Rail Operating Code

Code Supplement CS 4.4

Operating Instructions for DSG Class Locomotives

Issue Number	Prepared (P) Reviewed (R) Amended (A)	Approved by	Authorised for release by	Review date
Original	-	Ron Mail	20 Feb, 1994	-
1	-	Ron Mail	23 March, 1998	-
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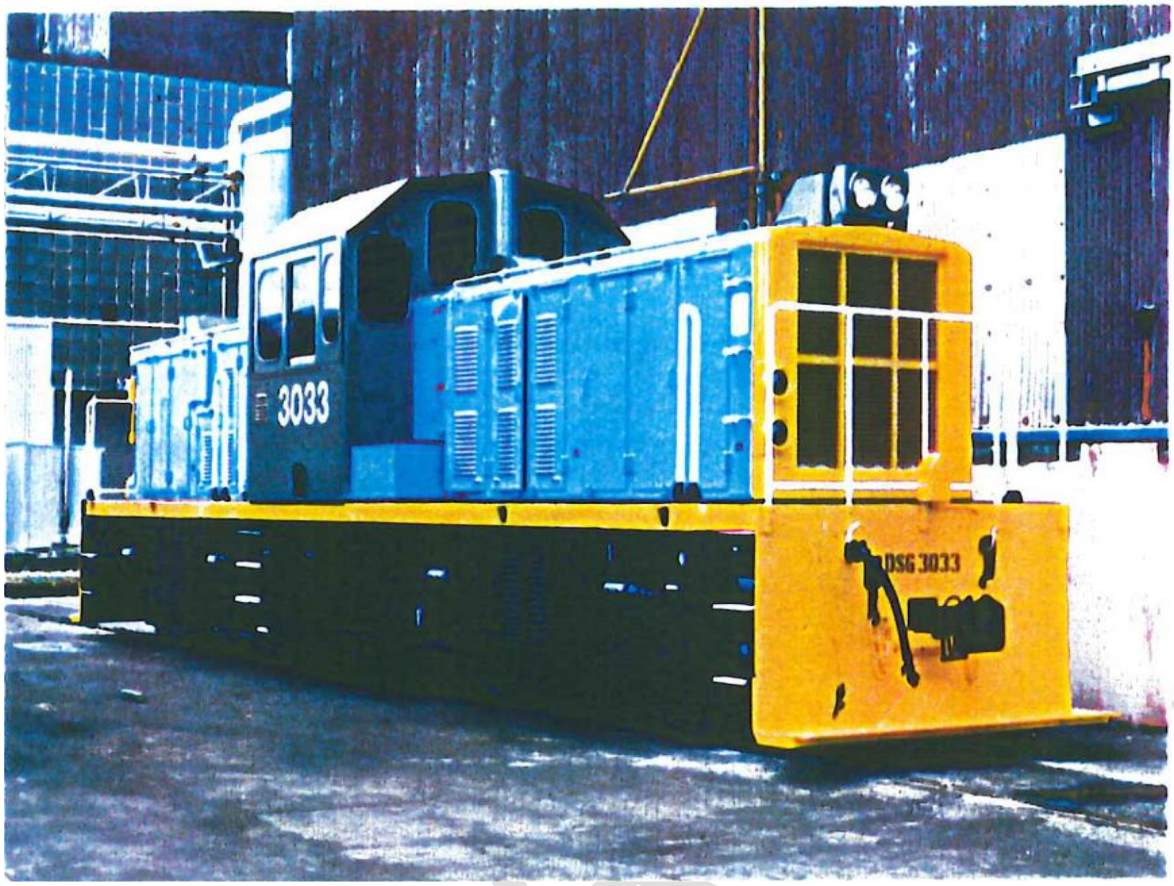
PICTURE OF DSG LOCOMOTIVE



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

APCOS	Auxiliary Power Cut-Out Switch
BIS	Battery Isolation Switch
BL	Blower Light
CCOS	Control Cut-Out Switch
DC	Direct Current
F	Forward
GR	Ground Relay
MCB	Miniature Circuit Breaker
MCOS	Motor Cut-Out Switch
N	Neutral
OCR	Overcurrent Relay
OSL	Road Overspeed Light
R	Reverse

3.0 GENERAL

3.1 Introduction

This locomotive is equipped with two 6-cylinder diesel engine which drives the main generators. These power two traction motors, geared to a pair of driving wheels on each bogie.

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 control cabinets are pressurised. The driver's desk is positioned in the cab to allow comfortable use of the controls during 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 on each of the bogies.

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.

Various alarms and safety devices will alert the operators.

‘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.

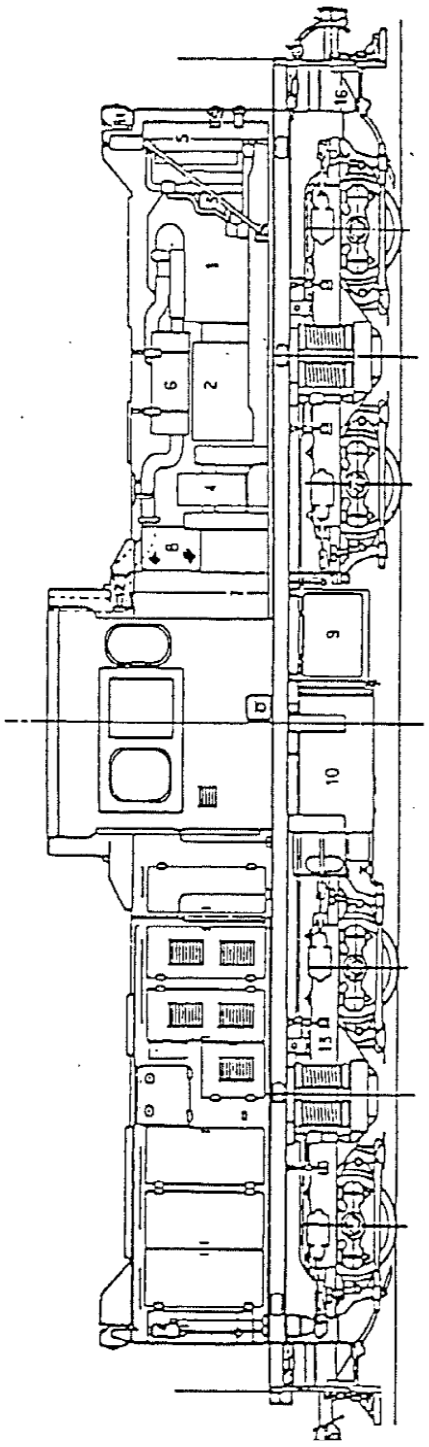
Type	(Bo-Bo)
Horsepower (nominal)	1,000
Diesel Engine Model No. of Cylinders Cylinder Arrangement Cylinder Bore and Stroke Operating Principle Full Speed Idle Speed	 KTA-1150-L Turbo Charged 6 x 2 In-line 159mm x 159mm 4 Stroke Cycle, Turbocharged: After Cooled: Water Cooled 1,800 RPM 700 RPM
Main Generator Number of Poles Maximum Voltage (DC) Output	SDT-518 4 755
Auxiliary Generator Voltage (DC) Rating	 28 2.8 kW
Traction Motors Model Number Type	 SE-213 4 DC, Series Wound, Axle Hung
Air Compressor Type Number of Cylinders Capacity at 1,200 RPM Air Compressor Cooling	C2000A 2 Stage 3 x 2 2,550 litre/min. Air
Storage Battery Type Number of Cells Voltage Rating (20 hour)	NX300-15 12 24 170 Amps / Hr
Lubricating Oil Capacity	73.8 litres x 2
Cooling Water Capacity	90 litres x 2
Fuel Capacity	1,500 litres
Sand	100 litres x 4
Air Brakes	Type 26LA

Weight On Rails	56 tonne
Weight on Driver's	100%
Major Dimensions Length over End Plates Width of Underframe Height – Top of Rail to Exhaust	 12.5 metres 2.7 metres 3.73 metres

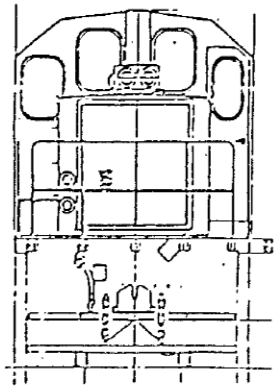
4.0 GENERAL DIAGRAMS

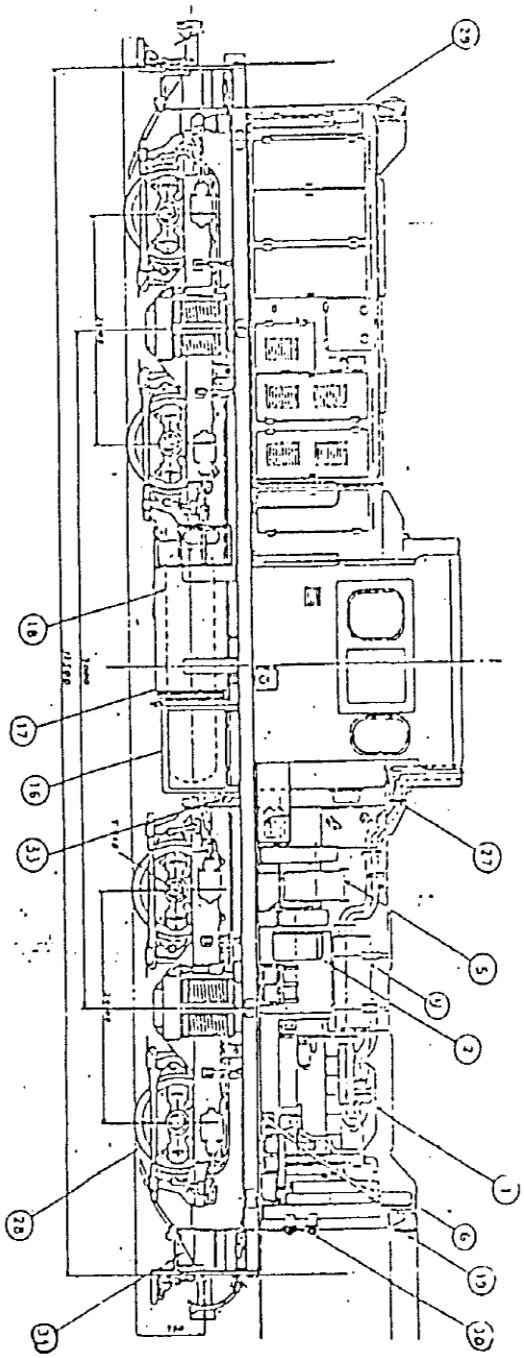
4.1 Arrangement of DSG

1. Diesel Engine (Cummins KTA1150L)
2. Traction Generator (SDT518)
3. Auxiliary Alternator
4. Traction Motor Blower
5. Radiator
6. Silencer
7. Control Box
8. Resistor Box
9. Battery Box
10. Fuel Tank
11. Headlight
12. Whistle (AW5)
13. Bogie (Type TT63)
14. Handbrake
15. Taillight
16. Sand Box

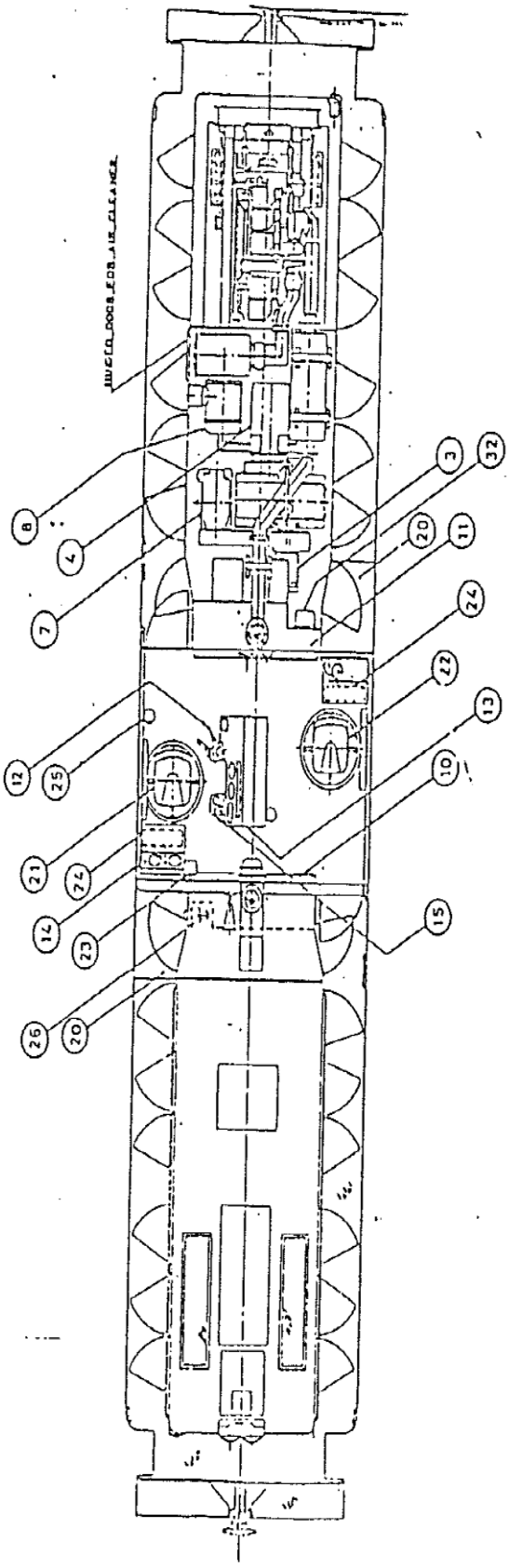


1. Diesel Engine (Cummins KTA1150l)
2. Main Generator SDT518
3. Auxiliary Alternator
4. Exciter
5. Traction Motor Blower
6. Radiator
7. Air Compressor
8. Intake Air Filter
9. Silencer
10. NQ1 Control Box
11. NQ2 Control Box
12. Brake Valve
13. NQ1 Gauge and Meter Box
14. NQ2 Meter Panel
15. Master Controller
16. Battery Box
17. Fuel Tank



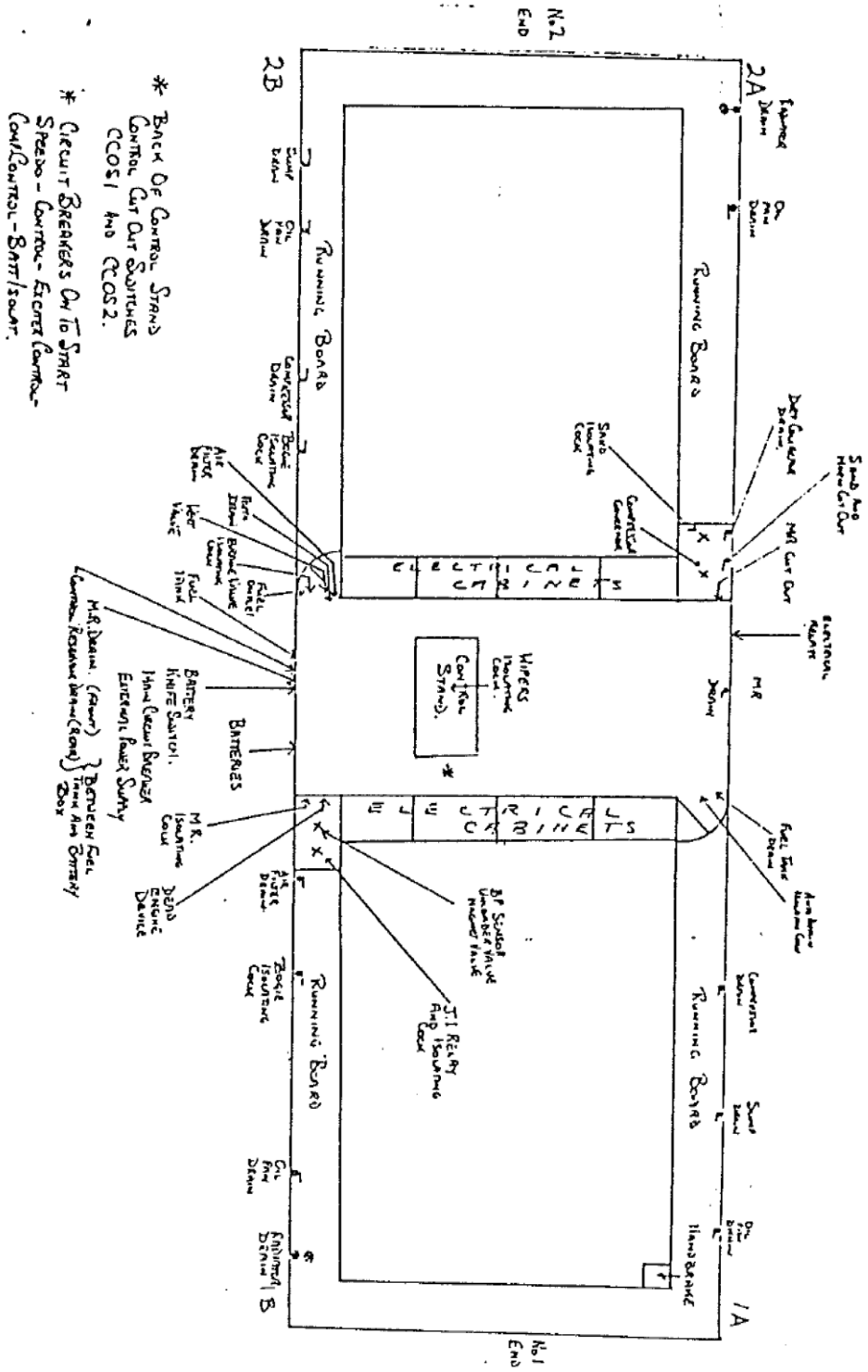


18. Main Air Reservoir
19. Headlight
20. Air Brake Sub-Unit
21. Driver's Seat
22. Assistant's Seat
23. Speedometer
24. Cab Heater, Defroster, Hot Water Type
25. Fire Extinguisher 5kg.
26. Pressurizing Fan
27. Whistle AW5
28. Bogie Type TT63
29. Handbrake
30. Taillight
31. Sand Box
32. Automatic Voltage Regulator
33. Dead Engine Device Cut In Cock

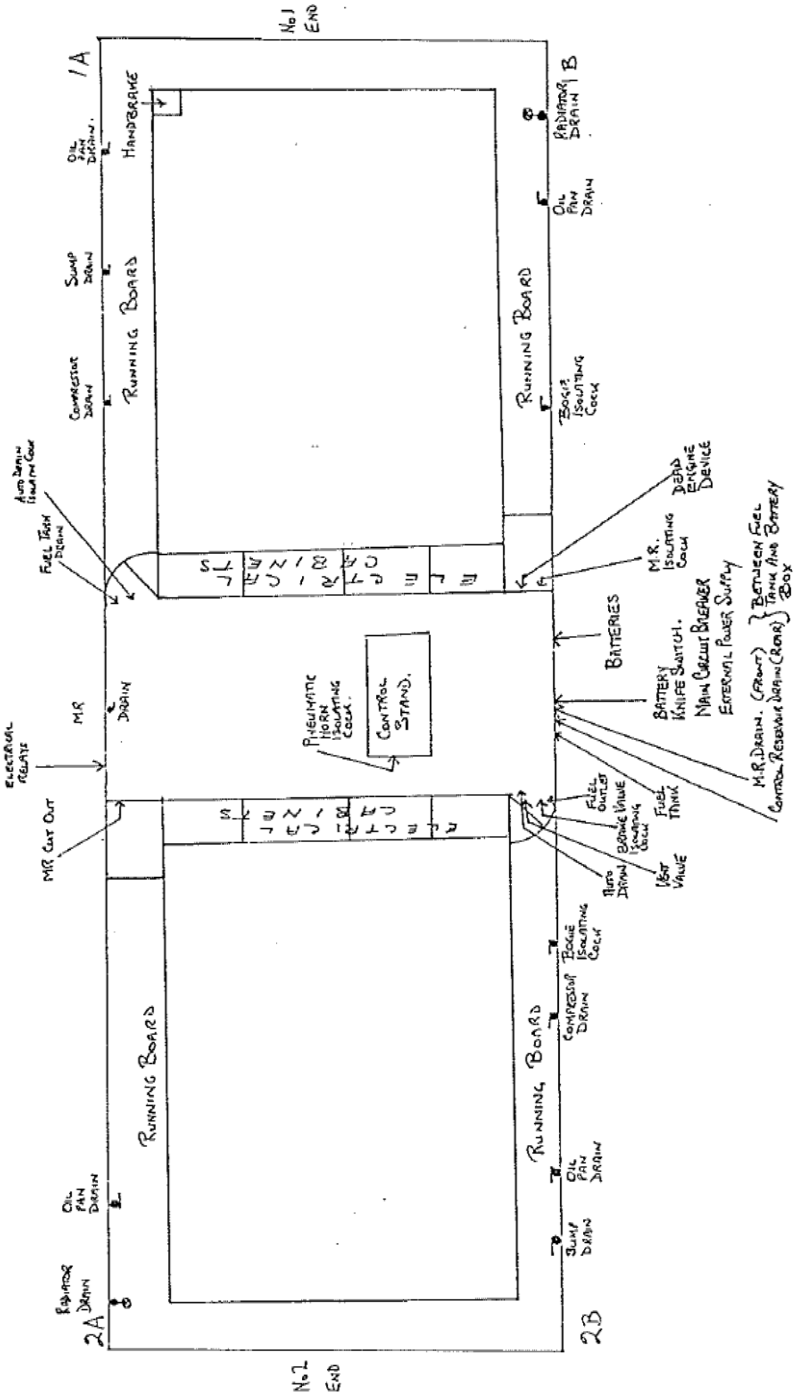


4.2 Location of Cocks etc.

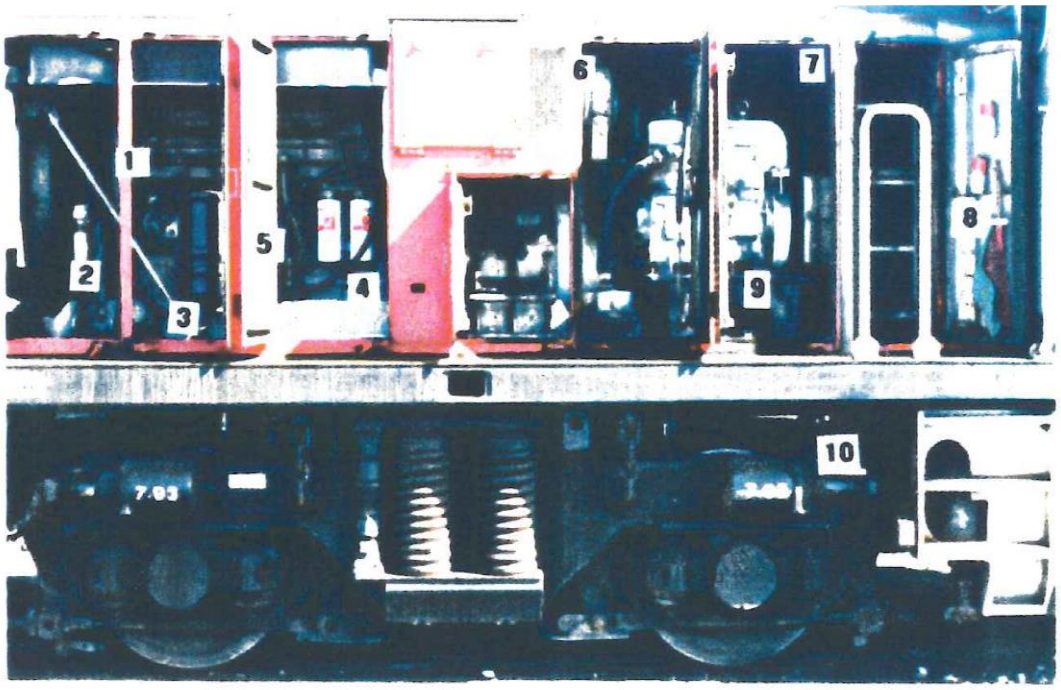
DSG New Type



DSG Old Type


No 1 END
1A
1B
Handbrake
Oil Fan Drain
Sump Drain
Compressor Drain
Running Board
Bogie Isolating Cock
Dead Engine Device
M.R. Isolating Cock
Batteries
Battery Knife Switch.
Main Circuit Breaker
External Power Supply
M.R. Drain. (Front)
Between Fuel Tank and Battery Box
Control Reservoir Drain (Rear)
Pneumatic Horn Isolating Cock.
Control Stand.
M.R.
Electrical Relays
M.R. Cut Out
Fuel Outlet
Bogie Valve Isolating Cock
Fuel Tank
Vent Valve
Auto Drain
2A
2B
No 2 END

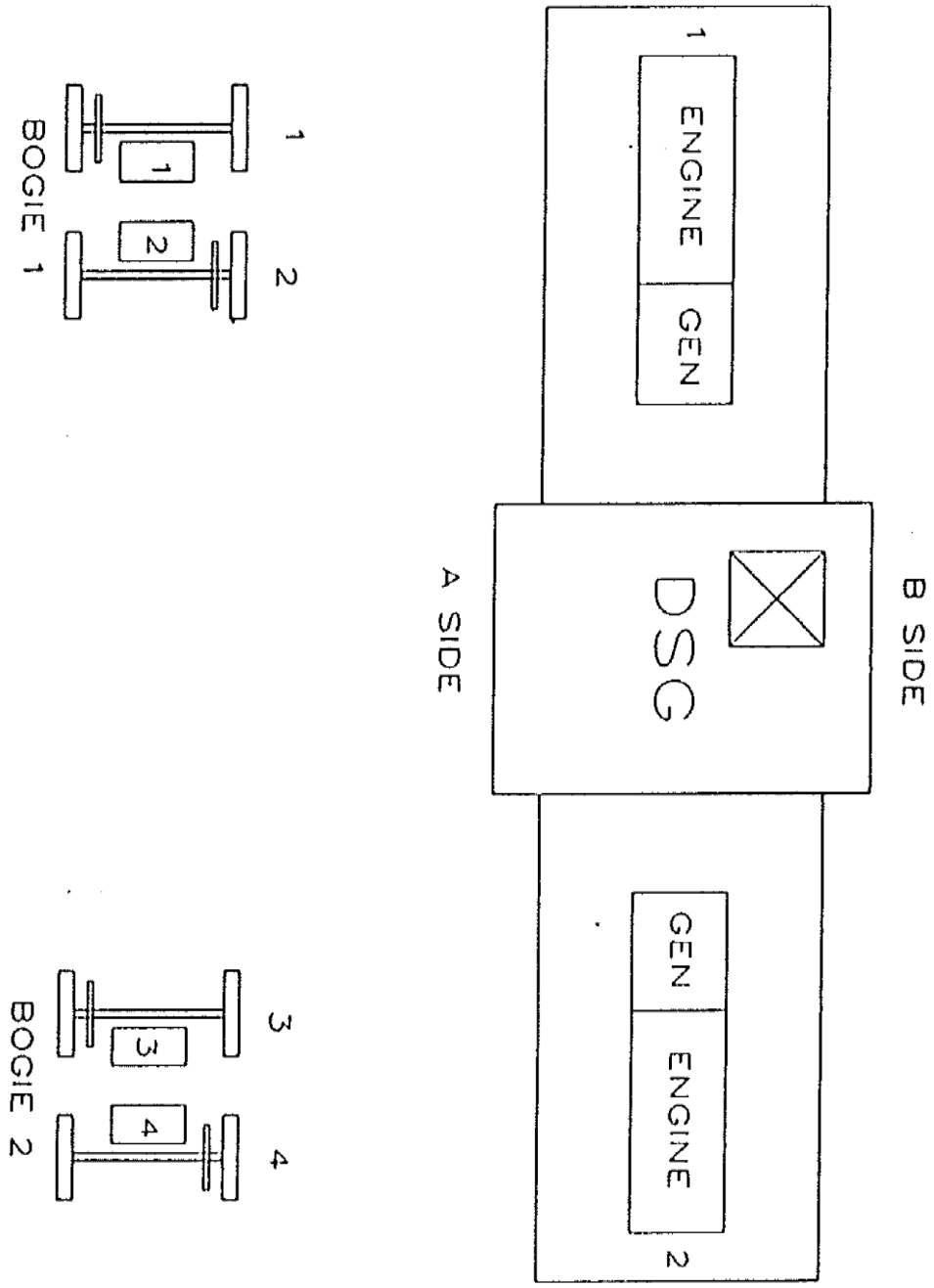
4.3 Engine Room



1. Fuel Shut Off Device, Fuel Injectors and Actuator 2. Ether Bottle 3. Fuel Filter
4. Oil Filters 5. Dip Stick and Oil Filler 6 Air Filters and Dirt Extractor
7. Auxiliary Generator (behind) 8. Emergency Equipment 9. Compressor
10. Piston Travel Indicator

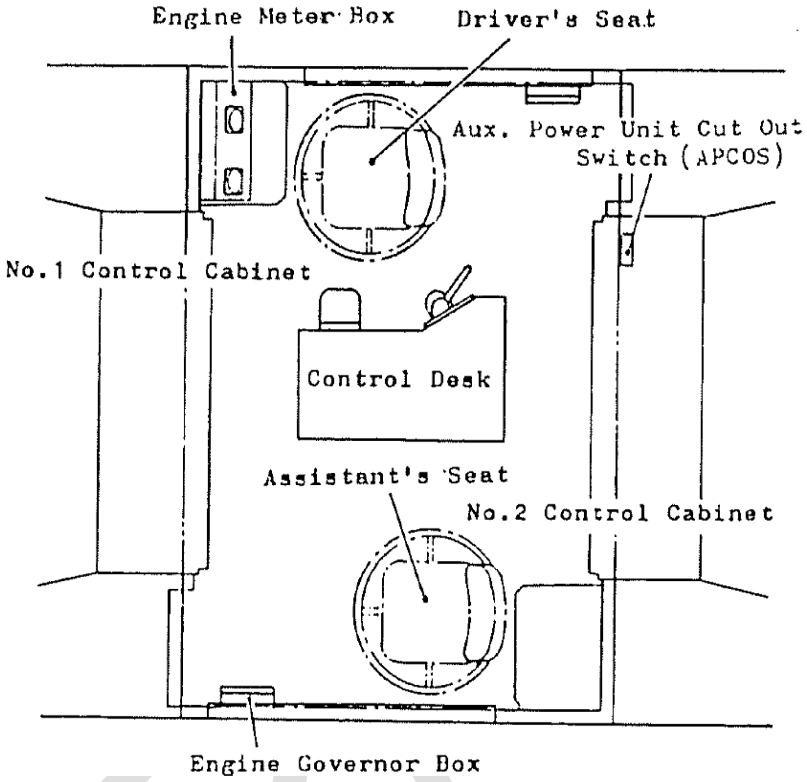
1. Resistances 2. Traction Motor Blower 3. Main Generator
4. Defroster Cock for Cab Heater 5. Radiator 6. Water Pump
7. Alternator (Battery Charging) 8. Starter Motor

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.



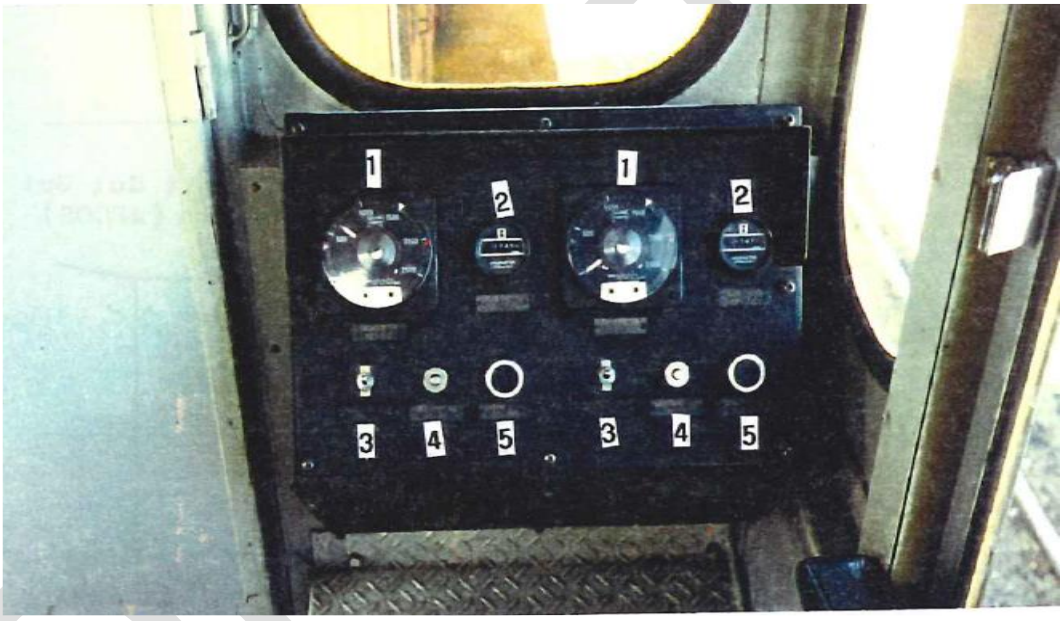
5.1 Engine Starting Controls

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.

This box is equipped with switches for starting and stopping of engines, tachometers and hour meters for No.1 end and No.2 end engines on its left and right halves, respectively.



5.2.1 Crank and Stop Switch

This "on / off" switch operates the electrically driven fuel shut-down 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

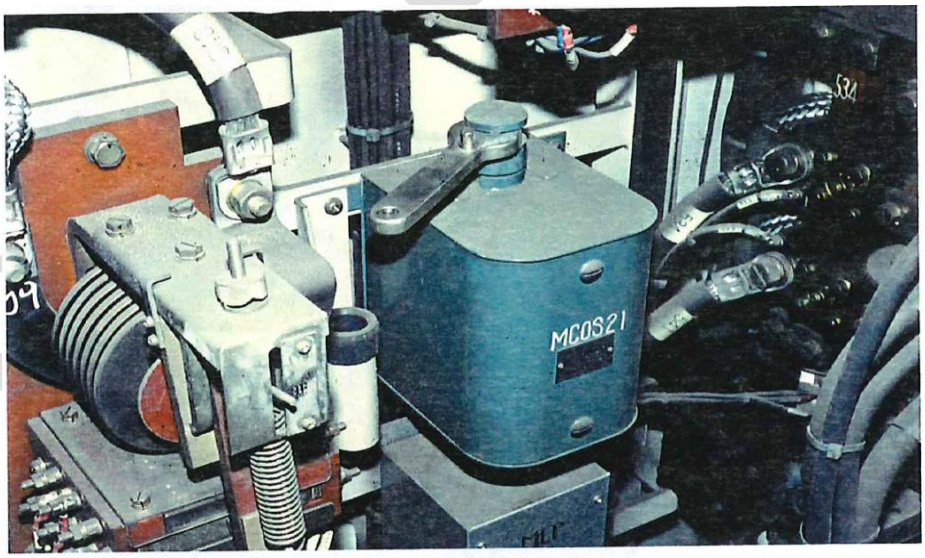
This switch is used for engine starting. It should be kept depressed until the engine has fired, and released after the engine starts and the oil pressure light has extinguished.

5.3 Control Cabinet

Two cabinets, with hinged doors, are located at No.1 end and No.2 end respectively. They are equipped with the motor cut-out switch, ground switch and APCOS.

5.3.1 Traction Motor Cut-Out Switch (MCOS No.1, No.2)

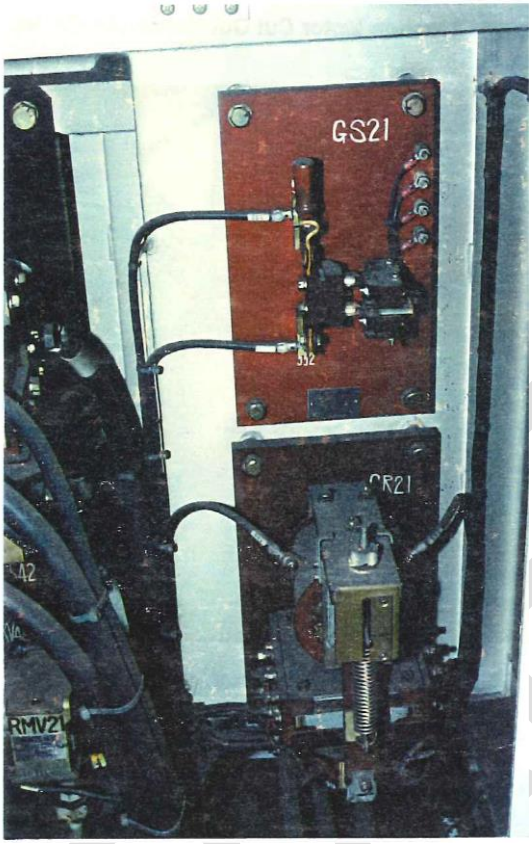
This switch is used for isolating a failed traction motor.



This switch is used for isolating a failed traction motor.
No.11 MCOS cuts out M1 or M2 traction motor, and No.21 MCOS cuts out M3 or M4 traction motor.

5.3.2 Ground Switch (On each end)

GS11 Ground Switch No.1 end – GS21 Ground Switch No.2 end.
GR11 Ground Relay No.1 end – GR21 Ground Relay No.2 end.



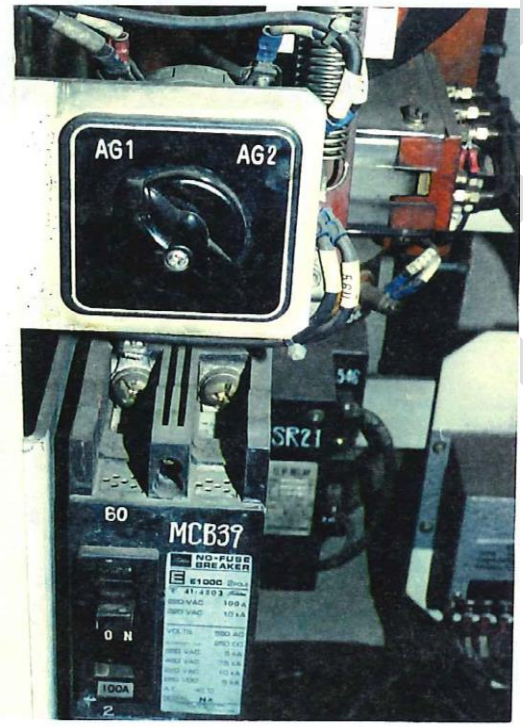
This switch connects the traction circuit to the ground.
Driving of the locomotive will be possible by opening this knife switch (if continually earthing). This is to be used for a short period only to clear the main line. A check should be kept for overheating of wiring.

5.3.3 Auxiliary Power Unit Cut-Out Switch (APCOS)

This switch is used for selecting AC power from the operative auxiliary generator when the locomotive is operating with only one engine.
When the locomotive is operating with both engines, power is supplied regardless of the position of the APCOS from the auxiliary generator selected.
APCOS is in the left side in No.2 end control cabinet and is used as follows:

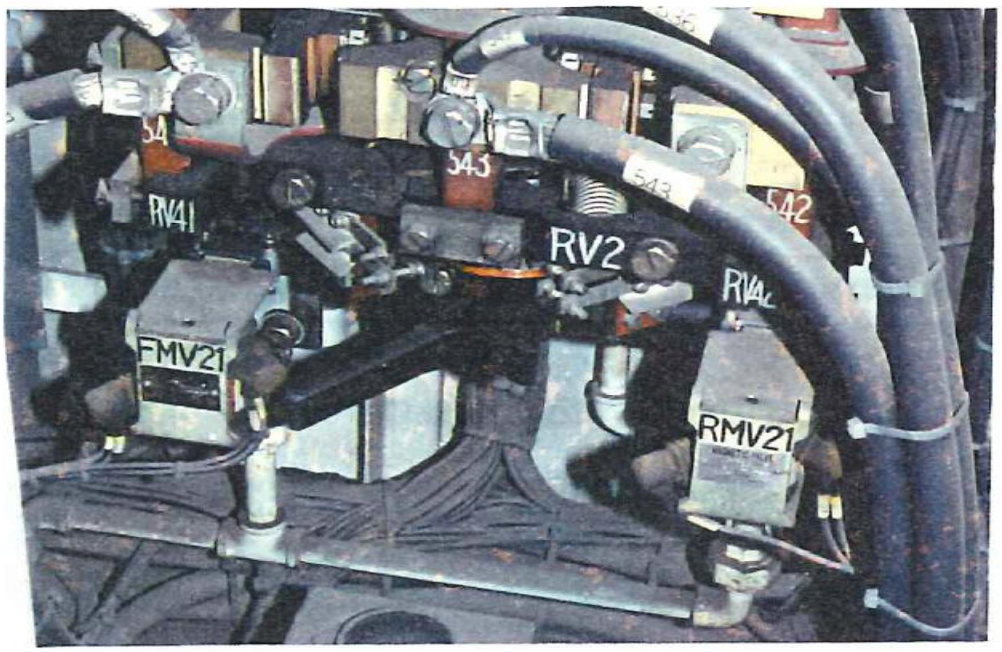
Condition	Position of APCOS
When operation with No.1 end engine only	Change to AG1
When operation with No.2 end engine only	Change to AG2

APCOS in No.2 End Control Cabinet



5.3.4 Reverser

This switch is to change current supply to the traction motors for reversing direction of travel. Its normal operation is by the air magnet valves RMV21 and FMV21 but if air supply to it is cut-off it can be moved by manual lever at the bottom of the unit.

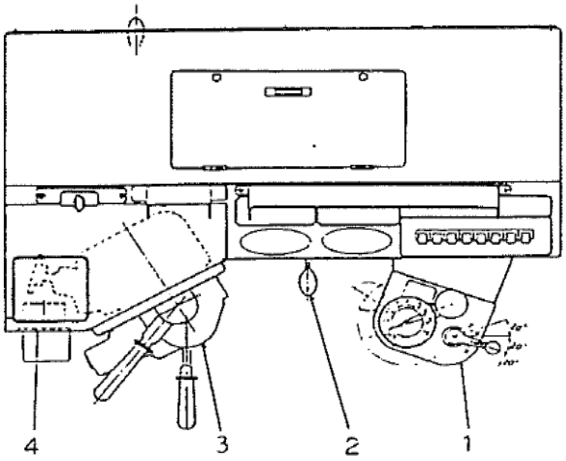


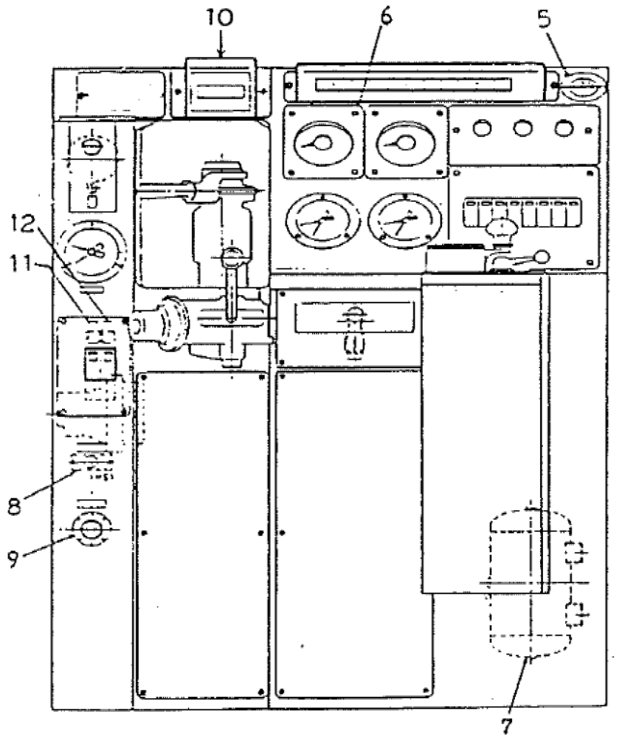
5.4 Control Desk

This desk is located at the centre of the cab.

Control Desk

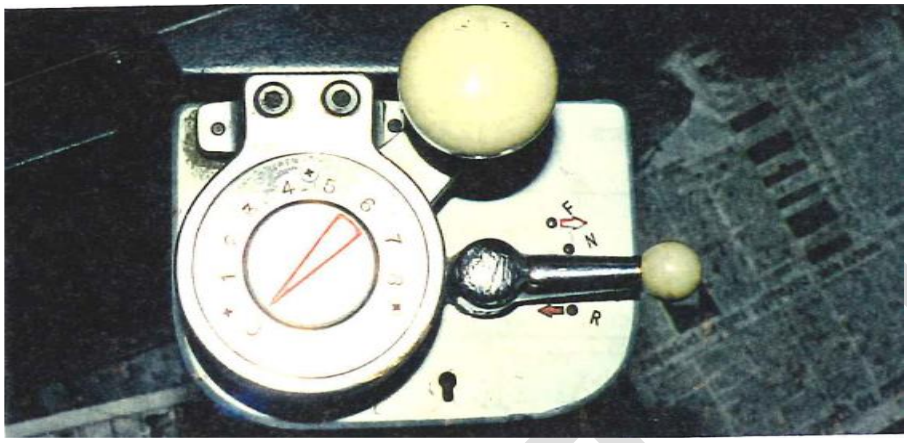
1. Master Controller
2. Whistle Valve
3. Brake Valve
4. Buzzer
5. Air Outlet
6. Gauge and Ammeters
7. Equalising Reservoir
8. Defroster Blower Half Speed Switch
9. Trouble Lamp Socket
10. Digital Speedo
11. Cab Heater Blower MCB
12. Defroster Blower MCB





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)	kW
OFF (Idle)	700	-	-
1	700	39	29
2	850	92	68
3	1050	137	102
4	1200	177	132
5	1300	253	188
6	1450	307	229
7	1600	368	274
8	1800	461	344

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 follows:

- 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 26LA air brake equipment.

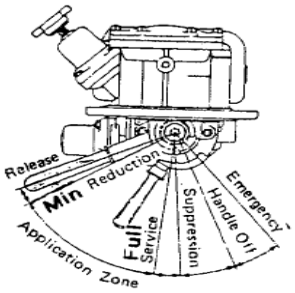
5.4.3 Brake Valve Handles

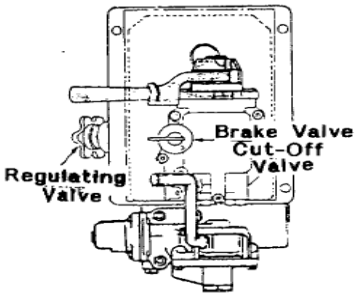
The operating controls of the operator’s brake valve are:

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

5.4.4 Automatic Brake Valve Handle

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

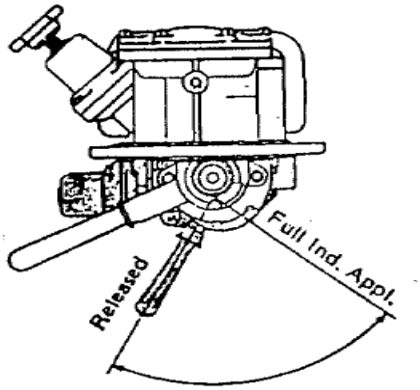


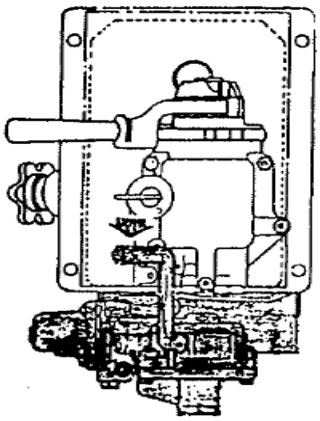


Release (Running / Charging) Position	The handle is normally in this position. It releases the locomotive and train brakes and recharges the equipment after an automatic application.
Minimum Reduction Position	Provides a minimum service brake application on the locomotive and train.
Application Zone	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.
Suppression Position	This position is not used on this locomotive. If used, brake response is similar to full-service position, but equalising reservoir and brake pipe air are reduced to more than a full service.
Handle Off Position	Provided for cutting brake out when assisting another train or being towed dead.
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 depressed while in 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 Valve Cut-Off Valve

The control knob is positively held in position by spring action. It has the following positions:

CUT IN	Set to this position when operating automatic brake valve.
CUT OUT	Set to this position when the automatic brake is cut-out for assisting or towing dead.

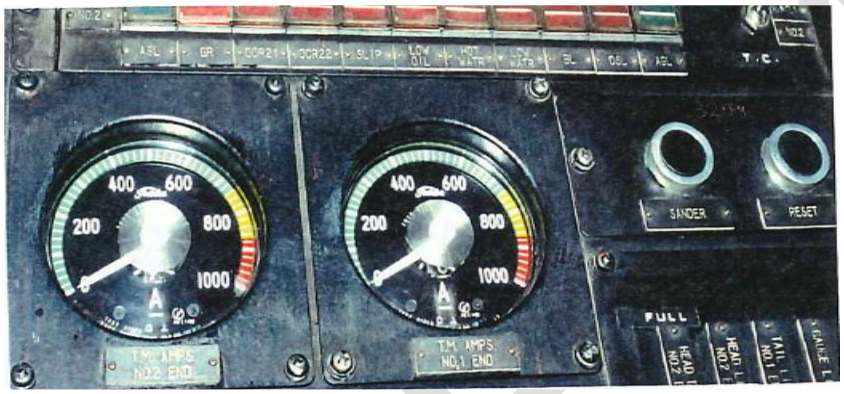
5.4.7 Brake Gauge Panel

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 (T.M. AMPS No.1 and No.2)

No.1 and No.2 ammeters indicates total current of M_1, M_2 motor circuits of No.1 end and M_3, M_4 motor circuits of No.2 end, respectively.
Their full scale 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.

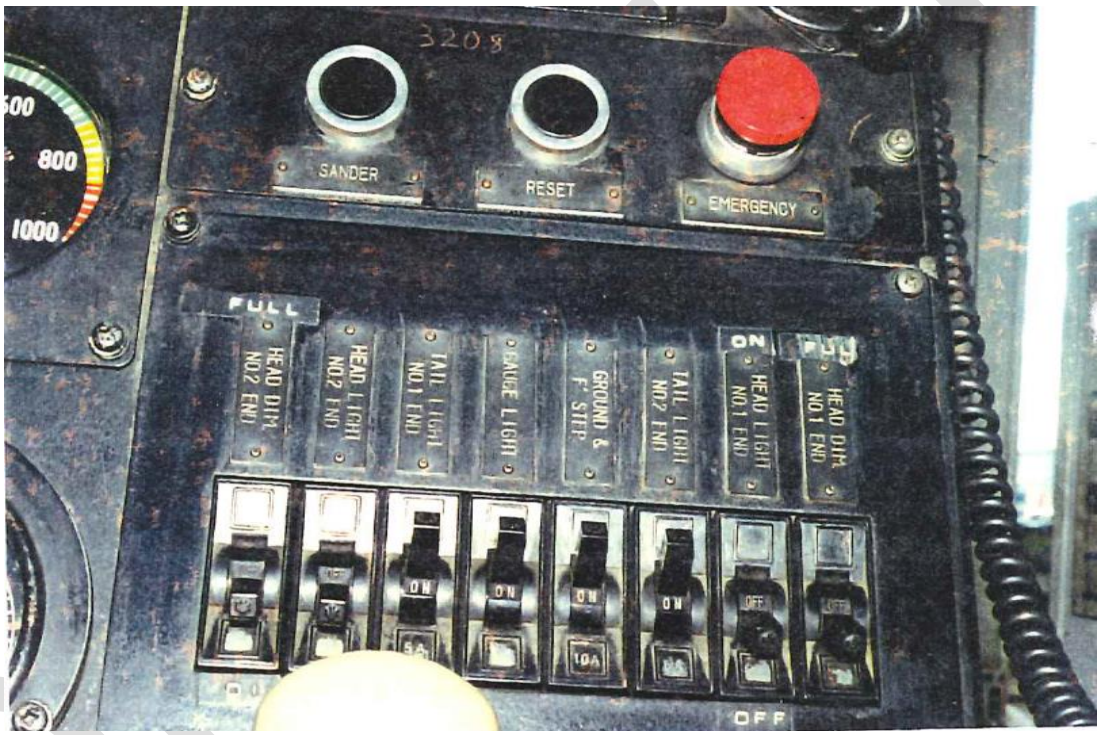
The ammeter shows the charging condition whenever the auxiliary alternator-rectifier set is operating.

5.4.9 Voltmeter (Battery)

This voltmeter shows battery voltage, running voltage 28V.

5.4.10 Pushbuttons

Emergency	This mushroom type pushbutton switch is to stop the engine in an emergency. Both engines stop simultaneously by pushing this switch, which latches in. To release, push again.
Reset	This pushbutton is to reset the protective relay after its operation. This is a spring return type pushbutton switch, also used after first starting the locomotive.
Sander	Sanding is made to the forward direction of locomotive by pushing this spring return type pushbutton switch.



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”.
DC Auxiliary Circuit	DC output of the auxiliary generator at either end is supplied by 1 or 2 MCB respectively. These are to be kept “on” during operation.
Battery Isolating	This MCB protects the battery circuits. 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 • Sanding Circuit • Warning Circuit • Pressurise Fan
Radio	This supplies power to the radio.
Kettle	Power supply to socket of kettle.
Trouble Lamp	Power supply to trouble lamp.
Cab Light	Power supply to cab lights.
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.

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	By turning “on” 1 or 2 MCB the cab heater / blower at each respectively operates.
Defroster BL HL Speed Switch	This switch controls the speed of the heater / blower. The speed of the heater / blower is reduced by turning this switch “off”
Control Cut-Out Switch (CCOS 1 and 2)	This switch is to open the control and warning circuits for each engine. The control, power and warning circuits of each end engine are cut-off by turning “off” the 1 or 2 switches respectively.

5.4.13 Warning Lights

GR	Lights when the traction control is grounded.
OCR	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

5.4.14 Operation of MCB's

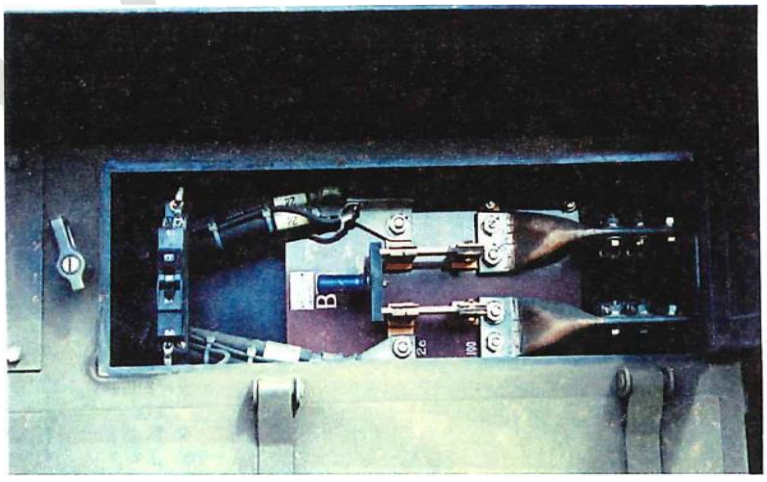
Operation			
Variation	**MCB No.**	**During Operation**	**According to Requirements**
GROUND & F'STEP LT	6		ON
TAILLIGHT NO.1	2		ON
TAILLIGHT NO.2	4		ON
HEAD DIM. NO.1	21		ON
HEADLIGHT NO.1	1		ON
HEAD DIM. NO.2	22		ON
HEADLIGHT NO.2	3		ON
GAUGE LIGHT	14		ON
CAB HEATER BL. NO.1	7		ON
DEFROSTER BL.	12		ON
CAB LTS.	34		ON
TROUBLE LAMP	17		ON
CAB HEATER BL. NO.2	8		ON
KETTLE	9		ON
COLD START AID NO.2	24		ON
RADIO	13	ON	
COLD START AID NO.1	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 NO.1	38	ON	
DC AUX CIRCUIT NO.2	39	ON	
PANEL HEATER	31 & 32		ON
BATT. CHARGING	10		ON

6.0 PRE-START PROCEDURES

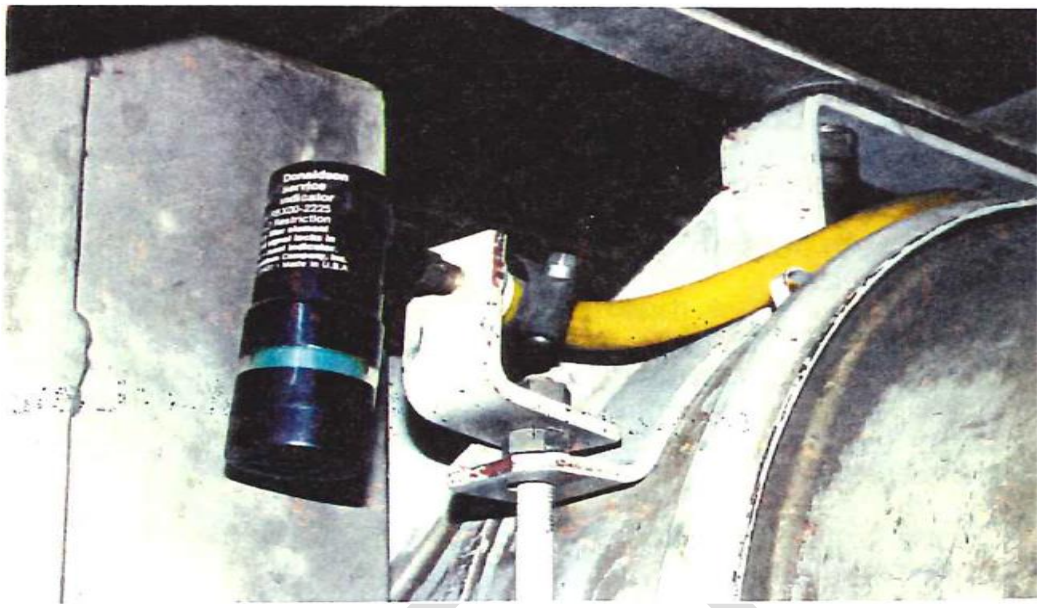
Separate instructions dated 15 June 2004 have been issued to Terminal Managers re-checking the oil level.

6.1 Outside Checks

- Check fuel level in the tank.
- Check sand boxes are full.
- 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 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 is 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.

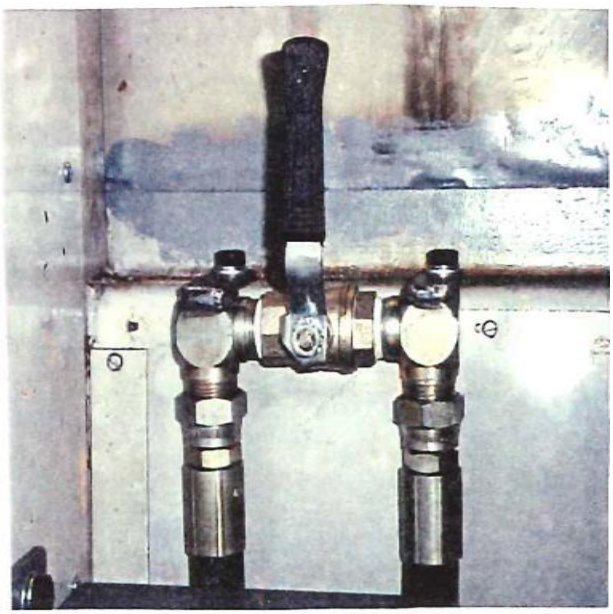
7.0 START UP PROCEDURES

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”.

Throttle and Brake Transfer Cock

Remote Brake Pipe Valve



5. Check that the RMS is in the “MAN” position.
6. Check that the isolation switch is “on”.

RMS Switch

Isolation Switch

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. 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:
- Brake Valve Cut-Off Valve is “cut-in”.
- Independent brake valve handle to “Full Application”
- Automatic brake valve handle to “Release / Running”.

14 Ensure headlights are “off”.

15 Turn Crank and Stop switch of No.1 engine to “on”. Warning lights come on and buzzer sounds.

16 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.

17 Turn Crank and Stop switch of No.2 engine to “on”. Warning lights come on and buzzer sounds.

18 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.

NOTE: Do not push the pushbutton of No.1 and 2 engines simultaneously.

19 In the case of one engine operation:
- Change APCOS to operating engine, AG1 or AG2.
- Turn “off” CCOS of stopped engine.

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

21 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”.

22 Wait until the main reservoir is fully charged.

23 Carry out a brake valve leakage test.

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

25 Turn “on” other MCB’s as required.

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

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

28 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. Brake Valve Cut-Off Valve to “cut-out”.
4. Throttle handle to “off” and Reverser to “N”.
5. Switch “on” radio remote CB.
6. Turn “on” external warning beeper and lights.
7. Pull “up” the throttle and brake remote transfer cock.
8. Switch “on” the RMS to the “RAD” (radio) position
9. Check the Remote-Control Brake Pipe Isolation is in “remote”.
10. Isolation switch to “on”.
11. 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
12. Turn controller “on” with the key (do not hold down the PTO switch while turning on).
13. Hold down the PTO switch.
14. Switch the ES override to “off”.
15. Sound the horn to verify operation of the remote.
16. Release the hand brake.

8.0 OPERATING

8.1 Moving the Locomotive

With the engine started and the inspections and precautions completed, the locomotive is moved as follows:

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 the “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.

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. Brake valve cut-off valve to “cut-in”.
8. Push down the throttle and brake remote transfer cock.
9. Switch the RMS to “MAN” position.
10. Switch off the remote CB.

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 switches 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 INTAKE SYSTEMS

Reserved for future use.

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

18.1 Tranzlog / Ditch Lights

All DSG class locomotives have been fitted with Tranzlog and Ditch Lights which have the following features:

- Full data logging.
- Realtime view once modem is activated.
- Full operational vigilance when working in manual mode only.
    - Vigilance is suppressed when the locomotive is set-up in remote control mode.
    - The locomotive radio's do not have selcall ability, so no selcall will be initiated on vigilance penalty brake, but
    - The capability is available if the radios are changed out later for ATC capable radios.
- Headlight Alert function.
- Signal Alert function.
- Road overspeed protection when operating in manual and remote modes.
    - Road overspeed is set for 70 km/h in all locations at this stage.
- The ditch lights will flash in the direction of travel anytime the horn is operated or ditch light flash pushbutton on the control stand is operated.
- The ditch lights will remain off if the headlight / ditchlight selector switch is in the "Headlights Only" position.
- The penalty brake reset button is located on the No.1 electrical cabinet door.
- The vigilance isolation cock is located inside the No.1 electrical cabinet.

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. Place the brake valve cut-off valve to “cut-out” position.
5. Open the Dead Engine Device (handle in line with the pipe).
6. Reduce No.2 main reservoir to 350 kPa.
7. Ensure the BKS is open.
8. Book in the Loco 54D book.

NOTE: It is not necessary to centre the reverser.

24.0 FAULTS

Fault:	Cause:	Remedy:
Engine will not crank.	Control MCB “off” CCOS “off” BIS “open” Battery isolating CB “off”	Set Control “on”. Set CCOS “on”. Close BIS. Place MBCB “on”
	Speedo CB “off”.	Turn CB “on”.
	Battery flat.	Advise Mechanical personnel.
Engine will not start (rotates OK)	Emergency pushbutton latched in.	Push emergency pushbutton in to free the latch and button.
Main generator will not generate amps.	OCR tripped. GR tripped.	Place reverser in “F”, “N” or “R” and throttle in “off” position. Push reset button.
	Control circuits tripped and failing to reset.	OCR and GR may be reset by hand.
Output of traction generator is insufficient.	Exciter MCB “off”.	Set exciter MCB “on”. After returning the reverser handle to “N” position, move the throttle handle from “off” to “notch 1” to confirm pick up.
In case of indicator lamps being “on”, the buzzer will sound simultaneously.		
GR light “on”.	Grounding of traction circuit.	Return the throttle handle to “off” position. Depress the “reset” pushbutton on the control desk, then drive again. If the light and buzzer come on again advise Operations Controller for further instructions.

Fault:	Cause:	Remedy:
OCR light “on”.	Overcurrent in traction circuit.	Return the throttle handle to “off”. Depress the “reset” pushbutton on the control desk, then drive again. If it occurs again, cut-out the affected traction motor by the MCOS.
LOW OIL light “on”.	Low pressure of the main engine lubricating oil.	Return the throttle handle to “off” position. Check lubricating oil level. Check lubricating oil leakage.
HOT WATER light “on”.	The cooling water is too hot.	Return throttle handle to “off” position. Set the reverser to “N’ position, check water level and if OK, then notch up the throttle handle to operate the radiator fan to cool the water. Check the radiator fan belt tension.
LOW WATER light “on”.	Low water level.	Return throttle handle to “off” position and check system for leaks. If water is to be added, advise Mechanical staff.
SLIP light “on”.	Wheels slip.	Depress the “sander” pushbutton for sanding. 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 does not sound.
	Batteries to slow after first starting.	Reverser in “N”, move throttle to ¾ until circuit picks up.

Fault:	Cause:	Remedy:
BL light “on”.	Rotating speed of the traction motor blower drops.	Check traction motor blower belt tension.
	Speedometer MCB tripped.	Reset.
OSL light “on”.	Locomotive speed exceeds 66 km/h	Return throttle handle to “off” and operate the brake handle to reduce locomotive speed.
Engine stops.	Engine overspeed.	Return throttle handle to “off”. To reset, open and close CCOS1 or CCOS2 depending on which engine has shut down.

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.