ELECTRIC LIFTING BARRIER

1. INTRODUCTION

- A crossing where Railway track crosses the road at the same level is termed as level crossing. More than 40,000 level crossings exist in Indian Railways.

- To avoid accidents at these level crossings, gates are provided. Railways normally employ a Gateman at these gates to open the gate for road traffic and to close the gate for train movement.

2. CLASSIFICATION OF GATES

There are five types of gates.

- Special class -manned
- ‘A’ class- manned
- ‘B’ class-manned
- ‘C’ class-manned if required
- ‘D’ class- Unmanned

- Special class to ‘C’ class is for road traffic and ‘D’ class is for cattle crossing. Either lifting barrier, leaf gates or chains are used to close the gates.

- Lifting barriers are mainly operated in two ways.
  - Mechanical (Gateman opens the gate by operating the handle)
  - Electrical (Button operated)

3. ADVANTAGES OF ELECTRIC LIFTING BARRIER

- Electric lifting barrier is reliable and its working capacity is high.

- Since its operating time is less, opening and closing is prompt as well as damage of boom also reduces due to heavy road traffic.

- Requires less maintenance.

- Electric lifting barrier is comparatively safe and there is no chance of outside interference.

- In case of power failure, it can be operated with the help of crank handle. Crank handling of electric lifting barrier is easy because its counter weight is less and balanced.
4. OPERATING CHARACTERISTICS

The type, rated voltage and current of the lifting barrier is as follows:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>RATED VOLTAGE AND CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage</td>
<td>24V DC / 6-8 Amps. For boom length up to 8 m.</td>
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<tr>
<td></td>
<td>8-12 Amps for boom length above 8 m.</td>
</tr>
<tr>
<td>High voltage</td>
<td>110 V AC, 50Hz, single phase, 2 Amps</td>
</tr>
</tbody>
</table>

5. GENERAL FEATURES

- Lifting barrier is manufactured according to the IRS specification No. S: 41-70.
- Lifting barrier is robust and operating mechanism is protected against unauthorised interference.
- The boom of the barrier is light in construction and extends across the full width of the road.
- The height of the boom is kept 1 m. from the rail level.
- Fringes, if provided, are made clear of road surface by not more than 15 cms. when the boom is in the horizontal position.
- The raised or open position of the lifting barrier is with in 85°-90° from the horizontal and lowered or closed position is within 5° from the horizontal.
- At the centre of the boom, the lifting barrier is provided with a 600 mm dia. red disc having red reflector buttons facing the road traffic.
- Lifting barrier can be stopped, reversed or its movement obstructed at any point during operation without damage.
- The mechanism is so designed and booms are so balanced that in case of failure of power supply, the barrier remains in the last operated position.
- The mechanism is so designed that if the boom is obstructed during operation, it stops and on removal of the obstruction assumes the position corresponding to the control apparatus, unless protected devices have operated.
- Lifting barrier have two booms one across the road on either side of the level crossing, operated by independent mechanism.
- Arrangements are provided to adjust the counter balance of the lifting barrier.
- The operating mechanism also includes a suitable device which locks the lifting barrier in the vertical and horizontal positions.
- Electrical contacts are easily accessible and independently adjustable and confirm to IRS specification No. S-23.

- Bearing confirms to IRS specification No. S-23 and is constructed so as to prevent entry of water.

- Exposed oil holes, cups or grease nipples are provided with waterproof spring loaded covers.

- In case of power failure, lifting barrier is operated manually by a crank handle. The insertion of hand-crank disconnects the power supply to the motor and it is not possible to reconnect the power supply until the hand-crank is withdrawn, and a switch is operated.

6. SEQUENCE OF OPERATION

The operation of Lifting Barrier takes place in following sequence:

- Open of detection contacts
- Unlock the boom
- Move boom
- Lock the boom in full horizontal or vertical position
- Close the detection contacts

7. MAIN PARTS OF ELECTRIC LIFTING BARRIER

An electrically operated device for closing the level crossing against road traffic comprises of an operating panel, an electric motor, operating mechanism, circuit controller, road signals, audible devices, boom etc. A typical Fig. is shown on next page.
A control panel is provided to operate the two booms individually as well as simultaneously.

The control panel may be either of the miniature lever type or push-button type with suitable arrangements to stop the barrier at any position.

In case of power supply failure during operation of the barrier, it is not possible to revert back to normal working on resumption of power supply, unless an additional switch provided for this purpose is operated.

Approved type contactors are provided in control panels for the operation of lifting barrier.

Two push buttons red and green are provided to open and close the lifting barrier, respectively.
7.2 Electric Motor

- Suitable protective devices are provided to disconnect the circuit in case of overloading of motor.

- Motor is totally enclosed type complying with B.S. 170 with class- ‘A’ insulation.

- Motor is an integral part of the mechanism and removable therefrom.

- Motor bearing is so designed that lubricant used can not reach to brushes, commutator or winding.

- Suitable protective device like circuit breaker in addition to friction clutch is provided to disconnect the circuit in case of over-loading of motor.

7.3 Mechanism

- Mechanism case is of metal, strong and weatherproof.

- It has ample space to accommodate various apparatus and wiring.

- A suitable gasket is provided on the mechanism case between case and its door to protect it from entry of water and dust.

- Arrangement is provided for rigidly securing and padlocking the door of the mechanism case.

- The door or cover when open, permits easy access to all parts.

7.4 Road Signals

- Audible and Visual warning arrangement for the road traffic are provided along with lifting barrier, on each side of lever crossing.

- The Audible warning arrangement consists of an electric bell operating on the same voltage as that of the boom and is provided on each side of the level crossing.

- Audible and Visual warning arrangements for the road traffic start operating 6-8 seconds before operation of the barrier from its vertical or open position and continues till both the booms reach the horizontal position.

- Visual warning arrangement is made for the road traffic by providing a road signal (like colour light signal) with a visibility of 180 meters as shown in fig no. 2 shown on next page.
7.5 Boom

- It is that part of barrier, which in horizontal position prevents passage across level crossing. Two booms, one each on either sides of track is provided.
- Both booms are painted in alternate black and yellow colour of 300mm bands.
- In horizontal position, the boom height is kept 1 meter from rail level.

8. RDSO APPROVED ELECTRIC LIFTING BARRIERS

At present there are two RDSO approved manufacturers of Electric lifting barrier:

- M/s Heidz India Ltd., New Delhi
- M/s Tahira Industrial Ltd., Mumbai

The detailed procedures of Installation, adjustment and Maintenance are given below.
8.1 M/s Heidz India Ltd, New Delhi

8.1.1 Foundation

- A small concrete foundation is required for mounting the barrier machine as shown in foundation drg.
- GI/ PVC bend pipe is installed at the centre of the 4 foundation bolts for entry of power and control cable.
- For exact fitting of barrier machine, position of the bolts i.e. inter-space of bolts is maintained properly.

8.1.2 Fitting mechanism

- Lift the mechanism box and place it on foundation in such a manner that the 4 grouting bolts protrude through the 4 holes provided at the bottom of this mechanism box.
- Mechanism box is so fixed that the double-ended shaft protruding from mechanism is parallel to the road.
- Ensure verticality of mechanism box (suitable packing may be placed below mechanism to achieve verticality, if required), and tighten the 4 nos. of grouting nuts, along with washer and lock washer.
The function of the gear drive unit is to reduce the speed and provide locking. A typical figure is shown.

![Fig No.4](image)

### 8.1.3 Equipment assembly

- The serial number of machine is marked on rear door. Similar serial number is also marked on counter, balance channels, aluminum booms and boom lock hook. Fit channel boom and boom hook on respective machine only to ensure matching.

- The counter-balance channels are first mounted on the mechanism shaft on both sides and fixed together in front with the 3/8” nuts and bolts, along with the 3/4” nuts on the shaft.

- After assembling of channel, the boom is fixed by 8 nos. 3/8” bolts, followed by the balance weights. While boom is being installed, support the tip of the boom until balance weights are in place, otherwise the gear unit may get damaged.

- The balance weights are suitably adjusted until boom is properly balanced. This may be checked by ensuring that the effort required for opening and closing barrier by crank handle or the current consumption is the same.

### 8.1.4 Solenoid boom lock

After completion of installation of the barrier machine, counterbalance channels, boom, boom hook, balance weight, etc. Mark the position of the boom tip support cum locking device and grout it at required position and height, so that boom falls in between the Y- shaped fork and the boom hook into the lock as shown below.
### 8.1.5 Electrical connection

Terminal details of barrier machine and control panel are given below:

<table>
<thead>
<tr>
<th>Terminals</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>Motor running winding 110 V AC and solenoid lock coil in parallel</td>
</tr>
<tr>
<td>3 and 4</td>
<td>Motor starting winding 110V AC</td>
</tr>
<tr>
<td>5 and 6</td>
<td>LS 1 contact (limiting switch) breaks at 2° and below.</td>
</tr>
<tr>
<td>7 and 8</td>
<td>LS 2 contact breaks at 88° and above</td>
</tr>
<tr>
<td>9 and 10</td>
<td>LS 3A contact makes at 88° and above</td>
</tr>
<tr>
<td>11 and 12</td>
<td>LS 3B contact makes at 88° and above</td>
</tr>
<tr>
<td>13 and 14</td>
<td>LS 4A contact makes at 2° and below</td>
</tr>
<tr>
<td>15 and 16</td>
<td>LS 4B contact makes at 2° and below</td>
</tr>
<tr>
<td>17 and 18</td>
<td>LS 5A contact makes at 2° and below</td>
</tr>
<tr>
<td>19 and 20</td>
<td>LS 5B contact makes at 2° and below</td>
</tr>
<tr>
<td>21 and 22</td>
<td>Crank handle cut-out switch</td>
</tr>
<tr>
<td>23 and 24</td>
<td>Boom light 12 V AC</td>
</tr>
</tbody>
</table>
TERMINALS IN CONTROL PANEL

<table>
<thead>
<tr>
<th>TERMINAL NO.</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>Key switch N-O contact</td>
</tr>
<tr>
<td>3 and 4</td>
<td>Push button OPEN N-O contact</td>
</tr>
<tr>
<td>5 and 6</td>
<td>Push button CLOSE N-O contact</td>
</tr>
<tr>
<td>7 and 8</td>
<td>Lamp open 110 V AC</td>
</tr>
<tr>
<td>9 and 10</td>
<td>Lamp close 110 V AC</td>
</tr>
<tr>
<td>11 and 12</td>
<td>Lamp power 1 110VAC</td>
</tr>
<tr>
<td>13 and 14</td>
<td>Lamp power 2 110VAC</td>
</tr>
</tbody>
</table>

Note: Terminal number may vary as per Railway requirement.

8.1.6 Adjustments

8.1.6.1 Limit Switch

- Two limit switches LS1 and LS2 are provided on rear box shaft to control auto stop in the fully open and closed position of the barriers.

- Three more limit switches with double contacts, LS3, LS4 and LS5 are provided to give back indications in fully open and closed positions.

  - The limit switches are actuated by contoured cams fixed on boom shaft and position of these cams can be adjusted as follows:

- Loosen the cam fixing screws using an allen key.

- Adjust the position of cam as required, by rotating it on boom shaft.

- Tighten one of cam fixing screws and check the position of cam by operating the barrier.

- Tighten all fixing screws after cam position is properly adjusted.
### 8.1.6.2 Cam

A typical figure showing CAM is given on next page. Positions of the cams are to be adjusted as given below:

- The cam for LS1 is to be adjusted such that its contacts just break in the fully closed position of barrier.
- The cam for LS2 is to be adjusted such that its contacts just break in the fully open position of barrier.
- The cam for LS3 is to be adjusted such that its contacts just make in the fully open position of barrier.
- The cams for LS4 and LS5 are to be adjusted such that its contacts just make in the fully closed position of barrier.

### 8.1.6.3 Friction clutch

The friction clutch is mounted on the input shaft of the gear drive unit and connected with the motor by a timing belt. An adjusting nut is provided on the clutch. Tightening this nut increases spring tension and hence slippage-torque. The slippage torque adjustment is to be done as follows:

- Completely loosen adjusting nut until gate fail to operate when motor is started and the clutch slips continuously.
- Tighten the nut in 1-1/2 turn stages and check for gate operation at every stage to locate the position of the nut where the slippage torque of clutch is just sufficient to drive the barrier.
- Tighten the adjusting nut by another ½ turn.
8.1.6.4 Timing belt

The tension of the timing belt transmitting the power from the motor to the clutch system can be adjusted by adjusting the vertical position of the motor as follows:

- Loosen 4 motor fixing bolts.
- Adjust position of motor, until desired belt tension is achieved by providing suitable packing below motor.
- Re-tighten 4 fixing bolts.
- Ensure that motor is parallel to the clutch shaft to avoid excess wear of belts.
- As timing belt does not transmit power by friction it is left a little loose and not tightened fully.

8.1.7 Maintenance

For trouble-free performance of electric lifting barrier periodic maintenance checks are recommended as follows:

8.1.7.1 Fortnightly Maintenance

- Check that operation of gate is smooth.
- Clean inside and outside of mechanism, boom and channels.
- Check for auto stop of gate in fully open and closed position. Adjust limiting switches, if required.
- Check tightness of all fixing nuts and bolts of mechanism base, gear box, motor, boom, counter-balance channels and adjusting screws of cams which operate the limiting switches.
- Clean inside solenoid locking device and ensure that lever falls to lock position by gravity.
- Check operating current and voltage of electric lifting barrier and ensure that they are within limits.

8.1.7.2 Quarterly Maintenance

- Check clutch slippage current. Adjust if required.
- Check belt tension. Adjust if required.
- Check contacts of limit switches and Contactors. Clean if required.
Apply a little grease to cam surface, which operate the limit switches.

8.1.7.3 Annual Maintenance

- Replace the oil in gear unit. Old oil is removed from bottom of the gear unit by opening bottom plug. New oil is filled from top of gear unit by opening top plug provided.
- Replace Timing belt if worn out.
- Replace clutch plate, if required.
- Oil clutch slippage bush.
- Check for slippage of friction clutch. Adjust if required.
- Megger tail cable and ensure that the values are within limit i.e. insulation of cable conductor is more than 10 Mega ohm.

8.1.8 Trouble Shooting

- **Barrier fails to operate for opening or closing**
  - Check power supply at terminals 1 and 2. If no supply, restore supply.
  - Check power at MCB at terminals 3 and 2. If no supply, change MCB.
  - Check power supply after “STOP” button at terminals 4 and 2. If no supply, change contact of stop button.
  - Check power supply after the crank handle (CHS) switch at terminal 3 and 13 of CHS. If no supply, clean limit switch.
  - Check power supply after timer contact TR between terminal 4 of timer and terminal 3. If no supply change timer.

- **Barrier Opens But Fails To Close**
  Check in sequence keeping close button pressed.
  - Check supply after close button between terminals 5 and 2. If no supply, change contact of close button.
  - Check supply after limit switch LS1 between terminals 7 and 2. If no supply, clean/adjust limit switches contacts.
  - Check supply after back contact of open contact between terminal 12 of OC (Open Contact) 7 terminal 2. If no supply, clean contact of OC.
♦ Check supply across coil of CC (closed contact). If supply is present but contactor does not operate, change coil of CC.

**BARRIER CLOSES BUT FAILS TO OPEN**

Check in following sequence, keeping open button pressed:

♦ Check supply after open button between terminals 6 and 2. If no supply, change contact of open button.

♦ Check supply after limiting switches LS2 between terminals 8 and 2. If no supply, clean/ adjust limit switch contact.

♦ Check supply after back contact of CC between terminals 12 of CC and terminal 2. If no supply, clean CC.

♦ Check supply across coil of OC open contact). If supply is present but contactor does not operate, change coil of OC.

**Contactors Operate But Motor Does Not Operate**

♦ Check that after contactor operates, supply is available between terminals 9 and 10 as well as between terminals 11 and 12. If no supply, clean contactor contacts.

♦ Check that motor running winding is connected to terminals 9 and 10 and starting winding between terminals 11 and 12. If not, correct motor winding.

♦ Check motor capacitor.

♦ Check motor.

**Motor Operates But Barrier Does Not Move**

♦ Check timing belt. Adjust/ replace as required.

♦ Check for any obstruction to boom or counterbalance channels, by operating manually. Remove obstruction.

♦ Check for slippage of friction clutch. Adjust if required.
8.2 M/s TAHIRA INDUSTRIAL LTD, MUMBAI

8.2.1 Installation

- Prepare foundation as shown in figure.

Fig. No. 7
(Not to Scale)

- After proper setting up of foundation, pedestal placed on foundation, tighten all the four foundation nuts firmly.

- Put de-clutching bolt from the side and de-clutch friction clutch.
- Make boom actuator horizontal by hand and give support from front and rear to keep firm in that position. Take out the de-clutching bolt.
- Assemble complete length of boom separately.
- Join the boom with boom actuator in position. Naturally boom will be supported at far end also.
- Fix fringes to boom in proper position.
- After putting the counter weight bolts on rear side of boom actuator, the counter weight plates are loaded one by one. Heavier plate comes first while loading. After putting all plates and tightening nuts, balancing can be done.

Balancing: -

- The barrier must be balanced perfectly before operation. The counter weight can be shifted backward or forward to achieve balancing.
- The friction clutch is de-clutched by the de-clutching bolt and boom is free to move.
- By putting one hand pressure on the counter weight the barrier is able to move.
Once this is achieved take off the support and move the barrier to 45\(^0\) position by hand. After relieving hand pressure barrier is having the tendency to come down (rather than going up) very slowly. Once this is achieved it means that barrier is perfectly balanced.

Before switching on supply and operating barrier on electric motor, care must be taken to ensure correct direction of electric supply. There is always chance that supply may be in reverse direction. This can be tested as follows:-

De-clutch the friction clutch by clutching bolt and make the boom free from gearing system. Switch on supply in one direction, which will get in motion, the system before friction clutch. Watch friction clutch in which it is rotating. Suppose it is moving to bring the barrier horizontal, move barrier by hand to horizontal and see that proper limit switch operates to stop the motor. If this is not the case only the supply lines should be interchanged to change the direction of motion. This will not be happen in DC supply if the limit switches are connected properly.

NOTE

- If barrier is not properly balanced it will give excessive of load (unbalanced) on gearing system and motor, which may damage the bearings, gears or electric motor. Barrier is designed to take unbalanced load for a short time, but continuous unbalanced operation may damage the barrier.
- Ensure that all parts are free for rotation and properly lubricated before giving the electric supply.
- Foundation bolts and counter weight bolts must be firmly tightened, otherwise any shifting of pedestal or counter weight will damage barrier in operation.

8.2.2 Operating Instructions

Control Panel Box

The control panel is shown. Operation of control panel is as follows: -
- Rotary switch provided should be turned towards “ON” position.
- Push buttons provided (3 nos.) for operation of barrier. They are:
  - **Green colour button** - Press for raising the boom.
  - **Yellow colour button** - Press for lowering the boom.
  - **Red colour button** - Press for stopping the boom (while in motion) at any point of the boom - either in upward or downward movement.
8.2.3 Interlocked Key chain working

- An independent stand by emergency key chain interlocking arrangement is provided for regulating rail/road traffic in case of damage/mechanical failure of gate machine.

- A post of about 1 meter (i.e. boom height from rail level) is provided at one side of the road. A metallic chain is fixed to this post. A sheet metal round board with legend "STOP" in red (with luminous paint) on white background is provided in the middle of this chain. A loop with E-type lock key is rigidly fixed to other end of the chain.
On the other side of the road, a lever lock with an E-type is provided on a post. The E-type lock plunger normally locks the lever lock plunger in normal position. The post at this side has a hook. In which a chain with a key is hanging to lock the lever lock.

When booms are immobilized due to damage or any other reason, chain is thrown across the road. The loop in chain is then engaged in the hook on lever lock post and E-type lock key is inserted in E-type lock and turned. Turning of key releases plunger of lever lock, which can now be reversed.

The reversing of lever enables transmission of slot of cabin/gate lodge. Once reversed, lever remains locked till slot for opening gate to road traffic is received.

When due to necessity, emergency chain interlocking is used, signals can assume only caution aspect even if other conditions for clear aspect exits.

Thus traffic can be run with the help of emergency key chain interlocking in interim, albeit in restrictive caution aspect, till barrier working is restored.

The arrangement is useful in CLS. (colour light signals) as shown on next page.

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Note:
1. The length of chain will be according to width of the road.
2. Electric lever lock and circuit controller combined 200-mm stroke with one proving contact confirming to RDSO SA 22701 IRS-23.
3. Chain signal steel galvanised 2 SWG 1 7/16 x 7/8 inches outside dia.
4. Stop board – 300-mm dia 3 mm thick, galvanised steel plated with fluorescent red paint back ground with stop in white letters.
### 8.2.4 Operation with Relay status

#### I - NORMAL WORKING

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>NORMAL POSITION OF RELAYS WHEN GATE IS CLOSED.</td>
<td><em>down</em></td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>up</td>
<td>up</td>
<td>up</td>
</tr>
<tr>
<td>GATE TO BE OPENED</td>
<td>up</td>
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<td></td>
<td>up</td>
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<td></td>
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</tr>
<tr>
<td>A. Panel operation</td>
<td>up</td>
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<tr>
<td>COG and B &amp; GRB pressed.</td>
<td>down</td>
<td></td>
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<tr>
<td>b. Buttons released.</td>
<td>up</td>
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<tr>
<td>GATE IS COMPLETELY OPEN</td>
<td>down</td>
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<td>GATE TO BE CLOSED</td>
<td>up</td>
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<td>A. Panel operation</td>
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<tr>
<td>COG and B &amp; GRB pressed.</td>
<td>down</td>
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<tr>
<td>GATE IS</td>
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</tbody>
</table>
### II - EMERGENCY KEY CHAIN INTERLOCKING WORKING WHEN BARRIER GETS DAMAGED WHILE CLOSING

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>ST N. X Y X N R</th>
<th>X Y N R</th>
<th>Y R</th>
<th>D TR FR R D</th>
<th>X C K R</th>
<th>X R</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1- CLOSING INITIATED BY PRESSING COG&amp;B and GRRB</td>
<td>↑ ↓ ↑ ↓ ↓ ↑ ↓ ↓ ↓</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>E2 BUTTONS COG&amp;B And GRRB RELEASED</td>
<td>↓ ↓ ↓ ↓ ↓ ↑ ↑ ↓ ↓ ↓</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>E3 BARRIER BUTTON PRESSED and BOOM STARTS CLOSING.</td>
<td>↓ ↓ ↓ ↓ ↓ ↑ ↑ ↑ ↓ ↓ ↓</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>E4 GATE MACHINE CRANK HANDED and BROUGHT TO 0°</td>
<td>↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E5 CHAIN PLACED ACROSS THE ROAD And EMERGENCY HANDLE OPERATED</td>
<td>↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓</td>
<td>↑ ↓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### III - EMERGENCY KEY CHAIN INTERLOCKING WORKING WHEN BOOM IS IN RAISED POSITION AND CLOSING OF BOOM IS NOT POSSIBLE

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>ST N. X Y X N R</th>
<th>X Y N R</th>
<th>Y R</th>
<th>D TR FR R D</th>
<th>X C K R</th>
<th>X R</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6 CLOSING</td>
<td>↑ ↓ ↑ ↓ ↓ ↑ ↓ ↓ ↓ ↓</td>
<td></td>
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</tr>
<tr>
<td>INITIATED BY PRESSING COG&amp;B and GRRB.</td>
<td>↓ ↓ ↓ ↓ ↑ ↑ ↓ ↓ ↓ ↓</td>
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</tr>
<tr>
<td>E-7 BUTTONS COG&amp;B And GRRB RELEASED.</td>
<td>↓ ↓ ↓ ↓ ↑ ↑ ↑ ↓ ↓ ↓</td>
<td></td>
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</tr>
<tr>
<td>E-8 BARRIER COG and B And GRRB CLOSED.</td>
<td>↓ ↓ ↓ ↓ ↑ ↑ ↑ ↓ ↓ ↓</td>
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</tr>
<tr>
<td>E-9 CHAIN PLACED ACROSS THE ROAD And EMERGENCY HANDLE OPERATED.</td>
<td>↓ ↓ ↓ ↓ ↑ ↓</td>
<td></td>
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</tbody>
</table>

**ELECTRIC LIFTING BARRIER**

*July* 2000
**IV-EMERGENCY KEY CHAIN INTERLOCKING WORKING WHEN BOOM GETS DAMAGED WHILE OPENING.**

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>ST N.</th>
<th>X N</th>
<th>X N</th>
<th>X Y</th>
<th>Y R</th>
<th>Y R</th>
<th>D</th>
<th>TR</th>
<th>FR R</th>
<th>X C K R</th>
<th>X R</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-10 OPENING INITIATED</td>
<td>↑</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
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<td>↓</td>
<td>↓</td>
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<td>↓</td>
</tr>
<tr>
<td>E-11 BUTTONS COG and B</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>And GRB RELEASED</td>
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<tr>
<td>E-12 BOOM STARTS OPENING BUT BREAKS</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>E-13 GATE MACHINE CRANK HANDLED And BROUGHT TO 0°</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
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</tr>
<tr>
<td>E-14 CHAIN PLACED ACROSS THE ROAD and EMERGENCY HANDLE OPERATED</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
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<td>↓</td>
</tr>
<tr>
<td>E-15 COG and B and GRRB PRESS AND RELEASED</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↑</td>
<td>↓</td>
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</tr>
</tbody>
</table>

**V-EMERGENCY KEY CHAIN INTERLOCKING WORKING WHEN BOOM IS DAMAGED IN CLOSED POSITION.**

<table>
<thead>
<tr>
<th>OPERATIONS</th>
<th>ST N.</th>
<th>X N</th>
<th>X N</th>
<th>X Y</th>
<th>Y R</th>
<th>Y R</th>
<th>D</th>
<th>TR</th>
<th>FR R</th>
<th>X C K R</th>
<th>X R</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-16 GATE MACHINE</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
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</tr>
</tbody>
</table>
8.2.5 Maintenance

8.2.5.1 Weekly

- Checking of wire connections, contacts and cable wire connections.
- Checking of motor carbons tensions of carbon springs and cleaning of armature.
- Checking of machine foundation bolts, motor-fixing bolts, gearbox-fixing bolts, pulleys of motor and gearbox, clutch assembly bolts and boom bolts.
- Checking of screws of ebonite cams of contacts.
- Checking of traffic lights, traffic warning bell, boom light and indication lamps of operating panel.

8.2.5.2 Monthly

- Cleaning and greasing of gears and oiling of oil points.
- Balancing of weight, testing of E lever locks.
- Testing of emergency cancellation key and checking of oil in gear box.

8.2.5.3 Quarterly Monthly

- Checking of motor peak and normal load while opening and closing.
- Checking of NX switch.
- Checking of core to earth insulation with 110 V megger from K rack.
8.2.5.4 Yearly

- Testing of cable insulation and motor insulation.
- Cleaning of neutral relays and contractor relays.

9. INSPECTION OF INTERLOCKED L.C.GATES

IN GENERAL

- The approach road should be in level.
- The gate equipments should be there as prescribed in the working rule.
- It should be ensured that the “Whistle Board” and “Warning Board” are provided.
- The telephone communication is in proper working order.
- The working instructions of level crossing gate is in local language besides Hindi and English.
- The height gauge should have proper clearance and should be located at a minimum of 8 (eight) meters from gate post in case of electrified section.
- Provision of Speed breakers on either side of Level crossing with in Railway boundary, preferably at a distance of 20 meters from gate.
- Ensure that boom locking is effective.

10. Trouble shooting

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Type of Failure</th>
<th>Action to be taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lifting barrier fail to operate in either position i.e. i) open-close ii) close-open</td>
<td>Check power supply at motor terminal, Check motor connections, contactor and carbon if not available then check supply at the panel end.</td>
</tr>
<tr>
<td>2.</td>
<td>Taking more time in close as well as in open operation</td>
<td>i) Check power supply. ii) Check the balancing of weight and adjust it if required. iii) Check cable and motor insulation.</td>
</tr>
<tr>
<td>3.</td>
<td>Motor is working but boom is not working.</td>
<td>iv) Check V belt or timing belt is proper. v) Check the friction clutch. vi) Check moon crank pin or pulley pin.</td>
</tr>
<tr>
<td>4.</td>
<td>Barrier not getting lock</td>
<td>i) Re-operate the barrier from panel and see locking is achieved or not, If achieved it means operator fail to operate correctly.</td>
</tr>
</tbody>
</table>
ii) Check needle bearing of moon crank and lever pin if worn out, replace it.

| 5. | Failure of road signal in open condition/ close condition | i) Check bulb and replace if fused.  
|    |                                                          | ii) Check indication circuit properly.  
|    |                                                          | iii) Check limit switch.              |
| 6. | Failure of boom light | i) Check bulb and replace if fused  
|    |                                                          | ii) Check limit switch.              |

11. **TOOLS**

i. Multi meter 1 No.  
ii. Megger 1 No.  
iii. Spanner set 1 No.  
iv. Pliers 1 No.  
v. Screw driver Set 1 No.  
vi. Allen key 1 No.  
vii. Hammer (5 Lbs.) 1 No.  
viii. Chisel 1 No.

12. **CONSUMABLES**

i. Timing Belt, 285 L, 20 mm width (make - Mitsubishi/Syncrostar)  
ii. SAE oil (Grade 90 or 100)  
iii. Cotton waster ‘A Grade’  
iv. Lamps