

DIRECTOR GENERAL BORDER ROADS

GENERAL MAINTENANCE INSTRUCTION NO - 221  
OF  
HYDRAULIC MOBILE CRANE F-15  
ESCORT CONSTRUCTION EQUIPMENT

**1. INTRODUCTION:** - (I) Escort make F-15, self propelled, wheeled articulation type, 4X4 version crane having lifting capacity of 14 TON at a radius of 1.5 mtr take from centre of the front tyre (with 75 % load rating) without using outriggers, having hydraulic power system with forward & reverse speed gear box sufficient to providing 40 km per hrs speed on high ways. The crane shall be powered by KOEL make, 4R 1040 T model, Turbo charged, water cooled diesel engine capable of developing 10 BHP at 2500 RPM. The crane shall be complete in all respect including full instrument panel, air conditioned operators cabin for maximum visibility, fly wheel jib of 2.6 mtr length, emergency winding off, and full lifting system.

**2. AIM:** - To lay down the details of periodical maintenance, lubrication and hints for safe operation and towing of hydraulic mobile crane F-15 heavy duty vehicles to achieve enhance life.

**3. ACTION BY:** -

**(I) USER UNIT :** - To carry out regular/ periodical maintenance as laid down in this instruction and enter the tasks in log books.

**(II) FIELD WORKSHOPS :** - **(a)** To check the maintenance and lubrication actually carried out as per log book record during the inspection and repairs of the equipment.

**(b)** Advise user unit in respect of any discrepancy/short coming noticed.

**4. DETAILS:** -

(a) Technical specification data - Appx 'A'

(b) Periodical service schedule and maintenance - Appx 'B'

(c) Recommended lubrication chart - Appx 'C'

(d) Hints for safe operation and towing - Appx 'D'

5. Please ack receipt

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Distribution

Normal

**TECHNICAL SPECIFICATION DATA OF ENGINE /MACHINE****ENGINE: -**

Make	: Kirloskar oil engine
Model	: 4R 1040 T
Fuel	: High speed diesel
Rated engine BHP	: 110 BHP at 2500 RPM
No of cylinders	: 4
Bore and stroke	: 105/120
Piston displacement	: 4160 CC
Compression ratio	: 17:1
Firing order	: 1-3-4-2
Fuel injection pump	: MICO-BOSCH INLINE
Atomiser pressure	: 280+8 Kg/cm <sup>2</sup>
Coolent	: Water
Air cleaner	: Dry type

**AIR COMPRESSOR: -** : Single cylinder

Type	: Reciprocating posting dog drive from engine
Make	: Sun dram Clayton

**ELECTRICAL SYSTEM: -**

Type	: 24 V, Dual battery, - ve earth
Battery	: Exide EF 70 Z 0- 2 Nos
Capacity (AH)	: 75 AH

**CLUTCH: -**

Type	: Single plate, heavy duty friction type
Clutch plate dia	: 14"

**HYDRAULIC SYSTEM: -**

Pump	: Vane pump directly driven from P.T.O
Main lift cylinders	: Two double acting jacks
Steering cylinders	: Two double acting jacks
Telescopic cylinder	: One double acting jack
Hydraulic filters	: Tank
Hoist mechanism main winch	: 7. 5 T Capacity, Four falls hydraulic winch
Control valve	: Three spools, with relief valve set at 210 bar
Steering working pressure	: 175 Bar

**CAPACITIES: -**

Fuel tank	: 230 Ltrs
Hyd oil tank	: 200 Ltrs
Engine oil sump	: 14 Ltrs
Gear box ZF	: 6.5 Ltrs
Auxiliary gear box	: 205 Ltrs
Front axle	: 16.5 Ltrs
Rear axle	: 16.5 Ltrs
Air reservoir main	: 15 Ltrs
Air reservoir service brake front	: 15 Ltrs
Air reservoir service brake rear	: 15 Ltrs
Fuel injection pump	: 250 ml
Clutch master cylinder	: 475 ml
Displacement	: 4160
Direction of rotation	: ACWR
Aspiration	: Turbocharged
Starting arrangement	: Electric start
Governor type	: Mechanical
Class of governing (ISO3046 pt 4)	: Class M2
Lub oil consumption	: <0.3% of fuel consumption
Specific fuel consumption	: 155 gm/bhp-hr
Lub oil sump capacity	: 11.5 Ltrs
Rated out put as per SAEJ 1995	: 105.0 HP
Maximum torque	: 375 N-M @ 1500 RPM
Rated speed	: 2200 RPM
Rating standard	: SAE J 1995
B.M.E.P.at rated out put Prime continous rating	: 1.30 Kg/cm <sup>2</sup>
Dry engine weight with radiator	: 521 Kgs
Without bell housing	
With fly wheel and SAE 3 Fly wheel housing & radiator	: 550 Kgs
Noise level (dba) - 2 M	: 97 dba
-7 M	: 86 dba

**PERIODICAL SERVICE SCHEDULE AND MAINTENANCE CHART**

**1. PERIODICAL MAINTENANCE ON ENGINE**

**DAILY ( EVERY 10 HOURS OPERATION)**

Check radiator water level  
Check engine oil level  
Check hydraulic oil level  
Check fuel level  
Check air cleaner chock indicator  
Clean pre-air cleaner

**WEEKLY ( EVERY 50 HOURS OPERATION)**

Change engine oil & filter (New engine)  
Clean air filter element  
Grease all points  
Check oil level of front & rear axle  
Check battery electrolyte level  
Drain air pressure from the air reservoirs  
Check tyre pressure  
Check oil level of winch (lifting & dragging)  
Check for leakage of fuel/engine oil hydraulic oil and rectify  
Change hydraulic return filter (New machine)

**MONTHLY (EVERY 250 HOURS OPERATION)**

Change engine oil & filter  
Check and adjust brakes  
Check wheel nuts tightness  
Check axle/engine mounting bolt &nuts tightness.  
Check clutch pedal free play and adjust  
Clean all air breathers

**QUARTERLY (EVERY 500 HOURS OPERATION)**

Change hydraulic return filter  
Change fuel filter primary  
Check front wheel bearings

**YEARLY (EVERY 1000 HOURS OPERATION)**

Change Hyd oil  
Change oil of main& auxiliary gear box  
Change oil of front and rear axle  
Change fuel filter secondary  
Change oil of both winch assemblies

## **MAINTENANCE SCHEDULE:-**

### **DAILY:-**

- (a) Check brake pedal clearance over brake valve.
- (b) Check pneumatic hand brake operation.
- (c) Check air leakage.
- (d) Check brakes.
- (e) Check compressed air build up on air gauge (8.25 Kg/cm)
- (f) Check for correct pressure setting (8.25 Kg/cm)
- (g) Check drain condensate.
- (h) Wheel nut tightness for specified torque.
- (j) Check tyre pressure and inflate as recommended.
- (k) Check all bulbs, horn, wiper, switch & gauges.

### **WEEKLY:-**

- (a) Lubricate centre joint bearing.
- (b) Lubricate propeller shaft UJ cross.
- (c) Lubricate propeller shaft splines.
- (d) Check and tighten propeller shaft bolts.
- (e) Check oil level and top up.
- (f) Lubricate the slack adjuster (2-Front,2-Rear)
- (g) Check brake lining for wear replace linings if necessary.
- (h) Lubricate shackle pins.
- (j) Check the proper function of alternator.
- (k) Check all the electric connection.

### **PERIODICAL MAINTENANCE**

- (a) Lubricate propeller shaft UJ cross.
- (b) Lubricate centre joint bearing.
- (c) Lubricate propeller shaft splines.
- (d) Check and tighten propeller shaft bolts.
- (e) Check oil level and top up.
- (f) Change oil when hot, refill up to correct level.
- (g) Check foot brake operation, remove stopper bolt to ensure full line pressure at the brake chamber.
- (h) Lubricate the slack adjuster (2-Front,2-Rear)
- (j) Check 'I' Bolts /'U' Bolts tightens, spring clip fitments, helper spring brackets and spring shackle pin bolts.
- (k) Shock absorber rubber pads/ mounting bracket bolts and nuts.
- (l) Check the proper function of alternator.
- (l) Check all the electric connection.

**LUBRICANT CHART**

Lubricant manufacturer	Engine air cleaner & FIP		Gear box	Hydraulic reservoir	Grease point	Axle
	Temp 0-27°	Temp above 0-27°				
Indian oil	Servo pride20 20w-40	Servo pride30 20w-40	Servo gear HP -80W	Servo system 68	Servo gear MP	Servo gear super-90
Bharat petroleum(H.P.C)	ACTUMA ULTRA OIL -30	ACTUMA ULTRA OIL -30	Bharat spirol 80W-EP	Bharat hydrol -68	UNIVEX A	Bharat spirol HD-90
Hindustan petroleum (H.P.C)	HYLUB MILCY-20	HYLUB MILCY-30	HP GEAR OIL EP-80	ENKLO 68	HP Multi purpose	HP gear oilXP-90
Castrol	Castrol CRD 20W-40	Castrol CRD 20W-40	Castrol hypoy 80-EP light	Castrol hypsil AWS-68	Ball BRG EPL-2	HYPOY B-90
TIDE water	VEEDOL HDE-30 20W-20	VEEDOL HDE-30 20W-40	MG-80	VEEDOL ATLINE 68	VEEDOL ALL PURPOSE GREASE	GULF MP GEAR OIL -90
GULF	GULF LUBE Motor oil XHD-20	GULF LUBE Motor oil XHD-30	GULF EP GEAR OIL-80	GULF Harmony-68	GULF Grease multi purpose	TG-90

## **HINTS FOR SAFE OPERATION AND TOWING**

Maintain original suspension and do not add additional leaves and do not recamber spring as recambering result in frequent spring failures.

Do not operate starter for more than 15 seconds at the time and wait for 30 to 60 seconds before trying again.

Do not cold water to a hot engine as this can lead to crack in crank case and other associated parts.

Fuel pump setting should not be tampered with

Mixing of kerosene with diesel is prohibited. This reduces engine and fuel pump life.

Do not coast the vehicle ie drive with engine switched off. This will affect gear box life.

Do not run the vehicle with leakage of air, fuel oil and water.

Do not ride the clutch pedal a it leads to premature wear of clutch plate and other associated components.

Do not move the vehicle before the low pressure warning buzzer stops beeping (set to stop beeping between 6.0 and 6.4 kg/cm), otherwise premature wear of brake linings would take place due to partial brake winding.

Do not attempt to dismantle spring brake actuator without proper special tools.

Do not tamper the air pressure setting in the unloader valve (8.0 Kg/cm). Other wise this can result in inefficient Brake/excess tyre wear.

Do not run vehicle without a battery in its electrical circuit at the life of alternator would be reduced.

Fill up diesel tank at the end of each working day to reduce water condensation in the tank.

Park vehicle on a level and hard ground when lifting (jacking) the vehicle. Apply hand brake as well as chock the wheels.

Drain air tank once in a week to drain water and oil sediment from the system.

Check tyre pressure and ensure it is as per chart (inside) before starting the vehicle.

Disconnect alternator/battery electrical connection while carrying out welding work on the vehicle.

Maintain electrolyte level in the battery using distilled water.