Cummins

E BRAKE
by Jacobs

Installation Manual For B5.9 Mechanical Engines

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Application Notes

A. The aftermarket base kit, Cummins P/N 3802671, is designed for vehicles equipped with the Cummins B Series engine. The engine must be equipped with Exhaust Valve Springs (Cummins P/N 3916691) which are included in this kit (see Application Notes B and C below).

B. The Cummins B Series engine may be specified from Cummins Engine Company with the heavy-duty exhaust springs installed.

C. Engines produced after November, 1991 have color-coded valve springs: Standard duty, Cummins P/N 3900276, BLUE stripe, P/N 3926700, solid WHITE; Heavy duty, Cummins P/N 3916691, WHITE stripe.

D. For applications on vehicles equipped with hydraulic brakes: Refer to the instructions included in the Auxiliary Air Group, Cummins P/N 3802673, for parts and installation information.

Vehicles with Allison Transmissions

IMPORTANT! When installing the E Brake on vehicles equipped with an Allison transmission, refer to E Brake Application Note 93-1, Cummins Bulletin 3698668 for detailed information.

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the mechanic or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

⚠ WARNING

THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY.

⚠ CAUTION

THIS SYMBOL REFERS TO POSSIBLE EQUIPMENT DAMAGE.

NOTE:

INDICATES AN OPERATION, PROCEDURE OR INSTRUCTION THAT IS IMPORTANT FOR CORRECT SERVICE.

Fuels, electrical equipment, exhaust gases and moving engine parts present potential hazards that could result in personal injury. Take care when installing an exhaust brake. Always use correct tools and proper procedures as outlined in this manual.

⚠ CAUTION

BEFORE INSTALLING THE CUMMINS E BRAKE FOR THE B5.9 ENGINE, THE ENGINE MUST HAVE THE HEAVY-DUTY EXHAUST VALVE SPRINGS, CUMMINS P/N 3916691, INSTALLED.

⚠ WARNING

THE CUMMINS E BRAKE IS A VEHICLE SLOWING DEVICE, NOT A VEHICLE STOPPING DEVICE. IT IS NOT A SUBSTITUTE FOR THE SERVICE BRAKING SYSTEM. THE VEHICLE'S SERVICE BRAKES MUST BE USED TO BRING THE VEHICLE TO A COMPLETE STOP.

Section 1: Installation in the Exhaust Pipe

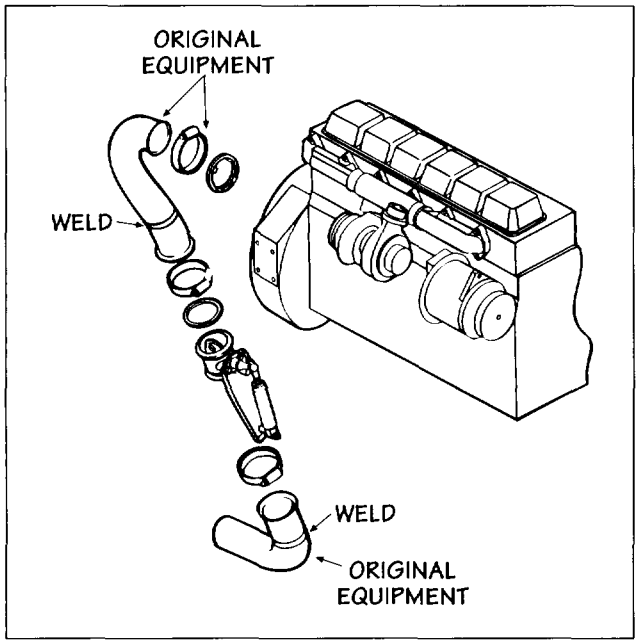

FIG. 1

Fig. 1 indicates a typical arrangement of the E Brake and mounting hardware.

Loosen the "V" clamps holding the original exhaust pipe arrangement in place. Remove the exhaust pipe, inspect for any sign of rust or damage. Replace if necessary.

Lay the exhaust pipe on the ground or bench with the E Brake and exhaust pipe sleeves, P/N 020089 (see Fig. 2) and mark out the pipe section required to be removed. Cut out the necessary pipe section and weld the sleeve, P/N 3929059 to the two exhaust pipe lengths.

Important Notes on the Positioning of the Extarder

Exhaust pipe arrangements vary from vehicle to vehicle. Where possible, install the E Brake at a distance of between 10" (25.4 cm) and 48" (121.92 cm) from the turbocharger. Do not attempt to mount the E Brake any closer than 8" (20.32 cm) to the turbocharger.

Where possible, mount the E Brake in a near vertical orientation with the E Brake air cylinder facing the front of the vehicle. This will ensure a flow of air over the cylinder.

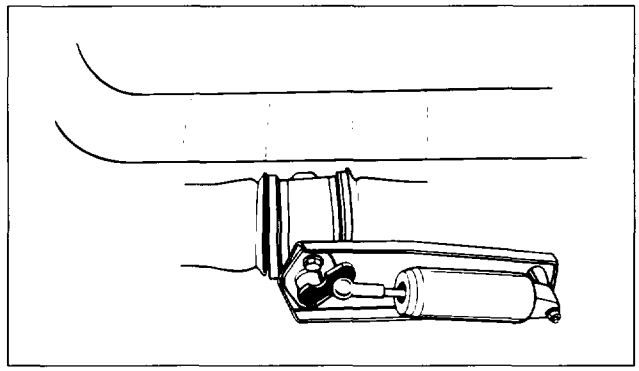

FIG. 2

Now reinstall the exhaust pipe section to the turbocharger using gasket, P/N 3929058. Ensure that the gasket is centered correctly. The tabs on this gasket will assist in holding the gasket in place while the original "V" clamp is installed and tightened. Orient the pipe and torque clamp sufficiently to hold the parts in place.

Next, install the E Brake at the other end of this section of pipe using the gasket, P/N 3929057, and the "V" clamp, P/N 3929060. Orient the E Brake so that the arrow located on the E Brake housing is in the direction of the gas flow. AVOID locating the E Brake in such a way that the actuating cylinder is in a horizontal or near horizontal position BELOW the main housing. Make sure that the gasket is installed on the locating pilot on the E Brake inlet. Install the "V" clamp and tighten enough so that the parts are held in place.

Install the second section of exhaust pipe with the sleeve, P/N 3929059, attached and clamp to the E Brake outlet using the "V" clamp, P/N 3929060. No gasket is needed between the E Brake and this pipe section.

Make the connection to the muffler using the parts (flex pipe and clamp) removed when the installation began. At this point with the clamps still loose, align the exhaust system. Ensure that there is proper clearance between the exhaust system, including the E Brake and the engine and chassis. Now torque all the "V" clamps to 70 - 80 lb.-in. (8 - 9 N•m).

IMPORTANT!

Make sure that the gasket, P/N 3929058, is installed between the turbo output and the exhaust pipe and P/N 3929057 between the exhaust pipe and the E Brake inlet. Failure to correctly install these gaskets will result in a loss of retarding performance.

Section 2: Pneumatic Group Installation

A generic schematic is shown in Fig. 3. Use this as a guide in performing this installation.

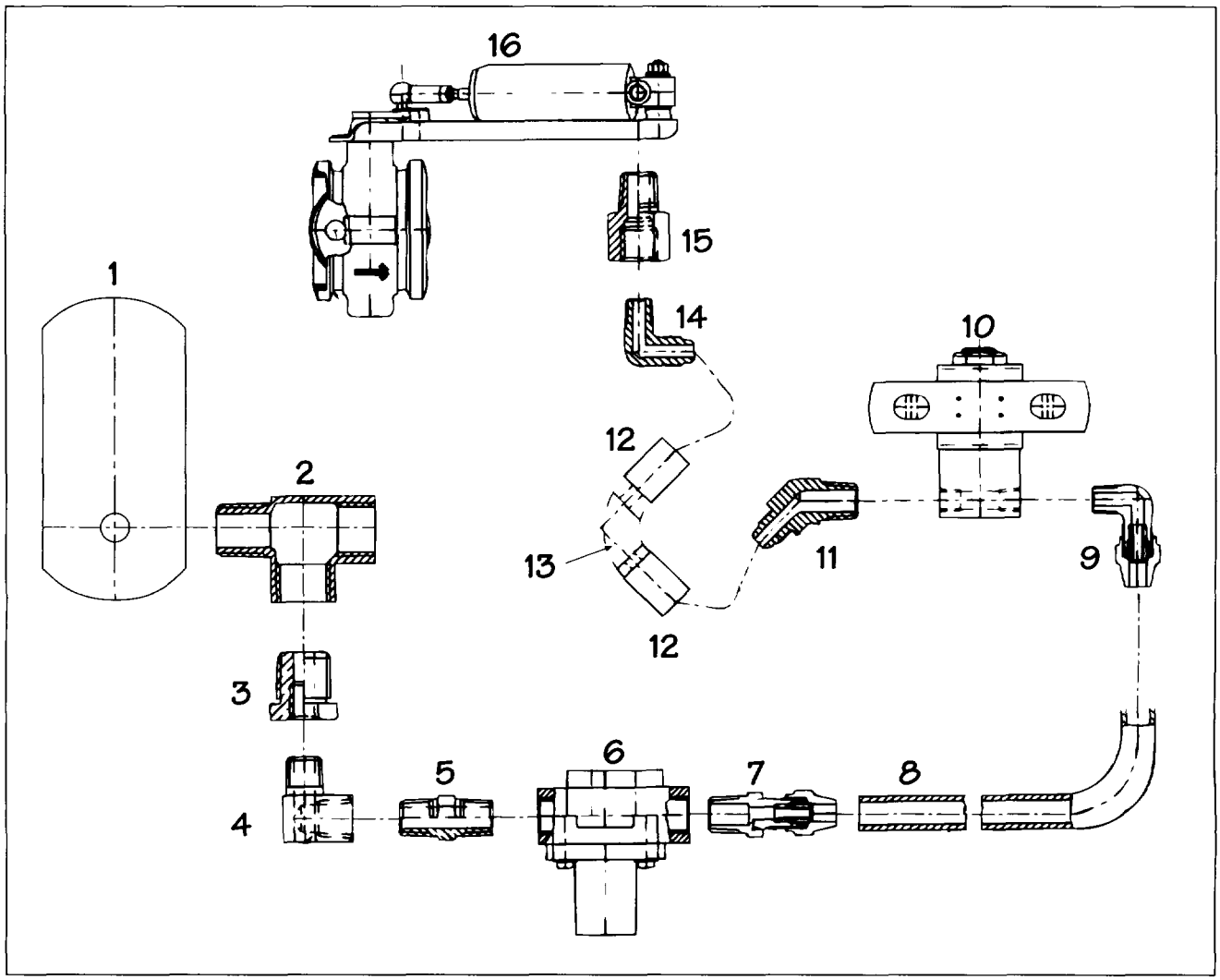

FIG. 3

Ill. No.	Description
1	Air tank
2	Pipe tee, 1/2 NPT
3	Reducer bushing, 1/2 - 1/4 NPT
4	90° street elbow, 1/4 NPT
5	Nipple, 1/4 NPT
6	Protection valve
7	Compression fitting assembly
8	Air brake tube

Ill. No.	Description
9	Compression fitting assembly
10	Solenoid valve
NI	45° flared, 90° elbow, 1/8 NPT
11	45° flared, 45° elbow, 1/8 NPT
12	Hose fitting assemblies (2)
13	Air brake hose
14	45° flared elbow, 1/4 NPT
15	Adapter, 1/4 NPT
16	E Brake assembly

NI = NOT ILLUSTRATED

Important Guidelines

1. Use the vehicle's existing air tank installed on the vehicle.
2. Bleed the air tank of the vehicle before starting this installation.

Install the protection valve, P/N 3929050, at the outlet of the air tank using the proper pipe fittings. Use of the protection valve will maintain the integrity of the original pneumatic system.

⚠CAUTION

IF A THREADED HOLE IS NOT AVAILABLE ON THE AIR TANK AND A "TEE" FITTING IS EMPLOYED TO TAP INTO THE ORIGINAL PNEUMATIC CONNECTIONS, ENSURE THAT THE ORIGINAL AIR CONNECTIONS ARE CORRECTLY RETORQUED.

Install the solenoid valve, P/N 3929051, on the chassis rail using existing predrilled holes. If no suitable location is available on the chassis rail, then mount the solenoid valve to the body sheet metal. Avoid excessive heat coming from the exhaust system. The distance from the solenoid valve to the air cylinder of the E Brake should be within the length of the supplied hose.

Connect the solenoid port marked "1" or "p" to the air tank using the air tubing.

Connect port "2" or "A" to the E Brake air cylinder using the air hose.

Use the 1/4 - 18 NPT compression fittings for the tubing connections from the air tank to the solenoid valve.

Compression Fitting Assembly Instructions

Cut the tubing ends squarely.

Insert the tubing into the fitting until it bottoms on seat. Tighten nut with wrench until one thread remains visible on the fitting.

Hose Assembly Instructions

Shorten the hose to the required length. Ensure that the minimum bend radius is 2" (51 mm). Install the end fittings on both ends of the hose according to the following steps:

1. Cut the hose squarely with a fine tooth hacksaw or cut-off wheel.
2. Put the socket in vise.
3. Screw hose counter-clockwise into socket until it bottoms.
4. Back off 1/4 turn.
5. Lubricate the nipple thread and inside of the hose liberally with a heavy oil or Aeroquip hose assembly lube, Aeroquip P/N 222070.
6. Screw nipple clockwise into socket and hose. Leave 1/32" (0.8 mm) to 1/16" (1.6 mm) clearance between the nipple hex and socket.

Route the air tubing carefully and clamp using the clamps provided. Avoid tight bends and ensure there is no possibility of abrasion through contact with chassis components.

All necessary fittings and fasteners are included in the kit to complete the installation.

Section 3: Installation of the Controls

Install the dash switch in a convenient location on the dashboard.

Install the clutch switch using the instructions included in the kit.

Fuel Pump Switch Installation (In-line Pump)

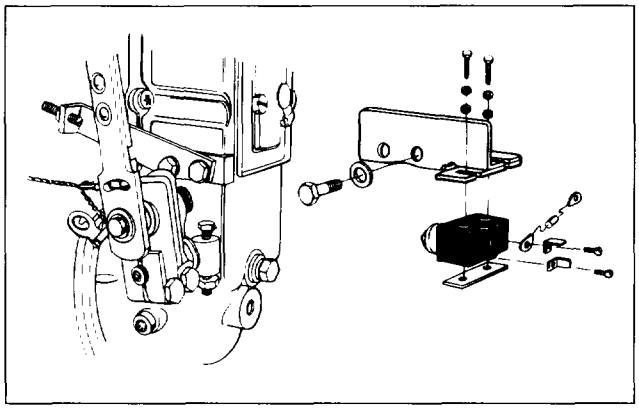

FIG. 4

Attach the switch to the bracket using the hardware provided (see Fig. 4). Torque the two mounting screws 10 to 14 lb.-in. (1.2 to 1.6 N•m). Make sure that the diode is positioned correctly (see Fig. 5).

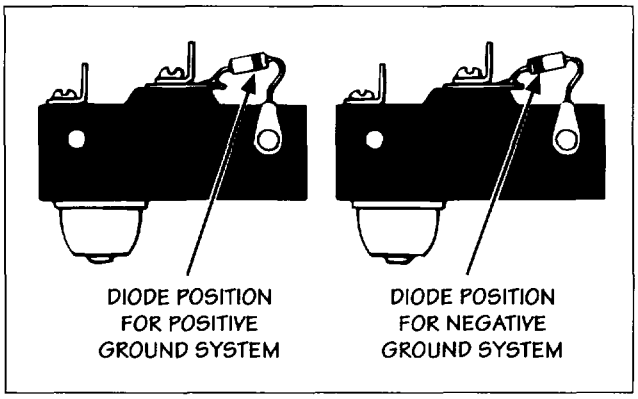

FIG. 5

The fuel pump switch bracket assembly is mounted to the rear end of the pump, between the pump housing and the stop bracket, using the two hex-head M6 bolts that hold in place the throttle stop bracket (Fig. 6).

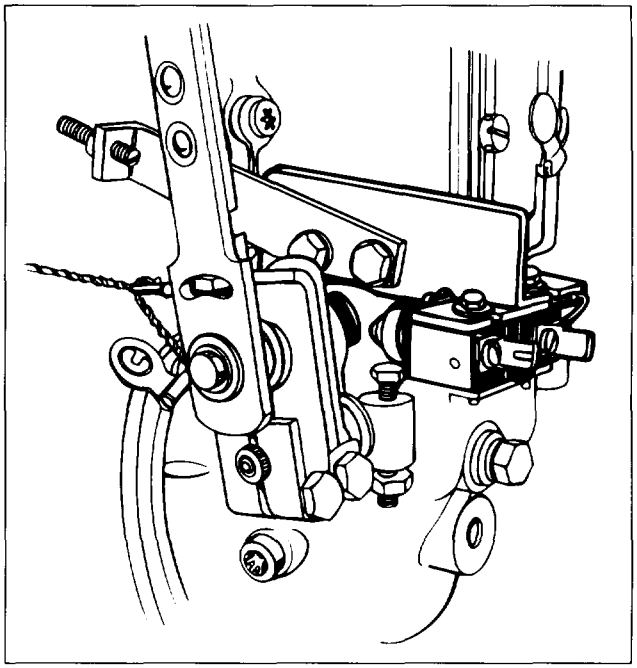

FIG. 6

First, remove the two hex-head M6 bolts and washers that hold the stop bracket in place. Then remove the two spacers. Discard the spacers; they are not required now. The thickness of the fuel pump switch bracket will now take the place of these spacers. Place the switch bracket between the pump housing and the stop bracket and attach using the two hex-head M6 bolts and washers previously removed. Torque the two M6 bolts to 45 to 60 lb.-in. (5 to 7 N•m). The button of the switch is activated by the low idle stop on the fuel pump throttle lever.

Loosen the two screws that mount the fuel pump switch to the bracket. Move the switch along the bracket slots so that the switch button contacts the low idle stop on the fuel pump throttle lever. Position the switch so that the E Brake turns off at 900 ±50 RPM.

NOTE:

ADJUST (IF NECESSARY) THE LOW IDLE RPM ACCORDING TO THE ENGINE SHOP MANUAL. NOTE THAT EVERY IDLE SPEED ADJUSTMENT WILL REQUIRE A FUEL PUMP SWITCH POSITION ADJUSTMENT.

Avoid locating the switch assembly so that the rubber boot rubs against the surrounding parts.

Fuel Pump Switch Installation (Rotary Pump)

Attach the switch to the bracket using the hardware provided (see Fig. 7). Torque the two mounting screws 10 to 14 lb.-in. (1.2 to 1.6 N•m). Make sure that the diode is correctly positioned (Fig. 5).

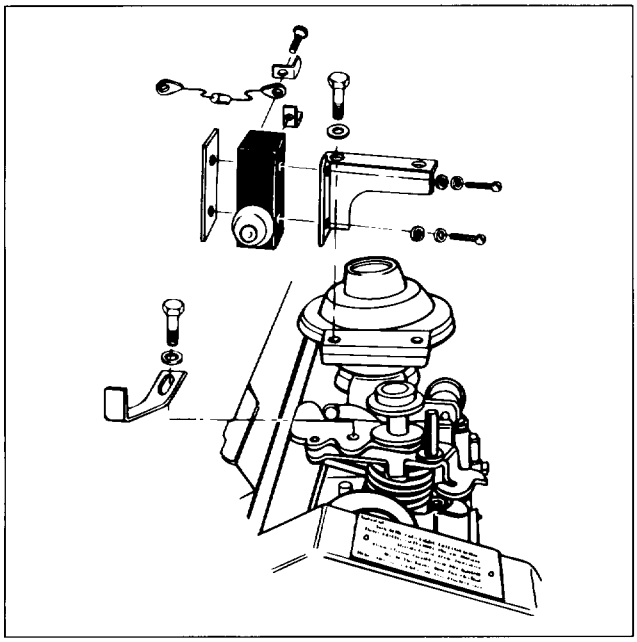

FIG. 7

The fuel pump switch bracket assembly is mounted on the aneroid housing of the fuel pump (see Fig. 8). First remove the two front M6 slotted head bolts from the aneroid housing and discard. Mount the switch bracket assembly to the aneroid housing using the two hex-head M6 bolts, plain and spring washers included in the kit. Torque to 45 to 60 lb.-in. (5 to 7 N•m). Now mount the other bracket, P/N 3929056, as shown in Fig. 7, using the existing M6 hex-head bolt. Position this bracket via the slotted hole in order that the switch actuates. Hold this position and torque the bolt 45 to 60 lb.-in. (5 to 7 N•m).

NOTE:

ADJUST (IF NECESSARY) THE LOW IDLE RPM ACCORDING TO THE ENGINE SHOP MANUAL. NOTE THAT EVERY IDLE SPEED ADJUSTMENT WILL REQUIRE A BRACKET POSITION ADJUSTMENT.

Avoid locating the switch assembly so that the rubber boot rubs against the surrounding parts.

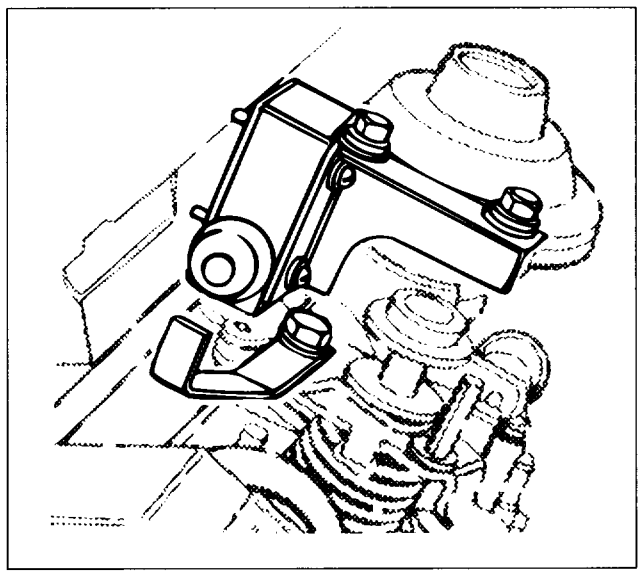

FIG. 8

Wire Harness Installation

Use the harness supplied, P/N 3803909, and follow the wiring schematic shown in Fig. 9 (facing page).

1. Ensure that the harness is properly supported and does not apply stress to any connections. This is especially important with the fuel pump switch connections.
2. If using the Auxiliary Air Group, Cummins P/N 3802673 (employed on hydraulic braked vehicles), note that the E Brake wiring is separate and independent from the air compressor wiring.

Final Test

Start the engine and run at low idle speed with the transmission in neutral and the parking brake set.

Switch on the dash switch. The E Brake should come on within 0.25 seconds. Step on the accelerator pedal and increase engine speed. The E Brake must turn off immediately. Take your foot off the pedal and the E Brake should turn on again within 0.25 seconds.

With the engine at idle, step on the clutch pedal. Again, the E Brake must turn off immediately. Take your foot off the clutch pedal and the E Brake should turn on again.

Check for exhaust gas leakage around the "V" clamps at the turbo outlet and E Brake inlet. No leakage is allowed as this will reduce the effectiveness of the E Brake's retarding performance.

Under normal operating conditions, do not use the E Brake at idle engine speed.

Before returning the vehicle to service, make a final check of wiring and air tubing/hose routing to make sure that it does not run against hot surfaces or is abraded or kinked. Take the vehicle out for a road test to ensure that the system is functioning correctly.

Wiring Schematic

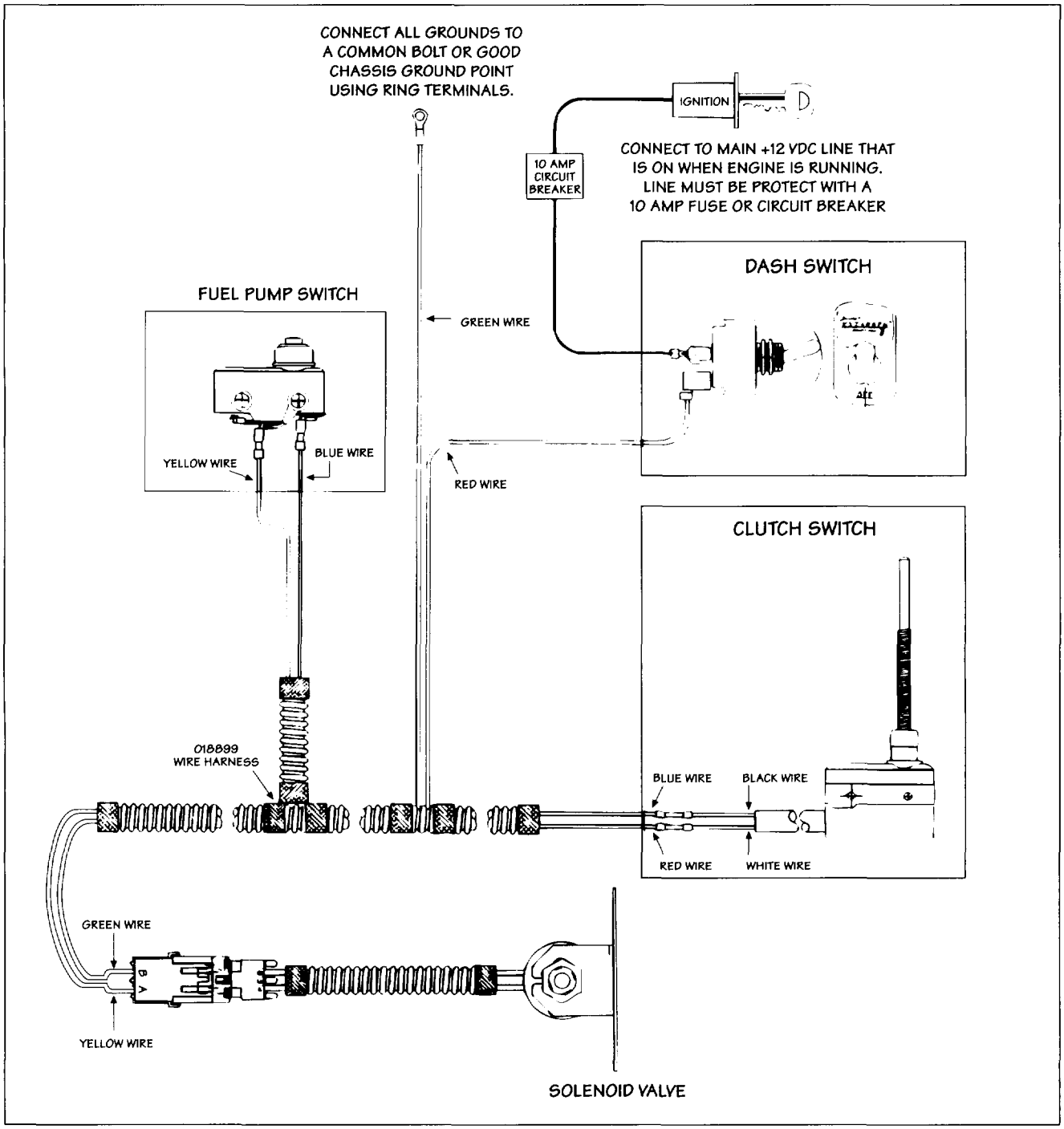

FIG. 9

NOTES

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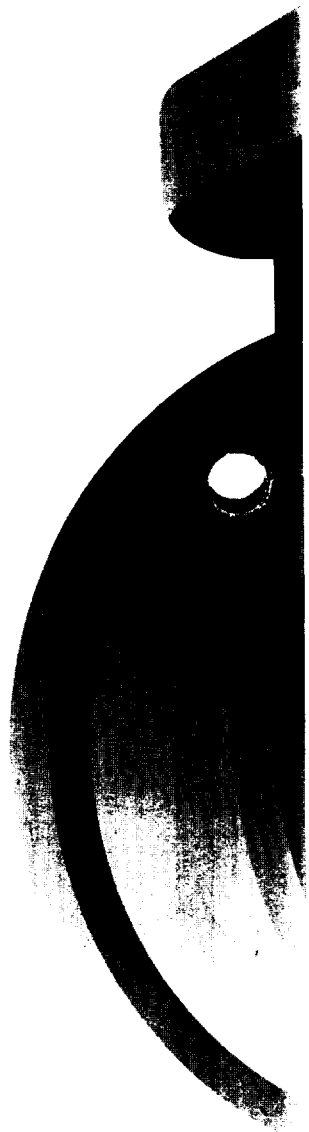

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