

DIRECTOR GENERAL BORDER ROADS
GENERAL MAINTENANCE INSTRUCTION NO :236
ON
ESCORT HAMM VIBRATION TANDEM ROLLER

1. **INTRODUCTION**

1.1. Escort HAMM model HD-85 having dual drum vibration Tandem Rollers. The machine is intended exclusively for the customary use of compacting, load bearing, loose ground, road foundations, road covering or similar surface. The eqpt is fitted with 04 cylinders Kirloskar HA-494 diesel engine having 70 HP at 2500 rpm which provides 12 Volts, 155 AH battery for operating electrical system, hydrostatic power assisted steering, hydrostatic transmission, infinitely variable with single lever operation to drive both the drums, direct hydrostatic transmission, infinitely variable frequency adjustment for the vibration of drums and also provide service brake and emergency stop brake by means of hydrostatic transmission and spring-loaded disc brakes.

1.2. These instruction are issued as guide line for general and scheduled maintenance, lubrication and safety precautions to be taken when operating these road rollers. In case of doubt, please refer operation and maintenance manual issued along with the machine.

2. **ACTION**

2.1. **USER UNIT:** - To carry out maintenance schedule and oil change etc as per periodicity laid down by mobile maintenance team or as per team detailed by the Task Forces and also follow safety precautions for optional utilization.

2.2. **FIELD WORKSHOP (GREF)**

2.2.1. To carry out and monitor maintenance schedule and oil changes etc as per periodicity laid down by this instruction.

2.2.2. To advise user units in respect of any lapses noticed.

3. **DETAILS**

3.1. The details of maintenance, fuel, lubricants and safety precautions are as under:-

- | | | |
|--|---|----------|
| 3.1.1. General maintenance and safety precaution | - | Appx 'A' |
| 3.1.2. Fuels oils and lubricants | - | Appx 'B' |
| 3.1.3. Periodical maintenance | - | Appx 'C' |
| 3.1.4. Technical details | - | Appx 'D' |

4. Please acknowledge receipt.

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GENERAL MAINTENANCE AND SAFETY PRECAUTION

GENERAL

- 1.1. Careful maintenance of this machine ensures maximum reliability and prolongs the service life of important components. The work involved is small compared to the problems which may occur, if these instructions are not observed.
- 1.2. Clean the machine and engine thoroughly after completion of day work and before carry out any maintenance works.
- 1.3. Make sure that the machine is on a level ground and on a firm base, when the maintenance work is being carried out and it should be done with engine shut down.
- 1.4. De-pressurize hydraulic hoses before any repair work is being done/undertaken to avoid accidents.
- 1.5. Disconnect battery and cover it with insulating material or remove before performing work on electrical components of the machine.
- 1.6. The terms "R/L" are always referred to the direction of travel.

SAFETY PRECAUTION

GENERAL

- 1.1. Make sure that you are familiar with all the accessories of your machine.
- 1.2. Only operate the machine if you are completely familiar with the operating and control elements as well as the functioning of the machine.
- 1.3. Wear protective clothing such as safety helmets, safety shoes and gloves.
- 1.4. Familiarise yourself with the area where you will be working.
- 1.5. The vibration must not be operated in the directly vicinity of building. Prior to switching on the vibration, ensure that no pipes in the ground can be damaged or destroyed.
- 1.6. In emergency situation and when the machine is endangered, actuate the EMERGENCY STOP switch to bring the machine to an immediate standstill.
- 1.7. Note where the fire extinguishers and first aid box are located and how they are used.
- 1.8. Only use the roller for the purpose it is intended.
- 1.9. CAUTION: - Keep away from the machine's articulation area when the engine is running.

PRIOR TO START

- 2.1. Observe the operating instruction before starting the engine.
- 2.2. Check the machine for any obvious fault.
- 2.3. Do not operate the machine with defective instruments, warning lights or control elements.
- 2.4. All safety devices must be in secure position.
- 2.5. Do not carry with you any movable objects or secure them to the machine.
- 2.6. Keep oily and inflammable material away from the machine.
- 2.7. Before entering the operator's cabin, check if persons or obstacles are beside or beneath the machine.
- 2.8. Be careful when entering the operator's cabin, use stairs and handles.
- 2.9. Adjust your seat before starting the engine.

STARTING

- 3.1. When starting, all operating levers must be in "neutral position".
- 3.2. Only start the engine from the operator's seat.
- 3.3. Check the indicating instruments after start to assure that all functions are in order.
- 3.4. Do not leave the machine unobserved when the engine is in running condition.
- 3.5. When starting with the help of another battery, connect positive point to positive and negative point to negative. Always connect the earth wire (negative) last and disconnect it first.
- 3.6. CAUTION: - Exhaust gases are toxic; always ensure an adequate supply of fresh air when starting the engine in indoors.

OPERATION

- 4.1. Before starting the machine for work, check all controls, lighting and horn for proper working.
- 4.2. Match the speed of the engine to the operating conditions.
- 4.3. Keep away from edges and slopes
- 4.4. Always switch on the lights when visibility is poor and in the dark.
- 4.5. Always maintain an adequate distance to building pit edges and embankments.

- 4.6. The vibration must not be operated in the directly vicinity of buildings (danger of collapse). Prior to switching on the vibration, ensure that no pipes in the ground (gas, water, sewage, electricity) can be damaged or destroyed.
- 4.7. The machine must be inspected for externally visible damage and defects at least once per shift.
- 4.8. During use, watch control and display devices on the instrument panel at regular intervals.
- 4.9. In the event of functional disturbances, the machine must be immediately shut down and secured, rectify faults without delay.
- 4.10. Always drive with due care on slopes and always directly up or down slope (never at an angle). Always shift to the lower travel speed range when approaching the slope.
- 4.11. Change the direction of travel by bringing the machine to rest.
- 4.12. When driving the machine in reverse direction, check there is no person or obstacle in the way.
- 4.13. Do not try to climb into the machine when it is moving.
- 4.14. Do not use then machine to transport persons.
- 4.15. Watch out for unusual noises or smoke when operating the machine.
- 4.16. Do not switch on the vibration, when the machine is on highly compacted material such as asphalt or concrete.

PARTING

- 5.1 Before leaving the machine, shift the control lever to “Neutral” apply the parking brake and switch off the engine, using the main battery switch.
- 5.2. If possible park the machine on a level and firm ground.
- 5.3. If you have to park the machine on a gradient, position your machine at a right angle to the slope and put wedges under the drums or wheels.
- 5.4. Never jump from the machine (danger of injury), use the steps and handles.

MAINTENANCE

- 6.1 Make sure that the machine is on flat, load-bearing surface when carrying out repair and maintenance work.
- 6.2. When working on the machine secure the articulated joint with the brace.
- 6.3. Make sure that maintenance work may only be carried out by skilled personnel
- 6.4. Attach a warning sign to the steering wheel if the machine is defective.

- 6.5. Before starting work, check that all drums or wheels are locked in position and that the battery is disconnected.
- 6.6. During maintenance work, always firmly tighten loosened screw connection
- 6.7. Check connections and fittings for leaks once all works have been completed.
- 6.8. Wipe away any fuel or oil which has been spilled on the machine.
- 6.9. Do not smoke when filling the tanks or checking the level of acid in the battery.
- 6.10. Never check the level of acid of the battery, or the fuel with a naked flame.
- 6.11. Be careful with cleaning agents, gasoline or other easily inflammable substances must never be used for cleaning purpose.
- 6.12. There is a danger of scalding if the engine oil or hydraulic oil is drained at operating temperature.

Appx 'B' to GMI No. 236

Fuels

7.1. Only use commercially available brand diesel fuel with sulphur content less than 0.5 %. With higher sulphur content, the engine oil must be changed more frequently. At low temperatures, only ever use winter grade diesel fuel. The machine should never be allowed to run out of fuel, otherwise the filter and injection lines will have to be bled.

7.2. The following fuel specifications are permitted: -

- 7.2.1. (a) Din 51601
- (b) BS 2869: A1 and A2 (With A2, note the sulphur content)
- (c) ASTM D 975-81: 1-D and 2-D
- (d) W-F 800 C: DF-A, DF-1 and 2.

7.3. At low temperatures, the flow and filtration capacity of the diesel fuel is inadequate (crystallized paraffin). For this reason, during the winter months, diesel fuels are available with improved low temperature characteristics. At the onset of winter, ensure that refill with winter diesel fuel.

Engine oil

8.1. Use only winter-grade engine oil at low temperatures

Hydraulic Oil

8.1. Only use ELFONA-68 (make IOC) or Shell Tellus-68 (make Shell) hydraulic oils of specification DIN-515224/2 for the hydraulic system.

Gear/Vibrator Oil

9.1. Only use multi-purpose gear/vibrator oils of class API, GL-5 MIL for the vibrators, drum and differential drives, ie. Servo gear super 85W-90.

9.2. This is top performance class hypoid oil for vibrator, drum and differential drives subject to heavy loads.

9.3. The additives in this oil ensure wear-resistant lubrication under all application conditions.

Lubricating grease

10.1. Use of EP high pressure grease, lithium soaped (penetration 2) for lubrication purposes ie. Servo grease MP.

Notes on the Fuel/Hydraulic system

11.1. The service life of the diesel engine and the hydraulic system/pump/units are governed primarily by the cleanliness of the fuel/hydraulic oil.

11.2. Keep the fuel/hydraulic oil free of contamination and water, otherwise the engine's injection elements/hydraulic pump, valves will be damaged.

LUBRICANTS AND CAPACITIES

Assembly	Quantity	Specifications	IOC	Castrol	Shell	Kirloskar
Engine oil	(10 + 1) Ltrs	API CD/SE	15W40 or 20W40	15W40 or 20W40	15W40 or 20W40	K-Oil
Hyd. Oil	90 Ltrs	DIN 515224/2	ELFONA 68	-	Sehll Tellus 68	-
Vibrator Oil	2 x 10 L	API, GL 5 MIL L2105D	85W90	85W90	85W90	85W90
Grease	-	Lithium Soap Base with AP Additive	EP-2	EP-2	EP-2	EP-2

PERIODICITY OF OIL/FILTER CHANGES

S/No	Description	50 Hrs	250 Hrs	500 Hrs	1000 Hrs	2000 Hrs
1st Change						
1.1.	Engine oil and filter	Change				
1.2.	Gear oil change(Torque Hub)		Change			
1.3.	Hydraulic filter		Change			
1.4.	Gear Oil (Drum & Differential)			Change		
1.5.	Hydraulic oil				Change	
Regular change intervals						
1.1.	Fuel filter		Change			
1.2.	Engine oil and filter		Change			
1.3.	Hydraulic filter				Change	
1.4.	Gear oil				Change	
1.5.	Hydraulic oil					Change
1.6.	Air filter inner			Change	Change	
1.7.	Air filter outer	Clean		Change	Change	
1.8.	Air Breather			Change		
1.9.	Drum Breather	Clean		Change	Change	
1.10.	Hydraulic strainer				Change	

PERIODICAL MAINTENANCE

MAINTENANCE TASK (EVERY 08-10 OPERATING HOURS/DAILY)

- 1.1. Check engine oil level and top up if required.
- 1.2. The service life of the filter cartridge in the air filter depends on correct removal of dust by discharge valve. If discharge valve is jammed or clogged, the cartridge gets clogged quickly due to excessive dust, squeeze the dust discharge valve, clean discharge slots.
- 1.3. Removed filter bowl with strainer and clean.
- 1.4. Check hydraulic oil level.
- 1.5. Fill diesel tank after day's work to avoid condensation of water.
- 1.6. Dirt tends to accumulate on the engine cooling fins, where surface gets contaminated with oil or fuel. If contamination is oily, spray the engine with diesel oil or cold cleaning agent and clean it, with a water jet after allowing an adequate soaking time.
- 1.7. Check air intake system for leakage.
- 1.8. Check visual inspection for damage.
- 1.9. Check hydraulic flexible hoses regularly and replace them in case of damage.
- 1.10. Check lighting system.
- 1.11. Check electrically operated, monitoring equipment/gauge/warning lamp for correct functioning, which are fitted on the panel. Example: engine temperature, water temperature, hydraulic oil temperature gauges and other warning lamps.

MAINTENANCE TASK (EVERY 50 HOURS/WEEKLY)

- 2.1. Carry out 10 operating hour's maintenance tasks.
- 2.2. Air filter outer and Drum breather to be cleaned and fitted.
- 2.3. All grease nipples to be cleaned and lubricate with grease
- 2.4. Clean out side of battery and check acid level, if required top up with distilled water only.
- 2.5. Apply mineral jelly to the cable terminal to prevent corrosion. Do not apply grease. Clean vent holes of the vent plugs of battery for free ventilation.
- 2.5. Battery mounting to be checked for rigidity.
- 2.6. Check oil level in transfer case.

MAINTENANCE TASK (EVERY 100 OPERATING HOURS)

- 3.1. Carry out 10 and 50 operating hour's maintenance tasks.
- 3.2. Clean cooling system.
- 3.3. In case of 'Air Lock' bleed the fuel system to remove air.
- 3.4. Clean the water sprinkler pump filters both front, rear and refits it.

MAINTENANCE TASK (EVERY 250 OPERATING HOURS)

- 4.1. Carry out 10, 50 and 100 operating hours maintenance task.
- 4.2. V-Belt tension to be maintained between 10 mm to 15 mm.
- 4.3. Change engine oil and replace oil filter element.
- 4.4. Replace fuel filter element.
- 4.5. Change gear oil in respect of Torque Hub.
- 4.6. Replace Hydraulic oil filter element.
- 4.7. Clean cooling fins of the engine and hydraulic oil coolers.
- 4.8. Blow cooling air ducts with compressed air.
- 4.9. If contamination is oily, spray the engine with diesel oil or cold cleaning agent and clean with a water jet after an adequate soaking time.
- 4.10. Check oil level of vibration bearing shaft (Front) and the exciter shaft (Rear) of drums and in case oil to be drained, oil drain plug to be kept at the lowest point, while draining and to keep it at the highest point while filling the chamber.
- 4.11. Clean drum breather hole in the cover under the vibration motor.

MAINTENANCE TASK (EVERY 500 OPERATING HOURS)

- 5.1. Carry out 10, 50, 100 and 250 operating hours' maintenance tasks.
- 5.2. Clean fuel tank.
- 5.3. Check screw connections of air intake pipe, exhaust pipe, oil pan, engine mounting, air cleaner and elastic suspensions.
- 5.4. Check electric exciter circuit.
- 5.5. Check water sprinkling is done, by operating switch in the instrument panel. Water pump of water sprinkler is operated by solenoid valve operated electrically.

- 5.6. Change gear oil in respect of drum and differential.
- 5.7. Replace Air filter elements inner and outer.
- 5.8. Replace Air breather and drum breather.

MAINTENANCE TASK (EVERY 1000 OPERATING HOURS)

- 6.1. Carry out 10, 50, 100, 250 and 500 operating hour's maintenance tasks.
- 6.2. Clean fuel pump strainer.
- 6.3. Change hydraulic oil.
- 6.4. Change oil in transfer case.
- 6.5. Check valve clearance: The clearance should be as under :-

Exhaust (Cold)	-	0.15 mm
Intake (Cold)	-	0.15 mm

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TECHNICAL DETAILS

1.1. Technical data

(a) Weights:-

Operating weight Total	-	9300 Kgs
Axle load front	-	4650 Kgs
Axle load rear	-	4650 Kgs
Static linear load, Front	-	27.6 Kg/Cm
Static linear load, Rear	-	27.6 Kg/Cm
Vibration: Direct hydrostatic Vibrator drive to both drum.	-	Front/Rear
Frequency	-	0-30/42 Hz
Nominal amplitude	-	1.27/0.75 mm
Total compaction force	-	225/245 kN
Working width	-	1,680 mm
Turning circle radius (external/internal)	-	6,200/4,550 mm
Drum diameter	-	1,200 mm

(b) Capacities: -

Fuel tank	-	155 Ltrs
Engine (for oil Change)	-	10 Ltrs
Oil tank hydraulic system	-	70 Ltrs
Drum (each)	-	10 Ltrs
Water tank sprinkling for front and rear drum	-	700 Ltrs

(c) Engine:-

KOEL Diesel engine, 04 stroke, 04 cylinder, air cooled	-	Type HA 494
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- | | | |
|--|---|-------------|
| Rating according to ISO 9249 at 2,500 rpm | - | 51 KW/70 HP |
| Rating according to SAE J1349 at 2,800 rpm | - | 62 KW/84 HP |
- (d) Electrical stem: -
- | | | |
|-------------------|---|---------------------|
| Operating voltage | - | 12 Volts |
| Battery | - | 01 No. 12 V, 155 Ah |
- (e) Transmission: -
- | | | |
|---|---|------------------------------|
| Hydrostatic transmission, Infinitely variable, single lever operation | - | all-wheel drive to both drum |
| Speed | - | 0-9.5 Km/Hr |
| Climbing ability with Vibration up to | - | 30 % |
| Climbing ability without Vibration up to | - | 45 % |
- (f) Vibration: -
- Direct hydrostatic transmission, infinitely variable frequency adjustment.
- | | |
|-------------------------------|--------------------|
| Stage 1: Frequency/Amplitude- | Max. 30 Hz/1.27 mm |
| Stage 2: Frequency/Amplitude- | Max. 42 Hz/0.75 mm |
- (g) Steering: -
- Hydrostatic power-assisted steering using an articulated reciprocating compensation 10o upwards and downwards.
- (h) Service brake:-
- During use, the machine is braked by the hydrostatic transmission.
Wear free braking
- (j) Emergency stop brake: -
- By mean of hydrostatic transmission and spring-loaded disc brakes
- (k) Water sprinkling: -
- Pressure sprinkling foot actuation and automatic pause
- (l) Special equipment: -
- On request, the machine can be equipped with extensive special accessories. Subject to design, weight and dimensional modifications.

1.2 Dimension sheet

(Photo copy attd)