

1500 R S C

Operating Manual



**1500-HP
ROAD SWITCHER**

AMERICAN LOCOMOTIVE COMPANY
GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

ALCO-GE
DIESEL-ELECTRIC ROAD SWITCHER
1500-HP
OPERATING MANUAL



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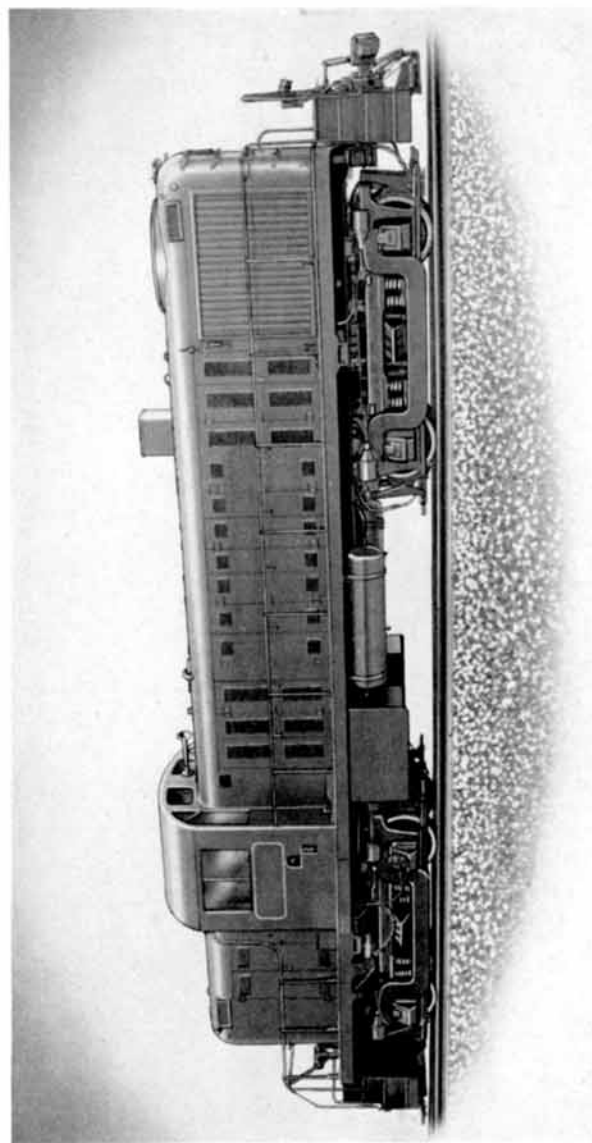


Fig. 1
ALCO-GE 1500-HP ROAD SWITCHER

GENERAL DATA FOR STANDARD LOCOMOTIVES

Rated Engine Speed	1000-rpm
Engine Horsepower	1500-hp
Bore	9-in.
Stroke	10½-in.
Fuel Oil Tank Capacity	800-gal.
Lubricating Oil System Capacity	200-gal.
Cooling Water System Capacity	250-gal.
Sand Capacity	28-cu. ft.
*Steam Generator Water Tank Capacity	800-gal.
Wheel Diameter	40-in.
Journal Size	6½-in. by 12-in.
Maximum Permissible Speed	65-mph
Minimum Radius Curvature	100-ft.
Maximum Height	14-ft. 5-in.
Maximum Width	10-ft. 0-in.
Length Overall	55-ft. 5¾-in.
Wheel Base	39-ft. 4-in.
Wheel Base (each truck rigid)	9-ft. 4-in.

*If used

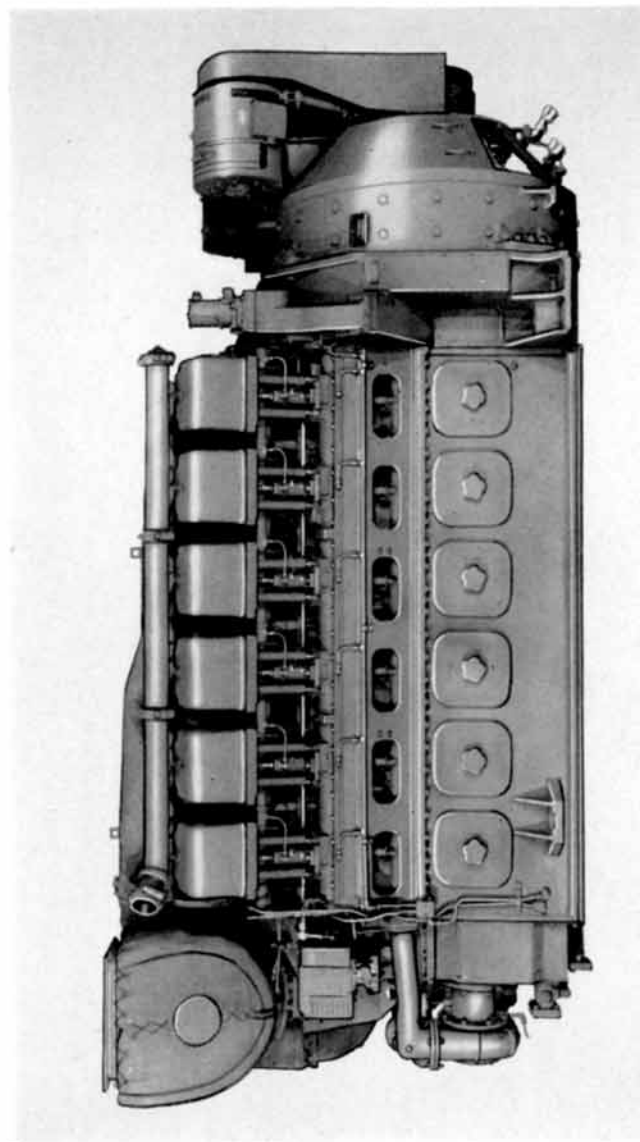


Fig. 2
ALCO-GE 1500-HP LOCOMOTIVE POWER PLANT

DESCRIPTION

The performance of a precision-built, ALCO-GE diesel-electric locomotive depends largely on intelligent handling and good care. This operating manual, written especially for operating personnel, describes basic information essential to efficient operation of the equipment.

Designed for main line and switching service, this locomotive is powered by a 12-cylinder, V-type, 4-cycle, turbo-supercharged, 1500-hp ALCO-GE diesel engine-generator set.

The operating cab is located between the diesel engine-generator and the steam generator compartment hoods.

A main generator, direct-connected to the engine crankshaft, transmits electrical energy to four air-cooled traction motors. This locomotive is mounted on two swivel, pedestal type trucks with a traction motor mounted on each leading and trailing axle.

The traction motor blowers which furnish cooling air to the traction motors are belt-driven from both ends of the power plant. An auxiliary generator furnishes power for control, lighting, and battery charging circuits, and is belt-driven from the generator end. The amplidyne exciter is also belt-driven from the generator end, and combined with the G-E power plant regulator, controls the conversion of diesel engine horsepower into tractive effort.

Equipped with air brakes, schedule 6-DS, air is provided by a mechanically-driven air compressor. A 64-volt storage battery is provided for engine starting.

The "Location of Apparatus" diagram will assist the operator in identifying all equipment and control stations.

Information furnished in this manual is for reference only and cannot be used for ordering renewal parts.

LOCATION OF APPARATUS

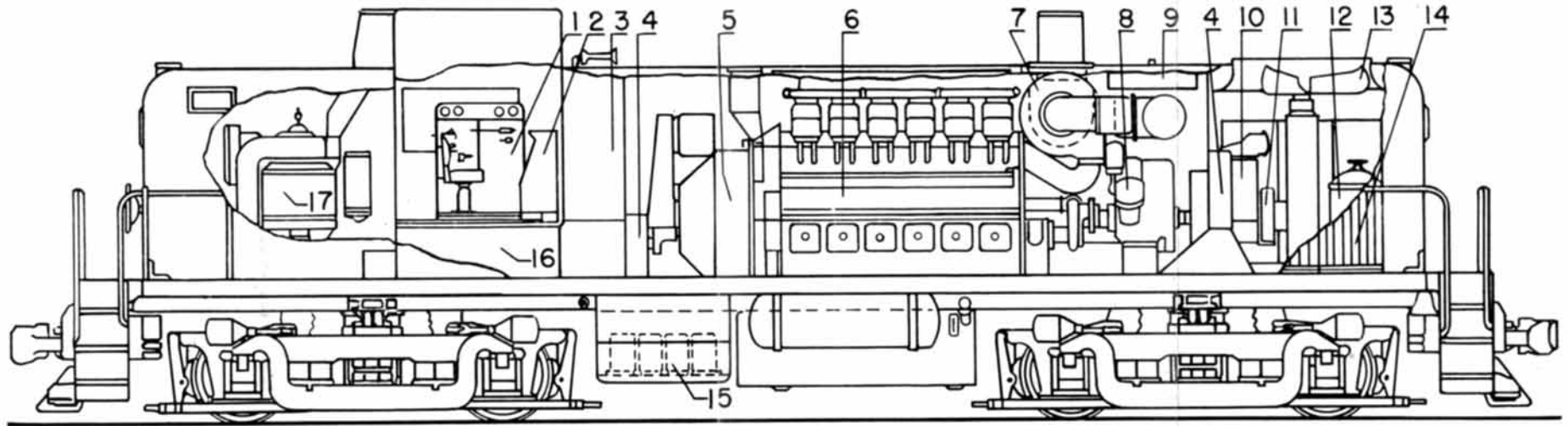


Fig. 3

- | | |
|-------------------------------|----------------------------|
| 1. Control Stand | 9. Engine Water Tank |
| 2. Engine Control Panel | 10. Lubricating Oil Cooler |
| 3. Contactor Compartment | 11. Radiator Fan Clutch |
| 4. Traction Motor Blowers | 12. Lubricating Oil Filter |
| 5. Main Generator | 13. Radiator Fan |
| 6. Diesel Engine | 14. Radiator Shutters |
| 7. Turbosupercharger | 15. Batteries |
| 8. Air Compressor | 16. Fuel Oil Tank |
| 17. Steam Generator (If Used) | |

FILLERS, DRAINS AND DIMENSIONS

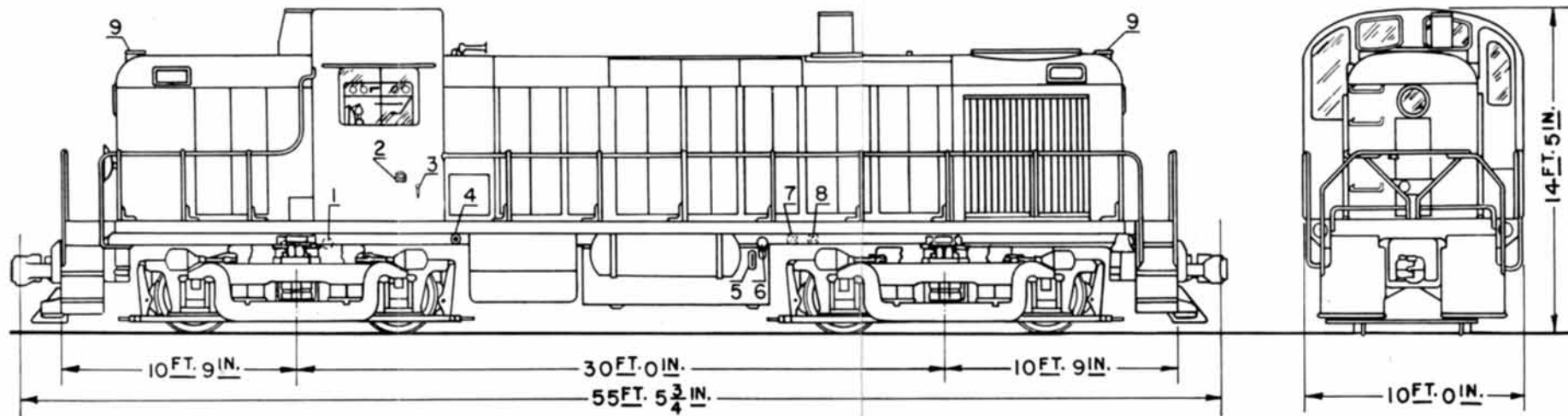


Fig. 4

- 1. Fuel Oil Tank Drain
- 2. Fuel Oil Tank Filler
- 3. Fuel Oil Tank Gage

- 4. Emergency Fuel Oil Shutoff
- 5. Steam Generator Tank Gage (If Used)
- 6. Steam Generator Tank Filler

- 7. Engine Oil Drain
- 8. Engine Water Filler
- 9. Sand Box Fillers

HOW A DIESEL-ELECTRIC WORKS

A diesel-electric locomotive is quite simple—a diesel engine drives the main generator which produces electricity to run traction motors geared to the axles. When the throttle is opened the main generator becomes electrically connected to the traction motors. Electrical power then flows to the traction motors and the locomotive moves. As the throttle is opened wider, the diesel engine speeds up, delivering more mechanical power to the main generator and thus more electrical power is furnished to the traction motors. When the throttle is wide open the diesel engine runs at its maximum speed. The main generator automatically adjusts its electric output to the traction motors, supplying the required horsepower up to the maximum rating for any combination of speed and load.

ENGINEMAN'S CONTROLS

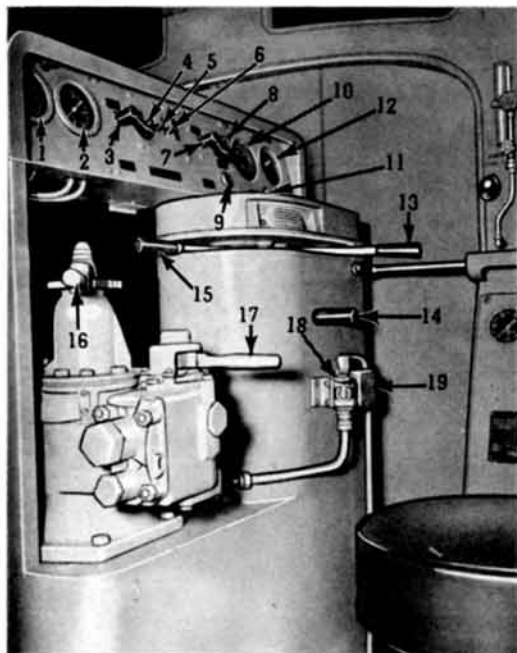


Fig. 5

ENGINEMAN'S POSITION

- | | |
|---|--------------------------------------|
| 1. Air Brake Gage
White Hand—Brake Pipe
Red Hand—Brake Cylinder | 9. Emergency Engine Shut-down Button |
| 2. Air Brake Gage
White Hand—Equalizing Reservoir
Red Hand—Main Reservoir | 10. Speed-Transition Indicator |
| 3. Rear Headlight Switch | 11. Wheel Slip Indicating Light |
| 4. Control Switch | 12. Load Indicator |
| 5. Generator Field Switch | 13. Throttle Handle |
| 6. Fuel Pump Switch | 14. Reverse Handle |
| 7. Front Headlight Switch | 15. Selector Handle |
| 8. Gage Light Control | 16. Automatic Brake Valve Handle |
| | 17. Independent Brake Valve Handle |
| | 18. Whistle Valve |
| | 19. Wheel Slip Buzzer |

ENGINEMAN'S CONTROLS

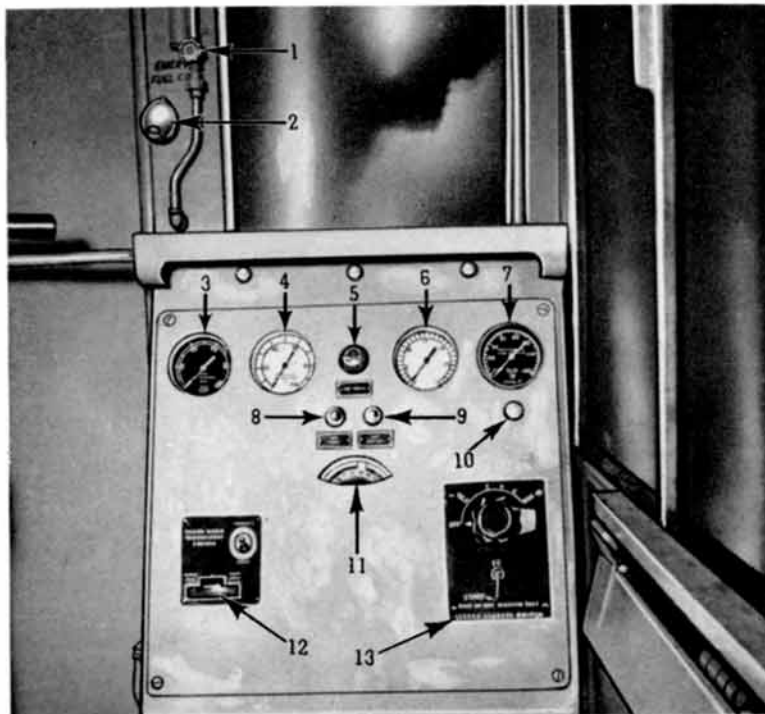


Fig. 6

ENGINE CONTROL PANEL

- | | |
|--|---------------------------------------|
| 1. Window Wiper Valve | 7. Control Air Gage |
| 2. Emergency Fuel Cut-out Knob | 8. Hot Engine Light |
| 3. Fuel Oil Pressure Gage | 9. Low Lubricating Oil Pressure Light |
| 4. Lubricating Oil Pressure Gage | 10. Ground Relay Light |
| 5. Cab Heater Control | 11. Engine Water Temperature Gage |
| 6. Lubricating Oil Pressure Gage
Red Hand—Turbocharger Bearings
Black Hand—Rocker Arms | 12. Engine Water Temperature Control |
| | 13. Engine Control Switch |

ENGINEMAN'S CONTROLS

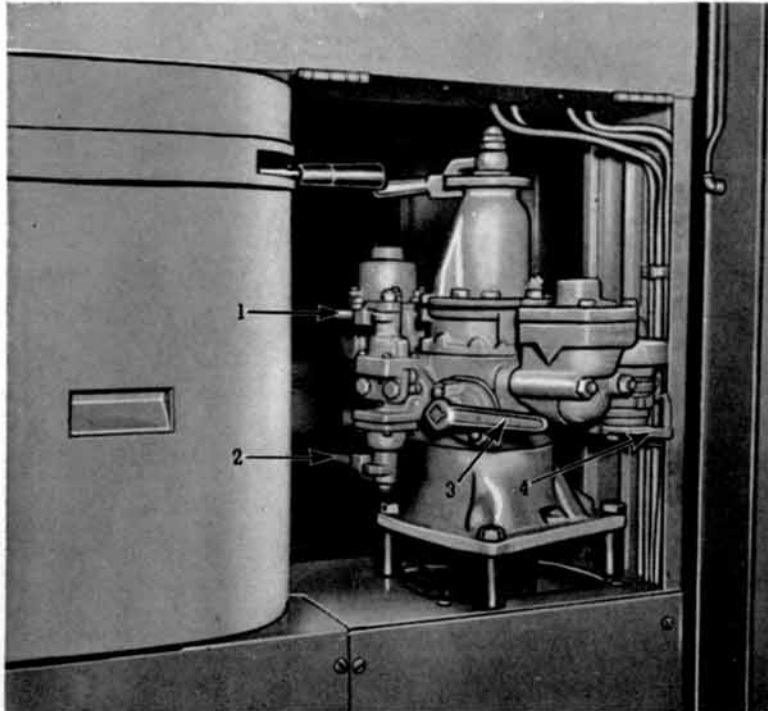


Fig. 7

AIR BRAKE STAND

1. Sander Valve Handle
2. Bell Ringer Valve Handle
3. Double Heading Cock
4. Brake Pipe Feed Valve

ENGINEMAN'S CONTROLS

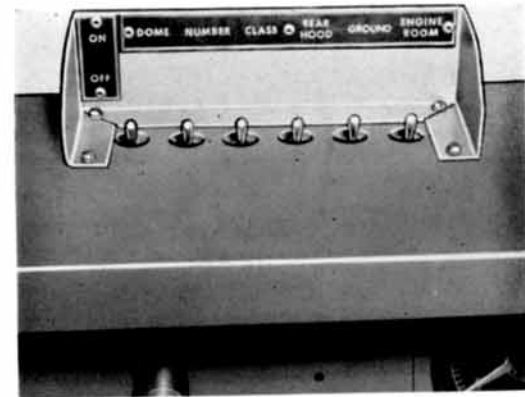


Fig. 8

LIGHT SWITCHES

1. Headlight
2. Steam Generator Negative*
3. Steam Generator Positive*
4. Cab Lights and Auxiliaries
5. Fuel Pump
6. Motor-Generator Set
7. Electric Cab Heater*
8. Engine Room Lights
9. Crankcase Exhauster
10. Control Negative
11. Control Positive
12. Auxiliary Generator
13. Auxiliary Generator Field
14. Battery Voltmeter
15. Crankcase Exhauster Light
16. Auxiliary Generator Ammeter
17. Compartment Light

*If furnished

CONTACTOR COMPART- MENT PANEL

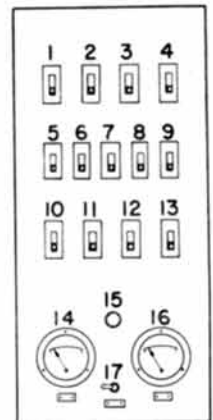


Fig. 9

OTHER CONTROLS

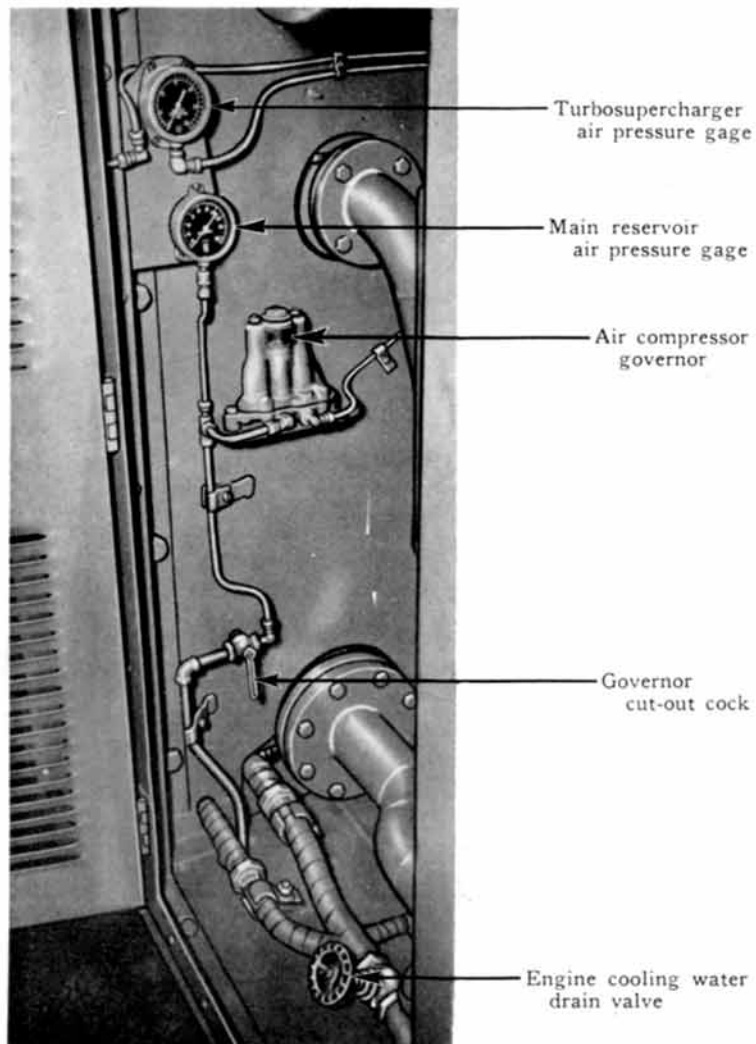


Fig. 10

AIR COMPRESSOR CONTROLS

OTHER CONTROLS

EMERGENCY FUEL OIL SHUTOFF VALVE

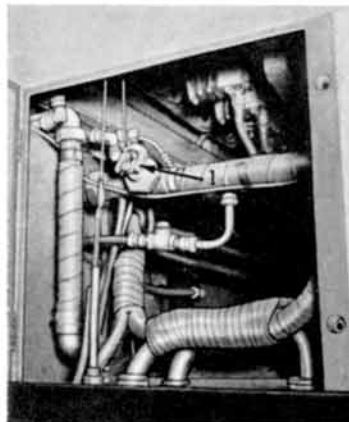


Fig. 11

1. Closed Position

Fig. 12

2. Open Position

FUEL OIL TANK

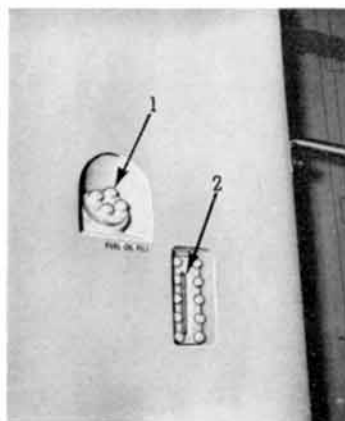


Fig. 13

1. Fuel Oil Filler
2. Fuel Oil Sight Glass

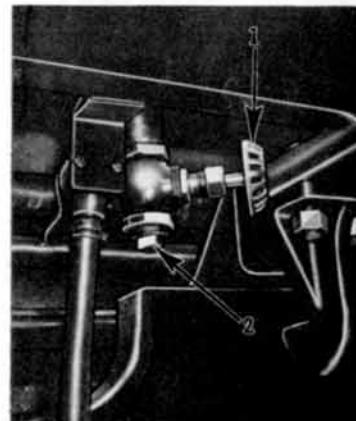


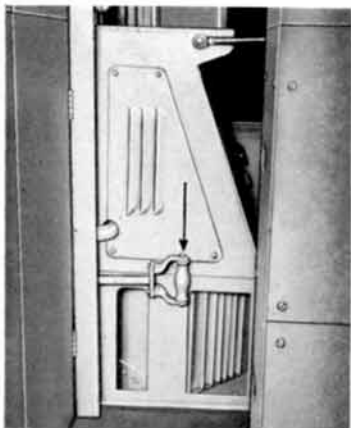
Fig. 14

1. Fuel Oil Tank Drain Valve
2. Pipe Plug

OTHER CONTROLS

BATTERY SWITCH
HANDLE

Fig. 15



LUBRICATING OIL
BAYONET GAGE

Fig. 16

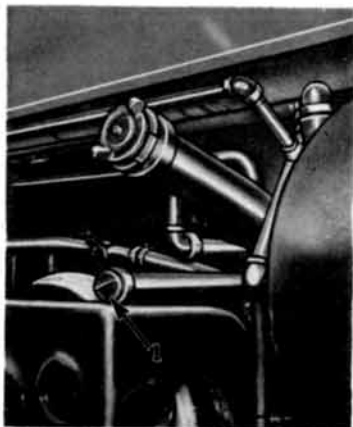
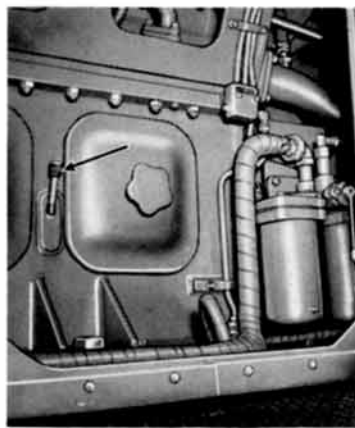


Fig. 17

1. Lubricating Oil Drain Pipe and Cap

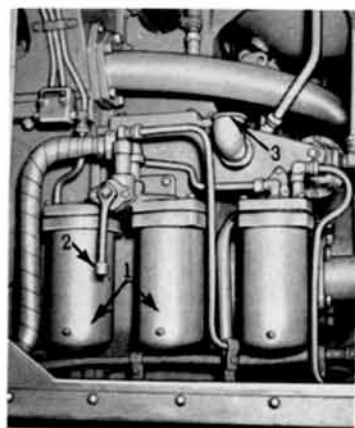


Fig. 18

1. Duplex Oil Filter
2. Filter Handle
3. Lubricating Oil Filler Pipe

OTHER CONTROLS CONTACTOR COMPARTMENT

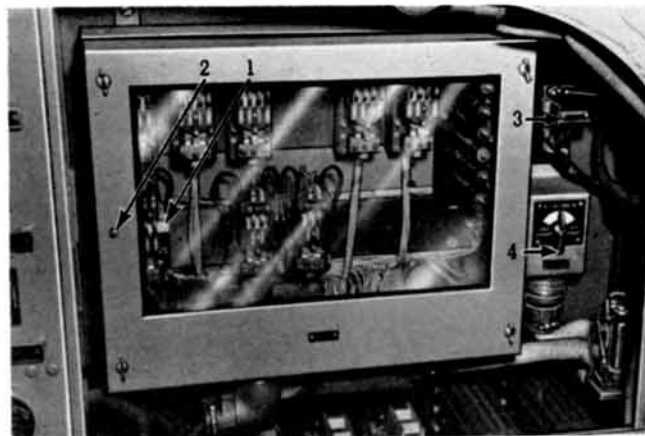


Fig. 19

1. Ground Relay Indicator
2. Ground Relay Reset Button
3. Ground Relay Cut-out Knife Switch
4. Traction Motor Cut-out Switch

RADIATOR SHUTTER OPERATING MECHANISM

Radiator fan limit switch

Hinged latch

Shutter operating rod

Manual operating arm

Shutter operating cylinder



Fig. 20

OTHER CONTROLS

FUEL PUMP LATCHING

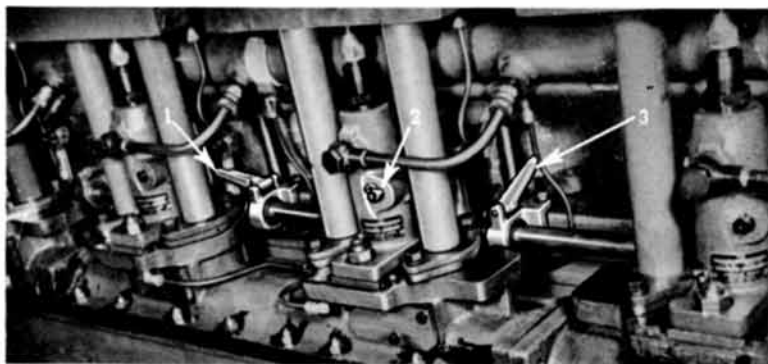


Fig. 21

1. Fuel Pump Latch Closed
2. Fuel Pump Rack
3. Fuel Pump Latch Open

EMERGENCY FUEL OIL CUT-OUT KNOB

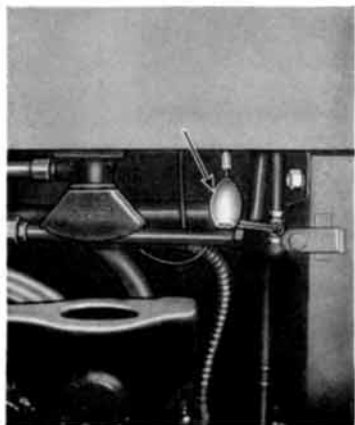


Fig. 22

HAND BRAKE

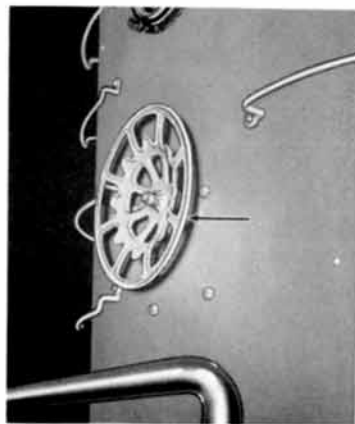


Fig. 23

OTHER CONTROLS

SAND BOX FILLER

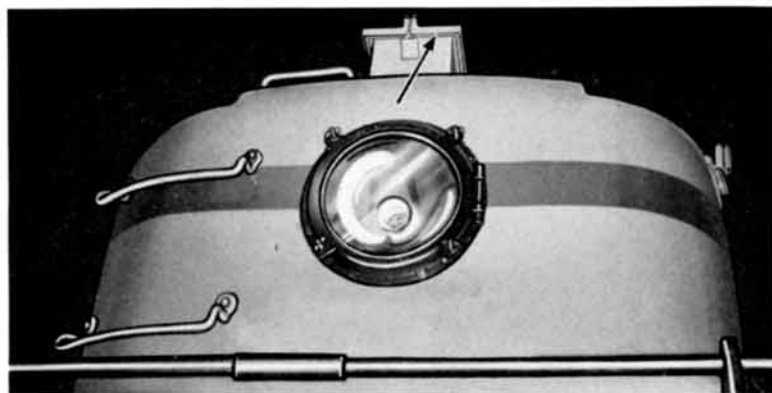


Fig. 24

MAIN AIR RESERVOIR DRAIN COCK

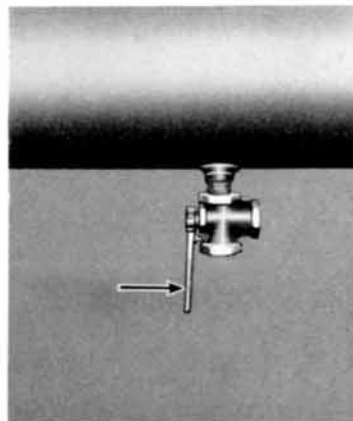


Fig. 25

ENGINE COOLING WATER FILLER

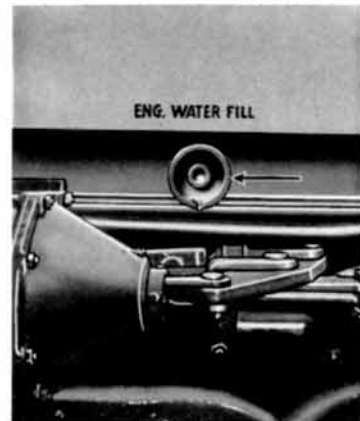


Fig. 26

OTHER CONTROLS

CAB HEATER



Fig. 27
Water Inlet Valve

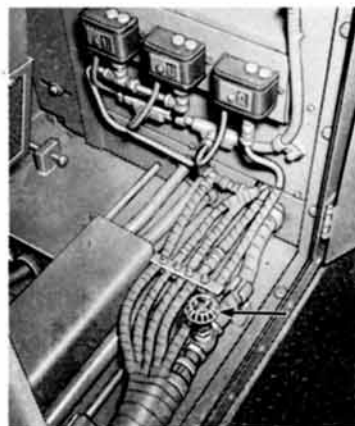


Fig. 28
Water Outlet Valve

DIESEL ENGINE TURNING GEAR

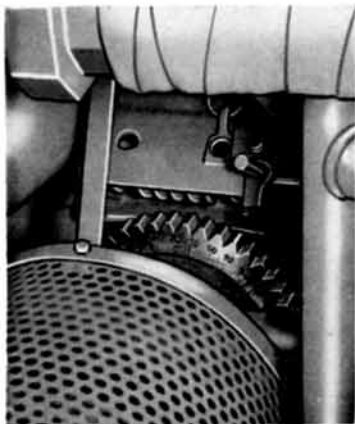


Fig. 29

EXPANSION TANK SIGHT GLASS

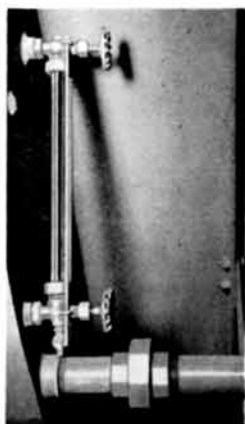


Fig. 30

OTHER CONTROLS

TACHOMETER GENERATOR

Tachometer generator

Overspeed reset button

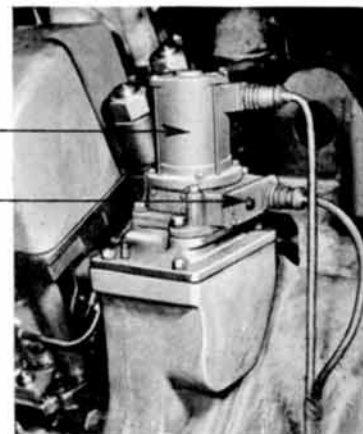


Fig. 31

SHUTTER CONTROLS

Air filter lubricator

"T" Vent valve

Shutter control
air cut-out cock

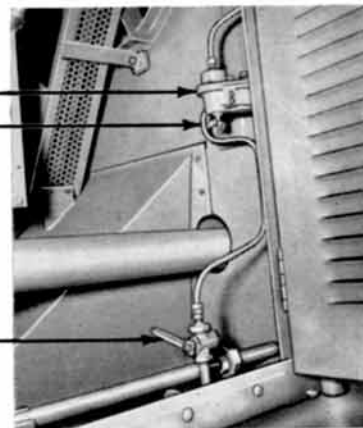


Fig. 32

OTHER CONTROLS

NOTES

DISTRIBUTING VALVE

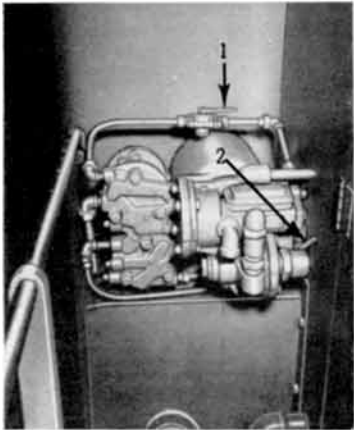


Fig. 33

1. Multiple Operation Cock
2. Dead Engine Cock

ROOF FILLER PIPE

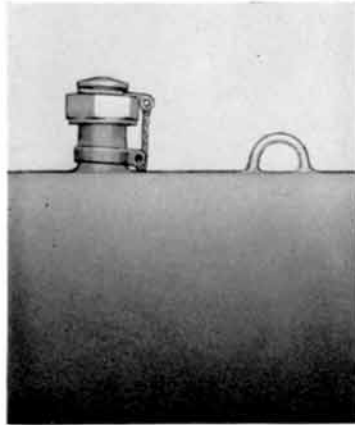


Fig. 34

Air Compressor bayonet gage

Air Compressor lube oil filler
plug



Fig. 35

CONTROL STAND HANDLES

CONTROL STAND HANDLES

The engineman's control stand has three operating handles. See Fig. 36.

1. Reverse handle, with three positions:
Forward, Off and *Reverse*
This handle controls direction of movement of locomotive.
2. Throttle handle, with nine notches:
Idle, and eight running notches controlling locomotive speed.

NOTE: In advancing the throttle handle from one notch to another, it must first be moved backward very slightly, and then advanced to the next notch.

3. Selector handle, with four power positions, used for traction motor transitions.

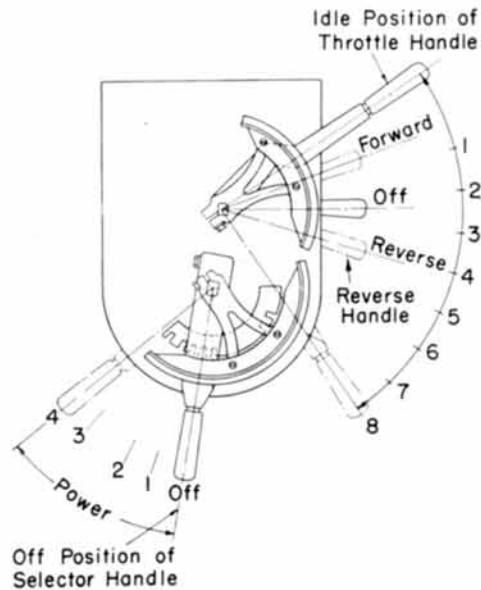


Fig. 36

REVERSE, SELECTOR, AND THROTTLE HANDLE POSITIONS

AND INDICATORS

These three handles are mechanically interlocked, and before attempting to move the locomotive, the engineman must be thoroughly familiar with their movements. He must also be familiar with the movements of the selector handle and their relation to locomotive speeds as indicated on the *Speed-Transition Indicator*.

With the reverse handle in *Forward* or *Reverse* position the throttle cannot be opened until the selector handle has been moved to *Position 1*.

Free travel of the selector handle through each power position is prevented by two latches built into the handle. A definite sequence of motion is required in moving the handle from one position to another in either direction. This prevents the handle from being accidentally moved while the locomotive is under power.

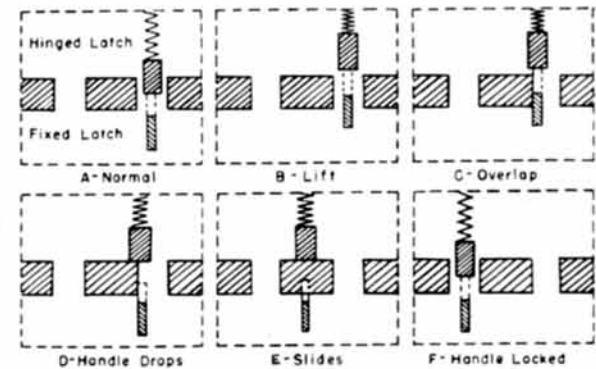


Fig. 37

SELECTOR HANDLE OPERATING DIAGRAM

To pass from one position to another, raise (B) the handle, move it in the desired direction (C) until the lower latch hits the far side of the notch. This is a very slight movement. Then depress (D) the handle and move (E) toward the next position. When the next position is reached, the upper latch will drop into the notch, stop the movement, and lock (F) the handle.

CONTROL STAND HANDLES



Fig. 38

SPEED-TRANSITION INDICATOR

The locomotive is equipped with a speed-transition indicator that has two scales. The inner scale is calibrated in miles per hour. The outer scale represents the selector handle transition positions and is used to guide the positioning of the selector handle. See table on Page 35.

As the locomotive speed increases, the selector handle should be moved to the corresponding position indicated by the pointer.

AND INDICATORS



Fig. 39

LOAD INDICATOR

The locomotive is equipped with a load indicator that is used by the engineman as a guide for operation of the throttle.

Through its proper use, the engineman may get the maximum performance from the locomotive and guard against abusive overloading of the traction motors.

The load indicator has its scale divided into three zones as follows:

Red zone at the high current end of the scale represents a heavy overload. Operation in this zone is normally used for starting and accelerating the train. A train of proper tonnage should not require more than approximately 4 minutes operation in this zone.

Yellow zone operation is permissible for a consecutive or accumulated time not to exceed 90 minutes.

NOTE: Operation in the yellow zone for an accumulated time exceeding 10 per cent of the total operating time will result in shorter traction motor life and higher maintenance.

White zone is used for continuous operation and pointer may remain in this zone as long as desired.

PREPARATIONS

1. If lights are needed, close the battery switch by pushing in on the extension handle located to the left of the engine control panel near the floor. See Fig. 15.
2. Inspect engine compartment to see that no rags, tools, lanterns, etc., are near any shafts, belts, or other moving parts or electrical apparatus. Waste should never be used on the locomotive.
3. Check the level of the diesel engine lubricating oil system. It is best to keep the oil level at the *High* mark on the bayonet gage with the locomotive on a level track. It is safe, however, to operate with the oil level above the *Low* mark. See Fig. 16.
4. The fuel oil tank drain valve, located under the left side of the cab, Fig. 14, should be closed and the fuel oil tank should be checked for quantity. See Fig. 13.
5. Check the quantity of water in the cooling water system. The sight glass attached to the water expansion tank should show water at all times. See Fig. 30.
6. The power plant governor operates under hydraulic oil pressure and a separate oil tank is furnished for governor operation. Maintain the oil level in the tank at $2/3$ full, using the bayonet gage to check height of oil. The tank is located on the left side of the locomotive at the air compressor end of the diesel engine, directly below the power plant governor. See Fig. 40.
7. See that the sand tanks have an ample supply of sand. See Fig. 24.
8. See that the emergency fuel shut-off valve is open. If closed, reset by raising the valve stem and slipping the crutch under the raised stem. See Fig. 11 and 12.
9. Make sure that the cooling water drain valve is closed. See Fig. 10.
10. See that the lubricating oil drain valve is closed and the pipe cap is securely tightened. See Fig. 17.
11. The handle on the duplex oil filter should be in a horizontal position. See Fig. 18.

FOR OPERATING

12. The traction motor cut-out switch pointer should indicate *All Motors In*. The ground relay cut-out knife switch should be closed and the ground relay indicator should not show red. To reset the ground relay, push in on reset button. See Fig. 19.
13. The radiator shutters should be under *Automatic* control by having hinged latch disengaged from the shutter operating arm. See Fig. 20. The radiator fan control switch on the engine control panel should be in *Automatic* position, Fig. 6, and the air compressor governor cut-out cock must be open. See Fig. 10.

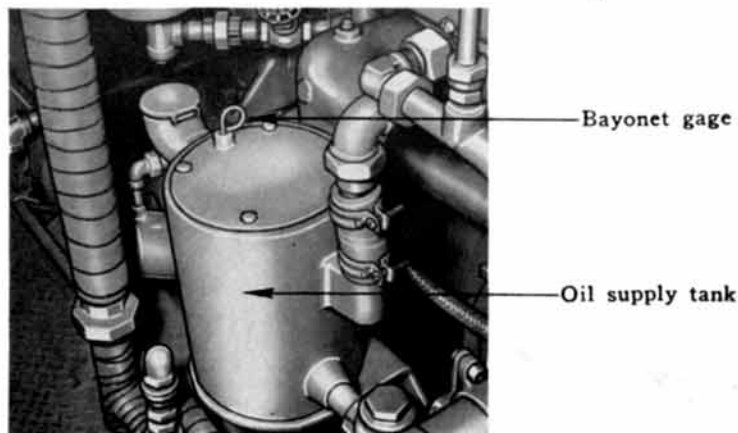


Fig. 40

GOVERNOR OIL SUPPLY TANK

14. See that the throttle is in *Idle*, reverse handle is in *Off* position and the selector handle is in *Off* position.
15. Diesel engine turning gear must be disengaged and locked. This is located at the air compressor end of the engine and mounted directly above the engine crankshaft extension. See Fig. 29.
16. See that the diesel engine overspeed reset button is *In*. See Fig. 31.
17. Check the air compressor oil level. Maintain the oil level at the full mark on the bayonet gage with the engine shut down. See Fig. 35.

HOW TO OPERATE

STARTING DIESEL ENGINE

In order to start the diesel engine, there are four sets of switches, circuit breakers and a battery switch involved:

One set is located on the *Engineman's Control Panel* to the left of the engineman's seat. See Fig. 5.

A second set is located on the *Engine Control Panel* directly in front of the engineman's seat. See Fig. 6.

A third set is mounted on top of the *Engineman's Control Panel* to the left of the engineman's seat. See Fig. 8.

The fourth panel is located on the *Contacting Compartment Panel* between the operating cab and the engine compartment. See Fig. 9.

The battery switch handle is located to the left of the engine control panel, near the floor. See Fig. 15.

All circuits are protected by automatic circuit breakers, there being no fuses on the locomotive.

1. Close battery switch.
2. Have selector handle in *Off position*.
3. Have throttle in *Idle*.
4. Have reverse handle in *Off position*.

5. See that the following switches located on contacting compartment panel in operating cab are in *On position*. See Fig. 9.

<i>Headlight</i>	<i>Crankcase Exhauster</i>
<i>Cab Lights and Auxiliaries</i>	<i>Control Negative</i>
<i>Fuel Pump</i>	<i>Control Positive</i>
<i>M G Set</i>	<i>Auxiliary Generator</i>
<i>Engine Room Lights</i>	<i>Auxiliary Generator Field</i>

6. Snap the following switches located on the engineman's control panel to *On position*. See Fig. 5.

<i>Control</i>	<i>Fuel Pump</i>
----------------	------------------

NOTE: Allow pressure to build up to 30 pounds minimum as indicated on fuel oil pressure gage mounted on engine control panel. See Fig. 6.

7. On this same panel turn *Engine Control* knob to *Idle position*.

NOTE: *Low Oil Pressure* light will light and alarm bell will ring until engine is started.

YOUR DIESEL-ELECTRIC

8. Wait ten seconds for power plant governor to reset. Turn *Start* switch on engine control panel clockwise to crank engine. Hold *Start* switch closed until engine starts, pressure shows on main bearing gage, light goes out and alarm bell stops ringing. Releasing the *Start* switch before the light goes out will stop the engine and the above procedure will have to be repeated.

9. Check lubricating oil pressure gage on engine control panel for 20 pounds minimum pressure.

10. See that *Crankcase Exhauster* light on contacting compartment panel is lighted.

SHUTTING DOWN DIESEL ENGINE

1. Move selector and reverse handles to *Off position*.
2. Snap *Generator Field* switch, located on engineman's control panel, to *Off position*.
3. Move *Engine Control* knob on engine control panel to *Off position*.
4. Snap *Fuel Pump* switch, on engineman's control panel to *Off position*.
5. Release air brakes and apply hand brake.
6. Move all other switches on engineman's control panel to *Off position* and open battery switch.

BEFORE MOVING LOCOMOTIVE

1. Have 125 to 140 pounds of main reservoir air pressure.
2. Have 70 pounds of control air pressure. Gage is located on engine control panel. See Fig. 6. The cut-out cock for the control air reservoir is located to the left of the battery box on right side of locomotive. The control air regulating valve and the control air reservoir are located just behind the battery box.
3. Apply independent air brake of 30 pounds minimum and release hand brake.
4. It is advisable to have at least 120 F water temperature as shown on the engine control panel gage. See Fig. 6.

HOW TO OPERATE

5. In order to test *Forward* sanders the following must be observed:

- Apply air brakes to prevent locomotive movement.
- Have 70 pounds of control air pressure.
- Place reverse handle in *Forward* position.
- Close *Generator Field* switch.
- Move selector handle to *Position 1*.
- Open throttle to *Notch 1* momentarily, this will place the reverser in *Forward* position.
- Close throttle.
- Move the sander valve handle, Fig. 7, from center position to the extreme left.
- Return sander valve handle to center position.

6. In order to test *Rear* sanders, the following must be observed:

- Apply air brakes to prevent locomotive movement.
- Have 70 pounds of control air pressure.
- Place reverse handle in *Reverse* position.
- Close *Generator Field* switch.
- Move selector handle to *Position 1*.
- Open throttle to *Notch 1* momentarily, this will place the reverser in *Reverse* position.
- Close throttle.
- Move the sander valve handle, Fig. 7, from center position to the extreme left.
- Return sander valve handle to center position.

MOVING LOCOMOTIVE

1. Move *Engine Control* knob on engine control panel to *Run*, pausing 3 seconds at each position.

2. Snap *Generator Field* switch on engine man's control panel to *On* position.

3. Move reverse handle to *Forward* or *Reverse* position, depending on direction desired.

4. Move selector handle to *Position 1*.

5. Release air brakes and open throttle to *Notch 1*. The pointer on the *Load Indicator* should show a slight movement. If not, return throttle to *Idle* and make sure all switches and circuit breakers are in proper positions as previously instructed.

YOUR DIESEL-ELECTRIC

6. Continue to notch up, stopping in each notch long enough for the *Load Indicator* pointer to settle to a steady reading, until the locomotive starts to move.

7. When locomotive starts to move, maintain throttle in a notch that will keep locomotive moving without acceleration until train is stretched.

NOTE: After the train is stretched and the train speed increases, the pointer on the *Speed-Transition Indicator*, Fig. 38, will move up to Section 2 on the transition scale and the selector handle should then be moved to *Position 2*. This procedure should be followed in moving selector handle to *Positions 3* and *4*.

8. Selector handle should be advanced or retarded as follows:

SELECTOR HANDLE

GEARING

	65-MPH	75-MPH
Position 1	0-18½-mph	0-21-mph
Position 2	18½-23-mph	21-26-mph
Position 3	23-49-mph	26-56-mph
Position 4	49-65-mph	56-75-mph

9. Selector handle may be moved to any position regardless of throttle position.

NOTE: During starting and acceleration, the *Load Indicator* pointer may move into the red zone for short periods of time. This is desirable in order to obtain maximum starting effort and speedy acceleration. See Fig. 39.

STOPPING LOCOMOTIVE

Return throttle to *Idle* position, apply brakes and move selector handle to *Off* position.

REVERSING LOCOMOTIVE

- Bring locomotive to a full stop.
- Move selector handle to *Position 1*.
- Move reverse handle to opposite direction.
- Release brakes and open throttle.

OPERATING TIPS

MULTIPLE LOCOMOTIVE OPERATION

If two locomotives are both equipped for multiple operation, all switches and cut-out cocks in the leading locomotive should be in the same position as if operating a single locomotive.

On the trailing locomotive all switches must be *On* with the exception of the *Control*, *Generator Field* and *Fuel Pump* switches located on the engineman's control panel. These three must be in *Off* position. The throttle must be in *Idle*, selector handle in *Off* position, and reverse handle placed in *Off* and removed. Both the independent and automatic brake valve handles must be placed in *Running* position. The double-heading cock on the brake valve pedestal must be in *Cut-Out* position. The multiple operation cut-out cock located on the cross-over pipe above the distributing valve must be open. See Fig. 33.

CHANGING LOCOMOTIVES IN MULTIPLE OPERATION

On locomotive being cut out:

1. Apply 30 pounds locomotive brake cylinder pressure with independent brake valve.
2. Place double-heading cock in *Cut-Out* position.
3. Open the multiple operation cut-out cock. See Fig. 33.
4. Place dead engine cock in closed position.
5. Move automatic brake valve handle to *Lap* and independent brake valve handle to *Running* position.
6. Place reverse handle in *Off* position and remove. To do this, it is necessary that the selector handle be in *Off* position and the throttle in *Idle*.
7. On the engineman's control panel, move the *Control* and *Generator Field* switches to *Off* position, leaving the *Fuel Pump* switch *On*.
8. Proceed to locomotive being cut in.

OPERATING TIPS

On locomotive being cut in:

1. Put reverse handle in place and leave in *Off* position.
2. Move independent brake valve handle to *Application* position.
3. Place double-heading cock in *Cut-In* position.
4. Close the multiple operation cut-out cock. See Fig. 33.
5. Move the *Control* and *Fuel Pump* switches on engineman's control panel to *On* position.
6. Return to the locomotive being cut out and move the *Fuel Pump* switch to *Off* position.
7. Go back to locomotive being cut in and move *Generator Field* switch to *On* position.

INDEPENDENT BRAKE

Do not use the independent brake to stop a heavy train. Use the automatic brake. The locomotive brakes may be released after an automatic application has been made by depressing the independent brake valve handle in *Running* position.

EMERGENCY DIESEL ENGINE SHUTDOWN

If it becomes necessary in an emergency to shut down the engine, push the red *Stop* button located on the engineman's control panel. See Fig. 5.

To restart the engine, return throttle to *Idle*, move the *Engine Control* knob on the engine control panel to *Off* position; then move it to *Idle* and start engine in the normal manner.

To shut off the flow of fuel oil from the tank to the engine, trip shut-off valve by pulling one of the three emergency fuel cut-out knobs located as follows:

1. Above the engine control panel. See Fig. 6.
2. Outside locomotive, located below cab on either side, and reached from the ground. See Fig. 22.

OPERATING TIPS

OPERATING THROUGH WATER

Do not exceed two or three mph if there is water above the railhead. Never operate in water over four inches above the railhead.

PASSING OVER RAILROAD CROSSINGS

Close the throttle to *Notch 2* or under. This reduces traction motor current and lessens the likelihood of arcing under the brushes and motor commutator flashover.

DUPLEX OIL FILTER

The duplex oil filter contains two sections for filtering fuel oil after it leaves the tank. One or both filter sections may be used at a time, depending upon the position of the filter handle.

During normal operation, only one filter section should be used at a time, and if the fuel pressure drops to 20 pounds, then swing handle over to opposite horizontal position.

With handle in vertical position, both filter sections are in use. With handle in horizontal position, one filter is in use. See Fig. 18.

DRAINING MAIN AIR RESERVOIRS

Main air reservoirs should be drained of condensation by opening the drain cock at least once every 24 hours. See Fig. 25.

FUEL INJECTION PUMP CUT-OUT

Each fuel pump has a cut-out latch located directly behind each pump. To cut out a pump, push *In* the fuel pump rack and flip the latch in place. See Fig. 21.

A maximum of two fuel pumps on each side of engine may be cut out at a time. If this causes excessive engine vibration, the engine should be shut down.

OPERATING TIPS

TOWING LOCOMOTIVE DEAD IN TRAIN

1. In freezing weather, drain engine cooling water system.

2. Close the double-heading cock on brake valve pedestal.

3. Place automatic and independent brake valve handles in *Running* position.

4. Place throttle in *Idle*, selector handle in *Off* and reverse handle in *Off* position. Turn all switches *Off* and open the battery switch.

5. Close the cut-out cock located on the crossover pipe above the distributing valve. Open the dead engine cock. See Fig. 33.

DRAINING AND FILLING COOLING WATER SYSTEM

To drain system in freezing weather:

1. Open the drain valve. See Fig. 10.

2. Remove plug from bottom of water pump.

3. Open both cab heater valves. See Fig. 27 and 28.

To drain system under ordinary conditions:

Open the drain valve. See Fig. 10.

To fill system:

Use either the roof connection, Fig. 34, or the filler nozzle, Fig. 26. Water under pressure is required to fill at the side connection but not at the roof connection.

HAND BRAKE OPERATION

With the locomotive brakes released, apply the hand brake by engaging the latching lever in back of brake wheel and turn the wheel in a clockwise direction until the brakes are fully applied.

To release the hand brake, turn the wheel clockwise about one-eighth of a turn; disengage latching lever and release wheel. The wheel will spin counter-clockwise until brakes are fully released. See Fig. 23.

OPERATING TIPS

The hand brake applies the brakes on the rear truck only.

REVERSER

The reverser is located in the contactor compartment in the lower left hand corner.

If the reverser fails to operate, turn the *Engine Control* knob to *Idle*. Try to operate the reverser by pressing *In* on the magnet valve buttons.

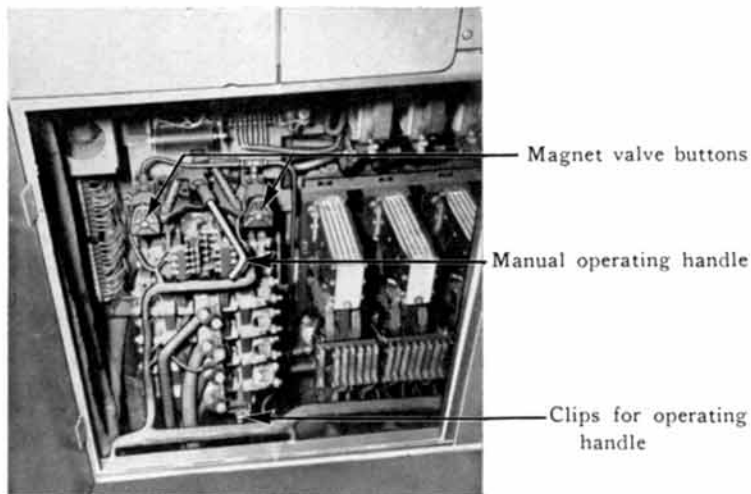


Fig. 41
REVERSER

If this is not effective, remove manual operating handle from the clips on the reverser frame. Insert the handle in hole provided in casting on top of operating shaft and move to position corresponding with movement of train. Fig. 41 shows handle in *Forward* position.

FASTER AIR PUMPING

1. *Generator Field* switch, located on engineman's control panel, must be *Off*.
2. Reverse handle must be in *Off* position.
3. Selector handle must be in *Position 1*.
4. Open throttle to *Notch 5* or below.

OPERATING TIPS

BRAKE CYLINDER CUT-OUT

The brakes on any one truck may be cut out by closing the brake cylinder cut-out cock, located below the locomotive chassis on the right side.

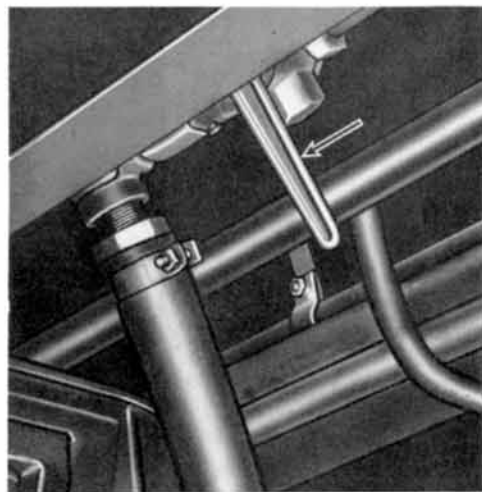


Fig. 42
BRAKE CYLINDER CUT-OUT COCK

PARTIAL LOAD OPERATION

The diesel engine may be operated at partial load by moving the *Engine Control* knob to points 2, 4, or 6, regardless of the position of the throttle.

AUTOMATIC ALARMS

WHEEL SLIPPAGE

Slipping of any driving wheels is indicated by the wheel slip indicating light and buzzer located on engineman's control panel. See Fig. 5.

When this occurs, shut off or partially close the throttle until buzzing stops and light goes out. Use sand as necessary to prevent slipping of wheels, and when braking if there is a likelihood of sliding wheels.

TRACTION MOTOR CUT-OUT SWITCH

This switch located in the contactor compartment, Fig. 19, is used to cut out traction motors if a ground should occur in the traction motor circuit or if this equipment should otherwise become defective.

Turning this switch to the left cuts out motors 2 and 3; to the right cuts out motors 1 and 4.

GROUND RELAY

If a ground occurs in the main power circuit the alarm bell will ring and the ground indicating light will light on the engine control panel. The ground relay indicator on the relay panel will show red. The diesel engine will drop its load and return to idling speed.

To reset the ground relay, move throttle to *Idle* position, push in ground relay reset button. See Fig. 19.

In order to determine whether or not a ground in the traction motors is causing the ground relay to pick up, return the throttle to *Idle*, push in the ground relay reset button, and turn the *Traction Motor Cut-Out* switch to cut out motors 1 and 4. With selector handle in *Position 1*, open throttle. If ground persists, return throttle to *Idle*, reset ground relay and turn *Traction Motor Cut-out* switch to cut out motors 2 and 3.

AND SAFEGUARDS

If ground still continues, return throttle to *Idle*, reset ground relay, open ground relay knife switch, Fig. 19, and move locomotive no farther than necessary to get into the clear. At the same time watching for smoke and overheating of electrical equipment.

DIESEL ENGINE OVERSPEED SWITCH

If the diesel engine overspeeds, the overspeed switch will automatically shut down the engine by opening the governor clutch coil circuit in the power plant governor. This causes the fuel pump racks to move to the shut down position.

To reset, move throttle and *Engine Control* switch to *Off* position. Push in *Overspeed Switch Reset* button, located on the base of the tachometer generator mounted on the governor side of the diesel engine at the generator end. See Fig. 31. Start the diesel engine in the normal manner and then move the *Engine Control* knob to *Run* position.

LOW LUBRICATING OIL PRESSURE SWITCHES

The diesel engine is equipped with two low lubricating oil pressure switches and one governor oil pressure switch.

If, for any reason, the lubricating oil pressure in the engine header drops to 20 pounds, the first switch will operate, dropping the engine load and return the engine to *Idle*.

If the oil pressure in the engine header continues to drop to 7 pounds, the second switch operates and shuts down the engine.

When the first switch operates, the alarm bell will ring and the *Low Lubricating Oil* light will light on the engine control panel.

In case the foregoing occurs, move the throttle and *Engine Control* knob to *Idle* and investigate for the cause. If the cause is found and corrected, move *Engine Control* knob to *Run* position.

AUTOMATIC ALARMS

When the oil pressure in the governor oil system drops below 75 pounds, the governor will shut the engine down causing the alarm bell to ring and the *Low Lubricating Oil* light to light on the engine control panel.

ENGINE WATER TEMPERATURE CONTROLS

The locomotive is equipped with radiator side shutters, the operation of which can be controlled either automatically or manually.

In automatic control, the shutters are either fully *Open* or *Closed*.

In manual operation, any desired shutter setting may be obtained, each side shutter being individually operated. To operate manually, close the cut-out cock for the shutter control air, open the small "T" vent valve at the air filter lubricator. This cut-out cock and air filter are located in the diesel engine compartment on the right side of the bulkhead between the diesel engine and radiator fan compartments. See Fig. 32.

Apply the extension handle to the shutter operating mechanism. Pull down on the handle to the desired shutter opening which will maintain the diesel engine water temperature between 140 F to 160 F. Lock the shutters in this position by dropping the hinged latch over the threaded operating rod and adjust lock nut to keep shutters in this position. See Fig. 20. However, if engine water temperature is not properly maintained by manual operation of the shutters, place them in full *Open* position. With the shutters in this position, the radiator fan limit switch is closed. The radiator fan can operate only when the switch is in this position.

To operate automatically, open the cut-out cock for the shutter control air, close the "T" vent valve and raise the hinged latch, fold back, and rest it on the shutter frame. High engine water temperature alarms are set at 185 F.

AND SAFEGUARDS

Each locomotive is equipped with a radiator fan, the speed of which can be controlled either automatically or manually.

For automatic control, move the engine water temperature switch to *Automatic* position. This switch is located on the engine control panel.

For manual control, move this switch to *Manual* position and rotate the knurled dial in direction indicated to maintain 140 F to 160 F temperature.

CIRCUIT BREAKERS

If a circuit breaker should trip out, the handle will be midway between *On* and *Off*. To reset, move handle to *Off* position and then to *On* position. In some cases it may be necessary to wait a few minutes before attempting to reset the breaker.

LOCOMOTIVE OVERSPEED RELAY

This relay limits the top speed of the locomotive. A warning whistle will blow for 6 seconds before the diesel engine drops its load, returning the engine to *Idle* speed and a service application of brakes is made. In order to prevent this action, return the throttle to *Idle* and make a service application of the brakes to reduce the train speed below the maximum permissible speed.

However, if this action does take place, it will be necessary to reset the relay by closing the throttle to *Idle* and release the brakes in the normal manner.