INSTRUCTIONS

MAGNETIC TIME RELAYS

*IC2820-J1054

*Also identified with prefix CR instead of IC.

GENERAL ELECTRIC

CR2820-1054

MAGNETIC TIME RELAYS

INTRODUCTION

The CR2820-1054 relay is a d-c operated relay. It may be applied as an instantaneous pick-up time-delay drop-out device, or an instantaneous pick-up and instantaneous drop-out device. Series or shunt coils permit the use as a current or voltage relay with adjustable pickup or dropout.

If a d-c source of power is not available, the d-c output of a metallic rectifier may be used as a source of power to energize the relay coil.

OPERATION

When the relay is used as a time-delay device, timing is initiated either by opening the coil circuit with a switch similar to S in Fig. 6 or by short-circuiting the relay coil as by switch S in Fig. 5. If the timing is initiated by short-circuiting the relay coil, the current in the coil and the flux in the magnetic circuit decays slowly, producing a time-delay drop-out of the relay armature as shown in Fig. 5.

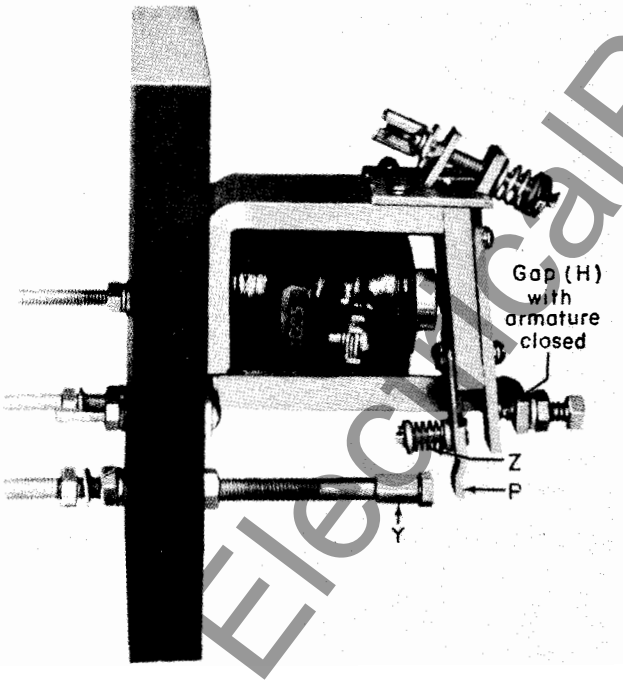


Fig. 1. CR2820-1054A relay with normally closed butt-type contact and normally open finger-type contact (P)

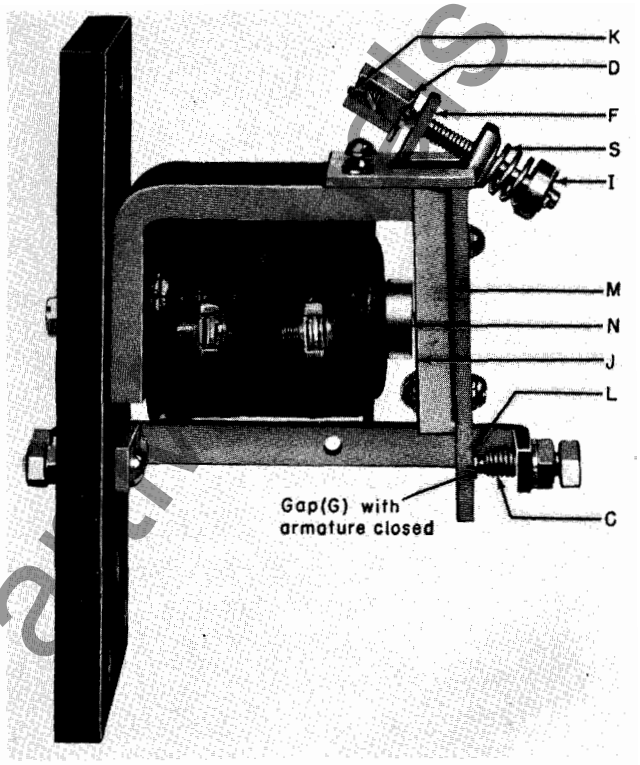


Fig. 2. CR2820-1054B relay with normally closed butt-type contact (L)

Whenever the time-delay is to be initiated by opening the coil circuit, the relay must have a copper jacket, surrounded by the coil as shown in Fig. 6.

Removal of the coil voltage induces a current in the copper jacket which produces a flux that slowly decays, resulting in a time delay dropout.

If the relay does not have a copper jacket and its dropout time is initiated by open circuiting the coil,

the relay will drop out instantly as there is no way to maintain a circulating flux which decays gradually to produce a time-delay.

ADJUSTMENT

The two principal adjustments of the relay are the shim (J), Fig. 2, and the armature opening spring (S), Fig. 2. The shim is a coarse adjustment affecting only the dropout time, as given in the table, Fig. 7.

For the frequent operation encountered in steel-mill service, the use of shims thinner than 0.010-inch is not recommended. The 0.010-inch thick shim is ordinarily supplied with the relay unless a shim of different thickness is required to secure a longer or shorter time for certain applications. If bimetallic shims are used, see that the bronze side of the shim is next to the armature, and that brass screws (not steel) are used to fasten the shim to the armature. The effective air gap in the magnetic circuit when bimetallic shims are used is so small that such factors as accumulation of dirt particles, or mechanical wear will tend to affect the timing to a greater extent than when thicker shims are used.

In addition to affecting the amount of time delay, the shim prevents residual magnetism in the magnetic circuit from holding the armature closed indefinitely.

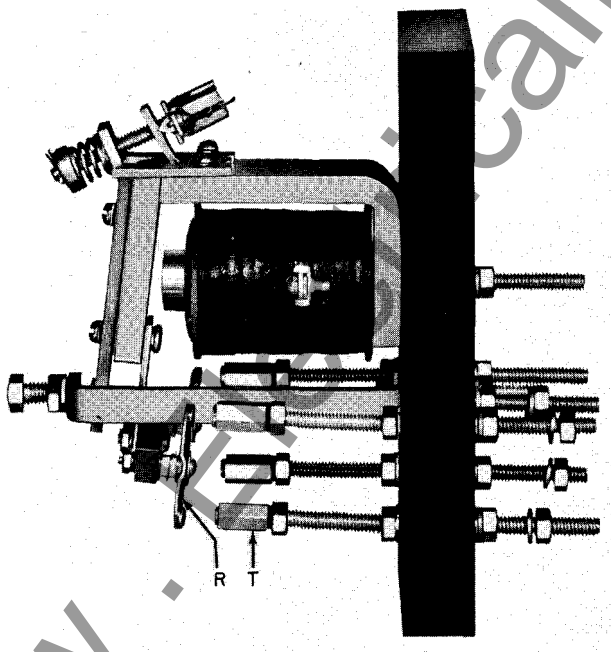


Fig. 3. CR2820-1054AG relay with normally closed butt-type contact and two normally open double-break type contacts

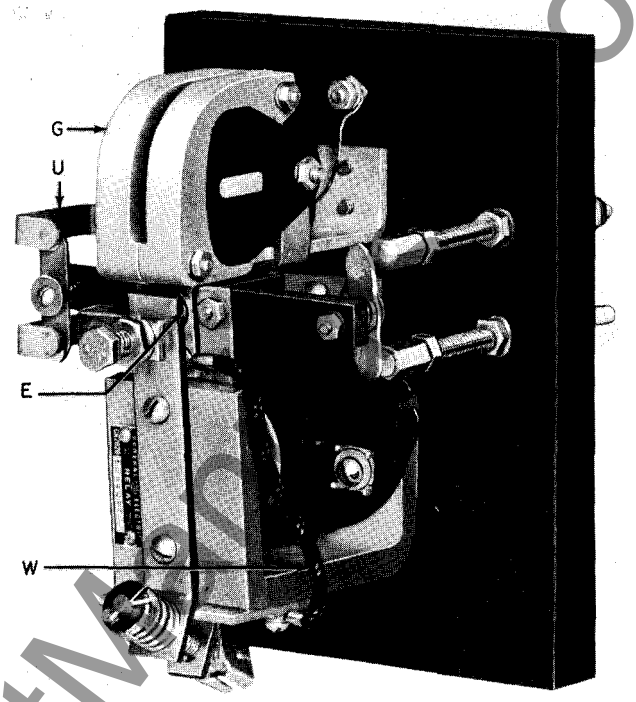


Fig. 4. CR2820-1054QM relay with blowout coil and arc chute, and one normally open and one normally closed double-break type contact

A shim must always be used. While it may appear possible in some cases to secure a relatively long time-delay by omitting the shim, the time is likely to be erratic, and it is probable that after a few operations the residual magnetism will prevent the armature from opening at all.

The drop-out value will always be a relatively low percentage of the pick-up value for a given setting, being about 10 percent or less.

The ***Armature Opening Spring*** permits fine adjustment of the time-delay dropout and is also the main adjustment of pick-up current and voltage. In the time-delay dropout application the spring affects the time as indicated in Fig. 8.

For the armature spring force (P1), the armature will release at time (T1), while if the spring force is decreased to (P2), a further decrease in flux is necessary before the armature releases, and the time delay is increased to (T2). Since the flux density in the magnetic circuit is above the point of saturation when the armature is closed, the time adjustment is substantially independent of the usual variation in line voltage. To adjust the spring force, remove cotter pin (K),

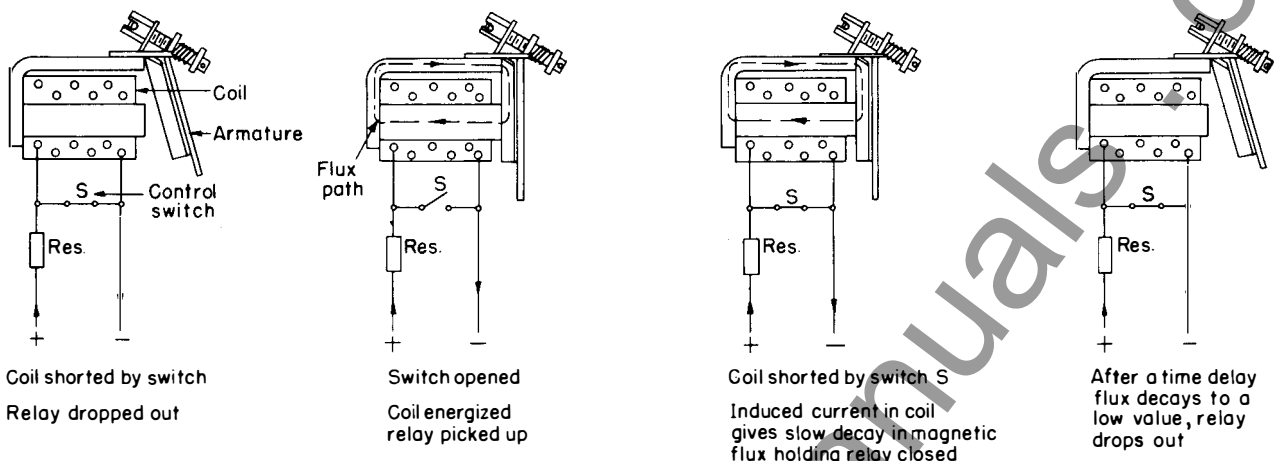


Fig. 5. Time-delay dropout of relay without copper jacket, when relay coil is short-circuited

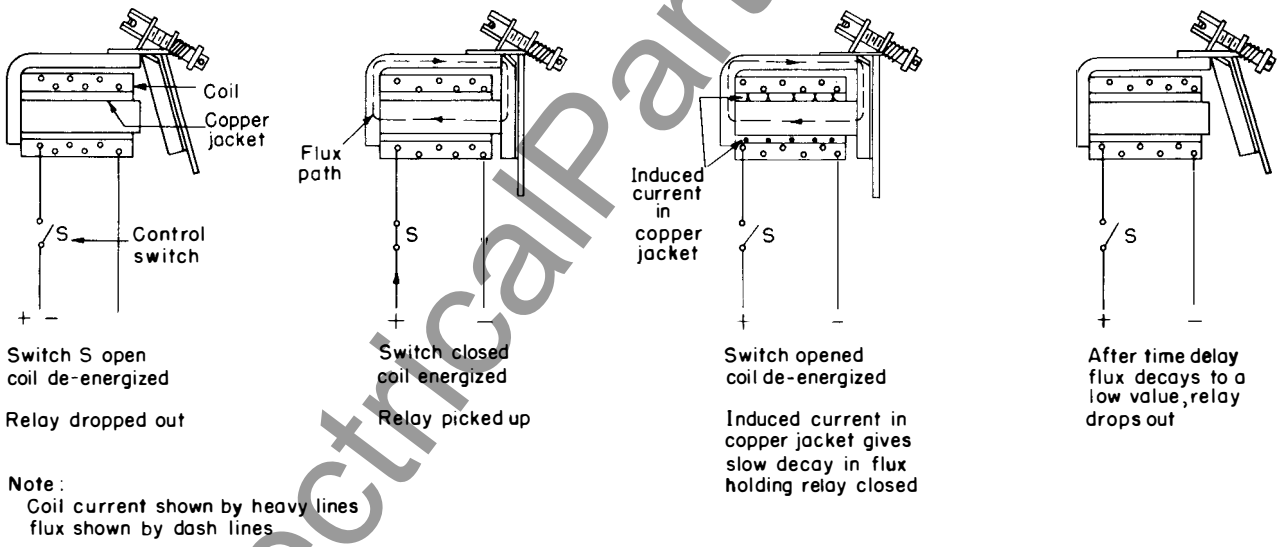
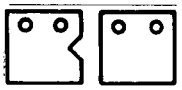
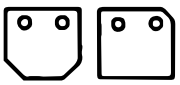
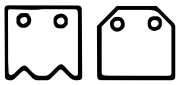
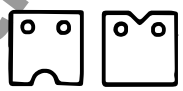


Fig. 6. Time-delay dropout of relay with copper jacket

Fig. 2, to free the adjusting nut. Replace after the adjustment.

The armature spring force must be strong enough to hold the armature positively against the back stop screw, but must not be increased to a value where the armature will fail to close if the coil is energized when at its maximum operating temperature.

For the CR2820-1054B relay, the armature backstop screw is normally adjusted at the factory to give a gap of $\frac{1}{16}$-inch at (G), Fig. 2, with the armature closed. For the CR2820-1054A relay and for other forms without magnetic blowouts, gap (H), Fig. 1, should be $\frac{1}{4}$-inch. For CR2820-1054 relays with magnetic blowouts and arc chutes, this gap is usually

Qty	Shim Cat. No.	Effective Thickness in Inches	Identification			Approximate Time Range—Seconds†		
						For Coils with Copper Jacket		For Coils Without Copper Jacket
			New	Old	Material	CR2820-1054B	Other Forms	
1	5354688	.0005			bimetal			
1	5155942	.001			bimetal			1.5–2.5
1	5354689	.0015			bimetal	1.3–2	1.5–2	1.3–1.9
1	2451597	.005		same	bronze	0.9–1.6	1.3–1.6	0.8–1.3
1	8616834	.007		same	bronze	0.75–1.4	1–1.4	0.65–1.15
1	2450533	.010*		same	bronze	0.6–1.25	0.75–1.25	0.5–1
1	8047765	.015			bronze	0.4–0.8	0.5–0.8	0.4–0.7
1	2439592	.020		same	bronze	0.35–0.7	0.4–0.6	0.25–0.45
2	8047765	.030φ			bronze	0.2–0.35	0.25–0.35	0.15–0.25
1	1453458	.060		same	bronze			

*Standard shim for steel-mill service.
†Maximum time is reduced about 30 per cent for relays having four double-break contacts, or two finger-type contacts and one or more double-break contacts.
φTwo shims each .015 inch thick.

Fig. 7. Shim data

CONTACT RATING

Fig.	Part	Contact	Amp Carry	Amp Make	Amp Break D-c			Gap
					115 Volts	230 Volts	550 Volts	
2	L	N.C. Butt type	1	20	0.5	0.2	0.08	$\frac{1}{16}$-in.
1	P	N.O. Finger type	1	20	1.0	0.5	0.15	¼-in.
3	R	N.O. or N.C. Aux. double-break type	15	40	2.0	0.8	0.13	¼-in.

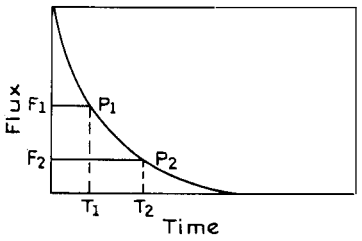


Fig. 8. Flux-time curve

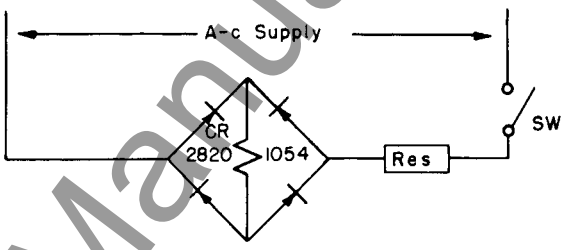


Fig. 9. Full-wave rectifier for CR2820-1054 relay

$\frac{5}{16}$-inch. Ordinarily it should not be necessary to change this adjustment.

From Fig. 2 it may be seen that the armature (M) may be easily removed without disturbing the calibration, by removing cotter pin (I); while to change the calibration it is necessary to remove cotter pin (K). In replacing the armature, care should be used to make certain that the knife edge (D) is in the horizontal groove of the frame punching (F).

A-C OPERATION

If the relay is to be energized from the output of a metallic rectifier, a full-wave bridge circuit of the type illustrated in Fig. 9 is often used. Whenever this type of connection scheme is used, the d-c side may not be opened except when the resistor on the a-c side is not used, or unless both a-c and d-c circuits are opened simultaneously.

RENEWAL PARTS

When ordering parts other than those shown in the following table, give the complete nameplate rating of the relay and describe the part in detail. All orders and inquiries should be addressed to the nearest General Electric Apparatus Sales Office.

DESCRIPTION	CATALOG NUMBER	CR2810-1054									
		A	B	AF	AG	AL	CF	CK	CV	EK	MB
Movable contact (P), Fig. 1 (Finger type single-break, N.O., copper)	1443051	1				2					
Movable contact (Finger type single-break, N.O., silver)	2840261G1						1	1	1		1
Stationary contact (Y), Fig. 1 (For finger type single-break, N.O., copper)	1416332	1				2	1	1	1		
Stationary contact	2840261G7						1				
Stationary contact tip	2840261G2										1
Auxiliary movable contact (R), Fig. 3 (Double-break, N.O. and N.C., silver)	3667572G1			2	2					3	
Auxiliary stationary contact for (T), Fig. 3 (Double-break, N.O., silver)	3614137G1			2	4					6	
Auxiliary stationary contact (U), Fig. 4 (For double-break, N.C., silver)	3805671G2			2							
Auxiliary contact spring (For double-break contact, N.O. and N.C.)	2411917			2	2					3	
Contact screw (C), Fig. 2 (Butt type single-break, N.C., silver)	2840219G1	1	1	1	1	1				1	1
Contact spring (E), Fig. 4 (For blowout type relay, N.O. contact)	2412681						1	1	1		1
Contact spring (Z), Fig. 1 (For non-blowout type relay)	246116	1				2					
Armature spring	235184	1	1	1	1	1	1	1	1	1	1
Shunt	2810417G8					1					
Shunt (W), Fig. 4	2810417G1						1	1			1
Arc chute side, right hand (G), Fig. 4 (Right side as mounted on relay, round type)	2433823						1	1	1		1
Arc chute side, left hand (Left side as mounted on relay, round type)	2433822						1	1	1		1

INDUSTRY CONTROL DEPARTMENT

GENERAL ELECTRIC

ROANOKE, VA.

3-57 (4M)

Supersedes GEH-85E

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