Rail Operating Code

Code Supplement CS 4.6

Operating Instructions for DSJ Class Locomotives

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PICTURE OF DSJ LOCOMOTIVE

New picture

1.0 TRAINING AND CERTIFICATION

The training for existing Shunt Class Operators shall consist of a two-hour conversion course.

If not already done so, the operator must also meet the other certification criteria as detailed in Section 10.3 of the RORP.

2.0 COMMONLY USED ABBREVIATIONS

BKS	Battery Knife Switch
CB	Circuit Breaker
CCB	Control Circuit Breaker
CCG	Control Circuit Governor
DCA	Direct Cooling Additive
EFR	Earth Fault Relay
EO	Engine Only
LOP	Low Oil Pressure
M/STOP	Manager / Supervisor, Training & Operating Practices
RMS	Remote Manual Switch
RSC	Rotary Screw Compressor

3.0 GENERAL

3.1 Introduction

This locomotive is equipped with one 6-cylinder diesel engine which drives the main generator for tractive purposes. This powers four traction motors, each geared to a pair of driving wheels.

Most of the controls are on the driver's desk, with others at the engine control panel located at the corner of the cab. The driver's desk is positioned in the cab to allow operation in either direction.

3.2 Locomotive

The diesel engine is started by a starter motor engaging the engine flywheel ring gear. The storage battery supplies electric current to the starter motor.

When the engine is running, it supplies mechanical power through shafts and V-belts, to directly drive the electrical generator, the air compressor, traction motor blower, radiator cooling fan and engine mounted lube oil and cooling water pump.

The auxiliary generator charges the storage battery and supplies low voltage direct current for the control and lighting circuits. The main generator supplies high DC voltage to the traction motors.

From the cab controls, low voltage circuits are established to actuate the engine governor and the switch gear in the control desk and control cabinet for generator excitation and distribution of power.

Each traction wheel is directly geared to an axle and a pair of driving wheels.

The throttle electronically controls speed and power by actuating a governor mounted on the engine.

The air compressor supplies to the reservoirs, air under pressure that is then used primarily for the air brakes.

‘Authorised personnel’ noted in these instructions refers to personnel certified to work in asbestos containing areas with the appropriate training, PPE and site preparation as required.

Entrance to electrical cabinets and engine / generator / compressor compartments is prohibited unless authorised to do so. This therefore will restrict access to switches / relays and other equipment contained within these compartments.

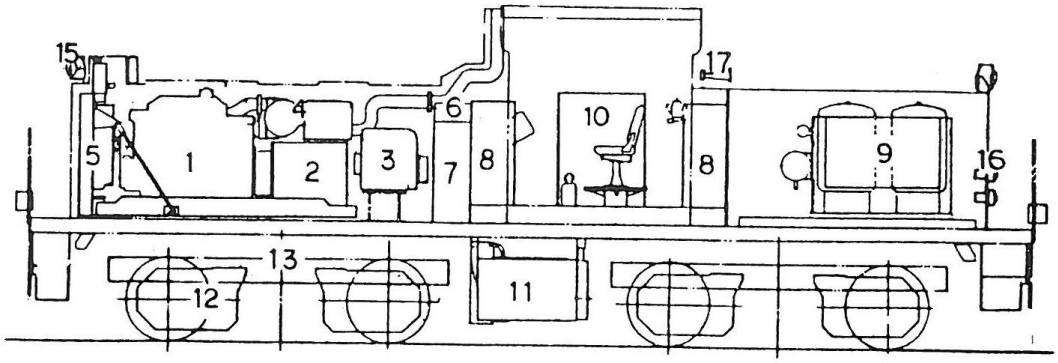
Type	(Bo-Bo) 0440
Horsepower (nominal)	500
Diesel Engine Model No. of Cylinders Full Speed Idle Speed	Cummins KTA-1150-L Turbo Charged 6 1,800 RPM 700 RPM
Main Generator	SDT-518A
Auxiliary Generator Rating	2.8 kW
Traction Motors Number Type	 4 DC, Series Wound Axle Hung
Air Compressor Capacity at 1,200 RPM	C2000A 2,550 litre/min
Rotary Screw Compressor	UD160 – Capacity 160 CFM@2000rpm
Lubricating Oil Capacity	73.8 litres
Cooling Water Capacity	90 litres
Fuel Capacity	1,000 litres
Sand	65 litres x 4
Air Brakes	Type 27LA
Weight On Rails	52 tonne
Weight on Driver's	100%
Major Dimensions Length over End Plates Height – Top of Rail to Exhaust	 11 metres 3.7 metres

4.0 GENERAL DIAGRAMS

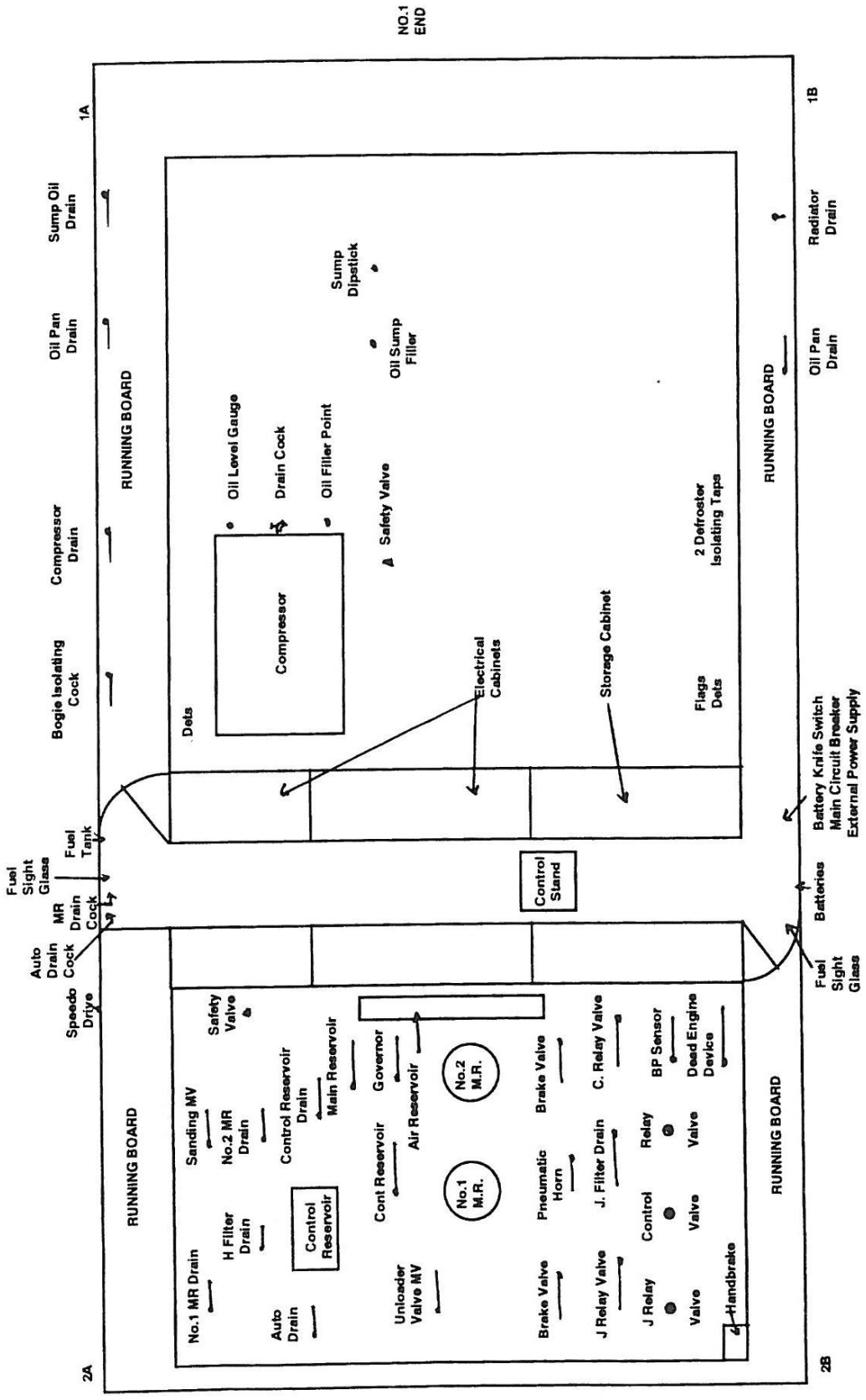
4.1 Arrangement of DSJ

Arrangement of Locomotive

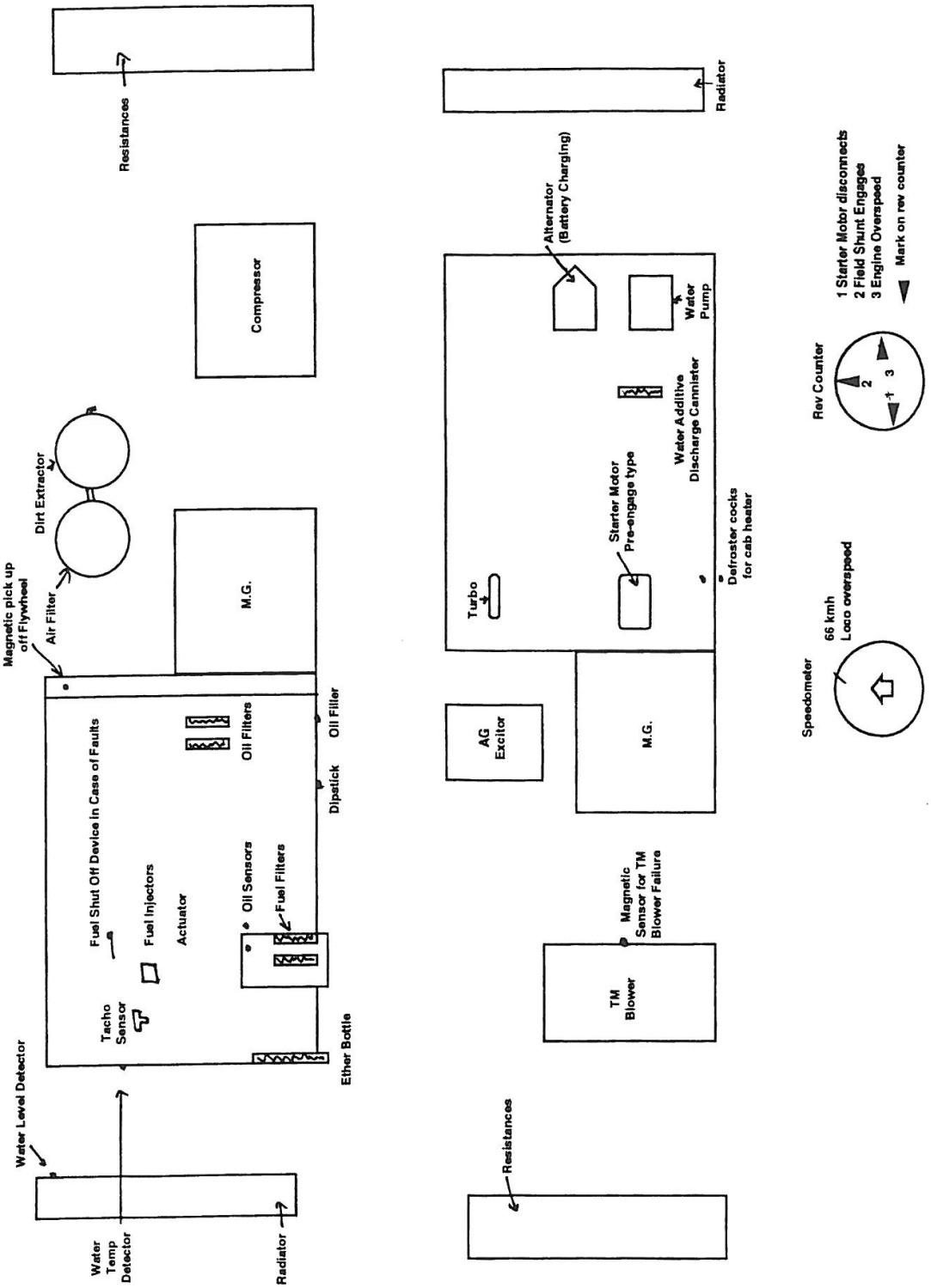
1. Diesel Engine
2. Traction Generator
3. Air Compressor
4. Intake Air Filter
5. Radiator
6. Field Resistor
7. Resistor Unit
8. Control Box
9. Air Brake Unit
10. Control Desk
11. Fuel Tank
12. Traction Motor
13. Bogie
15. Headlight
16. Tail Light
17. Whistle



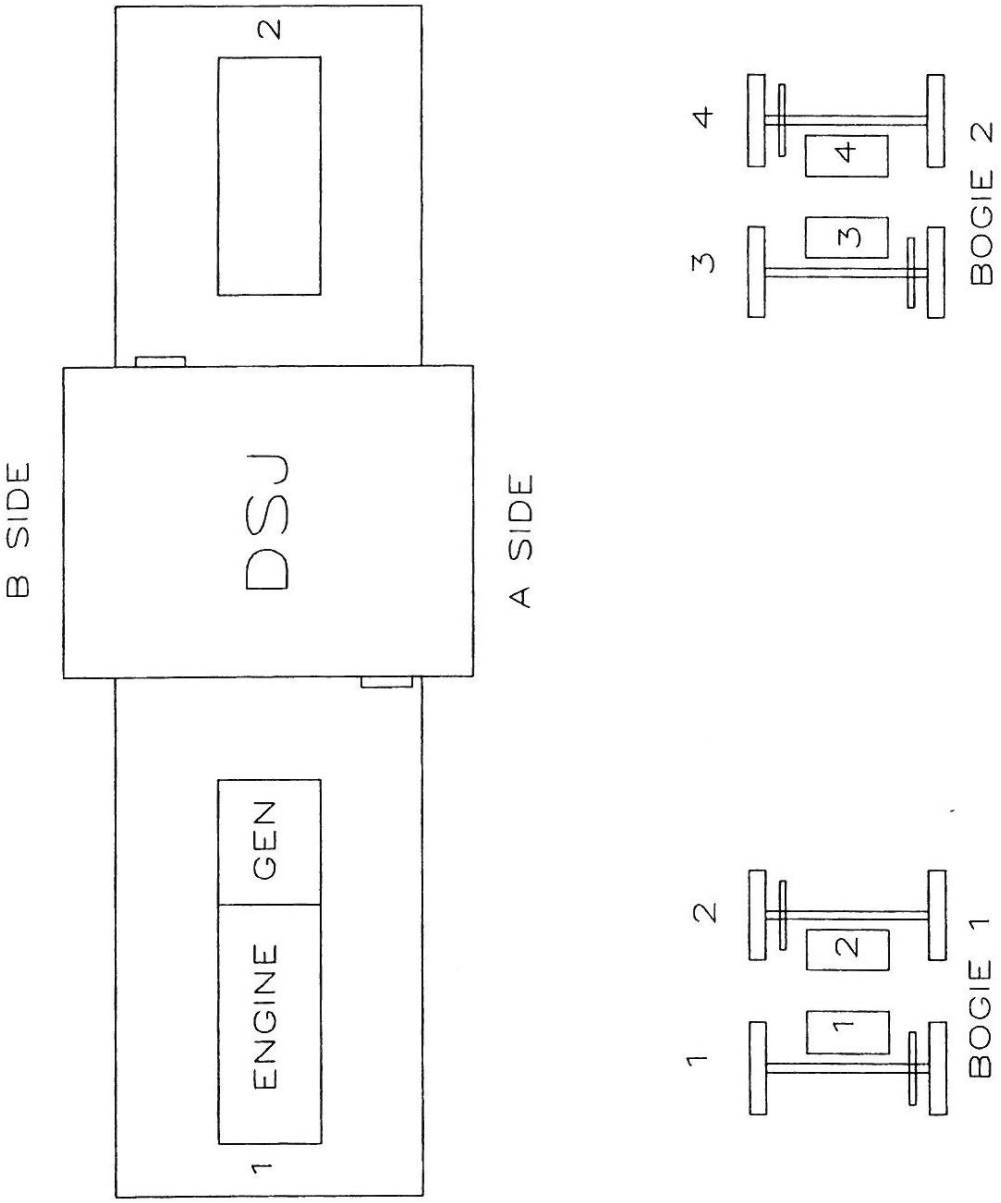
4.2 Location of Cocks etc.



4.3 Engine Room



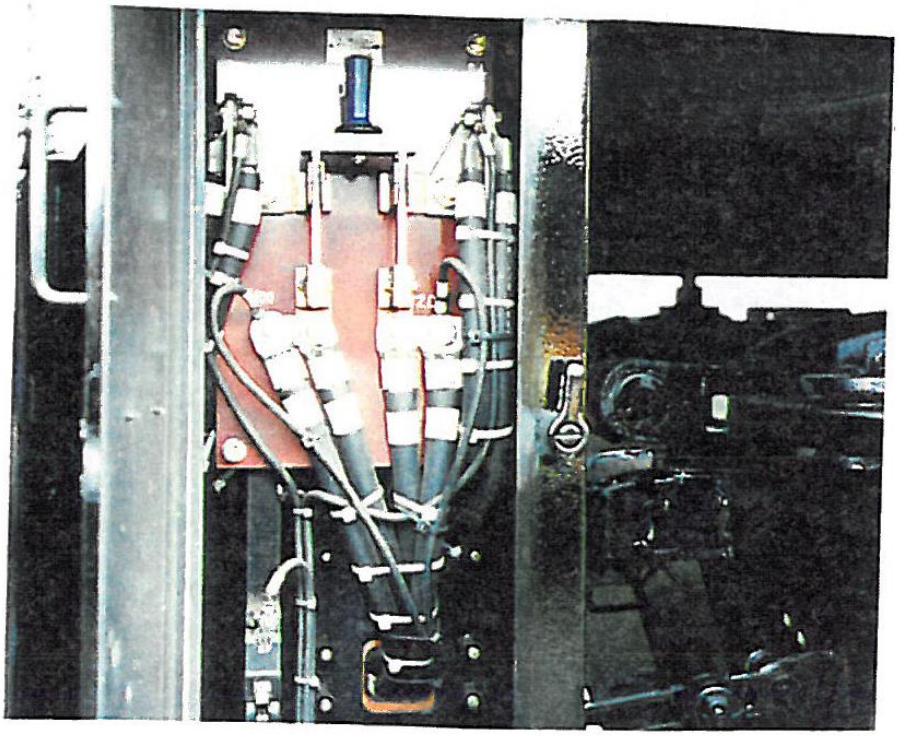
4.3 Bogie Arrangement



5.0 CAB CONTROLS / LAYOUT

A switch for engine cranking is located at the engine meter box in the cab. All other control equipment used during locomotive operation are located within the cab.

5.1 Engine Starting Controls

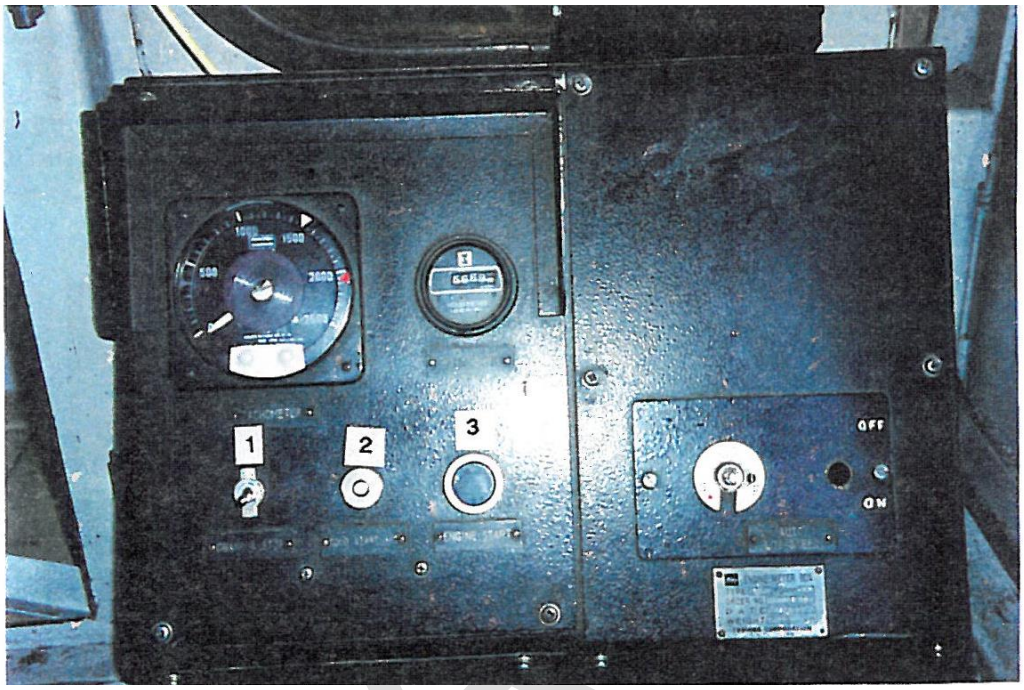


CAUTION: The battery knife switch, used to cut-out the storage battery power, is located in the upper side of the resistor box under the underframe of No.1 end, B side and should be closed before starting the engine.

5.2 Engine Meter Box

This box is installed at No.1 near the operator's seat in the cab.

The box is equipped with switches for starting and stopping of engines, tachometers, and hour meter.



1	Crank and Stop Switch
2	Cold Starting Aid Pushbutton
3	Engine Start Pushbutton

5.2.1 Crank and Stop Switch

This "on / off" switch operates the electrically driven fuel shutdown valve.

5.2.2 Cold Starting Aid Pushbutton

This switch operates the electrically operated valve for cold starting. This system only operates while the engine is cranking. When the pushbutton is depressed a measured amount of ether is metered. The ether is injected into the intake manifold when the pushbutton is released. The system only operates below 8^{o} C.

5.2.3 Engine Start Pushbutton

This switch is used for engine starting. It should be kept depressed until the engine has fired, and released after the engine starts and the oil pressure light has extinguished.

5.3 Control Cabinet

Two cabinets, with hinged doors, are in the front and rear of the cab.

These cabinets are located at 1 end side and 2 end side, respectively. They are equipped with motor cut-out switch and ground switch.

5.3.1 Traction Motor Cut-Out Switch (MCOS)

This switch is used for isolating a failed traction motor.

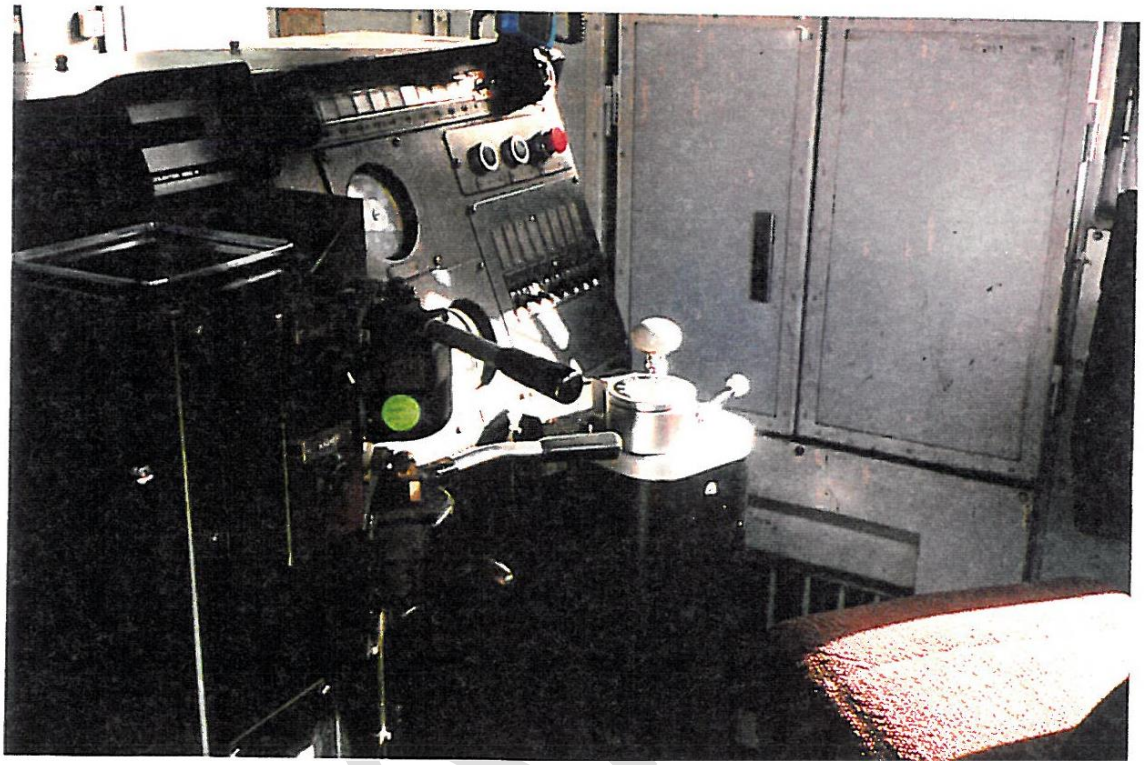
No.1 and 2 MCOS position cuts out M1 and M2 traction motors, and No.3 and 4 MCOS position cuts out M3 and M4 traction motors.

5.3.2 Ground Switch (GS)

This switch connects the traction circuit to the ground. Driving of the locomotive will be possible by opening this switch when any equipment of the traction circuit keeps grounding. This is to be used for a short period only to clear the main line. Check all electrical circuits for overheating before using.

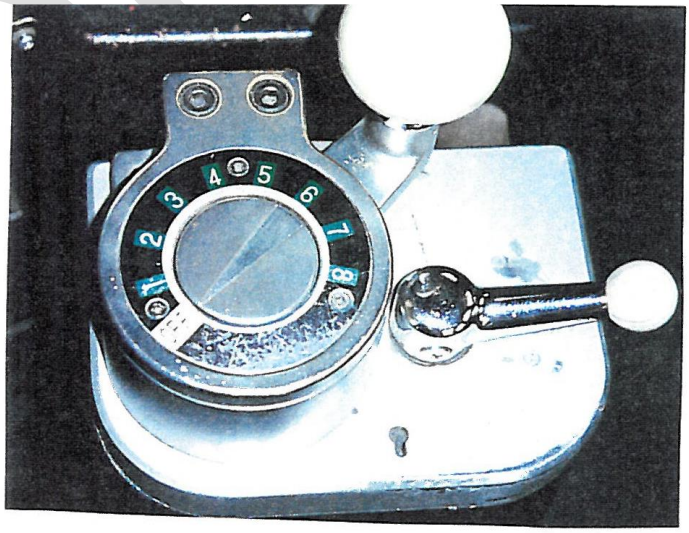
5.4 Control Desk

This desk is located at the centre of the cab.



5.4.1 Master Controller

The master controller is provided with operating handles as:



Main Handle

This handle is used for controlling the power of the locomotive. The main handle has OFF (idle) and 1 -8 power notches. Output of the engine increases when the handle is turned clockwise. The engine idles at the "OFF" and Notch 1 positions. At these positions the locomotive is not powered as the traction circuit is not established.
At the Notch 1 engine speed, the output is set at 700 RPM and 39 HP. When advanced to Notch 2 or higher, the locomotive is accelerated by the rotation speed and output of engine according to the table below.

Notch	Engine (RPM)	Engine Output (HP)
OFF (Idle)	700	-
1	700	39
2	850	92
3	1050	137
4	1200	177
5	1300	253
6	1450	307
7	1600	368
8	1800	461

Reverser Handle

The handle determines the running direction of the locomotive. The reverser handle has four positions, F, N, OFF and R.

When the handle is set to "F" position, the locomotive moves in the No.1 end direction. When the handle is placed to "R" position, the locomotive moves in the No.2 end direction. The main handle can be notched up to increase engine revs without producing amps when the handle is placed in "N" position.

The main handle and reverser handle are mechanically interlocked as:

- The reverser handle can be operated only when the main handle is on the "OFF: position.
- The main handle can be operated only when the reverser handle is in "F", "N" or "R" position.

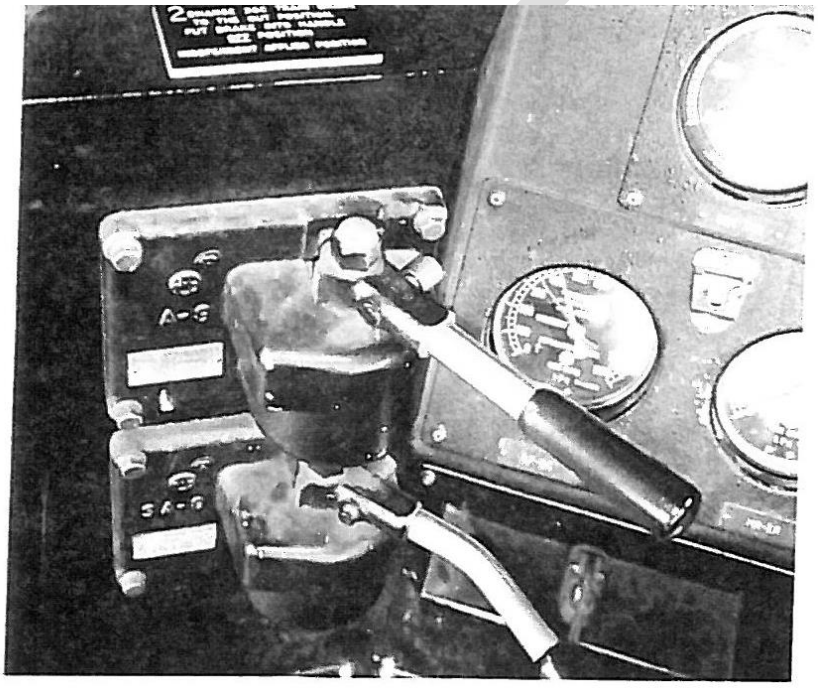
5.4.2 Air Brake

The locomotive is equipped with type 27LA air brake equipment.

5.4.3 Brake Valve Handles

The operating controls of the operator's brake valve are:

- The automatic brake handle (upper), which controls the train as well as the locomotive brakes.
- The independent brake handle (lower), which control the locomotive brakes only.



5.4.4 Automatic Brake Valve Handle

Movement of the automatic brake valve handle provides the following brake control on the train and locomotive.

Release (Running / Charging) Position	The handle is normally in this position. It releases the locomotive and train brakes and recharges the equipment after an automatic application.
Initial Reduction Position	Provides a minimum service brake application on the locomotive and train.
Application Zone	Provides brake application on the locomotive and on the train. The degree of brake application is determined by the distance the handle is moved towards the full service position. The brake valve will automatically lap itself and keep the brakes applied.
Full-Service Position	Provides a heavy maximum service brake application on the locomotive and train.
Over Reduction	This position is used with the safety control system. When used, brake response is faster than full position.
Emergency Position	Provides the quickest and most severe locomotive and train brake application, with brake pipe pressure quickly reduced to zero and sand automatically blown onto the rails. Locomotive brake cylinder pressure is the same as that obtained with a full-service application.

5.4.5 Independent Brake Valve Handle

Movement of the independent brake valve handle provides the following control on the locomotive only:

Release (Running) Position	The handle is normally in this position. It releases the locomotive brakes after an independent application.
Application Zone	Brakes are applied on the locomotive. The amount of brake application is determined by the distance the handle is moved towards full application position.
Full Application Position	Provides the maximum amount of brake application available for locomotive braking.
Quick Release Position	When the handle is pushed past the release position it will suppress, reduce, or release an automatic air brake application on the locomotive without affecting the automatic brake application on the train.

5.4.6 Brake Gauge Panel

Gauges to indicate various pressures concerned with the air brakes are located at near centre of the control desk. Duplex gauges indicate the following:

Main Reservoir Pressure (Red Hand)	/	Equalising Reservoir Pressure (White Hand)
Brake Cylinder Pressure (Red Hand)	/	Brake Pipe Pressure (White Hand)

5.4.7 Ammeter (Main Gen AMPS)

The ammeter indicates total current of the motor circuits.
The full sale is 1000 A.
The scale has three zones: green, yellow and red.
The green zone indicates the continuous rating range of the traction motor. The yellow and red zones are ranges of the short time rating and 5-minute rating of traction motor, respectively.

5.4.8 Ammeter (Battery)

This ammeter gives the value of charging and discharging current of the battery. The scale with symmetrical deflection of 100A-0-100A shows neutral point at the centre and indicates charging and discharging at the right and left hand scales, respectively.

The ammeter shows the charging condition whenever the auxiliary alternator-rectifier set is operating.

5.4.9 Voltmeter (Battery)

This voltmeter shows battery voltage to 50V.

5.4.10 Pushbuttons

Emergency	This mushroom type pushbutton switch is to stop the engine in an emergency. This button when pushed will latch in. To release, push again.
Reset	This pushbutton is to reset the protective relay after its operation. This is a spring return type which is also used after first starting the locomotive.

5.4.11 Miniature Circuit Breakers

Gauge Light	This gauge is lighted when this MCB is turned “on”.
Headlight	By turning 1 or 2 MCB “on”, the headlight of each end respectively is illuminated.
Headlight Dim	These MCB’s are usually set to “on”, the headlight illuminating power is reduced by turning these MCB’s “off”
Taillight	By turning 1 and 2 MCB’s “on”, the trail lights at each end respectively are illuminated.
Ground and Step Light	The ground lights and footstep lights are illuminated with this MCB “on”.
Defroster Blower	The defroster blower operates by turning this MCB “on”.
Cab Heater Blower	The cab heater blower is operated by turning this MCB “on”.
Speedometer	Power supply to the speed detecting circuit and is to be kept “on” during operation.
Washer	Power supply to the washer motor and is to be kept “on” during operation.
DC Auxiliary Circuit	DC output of auxiliary generator to supply the auxiliary circuits. This switch is to be kept “on” during operation.
Battery Isolating	This MCB protects the battery circuit. It is to be kept “on” during operation.
Compressor Control	This MCB controls the unloading valve of the compressor. It is to be kept “on” during operation.
Exciter Control	This is to be kept “on” during operation.
Control	This must be kept “on” during operation to provide power to: • Control Circuit • Warning Circuit • Pressurise Fan
Kettle	Power supply to socket of kettle.
Trouble Lamp	Power supply to trouble lamp.
Cab Light	Power supply to cab lights.

5.4.12 Switches

Test Switch	This switch is to check normal functioning of the warning lights and buzzer. All warning lights are on, and buzzer sounds simultaneously when the switch is “on”.
Cab Heater Blower	This switch controls the speed of the heater blower.
Low Speed	This switch selects between normal operation and low speed control. Normal operation is selected by setting to “off” position, and low speed operation by setting to “on” position.

5.4.13 Warning Lights

ASL	Lights when the constant speed control is normally performed.
GR	Lights when the traction control is grounded.
OCR 1 & 2	Lights when an overcurrent flows through the traction circuit.
SLIP	Lights with wheelslip.
LOW OIL	Lights when the pressure of the engine lubrication oil drops.
HOT WATER	Lights when the temperature of the cooling water in the engine rises beyond a predetermined temperature.
LOW WATER	Lights when the level of cooling water in the engine falls to a predetermined level.
BL	Lights when the speed of traction motor blower falls.
OSL	Lights when the speed of the locomotive increases. **NOTE:** Setting speed of OSL lighting is: • Low speed operation – 16.5 km/h • Normal operation – 66 km/h
AGL	Lights when the output voltage of auxiliary generator is normal.

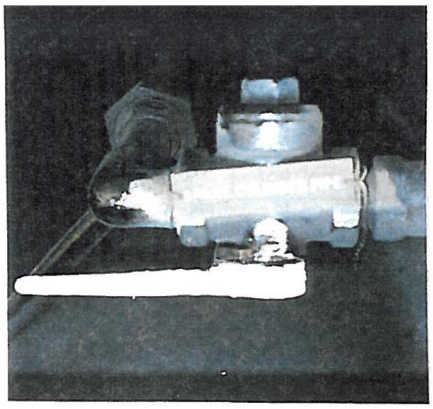
5.4.14 Operation of MCB's

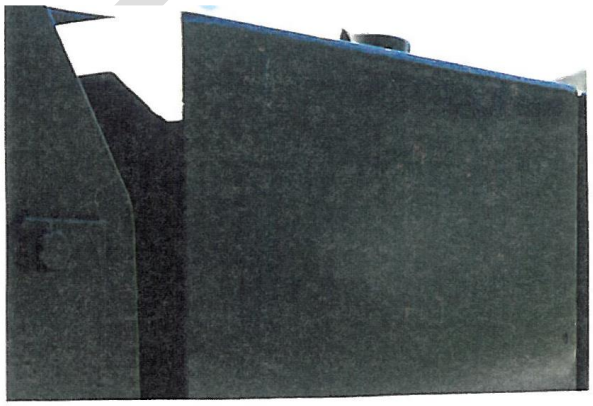
Operation			
Variation	**MCB No.**	**During Operation**	**According to Requirements**
GROUND & F'STEP LT	6		ON
TAILLIGHT (No.1)	2		ON
TAILLIGHT (No.2)	4		ON
HEAD DIM (No.1)	21		ON
HEADLIGHT (No.1)	1		ON
HEAD DIM (No.2)	22		ON
HEADLIGHT (No.2)	3		ON
GAUGE LIGHT	14		ON
CAB HEATER BL.	7		ON
DEFROSTER BL.	12		ON
CAB LTS.	34		ON
TROUBLE LAMP	17		ON
KETTLE	9		ON
RADIO TELEPHONE	13	ON	
COLD START AID	23		ON
CONTROL	51	ON	
EXCITER CONT.	16	ON	
COMP. CONTROL	18	ON	
BATT. ISOLATE.	30	ON	
SPEEDOMETER	19	ON	
WASHER	37		ON
DC AUX CIRCUIT	38	ON	
PANEL HEATER	31 & 32		ON
BATT. CHARGING	10		ON

6.0 PRE-START PROCEDURES

6.1 Outside Checks

- Check fuel level in the tank.
- Check for leakage of fuel, oil and water.
- Check both sets of reservoir drains at No.1 and No.2 ends.
- Check brake block thickness is sufficient for the shift.
- Check the bogie isolating cocks are in the cut-in position.
- Check radiator recovery tank water level. If low advise maintenance staff.





- Check that the traction motor bellows are intact.
- Check brake cylinder piston travel and if necessary adjust the brakes.
- Check for loose, missing, broken or dragging parts.
- Check engine and contactor compartments to ensure there are no flammable material present. As well as being a fire hazard, the lighter material may be drawn into cooling ducts reducing air circulation and causing overheating in generators and traction motors, with consequent risk of breakdown.
- Check drive belts to radiator fan, auxiliary generator, fuel pump and compressor.
- Check oil levels (sump and compressor). The engine must have been stopped at least 15 minutes before checks are made. Top up if required and record in Loco 54D book.
- Close BKS.
- Check engine oil filter indicator. Red indicates the filter id clogged and requires to be changed.

Due to asbestos issues, the following Pre-Start checks are to be carried out by authorised personnel only on locomotives with ACM.

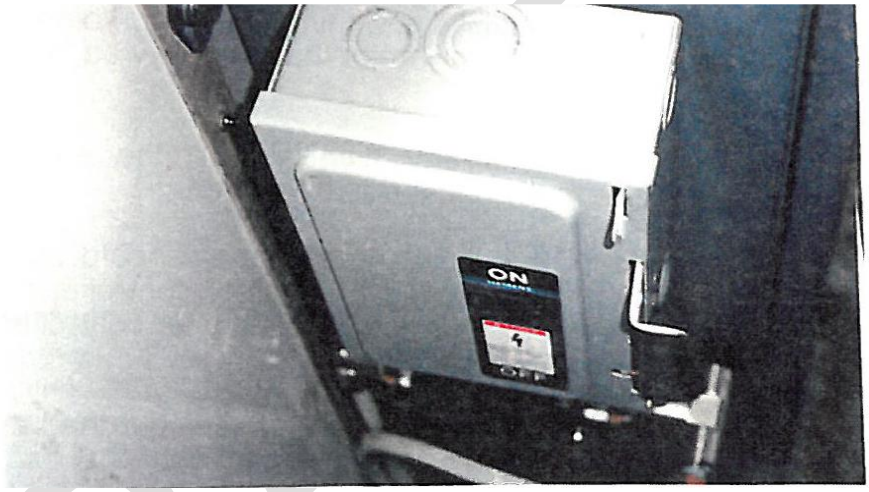
At a predetermined interval:

- Check engine and contactor compartments to ensure there is no flammable material present. As well as being a fire hazard, the lighter material may be drawn into cooling ducts reducing air circulation and causing overheating in generators and traction motors, with consequent risk of breakdown.
- Check drive belts to radiator fan, auxiliary generator, fuel pump and compressor.
- Check oil levels (sump and compressor. The engine must have been stopped at least 15 minutes before these checks are made. Top up if required and record in Loco 54 Book.
- Check Engine Air Filter Indicator. Red indicates the filter is clogged and requires to be changed.
- In the control cabinet, check:
- In the control cabinet, check:
    - Motor Cut-out switch in normal position
    - Ground switch is closed.
    - DC Aux. Circuit MCB is on
- In the case of one engine operation:
    - Change APCOS to operating engine, AG1 or AG2
    - Turn off CCOS of stopped engine.
- Check engine for fuel, oil, and water leaks, rectify any leaks.

7.0 START UP PROCEDURES

7.1 Starting the Engine

1. Check the Loco 54D book for any open bookings.
2. Ensure handbrake is “on”.
3. Check that the push down throttle and brake remote transfer cock is down.
4. Check that the Remote-Control Brake Pipe Isolation valve is in “manual”.
5. Check that the RMS is in the “MAN” position.
6. Check that the isolation switch is “on”.



7. Check the throttle and reverser are both “off”.
8. Ensure the local control switch is “on” (large black switch marked 1). Usually this switch is left “on”.
9. Set the test switch to “test” position and confirm that the warning lights and buzzer are normal, then set it to “off” position.
10. Turn Crank and Stop switch to “on”. Warning lights come on and the buzzer sounds.
11. On the control desk turn “on” the following MCB’s:
    - Battery Isolation
    - Control
    - Compressor Control
    - Exciter Control
    - Speedometer

12 In the control cabinet check:
- Motor Cut-Out switch in “normal” position
- Ground switch is “closed”.
- DC Auxiliary Circuit MCB is "on"

13 Position the following brake equipment:
- Cut-off cock to “open”
- Independent brake valve handle to “Full Application”
- Automatic brake valve handle to “Release / Running”.

14 Ensure headlights are “off”.

15 Push the start button and hold in until the ammeter shows a charge. Once the engine is running the buzzer will cancel, if the buzzer does not cancel then repeat the procedure.

NOTES:

If the engine temperature is 8^{o}C or lower the cold start aid pushbutton should be used during cranking.

The engine must fire within 30 seconds otherwise a cooling down period for the started motor must be allowed before attempting a restart.

16 Check alarm lights, if any alarm lights, the engine should be stopped, and the fault checked and rectified.

17 Output voltage of the auxiliary generator should build up at once until the AGL is lit by moving the master controller main handle to notch 3 or 4. After this operation, the master controller main handle may be returned to the “idle” position.

CAUTION: If this operation is not carried out, the storage battery may become discharged with the BL light “on”.

18 Wait until the main reservoir is fully charged.

19 Carry out a brake valve leakage test.

20 Check engine for fuel, oil and water leaks, rectify any.

21 When there is sufficient air, check operation of BOTH brake valves which are to be tested in ALL POSITIONS.

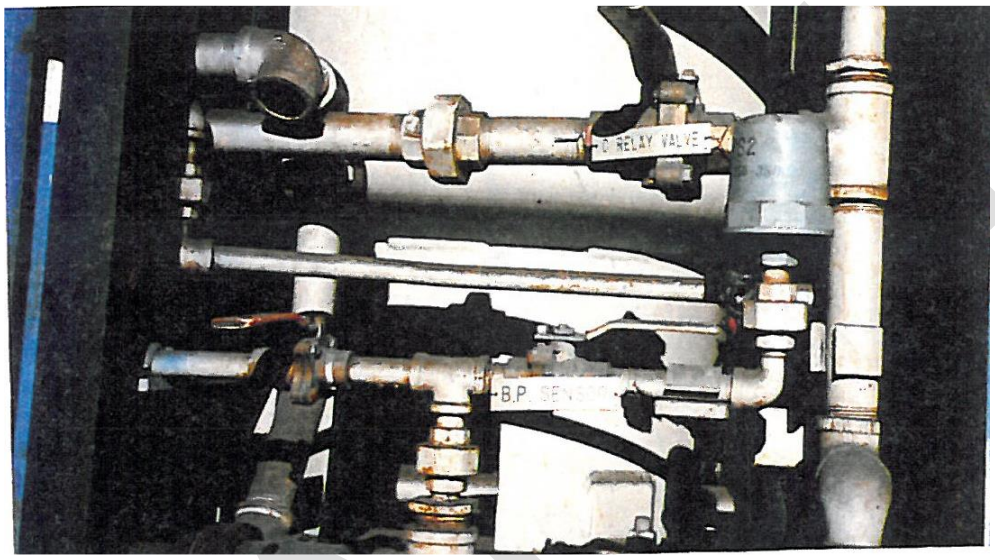
22 Air pressure may be increased more rapidly if the throttle is opened NO MORE than halfway with the reverser key placed in “neutral” position.

23 There should be at least 550 kPa in the main reservoir before moving the locomotive.

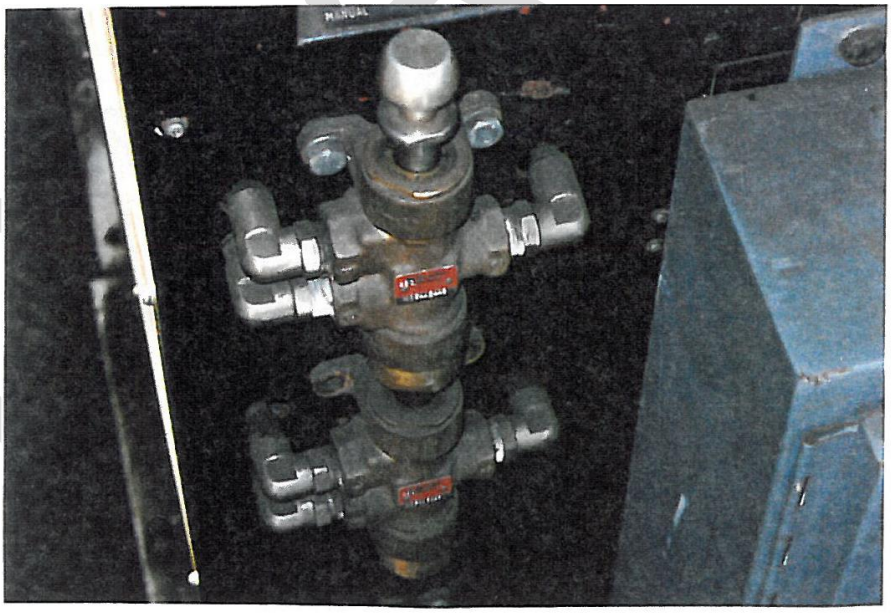
7.2 Changing to Remote

With the engine running and main reservoir pressure fully charged, the locomotive is now ready to be switched to radio operation:

1. Apply Independent Brake to “Full Service”.
2. Automatic Brake Valve handle to “Over Reduction” position.
3. Cut-out C Relay Valve (under hood).



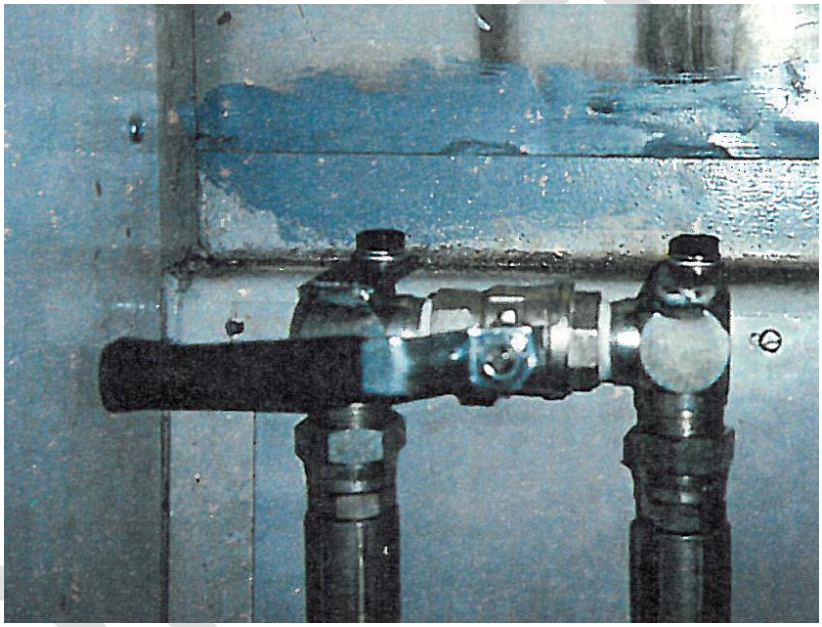
4. Turn “on” external warning beeper and lights.
5. Pull “up” the throttle and brake remote transfer cock.



6. Reverser to “neutral” position.

7. Switch “on” the RMS to the “RAD” (radio) position

8. Check the Remote-Control Brake Pipe Isolation is “cut-in”.



9. Check the alarm lights is not illuminated, if it is on, press the alarm reset button, the light should extinguish. If it stays illuminated, check:
   - Main reservoir air
   - Water – May be low or hot.
   - Low oil pressure

8.0 OPERATING

8.1 Moving the Locomotive

1. Low Speed Cut-out switch is “off”.
2. Headlight and miscellaneous switches “on” as required.
3. Move the reverser handle to forward or reverse.
4. Depress the Reset button.
5. Release brakes.
6. Notch up the master controller handle as required to move locomotive.

   CAUTION: On the traction circuit ammeter, ensure the current does not exceed the red zone of the T.M. AMPS.
7. The master controller handle should be returned to “off” before stopping. Operate the independent brake handle for braking the locomotive alone, and the automatic brake handle for braking when vehicles are attached.
8. Reverser handle should be moved to change direction of travel only when the locomotive is completely stopped.

8.2 Low Speed Drive

When low speed drive is required:

1. Set the handle of the throttle to” on” the Low-Speed switch.
2. Starting operation is the same as manual operation.
3. Drive the train with the throttle in Notch 1 to 4.
4. Then, adjust the driving speed to the required speed with the dial provided.

9.0 SHUT DOWN PROCEDURE

9.1 Stopping the Locomotive

1. Return the throttle to “off” position.
2. Apply the brakes.

9.1.1 Changing from Remote to Manual

1. Stop the locomotive.
2. Switch the ES Override switch to “on” and release the PTO.
3. Switch the transmitter “off” by using the key on the side of the remote pack.
4. Inside the locomotive, apply the handbrake.
5. Turn off the strobe and external warning beeper switches.
6. Cut-out the Brake Pipe Isolation valve
7. Push down the throttle and brake remote transfer cock.
8. Switch the RMS to “MAN” position.
9. Switch off the remote CB.
10. Cut the C Relay valve back in.

9.2 Shutting Down the Diesel Engine

1. Apply the handbrake.
2. Book all repairs necessary in the Loco 54D book and advise fitting staff.
3. Place the Crank and Stop switch in the “stop” position.
4. Switch off all CB’s.
5. Turn off all lights.
6. Open the BKS.

IMPORTANT: Engine must not be shut down unless it has been at idle speed for at least 5 minutes. This is to enable the turbocharger to run down. If this precaution is not taken, severe damage may occur to the turbocharger bearings through lack of lubrication.

10.0 DIESEL ENGINE

Reserved for future use.

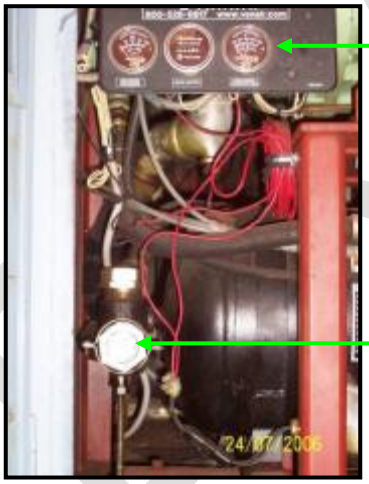
11.0 AIR SYSTEMS

11.1 Rotary Screw Compressor

WARNING:
DO NOT REMOVE CAPS, PLUGS AND / OR OTHER COMPONENTS WHEN THE COMPRESSOR IS RUNNING OR PRESSURISED.
THE COMPRESSOR MUST BE STOPPED AND RELIEVE PRESSURE BEFORE COMMENCING ANY WORK.

11.2 Daily Operation

Prior to starting the compressor, it is necessary to check the fluid level in the sump.
Should the level be low contact Maintenance personnel to add the necessary amount of fluid and record in the Loco 54D book.
If the addition of fluid becomes frequent, a problem has developed which is causing this excessive fluid loss. Contact Maintenance personnel and record in Loco 54D book.



Refer to the Troubleshooting Chart (Section 24) under Excessive Fluid Consumption for a probable cause and remedy.

Check belt tension of compressor drive. Belt deflection no greater than 10mm, if greater than 10mm deflection, record in Loco 54D book for attention.

After a routine start has been made, observe the instrument panel gauge and be sure it indicates the correct reading (within the operating zones) for each particular phase of the operation. After the compressor has warmed up, it is recommended that a general check on the overall compressor and instrument panel be made to assure that the compressor is running properly. Undue noise and vibration is to be recorded for further investigation.

NOTE: When the compressor is operating at the full supply air a relief valve will exhaust to atmosphere. This can be heard from the exterior of the locomotive. This exhaust is not a fault or air leak.

11.2.1 Lubricating Oil

Refer to the M2000 Lubricating Schedule.

WARNING: ONLY THE RECOMMENDED OIL IS TO BE USED.

11.2.2 Instrument and Safety Devices

The standard instrument panel contains the following:

- Pressure Switch Gauge.
- Temperature Switch Gauge.
- Hour Meter.
- Shutdown Relay.

11.2.3 Pressure Switch Gauge

Indicates compressor system air pressure and also an over-pressure switch set at 170 PSIG.

11.2.4 Temperature Switch Gauge

Indicates compressor discharge air temperature from the compressor and contains an over-temperature switch set at 240^{o} F.

11.2.5 Hour Meter

Records ongoing hours the compressor is operated. It can be used for scheduled maintenance purposes etc.

11.2.6 Shutdown Relay

Responds to over-pressure and / or over-temperature conditions to trip the relay which will shut down the engine.

11.2.7 Pressure Relief Valve

Fitted to the receiver tank, is set to relieve at 175 PSIG. This backs up the electric shutdown on over pressure mentioned above.

11.2.8 Oil Fill Plug

Has a safety relief vent hold, which will start to relieve pressure if any attempt is made to remove the fill plug without first ensuring that all system pressure is vented to atmosphere.

11.2.9 Blowdown Valve

Automatically vents compressor system pressure upon shut-down for normal compressor shut-down and in the event of an emergency over-pressure / over-temperature shut-down condition.

11.3 Troubleshooting

The system has been designed to protect the compressor from several forms of failure. Should the locomotive shut down (engine stop running), the locomotive cannot restart until the fault on the compressor has been investigated. Depending on the failure mode the locomotive engine will continue to shut down until a corrective action has occurred.

The Rotary Screw Compressor has a reset button on the compressor gauge panel. Should the locomotive shut down due to compressor over-temperature or over-pressure, the compressor cannot be reset, and the locomotive restarted until the cause has been remedied or the temperature / pressure has reduced to a safe operating level.

The information contained in the Troubleshooting Chart (Section 24) has been compiled from field report data and factory experience. It contains symptoms and usual causes from the described problems. However, DO NOT assume that these are the only problems that may occur. All available data concerning the trouble should be systematically analysed before undertaking any repairs or component replacement procedure.

A detailed visual inspection is worth performing for almost all problems Doing so may prevent damage to the compressor.

Always remember to:

- Check for loose wiring.
- Check for damaged piping.
- Check for parts damaged by heat or an electrical short circuit, usually noticeable by discolouration or a burnt odour.

Should the problem persist after making the recommended check, record the fault in the Loco 54D book and notify Maintenance personnel.

12.0 ELECTRICAL

Reserved for future use.

13.0 BRAKES

Reserved for future use.

14.0 CUT OUT COCKS

Reserved for future use.

15.0 EMERGENCY EQUIPMENT

Reserved for future use.

16.0 EVENT RECORDER / VIGILANCE SYSTEM

Reserved for future use.

17.0 PROTECTIVE DEVICES

Reserved for future use.

18.0 SAFETY INSTRUCTIONS

Reserved for future use.

19.0 MISCELLANEOUS

Reserved for future use.

20.0 DOOR OPERATION

Reserved for future use.

21.0 RADIO / PUBLIC ADDRESS SYSTEM

21.1 Tait 8260 Radio

Fitted to all mainline freight locomotives and shunts.

Refer RORP Section 12

22.0 TRAIN ATTENDANTS

Reserved for future use.

23.0 TOWING

1. Check the throttle lever and reverser is in the “off” position.
2. Place the independent brake valve handle in the “release” position.
3. Place the automatic brake valve handle in “release / running” position.
4. Close the C Relay Valve Isolating cock.
5. Open the Dead Engine Device.
6. Reduce No.2 main reservoir to 350 kPa.
7. Ensure the BKS is open.
8. Book in the Loco 54D book.

24.0 FAULTS

24.1 General Faults

Fault:	Cause:	Remedy:
Engine will not start.	Emergency pushbutton latched in.	• Push emergency button in to free the latch.
	Reverser wrongly positioned.	• Place to “off”.
	BKS wrongly positioned.	• Close BKS.
	Motor Cut-out switch wrongly positioned.	• Place to “on”.
	RMS wrongly positioned.	• Turn to “manual”
	Compressor shutdown relay energised.	• Press “reset” button.
Engine will not crank.	Control MCB “off”, BKS open.	• Turn control MCB “on”, Close BKS
	Battery Flat.	• Advise Maintenance personnel.
Engine shuts down.	Compressor over-temperature, or over-pressure	• Check temperature and pressure gauge panel. Only reset if temperature or pressure is in the normal operating zone.
Output of the traction generator is insufficient.	Exciter MCB “off”.	• Set Exciter MCB “on”. After returning the reverser handle to “N”, move the throttle handle from “off” to “notch 1” to confirm pick-up.
In the case of indicator lamps being “on”, the buzzer sounds simultaneously.		

Fault:	Cause:	Remedy:
GR light “on”.	Ground of traction circuit.	• Return the throttle handle to “off”. Depress the “reset” pushbutton on the control desk, then drive again. If the light and buzzer come “on” again, temporary operation is possible by opening the ground switch of the traction circuit.
OCR light “on”.	Overcurrent of traction circuit.	• Return the throttle handle to “off”. Depress the “reset” pushbutton on the control desk, then drive again. If it occurs again, turn off the MCOS of the effected end.
LOW OIL light “on”.	Low oil pressure of main engine lubricating oil.	• Return the throttle handle to “off”. Check lubricating oil level. • Check for leakage.
Main generator will not generate amps.	OCR tripped, GR tripped, Control circuits tripped and failing to reset.	• Place reverser in “F”, “N” or ‘R” and throttle in “off”. Push “reset” button. • OCR and GR may be reset by hand.
HOT WATER light “on”	The cooling water is too hot.	• Return the throttle handle to “off”. Set the reverser handle to “N” then check water level and if okay notch up the throttle handle to operate radiator fan to cool water. • Check radiator fan belt tension.

Fault:	Cause:	Remedy:
LOW WATER light “on”.	Low water level.	• Return the throttle handle to “off” and check system for leaks. • If water is to be added advise maintenance personnel.
SLIP light “on”	Wheels slip.	• Move the throttle handle to a lower notch.
AGL light “on”	Output voltage of the auxiliary generator drops.	• Check auxiliary generator belt tension. **NOTE:** in this case, the buzzer doesn’t sound.
BIL light “on”.	Rotating speed of the traction motor blower drops.	• Check traction motor blower belt tension.
	Speedometer CB “off”.	• Switch CB “on”.
	Power source of the blower fail switch failed.	• Check auxiliary generator failure by AGL lighting.
	The blower fail switch failed.	• Replace the blower fail switch.
OSL light “on”.	Locomotive speed exceeds 66 km/h	• Return throttle to “off” and operate the brake handle to reduce speed.
Under LOW-SPEED operation:		
Locomotive speed up.	Light load	• Return throttle to “off”. • Change “low speed” to “manual” operation.
Locomotive speed down.	Heavy load	• Return throttle to “off”. • Change “low speed” to “manual” operation.
OSL warning light “on” and buzzer sounds.	Locomotive speed exceeds 16.5 km/h	• Operate the brake handle to reduce speed. Change “low speed” to “normal” operation.

Resetting the Control Circuits

The locomotive control circuits require resetting after normal shutdowns and lay-overs, also after the operation of some of the warning system devices.

To Reset:

With the brake pipe air pressure above 350 kPa, the reverser handle in “N”, “F” or “R” and the throttle handle in “off”, depress the “reset” pushbutton.

24.2 Compressor Faults

Fault:	Cause:	Remedy:
Compressor shuts down with air demand present.	Compressor discharge temperature switch is “open”.	• Cooling air flow is insufficient, clean cooler and check for proper ventilation. • Low fluid sump level, add fluid. • Dirty compressor fluid filter, change element. • Defective discharge temperature switch, check for a short or open circuit to the fuel solenoid.
	Control relay tripped on instrument panel.	• Reset relay and check for causes of tripping, over-temperature, or pressure.
Compressor will not build up full discharge pressure.	Air demand is too great.	• Check service lines for leaks or open valves.
	Dirty air filter.	• Check the filter and change the element if required.
	Pressure regulator out of adjustment.	• Adjust regulator to control adjustment instructions in the maintenance manual.
	Defective pressure regulator.	• Check diaphragm and replace if necessary.
	Incorrect compressor speed.	• Check engine RPM’s

Fault:	Cause:	Remedy:
Improper unloading with an excessive pressure build-up causing pressure relief valve to open.	Pressure regulating valve is set to high.	• Re-adjust.
	Leak in control system causing loss of pressure signal.	• Check control lines.
	Inlet valve jammed.	• Replace inlet valve.
	Defective pressure relief valve.	• Replace pressure relief valve.
	Plugged element.	• Replace separator element.
Insufficient air delivery.	Plugged air filter.	• Replace.
	Plugged air / separator filter.	• Change separator element and compressor oil.
	Defective pressure regulator.	• Adjust or repair.
	Engine speed to low.	• Adjust engine speed.
Excessive fluid consumption.	Clogged return line.	• Clear orifice. • Check valve stuck.
	Defective blow-down valve.	• Replace valve.
	Leak in lubrication system.	• Check all pipes, connections, and comments.
	Separator element damaged or not functioning properly.	• Change separator element.
	Fluid sump over-filled.	• Drain to proper level.
Compressor overheating.	Dirty fluid cooler.	• Clean core thoroughly.
	Plugged fluid cooler tube.	• Clean tube.
	Low sump fluid.	• Fill.
	Plugged compressor fluid filter.	• Change element.