CENTRAL RAILWAY

TROUBLE SHOOTING FLOW CHARTS

HHP & ALCO MEP-660 LOCOS

Issued by: PCEE/CR

For Loco Running Staff

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Introduction

Diesel Loco crew face many challenges while working trains. They have to maintain punctuality/timings as well as take the train safely to destination. Many-a-times locomotives develop faults leading to en-route detention and time loss. With various types of locomotives and myriad loco control systems with their associated fault codes, trouble shooting becomes difficult. This trouble shooting guide is an effort to present to the loco crew a flow-chart type guide wherein the crew can trouble shoot in a step-by-step manner common locomotive faults. Distinction between different types of loco controls and corresponding steps to be taken have been brought out.

A Team of Officers, Loco Inspectors and Shed Supervisors have renewed the information presented and the trouble shooting flow charts have been updated. Modifications, recent developments including MEP-660, MAS-696, CCB BRAKE SYSTEM, VCD/Alerter, APU etc. have been incorporated in this guide.

Technology can never substitute the skills, and feel of the Loco pilot and this guide is a step towards further honing these techniques. This trouble shooting guide will help the crew in carrying out their mission of safe and punctual haulage of trains and also pre-empt many on line loco failures.

CENTRAL RAILWAY
Chhatrapati Shivaji
Maharaj Terminus,
MUMBAI – 400 001.

Message

I am very glad to know that trouble shooting flow charts along with accompanying photographs have been prepared for use by Loco Pilots & Assistant Loco Pilots. These flow charts cover all important trouble shooting topics and would be useful for en-route trouble shooting of Diesel - Electric Locomotives .

Efforts of Officers and Loco Inspectors who have contributed towards successful completion of this guide are applaudable. I hope these flow charts will prove helpful for all Loco running Staff of the Indian Railways.

With best wishes.

Date: 16.08.2018

(D. K. SHARMA)
GENERAL MANAGER
CENTRAL RAILWAY

CENTRAL RAILWAY
Parcel Bldg, 2nd Floor,
Chhatrapati Shivaji
Maharaj Terminus,
MUMBAI – 400 001.

Message

I am extremely happy to learn that pictorial trouble shooting flow charts have been prepared for ALCO & HHP Diesel Electric Locos. Efforts made by all the Officers and Loco Inspectors towards the preparation of these trouble shooting flow charts are highly appreciable.

I am confident that these Flow charts will be very useful to the Running Staff in trouble shooting faults encountered on line.

With best wishes.

Date: 16.08.2018

(S. P. VAVRE)
PRINCIPAL CHIEF ELECTRICAL ENGINEER
CENTRAL RAILWAY

CENTRAL RAILWAY
Headquarters Office,
(Mechanical Branch)
CSMT,
MUMBAI – 400 001.

Preface

Trouble shooting flow charts of ALCO and HHP Locos have been prepared for Loco Pilots and Asstt. Loco Pilots. These flow charts cover frequently encountered troubles of these locos. Flow charts include locations of important components and devices along with there images, so that Loco pilots can trouble-shoot the faults with-in a short time.

Important new topics such as MEP 660 faults codes, CCB system, VCD, APU and DBV operation have been covered. I hope this guide will prove extremely beneficial for Loco Pilots and Asstt. Loco Pilots. Efforts of the Officers, Loco Inspectors and Supervisors who were involved in preparation of this book to complete it in a short period are highly admirable.

Date: 16.08.2018

(SANJEEV DESHPANDE)
CHIEF MOTIVE POWER ENGINEER(D)
CENTRAL RAILWAY

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HHP LOCO

TROUBLE SHOOTING FLOW CHARTS

1. ENGINE NOT CRANKING

Is fuel oil, Lube oil & water level adequate? — **No** → **Add fuel oil, Lube oil & water if inadequate.**

Yes

Is Battery knife switch is in open condition? — **Yes** → **Close the battery knife switch properly.**

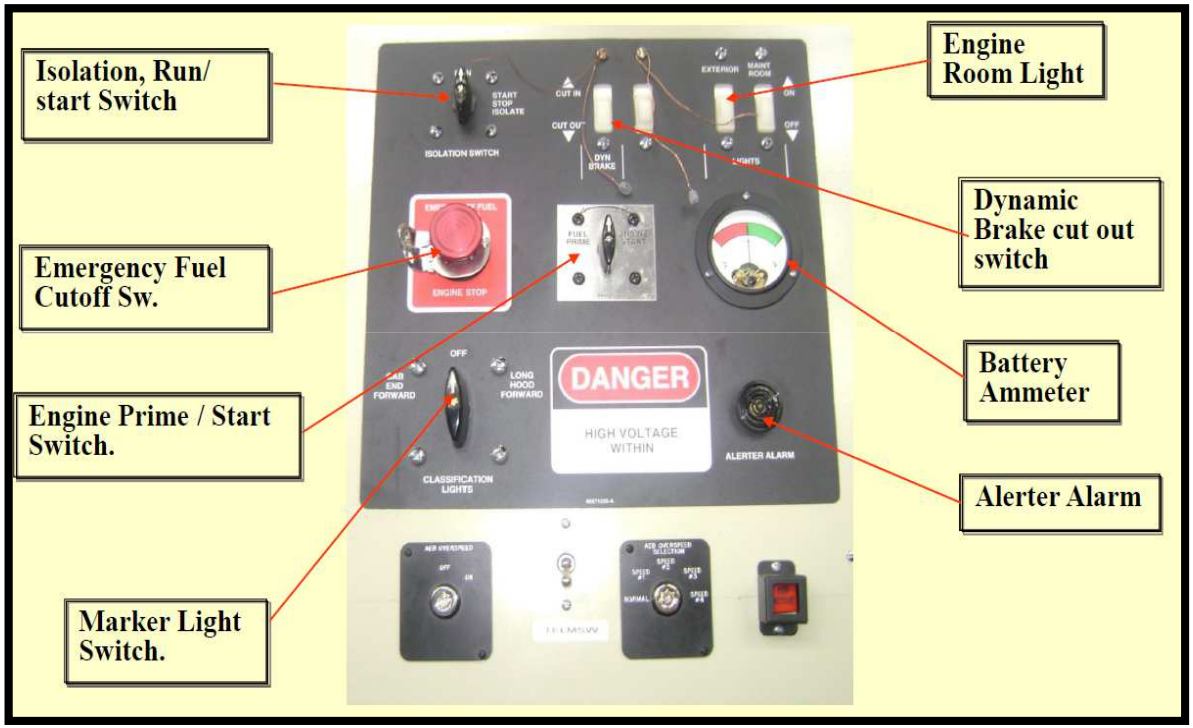
No

Is 800 Amps starting fuse in loose condition? — Yes → Tighten the 800 Amps starting fuse properly. If blown, replace it.

↓ No

Is isolation switch in START / STOP / ISOLATE position? — No → Keep it in START / STOP / ISOLATE position.

↓ Yes



Is EFCO button in locked condition? — Yes → Release it and ensure not operated.

↓ No

Is MUSD in 'RUN' position?

No

Keep it in 'RUN' position.

Yes

Is LLOB tripped condition?

Yes

Set it, after ensuring OSTA, EPD (LWP & CCP) are set.

No

Is control console secure?

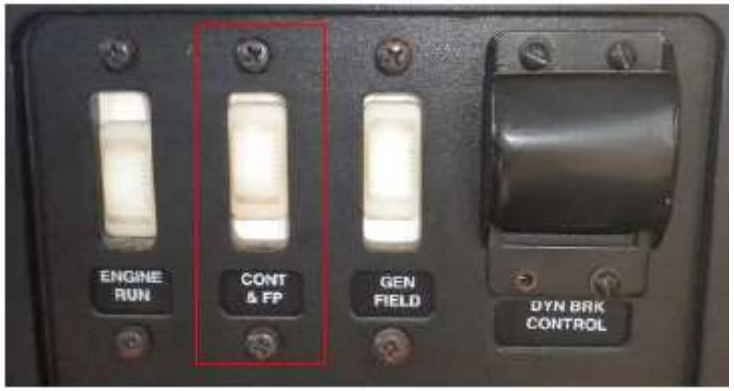
No

Secure control console.

Yes

Is control / FP slide switch in ‘OFF’ position? → Yes → Keep it in ‘ON’ position.

No



Is any Circuit breaker in ‘OFF’ / tripped condition ? → Yes → Keep it in ‘ON’ / Set position.

No

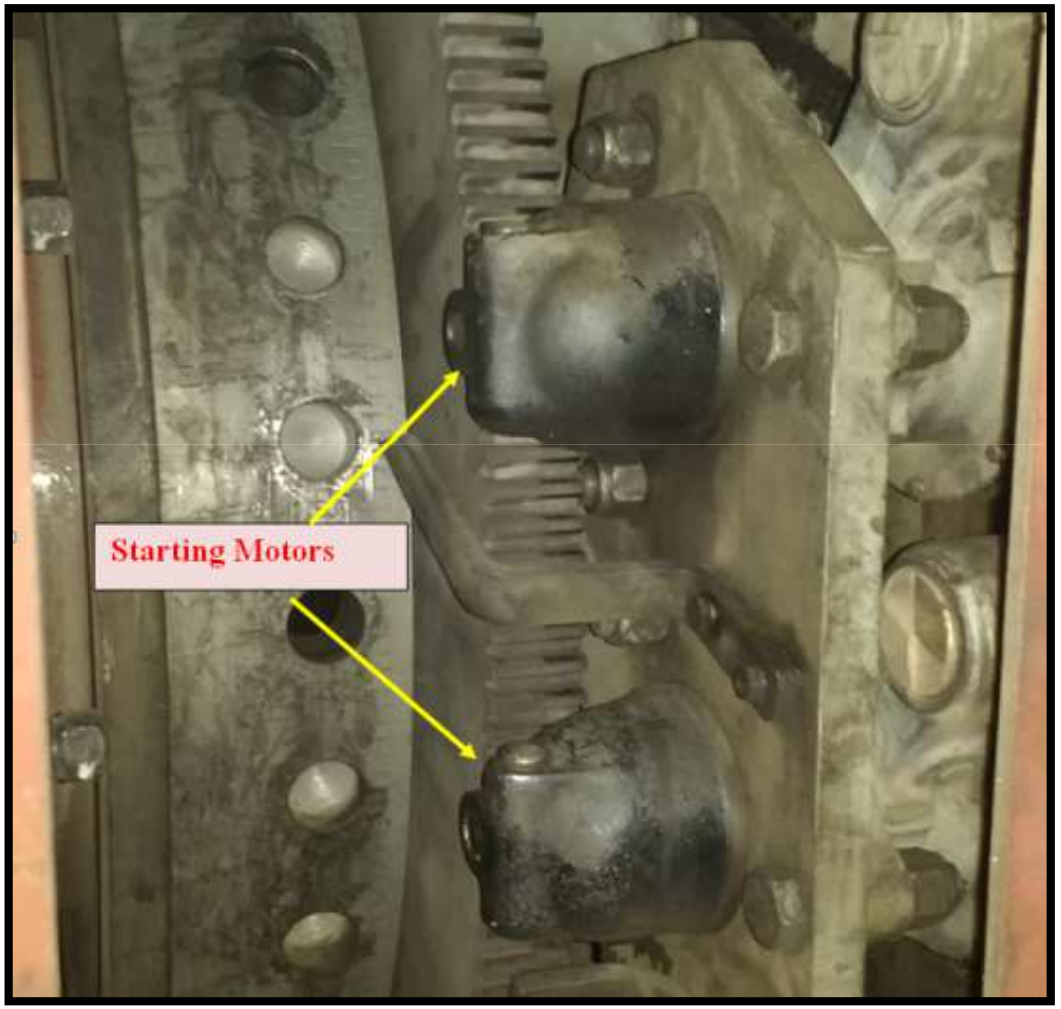
Is FPR relay pickup when Engine PRIME & START switch operated to PRIME side? → No → Operate FPR Emergency switch to ‘ON’ position (if provided). Inform LPC & Shed.

Yes

Is “Starter Motors are Abutment” message on display ?

Yes

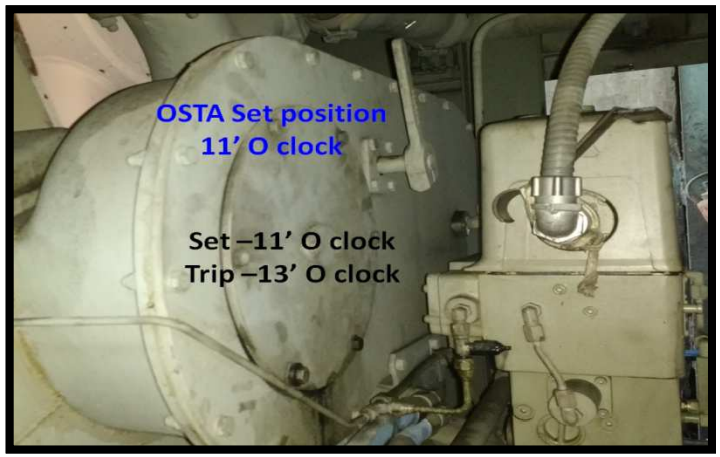
Rotate starting motor pinion gear manually 3-4 times and re-crank engine.



2. ENGINE CRANKING BUT NOT STARTING

Is OSTA in tripped condition (13 'O' Clock)? — Yes → **Reset the OSTA (Set 11 'O' Clock) & ensure LLOB in set position.**

No ↓

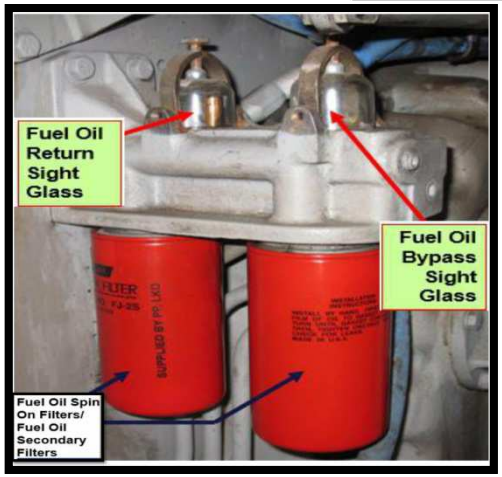


Is Fuel pump working? — No → **Trouble shoot accordingly.**

Yes ↓

Is Fuel oil showing in Bypass sight glass? **Yes** → It means spin on filter choked. Inform LPC.

No



Is fuel oil showing in return sight glass? **No** →

1) Ensure FPM is working.
2) Ensure primary filter vent & drain cocks are in closed position.
3) Check no leakages from suction strainer.
4) Inform LPC & Shed.

Is EPD in tripped condition?

Yes →

For LWP – Ensure adequate water level, check EPD test cock (water test cock) is in 6 'O' clock position , reset the LWP button along with LLOB, then re-crank.

No ↓

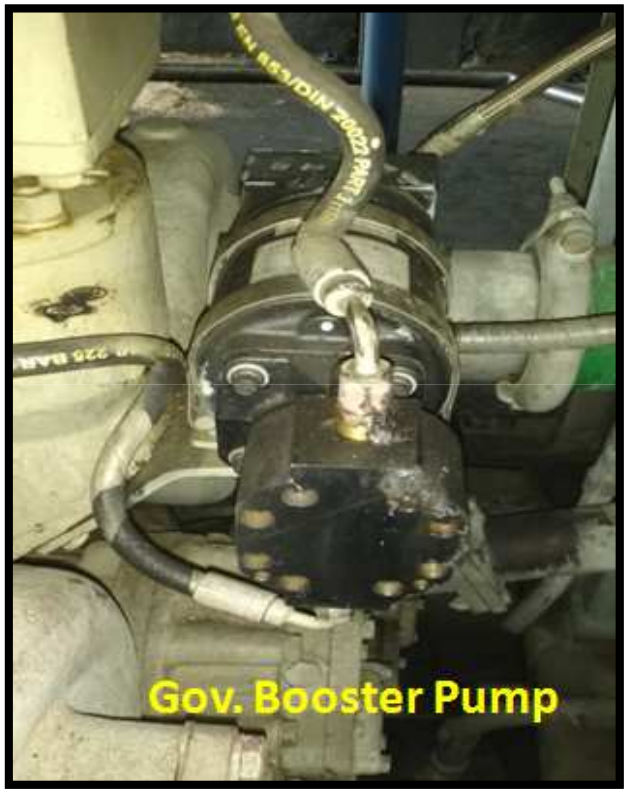
↓

For Crank case pressure – Do not reset Crank Case button & do not try to crank Engine. Inform LPC / Shed.

Is Governor booster pump working?

No

Check & ensure Gov. Booster Pump CB is in set position. . If tripping repeatedly then start the engine by pressing lay shaft gently.



Note: If the loco has been shut down for more than 48 hours, don't start the engine & contact LPC /Shed.

3. ENGINE SHUT DOWN AUTOMATICALLY

Is any circuit breaker in tripped condition (CB panel)? — Yes → **Reset the Circuit breaker.**

No ↓

Is MUSD in 'RUN' position? — No → **Keep MUSD in 'RUN' position.**

Yes ↓

Is Control & FP slide switch in 'OFF' condition? — Yes → **Switch 'ON' the Control, FP slide switch & ensure FPM is working.**

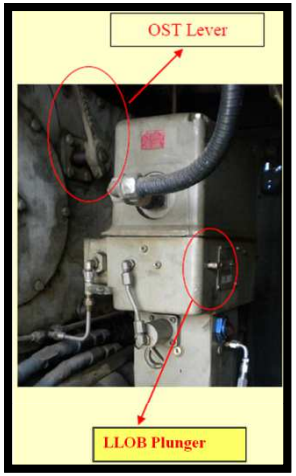
No ↓

Is EPD in tripped condition?

Yes → Set the water EPD after ensuring the adequate water level.

If crank case pressure EPD operated, don't start the engine. Inform LPC / Shed.

No



Is OSTA in tripped condition?

Yes → Reset the OSTA.

No

Is LLOB in tripped condition?

Yes → Reset the LLOB after ensuring adequate Lube oil, also ensure EPD, OSTA & water test cock is normal.

No

Still engine not cranking?

Yes → After checking all above items, disconnect Amphenol plug & try to re-crank the engine by pressing lay shaft, if not succeed inform to Shed.

4. LOCO NOT RESPONDING

Is Reverser handle in neutral Position? → Yes → Operate Reverser handle in desired direction.

↓ No

Is Isolation switch in 'Isolate' position? → Yes → Keep isolation switch 'RUN' position.

↓ No

Is BL key in 'OFF' condition in working cab of Dual cab loco? → Yes → Turn BL key 'ON' position in working cab.

↓ No

Is ER & GF slide switch and GFCB are ‘ON’ in working CAB?

No → Put ER & GF slide switch and GFCB to ‘ON’ in working Cab only .

YES

Is any circuit breaker in Tripped / OFF condition in ECC1?

Yes → If tripped, Reset it / keep in ‘ON’ condition (ECC1).

No ↓

Is any fault Message on Display?

Yes → Act accordingly.

No ↓

Is PCS knockout?

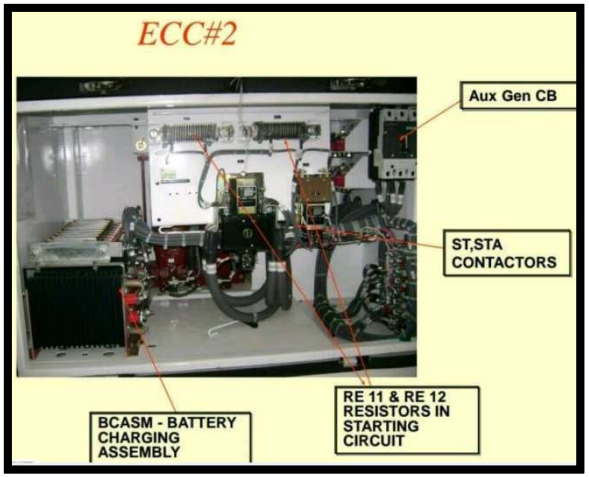
Yes → Recover the penalty as per display message.

No ↓

Is Aux Generator CB tripped in ECC1 & 2 and Message Displayed "No companion alternator output, no auxiliary generator output" ?

Yes → **Reset Aux Generator Circuit breakers in ECC1 & 2.**

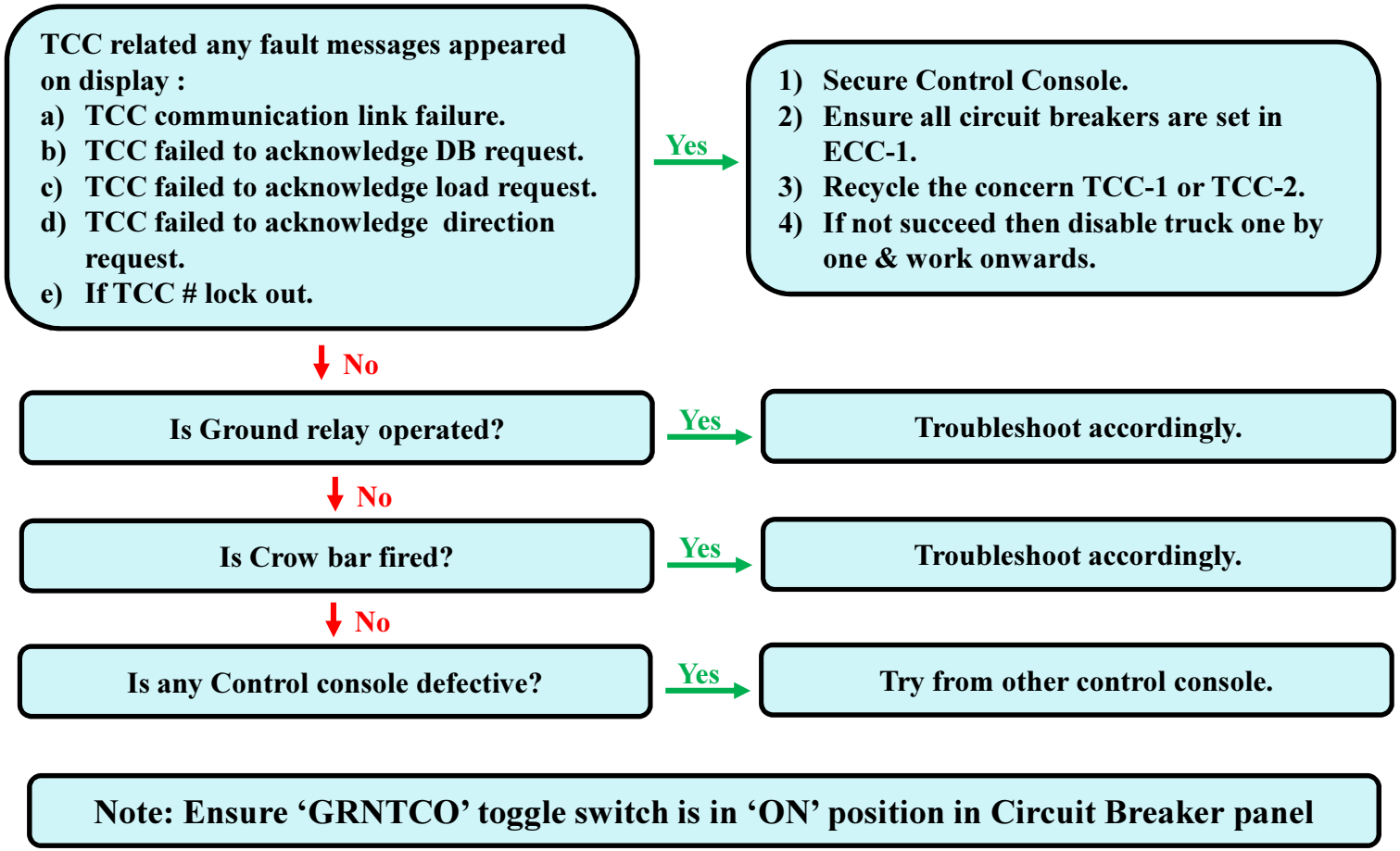
No ↓



Is Auxiliary Generator drive shaft broken ?

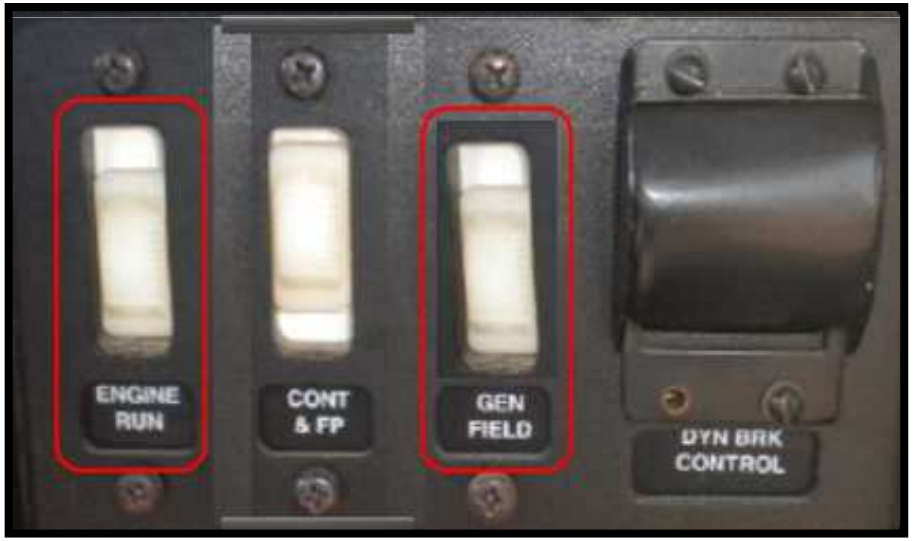
Yes → **Inform LPC & Shed.**

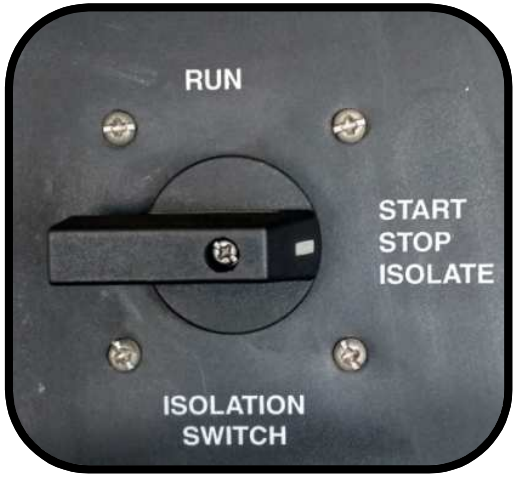
No ↓


TCC related any fault messages appeared on display :
a) TCC communication link failure.
b) TCC failed to acknowledge DB request.
c) TCC failed to acknowledge load request.
d) TCC failed to acknowledge direction request.
e) If TCC # lock out.
Yes
1) Secure Control Console.
2) Ensure all circuit breakers are set in ECC-1.
3) Recycle the concern TCC-1 or TCC-2.
4) If not succeed then disable truck one by one & work onwards.
No
Is Ground relay operated?
Yes
Troubleshoot accordingly.
No
Is Crow bar fired?
Yes
Troubleshoot accordingly.
No
Is any Control console defective?
Yes
Try from other control console.
Note: Ensure 'GRNTCO' toggle switch is in 'ON' position in Circuit Breaker panel

5. CONTROL CONSOLE SECURING PROCEDURE

1) Stop the train / loco.
2) Throttle – Idle.
3) Reverser Handle – Neutral.
4) ER & GF slide switch – off.
5) Isolation switch – Isolate.





6. CIRCUIT BREAKER RECYCLING PROCEDURE

1) Stop the train / loco.
2) Secure control console as per proper procedure.
3) Switch “OFF” computer circuit breaker.
4) Switch “OFF” concern circuit breaker.
5) Wait for 30 sec in single cab and 60 sec in dual cab.
6) Switch “ON” concern circuit breaker.
7) Switch “ON” computer circuit breaker.
8) Recover penalty as per computer message.

7. GROUND RELAY TRIPPING

Message "Ground Relay Power-Reset"

Yes →

1) Control Console secure.
2) Check Power circuit.
3) Acknowledge the fault.
4) Reset by F3 button.

↓

Tripping permitted to reset:
In EMD – 3 times in 10 minutes
In Medha – 3 times in 1 hour
If more than 3 times experience then

↓

Message "Ground Relay power-Locked out"

Yes →

Isolate truck one by one in EMD & Siemens Loco. Isolate TM one by one in Medha Loco

Note:

1) If grounding comes during dynamic then do not use DBR & put Dynamic slide switch (on ECP) to "CUTOUT" position.
2) After isolation of both truck still grounding fault comes it means problem in main alternator. Inform LPC / Shed.
3) After isolation of one truck, loco can be hauled 60% load & dynamic effect will get up to 60%.

8. TRUCK & TRACTION MOTOR ISOLATION

EMD locos:

1) **Stop train / loco**
2) **Secure control console(TH-Idle, Rev.-Neutral, ER & GF-off, Isolation switch – Isolate).**
3) **Press main menu key in display.**
4) **Select traction cut out by using up & down key**

Truck 1	Enable Traction
Truck 2	Enable Traction
	Disable
	F3

5) **Move cursor to the required truck (e.g. Truck-1) , press F3 to disable truck then display shows:**

Truck 1	Disable Traction
Truck 2	Enable Traction
	Enable
	F3

6) **If trouble rectified work onwards.**
7) **If not, enable truck 1 & disable truck 2.**
8) **If earth fault on both truck inform LPC & shed.**

TRUCK ISOLATION (SIEMENS)

Siemens Single cab:

1) Stop train / loco
2) Secure control console (TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch– Isolate).
3) On screen press 5 to select cut out & locked wheel.
4) Select truck by up & down key.
5) Press 'E' to disable selected truck.
6) Press ← key to exit.
7) Check responding with one truck and work onwards.
8) If not responding enable the previous truck and disable the other truck & try.
9) If not succeed, Inform LPC & shed.

Siemens Dual cab:

1) Stop train / loco
2) Secure control console(TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch–Isolate).
3) On screen press 5 to select cut out.
4) Select truck by up & down key.
5) Press 'E' to disable selected truck.
6) Press ← key to exit.
7) Again press 'E' to Ack.
8) Check responding with one truck and work onwards.
9) If not responding enable the previous truck and disable the other truck & try.
10) If not succeed, Inform LPC & shed.

TM ISOLATION (MEDHA SINGLE CAB)

Medha Single cab:

1) **Stop train / loco.**
2) **Secure control console(TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch–Isolate).**
3) **Press main menu on display.**
4) **Select TM cut out – display show status of 6 TMs.**
5) **Press change (F3) key.**
6) **TM NO. 1 will be selected as default (move the cursor to the TM to be cut out).**
7) **Press cut out (F3) key. Now display shows the condition to cut out a TM.**
8) **Full fill the conditions then press Enter (F3) key. Now display demands pass word.**
9) **Enter pass word (default – 12345) and press OK (F3) key. The TM will be cut out and display shows the current status of TM.**
10) **Now press Exit (F4) key to resume normal display.**

TM ISOLATION (MEDHA DUAL CAB)

Medha Dual Cab:

1) Stop train / loco.
2) Secure control console(TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch–Isolate).
3) Press 7 to select setting.
4) Press 1 to select TM cut out.
5) Press 1 to select change status.
6) Press up and down navigation key to select defective TM.
7) Press < > to change status & press Enter.
8) Full fill the condition as per display & press Enter.
9) Enter pass word and press Enter.
10) Display show updated TM status.
11) Press Exit key isolated TM nos. will be display in TM off indication in the main screen.

Note : In Medha base loco traction motor can be isolate from CB panel.

1) Stop train / loco.
2) Secure control console (TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch–Isolate).
3) Switch off the concerned TC, DCL & TCC Blower CKT BKR.

9. CROW BAR FIRED

Message " No Load- Communication failure, Crow Bar Fired-TCC1/TCC2" (EMD/Siemens Loco)

Message " No Load, Communication failure, Crow bar fired TC1, … TC6 (Medha Loco)

Yes → Recycle TCC1/ TCC2, If not success disable the truck one by one (In EMD/ Siemens Loco)

Yes → Shut down the engine & re-crank (Medha Loco)

10. COMMUNICATION LINK FAILURE

Message " No load, Communication link failure, (TCC/MAB/Event Recorder)

Yes → Recycle concerned TCC & AC GTO CB in GTO technology, TCC & IGBT CB in IGBT technology (EMD loco)

→ Recycle TCCPS & PS 5 Circuit breaker (Siemens loco)

→ Recycle concerned TC, DCL & TC Blower Circuit breaker (Medha Loco)

11. HOT ENGINE

Message "Hot engine throttle 6 limit"

Radiator Fans working

Radiator Fans not working

Yes

Switch OFF GFCB & GF slide switch and raise the engine up to 4th notch only to cool down. Open the compartment door.

Yes

Radiator fan Circuit breakers tripped in ECC 3

Yes

Reset the Radiator Fan Circuit Breakers in ECC 3

Note: Whenever hot engine experienced, ensure adequate water level in glow rod gauge.

Message " No load, Engine temperature feed back failure"

Yes

Engine temperature sensor ETP 1&2 defective

Yes

Check the sensors for uncoupling of plug, if uncoupled, try to reconnect. If both ETP becomes defective , locomotive will not respond. Inform LPC & Shed.

12. WATER COOLING TEMPERATURE CONTROL

MEDHA

TEMPERATURE	SYSTEM ACTION
> 85^0 C	Fans will be made ON
> 96^0 C	Power limited to 6th notch (RPM remains same)
> 101^0 C	Hot engine indication (RPM + power limited to 6th notch)
> 101^0 C For 5 min	Hot Engine – Extended Time 5 min. (Engine will come to IDLE)

EMD / SIEMENS

TEMPERATURE	SYSTEM ACTION
> 101^0 C	Power limited to 6th notch
> 112^0 C	Power reduce to 2nd notch

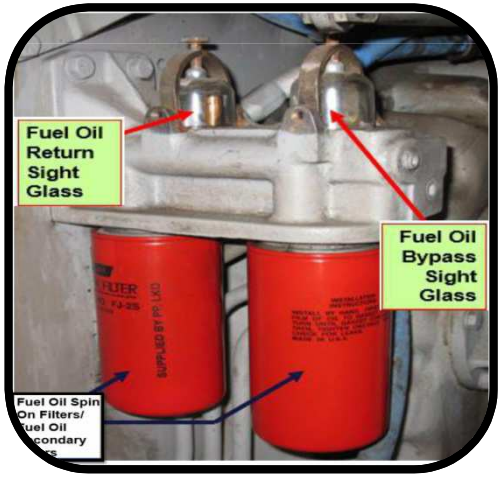
Note: If due to any reason loco shut down then loco will be re-crank after temperature comes below 95^0 C in Medha & below 100^0 C in EMD / Siemens loco.

13. POWER REDUCED TO 6TH NOTCH

Message "Reduce load throttle 6 limit, low fuel pressure into the engine"

Yes

Air bubbles in return sight glass or loose connection in Secondary filter & Suction strainer



Yes

Inform to LPC

Message " Reduce power, TCC over temperature"

Yes

TCC Blower Circuit breaker is tripped

Yes

Reset TCC blower circuit breaker

No

Disabled concerned TCC

Message " Reduce power, hot traction"

Yes

Traction motor temperature high

Yes

Put GFCB to OFF position & raise the engine speed up to 4th notch only & try to cool Traction Motor

14. SLIPPED PINION

↓

Message
“ Possible slipped pinion detected/ Voltage limiting in order to verify”

↓ Yes

Stop the train. Check the Traction Motor, Disable concerned truck/ Traction Motor, clear the section with restricted (not more than 15 Kmph) speed and inform LPC/Shed.

15. LOCKED WHEEL/SPEED SENSOR FAULTY

Message “No load- Locked wheel detected, check & verify whether locked wheel or sensor faulty”

Wheel locked

Yes

Do not move the Loco. Inform LPC and Home shed

Speed sensor faulty

Yes

Disable the speed sensor

PROCEDURE TO DISABLE THE SPEED SENSOR

EMD

Main MENU- Locked wheel- press F3 to select – press F1 to disable - Press F4 (To check status)- Exit

Medha loco

Cut out concerned TM by switching OFF TC, DCL & TCC blower CBs of concern TM

Siemens loco

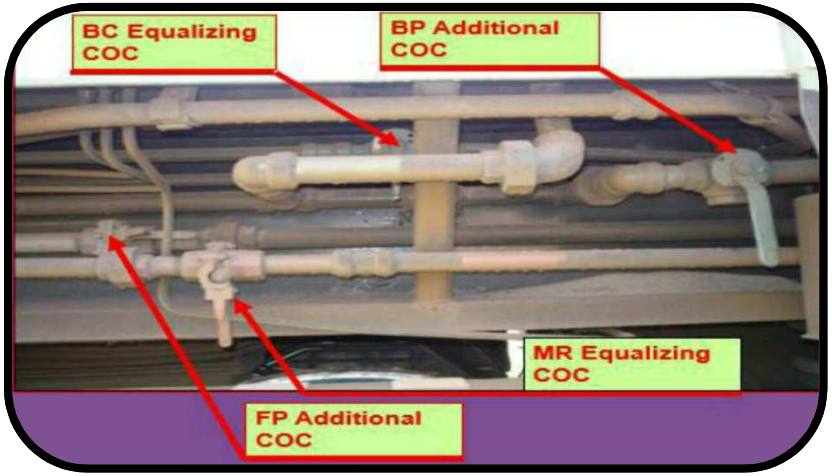
In Dual cab loco, Press 6 to lock wheel status – Select defective sensor by arrow key – Press E to disable – Press ‘0’ to go main menu. (In Siemens single cab loco 5 no. is combine option for TM cutout & lock wheel).

16. MR PRESSURE DROPPING

BP, FP ,MR , BC equalizing COC open in under truck?

Yes → Close the COC.

No



Air leakage from BP, FP,BC, Auto drain, Air dryer, Radar blow pipe, sanders, cooling coil?

Yes → Arrest the leakages.

No

Leakage in feed pipe? — Yes → Try to arrest. If not succeed, inform LPC and work the train with single pipe operation.

No ↓

Leakage in BC pipe? — Yes → Isolate the concerned bogie.

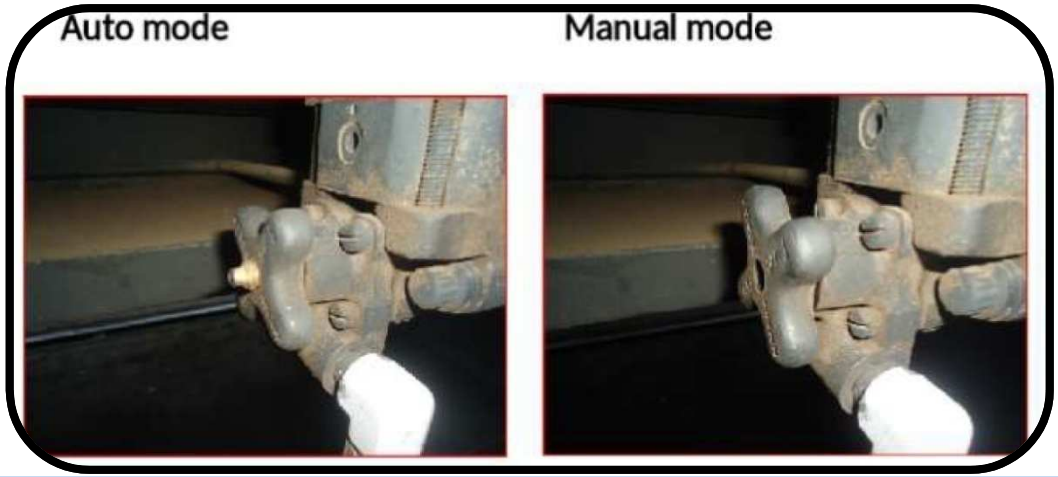
No ↓

Leakage in Air Dryer? — Yes → Isolate air dryer (if bypass cocks provided). Switch OFF Air dryer CB.

No ↓

Is ABD valve of MR1/ MR2 blowing? — Yes → Operate ABD to Manual position.

No ↓



Is there abnormal and unusual sound coming from compressor? — Yes → Inform LPC.

No ↓

Is Safety valve blowing continuously? — Yes → Tap it gently.

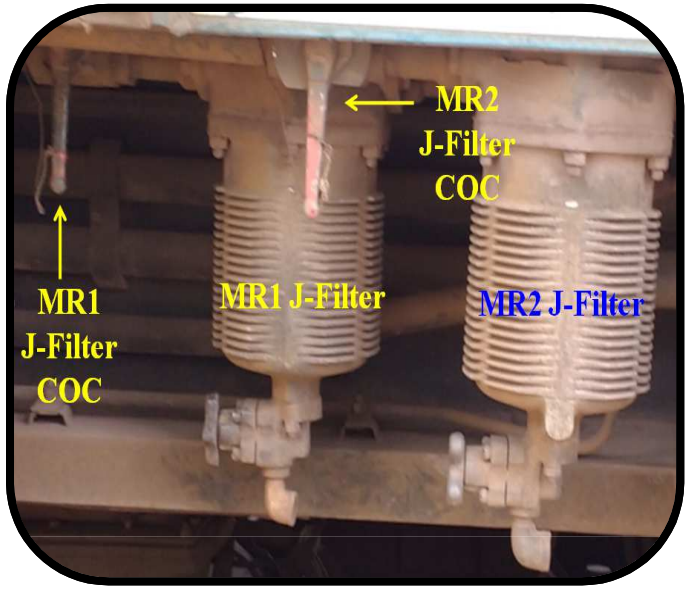
No ↓

Is there improper loading and unloading of compressor?

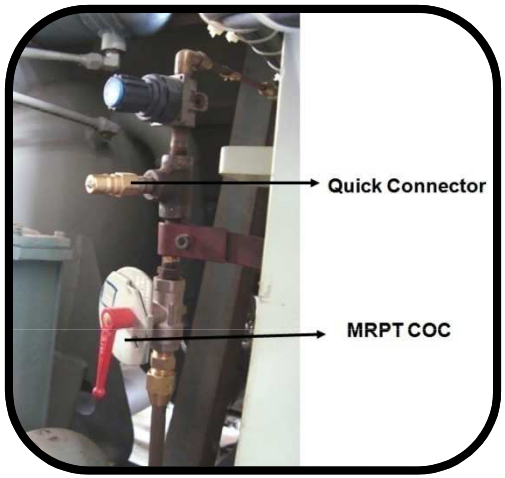
Yes

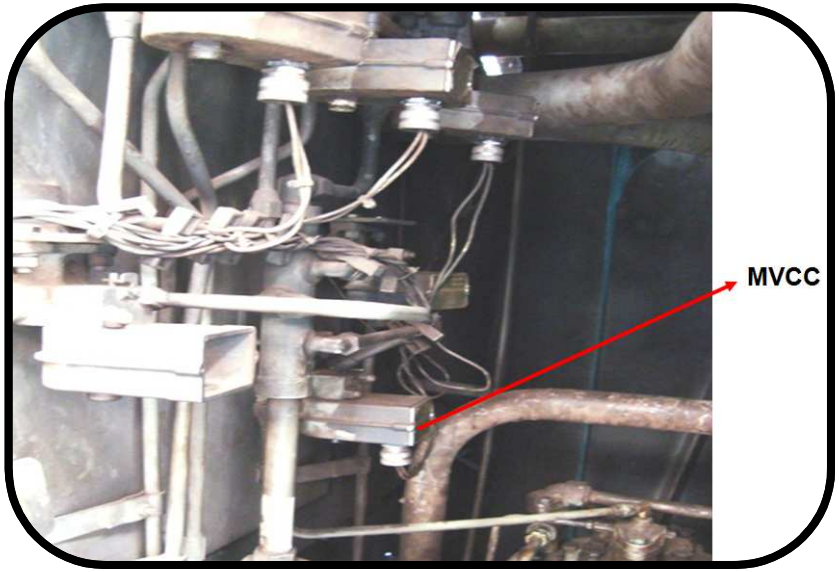
Close MR1 J filter COC and drain out the trapped moisture in MR1, when safety valve blowing reopen MR1 J filter COC.

No



Closed MRPT COC. Drained the trapped moisture from MRPT quick connector and reopen the COC.

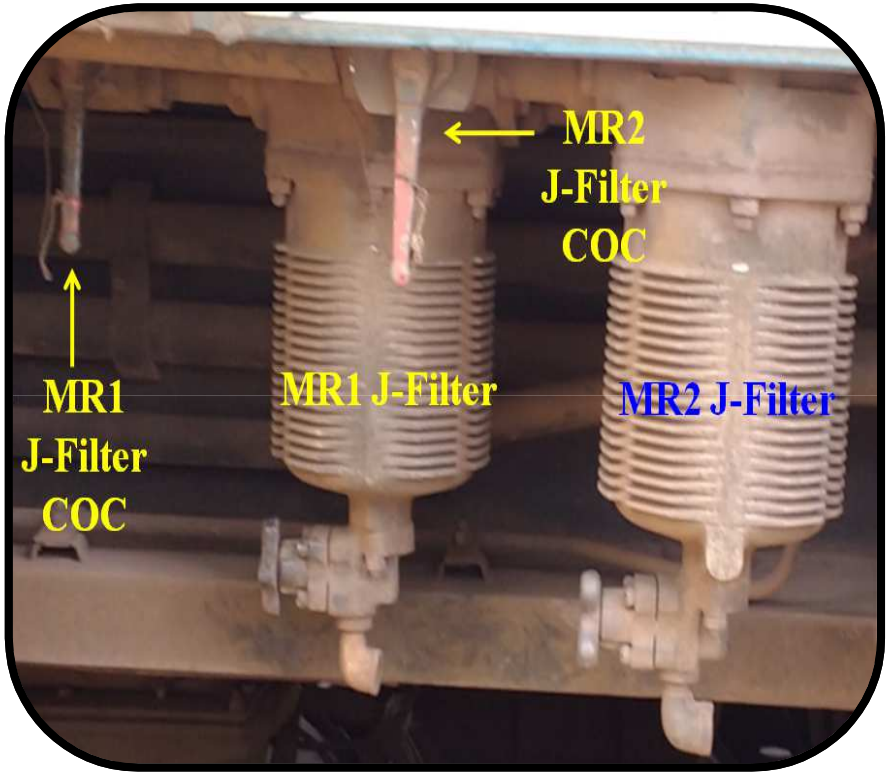




Press & release T handle of MVCC.

Sanders / Wipers working continuously? → Yes → Close MR1 J filter COC, drain out air pressure & reopen the COC.

No



If not success then re-cycle computer circuit breaker.

17. BP PRESSURE DROPPING

Leakages on Loco / Load? — Yes → Arrest the leakages.

No ↓

Leakage from control console? — Yes → Arrest the leakage.

No ↓

Is LT switch in 'LEAD' position in working Control Console ? — No → Keep LT switch to 'LEAD' position in working control console only.

Yes ↓

Is Auto handle stuck up in braking position? — Yes → Keep Auto brake handle to RUN position.

No ↓

Is Emergency Flap Valve in operated ?

Yes → Operate it to normal position.

No

Is PCS knockout?

Yes → Trouble shoot accordingly.

No

Still BP pressure dropping?

Yes → Recycle MAB Circuit breaker, if not succeed

↓

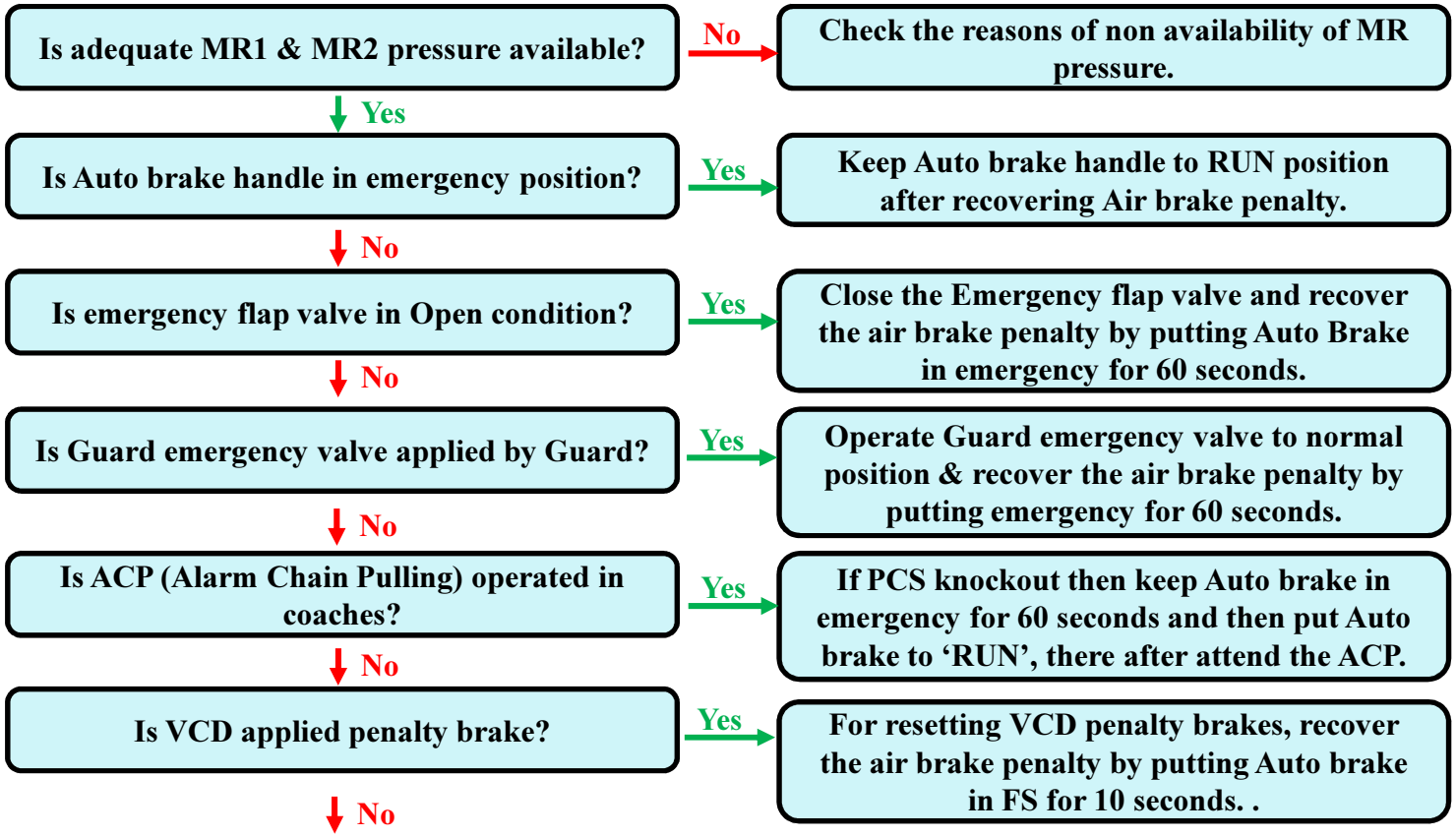
Conduct air brake self test

↓

Still not succeed contact to LPC & Home shed

18. PCS KNOCKOUT

Whenever BP pressure drops below 2.8 kg/cm^2 PCS will knockout.



Is wrong setup of LT switch? → Yes → Keep LT switch in LEAD position on working control console and TRAIL position on non working control console recover air brake penalty by putting Auto brake in FS for 10 seconds.

Note:

1) After recycling of computer circuit breaker PCS penalty should be recovered by putting Auto brake in FS for 10 seconds.

2) After conducting Air brake self test PCS penalty should be recovered by putting Auto brake in emergency for 60 seconds.

3) If PCS penalty not recovered by putting Auto brake in FS for 10 seconds then put Auto brake in emergency for 60 seconds.

4) If PCS not recovered by above mention procedure then:
   a) Change the control stand and try.
   b) Recycle MAB circuit breaker. If not succeed conduct Air brake self test.

5) In CCB-2 brake system, if PCS is not recovered then before conducting Air brake self test, put LT switch to Trail position, operate Auto brake to emergency position & apply direct brake to Full position. Wait for 10 seconds now put LT switch to Lead position & Auto brake in Run position to clear the fault.

19. AIR BRAKE SELF TEST

In following condition Air brake self test to be conducted.

1) **Whenever PCS open and unable to recover penalty by placing Auto brake handle in FS for 10 sec. / In Emergency for 60 sec.**
2) **PCS unable to recover after recycling MAB (Micro Air Brake Circuit breaker)**

Precautions before conducting Air brake self test:

- **Stop train / loco (speed should be zero).**
- **Applied Hand Brake and wooden wedges.**
- **If loco is attached with the train, then train should be secured.**
- **Built up MR pressure up to 8 to 10 kg/cm^2.**
- **Close BP, FP cut out angle cocks, MR & BC Eq. Cocks at both end of the loco.**
- **Secure control console.**

  TH-Idle, Rev.-Neutral, ER & GF–off, Isolation switch–Isolate.

  - **On working control console:**
    - **Keep Auto Brake Handle on RUN position.**
    - **Keep Direct Brake Handle on Release position.**
    - **LT switch in "LEAD" .**
  - **On non working control console:**
    - **Keep Auto Brake Handle on FS position.**
    - **Keep Direct Brake Handle in FULL position.**
    - **LT switch in "TRAIL".**

Note: In Dual cab loco BL key should be "ON" in working cab while conducting Air brake self test.

EMD SINGLE CAB LOCO

After ensuring precautions:

- **Press Main Menu key.**
- **Select Self Test by using ↑ ↓ key.**
- **Press F3 key to select (self test).**
- **Press F2 key to select next (to go on next page).**
- **Select Air Brake Test by using ↑ ↓ key.**
- **Press F3 key to select (Air Brake Test).**
- **Ensure AB self test condition & press F1 key to select CONTINUE (to start self test).**
- **Display shows "Air Brake test in progress".**
- **After 2-3 minutes display shows "Air Brake test has completed successfully, no defect found".**
- **Press F4 key to select End test (to exit self test).**
- **Recover Air Brake penalty by keeping Auto Brake in Emergency for 60 seconds.**

MEDHA SINGLE CAB LOCO

- After ensuring precautions
- Press Main Menu key.
- Select Self Test by using ↑ ↓ key.
- Press F3 key to select (self test).
- Enter the password 12345 (*****).
- Press F3 key to select OK (to submit the password).
- Select Auto Test by using ↑ ↓ key
- Press F3 key to select Auto Test.
- Select Air Brake Test by using ↑ ↓ key.
- Press F3 key to select (Air Brake Test).
- After ensuring AB test condition press F3 key to select ENTER.
- Press F3 key to select START TEST.
- Display shows “Air Brake test in progress”.
- After 2-3 minutes display shows “Air Brake test successful”.
- Press F4 key to select End test.
- Press F4 to select EXIT.
- Recover Air Brake penalty by keeping Auto Brake in Emergency for 60 seconds.

MEDHA DUAL CAB LOCO

- After ensuring precautions
- Press 1 no. Key to select Main Menu.
- Press 2 no. Key to select Self Test.
- Enter the password 12345 (*****).
- Press Enter key to continue
- Press 1 no. Key to select Auto Test.
- Press 1 no. Key to select Air Brake Test.
- Ensure Air Brake test entry conditions.
  - Notch must be in idle position.
  - Reverser Handle must be in centre position.
  - MAB circuit Breaker must be closed.
  - Control circuit Breaker must be closed.
  - Local control circuit Breaker must be closed.
  - Isolation / Run switch is in isolate position.
  - CCB status test mode data must be OK.
- Press 1 no. Key to select START TEST – display shows:
  - “Air Brake Test in progress”
  - “Air Brake Test Result”
  - “Air Brake Test successfully completed”.
- Press 2 no. Key to END TEST or press C key to Exit.
- Recover Air Brake penalty by keeping Auto Brake in Emergency for 60 seconds.

SIEMENS SINGLE CAB LOCO

After ensuring precautions

- **Press 7 no. Key to select System Function.**
- **Press 7 no. Key again to select Self Test.**
- **Move cursor on Air Brake Test by ↑ ↓ key.**
- **Press E key (to start test) – display will shows:**
  "Air Brake Test in progress"
  "Air Brake Test will complete within 140 to 180 seconds"
- **Recover Air brake penalty by keeping Auto Brake on emergency for 60 seconds.**

SIEMENS DUAL CAB LOCO

After ensuring precautions

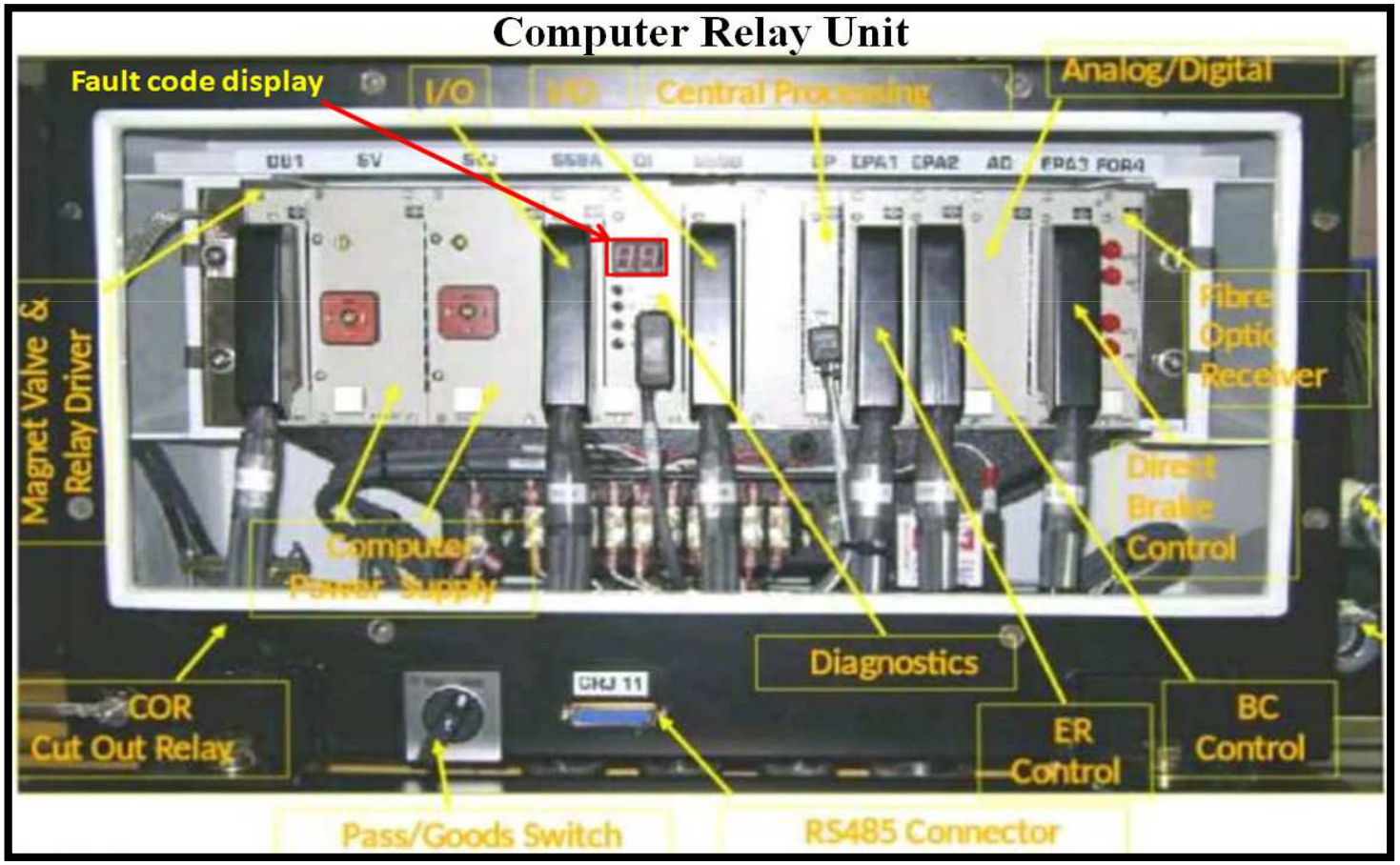
- **Press 1 no. Key to select Diagnostic Display.**
- **Press 1 no. Key to select System.**
- **Press 3 no. Key to select Self Test.**
- **Move cursor on Air Brake Test by ↑ ↓ key.**
- **Press E key (to start test) – display will shows:**
  "Air Brake Test in progress"
  "Air Brake Test will complete within 140 to 180 seconds"
  "Air Brake Test has completed successfully, No defect found".
- **Recover Air brake penalty by keeping Auto brake on emergency for 60 sec.**

Note:

- **If self test fails, then repeat the same procedure once again.**
- **If self test fails again then try by changing control console. If succeed then work from that control console. But if self test fails on another control console too, then informed to LPC and home shed with fault code which displayed on CCB.**
- **Shut down loco, drain out MR1, MR2, BP, FP pressure completely and re-crank loco.**

20. CCB-1.5 FAULT CODE

In CCB-1.5 brake system if any fault occurred, 2 digit fault code appears on computer relay unit of CCB panel.



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From first digit of fault code we can identify the location of fault.

1st Digit	Type of fault	Location of Problem
0	Software / CPZ / Communication	Computer & Communication problem
1	Software / CPZ / Communication	Air Brake self test.
2	Brake controller fault	Short hood brake control valve problem
3	Brake controller fault	Long hood brake control valve problem
4	Brake controller fault	LT switch problem
5	System fault	MR system problem
6	System fault	BP system problem
7	System fault	BCEQ system problem
8	System fault	BC system problem
9	System fault	ADZ card problem

Note

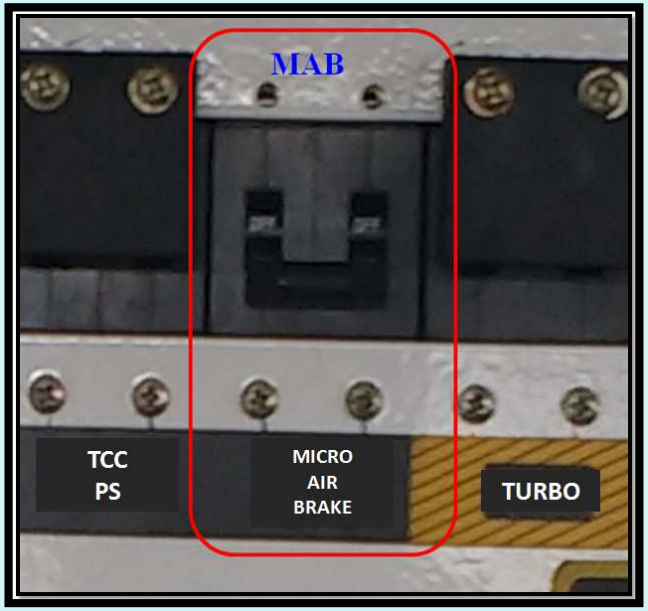
1) For fault code 05, 07 & 90 immediately contact to LPC / Shed & demand for assisting loco.
2) For brake controller faults do not conduct Air Brake Self Test.
3) For System faults, conduct Air Brake Self Test.

21. DRIVER'S BACK-UP VALVE (DBV) OPERATION

Driver's backup valve has been provided in CCB-2 system to develop BP pressure & work in case of CCB systems fails or PCS not recovered. By using PER (Pneumatic Equalizing Reservoir) operation train / loco can be work with DBV at a restricted speed of 10 kmph to clear the block section (if load & road permitted).

PER operation setup:

- **Stop the Loco / Train.**
- **If working a train, Close loco's BP angle cock of load / formation side.**
- **Open Micro Air Brake (MAB) circuit breaker. EBV display will be blank and MAB off message appears on computer display.**
- **Operate PER COS from vertical to horizontal (anti clock wise) position.**



- **Charge ER & BP by moving DBV handle towards position-II.**
- **If BP pressure is excess or less, adjust BP pressure to 5.2 kg/cm^2 by operating pressure regulating knob (Anti clock wise to increase BP & clock wise to reduced BP).**
- **Once BP charged to 5.2 kg/cm^2 move DBV handle towards position-III which is LAP position.**
- **For dropping BP, move DBV handle slowly towards application position-V and ensure BP pressure is dropping.**
- **Keep DBV handle to position-III.**
- **Open locos BP angle cock of load/formation side & charge the train with 5.2 kg/cm^2.**
- **Work cautiously with restricted speed (not more than 10 km/hr) to clear the block section.**

Note:

1) **Before starting the train ensure application & releasing of BC pressure by operating DBV.**
2) **If Loco brakes are not release then press test point of 16 CP & 20 CP & operate releasing spindle of KE valve.**
3) **In PER operation Independent Loco Brakes not available. Only Conjunction Brakes available.**

22. VCD / ALERTER

VCD is monitoring the alertness of the Loco Pilot by checking the movement of the following for every 60 seconds:

1) **Increase / Decrease Throttle Handle position.**
2) **Application / release of Dynamic brakes.**
3) **Auto Brake operation.**
4) **Direct Brake operation.**
5) **Bail off operation on working control console**
6) **Horn push button operation.**
7) **Manual sanding button operation.**
8) **VCD reset button operation.**

- **If the status of any one mentioned above is not changed within 60 seconds, VCD lamp will glow for 8 seconds. During this time Loco Pilot has to do the any one of above actions.**

- **If the Loco Pilot failed to operate any one of the above action, Buzzer sounds along with VCD lamp for 8 sec. During this time Loco Pilot has to operate VCD reset button.**

- **If Loco Pilot failed to operate VCD reset button, VCD applies penalty brake(60+8+8 seconds)**

VCD applies penalty brake(60+8+8 seconds) with following indications:

1) **Message in display.**
2) **VCD light glows for 35 seconds.**
3) **Buzzer stops sounding.**
4) **TE meter drops to zero.**
5) **ER and BP drops to 3.6 kg/cm²in CCB 2 system (ER & BP drops to 0 in CCB 1.5 system).**
6) **Loco/Load brakes are applied.**

Resetting procedure of VCD penalty brake:

1) **Bring the throttle to Idle.**
2) **Loco speed Zero.**
3) **Reverser should be in desired direction.**
4) **VCD lamp to glows "OFF"**
5) **Loco Pilot has to keep Auto brake handle in FS for 10 sec.**
   (CCB sends a reset message to computer and VCD gets reset.)
6) **Bring Auto brake handle to RUN position.**
7) **After BP comes to 5.2 kg/cm2, check responding & work train.**

Note:

1) **VCD should be reset from Loco Pilot side only.**
2) **VCD will not function if :**
   a) BC pressure is above 2.1 kg/cm2.
   b) Both control console LT switch is in "Trail" position.

23. CAB CHANGING PROCEDURE (WDP4D & WDG4D)

To making working Cab in to Non working

1) **Stop Loco by applied Direct brake to full position, ensure 5.2 kg/cm² pressure shows in BC gauge.**
2) **Keep Throttle – Idle , Reverser - Neutral.**
3) **Remove Reverser handle .**
4) **Keep Auto brakes to 'FS' position (Ensure ER/BP pressure shows 3.4 kg/cm²).**
5) **Operate LT switch to "TRAIL" position.**
6) **Switch 'OFF' GFCB in ECC1/ECC4.**
7) **Remove BL key from 'ON' to 'OFF'.**
8) **Switch 'OFF' ER, CONTROL /FP & GF Slide switch.**

To making Non working Cab into working

1) **Insert BL key in 'OFF' & operate to 'ON' position.**
2) **On control console Switch 'ON' ER. CONTROL/FP & GF slide switch.**
3) **Apply direct brake to full position.**
4) **Keep Auto brake to 'Run' position and Turn LT switch to "LEAD" position. Ensure 5.2 kg/cm² pressure shows in BC & BP gauge.**
5) **Switch 'ON' GFCB in ECC1/ECC4.**
6) **Insert Reverser Handle.**
7) **Check responding from working cab.**

Note : In SIEMENS LOCO keep ER, CONTROL /FP slide switch to 'ON' position in non working cab.

24. MULTIPLE UNIT (MU) SET UP

LEADING LOCO		
	Working cab (outer)	Non working cab (Inner)
Auto brake	Run	FS
Direct brake	Full	Full
LT switch	Lead	Trail
BL key	On	Off
ER slide switch	On	Off
CONTROL & FP slide switch	On	Off
GF slide switch	On	Off
GFCB	On	Off
Isolation switch	Run	Run

TRAILING LOCO		
	Non working cab (inner)	Non working cab (outer)
Auto brake	FS	FS
Direct brake	Full	Full
LT switch	Trail	Trail
BL key	Off	On
ER slide switch	Off	On
CONTROL & FP slide switch	Off	On
GF slide switch	Off	On
GFCB	Off	On
Isolation switch	Run	Run

Note :

1) Siemens Loco ER, CONTROL & FP slide switch to be kept “ON” position in all cab.
2) After cab changing check & ensure both locos are responding.

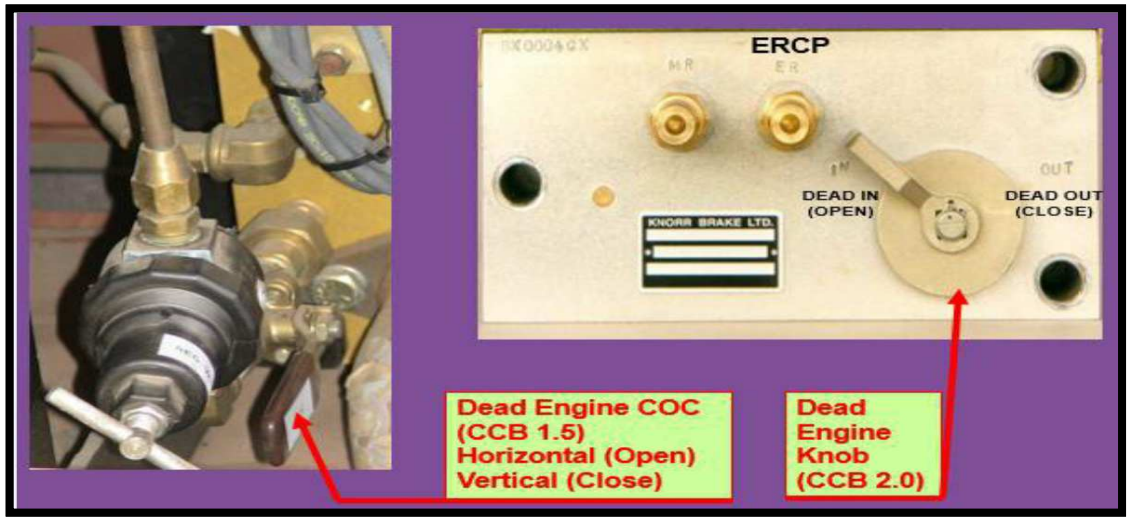
25. DEAD LOCO MOVEMENT

When MR & BC EQ pipe not available:

1) **First attach the working locomotive to the loco to be moved as dead and ensure CBC is properly locked.**
2) **Put OFF all circuit breakers. Drain MR1 & MR2 completely.**
3) **Keep Throttle - IDLE, Reverser - Neutral, & LT switch to Trail position.**
4) **Connect both locos BP pipe & open BP angle cock.**
5) **Open Dead engine cock on dead loco which is provided in CCB panel.**
6) **Open MR Eq. & BC Eq. COC at one end in dead loco (to avoid pressure trapping & quick releasing of brake cylinder pressure).**
7) **MR 2 in dead loco will slowly charge from leading loco BP up to 1.8 kg/cm2**

Note:

1) **Ensure application & releasing of brakes on dead loco in conjunction working.**
2) **When MR & BC equalizing pipes are available, then do not operate Dead engine cock. Connect MR & BC Eq. & BP pipes between both locos & open COCs.**



26. BANKER LOCO OPERATION

1) Couple up banker loco with load & ensure CBC is properly lock.
2) Apply loco brakes.
3) Connect BP pipe between loco & load.
4) Put LT switch to Helper mode.
5) Put Auto brakes to FS position.
6) Open BP angle cock.
7) Check loco responding and releasing & application of brakes.
8) Acknowledge VCD alerter as per procedure.

Note:

1) If VCD operated,
   a) stop the loco wait for VCD lamp extinguish.
   b) Put LT switch to LEAD position.
   c) Recover penalty by putting Auto brakes to FS for 10 seconds.
   d) Again put LT to HLPR mode and work onwards.

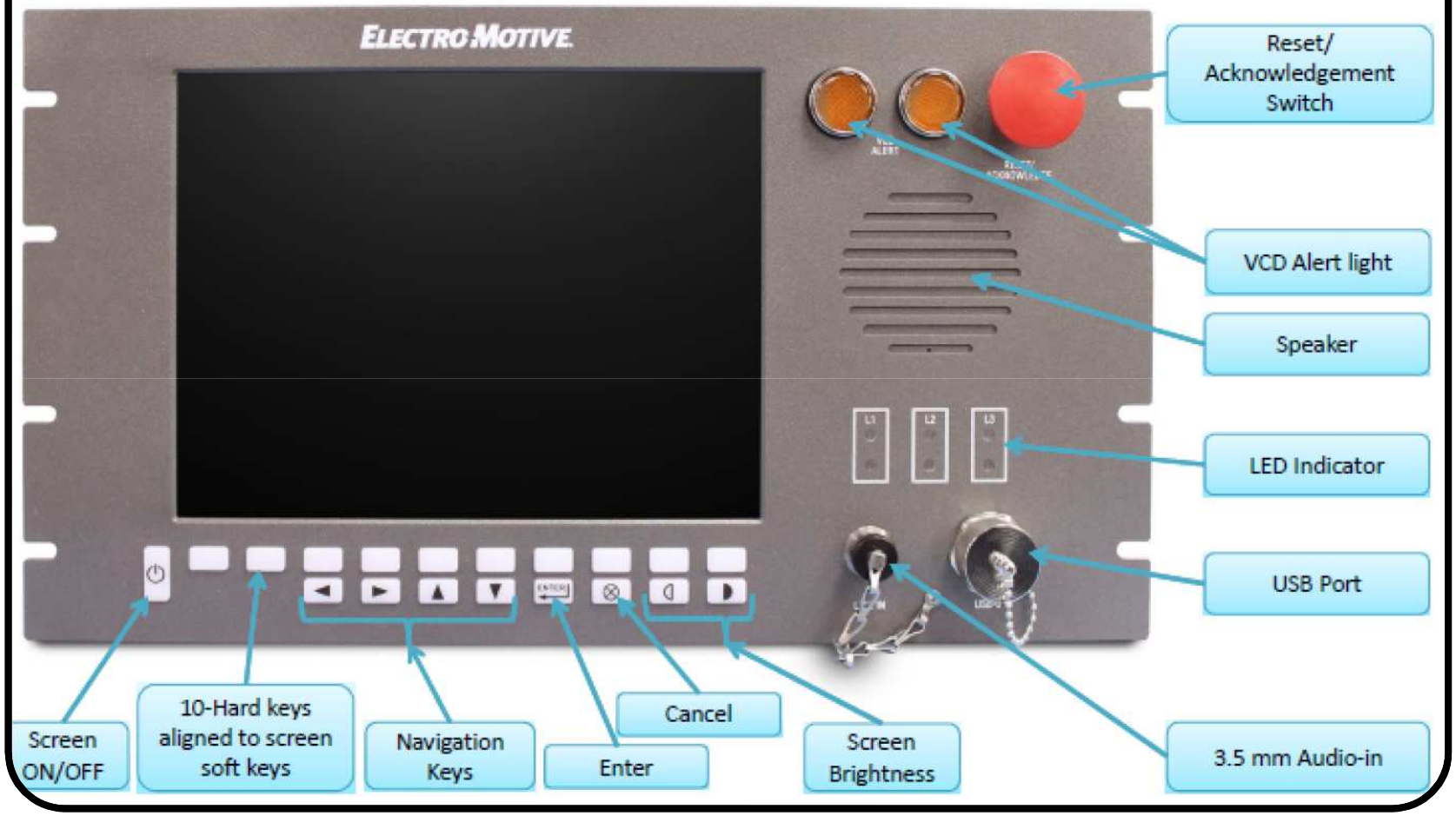
2) Do not change any setting in banker loco control stand if Auto brake handle of banker loco left in RUN position then while moving the loco PCS will knockout when speed reaches 3 kmph. To recover PCS penalty, stop the loco, bring throttle to IDLE, place Auto handle in FS for 10 seconds.

27. EMD DUAL CAB LOCO

Salient Features:

1) **It has 3 DIALS Display on Loco Pilot control console in each cab.**
2) **Combine & Primary display mode can be selected from left side monitor.**
3) **Combine & Secondary display mode can be selected from middle monitor.**
4) **ALP side monitor set for conductor display mode.**
5) **Power supply unit for DIALS display is controlled by PSU circuit breaker. Whenever, DIALS screen shows blank check PSU circuit breaker & conduct re-cycling of PSU circuit breaker.**
6) **MR-2, Air Flow Indictor, & FP pressure feedbacks are visible in DIALS screen (presently sensors not connected).**
7) **Engine starting system includes priming & starting system. So only "Engine Start" push button switch is provided for Engine starting purpose.**

DDHU (DIALS) SCREEN

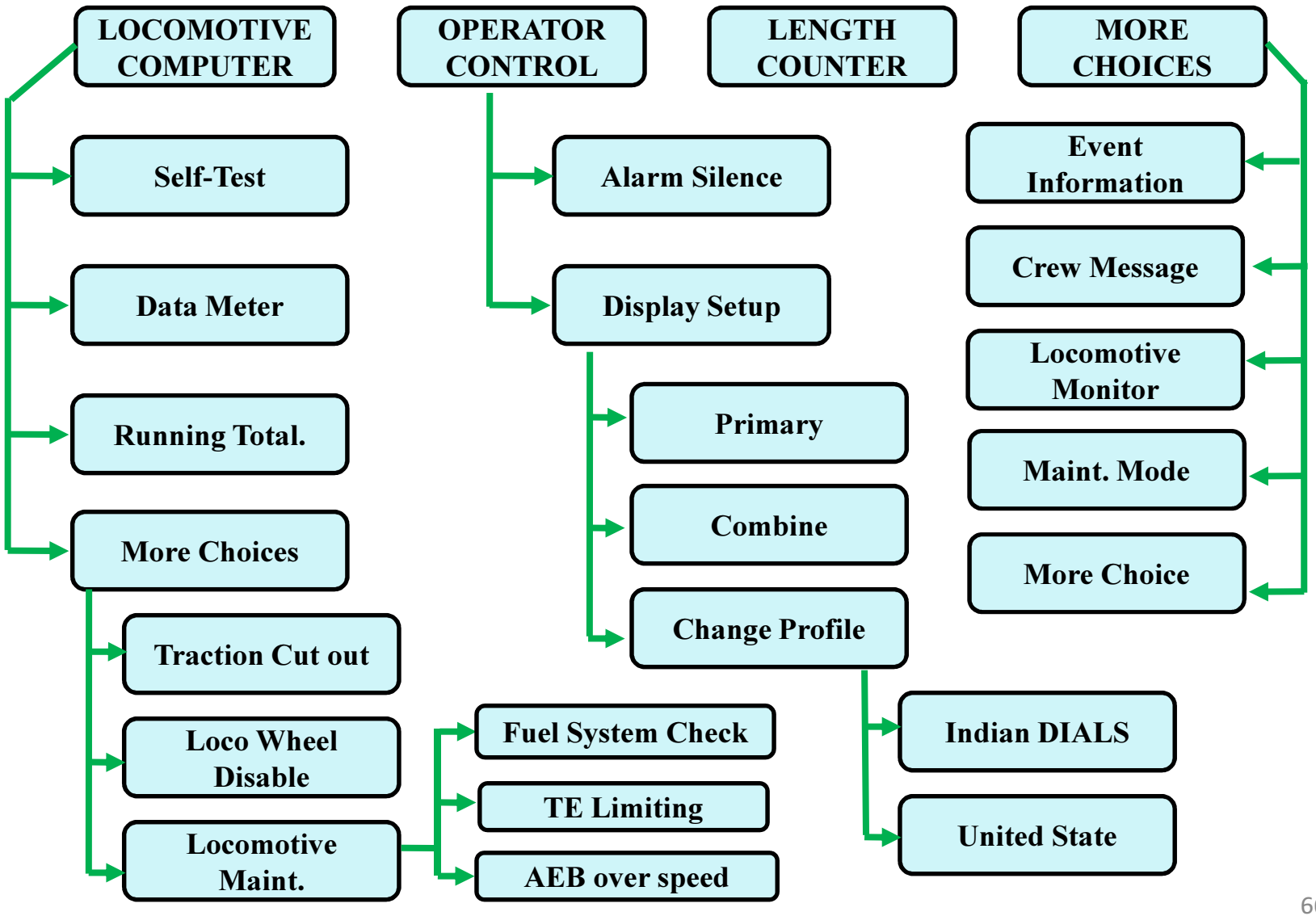


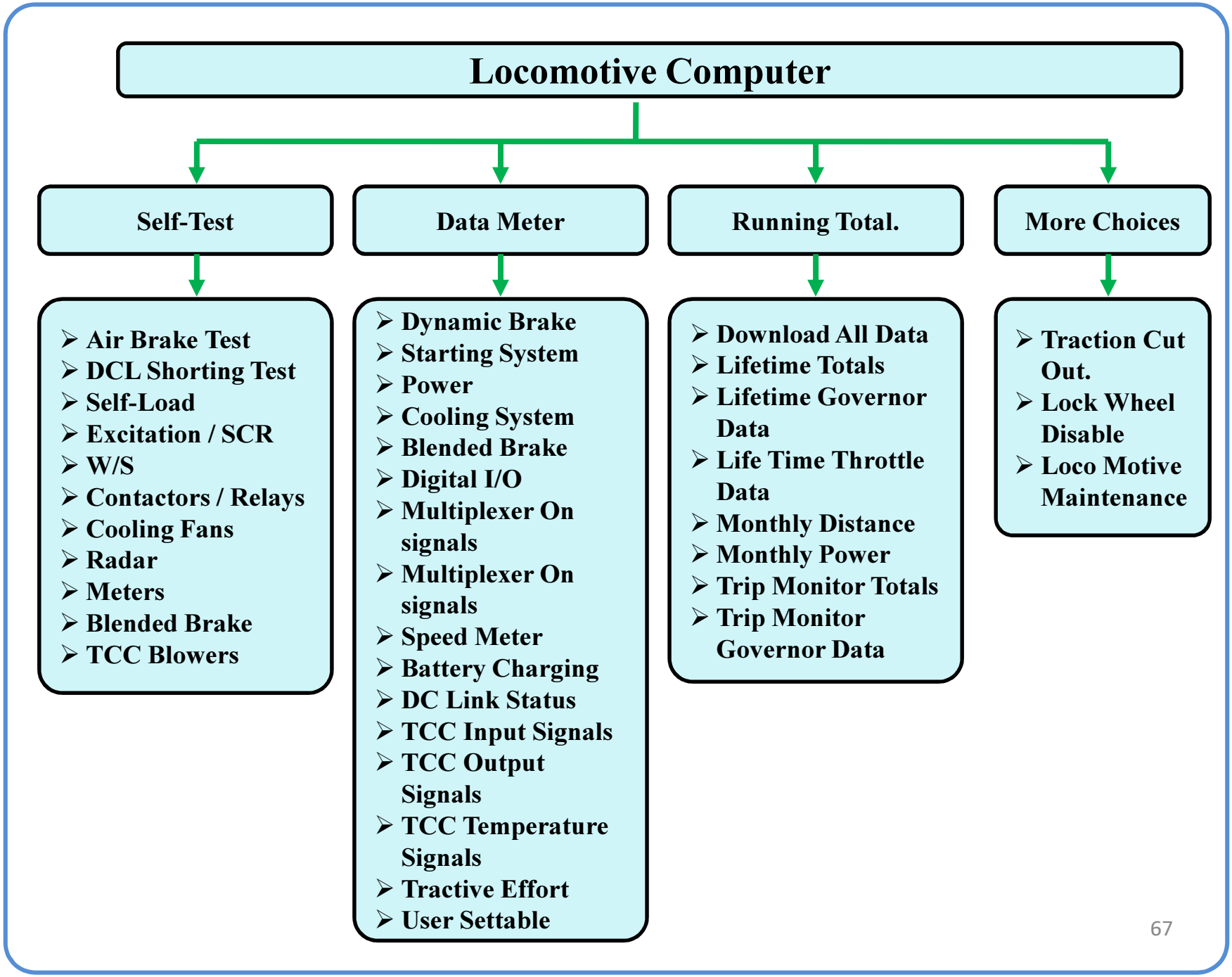
- **Primary display is for Loco Pilot. This display has all information required for loco operation.**
- **Secondary display is use for current status of DPC system.**
- **Conductor display is for ALP to have access all information required for loco operation.**

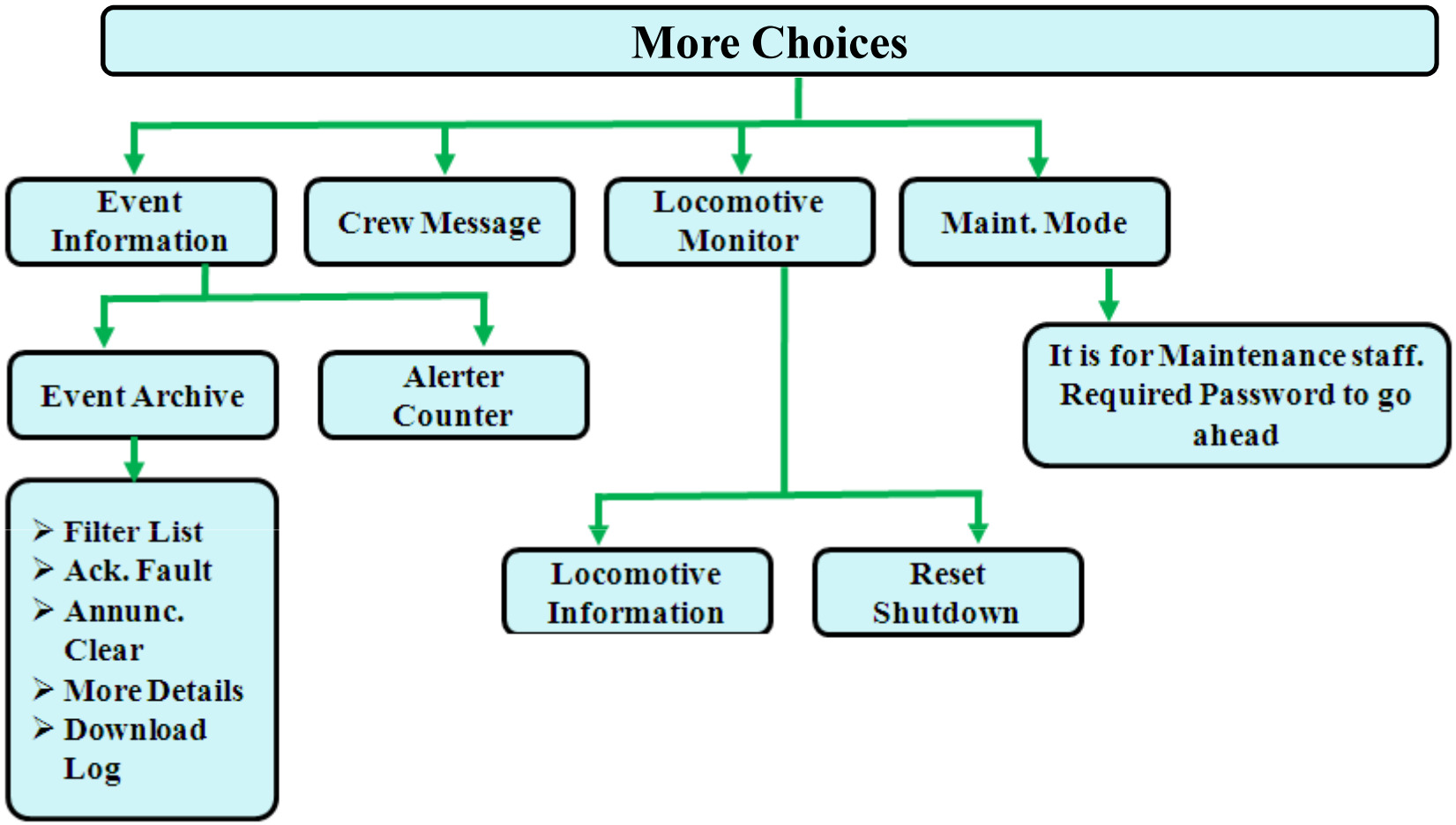
ECP


RUN
START
STOP
ISOLATE
ISOLATION SWITCH
CUT IN
CUT OUT
BLENDED BRAKE
EXTERIOR
MAINT ROOM
ON
OFF
LIGHTS
EMERGENCY FUEL
ENGINE STOP
BL KEY SWITCH
OFF
ON
OFF
CAB END FORWARD
LONG HOOD FORWARD
CLASSIFICATION LIGHTS
DANGER
HIGH VOLTAGE WITHIN
ENGINE START
AUDIO ALERT
TRACTIVE EFFORT LIMIT
MEMORY FREEZE
AEB RESET

EMD DUAL CAB DISPLAY PARAMETERS




Locomotive Computer
Self-Test
Data Meter
Running Total.
More Choices
Air Brake Test
DCL Shorting Test
Self-Load
Excitation / SCR
W/S
Contactors / Relays
Cooling Fans
Radar
Meters
Blended Brake
TCC Blowers
Dynamic Brake
Starting System
Power
Cooling System
Blended Brake
Digital I/O
Multiplexer On signals
Multiplexer On signals
Speed Meter
Battery Charging
DC Link Status
TCC Input Signals
TCC Output Signals
TCC Temperature Signals
Tractive Effort
User Settable
Download All Data
Lifetime Totals
Lifetime Governor Data
Life Time Throttle Data
Monthly Distance
Monthly Power
Trip Monitor Totals
Trip Monitor Governor Data
Traction Cut Out.
Lock Wheel Disable
Loco Motive Maintenance


More Choices
Event Information
Crew Message
Locomotive Monitor
Maint. Mode
Event Archive
Alerter Counter
It is for Maintenance staff. Required Password to go ahead
Filter List
Ack. Fault
Annunc. Clear
More Details
Download Log
Locomotive Information
Reset Shutdown

53. POINTS TO REMEMBER

1) **Always keep Gen. Field circuit breaker in 'OFF' position in 'Inactive Cab'.**
2) **Always keep lights circuit breaker in ON position on ECC1 CB panel, if you are working from any Cab. Since flasher lights & Classification lights are connected from Cab-1 lights circuit breaker.**
3) **Keep computer control CB and Micro Air Brake CB in ON position in both cabs for normal working from active cab.**
4) **Insert and turn ON the BL key in active cab only.**
5) **Keep Run/Isolate switch in RUN position at both cabs for normal working.**
6) **Keep MUSD button in `Run position (green portion inside) at both cabs before cranking the engine. Since both cabs MU Engine stop buttons are connected in parallel.**
7) **Keep LEAD/TRAIL switch in LEAD position in Active cab control console.**
8) **Keep always TELM and RAPB toggle switches in normal position in both cabs unless and until required.**
9) **Make a habit to check the TM CUTOUT status on Computer display unit, while taking over charge.**
10) **Apply loco brakes through independent brake handle and ensure brake cylinder pressure > 1.8 kg/cm2 to avoid alerter penalty brake application while the train is in stationary condition.**

POINTS TO REMEMBER

11) While cranking locomotive from any cab, keep Run/Isolate switch in isolate position at least in one cab.
12) When the engine speed increase for compressor operation, ensure no air leakages on engine and formation.
13) Press alerter reset button when the alerter light flashes or audio bell sounds to avoid penalty brake application from active cab only.
14) While re-cycling computer control circuit breaker, keep reverser handle in center, TH idle , Isolation switch in isolate position in 'active cab'.
15) Check time and date of loco shutdown from the engine logbook. If the loco has been shutdown for more than 48 hours, don't start the engine and contact home shed for advice.
16) Never discharge batteries excessively by repeated cranking.
17) Do not raised the engine beyond 4th notch without load (GFCB & GF slide switch in 'OFF' position). Which is very dangerous for TSC clutch gear assembly.
18) Do not put isolation switch to 'RUN' position immediately after engine start, otherwise engine will shut down due to low water & low lube oil pressure (wait for 6 minutes).
19) Before conducting air brake self test ensure loco / train is secured and BL key is 'ON' in working cab.
20) Do not apply load before engine water inlet temperature has been reached 49^0C.

ALCO LOCO

(MEP-660)

TROUBLE SHOOTING FLOW CHARTS

1. ENGINE NOT CRANKING

Is fuel oil pressure available? — No → **See trouble shooting of fuel oil pressure not built up.**

Yes ↓

Is MUSD-1 & 2 in Run position? — No → **Keep both MUSD in Run.**

Yes ↓

Is ECS in Idle? — No → **Keep it in Idle.**

Yes ↓

Is MPCB & PLPB in 'ON' / Set position? — No → **Put MPCB & PLPB to 'ON' position.**

Yes ↓

Is LWS operated? — Yes → **Trouble shoots accordingly.**

No ↓

Is Shut down plunger operated in WW governor ? — Yes → Reset it.

No ↓

Is any fault logged related to cranking shown in MEP-660 & MCBG display? — Yes → Trouble shoot accordingly.

No ↓

Is START button / ECS faulty? — Yes → Start engine using “SOFT KEY” operation.

No ↓

Is CK1, CK2 & CK3 picking up after pressing START button? — No → Inform LPC & shed.

Yes ↓

Is starting ground faults on MEP-660 display? — Yes → Open GRCO2 & crank engine normally. After engine crank, Close GRCO2. Inform LPC & shed.

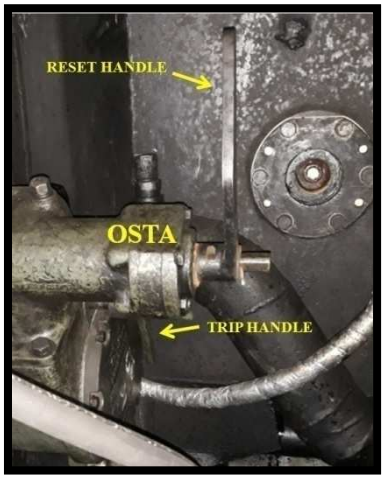
2. ENGINE CRANKING BUT NOT STARTING

Is there any message on MEP-660 / MCBG display? → **Yes** → **Attend the same. Else inform LPC & shed.**

No

Is OSTA in tripped condition? → **Yes** → **Reset it with proper procedure.**

No



Is fuel oil pressure not built up?

Yes → Trouble shoot accordingly.

No ↓

Is low oil level in WW governor?

Yes → Inform LPC & shed.

No ↓

Is governor linkage is not operating after pressing "START" button?

Yes → Check the governor linkage pin and fix it properly.

No ↓

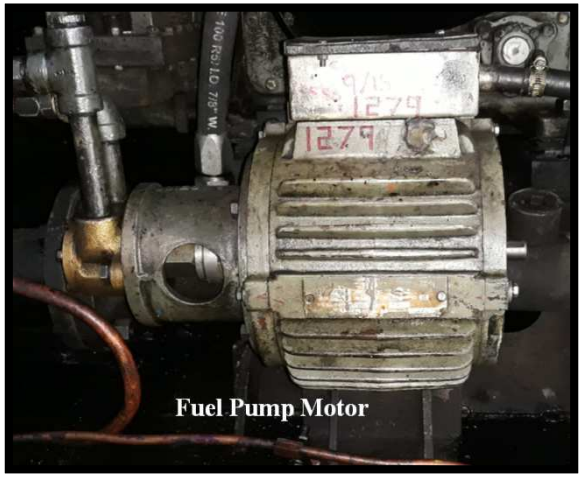
Is there weak battery?
(Message also displayed on screen)

Yes → Inform LPC & shed.

3. FUEL OIL PRESSURE NOT BUILDING UP

Is fuel oil sufficient in fuel tank? → **No** → **Top up fuel oil in tank.**

Yes



Is Fuel Pump Motor working? → **No** → **Trouble shoot accordingly.**

Yes

Is Relief & Regulating valve stuck up? → **Yes** → **Tap gently.**

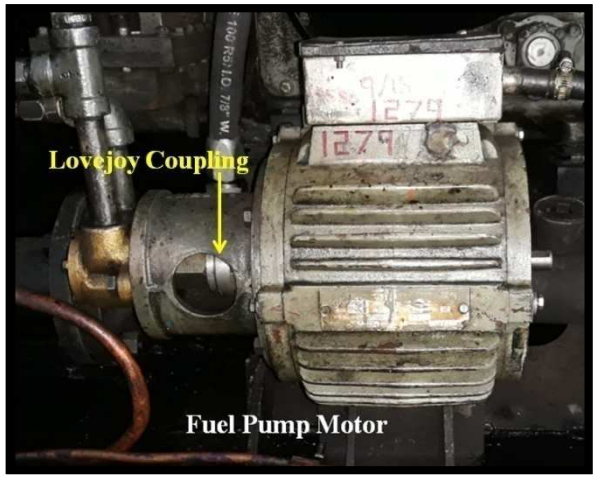
No

Is Primary filter chocked? → Yes → Inform LPC & Shed.

No

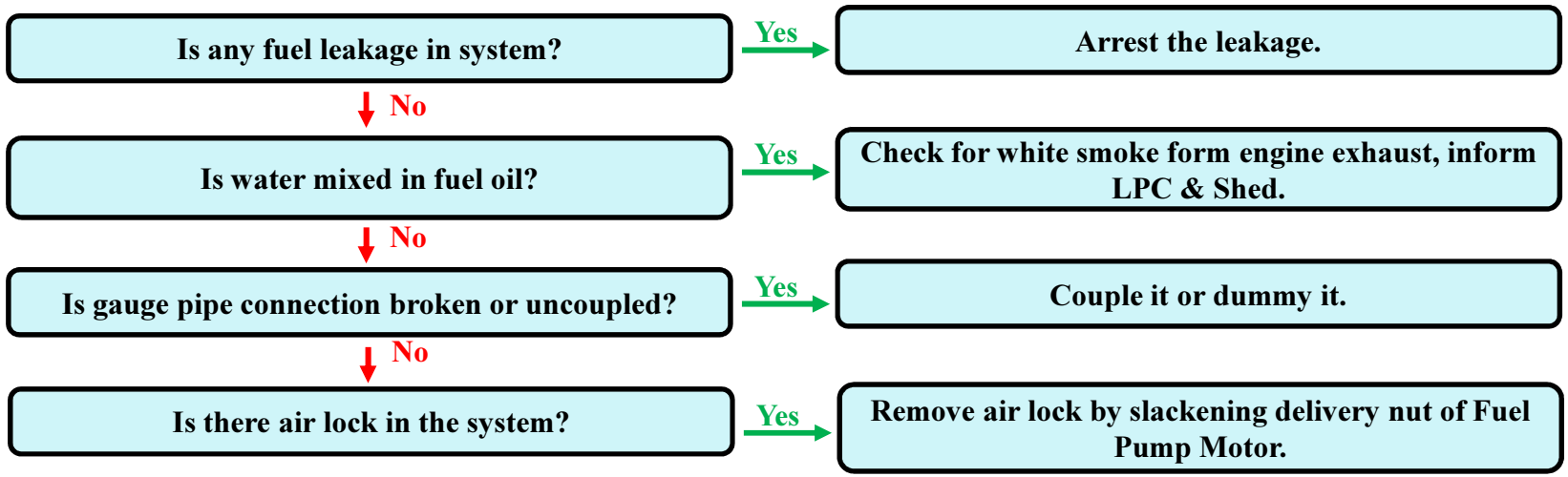
Is secondary filter chocked? → Yes → Inform LPC & Shed.

No



Is Fuel Pump working? → No → Check Lovejoy coupling connection.

Yes

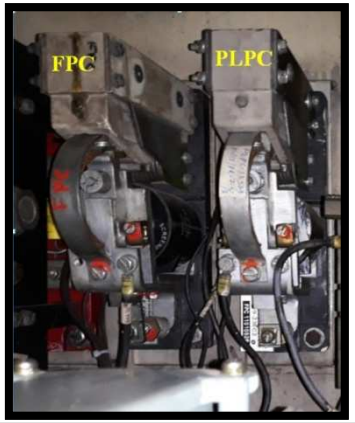


Note:
1) If hauling power of loco is not affected it means gauge is defective, work onwards.

4. FUEL PUMP CONTACTOR (FPC) NOT PICKING UP

Is MFPB1 & MBFP2 ON / Set? → **No** → **Put it to ON / Reset it.**

Yes



Is FPC coil connections loose or disconnected? → **Yes** → **Check & secure it properly.**

↓ **No**

Is FPC coil open? → **Yes** → **Pack FPC with precaution and inform LPC & Shed.**

5. FUEL PUMP MOTOR (FPM) NOT WORKING

Is battery voltage available?

No → **Close DLCB & check battery connections.**

Battery Ammeter


Battery Knife Switch

Yes

Is battery knife switch (BS) in closed position?

No → **Operate 2-3 times manually & close it.**

Yes

MB1 & MB2 in 'OFF' / tripped condition?

Yes → **Switch 'ON' / Reset it.**

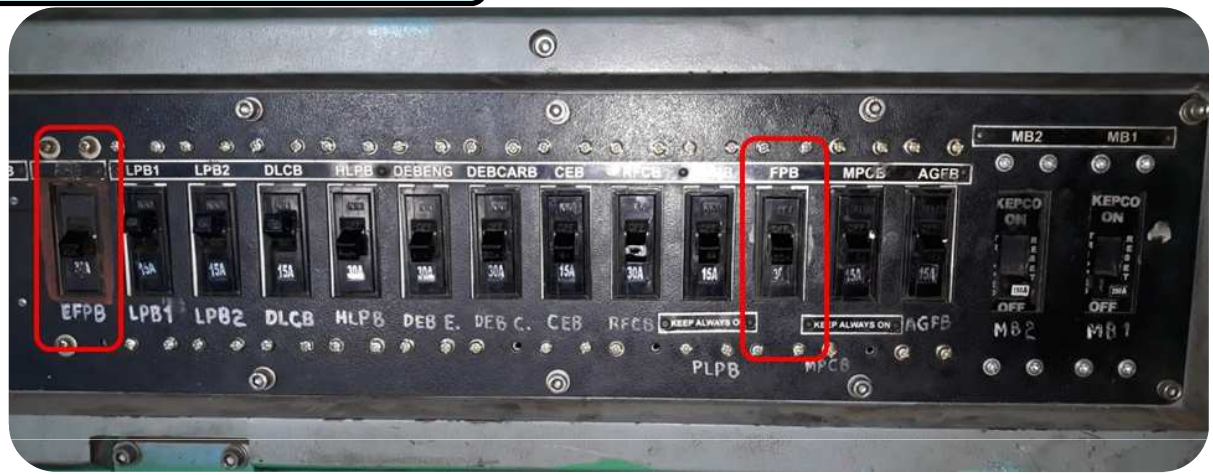
No

Is Fuel pump contactor (FPC) pick up? — No → Trouble shoot accordingly.

↓ Yes

Is Fuel Pump Breaker (FPB) 'OFF' / tripped condition? — Yes → Switch 'ON' / Reset it. If emergency FPB available then put it to 'ON'.

No ↓



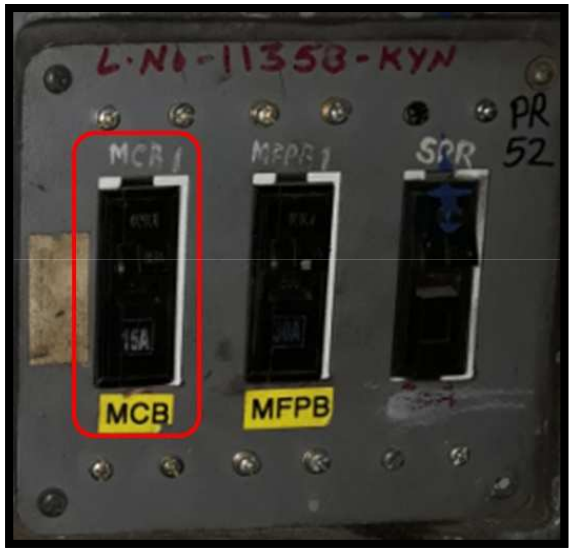
Is Fuel Pump Motor (FPM) connection loose or removed? — Yes → Try to connect / tight it if possible. Inform to LPC /Shed.

Note:
1) After ensuring all above items if FPM not working then contact LPC & Shed.
2) If FPM inverter switch is provided in Cab, then change it's position & try.

6. ENGINE RPM NOT RAISING

A) DMR not picking up

Is MCB-1 & 2 in 'OFF' / tripped condition? — Yes → **Keep MCB1 &2 in 'ON' / reset it.**



No

Is both control stand MH in idle position? — No → **Keep both control stand MH in idle position.**

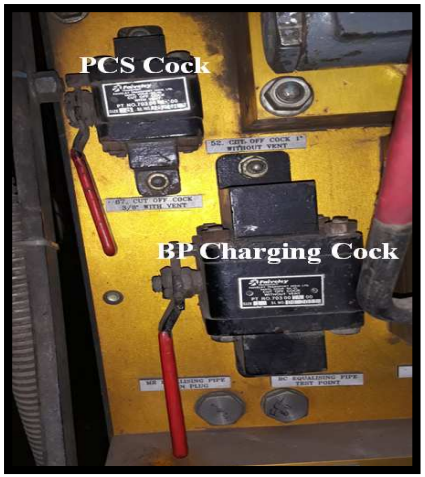
Yes

Is adequate BP pressure available? — No → **Build up adequate amount of BP.**

Yes

Is PCS cock in OPEN condition?

No → Kept it to OPEN in nose compartment.



Yes

Is BP adequate and DMR not picking up?

Yes → Operate PCS bypass switch to 'ON' position.

No

Still DMR is not picking up.

Yes → Wedge DMR with proper procedure and work with due precautions.

ENGINE RPM NOT RAISING

B) DMR picks up but engine speed not increasing

Is ECS in 'RUN' position? — No → **Keep it in 'RUN' position.**

Yes

Whether DMR drops while opening the throttle? — Yes → **Wedge DMR and work with precaution. Inform LPC / Shed.**

No

Is Amphenol plug loose or disconnected in WW governor? — Yes → **Connect it properly.**

No

Is MCBG governor's actuator unit connector loose? — Yes → Check the actuator unit, if found loose, tight the same.

↓ No

Is BKT in MOTORING position? — No → Keep it in MOTORING position.

Note: if not success, check the fault message and troubleshoot accordingly. Inform to home shed.

7. LOCO NOT RESPONDING

A) GFC not picking up

Is GFCO-1 & 2 in 'ON' position?

No → **Put it 'ON'.**

Yes ↓

Is ECS in 'RUN' position?

No → **Keep ECS in 'RUN' position.**

Yes ↓

Is BKT in 'MOTORING' position?

No → **Bring it to 'MOTORING' by pressing the magnet valve or manually by 'L' rod.**

Yes ↓

Is CK1, CK2 & CK3 welded? → Yes → Remove the welding by taking precautions. (Battery knife switch open)

↓ No

Is MH interlock defective? → Yes → Work from other control stand.

↓ No

Has GFC coil connection loose / defective? → Yes → Check & reconnect the same.

Note:

1) If not succeed, check the fault message and trouble shoot accordingly. Inform to PCOR and Home shed.
2) If still GFC not picking up wedge it by taking all precautions. Inform to PCOR and Home shed.
3) Check PCS cock is open in nose compartment on air brake panel.

LOCO NOT RESPONDING

B) All Power Contactors not picking up

Is adequate control air pressure (5 kg/cm²) available?

No → **Adjust control pressure to 5.0 kg/cm² by NS1 reducing valve.**

Yes

Is Reverser Handle is in desire direction?

No → **Keep it in desire direction.**

Yes

Is Reverser not in desire direction as per RH position?

No → **Bring it to desire direction by pressing the magnet valve or manually by 'L' rod.**

Yes

Still loco not moving.

Yes → **Check exciter generator wire. If found loose tight it. If not succeed inform LPC.**

8. BATTERY NOT CHARGING

Is battery knife switch properly closed? — No → Close it properly.

Yes

Whether MB1 is in 'Off' or tripped? — Yes → Keep MB1 in 'ON' / reset it.

No

Whether battery main cable series connections cut? — Yes → Try to reconnect the same. Inform LPC / Shed.

Note: if not succeed, check the fault message on display and trouble shoot accordingly. Inform Home shed.

9. AUXILIARY GENERATOR NOT WORKING

Message "NO BATTERY CHARGING DUE TO MAJOR FAULT"

↓

Whether AGFB & MB1 in 'OFF' / tripped condition? → **Yes** → **Put it in 'ON' / reset it.**

No ↓

Is there loose wiring connections in junction box of auxiliary generator? → **Yes** → **Try to reconnect properly.**

Note: if not succeed, AGFL glows continuously then check fault message on display and trouble shoot accordingly. Inform LPC & Shed.

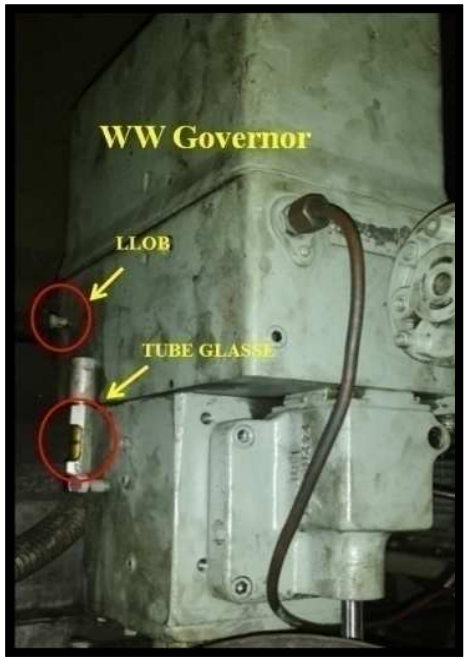
10. ENGINE SHUT DOWN WITHOUT ANY INDICATION

Is fuel oil pressure zero / less? → Yes → **Trouble shoot accordingly.**

↓ No

Is Governor linkage pin uncoupled? → Yes → **Fix it properly.**

↓ No

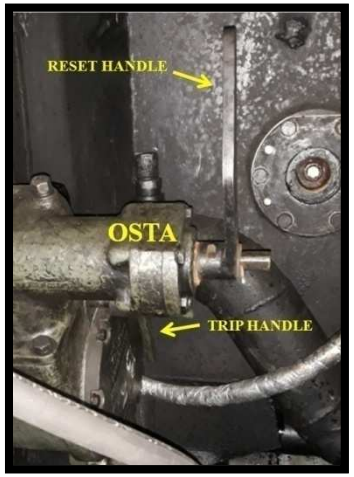


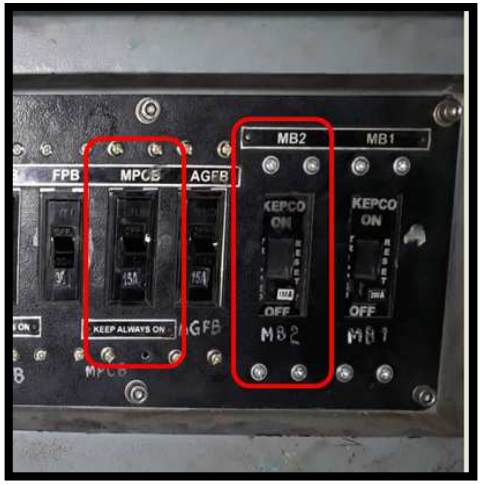
Is oil level less in WW governor? → Yes → **Inform LPC / Shed.**

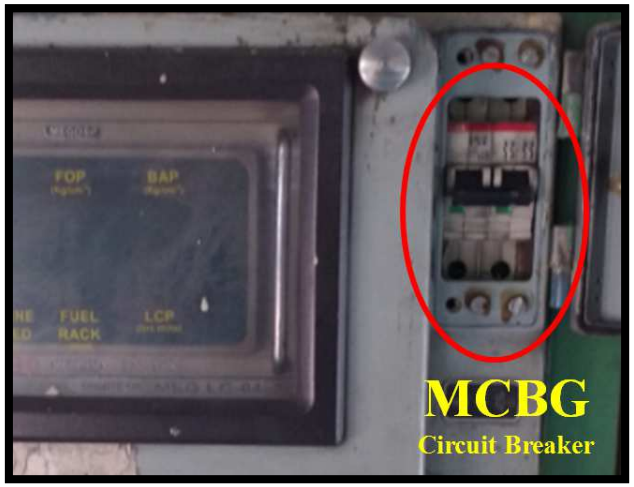
↓ No

Is OSTA in tripped condition? → Yes → Reset it.

No







Is MPCB in tripped condition? → Yes → Set it & re-crank the engine.

No

Is MB2 in tripped condition? → Yes → Reset it.

No

Is MCBG circuit breaker in tripped condition? → Yes → Reset it.

Note:

1) When loco works on battery & if MB1 tripped engine will be shut down.
2) When battery voltage is less than 50 volt engine will be shut down.

11. STARTING GROUND

To detect starting ground BANGI is provided and get connected in starting circuit and feed signal to micro processor.

Indications:

1) **Alarm bell ringing.**
2) **Display buzzer sound for 30 seconds.**
3) **Fault message on display:**
   "1008 – CONTROL CIRCUIT GROUND FAULT, CRANKING PROHIBITED"

Actions:

1) **Release START button.**
2) **Give time pause for auto reset the fault.**
3) **Check any control circuit wiring is grounded and CGR is open circuited.**
4) **If no unusual in Exciter & Auxiliary Generator, open GRCO-2 and re-crank engine.**
5) **After starting engine put GRCO-2 in normal (close) position. Otherwise battery charging will not take place.**

12. POWER GROUND

TANGI sensor detected the power circuit ground fault.

Message on display:
"2021 – POWER REDUCE DUE TO POWER CIRCUIT GROUND"

For every 0.1 amp increment above 0.4 amps of TANGI current 20% of that notch power is de-rated. The de-ration continues up to TANGI value reaches 0.9 amps. And there after systems declare the message
"1007 – POWER CIRCUIT GROUND FAULT"
"MOTORING PROHIBITED"

Indications:

1) **Alarm bell ringing.**
2) **Power is cut off.**
3) **Load meter shows zero.**
4) **GFC & power contactors dropped.**
5) **Engine speed comes to idle.**

Actions:

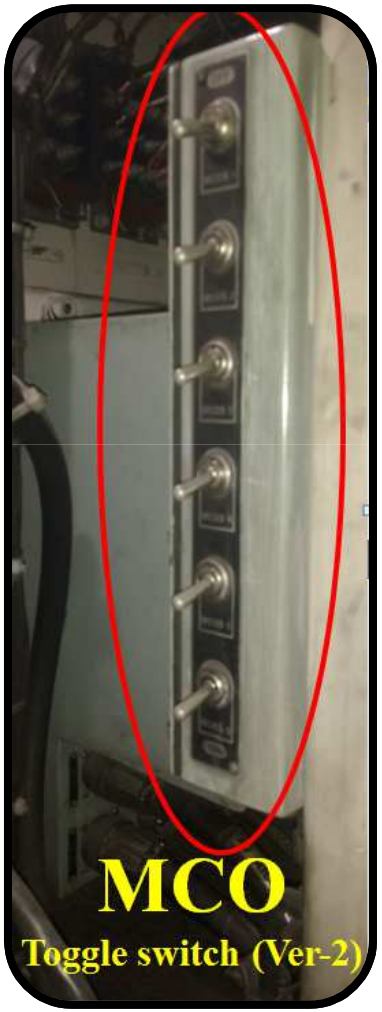
1) **Bring throttle to idle & wait for 15 seconds for auto reset.**
2) **Check for any cables rubbing the loco body, observe for any burn cable or overheated cable.**
3) **If nothing is found work the train further.**
4) **If power ground comes on higher notches, work on lower notches.**
5) **If not succeed, isolate traction motors one by one and keep defective traction motor in isolate position.**

Note: if power ground fault exists the system allow auto reset for 3 times in 1 hour (by keeping throttle to idle). Thereafter fault has to be cleared manually.
After isolating TM one by one if earth fault comes again then contact to LPC / Shed. If LPC / Shed instructed to open GRCO-1 & clear the block section then act accordingly with observing fire & smoke from power circuit.

13. TM CUT OUT PROCEDURE IN MEP-660 VER.-3 LOCO

1) Press Main Menu.
2) Select TM cut out by pressing no. 4 key.
3) Press F3 key to change. TM -1 will highlight.
4) Use navigation key to select defective TM.
5) Press F3 to cut out the TM.
6) Display shows conditions to cut out the TM.
7) Full fill the conditions stated in the display and then press “ENTER” (F3 key).
8) Micro Processor updates and displays the status of the TM in the display unit .
9) Press “EXIT” – now display unit shows idle display.

Note: In MEP-660 Ver.-2 locomotives, TMs are cut out with the help of toggle switches provided on top side of front panel. .



14. OSTA TRIP

When engine rpm increase more than 1180±20 rpm, then over speed trip assembly trips and engine shut down

Reasons:
1) **Fuel rake stuck up or fuel injection pump defective.**
2) **Faulty governor / sticky racks.**

Indications:
1) **Fault message comes on display - "1002 – Engine over speed, Engine shut down"**
2) **Alarm ringing for 30 seconds.**

	
Reset handle in Trip condition	Reset handle in set condition

Actions:
1) **Reset OSTA and re-crank engine.**
2) **Check no sticky racks.**
3) **Check the notch wise rpm.**
4) **If OSTA trips on higher notch work on lower notch if load and road permit inform LPC/Shed.**

15. LOW WATER LEVEL

Indications:

1) **Engine shut down.**
2) **Hot engine led glows.**
3) **Alarm bell ring continuously.**
4) **Fault message on display –"1001 – LOW WATER LEVEL, ENGINE SHUT DOWN"**

Actions:

1) **Check water level. If water is less, add water and reset the fault.**
2) **If electronic LWS is provided and water level is adequate ,then bypass it with help of toggle switch of electronic water level indicator.**
3) **If toggle switch is not provided then remove the fuse & recrank the loco & work further with ensuring adequate water level.**
4) **Contact to home shed & inform to PCOR.**

16. HOT ENGINE

In Microprocessor loco when water temperature is more than 90^0 C:

1) **The display shows: "2008 warning: Engine Temperature High Reduce power" for 5 seconds.**
2) **Alarm bell sounds continuously.**
3) **Hot engine led glows.**
4) **The engine power is de-rated by 20% for every 1^0 C increment beyond 90^0 C.**
5) **Need not switch off GF switches or reduce the notch as long as hauling is not affected.**

If the water temperature is raised further beyond 95^0 C :

Indications:

1) **Message on display: "1006 HOT ENGINE, CAN'T POWER UP"**
2) **Alarm bell & buzzer sounding.**
3) **Load meter shows zero.**
4) **GFC & power contactor drops.**

Actions:

1) **Bring throttle to idle position.**
2) **Apply train brakes.**
3) **Press Acknowledge button**
4) **Engine raised to 8^{th} notch.**
5) **Check water level and working of radiator fan.**
6) **Allow the engine to cool. When water temperature reduces to 85^0 C the hot engine message is cleared from the display and engine rpm comes to idle.**
7) **Loco can work normally.**

17. LLOB TRIP

LLOB is fitted in WW governor to monitor LOP. Due to any reason if lube oil pressure drops below 1.1 kg/cm^2 then LLOB will trips.

Indications:

1) **Low lube oil LED glows.**
2) **Alarm bell ringing continuously.**
3) **Engine will be shut down.**
4) **LLOB plunger comes out (tripped).**
5) **Fault message on display –**
   "1005 – LLOB trip – Reset plunger"
   "Restrictions: Cranking prohibited"

Actions:

1) **Examine the reasons of low lube oil pressure and trouble shoot accordingly.**
2) **Reset LLOB button. After fault recover (wait for 20 seconds).**
3) **Re-crank loco as per proper procedure and work further.**

18. OVER LOAD (EXAI)

Traction alternator field current is high (285Amps) as sensed by EXAI.

Indications:

1)Over load lead glows.
2)Alarm sounds for 30 seconds.
3)Load meter shows '0' and power cut off.
4)GFC and power contactor drops.
5)Engine comes to idle.
6)Fault message on display –
7)"1027 – Alternator field over current fault, Restriction Motoring Prohibited, Dynamic brake prohibited"

Actions:

1) Bring the throttle to idle. The fault is reset automatically.
2) Message on display – "Alternator field over current fault reset"
3) Examine for smoke, fire, over heating symptoms on Traction Alternator & Traction Motor cables. If everything is normal work further.

Note:

if fault exist the system allow auto reset for three times in one hour. There after the fault has to be cleared manually.
Contact to home shed & inform to PCOR.

19. WHEEL SLIP

A) MOMENTARY WHEEL SLIP

In microprocessor loco wheel slip is determined by current & speed sensor.
During wheel slip, microprocessor reduce the loco output accordingly to the percentage of slip.

Reasons:
1) Drizzling rain.
2) Oily / Greasy / wet track.
3) Track Gradient

Above 15% of slip, microprocessor take steps and gives indications:
1) Wheel-slip light glows.
2) Buzzer sound.
3) Load meter fluctuate.
4) Automatic sanding takes place.

If the wheel slip is above 40% high wheel slip message is logged.
Actions:
1) As long as loco is moving the Loco Pilot need not take any action. The microprocessor automatic regulates the power to the required level to arrest wheel slip.
2) Ensure working of sander and sand is available in sand box.

WHEEL SLIP

B) CONTINUOUS WHEEL SLIP

In microprocessor loco continuous wheel slip comes due to following reason:

1) **Axle locked.**
2) **Speed sensor defective.**
3) **Slipped Pinion.**

Axle locked / Speed sensor defective:

Due to axle lock or speed sensor defective continuous wheel slipping coming in loco.

Indications:

1) **Wheel slip led glows.**
2) **Buzzer will sound.**
3) **Automatic sanding takes place.**

Actions:

Loco pilot will stop the loco / train. With the help of ALP ensure free rotation of axle.

If axle rotation is free, it means speed sensor is defective. Then LP will reset the fault manually and isolate the concern traction motor and work further.

If LP examines no free movement of axle, it means axle is locked. Do not move the loco. Ask for brake down staff. Inform to LPC and shed.

Slip Pinion: In a running train if slip pinion occurs then wheel slip comes. Wheel slip led glows.

Action:

1) **Stop the loco.**
2) **On Display menu select wheel slip mode.**
3) **Take one notch and check the rpm of traction on display. TM having slip pinion will show rpm on display.**
4) **Check abnormal sound from traction motor and gear case.**
5) **Cut out concern TM by display and clear the section with restricted speed of maximum 15 kmph.**

20. RECTIFIER FUSE BLOWN

In ver-3 microprocessor, rectifier fuses are provided in series with each diode. In case if any diode short circuited this fuse blowout.

Indications:

1) **Rectifier fuse blown led glows.**
2) **Buzzer & alarm sound for 30 seconds.**
3) **Message on display –**
   "1066 – Rectifier fuse blown"
   "Restriction: power limited to 4th notch"
4) **Along with above message engine rpm and power limited to 4^{th} notch.**

Action:
Clear the section with restricted power if possible. Contact to home shed & inform to PCOR.

21. WATER COOLING SYSTEM

A) ENGINE SHUT DOWN WITH HOT ENGINE INDICATION

Water level decreasing. → Yes → **Arrange to fill the water.**

Arrange to fill the water.

↓

If water leakages then arrest it.

↓

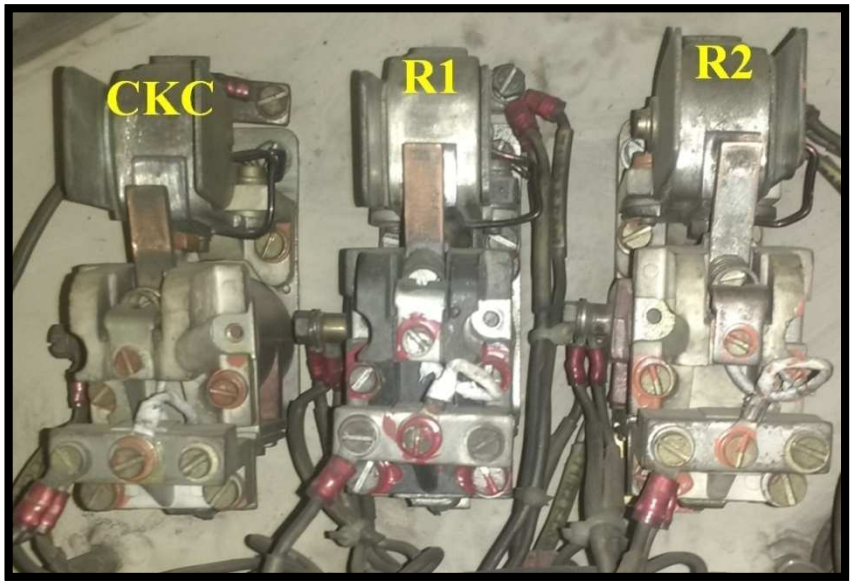
If Electronic water level indicator provided, operate toggle switch to bypass position, recrank engine & clear section duly observing adequate water level. Inform LPC / Shed.

WATER COOLING SYSTEM

B) RADIATOR FAN NOT WORKING

Is there fault in R1 & R2 contactor? → Yes → Switch ON RFCB.

No



Whether ECC coil wire connection loose / disconnected? → Yes → Try to tight / couple it.

Note: Still not succeed then inform PCOR.

Caution: Before enter in radiator room shut down the engine.

22. LOW BOOSTER AIR PRESSURE (BAP)

Is insufficient fuel oil pressure? — Yes → Check for relevant causes.

No ↓

Is Governor linkage tight? — Yes → Try to free it by operating 2-3 times manually.

No ↓

Is there leakage through Exhaust elbow / Manifold? — Yes → Note in repair book & inform to LPC / Shed.

No ↓

Is there after cooler dummy or inspection cover expansion joint loose? — Yes → Tight the same.

No ↓

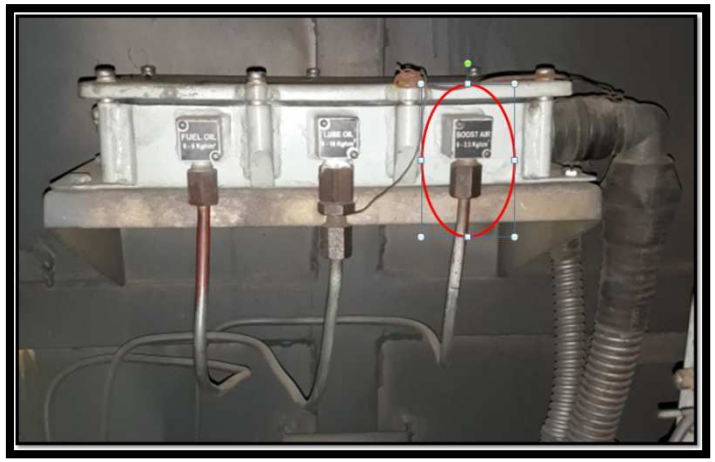
Is there leakage from inlet elbow? — Yes → Inform LPC / Shed.

No ↓

Is there loose BAP pipe connection of WW governor?

Yes → Attend leakage by tightening BAP pipe connection.

No



Is BAP sensor faulty of MCBG governor?

Yes → Bypass BAP switch on control unit of MCBG.

No

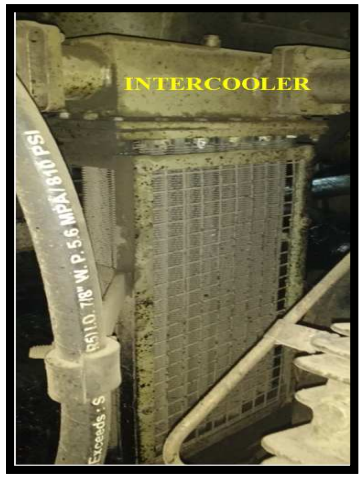
Is there unusual sound from TSC?

Yes → Inform LPC and Home shed

23. MR PRESSURE DROPPING

Is inter cooler safety valve blowing continuously? → Yes → **Tap it gently.**

No

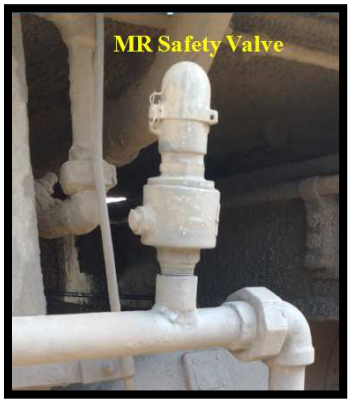


Is inter cooler tube broken? → Yes → **Maintain the MR pressure by keeping engine in raise condition if possible.**

No

Is MR safety valve blowing continuously? → Yes → **Tap it genly.**

No



Is there MR1, MR2, J-Filter and control reservoir drain cock in opened conditions?

Yes → Close the concern drain cock.

No

Is auto drain valve blowing continuously?

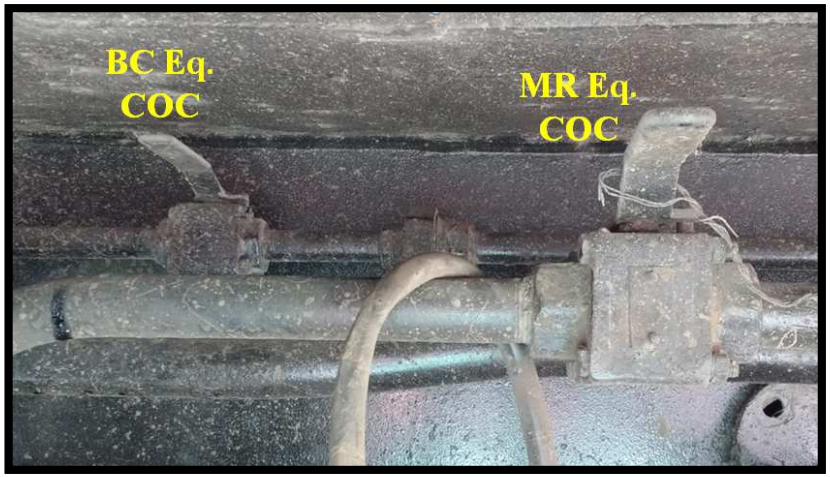
Yes → Tap / isolate it.

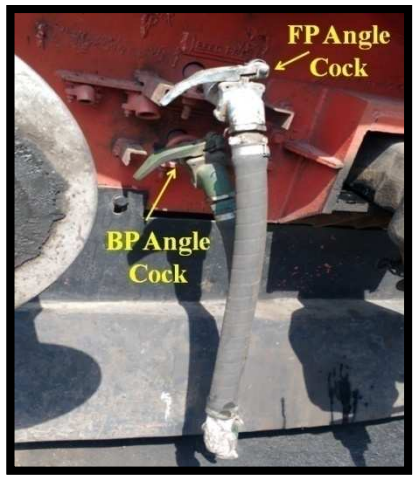
No

Is there leakage from MR / BC equalizing COC or BP / FP angle cock?

Yes → Arrest the leakage and ensure BP & FP angle cocks are close properly.

No





Is EPG is defective?

Yes → Tap EP valve or switch off toggle switch and close EP valve COC, create slight leakage in MR1.

No

Is J-filter COC in closed condition?

Yes → Open it.

No

Is Air dryer unit / filter defective?

Yes → Try to attend leakage or by pass it.

24. MR SAFETY VALVE BLOWING

Is MCB 1 & 2 in 'OFF' position? → Yes → Keep MCB1 & 2 in 'ON' position.

No

Is MR safety valve stuck up? → Yes → Tap it gently.

↓ No

Is EPG toggle switch is in 'OFF' position? → Yes → Keep it in 'ON' position.

↓ No

Is defect in EP valve of EPG? → Yes → Tap EP valve of EPG.

↓ No

Is EPG COC closed? → Yes → Open it.

Note: If not succeed, create leakage in MR1 through drain cock.

25. MR PRESSURE DROPPING ON RUN

1) In this situation loco pilot will not leave control stand.
2) Keep sharp watch on MR and BP pressure gauge, work the train and follow traffic rules.
3) When MR pressure comes below 5 kg/cm^2 , apply A9 to stop the train and keep A9 in emergency & SA9 in application position.
4) Protect / secure the train from rear by Guard as per traffic rule.
5) Further do the trouble shooting.

26. BP PRESSURE NOT BUILDING UP

Is MR pressure sufficient? — NO → **Trouble shoot for MR not building up.**

↓ YES

Whether both control stand A9 COC in closed condition? — YES → **Open A9 COC on working control stand & closed on non working control stand.**

↓ NO

Whether both control stand A9 handle in release condition? — NO → **Keep in release.**

↓ YES

Is MU2B in 'LEAD' position? — NO → **Keep it in 'LEAD' position.**

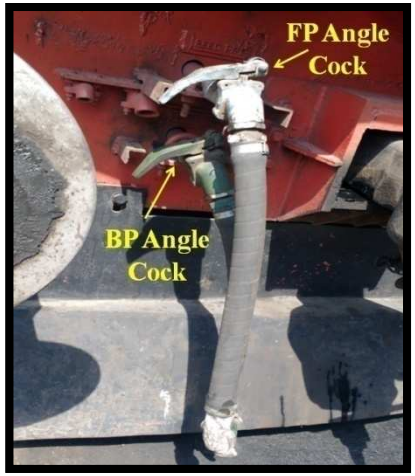
↓ YES

Is ¾” BP charging cock open?

NO

Open it.

YES



Is BP angle cut out cock open at end side?

YES

Close it.

NO

Is additional C2 relay valve in stuck up position?

YES

Tap it gently.

NO

Is emergency valve in open condition? YES → Close it.

NO

Is in MU ¾" COC open & MU2B is lead in trailing loco? YES → Keep ¾" COC in Close position and MU2B in trail position in trailing loco.

NO

Is A9 valve stuck up in emergency position? YES → Operate it from emergency to release position till reset or tap it.

27. LOCO BRAKES NOT RELEASING

Is BP pressure adequate

NO → **Troubleshoot accordingly.**

↓ YES

Is SA9 of other control stand in application?

YES → **Release it.**

NO ↓

Is C2 relay valve in stuck up position?

YES → **Tap it gently.**

↓ NO

Is brakes applied in conjunction working not releasing?

YES → **Operate foot pedal switch or release loco brake by C3W release handle.**

↓ NO

Is C3W valve defective?

YES → Tap it, pull C3W release handle or isolate using isolate handle of C3W.

NO

Is any one of brake cylinder not releasing?

YES → Dummy brake cylinder by closing concern bogie COC.

NO

Still loco brakes not releasing?

YES → Close bogie COC. If loco brakes released, inform to LPC & act accordingly.

28. VIGILANCE CONTROL DEVICE (VCD) OPERATION

VCD alerter is provided on loco to alert loco pilot in every 60 seconds, if loco pilot is not alert penalty brakes were applied through VCD.

VCD is monitoring the alertness of loco pilot by checking the movement of the following for every 60 sec -

1) **Throttle operation.**
2) **A9 & SA9 operation.**
3) **Dynamic brake operation.**
4) **Change of DB level (by 20 %).**
5) **Operation of GFCO**
6) **Horn operation.**
7) **Sanders operation**
8) **Reverser handles operation.**
9) **Pressing of VCD reset button.**

From the above if none of activity is carried out by loco pilot with in 60 sec,

1) **VCD lamp will glow and alert loco pilot for 8 seconds.**
2) **VCD buzzer will sound along with the VCD lamp for next 8 sec.**
3) **Within 76 sec. (60+8+8), if loco pilot fails to acknowledge VCD then penalty brakes will be applied.**

Indications when VCD applied penalty brakes:

1) **BP pressure will drops up to 2.8 kg/cm^2.**
2) **GFC drops & load meters shows '0'.**
3) **Engine speed comes to idle.**
4) **Buzzer will stop and VCD light glows for 35 seconds.**
5) **Message on display – "2301 – VCD applied penalty brakes, move master controller to idle and press resent button to release penalty brakes"**
6) **VCD counter will be increased by 1.**

VCD resetting procedure:

1) **Bring the throttle to idle.**
2) **Applied loco brake.**
3) **Ensure loco speed is zero.**
4) **Reversal handle should be operating in desired direction (forward or reverse).**
5) **Wait for VCD lamp to glow off (approx 35 seconds).**
6) **Press VCD reset button.**
7) **Ensure BP pressure is restore to 5.0 kg/cm^2 and check loco responding.**

Note:

1) **VCD will not function when brake cylinder pressure is above 2.1 kg/cm^2 and loco speed is zero.**
2) **VCD will not function if MCB in off position.**
3) **If VCD malfunctioning, it can be isolate by keeping VCD disable switch to disable position and operate VCD magnate valve COC to close position. Inform LPC / shed.**
4) **Reset VCD from LP side control stand only.**

VIGILANCE CONTROL DEVICE (VCD) IN MU LOCOS

If VCD applied penalty brakes in Leading Loco:

1) **Leading loco – Message - "2301 – VCD applied penalty brakes, move master controller to idle and press resent button to release penalty brakes"**
2) **Trailing loco – Message – "2032 – Penalty brakes applied by MU loco".**

If VCD applied penalty brakes in Trailing Loco (due to MCB remains in "ON" condition):

1) **Leading loco – Message – "2032 – Penalty brakes applied by MU loco".**
2) **Trailing loco - Message – "2301 – VCD applied penalty brakes, move master controller to idle and press resent button to release penalty brakes**

Resetting procedure:

A] If VCD applied in leading loco resetting procedure is same as single loco.

B] If VCD applied in trailing loco:

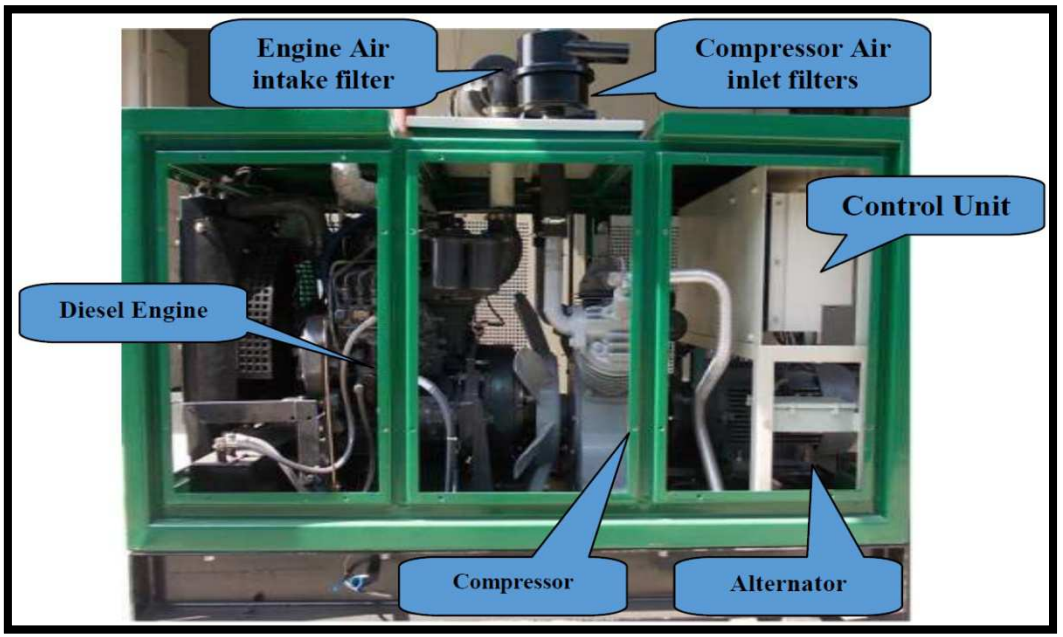
1) **Bring the throttle to idle.**
2) **Loco speed should be 0.**
3) **Remove Reverser handle from leading loco and go to trailing loco.**
4) **Insert Reverser in any control stand and operate it to Forward or Reverse direction.**
5) **Press VCD reset button to release penalty brakes (after VCD led glow off in trailing loco).**
6) **Check responding of both the locos.**

Note: While working MU ensure MCB1 & 2 are in OFF position in trailing loco & also ensure Emergency MCB is OFF to disable VCD operation.

29. AUXILIARY POWER UNIT (APU)

It is provided in Medha Microprocessor Version -3 locos and located in nose compartment.
Its main objects are:
1) To reduce fuel oil consumption.
2) To reduce lube oil consumption.
3) To reduce pollution.

APU is a combination of:
1) A small diesel engine of 25 hp.
2) A baby compressor of 15 hp.
3) A 12 volts 90 AH battery.
4) An alternator of 2 KW to charge the APU and Engine batteries.



Requirements for working of APU unit:

1) **Loco is in idle condition for more than 10 minutes.**
2) **AESS / APU switch (on front panel) is in enable (ON) position.**
3) **APU status is healthy – Water level, fuel oil level and lube oil pressure etc.**
4) **Main Engine EWT and EOT sensors are healthy and the temperature is > 30^0 C.**
5) **Battery charging current is below 10 Amps.**
6) **MCB 1 & 2 are in "ON"**
7) **MR pressure is more than 7.5 kg/cm^2.**
8) **BC pressure is more 2.1 kg/cm2.**
9) **Main engine rpm is in idle (between 350 to 400 rpm).**
10) **Reverser handle is in neutral position.**

Microprocessor display show message "loco is going to fuel save mode" with Buzzer sound. A decrement counter is starts from 60 and will decremented for every second.

When counter reaches zero, Microprocessor energizes ACC (APU cranking contactor) contactor and the following changes will happen.

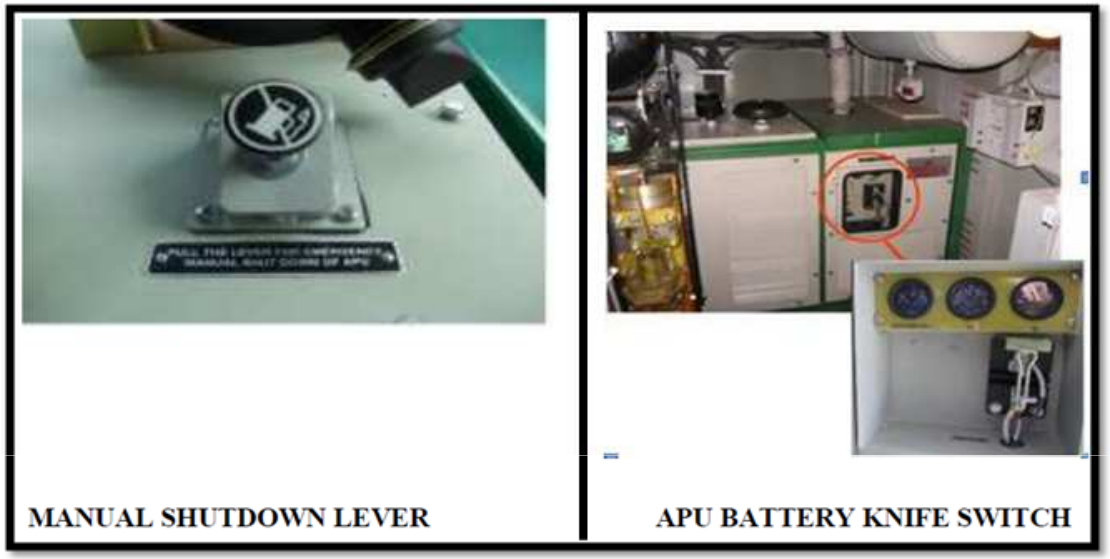
1) **Internal 12V supply is connected to starter motor of APU engine and gets started.**
2) **Main engine will shut down.**
3) **Baby compressor starts functioning and maintaining MR and BP.**
4) **The alternator starts functioning and 72 volt supply is being fed to locomotive and the batteries are getting charged (AGFL led glows).**
5) **SMC and FPC contactors are dropped to stop DEM, CCEM and FPM and reduce load on the APU.**
6) **Loco Pilot should not switch off any switch or breaker in the loco.**

When Loco Pilot wants to resume from fuel save mode, he has to move the reverser handle to any one direction. The following changes will happen.

1) **MEP display shows message – "2077 – System returning from fuel save mode"**
2) **Loco is cranked by the microprocessor within 5 seconds.**
3) **When diesel engine rpm reaches above 300 rpm, MEP energizes APU shut down contactor (ASC) and shuts the APU within 17 seconds.**

MEP crank the main engine and shut down the APU engine automatically, if

1) **MR is dropped below 6 kg/cm^2.**
2) **Battery get discharge.**
3) **APU is failed.**



MANUAL SHUTDOWN LEVER

APU BATTERY KNIFE SWITCH

If automatic re-cranking is failed due to APU failure, Loco Pilot has to crank the loco after switch off the AES switch.

If APU is running continuously even after main engine is get cranked, Shut down the APU engine by operating emergency stop lever in the APU unit.

Note:

Do not perform any jobs on the main engine or APU engine keeping AES switch is in on, since loco may cranked automatically.

If display prompts to open the battery cut out switch – operator has to break the glass cover in the APU unit and open the battery cut out switch and also switch off AES switch.

30. DOS AND DON'TS WITH MEP-660 LOCO

SN	Dos	Don'ts
1	Keep always TE limit switch in "NORMAL" position.	Do not keep TE limit switch in "Limit" position unnecessarily, when not required.
2	Keep MCOS switches always in ON position for normal operation.	Do not keep MCOS in OFF position while all motors are working properly.
3	Make a habit to check position of this TE Limit, AEB and MCOS switches while taking over charge.	Do not start loco without ensuring these switch position.
4	Switch OFF MCB1 and MCB2 on control desks while cranking.	Do not crank the engine with MCB1 & MCB2 in ON position otherwise penalty brakes are applied if BCP is not building up within 76 seconds.
5	Press start button till cranking contactors picks up (more than 60 seconds, if pre lube feature is available).	Do not release the start button in between. Otherwise the time starts again.
6	Switch OFF circuit breakers MCB1 & MCB2 in Rear locomotive to avoid VCD function.	Do not keep MCB1 & MCB2 in ON position in rear locomotive Otherwise VCD apply penalty brakes.
7	During continuous wheel slip and total power reduction, act in the case of wheel slip with conventional loco.	Do not reduce notch for momentary wheel slip and loco is moving.

DOS AND DON'TS WITH MEP-660 LOCO

SN	Dos	Don'ts
8	Apply train brakes & Loco brakes when total power is reduced at 95^0 C of water temperature (to avoid roll back).	Do not release brakes till the locomotive is ready to move (at 90^0 of engine temperature).
9	Reset VCD penalty brakes only when loco speed is zero, loco brakes is in applied condition, Throttle is in Idle and VCD lamp stops blinking.	Do not try to resent penalty brakes if loco speed is not zero, or throttle is not in idle or VCD lamp is blinking.
10	Before resetting VCD penalty brakes ensure Reverser is in desired direction (For or Rev).	For resetting penalty brakes do not keep Reverser in neutral position.
11	Keep EPG cut out switch in OFF position in trail / dead locos.	Do not keep the EPG cut out switch in ON position in rear / dead locos. Otherwise MR pressure reduces.
12	While loco is idle, apply loco brakes through SA9 & ensure brake cylinder pressure is more than 2.1 kg /cm^2.	Do not release loco brakes while loco is idle, otherwise VCD apply penalty brakes.