



M.I. 9657



MAINTENANCE INSTRUCTION

MODERNIZATION RECOMMENDATION

ENGINE PURGE CONTROL WITH DC MAIN GENERATOR

- PURPOSE:** To provide instructions for the addition of engine purge control to protect the diesel engine during cranking in the event of a hydraulic lock.
- APPLICATION:** Locomotives equipped with D32, D25, D22, D15, or D12 main generators.
- REFERENCE:** Use the applicable locomotive schematic diagram with this publication as a guide in implementing this modification.
- DISCUSSION:** An accumulation of water or fuel oil in one or more cylinders of a diesel engine may result in damage to the engine from a hydraulic lock during cranking. However, the diesel engine will not be damaged by a hydraulic lock if cranking speed is less than 30 revolutions per minute. The engine purge system is designed to provide this protection.

With this system, when the FP/ES switch is held in the start position, power is applied to the engine purge panel, initiating a self-test cycle. This causes the engine purge contactor EPC to pick up and drop out. Once this occurs, a circuit is completed to start the locomotive. When engine cranking speed increases to about 30 revolutions per minute, the circuit causes EPC to drop out. This inserts resistance RE-EPC in the starting circuit and thus slows down engine cranking speed. The slowing down of the engine causes the circuit to pick up EPC and increase engine cranking speed. This cycling continues for 6 seconds, which permits the engine to complete at least one revolution. Upon completion of this cycling, the RE-EPC stays shorted out to allow normal engine cranking speed during the remainder of the starting period.

CAUTION

When starting the engine, the injector control lever should not be advanced until time-out of the 6 second timer. This ensures against engine start until the engine has made at least one complete revolution.

MATERIAL REQUIRED:

| <u>ITEM</u> | <u>QUANTITY</u> | <u>PART NUMBER</u> | <u>DESCRIPTION</u> |
|-------------|-----------------|--------------------|--------------------|
| 1 | 1 | 9540890 | Engine Purge Panel |
| 2 | 1 | 9541885 | Resistor RE-EPC |
| 3 | 1 | 8473355 | EPC Contactor |
| 4 | 1 | 8197308 | EP Shunt |
| 5 | 1 | 8475947 | Nameplate, Fig. 1 |
| 6 | 1 | 9505936 | Nameplate, Fig. 2 |
| 7 | AR | 8472022 (500 ft.) | Wire - No. 14 |
| 8 | AR | 8433441 (100 ft.) | Cable - No. 550/24 |
| 9 | 1 | (See Below) | FP/ES Switch |

PRESENT FP/ES SWITCH

8332070
8350180
8296923
8426700
8441983
8346425

SUBSTITUTE FP/ES SWITCH

9543551
9543549
9543581
9543552
9543552
9543552

Items 1 thru 6 are contained in engine purge control kit 9543651. These parts can be ordered separately or as a kit. Mounting hardware, cable, and FP/ES switch are not included and need to be ordered separately.

COST OF MATERIAL:

Approximate material cost for this modification is \$1,200.00. Additional material cost will be incurred for the mounting hardware, cable, and FP/ES switch. This cost is for job estimating purposes only. Materials will be billed at the prices in effect at the time of shipment.

PROCEDURE

These instructions are provided for the application of engine purge control. A GP38 was used as a sample application. Other series of locomotives may not be labeled with the same wire designations. Refer to applicable locomotive schematic when installing this modification.

1. Mount the EPP panel, RE-EPC, EPC contactor, and EP shunt in convenient and available locations in the high voltage cabinet. Make certain they clear existing devices and cables, and that the opposite side of the mounting area is clear where bolt holes will be drilled.
2. Remove FP/ES switch on the locomotive and replace with a new switch. If the list located under "Material Required" does not contain a reference for your application, please contact your local EMD representative for assistance.

UNIT IS EQUIPPED WITH ENGINE PURGE CONTROL SYSTEM. CRANKING SPEED WILL BE LOW FOR FIRST FEW SECONDS. IF STARTING FUSE BLOWS OR ENGINE FAILS TO CRANK, OPEN TEST COCKS AND BAR THE ENGINE OVER TO CHECK FOR LEAKS BEFORE ATTEMPTING TO RESTART THE ENGINE. IF ENGINE FAILS TO CRANK AND NO LEAKS ARE PRESENT, HOLD DOWN BY-PASS SWITCH ON EP MODULE WHILE CRANKING.

26950

Fig.1 - Nameplate For FP/ES Switch Located In Locomotive Cab

The FP/ES switch part number may be found on the switch housing, or in the parts list on the applicable physical wiring diagram, or in the wiring running list for your locomotive order.

3. On units with the switch located on the engine control panel in the cab, apply nameplate 8475947, Fig. 1, at a convenient adjacent area. On units with the switch located at the equipment

rack in the engineroom, remove the existing nameplate from the fuel prime/engine start switch housing, and apply new nameplate 9505936, Fig. 2.

Refer to Fig. 3 and the locomotive schematic diagram when making modifications to the control wiring. Use No. 14 AWG wire as needed.

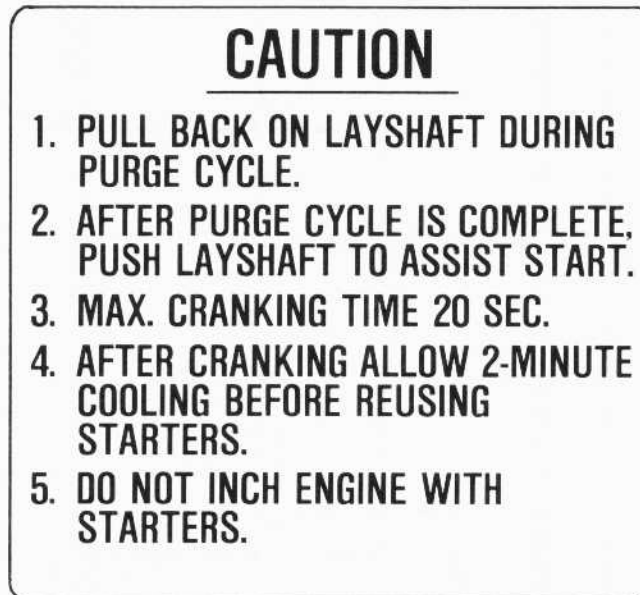
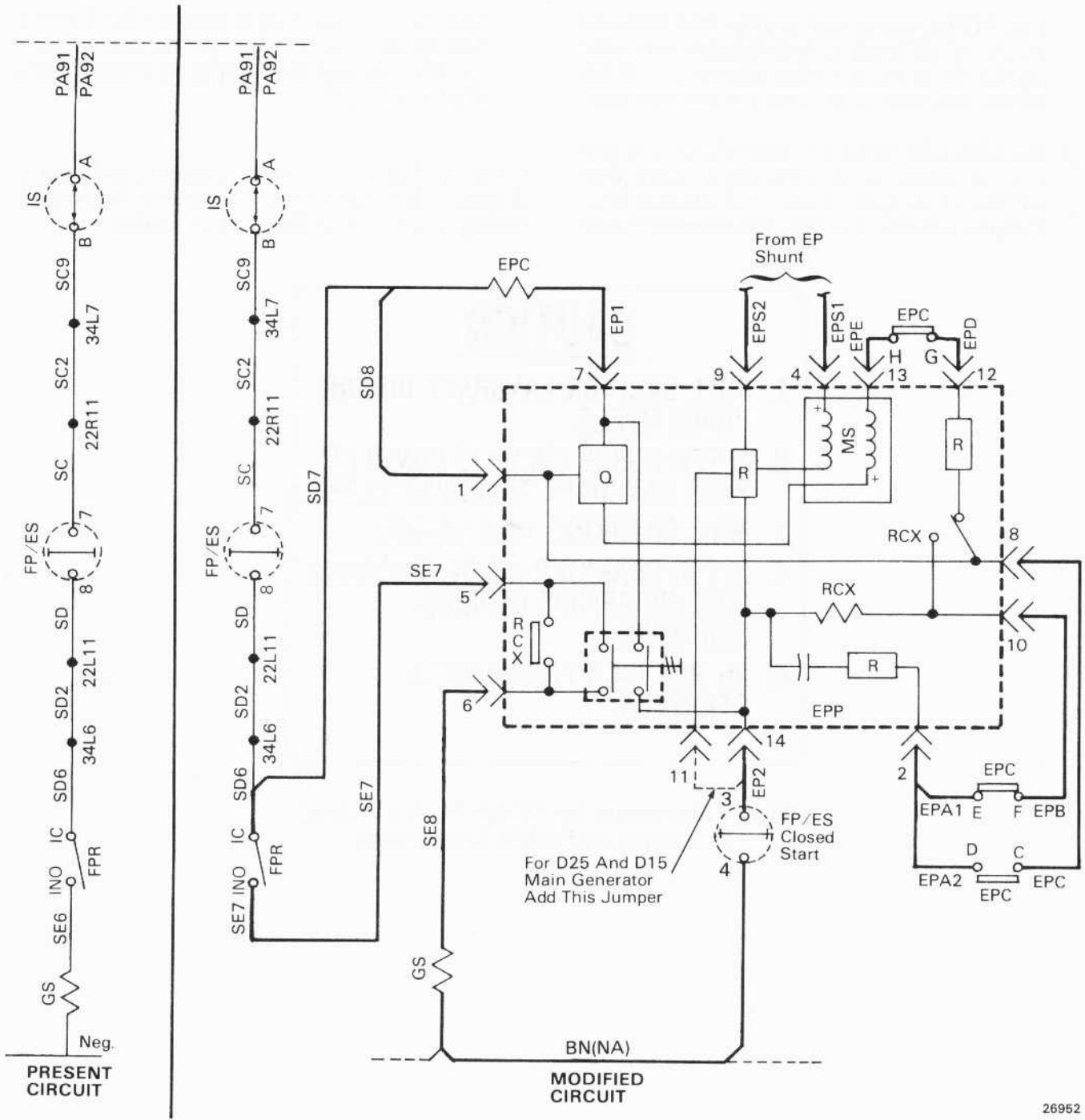


Fig.2 - Nameplate For FP/ES Switch Located At Equipment Rack In Engineroom



26952

Fig.3 - Typical Application Of Engine Control Panel (GP38 Locomotive)

1. Remove the following wires:

| <u>WIRE</u> | <u>FROM</u> | <u>TO</u> |
|-------------|-------------|-----------|
| SE6 | GS Coil Pos | FPR-INO |

2. Add the following wires:

| <u>WIRE</u> | <u>FROM</u> | <u>TO</u> |
|-------------|---------------------------|------------------------|
| SE7 | FPR-INO | EPP Panel-Term. No. 5 |
| SE8 | GS Pos Coil | EPP Panel-Term. No. 6 |
| SD7 | FPR-IC | EPC Coil Pos* |
| SD8 | EPC Pos Coil | EPP Panel-Term. No. 1 |
| EP1 | EPC Neg Coil | EPP Panel-Term. No. 7 |
| EP2 | FP/ES-Term No. 3 | EPP Panel-Term. No. 14 |
| BN | FP/ES-Term No. 4 | GS Neg Coil |
| EPA1 | EPC-E | EPP Panel-Term. No. 2 |
| EPA2 | EPC-D | EPP Panel-Term. No. 2 |
| EPB | EPC-F | EPP Panel-Term. No. 10 |
| EPC | EPC-C | EPP Panel-Term. No. 8 |
| EPD | EPC-G | EPP Panel-Term. No. 12 |
| EPE | EPC-H | EPP Panel-Term. No. 13 |
| EPS1 | EP Shunt** | EPP Panel-Term. No. 4 |
| EPS2 | EP Shunt** | EPP Panel-Term. No. 9 |
| Jumper | EPP Panel-Term. No. 11*** | EPP Panel-Term. No. 14 |

NOTES

*Do not remove SD6 wire from FPR-IC.

**Insure that EPS1 from terminal No. 4 of EPP is applied to the side of the shunt closest to the GS contactor and main generator, and that EPS2 wire from terminal No.9 of EPP is applied to the side of the shunt closest to the EPC contactor and battery positive. See Figs. 3 and 4.

***A jumper is used with D25 and D15 generators, Fig. 3.

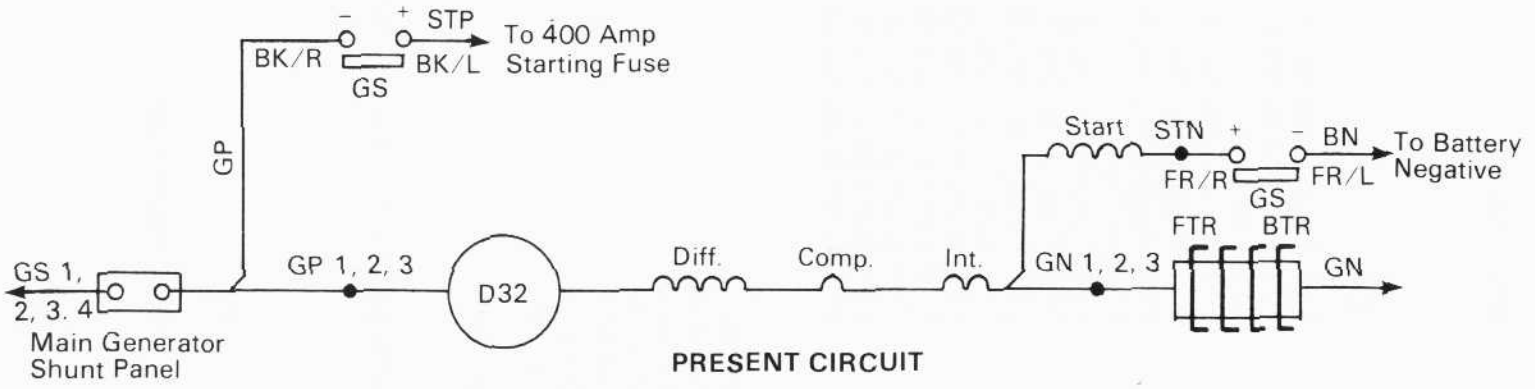
Refer to Fig. 4 when performing the following steps for modifications to the power circuit. Use 550/24 cable as needed.

1. Remove the following cable:

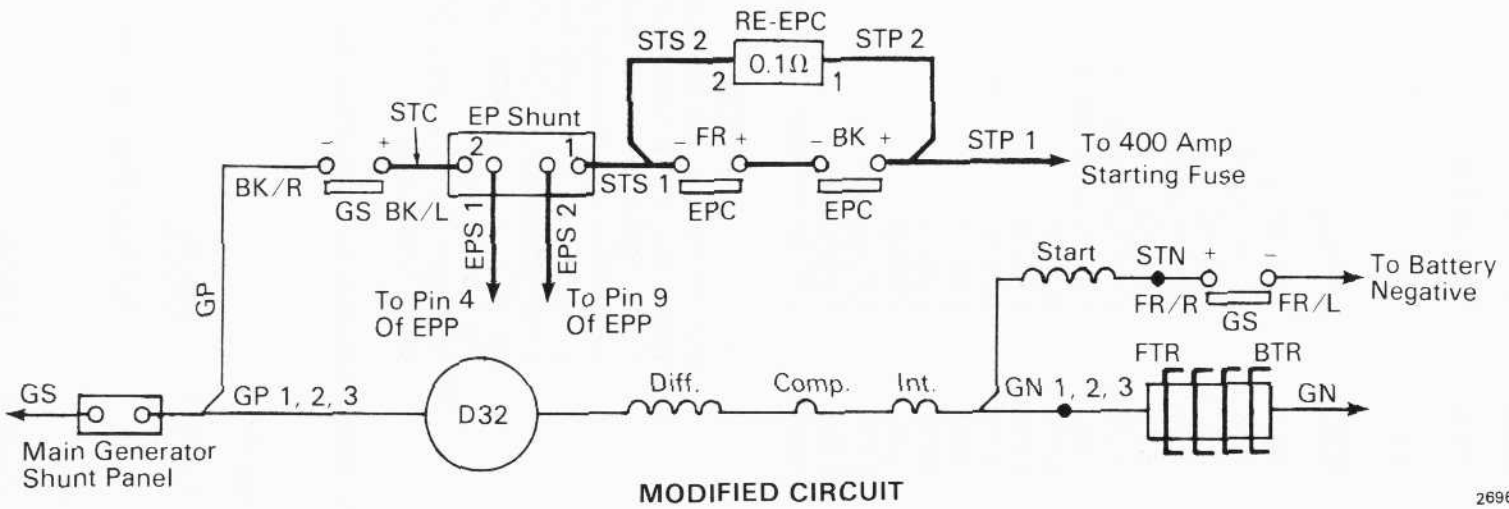
| <u>CABLE</u> | <u>FROM</u> | <u>TO</u> |
|--------------|------------------------|------------------|
| STP | 400 Amp. Starting Fuse | GS Contactor Pos |

2. Add the following cable:

| <u>CABLE</u> | <u>FROM</u> | <u>TO</u> |
|--------------|------------------------|-------------------------|
| STP1 | 400 Amp. Starting Fuse | EPC Contactor Pos-Back |
| STP2 | RE-EPC-1 | EPC Contactor Pos-Back |
| STS1 | EP Shunt-1 | EPC Contactor Neg-Front |
| STS2 | RE-EPC-2 | EPC Contactor Neg-Front |
| STC | EP Shunt-2 | GS Contactor Pos |



PRESENT CIRCUIT



MODIFIED CIRCUIT

26961

Fig.4 - Application Of EP Shunt And EPC Contactor To Starting Circuit

A Service Department Publication

Electro-Motive Division Of General Motors La Grange, Illinois 60525