SECTION : 308-02 Clutch Controls

VEHICLE APPLICATION : 2014 FGX Falcon

CONTENTS PAGE

SPECIFICATIONS

General Specifications

Description	Specification
Clutch System	
Clutch control	Hydraulic
System adjustment	Automatic
Clutch pedal type	Suspended
Fluid	
Brake Fluid (Ford)	Mobil ESZ - M6C55A

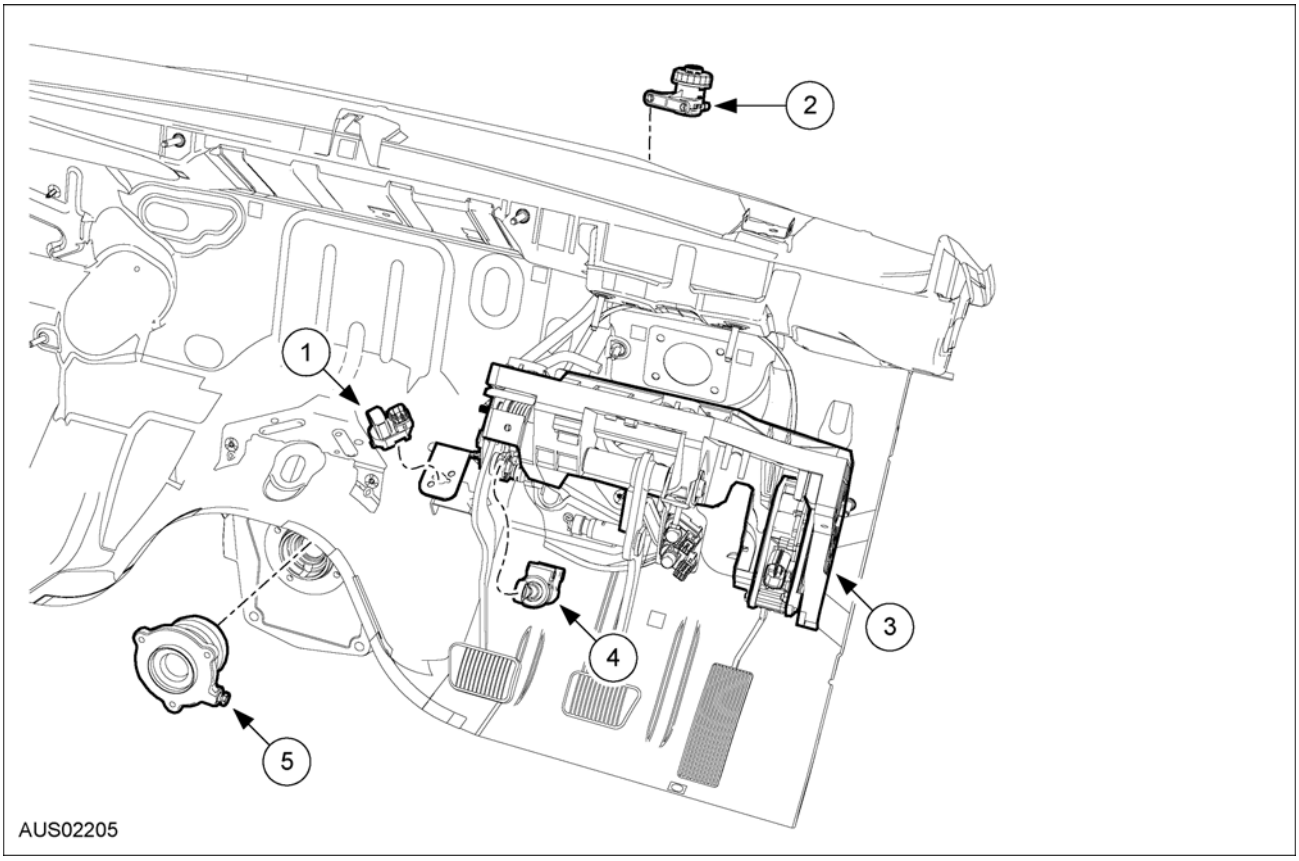
Torque Specifications

Description	Nm
Master Cylinder retaining bolts	14
Pedal Box Housing	22.5 ± 3.4
Brake Booster Retaining Nuts	22.5 ± 3.4
Clutch Pivot Bolt (M8)	16 ± 2
Clutch Assembly Bolt (M6)	6 ± 0.5
Reservoir Bracket Bolts	2 - 4

DESCRIPTION AND OPERATION

Clutch Controls

Component Location



Item	Description
1	Clutch pedal deactivation switch
2	Clutch reservoir
3	Brake and clutch pedal support bracket
4	Clutch master cylinder
5	Clutch slave cylinder/clutch release hub and bearing

The clutch control system actuates the clutch system. When the clutch pedal is depressed it pushes the clutch master cylinder plunger which transmits hydraulic pressure to the clutch slave cylinder. The clutch slave cylinder engages and compresses the clutch pressure plate diaphragm spring, releasing the pressure on the clutch disc which in turn disengages the transmission from the engine.

- The hydraulic clutch system adjusts automatically to compensate for clutch disc wear.
- The clutch pedal deactivation switch deactivates the speed control system when the pedal is depressed.

DESCRIPTION AND OPERATION (Continued)

Acronyms and Abbreviations

APM	Accelerator Pedal Module
PCM	Powertrain Control Module
BEM	Body Electronic Module
MSC	Memory Seat Controller
PPS	Pedal Position Sensor

DIAGNOSIS AND TESTING

Clutch Controls

Inspection and Verification - Clutch

The transmission and the clutch transfer the engine torque to the wheels. Both the transmission and the clutch should be considered when diagnosing concerns.

1. Verify the customer concern by operating the system.
2. Visually inspect for obvious signs of mechanical damage.
3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
4. If the concern is not evident, verify the symptom and refer to the Symptom Chart

Check these items before entering Diagnostics.

Topic	Specification
Brake Fluid Reservoir	Ensure that the Reservoir is Filled to the Max Point. Use Ford Approved Brake Fluid Mobil ESZ - M6C55A. **CAUTION: Do not allow brake fluid to contact vehicle paint work.**
Vehicle Test Drive to Confirm Fault	Ensure That Your Local State Speed Limits are Not Exceeded
Battery Voltage	Must be Greater Than 12 Volts
Obstructions	Check for Any Obstructions at the Brake Pedal Area, Such as Floor Mats and Wiring Harnesses

Visual Inspection Chart

Electrical
• Oil leaks • Visibly damaged or worn parts • Loose or missing nuts or bolts

DIAGNOSIS AND TESTING (Continued)

Function Test

Condition	Possible Source	Function Test	Pin Point Test
PEDAL FEEL	Pedal Slow or does not return	Manual Application Test of the Clutch Pedal to confirm	B
	Binding / Raspy pedal	Manual Test	C
	Worn Pedal Pad	Visual Inspection	
	Clutch Pedal "Sinks" to the Floor		Refer to Clutch Diagnosis in Section 206-06
CRUISE CONTROL CLUTCH SWITCH	Not Functioning	Visual Inspection	A
	Adjustment	Visual Inspection	
	Switch Disconnected	Visual Inspection	A
HARD TO ENGAGE GEARS	Master Cylinder Leakage	Visual Inspection	
	Slave Cylinder Leakage	Visual Inspection	Refer to Clutch Diagnosis in section 308-01
HARD TO ENGAGE GEARS (continued)	Clutch Plate Worn		Refer to Clutch Diagnosis in section 308-01
	Pressure plate Issue		Refer to Clutch Diagnosis in section 308-01
	Air in System		Refer to Clutch Diagnosis in section 308-01

DIAGNOSIS AND TESTING (Continued)

Symptom Chart

Symptom Chart - (MSC) Memory Seat Controller

Condition	Source	Action
• Excessive effort needed to depress clutch pedal or has a rough or raspy or sticky feel	• Clutch pedal binds at pivot	• INSTALL a new clutch pedal
	• Clutch Master Cylinder	• CHECK Clutch Master Cylinder and REFER to the Clutch Master Cylinder Section.
	• Return clutch pedal spring damaged or bad positioned	• CHECK the clutch pedal and INSTALL a new clutch pedal if necessary.
	• Worn or damaged clutch pedal	• INSTALL a new clutch pedal.
	• Foreign object caught in clutch pedal	• CHECK the clutch pedal.
• Brake pedal does not return freely	• Weak or broken clutch pedal return spring	• CHECK the clutch pedal and INSTALL a new clutch pedal if necessary.
	• Foreign object caught in clutch pedal	• CHECK the clutch pedal.
• No response from the cruise control when the clutch pedal is pressed	• Unconnected cruise switch	• CHECK the connection between the cruise switch and the cruise control.
	• Faulty clutch pedal switch flag	• INSTALL a new clutch pedal.
	• Bad position of the cruise switch	• CHECK the cruise switch. REPLACE or CHANGE cruise witch.
• Nothing happening when the clutch pedal is pressed	• Connection between the low pressure line and master cylinder	• CHECK any leak, CHANGE low pressure line if necessary.
	• Connection between the high pressure line and master cylinder	• CHECK any leak, CHANGE high pressure line if necessary.
	• Fluid level	• CHECK the fluid level and REFILL if necessary.
	• Master cylinder	• CHECK the master cylinder, CHANGE it if necessary.
• Discomfort on the clutch pedal	• Clutch pedal pad worn or loose	• CHECK clutch pedal pad and CHANGE it if necessary.
• Pedal feel	• Clutch Pedal Not Returning Once Released • "Raspy" Feel • Pedal Binding at Pivot • Pedal Pad Worn • Obstruction at / Under Pedal	• Go to PinPoint Test A

DIAGNOSIS AND TESTING (Continued)

Condition	Source	Action
• Gears "CRUNCH" when changing gears • Gears hard to select	• Clutch Master Cylinder Leaking / Faulty	• Go to Concentric Slave Cylinder in this chapter.
	• Clutch Slave Cylinder Leaking / Faulty	• Go to Concentric Slave Cylinder in this chapter.
	• Insufficient Master / Slave Cylinder Rod Travel	• Go to PinPoint Test A
	• Worn / Damaged Clutch Plate	• Go to Section 308-01.
	• Damaged / Worn Clutch Pressure Plate	• Go to Section 308-01.
	• Manual Transmission Issue. Gears / Synchromesh Rings or Lack of Lubrication	• Go to Section 308-03.
	• Air in System	• Refer to Clutch Diagnosis in Section 308-01.
• Cruise control not turning off when clutch activated	• Cruise Control Switch Faulty / Plug Disconnected	• Go to PinPoint Test A
	• Stop Lamp Switch Faulty / Plug Disconnected	• Go to PinPoint Test C in Section 206-06.

Pinpoint Tests

PINPOINT TEST A : CRUISE CONTROL CLUTCH PEDAL CUT OFF SWITCH

Test Step		Result / Action to Take
A1	**STOP LAMP CIRCUIT FUSE**	
	• Check the 15 Amp Fuse # 7 . • **Was Fuse blown?**	**Yes** Replace Fuse and recheck. **NOTE**: If Fuse blows again, this could indicate an electrical system fault. **No** Go to **A2**
A2	**CLUTCH PEDAL SWITCH CONTINUITY**	
	• Remove the clutch pedal switch. Refer to Section 308-01. • Carry out a continuity test. With the switch plunger Out = Continuity. • Push the switch plunger Inwards = Open circuit. • Push the switch pin Inwards = continuity. • **Is the clutch pedal switch electrical function Okay?**	**Yes** Go to **A3** **No** Replace the clutch pedal switch. Refer to Section 308-01.
A3	**SWITCH EARTH CIRCUIT CONTINUITY**	
	• Disconnect the electrical connector C-111 at the clutch pedal switch and the PCM connector. • Check the Blue/Yellow wire (92) from the switch connector C-111 to the PCM terminal B05 RBS. • **Was there continuity?**	**Yes** PCM issue. Refer to Section 303-14. **No** Check and repair wiring or terminal fault.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B : PEDAL NOT RETURNING ONCE RELEASED

Test Step		Result / Action to Take
B1	**HYDRAULIC SYSTEM**	
	• Check the fluid reservoir for clutch fluid. • **Was the reservoir empty?**	**Yes** Fill the reservoir with fluid. Refer to the specifications. Go to B2 to ensure that the master cylinder is not leaking. **No** Go to **B2**
B2	**HYDRAULIC HOSES**	
	• Carry out a visual inspection of the clutch hydraulic hoses and hose clamps to see evidence of a leakage point. • **Was a leak evident at the hoses, joints or clamps?**	**Yes** Rectify cause of fluid leakage or replace the offending hose. **No** Go to **B3**
B3	**MASTER CYLINDER**	
	• Carry out a visual inspection of the master cylinder push rod plunger to cylinder area for signs of fluid leakage between push rod plunger and the entry point to the master cylinder. • **Was a leak evident?**	**Yes** Replace the clutch master cylinder. Refer to Section 308-02. **No** Go to **B4**
B4	**RETURN SPRING**	
	• Carry out visual inspection of the Return spring at the pedal pivot for damage. • **Was the return spring damaged or broken?**	**Yes** Replace the complete Pedal box assembly. Refer to Section 308-02. **No** Go to **B5**
B5	**OBSTRUCTION**	
	• Check for an obstruction that could causing the pedal not to return such as floor carpet, wiring harness jammed at the upper pivot area, etc. • **Was an obstruction found?**	**Yes** Rectify cause of obstruction. **No** There appears to be no issue with clutch pedal return.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C : CRUISE CONTROL CLUTCH PEDAL CUT OFF SWITCH

Test Step		Result / Action to Take
C1	**PIVOT POINT BINDING OR "RASPY"**	
	• Remove the 2 x Torx head bolts used to retain the clutch master cylinder to the pedal box. • Gently turn the flexible inlet hose to the master cylinder so that the it is parallel with the master cylinder body. This hose repositioning is carried out to enable the hose to pass through the master cylinder to mounting opening. • Gently withdraw the master cylinder (including flexible hose) through the opening. Allow to hang loose. • Manually push on the clutch pedal to evaluate if any binding at the pivot pin or "raspy" effect is felt. • **Did you notice any binding or "raspy" feel?**	**Yes** Replace the clutch pedal / mount assembly. Refer to Section 206-06. **No** Clutch pivot pin okay. Refit the clutch master cylinder. Go to the clutch diagnosis section for slave cylinder and pressure plate diagnostics.

GENERAL PROCEDURES

Clutch Bleeding

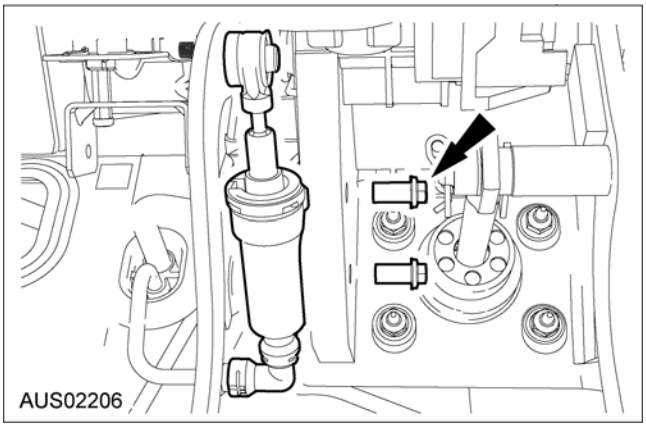
1. Reconnect all lines and hoses and ensure routing is correct. ie. Ensure there are no kinks or siphons present in the soft lines (especially the reservoir line). This is extremely important as the system will be difficult or impossible to bleed if siphons exist.
2. Fill the clutch reservoir to Full mark and keep filled above 1/4 full at all times during bleed procedure.
3. Pump the clutch pedal at a moderate pace through its full travel ensuring the pedal returns fully up against it's stop. Note that the pedal may need to be pulled back manually by hand to fully return. Rapid pedal returns can be of assistance if the clutch appears difficult to bleed.
4. Continue to pump the clutch pedal in bursts of 10 pumps with a rest for 5 seconds (with pedal fully returned) in between.
5. After 30 seconds to a minute some pedal feel should exist, continue the pumping/resting cycle until the pedal has come up fully (up to approx 5 minutes). Some rapid pumping at the end of this time may improve the bleed slightly but is not necessarily required.
6. (6 Cylinder only), V8 has no bleed port, continue step 5. for V8 clutch if still spongy). If there is some initial sponginess or play in the first part of pedal travel, continue with a CSC bleed. This is normally only required if the CSC has been drained or replace. Elevate the vehicle to gain access to the underside of the transmission and bleed the CSC manually by depressing the pedal fully and holding it down whilst an assistant opens and closes the bleed port on the side of the transmission bell housing (simular process to bleeding the braking system). Repeat until pumped fluid is not aerated (usually 2-4 strokes. Note that approx 3 full strokes will almost empty the reservoir. ensure that fluid remains in the reservoir at all times or the procedure may need to be started again.
7. The Clutch system should now be fully bled. Ensure that the reservoir is filled to Full mark and test drive the vehicle to ensure that the clutch is disengaging properly and not dragging. Note that the system is self-bleeding and some slight improvement will occur in pedal feel and take-up point after the vehicle has sat for a few hours or overnight after the above bleed procedure. This is normal as any emulsified air will coalesce and bleed out automatically during this time.

REMOVAL AND INSTALLATION

Clutch Pedal

Removal

1. Remove two M6 nuts and bolts, Clutch assembly can now be removed.
   NOTE: Ensure that inserts in pedal box remain in place.



2. Clutch Master Cylinder is now free of bracket but still retained on pedal by push-on fix.

Installation

1. To install, reverse the removal procedure.

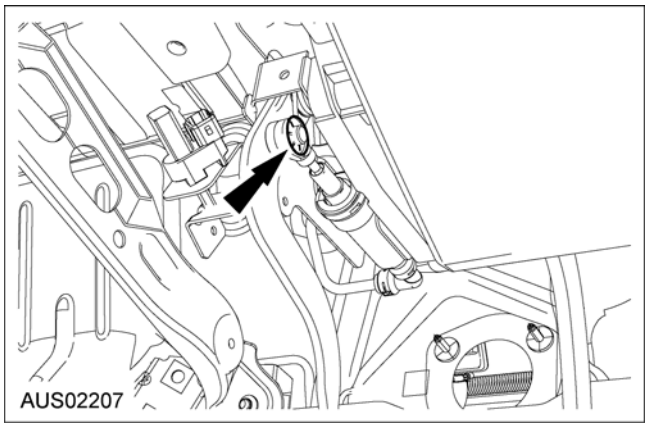
Clutch Master Cylinder

Removal and Installation

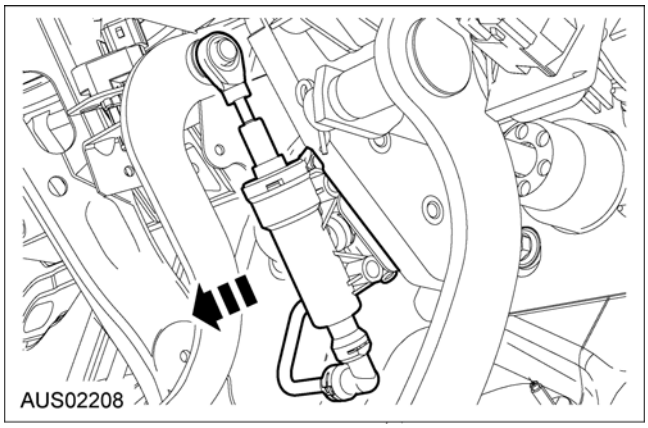
WARNING: Clutch fluid contains polyglycol ethers and polyglycols. Avoid contact with eyes. Wash hands thoroughly after handling. If brake fluid contacts eyes, flush eyes with running water for 15 minutes. Get medical attention if irritation persists. If taken internally, drink water and induce vomiting. Get medical attention immediately.

CAUTION: Clutch fluid is harmful to painted or plastic surfaces. If the clutch fluid is spilled onto a painted or plastic surface, wash it immediately with water.

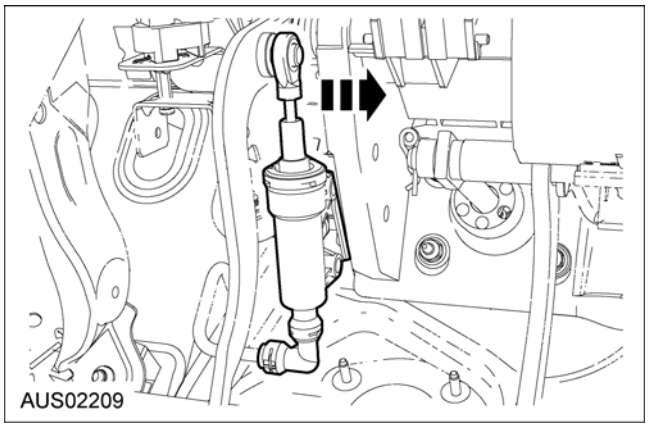
1. Partially drain the clutch reservoir.
   - Drain to just below the clutch reservoir nipple.
2. Remove the hose at the clutch reservoir.
3. Remove the push on decoupler from the clutch pedal pin.



4. Pull the clutch master cylinder forward until the line clip is accessible. Remove the clip and disconnect the line.



5. Disconnect the clutch master cylinder rod from the clutch pedal arm. Remove the clutch master cylinder from the vehicle.



6. Remove the reservoir line from the clutch master cylinder.

REMOVAL AND INSTALLATION (Continued)

7. To install, reverse the removal procedure.
   - Install new hose clamps on the reservoir line.
   - Refill the brake master cylinder with the specified fluid.
   - Bleed the clutch hydraulic system. For additional information, refer to procedure in this chapter.

REMOVAL AND INSTALLATION (Continued)

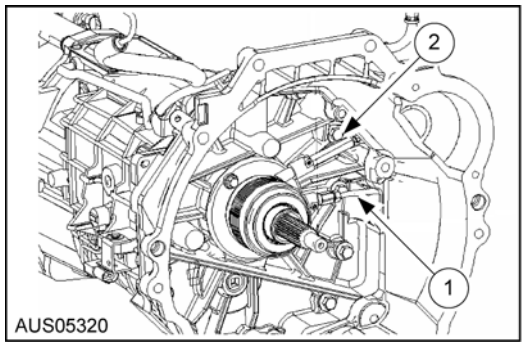
Concentric Slave Cylinder (CSC) (All I6 6-speed manual transmissions)

Removal

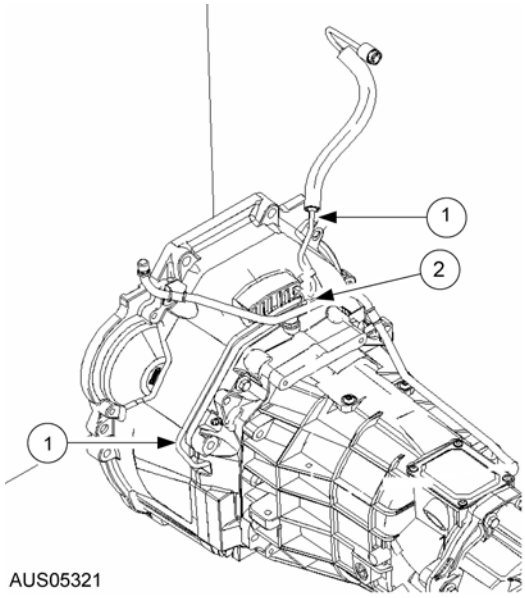
1. Before the CSC can be removed the transmission must be removed from the vehicle according to the procedures set out in Section 308-03A.

2. Undo and disconnect the CSC fluid hose from the CSC

   WARNING: Using a spanner, restrain the steel female fitting in the CSC whilst undoing the mating tube fitting to avoid damaging the CSC.

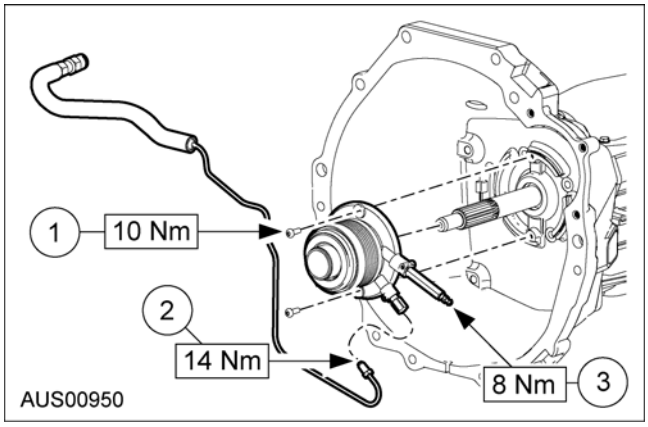


Item	Description
1	CSC – to – Hydraulic tube fitting
2	Bleed screw/Nipple



Item	Description
1	CSC – to – Hydraulic tube fitting
2	Hose Clip

3. Detach the fluid hose from the mounting clips and . remove it from the transmission housing.



Item	Description
1	CSC Mounting screws
2	CSC – to – Hydraulic tube fitting
3	Bleed screw/Nipple

4. Remove the two CSC mounting bolts that attach the CSC to the transmission housing.
5. Inspect the clutch release bearing as follows:
   1. Rotate the outer race while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.
   2. Inspect for wear or damage.
      - If wear pattern is continuous (not segmented) and the wear appears to be deep in bearing face, install a new clutch slave cylinder.
6. To install, reverse the removal procedure.
   1. Position the clutch slave cylinder to the transmission and install the bolts.
   2. Bleed the clutch hydraulic system. For additional information, refer to procedure in this chapter.

Installation

1. Place the CSC in the position shown and install the two CSC mounting bolts. Torque to specification.
2. Route the CSC hydraulic hose in the orientation shown and tighten the CSC-to-hydraulic hose fitting. Torque to specification.

   WARNING: Using a spanner restrain the steel female fitting in the CSC whilst tightening the mating tube fitting to avoid damaging the CSC.

   NOTE: Ensure the hydraulic hose is mounted in the clips located on and in the transmission housing.
3. Install the transmission as outlined in Section 308-03 and connect the hydraulic clutch line and bleed the clutch as outlined in this section.

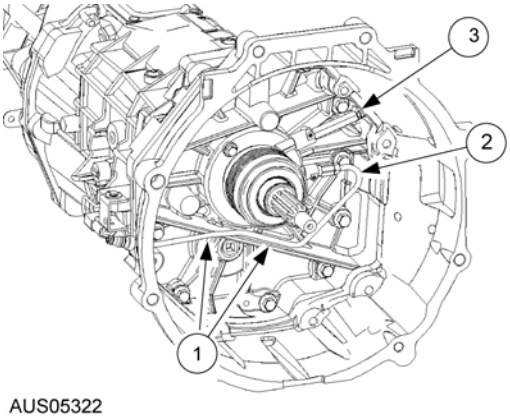
REMOVAL AND INSTALLATION (Continued)

Concentric Slave Cylinder (CSC) (All V8 6-speed manual transmissions)

Removal

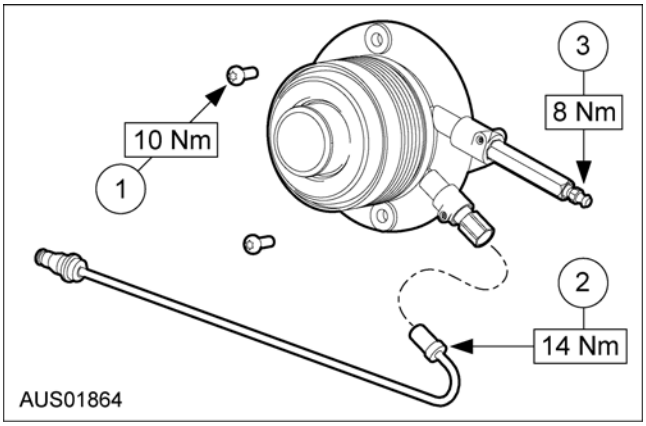
1. Before the CSC can be removed the transmission must be removed from the vehicle according to the procedures set out in Section 308-03B.
2. Undo and disconnect the CSC fluid hose from the CSC using a suitable spanner.

   WARNING: Using a spanner, restrain the steel female fitting in the CSC whilst undoing the mating tube fitting to avoid damaging the CSC.



Item	Description
1	Hydraulic Line
2	CSC – to – Hydraulic tube fitting
3	Bleed screw/Nipple

3. Detach the fluid hose from the mounting clips and remove it from the transmission housing.



Item	Description
1	CSC Mounting screws
2	CSC – to – Hydraulic tube fitting
3	Bleed screw/Nipple

4. Remove the two CSC mounting bolts that attach the CSC to the transmission housing.
5. Inspect the clutch release bearing as follows:
   1. Rotate the outer race while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.
   2. Inspect for wear or damage.
      - If wear pattern is continuous (not segmented) and the wear appears to be deep in bearing face, install a new clutch slave cylinder.
6. To install, reverse the removal procedure.
   1. Position the clutch slave cylinder to the transmission and install the bolts.
   2. Bleed the clutch hydraulic system. For additional information, refer to procedure in this chapter.

Installation

1. Place the CSC in the position shown and install the two CSC mounting bolts. Torque to specification.
2. Route the CSC hydraulic hose in the orientation shown and tighten the CSC-to-hydraulic hose fitting. Torque to specification.

   WARNING: Using a spanner restrain the steel female fitting in the CSC whilst tightening the mating tube fitting to avoid damaging the CSC.

   NOTE: Ensure the hydraulic hose is mounted in the clip located on and in the transmission housing.
3. Install the transmission as per the procedure set out in Section 308-03 and connect the hydraulic clutch line and charge the clutch as per this section.
4. Bleed clutch as previously stated in this chapter.

Clutch Hydraulic Fluid Tubes

Removal and Installation

WARNING: Clutch fluid contains polyglycol ethers and polyglycols. Avoid contact with eyes. Wash hands thoroughly after handling. If brake fluid contacts eyes, flush eyes with running water for 15 minutes. Get medical attention if irritation persists. If taken internally, drink water and induce vomiting. Get medical attention immediately.

CAUTION: Clutch fluid is harmful to painted or plastic surfaces. If the brake fluid is spilled onto a painted or plastic surface, wash it immediately with water.

1. Partially drain the clutch reservoir.
   - Drain to just below the clutch reservoir nipple.
2. Remove the hose at the clutch reservoir.

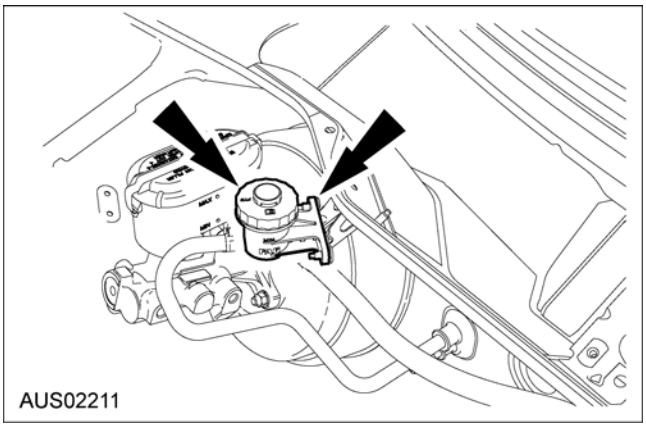
REMOVAL AND INSTALLATION (Continued)

3. Disconnect the hydraulic line from the clip on the instrument panel.
   1. Using a 3/32-inch punch and hammer, drive out the roll pin and discard it.
   2. Disconnect the hydraulic line.
4. Disconnect the hydraulic line from the clutch master cylinder.
5. Disconnect the lower end of the hydraulic line from the clutch slave cylinder.
6. Disconnect the hydraulic line from the clip on the transmission.
   NOTE: Make sure the O-ring is in the outlet port or on the tube connector.
7. To install, reverse the removal procedure.
8. Bleed the clutch hydraulic system. For additional information, refer to procedure in this chapter.

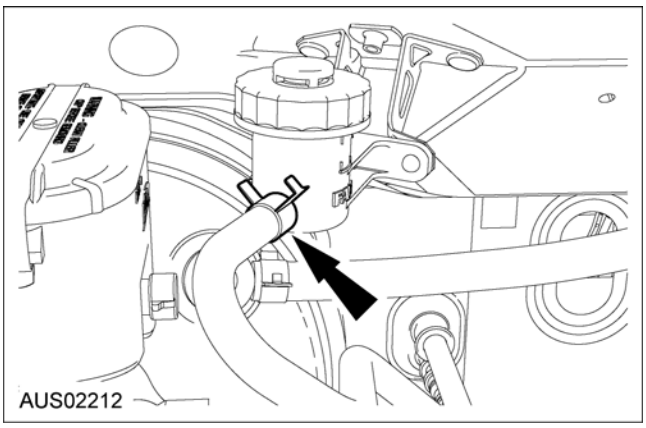
Clutch Reservoir

Removal and Installation

1. Remove the two M6 nuts securing the reservoir to the reservoir bracket.



2. Remove the cap, drain the reservoir of all fluid and replace cap.
3. Undo clamp on reservoir line and remove reservoir.



4. To install, reverse removal procedure.