

Question Bank (Alco) for LDCE (Tech-JE)

Q(1) Explain 4 stroke cycle engine with a neat sketch?

WORKING OF 4 STROKE CYCLE DIESEL ENGINE:

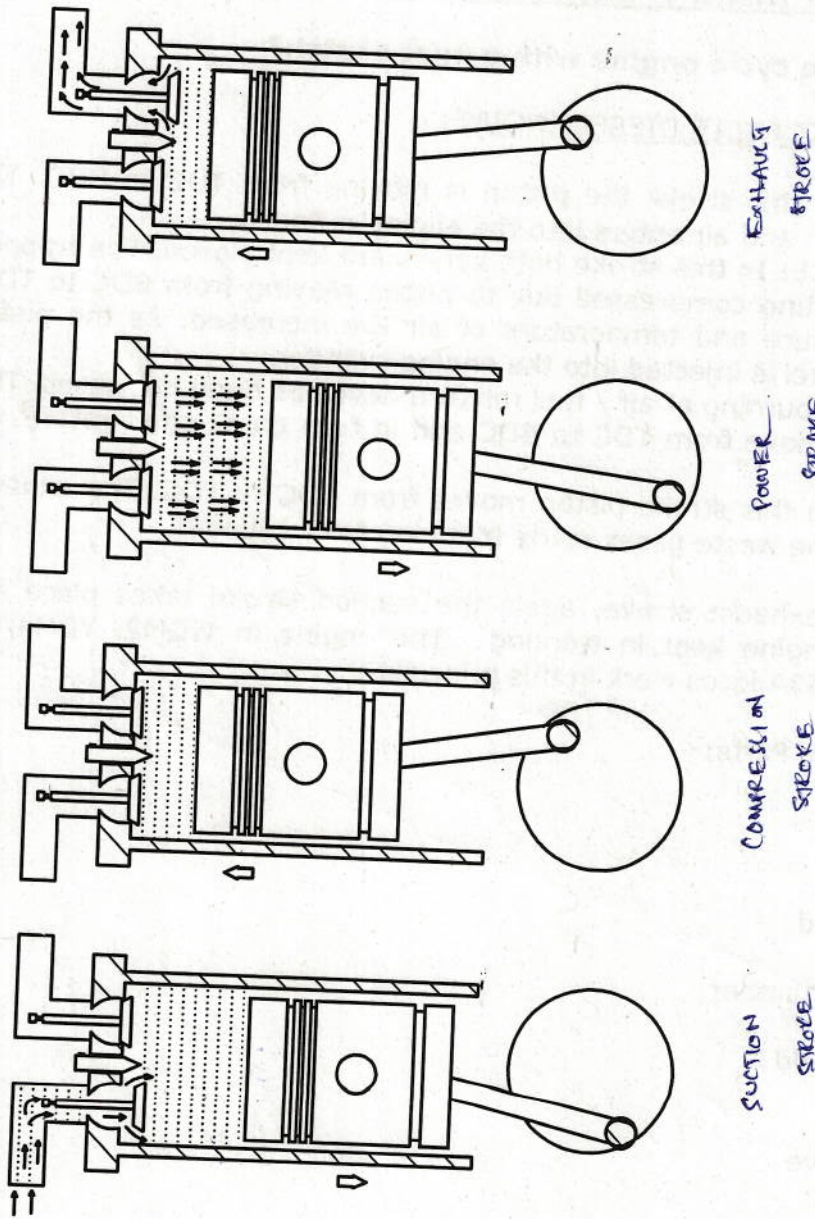
1. **SUCTION STROKE:** In this stroke the piston is moving from TDC to BDC. The inlet valve is kept open and air enters into the engine cylinder.
2. **COMPRESSION STROKE:** In this stroke both valves are kept closed. The trapped air in the cylinder getting compressed due to piston moving from BDC to TDC. Due to this the pressure and temperature of air are increased. As the piston reaches to TDC, the fuel is injected into the engine cylinder.
3. **POWER STROKE:** The burning of air / fuel mixture develops huge hot gases. This makes the piston to move from TDC to BDC and in turn crank shaft rotates on its own.
4. **EXHAUST STROKE:** In this stroke piston moves from BDC to TDC. The exhaust valve kept in open. The waste gases starts escaping from cylinder.

After completion of exhaust stroke, again the suction stroke takes place and cycle will repeat and engine kept in working. The engine in WDM2, YDM4/4A, WDM3A, WDP1 and WDG3A locos work in this principle.

4-Stroke Cycle Engine Parts:

1. Cylinder Liner
2. Piston
3. Connecting Rod
4. Crank Shaft
5. Combustion Chamber
6. Inlet Manifold
7. Exhaust Manifold
8. Injector
9. Inlet Valve
10. Exhaust Valve

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(2) Explain 2 stroke cycle engine with a neat sketch?

WORKING OF 2-STROKE CYCLE DIESEL ENGINE:

In this type of engine, two or more operations are being overlapped. Inlet valves are replaced by ports (a cut on cylinder liner). The opening and closing of port is regulated by piston movement itself.

INTAKE : Since the piston is away from the ports (at BDC) the out side air starts rushing into engine cylinder. This process continues till the piston obstructing the ports.

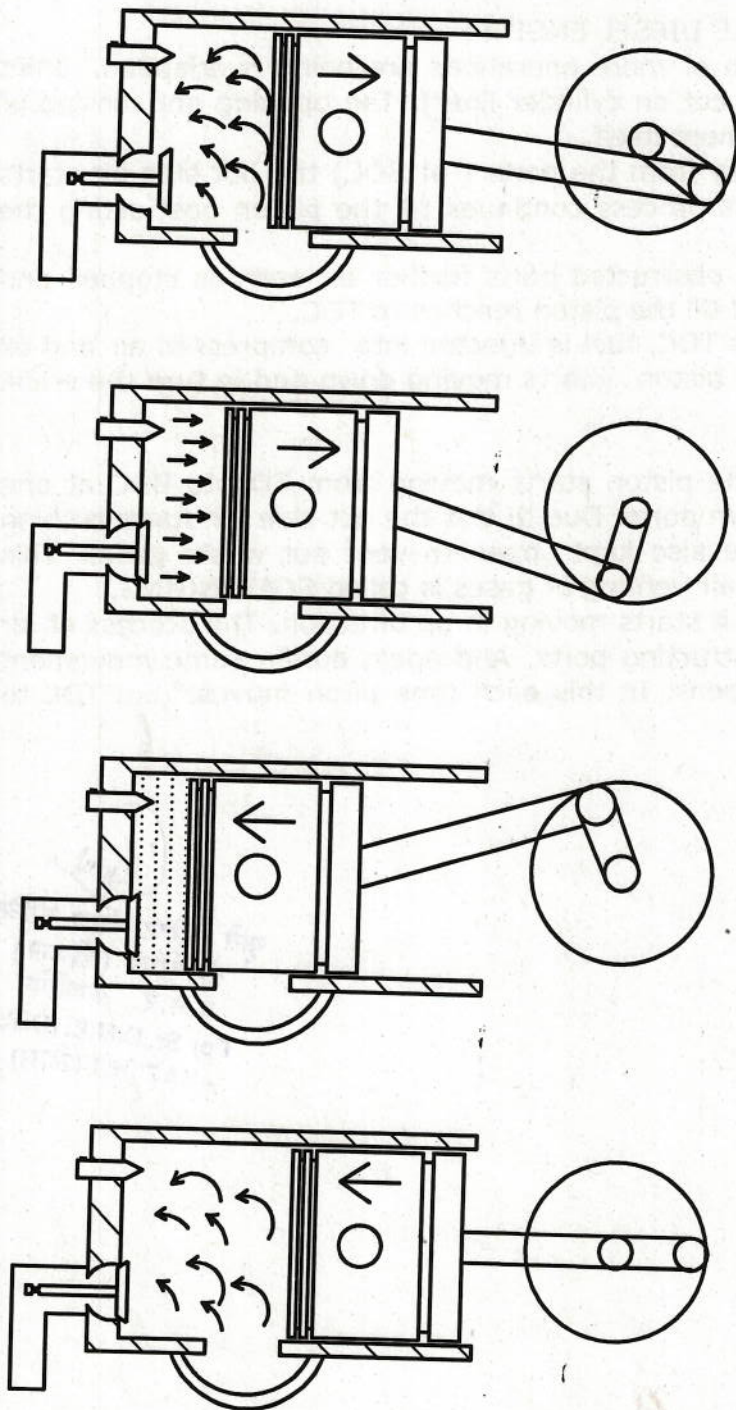
COMPRESSION: Once the piston obstructed ports further air entry is stopped and trapped air is getting compressed till the piston reaches to TDC.

POWER: Once the piston reaches TDC, fuel is injected into compressed air and oil is burnt. Due to this immediately piston starts moving down and in turn the crank shaft rotates on its own.

EXHAUST & SCAVENGING: As the piston starts moving from TDC to BDC at one time the piston is again away from ports. Due to this the out side air starts rushing in. Mean time the exhaust valve also kept open to vent out waste gases. This process of simultaneous entry of air venting of gases is called SCAVENGING.

After reaching of piston to BDC, it starts moving in up direction. The process of air entry continues up to piston obstructing ports. And again during same movement the compression of air also happens. In this each time piston moves from TDC to BDC with the POWER.

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(3) Differentiate 4 stroke and 2 stroke diesel engines?

S. No	Four stroke cycle engine	Two stroke cycle engine
1	The cycle is completes in 4-strokes of piston or two revolution of crank shaft	The cycle is completes in 2-strokes of piston or one revolution of crank shaft
2	Heavier fly wheel is needed	Lighter fly wheel is sufficient
3	Power produced from same size of engine is less	Power produced from same size of engine is more.
4	Lower cooling requirement	Greater cooling requirement
5	Lower rate of wear and tear	higher rate of wear and tear
6	Valve lever mechanism is required for opening and closing of valves	Only exhaust valves require mechanism for opening and closing of valves
7	Initial cost is high	Initial cost is less
8	High thermal efficiency	Low thermal efficiency

(4) Explain various types of transmission systems?

Transmission: The method of transferring power from one place to other place is called transmission system.

In Diesel transmission system there are three types:

1. Diesel- Mechanical transmission!
2. Diesel- Hydraulic transmission.
3. Diesel- Electric transmission.

In Diesel Mechanical transmission the power transferred is via clutch and gear box mechanism. e.g., trucks & buses.

In Diesel Hydraulic transmission the power is transferred via Torque converter/ fluid coupling. e.g., WDS4B and WDS 4D.

In Diesel- Electric transmission, the power developed in the engine is utilized to rotate armature in traction generator.

This produces electric power. The developed power is regulated in control gear equipment and supplied to traction motors. The traction motors will again produces mechanical power. The pinion of traction motor armature is connected to axle through bull gear. Due to this the axle starts revolving and loco moves due to combined effort of all Traction motors.

The Diesel- Electric transmission is again divided into 3 types:

1. DC/DC electric transmission: In this the generator is of DC type and traction motors also of DC series motors. E.g: YDM4/4A, WDM2, WDS6.
2. AC/DC electric transmission: In this the alternator is provided to produce AC current and traction motors are of DC series type. To convert the power from AC to DC a rectifier panel is provided.
E.g: WDM2 (AC/DC), WDM3A, WDG3A, WDP1 and WDP2.
3. AC/AC electric transmission: In this the alternator and AC induction motors are provided.
E.g: WDG4 and WDP4 locos.

Q(5) Explain fuel oil system in Alco locomotive with a neat sketch?

Fuel oil system of Alco Locomotive:

Before cranking the diesel engine, for the purpose to create fuel oil pressure the following items to be put 'ON'.

1. Battery Knife switch provided in nose compartment,
2. MB1 & MB2 breakers on control panel,
3. MFPB 1 & 2 breakers in both control stands
4. Fuel pump breaker (FPB) on control panel.

Then the battery current will go to the Fuel Pump Motor (FPM) located in Expresser Room and motor starts working. This fuel pump motor is connected to fuel booster pump ((FBP) through "love joy coupling".

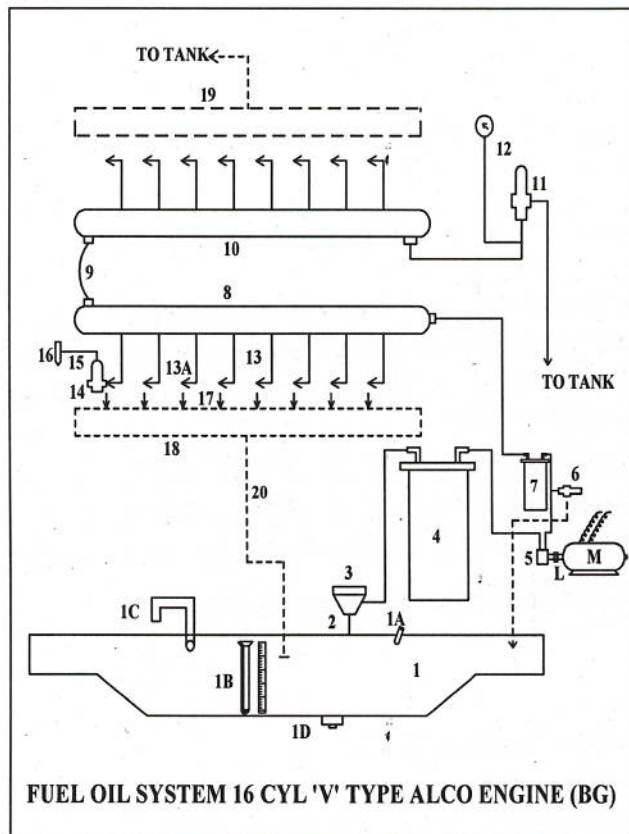
As the fuel pump motor starts revolving, the pump will work and sucks the diesel oil from the tank. The drawn oil from the tank will pass through the fuel trap and fuel oil primary filter and get purified. Then it will enter in to the booster pump getting pressurized and delivered in to the discharge pipe line. At the out let of the pump, the relief valve is provided and it is set at 5 to 5.3 kg/cm². Due to this if the discharge pressure is more than setting value, the excess oil will go back to the fuel tank duly protecting the booster pump. The normal path of the oil is from booster pump to secondary filter. After getting cleaned in the secondary filter, the oil will further goes to the engine right side fuel header pipe. From this header pipe line, the oil is fed to the right bank 8 (eight) cylinder locations Fuel injection pumps (FIP) through individual fuel jumper pipes. The same oil will go to the left side fuel header pipe through a flexible cross over pipe. Similar to the right bank here also the fuel oil is supplied to 8 FIPs through individual jumper pipes.

When the engine is cranked each FIP will start working from cam & FIP support and further pressurizes (app. 4000 PSI) the fuel oil. This High Pressure Oil will discharge into a High Pressure pipe line (HP pipe), which is connected to Fuel Injector provided inside the cylinder head. The injector will

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discharge this oil in a fine atomized form into the combustion chamber. When this sprayed fuel oil mixed with already compressed air in the combustion chamber develops huge hot gases and produces power.

The unused / balance oil left behind in the injector will be collected back through individual leak-off pipes in to the leak off gallery or drain channel on the right and left bank will return back to the fuel tank.



Fuel Oil System Parts:

1. Fuel Tank
- 1a. Fuel Filling Cap With Strainer
- 1b. Glo Rod Gauge With Scale
- 1c. Indirect Vent Pipes
- 1d. Drain Dummy
2. Suction Pipe
3. Fuel Trap
4. Fuel Oil Primary Filter
5. Fuel Booster Pump
6. Fuel Oil Relief Valve

7. Fuel Oil Secondary Filter
8. Right Side Fuel Oil Header
9. Flexible Cross Over Pipe
10. Left Side Fuel Header
11. Fuel Oil Regulating Valve
12. Fop Gauge With Pipe Line
13. Fuel Jumper
- 13a. Fuel Banzo Bolt
14. Fuel Injection Pump
15. Fuel Oil High Pressure Pipe (Hp Pipe)
16. Fuel Injector
17. Fuel Leak Off Pipe
18. Leak Off Gallery (Drain Channel)(Right)
19. Leak Off Gallery (Drain Channel)(Left)
20. Return Pipe to Tank (Flexible)
- L- Love Joy Coupling
- M- Fuel Pump Motor (Fpm)

After filling of the right side and left side header pipes , through a flexible pipe the oil is further touching to a regulating valve is set at 3.8 to 4.2 kg/cm². In case more pressure is developed (to maintain constant pressure) in the system, excess oil will return to the fuel tank by the operation of this regulating valve. At the bottom of this regulating valve, a small branch connection is taken to connect it to the fuel oil pressure gauge located in the drivers cab to indicate the fuel oil pressure in the system

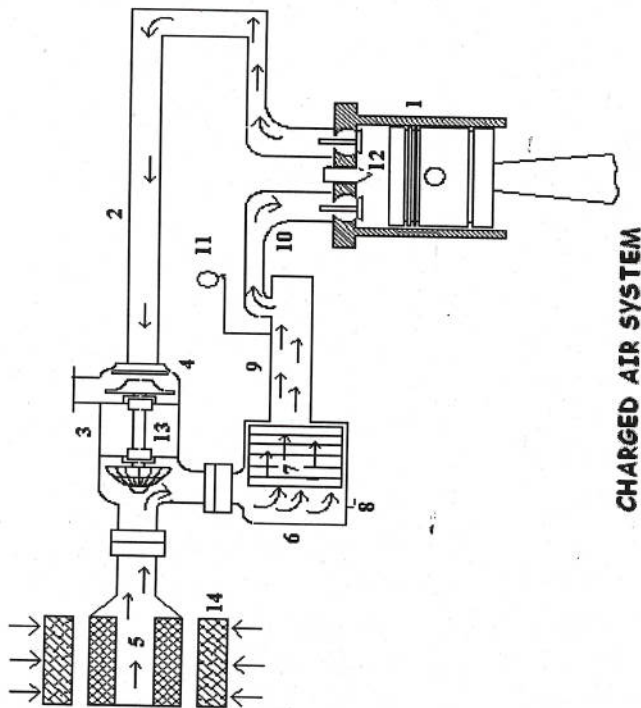
Q(6) Troubleshoot for FOP dropping in Alco locomotive?

1. Less fuel oil in the tank
2. Fuel oil may be dirty
3. Primary and secondary filters may be choked
4. Suction pipes may be air drawing
5. Relief and regulating valves may be struck up in open condition
6. Love joy coupling may be slack
7. Delivery pipes may be leaking
8. Fuel booster pump may be defective
9. Gauge pipe line may be damaged
10. Fuel oil pressure gauge may be defective
11. Water contaminated with fuel

Q(7). Explain fuel air intake system in Alco locomotive with a neat sketch?

Working of air intake system:

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Charge Air System Parts:

1. Engine Cylinder
2. Exhaust Manifold Pipe
3. Turbo Charger
4. Fixed Nozzle Ring
5. Bag Type Filtyers
6. After Cooler Housing
7. After Cooler Core
8. After Cooler Tell-Tale Pipe
9. Air Inlet Manifold ('V' Channel)
10. Air Inlet Elbow (16 Nos.)
11. Bap Gauge
12. Combustion Chamber
13. Turbine Rotor Shaft With Rotor & Blower
14. Cyclonic Filters

At the engine free end, a Turbo super charger is mounted on the top of after cooler housing -cum- TSC support. The exhaust manifold pipe of engine is directly connected to TSC. All the exhaust gases collected from each cylinder exhaust elbow, will flow in this pipe and pass in gas inlet casing. Through

This Booster air will develop from 4th/ 5th notch RPM on load (train working) only. At 8th notch full load the developed hot gases will rotate turbine rotor at 18,000 to 21,000 RPM depends upon the TSC design and develops BAP up to 1.6 to 2.1 Kg/cm² according to TSC type. To indicate the BAP there is a gauge pipe connection on V channel and gauge is provided in Drivers cab.

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Q(8) Write a short notes on Super charging?

To obtain more Horse Power from the engine it is necessary to burn more fuel inside the engine cylinder(s). For complete burning of this fuel and to give maximum heat energy, presence of more amount of air is required. But by the action of piston inside the cylinder during suction stroke always a constant volume of air only can be sucked which depends on cylinder sizes. To put in more amount of air into it, the atmospheric air is pre- pressurized outside the cylinder(s) by the use of a rotor driven blower (rotary compressor). This rotor works with the exhaust gases coming from engine. The process of sending this pre-pressurized air to the

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engine is called super charging and the machine used for this purpose is called Turbo Super Charger(TSC).

Turbo Super Charger(TSC): This machine consisting of a turbine rotor unit comprising of a turbine rotor with blades, and a blower (rotary compressor) which are connected with a rotor shaft.

Q(9) Troubleshoot for Turbo surging and Turbo oil throw?

Reasons for turbo (back pressure) surging:

1. Faulty injection system
2. Improper nozzle ring gap
3. After cooler blocked

Reasons for turbo oil throwing:

1. Turbine end oil seal may be defective
2. Piston rings may be weak
3. Liners may have ovalty

Q(10)Reasons for BAP dropping or Hauling power poor?

1. Fuel oil pressure dropping
2. Exhaust gasket between head and manifold may be given up
3. Exhaust manifold may be cracked
4. Turbo super charger may be defective
5. Turbo to after cooler housing flange joint may be given up
6. Intermediate casing joint gasket may be given up
7. After cooler housing to engine block joint gasket may be given up
8. After cooler to after cooler housing joint gasket may be given up
9. Air inlet elbow top & bottom gasket may be given up
10. BAP gauge may be defective
11. BAP pipe line may be damaged

Q(11)Explain Turbo Run Down Test?

TURBO RUNDOWN (TRD) TIME TEST:

This test is conducted on Diesel Electric locomotives, to understand the functioning of turbo super charger in case of BAP not building up/ hauling power poor/ lube oil throw from turbo chimney or unusual sound from turbo unit.

In this test, the time taken by the turbine rotor to STOP on its OWN is measured after complete stopping of Engine crank shaft.

PROCEDURE FOR CONDUCTING TRD TEST:

1. Before going to conduct TRD test, SAFETY should be observed:
 - a) there should not be OHE (AC traction) lines in section.
 - b) the loco/train should be secured properly as per the procedure.
2. Keep GFCO switch in OFF, 'RH' in neutral.
3. Keep the engine in IDLE, observe engine. It should be normal.
4. Observe for any leakages of exhaust gases.
5. After that keep the engine in stipulated notch depending on type of turbo in the loco.
6. Shutdown the engine at that notch using MUSD switch.
7. Wait for engine crank shaft to STOP by observing fast coupling.
8. Then observe the turbine rotor rotation from exhaust chimney for its STOP.
9. Note down the time taken by turbine rotor to stop after engine crank shaft stopping. It should be within the limits as prescribed for that particular type of turbo.


Q(12) Explain cooling water system in Alco locomotive with a neat sketch?

To produce more power from the engine, it is necessary to burn more fuel in the engine cylinders. Due to this the increased temperature will cause more heating of surrounding components. To control this and also to keep lube oil viscosity within the limits a cooling water system is incorporated. Here in cooling water system, the following things are happening- One the cooling of engine components using coolant water and the other the cooling of coolant water itself in radiators for re-circulation. For the circulation of water in system, a centrifugal type water pump is provided at the free end of the engine block. To achieve perfect cooling by the cooling water, the water used is either distilled or de-mineralized water further treated with chemicals known as Indion -1344 (Boron nitrite). With the adding of these chemicals the color of water will change to pink. The advantages behind this treatment is as follows:

- a) Treated water avoids corrosion on ferrous metals.
- b) It dissolves all water salts avoiding scaling in cooling water system.
- c) It protects the flowing water from foaming, which may lead to air locks.
- d) Boiling point of water is increased to minimize evaporating and consumption of water.
- e) Leakage in the cooling water system is easily noticed as color marks (scars) noticed on leaking sources and also this chemical arrest minor leakages by forming powder deposits at leaking joints.

Working Of Cooling Water System In BG Locomotives:

At the engine free end towards left side a centrifugal water pump is provided to circulate water in system. The drive for the pump is from crank shaft extension shaft gear. Water pump will suck the cooled water coming from both radiators through suction pipe and discharges it into the system through discharge piping. The water coming from pump is mainly divided into two branch pipes- one for engine left bank and the other for right bank of the engine. From the right bank branch pipe line one flexible pipe is connected to supply water to turbo super charger(TSC). Here after cooling turbo parts the water is allowed directly to go back to suction side of pump. Further for cooling the turbo charged air (booster air) in after cooler also the coolant water is utilized. For this purpose, in case normal WDM2 locos, a branch connection is taken from left bank piping. After cooling the air in after cooler this water will join into the left bank. Where as in case of new locos or modified locos, the inlet and outlet connections for after cooler will be on suction pipe of water pump itself. On engine left bank there are 8 cylinders in a row inserted inside the engine block. The water is allowed to circulate inside the engine block around these cylinder liners (called water jackets).


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7. Cylinder Liner
8. Water Jumper
9. Cylinder Head
10. Water Riser Pipe
11. Water Return Header (R&L)
12. Bubble Collector (R&L)
13. Main Water Expansion Tank (No.1 Tank)
14. Aux. Water Expansion Tank (No.2 Tank)
15. CocForLws
16. Low Water Switch (Lws) Float Chamber
17. Loco Left Radiator
18. Loco Right Radiator
19. Lube Oil Cooler
20. Water Pump Tell-Tale Pipe
21. Drain Cock
22. Water Temp. Column With Ts1, Ts2, Ets& W/Temp. Gauge
23. Radiator Water Outlet Equalising Pipe
24. Water Make Up Pipe Line
25. Vent Pipes (Flexible)
26. Pressure Cap Assembly
27. Water Level Glo-Rod Gauge

After cooling of engine block left portion and cylinder liners on left bank the water is further flowing into cylinder heads through individual water jumper pipes. After cooling the cylinder heads the hot water is allowed to rise in water riser pipes and collected into the left side water return header pipe. This very hot water while passing through water return header will cross through a bubble collector located on this piping. Here the bubbles/steam/hot gases available in water will be separated and vent out to expansion tanks through a flexible vent pipe. After this the water will pass into loco right side radiators. Here the water will cool due to indirect contact with atmospheric air while passing through several horizontal tubes. Then this water will be collected in to the suction pipe. The water entered into the engine right bank will cool the right side engine block, 8 cylinder liners and 8 cylinder heads. Then this water is collected into right side water return header pipe through individual water riser pipes. On this right side water return pipe one more bubble collector is provided to separate bubbles from the hot water. This hot water before going to cool in loco left radiators will touch to water temperature column pipe provided in expressor room. On this column Temperature switches- TS1, TS2 & ETS and also one water temperature gauge. The TS1 set at 68 Deg. C and TS2 set at 74 Deg. C will help in operation of radiator fan through R1 & R2 contactors. The ETS which is set at 90 Deg. C will act as a safety device by giving Hot Engine alarm indication. Due to this safety device operation there will be no effect on engine RPM. After cooling of the water in loco left radiators, it is allowed

to pass in lube oil cooler unit. Then this water will find its passage to suction side of water pump. To compensate the loss of water in system either due to evaporation or due to minor leakages, there is a stored water in water expansion tanks. These tanks are mounted in radiator room hood. The tank available towards expressor room is called main expansion or No.1 tank. And the other tank towards long hood side is called auxiliary or No.2 tank. Both the tank levels are equalized with two equalizing pipes to maintain same levels in tanks. From the main expansion tank one make-up pipe line is connected to suction pipe. From this pipe line water is constantly added into system to avoid air lock. The same expansion tanks will have all the vent pipe connections from different points (bubble collectors from right & left bank and turbo outlet as well from after cooler outlet & radiator inlet pipes) to collect steam or hot gases. To protect the system from low water damages, a safety device is provided on main water expansion tank called Low Water Switch (LWS). A small pipe line is connected from main tank to LWS float chamber through a COC. As far as water level is maintained in tank to at least 1" level above from bottom of tank the LWS float ball will lift and make the micro switch in N/C condition. If the water in tank is reduced or when LWS COC is closed (for testing) then this float chamber will become empty and float will drop. Due to this the micro switch connection will reverse and makes the engine to shut down with Hot Engine Alarm indication.

A water level Glo-Rod gauge is provided on auxiliary expansion tank to check the water level. On the same expansion tank top, a pressure cap assembly is provided. It should be ensured that the cap is properly seated on expansion tank to avoid water siphoning out.

NOTE : Do Not Dummy the Flexible Vent Pipes.

WATER PUMP TELL-TALE PIPE:

To indicate the failure of water pump water seal or oil seal a tell-tale pipe is provided at the bottom of water pump housing. In case water seal is damaged, water will leak out or oil seal is failed oil will leak out. In case leakage is noticed, check the leakage rate and act accordingly.

Similarly there is a tell-tale pipe at the bottom of AFTER COOLER also to indicate the failure of after cooler core. Same action is to be taken if water is leaking from this tell-tale pipe.

Q(13) Reasons for Hot engine alarm?

Reasons for water temperature raising and hot engine alarm:

Due to LWS:

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1. Malfunctioning of LWS
2. 3 way clock may be closed
3. Water level drops below one inch from the bottom of the tank

Due to ETS:

1. Water temperature above 90° C
2. Radiators may be choked
3. Radiator room door may be open
4. ECC may be defective
5. Radiator fan not working
6. Continuous load on engine
7. Less water in expansion tank
8. Atmospheric air temperature may be high
9. Right angle gear box may be defective
10. R1 and R2 contactors may be defective
11. TS1, TS2 and ETS switches may be defective or malfunctioning or set wrongly
12. Water pump may be defective

Q(14) Explain Lube oil system in Alco locomotive with a neat sketch?

Necessity Of Lubrication:

1. To reduce the friction between moving parts.
2. To reduce the wear & tear of the moving parts.

The lube oil system in the loco is of forced feed system i.e., the oil is supplied under pressure. For this purpose a good amount of lube oil is stored in sump. The capacity of the sump is varied for different locos and it is as follows:

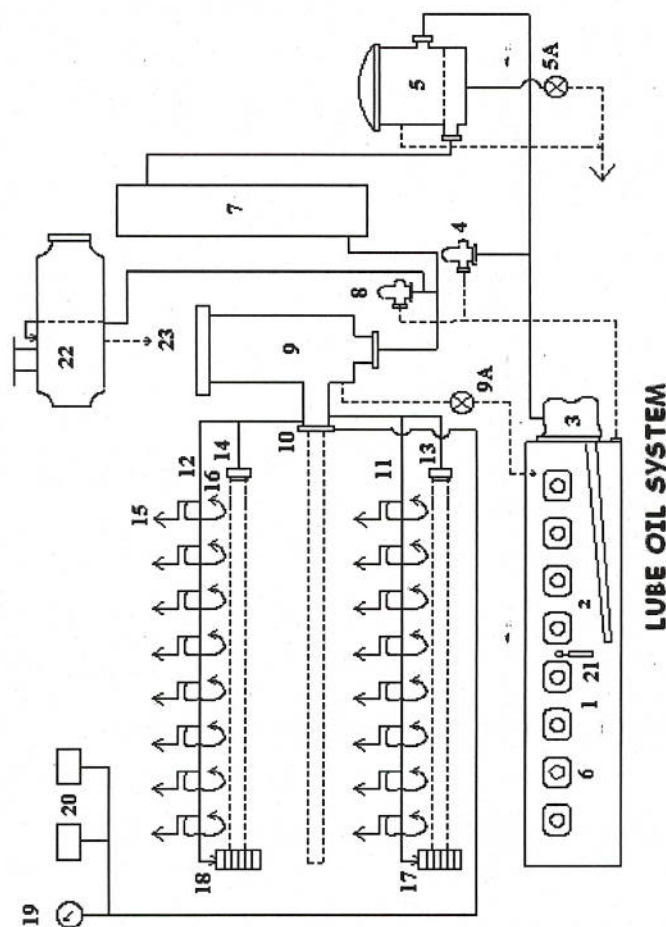
A lube oil pump is provided on free end of the engine towards right side. It is driven by a gear on the crank shaft extension shaft. The pump is of gear type (positive displacement type). The pump sucks the oil from sump through suction pipe which will be delivered into the discharge pipe. On this pipe line a relief valve is provided and is set at 130 PSI (9kg/cm²). In the event of excess pressure, this valve will open and sends the excess pressure back to the lube oil sump. Through discharge pipe line the oil will go to the lube oil filter drum located in the radiator compartment. This filter drum is having 8 paper type filters. Lube oil while crossing through the filter drum will get cleaned. This oil is further allowed to go to lube oil cooler which is also located in radiator compartment. Lube oil entering into the cooler will get cooled due to the indirect contact with the coolant water. This helps in maintaining lube oil viscosity within the limits. The oil will further enter into the

lube oil strainer. A branch pipe is drawn between the cooler and strainer to connect it to the lube oil regulating valve which is set at 110 PSI (7.7 kg/cm²). This valve will maintain the system pressure by sending the excess pressure back to the lube oil sump in case it is exceeded. In the lube oil strainer the oil is allowed to get down through a fine micronic mesh and thus cleaning the oil. Further the oil is allowed into the lube oil main header which is located at left side of the engine base.

From the main header, the oil which is entering into the main header pipe will go to the main bearings through 'S' type jumper pipes. After lubricating the main bearings this oil will find its passage to connecting rod big end bearings through drilled passages in crank shaft. From inside of the connecting rod, the oil will further go to the small end of connecting rod to lubricate piston pin bearing. From here the oil will find its passage into the piston crown. After absorbing temperature from crown it will try to drop back into the sump. While dropping, this oil will splash back and fall on the cylinder liner walls to lubricate between liner and piston rings.

Lube oil system parts:

1. Lube Oil Sump
2. Suction Pipe
3. Lube Oil Pump
4. Relief Valve
5. Filter Drum
- 5.A. Drain Cock For Filter Drum
6. C.C Explosion Door (Spring Loaded)
7. Lube Oil Cooler
8. Regulating Valve
9. Lube Oil Strainer
- 9a. Drain Cock For Strainer
10. Connection To Lube Oil Main Header Pipe
11. Lube Oil Auxiliary Header Pipe (Right)
12. Lube Oil Auxiliary Header Pipe (Left)
13. Lube Oil Connection To Osta & R/S Cam Shaft Bearings
14. Lube Oil Connection To L/S Cam Shaft Bearings
15. Connection To Valve Lever Mechanism
16. Connection To Fip Support
17. Spray Nozzle Pipe To Cam Gear (Right)
18. Spray Nozzle Pipe To Cam Gear (Left)
19. Lube Oil Pressure Gauge
20. Connection To Safety Device Ops1 & Ops2 Or W.W. Governor For Operation of LLLOB
21. Lube Oil Dip-Stick Gauge
22. Turbo Super Charger
23. Lube Oil Drain Pipe From Turbo To Sump (Flexible)



From the main header inlet connection one small branch pipe is taken to connect it to the lube oil pressure gauge and to the safety device (OPS/ LLOB). There are two branch connections from main header inlet- one is leading to right bank and other to left bank. From the right branch one connection is given to right side auxiliary header pipe mounted on top of the engine block. This aux. header will supply oil to valve lever mechanisms on top of cylinder heads and to FIP support mechanisms and also to right side cam gear through spray nozzle pipe. Before aux. header connection, one more connection is taken to supply oil to OSTA and right side cam shaft bearings. Similar connections were given on left side of engine also to supply oil to valve lever mechanisms and FIP supports and L/side cam gear as well as to left cam shaft bearings. From the bottom of the regulating valve, a flexible pipe connection is taken to supply the oil to turbo super charger (TSC). After lubricating the turbo, the oil is drained back to the sump through the flexible pipe. All the oil supplied to different parts will reach back to sump by gravity and ready for re-circulation. To protect the engine from low lube oil pressure damages, the safety

device LLOP(in WW governor) set at 1.3kg/cm^2 in idle and 3.5kg/cm^2 in 8th notch, depends upon the notch working) will come in to operation and makes engine to shut down.

NOTE: The drain cocks provided by the side of the filter drum and strainer unit should always be kept in close and sealed with sealing wire.

Q(15) Troubleshoot for LOP dropping?

1. Less lube oil in sump
2. Lube oil pump may be defective
3. Relief and regulating valves may be struck up in open position
4. Delivery pipes may be leaking
5. Filter drum filters may be choked
6. Filter drum 'O' ring may be damaged
7. Filter drum drain cock may be partially open
8. Lube oil gauge may be defective
9. Gauge pipe line may be damaged

Q(16) What are the main sub assemblies of Air compressor in locomotive and explain?

Alco locomotive is provided with 3 cylinder, 2 stage reciprocating type air compressor.

Main sub assemblies of compressor unit are

1. Lube oil pump
2. Brass Spindle Unit (Lube oil pressure Indicator)
3. Crankcase Breather
4. Inter Cooler
5. Electro Pneumatic Governor (EPG)

1. Lube oil pump: Compressor is provided with its own lube oil sump. The sump is provided with Lube oil pump which is gear driven by compressor crankshaft. Oil is sucked through a metallic strainer and is discharged under pressure to the main bearings and crank pins. The cylinder liners are lubricated by splash lubrication method.
2. Brass Spindle Unit: No pressure gauge is provided for indicating lube oil pressure developed by the pump. Instead a visual indicating arrangement is provided on the body of compressor unit. Whenever the engine started, the compressor lube oil pump starts working. The pump is connected to the Brass spindle unit. When the pump works the lube oil pressure will act under the piston that is spring loaded from top. Because of the lube oil pressure action the piston is pushed

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up and so the brass spindle is projected out. If there is no oil pressure, the spindle will not project out. Thus indication is given to the Loco pilot about the working of the lube oil pump.

3. Crankcase Breather: Compressor is equipped with a crankcase breather which permits a partial vacuum in the compressor crankcase. To accomplish this the acts as a check valve. When pressure builds up in the crankcase as the pistons moves down, the breather valve opens. As the pistons start up, the breather valve closes, preventing the admission of air into the crankcase.
4. Inter cooler: During running of compressor, LP cylinders draws the atmospheric air through air intake filter. The discharge of LP cylinders is sent into an Inter cooler. Here the air is getting cooled with the help of inter cooler fan mounted on compressor crank shaft. From Inter cooler this air is sent to HP cylinder for further compression. An Inter cooler safety valve is provided at the outlet of Inter cooler to protect the Inter cooler tubes from damage.
5. Electro Pneumatic Governor (EPG): This is provided in compressor room. A pipe line is connected from MR1 outlet through a cock to this governor. It controls the MR pressure in the reservoirs between 8 to 10 kg/cm². When MR pressure reaches 10 kg/cm², this governor will not allow the compressor to charge the reservoirs by keeping the unloader valves open provided on inlet side of both LP and HP cylinders. Due to utilization of air in the system, when MR pressure drops to 8 kg/cm², the governor stops operating the unloader valves and as usual the compressor charges the MR. this process is called loading and unloading of compressor.

Q(17) Troubleshoot for brass spindle not projecting?

Reasons for brass spindle not projecting:

1. No oil pressure in compressor sump
2. Lube oil pump gear may be damaged
3. Lube oil pump may be defective
4. Brass spindle itself defective
5. Compressor lube oil relief valve defective
6. Compressor lube oil pump strainer may be dirty

Q(18) What are the reasons for compressor oil throw?

Reasons for compressor oil throw:

1. Excess oil in compressor sump
2. Piston rings may be weak
3. Breather valve may be defective
4. Oil filling cap not secured properly
5. Both side inspection door gaskets may be given up or bolts may be slack

6. Both side oil seals air drawing
7. Compressor crankcase may be damaged

Q(19) Troubleshoot for MR pressure dropping?

Reasons for MR pressure dropping:

1. MR1, MR2 drain cocks may be open
2. Auto drain valve may be continuously blowing
3. BP, FP, MR, BC equalizing pipes may be opened to atmosphere
4. Compressor pipe line may be leaking very badly
5. Inter cooler tubes may be damaged
6. Inter cooler safety valve may be defective or dropped
7. Electro Pneumatic Governor may be malfunctioning
8. Compressor valves may be defective
9. MR gauge may be defective
10. Piston rings heavy blowby

Q(20) Troubleshoot for BP not charging?

Reasons for BP not charging

1. Less MR pressure
2. A9 may be in application
3. Both side control stand A9 coc may be closed
4. MU2B in dead condition
5. 3/4" may be closed
6. D1 emergency may be open condition
7. Additional C2 relay valve may be defective
8. A9 feed valve not adjusted properly
9. Both side BP angle cock may be open

Q(21) Explain about safety devices in locomotive?

Safety devices in Diesel electric locomotive are

1. Over speed trip assembly: This unit is provided in engine right side free end. Whenever engine RPM exceeds its set limit (1200 ± 20), loco will shut down without indication to protect the engine from over speed damages. Without resetting OSTA starting the engine, engine will crank but not fire. If OSTA tripping, do not try to re crank several times otherwise batteries may be discharged.
2. Low Lube Oil Button: In Woodward governor locomotives LLOB is set 1.3 kg/cm^2 in Idle and 3.5 kg/cm^2 in 8th notch. If lube oil pressure below the set

pressure engine will shut down with indication (bell and Green indication in LED panel)

3. Low Water Switch(LWS): It is provided in compressor room. Whenever water level in the expansion tank drops to one inch below from the bottom of the tank LWS will operate and makes engine to shut down without indication of HEA in LED panel.
4. EXPLOSION DOOR:-This is an openable door fitted on both the sides of the engine crank case in place of sump inspection door. Bursting of explosion door happens on two occasions.
 - A. when the crankcase exhaustor failed and furthers it is neglected by the driver for a long period of time.
 - B. when any hot bearing or any other moving parts gets over heated and emitting heavy smoke inside the crankcase beyond the capacity of the crankcase exhaustor motor then explosion door get opened. It opens and closes since it is a danger indication that some parts of engine over heated inside the crankcase.
5. ETS [ENGINE TEMPERATURE SWITCH] :-It is provided in expresser room. Whenever water temperature rises to 90`C this switch will operate and makes bell to ring and HOT engine indication will come to alert the driver.
6. DEAD MANS RELAY: - [DMR]This relay is provided inside the control compartment. When ever PCS knocked out this relay will get de energized and engine will comes to idle, throttle will not respond.
7. GROUND RELAY: - [GR]It is provided in control compartment. Whenever there is earth faults in control circuits and in power circuits this relay will be operated. Resetting knob will be projected out and its pointer will co insides with red dot, bell will ring, white light will glow and engine will comes to idle and load meter will drops to ZERO.
8. GFOLR [GENERATOR FIELD OVER LOAD RELAY]:-This is provided in all AC/DC locos. It is provided in control compartment. Whenever over load current flows to the rectifier panel and main generator [Alternator] shunt fields, GFOLR will be tripped and brings the engine to idle, load meter will come to ZERO and over load indication lamp will glow, bell will ring. To reset the GFOLR close the throttle, keep ECS in idle, press the GFOLR reset button. If the GFOLR does not get reset then reset manually. If the GFOLR trips more than three times it should not be reset and loco should be failed.

Q(22) List out various safety fittings and safety items in locomotive?

SAFETY FITTINGS IN DRIVER'S CAB:

1. Portable telephone with poles with seal
2. Fire extinguishers
3. Spare BP & Vacuum hose pipes
4. Spare transition screw coupling
5. Safety 'U' bracket
6. L- rod
7. Spare VRP fuse
8. Spare head light bulb

SAFETY FITTINGS IN UNDER TRUCK:

1. CBC coupling safety pin
2. Cattle guard should be 10" above the rail.
3. Rail guard should be 4" above the rail.
4. Compensating beam safety U bracket (trunion bracket) ,Tie rod bolt with cotter.
5. Vacuum hose pipe dummy.
6. Truck collar pins and safety U bracket.
7. Brake hanger tie bar with safety chain.
8. TM gear case bolts(4-vertical,3-horizantal)
9. Axle box stay plate with bolts.
10. Brake pull rod with safety U clamp
11. TM power cable secured with wooden cleats.
12. Sand pipe with proper alignment.

SAFETY ITEMS IN DRIVER'S CAB:

1. Portable telephone with poles with seal
2. Fire extinguishers
3. Spare BP & Vacuum hose pipes
4. Spare transition screw coupling
5. Safety 'U' bracket
6. L- rod
7. Spare VRP fuse
8. Spare head light bulb

Q(23) Explain Vigilance Control Device (VCD)?

VCD in Diesel Electric locomotive checks the alertness of the loco pilot for every 60 sec. It stops the train if driver is incapacitated.

1. Soon after circuit breakers MB1, MB2, MPCB, MFPB1, MFPB2 MCB1, MCB2 are switched ON and BC pressure is less than VCD starts functioning.
2. If BC pressure is more than 2.1 kg/cm²,

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3. VCD alerts the driver once in every 60 seconds through a blinking LED, if none of the following activities are performed within 60 seconds.
 - a. Increase/Decrease of Notch
 - b. Application/Release of A9
 - c. Application/Release of DB
 - d. Change of DB level
 - e. Change of RH position
 - f. Operation of Horns buttons
 - g. Operation of sander buttons
 - h. Pressing VCD reset button
4. Driver has to perform any of the above operations as required or press VCD reset button to suppress the warning lamp.
5. If the driver does not respond to the VCD warnings
 - a. The blinking LED continues for 8 seconds
 - b. After 8 seconds, a buzzer is switched ON along with blinking LED
 - c. The blinking LED and buzzer continues for another 8 seconds
 - d. After 76 (60+8+8) seconds VCD penalty takes place.
 - e. VCD counter is increased by 1.
 - f. Buzzer is switched off
 - g. LED continues to blink for another 35 sec.
 - h. BP drops and Loco/Formation brakes are applied
 - i. Engine comes to Idle.
6. To reset VCD penalty,
 - a. Bring the Throttle to Idle
 - b. Reverser Handle should be in 'Forward' or 'Reverse'
 - c. Wait till blinking LED is OFF
 - d. Wait till loco speed is reduced to zero
 - e. Press VCD reset button in working control stand

Q(24) Explain about REMMLOT in Diesel Electric Locomotive?

RDSO developed online monitoring system of locomotives and trains REMMLOT (Remote Monitoring and Management of Locomotives and Trains) which makes available the real time data from the microprocessor of the loco, including the location of the loco, to authorized personnel. REMMLOT system has already been tested and running on a large number of HHP & ALCO locos. With this system, predictive maintenance is possible. With predictive maintenance, not only the cost of maintenance is reduced & availability is increased and also reliability is improved. Following are the main actions being taken at present with the help of REMMLOT.

- a) Monitoring of loco parameters by the shed to plan schedule/of course attention to loco at near shed.
- b) Advising LP to take timely action to prevent online failure/detention to loco, on the basis of faults noticed on line.

Q(25) Explain Auxiliary Power Unit?

Analysis of locomotive data has shown that most of the run time of the goods trains is spent IDLING for want of line clear signals on the station & yards for prolonged periods of time. While the diesel engine is idling at 400 RPM, the engine consumes roughly 25 to 30 liters of diesel oil per hour. The diesel engine performs two functions while idling at stand still; the compressor maintains MR pressure and the auxiliary generator charges the locomotive batteries. These two functions do not require much power. However as the full engine runs to cater this requirement, the energy consumed is very large. To cater to above requirement APU system has been developed as per RDSO specification. During APU mode, Locomotive engine will be shut down and APU engine will start working which in turn consumes very less fuel i.e. 5 liters per hour.

Q(26) Difference between Naturally aspirated and Supercharged engine?

Naturally aspirated engine:

The diesel engine in which air under atmospheric pressure is supplied in to the engine cylinder during suction stroke is called 'Naturally aspirated engine.'

Super charged engine:

If it is possible to increase the quantity of air available for combustion with the existing size of the cylinder, more fuel can be burnt and thereby more horse power can be obtained.

The process of admitting more air at high pressure in order to burn more quantity of fuel is called 'Super charging'.

Several methods of super charging are

- (i) Electrically driven motor to rotate a blower
 - (ii) Gear driven blower where the blower is getting the drive from the crank shaft through gears
 - (iii) By means of exhaust gas driven turbine to rotate a blower
- The last method is the most economical method. Because we are utilizing the exhaust gas to drive the blower, which would have otherwise gone waste.

Q(27) Troubleshooting for Engine Hunting?

If the governor is not in a position to give the rated RPM of the diesel engine according to throttle position, this phenomenon is known as 'Hunting'.

Reasons for Hunting:

- (14)
- i. Dirty governor oil
 - ii. Low governor oil pressure. In this case examine the governor oil pipe connections for any leakages and arrest the same.
 - iii. Defective governor mechanism

Q(28) Troubleshooting for Poor Hauling power?

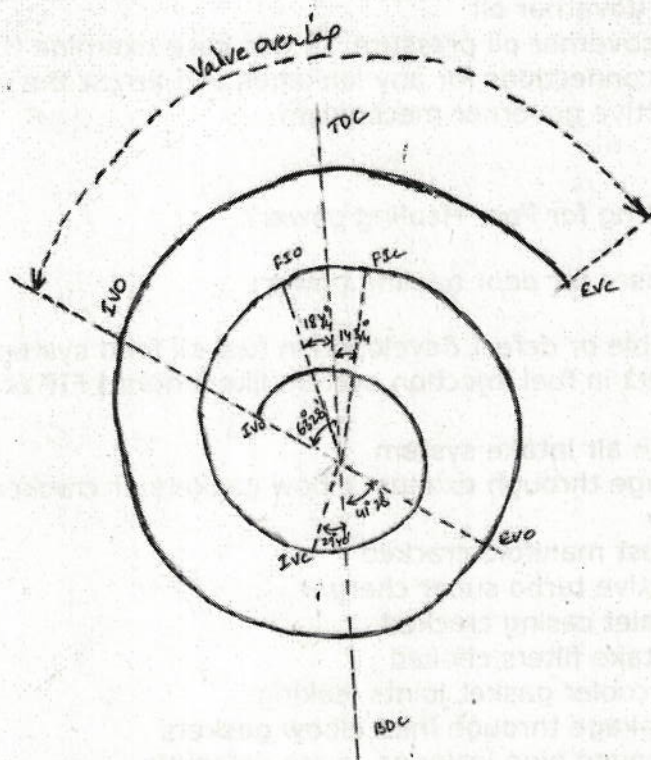
Possible causes for poor hauling power:

1. Any trouble or defect developed in fuel oil feed system
2. Any defect in fuel injection system like blocked FIP or fuel rack sticky
3. Defects in air intake system
 - a) Leakage through exhaust elbow gaskets or cracked exhaust elbow
 - b) Exhaust manifold cracked
 - c) Defective turbo super charger
 - d) Gas inlet casing cracked
 - e) Air intake filters choked
 - f) After cooler gasket joints leaking
 - g) Air leakage through inlet elbow gaskets
 - h) BAP gauge pipe leaky or gauge defective
 - i) Defects in excitation system

Q(29) Explain Valve timing diagram?

Valve Timing Diagram is a graphical representation of sequence of operations at which inlet and exhaust valves open and close as well as firing of the fuel. It is generally expressed in terms of angular position of crank shaft.


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Valve overlap in WDM2 $123^{\circ} 28'$
 valve overlap in WDG3A 140°

Alco loco valve timing diagram

Inlet valve opens	$63^{\circ} 28'$	before TDC
Inlet valve closes	$29^{\circ} 40'$	after BDC
Fuel Injection opens	$18\frac{1}{2}^{\circ}$	before TDC
Fuel Injection closes	$14\frac{3}{4}^{\circ}$	after TDC
Exhaust Valve opens	$41^{\circ} 28'$	before TDC
Exhaust Valve closes	60°	after TDC

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(B)

Q(30) Write short notes on Four stroke and Two stroke cycle engine?

S. No	Four stroke cycle engine	Two stroke cycle engine
1	The cycle is completes in 4-strokes of piston or two revolution of crank shaft	The cycle is completes in 2-strokes of piston or one revolution of crank shaft
2	Heavier fly wheel is needed	Lighter fly wheel is sufficient
3	Power produced from same size of engine is less	Power produced from same size of engine is more.
4	Lower cooling requirement	Greater cooling requirement
5	Lower rate of wear and tear	higher rate of wear and tear
6	Valve lever mechanism is required for opening and closing of valves	Only exhaust valves require mechanism for opening and closing of valves
7	Initial cost is high	Initial cost is less
8	High thermal efficiency	Low thermal efficiency

Q(31) What do you understand by Load Box test? Why is load box test conducted?

Load Box test is a test to check the capability and performance of the engine by simulating the actual working condition of the locomotive at rated output, in static condition.

During load box test, the output of the engine is measured in terms of electrical parameter (volt and ampere). In this the output of the generator is connected across a set of resistances instead of connecting it with the Traction Motors. The output of the engine is dissipated in terms of heat across resistance during Load Box test.

Types of Load Box

1. Grid Resistance Load Box.
2. Water Resistance Load Box

Load Box test is conducted to

1. To match the generator demand with the engine output.
2. To find certain parameters which could not be found by normal test methods.
3. To assess the condition of the components.

When to conduct Load test:

1. During Heavy Schedule
2. During components change which effect the engine output
3. During low BAP and low hauling power problem

During Load Box test, the following readings have to be recorded notch wise.

Notch	Volt	Current	HP	LCR	Rack	RPM	BAP	LOP	FOP	Exh. gas temp.

32) What are the design changes made in the RTTM blower?

- A) The design changes in the RTTM blower are
- a) Spherical roller bearings are used
 - b) Shaft thickness has been increased
 - c) Cogged belts are used for drive
 - d) Welded design impellers are used
 - e) Sealed bearing housings instead of pillow block are used.

33) What are the improvements done in radiators?

- A) The improvements done in radiators are
- a) The tubes are mechanically bonded
 - b) Louvered fins are used
 - c) Radiator assembly is changed from 3 core to 2 core
 - d) The heat dissipating capacity is increased
 - e) The size of radiator is increased

34) What are the parts upgraded (write any five) to improve reliability?

- A) The parts upgraded in compressor are
- a) Air discharge valve assembly
 - b) Air suction valve
 - c) Intercooler assembly
 - d) Breather valve
 - e) Intercooler manifold
 - f) Unloader connection
 - g) Cylinder heads
 - h) Crank case sump cover
 - i) Manifold gaskets
 - j) Intercooler gaskets

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- h) Crank case sump cover
- i) Manifold gaskets
- j) Intercooler gaskets

35) What are instructions issued by RDSO to reduce vibrations in the compressor compartment?

- A) Instructions issued by RDSO to reduce vibrations are
 - a) L shaped stiffener and plug with top plate to be welded with side plates, bottom plate and top plate on under frame
 - b) Modified top plate with plug holes to be placed on the top and welded with existing plates
 - c) Ensuring that plug holes to be aligned with stiffener top flange after proper contact and location

36) What are the advantages of self cleaned lube oil filters?

- A) Advantages of self cleaned lube oil filters are
 - a) Lube oil filters are completely eliminated
 - b) Lube oil is cleaned through self-cleaning action
 - c) Overhauling periodicity of this filter drum is POH to POH
 - d) No wastage of lube oil since no filters
 - e) No chance of unfiltered oil entering into the system

37) What are various types of filters used in locos?

- A) Various types of filters used are
 - a) Fuel oil primary filter (Conventional and Long life)
 - b) Fuel oil secondary filter (Conventional and Long life)
 - c) Lube oil filters
 - d) Break-in filters
 - e) J filters

38) What are up gradations done in filters used in locos?

- A) Up gradations done in filters are
 - a) When conventional filter were used, changing periodicity was once in a month
 - b) Because of repeated changing, lot of lube oil filter drum gasket failure were took place
 - c) This process also results in more wastage of lube oil
 - d) To avoid this type of recurring problems, long life filters are introduced which are being changed once in 122 days
 - e) The life is further increased when this filters are used in combination with on line centrifuge duly observing the differential pressure

39) What are the types of Turbos used in locos and their periodicity of overhauling?

- A) Different types of turbos are

a) 720 Alco	-	12 months
b) Napier (2600, 3100 HP)	-	24 months
c) ABB (2600, 3100 HP)	-	48 months (4 years)
d) Hispano Suiza	-	72 months (6 years)
e) ABB- TPR-61	-	72 months (6 years)

f) GE

72 months (6 years)

40) How lube oil supply is connected to Turbo earlier and now? What are advantages?

A) a) Earlier lube oil supply to turbo is connected from right side auxiliary header through Break-in filter. Now lube oil supply is connected from lube oil main header to turbo directly without any filter

Advantages:

- a) the maximum lube oil pressure available in the system is available for TSC bearings lubrication
- b) lube oil connections are simplified

41) What are the changes made in air filtration system?

A) Changes made in air filtration system are

- a) Primary stage filtration is through inertial type filters and dust exhaust motors
- b) Secondary stage filtration is through Bag/Box type filters, the filter media is fiber glass

42) What are types of cylinder heads and how valve insert is pressed?

A) I) The types of cylinder heads are

- a) 251 conventional with 45 inlet and outlet valves
- b) 251 conventional with 30 inlet and outlet valves
- c) 251 + with 45 inlet and outlet valves
- d) 251 + with 30 inlet and outlet valves

II) The valve seat inserts are to be dry ice cooled in liquid nitrogen and the cylinder head must be heated to a temperature of 210 to 230 degree Fahrenheit for expansion. Then the insert is inserted and allow it for cooling.

43) What are the types of pistons?

A) The different types of pistons are

- a) EML aluminum piston 12.5 CR
- b) EML steel cap piston 12.5 CR
- c) EML steel cap piston 11.75 CR
- d) IPL steel cap piston 12.5 CR
- e) IPL steel cap piston 11.75 CR
- f) GE steel cap piston 11.75 CR

44) What are the types of FIP supports? What are dimensions of different cross heads?

A) The types of FIP supports are

- a) 15mm non FE FIP support
- b) 17mm FIP support with wide cam rollers
- c) SUCS FIP support
- d) Non FE and FE 132.6 to 132.4 mm free length and 25.298-25.247mm diameter
- e) SUCS =125.4 to 124.9mm free length and 26.924-26.899mm diameter

45) What are the types of cam shafts and their overlap in degrees?

A) The different types of cam shafts are

- a) Non FE cam shaft 123 degree overlap

- b) FE cam shaft 140 degree overlap
- c) Stiffer unit cam shaft with 140 degree overlap
- d) Retro fitment unit cam shafts with 140 degree overlap

46) What are changes made in fuel oil system?

- A) The changes made in fuel oil system are
- a) In place of straight adaptors of fuel oil entry and exit from headers, 90 degree elbows are provided
 - b) Eliminator D-40, water separator is also provided in the suction line of the system
 - c) Long life primary filters with longer casing
 - d) Long life secondary filters with longer casing
 - e) Instead of cross over pipe direct connection to both headers of (later this modification is withdrawn by RDSO)

47) Write the matching cam gear timings?

- A) The matching of cam gear timings are done as follows
- a) Keep R1 piston in TDC
 - b) Ensure R1 TDC with trammel gauge
 - c) Match cam gear mark with engine block face by suitably rotating the camshaft
 - d) Check fuel cam lift to within limits for cross verification

48) Write any five types of valve seat inserts?

A) Five types of valve seat inserts are

Non-FE	
Inlet	Exhaust
44 ½ degree with ring Weltite	44 ½ degree with ring Weltite
FE	
Inlet	Exhaust
29 ½ degree with ring Weltite	44 ½ degree with ring Stellite
FE 251 + cylinder heads	
Inlet	Exhaust
29 ½ degree without ring Weltite	44 ½ degree without ring Stellite

49) What are the changes made in the water pump to increase the periodicity of overhauling and write any five important dimensions to be checked during assembly?

- A) Changes made in water pump are
- a) 10 inch water pump impeller
 - b) Water pump shaft without sleeve
 - c) Modified long life water seal
- Important dimensions are
- a) Water pump shaft outer dia = 60.013 to 59.997mm
 - b) Water pump shaft runout = 0 to 2 thou

- c) Water pump shaft dia at gear end on key 58.775 – max, 58.763 – min
- d) Water pump shaft dia at impeller side bearing – 55.014-55.004mm
- e) Water pump shaft dia at seal – 41.313-41.300mm

50) What are the checks to be done while attending Main Berings?

- A) The checks to be conducted while attending min bearing are
 - a) Reverse elongation
 - b) Crank pin runout within limits
 - c) Tri-metal overlay
 - d) General examination
 - e) Saddle cap serrations

51) Write types of wheel sets used in locos?

- A) Different types of wheel sets are
 - a) NH wheel set
 - b) WDM2 NBC PSB wheel set
 - c) WDM2 NBC RSB wheel set
 - d) WDM2 HNBC PSB wheel set
 - e) WDM2 HNBC RSB wheel set
 - f) WDG3 HNBC PSB wheel set
 - g) WDG3 HNBC RSB wheel set

52) Write the types of bogies used in locos?

- A) Different types of bogies are
 - a) Narrow horn cast steel bogie
 - b) Wider horn NBC cast steel bogie
 - c) Wider horn HNBC cast steel bogie
 - d) High adhesion bogie (Fabricated box type)
 - e) High tensile steel cast

53) Write any five safety parameters /readings to be checked in case of loco derailment and their limits?

- A) Some of the safety parameters to be checked are
 - a) Wheel dimeter : New 1095mm, Condemn 1016mm
 - b) Wheel flange wear : 3.0mm max
 - c) Wheel root wear : 6mm max
 - d) Wheel tread : 6.5mm max
 - e) Buffer height : Min: 1030mm , Max: 1105mm
 - f) Wheel gauge : New assembly: 1596+-0.5mm
Service limit: 1596(-0.5/+3)mm

54) Write the types of axle boxes used?

- A) Different types of axle boxes are
 - a) High speed NBC
 - b) NBC (Conventional)
 - c) CRU

- d) SKF
- e) Timken Heavy duty
- f) Timken Quad

55) Write any five air brake valves and their functions?

- A)
- a) A9 Automatic brake valve: This is used for loco and formation brake application
 - b) SA9 Independent brake valve: This is used for loco brake application
 - c) MU2B: This is used for MU brake application
 - d) D Emergency Brake Valve: This is used to apply brakes at emergency rate
 - e) C2 Relay Valve: Its function is to relay brake cylinder pressure either initiated by SA9 valve or C3W distributor valve for loco brake application
 - f) C3W Distributor Valve: This valve is provided in IRAB1 brake system to get conjunctional loco brake.

56) What are the types of Air brake panels used in locos and write advantages of latest two designs?

A) Different types air brake panels are

- a) Rake mounted
- b) Bi plate panel mounted
- c) Tri plate panel mounted

Advantages:

- Pipe lines and joints are minimized
- All valves are located at one place and easy to access
- Trouble shooting is easy
- Easy maintenance

57) What are the advantages of online centrifuge and at what schedule it is to be cleaned?

A) Advantages of online centrifuge are

- a) More effective filtration with constant cleaning efficiency
- b) Removal of contaminant particles below one micron size
- c) Longer oil change intervals
- d) Longer life of the pleated paper lube oil filter cartridges

The online centrifuge is cleaned in monthly and above schedules

58) What is PTLOC and what are its advantages?

A) PTLOC is Plate type lube oil cooler and its advantages are

- a) More heat is dissipated
- b) Better lube oil cooling
- c) POH to POH overhauling periodicity
- d) No tubes and hence no related failures
- e) Compact in size

59) What are the methods used to remove moisture in the compressed air in locos?

A) The methods used to remove moisture are

- a) By auto drain valve functioning during loading and unloading cycle
- b) By J filter drain out manually

- c) By MR drain coc manually
- d) By heat less twin tower regenerating type Air Dryers

60) What is the attention to radiators in different schedules?

- A) Radiator attention in different schedules is
- a) Trip: Radiators blowing with steam and air
 - b) Monthly: Radiators blowing with steam and air
 - c) Quarterly: Radiator grills removal and both sides radiators cleaning with wire brush and blowing with steam and air
 - d) Yearly: Radiator grills removal, cleaning thoroughly with cleaning solvent internally and externally & testing (in situ condition only)

61) Write any ten load test parameters for 3100 HP loco and their limits?

A) Load Box parameters (3100 HP loco)

Parameter	Unit	Specified Value
Initial Rack	mm	GE/MCBG: 0, WW:2
Over speed trip	Rpm	1200±20
SFC	Gms/BHP/Hr	156±4
TRD	Secs	Alco: 90-180 Napier: 20-65 ABB: 120-200
Crankcase Vacuum	Inches of H ₂ O	0.5 on 8 th notch full load
Exhaust gas temperature at Turbo inlet	°C	525 (max)
8 th notch voltage	Volts	700-775
8 th notch current	Amps	2700-2750
LOP	Kg/cm ²	5.3 to 6.0
FOP	Kg/cm ²	3.5 to 4.0
BAP	Kg/cm ²	1.6 to 2.0
Rack	mm	30+1/-2
Exh. Gas temp at cylinder head	°C	Max: 476 Differential: 38
Compression pressure at each cylinder	PSI	Max: 400±40 Differential: 40PSI max
Peak firing pressure at each cylinder	PSI	Max: 1800 to 1950 Differential: 100 PSI

62) Write the overhauling procedure of Bogie frame in ten steps?

A) Steps for the overhauling of Bogie during Yearly schedule

- 1) Remove the bogie by lifting the super structure until the bogie is clear and push the bogie out along the track.
- 2) Remove all pedestal lifting lugs and keep wedges to wheels. Remove brake pull rods and brake slack adjusters. Remove nose cap bolts, pin keepers, hold traction motors by crane and remove resilience pad, take out slowly the traction motors.

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- (9)
- 3) Take out the bogie frame to release springs. Remove springs and compensating equalizing beams and take out the wheels from its place after removing the axle boxes.
 - 4) After cleaning, inspect the bogie for any cracks, welding given up and horns bend etc.
 - 5) Assemble wheel set complete with axle boxes, place the wheel at required distance and mount traction motors, nose caps, gear case (1&2 – 5'7" and 2&3 – 6'11"). Place two assemble wheel set, traction motors units on track over a pit with motor noses facing one other.
 - 6) Secure motor properly in position, while lowering the frame on axle boxes and assemble compensating equalizer beam, properly provide cotter. Assemble complete brake equipment such as levers, hinges, pins, and provide outer and inner coil springs and lower frame carefully setting the springs and center pivot.
 - 7) Set the resilient pad, provide vertical pins and pin keeper properly. Attach pull rods, pedestal lugs, torque nose cap bolts to 800 – 850 ft.lbs., gear case bolts to 1000 ft.lbs., then sealing to be done.
 - 8) Clean nose cap, fill oil in it, provide wick pads and sealing to be done.
 - 9) After truck in, provide slack adjustment, brake blocks, air brake pipes.
 - 10) Attach bogies to loco body with lifting links.

63) What are the checks to be conducted for CBC and Transition screw coupling during M-24 and above schedules?

- 1) Height of CBC max - 1105mm and min – 1030mm. Check the CBC guard arm distortion. Close the knuckle and insert contour gauge no.1 between knuckle and knuckle pin and insert gauge no.2 (gauge no. 2 should not pass). If the gauge no. 2 passes between knuckle and guard arm, the guard arm of the CBC is distorted. Replace the CBC body.
- 2) Check the knuckle nose wear and stretch with the knuckle nose and stretch gauge. (To be checked by taking out the knuckle). Check the availability of anti creep prevention CBC lock piece should not get lifted. Knuckle should be opened. (If the anti creep is not available the knuckle will get opened)
- 3) Check and ensure CBC components lock, nose of knuckle should not be lubricated with oil or grease. If found with grease, clean it. Check of operating mechanism. Operate the CBC handle and see that the knuckle opens freely. Check the operating handle for for bends, cracks etc. Check the operating handle, support brackets for excessive wear or elongation. Check the availability of CBC operating handle lock pin and chain.
- 4) Lock the CBC pin and operate the operating handle, knuckle should not open. Condition of yoke pin support plate. Check the tightness of CBC yoke pin support plate bolts. Check whether the yoke pin is resting on the support plate and any damage to the support plate. If damaged/cut replace with new plate.
- 5) Check visually whether the yoke pin is bent or distorted. Check the condition of striker casting / striker front stop legs for cracks/excessive/uneven wear. Check the condition of rear stoppers/legs on the loco chassis.

64) Write the assembly procedure of ABB TSC in ten steps?

A) Assembly procedure of ABB TSC

1. Assemble the turbine end bearing and fit in the bearing casing.
2. Fit the cover with "O" ring and cover plate on turbine end.
3. Fit the piston ring by applying high vacuum grease on bladed shaft and insert the same in the bearing casing.

4. Press the thrust collar with assembly and disassemble device on bladed shaft and measure the "press fit measure K".
5. Assemble the compressor end bearing and slide the bearing in to the bearing casing and fit it in the bearing casing.
6. Fit the compressor end cover with 'O' ring to bearing casing.
7. Clean the rotor shaft on compressor side.
8. Fit the compressor wheel on the bladed shaft with piston ring by applying high vacuum grease and press it till to get axial clearance limit by using assembly/disassembly device.
9. Remove the assembly/dis-assembly device. Measure the axial and radial clearances.
10. Fit the hex. Head and collar screw, disc spring. Torque of 50 to 80 N-m.
11. Screw the cap up to the shoulder. Tighten the cap.
12. Fit the air outlet casing assembly without touching the compressor wheel.
13. Fit the nozzle ring and cover ring (if removed) to the gas inlet casing
14. Fit the gas inlet casing along with segments.
15. Fit exhaust chimney and accumulator.

65) Write the overhauling procedure of Cylinder head in ten steps?

The overhauling procedure of Cylinder head is

1. Soak the cylinder head in the plant at 95°C for two hours
2. After that conduct hydraulic test for water leaks at 70 PSI with 90°C
3. Check valve seat and grind to 44°C and valve seat bore diameter between 3.1805" to 3.1815".
4. Check the guide condition (check with 0.624" pilot rod) Valve guide bore should be 0.626" min. The clearance between valve guide to valve stem 0.0015" – 0.002".
5. Check condition of valve cracks and bent. Valve disc thickness for new 5/32" and reached to 3/32" grind the valves for 45°
6. To check valve with seat, blue the valve and insert in the guide and bounce against valve seat. A fine line of contact should show around the valve seat.
7. Check cracks of yoke guides with ultrasonic test.
8. Check the height of compression seal. Compression seal height 0.014" – 0.020", condemning size 0.005". Lap the seal with lapping tool and smoothen by blue matching. Check blow by test. Admission pressure 5kg/cm² should be maintained 3.8 to 4.8 kg/cm²
9. Check the nozzle sleeve for leakage. If leakage replace.
10. Check spring load to give satisfactory service with 118 lbs and height 4 ^{13/16}" (actual size) and min 3 ^{13/16}" (when load applied) final assembly will be done with the help of depressing tool.

66) Write the overhauling procedure of compressor in ten steps?

A) Overhauling procedure of compressor

1. Unloading of compressor from loco:
Remove inlet, discharge and MR pipe joints and pipes. Fast/flexible coupling, HP/LP cylinder manifold and inter cooler assembly.
2. Dismantling:
Strip manifold of cylinder head, valves, cylinder liners. Remove the connecting rod assembly and lube oil pump assembly from the compressor unit. Remove lube oil pump gear drive.

3. Cleaning:
Clean the components duly de-carbonizing using HSD oil, jet of water and finally blow with compressed air. Clean the compressor housing with HSD oil and blow with compressed air.
4. Inspection of all components for cracks, damages, scoring, pitting marks etc.
5. Zygo test pistons, connecting rod and connecting rod bolts
6. Overhaul inlet, discharge valve, unloader valve and inter cooler assembly
7. Assemble the compressor unit and check the crank case vacuum
8. Assemble the fast coupling along with cooling fan
9. Align the compressor using a dial gauge. Check the run out of the compressor with the help of a dial gauge and if run out exceeds 0.006", then add/remove the shims accordingly to maintain the run out within limit
10. Tighten the foundation bolts and provide dowel pins. Connect both side coupling and fill with cardium compound. Connect inlet and discharge pipes. Connect compressor delivery pipe to the cooling coils and top up servo press 150 oil to high mark

67) Write the overhauling procedure of water pump in ten steps?

A) Overhauling procedure of water pump

1. Stripping:

- Separate impeller casing from bearing carrier assembly
- Separate bearing carrier assembly drive gear retaining plate from shaft with extractor
- Remove impeller, water seal, seal plate, oil slinger and oil seal from shaft
- Check shaft run out at impeller end. Permissible limit is 0.002"
- Remove shaft along with bearings from bearing carrier
- Separate both bearings from shaft
- Remove sleeve in case of groove formed on the sleeve

Cleaning: Clean all the components with HSD oil, water and then blow with compressed air

Acceptance criteria: inspect visually impeller casing, shaft, drive gear, bearing, shaft sleeve and impeller for any burrs or sharp edges, pitting marks and scoring.

Zygo test the shaft and renew accordingly

Assembly: Press radial bearing and thrust bearing on shaft using hydraulic press. Apply oil on bearings.

Assemble shaft with bearings in the housing

Heat drive gear to the temperature of 240°C to 270°C and mount on shaft and tighten the check nut

Provide new oil seal, new oil slinger and seal plate

Provide new water seal on the shaft

Provide impeller and impeller sleeve and tighten the nut

Provide the complete assembly in to the impeller casing

Tighten all casing nuts

Testing:

Keep the ready pump on test stand and run it for more than half an hour

Check bearing for unusual sound, if any unusual sound noticed take the pump for stripping out and reassembly

Check tell-tale hole for any leakage of water or oil. If any leakages are noticed take the pump for stripping out and reassembly with new oil seal or water seal

68) Write the overhauling procedure of lube oil pump in ten steps?

1. Stripping:

Mount the lube oil pump on the fixture

Remove lock nut clamp screw and lock nut

Extract drive gear with the help of gear extractor remove key

Remove front flange cover all bolts

Separate front flange cover from body along with front cover bushes

Remove impeller assembly from pump

Remove back plate bushes

2. Cleaning: Clean all the components with HSD oil, water jet and then blow with compressed air

3. Acceptance criteria: inspect visually pump casing, drive shaft and idler gear assembly, drive gear, studs and key. Zyglo test drive shaft and idler gear assembly and drive gear and renew accordingly

Check all clearances and ensure to be within limits

4. Assembling:

a. Locate back plate flange bushes on pump body

b. Apply lube oil to the bushes and gear assembly

c. Place gear assembly in casing

d. Apply front flange bushings

e. Apply face plate with new gasket

f. Apply lock nut and tighten all bolts

g. Apply drive gear key on shaft

h. Apply pump drive gear

- i. Provide lock nut and tighten
- j. Provide lock screw to the lock nut and tighten
- k. Provide lock wire to lock screw

5. Testing:

- a. Keep the ready pump on the work bench
- b. Rotate the gear manually, if there is any unusual sound noticed, dismantle and follow the procedure again.

69) Write the overhauling procedure of FTTM blower in ten steps?

1. First remove the cover plate from casing and remove blower. Then fix the blower unit on the fixture, now remove the gear from the shaft and then remove the shaft with bearings now remove the bearings.
2. Clean all the components (parts) and examine for any damages. Clean impeller and examine header for any damages.
3. Visually examine the blower housing for damages and welding defects. Check bearing for pitting marks and condition of cages. Send the gear and shaft for zygo testing.
4. Press the ball bearing on the shaft (hydraulic). Mount the frame head on the fixture push the bearing with shaft into the frame head. Fit the roller bearing into the frame head.
5. Fit the frame head up with gasket coinciding with oil inlet hole. Fit retaining plate and tight the bolts.
6. Heat the gear and provide the gear on the shaft. Tighten the nut and provide locking screw.
7. Fit the impeller and tighten the nut and then fold the lock washer.
8. Insert the blower into the blower housing and then provide the cover plate with bolts.
9. During schedule time visually check the condition of gear and bearings and grease of the bearing.

70) Write the overhauling procedure of RTTM blower in ten steps?

1. Strip the pulley with sleeve from the shaft and bolts holding pillow blocks/sealed bearing housing & remove bearing carriers.
2. Remove bearings and impeller with shaft.
3. Clean all components and examine for any damage and send the shaft for zygo test.
4. Assemble the impeller on to the shaft and fit the shaft with the impeller in the housing.
5. Mount the assembled bearing carriers along with the sleeves in to the pillow blocks.
6. Add or reduce the shim between cap and base as required to obtain snug fit of unit in outer housing and tight the pillow block bolts.
7. Tight the bearing adapter both ends and rotate the impeller and check the rotation of the blower.
8. Fold the lock washer both sides and pump the grease to the bearings.
9. Fit the pulley on to the shaft with sleeve.
10. Load the overhauled blower on the test stand and run the blower for minimum one hour and examine for any unusual sound and feel the bearing temperature and attend as applicable.

71) How to conduct blow-by test?

- A) Blow-by test is conducted by passing air at a pressure of 5 kg/cm² with the blow-by into the cylinder head through the de-compression plugs. All the valves are in closed condition and the pressure reading is observed for about 20 seconds and it should not drop below 3

kg/cm². If it drops, the leakage of air is examined inside the sump and also at the TSC exhaust.

72) Write any reasons for FOP dropping?

- a. Less fuel oil in the tank.
- b. Fuel trap may be dirty.
- c. Primary and secondary filters may be chock.
- d. Suction pipes may be air drawing.
- e. Relief & regulating valves may be struck up in open condition.
- f. Love joy coupling may be slack.
- g. Delivery pipes may be leaking.
- h. Fuel booster pump may be defective.
- i. Gauge pipe line may be damaged.
- j. Fuel oil pressure gauge may be defective.
- k. Water contaminated with fuel.

73) Write any causes for LOP dropping?

1. Less lube oil in the sump.
2. Lube oil pump may be defective.
3. Relief & regulating valves may be struck up in open condition.
4. Delivery pipes may be leaking.
5. Filter drum filters may be chocked.
6. Filter drum 'o' ring may be damaged.
7. Filter drum & strainer casing drain cocks may be partially open.
8. Strainer may be dirty.
9. Lube oil gauge may be defective.
10. Gauge pipe line may be damaged.

If lube oil pressure not building during starting, Do not try to re crank several times otherwise batteries may be discharge.

74) Write any causes for BAP dropping?

1. Fuel oil pressure dropping
2. Exhaust gasket between head & manifold may be given up
3. Exhaust manifold may be cracked
4. Turbo super charger may be defective.
5. Turbo to after cooler housing flange joint gasket may be given up.
6. Intermediate casing joint gasket may be given up
7. After cooler housing to engine block joint gasket may be given up
8. After cooler to after cooler housing joint gasket may be given up
9. Air inlet elbow top & bottom gasket may be given up

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10. Booster air gauge may be defective or BAP pipe line may be damaged.

75) Write any causes for the brass spindle not projecting?

- a. No oil in the compressor sump
- b. Lube oil pump chain may be cut
- c. Lube oil pump may be defective
- d. Brass spindle itself defective
- e. compressor lube oil relief valve defective
- f. Compressor choke pipe may be leaking.
- g. Compressor lube oil pump strainer may be dirty.

76) Write any causes for the MR pressure dropping?

- a. MR1, MR2 drain cocks may be open
- b. Auto drain valve may be continuously blowing
- c. BP, FP, MR, BC equalizing pipes may be opened to atmosphere
- d. Compressor pipe line may be leaking very badly
- e. Inter cooler tubes may be damaged
- f. Inter cooler safety valves may be defective or dropped
- g. EP governor may be malfunctioning
- h. Compressor valves may be defective
- i. MR gauge may be defective
- j. Piston rings heavy blow-by.

77) Write any causes for wheel skidding?

- a. Brake cylinder pressure wrongly adjusted.
- b. Uneven adjustment of loco brake pull rods.
- c. Defective 28VB valve or Distributor valve.
- d. Defective BKIV valve or D1 pilot valve.
- e. Improper shunting operation by crew / shunters.
- f. Locked axle.
- g. Hand brakes not released properly.

78) Write any causes for compressor oil throw?

- a. Excess oil in the compressor sump
- b. Piston rings may be weak
- c. Breather valve may be defective
- d. Oil filling cap not secured properly
- e. Breather valve copper pipe may be damaged
- f. Both side inspection door gaskets may be given up or bolts may be slack
- g. Both side oil seals air drawing
- h. Bayonet gauge not secured properly
- i. Compressor crank case may be cracked

79) What are the reasons for high lube oil consumption?

- 1. External leakages through Victaulic dresser, tappet covers, sump covers and filter drum.

2. Worn out piston rings and oil throw from cylinder heads.
3. Cylinder liners ovality.
4. Excessive clearance between valves and guide.
5. Low crank case vacuum and oil spillage from oil seal and grommets.
6. Worn out scrapper rings or excessive ring gap.
7. Oil should be processed with physical and chemical properties.
8. Turbine end oil seal defective.
9. Engine temperature should be within limits.
10. At the time of oil brand change over, system should be thoroughly flushed.

80) Write a short notes on DPCS (Distributed Power Control System)?

Indian railways can increase throughput by running longer trains which require more motive power. More locomotives bunched together cause unacceptably high coupler forces. This situation can be overcome by distributing the locomotives throughout the consist of the train which will require a means of synchronizing actions on locos based on driver inputs in the lead locomotive. DPC system can provide real time communication between lead and remote locos through wireless data radio to synchronize all locomotives in the train.

81) What are the advantages of DPCS (Distributed Power Control System)?

1. Longer Trains with increased hauling capacities
2. Reduced coupler forces – lesser fatigue failures
3. Reduced crew requirements
4. Faster synchronized braking – Reduced stopping distance
5. Wireless radio control – Reduces clumsy wire connections
6. Safe handling of radio communication failures
7. Suitable for A and/or DC traction.

82) Write a short notes on CReDI?

Common Rail Electronic Direct Injection fuel system is second generation Electronic fuel injection system which leads to substantial reduction in specific fuel consumption and present levels of emissions. CReDI consists of a low pressure and high pressure fuel system. Salient feature of this system is that there are only two reciprocating 4 cylinder inline high pressure pumps which maintain a high fuel pressure for injection, approximately 1600 bar, in the fuel common rail. The injectors are solenoid operated, controlled through an interfaced ECU with traction excitation control. Governor, OSTA, FIP and control rack are the components that get eliminated from a conventional pump line nozzle loco.

83) What are the advantages of CReDI?

1. Reduced NOx emissions.
2. Reduced black smoke emissions
3. Reduced fuel consumption
4. Improvement in reliability of diesel engine.
5. On board diagnostic potential

84) What are the advantages of H type coupler over conventional E type coupler?

Traditionally the freight wagons were fitted with E-type center buffer couplers and coaching stock were fitted with screw couplers. Advantages of H type coupler over E type coupler are

1. Running longer trains with higher working loads.
2. Anti-climbing feature

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3. Locking provision for CBC operating handle.

85) What is the frequency of Maintenance Schedules for Alco and HHP locomotives?

ALCO Locos:

S.No.	Schedule	Periodicity
1	T1 (Trip 1)	15, 20, 30 & 40 days **
2	T2 (Trip 2)	15, 20, 30 & 40 days
3	M-2 (Monthly)	60 days
4	M-4 (Quarterly)	120 days
5	M-12 (Half Yearly)	12 Months
6	M-24 (Yearly)	24 Months
7	M-48 (Yearly)	48 Months
8	M-96 (POH)	96 Months

- ** 15 days for WDM2, WDM3A & WDG3A with plain suspension bearing.
 20 days for Roller suspension bearing locos including WDM3D locos.
 30 days for locos fitted with Microprocessor Based Control System (MBCS) and pure Air Brake (applicable to locos having 20 days trip schedule)
 40 days for locos fitted additionally with REMMLOT, small auxiliary motors (CCEM, FPM, DEBM) in AC variant, MCBG and upgraded compressor (applicable to locos having 30 days trip schedule). In these type of locos monthly will be done after 80 days, Quarterly after 160 days and Half Yearly after 400 days.

HHP Locos:

S.No.	Schedule	Periodicity
1	Trip/Monthly	Trip/30 days <i>145 days</i>
2	90/180 days	90/180 days
3	Yearly	1 year
4	2 Yearly	2 years
5	3 Yearly	2 years <i>3 years</i>
6	4 Yearly <i>5 yearly</i>	4 years <i>5 years</i>
7	6 Yearly	6 years
8	POH	18 years

1) Write a short notes on i) Stock Items ii) Ordinary Stores iii) Emergency Stores

- i) Stock Items: Stock items will be kept in the custody of the stores department which are frequently and regularly required and whose unit cost justifies incurring inventory carrying cost associated with these items. Such items will be known as 'Stock Items'.

ii) Ordinary Stores: Ordinary stores are generally such items of stores for which there is a regular turnover caused by constant demand and which are stocked by the department in its depot. Ex: oil, grease, steel raw material, paints, loco and C&W componets.

iii) Emergency Stores: Emergency Stores are the stores which are not required

frequently, but still stocks have to be maintained for ready use. Such items are not readily available in the market and as such would require long time for procurement in case they are not stocked. The stock out cost would be quite high if such items are not readily available in the stores when required. Ex: Spare parts of machinery&plant, components of Rolling stock and locos etc.

2) Write a short notes on i) Non Stock Items ii) Special Stores iii) Surplus Stores

i) Non Stock Items: The items which are essentially of one time or occasional requirement for which reasonable time will be available for procurement and hence no stock of such items is maintained. Such items are called Non stock Items.

ii) Special Stores: These are stores required for works and other special purposes i.e. other than for 'operation' or 'ordinary maintenance and repairs' and which are ordinarily dispatched directly to the requisitioner without being stocked in a stores depot.

iii) Surplus Stores: These are of two kinds, 'Movable' and 'Dead'.

Movable surplus stores comprise items of stores which have not been issued for a period of 24 months, but which, it is anticipated, will be used in the near future. Dead surplus stores comprise items of stores which have not been issued for 24 months and which, it is considered, are not likely to be utilized on any railway within next two years.

3) Write the procedure for stocking an item?

1. For stocking an item, the user department should first identify the need for stocking an item and then submit a stocking application to the stores department.
2. The consignee will prepare stocking application in 6 copis and send to the stores depot office with all necessary details like Description of the Item, Anticipated Annual Consumption (AAC), Rate, Value, No. of components etc..
3. The Ledger section will scrutinize the stocking application and ensures for the following.. Whether the item is available in other depots, facility to stock the item and availability of space.
4. Then from the Ledger section, stocking requisition will be sent to COS/HQ.
5. COS/HQ will give PL No. and tenders will be called for.
6. Once the supplier is selected, then Purchase Order will be released and it will be sent to Ledger section.

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7. From the Ledger section Purchase Order will be forwarded to progress section. PO particulars will be entered in progress register. Formal reminder will be given to supplier by the progress section.

4) Salient features of official language rules 1976?

- Communication to states etc. other than central govt. offices.
- Communication between central govt. offices.
- Replies to communications received in Hindi.
- Use of both Hindi & English.
- Application, representations.
- Proficiency in Hindi.
- Working knowledge of Hindi.
- Manuals, codes other procedural literature, articles of stationary.
- Responsibility for compliance.

4) What are the states in A,B,&C regions in official language rules?

Region A" means the States of Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Chhattisgarh, Jharkhand, Uttarakhand, Rajasthan and Uttar Pradesh and the Union Territories of Delhi and Andaman and Nicobar Islands;

"Region B" means the States of Gujarat, Maharashtra and Punjab and the Union Territory of Chandigarh, Daman and Diu and Dadra and Nagar Haveli

"Region C" means the States and the Union Territories other than those referred to in Region A & Region B.

5) What are the documents covered under section 3(3) of official language act 1963?

Under the provision of Section 3(3) of Official Language Act, 1963 the following documents shall be issued both in Hindi and English languages:-

Resolutions, General Orders, Rules, Notifications, Administrative & other Reports, Press Communiqués, Administrative and other reports and official papers to be laid before a House or the Houses of Parliament, Contracts, Agreements, Licenses, Permits, Tender Notices, Tender Forms.

6) What is 'Proficiency in Hindi'?

An employee shall be deemed to possess proficiency in Hindi if:-

- he has passed the Matriculation or any equivalent or higher examination with Hindi as the medium of examination ; or

- b. he has taken Hindi as an elective subject in the degree examination or any other examination equivalent to or higher than the degree examination; or
- c. he declares himself to possess proficiency in Hindi in the form annexed to these rules.

7) What is 'Working Knowledge of Hindi'?

An employee shall be deemed to have acquired a working knowledge of Hindi -

- a. If he has passed -
 - i. the Matriculation or an equivalent or higher examination with Hindi as one of the subjects ; or
 - ii. the Pragya examination conducted under the Hindi Teaching Scheme of the Central Government or when so specified by that Government in respect of any particular category of posts, any lower examination under that Scheme ; or
 - iii. any other examination specified in that behalf by the Central Government; or
- b. if he declares himself to have acquired such knowledge.

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Question Bank (HHP) for LDCE (Tech-JE

1) What are the salient features of GM locomotives?

11. Two stroke fuel efficient engine
12. High horse power – 4500HP
13. Extended schedule periodicity
14. Power assembly can be changed as a set
15. Unit injectors
16. Lash mechanism – no frequent tappet adjustment
17. Gear and exhaust gas driven turbo super charger
18. Oil cooled turbo
19. Educator mechanism for CCV
20. Water cooled compressor
21. AC-AC transmission system
22. Computer Control Brake System
23. HTSC (High Tensile Cast) bogie
24. High adhesion and tractive effort
25. Highly improved maintainability compared to Alco locomotive
26. High availability and reliability
27. Low fuel and lube oil consumption
28. Less emissions

2) What are the various compartments in HHP locomotive and mention components available in each compartment ?

1. Nose compartment
2. Driver Cabin
3. Electrical Control cabinet #1
4. Traction Control cabinet #1
5. Clean air compartment
6. Alternator compartment
7. Engine room
8. Accessories room
9. Equipment Rack
10. Compressor compartment
11. Radiator Compartment

1. Nose compartment: consists of CCB equipment i.e. Voltage conditioning Unit (VCU), Computer Relay Unit (CRU), Pneumatic Control Unit (PCU), KE Valve, Daed Engine Cock.

2. Driver Cabin: consists of Control console #1, Control console #2, Brake Valve controller #1, Brake Valve controller #2, Throttle handle, Reverser Handle, Tractive effort meter, MR,BP,BC gauges, Speedo meter, D1 Emergency valve, VCD alerter, VCD reset button etc.

3. Electrical Control Cabinet #1: consists of Engine control panel, circuit breaker panel, test panel, EM2000 display, Panel mounted modules etc.

4. Traction Control Cabinet: Traction Motor phase modules, Capacitors, filter circuits, Gate drivers, Dc link contactors.
5. Clean air compartment: consists of Dust Bin Blower Motor, Electronic Blower Motor, Baggie Type Fiber Glass Air Filters, Traction Motor Blower, IPR (Inverter Protection Resister), Magnet Valve for Radar.
6. Alternator compartment: consists of Main Alternator, Companion Alternator, Ring Gear, After cooler, Turbo (EMD G Series), Exhaust stack, Eductor, Oil Separator.
7. Engine Room: 16 cylinder diesel engine, Engine governor, OST assembly, EPD, Hot oil detector, Soak back pump and soak back filter, Turbo filter, Gear train assembly, exhaust manifold.
8. Accessories Room: Water Pumps, Lube oil strainer, Main lube oil & piston cooling pumps.
9. Equipment Rack: Water expansion Tank, Lube oil cooler, Lube oil filter, Fuel oil primary filter.
10. Compressor compartment: 3 cylinder, 2 stage compressor, MVCC, Inter cooler, Inter cooler safety valve, Horn magnet valve, Sand magnet valves etc.
11. Radiator compartment: Radiators, Radiator fans with motors, MR cooling coil, compressor air intake filters.

3) Write the cranking procedure of WDG4/WDP4 locos?

WDP4 / WDG4 Locomotive Cranking Procedure

1. Put on the hand brake.
2. Check oil and coolant water levels.
3. Make sure that LLOB on Governor, Low water and low crank case pressure reset buttons are pressed in.
4. Make sure that Engine Over Speed Trip Reset Lever (OSTA) is in Reset position (Handle should be tilted towards left side of locomotive in Reset position).
5. Make sure that the Isolate / Run switch is in 'Isolate' position.
6. On the Long hood control stand – Ensure • Engine Run switch is down (OFF). • Control & FP breaker is up (ON). • Generator field switch is down (OFF). • MU shut down RUN button is pressed-in.
7. on working control stand – • Ensure Reverser handle in Neutral. • Throttle handle in idle. • Keep Auto brake handle in RUN position. • Keep Independent brake handle in Full application position. • Keep Lead / Trail switch in Lead position.

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8. On Non-working control stand – • Ensure Reverser handle is removed. • Throttle handle in Idle. • Auto brake handle in FS (Full service) position. • Independent brake handle in released position. • Lead / trail switch is in Trail position.
 9. Ensure all circuit breakers on circuit breaker panel are in OFF position.
 10. Ensure that start Fuse is in position and and close the battery knife switch.
 11. On the circuit breaker panel • Put on all circuit breakers.
 12. On Computer select starting system
 - Main Menu, • Data Meter • Starting system
 13. TLPR shows on (Turbo Cooling Cycle Starts), now engine is ready for cranking.
 14. Go to the FUEL PRIME / ENGINE START switch and turn the switch to FUEL PRIME side (left side). If the shutdown procedure was followed properly earlier, the fuel pump motor will start (the motor sound can be heard). If the fuel pump motor does not start, wait for 15 to 20 minutes and try again.
 15. Keep holding the Engine PRIME / ENGINE START to prime side and see that the fuel secondary sight glass is full of fuel and shows no bubbles.
 16. Turn the Engine PRIME / ENGINE START switch to ENGINE START side, start switch can be released when engine RPM goes above 160 – 180, which can be readily seen on the starting system screen on EM 2000.
- 4) Write the shutdown procedure of WDG4/WDP4 locos?
- WDP4/WDG4 Locomotive Shut down Procedure
1. Put on the hand brake.
 2. Turn Isolate / Run switch to isolate position.
 3. On the long hood control stand, keep. • Engine Run Switch down (OFF). • Control & FP breaker up (ON). • Generator field switch down (OFF).
 4. On the working control stand - • Keep Throttle handle in idle. • Keep reverser handle in neutral and remove the handle. • Auto brake handle in run position. • Apply Independent brake to full application position. • Ensure Lead / Trail switch is in Lead.
 5. On the non-working control stand – Ensure - • Auto brake is in full service position. • Independent brake is released. • Lead / Trail switch is in Trail Position.
 6. Select Starting system on computer to watch the status of TLPR. (Shows off)
 7. Press EFCO (Red) button on the Control panel till the engine stops (TLPR shows ON)
 8. Make sure that the Turbo lube pump motor is running.

11. Remove the reverser and hand over to reliever or CCC.
 12. Wait till TLPR goes OFF. (Turbo cooling cycle completes)
 14. Put-off Turbo lube pump circuit breaker and computer circuit breaker.
- 5) Write down the procedure for recycling of circuit breaker?
1. Stop the locomotive.
 2. Secure the loco by (i) Apply SA9/hand brake. (ii) Keep throttle handle Idle. (iii) Keep reverser neutral. (iv) Isolation switch on isolate. (v) ER off. (vi) GF off. 3. Switch off computer circuit breaker 4. Switch off concerned circuit breaker (TCC1, TCC2, MAB, auxiliary generator breakers etc.).
 5. Wait for 20 to 30 seconds.
 6. Switch on concerned circuit breaker.
 7. Switch on computer circuit breaker.
 8. Recover air brake penalty by keeping A9 on FS for 10 seconds.
- 6) Explain Air Brake self-test procedure?
1. For Air Brake self-test only one control stand should be selected i.e. one control stand should be in 'Lead' and the other control stand should be in 'Trail'.
 2. Stop the locomotive, apply Hand Brake and provide skids for the wheels.
 3. Close BP, FP, MREQ and BCEQ COCs at both ends of the locomotive.
 4. Ensure MR pressure is between 8.2 kg/cm² to 9.8 kg/cm².
 5. Do not keep any of the Auto handle in Emergency position.
 6. Do not operate Bail-off ring while the test is ON.
 7. For the self-test, select 'Air brake Self-test' from the LCC screen and press 'CONTINUE'.
 8. Wait till completion of Air brake self-test.
 9. After successful completion of Self-test, LCC will display "Air brake self-test successful. No defects found". If self-test is not successful, LCC will display "Air brake Self-test failure".
 10. After getting the message "Air brake self-test successful. No defects found", press F4 key on LCC display screen and go back to MAIN MENU screen.
 11. Press CREW key on the display and act accordingly.
- 7) Write down the procedure for attaching dead loco (GM loco) to another working loco?
- Attaching a dead loco with another working loco (Any type)
- Option 1 (with only BP connection):
1. Couple the working loco to dead WDG4/WDP4 loco. Ensure both CBC's are locked properly.
 2. Ensure all the breakers in dead loco are in "OFF" position and open battery knife switch.
 3. Open MR Equalizing & BC Equalizing cut out cocks from any one end of dead loco.
 - 3a. Open "Dead Engine cut out cock" of dead loco
 4. Connect BP hose between two locos & open angle cut out cocks. Ensure BP is charged in dead loco and MR2 (on control stand gauges) charging in dead loco.
 5. Drop BP from leading loco and ensure BC application in dead loco. Re-charge BP from leading loco & ensure BC on trailing loco releases. loco with dead WDG4/WDP4 loco. Ensure both CBC's

2

Option 1 (with only BP connection):

1. Couple the working loco to dead WDG4/WDP4 loco. Ensure both CBC's are locked properly.
2. Ensure all the breakers in dead loco are in "OFF" position and open battery knife switch.
3. Open MR Equalizing & BC Equalizing cut out cocks from any one end of dead loco.
- 3a. Open "Dead Engine cut out cock" of dead loco
4. Connect BP hose between two locos & open angle cut out cocks. Ensure BP is charged in dead loco and MR2 (on control stand gauges) charging in dead loco.
5. Drop BP from leading loco and ensure BC application in dead loco. Re-charge BP from leading loco & ensure BC on trailing loco releases. loco with dead WDG4/WDP4 loco. Ensure both CBC's are locked properly. 2. Ensure all the breakers in dead loco are in "OFF" position and open battery knife switch. 3. Follow the points of making MU.

Option 2: (with all MU hose connections):

1. Couple working loco with dead WDG4/WDP4 loco. Ensure both CBC's are locked properly.
2. Ensure all the breakers in dead loco are in "OFF" position and open battery knife switch.
3. Follow the points of making MU.

8) Write down the procedure for making EMD locos MU?

Making MU:

1. Couple both the working locos & ensure both CBC's are locked properly.
2. Set both the control stands as below:-

Leading Loco:

WORKING CONTROL

STAND

A9 - Release/Run

SA9 - Full application

L/T Switch - Test

NON WORKING

CONTROL STAND

A9 - Full Service

SA9 - Release

L/T Switch - Trail

Trailing Loco: Both Control Stands: A9 - Full service, SA9 - Release, L/T Switch - Trail

1. Connect hose pipes between two locos (BP, FP, MR Equalising, BC Equalizing) and open cut out cocks on both the locos.

2. Now keep L/T Switch to "lead" position on working control stand of the leading loco & charge BP.

3. Apply hand brake.

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3. It also ensures a uniform water flow and minimizes the possibility of water pump cavitation.

4. A pressure cap is provided on the water tank filling pipe, opens at approximately 20 PSI. It prevents the damages of cooling system components by relieving excess pressure from the system.

5. The pressure cap is equipped with a handle which helps installing and removing of the cap.

6. The most important function of the pressure cap handle is to release the pressure developed in the system before removing the pressure cap.

10) Explain the fuel oil system of GM locomotive with a neat sketch?

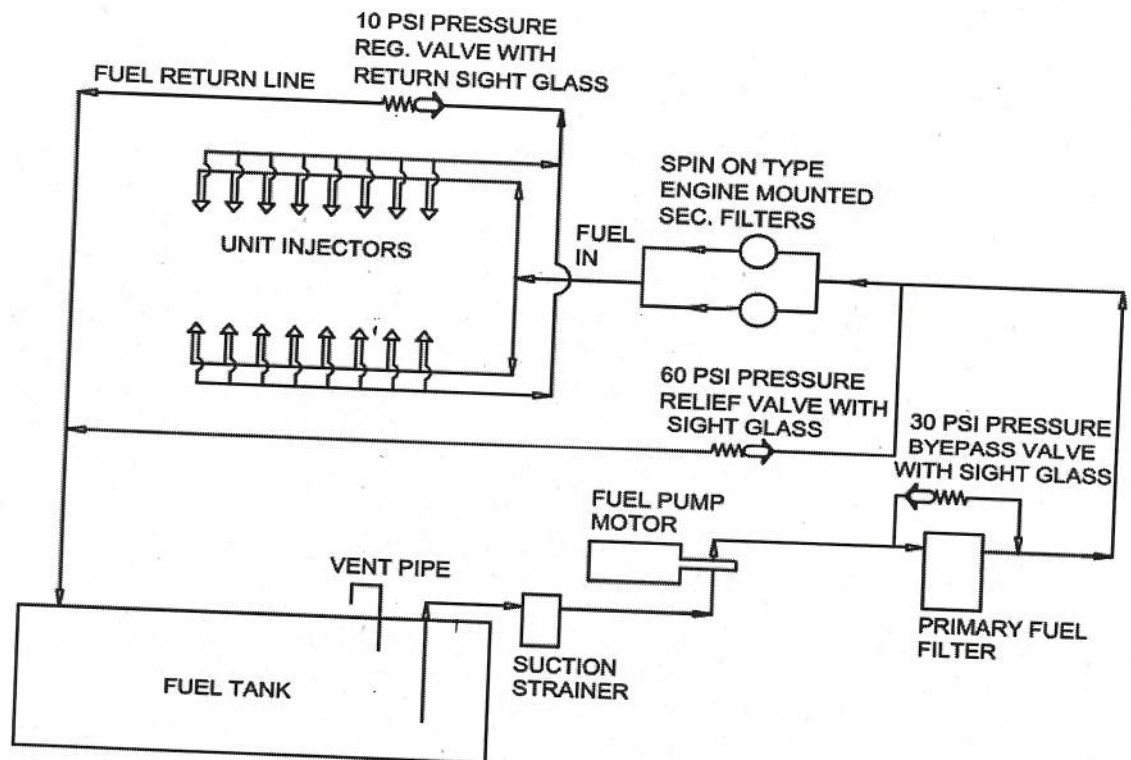
Fuel oil system is designed to give constant volume/ pressured fuel to the injectors irrespective of load. As per the throttle position and load requirement, Engine Governor controls the injector rack position.

The system consists of fuel tank, suction strainer, fuel pump, fuel filters, pressure control relief and bye pass valves. Fuel headers (one on each left and right bank) are fitted inside the top deck head frame assembly and connected to fuel injectors through individual fuel lines.


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Fuel oil system is designed to give constant volume/ pressured fuel to the injectors irrespective of load. As per the throttle position and load requirement, Engine Governor controls the injector rack position.

The system consists of fuel tank, suction strainer, fuel pump, fuel filters, pressure control relief and bye pass valves. Fuel headers (one on each left and right bank) are fitted inside the top deck head frame assembly and connected to fuel injectors through individual fuel lines.



Fuel supplied to fuel injectors from the fuel pump is injected into cylinders as per the requirement and the excess fuel is used to cool and lubricate fuel injector parts taking away the heat to fuel tank through return fuel line.

Fuel from the fuel tank (of capacity 6000 ltrs.) is drawn by the fuel booster pump through suction strainer, where the suspended particles are filtered. Fuel from suction strainer flows to fuel booster pump which is a crescent type positive displacement gear pump. Pressurised fuel from the booster pump is piped to fuel primary filter which is a paper type filter in which fuel is filtered.

that the fuel spin-on filters are choked need to be replaced. This sight glass should be always empty.

Fuel flown to secondary filters enter both bank fuel headers after secondary /fine filtration. Fuel from both bank fuel headers enter individual fuel injectors through the fuel lines.

According to the notch and load demand, engine governor meters the fuel supply to the engine cylinders by operating fuel racks of the injectors through linkages connected to fuel control shaft.

The excess fuel flows back to fuel return headers and to fuel tank through a return sight glass provided on the fuel spin on filters with a 15 psi pressure regulating valve. This sight glass is near to the engine block which should be always full of fuel without air bubbles.

Bubbles in the fuel return sight glass when the engine is in dead condition & fuel pump is running indicates air draw in suction side of the fuel booster pump. Bubbles after cranking the engine indicates the leaky fuel injector.

Bubbles in higher notch with full load indicates insufficient fuel supply.

11) What are the differences in fuel system of Alco & GM locomotives?

Fuel oil system - Alco locomotive Vs GM locomotive

1. The fuel tank capacity in GM loco is 6000 lts. and in Alco loco is 5000 lts.
 2. Both have a strainer with wire mesh element.
 3. Both the locomotives have a positive displacement gear type fuel feed pump.
 4. Both the locomotives have a relief valve for fuel feed pump safety.
 5. Both the locomotives have a regulating valve after the fuel manifold for the safety of the fuel system and to maintain adequate fuel supply to fuel injectors.
 6. Both the locomotives have a paper type primary filter. In GM locomotive a sight glass is also provided on the primary filter housing.
 7. Both the locomotives have a secondary filter but in GM locomotive a spin-on type 02 secondary filters with return sight glass and bypass sight glass are provided on the filter housing.
 8. In Alco locomotive fuel injection pumps and injectors connected by high pressure tube are separate units but GM locomotive a unit type fuel injection pump with injector is provided, and there is no provision of HP tube.
 9. Fuel oil pressure (Alco loco) 5.0 Kg/Cm² (Idle)
3.2 Kg/Cm² (8th Notch and Full load)
- Fuel oil pressure (GM loco) There is no pressure gauge in system

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5. Both the locomotives have a regulating valve after the fuel manifold for the safety of the fuel system and to maintain adequate fuel supply to fuel injectors.
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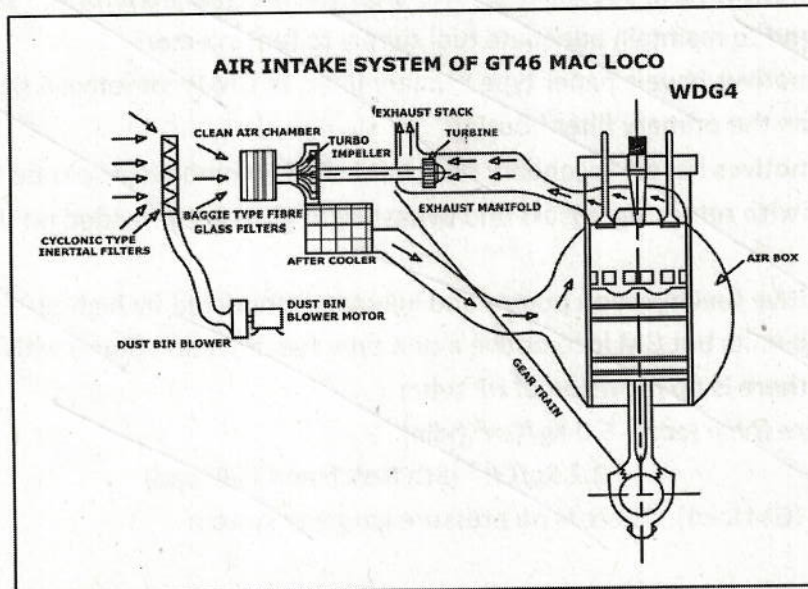
12) Explain Air Intake System of GM locomotive with a neat sketch?

Engine Air intake system ensures the amount of oxygen required for complete combustion of fuel injected in the cylinders in various operating conditions.

Air intake system consists of the following components.

- Turbo charger, • Inertial air intake filters, • Baggie type fiber glass air intake filters, • After cooler

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In order to supply the required quantity of air for complete combustion of injected fuel, this loco is provided with a turbo charger.

The turbo charger is primarily used to increase engine horse power and provide better fuel economy through the utilization of exhaust gases. The turbo charger used here is a single stage turbine with a connecting mechanical gear train also through a overriding clutch. The connecting gear train is necessary for engine starting, light load operation and rapid acceleration. Under these conditions, there is insufficient exhaust heat energy to drive the turbine fast enough to supply the necessary air for combustion, and the engine actually driving the turbocharger through the gear train assisted by exhaust gas energy. When the engine approaches full load, the heat energy in the exhaust gases reaches temperatures upto 1000°F (538°C) is sufficient to drive the turbocharger without any help from the engine. At this point, an overrunning clutch in the drive train disengages the mechanical drive and the turbocharger is mechanically disconnected from the engine gear train.

The engine inlet air is initially filtered through cyclonic filters and finally filtered in baggie filters and enter turbo impeller casing. The intake air is compressed by the turbo impeller & the outlet air from turbo enters both bank after coolers, where the heat generated in the compressed air is cooled by after coolers. Compressed air after cooling in after coolers enter both bank air boxes of the engine. Always pressurized air is filled in the air boxes by turbo. This pressurized air rushes into cylinders through 18 air inlet ports provided on each cylinder according to the engine timing.

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13) What are the differences in Air intake system of GM & Alco locomotives?

Air intake system: GM locomotive Vs Alco locomotive

1. In GM locomotive the turbocharger is driven by gear train at lower notches and by exhaust gases at higher notches but in Alco loco the turbo charger is driven by only exhaust gases.
2. In both the locomotives the turbo air is cooled by water in the aftercooler.
3. GM loco engine receives very fine clean air through double filtration. In Alco loco engine air filtered by single filter assembly.
4. In GM locomotive the turbo charger fitted on generator end side but in Alco loco the turbo charger fitted on free end side.
5. In GM loco turbo air goes to both side air boxes for combustion and in Alco loco turbo air goes to a common air gallery for combustion.

14) What are the differences in cooling water system of GM & Alco locomotives?

Cooling water system: GM locomotive Vs Alco locomotive

1. The water system capacity in GM loco is 1045 lts. and in Alco loco is 1210 lts. 2. Both the locomotives have a closed loop pressurized water cooling system.
3. Both have radiators but their locations and capacities are different. In GM loco the radiators are located in a hatch at the top of the long hood end. In Alco loco the radiators are placed in vertical position in radiator compartment.
4. Both the locomotives have centrifugal type water pump.
5. In GM locomotive 2 water pumps are provided one for right bank and one for left bank. In Alco locomotive only one water pump is provided.
6. In GM locomotive Berate nitrated water is used for cooling water and in Alco locomotive chromate water is used for cooling water.
7. In GM loco radiator fans operate by electrical motors and in Alco radiator driven by mechanical power.
8. The expansion tank is located in the equipment rack in GM loco. In Alco loco the expansion tank is located in radiator room at the top of the long hood end.
9. Both have pressurization cap which open at approximately 20 PSI.
10. In GM loco, the water system cools the compressor also. But in Alco loco, the expresser / compressor is air cooled.
11. GM loco has got low water temperature control system. In Alco, no such system provide.
12. The water temp. control system has EM 2000 computer and electronic temp. sensing probes ETP1 & ETP2 in GM loco, but in Alco control is done by ETS1, ETS2 and ETS3.

13. In GM loco the turbo charger cooling is done by lubricating oil but in Alco loco the turbo charger cooled by water system.

15) What are the differences in Lube oil system of GM & Alco locomotives?

Lube oil system: GM locomotive Vs Alco locomotive

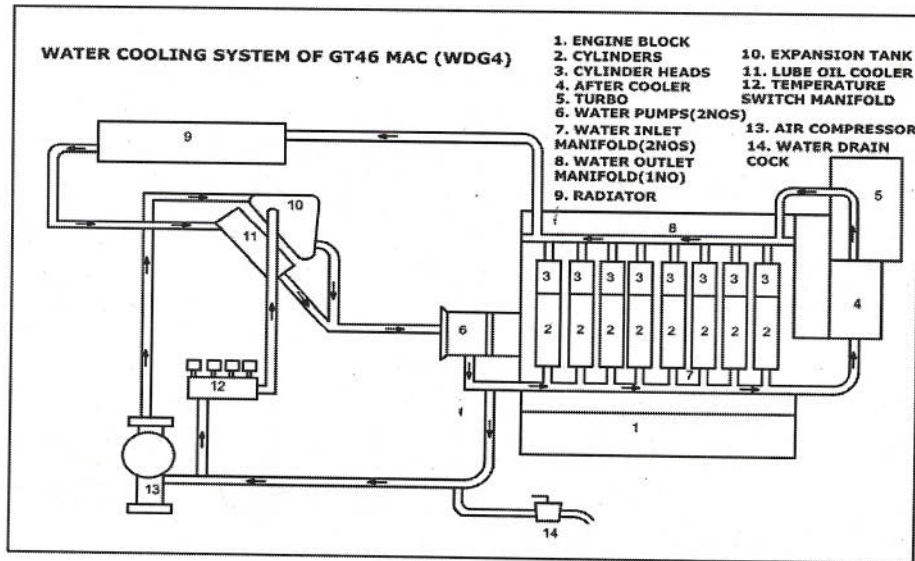
1. The lube oil system capacity in GM loco is 950 lts and Alco loco is 910 lts.
2. In GM locomotive 4 different lube oil pumps are provided for different areas of lubrication. In Alco locomotive only one lube oil pump is provided.
3. Both the locomotives have a pressurized lube oil system.
4. Both have lube oil filter, relief valve, regulating valve, bypass valve and strainer assembly but their locations are different.
5. Both the locomotives have a paper filter type filter assembly.
6. Both the locomotives have a strainer assembly for final filter.
7. Both the locomotives have a lube oil cooler assembly.
8. In GM locomotive a soak back system is provided for turbo charger cooling but in Alco loco turbocharger is water-cooled.
9. A separate system is used for piston cooling in GM loco but in Alco loco, there is no separate system of piston lubrication.
10. A separate system is used for turbo lubrication in GM loco but in Alco loco, there is no separate system of turbo cooling.

16) Explain cooling water system in GM locomotive with a neat sketch?

Cooling system is a closed loop pressurized system. Water from the expansion tank as well as lube oil cooler is drawn by both bank gear driven water pumps, and is pumped to all the power assemblies through both bank water inlet manifold assemblies, water inlet tubes. Cylinder head outlet elbows and both outlet header and water header of both banks are connected to both bank after coolers to cool the inlet air to the engine and collected back water return header.

Hot water from the engine outlet is cooled in both radiators and circulated back to engine through lube oil cooler. Hot water in the radiator is cooled by two AC motor

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driven Radiator Fans (8 blades 52" dia) powered from the Companion Alternator, which is controlled by EM 2000 based on the feed backs from Temperature Sensors (ETP1& ETP2).

Radiator Fans get three phase AC supply from Companion Alternator through 2 sets of 300 amps fuses and 3 sets of Contactors for each fan. FCS (Fan Contactor Slow Speed) for half speed and FCFA and FCF B (Fan Contactor Fast Speed) for full speed. Temperature of the cooling system is maintained between 79 0C and 870C with help of the above computer controlled circuitry.

If, EM 2000 detects the failure of any one of the Temperature probes, it displays a crew message "Engine Temperature Feedback Failure" and stores the message in the Archive memory. If it detects both probes have failed, it ignores both the probes signal, remains in last operation status and engine goes back to idle with a message - "No Load – Engine Temperature Feedback Failure".

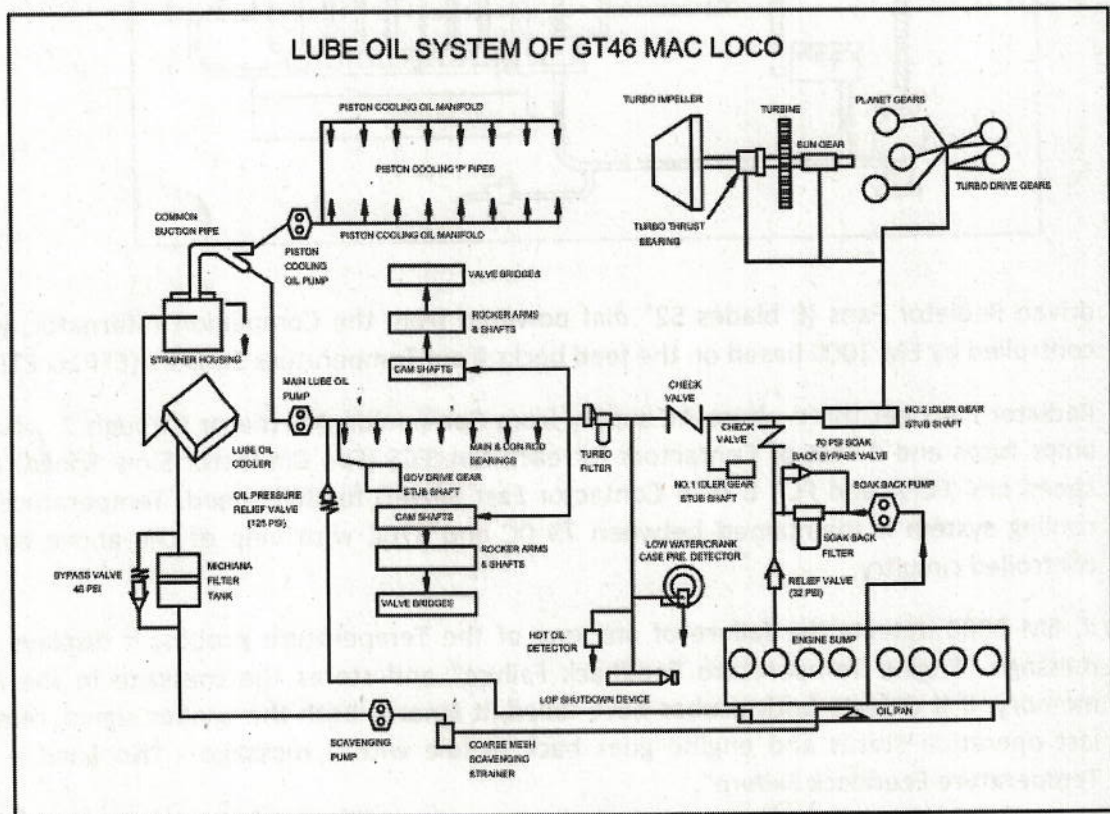
If for any reason one set of Fan fuse blows off or one Radiator Fan motor is not working, the coolant temperature will rise beyond max setting of 87 0 C. When the temperature exceeds 970C, the following message will display on EM 2000 Screen - "Hot Engine - Throttle 6 limit" even though the throttle handle is on 7 or 8th notch. This will continue till the engine temperature reaches the safe limit.

A common outlet from both water pumps is taken to Air Compressor. Water taken to air compressor circulate through all 3 cylinders, heads and Intercooler of the compressor. Outlet water from the air compressor is piped back to cooling system through lube oil cooler.

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17) Explain lube oil system in GM locomotive with a neat sketch?

- 18) Lubricating oil system consists of Engine sump, scavenging pump, Main lube oil pump, Lube oil strainer housing, Filter assembly, Lube oil cooler assembly, Turbo oil filter. Oil from the engine sump is drawn by gear driven scavenging pump through a coarse mesh lube oil strainer element and is filtered in lube oil filter tank in which 5 filter elements are housed. Oil from the filter tank flows to main lube oil pump through a lube oil cooler and fine mesh lube oil strainer elements.



A lube oil by pass valve is provided across lube oil filter tank which is set at 40 psi. This valve is responsible for continuous oil supply to engine moving parts when filters are choked. A filter condition gauge is provided across the filter tank and is in parallel with by pass valve to continuously indicate the condition of lube oil filters inside the filter tank.

Pressurized lube oil supplied by scavenging pump is further pressurized by a main lube oil pump. Main lube oil pump is basically having two pumps in one housing. One for piston cooling and the other for the complete engine moving parts including turbo charger. Piston cooling pump supplies pressurized oil to all the pistons through headers and piston cooling pipes on both banks. Oil supplied from piston cooling pipe

3

cools the piston crown from the bottom and lubricate cylinder liners and piston rings while dropping down to the sump.

Pressurized oil from Main lube oil pump passes through a pressure relief valve set at 125 psi, lubricate - all 10 main bearings, 8 connecting rod bearings, both end engine gear trains, stub shafts, all cam bushes through drilled oil passages in cam shafts, valve lever mechanism, bridge assembly, Lash adjusters & exhaust valves etc.,

Oil pipeline from the cam gear end lube oil main header is taken to engine Governor to shut down the engine in case of low lube oil pressure.

One 55V AC Electrical Motor (3/4 HP) driven pump (Turbo soak back pump) circulates engine lube oil to turbo before cranking and after shutting down the engine to protect the turbo running without oil and to cool turbo after the engine is shut down.

Working time of this Turbo soak back pump is decided by EM 2000. Turbo lube pump works for 15 minutes after engine shut down, if loco was working below 4th notch before shutting down of the engine and runs for 35 minutes after engine shut down, if loco was working above notch before shutting down of the engine.

Oil for the Turbo is taken from cam gear end lube oil main header through a paper type spin on filter.

17) What are the positions of consoles in WDG4 for (i) Single Loco (ii) MU (iii) Banker ?

(i) Single Loco:

Non-working Control Stand:

Auto Handle - FS
Direct Brake Handle - Release
Lead/Trail switch - TRAIL

Working control Stand:

Auto Handle - RUN
Direct Brake Handle - Full when stopped & REL for moving the locomotive
Lead/Trail switch - LEAD

(ii) Multiple Unit:

(a) Lead Loco

Non-working Control Stand:

Auto Handle - FS

Direct Brake Handle - Release

Lead/Trail switch - TRAIL

Working control Stand:

Auto Handle - RUN

Direct Brake Handle - Full when stopped & REL for moving the locomotive

Lead/Trail switch - LEAD

(b) Trail Loco: On both control stands

Auto Handle - FS

Direct Brake Handle - Release

Lead/Trail switch - TRAIL

(iii) Banker Operation:

Non-working Control Stand:

Auto Handle - FS

Direct Brake Handle - Release

Lead/Trail switch - TRAIL

Working control Stand:

Auto Handle - FS

Direct Brake Handle - Full when stopped & REL for moving the locomotive

Lead/Trail switch - HLPR

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AIR BRAKE:

1. Conjunction pressure is adjusted by limiting valve.
2. Unit of Air Flow Indicator (AFI) is wagon reading.
3. On operating D-1 emergency which pressure drops? BP
4. No braking positions of A-9 valve? 4
5. No braking positions of SA-9 valve? 1
6. Air supply to Horn is from MR1
7. Above additional C2- relay diaphragm air pressure comes from A9 feed valve.
8. Duplex check valve operates when MR pressure reaches at 5.0 kg/cm²
9. R-6 relay valve is fitted in loco for quick working of AFMV
10. In automatic switching on flasher light modification of locos the TDR (time delay relay) is set at 60 sec
11. The standard Color of humidity indicator in air dryer is Blue.
12. Air dryer starts functioning, when MR pressure reaches to 100 PSI
13. Thread diameter of BP & FP angle cocks (in inch) is 1 1/4 "
14. MR safety valve is set at 10.5 kg/cm²
15. Auto drain valve blows during unloading of compressor.
16. Feed valve is charged from MR1 .
17. When driver is working from right control stand and A-9 is applied from left control stand in emergency position, what will happen? BP drops to zero and loco will come to Idle.
18. In minimum reduction position of A-9 brake valve BP drops upto 4 to 7 PSI
19. Additional C-2 relay valve is used in air brake system for charging BP
20. MU2B valve has 2 no of positions
21. Calibration of Air Flow measuring valve is adjusted at 100 wagon reading.
22. Palm gauges (Orifice test gauge) has the hole size of 7.5 mm
23. MR pressure outlet pipe of air flow measuring valve goes to additional C2 relay valve.
24. In case BP pressure is fluctuating the possible defect is in additional c2 relay valve.
25. Exhaust choke size of C-2 relay valve is (in mm) 5.0 mm
26. Exhaust choke size of additional C-2 relay valve is (in mm) 6.0 mm
27. In full service position of A-9 auto brake valve pressure reduction is between 23 to 26 PSI

28. In over reduction position of A-9 auto brake valve pressure reduction is between 34 to 46 PSI
29. When drying capacity of air dryer is reduced the color of humidity indicator changes to white
30. Air supply to power contractor is from, MR1.
31. Wiper gets the air supply from MR1.
32. In which position of A-9 brake valve its vent valve operates Emergency.
33. The governor of air compressor (EPG) gets supply from MR1.
34. To operate sander valve air supply is received from MR1.
35. In pure air brake locos conjunction brakes will come due to Distributor Valve.
36. SP1 switch is provided for quick charging of BP.
37. MV27 switch is provided for over charging of BP.
38. In working control stand A9 cock should be kept in open position.
39. In non working control stand A9 cock should be kept in close position.
40. In A9 emergency position BP becomes zero.
41. In A9 emergency position BC becomes 1.8 kg/cm².
42. With Sap application, loco brakes will apply.
43. The purpose of F2 feed valve is to charge Feed Pipe to 6.0 kg/cm².
44. On run if BP drops to 4.4 kg/cm² pressure, due to other than A9 operation, Auto Flasher will operate.
45. In pure air brake locos, after releasing A9, if conjunction brakes are not getting released then conjunction brakes can be released through Manual Quick release.
46. If A9 emergency is applied, engine comes to Idle.
47. In pure air brake locomotive, to nullify the conjunction brakes temporarily Foot pedal has to be operated.
48. In MU lead loco MU2B position should be Lead.
49. In MU trail loco MU2B position should be Trail.
50. In Banker loco MU2B position should be open.
51. In MU lead loco $\frac{3}{4}$ " cock position should be open.
52. In MU trail loco $\frac{3}{4}$ " cock position should be close.
53. In Banker loco $\frac{3}{4}$ " cock position should be close.
54. In A9 release position BP should be 5.0 kg/cm².
55. In SA9 apply position BC pressure will be 3.5 kg/cm².
56. If MR pressure is dropping due to EPG malfunctioning EPG cock should be closed.
57. During conjunction brake, brake cylinder pressure will be 1.8 kg/cm².
58. Before starting the train, ensure BP pressure 5.0 kg/cm².
59. Before starting the train in the level gradient, ensure BC pressure zero kg/cm².
60. In pure air brake loco A9 has five positions.

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61. In pure air brake locos A9 has two positions.
62. If C3W distributor valve G/P handle is placed wrongly in passenger formation, late application of loco brakes will occur.
63. If C3W distributor valve G/P handle is placed wrongly in goods formation, wheel skidding takes place.
64. MR safety valve is set at 10.5 kg/cm².
65. In IRAB1 locos, conjunction brakes are operated by Distributor valve.
66. Conjunction brake cylinder pressure is adjusted in Limiting valve.
67. During SA9 application, if BC pressure is more than 3.5 kg/cm² then adjust SA9 feed valve.
68. For working of pneumatic power contactors, control air pressure is set by Limiting valve.
69. Purpose of air dryer is to drain out moisture.

ENGINE (POWER PACK)

1. During which stroke inlets valves opens Suction
2. During which stroke both valves closed Compression
3. In WDP-2 locos, how many Main Bearing journals are in one crankshaft? Nine
4. In WDP-2c locomotive, how many crank pins are on crankshaft? Eight
5. In WDP-2 loco, how many thrust bearing are used One
6. In WDP-1 locos, how many thrust bearing are used? One
7. The size of Engine Crank Pin is (in inch) 6.0"
8. Clearance between crankshaft journal & bearing is (in inch) 0.005" to 0.010"
9. How many cam segments are fitted in WDM-2c loco 8
10. Size of Main Bearing journals is (in inch).....8.5"
11. How many cam shaft bushes are fitted in one 16 cylinder block 18
12. What is minimum dia clearance between cam shaft & cam bush 0.005"
13. How many teeth are in split gear 52
14. During setting of cam gear timing which piston is kept at TDC R1
15. How many cam segments are fitted in WDP-1 loco? 8
16. In WDM-2c loco, how many counter weights are on one crankshaft? 8

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17. In WDP-2 loco, which type of lubrication system is used? Forced Feed
18. Main crankshaft vibration damper is fitted near which main bearings (in WDM-2) No1
19. In WDP-2 loco split gear is mounted on crankshaft near main bearing 9
20. Crankshaft vibration damper is fitted with crankshaft with the help of Nuts and Bolts
21. How many cam lobes are in one cam segment? 6
22. What is the condemning size of liner? 220.70 mm
23. In Alco loco, single exhaust manifolds have 7 no. of pieces?
24. In WDP-1 loco having four entry TSC, one exhaust manifold connects with how many cylinder Heads? Three
25. What should be maximum allowable run out of extension shaft? 0.006"
26. Water pump is driven from Extension shaft gear
27. Lube oil pump is driven from Extension shaft
28. In WDP-1 locos, main bearing elongation is 0.40"
29. What is the BHP of WDM-2 loco? 2600 HP
30. What is the BHP of WDP-1 loco? 2000 HP
31. What is the IHP of WDM-2C loco? 3100 HP
32. What is the BHP of WDP-2 loco? 2750 HP
33. In WDM-2C loco thrust bearing is fitted at location No. 9 Upper
34. Honey combing is related with Cylinder Liner
35. What is the maximum allowed deflection of main generator? ± .0008"
36. In ALCO TSC, Rotor side, what is the material of oil seal? Brass seal
37. Universal shaft is used to drive radiator fan because it is self aligned
38. GE Governor is operated Hydraulically
39. TSC surging on higher notches is due to Excess fuel rack or choked air filter or less area of nozzle ring
40. Hammering sound is coming from engine is due to... Exhaust valve bend or Fuel cam worn out or Cross head roller worn out.
41. Smoke is coming from "SMOKE" hole of cylinder Head indicates.. Injector seal is not proper.
42. Engine air inlet elbow bolt torquing is done at ... 75 ft. lbs

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43. Expresser foundation bolts is torqued at value (ft. lbs.) 450
44. TSP treatment is done to remove scaling.
45. When hot engine alarm is operated, the condition of loco comes to
- A. Idle
 - B. Run on same speed
 - C. Shut down
 - D. None of above
46. What is the unit of S.F.C. (Specific Fuel consumption) gm/hp/hr
47. In yearly loco, pre priming break in filters are used..to arrest foreign material.
48. The temperature difference between the two consecutive main bearings should not exceed by 10°C
49. CCE motor giving thick black smoke is due to increased liner wear.
50. Fuel test cock pressure is used for checking Fuel pressure dropping.
51. Exhaust gas temperature at ABB TSC inlet is 450°C.
52. Exhaust gas temperature at ALCO TSC inlet is 590°C
53. Which item is increases the copper content in lube oil? X-head floating bush wear.
54. In WDP-2, how many nos. of cam bushes fitted are in block? 18
55. In WDP-1 (Chetak) the angle of firing order from L to R is 75°
56. Split gear bolt torquing is done at 300 ft. lbs
57. Engine crank case vacuum is not building up due to Liner chrome plating worn out.
58. Reason of hot engine ETS setting defective or Radiator fan not working or radiator fins choked.
59. Engine giving blueish smoke indicates Cylinder head valve guide clearance more.
60. White smoke given by engine is due to Cylinder head crack internally.
61. What is compression ratio of WDM2 loco? 11.75 : 1
62. Minimum RPM of engine with low idle feature is 350.
65. BAP is not building up due to TSC rotor jam or Governor defective or Air inlet gasket burst.

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66. Which of the following is not the reason of low BAP? Unmodified FIP or Unmodified After Cooler or Radiator fins chocked.

67. Which of the following is not item of fuel efficient loco (C)

- A. Steel cap piston
- B. Modified FIP
- C. ALCO TSC
- D. Large After Cooler

68. Which of the following statement is not true (D)

- A. Comp. Ratio in diesel engine is more then Petrol engine.
- B. For high HP diesel engine are used.
- C. Ignition in diesel engines takes place by comp. of air.
- D. For the same HP diesel Engine are lighter as compare to Petrol engine.

69. What are the possible causes of injector not responding (D)

- A. Injector nozzle hole chocked
- B. Phasing on up position
- C. Fuel cam lob damage
- D. Any of the above

70. What is the delivery of unmodified FIP on test bench at full rack position 350 CC

71. What is the delivery of modified FIP on test bench at full rack position 400 CC

72. Which of the following is prime mover (A)

- A. Engine
- B. Traction Generator
- C. Traction Motor
- D. None of the above

73. High viscosity indicates (C)

- A. Mixing of water in lube oil
- B. Mixing of fuel in lube oil
- C. Mixing of carbon contents

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D. None of these

74. What is the cause of increase silicon in lube oil Dust.

75. Cyl. Head hydraulic testing is done at 5.0 kg/cm²

76. Extension shaft clearance limit is 0.006"

77. In scavenging period burnt gases are pushed out by fresh air.

78. During over lapping period inlet and exhaust valve remain in open position.

79. Engine hunting is due to (A)

A. Rake movement not free

B. Excess fuel pressure

C. Low fuel pressure

D. Nothing of these

80. Low phasing means (A)

A. After burning of fuel

B. Correct burning of fuel

C. Without burning of fuel

D. Nothing of these

81. Engine given thick black smoke due to (A)

A. Low BAP

B. Less fuel oil level

C. Defective CCE motor

D. Defective manifold

82. Crank pin condemning limit is 152.30 mm.

83. Main bearing general surface finish is 25 RMS

84. Crank shaft is supported at journal nos. 2 & 7.

85. Crankshaft is lifted from crank pin nos. (In WDM₂) 2 & 7.

86. Backlash of cam gear is 0.006" to 0.012".

87. The torquing value of foundation bolt of engine block is 1150 ft. lbs (GE) 850 ft-lbs (Free end)

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88. Cam shaft thrust is 0.006" to 0.012"
89. Crank shaft thrust is 0.010" to 0.017".
90. In fuel injection pump (FIP) meaning of "No Fuel Position" is Helix of plunger is to be in front of spill port.
91. Torquing of injector is done at 50 ft. lbs.
92. At what degree the spray hole in injector nozzle is made 40°
93. Out of which safety device, engine comes to idle (C)
- OST
 - LWS
 - ACP
 - Low lube oil indication
94. Which item increases the sodium (Na) content in lube oil mixing of water in lube oil.
95. Lube oil sump capacity of WDM3A is 1110 liters.
96. Lube oil sump capacity of WDG3A is 1110 liters.
97. Lube oil sump capacity of WDP1 is 760 liters.
98. Lube oil dip stick capacity of WDM2 is 400 liters.
99. Lube oil dip stick capacity of WDM3A is 600 liters.
100. Lube oil dip stick capacity of WDG3A is 600 liters.
101. Lube oil dip stick capacity of WDP1 is 320 liters.
102. In WDM3A loco fuel glow rod gauge each division denotes the oil of 20 liters.
103. Lube oil pump is positive displacement type pump.
104. Lube oil pump is driven by Extension shaft gear.
105. Lube oil relief valve is set at 9.0 kg/cm².
106. Lube oil relief valve is set at 7.7 kg/cm².
107. Wdm3A has eight no of lube oil filters.
108. In WDG3A locomotive lube oil filter is located in radiator compartment.
109. In lube oil cooler water will circulate in cooler tubes.
110. From lube oil main header pipe, oil enters main bearing through S jumper pipes.
111. Cam gears are lubricated by auxiliary header.
112. In idle LLOB tripping is set at 1.3 kg/cm².
113. In 8th notch LLOB tripping is set at 3.5 kg/cm².
114. During cranking if LLOB in tripped condition, engine will crank but not fire.
115. If water contaminated with lube oil, viscosity of lube oil will be more.
116. Torque value of air inlet elbow to engine block is 75 ft. lbs.
117. Torque value of air inlet elbow to cylinder head is 150 ft. lbs.
118. Torque value of exhaust manifold to cylinder head is 60 ft. lbs.
119. Torque value of exhaust manifold band is approx. 15 - 25 ft. lbs.
120. Torque valve of cylinder head stud is 100 - 120 ft. lbs.
121. Torque valve of cylinder head nut is 550 ft. lbs.
122. Torque valve of cylinder head with torque wrench ratio of 1:5 is 550 ft. lbs.


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123. Torque value of valve lever mechanism allen cap screw is approx. 150 ft. lbs.
124. Torque value non adjustable of fulcrum for adjusting tappet is approx. 250 ft. lbs.
125. Torque value of adjustable end of yoke for adjusting tappet is approx. 75 ft. lbs.
126. Torque value of Main generator flange bolt is 800 ft. lbs.
127. Torque value of engine block foundation bolts is 1150ft.lbs.
128. Torque value of fast coupling bolts is 320 ft. lbs.
129. Torque value of compressor foundation bolts is approx. 650 ft. lbs.
130. Torque value of filter drum cover wing nut is 100 ft. lbs.
131. Torque value of turbo rotor assembly is 100 ft. lbs.
132. Torque value of FIP bed bolt is 60 ft. lbs.
133. Torque value of FIP delivery valve holding nut is 450-500 ft. lbs.
134. Torque value of injector cap nut is 110Torque value of 110-120 ft. lbs.
135. Torque value of FIP support bed bolt is 150 ft. Lbs.
136. Torque value of cam shaft stud is 80-90 ft. lbs.
137. Torque value of nose cap bolts is 850 –1000 ft. lbs.
138. Torque value of axle box end plate locking bolts is 350 ft. lbs.
139. Torque value of vertical gear case bolts is 650 ft. lbs.
140. Torque value of horizontal gear case bolts is 1000 ft. lbs.
141. Torque value of split gear preliminary torque is 50 ft. lbs.
142. Torque value of split gear is 300 ft. lbs.
143. Torque value of water jumper bed bolts is 75 ft. lbs.
144. Torque value of injector retaining clamp is 60 ft. lbs.
145. Size of Main bearing journal is 8.500" to 8.496".
146. Crank shaft thrust using by bearing shell is 0.010"-0.017" limit 0.035".
147. Crank pin diameter is 6.000"-5.998"-5.996".
148. Crank gear back lash is 9-16-28 thou.
149. Cam shaft thrust is 6-12-22 thou.
150. Piston diameter at crown is 8.918"-8.921".
151. Cylinder liner bore size is 9 ± 0.002 ".
152. Cylinder Head valve disc (new) angle is 30°.
153. Cylinder Head valve disc (old) angle is 45°.
154. Cylinder Head valve seat (new) angle is 29 ½ °.
155. Cylinder Head valve seat (old) angle is 44 ½ °.
156. Vibration damper side clearance is 15-23 thou.
157. Vibration damper back lash is 1.056".
158. In WDM3A OSTA trips at 1180-1220 RPM.
159. Split gear side clearance is 0.007"-0.023".
160. Radiator fan starts working at minimum speed at 68°C.
161. Radiator fan starts working at maximum speed at 74°C.
162. ETS will operate at 90°C-95°C.

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UNDER TRUCK

1. Which type of bogie is used in WDM₂ loco? Trimount Bogie
2. Centre pivot of bogie of WDM₂ is located between leading axles and middle axles.
3. How much percentage of load does center pivot of WDM₂ bogie carries 60%
4. Which type of suspension in WDM₂ loco bogie has Single stage suspension
5. The main advantage of single stage suspension is to lower the center of gravity.
6. The device used to transmit loco speed from wheels to the speedometer is called Axle generator.
7. Traction motor load is transferred on bogie frame through suspension nose.
8. Height of side buffer should be maintained between 1105 mm to 1030 mm.
9. Buffer height can be adjusted by adding shims to load pads & side bearers (or) by adding shims to spring seat.
10. Amount of shims that could be added to centre pivot & side bearers to adjust side buffer height 12 mm.
11. Amount of shims that could be added to spring seat to adjust side buffer height 12 mm.
12. Minimum distance between brake block & wheel in release position should be 10 mm.
13. Brake piston travel adjustment in WDM₂ is recommended between 67 mm to 100 mm.
14. Gear case bolts of WDM₂ bogies is torque at 1000-1200 ft.lbs.
15. The wheel dia variation of WDM₂ loco on same bogie is permitted upto 2 mm.
16. The wheel dia variation of WDM₂ on same axle is permitted upto 0.5 mm.
17. The wheel dia variation of WDM₂ on same loco is permitted upto 25 mm.
18. Service limit of wheel dia. of diesel locomotive (In goods service) is 1010 mm.
 - A. 1010 mm
 - B. 1040 mm
 - C. 1030 mm
 - D. 1020 mm
19. Torquing of axle cap bolt is done at 50 m-kg.
20. Gauge width of broad gauge loco should be 1596 ± 0.5 mm.


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21. The diameter of new axle of WDM₂ bogie at the location of suspension bearing should be 9.000" ± 0.002"
22. In Co- Co bogie, traction motor cap bolts is torque at 759-810 ft. lbs.
23. While inspecting the nose suspension wear plate of a Co-Co bogie maximum clearance permitted on motor lugs is 10 mm.
24. Cracks in the axle are detected by Ultrasonic test.
25. Nos. of pinion teeth in GE- 752 TM is 18.
26. Nos. of teeth of bull gear of WDM₂ bogie is 65.
27. Free height of outer coil spring of WDM₂ loco is 451 ± 8 mm
28. Free height of inner coil spring with nominal coil dia 130 mm of the bogie of WDM₂ loco is 423 ± 6 mm
29. Axle load of WDP₂ loco is 19.5 tonnes
30. Weight of complete bogie of WDP₂ loco is 24.13Tonnes.
31. Length of WDP₂ loco over buffer is 19182 mm.
32. No. of primary helical coil springs per bogie in WDP₂ loco is 12.
33. No. of primary helical coil springs in WDP₂ loco is 24.
34. No. of secondary helical coil springs per bogie in WDP₂ loco is 8.
35. No. of secondary helical coil springs in WDP₂ loco is 16.
36. Free height of primary helical coil springs of WDP₂ loco is 387.8 mm.
37. Free height of secondary helical coil springs of WDP₂ loco is 475 mm.
38. No. of primary vertical dampers per bogie in WDP₂ loco is 4.
39. No. of primary vertical dampers per loco in WDP₂ loco bogie 6.
40. No. of secondary vertical damper per bogie in WDP₂ loco is 4.
41. No. of secondary vertical damper per loco in WDP₂ loco bogie is 8.
42. No. of secondary lateral damper per bogie in WDP₂ loco is 2.
43. No. of secondary lateral damper per loco in WDP₂ loco bogie is 4.
44. Vertical clearance between bolster & bogie frame in WDP₂ loco should be 35 mm.
45. Vertical clearance between under frame & bolster of WDP₂ loco should be 10 mm.


46. Lateral clearance between bolster & bogie frame (on each side) in WDP₂ loco is 32 mm.
47. Longitudinal clearance between bolster & bogie frame (on each side) in WDP₂ loco is 7 mm.
48. No. of friction snubber in WDP₂ bogie is (D)
- A. 2
- B. 4
- C. 8
- D. None of these
49. Bogie of WDP₂ loco is designated as Flexi-coil Mk-5.
50. Total no. of guide links per bogie in WDP₂ loco is 8.
51. Total no. of guide links in WDP₂ loco is 16.
52. No. of traction bars per bogie in WDP₂ loco is 2.
53. No. of traction bars in WDP₂ loco is 4.
54. To transfer traction & breaking forces between bogie frame & bolster WDP₂ loco bogie is provided with Traction bar.
55. End axles of WDP₂ bogie are wing type.
56. Suspension of flexi coil MK-5 bogie is two stage.
57. For testing of bogie spring, the magnitude of load is 3864 kg.
58. The shape of Bo- Bo bogie frame resembles to English alphabet H.
59. Expanded form of TBU is Tread Brake Unit.
60. The thickness of metal washer used in MSU of WDP₂ loco is 11.0 mm.
61. In WDP₂ loco bogie the torquing value of M-36 bolts that connects the suspension tube with magnet frame should be 1186-1420 ft. lbs.
- A. 1100-1200 ft. lbs.
- B. 1186- 1420 ft. lbs.
- C. 1320-1440 ft. lbs.
- D. 1423-1560 ft. lbs.
62. The adjustment washer used in MSU of WDP₂ loco bogie is fitted in Two pieces.
63. The adjustment washer pieces used in MSU of WDP₂ loco bogie is welded as it may cause

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- A. Failure of bearing due to electric arc of welding (C)
B. Loss of lateral play
C. Both (A) & (B)
D. None of the above

64. The thickness of horizontal centre pivot liner of WDP₂ loco in bogie is 10 mm.
65. The clearance between new centre pivot & vertical liners of WDP₂ loco bogie is 1.2 mm.
66. The service limit of clearance between centre pivot & vertical liners of WDP₂ loco bogie is 6 mm.
67. Silent block flexible bearings are used in Guide link.
68. The traction force taken by each traction bar in WDP₂ loco is 10,000 kg.
A. 8000 kg
B. 10,000 kg
C. 12,000 kg
D. 15,000 kg
69. Shape of bolster used in WDP₂ loco resembles with English alphabet H.
70. While inspecting the nose suspension wears plate in WDP₂ loco bogie, the clearance permitted on motor lugs is 12 mm.
71. Slack adjuster is initially set to provide a safe release of 10 mm.
72. With new wheels & brake shoes the initial setting of safe release is 10 mm. At this position the piston travel will be 67 mm.
73. The limit of flat spot on wheel is 50 mm.
74. If flat spot on wheel is exceeds 50 mm, then dressing is done before turning.
75. New wheel diameter is 43" (1092mm)
76. Condemning size of wheel diameter is 40" (1016 mm)
77. Difference in wheel dia on same axle is 3/32" or 2.5 mm.
78. Difference in wheel dia on same truck is 5/16" or 8 mm.
79. Difference in wheel dia on same loco is 1" or 25.4mm.
80. Wheel profiling will be done after 4500kms running.
81. Axle box side clearance is 1.5 to 4.5mm.
82. Axle box lateral clearance for 1,3,4,6 axles is 6-12 mm.
83. Axle box lateral clearance for 2&5 axles is 25-31mm.
84. Axle journal size is 9"±0.002".

85. Pinion to Bull gear ratio of WDM3A loco is 18:65.
86. Pinion to Bull gear ratio of WDG3A loco is 18:74.
87. WDM2 traction motor arrangement is LLR – LRR.
88. WDG3A traction motor arrangement is LLL – RRR.
89. Buffer height is 1105-1030 mm.
90. WDM2 center pivot height is 219 mm.
91. WDM2 side bearer height is 213 mm.
92. Cattle guard above rail level is 10".
93. Rail guard height is 4".
94. In WDM3A loco no. of brake cylinders 8.
95. Free height of outer coil spring is 457±7 mm.
96. Free height of outer coil spring is 423±6 mm.
97. WDM3A loco has CO-CO cast type of bogie.
98. WDG3A loco has CO-CO fabricated type of bogie.
99. In WDG3A loco 8 number of vertical dampers are available.
100. In WDG3A loco 4 number of horizontal dampers are available.


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(40)

BIT BANK Mech. (HHP) for LDCE (Tech-JE)

1. What is the Horse Power of WDP₄ & WDG₄ locomotive 4500 HP.
2. What is the model designation of WDG₄ locomotive GT46MAC.
3. What is the model designation of WDP₄ locomotive GT46PAC.
4. Which type of diesel engine model is fitted in GM locomotive 710G3B.
5. Which type of diesel engine is fitted in GM locomotive Two stroke.
6. What is the compression ratio of the GM locomotive 16:1.
7. What is the full speed RPM of the GM locomotive engine 954 RPM.
8. How much the minimum speed of the GM locomotive engine without LIR (low idle relay) 269.
9. How much the minimum speed of the GM locomotive engine with LIR 200 RPM.
10. What is the lube oil capacity in WDP₄ loco? 950 liters.
11. What is the fuel tank capacity in the GM locomotive 6000 Liters.
12. What is the coolant water capacity in the GM locomotive 1045 Liters.
13. Capacity of sand box in the WDP₄ & WDG₄ locomotive 1.5 ft³/box.
14. What is the minimum continues speed of the WDG₄ locomotive 22.5 KMPH.
15. What is the maximum speed of the WDG₄ locomotive 120 KMPH.
16. Which type of bogie fitted in the GM locomotive Double Suspension.
17. In the fuel oil system which type of injectors provided in the GM locomotive Unit Injectors.
18. In the two stroke engine the cylinder head of the engine equipped with only Exhaust valves.
19. In the GM locomotive the Turbo charger is driven by Gear train & Exhaust gas.
20. In the GM locomotive how many lube oil pumps used? Four.
21. In the GM locomotive the air compressor is water cooled.
22. In the WDP₄ & WDG₄ locomotive the coolant used in compressor is Engine Coolant.
23. Air compressor the lube oil sump capacity is 10 Liters.
24. Air compressor in the GM locomotive is Two Stage.
25. How many brake cylinders are used per bogie 6 Nos.
26. Which type of bogie is used in GM locomotive High Tensile Cast Steel.
27. In GM locomotive Air brake is controlled by Computer.
28. Air brake system in WDP₄ & WDG₄ loco is CCB-KNORR.
29. In GM locomotive the first schedule carried out after Three Months.
30. Maximum speed of WDP₄ locomotive is 160 KMPH.
31. TM pinion and bull gear ratio in WDG₄ loco is 17:90.
32. TM pinion and bull gear ratio in WDP₄ loco is 17:77.
33. Total weight of WDG₄ loco is 129 Tonnes.
34. Total weight of WDP₄ loco is 115.8 Tonnes.
35. Maximum Tractive effort of WDG₄ locomotive is 53 Tones.
36. Number of cylinders in HHP locomotive is 16

37. Type of Traction Motors fitted in HHP locomotive 3 phase AC motors.
38. In WDG4 locomotive, MRPT is located in ECC3.
39. Radar sensor type of speedometer is available in WDG4 locomotive.
40. Number of Power contactors available in WDG4 loco Zero.
41. In WDG4 locomotive Turbo super charger is cooled by oil.
42. In WDG4 locomotive power contactors are replaced with DC link.
43. In WDG4 locomotive when Loco pilot fails to acknowledge the alerter, it gives audio warning for 8 seconds.
44. In WDG4 locomotive for quick charging of BP Auto Handle Release position is used.
45. In WDG4 Hot Oil Detector is set at 126 degree centigrade.
46. Blended Brake is a mixture of Loco Brake+Formation Brake+Dynamic Brake.
47. What is the lube oil sump capacity in WDG4 loco 1457 liters.
48. In HHP loco fuel oil system Unit injectors are provided.
49. In HHP loco two no. of lube oil pumps are provided.
50. In HHP loco coolant used in compressor is Engine coolant.
51. In HHP loco if water pressure is less LLOB & Low Water Pressure Button will trip.
52. In HHP loco while conducting Air Brake Self Test, on working control stand L/T switch should be in Lead position.
53. In HHP loco while conducting BP leakage Test, on working control stand L/T switch should be in Test position.
54. In WDG4/WDP4 locos, if LLOB is in tripped position during cranking engine will not crank. (will/will not)
55. Location of battery knife switch in WDG4 loco is on foot plate.
56. In HHP Banker loco, working control stand Auto handle should be kept in FS position.
57. In HHP Banker loco, working control stand L/T switch should be kept in HLPR position.
58. In HHP loco, oil visibility in Bypass sight glass indicates that spin on filters choked.
59. In HHP loco, chocking of fuel oil primary filter is indicated by Filter condition gauge.
60. In WDG4/WDP4 MU trailing loco L/T switches in both control stands should be in Trail position.
61. In HHP loco TH gear case is lubricated by oil.
62. Firing order of HHP loco is 1,8,9,16,3,6,11,14,4,5,12,13,2,7,10,15.
63. In WDG4 loco Radar is located in between front truck and fuel tank.
64. In WDP4 loco Radar is located in between rear truck and fuel tank.
65. In WDG4/WDP4 locos, Dead Engine cock is located in Nose Compartment.
66. In WDG4/WDP4 locos, C3W distributor valve is located in Nose Compartment.
67. In HHP loco engine exhaust gas temperature reaches up to 538 °C.
68. In HHP loco thick black smoke and poor hauling power is due to low FOP, Low BAP, faulty Turbo & faulty injectors.
69. Total no. of keys in EM2000 display are 16.
70. Main components of CCB 1.5 Brake system are BVC, VCU, CRU, PCU, & KE valve.
71. Number of Radiator fans in HHP loco are Two.

- (11)
72. Number of Brake Blocks in HHP loco are 12.
 73. Brake warning lamp indicates excessive braking current in DB.
 74. To check up engine sump oil level, engine should be in Idle condition.
 75. Wheel diameter of new wheels in HHP loco 1095 mm.
 76. When there is communication link failure and micro air brake breaker is active, the loco will work only in trail mode.
 77. In WDP4 loco Hand Brake applies on R4, R5 wheels.
 78. In WDG4 loco Hand Brake applies on R4, R5 wheels.
 79. In WDG4/WDP4 loco, Brake cylinder pressure is 5.2 kg/cm².
 80. MVCC stands for Magnet Valve Compressor Control.
 81. Lube oil pumps provided in HHP loco are Scavenging oil Pump, Main Lube oil & Piston cooling Pump, Turbo Lube oil pump.
 82. In HHP loco radiator fans are controlled by EM2000 (Loco computer)
 83. Total number of after coolers in WDG4 loco are two.
 84. Number of water expansion tanks in WDG4 loco are one.
 85. Type of governor in HHP loco WWG/MCBG.
 86. Type of cooling water pump used in HHP loco is Centrifugal.
 87. In HHP (4500 HP) loco, OSTA trips at 1085 RPM.
 88. Number of Main bearings available in HHP loco 10.
 89. In HHP loco inter cooler is cooled by water.
 90. In HHP loco fuel oil primary filter bypass valve is set at 30 PSI.
 91. In HHP loco fuel oil secondary filter bypass valve is set at 70 PSI.
 92. In HHP loco fuel oil regulating valve is set at 15 PSI.
 93. In HHP loco lube oil filter bypass valve is set at 40 PSI.
 94. In HHP loco lube oil relief valve is set at 125 PSI.
 95. In HHP loco lube oil soak back filter bypass valve is set at 70 PSI.
 96. In HHP loco lube oil soak back line relief valve is set at 32 PSI.
 97. In HHP loco starting of engine is through two starting motors.
 98. In HHP loco engine should be pre lubricated, if it has been shut down for more than 48 hours.
 99. In HHP loco Turbo super charger is located at power take off end.
 100. In WDG4 loco, EM 2000 display indicates MR1 main reservoir pressure.
 101. In WDG4 loco, control stand MR gauge indicates MR2 main reservoir pressure.
 102. In HHP loco to maintain crank case vacuum instead of CCEM, Eductor is provided.
 103. MRPT stands for Main Reservoir Pressure Transducer.
 104. EFCO stands for Emergency Fuel Cut Off.
 105. RAPB stands for Restricted Air Penalty Brake.
 106. In HHP loco after 6th notch, Turbo Super Charger is driven by Exhaust Gas.
 107. Turbo Lube pump is provided to lubricate Turbo bearing, before cranking and after shut down.
 108. In HHP loco water expansion Tank is located in Equipment Rack.
 109. In HHP loco Lube oil cooler & Lube oil filter are located in Equipment
 110. In HHP loco MVCC is located in Compressor Room.

