

THE CLUTCH

Text: Ed Bernstein
DeLorean One, Chatsworth, CA

Factory records indicate that approximately 25% of the entire production of DeLorean automobiles consisted of cars with automatic transmissions. The remaining 75% of the overall production were manual transmission cars using a clutch.

This is the initial installment in a series of articles that will describe the clutch, its components and its function in your DeLorean automobile. Subsequent articles will address clutch malfunctions, and suggested diagnostics used to evaluate related problems.

The basic function of the clutch is to engage and disengage. It is involved in three fundamental features.

- 1.** *The comfort and smoothness of the drive when starting each gear change.*
- 2.** *The filtering of engine vibration and noise.*
- 3.** *Protection of the engine and transmission by playing the role of a fuse. ie: to slip under extreme conditions or tear-out when the car is driven too aggressively.*

The vehicle, when equipped with the 5 speed manual transmission, uses a single, dry type clutch. The clutch is hydraulically operated. The pressure plate is a diaphragm spring type and the disc has a spring cushioned hub. A self-aligning, sealed ball-type throw-out bearing is used to depress the

diaphragm spring. The clutch has its own fluid reservoir and master cylinder that provides hydraulic pressure when the clutch pedal is depressed.

The clutch pedal is connected to the master cylinder with a push-rod. When the pedal is depressed, the push-rod exerts pressure against the master cylinder piston. The slave cylinder piston pressure causes the clutch fork to move the throw-out bearing against the pressure plate. As a diaphragm spring is depressed, pressure on the disc is released and the clutch disengages. When the clutch pedal is released, the procedure is reversed and the clutch engages.

The clutch controls consist of a mechanical pedal assembly and a hydraulic control system. A clutch master cylinder, connected to the pedal assembly, converts mechanical movement into hydraulic movement. This pressure and movements is transmitted through a hydraulic line to the clutch slave cylinder, where it is converted back to mechanical movement. The slave cylinder, connected to the clutch assembly, moves the clutch fork and clutch release bearing, thus engaging or disengaging the clutch mechanism.

The hydraulic clutch system is self-adjusting; therefore no provisions are made for adjustment.

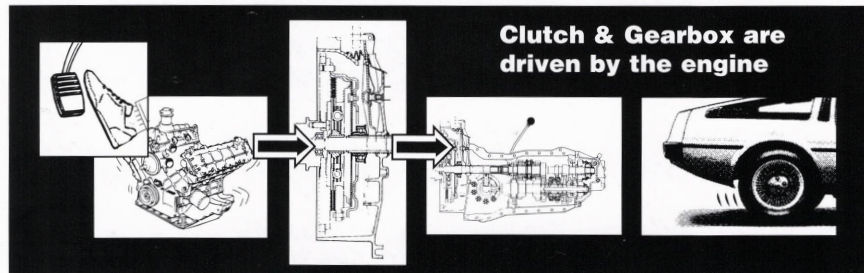
3 PRIMARY FUNCTIONS OF THE CLUTCH

USE OF THE CLUTCH

- 1.** To transmit drive to the gearbox.
- 2.** To allow connection and disconnection.
- 3.** For the driver to be able to control the connection or disconnection. (the biting point)

THE 3 POSITIONS OF THE CLUTCH

ENGAGED I. *To transmit drive to the gearbox, thereby assuring connection between the engine and the gearbox. (Engaged)*



"ENGAGED" POSITION OF THE COMPONENTS.

- A.** Release bearing - no contact with the diaphragm when foot is off the pedal.
- B.** The pressure plate - the diaphragm exerts its power onto the pressure plate. This compresses the

clutch disc against the flywheel.

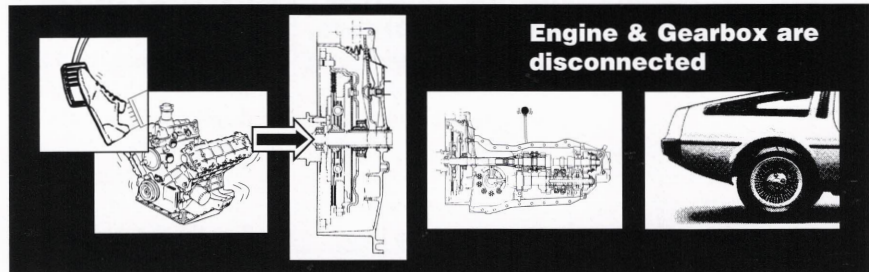
- C.** The clutch disc is independent to the fly wheel and the relationship between the engine and the gearbox is effective.

"ENGAGED" MOVEMENT OF THE COMPONENTS.

- A.** The flywheel turns, it drives the cover/diaphragm/pressure plate assembly.
- B.** The load on the pressure plate clamps the clutch disc causing the rotation of the gearbox primary shaft.

- C.** The control system is at rest; therefore the clutch release bearing is stationary. Stationary - clearance between the clutch release bearing and the diaphragm fingers.

DISENGAGED II. *To provide connection and disconnection to the engine. To break the connection, (disengaged) engine and gearbox are disconnected.*



"DISENGAGED" POSITION OF THE COMPONENTS.

- A. With the action of the pedal, the fork has depressed the clutch release bearing.
- B. The action above has caused the diaphragm to pivot about the fulcrum.
- C. The diaphragm has released its clamp load on the pressure plate.
- D. The clutch friction disc is

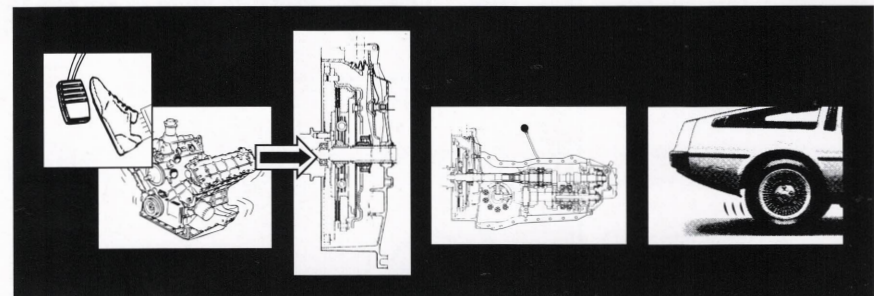
allowed to move on splines on the gearbox primary shaft. When disengaged, the clutch disc backs away from the flywheel.

- E. The clutch disc is now totally free: it is no longer in contact with the pressure plate or with the flywheel.

"DISENGAGED" MOVEMENT OF THE COMPONENTS.

- A. The flywheel turns; it still drives the cover/diaphragm/pressure plate assembly.
- B. The clutch friction disc is free: it is no longer driven by the flywheel and no longer drives the gearbox primary shaft.
- C. The release bearing is totally active: rotating with engine speed.

SLIPPING III. *The driver can control the rate of engagement. Intermediate position/ slipping; clutch and gearbox are partially driven by the rotation of the engine (the biting point).*



THE CLUTCH

"SLIPPING"

POSITION: POSITION OF THE COMPONENTS.

- A. The clutch release bearing occupies a mid-position on its travel, it maintains the diaphragm partially pivoted.
- B. The diaphragm exerts part of its clamp load onto the pressure plate.
- C. The pressure plate now partially grips the clutch friction disc allowing slip.
- D. The clutch disc has moved on the splines and is in contact with the flywheel and the pressure plate.

"SLIPPING"

MOVEMENT OF THE COMPONENTS.

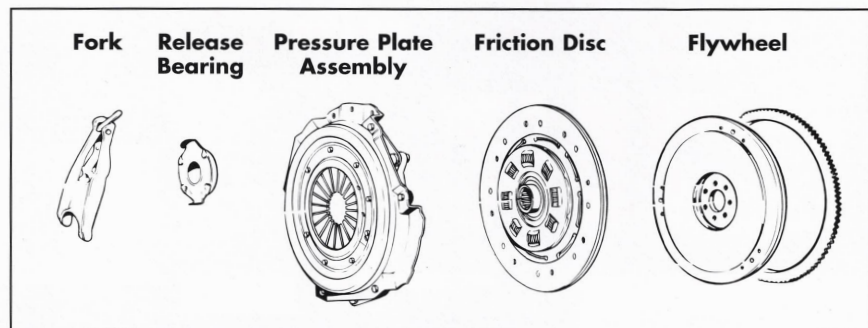
- A. The flywheel turns and rotates the cover/diaphragm/pressure plate assembly.
- B. The clutch friction disc turns slower or quicker than the flywheel and cover/diaphragm/pressure plate assembly. There is friction between the surfaces. (clutch slip)
- C. In rotating, the clutch disc drives the gearbox primary shaft.

- D. The release bearing turns at the same speed as the cover/diaphragm/pressure plate assembly.

Essential Points to remember:

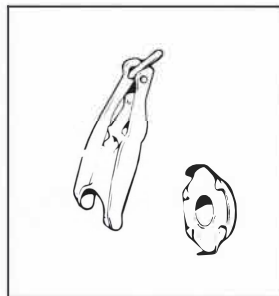
- 1. The clutch serves to establish, release and control the transfer of power from the engine to the transmission. These 3 functions correspond to 3 clutch positions: ENGAGED - DISENGAGED - SLIPPING
- 2. The aforementioned functions are achieved by the three main components of the clutch: THE RELEASE BEARING - THE COVER/DIAPHRAGM/PRESSURE PLATE ASSEMBLY - THE CLUTCH DISC.

Elements of the Clutch



The Control System

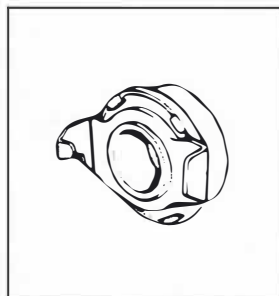
1. Release bearing guide
2. Fork
3. Crossgate cable
4. Clutch pedal



The manual transmission is a constant mesh five speed. All forward gears are fully synchronized for ease of shifting.

The Release Bearing

1. Carrier
2. Bearing
3. Back Plate

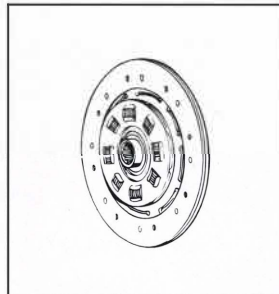


All gears are selected manually by the driver using the gearshift lever attached to the selector lever mounted on the side of the transmission rear housing. Inside the rear housing, a selector shaft arm, attached to the selector shaft, fits through a slot in the pivoting interlock. When a gear is selected, the selector shaft arm moves the interlock to the desired position and moves the appropriate shift rod in or out depending on the gear selected. The shift rod attached to the shift rod moves the desired gear into the proper position while the synchronizer ring matches the speed of the two gears being coupled.

The Pressure Plate Assembly

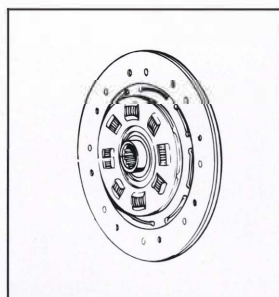
(The component which engages and disengages the driven/friction clutch disc).

1. Cover
2. Diaphragm
3. Pressure plate



The Driven/Friction Clutch Disc

1. Lining
2. Disc
3. Springs
4. Gearbox input primary shaft



The shift sequence is repeated for all forward gears. Reverse operation is the same with the exception of the synchronizer ring, which is not required, since the vehicle should be stationary when shifting into reverse.

(To be continued) 