ALLISON 1000/2000

TRANSMISSION PRESSURE SWITCH "STUCK" CODE DIAGNOSIS

COMPLAINT: A truck comes into the shop with complaints of erratic shifting, a shift to the wrong gear and limp mode with the "MIL" Lamp illuminated. A diagnostic scan of the TCM can reveal Diagnostic Trouble Codes P0841, P0842, P0846, P0847, P0871, P0872, P0876, P0877, P1710, P1711, P1714 or P1715.

These codes indicate that one or more of the pressure switches in the Transmission Pressure Switch Assembly (Refer to Figure 1), is either "Stuck Open" or "Stuck Closed". The most common of these codes is P0872/P1711 for 'Pressure Switch "E" Stuck Closed, which will be used as the base of the following diagnosis. Refer to Figure 2 for pressure switch identification.

CAUSE: The P0872/P1711 code indicates that the "E" Pressure Switch is indicating a signal that is different from the commanded position of the "E" shift valve. Unlike, for example a 4L80E, which uses oil directed from the manual valve to open and close the pressure switches, the Allison 1000/2000 series uses oil directed from the shift valves to accomplish that task. The valve body passages that feed the pressure switches can be seen in Figure 3. The only pressure switch in the Allison that uses oil from the manual valve is the Reverse Pressure Switch, Refer to Figure 4 for "Worm Track" identification.

This means that there could be a mechanical problem with Shift Solenoid "E", Shift valve "E" is stuck or the "E" pressure switch is stuck closed. The same could be true with Shift Solenoids "C" and "D" as well as Shift Valves "C" and "D" when diagnosing other pressure switch codes. So, the way the diagnostic course goes is, shift solenoid controls shift valve and shift valve operates pressure switch, (Except Reverse). Refer to Figures 5 and 6 for solenoid and valve identification.

CORRECTION: When diagnosing code P0872/P1711, start by checking the pressure switch assembly ranging by comparing the PSA range chart in Figure 7 with the ranging on the scan tools data list. The chart indicates both switch status and scan tool parameter status.

Since Shift Solenoids C, D and E are identical, one can be switched with the other to see if the solenoid is causing the pressure switch code. The shift valve is either stuck or not, and the pressure switch assembly can be checked for mechanical operation on the bench with an ohm meter connected to the switch terminals and physically pushing on the switch and releasing it while watching the meter to see if it changes from an open to a closed state, See Figure 8.

SERVICE INFORMATION:

There is much confusion between wiring diagrams and scan tool parameter displays concerning the pressure switch identification. Referring to Figure 9, notice that the pressure switch electrical circuits are labeled A, B, C and D, but the pressure switch identification is Pressure Switch C, D, E and R. Be careful not to confuse this.

IMPORTANT NOTE: A faulty Neutral Safety Back Up (NSBU) Switch can cause P0872/P1711 to be stored **FALSELY.** Refer to Figure 10 for the NSBU Switch Logic chart.

TRANSMISSION FLUID PRESSURE SWITCH LOCATION

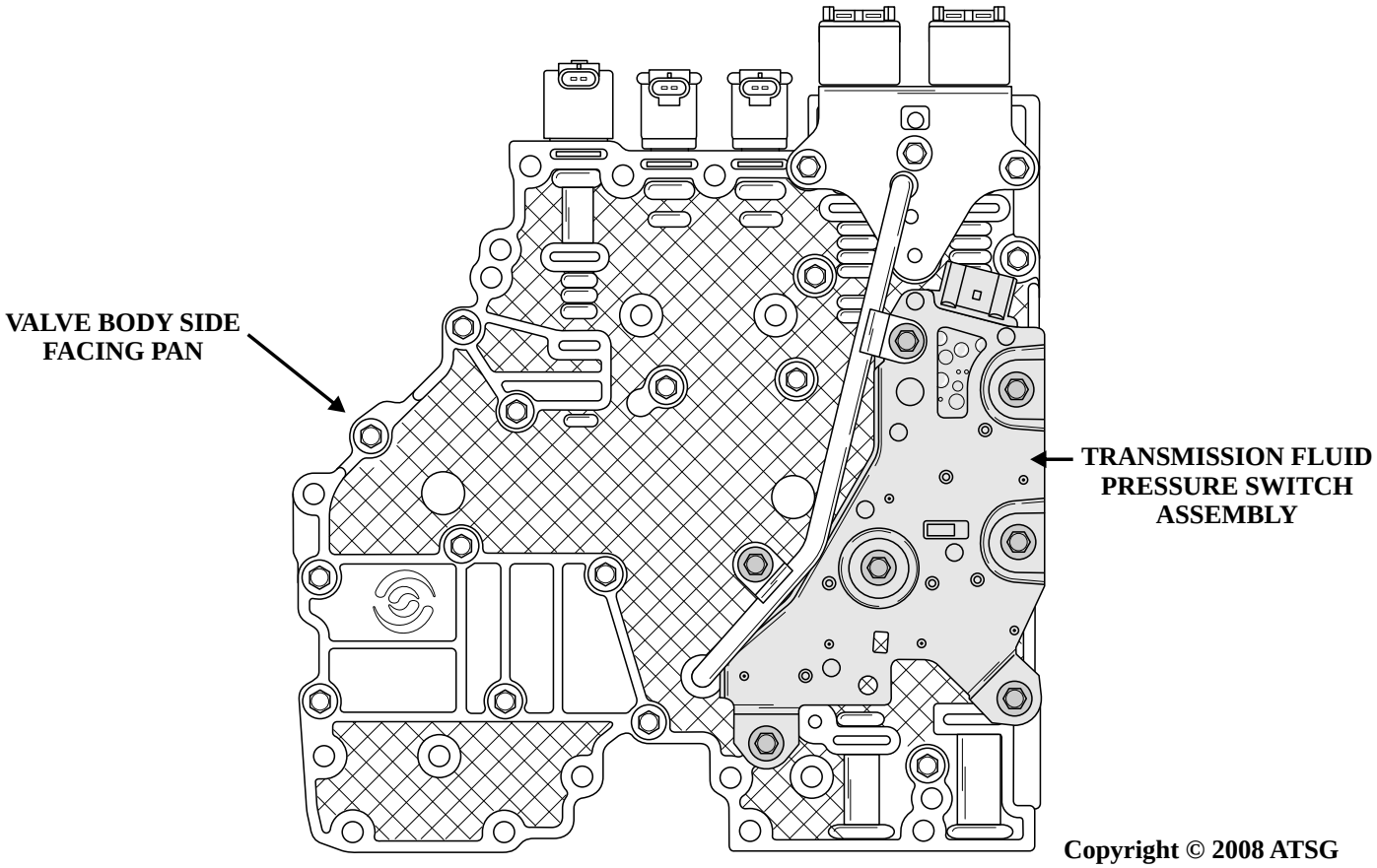

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Figure 1

TRANSMISSION FLUID PRESSURE SWITCH IDENTIFICATION

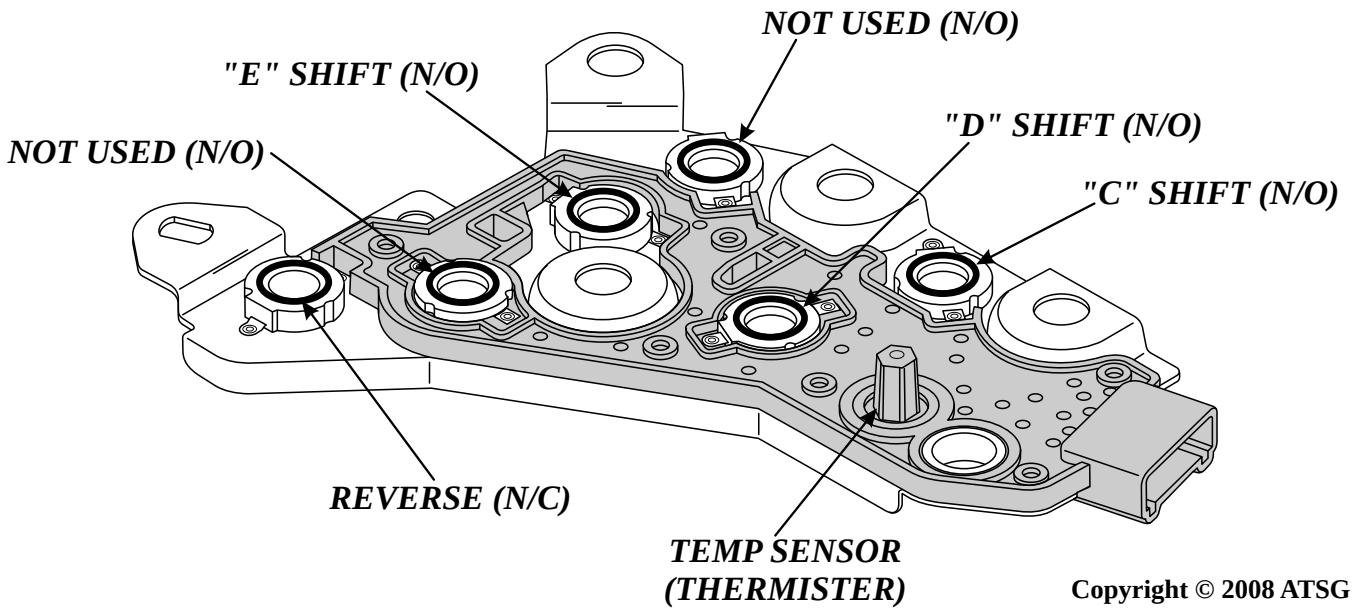

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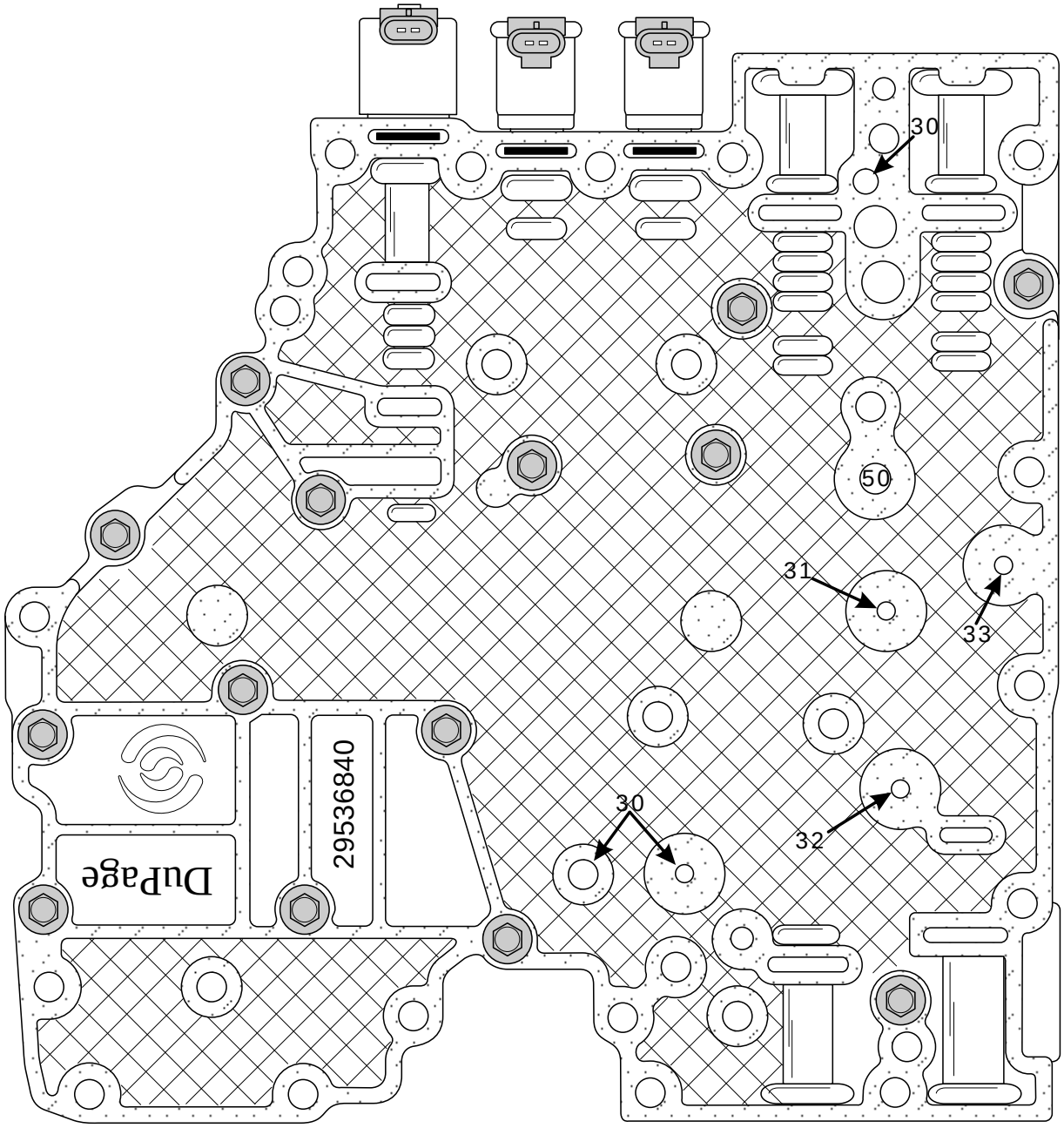
Figure 2

VALVE BODY PRESSURE SWITCH FEED PASSAGES



Passage # 30.....Reverse Pressure Switch
Passage # 31....."D" Shift Valve Pressure Switch
Passage # 32....."E" Shift Valve Pressure Switch
Passage # 33....."C" Shift Valve Pressure Switch

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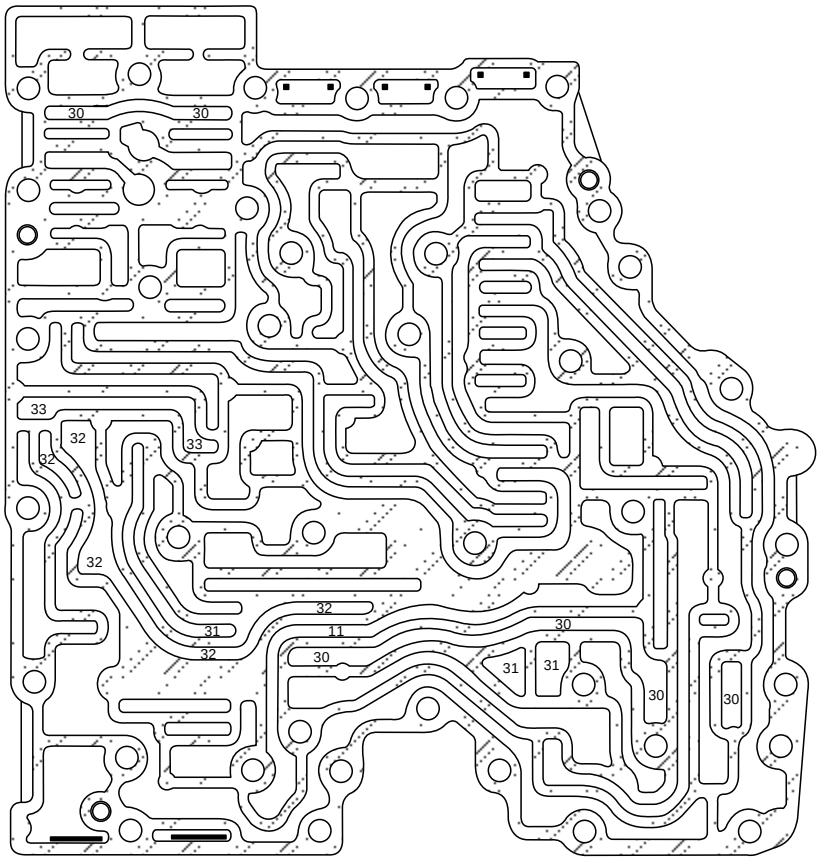
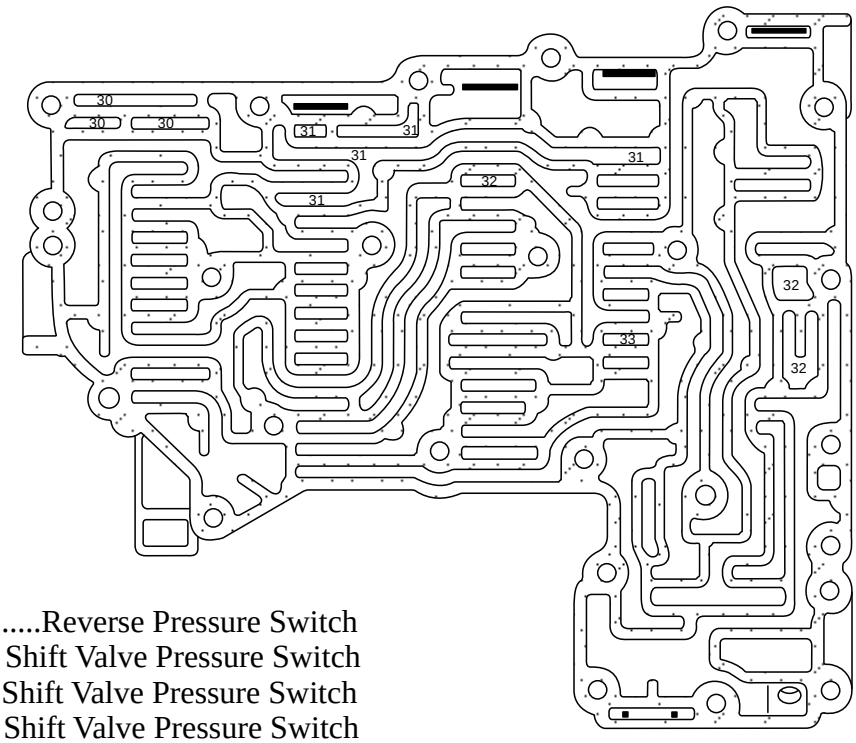
Figure 3

VALVE BODY PRESSURE SWITCH FEED PASSAGES

MAIN VALVE BODY



SHIFT VALVE BODY



Passage # 30.....Reverse Pressure Switch
Passage # 31....."D" Shift Valve Pressure Switch
Passage # 32....."E" Shift Valve Pressure Switch
Passage # 33....."C" Shift Valve Pressure Switch

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Figure 4

"MAIN" VALVE BODY EXPLODED VIEW

1. MAIN VALVE BODY CASTING.
2. ALIGNMENT DOWELS (5 REQUIRED).
3. MAIN CONTROL RELIEF VALVE.
4. MAIN CONTROL RELIEF VALVE SPRING.
5. MAIN CONTROL RELIEF VALVE SPRING RETAINER.
6. EXHAUST BACKFILL VALVE SPRING RETAINER.
7. EXHAUST BACKFILL VALVE SPRING.
8. EXHAUST BACKFILL VALVE.
9. BOLT, M6 X 1.0 X 50 (23 REQUIRED)
10. SOLENOID "F" TRIM VALVE SPRING.
11. SOLENOID "F" TRIM VALVE.
12. SOLENOID "F" TRIM VALVE SLEEVE.
13. SOLENOID "F" SMALL "O" RING.
14. SOLENOID "F" LARGE "O" RING.
15. SOLENOID "F" (LOCK-UP PWM).
16. SOLENOID "F" RETAINING CLIP.
17. SHIFT SOLENOID "D" SMALL "O" RING.
18. SHIFT SOLENOID "D" LARGE "O" RING.
19. SHIFT SOLENOID "D".
20. SHIFT SOLENOID "D" RETAINING CLIP.
21. SHIFT SOLENOID "E" SMALL "O" RING.
22. SHIFT SOLENOID "E" LARGE "O" RING.
23. SHIFT SOLENOID "E".
24. TRIM PRESSURE ACCUMULATORS.
25. TRIM PRESSURE ACCUMULATOR SPRINGS.
26. TRIM SOLENOID "A" AND "B" RETAINING BRACKET.
27. TRIM "B" VALVE SPRING.
28. TRIM "B" VALVE.
29. TRIM GAIN VALVE.
30. TRIM SOLENOID "B" "O" RING (BLACK).
31. TRIM SOLENOID "B" (N/O PWM) (Snout Diameter = .665").
32. TRIM SOLENOID "A" (N/C PWM) (Snout Diameter = .645").
33. TRIM SOLENOID "A" "O" RING (GREEN).
34. TRIM GAIN VALVE.
35. TRIM "A" VALVE (Note I.D. Ring Between Lands).
*36. TRIM "A" VALVE SPRING. (Early Models Did Not Use This Spring)

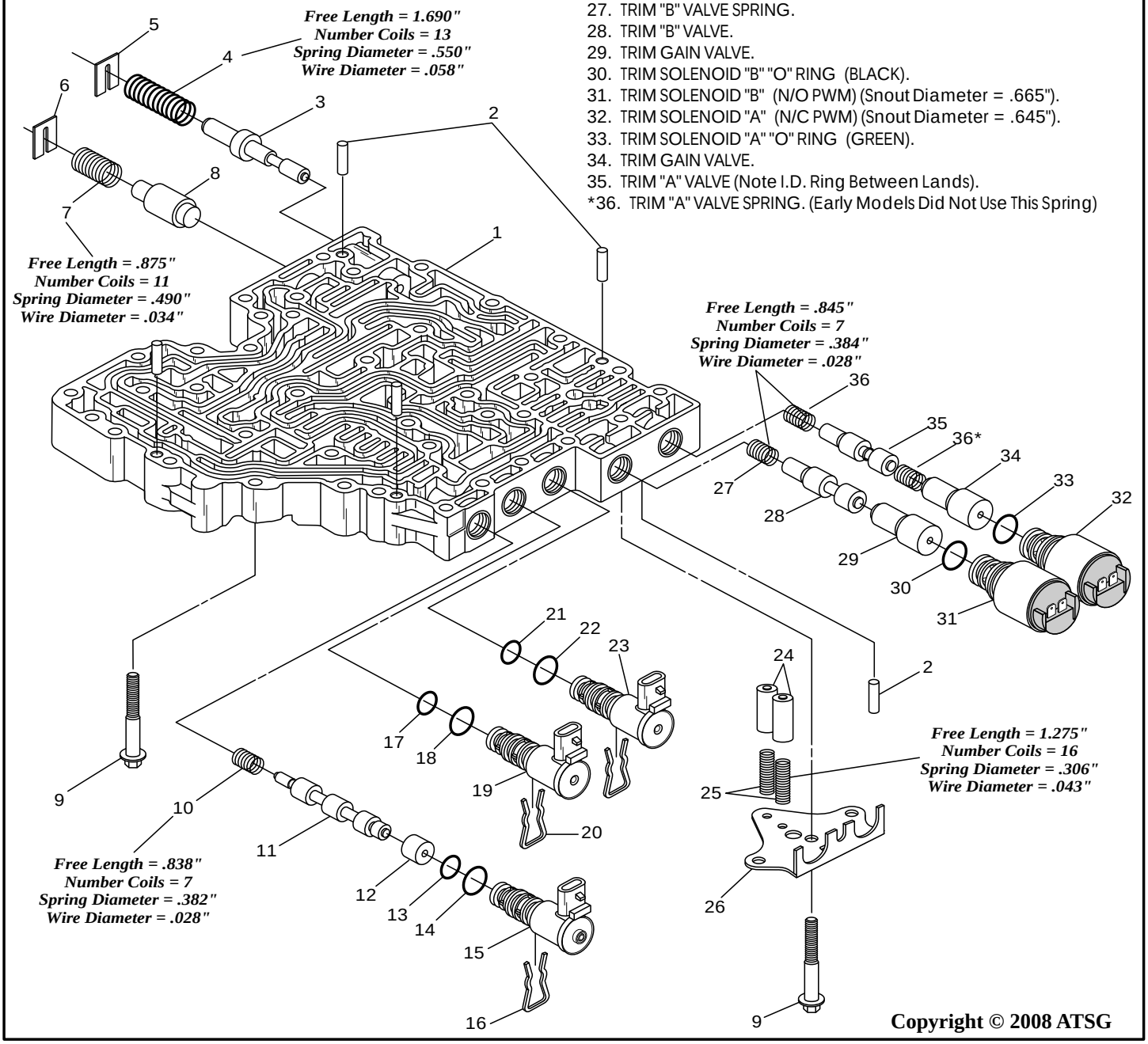

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Figure 5

"SHIFT" VALVE BODY EXPLODED VIEW

1. SHIFT VALVE BODY CASTING.
2. SOLENOID SCREEN.
3. SHIFT SOLENOID "C".
4. SHIFT SOLENOID "C" RETAINING CLIP.
5. MANUAL SELECTOR VALVE.
6. MANUAL SELECTOR VALVE PIN.
7. SOLENOID "D" SHIFT VALVE.
8. SOLENOID "D" SHIFT VALVE SPRING.
9. SOLENOID "D" SHIFT VALVE BORE PLUG.
10. SOLENOID "D" SHIFT VALVE LINE-UP RETAINER.
11. SOLENOID "E" SHIFT VALVE.
12. SOLENOID "E" SHIFT VALVE SPRING.
13. SOLENOID "E" SHIFT VALVE BORE PLUG.
14. SOLENOID "E" SHIFT VALVE LINE-UP RETAINER.
15. SOLENOID "C" SHIFT VALVE.
16. SOLENOID "C" SHIFT VALVE SPRING.
17. SOLENOID "C" SHIFT VALVE LINE-UP RETAINER.
18. MAIN CONTROL VALVE.
19. MAIN CONTROL VALVE SPRING.
20. MAIN CONTROL VALVE LINE-UP RETAINER.

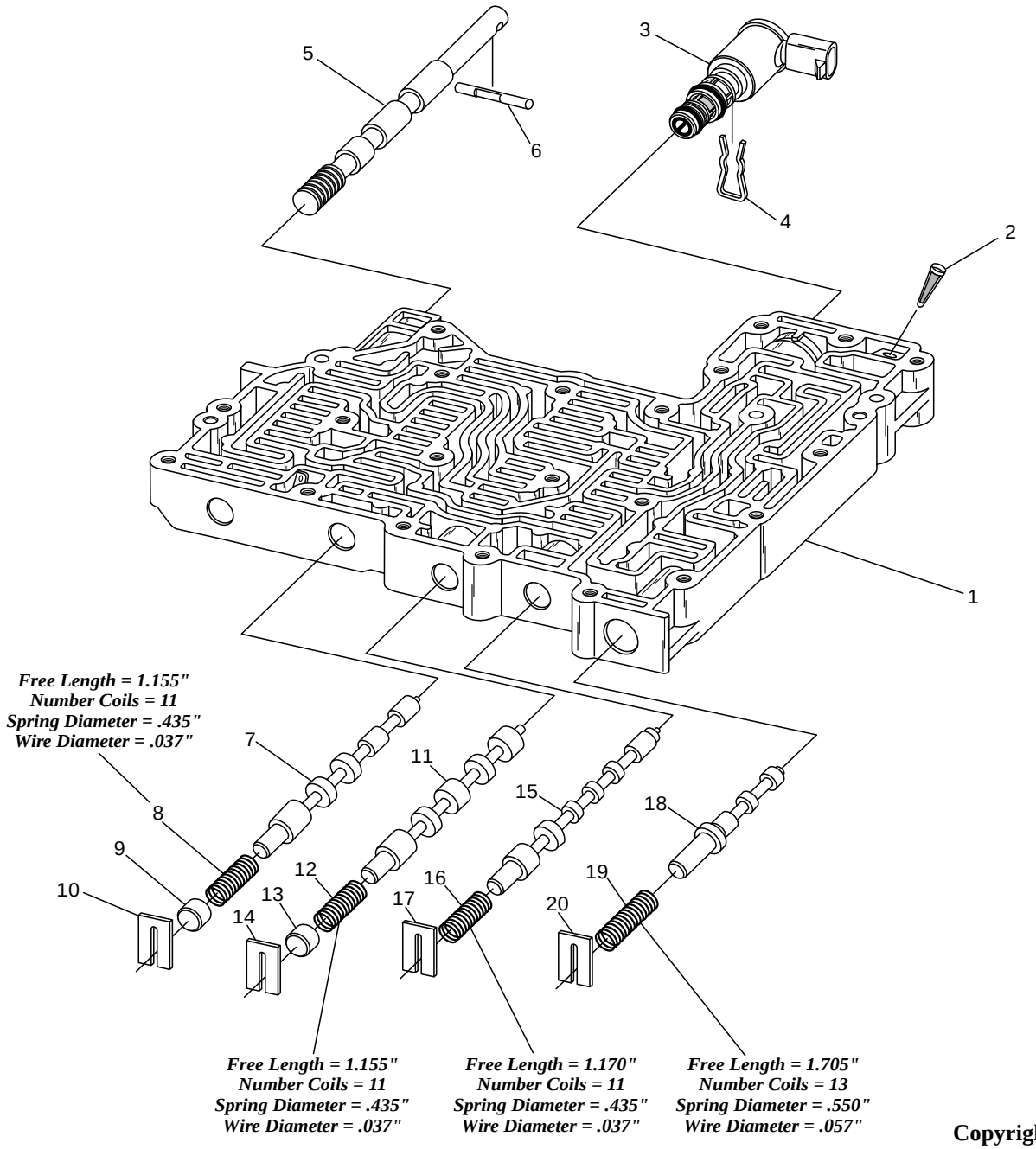

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Figure 6

PRESSURE SWITCH STATUS CHART								
	PRESSURE SWITCH C (N.O.)		PRESSURE SWITCH D (N.O.)		PRESSURE SWITCH E (N.O.)		PRESSURE SWITCH R (N.C.)	
RANGE	SWITCH STATUS	SCAN TOOL STATUS	SWITCH STATUS	SCAN TOOL STATUS	SWITCH STATUS	SCAN TOOL STATUS	SWITCH STATUS	SCAN TOOL STATUS
R	CLOSED	ON*	CLOSED	ON	CLOSED	ON	CLOSED	ON
N	CLOSED	ON	CLOSED	ON	CLOSED	ON	OPEN	OFF
1	OPEN	OFF	CLOSED	ON	OPEN	OFF	OPEN	OFF
2	OPEN	OFF	OPEN	OFF	OPEN	OFF	OPEN	OFF
3	CLOSED	ON	OPEN	OFF	OPEN	OFF	OPEN	OFF
4	CLOSED	ON	OPEN	OFF	CLOSED	ON	OPEN	OFF
5	OPEN	OFF**	OPEN	OFF	CLOSED	ON	OPEN	OFF

N.O. = Normally Open N.C. = Normally Closed
****Pressure Switch "C" reverts to the CLOSED/ON state with throttle applied in Reverse.***
*****Model year 2001 ONLY; In 5th range Pressure Switch "C" remains in the CLOSED/ON state until 3900 RPM is attained.***

Figure 7

BENCH TESTING PRESSURE SWITCH ASSEMBLY

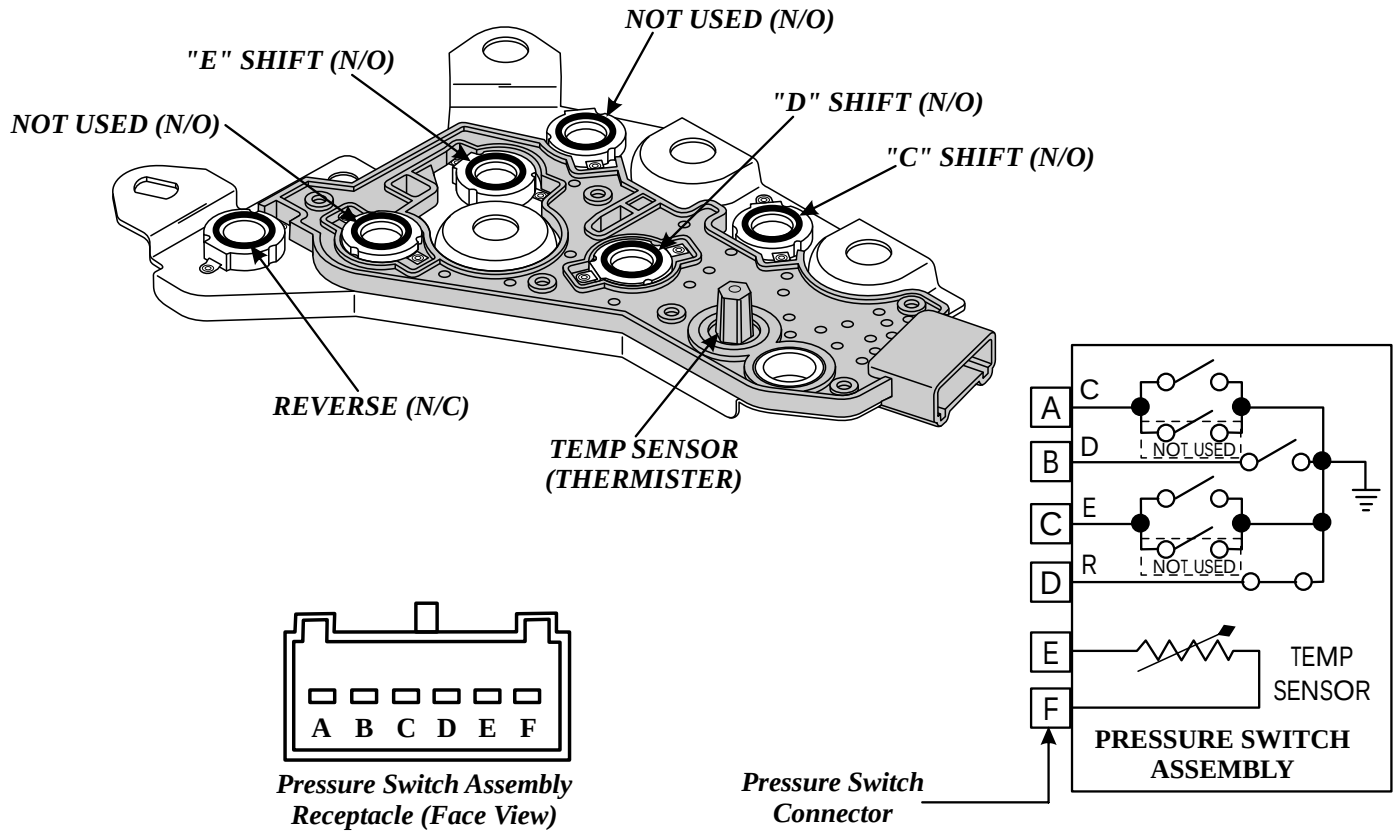

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Figure 8

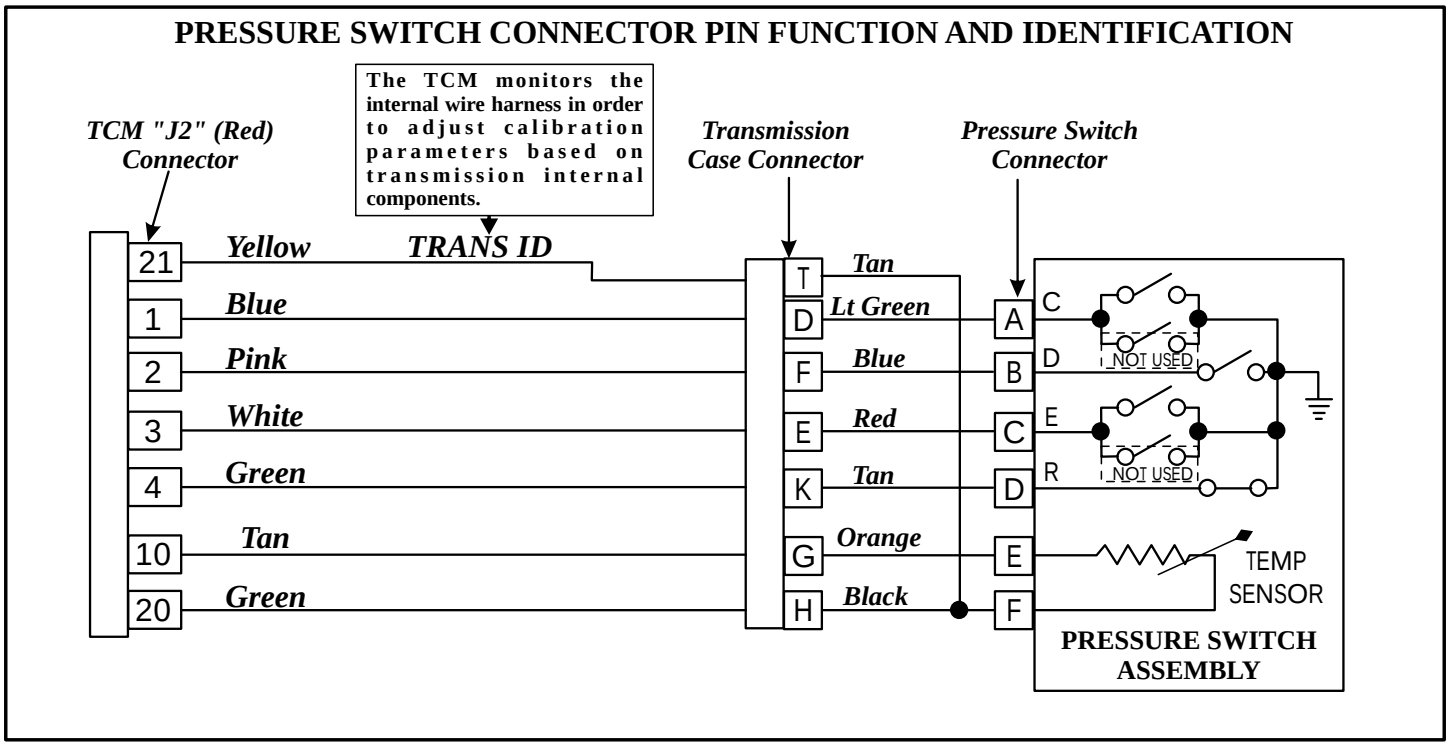

Figure 9

NEUTRAL SAFETY BACK UP (NSBU) SWITCH LOGIC

GEAR SELECTOR POSITION	RANGE "A"	RANGE "B"	RANGE "C"	RANGE "P"
Park (P)	OFF	ON	ON	OFF
Reverse (R)	OFF	OFF	ON	ON
Neutral (N)	ON	OFF	ON	OFF
D	ON	OFF	OFF	ON
3	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	ON
1	ON	ON	OFF	OFF

OFF = 12 Volts
ON = 0 Volts

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Figure 10