नाम
Name : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

अनुक्रमांक
Roll No : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

प्राप्तांक
Marks Awarded :

पाठ्यक्रम
Course : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

दिनांक
Date : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

अनुदेशक के आद्यक्षर
Instructor Initial :

STUDY OF ELECTRIC KEY TRANSMITTER (Rotary key transmitter)

Introduction :- EKT is combination of E-Type Lock and an electromagnet.
When key of E-Type lock is inserted in EKT and turned then the key get locked
The locked key can only be released when Electromagnet in side EKT is energized. EKT is Electro magnet based equipment in which a key of 'E" type lock is in locked condition and can be released only when Electro magnet is energised. It is used to transfer the key electrically from a centralized place to other location and also to prove that gear/ equipment attached to EKT key(Crank handle) is in locked condition. This Electrical transmission of key over comes the problem with physical transmission of the key.

The simplest way of controlling a signal, point, or level crossing gate is that the SM shall retain the key of the controlled apparatus (which is normally locked) and issue the key for releasing the apparatus when required.

When signalling gear is controlled through key interlocking then transfer of key from SM/ Cabin to signalling gear is required. As the physical transmission of the key to the controlled spot causes delay, Electrical Key Transmitters are used. The key is normally kept locked in Transmitter (EKT) at site and a similar key Transmitter (EKT) is fixed in stationmaster's room / cabin. They are electrically (cable) interconnected. The instruments have indicator to indicate visually (that a key is transmitted' and EKT is ready for extraction of key), for calling attention either a bell or phone connection provided between the ends.

The Electric key Transmitters are of robust construction and are normally fixed close to the appliances, which is to be unlocked by the key locked in EKT. EKTs are designed to accommodate the key of a particular ward & feather combination so that key controlling/interlocked one signaling gear, does not enter any other EKT controlling other signaling gear of its kind to ensure safety. They are provided with locking or sealing arrangements for security reasons.

EKTs are used in pair OR in single when controlled from panel

Application of EKT

- L.C. Gate and Station Master/ Cabin
- Locally operated siding point
- Crank handle locking
- Locking of key (used for shunting) electrically attached to Block instrument
- Along with token key exchanger at intermediate sidings

WORKING PRINCIPLE

RKT contain one drum which accommodates all the tumblers spring and operating piece and has notch on it's periphery. Realising OR locking of key depends open rotation of drum but rotation of drum is locked if a plunger attached to an armature of an electromagnet is inside the notch on periphery of drum. When feed is extended to electromagnet, the armature get attracted and plunger attached to it comes out of notch on periphery of drum now drum can rotate and key can be extracted.

Exercise 1

Description of the instrument and exercise:

1. The Electrical key transmitter consists of _____ (two) parts.
    a) The back portion
    b) The front portion

    c) The front portion or cover having _____ (a hole) for the insertion of key and a small disc type _____ (indicator) to indicate the incoming and outgoing currents and calling attention of operator that EKT is ready for extraction.

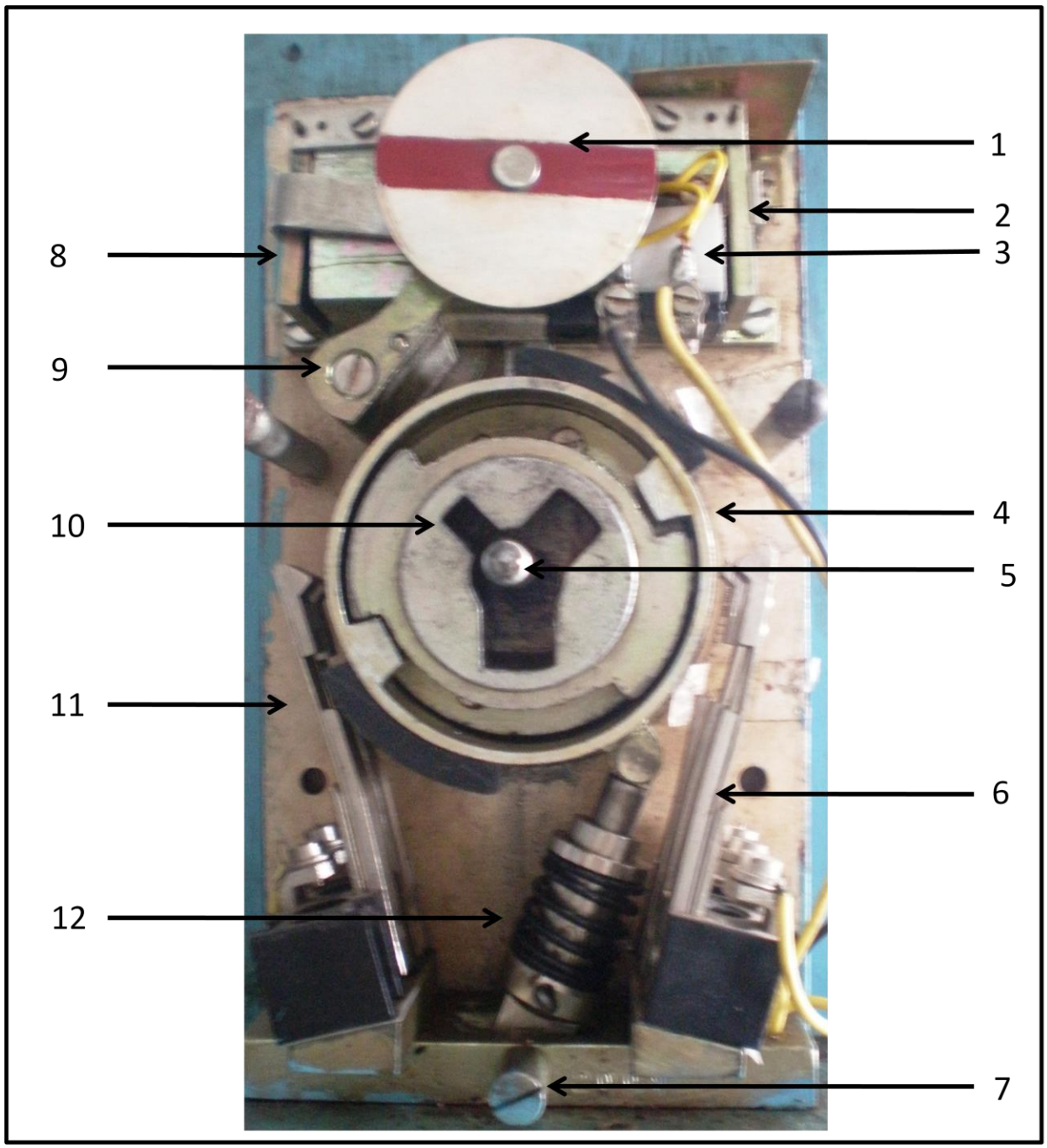
2. The back portion of base consists of three parts
    a) Electro – magnet
    b) Contact arrangement unit and.
    c) Locking unit.
    d) Force drop arrangement

Exercise 2

3. **Electro – Magnet:** The Electro – magnet occupies the upper portion of the case having a coil resistance of _____(12.5)Ω. The minimum voltage required to operate the magnet is 3.75V DC and working voltage is _____(5V) DC and current _____(350)mA as per specification No.S 21 of 1.3.71 (Correction slip). The Magnet has two pole faces. The main pole faces attracts the armature, which in turn releases _____ (locking) plunger which allows extraction of key from RKT The auxiliary pole pulls the link placed behind and attach to the _____(Visual indication) and deflects the indicator towards _____ (Right side) as soon as the coil becomes energized.

4. **Contact unit:** The contact unit consists of _____(5) contacts insulated from each other contact numbers _____(1 & 2 and 3 & 4) normally remain in make condition when key is in transmitter and lock condition whereas at the contact numbers _____(1 & 2 and 3 & 5) are make when the key is turn forcefully to right hand side for transmitting the key to other end to energies the electromagnet

5. **Force drop arrangement:** Force drop arrangement provided on the armature of the electro-magnet to avoid the effects of _____(residual magnetism). normally this gear is hold up word against gravity and restrict upward movement of lock plunger In case, lock plunger remain outside notch on drum due to any reason it push the lock plunger inside the notch due to its weight. then ensure that the lock plunger is properly locked before transmitting to release other end instrument key, otherwise both keys may be simultaneously release. The electrical lock shall be of gravity type and provided with an efficient forced-drop arrangement.



RKT with cover open

1. INDICATOR
2. ELECTRO MAGNET MAIN POLE (ARMATURE)
3. ELECTRO MAGNET
4. DRUM
5. KEY STUD
6. SPRING ASSEMBLY (FINGER CONTACTS)
7. THUMB SCREW METALLIC BASE
8. ELECTRO MAGNET AUXILIARY POLE (ARMATURE)
9. FORCE DROP GEAR
10. OPERATING PIECE
11. BASE
12. QUICK RETURN GEAR

Exercise 3:- Indentify the various parts in table model opened RKT with the help of shown picture above

Exercise 4:-
Observe the contacts in RKT with respect to position of KEY and fills up the table

S.No	Operation	Indication Deflected/ steady		Contacts make / break		Coils energized/ de-energized		Key can remained be extracted.
		X	Y	X	Y	X	Y	
1.	The key at "X" is out							
2.	"X" inserts the key, turns it round to the right and holds it there.							"Y" hears bell sound
3.	"y" Extracts his key. Key is out at "y"							
4.	"X" releases the hold on the key.							

STUDY OF E.K.T WIRING DIAGRAM IN RE-AREA

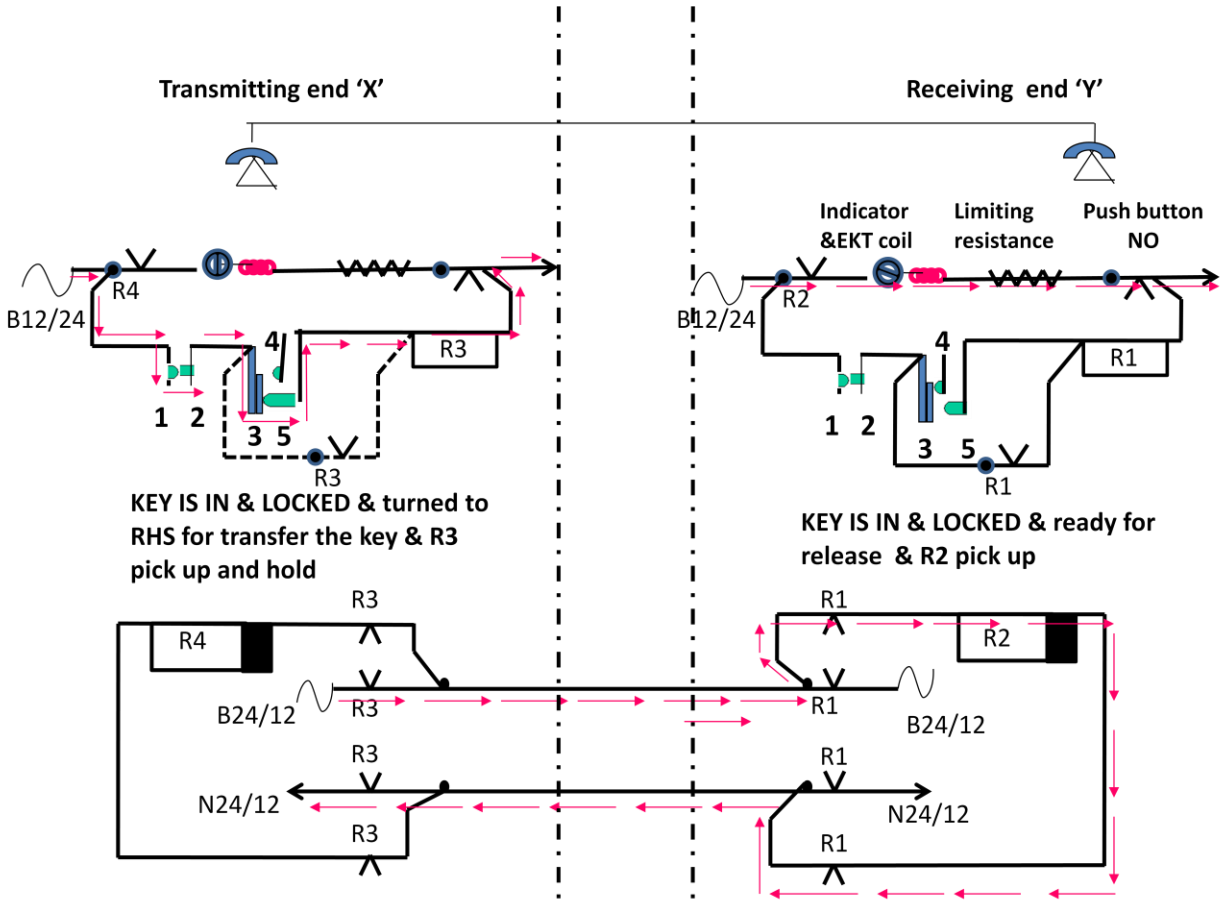
Electrical Key Transmitter instrument in RE AREA: The wiring of the instrument (EKT) in 25KV AC Traction Area is as shown below and direct feeding to RKT coil through line is avoided to overcome inadequate AC immunity of electromagnet coil, it is fed through AC immunized line relay.

In general 12 / 24 volts power supply is used for RKT and to transfer the Key the key transmission relay KTR (R1/R3) is used. As relay and RKT control circuit is common but their operating voltages or different, a limiting resistance is used RKT coil path to drop the voltage to required level.

Key Transmitter relay (R1/R3) (when shelf type relay is used) is 250Ohm instead of 1000 Ohms because, internal/ local voltage require to energies EKT coil and indication is 4V only. In case plug in type relay is to be used then KTR (R1/R3) shall be QS3 relay and (R2/R4) shall be QNA1 relay

Line relay voltage can be 12/24 volt DC and LR (R2/R4) shall be AC immunized

Electrical Key Transmitter instrument working in RE area: The working of the instrument in RE area as follows:



Circuit in RE area where contact 1&2 and 3&4 in series with EKT coil

As the key is not inserted in EKT at location 'x', all contacts are in open condition. At location 'Y' as key is inserted and in locked condition, contact No. 1&2 and 3&4 are in made condition. Now, key is inserted into the instrument of location 'x' and contact 1&2 and 3&4 are in made condition. When key at 'X' is turned further to right hand side 3&4 open and 3&5 is made (1&2 remain made). Now the Key Transmitter Relay 'R3' energized at 'X' and through front contact of KTR (R3)of location 'X' current is extended to location 'Y'. As KTR (R1) of 'y' is not energized at Y location, through back contact of KTR (R1) at 'Y' the LR(R2) relay of location 'Y' is energized and through front contact of LR (R2), armature EKT coil is energized at 'Y' location. Now key at 'Y' can be extracted but key at 'X' remains in locked condition.

Review question:

1. **Describe the "Force drop" arrangement provided on the armature of the Electromagnet. Why it is necessary?**

2. **Why two separate poles are provided in RKT Electro magnet?**

3. **Write down the ward combination /number of RKT key used in Experiment?**

4. **Why limiting resistance is provided in series with electromagnet coil?**

5. **Specify the type of plug in relay used in RE area?**

Date: **Signature of the Trainee**