GE Drive Systems

MAGNETIC RELAYS FOR INSTANTANEOUS OR TIME-DELAY DROPOUT

DS2820A100 AND DS2820B200

Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the POWER SUPPLY MUST BE DISCONNECTED.

INTRODUCTION

The DS2820A100 and DS2820B200 relays are self-contained, front-connected, dc operated magnetic relays. Either form relay may be applied in instantaneous pick-up applications, however, drop-out characteristics differ between the two forms.

The DS2820A100 relay can be applied as an instantaneous pick-up, time-delay drop-out device; or as an instantaneous pick-up, instantaneous drop-out device. Maximum time delay of up to approximately 2.0 seconds may be obtained depending upon the number of interlocks and the thickness of shims. This relay is capable of controlling from two to twelve circuits. Time-delay dropout may be obtained with relays controlling up to four circuits.

The DS2820B200 Relay may be applied as an instantaneous pick-up, time-delay drop-out device with a maximum time delay up to approximately 5.0 seconds.

Series or shunt coils permit the use of these relays as current or voltage relays with adjustable pickup or dropout.

If a dc source of power is not available, the dc output of a metallic rectifier may be used as a source of power to energize the relay coils.

INSTALLATION

These relays can be mounted as a unit on either steel or insulated bases.

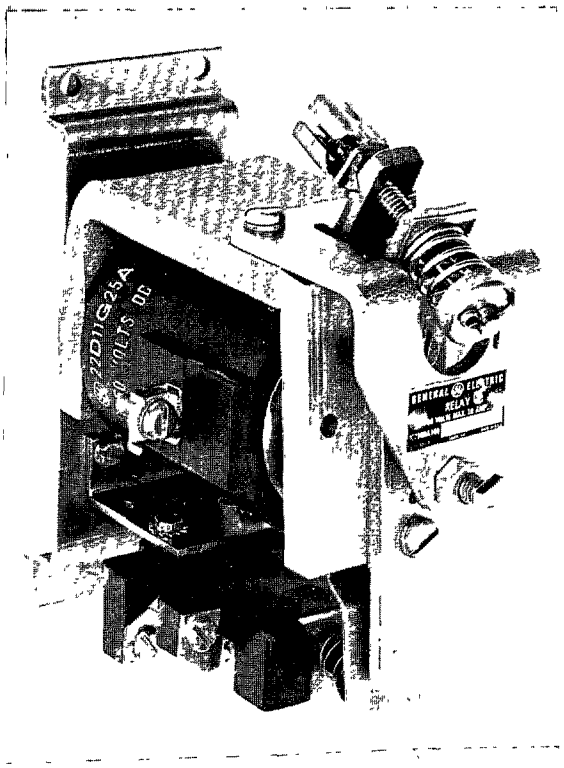


Fig. 1. DS2820A100A Two-circuit dc magnetic time relay.

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. 4 or by short-circuiting the relay coil as by switch S in Fig. 3. 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 dropout of the relay armature as shown in Fig. 3.

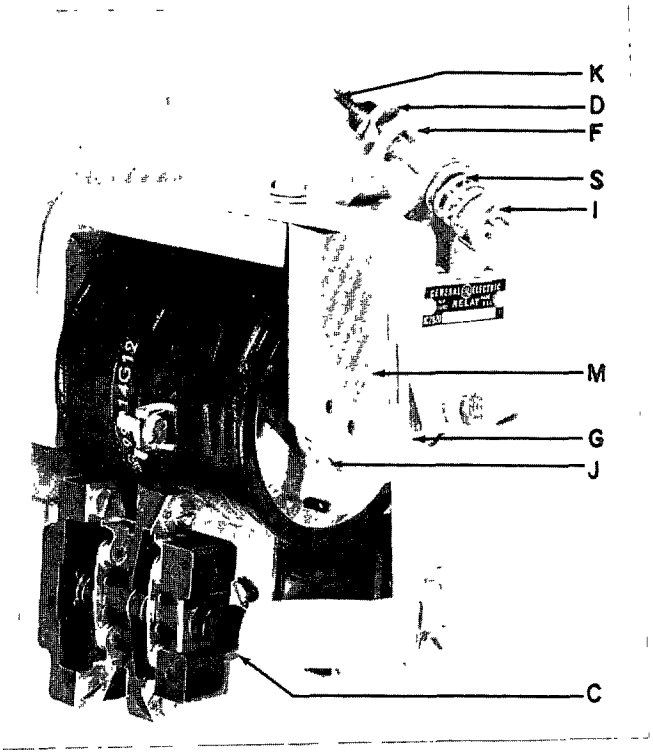


Fig. 2. DS2820B200A Four-circuit dc magnetic time relay.

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. 4.

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 drop-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.

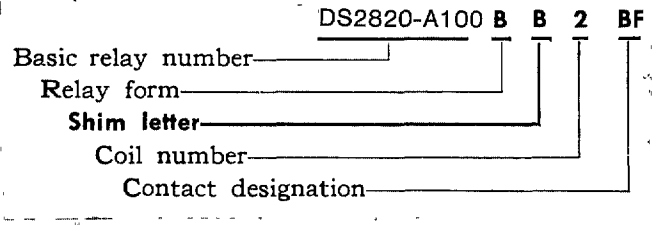
SHIMS. The shim is a coarse adjustment affecting only the drop-out time, as given in the Tables I and II.

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 shorer time for certain applications. If bimetallic shims are used, make sure 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.

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 pickup value for a given setting, about 10 percent or less.

SHIM LETTER IDENTIFICATION. To identify the shim furnished on a given relay, refer to the shim suffix letter in the relay catalog number. The shim suffix letter appears in the position illustrated in the following example:



ARMATURE OPENING SPRING. 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 drop-out application the spring affects the time as indicated in Fig. 5.

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

The armature gap is normally adjusted at the factory to give the gaps, measured at G (see Fig. 2) with the armature closed, as shown in the following table:

Device	Armature Travel at Back-stop Screw G
DS2820A100	0.135-0.153
DS2820B200	0.158-0.176

From Fig. 2 it may be seen that the armature (M) may be easily removed without disturbing the calibration,

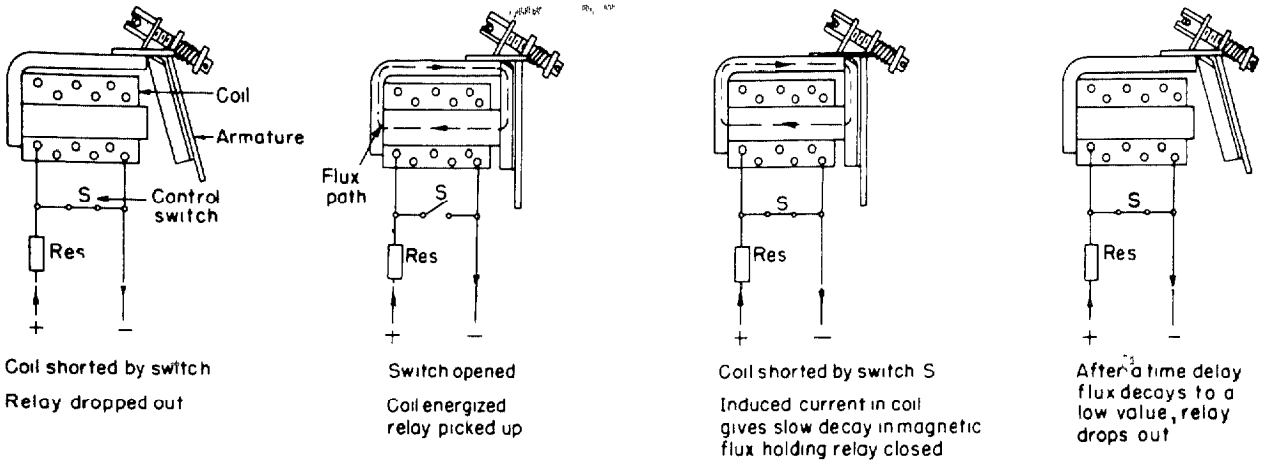


Fig. 3. Time-delay dropout of relay without copper jacket when relay coil is short-circuited.

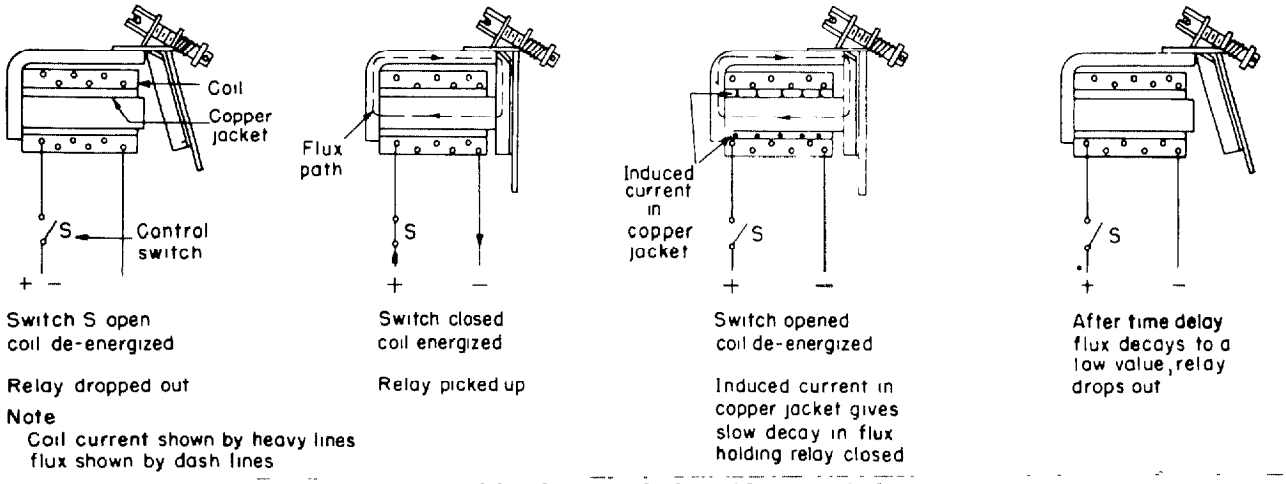


Fig. 4. Time-delay dropout of relay with copper jacket.

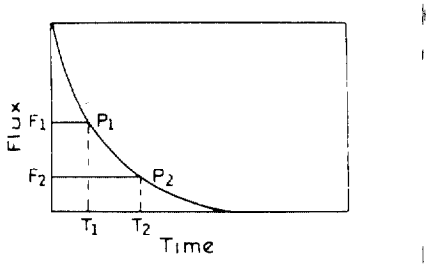


Fig. 5. Flux-time curve.

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).

AC 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. 6 is often used. Whenever this type of connection scheme is used, the dc side may not be opened except when the resistor on the ac side is not used, or unless both ac and dc circuits are opened simultaneously.

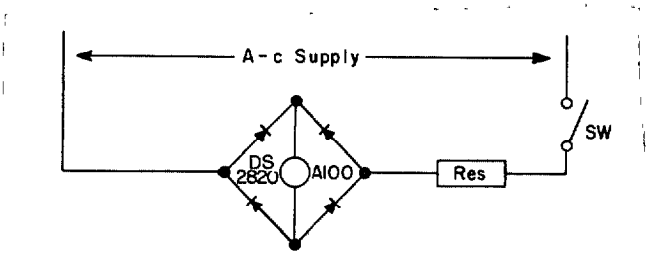


Fig. 6. Full-wave rectifier for DS2820A100.

CONTACT BLOCKS

These relays uses a contact block having internal parts which can be rearranged to give different contact arrangements. Should this be necessary the parts should be reassembled in accordance with Figs. 7, 8, or 9.

Table I. Shim data for DS2820A100.

Qty.	Shim Cat. No.	Effective Thickness in Inches	Identification			Approximate Time Range—Seconds	
			Shim Letter	Shape	Material	A100A A100B (2 Cir. Int.)	A100B (4 Cir. Int.)
1	5155942	001	C		bimetal		
1	5354689	.0015	D		bimetal		
1	2451597	005	E		bronze	1.3 –1.6	1 0 –1 2
1	8616834	007	F		bronze	1 –1 4	0 75–1.1
1	2450533	010	B		bronze	0 75–1 25	0 6 –0 9
1	8047765	015	R		bronze	0.5 –0 8	0.4 –0 6
1	2439592	020	X		bronze	0 4 –0 6	0 3 –0 45
2	8047765	030	Y		bronze	0 25–0 35	0 2 –0 2

Table II. Shim data for DS2820B200.

Qty.	Shim Cat No.	Effective Thickness in Inches	Identification			Approximate Time Range (Seconds)
			Shim Letter	Shape	Material	IC2820-B200
1	5351666	001	D		bimetal	
1	5353251	0015	E		bimetal	
1	2475160	005	F		bronze	3 2–5 0
1	5386520	010	B		bronze	1 8–2 5
1	2489801	015	R		bronze	1 3–1 8
2	5386520	020	X		bronze	0 9–1 2
2	2489801	.030	Y		bronze	0 7–0 9

NOTE: The time ranges given in Table I and Table II are from the time the circuit of a copper-jacketed coil is broken until the armature drops out. The times given are for operating at rated voltage for a relay which will pick up at 63 percent or less of rated voltage with a cold coil. The time ranges listed mean only that the time delay will be within the range and is not meant to imply that the time delay is adjustable throughout the range. If the time-delay dropout is secured by short-circuiting a coil without copper jacket, the minimum time will be reduced to about 2/3 and the maximum to about .8 of that given in Tables I and II.

Shims thicker than 0.020 in. cannot be used with gradually increasing voltage as pickup will not be clean.

Spring ends must not protrude into holes (A), slots (B), or keys (C), which serve as guides for operating arm. See Fig. 7.

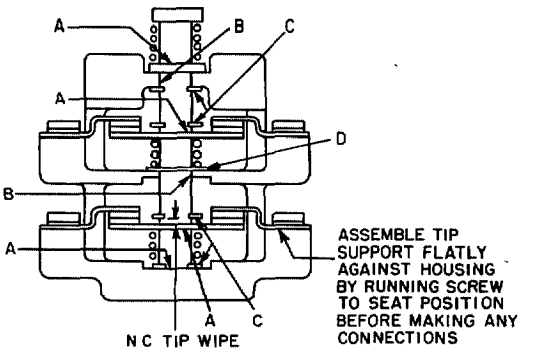


Fig. 7. Contact block with normally closed contacts in unoperated position.

Contact blocks with two normally closed circuits require a spring spacer (D) as shown in Fig.7 to assure that the center spring is properly in place. Because of the circuit rearrangement feature, a spring spacer is supplied with all other two-circuit contact blocks, as shown in Fig. 8 and 9.

When circuits are rearranged to obtain one normally open and one normally closed circuit, the normally closed circuit must be located at the bottom as shown in Fig. 9.

The interlock should be positioned on its bracket so that with the relay in its energized position, the interlock plunger, Fig. 8, should not bottom, and with the contactor in its de-energized position,there should be some clearance (C) between the interlock plunger and the interlock operating arm, Fig. 8.

Tip gaps and wipes, when new, should be as shown in the following table. Replace contact tips when wipe reaches one half of minimum specified.

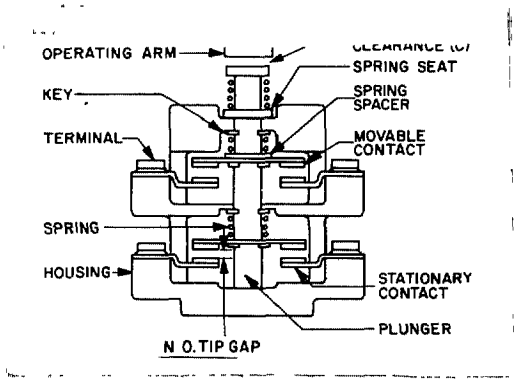


Fig. 8. Contact block with normally open contacts in unoperated position.

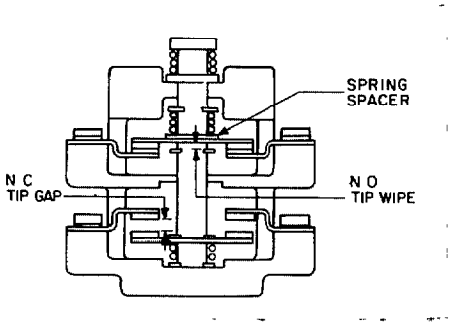


Fig. 9. Contact block with one set of normally open contacts and one set of normally closed contacts in operated position.

Contact Tip Gap and Wipe

Contacts		Maximum	Minimum
Not Operated	(N.O.) Tip Gap	7/64"	5/64"
	(N.C.) Tip Wipe	5/64"	3/64"
Operated	(N.O.)Tip Wipe	5/64"	3/64"
	(N.C.) Tip Gap	7/64"	5/64"

Contact Rating

Number of Contacts	Carry	Make	Interrupt						
			DC Inductive*			AC**			
			125V	250V	600V	110V	220V	440V	600V
One Set	10	60	1.8	0.5	0.2	6	3	1.5	1 2
Two sets in Series	10	60	4.0	1.2	0.35				

* Non-inductive dc interrupting rating is 1.5 times inductive.

** Capable of interrupting inrush current of 60 amperes at 110 volts, 30 amperes at 220 volts, 15 amperes at 440 volts, and 12 amperes at 600 volts a limited number of times.

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met during installation, operation, and maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Drive Systems, Salem, Virginia, U.S.A.