**DIRECTORATE GENERAL BORDER ROADS**
**GENERAL MAINTENANCE INSTRUCTION NO 191**
**ON**
**FARM TRACTOR HMT 5911: MANUFACTURED BY M/S HINDUSTAN MACHINE TOOLS LTD**

## 1. INTRODUCTION

1. Regular servicing and preventive maintenance are essential for optimal usage of equipment to achieve maximum life for planning and timely repair to arrest defects from developing into major one, whereby minimizing the down time and production losses.

2. These instructions are issued as guidelines for scheduled and preventive maintenances and lubrication schedule of Farm Tractor HMT 5911 manufactured by M/S Hindustan Machine Tools Ltd.

**ACTION BY**.

3. (a) User Units – To carry out scheduled maintenance, Inspection, servicing and preventive maintenance task as laid down by Mobile Maintenance Team.

(b) Field Wksp (GREF) – (i) To monitor the record of maintenance and lubrication as carried out by Mobile Maintenance Team of the equipment during its inspection and repairs when carried out as per maintenance and lubrication schedules given in this instructions.

(ii) To advise user units in respect of any lapses noticed.

**DETAILS**

4. The details of preventive maintenance are as under:-

| | | | |
|---|---|---|---|
| (a) | Preventive and scheduled maintenance | - | Appx 'A' |
| (b) | Lubrication Chart | - | Appx 'B' |
| (c) | Specifications | - | Appx 'C' |

Sd xxxxx

Dated : 11 Jun 90

(AJS KHALSA)
SE (E&M) SG
Dir Tech
For Dir General Border Roads

## Preventive/scheduled maintenance instructions

1. The maintenance of tractor when done and correctly carried out, ensure, the trouble free tractor performance.

2. The following instructions are to be observed carefully:-

## GENERAL PRECAUTION

(a) Daily Task (to be carried out after each 8-10 hrs of operation of tractor).

(i) Clean both the tractor and implements.
(ii) Replenish fuel and inspect for tightness of the fuel system.
(iii) Check water level and inspect for tightness joints of the cooling system.
(iv) Check oil level and inspect for tightness joints of lubricating system.
(v) Check oil level in the air cleaner and clean the pre- filter removing dust from it.
(vi) Check function both of the foot and of hand brake. Check brake liquid level in the jar and hydraulic brake system for tightness.
(vii) Inspect the condition of the electrical installation, Check lights trafficator etc. Check the regulator run of running engine, correct lubrication and charging.
(viii) Check air pressure in the front and rear tyres, screw on caps and tighten them well.
(ix) Check if screw, blots and nuts of the steering system linkage and leverage and discs both of the front and rear wheels.
(x) Check if water pump drive V-belt as well as that of the dynamo are tightened well and correctly. (for sag see Para 2 (a) (v) ).
(xi) Before starting to drive the tractor with trailor or trailor in toe, check their state as well as the state and condition of coupling and locking elements.
(xii) When starting to employ the hydraulic power lift, unscrew the magnetic oil cleaner from its housing. Rinse and blow off the screen and clean magnet. It is recommended to inspect and clean the magnetic oil filter during the starting period of the hydraulic power lift service. Check each 30-50 engine hours the oil level in the injection pump.

(b) After every 500 litres fuel consumption or after each 100 engine hours. All operation mentioned in Para 2 (a) (i) to (xii) above to be carried out at first.

(i) Check oil level in the crankcase oil sump and clean the centrifugal oil cleaner drum rotor.
(ii) Inspect oil level in portals.
(iii) Inspect oil level in the gearbox.
(iv) Unscrew the butterfly nut from the air cleaner, remove the cover and check the condition of the sedimentation in bowl. Untie three bottom quick couplings and remove the complete pre- cleaner upwards (evacuate the dust) and complete air cleaner body downwards. Wash air cleaner jacket, cartridges blade distributor with rebounding plate in petrol or gas oil and dry them before assembly. Suction slots protecting strainer must also be clean. Bolt parts with screw and nut together and put them on to the cleaner bowl filled up before with pure 1.5 liters engine oil upto the relative margin and fix the body to the air cleaner cover. Lubricate the contact surface if the cover and the sealing rubber ring with grease, situated on the cartridge neck.
(v) Lubricate the water pump by turning the greasing nipple through one turn and check fan belt sag which is to be maximum of 15 mm.
(vi) Oil the clutch-disengaging sleeve.
(vii) Lubricate front axle bracket, wheel extensions, shaft to the clutch disengagement, pedals right hand strut, stirrup of the draft control, strut tension nuts and collar with the steering wheel small control lever by means of greasing nipple press.
(viii) Inspect the electrolyte level in the storage battery, which should reach 15 mm above, the upper border of plates. Clean corroded cable terminals.

(ix) Lubricate the Bowden cable at braked tractor by means of the hand brake with few drops of oil SAE 30.

(c) After every 1000 litres fuel consumption or after each 200 engine hours. All operation mentioned in para 2 (a) (i) to (xii) and 2 (b) (i) to (ix) above to be carried out at first.

(i) Change oil in the crankcase oil sump, injection pump body and the governor.
(ii) Clean duly the centrifugal oil cleaner.
(iii) Replace the cartridge of the coarse fuel filter.
(iv) Check clearance between the clutch disengagement levers and the sleeve.
(v) Inspect and necessary clean and set up the injector. Inspect the oil level and replenish if necessary the steering box.

(d) After every 3000 litres of fuel consumption or after each 600 engine hours. All operation mentioned in Para 2 (a) (i) to (xii), (b) (i) to (ix) and (c) (i) to (v) above to be carried out at first.

(i) Replace the fine fuel filter cartridge.
(ii) Check valve clearance in a field wksp on the cold engine – both intake and exhaust valve of 0.25+0.05 mm.
(iii) Check the front wheel toe-in and the divergence as well as the play of the front wheel heads taper roller bearings, replenish the grease in the front wheel heads.
(iv) Check and adjust the hand brake if necessary.
(v) Flush the cooling system under the pressure of pure water in order to remove sediments.

(e) After every 6000 litres of fuel consumption or after each 1200 engine hours. All operation mentioned in Para 2 (a) (i) to (xii), (b) (i) to (ix),(c) (i) to (v) and(d) (i) to (v) above to be carried out at first.

(i) Change oil in the steering box
(ii) Change oil in the portals.
(iii) Change the suction strainer of the oil pump.
(iv) Have checked tightness of the injection pump elements in a Fd wksp.

(e) After every 12000 litres of fuel consumption or after each 1200 engine hours. All operation mentioned in Para 2 (a) (i) to (xii), (b) (i) to (ix),(c) (i) to (v) ,(d) (i) to (v) and,(e) (i) to (v) above to be carried out at first.

(i) Check or have repaired the steering wheel play according to the steering wheel dead point position.
(ii) Check the charging unit and the starter motor by Fd Wksp.
(iii) Clean and rinse the radiator with the sodium solution.
(iv) Turn the front wheel tyre casings with respect to one side wear of them.
(v) Have ground in engine valves by the Fd Wksp
(vi) Clean oil in the injection pump.

**LUBRICATION CHART FOR HMT 5911 TRACTOR**

| Lubrication | Maintenance | Capacity | Recommended Lubricants | | |
|---|---|---|---|---|---|
| | | | Indian Oil | Hindustan Petroleum | Bharat Petroleum |
| (1) | (2) | (3) | (4) | (5) | (6) |
| LUBRICATION CHART FOR HMT 5911 TRACTOR DURING RUNNING IN | | | | | |
| Engine | Flush after 50 hrs | 10 Lts | Servo Flush 10 | Flushing oil | Flushing oil |
| | Change after 50 hrs | 12 Lts | Servo super 30 (winter only) | Hylube HDx 30 (winter only) | Actuma T.oil 30 (winter only) |
| | | | Servo super 30 (summer only) | Hylube HDx 40 (summer only) | Actuma T.oil 40 (summer only) |
| FIP | Change after 30 hrs | 0.2 Lts | -do- | -do- | -do- |
| Gear box | Change after 200 hrs | 25 Lts | Servo gear 90 HP | HP gear oil EP 90 | Spirol 90 EP |
| Portals | Change | 3.8 Lts | -do- | -do- | -do- |

| | | | | | |
|---|---|---|---|---|---|
| | after 200 hrs | | | | |
| DAILY LUBRICATION AFTER EACH 8-10 OPERATING HOURS | | | | | |
| Engine | Inspection | 12 ltrs | Servo super 30 or Super 40 | Hylube HDx50 or HDx40 | Actuma T.oil 30 or T.oil 40 |
| Air cleaner | Normal dust | No change | Same as engine oil | Same as engine oil | Same as engine oil |
| | For heavy duty change after 15-20 hrs | 1.5 Lts | Same as engine oil | Same as engine oil | Same as engine oil |
| LUBRICATION AFTER EACH 70 OPERATING HOURS | | | | | |
| Air cleaner | Change | 1.5 Lts | Same as engine oil | Same as engine oil | Same as engine oil |
| Injection | Inspection | 0.2 Lts | -do- | do | -do- |
| Gear box | Inspection | *25 Lts | | | |
| Portal both | Inspection | 3.8 Lts | -do- | -do- | -do- |
| Water pump | To be turned by one thread | - | Servo grease MP | Multipurpose grease II | Univex A |
| Clutch disengaging | To be filled up | 0.06 Lts | Same as engine oil | Same as engine oil | Same as engine oil |
| Front axle pin | Grease thoroughly | 0.1 Kg | Servo grease MP | Multipurpose grease II | Univex A |
| King pins | -do- | 0.06 Kg | -do- | do | -do- |
| Joints of three points linkage | -do- | 0.05 kg | -do- | do | -do- |
| LUBRICATION AFTER 175 OPERATING HOURS | | | | | |
| Engine | Change | 12 Lts | Servo super 30 or super 40 | Hylube HDx30 or HDx40 | Actuma T.oil 30 or T.oil 40 |

**SPECIFICATION OF FARM TRACTOR HMT 5911 FITTED WITH TROLLEY 5 TON CAPACITIES: MANUFACTURED BY M/S HMT LTD**

ENGINE

| | |
|---|---|
| Model | Z 5901 |
| Type | Diesel with direct fuel Injection,4 stroke, in-line engine water cooled. |
| No of cylinder | 4 |
| Bore of cylinder | 100 mm |
| Stroke | 110 mm |
| Cylinder volume | 3465 $cm^3$ |
| Compression ratio | 17:1 |
| Type of cylinder liners | Wet separate for each cylinder |
| Valve arrangement | Overhead valve system |
| Fuel consumption | 195±5 DIN/2200 |
| Normal engine speed | 2200 RPM |
| Power output HP/RPM | 58-5% DIN/ |
| Output class | 55-60 HP |
| Injection timing | 24.5°-1-5° before TDC |
| Air cleaner | Two stage with oil filling (Oil bath) |
| Cooling | Water cooled with thermostatic control |
| Lubrication | Splash and positive drive gear pump, with centrifugal full flow oil filter |

| | |
|---|---|
| Capacity of cooling | 13 Litres |
| Capacity of fuel tank | 70 litres |

**FILL UP DATA**

| | |
|---|---|
| Engine oil sump | 12 litres |
| Fuel Injection pump | 0.2 litres |
| Gear box when working with hydraulic lift system: | |
| On flat ground | 25 litres |
| In hilly grounds | 32 litres |
| Portals | 3.8 litres (2x1.9 litres) |
| Steering box | 1.9 litres |
| Air cleaner | 1.5 litres |

**GEAR BOX**

| | |
|---|---|
| Number of gears | 10+2 |
| Speeds of the tractor with T6.9/14.28 tyres at rated engine rpm | |

**ROAD SPEEDS**

| | |
|---|---|
| 1st gear | 7.56 Km/hr |
| 2nd | 11.17 Km/hr |
| 3rd | 15.80 Km/hr |
| 4th | 19.65 Km/hr |
| 5th | 32.90 Km/hr |
| Reverse gear | 13.20 Km/hr |

**FIELD SPEEDS**

| | |
|---|---|
| 1st gear | 2.23 Km/hr |
| 2nd | 3.54 Km/hr |
| 3rd | 4.68 Km/hr |
| 4th | 5.80 Km/hr |
| 5th | 9.70 Km/hr |
| Reverse gear | 3.90 Km/hr |

| | |
|---|---|
| **CLUTCH** | Dry, double clutch plates for transfer travel, 2nd for PTO shaft. Actuation through a diaphragm plate spring ensuring longer clutch life at constant operating pressure. |
| **STEERING BRAKES** | Recalculating ball type. |
| Foot operated | Hydraulic, shoe type, two pedals with latch to brake the wheels simultaneously and independently |
| Emergency/parking | Band type mechanical control. |
| | |
| **PTO SHAFT** | |
| Standard revolution at engine RPM 2000 | 540 RPM. Clockwise, viewed facing driving end. |

**TRANFER GEAR BOX**

| | |
|---|---|
| 1st gear | 273.2 RPM |
| 2nd | 454.0 RPM |
| 3rd | 639.5 RPM |
| 4th | 797.2 RPM |
| 5th | 1331.6 RPM |
| Reverse gear | 534.0 RPM |

**HYDRAULIC POWER LIFT SYSTEM**

| | |
|---|---|
| Working pressure max | 150±10 kg/cm$^2$ |
| Output of hydraulic power lift pump | 20 litres at 540 RPM of PTO Shaft |
| Lifting capacity on ends of tie rods/800 length | 1700 Kg |

## ELETRICAL EQUIPMENT

| | |
|---|---|
| Storage battery | 2x12V |
| Dynamo | 12V/12 Amp |
| Voltage regulating relay | 12V/12 Amp |
| Starter | 12V/4 HP |

## TYRES

| | |
|---|---|
| Front | 6.5-20 |
| Rear | 16.9/14-28 |

## MAIN DIMENSION AND WEIGHTS

| | | |
|---|---|---|
| Overall length | 3655 mm | |
| Overall width at rear wheel track 1420 mm | 1850 mm | |
| Height upto upper rim of steering wheel | 1761 mm | |
| Max. height with upper exhaust | 2220 mm | |
| Height of swinging drawbar from ground | 460 mm | |
| Ground clearance | 470 mm | |
| Wheel base | 2250 mm | |
| Front wheel track adjustable | 1295-1390-1765 mm | |
| Rear wheel track adjustable | 1420,1480,1590,1650,1700,1760 mm | |
| Min. turning radius with braking one wheel | 3.4+0.25 m | |
| Ballast weights | | |
| Rear wheels (6 pcs) | 175 kgs (Standard) | Total 315 kgs |
| Rear wheels (4 pcs) | 140 kgs (Optional) | |
| Front axle (6 pcs below the pan) | 160 kgs (Optional) | Total 390 kgs |
| Front axle (10 pcs in front of the pan) | 230 kgs (Optional) | |
| Weight of water in rear tyres | 2x150 kgs | |
| Weight of tractor in standard design | 2550 kgs | |
| There from – Front axle load | 910 kgs | |
| - Rear axle load | 1640 kgs | |
| Weight of tractor when fully ballasted | 3325 kgs | |
| Water in tyres only 230 kgs.Front axle ballast wts. Not included | | |
| There from – Front axle load | 1020 kgs | |
| - Rear axle load | 2305 kgs | |
| Tractive force at suspension with additional ballast weight | 2600 kgs | |