MAINTENANCE INSTRUCTIONS FOR THE 5000 AMPERE POWER CONTACTOR (INDUSTRIAL)

DESCRIPTION

The 5000 ampere power contactor, Fig. 1 is a single pole, normally open device capable of connecting and interrupting D.C. current up to 5000 amperes at 800 volts.
A four circuit interlock switch with two normally open and two normally closed contacts is enclosed in a dust proof housing. Circuit connections for the interlocks are provided by external faston terminals.

Arc interruption takes place entirely within the arc chute. The magnetic field required to lengthen the arc and speed interruption is provided by permanent magnets on both sides of the arc chute.

The arc chute is designed to operate under normal conditions of rating and environment, with the vent located not closer than 3 inches from a encloser door or other interfering surface.

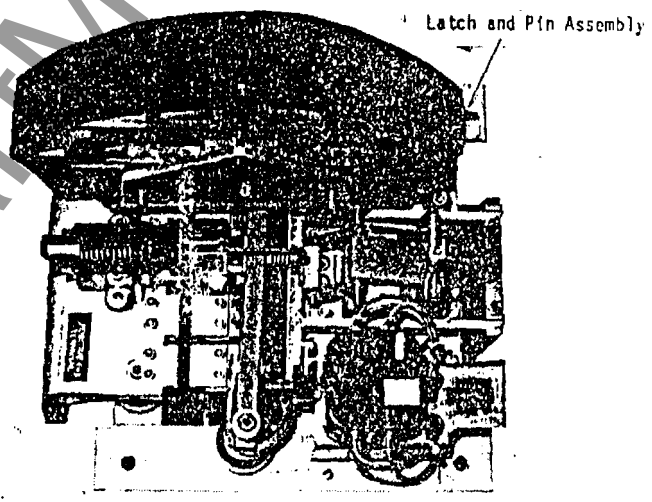


Fig.1 5000 ampere power contactor

SIEMENS ELECTRIC LTD.

ISSUE 01 SEPT. 26, 1989

SAFETY PRECAUTIONS

WARNING

This power contactor was designed for general application to circuits of direct current equipment where the circuits and devices are enclosed in suitably protective cabinets. Care has been taken in the design of the equipment to provide for safety of operating and service personnel, provided reasonable care is exercised in the performance of operating and service functions.

The following safety considerations should always be carefully observed in the application, operation, or servicing of the equipment.

1. ELECTRICAL RATINGS of the equipment are values that should be considered to be EXTREMELY DANGEROUS to personnel.

2. EQUIPMENT SHOULD ALWAYS BE COMPLETELY DE-ENERGIZED BEFORE HANDLING OR PERFORMING ANY SERVICE OPERATIONS. De-energizing the operating coil is not sufficient to render the equipment safe; the power lines must also be disconnected or otherwise de-energized. If power lines are not de-energized, all parts of the device should be considered to be at the maximum system voltage.

3. IF INSPECTION OF ENERGIZED EQUIPMENT IS NECESSARY, DO NOT TOUCH OR HANDLE ANY PARTS. DO NOT STAND IN FRONT OF THE EQUIPMENT OR AT CLOSE RANGE TO PERFORM VISUAL INSPECTIONS. The discharge of hot gases and particles is always likely when the contactor is operated in an energized circuit.

4. An electrical interlock is provided in the design to prevent the closing of main contacts until the arc chute is in position. TO AVOID EQUIPMENT DAMAGE OR DANGER TO PERSONNEL, DO NOT APPLY BYPASS DEVICES OR OTHERWISE ATTEMPT TO DEFEAT THE ACTION OF THIS INTERLOCK.

5. NEVER ATTEMPT TO REMOVE THE ARC CHUTE WHILE THE POWER CONTACTOR IS IN AN ENERGIZED OR CLOSED POSITION. Such action is extremely dangerous and would likely result in extensive damage.

6. Operating temperatures for the power contactor are high. Some parts of these devices may normally reach temperatures in excess of 93 degrees C (200 degree F). SERIOUS BURNS CAN RESULT FROM HANDLING THE EQUIPMENT AFTER IT HAS BEEN IN SERVICE AND BEFORE IT HAS BEEN ALLOWED TO COOL.

MAINTENANCE

Only skilled personnel familiar with electrical equipment and the hazards involved should be permitted to service a power contactor. All safety precautions must be observed.

Minimum maintenance is required to keep the power contactor in serviceable condition. Moving mechanical parts should be free from excess friction. Parts should also be checked for excessive wear. The bearing surfaces of the contactor are designed to operate without lubrication. Do NOT oil or grease at any time.

NOTE:
For complete disassembly and assembly procedures, refer to "Rebuilding Contactor."

Torque values for all fasteners unless otherwise noted.

Screw Size	Torque N.m (in-lbs)
10-32	2.2-3.3 (20-29)
0.250-20	5.4-8.1 (48-72)
0.312-18	9.5-13.6 (84-120)
0.375-16	16.3-23.0 (144-204)

WARNING
High voltage can cause severe injury or death. Remove power supply prior to inspection or servicing.

ARC CHUTE INSPECTION
Remove arc chute by releasing latch mechanism on right side of the arc chute then rotate the arc chute assembly in the direction shown on the label side of the arc chute. After rotating the arc chute approximately 90 degrees disingage the arc chute from the hinge, Fig. 1.

Examine the arc chute Fig. 11 for any signs of; cracks, breaks, holes due to arc errosion, loose parts or foreign material. Blackened ceramic flash plates are still functional provided that none of the ribs are completely erroded away. Damaged arc chute should be repaired or replaced before returing arc chute to service.
NOTE: See "Rebuilding Contactor" For arc chute repair information

CONTACT INSPECTION AND RENEWAL

NOTE:
When arc chute is removed, an electrical interlock prevents the contactor from closing.

MAIN AND ARCING CONTACT INSPECTION

Remove arc chute as described in previous section.

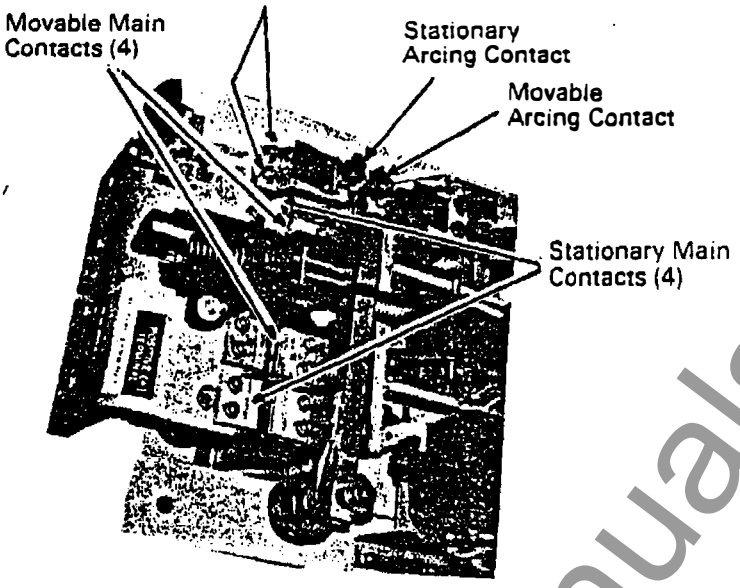
The main and arcing contact inserts, Fig. 2, should be free of foreign matter, but need not be dressed or filed. If foreign material is present, it should be removed by wire brushing. The contacts will operate satisfactorily even though blackened, pitted, or eroded.

1. Main Contact Inspection: With arc chute removed, inspect the four movable and four stationary main contacts (8, 12 Fig. 3) if any contact insert is eroded or worn to within 0.76mm (.030") of the base material the contact should be replaced with a new contact.

2. Arcing Contact Inspection: Place movable arcing contact against the stationary arcing contact (1, 2 Fig. 3) as shown. If the indicated dimension is less than 18.1mm (.712") both stationary and movable arcing contacts should be replaced. Special attention should be given to the stationary contact, as most erosion takes place at this point. If the contact insert is eroded or worn to within 0.76mm (.030") of the base material, both contacts should be replaced with new contacts.

WARNING
Do not connect power to main power terminals during this test. High voltage can cause injury or death. Make sure that main power has been disconnected before proceeding.

Apply a jumper across the arc chute electrical interlock contacts.



NOTE
This stationary main contact and the stationary arcing contact are secured by the same screws.

Fig.2 - Main And Arcing Contact Locations

Energize the control power circuit to close the contactor. Refer to fig. 15. Using a feeler gage or similar tool, measure the arcing contact overtravel. If the overtravel, measured at the location shown, is less than .984mm (.039") both stationary and arcing contacts must be replaced. Disconnect control power from the contactor. Remove jumper from arc chute electrical interlock contacts.

MAIN AND ARCING CONTACT RENEWAL

The stationary and movable main and arcing contacts, Fig. 2, are renewed by removing the screws securing the contacts, applying new contacts, and replacing the screws.

1. Main Contact Renewal: Remove screws from main & arcing contacts Fig.2, as required . Remove failed contacts & replace with new components. Ensure main contacts (8,12 Fig. 3) are aligned by butting the back of the contact against its support.

   Tighten the movable and stationary main contact fastening screws securely. Torque to approximately 6N.m (50 in/lbs).

2. Arcing Contact Renewal: Remove the screws securing arcing contacts (1,2 Fig. 3).

   Apply one or two drops of loctite 222 to each of two #10-32 X .50 screws. Position new mavable contact on the end of the arcing contact support arm and tighten securely. Screws should be torqued to 3.3N.m (20 to 29 in/lb).

   Position stationary arcing contact, insert two new .25-20 X 1.50 screws and lockwashers aligning these contacts with the mounting holes in the positive terminal. Inspect assembly for proper contact tip alignment of both arcing and main contact. torque screws to 8.1 to 12.2 N.m (72 to 108 in/lb).

NOTE:

Whenever replacement of arcing contacts is required, a new arcing contact preload spring (10 Fig. 3) should be installed.

PILOT CONTACT INSPECTION

The pilot contacts are a part of the pilot contact-latch assembly, Fig. 4.

Pilot contacts should be replaced with new contacts when contact tips have eroded to within 0.25 mm (.010") of base metal.

STATIONARY PILOT CONTACT RENEWAL

1. Remove nuts & set screw (14 & 15) from armature (6 fig 4.)

2 Remove pivot pins from main armature, release armature from operating lever.

3. Remove screws (13 Fig 5) securing housing (14 fig 5) to pivot block (10 fig 5).

4. Remove housing to gain access to stationary contact, remove retaining screw and terminal lead from stationary contact.

5. Remove worn contact and install new contact.

6 Reassemble in reverse order of disassembly.

MOVABLE PILOT CONTACT RENEWAL

With pilot contact-latch assembly removed proceed as follows:

1 Proceed as described under "stationary contact removal" until step (3) is completed.

2. Following removal of housing (14 fig 5) remove leads from arc chute interlock and free wiring from its cable clamp.

3. Remove (+) lead connecting main coil to arc chute interlock (see fig 21).

4. Remove the three attaching screws (9 fig 5) from the mounting plate.

5. Remove snap rings and shaft from pivot block armature (9 fig 4) along with extension spring (2 fig 4) and return spring (16 fig 4).

6. Slide entire pilot contact latch assembly toward the main armature (7 fig 4) and remove latch assembly from frame.

7. With pilot contact latch removed - remove pivot block retaining screws (4 fig 5) and remove pivot block (10 fig 5) and attached armature (17 fig 5).

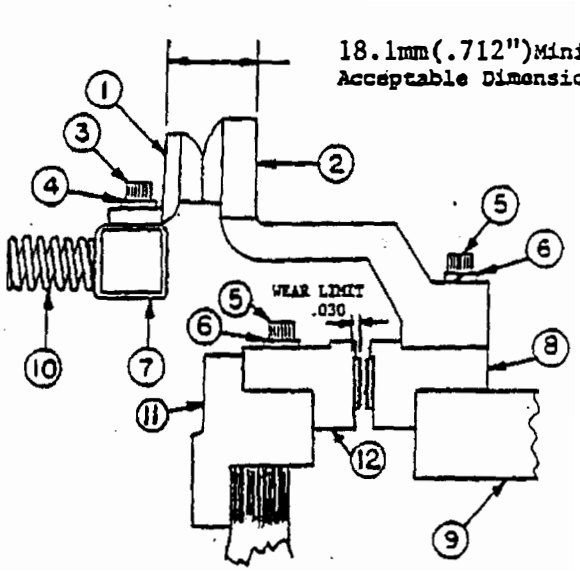
8. Spread legs of movable contact assembly (1 fig 5) one at a time until they are clear of the pivot pins in the pivot block - remove movable contact assembly. Install new movable contacts assembly.

NOTE:

9. Pilot contact coil and related components should be inspected at this time - if inspection shows the need for coil replacement a new coil should be installed at this time.

10. Reassemble pilot contact latch assembly in reverse order of disassembly.

Refer to contactor adjustment section of this maintenance instruction for proper adjustment.



1. Movable Arcing Contact
2. Stationary Arcing Contact
3. #10-32 x .50 Soc. Hd. Cap. Scr.
4. #10 Internal Tooth Lk. Washer
5. .25-20 x 1.50 Soc. Hd. Cap. Scr.
6. .25 I.D. Lockwasher
7. Arcing Contact Support Arm
8. Main Contact
9. Positive Terminal
10. Arcing Contact Preload Spring
11. Negative Terminal
12. Main Contact (Movable)

FIG. 3 - STATIONARY AND MOVABLE ARCING AND MAIN CONTACTS

AUXILIARY INTERLOCK ASSEMBLY

DESCRIPTION:

The auxiliary interlock assembly, Fig.6, is a four circuit switch with two normally closed and two normally open contacts enclosed in a dustproof housing.

The interlock assembly has three major subassemblies, Fig. 7; two cover assemblies containing the stationary contacts, and a movable contact assembly.

The nominal travel of the movable contacts is 9.52 mm (.375") with over-travel of 2.39 mm (.094") beyond nominal in either direction. There is a 2.39 mm (.094") travel to contact touch, 2.39 mm (.094") additional travel to normal lift position, and 2.39 mm (.094") additional travel to internal stop. Movable contact travel is symmetrical each direction from center. The 2.39 mm (.094") normal lift permits an adjustment tolerance of 0.81 mm (.032").

The nominal position in one direction occurs when the short end of the movable contact assembly is flush with the end of the auxiliary interlock housing. The nominal position in the other direction occurs when the 0.41 mm (.016") step on the longer end (threaded end) of the movable contact assembly is flush with the end of the auxiliary interlock housing.

AUXILIARY INTERLOCK CONTACT INSPECTION

1. Remove auxiliary interlock support bracket (7, Fig. 7) from frame.

2. Remove auxiliary interlock (1, Fig. 7) from interlock support bracket (7).

3. Remove two parting screws (3, Fig. 7) and carefully separate covers.

4. Carefully remove movable contact assembly, Fig. 8. The movable contact assembly can be removed from the cover-half without danger of losing small parts.

5. Inspect the movable contacts in the movable contact assembly and inspect the stationary contacts in each cover-half. The contact maximum wear allowance is 0.25 mm (.010") of each contact. New contact tips are 0.38 mm (.015") thick. If the movable contacts are worn beyond specified limits, the movable contacts

should be replaced with new contacts. If the stationary contacts in the interlock cover halves are worn or loose, the interlock assembly should be replaced with a new interlock assembly.

AUXILIARY INTERLOCK CONTACT RENEWAL

If determined after inspection that interlock movable contacts should be renewed, proceed as follows:

CAUTION
Each movable contact must be positioned properly and not inverted because this could cause malfunction of the contactor. Carefully note the position of each contact before removal. The location and attitude of all parts with respect to the molded key on the contact carrier must be correct. Refer to Fig. 9.

The movable contact should be disassembled ONLY in an area where the small parts will not be lost if accidentally dropped.

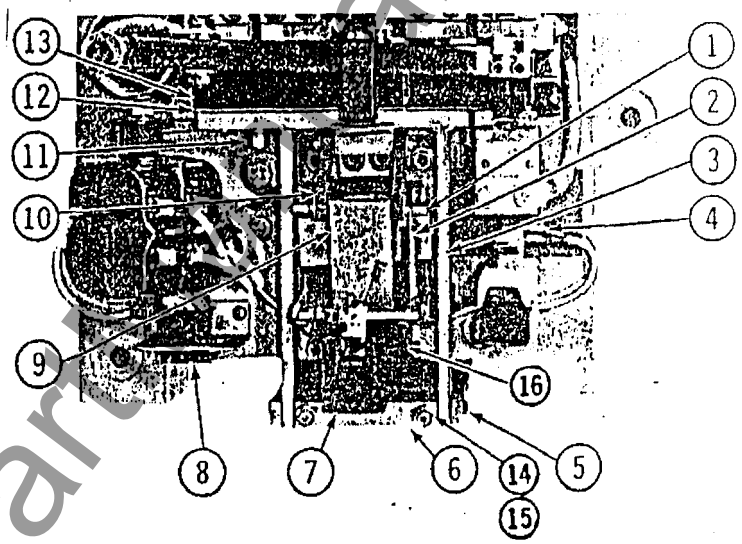
1. Hold contact carrier, Fig. 9, in one hand and tilt forward the movable contact to be removed.

2 Using a screwdriver or similar tool, push down on end of contact spring. Pull out spring while pushing down to free contact spring from its retainer. Remove contact spring.

3. Turn movable contact sideways (rotate 90 degrees) and remove movable contact.

4. To install new movable contact, reverse Steps 1, 2, and 3. Ensure each movable contact is positioned correctly.

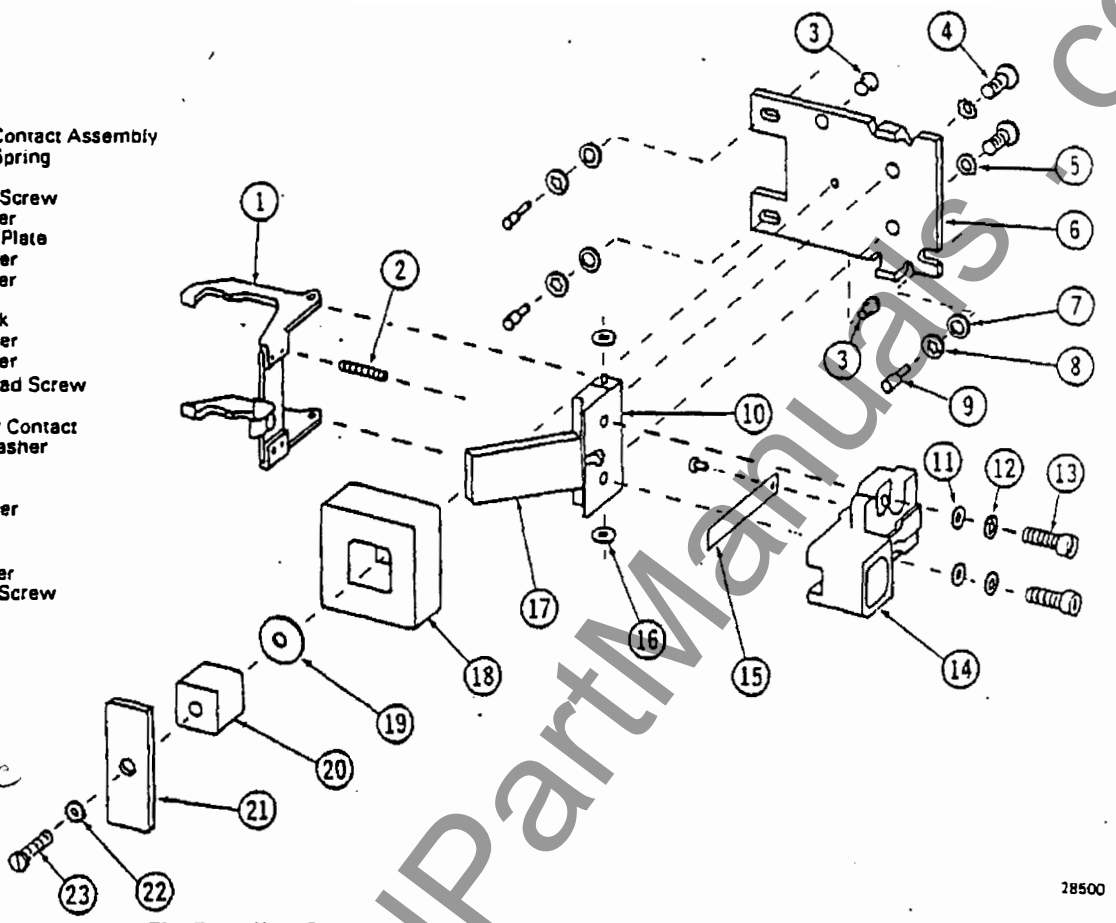
CAUTION
When placing movable contact assembly into interlock cover, ensure that each movable contact tip is mated to each stationary contact. It is possible to place the contact carrier into the interlock cover half so that the movable contact tips will not engage the stationary contacts.



1. Bearing Pin
2. Extension Spring
3. Operator Lever
4. Lead Connector Tabs (of arc chute electrical interlock)
5. Operating Lever/Main
6. Main Armature
7. Pilot Contact-Latch Assembly
8. Terminal Socket
9. Armature (of pivot block)
10. Link
11. Operating Lever/Spring Mounting Holding Screw
12. Insulating Strip
13. Spring Mounting Holding
14. Jam Nut
15. Set Screw
16. Opening Spring

Fig.4 – Pilot Contact-Latch Assembly

1. Movable Contact Assembly
2. Opening Spring
3. Stop
4. Flat Head Screw
5. Lockwasher
6. Mounting Plate
7. Flat Washer
8. Lockwasher
9. Screw
10. Pivot Block
11. Flat Washer
12. Lockwasher
13. Socket Head Screw
14. Housing
15. Stationary Contact
16. Spacer Washer
17. Armature
18. Coil
19. Core Spacer
20. Core
21. Pole Plate
22. Lockwasher
23. Flat Head Screw



Coil 74 V DC

Fig.5 – Pilot Contact-Latch Assembly, Exploded View

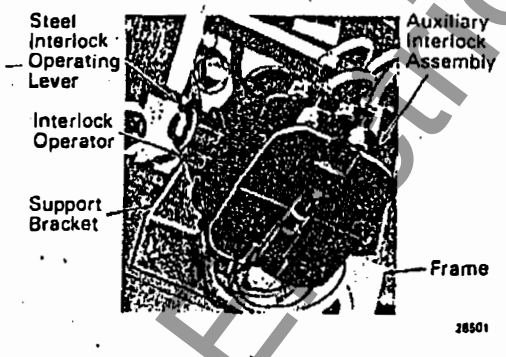


Fig.6 – Auxiliary Interlock Assembly

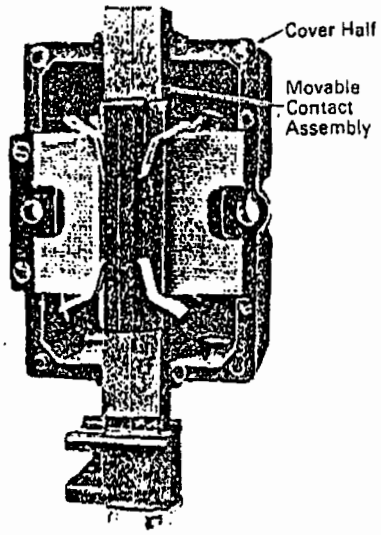


Fig.8 – Movable Contact Assembly in Interlock

5. When all movable contacts have been replaced with new contacts, very carefully place contact carrier into interlock cover-half, Fig. 8. Ensure each movable contact tip is mated to each stationary contact. Position contact carrier key so that the key is inside the C-D, G-H cover. A molded projection inside the A-B, E-F cover further assures a correct assembly.

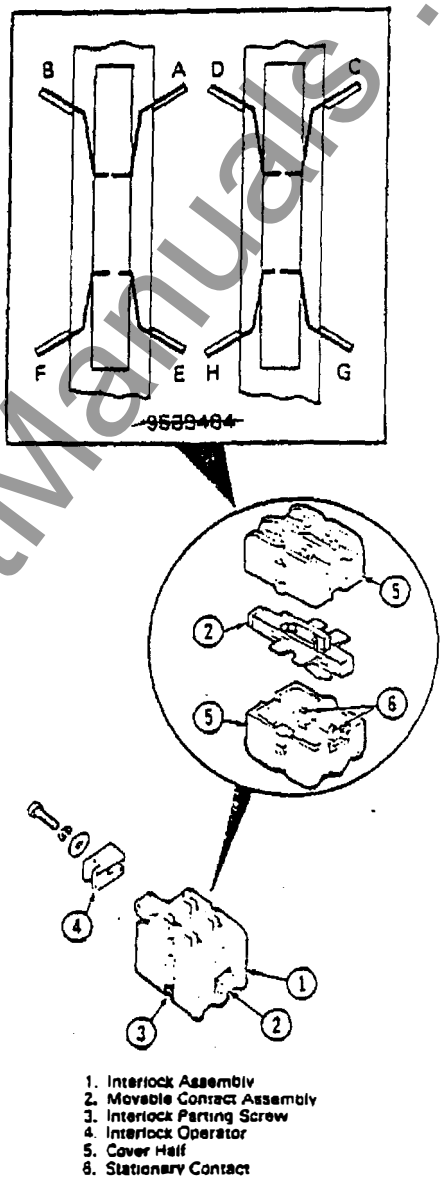
6. Gently slide insulator up until the insulator fits into notches in the interlock cover half as shown in Fig. 8.

7. Hold the insulator in place and move contact carrier from end to end to ensure movable contacts are positioned correctly.

8. Apply other cover half in interlock assembly. Ensure the movable contact tips are mated to the stationary contacts. Fasten securely. Move contact carrier from end to end to ensure the movable contacts are positioned correctly.

9. Mount interlock assembly, (Fig, 6), to the interlock support bracket and attach interlock support bracket to frame using lockwashers and screws. Ensure the steel interlock operating lever is aligned inside slot in interlock operator, as shown in Fig. 6, then fasten securely.

10. With the contactor in de-energized position, ensure that 0.41 mm (.016") step, Fig. 9, on movable contact carrier molding is flush with the end of the housing within 0.81 mm (.032"). If adjustment is required, adjust by bending the steel interlock operating lever.



1. Interlock Assembly
2. Movable Contact Assembly
3. Interlock Parting Screw
4. Interlock Operator
5. Cover Half
6. Stationary Contact

Fig.7 - Auxiliary Interlock Assembly, Partial Exploded View

REBUILDING CONTACTOR

Under ordinary circumstances, replacement of the contactor contacts and interlock contacts is the extent of the periodic maintenance required to assure reliable operation. However, if the contactor is to be serviced or rebuilt for other reasons, use the following procedure. Refer to Fig. 10 contactor. Exploded View as required during rebuilding.

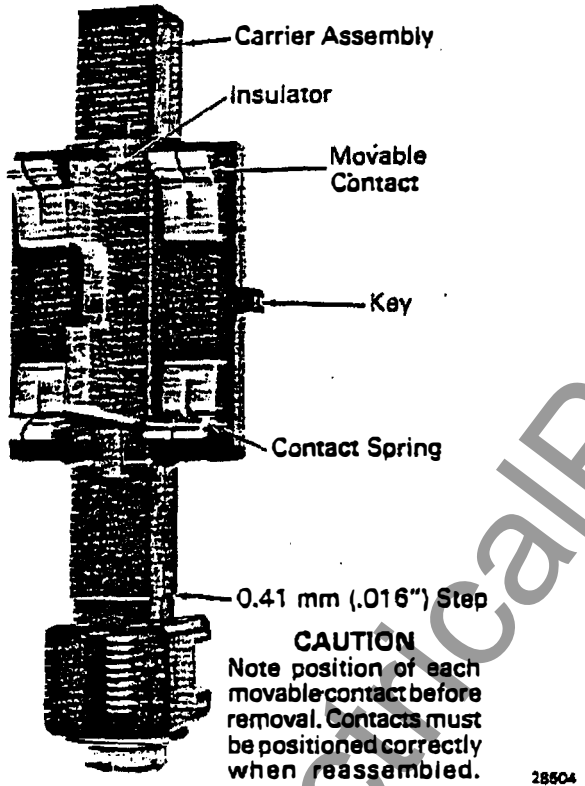


Fig.9 - Interlock Movable Contact Assembly

WARNING

Do not disassemble contactor in the cabinet. Disconnect the contactor power cables and leads to the interlock assembly and then remove the contactor from the cabinet.

Torque values for all fasteners unless otherwise noted.

Screw Size	Torque N.m (in-lbs)
10-32	2.3 - 3.3 (20-29)
0.250-20	5.4 - 8.1 (48-72)
0.312-18	9.5 - 13.6 (84-120)
0.375-16	16.3 - 23.0 (144-204)

ARC CHUTE ASSEMBLY MAINTENANCE

NOTE:

It is not advisable to completely disassemble arc chute in the field. However, the following components may be replaced if inspection shows them to be damaged. See figure 11.

1. Arc chute latch (5, fig 11)
2. Arc runners (4)
3. Hinge pin (3)

WARNING

Arc chute halves contain very strong magnets which pull the two halves toward each other with a strong force. Do not place fingers between separated arc chute halves. The magnetic force can cause the arc chute halves to snap together suddenly, with sufficient force to badly pinch a finger.

DISASSEMBLY

1 Remove retaining hardware (2, & 7 Fig 11, screws, lockwashers, washers, and nuts.

2. Place arc chute on a table with the label side down and the white arrows on the magnets of pole plate magnet assembly (9 fig 11) pointing down.

3. With a pair of screw drivers or similar tools, separate the arc chute halves by prying them apart. Be careful not to pinch fingers as cautioned above. Remove upper arc chute half.

4. With arc chute halves separated the following components may be removed by lifting them out of their molding half retaining holes or slots.

   Refer to Fig. 13
   1. Hinge Pin (2)
   2. Core (3)
   3. Arc Runner(4)
   4. Latch & Pin Assembly (5)

5. Replace damaged components with new components.

NOTE:

If at any time during disassembly of the arc chute, the magnets (or magnet pole plate) should become dislodged from the arc chute molding halves further repairs should be discontinued and the arc chute assembly should be replaced with a new arc chute.

ASSEMBLY

WARNING

It is extremely important that the components of the arc chute assembly be placed in proper orientation to the magnetic field established by the arc chute magnets. Failure to install the latch mechanism (5, Fig 11) in its proper location will result in the arc chute failing to interrupt the arc, and the contactor will be destroyed.

1. Place the labeled half of the arc chute on the work surface A) label side down, and B) with flat side of arc chute facing the person repairing the arc chute.

2. Install the two arc runners in their appropriate slots in the arc chute half.

3. Install the arc chute latch assembly and pin (5, Fig. 11) its mounting hole on the RIGHT SIDE of the arc chute half.

4. Install hinge pin (3, Fig. 11) in locating hole on the left side of arc chute half.

5. Being careful to keep fingers from between arc chute halves, install remaining half of arc chute and secure with attaching hardware.

NOTE:

Should arc chute magnets or pole plates become dislodged during assembly, discontinue repairs and replace arc chute with a new arc chute assembly.

REBUILDING MOVABLE MAIN CONTACT ASSEMBLY

DISASSEMBLY

If movable contact support (2, Fig.14), main contact springs (7), or spring mounting molding (8) require replacement, proceed as follows:

1. Remove the end of the flexible lead (4 Fig. 14) that attach to negative terminal (5). Remove support screws and remove support (15) along with flexible lead.

2. Remove screws that secure the spring mounting molding (8 Fig 14) and insulating strip (9) to the operator lever (10).

3. Loosen two screws that secure drive plate (13 Fig. 14 view A) to the spring mounting molding (8). Push drive plate (13) as far away from arc tip latch assembly (11) as possible and then lightly retighten screws.

4. Push trip operator (1, Fig. 15) as far to the left as possible and release trip retainer (5).

5. Remove three screws that attach standoff insultaors (6, Fig. 14) to frame (14).

6. Remove movable main contacts (1 Fig. 14), movable contact supports (2), clamping plates (3), negative terminal (5), and standoff insulators (6) as an assembly. Refer to Fig. 10 Item 93.

7. Remove screws (63, Fig. 10), lockwashers (25), and clamping plates (62) securing movable contact supports (58) to negative terminal (56).

8. Remove locknuts (48 Fig 10) and flat washers (49) securing each movable contact to the spring mounting molding (50). Remove main contact spring (59) & spring mounting molding (50).

ASSEMBLY

Replace movable contact support (2, Fig. 14), main contact spring (7), or spring mounting molding (8) with new parts as required. Reassemble movable main contact assembly as follows:

NOTE:
Prior to applying Loctite retaining compound in Step 1, Loctite cleaner-activator can be used to ensure a good bond.

1. Place movable contact support stud (4, Fig. 16) through main contact spring (5). Seat main contact spring (5) in spring pocket of spring mounting molding (3) and place stud (4) through hole in spring mounting molding (3). Apply Loctite Grade A-A retaining compound to locknut threads and apply locknut (2) and washer (1) to movable contact support stud (4). Engage locknut (2) with one or two turns. Repeat this procedure for all movable contact supports which were removed.

2. Tighten locknut (2 Fig. 16) until 60.02 mm ±0.02 (2.363" ±.001) is obtained between the end of the spring mounting molding (3) and the support (6). Adjustment torque of locknut (2) should be a minimum of 2.8 N.m (25 in/lbs). If not, replace locknut with a new one.

3. Loosely attach all movable contact supports and clamping plates (3, 2, Fig. 14), which were removed to negative terminal (5). Do not tighten at this time.

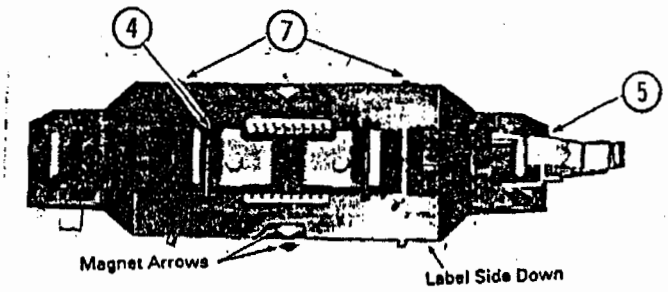
4. Replace (any) movable main contacts (1 Fig. 16) that have been removed, taking care to position contact against contact locating surface.

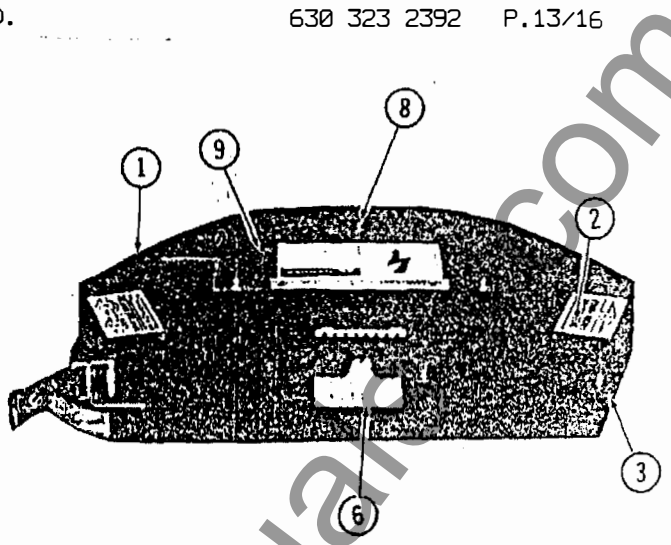
5. Place movable contact assembly (1, 2, 3, 5 and 6 Fig. 14) in proper position and attach standoff insulators (6) to frame (14) with three screws and lockwashers. Tighten securely.

6. Position trip retainers (5, Fig. 15) inside of window of trip operator (1). Ensure drive plate (4) is positioned with adjustment screws (3) against the ends of adjustment slots in drive plate (4).

NOTE: Refer to contactor adjustment section for proper drive plate adjustment procedure.

7. Place insulating strip (9, Fig. 14) between spring mounting molding (8) and operator lever (10). Attach spring mounting molding (8) and operator lever (10) with two screws and lockwashers. Tighten securely.





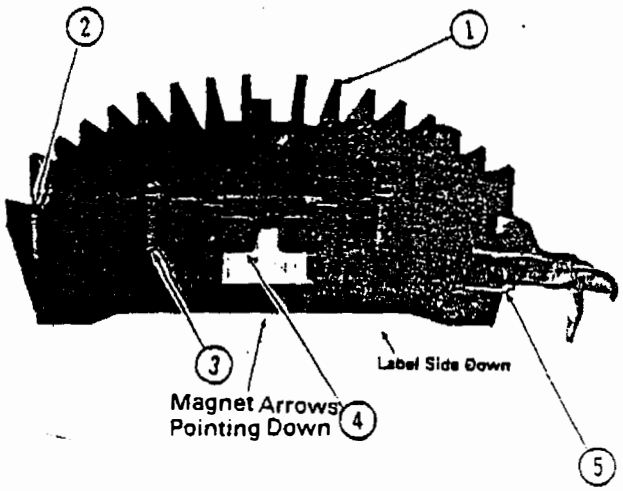
1. Arc Chute Molding
2. Retaining Hardware
3. Latch Pin
4. Arc Runner
5. Arc Chute Latch
6. Ceramic flash plate
7. Screw 10-32 x 12.70 mm (.50") - Two
8. Screw 10-32 x 12.70 mm (.50") - One
9. Pole Plate Magnet Assembly

Fig. 11 ARC CHUTE

8. Install support (15, Fig. 14) to frame assy. Attach ends of flexible lead (4) to negative terminal (5) and support (15) with screws and lockwashers.

9. Tighten screws that fasten movable contact supports (2 Fig. 14) to negative terminal (5) securely. Check for freedom of movement of movable contact support stud in spring mounting molding (8). If rubbing exists, loosen screws securing movable contact supports (2) to negative terminal (5) and move movable contact support (2) to relieve friction. Retighten screws and recheck for freedom of movement.

10. Refer to Contactor Adjustment section of this Maintenance Instruction to adjust contactor.



1. Arc Chute
2. Hinge Pin
3. Core
4. Arc Runner
5. Latch and Pin Assembly

Fig.13 - ARC CHUTE MOLDING ASSEMBLY

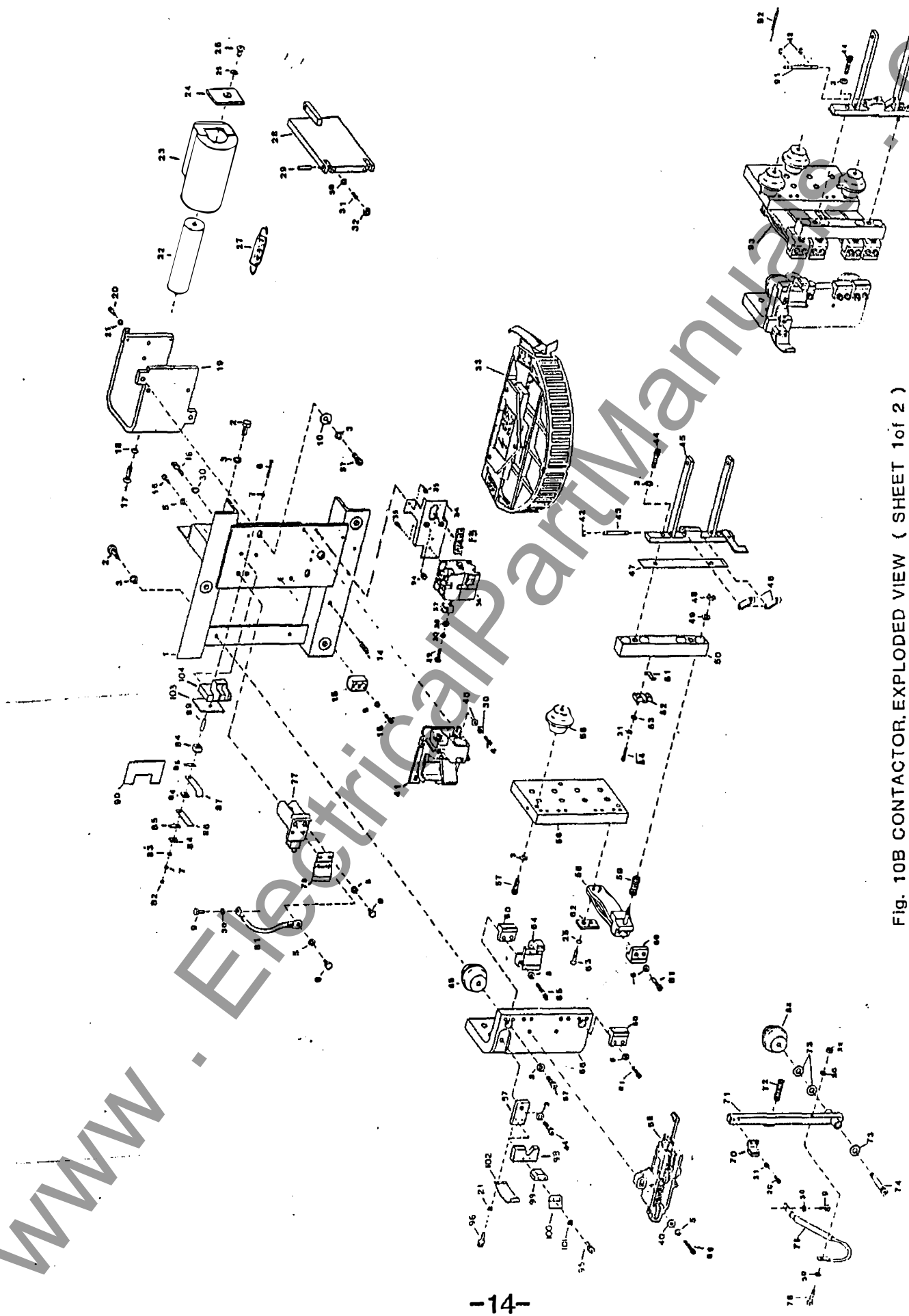
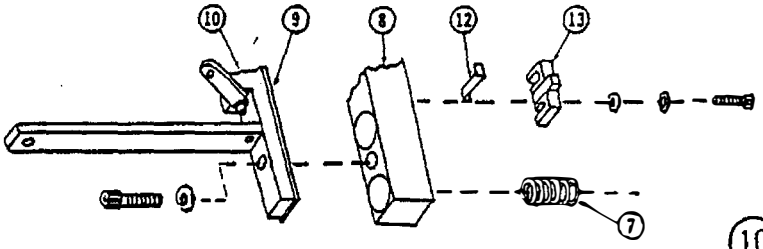


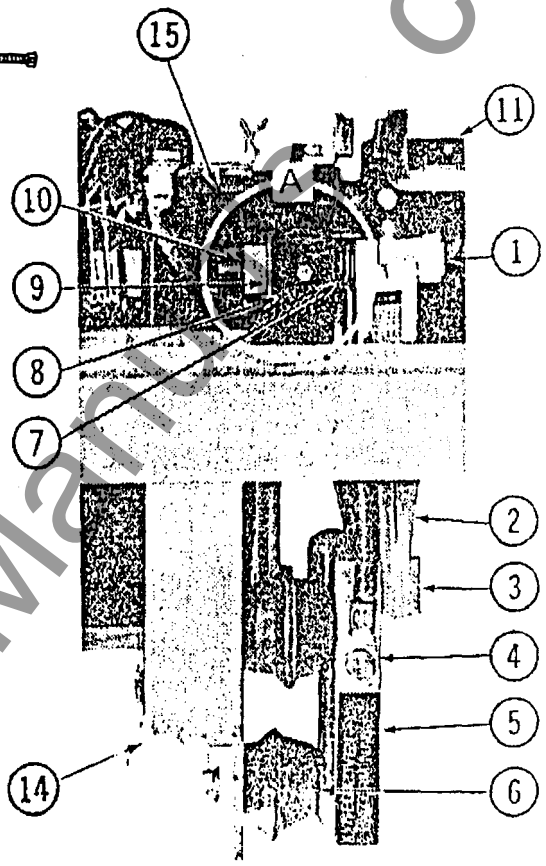
Fig. 10B CONTACTOR.EXPLODED VIEW (SHEET 1of 2)

1	Frame
2	Screw, .318-18 x .75 Hex Hd. Cap
3	Lk. Washer, .312 Spring
4	Screw, .250-20 x .50 Soc. Hd Cap
5	Lk. Washer, .250 Sping
6	Screw, #8-32 x 1.25 Slotted Rd. Hd.
7	Lk. Washer, #8 Int. Tooth
9	Screw, .250-20 x .50 Hex Hd. Cap
10	Flat Washer, .375
13	Terminal
14	Screw, .312-18 x .62 Cup St. Soc. Set
15	Stop Block
16	Screw, .250-20 x .62 Soc. Hd. Cap
17	Screw, .375 x 1.00 Hex. Soc. Flt. Hd.
18	Lk. Washer, .375 CTSK
19	Yoke
20	Screw, #10-32 x .50 Hd. Cap
21	Washer, #10 Int Tooth
22	Magnet Core
23	Main Coil
24	Pole Plate
25	Lk. Washer, .250 CTSK
26	Screw, .250 x .50 Hex. Soc. Flt. Hd.
27	Armature Spring
28	Main Armature
29	Pin
30	Lk. Washer, .250 Int. Tooth
31	Screw, .250 x .62 Hex. Soc. Set
32	Nut, .250-20 Hex
33	Arc Chute
34	Interlock Support Bracket
35	Screw, #10-32 x .38 Fil. Hd.
36	Interlock
37	Interlock Operator
38	Washer, .250 Belleville
39	Screw, .250-20 x 1.25 Hex. Hd. Cap
40	Flat Washer, .250
41	Pilot Contact - Latch Assembly
42	Retaining Ring
43	Bearing Pin
44	Screw, .312-18 x 1.00 Soc. Hd. Cap
45	Operator Lever
46	Link
47	Insulating Strip
48	Lk. Nut, 312-18 Hex
49	Flat Washer .312
50	Spring Mounting Molding
51	Trip Retainer
52	Drive Plate
53	Flat Washer, .197
54	Screw, #10-32 x .75 Soc. Hd. Cap
55	Stand Off Insulator
56	Negative Terminal
57	Screw, .312-18 x .75 Soc. Hd. Cap
58	Movable Contact Support Assembly
59	Main Contact Spring
60	Main Contact
61	Screw, .250-20 x 1.00 Soc. Hd. Cap
62	Clamping Plate
63	Screw, .250-20 x 1.00 Hex Soc. Flt Hd
64	Arc Tip
65	Screw, .250-20 x 1.50 Soc. Hd. Cap
66	Positive Main Terminal
68	Arc Tip Latch Assembly
69	Screw, .250-20 x 1.25 Soc. Hd. Cap
70	Movable Arc Tip
71	Arc Tip Lever
72	Arc Tip Preload Spring
73	Flat Washer, .375
74	Hex Socket Shoulder Screw
75	Flexible Lead
76	Screw, .250-20 x 1.00 Hex Hd. Cap
77	Support
78	Spring
81	Flexible Lead
82	Nut, #8-32 Hex
83	Flat Washer, #8 Brass
84	Insulator
85	Connector Tab
86	Contact Blade
87	Contact Blade
89	Insulator Tube
90	Insulator
91	Bearing Pin
92	Extension Spring
93	Movable Contact Assembly (NEG)
94	Bushing
95	Socket HD Screw #10-32 x 1.500
96	Socket HD Screw #10-32 x .375
97	Block, Arc Chute Base
98	Block, Arc Chute Support
99	Block, Arc Chute Guide
100	Spring, Stud
102	Arc Chute Retaining Spring
103	Insulation Sheet
104	Arc Chute Support Assembly

Fig 10B CONTACTOR (SHEET 2 of 2)



View A, Exploded



1. Movable Main Contact
2. Movable Contact Support
3. Clamping Plate
4. Flexible Lead
5. Negative Terminal
6. Standoff Insulator
7. Main Contact Spring
8. Spring Mounting Molding
9. Insulating Strip
10. Operator Lever
11. Arc Tip Latch Assembly
12. Trip Retainer
13. Drive Plate
14. Frame
15. Support

Fig.14 - Movable Main Contact Assembly

REBUILDING ARC TIP LATCH ASSEMBLY

DISASSEMBLY

If any parts of the arc tip latching assembly are worn or damaged, proceed as follows:

1. Loosen two screws that secure drive plate (4, Fig. 15) to the spring mounting molding (6). Push drive plate (4) as far away from arc tip latch assembly (11, Fig. 14) as possible and then lightly retighten screws.

2. Push trip operator (1, Fig. 15) as far to the left as possible and release trip operator (1) from trip retainer (5) (As shown in illustration).

CAUTION

In Step 3, never trip the arc tip latch assembly (2, Fig. 17) without restraining the spring support (4) because the resultant impact forces can permanently damage housing molding and other parts.

3. Remove two screws securng the arc tip latch assembly (2, Fig. 17) to the positive main terminal (1). Remove latch assembly from contactor.

4. Remove two extension springs (18, Fig. 18).

5 Remove the RTV compound surrounding retaining ring (17 Fig. 18) and remove retaining ring (17).

6. Push on free end of spring support (13 Fig. 18) with enough force to compress compression spring (5) slightly and remove pin (4). Be careful not to lose spacers (10 and 12).

7. Remove spring support (13 Fig. 18).

8. Replace all worn or damaged parts with new parts.

ASSEMBLY

1. Lay spring support (13, Fig. 18) in slot in trip operator (11), holding trip operator (11) in place against the spring support (13). Insert flat end of spring support (13) through spring cup washer (6) and compression spring (5). Align flat end of spring support (13) with slot in housing (1). Push spring support into place.

2. Hold spring support (13, Fig. 18) in position by placing the assembly between the jaws of a large vise, blocks of wood nailed to a board, or similar means of retention.

3. Refer to Fig. 18 and assemble the following: bearing pin (15), bearing (16), both retaining rings (8), both rollers (9), and bearing pin (14) to both trip links (7). Place this assembly inside of housing (1) with one trip link (7) on each side of spring support (13). Align the holes in both trip links (7) with the hole that pin (4) goes through and the slot in the spring support (13).

4. Place spacers (10) in proper positions and secure with pin (4) and retaining ring (17).

5. Replace extension springs (18) and remove assembly from vise or holding fixture. Cover both ends of pin (4) and retaining ring (17) with RTV Compound for electrical insulation.

6. Position spring support (4, Fig. 17) over arc tip lever (6) and attach loosely to positive terminal (1) at this time.

WARNING

In step 7, failure to key trip retainer (5, Fig. 15) with drive plate (4) will result in failure to interrupt the arc. The contactor will be destroyed.

7. Position trip retainer (5, Fig. 15) inside of window of trip operator (1). Drive plate (4) must be positioned with adjustment screws (3) against ends of adjustment slots in drive plate (4) while engaging trip retainer (5). Key trip retainer (5) with drive plate (4). See Warning above.

8. Replace arc tip preload spring (5) with new preload spring.

9. Refer to Contactor Adjustment section of this Maintenance Instruction to adjust contactor.

MAIN COIL REPLACEMENT

If main coil, Fig. 19, requires replacement, proceed as follows:

NOTE:

Unless it is absolutly necessary at no time should the magnet yoke (1, Fig. 20) be removed from the frame of the contactor. Removal of this component will make adjustment of the contactor more difficult.

DISASSEMBLY

1. Loosen hex nuts (16, Fig. 20) and back out two setscrews (15) and remove pins (13).

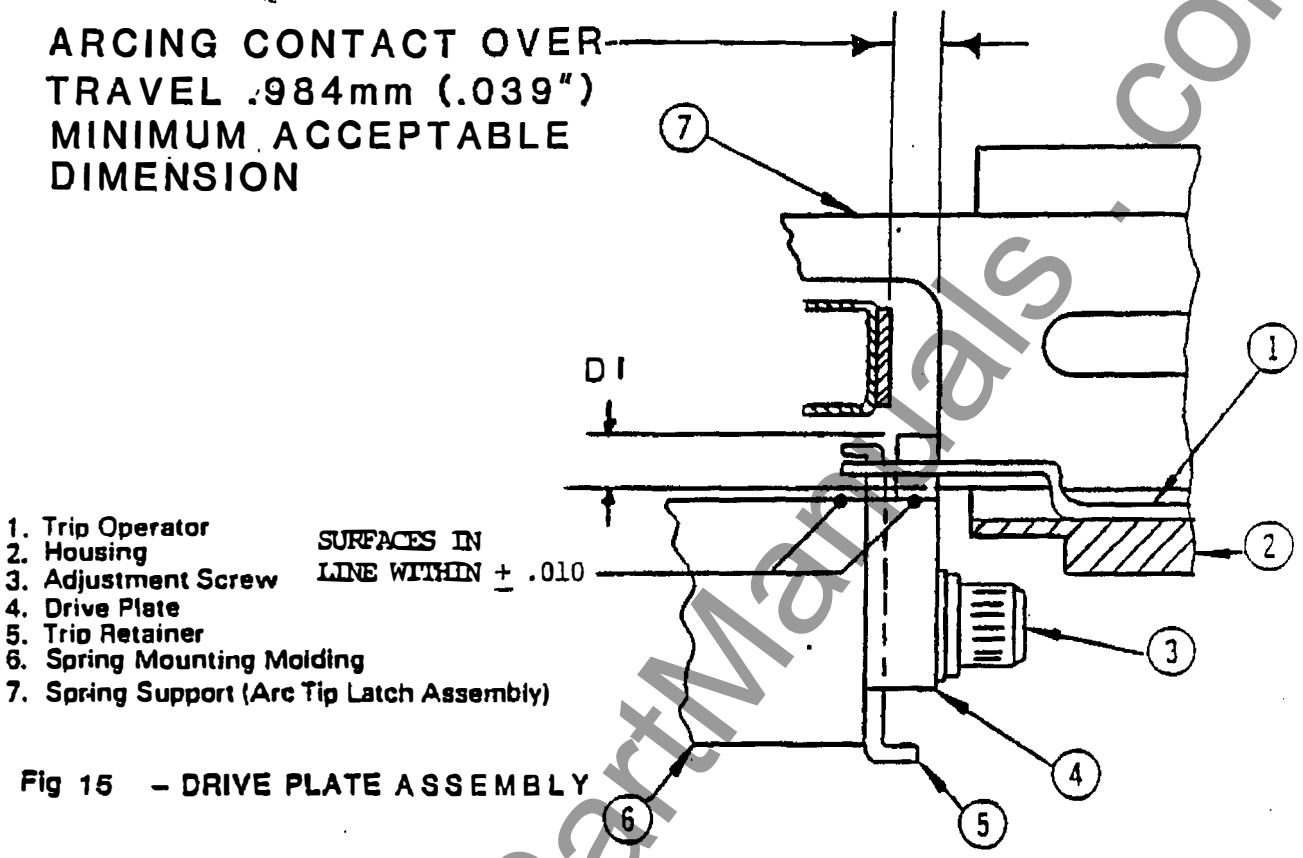
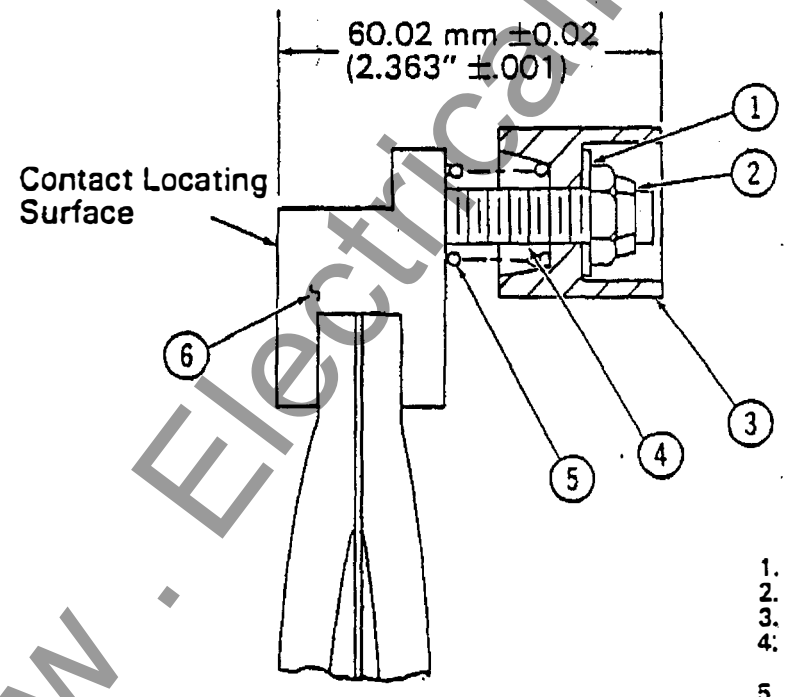


Fig 15 – DRIVE PLATE ASSEMBLY



1. Flat Washer
2. Locknut
3. Spring Mounting Molding
4. Movable Contact Support Stud
5. Main Contact Spring
6. Movable Contact Support

28512

Fig.16 – Movable Contact Support Adjustment

2. Remove two screws (5) securing main armature (12) to yoke (1). Remove armature (12).

3. Remove armature spring (11).

4. Remove screw (10) and pole plate (8).

5. Note the positions of the electrical leads attached to the main coil and remove leads. Slide coil (7) from magnet core (6) and replace coil

NOTE:

If difficulty in removing the magnet coil (7) from the magnet core (6) is encountered; the coil and core may be removed as an assembly by removing core mounting bolt (2, Fig. 20). The magnet core may then be removed from the core by suitable means, or the entire assembly may be replaced.

ASSEMBLY

1. Insert new main coil (7, Fig. 20) and replace electrical leads. Polarity MUST be as shown in Fig. 21.

2. Reposition pole plate (8) and secure using lockwasher (9) and screw (10).

3. Engage armature spring (11) between frame and main armature (12).

4. Reposition main armature (12) and secure to yoke (1) with lockwashers (4) and screws (5).

5. Align holes in main armature (12) with holes in ends of operator lever (17) legs and insert pins (13). Secure pins (13) with setscrews (15) and secure setscrews (15) with lockwashers (14) and hex nuts (16).

6. Refer to Contactor Adjustment section of this Maintenance Instruction to adjust contactor.

PILOT COIL REPLACEMENT

The pilot coil is part of the pilot contact latch assembly (7 fig 4) to replace pilot coil it is necessary to remove the pilot contact latch assembly from the contactor.

NOTE:

The procedure for removing the pilot contact latch assembly is outline in the section of this instruction manual entitled "STATIONARY PILOT CONTACT RENEWAL"

1. With pilot contact latch removed. Remove flat head screws (4 fig 5) that secure pivot block (10 fig 5) to mounting plate (6 fig 5) remove pivot block along with attached components.

2. Remove screw (23 fig 5)

3. Remove pole plate (21 fig 5) core (20 fig 5) and spacer (19 fig 5).

4. Remove old coil (18 fig 5) and replace it with a new coil.

5. Reassemble in reverse order of disassembly.

CONTACTOR ADJUSTMENT

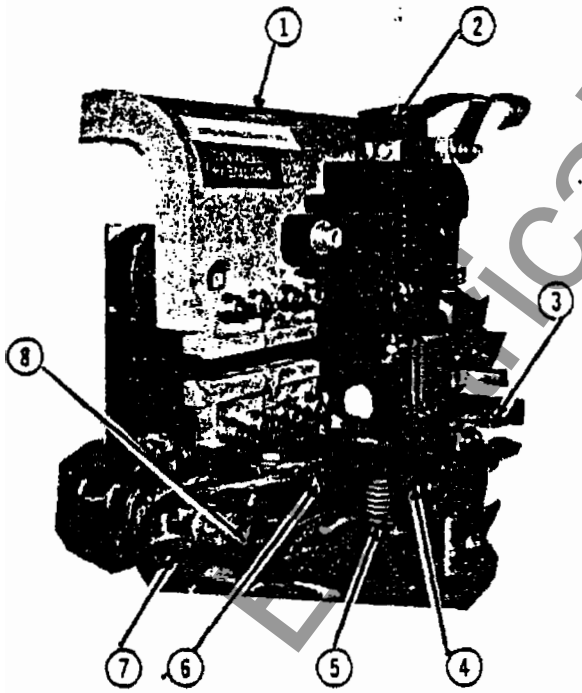
After rebuilding the contactor or any of its major subassemblies, the following conditions should be checked and adjustments made if required.

DRIVE PLATE

1 Adjust Drive Plate as Follows: Loosen adjustment screws (3 fig 15) and position drive plate (4) and trip retainer assembly in the center of the window in the trip operator (1). Set the shoulder of the drive plate (4) such that it is flush within .010" with the surface of the spring mounting molding (6).

With drive plate properly position on spring mounting molding there should be a minimum contact between the drive plate and the spring carrier (8) of .125" (shown as dimension D1).

When these conditions are met, tighten adjusting screws (3) securely.



1. Positive Main Terminal
2. Arc Tip Latch Assembly
3. Movable Arc Tip
4. Spring Support (Arc Tip Latch Assembly)
5. Arc Tip Preload Spring
6. Arc Tip Lever
7. Spring Mounting Molding
8. Hex Socket Shoulder Screw

28513

Fig.17 - Arc Tip Latch Assembly

MAIN CONTACT TOUCH POSITION

1. Note position of electric leads attached to main coil (5, Fig. 19) and remove leads.

NOTE
To check out the contactor, a power supply capable of producing 50 volts DC, 26 amperes should be used. If a power supply capable of producing 26 amperes at 50 volts DC is not available, a smaller power supply can be used, but the main armature closing must be manually assisted.

2. Attach power supply to main coil positive and negative terminals. Refer to Fig. 19.

3. Place a 17.78 mm (.070") shim of magnetic steel in the gap between the main armature (2, Fig. 19) and yoke leg (4) at a point farthest from the main armature pivot point. Apply 50 volts DC to main coil (5) which will cause the main armature (2) to close, clamping the shim in place. If a smaller power supply is being used, manually assist the armature closing.

NOTE:
After clamping has occurred, reduce coil voltage to 9 volts DC, or damage to the coil will result.

NOTE:
Check contact touch at this time, if contacts are out of adj. proceed with step (4).

4. Loosen two screws (18, Fig. 20) securing the yoke (1) to the frame. Position yoke (1) and main armature assembly (12) so that the main contacts, just touch or have a maximum gap of 0.13 mm (.005"). Secure yoke (1) to frame tightly with the two screws (18).

5. De-energize the power supply. Remove 17.78 mm (.070") shim.

MAIN CONTACT LATCH

1. Repeat Step 3 of Main Contact Touch Position procedure except close the main armature (2, Fig. 19) onto a 0.28 mm (.011") magnetic steel shim in the main armature gap.

2. Loosen three screws (9, Fig. 5) securing pilot contact-latch assembly (7, Fig 4) to frame. Manually close pilot contact-latch assembly armature (17, Fig 5). Position pilot contact-latch assembly so that the armature (17) just closes without free-play. Secure with three screws (9). Torque to 14-19 N.m (120-168 in/lbs).

ARC TIP LATCH

1. Repeat Step 3 of Main Contact Touch Position procedure except close the main armature (2, Fig. 19) onto a 0.38 mm (.015") magnetic steel shim in the main armature (2) gap.

2. Loosen screws (21, Fig. 18) securing arc tip latch assembly (2, Fig. 17) to positive main terminal (1). Screws must be tight enough to prevent free movement of arc tip latch assembly, but loose enough for arc tip latch assembly to be moved when tapped with a rubber hammer.

3. Position arc tip latch assembly (Fig. 17) by tapping with a rubber hammer so that the bearing (16, Fig. 18) has just enough clearance to allow the mechanism to latch. Secure with the two screws. Torque to 8-12 N.m (60-89 in-lbs).

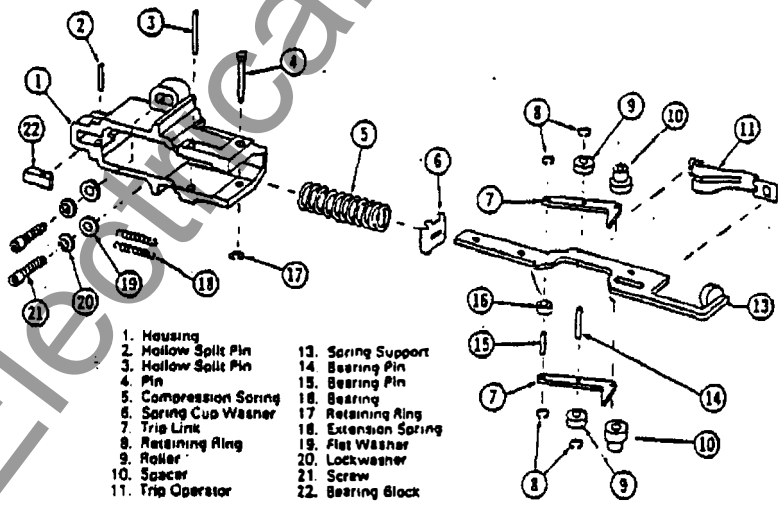


Fig. 18 - Arc Tip Latch Assembly, Exploded View

4. De-energize the main coil and disconnect the power supply leads. Replace the contactor leads that were removed from main coil. Ensure polarity is as shown in Fig. 21.

MAIN CONTACT OVERTRAVEL CHECK

Main contact (Fig. 2) should have an overtravel of 1.37-2.03 mm (.054"-.080") when the contactor is in the latched closed position. If this condition is not met, repeat the three adjusting procedures just completed until correct overtravel is obtained.

NOTE:

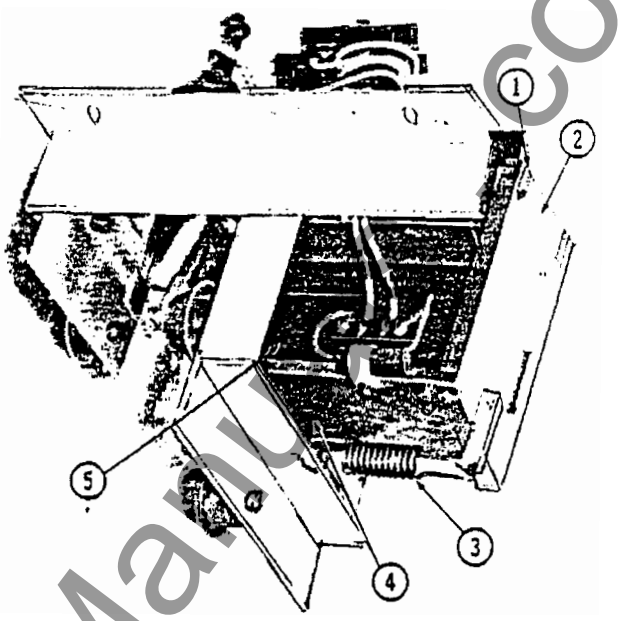
With the main armature in the sealed position (zero gap) the main contacts must be free to deflect without jamming.

AUXILIARY INTERLOCK TRAVEL

With coil de-energized, step at operator end of interlock carrier shall be within .76mm (± .030") of interlock housing. With main contact latch sealed, free end of interlock carrier shall be within .76mm (±.030") of interlock housing. To make adjustments, bend interlock operator which is welded to operator lever assembly (See Fig. 6).

PILOT CONTACT GAP

There shall be a 2.18mm (.086") min contact gap with main device both open and closed. There shall be 1.52 mm (0.060") min contact travel after touch, at maximum movable contact travel. Bend movable contact support for adjustment if required. Refer to Fig. 5.



1. Operator Lever
2. Main Armature
3. Armature Spring
4. Yoke
5. Main Coil

28515

Fig.19 - Main Coil Assembly

Energize the contactor several times at 74 volts DC while inspecting for proper operation.

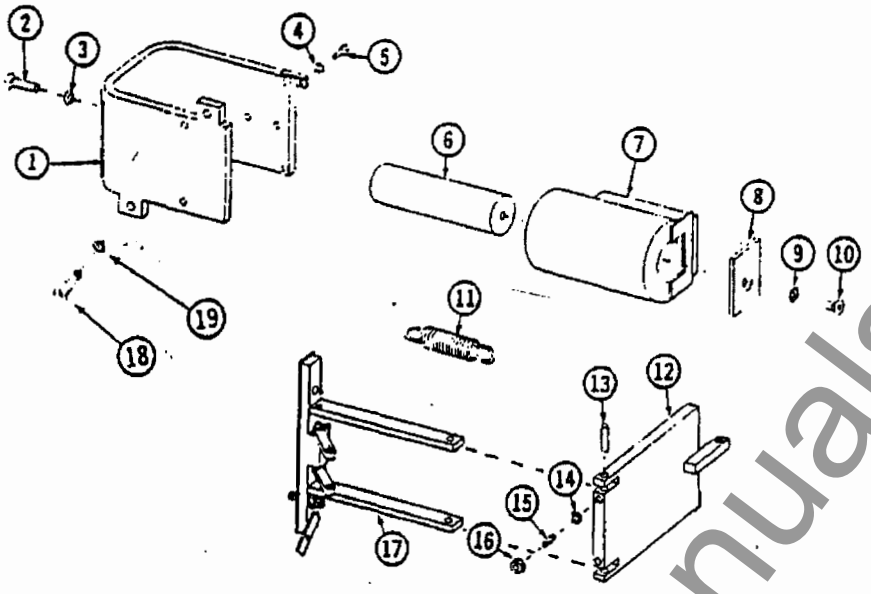
ARC TIP RELEASE POINT CHECK

After all adjustment are complete, close the main armature. Alow main armature to open slowly. Arc tip latch (Item 2 Fig. 17) must trip by the pull of main armature spring when the main contact gap is 3.81mm (.150") minimum and not less than 1.27mm (.050") from the full open position.

ARC CHUTE ELECTRICAL INTERLOCK

Contactor will not operate without arc chute in place because of this interlock.

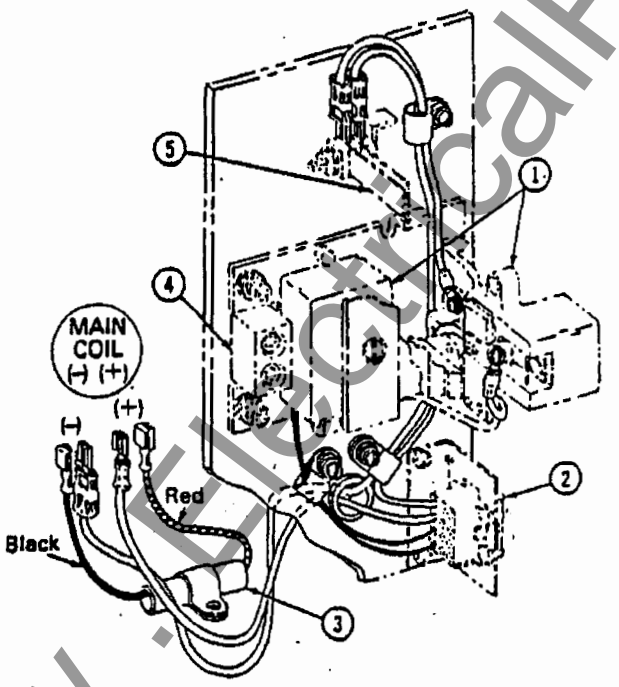
The position of the blades of the electrical interlock should be as shown in Fig. 22. If they are not, bend the blades to the dimensions specified.



1. Yoke
2. Screw, Hex Socket Head
3. Lockwasher, Countersunk
4. Lockwasher, Internal Tooth
5. Screw, Socket Head Flat
6. Magnet Core
7. Main Coil
8. Pole Plate
9. Lockwasher, Countersunk
10. Screw, Hex Socket Flat Head
11. Armature Spring
12. Main Armature
13. Pin
14. Lockwasher, Internal Tooth
15. Setscrew, Hex Socket
16. Nut, Hex
17. Operator Lever
18. Mounting Bolt
19. Washer

28616

Fig.20 – Main Coil Assembly, Exploded View



1. Pilot Contact-Latch Assembly
2. Terminal Socket
3. Arc Suppression Diode
4. Stop Block
5. Electrical Interlock

28617

Fig.21 – Wiring Pictorial Diagram

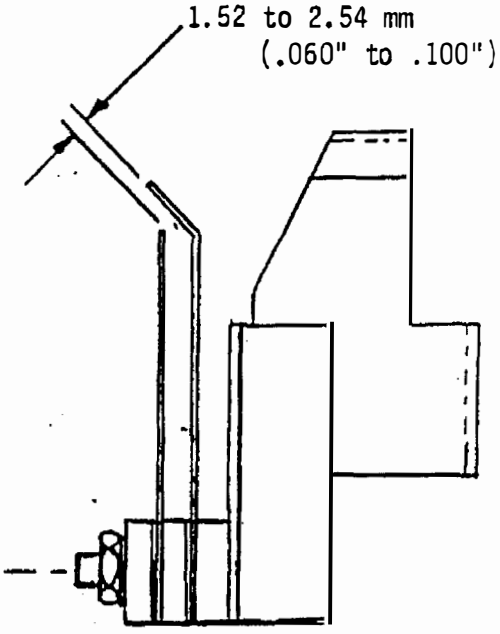


Fig.22 – Arc Chute Electrical Interlock

SPECIFICATIONS

MAIN CONTACTS

Contact rating, continuous	5000 Amperes
Contact wear allowance (max. per tip)	0.81 mm (.032")
Contact opening (nominal)	10.44 mm (.411")
Contact force (each tip)	5.7 kg (12.5 lb)

ARCING CONTACTS

Contact wear allowance (each tip)	3.96 mm (.156")
Contact opening (nominal)	7.62 mm (.300")
Contact force (nominal)	6.8 kg (14.9 lbs)

INTERLOCK CONTACTS

A-B,C-D contacts	Normally Open
E-F,G-H contacts	Normally Closed
Contact opening	4.8 mm (3/16")
Contact lift	2.39 mm (.094")
Contact wear allowance (max. per tip)	0.25 mm (.010")

MAIN MAGNET COIL

Rating, continuous	9 VDC
Rating, intermittent	74 VDC
Resistance at 20 degrees C (68 deg. F), + 10 %	1.95 ohms

PILOT COIL

Rating continuous	74 VDC
Resistance at 20 degrees C (68 deg. F),+ 10%	140 ohms

OPERATION

Working voltage, continuous	74 VDC
Pickup at 20 degrees C (68 deg. F), Max	48 VDC
Dropout at 20 degrees C (68 deg. F)	5 to 25 VDC

HIPOT 60 Hz, 1 minute

CAUTION

Hi-pot values above 5400 volts are not recommended.

Magnet coil to mounting	600 V RMS
Magnet coil to main contacts	5400 V RMS
Main contacts to mounting	5400 V RMS
Main contacts to interlock contacts	5400 V RMS
Between open main contacts	5400 V RMS
Interlock contacts to mounting	5400 V RMS
Interlock to interlock	5400 V RMS

MATERIAL LIST

Loctite retaining compound

Movable main contact support locknut	Grade A-A
Arc tip lever shoulder screw	Grade 271
Movable arc tip to arc tip lever	Grade 222

Loctite cleaner-activator, 6 oz aerosol can.

Silicone rubber compound (RTV), 5oz tube