



FAILURE CASE STUDY ON TLAC SYSTEM IN LHB

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FAILURES IN AC COACHES

- AC less cooling
- Supply failure (750 V/415 V/ 110 Vdc)
- Passenger amenity items

Reasons for AC less cooling

- **Leakage in system**
- **Chocking**
- **HP rise**
- **Compressor reverse rotation**
- **Compressor internal trip**
- **Low pressure**
- **Air loss**
- **CPU defective**

Reasons for supply failure (750/415/DC)

- **Single phasing**
- **HOG/EOG supply**
- **Wrenchet/ZS coupler/Junction box**
- **RBC/EBC/monoblock batteries**
- **60 kVA Transformer**
- **D&E Device**
- **Fuses and switchrears**

Failure of passenger amenity items

- **Reading lights**
- **Mobile/laptop charging points**
- **Lights**
- **Water Pumps**

Leakage (less cooling)

- Suction/Discharge (Low side/High side)
- **REASON OF LEAKAGES IN RMPU**
 - **Unusual / heavy vibrations in RMPU**
 - **Fixing of RMPU equipments**
 - **Design problems**
 - **Poor quality of material**
 - **Poor workmanship**

Leakage (less cooling)

○ **LOCATION OF LEAKAGES IN LHB AC UNIT**

- Discharge Line**
- Condenser Coil**
- Liquid Line**
- Strainer cum Capillary / Expansion Valve**
- Evaporator Coil**
- Suction Line**
- Charging Valve (Hand Shut Off Valve / Schrader Valve)**
- HP / LP Cut Out**

Discharge line



Discharge line

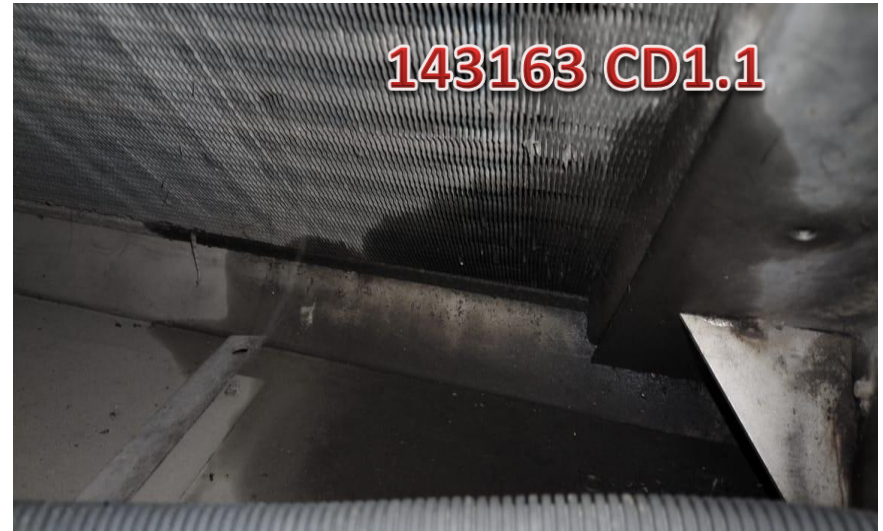
Discharge line leakage video



Deadnut valve Discharge line



CONDENSER COIL



Condenser coil

- Video of leakage testing



Suction line leakage



Suction line



153167
CP1.1



071335 cp 1:1 suction line leak A/POH

Liquid line



Liquid line sight glass



Liquid line valve

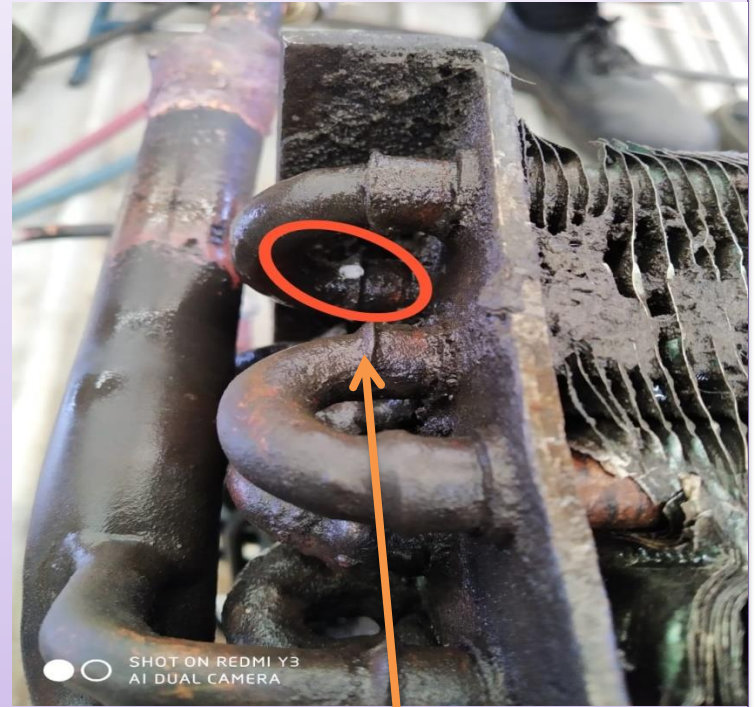


Liquid line hand shutoff valve

Evaporator (Cooling)coil leakage

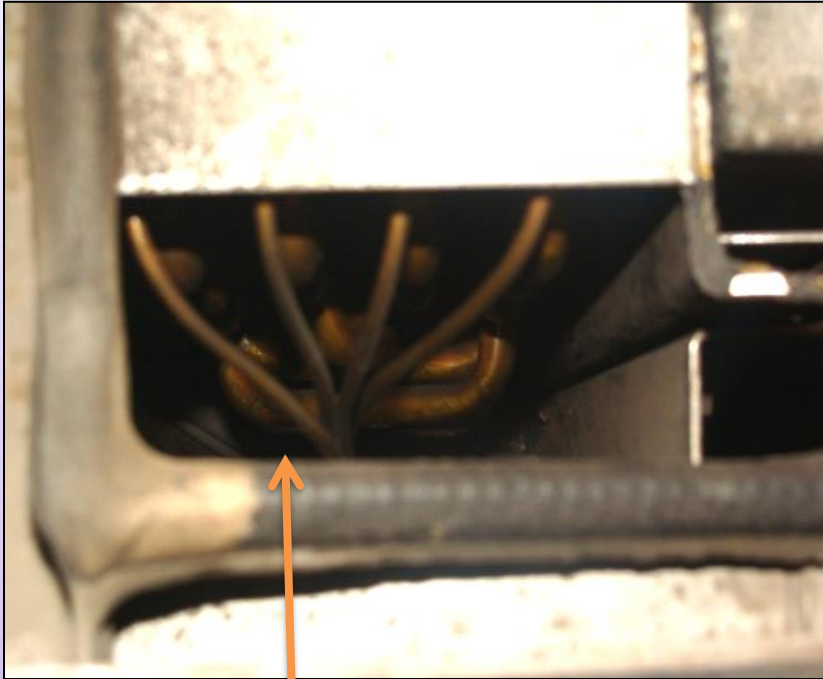


Evaporator (cooling coil)



153160 CP 2.2

capillary



capillary



Gas charging valve

COMPRESSOR leakage

1. Compressor base leak



2. Compressor Jam

3. Compressor open circuit

4. Compressor short circuit

5. compressor internal trip

6. poor efficiency

Attention on following points during repair of leakage cases

- Maintenance Supervisor will be present there personally and examine that the repairing work has been carried out perfectly.**
- To attend the leakage cases, depot should have all the requisite tools and plants, machinery, spares, like - Gas welding set, Copper pipes of different size, Brazing rod, etc.**
- Maintenance team should also find the root cause of leakage and maintain the records properly after analyze the case.**
- Smooth, equal & bubbles free brazing should be done on joints to avoid recurrence of such failure.**
- After carried out the brazing work, AC unit must be examined by going through pressure test with Nitrogen & vacuum test and then charge refrigerant with adequate quantity in the AC unit.**

Air loss

1. Duct worn/torn out



**163155 PP side
Supply air**



**99153 NPP side
Supply air**

Air loss

2. Duct shifting




VIDEO

Water dropping

- Water dropping video



Water dropping

1. DUCT (VIDEO)



2. TRUFF (VIDEO)



POWER SUPPLY FAILURE (750 V)

1. ZS coupler



OVERHEATING MARK

POWER SUPPLY FAILURE (750 V)

- WRATCHET



OVERHEATED

POWER SUPPLY FAILURE (750 V)

- WRATCHET



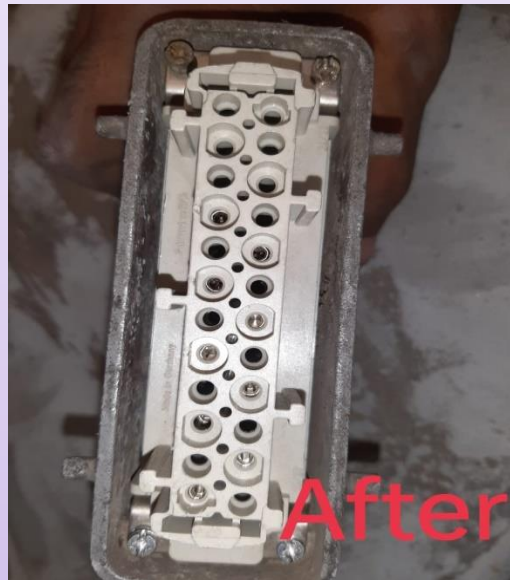
GOTI PRESSED INSIDE

POWER SUPPLY FAILURE (750 V)

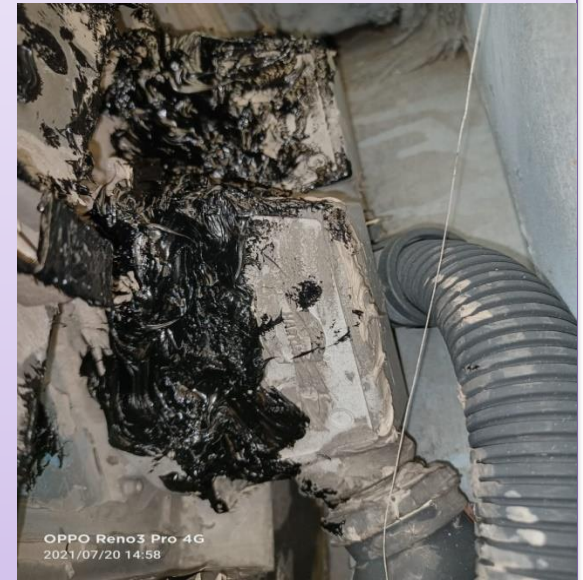
- Harting connector



SHORT due to ingress of
rain water



OK CONDITON



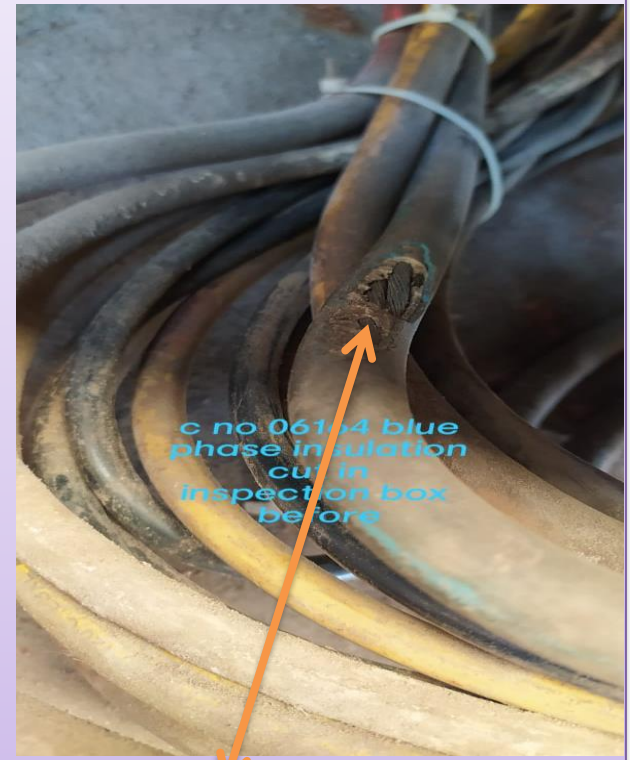
PU sealant provided

POWER SUPPLY FAILURE (750 V)

- Feeder fault in junction box



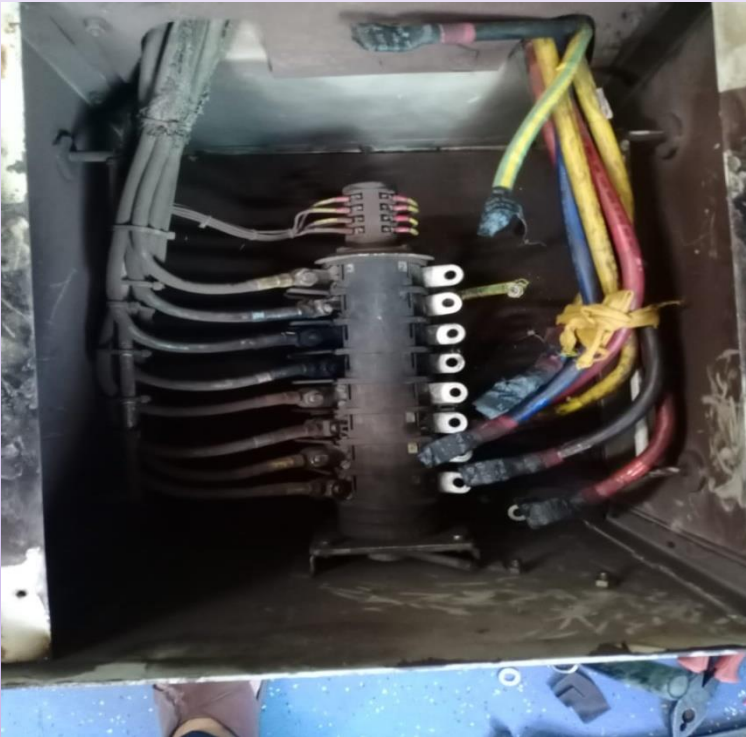
INSPECTION BOX under AC panel



Insulation found cut by RAT in junction box

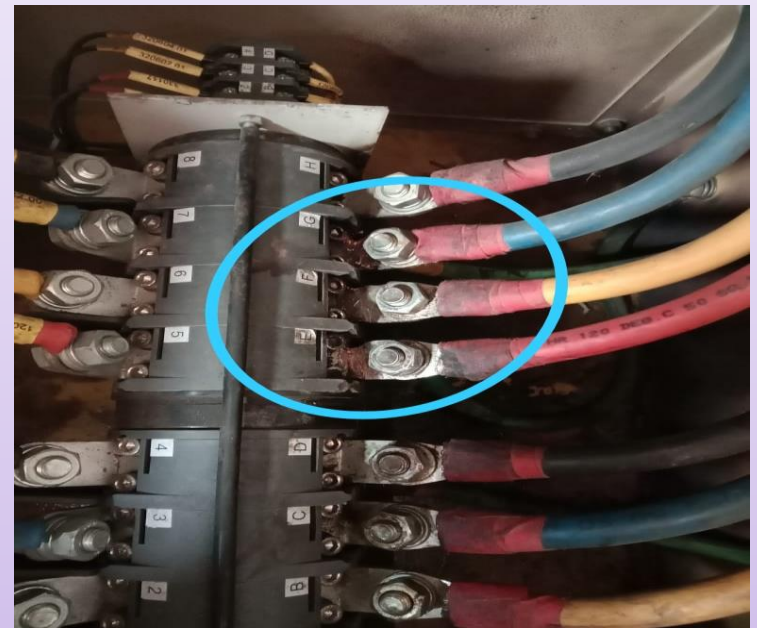
POWER SUPPLY FAILURE (750 V)

- Disconnecting and Earthing device(D&E) failure failure



POWER SUPPLY FAILURE (750 V)

- Disconnecting and Earthing device(D&E)



POWER SUPPLY FAILURE (750 V)

- 60 Kva Transformer

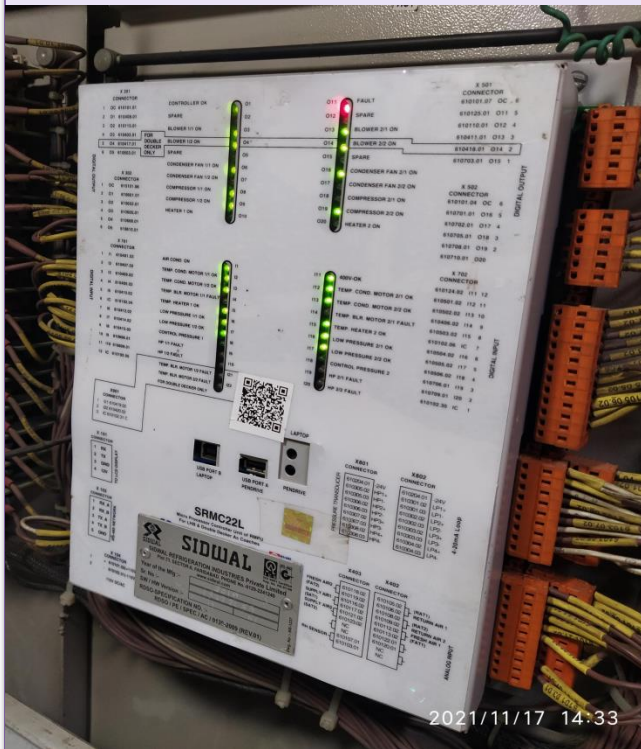


Overheating mark

Microprocessor unit (AC Controller)

- CPU

AC PANEL



MCB 35 NO

AC ON/OFF Rotary

DIGITAL DISPLAY

FAULT LAMP

Microprocessor unit (AC Controller)

- As microprocessor (CPU) controls both ac unit of coach. Therefore, any defect of CPU will result in CNAC/less cooling.
- Some common points to be checked before starting AC unit are as under:
 1. Sensors (01 HYGROSTAT, 02 Fresh air, 02 return air & 02 supply air) play important role in working of CPU
 2. It is required to monitor cleaning/testing their health as per schedule (every D2 Schedule)
 3. Ensure 35 no MCB is switched ON
 4. Ensure 110 V DC supply in controller
 5. Ensure AC ON/OFF switch (U4S1) provided on AC panel is kept ON.

Microprocessor unit (AC Controller)

6. 6. Ensure that fault indication lamp is not glowing.



Fault indication lamp

7. Ensure always that the following three indication on CPU are glowing:

- controller OK
- AIR-CON. ON
- 400 V OK

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Microprocessor unit (AC Controller)

8. Some other points to know:

- the microprocessor shall shut down the AC unit in the following conditions:
 - a) If supply air temp goes below 5 °C
 - b) If supply air temp goes above 85 °C
- Both compressors shall not start at a time. First compressor of each unit will start after 30 seconds from switching ON of air condition switch and second compressor will start after a delay of 5 second.
- Once compressor has been switched off, it will not be started before 5 second even it is required.

Microprocessor unit (AC Controller)

- Equipment will be blocked permanently if it is tripped thrice in a hour.
- If all temp sensors are defective, heating mode should not work.
- **EMERGENCY MODE:**
- In this mode, both blower and exhaust fan will work (if the refrigeration circuit failed for any reason and malfunction with the controller

Microprocessor unit (AC Controller)

➤ Dehumidification mode:

this mode will start, if relative humidity is above 60% and RT is below set point. One compressor, one condenser & one heater will be ON. Heater will be switched OFF after 3 minutes and will remain OFF for further 5 minutes. After 5 minutes, cycle will be repeated till relative humidity is reached upto 60%.

No water

- Water pump defective
- Pipe line chock
- No water from tank
- No water in tank



Thanking
you