HOW TO USE THIS BOOK

rst time users of this book may find the page layout ittle unusual or perhaps confusing. However, with minimal amount of exposure to this format its efulness becomes more obvious. If you are familiar with this publication, the following idelines are helpful in understanding the functional tent 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 4/5L40-E (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 53) 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 size page and is followed by a half page of descriptive text. The opposite side of the half page contains the narrative description of the hydraulic fluid as it applies components or moves valves in the system. Facing this partial page is a hydraulic schematic which shows the position of valves, ball check valves, etc., as they function in a specific gear range. Also, located at the bottom of each half page is a reference to the Complete Hydraulic Circuit section that follows.

- The Complete Hydraulic Circuits section (beginning on page 85) details the entire hydraulic system. This is accomplished by using a fold-out circuit schematic with a facing page two dimensional fold-out 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.

OVERDRIVE RANGE – FIRST GEAR

(after the first 1-2 shift has occurred)

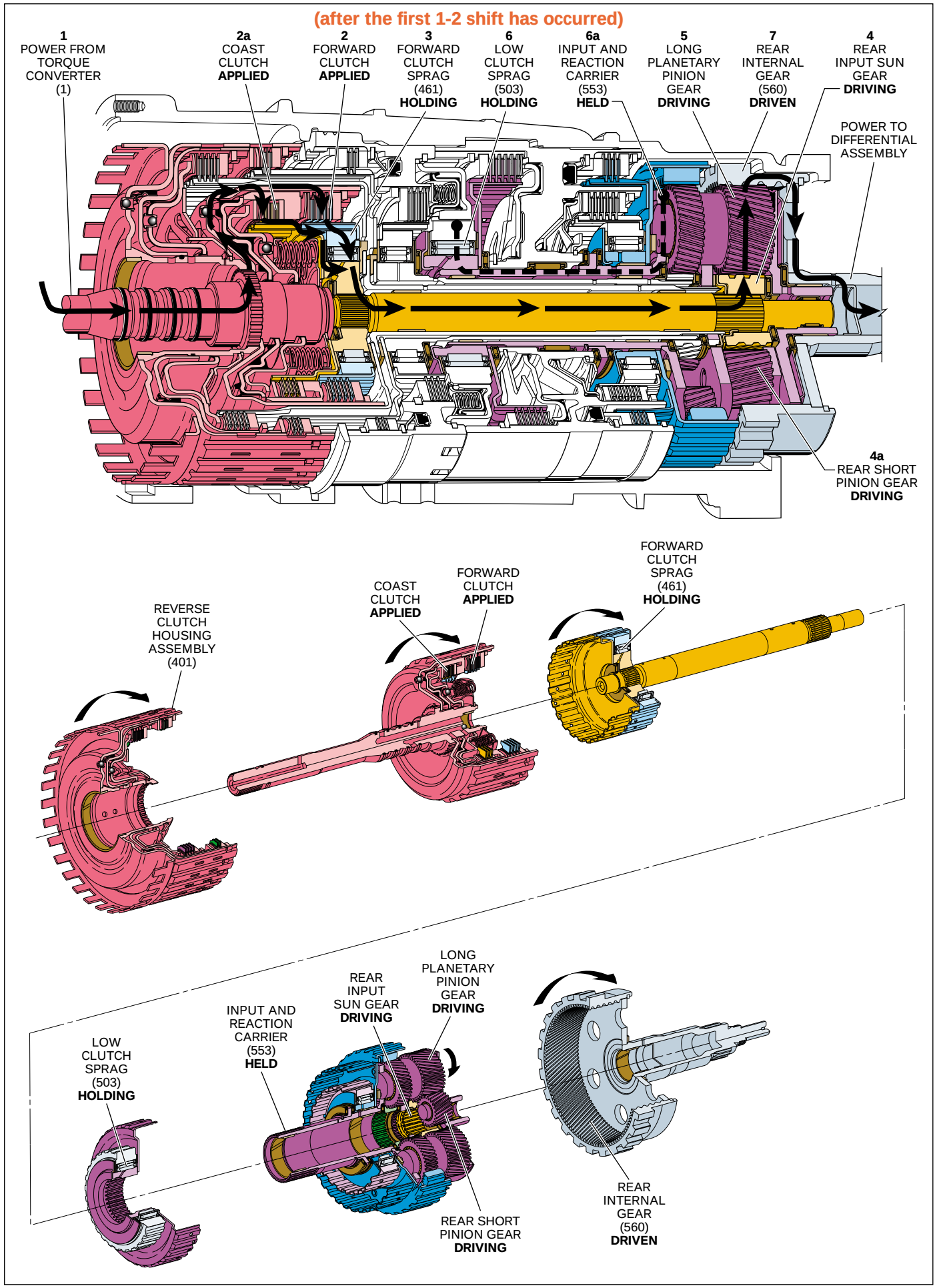


Figure 60

OVERDRIVE RANGE – FIRST GEAR

(after the first 1-2 shift has occurred)

SOLENOID			DIRECT CLUTCH	REVERSE CLUTCH	COAST CLUTCH	FORWARD CLUTCH	FORWARD SPRAG CLUTCH	OVER-DRIVE CLUTCH	INTERM. SPRAG CLUTCH	INTER-MEDIATE CLUTCH	LOW SPRAG CLUTCH	LOW AND REVERSE CLUTCH	SECOND CLUTCH	SECOND SPRAG CLUTCH	SECOND COAST CLUTCH
1-2	2-3	4-5													
OFF	ON	OFF			APPLIED	APPLIED	LD				LD				

LD = LOCKED IN DRIVE

In Overdrive Range Ⓓ – First Gear, torque from the engine is multiplied through the torque converter and transmission gear set to the vehicle's drive shaft. The planetary gears operate in reduction to achieve a First gear starting ratio of approximately 3.42:1.

- The manual shift shaft (606) and the manual valve (377) are in the Overdrive Ⓓ position.

1 Power from Torque Converter
The input shaft forward and coast clutch housing assembly (433) is splined to and driven by the converter turbine.

2 Forward and Coast Clutches Applied
The forward clutch, which is located within the input shaft forward and coast clutch housing assembly (433), is applied and holds the forward clutch sprag outer race (459). The coast clutch is also located in the input shaft forward and coast clutch housing assembly (433) and is also applied.

3 Forward Clutch Sprag Holding
The forward clutch sprag (461) holds and power is transmitted to the input sun gear shaft assembly (457).

4 Rear Input Sun Gear Driving
The input sun gear shaft assembly (457) is splined to the rear input sun gear. The rear input sun gear drives the rear short planetary pinions.

5 Long Planetary Pinion Gears Driving
The rear short planetary pinions drive the long planetary pinions. The long pinions are in mesh with the front input sun gear, the front short pinions and the rear internal gear.

6 Low Clutch Sprag Holding
The power transferred to the input and reaction carrier (553) by the long planetary pinions attempts to rotate the carrier but, the carrier is held stationary by the low clutch sprag (503).

7 Rear Internal Gear Driven
With the input and reaction carrier (553) held, the long pinions drive the rear internal gear (560) to achieve the first gear starting ratio of approximately 3.42:1

- When the throttle is released in Overdrive Range – First Gear, power from the vehicle wheels drives the transmission components faster than engine torque is driving them. This causes the low clutch sprag (503) to overrun and allows the vehicle to coast freely without engine braking.

- In order to achieve engine braking, the low and reverse clutch can be applied to hold the input and reaction carrier assembly. See Manual Second – First Gear (page 82A) for a description of power flow during coast conditions.

As vehicle speed increases, less torque multiplication is needed for maximum efficiency. Therefore, it is desirable to shift the transmission to a lower gear ratio, or Second gear.

Note: the above description of mechanical power flow occurs after the first 1-2 shift has occurred.

OVERDRIVE RANGE – FIFTH GEAR

(Torque Converter Clutch Released)

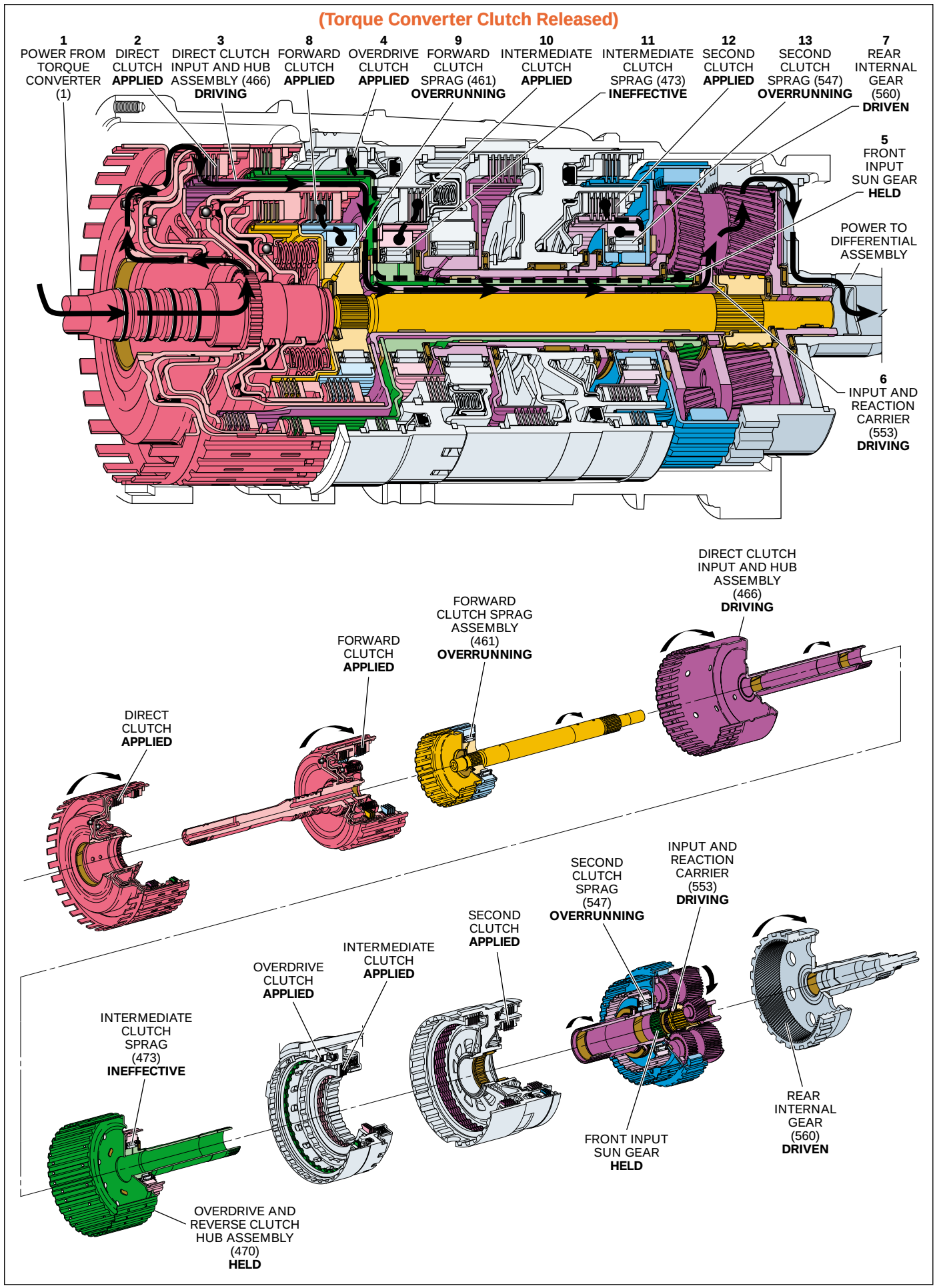


Figure 68

OVERDRIVE RANGE – FIFTH GEAR

(Torque Converter Clutch Released)

SOLENOID			DIRECT CLUTCH	REVERSE CLUTCH	COAST CLUTCH	FORWARD CLUTCH	FORWARD SPRAG CLUTCH	OVER-DRIVE CLUTCH	INTERM. SPRAG CLUTCH	INTER-MEDIATE CLUTCH	LOW SPRAG CLUTCH	LOW AND REVERSE CLUTCH	SECOND CLUTCH	SECOND SPRAG CLUTCH	SECOND COAST CLUTCH
1-2	2-3	4-5													
OFF	OFF	OFF	APPLIED			APPLIED		APPLIED		APPLIED			APPLIED		

LD = LOCKED IN DRIVE

To maximize engine performance and fuel economy, a Fifth gear (Overdrive) is used to achieve an approximate ratio of 0.75:1 through the transmission gear set to the vehicle drive shaft. This allows the vehicle to maintain a given road speed with less engine output speed.

1 Power from Torque Converter
The input shaft forward and coast clutch housing assembly (433) is splined to and driven by the converter turbine.

2 Direct Clutch Applied
The direct clutch, which is located within the reverse clutch housing assembly (401), is applied and engine torque is transferred to the direct clutch input and hub assembly (466).

3 Direct Clutch Input and Hub Assembly Driving
The direct clutch input and hub assembly (466) is splined to and drives the input and reaction carrier (553).

4 Overdrive Clutch Applied
The overdrive clutch, which is located within the overdrive clutch housing (493), is applied and holds the overdrive and reverse clutch hub assembly (470) stationary.

5 Front Input Sun Gear Held
The overdrive and reverse clutch hub assembly (470) is splined to the front input sun gear and holds it stationary.

6 Input and Reaction Carrier Driving
With the front input sun gear held, and the input and reaction carrier being driven by the direct clutch input and hub assembly (466), the long planetary pinion gears are forced to walk in the direction of engine rotation around the stationary front input sun gear and drive the rear internal gear (560).

7 Rear Internal Gear Driven
The input and reaction carrier long pinion gears drive the rear internal gear (560) faster than converter turbine speed to obtain a 0.75:1 overdrive drive gear ratio through the transmission gear set.

8 Forward Clutch Applied
The forward clutch is applied and holds the forward clutch sprag outer race (459).

9 Forward Clutch Sprag Overrunning
The input sun gear shaft assembly is splined to and driven by the rear input sun gear, causing the forward clutch sprag (461) to overrun.

10 Intermediate Clutch Applied
The intermediate clutch is applied and holds the intermediate clutch sprag outer race (474) stationary.

11 Intermediate Clutch Sprag Ineffective
With the intermediate clutch sprag outer race (474) and the overdrive and reverse clutch hub assembly (470) both held, the intermediate clutch sprag (473) has no effect in fifth gear.

12 Second Clutch Applied
The second clutch is applied and holds the second clutch sprag outer race (545) stationary.

13 Second Clutch Sprag Overrunning
The power transferred to the front short pinions by the long planetary pinions drives the reaction internal gear (550) causing the second clutch sprag (547) to overrun.

When the throttle is released in Overdrive Range – Fifth Gear, the vehicle is allowed to coast brake. Because none of the sprag clutches are used in driving the vehicle during acceleration, there are no elements to overrun to allow the vehicle to coast freely in Fifth gear. Therefore, engine compression slows the vehicle when the throttle is released until the transmission downshifts into Overdrive Range – Fourth Gear.

However, due to the gear ratio in Overdrive, engine compression braking is not as noticeable by the driver as it is in the Manual gear ranges.

COMPLETE HYDRAULIC CIRCUITS

The hydraulic circuitry of the Hydra-matic 4/5L40-E 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 half 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 plates and case to assist the user when following the hydraulic circuits as they pass between them. The half 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 half 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 BODY (LIGHT GREY AREA)
PASSAGE B IS LOCATED IN THE FRONT CONTROL VALVE BODY (LIGHT BLUE AREA)
PASSAGE C IS LOCATED IN THE REAR CONTROL VALVE BODY (LIGHT GREEN AREA)
PASSAGE D IS LOCATED ON THE SPACER PLATE (DASHED LINE)
PASSAGE E IS LOCATED IN THE BOTTOM CHANNEL PLATE (LIGHT RED AREA)
PASSAGE F IS LOCATED IN THE TOP CHANNEL PLATE (LIGHT PURPLE AREA)
PASSAGE G IS LOCATED IN THE ACCUMULATOR HOUSING (LIGHT YELLOW AREA)
PASSAGE H IS LOCATED IN THE CASE (WHITE AREA)

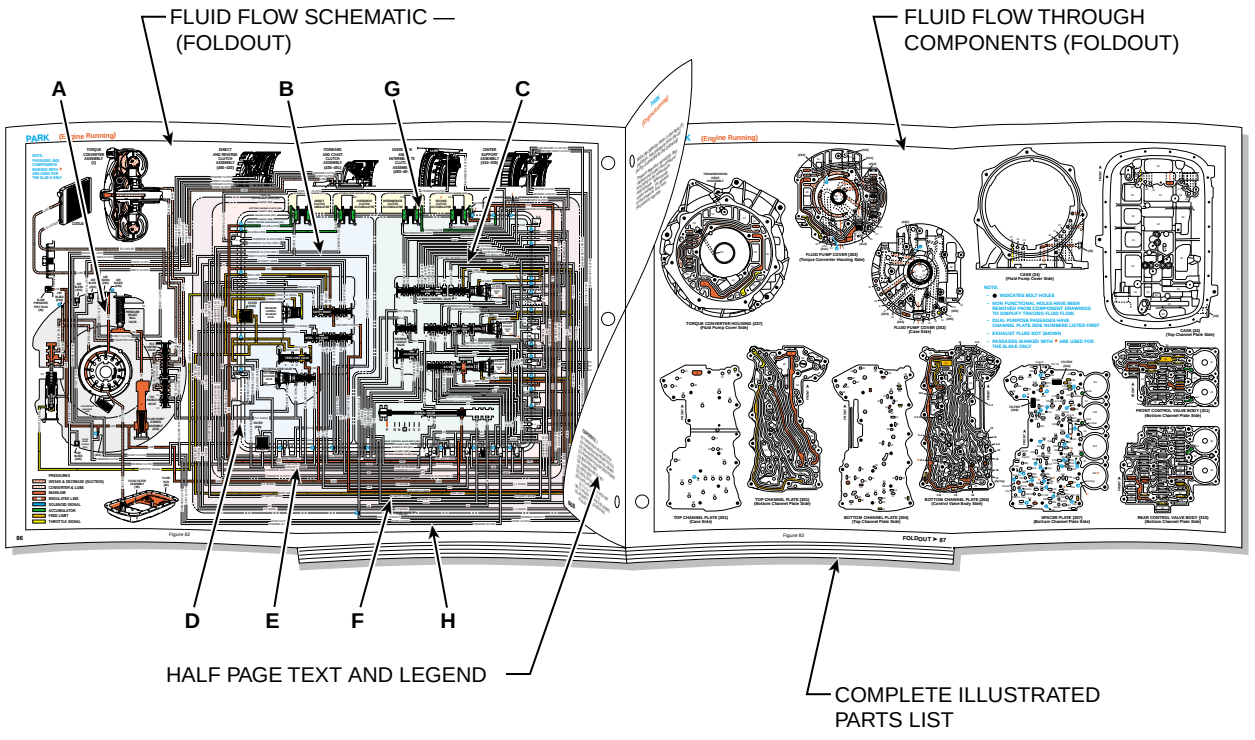
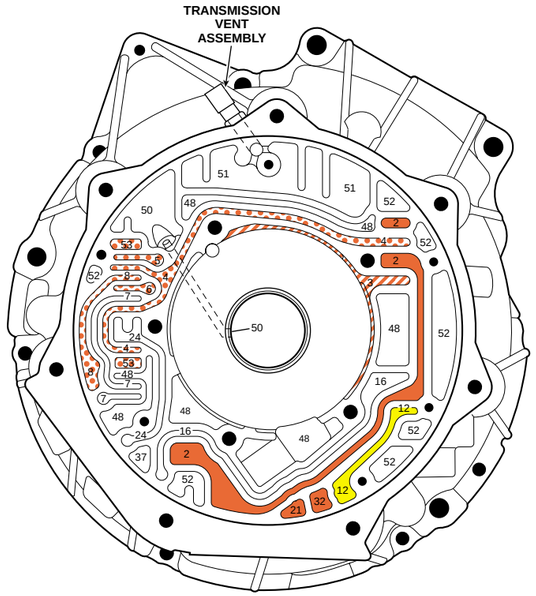
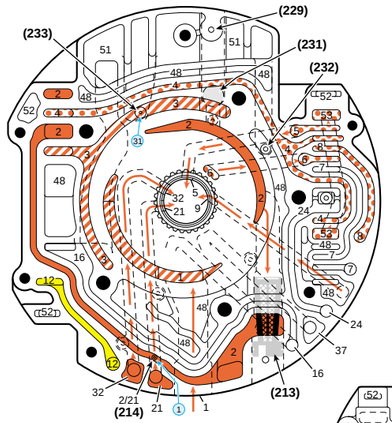


Figure 81

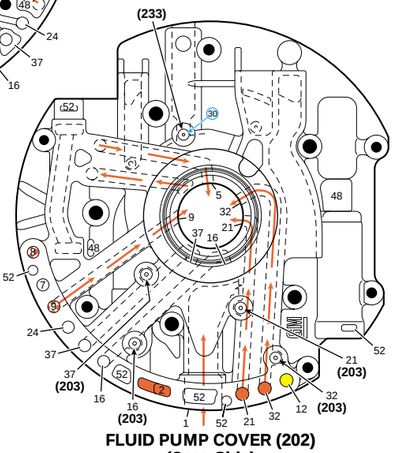
OVERDRIVE RANGE – SECOND GEAR



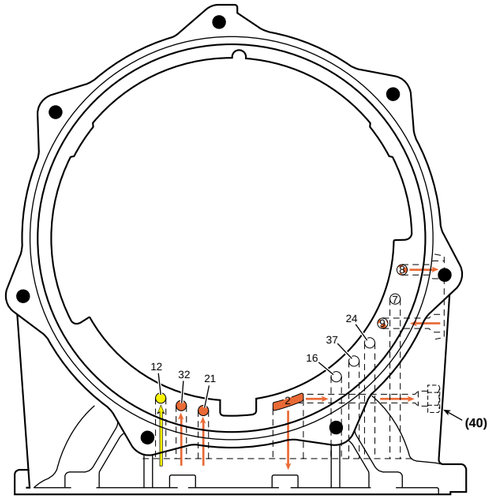
TORQUE CONVERTER HOUSING (227)
(Fluid Pump Cover Side)



FLUID PUMP COVER (202)
(Torque Converter Housing Side)



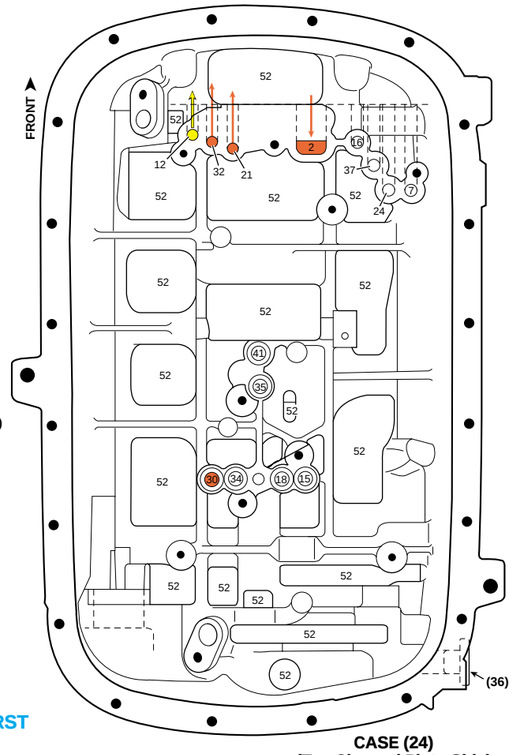
FLUID PUMP COVER (202)
(Case Side)



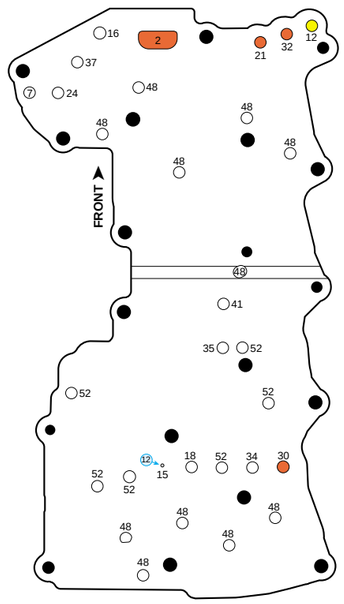
CASE (24)
(Fluid Pump Cover Side)

NOTE:

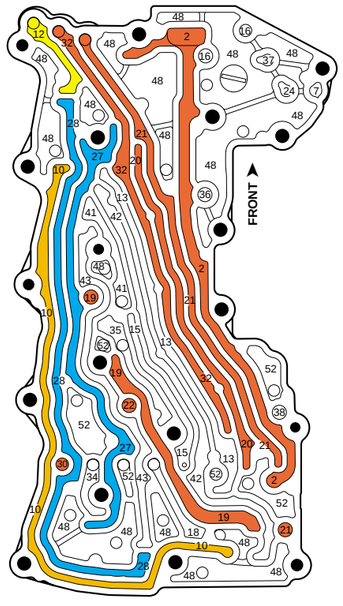
- ● INDICATES BOLT HOLES
- NON FUNCTIONAL HOLES HAVE BEEN REMOVED FROM COMPONENT DRAWINGS TO SIMPLIFY TRACING FLUID FLOW.
- DUAL PURPOSE PASSAGES HAVE CHANNEL PLATE SIDE NUMBERS LISTED FIRST
- EXHAUST FLUID NOT SHOWN
- PASSAGES MARKED WITH ✱ ARE USED FOR THE 5L40-E ONLY



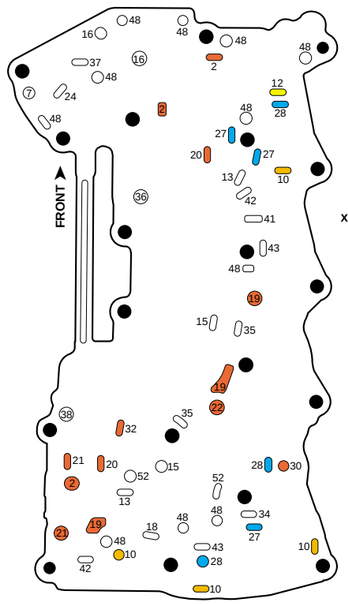
CASE (24)
(Top Channel Plate Side)



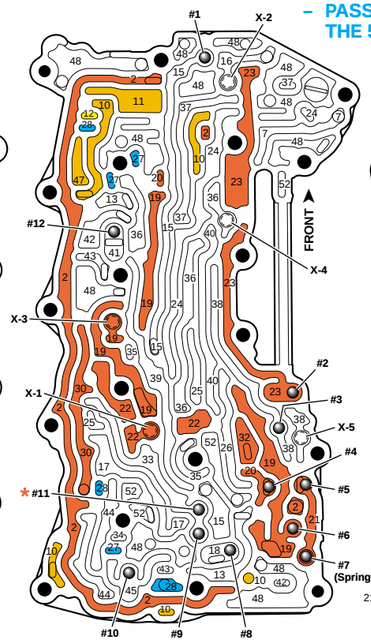
TOP CHANNEL PLATE (301)
(Case Side)



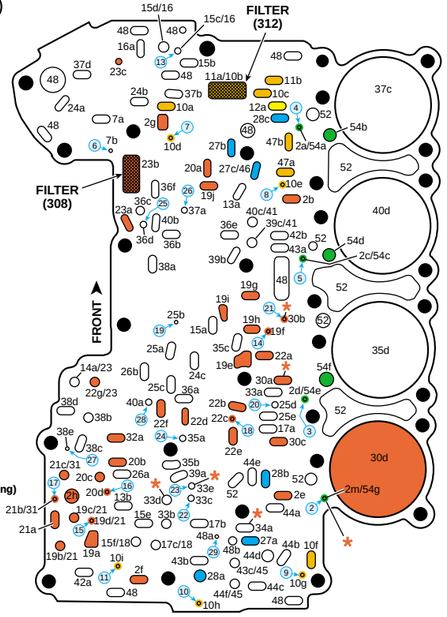
TOP CHANNEL PLATE (301)
(Bottom Channel Plate Side)



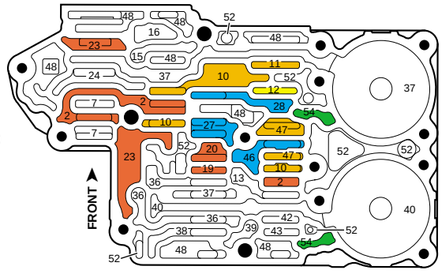
BOTTOM CHANNEL PLATE (304)
(Top Channel Plate Side)



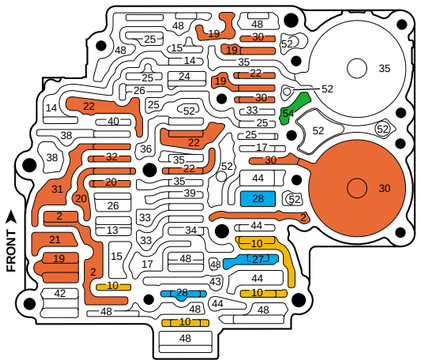
BOTTOM CHANNEL PLATE (304)
(Control Valve Body Side)



SPACER PLATE (307)
(Bottom Channel Plate Side)



FRONT CONTROL VALVE BODY (311)
(Bottom Channel Plate Side)



REAR CONTROL VALVE BODY (310)
(Bottom Channel Plate Side)

Figure 91

FOLDOUT ➤ 95

OVERDRIVE RANGE – FIFTH GEAR (Torque Converter Clutch Released)

NOTE: PASSAGES AND COMPONENTS MARKED WITH * ARE USED FOR THE 5L40-E ONLY

TORQUE CONVERTER ASSEMBLY (1)

DIRECT AND REVERSE CLUTCH ASSEMBLY (400–420)

FORWARD AND COAST CLUTCH ASSEMBLY (430–451)

OVERDRIVE AND INTERMEDIATE CLUTCH ASSEMBLY (480–497)

CENTER SUPPORT ASSEMBLY (510–535)

COOLER

FLUID PRESSURE TEST PLUG (40)

PRESSURE RELIEF BALL VALVE

TCC CONTROL VALVE

TCC ENABLE VALVE

BOOST VALVE

CONVERTER HOUSING (224)

FLUID PUMP SCREEN ASSEMBLY (213)

FLUID PUMP COVER (202)

FLUID FILTER ASSEMBLY (59)

FLUID PAN (62)

FILTER (312)

FILTER (308)

PRESSURE CONTROL SOLENOID VALVE

FEED LIMIT VALVE

TCC REGULATOR VALVE

TCC PWM SOLENOID VALVE N/C

DIRECT CLUTCH ACCUMULATOR

OVERDRIVE CLUTCH ACCUMULATOR

INTERMEDIATE CLUTCH ACCUMULATOR

SECOND CLUTCH ACCUMULATOR

1-2 SHIFT VALVE

1-2 SHIFT CONTROL VALVE

1-2 SHIFT SOLENOID VALVE N/C (A)

2-3 SHIFT VALVE CNTRL

2-3 SHIFT SOLENOID VALVE N/C (B)

3-4 SHIFT CNTRL

4-5 SHIFT VLV CNTRL

4-5 SHIFT SOLENOID VALVE N/C (C)

REVERSE LOCKOUT VALVE

MANUAL VALVE

P R N D 4 3 2

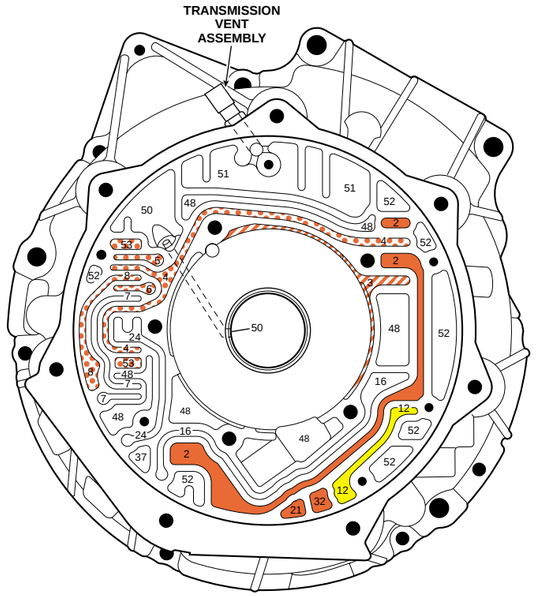
REAR CONTROL VALVE BODY (310)
GASKET (309)
SPACER PLATE (307)
GASKET (305)
BOTTOM CHANNEL PLATE (304)

CASE (24)
TOP CHANNEL PLATE (301)
GASKET (303)
BOTTOM CHANNEL PLATE (304)
GASKET (305)
SPACER PLATE (307)
GASKET (309)
FRONT CONTROL VALVE BODY (311)

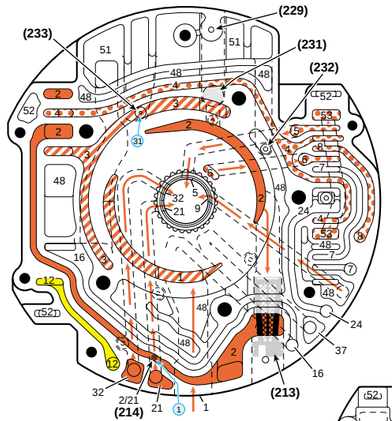
PRESSURES
- INTAKE & DECREASE (SUCTION)
- CONVERTER & LUBE
- MAINLINE
- REGULATED LINE
- SOLENOID SIGNAL
- ACCUMULATOR
- FEED LIMIT
- THROTTLE SIGNAL

Figure 96

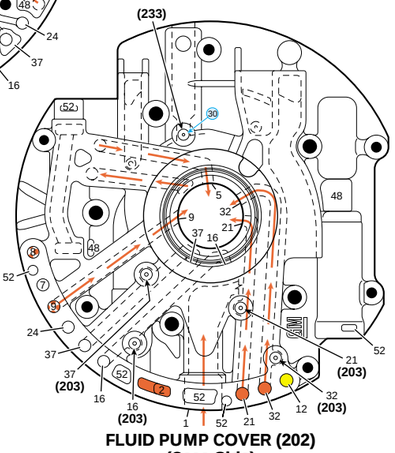
MANUAL SECOND – SECOND GEAR (from Manual Third – Third Gear)



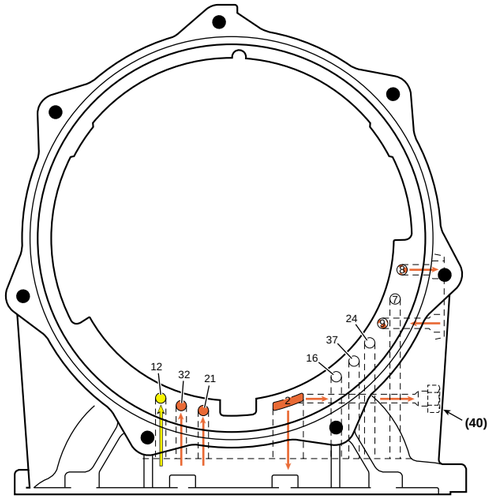
TORQUE CONVERTER HOUSING (227)
(Fluid Pump Cover Side)



FLUID PUMP COVER (202)
(Torque Converter Housing Side)



FLUID PUMP COVER (202)
(Case Side)



CASE (24)
(Fluid Pump Cover Side)

NOTE:

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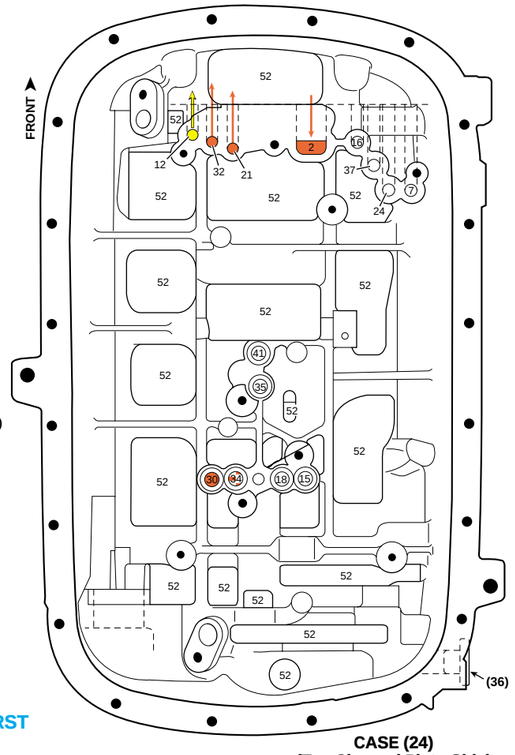
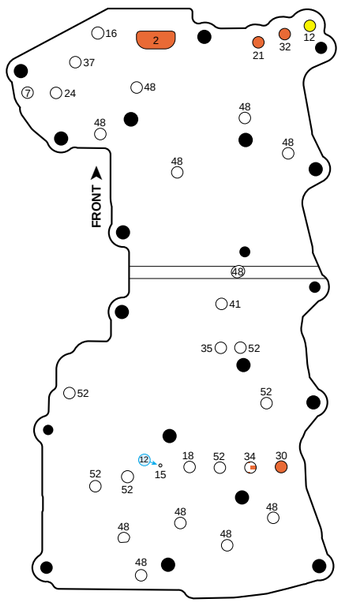
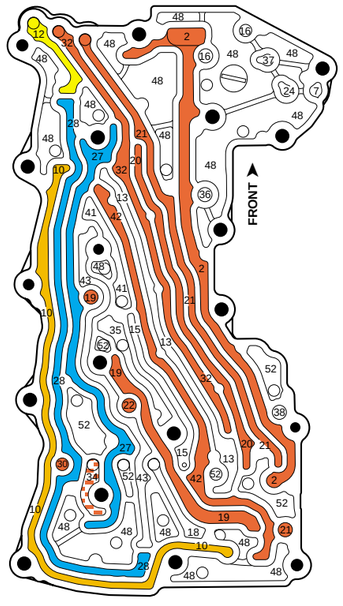
- EXHAUST FLUID NOT SHOWN
- PASSAGES MARKED WITH ✱ ARE USED FOR THE 5L40-E ONLY



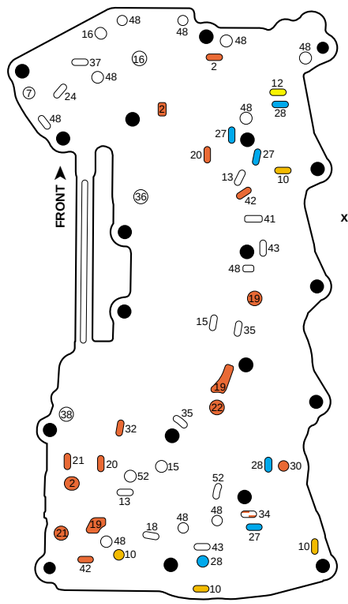
CASE (24)
(Top Channel Plate Side)



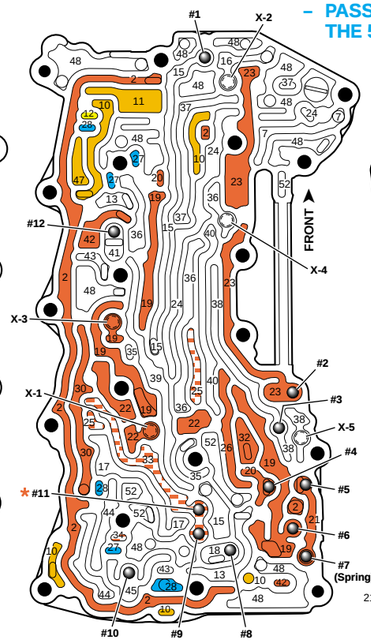
TOP CHANNEL PLATE (301)
(Case Side)



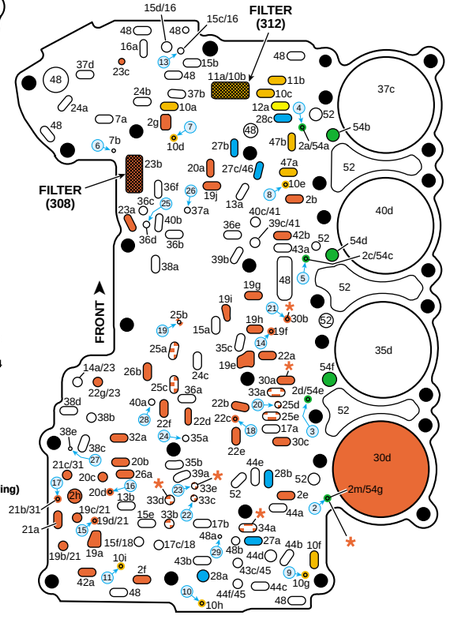
TOP CHANNEL PLATE (301)
(Bottom Channel Plate Side)



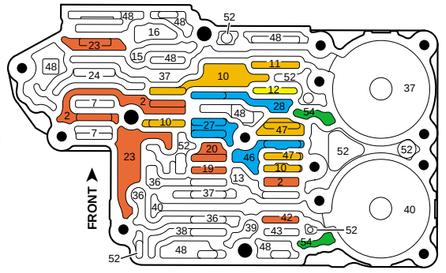
BOTTOM CHANNEL PLATE (304)
(Top Channel Plate Side)



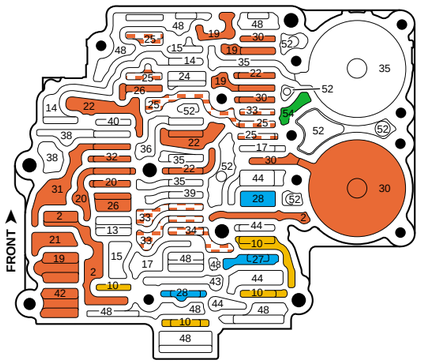
BOTTOM CHANNEL PLATE (304)
(Control Valve Body Side)



SPACER PLATE (307)
(Bottom Channel Plate Side)



FRONT CONTROL VALVE BODY (311)
(Bottom Channel Plate Side)

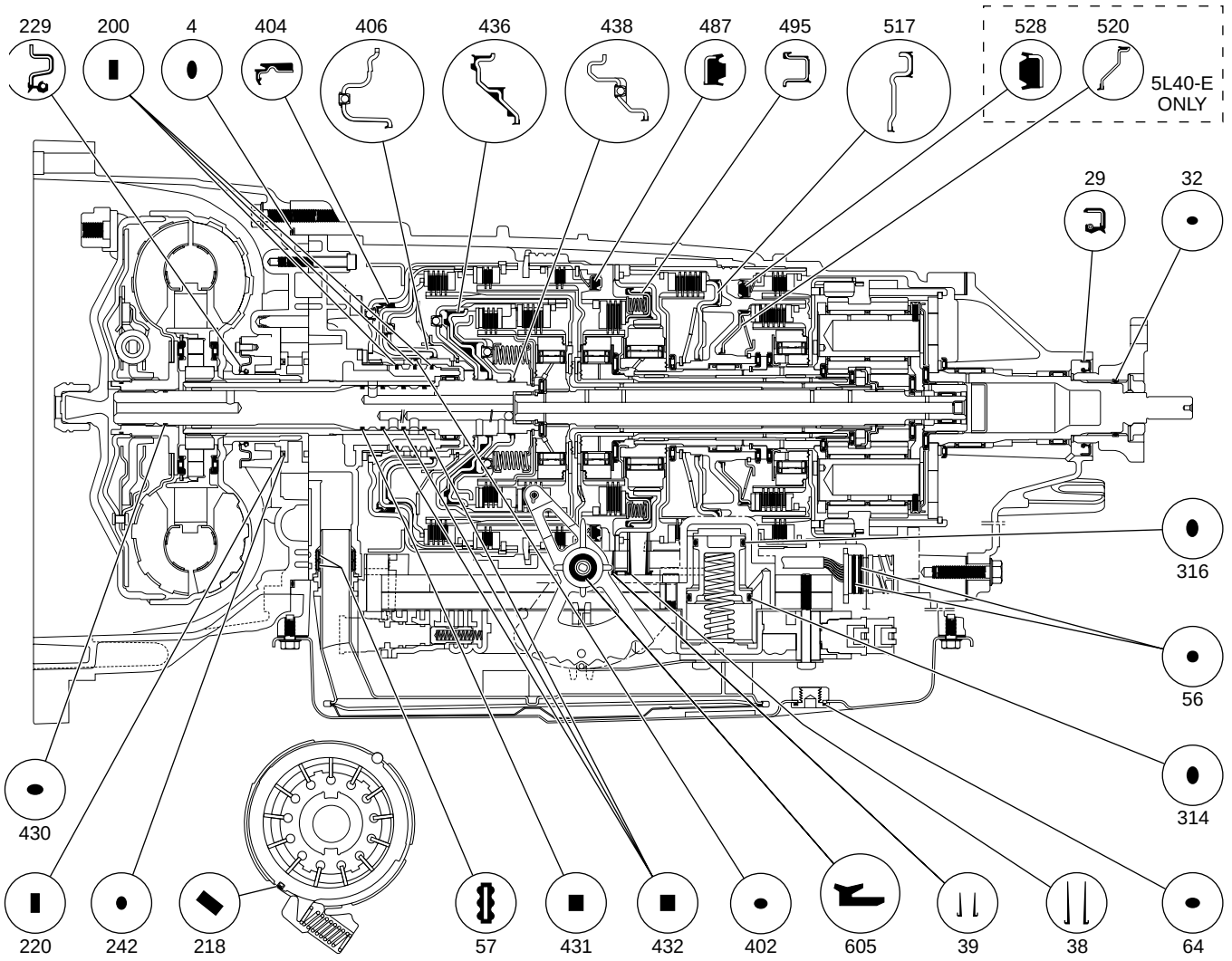


REAR CONTROL VALVE BODY (310)
(Bottom Channel Plate Side)

Figure 105

FOLDOUT ➤ 109

Seal Locations



4	TORQUE CONVERTER HOUSING FLUID SEAL ASSEMBLY
29	TRANSMISSION PROP SHAFT FLANGE SEAL
32	TRANSMISSION PROP SHAFT FLANGE (O-RING) SEAL
38	CENTER SUPPORT FLUID PASSAGE SLEEVE
39	OVERDRIVE CLUTCH FLUID PASSAGE SLEEVE
56	A/TRANSMISSION WIRING HARNESS (O-RING) SEAL (2)
57	TRANSMISSION FILTER SEAL (2)
64	A/TRANS FLUID PAN DRAIN PLUG SEAL
200	REVERSE CLUTCH HOUSING FLUID SEAL RING
218	A/TRANS FLUID PUMP SLIDE SEAL
220	A/TRANS FLUID PUMP SLIDE RING
229	TORQUE CONVERTER HOUSING SEAL
242	A/TRANS FLUID PUMP SLIDE O-RING SEAL
314	CLUTCH ACCUMULATOR PISTON FLUID SEAL RING
316	CLUTCH ACCUMULATOR PISTON FLUID SEAL RING
402	REVERSE CLUTCH PISTON INNER SEAL
404	REVERSE CLUTCH PISTON
406	DIRECT CLUTCH PISTON ASSEMBLY
430	INPUT SHAFT (O-RING) SEAL
431	INPUT SHAFT FLUID SEAL RING
432	INPUT SHAFT FLUID SEAL RING
436	FORWARD CLUTCH PISTON ASSEMBLY
438	COAST CLUTCH PISTON ASSEMBLY
487	OVERDRIVE CLUTCH PISTON ASSEMBLY
495	INTERMEDIATE CLUTCH PISTON ASSEMBLY
517	LOW AND REVERSE CLUTCH PISTON
520	2ND CLUTCH PISTON
528	2ND COAST CLUTCH PISTON ASSEMBLY
605	MANUAL SHIFT SHAFT SEAL

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Figure 110