Electric lifting barrier with hand generator HEIDZ make

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Study the electric lifting barrier with hand generator HEIDZ make (MODEL ELB-206) as per RDSO specification /180/2005 Amd2

The level crossings gates are provided with lifting barriers, which are operated by a central winch through wire transmission or power supply. As road and rail traffic increases, necessity of introducing electric operated lifting barriers on Special, A & B class level crossing gates. All Special, A & B class level crossings are protected by signals.

ADVANTAGES OF ELB;

1. Easy operation to avoid physical strain on gate man.
2. Crank handle facility for manual operation of gate in case of power or any other failure. (However both barriers will have to be cranked separately as they are not mechanically linked).
3. Barrier pedestals can be erected on opposite sides of roads for equal flow of road traffic when barriers are raised. i.e., RHS of road.
4. Individual operation of booms can be possible
5 Easy maintenance.
6. The time of operation is only 10 sec. against 60 sec. for manual operation.
7. Barrier width is enlarged to increase its visibility to road users.
8. Boom Segments are bolted together and facilitate easy replacement in case of damage to barrier by road vehicles, hence break down time can be reduced
9. Increased safety due to boom lock and lock detection
10. Feasibility of remote operation in conjunction with close circuit TV
11. Effortless operation and hence improved service condition of gate man.
12. The operating mechanism also includes a suitable device which locks the lifting barrier in the vertical and horizontal positions

Main components of electrical lifting barrier as per RDSO/SPN/180/2005 are

1. Control panel with hand generator
2. Pedestal with boom
3. Boom rest

Mode of operation: There are three mode of operations are available in this LC gate and they are

1. power operation
2. Hand generator operation
3. Crank handle operation

Power supply parameter

For barriers without Hand generator:

Type	Rated Voltage	Normal (max.)Operating Current / barrier for boom length upto 9.76 m (≈10 m)	Maximum rated Current for each barrier for boom length upto 9.76 m (≈10 m)
AC	110V	2.5 Amps	4 Amps
DC	24V	4 Amps	7 Amps
DC	110V	1.0 Amps	1.8 Amps

For barriers Hand generator

Type	Rated Voltage	Normal (max.)Operating Current / barrier for boom length upto 9.76 m (≈10 m)	Maximum rated Current for each barrier for boom length upto 9.76 m (≈10 m)
DC	24V	3 Amps	5 Amps
DC	110V	0.7 Amps	1.2 Amps

CONTROL CUM INDICATION PANEL

It is small rectangular metal case with door and placed in gate lodge at appropriate place, so as to have adequate visibility of track and road on both side of gate lodge. Control panel provides different operational facilities like operation of both Booms simultaneously or individually

1. Main power supply switch : when off cut the main power supply including generator supply
2. Auto /manual mode switch: when generator is to be used turn to manual mode
3. Barrier-1and Barrier 2 ; Facilitate individual barrier operation
4. Open and close switches; Are used for open and close operation of barrier

HAND GENERATOR

Hand generator is used in case of power failure. Hand generator mounted in side casing and a handle is fixed from outside. It generates 24 DC volts when handle rotated at genuine speed which attends the 1500 RPM by means of gear box provided between handle and generator. To use the hand generator turn the switch to manual mode and rotate the handle in anti clockwise direction for opening and clockwise direction for closing the gate while standing in front of handle .

PEDESTAL

Pedestal is main part of heidz electric lifting barrier and contains motor and gear system to generate mechanical power to operate gate barrier. It contain crank and link system to extend mechanical movement from gearbox to barrier. Circuit controllers are fixed on various shafts to control feed power to different type of functions. Gearbox is oil filled, sealed composite gear drive and requires very low power.

Pedestal comprises of

1. DC MOTOR
2. DRIVE UNIT (gear box)
3. CIRCUIT CONTROLLE
4. FRICTION LUTCH
5. SPECIAL LINK SYSTEM

6. CHRANK HANDLE CONTACT

D.C PERMANENT MOTOR;

It is Compact & Durable 24 V or 110 V Permanent Magnet motor (120 W, 1500 RPM). Motor is capable of operating barrier at 25% below & above rated voltage. It is mounted inside pedestal and shaft is connected to gearbox with the help of timing belt

DRIVE UNIT (gear box)

It is oil filled gear box provided to get desired mechanical advantage (power) and capable of locking the movement of boom in last operated position in case of power failure

CIRCUIT CONTROLS

There are 6 Contact Circuit Controller and called as limit switch which operates on the principle of cam these cam are fixed on boom shaft and gear box shaft Limit switches provided are LS1, LS2, LS3, LS4, LS5, and LS6

Friction clutch

It is provided for over load protection to the motor in case the boom is in lock condition.

Special link system

It comprises of three links main boom shaft link, connecting link and gear box shaft link it also increase the mechanical advantage and stops excess rotation of boom beyond 90°and 0°

CRANCK HANDLE CONTACT

Manual operation facility is provided in the form of crank handle and insertion of the crank handle disconnects the power supply path to the motor. If crank handling is to be done when gate is failed in close and lock condition then unlocking of the boom shall be done by gate man with using the key & lever in his possession.

Boom rest with solenoid locks (lock post)

The tip of the boom rest on this and arrangement is provided to lock the boom and positive proving of boom locking with the help of special magnetic switch called as read switch. The unlocking of boom is activated by a solenoid which works on 24V DC and feed to the solenoid automatically controlled by the limit switch LS3. The arrangement is provided on the rear side of the boom rest box to unlock the boom mechanically with the help of lever incase boom get locked due to power failure. (as per amendment-2 of the specification the new boom locking will be motorized and read switch will be mechanical)

BOOM of Electrical operated LC gate

The boom of gate is made of aluminum sheet (as amendment 2 in draft specification it shall be made of galvanized iron sheet and octagonal with telescopic structure) and maximum length of boom is 9.76 Mts and available in four pieces.

The open position of the lifting barrier shall be within 80° to 85° degrees from the horizontal and the closed position shall be within 0° to 10° from the horizontal. At the center of the boom, the lifting barrier shall be provided with a 600mm dia red disc having red reflector/luminous strip facing the road traffic. It shall be ensured that Boom locking is effective and it is not possible to lift the boom by more than 10 degrees from closed position

Wiring of LC gate

As the motor used is a D.C permanent motor, the circuit is to be designed in such a way that every operation the direction of current shall be reversed. This arrangement is achived in control panel with the help NC/NO contacts of switches.

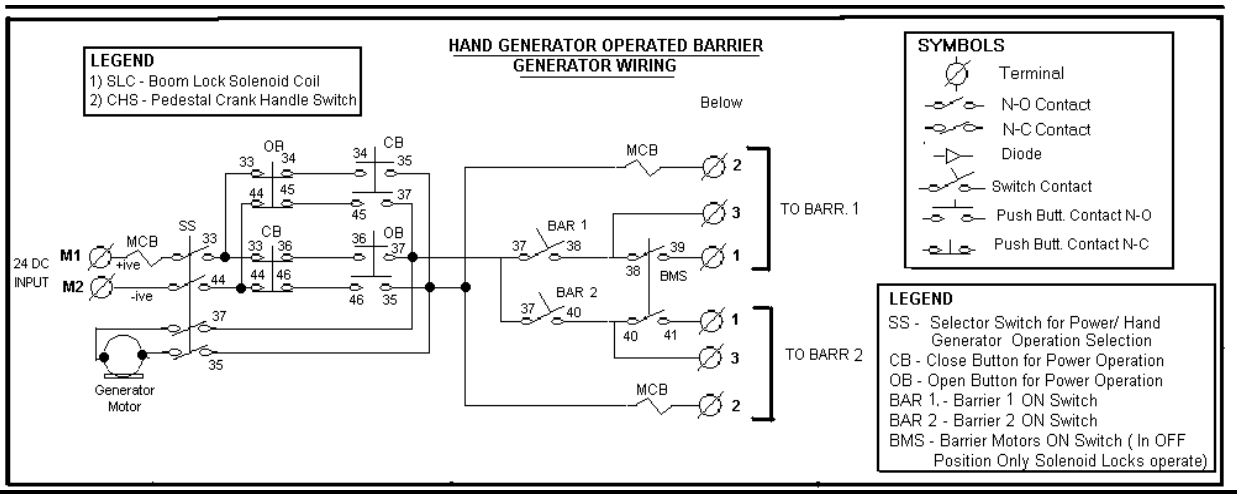

Fig.. Wiring inside the control panel

The supply from the control panel is extended to pedestal and connected to D.C motor through diode and limit switch so that current should be unidirectional and supply to motor shall be cut off at the end of operation

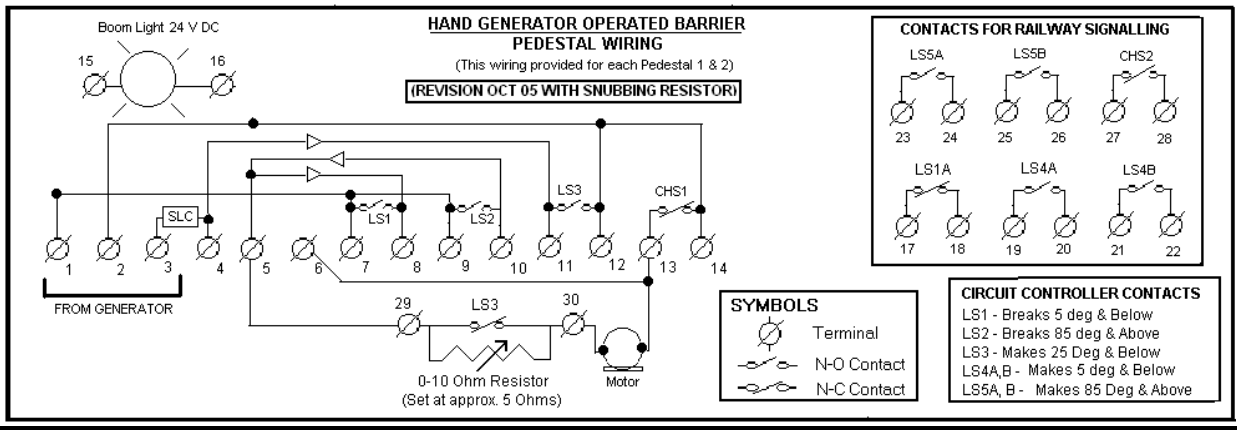

Fig... Wiring inside the pedestal

General guide lines given in SEM II regarding ELECTRIC LIFTING BARRIER:

1. Machines must be kept in good condition, free from rust, dust and dirt.
   The bearing surface and moving parts of the electric lifting barrier shall be lubricated properly.
2. Contacts must be kept clean and in proper adjustment. If contact surfaces are pitted, they must be replaced.
3. Commutator and Brushes:- Commutator must be clean, smooth and have a bright appearance and Brushes must be kept clean and properly bedded on the commutator. Brushes should have proper pressure and should be free in brush holders.
4. Friction clutch must be so adjusted that the same should get de-clutched when the boom is raised or lowered fully and the power supply is not cut off.

5. The shock absorber at the boom rest (stop post) must be kept properly adjusted.
The time of operation of electric lifting barrier shall not exceed stipulated time. Measured value of current should not exceed rated values.
6. The satisfactory functioning of the lifting barrier by a hand crank shall be checked.
7. All gate locking apparatus must be examined regularly and working parts kept oiled. Gate locks must be kept in good working order.
8. Proper working of audio/visual warning shall be ensured.
Approach warning arrangement where provided, is working satisfactorily and effectiveness of Approach and Back locking provided shall be ensured.
9. The telephone communication facilities where provided between Level Crossing gates and the adjoining stations shall be checked in regard to their satisfactory functioning.
10. Heavy repairs, renewals or alterations to gate interlocking must not be carried out until Jr. Engineer/Section Engineer/Sr. Section Engineer (Signal) concerned has arranged for the protection of the road traffic by the concerned department and the work shall be carried out under proper disconnection.
11. Sectional Signal engineer shall maintain a register indicating details of each class of level crossing gate in regard to its location, number, type of gate provided, provision of communication, interlocking arrangement, provision of approach warning and flash lights etc., pertaining to his section. A statement in regard to the above should be submitted on first January and first July every year, to the Sr. Divisional Signal and Telecommunication Engineer/Divisional Signal and Telecommunication Engineer.
12. Maintenance Schedule as laid down in Annexure-11 shall be followed. This may be modified by CSTE of the Railway to suit local needs.

1. The solenoid lock works on ----------supply
2. The boom light is LED based & works on ---------- supply
3. Maximum length of Boom is ---------- meters
4. Hand generator generates ---------- supply when handle rotated at genuine speed (1500 RPM)
5. The open position of the lifting barrier shall be within ---------- degrees from the horizontal and the closed position shall be within ---------- degrees from the horizontal
6. At the center of the boom, the lifting barrier shall be provided with a ----------dia red disc having red reflector/luminous strip facing the road traffic
7. It shall be ensured that Boom locking is effective and it is not possible to lift the boom by more than ----------degrees from closed position
8. The working instructions of the L.C.Gate is provided in ---------- ---------- languages