

**DIRECTORATE GENERAL OF BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO.94**  
**ON**  
**FUEL INJECTION SYSTEM – LORRY 3 TON DODGE 109 T-165” WB MODEL**  
**(P6/354 ENGINES) (NEW BUYS)**

**Summary**

1. Fuel Injection Pump provided with P6/354 Engines of Lorry 3 TON DODGE 109 T-165” WB MODEL (P6/354 ENGINES) (NEW BUYS) is of single Plunge Distributor type of BOSCH design. The pump is a compact and tight unit. It is lubricated throughout by Diesel fuel itself and thus requires no separate lubrication. Besides, filters have been provided in the system itself to protect it against premature wear, tear and frequent blockade of fuel system. To ensure perfect and trouble-free operation of the Fuel Injection Pump, driver of the vehicle should carry out regular maintenance of Fuel and Oil filters of the engine.

**Aim**

2. To lay down instruction on the maintenance and timely change of oil and fuel filters in Lorry 3 TON DODGE 109 T-165” WB MODEL (P6/354 ENGINES) (NEW BUYS).

**Details**

3. The driver of the vehicle should ensure the following, so as to eliminate at least 90% of the potential engine trouble by proper care and maintenance of filtration equipment: -.

- (a) Filter the Diesel fuel before filling into tank and keep filtered Diesel ready in jerricanes so marked.

**Method :-**

- (i) Use 3 to 4 layers of MUSLING clothes to filter fuel.
- (ii) Use TECALEMIT Refueling and Filtering unit (Available from M/s TECALEMIT (HIND) LTD, E3/12, JHANDEWALA Extn, New Delhi-1 for Rs.425/- Appx). These can be brought as Category ‘B’ Stores by Chief Engineer (Project) under their own powers as suggested vide HQ DGBR Ir No.67721/DGBR/E4/T dated 10 Mar 72.
- (b) Carry out regular and periodic maintenance of filter as Appendix ‘A’ attached.
- (c) Under no circumstances, allow the Fuel Injection Pump to be opened in field by maintaining Field Workshop. (It is to be opened even in the Base Workshops (GREF), if specialized equipment to repair Distributor type of FIP is held).
- (d) The fuel tank cap sits properly and is not loose in the fuel tank neck. The fuel tank cap washer be replaced whenever it is worn out.
- (e) Clean fuel tank(s) once a year.

**FILTER MAINTENANCE**

**Air Filter**

1. Clean Oil-bath Air Cleaner and renew its oil under norms working condition after every 4,500 KMs.

Note :- Clean the Air Cleaner earlier under dusty operating conditions to prevent dusty air entering into cylinders causing premature wear of piston, rings and cylinder liners.

**Fuel Filters**

2. (a) **Glass bowl filter.** Clean glass bowl and filter every 9,000 KMs or 300 hours, whichever is earlier.
- (b) **Gauge type filter of Fuel Lift Pump.** Clean this filters every 12,000 KMs.
- (c) **Final Filters**
  - (i) **Felt type filter.** Clean every 9,000 KMs or 300 hours, and change element every 27,000 KMs/900 hrs.
  - (ii) **Paper type filter** Clean paper type filter except by compressed air. It is basically throwaway type. So, replace every 27,000 KMs/900 hours.

**Lubricating Oil Filter**

3. The main full flow filter should not be cleaned, but replaced every 9000 KMs/300 hours.

**Oil Sump Strainer**

4. Sump Strainer is of wire gauze type, and is hence clean every 18,000/600 hours.

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**DIRECTORATE GENERAL OF BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO.95**  
**STARTING AND STOPPING DRILL – ROLEBA – R-1200 SNOW**  
**CLEARING MACHINE**

**Aim**

1. To lay down the starting and stopping drill of ROLEBA – R-1200 SNOW CLEARING MACHINE

**STARTING DRILL**

2. First check the machine from outside and then get into the friver’s cabin and check various items of the machine as per details given in the succeeding paragraphs.

**3. Outside the machine**

- (a) Go round the machine once to make sure no side panel is opened.
- (b) Remove the wheel block and place it at its appropriate place on left side of the cabin.
- (c) Make sure no boulder or wooden block is lying before the wheels.
- (d) For driving on highway, take out parts of tail stop lights.

**4. Inside the Driver’s cabin**

- (a) Open the cabin door, get in, sit on the friver’s seat and close the cabin door.
  - (b) ‘Feel’ the foot brake pressure and ensure brakes are not spongy or ineffective; otherwise bleed the system or rectify defects.
  - (c) Check the following control levers which should be in neutral position :-
    - (i) Vehicle Drive lever
    - (ii) Cutter driver lever
    - (iii) Impeller driver lever
- } Hydro-static system
- (d) Hand brake should be in engaged position.
  - (e) Insert the switch key in the switch in ‘Zero’ position and press it slightly. The battery circuit ‘on’ and oil pressure warning lights will lit on the dashboard.
  - (f) Press Throttle lever down by moving it slightly to the left side.
  - (g) Turn the starter switch to no.1 position, and hold it till the Heater Plug light comes on (say after 2 to 3 minutes). It indicates that the battery has heated up both the Heater Plugs.
  - (h) As soon as the Heater Plug light comes on, press and turn the ‘Starting Switch’ further to start the engine.

**Caution :-** DO NOT OPERATE STARTER SWITCH FOR MORE THAN 10 SECONDS AT A TIME. IF ENGINE FUELS TO START IN THE FIRST ATTEMPT, WAIT FOR 2 TO 3 MINUTES AND RE-OPERATE THE STARTER TO START THE ENGINE.

(J) Operate Throttle lever to adjust engine speed to 900 RPM. (See RPM in the Revolution counter on the dashboard).

(k) Allow engine to run at 900 RPM for three minutes for initial warming up.

(l) Select suitable gear, engage gear lever, keeping in mind the following speed limits :-

1 <sup>st</sup> gear	-	for	0-5 Km PH
2 <sup>nd</sup> gear	-	for	0-12 Km PH
3 <sup>rd</sup> gear	-	for	0-20 Km PH
4 <sup>th</sup> gear	-	for	0-32 Km PH

Note : Second gear is the most recommended speed.

(m) Increase engine RPM by pressing Throttle lever to about 2,000 RPM. Adjust engine speed by the Throttle Knob/lever to 1,800 RPM for plain drive and 2,100 RPM for snow clearance work.

(n) Make sure that no one is near about the machine within 10 feet distance. Also check that move is in its front. See from Rear-view mirror and give horn.

(o) Gradually pull the first hydraulic lever (near the driver seat) till the plough is raised about 18” high from ground, then leave it.

(p) Release Hand Brake

(q) Gradually operate ‘Vehicle drive lever’ forward backwards, depending upon the direction if the machine is to be moved forward or backward respectively.

(r) Adjust speed by the vehicle control lever, according to the road condition.

### **STOPPING DRILL**

5. (a) Reduce vehicle speed gradually by operating ‘vehicle drive control’.
- (b) Bring machine to the left or road at a suitable place.  
(USE SIDE – INDICATOR)
- (c) Bring vehicle control lever in neutral position. The machine will stop.
- (d) Lower the cabin/plough gradually by pushing the 1<sup>st</sup> lever (near to the driver seat) gradually till touches the ground.
- (e) Engage Hand Brake.
- (f) Bring the main drive to neutral.
- (g) Kill the engine gradually.
- (h) Take out switch key.

**Caution :-** ENSURE THAT 'DEFROSTING SCREEN' AND 'CABIN HEATER' ARE OFF.

- (j) Come out of the driver's cabin and close the cabin door.
- (k) Put the wheel block (Wedge) behind wheels, if the ground is sloppy.
- (l) Go round the machine and see for any leakage and loose/broken/missing nuts and bolts. Take remedial action immediately, so that machine is available in serviceable condition for use whenever required.

- END -

**DIRECTORATE GENERAL OF BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO.96**  
**ON**  
**MAINTENANCE AND LUBRICATION**  
**OF**  
**CRAWLER TRACTOR D-120 INCLUDING ANGLE DOZER**  
**AND TOWING WINCH**

**Introduction**

1. Regular servicing and preventive maintenance are essential to prolongs the life of the equipments, ensure timely repairs to arrest defect from developing into major ones, to work the engine effectively tell times, minimize inopportune breakdowns and down time losses.

**Aim**

- 2 (a) To enumerate the details of periodic and preventive maintenance and lubrication of Crawler Tractor D-120 Including Angle Dozer And Towing Winch
- (b) Issue CHECK CARD for use by Mobile Maintenance Team.

**Action by**

3. (a) User Units. To Carry out periodic inspection, regular servicing and preventive maintenance task as laid down.
- (b) Field Workshops (GREF) :
  - (i) To Check the “Record of maintenance and lubrication” in the log book of the vehicles during its inspection and repairs and ensure compliance of Maintenance and Lubrication Schedules given in this instruction.
  - (ii) Advice user units in respect of any discrepancy/short comings noticed.
- (c) Mobile Maintenance Team : To ensure that proper maintenance is carried out and report accordingly to OC Field Workshop (GREF) for necessary action.

4. **Details**

Details of Maintenance and Lubrication alongwith the periodicity have been tabulated in Appendix ‘A’ to this instruction.

**Appendix 'A' to HQ DGBR, GMI No. 95**  
**Dated 29 Nov 73**

**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Points
1	2	3	4	5

**10 HOUR MAINTENANCE TASK**

1.	General	(a) Check oil, water and fuel for leakage. (b) Check for exhaust smoke colour, noise or vibrations. (c) Check readings of all gauges and meters. (d) Check all bolts and nuts if loose and deficient.		
2.	Crankcase			
(a)	Main Engine	Check oil level and top up if necessary.	Engine Oil	1
(b)	Starting Engine	-do-	-do-	
3.	Main clutch	Check oil level and top up	-do-	
4.	Steering control hydraulic unit	-do-	-do-	
5.	Transmission case	-do-	Gear oil	1
6.	(a) Fuel tanks : Main Engine	drain sediments and water from sediment trap drain plug.		
	(b) Fuel tanks :	Check fuel level		1
7.	Fuel filter	Drain sediment and water from drain plugs.		4
8.	Cooling system	(a) Top up coolant level.		1
		(b) Tighten Radiator cap properly and check for water leaks.		1
		(c) Inspect fan belt for tension		2
9.	Air Cleaner	Clean dust pan. It may be necessary to clean at shorter intervals, if operated in dusty condition.		1

: 2 :

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
10.	Final Drives	Check for oil leaks	Gear oil	1
11.	Under Carriage	(a) Remove mud and clean (b) Inspect tracks for wear and tear. (c) Check rollers and idler for oil leaks.		13
12.	Blade Equipment	(d) Check rollers and idler for wear. (a) Check blades, 'C' frame for distortion cracks or damage. (b) Check all cutting edges, end-bits For wear and tear. (c) Check upper and lower struts for damages/bent, pins and lugs for wear and tear. (d) Check all mounting bolts and bushings for looseness or wear.		
13.	Hydraulic system	(a) Check hydraulic cylinder for oil leaks from seals. (b) Check all piping and hose connection for oil leaks or damage. (c) Check for leaks at Hydraulic pump and inspect drive coupling for wear and tear. (d) Inspect control valve for leaks and efficient function.		
14.	Towing Winch	(a) Change gear Check oil level and top up if required. (b) Right hand side -do- gear case -do-	Gear Oil	
15.	FIP and Governor	Check for leaks	Engine Oil	
16.	Oil Cooler	Check for oil leaks		



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Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Page
1	2	3	4	5

17.	Battery terminals and vent plugs	(a) Check for tightness (b) Check for clear vent holes (c) Check electrolyte level, Add distilled water if required.		
18.	Wiring	Check for cracked or frayed insulation, broken wire or loose connection.		
19.	Manifold	Check for leaks from joints		
20	Grease Nipples			
	Steering clutch Release bearing cage	Grease	Grease	2

Note :-

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

1. **Main Engine, Starting Engine and Hydraulic Steering control unit**
  - (a) Extremely hot area - Use SAE 40 engine oil
  - (b) Temperate areas (All seasons) - Use SAE 30 engine oil
  - (c) Freezing areas (-10° C and below) - Use SAE 10 engine oil
2. **Transmission Oil, and Final Reduction Gear Case**
  - (a) Temperate areas (All seasons) - Use SAE 90 Gear oil
  - (b) Freezing areas (-10° C and below) - Use SAE 80 Gear oil
3. Hydraulic Oil - Use SAE 10W H/D in all temperature
4. **Grease - Grades**
  - (a) Above + 15° C - Use Grease No. 2
  - (b) +15°C to -10°C - Use Grease No.1
  - (c) Below -10°C - Use Grease No. '0'

**: 4 :**

5. Refuelling of diesel tanks must be done at the end of day's work to give enough time for settling down the water and sediments.
6. If excessive foam is seen in the Hydraulic tank, it may be due to poor quality of oil or use of too little oil.
7. Do not attempt to adjust the FIP and Governor since it is not a normal Field Repairs, unless servicing Lorry/Calibrating Machine is provided.

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**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**60 HOUR MAINTENANCE TASK**

1.	General	First carry out 10-Hour maintenance task.		
2.	Oil Pan	Change engine oil. Initial change of lubricant in case of new or overhauled engine.	Engine Oil	
(b)	Starting Engine	-do-		-do-
3.	Air Cleaner Main Engine	Clean element and cyclone tubes.		
4.	Starting engine Fuel filter.	Clean element and filter bowl.		
5.	Fuel Injectio Pump			
(a)	Camshaft housing	Check oil level and top up, if necessary.		-do-
(b)	Governor housing	-do-		-do-
6.	Radiator and connection	(a) Check for leaks and hose connection. If antifreeze (Ethylene glycol) is used check its strength. GMI No.2 and 37 refers.  (b) Check radiator core/spaces.	Antifreeze chemical	
7.	Fan Belt	Check for tension. Adjust, if necessary.		
8.	Spark Plug	Clean plugs. Adjust cap. Replace plug, if necessary.		2
9.	Starting engine	Drain out water sediment from case.		1
10.	Starting transmission	Check oil level. Refill, if required.		1

Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Points
1	2	3	4	5
11.	Steering brakes	Adjust brake pedal free play.		2
12.	Tracks	Check and adjust slack for ¾” to 1” at straight edge.		2
13.	Hydraulic Oil	Check oil level. Top up, if necessary.		
14.	Control valve and linkage	Inspect and lubricate linkage.		
15.	<b><u>Grease Nipples/Oil Lubrication</u></b>			
(a)	Cooling fan shaft	Grease	Grease	1
(b)	Hour meter	Lubricate with oil	Engine Oil	1
(c)	Starting Engine water pump	Grease	Grease	1
(d)	Starting Engine clutch case	Lubricate with oil	Engine oil	1
(e)	Idler gear bearing starter motor	Grease	Grease	1
(f)	Control valve lever shaft	Grease	Grease	1
(g)	Universal joint (Transmission)	Grease	Grease	2
(h)	Sprocket drive shaft bearing	Grease	Grease	2
(j)	Diagonal bracer bearing	Grease	Grease	2
(k)	Carrier roller	Grease (Service when tractor is operating in nuddy/dusty condition).	Grease	
(l)	Track roller	-do-	Grease	
(m)	Front idler	-do-	Grease	
(n)	Track adjusting rod	Grease	Grease	
(o)	Hydraulic cylinder	Grease	Grease	
(p)	Lever axle (Towling Winch) (Towing Winch)	Grease	Grease	

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Note :-

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

1. **Main Engine, Starting Engine and Hydraulic Steering control unit**
  - (a) Extremely hot area - Use SAE 40 engine oil
  - (b) Temperate areas - Use SAE 30 engine oil  
(All seasons)
  - (c) Freezing areas - Use SAE 10 engine oil  
(-10° C and below)
  
2. **Transmission Oil, and Final Reduction Gear Case**
  - (a) Temperate areas - Use SAE 90 Gear oil  
(All seasons)
  - (b) Freezing areas - Use SAE 80 Gear oil  
(-10° C and below)
  
3. Hydraulic Oil - Use SAE 10W H/D in all temperature
4. **Grease - Grades**
  - (a) Above + 15° C - Use Grease No. 2
  - (b) +15°C to -10°C - Use Grease No.1
  - (c) Below -10°C - Use Grease No. '0'

5 If excessive foam is seen in the Hydraulic tank, it may be due to poor quality of oil or use of too little oil.

6 Watch for metal particles or other foreign material in the drained oil, report accordingly to Workshop.

**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**120 HOUR MAINTENANCE TASK**

1.	General	First carry out 10-Hour and 60 hour maintenance task.		
2.	Crankcase			
(a)	Main Engine	Change engine oil	Engine Oil	1
(b)	Starting Engine	-do- (Initial change in case of new and overhauled engine)	-do-	
3.	Starting engine Air Cleaner	Clean air and cleaner and change oil.	-do-	
4.	Cranking handle bevel gear case	Change engine oil (Initial change in case of new and overhauled engine)	-do-	
5.	Main clutch case	(a) Change oil (Initial change in case or new and overhauled machine) (b) Drain out water sediments.	-do-	
6.	Transmission case	(a) Change oil (Initial change in case of new and overhauled machine)  (b) Drain out water sediments.		1
7.	Steering control	(a) Change oil (Initial change in case of new and overhauled machine)	Engine oil	
8.	Final drive	a) Change oil (Initial change in case of new and overhauled machine)	Gear oil	
9.	Cooling system	Flush the cooling system and refill the system with fresh clean water (In case antifreez used refit the system with antifreez mixer of correct strength)	Water	1

Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Points
1	2	3	4	5
10.	Dynamo	Recondition brush and commutator surface.		1
11.	Inlet and	Check and adjust valve clearance		2
12.	Decompression	Check and adjust decompression travel of suction valves.		
13.	<b><u>Tightening of bolts</u></b>			
	(a) Main engine	Check following bolts for tightness to specified torque :-  (a) Precombustion chamber (b) Cylinder head (c) Crank case oil pan.		
	(b) Starting engine	(a) Cylinder head  (b) Crank case oil pan		
14.	Starting engine carburator	Clean check and adjust		
15.	Starting engine oil pump and inlet strainer	Clean oil pan, oil pump and inlet strainer.		
16.	Main clutch	Check and adjust clutch brake		
17.	Steering clutches and brakes	Drain out water sediments		

Note :-

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

**1. Main Engine, Starting Engine and Hydraulic Steering control unit**

- (a) Extremely hot area - Use SAE 40 engine oil
- (b) Temperate areas (All seasons) - Use SAE 30 engine oil
- (c) Freezing areas (-10° C and below) - Use SAE 10 engine oil

2. **Transmission Oil, and Final Reduction Gear Case**

(a) Temperate areas - Use SAE 90 Gear oil  
(All seasons)

(b) Freezing areas - Use SAE 80 Gear oil  
(-10° C and below)

3. Hydraulic Oil - Use SAE 10W H/D in all temperature

4 Watch for metal particles or other foreign material in the drained oil, report accordingly to Workshop.



**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**250 HOUR MAINTENANCE TASK**

- |     |                                    |   |            |   |
|-----|------------------------------------|---|------------|---|
| 1.  | General                            | First carry out 10, 60 and 120-hour maintenance task. |            |   |
| 2.  | Fuel Injection Pump                |   |            |   |
| (a) | Injection pump<br>Camshaft housing | Change oil  | Engine Oil | 1 |
| (b) | Governor housing                   | -do-  | -do-       | 1 |
| 3.  | Engine Oil filter                  | Change filter   |            | 2 |
| 4.  | Fuel oil filter                    | Change filter   |            | 8 |
| 5.  | Starting engine<br>Crankcase       | Change oil  | Engine oil | 1 |
| 6.  | Cranking handle<br>bevel gear      | Check oil level and top up,<br>if necessary.          | Engine Oil | 1 |
| 7.  | Final drive case                   | Check level and top up,<br>if necessary               | Gear Oil   | 2 |
| 8.  | <b><u>Crankcase Breather</u></b>   |   |            |   |
| (a) | Main engine                        | Clean breather screen                                 |            | 1 |
| (b) | Starting engine                    | Clean breather screen                                 |            | 1 |
| 9.  | Compression<br>Pressure            | Check compression pressure<br>of each cylinder        |            | 6 |
| 10  | Injection Nozzle                   | Clean Oil filter                                      |            | 1 |
| 11. | Transmission                       | Clean Oil filter                                      |            | 1 |
| 12. | Magneto                            | Recondition contact bracket<br>point and adjust gap.  |            | 1 |
| 13. | Starter motor                      | Recondition commutator and brush.                     |            |   |

Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Points
1	2	3	4	5

14.	Starting engine inlet and exhaust valve	Check and adjust valve clearance		
15.	Starting engine clutch	Adjust clutch play.		1
16.	Starting engine output pinion	Check on smoothness of engage disengage action and adjust if necessary		1
17.	Steering clutches	Check clutch lever adjustment		2
18.	Hydraulic booster	Check condition of oil seal		2
19.	<b><u>Grease Points</u></b>			
(a)	Starting Engine clutch release shaft	Grease	Grease	1
(b)	starter motor	Lubricate by oil	Engine Oil	1
(c)	Magneto lever shaft	-do-	-do-	1
(d)	Lower strut	Grease	Grease	2
(e)	Upper strut	Grease	Grease	2

Note :-

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

1. **Main Engine, Starting Engine and Hydraulic Steering control unit**

- (a) Extremely hot area - Use SAE 40 engine oil
- (b) Temperate areas (All seasons) - Use SAE 30 engine oil
- (c) Freezing areas (-10° C and below) - Use SAE 10 engine oil

2. **Transmission Oil, and Final Reduction Gear Case**

- (a) Temperate areas (All seasons) - Use SAE 90 Gear oil
- (b) Freezing areas (-10° C and below) - Use SAE 80 Gear oil

- 3. Hydraulic Oil - Use SAE 10W H/D in all temperature
- 4. **Grease - Grades**
  - (a) Above + 15° C - Use Grease No. 2
  - (b) +15°C to -10°C - Use Grease No.1
  - (c) Below -10°C - Use Grease No. '0'

5 Watch for metal particles or other foreign material in the drained oil, report accordingly to Workshop.

6. It may be necessary to replace the oil filter at shorter intervals under severe working condition.

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**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**500 HOUR MAINTENANCE TASK**

1. General First carry out 10, 60, 120 and 250-hour maintenance task.
2. Main engine Crankcase Remove and clean: -
  - (a) Pil sump
  - (b) Pil pump inlet pipes and strainers.
3. Cooling system Wash the entire cooling system with soda/anti-corossive chemical.
4. Final Drive housing Change oil if tractor is operating in muddy/dusty condition. Gear oil
5. Steering clutches and brakes
  - (a) Check bearings for tightness and adjust if necessary.
  - (b) Check condition of the brake lining.
6. Final drive housing case Check and tighten bolts securing gear case.
7. **Under carriage**
  - (a) Track rollers Check rollers and bearings for running clearance. 1
  - (b) Carrier rollers -do-
  - (c) Front idlers -do-
  - (d) Suspension spring Check and tighten equiviliser spring mounting bolts.
  - (e) Diagonal brace Check diagonal brace bearing for clearance.

8. **Grease Points**

(a)	Engine front support	Grease	Grease	1
(b)	Track roller	Grease	Grease	14
(c)	Carrier roller	Grease	Grease	4
(d)	Front Idler	Grease	Grease	2

Note :-

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

1. **Main Engine, Starting Engine and Hydraulic Steering control unit**

- (a) Extremely hot area - Use SAE 40 engine oil
- (b) Temperate areas - Use SAE 30 engine oil  
(All seasons)
- (c) Freezing areas - Use SAE 10 engine oil  
(-10° C and below)

2. **Transmission Oil, and Final Reduction Gear Case**

- (a) Temperate areas - Use SAE 90 Gear oil  
(All seasons)
- (b) Freezing areas - Use SAE 80 Gear oil  
(-10° C and below)

3. **Grease - Grades**

- (a) Above + 15° C - Use Grease No. 2
- (b) +15°C to -10°C - Use Grease No.1
- (c) Below -10°C - Use Grease No. '0'

4. Watch for metal particles or other foreign material in the drained oil, report accordingly to Workshop.

**PREVENTIVE MAINTENANCE – TRACTOR D-120 KOMATSU**

<b>Srl No.</b>	<b>Item/Assembly</b>	<b>Maintenance Instructions</b>	<b>Lubricant</b>	<b>No. of Points</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

**1000 HOUR MAINTENANCE TASK**

1.	General	First carry out 10, 60, 120, 250 and 500 hours maintenance task.		
2.	Starting Engine bevel gear case	Change oil	Engine Oil	1
3.	Starting Engine Transmission case	-do-	Gear oil	1
4.	Main engine	Change oil	Engine Oil	1
5.	Transmission case	(a) Change oil	Gear oil	1
6.	Steering control Hydraulic unit	(a) Change oil	Engine oil	1
7.	Final drive housing	a) Change oil	Gear oil	2
8.	<b><u>Towing Winch</u></b>			
(a)	Change gear case	Change oil	Gear oil	1
(b)	Right hand side gear case	Change oil	Gear oil	1
9.	Hydraulic Oil	Change oil	Hyd oil	1
10.	Air Cleaner (Main Engine)	Replace element		
11.	Main Engine Fuel tank	Remove and clean fuel tank thoroughly		
12.	Main clutch	(a) Clean strainer (b) Clean breather		
13.	Steering clutch assembly	(a) Check condition of clutch lining. Replace if necessary. (b) Check bevel gear backlash. Adjust if required.		

Srl No.	Item/Assembly	Maintenance Instructions	Lubricant	No. of Points
1	2	3	4	5
14.	Final Drive	(a) Check nuts holding sprocket for tightness.  (b) Check sprocket for wear and tear.		2
15.	Hydraulic booster Booster	Check condition of steering lever linkage. Repair/recondition as required.		
16.	<b><u>Under carriage</u></b>			
(a)	Track rollers	Check for wear and tear repair/rebuild as required.. 1		14
(b)	Carrier rollers	-do-		4
(c)	Front idlers	-do-		2
(d)	Track chain	Check track shoes, pins and bushes for wear and tear. Replace/repair as required.		2
17.	Hydraulic pump and drive coupling	Inspect, repair or replace worn out parts.		
18.	Control valve and linkage	Check and carry out necessary repair or replace defective parts.		
19.	Hydraulic cylinder, hoses and fittings	Inspect and repair/replace defective component.		
20.	'C' Frame and Bowl assembly	Repair/rebuild/replace worn out assembly and components.		
21.	<b><u>Grease Points</u></b>			
(a)	Universal joint Drive shaft Hydraulic pump	Grease	Grease	1

Note: -

**OIL AND GREASE GRADES – ASSEMBLYWISE USE OF**

1. **Main Engine, Starting Engine and Hydraulic Steering control unit**

- (a) Extremely hot area - Use SAE 40 engine oil
- (b) Temperate areas - Use SAE 30 engine oil  
(All seasons)
- (c) Freezing areas - Use SAE 10 engine oil  
(-10° C and below)

2. **Transmission Oil, and Final Reduction Gear Case**

- (a) Temperate areas - Use SAE 90 Gear oil  
(All seasons)
- (b) Freezing areas - Use SAE 80 Gear oil  
(-10° C and below)

- 3. Hydraulic Oil - Use SAE 10W H/D in all temperature

4. **Grease - Grades**

- (a) Above + 15° C - Use Grease No. 2
- (b) +15°C to -10°C - Use Grease No.1
- (c) Below -10°C - Use Grease No. '0'

- 5. Watch for metal particles or other foreign material in the drained oil, report accordingly to Workshop.



**Reference GMI No.96 dt Jul 73**

**CHECK CARD : PREVENTIVE MAINTENANCE**  
**(ORIGINAL/DUPLICATE)**

- |                    |   |  |
|--------------------|---|--|
| 1. Project _____   | 4. Make & Type : SISCO<br>of Eqpt STONE | Action :<br>After carrying out the<br>preventive Maintenance<br>Task, Mobile Maintenance<br>Team will enter its date<br>in the months column<br>below and initial. |
| 2. Tsk Force _____ | CRUSHER                                 |  |
| 3. Unit _____      | 5. BA/EM No. _____                      |  |
|                    | 6. Location _____                       |  |

Srl No.	Task	J	F	M	A	M	J	J	A	S	O	N	D
---------	------	---	---	---	---	---	---	---	---	---	---	---	---

1. **10 Hours**

- (a)
- (b)
- (c)
- (d)
- (e)
- (f)
- (g)

2. **60 Hours**

- (a)
- (b)
- (c)
- (d)

3. **120 Hours**

- (a)
- (b)
- (c)

4. **250 Hours**

- (a)
- (b)

5. **500 Hours**

- (a)
- (b)

6. **1,000 Hours**

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Signature of SO-1/SO-2 EME (Project) \_\_\_\_\_

Date \_\_\_\_\_

Remarks \_\_\_\_\_

Note :- Column 'J' to 'D' stands for months of the year.

**DIRECTORATE GENERAL OF BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO.99**  
**ON**  
**FIRST PARADE, HALT PARADE AND LAST PARADE**  
**OF**  
**ROTARY SNOW PLOUGH ROLB: R-1200 'MONOFORCE'**

**Aim**

1. To lay down the FIRST PARADE, HALT PARADE AND LAST PARADE OF ROTARY SNOW PLOUGH ROLB: R-1200 'MONOFORCE'

**Action By**

2. User Units: - Take action as per details given in the succeeding paragraphs.

**Details**

3. First Parade. Carry out the following Maintenance and Inspection of machine before starting: -

(a) Check for any seepage or leakage of fuel, engine oil, Gear Oil, Hydraulic Oil and Brake Fluid from anywhere on the respective systems. Locate the point of leakage and report for rectification.

(b) Go round the visit and check for any missing nuts and bolts or visit breakage or damage.

(c) Refit batteries if removed and secure the connections.  
(Caution : Negative earthed)

Note :- Batteries will be removed only when minimum temperature falls down below minus 20°C.

(d) Check up the following for correct level and top up, if necessary: -

(i) Engine Oil (by Dipstick marking)

(ii) Hydraulic oil in the Hydraulic tank (from Glass Window, if not less than it's mid-point)

(iii) Oil in Air Cleaner (oil bath type) for sedimentation also. Replace oil if dirty.

(iv) Diesel on the Engine Fuel Tank. (Method: Insert 'switch key' and press. Read fuel gauge directly for the quantity.)

(v) Diesel in the cabin heater fuel tank.

(e) Open drain plug of the Engine fuel tank. Clean water and sedimentation. Replace plug, and gear diesel begins to flow.

(f) Check fuel glass bowl, and clean it's filter, if dirty, start engine by self starter and stop engine as soon as glass bowl is filled.

(g) Check all the four wheels visually for proper inflation.

**Halt Parade.** The following Maintenance and Inspection be carried out, whenever the machine is stopped during working hours; -

(a) Inspect machine for any damages, specially to cutter blades, missing/broken bolts and nuts, leakage/seepage.

(b) Check the following for overheating ('fuel' by hand, if bearable): -

- (i) Cutter Gear Box (chain drive) and planetary Gear casing.
- (ii) Impeller Gear Box (chain drive) and Planetary gar casing.
- (iii) Vehicle Drive (Main) gear Box (Main) Gear Box and Transfer Case.
- (iv) Front and Rear Axles.
- (v) Portal Gears on all the four wheels.
- (vi) Distributor Ger Box.

(c) Check Hydraulic oil temperature gauge (It should be always below 100°C)

(d) Remove any excessive accumulations of snow from rotor assembly.

5. **Last Parade (Or Garage Drill).** The following maintenance and Inspection be carried out after parking the machine at the end of the day's work: -

(a) Clean snow accumulation from other parts of the machine.

(b) Go round the machine: Check for any leakage of fuel, Brake Fluid, Hydraulic oil, Engine oil, Gear Oil, damage and deficient nuts and bolts.

(c) Pay particular attention for possible damage to cutting and impeller components. Re-adjust distorted cutter blades means of adjusting fork (placed in the cutter rotor shaft). Also lighten up cutter blade and scraper blade nuts and bolts and cutter drum mounting bolts. Replace broken/missing nuts and bolts.

(d) Under temperature below minus 20°C, disconnect battery connection and remove the batteries to a warm place.

**CAUTION :-** Cabin must be in lifted position by two feet to remove batteries and refit the next morning.

(e) Fill clean diesel in the Engine Fuel Tank and cabin heater fuel tank to full capacity.

**CAUTION :-** Use filter/strainer while filling in fuel.

(f) If machine is to be parked in the open, cover with a tarpaulin.

6. Any additional point may be added by SO-1/SO-2 EME (Project) based on their practical experience or as per instruction of M/s ROLBA Company, ZURICH, SWITZERLAND or M/s KUMAR ENTERPRISE, NEW DELHI.

**DIRECTORATE GENERAL OF BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO.102**  
**ON**  
**CARE AND MAINTENANCE OF DISTRIBUTOR PLUNGER ASSEMBLY**  
**ON DODGE VEHICLES**

**Introductionim**

1. It has been observed that some cases of premature failure of Distributor Plunger Assembly on DODGE vehicles have come to notice. All user units, and Maintaining Field Workshops (GREF) will ensure that the section given below is taken to obviate the defect.

**Summary**

2. The premature failure of Distributor Plunger Assembly have been reported and investigated. The main cause for premature failure of the assembly is due to improper filtration are as under: -

- (a) Non-genuine MICO filters or filters of mark other than MICO were fitted. It was noticed that wherever genuine MICO filters were used, they were partly clogged and all filters of other makes were clean. This goes to show that the filters of makes other than MICO did not filter the impurities and dust particles in the fuel and that the MICO filters have filtered the same.
- (b) No standard schedule for maintenance/change of filters is being followed.
- (c) The filter inserts are not being cleaned regularly.
- (d) The water separator is also not being drained regularly.

**Action By**

- 3. (a) User Units :- Carry instruction given in para 4(a) and para (5).
- (b) Field Workshops (GREF) :- Carry out and ensure compliance of instructions given in Para 4.
- (c) Base Workshops (GREF) :- To use MICO filters in the stages of filtration during overhaul.

**Details**

- 4 (a) Only MICO filters should be used on all these changes of filtration.

State	Part No.	Frequency for change of Filter inserts.
1 <sup>st</sup>	1 457 481 003	24,000 KMs
	If this is not available any of the following Two may be used: -	
	9 451 037 418	
	9 451 037 409	
2 <sup>nd</sup>	9 451 037 406	36,000 KMs
	9 451 037 409	
3 <sup>rd</sup>	9 451 037 405	50,000 KMs
	9 451 037 407	

- (a) All the 3 filters inserts should never be changed together.
- (b) MICO filters should not be cleaned, but replaced after the recommended period.
- (c) MICO filters should not be cleaned, but replaced after the recommended period.

Note: - The above-mentioned procedure is applicable only for normal operating condition and, therefore, should only be taken as a guideline. They have to be adapted to prevalent working conditions taking into consideration the terrain, dusty areas, hilly routes, task condition, dirty fuel, fuel storage condition etc.

5. The following maintenance points are emphasized:-

- (a) The fuel tank should be thoroughly cleaned from the inside, at least twice a year.
- (b) Fuel tank cap should be fitted properly.
- (c) While filling the vehicle tanks, the diesel should be filtered, preferably using chamoie leather.
- (d) The water separator should be drained daily. A drain screw for this purpose has been provided at the bottom of the bowl.