GENERAL PROCEDURES

Transmission Fluid Cooler Backflushing and Cleaning

Special Tool(s)

 ST2971-A	Transmission Heated Cooler Line Flusher 222-00007, 222-00004 or equivalent

NOTICE:
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.

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)

 ST2467-A	Rubber Tip Air Nozzle 100-D009 (D93L-7000-A)
 ST2933-A	Transmission Fluid Fill Tube 307-570

 ST2715-A	Transporter Fluid Evacuator/Injector 307-D465 or equivalent
 ST1269-A	Vacuum Pump Kit 416-D002 (D95L-7559-A) or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

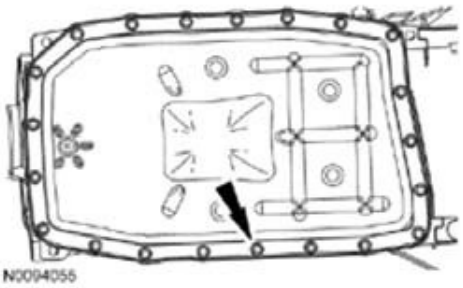
Material

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLVC (US); CXT-10-LV12 (Canada)	MERCON® LV

Drain

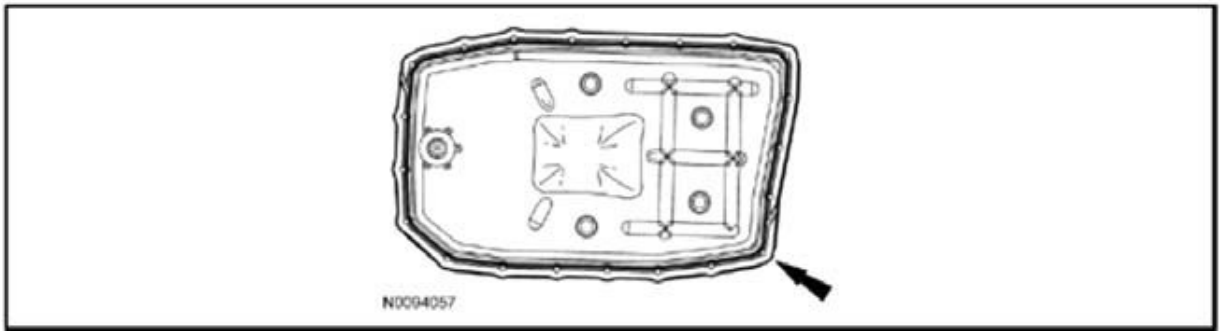
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.

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

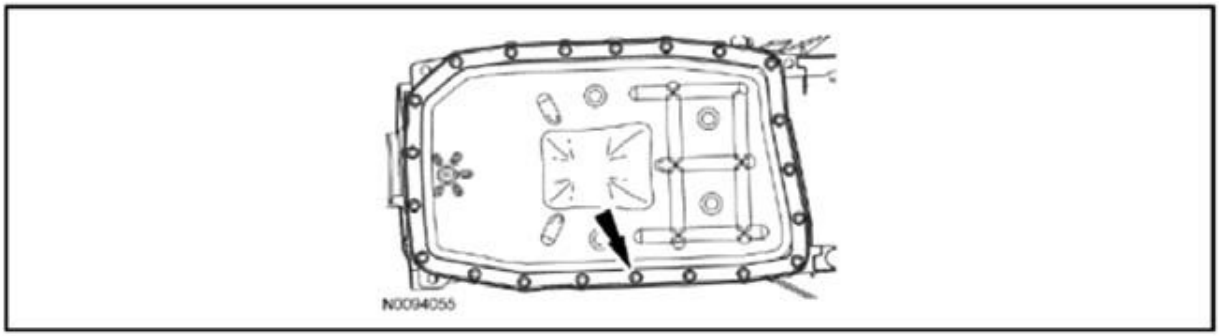


3. **NOTE:**
   The transmission fluid pan gasket can be reused if not damaged.

   Install a new transmission fluid pan gasket, if required.



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



Refill

NOTICE:

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.

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

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

NOTICE:
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 91ºC-102ºC (195ºF-215ºF) 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 91ºC-102ºC (195ºF-215ºF).

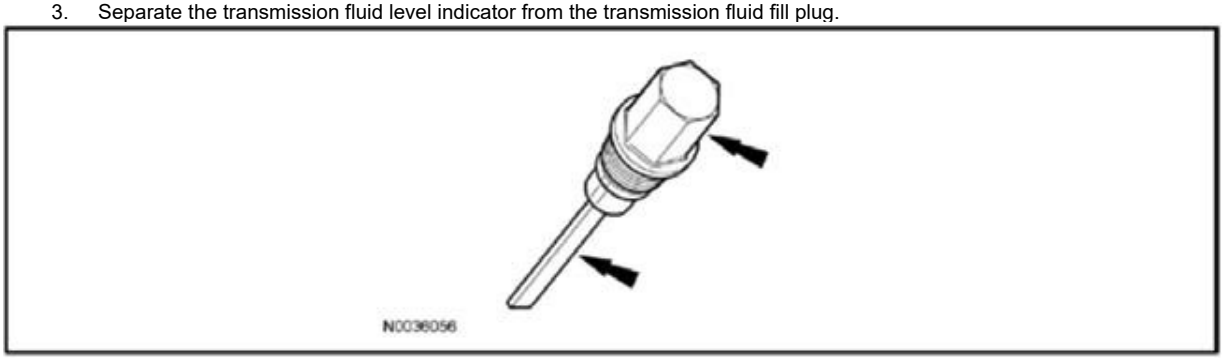
1. **NOTE:**
   The transmission will need 3.3L (3.5 qt) of transmission fluid added to the transmission as an initial fill if:
    - a new mechatronic assembly has been installed.
    - the transmission fluid pan or transmission fluid filter have been removed.

NOTE:

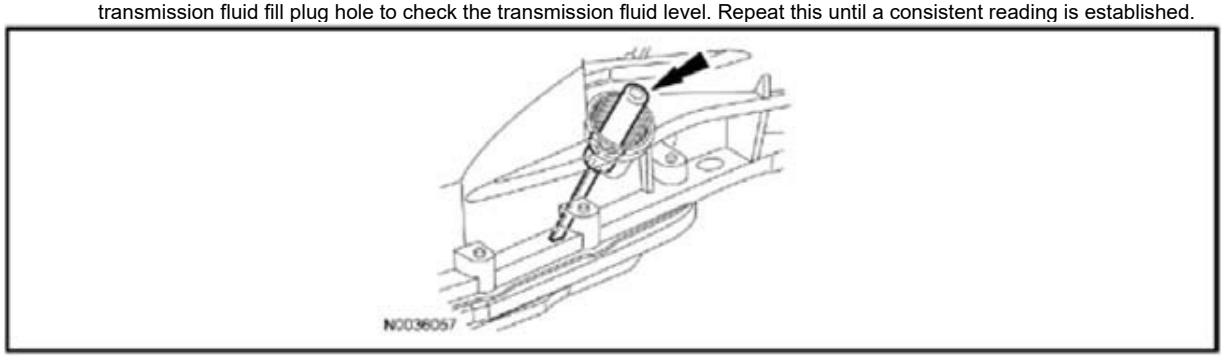
The transmission will need 11.35L (12 qt) of transmission fluid added to the transmission as an initial fill if the transmission has been overhauled.

Using the Transmission Fluid Fill Tube, add the transmission fluid to the transmission through the transmission fluid fill hole. For additional information, refer to Adding Additional Transmission Fluid in this procedure.

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.

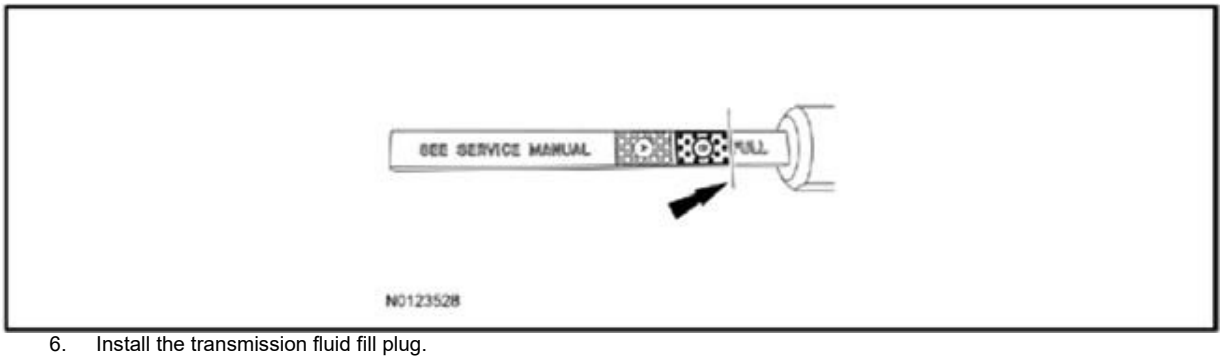


4. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.

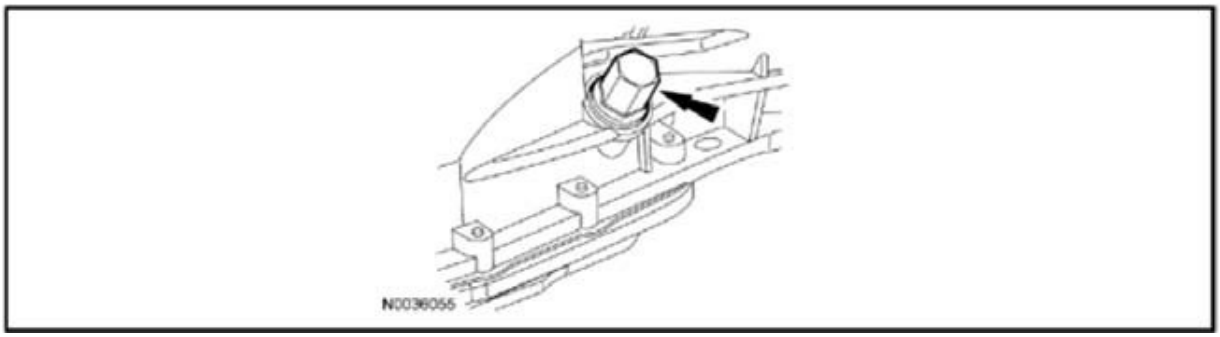


5. **NOTE:**
   The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (labeled A) area and a dotted (labeled B) area. Use the dotted area to check the transmission fluid level.

   Using the scan tool, verify that the Transmission Fluid Temperature (TFT) is between 91ºC-102ºC (195ºF-215ºF). Do not overfill the transmission. The transmission fluid level must be at the upper level of the dotted (B) marked area on the transmission fluid level indicator.

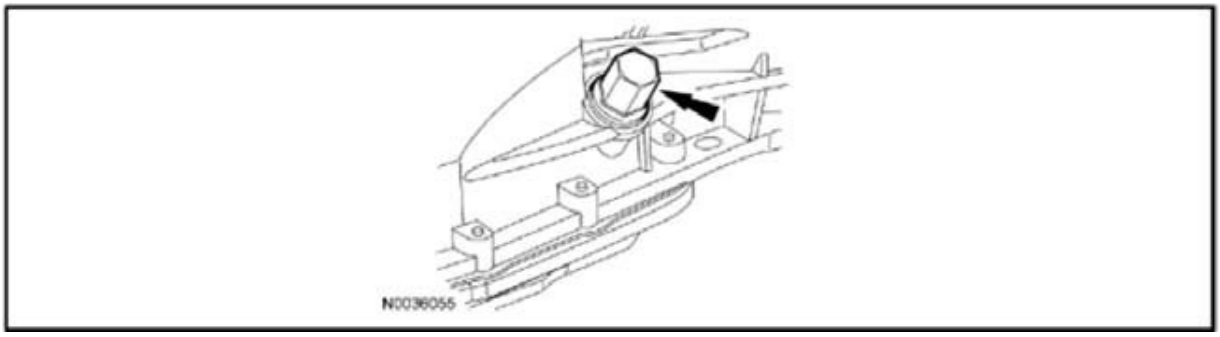


6. Install the transmission fluid fill plug.
   - Tighten to 35 Nm (26 lb-ft).

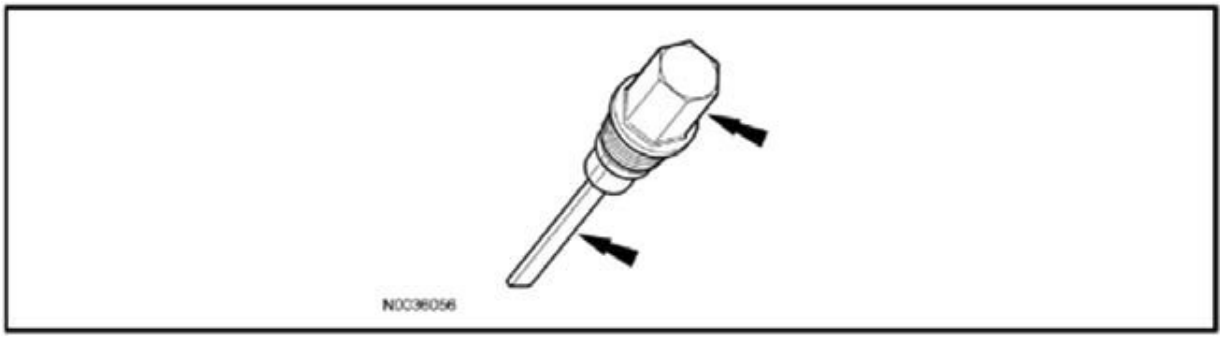


7. While driving the vehicle, use the scan tool to verify that the TFT has reached a temperature of 91°C (195°F). This will circulate the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system.
    - With the engine idling (600-750 rpm) in PARK, verify that the TFT is between 91ºC-102ºC (195ºF-215ºF).

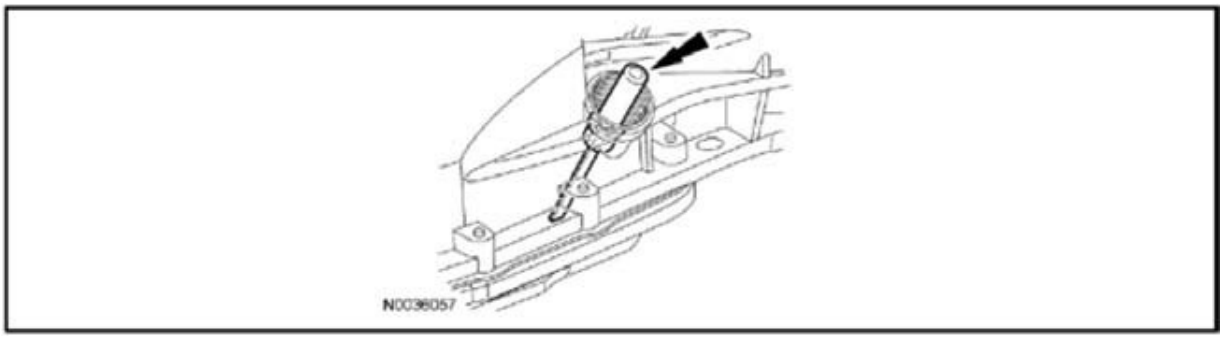
8. Remove the transmission fluid fill plug transmission fluid level indicator assembly located on the passenger side front portion of the transmission case.



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

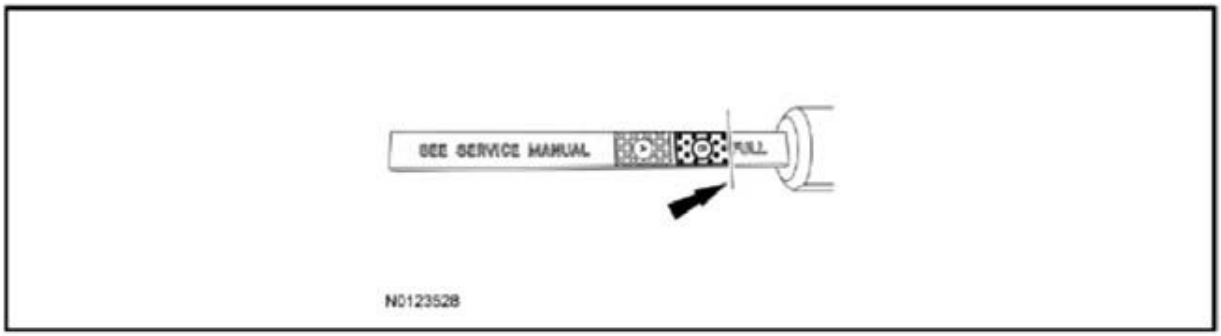


10. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level. Repeat this until a consistent reading is established.



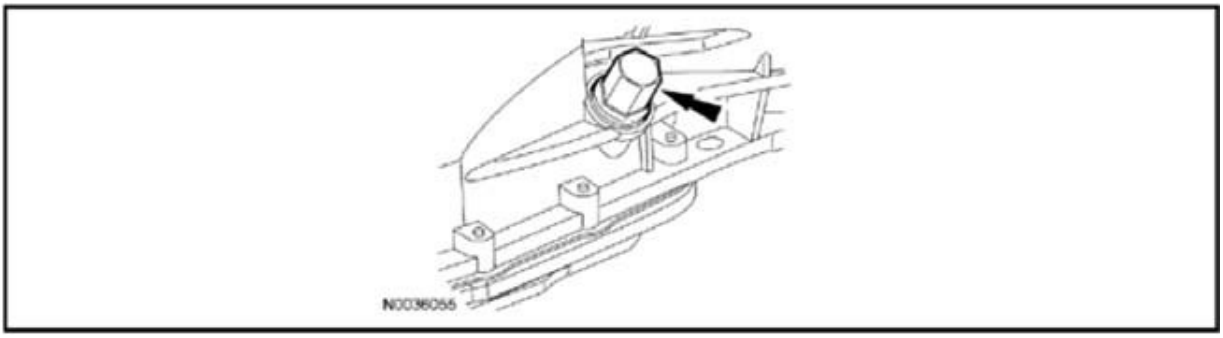
11. **NOTE:**
    The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (labeled A) area and a dotted (labeled B) area. Use the dotted (labeled B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted marks on the transmission fluid level indicator.

    Using the scan tool verify that the TFT is between 91ºC-102ºC (195ºF-215ºF). The transmission fluid level must be at the upper level of the dotted (B) mark.



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

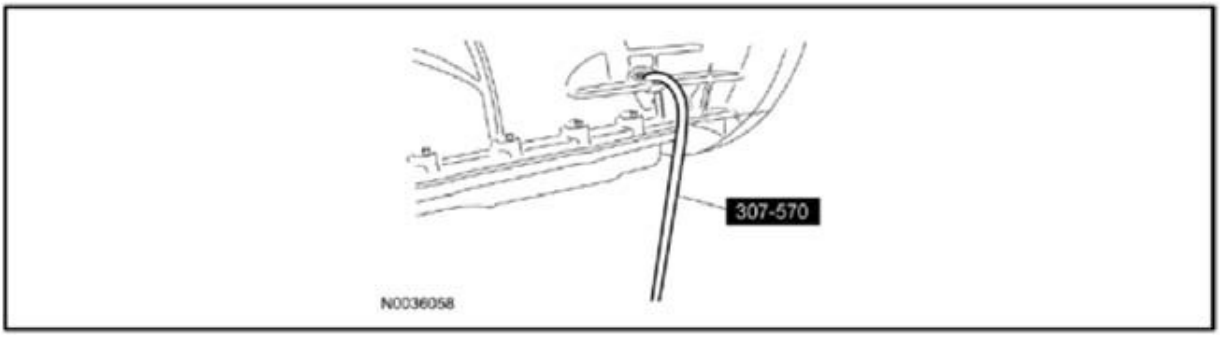
    Install the transmission fluid fill plug.
    - Tighten to 35 Nm (26 lb-ft).



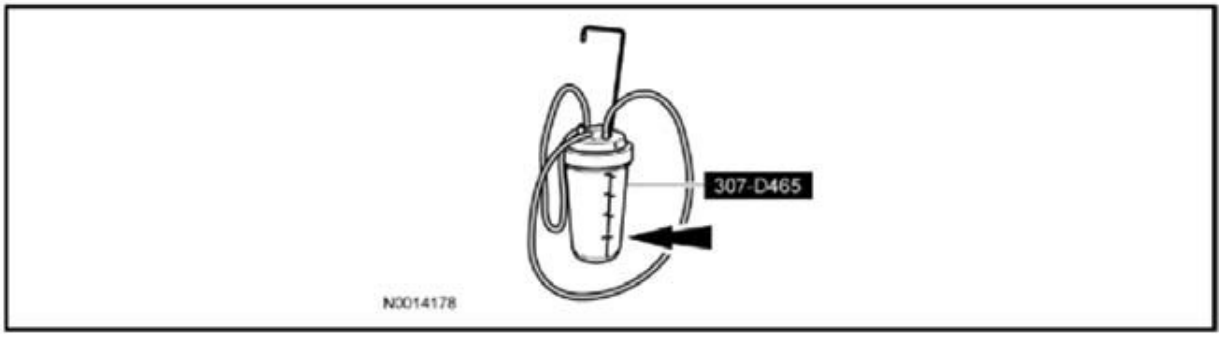
Adding Additional Transmission Fluid

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

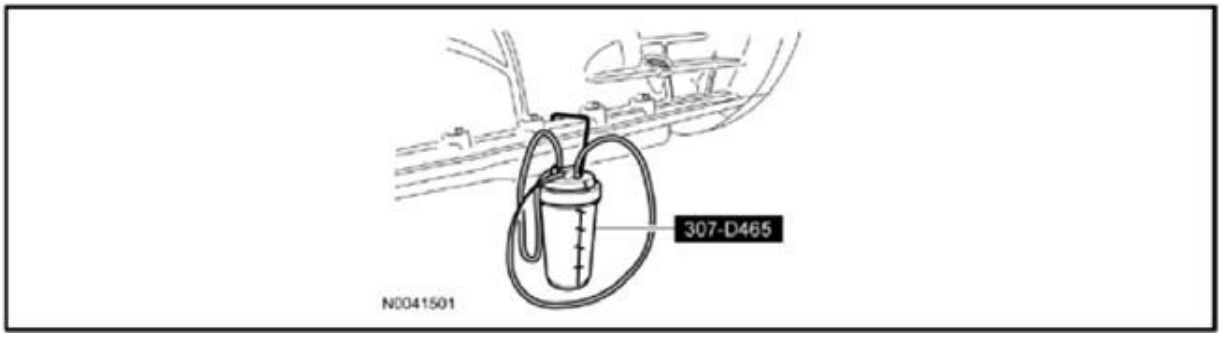
1. Install the Transmission Fluid Fill Tube into the transmission fluid fill hole.



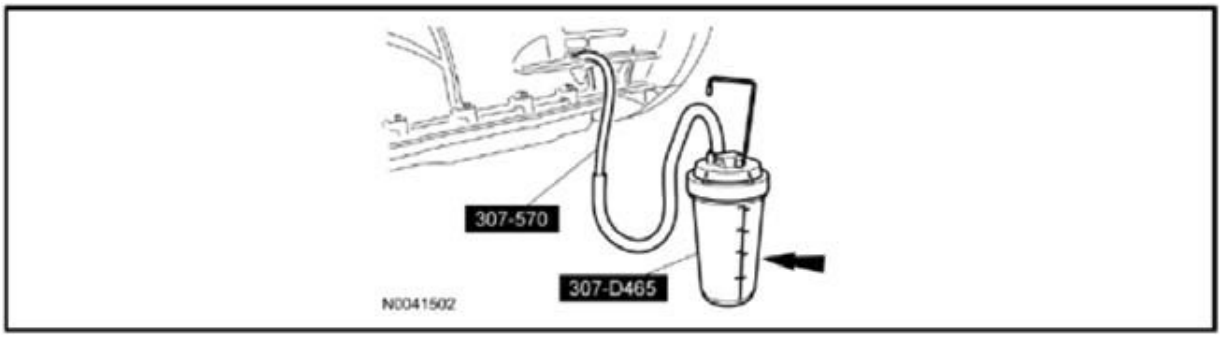
2. Fill the Transporter Fluid Evacuator/Injector with approximately 0.47L (1 pt) of transmission fluid.



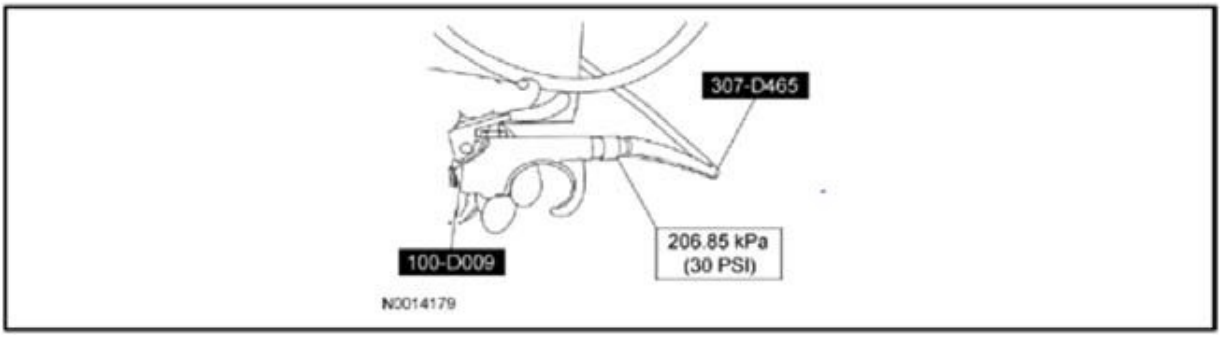
3. Hang the Transporter Fluid Evacuator/Injector under the vehicle, upright and close to the transmission.



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.

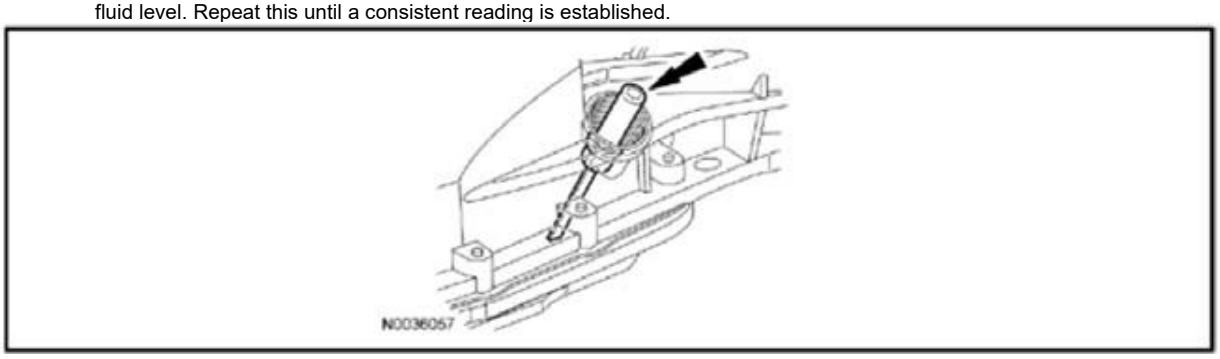


5. Use a Rubber Tip Air Nozzle to apply a maximum of 206.85 kPa (30 psi) to the open end of the vacuum/pressure hose from the Transporter Fluid Evacuator/Injector. Transmission fluid will immediately start flowing out of the Transporter Fluid Evacuator/Injector into the transmission.



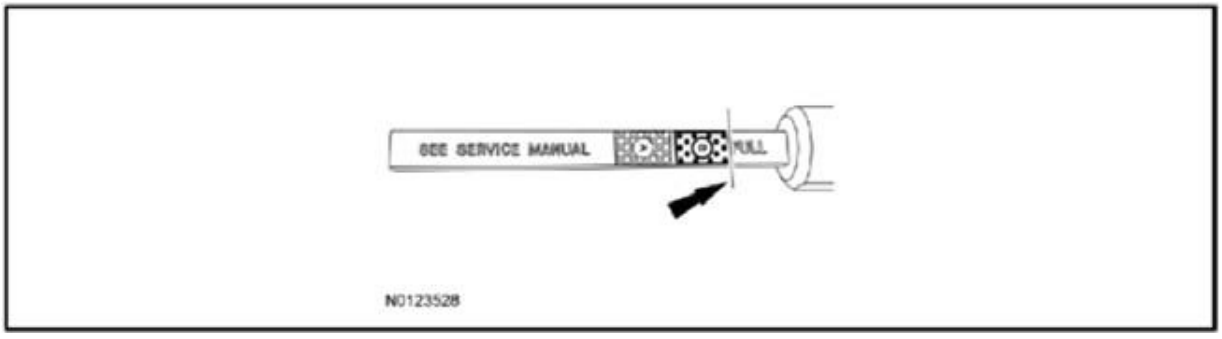
6. **NOTE:**
Do not overfill the transmission. The transmission fluid level must be at the upper level of the dotted mark.

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.



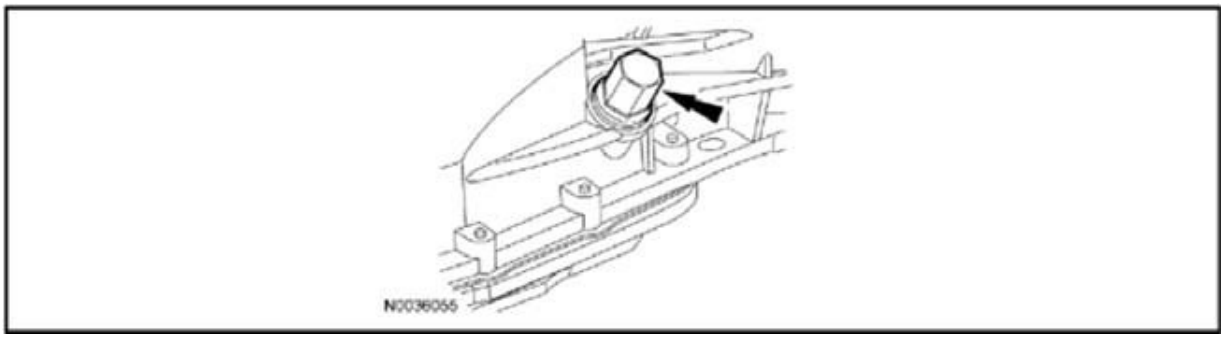
7. **NOTE:**
The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (labeled A) area and a dotted (labeled B) area. Use the dotted (labeled B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted marks on the transmission fluid level indicator.

Using the scan tool, verify that the TFT is between 91ºC-102ºC (195ºF-215ºF). The transmission fluid level must be at the upper level of the dotted (B) mark.



8. **NOTE:**
If the transmission fluid is over full, follow the steps for Removing Transmission Fluid in this procedure.

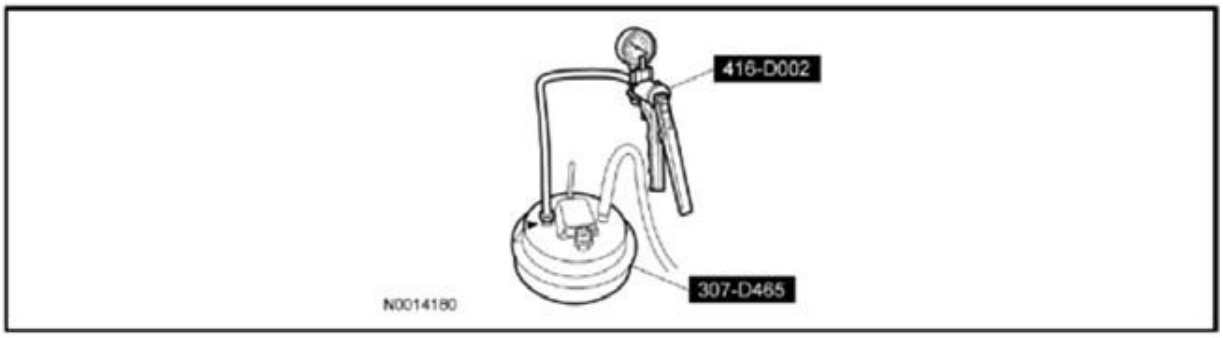
Install the transmission fluid fill plug.
- Tighten to 35 Nm (26 lb-ft).



Removing Transmission Fluid

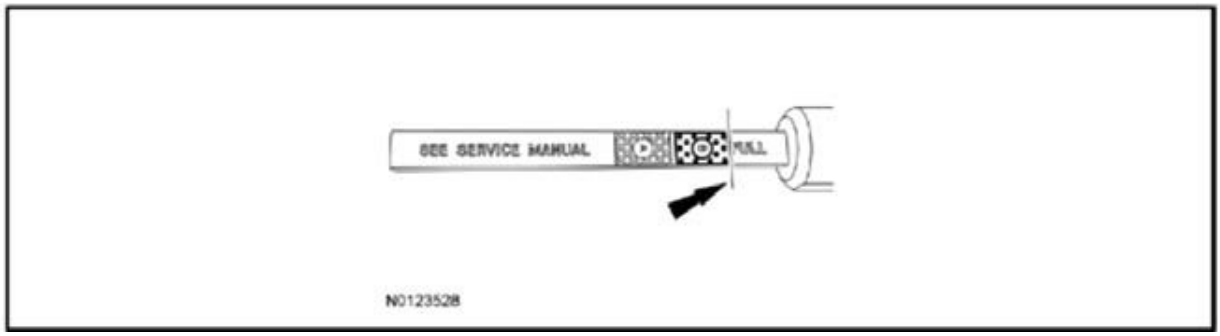
NOTE:
To get an accurate transmission fluid level reading the engine should be idling (600-750 rpm) in PARK.

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.

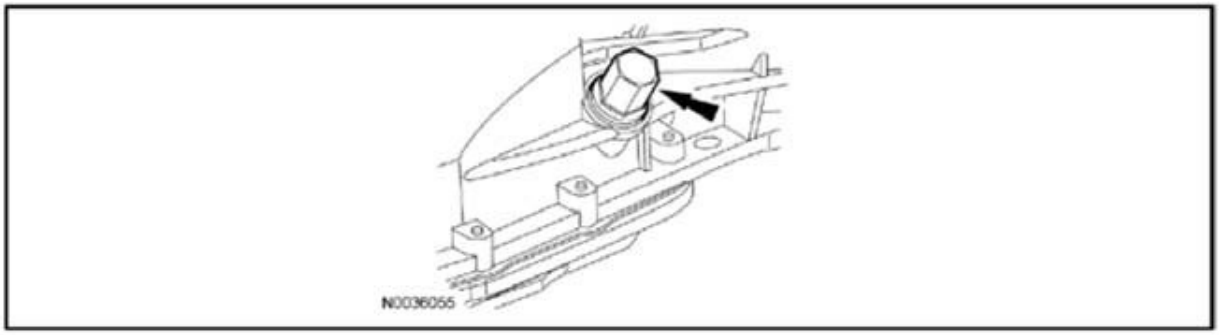


2. **NOTE:**
   The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (labeled A) area and a dotted (labeled B) area. Use the dotted (labeled B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted marks on the transmission fluid level indicator.

   Using the scan tool, verify that the TFT is between 91ºC-102ºC (195ºF-215ºF). The transmission fluid level must be at the upper level of the dotted (B) mark.



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



Transmission Fluid Exchange

Special Tool(s)

 ST3088-A	ATF Fluid Exchanger W/Power Steering Fluid Exchanger 199-00059 or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Material

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLVC (US); CXT-10-LV12 (Canada)	MERCON® LV

NOTICE:
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.

NOTE:
For best results, perform the transmission cooler backflush and cleaning procedure before exchanging the fluid.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to Section 100-02.

2. Connect the ATF Fluid Exchanger W/Power Steering Fluid Exchanger 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.

3. Perform the transmission fluid exchange using the ATF Fluid Exchanger W/Power Steering Fluid Exchanger. Follow the manufacturer's instructions included with the machine.

4. Once the transmission fluid exchange is completed, disconnect the ATF Fluid Exchanger W/Power Steering Fluid Exchanger. Reconnect any disconnected transmission fluid cooler tubes.

5. Using the scan tool with the engine running, check and make sure that the transmission is at normal operating temperature 91ºC-102ºC (195ºF-215ºF). 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)

Diagnostic USB harness and software CD: Part # TCM4120

Material

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLVC (US); CXT-10-LV12 (Canada)	MERCON® LV

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

NOTICE:
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.

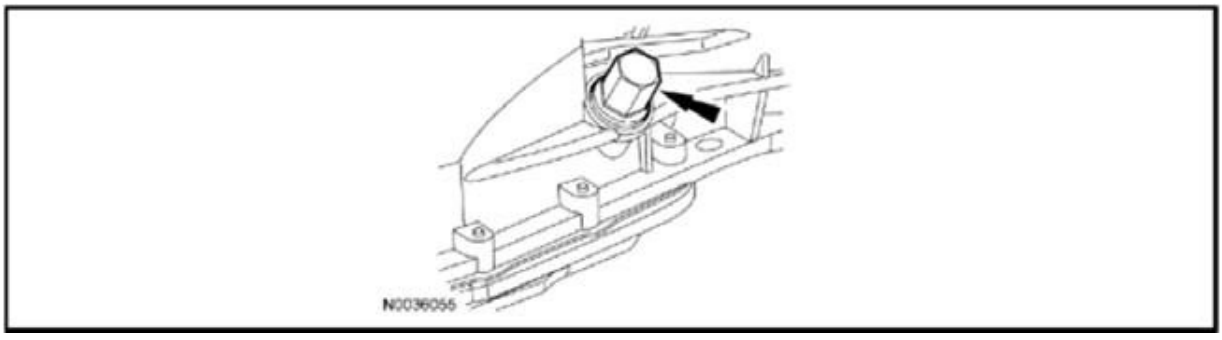
NOTE:

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 89°C (193°F) in order to purge the air from the transmission fluid cooling system.

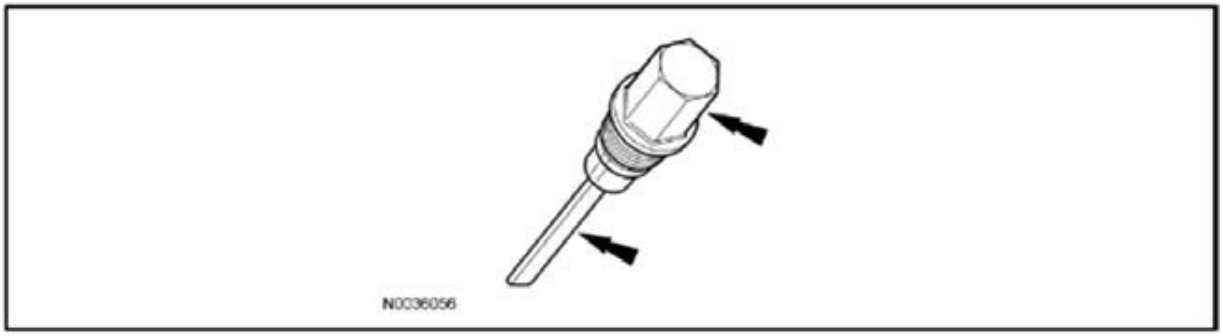
1. With the engine running, place the transmission selector lever in each gear position and hold approximately 5 seconds. Place the transmission selector lever in PARK.

2. With the engine idling (600-750 rpm) in PARK, position it on a hoist. For additional information, refer to Section 100-02.

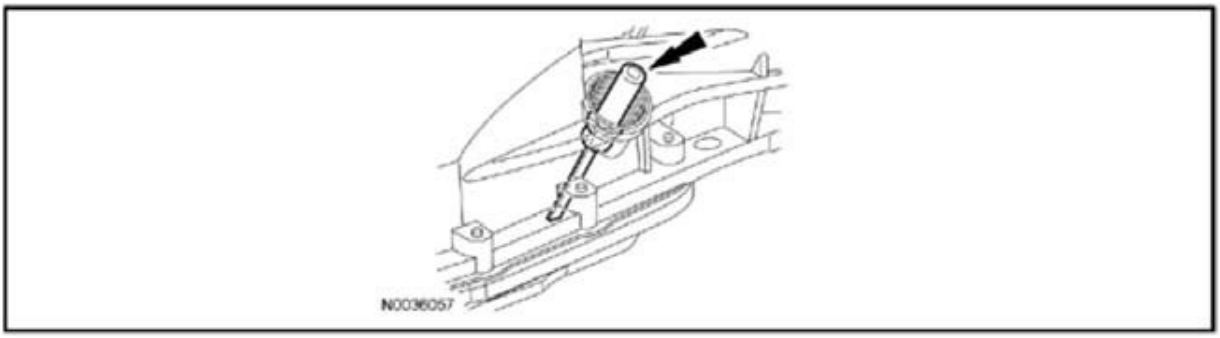
3. Remove the transmission fluid fill plug transmission fluid level indicator assembly, located on the passenger side front portion of the transmission case.



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

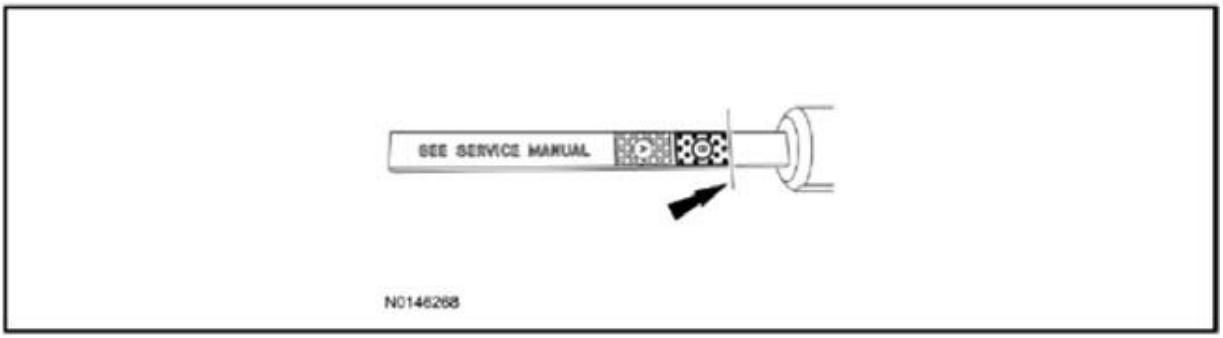


5. Wipe the transmission fluid level indicator clean. Reinstall the transmission fluid level indicator only back into the transmission fluid fill plug hole to check the transmission fluid level.



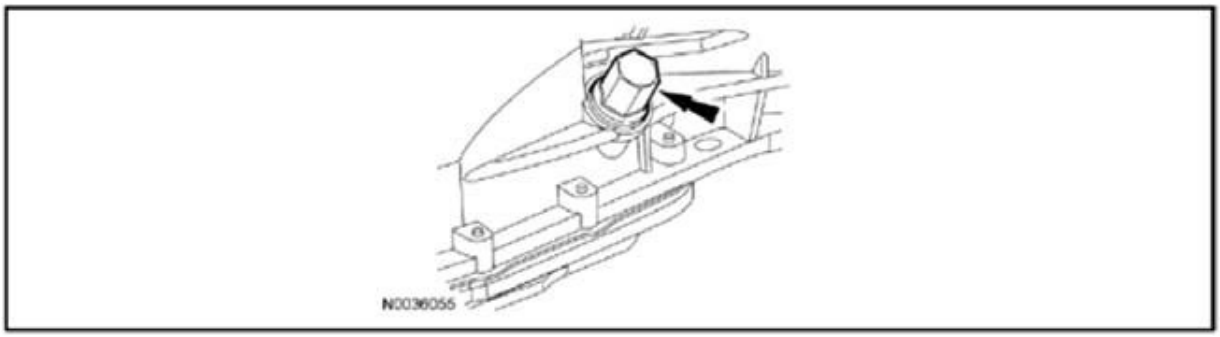
6. **NOTE:**
The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (labeled A) area and a dotted (labeled B) area. Use the dotted (labeled B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted marks on the transmission fluid level indicator.

Using the scan tool verify that the TFT is between 89ºC-102ºC (193ºF-215ºF). The transmission fluid level must be at the upper level of the dotted (B) mark.



7. **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 in this section.

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



Torque Converter Contamination Inspection

Material

Item	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid XT-10-QLVC (US); CXT-10-LV12 (Canada)	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. The fluid must be free of metallic contaminants.
5. ***NOTICE:***
   Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur.

   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.