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HIGH SPEED MULTI-CONTACT

LOCK-OUT RELAYS

FOR ELECTRICAL INDUSTRY APPLICATIONS

LOCK-OUT RELAY

SUMMARY DATA

GENERAL 30 A / 600 VAC CONTINUOUS

- 2 POSITION, STOPS FACTORY SET FOR "TRIP" AND "RESET"
- 1 TO 10 SECTIONS STANDARD (FOR OTHER OPTIONS CONTACT FACTORY)
- UP TO 20 SETS OF **N.O.** AND 20 SETS OF **N.C.** CONTACTS
- CONTACTS ARE BREAK-BEFORE-MAKE
- ACTION: 45 DEGREE POSITIVE TRIP DETENT
- STATIONARY CONTACTS: SILVER OVER COPPER
- NAMEPLATES, TERMINAL SCREWS AND MOUNTING SCREWS SUPPLIED WITH SWITCH

ELECTRICAL INTERRUPTING RATINGS *(FOR N.O. AND N.C. CONTACTS)*

25 A / 120 VAC	3 A / 125 VDC
15 A / 240 VAC	1 A / 250 VDC
6 A / 600 VAC	

OVERLOAD CURRENT (50 OPERATIONS)

95 A / 120 VAC
65 A / 240 VAC
35 A / 600 VAC

DIELECTRIC STRENGTH - 2200 Vrms

INSULATION RESISTANCE - 100 MEGOHMS MIN.

CONTACT RESISTANCE - 10 MILLIOHMS MAX. INITIAL

MECHANICAL

DIMENSIONAL TABLES SHOWN ON OPPOSITE PAGE

ORDERING INFORMATION

76 XX X

Series Designation

Number of Lock Out Decks
Note: One control deck always present.

Coil type (A, B, C, D, E)
Note: Coil information contained on page 4.

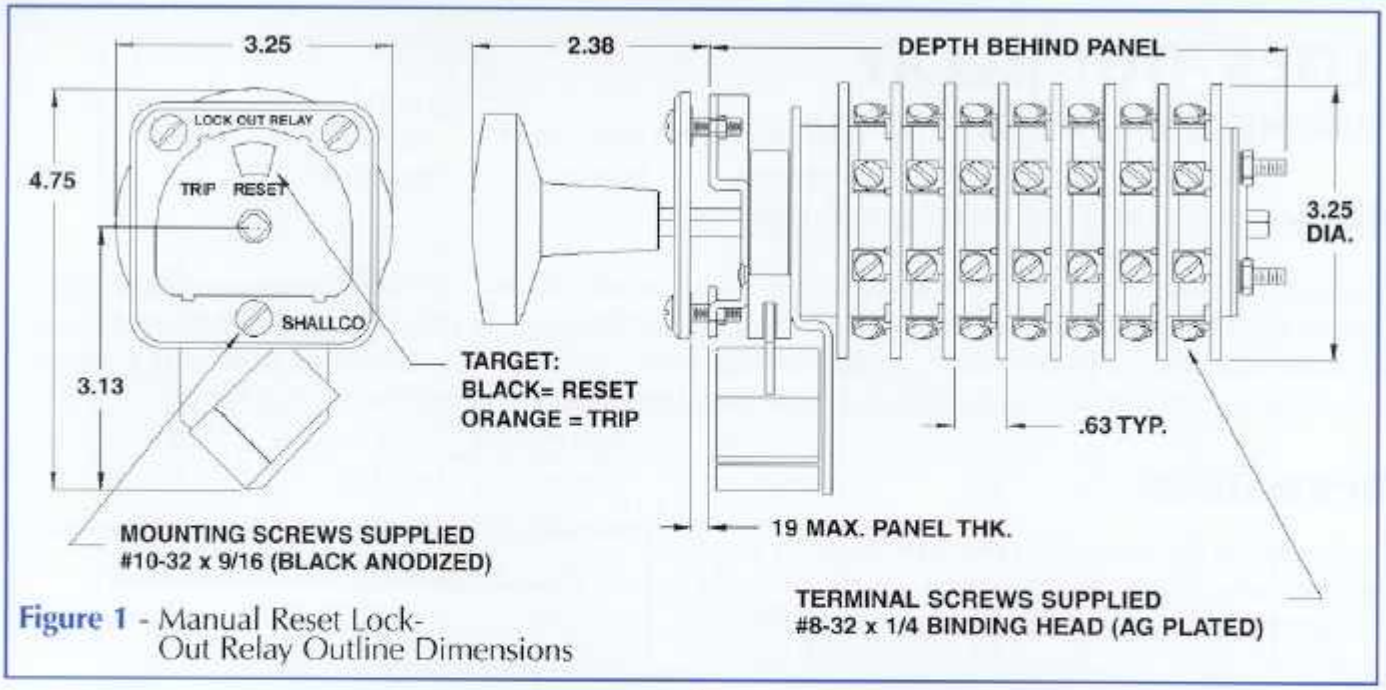


Figure 1 - Manual Reset Lock-Out Relay Outline Dimensions

DEPTH BEHIND PANEL

Number of Decks	Depth in Inches
1	3.63
2	4.38
3	4.75
4	5.50
5	6.25
6	7.50
7	8.13
8	8.50
9	9.25
10	9.63

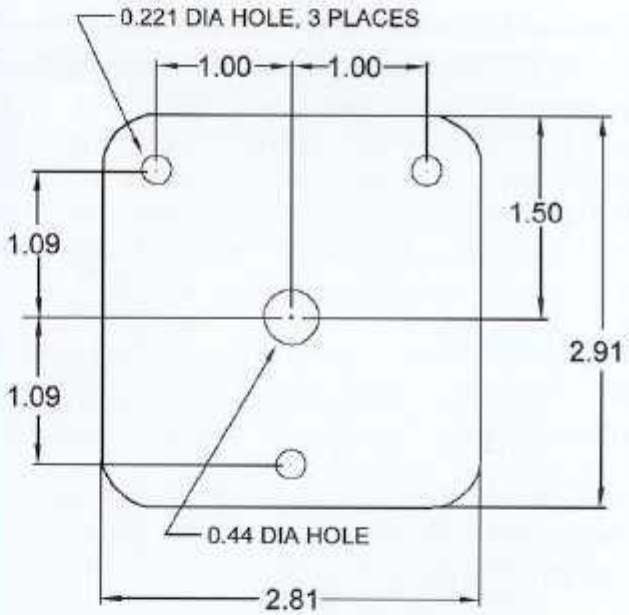


Figure 2 - Nameplate and Panel Drilling Dimensions

USING 2.0 A AUXILIARY TARGETS

1. Select desired trip coil from Engineering Design Data on pages 4-6.
2. Determine number of N.O. and N. C. contacts necessary to meet application requirements.
3. Consult ORDERING INFORMATION on page 2 to build part number.
4. Units are supplied with Engraved Name Plate as shown in Figure 1 above unless otherwise specified.

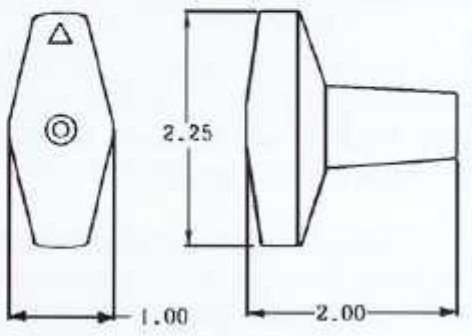


Figure 3 - Handle Dimensions

LOCK-OUT RELAY

ENGINEERING / DESIGN INFORMATION

BACKGROUND INFORMATION

The Lock-Out Relay is primarily used in the electrical power industry. These switches are electric-trip, manual reset control relays for the purpose of tripping and locking out circuit breakers or other devices automatically when a fault or other predetermined condition exists. The Lock-Out Relay may be used in conjunction with differential relays to protect transformers, busses and rotating machinery.

OPERATION

The Lock-Out Relay contacts shown in Figure 4 are in the normally closed "RESET" position. The B and C contacts connect the LOR to the control circuit. Contacts C and F are intergral connections to the trip coil and are shown for reference only.

The Manual Lock-Our Relay must be manually turned to the "RESET" position. When a predetermined condition exists, a signal sent by S1 (see Figure 4) will actuate the coil (LOR/T) causing the switch to "TRIP" up to 20 sets of normally closed contacts to the normally open position. The switch will stay in the "TRIP" position until manually reset. S1 may be any type of contact including a breaker or relay.

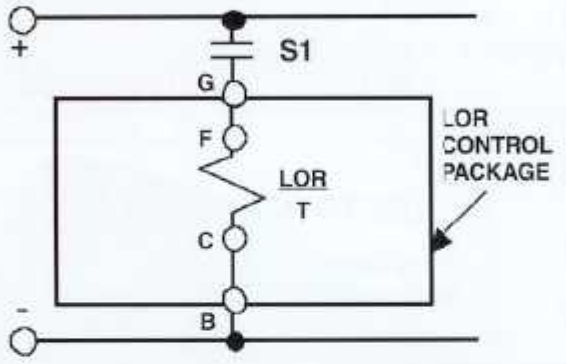


Figure 4 - Manual Reset LOR Control Circuit

The Lock-Out Relay requires no special circuitry except for a N.C. contact (S1) to signal the coil to "TRIP". The choice of S1 should take into consideration the burden data for the trip coil. This circuit is self-interrupting, therefore S1 does not break the main circuit contacts.

The visual indications of the switch position are both the handle (vertical in the "RESET" position and rotated counterclockwise in the "TRIP" position) and a mechanical target window (black for "RESET", orange for "TRIP").

OPERATING VOLTAGE INFORMATION

The Lock-Out Relay is a self-interrupting circuit, and due to the short duration of the voltage, the coil may be subjected to the maximum design voltage in a 55°C ambient environment without causing harm to the unit.

The trip coil provides reliable operation over a wide range of voltages. Note that the coil data shows significant overlapping of trip voltages to allow flexibility when selecting desired speed verses current burden. Coils G and H have controlled threshold voltages to prevent early and/or false tripping from stray control circuit signals.

The full voltage ranges are shown in Table 1. It should be noted that the Threshold Voltage shown is the maximum voltage that could produce a "TRIP"; however, this is not a reliable voltage for normal use. The normal operation should be within the Operating Range voltage.

COIL	NOMINAL CIRCUIT VOLTAGE	THRESHOLD VOLTAGE	OPERATING RANGE	COIL RESISTANCE (IN OHMS) @ 25°C	CURRENT AT RATED VOLTAGE
A	24 VDC	6 VDC	10 - 40 VDC	3.3	7.3
B	24 VDC	9 VDC	18 - 50 VDC	7.7	3.1
C	48 VDC	12 VDC	24 - 70 VDC	13	3.7
D	125 VDC	16 VDC	30 -140 VDC	27	4.6
	120 VAC	20 VAC	30 -140 VAC	27	4.4
E	125 VDC	23 VDC	45 -140 VDC	50	2.5
F	250 VDC	33 VDC	70 -280 VDC	104	2.4
	240 VAC	40 VAC	70 -280 VAC	104	2.3
G	125 VDC	70 VDC	90 -140 VDC	27	4.6
H	250 VDC	140 VDC	180-280 VDC	104	2.4
K	125 VDC	16 VDC	30 -140 VDC	27	4.6

Table 1 - Trip Coil Voltages and Current Data

TRIP VOLTAGE vs CURRENT PROPERTIES

The current requirements at a specific voltage applied are graphed in Figure 5 to aid in the selection of coils.

RESPONSE TIME

Figure 6 shows response time of the Lock-Out Relays. The values given are the cumulative time to "TRIP" the normally closed contacts to the normally open contacts. The values are based upon a ten deck Lock-Out Relay at 20°C.

TARGETS

All Lock-Out Relays have a mechanical target incorporated into the Escutcheon plate. This target indicates black for "RESET" and orange for "TRIP". The target resets and trips at the same time as the Lock-Out Relay. Auxiliary targets may also be used in conjunction with the Lock-Out Relay to indicate the condition at a remote location.

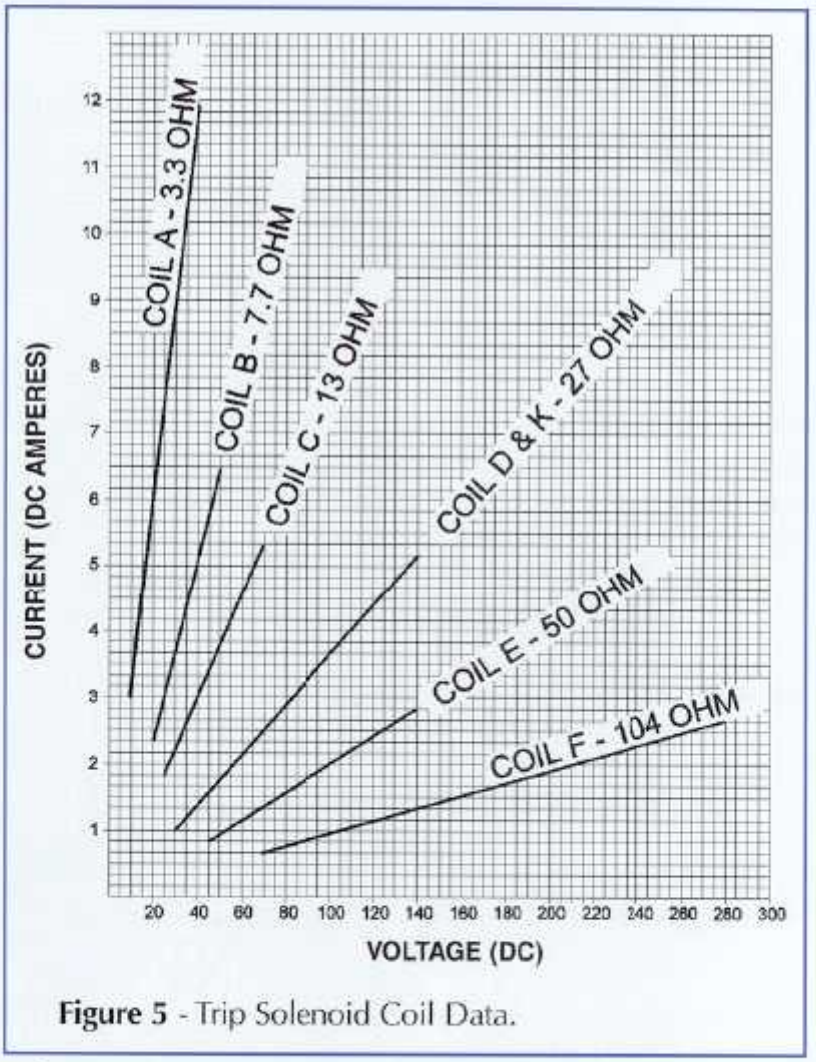


Figure 5 - Trip Solenoid Coil Data.

When wired in series as shown in Figure 7, the 0.2 Amp target operates in an acceptable manner. The 2.0 Amp targets however, require special attention in order to trip properly. See Table II, III and IV for additional information to aid in selecting the proper Trip Coil and Auxiliary Target.

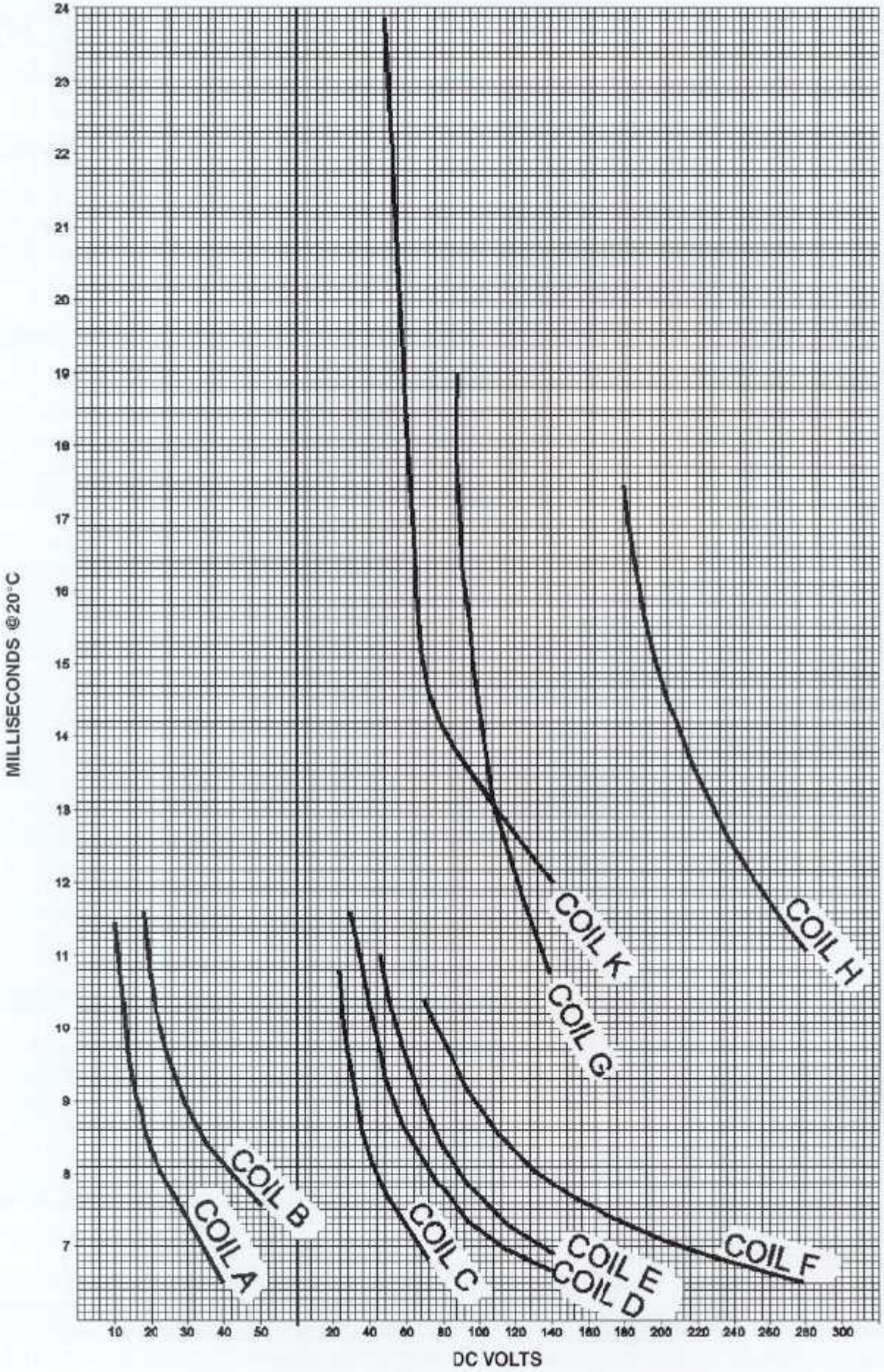


Figure 6 - Lock - Out Relay Response Times (time to close normally open contacts)

OPERATING DC VOLTS	LOR TRIP COILS TO USE	
	0.2 A TARGET	2.0 A TARGET
24	A, B, C	--
48	B, C, D, E	--
100	D, E, F	--
125	D, E, F, G	D
140	D, E, F	D
190	F	D
250	F, H	D

Table II - LOR Trip Coil selection for Positive Auxiliary Target Operation

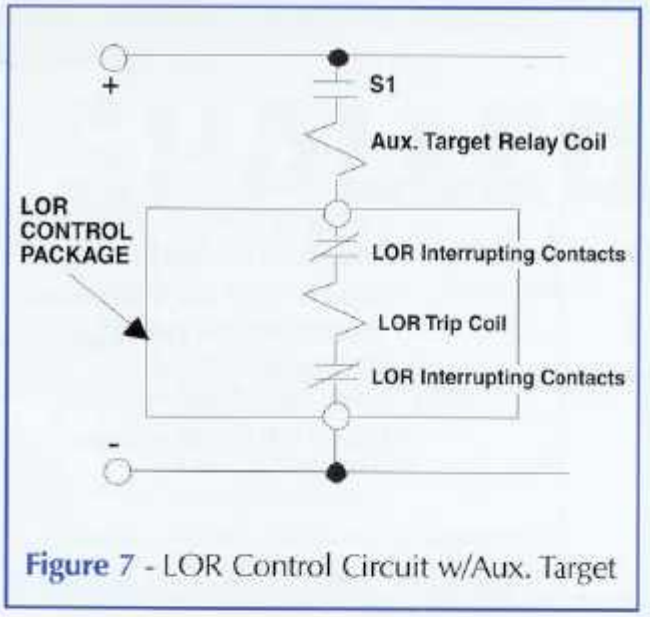


Figure 7 - LOR Control Circuit w/Aux. Target

LOR TRIP COIL	NO ADDITIONAL CIRCUITRY (TARGET)			20 A TARGET RESISTOR (Rp) IN PARALLEL		20 A TARGET R - C CIRCUIT		20 A TARGET R - C CIRCUIT		
	0.2	0.6	20	25 OHMS	50 OHMS	40 MFD	20 MFD	7 OHMS	12.3 OHMS	16.7 OHMS
A B	12	12	42						90	90
C D	24	40	118		80	95	105	95		
E F	40	150		75 70	105 125					
G H	90 180									

Table III - Minimum D.C. Voltage for Operation of Auxiliary Target with Manual Reset LOR

VALUES BASED ON FOLLOWING TARGET COIL CHARACTERISTICS	TARGET		
	0.2 A	0.6 A	2.0A
COIL RESISTANCE (OHMS)	8.15	0.71	0.195
PULL-IN CURRENT (AMPS)	0.15	0.45	1.75

Table IV - Auxiliary Target Relay Coil Characteristics

USING 2.0 A AUXILIARY TARGETS

In order to use 2.0 A Aux. Targets at lower voltages, (see Table III), several control circuits have been developed. The standard control circuit with no additional circuitry is shown in Figure 7. Figures 8, 9, and 10 may be used in conjunction with Table III to allow the use of lower voltages on 2.0 A Aux. Targets.

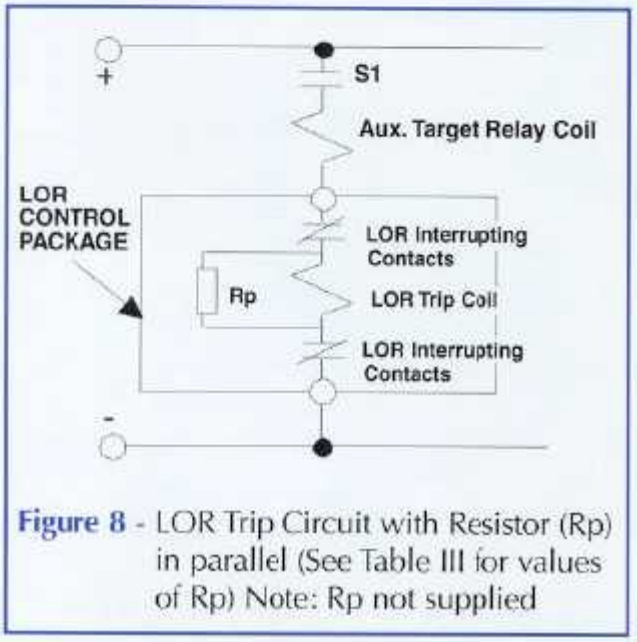


Figure 8 - LOR Trip Circuit with Resistor (Rp) in parallel (See Table III for values of Rp) Note: Rp not supplied

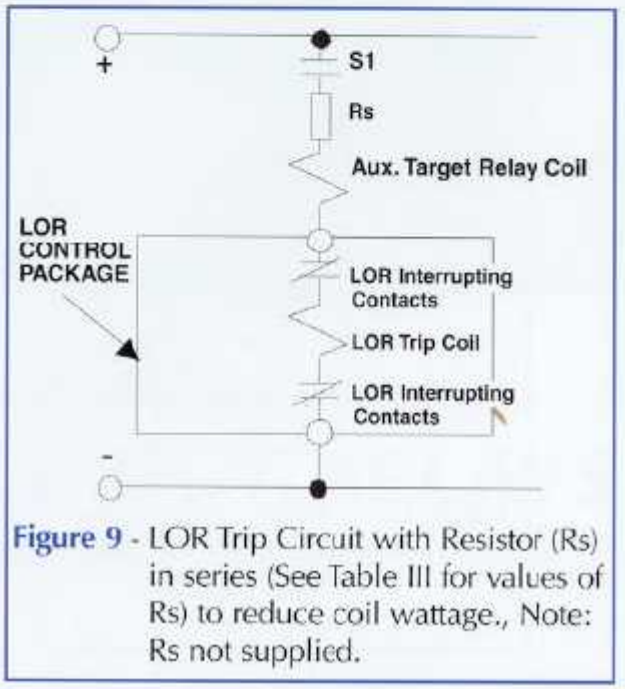


Figure 9 - LOR Trip Circuit with Resistor (Rs) in series (See Table III for values of Rs) to reduce coil wattage., Note: Rs not supplied.

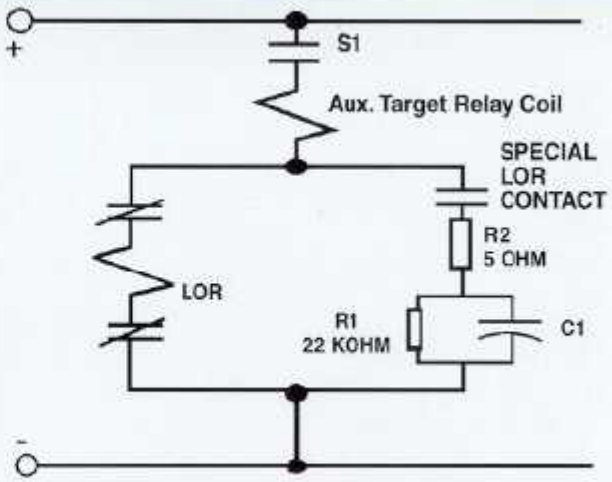
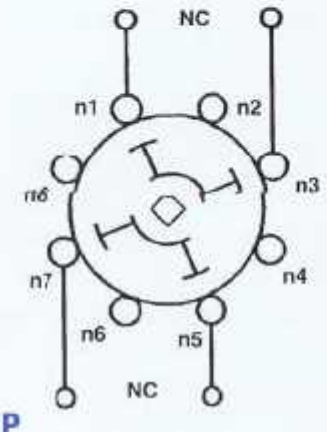


Figure 10 - LOR Trip Circuit with RC Network Circuit. There is a brief connection between the coil and the capacitor increasing the current in the 2.0 A Aux. Target. (See Table III for values of C1)
Note: C1 not supplied

CIRCUIT CONFIGURATION

Figure 11 illustrates the Lock-Out Relay deck(s) internal circuit arrangement in both the "TRIP" and "RESET" positions. Figure 12 indicates the control deck internal layout in the "RESET" position. Also included is a contact chart to indicate the position of the switch and closure of contacts. For multiple decks the contacts are numbered as follows: xx - First digit indicates deck number, second digit indicates contact location. Example: 23 indicated deck 2 position 3. This contact is directly in line with 13 and 33 and would be used with contact 21 for a NC circuit.

RESET



TRIP

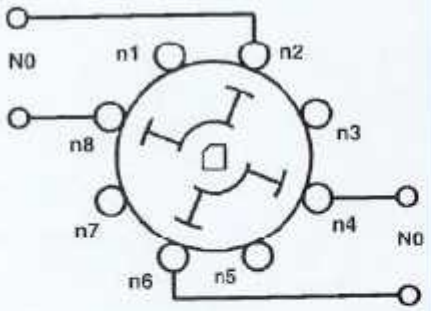


Figure 11 - Contact Deck Layout in both "RESET" and "TRIP" positions

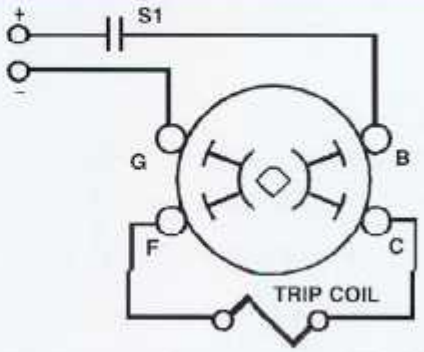


Figure 12 - Control Deck Layout - "RESET" Position

DECK	CONTACTS	POSITION TRIP	POSITION RESET
1	11 — 13		X
	12 — 18	X	
	15 — 17		X
	16 — 14	X	
2	21 — 23		X
	22 — 28	X	
	25 — 27		X
	26 — 24	X	
10	101 — 103		X
	102 — 108	X	
	105 — 107		X
	106 — 104	X	

LOCK-OUT RELAY CONTACT CHART