

**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. 96**  
**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. (b) Tighten Radiator cap properly and check for water leaks. (c) Inspect fan belt for tension		1 1 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 bushes 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 gear case -do-	Gear Oil -do-	
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.

: 5 :

**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	

: 7:

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 carburetor	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<br>(All seasons)     | - | Use SAE 30 engine oil |
| (c) | Freezing areas<br>(-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 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 Crankcase	Change oil	Engine oil	1
6.	Cranking handle bevel gear	Check oil level and top up, if necessary.	Engine Oil	1
7.	Final drive case	Check level and top up, 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 Pressure	Check compression pressure of each cylinder		6
10	Injection Nozzle	Clean Oil filter		1
11.	Transmission	Clean Oil filter		1
12.	Magneto	Recondition contact bracket 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 :-

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

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

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

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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.

**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
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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.