SECTION : 308-01 Clutch

VEHICLE APPLICATION : 2006.0 FPV GT/GT-P, Pursuit, Super Pursuit, F6 Typhoon and F6 Tornado

CONTENTS PAGE

SPECIFICATIONS

FPV supplement

This supplement contains information on the unique F6 Clutch, for information on the GT-GT-P and Pursuit V8 Clutch, please refer to section 308-01 in the BF Falcon Workshop Manual.

Torque Specifications

Description	Nm
CSC to clutch housing	9.5
CSC to pipe fitting nut	14
CSC Bleed screw	8
Clutch to flywheel	26
Flywheel to crankshaft	75

NOTE: The flywheel to crankshaft bolts must be replaced with new bolts whenever they are removed

DESCRIPTION AND OPERATION

Clutch (F6 Only)

Introduction

The Manual F6 Typhoon and Tornado are fitted with a high torque capacity 240 mm twin plate clutch with a one-piece flywheel. When the clutch slave cylinder is actuated, it applies pressure to the diaphragm spring, this removes the pressure on the main pressure plate which moves away from the flywheel. As the main pressure plate moves away from the flywheel it removes the clamping force on the intermediate plate. The intermediate plate slides within the clutch cover and releases the flywheel side clutch disc.

A pilot bearing located in the engine crankshaft supports the end of the transmission input shaft. The bearing should be lubricated when the clutch system is serviced.

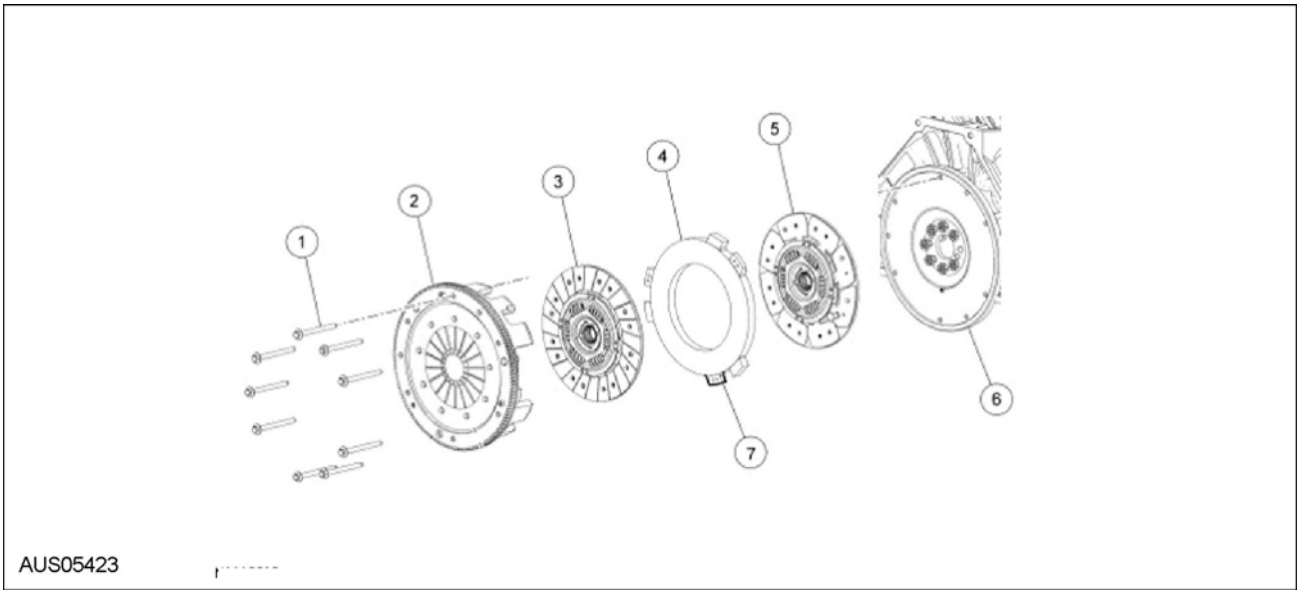
The clutch does not require pressure plate re-setting after disassembly or disc renewal.

Clutch Function

The primary function of the clutch system is to connect and disconnect engine power to the transmission upon driver command.

DESCRIPTION AND OPERATION (Continued)

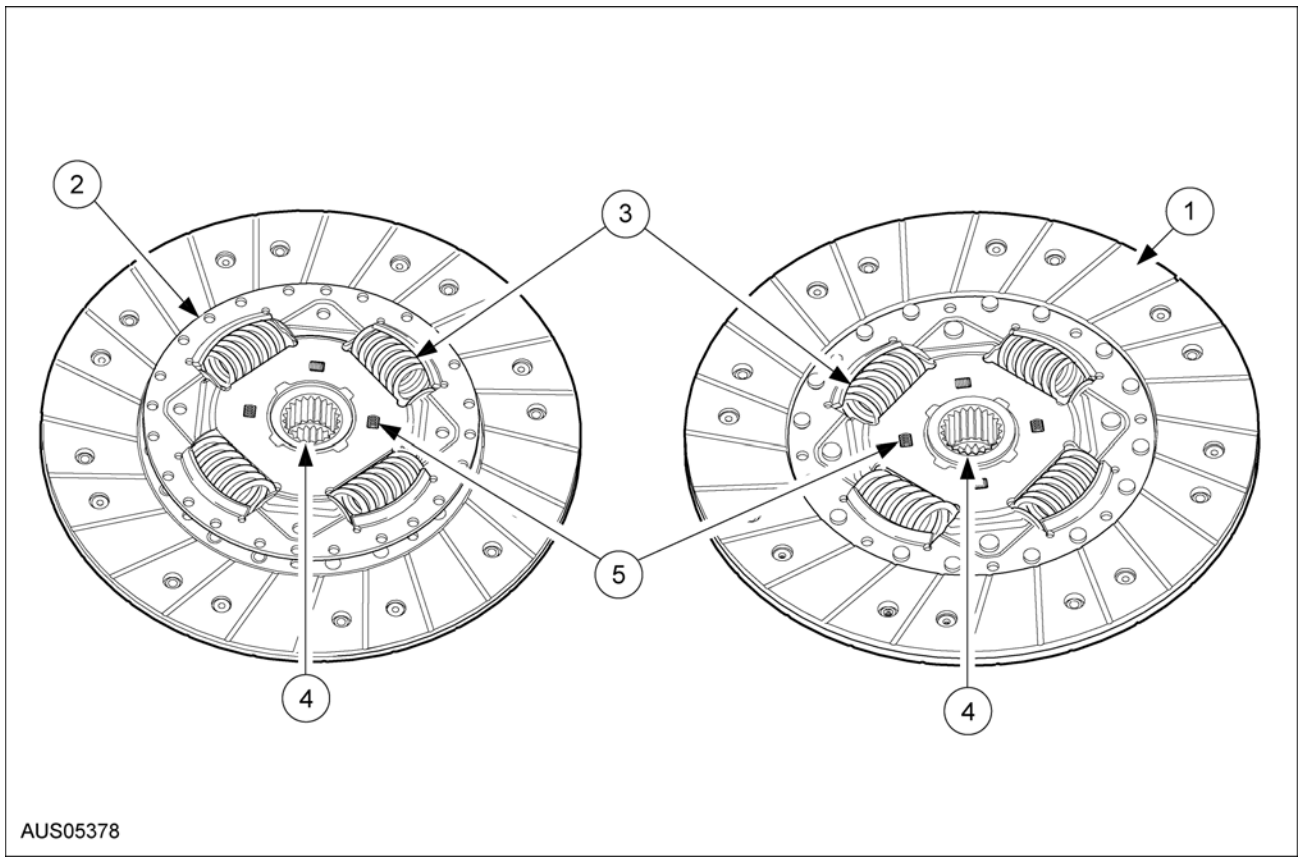
Clutch System Components - F6 Turbo



Item	Description
1	Clutch attaching bolts
2	Clutch pressure plate and cover assembly
3	Clutch disc (release bearing side)
4	Intermediate pressure plate
5	Clutch disc (flywheel side)
6	Flywheel
7	Intermediate plate lug

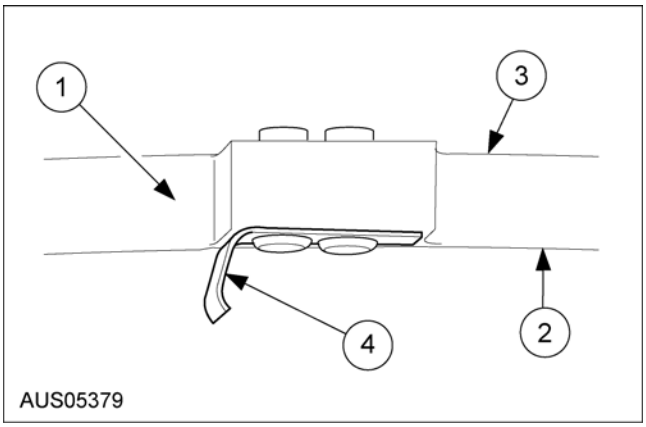
DESCRIPTION AND OPERATION (Continued)

Side Clutch



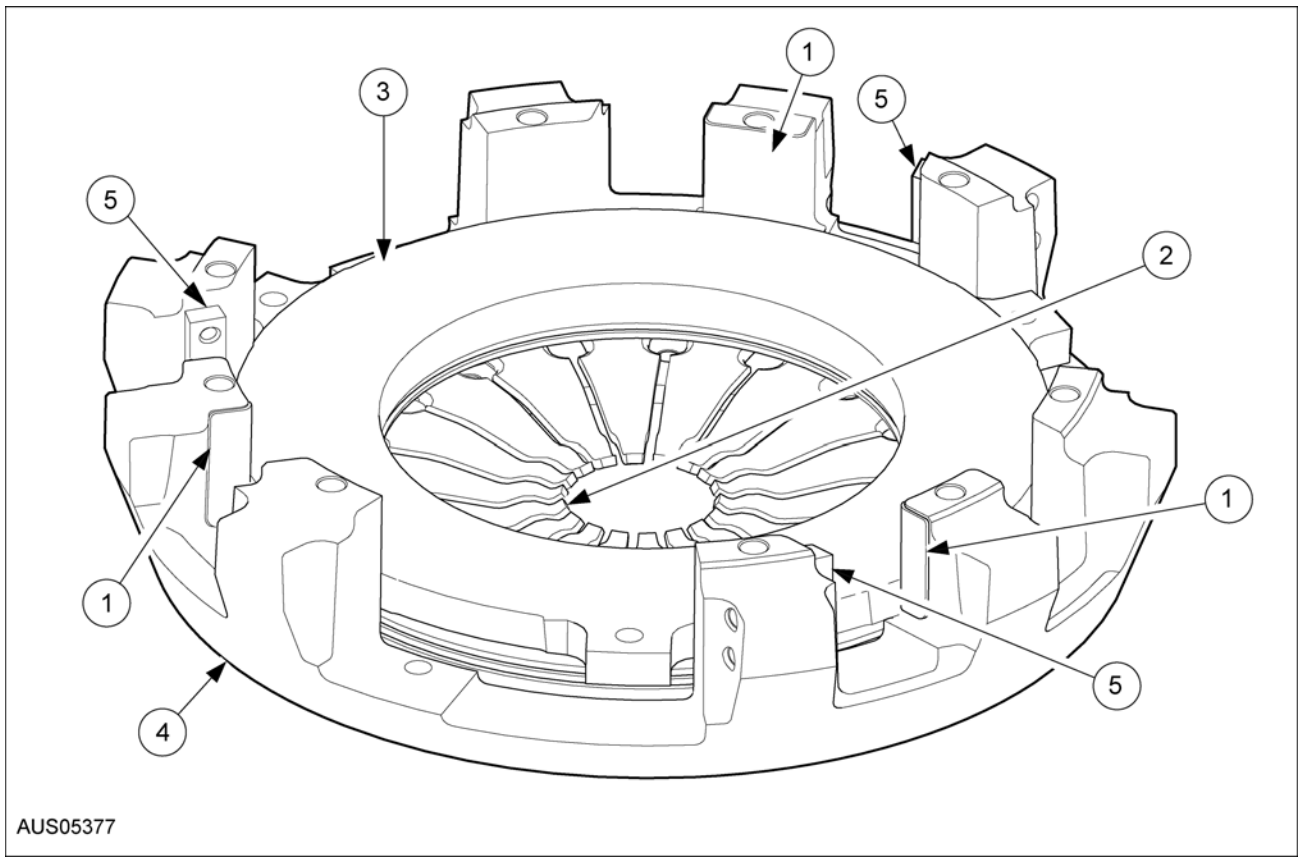
Item	Description
1	Clutch driven disc - Release bearing side disc
2	Clutch driven disc - Flywheel side disc
3	Main stage torsional springs
4	Main splines - mate with transmission input shaft
5	Predamper Springs (red)

DESCRIPTION AND OPERATION (Continued)



Item	Description
1	Intermediate Pressure Plate
2	Release bearing side of the intermediate pressure plate
3	Flywheel side of the intermediate pressure plate
4	J-clip (3 off per intermediate plate)

DESCRIPTION AND OPERATION (Continued)



Item	Description
1	Wear Plate (3 off)
2	Diaphragm Spring
3	Main pressure plate
4	Clutch Cover
5	J-clip rubbing strips (3 off)

DIAGNOSIS AND TESTING

Clutch

Symptom Chart

Condition	Source	Action
• Clutch does not disengage correctly (Clutch drag)	• Binding of the disc on the input shaft splines	• Check splines for burrs, rusting and damage. Clean up splines and lubricate with the specified lubricant
	• Air or water in hydraulic system	• Flush, refill and bleed hydraulic system
	• Low fluid level in hydraulic clutch system	• Bleed clutch system and fill clutch fluid reservoir
	• Excessive wear on the surface of the wear strips and wear plates	• If there is any indentation or roughness on the wear strips or plates, replace the wear strips, wear plates and intermediate plate.
	• Failed, uneven or excessively worn diaphragm spring	• Replace F6 clutch assy
	• Excessively worn or damaged clutch discs (minimum compressed thickness of each disc is 6.4 mm)	• Replace F6 clutch assy
	• Concentric Slave Cylinder (CSC) damaged	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Clutch master cylinder damaged	• Replace master cylinder
	• Cracked/Crazed pressure plate	• Replace F6 clutch assy
	• Transmission/Bell housing out of alignment	• Align to specifications

• Clutch does not engage correctly (Clutch Slip)	• Contamination of the clutch facings with oil or grease from the following places:
	  • Release bearing
	  • Engine
	  • Concentric Slave Cylinder (CSC)
	  • Pilot bearing
	  • Transmission
		• Replace defective part. (If grease or oil is causing the clutch to slip, replace the disc, remove the grease or oil from the pressure plate and flywheel and reuse if it is not burned or scored.) Repair source of leakage.

	• Blockage in hydraulic system	• Flush, refill and bleed hydraulic system
	• Failed, uneven or excessively worn diaphragm spring	• Replace F6 clutch assy
	• Clutch to Flywheel bolts loose	• Tighten bolts
	• Excessively worn or damaged clutch discs (minimum compressed thickness of each disc is 6.4 mm)	• Replace F6 clutch assy
	• Concentric Slave Cylinder (CSC) damaged	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Clutch master cylinder damaged	• Replace master cylinder
	• Cracked/Crazed pressure plate	• Replace F6 clutch assy
	• Flywheel housing out of alignment	• Align to specifications
	• Excessive heat damage (eg hot spots or grooving of the friction surfaces) on the flywheel or clutch pressure plates	• Replace clutch assy and flywheel assy

DIAGNOSIS AND TESTING (Continued)

Condition	Source	Action
• Excessive clutch pedal effort or clutch pedal slow to return	• Blockage in hydraulic system	• Flush, refill and bleed hydraulic system
	• Failed, uneven or excessively worn diaphragm spring	• Replace F6 clutch assy
	• Excessively worn or damaged clutch discs (minimum compressed thickness of each disc is 6.4 mm)	• Replace F6 clutch assy
	• Concentric Slave Cylinder (CSC) damaged	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Clutch master cylinder damaged	• Replace master cylinder
	• Cracked or excessively heat affected pressure plate	• Replace F6 clutch assy
• Noisy clutch operation when engine running	• Concentric Slave Cylinder (CSC) bearing failure	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Excessively worn or damaged clutch discs (minimum compressed thickness of each disc is 6.4 mm)	• Replace F6 clutch assy
	• Loose Clutch to Flywheel bolts	• Replace and tighten clutch to flywheel bolts
	• Loose Flywheel to crank bolts	• Replace flywheel, flywheel bolts and ensure crank is not damaged
	• Damaged J-clips on intermediate plate	• Replace intermediate plate, wear plates & wear strips and fixings
	• Loose engine mount bolts	• Replace bolts and torque to specification
• Noisy clutch operation with engine off	• Binding at pedal support bracket	• Lubricate with engine oil or replace support bracket bushing
	• Concentric Slave Cylinder (CSC) damaged	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Binding within pressure plate/intermediate pressure plate	• Lubricate pressure plate pins

DIAGNOSIS AND TESTING (Continued)

Condition	Source	Action
• Clutch Shudder	• Loose pressure plate to flywheel bolts	• Replace bolts and Torque bolts to spec
	• Damaged J-clips on intermediate plate	• Replace intermediate plate, wear plates & wear strips and fixings

	• Contamination of the clutch facings with oil or grease from the following places:
	  • Release bearing
	  • Engine
	  • Concentric Slave Cylinder (CSC)
	  • Pilot bearing
	  • Transmission
		• Replace defective part. (If grease or oil is causing the clutch to slip, replace the disc, remove the grease or oil from the pressure plate and flywheel and reuse if it is not burned or scored.) Repair source of leakage.

	• Air or water in hydraulic system	• Bleed hydraulic system
	• Low fluid level in hydraulic clutch system	• Bleed clutch system and fill clutch fluid reservoir
	• Failed, uneven or excessively worn diaphragm spring	• Replace F6 clutch assy
	• Clutch to Flywheel bolts loose	• Replace and Torque bolts to spec
	• Excessively worn or damaged clutch discs (minimum compressed thickness of each disc is 6.4 mm)	• Replace F6 clutch assy
	• Concentric Slave Cylinder (CSC) damaged	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Clutch master cylinder damaged	• Replace master cylinder
	• Cracked/Crazed pressure plate	• Replace F6 clutch assy
	• Loose pressure plate to flywheel bolts	• Replace bolts and torque bolts to spec
	• Loose engine mount bolts	• Replace bolts and torque bolts to spec
	• Excessive heat damage (eg hot spots or grooving of the friction surfaces) on the flywheel or clutch pressure plates	• Replace clutch assy and flywheel assy
• Clutch noisy when disengaged (Engine running)	• Pilot bearing worn	• Replace pilot bearing
	• Concentric Slave Cylinder (CSC) bearing worn	• Replace Concentric Slave Cylinder (CSC). Refer to Section 308-02.
	• Loose Clutch to Flywheel bolts	• Replace bolts and torque bolts to spec
	• Loose Flywheel to crank bolts	• Replace flywheel, flywheel bolts and ensure crank is not damaged
	• Damaged J-clips on intermediate plate	• Replace intermediate plate, wear plates & wear strips and fixings

NOTE: CSC - Concentric Slave Cylinder

GENERAL PROCEDURES

Clutch spin down time - Evaluation

The clutch should be evaluated for 'spin down time' at each service interval and if the customer complains of difficult gear changes.

Clutch spin down time is the time required for the transmission input shaft and clutch driven discs to stop rotating from engine idle speed, after the clutch is fully disengaged. Gear selection will be difficult until the clutch driven discs have stopped spinning.

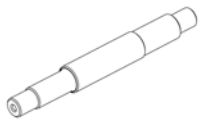
If clutch drag is occurring, clutch spin down time will be increased. The F6 Typhoon twin plate clutch has a maximum acceptable spin down time of 5 seconds, with 2-3 seconds typical.

This is assessed using the following procedure.

1. Bring the engine and transmission to operating temperature.
2.
   - With the vehicle stationary, on level ground and the engine at idle, have the transmission in neutral and the clutch pedal up.
   - Fully depress the clutch pedal, wait 5 seconds and select 1st gear normally. Assess shift efforts and feel. Shift transmission to neutral and release clutch pedal.
3. Repeat step 2 five more times.
4. Carry out step 2 six times, selecting reverse gear instead of 1st gear.

If gear selection is unusually difficult, clutch drag is likely to be occurring. This will necessitate inspection of the clutch and possible replacement of the wear plates and rubbing strips in the clutch assembly, as per the service procedure.

Special Tool(s)

 SST308-257	**Aligner, Clutch Disc** **All I6: Tool 308-257 (E9276) or Transmission Input Shaft (23T)** **All V8: Generic Tool or Input Shaft (10T)**

REMOVAL AND INSTALLATION

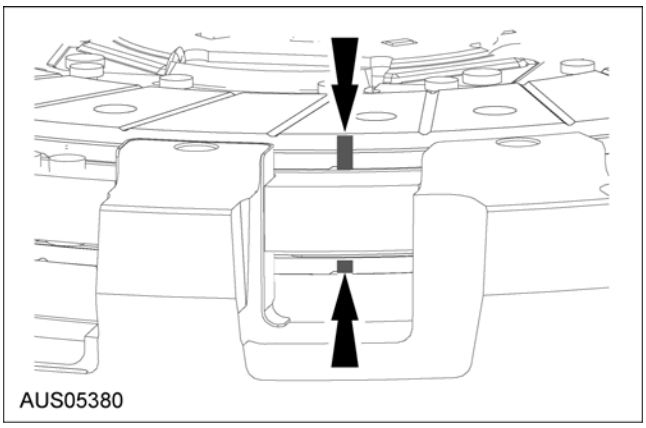
REMOVAL OF CLUTCH

Disc and Pressure Plate (F6 Clutch)

Clutch Removal

The following illustrations show the removal and installation procedure for the F6 Clutch.

1. Remove the transmission. For additional information, refer to Section 308-03 in the BF Falcon Workshop Manual.
2.
   - Prior to clutch removal, mark the clutch discs so that they can be re-aligned to each other during assembly.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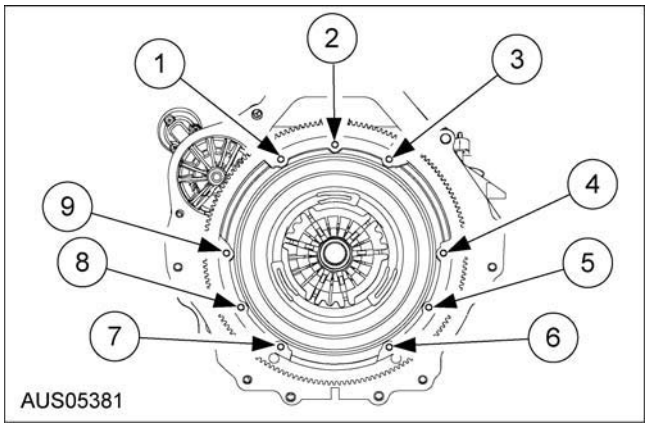
   - Remove (and retain) the bolts using the following process: - remove bolts 1, 3, 4, 6, 7 & 9 completely - the remaining bolts (2, 5 & 8) need to be unscrewed one bolt turn at a time in the following manner: bolt 2 (1 turn), bolt 5 (1 turn), bolt 8 (1 turn), bolt 2 (1 turn), bolt 5 (1 turn), bolt 8 (1 turn)…….and continue in this manner until all the bolts have been removed - taking care not to let the clutch fall. **The bolts must be removed evenly or permanent damage to the diaphragm spring will occur resulting in complete clutch release.**



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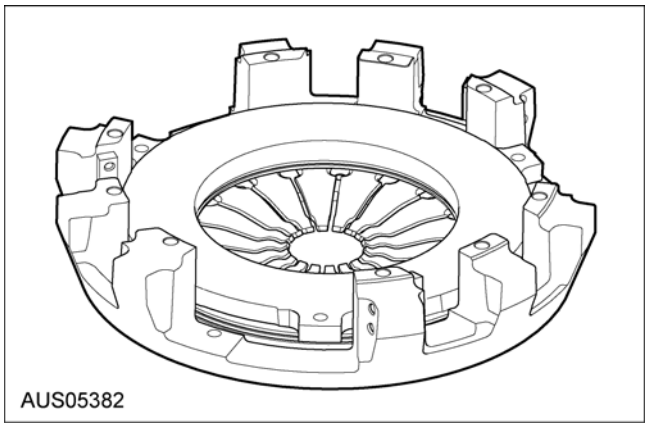
   - Remove the clutch as an assembly (try not to separate as this can lead to damage to the intermediate plate. This is most easily achieved by having the 'Clutch Disc Aligner Tool' inserted through the splines during removal.
3.
   - Place the clutch so that it lies flat, with the diaphragm spring resting on the bench.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   - Remove the flywheel side clutch driven disc.
   - Remove the intermediate plate.

⚠ CAUTION: Care must be taken to avoid damaging the J-clips. Never place the intermediate plate down on the J-clips. Never rest anything on the J-clips. J-clip damage will necessitate intermediate plate replacement.

REMOVAL AND INSTALLATION (Continued)

CLUTCH INSPECTION

Pressure Plate & Intermediate Pressure Plate Inspection

1. Inspect the friction surface of the pressure plate for burn marks, scoring or ridges, and warpage.
   NOTE: Generally, pressure plate resurfacing is not recommended.
2. Clean the pressure plate and flywheel to be sure the surfaces are free from any oil film. Do not use cleaners with petroleum base, and do not immerse the pressure plate in solvent.

Clutch Disc Inspection

1. Inspect the friction facings for oil or grease. Eliminate the source of any oil or grease before replacing the disc. Excessive grease will contaminate the disc facings.
2. Inspect the clutch disc for worn or loose facings. Check the disc for distortion and for loose rivets at the hub. Check for broken springs and springs that can be moved radially.
3. Check that the disc will slide on the input shaft prior to installation.

NOTE: Replace the clutch assembly if any of these defects are present. Be especially careful when installing a new disc to avoid dropping it or contaminating it with oil or grease.

Intermediate Plate Inspection

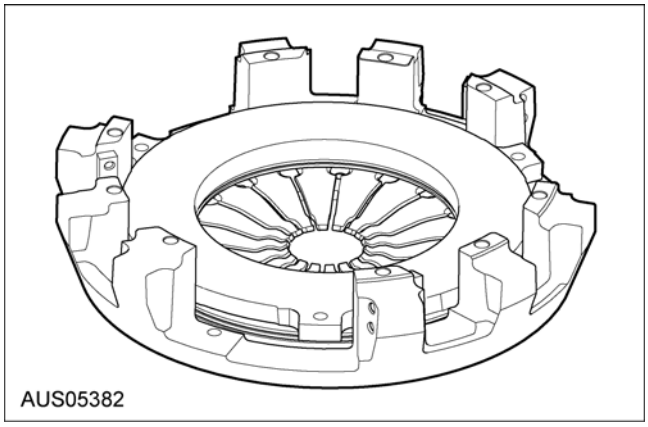
1. Inspect the friction surface of the pressure plate for burn marks, scoring or ridges, and warpage. Check the J-Clips, they should still have a curved profile and provide a tight, but moveable fit with the clutch cover. If the J-Clips are bent or deformed the intermediate plate will need to be replaced.
   NOTE: Generally, pressure plate resurfacing is not recommended.
2. Clean the pressure plate and flywheel to be sure the surfaces are free from any oil film. Do not use cleaners with petroleum base, and do not immerse the pressure plate in solvent.
3. If the clutch spin down time was excessive when evaluated, inspect the wear plates and the wear strips. If these are excessively worn they should be replaced (ONLY REPLACE THESE PARTS IF THE CLUTCH IS EXHIBITING CLUTCH DRAG WHEN DRIVEN)

REPLACEMENT OF THE WEAR PLATES AND THE RUBBING STRIPS

Strip Down

1.

- Place the clutch so that it lies flat, with the diaphragm spring resting on the bench.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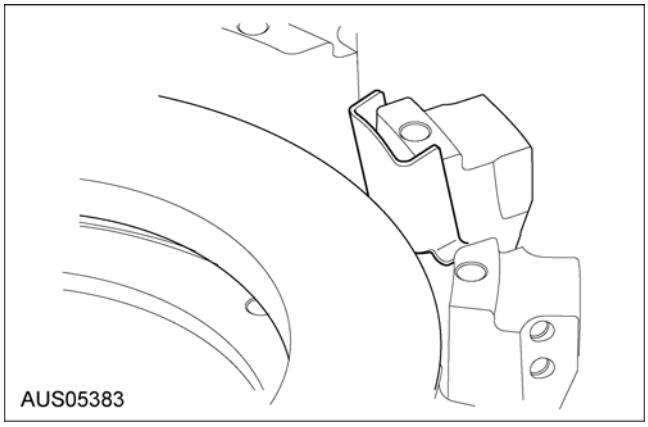
- Remove the flywheel side clutch driven disc.
- Remove the intermediate plate.

⚠ **CAUTION: Care must be taken to avoid damaging the J-clips. Never place the intermediate plate down on the J-clips. Never rest anything on the J-clips. J-clip damage will necessitate intermediate plate replacement.**

- Remove the release bearing side clutch driven disc.

2.

- Remove the wear plates. Remove all the wear plate adhesive using either the solvent in the clutch kit or a paint thinning solvent. Discard the wear plates.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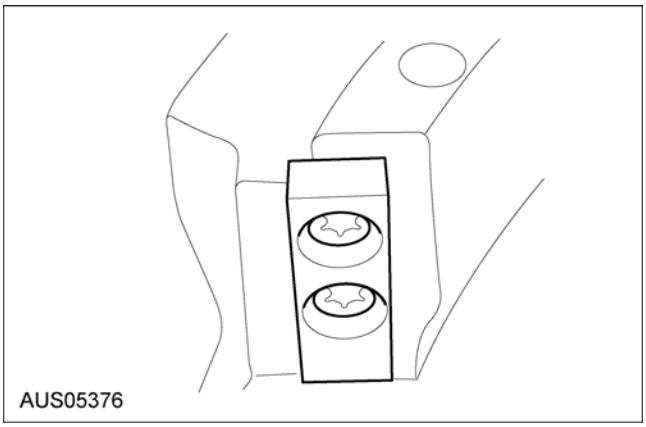
- Remove the J-clip rubbing strips. Discard the J-clip rubbing strips and M4 screws.

REMOVAL AND INSTALLATION (Continued)



- Clean the clutch cover assembly with particular attention to the wear plate and J-clip rubbing strip mating surfaces. All the existing adhesive and loctite must be removed. CLEAN WITH EITHER THE SOLVENT IN THE KIT OR PAINT THINNERS IF THERE IS INSUFFICIENT SOLVENT IN THE KIT.
- Inspect the clutch cover, pressure plate, intermediate plate, driven discs and flywheel for signs of wear or damage.

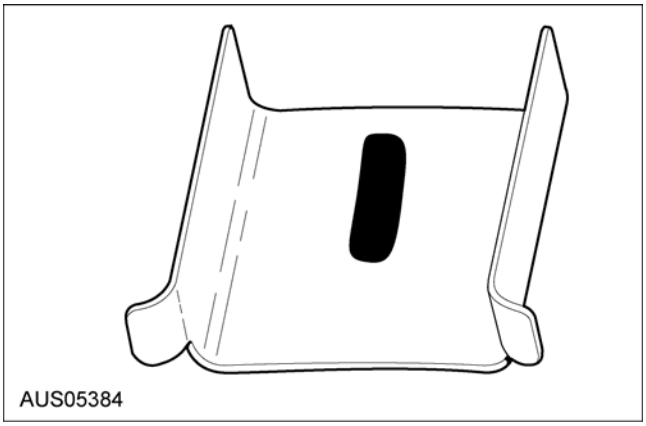
3.

- Fit three new J-clip rubbing strips to the cover legs using new M4 screws. Apply a small amount (so that it lightly covers 5 threads) of Loctite 243 or 242 to the screw threads and tighten to 4Nm.
- Ensure that all the J-clip rubbing strips are properly seated and that the screw heads are sunken below the rubbing face of the strip.

NOTE: All the visible surfaces should be free of loctite.

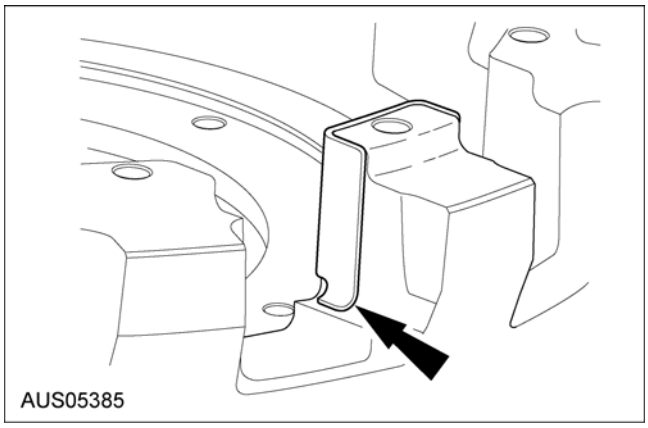
4.

- Apply silicone adhesive to wear plate (SILICONE ADHESIVE SUPPLIED IN THE KIT). The silicone strip should be approximately 7 mm long x 3 mm wide, positioned centrally in the wear plate. The line should be of consistent width and volume.



⚠ CAUTION: Only apply silicone to the non-drive face of the wear plate. Apply only specified amount of silicone. Excessive or incorrectly applied silicone will cause improper seating of the wear plate.

- To install the wear plate, press the wear plate firmly against the middle cover leg (there are three banks of three legs). Ensure that the wear plates mate with the radius at the base of the clutch cover leg.



- If silicone seeps from the joint, remove wear plate, clean off silicone and restart procedure.
- The silicone must be allowed to cure for 24 hours before progressing to the next stage of the assembly process.
- The service kit also contains a new intermediate plate. This new intermediate plate must be used when the wear plates and the wear strips are replaced.

REMOVAL AND INSTALLATION (Continued)

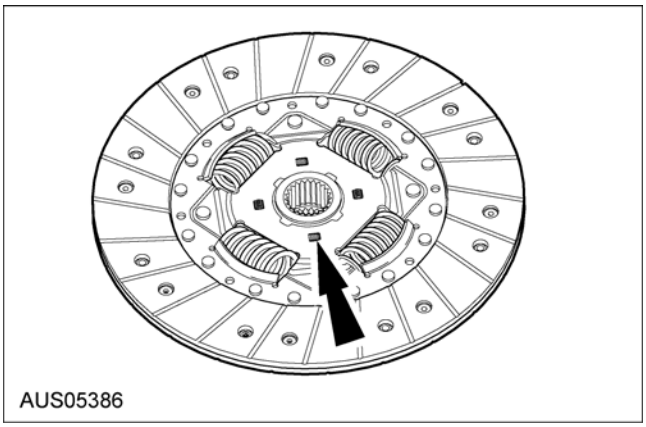
INSTALLATION OF CLUTCH

Disc and Pressure Plate (F6 Clutch) Installation

Clutch Installation

Clutch Preparation

1. Rebuild the clutch in the reverse manner to the way it was taken apart. With the clutch resting on the diaphragm spring:
   - Put the release bearing side clutch driven disc against the clutch main pressure plate. The writing "bearing side" on the disc must be on the side facing the diaphragm spring. With the clutch in this position, and when the release bearing side clutch driven disc is placed against the clutch main pressure plate correctly, you should still be able to see the red pre-damper springs.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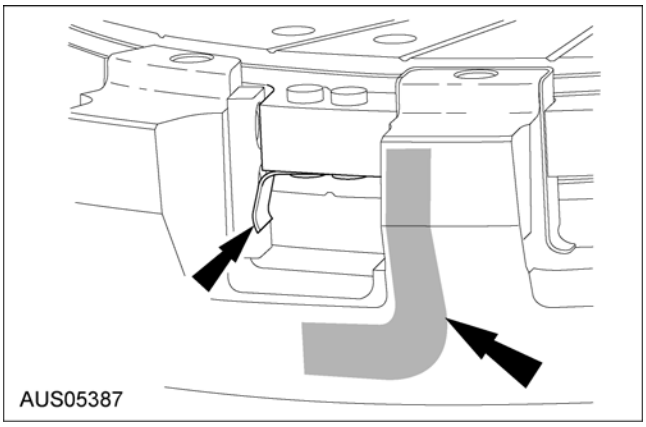
   - The intermediate plate should be fitted on top of the release bearing side clutch driven disc, with the J-clips pointing down toward the diaphragm spring. The intermediate plate should be aligned to the clutch cover using the markings already on the intermediate plate and the clutch cover (usually a green marking on the intermediate plate and the clutch cover).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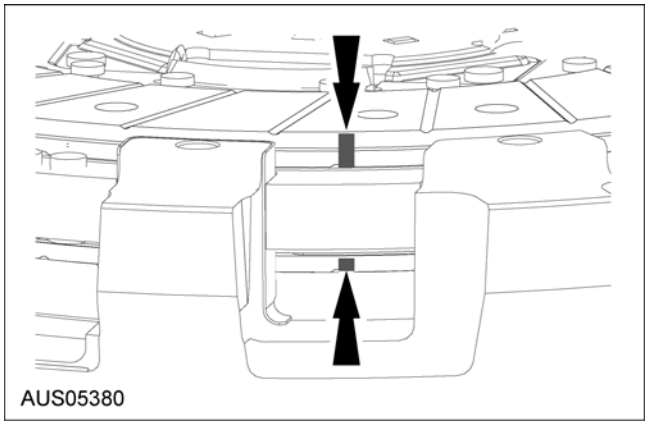
A small amount of rotational force will be needed to be applied to the intermediate plate, to overcome the J-clip preload, before it will fall into place.
DO NOT FORCE THE J-CLIPS. ENSURE J-CLIPS SLIDE SMOOTHLY AGAINST THE RUBBING STRIPS.

   - The flywheel side clutch driven disc should be placed on the intermediate plate.

The writing "flywheel side" must be on the side facing the flywheel.
With the clutch in this position, and when the flywheel side clutch driven disc is placed against the clutch intermediate pressure plate correctly, you should not be able to see the red pre-damper springs.
The flywheel side clutch driven disc should be rotated until the two sets of alignment marks match.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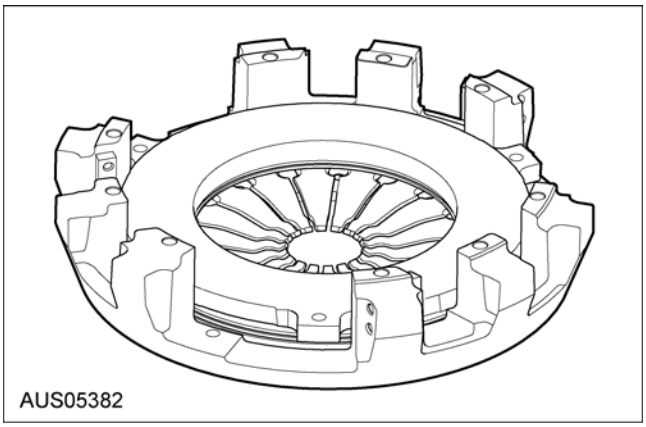
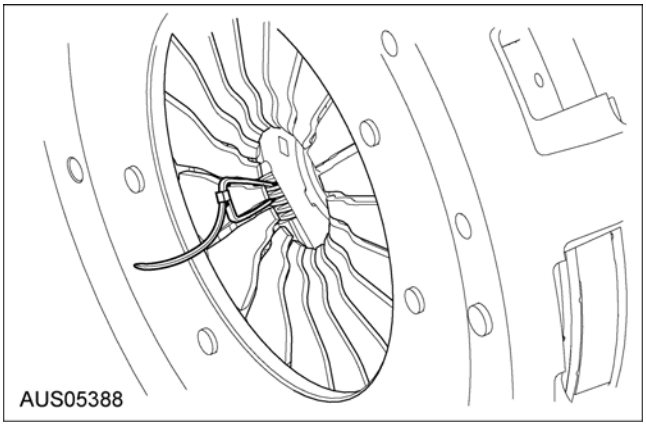
NOTE: It is essential that these marks align to ensure low out of balance on the clutch driven discs.

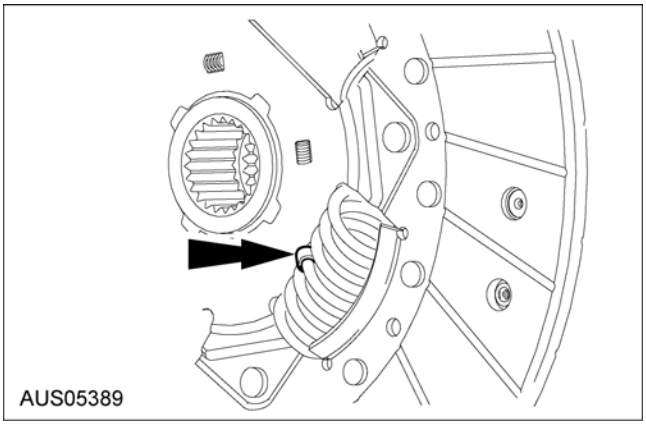
OPTIONAL

   - Loop a thin cable tie through diaphragm springs into the main damper springs, so that it passes from the diaphragm spring side of the clutch through to the flywheel side of the clutch and back again. The aim is to prevent the flywheel side clutch driven disc from falling off and to allow the clutch to be fitted as a cartridge (fig's 16 0& 17). This is an assembly aid only.

REMOVAL AND INSTALLATION (Continued)



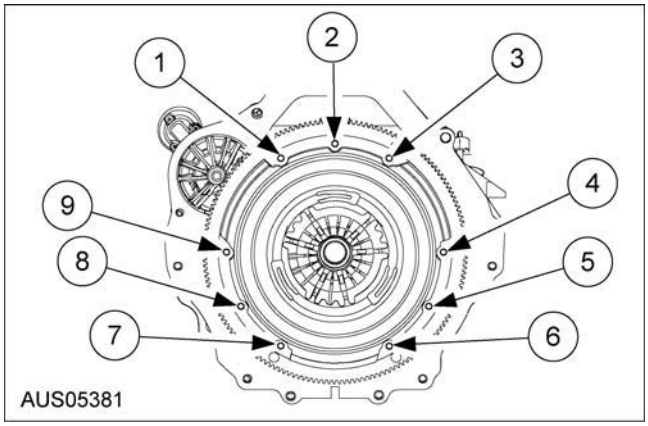




2. **Assembly to the engine**
   - Insert the 'Clutch Disc Aligner Tool' through the clutch splines from the diaphragm spring end of the clutch.
   - Lift the clutch so that it is level with the flywheel and align the clutch to the flywheel using the 'Clutch Disc Aligner Tool'.

   NOTE: USE NEW CLUTCH TO FLYWHEEL BOLTS

   - Secure the clutch temporarily by fitting bolts 1, 4 and 7 (loosely)



   - Install the bolts as follows:
   - The bolts (2, 5 & 8) need to be tightened one bolt turn at a time in the following manner: bolt 2 (1 turn), bolt 5 (1 turn), bolt 8 (1 turn), bolt 2 (1 turn), bolt 5 (1 turn), bolt 8 (1 turn) …….and continue in this manner until these bolts have been tightened to 26 Nm
   - For the remaining bolts, tighten bolts 1, 3, 4, 6, 7 & 9 to 26Nm in sequence
   - Remove and discard the cable tie if used, ensuring that the cable tie has been fully removed from the clutch.
3. Remove 'Clutch Disc Aligner Tool'.
4. Install the transmission. For additional information, refer to Section 308-03 in BF Falcon Workshop Manual.

Hardware - Pressure Plate-to Flywheel

Vehicle variant	Item	Specification	QTY
F6 Turbo	Bolt - M8x1.25x84 bolts (x9)	W-711197-S430	9

NOTE: The flywheel to crankshaft bolts must be replaced with new bolts if they are removed.

REMOVAL AND INSTALLATION (Continued)

REMOVAL OF FLYWHEEL

F6 Flywheel

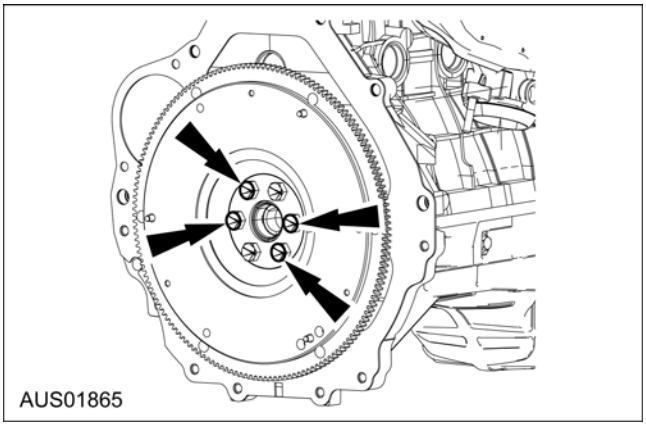
Hardware - Flywheel-to-crankshaft

Vehicle variant	Item	Specification	QTY
F6	Bolt - M10x1.25x25 HEX HD	3R23-7J315-AB	6

Removal

1. Remove the transmission. For additional information, refer to Section 308-03 in BF Falcon Workshop Manual.
2. Remove the clutch disc and pressure plate. For additional information, refer to Disc and Pressure Plate in this section.
3. Remove four of the six bolts. Leaving two opposing bolts in place, loosely.

   ⚠ CAUTION: Two bolts should be loosened but left in to prevent the flywheel from falling.



4. Separate the flywheel from the crankshaft.
5. Remove the bolts remaining in the crankshaft.
6. Remove the flywheel.

FLYWHEEL INSPECTION

Flywheel Inspection

1. Inspect the friction surface of the flywheel for burn marks, scoring or ridges, and warpage. Generally, flywheel resurfacing is not recommended. However, minor burn marks, scores or ridges may be removed.
2. Inspect the crank mating face for any damage to the flywheel or the crank faces. It is unlikely that these will be damaged however, if the flywheel or the crankshaft are damaged they will need to be replaced.
3. Inspect the flywheel face that the flywheel bolts mate against. If the face has indentations underneath the bolt heads it will need to be replaced (Discolouration is acceptable, provided there is no physical damage to the flywheel).

FLYWHEEL INSTALLATION

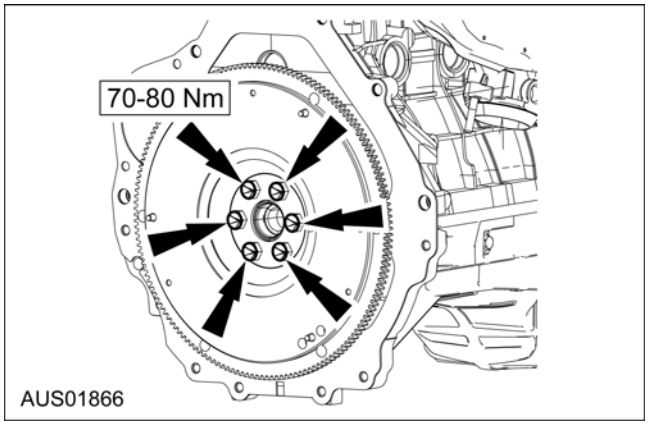
Flywheel Installation

1. Clean all oil, dust, dirt and residual loctite etc from the flywheel and the crankshaft bolt interface. Clean all oil, dust, dirt, debris and residual loctite from the crankshaft bolt hole threads
2. Position the flywheel onto the crankshaft and install the **NEW** flywheel-to-crankshaft bolts.

   NOTE: The flywheel to crankshaft bolts must be replaced with new bolts if they are removed.

   DO NOT USE RATTLE GUNS TO TIGHTEN THE BOLTS

   NOTE: The crankshaft is designed with a single offset bolthole to ensure correct angular alignment between crankshaft and flywheel. These holes must be aligned before installing the six flywheel-to-crankshaft bolts.

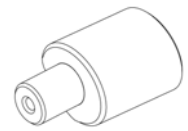


3. Install the disc and pressure plate. For additional information, refer to Disc and Pressure Plate in this section.
4. Install the transmission. For additional information, refer to Section 308-03 in BF Falcon Workshop Manual.

REMOVAL AND INSTALLATION (Continued)

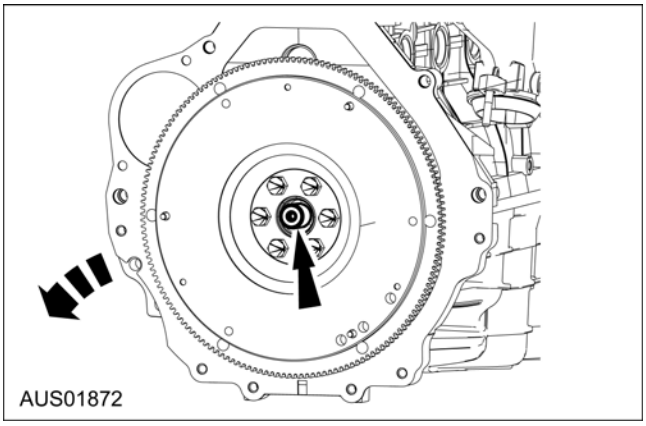
Pilot Bearing

Special Tool(s)

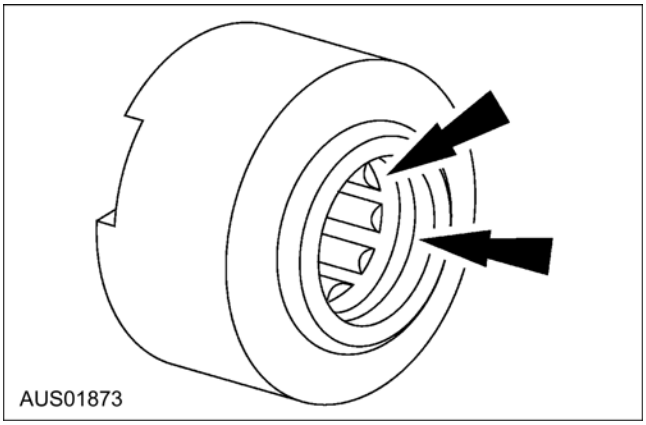
 SST308-105	**Installer, Pilot Bearing 308-105 (T85T-7137-A)**

Removal

1. Using a standard bearing puller, remove the transmission input shaft pilot bearing.



2. Inspect the transmission input shaft pilot bearing for:



- misalignment and looseness in the flywheel.
- needle rollers for scoring, worn or broken needle rollers, inadequate grease or discoloration.
- seal leakage.

Installation

NOTE: The transmission input shaft pilot bearing should only be installed with the seal facing the transmission. The transmission input shaft pilot bearing is pregreased and does not require additional lubrication. A new transmission input shaft pilot bearing must be installed whenever it is removed.

1. Using a soft-face hammer and the special tool, install the transmission input shaft pilot bearing.