

Clutches

Objectives

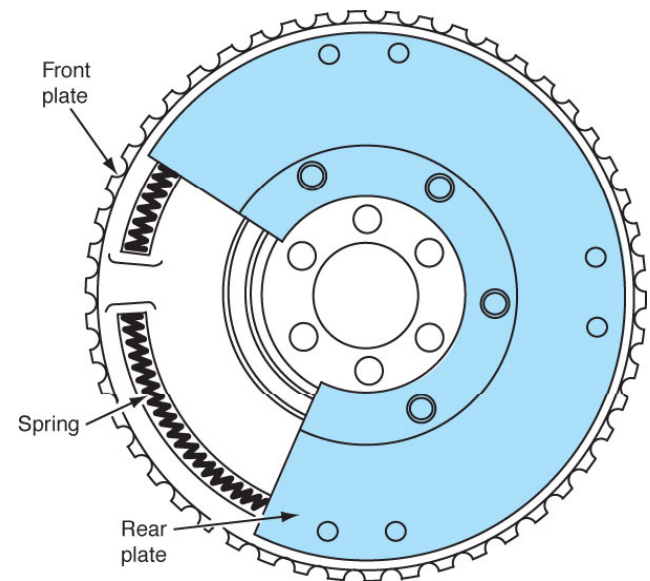
- Understand and define the purpose of a clutch assembly.
- Understand and describe the major components of a clutch assembly.
- Understand and describe the operation of a clutch.
- Diagnose clutch-related problems by analyzing the symptoms.

Objectives (*cont'd*)

- Understand and define the role of each major component in a clutch.
- Describe the operation of the various mechanical and cable-type clutch linkages.
- Describe the operation of a hydraulic clutch linkage.

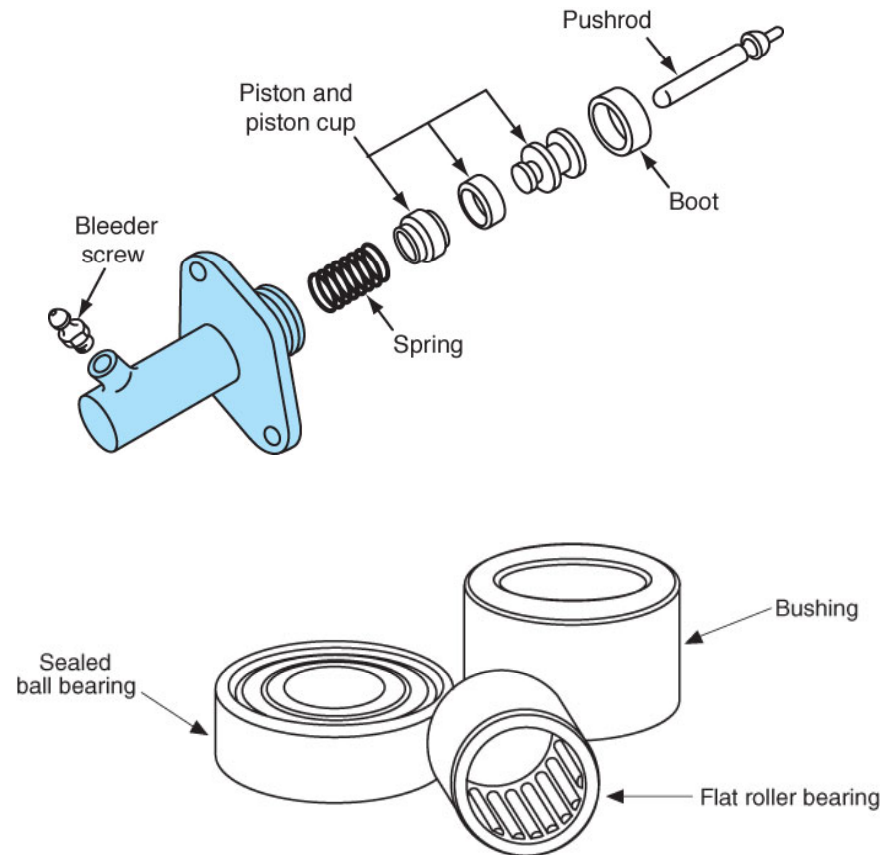
Clutch Components

- Clutch housing
 - Connects engine and transmission, and houses the clutch assembly
- Flywheel
 - Acts as balancer for engine
 - Adds inertia to the rotating crankshaft
 - Provides a surface for the clutch to contact



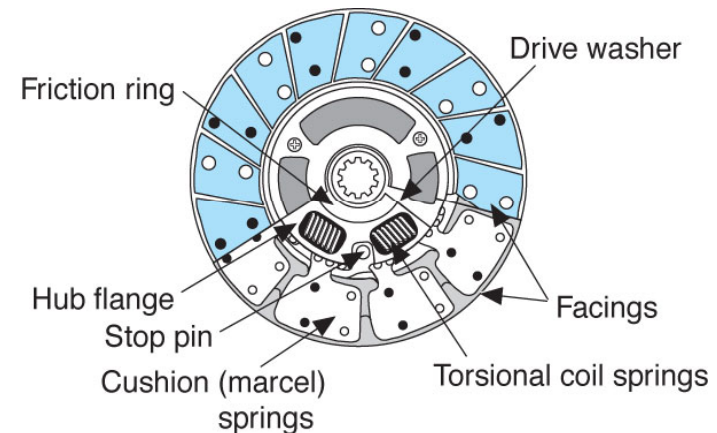
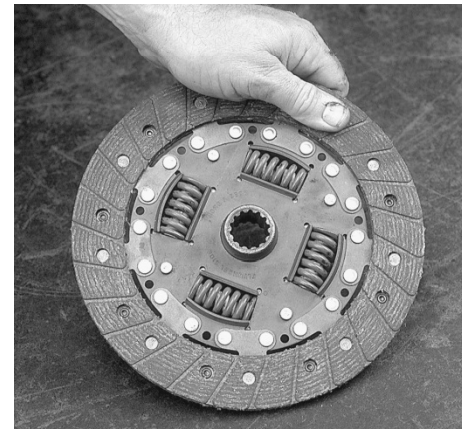
Clutch Components (*cont'd*)

- Clutch shaft
 - Projects from the front of the transmission
 - Usually has a pilot which rides in a bearing or bushing in the end of the crankshaft
 - The clutch disc is splined to the clutch shaft



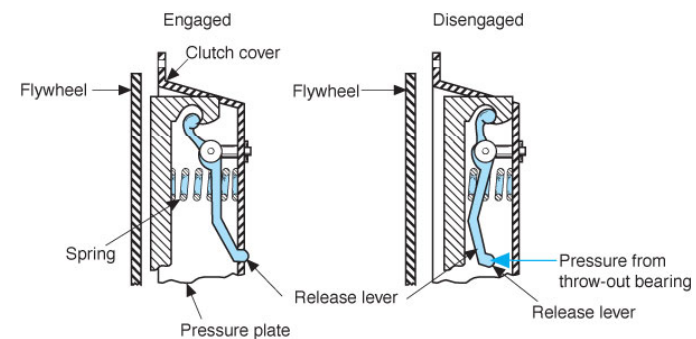
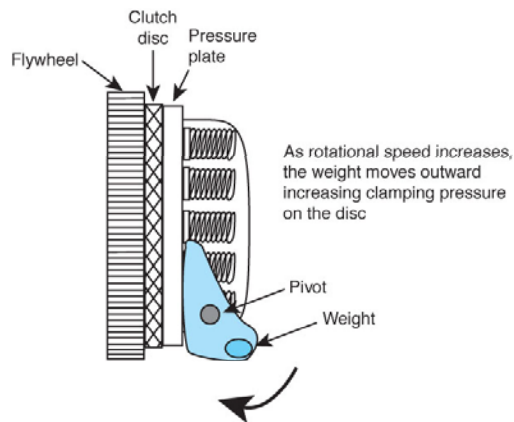
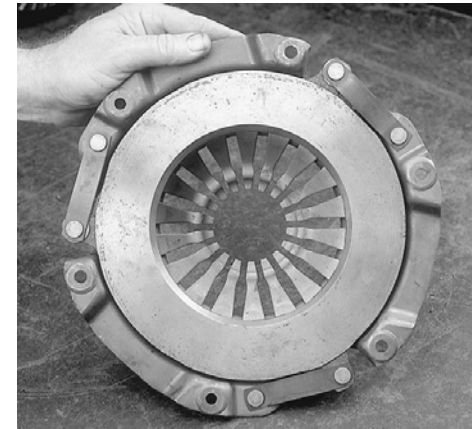
Clutch Components (*cont'd*)

- Clutch disc
 - Is covered with frictional material
 - Is squeezed between the flywheel and the pressure plate
 - Transmits power from the engine crankshaft to the transmission input shaft



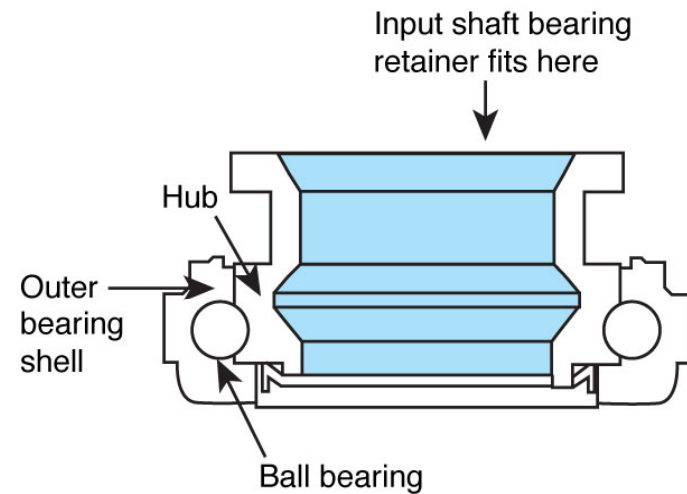
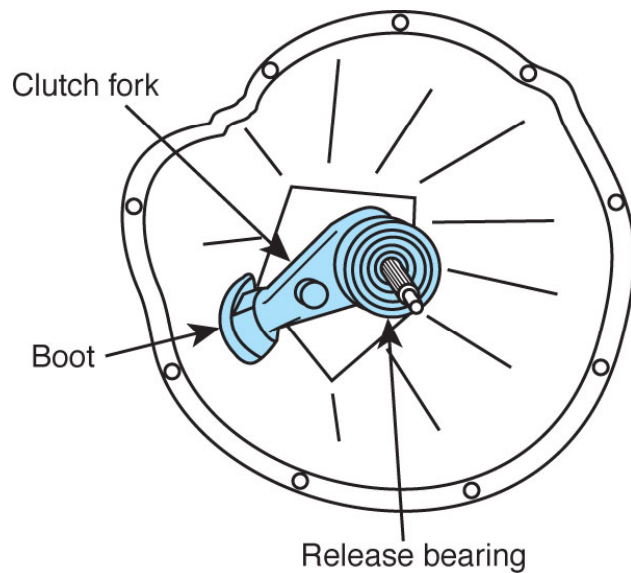
Clutch Components (*cont'd*)

- Pressure plate assembly
 - Squeezes clutch disc onto flywheel
 - Can be engaged or disengaged
 - Acts like a spring-loaded clamp



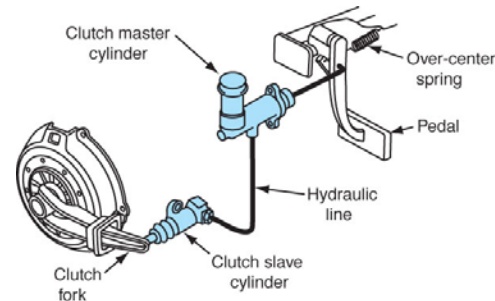
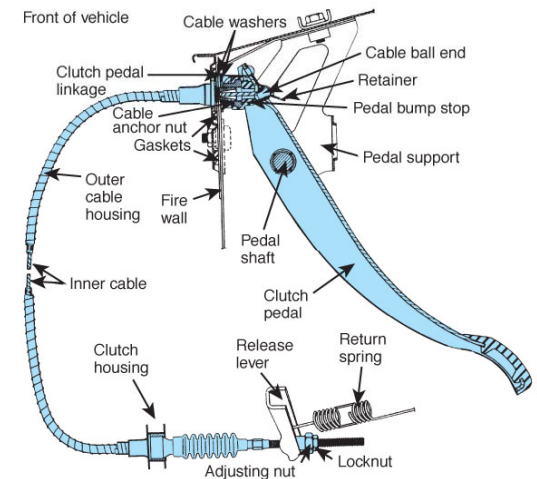
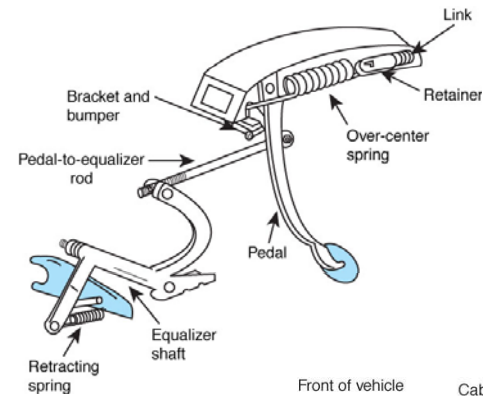
Clutch Components (*cont'd*)

- Release bearing
 - Is operated by the clutch linkage
 - Presses against the pressure plate to release the clutch



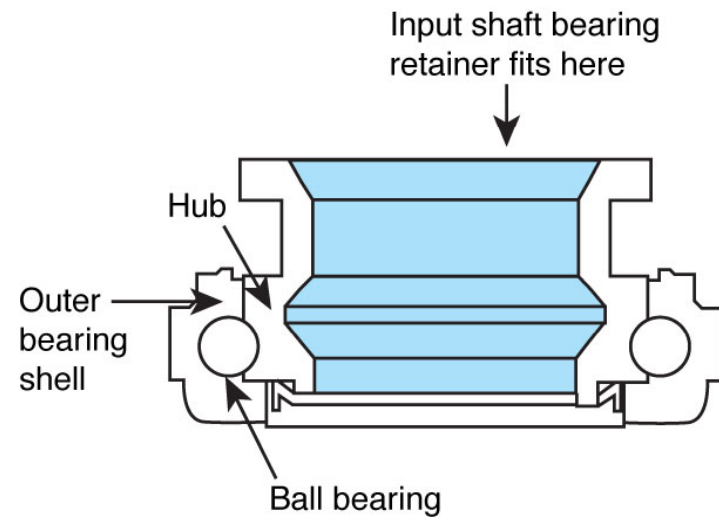
Clutch Linkage

- Transfers the clutch pedal movement to the release bearing
- Mechanical clutch linkage
 - Uses shafts, levers, and a bell crank or a cable
- Hydraulic clutch linkage
 - Consists of a master cylinder, hydraulic tubing, and a slave cylinder



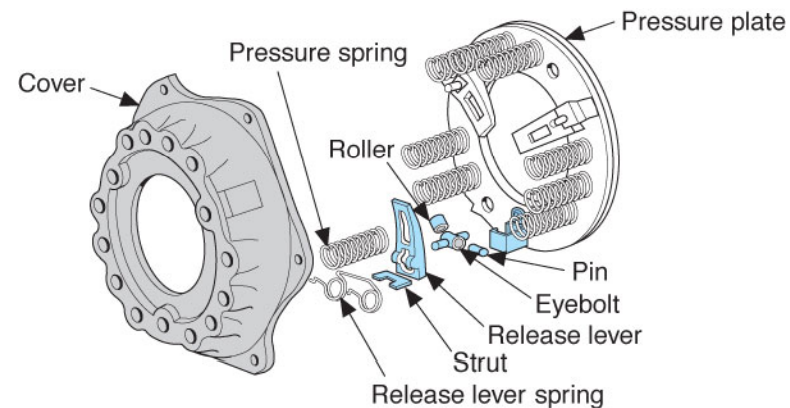
Clutch Release Bearing

- Transmits the movement of the clutch linkage to the pressure plate
- Is usually a ball or roller type bearing
- May be self-centering to compensate for clutch alignment variances



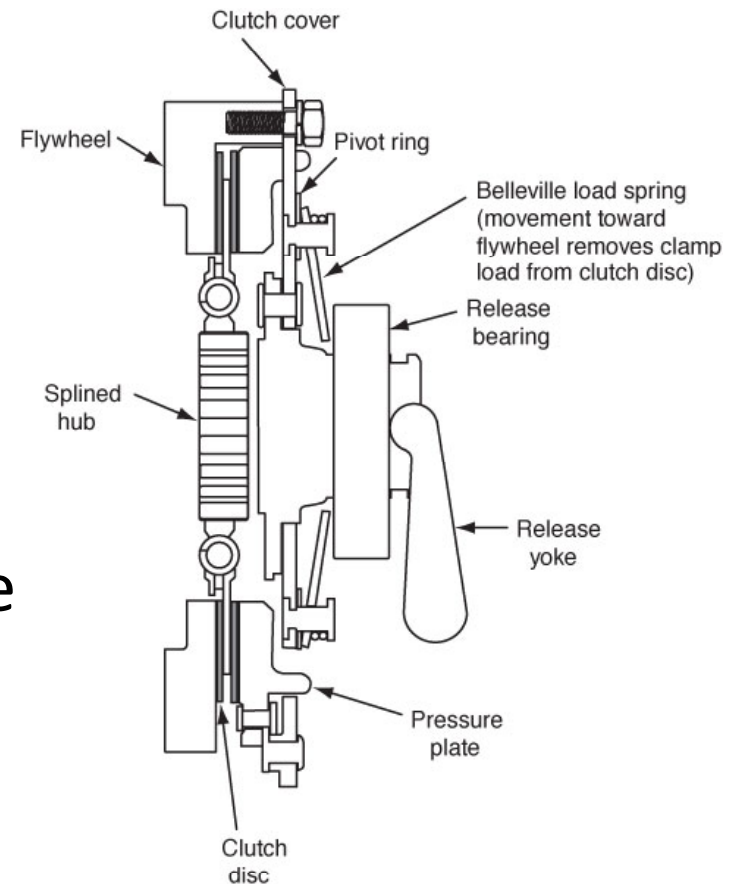
Clutch Operation

- The pressure plate is a large spring-loaded plate that engages the clutch by pressing the disc against the flywheel
- The pressure plate moves away from the flywheel when the clutch pedal is depressed



Clutch Operation (*cont'd*)

- The clutch release bearing is operated by the clutch linkage
- When the clutch pedal is depressed, the bearing moves toward the flywheel, depressing the pressure plate fingers and moving the pressure plate away from the clutch disc

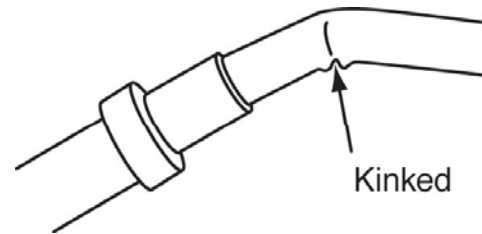


Diagnosing Clutch Problems

- Gather all possible information
 - Obtain the customer's explanation of the concern
 - Look up service history
- Road test the vehicle to verify customer concern
 - Pay close attention to the clutch during all phases of operation

Clutch Problems

- Clutch slippage
 - With the clutch engaged, engine speed increases but vehicle speed does not
 - Before disassembly:
 - Check linkage
 - Check for worn or binding parts
 - Check engine mounts



Clutch Problems (*cont'd*)

- Clutch chatter
 - Shaking or shuddering when the clutch is engaged
 - Before disassembly:
 - Check engine mounts
 - Check for leaks from rear main seal, transmission input shaft seal, and clutch slave cylinder

Clutch Problems (*cont'd*)

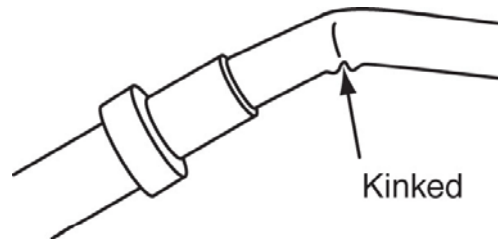
- Clutch noises
 - These noises are usually caused by bad bearings or bushings
 - To diagnose, determine whether the noise changes with the clutch engaged or disengaged

Clutch Problems (*cont'd*)

- Clutch vibrations
 - Are usually caused by worn engine mounts, loose bolts, excessive flywheel runout, or flywheel and/or pressure plate assembly imbalance
- Dragging clutch
 - Is usually caused by linkage problems, incorrect adjustments, or defective clutch assembly

Clutch Problems (*cont'd*)

- Pulsating clutch pedal
 - Is usually caused by broken or bent release levers, misaligned bell housing, or warped pressure plate, flywheel or clutch disc
- Binding clutch
 - Is usually caused by binding linkage or cables, defective clutch assembly, or improper installation



Mechanical Linkage Service

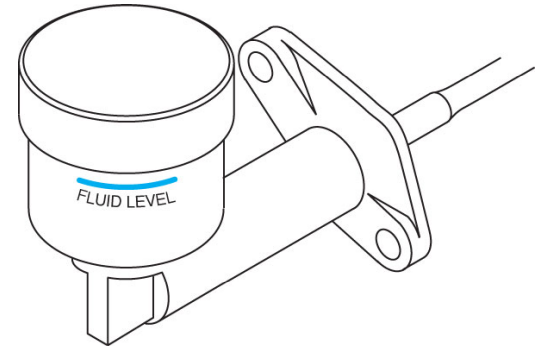
- Free-play adjustment
 - Misadjustment causes premature wear and clutch slippage
 - Wear on clutch linkage components can cause inaccurate adjustment
- Pedal travel
 - One of the most frequent causes of clutch failure

Free-Play Adjustment

- Insufficient free-play can cause premature bearing failure
- Excessive free-play can prevent full disengagement when clutch pedal is depressed
- Adjustment should be made when free-play falls below 1/2 inch (13mm)

Hydraulic Clutch Diagnosis

- Inspect the fluid
 - Check for dirt or other contaminants
- Check the pedal feel and travel
 - Some causes of a soft pedal are:
 - Low fluid level
 - Internal leaks in master or slave cylinder
 - External leaks
 - Excessive pedal travel can be caused by low fluid level



Hydraulic Clutch Service

- Is serviced like hydraulic brakes
- Some common problems are:
 - Fluid leaks
 - Worn out piston seals
 - Air in the system
 - Corrosion buildup

Pressure Plate Service

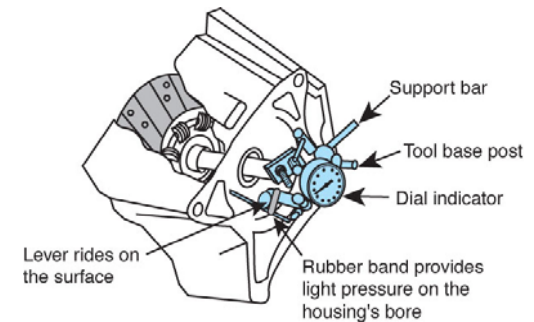
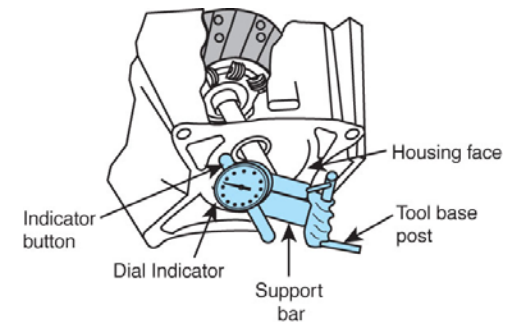
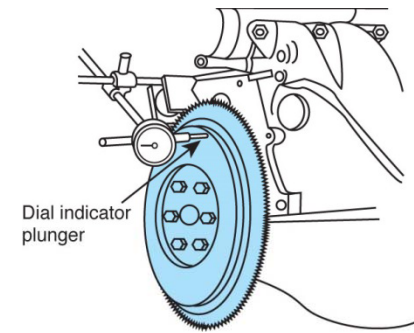
- Pressure plate is usually replaced when replacing a worn clutch disc
- It should be checked for hot spots, scoring, finger wear, and bent or broken fingers
- Attaching bolts must be loosened in a staggered sequence

Clutch Disc Service

- Improper driving technique is the usual cause of premature failure
- Inspect the clutch for indication of cause of failure
- If the clutch is removed from a vehicle with more than 50,000 miles, it should be replaced

Flywheel Service

- The flywheel should be checked with a dial indicator for excessive runout
- In many cases, the flywheel can be resurfaced
- Check the condition of the ring gear teeth
- Check the alignment of the bell housing's face



Hints for Removing Clutch

- Always refer to the correct service information
- Clean the area around the clutch housing and transmission
- Suspend any components that are disconnected so that they don't hang free
- Be aware that the clutch disc contains harmful asbestos fibers

Summary

- The main parts of the clutch assembly are the clutch housing, flywheel, input shaft, disc, pressure plate assembly, release bearing, and linkage
- The flywheel acts as a balancer and dampens engine vibrations and provides a machined surface for the clutch friction disc

Summary (*cont'd*)

- The clutch disc is a steel plate with frictional material bonded on both sides that is splined to the input shaft
- A mechanical or hydraulic linkage is used to transfer the clutch pedal movement to the release bearing

Summary (*cont'd*)

- Proper repair of clutch problems is dependent on a complete and accurate diagnosis
- Repair procedures include inspection, measurement, adjustment, and repair or replacement of clutch components

