MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION

280 SE, 280 SL, 300 SEL (1970-71)
300 SEL 6.3, 600 (1970-71)

DESCRIPTION

In order to keep hydrocarbon emissions as low as possible, ignition timing on all models except the 300 SEL/8 6.3 and 600 will be adjusted in a retarded direction while driving in the lower speed range. Fuel delivery will be shut off under decelerating conditions.

OPERATION

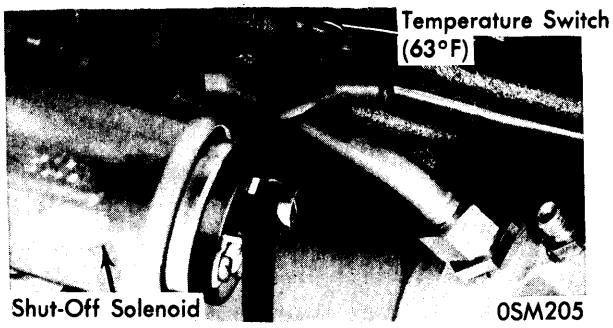
Ignition Changeover (All Models Except 300 SEL/8 6.3 & 600) – A two-way valve, controlled by RPM switch, 17°C (63°F) temperature switch in crankcase and 100°C (212°F) temperature switch in thermostat housing, retards ignition timing depending on engine speed and cooling water temperature. Conditions which affect vacuum retard unit are as follows:

1) When cooling water temperature is between 17°C (63°F) and 100°C (212°F) both temperature switches are open. If engine speed drops below 2200 RPM, while both temperature switches are open, the RPM switch will actuate the two-way valve. This will allow intake manifold vacuum to pass to the retard unit on ignition distributor. Ignition timing, although remaining in an advanced state, will be slightly retarded.

2) When both temperature switches are open, due to cooling water temperature being between 17°C (63°F) and 100°C (212°F), and engine speed rises above 2400 RPM, the RPM switch will shut off two-way valve. Vacuum can no longer pass from intake manifold to retard unit on distributor. Vacuum retard unit on distributor opens to atmospheric pressure and ignition timing is no longer retarded.

3) When cooling water temperature is below 17°C (63°F) or above 100°C (212°F), the affected temperature switch is closed. If either temperature switch is closed, the RPM switch is de-energized and two-way valve is shut off. Vacuum can no longer pass from intake manifold to retard unit on distributor. Vacuum retard unit on distributor opens to atmospheric pressure and ignition timing cannot be retarded.

Fuel Shut-Off on Deceleration – *NOTE – Different systems used on various models. Refer to appropriate model (below) for individual system.*



SHUT-OFF SOLENOID & TEMPERATURE SWITCH, 280 SE, 280 SL, & 300 SEL/8

280 SE/8 & 300 SEL/8 With Automatic Transmissions – Fuel shut-off solenoid, located on injection pump, is activated when the following conditions are met:

1) When temperature switch in crankcase is open due to cooling water temperature being above 17°C (63°F).

2) When vehicle is traveling at speeds above 18-22 MPH and oil pressure switch, located on rear transmission cover, is open. *NOTE – Oil pressure switch is connected to governor pressure and opens when pressure is 17 psi or less.*

3) When accelerator pedal is in idling position. Idling speed switch, located on venturi control unit, is energized when accelerator pedal is in idling position.

280 SE/8, 280 SL/8 & 300 SEL/8 With Standard Transmissions – Fuel shut-off solenoid, located on injection pump, is activated when the following conditions are met:

1) When temperature switch in crankcase is open due to cooling water temperature being above 17°C (63°F).

2) When accelerator pedal is in idling position. Idling speed switch, located on venturi control unit, is energized when accelerator pedal is in idling position.

3) When clutch pedal is not depressed. *NOTE – Clutch switch, located on clutch pedal is not de-energized until pedal is depressed.*

4) When transmission is in third or fourth gear. *NOTE – Third and/or fourth gear switches, located on shift linkage, are not energized until transmission is placed in third or fourth gear.*

280 SL/8 With Automatic Transmission – Fuel shut-off solenoid, located on injection pump, is activated when the following conditions are met:

1) When temperature switch in crankcase is open due to cooling water temperature being above 17°C (63°F).

2) When accelerator pedal is in idling position. Idling speed switch, located on venturi control unit, is energized when accelerator pedal is in idling position.

3) When engine speed is above 1250 RPM. *NOTE – RPM switch, located on left wheel housing, is activated above 1250 RPM.*

4) When Automatic Transmission is in 3rd. or 4th. speed driving range. In 3rd. or 4th. speed driving range oil pressure switch on transmission as well as starter lock and backup light switch are de-energized.

300 SEL/8 6.3 & 600 – Fuel shut-off solenoid, located on injection pump, is activated when the following conditions are met:

1) When accelerator pedal is in idling position. Idling speed switch, located on venturi control units, is energized when accelerator pedal is in idling position.

2) When engine speed, under decelerating conditions, is above 750 RPM.

3) When driving in 3rd. or 4th. gear and with oil pressure switch, located on transmission, open. *NOTE – Oil pressure switch on transmission is open when pressure is 31 psi or less.*

MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)

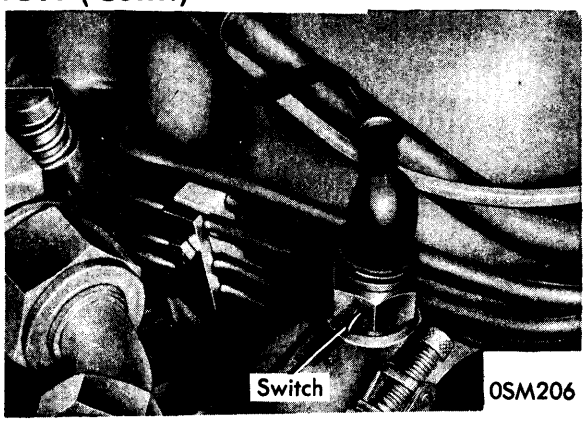
NOTE – If cooling water temperature is below 17°C (63°F), temperature switch is closed and fuel shut-off will not operate.

MAINTENANCE

Checking Ignition Changeover – Connect tachometer and timing light. Start engine and increase speed, at approximately 2400 RPM the distributor control should adjust ignition timing from retard to advance. Ignition changeover is also noticed by a sudden increase in engine speed. *NOTE – Ignition timing is also controlled by the 17°C (63°F) and the 100°C (212°F) temperature switches. Refer to checking individual switches below.*

Checking 17°C (63°F) Temperature Switch – Remove connector from relay box and connect test lamp to terminals 6 and 8 (All models except 300 SEL/8 6.3 & 600), connect test lamp to terminals 6 and 2 (300 SEL/8 6.3 & 600). Turn on ignition, test lamp should light up only below 17°C (63°F) cooling water temperature.

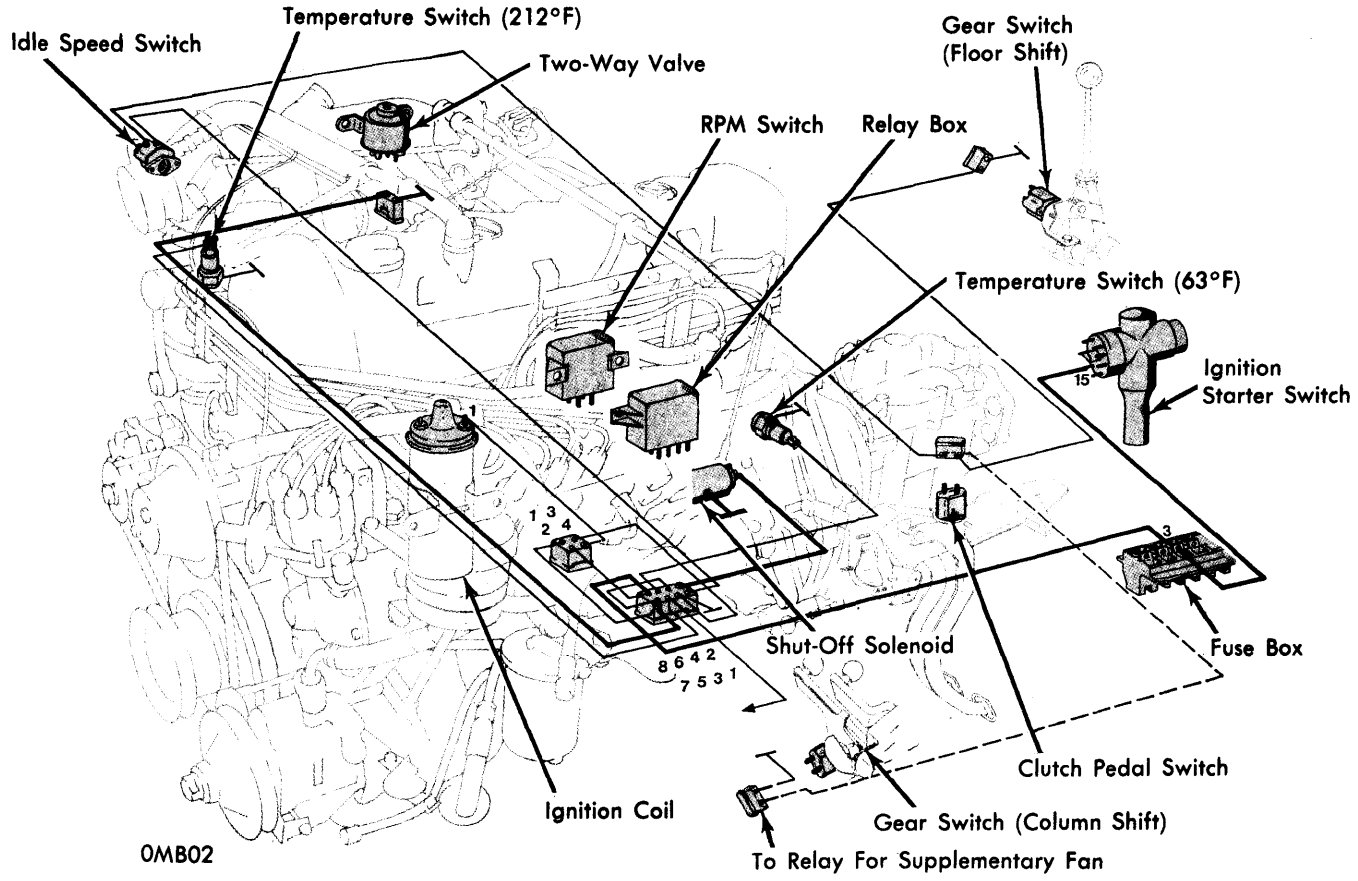
Checking 100°C (212°F) Temperature Switch – Remove connector from relay box and connect test lamp to terminals 5 and 8. Turn on ignition, test lamp should light when cooling water temperature is above 100°C (212°F).



TEMPERATURE SWITCH (212°F)

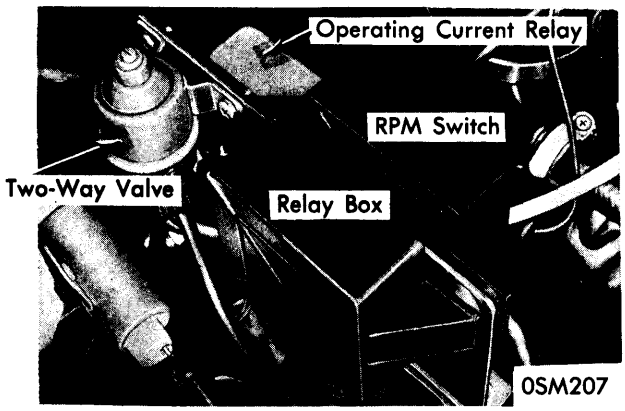
Checking RPM Switch – *NOTE – Use voltmeter only for checking RPM switch. Use of test lamp may result in damage to switch. For proper procedure refer to individual model below:*

280 SE/8 & 300 SEL/8 With Automatic Transmission And 280 SE/8, 280 SL/8 & 300 SEL/8 With Standard Transmission – Remove connector from two-way valve and connect voltmeter to connector. Start engine and increase speed. Above 2400 RPM voltmeter should indicate approximately 13 volts. Below 2200 RPM voltmeter should indicate 0 volts.



280 SE/8 & 300 SEL/8 (MANUAL TRANSMISSION)

MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)



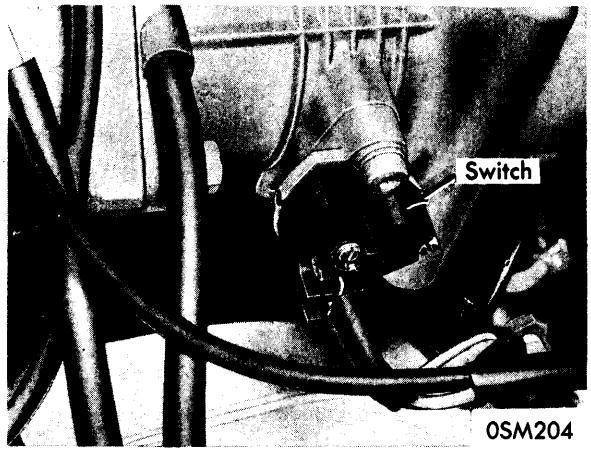
COMPONENT IDENTIFICATION 280 SL/8 WITH AUTOMATIC TRANSMISSION (TYPICAL)

280 SL/8 With Automatic Transmission – There are two separate checks to be made on RPM switch, the first for checking fuel shut-off solenoid and the second for checking ignition changeover.

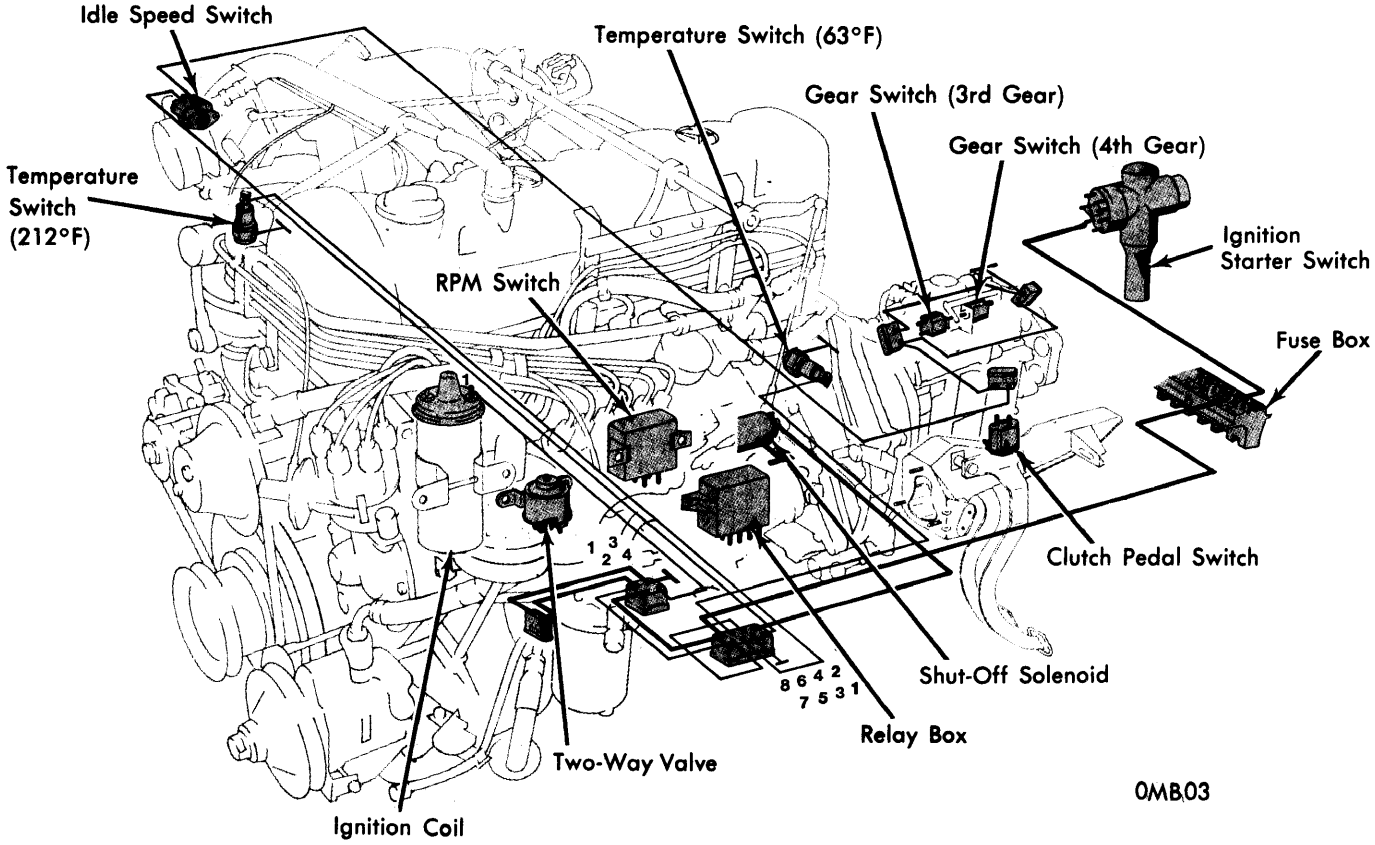
1) Checking Shifting Point 1250-1450 RPM (Shut-Off Solenoid) – Bridge connecting terminals on idling speed switch. Start engine, remove connector from starter lock and backup light switch and connect terminal 5 to terminal 6. Remove connector from operating current relay and connect voltmeter to terminal 4 and to ground. Increase engine speed, above 1200 RPM voltmeter should indicate approximately 13 volts. Below 1000 RPM voltmeter should indicate 0 volts.

2) Checking Shifting Point 2200-2400 RPM (Ignition Changeover) – Remove connector from two-way valve and connect voltmeter. Start engine and increase speed, above 2400 RPM voltmeter should indicate approximately 13 volts. Below 2200 RPM voltmeter should indicate 0 volts.

300 SEL/8 6.3 & 600 – Connect tachometer, remove connector from relay box and connect test lamp to terminal 7 and ground. Start engine and increase speed. Test lamp should light up at approximately 850 RPM. Reduce engine speed, test lamp should go out at approximately 750 RPM.



IDLING SPEED SWITCH



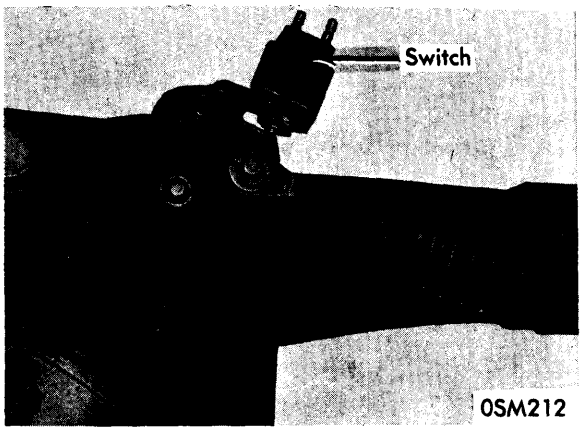
280 SL/8 (MANUAL TRANSMISSION)

MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)

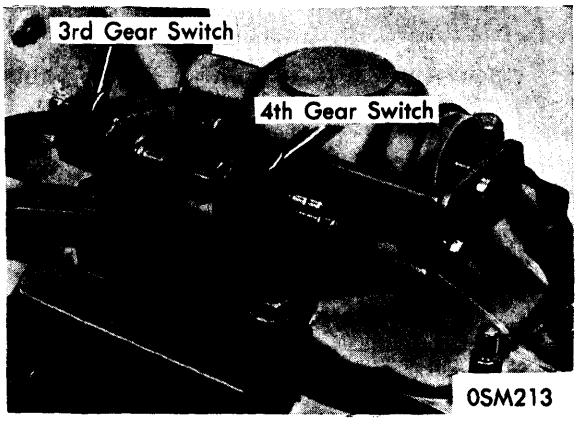
Checking Idle Speed Switch On Venturi Control Unit – Individual model procedures are as follows:

280 SE/8 & 300 SEL/8 With Automatic Transmissions – Connect terminal on oil pressure switch of automatic transmission to ground. Remove connector from relay box and connect test lamp to terminals 8 and 1. Turn on ignition, when actuating throttle linkage test lamp should immediately go out.

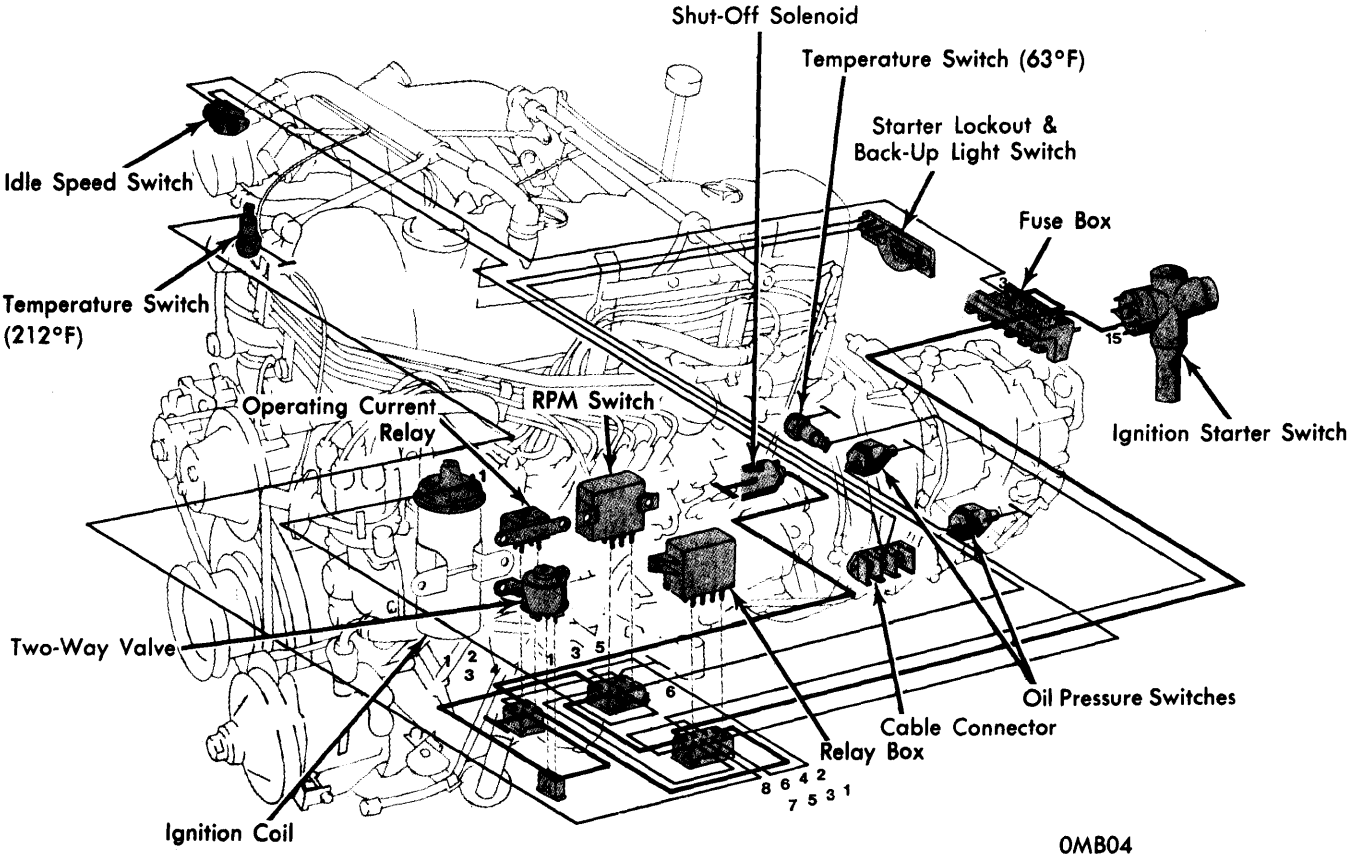
280 SE/8, 280 SL/8 & 300 SEL/8 With Standard Transmissions – *NOTE – In addition to checking idling speed switch, following procedure will also check clutch pedal switch and 3rd. and 4th. gear switches. Gear switch is connected in series with clutch pedal switch. 280 SL/8 has two gear switches connected in parallel.* Remove connector from relay box and connect test lamp to terminals 8 and 1. Turn on ignition, test lamp should light up when 3rd. and 4th. gear are engaged. *NOTE – Do not depress clutch and/or accelerator pedal.* Then depress accelerator and clutch pedals (one after the other) and engage 3rd. and 2nd. gear. Test lamp should go out in each case. *NOTE – If test lamp does not light up, find defective switch by bridging pertinent connections.*



CLUTCH PEDAL SWITCH



GEAR SWITCHES

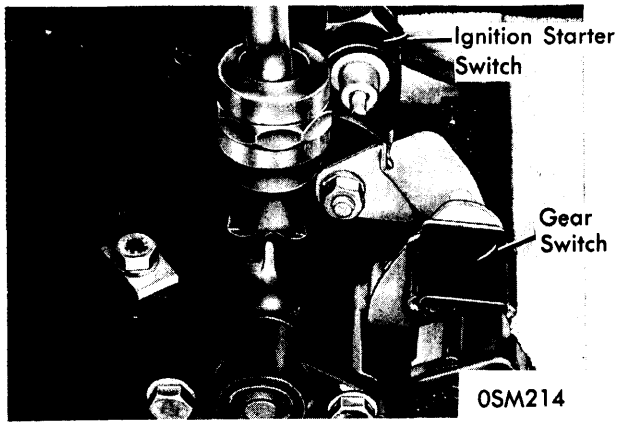


280 SL/8 (AUTOMATIC TRANSMISSION)

MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)

280 SL/8 With Automatic Transmission – Connect test lamp to brown/white wire side of idling speed switch, connect other end of test lamp to ground. Test lamp should light up when ignition is turned on. Test light should go out when throttle linkage is actuated.

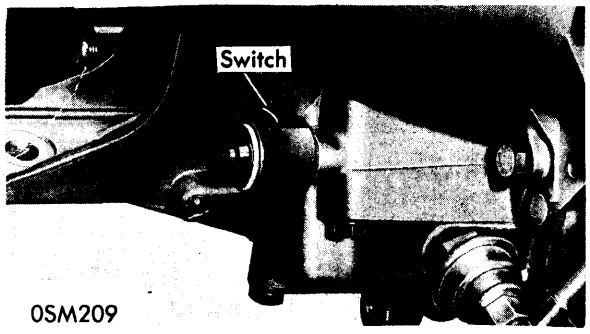
300 SEL/8 6.3 & 600 – Remove connector from relay box and connect test lamp to terminal 8 and to ground. Turn on ignition, test lamp should go out when throttle linkage is actuated.



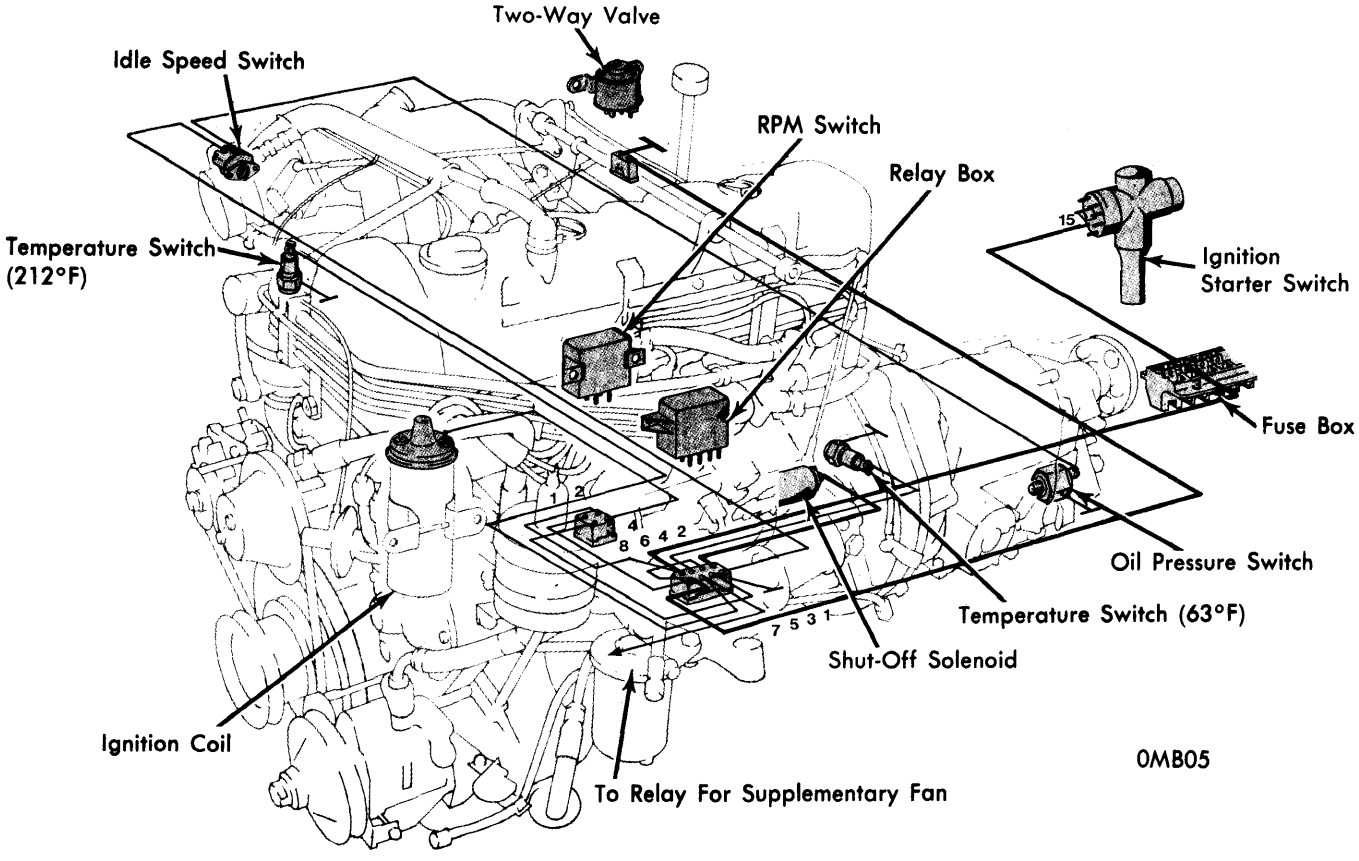
GEAR SWITCH, FLOOR MOUNTED SHIFT (TYPICAL)

Checking Oil Pressure Switch On Automatic Transmission- Individual model procedures are as follows:

280 SE/8 & 300 SEL/8 With Automatic Transmissions – Bridge connecting terminals of idling speed switch. Remove connector from relay box and connect test lamp to terminals 8 and 1. Drive vehicle, with selector lever in position 4. Test lamp should light up when speed reaches 31 MPH. Release accelerator pedal (decelerate), test lamp should go out at approximately 18-22 MPH.



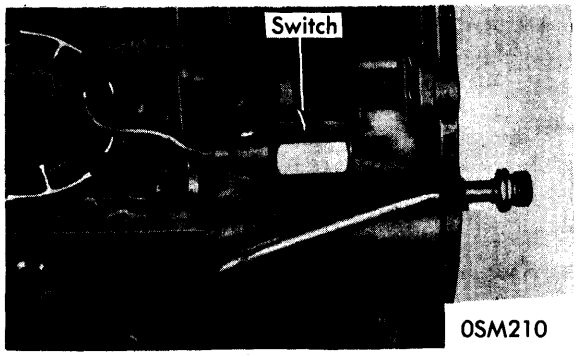
OIL PRESSURE SWITCH, 280 SL/8 WITH AUTOMATIC TRANSMISSION



280 SE/8 & 300 SEL/8 (AUTOMATIC TRANSMISSION)

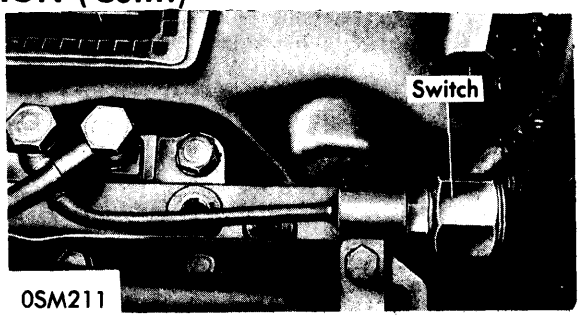
MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)

280 SL/8 With Automatic Transmission – *NOTE – Oil pressure switch can only be checked while driving or on a dynamometer.* Remove connector from relay box and connect test lamp to terminals 8 and 1. Drive vehicle at approximately 25 MPH with selector lever in position 4, release accelerator pedal and allow vehicle to decelerate. Test lamp should light up when shifting back to 2nd. gear (approximately 11 MPH).



OIL PRESSURE SWITCH, 280 SE/8 & 300 SEL WITH AUTOMATIC TRANSMISSION

300 SEL/8 6.3 & 600 – *NOTE – Oil pressure switch can only be checked while driving or on a dynamometer.* Remove connector from relay box and connect test lamp to terminals 5 and 2. Drive vehicle with selector lever in position 4, test lamp should light up above 15-19 MPH. Test lamp should go out when decelerating and transmission shifts from 3rd. to 2nd. gear.

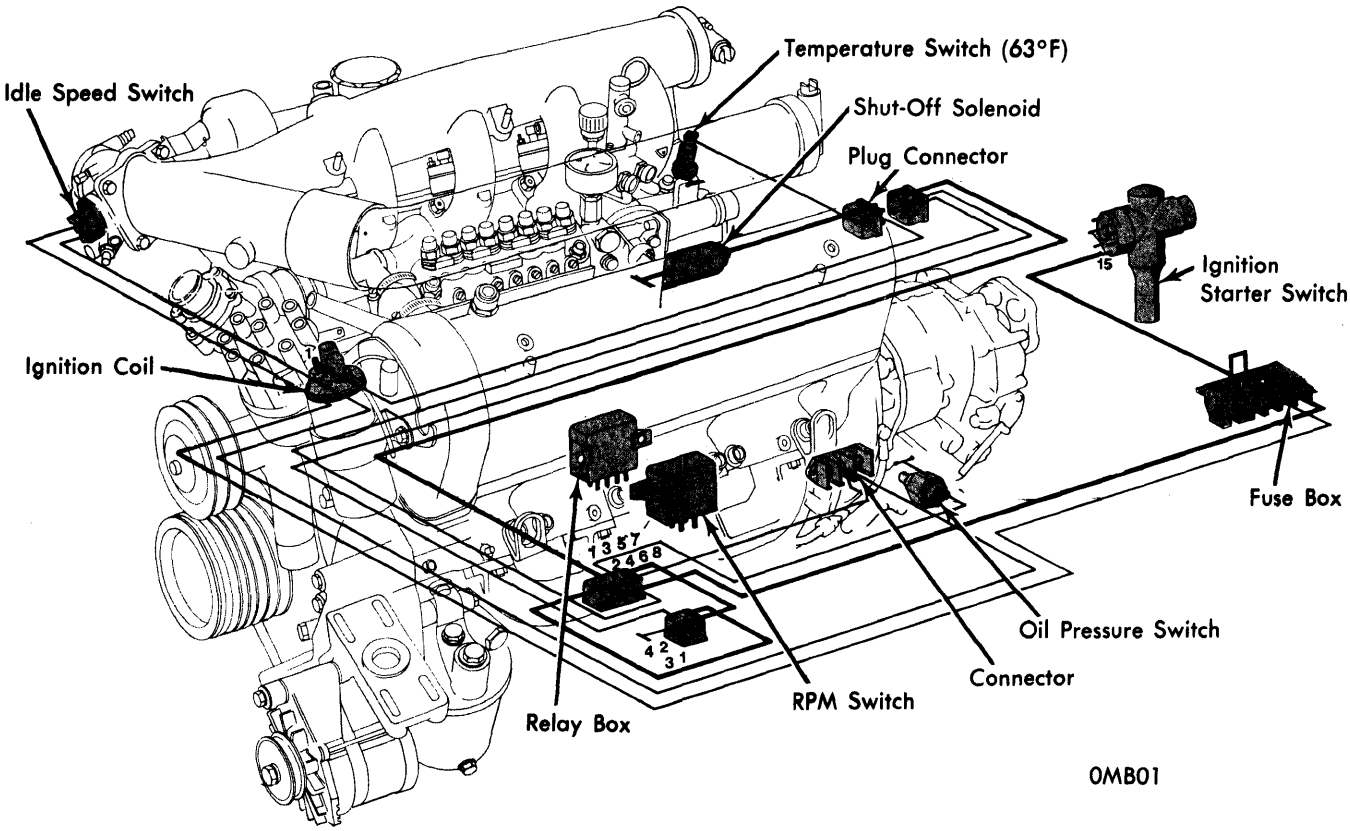


OIL PRESSURE SWITCH, 300 SEL/8 6.3 & 600

Checking Starter Lock Switch (280 SL/8 With Automatic Transmission) – Remove connector from RPM switch and connect test lamp to terminal 6 and ground. With ignition turned on, test lamp should light up with selector lever in 2, 3, 4 and "R" positions.

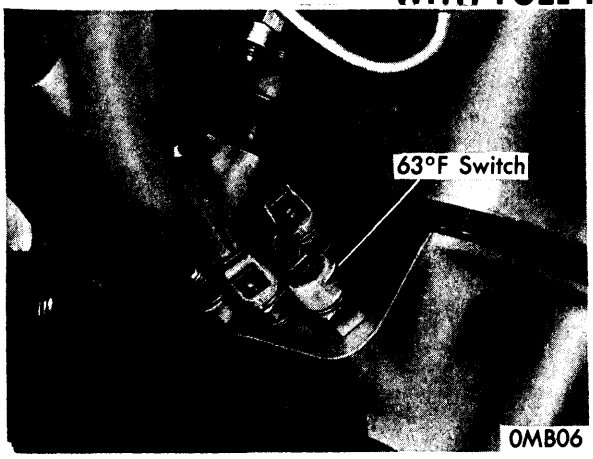
Checking Fuel Shut-Off – Individual model procedures are as follows:

280 SE/8 & 300 SEL/8 With Automatic Transmissions – Connect test lamp to shut-off solenoid of injection pump and to ground. *NOTE – Check must be performed when cooling water temperature is above 17°C (63°F). Vehicle must be on a dynamometer or driven on the road.* At approximately 31 MPH and with selector lever in position 4, test light should not be on. Release accelerator pedal (decelerate), test light should now light up until vehicle speed drops to 18-22 MPH.



300 SEL/8 6.3 & 600 EMISSION SYSTEMS

MERCEDES-BENZ 1970-71 ENGINE MODIFICATION WITH FUEL INJECTION (Cont.)



TEMPERATURE SWITCH, 300 SEL/8 6.3 & 600

280 SE/8, 280 SL/8 With Standard Transmissions – Connect test lamp to shut-off solenoid of injection pump and to ground. Turn on ignition, test lamp should light up when 3rd. or 4th. gears are engaged. Actuate clutch and accelerator pedals (one after the other), in each case test lamp should go out.

280 SL/8 With Automatic Transmission – *NOTE – Check must be performed while vehicle is driven or on a dynamometer and with cooling water temperature above 17°C (63°F).* Connect tachometer, connect test lamp to shut-off solenoid and to ground. At approximately 31 MPH, with selector lever in position 4, test lamp should not light up. Release accelerator pedal (decelerate), test lamp should light up until engine speed drops to approximately 1250 RPM.