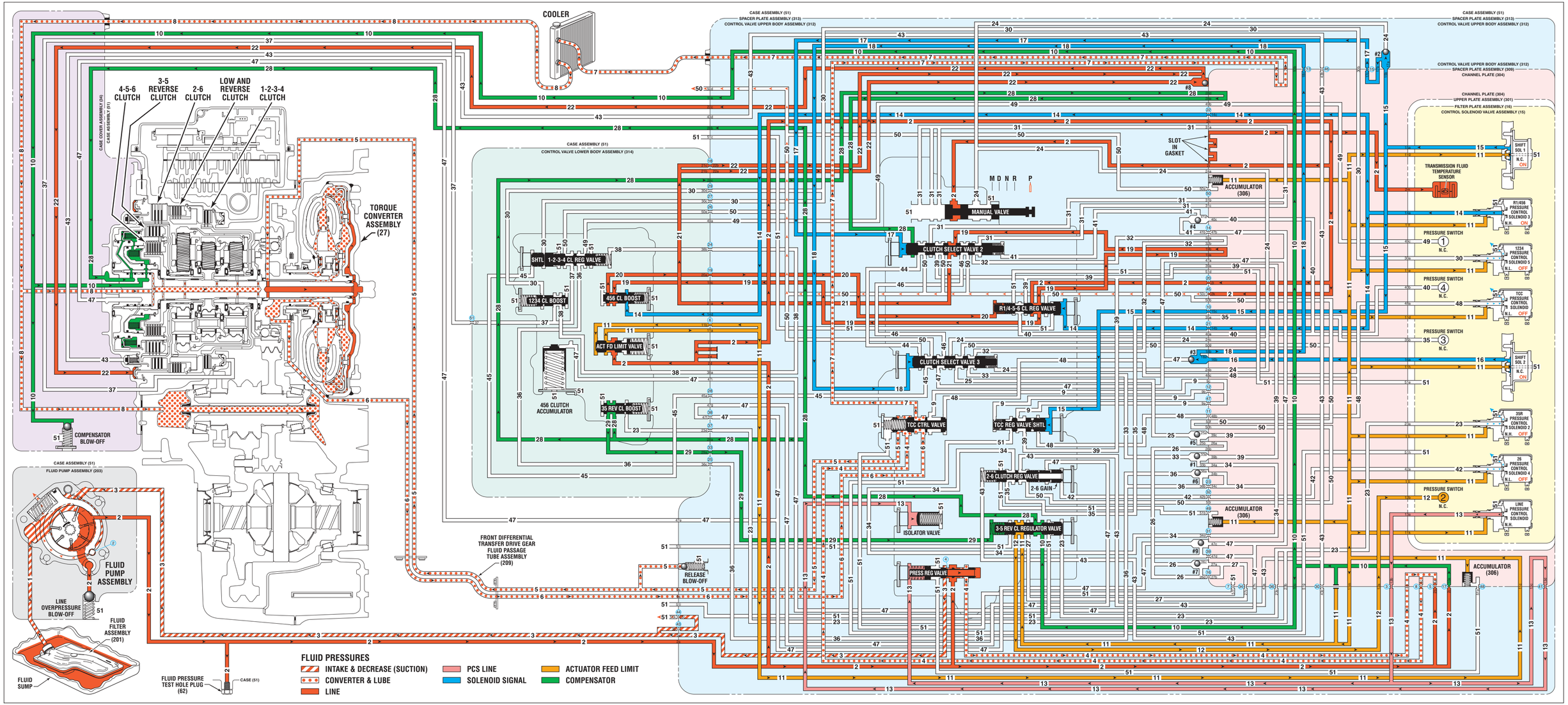


Figure 82

PARK
(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
PARK	P	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

The following conditions and component problems could happen in any gear range, and are only some of the possibilities recommended to diagnose hydraulic problems. Always refer to the appropriate vehicle platform service manual when diagnosing specific concerns.

HIGH LINE PRESSURE

- Pressure Regulator Valve (337) or Isolator Valve (340)
  - Stuck, damaged
- Pump Slide
  - Stuck
- Line Pressure Control Solenoid
  - Loose connector
  - Commanded/failed LOW (ON)

LOW LINE PRESSURE

- Pressure Regulator Valve (337), Pressure Regulator Valve Spring (338), or Isolator Valve (340)
  - Stuck, damaged, broken
- Fluid Pump Assembly (203)
  - Cross channel leak at pump base to torque converter and differential housing assembly, or torque converter and differential housing assembly to transmission case assembly
- Control Valve Channel Plate (304)
  - Cross channel leaks
- Control Valve Upper Body Assembly (312)
  - Cross channel leaks
  - Cross valve land leaks
- Control Valve Lower Body Assembly (314)
  - Cross channel leaks
  - Cross valve land leaks
- Spacer Plate Assembly (309 or 313)
  - Damaged
  - Missing
- Line Pressure Control Solenoid
  - Commanded/failed HIGH (OFF)
- Actuator Feed Limit Valve (362), Spring (363) or Retainer (339)
  - Stuck, damaged, broken

PARK
(Engine Running)

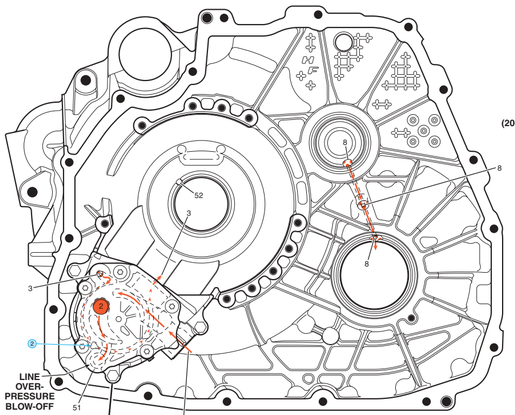
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

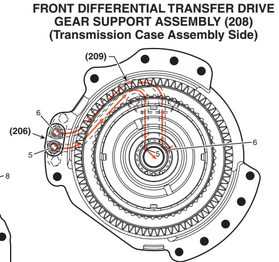
PARK (Engine Running)



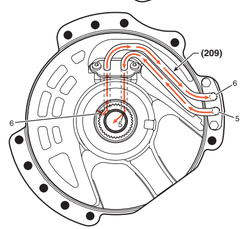
TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

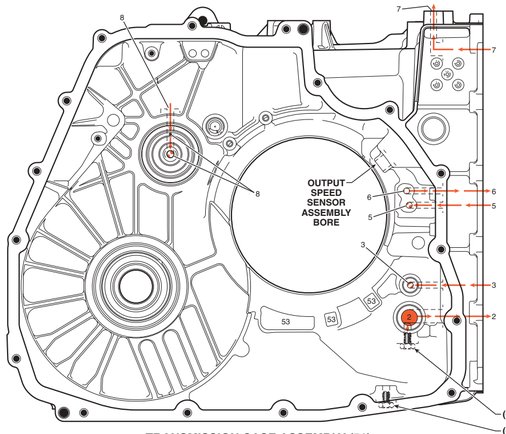
TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)

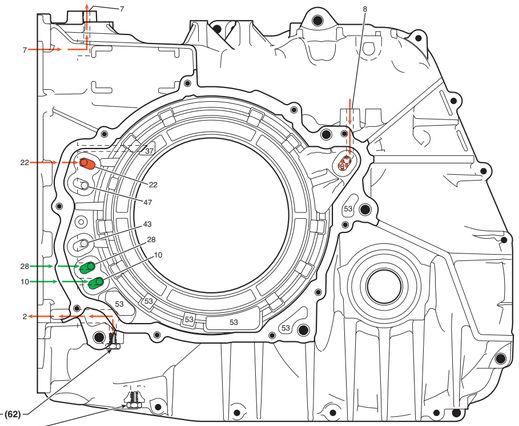


FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)

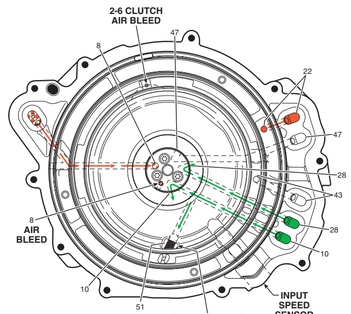




TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



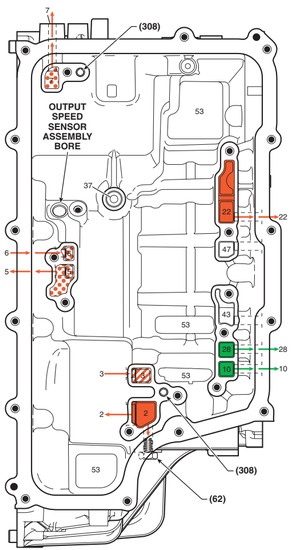
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



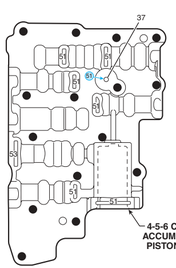
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

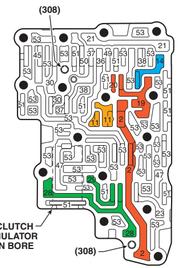
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



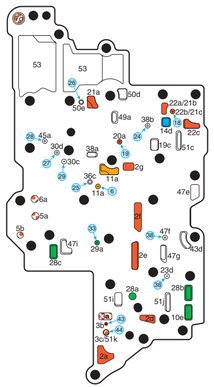
TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)



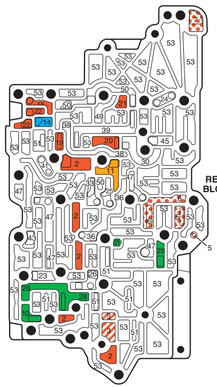
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



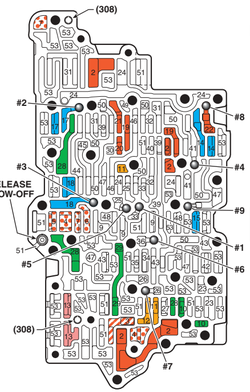
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



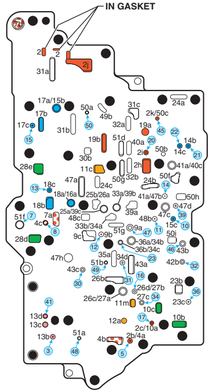
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



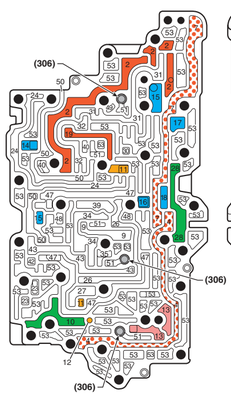
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



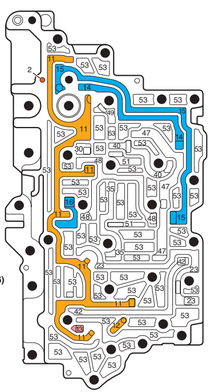
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



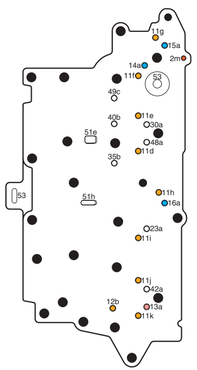
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



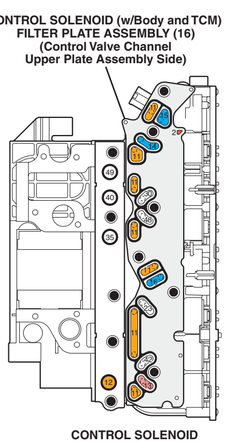
CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 83

FOLDOUT ➤ 103

FOLDOUT ➤ 103A

REVERSE

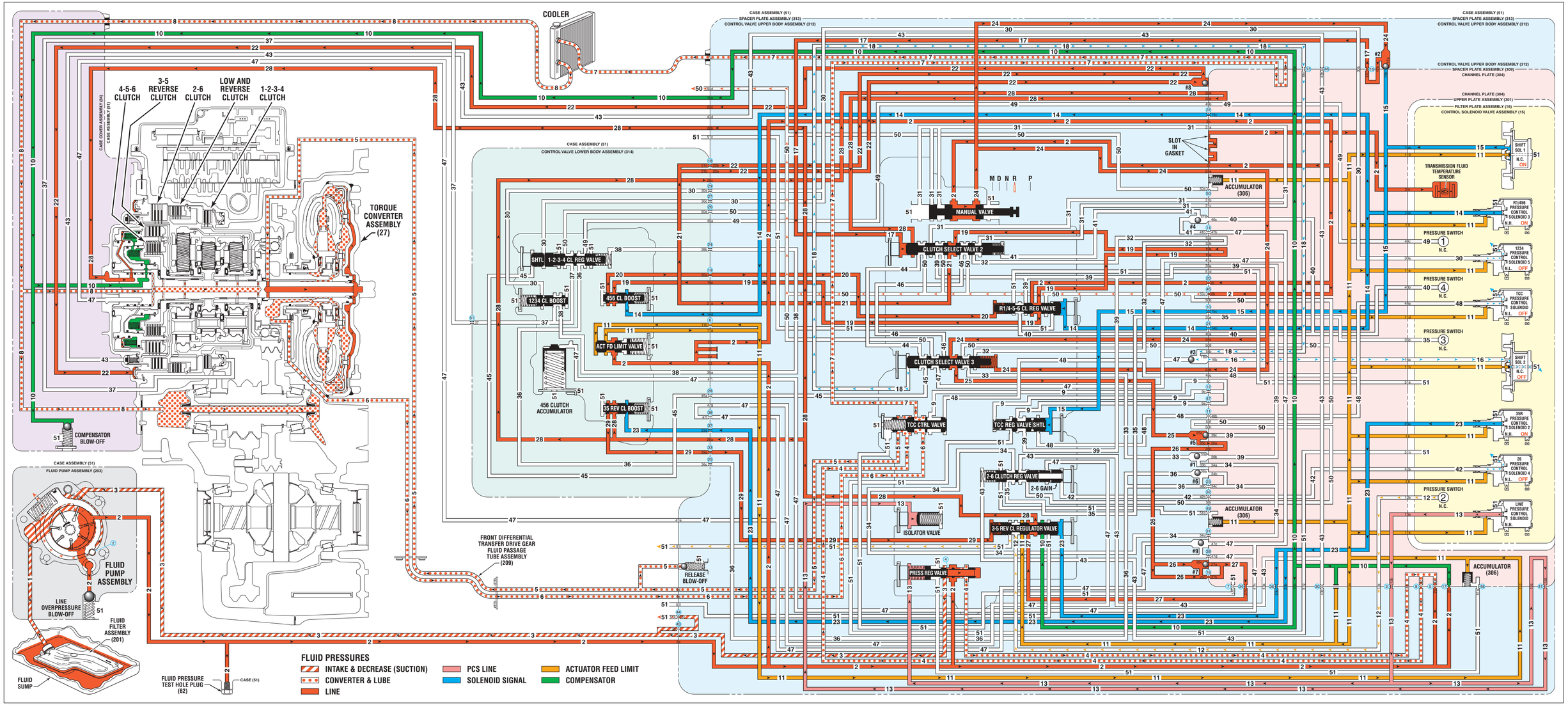


Figure 84

REVERSE

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
REV	R	2.880	ON	OFF	OFF	OFF	ON	ON		APPLIED		APPLIED		

NO REVERSE OR SLIPS IN REVERSE

- 35R Pressure Control Solenoid 2
  - Commanded/failed LOW (ON)
  - Leaking
- Transmission Case Assembly (51)
  - Broken
  - Leaking at case
- Low and Reverse Clutch Piston Assembly (408)
  - Leaking
  - Jammed or cracked
- Clutch Select Valve 2 (347), Spring (346) Bore Plug (327) or Retainer (328)
  - Stuck
  - Missing
- Clutch Select Valve 3 (345), Spring (344) Bore Plug (327) or Retainer (328)
  - Stuck
  - Missing
- #5 Ball Check Valve
  - Stuck
  - Missing
- #2 Ball Check Valve
  - Stuck
  - Missing
- 3-5 Reverse Clutch Piston (417)
  - Leaking
  - Jammed or cracked
- 3-5 Reverse Clutch Piston Inner Seal (419 or 420) or Dam Seal (421)
  - Leaking
  - Missing

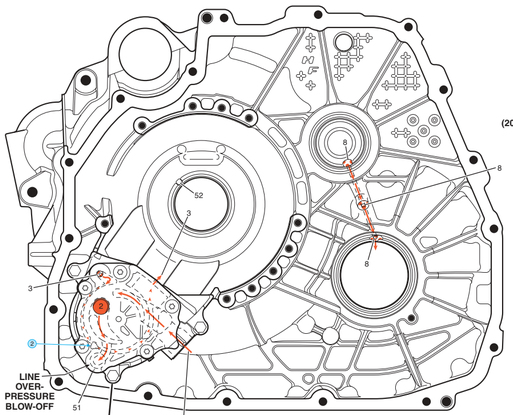
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

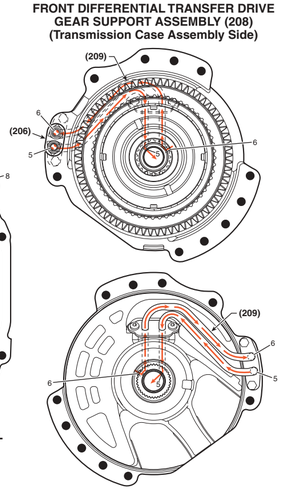
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

REVERSE

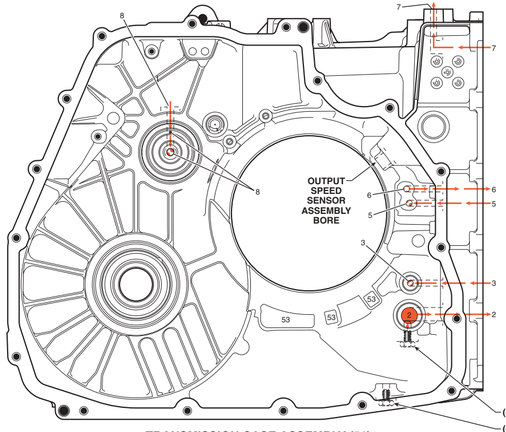


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

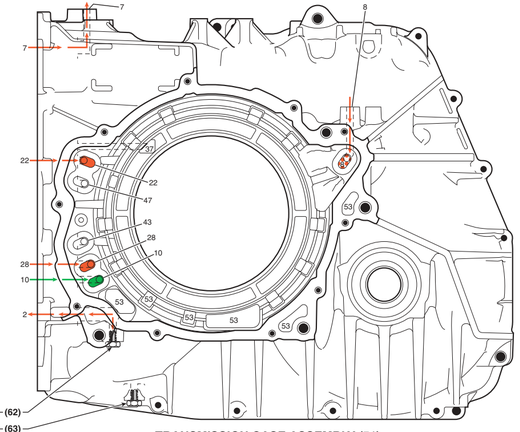


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

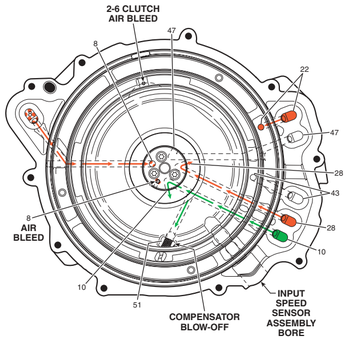
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



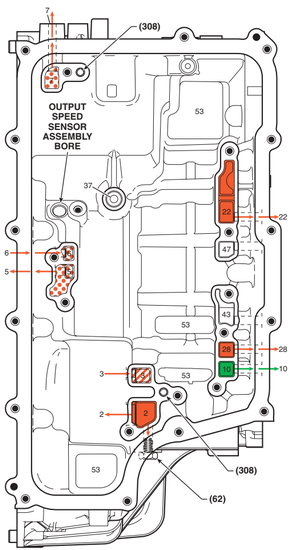
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



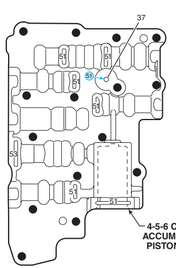
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

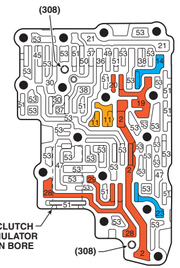
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

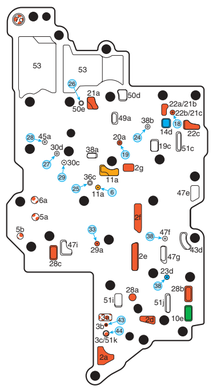


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

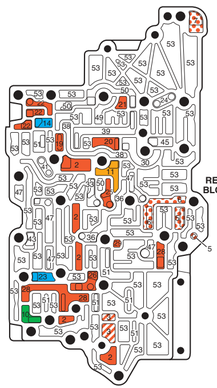


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

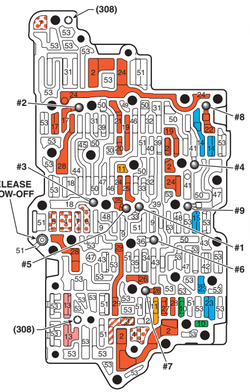
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



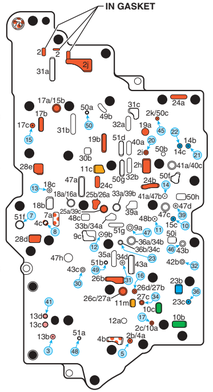
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



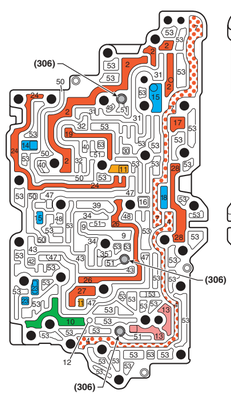
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



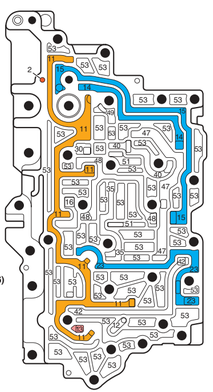
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



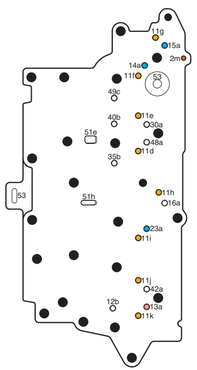
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

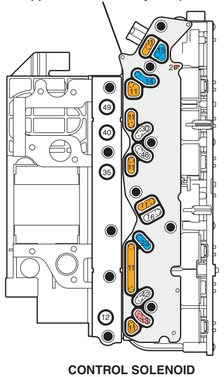


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 85

NEUTRAL (Engine Running)

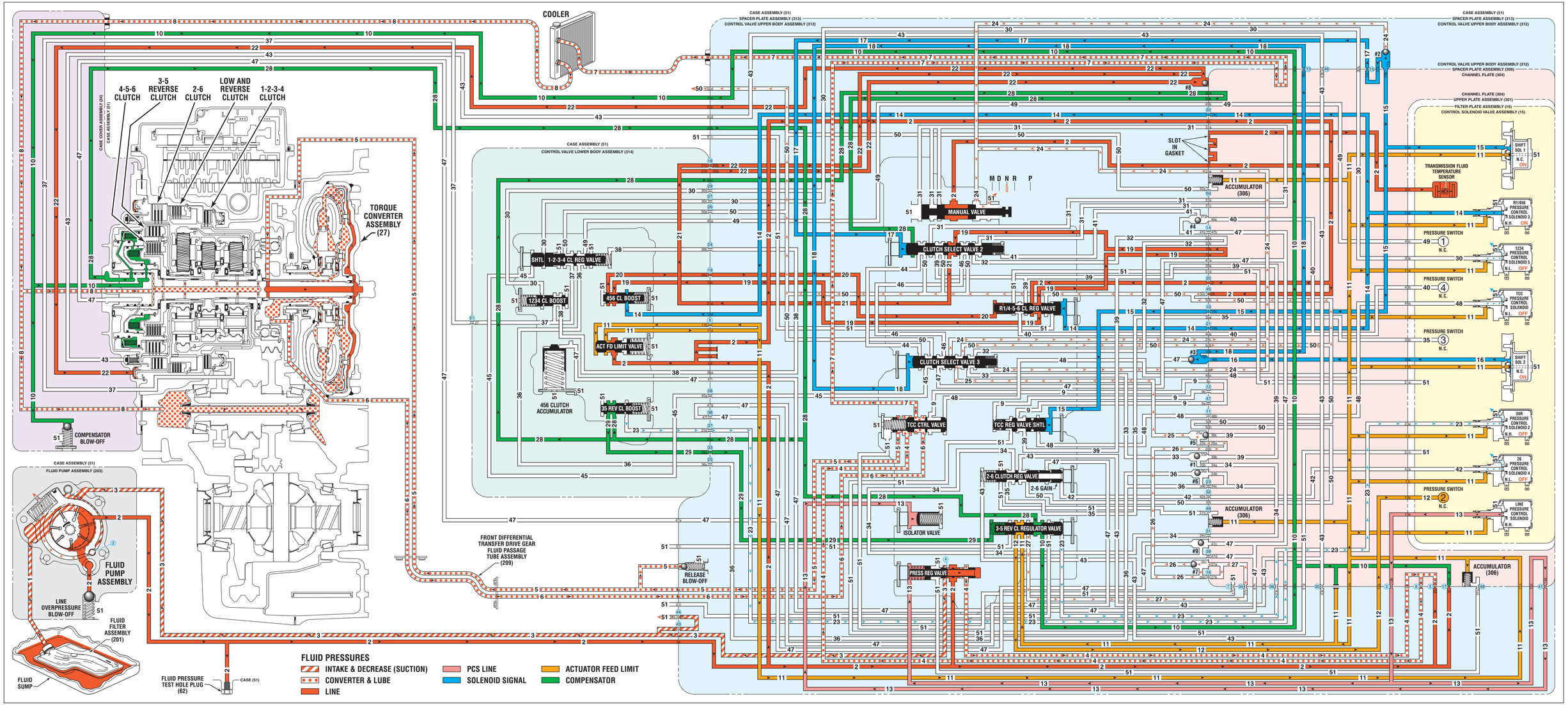


Figure 86

NEUTRAL
(Engine Running)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
NEU	N	—	ON	ON	OFF	OFF	OFF	ON				APPLIED		

FORWARD MOTION IN NEUTRAL

- Manual Valve (348)
  - Mis-positioned
- Clutch Select Valve 3 (345)
  - Stuck
- #3 Ball Check Valve
  - Stuck
  - Missing
- 35R Pressure Control Solenoid 2
  - Commanded/failed LOW (ON)
  - Leaking

NEUTRAL
(Engine Running)

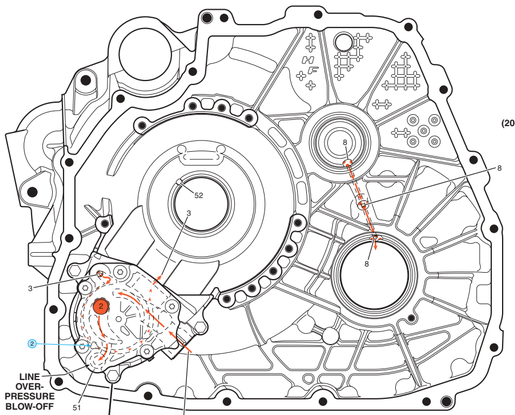
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

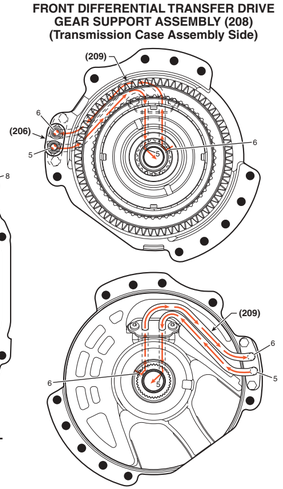
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

NEUTRAL (Engine Running)



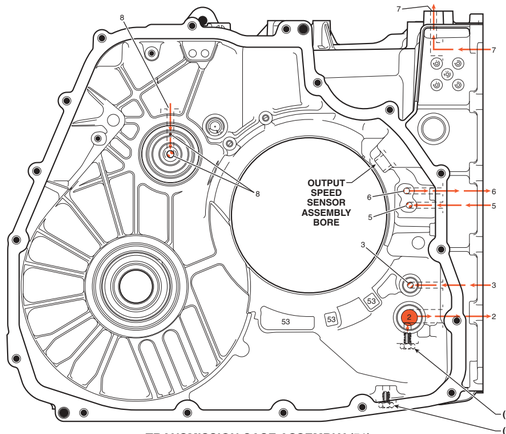
TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)



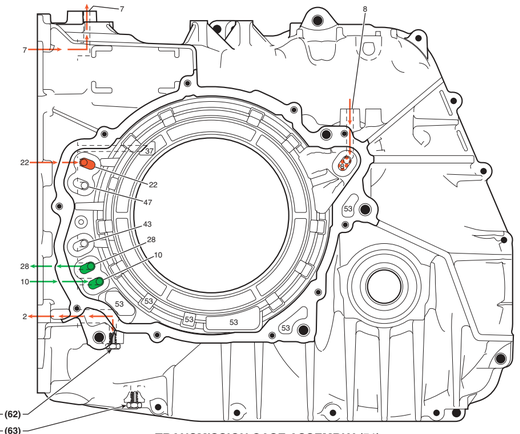
TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)

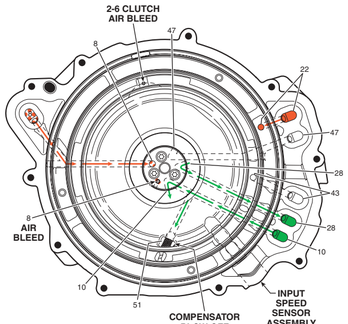
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



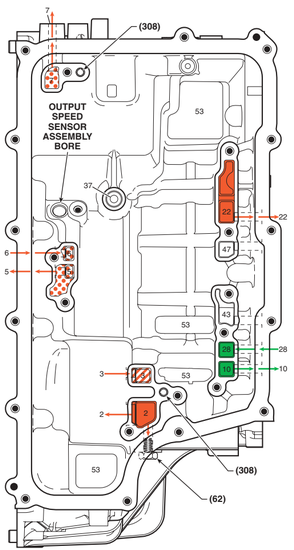
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



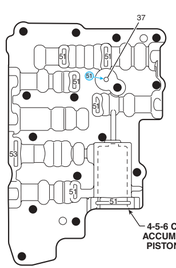
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

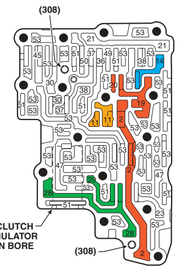
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



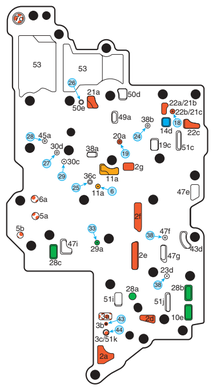
TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)



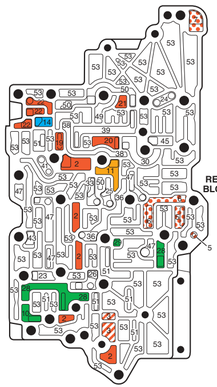
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



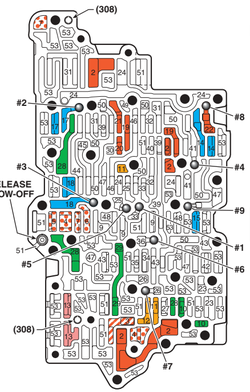
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



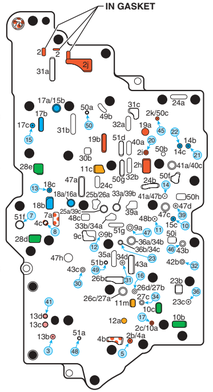
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



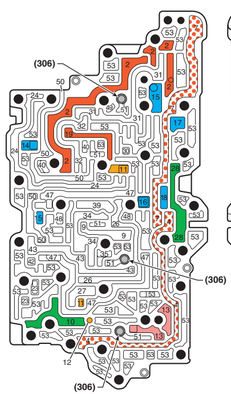
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



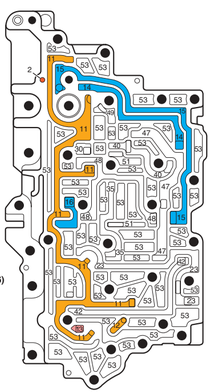
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



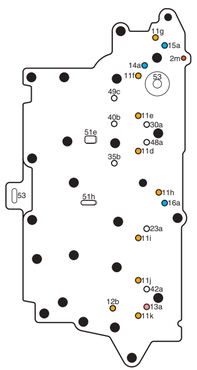
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

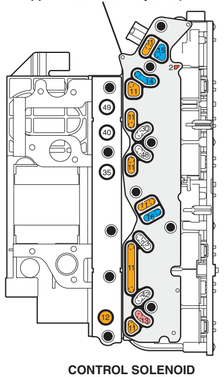


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 87

DRIVE RANGE – FIRST GEAR (Engine Braking)

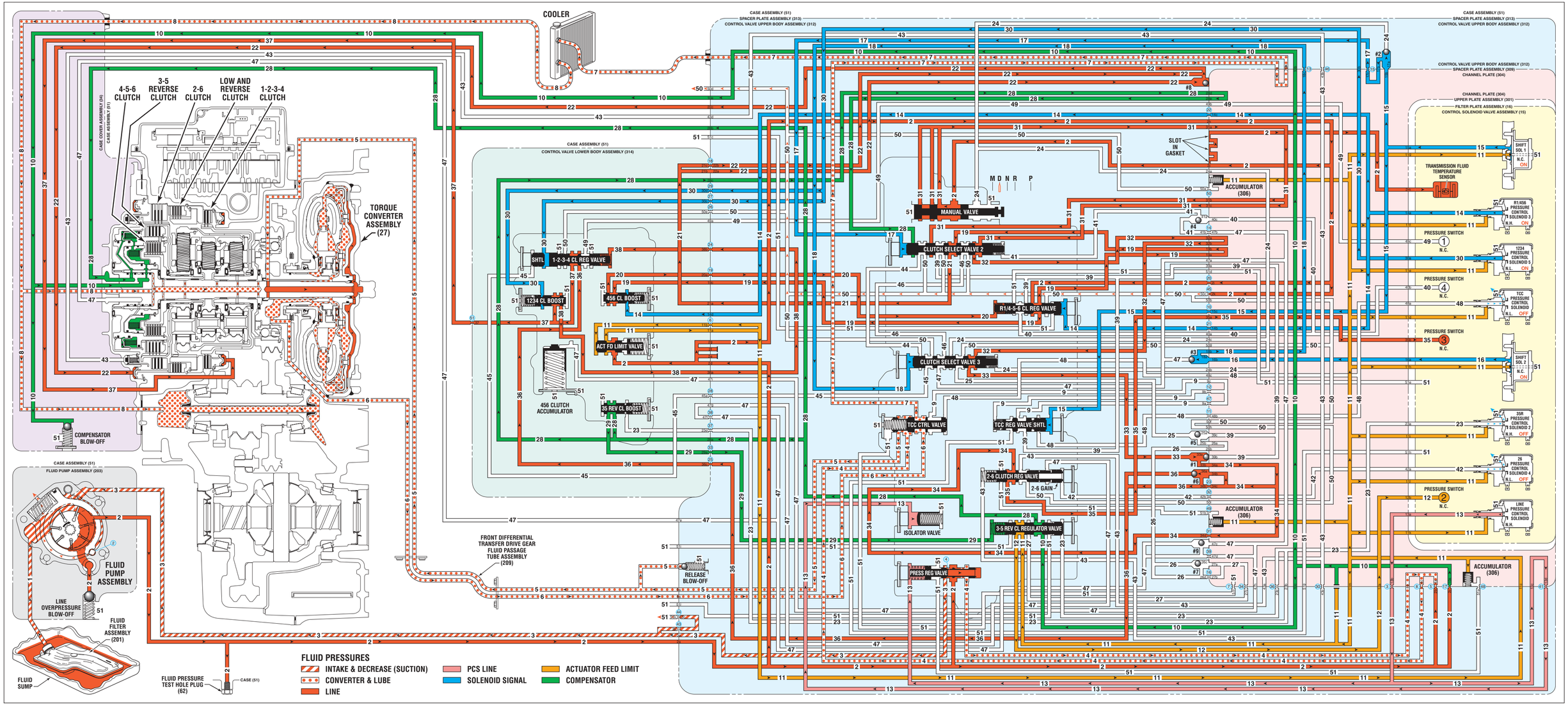


Figure 88

DRIVE RANGE – FIRST GEAR
(Engine Braking)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st Braking	4.484	ON	ON	ON	OFF	OFF	ON				APPLIED	HOLDING†	APPLIED

† HOLDING BUT INEFFECTIVE.

LOSS OF DRIVE

- Fluid Pump Assembly (203)
  - Seized
  - Leaking
- 1-2-3-4 Clutch Piston (461)
  - Jammed or cracked
  - Leaking
- Transmission Case Assembly (51)
  - Passage plugged
  - Cracked
- 1-2-3-4 Clutch Regulator Valve (372)
  - Stuck
- #1 Ball Check Valve
  - Stuck
  - Missing
- 1234 Pressure Control Solenoid 5
  - Commanded/failed LOW (OFF)
  - Leaking
- Low and Reverse Clutch Assembly (OWC) (455)
  - Not holding

LOSS OF ENGINE BRAKING – FIRST GEAR

- #2 Ball Check Valve
  - Stuck
  - Missing
- Clutch Select Valve 2 (347)
  - Stuck
- #3 Ball Check Valve
  - Stuck
  - Missing
- Clutch Select Valve 3 (345)
  - Stuck
- Low and Reverse Clutch Piston Assembly (408)
  - Leaking
  - Jammed or cracked

DRIVE RANGE – FIRST GEAR
(Engine Braking)

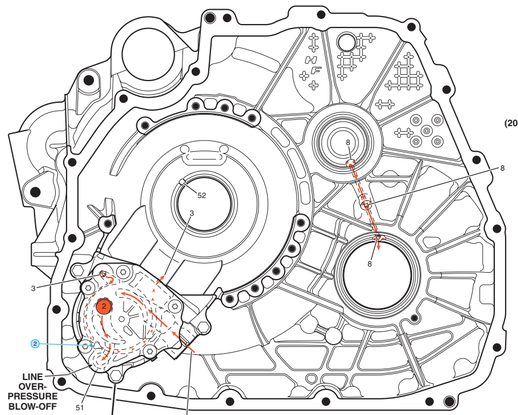
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

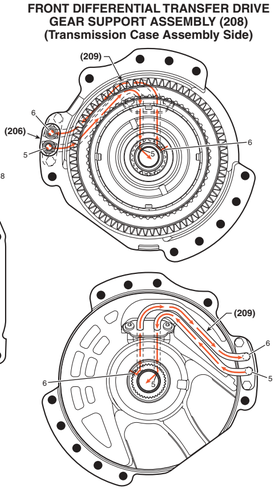
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – FIRST GEAR (Engine Braking)

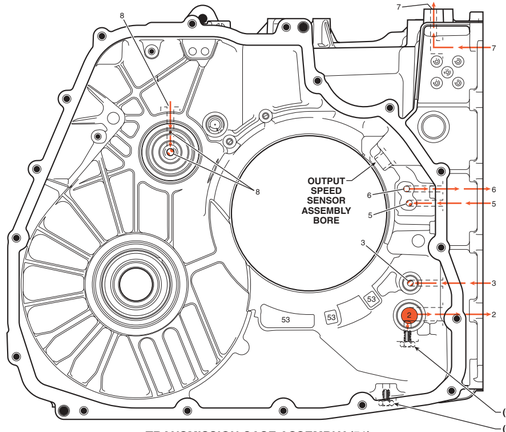


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

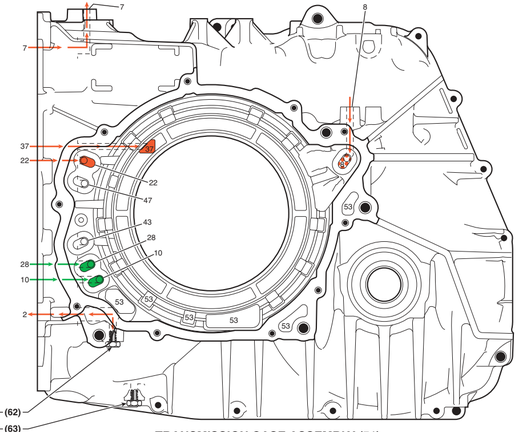


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

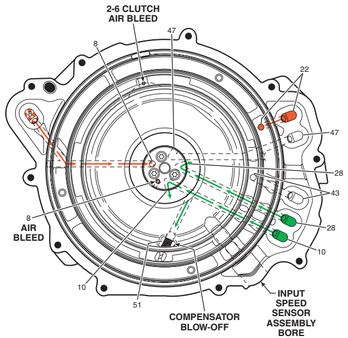
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



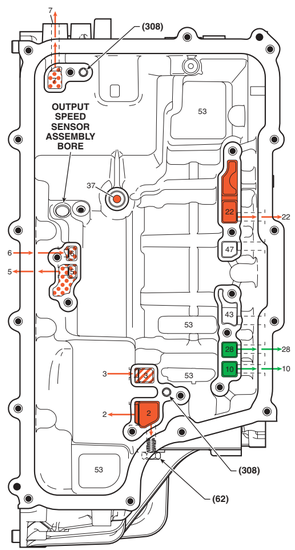
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



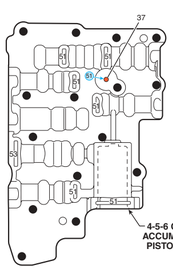
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

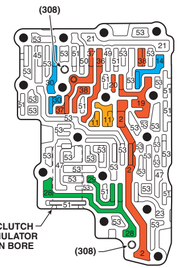
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

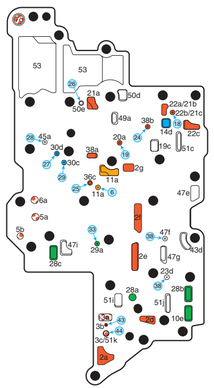


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

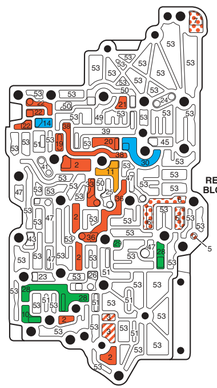


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

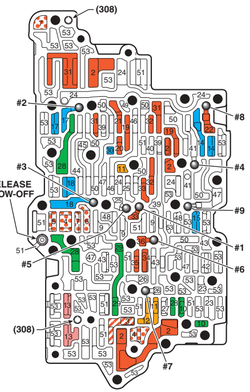
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



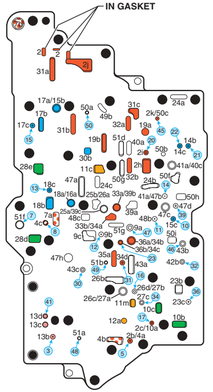
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



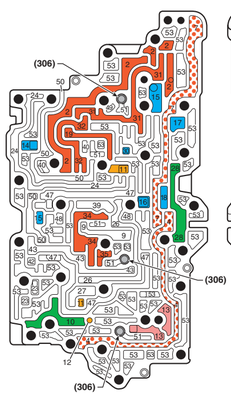
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



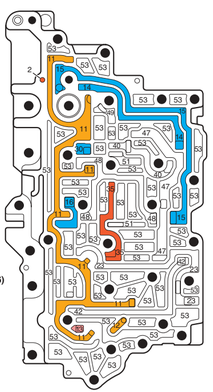
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



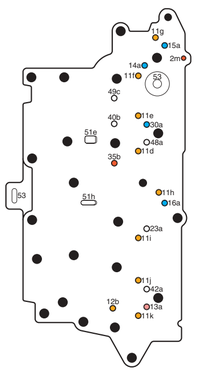
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

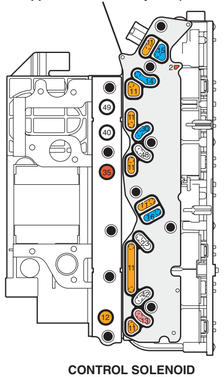


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 89

DRIVE RANGE – FIRST GEAR

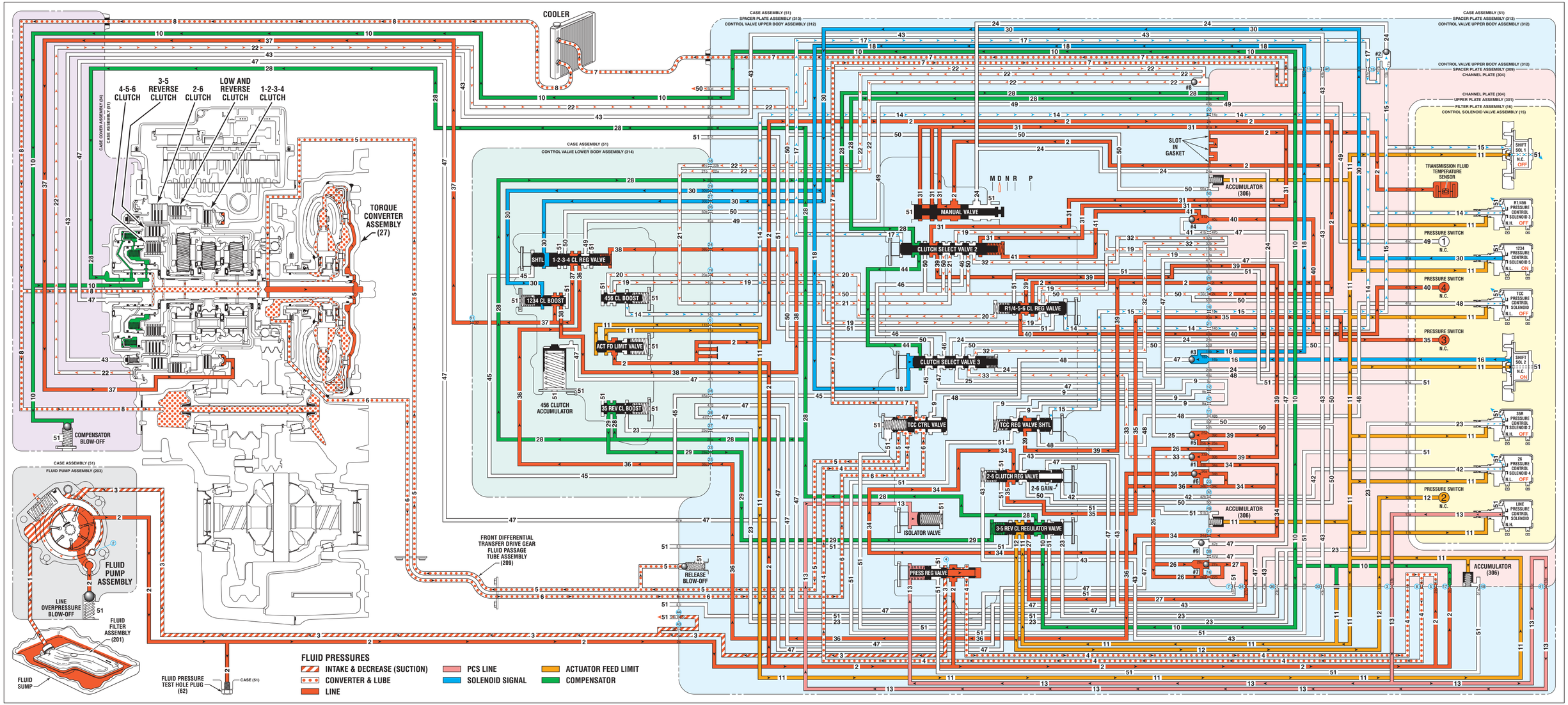


Figure 90

DRIVE RANGE – FIRST GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	1st	4.484	OFF	ON	ON	OFF	OFF	OFF					HOLDING	APPLIED

LOSS OF DRIVE

- R1/456 Pressure Control Solenoid 3
  - Commanded/failed HIGH (OFF)
  - Leaking
- Clutch Select Valve 2 (347)
  - Stuck
- #1 Ball Check Valve
  - Stuck
  - Missing
- #4 Ball Check Valve
  - Stuck
  - Missing
- #5 Ball Check Valve
  - Stuck
  - Missing
- 1-2-3-4 Clutch Regulator Valve (372)
  - Stuck
- 1-2-3-4 Clutch Piston (461)
  - Jammed or cracked
  - Leaking
- Low and Reverse Clutch Assembly (OWC) (455)
  - Not holding
- Transmission Case Assembly (51)
  - Passage plugged
  - Cracked

DRIVE RANGE – FIRST GEAR

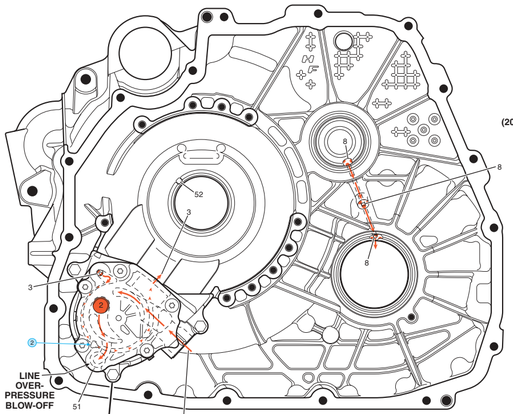
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

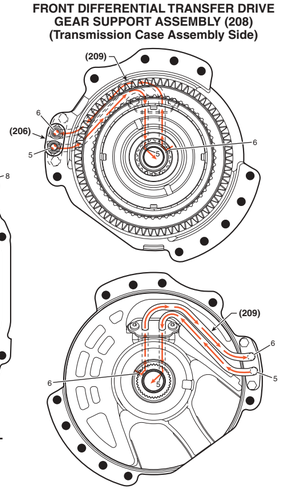
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – FIRST GEAR

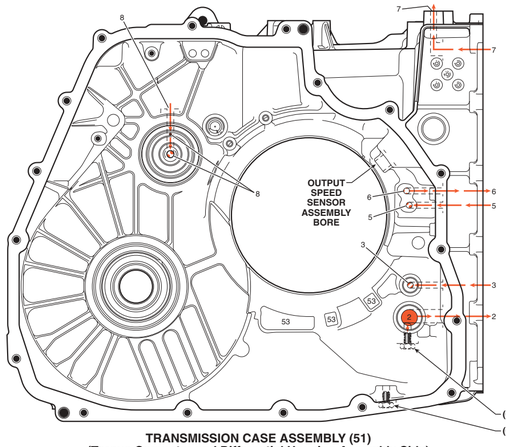


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

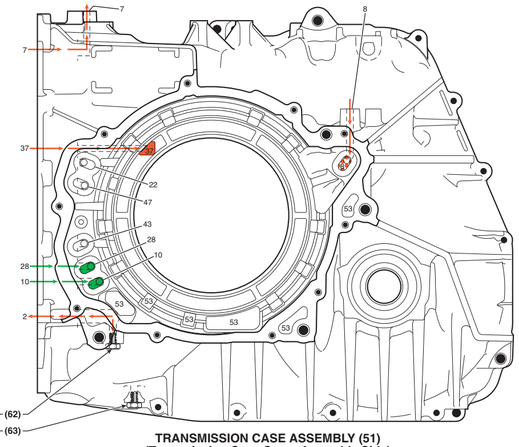


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

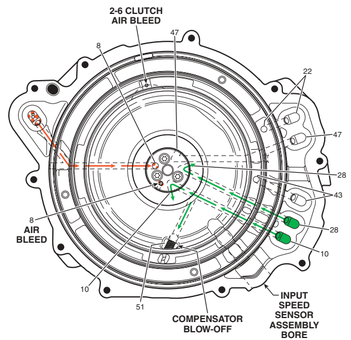
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



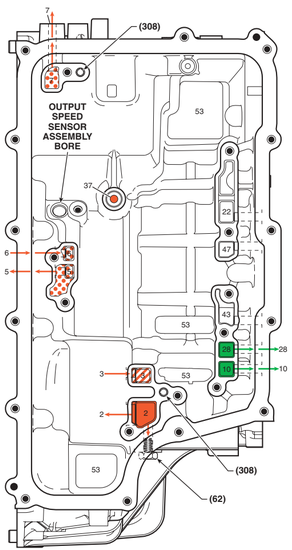
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



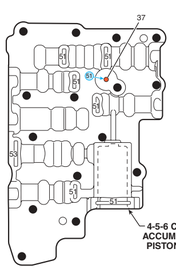
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

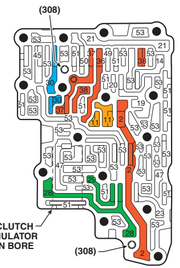
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

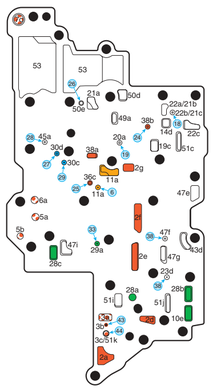


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

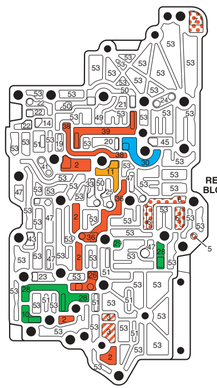


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

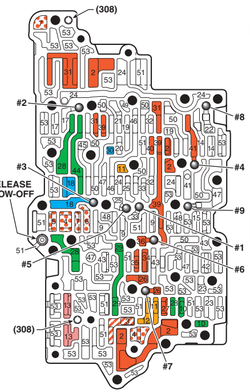
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



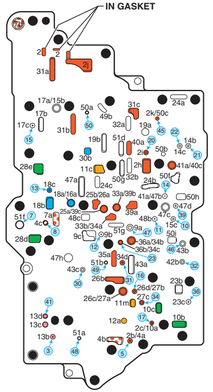
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



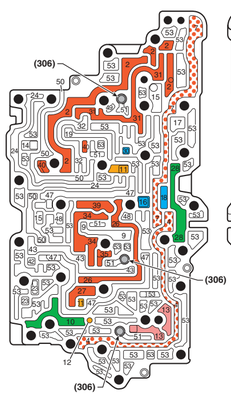
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



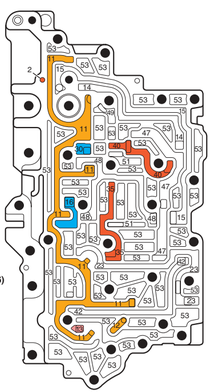
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



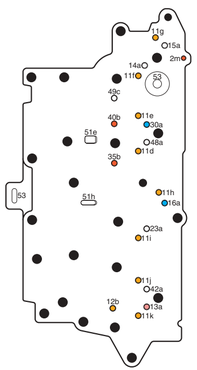
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

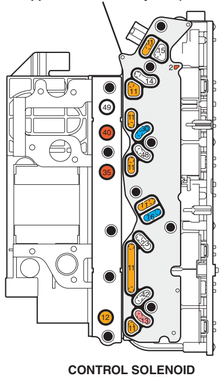


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 91

DRIVE RANGE – SECOND GEAR

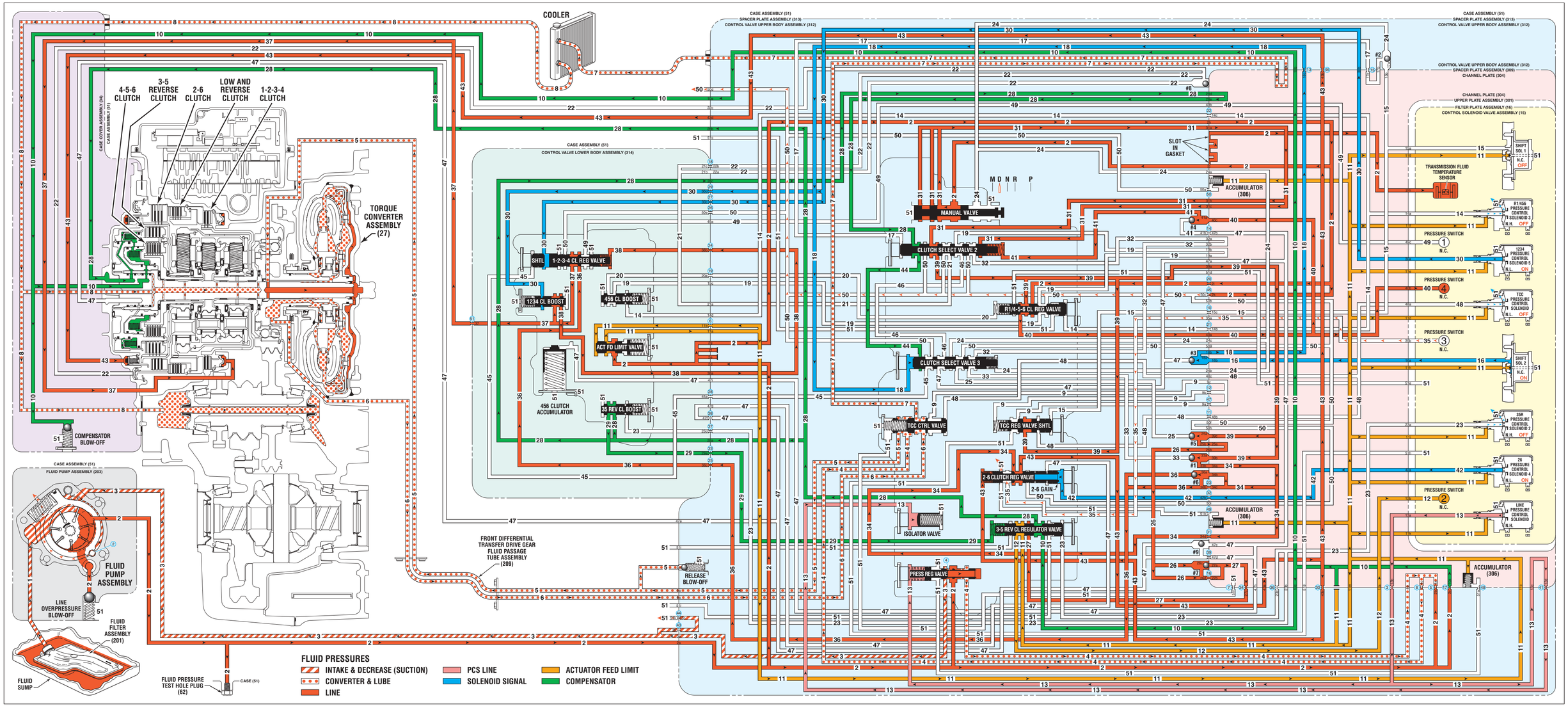


Figure 92

DRIVE RANGE – SECOND GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	2nd	2.872	OFF	ON	ON	ON	OFF	OFF			APPLIED			APPLIED

NO SECOND GEAR

- 26 Pressure Control Solenoid 4
  - Commanded/failed LOW (OFF)
  - Leaking
- 2-6 Clutch Regulator Valve (333)
  - Stuck
- Transmission Case Assembly (51)
  - Broken
  - Feed hole plugged
- 2-6 Clutch Piston (405)
  - Leaking
  - Jammed or cracked

DRIVE RANGE – SECOND GEAR

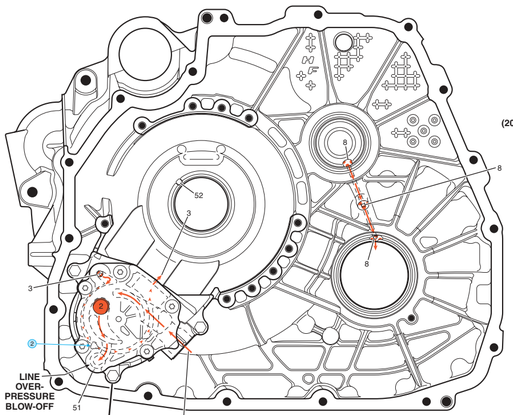
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

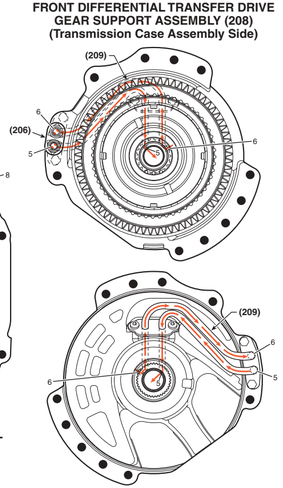
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – SECOND GEAR



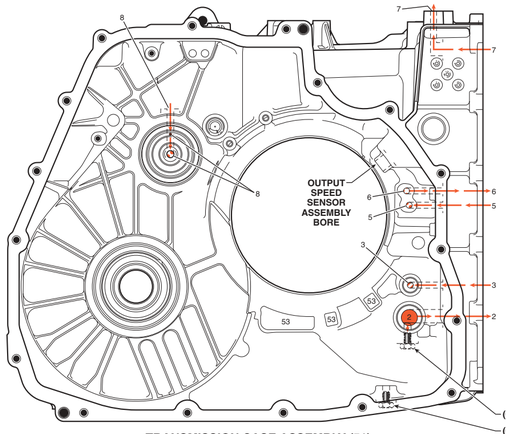
TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)



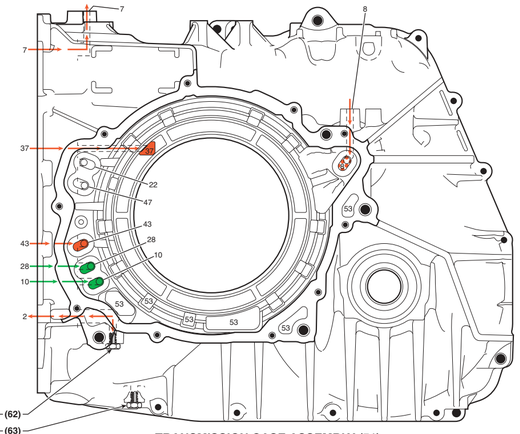
TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)

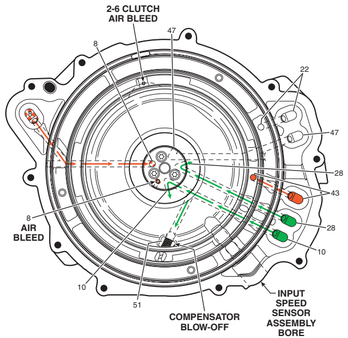
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



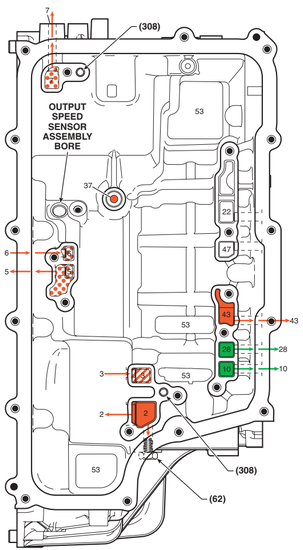
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



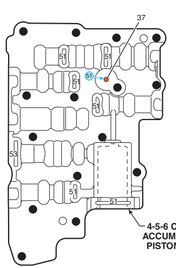
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

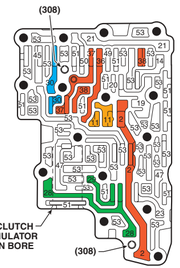
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



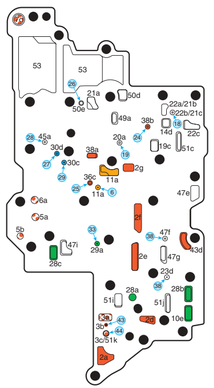
TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)



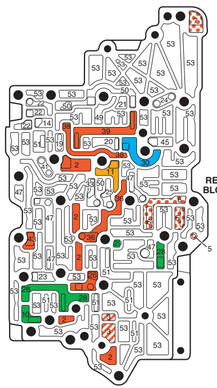
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



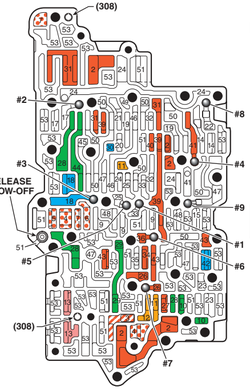
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



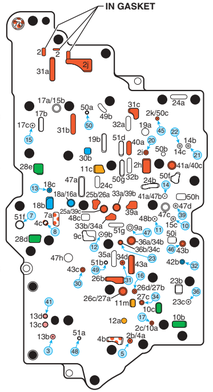
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



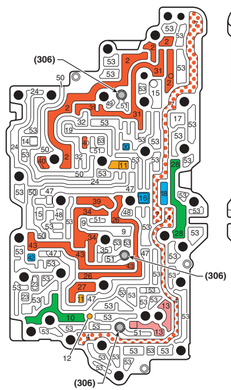
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



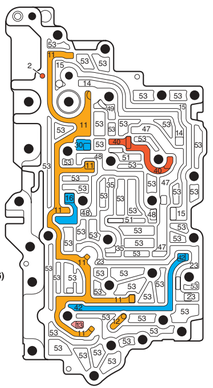
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



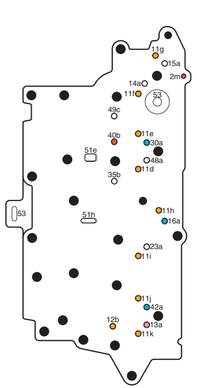
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



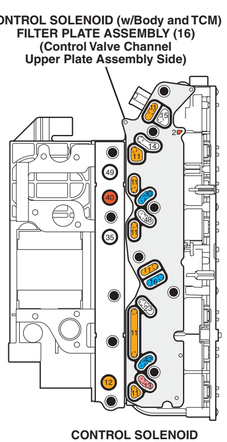
CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)



CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)

CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 93

FOLDOUT ➤ 113

FOLDOUT ➤ 113A

DRIVE RANGE – THIRD GEAR

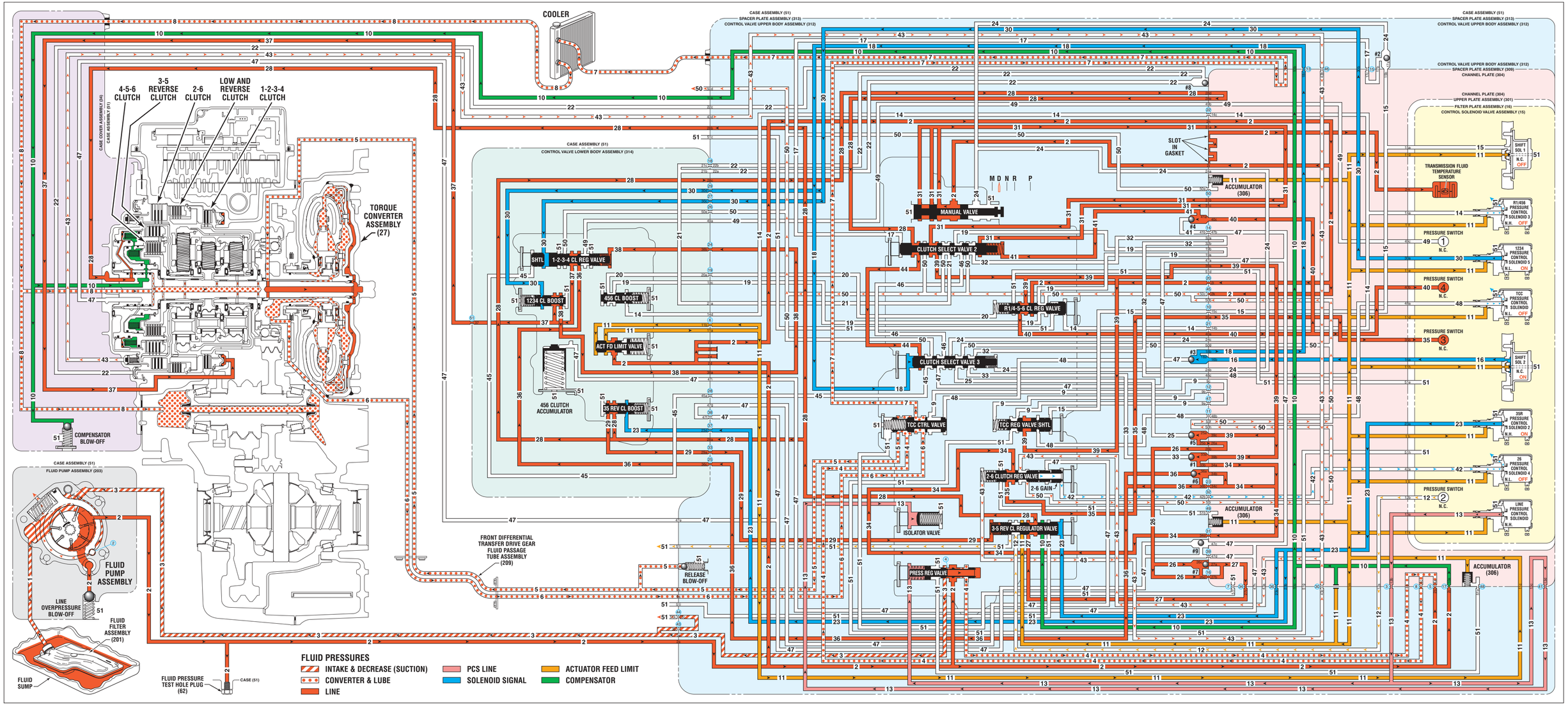


Figure 94

DRIVE RANGE – THIRD GEAR

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	3rd	1.842	OFF	ON	ON	OFF	ON	OFF		APPLIED				APPLIED

NO THIRD GEAR

- 35R Pressure Control Solenoid 2
  - Commanded/failed LOW (ON)
  - Leaking
- 3-5-Reverse Clutch Regulator Valve (336)
  - Stuck
- 3-5-Reverse Clutch Piston (417)
  - Leaking
  - Jammed or cracked
- 3-5-Reverse Clutch Piston Inner Seal (419 or 420) or Dam Seal (421)
  - Leaking
  - Missing
- 26 Pressure Control Solenoid 4
  - Commanded/failed HIGH (ON)

DRIVE RANGE – THIRD GEAR

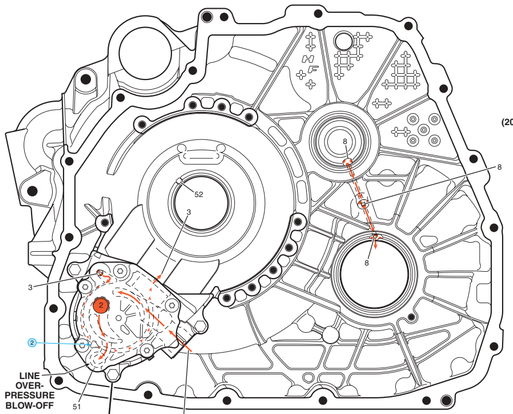
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

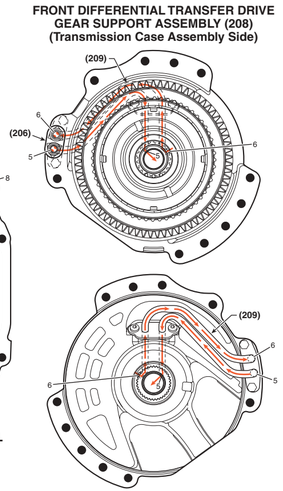
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – THIRD GEAR

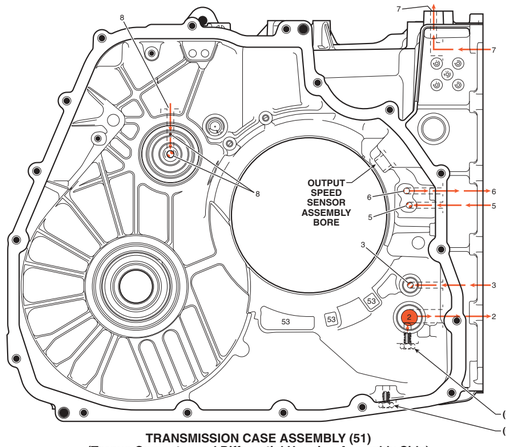


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

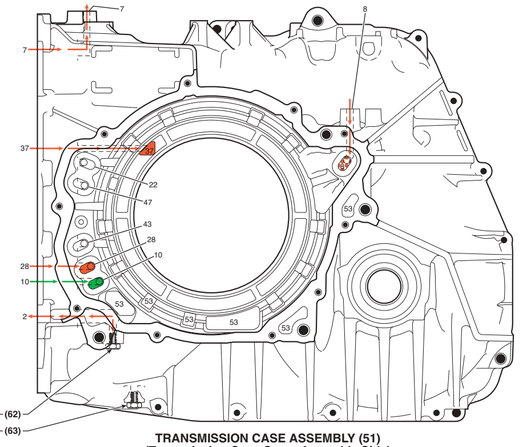


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

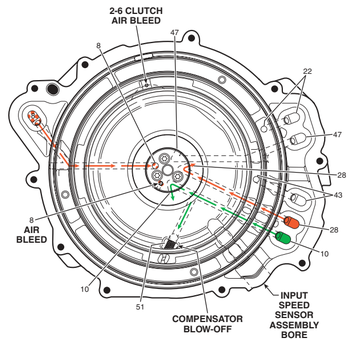
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



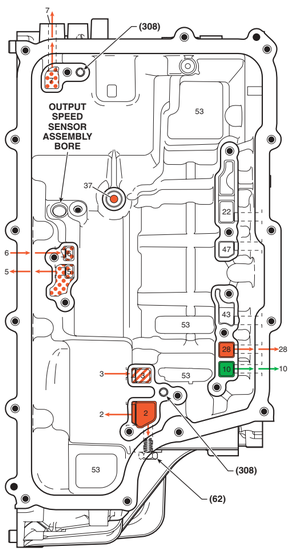
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



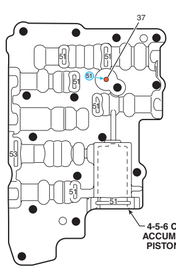
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

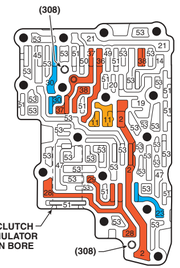
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

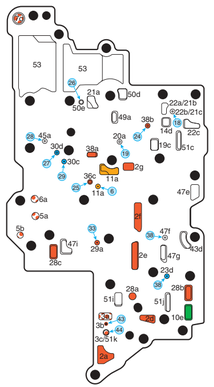


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

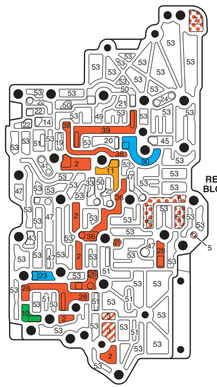


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

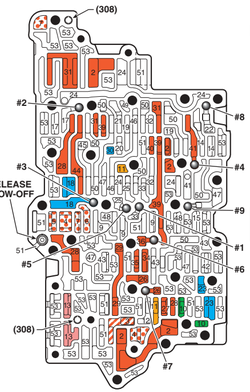
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



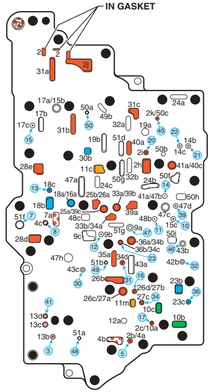
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



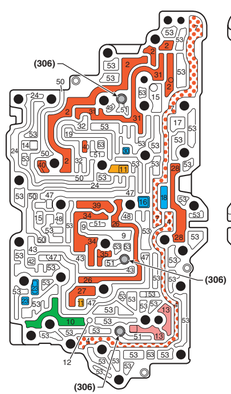
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



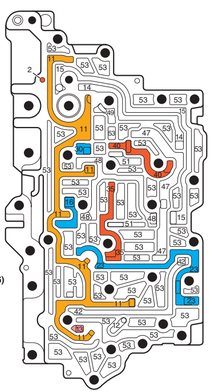
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



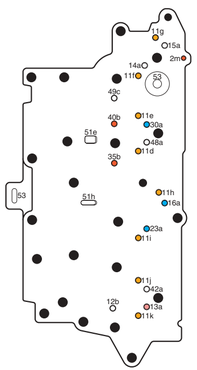
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

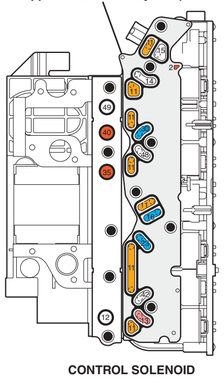


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 95

DRIVE RANGE – FOURTH GEAR (Torque Converter Clutch Applied)

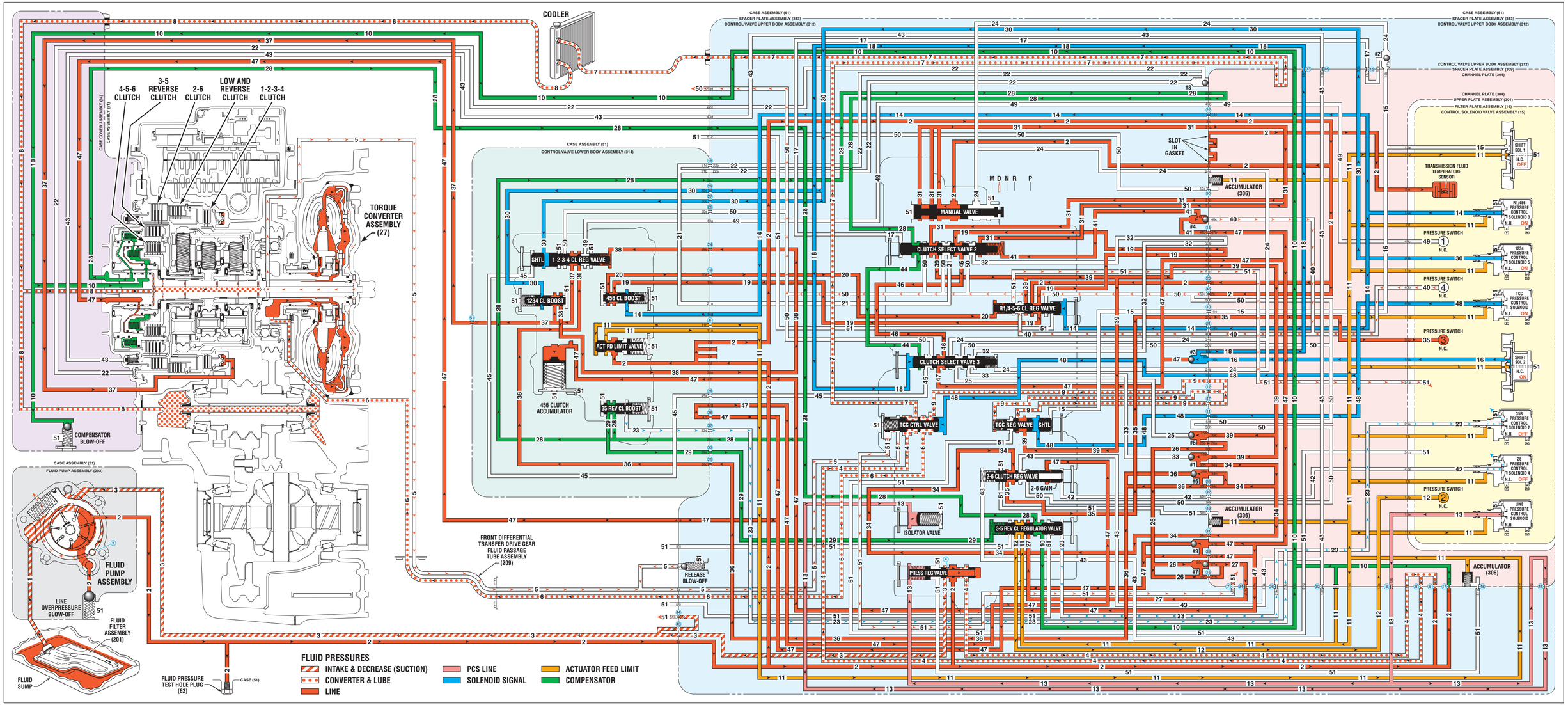


Figure 96

DRIVE RANGE – FOURTH GEAR
(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	4th	1.414	OFF	ON	ON	OFF	OFF	ON	APPLIED					APPLIED

The torque converter clutch (TCC) applies during Fourth gear operation when the transmission control module (TCM) receives the appropriate input signals to energize (turn ON) the Torque Converter Clutch Pressure Control Solenoid. The TCC can apply in Second and Third gear also.

NO FOURTH GEAR

- R1/456 Pressure Control Solenoid 3
  - Commanded/failed LOW (ON)
  - Leaking
- R1/456 Clutch Regulator Valve (325)
  - Stuck
- 4-5-6 Clutch Piston (433)
  - Leaking
  - Jammed or cracked
- 3-5-Reverse and 4-5-6 Clutch Fluid Seal Rings (404)
  - Leaking
  - Missing
- 3-5-Reverse and 4-5-6 Clutch Housing Assembly (422)
  - Leaking
  - Cracked

NO TCC APPLY

- TCC Pressure Control Solenoid
  - Commanded/failed LOW (OFF)
  - Stuck OFF
  - Leaking
  - Poor connection
- TCC Regulator Apply Valve (330)
  - Stuck in OFF position
- TCC Control Valve (342)
  - Stuck in OFF position

TCC STUCK ON

- TCC Pressure Control Solenoid
  - Stuck ON
- TCC Regulator Apply Valve (330)
  - Stuck ON

DRIVE RANGE – FOURTH GEAR
(Torque Converter Clutch Applied)

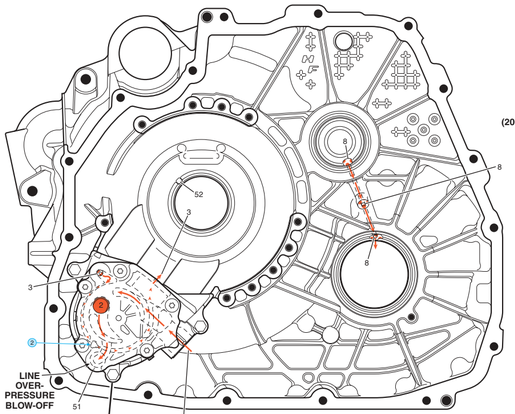
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

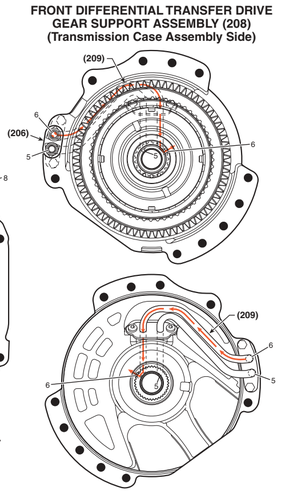
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – FOURTH GEAR (Torque Converter Clutch Applied)

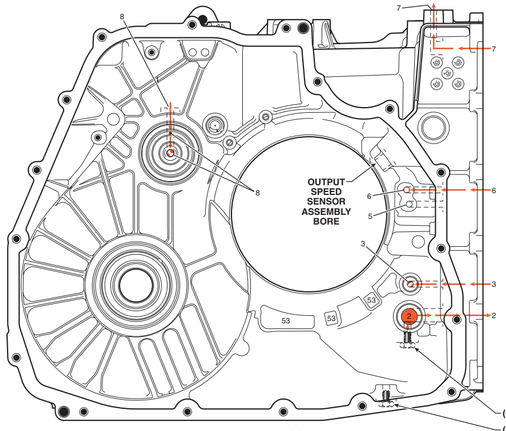


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

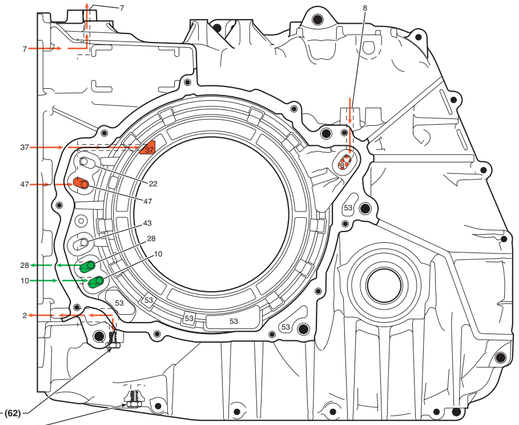


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

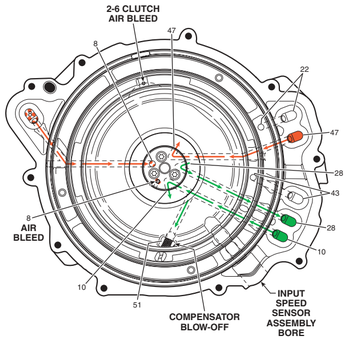
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



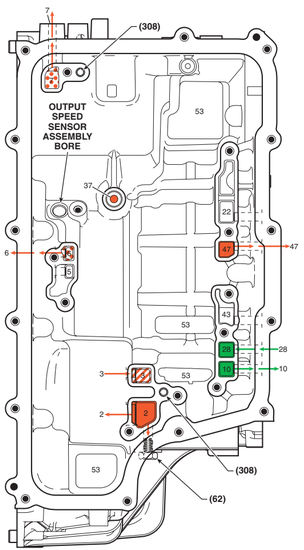
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

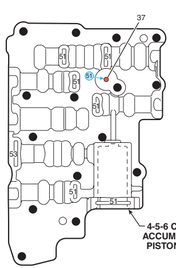
NOTE:

- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN

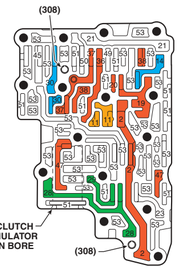


TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

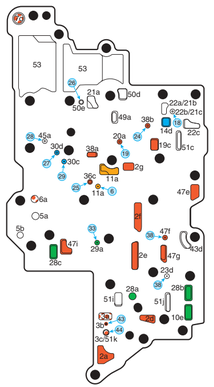
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



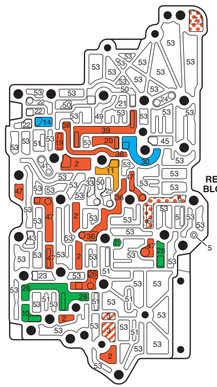
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



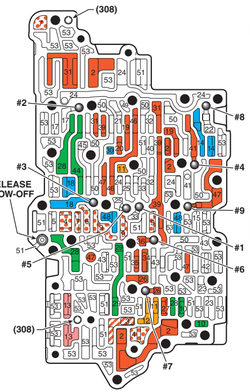
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



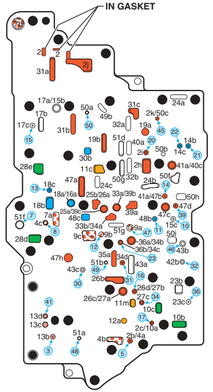
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



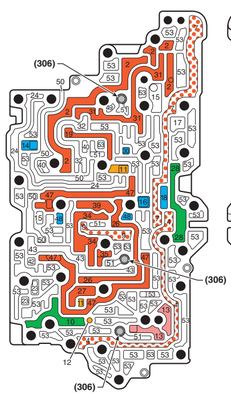
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



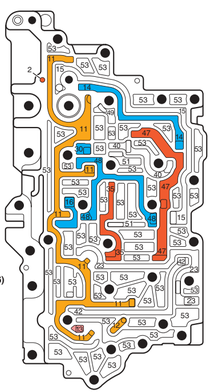
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



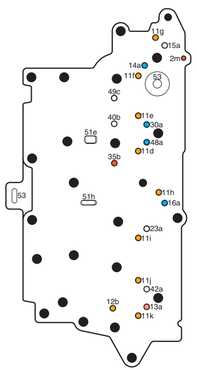
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

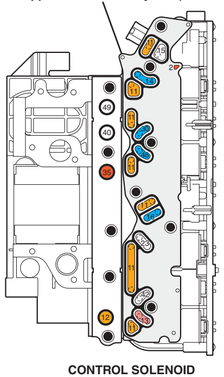


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 97

FOLDOUT ➤ 117

FOLDOUT ➤ 117A

DRIVE RANGE – FIFTH GEAR (Torque Converter Clutch Applied)

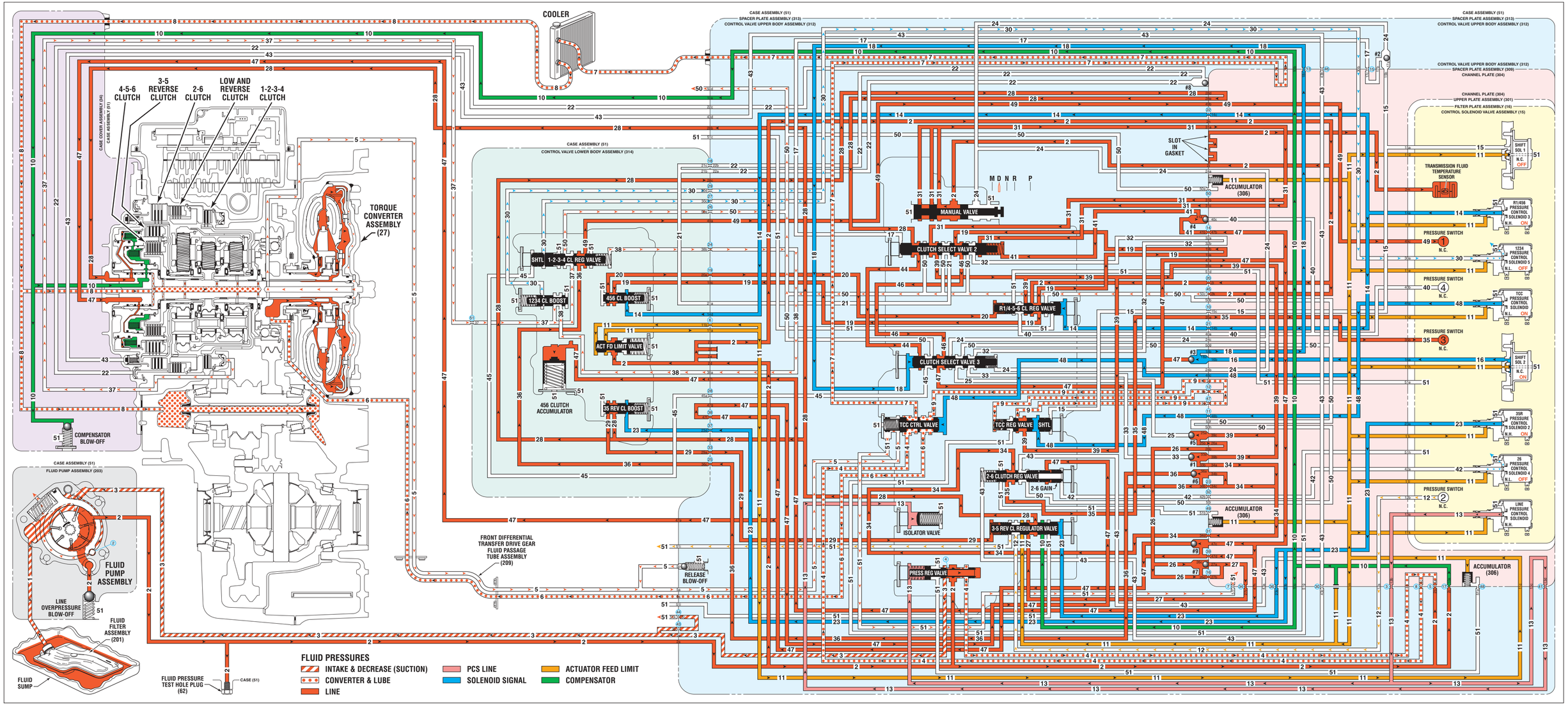


Figure 98

DRIVE RANGE – FIFTH GEAR
(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	5th	1.000	OFF	ON	OFF	OFF	ON	ON	APPLIED	APPLIED				

NO FIFTH GEAR

- 35R Pressure Control Solenoid 2
  - Commanded/failed LOW (ON)
  - Leaking
- 3-5-Reverse Clutch Regulator Valve (336)
  - Stuck
- 3-5-Reverse Clutch Piston (417)
  - Leaking
  - Jammed or cracked
- 3-5-Reverse Clutch Piston Inner Seal (419 or 420) or Dam Seal (421)
  - Leaking
  - Missing
- 1234 Pressure Control Solenoid 5
  - Commanded/failed HIGH (ON)

DRIVE RANGE – FIFTH GEAR
(Torque Converter Clutch Applied)

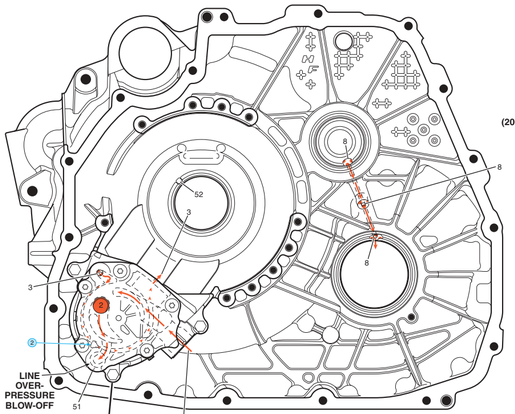
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

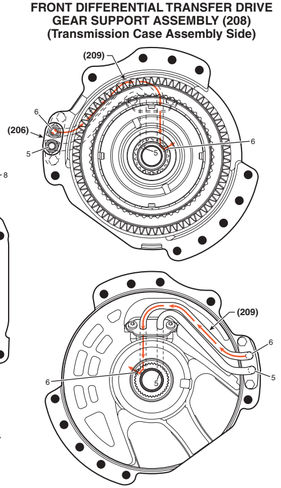
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – FIFTH GEAR (Torque Converter Clutch Applied)



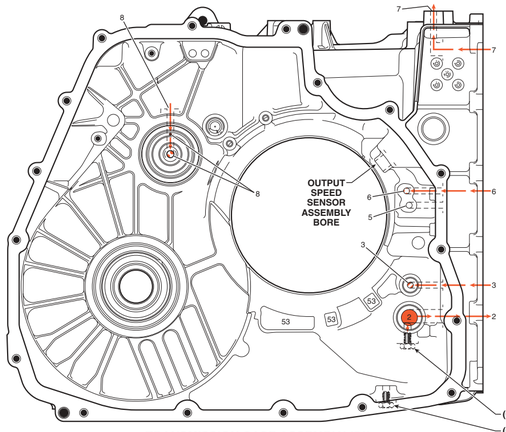
TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)



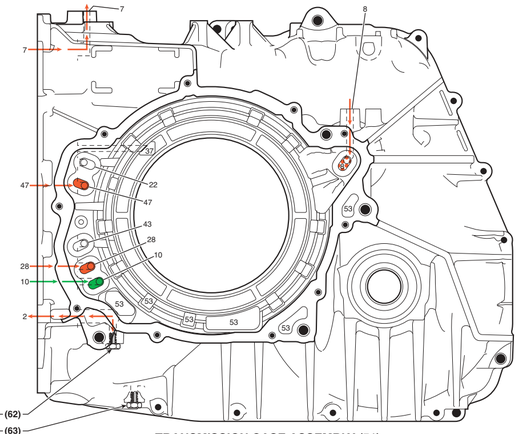
TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)

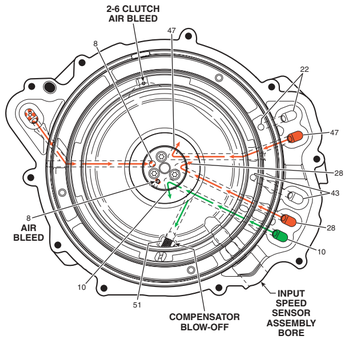
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



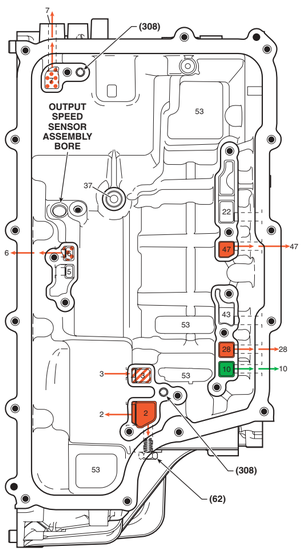
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



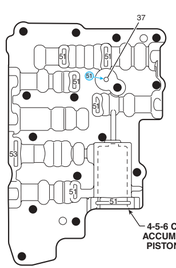
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

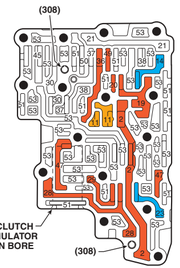
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



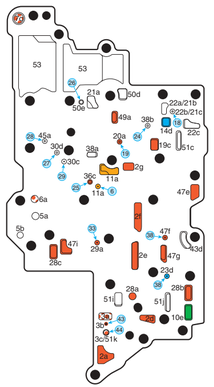
TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)



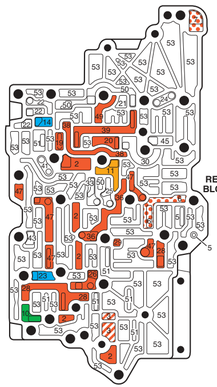
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



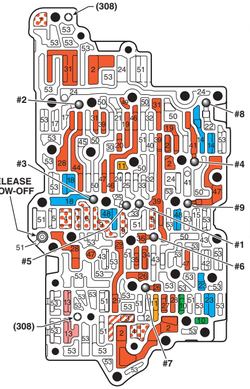
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



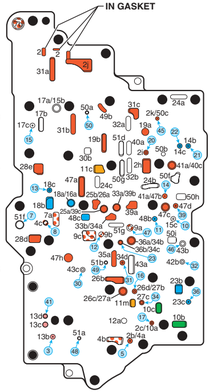
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



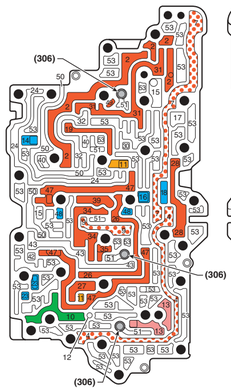
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



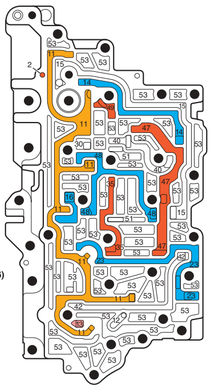
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



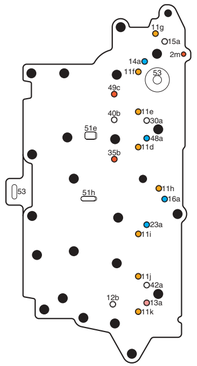
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



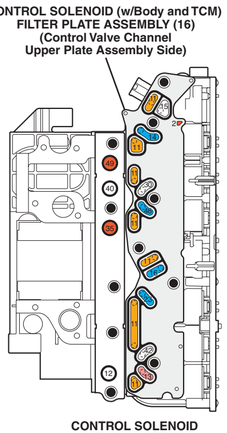
CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 99

FOLDOUT ➤ 119

FOLDOUT ➤ 119A

DRIVE RANGE – SIXTH GEAR (Torque Converter Clutch Applied)

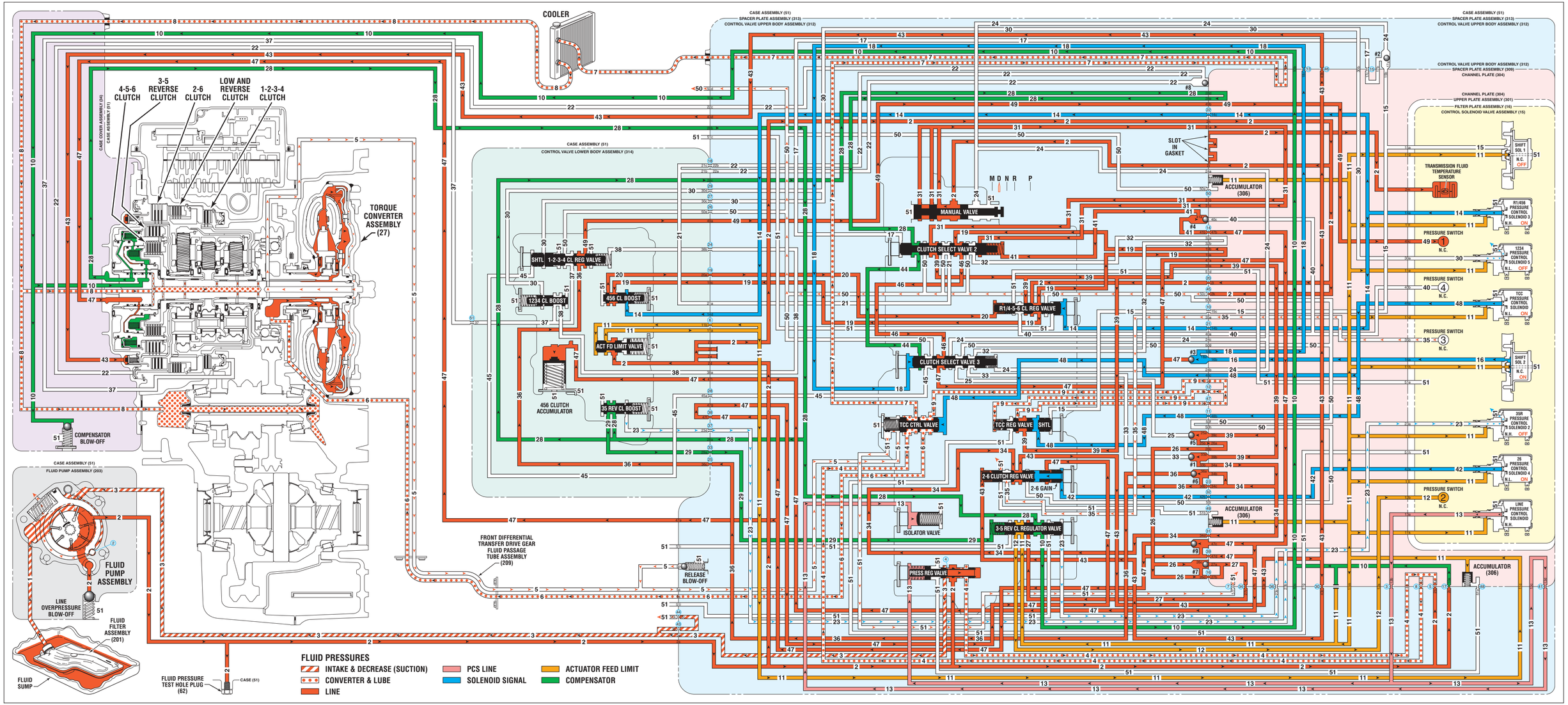


Figure 100

DRIVE RANGE – SIXTH GEAR
(Torque Converter Clutch Applied)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	6th	0.742	OFF	ON	OFF	ON	OFF	ON	APPLIED		APPLIED			

NO SIXTH GEAR

- 26 Pressure Control Solenoid 4
  - Commanded/failed LOW (OFF)
  - Leaking
- 2-6 Clutch Regulator Valve (333)
  - Stuck
- Transmission Case Assembly (51)
  - Broken
  - Feed hole plugged
- 2-6 Clutch Piston (405)
  - Leaking
  - Jammed or cracked
- 35R Pressure Control Solenoid 2
  - Commanded/failed HIGH (OFF)

DRIVE RANGE – SIXTH GEAR
(Torque Converter Clutch Applied)

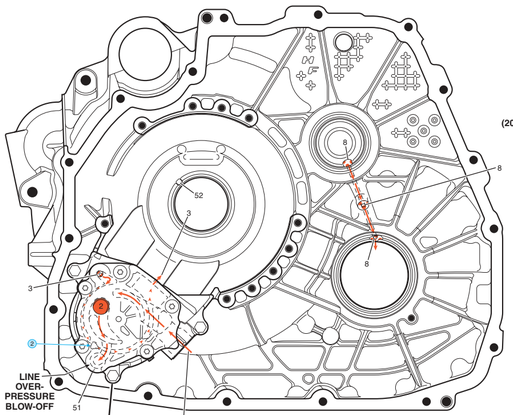
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

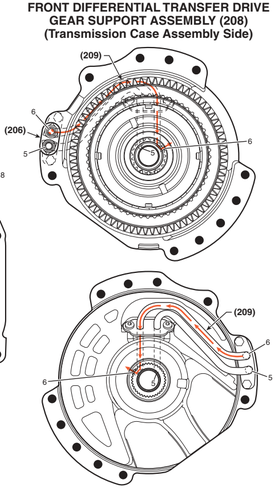
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – SIXTH GEAR (Torque Converter Clutch Applied)



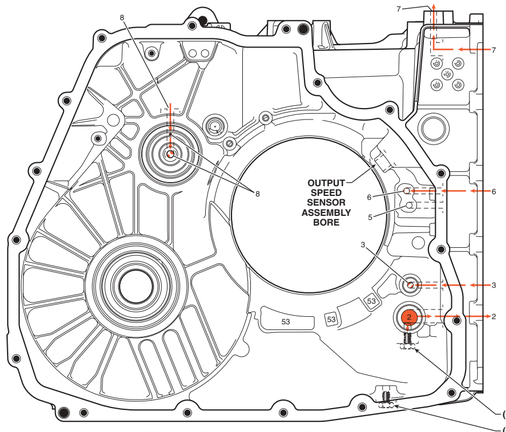
TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)



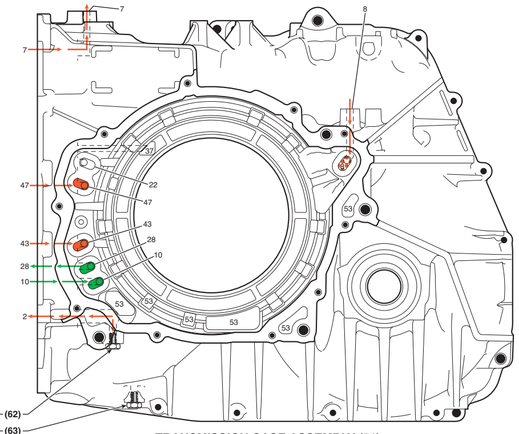
TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)

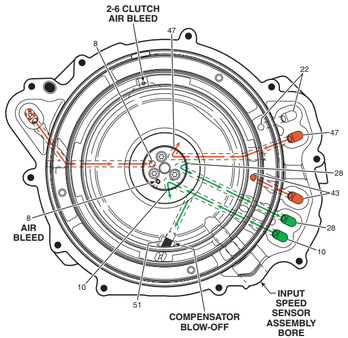
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



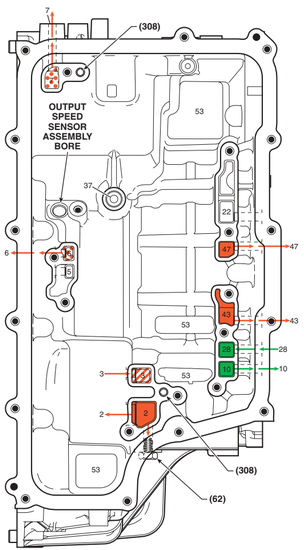
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



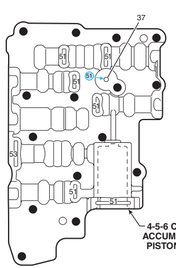
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

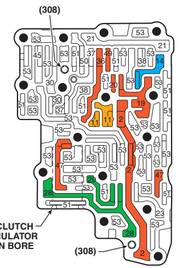
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



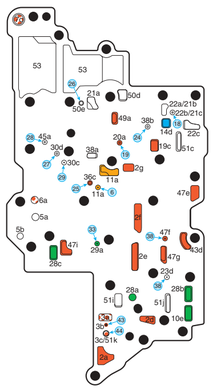
TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)



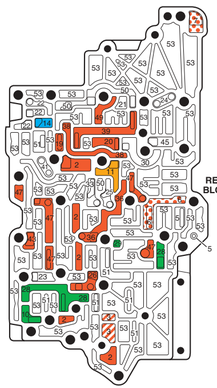
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)



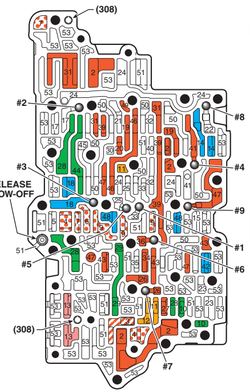
CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)



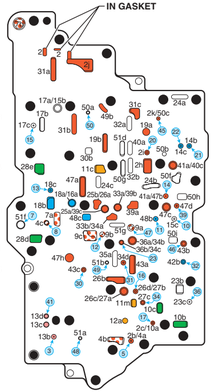
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



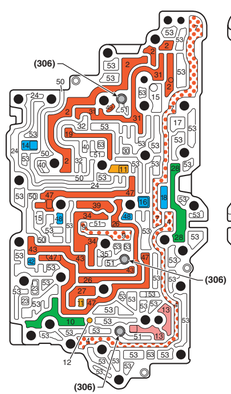
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



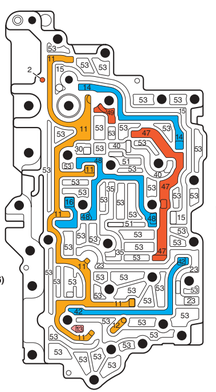
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



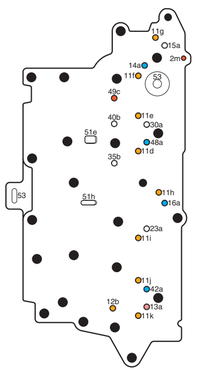
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



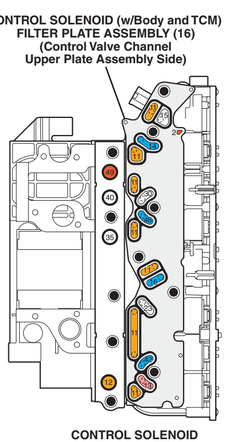
CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 101

FOLDOUT ➤ 121

FOLDOUT ➤ 121A

DRIVE RANGE – THIRD GEAR DEFAULT (Torque Converter Clutch Released)

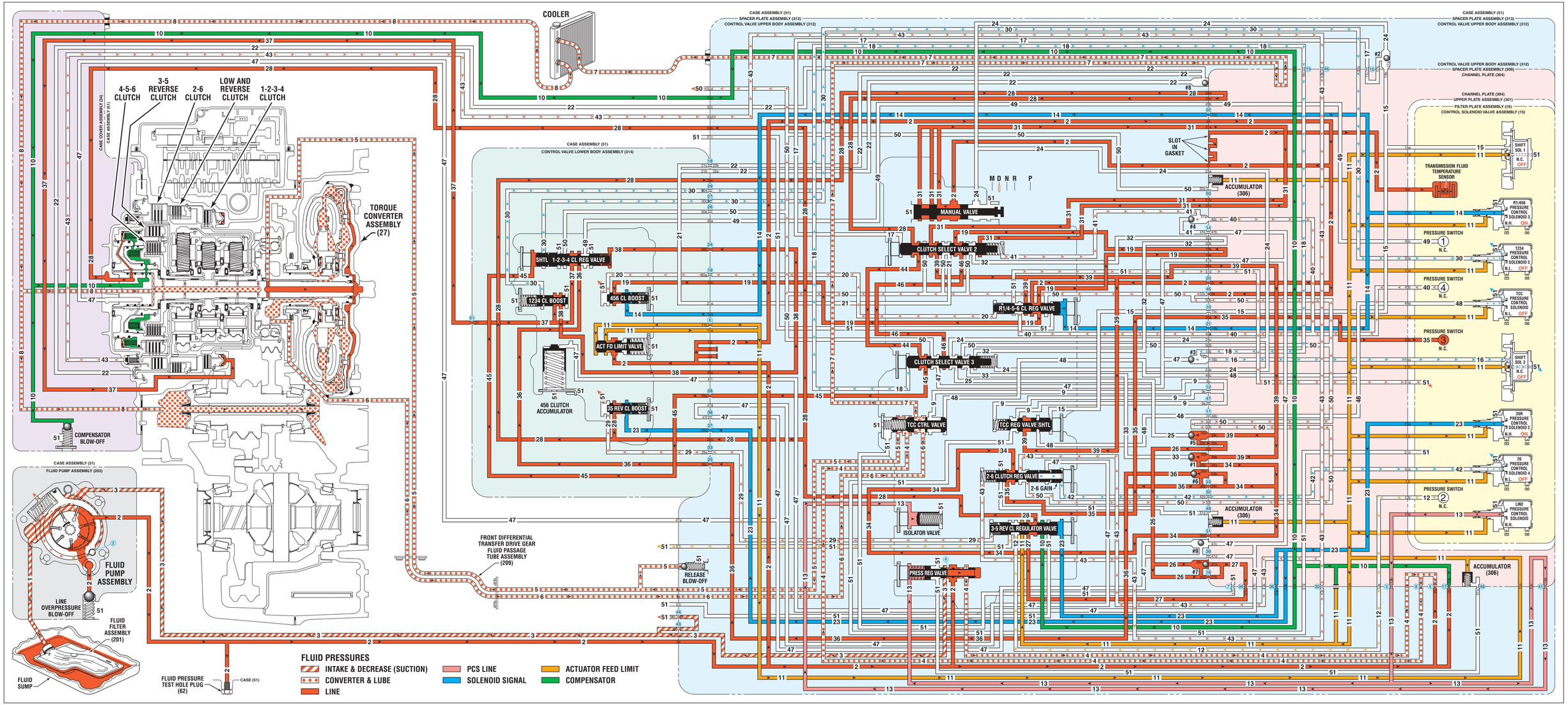


Figure 102

DRIVE RANGE – THIRD GEAR DEFAULT

(Torque Converter Clutch Released)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	3rd Def	1.842	OFF	OFF	OFF	OFF	ON	ON		APPLIED				APPLIED

NO THIRD GEAR

- Shift Solenoid 2
  - Stuck ON
- 35R Pressure Control Solenoid 2
  - Stuck OFF
  - Leaking
- 26 Pressure Control Solenoid 4
  - Stuck ON
- 3-5-Reverse Clutch Regulator Valve (336)
  - Stuck
- 3-5-Reverse Clutch Piston (417)
  - Leaking
  - Jammed or cracked
- 3-5-Reverse Clutch Piston Inner Seal (419 or 420) or Dam Seal (421)
  - Leaking
  - Missing
- Clutch Select Valve 3
  - Stuck Open

DRIVE RANGE – THIRD GEAR DEFAULT
(Torque Converter Clutch Released)

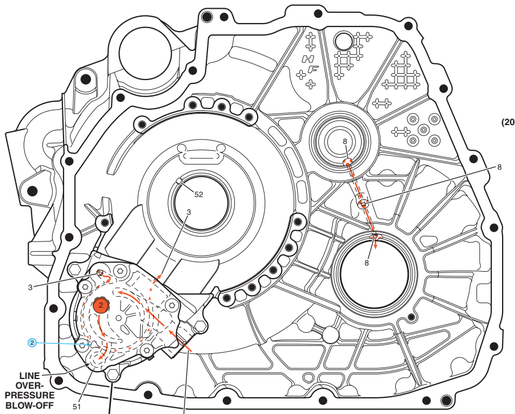
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

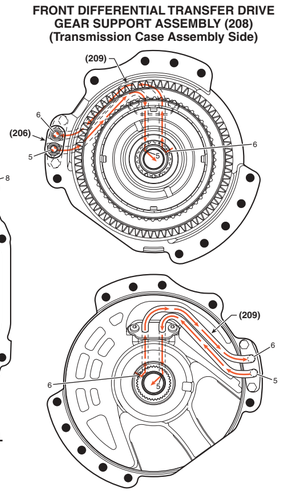
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – THIRD GEAR DEFAULT (Torque Converter Clutch Released)

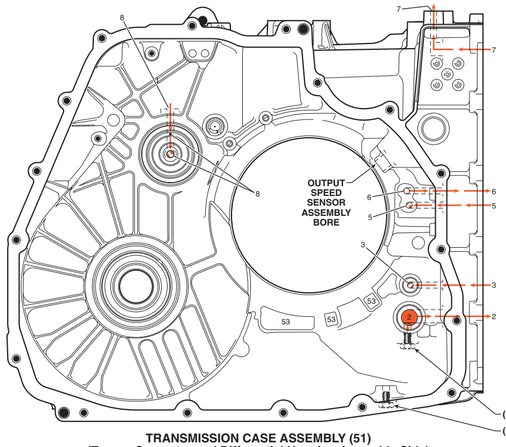


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

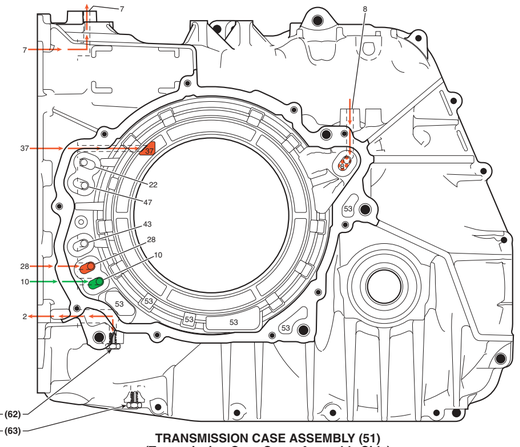


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

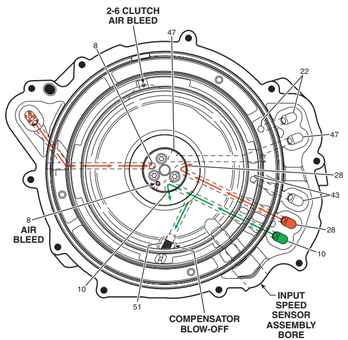
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



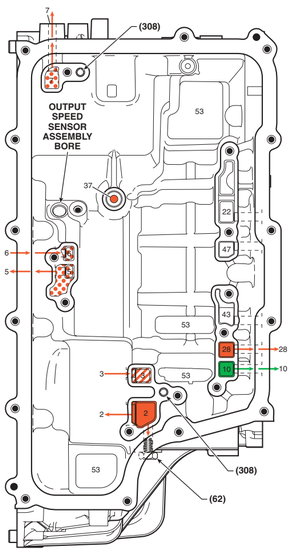
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



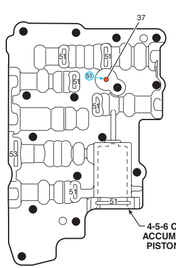
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

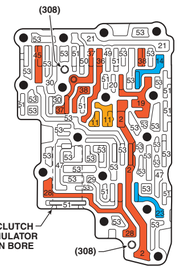
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

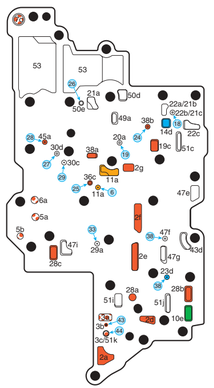


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

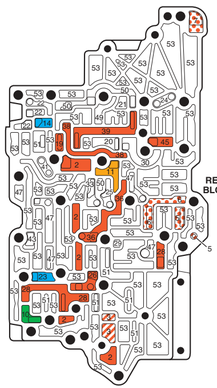


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

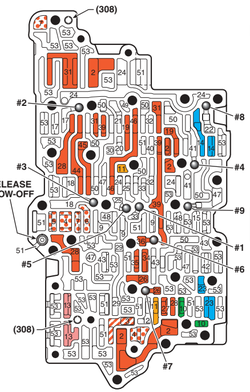
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



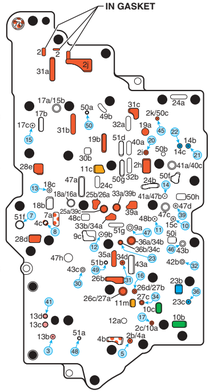
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



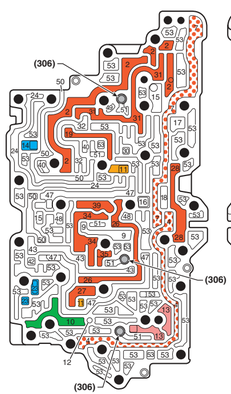
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



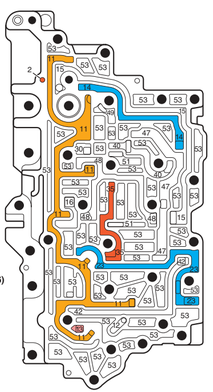
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



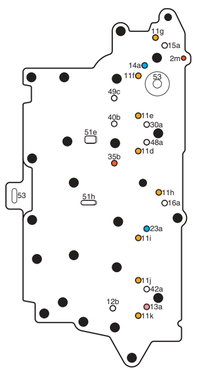
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

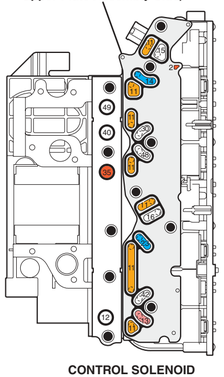


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 103

FOLDOUT ➤ 123

FOLDOUT ➤ 123A

DRIVE RANGE – FIFTH GEAR DEFAULT (Torque Converter Clutch Released)

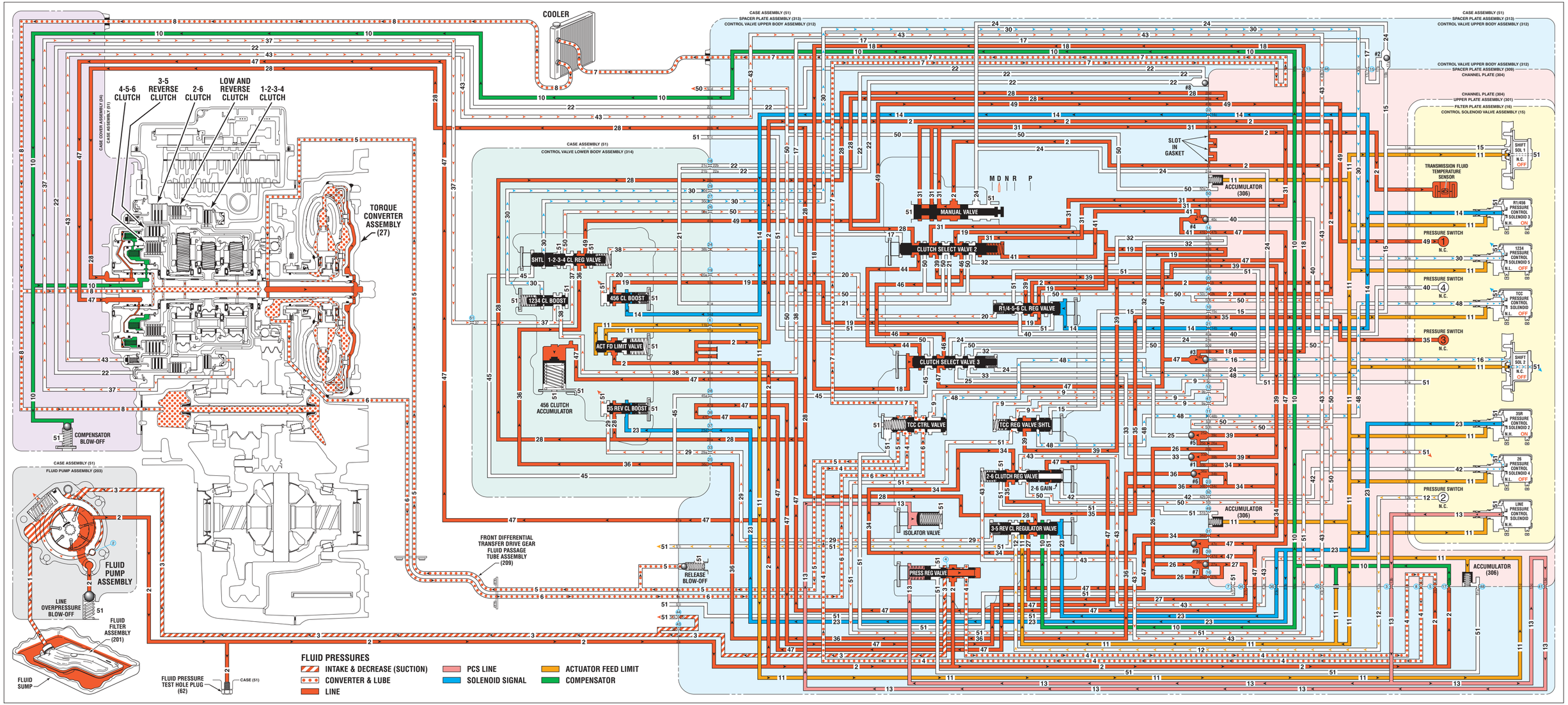


Figure 104

DRIVE RANGE – FIFTH GEAR DEFAULT

(Torque Converter Clutch Released)

RANGE	GEAR	RATIO	SHIFT SOLENOID 1	SHIFT SOLENOID 2	1-2-3-4 CL PC SOL 5 N.L.	2-6 CL PC SOL 4 N.L.	3-5 REV CL PC SOL 2 N.H.	LOW REV 4-5-6 CL PC SOL 3 N.H.	4-5-6 CLUTCH	3-5 REVERSE CLUTCH	2-6 CLUTCH	LOW AND REVERSE CLUTCH	LOW AND REV CL (OWC)	1-2-3-4 CLUTCH
D	5th Def	1.000	OFF	OFF	OFF	OFF	ON	ON	APPLIED	APPLIED				

NO FIFTH GEAR

- 35R Pressure Control Solenoid 2
  - Stuck OFF
  - Leaking
- 1234 Pressure Control Solenoid 5
  - Stuck ON
- 3-5-Reverse Clutch Regulator Valve (336)
  - Stuck
- 3-5-Reverse Clutch Piston (417)
  - Leaking
  - Jammed or cracked
- 3-5-Reverse Clutch Piston Inner Seal (419 or 420) or Dam Seal (421)
  - Leaking
  - Missing
- Clutch Select Valve 3
  - Stuck Closed

DRIVE RANGE – FIFTH GEAR DEFAULT
(Torque Converter Clutch Released)

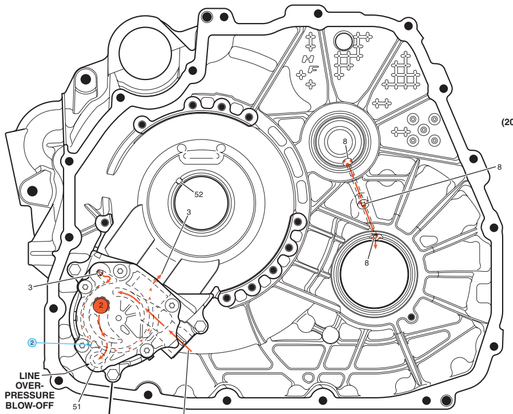
PASSAGES

1 SUCTION
2 LINE
3 DECREASE
4 CONVERTER FEED
5 TCC RELEASE
6 TCC APPLY
7 COOLER FEED
8 LUBE
9 REGULATED APPLY
10 COMPENSATOR FEED
11 ACTUATOR FEED LIMIT
12 PS2
13 PCS LINE
14 PCS R1/456 CLUTCH
15 SOLENOID 1
16 SOLENOID 2
17 CSV2 ENABLE
18 CSV3 ENABLE
19 R1/456 CLUTCH FEED
20 R1 FEEDBACK
21 R1 SUPPLY
22 R1
23 PCS 35 REVERSE CLUTCH
24 REVERSE
25 35 REVERSE CLUTCH FEED
26 35 REVERSE SUPPLY
27 35 REVERSE FEED
28 35 REVERSE CLUTCH
29 35 REVERSE CLUTCH FEEDBACK
30 PCS 1234 CLUTCH
31 DRIVE
32 DRIVE BRAKE
33 DRIVE B
34 26 CLUTCH/1234 CLUTCH FEED
35 PS3
36 1234 CLUTCH FEED
37 1234 CLUTCH
38 1234 CLUTCH FEEDBACK
39 DRIVE 1-6
40 PS4
41 CSV2 LATCH
42 PCS 26 CLUTCH
43 26 CLUTCH
44 1234 CLUTCH DEFAULT FEED
45 1234 CLUTCH DEFAULT
46 456 CLUTCH FEED
47 456 CLUTCH
48 PCS TCC
49 PS1
50 EXHAUST BACKFILL
51 EXHAUST
52 TORQUE CONVERTER SEAL DRAINBACK
53 VOID

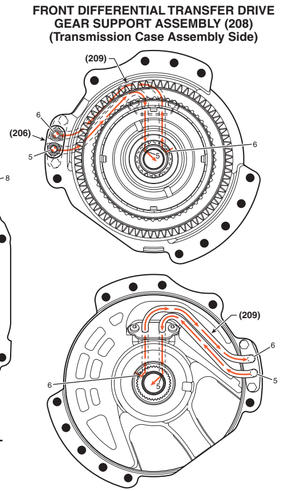
COMPONENTS ( )

(62) FLUID PRESSURE TEST HOLE PLUG
(63) FLUID LEVELHOLE PLUG
(206) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT TORQUE CONVERTER FLUID SEAL ASSEMBLY
(209) FRONT DIFFERENTIAL TRANSFER DRIVE GEAR FLUID PASSAGE TUBE ASSEMBLY
(306) ACTUATOR FEED ACCUMULATOR PISTON
(308) CONTROL VALVE BODY LOCATOR PIN
(311) CONTROL VALVE BODY BALL CHECK VALVE (#1, 2, 3, 4, 5, 6, 7, 8, 9)

DRIVE RANGE – FIFTH GEAR DEFAULT (Torque Converter Clutch Released)

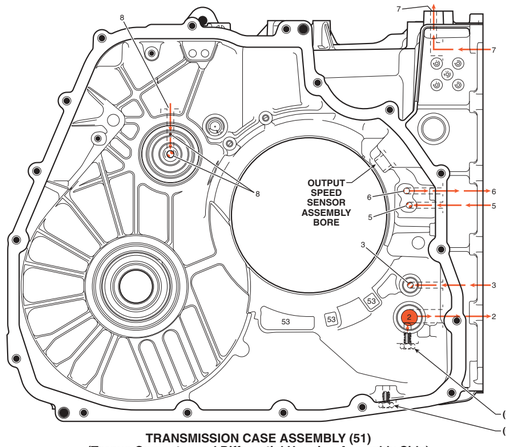


TRANSMISSION FLUID PUMP ASSEMBLY (203) (Transmission Case Assembly Side)

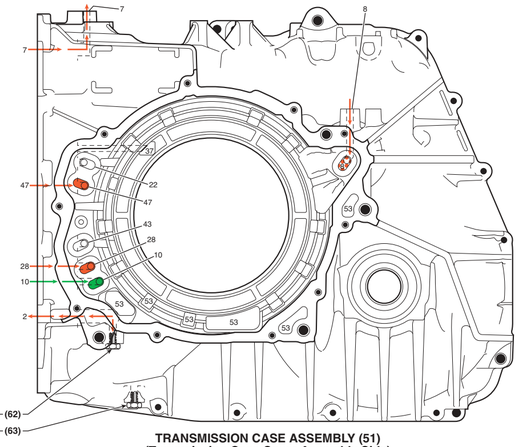


TORQUE CONVERTER AND DIFFERENTIAL HOUSING ASSEMBLY (221) (Transmission Case Assembly Side)

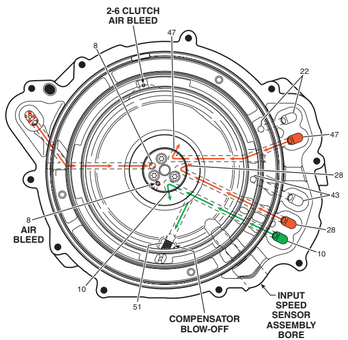
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Transmission Case Assembly Side)



TRANSMISSION CASE ASSEMBLY (51) (Torque Converter and Differential Housing Assembly Side)



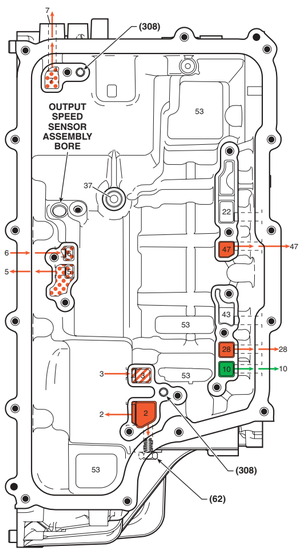
TRANSMISSION CASE ASSEMBLY (51) (Transmission Case Cover Assembly Side)



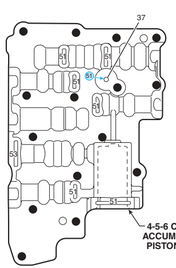
TRANSMISSION CASE COVER ASSEMBLY (34) (Transmission Case Assembly Side)

NOTE:

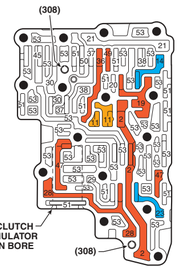
- ● INDICATES BOLT HOLES
- NON-FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CONTROL VALVE UPPER BODY ASSEMBLY SIDE NUMBERS LISTED FIRST.
- EXHAUST FLUID IS NOT SHOWN



TRANSMISSION CASE ASSEMBLY (51) (Control Valve Body Assembly Side)

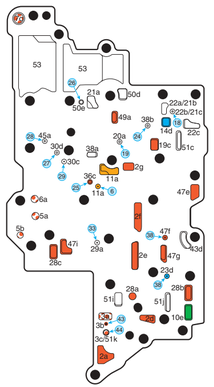


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Transmission Case Assembly Side)

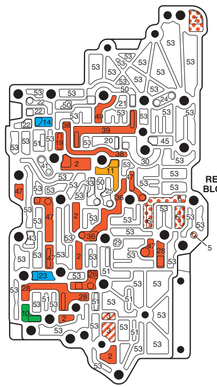


CONTROL VALVE LOWER BODY ASSEMBLY (314) (Lower Body Spacer Plate Assembly Side)

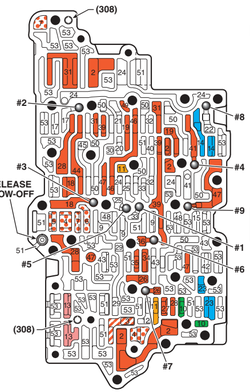
FRONT DIFFERENTIAL TRANSFER DRIVE GEAR SUPPORT ASSEMBLY (208) (Torque Converter and Differential Housing Assembly Side)



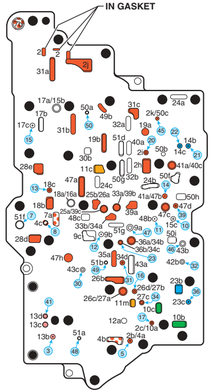
CONTROL VALVE LOWER BODY SPACER PLATE ASSEMBLY (313) (Control Valve Upper Body Assembly Side)



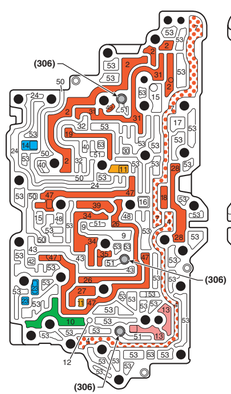
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Lower Body Spacer Plate Assembly Side)



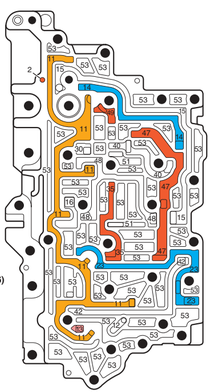
CONTROL VALVE UPPER BODY ASSEMBLY (312) (Upper Body Spacer Plate Assembly Side)



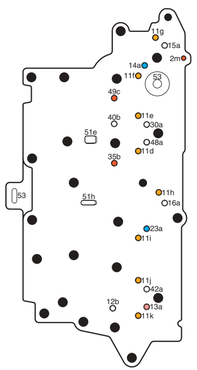
CONTROL VALVE UPPER BODY SPACER PLATE ASSEMBLY (309) (Control Valve Upper Body Assembly Side)



CONTROL VALVE CHANNEL PLATE (304) (Control Valve Upper Body Spacer Plate Assembly Side)

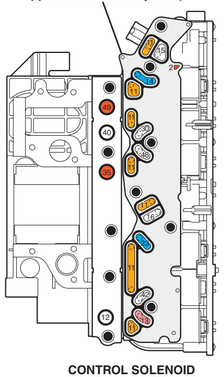


CONTROL VALVE CHANNEL PLATE (304) (Control Valve Channel Upper Plate Assembly Side)



CONTROL VALVE CHANNEL UPPER PLATE ASSEMBLY (301) (Control Valve Channel Plate Side)

CONTROL SOLENOID (w/Body and TCM) FILTER PLATE ASSEMBLY (16) (Control Valve Channel Upper Plate Assembly Side)



CONTROL SOLENOID (w/Body and TCM) VALVE ASSEMBLY (15) (Control Valve Channel Upper Plate Assembly Side)

Figure 105

FOLDOUT ➤ 125

FOLDOUT ➤ 125A

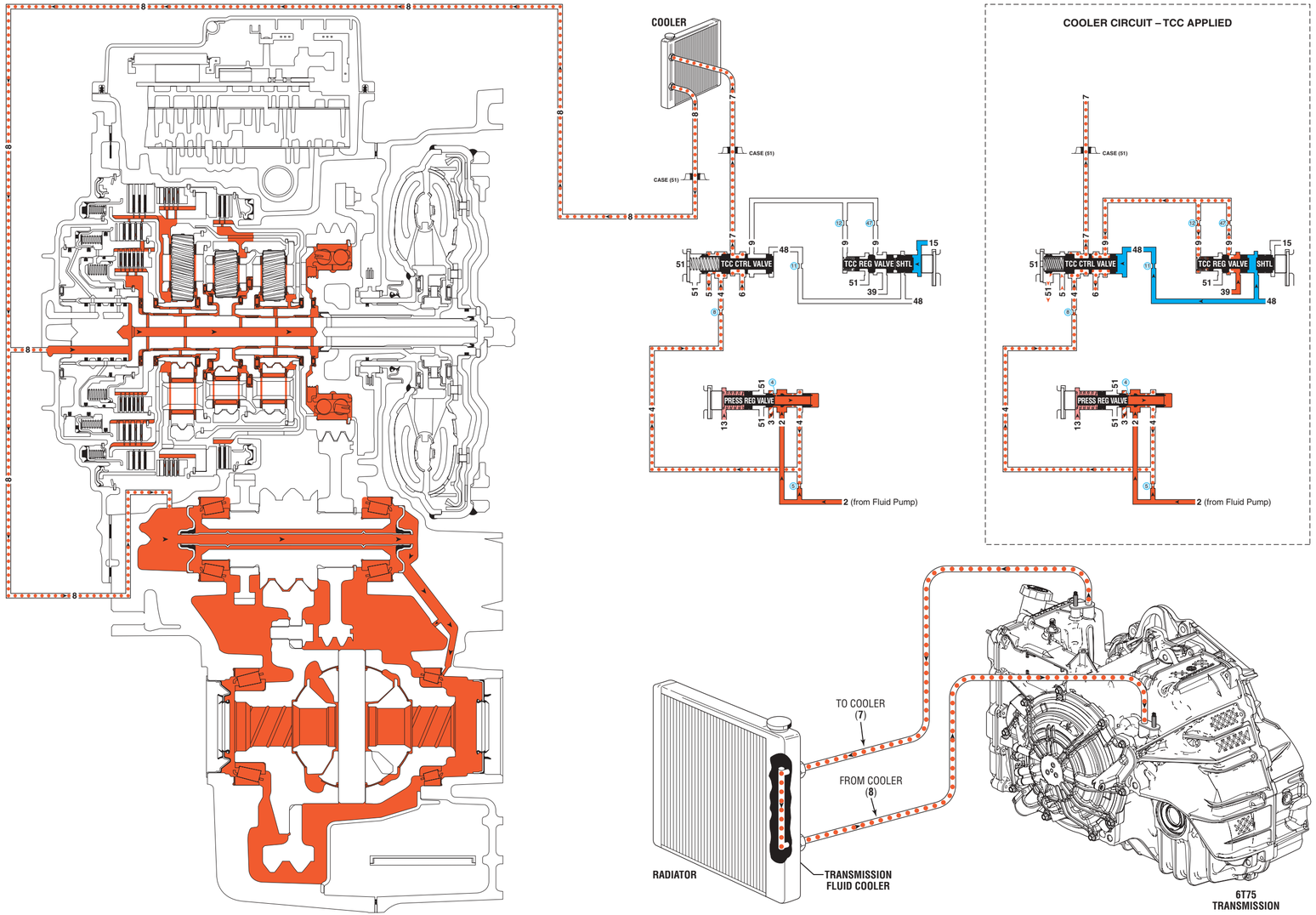


Figure 106

COOLER AND LUBRICATION CIRCUITS

To maintain proper transmission fluid temperature, fluid is routed to the transmission fluid cooler located in the vehicle radiator. After the fluid is cooled it is routed back to the transmission and into the lubrication fluid circuits.

COOLER CIRCUIT

- Line (2) pressure from the fluid pump assembly (203) is directed to the pressure regulator valve (337) located in the control valve upper body (349).
- Line (2) pressure passes through the pressure regulator valve (337) and enters the converter feed (4) circuit.
- Converter feed (4) pressure is directed to the torque converter clutch control valve (342) located in the rear control valve upper body (349).
- Converter feed (4) pressure passes through the torque converter clutch control valve (342) and enters the TCC release (5) circuit.
- TCC release (5) fluid is routed through the case (51) and the front differential transfer drive gear support assembly (208) before it is fed through a passage in the input shaft [3-5-reverse and 4-5-6 clutch housing assembly (422)] to the release side of the torque converter clutch pressure plate.
- TCC release (5) fluid passes around the torque converter clutch pressure plate and enters the TCC apply (6) fluid side of the plate.
- TCC apply (6) fluid from the torque converter assembly (27) is then routed back to the torque converter clutch control valve (342) where it passes through the valve and enters the cooler feed (7) circuit.
- Fluid in the cooler feed (7) circuit is routed through the control valve upper body, the channel plate (304), the case (51), and the cooler feed line to the transmission fluid cooler.
- Cooler feed (7) fluid passes through the transmission fluid cooler, enters the lube (8) circuit and is returned to the fluid sump.

COOLER CIRCUIT DURING TCC APPLY

- When the TCC is applied, the cooler circuit is similar to the preceding description with the exception that the torque converter clutch control valve (342) is shifted to the apply position by PCS TCC (48) fluid pressure. As a result, converter feed (4) fluid, from the pressure regulator valve (337), feeds the cooler feed (7) circuit instead of TCC apply (5) fluid.
- The remainder of the cooler circuit is the same as when the TCC is released.

LUBRICATION CIRCUITS

- Fluid leaving the transmission fluid cooler enters the lube (8) circuit at the case (51).
- Lube (8) is routed through the case (51) to the front differential drive pinion gear lube dam (224) in order to provide lubrication for the front differential drive pinion (w/transfer gear) gear assembly (23).
- Lube (8) is also routed through the case (51) to provide lubrication for the front differential carrier assembly (31).
- Lube (8) fluid passes from the case (51) and is routed through the case cover assembly (34) into the 3-5-reverse and 4-5-6 clutch housing assembly (422) in order to provide lubrication for components such as the reaction sun gear assembly (466), the reaction carrier assembly (467), the input carrier assembly (470), the output carrier assembly (474), the output sun gear assembly (475), the output carrier transfer drive gear hub assembly (477), and the front differential transfer drive gear support assembly (208).

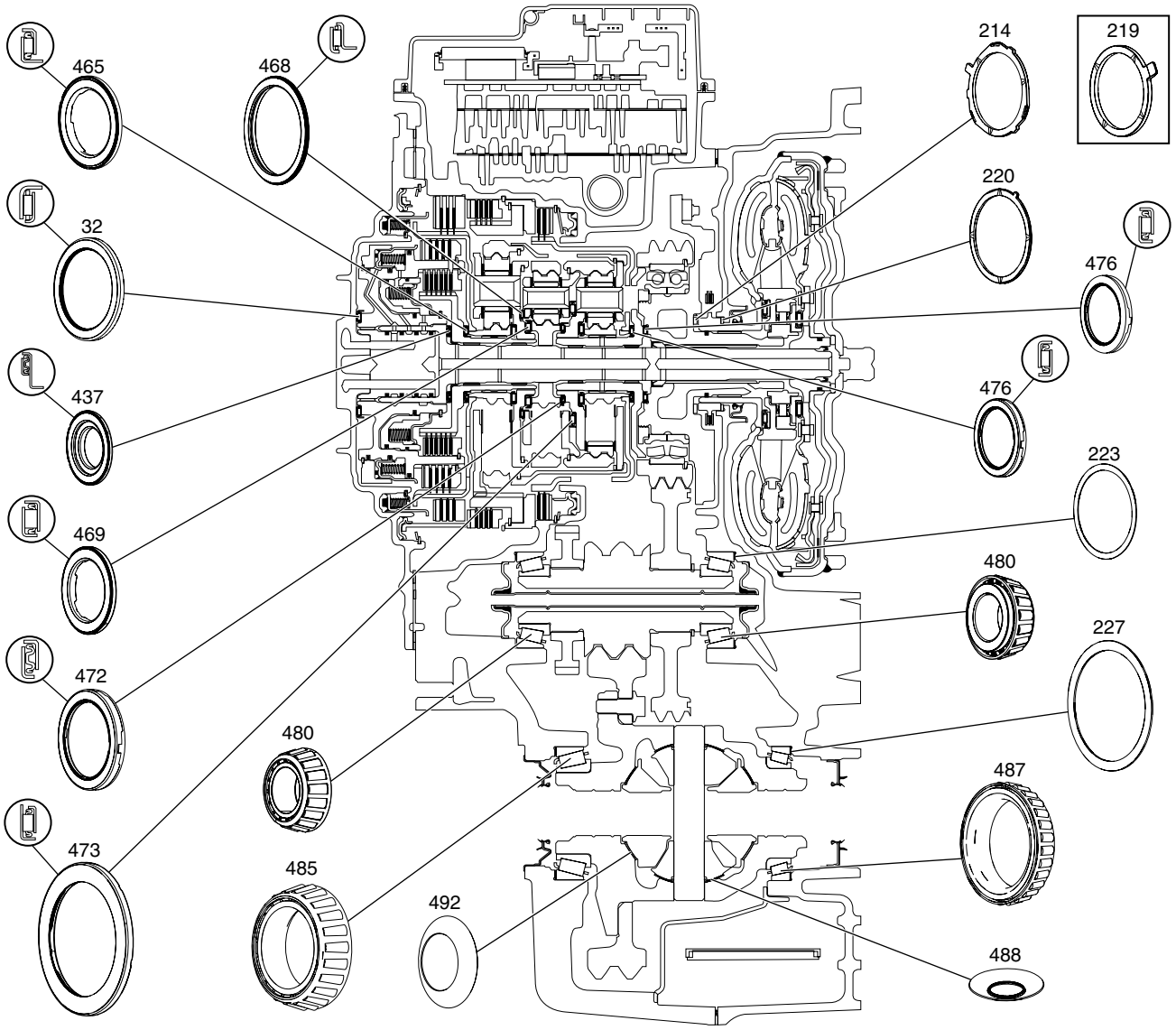
Cooler and Lubrication Circuit Related Diagnostic Tips

A blockage in the transmission cooling system could cause:

- High cooler/lube fluid pressure
- Low or no cooler/lube flow
- Transmission overheating

Transmission cooler lines and fluid cooler must flow a minimum of 3 liters (3.2 quarts) per minute at 414 kPa (60 psi) and 10 liters (10.6 quarts) per minute at 966 kPa (140 psi). The flow test shall be conducted at a transmission fluid temperature of 93°C (200°F).

Bushing, Bearing and Washer Locations

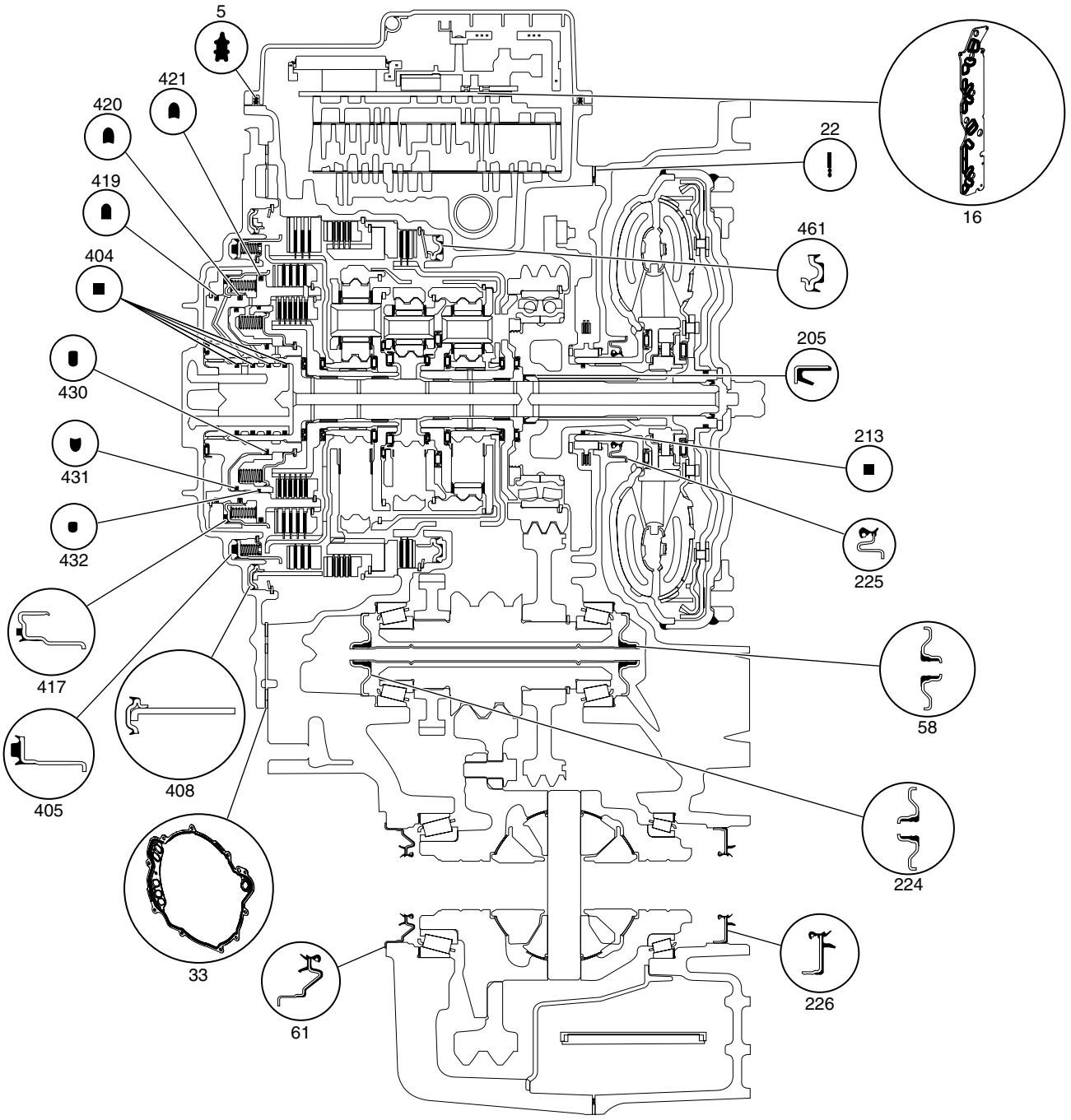


32. Input Shaft Thrust Bearing Assembly
214. Drive Sprocket Thrust Washer
219. Drive Sprocket Thrust Washer
220. Drive Sprocket Thrust Washer
223. Front Differential Drive Pinion Gear Bearing Thrust Washer
227. Front Differential Bearing Thrust Washer
437. 4–5–6 Clutch Hub Thrust Bearing Assembly
465. 2–6 Clutch Hub Thrust Bearing
468. Input Carrier Thrust Bearing Assembly
469. Input Sun Gear Thrust Bearing Assembly
472. Output Carrier Thrust Bearing Assembly
473. Output Carrier Thrust Bearing Assembly
476. Front Differential Transfer Drive Gear Input Hub Bearing Assembly
480. Front Differential Drive Pinion Gear Bearing Assembly
485. Front Differential Carrier Bearing Assembly
487. Front Differential Carrier Bearing Assembly
488. Front Differential Carrier Thrust Washer
492. Front Differential Side Gear Thrust Washer

1760304

Figure 107

Seal Locations #1

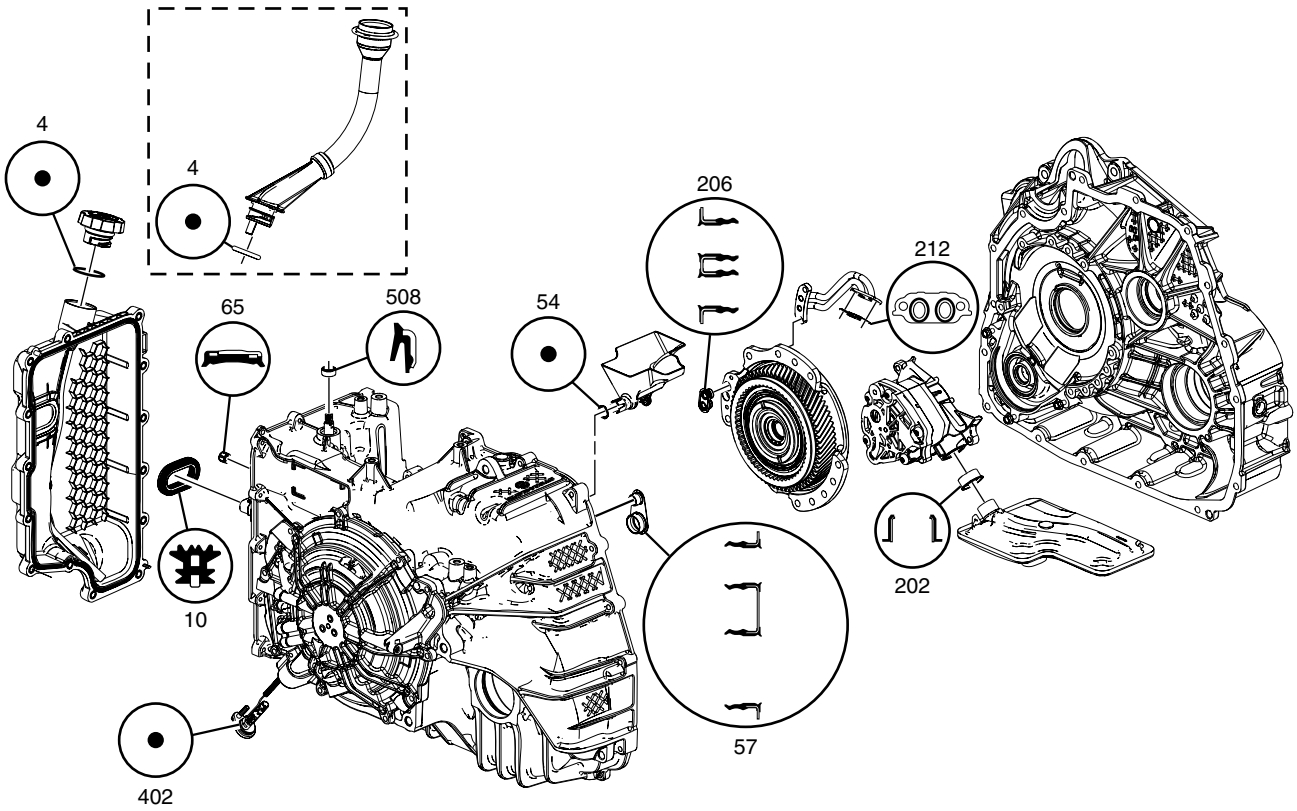


5. Control Valve Body Cover Assembly Gasket
16. Control Solenoid (w/Body and TCM) Filter Plate Assembly
22. Torque Converter Housing Outer Seal
33. A/Trans Case Cover Gasket
58. Front Differential Drive Pinion Gear Lube Dam
61. Front Wheel Drive Shaft Oil Seal Assembly
205. Front Differential Transfer Drive Gear Support Seal Assembly
213. Front Differential Transfer Drive Gear Support Seal
224. Front Differential Drive Pinion Gear Lube Dam
225. Torque Converter Fluid Seal Assembly
226. Front Wheel Drive Shaft Oil Seal Assembly
404. 3–5–Reverse and 4–5–6 Clutch Fluid Seal Ring
405. 2–6 Clutch Piston
408. Low and Reverse Clutch Piston Assembly
417. 3–5–Reverse Clutch Piston
419. 3–5 Reverse Clutch Piston Inner Seal
420. 3–5 Reverse Clutch Piston Inner Seal
421. 3–5 Reverse Clutch Piston Dam Seal
430. 4–5–6 Clutch Piston Inner Seal
431. 4–5–6 Clutch Piston Outer Seal
432. 4–5–6 Clutch Piston Outer Seal
461. 1–2–3–4 Clutch Piston

1760307

Figure 108

Seal Locations #2



4. Fluid Level Indicator Tube Seal – Model Dependent
10. Control Valve Body Cover Wiring Connector Hole Seal
54. A/Trans Fluid Trough O-Ring Seal
57. A/Trans Pump Fluid Outlet Seal Assembly
65. 1–2–3–4 Clutch Fluid Passage Seal
202. Filter Neck Seal
206. Front Differential Transfer Drive Gear Support Torque Converter Fluid Seal Assembly
212. Front Differential Transfer Drive Gear Support Fluid Passage Tube Gasket
402. ISS O-Ring Seal
508. Manual Shift Shaft Seal

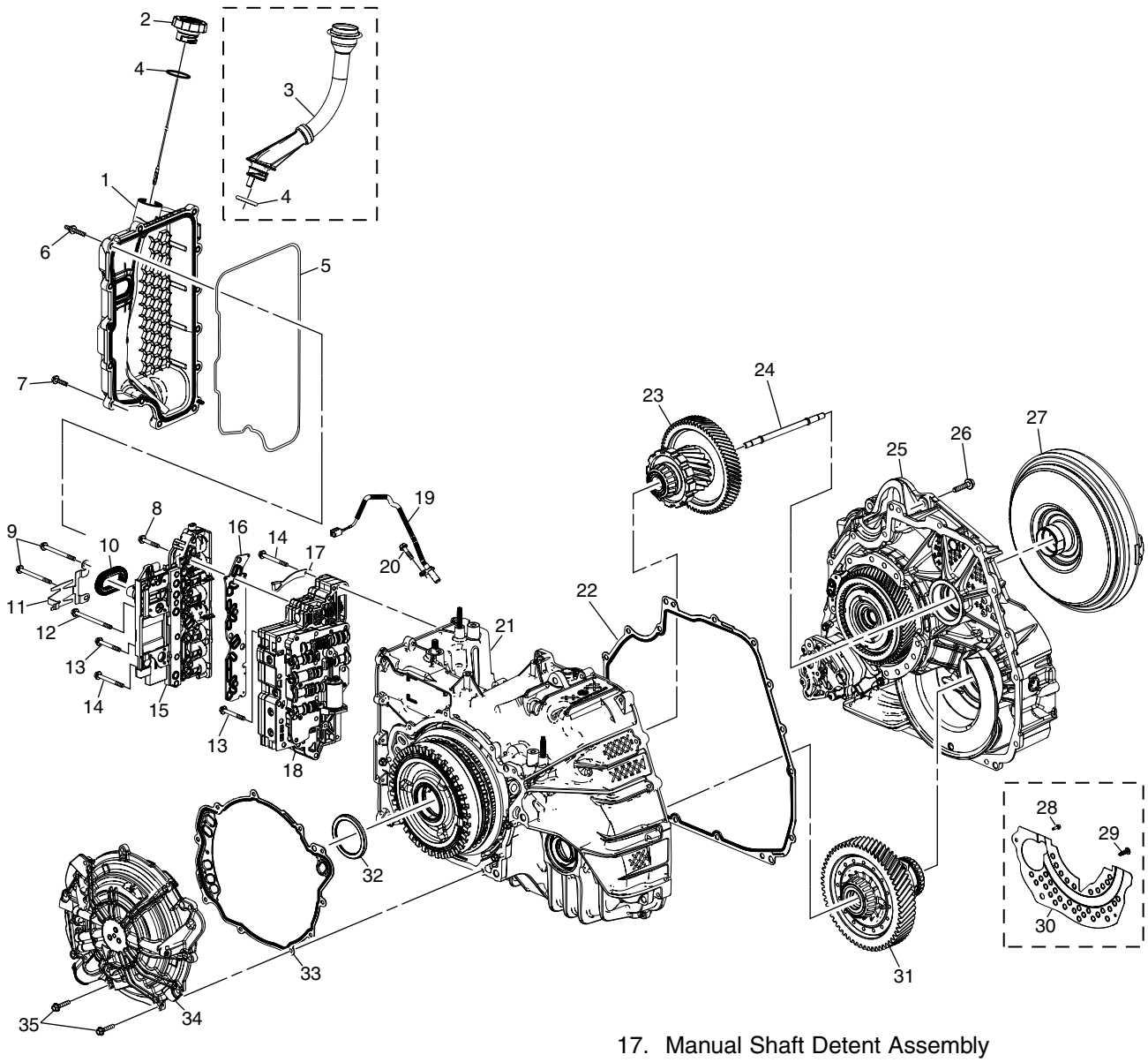
1774528

Figure 109

NOTES

ILLUSTRATED PARTS LIST

Case and Associated Parts

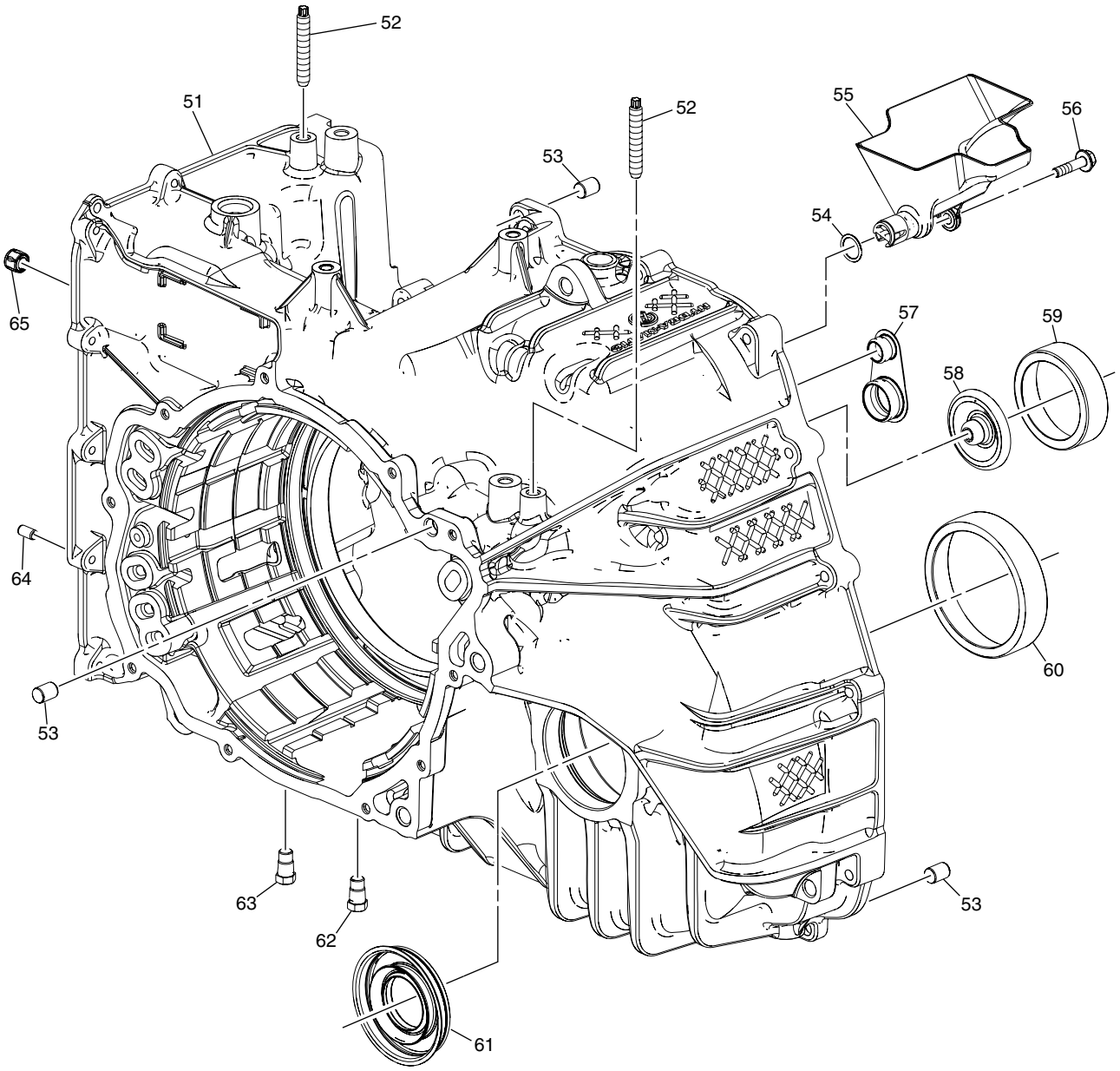


1. Control Valve Body Cover Assembly
2. Transmission Fluid Level Indicator Assembly
3. Fluid Level Indicator Tube – Model Dependent
4. Fluid Level Indicator Tube Seal – Model Dependent
5. Control Valve Body Cover Assembly Gasket
6. Control Valve Body Cover Stud
7. Control Valve Body Cover Bolt
8. Control Valve Body Bolt
9. Control Valve Body Bolt
10. Control Valve Body Cover Wiring Connector Hole Seal
11. Control Solenoid Valve Spring
12. Control Valve Body Bolt
13. Control Valve Body Bolt
14. Control Valve Body Bolt
15. Control Solenoid (w/Body and TCM) Valve Assembly
16. Control Solenoid (w/Body and TCM) Filter Plate Assembly
17. Manual Shaft Detent Assembly
18. Control Valve Body Assembly
19. A/Trans Output Speed Sensor Assembly
20. A/Trans Output Speed Sensor Bolt
21. A/Trans Case Assembly
22. Torque Converter Housing Outer Seal
23. Front Differential Drive Pinion (w/Transfer Gear) Gear Assembly
24. Front Differential Drive Pinion Gear Lube Tube
25. Torque Converter and Support and A/Trans Fluid Pump Housing Assembly
26. Torque Converter and Differential Housing Bolt
27. Torque Converter Assembly
28. Dust Cover Push Pin – Model Dependent
29. Dust Cover Bolt – Model Dependent
30. Dust Cover – Model Dependent
31. Front Differential Carrier Assembly
32. Input Shaft Thrust Bearing Assembly
33. A/Trans Case Cover Gasket
34. A/Trans Case Cover Assembly
35. A/Trans Case Cover Assembly Bolt

1725874

Figure 110

Transmission Case Assembly

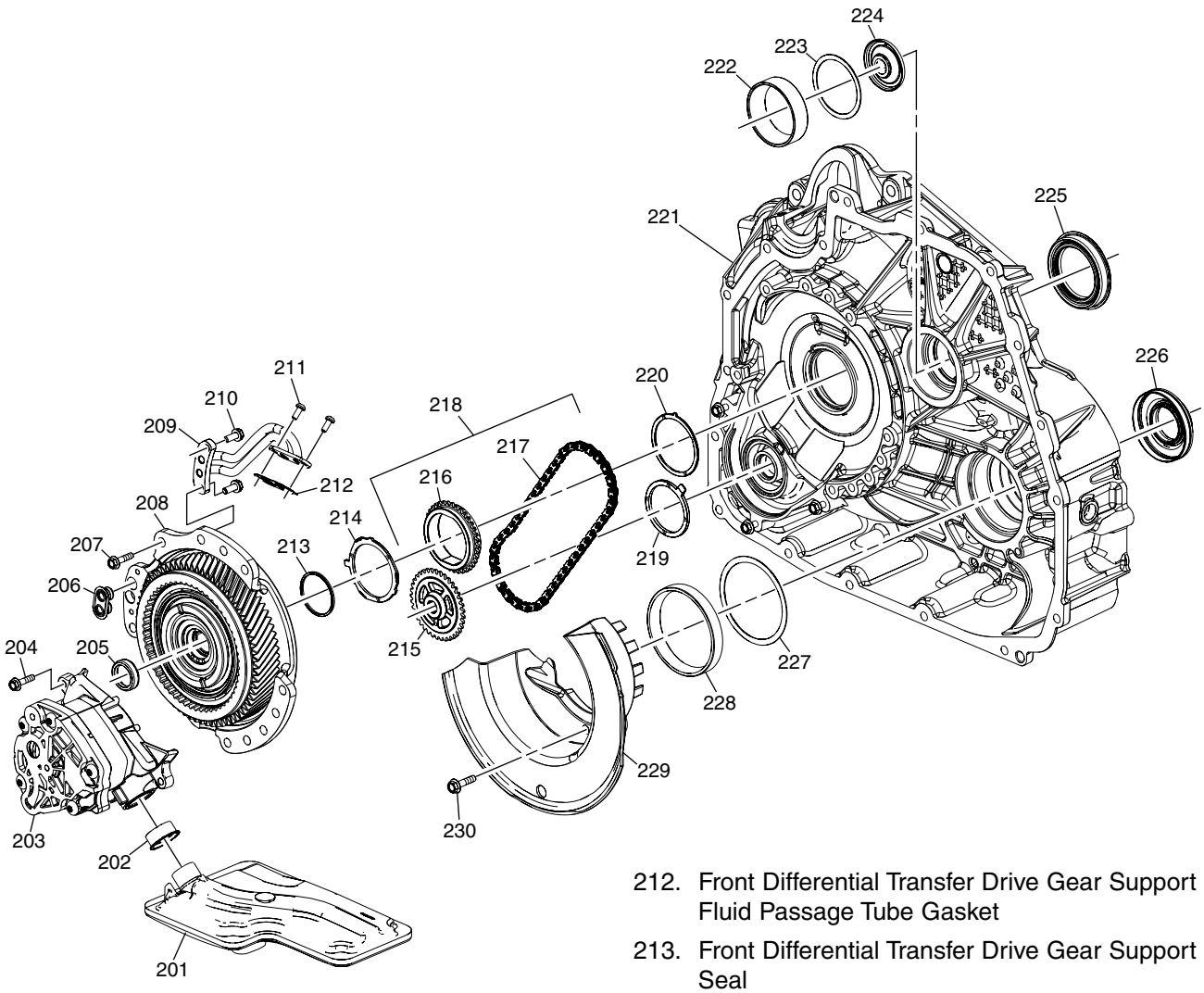


51. A/Trans Case Assembly
52. Transmission Fluid Cooler Pipe Stud
53. Transmission Case Locator Pin
54. A/Trans Fluid Trough O-Ring Seal
55. A/Trans Fluid Trough Assembly
56. A/Trans Fluid Trough Bolt
57. A/Trans Pump Fluid Outlet Seal Assembly
58. Front Differential Drive Pinion Gear Lube Dam
59. Front Differential Drive Pinion Gear Bearing Cup
60. Front Differential Carrier Bearing Cup
61. Front Wheel Drive Shaft Oil Seal Assembly
62. A/Trans Fluid Press Test Hole Plug
63. A/Trans Fluid Level Hole Plug
64. Control Valve Body Locator Pin
65. 1–2–3–4 Clutch Fluid Passage Seal

1725878

Figure 111

Torque Converter, Support and Fluid Pump Housing Assembly



201. A/Trans Fluid Filter Assembly
202. Filter Neck Seal
203. A/Trans Fluid Pump Assembly
204. A/Trans Fluid Pump Bolt
205. Front Differential Transfer Drive Gear Support Seal Assembly
206. Front Differential Transfer Drive Gear Support Torque Converter Fluid Seal Assembly
207. Front Differential Transfer Drive Gear Support Bolt
208. Front Differential Transfer Drive Gear Support Assembly
209. Front Differential Transfer Drive Gear Fluid Passage Tube Assembly
210. Front Differential Transfer Drive Gear Fluid Passage Tube Bolt
211. Front Differential Transfer Drive Gear Fluid Passage Tube Bolt
212. Front Differential Transfer Drive Gear Support Fluid Passage Tube Gasket
213. Front Differential Transfer Drive Gear Support Seal
214. Drive Sprocket Thrust Washer
215. Oil Pump Drive Link Driven Sprocket
216. Oil Pump Drive Link Drive Sprocket
217. Drive Link
218. Drive Link Assembly
219. Drive Sprocket Thrust Washer
220. Drive Sprocket Thrust Washer
221. Torque Converter and Differential Housing Assembly
222. Front Differential Drive Pinion Gear Bearing Cup
223. Front Differential Drive Pinion Gear Bearing Thrust Washer
224. Front Differential Drive Pinion Gear Lube Dam
225. Torque Converter Fluid Seal Assembly
226. Front Wheel Drive Shaft Oil Seal Assembly
227. Front Differential Bearing Washer
228. Front Differential Carrier Bearing Cup
229. Front Differential Carrier Baffle
230. Front Differential Carrier Baffle Bolt

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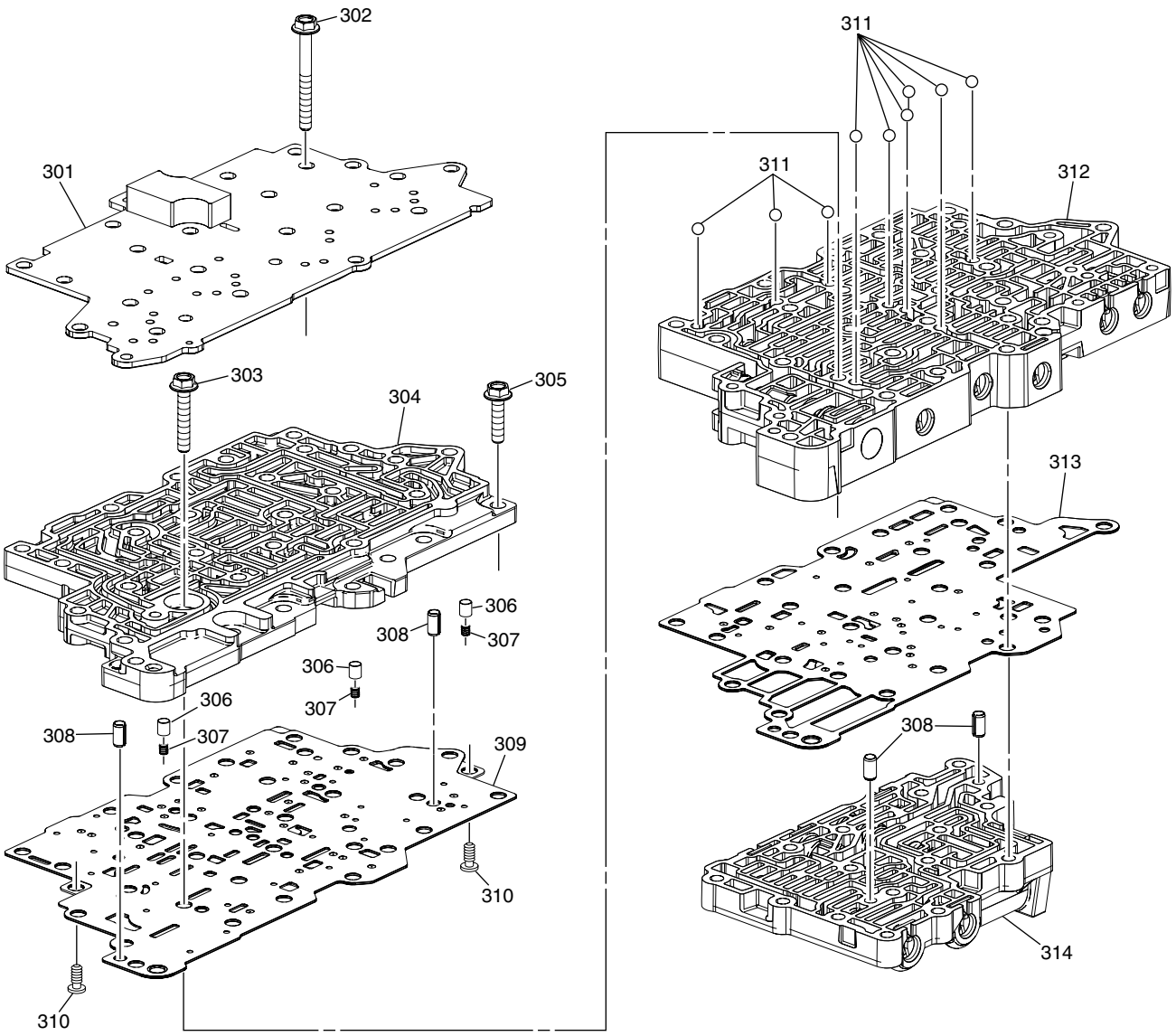
Figure 112

Control Valve Body Assembly



301. Control Valve Channel Upper Plate Assembly
302. Control Valve Body Bolt
303. Control Valve Body Bolt
304. Control Valve Channel Plate
305. Control Valve Body Bolt
306. Actuator Feed Accumulator Piston
307. Actuator Feed Accumulator Spring
308. Control Valve Body Locator Pin
309. Control Valve Upper Body Spacer Plate Assembly
310. Control Valve Body Spacer Plate Retainer
311. Control Valve Body Ball Check Valve
312. Control Valve Upper Body Assembly
313. Control Valve Lower Body Spacer Plate Assembly
314. Control Valve Lower Body Assembly

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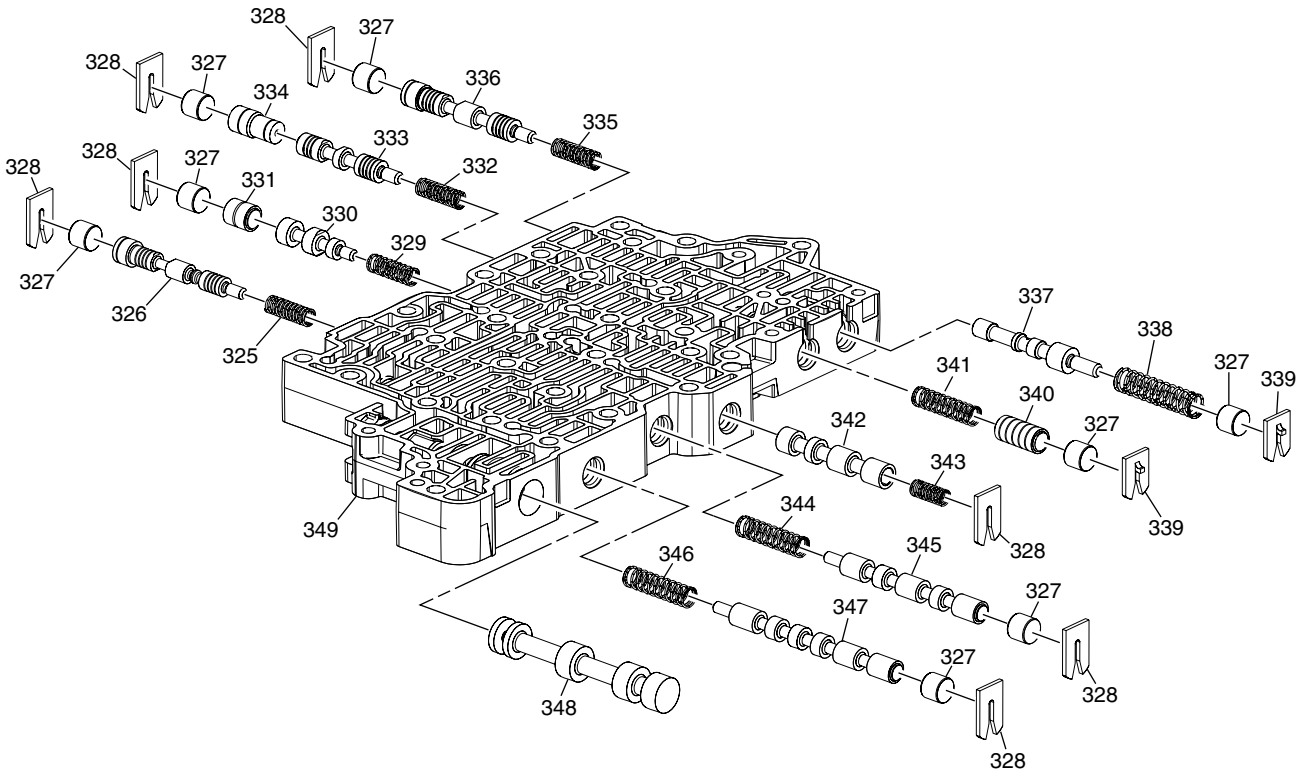
Figure 113

Upper Valve Body Assembly



325. Low and Reverse and 4–5–6 Clutch Regulator Valve Spring
326. Low and Reverse and 4–5–6 Clutch Regulator Valve
327. Pressure Regulator Valve Bore Plug
328. Torque Converter Clutch Valve Spring Retainer
329. Torque Converter Clutch Regulator Apply Valve Spring
330. Torque Converter Clutch Regulator Apply Valve
331. Torque Converter Clutch Regulator Apply Shuttle Valve
332. 2–6 Clutch Regulator Valve Spring
333. 2–6 Clutch Regulator Valve
334. 2–6 Clutch Regulator Valve Gain Valve
335. 3–5–Reverse Clutch Regulator Valve Spring
336. 3–5–Reverse Clutch Regulator Valve
337. Pressure Regulator Valve
338. Pressure Regulator Valve Spring
339. Pressure Regulator Valve Bore Plug Retainer
340. Isolator Valve
341. Isolator Valve Spring
342. Torque Converter Clutch Control Valve
343. Torque Converter Clutch Control Valve Spring
344. Clutch Select Solenoid Valve #3 Spring
345. Clutch Select Solenoid #3 Valve
346. Clutch Select Solenoid Valve #2 Spring
347. Clutch Select Solenoid #2 Valve
348. Manual Valve
349. Control Valve Upper Body

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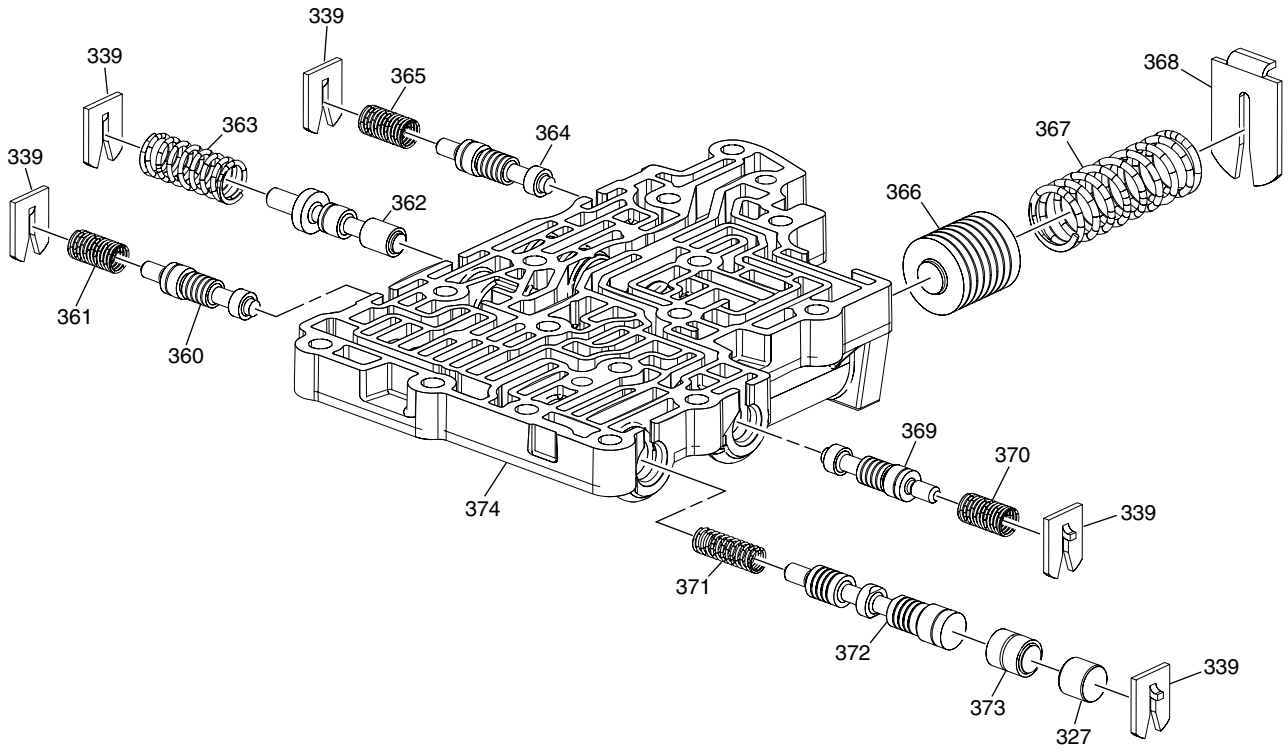
Figure 114

Lower Valve Body Assembly



327. 1–2–3–4 Clutch Regulator Valve Bore Plug
339. Actuator Feed Limit Valve Spring Retainer
360. 4–5–6 Clutch Boost Valve
361. 4–5–6 Clutch Boost Valve Spring
362. Actuator Feed Limit Valve
363. Actuator Feed Limit Valve Spring
364. 3–5–Reverse Clutch Boost Valve
365. 3–5–Reverse Clutch Boost Valve Spring
366. 4–5–6 Clutch Accumulator Piston
367. 4–5–6 Clutch Accumulator Piston Spring
368. 4–5–6 Clutch Accumulator Piston Retainer
369. 1–2–3–4 Clutch Boost Valve
370. 1–2–3–4 Clutch Boost Valve Spring
371. 1–2–3–4 Clutch Regulator Valve Spring
372. 1–2–3–4 Clutch Regulator Valve
373. Default Override 1–2–3–4 Clutch Valve
374. Control Valve Lower Body

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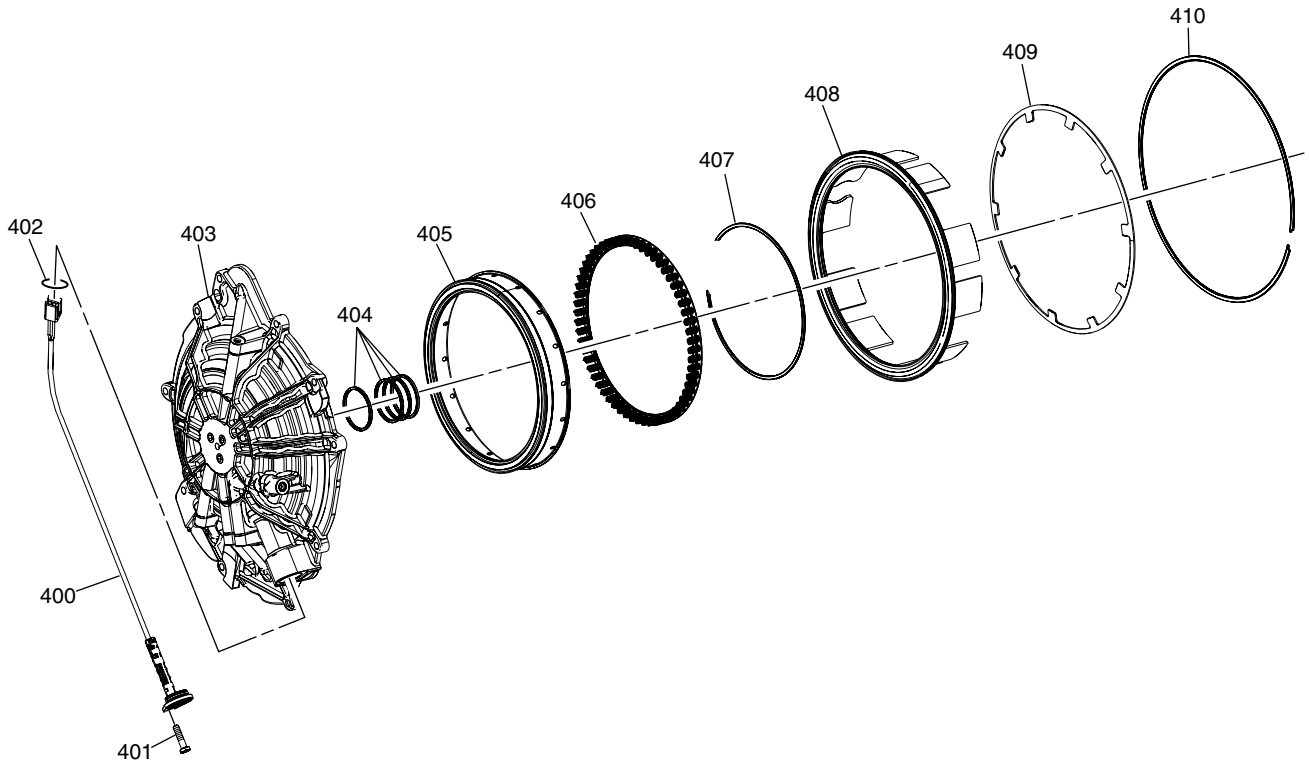
Figure 115

A/Trans Case Cover, 2–6 and Low Reverse Pistons



400. A/Trans Input Speed Sensor Assembly
401. A/Trans Input Speed Sensor Bolt
402. ISS O-Ring Seal
403. A/Trans Case Cover Assembly
404. 3–5–Reverse and 4–5–6 Clutch Fluid Seal Ring
405. 2–6 Clutch Piston
406. 2–6 Clutch Spring Assembly
407. 2–6 Clutch Spring Retainer Ring
408. Low and Reverse Clutch Piston Assembly
409. Low and Reverse Clutch Spring
410. Low and Reverse Clutch Spring Retainer Ring

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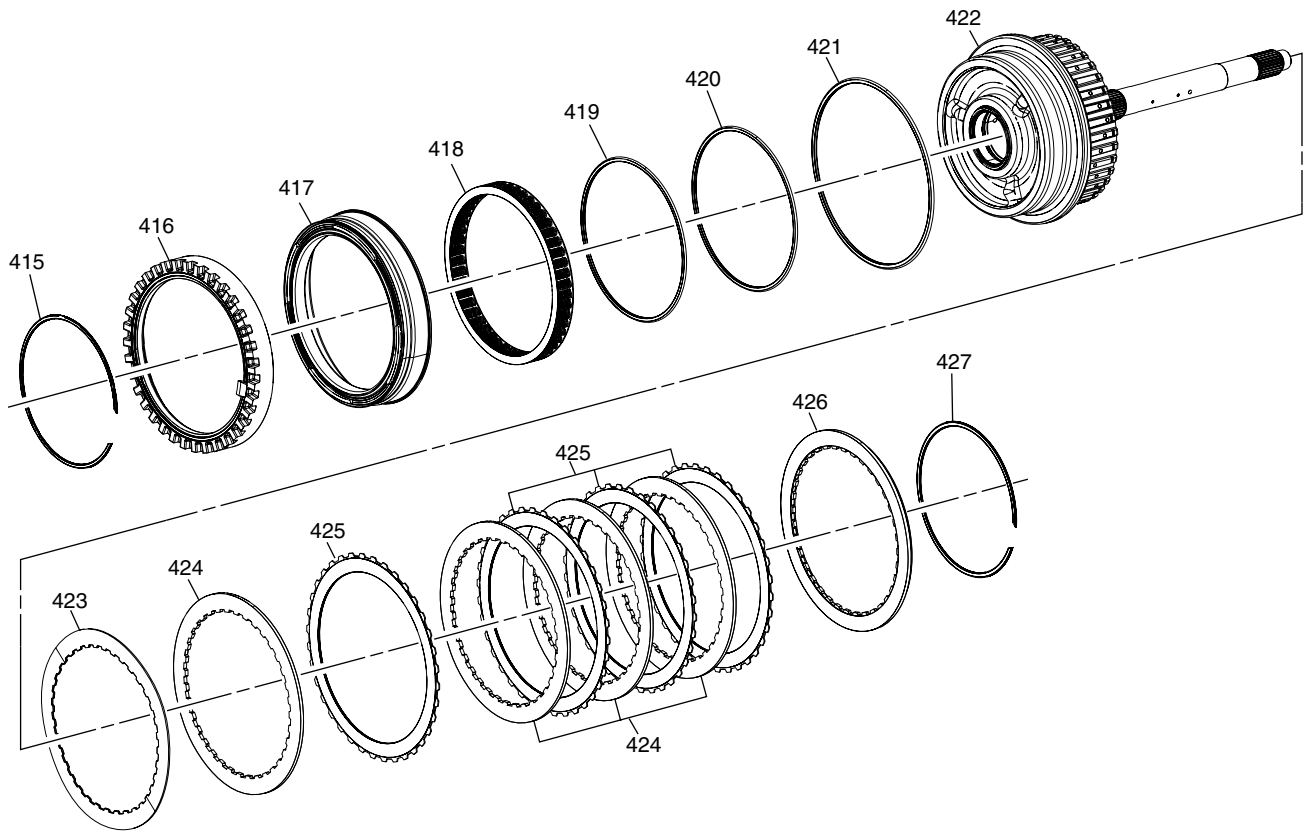
Figure 116

3–5–Reverse Clutch Assembly



415. A/Trans Input Shaft Speed Sensor Reluctor Ring Retainer Ring
416. A/Trans Input Shaft Speed Sensor Reluctor Wheel
417. 3–5–Reverse Clutch Piston
418. 3–5–Reverse Clutch Spring
419. 3–5–Reverse Clutch Piston Inner Seal
420. 3–5–Reverse Clutch Piston Inner Seal
421. 3–5–Reverse Clutch Piston Dam Seal
422. 3–5–Reverse and 4–5–6 Clutch Housing Assembly
423. 3–5–Reverse Clutch (Waved) Plate
424. 3–5–Reverse Clutch Plate
425. 3–5–Reverse Clutch (w/Friction Material) Plate Assembly
426. 3–5–Reverse Clutch Backing Plate
427. 3–5–Reverse Clutch Backing Plate Retainer Ring

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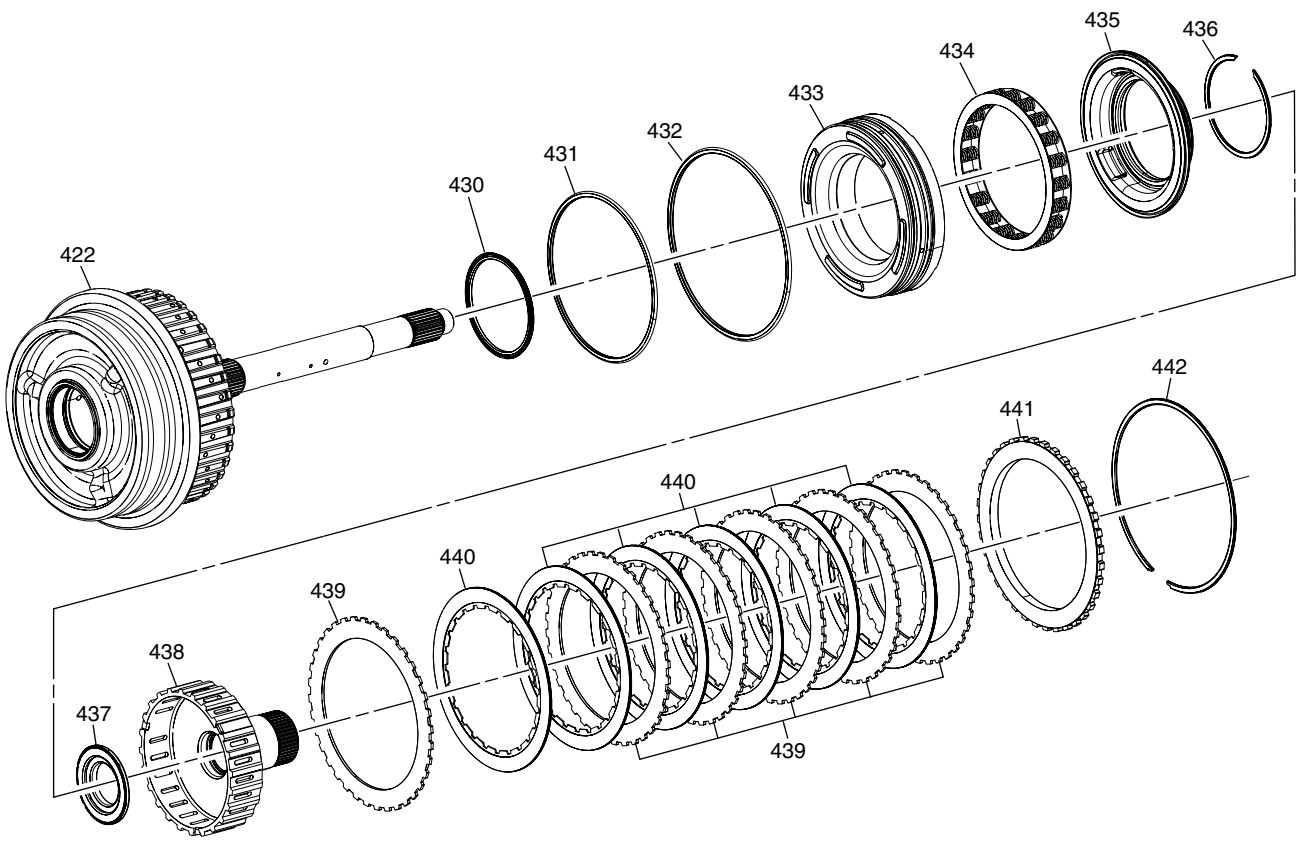
Figure 117

4–5–6 Clutch Assembly



422. 3–5–Reverse and 4–5–6 Clutch Housing Assembly
430. 4–5–6 Clutch Piston Inner Seal
431. 4–5–6 Clutch Piston Outer Seal
432. 4–5–6 Clutch Piston Outer Seal
433. 4–5–6 Clutch Piston
434. 4–5–6 Clutch Spring
435. 4–5–6 Clutch Piston Fluid Dam
436. 4–5–6 Clutch Dam Retainer Ring
437. 4–5–6 Clutch Hub Thrust Bearing Assembly
438. Reaction Carrier Hub Assembly
439. 4–5–6 Clutch Wave Plate
440. 4–5–6 Clutch (w/Friction Material) Plate Assembly
441. 4–5–6 Clutch Backing Plate
442. 4–5–6 Clutch Backing Plate Retainer Ring

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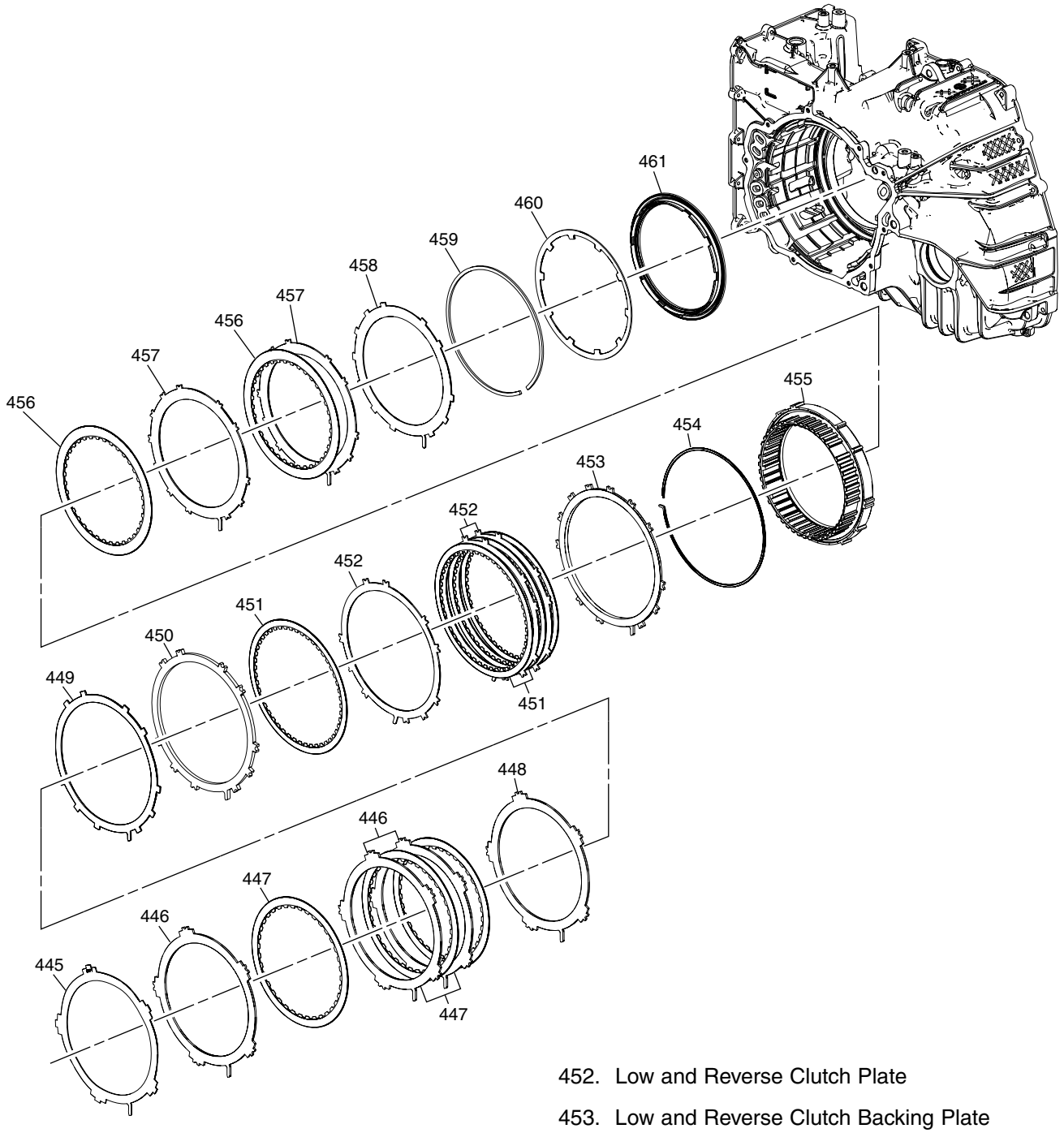
Figure 118

2–6, Low and Reverse and 1–2–3–4 Clutch Plate Assemblies



445. 2–6 Clutch Cushion Spring
446. 2–6 Clutch Plate
447. 2–6 Clutch (w/Friction Material) Plate Assembly
448. 2–6 Clutch Backing Plate
449. Low and Reverse Clutch Cushion (Waved) Spring
450. Low and Reverse Clutch Apply Plate
451. Low and Reverse Clutch (w/Friction Material) Plate Assembly
452. Low and Reverse Clutch Plate
453. Low and Reverse Clutch Backing Plate
454. Low and Reverse Clutch Retainer Ring
455. Low and Reverse Clutch Assembly (OWC)
456. 1–2–3–4 Clutch (w/Friction Material) Plate Assembly
457. 1–2–3–4 Clutch Plate
458. 1–2–3–4 Clutch (Waved) Plate
459. 1–2–3–4 Clutch Spring Retainer Ring
460. 1–2–3–4 Clutch Spring
461. 1–2–3–4 Clutch Piston

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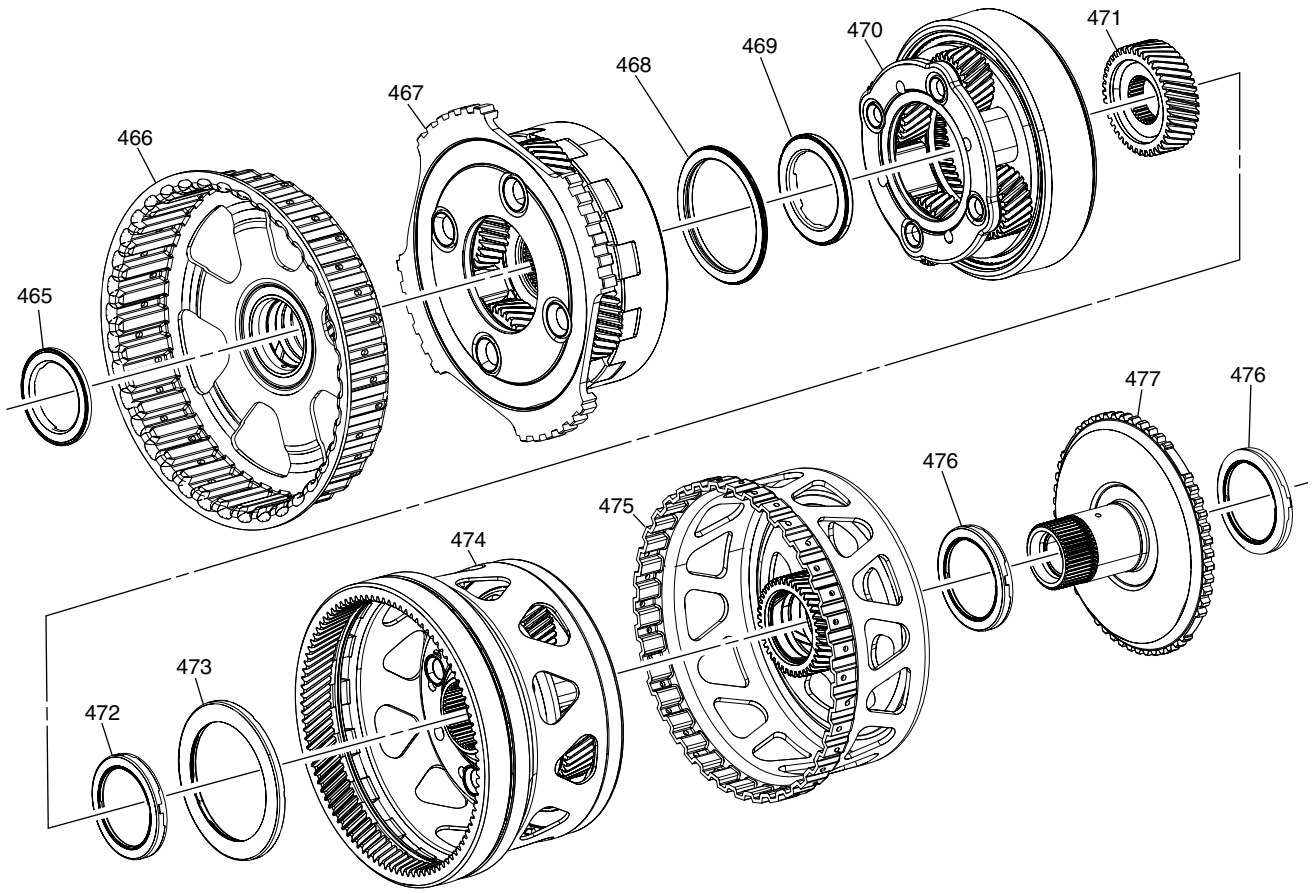
Figure 119

Input, Output and Reaction Gearsets



465. 2–6 Clutch Hub Thrust Bearing
466. Reaction Sun Gear Assembly
467. Reaction (w/Input Internal Gear) Carrier Assembly
468. Input Carrier Thrust Bearing Assembly
469. Input Sun Gear Thrust Bearing Assembly
470. Input (w/Output Internal Gear) Carrier Assembly
471. Input Sun Gear
472. Output Carrier Thrust Bearing Assembly
473. Output Carrier Thrust Bearing Assembly
474. Output Carrier Assembly
475. Output Sun Gear Assembly
476. Front Differential Transfer Drive Gear Input Hub Bearing Assembly
477. Output Carrier Transfer Drive Gear Hub Assembly

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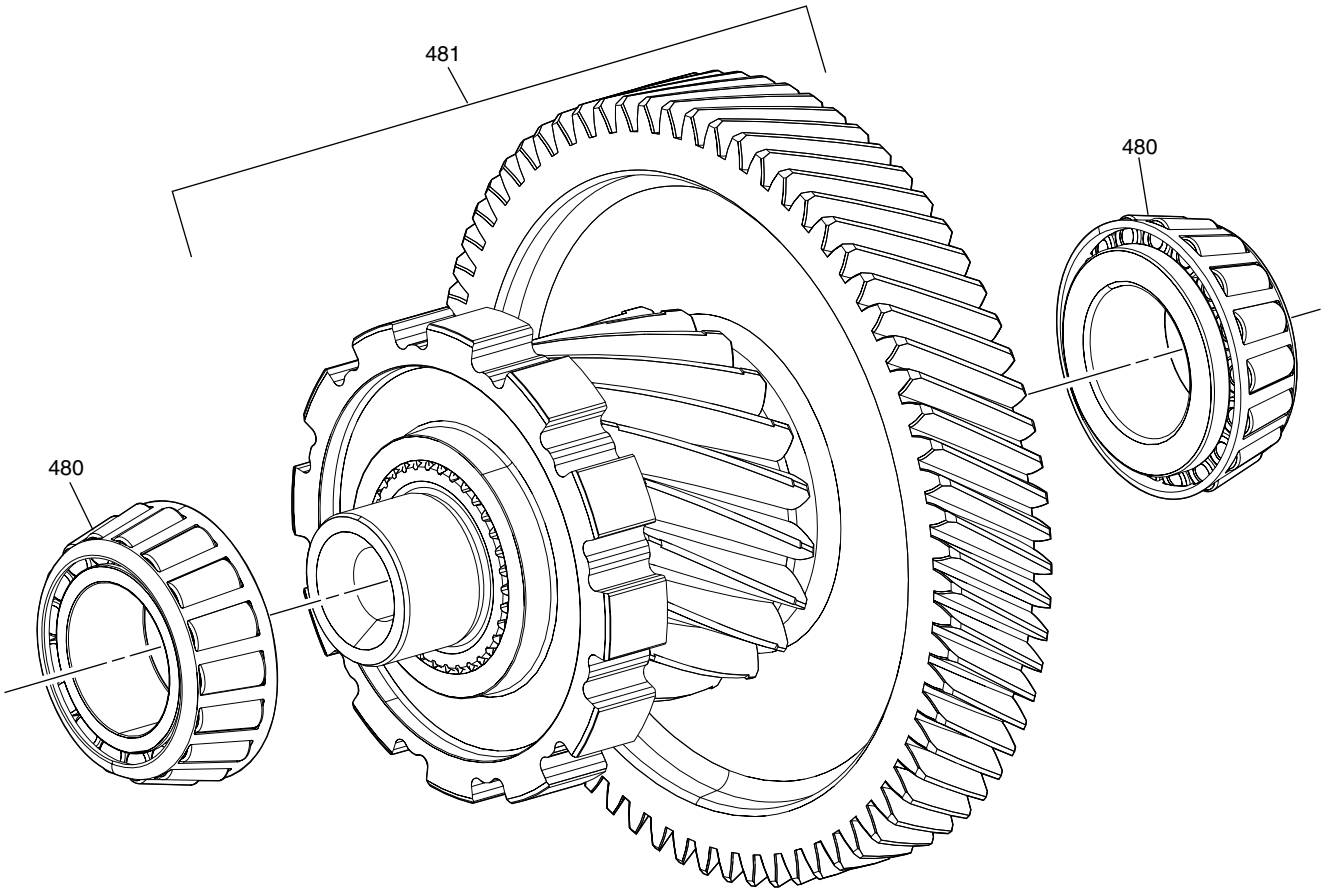
Figure 120

Front Differential Transfer Drive Gear Assembly



480. Front Differential Drive Pinion Gear Bearing Assembly

481. Front Differential Drive Pinion (w/Transfer Gear) Gear Assembly

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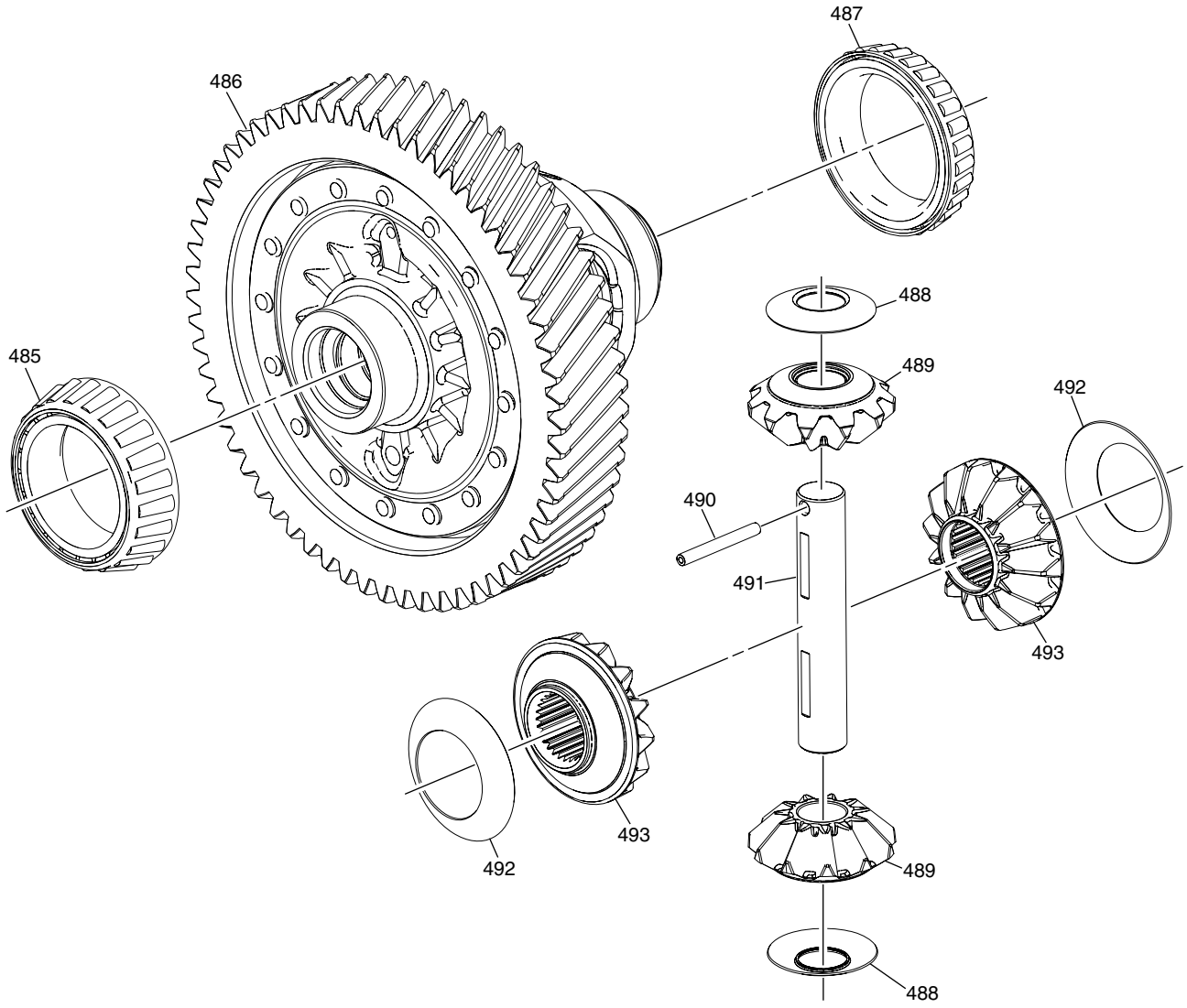
Figure 121

Front Differential Carrier Assembly



485. Front Differential Carrier Bearing Assembly
486. Front Differential Carrier Assembly
487. Front Differential Carrier Bearing Assembly
488. Front Differential Carrier Thrust Washer
489. Front Differential Pinion Gear
490. Front Differential Pinion Gear Shaft Retainer
491. Front Differential Pinion Gear Shaft
492. Front Differential Side Gear Thrust Washer
493. Front Differential Side Gear

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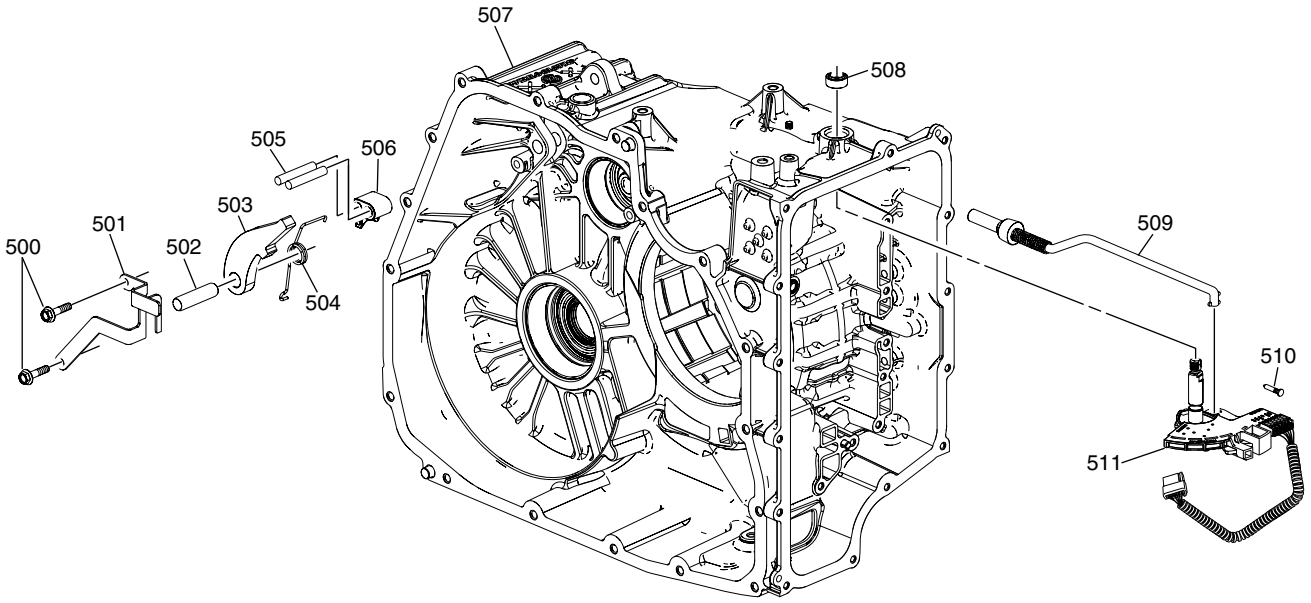
Figure 122

Park System Components



500. Park Pawl Actuator Bracket Bolt
501. Park Pawl Actuator Bracket
502. Park Pawl Shaft
503. Park Pawl
504. Park Pawl Spring
505. Park Pawl Actuator Guide Pin
506. Park Pawl Actuator Guide
507. A/Trans Case Assembly
508. Manual Shift Shaft Seal
509. Park Pawl Actuator Assembly
510. Manual Shift Shaft Pin
511. Manual Shift Detent (w/Shaft Position Switch) Lever Assembly

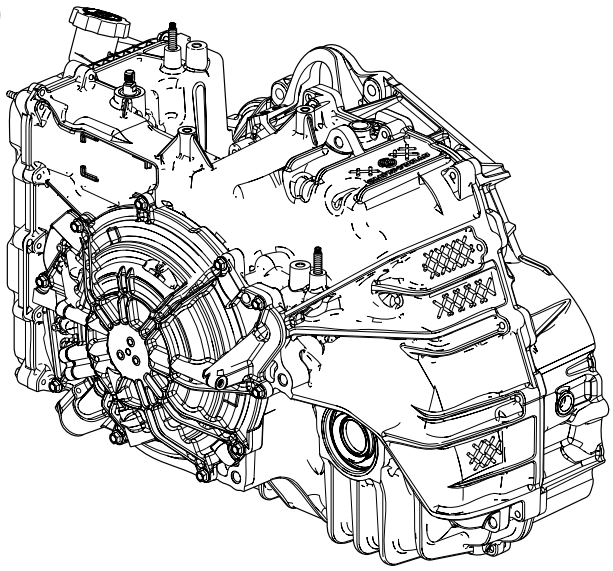
1725920

Figure 123

BASIC SPECIFICATIONS

HYDRA-MATIC 6T70/75 TRANSMISSION

Produced at: Warren, MI (USA)



HYDRA-MATIC 6T75 SHOWN

Transmission Drive
Front Wheel Drive
All Wheel Drive

Transmission Type
6: Six Speed
T: Transverse Mount
70/75: Product Series
Electronic Controls
Automatic Overdrive with a Torque Converter Clutch Assembly.

Current Engine Range
3.0L - 4.6 L Gasoline

Control Systems
Shift Pattern – PC Solenoids & on/off solenoids
Shift Quality – Pressure Control Solenoid
Torque Converter Clutch – Pressure Control Solenoid

Gear Ratios	6T70/75
1st	4.484
2nd	2.872
3rd	1.842
4th	1.414
5th	1.000
6th	0.742
Rev	2.880

Effective Final Drive (EFD) Ratio
6T70: 2.77
6T75: 3.16

Maximum Engine Torque
6T70: 380 N•m (280 lb ft)
6T75: 400 N•m (295 lb ft)

Maximum Gearbox Torque
6T70: 450 N•m (332 lb ft) (1st gear)
515 N•m (380 lb ft) (2nd through 6th gears)
6T75: 515 N•m (380 lb ft)

Maximum Input Speed
6T70/75: 7,000 RPM

Maximum Gross Vehicle Weight
1745 - 2360 kg (3847 - 5203 lb)

Transmission Fluid Type
Dexron® VI

Transmission Fluid Capacity (Approximate)
246 mm Converter (Dry): 9.0 L (9.5 qt)

Transmission Weight w Torque Converter (Wet)
6T70: 103 kg (227 lb)
6T75: 105 kg (231 lb)

Converter Sizes Available
246 mm

Converter Stall Torque Ratio Range
246 mm Converter – 1.7

Converter "K" Factor Range
246 mm Converter – 172 K

Not all "K" Factors are applicable across the range of Converter Stall Torque Ratios.

Pressure Taps Available
Line Pressure

Information may vary with application. All information, illustrations and specifications contained in this book are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

HYDRA-MATIC PRODUCT DESIGNATION SYSTEM

The product designation system used for all Hydra-matic transaxles and transmissions consists of a series of numbers and letters that correspond with the special features incorporated in that product line. The first character is a number that designates the number of forward gear ranges available in that unit. For example: 6 = six forward gear ranges.

The second character is a letter that designates how the unit is mounted in the vehicle. When the letter "T" is used, it designates that the unit is transversely mounted and is used primarily for front wheel drive vehicles. The letter "L" designates that it is longitudinally mounted in the vehicle and it is used primarily for rear wheel drive vehicles. The letter "M" designates that the unit is a manual transaxle or transmission but not specific to a front or rear-wheel drive vehicle application.

The third and fourth characters consists of a set of numbers, (i.e. "70" or "75"), that designate the transaxle or transmission "Series" number. This number signifies the relative torque capacity of the unit.

There is no fifth character used on new transmissions to designate electronic controls, as all of the new Hydra-matic transmissions incorporate electronic controls.

By using this method of classification, the HYDRA-MATIC 6T70 is a 6-speed, transversely-mounted, 70 series unit, and the HYDRA-MATIC 6T75 is a 6-speed, transversely-mounted, 75 series unit.

HYDRA-MATIC 6T70/75

HYDRA-MATIC	**6**	**T**	**70/75**
	Number of Speeds:	Type:	Series:
	4	T - Transverse	Based on
	5	L - Longitudinal	Relative
	6	M - Manual	Torque
			Capacity

GLOSSARY OF TECHNICAL TERMS

Accumulator: A component of the transmission that absorbs hydraulic pressure during the apply of a clutch. Accumulators are designed to control the quality of a shift from one gear range to another.

Adaptive Learning: Programming within the TCM that automatically adjusts hydraulic pressures in order to compensate for changes in the transmission (i.e. component wear).

Applied: An apply component that is holding another component to which it is splined or assembled with. Also referred to as "engaged".

Apply Components: Hydraulically operated clutches, servos, bands, and mechanical one-way roller or sprag clutches that drive or hold members of a planetary gear set.

Apply Plate: A steel clutch plate in a clutch pack located next to the (apply) piston.

Backing Plate: A steel plate in a clutch pack that is usually the last plate in that clutch assembly (farthest from the clutch piston).

Ball Check Valve: A spherical hydraulically controlled component (made of steel or plastic) that either seals or opens fluid circuits. It is also referred to as a check valve or checkball.

Brake Switch: An electrical device that provides signals to the Transmission Control Module (TCM) based on the position of the brake pedal. The TCM uses this information to apply or release the torque converter clutch (TCC).

Centrifugal Force: A force that is imparted on an object (due to rotation) that increases as that object moves further away from a center/point of rotation.

Clutch Pack: An assembly of components generally consisting of clutch plates, an apply plate and a backing plate.

Clutch Plate: A hydraulically activated component that has two basic designs: (1) all steel, or (2) a steel core with friction material bonded to one or two sides of the plate.

Component: Any physical part of the transmission.

Control Valve Body: A machined metal casting that contains valve trains and other hydraulically controlled components that shift the transmission.

Coupling Speed: The speed at which a vehicle is traveling and no longer requires torque multiplication through the torque converter. At this point the stator free wheels to allow fluid leaving the turbine to flow directly to the pump. (See torque converter)

De-energize(d): To interrupt the electrical current that flows to an electronically controlled device making it electrically inoperable.

Downshift: A change in a gear ratio where input speed and torque increases.

Driver Shift Control: A selector system variant which is configured to be shifted only manually, and allows for engine braking in first, second, third and fourth gears.

Duty Cycle: In reference to an electronically controlled solenoid, it is the amount of time (expressed as a percentage) that current flows through the solenoid coil.

Effective Final Drive (EFD) Ratio: A combination of the gear ratios between the front differential transfer drive gear, the front differential drive pinion gear, the front differential transfer driven gear, and the front differential ring gear.

Engine Control Module (ECM): An electronic device that manages the electrical system of the engine.

Energize(d): To supply a current to an electronically controlled device enabling it to perform its designed function.

Engine Compression Braking: A condition where compression from the engine is used with the transmission to decrease vehicle speed. Braking (slowing of the vehicle) occurs when a lower gear ratio is manually selected by moving the gear selector lever.

Exhaust: The release of fluid pressure from a hydraulic circuit. (The words exhausts and exhausting are also used and have the same intended meaning.)

Fluid: Generally considered a liquid or gas. In this publication fluid refers primarily to "transmission fluid".

Fluid Pressure: A pressure (in this textbook usually transmission fluid) that is consistent throughout its circuit.

Force: A measurable effort that is exerted on an object (component).

Freewheeling: A condition where power is lost through a driving or holding device (i.e. roller or sprag clutches).

Friction Material: A heat and wear resistant fibrous material bonded to clutch plates and bands.

Gear: A round, toothed device that is used for transmitting torque through other components.

Gear Range: A specific speed to torque ratio at which the transmission is operating (i.e. 1st gear, 2nd gear etc.).

GLOSSARY OF TECHNICAL TERMS

Gear Ratio: Revolutions of an input gear as compared to the revolutions of an output gear. It can also be expressed as the number of teeth on a gear as compared to the number of teeth on a gear that it is in mesh with.

Hydraulic Circuit: A fluid passage which often includes the mechanical components in that circuit designed to perform a specific function.

Input: A starting point for torque, revolutions or energy into another component of the transmission.

Internal Gear: The outermost member of a gear set that has gear teeth in constant mesh with planetary pinion gears of the gear set.

Internal Leak: Loss of fluid pressure in a hydraulic circuit.

Land (Valve Land): The larger diameters of a spool valve that contact the valve bore or bushing.

Line Pressure: The main fluid pressure in a hydraulic system created by the pump and pressure regulator valve.

Manual Valve: A spool valve that distributes fluid to various hydraulic circuits and is mechanically linked to the gear selector lever.

Orifice: A restricting device (usually a hole in the spacer plate) for controlling pressure build up into another circuit.

Overdrive: An operating condition in the gear set allowing output speed to be higher than input speed and output torque to be lower than input torque.

Overrunning: The function of a one-way mechanical clutch that allows the clutch to freewheel during certain operating conditions of the transmission.

Pinion Gear: A small toothed gear that meshes with a larger gear.

Planet Pinion Gears: Pinion gears (housed in a carrier) that are in constant mesh with a circumferential internal gear and centralized sun gear.

Planetary Gear Set: An assembly of gears that consists of an internal gear, planet pinion gears with a carrier, and a sun gear.

Pressure: A measurable force that is exerted on an area and expressed as kilopascals (kPa) or pounds per square inch (psi).

Pressure Control (PC): An electronic signal that continuously cycles the ON and OFF time of a device (such as a solenoid) while varying the amount of ON time.

Race (Inner or Outer): A highly polished steel surface that contacts bearings or sprag or roller elements.

Reduction (Gear Reduction): An operating condition in the gear set allowing output speed to be lower than input speed and output torque to be higher than input torque.

Residual Fluid Pressure: Excess pressure contained within an area after the supply pressure has been terminated.

Safety Mode: A condition whereby a component (i.e. engine or transmission) will partially function even if its electrical system is disabled.

Solenoid Valve: An electronic device used to control transmission shift patterns or regulate fluid pressure.

Spool Valve: A cylindrical hydraulic control device having a variety of land and valley diameters, used to control fluid flow.

Sprag Clutch: A mechanical clutch (holding device) consisting of figure eight like elements assembled between inner and outer races.

Throttle Position: The travel of the throttle plate that is expressed in percentages and measured by the throttle position (TP) sensor.

Torque: A measurable twisting force expressed in terms of Newton-meters (N•m), pounds feet (lbs ft) or pounds inches (lbs in).

Torque Converter: A component of an automatic transmission, (attached to the engine flywheel) that transfers torque from the engine to the transmission through a fluid coupling.

Transmission Control Module (TCM): An electronic device that manages the electrical system of the transmission.

Variable Capacity Pump: The device that provides fluid for operating the hydraulic circuits in the transmission. The amount of fluid supplied varies depending on vehicle operating conditions.

ABBREVIATIONS

AC - Alternating Current
A/C - Air Conditioning
ACT - Actuator
AFL - Actuator Feed Limit
ALDL - Assembly Line Diagnostic Link
AMP - Amperage
ASM - Assembly
AT - Automatic Transmission

BF - Backfill

°C - Degrees Celsius
CL - Clutch
COMP - Compensator
CONT - Control
CONV - Converter
CSV - Clutch Select Valve

DC - Direct Current
D.C. - Duty Cycle
DFLT - Default
DLC - Diagnostic Link Connector
DRAC - Digital Ratio Adaptor Converter
DSC - Driver Shift Control
DTC - Diagnostic Trouble Code
DRV - Drive

ECM - Engine Control Module
ECT - Engine Coolant Temperature
EFD - Effective Final Drive (Ratio)
EX - Exhaust

°F - Degrees Fahrenheit
FD - Feed
FDBK - Feedback
FWD - Front Wheel Drive

Hz - Hertz

ISS - Input Speed Sensor

KM/H - Kilometers per Hour
kPa - KiloPascals

LIM - Limit

MAP - Manifold Absolute Pressure
MPH - Miles per Hour

N - Neutral
N.C. - Normally Closed
N.H. - Normally High
N.L. - Normally Low
N•m - Newton Meters
N.O. - Normally Open

ORF - Orificed
ORUN - Overrun
OSS - Output Speed Sensor
OWC - One Way Clutch

P - Park
PC - Pressure Control (solenoid)
PCM - Powertrain Control Module
PCS - Pressure Control Solenoid
PRESS REG - Pressure Regulator
PS - Pressure Switch
PSI - Pounds per Square Inch
PWM - Pulse Width Modulated

R - Reverse
REV - Reverse
REG - Regulated
RPM - Revolutions per Minute
RWD - Rear Wheel Drive
R1 - Low and Reverse

SEL - Selective
SHTL - Shuttle (Valve)
SIG - Signal
SOL - Solenoid
SS - Shift Solenoid

TCC - Torque Converter Clutch
TCM - Transmission Control Module
TFP - Transmission Fluid Pressure
TFT - Transmission Fluid Temperature
TP - Throttle Position (sensor)
TRANS - Transmission or Transaxle

V - Volts
VSS - Vehicle Speed Sensor

2WD - 2 Wheel Drive
4WD - 4 Wheel Drive

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NOTES

HYDRA-MATIC 6T70/75 TECHNICIAN'S GUIDE

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GENERAL MOTORS CORPORATION 2M Litho in U.S.A.