GEJ-6357A

OPERATING MANUAL

NEW SERIES DIESEL-ELECTRIC LOCOMOTIVE

MODEL B30-7A (CABLESS)

GENERAL ELECTRIC

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GENERAL ELECTRIC

CONTENTS

Model Designation	B30-7A
Type (AAR symbol)	B-B
Horsepower (net)	3000
Diesel Engine	GE-FDL12
Number of Cylinders	12
Full Speed	1050 rpm
Idle Speed:	
Normal	450 rpm
Low	385 rpm
Main Alternator	5GTA24
Traction Motors	
Model	5GE752AF
Number	4
Type	D-C, Series Wound
Wheel Diameter	40 in.
Major Dimensions	
Length	61 ft., 2 in.
Width	119 in.
Height	14 ft., 11 in.
Length Between:	
Bolster Centers	37 ft., 2 in.
Truck Wheel Base	108 in.
Minimum Curve	
Locomotive Alone	150' or 39'
Coupled to Train	250' or 23'
Weight (typical) (lb.)	
Minimum	253,000
Maximum	280,000
Supplies	
Fuel Capacity	3250 gal.
Lubricating Oil	300 gal.
Cooling Water	335 gal.
Governor Oil	2 qts.

Sand	60 cu. ft.
Center of Gravity	
Serviced	61.86 in. off rail
Unserviced	64.53 in. off rail
Horsepower	
Notch 1	100 hp
Notch 2	180 hp
Notch 3	430 hp
Notch 4	730 hp
Notch 5	1440 hp
Notch 6	1930 hp
Notch 7	2500 hp
Notch 8	3090 hp

INTRODUCTION

The General Electric Co. Model B30-7A (cabless) diesel electric locomotive, illustrated in Figs. 1 and 2, is equipped with a turbocharged 12 cylinder GE-FDL12 diesel engine which drives the main alternator. Electrical power from the alternator is rectified and distributed to the four traction motors through the lower control compartment. Each of the four traction motors is geared directly to a pair of driving wheels. The 83/20 gear ratio of the traction motor to wheel axle determines the maximum operating speed of 70 mph.

The four traction motors are connected permanently in parallel. The main alternator has two outputs. From zero to 31 mph, the alternator outputs are connected in parallel for more starting current. Above 31 mph, the alternator outputs are connected in series for higher voltage for high speed operation.

FIG. 1, E-30985

FIG. 1. B30-7A CABLESS (1982 MODEL).

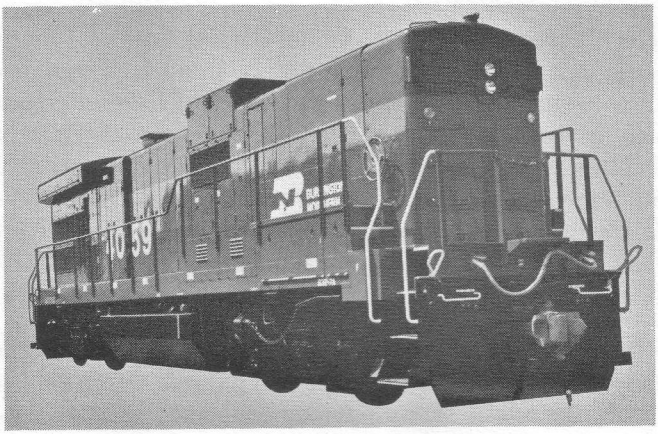


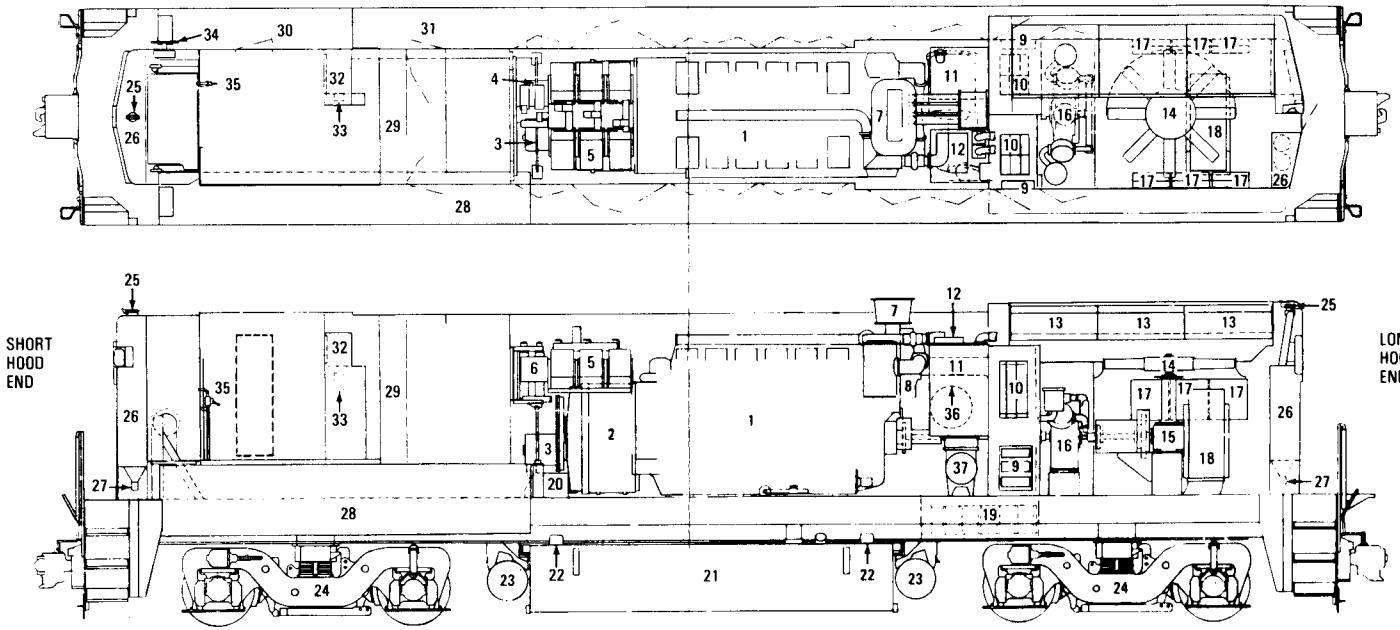
FIG. 2, E-31309

FIG. 2. B30-7A CABLESS (1983 MODEL).

The locomotive is designed to be used in multiple as a TRAIL LOCOMOTIVE ONLY. When coupled together in multiple, this unit receives all control commands from the lead locomotive through jumper cables from the lead locomotive.

There is NO hostler station or operator's air brake controls. There is an emergency air brake valve located just inside the door to the Engine Control (EC) panel room. A hand brake is provided. For Location of Apparatus drawings, see Fig. 3A for 1982 Model and Fig. 3B for 1983 Model.

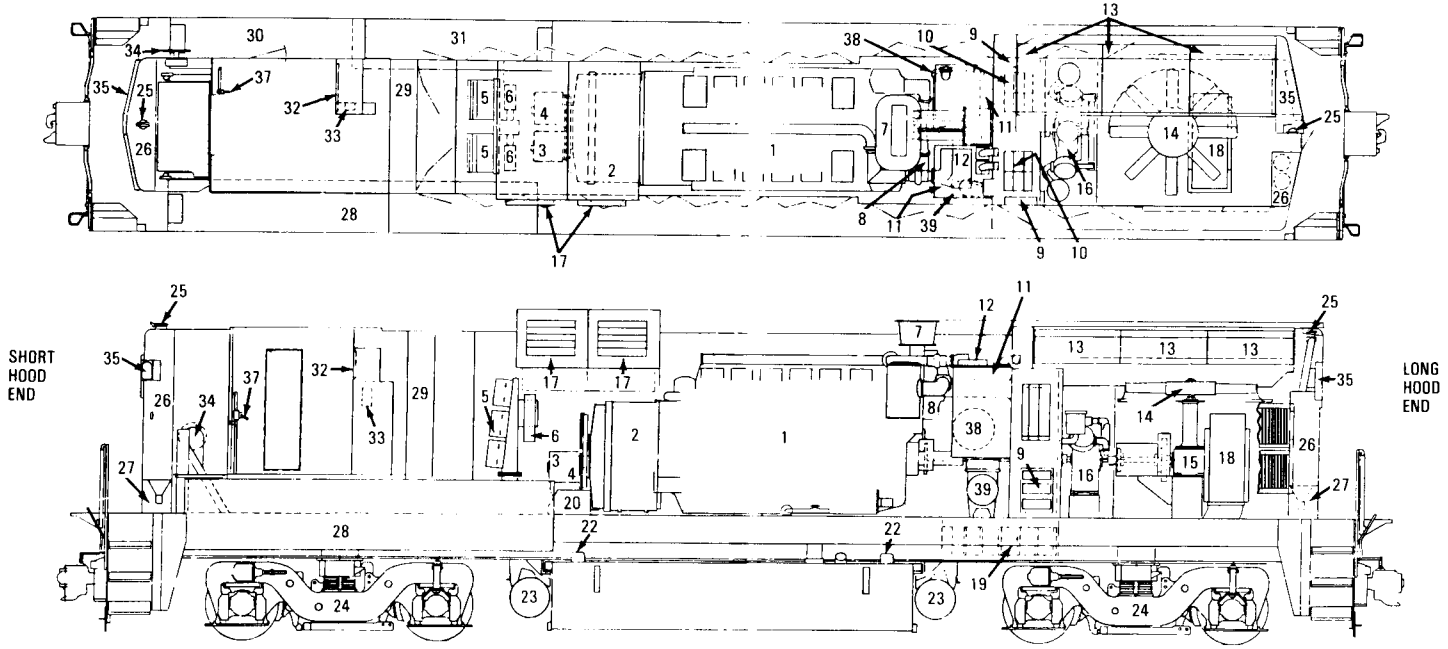
FIG. 3A, E-29423



REF.	DESCRIPTION	REF.	DESCRIPTION	REF.	DESCRIPTION
1	ENGINE – GE MODEL 7FDL12	14	RADIATOR FAN AND EDDY-CURRENT CLUTCH	27	SAND TRAP ENCLOSURES
2	ALTERNATOR			28	LOWER CONTROL COMPARTMENT
3	AUXILIARY GENERATOR	15	RADIATOR FAN GEAR UNIT	29	UPPER CONTROL COMPARTMENT
4	EXCITER	16	AIR COMPRESSOR	30	AIR BRAKE EQUIPMENT COMPARTMENT
5	RECTIFIERS	17	BRAKING GRIDS		
6	CONTACTORS	18	EQUIPMENT BLOWER	31	BATTERY BOX
7	ENGINE MUFFLER	19	EQUIPMENT AIR FILTERS	32	ENGINE CONTROL PANEL
8	TURBOCHARGER	20	AIR DUCT	33	BATTERY SWITCH
9	PRIMARY ENGINE AIR FILTERS	21	FUEL TANK	34	HANDBRAKE
10	SECONDARY ENGINE AIR FILTERS	22	FUEL FILLER	35	EMERGENCY BRAKE VALVE
		23	MAIN AIR RESERVOIRS	36	LUBE-OIL FILTER HOUSING
11	ENGINE WATER TANK	24	TRUCK	37	LUBE-OIL COOLER HOUSING
12	FLUID AMPLIFIER	25	SAND FILL		
13	RADIATORS	26	SAND BOX		

1982 MODEL
FOR 1983 MODEL, SEE FIG. 3B

FIG. 3A. LOCATION OF APPARATUS (1982 MODEL).



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8	TURBOCHARGER	20	AIR DUCT	33	BATTERY SWITCH
9	PRIMARY ENGINE AIR FILTERS	21	FUEL TANK	34	HANDBRAKE
10	SECONDARY ENGINE AIR FILTERS	22	FUEL FILLER	35	NUMBER AND HEADLIGHT BOX
		23	MAIN AIR RESERVOIR	36	GOVERNOR
11	ENGINE WATER TANK	24	TRUCK	37	EMERGENCY BRAKE VALVE
12	FLUID AMPLIFIERS	25	SAND FILL	38	LUBE-OIL FILTER HOUSING
13	RADIATORS	26	SAND BOX	39	LUBE-OIL COOLER HOUSING

1983 MODEL
FOR 1982 MODEL, SEE FIG. 3A

FIG. 3B, E-31311

FIG. 3B. LOCATION OF APPARATUS (1983 MODEL).

When in MU with a controlling locomotive, the engine speed schedule is as follows in motoring:

Throttle Handle (Control Loco-motive)	Engine Notch	Engine RPM (1982)	Engine RPM (1983)
Idle	*	445-453	450
1	1	445-453	450
2	2	521-549	536
3	4	704-712	705
4	5	758-788	765
5	6	876-884	879
6	6	876-884	879
7	7	962-980	964
8	8	1049-1057	1050

*If EC switch is in the SUMMER ISOLATE, LOW IDLE position, then idle speed is 450 rpm for 1983 models.

If EC switch is in the WINTER ISOLATE, HIGH IDLE position, then idle speed is 705 rpm, or Notch 3.

When in dynamic braking, engine speed depends upon the amount of current to the braking grids:

Grid Amps	1982 Vintage	1983 Vintage
0-449	Engine at IDLE	Engine at IDLE
450-574	Engine at Notch 5	Engine at IDLE
575-720	Engine at Notch 8	Engine at Notch 5

DIESEL ENGINE CONTROL GOVERNOR

The diesel engine control governor's primary function is to maintain speed of the diesel engine as called for by the

Throttle Handle notch setting in the controlling locomotive controller. Engine rpm is maintained under a full range of loads. The governor also monitors the engine oil and water pressures, and will **modulate** the load and engine speed or, if necessary, shut the engine down if either pressure should fall below preset limits. Intake manifold air pressure is also monitored and the governor will limit the fuel available to the engine if the air pressure is below that required for complete combustion.

ENGINE CONTROL PANEL (Fig. 4)

The Engine Control (EC) panel is located on the rear wall of the utility cab. This is the same location as on all GE locomotives. See Figs. 3A and 3B for details. Mounted on this panel are various switches, circuit breakers and operating devices used during the locomotive operation.

BATTERY SWITCH

The location of the Battery switch is to the right of the EC panel behind a hinged door with a finger pull open hole for opening.

DEVICES ON ENGINE CONTROL (EC) PANEL

Engine Control (EC) Switch (Fig. 5)

The Engine Control switch (Isolation switch) has four (4) positions; RUN, WINTER ISOLATE/HIGH IDLE, SUMMER ISOLATE/LOW IDLE, START/NORMAL IDLE/ALARM OFF. The Engine Start button located at the Start Station is only effective when the EC switch is in the START position.

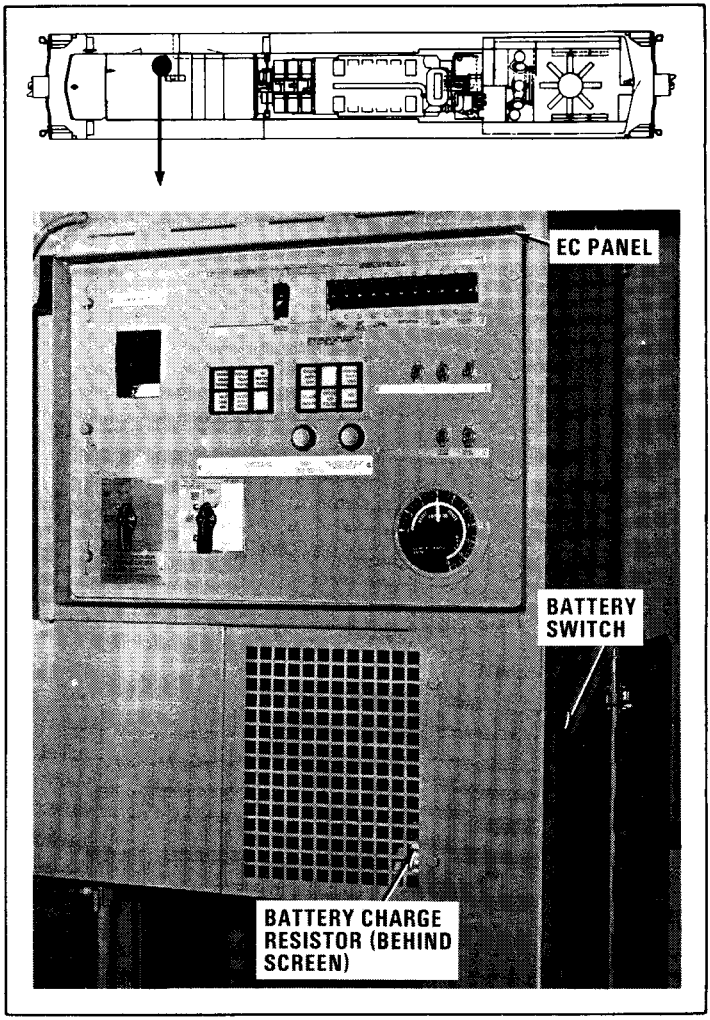

FIG. 4, E-31333

FIG. 4. ENGINE CONTROL (EC) PANEL.

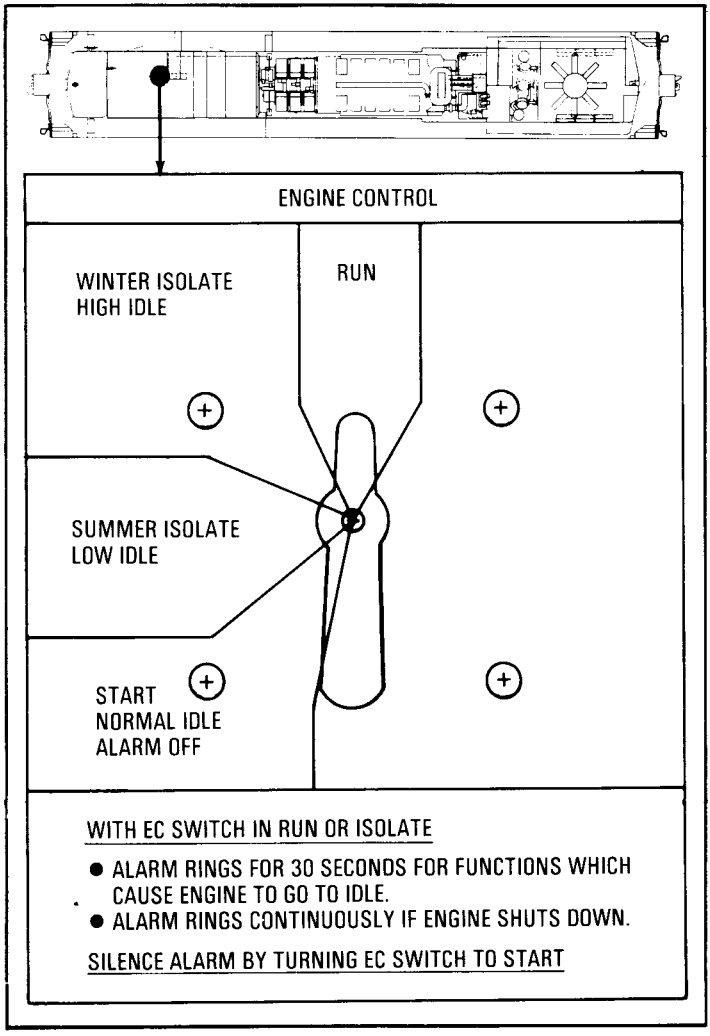

FIG. 5, E-30987

FIG. 5. EC SWITCH NAMEPLATE.

When the engine is running and the EC switch is in the START or ISOLATE position, engine speed is held at idle and power cannot be applied to the locomotive.

When the engine is idling and the locomotive is to be operated, the EC switch must be moved to the RUN position.

When the engine is running and the EC switch is in either ISOLATE position, engine speed is held at idle and power cannot be applied to the locomotive. The alarm bell will sound continuously if a fault occurs that will shut the engine down. If a fault occurs that takes the unit "off line" but does not shut down the diesel engine, the alarm bell will ring for 30 seconds.

MU Headlight Set-Up Switch (Fig. 6)

The MU Headlight Set-Up switch has three positions. Positioning of the switch is determined by location of the locomotive unit in the consist and whether the front or the rear of the locomotive is trailing. Switch positions are as follows:

1. MIDDLE UNIT: Place this switch in this position on all locomotives operated, except the lead or trail locomotives.

*2. SHORT HOOD TRAIL – TRAILING UNIT: Place switch in this position when the final trailing unit is connected so its short hood trails.

*3. LONG HOOD TRAIL – TRAILING UNIT: Place switch in this position when the final trailing unit is connected so its long hood trails.

*See Figs. 3A and 3B for details.

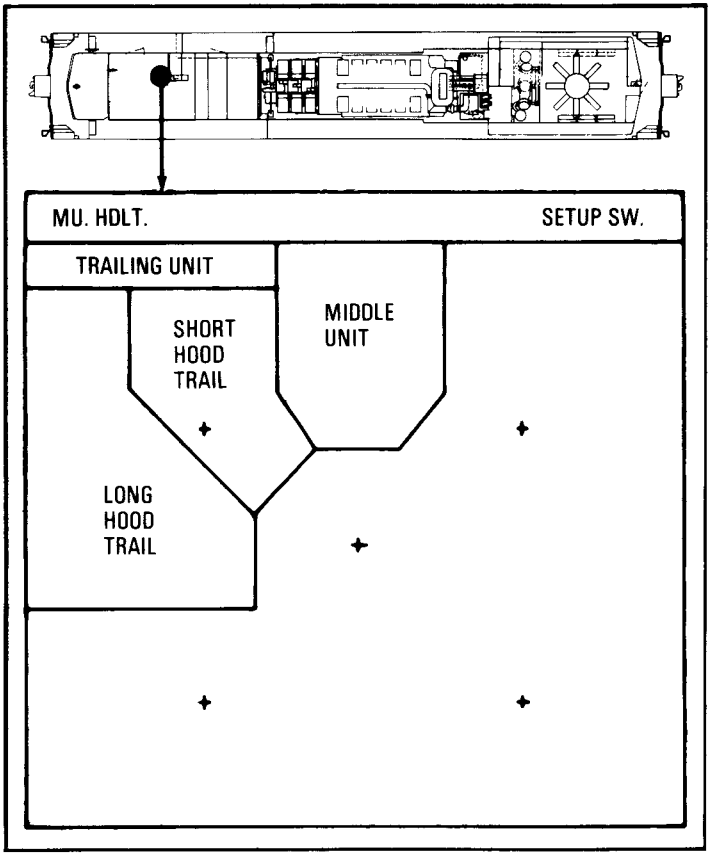

FIG. 6, E-30988

FIG. 6. MU HEADLIGHT SET-UP SWITCH NAMEPLATE.

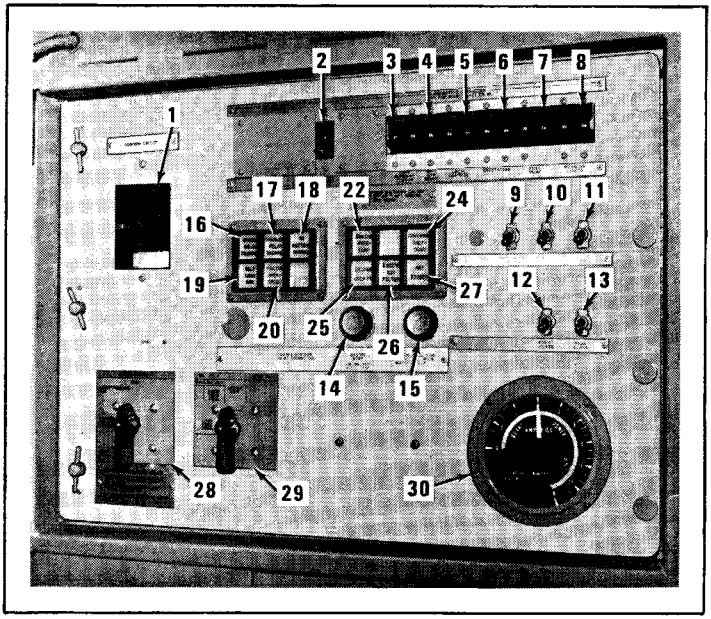

FIG. 7, E-31334

FIG. 7. ENGINE CONTROL (EC) PANEL.

Circuit Breakers on EC Panel (Fig. 7)

The following are circuit breakers located on the EC panel from left to right as you face it. (Numbers indicate references on Fig. 7.)

1. Battery Charge
2. Control*
3. Eddy Current Clutch
4. Unit Dynamic Braking
5. Local Control
6. Excitation
7. Fuel Pump
8. Running Lights.

*This breaker must be left ON when the unit will be left running by itself to assure an engine shutdown if a fault occurs.

The following switches and push-buttons are located on the EC panel:

9. Cross Walk Light switch
10. Control Compartment Light switch
11. Step Light switch
12. Front Class Light switch
13. Rear Class Light switch
14. Engine Stop push-button
15. Air Filter, Fuel Pump, Hot Diode and Open Motor Reset push-button.

The following indicating lights are located on the EC panel:

16. Ground Relay Tripped
17. Overload Relay Tripped
18. No Battery Charge
19. Self-Load
20. Engine Overspeed (1983 Model only)
21. Blank
22. Engine Overtemperature

23. Blank
24. Governor Shutdown
25. Crankcase Overpressure
26. Engine Air Filter
27. Hot Diodes.

The following devices are located on the EC panel:

28. Engine Control Switch (EC)
29. MU Headlight
30. Loadmeter.

MISCELLANEOUS CONTROLS

1. Hand Brake – Located outside of short hood door, Figs. 3A and 3B.

2. Emergency Brake Valve – Handle located right side of door. Pulling this handle causes an Emergency brake application and dropping of power.

3. Emergency Fuel Cut-Off System – In an emergency, any one of four electric push-buttons may be depressed momentarily to cut off fuel delivery and shut down the engine. One of these buttons is located on each side of the locomotive under frame near the fuel tank. The third button (Engine Stop) is located on the EC panel and the fourth button (Engine Stop) is located at the Start Station. The Stop buttons on the EC panel and the Start Station are used for normal engine shut down.

NOTE: ***Emergency Cut-Off buttons are used to shut down the engine on that locomotive only. The SHUT-DOWN position of the Throttle handle on the Master Controller of a cab unit will shut down the engines on all units of the consist simultaneously.***

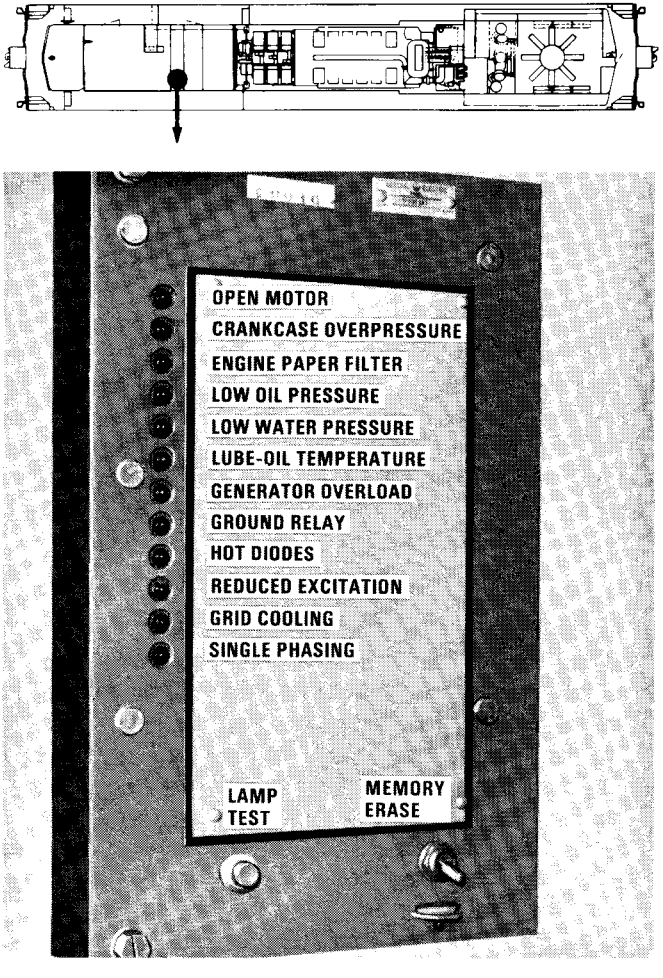

FIG. 8, E-30989

FIG. 8. ANNUNCIATOR PANEL.

ANNUNCIATOR PANEL MEMORY FUNCTIONS (Fig. 8)

The Annunciator panel is strictly a memory device whose only purpose is to inform a qualified trouble-shooter of occurrences that have happened on the locomotive.

Operating the Memory Erase switch will only turn off the lamps on the Annunciator panel and will not reset any functions on the locomotive. DO NOT operate the Memory Erase switch unless the cause of the indication has been located and corrected.

The following checks and inspection should be made in accordance with railroad rules.

BEFORE BOARDING LOCOMOTIVE

1. Inspect for broken, worn, loose or dragging parts (brake rigging, brake shoes, wheels, traction motor commutator covers, etc.).
2. Check if engine cooling water, fuel oil, lube oil or air leaks on the locomotive may be present.
3. Insure all drain and cut-out cocks are properly positioned.
4. Insure proper connection of air hoses and electrical jumper cable.
5. Check the fuel supply on the fuel tank sight glass or gauge.

AFTER BOARDING LOCOMOTIVE

1. Insure rags, tools, etc., have been removed from moving parts and electrical equipment.
2. Check the diesel engine lubricating-oil supply. Oil level should indicate FULL on the measuring gauge with the engine idling. If the diesel engine is shutdown, the oil level will indicate above the FULL mark. A measuring gauge (dipstick) is located on both sides of the engine and is marked LOW and FULL. Check that the drain-back valve "C" is fully closed, Fig. 9.

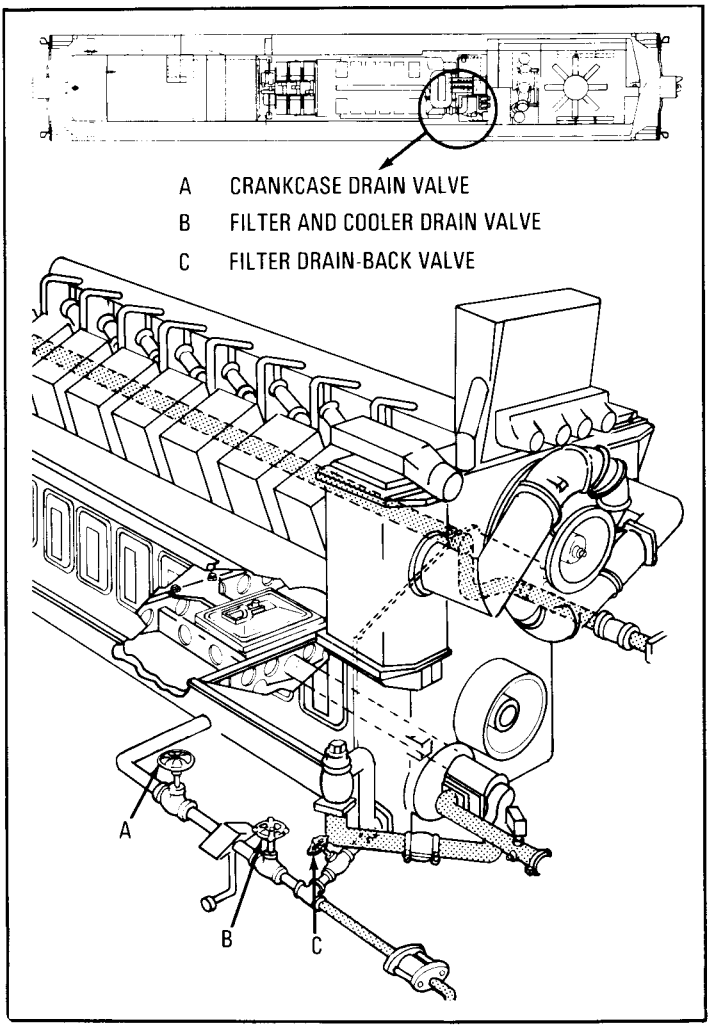

FIG. 9, E-30990

FIG. 9. LUBE-OIL SYSTEM DRAIN VALVES.

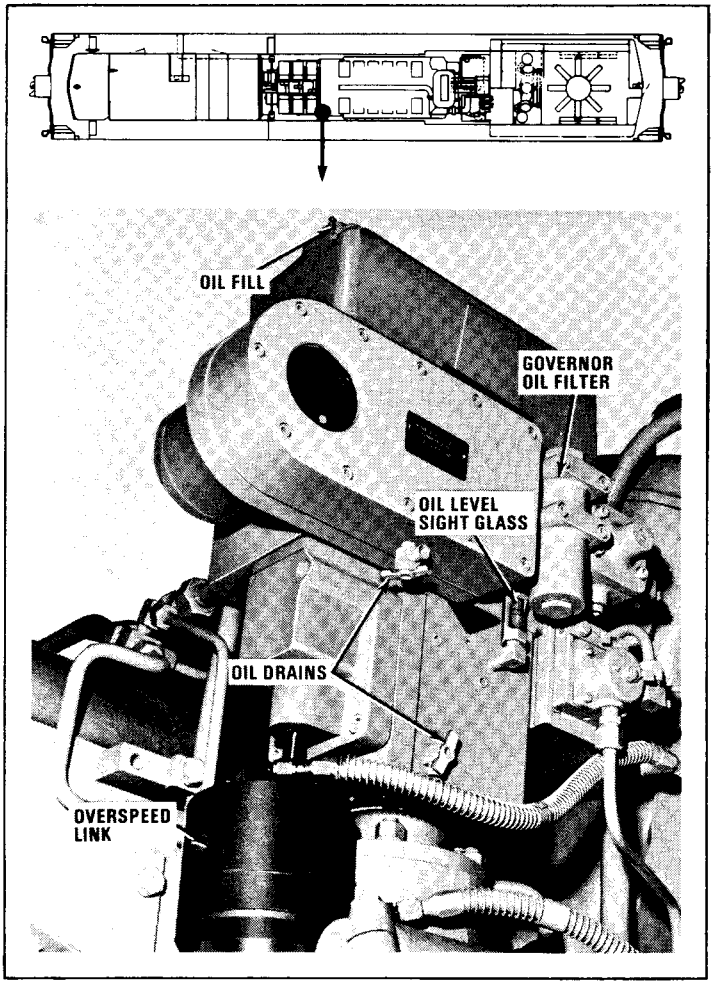

FIG. 10A, E-30991

FIG. 10A. ENGINE GOVERNOR (1982 MODEL).

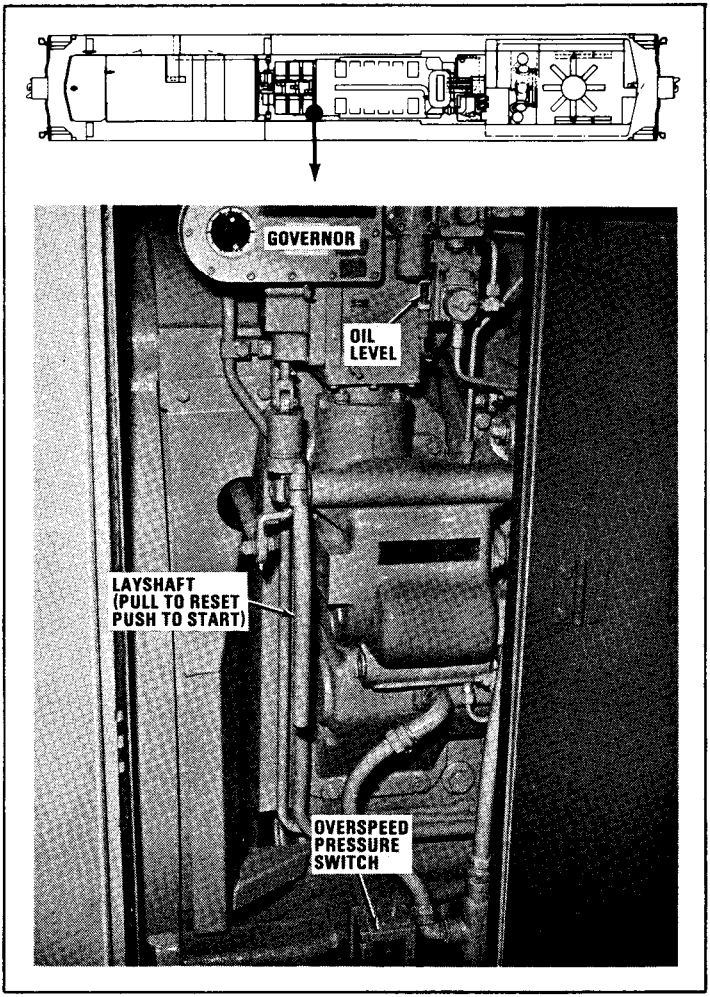

FIG. 10B. E-31337

FIG. 10B. ENGINE GOVERNOR (1983 MODEL).

3. Check the governor oil supply. The sight glass on the governor should be full of oil. After the engine is started, the oil level must be near the mark on the sight glass, Figs. 10A and 10B.

4. Check the air compressor lubricating-oil supply. The proper oil level is indicated on the dipstick near the oil fill cap, Fig. 11.

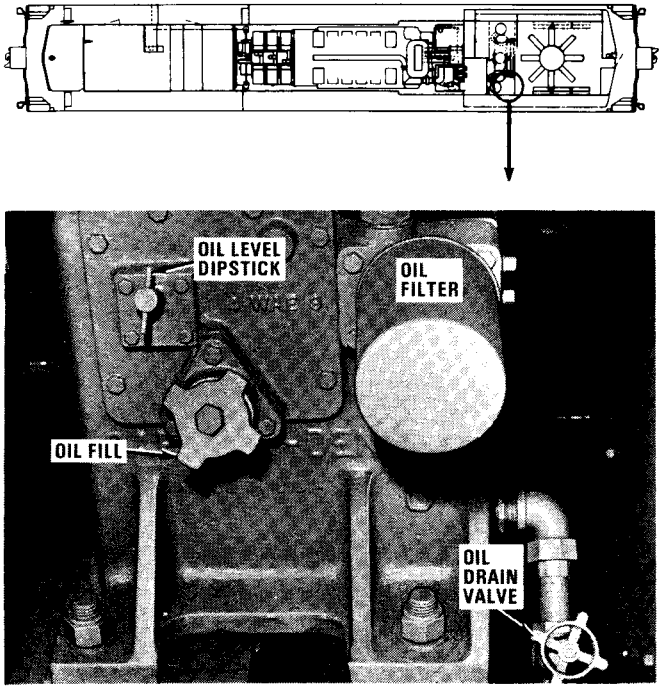

FIG. 11, E-30992

FIG. 11. AIR COMPRESSOR.

5. Check the cooling water supply. Be sure the water drain valve is closed, Fig. 21.

NOTE: ***A fold-down step is provided to reach the water fill cap.***

6. Check that the fan-gear unit oil level is up to the spill-over of the fill pipe when the engine is shutdown, Fig. 12.

FIG. 12, E-30993

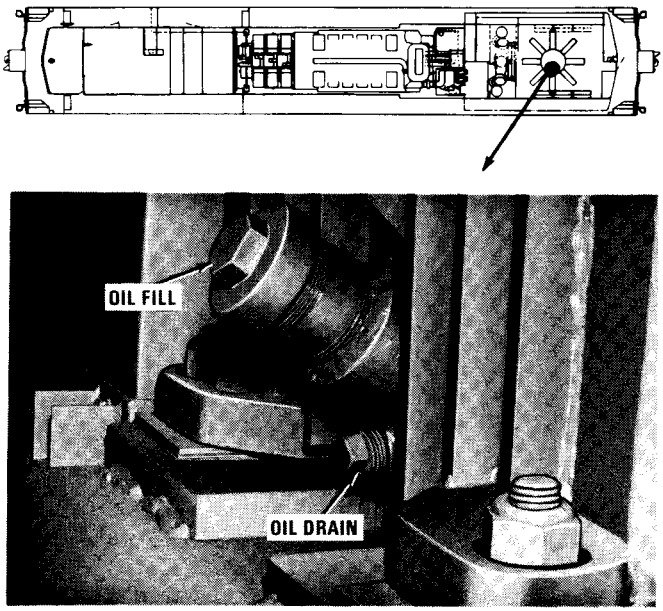

FIG. 12. FAN GEAR UNIT.

7. Check the lubricating oil of the generator gear unit. The dipstick is marked EMPTY – ADD – FULL. The proper level is between the ADD and FULL marks, Fig. 13.

8. Check that the diesel engine overspeed device is reset, Fig. 14. If model with layshaft, pull to insure device is reset.

9. Check that the engine barring-over device is removed from the engine and cover is mounted in place, Fig. 14.

10. Check that the following cut-out cocks are open:

    a. Air compressor governor
    b. Control air.

11. Move the Engine Control switch to START.

12. Properly position the MU Headlight Selector switch.

STARTING ENGINE (Figs. 15A and 15B)

1. Perform operations as in Before Boarding Locomotive and After Boarding Locomotive sections.

NOTE: ***If the engine has been stopped for a considerable period of time, the cylinders should be cleared of fuel or water accumulation before starting the engine.***

Proceed as follows:

a. Apply the engine barring-over device, and back off the compression relief plugs on the left side of each cylinder.

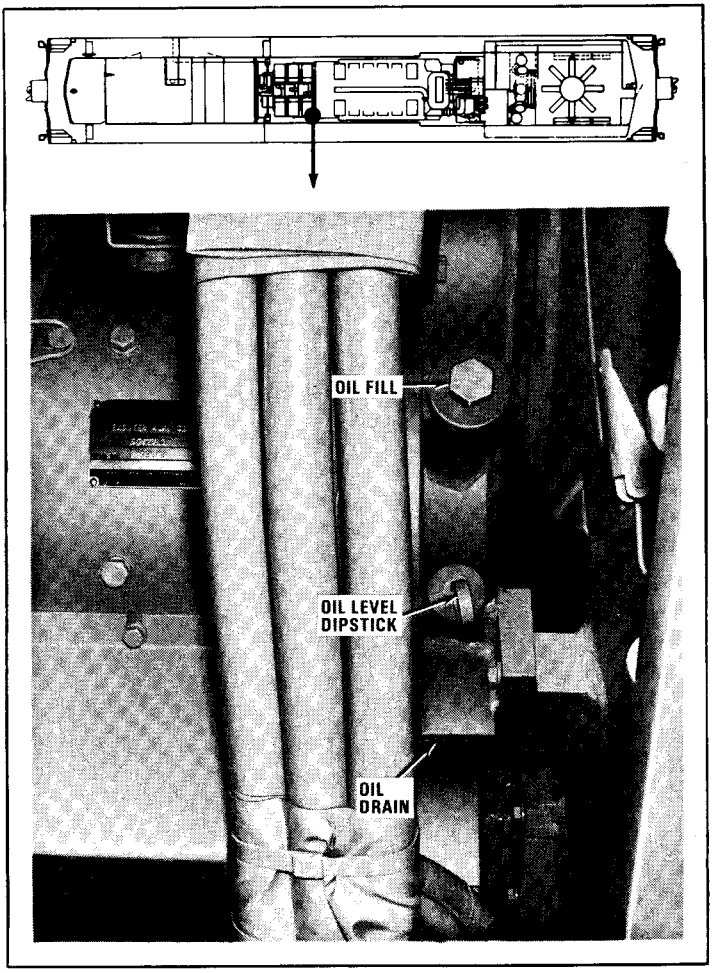

FIG. 13, E-30994

FIG. 13. TRACTION GENERATOR GEAR UNIT.

b. Rotate the engine at least two complete revolutions by use of the engine barring-over device.

c. Remove the barring-over device from the engine, and tighten all compression relief plugs before cranking.

NOTE: ***Cover for barring-over feature must be securely mounted; otherwise, engine cannot be cranked.***

2. Close the Battery switch located in the Auxiliary Cab.

3. On the EC panel, check that the Governor Shutdown light or other power-limiting indicating lights are not on. The cause of faults must be cleared before proceeding.

4. Close the following circuit breakers on the EC panel:

   a. Battery Charge
   b. Control*
   c. Eddy Current Clutch
   d. Unit Dynamic Braking
   e. Local Control
   f. Excitation
   g. Fuel Pump
   h. Running Lights.

*When starting engines of several locomotives in a consist, start engines one at a time. Close the Control circuit breaker on the controlling locomotive only. Push the Fuel Pump Reset button, and allow the fuel pump to run a few seconds until fuel is in the sight glass before starting the engine.

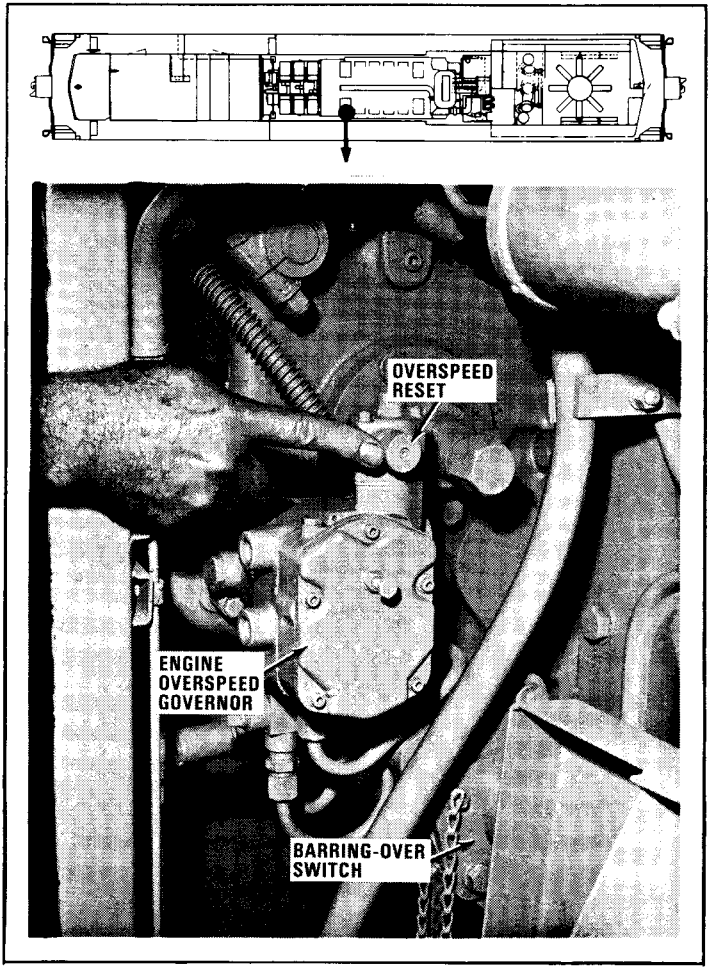

FIG. 14, E-30995

FIG. 14. ENGINE OVERSPEED GOVERNOR RESET AND BARRING-OVER SWITCH.

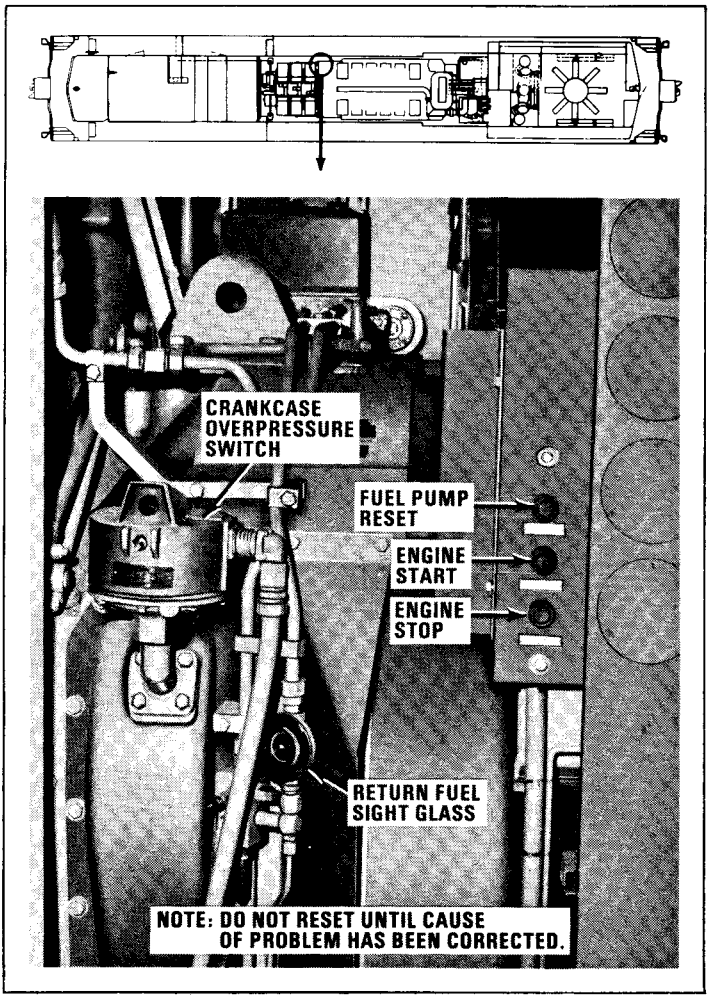

FIG. 15A, E-30996

FIG. 15A. START STATION (1982 MODEL).

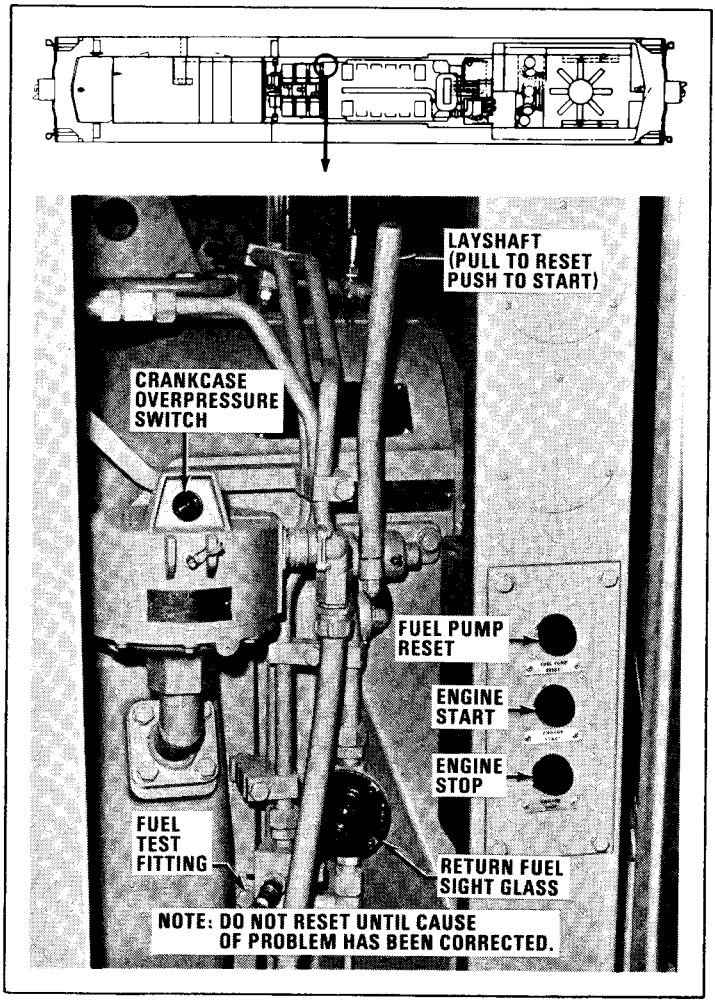

FIG. 15B, E-31336

FIG. 15B. START STATION (1983 MODEL).

NOTE: ***When fuel is first observed in the sight glass of a non-running GE engine, the fuel will look clear. After the engine is started, the fuel will turn a murky color. This is to be considered normal.***

Push the Engine Start button. Then push in half the travel of the layshaft until engine starts.

NOTE: ***If proper engine lube-oil pressure does not build up within approximately 40 seconds, the governor will shut off fuel and prevent the engine from starting. (Refer to Pressure and Temperature Gages section).***

CAUTION: ***Do not discharge the battery excessively by repeated attempts to start. If the first two or three tries are unsuccessful, recheck the starting procedure.***

COLD WEATHER ENGINE STARTING/WARM-UP

During cold weather conditions, when a locomotive has been shut down for a period of time, special attention must be given to engine starting and warm up to avoid equipment failure from thermal or overload strain. After start-up, engine speed must be **limited to no higher than Notch 3** until water tank temperature has reached 140 F.

DIESEL ENGINE OVERSPEED

A new overspeed shutdown system, shown in Figs. 10B and 15B is in 1983 standard on General Electric diesel engines. The operating principle remains the same in that a link beneath the governor extends to shut off fuel to the cylinders when engine speed is too high.

The main feature of the new system is that engine cranking time is greatly reduced. Fuel pump racks move quickly to the starting position with no delay. The overspeed link does not have to be pumped up and compressed into the fuel ON position as with earlier models.

Another feature is the layshaft lever, which has two functions. One is to reset the overspeed link after an overspeed shutdown. The lever may also be used to provide more fuel to the cylinders during cranking if desired.

Note that the location of the lever prevents inadvertent manual overspeeding of the engine beyond the trip setting. Once the device trips, manual control of the fuel racks is eliminated. With the previous overspeed system it was possible to override the overspeed link after it tripped and continue to control the fuel racks manually.

Additionally, the overspeed governor has an automatic reset feature. Note there is no Reset button on it. After an overspeed trip, the governor resets internally at about 600 rpm.

OVERSPEED SHUTDOWN

When the overspeed governor trips and dumps oil pressure from the actuator, oil pressure is immediately lowered. The overspeed link snaps open and fuel racks go to zero.

OVERSPEED RESET

The system allows a manual resetting of the overspeed link. By pulling outward on the layshaft lever, the overspeed link spring is compressed until the actuator pin re-engages the overspeed link.

OTHER SYSTEM FEATURES

Oil from the overspeed governor circulates through the chamber to keep the actuator warm in cold weather. A relief valve in the outlet line allows a small amount of oil to flow back to the crankcase.

An Oil Pressure switch is also included. Its purpose is to indicate no oil pressure to the actuator by lighting the ENGINE OVERSPEED lamp on the EC panel. Since the system depends on a rapid pressure drop developing in the actuator in order to function, the absence of oil pressure would result in no overspeed protection.

The Oil Pressure switch is open below 130 psi. In the event of a true overspeed shutdown, a continuous alarm would be trainlined due to no battery charging. Also, an Engine System Monitor light will come on.

If, however, there were some system fault (no oil pressure to the actuator for any reason), the engine would start and run at IDLE but could not be loaded. In this case, the alarm would be trainlined for 30 seconds.

AIR BRAKE EQUIPMENT

The modified 26-F System without control valves is arranged for multiple-unit operation as a TRAIL unit only on this locomotive. The principal parts are as follows.

TYPE 26-F CONTROL VALVE

This valve is located in the air brake compartment. When actuated by changes of pressure in the brake pipe, it operates to charge, apply and release the locomotive brakes.

CUT-OUT COCKS

The following cut-out cocks are located on the locomotive:

1. Main Reservoir Cut-Out cocks – Located on right side of locomotive near the main reservoir. One is for the No. 1 main reservoir and one is for the No. 2 main reservoir.
2. Main Reservoir Drain cocks – One located on the end of each main reservoir, usually part of automatic drain valves.
3. Air-Filter Drain cocks – Normally located at the rear of the fuel tank on filter and on auxiliary air filter at front of fuel tank.
4. Control-Air Cut-Out cock – Located in air brake compartment as part of reducing valve.
5. Control-Air Reservoir Drain cock – Located in air brake compartment on the wall towards the rear of the locomotive.

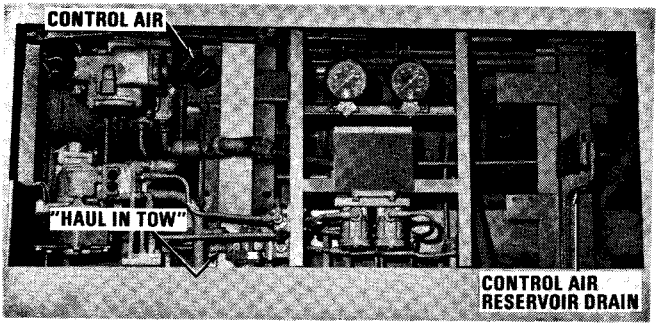

FIG. 16, E-31002

FIG. 16. AIR BRAKE RACK.

6. Brake Cylinder Cut-Out cocks – Located on right side beneath locomotive platform lever (one for each truck).

7. Air Compressor Governor Cut-Out cock – Located in air compressor compartment accessible from right side of locomotive.

8. Sander Control Cut-Out cocks – Located behind doors above platform on both ends of the locomotive.

9. Cut-out cocks on each end of locomotive, Fig. 17:

   a. Brake pipe cut-out cock (BP)
   b. Main Reservoir Equalizing (MR)

c. Actuating (ACT)
d. Independent Application and Release (IAR), labelled (AP).

10. Haul In Tow cock – Located in air brake compartment.

ADJUSTING VALVES

Control Air Reducing Valve

This valve maintains a predetermined pressure in the air supply for operation of the reverser, braking switch and pneumatic contactors. Clockwise adjustment of adjusting screw increases pressure. Normal control air pressure is 70 lb.

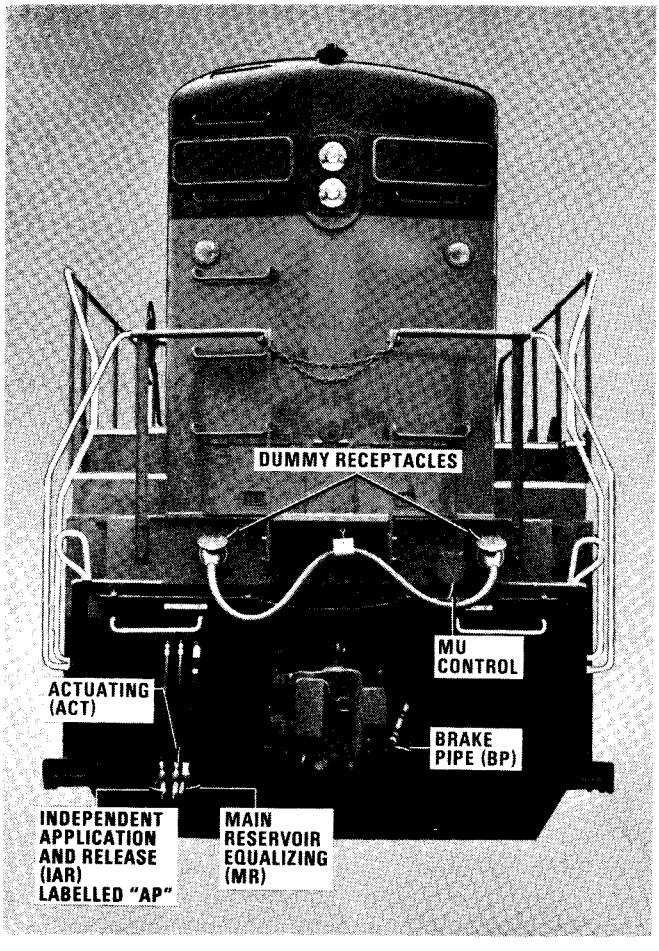

FIG. 17, E-30997

FIG. 17. LOCOMOTIVE END CONNECTION.

Locations of the following described alarms and safeguards may be found in Figs. 3A and 3B, Location of Apparatus.

CIRCUIT BREAKERS

1. Operates like a Toggle switch to open circuit manually. Two types of breakers are used, magnetic and thermal.
2. The Magnetic Breaker toggle moves to OFF position during circuit overload.

   The Thermal Breaker toggle moves to the center position during circuit overload.

NOTE: ***The Charging circuit breaker is the only thermal circuit breaker used. All others are magnetic.***

3. When the electric overload is cleared, the breaker reset is as follows:

   Magnetic Breaker toggle is moved back to ON position.

   Thermal Breaker toggle is moved to OFF, then to ON after allowing a few minutes for thermal element to cool.

COLORED INDICATING LIGHTS AND BELL

Colored indicating lights on the EC panel are a visual means used to indicate a condition of operation, an existing fault or abnormal situation. When a fault light comes on, a warning bell will also sound. The warning bell will sound in all locomotives for 30 seconds when a fault occurs that will take the locomotive off line but not shut down the engine. If the engine is shut down, then the alarm bell will sound continuously until the Isolation switch is placed in the START/ISOLATE position. The fault light will stay on only on the affected unit.

INDICATING LIGHTS ON EC PANEL (Fig. 7)

The following is a functional description of indicating lights on the EC panel:

1. Ground Relay Tripped (White) – Indicates a ground fault in the main power circuits. Alarm bell will sound for 30 seconds; power will be removed; engine speed will go to idle.

   Ground relay operation occurring while cranking the engine indicates a ground in the control circuits. Report this condition.

   Ground relay and overload relay reset may be done either automatically or manually. The method will depend upon installed equipment as specified by the railroad.

   a. Automatic Reset – If automatic reset equipment is installed, either or both relays will be reset three times without any action on the part of the operator. The equipment will automatically lock out after four ground relay actions within a specific period of time.

      Isolate locomotive after fourth consecutive trip.

   b. Manual Reset – Reset push-button located in upper control compartment.

      1) Take the engine off the line.
      2) Depress the Reset button.

   c. Advance the controlling locomotive's Throttle handle. If the ground relay or overload relay stays in,

continue normal operation. Running at a reduced engine speed may be helpful.

If the ground relay or the overload relay operates a fourth consecutive time, the affected locomotive must not be operated. Isolate the locomotive by turning the EC switch to applicable ISOLATE position.

NOTE: ***When the Ground Relay Cut-Out switch (GRCO) is opened, the locomotive will not operate. Diesel engine will continue to run at speed called for by the Throttle handle. Generator Field circuit will be open.***

2. Overload Relay Tripped (White) – Indicates a transient or continuing overload condition in the main alternator field circuit. Alarm bell will sound for 30 seconds; power will be removed; engine speed will go to idle.

   Most probable cause for operation of this relay is a traction motor flashover, perhaps resulting from full power operation over a railroad crossing, excessive speed or other condition causing violent motor shock.

   Resetting the overload relay is done by depressing the same button used to reset the ground relay. Follow instruction in Step 1 above.

3. No Battery Charge (Blue) – If the engine is running and the Engine Control switch is in the RUN position, the light indicates the battery charging equipment has failed. The alarm bell will sound continuously.

When you first start up a unit and the Battery switch is closed, the No Battery Charge light may come on until the engine is started. Under these conditions, this is not considered a fault. If the light remains on after the engine is started, then there is a problem in the Battery Charging system.

4. Self-Load Box (White) – Indicates the Self-Load Box toggle switch in the upper control compartment is in the LOAD BOX position. The locomotive will not operate normally.

5. Engine Over-Temperature (Red) – Indicates engine lubrication oil or water temperature (or both) has exceeded the safe maximum operating condition. The alarm bell will sound for 30 seconds; power is removed; the engine is returned to idle.

   a. Examine the engine cooling water level and temperature gauge.

   b. Check filler cap to insure secure.

   c. To regain power and engine speed the Engine Temperature Holding Relay must be manually reset. Under normal operating conditions, this relay must only be reset by maintenance forces.

   Proceed as directed by railroad rules when this situation occurs.

6. Governor Shutdown (Yellow) – Indicates engine Low Oil Pressure (LOP) or Low Water Pressure (LWP) conditions have become so severe that it is unsafe for the engine to continue to run. In most circumstances,

actual shutdown will have been preceded by the engine developing less power and running at lower engine rpm's.

The alarm bell will sound continuously and the No Battery Charge light will come on.

Engine will not crank until the Governor Shutdown Holding Relay is reset.

a. If caused by lack of water, after filling system, reset Governor Shutdown Holding Relay and re-start engine.

b. If caused by low lubricating oil pressure, leave shutdown.

7. Crankcase Overpressure (Red) – Indicates a serious engine fault exists. Engine will shut down automatically. The alarm bell will sound continuously and the No Battery Charge light will come on, Fig. 18.

CAUTION: ***To prevent even more extensive engine damage, cause of shutdown must be determined and the fault corrected before any attempt is made to re-start the engine. Do not open doors to engine room area.***

8. Engine Air Filter (Red) – Indicates that the engine air filters are plugged with dirt or other material and must be changed. Power is removed and engine speed goes to idle. Alarm bell will sound for 30 seconds. Depress the Air Filter reset button on the EC panel to restore normal operation after the fault is corrected.

NOTE: ***Trouble may be caused by paper, leaves or other material obstructing the engine air filter air intake screens on either or both sides. Clear away such debris. If the device trips twice, leave the locomotive in the proper ISOLATE position.***

NOTE: ***Even with dirty filters, the engine may operate at less than full power. Full tractive effort can be developed, but not full power.***

NOTE: ***Early stage of air filter cleanliness can be observed on the service indicator mounted high on the right side of the locomotive near the radiator, Fig. 19. When the engine is running at full speed and the red band inside the indicator becomes visible, the air filter is starting to get dirty. When the red band locks in place at the sight portion of the indicator, the service condemning limit has been reached. Typically, about 30 days of operation remains before the engine will automatically go to idle. Report the condition.***

9. Hot Diodes (Red) – Indicates safe operating temperature of one or more of the power rectifier panels has been exceeded. The alarm bell will sound for 30 seconds, power will be removed and the engine speed will return to idle.

   The temperature sensors in the rectifier panels will reset automatically when sufficiently cool. Depress the Hot Diode Reset button on the EC panel to restore normal operation.

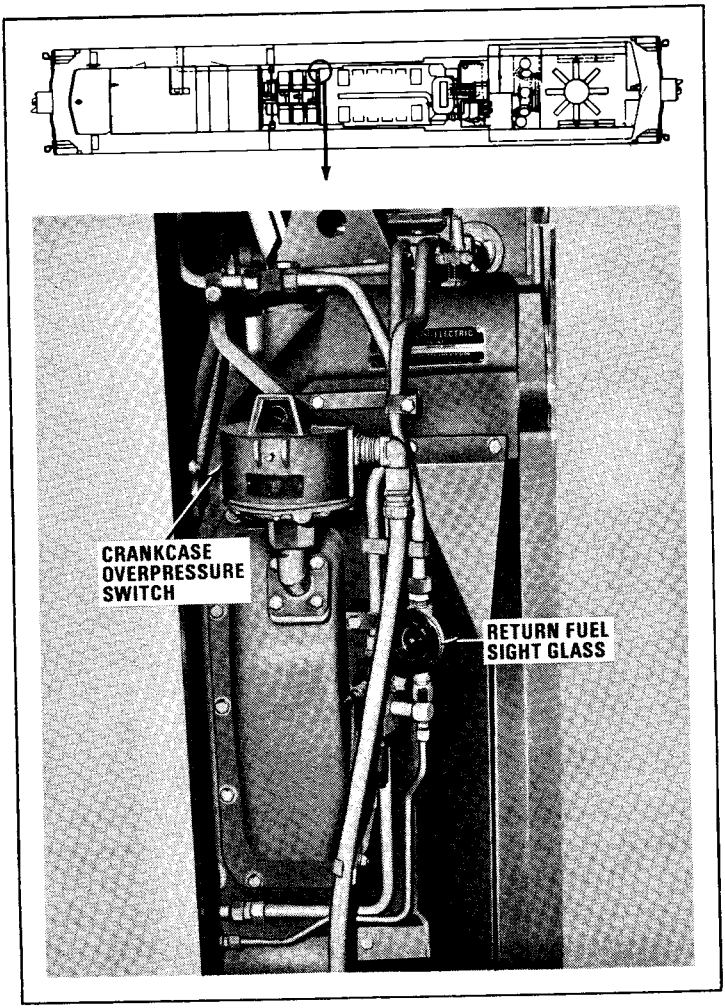

FIG. 18, E-30998

FIG. 18. CRANKCASE OVERPRESSURE SWITCH.

NOTE: ***Trouble may be caused by paper, leaves or other material obstructing the equipment blower air intake screens on either or both sides. Clear away any such debris. Another possible cause is loose or missing inspection covers on the main alternator. Replace them if possible. Proceed as directed by railroad rules when this situation occurs.***

10. Diesel Engine Overspeed (Red) 1983 and later models only – Indicates that either the oil pressure in the overspeed system is too low to trip the overspeed system or that an actual engine overspeed has occurred. To reset on 1983 or later models, pull back on the layshaft handle.

BARRING-OVER SWITCH

A Barring-Over switch, Fig. 14, is located under the cover of the engine barring-over feature behind the engine overspeed governor. This switch prevents the engine from being cranked while engine barring-over may be in progress.

ENGINE OVERSPEED SHUTDOWN

In the event the engine overspeeds to 1160 rpm, the engine is shut down automatically. After an overspeed shutdown of the engine, move the EC switch to START. Reset the overspeed mechanism by pushing in the knob of the engine overspeed governor, Fig. 14, accessible from the left walkway near the main alternator and under the engine control governor. This knob only comes out about 1/8 in. Proceed to start the engine as described under Starting Engine section. If it overspeeds again, do not restart the engine.

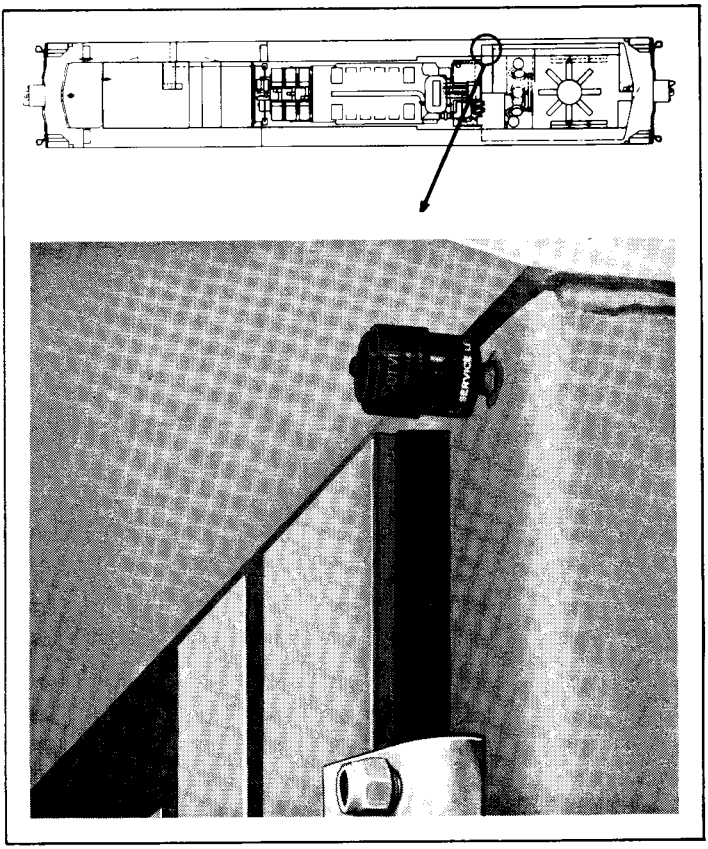

FIG. 19, E-30999

FIG. 19. ENGINE AIR FILTER SERVICE INDICATOR.

PRESSURE AND TEMPERATURE GAUGES

1. Control Air Gage – Located in the air brake compartment. Normal air pressure is 70 psi.

2. Intake Manifold Air-Pressure Gage (optional) – Located at the engine Start Station if applied. Normal reading at full engine speed and full load is 28-32 psi for a B30-7A.

3. Fuel Pressure Gage (optional) – Located at the engine Start Station if applied. On current locomotives, normal fuel pressure at idle is 40 psi and at full load 25-36 psi.

4. Lube-Oil Pressure Gage (optional) – Located at the engine Start Station if applied. Normal lube pressure at idle is 25-35 psi and at full load 90-115 psi. Minimum lube-oil pressure at IDLE is 10 psi. Pressure near this level should be reported. Upon re-starting an engine, if the lubricating oil pressure does not build up within 45 seconds, shut the engine down.

5. Water Temperature Gage – Located on the left side of the water storage tank, Fig. 20. Normal operating temperature is 170-180 F.

OTHER GAUGES

1. Engine Lubricating-Oil Dipstick – One on both sides of engine. The stick is marked FULL and LOW. Proper level with the engine idling is between FULL and LOW.

NOTE: ***Oil fills are provided on both sides of the engine. Overfilling will cause engine to shut down from excessive crankcase pressure.***

2. Fuel-Oil Sight Glasses – Mounted on both sides of the main fuel tank to indicate the level of fuel in the tank.

3. Cooling Water – A water level sight glass mounted on each side of the cooling water storage tank indicates the level of the cooling water. Markings near the sight glass indicate the proper level for various conditions of the system.

   When filling the system, or adding water treatment compound, proceed according to instructions mounted at the water storage tank area near the fill cap, Fig. 20.

NOTE: ***Never check the water level until the water in the sight glass is stable, and not full of air bubbles or foam. If water is flowing through the sight glass, this means that water is in the radiators and the engine has not cooled down enough to check for proper water level.***

WARNING: ***To avoid personal harm from water burns, never remove the water fill cap when the water level is above FULL AT IDLE mark. If over-full, open the manual drain valve and lower the level.***

4. Compressor Lube-Oil – A dipstick near the fill cap indicates when the crankcase is full or how much oil is needed to bring the oil level to the FULL mark, Fig. 11. Oil level may be checked with engine running.

5. Traction Alternator Gear Box – A dipstick marked EMPTY, ADD, FULL indicates oil level. Proper level is between ADD and FULL with the engine stopped, Fig. 13.

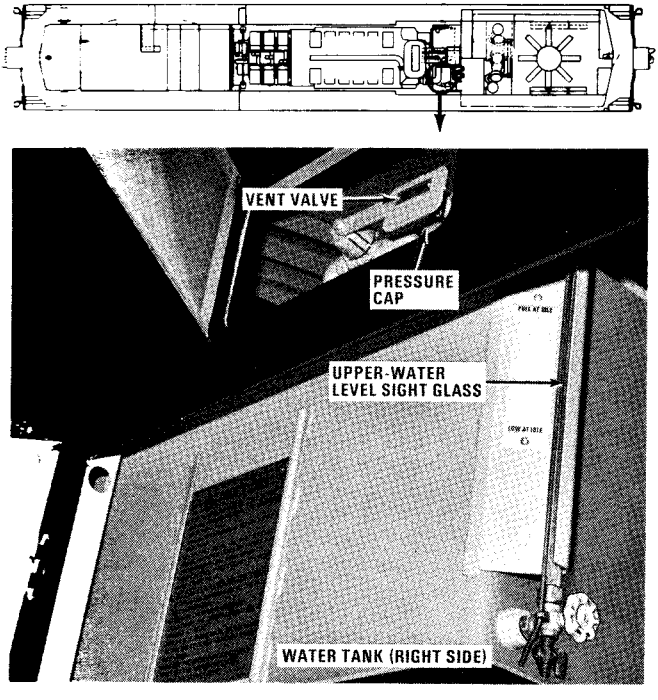

FIG. 20, E-31000

FIG. 20. WATER TANK STORAGE DETAILS.

- Fan Gear Unit Oil Level – Maintain oil level near the spillover of the fill pipe, Fig. 12. Check with engine shutdown.

- Governor Oil Level Sight Glass – Located on the left side of the engine near the traction alternator, Fig. 10. Oil level must be visible near the mark on the sight glass when the engine is running at idle.

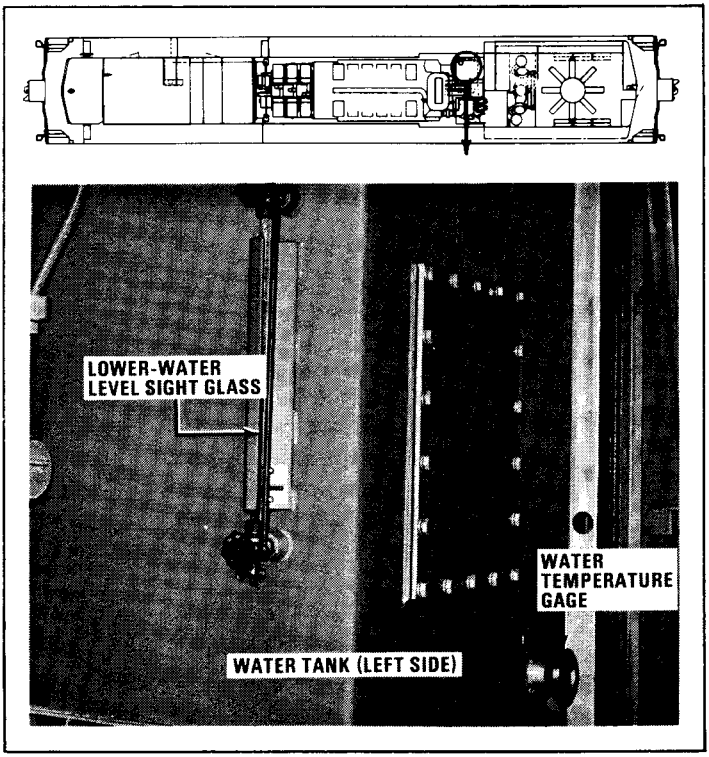

FIG. 20, E-31000

FIG. 20. WATER TANK STORAGE DETAILS.

CAUTION: *To prevent serious equipment damage, never start an engine until the engine governor has been properly serviced with governor lube oil.*

PASSING THROUGH WATER

Do not pass through water that is above the rail.

PASSING OVER RAILROAD CROSSINGS

Do not pass over railroad crossings at full power, or traction motor flashover may result. Reduce power by moving the Throttle handle to the Notch 4 until all locomotives have passed over the crossing.

STOPPING ENGINES

1. Move the lead unit's Throttle handle to IDLE.
2. Open the Generator Field circuit breaker on the control stand of the lead unit.
3. Move the Engine Control switch to START.
4. Press the Stop button on the EC panel.
5. To shut down all engines when in multiple-unit operation, move the Throttle handle (of any locomotive equipped) to the SHUTDOWN position on the Master Controller. The Throttle handle must be returned to IDLE before the engine can be re-started.

CAUTION: ***After a locomotive has operated under normal condition, allow the engine(s) to run at IDLE for at least five minutes before shutting down. Otherwise, immediate shutdown after such operation could be harmful to some engine components requiring brief idle time.***

FIG. 21, E-31001

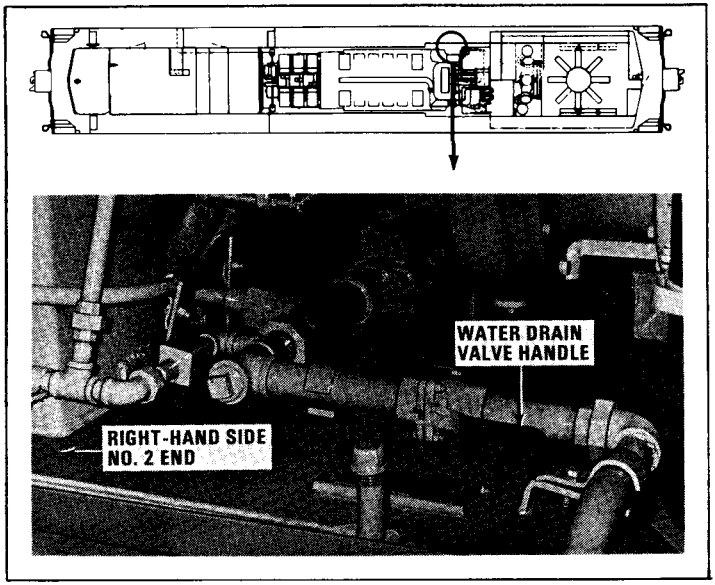

FIG. 21. COOLING WATER SYSTEM DRAIN VALVE.

DRAINING COOLING WATER SYSTEM (Fig. 21)

If a diesel engine shuts down in freezing weather and cannot be re-started, it must be drained at the difficulty site. Consult the draining instructions posted in the locomotive cab to assure proper draining and prevent component freeze-ups.

OPERATING AS A TRAILING LOCOMOTIVE

Air Equipment Setup

Make sure all necessary MU and brake pipe end hoses are properly connected and cocks open, Fig. 22.

Electrical Equipment Setup

1. Leave all circuit breakers in the CLOSED position on the EC panel. The Running Light circuit breaker may be positioned as desired. The Control circuit breaker must be ON in the lead locomotive only, all other Control breakers must be OFF.
2. Place the MU Headlight Set-Up switch in the proper position.
3. Place the Engine Control switch in the RUN position.

TO OPERATE WITH OTHER TYPES OF LOCOMOTIVES

If the locomotives of the locomotive consist are geared for differing maximum speeds, do not run at speeds in excess of that recommended for the locomotive having the lowest maximum permissible speed.

Similarly, do not operate at low speeds long enough to exceed the specified traction motor minimum continuous speed and short time ratings on any of the locomotives in the consist. A locomotive with high horsepower per axle will develop more tractive effort at any given speed than will units of lower horsepower per axle.

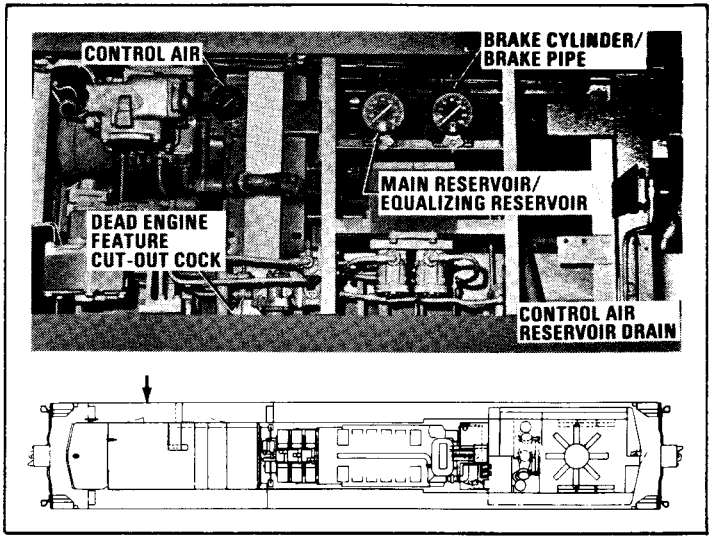

FIG. 22, E-31628

FIG. 22. AIR BRAKE RACK.

On GE units equipped with automatic Power-Matching control, power is automatically reduced to a lower level under certain conditions when operating at low locomotive speeds.

See Figs. 23 through 26 for flow charts.

Fig. 23 is a flow chart describing the Engine Control Governor operation conditions when the locomotive is under power.

Fig. 24 is a flow chart describing the Engine Control Governor operation conditions when the locomotive is in Dynamic Braking.

Fig. 25 is a flow chart describing the Engine Control Governor operation during a Diesel Engine Starting.

Fig. 26 is a flow chart describing the Engine Control Governor operation during a Hot Engine occurrence.

FIG. 23, E-31003

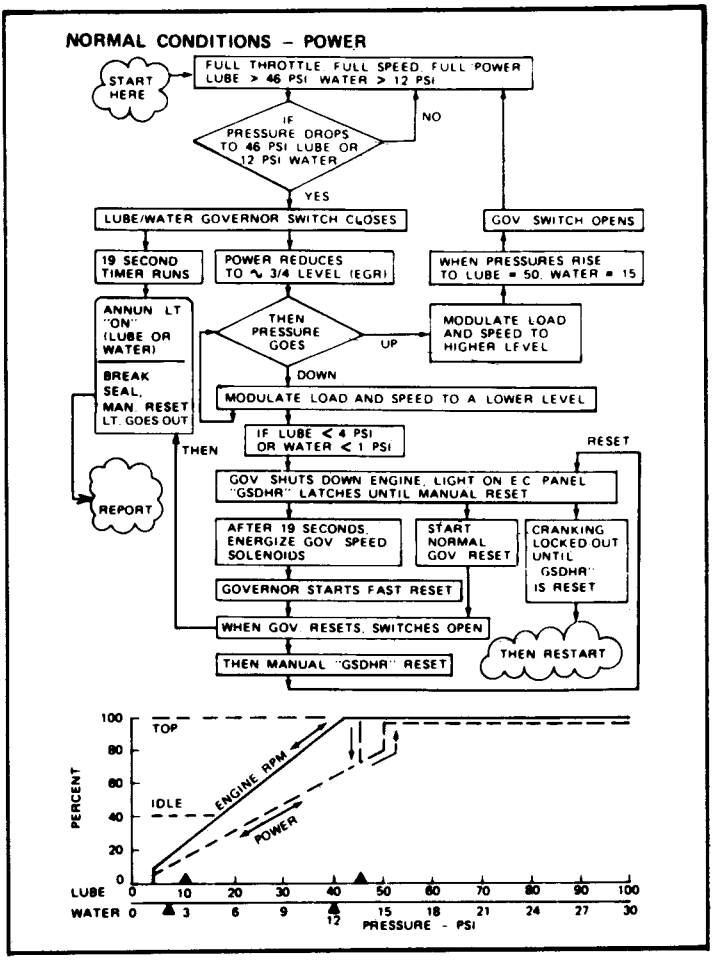

FIG. 23. MODULATING ENGINE CONTROL GOVERNOR FLOW CHART.

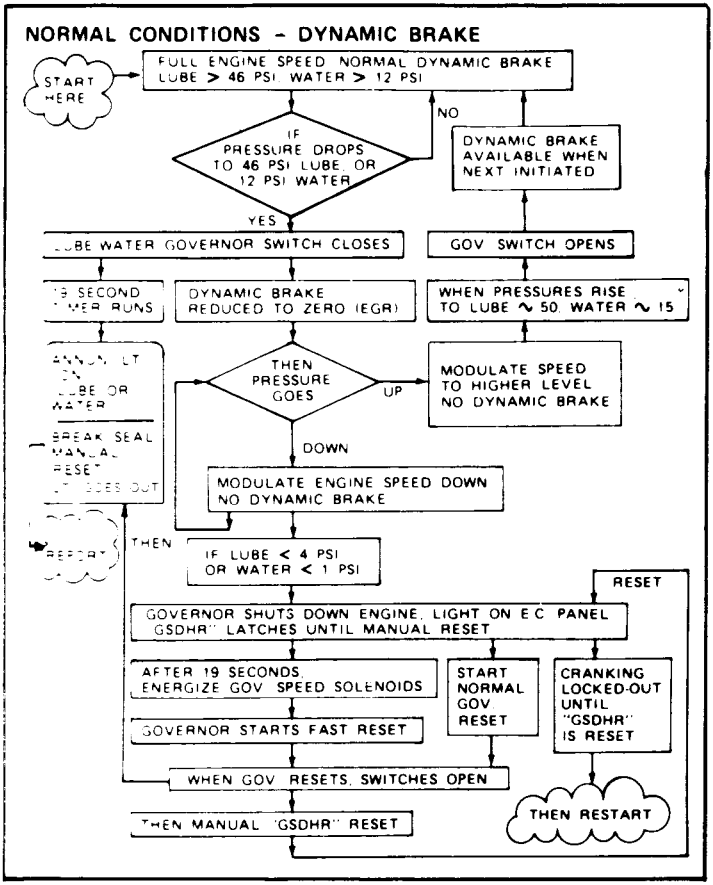

FIG. 24, E-31004

FIG. 24. MODULATING ENGINE CONTROL GOVERNOR FLOW CHART.

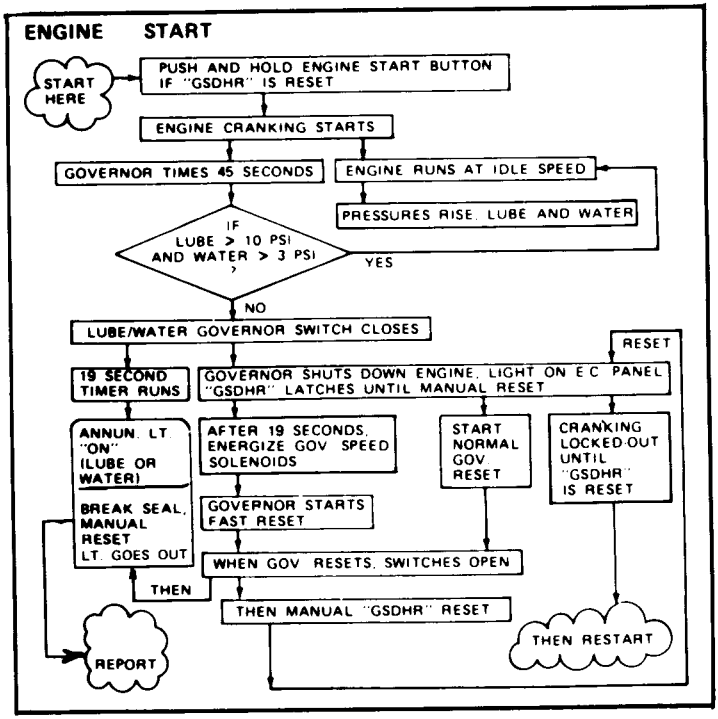

FIG. 25, E-31005

FIG. 25. MODULATING ENGINE CONTROL GOVERNOR FLOW CHART.

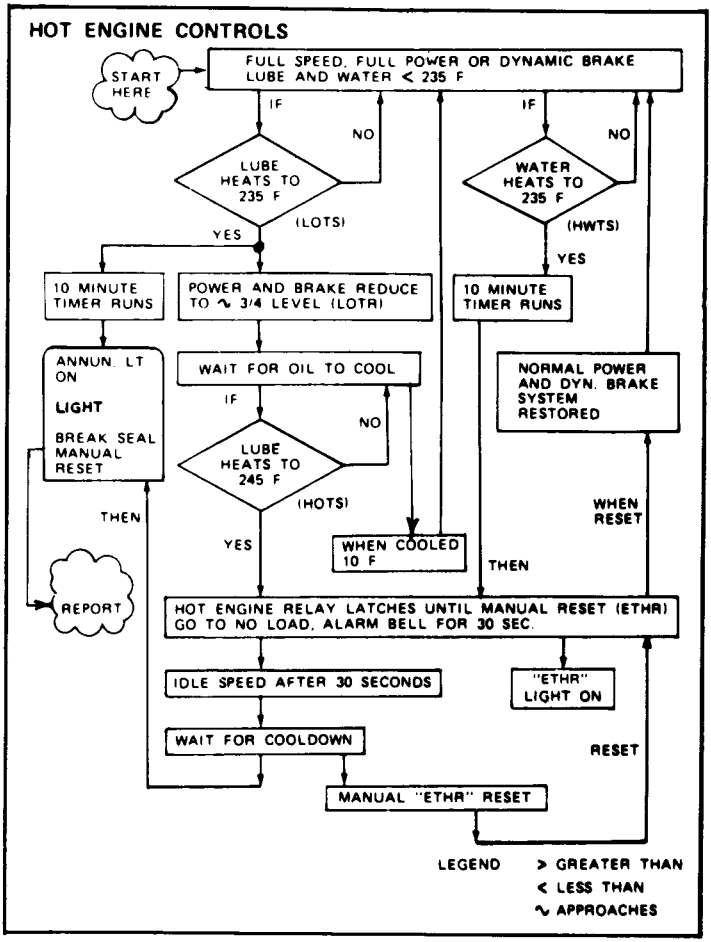

FIG. 26, E-31006

FIG. 26. MODULATING ENGINE CONTROL GOVERNOR FLOW CHART.

NOTES:

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