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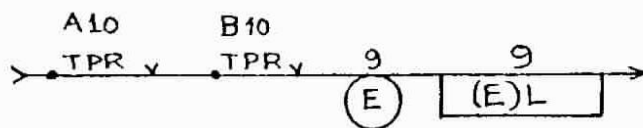
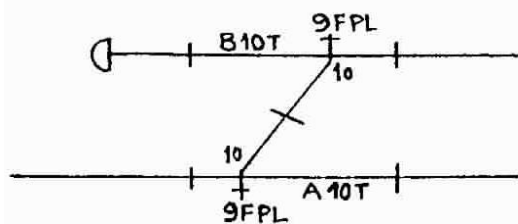
### Study of IRS Combined Lever Locks and Circuit Controllers

Electric lever lock is used where an electrical control on a mechanical lever is required. It is a electro magnet controlled equipment placed just below the lever tail inside the basement and connected to the tail of the lever to be controlled. The lever tail is connected to the plunger of lever lock with help of down rod and plunger moves up and down with movement of the lever. The notches are cut on the surface of the plunger and a spring loaded lock pawl attached to electromagnet armature rests on the surface of the plunger whenever notch on the plunger comes in front of lock pawl it falls inside the notch and lock the plunger and hence the lever. When feed is extended to electromagnet coil the lock get released and lever can be move further.

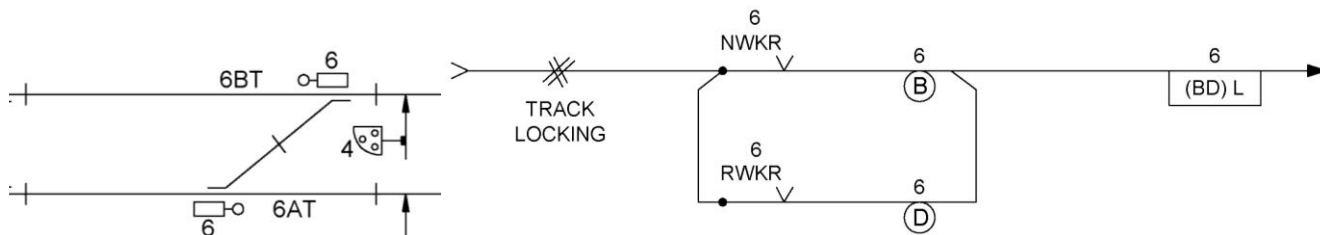
Any interlocking condition can be a part of feed to electromagnet such as,

1. Track locking
2. Indication locking
3. Back locking
4. Approach locking

The circuit diagram of a lever lock and circuit controller a) Track locking and b) Indication locking in electro-mechanical signalling are given below:-



#### Track locking



#### Indication locking

## 1. Types of Lever locks and Circuit controllers are

- A). SGE lever lock and circuit controller (Single wire).
- B). IRS lever lock and circuit controller (Single wire). And
- C). T-2 type lever lock and circuit controller (Double wire).

### 2. The following are main features of a Lever Lock and Circuit Controller

- i) Electromagnet.
- ii) Force dropping arrangement.
- iii) Economiser contacts mechanism.
- iv) Lock proving contacts.
- v) Sliding plunger with lock pawl.
- vi) Circuit controllers and its operating mechanism.

## Theory:-

**Introduction:** Electric lever lock is an electromagnetic device used where an electrical control on a mechanical lever is required. The lock holds the lever mechanically so that the lever cannot be operated when the condition for its operation is not safe.

**Electromagnet:** The armature and magnet core is laminated and shading bands are fixed on the pole faces to ensure quiet and efficient operation when used on alternating current.

**Force drop device:** Sometime, the armature of the lever lock may not release after de-energisation of lock coil due to residual magnetism or any other mechanical holding which may lead to unsafe condition by allowing the lock to release without proving the required safety conditions. To ensure that the lock pawl is positively pushed inside the locking notch before every unlocking operation, a mechanical arrangement called "force drop" is provided. The force drop pins/nibs are riveted on the slide and a bevel shaped extension is provided with the lock pawl. The force drop PAP/Nib force the lock pawl to drop into the locking notch through its bevel shaped extension before each pick up.

**In DW (T-2 type Drg. No.SA2120/M)** Electric lever lock circuit controller bevel shaped projections are provided on the bottom surface of the rotary type locking **segment instead of force drop pins/nibs of S. W.** lever locks.

**Economiser Contact:** The economiser contact is provided with the electric lever lock circuit controllers to cut off the power to the lock coil at the end of each stroke. It makes between A & E positions of the lever and remains disconnected in N & R positions of the lever. This connects supply to the lock coil proving other required conditions after initiating the operation of the lever from its N' or W position thus economising the power consumption.

The D.W (T-2) type lever locks is not provided with economiser contact hence 'AE' band of circuit controller can be used as an economiser contact.

**Lock Proving Contacts:** A set of contacts is actuated when the lock is de- energised the lock pawl drops into the locking notch, proving that the lever is locked positively. The lock proving contacts are not provided in D.W.(T-2 type) lever lock.

**Counter Weight in SGE:** The operating lever of the lever lock carries a carefully designed counter weight to throw the dog by gravity into the lock slide notches in the vertical mounting of the lever lock. As the affect of this counter-weight is opposite in horizontal mounting, it should be removed when lever lock is mounted horizontal to avoid unsafe working.

The D.W. T-2 type (Drg.No.SA.2120/M) Lever locks and SM. lever locks designed as per R.D.S.0 Drg.No.SA.22701 are not provided with counter - weight.

**Circuit Controllers:** Circuit controller is a device by which electrical circuits can be made or broken according to requirements. Generally, it is provided with two sets of fixed finger contact springs and corresponding numbers of rotating bands. The rotating bands, may be of different positions which as N'R', 'NB', 'RD' etc. The contact bands are rotated along with lever operation through cam & roller or rack & pinion arrangement. In some lever lock circuit controllers the rotating bands are adjustable type whereas in others they are fixed type. Each rotating copper band is held in the Bakelite contact holder. Generally, in SM. lever lock circuit control four sizes of contact segments are used the details of which are given in Fig. 1.

Type	Resistance of coil	Working voltage	Stroke plunger	Force drop arrangement	Economiser contact	For 'H' or 'V' mounting
SGE (two coils)	6.25+6.25 ohm series	230VAC/ 50 W 12VDC	200mm	Provided	Provided	For both
	3.125 ohm parallel	110VAC/ 50 W or 06VDC	200mm	Provided	Provided	For both
IRS (Single Coil)	4.5 ohm		200mm	Provided	Provided	For both
T2 for DW (Single Coil)	150 ohm	10-12V DC	40mm	Provided	Not provided	Vertical mounting only

#### Testing of the lever lock circuit controllers:

1. Check that the all moving parts are clean, oiled and they work freely.
2. The lock armature works freely.
3. Check the proper functioning of force drop device. This can be tested by holding the armature loosely by hand and operating the lever from locked position. If a down wards force is experienced on hand, it indicates that the force drop device is functioning properly.
4. Check the faces of the locking notches on the lock slide and the lock pin any wear.
5. Cheek all terminals, screws and nuts for proper tightness.
6. Ensure that the circuit controller contact bands and springs are cleaned and they make contacts with proper tension.
7. Cheek the terminal clocks of circuit controller for their proper fitting and intactness.
8. Check the economiser contact and lock proving contacts for their proper functioning.
9. Ensure that the split pins are in position and properly splitted.
10. Check the wiring of any damage of insulation especially at cable inlets.

11. Measure the operating voltage and current at lock coil terminals.
12. Carry out the test to ensure that the lever cannot be operated when the required safety conditions for its operation are not fulfilled.
13. Ensure that the staff operating the levers are familiar with the operation of the levers fitted with electric lever locks. Such levers should be operated **urgently without** jerk after the lever getting un-locked electrically.

**Review Questions :-**

Q. 1 What is the function of the electric lever lock?

Q.2 What is the function of Econorniser contact?

Q.4. What do you understand by force drop arrangement in the lever lock?

Q.4. What is resistance of coil of electro-magnet of IRS lever lock ?

**Date:**

**Signature of the Trainee**