

PNEUMATIC SYSTEM in EMU MEMU....2

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NECESSITY OF AIR IN MEMU

1. Pantograph
2. Vacuum Circuit Breaker(VCB/ABB)
3. EP contactors and switch groups
4. Brake system
5. Air Suspension System
6. Hooter & Wiper System

PNEUMATIC SYSTEM

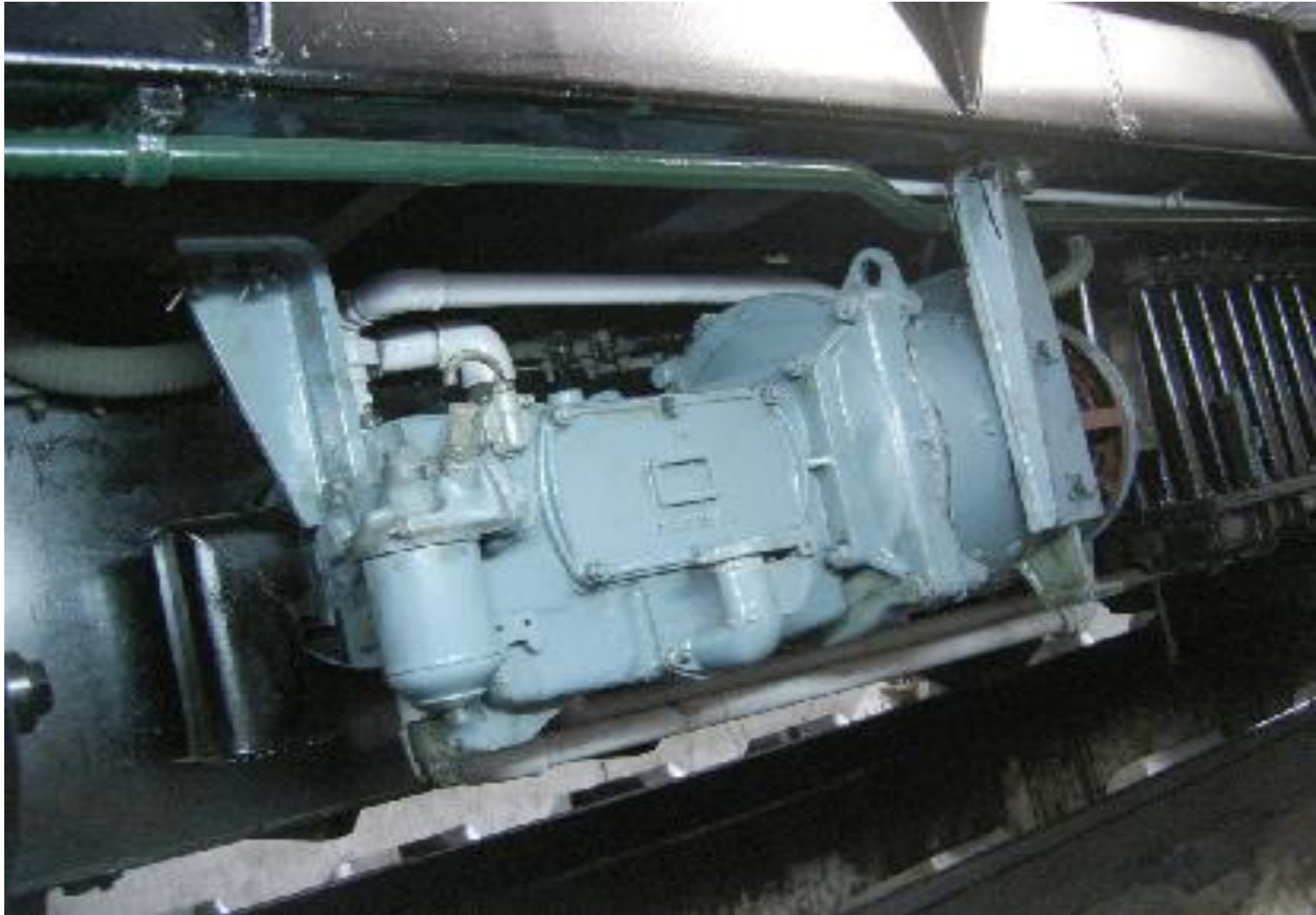
It consists of

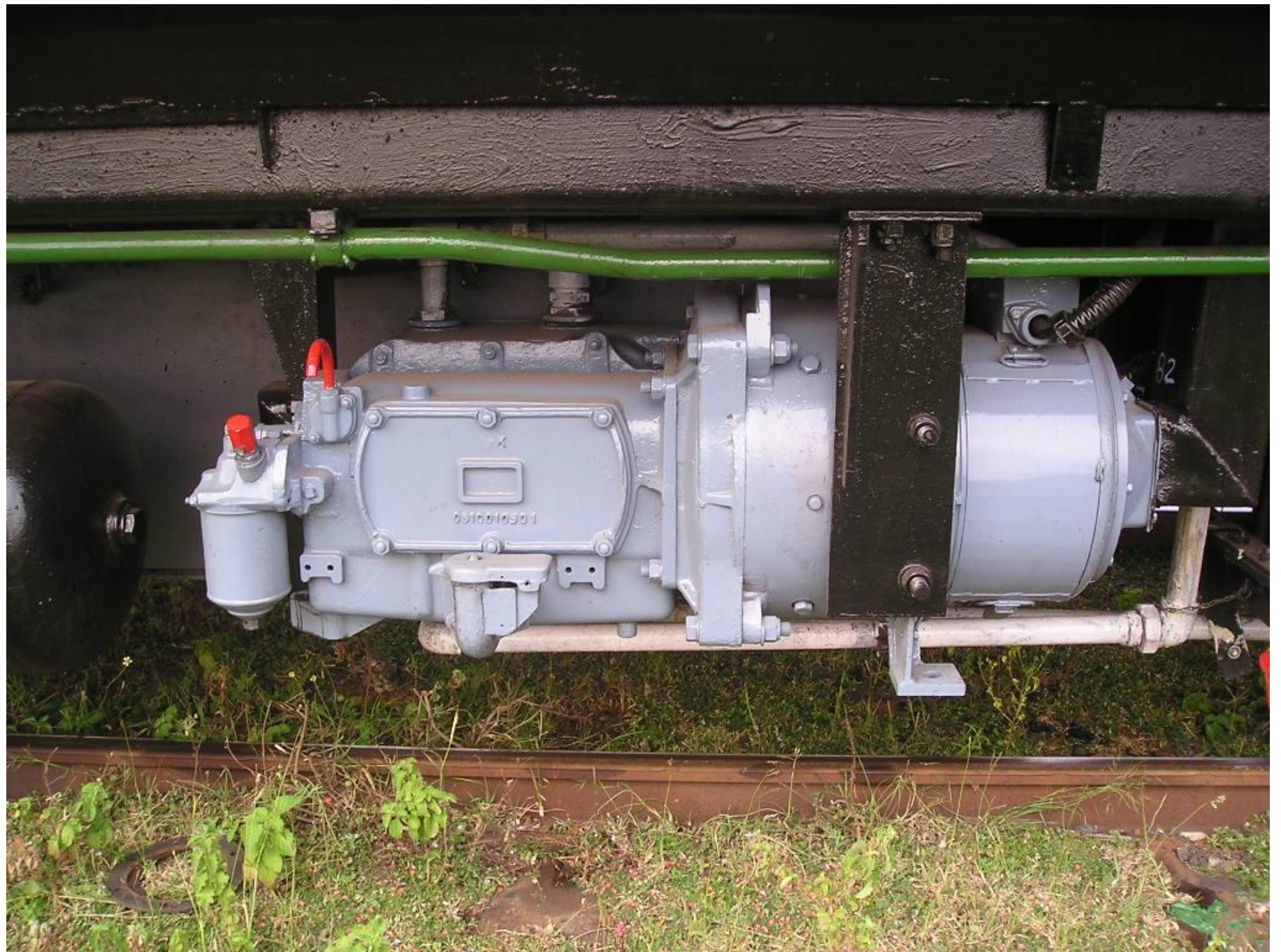
1. Main Air Compressor
2. Auxiliary Compressor
3. Piping arrangement

(Valves, SS pipes, hose pipes, air reservoirs and other fittings)

MAIN AIR COMPRESSOR

MAIN AIR COMPRESSOR





Main Compressor

- MCP is a horizontal three cylinders, two stage, pipe ventilated and flood-proofed machine of light weight construction, directly driven through an extended crank shaft by an integral electric motor.
- MCP sucks atmospheric air through oil bath suction filter, compresses it to a pressure of about 3kg/cm² in low pressure (LP) stage.

Main Compressor

- This hot compressed air passes through inter cooler where it gets cooled and then enters the high pressure (HP) suction side.
- In HP stage of the MCP, the air is finally compressed to a pressure of 7 kg/cm² and passes through after cooler and finally gets delivered into main reservoir through a non-return valve.
- Inter cooler and After cooler are provided to reduce the temperature of the compressed air.

Main Compressor

- specification of KPC make compressor:
- Model : KPC 3HC 55
- Type : Reciprocating, Air Cooled, Forced Feed Lubricated, Mono-block.
- No. of Cylinders : 3 (LP-2 & HP-1)
- No. of Stages : 2
- Nominal Speed : 1150 rpm.
- Swept Volume : 1560 lts/min.
- Free Air Delivered : 1075 lts/min.

Main Compressor

Power Input at 7 kg/cm² : 8.5 KW

Sump Capacity : 6.24 lts. Max. & 3.12 lts. Min.

Recommended Lubricant : Servo System 68

Main Compressor

- Specification for Motor for KPC Compressor:
- Model : To suit 3HC 55 KPC compressor
- Voltage : 110V DC (415v ac 3 phase for Mumbai area EMU)
- Current : 96 A
- Output : 11.38/9.12 KW
- RPM : 1150
- Weight : 245 kgs (Approx.)

AUXILIARY COMPRESSOR



AUXILIARY COMPRESSOR

- Auxiliary compressor and its associated pipe line in HT compartment is responsible for creating air pressure initially to raise the pantograph, closing of ABB and operating the EP contactors.
- The ACP will cut off automatically at 6.5kg/cm² pressure through ACP governor.
- The governor can be bypassed by a switch called ACP bypass switch

AUXILIARY COMPRESSOR

- A safety valve is provided which acts whenever air pressure rises beyond 7.75kg/cm²/ or 8kg/cm².
- Air produced by ACP is being stored in three reservoirs, called control reservoir, panto & ABB reservoir.

AUXILIARY COMPRESSOR

- The pneumatic circuit in HT compartment is interconnected with the main reservoir air supply through a non-return valve so that once coach is energized and MCP starts working, ACP (Aux CP) will not work further.
- Thus the whole pneumatic circuit is being fed from main compressor.

AUXILIARY COMPRESSOR

- Make : Elgi Festo
- Type : Single cylinder, Reciprocating, Mono block
- Power required : 1 H.P.
- Maximum operating pressure : 8 kg/cm²
- Piston Displacement : 150 lpm
- Speed at 8 kg/cm² : 1500 rpm
- Crank case lubrication : 300ml

AUXILIARY COMPRESSOR

- MOTOR
- Make : Elgi Electric
- Type : Open TYPE, Screen protected
- Power Supply : 110V DC
- Current : 8.5A

PIPING ARRANGEMENT

1. Air is stored in two main air reservoirs viz MR Tanks, AR and MR & BP pipes.
2. Continuity of air pressure is maintained by SS pipes, coupling cocks and flexible hose pipe connections

PIPING ARRANGEMENT

3. Two metallic pipelines runs from one end to the other end of EMU to carry & distribute compressed air

Main Reservoir Pipeline

- diameter 0.75"
- charged through main compressor at pressure of 7 kg/cm²
- MR pressure to apply EP brake

PIPING ARRANGEMENT

Brake Pressure Pipeline

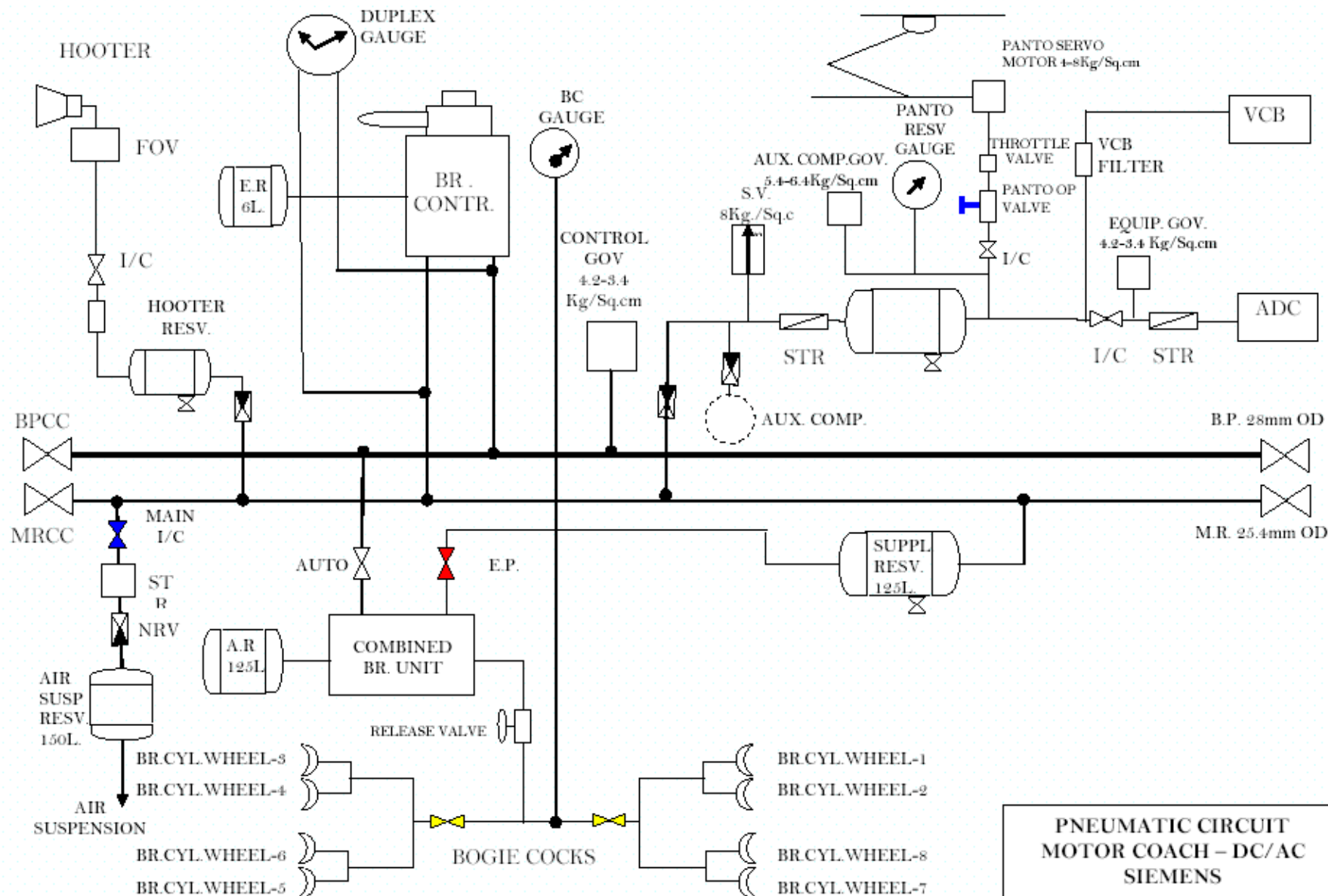
- diameter 1"
- charged at 5 kg/cm²(4.6 kg/sqcm)
- BP pressure to apply Auto brake

BRAKE PIPE

- Brake pipe pressure is obtained through reducing valve of Brake Controller which reduces incoming MR pressure to a pressure of 4.6 kg/cm².
- Aux. reservoirs in motor coach and trailer coach are connected to brake pipe through triple valve of EP unit and is maintained at a pressure of 4.6kg/cm².

BRAKE PIPE

- This brake pipe pressure is utilized to supply compressed air to brake cylinder during 'Auto' brake application, Dead-man handle (DMH) brake application, Guard's emergency brake application.
- Brake pipe is 1 inch. in diameter and green in colour, whereas MR pipe is $\frac{3}{4}$ inch in diameter and red in colour.



Different Air Reservoirs

Main Reservoir

1. It is located in the under-frame of the Motor coach.
2. Compressed air created by the main compressor is stored in main reservoir & is called MR pressure.
3. During EP brake application, compressed air is fed to the brake cylinder from main reservoir through EP unit.
4. The main reservoirs are fitted with drain cocks for draining off the condensate.

Supplementary Reservoir

- Each Trailer coach is provided with two supplementary reservoirs connected in parallel and located at under-frame.
- These reservoirs are connected with the main reservoir of Motor coach meant for storing the compressed air.
- During EP brake application, compressed air is fed to the brake cylinder from supplementary reservoir through EP unit.

Auxiliary Reservoir

- This reservoir is a part of brake circuit and is connected to brake pipe through triple valve of EP unit & remains charged at a pressure of 4.6 kg/cm² when the brakes are released.
- During auto brake application, compressed air is fed to the brake cylinder from auxiliary reservoir through EP unit.

Auxiliary Reservoir



Equalizing Reservoir

- This reservoir is located in the underneath of driving cab and connected with equalizing discharge valve through isolating valve switch of brake controller & contains compressed air at a pressure of 5 kg/cm². capacity 2.9/3.0 litres.

Equalizing Reservoir



Horn Reservoir

- It is located in the under-frame below the driving cab & is connected to the MR pipe line.
- Requisite compressed air supply needed for horn sounding is made available by this reservoir.

Control , ABB & Panto Reservoir

- These two reservoirs are provided in HT compartment.
- Control reservoir is provided for supplying compressed air to the tap changer & switch groups.
- Panto reservoir is provided for supplying compressed air to the Servo motor of pantograph and ABB.

Control Reservoir



Panto Reservoir



Different types of Governors

MCPA(Aux. compressor) governor:

1. This is located at HT compartment and controls the working of aux. Compressor.
2. The governor is set at 5.5 kg/cm² (cut in) / 6.5 kg/cm² (cut out).
3. There is a bypass switch (located in driving cab) in parallel with this governor.
4. This is a normally closed type governor i.e. after building up of requisite pressure it's inter lock opens to switch off the MCPA.

MCP (Main Compressor) Governor

1. This is located at HT compartment and controls the working of main compressor.
2. The governor is set at 6 kg/cm² (cut in) / 7 kg/cm² (cut out).
3. There is a bypass switch (located in driving cab) in parallel with this governor.
4. This is a normally closed type governor i.e. after building up of requisite MR pressure it's inter lock opens to switch off MCP.

Different types of Governors



ABB/VCB Governor

- This is located at HT compartment and prevents the closing of VCB/ABB in low pressure.
- The governor is set at 4.5 kg/cm² (cut out) & 5.2 kg/cm²(cut in).
- This is a normally open type governor i.e. after building up requisite pressure its inter-lock gets closed.

Control Governor

- It is provided in driving cab on BP pipe line to prevent the closing of Motor contactors till BP line is charged.
- This governor is set at 3.2kg/cm² (cut-out) /4.2kg/cm² (cut-in) and is having a bypass switch located in driving cab.
- This is a normally open type governor i.e. after building up requisite pressure its inter-lock gets closed.

Equipment governor

1. It is connected to incoming pipe line of tap changer and switch groups to prevent closing of EP contactor at low pressure and is located in HT compartment.
2. This governor is set at 3.2kg/cm² (cut-out) /4.2kg/cm² (cut-in)
3. It is having a bypass switch located in driving cab.
4. This is a normally open type governor i.e. after building up requisite pressure its inter-lock gets closed.

Parking Brake governor

- This is provided in newly received motor coaches and MEMUs in which provision of parking brake is made. It prevents closing of motor contactors and extends feed to indication lamp if parking brake is in applied condition.
- This governor is set at 3kg/cm² (cut in) and 2kg/cm² (cut out).

Thanking You All

