

LUBRICATION  
FEATURES OF A  
DIESEL ENGINE  
(WDM3A  
LOCOMOTIVE)

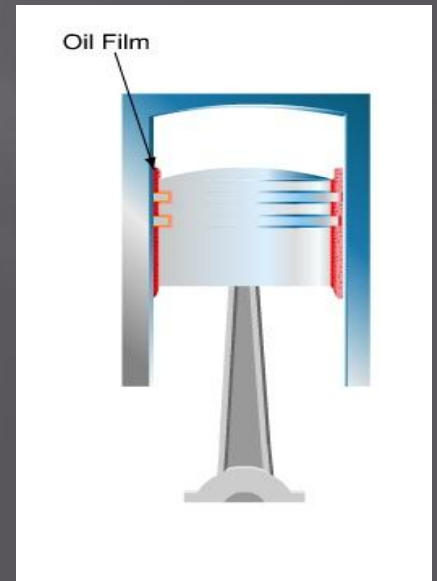
# Objectives

- 1. Cooling of bearings, pistons etc.
- 2. Protection of metal surfaces from corrosion, rust, surface damage and wear.

3. Keep the components clean and free from carbon, lacquer deposits and prevent damage due to deposits.

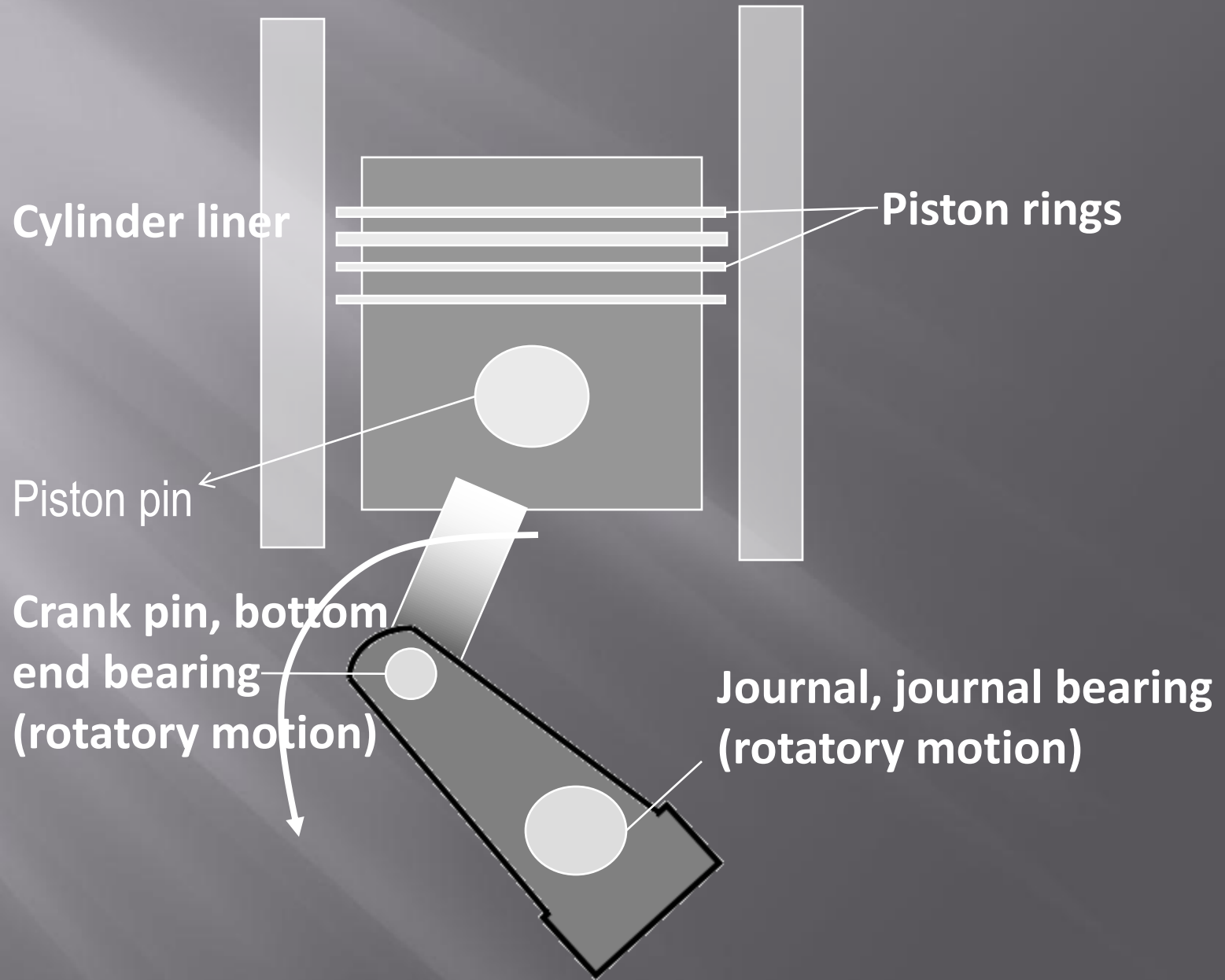
# IMPORTANCE

The importance of lube oil system is comparable with the blood circulation system in the human body.

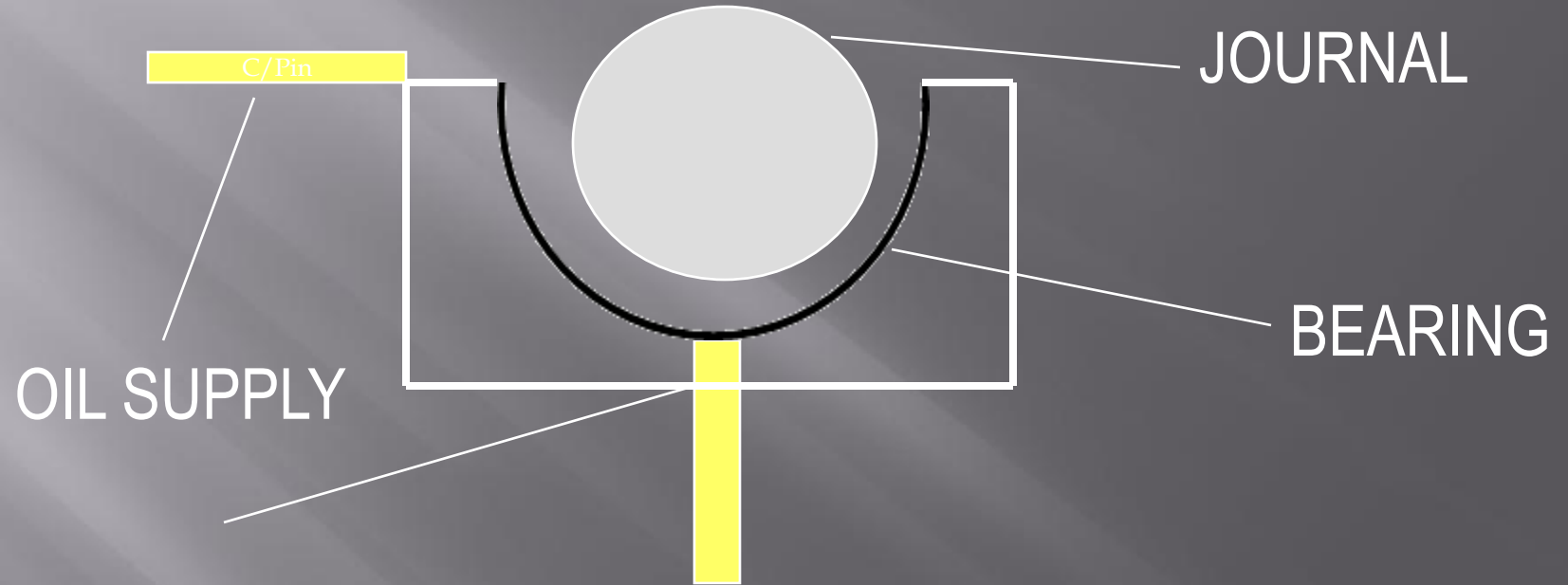


Safety of the engine, it's components and their life span will largely depend on correct quality of oil at correct quantity and pressure to various locations of the diesel engine.

# Power pack assembly



# JOURNAL BEARING

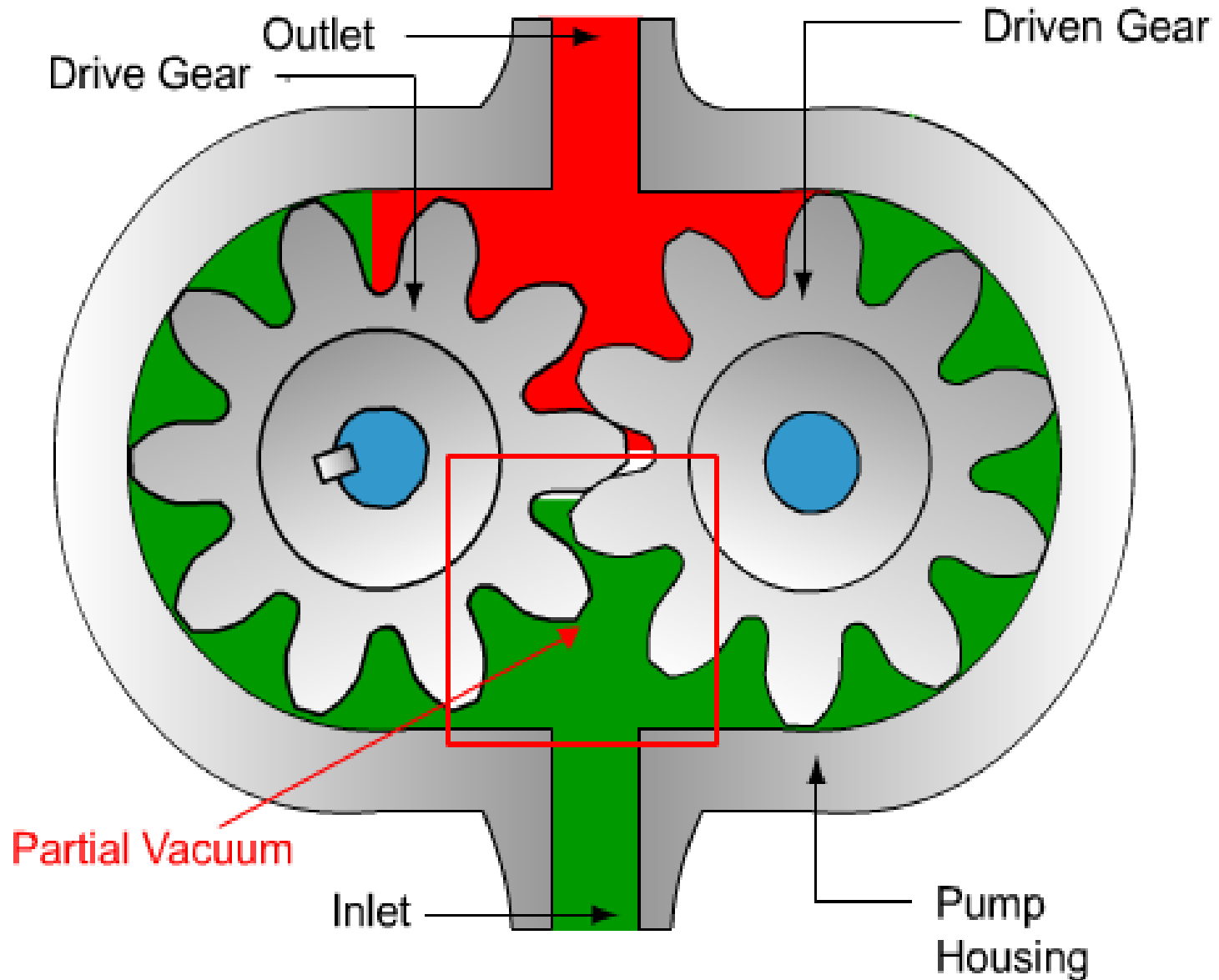


# MAIN COMPONENTS

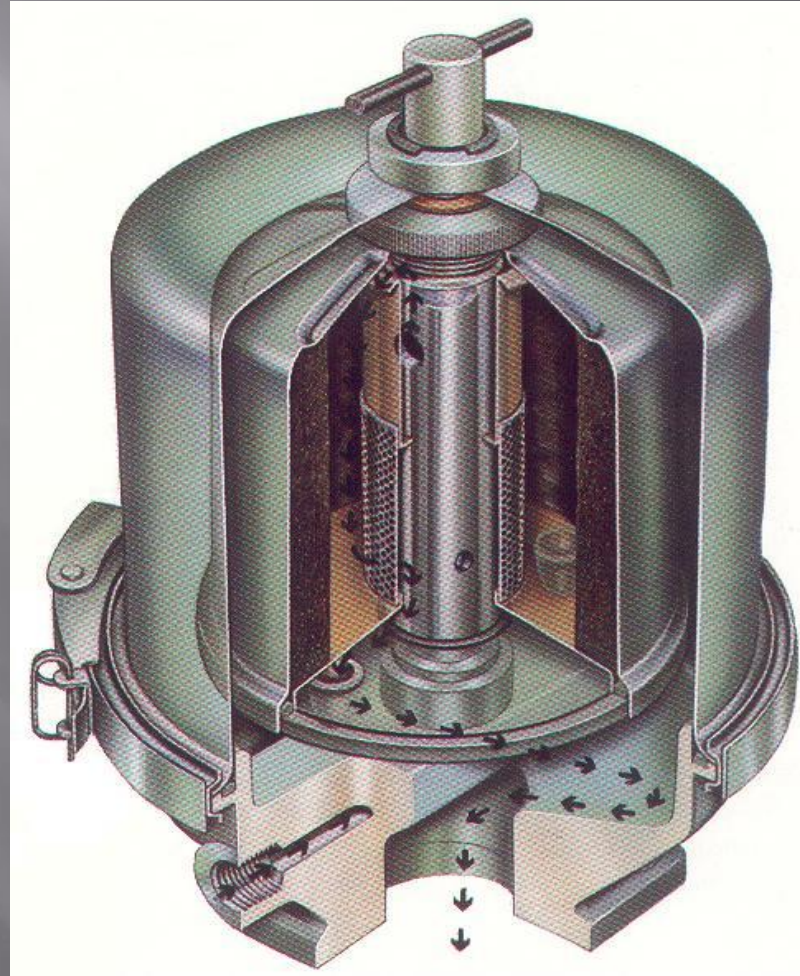
- 1). OIL PAN
- 2). POWER PACK
- 3). MAIN HEADER PIPE
- 4). LUBE OIL PUMP
- 5). RELIEF VALVE



# LUBE OIL PUMP

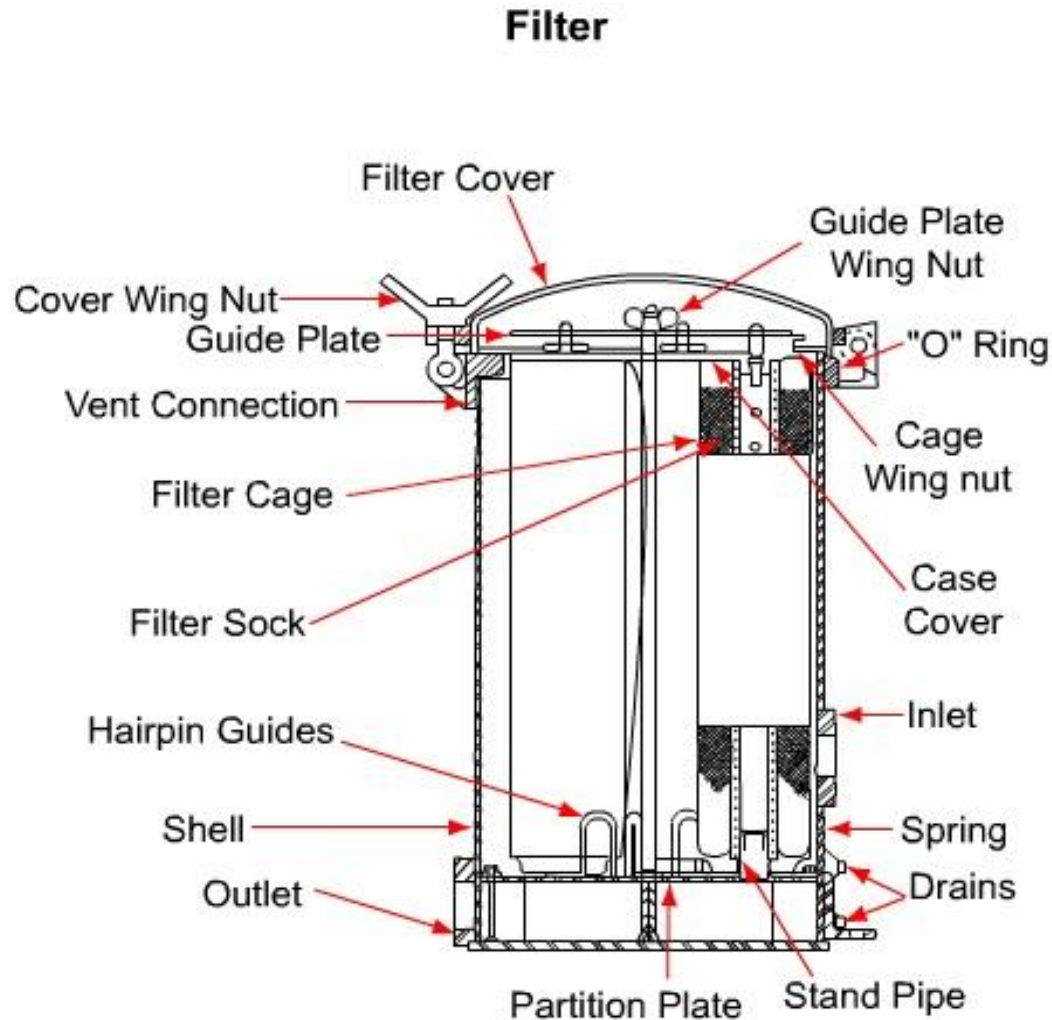


# CENTRIFUGAL OIL SEPARATOR



# CONTINUED-

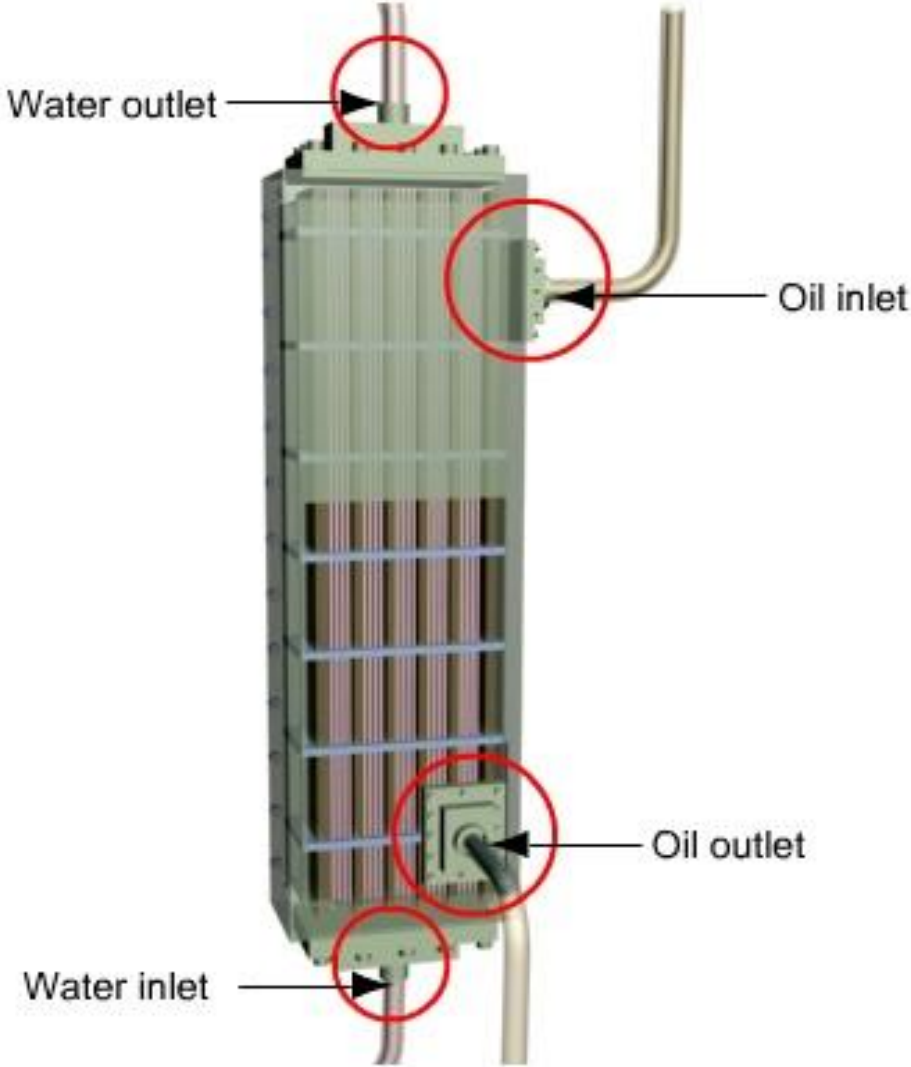
## 6). FILTER DRUM/ MOATTI FILTER



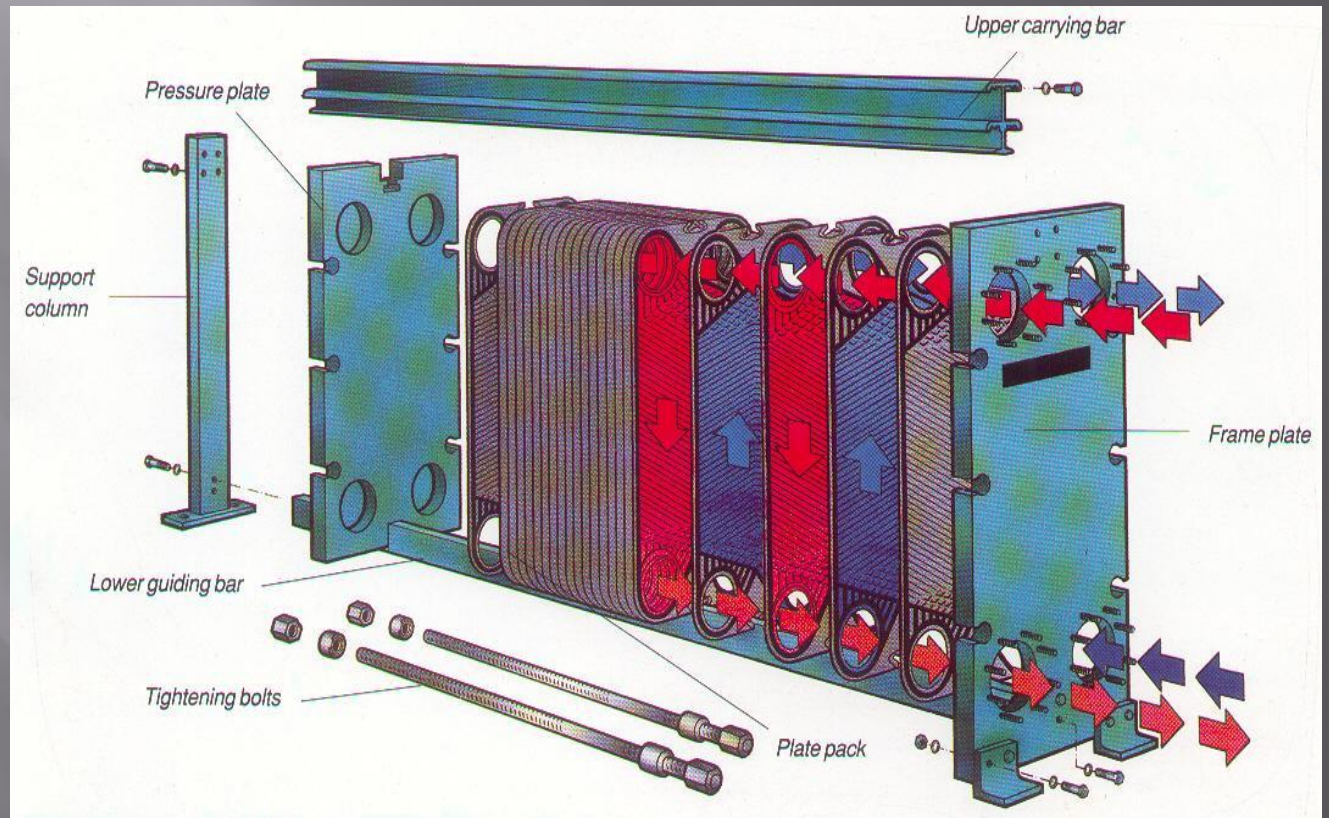
Moatti filter



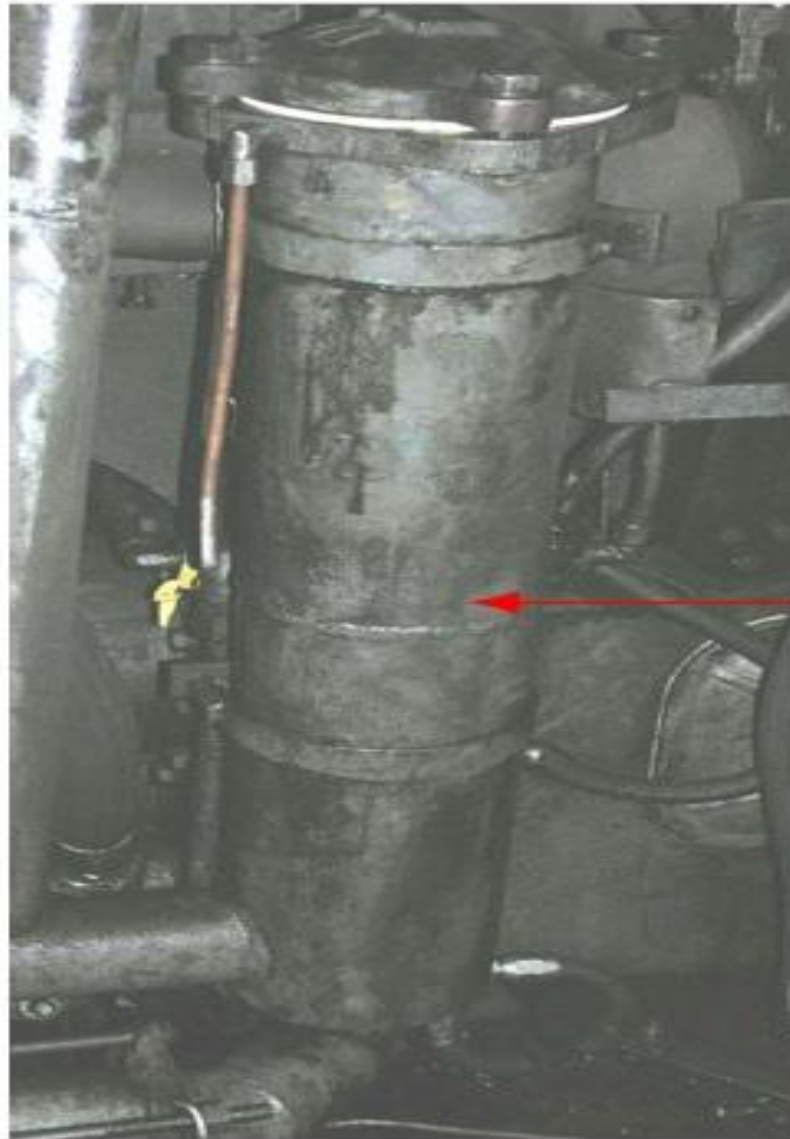
# Lube Oil Cooler



# PLATE TYPE



## Oil Strainer



Oil Strainer

# HEADER PIPES

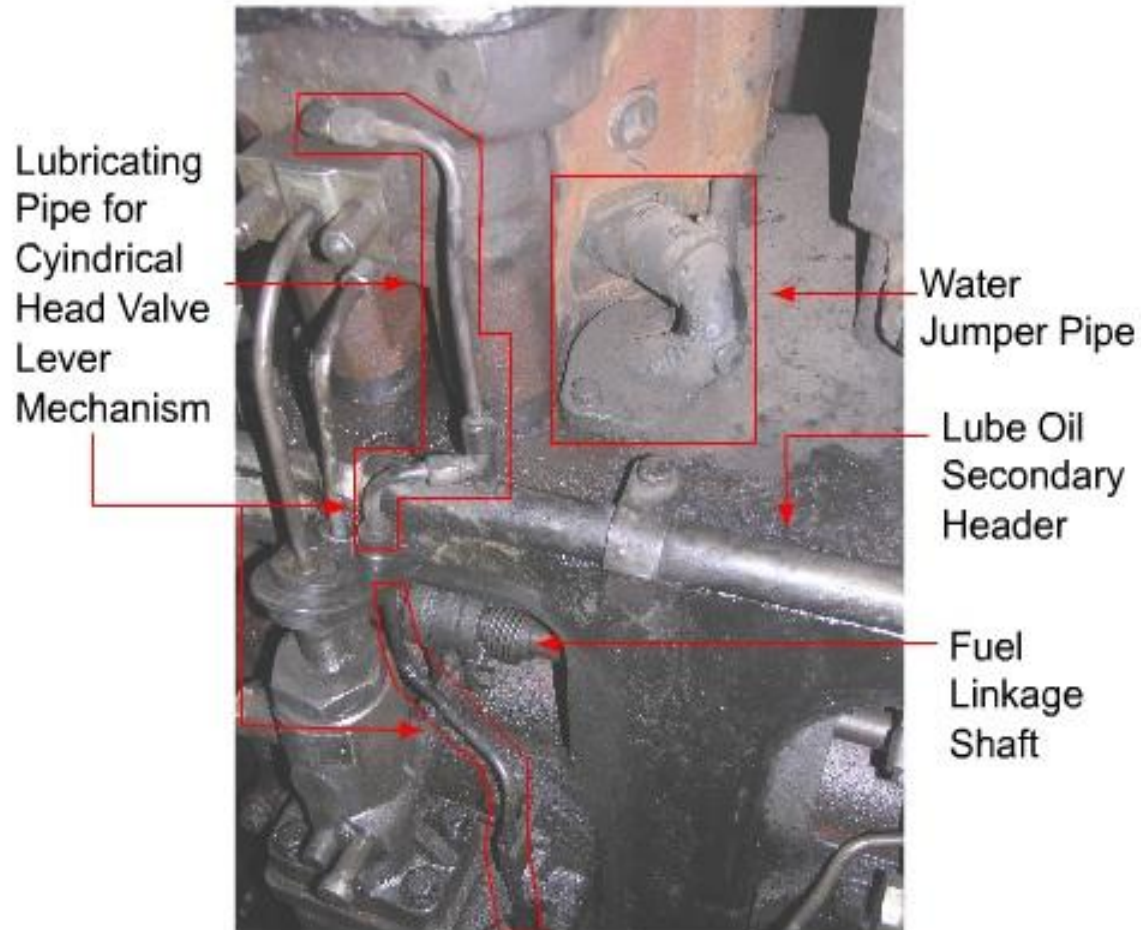
Main header pipe

Right sub header pipe

Left sub header pipe



# Piping



# CAM SHAFT



Unit cam shaft



Conventional

CAM SHAFT BUSHING

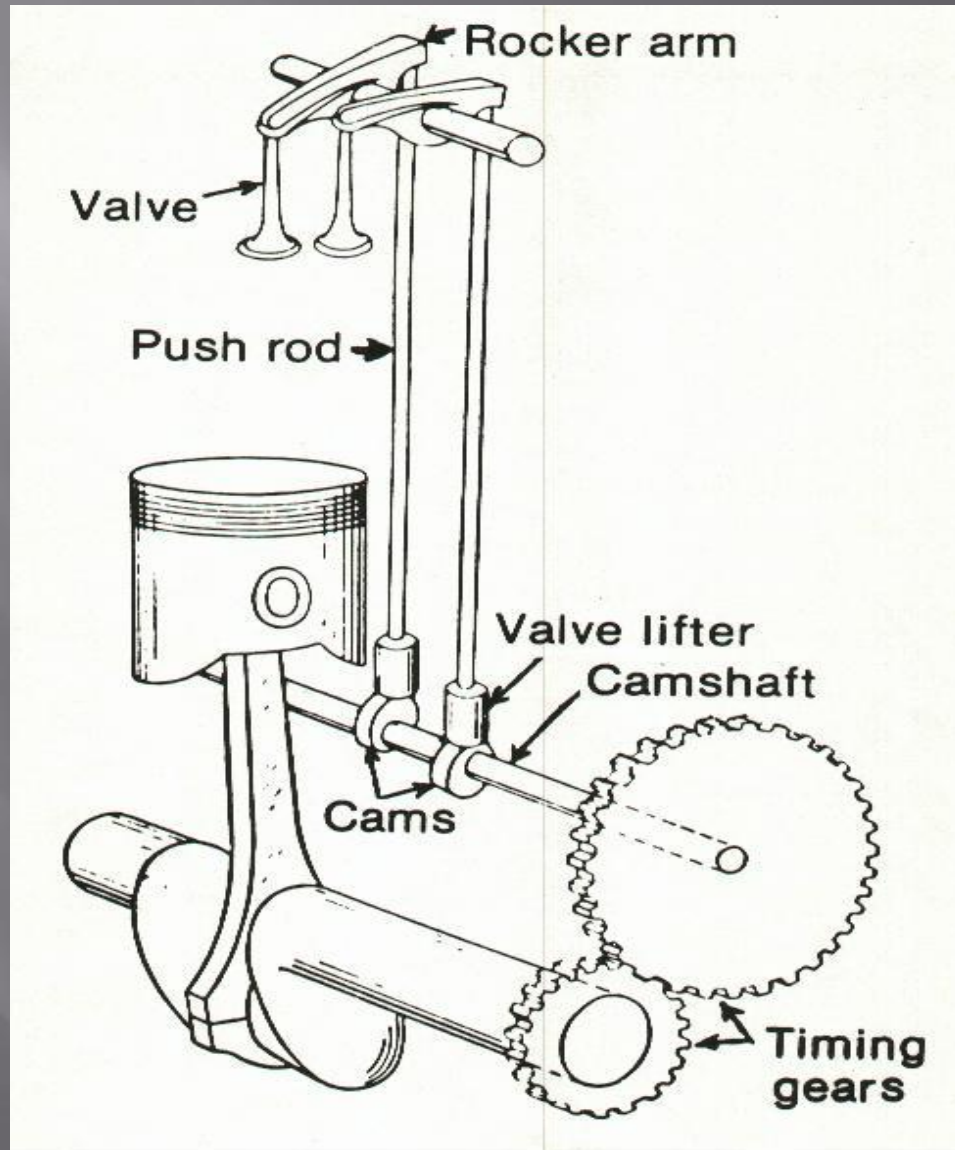
(both side)

OSTA (over speed trip assembly)

CYLINDER HEAD

VALVE LEVER MECHANISM

# VALVE LEVER MECHANISM



CAM GEARS

SPLIT GEAR

“S” PIPES

MAIN BEARINGS

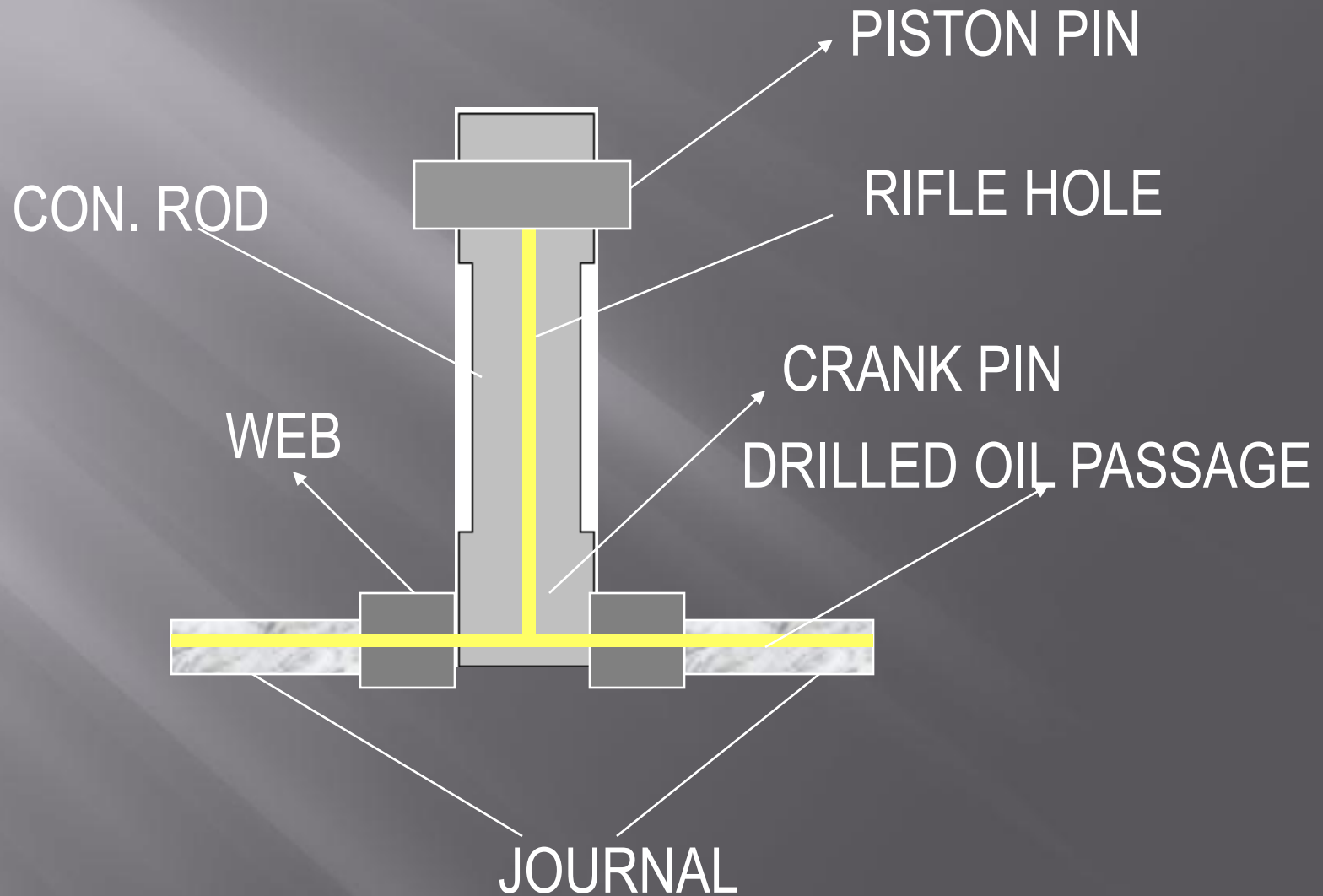
CRANK SHAFT

CONNECTING RODS

GUDGEN PINS

PISTONS

# Oil passage between bearings in a unit



# LUBE OIL SYSTEM OF ALCO 251B - ENGINES



## ➤ The ALCO 251-B

diesel engine of WDM3A class

locomotive has a full flow filtration

lube oil system.

# LUBE OIL PUMP DRIVEN

➤ The lube oil pump on the free end of the engine is driven by the engine crank shaft through suitable gears and keep it running along with the engine. The displacement of the pump at its maximum speed of 1800 rpm is 1190 lts. per minute at 90 psi pressure (SAE 40 oil at 82 degree C

➤ When the engine is started the pump draws oil from the engine sump and deliver it. The delivery pressure of the pump has to be controlled, as the pump is driven by an engine of variable speed, and would often have higher delivery pressure or load on it than actually required.

➤ This would mean loss of more power from the engine for driving the pump and higher rate of depreciation on it due to higher load. Higher pressure may also endanger the safety of the filters and the pipe lines and its joints.

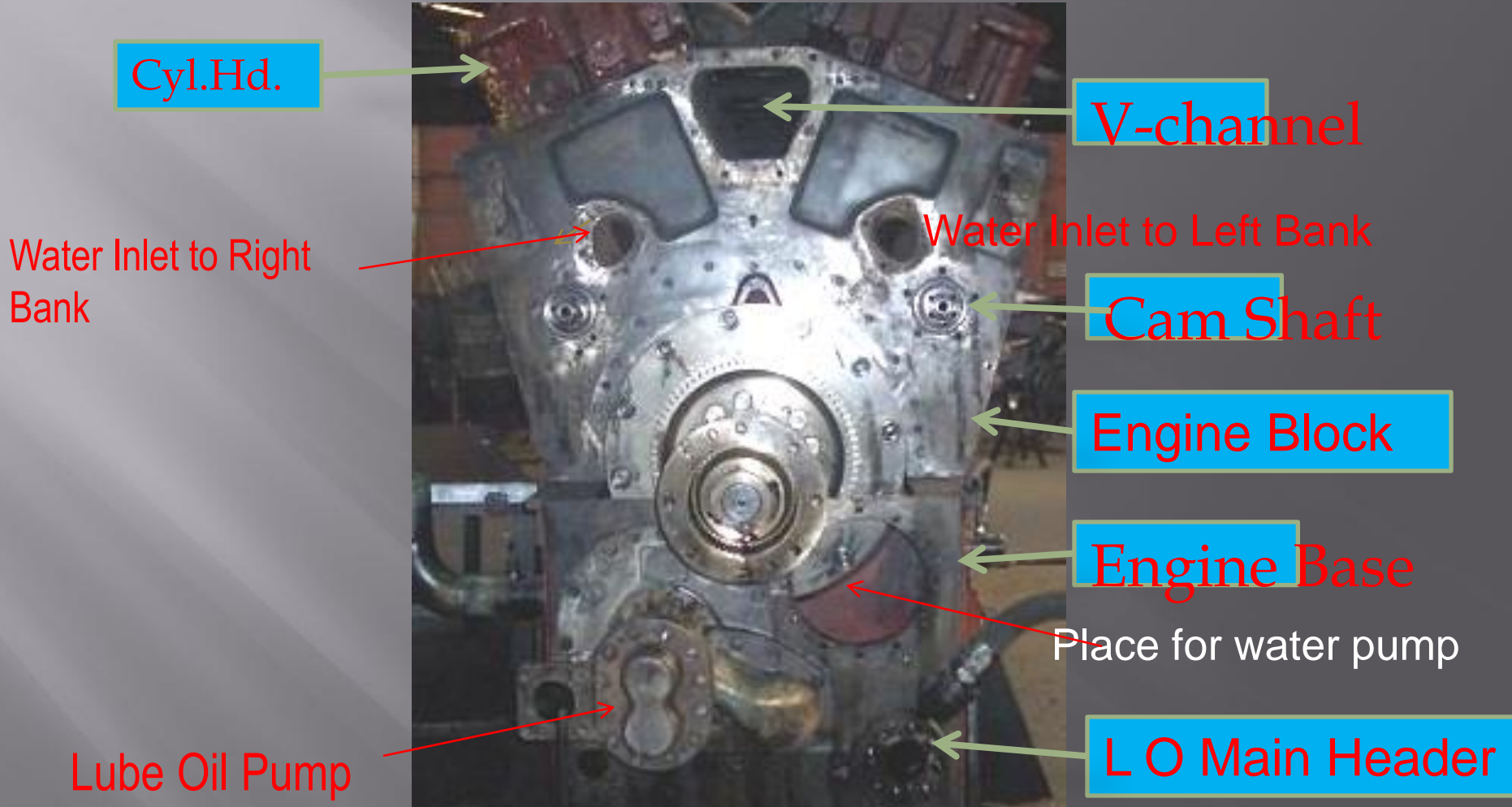
The relief valve set at 125 psi releases the delivery pressure above its setting and by-pass it back to the oil sump. Oil then flows to a filter tank containing 8 nos. of paper type filter elements.

After the filtration the oil passes to the cooler, gets cooled by transferring heat to water and regains its lost viscosity. At the discharge side of the cooler a Regulating valve adjusted at 80psi is provided to regulate the pressure.

- Excess pressure is regulated by-passing the oil back to the engine oil sump.
- The oil then finds its way to the main oil header after another stage of filtration in the strainer type filter from where it is distributed for lubrication to different places as required.

➤ Direct individual connections are taken from the main oil header to all the main bearings. Oil thus pass through the main bearings supporting the crank shaft on the engines block, pass through crank pin to lubricate the Conn. rod big end bearing and the crank pin journals, reach the small end through rifle drill hole.





➤ and after lubrication the gudgeon pin and bearings enters into the pistons. The aluminum alloy pistons are provided with spiral oil passage inside them for internal circulation of lube oil. This is done with the purpose of cooling the pistons which are highly thermally loaded components.

➤ After circulating through the pistons oil returns back to the oil sump but in this process a part of the oil hits the running Conn. rod and splashes on to the cylinder liners for their lubrication. The actual lube oil pressure is a function of lube oil pump, temperature of oil, engine speed and regulating valve setting.

➤ A line from the main oil header is connected to a gauge in the Driver's cabin to indicate pressure level. Lube oil pressure drop to less than 1.4 kg/cm. sq. would automatically shut down the engine through a safety device (Oil pressure switch ) to protect it from damage due to insufficient lubrication.

From the main oil header two branch lines are taken to the right and left side secondary headers to lubricate the components on both banks of the vee shape engine.

# POWER PACK



Valve lever  
Mechanism

Push Rod

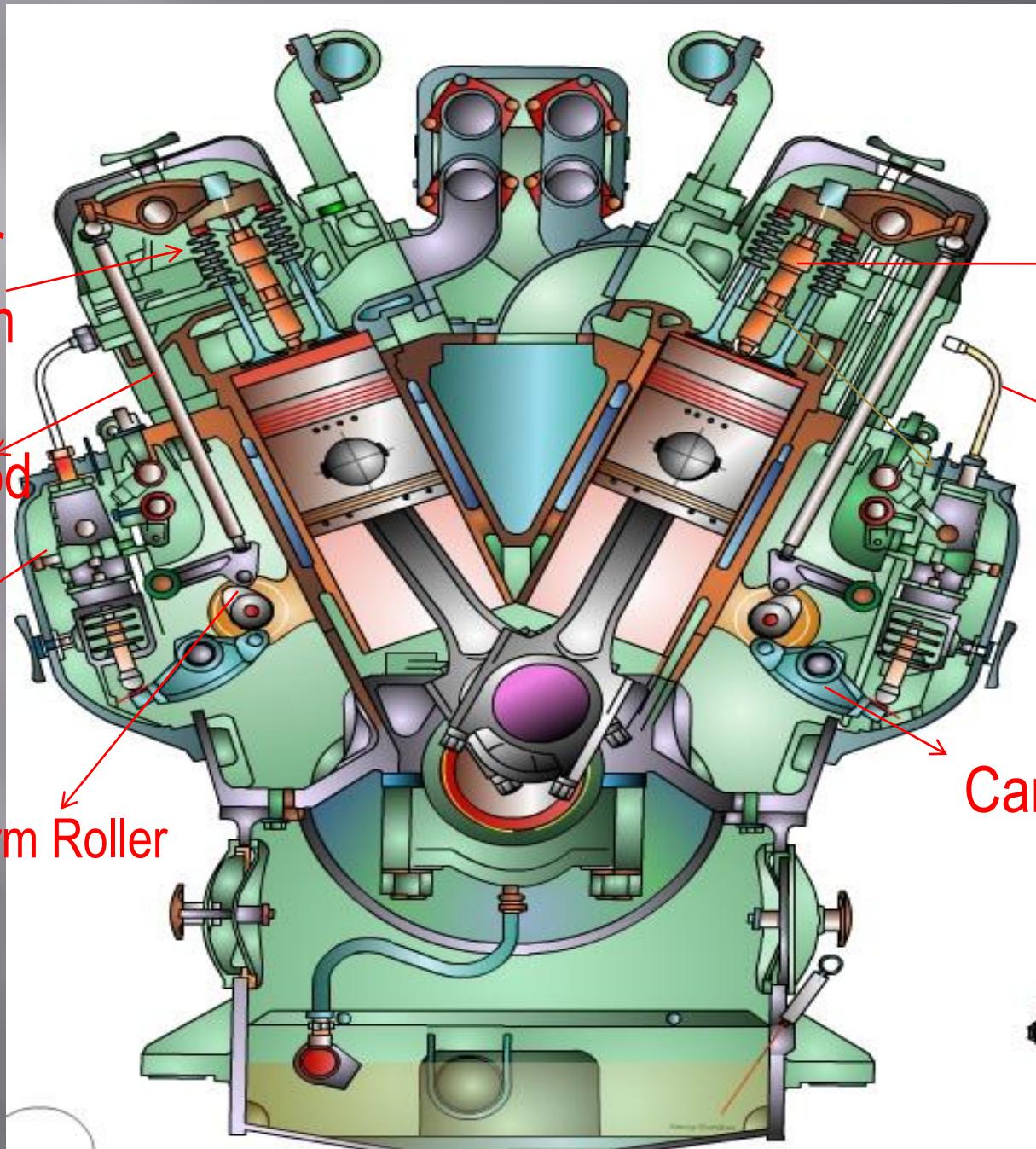
FIP

FIP Base Arm Roller  
for Valve

Injector

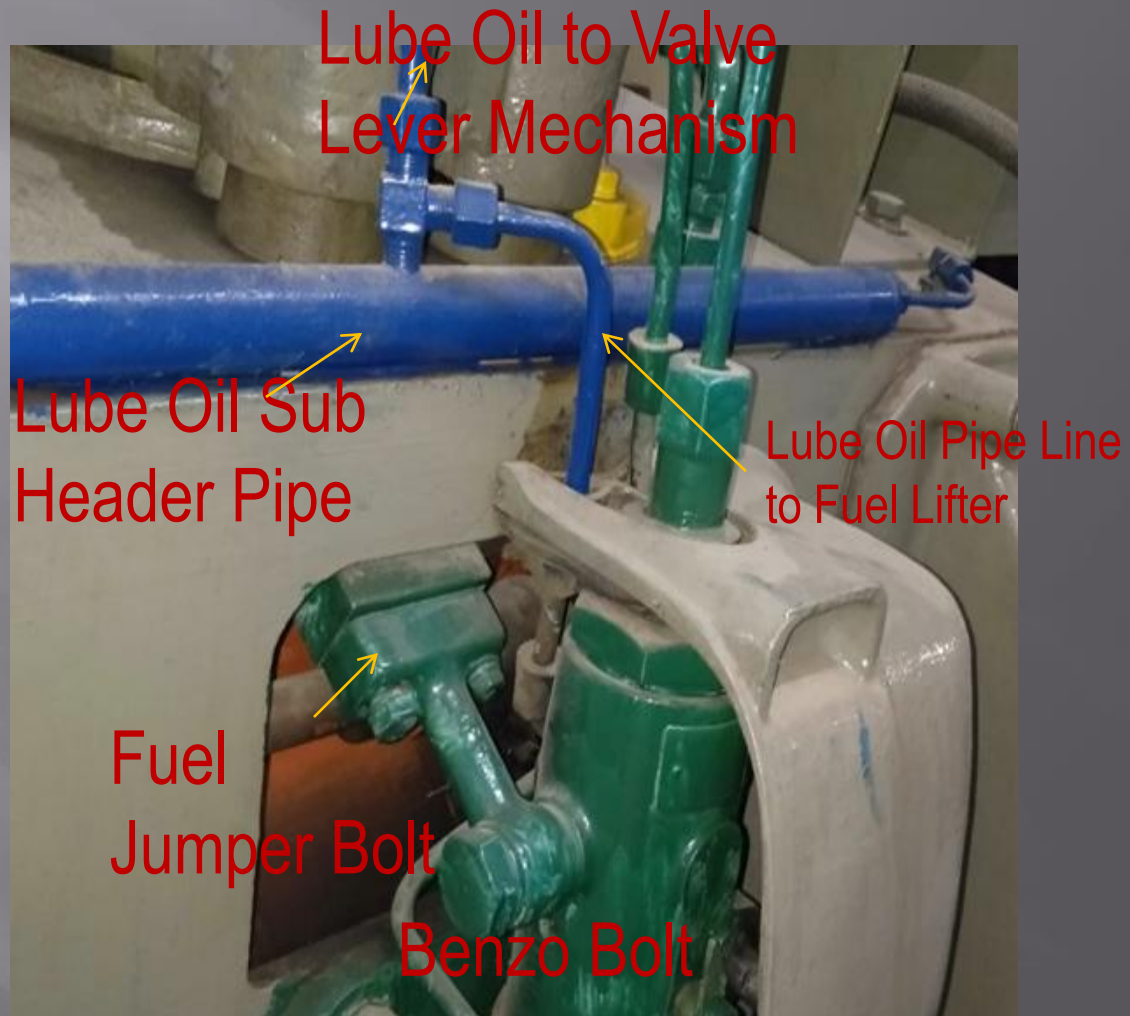
HP Line

Cam Profile



➤ Each branch line of the secondary header lubricate the cam shaft bearings, fuel pump lifters, valve lever mechanism and spray oil to lubricate the gears for cam shaft drive. A separate connection is taken to the turbo supercharger from the right side header, for lubrication of its bearings.





Lube Oil to Valve  
Lever Mechanism

Lube Oil Sub  
Header Pipe

Lube Oil Pipe Line  
to Fuel Lifter

Fuel  
Jumper Bolt

Benzo Bolt

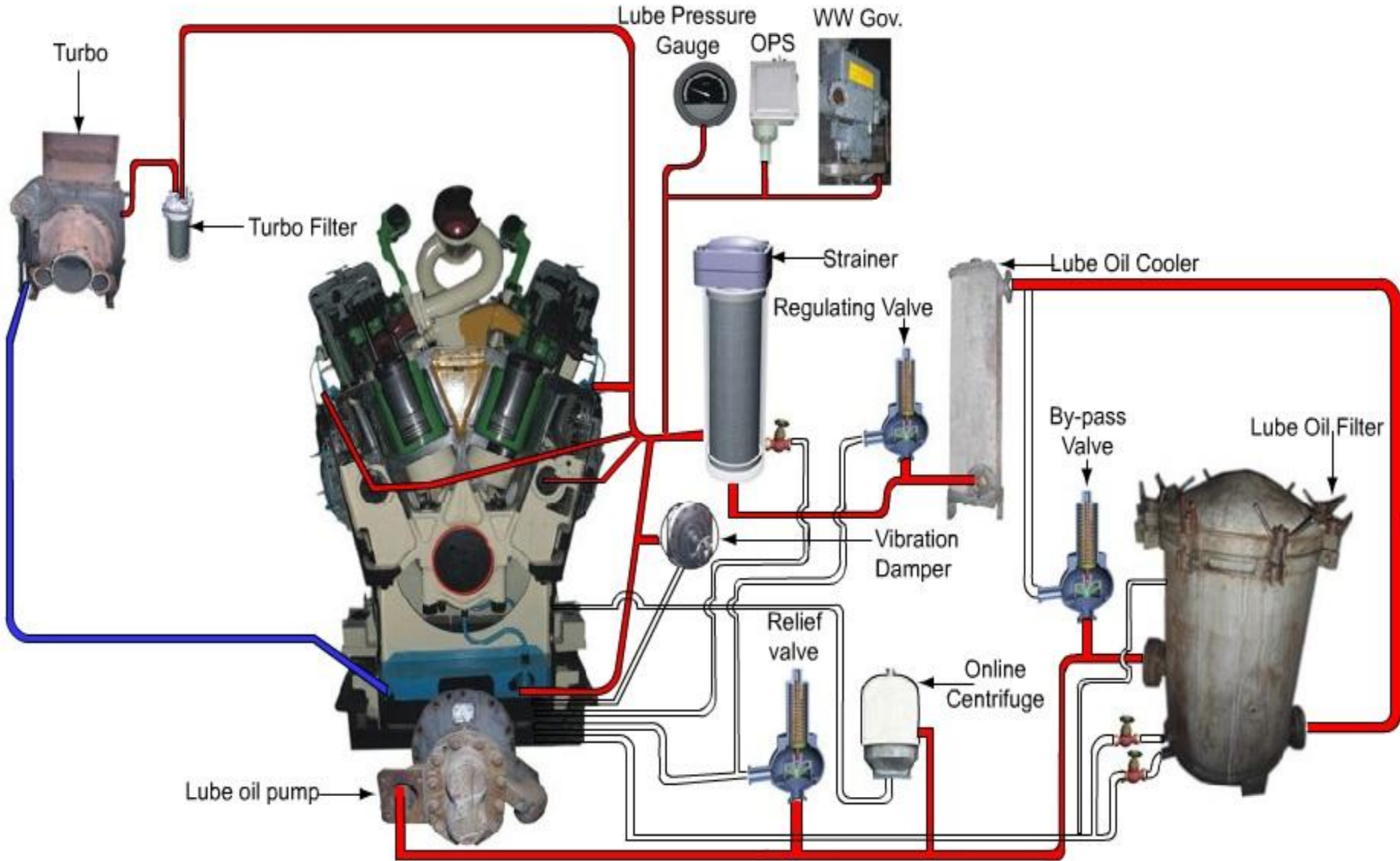


Lube Oil Inlet  
to Valve  
Lever  
Mechanism

Injector

After circulation to all the points of lubrication the oil returns back to the sump for recirculation through return pipes( the same circuit).

# Loco lube oil system



# ▣ MODIFICATIONS

# REMOVAL OF BYE PASS VALVE AND TURBOCHARGER FILTER

- ▣ BY PASS VALVES DO NOT OPERATE IN INDIAN CONDITIONS
- ▣ BASED ON DECISION IN DMG FITMENT OF BY PASS VALVE STOPPED IN DLW LOCOMOTIVES
- ▣ CONSEQUENTLY TURBOCHARGER FILTER ALSO REMOVED FROM ENGINES
- ▣ LUBE OIL FILTER & REGULATING VALVE ALSO REMOVED AFTER IMPLEMENTATION OF MOATTI LUBE OIL FILTER.

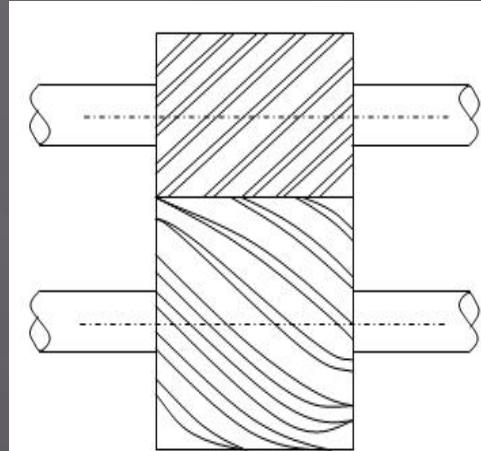
# REMOVAL BENEFITS

- ▣ **SAVING IN COST OF TURBO FILTER AND BYE PASS VALVE**
- ▣ **• IMPROVED FILTERATION**

# Lube Oil Pump

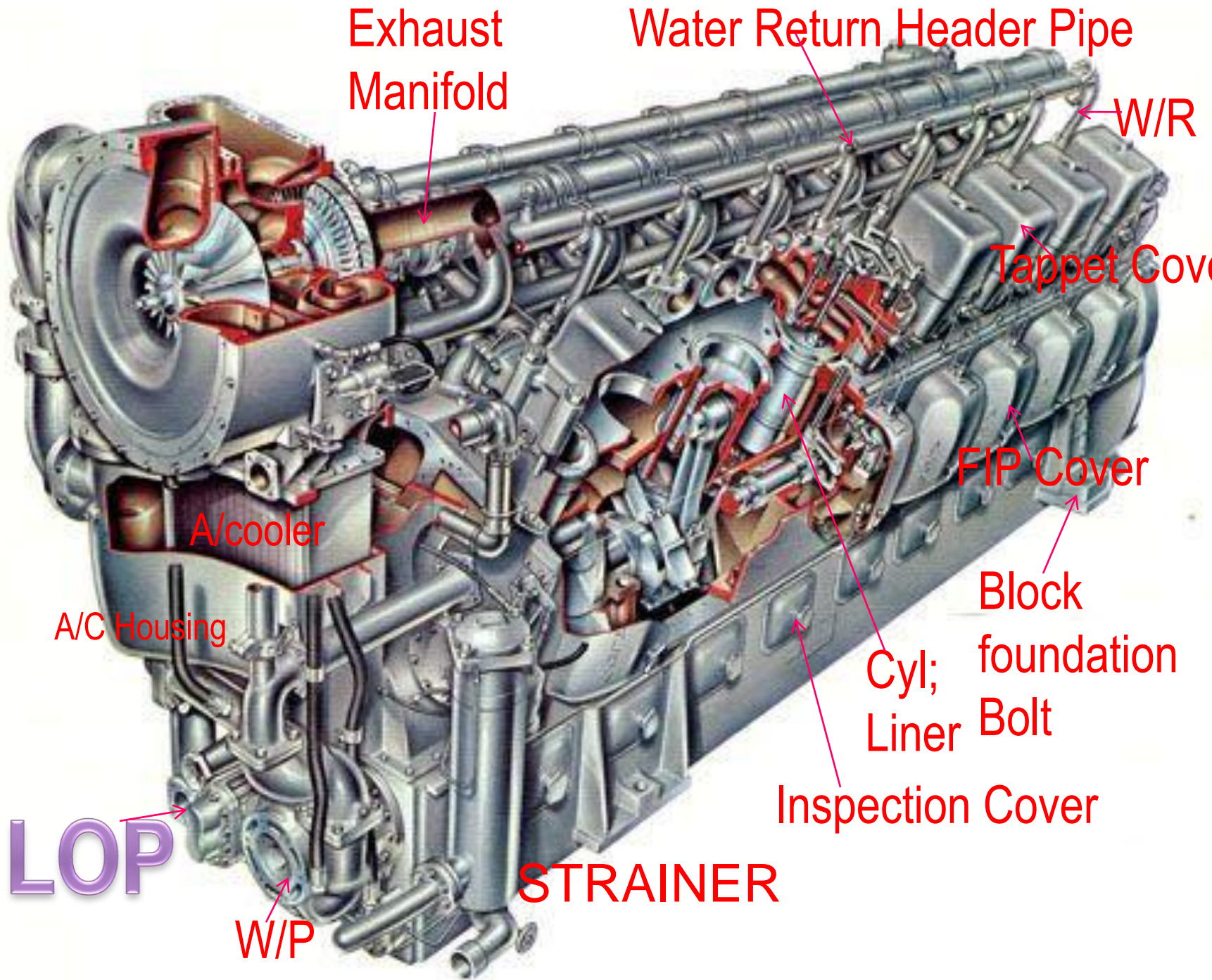
- ▣ Gear Ratio- (Conventional)=67:79
- ▣ Modified = 63:83
- ▣ Conventional- Single Helical Gear
- ▣ Modified- Double Helical Gear

modified lube oil pump  
(Herringbone type gear)  
fitted on Alco type diesel  
electric locos was  
published vide RDSO  
Instruction Bulletin No.  
MP.IB.ES.08.66.09.



Single Helical Gear Set





# Moatti filter



Moatti self-cleaning filter for lube oil filtration of diesel locos was published vide RDSO publication No. MP. Misc 133 (Rev-00), Aug 2002)

# सेंट्रीफ्यूगल ल्यूब आईल क्लीनर

- ▣ जब इंजन चलता है तथा ल्यूब आईल सिस्टम कार्य करने लगता है और जैसे ही सिस्टम का प्रेशर 2.5 के.जी/सेमी<sup>2</sup> हो जाता है तेल ल्यूब आईल सेंट्रीफ्यूगल क्लीनर में प्रवेश करता है ( इनलेट वाल्व की सेटिंग 2.5 केजी/सेमी<sup>2</sup> रखी गई है)
- ▣ इसकी डर्ट होल्डिंग कैपेसिटी – 6.0 लीटर तथा तेल होल्डिंग कैपेसिटी—6.5 लीटर होती है। इसे शेड प्रैक्टिस के अनुसार 45 दिन में साफ किया जाता है।
- ▣ यह क्लीनर तेल को लगातार साफ करता रहता है और 01 माइक्रोन तक के कण तेल से निकाल देता है जिससे सिस्टम में उपयोग में आने वाले फिल्टर की लाइफ बढ़ती है , तथा तेल बदली करने का समयवधि में बड़ोत्तरी होती है। इससे ज्यादा प्रभावी फिल्टरेशन सिस्टम होता है।