VOLKSWAGEN "01M"
PRELIMINARY INFORMATION

The "01M" designated transaxle, shown in Figure 1, first appeared in the 1995 model year and was used in a wide variety of the Volkswagen car lines along with various engine combinations, including the 2.8L V6 engine, as shown in the chart below.

The "01M" transaxle is a 4 speed unit, with 4th gear being overdrive, and is equipped with a clutch in the torque converter. Refer to the chart in Figure 1 for the internal components that are applied in each of the four forward gear ranges. Notice that it has only one freewheel device for 1st gear.

"01M" MODEL USAGE CHART		
Vehicle	***Years***	***Engine Size***
Cabrio	***1995-2001***	***2.0L (L4)***
Beetle	***1998-2001***	***1.8L (L4), 2.0L (L4), 1.9L Diesel***
Golf	***1995-2001***	***1.8L (L4), 2.0L (L4), 1.9L Diesel***
GTI	***1999-2001***	***1.8L (L4), 2.8L (V6)***
Jetta	***1995-2001***	***1.8L (L4), 2.0L (L4), 1.9L Diesel, 2.8L (V6)***
Passat	***1995-1997***	***2.0L (L4), 2.8L (V6)***

The "01M" transaxle is totally electronic controlled and uses a Electronic Control Unit (ECU) to control shift points, apply and release of the torque converter clutch, and line pressure control. This is done using seven solenoids located on the valve body. The solenoid pattern for each gear and the description of operation is provided for you in Figure 2. Electrical signals from various sensors provide information to the ECU about vehicle speed, throttle position, engine coolant temperature, transaxle fluid temperature, gear range selected, converter turbine speed, engine load and engine speed. The ECU uses this information to determine the precise moment to upshift or downshift, apply or release the TCC and what fluid pressures are needed to apply the components.

If for any reason the entire electronic control system of the transaxle becomes disabled, or the ECU detects a problem with one of the various sensors that stores a trouble code, all of the solenoids will be de-energized (Turned OFF). This "Safety Mode" operating state of the solenoids forces the transaxle to operate in 3rd gear when the selector lever is in the "Drive" range. We have provided you with an internal wire schematic and case connector pin identification in Figure 3, and a chart in Figure 4 to check the resistance of the solenoids and fluid temperature sensor. Refer to Figure 5 to check solenoid mechanical operation on the bench.

Figures 6, 7 and 8 will provide you with exploded views of the valve body and all valve body components along with the names of each valve. The names of the valves are ATSG interpretations of the valves functions, not Volkswagens. Figure 9 will provide you with the valve body spring specifications that we observed in the valve body that was used for the illustrations, and may be different in the various models. Refer to Figures 10 and 11 for the checkball locations in this unit and Figure 12 for air checks.

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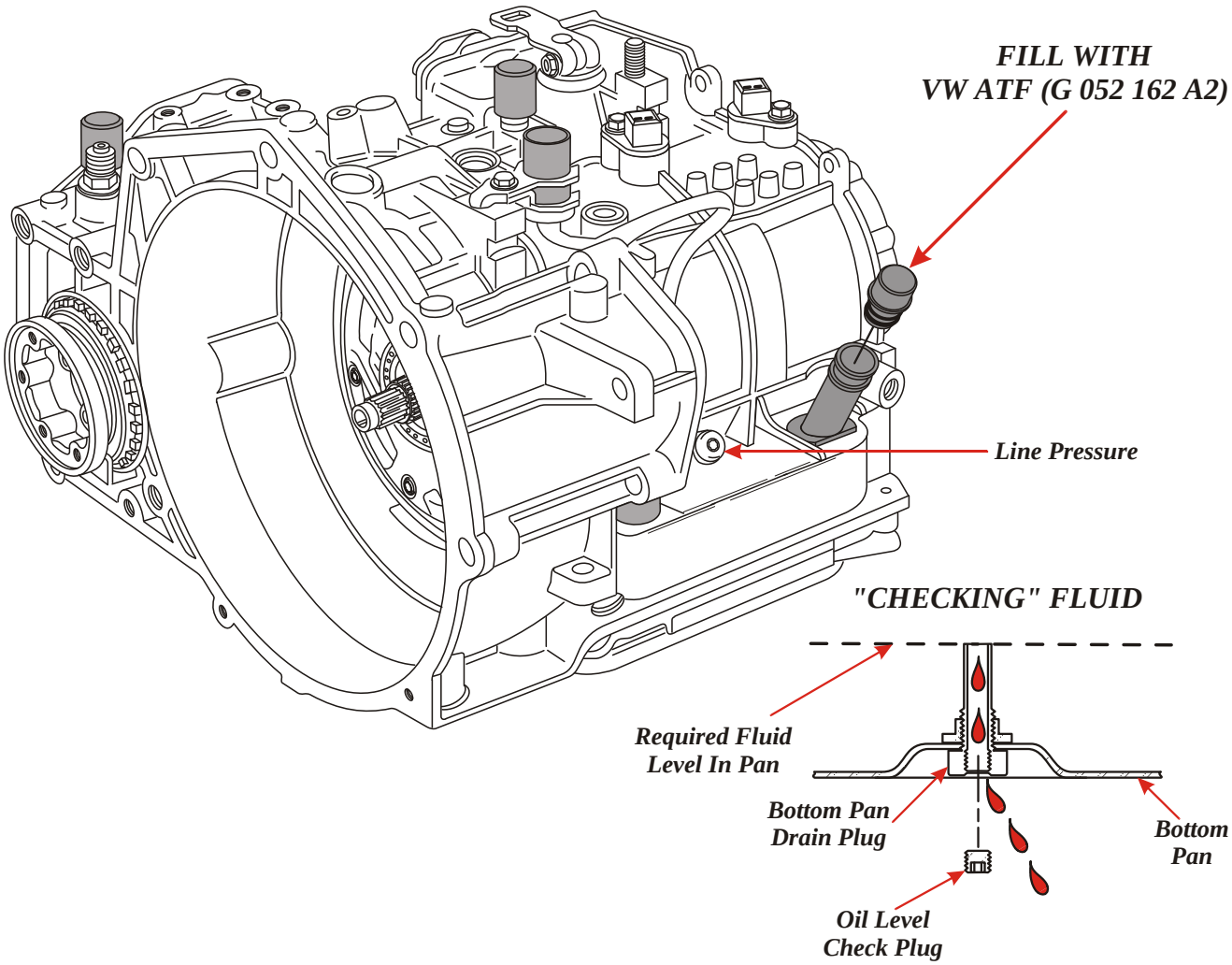
VOLKSWAGEN "01M"



COMPONENT APPLICATION CHART							
RANGE	"K-1" CLUT	"K-2" CLUT	"K-3" CLUT	"B-1" BRAK	"B-2" BRAK	LOW SPRG	CONV CLUT
Park					*ON*		
Reverse		*ON*		*ON*			
Neutral							
Dr-1st	*ON*					*HOLD*	**
Dr-2nd	*ON*				*ON*		**
Dr-3rd	*ON*		*ON*				**
Dr-4th			*ON*		*ON*		**
Man-1st	*ON*			*ON*			

** *Converter Clutch may be on depending on throttle position and vehicle speed.*

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Figure 1

VOLKSWAGON "01M" SOLENOID APPLY CHART							
RANGE SELECTED	*EV-1 (N88)*	*EV-2 (N89)*	*EV-3 (N90)*	*EV-4 (N91)*	*EV-5 (N92)*	*EV-6 (N93)*	*EV-7 (N94)*
PARK/NEUTRAL	*ON*		*ON*			*ON****	
REVERSE			*ON*		*ON***	*ON****	
DRIVE - 1ST			*ON*	*ON**	*ON***	*ON****	
DRIVE - 2ND		*ON*	*ON*	*ON**	*ON***	*ON****	
DRIVE - 3RD				*ON**	*ON***	*ON****	*ON*
DRIVE - 4TH	*ON*	*ON*		*ON**	*ON***	*ON****	*ON*

DESCRIPTION OF SOLENOID OPERATION

EV-1 (N88) ***This solenoid feeds the K-1 clutch when it is de-energized (Off), and feeds the B-1 brake when it is energized (On), in Park, Neutral and 4th.***

EV-2 (N89) ***This solenoid is energized in 2nd and 4th to apply the B-2 brake.***

EV-3 (N90) ***This solenoid controls the K-3 clutch***

****EV-4 (N91)*** ***This PWM solenoid applies the converter clutch when it is energized (On) and is dependent on engine temp, vehicle speed and throttle position.***

*****EV-5 (N92)*** ***This solenoid is energized (On) during every shift, to drop line pressure, and orifices the apply oil to each clutch pack during the shift to provide smoother shifts. After the shift is completed, the solenoid is de-energized (Off).***

******EV-6 (N93)*** ***This PWM solenoid controls main line pressure anytime the engine is running. This is a Pulse Width Modulated signal that varies with engine load and throttle position. When the solenoid is de-energized (Off) pressure goes to maximum.***

EV-7 (N94) ***This solenoid controls the apply oil to the B-2 brake, to provide smoother shifts into 4th gear. It will also be energized (On) momentarily during the 2-3 shift.***

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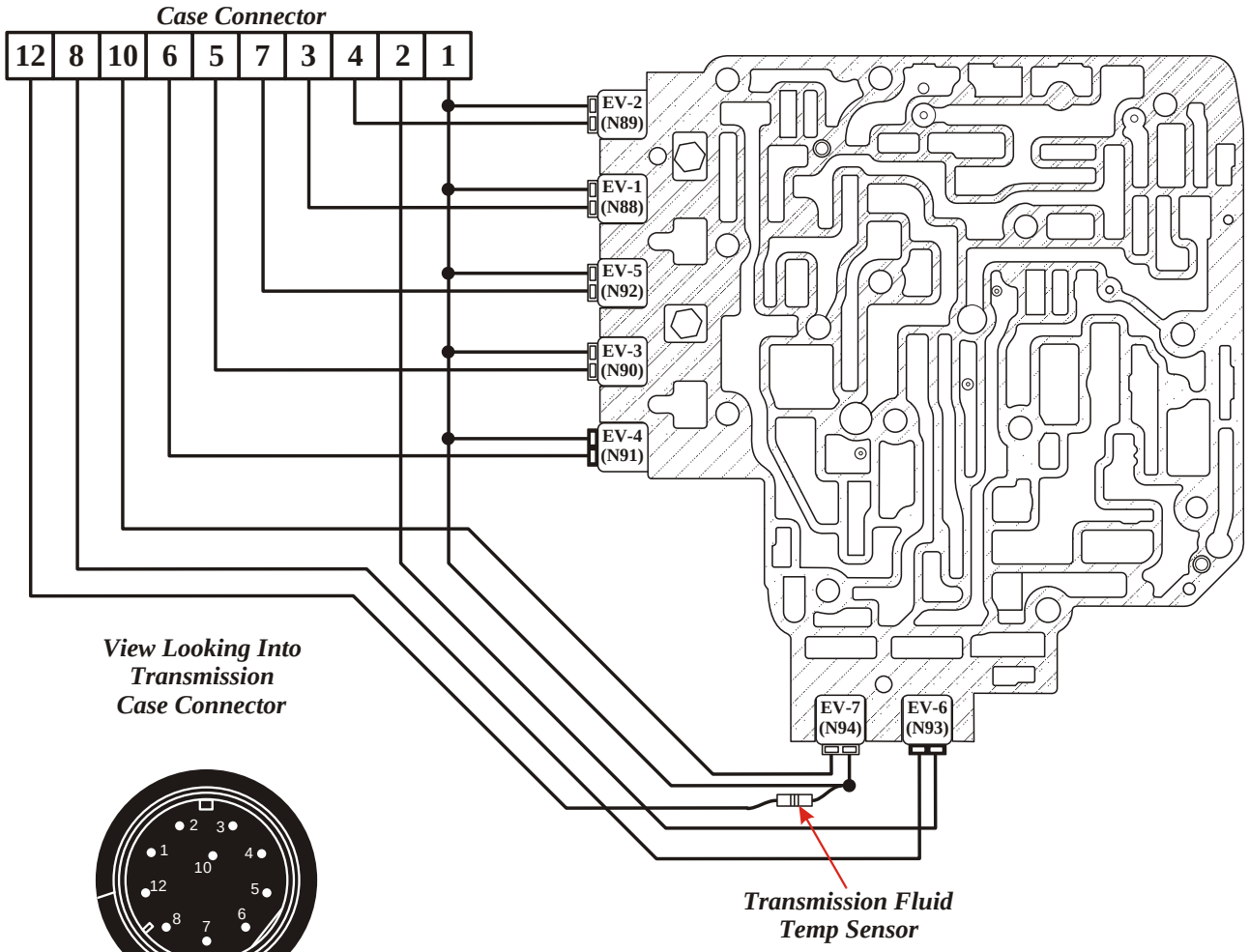
Figure 2

CASE CONNECTOR PIN FUNCTIONS



Pin No.	Pin Function
1	*Voltage supply to Solenoids EV-1, 2, 3, 4, 5, 7 and ATF Sensor.*
2	*Voltage supply to Solenoid EV-6.*
3	*Ground signal to Solenoid EV-1.*
4	*Ground signal to Solenoid EV-2.*
5	*Ground signal to Solenoid EV-3.*
6	*Ground signal to Solenoid EV-4.*
7	*Ground signal to Solenoid EV-5.*
8	*Ground signal to Solenoid EV-6.*
10	*Ground signal to Solenoid EV-7.*
12	*Fluid Temp Sensor signal return (Resistor In Ribbon).*

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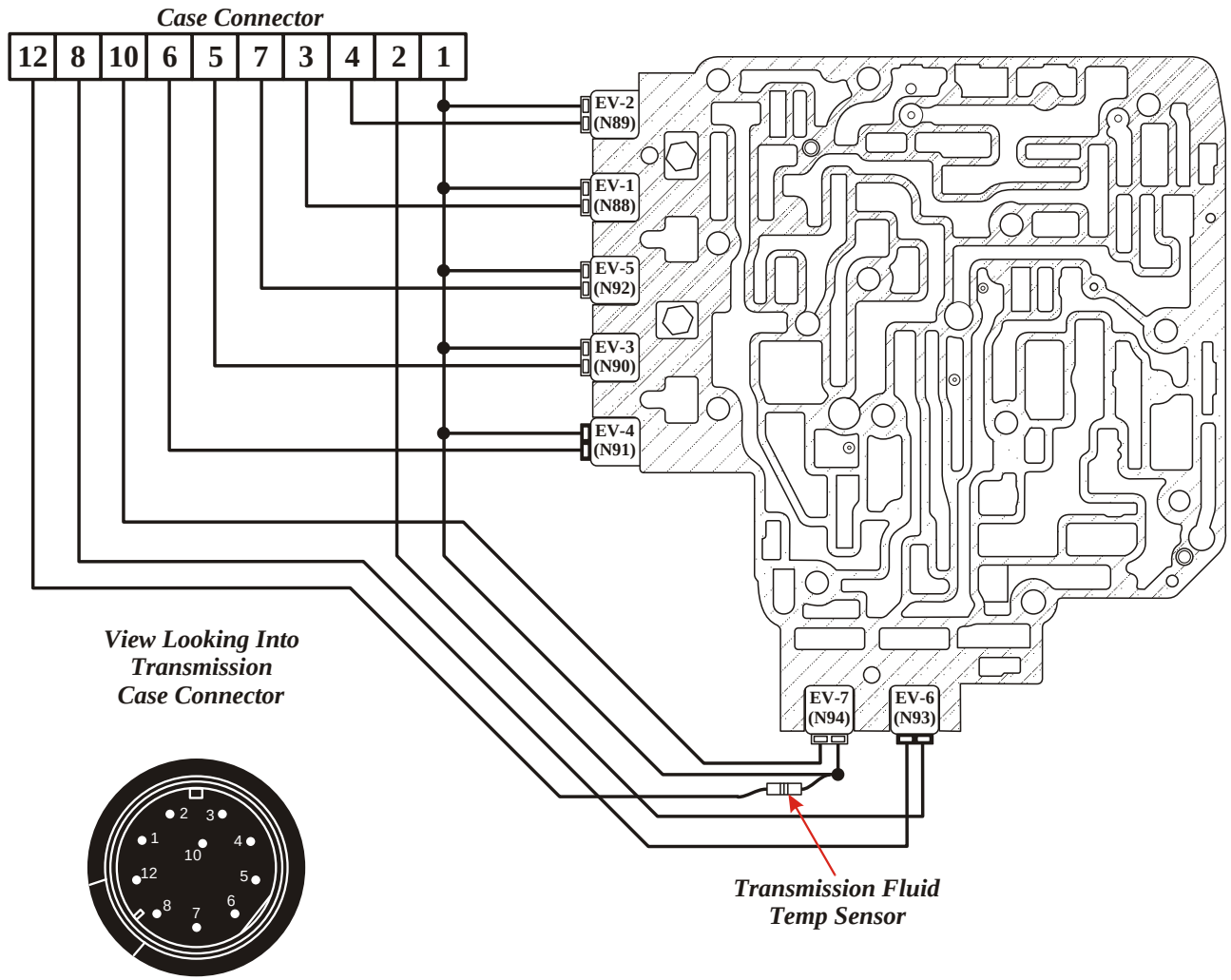
Figure 3

INTERNAL COMPONENT RESISTANCE CHART



Component	Pin No's.	Resistance @ 20°C (72°F)
Solenoid EV-1 (N88)	1 And 3	55-65 Ohms
Solenoid EV-2 (N89)	1 And 4	55-65 Ohms
Solenoid EV-3 (N90)	1 And 5	55-65 Ohms
Solenoid EV-4 (N91)	1 And 6	4.5-5.1 Ohms
Solenoid EV-5 (N92)	1 And 7	55-65 Ohms
Solenoid EV-6 (N93)	2 And 8	4.5-5.1 Ohms
Solenoid EV-7 (N94)	1 And 10	55-65 Ohms
TFT Sensor	1 And 12	190k-200k Ohms

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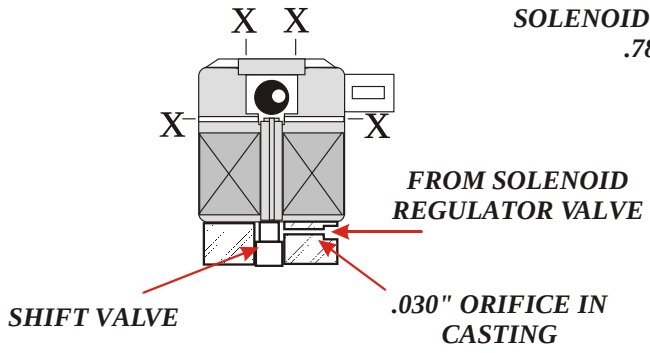
Figure 4

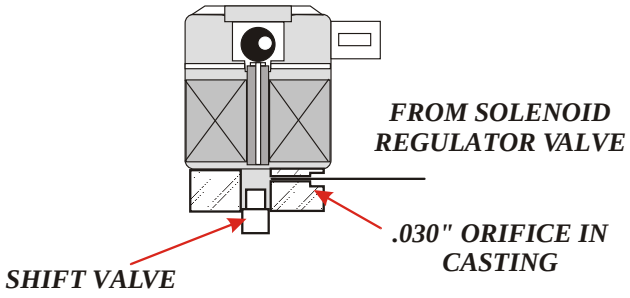
EV1 (N88), EV2 (N89), EV3 (N90), EV5 (N92) AND EV7 (N94) SOLENOID CHECK AND OPERATION

SOLENOID OFF



WHEN THE SOLENOID IS "OFF" ORIFICED SOLENOID REGULATOR OIL WILL EXHAUST OUT THE END OF THE SOLENOID

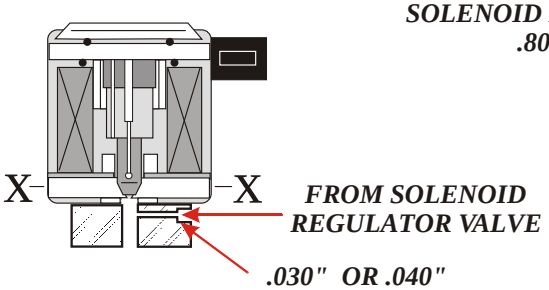
SOLENOID ON



WHEN THE SOLENOID IS "ON" ORIFICED SOLENOID REGULATOR OIL WILL BUILD UP UNDER THE SOLENOID STROKING THE VALVE THAT THE SOLENOID CONTROLS

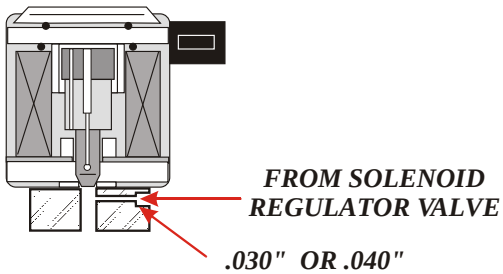
EV4 (N91) AND EV6 (N93) SOLENOID CHECK AND OPERATION

SOLENOID OFF



WHEN THE SOLENOID IS "OFF" ORIFICED SOLENOID REGULATOR OIL WILL EXHAUST OUT THE SIDE OF THE SOLENOID

SOLENOID ON



WHEN THE SOLENOID IS "ON" ORIFICED SOLENOID REGULATOR OIL WILL BUILD UP UNDER THE SOLENOID STROKING THE VALVE THAT THE SOLENOID CONTROLS

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Figure 5

AUDI AND VOLKSWAGEN 01M VALVE BODY

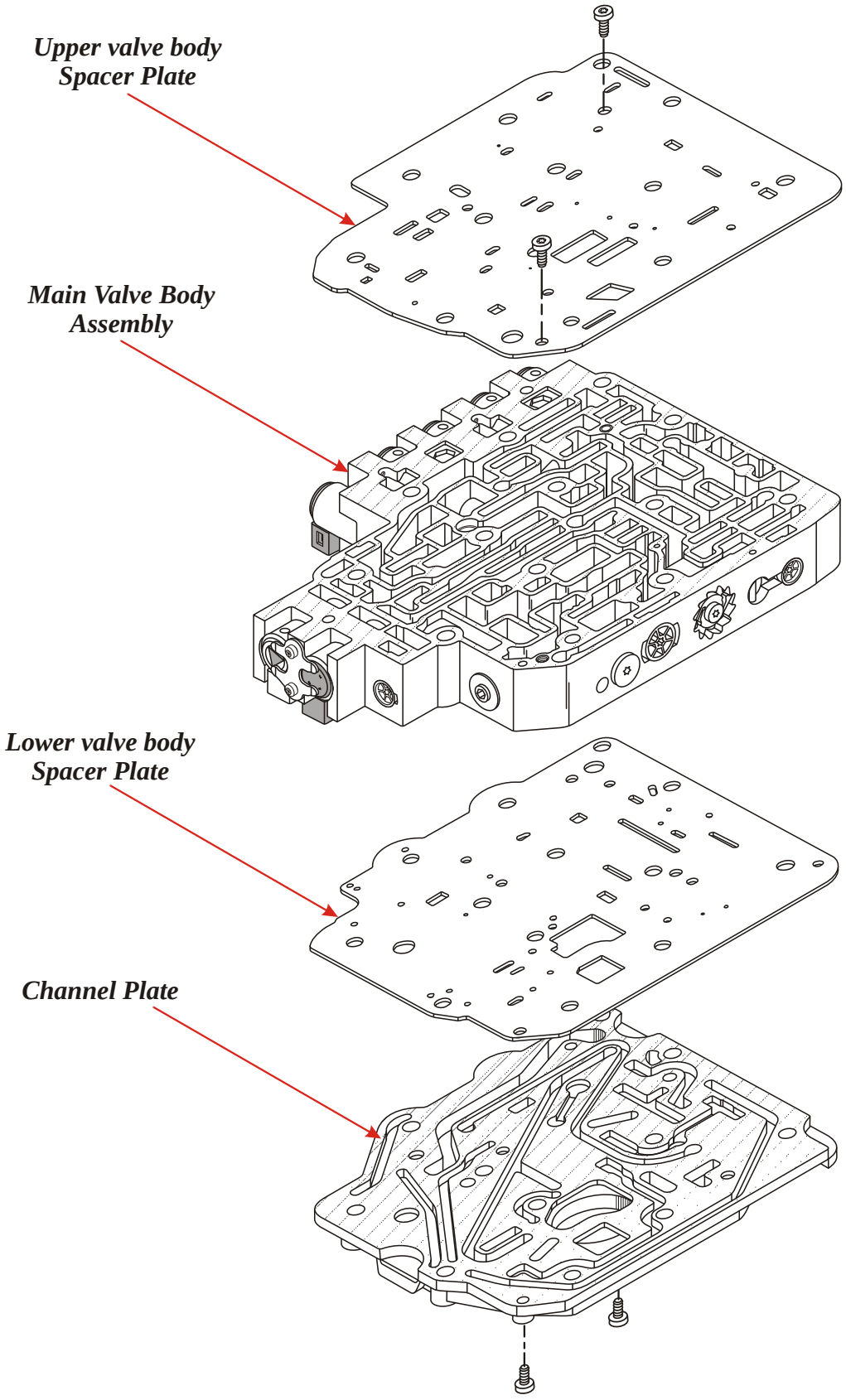

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Figure 6

AUDI AND VOLKSWAGEN 01M VALVE BODY
EXPLODED VIEW

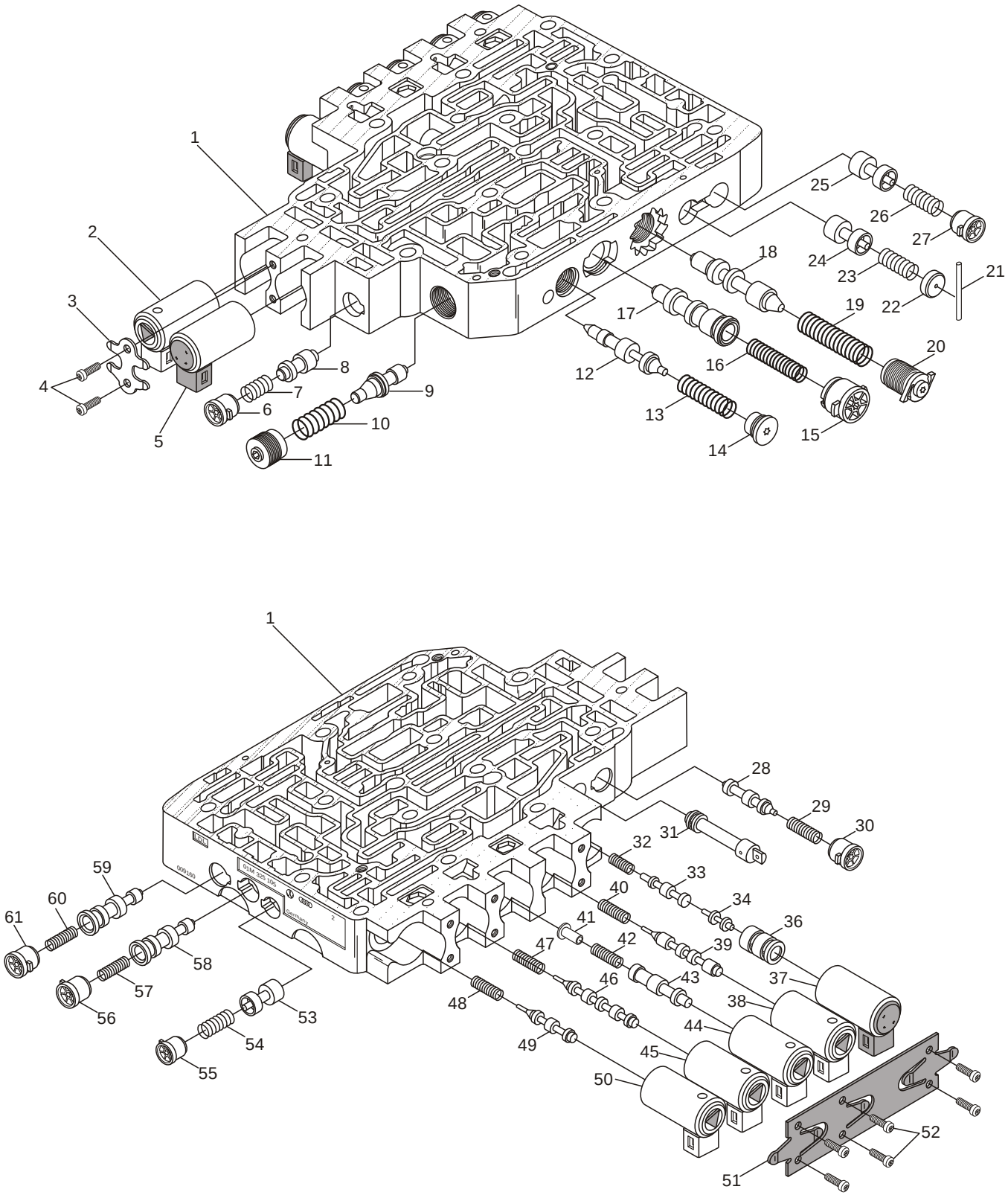

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Figure 7

1. MAIN VALVE BODY CASTING
2. EV-7 SOLENOID (N94)
3. SOLENOID RETAINING BRACKET
4. SOLENOID RETAINING BRACKET BOLTS
5. EV-6 SOLENOID (N93)
6. MANUAL 1ST LOCKING VALVE RETAINER (YELLOW)
7. MANUAL 1ST LOCKING VALVE SPRING (SEE SPRING SPEC)
8. MANUAL 1ST LOCKING VALVE
9. SOLENOID REGUL ATOR VALVE
10. SOLENOID REGUL ATOR VALVE SPRING (SEE SPRING SPEC)
11. SOLENOID REGUL ATOR VALVE RETAINER
12. CONVERTER REGUL ATOR VALVE
13. CONVERTER REGUL ATOR VALVE SPRING (SEE SPRING SPEC)
14. CONVERTER REGUL ATOR VALVE RETAINER
15. MAIN PRESSURE REGUL ATOR VALVE RETAINER (BROWN)
16. MAIN PRESSURE REG. VALVE SPRING (SEE SPRING SPEC)
17. MAIN PRESSURE REG ULATOR VALVE
18. BOOST PRESSURE REGULATOR VALVE
19. BOOST PRESSURE REG. VALVE SPRING (SEE SPRING SPEC)
20. BOOST PRESSURE REGUL ATOR RETAINER (ADJUSTABLE)
21. K-3 REGULATOR VALVE RETAINING PIN
22. K-3 REGULATOR VALVE BORE PLUG
23. K-3 REGULATOR VALVE SPRING (SEE SPRING SPEC)
24. K-3 REGULATOR VALVE
25. K-1 REGULATOR VALVE
26. K-1 REGULATOR VALVE SPRING (SEE SPRING SPEC)
27. K-1 REGULATOR VALVE RETAINER (YELLOW)
28. MANUAL 1ST/K-3 LOCKOUT VALVE
29. MANUAL 1ST/K-3 LOCKOUT VALVE SPRING (SEE SPRING SPEC)
30. MANUAL 1ST/K-3 LOCKOUT RETAINER (YELLOW)
31. MANUAL VALVE
32. CONVERTER CLUTCH APPLY VALVE SPRING (SEE SPRING SPEC)
33. CONVERTER CLUTCH APPLY VALVE
34. CONVERTER CLUTCH CONTROL VALVE
36. CONVERTER CLUTCH CONTROL VALVE SLEEVE
37. EV-4 SOLENOID, CONVERTER CLUTCH (N91)
38. EV-3 SOLENOID (N90)
39. K-3 SHIFT VALVE
40. K-3 SHIFT VALVE SPRING (SEE SPRING SPEC)
41. B -1 APPLY VALVE SPRING SEAT
42. B -1 APPLY VALVE SPRING (SEE SPRING SPEC)
43. B -1 APPLY VALVE
44. EV-5 SOLENOID (N92)
45. EV-1 SOLENOID (N88)
46. K-1/B-1 SHIFT VALVE
47. K-1/B-1 SHIFT VALVE SPRING (SEE SPRING SPEC)
48. B -2 SHIFT VALVE SPRING (SEE SPRING SPEC)
49. B -2 SHIFT VALVE
50. EV-2 SOLENOID (N89)
51. SOLENOID RETAINING BRACKET
52. SOLENOID RETAINING BRACKET BOLTS (6)
53. B -2 REGULATOR VALVE
54. B -2 REGULATOR VALVE SPRING (SEE SPRING SPEC)
55. B -2 REGULATOR VALVE RETAINER (BLACK)
56. K-1 CONTROL VALVE RETAINER (BROWN)
57. K-1 CONTROL VALVE SPRING (SEE SPRING SPEC)
58. K-1 CONTROL VALVE
59. 2-3 TIMING VALVE
60. 2-3 TIMING VALVE SPRING (SEE SPRING SPEC)
61. 2-3 TIMING VALVE RETAINER (WHITE)

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Figure 8

VOLKSWAGON "01M" SPRING SPECIFICATIONS

Main Valve Body

"Back Side"	*"Front Side"*
SPRING ILLUSTRATION NO. 7: FREE LENGTH = .728" SPRING DIAMETER = .352" WIRE DIAMETER = .029"	SPRING ILLUSTRATION NO. 29: FREE LENGTH = .987" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
SPRING ILLUSTRATION NO. 10: FREE LENGTH = 1.295" SPRING DIAMETER = .454" WIRE DIAMETER = .039"	SPRING ILLUSTRATION NO. 32: FREE LENGTH = .600" SPRING DIAMETER = .219" WIRE DIAMETER = .020"
SPRING ILLUSTRATION NO. 13: FREE LENGTH = 1.235" SPRING DIAMETER = .330" WIRE DIAMETER = .037"	SPRING ILLUSTRATION NO. 40: FREE LENGTH = .973" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
SPRING ILLUSTRATION NO. 16: FREE LENGTH = 1.385" SPRING DIAMETER = .410" WIRE DIAMETER = .035"	SPRING ILLUSTRATION NO. 42: FREE LENGTH = .973" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
SPRING ILLUSTRATION NO. 19: FREE LENGTH = 1.460" SPRING DIAMETER = .357" WIRE DIAMETER = .039"	SPRING ILLUSTRATION NO. 47: FREE LENGTH = .973" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
SPRING ILLUSTRATION NO. 23: FREE LENGTH = 1.090" SPRING DIAMETER = .352" WIRE DIAMETER = .029"	SPRING ILLUSTRATION NO. 48: FREE LENGTH = .973" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
SPRING ILLUSTRATION NO. 26: FREE LENGTH = 1.090" SPRING DIAMETER = .352" WIRE DIAMETER = .029"	SPRING ILLUSTRATION NO. 54: FREE LENGTH = 1.075" SPRING DIAMETER = .352" WIRE DIAMETER = .029"
	SPRING ILLUSTRATION NO. 57: FREE LENGTH = .968" SPRING DIAMETER = .280" WIRE DIAMETER = .027"
	SPRING ILLUSTRATION NO. 60: FREE LENGTH = .915" SPRING DIAMETER = .280" WIRE DIAMETER = .027"

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Figure 9

CHANNEL PLATE UPPER SIDE
CHECKBALL LOCATIONS

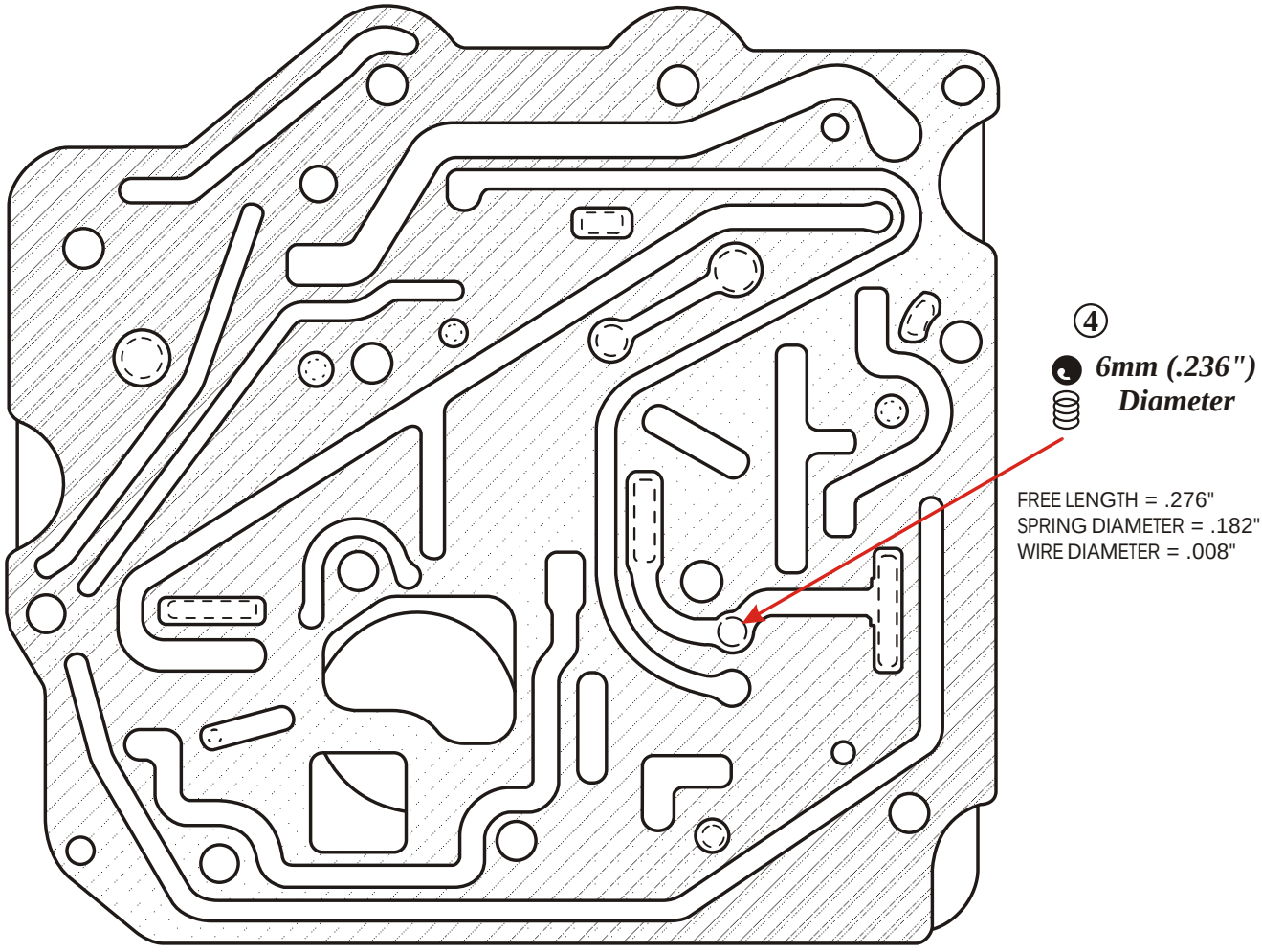

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Figure 10

VALVE BODY UPPER SIDE
CHECKBALL LOCATIONS

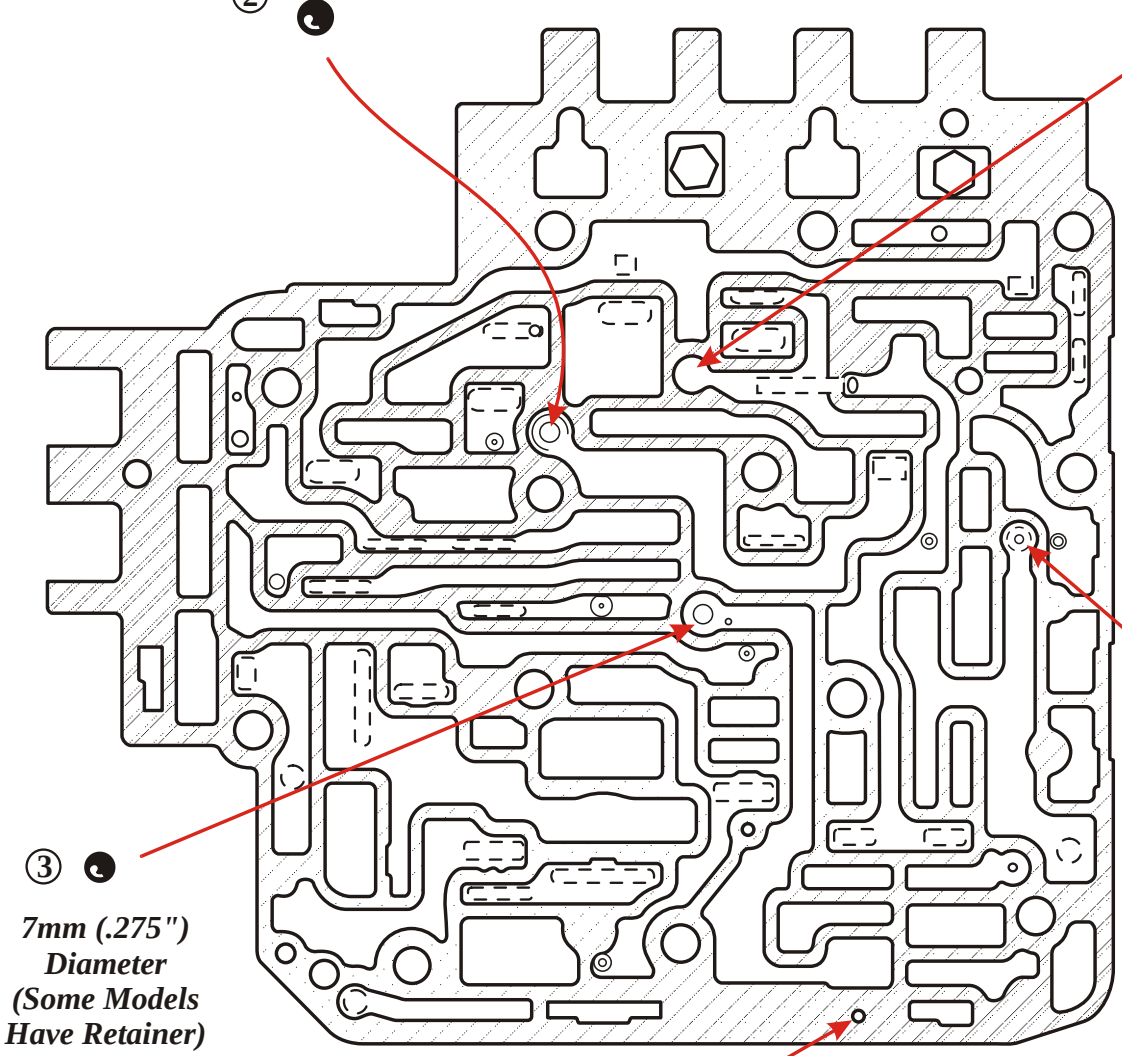

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Figure 11

CASE PASSAGES
FOR AIRCHECKS

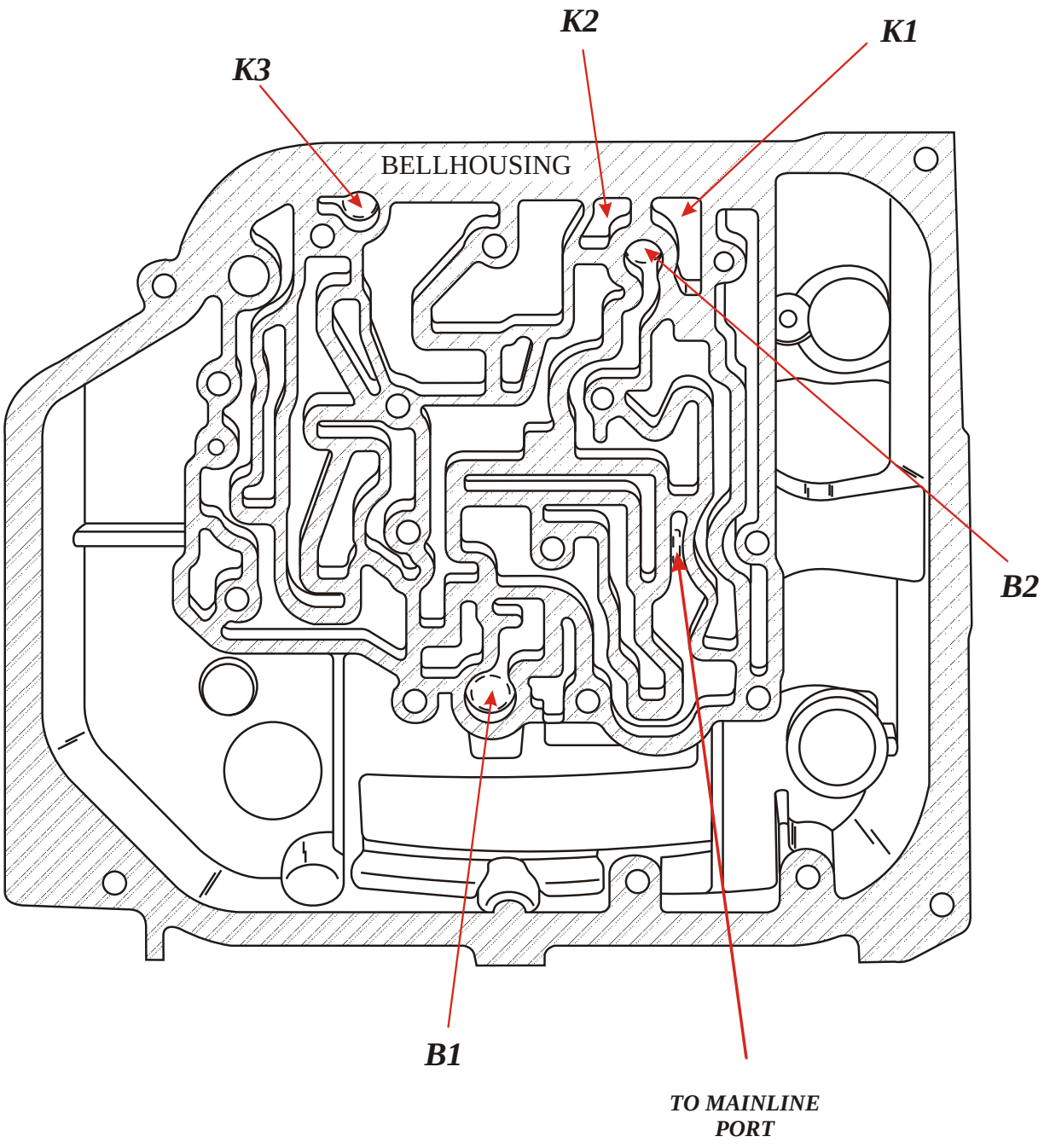

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Figure 12