BRAKE SYTEM IN AC EMU

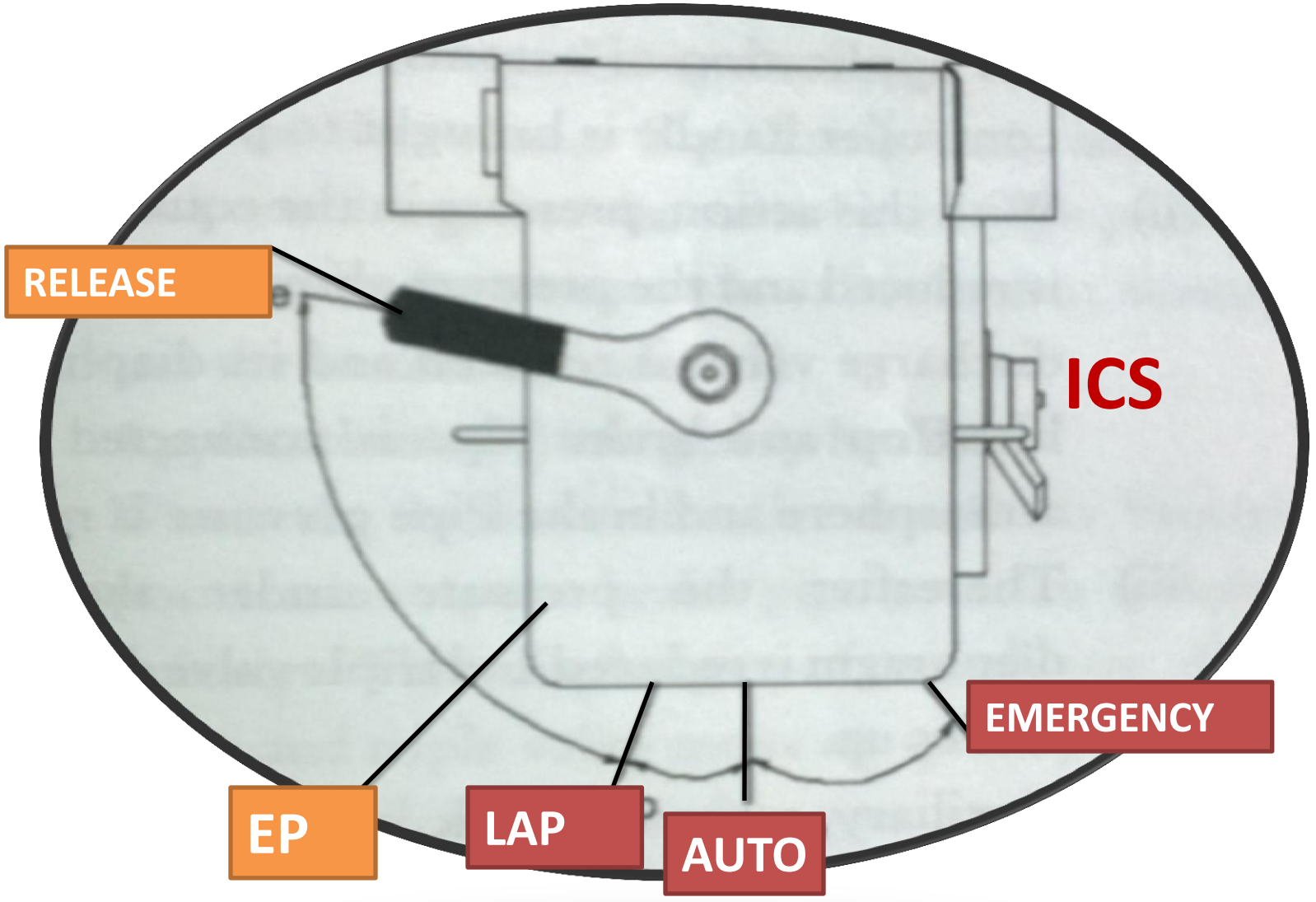
TYPES OF BRAKE IN AC EMU

1. Electro pneumatic Brake
2. Automatic Brake
3. Driver’s Emergency Brakes (Auto + EP Brake)
4. Guard's emergency Brake
5. Dead man's handle Brake
6. Parking Brakes

Brake Equipments

1. Brake Controller
2. EP Unit
3. Brake Rigging(Brake Block to brake cylinder parts)

Brake controller

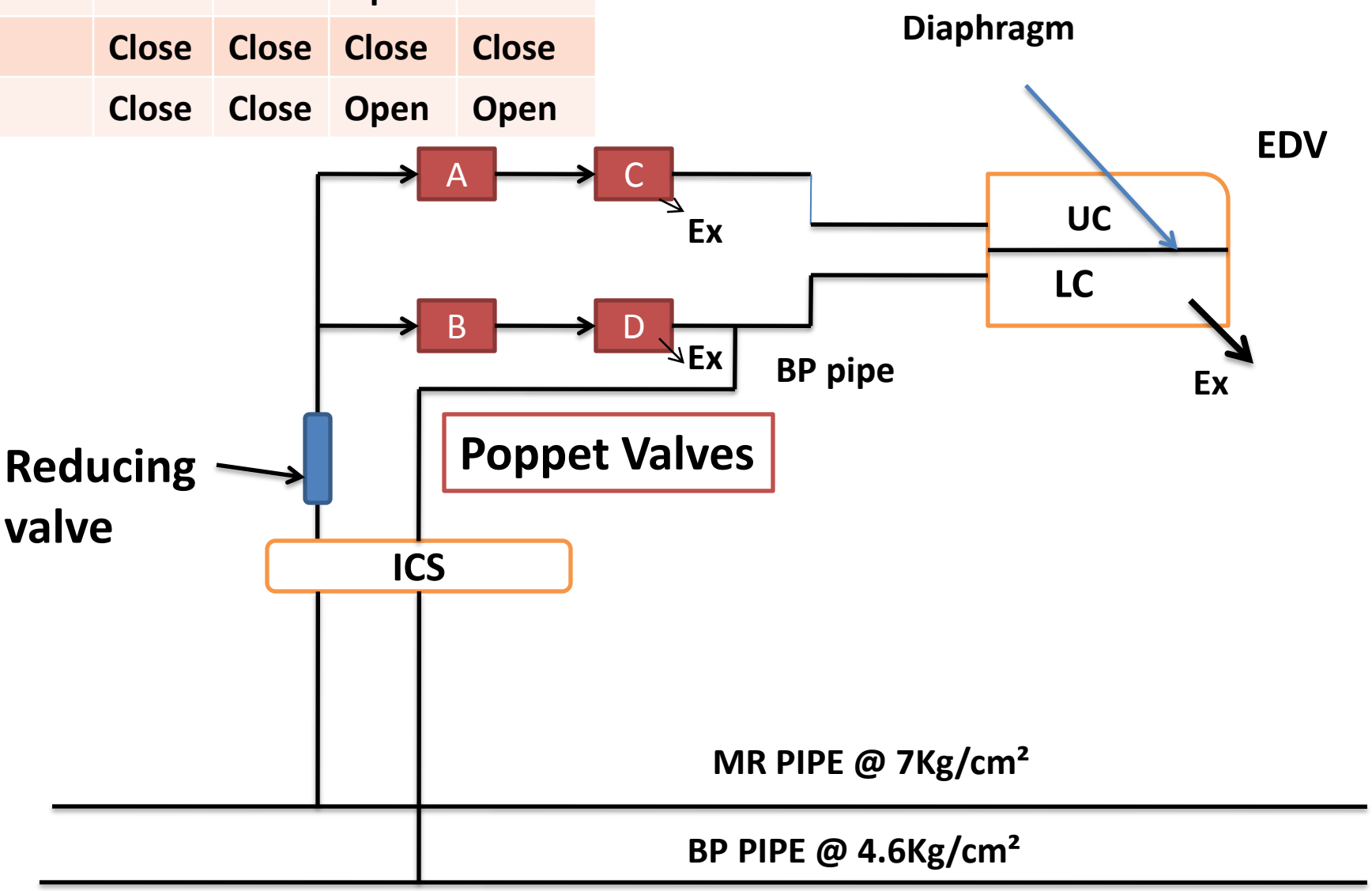


BRAKE CONTROLLER

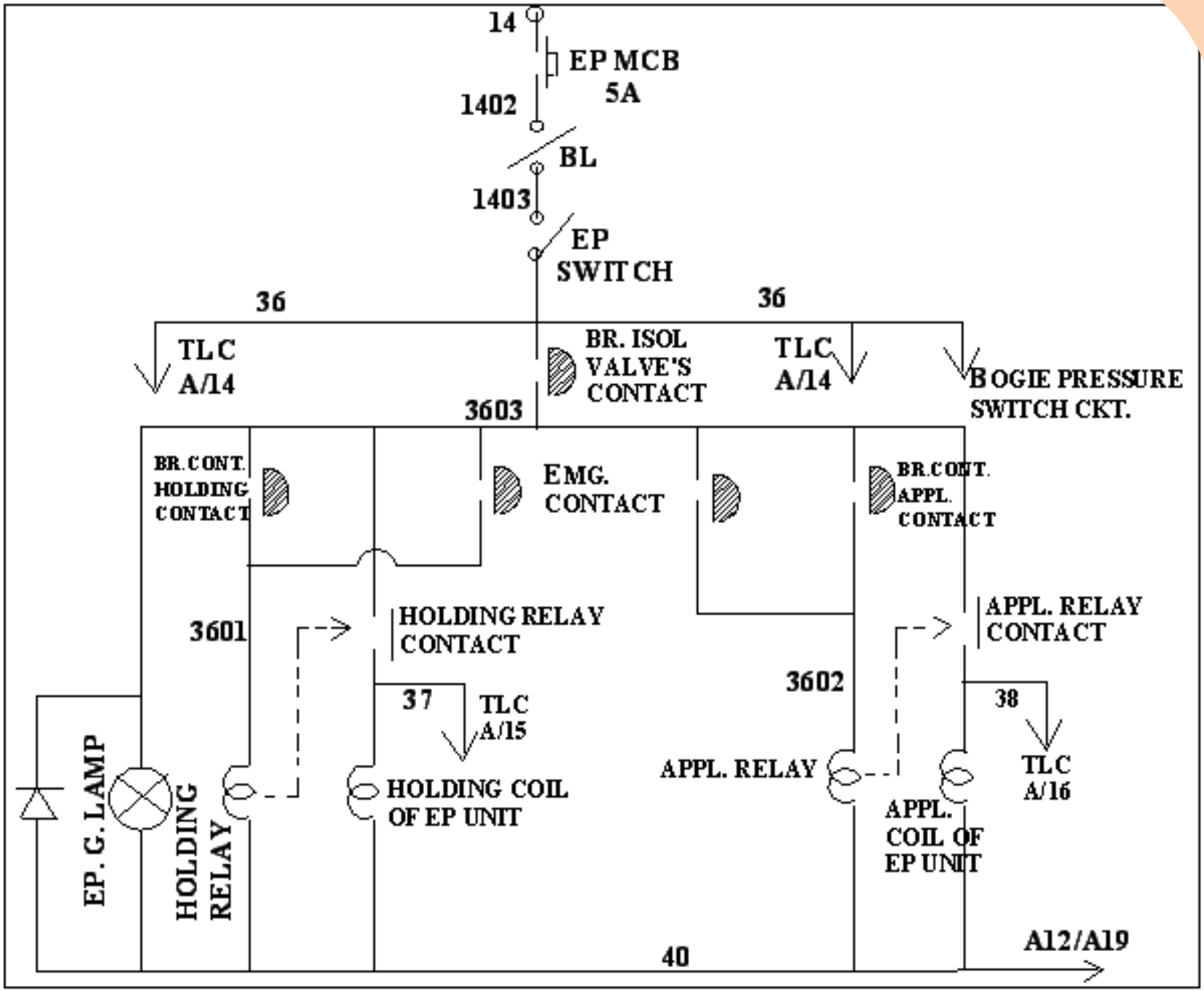
Brake Controller

Brake Controller Poppet valve

	A	B	C Ex	D Ex
Release	Open	Open	Close	Close
Auto	Close	Close	Open	Close
LAP	Close	Close	Close	Close
EB	Close	Close	Open	Open



EP BRAKE CIRCUIT



MAIN PARTS OF EK TYPE EP UNIT:

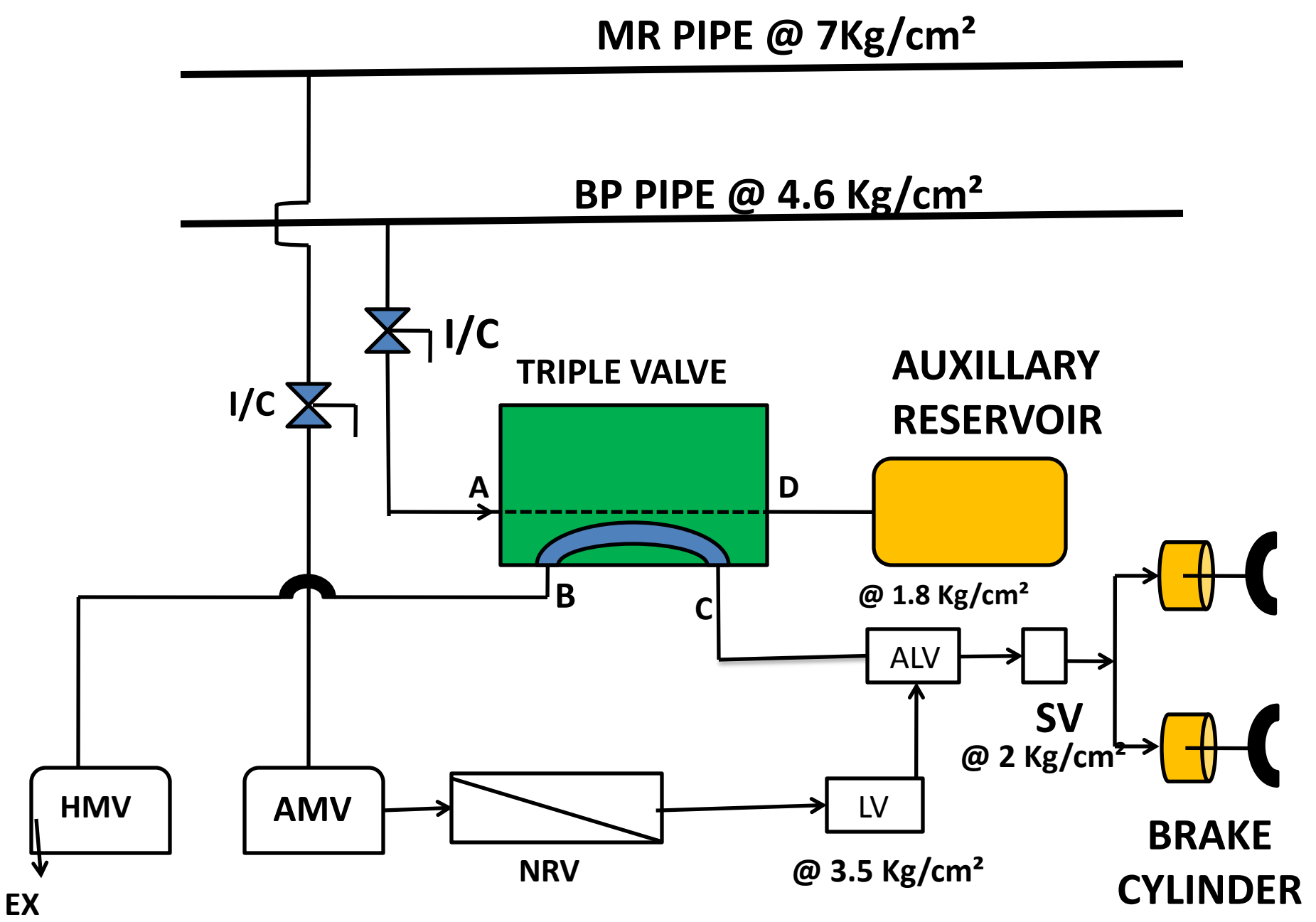
- Holding magnet valve- During EP brake application this valve closes the BC exhaust port to atmosphere and during release connects BC pipe to atmosphere.
- Application magnet valve – During EP brake application this valve connects MR line to BC line and thus supplies compressed air to brake cylinder required for brake application.

MAIN PARTS OF EK TYPE EP UNIT:

- Triple valve –This valve is responsible for auto brake application and supplies compressed air to brake cylinder by connecting the auxiliary reservoir to BC line when there is a drop in brake pipe pressure.
- Limiting valve- The function of the pressure limiting valve is to limit the air pressure in BC pipe line to a specified value (3.2kg/cm2).

MAIN PARTS OF EK TYPE EP UNIT:

- Safety valve- This valve protects the brake cylinder line from over-pressure thus preventing consequent damage on brake-block and wheel.
- Non-return valve-This valve is used to provide unidirectional path for air flow.



EP UNIT DIAGRAM

EP UNIT

ELECTRO PNEUMATIC BRAKE

- When motorman moves the brake controller handle to EP position, then both HMV & AMV get energized.
- HMV holds the brake cylinder pressure.
- AMV allows MR pressure to Brake Cylinder through Various Valves.
- Air Flow

  MR Pressure → AMV → NRV → Limiting Valve (LV)→ Additional Limiting Valve (ALV)→ Safety Valve → Brake Cylinder

RELEASE OF EP BRAKE

- When motorman moves the brake controller handle to release position, then both HMV & AMV get de-energized.
- HMV exhausts the brake cylinder pressure.
- AMV blocks MR pressure to Brake Cylinder through Various Valves.
- Air Flow

  Brake Pressure → Additional Limiting Valve (ALV)→ HMV→atmosphere

APPLICATION AUTOMATIC BRAKE

- When motorman moves the brake controller handle to Auto position, poppet valve A& B close and poppet Valve C's exhaust gets open then upper chamber of EDV valve gets exhausted and it's diaphragm moves upward and it's exhaust port gets open and BP pressure starts reducing
- This Reduction in BP pressure is sensed by tripple valve which connects D port to C port and allows auxiliary reservoir pressure to brake cylinder through ALV and safety valve.

APPLICATION AUTOMATIC BRAKE

- **Air Flow**

  Pressure from Auxiliary Reservoir → Triple Valve port D to Port C → Additional Limiting Valve → Safety Valve → Brake Cylinder

RELEASE OF AUTOMATIC BRAKE

- When motorman moves the brake controller handle to release position, poppet valve A& B open and poppet Valve C's exhaust gets closed then upper chamber of EDV valve gets charged and it's diaphragm moves downward and it's exhaust port gets closed and BP pressure starts charging.
- This charging in BP pipe is sensed by tripple valve which connects B port to C port and exhausts brake cylinder through ALV and safety valve.

APPLICATION OF EMERGENCY BRAKE

- During Driver's emergency brake application BP pressure is destroyed to actuate Auto brake application with EP brake simultaneously.

RELEASE EMERGENCY BRAKE

- When motorman moves the brake controller handle to release position, EP and Auto brake are released.

PARKING BRAKE

PARKING BRAKE

- The parking brake is provided to prevent the train from inadvertent rolling, if the normal brake looses its effect by having too less air pressure in the MR pipe during standstill condition
- Every axle of the DMC coach has an additional parking brake.

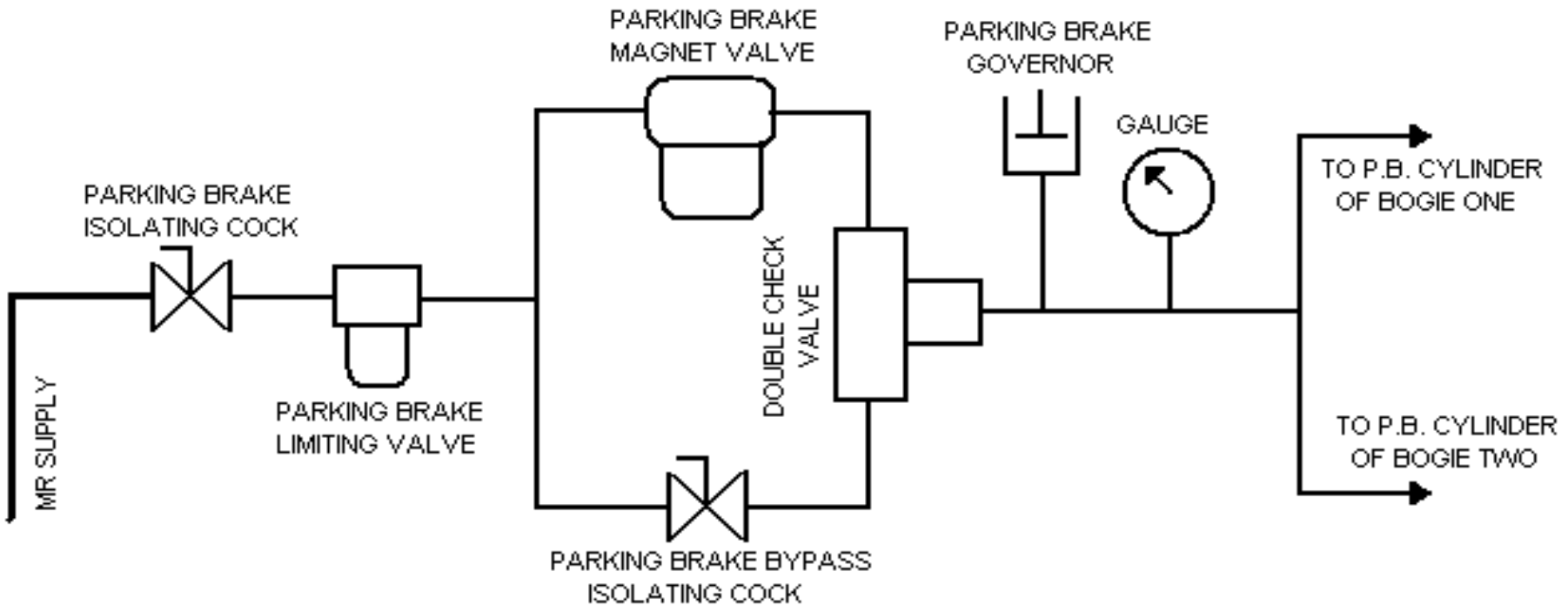
PARKING BRAKE

- Parking brake is applied using power of a spring and is released by using power of air.
- The parking brake is activated in standstill only.
- It is only possible to release the parking brake when a certain minimum air pressure is reached in the MR PIPE

Working principle

- The parking brakes are electro-pneumatically operated through the solenoid valve and separate brake cylinders. The brakes are applied on the following wheel positions.
- Position 1 axle wheel No. 1
- Position 2 axle wheel No. 3
- Position 3 axle wheel No. 5
- Position 4 axle wheel No. 7

Parking brake air circuit



PARKING BRAKE BYPASS ARRANGEMENT (NON-MODIFIED)

Application of parking brake

1. When Motorman switches on the knob switch for parking brake, the solenoid valve gets de-energized which stops the air pressure supply to parking brake cylinder and opens the vent for exhaust of the air pressure from the parking brake cylinder.
2. The cylinder operates (without air) and apply the parking brake

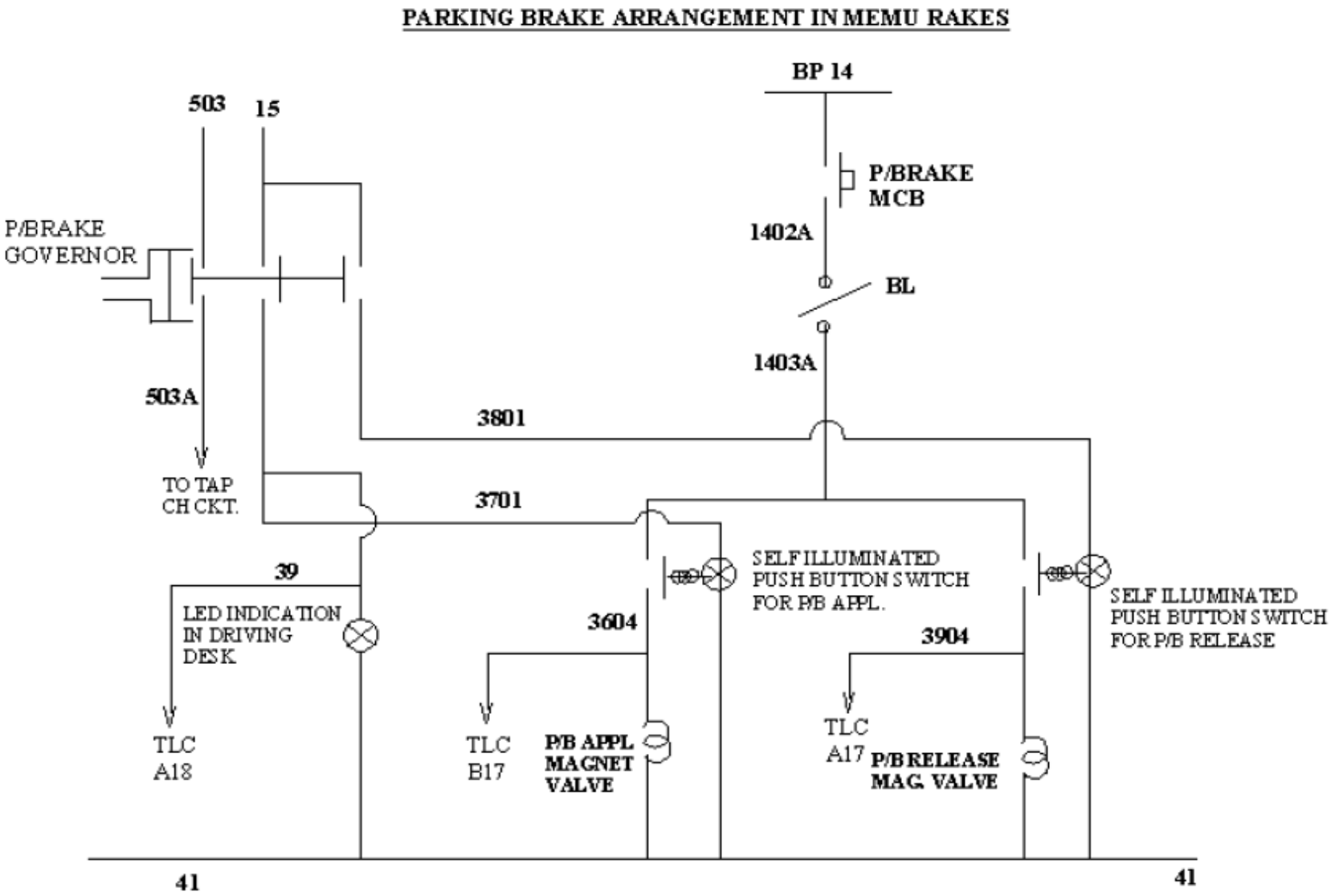
PARKING BRAKE

- When the air pressure in the parking brake air pipe is higher than 3 bar the parking brake is released.
- When the air pressure in the parking brake air pipe is less than 2 bar the parking brake is applied

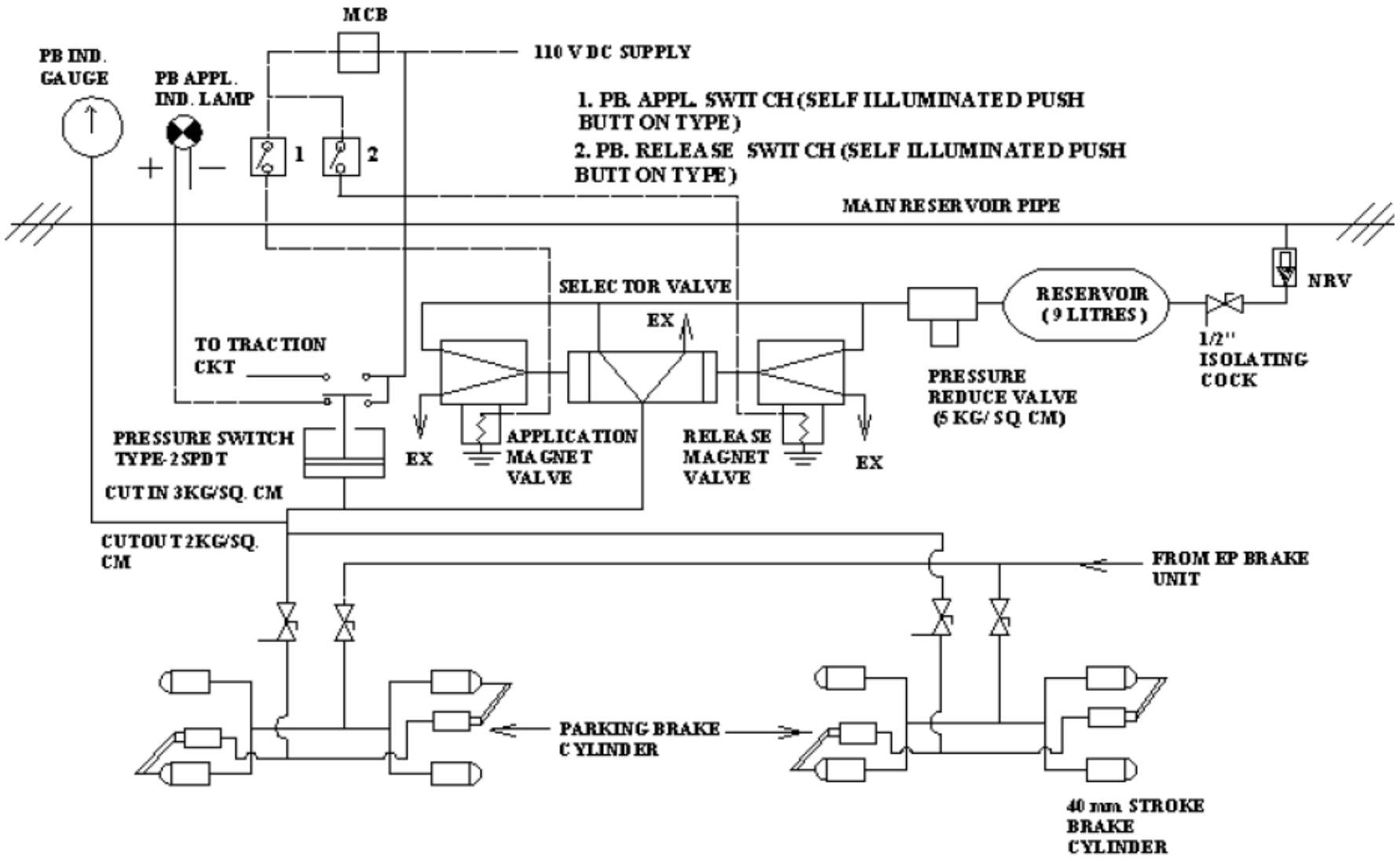
Release of Parking Brake

- As soon as the motorman switches off the knob for parking brake, the solenoid valve gets energized allows the MR pressure to the parking brake cylinder through a reducing valve and release the brake.

Parking brake electrical circuit



Parking brake air circuit



Application of Parking Brake

- For applying the parking brake, operate the push button for parking brake application provided in front of the Motorman’s desk.
- On pressing the push button, back light with parking brake applied symbol will illuminate.

Thanking You All