ONE WORD QUESTIONS ON EMU/MEMU/DELUXE EMU.

ELECTRICAL

1. OLP relay setting is 0.7A Amps.
2. T1 to T6 switches are called as tapping switches.
3. OL6_relay is protecting the tap changer.
4. Six inEMU/3 in MEMU Nos. of bridges are connected in main rectifier.
5. CLR setting is 500_Amps.
6. OVR setting is 540volts.
7. Power circuit is protected from earth fault by EFRP relay.
8. In 15th notch W2, T2, T8, T9 switches will be in closed condition.
9. When the current exceeds 900 Amps OL3 will act.
10. OP motor is circulating the transformer oil.
11. RF motor is cooling the main rectifier.
12. KF1,KF2 motor is cooling the transformer oil.
13. NVR relay is ensuring the Aux. II 266 V AC supply.
14. CC2 contactor is provided in Aux. Compressor circuit.
15. CC1 contactor is provided in MCP circuit.
16. To get rear motor coach BA supply CCOS switch to be put in emergency position.
17. Synchronize wire no. is 13.
18. HOBA is protecting the Aux II circuit.
19. Static battery charger (SBC) input 266 V AC and output is 110 V DC.
20. Aux. supply rectifier (ASR) input is 141V AC and output is 110 V DC.
21. LTR relay is provided to ensure the MCP 110 V DC supply.
22. MCP motor HP is 12.
23. HLVS input is 141VAC and output is 32VAC.
24. Fans are operated in 141 V AC supply.
25. NLVS input is 141 VAC and output is 110 VAC.
26. EML relay is working in 141 V AC supply.
27. EFRA II is the earth fault relay for Aux. II circuit.
28. Aux. Rectifier is located in Main RECTIFIER CUBICLE.
29. If the TFR oil temperature exceeds 75 ° C, TTR relay will act.
30. When gas forms in TFR oil, BIR relay will act.
31. If RFAR not energized MOTOR contactor will not close.
32. If EFRP is unable to reset HEFRP to be kept in fault position.
33. AC aux. Motors are operated in 266 V AC.
34. To close the ABB TSS to be kept in RUN position.
35. After releasing the HVCB close switch, ABB is holding through LTR interlock.
36. ABB governor setting is 5,3 Kg/cm² and 4.5 Kg/cm² .
37. For energizing of CR set coil MCP start switch to be pressed.
38. When BA voltage is less than 85V CCOS switch to be kept in emergency position.
39. To reset the OL relays CONTROL switch must be in OFF position.
40. EP brake will not work when jumper cables are disconnected.
41. RFAR ensures the working of rectifier fan motor.
42. T9 will close in all ODD notches.
43. RTL, TL will come into circuit only in EVEN notches.
44. DL will be in the circuit up to 10 th notch.
45. 'H'class insulation is used in traction motor components
46. If MR pressure is less than 6 kg/cm^2 CG1 governor will close.
47. In EMU automatic progression is ensured by CLR 1&2 relays.
48. OHE supply is 25KV AC 1Ø 50 c/s.

49. Direct contact between positive and negative is called SHORT CIRCUIT.
50. To calculate the current, the formula is V/R.
51. DCP fire extinguisher is used in EMU/Loco.
52. DC SERIES type of traction motor is used in EMU.
53. K1&K2 is used to change the rotating direction of traction motor.
54. One pair of traction motor can be isolated when CBAR is acted.
55. Total Nos of indication lamps in the driver's desk are EIGHT
56. CBAR will acts when two bridges fail in main rectifier.
57. If CBAR acts ONE PAIR Nos of traction motor to be isolated.
58. MCP is operated in 110V. DC voltage.
59. EMU Battery capacity is 90 AH.
60. 10 Nos of battery is provided in EMU/MC05 No of cell in a Battery.
61. Total voltage of one battery is 11 Volts total voltage of 10 batteries is 110 Volts.
62. SL, ASL is provided for FILTERING AC RIPPLES purpose.
63. TRACTION AMMETER is provided to measure the flow of current in the traction motor.
64. 5 (FIVE). Nos of winding are provided in EMU transformer.
65. EMU transformer oil quantity is 688 Lts.
66. Tapped winding voltage is 391V AC and untapped winding voltage is 391 V AC.
67. Individual tapping voltage is 70 V AC.
68. Auxiliary I winding voltage is 266 V AC and Auxiliary II winding voltage is 141 V AC.
69. PRV is located in GUARD side of the transformer.
70. SL,DL and TL is provided in the choke box.
71. If the temperature exceeds 75ºC TTR will act.
72. MCS1&MCS2 is used to isolate the traction motors.
73. Main rectifier input 782 VAC and output is 535 V DC
74. Minimum voltage required to energize AC BG EMU is 85.
75. When TM-1 is over loaded OL1 relay will energize and MOTOR CONTACTOR will open.
76. For energizing CR trip coil 42 + wire to be energized.
77. W switch will go to HV position from 13 th notch when MPT is brought to full power position.
78. While closing ABB, ABB Open lamp will extinguish BCFR &RECT-Fuse BLOWN lamp will glow and extinguish.
79. If MR drain cock is broken CIC COC to be closed and work.
80. Maximum BC pressure during brake application is 1.5 Kg/cm ² in MC and 1.8 Kg/cm ² in TC. (1.2 Kg/cm ² in DELUXE EMU)
81. For energizing SR all TAPPING contactor must be opened and NVR relay should energized condition.
82. When pressure exceeds in transformer tank PRV valve will burst and ABB will trip.
83. When battery voltage is "0" 2.5A,35A(MCBs) 63A and 32A (Fuses) to be checked.
84. To reset OL, BL should be ON and CONTROL should be in OFF position.
85. MR and BP pressure admitted to BCs during Emergency brake application.
86. When Battery charger is failed in rear MC BCFR pilot lamp will glow in leading MC.
87. When TTR acted UFL and MSTWL pilot lamp will glow while moving MPT to shunt.
88. MCPA creating pressure in PANTO, ABB and CONTROL reservoirs
89. If horn reservoir drain cock is damaged and MR not maintaining MR end COKC to be closed.
90. To raise pantograph MPT must be in OFF and ABB must be open.
91. Minimum pressure required for closing VCB is 4.6 Kg/cm ²
92. If ABB not closing PANTO/ABB MCB to be checked in Driver's desk and 15AMCB to be checked in fuse/MCB panel.
93. CC2 is the contactor for MCPA and CG2 is its Governor.
94. If EFRP is unable to reset HEFRP to be kept in FAULT position.
95. When there is no voltage in OHE ABB will trip through LTR.
96. 19 No's of pins is provided in each jumpers.
97. Auxiliary motors are working in 266 VAC.

98. When ASR supply is available LTR relay will energize.
99. BCFR Relay will energize when battery charger is properly working.
100. If any one unit MCP to be isolated SYNCHNORISE MCB to be kept OFFposition.
101. While on run REVERSER KEY shall not be brought to neutral position.
102. When mechanical brake binding is experienced PALMPULL ROD to be disconnect in MC and PULL ROD to remove in TC.
103. Traction motor HP is 224 (cont) and 251 (1Hr).
104. OL5 will act if the supply exceeds 4000 A.
105. Halogen head light is operated in 110/90 Volts.
106. 1000 Volts 1000 Amps fuse is provided in main rectifier.(500A/800V)
107. DL will not come in the circuit after 10th notch.
108. OVR acts FURTHER NOTCH will takes place.
109. EAS is provided for EARTHING OF TFR PRIMARY.
110. W2,T1,T8 switches will be in closed condition in 14th Notch.
111. Vth jumper is provided in DELUXE EMU for COMMUNICATION purpose.
112. DILUTED SULPHURIC ACID electrolyte is used in EMU battery.

MECHANICAL

1. Wheel dia new is 952 mm.
2. Wheel gauge is 1600 (+1.–2) mm.
3. Track gauge is 1676 mm.
4. Thickness of wheel is 130 mm.
5. Permitted length of flat tyre is 50 mm.
6. Crow clearance in MC is 38±6 mm and in TC is 42±6 mm.
7. Length of EMU coach is20726 mm.
8. Buffer height from rail is1090 mm.
9. Centre buffer coupler height is 1035 mm.
10. Height of cattle guard from rail is 200±15 mm.
11. SERVU LUBE 100 oil is used for suspension bearing.
12. SERVOGEM RR3 grease is used for axle box.
13. In the BO-BO type bogie, 'B' stands for NUMBER OF AXLES PER BOGIE (TWO) and 'O' stands for INDIVIDUAL DRIVE OF TRACTION MOTOR.
14. SHOCK ABSORBER is provided to share the load of secondary spring.
15. The purpose of shock absorber is TO SUPPORT SECONDARY SPRING.
16. Primary suspension is between AXLE BOX and BOGIE FRAME.
17. Secondary suspension between BOGIE FRAME and BOLSTER.
18. Dia of TC wheel is 952 mm
19. Breadth of TC wheel is 130 mm
20. Total length of TC axle is 2286 ±1 mm.
21. AXLE GEAR is provided in MC axle only.
22. Brake block thickness (New) is 49 mm.
23. Brake block thickness (Condemn) is 18 mm in MC and in TC 16 mm.
24. RETYRED type of wheels are used in EMU.(At present SOLID wheel)
25. EIGHT No's of brake cylinder is provided in MC.
26. EIGHT No's of brake cylinder is provided in DELUXE TC(FOUR in EMU/MEMU)
27. Suspension bearing lubricant is SERVOLINE 100.
28. SERVO COAT 170T Lubricant is using for Gear case
29. SERVOLINE 68 lubricant is using for Dashpot
30. SERVOLINE 68 lubricant is using for Side bearer
31. SERVOLINE 68 lubricant is using for Center pivot
32. SERVOPRESS 150 lubricant is using for Main Compressor.(Also SERVOPRIME76)
33. SERVOPRESS 150 lubricant is using for Aux Compressor..(AlsoSERVOPRIME76)

34. Pantograph seating pressure is 10.0 Kg.
35. Panto graph contact pressure 7.0 Kg.

PNEUMATIC

1. EP brake will not work when jumper cables are disconnected.
2. If BP pressure is less than 5 kg/cm^2 CONTROL governor will not close.
3. If MR pressure is less than 6 kg/cm^2 EQUIPMENT governor will not close.
4. Maximum MR Pressure is 7.0 kg/cm^2.
5. Maximum BP pressure is 5.0 kg/cm^2.
6. Maximum BC pressure in MC is 1.5 kg/cm^2.and in TC is 1.8 kg/cm^2.
7. BA relay is provided in brake system.
8. FIVE Nos. of position in brake controller.
9. Triple valve is used for AUTO brake.
10. Aux. Reservoir pressure is used for LT TEST,PANTO RAISE and ABB close.
11. To release the BC pressure HMV valve must be in opened condition.
12. To release the BC pressure AMV valve must be in closed condition.
13. If HMV valve is not opened, brake binding will takes place.
14. If BP is destroyed AUTO brake will takes place.
15. Wire no. 38 is for Application magnet valve.
16. Wire no. 37 is for holding magnet valve.
17. Equalising reservoir capacity is 11lts
18. Control reservoir capacity is 80 lts
19. Main reservoir capacity is 120 lts
20. Panto reservoir capacity is 60 lts
21. Horn reservoir capacity is 39 lts
22. BC pressure in DELUXE EMU/MC is 1.5 kg/cm² and in TC is 1.2 kg/cm²
23. BIC is provided to cut the pressure to brake cylinder.
24. EPIC is provided to cut the MR pressure to EP unit
25. AIC is provided to cut the BP pressure to EP unit.
26. Main comp governor closes in 6.0 kg/cm^2. & opens in 7.0 kg/cm^2.
27. Aux comp governor closes in 5.3 kg/cm^2. & opens 6.3 kg/cm^2.
28. Equipment comp governor closes in 4.2 kg/cm² & opens 3.5 kg/cm²
29. Control comp governor closes in 4.2 kg/cm² & opens 3.5 kg/cm²
30. ABB comp governor closes in 5.3 kg/cm² & opens 4.5 kg/cm²
31. Emergency application valve is provided for DMH operation
32. Duplex check valve setting is 5.0 kg/cm²
33. Main compressor pressure is cooled by INTER COOLER & AFTER COOLER.

State TRUE or FALSE

1. "W" will be through after 12th notch to HV side.F
2. "TL" will come in the circuit when T9 is closed.T
3. When OLP acts ABB will not trip.F
4. EFRP is an earth fault relay for transformer primary.F
5. 48 diodes are provided in main rectifier.T
6. Panto rising time is 6 to 10 seconds.F
7. Servomotor fitted on under gear.F
8. Main rectifier output is 535 V DC.T
9. Normal lights are working in 141 V. AC. (florescent lamps) T
10. Minimum pressure is required to close ABB is 4.5 kg/sm^2.T
11. When LTR de-energized ABB will not open.F

12. OVR acts motor contactor will open.F
13. CLR acts Tap changer will come to 'O'.T
14. If RF functioning RFAR will energize.T
15. CBAR acts motor contactor will not open.F
16. When EFRA II acts ABB will not trip.F
17. T 1 to T 6 is transfer switches.F
18. Emergency lights are working in 141 V AC.F
19. The vertical load from coach body to bolster is transferred through side bearers.T
20. The type of EMU wheel is RETYRED wheel.T
21. NVR is having no indication.T
22. MCP safety valve blows when the pressure exceeds 8.0 kg / $cm^{2.T}$
23. EMU Bogie type is BO BO.T
24. EMU/MC Bogie frame type is box.F
25. Servo gem RR3 grease is using for axle box.T
26. When DMH is operated emergency brakes takes place.T
27. The drop forging temperature is 1000 ℃ to 1100 ℃.T
28. RF is having Air flow relay. T
29. EML1 is DC relay F
30. Auxiliary motors are working is 110 V DC.F
31. Line Voltmeter is provided in Aux I Circuit.F
32. If NVR de-energized unit will respond. F
33. If two bridges fail CBAR will act. T
34. Traction Motor's HP is 224 cont/251 per hour. T
35. If NVR fails indication lamp will glow. F
36. LTR fails ABB will not open.F
37. 160A fuse is provided for MCP.T
38. DL is only in circuit up to 10th notch.T
39. 500 A fuse is provided in Main Rectifier.T
40. KVA of EMU transformer is 1000.T
41. EMU battery capacity is 90AH.
42. HP of MCP is 12.T
43. CC2 contactor is closed MCP will start.F
44. TC bogie frame type is I type.T
45. When ABB is closed 3 Aux. motor will start working.F
46. To raise the pantograph MPTmust be in OFF position.T
47. GS3 switch is provided to bypass the MCP.T
48. Availability of Aux.II supply is monitored by LTR.T
49. When the current exceeds 0.7 Amps, OLP will act.T
50. HLVS output is 32VAC /250W.T
51. In 15^{th} notches W2, T2, T8, T7 switches are in closed condition.T
52. The CLR setting is 5OO Amps.T
53. GS2 is provided to operate control governor.T
54. MR reservoir capacity is 120 Liters.T
55. When MPT handle is moved to shunt position MSTWL will glow and extinguish.T
56. If HMV is not deenergised brake binding will takes place.T
57. Triple valve is used to charge the AUX. Reservoir.T
58. Application magnetic valve is provided in EP unit.T
59. Duplex check valve setting is 5.0 kg / $cm^{2.\ T}$
60. If OHE supply fails ABB will open through LTR relay.T
61. MC bogie frame type is BOX type.T
62. If CBAR acts one pair of traction motors to be isolated.T
63. T6 will closes in 11^{th} and 12^{th} notch.T
64. Semi permanent couplers are used in EMU/MEMU.T
65. Air suspension spring is provided in DELUXE EMU.T

66. Pantograph seating pressure is 10 Kg.
67. Pantograph contact pressure 7 Kg.
68. Pantograph raising time 6 to 19 seconds.F
69. 7 Nos. of reservoir is provided in MC.F
70. gear ratio of EMU 20:91(1:4.55)T
71. Double row self aligning spherical roller bearing is provided in axle box.T
72. New wheel dia of EMU 952mm.T
73. Condemn. Size of wheel dia in MC 877mm and in TC 857mm.T
74. Breadth of the tyre is 130mm.T
75. Axle load 20 tones in MC and 16 tones in TC.T
76. Wheel pressing pressure 75 to 106 tones.T
77. Gear pressing pressure is 65 to 85 tones.T
78. Servo coat 170T is used for gear case.T
79. Servo line 68 oil is used for dash pot.T
80. Servo fringe 12 is used for shock absorber.T

WRITE SHORT NOTES FOR THE FOLLOWING

Sl.No.	EQUIPMENT	Sl.No.	EQUIPMENT
1.	Pantograph	28	MCP
2.	ABB	29	Battery
3.	VCB	30	Jumpers
4.	Transformer	31	ASR
5.	Tap changer	32	EP unit
6.	OLP	33	Reverser
7.	EFRP	34	Bogie
8.	OL5and OL6	35	HLVS
9.	BIR	36	Main parts of MC and TC bogie
10.	EFRA II	37	Name of the MCBs in Provided in Drivers desk.
11.	LTR	38	DMH
12.	SR	39	TPWS
13.	NVR	40	DC to DC converter
14.	CLR	41	EPIC/AIC/BIC
15.	OVR	42	AIR suspension spring
16.	PRV	43	Brake controller(WSF/ModularIII)
17.	Main rectifier	44	Flasher unit
18.	SL	45	Esmon speedometer
19.	DL	46	HRC fuse
20.	TL	47	CCOS
21.	Auxiliary Motors	48	MCS I and II
22.	Traction motors	49	Parking brake
23.	OL1 to OL4	50	EAS
24.	SBC	51	MCP synchronizing operation
25.	MCPA	52	CIC
26	Triple valve	53	Maintenance schedule/ EMU
27	‘’ W ‘’ switch	54	BA relay

MODEL QUESTIONS – EMU/MEMU

(10 marks questions)

1. Draw the power circuit of WAU4.
1. Draw the Auxiliary I circuit of WAU4 and explain the components.
2. Write the overhauling procedure of pantograph.
3. Draw the block diagram of pantograph .
4. What are the main parts provided in ABB and explain its use .
5. Draw the Pantograph/ ABB Circuit of WAU4.
6. Draw the motor contactor closing circuit.
7. Write about the Auxiliary Compressor, MCP and other four AC Motors.
8. Write about the functioning of EP unit with block diagram.
9. Write about the EP & AUTO brake system with block diagram.
10. How will you attend the EP and AUTO brake binding?
11. Write about the Unit Preparation.
12. What are the safety relays provided and explain its purpose.
13. Write about the Procedure of Traction Motor overhauling.
14. Explain the overhauling procedure of MCPA, MCP motors.
15. Explain the overhauling procedure of OP, RF, KF1 &KF2 motors.
16. Explain briefly the components provided in the Aux I & Aux II circuit with block diagram.
17. Explain the overhauling procedure of EMU bogie.
18. Explain the overhauling procedure of EMU transformer.
19. Explain the overhauling procedure brake controller.
20. Explain the overhauling procedure of EP unit.
21. Explain the overhauling procedure of main rectifier and ASR.
22. Explain the overhauling procedure ABB or VCB.
23. Explain the overhauling procedure of compartment fans.
24. Explain the overhauling procedure of Battery charger.
25. Explain the overhauling procedure of Battery.
26. Explain the trouble shooting for ICABB.
27. Explain the trouble shooting for pantograph not rising.
28. Explain the trouble shooting for motor contactor not closing.
29. Write about the check list when train is arriving to the destination and CAB changing procedure of EMU/MEMU.
30. Write about the check list electrical/mechanical equipments when cattle run over and train night stabling procedure of EMU/MEMU
31. What are the checks carried over during trip inspection?
32. What are the checks carried over during IA1 inspection?
33. What are the checks carried over during IA2 inspection?
34. What are the checks carried over during IA3 inspection?
35. What are the checks carried over during IC inspection?
36. Explain the periodical overhauling procedure of EMU-MC.
37. Explain the periodical overhauling procedure of EMU-TC.
38. Draw the Pneumatic pipe diagram of EMU and explain the function of EP unit..
39. Write the method of releasing of EP & Auto brake binding.
40. Draw the TC wheel set with measurement and axle box with components.
41. Write the Procedure when entering into the HT room and releasing method of mechanical brake binding.
43. What are the checks carried over during panto entanglement?

Match the following:

10 x1=10 Marks

Governor settings	Cut in	Cut out
MCP	6.0 kg / $cm^{2.}$	7.0 kg / $cm^{2.}$
MCPA	5.3 kg / $cm^{2.}$	6.3 kg / $cm^{2.}$
Control	3.5 kg / $cm^{2.}$	4.2 kg / $cm^{2.}$
Equipment	3.5 kg / $cm^{2.}$	4.2 kg / $cm^{2.}$
ABB	4.5 kg / $cm^{2.}$	5.3 kg / $cm^{2.}$

1.	HMV	A.	Pantograph
2.	NLVS	B.	Reverser
3.	EFRP	C.	Aux. Compressor
4.	6 – 7 kg / cm^2	D.	Auto brake
5.	Throttle valve	E.	Power circuit
6.	KF	F.	EP unit
7.	CC2 contactor	G.	110 V AC
8.	BP	H.	Pilot Valve
9.	DMH	I.	Radiator fan
10.	K	J.	MR pressure

1	Fans	A.	49 mm
2	NLVS	B.	Reverser
3	Brake block	C.	Main Compressor
4	6 – 7 kg / cm^2	D.	900 Amps
5	Throttle valve	E.	Pantograph
6	KF	F.	141v AC
7	CC1 contactor	G.	110 V AC
8	OL 1 to OL 4	H.	Pilot Valve
9	DMH	I.	Radiator fan
10	K	J.	MR pressure

1	Green	A.	75ºC
2	Dashpot	B.	Reverser
3	TTR	C.	HMV
4	Triple valve	D.	32 VAC
5	G352	E.	Coupler
6	DS-8	F.	BP pipe
7	37	G.	Bogie
8	HLVS	H.	WCA
9	Semi-permanent	I.	Stores
10	K	J.	Auto brake

1.	MCP	A.	OL 1to 4
2.	EFRA2	B.	0.7A

3.	Traction motor	C.	500 A
4.	900 A	D.	OVR
5.	OLP	E.	141 VAC
6.	CLR	F.	32 VAC
7.	540V	G.	CC2
8.	Fan	H.	EFRP
9.	HLVS	I.	110 VDC
10.	Aux compressor	J.	Aux circuit 2

1	AIC	A.	coupler
2	NLVS	B.	Reversor
3	Semi permanent	C.	Aux. Compressor
4	6 – 7 kg / cm^2	D.	900 Amps
5	Throttle valve	E.	MR pressure
6	KF	F.	BP pressure
7	CC2 contactor	G.	110 V AC
8	OL 1 to OL 4	H.	Pilot Valve
9	DMH	I.	Radiator fan
10	K	J.	Pantograph

1.	AMV	A.	Pantograph
2.	EML relay	B.	Reverser
3.	CC1 contactor	C.	Servo gem RR3
4.	6 – 7 kg / cm^2	D.	Auto brake
5.	Throttle valve	E.	MCP
6.	KF	F.	EP unit
7.	Axle box	G.	Aux II circuit
8.	BP pressure	H.	Pilot Valve
9.	DMH	I.	Radiator fan
10.	K	J.	MR pressure

1.	Aux motors	A.	1000KVA
2.	MCP	B.	540V
3.	Transformer	C.	Transformer oil
4.	OVR	D.	266VAC
5.	Tapchanger	E.	T7,T8,T9
6.	Aux supply rectifier	F.	Servo prime
7.	BIR	G.	13
8.	Transfer switches	H.	160A fuse
9.	Dash pot	I.	141VAC/110 VDC
10.	MCP Synchronise	J.	OL6

ABBREVATIONS AND LOCATIONS OF WAU4

S. No.	Abbreviations	Expansion	Location
1.	A	Traction Ammeter	Bottom of Gauge panel
2.	AB	Alarm bell	Below of signal bell Guard side
3.	ABB	Air blast circuit breaker	In Roof
4.	ABR	Air blast circuit relay	5th relay in relay panel (1st row)
5.	AIC	Auto isolating cock	Back side of BP CDC in U/F Dr side
6.	AF1, AF2	Auxiliary fuses	Back side of tap changer or TFR
7.	AMV	Application magnet valve	Inside of the EP unit
8.	AOVR	Auxiliary over voltage relay	Below OL2 in switch group I
9.	ARR	ABB reset relay	6th relay in relay panel (2nd row)
10.	AS	Ammeter shunt	Back side of M1(SG1)andM3 (SG2)
11.	ASS	Ammeter selector switch	Rt side of BL box in driver's desk
12.	ASL1&2	Additional smoothening reactor 1&2	In HT room,Opposit to Aux.comp(1) & BIR bud (2)
13.	ASR	Auxiliary supply rectifier	(7 th bridge) Rt side corner in Rect.Box
14.	BA	Battery	Guard side U/F-Rt of KF1
15.	(BA) V	Battery volt meter	CAB gauge panel
16.	(BA) A	Battery ammeter	Rt side of switch panel or below of relay panel.
17.	BA RELAY	Brake application relay	Above Dr lookout glass or in MLT room
18.	BC	Brake cylinders(1-8)	1&2 driver side and 3&4 guard side U/F 5&6 driver side and 7&8 guard side U/F
19.	BCFR	Battery charger failure relay	Inside of the BA charger
20.	BCH	Brake controller handle	Top of the Brake controller
21.	BCS	Battery charging socket	U/F Driver side near HLS
22.	BIC	Bogie isolating cock	Rt side of wheel No 2 Lt side of W.No5
23.	BIR	Bucholz indication relay	4 th relay in relay panel (1st row)
24.	BIS	Battery isolating switch	Below switch panel or Lt side of GS3
25.	BIV	Brake isolating valve	Rt side bottom of Br.Controller
26.	BP	Brake pipe	Under frame Dr side, green colour
27.	BRH	Brake release handle	Both side of under frame
28.	BUD	Bucholz device	Under conservator tank-Rt side
29.	CBAR	Current balancing auxiliary relay	3rd relay in relay panel (Ist row)
30.	CBR	Current balancing relay	In the Rectifier cubicle
31.	CC1 & CC2	Compressor contactor	CC1below lights contactor and CC2 is Below the fans contactor
32.	CG1 – CG4	CG1forMCP, and CG2 for Aux,compressor	1,3,4 in HT room and 2in under Dr desk
33.	CCOS	Control changeover switch	Switch panel, below the MCS2
34.	CIC	Compressor isolating cock	Lt side of wheel No8
35.	CLAR	Current limiting auxiliary relay	Middle portion of MLT panel
36.	CLR	Current limiting relay	CLR1 belowOL1.CLR2 below OL3
37.	CR	Compressor relay	10th relay in relay panel 2nd row)

38.	CT	Current transformer	HT room,Top of the 25KV bush
39.	DL	Dropping reactor	In choke box, backside of SGI
40.	DMH	Dead man's handle	Top of the master controller
41.	DMH COC	Dead man's handle COC	U/F-Dr side, backside of wheel No1
42.	EAS	Earthing switch	Back side of the ABB in roof
43.	EFRA II	Earth fault relay for auxiliary II circuit	Above OLP/EFRP
44.	EFRP	Earth fault relay for power circuit	Below the relay panel-Rt side to OLP
45.	EPIC	Electro-pneumatic isolating cock	Gd side U/frame-behind MR-CDC
46.	FC 1 & 2	Fan contactors 1 & 2	Above the CC2 contactor
47.	GS1 – GS4	Governor bye pass switches	MLT room-below HEFRP
48.	HEFRA II	Fault Switch for EFRA II	Dr back side-below relay panel
49.	HEFRP	Fault Switch for EFRP	MLT room-above Governor bye pass switches
50.	HLS	Hand lamp socket (5 Nos)	Dr desk,MLT&HT rooms, Dr&Gd side U/F (total 5)
51.	HLVS	Headlight voltage stabilizer	UnderDrdesk-Rtside of Cont,Governor
52.	HMV	Holding magnet valve	In side of the EP unit
53.	HOBA	Earthing switch of battery	Below relay panel Rt side of HEFRA2-
54.	K1 & K2	Reversors	K1 in Rt side Switch Group I& K2 in Rt side Switch GroupII
55.	KF1 & KF2	Radiator fan 1 & 2	Lt side of battery box(U/F-Gd side)
56.	LA	Lighting arrestor	On the roof Lt side of ABB
57.	LS 1&3	Limiting switches 1&3	In MCOS box
58.	LTR	Low tension proving relay	4^{th} relay in relay panel 2^{nd} row
59.	M1 – M4	Motor contactors	M1&M2 in SG1 & M3&M4 in SG2
60.	MCB	Miniature circuit breaker	(Dr desk & fuse panel)
61.	MCP	Main compressor	Rt side of Aux Reservoir-U/F-Dr side
62.	MCS1 & 2	Motor contactor switch	Switch panel-1 aboveTSS&2 above CCOS
63.	MCOS1-4	Motor cutout switches 1-4 negative side	In a box above ASL2(MCOS 1,2,4&3)
64.	MPT	Master controller	CAB-Rt side of Brake controller
65.	MR	Main reservoir	Rt side of wheel No 6 (back of axle 4)
66.	MR /R1 COC	Main reservoir COC	In HT room, before NRV
67.	MSTWL	Motor switch trip white light.	Dr desk. 5^{th} Indication lamp
68.	NLVS	Normal light voltage stabilizer	Back side of MLT panel
69.	NR1 & NR2	Notching relay 1 & 2	Lt side of M2 in SG 1
70.	NVR	No voltage relay	7^{th} relay in relay panel 2^{nd} row
71.	NLC	Normal lights contactor	Lt side of fan contactor
72.	OL1 – 4	Overload relay for traction motors 1 – 4	OL1&2 in SG1 & OL3&4 in SG 2
73.	OL5	Overload relay for rectifier	Lt side of Tap changer 2^{nd} portion-above OL6
74.	OL6	Overload relay for tap changer	Lt side of Tap changer 2^{nd} portion-below OL5

75.	OLP	Overload relay for transformer primary	Below the relay panel-Lt side to EFRP
76.	OP	Oil pump	U/F-behind the KF2
77.	OVR	Over voltage relay	Below OL4 inSG2
78.	PB	Parking brake	Bogie No 1&2 (switch in BL box) (bye pass switch in Dr desk) (PB provided in some MC only)
79.	PFD	Permanent field diverter	U/F-Lt side of SG2
80.	RF	Rectifier fan motor	Lt side corner in Rectifier cubicle
81.	RFAR	Rectifier fan auxiliary relay	1st relay in relay panel 1st row
82.	RFR	Rectifier fan airflow relay	Fixed in RF motor in Rectifier cubicle
83.	ROVR	Resistor for OVR	Below OL2 inSG1 (Rt side of AOVR)
84.	RTL	Resistor for TL	U/F-backside of the battery box
85.	S	Speedometer	Dr desk.
86.	SB	Signal bell	Dr desk and Guard side corner
87.	SBC	Static battery charger	MLT room
88.	SL	Smoothening reactor	U/F-In choke box
89.	SR	Starting relay	3rd relay in relay panel 2nd row
90.	SV1,2&3	Safety valves 1,2&3	SV1 is Ltside of CIC, SV2 is above Aux,compressor and SV3 fixed in intercooler
91.	T1 – T6	Tapping switches	U/F Dr side in Tap changer
92.	T7 – T9	Transfer switches	U/F Dr side in Tap changer
93.	TL	Tapping reactor	U/F-In choke box
94.	TSS	Test sequence switch	Switch panel-below MCS1
95.	TT	Transformer thermostat	In side of TFR tank
96.	TTR	Transformer thermostat relay	2nd relay in relay panel 1st row
97.	VCB	Vacuum circuit breaker	On the roof (ABB also)
98.	War-switch	Warning switch	16th switch in the BL box
99.	W-switch	Winding grouping switch	Lt side of Tap changer 1st portion
100.	WGR	Winding grouping relay	Rt side of T5 (corner of Tap changer 2nd portion)