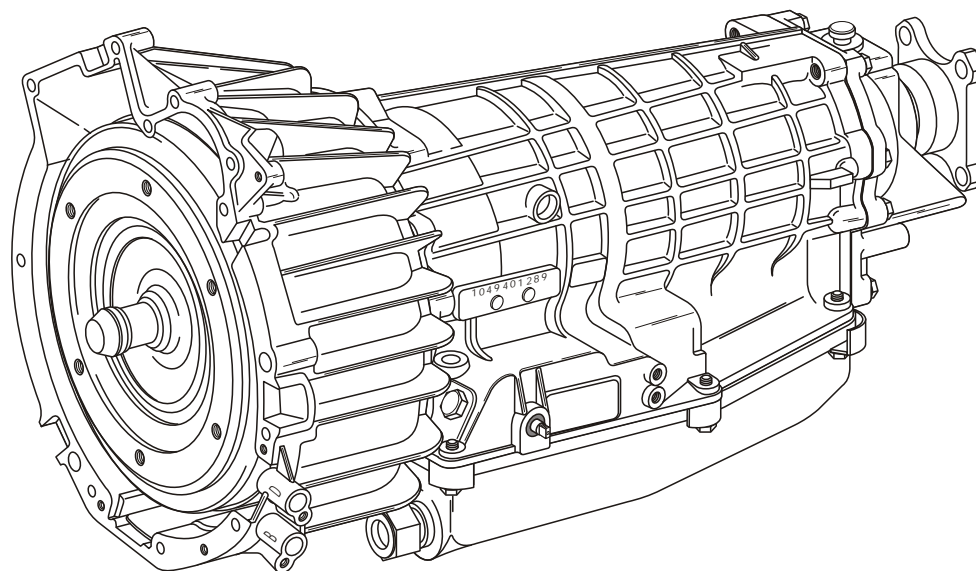




Technical Service Information

ZF 4HP-22/24 SERIES DIAGNOSTIC AND VALVE BODY INFORMATION



The Electronic Control system was first introduced in 1986 and was incorporated into the totally hydraulic 4HP-22 unit produced by ZF. It combines the hydraulic control of forward and reverse gear engagement, with electronic control for automatic upshifts from 1st thru 4th and automatic downshifts from 4th thru 1st gears. Three different versions of valve bodies have been used on BMW vehicles, with minor differences between them

The 1st version, *designated Early "E-7"*, has **5 solenoids** on the valve body, was introduced in 1986 and used up thru 1989. This version includes a solenoid for reverse lockout.

The 2nd version, *designated Late "E-7"*, has **5 solenoids** on the valve body, was introduced in 1988 and used up thru Mid-1989. This version includes a solenoid for reverse lockout.

The 3rd version, *designated "E-9"*, has **4 solenoids** on the valve body, was introduced in Mid-1989 and used up thru 1994. This version uses a shift solenoid for the reverse lockout function.

MODEL YEAR USAGE CHART

Valve Body Models	Model Year								
	86	87	88	89	90	91	92	93	94
<i>1st Version, Early "E-7", 5 Solenoid</i>									
<i>2nd Version, Late "E-7", 5 Solenoid</i>									
<i>3rd Version, "E-9", 4 Solenoid</i>									

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Figure 1



Technical Service Information

FOR ZF 4HP-22/24 SERIES VEHICLES

Refer to Figure 1 for model year usage of the "E7", 5 Solenoid and "E9", 4 Solenoid valve bodies.

Refer to Figure 2 for internal component application chart for all models.

Refer to Figure 3 for shift quadrant and mode switch differences between the different models.

FOR MODEL "E7", "5 SOLENOID" VALVE BODY

Refer to Figure 4 for identification, location and function of the 5 solenoids, along with the shift solenoid firing order for the "E7" 5 solenoid models.

Refer to Figure 5 for internal wire schematic and case connector terminal identification, along with a resistance chart to check the internal electronic components.

Refer to Figure 6 for individual solenoid operation.

Refer to Figure 7 for valve body assembly exploded view.

Refer to Figure 8 for Lower Front Valve Body exploded view, with valve identification, and individual spring specifications, as observed in a used valve body.

Refer to Figure 9 for Lower Rear Valve Body exploded view, with valve identification, and individual spring specifications, as observed in a used valve body.

Refer to Figure 10 for MV-1 and MV-2 Shift Solenoid Body exploded view, with valve identification, and spring specifications, as observed in a used valve body.

Refer to Figure 11 for Pressure Control Solenoid Body exploded view, with solenoid identification.

Refer to Figure 12 for Reverse Lockout Solenoid Body exploded view, with valve identification, and spring specifications, as observed in a used valve body.

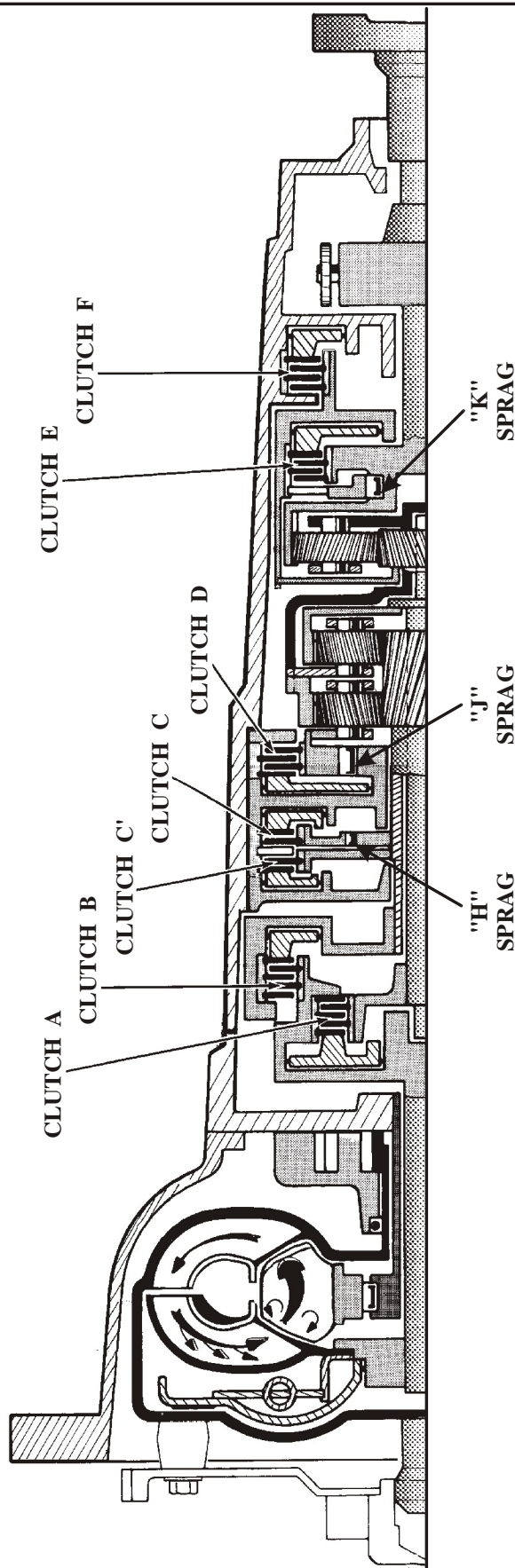
Refer to Figures 13, 14, 15, 16 for retainer, checkball and orifice locations.

FOR MODEL "E9", "4 SOLENOID" VALVE BODY INFORMATION AND THE INDEX REFER TO FIGURE 17 IN THIS BULLETIN



Technical Service Information

COMPONENT APPLICATION CHART FOR ZF 4HP-22/24 SERIES



RANGE	"A" Clutch	"B" Clutch	"C" Clutch	"C'" Clutch	"D" Clutch	"E" Clutch	"F" Clutch	"H" Sprag	"J" Sprag	"K" Sprag
Park										
Reverse		ON			ON	ON				Hold
Neutral										
"D"-1st	ON					ON			Hold	Hold
"D"-2nd	ON					ON		Hold		Hold
"D"-3rd	ON	ON				ON				Hold
"D"-4th	ON	ON	ON			ON	ON			
"3"	Same as above, Automatic Shift 1st thru 3rd, 4th gear is inhibited.									
"2"	Same as above, Automatic Shift 1st thru 2nd, 3rd and 4th gear are inhibited.									
"1"	Same as above, except "D" Clutch is applied for engine braking									

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Figure 2