41/42 Series Automatic Transmission Repair
# 41/42 Series Automatic Transmission Repair

## TABLE OF CONTENTS

**INTRODUCTION AND OBJECTIVES** ................................................................. 1
- INTRODUCTION ......................................................................................... 1
- COURSE OBJECTIVES ........................................................................... 2

**ACRONYMS** .............................................................................................. 3

**MODULE 1 41/42 SERIES AUTOMATIC TRANSMISSIONS** ........... 4

**ACTIVITY 1.1 DISASSEMBLY** ................................................................. 7
- OIL PUMP ................................................................................................. 8

**ACTIVITY 1.2 PUMP INSPECTION** ....................................................... 9

**MODULE 2 42LE DIFFERENTIAL** .......................................................... 10

**ACTIVITY 2.1 ASSEMBLE 42LE DIFFERENTIAL** ............................... 12

**MODULE 3 41TE DIFFERENTIAL** ......................................................... 14

**ACTIVITY 3.1 ASSEMBLE 41TE DIFFERENTIAL** ............................... 15

**MODULE 4 TRANSMISSION CENTERLINE** ........................................... 17
- LOW/REVERSE CLUTCH ........................................................................ 17
- 2/4 CLUTCH .......................................................................................... 22
- PLANETARY GEARTRAIN ASSEMBLY .................................................. 24
  - Rear Carrier Assembly ................................................................. 25
- SNAP RING AND REACTION PLATES .................................................. 26

**ACTIVITY 4.1 ASSEMBLE TRANSMISSION CENTERLINE** ............... 27

**MODULE 5 INPUT CLUTCH ASSEMBLY** ............................................. 29
- INPUT CLUTCHES .................................................................................. 29
  - Underdrive Clutch .......................................................................... 30
  - Overdrive and Reverse Clutch ....................................................... 35

**ACTIVITY 5.1 DISASSEMBLE AND ASSEMBLE INPUT CLUTCH ASSEMBLY** ................................................................. 42

**MODULE 6 HYDRAULICS** ................................................................. 43
- VALVE BODY ......................................................................................... 43
  - Solenoid Switch Valve .................................................................. 45
  - Torque Converter Regulator Valve ............................................ 47
  - Converter Clutch Switch .............................................................. 47
  - Low/Reverse Switch Valve ......................................................... 49
  - Accumulator .................................................................................. 49
  - Solenoid Pack ............................................................................... 50
  - Manual Shaft/Roostercomb ......................................................... 51

**ACTIVITY 6.1 VALVE IDENTIFICATION** .............................................. 52
**ACTIVITY 6.2 CHECK BALL IDENTIFICATION** ................................. 53
TABLE OF CONTENTS (CONTINUED)

ACTIVITY 6.3 VERIFICATION TEST................................................................. 54
GLOSSARY.................................................................................................. 55
INTRODUCTION AND OBJECTIVES

INTRODUCTION
This course provides hands on experience in the disassembly and assembly of the hydraulic and mechanical control systems of the 41TE/AE, 42LE & 42RLE transaxles. The goal of this course is to provide the technician with information and the tools to disassemble, reassemble and properly set-up the differentials of these transaxles. The 41TE/AE & 42LE transaxles are found on the following DaimlerChrysler vehicles:

- Caravan/Voyager  41AE-AWD, 41TE-FWD
- Cirrus/Stratus  41TE
- Sebring Convertible  41TE
- Neon  41TE
- PT Cruiser  41TE
- Intrepid/Concorde/300M  42LE
- Wrangler  42RLE

This course contains six modules of training information:

- Module 1  Disassembly of the 41/42 Series Electronic Automatic Transmissions
- Module 2  Assembly of the 42LE Differential
- Module 3  Assembly of the 41TE Differential
- Module 4  Assembly of the Transmission’s Centerline
- Module 5  Disassembly and Assembly of the Input Clutch Assembly
- Module 6  Disassembly and Assembly of the Valve Body
COURSE OBJECTIVES

After completing this course, a technician will be able to:

• Disassemble the transmissions and analyze each component.
• Disassemble and analyze the final drive components (transfer shaft and differential if applicable).
• Perform differential setup procedures on the 42LE transmission.
• Perform differential setup procedures on the 41TE transmission.
• Disassemble and reassemble the input clutch assembly.
• Reassemble the transmissions.
• Disassemble and reassemble the hydraulic valve body.
ACRONYMS

The acronyms listed here are used throughout this course.

- AWD  All-Wheel Drive
- DRBIII®  Diagnostic Readout Box
- EATX  Electronic Automatic Transaxle
- FWD  Front-Wheel Drive
- PCM  Powertrain Control Module
- TCC  Torque Converter Clutch
- TCM  Transmission Control Module
- TRS  Transmission Range Sensor
MODULE 1 41/42 SERIES AUTOMATIC TRANSMISSIONS

The 41/42 series transmissions are four-speed transmissions that have a conventional hydraulic/mechanical assembly with an integral differential (fig. 1 & 2). The transmissions are controlled with adaptive electronic controls and monitors. The hydraulic system consists of the transmission fluid, fluid passages, valves, and various line pressure components. The primary mechanical components of the transmissions are:

- Three multiple disc input clutches
- Two multiple disc holding clutches
- Four hydraulic accumulators
- Two planetary gear sets
- Hydraulic oil pump
- Valve body
- Solenoid/Pressure switch assembly
- Integral differential assembly

In this module we will be concentrating on the mechanical components of the transmissions. It is important you that the disassembly procedures in the Service Manual are followed. Tag all clutch pack assemblies, as they are removed, for reassembly identification.

Caution: Do not intermix clutch discs or plates or the unit might fail.
1 Reverse Clutch
2 Overdrive Clutch
3 Underdrive Clutch
4 Oil Pump
5 Differential Assembly
6 Solenoid Assembly
7 Transfer Shaft
8 Transfer Chain
9 Low/Reverse Clutch
10 2-4 Clutch

Figure 1 42LE Transaxle
1 Differential Assembly 7 Low/Reverse Clutch
2 Differential Ring Gear 8 Transfer Gears
3 Underdrive Clutch 9 Transmission Range Sensor
4 Overdrive Clutch 10 Solenoid Assembly
5 Reverse Clutch 11 Torque Converter
6 2-4 Clutch 12 Input Shaft

Figure 2 41TE Transaxle
ACTIVITY 1.1 DISASSEMBLY

For this activity you will disassemble the 41/42 series transmissions using the appropriate Service Manual. Follow this activity and complete all the answers. Take off the valve body and set it aside. You will be using the valve body in another activity.

1. What is the transmission assembly part number? ______________________

2. What is the input shaft endplay measurement of your transmission? _______

3. Is it within specification? __________________________

4. How is input shaft endplay adjusted on your transmission? ________________

5. What position does the manual shift lever need to be in to remove the valve body? ________________

6. Before and after transmission assembly, you should air pressure check the clutches using what tools and how much air pressure? ________________

7. Should the by-pass valve be replaced if a transmission failure occurs? ______

8. The number seven needle bearing has three anti-reversal tabs. What other two needle bearings have the same tabs? __________________________

9. On the 41TE the ________ and ________ must be removed before you can remove the rear carrier assembly. __________________________

10. On the 42LE and 42RLE only the ________ must be removed before removing the rear carrier assembly. __________________________
OIL PUMP

The oil pump is located in the pump housing inside the bell housing of the transaxle case (fig. 3). The oil pump consists of an inner and outer gear, a housing, and cover that also serves as the reaction shaft support.

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. (Actually, fluid is pushed into the low-pressure region by atmospheric pressure). As clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

Measuring oil pump output volume determines if sufficient flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outer Pump Gear</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Inner Pump Gear</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Reaction Shaft Support</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Seal Rings (4)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3  Oil Pump
ACTIVITY 1.2 PUMP INSPECTION

The purpose of this activity is for you to understand a good pump from a defective pump. In addition you will demonstrate, using the Service Manual, the proper assembly procedure.

<table>
<thead>
<tr>
<th>OIL PUMP</th>
<th>MEASUREMENT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer gear to pocket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer gear side/Reaction shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner gear side/Reaction shaft</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. What is the first step in pump inspection? ____________________

2. What is the specification on the clearance of the outer gear to the reaction shaft? ____________________

3. What is the specification on the clearance of the inner gear to the reaction shaft? ____________________

4. What should the clearance be between the outer gear to pocket? ____________________

5. What two tools can you use to check clearance? ____________________

6. Should the gear be lubricated? What should the gear be lubricated with? ______

7. What tool should be used to bolt the reaction shaft to the pump body, and what is the specification? ____________________
MODULE 2 42LE DIFFERENTIAL

In the 42LE, the final drive geartrain includes the transfer shaft, ring gear, and differential assembly (fig. 4). The differential case consists of pinion and side gears, and a pinion shaft. The differential case is supported in the transaxle by tapered roller bearings.

The 42LE uses a hypoid-type ring and pinion gear set, which is similar to those found in rear wheel drive axles. The differential backlash is adjustable but does not use any shims. Backlash is adjusted by moving the ring gear and the differential assembly closer to, or further away from, the transfer shaft pinion gear.

Whenever you are replacing any component associated with the differential assembly in the 42LE, both backlash and pinion depth adjustments must be made (fig. 5). These adjustments are to bring the teeth of this matched set of gears to their correct relationship (fig. 6).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transfer Shaft</td>
</tr>
<tr>
<td>2</td>
<td>Pinion Gear</td>
</tr>
<tr>
<td>3</td>
<td>Ring Gear</td>
</tr>
</tbody>
</table>

Figure 4  42LE Final Drive Geartrain
1 Centering Block  |  3 Gauge Disc

2 Dial Indicator

Figure 5  Mounting of Dial Indicator to Centering Block

1 Centering Block  |  2 Gauge Disc

Figure 6  Pivot Dial Indicator
ACTIVITY 2.1 ASSEMBLE 42LE DIFFERENTIAL

For this activity you will disassemble and assemble a 42LE differential using the appropriate Service Manual. Follow this activity and complete all the answers. Before proceeding with this activity you will watch a video on all the adjustments made to the 42LE differential.

42LE FINAL DRIVE MEASUREMENT SPECIFICATION

<table>
<thead>
<tr>
<th>Differential assembly</th>
<th>Output shaft</th>
<th>Transfer shaft</th>
<th>Backlash</th>
<th>Assembly preload</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The dial indicator used to adjust pinion depth must have a face that shows what?

2. Write out the formula to determine the required shim thickness for the pinion depth measurement.
   Measured depth
   Adjustment number on transfer shaft
   +,- Adjustment factor found in the Service Manual
   = Shim needed

3. Before you install the transfer shaft what must be done and why?

4. Differential bearings must be seated before measuring turning torque. This is done by:

5. What failure could occur if pinion depth is not adjusted correctly?

6. How many foot-pounds were required on the outer adjuster to obtain the correct turning torque?

7. What other repair requires the above measurements be performed?

8. What is the specification for backlash?
ACTIVITY 2.1 ASSEMBLE 42LE DIFFERENTIAL (CONTINUED)

9. Once backlash is within specification, what would you do next? 

10. What types of fluid do you use to fill the differential?
The final drive gears include the transfer shaft, which has a pinion gear on one end, and the differential ring gear, which is driven by the transfer shaft pinion gear (fig. 7). The ring gear is bolted to the differential case and, when rotated, drives the case. The case drives the differential gear set and, in turn, the front axle shafts. The axle shafts then drive the front wheels.

The differential gears are typical in design and include a shaft, two pinion gears, and two side gears. The final drive gears and the differential case are supported by tapered roller bearings. The transfer shaft and its tapered roller bearings are set-up with a specific amount of endplay. The differential ring gear and case assembly bearings are set up with a specific amount of preload. Follow the Service Manual procedures for setting up these bearings to ensure a long life for the bearings and the components they support.

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<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Differential Gears (2)</td>
<td>5</td>
<td>Transfer Shaft Pinion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ring Gear</td>
<td>6</td>
<td>Differential Case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Transfer Shaft</td>
<td>7</td>
<td>Differential Side Gears (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spline for Transfer Gear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 7  41TE Final Drive Gears and Differential
ACTIVITY 3.1 ASSEMBLE 41TE DIFFERENTIAL

For this activity you will disassemble and assemble a 41TE differential using the appropriate Service Manual. Follow this activity and complete all the answers.

<table>
<thead>
<tr>
<th>41TE FINAL DRIVE</th>
<th>MEASUREMENT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential assembly</td>
<td>____________</td>
<td>____________</td>
</tr>
<tr>
<td>Output hub</td>
<td>____________</td>
<td>____________</td>
</tr>
<tr>
<td>Transfer shaft endplay</td>
<td>____________</td>
<td>____________</td>
</tr>
</tbody>
</table>

1. Differential service is limited to _______ and _________. ______________

2. The ____________ should be removed before differential repair and bearing turning torque checking. ______________

3. The turning torque should be ______ and ______ in. lbs. ______________

4. Where is the shim installed? ______________

5. If turning torque is too high, what size shim thickness should be used? ______

6. If turning torque is too low, what size shim thickness should be used? ______
ACTIVITY 3.1 ASSEMBLE 41TE DIFFERENTIAL (CONTINUED)

7. Shim thickness needs to be determined only if any of the following parts are replaced except:
   a. Transaxle case
   b. Extension housing
   c. Input shaft
   d. Differential bearing retainer

8. In the picture below, what measurement is shown and what is the correct repair if it is out of specification?

1. Dial Indicator Set
2. Differential Assembly
3. Side Gear
4. Special Tool C-4996
Two hydraulically applied multi-disc clutches are used to hold planetary geartrain components stationary. While the input clutches drive others, the 2/4 and low/reverse clutches are considered holding clutches and are contained at the rear of the transmission case.

**LOW/REVERSE CLUTCH**

The Low/Reverse (L/R) clutch is hydraulically applied in park, reverse, neutral and first gears by pressurized fluid against the low/reverse clutch piston. When the low/reverse clutch is applied, the front planet carrier/rear annulus assembly is held or grounded to the transaxle case (fig. 11).

The L/R reaction plate is installed flat side up and it is selective only on the L/R side (fig. 8). The L/R clutch piston Belleville spring snap ring is a flat snap ring with two tabs for easy removal (fig. 9). The L/R lower reaction plate snap ring is flat with two tabs for easy removal (fig. 9). The L/R upper reaction plate snap ring is tapered with the painted side down when installed. This snap ring is not reusable (fig. 10).
1 L/R Reaction Plate (Selective)

Figure 8  L/R Reaction Plate
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/R Piston Belleville Snap Ring</td>
<td>L/R Lower Reaction Plate Snap Ring</td>
</tr>
</tbody>
</table>

Figure 9  L/R Piston Belleville Spring & L/R Lower Reaction Plate
1  L/R Reaction Plate Snap Ring (Not Reusable)

Figure 10  L/R Upper Reaction Plate Snap Ring
## 41/42 Series Automatic Transmission Repair

<table>
<thead>
<tr>
<th></th>
<th>Component</th>
<th></th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Snap Ring</td>
<td>6</td>
<td>Piston</td>
</tr>
<tr>
<td>2</td>
<td>Separator Plates</td>
<td>7</td>
<td>Belleville Snap Ring</td>
</tr>
<tr>
<td>3</td>
<td>Belleville Spring</td>
<td>8</td>
<td>Clutch Discs</td>
</tr>
<tr>
<td>4</td>
<td>Piston Retainer</td>
<td>9</td>
<td>Reaction Plate</td>
</tr>
<tr>
<td>5</td>
<td>Gasket</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 11** Low/Reverse Clutch
The 2/4 clutch is hydraulically applied in second and fourth gears by pressurized fluid applied against the 2/4 clutch piston. When the 2/4 clutch is applied, the front sun gear assembly is held, or grounded, to the transmission case (fig. 13).

The 2/4 piston snap ring is flat with a tab for easy removal. It differs from the L/R reaction plate snap ring (fig. 12).
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Snap Ring</td>
<td>5</td>
<td>Snap Ring</td>
</tr>
<tr>
<td>2</td>
<td>Piston Retainer</td>
<td>6</td>
<td>Clutch Discs</td>
</tr>
<tr>
<td>3</td>
<td>Belleville Spring</td>
<td>7</td>
<td>Piston</td>
</tr>
<tr>
<td>4</td>
<td>Separator Plates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 13  2/4 Clutch
PLANETARY GEARTRAIN ASSEMBLY

The entire planetary geartrain is located behind the input clutch assembly and inside the 2/4 and L/R clutch assemblies (fig. 14). The planetary geartrain consists of two sun gears, two planetary carriers, two annulus rings, and one output shaft (which is part of the rear carrier).

<table>
<thead>
<tr>
<th></th>
<th>1 #6 Thrust Bearing</th>
<th>2 #7 Thrust Bearing</th>
<th>3 Rear Carrier Front Annulus Assembly</th>
<th>4 Rear Sun Gear</th>
<th>5 Front Carrier Rear Annulus Assembly</th>
<th>6 Front Sun Gear</th>
<th>7 Front Sun Gear Assembly</th>
</tr>
</thead>
</table>

Figure 14 Planetary Geartrain Assembly
Rear Carrier Assembly

The rear planetary carrier, front annulus gear and output shaft are all one assembly (fig. 15). The rear carrier assembly provides all output power for the transaxle assembly. The lugs around the outside of the assembly have two purposes:

- To engage the parking pawl when the driver selects park
- To generate an output speed signal used by the TCM

There are no clutches splined or connected to this unit in any way. The rear carrier assembly is supported to the case by two tapered roller bearings, which must be set up with specific preload and measured by turning torque.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planetary Pinion Gear</td>
</tr>
<tr>
<td>2</td>
<td>Rear of Transaxle</td>
</tr>
<tr>
<td>3</td>
<td>Front Annulus Gear</td>
</tr>
<tr>
<td>4</td>
<td>Lugs for Parking Pawl and Output Speed Sensor</td>
</tr>
<tr>
<td>5</td>
<td>Output Shaft</td>
</tr>
</tbody>
</table>

Figure 15  Rear Carrier Assembly
SNAP RING AND REACTION PLATES

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OD/Rev Piston Belleville Snap Ring</td>
<td>10</td>
<td>Reverse Clutch Reaction Plate Snap Ring</td>
</tr>
<tr>
<td>2</td>
<td>Input Clutch to Hub Snap Ring</td>
<td>11</td>
<td>Reverse Reaction Plate</td>
</tr>
<tr>
<td>3</td>
<td>UD Clutch Spring Retainer Snap Ring</td>
<td>12</td>
<td>L/R Piston Belleville Spring Snap Ring</td>
</tr>
<tr>
<td>4</td>
<td>UD Reaction Plate</td>
<td>13</td>
<td>L/R Reaction Plate</td>
</tr>
<tr>
<td>5</td>
<td>UD Lower Reaction Plate Snap Ring</td>
<td>14</td>
<td>L/R Lower Reaction Plate Snap Ring</td>
</tr>
<tr>
<td>6</td>
<td>UD Upper Reaction Plate Tapered Snap Ring</td>
<td>15</td>
<td>L/R Upper Reaction Plate Snap Ring</td>
</tr>
<tr>
<td>7</td>
<td>OD/Rev Lower Reaction Plate Snap Ring</td>
<td>16</td>
<td>2-4 Piston Snap Ring</td>
</tr>
<tr>
<td>8</td>
<td>OD/Rev Reaction Plate</td>
<td>17</td>
<td>Input Shaft Snap Ring</td>
</tr>
<tr>
<td>9</td>
<td>OD/Rev Upper Reaction Plate Snap Ring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 16 Location of Snap Rings and Reaction Plates
ACTIVITY 4.1 ASSEMBLE TRANSMISSION CENTERLINE

The purpose of this activity is to assemble the centerline of the transmission, paying close attention to the placement of snap rings and retainers.

CLUTCH PACK | MEASUREMENT | SPECIFICATION
--- | --- | ---
L/R clutch | | |
2/4 clutch | | |

1. Is the low/reverse snap ring reusable? __________________________
2. How is the low/reverse clutch pack adjusted? __________________________
3. How is the 2/4 clutch adjusted? __________________________
4. If the 2/4 clutch were out of specification, what would be the cause? _________
5. The #4 thrust plate is used to adjust what? __________________________
6. On the 42LE transmission, when must you check and adjust output shaft preload? __________________________
7. On the 42LE transmission, the blue link on the chain must face in what direction? __________________________
8. On the 41TE what three adjustments need to be made before installing the low/reverse clutch? __________________________
ACTIVITY 4.1 ASSEMBLE TRANSMISSION CENTERLINE (CONTINUED)

9. The picture below shows what measurement being performed? ____________

10. Based on the picture, what side has the flat end and what side has the tapered end?

| 1 | Low/Reverse Reaction Plate |
| 2 | Start Here to Press into Groove |
MODULE 5 INPUT CLUTCH ASSEMBLY

INPUT CLUTCHES

Each of the three clutches in the input clutch assembly supply input power to a particular component in the planetary geartrain when they are hydraulically applied (fig. 17). They are connected to the planetary geartrain through the overdrive hub assembly, underdrive hub assembly, and the front sun gear assembly. When any of these clutches are applied, they turn or drive a component, which is an input to the planetary geartrain.

![Figure 17 Input Clutches](image)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Separator Plates</td>
</tr>
<tr>
<td>2</td>
<td>Reaction Plate</td>
</tr>
<tr>
<td>3</td>
<td>Overdrive Discs</td>
</tr>
<tr>
<td>4</td>
<td>Snap Rings</td>
</tr>
<tr>
<td>5</td>
<td>Reverse Clutch Discs</td>
</tr>
<tr>
<td>6</td>
<td>Reaction Plate</td>
</tr>
<tr>
<td>7</td>
<td>Snap Ring</td>
</tr>
<tr>
<td>8</td>
<td>Separator Plate</td>
</tr>
<tr>
<td>9</td>
<td>OD/Rev Pressure Plate</td>
</tr>
<tr>
<td>10</td>
<td>Separator Plates</td>
</tr>
<tr>
<td>11</td>
<td>Snap Rings</td>
</tr>
<tr>
<td>12</td>
<td>Underdrive Clutch Discs</td>
</tr>
</tbody>
</table>
Underdrive Clutch

The Underdrive Clutch (UD) is splined to the underdrive hub assembly (fig. 18). The underdrive shaft, which is secured to the underdrive hub, is splined to the rear sun gear. When the underdrive clutch is applied hydraulically, the rear sun gear is the input to the planetary gearset in first, second and third gears (fig. 22).

The UD clutch retainer snap ring is located in the input clutch assembly. The snap ring is directional and the flat side should be facing up (fig. 19). The UD lower reaction plate snap ring has flat tabs for easy removal (fig. 19). The UD reaction plate, which is located in the input clutch assembly, also is directional with the flat side up and selective (fig. 20). The UD upper reaction plate has a tapered snap ring. The tapered side is up with the painted side down. This snap ring is not reusable (fig. 21).

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Underdrive Hub</td>
</tr>
<tr>
<td>2</td>
<td>Underdrive Shaft</td>
</tr>
<tr>
<td>3</td>
<td>#3 Thrust Washer</td>
</tr>
</tbody>
</table>
1 Underdrive Clutch Spring Retainer Snap Ring (Directional)
2 Underdrive Reaction Plate Snap Ring (Flat with Tabs)

Figure 19 Underdrive Snap Ring
1 Underdrive Reaction Plate (Directional and Selective)

Figure 20 Underdrive Reaction Plate
1 Underdrive Reaction Plate Snap Ring (Tapered and not Reusable)

Figure 21 Underdrive Upper Reaction Plate Snap Ring
### Parts List

<table>
<thead>
<tr>
<th>Number</th>
<th>Part Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Input Shaft</td>
</tr>
<tr>
<td>2</td>
<td>#2 Thrust Bearing</td>
</tr>
<tr>
<td>3</td>
<td>Clutch Retainer</td>
</tr>
<tr>
<td>4</td>
<td>Underdrive Piston</td>
</tr>
<tr>
<td>5</td>
<td>Spring Retainer</td>
</tr>
<tr>
<td>6</td>
<td>Snap Ring</td>
</tr>
<tr>
<td>7</td>
<td>Underdrive Clutch Spring</td>
</tr>
<tr>
<td>8</td>
<td>Input Hub</td>
</tr>
<tr>
<td>9</td>
<td>Separator Plates</td>
</tr>
<tr>
<td>10</td>
<td>Underdrive Clutch Discs</td>
</tr>
</tbody>
</table>

**Figure 22** Underdrive Clutch
Overdrive and Reverse Clutch

The overdrive clutch is splined to the overdrive hub assembly, and the overdrive hub is splined to the front carrier assembly (fig. 23). When the overdrive clutch is applied hydraulically, the front carrier assembly is an input to the planetary gearset in direct and overdrive gear ranges. The reverse is splined to the front sun gear assembly. When the reverse clutch is hydraulically applied, it drives the front sun gear, which is the input to the planetary gearset in reverse range (fig. 29).

The OD/Rev piston Belleville snap ring is located in the input clutch assembly (fig. 24). The snap ring is flat with tabs for easy removal. The OD/Rev lower reaction plate snap ring is a narrow wave type snap ring (fig. 25). The OD/Rev upper reaction plate snap ring is flat with tabs for easy removal (fig. 26). The OD/Rev reaction plate is directional and the flat side should be up when installed (fig. 27). The reverse clutch reaction plate snap ring is flat in shape and is selective (fig. 27). The reverse reaction plate is installed flat side down (fig. 28).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>#3 Thrust Washer</td>
</tr>
<tr>
<td>2</td>
<td>Overdrive Hub</td>
</tr>
</tbody>
</table>

Figure 23  Overdrive Hub
1 OD/Rev Piston Belleville Spring Snap Ring (Flat with Tabs)

Figure 24  OD/Rev Piston Belleville Snap Ring
1 OD/Rev Lower Reaction Plate Snap Ring (Wave)

Figure 25 OD/Rev Lower Reaction Plate Snap Ring
1 OD/Rev Upper Reaction Plate Snap Ring (Flat)

Figure 26  OD/Rev Reaction Plate Snap Ring
1. Reverse Clutch Reaction Snap Ring (Flat and Selective)
2. Input Shaft Snap Ring (Round)

Figure 27  Reverse Clutch Reaction Plate Snap Ring
1 Reverse Reaction Plate (Flat Side Down)

Figure 28 Reverse Reaction Plate
<table>
<thead>
<tr>
<th></th>
<th>Component</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overdrive/Reverse Piston</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Overdrive Hub</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Underdrive Hub</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Reaction Plate</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Snap Ring</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>Separator Plate</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>OD/Rev Pressure Plate</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Separator Plates</td>
<td></td>
</tr>
</tbody>
</table>

Figure 29  Overdrive and Reverse Clutch
ACTIVITY 5.1 DISASSEMBLE AND ASSEMBLE INPUT CLUTCH ASSEMBLY

For this activity you will disassemble/assemble the 41/42 series input clutch assembly using the appropriate Service Manual. Follow this activity and complete all the answers.

<table>
<thead>
<tr>
<th>CLUTCH PACK</th>
<th>MEASUREMENT</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rev clutch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OD clutch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UD clutch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input shaft endplay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The OD/UD clutch reaction plate tapered snap ring is reusable. True False
2. The input hub tapered snap ring is installed in what direction? _____________

3. How is the underdrive clutch pack adjusted? _________________

4. How many measurements should be taken on the underdrive clutch before you make adjustments for clearance? _________________

5. What is used to adjust the clearance of the underdrive clutch pack? _____________

6. What other clutch packs are adjusted using tool 8391 and 30 psi of shop air? _____________

7. How is the OD clutch pack adjusted? _________________

8. How is the Rev clutch pack adjusted? _________________

9. When installing the input clutch assembly, how can you verify it is fully engaged?
   a. Make depth measurement of the assembly
   b. Feel the unit bottom
   c. Look through the input speed sensor hole
   d. None of the above

10. All of the following must be done when overhauling a transmission except:
    a. Perform Quick Learn
    b. Test drive
    c. Clear codes
    d. Replace transmission range sensor
VALVE BODY
The valve body assembly consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, solenoid/pressure switch assembly, and friction clutches (fig. 30). The valve body contains the following components:

- Regulator valve
- Solenoid switch valve
- Manual valve
- Converter clutch control valve
- Converter clutch switch valve
- Torque converter regulator valve
- Low/Reverse switch valve

In addition, the valve body also contains the thermal valve, #2, 3 & 4 check balls, the #5 check valve, and the 2/4 accumulator assembly.
Regulator Valve

The regulator valve controls hydraulic pressure in the transaxle. It receives unregulated pressure from the pump, which works against spring tension to maintain specific pressures. Regulated oil pressure is referred to as line pressure. The regulator valve is the sole source of pressure regulation in the transmission. It is both non-adjustable and non-computer controlled. Special tools 6301 and 6302 are required for removal of the regulator valve (fig. 31)

![Figure 31 Regulator Valve Removal and Installation Tool](image_url)

<table>
<thead>
<tr>
<th></th>
<th>Tool 6301</th>
<th></th>
<th>Tool 6302</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Retainer</td>
<td>1</td>
<td>Retainer</td>
</tr>
</tbody>
</table>
Solenoid Switch Valve

The solenoid switch valve controls line pressure from the LR/CC solenoid (fig. 32). In one position, it allows the L/R clutch to be pressurized. In the other direction, it directs line pressure to the converter control and converter clutch valves. The valve is shifted to the right in all positions except second, third, or fourth gears. The solenoid switch valve is electronically controlled through the solenoid pack by the LR/CC solenoid. A failure of the solenoid switch valve results in a fault code being set.

Figure 32  Solenoid Switch Valve
Manual Valve
The manual valve is operated by the mechanical shift linkage (fig. 33). Its primary responsibility is to send line pressure to the appropriate hydraulic circuits and solenoids. The valve has three operating ranges or positions. The valve is shifted to the left in OD, Drive, or Low when selected. The valve moves to the center when Park and Neutral are selected. The valve moves right when Reverse is selected. In limp-in flow to the circuits are controlled by the manual valve.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UD Clutch</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>LR/CC Solenoid</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Reverse Clutch</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Manual Valve</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Regulator Valve</td>
<td>10</td>
</tr>
</tbody>
</table>

Figure 33  Manual Valve
Torque Converter Regulator Valve

The torque converter regulator valve slightly regulates the flow of fluid to the torque converter. In the event of a converter clutch failure, everything in the converter clutch circuit should be checked. Use of the appropriate fluid is critical in the proper operation of the converter clutch and the clutch circuit.

Converter Clutch Switch

The main responsibility of the converter clutch switch valve is to control hydraulic pressure applied to the front (off) side of the converter clutch (fig. 34). Line pressure from the regulator valve is fed to the torque converter regulator valve, where it passes through this valve, and is slightly regulated. The pressure is then directed to the converter clutch switch valve and to the front side of the converter clutch piston. This pressure pushes the piston back and disengages the converter clutch.

![Figure 34 Converter Clutch Switch Valve](image)
Converter Clutch Control Valve

The main responsibility of the converter clutch switch valve is to control hydraulic pressure applied to the front (off) side of the converter clutch (fig. 35). Line pressure from the regulator valve is fed to the torque converter regulator valve, where it passes through this valve, and is slightly regulated. The pressure is then directed to the converter clutch switch valve and to the front side of the converter clutch piston. This pressure pushes the piston back and disengages the converter clutch.

Figure 35  Converter Clutch Control Valve
Low/Reverse Switch Valve

The low/reverse switch valve alternates positions depending on which direction fluid pressure is applied. The switch valve alienates the possibility of a sticking check ball, thus providing consistent application of the low/reverse clutch under all operating conditions.

Accumulator

The 41/42 series transmissions have four accumulators for each clutch hydraulic circuit. They are the underdrive, overdrive, 2/4, and low/reverse clutch hydraulic circuits. An accumulator assembly consists of a piston, seals, return spring(s) and a cover or plug (fig. 36). The function of an accumulator is to cushion the application of a frictional clutch element. In the event of an accumulator failure, the customer experiences poor driveability and harsh shifts.

![Diagram of Accumulator (Underdrive)](image)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accumulator Piston</td>
<td>3</td>
<td>Seal Ring</td>
</tr>
<tr>
<td>2</td>
<td>Return Springs</td>
<td>4</td>
<td>Seal Ring</td>
</tr>
</tbody>
</table>

Figure 36  Accumulator (Underdrive)
Solenoid Pack

The solenoid/pressure switch assembly is mounted either outside or inside the transmission, depending on which transmission you are working on (fig. 37 & 38). The assembly consists of four solenoids that control hydraulic pressure. The solenoid assembly also contains pressure switches that monitor and send hydraulic circuit information to the transmission control module (TCM). The only way the assembly can be serviced is to replace the entire assembly. In the event of a fault, you need to make sure to separate a solenoid pack failure from an internal transmission problem, such as a stuck valve in the valve body.

Figure 37  41TE Solenoid Pack

Figure 38  42LE Solenoid Pack
Manual Shaft/Roostercomb

The manual shaft/roostercomb is serviceable (fig. 39). You should check for worn or damaged combs, as well as excessive metal particles on the comb.

Figure 39  Manual Shaft/Roostercomb

<table>
<thead>
<tr>
<th></th>
<th>Transmission Range Sensor</th>
<th>3</th>
<th>Roostercomb</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Manual Shaft</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 1: Transmission Range Sensor
- 2: Manual Shaft
- 3: Roostercomb
ACTIVITY 6.1  VALVE IDENTIFICATION

Match the numbers to the valves of the valve body shown below.

_____ Manual Valve       _____ Valve Body       _____ Regulator Valve
_____ CC Switch Valve    _____ CC Control Valve  _____ Solenoid Switch Valve
_____ L/R Switch Valve   _____ T/C Regulator Valve

Diagram of valve body with numbered parts corresponding to the valve names listed above.
ACTIVITY 6.2 CHECK BALL IDENTIFICATION

Match the numbers to the check balls of the valve body shown below. Use the Service Manual as a reference.

1. 
2. 
3. 
4. 
5. 
6.
ACTIVITY 6.3 VERIFICATION TEST

The purpose of this activity is to ensure that your overhaul and repairs are done properly. Using the Transmission Diagnostic Procedures Manual, fill in the blanks.

1. Connect the _________ to the Data Link Connector (DLC)
2. Reconnect any disconnected ___________.
3. With the DRBIII®, erase all ______ DTCs, and also erase ______ DTCs.
4. With the DRBIII®, display transmission ___________. Start and run the engine until the transmission temperature is _________________.
5. Check the transmission ________ and adjust if necessary.
6. If the transmission control module or torque converter has been replaced, or if the transmission has been repaired or replaced, it is necessary to perform the DRBIII® ________________ and reset the _________________.
7. ________the vehicle. With the DRBIII®, monitor the engine____ Make _____ 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to ________ with constant throttle opening of _________________.
8. Below ________, make ______ wide open throttle kickdowns in first gear. Allow at least ________, each in 2nd and 3rd gear, between each kickdown.
9. For a specific DTC, drive the vehicle to the ______________________ ____________ conditions to verify DTC repair.
10. Were there any DTCs set during road test?
   a. Yes-----Repair is ____________
   b. No-----Repair is ____________
GLOSSARY

ACCUMULATOR: An accumulator assembly consists of a piston, seals, return spring(s), and a cover or plug. The function of an accumulator is to cushion the application of a frictional clutch element.

BACKLASH: The clearance between the teeth of the ring gear and pinion (transfer shaft) gear in the differential section of the transaxle. The clearance is measured in thousandths of an inch and is adjustable.

BELLEVILLE RETURN SPRING: A round, slightly cone shaped disc used to return a hydraulic piston in a clutch assembly to a static, unapplied position.

CENTERLINE: The axis of rotation for a particular gear, series of gears or shaft. For example, the 42LE transaxle has three centerlines: the planetary gear set centerline, the transfer shaft centerline and the differential centerline.

CLUTCH VOLUME INDEX: Clutch Volume Indexes, or CVIs. CVIs represent the volume of fluid needed to compress a clutch pack.

DIAGNOSTIC TROUBLE CODE (DTC): A DTC is a two digit number (P-code) stored in the powertrain control module memory, indicating a malfunction with the transaxle or its control system. Obtained by using the DRBIII® scan tool, the DRBIII® retrieves and displays the code(s).

ENDPLAY: The amount of end to end movement in a shaft due to clearance in the bearings.

LAND: Flat surface(s) on a valve which cause the valve to be moved to the left or right when the fluid pressure pushing against the land is high enough to overcome spring pressure, causing an upshift or downshift.

LIMP-IN: A condition where the powertrain control module shuts off the internal controls of the transaxle to prevent or reduce the chance of internal transaxle damage. Only second gear, park/neutral, and reverse are available.

LOW/REVERSE CLUTCH: The low/reverse clutch operates in first and reverse gears when the vehicle is parked and during manual operation. The low/reverse clutch is located between the reverse clutch and the output planetary carrier.

OVERDRIVE: Overdrive is a gear range in the transaxle with an output speed greater than its input speed. For example, for every 0.75 revolutions of input, the output rotates 1 revolution (0.75:1).

OVERDRIVE CLUTCH: Located in the reverse/overdrive clutch assembly, the overdrive clutch is used in third gear, and fourth gear.

PRELOAD: The amount of force, or torque required to rotate a tapered bearing to minimize thrust variation and the deflection of components.

PINION DEPTH: Represents the shim thickness required to achieve a proper mesh between the pinion gear and ring gear.
GLOSSARY (Continued)

PORT: The port is an opening in a valve through which fluid flow is controlled to the various clutches and brakes when the port opens or closes.

REACTION PLATE: The reaction plate is a component within a clutch assembly that, when applied, backs up or retains the pressure exerted on the clutch pack from the hydraulic pressure force of the piston.

RETURN SPRING: The return spring is located in the reverse/overdrive clutch, and is used to help release the overdrive clutch piston.

REVERSE CLUTCH: The reverse clutch is located in the reverse/overdrive clutch and is used in reverse only.

SOLENOID PACK: The solenoid pack is an electrical component comprised of a series of windings, hollow iron cores and a movable spring-loaded plunger or rod. When energized or turned on, it creates a magnetic field that moves the plunger against spring pressure. It converts electrical energy into mechanical force and movement and is used in the transaxle to open or close a valve.

SWITCH VALVE: The switch valve prevents the application of the low/reverse brake when the solenoid is OFF during limp-in operation. It is also used to reduce hydraulic line pressure in third and fourth gears.

TRANSAXLE RANGE SENSOR: The transaxle range sensor is a component that allows for accurate transmission gear position measurement.

UNDERDRIVE CLUTCH: Located on the input shaft, the underdrive clutch is used in all gear ranges except park, reverse, neutral, and fourth.

VALVE BODY: The valve body is a component of an automatic transaxle that contains the hydraulic valves. The valves are shifted to apply friction elements that control planetary gearset components.

VENT: The vent consists of holes in the clutch packs that allow fluid to be released when the solenoid to the clutch is duty cycled.

WAVE SPRING: Located in the low/reverse clutch, the wave spring is used to cushion the application of the low/reverse clutch.

2/4 CLUTCH: The 2/4 clutch is hydraulically applied in second and fourth gears. When the 2/4 clutch is applied, the front sun gear assembly is held or grounded to the transaxle case.