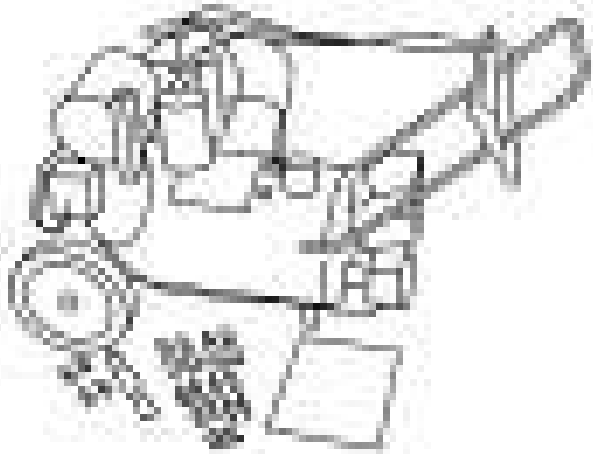


GENERAL PROCEDURES

TRANSMISSION FLUID COOLER BACKFLUSHING AND CLEANING

Special Tool(s)

SPECIAL TOOL SPECIFICATION

 <p>ST2971-A</p>	<p>Transmission Heated Cooler Line Flusher 222-00007, 222-00004 or equivalent</p>
---	---

Material

MATERIAL SPECIFICATION

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLV	MERCON® LV

NOTE: Use transmission fluid specified for this transmission. Do not use any supplemental transmission fluid additives or cleaning agents. The use of these products could cause internal transmission components to fail; this will affect the operation of the transmission.

NOTE: Transmission fluid cooler backflushing and cleaning will be performed using the Transmission Heated Cooler Line Flusher or equivalent. Follow the manufacturer's instructions included with the machine. Test the equipment to make sure that a vigorous fluid flow is present before proceeding.

NOTE: If the Transmission Heated Cooler Line Flusher or equivalent is not available, install a new transmission fluid cooler and/or an auxiliary transmission fluid cooler will be required.


1. Check and top off the fluid level of the cooler line flusher with transmission fluid.

2. Allow the transmission fluid in the cooler line flusher 15-30 minutes to heat up to 60°C (140°F) before using.
3. Install the line adapters into the transmission fluid cooler tubes.
4. Attach the cooler line flusher red line to the transmission fluid cooler pressure tube quick connect fitting.
5. Attach the cooler line flusher blue line to the transmission fluid cooler return tube quick connect fitting.
6. Follow the equipment instructions to purge the transmission fluid cooler tubes and cooler prior to starting the flushing procedure.
7. Allow the transmission fluid cooling system to backflush for 10-15 minutes, then flush the transmission fluid cooler in a normal flow direction for an additional 10-15 minutes.

TRANSMISSION FLUID DRAIN AND REFILL

Special Tool(s)

SPECIAL TOOL SPECIFICATION

 <p>ST2487-A</p>	<p>Rubber Tip Air Nozzle 100-D009 (D93L-7000-A)</p>
	<p>Transmission Fluid Fill Tube 307-570</p>



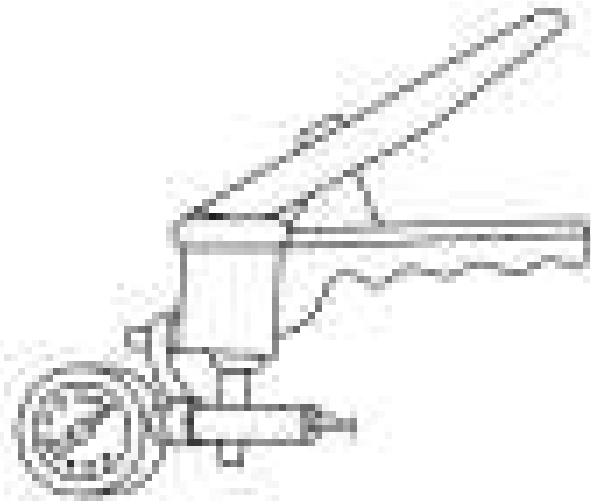
ST2933-A



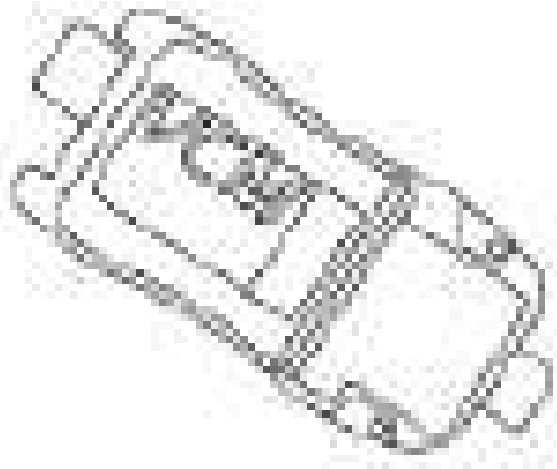
ST2715-A

Transporter Fluid Evacuator/Injector
307-D465 or equivalent

416-D002 (D95L-7559-A) or equivalent



ST1259-A



ST2634-A

Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Material

MATERIAL SPECIFICATION

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLV	MERCON® LV

Drain

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.

- NOTE:** Some transmission fluid leakage may occur when removing the transmission fluid fill plug.
- 2.

Remove the transmission fluid fill plug fluid level indicator assembly located on the passenger side front portion of the transmission case. Removal of the transmission fluid fill plug will relieve any vacuum that might have built up in the transmission. This will aid in allowing the transmission fluid pan to be easily removed when the bolts are removed.

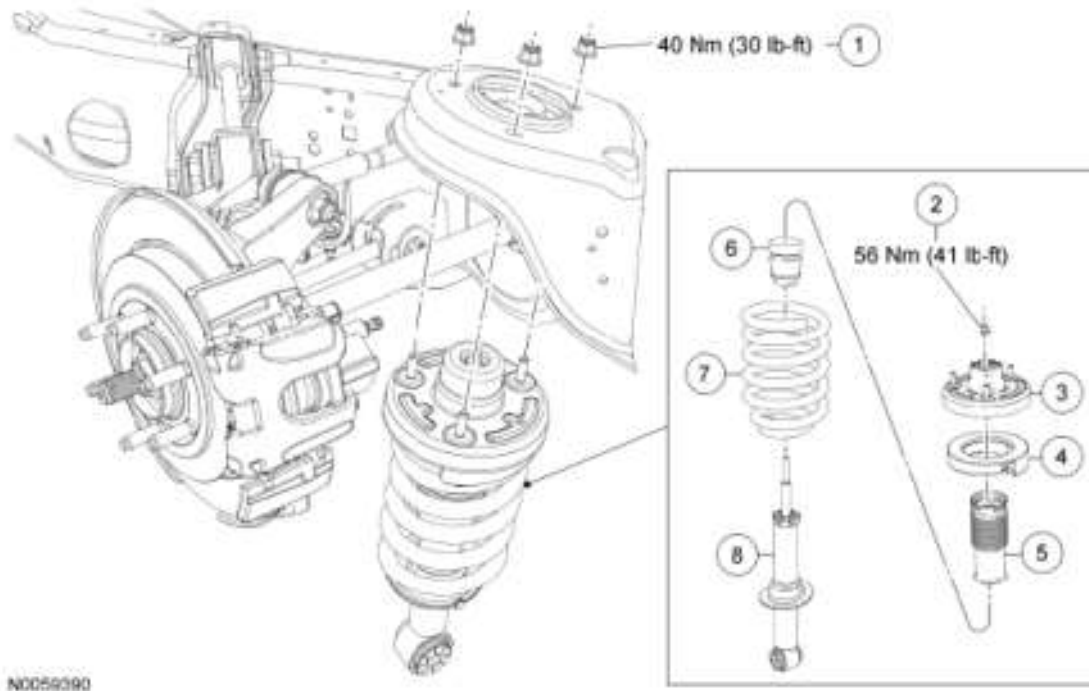


Fig. 104: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

3. Remove the transmission fluid pan and allow the transmission fluid to drain.

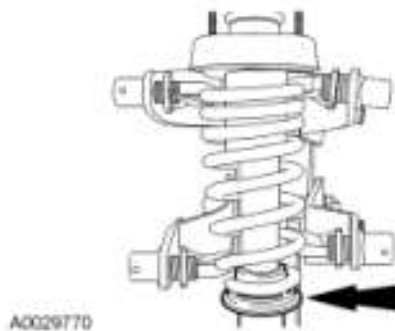


Fig. 105: Locating Transmission Fluid Pan Bolts
Courtesy of FORD MOTOR CO.

- NOTE:** The transmission fluid pan gasket can be reused if not damaged.
- 4.

Install a new transmission fluid pan gasket, if required.

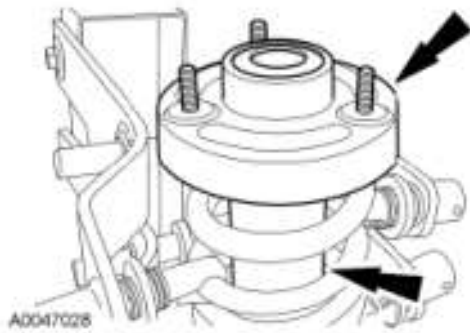
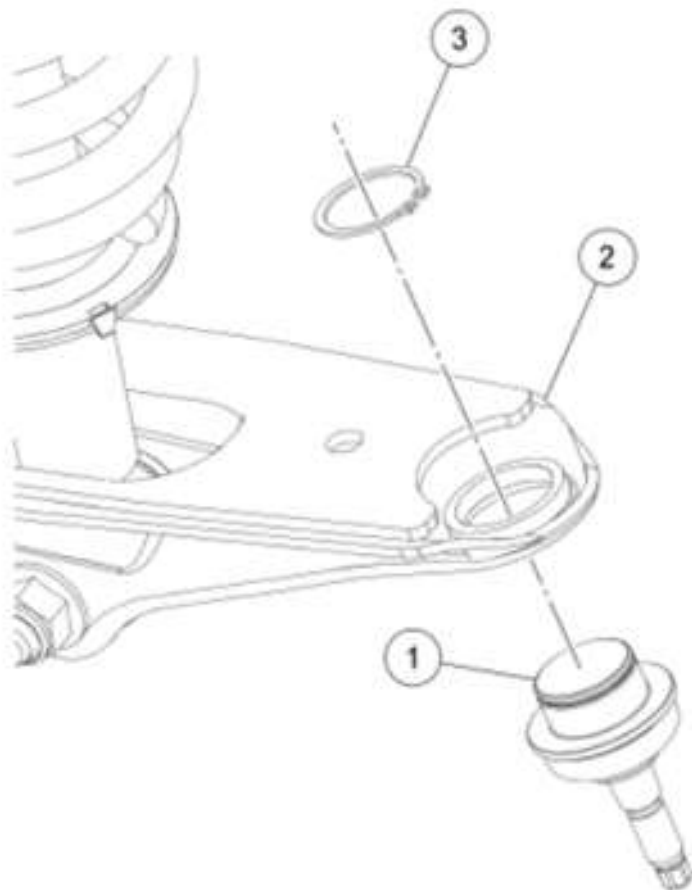


Fig. 106: Locating Transmission Fluid Pan Gasket
 Courtesy of FORD MOTOR CO.

5. Install the transmission fluid pan and tighten the bolts in a crisscross pattern.
 - Tighten to 12 Nm (106 lb-in).



N0054928

Fig. 107: Locating Transmission Fluid Pan Bolts
 Courtesy of FORD MOTOR CO.

Refill

NOTE: This procedure contains the air purge steps required to purge air from the transmission fluid cooling system. This procedure is NOT intended for use

with the Transmission Fluid Level Check.

NOTE: The vehicle should not be driven if the transmission fluid level is low as internal failure could result.

NOTE: The transmission fluid fill plug is located near the exhaust system. The exhaust will be extremely hot during this procedure.

NOTE: The use of any other transmission fluid than specified can result in the transmission failing to operate in a normal manner or transmission failure.

NOTE: If the transmission starts to slip, shifts slowly or shows signs of transmission fluid leaking, the transmission fluid level should be checked.

NOTE: Here is an overview of the Transmission Fluid Drain and Refill procedure.

- Adding 3.3L (3.5 qt) of transmission fluid to the transmission is an initial fill enabling the engine to be started.
- The cold level range shown in the procedure allows the vehicle to be driven.
- The vehicle should be driven to allow the Transmission Fluid Temperature (TFT) to reach 85°C-88°C (185°F-190°F) in order to purge the air from the transmission fluid cooling system.
- Fill the transmission fluid to the fill range on the transmission fluid level indicator at the normal operating range 80°C-85°C (176°F-185°F).

NOTE: The transmission will need 3.3L (3.5 qt) of transmission fluid added to the transmission as an initial fill if:

- the transmission has been overhauled.
- a new mechatronic assembly has been installed.
- the transmission fluid pan or transmission fluid filter have been removed.

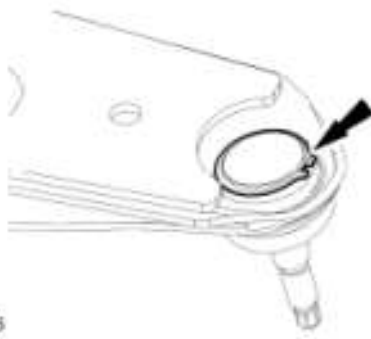
1.

Using the Transmission Fluid Fill Tube, add 3.3L (3.5 qt) of transmission fluid to the transmission through the transmission fluid fill hole. For additional information, refer to **ADDING ADDITIONAL TRANSMISSION FLUID**.

2. Check the transmission fluid level cold.

- The vehicle is safe to drive if the transmission fluid is in the cold level range 32°C-43°C (90°F-110°F).
- Using the scan tool and with the engine running, place the selector lever in each gear position and hold approximately 5 seconds. Place the selector lever in PARK, with the engine at idle (600-750 rpm).

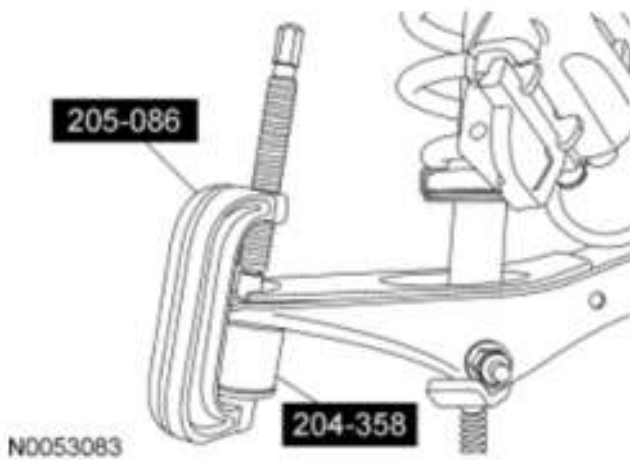
3. Separate the transmission fluid level indicator from the transmission fluid fill plug.



N0054926

Fig. 108: Locating Transmission Fluid Level Indicator
 Courtesy of FORD MOTOR CO.

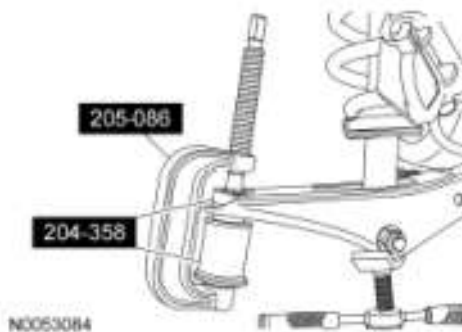
4. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.



N0053083

Fig. 109: Locating Transmission Fluid Level Indicator
 Courtesy of FORD MOTOR CO.

5. Add transmission fluid to the cold level location as shown in the illustration.



N0053084

Fig. 110: Locating Transmission Fluid To Cold Level Location
 Courtesy of FORD MOTOR CO.

6. Install the transmission fluid fill plug.
 - Tighten to 35 Nm (26 lb-ft).

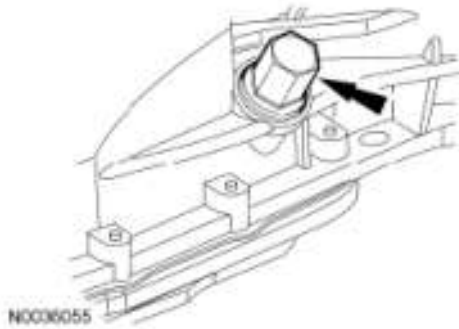


Fig. 111: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

7. While driving the vehicle, use the scan tool to verify that the **TFT** has reached a temperature of 88°C (190°F). This will circulate the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system.
 - With the engine idling (600-750 rpm) in PARK, verify that the **TFT** is between 80°C-85°C (176°F-185°F).
8. Remove the transmission fluid fill plug transmission fluid level indicator assembly located on the passenger side front portion of the transmission case.

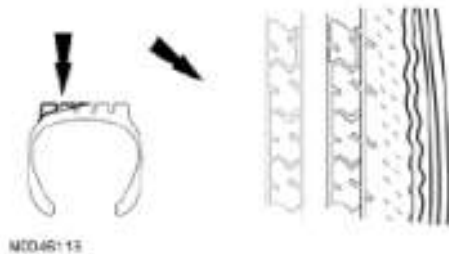


Fig. 112: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

9. Separate the transmission fluid level indicator from the transmission fluid fill plug.

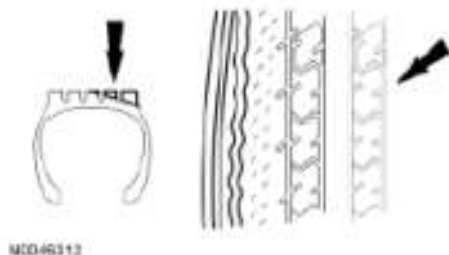


Fig. 113: Locating Transmission Fluid Level Indicator
Courtesy of FORD MOTOR CO.

10. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.



Fig. 114: Locating Transmission Fluid Fill Plug
 Courtesy of FORD MOTOR CO.

11. Using the scan tool verify that the TFT is between 80°C-85°C (176°F-185°F). The transmission fluid level must be at the upper level of the crosshatch mark.

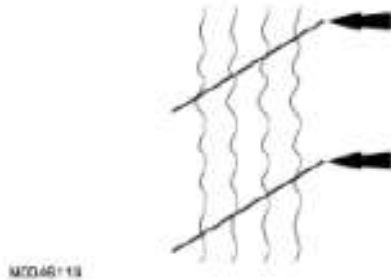


Fig. 115: Checking Transmission Fluid Level And Condition
 Courtesy of FORD MOTOR CO.

12. **NOTE:** If the transmission fluid is not at the correct level, follow the steps for **Adding Additional Transmission Fluid** or **Removing Transmission Fluid**.

Install the transmission fluid fill plug.

- Tighten to 35 Nm (26 lb-ft).

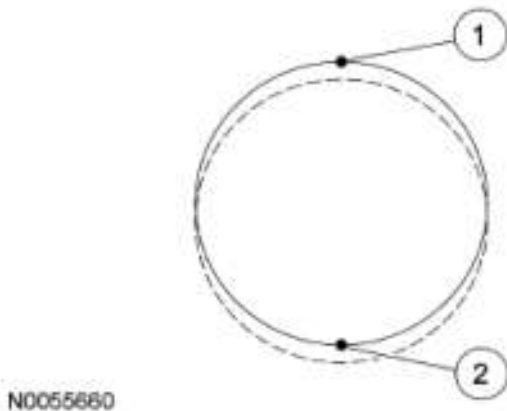
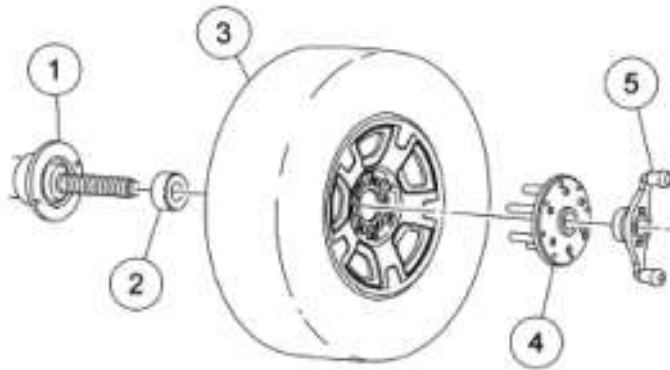


Fig. 116: Locating Transmission Fluid Fill Plug
 Courtesy of FORD MOTOR CO.

Adding Additional Transmission Fluid

NOTE: To get an accurate transmission fluid level reading the engine should be idling (600-750 rpm) in PARK.

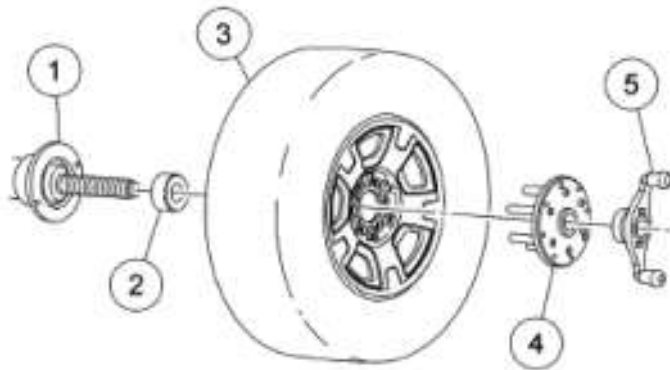
1. Install the Transmission Fluid Fill Tube into the transmission fluid fill hole.



N0086327

Fig. 117: Identifying Transmission Fluid Fill Tube
Courtesy of FORD MOTOR CO.

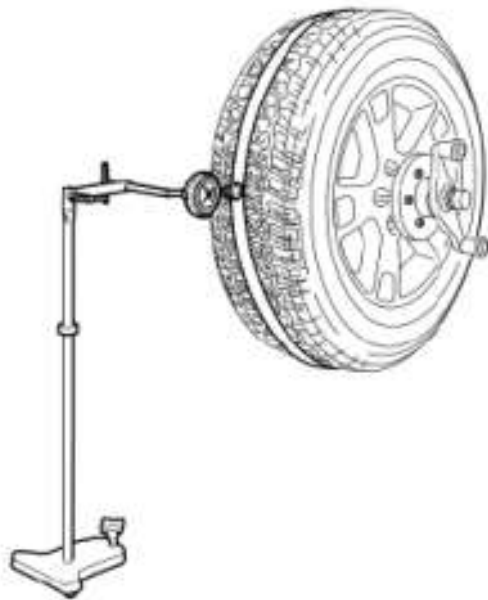
2. Fill the Transporter Fluid Evacuator/Injector with approximately 0.47L (1 pt) of transmission fluid.



N0086327

Fig. 118: Identifying Special Tool
Courtesy of FORD MOTOR CO.

3. Hang the Transporter Fluid Evacuator/Injector under the vehicle, upright and close to the transmission.



N0083951

Fig. 119: Hanging Transporter Fluid Evacuator/Injector Under Vehicle
Courtesy of FORD MOTOR CO.

4. Connect the Transporter Fluid Evacuator/Injector and Transmission Fluid Fill Tube.
 - Connect the open end of the fluid hose from the Transporter Fluid Evacuator/Injector onto the Transmission Fluid Fill Tube from the transmission case.



N0083960

Fig. 120: Connecting Transporter Fluid Evacuator/Injector And Transmission Fluid Fill Tube
Courtesy of FORD MOTOR CO.

5. Use a Rubber Tip Air Nozzle to apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the Transporter Fluid Evacuator/Injector. Transmission fluid will immediately start flowing out of the Transporter Fluid Evacuator/Injector into the transmission.

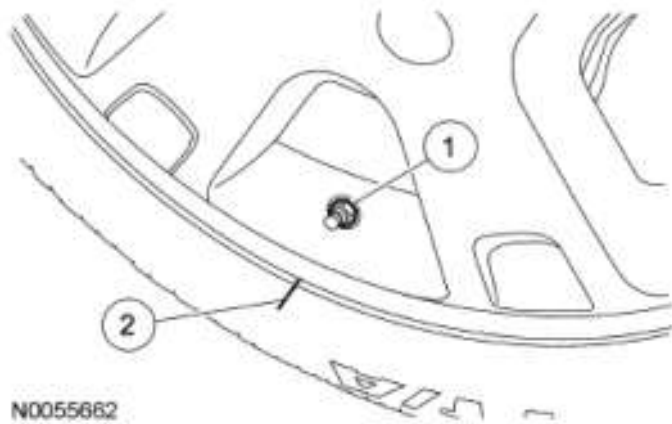


Fig. 121: Applying Air Pressure To Open End Of Vacuum/Pressure Hose
 Courtesy of FORD MOTOR CO.

6. **NOTE: Do not overfill the transmission. The transmission fluid level must be at the upper level of the crosshatch mark.**

Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.

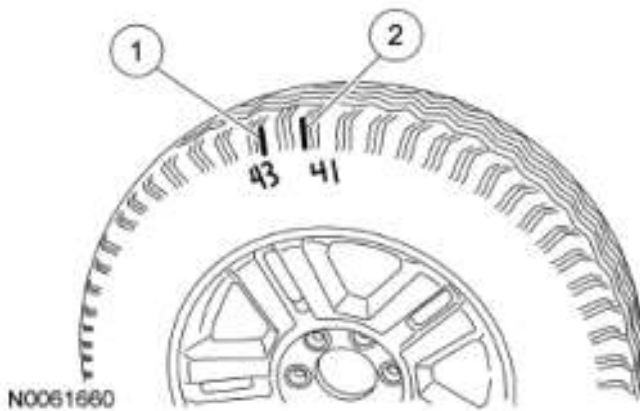
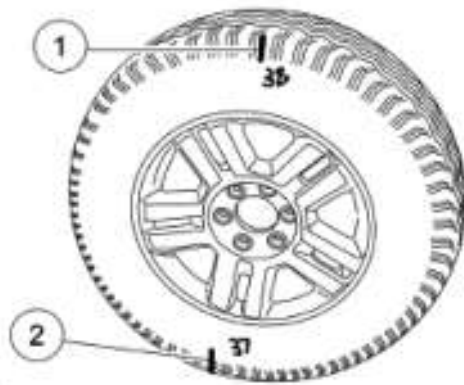


Fig. 122: Locating Transmission Fluid Level Indicator
 Courtesy of FORD MOTOR CO.

7. Using the scan tool, verify that the TFT is between 80°C-85°C (176°F-185°F). The transmission fluid level must be at the upper level of the crosshatch mark.



N0061658

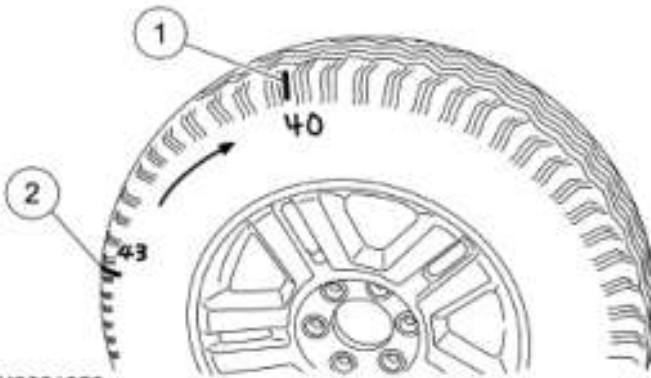
Fig. 123: Checking Transmission Fluid Level And Condition
 Courtesy of FORD MOTOR CO.

NOTE: If the transmission fluid is over full, follow the steps for Removing Transmission Fluid.

8.

Install the transmission fluid fill plug.

- Tighten to 35 Nm (26 lb-ft).



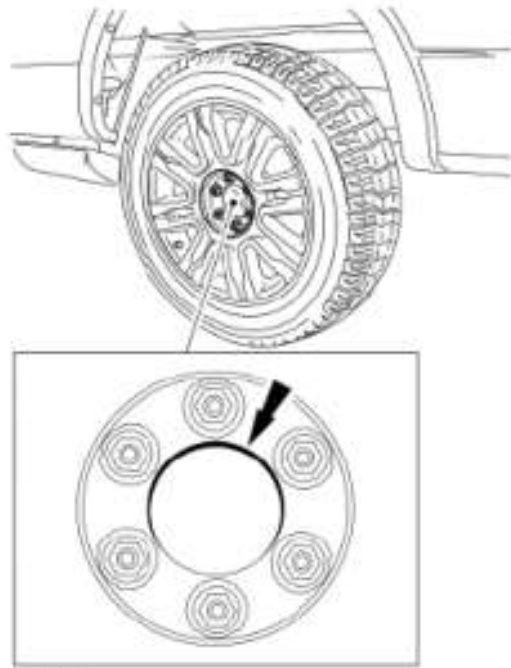
N0061659

Fig. 124: Locating Transmission Fluid Fill Plug
 Courtesy of FORD MOTOR CO.

Removing Transmission Fluid

NOTE: To get an accurate transmission fluid level reading the engine should be idling (600-750 rpm) in PARK.

1. If the transmission is overfilled, transmission fluid must be removed to the correct level. Use the Transporter Fluid Evacuator/Injector and the Vacuum Pump Kit to extract any excessive transmission fluid.



N0083962

Fig. 125: Removing Excessive Transmission Fluid
Courtesy of FORD MOTOR CO.

2. Using the scan tool, verify that the **TFT** is between 80°C-85°C (176°F-185°F). The transmission fluid level must be at the upper level of the crosshatch mark. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.

Table 1. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature¹

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall ****

Table is based on a Garage Temperature of 76°F. Max Pressure Adjustment is 7 psi.

Outside Temperature (°F)	Tire Placard Pressure (PSI)																	
	30	32	34	36	38	40	41	42	45	50	55	60	65	70	75	80	85	90
70	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
60	31	33	35	36	39	41	42	43	46	51	56	61	67	72	77	82	87	92
50	32	34	36	37	40	42	43	44	47	53	58	63	68	73	79	84	89	94
40	33	35	37	38	41	43	44	45	49	54	59	64	70	75	80	85	91	96
30	34	36	38	39	42	44	46	47	50	55	61	66	72	77	82	87	92	97
20	35	37	39	40	43	46	47	48	51	57	62	67	72	77	82	87	92	97
10	36	38	40	41	45	47	48	49	52	57	62	67	72	77	82	87	92	97
0	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-10	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-20	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-30	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-40	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97

Table 2. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature (Metric Units)¹

**** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall ****

Table is based on a Garage Temperature of 21°C. Max Pressure Adjustment is 50 kPa.

Outside Temperature (°C)	Tire Placard Pressure (kPa)																	
	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
21	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
16	215	230	240	250	270	285	290	295	315	350	385	420	460	495	530	565	600	635
10	220	235	250	255	275	290	295	305	325	365	400	435	470	505	545	580	615	650
4	230	240	255	260	285	295	305	310	340	370	405	440	485	515	560	605	625	660
-1	235	250	260	270	290	305	315	325	345	380	420	455	495	530	565	600	635	670
-7	240	255	270	275	295	315	325	330	350	395	425	460	495	530	565	600	635	670
-12	250	260	270	285	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-18	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-23	265	270	285	295	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-29	265	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-34	265	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-40	265	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670

¹When Outside (Ambient) Temperature is greater than 21°C (70°F), inflate tires to placard pressure.

²Use the table to adjust tire pressure for P-metric and LT tires only.

³Do NOT use table for Commercial Truck Tires (i.e. 19.5 inch tires for F450 & F550. See F-Super Duty Service Manual for tire inflation procedures.

M0067700

Fig. 126: Checking Transmission Fluid Level And Condition
Courtesy of FORD MOTOR CO.

3. Install the transmission fluid fill plug.
 - Tighten to 35 Nm (26 lb-ft).

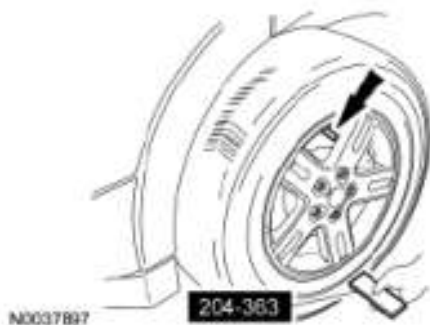
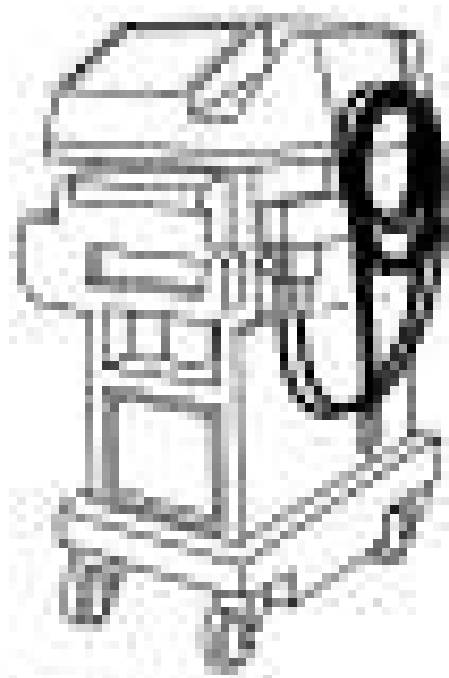


Fig. 127: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

TRANSMISSION FLUID EXCHANGE

Special Tool(s)

SPECIAL TOOL SPECIFICATION



ST3068-A

Heavy-Duty Transmission and Power
Steering Fluid X-Changer
078-00531 or equivalent



ST2034-A

Vehicle Communication Module (VCM) and
Integrated Diagnostic System (IDS) software
with appropriate hardware, or equivalent
scan tool

Material

MATERIAL SPECIFICATION

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid	


NOTE: Use transmission fluid specific for this transmission. Do not use any supplemental transmission fluid additives or cleaning agents. The use of these products can cause internal transmission components to fail, which will affect the operation of the transmission.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Use the Heavy-Duty Transmission and Power Steering Fluid X-Changer to change the fluid.
3. Connect the Heavy-Duty Transmission and Power Steering Fluid X-Changer to the transmission fluid cooler tube after the transmission fluid cooler on the return tube. This will help remove any foreign material trapped in the transmission fluid coolers.
4. Perform the transmission fluid exchange using the Heavy-Duty Transmission and Power Steering Fluid X-Changer. Follow the manufacturer's instructions included with the machine.
5. Once the transmission fluid exchange is completed, disconnect the Heavy-Duty Transmission and Power Steering Fluid X-Changer. Reconnect any disconnected transmission fluid cooler tubes.
6. Using the scan tool with the engine running, check and make sure that the transmission is at normal operating temperature 66-77°C (150-170°F). Check and adjust the transmission fluid level and check for any leaks. If transmission fluid is needed, add transmission fluid in increments of 0.24L (0.5 pt) until the correct level is achieved.

TRANSMISSION FLUID LEVEL CHECK

Special Tool(s)

SPECIAL TOOL SPECIFICATION

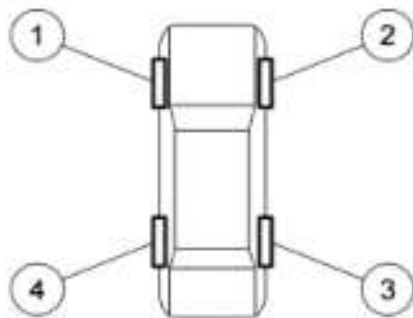
 <p>ST2034-A</p>	<p>Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool</p>
---	--

Material

MATERIAL SPECIFICATION

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLV	MERCON® LV

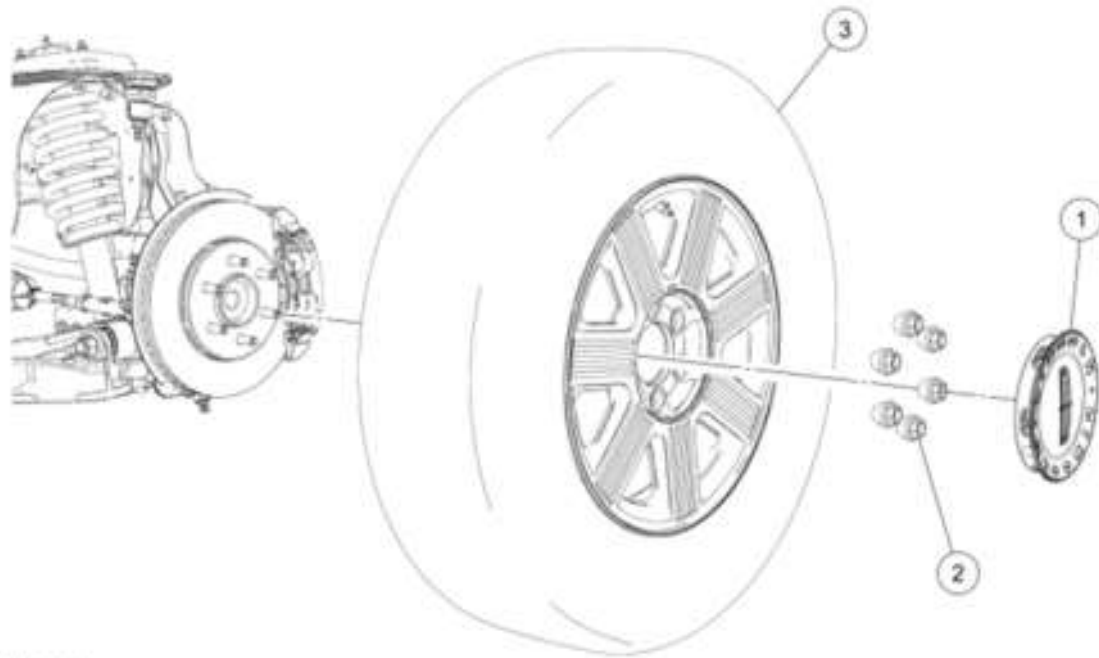
- NOTE:** The vehicle should not be driven if the transmission fluid level is low as internal failure could result.
- NOTE:** The transmission fluid fill plug is located near the exhaust system. The exhaust will be extremely hot during this procedure.
- NOTE:** If the vehicle has been operated for an extended period at high highway speeds, in city traffic, during hot weather or while pulling a trailer, the transmission fluid must cool down to obtain an accurate reading.
- NOTE:** If the transmission starts to slip, shifts slowly or shows signs of transmission fluid leaking, the transmission fluid level should be checked.
- NOTE:** Do not overfill the transmission. The transmission fluid level must be at the upper level of the crosshatch mark.
- NOTE:** If the installation of a new transmission fluid cooler or transmission fluid cooler tubes has been carried out, the vehicle must be driven to get the transmission fluid to a temperature of 88°C (190°F) in order to purge the air from the transmission fluid cooling system.
1. With the engine running, place the transmission selector lever in each gear position and hold approximately 5 seconds. Place the transmission selector lever in PARK.
 2. With the engine idling (600-750 rpm) in PARK, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
 3. Remove the transmission fluid fill plug transmission fluid level indicator assembly, located on the passenger side front portion of the transmission case.



A0086882

Fig. 128: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

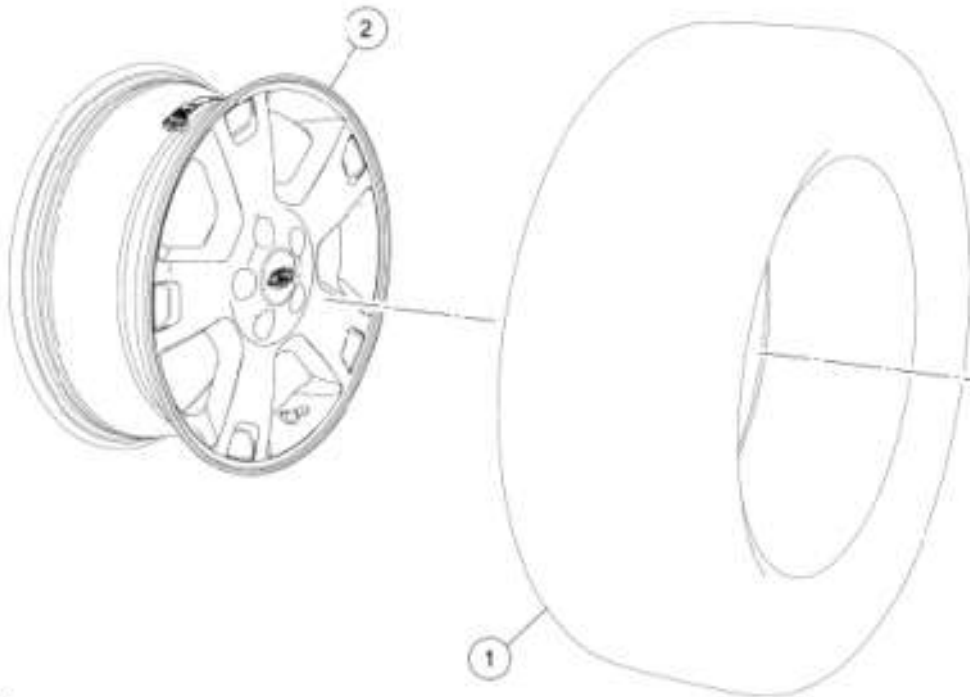
4. Separate the transmission fluid level indicator from the transmission fluid fill plug.



N0103340

Fig. 129: Locating Transmission Fluid Level Indicator
 Courtesy of FORD MOTOR CO.

5. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level.



N0040293

Fig. 130: Locating Transmission Fluid Fill Plug
 Courtesy of FORD MOTOR CO.

6. Using the scan tool, verify that the Transmission Fluid Temperature (TFT) is between 80°C-85°C (176°F-185°F). Do not overfill the transmission. The transmission fluid level must be at the upper

level of the crosshatch mark.



Fig. 131: Checking Transmission Fluid Level And Condition
Courtesy of FORD MOTOR CO.

NOTE: If the transmission fluid is not at the correct level, follow the steps for **Adding Additional Transmission Fluid or Removing Transmission Fluid**. For additional information, refer to **TRANSMISSION FLUID DRAIN AND REFILL**.

7.

Install the transmission fluid fill plug.

- Tighten to 35 Nm (26 lb-ft).

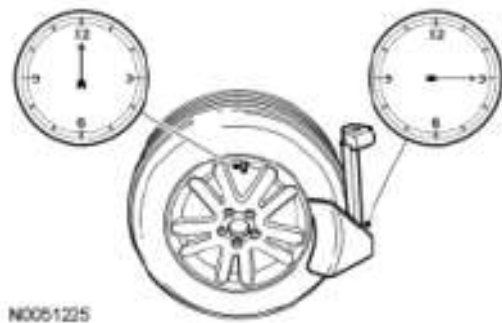


Fig. 132: Locating Transmission Fluid Fill Plug
Courtesy of FORD MOTOR CO.

TORQUE CONVERTER CONTAMINATION INSPECTION

Material

MATERIAL SPECIFICATION

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLV	MERCON® LV

1. A new or remanufactured torque converter must be installed if one or more of the following statements is true:
 - A torque converter malfunction has been determined based on complete diagnostic procedures.
 - The torque converter stud or studs, impeller hub or bushing are damaged.

- The torque converter exhibits external discoloration (due to overheating).
 - There is evidence of transmission assembly or fluid contamination due to the following transmission or converter failure modes.
 - Major metallic failure
 - Multiple clutch plates or band failures
 - Sufficient component wear which results in metallic contamination
 - Water or antifreeze contamination
2. If none of the above conditions are present, continue with the following fluid inspection.
 3. Pour a small amount of transmission fluid from the torque converter onto an absorbent white tissue or through a paper filter.
 4. Examine the fluid for contaminants, color and smell. The fluid must be free of contaminants, red in color and not have a burnt smell.
- NOTE:** **Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur.**
- 5.

If the fluid passed inspection:

- drain the remaining fluid from the torque converter.
- using only the recommended transmission fluid, add 1.9L (2 qt) of clean fluid into the converter and agitate by hand.
- thoroughly drain the fluid.