DS303 HEAVY DUTY DC CONTACTORS

SIZES 1 THROUGH 5

Before 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, and suitable for mounting on steel bases, with insulation bases recommended for contaminated environments. The insulation and arc extinguishing systems are designed for 600 and 1000 Vdc with no arc excursion beyond the contactor. All contactors, in addition to having fully-rated blowout coils, also have blowout coils with lower current rating to improve interruption characteristics at low current. For 600 V contactors, the minimum interruption capacity is 10% of the blowout coil rating, and the maximum interruption capacity is 1000% of the contactor frame size rating with L/R = 15 ms. For contactors with more than one pole, it is possible to have a mixture of blowout ratings that might include poles with no blow out.

Refer to Table 1 for a listing of basic contactor forms and nominal ratings.

AC OPERATION

If the contactor is to be energized from the output of a rectifier, a full-wave bridge circuit of the type shown in Figure 2 is often used. Whenever this type of connection is used, only the ac side should be opened, or both the ac and dc sides should be opened simultaneously. The dc circuit alone should not be opened unless the rectifier is rated for full ac voltage, which would be evident from the omission of the resistor on the ac side. Contactors may be de-energized by opening both ac and dc circuits simultaneously, to prevent time delay dropout and to prolong rectifier life.

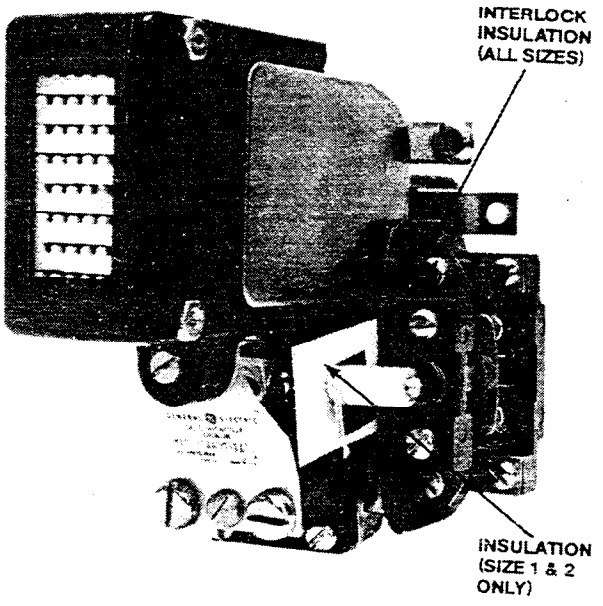

Figure 1. DS303B1A Contactor - interlock added.

MAINTENANCE

ARC CHUTES (See Figure 3)

All poles with blowout coils also have arc chutes. To remove the arc chute, loosen the captive screw "A" and slide the arc chute off in the horizontal direction. With the Size 4 and 5 contactors, it is also necessary to release the arc chute latch "B". This may be effectively done

with a screw driver used to release the latch and slide the arc chute in the same motion.

In normal service, the arc chute is good for the life of the contactor and requires no maintenance. Operation beyond rating may cause excessive erosion of plastic or ceramic. Replacement is necessary only if there is evidence of ceramic or plastic walls wearing through, or if there is extreme ceramic melting caused by an overload.

Replace the arc chute by sliding it over the arc runner and between the pole pieces. Tighten captive screw "A" and ensure that latch "B" is engaged. There must be electrical contact at arc chute support "C", Figure 4.

COILS (See Figure 4)

To replace coils, remove the arc chutes, remove the two screws supporting the lower terminal block, and unhook the armature tension spring. Do not loosen or otherwise change the adjustments of the armature tension spring because this is factory adjusted for proper pick up.

Remove the armature assembly and the C-ring retaining the coil. Remove the coil.

Replace the coil and reassemble in reverse order. Spring washer clips and locking screws are used on some contactors to prevent coil shifting. Reassemble and adjust if necessary to hold the coils firmly in place.

Adjust the armature spring if loosened or otherwise disturbed.

CONTACT WIPE AND GAP, POWER CONTACT CARE (See Figures 4 & 7)

Power contacts do not require maintenance (dressing, filing, or adjusting) for the life of the contacts. Contacts must be replaced when either contact has worn through to the copper support or when the wipe is reduced to .016 inch (see Figures 4 & 7).

In the event of extensive contactor disassembly or exchange of parts (power contacts excluded), check contact wipe and gap per Table 1. Some adjustment can be made using shims under the plastic movable tip carrier.

On contactors with normally closed contacts, normally closed contact wipe is zero with holding coils, and 1/2 of the Table 1 wipe when no holding coil is used. With the armature held in the fully open or closed position, however, gaps and wipes must be according to Table 1.

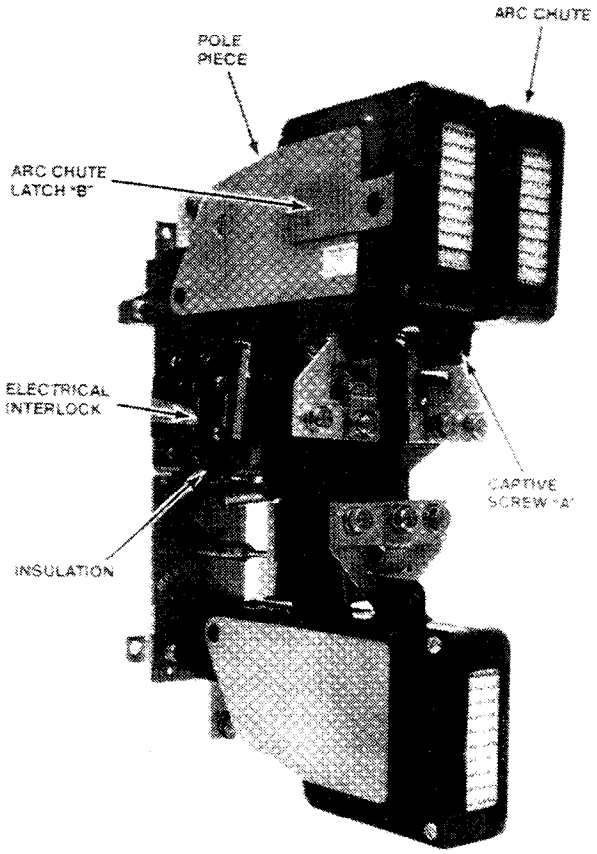

Figure 3. DS303B5E Contactor.

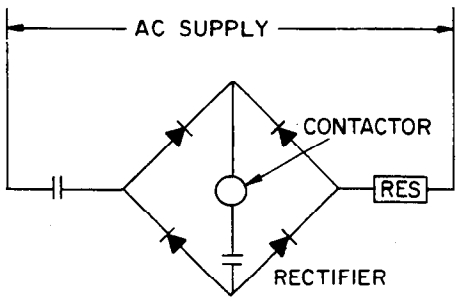

Figure 2. Full wave rectifier for ac operation.

TABLE 1
MAIN CONTACT GAP, WIPE & FORCE

Device DS303*#†		Pole Arrangement	Holding Coil	Max. Continuous Amps. De-rate for Smaller Blow-out Coils	Contact Wipe N.O. & N.C.		N.O. Contact Gap	N.C. Contact Gap	N.O. Contact Force Closed, Oz.	N.C. Contact Force Closed, Oz.
Size	Form				Max.	Min.	Min.	Min.	Min.	Min.
1	A	1NO	--	25	.064	.044	.28	-	5.5	-
1	B	1NC	--	25	.064	.044	-	.37	-	3.0
1	D	1NO-1NC	--	25	.064	.044	.25	.37	5.5	3.0
1	G	1NC	YES	25	.064	.044	-	.37	-	5.5
1	J	1NO-1NC	YES	25	.064	.044	.25	.37	5.5	5.5
2	A	1NO	--	50	.064	.044	.28	-	5.5	-
2	B	1NC	--	50	.064	.044	-	.37	-	3.0
2	C	2NO	--	50	.072	.052	.40	-	20.0	-
2	D	1NO-1NC	--	50	.064	.044	.25	.37	5.5	3.0
2	E	2NO-1NC	--	50	.072	.052	.40	.40	20.0	6.5
2	F	2NO-2NC	--	50	.072	.052	.40	.40	20.0	6.5
2	G	1NC	YES	50	.064	.044	-	.37	-	5.5
2	H	2NO	YES	50	.072	.052	.40	-	20.0	-
2	J	1NO-1NC	YES	50	.064	.044	.25	.37	5.5	5.5
2	K	2NO-1NC	YES	50	.072	.052	.40	.40	20.0	20.0
2	L	2NO-2NC	YES	50	.072	.052	.40	.40	20.0	20.0
3	A	1NO	--	100	.072	.052	.57	-	20.0	-
3	B	1NC	--	100	.072	.052	-	.40	-	6.5
3	C	2NO	--	100	.072	.052	.40	-	20.0	-
3	D	1NO-1NC	--	100	.072	.052	.35	.40	20.0	6.5
3	E	2NO-1NC	--	100	.072	.052	.40	.40	20.0	6.5
3	F	2NO-2NC	--	100	.072	.052	.40	.40	20.0	6.5
3	G	1NC	YES	100	.072	.052	-	.40	-	20.0
3	H	2NO	YES	100	.072	.052	.40	-	20.0	-
3	J	1NO-1NC	YES	100	.072	.052	.35	.40	20.0	20.0
3	K	2NO-1NC	YES	100	.072	.052	.40	.40	20.0	20.0
3	L	2NO-2NC	YES	100	.072	.052	.40	-	-	-
4	A	1NO	--	150	.081	.051	.62	-	32.0	-
4	B	1NC	--	150	.081	.051	-	.42	-	21.0
4	C	2NO	--	150	.081	.051	.42	-	32.0	-
4	D	1NO-1NC	--	150	.081	.051	.42	.42	32.0	21.0
4	E	2NO-1NC	--	150	.081	.051	.42	.42	32.0	21.0
4	G	1NC	YES	150	.081	.051	-	.42	-	32.0
4	H	2NO	YES	150	.081	.051	.42	-	32.0	-
4	J	1NO-1NC	YES	150	.081	.051	.42	.42	32.0	32.0
4	K	2NO-1NC	YES	150	.081	.051	.42	.42	32.0	32.0
5	A	1NO	--	300	.081	.051	.62	-	32.0	-
5	B	1NC	--	300	.081	.051	-	.42	-	21.0
5	C	2NO	--	300	.081	.051	.42	-	32.0	-
5	D	1NO-1NC	--	300	.081	.051	.42	.42	32.0	21.0
5	E	2NO-1NC	--	300	.081	.051	.42	.42	32.0	21.0
5	G	1NC	YES	300	.081	.051	-	.42	-	32.0
5	H	2NO	YES	300	.081	.051	.42	-	32.0	-
5	J	2NO-1NC	YES	300	.081	.051	.42	.42	32.0	32.0
5	K	2NO-1NC	YES	300	.081	.051	.42	.42	32.0	32.0

* ALL DESIGNS: i.e. A: 600V; B: 1000V; etc.

\# Size

† Form

ARMATURE SPRING ADJUSTMENT

The armature spring is factory adjusted and does not require re-adjustment during routine maintenance. If the armature spring is disturbed or the contactor is completely disassembled, the armature spring may be adjusted as follows:

- On contactors with only normally open poles, the armature spring must be adjusted to firmly open the armature against its stop and yet pick up between 45 and 65% of the maximum coil nameplate voltage with the coil at room temperature.
- On contactors with normally closed poles but without a holding coil, the armature spring must be adjusted to obtain at least 1/2 of the normally closed contact wipe in Table 1. Verify that pickup is still within 45 to 56% voltage as above.
- On contactors with normally closed poles and with a holding coil, the normally closed contacts do not wipe using the armature return spring because these contactors use a larger contact spring. Adjust the armature return spring to obtain pick up between 45 and 65% voltage as above.

Notes:

1. Pick up measurements are always made with the contactor mounted on a vertical panel with the normally open contacts pointed up and the normally closed contacts pointed down. ***This is the only acceptable mounting position.***
2. The woven shunt must be formed so that it is in a neutral position with the contacts just touching; otherwise, the shunt acts as a spring and impairs pickup.

CONTACT FORCE

Contact force can be checked according to the minimum values of Table 1 by closing the armature by hand and then measuring the force required to part the contacts according to Figure 7. Contact force below minimum can be corrected only by replacing the contact spring.

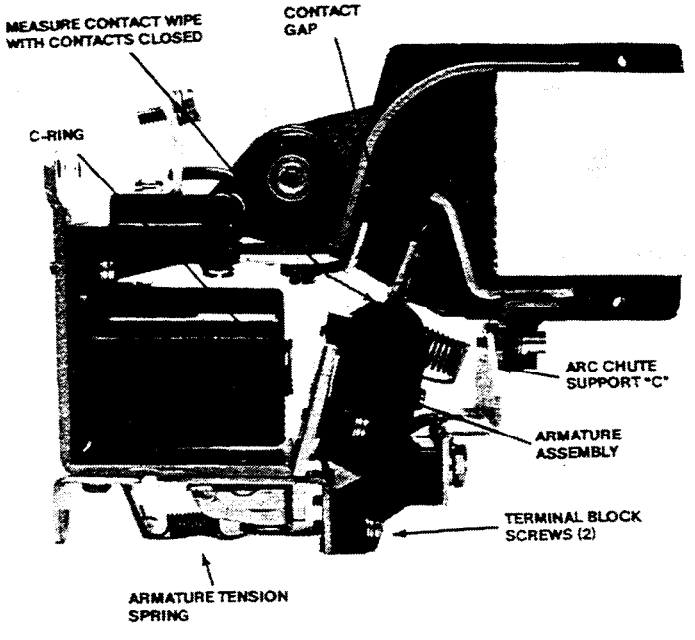

Figure 4. DS303B3A Contactor – arc chute half removed to show detail.

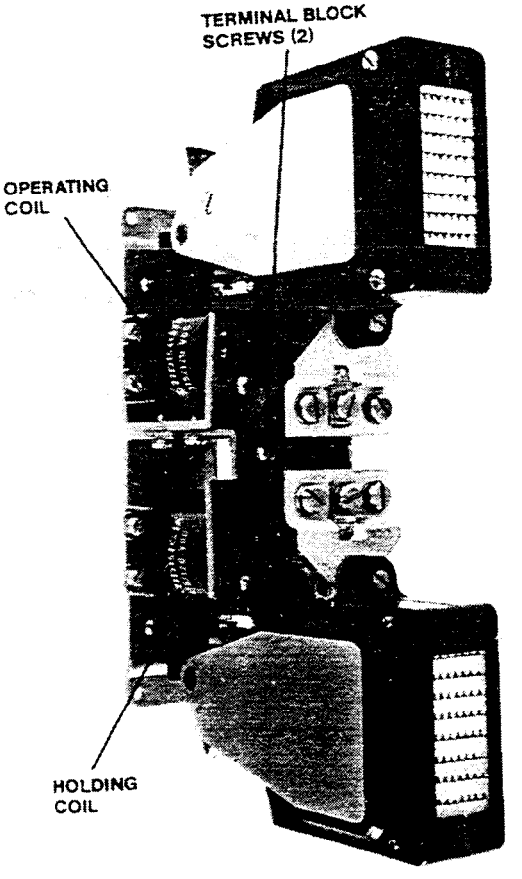

Figure 5. DS303B3J Contactor.

TABLE 2
INTERLOCK RATINGS (In Amperes)

Number of Contacts	Carry	Make	Interrupt						
			Dc Inductive*			Ac**			
			125V	250 V	600 V	110 V	220 V	440 V	600 V
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.

ELECTRICAL INTERLOCKS

Note: When adding or replacing a complete interlock assembly, the insulation as shown in Figure 3 must be in place between the interlock and the coil.

INSPECTION AND CARE

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

Tip gaps and wipes, when new, should be as shown in Table 3. Replace contact tips when wipe reaches one-half of minimum specified.

A universal interlock (Figure 9) having one set of normally open contacts and one set of normally closed contacts must be adjusted so that with one set of contacts just touching, there is at least 1/64 inch of gap between the other set of contacts.

REPLACING CONTACTS

To replace removable contacts, lift the spring seat with the thumb and forefinger, and remove the operating plunger that supports the movable contacts. Snap off the U-shaped keys, and the removable contacts can be removed and replaced. Care should be taken not to lose any parts or pieces during this operation. To replace a stationary contact, remove the terminal screw and lift the contact off the housing. Replace by pressing the new contact assembly into the molded insert and run the terminal screw to its seal position. Care should be taken to avoid changing the shape of this contact assembly in handling. Also, the shape should not change during operation.

CHANGING CIRCUIT ARRANGEMENT

To change an interlock from normally open to normally closed or vice-versa, disassemble the movable contacts in the manner described above and turn the contact over. The contact, spring, spring spacer, and keys should be reassembled as shown in Figures 9, 10, and 11. The stationary contacts should then be removed, inverted and replaced as outlined in the preceding paragraph.

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 Figure 9. Otherwise, electrical creepages will not be maintained. (Note that Figure 9 is shown in the operated position).

Spring ends must not protrude into holes (A), slots (B), or keys (C), which serve as guides for the operating arm. See Figure 10.

Contact blocks with two normally closed circuits require a spring spacer (D) as shown in Figure 10 to ensure 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 Figures 9 and 11.

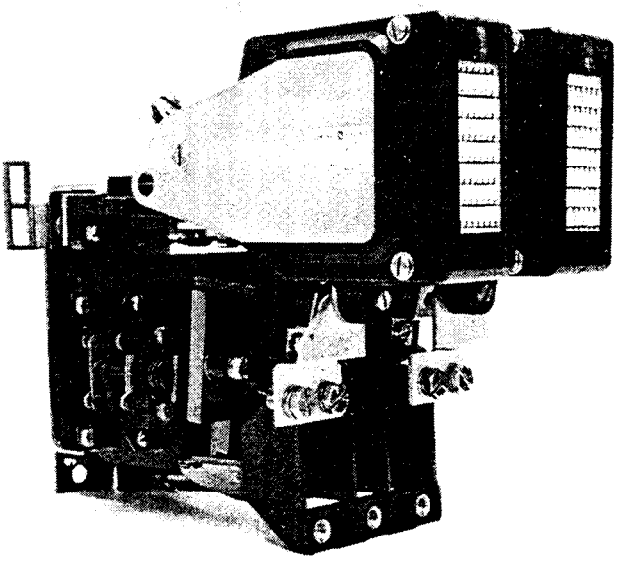

Figure 6. DS303B3D Contactor.

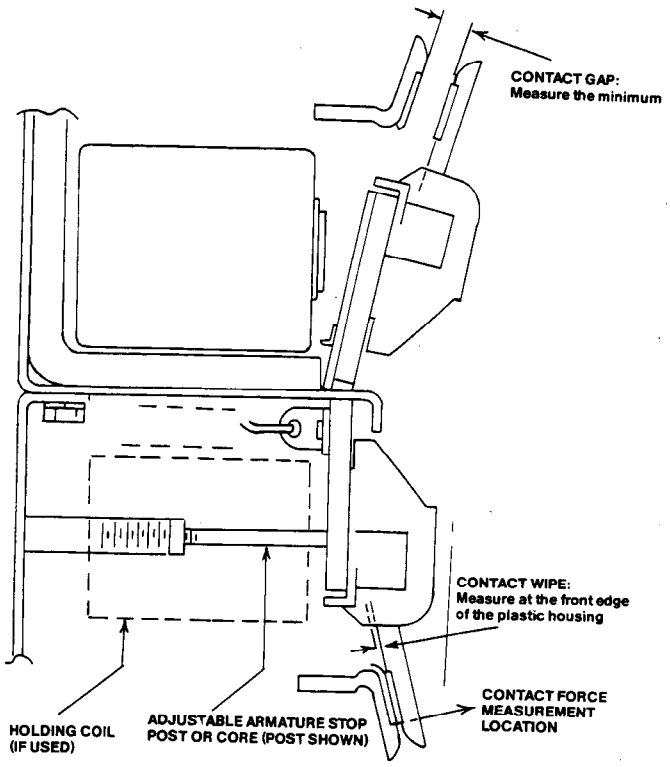

Figure 7. Typical contact gap and wipe measurements.

TABLE 3
INTERLOCK CONTACT GAP AND WIPE
(Per Figures 9, 10, & 11)

CONTACTS		MAXIMUM INCHES	MINIMUM INCHES
Not Operated	(N.O.) Tip Gap	1/8	5/64
	(N.C.) Tip Wipe	3/32	3/64
Operated	(N.O.) Tip Wipe	5/64	3/64
	(N.C.) Tip Gap	7/64	5/64

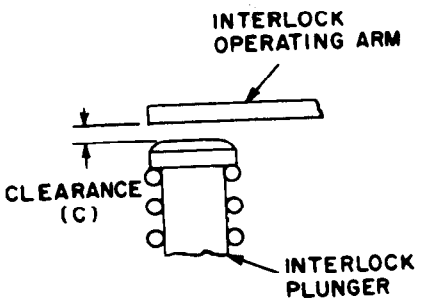

Figure 8. Contactor in its de-energized position.

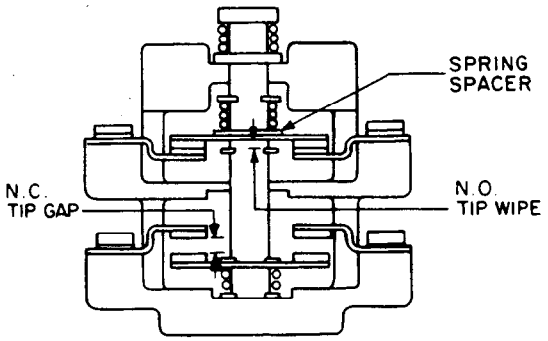

Figure 9. Universal electrical interlock with one set of normally open contacts and one set of normally closed contacts in the operated position.

MECHANICAL INTERLOCKS

Contactors are arranged for horizontal mechanical interlocking in pairs to keep one device from closing while the other is closed. When one contactor is completely closed and the other open, there should be a slight amount of free motion of the interlock arm. Double-throw forms cannot be mechanically interlocked.

RENEWAL PARTS

Renewal parts may be ordered from the renewal parts bulletin by specifying the quantity required and the catalog number, or by describing the parts in detail and giving the complete nameplate rating of the equipment.

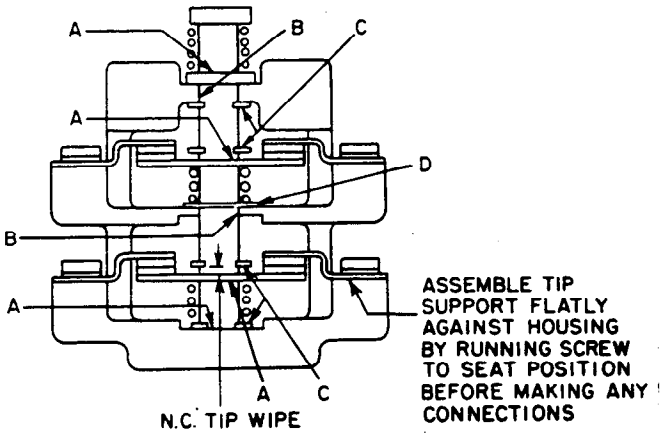

Figure 10. Universal electrical interlock with normally closed contacts in unoperated position.

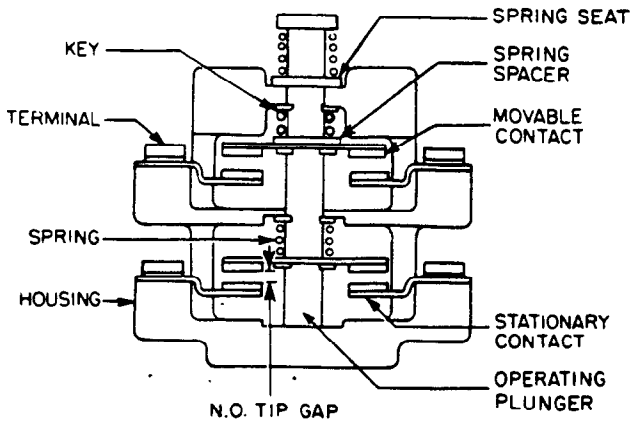

Figure 11. Universal electrical interlock with normally open contacts in unoperated position.

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

WARRANTY SERVICE

Should a defect covered by our warranty occur, the part shall be repaired or replaced only upon receipt of the failed part by Drive Systems Product Service. General Electric sales offices will provide return tags and shipping instructions.