



इ रि से ट
विद्युत सिगनल प्रयोगशाला
प्रयोग नं: ई एस एल -3

IRISET
ELECTRICAL SIGNALLING LABORATORY
EXPERIMENT NO.: ESL - 3

नाम

Name : _____

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अनुदेशक का अध्याक्षर

Instructor's Initial : _____

PROVED TYPE D.C. NEUTRAL LINE RELAYS (PLUG-IN-TYPE)

Style Manufactured by : K-50 M/s. Siemens (India) Ltd.

K-50 Metal to Metal contact relays are proved type plug in relays. Being contacts are metal to metal, it is ensured that the release of these relays after each previous operation is proved before any function is controlled through their operated contacts. Hence, these relays are called as 'proved type' relays.

Following design parameters contributes to eliminates the chances of contact welding

- To reduce arcing Series double break- double make contacts is used.
- For faster heat dissipation the contacts are made elliptical in shape. This also supports dissipation of contact through wiping action.
- Release time is 7 to 15 milliseonds to reduce the chances of welding.

To ensure that release time of K-50 relay should be minimum,

- One pressing away spring is provided.
- To overcome the effect of residual magnetism

K-50 relays are further classified on the basis of thickness of residual pin /separating pin as:

(a) K50-A type: (0.35 mm residual pin thickness).

Non ACI Neutral, Interlocking Relays.

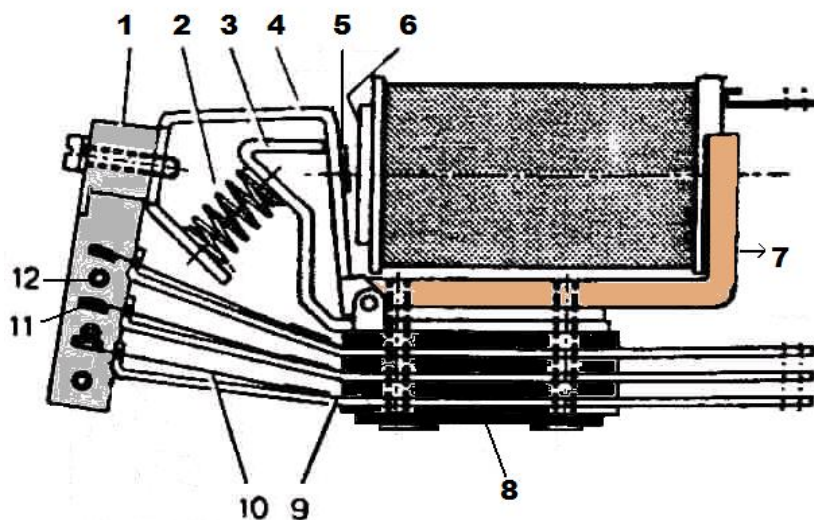
(b) K50-B type: (0.15mm residual pin thickness).

ACI Neutral, double coil, special type relays (Z1RWR, Z1NWR, Z1WR1, Z1WR, WLR etc. in points group), and UECR

(c) K50-E type: (0.45mm thickness).

ON ECR and OFF ECR

Increase in residual pin thickness increases the sensitivity of the relay.



Name the parts of the relays

1	-----	8.	-----
2	-----	9.	-----
3	-----	10.	-----
4	-----	11.	-----
5	-----	12.	-----
6	-----		
7	-----		

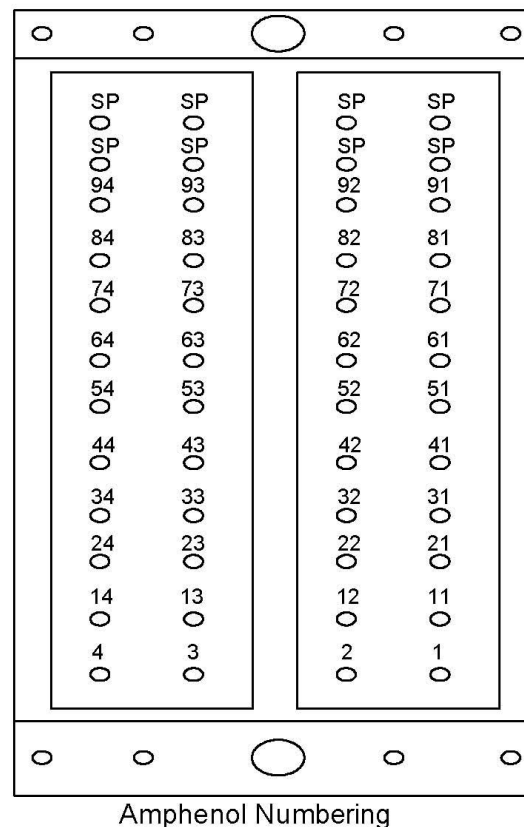
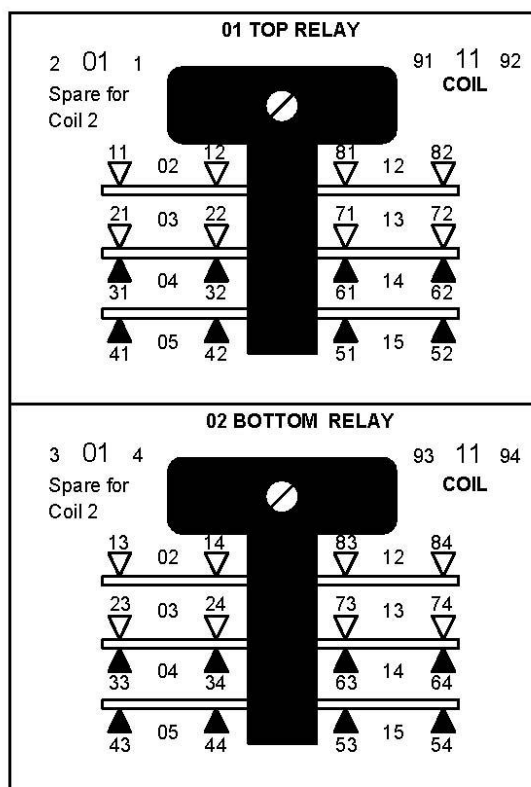
Features of K-50 Relays:

1. Maximum number of contacts = 8 Nos.
2. Contact resistance = 0.05 Ohm
3. Working voltage = 60 V DC
60V operation limits the current levels and hence less power drain.
 - i) Power required for energisation = 0.6 to 1.3 W
 - ii) Operating power - 1.3 to 2.5W (60V D.C. working)
4. Current Carrying capacity
Switching current = 5 amp.
Continuous current = 3 amp.
5. Neutral relay : Pick up time = 25 to 60 milliseconds
Drop away time = 7 to 15 milliseconds
6. AC Immunize relay: Pick up time = 200 milliseconds
Drop away time = 50 milliseconds.
7. All contacts are Independent; series double make double break contacts.
8. Contact material: Silver or Silver palladium or silver with hard gold plating.

Different types of Mini groups available are:

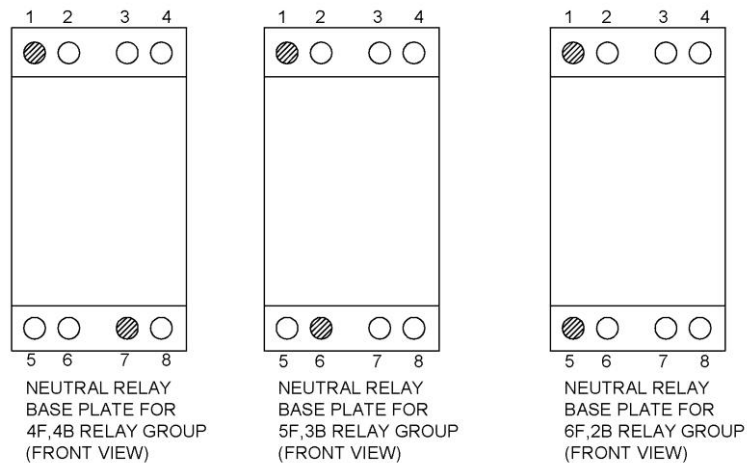
1. Mini Groups with Two Nos. K-50 Neutral Relays.
2. One AC Immunised and one Non – AC Immunised K-50 Neutral relays or Two AC Immunised K-50 Neutral relays.
3. Two Nos. K-50 Inter Locked Relays.
4. Lamp proving relays (3F/3B) for ON and OFF aspect and (5F/1B) for Route Indicator lamps.

Relay Coils and contacts are numbered as shown in figures below.



02-12	always Front contact
03-13	always Front contact
04-14	inter changeable contact
05-15	always Back contact

Code Pin: Code pins are provided to prevent the plugging of wrong configuration of relay to the base plate.



Write down the code pin position

Sl.No	Relay Type	Contact configuration	Code Pin Position
(a)	Neutral:	4F/4B	
		5F/3B	
		6F/2B	
(b)	Inter Locked:	4F/4B	
		5F/3B	
		6F/2B	
(c)	AC Immunized :		
	One relay ACI and other relay Non ACI	5F/3B	2 & 5
	Both relays ACI	5F/3B	2 & 6
(d)	ECRs:		
	ON ECR	3F/3B	4 & 7
	OFF ECR	3F/3B	4 & 5
	UECR	5F/1B	4 & 6

Note the following for the given relays:-

- (I) Pick up volts _____ V; P.U. Current _____ mA
- (ii) Drop away volts _____ V; D.A. current _____ mA
- (iii) % Release of the relay _____
- (iv) Energization Power _____ W
- (v) Normal volts- 60V; Normal working current _____ mA.
- (vi) Normal operating power _____ W

Mini group with AC Immunized K-50 Neutral relays (Drg. Rs. SK. 30/0076.)

ACI relay is provided with Copper slug for AC Immunisation and Brass strip as a counter weight for reducing release time.

It is available in two types:

- a) Top Relay is ACI and bottom relay is Non-ACI.(K-50 A & B)
- b) Both Top and bottom relays are ACI.(K-50 B)

It has contact configuration of 5F.3B only. AC Immunity level is **450 V AC**.

Usage: for all control circuits and detection circuits other than signal lamp proving.

Sl. No.	Relay Type	Contacts	AC Immunity Level	Length of parallelism of coil circuit permitted		
				As per old norms	As per new norms	
					In single line Section	In double
1.	K-50 A&B	5F.3B	150v	1.7 KM	0.75 KM	0.9 KM
		4F.4B	130V	1.4 KM	0.75 KM	0.9 KM
		6F.2B	120V	1.3 KM	0.75 KM	0.9 KM
2	K-50 B I	5F.3B	175 V	2 KM	0.75 KM	0.9 KM

Note:- AC Induced voltage per KM length of parallelism is 35V as per old norms and it is 95 V in double line sections and 116V in single sections as per new norms.

1) Coil Resistance of the AC immunized relay is _____ohms &, coil Resistance of the non-immunized relay is _____ohms

2) Note the following for the given relay:

- i) Pick up volts _____V; P.U.Current _____mA
- ii) Drop away volts _____V; D.A. Current _____mA.
- iii) % Release of the Relay _____
- iv) Energisation power _____W
- v) Normal volts _____V; Normal working Current _____mA
- vi) Normal operating power _____W

Usage: For point detection relays with one repeater and for Track repeater relays with one repeater in A.C. R.E. Area.

K.50 INTERLOCKED RELAY MINI GROUP:

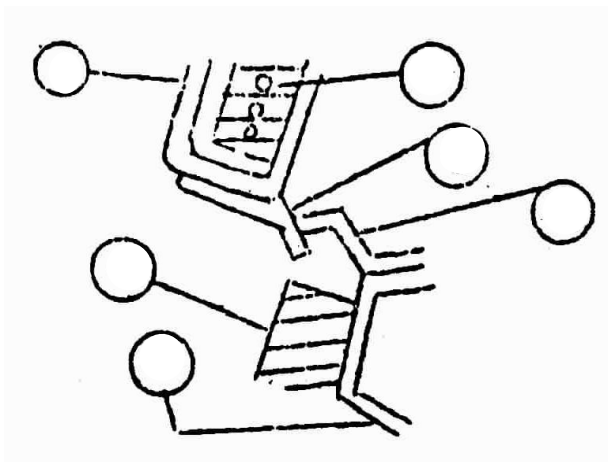
As per Drg. R.S.S.K.30/0012

In this, two 'tiered' K50 relays are mounted on a channel plate fitted to a frame with a common back plate. These relays are mechanically so interlocked by two support plates that at a time only one relay can remain in the released position. Of the two support plates, one is fixed on a bracket screwed to the top relay contact bar. The other one is on the armature extension of the bottom relay.

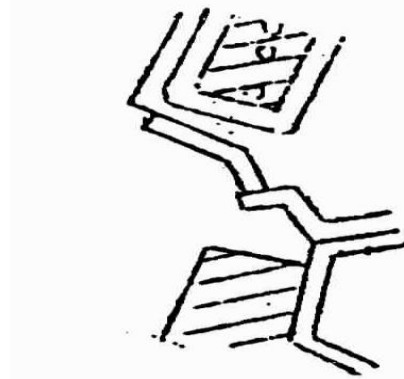
In the normal condition of this unit, the bottom relay armature is latched in its operated position as its support plate is held up by that of the top relay which is dropped.

Contact arrangements are 5F/3B,4F/4B,6F/2B.

(1) Name the parts of the relay shown in the sketch below:



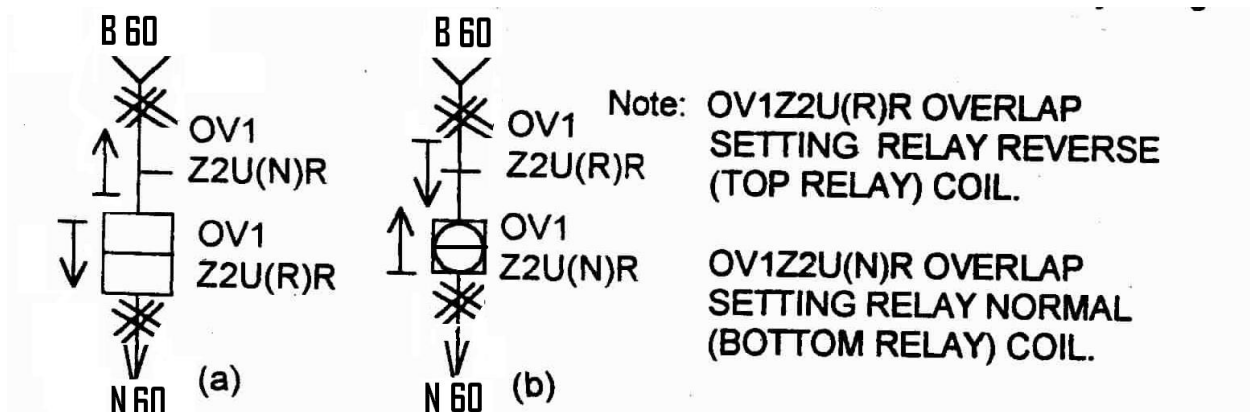
RELAY LATCHED IN _____ POSITION



RELAY LATCHED IN _____ POSITION.

- 1) Bracket on contact bar.
- 2) Top relay contact bar.
- 3) Latch piece on top relay.
- 4) Latch piece on bottom relay.
- 5) Bottom relay contact bar.
- 6) Bottom relay armature extension.

Use of interlocked relay contacts as economizer contacts:-



(2) Observe the given relay and answer :

- Top relay coil is called _____ coil and is normally _____. Its resistance is 615Ω
- Bottom coil is called _____ coil and is normally _____. Its resistance is _____ Ω .
- Front contacts of the top relay are called _____ contacts. (Normal /Reverse)
- Back contacts of the top relay are called _____ contacts. (Normal /Reverse)
- Front contacts of bottom relay are called _____ contacts. (Normal / Reverse)
- Back contacts of the bottom relays are called _____ contacts. (Normal /Reverse)

Note the following for the given relay.

- Pick up volts _____ V P.U current _____ mA (for the 'R' coil)
- Pick up volts _____ V P.U. current _____ mA (for the 'N' coil)

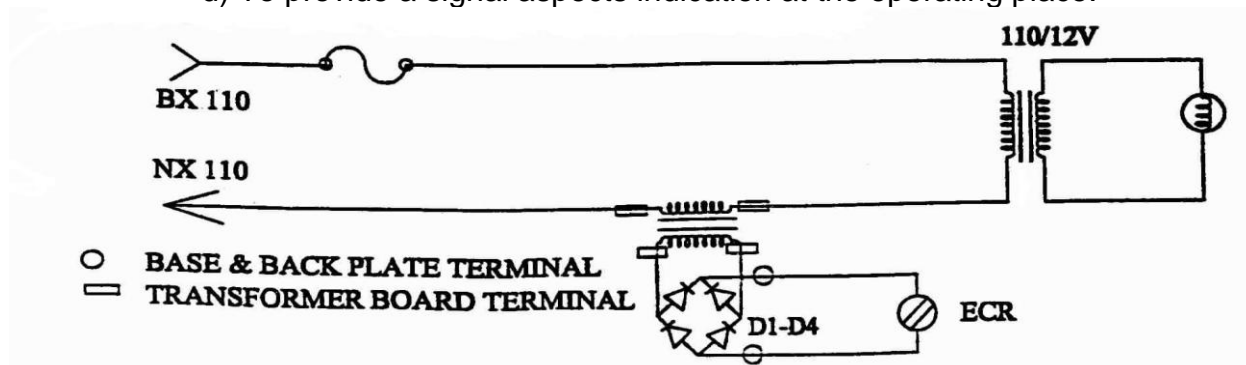
Usage:- For control of conflicting functions and where power failure shall not change the relay conditions.

SIEMEN'S ECRs :-

The relay with metal to metal contact, are utilized for lamp proving purpose supplied as mini group. The mini group comprises of a current transformer, rectifier and a K.50 neutral relay. They are supplied separately for On aspect, OFF aspect and routing aspect.

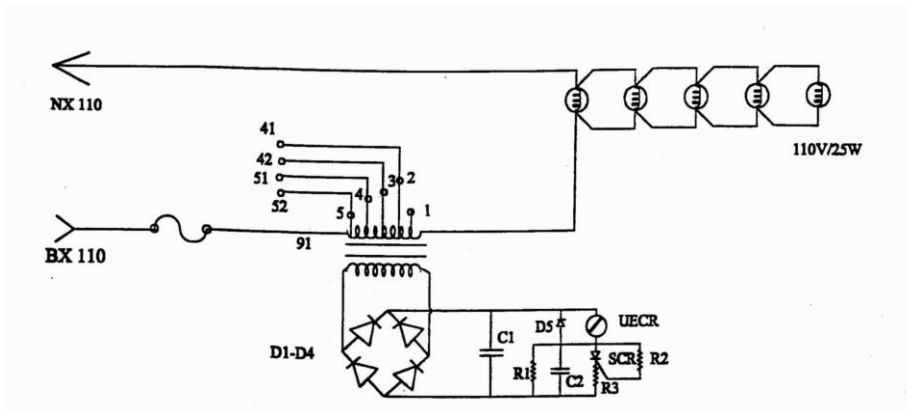
The On aspect ECR is designed to de-energies when one filament of signal is fused but OFF ECR will De-energized only when both the filaments are fused.

- Purpose :-**
- To provide a cascading arrangement.
 - To provide a Red lamp protection arrangement
 - Controlling the signal in accordance with the aspect displayed on signal in advance.
 - To provide a signal aspects indication at the operating place.



Sl.No.	Description	ON ECR	OFF ECR
1	Drawing No.	RSSK-30/0013	RSSK-30/0014
2	Current transformer ratio	1 : 3	1:1
3	Amphenol terminal No's of relay coil	1-91	1-92
4	Relay coil Resistance	64.1 Ω	64.1 Ω
5	Std contact configuration/current	3F/3B	3F/3B
6	PU voltage/current	App 5 V/340 mA	App 5 V/340 mA
7	DA voltage/current	App 4 V/125 mA	App 4 V/125 mA

ROUTE LAMPS CHECKING RELAY (UECR) :- Drg.N.RSSK. 30/0015
(Junction type route indicator lamps connected in parallel)



CT- Current Transformer

D1- D4- Bridge Rectifier

D5- To make relay slow to release

C1- Condenser -100 Mfd. Filtration of rectified PC

C2- Condenser - 0.1 Mfd.

R1- Resistance = 33 K Ohms

R2- Resistance = 39 K Ohms to limit gate current











R3- Resistance = 10 Ohms to limit circuit current

























CBCR = K-50. 'B' Type relay

The basic feature of this relay is that the relay will be de-energized when more than 2 lamps of the junction type route indicator are fused. This is achieved by a special design which will sense the presence of 3rd bulb in the circuit.

Silicon controlled rectifier is connected in series with the relay coil the SCR is switch ON When the gate current flowing through the resistance R2 across the SCR is 5mA and relay pick & up. It stops conduction when the holding current is less than 20 mA.

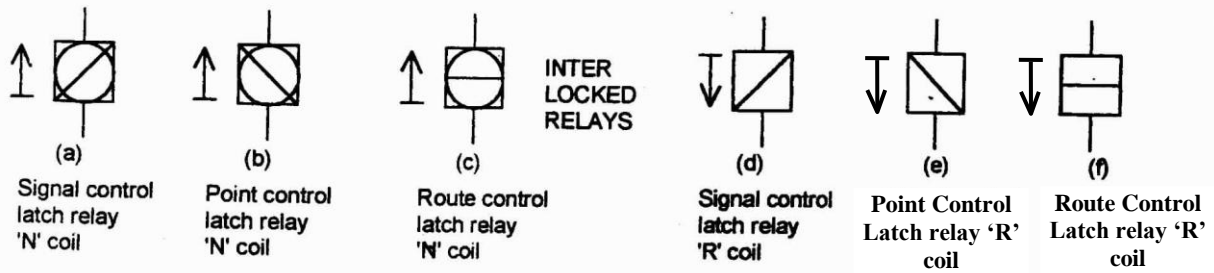
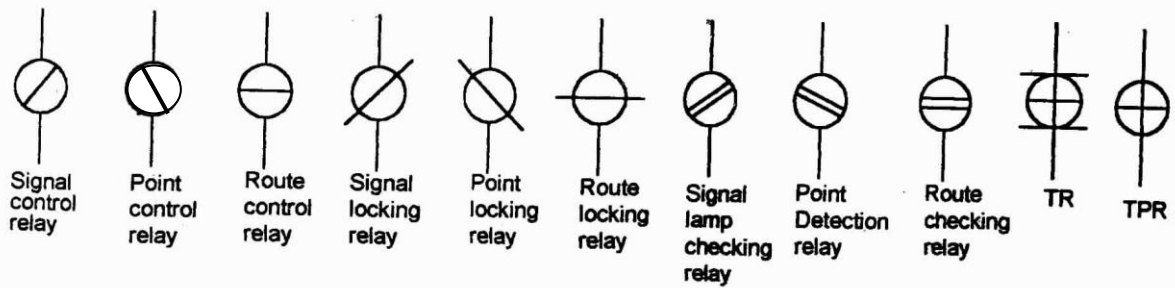
SYMBOLS AND NOMENCLATURES

S.No.	Symbol	Description
1		Neutral Relay
2		Interlocked Relay Reverse Coil (Top Relay)
3		Interlocked Relay Normal Coil (Bottom Relay)
4		Track Relay
5		Track Repeater Relay
6		Block Relay in Automatic Territory
7		Time Element Relay
8		Normal Position of Neutral Relay is picked up
9		Normal Position of Neutral Relay is Dropped
10		Normal Position of Interlocked Relay is picked up (Normal Coil)

Relays Connected in point Circuit 		Relays Connected in Route Circuit 		Relays Connected in Signal Circuit 	
Symbol	Nomenclature	Symbol	Nomenclature	Symbol	Nomenclature
NEUTRAL RELAYS					
	Point Control Circuit		Route Control Circuit		Signal Control Relay
	Point Detection Relay		Route Checking Relay		Lamp Proving Relay
	Point locking Relay		Route Locking Relay		Signal Locking Relay
INTERLOCKED RELAYS					
	Reverse Coil Used for point control circuit for reverse operation		Reverse coil used for Route Control circuit		Reverse coil used for controlling Signal Control Circuit
	Normal Coil used for Point Control circuit for Normal operation		Normal coil used for Route Control circuit		Normal coil used for controlling Signal Control circuit
	Reverse coil used for locking the Point circuit		Reverse coil used for locking the Route circuit		Reverse coil used for locking the Signal control circuit
	Normal coil used for releasing the locked circuit		Normal coil used for releasing the locking over route circuit		Normal coil used for releasing the locking of Signal control circuit

Note: The arrow on the left with a base line indicates the normal condition of the relay.

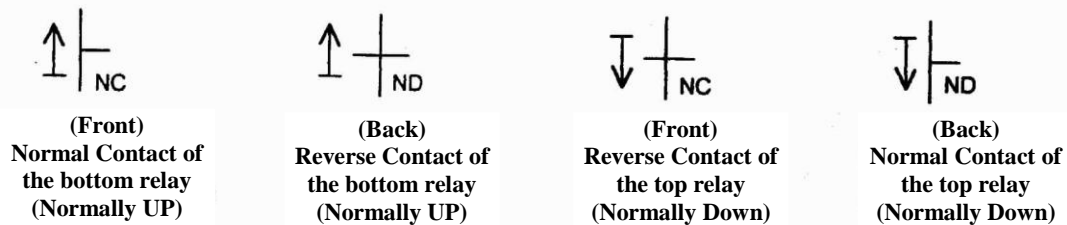
(3) Circuit symbols of relay coils and contacts.



NEUTRAL RELAY CONTACTS



NEUTRAL RELAY CONTACTS



Note: N.C. Contact-Contact closed in Normal condition of the relay. NO. contact- contact closed in reverse condition of the relay. Bottom relay is normally latched in the energized condition. Top relay gets latched when the relay is reversed by energizing the top coil.

K-50 ECRs(Siemens make)

S.No.	Type of ECR	Filament lit	Signal transformer primary current	Current transformer voltage		Relay voltage	Position of ECR
				Primary	Secondary		
1	ON ECR RSSK-30/0013	Both filament					
		Main filament					
		Aux. filament					
2	OFF ECR RSSK-30/0014	Both filament					
		Main filament					
		Aux. filament					

		On ECR	OFF ECR
Pick up voltage			
Drop away voltage			

Date:

Signature of the trainee