INSTRUCTIONS

IC2800-B310 AND IC2800-B410 MAGNETIC CONTACTORS

INSTANTANEOUS OR TIME-DELAY DROPOUT

IC2800-B310—50 AMPERES, 600 VOLTS
IC2800-B410—100 AMPERES, 600 VOLTS

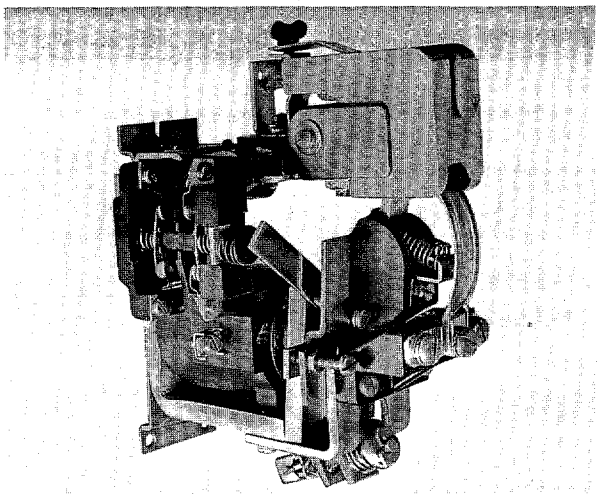


Fig. 1. IC2800-B310 with arc chute in place

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.

GENERAL

These contactors are self-contained, front-connected, d-c operated units, and are suitable for mounting on either steel or insulated bases. They are available either with or without blowouts. A choice of blowout ratings is available for both contactors covered in this instruction. Either device may be applied as an instantaneous pick-up, time-delay, drop-out device, or as an instantaneous pick-up, instantaneous drop-out device. However, the drop-out characteristics differ between the two devices.

The IC2800B310, 50-ampere device will have a maximum time delay of up to approximately 2.0 seconds, and the IC2800B410, 100-ampere device will have a maximum time delay of up to approximately 5.0 seconds. For both devices, the time delay is dependent upon the thickness of shims and whether an electrical interlock is used.

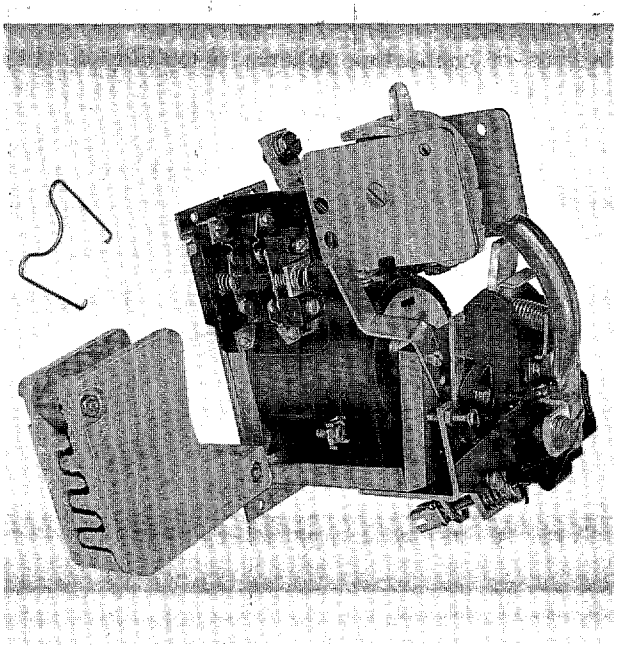


Fig. 2. IC2800-B410 with arc chute removed

These contactors are capable of controlling a maximum of four electrical interlock circuits; however, time delay dropout is available for only two electrical interlock circuits.

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

INSTALLATION

The contactor must be mounted with the arc chute at the top.

When mounting the contactor, the proper NEMA standard for electrical clearance and creepage to conducting parts and to ground must be maintained.

To obtain the maximum interruption rating of the electrical interlocks, an air gap of 3/4-inch must be maintained between the open face of the interlocks and any conducting part or ground.

OPERATION

INSTANTANEOUS DROPOUT

Never operate the contactor with power on the contacts unless the arc chutes are in place.

If the contactor is to be energized from the output of a rectifier, a full-wave bridge circuit of the type illustrated in Fig. 3 is often used. Whenever this type of connection scheme is employed, both the a-c and d-c side of the rectifier must be opened simultaneously by use of an auxiliary contactor, so that the IC2800B310 or IC2800B410 will not experience an added time-delay dropout because of coil discharge through the rectifier.

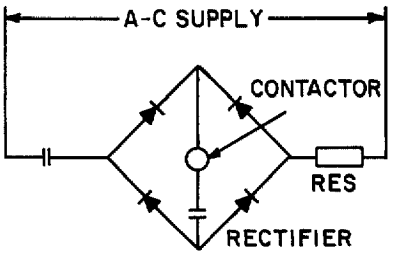


Fig. 3. Full-wave rectifier for a-c operation

TIME-DELAY DROPOUT

When the contactor is used as a time-delay device, timing is initiated either by opening the coil circuit with a switch similar to S in Fig. 5, or by short-circuiting the contactor coil as by switch S in Fig. 4. If the timing is initiated by short-circuiting the contactor coil, the current in the coil and the flux in the magnetic circuit decay slowly, producing a time-delay dropout of the contactor armature as shown in Fig. 5.

Whenever the time delay is to be initiated by opening the coil circuit, the contactor must have a copper jacket, surrounded by the coil as shown in Fig. 5.

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 contactor 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.

ADJUSTMENTS

The three principal adjustments of the contactor are the shim, armature stop screws and the armature opening spring. See Fig. 6.

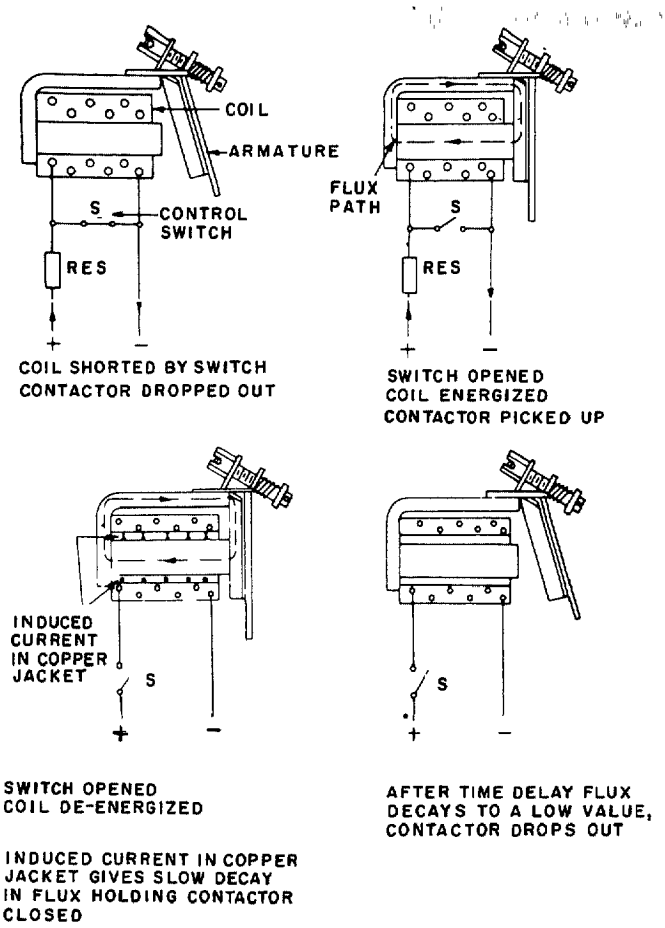


Fig. 4. Time-delay dropout of contactor without copper jacket when relay coil is short-circuited

SHIMS

The shim is a coarse adjustment affecting only the dropout time as given in 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 contactor unless a shim of different thickness is required to secure a longer or shorter time for certain applications.

If bimetal shims are used, make sure that brass screws (not steel) are used to fasten the shim to the armature. The effective air gap in the magnetic circuit when bimetal 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

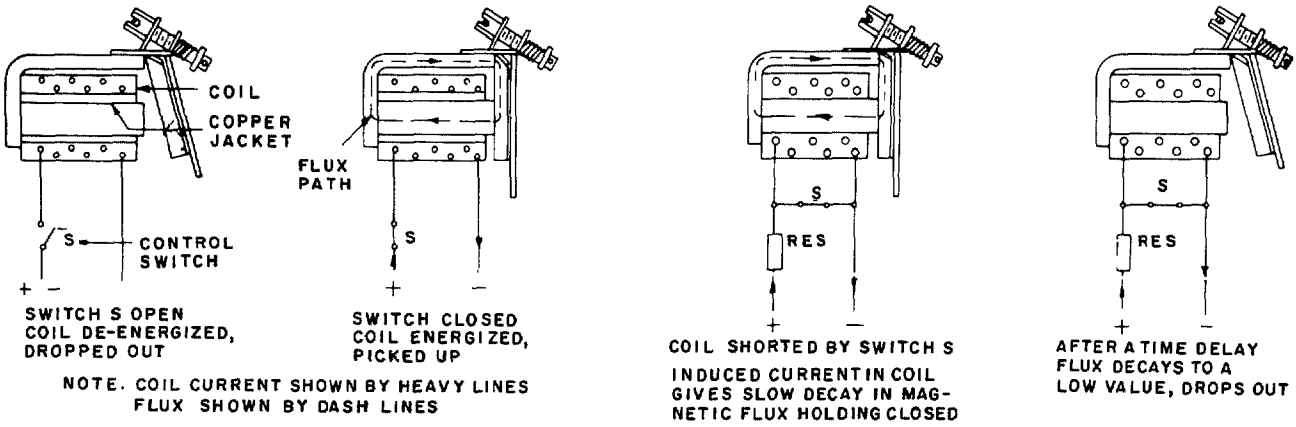


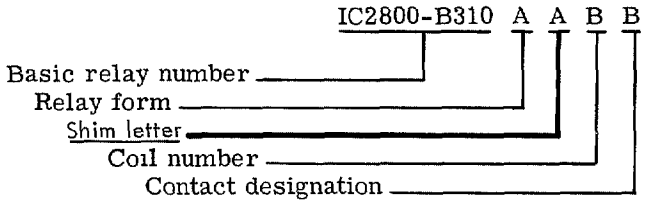
Fig. 5. Time-delay dropout of contactor with copper jacket

likely to be erratic. It is also probable that after a few operations, the residual magnetism will prevent the armature from opening at all.

The dropout 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 STOP SCREW

The armature stop screws, located on each side of the molded movable tip support (Figs. 1 and 2), are normally adjusted by the factory to obtain the gap (A) and wipe (B) for the power tips as shown in Fig. 6.

NOTE: *The time ranges given 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. 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 80 percent of that given in Table I.*

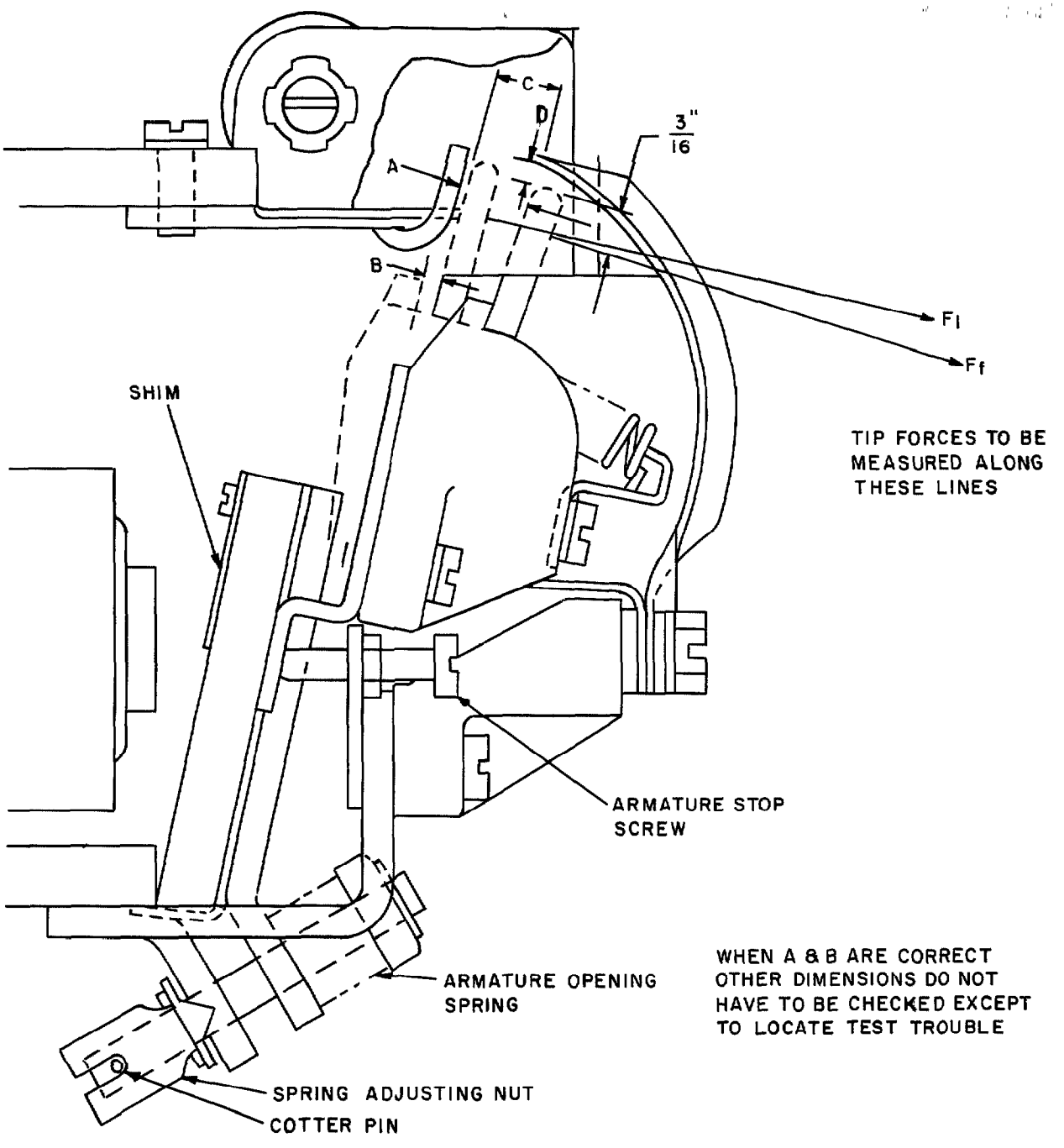
Shims thicker than 0.020-inch cannot be used with gradually increasing voltage as pickup will not be clean.

Table I. Shim Data For IC2800-B310

Qty.	Shim Cat. No.	Effective Thickness in Inches	Identification			Approximate Time Range (Seconds)	
			Shim Letter	Shape	Material	0 CIR	2 CIR
1	5155942	0.001	C		bimetal	-----	-----
1	5354689	0.0015	D		bimetal	1.5 -2	1.1 -1.5
1	2451597	0.005	E		bronze	1.3 -1.6	1.0 -1.2
1	8616834	0.007	F		bronze	1 -1.4	0.75-1.1
1	2450533	0.010	B		bronze	0.75-1.25	0.6 -0.9
1	8047765	0.015	R		bronze	0.5 -0.8	0.4 -0.6
1	2439592	0.020	X		bronze	0.4 -0.6	0.3 -0.45
2	8047765	0.030	Y		bronze	0.25-0.35	0.2 -0.2

Table II. Shim Data For IC2800-B410

Qty.	Shim Cat. No.	Effective Thickness in Inches	Identification			Approximate Time Range (Seconds)	
			Shim Letter	Shape	Material	0 CIR	2 CIR
1	5351666	0.001	D		bimetal	-----	-----
1	5353251	0.0015	E		bimetal	-----	-----
1	2475160	0.005	F		bronze	3.2 - 5.0	2.6 - 4.2
1	5386520	0.010	B		bronze	1.8 - 2.5	1.5 - 2.1
1	2489801	0.015	R		bronze	1.3 - 1.8	1.0 - 1.5
2	5386520	0.020	X		bronze	0.9 - 1.2	0.7 - 1.0
2	2489801	0.030	Y		bronze	0.7 - 0.9	0.5 - 0.07



CONTACTOR	BW	A	B*	C	D	SPRING FORCES	
						Initial Fi - oz.	Final Ff - oz.
IC2800B310	1/32	5/16 to 3/8	1/16 min	3/8 to 7/16	1/16 to 5/32	7 1/2 ± 1	14 ± 1
IC2800B410	1/16	7/16 ± 1/32	3/32 min	1/2 to 9/16	1/16 to 5/32	18 1/2 ± 2	23 ± 2

*When "B" measures "BW", it is recommended that tips be renewed.

Fig. 6. Tip gaps and wipes

ARMATURE OPENING SPRING

The armature opening spring permits fine adjustment of the time-delay dropout and is also the main adjustment of pickup current and voltage. In the time-delay dropout application the spring affects the time as indicated in Fig. 7.

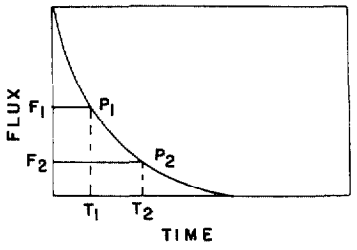


Fig. 7. Flux—time curve

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 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.

MAINTENANCE

ARCING HORNS

All poles which have blowouts also have arc chutes. These arc chutes in all cases are clamped in position in one of two ways: either a retainer and wing nut or a spring clamp are used. To remove the arc chute simply loosen the wing nut and swing the retainer aside or unhook the spring clamp (Figs. 1 and 2). Take care to replace the arc chute in the same manner in which it was removed. The retainer or spring clamp should go back into place without any undue forcing. If you encounter trouble, recheck to make sure the arc chute is in place properly.

ARC CHUTES

Clearance to contacts must be as shown in Fig. 6.

COILS

To replace coils, the complete armature assembly may be removed without disturbing the calibration by removing the two screws that secure the assembly to the frame (Fig. 1). After removing the armature assembly, take out the coil retainer which fits into a groove in the core. Replace the coil, making sure that the spring washer and any other spacers are also replaced in the same order in which they were removed. Take care also that the armature is replaced in the same manner as it was removed and support (K) (Fig. 2) fits into V grooves of bracket (L). As an added precaution, check the contact gap and wipe as given in Fig. 6.

POWER CONTACTS

Contacts should be inspected at regular intervals for wear. When they have worn so that the B dimension is reduced to BW (Fig. 6), it is recommended that they be replaced. The B dimension must be measured with the armature manually held down against the core.

CONTACT FORCE

Check contact force using a pull scale. Pull in the direction perpendicular to the plane of the movable contact as shown in Fig. 6. Do not try to adjust the contact force. If it is not within the limits as given (Fig. 6), replace the contact spring.

ELECTRICAL INTERLOCKS

Electrical interlocks are rated as follows:

Interlock Ratings in Amperes

Number of Contacts	Carry	Make	Interrupt						
			D-c Inductive*			A-c**			
			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 d-c 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.*

Contact Tip Gap and Wipe

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.

Contacts		Maximum	Minimum
Not Operated	(NO) Tip Gap	1/8"	5/64"
	(NC) Tip Wipe	5/64"	3/64"
Operated	(NO) Tip Wipe	1/8"	1/16"
	(NC) Tip Gap	5/32"	3/32"

The gap and wipe in the operated position will be obtained by bending the interlock operator (Figs. 1 and 2), as required. With the contactor energized, the interlock operating arm (Fig. 9), should not bottom; with the contactor de-energized, clearance must exist between the interlock operating arm and interlock operator (Figs. 1 and 2).

These contactors use an interlock 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. 8, 9, or 10.

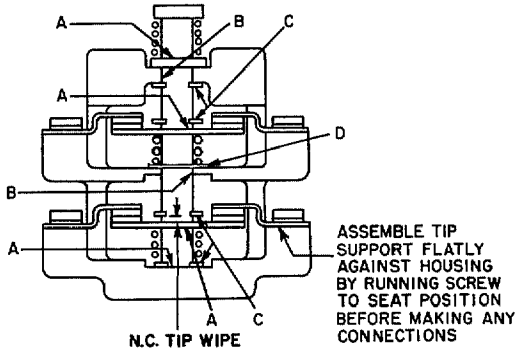


Fig. 8. Contact block with normally closed contacts in unoperated position

Spring ends must not protrude into holes (A), slots (B), or keys (C), which serve as guides for operating arm. See Fig. 8.

Interlock blocks with two normally closed circuits require a spring spacer (D) as shown in Fig. 8 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 blocks, as shown in Figs. 9 and 10.

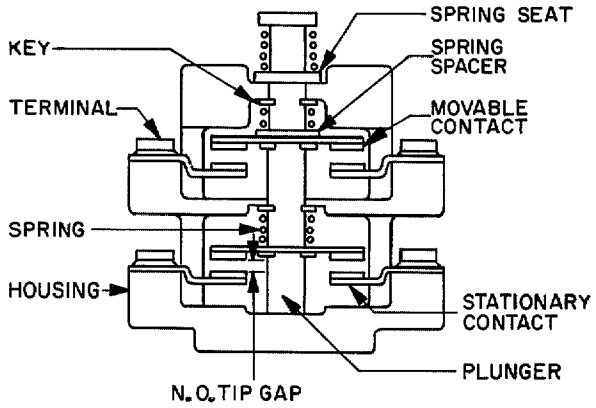


Fig. 9. Interlock block with normally open contacts in unoperated position

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. 10.

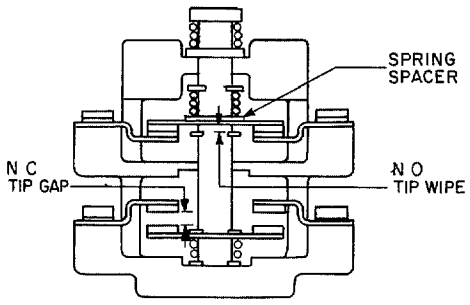


Fig. 10. Interlock block with one set of normally open contacts and one set of normally closed contacts in operated position

RENEWAL PARTS

Renewal parts information is contained in renewal parts bulletins GEF-4179 (for IC2800-B310) and GEF-4313 (for IC2800-B410). When ordering renewal parts, specify the quantity required and give catalog number or describe the parts in detail. Also, give the complete nameplate rating of the equipment.

DRIVE SYSTEMS DEPARTMENT

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