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UKAS

# Venus ENGINEERS

YOUR **IMAGINATION** COMES TRUE WITH OUR **EFFORT**

A LEADING MANUFACTURER OF
MATERIAL HANDLING EQUIPMENTS & ALLIED ACCESSORIES SINCE 1998.

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# COMPANY PROFILE

## INTRODUCTION :

The company in the name of "Venus Engineers" was set up in 1998 with primary aim to manufacture chain pulley blocks up to 3 ton capacity. With the passage of time, the company extended its manufacturing range in the field of material Handling equipments may be mechanical, Hydraulic, Electrical right from chain Pulley Blocks to H.O.T. /E.O.T Cranes up to 100 Ton capacity. The company is always keen to use its skills and recourses into manufacturing of items to the finest Engineering standard and provides excellent After Sales Services .

## MANAGEMENT :

The company is headed by Mr. Atul Mittal having vast practical experience in the field of manufacturing Material Handling Equipments. He is assisted by qualified Mechanical Engineers Mr. Atul Mittal and Mr. Parvesh Mittal and general manager- a law graduate having 18 years experience of working in Managerial cadre with a multinational Organization.

## THE PRODUCT :

With the belief that only the Finest can survive. Venus Engineers Industries the company do not compromise with the quality and hence, best quality of Raw-Material duly thoroughly tested is used. Keeping in view the Break down of the Products is prone to accident, each and every equipment is tested to 25% overload. .

# GENERAL DESCRIPTION

**2.1 E.O.T. Cranes—Single Girder or Double Girder :**

These Cranes move on the gantry rails fixed on top of the gantry girders. In this type 3 common motions are incorporated namely Hoist, Cross Traverse and Long Travel. Sometimes according to the customer's requirements auxiliary Hoist and Micro motions are also incorporated. Hoist and C.T. machineries are fitted on a common frame called crab, which moves on rails fixed on the Crane girders.

**2.2 Goliath Cranes :**

Goliath or Gantry Cranes differ from E.O.T. Cranes since they move on the rails fixed at ground level as compared to rails fixed at a height for E.O.T- Cranes. These are invariably used for outdoor duty as in stock yards and dam sites.

**2.3 Grabbing Cranes :**

For handling bulk materials like fertilizers chemicals coal, lime-stone, gypsum clinker, sand, ore, grains, etc. Grabbing Cranes are used. The hoisting-cum-grabbing machinery of these Cranes consists of two identical drives controlled by a common controller.

**2.4 Bracket Cranes :**

These Cranes are mounted and run on a set of 3 parallel rails fixed on one side of the gantry structure. The Crane girders overhang as Cantilevers over which the normal crab runs. These Cranes are extensively used in machine shops and foundries besides, the normal E.O.T. Cranes, for handling smaller loads near the sides of the shop bay.

**2.6 Component Parts of Crane :**

A Crane consists of the following main parts:

(a) Bridge Girders (b) End Carriages (c) Platforms (d) Crane Travelling Mechanism
(e) Crab (f) Cabin and Electrical Equipment

2.5 **a. Bridge Girders :**

A Crane Bridge consists of a welded, rivetted or machine bolted structure which is composed of a single girder or double girders. These form the main supporting members for all dead and live loads.

**b. End Carriages :**

These house the L.T. wheels, driving as well as idle wheels and support the girders at the ends.

**c. Platforms :**

These provide support for the L.T. machinery and sometimes for the electrical panels also. They provide walking space along the span of the Crane.

**d. Crane Travelling Mechanism :**

Crane travelling machinery move the Crane along the bay length. It consists of :

1. One motor at centre of span or 2 motors provided at ends of span.
2. E.M. or Thrustor Brake which applies brake to the L.T. motion.
3. Gear Box which provides exact speed ratio as required between motor and L.T. wheel.
4. L.T. shaft which transmits the torque from gear box output to wheel.
5. Wheel which moves on the gantry rail along the bay length.

**e. Crab :**

Carb consists of two / three machineries:

A) Hoist B) Cross Travel C) Grabbing

**A) Hoist machinery :**

1 Motor
2 E M Brake/Thrustor Brake
3. Gear Box
4 Rope drum.
5. Rope
6. Snatch Block

B) Cross Travel machinery :

1. Motor
2 Brake
3. Gear Box
4 Shaft/Couplings
5. Wheels

C) Grabbing machinery :

1. Motor
2. E.M. Brake Thrustor Brake
3. Gear Box
4. Rope drum
5. Rope
6. Grab Bucket

**f) Cabin, Electrical Equipment :**

The Cabin, if provided, is suspended from one end of the girder All cam/master controllers are mounted in the driver's cabin

The figure indicates the nomenclature of crane parts as generally applied to the Cranes. The actual configuration of the Crane would be as per the general assembly drawing for the unit The characteristics of the Crane are included in this manual for reference.

# STORAGE INSTRUCTIONS

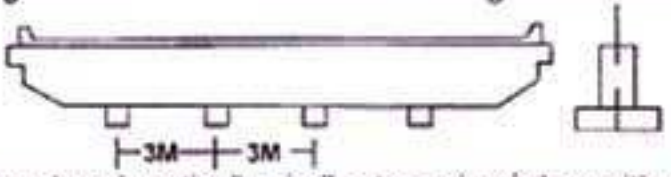
The crane and its components are despatched to site by road rail in suitable packings and protection against

precautions are to bo taken to elliminate the possible detenoration due to exposure to elements of nature.

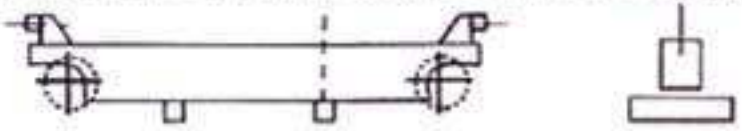
The following precautions should be taken for conservatioon of material at Site.

**Structural Items:**

A The main girder, should be stored with their web plate in vertical plane and rail on the top side. While storing, the girder should be supported only on the bottom flange preferably at every three meters interval as shown below. In no case the girder should be stored flat resting on the web.




B The end carriages should also be stored vertically similar to main girders with a minimum of two supports equalspaced in case the length is less than 3 M. They should be stored vertically with wheels on the lower side



The ends of the end carriage where wheels are mounted should be covered with tarpaulin to prevent water from entering inside and damaging the bearing and other mechanical parts. Wheel tread and flanges should be painted periodically with rust preventive paint.

C All other structural members like platform, ladders, hand railings, etc. may be stored in open area but should be covered with tarpaulin for protection against rain.

D All structural members, if required to be stored in the open for a very long period, should be repainted wherever the paint has peeled off and where there is a marked evidence of rusting. This is in addition to the normally applied coat before erection.

**Mechanical Items :**

A. **Crab Assembly :**

As far as possible the crab should be stored in a covered area. However, if this is not possible, the crab may be stored in open yard but should be fully covered with tarpaulin. In addition to the tarpaulin cover, the electrical components like motors, brakes, limit switches, etc. should be covered with thick polythene sheet to avoid entry of moisture into these components. All exposed machined surfaces should be coated with anti-rust compound.

B. Other mechanical items like Bottom Block, Ropes, shafts, couplings, etc. which are despatched in closed cases should be stored in covered storage area.

C. All fasteners including machined bolts should be kept properly oiled.

**Electricals :**

All electrical items like operator's cabin, panel boxes, resistance boxes and cables, etc. should be stored only in closed area. In no case these items should be stored in open yard. The cabin should be stored in vertical position and the cases containing the panels and resistances should also be stored in a vertical position.

**General :**

If the materials have been lying for a long time at the site, It is necessary to do the following before commencement of erection

1. No load running trial of all mechanisms.
2. Insulation test of all electrial components like motors, brakes, limit switches panels, resistances, controllers, etc.
3. To check the condition of grease in wheel assemblies for crane and trolley and to ensure these move freely.
4. To check the lubrication in pulleys, couplings, etc.
5. To check the gear boxes through inspection covers.

In case the storage area is easily susceptible to pilferage then all electrical component like motors, brakes, limit switches, etc. may be dismantled from assly and stored separately in a safe location or inside the store. Also in case of indoor storage the area may be cordoned off and should be located away from main handling area.

# ERECTION INSTRUCTIONS

**General :**

of erection is requested to go through all instructions and drawing enclosed.

**Checking of the Consignment :**

contents of each crate are to be checked carefully against the packing lists.

Any damage that have occurred in transit despite due care taken during packing and despatch must be looked into first. Report to us immediately on any breakage or shortage, so that proper claims can be made to the insurance company if the consignment has been insured by us. If the consignment is insured by you, this claim should be

for assembly.

**Preparatory Work for Erection :**

1) Select a space in the bay where Crane is to be erected which is free from all obstructions and also other construction work. The dimensions should allow for easy manipulation of the girders, etc. at a preparatory stage as well as during erection. The most suitable location is in the span between two columns which have no horizontal ties in between the roof trusses.

2) Keep all the erection equipment such as derricks, pulley blocks, slings, tools etc. ready before commencing erection work.

The following services should be available at the erection site :

a) 415 V, 3 ph. c/s. AC supply b) 7 kg/cm$^2$ compressed air supply.

c) 400 A welding transformer. d) Oxyacetylene gas cutting set.

Ensure that all parts are identified thoroughly cleaned and kept in orderly manner. Look for match-marks at every stage of the erection work so that the assembly proceeds in the right manner.

3) **Gantry Rails:**

Check the gantry rails and make sure that they are in proper alignment. The proper running of the Crane depends very much upon the rail alignment. Check the span which should be equal to the crane span and make sure that deviations, if any, are within the permissible limits. Any abnormal variations must be rectified prior to the erection of the Crane. Refer Sheet No. 31 for the permissible deviations in the gantry rails. End stoppers must be provided at the end of the gantry rails and the rails electrically earthed.

4) The position, spacing and alignment of the mains supply conductors have to be examined with respect to the general assembly drawing. If down shop leads, are of bare copper wire, see that there is no excessive sag. If they are of angle iron or rails see that they are reasonably straight and their joints are smooth.

5) Assemble the end carriage and girders on the ground If the size of the Crane is small and the lifting capacity as well as space availble are adequate for lifting the entire girder saddle frame as a unit and placing it on the gantry rails. Alternatively, place the end carriage along with the wheels assembled one on each gantry rail and clamp them in position.

Check the hands as required by general assembly drawing. Check the wheel verticality and straightness individually and relatively between the two end carriages. Check the diagonals of wheel positions. Make necessary adjustments to position the end carriages as required. Place the girders one after the other over the end carriage and locate them corresponding to match marks by means of taper pins. Use taper dowel pins at least 20% in number to locate the girders. Check the alignment and fix the reamed bolts Remove the dowel pins and put reamed bolts to complete the joint. If the girders are sent in pieces, they must be preassembled on the ground, in no case should gas cutting of holes be done if they do not match. Ream them to large diameter tight-fit-bolts.

Now fix the plalform and its support. Assemble the L.T. machinery. Check the alignment of the motors, gear boxes and brakes. Weld locating pads to prevent shifting of these units from the aligned position.

Place the crab assembly on top of the girders. Fix the rope as per the reeving shown in the crab assembly drawings. Fix the platform and hand-railings, weld all loose of tackwelded angle supports and cleats fully. Weld the nuts to the bolts which hold the platform angles and supports after fully tightening them. This

Weld locating flats in the slots to prevent shifting of the platform gratings wherever platforms are of M.S. grating.

Fix the cabin ladder, guards, main collector platform and C. T. conductor arrangement. Any site work and welding to be done as per the drawing, is to be completed now.

Next complete the wiring as per the wiring diagram. Inspect all parts to ensure that everything is in order.

Then connect the main collectors and power supply to the Crane.

# OPERATION INSTRUCTIONS

**Inspection before Operation :**

Check the following point by point, to ensure that the Crane is finally ready for trial operation.

1) The gear boxes are filled with recommended lubricants upto the maximum level marked on the respective dipsticks.

2)

points are getting lubricated

3) For all other points where individual greasing is required. the proper amount of lubricant is filled manually by a grease gun.

4) Open reduction gears wherever used, are properly greased with the recommended lubricant

5) The wire rope is lubricated with the recommended grease. Refer to the enclosed 'Lubrication Chart' for selecting the proper kind of lubricant.

6) The rotary limit switch sets the contacts that it operates at the upper and lower limits of the hook travel. The upper limit contact must operate slightly ahead of the overhoist limit switch if one is provided.

The over-hoist limit switch if provided should be assembled and wired properly. For counterweight actuated

ropes from the top sheave and does not get displaced side- ways or sway out.

7) The lever type limit switches provided for long travel and cross traverse are properly positioned and wired and are operating smoothly.

8) Buffers and end stops wherever required are properly assembled

9) Rope clamp are properly positioned and tightened.

**Preparation for Operation :**

The crane is operated by manipulating the controllers governing each motion Before beginning to operate the Crane complete the following preparatory routine.

1. Check all cable interconnections as per wiring diagram.
2. Ensure that no connection is LOOSE.
3. Carry out insulation resistance test on both power and Control circuits.
4. Remove Power Circuit Fuses in the Main panel, and switch on the Main isolator. Test only the Control Circuit by energising the various circuits.
5. Switch off the Main isolator, replace the Power Circuit Fuses in the Main Panel.
6. Check Over Load Relay settings and ensure that the same have been set for the Full Load Current of the motor as per the name plate details.
7. Decouple all motors.
8. Switch on power.
9. Check direction of rotation with respect to controller handle movement against all motions.
10. Couple all motors.
11. Test Power Circuit.

**Trial Operation :**

1. One by one operate all the mechanisms of the Crane at NO LOAD. Check performance of the mechanisms and safely devices and ensure that there is no malfunctioning of any component or assembly. Closely observe for any abnormal noise, vibrations, etc.
2. Repeat the trial with 10%, 25% and 50% of the rated load on the Crane hook and then with 100% rated load. Check the simultaneous operation of the various mechanisms and ensure proper functioning of the same.
3. Hoist 125% rated load by the Crane and check whether the structure is able to sustain the load without any permanent deformation.
4. Record current drawn by motors during each one of the above tests.
5. Set thermal overload relays to 110% of the recorded full load current and magnetic overload relay to 105% of the recorded full load current.

Report any abnormalities observed to Works lor rectification.

**Safe Hoisting Practices :**

Your own safety and that of your fellow workers will be assured when the overhead material handling equipment is used as recommended. Disregarding such recommendations endangers life and property. The following are basic rules worthy of your careful consideration and attention :

1. DO NOT LOAD BEYOND THE RATED CAPACITY. The immediate danger is the possible failure of some load carrying parts. Overloading might also start a defect which could lead to some future failure even at less than rated capacity.
2. DO NOT USE ANY OVERHEAD MATERIAL HANDLING EQUIPMENT FOR HANDLING PERSONNEL.
3. CONDUCT A PERIODIC VISUAL INSPECTION FOR SIGNS OF DAMAGE OR WEAR. Particular attention should be paid to the wire rope and hook. If there are signs of wear or damage or if the hook is distorted or opened out, call it to the attention of the safety engineers before loading the hoist.
4. DO NOT USE HOISTING ROPES OR CHAINS AS A SUBSTITUTE FOR SLINGS. Use the slings only. Cable or chain slings should be of the proper size and type for load handling. Never use slings showing physical damage of any extent.
5. WHENEVER THE HOIST IS LOWERED IN SUCH A MANNER AS TO TAKE THE LOAD OFF THE WIRE ROPE, the operator should determine; before making a lift again, if the wire rope is properly reeved on the drum.
6. STAND CLEAR OF ALL LOADS. If you must travel a load over the heads of other personnel, give ample warning of your intention before you move.
7. ALWAYS "INCH" THE HOIST INTO THE LOAD. Running into the load at full hoisting speed imposes an excessive overload on the hoisting mechanism and could result in the failure of parts and/or the supporting structure. This is particularly true with high hoisting speeds. The same principle applies to the travelling motion also, which would otherwise cause a swinging of the load leading to unforeseen damages.
8. LIMIT SWITCHES ARE FOR EMERGENCY USE ONLY and should not be tripped during normal operation. If it is necessary to travel to the limit, use extreme caution and approach the limit in slow speed or by "inching". Do not leave the hook block in contact with the limit switch at the end of the operation. A phase

lever is operated.

9. BE SURE THAT THE HOIST RAISES AND LOWERS PROPERLY WHEN THE CORRESPONDING PUSH BUTTON OR CONTROL LEVER IS OPERATED. A reversal of direction indicates a phase reversal in the current conductor, or an interchange of wires on the push button-any of which would cause the limit switch to be inoperative. **Do not under any circumstances,** operate the equipment until the fault has been found and corrected.

10. CENTRE THE HOIST OVER THE LOAD BEFORE LIFTING. Do not side-pull or end-pull. When the centre of

    at the same time. The use of many ropes would be meaningless if the load is not supported evenly.

11. USE PADDING ON THE EDGE OF LOAD IF IT IS SHARP AND ANGULAR to prevent damage to the rope. Contact of the wire rope with a sharp angular edge of the load Is unsafe. The wire rope can be cut very easily when it is twisted. Remember that twisting and pulling is the method employed when it is necessary to cut the wire rope.

12. When the straddle angle of the rope slings is large, a larger load than commonly supposed, works on the wire ropes. The limit for this angle should be kept within 90°.

13. WIRE ROPES FOR LOAD HANDLING should not be placed on the portion of the load which may cause them to move or slip off.

14. REVERSING THE POSITION OF AN OBJECT OR LOAD is among the most dangerous types of operations. This Operation should be done very slowly taking care that the rope do not become loose. When the ropes become loose, the next thing to expect is a sudden reversal of the object position which will cause a very heavy strain on the ropes and possibly make them snap.

15. DO NOT DRAG THE LOAD. It is dangerous to assume that a load which has been safely tied can be dragged because dragging the load creates higher stress in the wire open than when suspending it.

16. KNOW THE HAND SIGNALS for hoisting cross travel and long travel if working with cabin operated Cranes. Operators should accept the signals of only those parsons authorise to give them. Do not operate when signals are not clear.

17. DO NOT LEAVE THE LOAD SUSPENDED IN THE AIR AND UNATTENDED.

18. DO NOT JOG CONTROLS UNNECESSARILY Hoist motors are generally of a high torque, high slip type. Each start causes in inrush of current greater than the running current and leads to overheating and heat failure, or burnout. if continued to excess.

19. AFTER DISUSE. When the Crane is to be operated after a long period of disuse, be sure to operate all the motions without load first.

**Crane Drivers :**

**Conduct**

1. Only trained, comipetent and properly authorised crane drivers are permitted to operate overhead travelling cranes. A crane driver shall have written knowledge of English.

2. Crane drivers must be physically fit, and have good hearing and eye-sight. A crane driver shall not operate his

   once.

3.

   from the control cabin or bridge structure, are not permitted under any circumstances.

4. They shall keep their hands free when going up or down access ladders.

5. They shall familiarize themselves Fully with all crane safety operating Instructions, the crane mechanism and its proper care.

6. Extreme care shall at all times be exercised by crane drivers and attendants, and all other personnel working or present on premises where cranes are located, to avoid contact with the crane collector wires and/or any other power cables, whether covered or bare.

7. Rail trucks, cars, or other transport vehicles, shall not be towed by any crane.

8. The crane driver must ensure that the fire extinguisher is kept in serviceable condition.

9. The communication between the crane driver and crane attendant, (slinger) shall be through mutually agreed code of handsignals. This shall be displayed prominently inside the cabin Verbal instructions can be given only if they are rendered audible

10. The crane driver is at all limes responsible for the safe operation of his crane.
11. He shall not leave the controls while a load is suspended from the crane.
12. He shall not permit anyone to be in any position of the crane while the crane is performing normal working operation.
13. Where and when any crane fails to correctly respond to control, the crane driver shall immediately stop

    by repeated operations of the controls
14.

    await instructions.
15. He shall not rely on LIMIT SWITCHES in ordinary working, they are for emergency only.
16. The crane driver shall not tamper with circuit breakers, limit switches, and/or other safety devices.
17. Before closing main switches, make sure that all controllers are in the "OFF" position.
18. All crane movements whilst loads are being handled, or maintenance or repair work done, shall be governed absolutely by the standard operating signals as given to the crane driver by the person authorised.
19. The crane driver shall obey a STOP signal, regardless on who gives it.
20. Under no conditions shall any crane driver move a load unless he has clearly seen and undersood the given signal.
21. Where two cranes are operating in tandem, the driver of each crane shall take movement signals ONLY from one (same) person.
22. Bumping into runway stoppers shall be avoided.
23. All load movements shall be done smoothly, without jerking or sudden stops
24. Under no circumstances shall the crane driver attempt to travel any load until that load has been hoisted clear of all obstruction.
25. When handling loads approaching maximum rated capacity the crane driver shall test the hoist brakes after

    brakes do not hold, the brakes should be adjusted immediately.

26. While the crane is in motion, crane drivers shall keep their hands on the controls at all times.

**Floorman's Standard Hand Signals :**

The determination of a system of operating signals sids by side with a strict adherence thereto, is strongly recommended from the standpoint of operating efficiency and accident elimination. Suitable examples are given below for the Operator's Information.

1. For Hoisting : Hold forearm horizontally, palm up and move forearm upward.
2. For Lowering : Hold forearm horizontally, palm down, and move forearm downward.
3. the direction of movement and move forearm in the direction of movement.
4. small movements) for a slight movement, or increased when a greater movement is desired.
5. Stop Lowering : The previous position of the forearm is maintained, but the palm is turned over with the forearm in the same position.
6. Stop Travelling : The position of the forearm is the same as that for travelling, but the palm is turned over as in the case of Stop Lowering.
7. Emergency Stop : Hold forearm horizontally in front of the body and swing rapidly to left and right.
8. Operation : The completion of work is shown by raising both arms horizontally and lowering both at the

entire arm may be moved, instead of the forearm. The use of a whistle together with the above signals will help in making them clearly understood. When a whistle is used, with the signals, the following notes are sounded before the hand signals are made :

a) Short movement

b) Continuous movement

c) Stop

two or more men is extremely dangerous The operation of the Crane should also the performed by one man chosen for this purpose.

**Crane Parking :**

Before leaving his control position, the crane driver shall at all times ensure that :

a) The crane is spotted at the location designated for leaving the crane.

b) There in no load suspended from the hook.

c) The hook is raised clear of all obstructions.

d) All controllers are placed in the OFF positions.

e) Subject to more specific local instructions, the main power switch in the crane is locked in the OFF position.

f)

**Crane Attendants or Slingers :**

1. The crane attendants shall have an adequate knowledge of safe handling methods.
2. He shall have a sound knowledge of knotting, slinging, the strength of ropes, chains, cables and slings.
3. The crane attendant is at all times responsible for the safe slinging and handling of the load.
4. He shall notify his supervisor whenever, and prior to, any unusual or special lifts are lo be made.
5. The crane attendant is responsible for ensuring that :

a)

of the load, this should be Immediately ascertained.

b) All loads are securely slung, and that all slings etc., used are of the correct size and quality.

c) All loads are moved in such a manner as to clear all obstructions and are not carried over personnel on Shop Floor.

d) All piling and stacking is done in a safe and orderly manner.

e)

taken when it is necessary to steady the slings by hand.

f) Chains, cables and ropes shall be kept free from knots and kinks.

# MAINTENANCE INSTRUCTIONS

Needless to say, daily maintenance and inspection are not only important for safe operation but also govern the efficiency and service life of the Crane.

**General Precautions :**

be roughly classified as following :

1. Lubrication.
2. Inspection and replacement of wearing parts & deforming parts, and deletion of broken parts.
3. Inspection for loosened fastening parts.
4. Inspection of contacting parts.

thorough maintenance.

1. **Lubrication :**

   Lubrication, which is as important to a Crane as breathing is for a man, must never be forgotten. Apply the proper amount of oil or grease at proper intervals. The lubrication chart for cranes is enclosed for reference.

2. **Worn or Deformed Parts and Broken Parts :**

   In the wear table is the usable wear limit.

   At each periodic inspection, consider the amount of expected wear before the next inspection and repair

   some Cases, you are advised to make a table indicating the initial dimensions and the wear condition to facilitate inspection.

3. **Loosening of fastened parts :**

   Loose nuts, etc., may result in serious trouble. Inspect all fastened parts (nuts, etc.) with special care.

4. **Contacting parts :**

This mainly concerns electrical parts. Always perform hoisting travelling and traversing operation with no load to check the operating conditions before starting actual operation with load. At the same time, check the contact of the electrical equipment.

**Details of Maintenance :**

1. **Motors :**

Electric motors should be protected against drops of water, oil, etc. Terminal boxes should be carefully closed.

box should be cleaned of all dirt and dust.

When checking slip rings and brush holders, it is necessary to remove metal and carbon dust from the box. The rings are to be wiped with cotton cloth. If there is oil on the ring, the cloth should be soaked in petrol. 'Scorched' rings can be polished with fine emery paper. When inspecting the brush holder it is necessary to check the brush pressure on the rings and smoothness of arm motions. Worn out brushes sould be replaced by spare ones Bearings of motors should be checked and washed with petrol, and the lubricant changed every 8 to 12 months. Lubricant should be added every 3 to 6 months. It should be noted that the lubricant fills no more than 2/3rds of the bearing housing.

2. **Brakes :**

The braking torgue of the electro-magnetic/thrustor brake is produced by the action of a strong compression spring When the current is switched on, the brake is released by the solenoid thrustor closing against the pressure of the operating spring. The normal position of the brake is there- fore "ON" and the brake will return to this position if the current fails.

The heavy duty cast-iron brake shoes have treated fabric lining secured with brass or aluminium rivets, they have large cooling surfaces and are self-aligning.

in use becomes worn. The worn shoes should be then relined and kept in readiness for future replacement

alteration is requried.

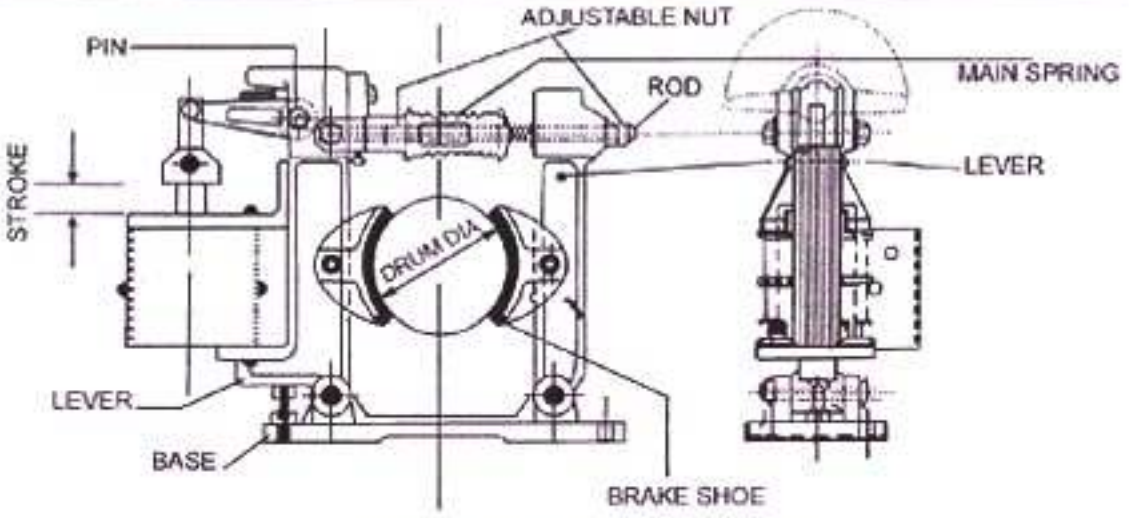
Complaints about the brakes of the electro-magnet type have been frequent only where maintenance has not been proper. Generally, the plunger of the solenoid sticks during the movement when a lot of dust enters the solenoid opening. With the right maintenance, if the dust is kept down, the movement of the plunger will be smooth and therefore there will be less trouble.

considerably as the gap between the plunger and the magnet reduces. The current becomes very low after the plunger has been fully drawn in, and the air gap in the magnet circuit reduces to zero.

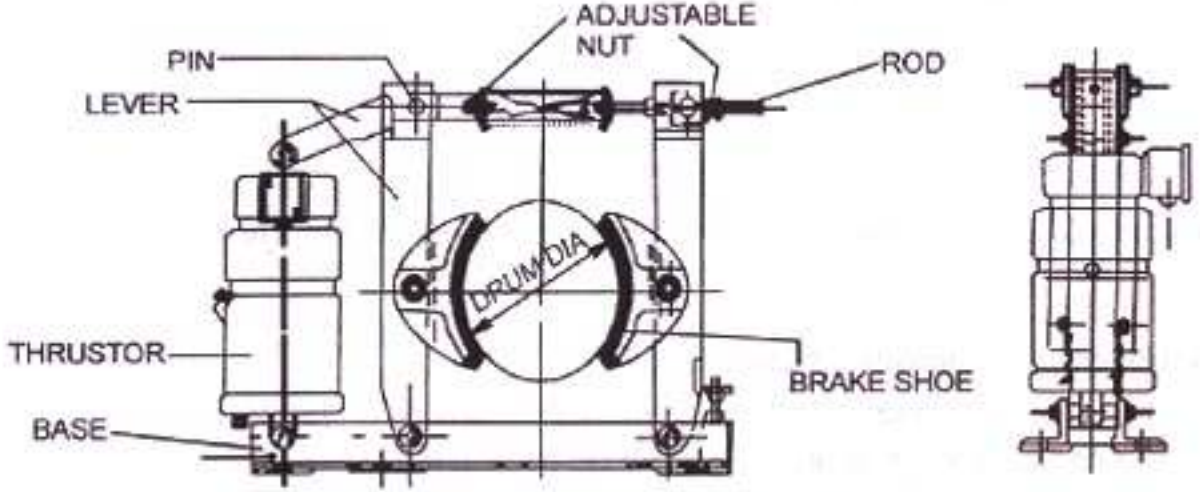
this precaution is followed, there will be no coil burnout.

**BRAKE SETTING-ELECTRO MAGNETIC BRAKES :**

1. Check if Magnet stroke is 20mm.
2. If not, manipulate adjuster nuts to obtain 20mm stroke.
3. Make the hand release lever "ON".
4. Check uniformity of gap between brake drum and shoes. This gap should be 1.5mm if not uniform, adjust the shoe clearance adjuster bolts.
5. Make the hand release lever "OFF".
6. Press the solenoid lever by hand and confirm that both shoes clear the brake drum.
7. Energise coil in case the magnet hesitates to close, adjust spring pressure by loosening the spring pressure by adjusting the nuts.
8. Solenoid stroke should be reset periodically to the figure given in the instruction plate to compensate for wear. The shoe clearance bolts should also be adjusted simultaneously.




**A.C. ELECTROMEGNETIC SOLENOID OPERATED SINGLE PHASE BRAKES.**




**ELECTRO HYDRAULIC THRUSTOR OPERATED BRAKE**

**INSTALLATION & MAINTENANCE OF ELECTRO HYDRAULIC THRUSTOR :**

carefully with the oil.

**INSTALLATION :**

operation in ambient temperature down to 10°C (40°F)

**Bearings :**

under severe conditions SERVOGEM-2 of 10C or equivalent is the lubrication of these bearings in future.

**Maintenance :**

the tank or remains on the piston or other parts when the unit is reassembled. Try movement of assembled unit by

in future.

3. **Master Controller/Cam Controller-Maintenance :**

   Isolale the main supply before opening the Controller.

   **BEARINGS :** A thin film of acid-free grease is to be provided at the pivot points of the roller every six months by means of a thin brush. The cam shaft ends must be provided with the same lubrication at the same Interval in Joystick Master Controllers, the grease should be provided every three months.

**CONTACTS :** The Contact surface will become dark and rough duo to arcing but this does not affect the functioning and contacts are not to be cleaned. Only if the Silver contact facing is burnt down, should the contact be replaced. To remove, unscrew the contact stud and replace with a new silver tipped contact stud.

4. **Gears :**

Gears are to be inspected at least once every six months. During a check-up, care should be paid to the condition of working surfaces, degree of teeth wear and correctness of meshing (especially during the first week of gear working). Normally gears should not make a sharp noise or knock it is also necessary to check gear-fit

on the dip stick. The first change of oil in the gear case is to take place after 150 hours of operation.

5. **Bearings :**

of packing and lubrication. When normally operated, bearings should not heat much, nor squeak as a result of dirt, insufficient lubrication, damage of some elements or friction of rotating parts against the body.

6. **Wire Rope :**

The reliability and soundness of wire rope for lurther use should be determined by the number of broken wires

on drum grab and other places.

To prevent untimely wear on ropes, they should be lubricated with the recommended lubricant.

7. **Travelling Wheels :**

Travelling wheels should not have cracks or worn collar rims. The rolling surface of the wheels should be clear of hollows and dents.

**MAINTENANCE SCHEDULE :**

Weekly Inspection

| Equipment No. | Dept. | Crane No. | Inspection |
|---|---|---|---|
| | | | |

**Inspection of items :**

i. Check fastening bolts of hoist motors, brake gearbox, drum pedestal, hoist drum gear and hoist brake drum lock plate, if any.

ii. Check fastening bolts of traverse motor, brake, gear box, wheels, shaft, bearing and couplings.

iii. Check fastening of LT motor, brake, gearbox, shaft coupling and bearing and its housing.

iv. Condition of girder and end carriage joint bolts.

v. Current collector of L.T.

vi. Brakes:

(a)

& whether operation is free from chatter.

(b) Hydraulic thrustor brakes — Oil leakage, condition of liners, oil in thrustor, lubrication of hinges.

(c) Hydraulic foot operated brakes — Oil level in master cylinder, Lubrication of hinges. Operation of foot pedestal. Leakage in the system, free from air lock.

vii. Resistance boxes — connections, condition of elements.

viii. Junction box — connections for looseness.

ix. Drum Controllers — connections, contact pressure condition of the brushes.

x. Master controllers — contact pressure.

**NOTE:** Inscribe **'O'** for ilems found satisfactory

Inscribe **'R'** for items requiring repair.

Inscribe **'H'** for items repaired by hand.

**Quarterly Inspection:**

i. Gearboxes — noise level, leakage of oil, topping up if necessary.

ii. Motors — terminal connections, sliprings, carbon brushes.

iii. Wire rope — lubrication, number of broken wires.

iv. Hook — free rotation of hook, lubrication of moving parts.

Alignment of motors, couplings, floating shaft, clutches, if any.

Electrical — contactor tips, limit switch operating mechanism including connections.

**Yearly Inspection :**

i. End buffers for CT & LT.
ii. All structural connections and joints and conditon welds.
iii. Wheel flanges for wear.
iv. Replacement of lubricants.
v. Wear of brake drums.
vi. 1st stage Gear / Pinion wear.
vii. Check for pitting and wearing of bowl of hook.
viii. Hook

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Chain Pulley Block

Chain Hoist

Electric Wire Rope Winch Machine

Trolley

Wall Mounting Jib Crane

Gantry Crane

Wire Rope Electrical Hoist

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