CHRYSLER A500/518

ELECTRICAL DIAGNOSIS (4TH & LOCK-UP)

The A500 and A518 are both found in 1988 and later Ram Vans, Pick-ups, Ram chargers and Dakota Trucks. The 3.9L engines were equipped with the A500 transmission. The 5.2L shared both the A500 and the A518 transmissions, while the 5,9L had only the A518. Both the A500 and the A518 are rear wheel drive overdrive transmissions. The A500 has been equipped with a converter clutch since 1988, while the A518 did not use a converter clutch until start of production 1992. Fourth gear and Lock-up are both electronically controlled. The Single Module Engine Controller (SMEC) uses the following inputs to allow the shift to 4th gear and lock-up in the converter to take place:

1. Coolant Temperature Sensor (CTS)
2. Engine Speed Sensor (Tach)
3. Vehicle Speed Sensor (VSS)
4. Throttle Position Sensor (TPS)
5. Manifold Absolute Pressure (MAP)

Both the lock-up and overdrive solenoids share a common 12V supply which originates at the ignition switch. Once the SMEC recieves the necessary information from the 5 inputs listed above, it sends a ground signal to the appropriate solenoid. Figure 1 identifies the three terminals located in the transmission case connector near the rear cooler line fitting.

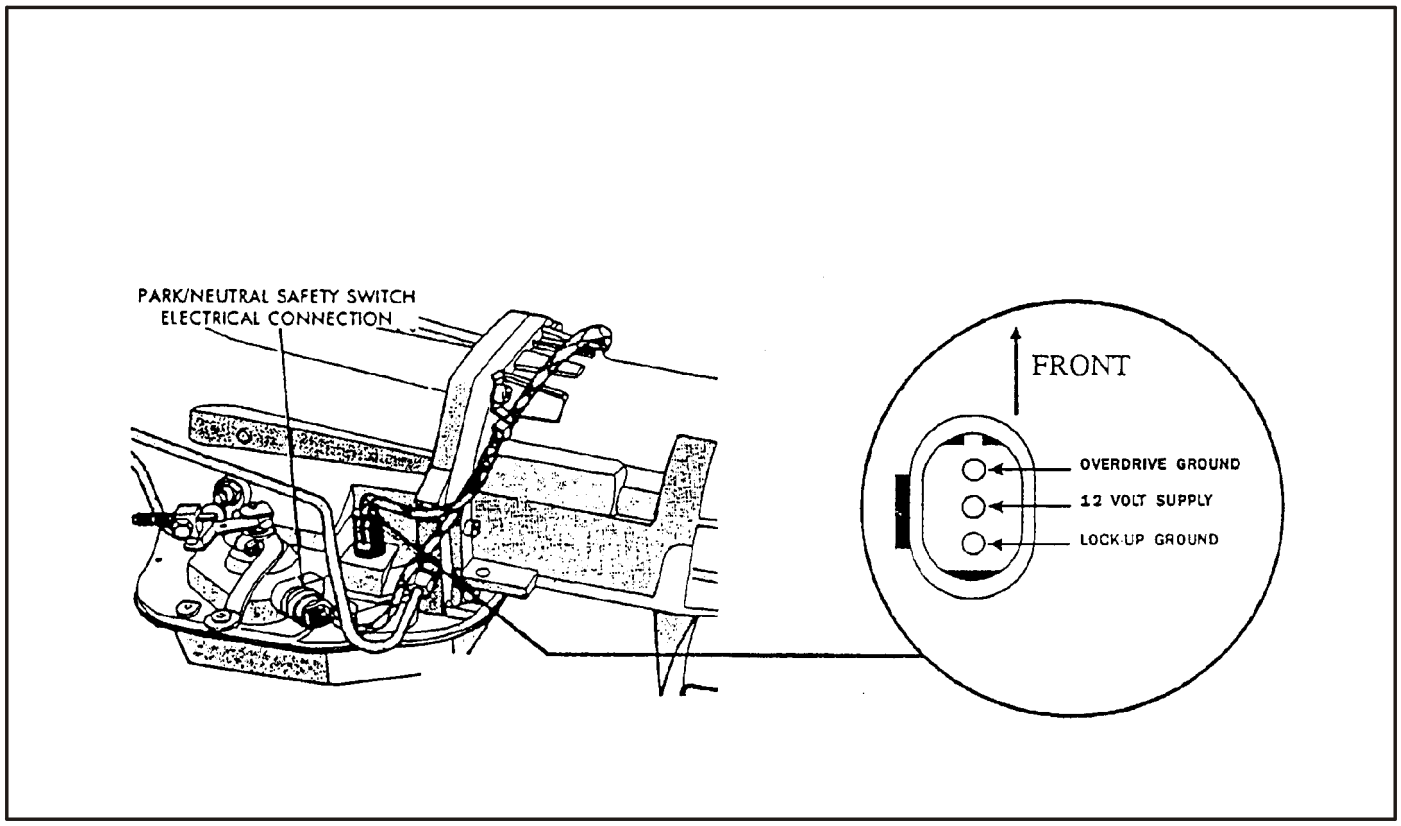


Figure 1

A quick check that can be made when the vehicle has lost lock-up and/or O.D. is to supply your own 12V to the center terminal on the case connector (See Figure 1). After the vehicle is in third gear, ground the front pin on the case connector and a shift to overdrive should occur. With the rear pin on the case connector grounded the converter clutch should come on.

If one or both operations have failed this test, the problem is internal and will require checking the solenoid. Both solenoids are normally open to exhaust and will close when energized. Both solenoids should have 25-30 ohms resistance at 70°F. Once this check has been completed and the solenoids are in good working order, there is a non-electrical fault in the transmission causing the no overdrive and/or the no lock-up condition.

If the quick test shifted the transmission into overdrive and lock-up applied, then an external electrical problem exisits. A scanner will interface with the SMEC to retreive any stored fault codes. Figure 2 shows the location of the diagnostic connector and the SMEC with its 60 way and 14 way connectors.

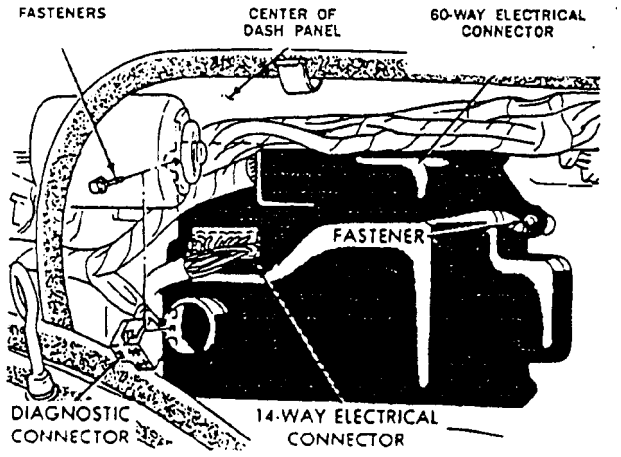


Figure 2

If a scanner is not available the SMEC can show fault codes by flashing the "Check Engine" lamp located on the instrument cluster. To activate this function turn the ignition switch to the run position without starting the engine. The check-engine lamp will comw on for two seconds as a bulb check. Immediately following this it will display a fault code by flashing on and off. There is a short pause between flashes and a longer pause between digits. An example of two codes are as follows:

1. Lamp on for two seconds, then turns off.
2. Lamp flashes four (4) times, pauses, then flashes one (1) time.
3. Lamp pauses for four seconds.
4. Lamp flashes four (4) times, pauses, then flashes seven (7) times.

The two codes shown in this example are 41 and 47. The following chart is a list of the fault codes that can be stored in the memory of the SMEC.

FAULT CODE	SCANNER DISPLAY	DESCRIPTION OF FAULT CODE
11	IGN Reference Signal	No distributor reference signal detected during engine cranking
12	No. of Key-ons since last fault or since faults were erased.	Direct battery input to controller disconnected within the last 50-100 ignition key-ons.
13 +**	MAP Pneumatic Signal or MAP Pneumatic Change	No variation in MAP sensor signal is detected. No difference is recognized between the engine MAP reading and the stored barometric pressure reading. MAP sensor input below minimum acceptable voltage.
14+**	MAP voltage too low or MAP voltage too low	MAP sensor input above maximum acceptable voltage.
15**	Vehicle Speed Sensor	No distance sensor signal detected during road load conditions.
16+**	Battery Input Sense	Battery voltage sense input not detected during engine running.
17	Low Engine Temp.	Engine coolant temperature remains below normal operating temperatures during vehicle travel (thermostat).
21**	Oxygen Sensor Signal	Neither rich or lean condition is detected from the oxygen sensor input.
22+**	Coolant voltage low or	Coolant temperature sensor input below minimum acceptable voltage.
	Coolant voltage high	Coolant temperature sensor input above maximum acceptable voltage.
23	T/B temp. voltage low or	Throttle body temperature sensor input below the minimum acceptable voltage (5.2L and 5.9L only).
	T/B temp. voltage high.	Throttle body temperature sensor input above the maximum acceptable voltage (5.2L and 5.9L only).
24+**	TPS voltage low or	Throttle position sensor input below the minimum acceptable voltage.
	TPS voltage high	Throttle position sensor input above the maximum acceptable voltage.
25**	ISC motor circuits	A shorted condition detected in one or more of the ISC control circuits.
26	INJ1 peak current or	High resistance condition detected in the INJ1 injector output circuit.
	INJ2 peak current	High resistance condition detected in the INJ2 injector output circuit.
27	INJ1 control circuit or INJ2 control circuit	INJ1 injector output driver stage does not respond properly to control signal INJ2 injector output driver stage does not respond properly to control signal

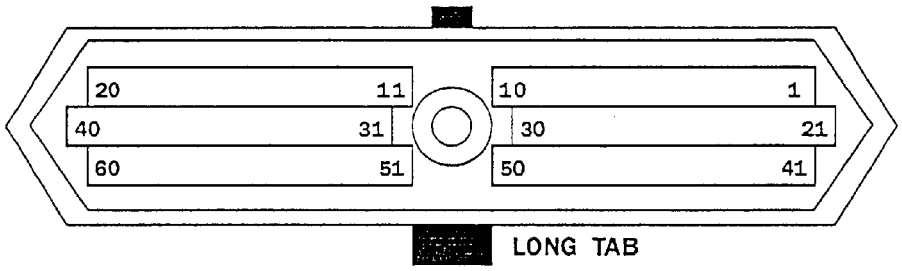
FAULT CODE	SCANNER DISPLAY	DESCRIPTION OF FAULT CODE
31**	Purge solenoid circuit	An open or shorted condition detected in purge solenoid circuit.
32**	EGR solenoid circuit or	An open or shorted condition detected in ERG solenoid circuit. (California emissions only).
	EGR system failure	Required change in fuel/air ratio not deteced during diagnostig test (California only).
33	A/C clutch relay circuit	An open or shorted condition detected in the A/C clutch relay circuit.
34	S/C.servo solenoid	An open or shorted condition detected in the speed control vacuum or vent solenoid circuit.
35	Idle switch shorted or Idle switch opened	Idle contact switch input circuit shorted to ground. Idle contact switch input circuit opened.
36	Air switch solenoid	An open or shorted condition detected in the air switching solenoid circuit.
37	PTU solenoid circuit	An open or shorted condition detected in the torque converter part throttle unlock solenoid circuit.
41	Charging system circuit	Output driver stage for alternator field does not respond properly to the voltage regulator control system.
42	ASD relay circuit or	An open or shorted condition detected in the auto shutdown relay circuit.
	Z1 voltage sense	No Z1 voltage sensed when the auto shutdown relay is energized.
43	Ignition control circuit	Output driver stage for ignition coil does not respond properly to the dwell control signal.
44	FJ2 voltage sense	No FJ2 voltage present at the logic board during controller operation.
45	Overdrive solenoid	An open or shorted condition detected in the overdrive solenoid circuit.
46**	Battery voltage high	Battery voltage sense input above target charging voltage during engine operation.
47	Battery voltage low	Battery voltage sense input below target charging voltage during engine operation.
51**	Air fuel at limit	Oxygen sensor signal input indicates lean fuel/air ratio condition during engine operation.
52**	Air fuel at limit or	Oxygen sensor signal input indicates rich fuel/air ratio condition during engine operation.
	Excessive leaning	Adaptive fule value leaned excessively due to a sustained rich condition
53	Internal self-test	Internal engine controller fault condition detected, complea-

FAULT CODE	SCANNER DISPLAY	DESCRIPTION OF FAULT CODE
62	EMR mileage accum	Unsuccessful attempt to update EMR mileage in the controller EEPROM.
63	EEPROM write denied	Unsuccessful attempt to write to an EEPROM location by the controller.
	Fault code error	An unrecognized fault ID recieved by DRB II.

\+ CHECK ENGINE LAMP ON

** CHECK ENGINE LAMP ON (CALIFORNIA ONLY)

Once the fault codes have been retrieved, the necessary repairs can then be made. But if shorted and/or open circuits have occured, the replacement of sensors or switches will not correct the problem. To aid the technician in locating shorted and open circuits, Figure 3 shows the 60 way connector viewed from the wire end as it plugs into the SMEC. Each terminal has been numbered for pin identification. The following chart provides information on the terminals that are transmission related only. Figure 4 is a wiring diagram of these terminals for additional assistance to the technician.



VIEW FROM WIRE END OF THE CONNECTOR

Figure 3

TERMINAL #	CIRCUIT NAME	WIRE COLOR
1	K4	Dark Blue With Red Tracer
3	K10	Tan With White Tracer
4	N5	Black With Light Blue Tracer
13	K8	Violet With White Tracer
22	K7	Orange With Dark Blue Tracer
30	S4	Brown With Yellow Tracer
38	U4	Orange With White Tracer
41	J11	Red
47	N7	Gray With Black Tracer
48	G7	White With Orange Tracer
55	U3	Orange With Black Tracer

TERMINAL 1 - This is the MAP sensor signal to the SMEC.
TERMINAL 3 - This is the engine coolant sensor ground signal.
TERMINAL 4 - This is the engine coolant sensor ground return. With the connector unplugged, 7K to 13K ohms can be seen between terminals 3 and 4 when the coolant sensor is at approximately room temperature (70°F). With the engine at operating temperature (200"F), 700 to 1000 ohms resistance should be seen.
TERMINAL 13 - This is a 5V supply from the SMEC to both the MAP sensor and the Throttle Position Sensor. Five volts should be seen here.
TERMINAL 22 - This is the Throttle Position Sensor signal to the SMEC. At closed throttle approximately .lO volts can be seen. As the accelerator is depressed the voltage should rise smoothly to 4.5 to 5 volts at wide open throttle.
TERMINAL 30 - This is a ground signal circuit for the SMEC from the middle terminal on the neutral safety switch. With the connector unplugged, there will be continuity at this terminal in Park and Neutral only.
TERMINAL 38 - This is the ground circuit for the overdrive solenoid.
TERMINAL 41 - This is the direct battery feed (12V) for the computer.
TERMINAL 47 - This is a reference signal from the distributer providing engine RPM.
TERMINAL 48 - This is a vehicle speed input from the distance sensor (VSS) located on the transmission.
TERMINAL 55 - This is the ground circuit for the lock-up solenoid. On the dash panel there is an overdrive cancel button. When the vehicle has been started, the O.D. light is on and a shift to overdrive will take place when vehicle reaches operating temperature. If the driver chooses to cancel O.D. operation, the button is pressed and the light goes out and O.D. is prohibited. This button cancels O.D. by opening the ground circuit that the SMEC provides for the O.D. solenoid thru an Overdrive Control Module. On some vehicles this module is built into the switch and on others it is mounted on the right side of brake support bracket (Figure 5). The switch or control module can malfunction in 1 or 2 ways. It could allow the transmission to shift into O.D. with no cancel abilities, or it could prevent O.D. from ever occurring. Figure 6 shows the wiring circuit for the Overdrive Control Module that is mounted on the brake support bracket, and Figure 7 shows the wiring circuit for the Overdrive Control Module that is built into O.D. cancel button. With the overdrive button on allowing overdrive to take place, continuity should be seen with an ohmmeter between terminals 8 and 9. When the overdrive button is in the canceled position, the ohmmeter should read open between these two terminals. If terminals 8 and 9 always show continuity, there will be no ability to cancel overdrive. If terminals 8 and 9 always read open, overdrive will not occur.

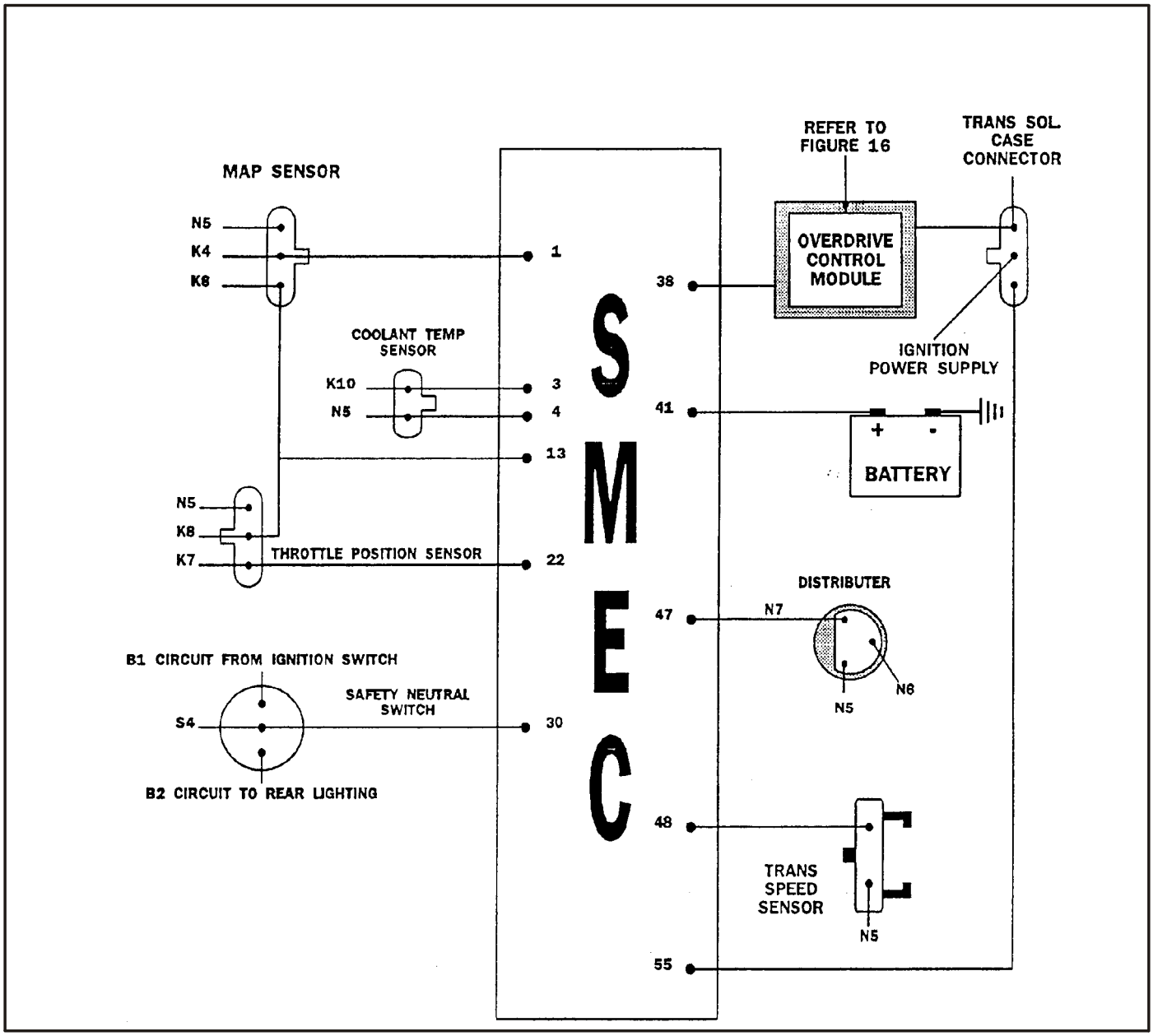


Figure 4

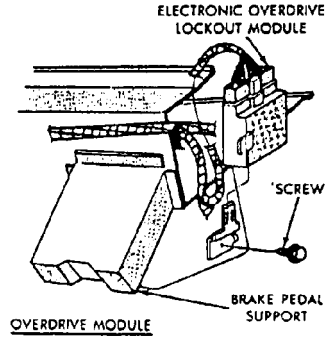


Figure 5

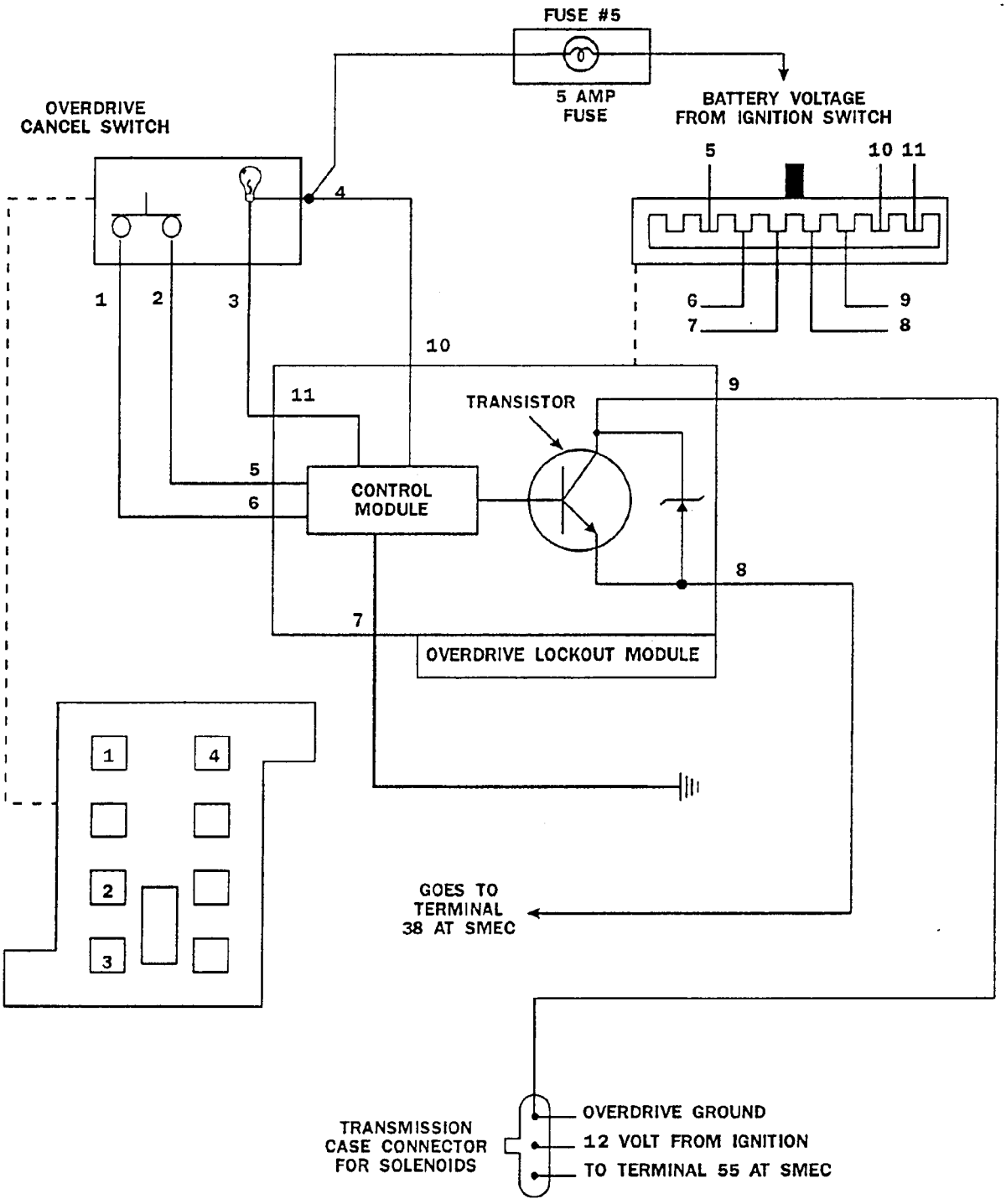

FUSE #5
5 AMP FUSE
BATTERY VOLTAGE FROM IGNITION SWITCH
OVERDRIVE CANCEL SWITCH
5
10 11
4
1
2
3
6
7
9
8
10
11
9
TRANSISTOR
5
6
CONTROL MODULE
8
7
OVERDRIVE LOCKOUT MODULE
1
4
2
3
GOES TO TERMINAL 38 AT SMEC
TRANSMISSION CASE CONNECTOR FOR SOLENOIDS
OVERDRIVE GROUND
12 VOLT FROM IGNITION
TO TERMINAL 55 AT SMEC

Figure 6

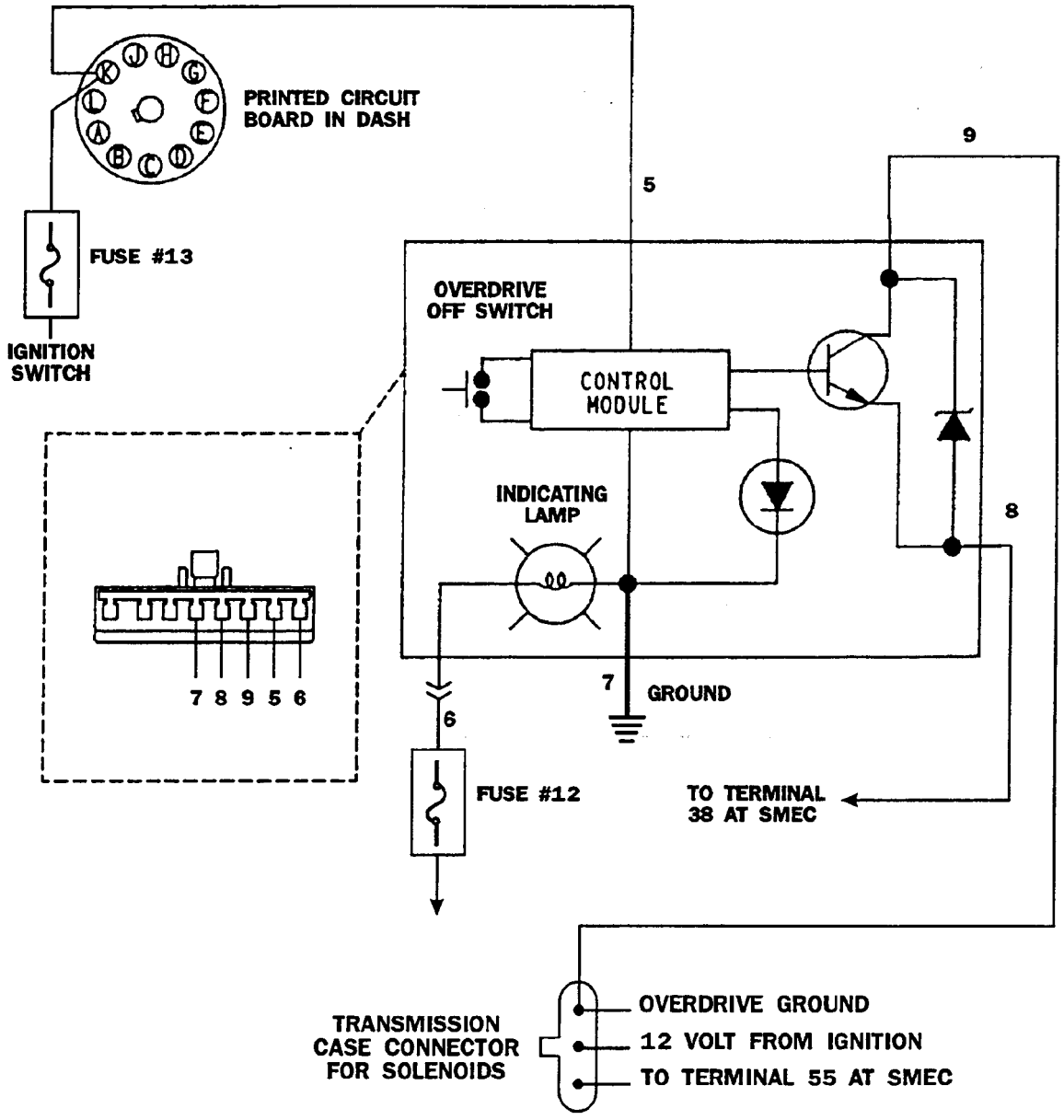

PRINTED CIRCUIT
BOARD IN DASH
FUSE #13
IGNITION
SWITCH
5
9
OVERDRIVE
OFF SWITCH
CONTROL
MODULE
INDICATING
LAMP
8
7 8 9 5 6
7
GROUND
6
FUSE #12
TO TERMINAL
38 AT SMEC
TRANSMISSION
CASE CONNECTOR
FOR SOLENOIDS
OVERDRIVE GROUND
12 VOLT FROM IGNITION
TO TERMINAL 55 AT SMEC

Figure 7