

	<b>SURFACE VEHICLE RECOMMENDED PRACTICE</b>	<b>SAE</b>	<b>J647 APR2010</b>
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		Superseding J647 JUL1997	
(R) Automatic Transmissions - Schematic Diagrams			

## RATIONALE

This document has been updated for improved clarification and for inclusion of latest six-speed and CVT transmission schematics.

## FOREWORD

This document has been changed to add additional typical schematic diagrams and to show the revised one-way clutch schematic diagrams.

### 1. SCOPE

The following schematic diagrams reflect various methods of illustrating automotive transmission arrangements. These have been developed to facilitate a clear understanding of the functional interrelations of the gearing, clutches, hydrodynamic drive unit, and other transmission components.

Two variations of transmission diagrams are used: in neutral (clutches not applied) and in gear. For illustrative purposes, some typical transmissions are shown.

### 2. REFERENCES

There are no referenced publications specified herein. However, as an additional method for transmission schematic arrangement analysis, please refer to SAE Technical Paper 810102, "Lever Analogy".

### 3. TRANSMISSION IN NEUTRAL

Figure 1 illustrates a six-speed layshaft dual clutch transmission. Each gear is identified according to the particular transmission speed it provides when engaged, for example: 1st, 2nd, 3rd, and so forth.

Figure 2 illustrates a four speed planetary gear transmission in neutral with clutches and bands shown disengaged. Brake bands and clutches are designated as 1st, 2nd, 3rd, reverse, and so forth, in accordance with their use. The number of teeth in each gear is shown.

Figure 3 illustrates a four-speed transverse planetary gear transaxle with a chain drive connecting the two axes.

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Figure 4 illustrates a four-speed longitudinal planetary gear transaxle with a chain drive connecting the main centerline to the differential.

Figure 5 illustrates a five-speed planetary gear transmission.

Figure 6 illustrates a six-speed planetary gear transmission.

Figure 7 illustrates a continuously variable transmission (CVT).

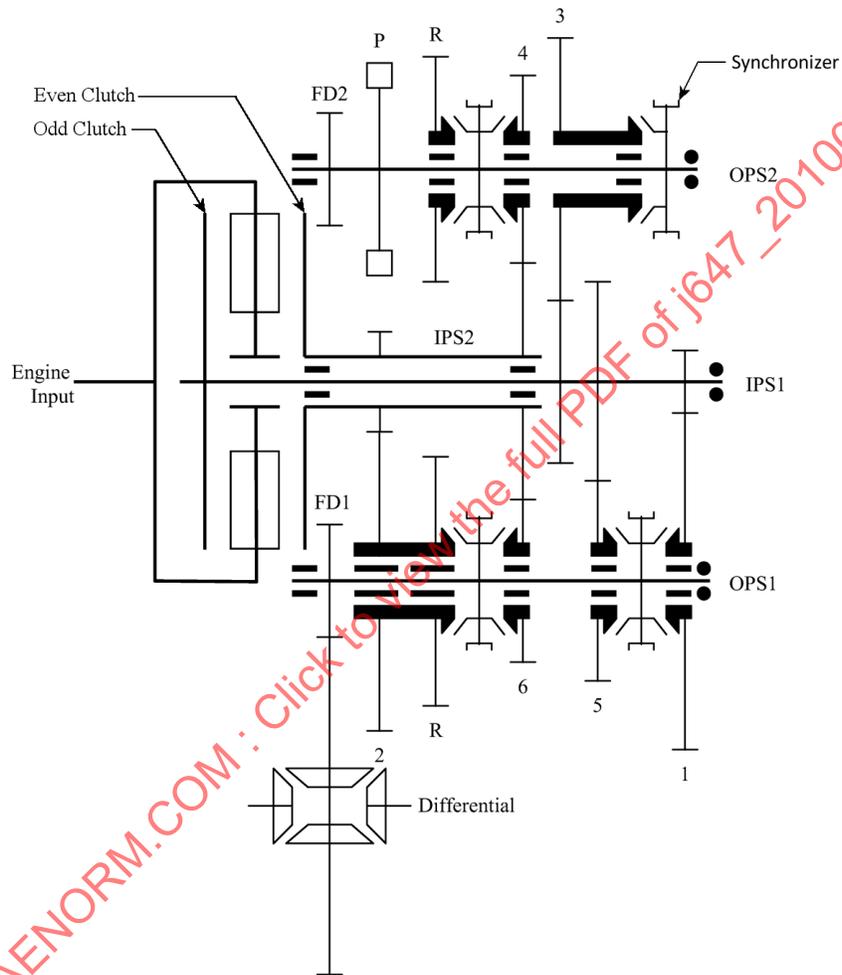


FIGURE 1 - SIX-SPEED DUAL CLUTCH TRANSMISSION DIAGRAM - NEUTRAL

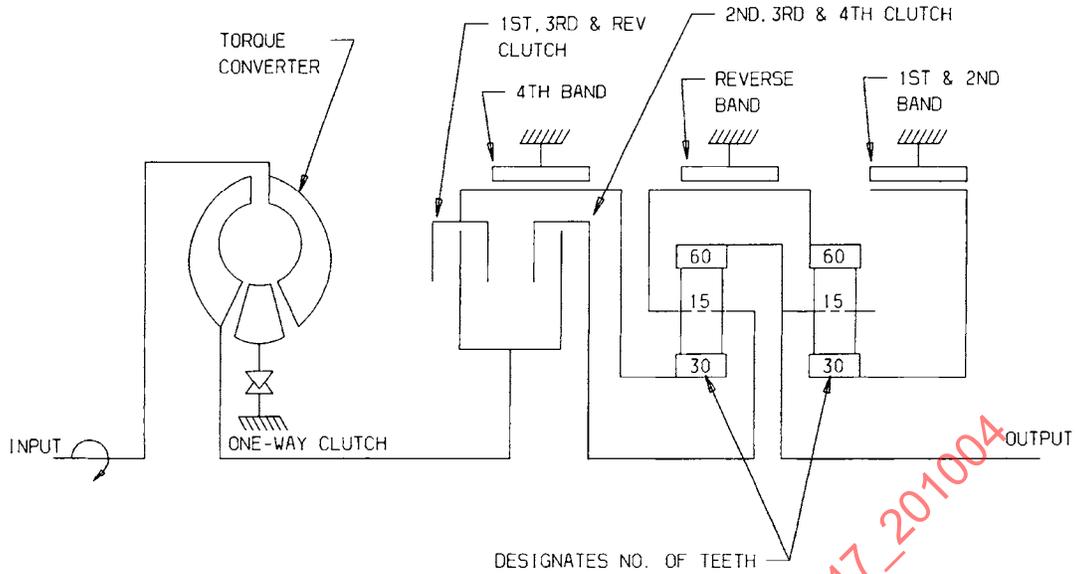


FIGURE 2 - FOUR-SPEED TRANSMISSION DIAGRAM - NEUTRAL

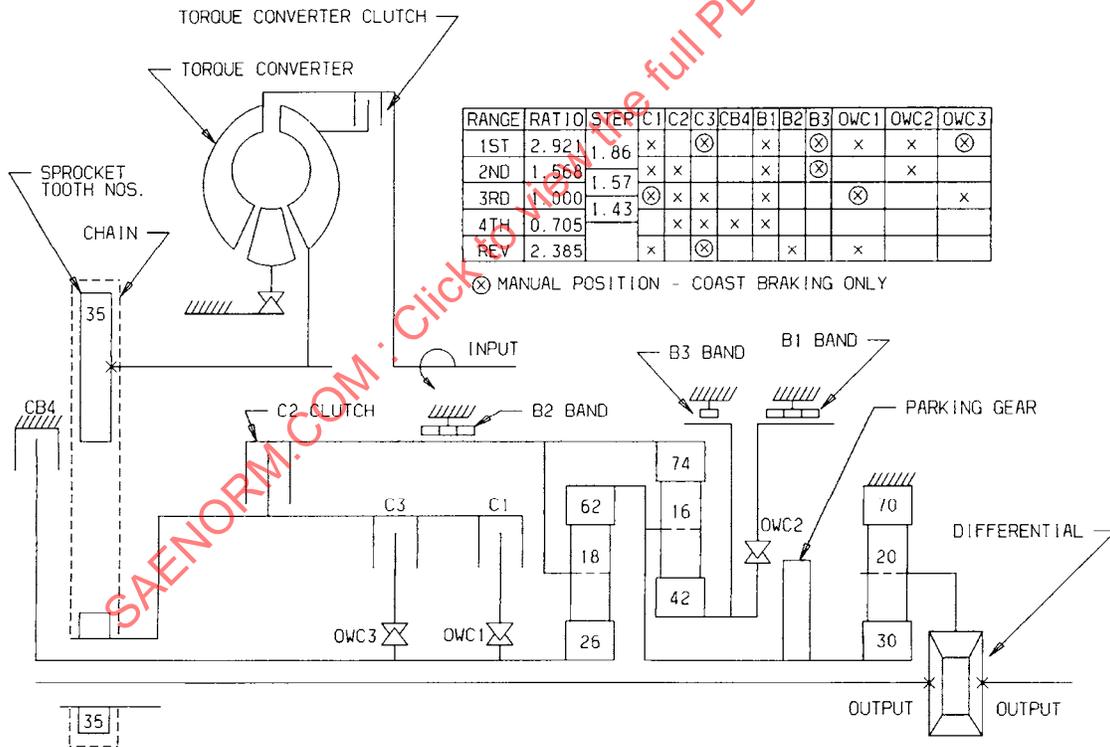


FIGURE 3 - FOUR-SPEED TWO AXES TRANSVERSE TRANSAXLE - NEUTRAL

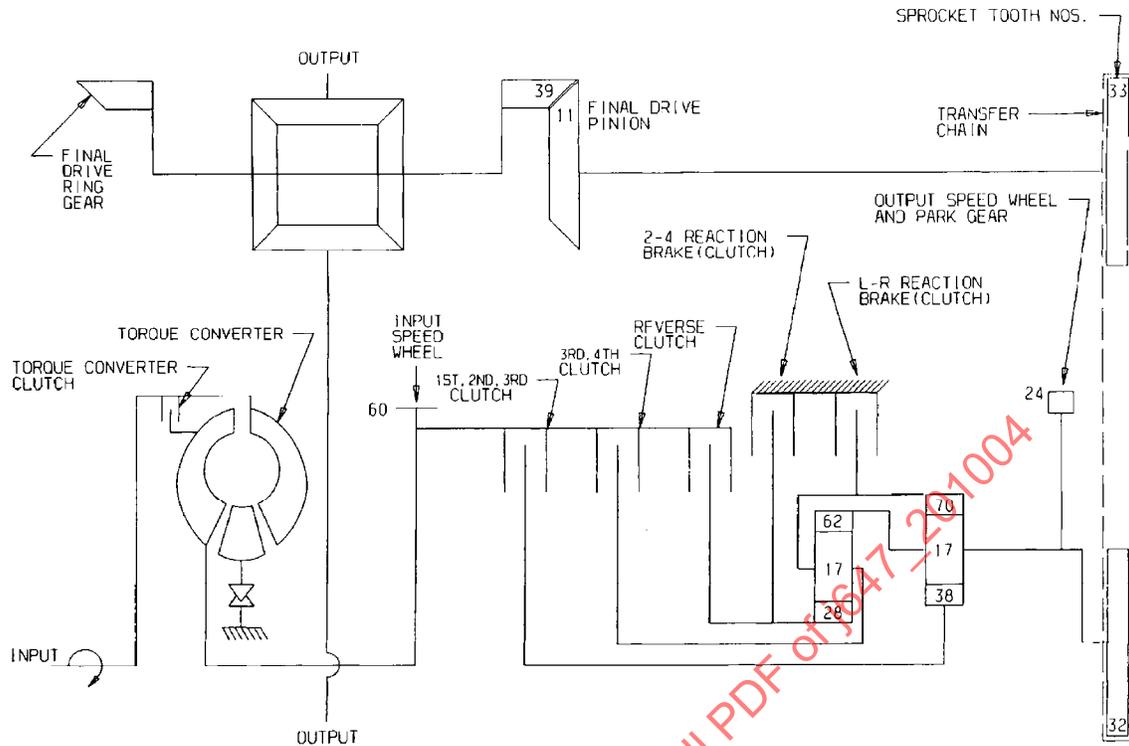


FIGURE 4 - FOUR-SPEED LONGITUDINAL AUTOMATIC TRANSAXLE - NEUTRAL

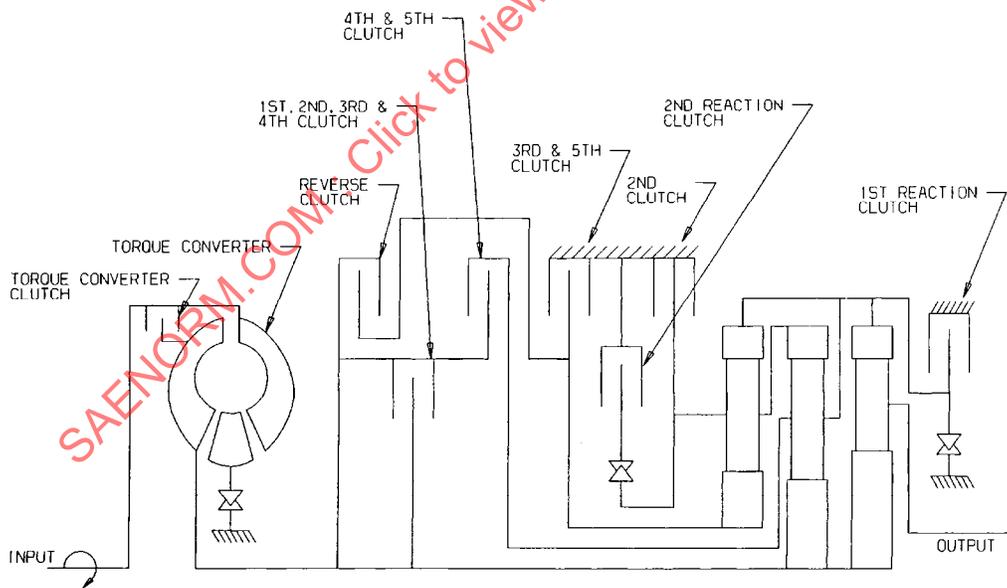


FIGURE 5 - FIVE-SPEED AUTOMATIC TRANSMISSION DIAGRAM - NEUTRAL

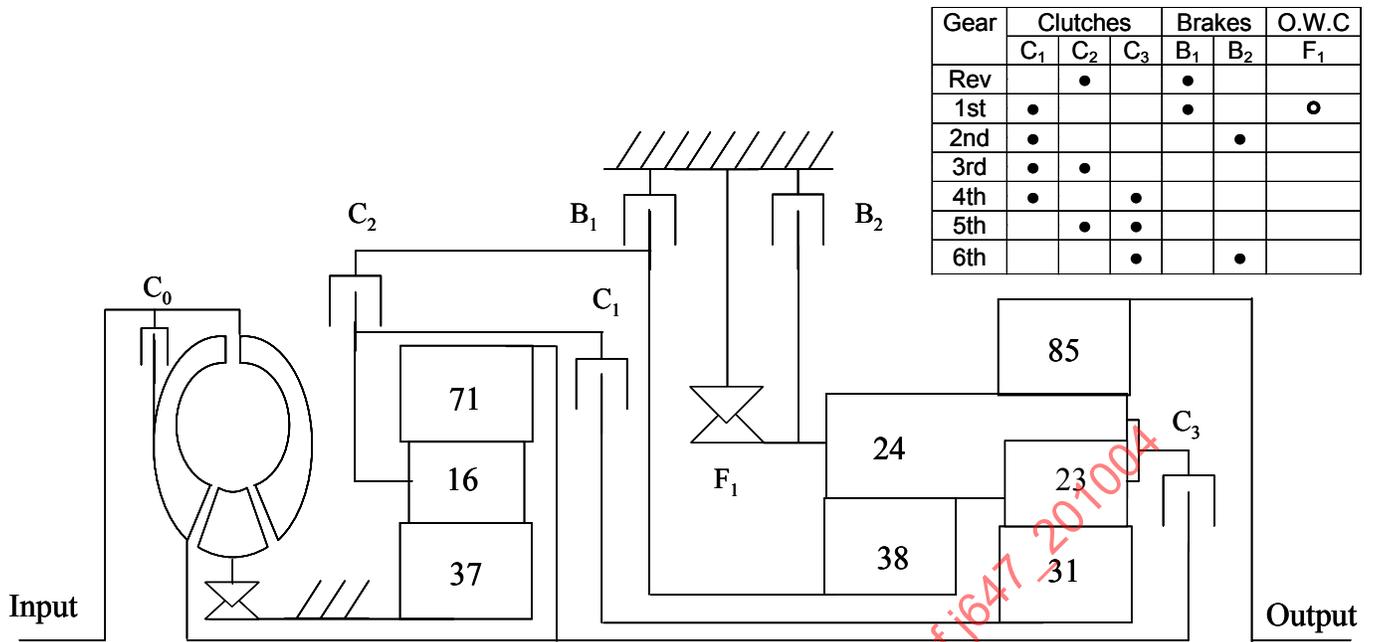


FIGURE 6 - SIX SPEED AUTOMATIC TRANSMISSION - NEUTRAL

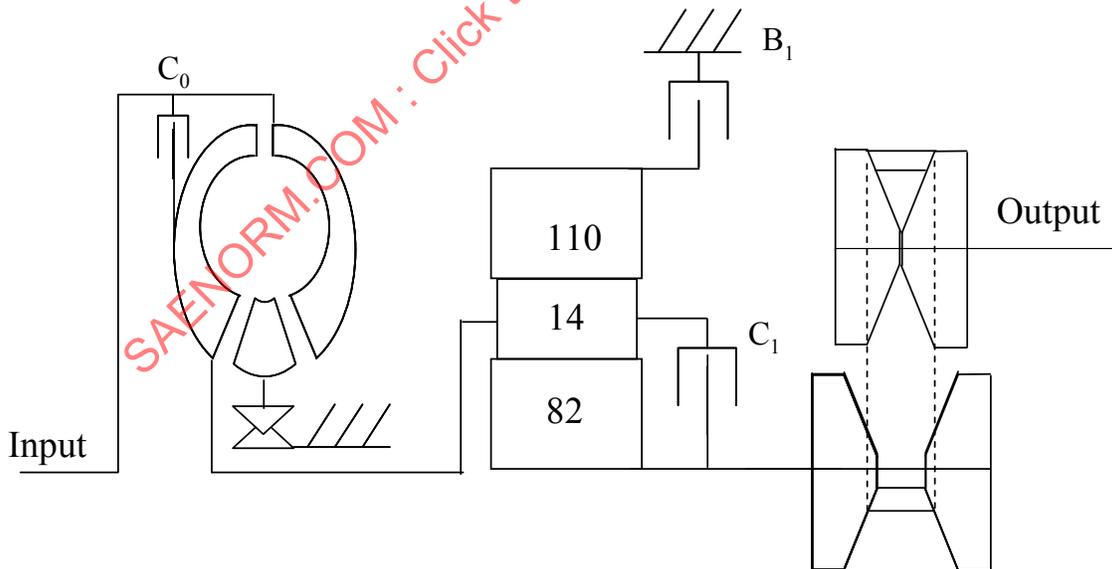


FIGURE 7 - CONTINUOUSLY VARIABLE TRANSMISSION (CVT) - NEUTRAL

#### 4. TRANSMISSION IN GEAR

4.1 Figures 8 and 9 illustrate a six speed dual clutch transmission and a four speed planetary gear transmission in gear (originally shown in Figures 1 and 2) engaged with the torque path denoted by straight bold arrows. Curved arrows indicate direction of shaft rotation. Active members are designated with sections crosshatched.

#### 4.2 Dual Clutch Transmission (Figure 8)

In second gear, for example, the mainshaft second gear is clutched to the output shaft. This is schematically illustrated by means of the drive dog engaging the lug in the gear. Note that the reverse gears are in mesh with each other, and the final drives are in mesh with the differential.

#### 4.3 Planetary Gear Transmission (Figure 9)

Second gear is illustrated. The pertinent brake band is crosshatched to denote brake application. Additional information added to this diagram is optional:

- The rpm of the sun gear, ring gear, and carriers are designated for 100 rpm input speed.
- Clutch plate speed differential is designated for 100 rpm input speed.
- The torque of the sun gear, ring gear, and carrier is designated for 1.00 "T" input torque.

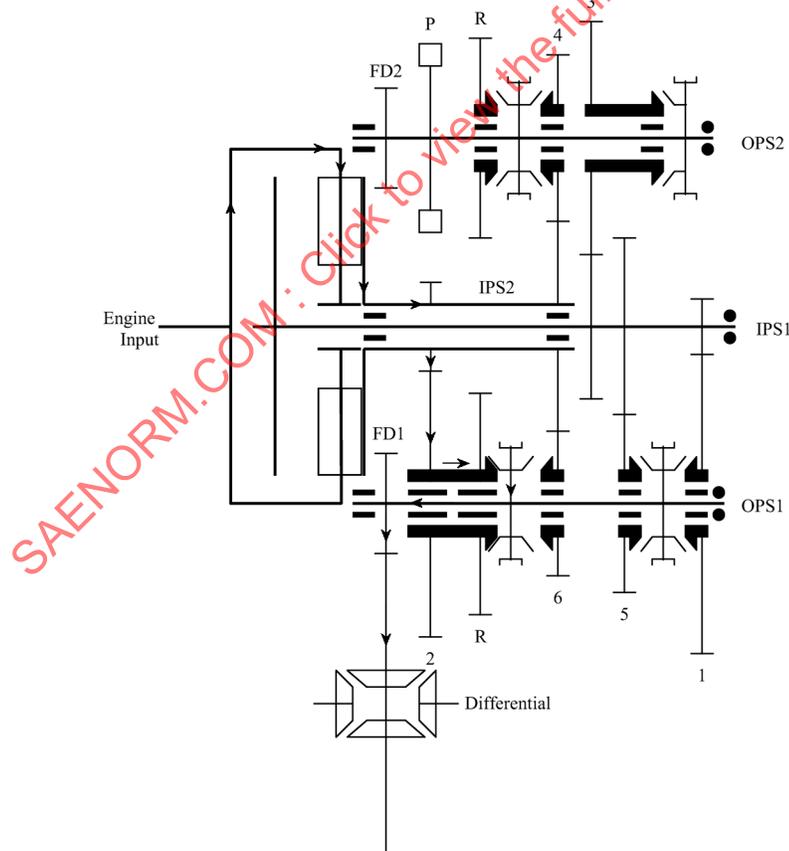


FIGURE 8 - SIX-SPEED DUAL CLUTCH TRANSMISSION DIAGRAM - 2ND SPEED