

Unit 4 Introduction to Drive Train 传动系

Passage B Drive Train (II)

Clutch (离合器)

Another basic component of all drive trains is a clutch. It is a rotating mechanism between the engine and the transmission. It operates through friction which comes from contact between the parts. (离合器是一个在发动机和变速器之间的旋转机构, 通过各部件之间产生摩擦来运行)

In a car with a manual transmission, we need a clutch because the engine spins all the time and the car wheels don't. (手动离合器汽车, 需要离合器, 因为发动机始终在运转而车轮却不是) In order for a car to stop without killing the engine, the wheels need to be disconnected from the engine somehow. The clutch allows us to smoothly engage a spinning engine to a non-spinning transmission by controlling the slippage between them. (要使汽车停下来而不伤及发动机, 必须设法让车轮与发动机脱离。离合器使旋转的发动机与非旋转的变速器平顺啮合是靠控制两者之间产生的滑动。)

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

The clutch includes the flywheel, clutch disk, pressure plate, pressure plate cover and the linkage necessary to operate the clutch. (离合器包括飞轮, 离合器盘, 离合器压盘, 离合器盘盖及离合器运转所需的联动装置) See figure 4-6.

The flywheel is bolted to the crankshaft of the engine. Its main function is to transfer engine torque from the engine to the transmission. See figure (飞轮用螺栓固定在发动机曲轴上, 它的主要作用是将发动机扭矩从发动机传递到变速器中) 4-7.

The clutch disk is basically a steel plate, covered with a frictional material that goes between the flywheel and the pressure plate. (离合器盘基本上是个钢制的盘, 上有摩擦材料, 在飞轮和压盘之间运行) See figure 4-8.

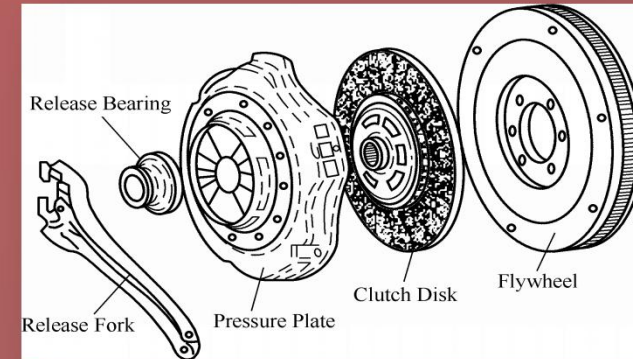


Figure 4-6 Clutch assembly



Figure 4-7



Figure 4-8

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

A pressure plate is bolted to the flywheel. It includes a sheet metal cover, heavy release springs, a metal pressure ring that provides a friction surface for the clutch disk. (压盘固定在飞轮上。它包括一个金属盖，分离弹簧，一个为离合器盘产生摩擦的金属压环) See figure 4-9.



Figure 4-9 Pressure plate

The release bearing is the heart of clutch operation. When the clutch pedal is depressed, the release bearing moves toward the flywheel, pushing in the release fingers and moving the release fingers against pressure plate spring force. (分离轴承是离合器运转的心脏。踩踏离合器踏板时，分离轴承朝飞轮方向移动，推入到压盘分离指中，使压盘分离指抵住压盘弹簧力)

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

The linkage multiplies the driver's leg force and transmits the force to the release fork. (离合器连动机构增大驾驶者的腿部力并将其传递到分离叉上。) A mechanical clutch linkage usually consists of the clutch pedal, a series of linkage rods and arms, or a cable. (机械离合器连动机构包括离合器踏板, 一系列连杆臂和拉索) See figure 4-10a. A hydraulic clutch linkage typically includes a clutch master cylinder and reservoir, a hydraulic line and a slave cylinder. (液压离合器连动机构包括离合器主汽缸和储液罐, 液压管路和一个从动缸) See figure 4-10b.

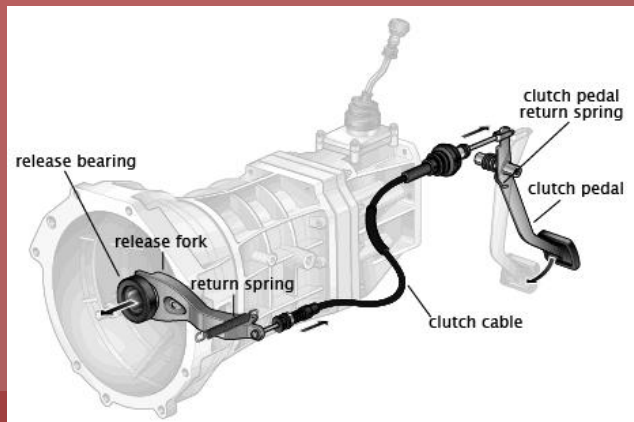


Figure 4-10a Mechanical clutch linkage



Figure 4-10b Hydraulic clutch linkage

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

Torque Converter (液力变矩器)

Automatic transmission cars use a “torque converter” instead of a clutch. (自动变速器汽车使用液力变矩器而不是离合器。) A torque converter is a larger doughnut shaped device that is mounted between the engine and the transmission. It turns at the same speed as the engine.

(液力变矩器是一个环形装置，位于发动机和变速器之间，它的转速与发动机一样) Figure 4-11 shows how everything is connected inside the torque converter.



Figure 4-11 Torque Converter

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

The torque converter has three parts that work together to transmit power to the transmission. (液力变矩器有三个部件，一起运转，将发动机扭矩传递给变速器。) The three parts of the torque converter are impeller (or pump), the turbine, and the stator. (这三个部件分别是泵轮，涡轮和导轮) The impeller is mounted directly to the torque housing which in turn is bolted directly to the engine's crankshaft and turns at engine speed. (泵轮直接安装在液力变矩器外壳上，变矩器外壳又直接固定在发动机曲轴上，以发动机的转速旋转。) The turbine is inside the housing and is connected directly to the input shaft of the transmission providing power to move the car. (涡轮是在变矩器壳内，直接与提供动力驱动汽车的变速器输入轴连接。) The stator (or guide wheel) between the two is mounted to a one-way clutch so that it can spin freely in one direction but not in the other. (在泵轮和涡轮之间的导轮是单向离合器，以便向一个方向自由旋转，但不是向另一个方向旋转)

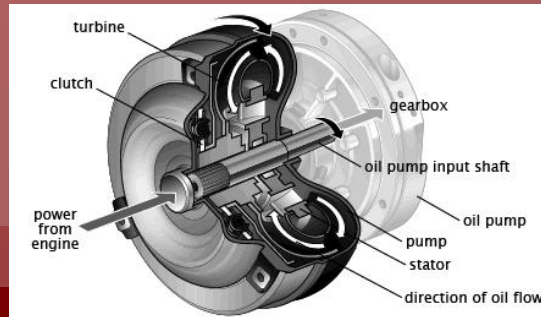


Figure 4-12
Inside of torque converter

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

The torque converter is filled with transmission fluid that is moved by the impeller blades. The stator's vanes catch the oil thrown off from the impeller, and use it to move the turbine's blades. When the impeller spins above a certain speed, the turbine spins, driven by the impeller. (液力变矩器中蓄满了变速器液，靠泵轮叶片来流动。导轮叶片接到泵轮甩出的机油，用其来推动涡轮叶片旋转。当泵轮旋转超过一定速度时，涡轮靠泵轮驱动来旋转) See figure 4-12.

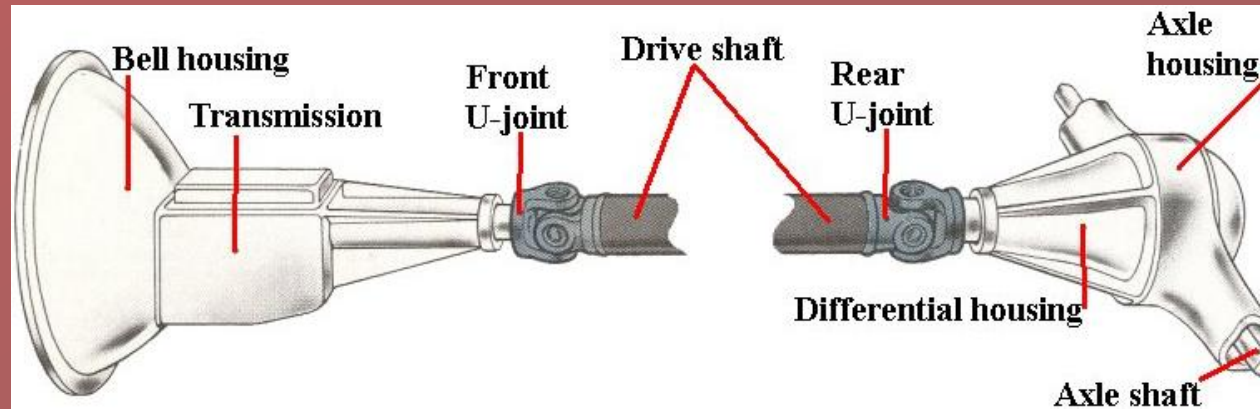


Figure 4-13 Driveshaft and U-joints

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

Drive Shaft (传动轴)

A drive shaft and universal joints (U-joints) connect the transmission to the rear drive axle on most rear-wheel-drive cars. (传动轴和万向节将变速器连接到大多数后驱汽车的后驱动桥上。) Many four-wheel-drive cars also use drive shafts and universal joints, with one drive shaft between the transfer case and rear drive axle and a second drive shaft between the transfer case and the front drive axle. (许多四驱汽车还用传动轴和万向接头, 其中一个传动轴在分动器和后驱动桥之间, 另外一个在分动器和前驱动桥之间。) The drive shaft is sometimes called a propeller shaft. (传动轴有时也叫驱动轴) See figure 4-13.

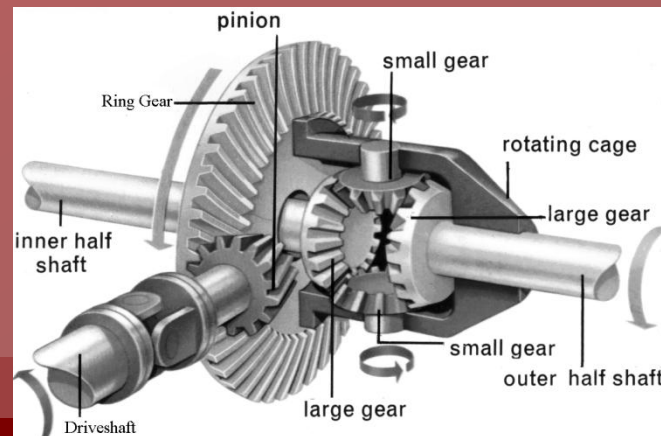


Figure 4-14 Differential

Unit 4 Introduction to Drive Train

Passage B Drive Train (II)

The drive shaft and U-joints provide a means of transferring engine torque to drive axles. The universal joints allow the drive shaft to move up and down, to allow for suspension travel. Some drive shafts also have a slip joint that allows the drive shaft to make minor length changes as the car suspension height changes.

Differential System (差速器系统)

The differential is mounted in a housing or a differential case and revolves with the ring gear. (差速器安装在一个壳里面, 即差速一同, 与齿圈一同旋转) See figure 4-14. It performs two tasks: (他的任务主要有两个) when the car is traveling straight ahead, both wheels are free to rotate, the lever will divide the driving force equally, and both disks will move the same amount. (当汽车直线行驶时, 两侧车轮自由旋转, 小齿轮将驱动力平分, 两侧车轮行进速度相等)。When a car is cornered, the inner wheel moves through a shorter distance than the outer wheel. This means that the inner wheel must slow down, and the outer wheel must speed up. (当汽车转弯时, 内侧车轮比外侧车轮行驶距离短, 这就意味着内侧车轮必须减速, 而外侧车轮必须加速)

Unit 4 Introduction to Drive Train

Notes

1. In order for a car to stop without killing the engine, the wheels need to be disconnected from the engine somehow. 要使汽车停下来而不伤及发动机，必须设法让车轮与发动机脱离。
2. The clutch allows us to smoothly engage a spinning engine to a non-spinning transmission by controlling the slippage between them. 离合器通过控制在两者之间产生的滑动使旋转的发动机与非旋转的变速器平顺啮合。
3. When the clutch pedal is depressed, the release bearing moves toward the flywheel, pushing in the pressure plate's release fingers and moving the pressure plate fingers or levers against pressure plate spring force. 踩踏离合器踏板时，分离轴承朝飞轮方向移动，推入到压盘分离指中，使压盘分离指抵住压盘弹簧力。
4. Some drive shafts also have a slip joint that allows the drive shaft to make minor length changes as the car suspension height changes. 一些驱动轴还有伸缩接头，使驱动轴在汽车悬架高度变换时长度有小的变化。

Unit 4 Introduction to Drive Train

New Words

disconnect [diskə'nekt] v. 分离，切断
engage [in'gei] v. 接合，啮合
slippage ['slipi] n. 滑移，滑动
frictional ['frikʃənəl] a. 摩擦的
depress [di'pres] v. 压低，压下，按下
multiply ['mʌltiplai] v. 增加，倍增，增多
fork [fɔ:k] n. 叉，离合器叉
reservoir ['rezəvɔ:] n. 储液罐
doughnut ['dəunʌt] n. 油炸圈饼
impeller [im'pelə] n. 泵轮，轮叶
turbine ['tə:bin] n. 涡轮
stator ['steitə] n. 导轮
vane [vein] n. 叶片
blade [bleid] n. 叶片，轮片
propeller [prə'pelə] n. 推进器
suspension [səs'penʃən] n. 悬挂，悬架

Unit 4 Introduction to Drive Train

Phrases and Expressions

basic component 基础部件
clutch disk (clutch plate) 离合从动器盘
pressure plate 离合器压盘
pressure plate cover 离合器盘盖
release spring 膜片弹簧, 分离弹簧
pressure ring 压环, 压盘
friction surface 摩擦面, 摩擦表面
release bearing (throw-out bearing) 分离轴承
clutch pedal 离合器踏板
release finger 离合分离爪, 离合器分离指
clutch master cylinder 离合器总泵, 离合器主缸
hydraulic line 液压管路
slave cylinder 离合器分泵, 从动缸
torque converter 液力变矩器

Unit 4 Introduction to Drive Train

Phrases and Expressions

input shaft 输入轴，主动轴
transmission fluid 传动液，变速箱润滑油
universal joint 万向接头
transfer case 分动箱，分动器
drive axle 传动轴，驱动桥
differential case 差动齿轮箱，差速器箱
inner wheel 内侧车轮
outer wheel 外侧车轮

Unit 4 Introduction to Drive Train

EXERCISE 4

Abbreviations are very useful in practical work. Do you know the following English abbreviations you often come across in handling automotive materials? Read them and then translate them into corresponding Chinese terms.

1. FWD front-wheel-drive
2. RWD rear-wheel-drive
3. 4WD four-wheel-drive
4. PO Power Output
5. PCM Power-train Control Module
6. PTU Power Transfer Unit

前轮驱动

后轮驱动

四轮驱动

输出功率

动力传动系控制模块

动力分配装置