

Fuel oil System

STC / SBC

Fuel oil System -- Purpose

Pressurizing of Fuel oil to required level by FPM

Ensure continuous supply of fuel to all Fuel Injection Pumps

Supply of Fuel to Injectors by Fuel Injection Pump at a higher pressure

Supply of required quantity of fuel at required pressure to combustion chamber

Components in Fuel oil System

Fuel oil tank

Fuel trap

Primary Filter & Secondary Filter

Fuel booster pump

Relief Valve

Regulating valve

Fuel main header(Right & Left)

Fuel injection pumps(8 + 8)

Fuel injectors(8 + 8)

High pressure pipeline (8 + 8)

Crossover pipe(@ power takeoff end)

Fuel Tank Capacity & Minimum Fuel Oil Balance:



**6000 litres in WDG 3A and
WDM 3D.**

(Fabricated Bogie Locos)



**5000 litres in WDM 2 and
WDM 3A**

(Tri Mount Bogie Locos)

**1000 litres + Trip ration for working the train + 10% of
the Trip ration [or as per Stencil in Loco]**

FUEL OIL TANK

Steel fabricated tank located between the two trucks

Provision of fuel oil filling on both side with caps & strainers, to prevent foreign particles entering into the tank.

Glow rod gauge & scale are provided on both sides

Vent pipe is provided to

- Maintain air pressure on the top surface of oil
- Enable air to escape out during filling

Fuel trap

Provided on the right side of the engine block between fuel tank and fuel primary filter.

Traps heavy particles in fuel such as paper, cloth etc.

Primary & Secondary filters

Primary filter located at Engine right Side free End (WDM 2, WDM 3A), Engine room or Compressor Room(WDG3A).

Secondary filter is located at Engine right side free end.

Filters minute particles.

Fuel booster pump

Electrical Motor driven pump is located at the Compressor room.

When the pump starts working a partial vacuum is created in the pump and the fuel oil is sucked from the tank.

Fuel oil pressure Relief & Regulating valves

Relief valve is located near Secondary filter at engine right side free end & set at 5.5 Kg/sq. cm².

Relief valve is provided to protect the pump and motor from over load whenever the secondary filter is choked or due to any blockage in the system.

Regulating valve is located at engine left side free end & set at 4.4 kg/cm².

Regulating valve maintains constant pressure in the fuel main headers.

The excess pressure returns to the tank

Fuel main headers

The header runs from free end to the power take off end on both sides.

These headers have fuel oil always stored at certain pressure.

Cross over pipe connects both side fuel oil main headers at power take off end

Fuel reaches the FIP's through fuel jumper pipe/ Banjo pipe

High pressure pipe line

It is connected between FIPs & Injectors

The pressure of fuel oil flowing will be very high (approx 7000 PSI to 9000 PSI).

Fuel injection pumps - FIPs

FIPs are operated by centre cams of the camshaft

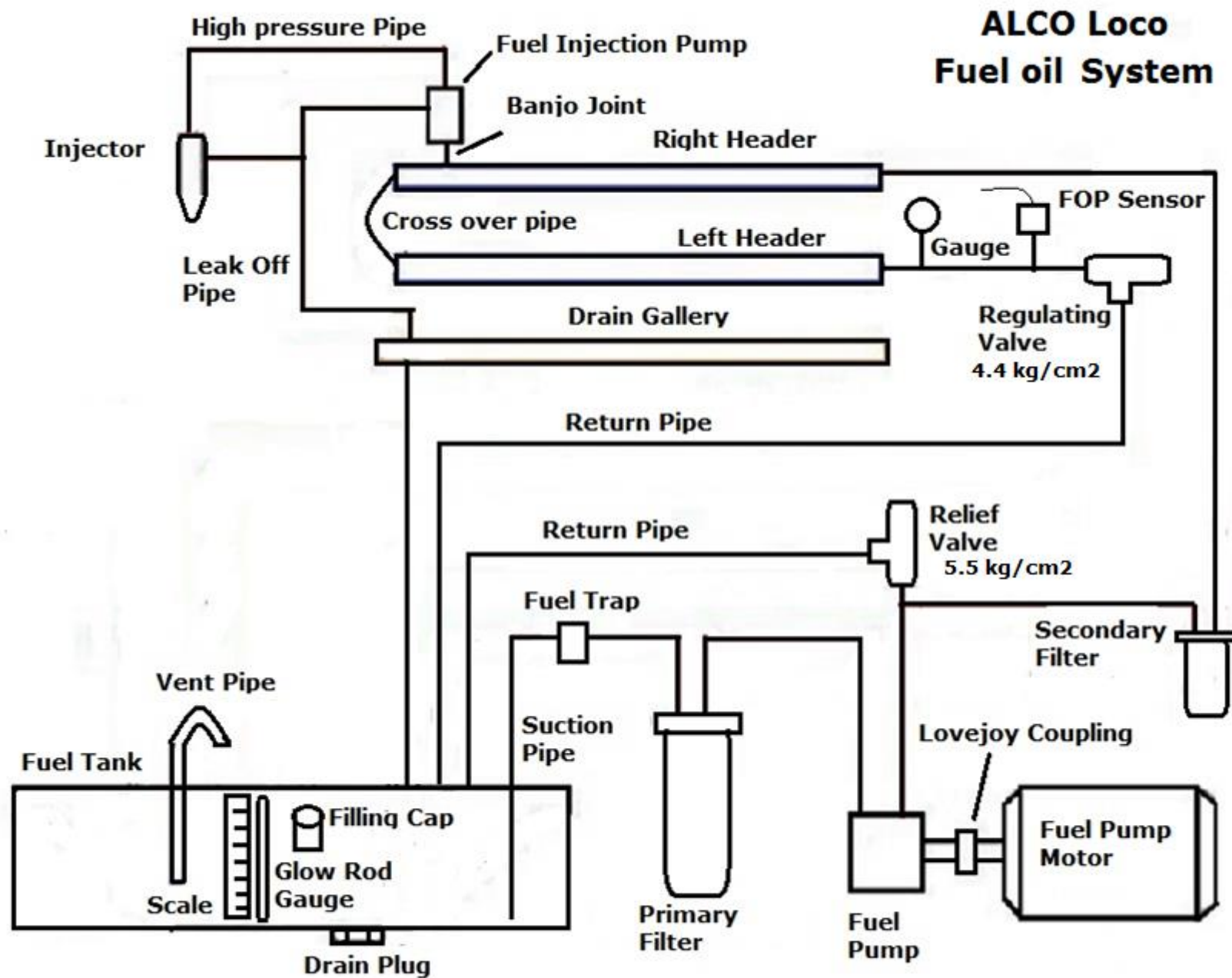
FIPs supply Fuel at very high pressure to the injectors.

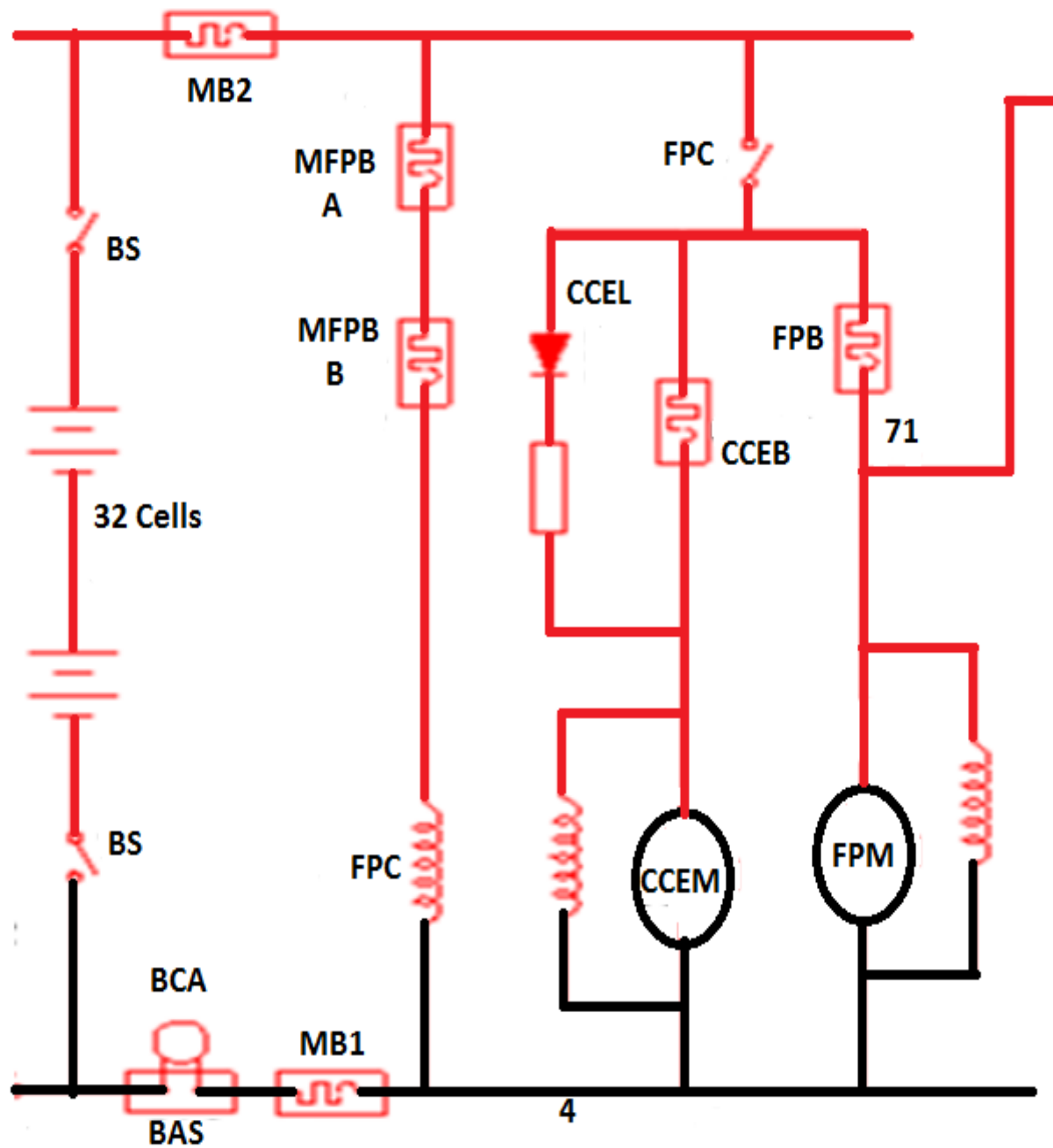
FIPs are provided with fuel rack to allow required quantity of fuel.

Fuel injectors

Finely drilled spray holes at the tip of the injector sprays fuel in atomized form so as to distribute the oil throughout the combustion chamber.

The pressure during fuel injection is around 3600 PSI to 4050 PSI.



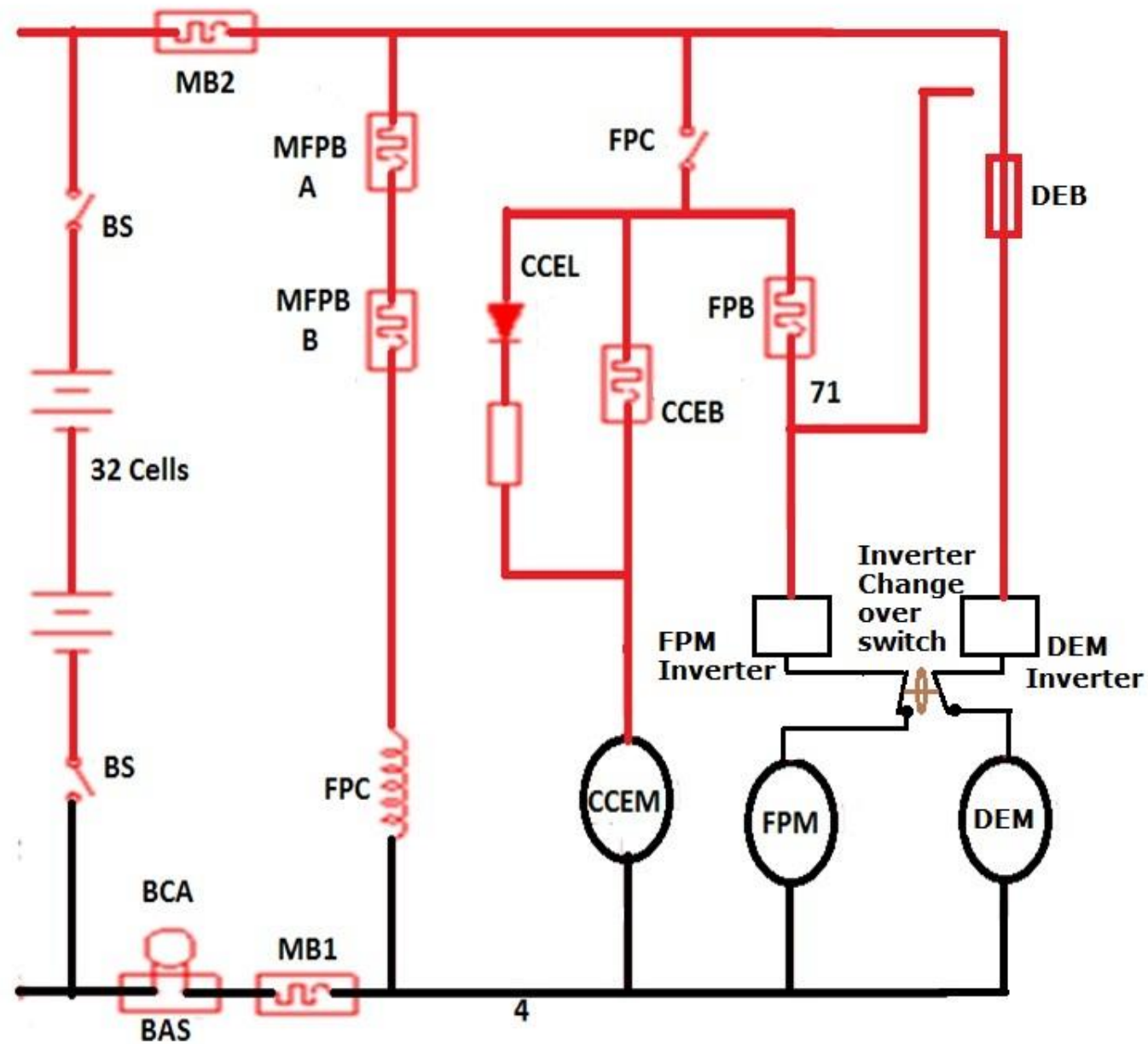


**AC – DC
locos**

Fuel pump motor or pump not working

Reason	Remedies
Weak Battery	Contact PRC
BS not closed	Close
MB1 / MB2 - OFF / tripped	Switch ON / reset
MFPB1 / MFPB2 - OFF / tripped	Switch ON / reset
FPC not picking up ▪Terminals disconnected / Slack ▪Coil short circuited or burnt ▪Any mechanical binding	▪Connect them ▪Remove wire No. 13 & insulate it. Pack FPC in energized condition. ▪Remove the binding
FPB OFF / tripped	Switch ON / reset
Fuel Pump Motor ▪Terminals disconnected ▪Commutator dirty (DC Motor) ▪Carbon brushes not making contact	▪Connect terminals ▪Clean the commutator ▪Check spring tension and adjust
Fuel Pump ▪Lovejoy coupling given up ▪Mechanical binding	▪Check and tighten the allen screw ▪Contact PRC

FPM not working





FPC not picking up

- Terminals disconnected / Slack
- Connect them & try
- Coil short circuited or burnt
- Remove wire No. 13 & insulate it. Pack FPC in energized condition.
- Any mechanical binding
- Remove the binding

Location:

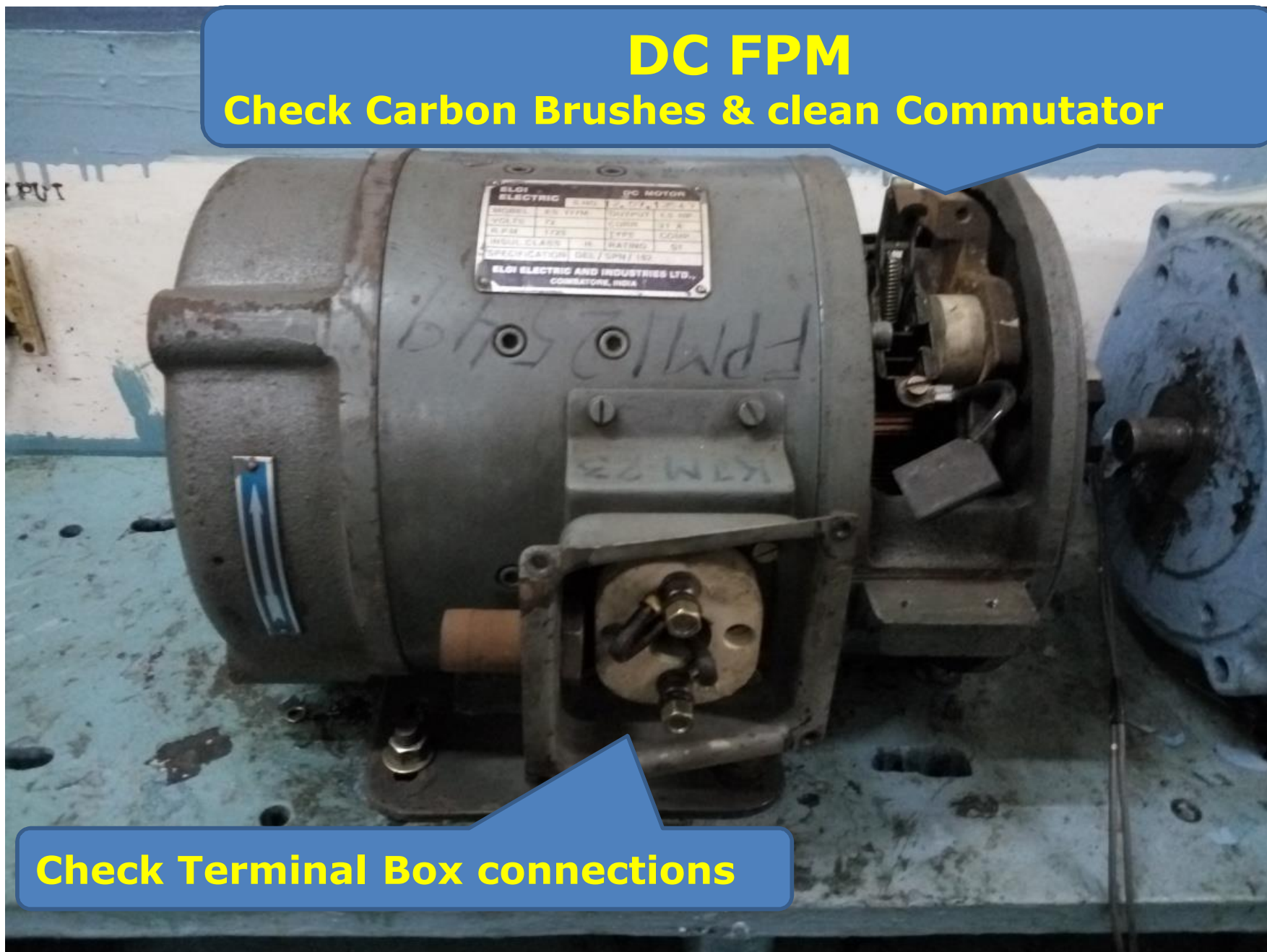
Back panel or Control
Compartment

Note: FPR is provided in GE mcp loco and energizes when EST kept to Prime

DC FPM

Check Carbon Brushes & clean Commutator

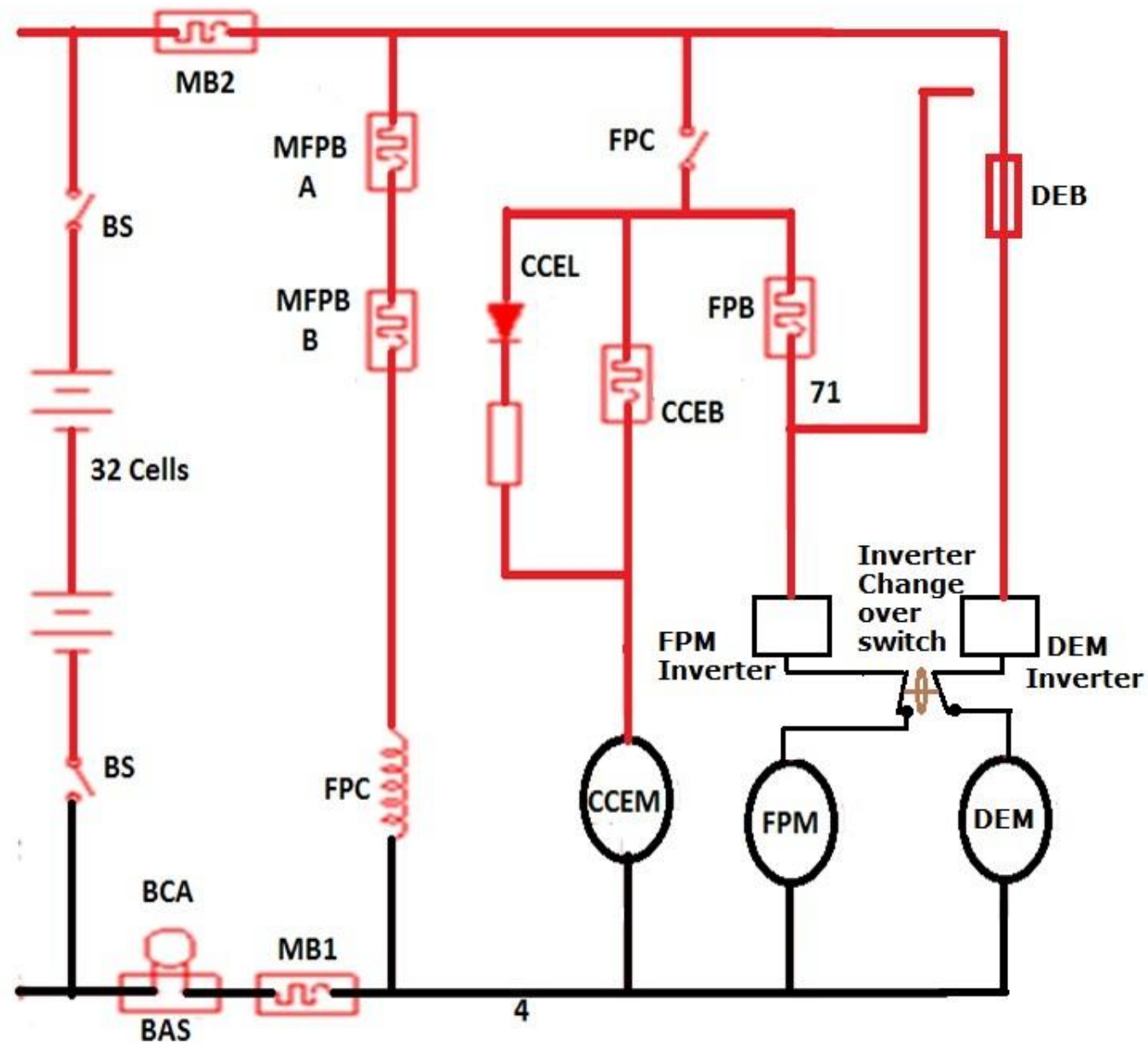
Check Terminal Box connections



SLOI ELECTRIC		DC MOTOR	
MODEL	250 FPM	OUTPUT	1.5 HP
VOLTS	220	CURR	27 A
RPM	1725	TYPE	COMM
INSUL CLASS	B	RATING	ST
SPECIFICATION DEL / SPN / 182			
SLOI ELECTRIC AND INDUSTRIES LTD., COMMATORE, INDIA			

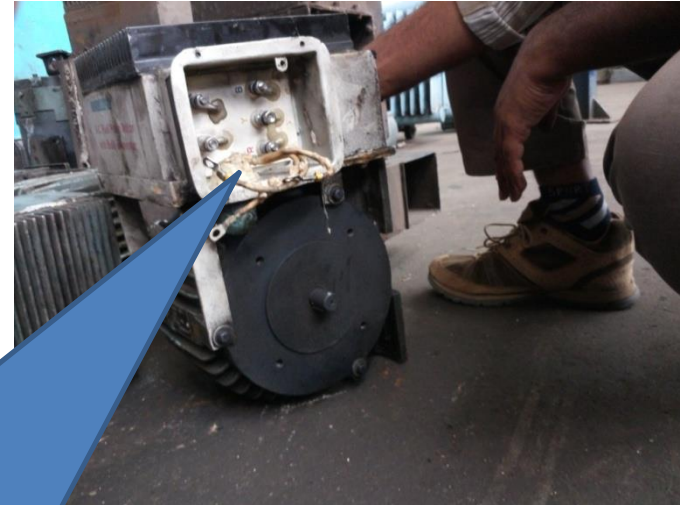
Handwritten on the motor body: FPM 250, 220V, 1725

Provision of Inverter changeover switch for AC FPM



Modifications

3 phase AC Fuel Pump Motor with Inverter



Check 3 phase AC and DC terminals

Vertical Type FPM with inbuilt FPM, Pump & Inverter



Modifications

Inverter changeover Switch

In LPs Cab



In Compressor Room



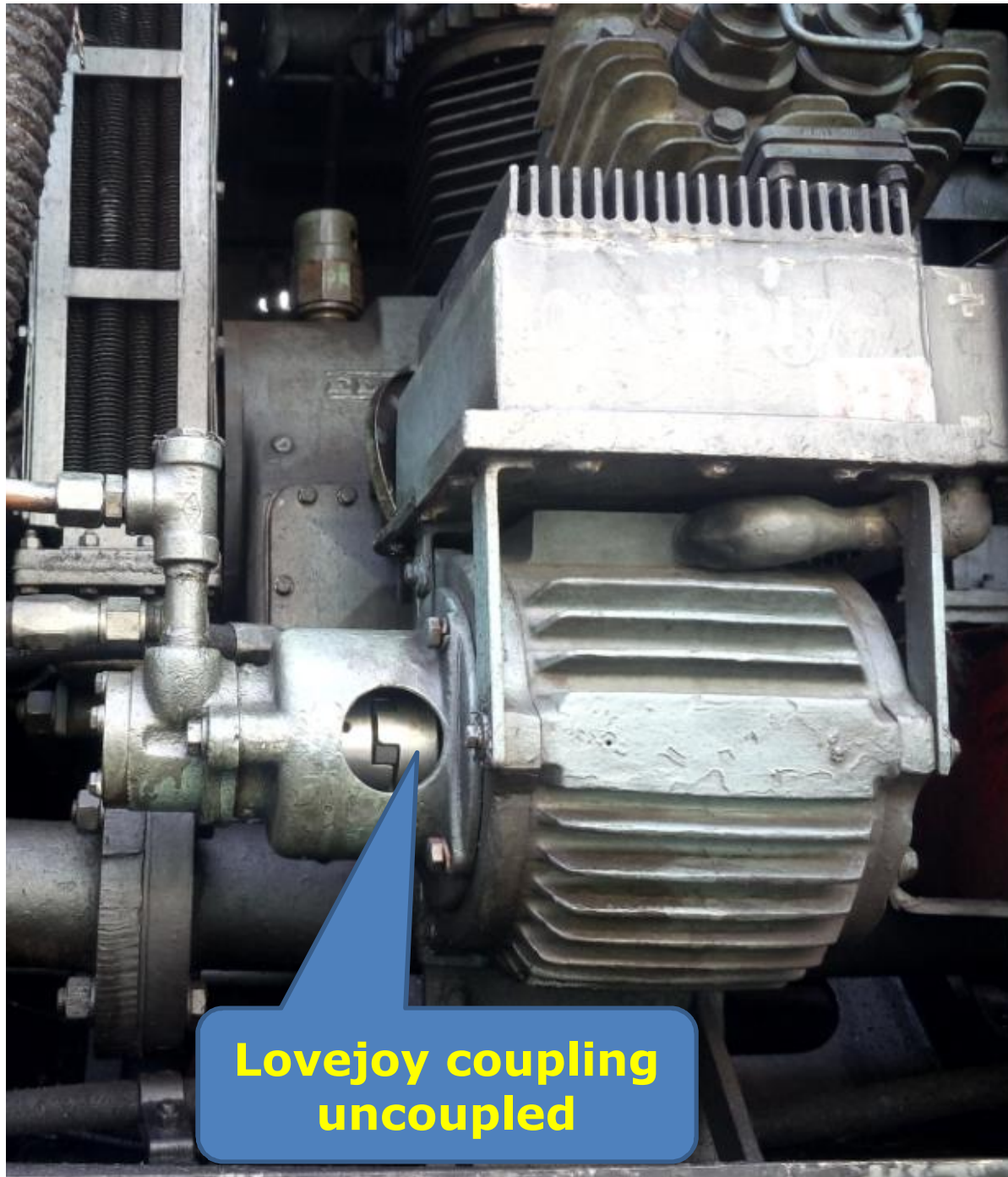
Trouble Shooting for AC Fuel Pump Motor

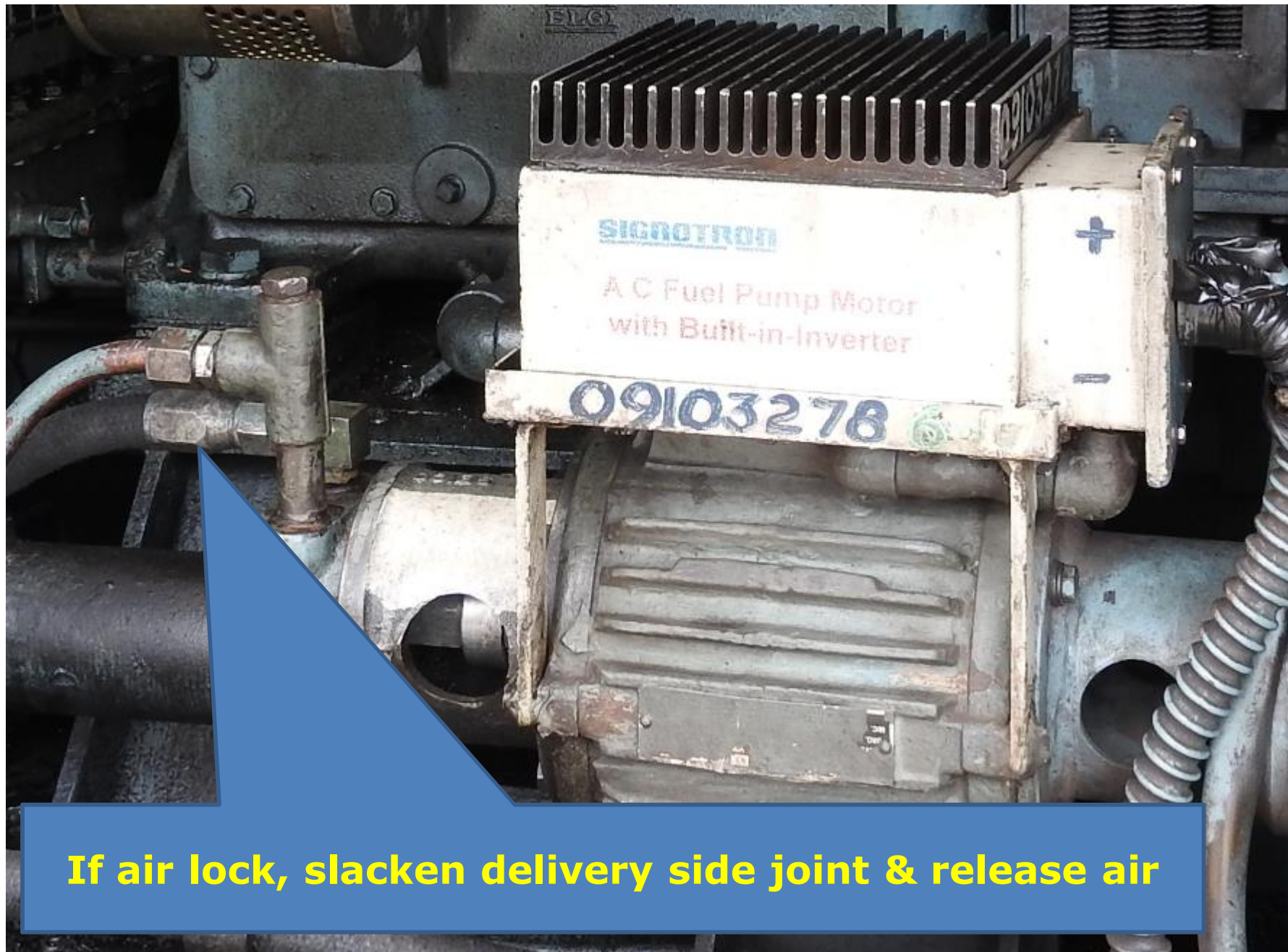
If FPM not working due to Inverter problem:

1. Switch OFF FPB & DEB
2. Change the Inverter Changeover Switch position
3. Switch ON FPB & DEB
4. Ensure FPM Working
5. If FPM is not working, Contact PRC

Note: DEM(Engine) will not work in this position

**Fuel oil pressure not building up even
though FPM working**





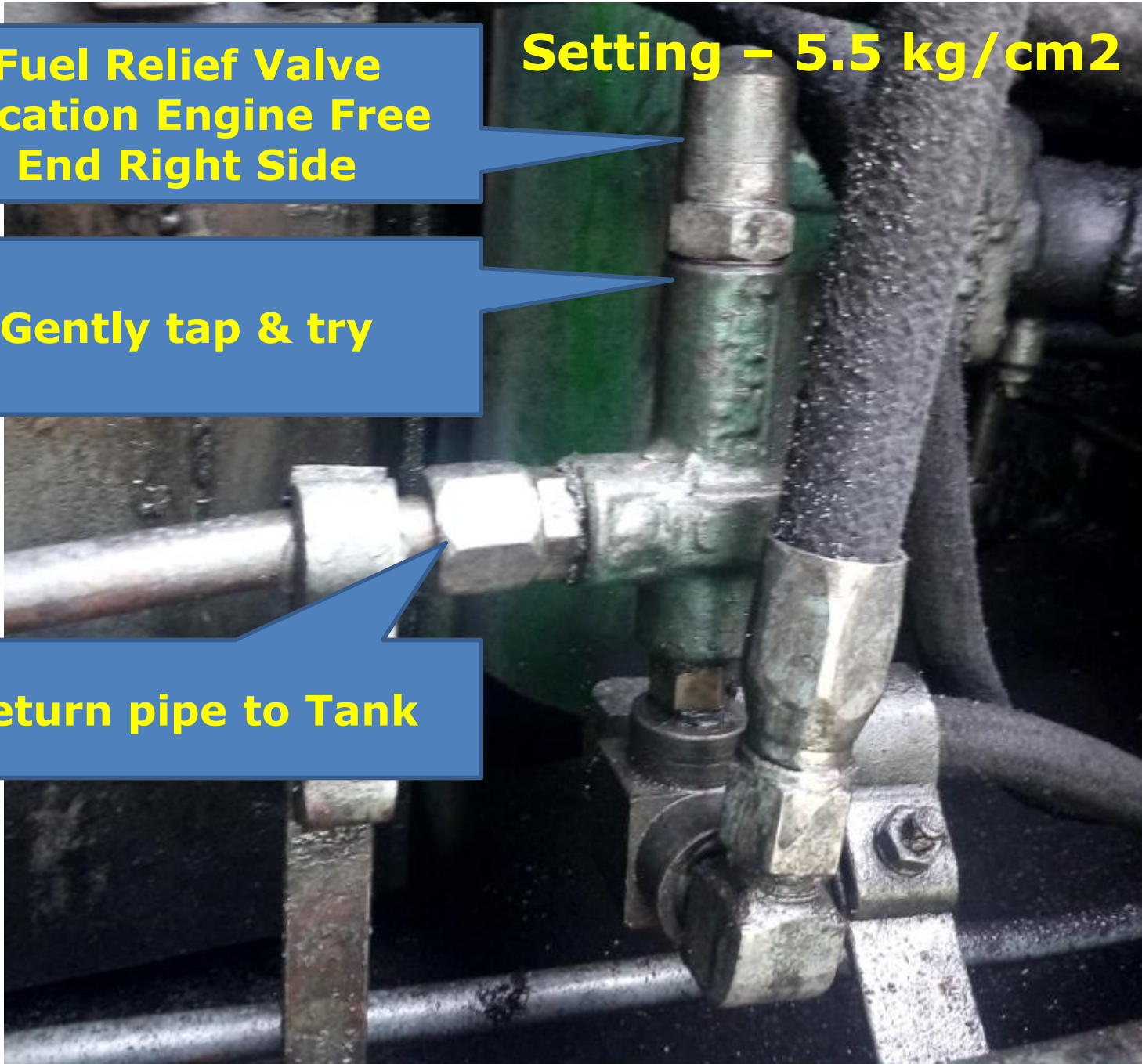
If air lock, slacken delivery side joint & release air

**Fuel Relief Valve
Location Engine Free
End Right Side**

Setting – 5.5 kg/cm²

Gently tap & try

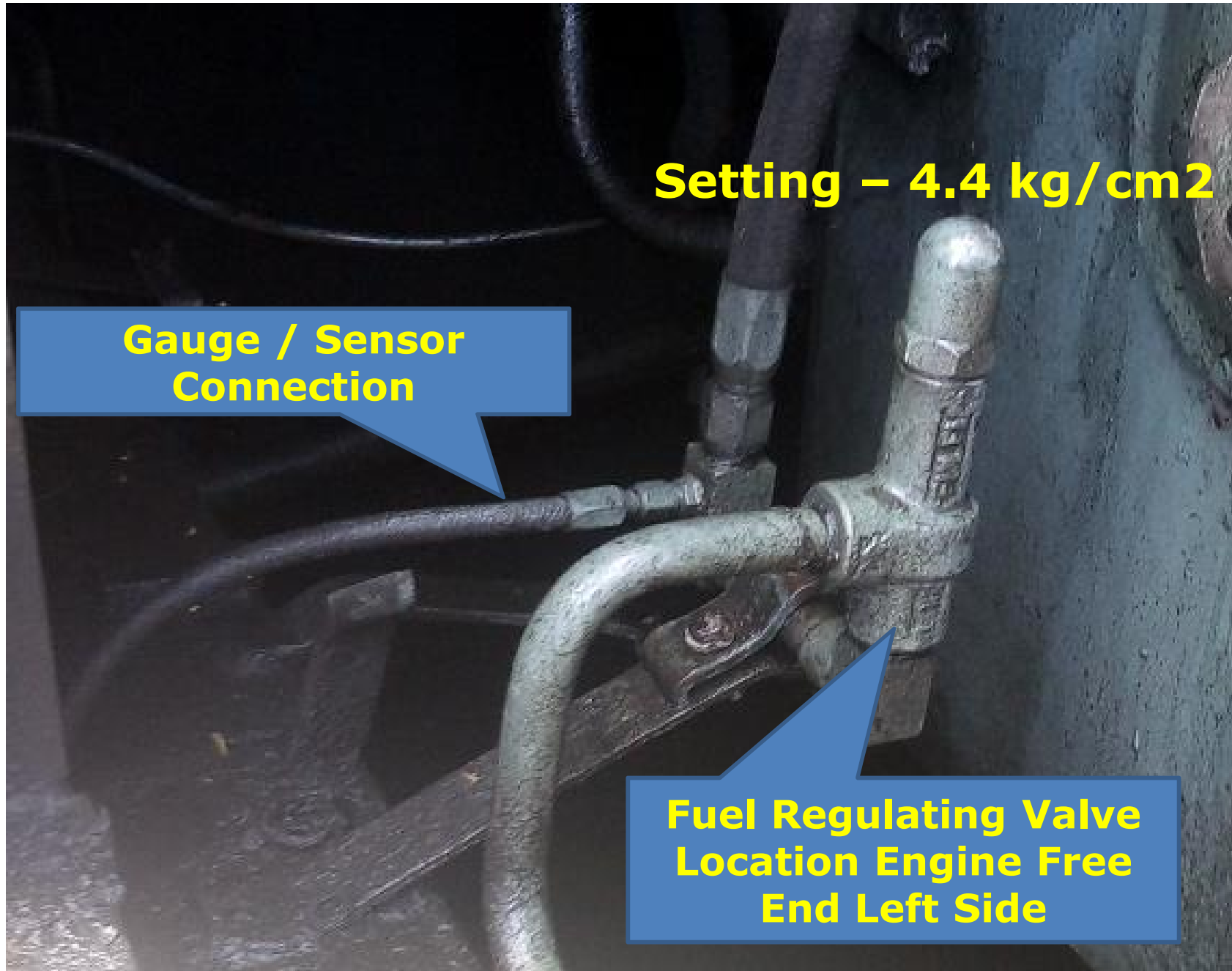
Return pipe to Tank



Setting – 4.4 kg/cm²

**Gauge / Sensor
Connection**

**Fuel Regulating Valve
Location Engine Free
End Left Side**





Leakage in Crossover pipeline / joints

Try to arrest leakage

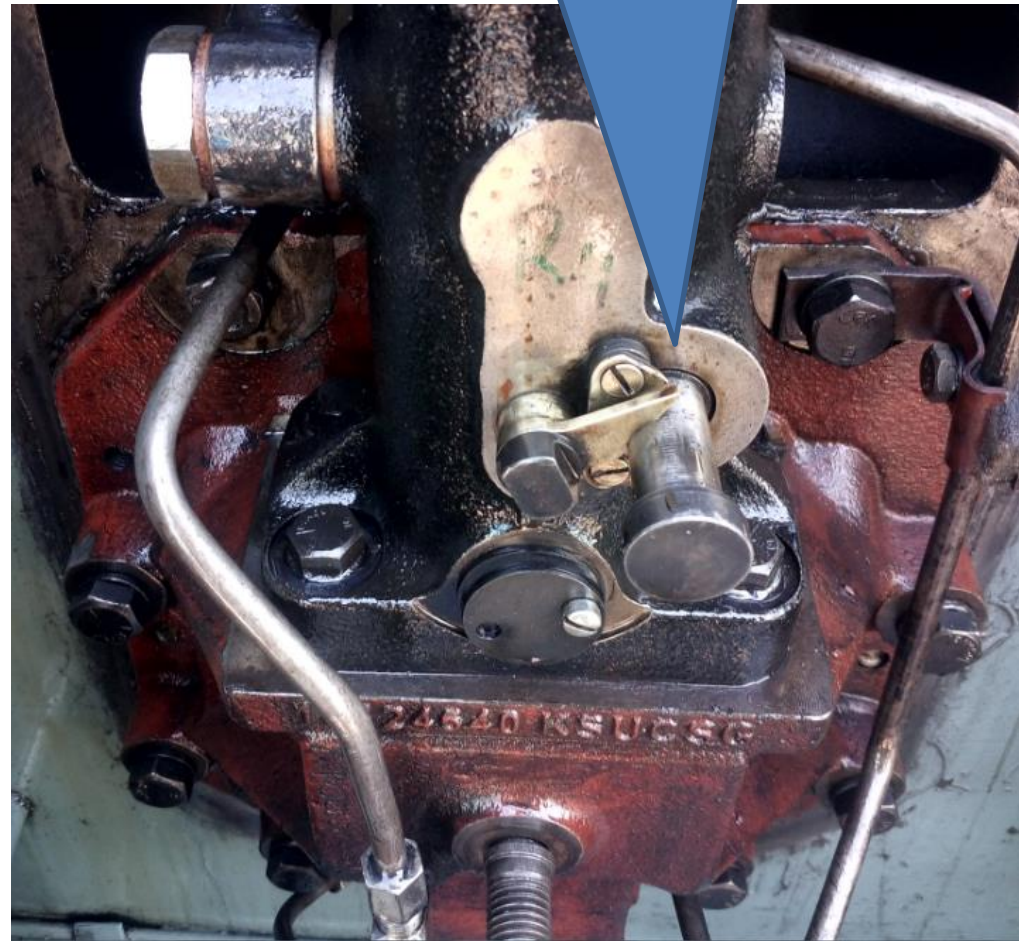
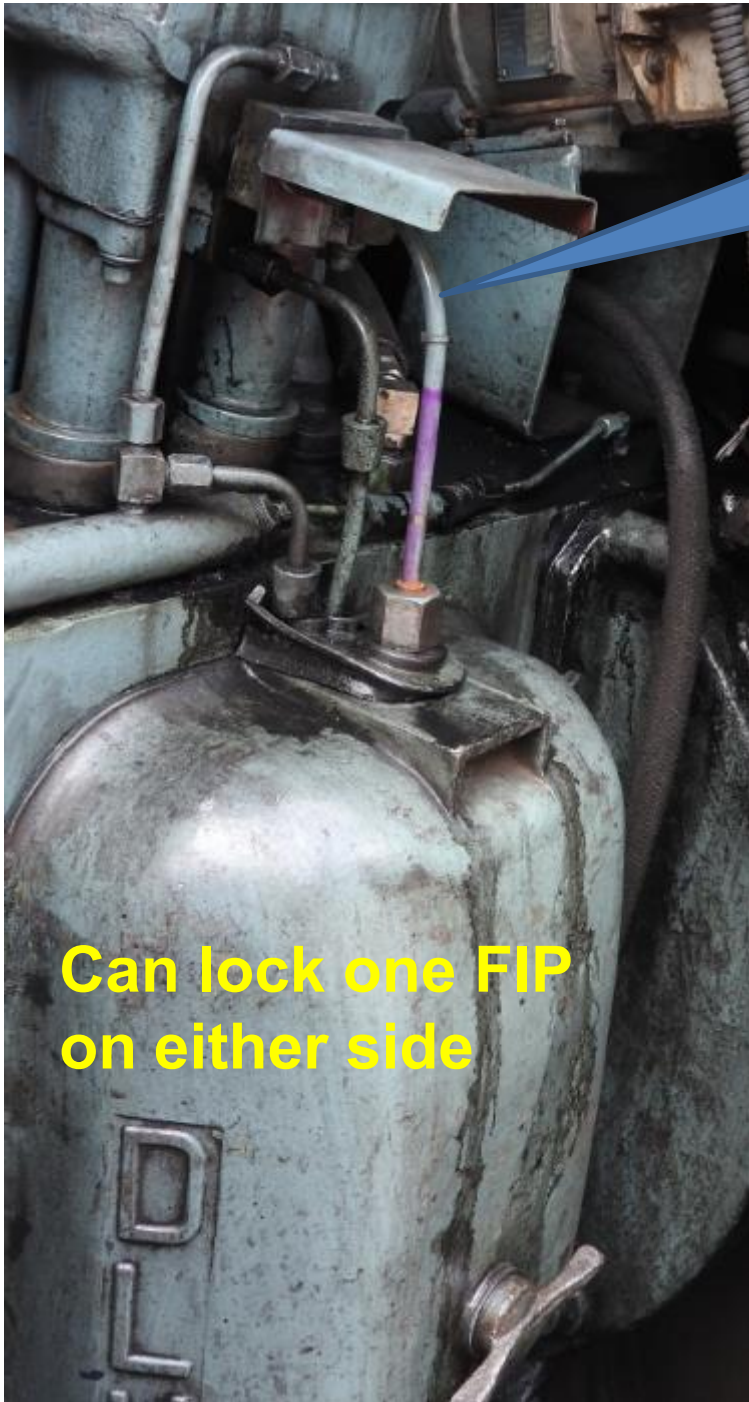
Contact PRC

Location : Engine Power take off end both sides

**If High Pressure Pipeline
leaking or Unusual sound from
FIP**

Lock FIP Fuel Rack

**Can lock one FIP
on either side**

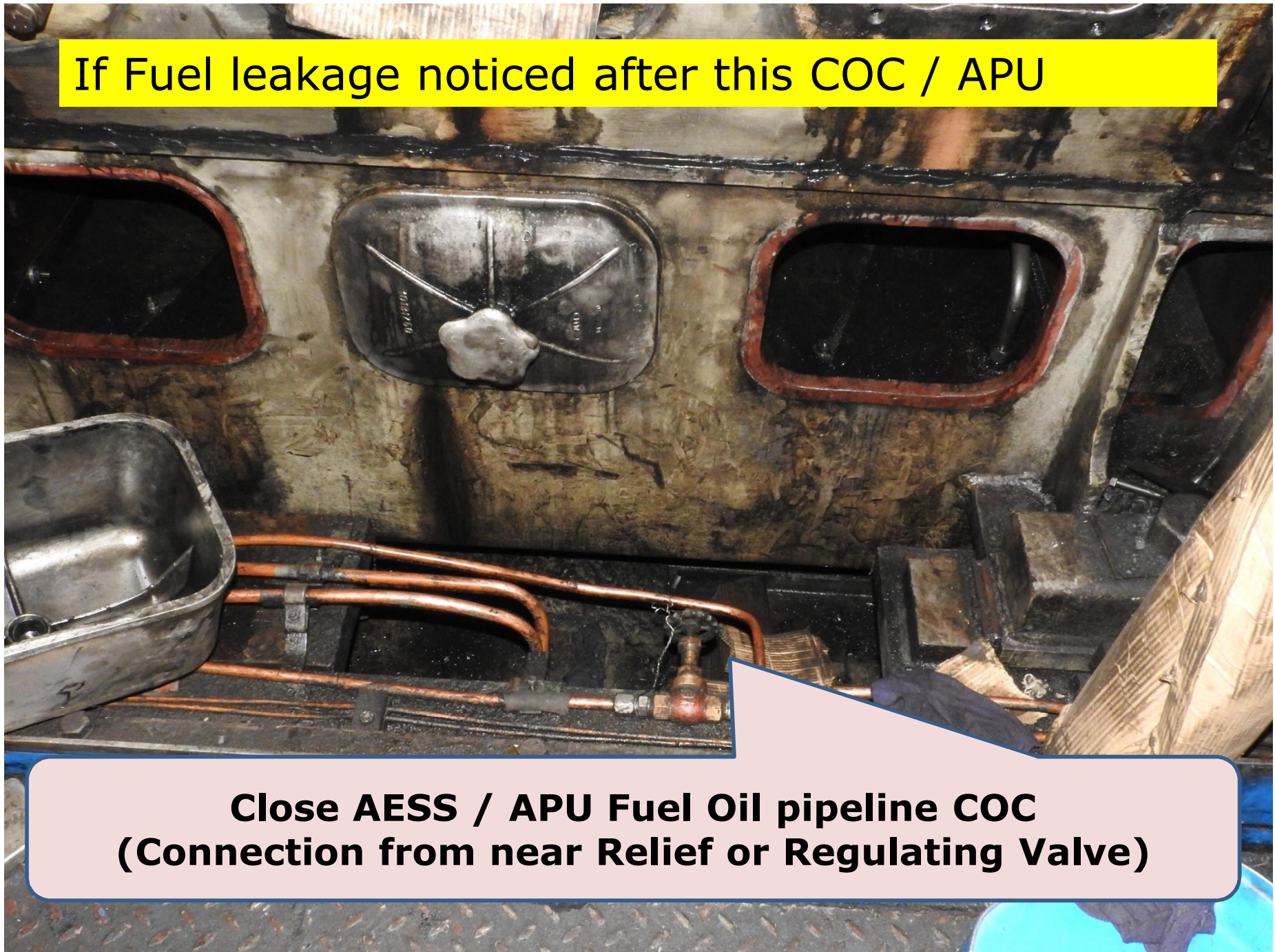


Can try Banjo joint Dummying

Leakage at Banjo joint or FIP damage

Leakage at Banjo joint or FIP damage

If Fuel leakage noticed after this COC / APU



**Close AESS / APU Fuel Oil pipeline COC
(Connection from near Relief or Regulating Valve)**

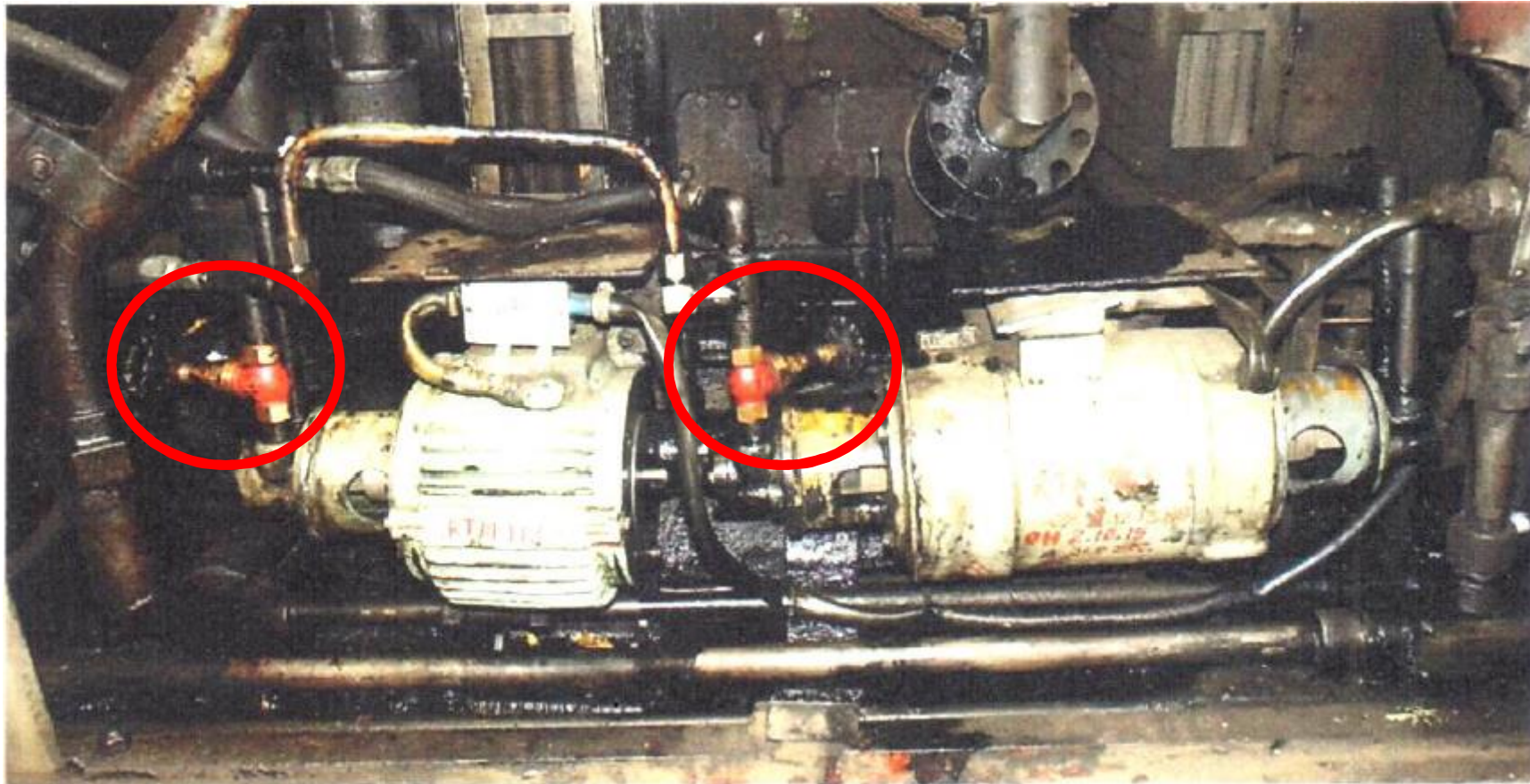


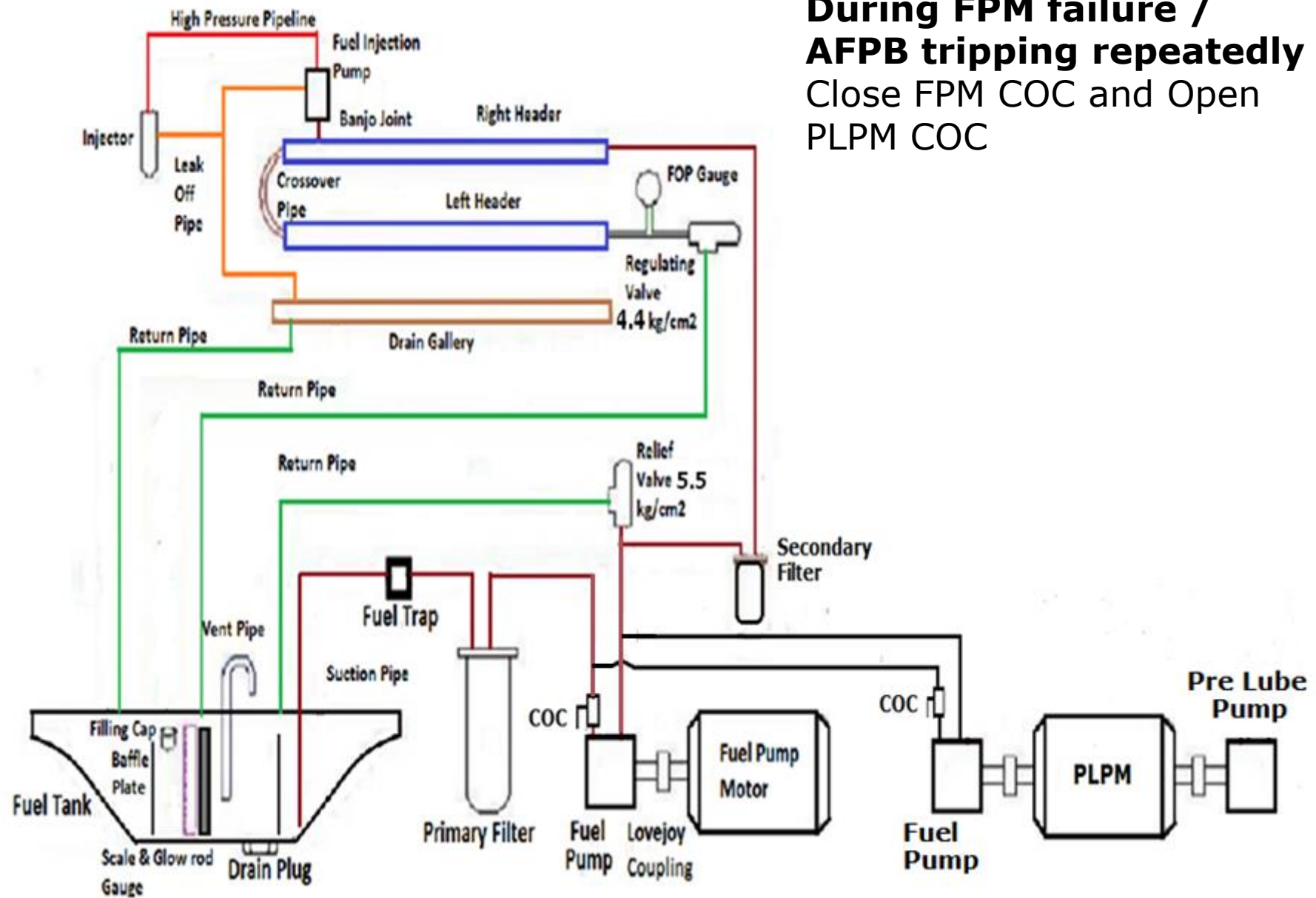
**AESS / APU Fuel Oil pipeline COC
(Connection from near Relief or Regulating Valve)**

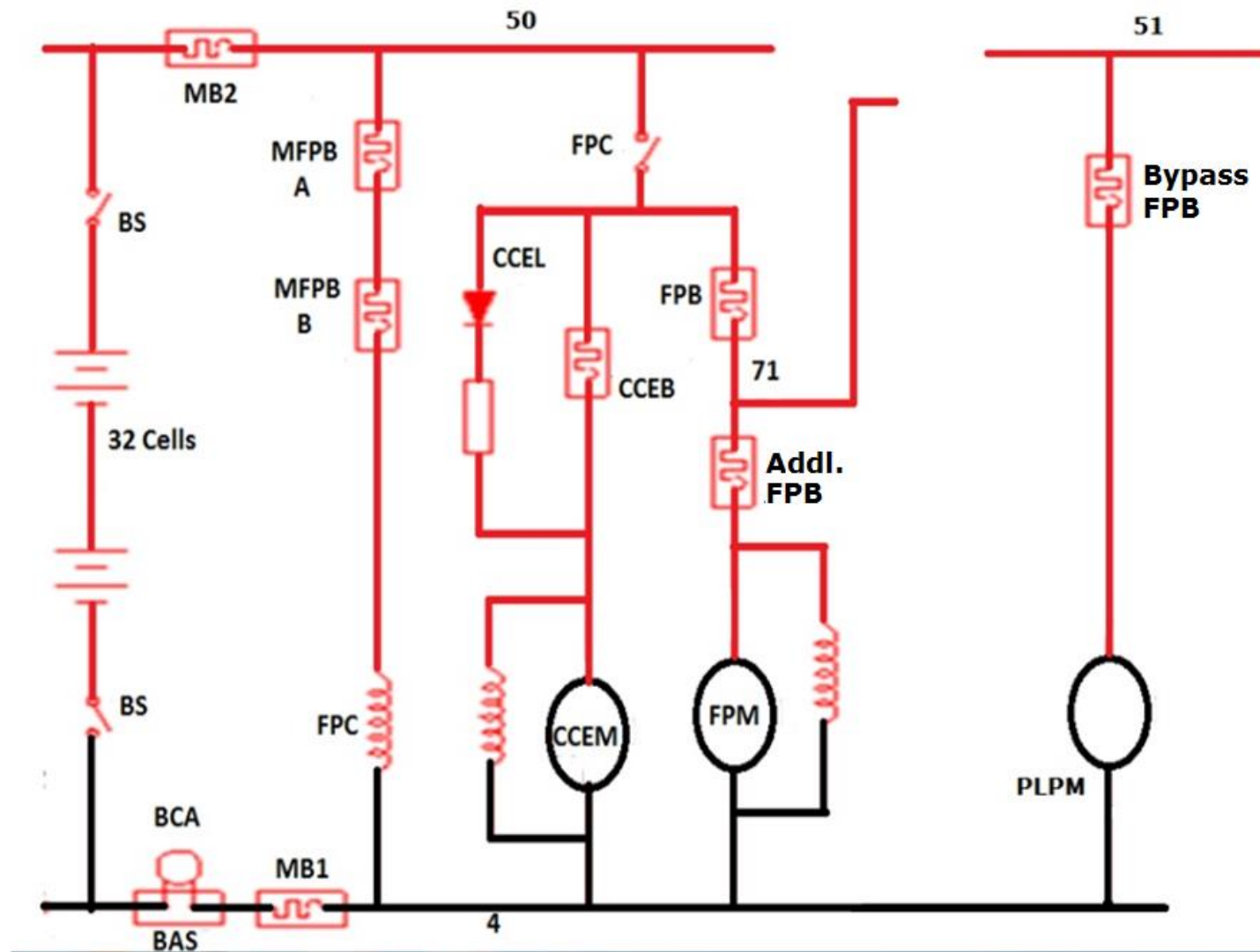
Additional FPM (PLPM) Modifications

PLPM is fitted with Fuel Booster Pump

COCs provided in Fuel pipeline – For Changeover







ÅFPB to be kept always ON.

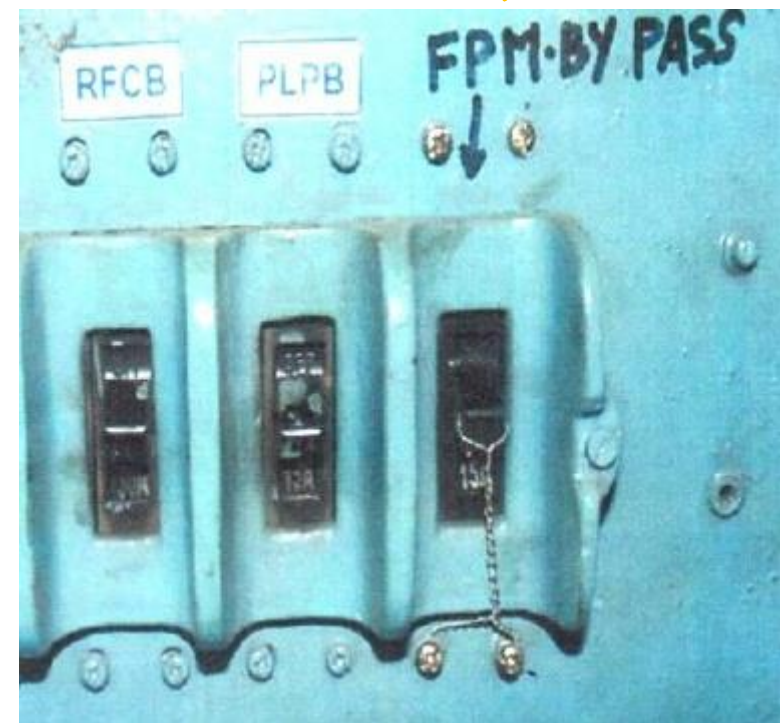
ÅAddl. FPB to be kept ON for FPM working.

ÅDuring FPM failure / Addl. FPB tripping repeatedly - Switch ON Bypass FPB



**Additional Fuel Pump
Breaker**

**Fuel Pump By Pass
Breaker**





Fuel Trap



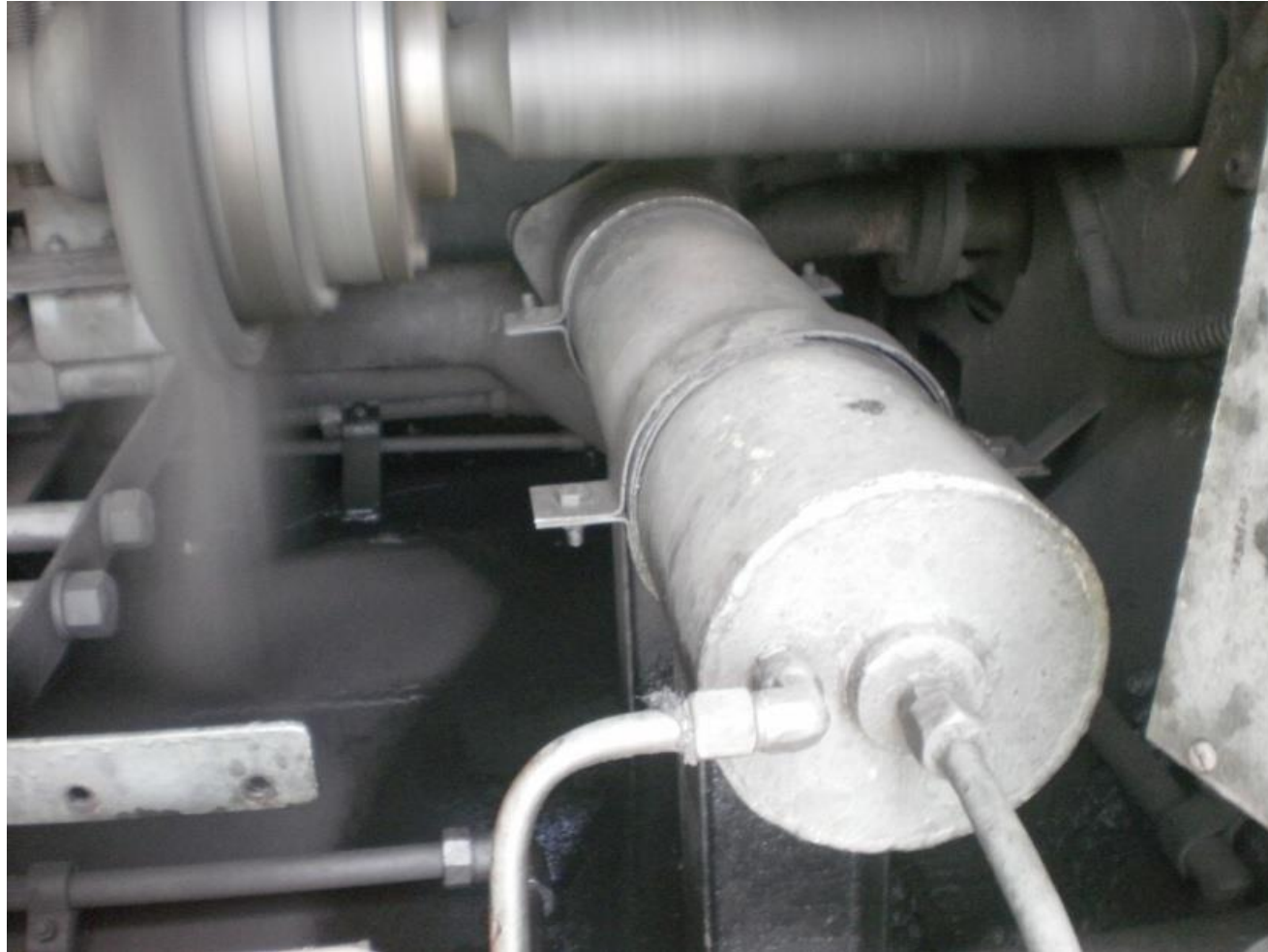
WDM2/WDM3A Loco Primary & Secondary Filter

Primary Filter

Secondary Filter

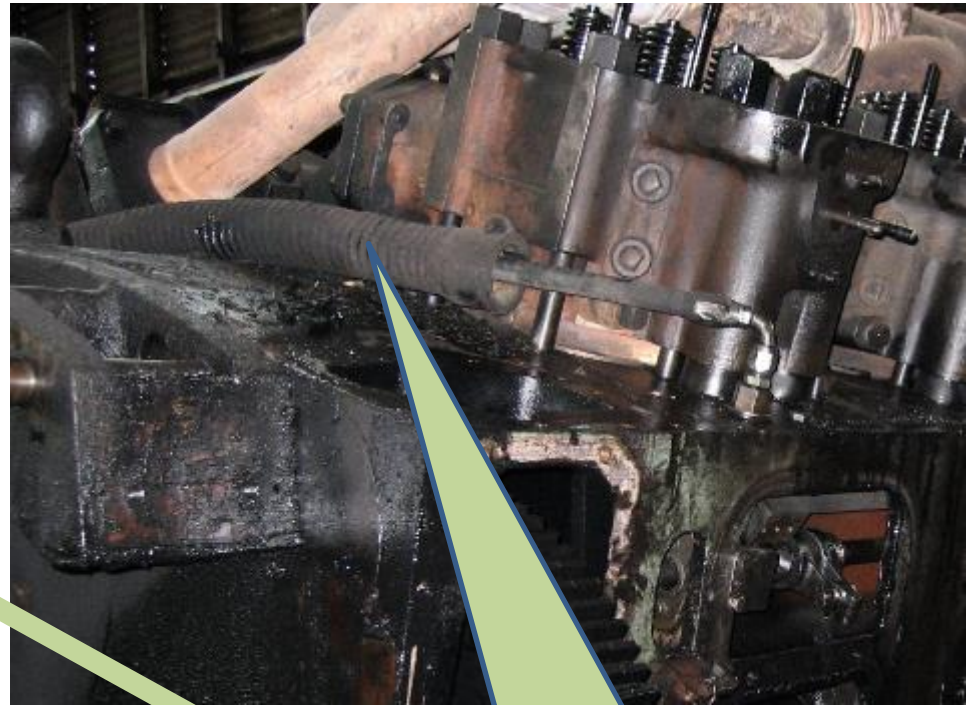
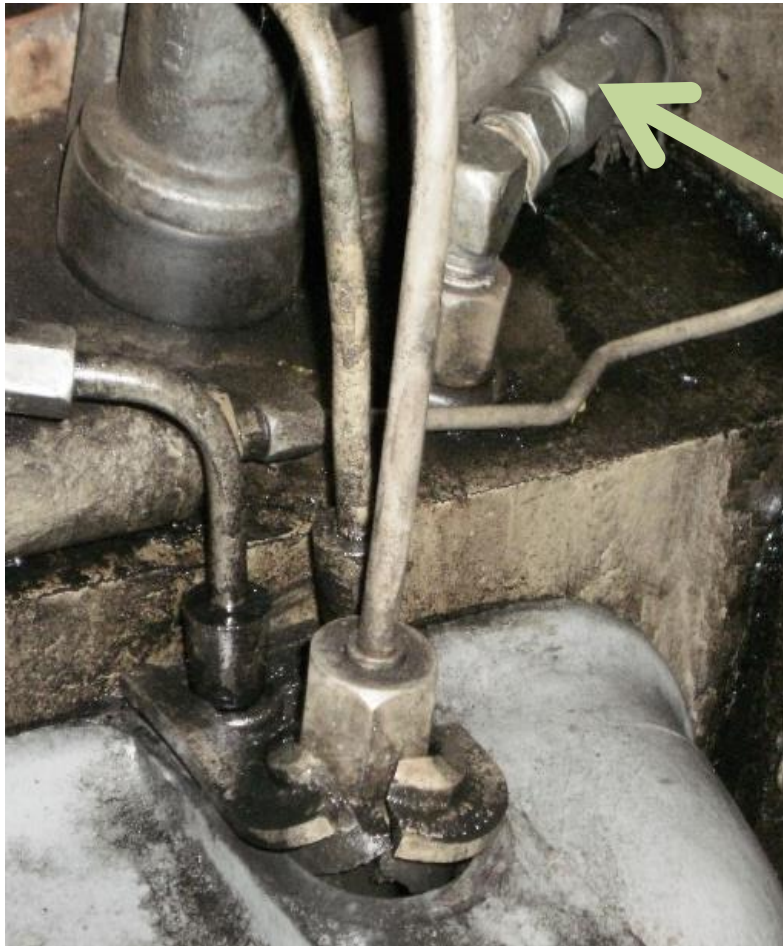
Relief Valve

Primary Filter In WDG 3A Loco in Compressor Room and size is bigger





Primary Filter provided on right side of Engine Block
in WDM3D Loco



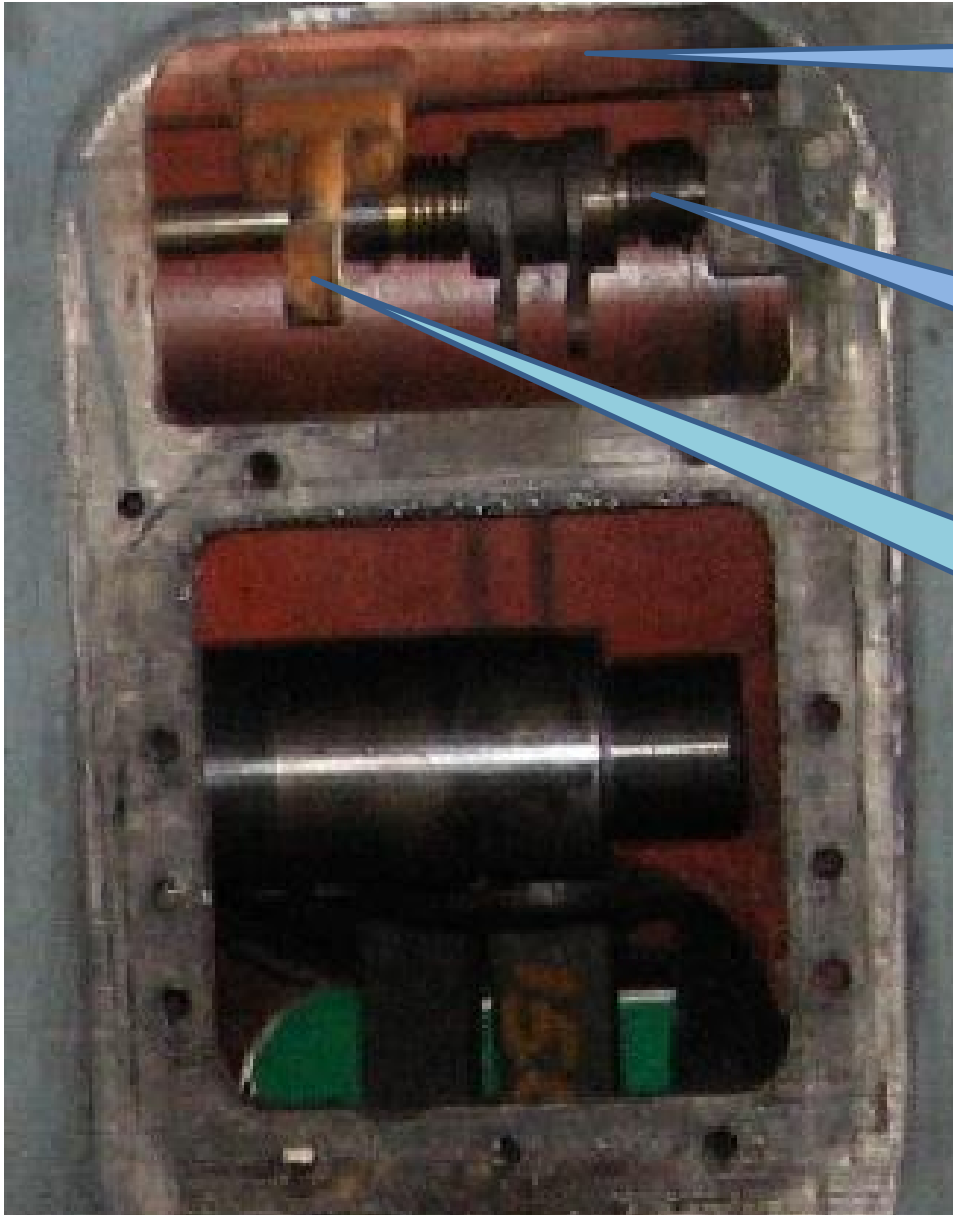
**Crossover
pipe**



**From Left Header at Engine
Free End**

**Regulating Valve
4.4 KG/CM²**

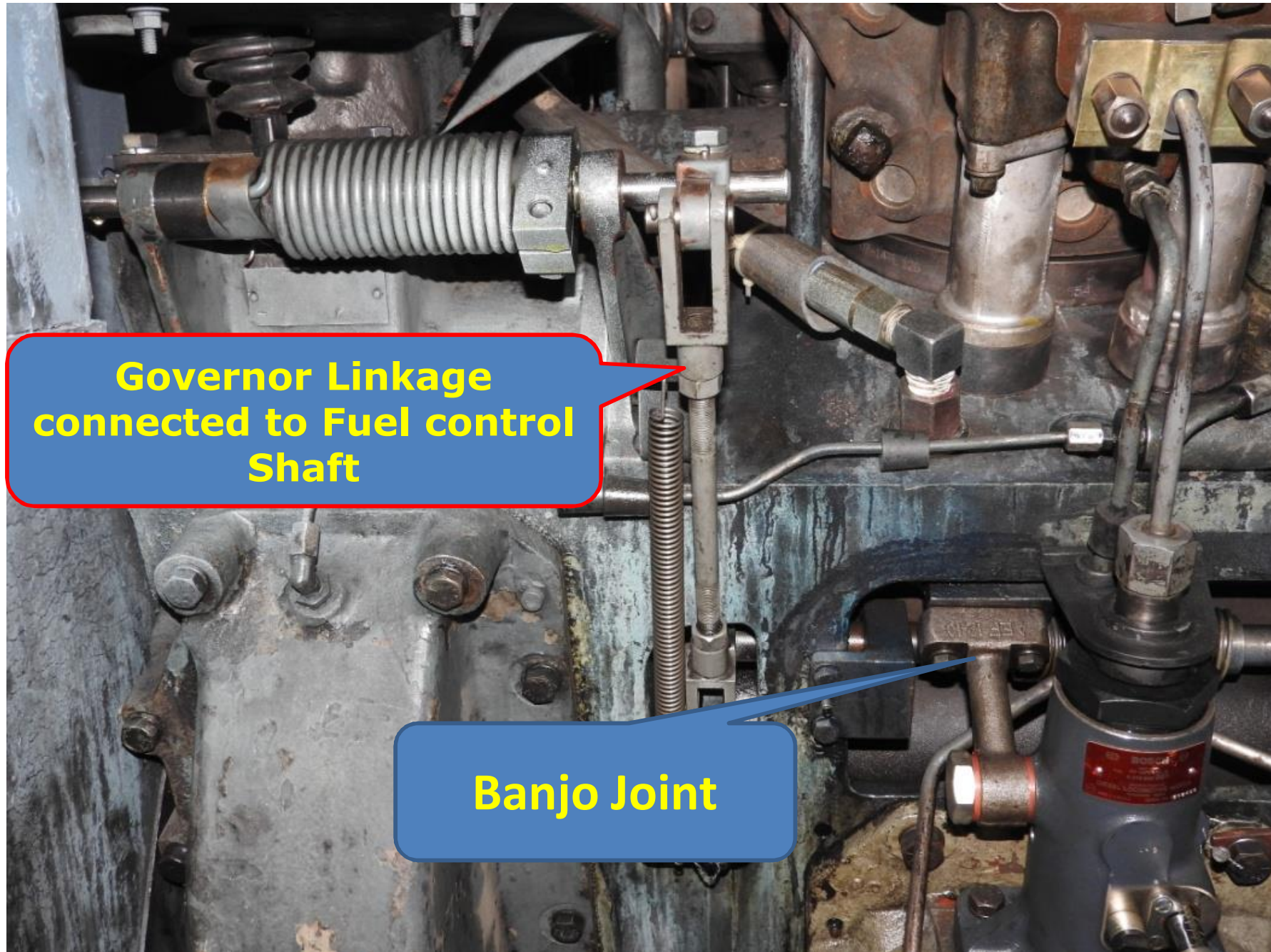
**Connection To Fop
Gauge In Lp's Cab**



Fuel Header

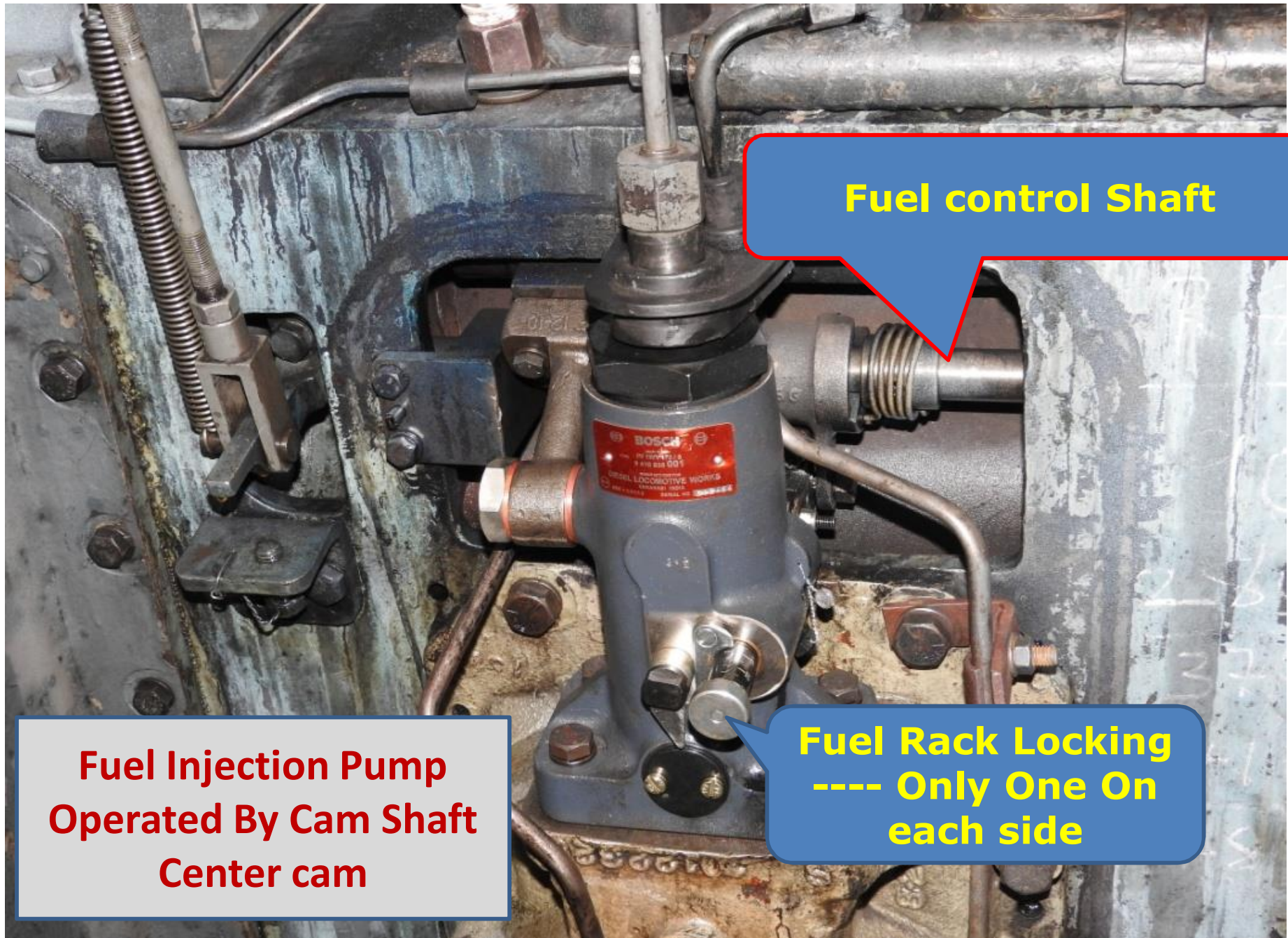
**Fuel Control
Shaft**

**Fuel Jumper
pipe / Banjo
Joint**



**Governor Linkage
connected to Fuel control
Shaft**

Banjo Joint



Fuel control Shaft

**Fuel Injection Pump
Operated By Cam Shaft
Center cam**

**Fuel Rack Locking
---- Only One On
each side**

Duties related to Fuelling point & others



En route examination

- Fuel balance and no leakage from tank.
- Ensure no fuel falls on engine block. Arrest leakage immediately. If not possible shutdown loco.
- For High Pressure Pipeline Leakages, FIP Locking can be done.
(Only one FIP on each side).
- Glow Rod gauge leakages can be arrested by dummying it.
- Check fuel tank leakages after cattle run over / while checking under gear examination