SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J647 | REV. JUL97

Issued 1960-06
Revised 1997-07

Superseding J647 JUN95

Submitted for recognition as an American National Standard

(R) TRANSMISSIONS—SCHEMATIC DIAGRAMS

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 exemplify the SAE recommended method of illustrating automotive transmission arrangements. They were developed to standardize industry practice and facilitate a clear understanding of the functional interrelations of the gearing, clutches, hydrodynamic drive unit, and other transmission components.

   Two variations of diagrams are used: transmission in neutral and in gear. For illustrative purposes, some typical transmissions are shown.

2. ***References***—There are no referenced publications specified herein.

3. ***Transmission in Neutral***—Figure 1 illustrates a five-speed countershaft transmission which is in constant mesh in all forward gears. Each gear is identified according to the particular transmission speed it provides when engaged, for example: 1st, 2nd, 3rd, and so forth. The number of teeth in each gear is indicated. Synchronized and positive jaw clutches are schematically represented with a cone or drive dog, respectively, and a ramp or mating lug on the affected gear. Two drive plates and one driven plate are used to designate the plate clutch assembly. The reverse idler gear is shown out of position for clarity.

   Figure 2 illustrates a 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 longitudinal planetary gear transaxle with chain drive connecting the two axes.

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

   Figure 5 illustrates a five-speed planetary gear transmission.

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-8512 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER; (412) 776-4970 FAX: (412) 776-0790
SAE WEB ADDRESS http://www.sae.org

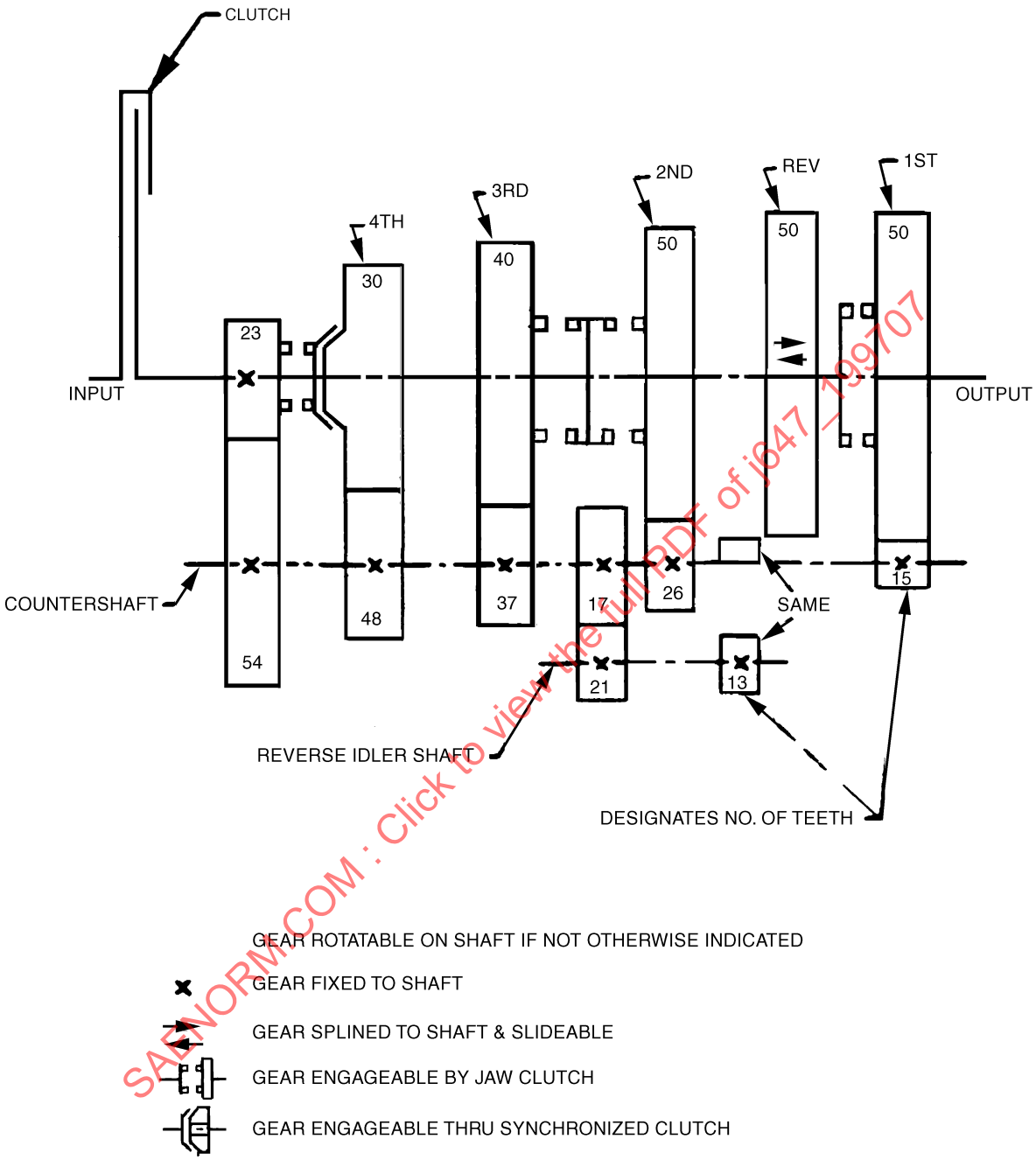


FIGURE 1—FIVE-SPEED TRANSMISSION DIAGRAM—NEUTRAL

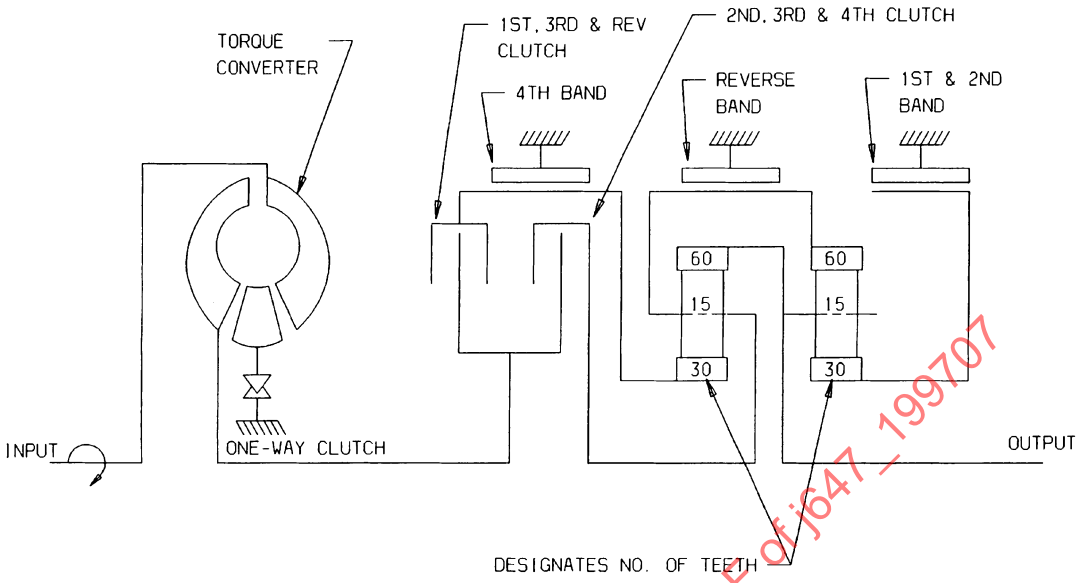
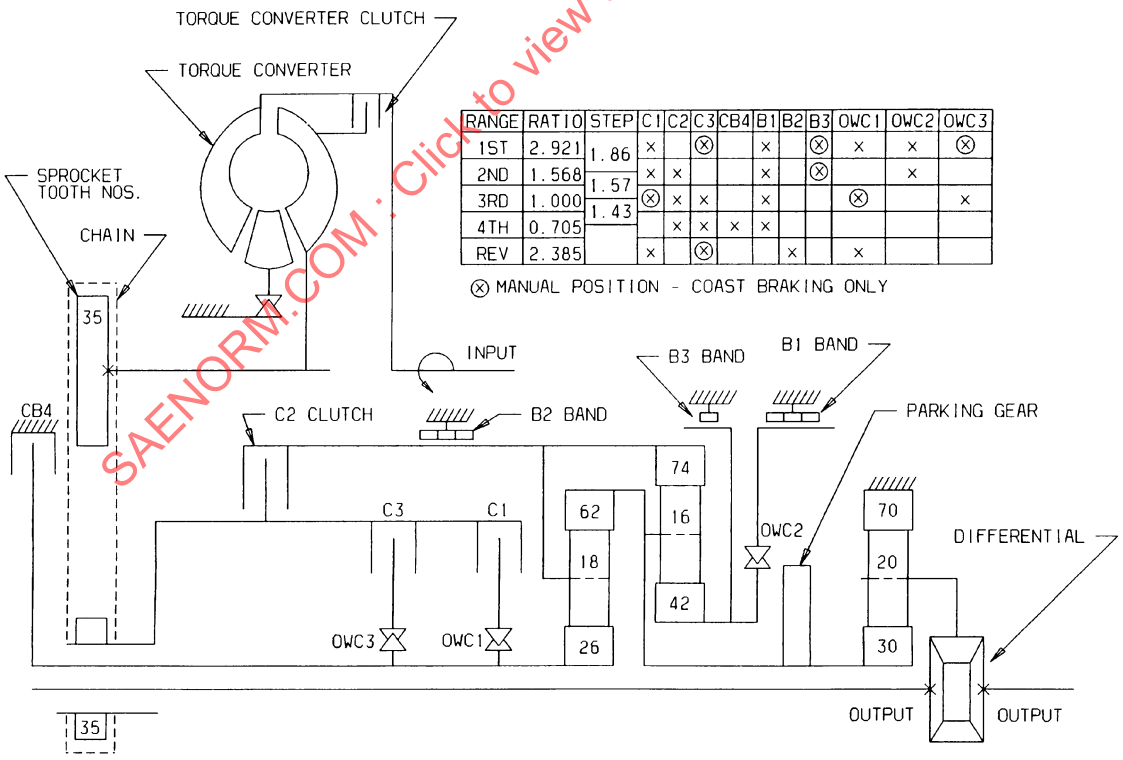


FIGURE 2—FOUR-SPEED TRANSMISSION DIAGRAM—NEUTRAL



RANGE	RATIO	STEP	C1	C2	C3	CB4	B1	B2	B3	OWC1	OWC2	OWC3
1ST	2.921	1.86	×		⊗		×		⊗	×	×	⊗
2ND	1.568	1.57	×	×			×		⊗		×	
3RD	1.000	1.43	⊗	×	×		×			⊗		×
4TH	0.705			×	×	×	×					
REV	2.385		×		⊗			×		×		

⊗ MANUAL POSITION - COAST BRAKING ONLY

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

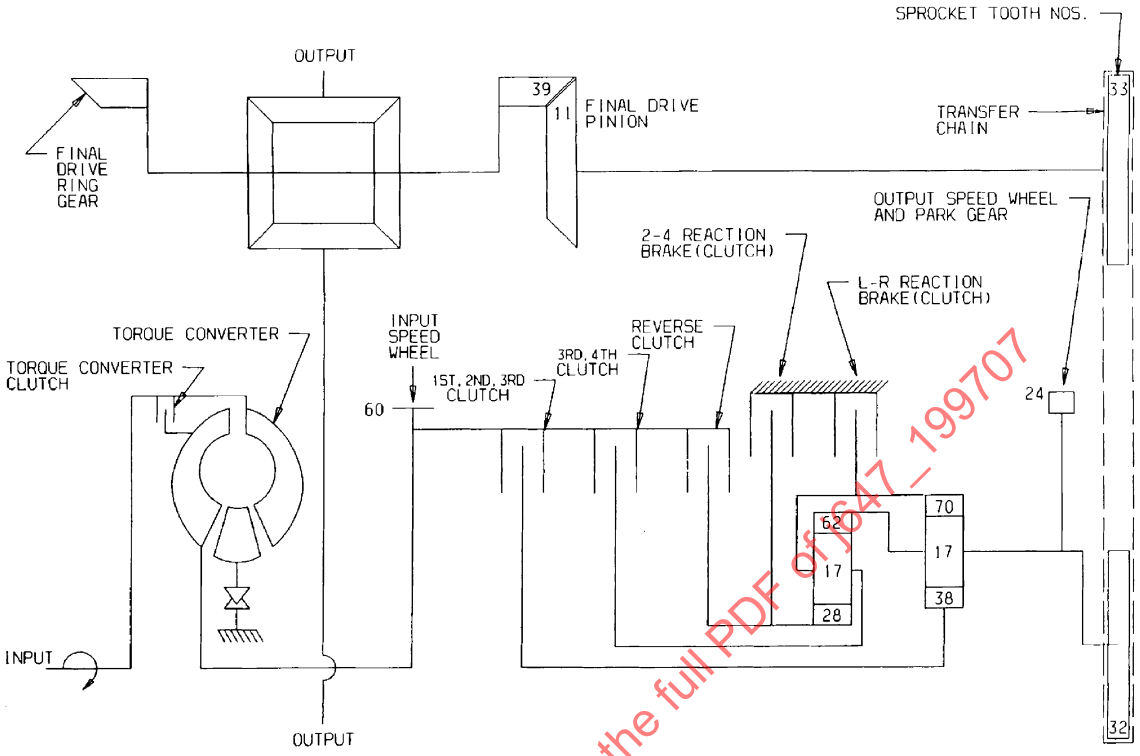


FIGURE 4—FOUR-SPEED LONGITUDINAL AUTOMATIC TRANSAXLE—NEUTRAL

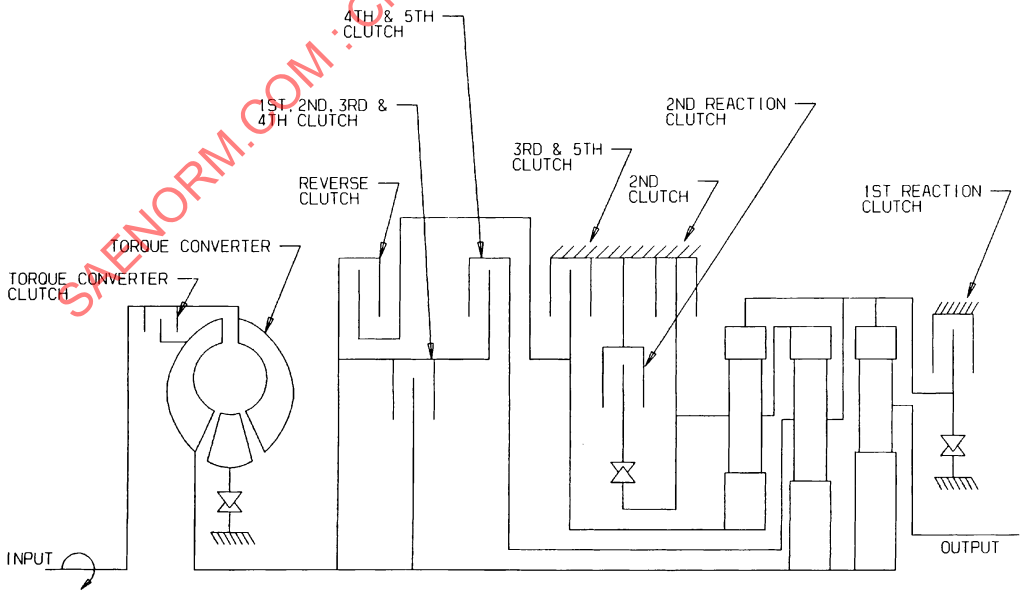


FIGURE 5—FIVE-SPEED AUTOMATIC TRANSMISSION DIAGRAM—NEUTRAL

4. Transmission in Gear

4.1 Figures 6 and 7 illustrate the countershaft transmission and the first planetary gear transmission in gear 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 Countershaft Transmission (Figure 6)—In third, for example, the mainshaft third gear is clutched to the output shaft. This is schematically illustrated by means of the drive dog engaging the lug in the gear.

4.3 Planetary Gear Transmission (Figure 7)—Second gear is illustrated. The pertinent brake band is crosshatched to denote brake application. Additional information added to this diagram is optional:

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

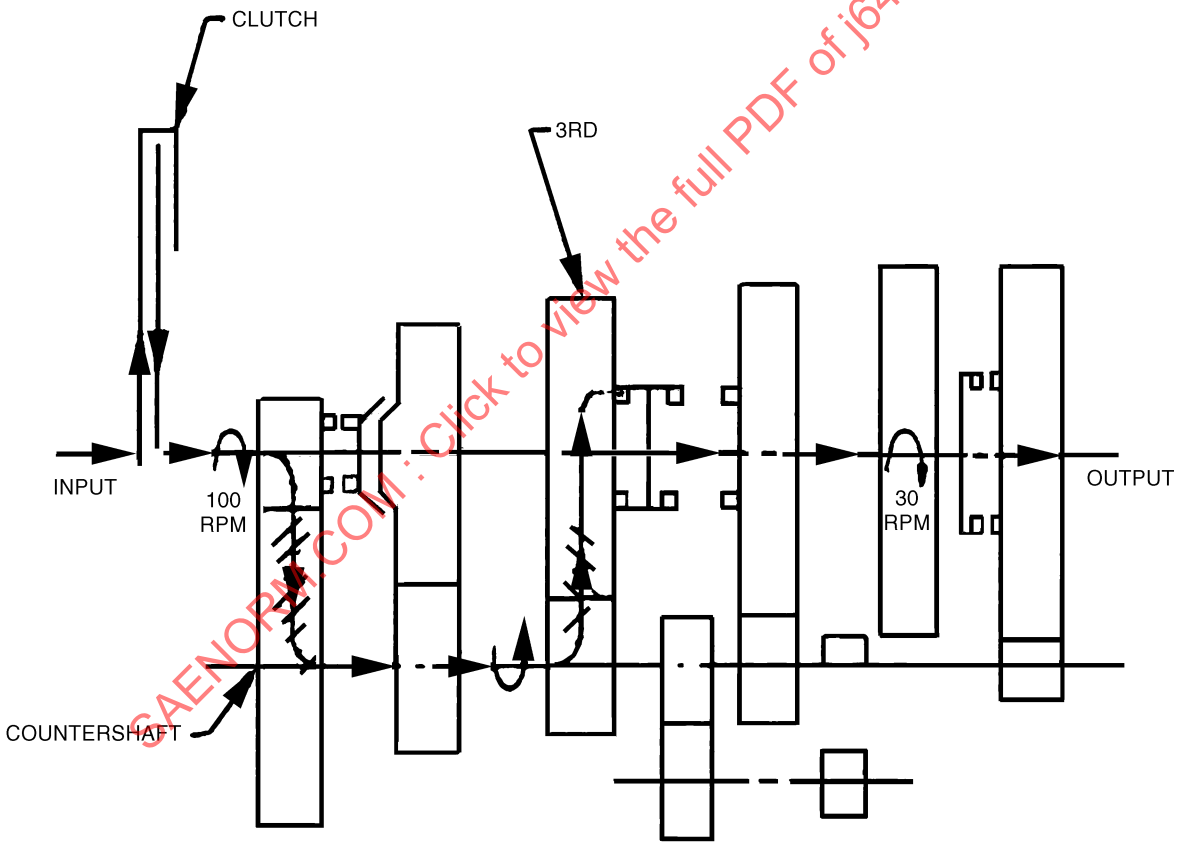


FIGURE 6—FIVE-SPEED TRANSMISSION DIAGRAM—3RD SPEED