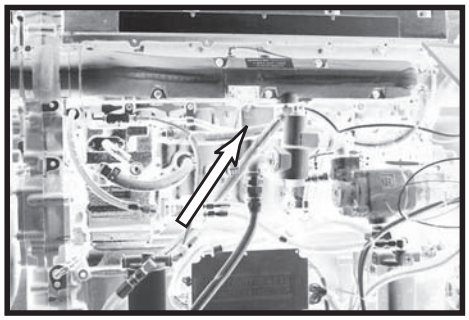
# Installation Manual


## P-61/P-63/P-63A/P-63B/P-63C ENGINE BRAKES

PACBRAKE®
ENGINE BRAKES

1 BEFORE STARTING

Identify the engine model and serial number which may be found on the option labels attached to the valve cover, and stamped on the engine block as shown.



**DDEC III and DDEC IV Applications**

Note: Two different engine brake activation circuits are available for Series 60 engines. The engine ECU has an optional circuit to control the engine brake. Use a Prolink diagnostic tool to determine if the circuit is turned on. If the circuit is not turned on for engine brake enable, it can be reprogrammed by a Detroit Diesel Dealer for a service charge. When using this activation circuit, if no under cover wiring exists, use Pacbrake Kit P80155.
An optional ECU bypass system P60154 is available through Pacbrake distrribution. This system uses a foot switch and a service brake pressure switch to enable the engine brake, the engine ECU does not need to be reprogrammed for this system. P60154 kit includes all the necessary components for electrical installation.

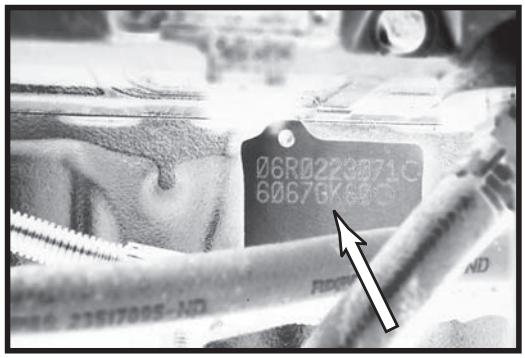
**IMPORTANT APPLICATION INFORMATION**

**Check the engine serial number and engine build date PRIOR to installing this Pacbrake engine brake.**

P-63C model fits engines manufactured before 12/15/99
P-63C model fits Freightliner engines below 06R566178
P-63C model fits OEM engines below 06R566302
P-80 model fits engines manufactured 12/15/99 to 8/10/00
P-80 model fits Freightliner engines below 06R566178
P-80 model fits OEM engines below 06R566302
P-80A model fits engines manufactured 8/10/00 to 9/30/02
P-80A model fits engines with 82.1mm injector lash

2 The first letter in the engine model number indicates displacement. The second letter indicates the type of electronic control system. (Sample: model# 6067 G K 60)

G = 12.7 liter (model P-63C)
W = 11.1 liter (model P-61)
U = DDEC II
K = DDEC III/DDEC IV
T = STD '98 (1550 ft. lbs. torque) P-63C
P = PREMIUM '98 (1650 ft. lbs. torque) P-63C
B = DDEC IV PREMIUM '99 - P-63C
M = DDEC IV STD '99 - P-63C
S = DDEC III/IV
E = DDEC III/IV
L = DDEC III/IV

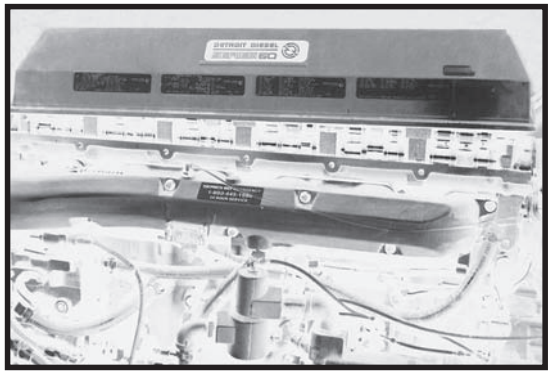


3 DDEC II equipped engines have the engine brake enable circuit turned on, use Pacbrake electrical interface kit #P60150. An optional extension harness P60085 for cab-over trucks is available to extend the harness supplied in the DDECIII kit. P60085 must be ordered separately. Follow the DDEC II instructions.

DDEC III and DDEC IV equipped engines may have the engine brake circuit turned on, use Pacbrake electrical interface kit #P60155. Engines with the engine brake circuit turned off using kit #P60154 follow the under cover wiring installation in this manual and then follow the instructions contained in the P60154.

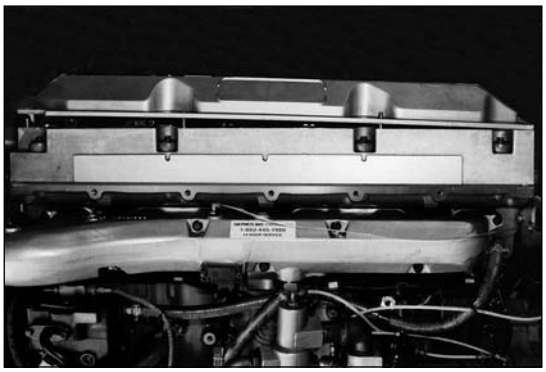

4 Thoroughly clean the top of the engine and remove fiberglass valve cover.

NOTE: This cover is originally installed with a silicone adhesive on both sides of the camshaft caps. Take care not to stretch the gasket when removing the cover.



**5** If the engine is equipped with an aluminum valve cover and base, both should be removed for easier and faster brake installation.

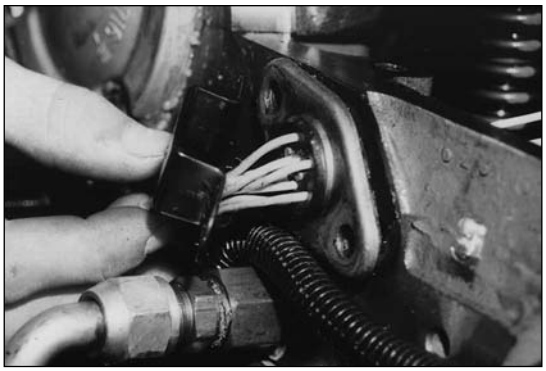
***NOTE:*** *The valve cover base is originally installed with silicone adhesive on both sides of the camshaft caps. Take care not to stretch the gasket when removing the valve cover base.*



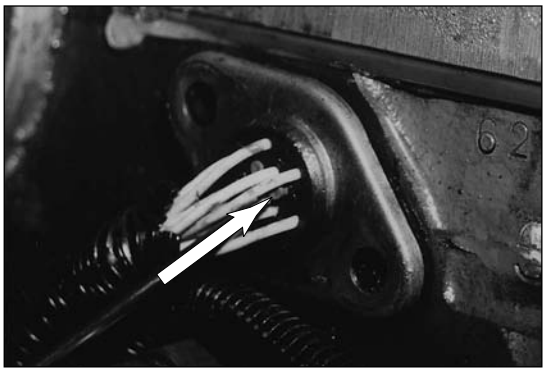
**1** **ENGINE NOT PREWIRED**

Remove the wiring harness mounting flange from the rear of the cylinder head.

***NOTE:*** *Some engines may have engine brake wiring tied to the injector harness. If so, omit following steps 1 through 13.*

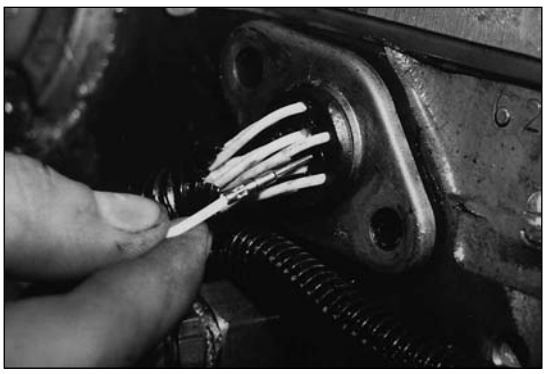


**2** There are four spare holes through the harness grommet which are sealed with plastic plugs. Pulling outward, remove any two of these plugs.

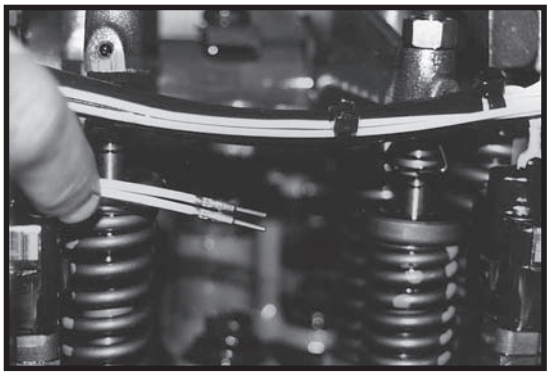


**3** Insert both wires of the Pacbrake ' through head harness' through the grommet from the outside.

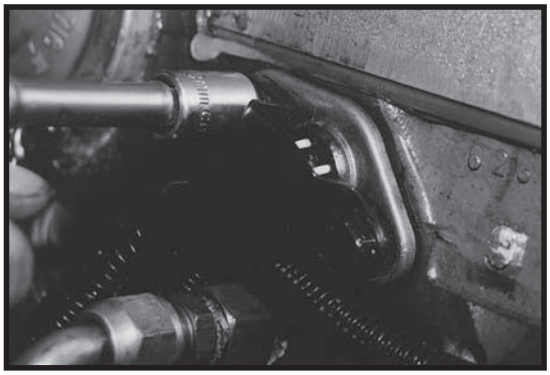
***NOTE:*** *In trucks with limited access at the rear of the cylinder head, it may be easier to slide the grommet out of the head.*



4 Route the wires alongside the Electronic Unit Injector (EUI) harness and adjust the length so the terminal ends are between cylinders 5 and 6.



5 Lay the two wires in the convoluted conduit and replace the harness mounting flange.



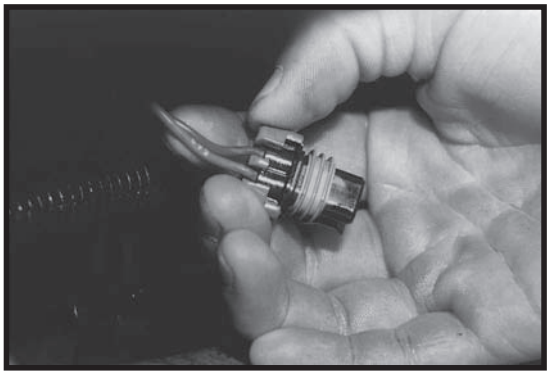
6 DDEC II applications only:

Bury the wires within 1" of the Weather Pack connector and tape around the conduit to keep in place.

NOTE: By using this same connector and wire positions, the Pacbrake harnesses are completely compatible with the Detroit Diesel engine harness and the VOEMs vehicle harness.

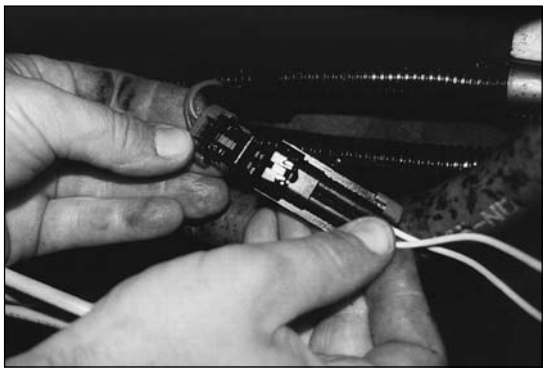
7 DDEC III and IV applications only
**With Engine Brake Enable Turned On Only**

Locate the red (561) and orange (562) wires terminating in the Metri-Pack plug. This is located in the harness on the drivers side of the engine just below the intake mainfold, above the starter.



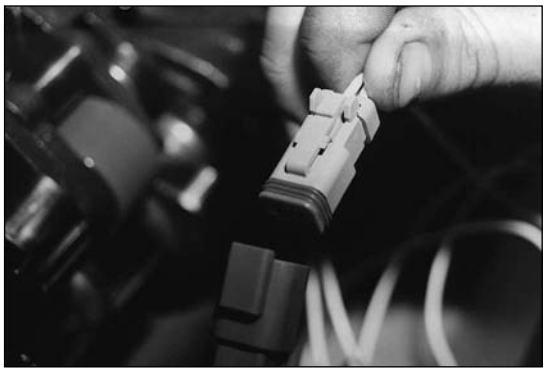
**8** **DDEC III and IV applications only:**

Remove the black protective cap and connect to Pacbrake harness previously installed in step 3.



**9** The through head harness must now be connected to the under cover harness, P/N P60048. As both halves of the connector are preassembled, simply insert the plain white wire into the hole on the same side as the other plain white wire. The remaining wires both have black shrink tube markings.

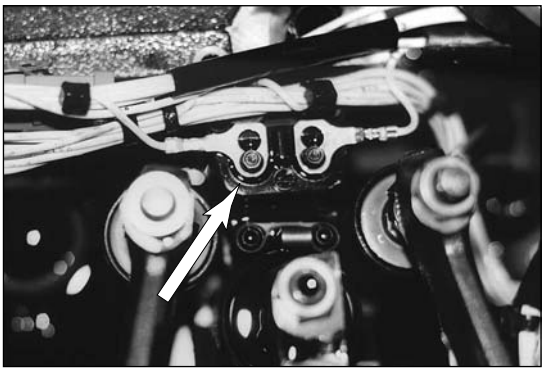
**10** This connector is polarized and may now be parted and reconnected without losing correct brake sequencing.



**11** **DDEC II, III and IV applications:**

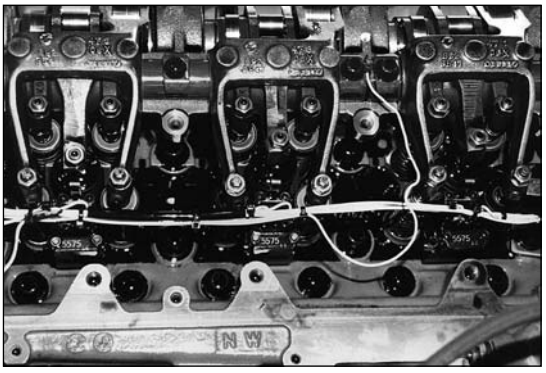
All injector electrical terminals on older engines should be bent upwards almost 90$^{O}$ as shown to allow clearance for engine brake housings.

**12** Later type terminals as shown require no modifications.



**13** Secure the complete Pacbrake harness to the EUI harness with plastic ties.

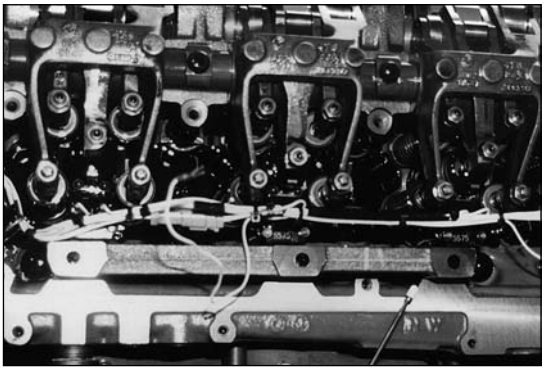
***NOTE:*** *Use only the ties supplied in the kit which are temperature stabilized and will not deteriorate due to heat.*



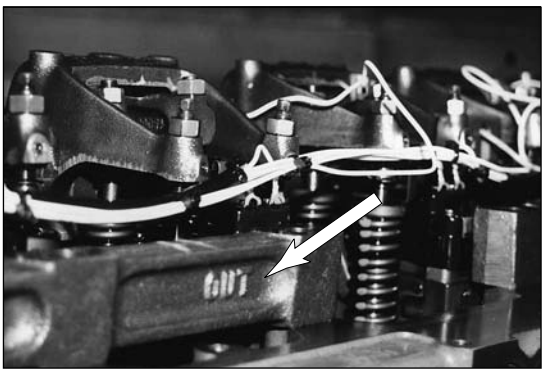
**1** **BRAKE HOUSING INSTALLATION**

Place the two spacer bars on the exhaust manifold side of the engine.

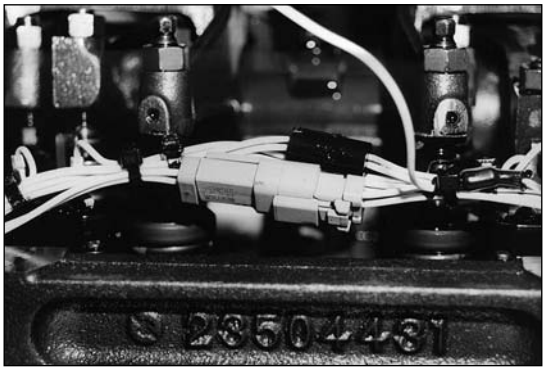
***CAUTION:*** *Using air pressure, blow out the six mounting holes before placing the spacer bars.*



**2** Ensure that the OUT marks are adjacent to each other, and facing outwards.

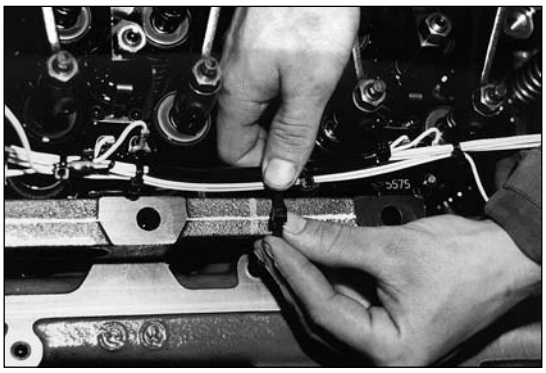


**3** Our nylon connector should be positioned between cylinders 5 and 6.



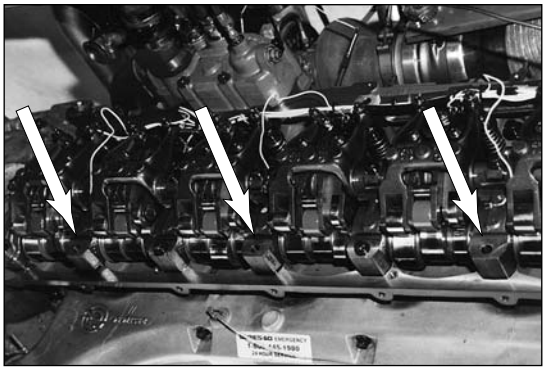
**4** Reposition the entire wiring harness to keep it from being chafed by the rocker levers or brake housings. If the original Detroit harness is long enough, it may be attached to the face–but not the corner of the spacer bars.

***NOTE:*** *Make certain that the three wires which will be attached to the solenoids are carefully positioned between cylinders 1-2, 3-4, and 5-6.*



**5** Move to the camshaft side of the engine. Remove the three outboard 12 pt. flange screws holding the camshaft bearing caps in locations #2, 4, and 6, as shown by the arrows.

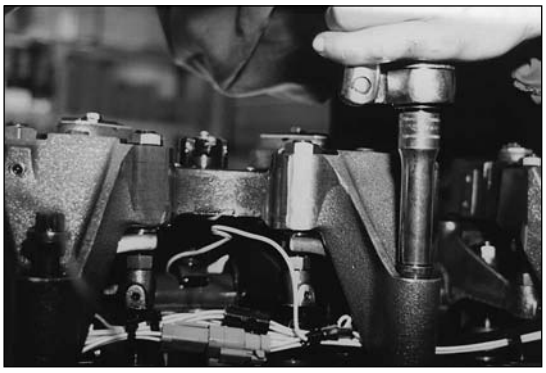
***CAUTION:*** *Using air pressure, blow out the three mounting holes.*



**6** Place a special hardened washer on each of the nine Pacbrake 12 pt. flange screws.

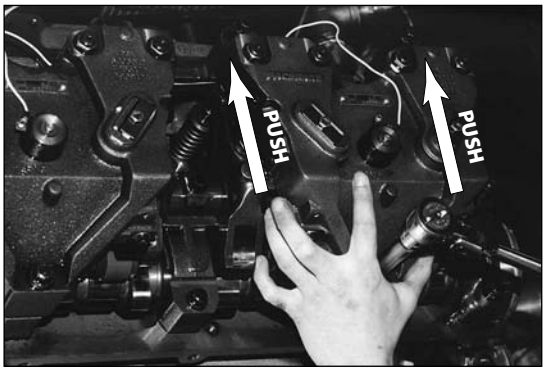
**7** Carefully position the three engine brake housings on the engine. Lubricate and loosely install the nine flange screws and washers.

**8** Run the flange screws down loosely using hand tools only.

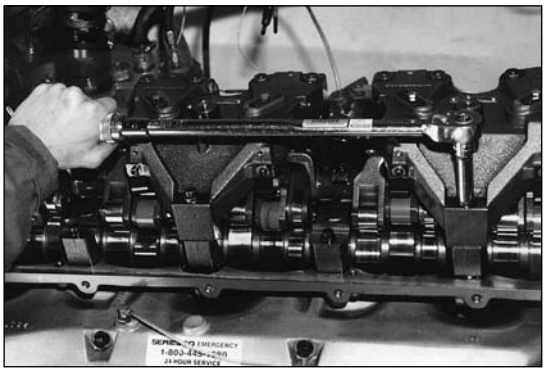


**9** Prior to initial tightening of the flange screws, make certain that the housings are pushed laterally (in the direction shown by the arrows) as far as each housing will go–towards the exhaust manifold side of the engine. This action will precisely locate the Pacbrake pistons with their mating engine components. Snug down the flange screws.

***NOTE:*** *The Pacbrake housings have a machined locating step on the single stud side, this aligns with the bearing cap for correct location above the exhaust valve adjusting screws.*




**10** Torque the three flange screws on the camshaft side, then the six on the exhaust manifold side to **40 ft. lbs. (55 Nm)**. Then repeat in the same sequence to **100 ft.lbs. (136 Nm)**.



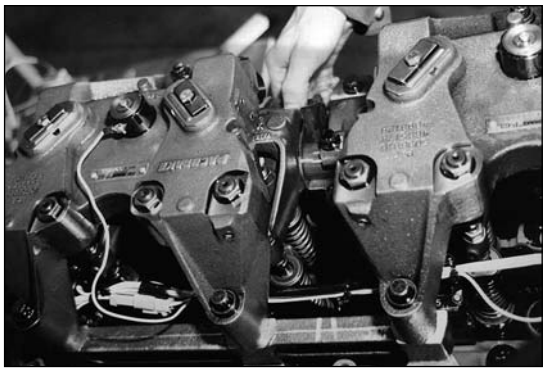
**11** Attach the three wires to the solenoids.

***NOTE:*** *A check should be done at this point if older style injector harness was used in previous step 11. Make certain injector terminals DO NOT contact Pacbrake housing, this will cause the engine to misfire.*

**1** **SLAVE PISTON ADJUSTMENT**

Loosen all twelve engine brake adjusting screws and locknuts. Determine which cylinders have clearance between exhaust rocker adjusting screws and valve stems, indicating that the exhaust valves are fully closed. There are usually four cylinders in this condition regardless of the crankshaft position.

***NOTE:*** *Both screws on each cylinder having closed valves may be adjusted.*



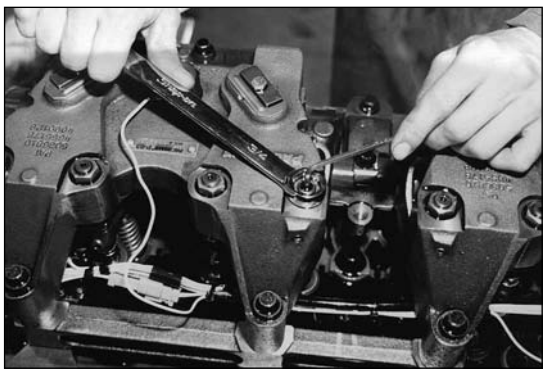
**2** Slave lash may now be adjusted on all cylinders which have clearance between the exhaust rocker adjusting screw and valve stems. Turn the Paclash screw clockwise to establish zero exhaust valve lash. Once zero lash is determined, turn screw an additional 1/4 turn to squeeze out any trapped oil, then back screw out to zero lash.

***CAUTION:*** *When adjusting the slave lash, the adjusting screw has a spring loaded piston, exercise caution as the piston in the adjusting screw must be collapsed when final adjustment is performed.*

**3** From this position (zero lash), turn the Allen wrench counter-clockwise **exactly 1/2 turn** and torque the locknut to **25 ft. lbs. (35 N•m)**. This method gives the correct slave piston clearance of **.025"**. Repeat this procedure on all cylinders on which the exhaust valves are closed. Bar the engine over approximately one revolution and adjust the remaining cylinders which now have clearance between the exhaust rocker adjusting screw and valve stems.

***NOTE:*** *Same procedures apply for all models.*
***CAUTION:*** *Do not overtorque slave adjusting screw locknut.*

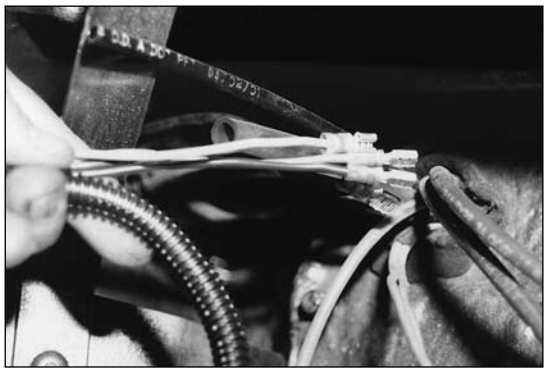
Double check all torques and wiring prior to reinstalling the valve cover. Use silicone sealant at front and rear bearing caps at valve cover installation. Torque valve cover bolts as per DDC service manual.



## CONTROL SYSTEM DDEC II

**1** Locate or drill a 1/2" or larger hole through the firewall.

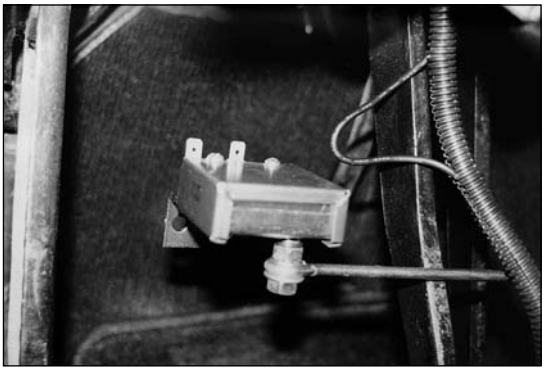
From the engine side of the firewall, pass the end of the harness with the four wires protruding, through the firewall and into the cab. Connect these and the power source to the dash switches as per the wiring schematic. For DDEC III and IV proceed to page 14.



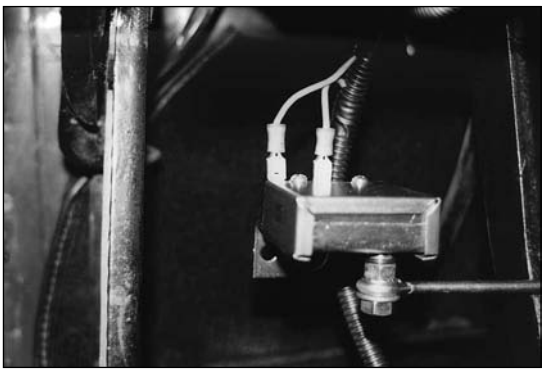
**2** Install the standard or optional clutch switch and adjust it so the circuit will be broken within the first inch of free travel of the clutch pedal.

***NOTE:*** *For vehicles having automatic transmissions, please consult the Pacbrake factory.*

**3** Route the harness coming from the dash switches close by the clutch switch. Pull a short loop of green wire from the conduit.



**4** Cut the wire and crimp on the two push-on terminals provided. Tape the conduit closed where the wires exit and attach to the clutch switch.



**5** Mount the relay receptacle in any convenient position on the firewall, using the special drill point self-tapping screw supplied.

**NOTE:** *Ensure that the harness enters the bottom of the receptacle, to prevent moisture entering the relay.*

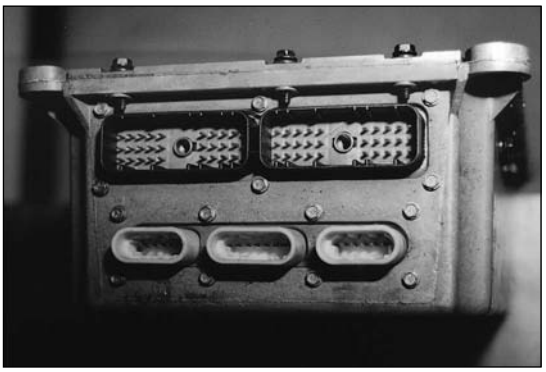
**6** Install the special relay into the receptacle.

**CAUTION:** *Do not substitute with any other relay, as the Pacbrake P60045 relay has a built-in diode to protect the DDEC system.*

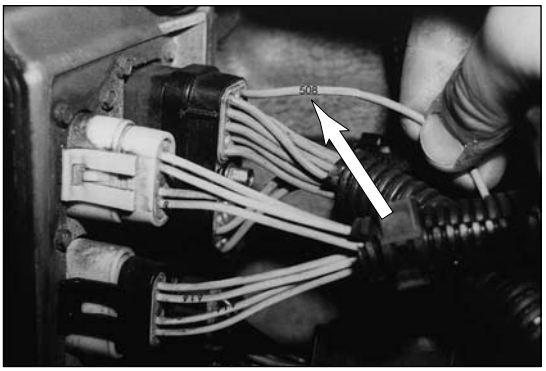
**7** Install on/off switch and three-position switch in dash, conveniently located for the driver.


**8** Continue the harness to the rear of the cylinder head and snap the two mating Weather Pack connectors together.

**9** This leaves one remaining white wire at the end of the harness, which must be connected to the #508 wire in the vehicle harness. This wire originates at terminal A-1 of the Electronic Control Module (ECM).

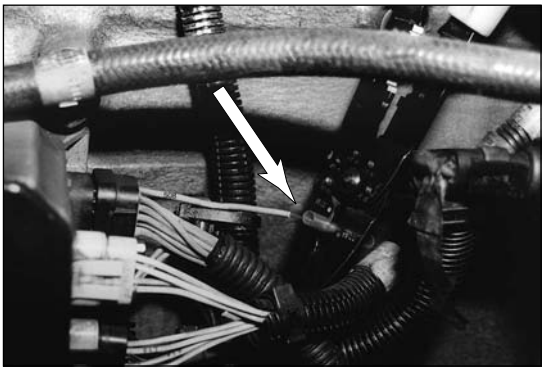


**10** The ECM is mounted on the left side of the engine block, and #508 wire will be the uppermost one closest to the engine.

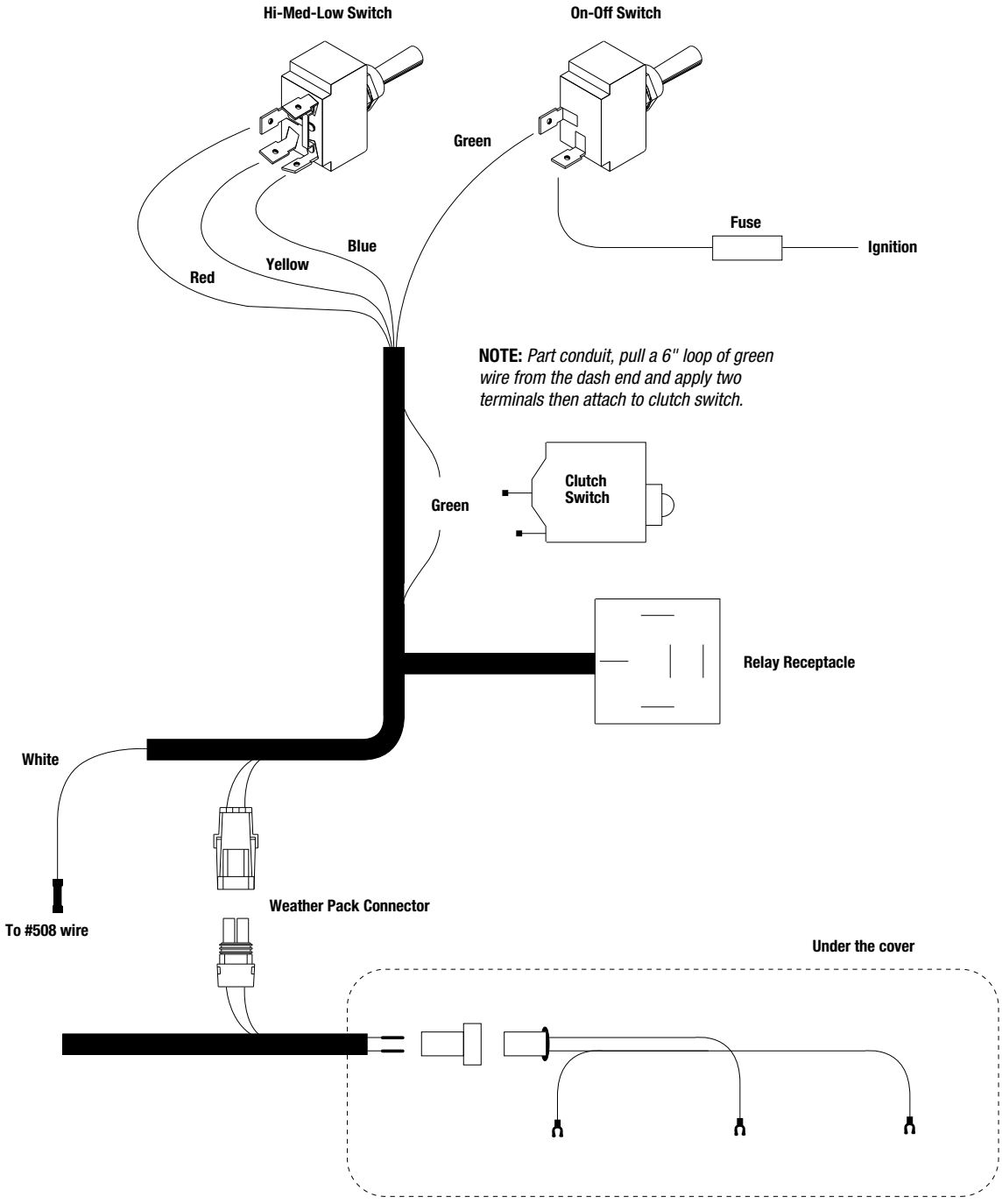



**11** Cut the #508 wire where accessible and join the end originating at the ECM to our white wire with the attached butt connector. This should be crimped, Then shrunk down using a heat gun or other source, to produce a tightly sealed joint.

***NOTE:*** *The remaining end of the #508 wire should be taped out of the way, as it dead-ends in the vehicle harness and will not be used.*



## DDEC II WIRING SCHEMATIC



Some DDEC III and IV engines have the Pacbrake wiring installed at the factory. If not - follow the instructions below.

**Installations using kit P60154 follow the electrical instruction provided in the kit.**

1

CONTROL SYSTEM DDEC III-IV

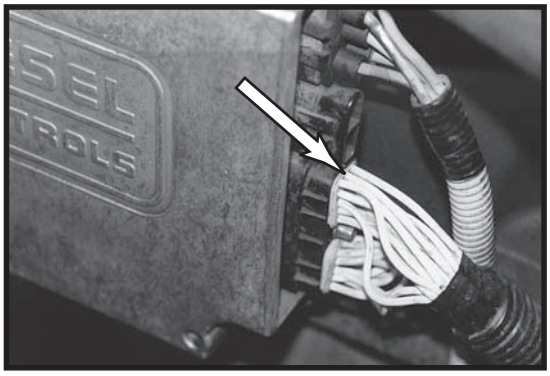
Locate the 30 pin connector at the rear end of the DDEC III or DDEC IV ECM. This is the Vehicle Interface Harness (VIH).

NOTE: *Some DDEC III and IV engines may not have the ECM programmed for engine braking. This may be verified using a Diagnostic Data Reader. If any of the ECM input switches; K2, K3, S3 or T3 read NONE, then the vehicle should be taken to a DDC dealer to have these switches enabled.*


2

Note the color and/or number of the two wires originating at the K2 and K3 terminals of the VIH connector. They are both on the top row, K2 is in the center and K3 is the closest one to the engine.

These two wires terminate behind the dash and may be grouped with a third wire connected to battery ground.

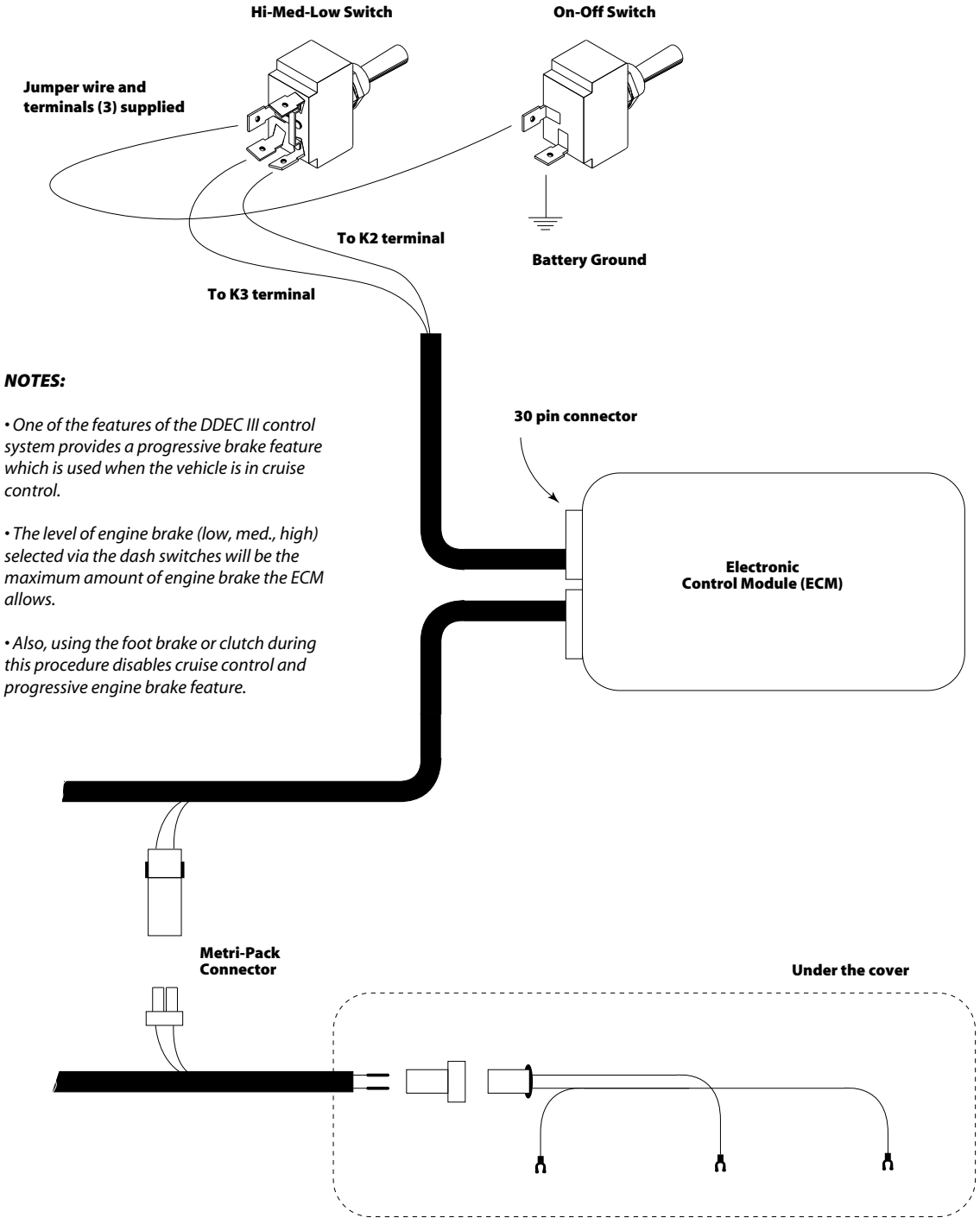


3

Mount the two dash switches and connect the three wires as shown in the DDEC III wiring schematic.

CAUTION: *Ensure that ONLY the negative ground side of the electrical system is input to terminals K2 and K3 via the dash switches OR DAMAGES TO THE ENGINE ECM WILL RESULT.*

## DDEC III - IV WIRING SCHEMATIC




***NOTES:***

*• One of the features of the DDEC III control system provides a progressive brake feature which is used when the vehicle is in cruise control.*

*• The level of engine brake (low, med., high) selected via the dash switches will be the maximum amount of engine brake the ECM allows.*

*• Also, using the foot brake or clutch during this procedure disables cruise control and progressive engine brake feature.*

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