



ZF6HP21/28/34 (Generation 2) ZIP KIT

PART NUMBER ZF6-GEN2-ZIP

TECHNICAL BOOKLET

Valve Body Identification

This Zip Kit **ZF6-GEN2-ZIP** is designed for ZF6HP21/28/34 (Generation 2) applications only. A separate Zip Kit **ZF6-6R60-ZIP** is available for ZF6HP19/26/32 (Generation 1) and Ford 6R60/6R80 applications. See separate identification guide for details.

Torque Specifications

Mechatronic-to-Case or Valve Body Halves Bolts 6Nm/53 in-lb	Metal Oil Pan to Case 14Nm/10 ft-lb
Plastic Oil Pan to Case 10Nm/89 in-lb	Pump Bolts to Case 10Nm/89 in-lb
Output Shaft Flange Nut 60Nm/44 ft-lb	

Clearance & Endplay

Rear Unit Endplay (flanged output) 0.15-0.35mm/.006-.013"	Input Shaft Endplay 0.2-0.4mm/.008-.015"
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Clutch clearance and material is critical (refer to OE clutch travel specifications). These have fluid balanced clutch pistons.

Fluid

Ford 6R60 extension housing has an allen head fill plug and/or the front corner of the case has a hex head fill plug. A dipstick lives within this plug.

Note: *The thermal element must open (88°C, 190°F) to purge the cooler before verifying the fluid level!*

Complete Fill Required 9.5 qt./9 ltr.	Service Fill Approx. 4.2 qt./4 ltr.
Ford Fluid XT-6-QSP, Mercon SP	ZF Fluid S671 090 0255- Shell M-1375.4

Drive-Cycle Relearn

Ford requires six light throttle up and coastdown shift cycles (after obtaining 80°C/175°F) for a partial relearn.

Cautions

Electronics

Do not use an ohm meter with more than .6 voltage supply. The TCM is capable of limited solenoid adaptation without reprogramming. After any service, resetting adapts/clearing KAM is suggested. In many instances, solenoids can be replaced with new OE or with qualified used. Original solenoids, if reused, should be returned to their same location due to a learned flow rate by the TCM. Make every effort to avoid mixing up the solenoids.

It is not advised to attempt circuit testing through the 16-pin connector. Check the solenoid resistance (5.0 ohms at 20°C/68°F) with the circuit board removed.

Visual Identification

The ZF6 has two generations:

- 2002–2005 ZF6HP19/26/32 = Generation 1
- 2006-later ZF6HP21/28/34 = Generation 2

The 19, 26 and 32 of Generation 1 ZF6 units refer to the sequentially larger amounts of torque capacity. In 2006, the mechatronic was upgraded to increase oil flow, which reduced the duration of the shift. These units became known as Generation 2, and were given the numbers 21, 28 and 34. The photos on the separate identification guide show how to identify and verify the valve body as a Generation 1 or Generation 2 version with the updated solenoids.

Within both vintages, there is an “M” version for the manual valve and an “E” solenoid controlled manual valve. The “E” version in both the early and late generations will have two additional solenoids, for a total of 9.

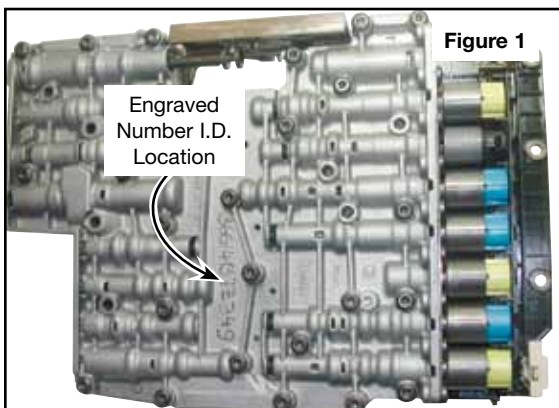
Technical Tips

Reprogramming

As indicated on the photo (**Figure 1**) an engraved number identifies this mechatronic as a service unit. This exchange unit may also have a blue paint dot, (**Figure 2**) on the solenoid end of the plastic frame, next to the bar code part number. This blue dot indicates it is NOT programmed and that the unit must be flashed with vehicle application prior to installation.

A white dot in the same area indicates the unit HAS been programmed without the transmission.

A pin dot identification in the same area with a fifth, sixth or seventh digit of 128 indicates this is a NEW unit, not a serviced mechatronic.



OE Serviced Valve Body

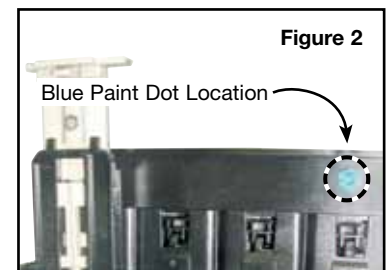
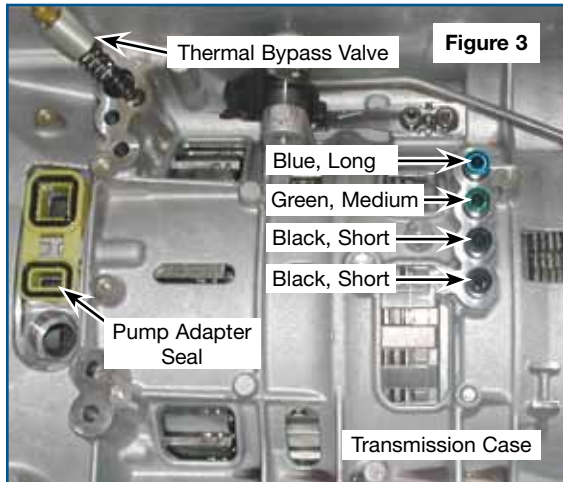


Figure 2



Technical Tips (continued)

Transmission Specifications & Reassembly Tips

ZF suggests the body-to-case, pump in/out adapter seal be replaced on every valve body R-R (Figure 3). The overall seal height on these vary depending on application. Make sure you have the correct size.

There are four mechatronic-to-case center support seals. The longest (blue) resides next to the manual linkage, medium (green) next to it. The two shortest ones (black) are furthest from the linkage (Figure 3).

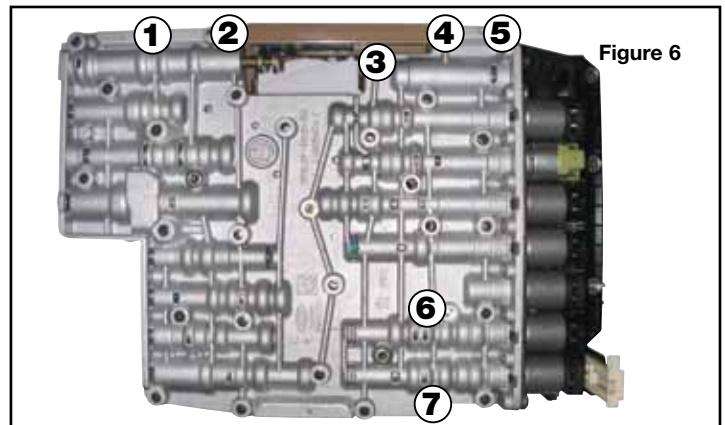
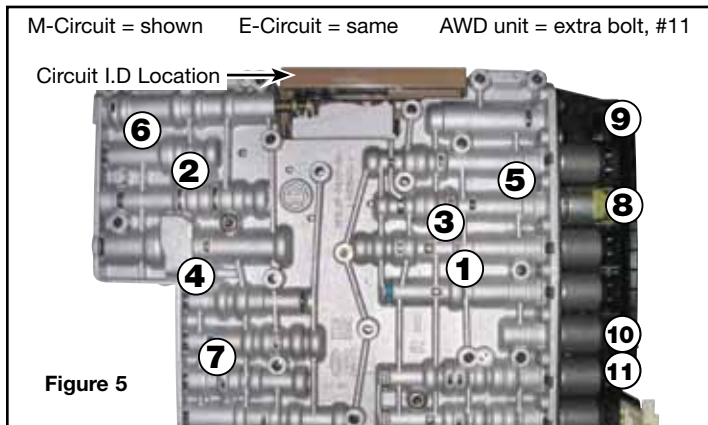
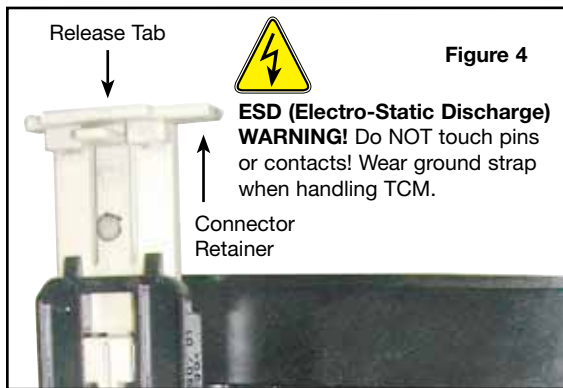
Zip Kit Instructions

1. Valve Body Removal from Case

- Press release tab and lift connector retainer (Figure 4).
- Pull connector sleeve out of case.
- Remove 10 or 11 bolts to drop valve body from case (Figure 5).

2. Valve Body Disassembly

- Remove seven bolts to remove TCM from valve body (Figure 6).
- Remove TCM (Figure 7).
- Pry valve body halves from separator plate where indicated (Figure 8).



2. Valve Body Disassembly (continued)

NOTES: The separator plate has a bonded gasket which may delaminate during disassembly (Figure 9). If any damage or delamination to the gasket is present, a new Sonnax separator plate should be used.

These separator plates are specifically calibrated, requiring either the OE valve body code or an identification number stamped on original plate (Figures 10 & 11) for reorder. See Sonnax application chart for cross-reference numbers (Figure 12).

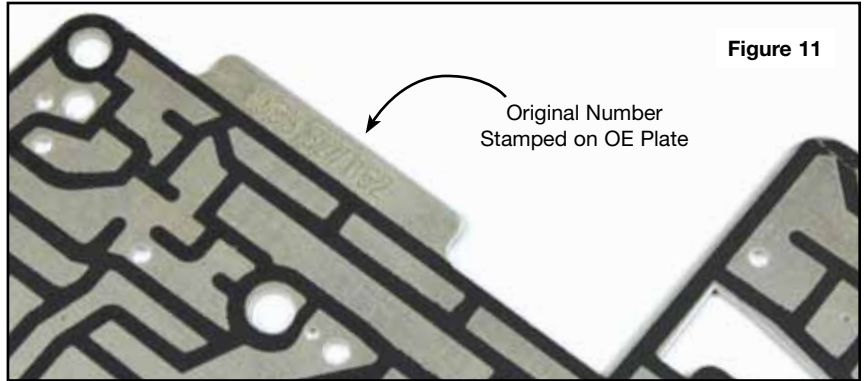


Figure 11

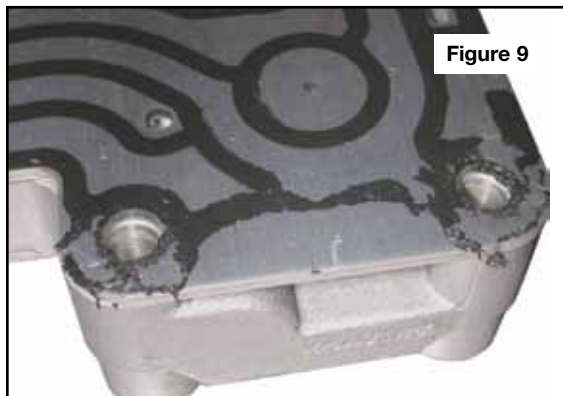


Figure 9

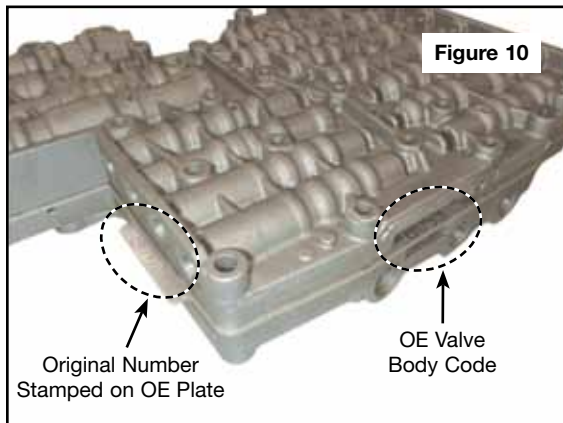


Figure 10

OE Valve Body Code	Number Stamped on Original Plate	Order Sonnax Part Number
A035/B035	1068-327-141	95740-035
A036/B036	1068-327-145	95740-051*
A046/B046	1068-327-162	95740-046
A047/B047	1068-327-163	95740-047
A051/B051	1068-327-179	95740-051*
A052/B052	1068-327-180	95740-052
A053/B053	1068-327-189	95740-053
A063/B063	1068-327-210	95740-063
A065/B065	1068-327-224	95740-065

Figure 12

*NOTE: Sonnax valve body plate **95740-051** is a direct replacement for both OE valve body codes A036/B036 and A051/B051, due to supersession by ZF.

3. Installation

Install Zip Kit parts as shown on diagram of separate quick guide sheet included in this Zip Kit. The locations of the replacement solenoid O-rings are shown at left (Figure 13). For additional solenoid information see Solenoid O-Ring Sizes chart (Figure 14) and Solenoid Function chart (Figure 15) on page 8 of this booklet.

Sonnax recommends vacuum testing critical wear areas not covered by this kit to determine whether additional Sonnax parts are required (see pages 4–5).

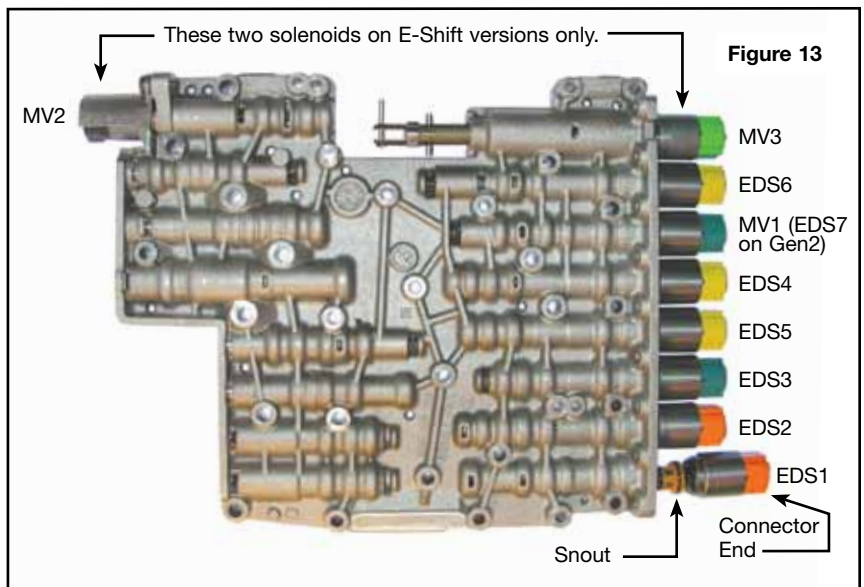


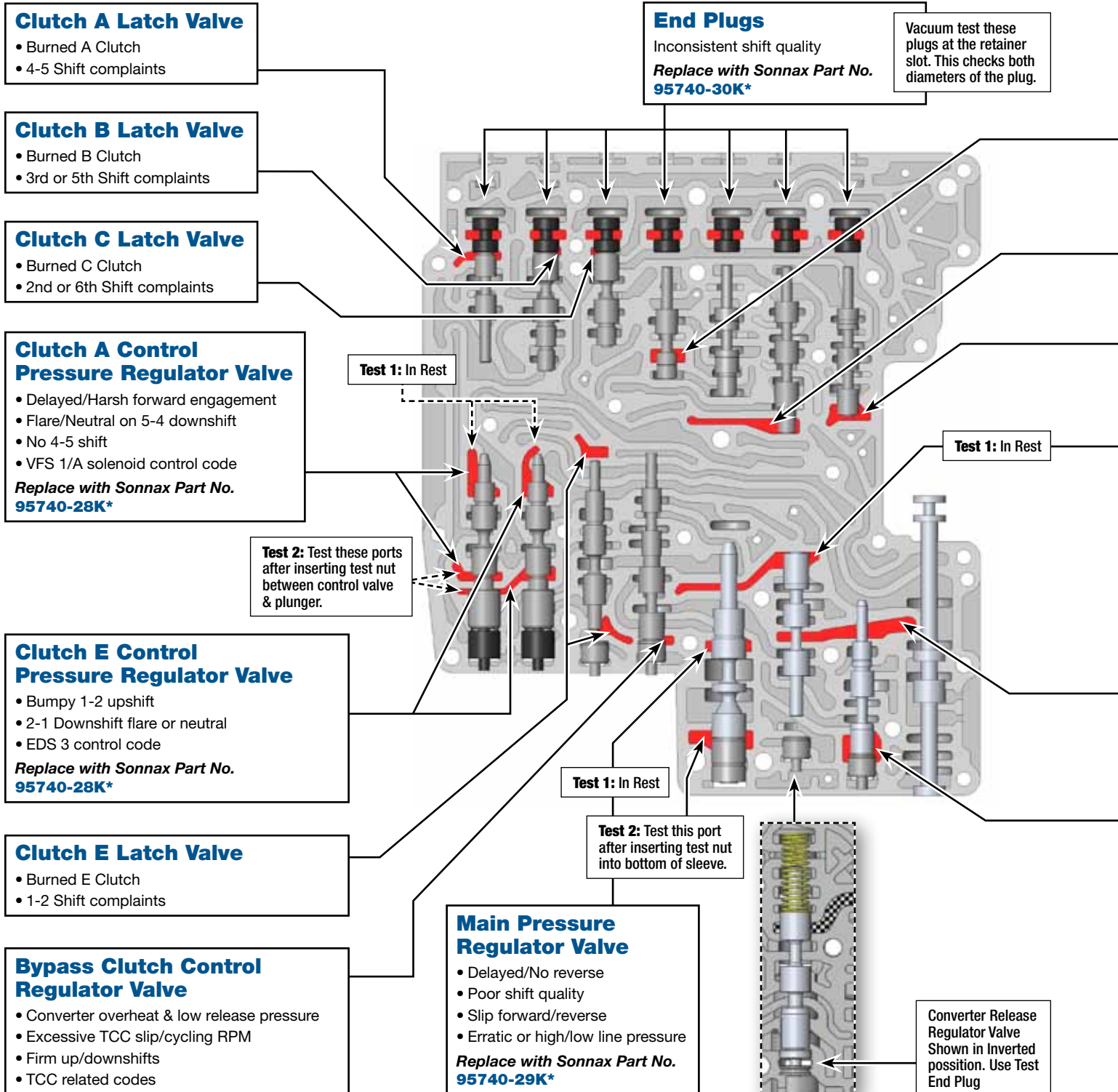
Figure 13

NOTE: O-ring sizes vary depending upon solenoid, location, make, model and generation version. Included in this Zip Kit are 31 standard replacement-size O-rings for the various solenoids. It is recommended to verify the size of the replacement O-ring by physically comparing it against the OE. The chart (Figure 14, page 8) provides some general guidance.

Critical Wear Areas & Vacuum Test Locations

NOTE: OE valves are shown in rest position and should be tested in rest position unless otherwise indicated. Test locations are pointed to with an arrow. Springs are not shown for visual clarity. Low vacuum reading indicates wear and Sonnax parts noted for replacement.

Lower Valve Body • ZF6HP21, Generation 2, M-Shift Shown Here



Part numbers with an asterisk () are included in this Zip Kit. Other part numbers are available separately.



For specific vacuum test information, refer to individual part instructions included in kits and available at www.sonnax.com.

Upper Valve Body • ZF6HP21, Generation 2, M-Shift Shown Here

Solenoid Pressure Regulator Valve

- Soft Shifts, poor line rise
- High line pressure during stall test
- Loss of 1-2 or 4-5 upshift
- Delayed forward/reverse engagement
- 5-4 or 4-3 Flare
- Gear ratio codes

Test part after inserting test nut into bottom of bore.

Drive Enable Valve

No fail safe

Solenoid Multiplex Valve

- EDS/Solenoid codes
- Shift complaints

Converter Release Regulator Valve

- Excessive TCC slip RPM & related codes
- Harsh lockup apply & release
- Harsh downshifts
- Converter overheat

Replace with Sonnax Part No. **95740-05K**

Test 2: Test this port with valve in inverted position. Hold valve and spring in place with enclosed testing end plug.

Lubrication Control Valve

- Excessive cooler pressure (ruptured hoses or cooler)
- Bushing and/or planet overheat

Clutch C Regulator Valve

- 2nd/6th Soft complaints
- EDS 3 codes

Clutch D1 Control Pressure Regulator Valve

- Bumpy 1-2 upshift
- 2-1 Downshift flare or neutral
- EDS 3 control codes

Clutch C2 Latch Valve

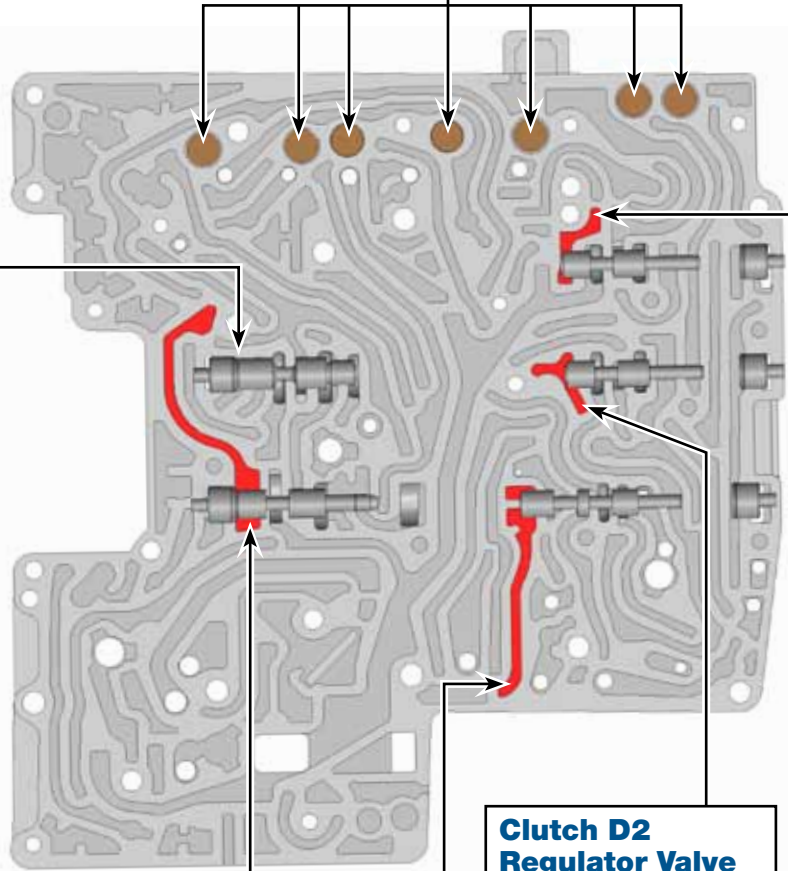
- 2nd/6th Shift complaints
- EDS 3 codes

Accumulator Pistons

- Firm up/downshifts & harsh engagement
- Erratic EDS solenoid control/EDS codes

Replace with Sonnax Part No. **95740-15K***

OE accumulator pistons should be flush with the casting. It is common for the rubber insert to lose tension. Each of these pistons can be vacuum tested from the exhaust hole on the opposite side of the casting.



Clutch D2 Regulator Valve

- 1st/2nd Shift complaints
- EDS 4 codes

Clutch B Regulator Valve

- 3rd/5th Shift complaints
- EDS 2 codes

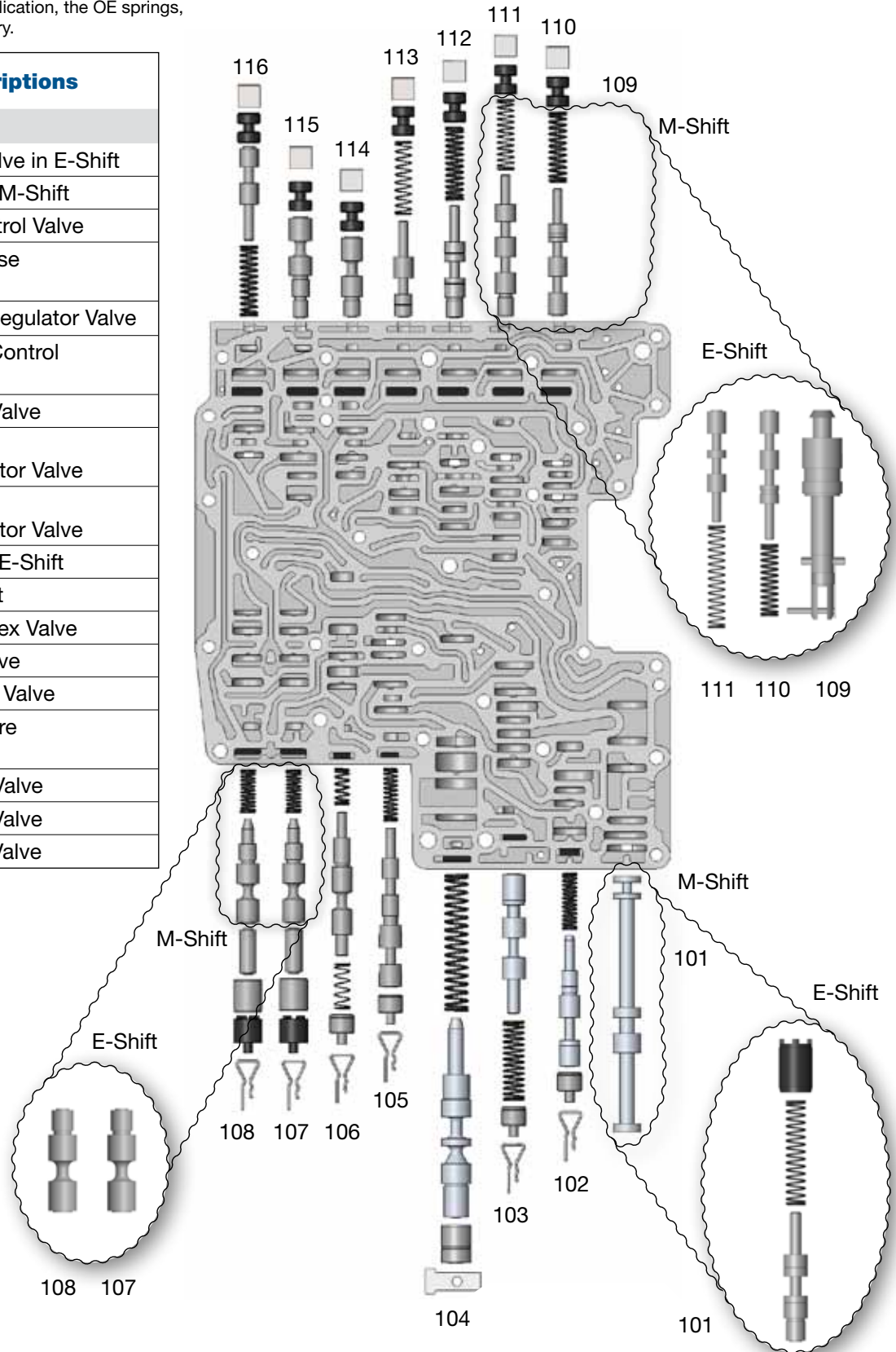
Part numbers with an asterisk () are included in this Zip Kit. Other part numbers are available separately.

OE Exploded View

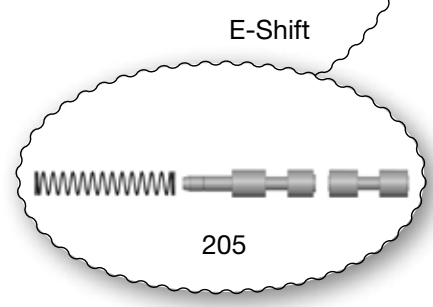
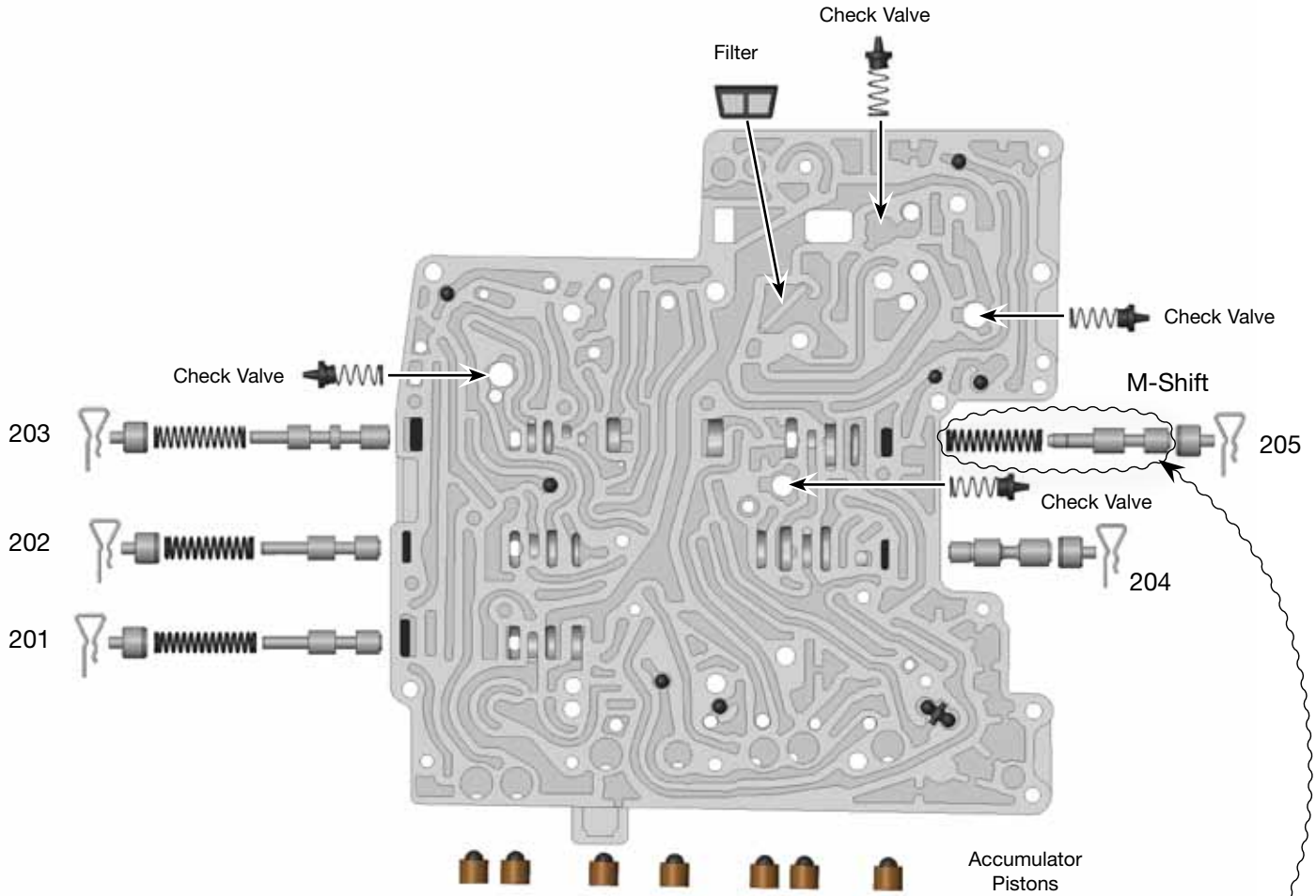
Lower Valve Body • ZF6HP21, Generation 2, M-Shift Shown Here

NOTE: Depending upon vehicle application, the OE springs, checkballs and worm tracks may vary.

Lower Valve Body Descriptions	
I.D. No.	Description
101	Parking Lock Valve in E-Shift
101	Manual Valve in M-Shift
102	Lubrication Control Valve
103	Converter Release Regulator Valve
104	Main Pressure Regulator Valve
105	Bypass Clutch Control Regulator Valve
106	Clutch E Latch Valve
107	Clutch E Control Pressure Regulator Valve
108	Clutch A Control Pressure Regulator Valve
109	Manual Valve in E-Shift
109	Empty in M-Shift
110	Solenoid Multiplex Valve
111	Drive Enable Valve
112	Clutch D1 Latch Valve
113	Solenoid Pressure Regulator Valve
114	Clutch C Latch Valve
115	Clutch B Latch Valve
116	Clutch A Latch Valve



Upper Valve Body • ZF6HP21, Generation 2, M-Shift Shown Here



Upper Valve Body Descriptions

I.D. No.	Description
201	Clutch B Regulator Valve
202	Clutch D2 Regulator Valve
203	Clutch D2 Latch Valve
204	Clutch C Regulator Valve
205	Clutch D1 Control Pressure Regulator Valve

Technical Tips (continued from page 3)

Figure 14

Solenoid O-Ring Sizes				
Make	Connector Color	Snout Color	Inboard O-Ring Size	Outboard O-Ring Size
ZF	Yellow or Tan	Black	10.5 x 2mm	13.5 x 2mm
ZF	Blue	Yellow	10.5 x 2mm	13 x 2mm
ZF	Orange	Orange	10.5 x 2mm	14.5 x 2mm
ZF	Black (Typical MV1 solenoid in Gen 1 & MV2 solenoid on E-Shifts)	Short Black	14.5 x 1.5mm	14.5 x 1.5mm
Ford	Black or Brown (Typical on all EDS solenoids)	Long Black	10.5 x 2mm	13 x 2mm
Ford	Cream (Typical on MV1 solenoid)	Cream	OR-014	OR-016

Figure 15

Solenoid Function					
Identification	Connector Color	Location	Output	Resistance at 68°F (20°C)	Function
ZF6HP19/26/32	Green	EDS 1, 3, 6	0 psi (0 bar) at 0 mA	5.05 ohms	1 – A Clutch 3 – C Brake 6 – TCC
Ford 6R60/6R80	Brown				
ZF6HP19/26/32	Black/Gray	EDS 2, 4, 5	67 psi (4.6 bar) at 0 mA	5.05 ohms	2 – B Clutch 4 – D & E Clutch 5 – EPC
Ford 6R60/6R80	Black				
ZF6HP19/26/32	Black	MVI	Open/Closed	11.5 ohms	Selector Valve
Ford 6R60/6R80	Cream				
ZF6HP19/26/32	Black	MV2	Open/Closed	11.5 ohms	Park Lock Valve
ZF6HP19/26/32	Green	MV3	Open/Closed	11.5 ohms	Park Lock Cylinder
ZF6HP21/28/34	Orange	EDS 1, 2	67 psi (4.6 bar) at 0 mA	5.05 ohms	1 – A Clutch 2 – B Clutch
ZF6HP21/28/34	Yellow/Tan	EDS 4, 5, 6	67 psi (4.6 bar) at 0 mA	5.05 ohms	2 – D & E Clutch 4 – EPC 5 – TCC
ZF6HP21/28/34	Blue	EDS 3, 7	0 psi (0 bar) at 0 mA	5.05 ohms	3 – C Brake 7 – Logic
ZF6HP21/28/34	Black	MV2	Open/Closed	11.5 ohms	Park Lock Valve
ZF6HP21/28/34	Green	MV3	Open/Closed	11.5 ohms	Park Lock Cylinder