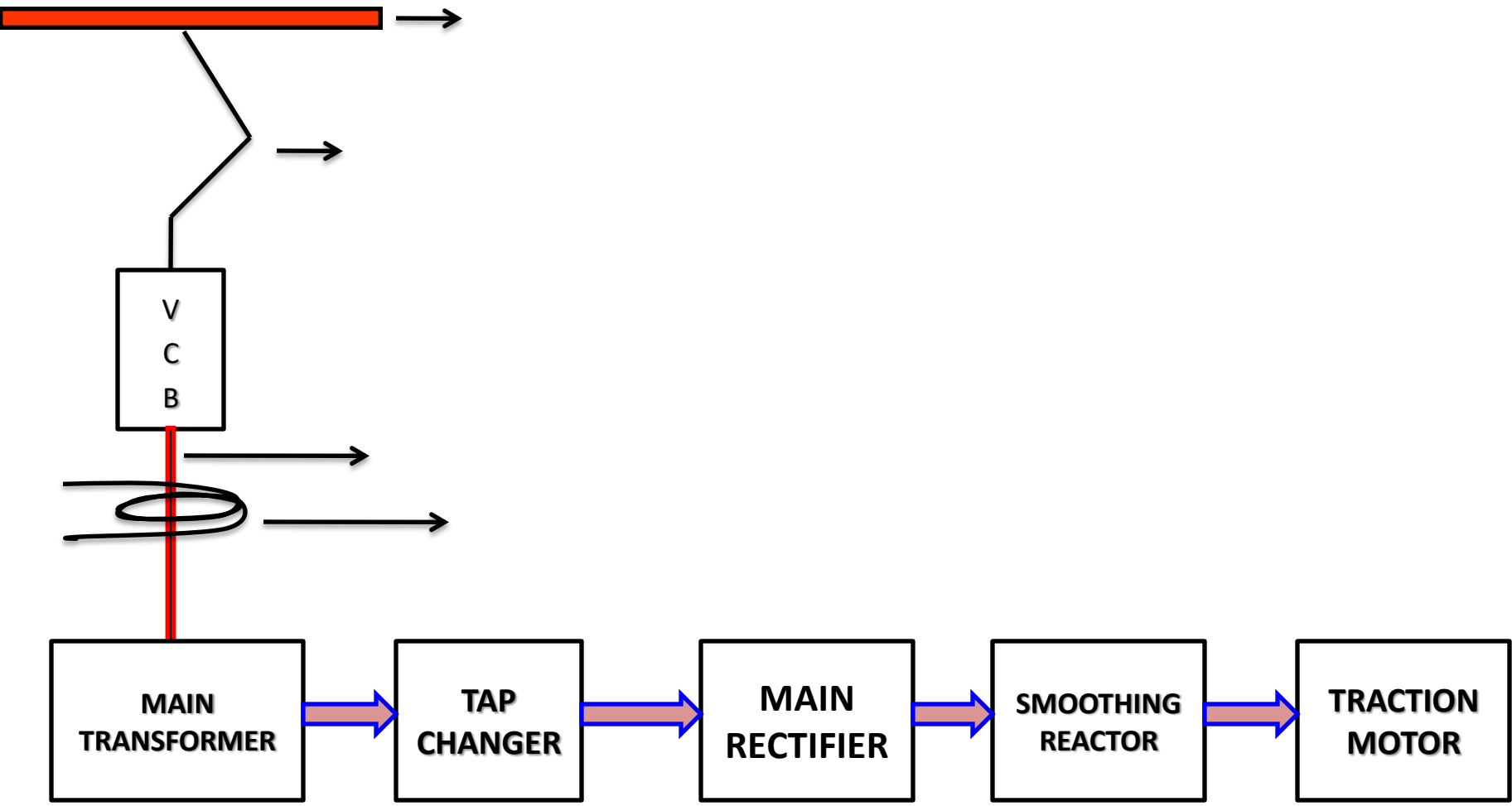
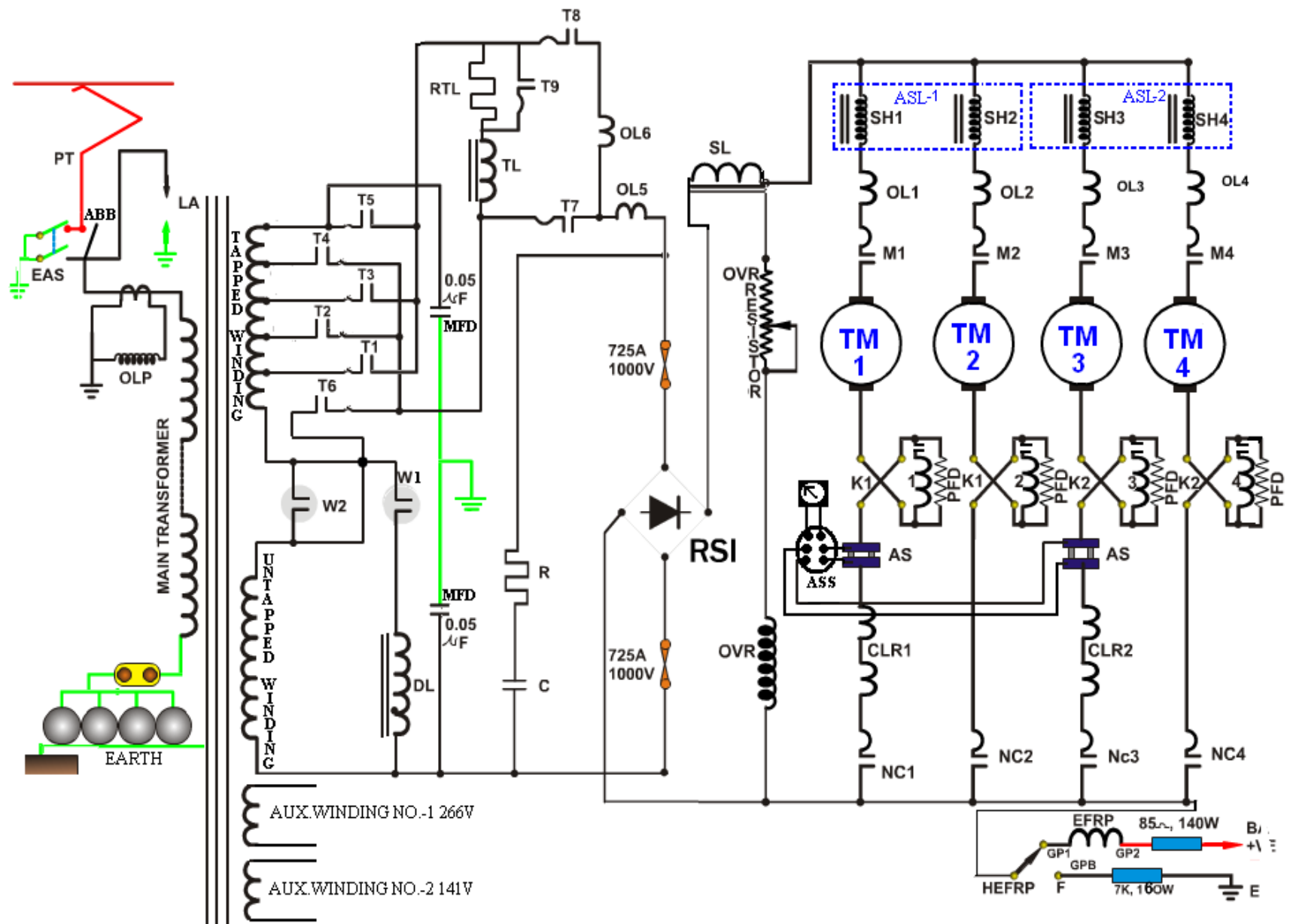


AC EMU/MEMU POWER CKT

N.D.Turkar/PL/IRIEEN/NK





TAP CHANGING SEQUENCE NOTCH	W1/W2	TAP CHNGING CONTACTORS	TRANSFER SWITCHES
OFF 0	W1	----	-----
SHUNT 1	W1	T1	T7 &T9
2	W1	T1	T8
HALF 3	W1	T2	T8 &T9
4	W1	T2	T7
5	W1	T3	T7 &T9
6	W1	T3	T8

TAP CHANGING SEQUENCE NOTCH	W1/W2	TAP CHNGING CONTACTORS	TRANSFER SWITCHES
7	W1	T4	T8 &T9
8	W1	T4	T7
9	W1	T5	T7 &T9
10	W1	T5	T8
11	W1	T6	T8 &T9
12	W1	T6	T7

TAP CHANGING SEQUENCE NOTCH	W1/W2	TAP CHNGING CONTACTORS	TRANSFER SWITCHES
Full power 13	W2	T1	T7 &T9
14	W2	T1	T8
15	W2	T2	T8 &T9
16	W2	T2	T7
17	W2	T3	T7 &T9
18	W2	T3	T8
19	W2	T4	T8 &T9
20	W2	T4	T7
21	W2	T5	T7 &T9
22	W2	T5	T8

Secondary winding

Across	Voltage	kVA
$a_3 - a_4$	78.2	100
$a_3 - a_5$	156.4	200
$a_3 - a_6$	234.6	300
$a_3 - a_7$	312.8	400
$a_3 - a_8$	391.0	500
$a_1 - a_2$	391.0	500
$a_1 - a_4$	469.2	600
$a_1 - a_5$	547.5	700
$a_1 - a_6$	625.6	800
$a_1 - a_7$	703.8	900
$a_1 - a_8$	782.0	1000

POWER CIRCUIT DESCRIPTION

1. Current at 25KV is taken from OHE to the primary winding of the main transformer via the pantograph, the vacuum circuit breaker and Ht cables which passes through the coach.
2. The return path of this current is via the earthing brushes mounted in the axle cap of each traction motors and the running rails.

POWER CIRCUIT DESCRIPTION

3. The transformer secondary consists of two separate tapped and untapped windings each of 391V. One half tapped winding is divided into five sections each 78.2V.
4. In the first half of the notching sequence, only the tapped portion of the winding is used, while for the remaining notches both tapped and untapped portions are connected in series.

POWER CIRCUIT DESCRIPTION

5. The changeover is effected by means of contacts W1 and W2 on the winding-grouping switch and are only operated off load.
6. This arrangement gives a total of 22 notches/voltage steps by various connections of transformer tapplings and voltage dropping reactors.

DROPPING REACTOR DL

- The reactor DL is connected in such a position in the circuit that for all notches when only the tapped half of the secondary winding is in circuit.
- it is in series with the output.

DROPPING REACTOR

The purpose of this reactor are

1. To steepen the notching curves on low taps
2. To reduce the notching current swing.
3. To increase the short-circuit reactance of the transformer in the low taps
4. To provide two extra notches 11 and 12.

POWER CIRCUIT DESCRIPTION

- The switching of the transformer sections are carried out by the tap changer contactors T1 to T9.
- Contactors T1 to T6 are connected to transformer tapplings and the required voltage is selected.
- Tapchanging is carried out by means of a reactor TL, in conjunction with the two reactors T7 and T8 to give alternate notches with and without the reactor in the circuit.

POWER CIRCUIT DESCRIPTION

- A resistor is also provided in series with the reactor but this is in circuit only during the actual tap-changing operation being immediately cut out of circuit when T9 closes.
- The purpose of this resistor is to ease the duty on the opening contactor by reducing the circulating current

POWER CIRCUIT DESCRIPTION

- Two capacitors of 0.05 microfarads are connected between the two secondary windings and earth to prevent the build up of high voltages to earth on the windings when they are not connected to the traction circuit earth.

POWER CIRCUIT DESCRIPTION

- This voltage which is controlled by the tap changer contactors, is applied to the silicon rectifiers, the full wave output of which is fed to the traction motors via the smoothing reactor.
- The motors are permanently connected in parallel are cooled with filtered air taken from the coach interior.

POWER CIRCUIT DESCRIPTION

- The silicon-rectifier assembly consists of six bridge circuits in parallel.
- Each bridge being protected on its AC side by fuses.
- A surge-absorbing capacitor and series resistor are connected across the AC input to the rectifier bridges.

POWER CIRCUIT DESCRIPTION

- The output from the rectifier assembly is taken through a smoothing reactor to the motor circuits.
- The four motors are arranged in parallel, and are connected in circuit as required by the four motor contactors M1 to M4.

POWER CIRCUIT DESCRIPTION

- Each motor is protected by an overload relay which trips the motor contactor in case of overload.
- The direction of rotation of the traction motor is reversed by reversing the connections to the motor field windings.

POWER CIRCUIT DESCRIPTION

- Motors 1 and 3 have current limit relays connected in their circuits to control the automatic acceleration of the train.
- The normal setting of the relay is 500 amp., which is reduced to 425 amps immediately before the transition from notch 10 to notch 11 and again before the weak field.

POWER CIRCUIT DESCRIPTION

- Operation of the motor cut-out switches (MCOS) allows the unit to operate with any one motor cut -out, or with a bogie pair of motors cut-out.
- In any motor cut-out condition the current-limit relay setting is reduced to 450 amp.

POWER CIRCUIT DESCRIPTION

- **An earth fault relay(EFR)** trips the air-blast circuit-breaker/VCB in the event of an earth fault occurring in any part of the motor circuit. The relay has a flag which leaves an indication that a trip has occurred.
- Protection against interruptions of line voltage is given by a no-volt relay(NVR) which opens the contactors in the traction circuit in the event of failure of line voltage

CHOKE TANK:

- The choke tank is mounted in under-gear of the motor coach. It consists of SL, DL & TL.

SMOOTHING REACTOR

- SL - Its function is to smooth the DC out put by eliminating the AC ripples.

DROPPING REACTOR

- DL- The dropping reactor is called DL. The reactor DL is connected in such a position that it is in series with the output of all notches when the tapped half of the secondary winding comes in the circuit. The purpose of the reactor is:
- To steepen the notching curves on low taps and thus to reduce the notching current swing.
- To increase the short circuit reactance in the low taps.
- To provide two extra notches i.e. 11th & 12th notch.

TAP CHANGER REACTOR

- TL – The tap changing reactor is switched into circuit during alternate electrical notches to give an intermediate increase in voltage to make notching and hence acceleration smoother.

Thanking You All

