

INSTRUCTION SHEET

NO. 307 THERMAL OVERLOAD RELAY

Description

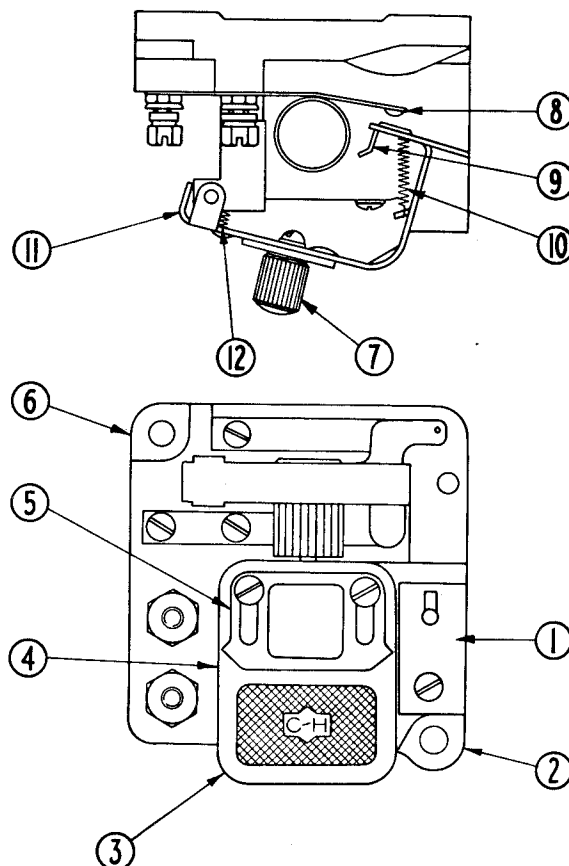
The essential operating parts of this relay are the heater coil, solder tube, control contacts, ratchet mechanism, and the compression spring. Under normal conditions the contacts of the relay are closed. The spring is then under compression and tends to open the contacts, but this is prevented by the outer part of the solder tube holding the ratchet mechanism. When the current to the heater coil becomes great enough to melt the solder film holding the outer part of the tube, this part of the tube rotates and releases the ratchet mechanism to open the control contacts. The opening of these contacts breaks the circuit to the coil of the contactor handling the power circuit and this circuit is opened. As soon as the power circuit is opened the solder film cools and hardens, after which the relay is ready to be reset with the reset button.

How to Install the Heater Coil

- 1—Remove the screws holding the instruction plate to the overload relay and take off this plate.
- 2—Remove the cover of the overload relay by sliding it to the extreme upper position and pulling outward.
- 3—Remove the terminal nuts at the side of the relay.
- 4—Insert the heater coil in the overload relay base, with the asbestos tube surrounding the coil. Be sure that the heater coil eyes fit over the terminal studs.
- 5—Fasten the celluloid calibration plate, which forms a part of the heater coil package, to the front of the overload relay base, using the screw provided for this purpose. Note that the celluloid plate bears a symbol marking which should agree with that on the heater coils.
- 6—Replace the relay cover which should fit over the heater coil, inclosing all of the coiled portion of the heater.
- 7—Replace the terminal nuts.

How to Set the Overload Relay

This relay, is adjustable. The pointer on the instruction plate should be set opposite the current marked on the calibration plate, at which it is desired to have the overload relay trip. This can be done by loosening the two screws which hold the instruction plate and the cover of the relay (item 3 on the cut above), and sliding the entire cover until the pointer on the plate is in the proper position.



34908-3

RENEWAL PARTS—Information Required

Parts CANNOT be sent promptly unless you include the FOLLOWING with your order: PUBLICATION NO. 4527, PART NO., DESCRIPTION, and the Number Stamped on the Controller Nameplate.

Due to the cost of handling, the minimum net billing charge is \$1.00

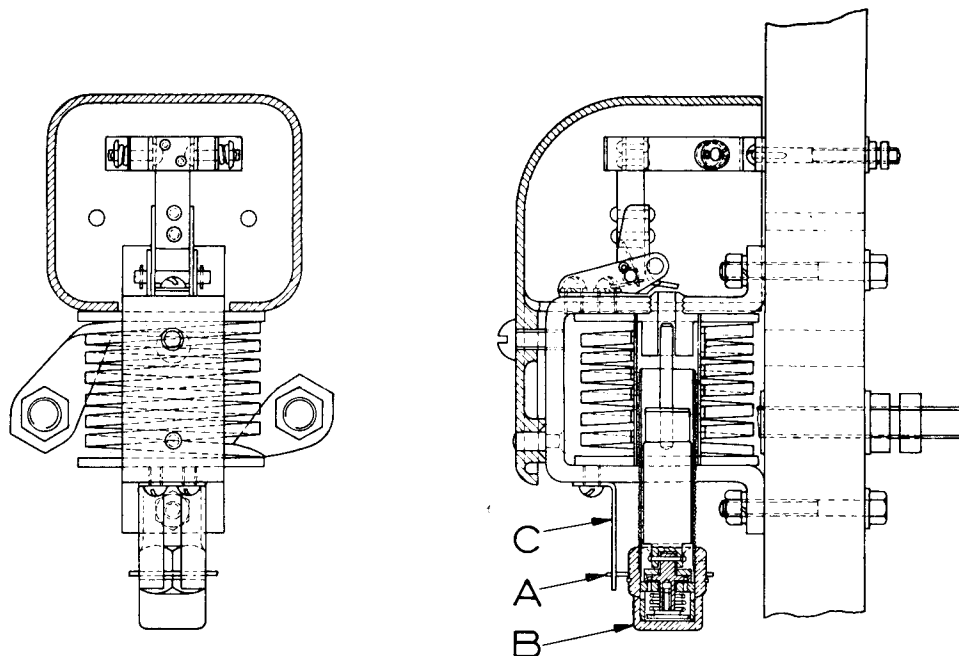
Item No.	Description	No. Req.	Part No.
1	Calibration plate (supplied with heater coil)	1	Give No. on Bottom of Plate
2	Complete relay with reset button	34908-3 Fig. 2
3	Cover and ratchet assembled	1	644-204
4	Heater coil	1	Give No. Stamped on Coil
5	Instruction plate	1	4230-151
6	Moulded base with post for item 11 ..	1	17-1308
7	Reset button	1	2222-805
8	Stationary contact finger	2	640-217
9	Latch	1	845-44
10	Tension spring	1	69-262
11	Assembled contact lever includes items 9 and 10	1	34985-1 Fig. 3
12	Spring	1	69-264



INSTRUCTION SHEET

No. 609 D-c Overload Relay

With Time Delay and Instantaneous Trip



DESCRIPTION

This device is a magnetically operated overload relay, providing time delay trip on normal settings and instantaneous trip on excessive overload conditions. Time delay proportional to the degree of overload is provided by the oil dashpot mechanism up to approximately 650% of the relay settings, and above this figure instantaneous trip is obtained.

The relay is also furnished for instantaneous trip at normal overload values when so ordered. This is done at the factory by omitting a washer in the plunger which regulates the flow of the oil, and no oil is used in the dashpot.

The relay is built in the single and double coil types, the single coil type being used on 3 wire control schemes, and the double coil types on 2 wire control schemes.

INSTALLATION

Raise the indicating plate (A) to allow the dashpot assembly (B) to be unscrewed from the relay. Lift out the plunger and make certain all of the internal parts are clean. Place about $\frac{3}{4}$ of an inch of Cutler-Hammer Dashpot oil part No. 637-218 in the dashpot. This oil is supplied with the relay. Replace the plunger, and indicating plate, and then screw the dashpot on the relay to the desired setting.

CALIBRATION

The relay is calibrated at the factory, for the application, and is set to trip on the minimum current. The calibration currents are stamped on the calibration plate (C). These represent the minimum, maximum and

midpoint in the range of settings. To change the settings of the relay proceed as follows: Raise the indicating plate (A), to allow the dashpot to be turned.

To Lower Tripping Current — Raise the dashpot by turning it clockwise. This will raise the plunger further into the magnetic circuit of the relay and will lower the value of current at which the relay will trip.

To Raise Tripping Current — Lower the dashpot by turning it counter-clockwise. This will reduce the magnetic pull on the plunger, and will raise the value of current at which the relay will trip.

When the desired setting is obtained, allow the indicating plate to drop down over the hexagon portion of the dashpot to again indicate the tripping current and lock the dashpot in position.

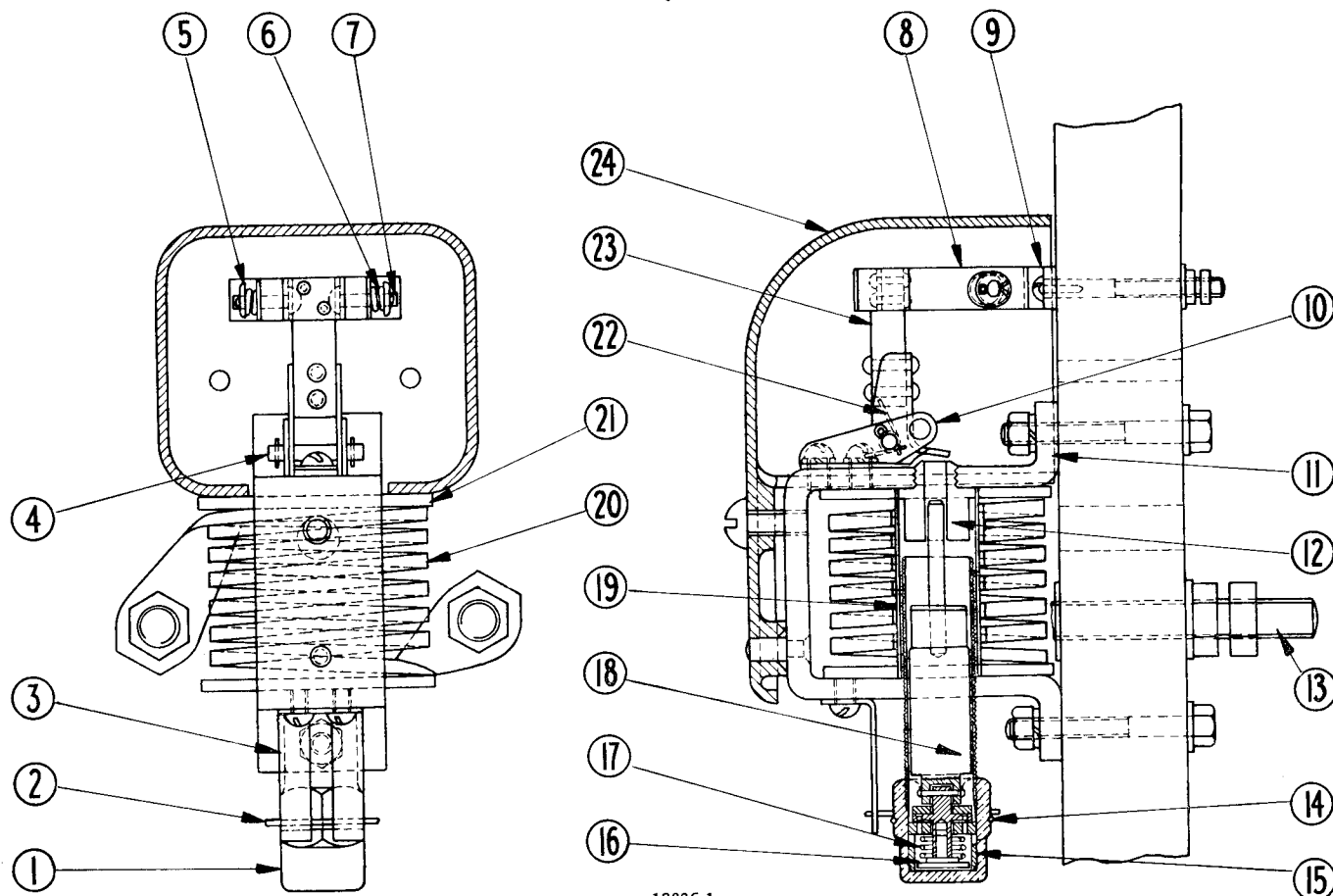
CARE

Keep the operating parts of the relay clean at all times. A cover is provided on relays mounted on open panels, and should not be removed except for inspection and service.

Lubricate the bearing points of the contact mechanism occasionally with light machine oil. Keep the contacts clean and lubricate with a small amount of vaseline.

When the level of oil in the dashpot drops below the normal level of $\frac{3}{4}$ of an inch, it is recommended that the old oil be replaced, the parts cleaned and the dashpot refilled with new oil. Do not mix the oil, use only C-H dashpot oil part No. 637-218.

(See Page 2 for Renewal Parts List)



18036-1

RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the FOLLOWING with your order: PUBLICATION No., 7235, ITEM No., DESCRIPTION, PART No., and COMPLETE NAMEPLATE DATA ON THE CONTROLLER.

Item No.	Description	No. Req'd.	Part No.
1	Dashpot.....	1	699-1841
2	Locking washer (with 9/16" lip).....	1	52-650
3	Locking washer (without lip).....	1	816-5
4	Indicator Plate.....	1	Furnish Nameplate Data
5	Shaft.....	1	956-16
6	Cup washer.....	4	916-561Z
7	Spring.....	2	969-19J
8	Pin.....	2	913-1195Z
9	Contact finger.....	2	740-8F1
10	Support.....	2	679-354
11	Support.....	1	979-14
12	Magnet frame.....	1	949-54
13	Plug.....	1	51-356
14	Stud (Give length and diameter).....	2	
15	Brass nut (Give inside diameter).....	8	
16	Washer (Give inside diameter).....	4	
17	Steel nut (Give inside diameter).....	2	
18	Ring.....	1	964-1Z
19	Piston.....	1	51-441
20	Screw.....	1	11-986
21	Spring.....	1	69-1766
22	Plunger assembly (Includes Items 15, 16 and 17).....	1	51-440
23	Insulating tube.....	1	4429-98
24	Coil.....		
25	Bar wound series coil.....	1	Give No. on Coil
26	Wire wound series coil.....	1	Give No. on Coil
27	Flat shunt wire wound coil (used only on 2 coil relays).....	1	Give No. on Coil
28	Insulating washer.....	As Req.	1016-1165
29	Spring.....	1	969-16
30	Contact lever.....	1	624-266
31	Cover.....	As Req.	49-1470
32	1/4 pt. of oil.....	1	637-218

▲We recommend that these items be stocked. The quantity to be stocked will depend upon the total number in use.

INSTRUCTION SHEET

For No. 693 Types "D" and "E" Pneumatic Timing Relay

DESCRIPTION OF OPERATION

This is a solenoid operated pneumatic timer. Energizing the type "E" or de-energizing the type "D" solenoid initiates the timing. The main spring then moves the diaphragm at a rate determined by the adjustment of the timing screw "C". This allows the operating levers to actuate the Micro switch or switches. A relief valve located in the center of the diaphragm is operated by the solenoid to provide instantaneous reset.

The left hand Micro switch is adjusted and sealed at "A" to operate at the end of the timing stroke. Do not break this seal unless re-adjustment is required when this switch is renewed. (See instructions for renewal below).

The right hand Micro switch may be adjusted at "B" to operate at any point in the timing period.

The timing period is obtained with the timing adjusting screw "C".

The auxiliary contacts (when used), either normally open or normally closed, operate instantaneously when the coil is energized or de-energized. The auxiliary contacts are not timed.

ADJUSTMENT

The relay may be adjusted to provide timing in a range of 0.3 seconds to 1 minute. This range is covered in approximately 8 turns of the timing adjusting screw "C".

To increase the timing period, turn the screw in a clockwise direction.

To decrease the timing period, turn the screw in a counter-clockwise direction.

Right Hand Micro Switch (when used).

The right hand switch may be adjusted at "B" to operate at any point in the timing period. The range of adjustment is covered in approximately one turn of the screw "B". To make the switch operate earlier in the timing period, turn the screw counter-clockwise. To make the switch operate later in the timing period, turn the screw clockwise.

CAUTION

Do not lubricate any part of this timing relay.

CARE

No special maintenance of this timing relay is required.

TO RENEW THE DIAPHRAGM AND VALVE ASSEMBLY

(See Illustration on page 2)

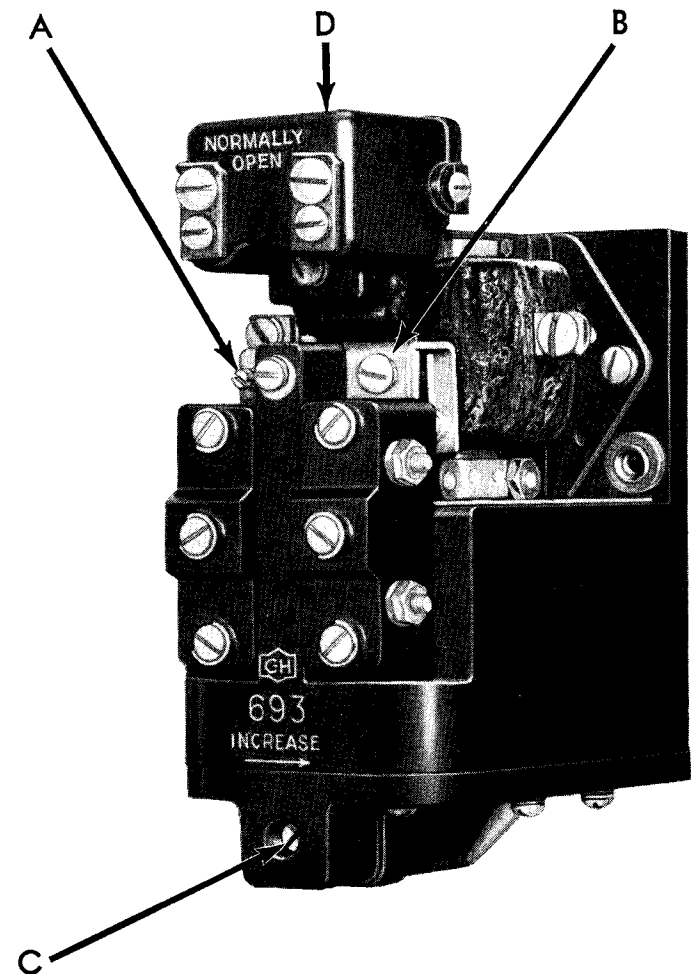
Remove the diaphragm cover by removing the eight screws at the bottom of the relay. The diaphragm valve operating rod is threaded into the spring cup item 5 or 54. Turn the knurled hub item 1 or 51 counter-clockwise to remove. Thread the new assembly into the spring cup and line up the holes in the diaphragm with the threaded holes in the relay base. Replace the cover and the screws. Tighten the screws uniformly and securely.

For Parts list see pages 2 and 3. For Wiring Diagram see page 4.

Left hand Micro switch adjusting screw
Adjusted and sealed to operate at the end of the timer stroke.

Auxiliary Contacts (when used)
Auxiliary contacts either normally open or normally closed, operate instantaneously when the coil is energized or de-energized.

Right hand Micro switch adjusting screw
The right hand Micro switch may be set to operate at any point in the timing period, by turning this screw



TIMING ADJUSTING SCREW
Turn clockwise to increase timing.
Turn counter-clockwise to decrease timing.

TO RENEW THE MICRO SWITCHES

The left hand switch is adjusted and sealed at the factory to operate at the end of the timing stroke. If this switch is replaced, it may be necessary to re-adjust.

With the new switch installed, check the point at which the switch operates. It should operate very near the end of the timing stroke. Adjustment may be made by breaking the solder seal and turning the headless screw "A" a small amount at a time.

For later operation turn the screw clockwise.

For earlier operation turn the screw counter-clockwise.

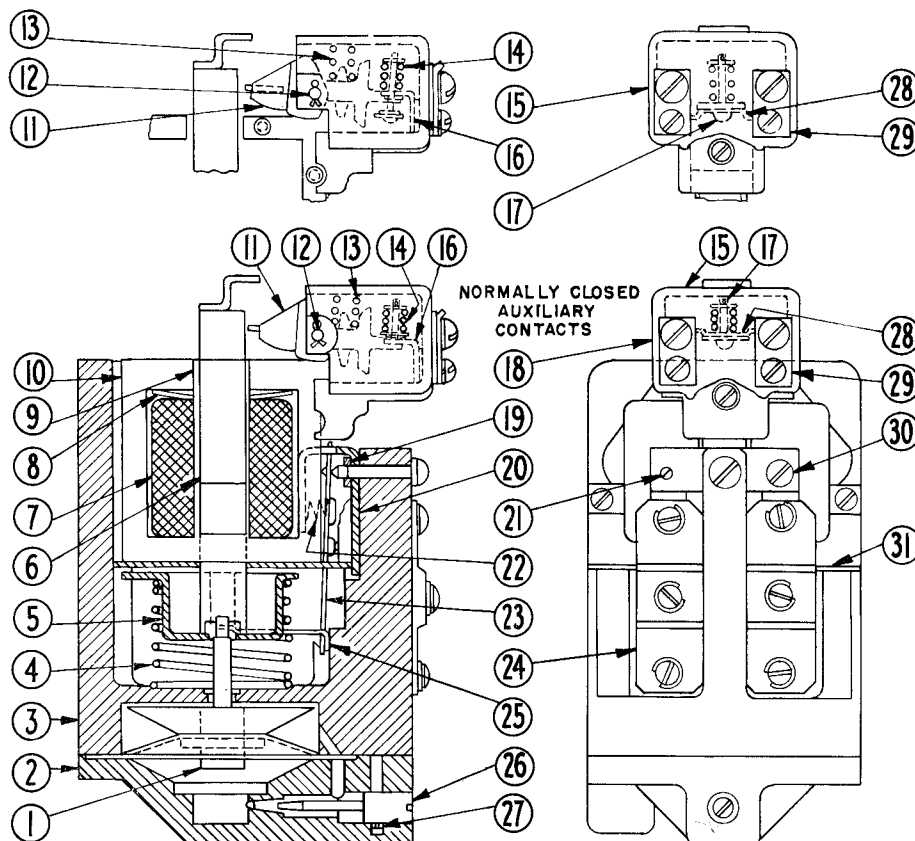


RENEWAL PARTS

No. 693 Type "D" Timing Relay

Timing Begins When Coil is De-energized

NORMALLY OPEN AUXILIARY CONTACTS



10-1742

RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the FOLLOWING with your order: PUBLICATION NO. 8460, ITEM NO., PART NO., DESCRIPTION and COMPLETE NAMEPLATE DATA ON THE CONTROLLER.

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
1	Valve and diaphragm assembly	1	27-464-2	18	Auxiliary contact complete (include items 11 thru 17, 28 and 29)	1	
2	Cover	1	49-1711		Normally open		10-1274-4
3	Base	1	17-2871-2		Normally closed		10-1274-3
4	Spring	1	69-1315	19	Lock plate	1	52-557
5	Cup	1	29-1946	20	Bracket	1	79-2986
6	Plunger	1		21	Headless adjusting screw	*	11-1236
	For use with auxiliary contacts		51-635	22	Spring	2	69-1313
	For use without auxiliary contacts		51-606-2	23	Lever	2	24-2391
7	Coil (Give No. on Coil)	1		24	Micro switch	*	
8	Spring	1	69-766-2		Normally closed		10-1157
9	Plunger guide	2	54-297-4		Normally open and normally closed		10-1156
10	Magnet frame	1	17-2872-2		Normally open		10-1257
11	Lever	1	24-2776-2	25	Lever	1	24-2390
12	Pin	1	13-1012-27	26	Timing adjusting screw	1	11-1235
13	Spring	1	69-1565	27	Friction spring	1	69-1563
14	Spring	1	69-1564	28	Movable contact	1	23-2200
15	Cover	1		29	Terminal plate	2	80-1188
	With normally open stamping		47-4448-2	30	Round head adjusting screw	*	11-1234
	With normally closed stamping		47-4448-3	31	Insulator	1	56-1677
16	Stationary Contact	2	23-2201				
17	Pin	1	13-1012-22				

*Quantity as required.

▲We recommend that these items be stocked. The quantity to be stocked will depend upon the total number in use.

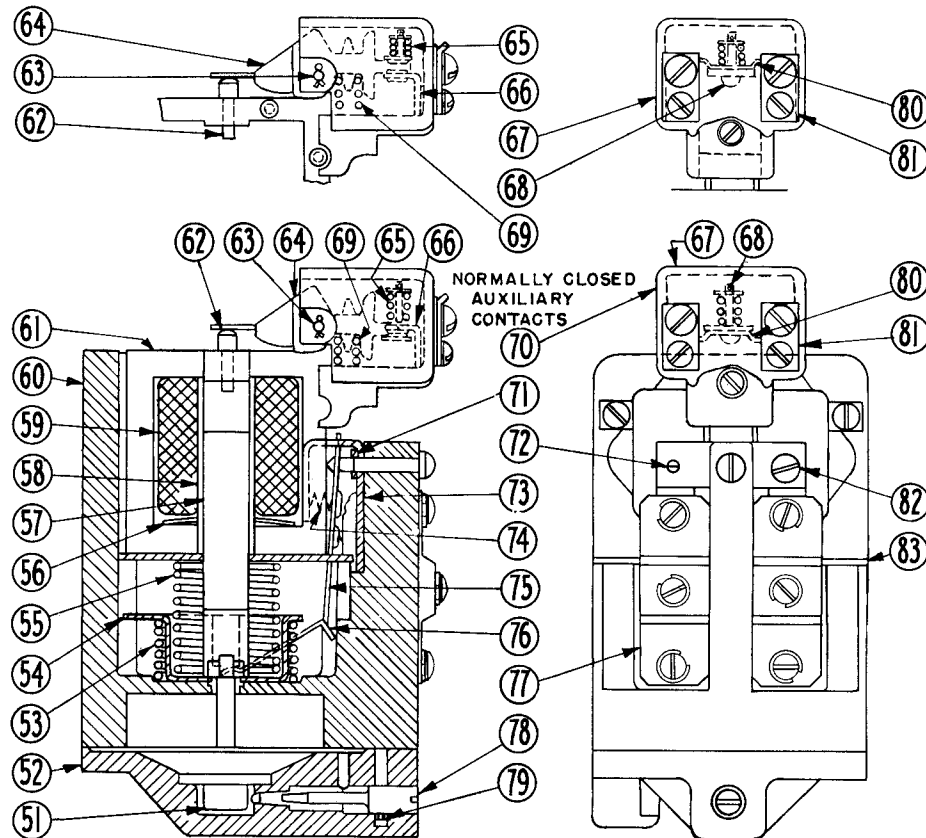
●It is recommended that when items 6, 9, or 10 are needed that a complete solenoid assembly Part Number 88-292-10 is purchased instead.



RENEWAL PARTS

No. 693 Type "E" Timing Relay Timing Begins When Coil is Energized

NORMALLY OPEN AUXILIARY CONTACTS



10-1743

RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the FOLLOWING with your order: PUBLICATION NO. 8460, ITEM NO., PART NO., DESCRIPTION and COMPLETE NAMEPLATE DATA ON THE CONTROLLER.

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
51	Valve and diaphragm assembly.....	1	27-464-2	70	Auxiliary contact complete.....	1	
52	Cover.....	1	49-1711		(Includes items 62 thru 69, 80 & 81)		
53	Spring.....	1	69-1312		Normally open.....		10-1758
54	Cup.....	1	29-1946		Normally closed.....		10-1758-2
55	Spring.....	1	69-1314	71	Lock plate.....	1	52-557
56	Spring.....	1	69-766	72	Headless adjusting screw.....	*	11-1236
57	Plunger.....	1	51-659	73	Bracket.....	1	79-2986
58	Plunger guide.....	2	54-297-3	74	Spring.....	2	69-1313
59	Coil (Give No. on coil).....	1		75	Lever.....	2	24-2391
60	Base.....	1	17-2871-2	76	Lever.....	1	24-2390
61	Magnet frame.....	1	17-2872-2	77	Micro switch.....	*	
62	Plunger.....	1	51-634		Normally closed.....		10-1343
63	Pin.....	1	13-1012-27		Normally open and normally closed		10-1342
64	Lever.....	1	24-2776		Normally open.....		10-1341
65	Spring.....	1	69-1564	78	Timing adjusting screw.....	1	11-1235
66	Stationary contact.....	2	23-2201	79	Friction spring.....	1	69-1563
67	Cover.....	1		80	Movable contact.....	1	23-2200
	With normally open stamping.....		47-4448-2	81	Terminal plate.....	2	80-1188
	With normally closed stamping.....		47-4448-3	82	Round head adjusting screw.....	*	11-1234
68	Pin.....	1	13-1012-22	83	Insulator.....	1	56-1677
69	Spring.....	1	69-1565				

*Quantity as required.

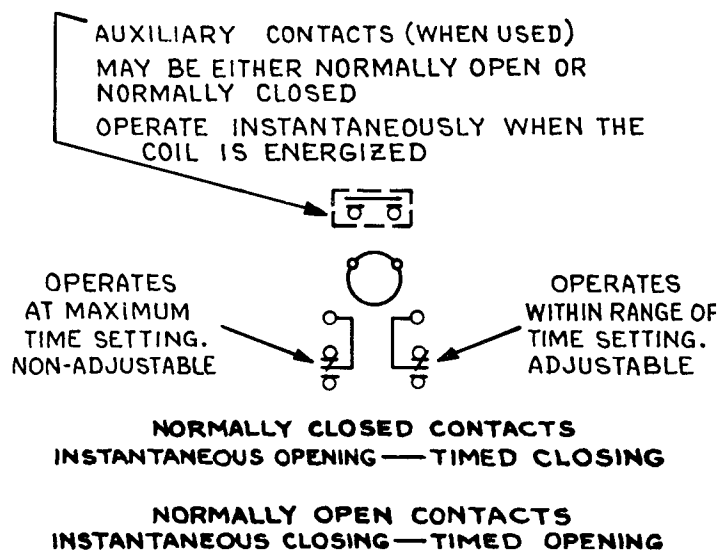
▲We recommend that these items be stocked. The quantity to be stocked will depend upon the total number in use.

●It is recommended that when items 57, 58, or 61 are needed that a complete solenoid assembly Part Number 88-292-9 is purchased instead.

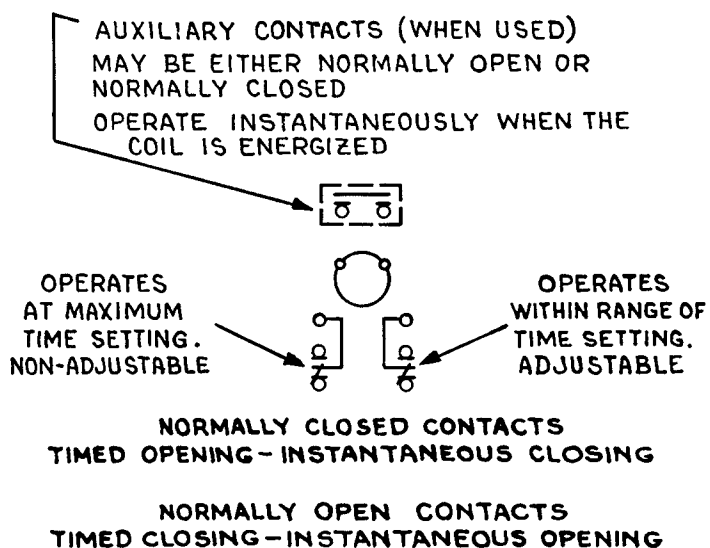


Wiring Diagram

Type "D" Timing Relay



Type "E" Timing Relay



INSTRUCTION SHEET FOR NO. 541 D-C CONTACTOR

8 HOUR CURRENT RATING 150 AMPERES

CARE

Main Contacts

Main contacts should not be lubricated. Grease, dust or copper oxide have insulating qualities which increase the contact resistance and result in unnecessary heating. Dust and grease can be wiped off. A fine file should be used to remove Copper oxide, or to dress rough or pitted contacts. Care should be taken to remove as little copper as necessary.

Renewal of Contacts

The contacts should be renewed when worn so that the distance "A" between the back edges with the contactor in the closed position as indicated in Fig. 1 becomes 1-15/16 inches.

Failure to renew the contacts at the proper time may cause serious damage to the contactor.

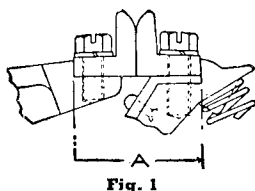


Fig. 1

Contact Spring Pressure

The contact pressure spring is made of stainless steel. It is designed for long life and will retain its operating characteristics under heavy service conditions. Should excessive contact temperatures occur the spring may be checked as described below. It is

only necessary to check the initial contact pressure. The final contact pressure may be checked only if equipped with new contacts.

The illustrations, figures 2 and 3 below provide the spring pressure range of values and the means of measuring. If the spring pressures are measured and found to be within the values given, the contact pressure spring is satisfactory. If the measured spring pressures are less than the values given, the spring should be replaced.

Electrical Interlocks

Two types of electrical interlocks are listed for this contactor. These are: The wiping finger and contact bar type, and the roller type.

The Wiping Finger Type

When the interlock contact tubes become worn, loosen the nuts and turn the tubes enough to present a new surface to the fingers. Tighten the nuts securely before operating the contactor.

Renew the fingers before they wear through at the tips.

Lubricate the fingers with a thin film of vaseline.

The roller type interlock fine silver contacts should not be filed or lubricated. Renew the contacts before the silver facing has worn away.

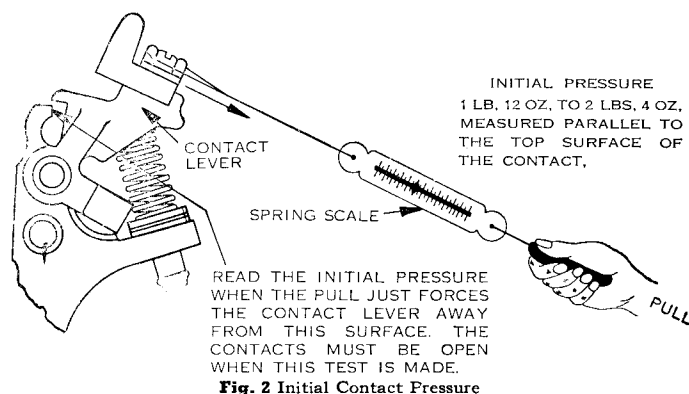


Fig. 2 Initial Contact Pressure

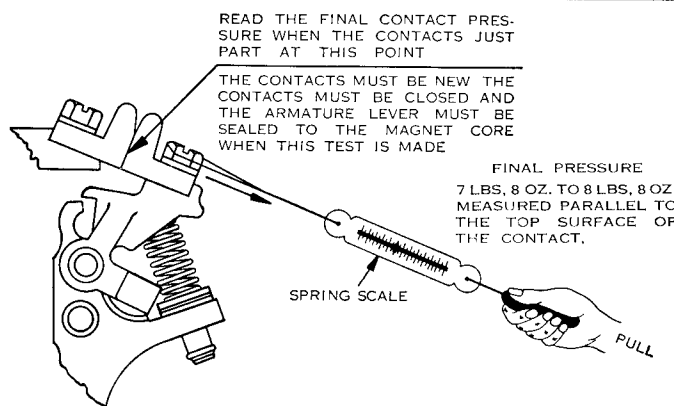


Fig. 3 Final Contact Pressure

Contact Heating and Application of Silver Contacts

Copper oxide forms very rapidly at excessive contact tip temperatures. If this condition occurs, check the remaining wear allowance (see Fig. 1 and paragraph "Renewal of Contacts") and the current carried by the contactor. If these are satisfactory, it is advisable to check the contact pressures (see Figs. 2 and 3 and paragraph "Contact Spring Pressure"). Copper contacts that are operated fairly often within their rating and wear allowance and with sufficient spring pressure seldom form oxide or require dressing.

Silver faced contacts are used where the contactor remains closed for long periods of time and is not subject to frequent operation, (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. Silver faced contacts should **not** be filed or dressed unless sharp projections, caused by heavy arcing, extend beyond the contact surface. Such projections should be filed down to the surface only.

Armature Lever and Magnet Core

Keep the surface of the magnet core, item 9 and the armature lever, item 24, which come together when the contactor closes, clean and free of dirt and oil.

The armature lever shaft, item 23, should be lubricated occasionally with a drop or two of light machine oil.

Wipe off excess oil.

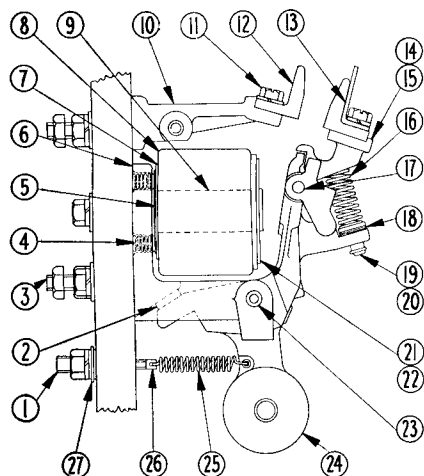
Arc Shields

The arc shields, items 41, 42, 65 and 90 should be replaced before they wear through, so the arc will not touch the metal pole pieces, items 37, 63 and 88.

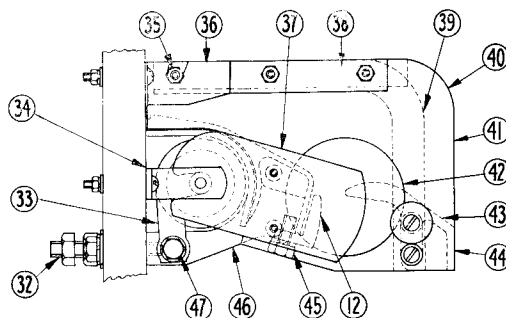
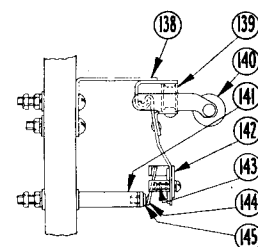
The arc shields can easily be raised for inspection or renewal of the contact parts. However, be sure that they are lowered to their normal position as shown on page 2 before the contactor is allowed to operate. If this is not done, no blowout effect is obtained and the contacts will wear very rapidly.

INSTRUCTION SHEET FOR NO. 541 D-C CONTACTOR

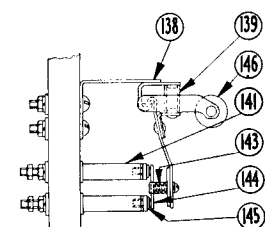
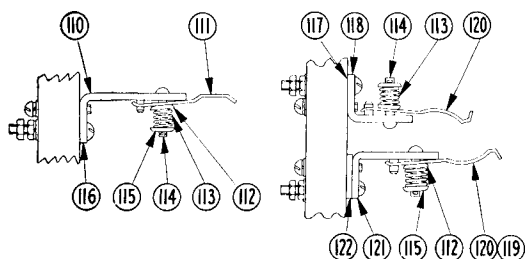
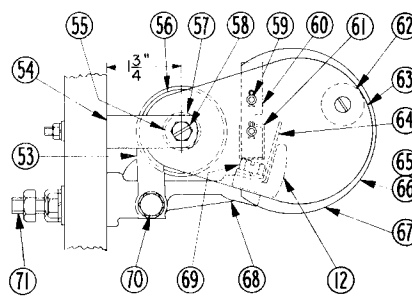
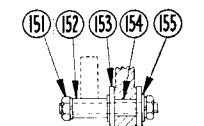
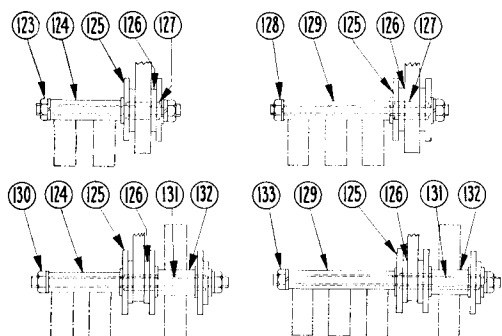
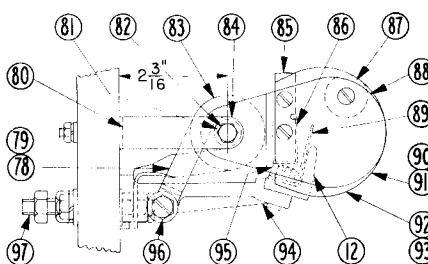
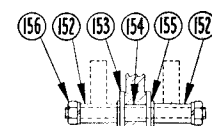
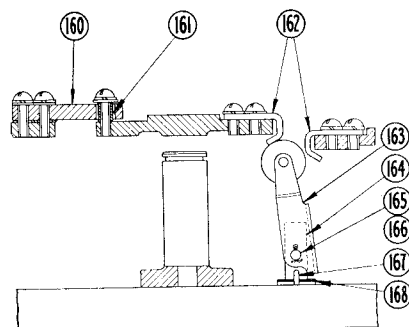
8 HOUR CURRENT RATING 150 AMPERES



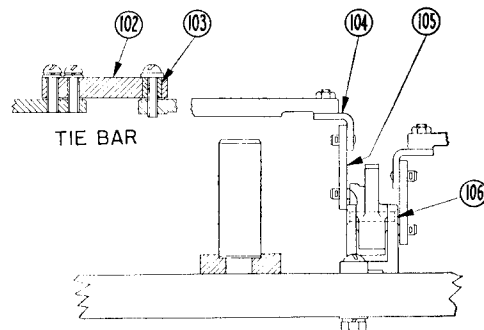
CONTACTOR PROPER

A-C AND D-C
LARGE MILL TYPE BLOWOUT

SINGLE BREAK

DOUBLE BREAK
ROLLER TYPE
ELECTRICAL INTERLOCKCONTACT FINGERS FOR
FINGER TYPE ELECTRICAL INTERLOCKA-C AND D-C
SMALL MILL TYPE BLOWOUTOPERATING BARS FOR
ROLLER TYPE
ELECTRICAL INTERLOCKCONTACT BARS FOR
FINGER TYPE ELECTRICAL INTERLOCKD-C
GENERAL PURPOSE BLOWOUTOPERATING BARS FOR
ROLLER TYPE
ELECTRICAL INTERLOCK

WHEEL TYPE MECHANICAL INTERLOCK



CAM TYPE MECHANICAL INTERLOCK

D10-346



RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the following with your order: PUBLICATION NO. 8682, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
CONTACTOR PROPER				A-c and D-c SMALL MILL TYPE BLOWOUT			
1	Screw.....	1	911-5658Z1	45	Contact screw.....	1	911-5606FZ
2	Stop.....	1	768-13	46	Lock washer.....	1	916-763Z
3	Stud.....	1		47	Contact support complete (Includes items 13 and 45).....	1	18-738
	For 3/4" panel.....		14-73		Screw.....	1	911-5606FZ
	For 1" panel.....		14-274-16		Washer.....	1	916-801Z
	For 1-1/2" panel.....		14-274-17		Lock washer.....	1	916-763Z
	For 2" panel.....		814-138				
	Nut.....	4	815-883				
	Washer.....	2	916-882Z	53	Blowout coil.....	1	
	Lock washer.....	1	916-921Z		D-c.....		9-460-99
	Lock nut.....	1	915-200		A-c.....		9-460-281
4	Spring.....	2	969-1001J		Support.....	2	879-107
5	Steel washer.....	1	916-2881Z	54	Core.....		
6	Magnet frame.....	1	17-207-7	55	D-c.....	1	51-199
7	Bakelite washer.....	1	4416-1321		A-c.....	1	51-365
▲ 8	Coil (Give No. on coil).....	1		56	Fibre washer.....	2	1016-192
9	Coil core.....	1	51-195-2	57	Insulating tube.....	1	29-754
10	Contact support complete (Includes items 11, and plain copper contact 12).....	1	18-240-8	58	Spacer (At pivot point).....	2	29-80
11	Contact screw.....	2	911-5606FZ	59	Pin.....	2	13-719
	Lock washer.....	2	916-763Z	60	Spacer.....	1	2222-1485
▲ *12	Contact.....	2		61	Protecting clip.....	1	933-203Z
	Plain copper.....		23-717	62	Spacer.....	1	2222-386
	*Silver faced (see note before ordering).....		23-813	63	Pole piece.....	2	
13	Arc guard.....	★	49-685		D-c.....		62-8
14	Contact lever with connector.....	1	24-825-4	▲ 64	Arc guard.....	1	62-113
15	Contact lever complete (Includes items 11, 12, and 15).....	1		▲ 65	Arc shield.....	2	4973-2
	Without arc guard.....		24-825-5	66	Arc shield complete (Includes items 59, 60, 61, 62, 63 and 65).....	1	
	With arc guard (Includes item 13).....		24-825-2		D-c.....		62-52
▲ 16	Spring.....	1	69-432		A-c.....		62-52-2
17	Pin.....	1	956-1838	67	Blowout complete with coil (Includes items 53 to 65 and 68 to 71).....	1	
18	Shim washer 1/64" thick.....	5	16-320		D-c for 3/4" panel.....		62-40-8
19	Adjusting pin.....	1	13-734		D-c for 1" panel.....		62-40
20	Spring ring.....	1	29-531		D-c for 1-1/2" panel.....		62-40-2
21	Brass washer.....	1	16-398		D-c for 2" panel.....		62-40-9
22	Bakelite washer.....	1	16-399		A-c for 3/4" panel.....		62-40-12
23	Shaft.....	1	13-716		A-c for 1" panel.....		62-40-6
24	Armature lever (Includes item 2).....	1	24-845-2		A-c for 1-1/2" panel.....		62-40-7
25	Spring.....	1			A-c for 2" panel.....		62-40-13
	For commercial use with or without finger type electrical interlock.....		969-608J	68	Contact support complete (Includes items 12, 64 and 69).....	1	18-240-16
	For commercial use with roller type electrical interlock.....		69-998	69	Contact screw.....	1	911-5606FZ
	For marine use.....	1	69-998		Lock washer.....	1	916-763Z
26	Adjusting stud.....	1	914-423	70	Screw.....	1	911-5606Z
27	Insulating washer (when used) 3/4" diameter.....	★	4416-841		Washer.....	1	916-801Z
	1" diameter.....	★	4416-96		Lock washer.....	1	916-763Z
A-c and D-c LARGE MILL TYPE BLOWOUT				71	Stud.....	1	
32	Stud.....	1			For 3/4" panel.....		814-724
	For 3/4" Panel.....		814-724		For 1" panel.....		814-725
	For 1" panel.....		14-274-16		For 1-1/2" panel.....		14-274-16
	For 1-1/2" panel.....		14-274-17		For 2" panel.....		14-274-17
	Nut.....	4	815-883		Nut.....	4	815-883
	Washer.....	2	916-882Z		Washer.....	2	916-882Z
	Lock washer.....	1	916-921Z		Lock washer.....	1	916-921Z
	Lock nut.....	1	915-200		Lock nut.....	1	915-200
33	Blowout coil.....	1		D-c GENERAL PURPOSE BLOWOUT			
	D-c.....		9-460-161	78	Bar wound blowout coil.....	1	9-460-228
	A-c.....		9-460-372	79	Wire wound blowout coil (Give No. on coil).....	1	
34	Support.....	2	79-846	80	Support.....	2	79-543
35	Stud.....	1	14-359	81	Core.....	1	985-762
	Nut.....	2	15-322	82	Spacer (at pivot point).....	2	929-992
	Lock washer.....	2	916-484Z	83	Bakelite washer.....	2	16-840-11
	Clamping nut (when used).....	★	15-321	84	Insulating tube.....	1	56-1108-10
36	Bracket.....			85	Spacer.....	1	2222-402
	Right hand.....	1	79-881	86	Protecting clip.....	1	933-203Z
	Left hand.....	1	79-882	87	Spacer.....	1	2222-483
37	Pole piece.....	2	62-209	▲ 88	Pole piece.....	2	962-54
38	Side plate.....	2	17-1901	▲ 89	Arc guard.....	1	49-685
39	Connector.....	1	25-900	▲ 90	Arc shield.....	2	4973-5
40	Arc shield complete (Includes items 35, 37, 38, 39, 42 and 43).....		62-177	91	Arc shield complete (Includes 82, 85, 86, 87, 88 and 90).....	1	662-159
▲ 41	Arc shield.....			92	Blowout complete with bar wound coil (Includes items 78, 80 to 91 and 94 to 97).....	1	
	Right hand.....	1	73-369		For 3/4" panel.....		62-48-7
	Left hand.....	1	73-368		For 1" panel.....		62-48
▲ 42	Arc shield (circular).....	2	73-371		For 1-1/2" panel.....		62-48-2
43	Arc horn.....	1	62-88		For 2" panel.....		62-48-9
44	Blowout complete (Includes items 32 to 43 and 45 to 47).....	1		93	Blowout complete with wire wound coil (Includes items 79 to 91 and 94 to 97).....	1	
	D-c for 3/4" panel.....		62-178		For 3/4" panel.....		62-48-8
	D-c for 1" panel.....		62-178-2		For 1" panel.....		62-48-3
	D-c for 1-1/2" panel.....		62-178-3		For 1-1/2" panel.....		62-48-1
	D-c for 2" panel.....		62-178-4		For 2" panel.....		62-48-10
	A-c for 3/4" panel.....		62-178-7	94	Contact support complete (Includes items 12, 89 and 95).....	1	18-240-4
	A-c for 1" panel.....		62-178-8	95	Contact screw.....	1	911-5606FZ
	A-c for 1-1/2" panel.....		62-178-9		Lock washer.....	1	916-763Z
	A-c for 2" panel.....		62-178-10				

△Quantity of 1 per interlock finger required.

★Quantity is "As Required".

▲We recommend that these items be stocked, the quantity to be stocked will depend upon the total number in use.

※Silver faced contacts are used only where the contacts remain closed for long periods (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. See section "Application of silver contacts" page 1.

RENEWAL PARTS — Information Required

Parts **CANNOT** be sent promptly unless you include the following with your order: **PUBLICATION NO. 8682, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.**

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
96	Screw.....	1	911-5606Z		CONTACT FINGER FOR FINGER TYPE ELECTRICAL INTERLOCK		
	Washer.....	1	916-801Z	110	Protecting resistance contact finger complete (Includes items 111 to 116).....	★	39247-1 Fig. 4
	Lock washer.....	1	916-703Z	▲111	Finger only.....	△	740-963
97	Stud.....	1		112	Cup washer.....	△	916-561Z
	For 3/4" panel.....		814-724	113	Spring.....	△	969-530J
	For 1" panel.....		814-725	114	Spring pin.....	△	913-1195Z
	For 1-1/2" panel.....		14-274-16	115	Cup washer.....	△	916-2641Z
	For 2" panel.....		14-274-17	116	Bracket.....	△	979-661AZ
	Nut.....	4	815-883	117	Normally closed contact finger complete (Includes items 112 to 115, 118 and 119)...	★	39248-1 Fig. 12
	Washer.....	2	916-882Z	118	Bracket.....	△	679-369
	Lock washer.....	1	916-921Z	119	Normally open contact finger complete (Includes items 112 to 115, 121 and 122)...	★	640-39
	Lock nut.....	1	915-200	▲120	Finger only.....	△	740-964
				121	Bracket.....	△	979-661AZ
				122	Spacer (when used).....	★	929-560
	MECHANICAL INTERLOCK CAM TYPE				CONTACT BAR FOR FINGER TYPE ELECTRICAL INTERLOCKS		
102	Tie bar.....	★	61-178	123	Contact bar complete.....	★	23-1056
103	Tube.....	★	29-714	▲124	Contact tube.....	★	29-440
104	Bracket.....	★	79-547	125	Bakelite washer (large).....	★	4416-883
105	Link.....	★	61-180	126	Bakelite washer (small).....	★	4416-881
106	Interlock mechanism.....	★	10-199	127	Insulating tube.....	★	4429-485
	WHEEL TYPE			128	Contact bar complete.....	★	23-946-7
160	Tie bar.....	★	61-178	▲129	Contact tube.....	★	29-442
161	Tube.....	★	29-714	130	Contact bar complete.....	★	23-948-14
162	Bracket.....	★	79-3748	131	Insulating tube.....	★	29-701
163	Lever with roller.....	★	24-3206	▲132	Contact tube.....	★	29-457
164	Interlock post.....	★		133	Contact bar complete.....	★	23-948-15
	For 3/4", 1", and 1-1/4" panel.....	★	18-1076				
	For 1-1/2" and 2" panel.....	★	18-1076-2				
165	Pin.....	★	13-2666				
166	Retaining ring.....	★	28-71				
167	Lock pin.....	★	13-2665				
168	Shim washer.....	★	16-386-6				

ELECTRICAL INTERLOCK PARTS (ROLLER TYPE — SINGLE AND DOUBLE BREAK)

Item No.	Description of Part	1" Diameter Roller		3/4" Diameter Roller
		● Normally Closed	● Normally Open	● Normally Closed Delayed Opening
138	Support bracket.....	79-1000-24	79-1000-19	79-1000-25
139	Spring.....	69-658	69-658	69-658
140	Roller and contact support assembly for single break interlock (Includes items 142, 143, and 144).....	24-1705	24-1705	24-1705-2
141	Contact post — 3/4", 1", and 1-1/2" panel.....	18-444-32	18-444-11	18-444-35
	2" panel.....	18-444-33	18-444-12	18-444-36
142	Contact bracket.....	79-1314	79-1314	79-1314
143	Spring.....	69-193	69-193	69-193
▲144	Movable contact.....	21-505	21-505	21-505
▲145	Stationary contact.....	23-1316	23-1316	23-1316
146	Roller and contact support for double break interlock (Includes items 143 and 144).....	24-1698	24-1698	24-1698-2

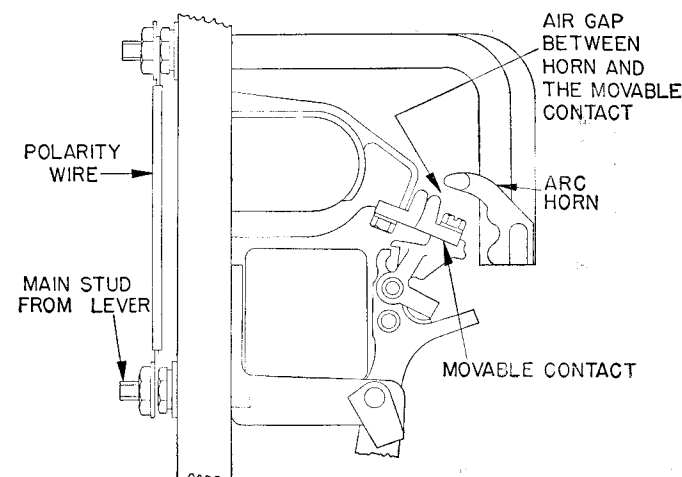
Item No.	Description of Part	No. Req.	Part No.
	OPERATING BAR FOR ROLLER TYPE ELECTRICAL INTERLOCK		
151	Operating bar (Includes items 152, to 155).....	★	61-357-4
152	Tube 7/8" long.....	★	29-1255
153	Washer.....	★	4416-881
154	Spacer.....	★	4429-486
155	Washer.....	★	916-641Z
156	Operating bar (Includes items 152 to 155).....	★	61-357-5
157	Operating bar (Includes items 152 to 155 and 158).....	★	61-357-6
158	Tube 2" long.....	★	29-1255-5

△Quantity of 1 per interlock finger required.

★Quantity is "As Required".

▲We recommend that these items be stocked, the quantity to be stocked will depend upon the total number in use.

●Reference to the position of the contacts is made with the coil of the contactor de-energized. Contacts which are closed when the coil is de-energized are normally closed, those that are open are normally open.



USE OF POLARITY WIRE

On the mill type blowout the arc is transferred from the movable contact to the arc horn through an air gap. If the arc horn is at the same potential as the lever and the movable contact, the arc leaves the movable contact as soon as it strikes the arc horn. If these parts are not at the same potential, the arc will blow out on the contact tips and burn them. To assure that the potential will be the same, the lever is connected to the arc horn with No. 12 wire on the back of the panel. Be sure this wire is not damaged or removed, and is kept tightly connected.

INSTRUCTION SHEET FOR NO. 542 D-C CONTACTOR

8 HOUR CURRENT RATING 300 AMPERES

CARE

Main Contacts

Main contacts should not be lubricated. Grease, dust or copper oxide have insulating qualities which increase the contact resistance and result in unnecessary heating. Dust and grease can be wiped off. A fine file should be used to remove Copper oxide, or to dress rough or pitted contacts. Care should be taken to remove as little copper as necessary.

Renewal of Contacts

The contacts should be renewed when worn so that the distance "A" between the back edges with the contactor in the closed position as indicated in Fig. 1 becomes 2-21/32 inches.

Failure to renew the contacts at the proper time may cause serious damage to the contactor.

Contact Spring Pressure

The contact pressure spring is made of stainless steel. It is designed for long life and will retain its operating characteristics under heavy service conditions. Should excessive contact temperatures occur the spring may be checked as described below. It is

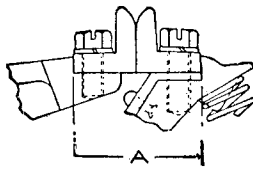


Fig. 1

only necessary to check the initial contact pressure. The final contact pressure may be checked only if equipped with new contacts.

The illustrations, figures 2 and 3 below provide the spring pressure range of values and the means of measuring. If the spring pressures are measured and found to be within the values given, the contact pressure spring is satisfactory. If the measured spring pressures are less than the values given, the spring should be replaced.

Electrical Interlocks

Two types of electrical interlocks are listed for this contactor. These are: The wiping finger and contact bar type, and the roller type.

The Wiping Finger Type

When the interlock contact tubes become worn, loosen the nuts and turn the tubes enough to present a new surface to the fingers. Tighten the nuts securely before operating the contactor.

Renew the fingers before they wear through at the tips.

Lubricate the fingers with a thin film of vaseline.

The roller type interlock fine silver contacts should not be filed or lubricated. Renew the contacts before the silver facing has worn away.

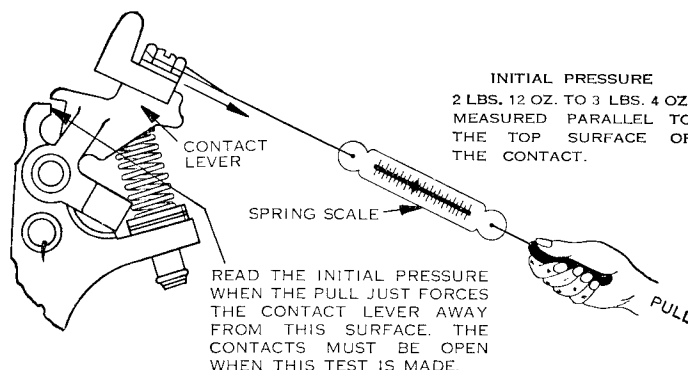


Fig. 2 Initial Contact Pressure

INITIAL PRESSURE
2 LBS. 12 OZ. TO 3 LBS. 4 OZ.
MEASURED PARALLEL TO
THE TOP SURFACE OF
THE CONTACT.

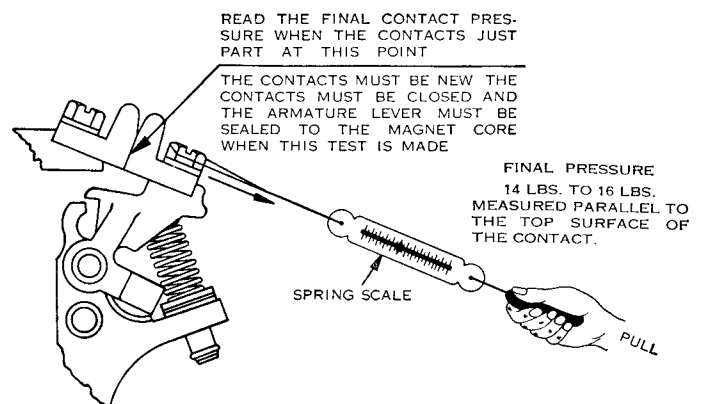


Fig. 3 Final Contact Pressure

Contact Heating and Application of Silver Contacts

Copper oxide forms very rapidly at excessive contact tip temperatures. If this condition occurs, check the remaining wear allowance (see Fig. 1 and paragraph "Renewal of Contacts") and the current carried by the contactor. If these are satisfactory, it is advisable to check the contact pressures (see Figs. 2 and 3 and paragraph "Contact Spring Pressure"). Copper contacts that are operated fairly often within their rating and wear allowance and with sufficient spring pressure seldom form oxide or require dressing.

Silver faced contacts are used where the contactor remains closed for long periods of time and is not subject to frequent operation, (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. Silver faced contacts should **not** be filed or dressed unless sharp projections, caused by heavy arcing, extend beyond the contact surface. Such projections should be filed down to the surface only.

Armature Lever and Magnet Core

Keep the surface of the magnet core, item 9 and the armature lever, item 26, which come together when the contactor closes, clean and free of dirt and oil.

The armature lever shaft, item 25, should be lubricated occasionally with a drop or two of light machine oil.

Wipe off excess oil.

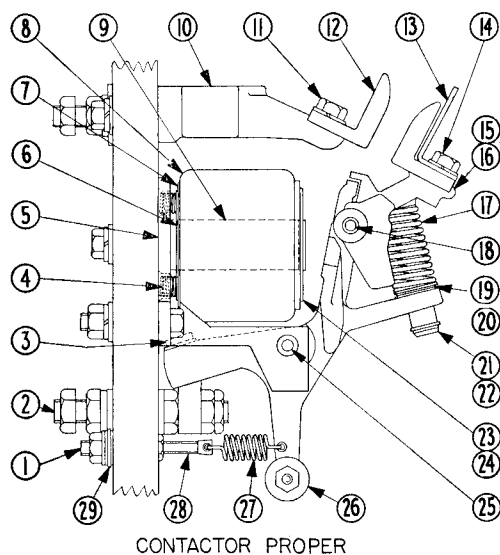
Arc Shields

The arc shields, items 39, 41 and 59 should be replaced before they wear through, so the arc will not touch the metal pole pieces, item 57.

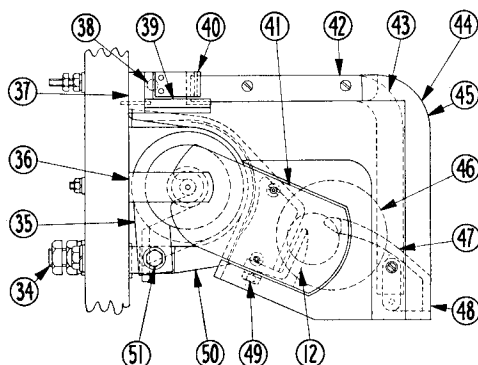
The arc shields can easily be raised for inspection or renewal of the contact parts. However, be sure that they are lowered to their normal position as shown on page 2 before the contactor is allowed to operate. If this is not done, no blowout effect is obtained and the contacts will wear very rapidly.

INSTRUCTION SHEET FOR NO. 542 D-C CONTACTOR

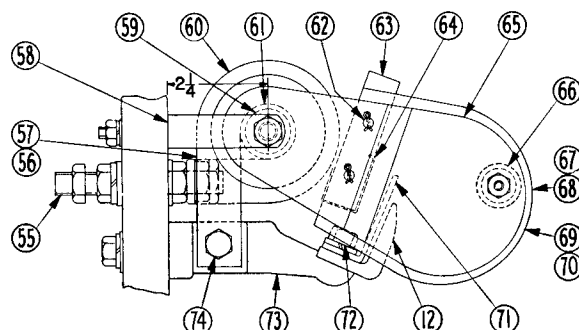
8 HOUR CURRENT RATING 300 AMPERES



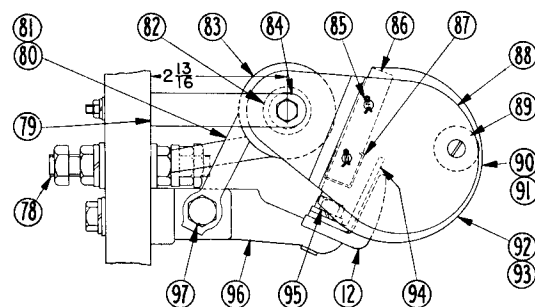
CONTACTOR PROPER



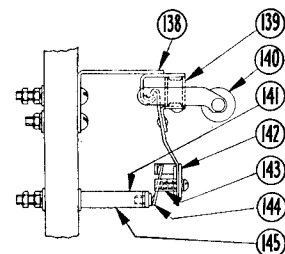
A-C AND D-C LARGE MILL TYPE BLOWOUT



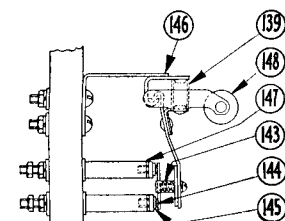
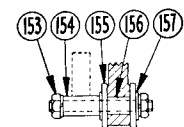
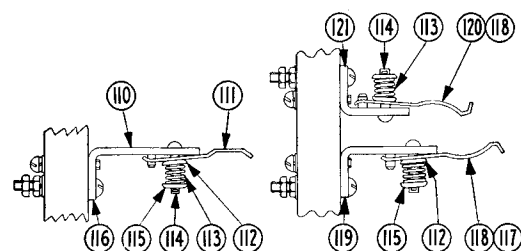
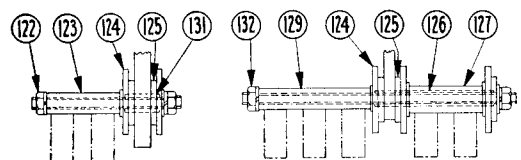
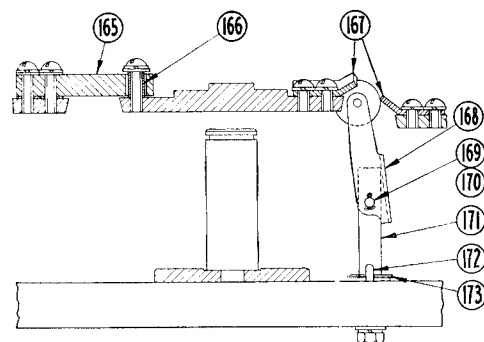
A-C AND D-C SMALL MILL TYPE BLOWOUT



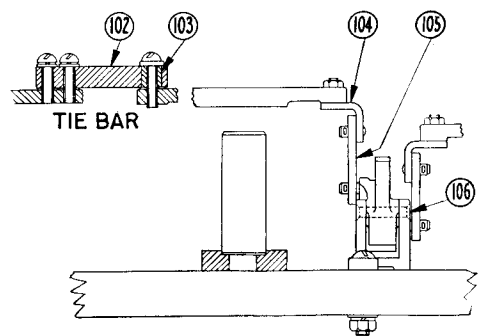
D-C GENERAL PURPOSE BLOWOUT



SINGLE BREAK

DOUBLE BREAK
ROLLER TYPE
ELECTRICAL INTERLOCKOPERATING BARS FOR
ROLLER TYPE
ELECTRICAL INTERLOCKCONTACT FINGER FOR
FINGER TYPE ELECTRICAL INTERLOCKCONTACT BARS FOR
FINGER TYPE ELECTRICAL INTERLOCK

WHEEL TYPE MECHANICAL INTERLOCK



CAM TYPE MECHANICAL INTERLOCK

D10-387



RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the following with your order: PUBLICATION NO. 8683, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
CONTACTOR PROPER				51	Screw..... Washer..... Lock washer.....	1 1 1	911-5646Z 916-882Z 916-921Z
1	Screw.....	1	11-1003	A-c and D-c SMALL MILL TYPE BLOWOUT			
2	Stud.....	1		55	Stud.....	1	
	For 3/4" panel.....		1314-844		For 3/4" panel.....		14-256-14
	For 1" panel.....		14-256-15		For 1" panel.....		1314-844
	For 1-1/2" panel.....		1314-845		For 1-1/2" panel.....		14-256-18
	For 2" panel.....		1314-9		For 2" panel.....		1314-9
	Nut.....	4	815-1128		Nut.....	4	815-1128
	Washer.....	2	916-1125Z		Washer.....	2	916-1125Z
	Lock washer.....	1	916-1161Z		Lock washer.....	1	916-1161Z
	Lock nut.....	1	915-215		Lock nut.....	1	915-215
3	Stop.....	1	768-15	56	Bar wound coil.....	1	
4	Spring.....	2	969-1162		D-c.....		9-460-40
5	Magnet frame.....	1	17-207-15		A-c.....	1	9-460-280
6	Steel washer.....	1	916-2882Z	57	Wire wound coil (Give No. on coil).....	1	
7	Bakelite washer.....	1	4416-1322	58	Support.....	★	79-138
▲ 8	Coil (Give No. on Coil).....	1		59	Core.....	1	
9	Coil core.....	1	51-92		D-c.....		985-1410Z
10	Contact support complete (Includes items 11 and plain copper contact 12).....	1	79-124-4	60	A-c.....	★	51-366
11	Contact screw.....	1	911-373	61	Fibre washer.....	★	1016-1361
	Lockwasher.....	1	916-921Z	62	Insulating tube.....	★	1029-160
▲ *12	Contact.....	2		63	Pin.....	2	813-135
	Plain copper.....		23-435	64	Spacer.....	1	29-569
	*Silver faced (See note before ordering).....		23-1042-2	65	Protecting clip.....	1	55-195
13	Arc guard.....	★	49-99		Pole piece.....		
14	Contact screw.....	1	911-5646Z		D-c right hand.....	1	962-1522Z1
	Lockwasher.....	1	916-921Z		D-c left hand.....	1	962-1522Z
15	Contact lever with connector.....	1	24-196-2		A-c right hand.....	1	62-114-2
16	Contact lever complete (Includes items 12, 14 and 15).....	1			A-c left hand.....	1	62-114
	Without arc guard.....		24-196-5	66	Spacer.....	1	2222-386
	With arc guard (includes item 13).....		24-196-15	▲ 67	Arc shield.....	2	4973-1
▲ 17	Spring.....	1	69-58	68	Arc shield complete (Includes items 62 to 67).....	1	
18	Pin.....	1	13-84		D-c.....		62-5
19	1/64" shim washer.....	2	916-1164Z		A-c.....		62-5-2
20	1/32" shim washer.....	1	16-319	69	Blowout complete with bar wound coil (Includes items 55, 56, 58 to 68 & 71 to 74).....	1	
21	Adjusting pin.....	1	13-587		D-c for 3/4" panel.....		62-4
22	Spring ring.....	1	29-541		D-c for 1" panel.....		62-4-9
23	Brass washer.....	1	16-252		D-c for 1-1/2" panel.....		62-4-2
24	Bakelite washer.....	1	16-253		D-c for 2" panel.....		62-4-3
25	Shaft.....	1	13-170		A-c for 3/4" panel.....		62-4-11
26	Armature lever (Includes item 3).....	1	24-215-4		A-c for 1" panel.....		62-4-12
27	Spring.....	1	969-887J		A-c for 1-1/2" panel.....		62-4-13
28	Adjusting stud.....	1	14-317-3		A-c for 2" panel.....		62-4-14
29	Insulating washer.....			70	Blowout complete with wire wound coil (Includes items 55, 57 to 68 and 71 to 74).....	1	
	3/4" diameter.....	1	4416-841		D-c for 3/4" panel.....		62-4-4
	1" diameter.....	1	4416-96		D-c for 1" panel.....		62-4-10
A-c and D-c LARGE MILL TYPE BLOWOUT					D-c for 1-1/2" panel.....		62-4-5
34	Stud.....	1			D-c for 2" panel.....		62-4-6
	For 3/4" panel.....		14-256-14		A-c for 3/4" panel.....		62-4-15
	For 1" panel.....		1314-844		A-c for 1" panel.....		62-4-16
	For 1-1/2" panel.....		14-256-18		A-c for 1-1/2" panel.....		62-4-17
	For 2" panel.....		1314-9		A-c for 2" panel.....		62-4-18
	Nut.....	4	815-1128	▲ 71	Arc guard.....	1	49-98
	Washer.....	2	916-1125Z	72	Contact screw.....	1	911-373
	Lock washer.....	1	916-1161Z		Lock washer.....	1	916-921Z
	Lock nut.....	1	915-215	73	Contact support complete (Includes items 12, 71 and 72).....	1	79-980-3
35	Blowout coil.....	1		74	Screw.....	1	911-373
	A-c.....		9-460-149		Washer.....	1	916-882Z
	D-c.....		9-460-162		Lock washer.....	1	916-921Z
36	Support.....	2	79-888	GENERAL PURPOSE BLOWOUT			
37	Base.....	2	17-2294	78	Stud.....	1	
38	Screw.....	1	11-1249		For 3/4" and 1" panel.....		1314-843
	Nut.....	1	15-416-3		For 1-1/2" panel.....		1314-844
	Lockwasher.....	1	916-187		For 2" panel.....		14-256-18
▲ 39	Base.....				Nut.....	4	815-1128
	Right hand.....	1	17-2291		Washer.....	2	916-1125Z
	Left hand.....	1	17-2292		Lock washer.....	1	916-1161Z
40	Bracket.....	2	79-1677		Lock nut.....	1	915-215
▲ 41	Pole piece.....	2	62-208		Support.....	★	79-139
42	Side plate.....	1	17-2293	79	Bar wound blowout coil.....	1	9-460-289
43	Connector.....	1	25-990	80	Wire wound blowout coil (Give No. on coil).....	1	
44	Arc shield complete (Includes items 38, 41, 42, 43, 45, 46 and 47).....	1	62-233	81	Insulating tube.....	★	1029-393
▲ 45	Arc shield.....			82	Bakelite washer.....	★	1016-1004
	Right half.....	1	73-372	83	Core.....	1	985-962Z
	Left half.....	1	73-373	84	Pin.....	2	13-719
▲ 46	Arc shield (circular).....	1	73-374	85	Spacer.....	1	5029-6
47	Arc horn.....	1	62-93	86	Protecting clip.....	1	933-203Z
48	Blowout complete (Includes items 34 to 51).....	1		87	Pole piece.....	2	962-1204Z
	D-c for 3/4" panel.....		62-234	88	Spacer.....	1	2222-386
	D-c for 1" panel.....		62-234-2	89	Arc shield.....	2	4973-2
	D-c for 1-1/2" panel.....		62-234-3	▲ 90	Arc shield complete (Includes items 85 to 90).....	1	662-172
	D-c for 2" panel.....		62-234-4	91	Blowout complete with bar wound coil (Includes items 78, 79, 80 & 82 to 91).....	1	
	A-c for 3/4" panel.....		62-234-7		For 3/4" panel.....		62-6-17
	A-c for 1" panel.....		62-234-8		For 1" panel.....		62-6-2
	A-c for 1-1/2" panel.....		62-234-9		For 1-1/2" panel.....		62-6-3
	A-c for 2" panel.....		62-234-10		For 2" panel.....		
49	Contact screw.....	1	911-5646Z				
	Lock washer.....	1	916-921Z				
50	Contact support complete (Includes items 12 and 49).....	1	62-234-6				

▲Quantity of 1 per interlock finger required.

★Quantity is "As Required".

▲We recommend that these items be stocked as spares. The quantity to be stocked will depend upon the total number in use.

*Silver faced contacts are used only where the contacts remain closed for long periods (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. See section "Application of Silver Contacts" page 1.

RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the following with your order: PUBLICATION NO. 8683, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.

Item No.	Description of Part	No. Req.	Part No.	Item No.	Description of Part	No. Req.	Part No.
93	Blowout complete with wire wound coil (Includes items 78, 79 & 81 to 91).....		62-6-4		CONTACT FINGERS FOR FINGER TYPE ELECTRICAL INTERLOCK		
	For 3/4" panel.....		62-6-18	110	Protecting resistance contact finger complete (Includes items 111 to 116).....	★	45381-1 Fig. 4
	For 1" panel.....		62-6-5	▲111	Finger only.....	△	740-963
	For 1-1/2" panel.....		62-6-6	▲112	Cup washer.....	△	916-561Z
	For 2" panel.....		49-99	▲113	Spring.....	△	969-530J
▲94	Arc guard.....	1	911-5648Z	114	Spring pin.....	△	913-1195Z
95	Contact screw.....	1	916-921Z	115	Cup washer.....	△	916-2641Z
	Lockwasher.....	1					
96	Contact support complete (Includes items 12, 94 and 95).....	1	79-980-4	116	Bracket.....	△	979-660AZ
97	Screw.....	1	911-5648Z	117	Normally open contact finger complete (Includes items 112 to 115, 118 & 119).....	★	39249-1 Fig. 4
	Washer.....	1	916-882Z	▲118	Finger only.....	△	740-964
	Lockwasher.....	1	916-921Z	119	Bracket.....	△	979-661AZ
				120	Normally closed contact finger complete (Includes items 112 to 115, 118 & 122)....	★	39248-1 Fig. 4
				121	Bracket.....	△	979-659AZ
	MECHANICAL INTERLOCK CAM TYPE				CONTACT BARS FOR FINGER TYPE ELECTRICAL INTERLOCK		
102	Tie bar.....	★	61-144	122	Contact bar complete.....	★	23-946-8
103	Tube.....	★	29-1246	▲123	Contact tube.....	★	29-441
104	Bracket.....	★	79-558	124	Bakelite washer (large).....	★	4416-883
105	Link.....	★	61-180-3	125	Bakelite washer (small).....	★	4416-881
106	Interlock mechanism.....	★	10-199	126	Insulating tube.....	★	4429-303
	WHEEL TYPE			▲127	Contact tube.....	★	29-458
165	Tie bar.....	★	61-144	▲128	Contact bar complete.....	★	23-946-7
166	Tube.....	★	29-1246	▲129	Contact tube.....	★	29-442
167	Bracket.....	★	79-3875	130	Contact bar complete.....	★	23-948-16
168	Lever with roller.....	★	24-3206	131	Insulating tube.....	★	4429-485
169	Pin.....	★	13-2666	132	Contact bar complete.....	★	23-948-17
170	Retaining ring.....	★	28-71				
171	Interlock rod.....						
	For 3/4", 1", and 1-1/4" panel.....	★	18-1076-6				
	For 1-1/2" and 1-2" panel.....	★	18-1076-7				
172	Lock pin.....	★	13-2665				
173	Shim washer.....	★	16-862-11				

ELECTRICAL INTERLOCK PARTS (ROLLER TYPE — SINGLE AND DOUBLE BREAK)

Item No.	Description of Part	1" Diameter Roller		3/4" Diameter Roller
		●Normally Closed	●Normally Open	●Normally Closed Delayed Opening
138	Support bracket (For single break).....	79-1000-23	79-1000-19	79-1000-24
139	Spring.....	69-658	69-658	69-658
140	Roller & contact support assembly for single break interlock, (Includes items 142, 143 and 144).....	24-1705	24-1705	24-1705-2
141	Contact post (for single break).....	18-444-29	18-444-11	18-444-32
	3/4", 1" & 1-1/2" panel.....	18-444-30	18-444-12	18-444-33
142	Contact bracket.....	79-1314	79-1314	79-1314
143	Spring.....	69-193	69-193	69-193
▲144	Movable contact.....	21-505	21-505	21-505
▲145	Stationary contact.....	23-1316	23-1316	23-1316
146	Support bracket (For double break).....	79-1000-23	79-1000-19	79-1000-23
147	Contact post (For double break).....	18-444-29	18-444-11	18-444-29
	3/4", 1", 1-1/2" panel.....	18-444-30	18-444-12	18-444-30
148	Roller and contact support assembly for double break interlock (Includes items 143 and 144).....	24-1698	24-1698	24-1698-2

Item No.	Description of Part	No. Req.	Part No.
	OPERATING BAR FOR ROLLER TYPE INTERLOCK		
153	Operating bar (Includes items 154 to 157).....	★	61-357-10
154	Tube 7/8" long.....	★	29-1255
155	Washer.....	★	4416-881
156	Spacer.....	★	4429-486
157	Washer.....	★	916-641Z
158	Tube 2" long.....	★	29-1255-5
159	Operating bar (Includes items 155 to 158).....	★	61-357-11
160	Operating bar (Includes items 155, 156, 157 and 161).....	★	61-357-12
161	Tube 3" long.....	★	29-1255-6

USE OF POLARITY WIRE

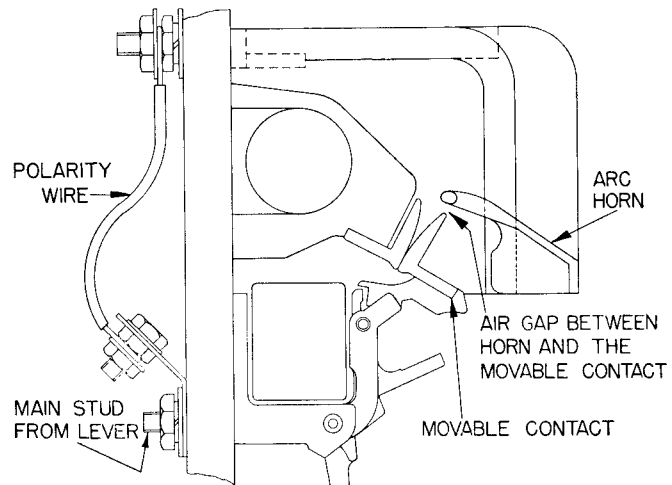
On the mill type blowout the arc is transferred from the movable contact to the arc horn through an air gap. If the arc horn is at the same potential as the lever and the movable contact, the arc leaves the movable contact as soon as it strikes the arc horn. If these parts are not at the same potential, the arc will blow out on the contact tips and burn them. To assure that the potential will be the same, the lever is connected to the arc horn with No. 12 wire on the back of the panel. Be sure this wire is not damaged or removed, and is kept tightly connected.

△Quantity of 1 per interlock finger required.

★Quantity is "As Required".

▲We recommend that these items be stocked, the quantity to be stocked will depend upon the total number in use.

●Reference to the position of the contacts is made with the coil of the contactor de-energized. Contacts which are closed when the coil is de-energized are normally closed, those that are open are normally open.





INSTRUCTION SHEET FOR NO. 545 D-C CONTACTOR

8 HOUR CURRENT RATING 600 AMPERES

CARE

Main Contacts

Main contacts should not be lubricated. Grease, dust or copper oxide have insulating qualities which increase the contact resistance and result in unnecessary heating. Dust and grease can be wiped off. A fine file should be used to remove Copper oxide, or to dress rough or pitted contacts. Care should be taken to remove as little copper as necessary.

Renewal of Contacts

The contacts should be renewed when worn so that the distance "A" between the back edges with the contactor in the closed position as indicated in Fig. 1 becomes 3-3/4 inches.

Failure to renew the contacts at the proper time may cause serious damage to the contactor.

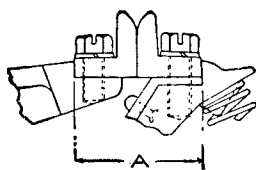


Fig. 1

Contact Spring Pressure

The contact pressure spring is made of stainless steel. It is designed for long life and will retain its operating characteristics under heavy service conditions. Should excessive contact temperatures occur the spring may be checked as described below. It is

only necessary to check the initial contact pressure. The final contact pressure may be checked only if equipped with new contacts.

The illustrations, figures 2 and 3 below provide the spring pressure range of values and the means of measuring. If the spring pressures are measured and found to be within the values given, the contact pressure spring is satisfactory. If the measured spring pressures are less than the values given, the spring should be replaced.

Electrical Interlocks

Two types of electrical interlocks are listed for this contactor. These are: The wiping finger and contact bar type, and the roller type.

The Wiping Finger Type

When the interlock contact tubes become worn, loosen the nuts and turn the tubes enough to present a new surface to the fingers. Tighten the nuts securely before operating the contactor.

Renew the fingers before they wear through at the tips.

Lubricate the fingers with a thin film of vaseline.

The roller type interlock fine silver contacts should not be filed or lubricated. Renew the contacts before the silver facing has worn away.

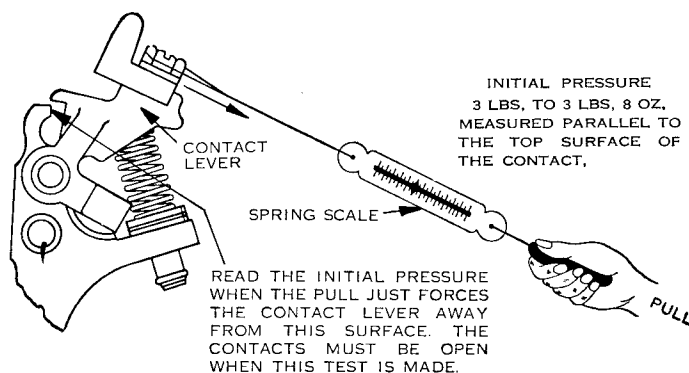


Fig. 2 Initial Contact Pressure

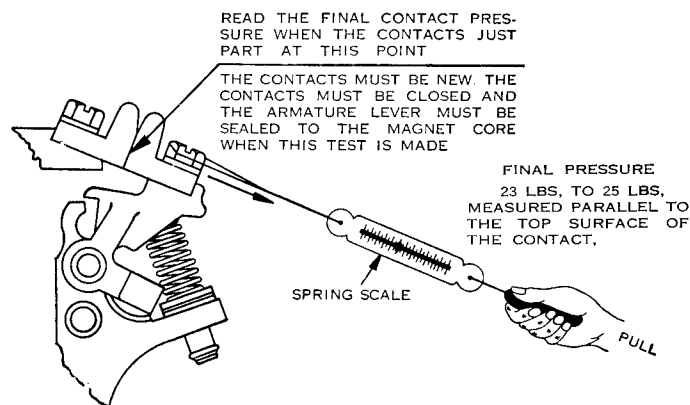


Fig. 3 Final Contact Pressure

Contact Heating and Application of Silver Contacts

Copper oxide forms very rapidly at excessive contact tip temperatures. If this condition occurs, check the remaining wear allowance (see Fig. 1 and paragraph "Renewal of Contacts") and the current carried by the contactor. If these are satisfactory, it is advisable to check the contact pressures (see Figs. 2 and 3 and paragraph "Contact Spring Pressure"). Copper contacts that are operated fairly often within their rating and wear allowance and with sufficient spring pressure seldom form oxide or require dressing.

Silver faced contacts are used where the contactor remains closed for long periods of time and is not subject to frequent operation, (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. Silver faced contacts should **not** be filed or dressed unless sharp projections, caused by heavy arcing, extend beyond the contact surface. Such projections should be filed down to the surface only.

Armature Lever and Magnet Core

Keep the surface of the magnet core, item 8 and the armature lever, item 25, which come together when the contactor closes, clean and free of dirt and oil.

The armature lever shaft, item 25, should be lubricated occasionally with a drop or two of light machine oil.

Wipe off excess oil.

Arc Shields

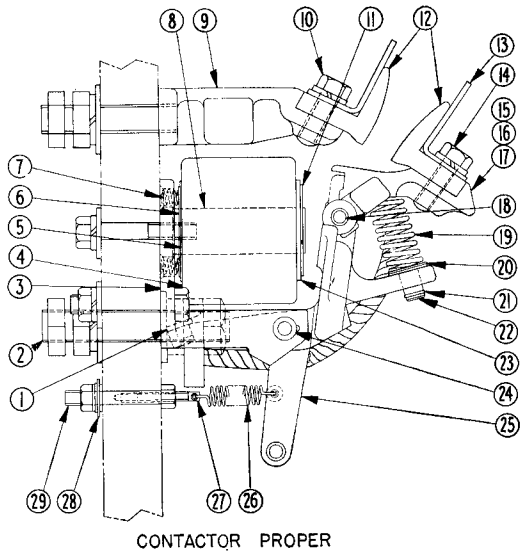
The arc shields, items 39, 41 and 59 should be replaced before they wear through, so the arc will not touch the metal pole pieces item 57.

The arc shields can easily be raised for inspection or renewal of the contact parts. However, be sure that they are lowered to their normal position as shown on page 2 before the contactor is allowed to operate. If this is not done, no blowout effect is obtained and the contacts will wear very rapidly.

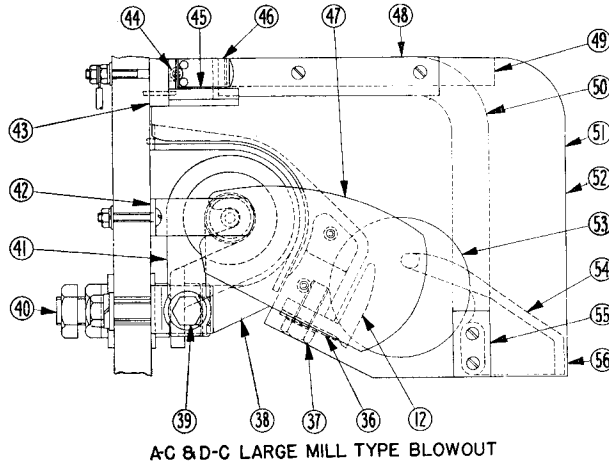


INSTRUCTION SHEET FOR NO. 545 D-C CONTACTOR

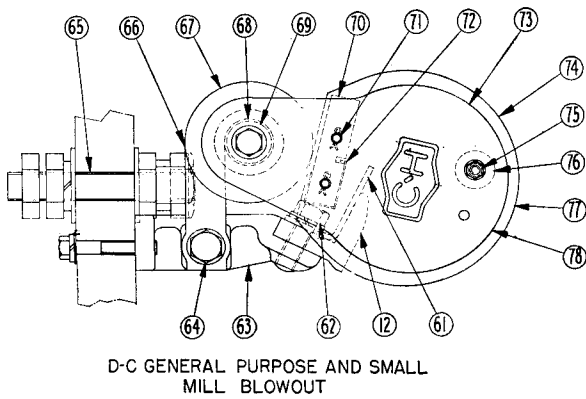
8 HOUR CURRENT RATING 600 AMPERES



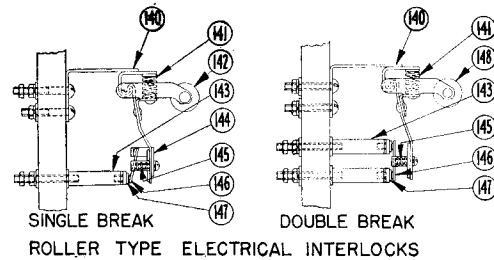
CONTACTOR PROPER



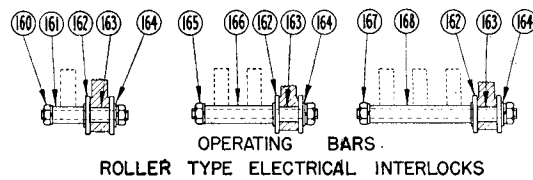
AC & D-C LARGE MILL TYPE BLOWOUT



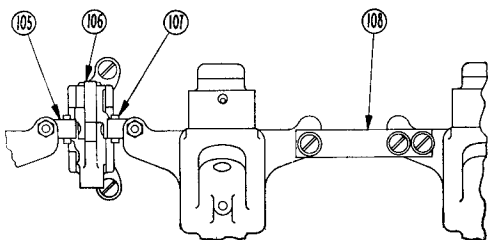
D-C GENERAL PURPOSE AND SMALL
MILL BLOWOUT



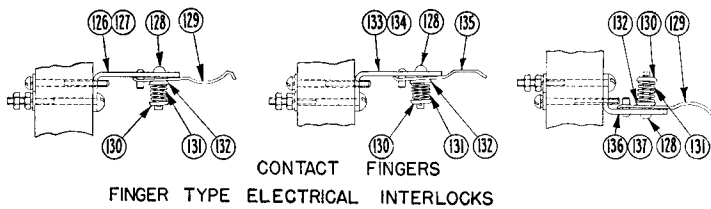
SINGLE BREAK DOUBLE BREAK
ROLLER TYPE ELECTRICAL INTERLOCKS



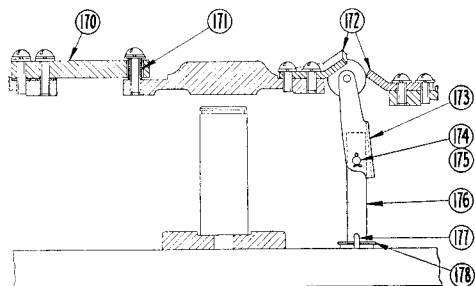
OPERATING BARS
ROLLER TYPE ELECTRICAL INTERLOCKS



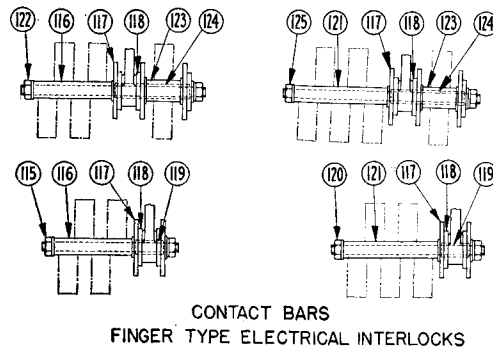
TIE BAR
CAM TYPE MECHANICAL INTERLOCK



CONTACT FINGERS
FINGER TYPE ELECTRICAL INTERLOCKS



WHEEL TYPE MECHANICAL INTERLOCK



CONTACT BARS
FINGER TYPE ELECTRICAL INTERLOCKS

D10-377



RENEWAL PARTS — Information Required

Parts CANNOT be sent promptly unless you include the following with your order: PUBLICATION NO. 8684, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.

Item No.	Description	No. No.	Part No.	Item No.	Description	No. No.	Part No.
CONTACTOR PROPER				45	Base		
1	Stop.....	1	768-15		Right hand.....	1	17-2291
2	Stud.....	1			Left hand.....	1	17-2292
	For 1" panel.....		1314-100	46	Bracket.....	2	79-1677
	For 1-1/2" and 2" panel.....		1314-101	47	Pole piece.....	2	62-98
	Nut.....	4	815-246	48	Side plate.....	1	17-2295
	Washer.....	2	916-1601Z	49	Spacer.....	1	29-1127
	Lockwasher.....	1	916-1602Z	50	Connector.....	1	25-991
	Locknut.....	1	915-239				
3	Magnet frame.....	1	17-207-16	51	Arc shield complete (Includes items 44, 47, 48, 49, 50, 52, 53, 54 and 55).....	1	62-235
▲ 4	Coil (Give No. on coil).....	1		▲ 52	Arc shield		
5	Bakelite washer.....	2	4416-1441		Right half.....	1	73-268
					Left half.....	1	73-267
6	Steel washer.....	1	916-2921Z	▲ 53	Arc shield (Circular).....	2	73-243
7	Spring.....	2	969-1162	54	Arc horn.....	1	62-99
8	Coil core.....	1	685-119	55	Side plate.....	1	17-1250
9	Contact support complete (Includes item 10, and 12) (Copper contact).....	1	23-1289-3	56	Blowout complete (Includes items 36 to 55).....	1	
10	Contact screw.....	1	911-5890Z		D-c for 1" panel.....		62-236
	Lock washer.....	1	916-1161Z		D-c for 1-1/2" panel.....		62-236-2
					D-c for 2" panel.....		62-236-3
11	Retaining washer.....	1	16-426		A-c for 1" panel.....		62-236-6
▲ *12	Contact.....	2	23-1225		A-c for 1-1/2" panel.....		62-236-7
	Plain copper.....		23-1288		A-c for 2" panel.....		62-236-8
▲ 13	*Silver faced (See note before ordering).....	★	4221-6	D-c GENERAL PURPOSE BLOWOUT AND SMALL MILL BLOWOUT			
14	Arc guard.....	1	911-5892Z	▲ 61	Arc guard.....	1	4221-6
15	Contact screw.....	1	916-1161Z	62	Contact screw.....	1	911-5892Z
	Lock washer.....	1	624-594		Washer.....	1	916-1125Z
	Contact lever with connector.....	1			Lockwasher.....	1	916-1161Z
16	Contact lever complete with arc guard (Includes items 12, 13, 14 & 15) (Copper contact).....	1	24-1330-2	63	Contact support complete (Includes items 12, 61 and 62).....	1	62-109-5
17	Contact lever complete without arc guard (Includes items 12, 14, and 15) (Copper Contact).....	1	24-1330	64	Screw.....	1	911-5890Z
18	Pin.....	1	956-1870		Lockwasher.....	1	916-1161Z
▲ 19	Spring.....	1	969-583	65	Stud.....	1	
20	Shim washers				For 1" and 1-1/2" panel.....		1314-100
	3 32" thick.....	1	916-1121Z		For 2" panel.....		1314-104
	1 32" thick.....	1	16-319		Nut.....	4	815-246
	1 64" thick.....	2	916-1164Z		Washer.....	2	916-1601Z
	.004" thick.....	3	916-225		Lockwasher.....	1	916-1602Z
21	Spring ring.....	1	29-541		Lock nut.....	1	915-239
22	Adjusting pin.....	1	13-593	66	Blowout coil.....	1	9-460-20
23	Insulating washer.....	1	16-253	67	Fibre washer.....	2	1016-211
24	Shaft.....	1	13-164	68	Insulating tube.....	1	1029-75
25	Armature lever (Includes item 1).....	1		69	Core.....	1	985-72Z
	For use with item 26.....		57566-3 Fig. 3	70	Spacer.....	1	5029-17
	For use without item 26.....		624-592	71	Pin.....	2	813-159
26	Spring.....	1	969-887J	72	Protecting clip.....	1	55-173
27	Adjusting stud.....	1	14-317-3	73	Pole piece.....	2	3462-183F1
28	Insulating washer.....			▲ 74	Arc shield.....	2	4973-3
	3/4" diameter.....	★	4416-841	75	Spacer (thru item 74).....	2	829-505
	1" diameter.....	★	4416-96	▲ 76	Spacer.....	2	2229-603F1
29	Screw.....	1	11-1003	77	Arc shield complete (Includes item 70 to 76).....	1	62-109-4
A-c and D-c LARGE MILL TYPE BLOWOUT				78	Blowout complete (Includes items 61 to 77).....	1	
36	Barrier for A-c only.....	1	73-618		For 1" panel.....		62-109
37	Contact screw.....	1	911-5890Z		For 1-1/2" panel.....		62-109-2
	Lock washer.....	1	916-1161Z		For 2" panel.....		62-109-3
38	Contact support complete (Includes items 12, 36 and 37).....	1		MECHANICAL INTERLOCK CAM TYPE			
	D-c.....		62-236-5	105	Bracket.....	★	79-558-2
	A-c.....		62-236-10	106	Mechanical interlock complete.....	★	10-199
▲ 39	Screw.....	1	911-5890Z	107	Link.....	★	61-180-4
	Washer.....	1	916-1121Z	108	Tie bar.....	★	619-1178
	Lock washer.....	1	916-1161Z	WHEEL TYPE			
40	Stud.....	1		170	Tie bar.....	★	4419-132
	For 1" panel.....		1314-103	171	Spacer.....	★	29-1246
	For 1-1/2" panel.....		1314-100	172	Bracket.....	★	79-3886
	For 2" panel.....		1314-104	173	Lever with roller.....	★	24-3206
	Nut—1-1/2" across flats.....	3	815-246	174	Pin.....	★	13-2666
	Nut—1-1/4" across flats.....	1	815-1408				
	Washer.....	2	916-1601Z	175	Retaining ring.....	★	28-71
	Lock washer.....	1	916-1602Z	176	Interlock post		
	Lock nut.....	1	915-239		For 3/4", 1", and 1-1/4" panel.....	★	18-1076-3
▲ 41	Blowout coil.....	1			For 1-1/2" and 2" panel.....	★	18-1076-4
	D-c.....		9-460-268	177	Lock pin.....	★	13-2665
	A-c.....		9-460-163	178	Shim washer.....	★	16-862-11
42	Support.....	2	79-891				
43	Base.....	2	17-2294				
44	Screw.....	1	11-1249-2				
	Nut.....	1	15-416-3				
	Clamping nut (when used).....	2	15-321				

△Quantity of 1 per interlock finger required.

★Quantity is "As Required".

▲We recommend that these items be stocked, the quantity to be stocked will depend upon the total number in use.

*Silver faced contacts are used only where the contacts remain closed for long periods (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally. See section "Application of Silver Contacts" page 1.



RENEWAL PARTS — Information Required

Parts **CANNOT** be sent promptly unless you include the following with your order: **PUBLICATION NO. 8684, ITEM NO., DESCRIPTION, PART NO. and NO. STAMPED ON CONTROLLER NAMEPLATE.**

Item No.	Description	No.	Part No.	Item No.	Description	No.	Part No.
CONTACT BARS FOR FINGER TYPE ELECTRICAL INTERLOCKS				CONTACT FINGERS FOR FINGER TYPE ELECTRICAL INTERLOCKS			
115	Contact bar complete (2 fingers wide).....	★	23-946-8	126	Normally open finger complete (Includes items 127, 128, 129, 130, 131, and 132)...	★	39249-1 Fig. 4
▲116	Contact tube.....	★	29-441	127	Finger support (For normally open plain finger).....	△	979-661AZ
117	Insulating washer (large).....	★	4416-883	128	Spring pin.....	△	913-1195Z
118	Insulating washer (small).....	★	4416-881	▲129	Contact finger (plain).....	★	740-964
119	Insulating tube.....	★	4429-485	130	Cup washer.....	△	916-2641Z
120	Contact bar complete (3 fingers wide).....	★	23-946-7	▲131	Spring.....	△	969-530J
121	Contact tube.....	★	29-442	132	Cup washer.....	△	916-561Z
122	Insulated contact bar complete (3 fingers wide).....	★	23-948-12	133	Finger support (For long wipe finger).....	△	979-661AZ
▲123	Contact tube.....	★	29-457	134	Delayed opening finger complete (Includes items 128, 130, 131, 132, 133, and 135)...	★	39247-1 Fig. 4
124	Insulating tube.....	★	29-653	▲135	Contact finger (delayed opening).....	★	740-963
125	Insulated contact bar complete (4 fingers wide).....	★	23-948-13	136	Normally closed finger complete (Includes items 128, 129, 130, 131, 132, and 137)...	★	39248-1 Fig. 4
				137	Finger support (for normally closed plain finger).....	△	979-659AZ

ELECTRICAL INTERLOCK PARTS (ROLLER TYPE — SINGLE AND DOUBLE BREAK)

Item No.	Description	1" Diameter Roller		3/4" Diameter Roller
		Normally Closed	Normally Open	Normally Closed Delayed Opening
140	Support bracket.....	79-1000-23	79-1000-19	79-1000-24
▲141	Spring.....	69-658	69-658	69-658
142	Roller and contact support assembly for single break interlock (Includes items 145 and 146).....	24-1705	24-1705	24-1705-2
143	Contact post 3/4", 1" and 1-1/2" panel.....	18-444-29	18-444-11	18-444-32
144	Contact bracket.....	18-444-30	18-444-12	18-444-33
		79-1314	79-1314	79-1314
▲145	Spring.....	69-193	69-193	69-193
▲146	Movable contact.....	21-505	21-505	21-505
▲147	Stationary contact.....	23-1316	23-1316	23-1316
148	Roller and contact support assembly for double break interlock (Includes items 145 and 146).....	24-1698	24-1698	24-1698-2

Item No.	Description	No.	Part No.
OPERATING BARS FOR ROLLER TYPE ELECTRICAL INTERLOCKS			
160	Operating bar (Includes items 161, 162, 163, and 164).....	★	61-357-10
161	Tube 7/8" long.....	★	29-1255
162	Washer.....	★	4416-881
163	Spacer.....	★	4429-486
164	Washer.....	★	916-641Z
165	Operating bar (Includes items 162, 163, 164 and 160).....	★	61-357-11
166	Tube 2" long.....	★	29-1255-5
167	Operating bar (Includes items 162, 163, 164, and 168).....	★	61-357-12
168	Tube 3" long.....	★	29-1255-6

△Quantity of 1 per interlock finger required.

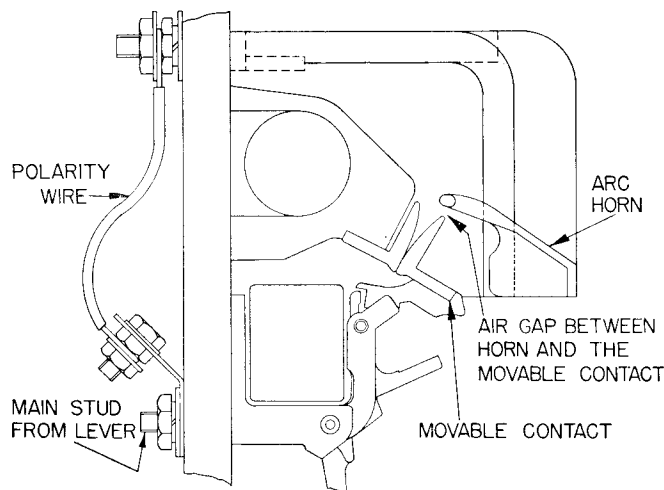
★Quantity is "As Required".

▲We recommend that these items be stocked, the quantity to be stocked will depend upon the total number in use.

*Silver faced contacts are used only where the contacts remain closed for long periods (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally.

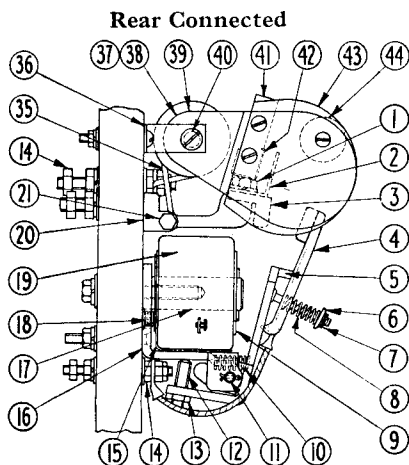
USE OF POLARITY WIRE

On the mill type blowout the arc is transferred from the movable contact to the arc horn through an air gap. If the arc horn is at the same potential as the lever and the movable contact, the arc leaves the movable contact as soon as it strikes the arc horn. If these parts are not at the same potential, the arc will blow out on the contact tips and burn them. To assure that the potential will be the same, the lever is connected to the arc horn with No. 12 wire on the back of the panel. Be sure this wire is not damaged or removed, and is kept tightly connected.

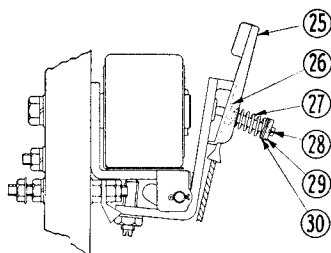


INSTRUCTION SHEET

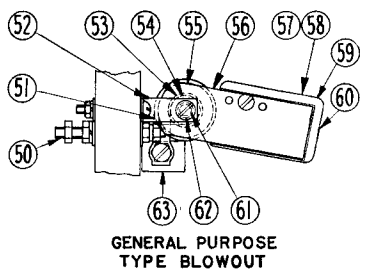
For No. 369—D-c Contactor



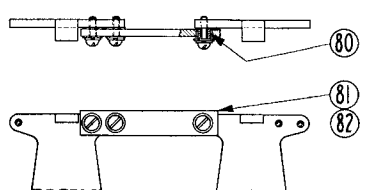
CONTACTOR PROPER WITH
MILL TYPE BLOWOUT



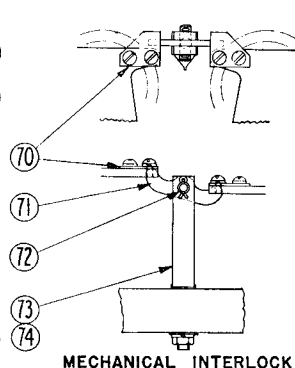
MILL DUTY CONTACTOR
FINGER CONSTRUCTION



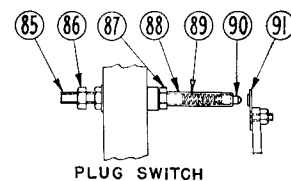
GENERAL PURPOSE
TYPE BLOWOUT



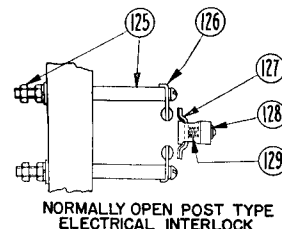
TIE BAR



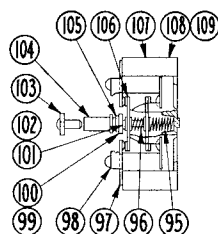
MECHANICAL INTERLOCK



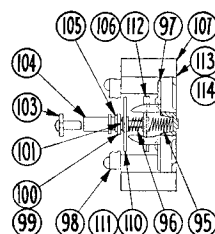
PLUG SWITCH



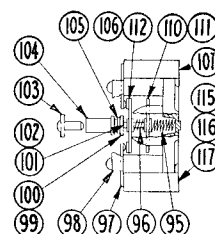
NORMALLY OPEN POST TYPE
ELECTRICAL INTERLOCK



NORMALLY OPEN AND NORMALLY
CLOSED CONTACTS
NORMALLY OPEN AND NORMALLY
CLOSED CONTACTS WITH OVERLAP



NORMALLY OPEN CONTACTS
NORMALLY OPEN 3 POINT
CONTACTS

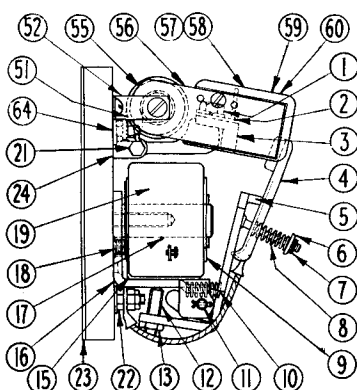


NORMALLY CLOSED CONTACTS
NORMALLY CLOSED DELAYED
OPENING CONTACTS
NORMALLY CLOSED 3 POINT
CONTACTS

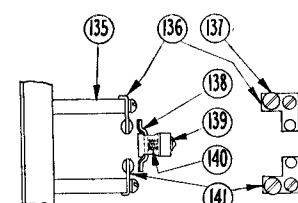
UNIT TYPE ELECTRICAL INTERLOCK

D10-45

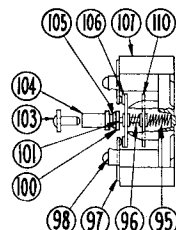
Front Connected



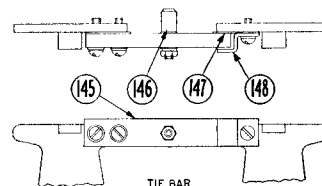
CONTACTOR PROPER WITH
GENERAL PURPOSE BLOWOUT



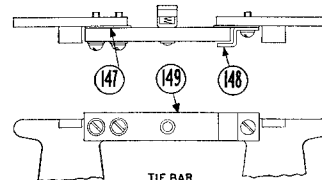
NORMALLY OPEN POST TYPE
ELECTRICAL INTERLOCK



NORMALLY CLOSED UNIT TYPE
ELECTRICAL INTERLOCK



TIE BAR
FOR USE WITH
UNIT TYPE
ELECTRICAL INTERLOCK

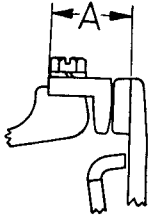


TIE BAR
FOR USE WITH
NORMALLY OPEN POST TYPE
ELECTRICAL INTERLOCK

C10-933

CARE

Lubricate the armature lever shaft (item 11) occasionally, with a light oil.



Copper contacts should be renewed when worn so that the distance "A", in Figure 1, with the contact closed becomes 1".

Silver faced contacts should be replaced as soon as the silver is worn off.

Do not lubricate the main contacts, items 3 and 4. If these contacts become badly pitted or burned, smooth

them with a fine file, taking care to remove as little copper as possible.

The contact surfaces of the electrical interlock contacts should be kept clean, and these contacts should be replaced if they become badly pitted or worn.

ADJUSTMENT

These contactors are adjusted at the factory for normal conditions. If it is desired to change the voltage value at which the contactor closes it can readily be done.

Turning slotted screw, item 12, clockwise will decrease this voltage value, while turning it counter-clockwise will increase it. After making any adjustment be sure to lock the screw in position with the lock-nut, item 13.

RENEWAL PARTS—Information Required

Parts **CANNOT** be sent promptly unless you include the **FOLLOWING** with your order: **PUBLICATION NO. 9154, Item No., PART No., DESCRIPTION, and the Number Stamped on the Controller Nameplate.**

Item No.	Description	No. Req.	Part No.	Item No.	Description	No. Req.	Part No.
CONTACTOR PROPER				CONTACTOR PROPER Cont.			
1	Contact screw.....	1	911-5446FZ	21	Blowout coil screw.....	1	911-5445FZ
▲2	Lockwasher.....	1	916-682Z		Washer.....	1	916-641Z
#3	Arc guard.....	1	4221-7		Lock washer.....	1	916-682Z
#4	Contact.....	1		22	Screw.....	1	911-864Z
	Plain copper.....		1321-61		Slotted nut.....	1	815-79
	Silver faced.....		23-1258		Nut.....	1	815-601
#4	Finger with connector.....	1			Washer.....	2	916-601Z
	With copper contact tip.....		640-246		Lock washer.....	1	916-682Z
	With silver faced contact tip.....		640-315		Cup washer.....	1	816-2721
5	Armature lever assembly.....	1	24-3107	23	Insulator.....	1	56-1227
6	Cup washer.....	1	916-2641Z	24	Contact post (includes items 1, 2, 3, and 21).....		
7	Shim washer.....	3	16-139		For use with blowout.....	1	18-528-25
▲8	Spring.....	1	69-95		For use without blowout.....	1	18-528-15
9	Insulating washer.....	2	4416-134	MILL DUTY CONTACTOR FINGER CONSTRUCTION			
10	Spring.....	1	69-179	25	Finger with connector.....	1	640-335
11	Shaft.....	1	956-343	26	Spring gland.....	1	49-1204-13
12	Adjusting screw.....	1	711-6	27	Spring.....	1	69-1663
13	Hexagon nut.....	1	815-73	28	Pin.....	1	13-1079-29
14	Shake proof washer.....	1	916-125-2	29	Spring gland.....	1	49-2171
	Stud.....	2		30	Shim washer.....	3	16-626
	For 1/2" panel.....		814-489	MILL TYPE BLOWOUT			
	For 3/4" and 1" panel.....		814-491	35	Coil (Give No. on coil).....	1	
	For 1-1/2" panel.....		14-281-16	36	Bracket.....	2	79-418
	For 2" panel.....		814-206	37	Arc chute assembly (Includes items 39 to 44).....	1	662-159
	Lock nut.....	2	915-209	38	Mill type blowout complete: (Includes items 14 & 35 to 44) (Give No. stamped on coil).....	1	
	Nut.....	8	815-601		For 1/2" panel.....		62-20-5
	Lock washer.....	2	916-682Z		For 3/4" and 1" panel.....		62-20-3
	Washer.....	6	916-641Z		For 1-1/2" panel.....		62-20-4
15	Insulator.....	1	56-1228		For 2" panel.....		62-20-6
16	Magnet frame.....	1		39	Pole piece.....	2	962-54
	For 1/2 panel.....		649-435	40	Spacer.....	2	929-992
	For 3/4" & 1" panel.....		649-375	41	Spacer.....	1	2222-402
	For 1-1/2" panel.....		649-441	42	Protecting clip.....	1	933-203Z
	For 2" panel.....		55279-1 Fig. 3	43	Arc shield.....	2	4973-5
	For front connected.....		649-430	44	Spacer.....	1	2222-483
17	Core.....	1	51-64				
18	Spring.....	1	969-566				
▲19	Coil (Give No. Stamped on Coil).....	1					
20	Contact post (Includes items 1, 2, 3, and 21).....	1					
	For use with blowout.....		18-528-2				
	For use without blowout.....						
	For C.E.M.F. switch.....		18-528-14				
	For shunt switch.....		18-528-10				

▲We recommend that these items be stocked. The quantity to be stocked will depend on the total number is use.

Silver faced contacts are used only where the contacts remain closed for long periods, (nominally eight hours or more). Do not use silver faced contacts unless the contactor was so equipped originally.



RENEWAL PARTS—Information Required (Cont'd.)

Item No.	Description	No. Req.	Part No.	Item No.	Description	No. Req.	Part No.
GENERAL PURPOSE TYPE BLOWOUT				TIE BAR			
50	Stud.....	1		80	Spacer.....	1	29-273
	For 1/2" and 3/4" panel.....		814-489	81	Normally open interlock bar		
	For 1" panel.....		814-491		(For use with tie bar).....	*	10-87-2
	For 1-1/2" panel.....		14-281-16	82	Tie bar (Used with normally		
	For 2" panel.....		814-206		closed interlock and plain tie	*	61-75
	Nut.....	4	815-601	PLUG SWITCH			
	Washer.....	3	816-642	NORMALLY OPEN			
	Lock washer.....	1	916-682Z	NON-INSULATED			
51	Coil.....	1					
	Bar wound.....		9-460-51	85	Contact post complete (Includes	1	
	Wire wound (Give No. on				items 85 to 91).....		
	Coil).....				For 1/2" panel.....		10-43-6
52	Bracket.....				For 3/4" and 1" panel.....		10-43
	For wire wound blowout.....	2	79-797		For 1-1/2" panel.....		10-43-2
	For bar wound blowout.....	1	79-217		For 2" panel.....		10-43-5
53	Fiber tube.....	*	1029-274	86	Stud.....	1	914-535
54	Coil core.....	*	985-526Z		Nut.....		915-605Z
55	Bakelite washer.....	*	4416-6044		Washer.....		916-601Z
56	Pole piece.....	2	962-923Z		Lock washer.....		916-682Z
57	Right hand arc shield.....	1	73-406	87	Nut.....	1	815-115
58	Left hand arc shield.....	1	73-405	88	Tube.....	1	829-332
59	Blowout assembly (includes			89	Spring.....	1	869-22
	items 51 to 62) wire wound	1		90	Contact.....	1	1321-516
	coil (Give No. on Coil).....		62-224	91	Contact plate.....	1	21-80
	Bar wound coil.....		62-224-4	UNIT TYPE INSULATED			
60	Arc chute assembly (Includes			ELECTRICAL INTERLOCK			
	items 56, 57 and 58).....	1	62-222	95	Spring.....	1	69-1139
61	Spacer (for wire wound blowout)	*	29-1035	96	Spring.....	1	69-1138
62	Spacer (for bar wound blowout)	*	829-559	97	Stationary contact.....	*	23-1745
63	Insulator.....	*	56-1493	98	Cover.....	1	49-1484
64	Screw.....	1	911-864Z	99	Washer .032" thick.....	1	16-68-2
	Slotted nut.....	1	815-79	100	Washer .093" thick.....	1	16-68-3
	Nut.....	2	815-601	101	Pin 31/32" long.....	1	13-1724-2
	Washer.....	2	916-601Z	102	Pin 1-3/32" long.....	1	13-1724
	Lock washer.....	1	916-682Z	103	Interlock bar.....	1	61-607-2
	Cup washer.....	1	816-2721	104	Push rod.....	1	61-597-2
MECHANICAL INTERLOCK				105	Spring.....	1	69-1144
70	Stop.....	2	18-718	106	Movable contact.....	*	23-1747
71	Lever.....	1		107	Base.....	1	17-2298
	Steel.....		24-1884	108	Unit interlock complete		
	Bakelite.....		24-1223		Normally open and normally		
72	Hinge pin.....	1	956-325		closed contacts.....	*	10-839-4
73	Interlock complete (Includes			109	Unit interlock complete		
	items 70, 71 and 72).....	1			Normally open and normally		
	With steel lever				closed contacts with over-		
	For 1/2" and 3/4" panel...		10-80-10		lap using item 99 and item		
	For 1" and 1-1/4" panel...		10-80-3		item 102.....	*	10-841-3
	For 1-1/2" panel.....		10-80-8	110	Spacer plate.....	*	23-1747-2
	For 2" panel.....		10-80-9	111	Bushing.....	*	29-2050
	With bakelite lever			112	Movable contact (with connec-		
	For 1/2" and 3/4" panel...		10-80-7		tor.....	*	23-1748
	For 1" and 1-1/4" panel...		10-80-4	113	Unit interlock complete		
	For 1-1/2" panel.....		10-80-5		Normally open contact.....	*	10-839-5
	For 2" panel.....		10-80-6	114	Unit interlock complete		
74	Post.....	1			Normally open 3 point con-		
	For use with bakelite lever...		18-407		tact using item 112.....	*	10-842-4
	For use with steel lever.....		18-146				

*As required.

▲We recommend that these items be stocked. The quantity to be stocked will depend on the total number in use.



RENEWAL PARTS — Information Required (Cont'd.)

Item No.	Description	No. Req'd.	Part No.	Item No.	Description	No. Req'd.	Part No.
UNIT TYPE INSULATED ELECTRICAL INTERLOCK Cont.				POST TYPE NORMALLY OPEN INSULATED ELECTRICAL INTERLOCK (FRONT CONNECTED)			
115	Unit interlock complete Normally closed contact.....	*	10-839-6	135	Post.....	2	18-573-2
116	Unit interlock complete Normally closed delayed opening contact using item 99, and item 102.....	*	10-841-4	136	Stationary contact.....	1	21-255-2
117	Unit interlock complete Normally closed 3 point contact using item 112.....	*	10-842-3	137	Screw.....	2	811-7292F2
POST TYPE NORMALLY OPEN INSULATED ELECTRICAL INTERLOCK (REAR CONNECTED)					Washer.....	2	816-69
125	Post.....	2		138	Movable contact.....	1	23-887
	For 1/2" panel.....		18-527-25	139	Interlock bar (includes item 140)	1	10-544-2
	For 3/4" and 1" panel.....		18-527-14	140	Spring.....	1	969-633
	For 1-1/2" panel.....		18-527-13	141	Stationary contact.....	1	21-256-2
	For 2" panel.....		18-527-12	TIE BARS FOR USE WITH ELECTRICAL INTERLOCKS			
	Nut.....	4	915-322Z	145	Tie bar.....	1	
	Washer.....	2	916-523Z		2-7/8" long.....		61-667
	Lock washer.....	2	916-195		3-3/16" long.....		61-667-2
126	Stationary contact.....	2	21-144	146	Post.....	1	18-367-2
127	Movable contact.....	1	23-887	147	Shim.....	*	19-360-51
128	Interlock bar with riveted contact support.....	1	10-87	148	Clip.....	1	55-751
129	Spring.....	1	969-633	149	Tie bar.....	1	
					2-15/16 long.....		61-670-3
					3-3/16 long.....		61-670-4

*As required,