

**DIRECTORATE GENERAL BORDER ROADS**  
**GENERAL MAINTENANCE INSTRUCTION NO-215 ON**  
**MARSHALL PORTABLE STONE CRUSHER 6/10 TPH**

**INTRODUCTION**

1. Marshall portable Stone Crusher is a 16 x10 Jaw Crusher single Toggle Machine used for crushing lime stone, granite and coal etc. This machine also can be converted easily to a 16x6 granulator.
2. It is powered with kirloshar RB-44, 4 Cylinder, 4 stroke water Cooled Diesel Engine.

**AIM**

3. To lay down the details of periodical maintenance and lubrication and hints for safe operation and towing of Marshall Portable stone Crusher to achieve enhance life.

**ACTION BY**

(a) **USER UNIT**

- (i) To carry out regular/periodical maintenance as laid down in this instruction and enter the tasks in log book.

(b) **FIELD WORKSHOPS**

- (I) To check the maintenance and lubrication actually carried out as per log book record during the inspection and repairs of the equipment.
- (II) Advise user units in respect of any discrepancy/short coming noticed.

**DETAILS**

- |   |   |          |
|---|---|----------|
| (a) Technical Specification Data                                | - | Appx 'A' |
| (b) Periodical Service Schedule & recommended lubrication chart | - | Appx 'B' |
| © Hints for safe operation and towing                           | - | Appx 'C' |

1. Please ack receipt.

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TECHNICAL SPECIFICATION DATA OF ENGINE/ MACHINEMODEL

<u>ENGINE</u>	:	Kirloskar RB-44 Diesel Engine
On of Cylinders (Vertical in line)	:	4
Working Cycle	:	4 Stroke Diesel
Cooling System	:	Water cooled
Fan belt Tension	:	8 to 10 mm
Bore x Stroke	:	110 x 116 mm
Cubic Capacity	:	4410 cc
Firing Order (From F.W.end)	:	1-3-4-2
Direction of Rotation looking at F.W.end	:	Anti clockwise
Compression Ratio	:	17:1
B.M.E.P at 1500 rpm	:	6.5 Kg/cm <sup>2</sup>
Torque at 1500 rpm	:	24.10 Kg/ cm <sup>2</sup>
Fuel injection pressure	:	200 Kg/ cm <sup>2</sup>
Specification fuel consumption at Full load and 1500 rpm +5% allowance	:	230 Kg/Kwh
Fuel Injection timing (By Spill cot off)	:	34 ° ± 1°
Lubrication System	:	Force feed gear pump
Lubrication Oil Pressure	:	In idle run, min- 0.5 Kg/ cm <sup>2</sup> In normal working ( engine warm) Min-1.8 Kg/ cm <sup>2</sup>
Valve Clearance (in cold)	:	Inlet 0.25 mm Exhaust 0.3 mm
Starting	:	Electrical
Max Operating Speed	:	2000 rpm
Min Operating Speed	:	1200 rpm
Idling Speed	:	550-600 rpm

## CRUSHER

Model	:	1610 Marshall major crusher
Size of machine	:	400 mm x 250 mm
Feed Size	:	100 mm min-225 mm max
Minimum jaw setting	:	25 mm
Screen size	:	3048 mm (length) x 688 mm dia
Punching (std) (on screen) dia.	:	22 mm dia. 45 mm dia. 55 mm
Power consumption	:	60 HP (44.20 KW)

## APPROX CAPACITY

Jaw setting mm	:	20 mm 25 mm 38 mm 50 mm 63 (Granulator)
Out put /Hour 28	:	12-14 12-14 16-18 20-22 25-
Shipping dimension (appx)	:	7440 mm x1980 mmx3000 mm
Weight	:	7000 Kgs (appx)
Speed to be towed	:	10 kmph 9max) on plain roads.
Type of wheels	:	Pneumatic

**PERIODICAL SERVICE SCHEDULE AND RECOMMENDED LUBRICATION CHART**

1. PERIODICAL MAINTANENCE ON ENGINE

DAILY

(a) Check engine oil level (This check should be made with the engine in horizontal position). If the level only reaches to the lower mark of the dipstick, the oil should be topped up with out delay.

(b) Top up water in the radiator.

(c) Fill up the fuel tank at the end of each working day. Never wait until the tank is empty. This would necessitate rebuilding or the entire fuel system.

(d) Clean the engine at the day's work.

2. AFETR EVERY 50 HOURS (UNDER VERY DUSTY CONDITIONS)

(a) Check and clean the oil bath type air cleaner. Dismantle air cleaner and pour the dirty oil ( In case of normal working condition, this is to be followed after every 200 Hrs.)

(b) Clean the dismantled components with the help of Diesel fuel. Then filled up the bowl with fresh engine oil up to the oil level mark and the unit then reassembled with element in position.

(c) It is also necessary to check the unions and connection of the air intake manifold regularly.

3. AFTER EVERY 200 HOURS

(a) Clean the lubrication oil filter bowl and filter discs with the help of Diesel fuel.

(b) Greased the volute body of water circuiting pump with the help of grease gun.

(c) Drain the fuel tank and remove the sediments which accumulate at the bottom.

(d) Also check and clean the breather hole of the tank if found blocked.

(e) Drain the fuel filter bowls to remove sediments and water which accumulate at the bottom of bowls.

(f) Clean the filter sleeve which has been fitted on the suction side of feed pump.

(g) Check electrolyte level in each cell of battery with the help of electrolyte level tester/wooden stick. In case of wood stick the level should wet the stick over a length of about 10 to 15 mm (0.4 inch to 0.6 inch). If the level found low then top up with distilled water only.

(h) Check the cable connections at the starter, battery and dynamo if found loose, tighten it properly. Loose connections lead improper contact and damage to the terminals.

(J) Check the belt tension. It should be 8 to 10 mm. If found loose or more than adjust tension.

AFTER EVERY 400 HOURS

- (a) Carry out oil change when the engine is hot, flash out all old oil and fill in fresh oil in the sump up to top dipstick mark.
- (b) Check oil level in fuel injection pump and Governor. If required, top up with engine oil through breather hole at the top of Governor housing.
- (c) If the engine is operating under very dirty/ dusty condition, wash the air breather of the pump thoroughly in petrol and blow dry with compressed air.
- (d) It Spin-on type lub oil filter on the engine. Change the filter.
- (e) Drain the water from radiator/heat exchanger and jacket of the cylinder block. Clean it with fresh water adding desoling compounds.
- (f) Knock out shoot from exhaust silencer.
- (g) Check and tighten up if necessary, the following :-
  - (i) Fuel connection.
  - (ii) Oil Sump bolts.
  - (i) All external nuts and bolts.
  - (ii) Engine and radiator counting
  - (iii) Radiator hose connections.

5. AFTER EVERY 500 HOURS

- (a) Clean the pre-filter bowls and replace insert of fuel filter
- (b) Check the condition of sealing of pre-filter and if required change it.

NOTE: IMPROTANT

Do not clean filter inserts always destroy the insert before throwing it away.

6. AFTER EVERY 750 HOURS

- (a) Change the Micro filter insert of fuel filter.

7. AFTER EVERY 800 HOURS

- (a) Check and adjust valve tappet clearance.
- (b) Check the injector nozzle spray. If required, cleaned and replace sealing washer and refit the nozzle, connect the high pressure pipe.
- (c) Check the brushes and commutator of starting motor and dynamo Inject few drop of SAE 30 oil into the hole at the center of commutator bracket of dynamo. Clean the contact points of regulator.

8. AFTER EVERY 1200HOURS/SIX MONTHS

- (a) Clean the fuel tank thoroughly with diesel. Do not use water for cleaning, it will lead to rusting and scale formatting.

9. AFTER EVERY 2500 HOURS

- (a) Replace the oil in the fuel injection pump or when the fuel injection pump is removed for some attention. SAE30 oil should be used for refill.

10. TOP OVERHAUL AND MAJOR PERIODS

- (a) After about 3000 working hours engine will need top (min overhaul and after about 9000 working hours engine will need major overhaul. This period are based provided the engine properly maintained as per this GMI

11. LUBRICATION OF BASIC MACHINE

- (a) Lubrication on basic machine should be carried out as follows :-

JAW STOCK BEARING

- (l) Jaw stocks Stauffer are provided for lubricating Jaw stock bearing - Servo Gem EP-2 of IOC Ltd or equivalent.

**RECOMMENDED LUBRICANT FOR RB 44 FITTED WITH THIS MACHINE**

Maintenance of Job	Kind of Lub	Ambient temperature	Viscosity No.	IOC Grade	Periodicity	Remarks	
Assy Kiloskar	Engine Oil	<u>MULTI GRADE OIL</u>					
		-20° C to + 20° C	SAE 10W30			Ist change 50 working hrs Thereafter Every 400 hrs	
		-10° C to +40° C	SAE 15W40	Servo Premium XHP 15W40 or Servo pride Super MG14W40			
		-5° C to 45° C	SAE 20W40	Servo Premium 20W40 or Servo Pride 20W40			
<u>MONO GRADE OIL</u>							
		- 15 ° C TO + 5° C	SAE 10 W	Servo Ultra 10 W			
		- 5 ° C to +5° C	SAE 20	Servo Ultra 20 W			
		+ 5 ° C to 25° C	SAE 30	Servo Ultra 30 or Servo Pride 30			
		Above 25 ° C	SAE 40	Servo Ultra 40 or Servo Pride 40			

### LUBRICATION OF EQUIPMENT

- |     |   |   |  |
|-----|---|---|--|
| (a) | Lubricate Plumper blocks on the discharge chute and tail end Bracket of the rotary screen, Bevel wheel at the tail end of The screen shaft and bevel pinion teeth at every 8 working hours. | - | Servo Gem EP-2 or IOC Ltd or equivalent. |
| (b) | Lubricate turntable mounting pin & Top plate and tow hook mounting at every 500 working hours.  | - | -do-                                     |
| ©   | Lubricate wheel hub bearing of front axle and rear axle at every 1000 working hours.  | - | -do-                                     |

### IMPORTANT POINTS

- (a) In order to ensure long trouble free service it is most important that the crushing ratio of reduction should not exceed 6 to 1. Therefore, a 25 mm setting the feed size should not exceed 150 mm and at 38 mm feed size should be less than 225mm.
- (b) Blow off the dust each day and clean the Crusher thoroughly each week.
- (c) Before closing down the machine make sure that this crushing mouth is free from stone.
- (d) If the crusher is clean if all working parts are well lubricated, it will result in saving the power and prolonging the life of the crusher.
- (e) Before starting the crusher each day make sure that the mouth of crusher is clean and that all bolts and working parts are secured.
- (f) Never start or stop the crusher with stones between the jaws.



HINTS FOR SAFE OPERATION AND TOWING

- (a) Trolley should be properly supported on all four supports to avoid excessive vibration during working of the machine.
- (b) Before towing, ensure the following :-
  - (i) Removal of screen belt guard with belt and pinion assembly and refitment on to the top of the chassis.
  - (ii) Refitment of the Adaptor at the near and cross member of the chassis on to the top of the same.
  - (iii) Tail end bracket supporting the screen shaft to be fitted directly on to the bottom of the rear end cross member of the chassis.
- © During towing, maximum speed of the machine shall not exceed 10 Km ph.
- (d) Check for the tightness of all fasteners on the machine after the machine has been towed to site. They may have got work loosened during transportation.
- (e) Also check once a week the tightness of all nuts and bolts.
- (f) Lubricate as per schedule all the greasing points on the machine.