GEH-1937B
Supersedes GEH-1937A

INSTRUCTIONS

HIGH-VOLTAGE CONTACTORS

A-C, AIR-BREAK TYPE

IC2812-E100 IC2812-F100
IC2812-E101 IC2812-G100

INTRODUCTION

These instructions cover high-voltage, a-c air-break contactors—outlined in Table I. The contactors are designed for equipment used in starting a-c motors with line voltage from 600 volts to a maximum of 5200 volts.

TABLE I

DEVICE IC2812-	NORMALLY OPEN POLES	NORMALLY CLOSED POLES
—E100 —E101	3	—
—F100	5	—
—G100	3	3

STANDARD CONTACTORS—IC2812-E100 AND IC2812-E101

RATINGS

The standard contactors, IC2812-E100 and IC2812-E101 (see Fig. 1), are three-pole, normally open contactors, rated 200 or 400 amperes, continuous; with a maximum interrupting capacity of 50,000 kva, and a maximum "let-through" current of 58,000 amperes.

OPERATING MAGNETS

The IC2812-E100 and -E101 contactors are provided with a-c and d-c operating magnets, respectively, both have continuous-rated coils.

Control voltage for energizing the coils should be within 85 to 110 percent of the control voltage.

ARC CHUTES

The arc chutes are shipped unmounted. They must be mounted before applying power to the contactor. When unpacking them, handle carefully to prevent damage. See that there is no packing material or other foreign matter inside the chutes; and make certain that they are dry. Mount the chutes by easing them onto the upper and lower arcing horn extensions as far as they will go. Observe the notice on the front of the chute, shown in Fig. 2. Figure 3 shows the difference between properly and improperly seated chutes.

The weight of the arc chute itself holds it in place when correctly seated. The chute may be mounted with either end at the top.

ELECTRICAL INTERLOCKS

The electrical interlock consists of three contact units, each with one normally open and one normally

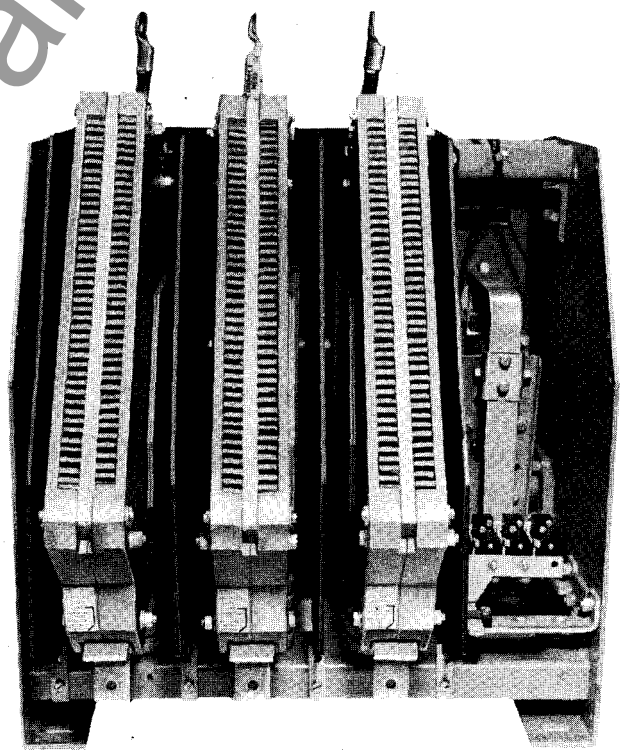

Fig. 1. IC2812-E100 high-voltage contactor.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

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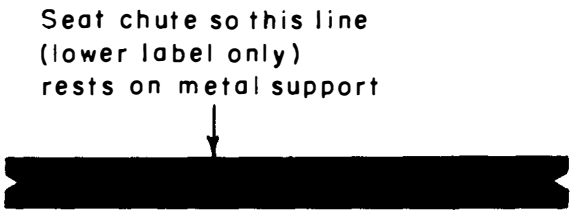


Fig. 2. Arc chute guide notice.

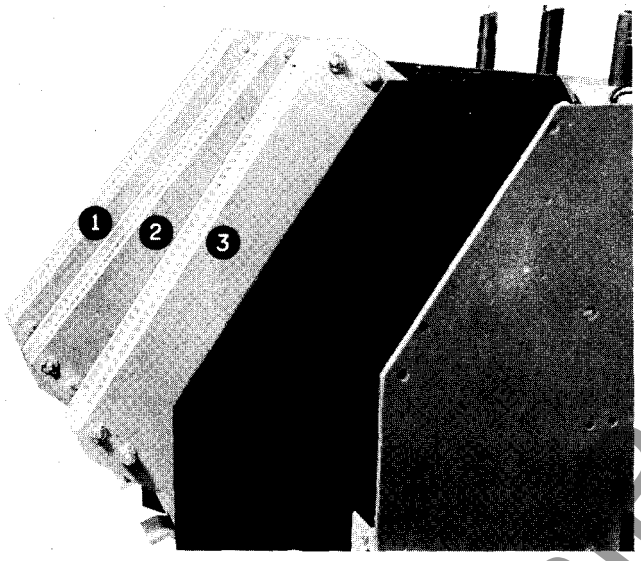


Fig. 3. View showing arc chutes 1 and 2 improperly seated with top of chute not pushed down into place on arcing horn. View also shows arc chute 3 properly seated with edges of chute parallel with phase barrier and edge of contactor.

closed contact. These contacts are mechanically connected to the main shaft of the contactor, and move when the contactor operates.

Adjustment of these interlocks is critical to the operation of the contactor. Figure 4 should be followed in making this adjustment. Also, see Table II.

TABLE II
(Refer to Fig. 4a for Interlock No.)

MAIN CONTACTS FULLY CLOSED (Magnet Armature Laminations Held Against Stationary Magnet)			
	(Dimensions in Inches)		
Interlock No.	1	2	3
Dimension "J"	3/8	3/8	1/32
Travel "K"	17/32	17/32	17/32
N. O. Tip Wipe	1/16	1/16	1/16
N.C. Tip Gap	3/32	3/32	3/32

* Trade-mark of General Electric Company.

The electrical rating of the interlock is 15 amperes, continuous; 60 amperes, "make" current; with current interrupting values, as listed below in Table III.

TABLE III
A-C INDUCTIVE

Normally Open or Normally Closed	
Volts	One Interlock-Amp
110	60
220	30
440	12
550	8

D-C INDUCTIVE

Normally Open or Normally Closed		
Volts	One Interlock-Amp	Two Interlocks in Series-Amp
125	1.8	3.0
250	0.5	0.8
600	0.2	0.3

DOOR INTERLOCK

The door interlock can be furnished with all forms of the IC2812 contactor. When applied to Limitamp* controllers or to any other form of enclosure, the interlock prevents the opening of enclosure doors with the contactor in closed position.

Adjust the door interlocks according to the instructions on Fig. 5.

Since the operation of electrical interlocks is effected whenever the door interlock is adjusted, the electrical interlock should be readjusted according to Fig. 5.

IC2812-F100 CONTACTORS

The IC2812-F100 contactors are identical to the IC2812-E101 contactors except for the number of poles. Therefore, the instructions above for the -E101 contactors also apply for the -F100 contactors.

To operate the five-pole device a d-c magnet is used with intermittent rated coils with an economy resistor.

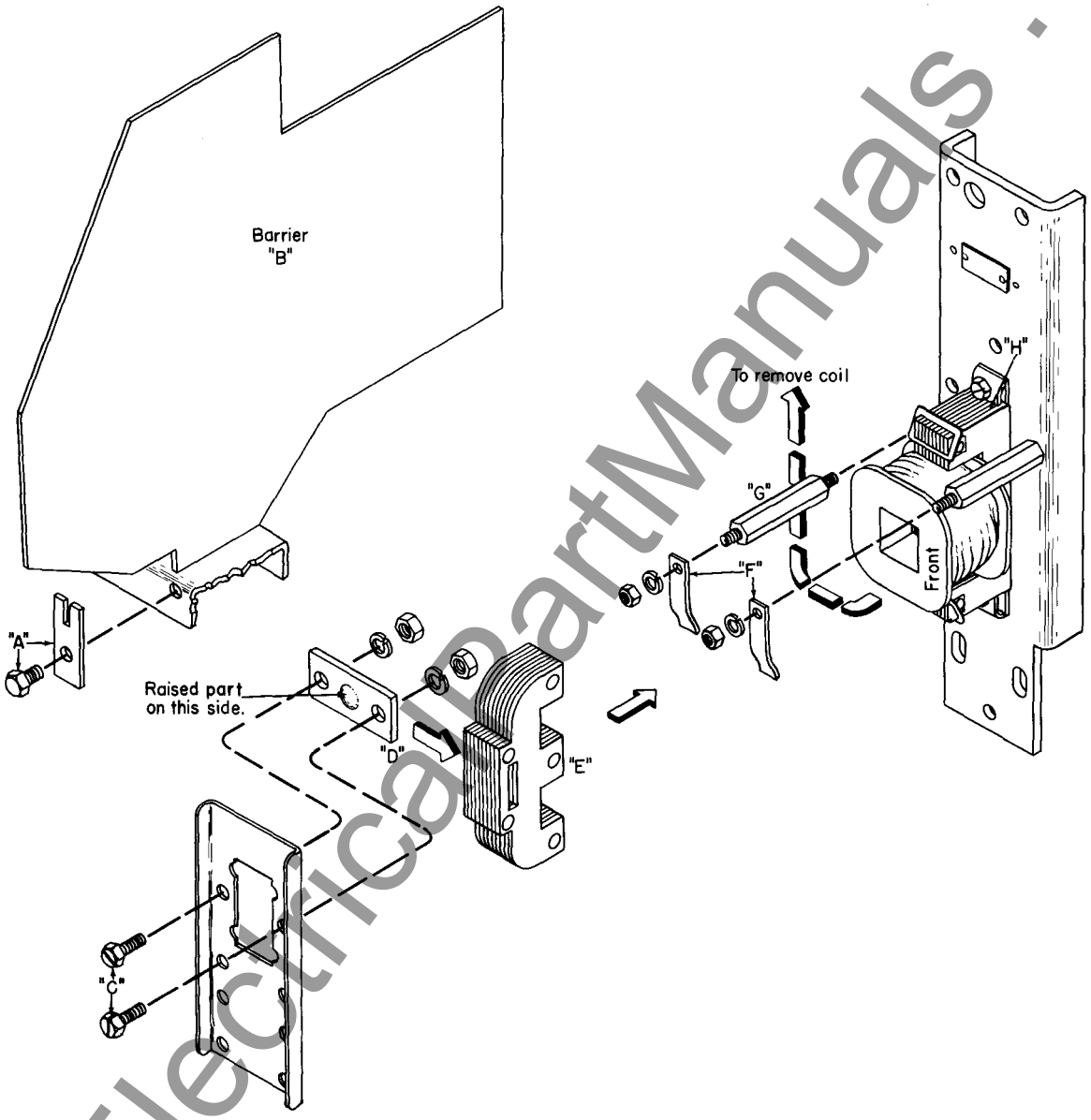
IC2812-G100 CONTACTORS

The IC2812-G100 contactors consist of three normally open poles which are identical to the IC2812-E101 contactors and are mechanically interlocked to three normally closed poles. The instructions given above for the -E101 contactors apply to the -G100 contactors, with the following exceptions:

The normally open poles and normally closed poles of the -G100 each have their own d-c magnet. The

PROCEDURE FOR REPLACING A-C COIL FOR HIGH-VOLTAGE CONTACTOR IC2812-E100

SUPPLEMENT TO GEH-1937B



A-c coil removal, for IC2812 5000-volt air-break contactor

The following procedure for replacing a-c coils supersedes the procedure described on Page 6 of GEH-1937B:

1. Remove the coil leads from the terminal board and let them hang free.

(Note: Do not handle coil by the leads as this may break the leads.)

2. Remove the bolt and bracket at "A" for the right-hand barrier.

3. Remove barrier "B."

4. Remove the two screws at "C" in the armature which hold the fulcrum plate "D."

5. Slide out fulcrum plate "D" to the left.

6. Remove armature "E" to the left.

7. Remove coil retaining springs "F" from their studs.

8. Unscrew and remove left stud "G" from the back support.

9. Remove the coil by pulling it forward and then to the left and up.

10. When replacing the coil, place it as low as possible in the stationary magnetic structure "H." The armature center leg should then have clearance with the coil in any part of its movement. Assemble the coil with the word "Front" as shown. (The front of the coil has the edges of the center hole rounded to prevent binding of the armature "E" during magnet operation. This may be used to determine which side is the front in case the wording has been obliterated.)

11. The fulcrum plate "D" has a small dome on the front to permit self alignment of the armature "E." In assembling the armature, make sure this raised part of the fulcrum faces away from the magnet.

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normally closed part has no blowouts or arc chutes; therefore, this contactor has no interruption rating. These contacts establish circuit only, and should not be opened with current flowing.

The operating magnets for the IC2812-G100 normally open contacts are the same as the d-c magnets (previously described) of the -E101 contactor. The normally closed contacts are operated by an intermittent rated magnet. A resistor is added to the coil circuit after the contactor has closed, to reduce the current in the coils.

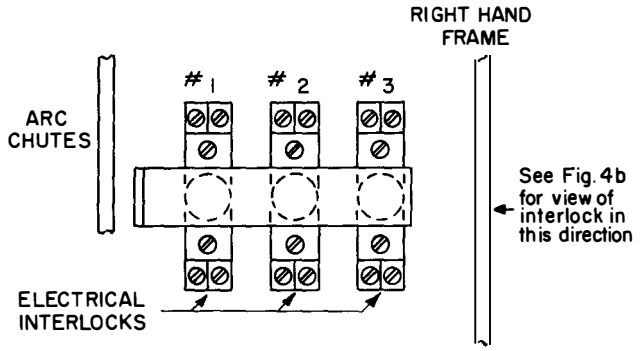

Fig. 4a. View from front of contactor showing electrical interlock arrangement.

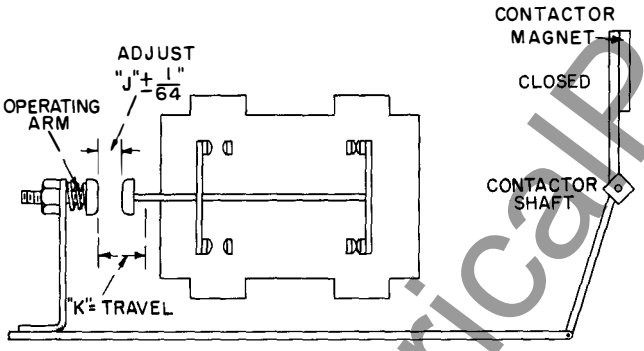

Fig. 4b. View with main contacts fully closed (contactor energized).

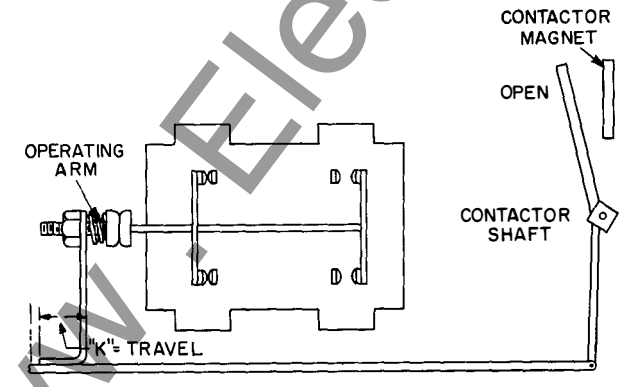

Fig. 4c. View with main contacts fully open (contactor energized).

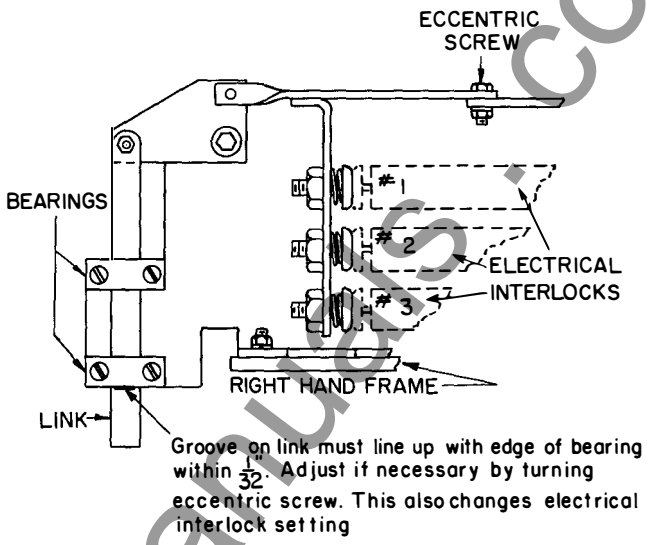

Fig. 5. View looking down on door interlock.

INSTALLATION

For convenience and safety in moving the contactor, use the lifting holes at the top of the steel side plates; and, likewise, use an equalizer bar or spreader for the cable sling.

Although the contactor has self-aligning bearings, it is advisable to mount it on a flat, horizontal surface. The contactor should be anchored by screws or studs at the mounting feet. If the contactor is not installed in a metal enclosure, at least eight to ten feet of arcing clearance in front of the unit is advised for protection of personnel.

Observe the following precautions before applying power to the contactor for the first time.

1. Remove shipping supports, blocks or ties used for protecting the contactor in transit.

2. Carefully inspect all parts of the contactor. Operate it by hand to see if all parts work freely. Be sure that contacts strike squarely with their sides in line within 1/16-inch.

3. Remove protective grease or oil which may be on the magnet face, as the grease could collect dust and dirt, thus promoting a sticking of the magnet.

4. See that all parts of the contactor are clean. High-voltage equipment fails if too much dirt accumulates.

5. It is of utmost importance to mount the arc chutes before applying power to the contactor, since

the arc chutes are essential to confine and extinguish the arcs. Without the chutes, the arcs may do serious damage. See the section on "Arc Chutes" and also refer to Fig. 2 and 3.

MAINTENANCE

Contact life depends on the severity of service required for the device. The contactor should be thoroughly inspected after every 50,000 operations.

> CAUTION: All power should be disconnected from the contactor before any inspection is made.

In routine inspection, check for loosened screws, nuts, bolts, cable clamps, and electrical interlocks. It is important to check contact wear and contact force. Lubricate the bearings once a year with a good grade of ball-bearing lubricant.

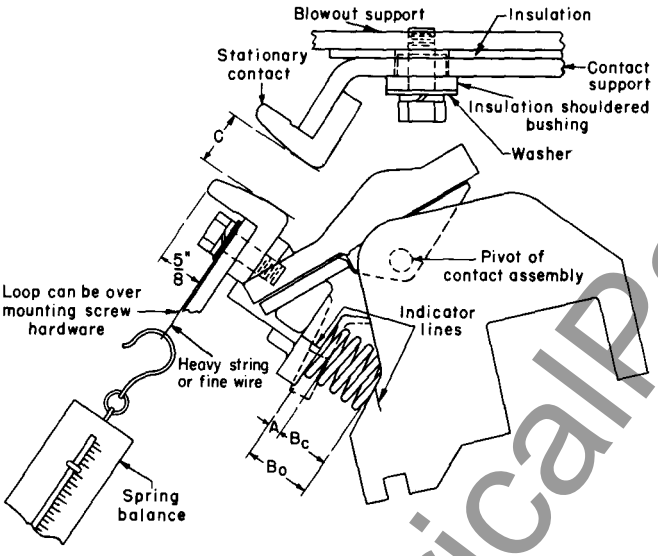

Fig. 6. View of contacts in open position with letters designating important contact dimensions.

WHEN TO REPLACE CONTACTS

Outlined below is the proper method for determining when it is necessary to replace contacts:

1. Use Fig. 6 as a guide. With the contacts in the completely open position, measure the distance, B_o, between the two spring supports. Take measurements at the indicator lines moulded into the support and bracket.

2. Next, with the contacts in the completely closed position, measure the distance, B_c, between the two spring supports.

3. Subtract B_c from B_o. If the difference, A, is less than 3/32-inch* (see Table IV), replace both the movable and stationary contacts. Contacts not replaced at this time may overheat or weld together.

In making measurements, any of the normally open contacts may be held in the closed position by blocking the armature with a wooden block or wedge. A-c armatures should be closed by applying pressure directly to the laminated armature. An incorrect indication of the contact wear and wipe will be obtained if pressure is applied to the support, due to the normal amount of play between the armature and the support.

The contact gap ("C" in Fig. 6) is set correctly at the factory, and it is not necessary to recheck this gap unless some major work is done on the contactor. The gap is measured as the shortest distance between the movable and stationary contacts. The force required to close the armature through the last part of its stroke will be high, because close to its sealed position it operates against a kick-out spring normally used to assure quick release of the magnet.

* 1/16-inch on the IC2812-G100 normally closed contacts

TABLE IV
(Refer to Fig. 6)

CONTACTOR IC2812-	CONTACTS IN WIPED POSITION MEASUREMENT "A"		NEW CONTACTS IN OPEN POSITION MEASUREMENT "C"	CONTACT FORCE (POUNDS)	
	New Contacts	Replace When Measurement "A" Reaches		Initial (Contacts Open)	Final (Contacts Closed)
—E100 —E101 —F100 —G100 (N.O. contacts only)	3/16-in.	3/32-in.	3/4-in.	8¼ to 10¼	14 to 16
—G100 (N. C. contacts)	9/64-in.	1/16-in.	*27/64-in.	**8¼ to 10¼	**9¼ to 11¼

*Measured when gaps between movable and two stationary contacts are equal.
**Total force for one bridge contact.

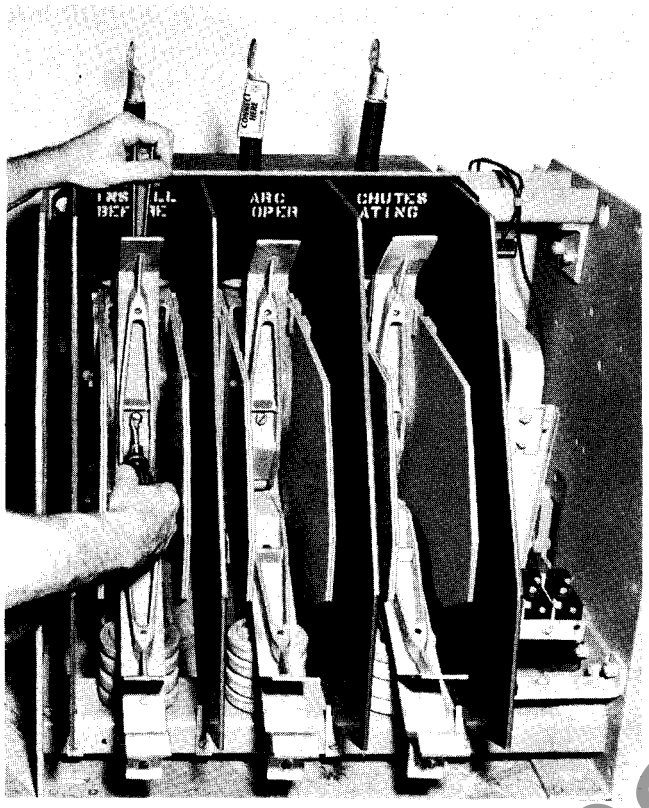

Fig. 7. View showing method of removing upper arcing horn.

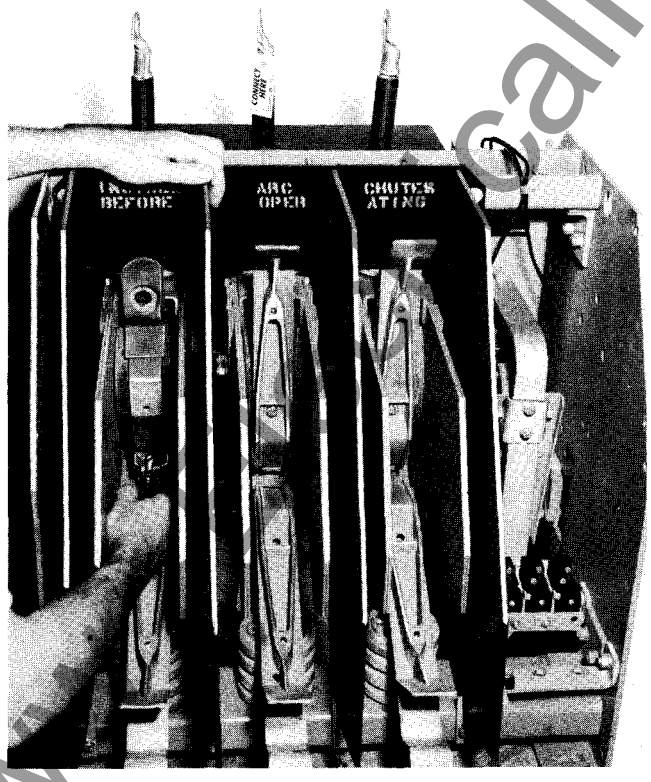

Fig. 8. Method of removing stationary contact.

In taking measurements on the normally closed contacts of the IC2812-G100 contactors, the armature must be forced to the closed position in order to fully open the contacts.

REPLACING CONTACTS

Replacing Normally Open Contacts

In replacing normally open contacts, work from the front of the contactor, following the steps described below.

1. Remove the arc chute by lifting gently from the upper and lower arcing horn extensions. Exercise care in handling the chutes so that they will not be damaged by tipping or accidental blows.

2. See Fig. 7. Using a long (14-inch) screwdriver or 9/16-inch socket wrench, remove the front bolt holding the upper arcing horn. Using an open-end 1/2-inch wrench, remove the bolt at the back, and remove the upper arcing horn.

3. Reaching in between the pole pieces, remove the loose compound arc deflector resting on the stationary contact.

4. See Fig. 8. Remove the stationary contact by removing the bolt immediately above the contact. Use either a standard 14-inch screwdriver or 1/2-inch socket wrench.

5. Before removing the movable contact, the stationary contact should be replaced first to retain the proper contact alignment of 1/16-inch. When replacing the bolt and lockwasher, the bolt is threaded into the nut which has been held in place by a nut retainer.

6. See Fig. 9. To remove the movable contact, block the magnet armature closed, thus exposing the movable contact bolt. Using a 1/2-inch socket wrench or screwdriver, remove the bolt and contact. Replace the contact, being certain that the shunt is between the flatwasher and the movable contact. The movable contact support is tapped to receive the bolt.

7. Check the alignment of the edges of the contacts to make certain that the movable and stationary contacts are within 1/16-inch.

8. Make certain that all contacts in all phases open and close at the same time or within 1/32-inch. After adjustment, tighten all bolted connections.

9. Replace the compound arc deflector over the stationary contact before replacing the upper arcing horn.

10. Replace the arc chute.

Replacing Normally Closed Contacts for IC2812-G100 Contactors Only

Both the stationary and movable contacts in the normally closed part of the -G100 contactor are ac-

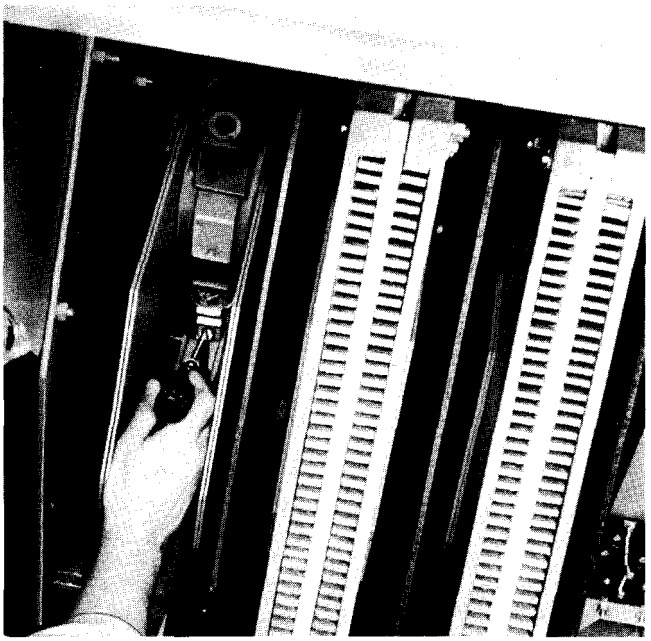

Fig. 9. Method of removing movable contact.

cessible from the front. Block the armature closed and replace the movable contact by removing the holding screw and bracket (see Fig. 10). The contact lifts off the pin. After replacing the movable contact it should be free to pivot slightly on the pin.

The screws holding the stationary contacts are directly accessible from the front. Before tightening them, after replacing the contacts, remove the armature block; this will allow the movable contacts, by the pull of the main springs, to align the stationary contacts. The stationary contacts must strike the movable contacts squarely, and all poles must open and close together, within 1/32-inch.

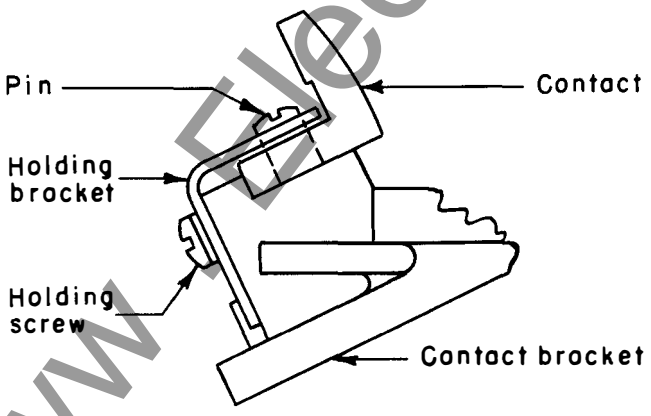

Fig. 10. Position of the holding screw and bracket.

CONTACT FORCE

Insufficient contact force can cause overheating or welding of the contacts. Excessive contact force can cause the magnet, if it is of the a-c type, to be noisy. In addition, it may prevent proper closing of the contacts. It is not necessary to check the contact force under normal operating conditions unless the contact springs have been damaged or there is some reason to suspect incorrect contact force.

When contact force is checked, a spring balance may be used in the manner indicated in Fig. 6. Note the positioning of the loop of string (or fine wire). Also note the line of pull in relation to the contact pivot. The spring balance reading should be corrected for zero reading when held in the same position. If the shunt is removed, an equivalent spacer should be used to locate the wire from the balance in the correct position. If the line of pull is slightly off, the reading will be increased. Move the balance to find the lowest reading. Use Table IV for reference figures.

Final contact force is the force required to cause the contact assembly to start to turn around its pivot when the contacts are fully wiped.

Initial contact force is the force required to cause the contactor assembly to start to turn around its pivot when the contacts are open.

To determine when the assembly starts to turn around its pivot, use a thin piece of paper between the contacts in checking final contact force—and between the die cast and moulded supports to check for this motion when the contacts are open.

REPLACING A-C COILS

By the use of two 9/16-inch box wrenches, remove the two bolts holding the movable fulcrum. Loosen the coil spring holder bolts and rotate the coil spring holders to clear the coil. Then the coil can be removed.

When reassembling it, make sure that the projection on the armature fulcrum faces away from the stationary magnet and coil. The purpose of this projection is to provide self-alignment of the movable armature.

REPLACING THE CONTACT SPRINGS

To replace the contact springs, first remove the barriers by removing the bolts in front of the contactor and sliding the barrier forward. Reach under the lower arcing horn assembly with a screwdriver and pry the spring forward, out of its lower seat.

Thread a length of heavy cord around the top of the spring and drop the cord down to the bottom. Pull the spring out with the cord (refer to Fig. 11). To replace the spring, slide one end of the spring into the recess formed by the shaft insulator and the contact holder. Compress the spring with the thumbs

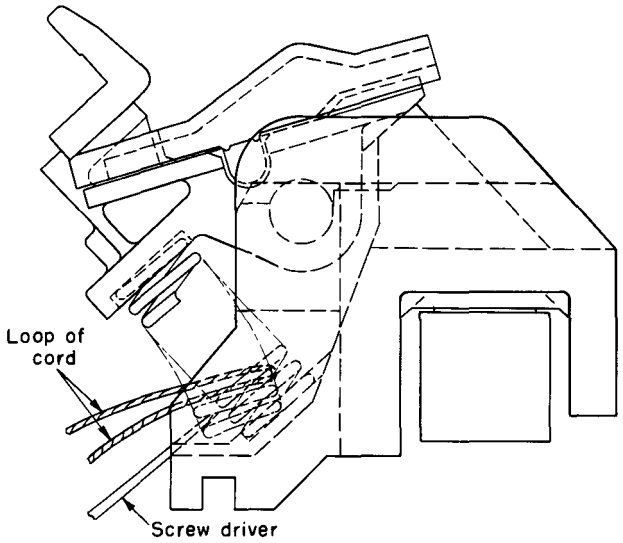

Fig. 11. Method of replacing contact spring.

and insert the spring in the top seat. The bottom can then be seated by prying with a screwdriver. Replace the barriers.

REPLACING D-C COILS

Coils for Normally Open Section of IC2812-E101, -F100, -G100 Contactors

For replacing d-c coils in normally open contactors, loosen the core bolt on the front coil (these are the bolts which project upward through the coil bracket). Detach the harness from the coil and remove the coil. It is helpful to tag all leads. Repeat with back coil. When replacing the coils, the washer must be centered around the core before the core bolts are tightened.

Coils for Normally Closed Section of IC2812-G100 Contactors

Before attempting to remove the lower coils of the IC2812-G100 contactor, block the armature of the normally open contactor and remove the top of this contactor to provide clearance for removal of the normally closed core bolts. To replace the coils, proceed as outlined above under the preceding paragraph.

WHEN YOU NEED SERVICE

IF YOU NEED TO REPAIR, recondition, or rebuild any electric apparatus, a G-E service shop near you is available day and night, seven days a week, for work in the shops or on your premises. Latest factory methods and genuine G-E renewal parts are used to maintain the original performance of your G-E equipment. For full information about these services, contact the nearest service shop or sales office listed below:

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