

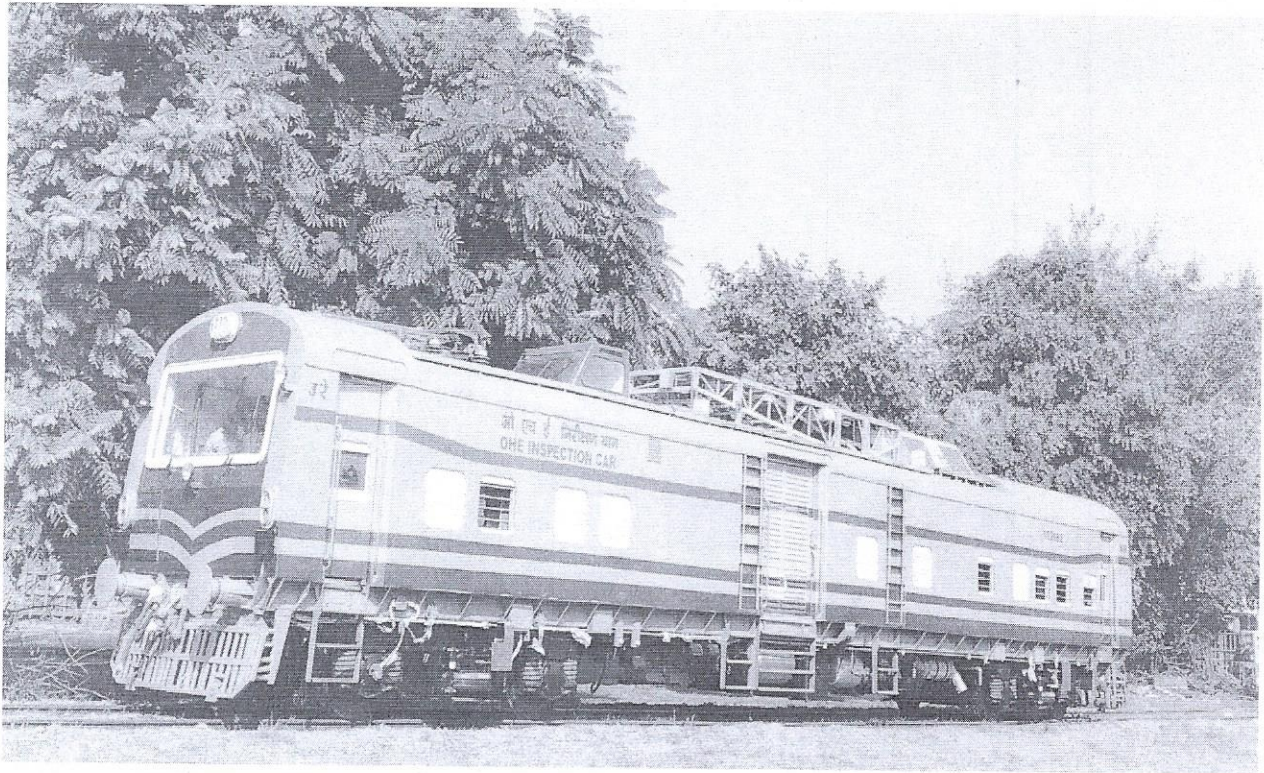


भारतीय रेल

INDIAN RAILWAYS

डीजल रेलइंजिन आधुनिकीकरण कारखाना, पटियाला

DIESEL LOCO MODERNISATION WORKS, PATIALA



**HISTORY & TESTING RECORD OF 8W-DIESEL
ELECTRIC TOWER CAR**

DETC NO.	: 190065
TYPE	: 8 WHEEL
RAILWAY/DIVISION	: NFR
ELECTRIC TRACTION	: CGL

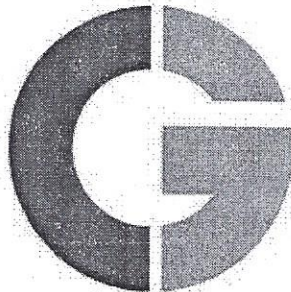
निर्माण रिकार्ड

190065 MAR 17-16

DETC-US

Installation & Commissioning Protocol Diesel Electric Tower Car

CP/DETC/US/DMW R0



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DETC COMMISSIONING PROTOCOL

PROJECT	Diesel Electric Tower Car with Under-Slung Propulsion
CUSTOMER	DMW, PATIALA
DETC DMW NO.	M-16
DETC RLY.NO.	NFR-190065
Date of Intake	14-SEP-2019
Date of Dispatch	18-OCT-2019

DETC COMMISSIONING PROTOCOL :		
SUBMITTED BY CGPISL:	<u>Harvinder Singh</u>	<u>[Signature]</u>
	Name	Date
		Signature
VERIFIED BY DMW:	<u>DINESH MEHTA</u>	<u>18/10/19</u>
	Name	Date
		<u>[Signature]</u>
		का.प्र. वे. आर. एस.
		डी.एस.पियाला
		WM/TRS
		DMW/Patiala

[Signature]
SEE TRS



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DETC Installed & Tested Equipments:

Equipment	Make	Serial No.
Diesel Engine -1	CUMMINS	25446255
Traction Alternator-1	CGPISL	2189706-279
Diesel Engine -2	CUMMINS	25446278
Traction Alternator-2	CGPISL	2189706-272
Power Rectifier- 1	RUTTONSHA	1905/1905/2184A
Power Rectifier-2	RUTTONSHA	1905/1905/2208B
Traction Motor-1	CGPISL	2189002-935
Traction Motor-2	CGPISL	2189002 - 934
Traction Motor-3	CGPISL	2189002 - 936
Traction Motor-4	CGPISL	2189002 - 933
Auxiliary Alternator-1	KEL	190571263
Rectifier Regulator Unit- 1	KEL	190671C263
Auxiliary Alternator -2	KEL	190671271
Rectifier Regulator Unit -2	KEL	190571C262
Control Cubicle-1	INDER ENGG.	1920/0128
Control Cubicle-2	INDER ENGG.	2019/08/63
Driver Desk-1	INDER ENGG.	1920/0134A
Driver Desk-2	INDER ENGG.	1920/0134B
Master Controlleer-1	INDER ENGG.	05190369
Master Controlleer-2	INDER ENGG.	05190368
Driver Control Switch-1	INDER ENGG.	05190297
Driver Control Switch-2	INDER ENGG.	05190289
MSGC	INDER ENGG.	1920/0127
Resistor Panel	INDER ENGG.	1920/0131

LED PANEL 1 11 2019-263
2 11 2019 - 262



1. SEQUENTIAL TEST

1.1 Purpose

Sequence test of control circuits.

1.2 Measuring and Testing Equipment, Auxiliary Equipment

- Digital Multimeter
- Continuity tester
- Wago connector
- DCS key
- Master Controller Unlock key
- DC Ammeter
- Insulation Tester
- All Electrical Circuit Schematics

1.3 Test Status

Individual test performance is recorded against each test performed.

1.4 Test Implementation

The fully completed routine test record is the only valid document to demonstrate that the routine test has been successfully completed. The Performed ok column in this routine test instruction merely serves the purpose of engaging the tester to verify the test progress.

All test steps in a chapter must have been successfully performed. If a test has been unsuccessful, the cause or causes must be established and remedied so that the test item can subsequently be tested with possible result. Before testing sequence test, all continuity test points are to be cleared.

Procedural Notes:

1. Disconnect all electronic system prior to Megger, Hi pot test and during welding.
3. Use DIGITAL multimeter only to check continuity and to read test point voltages.
4. Ensure that test lead does not touch body or ground during measurement of low voltage sources.

1.4.1 Visual Inspection

1.4.1.1 Rotating Equipment

Operation	Performed
• Inspect the rotating equipment for the following (Tr. Alternator, Tr. Motor, Aux alternator)	<input checked="" type="checkbox"/>
• No unwanted materials should be lying inside the machines.	<input checked="" type="checkbox"/>



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• No loose wires/ terminals should be available near the machines.	<input checked="" type="checkbox"/>
• Ensure that the mounting bolts have been properly torque checked and marked.	<input checked="" type="checkbox"/>
• Ensure that High Voltage electrical terminals are not exposed.	<input checked="" type="checkbox"/>
• Check availability of warning boards	<input checked="" type="checkbox"/>

1.4.1.2 Control Equipment and Wiring

Operation	Performed
• There should not be any loose hanging wires near the equipment / terminal boards.	<input checked="" type="checkbox"/>
• Ensure all components are loaded and connections are intact.	<input checked="" type="checkbox"/>
• Ensure all connectors are coupled tightly.	<input checked="" type="checkbox"/>

1.4.1.3 Checking of TM chain cleat arrangement between TM Junction box to TM

S.No.	Equipment	Available	Not Available
1.	Traction motor1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2.	Traction motor2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3.	Traction motor3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.	Traction motor4	<input checked="" type="checkbox"/>	<input type="checkbox"/>

1.4.1.4 Checking of End fitting & Conduit Coupler for TMJB

S.No.	Equipment Name	Quantity	Available	Not Available
1	Traction Alternator 1	3+1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Traction Alternator 2	3+1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Power Rectifier 1	3+4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Power Rectifier 2	3+4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	MSGC	24+2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	TM Junction box 1	5+5	<input checked="" type="checkbox"/>	<input type="checkbox"/>



1.4.3.2 Observation

Test Condition	Acceptance Criteria	Observed
Power Circuit IR	> 5M Ohm	OK

1.4.3.2.1 HV Test for Power Circuit:

High Voltage test is carried out at 2.4 KV AC voltage. The test voltage is applied between shorted power cables at rectifier and body and should withstand for 60 seconds.

1.4.3.3 Observation

The HV tester should not trip within 60 seconds in each of the above tests.

Parameter	Acceptance Criteria	Observed
Voltage Applied	2400 V AC	OK
Leakage Current	100 mA	OK
Time Applied	60 Second	OK

Tested & witnessed by DMW:

Signature
28/05/19

Date:

28/05/19

1.4.4 IR & HV Test for Control Circuit

1.4.4.1 IR Test Preparation

Operation	Performed
• Disconnect battery cables at the battery terminals of Control battery	<input type="checkbox"/>
• Close the battery switch BIS110	<input checked="" type="checkbox"/>
• Keep battery Switch (BCS 24) in open condition	<input checked="" type="checkbox"/>
• Switch ON all switches and circuit breakers on the CP&DD	<input checked="" type="checkbox"/>
• Open ground cut out switches GRCO-1 & 2	<input checked="" type="checkbox"/>
• Insert DCS key and turn ON	<input checked="" type="checkbox"/>
• Insert MC key and turn ON	<input checked="" type="checkbox"/>



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• Move ECS Switch to "RUN" position	<input checked="" type="checkbox"/>
• Move Reverser handle to Forward or Reverse position	<input checked="" type="checkbox"/>
• Move the Master Handle (MH) to 6th notch position on DD	<input checked="" type="checkbox"/>
• Remove LCC 1 and LCC 2 connections	<input checked="" type="checkbox"/>
• Disconnect LED panel from the circuit	<input checked="" type="checkbox"/>
• Remove connector for Power rectifier 1 and 2	<input checked="" type="checkbox"/>

The insulation resistance test is carried out with 500V Megger. Measure insulation resistance between wire terminals 300 /100 and body.

1.4.4.2 Observation

Test Condition	Acceptance Criteria	Observed
Control Circuit IR	> 1M Ohm	

1.4.4.2.1 HV Test for Control Circuit

High voltage test is carried out at 1300V AC voltage. The test voltage is applied between wire terminals 300 /100 and body and should with stand for 1 minute.

1.4.4.3 Observation

The HV tester should not trip within 60 seconds in each of the above tests.

Parameter	Acceptance Criteria	Observed
Voltage Applied	1300V AC	
Leakage Current	100 mA	
Time Applied	60 Seconds	

Tested & witnessed by DMW:

Paulo B
26/09/19

Date: 26/09/19



1.4.4.4 Post Test Operations

Operation	Performed
• Remove all shorting wires on the terminals	<input checked="" type="checkbox"/>
• Restore all power cable connections	<input checked="" type="checkbox"/>
• Connect the all removed connectors	<input checked="" type="checkbox"/>

1.4.5 Batteries (110V & 24V)

Operation	Performed
• Ensure that interconnecting cables between each battery is connected and are tight.	<input checked="" type="checkbox"/>
• Check the polarity of each battery and ensure that all are connected in series.	<input checked="" type="checkbox"/>
• Connect the battery cable 308 at battery positive and 300 at battery negative terminal for 110V Battery.	<input checked="" type="checkbox"/>
• Connect the battery cable 201 at battery positive and 200 at battery negative terminal for 24V Battery.	<input checked="" type="checkbox"/>
• Measure the voltage of the battery at equipment panel or at battery charging socket using digital Multimeter. The voltage should be more than 100V across 308 and 300 terminals.	110 VDC
• Measure the voltage of the battery at equipment panel or at Knife Switch using digital Multimeter. The voltage should be more than 24V across 201 and 200/210 terminals.	24 VDC

1.4.6 Circuit Breakers and Switches

Preliminary check

Wait for one or two minutes after switching ON each Circuit breaker and observe for any overheating symptoms like smell, smoke, temperature etc. from the wire bunches. If any such symptoms are noticed there might be short circuit in wire bunch, check continuity in suspected area. Switch ON the following Circuit Breakers and ensure the circuit functionality is correct.

1.5 SEQUENCE TEST (Auxiliary Circuit)

S.No.	Operation	Effect	Location	Performed In Cab-I	Cab-II
1	Turn 110 V BCS in 3 o'clock position and measure voltage between Cable No. 311 and 300	≈ 110 V	311 as positive.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Turn ON EL+ MCB and check voltage between wire EL+ with respect to EL-.	≈ 110 V	EL- as negative	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Turn ON CFD MCB and CFDS toggle switch	≈ 110 V	Cab Fan Driver side should operate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Turn ON LLD MCB and LLDS toggle switch	≈ 110 V	Cab Light Driver side should operate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Turn ON SPLD/SPLG MCB followed by Turn On SPLDS & SPLGS toggle switch.	≈ 110 V	Spot light Driver side should operate. Spot light Guard side should operate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Turn ON Aux MCB and HLS,SM,V MCB and switch on 110 Voltmeter toggle switch	≈ 110 V	The voltmeter should read 110V approx.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Speedometer should turn ON.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			110V Supply should be available at HLS on Control Cubicle and Driver Desk.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Horn Push Buttons on Driver side and Guard Side should operate.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Foot operated horn Switch should work.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.1	Turn ON Aux MCB and Tail light/Flasher Light MCB and switch on Tail light Toggle switch on Driver Desk.	≈ 110 V	Tail light should operate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Turn ON Flasher Light Toggle Switch on Driver Desk.		Flasher Light should operate at both converters.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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6.2	Turn ON Aux MCB and Marker light MCB and Marker light toggle switch on Driver Desk.	≈ 110 V	Marker light should operate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.3	Turn ON Aux MCB and Head Light MCB and Toggle switch in Driver Desk	≈ 110 V	Head Light Should ON/OFF in Converter-1 and Dim/Bright	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		≈ 110 V	Head Light Should ON/OFF in Converter-2 and Dim/Bright	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.3.1	Turn ON Aux MCB and Head Light MCB and Toggle switch in Driver Desk and Turn OFF Tail Light Toggle switch in Rear Cab.	≈ 110 V	Tail Light Should ON/OFF in Rear Side (Converter-1).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		≈ 110 V	Tail Light Should ON/OFF in Rear side (Converter-2).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.4	Turn ON Aux MCB and HT Sensor MCB	≈ 110 V	Green LED should glow in HT Sensor Display unit.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.6 SEQUENCE TEST (Control Circuit 110V & 24V)

S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
1	Ensure 110V Supply across Cable No. 1600 & 320.	SUPPLY(+) FROM BATTERY+BCS(4 POLE) ON+SYSTEM CONTROL MCB-ON & SUPPLY (-) FROM BATTERY THROUGH 63A FUSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Supply to MASTER CONTROLLER(MC)	OPERATION1+CONTROL MCB ON+CONTROL ON/OFF SWITCH ON (Ensure the +ve 110V supply at 1602).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	EMY RELAY (EMR) ON	OPERATION1+CONTROL MCB ON+CONTROL ON/OFF SWITCH ON+EMY TRACTION CUT-OFF PB ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	DMR RELAY ON	OPERATION1+DMMV MCB ON (Ensure 110V +ve available at Cable Nos. 1732 and 1734).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	DEAD MAN VALVE-ACTIVE	OPERATION 1+DMMV MCB ON+EMY RELAY ON+DEAD MAN RELAY ON+Operate F/R Switch on MC+Operate Master Handle on MC.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	GOV1 EXC RELAY (ER1) ON	OPERATION1+EXC MCB ON+DCS ON+TSS(TEST)+EXC ON/OFF SWITCH ON+ECS (RUN)+GOV1 CONTROL MCB ON+EMR ON+R11 RELAY ON+S11 ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
7	GOV2 EXC RELAY (ER2) ON	OPERATION1+EXC MCB ON+DCS ON+TSS(TEST)+EXC ON/OFF SWITCH ON+ECS (RUN)+GOV2 CONTROL MCB ON+EMR ON+R12 RELAY ON+S12 ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	EXC CONTROL RELAY-1 (ECR-1) ON	OPERATION1+CONTROL MCB ON+CONTROL ON/OFF SWITCH ON+Operate F/R in MC+MC(Notch-1 to 8) +ALT EXC MCB ON +GFR INOPERATIVE+ER1 ON+SR1 OFF+{LC1(CLOSE)/LC3(CLOSE)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	EXC CONTROL RELAY-2 (ECR-2) ON	OPERATION1+CONTROL MCB ON+CONTROL ON/OFF SWITCH ON+Operate F/R in MC+MC(Notch-1 to 8) +ALT EXC MCB ON +GFR INOPERATIVE+ER2 ON+SR2 OFF+{LC1(CLOSE)/LC3(CLOSE)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	RCFR1 RELAY ON	OPERATION1+FAULT INDICATION MCB ON+DCS ON+RCFR-1 Toggle Switch {SS-4 SWITCH ON}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11	SAFETY RELAY1 ON	OPERATION1+FAULT INDICATION MCB ON+DCS ON+ {LPR RELAY ON/ RCFR1 RELAY ON/R11 RELAY ON/ RL21 RELAY ON}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	RCFR2 RELAY ON	OPERATION1+FAULT INDICATION MCB ON+DCS ON+{SS-5 SWITCH ON}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	SAFETY RELAY 2 ON	OPERATION1+FAULT INDICATION MCB ON+DCS ON+ {LPR RELAY ON/ RCFR2 RELAY ON/R12 RELAY ON/ RL22 RELAY ON}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	PARKING BRAKE APPLICATION MAGNET VALVE ACTIVE	OPERATION1+PARKING BRAKE MCB ON+DCS ON+PRESS PARKING BRAKE APPLICATION BUTTON ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15	PARKING BRAKE RELEASE MAGNET VALVE ACTIVE	OPERATION1+PARKING BRAKE MCB ON+DCS ON+PRESS PARKING BRAKE RELEASE PUSH BUTTON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16	COMPRESSOR -1/2 UNLOADER VALVE ACTIVE	OPERATION1+COMPRESSOR UNLOADER MCB ON+COMPRESSOR GOVERNOR ACTIVE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17	AIR DRIER ACTIVE	OPERATION1+COMPRESSOR UNLOADER MCB ON+ COMPRESSOR GOVERNOR INACTIVE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18	CUT OUT RELAY (COR1 &2) ON	OPERATION1+OPERATION2+MC (NOTCH 4 & 8)+MCS1/MCS2 OPERATE	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab- I	Cab-II
19	PANTO MAGNET VALVE ACTIVE	OPERATION-1+CONTROL MCB ON+DCS ON+ +PANTO UP DOWN PRESSURE SWITCH ON+PANTO UP INDICATION	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20	SUPPLY TO CAMERA UNIT	OPERATION1+CCTV MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
21	SUPPLY TO TELEPHONE EXCHANGE SYSTEM	OPERATION1+TELEPHONE EXCHANGE MCB ON+AUX MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
22	CFG ON	OPERATION1+[F+] MCB ON+CFG MCB ON+CFG SWITCH ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
23	LLG ON	OPERATION1+[L+] MCB ON+LLG/CL MCB ON+LLGS SWITCH ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
24	CLS ON	OPERATION1+LLG/CL MCB ON+CL SWITCH ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
25	BM1 MOTOR ON	Ensure Supply at Cable No. 305 & 300+BM1 MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
26	BM2 MOTOR ON	Ensure Supply at Cable No. 306 & 300+BM2 MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
27	AAFR1 RELAY ON	Ensure Supply at Cable No. 301 and 300.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
28	AAFR2 RELAY ON	Ensure Supply at Cable No. 301 and 300.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
29	BATTERY CHARGING(120 AH)	OPERATION1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30	SUPPLY TO HEATER UNIT	OPERATION1+HEATER MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
31	AEFR RELAY ON	OPERATION1+FAULT INDICATION MCB ON+DCS ON+AEFR-AUX (OFF)+AEFR CO CLOSE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
32	AEFR-AUX RELAY ON	OPERATION1+ DCS ON+ FAULT INDICATION MCB ON+AEFR RELAY ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33	SUPPLY TO CHARGING SOCKET	OPERATION1+CHARGING SOCKET MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
34	SUPPLY TO CHARGING SOCKET (DESK)	OPERATION1+CHARGING SOCKET MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
35	SUPPLY TO 24V SYSTEM	SUPPLY TO BATTERY CHARGER+BIS (CLOSE)+ENG1 PROTECTION MCB ON+ENG2 PROTECTION MCB ON+Ensure 24V across Cable No. 201 & 210.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
36	FOG LIGHT ON	OPERATION 35+24V -VE AUX MCB ON+FGL MCB ON+TURN ON FOG LIGHT TOGGLE SWITCH	<input checked="" type="checkbox"/>	<input type="checkbox"/>
37	SEARCH LIGHT ON	OPERATION 35+24V -VE AUX MCB ON+SL MCB ON+TURN ON SEARCH LIGHT TOGGLE SWITCH	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab- I	Cab-II
38	BATTERY CHARGING AMMETER 1 READING	SUPPLY TO BATTERY CHARGER+BIS (CLOSE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
39	BATTERY CHARGING AMMETER 2 READING	SUPPLY TO BATTERY CHARGER+BIS (CLOSE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
40	SUPPLY TO SPU1	OPERATION 35+R81 RELAY ON+R91 RELAY ON+S11 RELAY ON+TR11 TIMER (OFF)+ENG 1 SPU MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
41	SUPPLY TO SPU1	OPERATION 35+R82 RELAY ON+R92 RELAY ON+S12 RELAY ON+TR12 TIMER (OFF)+ENG 2 SPU MCB ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
42	LOCAL RESET RELAY1 (LRR1) ON	OPERATION 35+LOCAL REMOTE SWITCH1(L)+LOCAL ENG- 1 OFF PB(OFF)+PRESS LOCAL RESET PB ENG1(US)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
43	LOCAL RESET RELAY2 (LRR2)ON	OPERATION 35+LOCAL REMOTE SWITCH2(L)+LOCAL ENG- 2 OFF PB(OFF)+PRESS LOCAL RESET PB ENG2(US)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
44	LOCAL ON/OFF RELAY 1 (R81) ON	OPERATION 35+ FC21 RELAY (OFF)+LOCAL REMOTE SWITCH1 (L)+LOCAL ENG-1 OFF PB(OFF)+PRESS LOCAL ENG-1 ON PB(US)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
45	LOCAL ON/OFF RELAY 2 (R82) ON	OPERATION 35+ FC22 RELAY (OFF)+LOCAL REMOTE SWITCH2 (L)+LOCAL ENG-2 OFF PB(OFF)+PRESS LOCAL ENG-2 ON PB(US)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
46	REMOTE ON/OFF RELAY1 (R91) ON	OPERATION 35+LOCAL REMOTE SWITCH1 (R)+OPERATE DCS ENG-1 ON SWITCH+S11 RELAY ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
47	REMOTE ON/OFF RELAY2 (R92) ON	OPERATION 35+LOCAL REMOTE SWITCH2 (R)+OPERATE DCS ENG-2 ON SWITCH+S12 RELAY ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>
48	TR11 TIMER (ON)+TR21 TIMER (ON)+HM1(ACTIVE)	OPERATION 35+R81 RELAY (ON)/R91 RELAY (ON)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
49	TR12 TIMER (ON)+TR22 TIMER (ON) +HM2(ACTIVE)	OPERATION 35+R82 RELAY (ON)/R92 RELAY (ON)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
50	R31 RELAY (HCWT-1 IND) ON	OPERATION 35+ENG1 SAFETY MCB1 ON+TS11(91°C) CONTACT (CLOSE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
51	R32 RELAY (HCWT-2 IND) ON	OPERATION 35+ENG2 SAFETY MCB1 ON+TS12(91°C) CONTACT (CLOSE)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
52	R11 RELAY (HCWT-1) ON	OPERATION 35+ENG 1 SAFETY MCB1 (ON)+ TS11(96°C) CONTACT (CLOSE)+{RR1 RELAY(ON)/LRR1 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
53	R12 RELAY (HCWT-2) ON	OPERATION 35+ENG 2 SAFETY MCB1 (ON)+ TS11(96°C) CONTACT (CLOSE)+{RR2 RELAY(ON)/LRR2 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
54	R41 RELAY (LLOP-1) ON	OPERATION 35+ENG 1 SAFETY MCB1 (ON)+{RR1 RELAY(ON)/LRR1 RELAY(ON)/PS11 CONTACT(CLOSE)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
55	R42 RELAY (LLOP-2) ON	OPERATION 35+ENG 2 SAFETY MCB1 (ON)+{RR2 RELAY(ON)/LRR2 RELAY(ON)/PS12 CONTACT(CLOSE)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
56	R51 RELAY (OS-1) ON	OPERATION 35+ENG1 SAFETY MCB1(ON){RR1 RELAY(ON)/LRR1 RELAY (ON)+LM CONNECTOR TO BE CONNECTED IN LCC B1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
57	R52 RELAY (OS-2) ON	OPERATION 35+ENG2 SAFETY MCB1(ON){RR2 RELAY(ON)/LRR2 RELAY (ON)+ LM CONNECTOR TO BE CONNECTED IN LCC B1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
58	R71 RELAY (HOF-1) ON	OPERATION 35+ENG 1 SAFETY MCB1(ON)+{RR1 RELAY (ON)/LRR1 RELAY(ON)+LIMIT SWITCH AT HYDRAULIC TANK(DE-ENGAGED)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
59	R72 RELAY (HOF-2) ON	OPERATION 35+ENG 2 SAFETY MCB1(ON)+{RR2 RELAY (ON)/LRR2 RELAY(ON)+ LIMIT SWITCH AT HYDRAULIC TANK(DE-ENGAGED)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
60	FC21 RELAY (ENG-1 TRIP) ON	OPERATION 35+ENG 1 SAFETY MCB1(ON)+{R21 RELAY(OFF)/R41 RELAY(OFF)/R51 RELAY(OFF)/R61 RELAY(OFF)/R71 RELAY (OFF)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
61	FC22 RELAY (ENG-2 TRIP) ON	OPERATION 53+ENG 2 SAFETY MCB1(ON)+{R22 RELAY(OFF)/R42 RELAY(OFF)/R52 RELAY(OFF)/R62 RELAY(OFF)/R72 RELAY (OFF)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
62	R21 RELAY (LHOL) ON	OPERATION 53+ENG 1 SAFETY MCB2(ON){RR1 RELAY (ON)/LRR1 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
63	R22 RELAY (LHOL) ON	OPERATION 53+ENG 2 SAFETY MCB2(ON){RR2 RELAY (ON)/LRR2 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
64	R61 RELAY (LCWL-1) ON	OPERATION 53+ENG 1 SAFETY MCB2(ON){RR1 RELAY (ON)/LRR1 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
65	R62 RELAY (LCWL-2) ON	OPERATION 53+ENG 2 SAFETY MCB2(ON){RR2 RELAY (ON)/LRR2 RELAY(ON)}	<input checked="" type="checkbox"/>	<input type="checkbox"/>
66	S11 RELAY (ENG-1 ON) ON	OPERATION 1+ENGINE CONTROL SUPPLY MCB(ON)+DCS ON+ECS(IDLE)+OPERATE ENG1 ON SWITCH(ON)+ FC21 RELAY(OFF)	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab- I	Cab-II
67	S12 RELAY (ENG-2 ON) ON	OPERATION 1+ENGINE CONTROL SUPPLY MCB(ON)+DCS ON+ECS(IDLE)+OPERATE ENG2 ON SWITCH(ON)+ FC22 RELAY(OFF)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
68	RR1+ RR2 RELAYS (REMOTE READY TO START) ON	OPERATION1+CONTROL MCB(ON)+READY TO START MCB(ON)+Ensure +ve 110V supply at Cable No. 1661+ OPERATE READY TO START SWITCH IN DCS	<input checked="" type="checkbox"/>	<input type="checkbox"/>
69	S13 RELAY (ENG-1 OFF) ON	OPERATION1+ENGINE CONTROL SUPPLY MCB(ON)+DCS ON+ECS(IDLE)+OPERATE ENG-1 OFF SWITCH IN DCS	<input checked="" type="checkbox"/>	<input type="checkbox"/>
70	S14 RELAY (ENG-2 OFF) ON	OPERATION1+ENGINE CONTROL SUPPLY MCB(ON)+DCS ON+ECS(IDLE)+OPERATE ENG-2 OFF SWITCH IN DCS	<input checked="" type="checkbox"/>	<input type="checkbox"/>
71	TRACTION CONTROL SUPPLY ON LED(ON)	OPERATION1+CONTROL MCB ON +LAMP TEST MCB ON+LAMP TEST SWITCH ON+CONTROL ON/ OFF SWITCH ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
72	ENGINE 1 ON LED(ON)	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+LAMP TEST SWITCH ON+ DCS ON+S11 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
73	ENGINE 2 ON LED(ON)	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+LAMP TEST SWITCH ON+ DCS ON+S12 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
74	ENGINE 1 TRIP LED(ON)	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+FC21 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
75	ENGINE 2 TRIP LED(ON)	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+FC22 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
76	MOTOR EARTH FAULT LED(ON)	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON +DCS ON+GR RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
77	PARKING BRAKE APPLICATION LED	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+OPERATE PBG APPL SWITCH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
78	ALTERNATOR1 EXCTATION ON LED(ON)	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+ECR1 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
79	ALTERNATOR2 EXCTATION ON LED(ON)	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+ECR2 RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
80	HCWT ENG1 LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+R31 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
81	HCWT ENG2 LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+R32 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
82	AUX ALT 1 FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+AAFR1 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
83	AUX ALT 2 FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+AAFR2 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
84	RECT1 FUSE FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+RL11 RELAY ON(In Rect-1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
85	RECT2 FUSE FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+RL12 RELAY ON(In Rect-2)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
86	RECT1 COOL FAN FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON +DCS ON+RCFR1 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
87	RECT2 COOL FAN FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON +DCS ON+RCFR2 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
88	GOV-1 SUPPLY FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+ER1 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
89	GOV-2 SUPPLY FAILURE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+ER2 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
90	TRACTION MOTOR OVERLOAD LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+{MOLR1/MOLR2/MOLR3/MOLR4} RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
91	PANTO UP LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+PANTO GOVERNOR CONTACT(CLOSE)RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
92	DEAD MAN BRAKE APPL LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+DMR RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
93	AUX EARTH FAULT LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+AEFR ON+AEFR(AUX) RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
94	LOW LUBE OIL PRESSURE ENG1 LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+R41 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
95	LOW LUBE OIL PRESSURE ENG2 LED ON	OPERATION1+FAULT INDICATION MCB ON+ LAMP TEST MCB ON+DCS ON+R42 RELAY OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
96	ENGINE1 IDLE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON +DCS ON+ECR1 RELAY OFF+S11 RELAY (ON)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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S.No.	Operation	Condition	Performed In	
			Cab-I	Cab-II
97	ENGINE2 IDLE LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON +DCS ON+ECR2 RELAY OFF+S12 RELAY (ON)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
98	EMY TRACTION CUT OFF LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+EMR RELAY ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
99	LUBE OIL TEMP TOO HIGH ENG1 LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+LUBE OIL TEMP SW ENG1(OPEN)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
100	LUBE OIL TEMP TOO HIGH ENG2 LED ON	OPERATION1+FAULT INDICATION MCB ON+LAMP TEST MCB ON+DCS ON+LUBE OIL TEMP SW ENG2(OPEN)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
101	REV1 FOR(ON)	TO GIVE EXTERNAL AIR PRESSURE (5-7 kg/SqCm) TO EQUIPMENT GOVERNOR+OPERATION1+OPERATION2+ECS-RUN(CLOSE)+MASTER CONTROLLER(19-20)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
102	REV1 REV(ON)	TO GIVE EXTERNAL AIR PRESSURE TO EQUIPMENT GOVERNOR+OPERATION1+OPERATION2+[ECS-RUN(CLOSE)/TSS(ON)]+MASTER CONTROLLER(23-24)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
103	LC1+LC3 (ON)	TO GIVE EXTERNAL AIR PRESSURE TO EQUIPMENT GOVERNOR+[OPERATION 99/OPERATION 100]+SS1 ON+SS2 ON+SS3 ON+GROUND RELAY(OFF)+SAFETY RELAY1(OFF)+MOLR1(OFF)+ MOLR3(OFF)+MCS1(OFF)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
104	LC2+LC4 (ON)	TO GIVE EXTERNAL AIR PRESSURE TO EQUIPMENT GOVERNOR+[OPERATION 99/OPERATION 100]+SS1 ON+SS2 ON+SS3 ON+GROUND RELAY(OFF)+SAFETY RELAY2(OFF)+MOLR2(OFF)+ MOLR4(OFF)+MCS2(OFF)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Tested by:

Date :

Witnessed by DMW:

[Signature]
16/05/19



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1.7. Engine Cranking Prerequisites

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
• Switch on BCS 110 V to power up the 110V control circuit		CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Switch on 24V Knife Switch to power up the 24V control Circuit		CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Switch all the Control and Aux MCBs (24V & 110V)	• Availability of power supply at the input terminals of LCCs.	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Turn ON DCS key	• LED Panel will power up and display the default indications	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Keep ECS in IDLE Position		DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ensure following:				
• Excitation Control Switch is off.		DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Check 24 V battery status.	• 24 V voltmeter should show 24 V approx.	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Check 110 V battery status	• 110 V voltmeter should show 110 V approx.	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Check the master controller	• Master controller handle should be at 0 position	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Check Engine RPM meters	• 'ENG RPM' should indicate 0	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• There should be no active faults in the system.	• No Fault indications on the LED Panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Operate Ready to Start Toggle Switch for a second to reset and release.	• All the relays will retain their healthy state. • All the fault Indications will disappear in LED Panel.	CC1 DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Operate Engine <u>1/2</u> Start toggle switch for 3 to 4 Seconds and Release.	• Engine will crank and Engine RPM shows 700 RPM in RPM Meter <u>1/2</u> .	CC1 & 2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
	• Engine <u>1/2</u> ON relay picks up	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	• Eng <u>1/2</u> ON and Eng <u>1/2</u> Idle indication will appear in LED Panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.7.1 Engine Shutdown procedure:

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
• Take the Master Handle to 0 notch and Reverser Switch to Neutral Position.	• Engine RPM will reduce to 700 RPM viewed at RPM Meter and Eng Idle Indication will appear in LED Panel	CC and DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Press Engine <u>1/2</u> Off toggle switch.	• Engine <u>1/2</u> Trip indication appears in the LED panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.7.3 Engine Safety Checks

1.7.3.1 Low Hydraulic Oil Level

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
• Ensure Engin <u>1/2</u> is running.	• Engine <u>1/2</u> ON and Eng <u>1/2</u> Idle Indication in the LED panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Connect a jumper wire between Cable No. LHOL 1A and LHOL 1B at Level Sensor End.	• LHOL indicator displays LO	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	• Engine will shutdown	Under Frame	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	• Engine 1 trip indication will be displayed.	LED Panel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



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• Remove the jumper wire.	• In LHOL, LO indication disappears.	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Re Crank the Engine As per Procedure mentioned above.			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.7.3.2. High Cooling Water Temperature Fault Test

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
• Ensure Engine <u>1/2</u> is running.	• Engine <u>1/2</u> ON and Alt- <u>1/2</u> Exc. ON indication in the LED panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Disconnect the TS11 and TS12 at Engine end.	• HCWT-1 Indication appears, Engine-1 Excitation will cut-off and Eng-1 Idle Indication will appear	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Restore the TS11 and TS12 at the Engine and Re Crank the Engine	• Engine trip indication will disappear in the LED panel and Eng-1 ON and Eng-1 Idle Indication will appear	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.7.3.3. Low Lube Oil Pressure Fault Test

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
• Ensure Engine <u>1/2</u> is running.	• Engine <u>1/2</u> ON and Eng <u>1/2</u> Idle Indication in the LED panel.	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Disconnect the PS11 at Engine end.	• Low Lube Oil Pressure Eng <u>1/2</u> indication will appear in LED Panel	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	• Engine will shutdown	Under Frame	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	• Engine <u>1/2</u> trip indication will be displayed.	LED Panel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Restore the PS11 at Engine end and Engage Ready to Start Switch in DCS	<ul style="list-style-type: none"> Low Lube Oil Pressure Eng <u>1/2</u> and Engine <u>1/2</u> trip indication will disappear 	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Re Crank the Engine As per Procedure mentioned above.			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

7.3.4. Low Cooling Water Level

Operation	Effect/Observation	Location	Performed in	
			ENG-1	ENG-2
Ensure Engine <u>1/2</u> is running.	<ul style="list-style-type: none"> Engine <u>1/2</u> ON and Eng <u>1/2</u> Idle Indication in the LED panel. 	DD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> Connect a jumper wire between Cable No. LCWL 1A & LCWL 1B for ENG-1 and LCWL 2A & 2B for ENG-2 at Level Sensor End. 	<ul style="list-style-type: none"> LCWL <u>1/2</u> indication displays LO 	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<ul style="list-style-type: none"> Engine will shutdown 	Under Frame	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<ul style="list-style-type: none"> Engine 1 trip indication will be displayed. 	LED Panel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> Remove the jumper wire. 	<ul style="list-style-type: none"> In LCWL, LO indication disappears. 	CC1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> Re Crank the Engine As per Procedure mentioned above. 			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2. LOAD TEST

Load test is carried out to check the performance of power pack installed in the DETC coach along with interconnected control system. It ensures that the power pack delivers rated output in each notch at rated speed as per the designed requirement.

Load test can be a fountain of valuable information revealing engine trouble such as low horse power, black smoke in the exhaust, hunting under load, and as well as some electrical problems like power circuit ground detection (Grounding of Alternator, Rectifier and cables up to CP can be detected).

Diesel engine (CUMMINS, NTA 855R3) and Traction Alternator (C1009A1), Rectifier along with LCC shall be used for this test. After setting up the load bench, move Master Handle (MH) from IDLE to 8th notch in steps while keeping Reverser Handle (RH) in F/R position. In Load test, notch

wise engine rpm and output power in kilowatts is maintained by the LCC under power limit mode.

2.1 Test Status

Record test results in the format given below.

2.2 Test Equipment

- Digital Multimeters
- Wago connector
- DCS key
- Master Controller Unlock key
- DC Clamp Ammeter

2.3 Test Programme

2.3.1 Test Preparations

Operation	Performed in	
	ENG-1	ENG-2
• Ensure Engine is OFF and all circuit breakers and battery isolation switches are OFF.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Connect the load bank between wire no. P5(Eng-1)/P6(Eng-2) and G0.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Connect the Digital Multimeters(10A) in LCCs for measuring Actuator and Field Current.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Connect the Digital Multimeter for voltage and Digital Clamp meter for current measurement at load Bank.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Crank the Engine as per the instructions provided above.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
• Allow engine to run for 15 minutes before loading.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2.3.2 Traction Alternator Load Test

2.3.2.1 Notch wise Load Test

Operation	Performed in	
	ENG-1	ENG-2
Start the power pack at notch-0 with load bank plate slightly dipped into the water and adjust the plate so that voltage and current LED in the LCC does not glow.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Turn ON the excitation switch and change the notch position to 1 st . Measure the DC current/DC voltage and calculate the power output i.e. kW reading.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
If the kW is lower than required, rotate the kW pot in LCC against 1 st notch in clockwise direction (Load ramp-Up LED glows while adjusting the knob in LCC) until the kW matches with the required value. If kW is not increasing after 2-3 rotations, dip the plate into water to increase the load capacity and again check the kW.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
If kW is higher than required, rotate the kW pot against the 1 st notch in anti-clockwise direction (Load ramp-Down LED glows) until the kW output matches the required value.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Repeat the above steps for each of the notches.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cross-check the readings after restart and in both ascending & descending orders of notch.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Record the actuator current, excitation current, Load voltage and current.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



2.3.2.2 Notch wise Load Test Report

2.3.3.2.1 Load Test Engine A

Diesel Engine S. no.	25446255	Traction Alternator S. no.	2189706-278
LCC Control module S. no.	F030MNB005	LCC Power module S. no.	ES10MDK015

Engine Safety Check

Item	Action	Performed	Remarks
HWT 1	LED INDICATION	<input checked="" type="checkbox"/>	
HWT 2	EXCITATION OFF	<input checked="" type="checkbox"/>	
LLOP	ENGINE TRIP	<input checked="" type="checkbox"/>	
OS	ENGINE TRIP	<input checked="" type="checkbox"/>	
LCWL	ENGINE TRIP WITH DELAY	<input checked="" type="checkbox"/>	
LHOL	ENGINE TRIP WITH DELAY	<input checked="" type="checkbox"/>	
HOFF	ENGINE TRIP	<input checked="" type="checkbox"/>	
RCFR	EXCITATION OFF	<input checked="" type="checkbox"/>	
RFF	EXCITATION OFF	<input checked="" type="checkbox"/>	

Prior to load testing ensure following:

- FP pressure should be between 5-7 kg/cm²
- Hydraulic oil pressure should be between ~~130-140~~ psi at 1800 rpm

200 BAR



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Load test chart (Engine A)

Notch position	Engine speed	V ref	V	I ref	I	P ref	P	P reference (kW)		Upper limits				I actuator	I field
								Lower limit	Upper Limit	V ref	V msrd	I ref	I msrd		
1	700	100	125	150	185	15	23	14.6	15.5	130	180	350	340	1.1	0.62
2	1000	150	160	210	240	31	38	30	32	230	230	400	400	1.18	0.49
3	1200	170	180	420	425	71	78	69	73	330	330	460	520	1.28	0.78
4	1300	200	210	490	520	98	106	95	101	400	400	500	560	1.32	1.06
5	1400	230	240	565	581	130	138	126	134	460	460	580	670	1.36	1.30
6	1500	260	280	620	611	162	170	157	167	533	530	650	680	1.39	1.48
7	1650	300	300	626	635	188	195	182	194	620	580	720	740	1.43	1.51
8	1800	330	340	630	640	208	216	202	214	640	610	780	740	1.46	1.43

LCC Parameters:

ACCEL	50	RESET	70	GAIN	50
DECEL	50	DROOP	0	STAB	50
L. STAB	50	L. RAMP	70	L. GAIN	60
L. DERIV	0	WHEEL SLIP	0		



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After setting power, voltage & Current; include thermostatic valve and operate the engine in full power. Run engine till full hydraulic pressure is attained. During this time monitor Engine Coolant Temperature; NO temperature fault should pop up. Note down final reading of following gauges:

Gauge	Value	Unit
EWT	75	°C
LOT	80	°C
LOP	45	psi

Amit Mandali

Tested by:

Date :

Witnessed by :

[Signature]
12/09/19

2.3.3.2.1 Load Test Engine B

Diesel Engine S. no.	25446278	Traction Alternator S. no.	2189706-272
LCC Control module S. no.	F030MNB016	LCC Power module S. no.	ES10MDR006.

Engine Safety Check

Item	Action	Performed	Remarks
HWT 1	LED INDICATION	<input checked="" type="checkbox"/>	
HWT 2	EXCITATION OFF	<input checked="" type="checkbox"/>	
LLOP	ENGINE TRIP	<input checked="" type="checkbox"/>	
OS	ENGINE TRIP	<input checked="" type="checkbox"/>	
LWL	ENGINE TRIP WITH DELAY	<input checked="" type="checkbox"/>	
LHOL	ENGINE TRIP WITH DELAY	<input checked="" type="checkbox"/>	
HOFF	ENGINE TRIP	<input checked="" type="checkbox"/>	
RCFR	EXCITATION OFF	<input checked="" type="checkbox"/>	
RFF	EXCITATION OFF	<input checked="" type="checkbox"/>	



Prior to load testing ensure following:

- c. FP pressure should be between 5-7 kg/cm²
- d. Hydraulic oil pressure should be between ~~130-140~~ psi at 1800 rpm

200 BAR



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Load test chart (Engine B)

Notch position	Engine speed	V ref	V	I ref	I	P ref	P	Preference (kW)		Upper limits				I actuator	I field
	Rpm	(V)	(V)	(A)	(A)	(kW)	(kW)	Lower limit	Upper Limit	V ref	V msrd	I Ref	I msrd	(A)	(A)
1	700	100	125	150	185	15	23	14.6	15.5	130	180	350	340	1.1	0.62
2	1000	150	160	210	241	31	38	30	32	230	230	400	400	1.18	0.49
3	1200	170	180	420	426	71	78	69	73	330	330	460	500	1.28	0.77
4	1300	200	210	490	520	98	106	95	101	400	400	500	560	1.33	1.07
5	1400	230	240	565	580	130	138	126	134	460	460	580	670	1.35	1.33
6	1500	260	280	620	610	162	170	157	167	533	530	650	650	1.40	1.48
7	1650	300	360	626	635	188	195	182	194	620	580	720	700	1.44	1.52
8	1800	330	330	630	640	208	216	202	214	640	610	780	740	1.46	1.44

LCC Parameters:

ACCEL	50	RESET	70	GAIN	50
DECEL	50	DROOP	0	STAB	50
L. STAB	50	L. RAMP	70	L. GAIN	60
L. DERIV	0	WHEEL SLIP	0		



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MSU mounting					
(i)	08 Nos hex head bolt M30x110 8.8 with washers	✓	✓	✓	✓
(ii)	Sandwich to bogie mounting bolts 4Nos. M24x90 with plain washer & Split Pin to be provided	✓	✓	✓	✓
(iii)	Motor to Sandwich bolts 2Nos. M24x170	✓	✓	✓	✓
(iv)	Sandwich cover to bogie mounting bolts 2Nos. M24x85	✓	✓	✓	✓
(v)	Terminal box cover bolts 4Nos M10x20	✓	✓	✓	✓

Checked By

Witnessed by SSE/Bogie

Witnessed by INSP/ELEC *SSE/TPS*

3.2 TM HEAT RUN TEST for Cab 1 side bogie with motor 1 & 3

BOGIE NO : DETC / US -

DATE:

TRACTION MOTOR 1 S.N.: _____ TRACTION MOTOR 3 S.N.: _____

ROTATION IN NORMAL DIRECTION



TIME	AMB.TEMP°C	MOTOR 1		MOTOR 3		REMARKS
		NDE°C	DE°C	NDE°C	DE°C	
						Heat Run Test Started At _____ hrs
						Heat Run Test Completed At _____ hrs

ROTATION IN REVERSE DIRECTION



TIME	AMB.TEMP°C	MOTOR 1		MOTOR 3		REMARKS
		NDE°C	DE°C	NDE°C	DE°C	
						Heat Run Test Started At _____ hrs
						Heat Run Test Completed At _____ hrs



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IR VALUE OF MOTORS (MΩ) after the completion of Heat run test

INBETWEEN	MOTOR 1	MOTOR 3
A to E		
F to E		
A to F		

TESTED BY:-

WITNESSED BY DMW:

3.3 TM HEAT RUN TEST for Cab 2 side bogie with motor 2 & 4

BOGIE NO : DETC / US -

DATE:

TRACTION MOTOR 2 S.N.:- _____ TRACTION MOTOR 4 S.N.:- _____

ROTATION IN NORMAL DIRECTION



TIME	AMB.TEMP°C	MOTOR 2		MOTOR 4		REMARKS
		NDE°C	DE°C	NDE°C	DE°C	
						Heat Run Test Started At _____ hrs
						Heat Run Test Completed At _____ hrs

ROTATION IN REVERSE DIRECTION



TIME	AMB.TEMP°C	MOTOR 2		MOTOR 4		REMARKS
		NDE°C	DE°C	NDE°C	DE°C	
						Heat Run Test Started At _____ hrs
						Heat Run Test Completed At _____ hrs



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IR VALUE OF MOTORS (MΩ) after the completion of Heat run test

INBETWEEN	MOTOR 2	MOTOR 4
A to E		
F to E		
A to F		

TESTED BY:-

WITNESSED BY DMW:

4. MOVEMENT TEST

4.1 Purpose

To ensure DETC movement in right direction as per Reverser Handle position.

4.2 Measuring Equipments and Test Setup

- Multimeter
- Wago connector
- DCS key
- Master Controller Unlock key

4.3 Test Status

Record the test results in the table given below

4.4 Test Implementation

Forward and Reverse movement about 10 kmph has been taken with all Traction Motors. Individual Traction Inverter data is recorded by performing the bogie cut out of each Line Contactor in MSGC. Forward and Reverse movement of Traction Motors performed and data is recorded. Based on recorded data, we verified the performance of the motor during movement test.

4.5 SAFETY AND BYPASS CHECKS (Before Movement)

SN	Test	Readings/Result	Remarks
1.	SA9 Brake Apply and release physical check at all wheels	OK	
2.	A9 Brake Apply and release physical check at all wheels	OK	

3	Parking Brake Apply and release physical check at designated wheels	OK	
4	Equipment Governor Bypass	OK	
5	Rectifier Cooling Fan - 1 Failure Bypass	OK	
6	Rectifier Cooling Fan - 2 Failure Bypass	OK	
7	Brake Pressure Control Governor Bypass	OK	
8	Parking Brake Governor Bypass	OK	
9	Functioning of Movement Restriction at 10KMPH interlock while Lifting platform is in up condition. (Excitation Off)	OK	
10	Power Ground fault in Power Pack-1 and Resetting	OK	
11	Power Ground Fault in Power pack-2 and Resetting	OK	
12	Control Circuit Earth fault (+)	OK	
13	Control Circuit Earth fault (--)	OK	

4.6 LOCAL MOVEMENT TEST FROM CAB-1

DATE:

SN	Test	Readings/Result	Remarks
1.	Forward movement with engine-1 in ON condition + TM-1 Traction Motor only Included (10Kmph) Notch-1	TM-1 <u>240</u> A	
2.	Reverse movement with engine-1 in ON condition + TM-1 Traction Motor only Included (10Kmph) Notch-1	TM-1 <u>240</u> A	
3	Forward movement with engine-1 in ON condition + TM-3 Traction Motor only Included (10Kmph) Notch-1	<input checked="" type="checkbox"/>	
4	Reverse movement with engine-1 in ON condition + TM-3 Traction Motor only Included (10Kmph) Notch-1	<input checked="" type="checkbox"/>	
5	Forward movement with engine-1 in ON condition + Both Traction Motors Included (10Kmph) Notch-1 TM-1 Current	TM-1 <u>160</u> A	
6	Reverse movement with engine-1 in ON condition + Both Traction Motors Included (10Kmph) Notch-1 TM-1 Current	TM-1 <u>160</u> A	
7	Forward movement with engine-2 in ON condition + TM-2 Traction Motor only Included (10Kmph) Notch-1	TM-2 <u>240</u> A	
8	Reverse movement with engine-2 in ON condition + TM-2 Traction Motor only Included (10Kmph) Notch-1	TM-2 <u>240</u> A	
9	Forward movement with engine-2 in ON condition + TM-4 Traction Motor only Included (10Kmph) Notch-1	<input checked="" type="checkbox"/>	
10	Reverse movement with engine-2 in ON condition + TM-4 Traction Motor only Included (10Kmph) Notch-1	<input checked="" type="checkbox"/>	



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11	Forward movement with engine-2 in ON condition + Both Traction Motors Included (10Kmph) Notch-1 TM-2 Current	TM-2 <u>160</u> A	
12	Reverse movement with engine-2 in ON condition + Both Traction Motors Included (10Kmph) Notch-1 TM-2 Current	TM-2 <u>160</u> A	
13	Forward movement with both engines are in ON condition + All Traction Motors are Included (10Kmph) Notch-1	TM-1 <u>160</u> A	
		TM-2 <u>160</u> A	
14	Reverse movement with both engines are in ON condition + All Traction Motors are Included (10Kmph) Notch-1	TM-1 <u>160</u> A	
		TM-2 <u>160</u> A	
15	Speedometer over speed alarm function working (Ensure WD : 952mm)	<input checked="" type="checkbox"/>	
16	Braking Performance SA9	<input checked="" type="checkbox"/>	
17	Braking Performance A9	<input checked="" type="checkbox"/>	
18	Deadman Braking Performance	<input checked="" type="checkbox"/>	
19	Emergency Braking Performance	<input checked="" type="checkbox"/>	
20	Head light both beams glowing with proper focusing	<input checked="" type="checkbox"/>	
21	Driver and Guard side both Tail Lights glowing	<input checked="" type="checkbox"/>	
22	Driver and Guard side both Marker Lights glowing	<input checked="" type="checkbox"/>	
23	Flasher Light working properly	<input checked="" type="checkbox"/>	
24	Search Light glowing	<input checked="" type="checkbox"/>	
25	Fog light Glowing	<input checked="" type="checkbox"/>	

4.7 LOCAL MOVEMENT TEST FROM CAB-2

SN	Test	Readings/Result	Remarks
1.	Forward movement with both engines are in ON condition + All Traction Motors are Included (10Kmph) Notch-1	TM-1 <u>160</u> A	
		TM-2 <u>160</u> A	
2.	Reverse movement with both engines are in ON condition + All Traction Motors are Included (10Kmph) Notch-1	TM-1 <u>160</u> A	
		TM-2 <u>160</u> A	
3.	Head light both beams glowing with proper focusing	<input checked="" type="checkbox"/>	



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4.	Driver and Guard side both Tail Lights glowing	<input checked="" type="checkbox"/>	
5.	Driver and Guard side both Marker Lights glowing	<input checked="" type="checkbox"/>	
6.	Flasher Light working properly	<input checked="" type="checkbox"/>	
7.	Search Light glowing	<input checked="" type="checkbox"/>	
8.	Fog light Glowing	<input checked="" type="checkbox"/>	
9.	Braking Performance SA9	<input checked="" type="checkbox"/>	
10.	Braking Performance A9	<input checked="" type="checkbox"/>	
11.	Deadman Braking Performance	<input checked="" type="checkbox"/>	
12.	Emergency Braking Performance	<input checked="" type="checkbox"/>	

4.8 HV SENSOR, HL-TL AND LOCAL ON/OFF PERFORMANCES IN CAB I & II

SN	Test	Readings/Result	Remarks
1	Headlight-Tail light Interlock performance	<input checked="" type="checkbox"/>	
2	H.V Sensor Performance	<input checked="" type="checkbox"/>	
3	Engine- 1 local On / Off Function	<input checked="" type="checkbox"/>	
4	Engine- 2 local On / Off Function	<input checked="" type="checkbox"/>	

4.9 ALL GOVERNORS PERFORMANCE

Equipment Governor Pressure Setting (Brake Team Scope)			MR Governor(ADV Setting) SAN Scope		
Cut-in	4.2Kg/SqCm	<input checked="" type="checkbox"/>	Cut-in	6Kg/SqCm	<input checked="" type="checkbox"/>
Cut-off	3.4Kg/SqCm	<input checked="" type="checkbox"/>	Cut-off	7Kg/SqCm	<input checked="" type="checkbox"/>
BPC Governor Pressure Setting (Brake Team Scope)			Parking Brake Apply and Release		
4.2Kg/SqCm	4.2Kg/SqCm	<input checked="" type="checkbox"/>	DCS Switch Configuration		Function
3.4Kg/SqCm	3.4Kg/SqCm	<input checked="" type="checkbox"/>	Apply	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			Release	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Test Assisted by
(CIL)

Test Assisted by
(CGPIL)

Movement Test Done by
(DMW)



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Brake Clearance for Movement Certified by: Dinesh Kumar Sr Teh

Brake Clearance Issue date: 16-10-19

Brake Firm: _____

Name of the Brake Staff present during movement: Dinesh Kumar Sr Teh

REMARKS

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DIESEL LOCO MODERNISATION WORKS ,PATIALA

DETC NO-M16(190065)			
Sr.No.	Description	MAKE	Sr. No.
1	CAB HEATER (CAB-1)	Top grip	548
2	CAB HEATER (CAB-2)	Top grip	547
3	SPEEDOMETER (CAB -1)	Telpro	8112
4	SPEEDOMETER (CAB -2)	Telpro	7067
7	Control Cubical -1	Inder	1920/0128
8	Control Cubical-2	Inder	2019/08/63
9	Driver Desk -1	Inder	1920/0134A
10	Driver Desk -2	Inder	1920/0134B
11	Master Controller -1	Inder	5190369
12	Master Controller -2	Inder	5190368
13	Battery 24	STAR PLUS	575
14	Battery 110v	HBL	U1173
15	MSG	Inder	1920/0127
16	Resistor Panel	Inder	1920/0131


SSE/TRS


JE/TRS

DIESEL LOCO MODERNISATION WORKS, PATIALA**DETC-NFR/190065(M-16)**

S.NO.	Description	Make	MFG. DATE & SN
1	SHELL	EC BLADES PVT LTD	2019 & 13
2	HYDRAULIC PLATFORM	HYADRAULIC ACTUATOR PVT LTD	HAL-03-2019-123/101
3	LIFTING RAM	HYADRAULIC ACTUATOR PVT LTD	HAL-03-2019-123/101
4	STARTER BATTERY CHARGER	RAMYAA ELECTRO-GEAR(P) LTD.	1905.23.445
5	RECTIFIER REGULATOR UNIT	KERALA ELECTRICAL & ALLIED ENGG. CO. LTD.	05/19 & 190571C263 , 190671C262
6	RECTIFIER A & B	RUTTONSHA INTERNATIONAL RECTIFIER LTD.	1906/1905/2208B/2019 , 1905/1905/2184B/2019
7	MOTOR SWITCH GROUP CUBICAL	CGL & INDER ENGG. INDUSTRIES	DETC/1920/0127
8	AUX. ALTERNATOR-1 & 2	KERALA ELECTRICAL & ALLIED ENGG. CO. LTD.	06/19 & 190671271 & 05/19 & 190571263
9	ENGINE 1 & 2	CUMMINS INDUSTRIES	05/19 & 25446278 & 25446255
10	ALTERNATOR 1 & 2	KERALA ELECTRICAL & ALLIED ENGG. CO. LTD.	03/19 & 2189706/272,06/19 & 2189706/279
11	CONTROL CUBICAL-1	CGL & INDER ENGG. INDUSTRIES	DETC/1920/0128
12	CONTROL CUBICAL-2	CGL & INDER ENGG. INDUSTRIES	CC2-2019-08/63
13	10 KV GENERATOR SET	AMPLE CORP. PVT LTD	08/19 & AMPL/ES/0220
14	AIR CLEANER	FLEET GUARD	3872668
15	DRILLING MACHINE	SIDDHAPURA	SMT 27/04/19
16	FUEL TANK	SBB	10 & 07/19

Sign.....
SSE/DETCSign.....
JE/DETC

Air-brake equipments details of DETC- M16

S.No.	Description	QPL /Nos.	Supplier	Item Sr. no.	Warranty
1	Distributor Valve	1	Faiveley	19066024	As per IRS/PO conditions
2	A9 brake Valve	2	Faiveley	-	
3	SA9 brake valve	2	Faiveley	-	
4	Air Dryer	1	Prag	1708-12-18	
5	C2 Relay Valve	1	Faiveley	D19-5392	
6	Auto Drain valve	3	Faiveley	-	
7	Air whistle	4	Elgi	-	
8	Wiper motor	4	Elgi	-	
9	Three way magnet valve(Parking)	1	Rotex	-	
10	Three way magnet valve(Horn)	2	Rotex	-	
11	Two way magnet valve(MR)	1	Rotex	-	
12	Two way magnet valve(Compressor)	1	Rotex	-	
13	N1 Reducing valve	3	Faiveley	-	
14	PRV Limiting valve	1	Faiveley	-	
15	Safety valve	1	Faiveley	-	
16	Pantograph assembly	1	Contransys	-	
17	Servo Motor	1	Contransys	-	

Sumit
JE/ABS
17/01/2020

m
SSE/ABS

DIESEL LOCO MODERNISATION WORKS

DETC No.	190065	Rly:	NFR	Month:	Sep., 19
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1. BOGIE FRAME:

BOGIE	FRAME NO	Make	PL No.	PO No. & dt.	Warranty Period
Panto side	SL-80	ECBT	10992169	566432	As per PO/IRS conditions
Radiator Side	SL-66				

2. Hydraulic Dampers (Vertical and Lateral) Make: IAI

3. AXLES:

LOCATION	1	2	3	4
S.NO	K-6284	K-6146	J-5877	K-6138
Ultrasonic Testing	OK	OK	OK	OK

4. WHEEL DISCS NO. AND TYPE

LOCATION	1	2	3	4
GEAR END	19/1433	19/1474	19/1480	19/1445
Ultrasonic Testing	OK	OK	OK	OK
FREE END	19/1432	19/1477	19/1479	19/1415
Ultrasonic Testing	OK	OK	OK	OK

5. AXLE ROLLER BEARING (PL No. 31020513, Warranty: As per PO/IRS conditions)

LOCATION		1	2	3	4
Gear End	MAKE	FAG	FAG	FAG	FAG
	PO NO. & dt	566542	566542	566542	566542
Free End	MAKE	FAG	FAG	FAG	FAG
	PO NO. & dt	566542	566542	566542	566542

6. WHEEL DISC PRESSING (PRESSURE IN TONNES): SPECIFIED 77.2-115.6 T

AXLE NO	1	2	3	4
BULL GEAR END	98	103	90	78
FREE END	100	100	80	92

DETC No.	190065	Rly:	NFR	Month:	Sep., 19
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7. DIAMETER AFTER PROFILE TURNING: SPECIFIED 952-955 mm

AXLE NO.	1	2	3	4
DIA IN mm GE	953	953	953	953
DIA IN mm FE				
WHEEL PROFILE GAUGE (1600±1mm)	OK	OK	OK	OK

8. SUSPENSION TUBE & ITS TAPER ROLLER BEARING:

AXLE NO.		1	2	3	4
S.T.	MAKE	CGL	CGL	CGL	CGL
G.E. BEARING	MAKE	SKF	SKF	SKF	SKF
F.E. BEARING	MAKE	SKF	SKF	SKF	SKF

9. GEAR CASE & BACKLASH:

AXLE NO.	1	2	3	4
MAKE	CGL	CGL	CGL	CGL
BACKLASH (0.200 – 0.700mm)	0.500	0.450	0.450	0.400

10. TRACTION MOTOR : (PL No. 30906313; Warranty: As per PO/IRS conditions)

LOCATION	MAKE	PO No. & date	S. NO.
1	CGL	566639 dt. 31.01.19	2189002-935
2	CGL	566639 dt. 31.01.19	2189002-936
3	CGL	566639 dt. 31.01.19	2189002-934
4	CGL	566639 dt. 31.01.19	2189002-933

SSE/ Bogie Shop