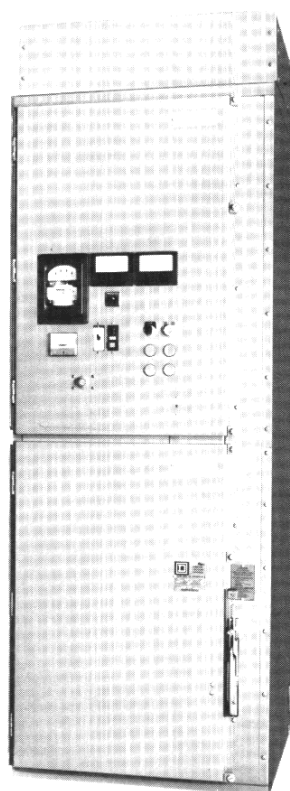


SERVICE BULLETIN **8198-3**

APRIL, 1981



ISO-flex® One High Medium Voltage Controllers — Model 2 Series B

- Installation
- Operation
- Maintenance
- Parts Listing

SQUARE D COMPANY

P. O. Box 9247, Columbia, S. C. 29290

CONTENTS

GENERAL		
Precautions	3	
Location and Identification of Controller Parts	4	
Glossary	4	
INTRODUCTION		
Controller Ratings	5	
Lifting	5	
Preliminary Inspection	5	
Contactor Inspection	6	
INSTALLATION INSTRUCTIONS		
Controller Mounting	6	
Arrangements For Terminating Line Cables	6	
Power and Ground Bus Connections Between Shipping Sections	7	
Preparation For Installing Power Cables	7	
Power Cable Connections	8	
Line Cable Connections: Single Vertical Section	8	
Load Cable Connections	8	
Low Voltage Control Connection	9	
Contactor Installation	9	
Checking Operation Of Safety Interlocks	9	
Drawout Mechanism And Contactor Alignment	10	
START-UP PROCEDURE		
Controller Test Circuit	12	
Controller Control Circuit Sequence	12	
A. Electrically Held Controllers: Type FC-11, FC-21	12	
B. Mechanically Held Controllers: Type FL-11, FL-21	12	
Operation	13	
ACCESS TO LOW VOLTAGE AND MEDIUM VOLTAGE COMPARTMENTS		
Low Voltage Compartment	13	
Medium Voltage Compartment	14	
A. Access Under Normal Conditions	14	
B. Access Under Emergency Conditions	14	
MAINTENANCE AND REPAIRS		14
TROUBLESHOOTING SUGGESTIONS		15
PARTS LIST		
Frame Assembly	16	
Drawout Handle Assembly And Release Handle for Latched Contactor	17	
Current Transformer Assembly	18	
Low Voltage Compartment	19	

PRECAUTIONS

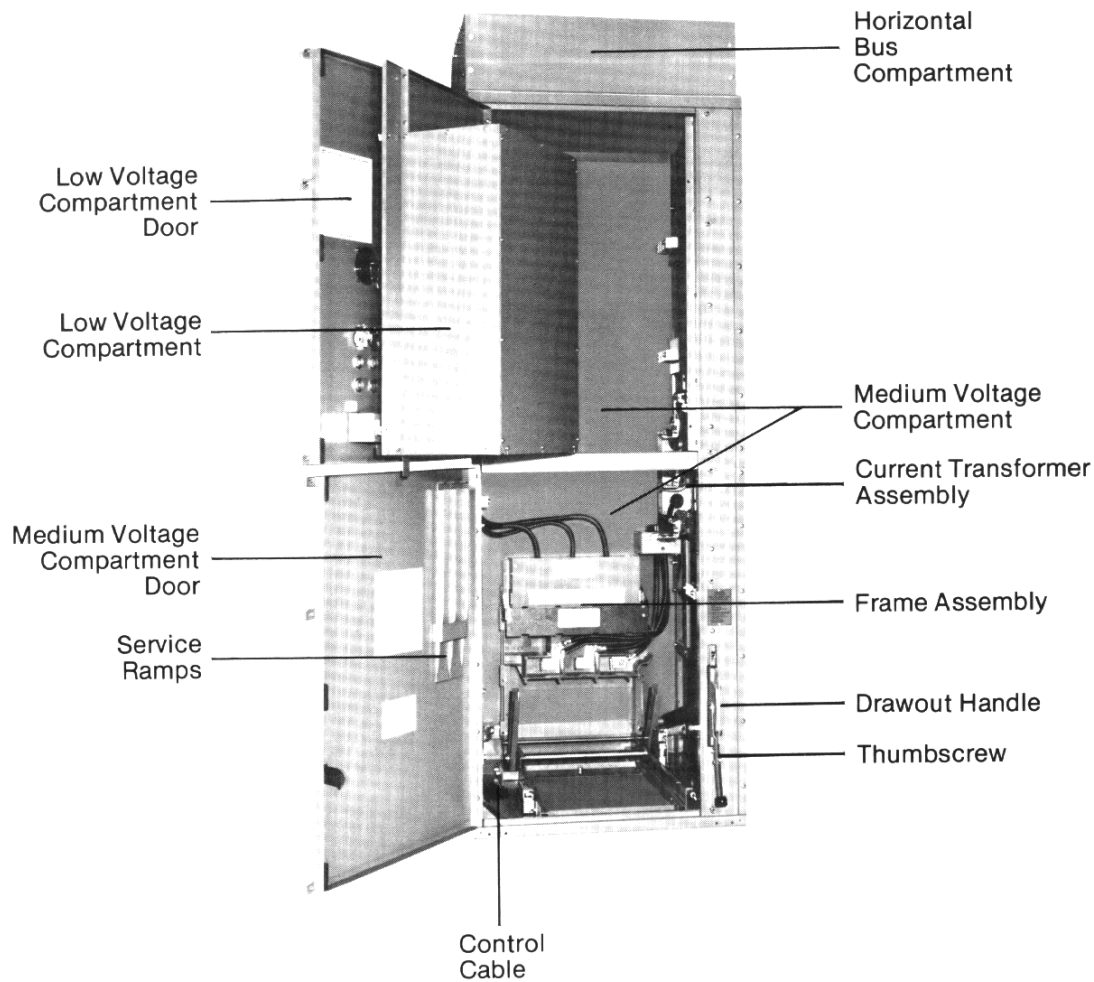
Medium voltage motor controllers are provided with many safety features. Nevertheless, they control 5,000 volt rated power circuits with high fault capacity which can be dangerous. The following list of recommended "**PRECAUTIONS**" must be studied and followed during installation, operation and servicing of the equipment.

WARNING

Power must be disconnected from the controller equipment prior to performing any installation. However, the equipment has been designed to permit limited maintenance and/or testing on those components that are disconnected from the main power. When performing this work **EXTREME CAUTION** must be exercised in view of the presence of hazardous voltage.

1. READ THIS SERVICE BULLETIN PRIOR TO INSTALLING OR OPERATING THE EQUIPMENT.
2. IF MOTOR CONTROLLERS ARE TO BE STORED PRIOR TO INSTALLATION, THEY MUST BE PROTECTED FROM THE WEATHER AND BE KEPT FREE OF CONDENSATION AND DUST.
3. USE EXTREME CARE WHEN MOVING OR POSITIONING VERTICAL SECTIONS (EVEN IF CRATED) AS THEY CONTAIN DEVICES AND MECHANISMS WHICH MAY BE DAMAGED BY ROUGH HANDLING.
4. USE SERVICE RAMPS OR SERVICE TRAY SUPPLIED WITH CONTROLLER OR A CLASS 8198 TYPE HJ-2 LIFT JACK, WHEN AVAILABLE, TO REMOVE OR INSTALL THE CONTACTOR (APPROXIMATE WEIGHT 350 POUNDS).
5. BE SURE LINE TERMINAL COVER IN CONTROLLER AND ARC CHUTES AND PHASE BARRIERS ON CONTACTOR ARE IN PLACE BEFORE OPERATING CONTROLLER.
6. BE SURE CURRENT TRANSFORMER SECONDARY CIRCUIT IS COMPLETE. BE SURE CURRENT ELEMENTS ARE PROPERLY SELECTED AND INSTALLED FOR THERMAL OVERLOAD RELAYS PER THE INSTRUCTION LABEL LOCATED INSIDE THE MEDIUM VOLTAGE COMPARTMENT DOOR BEFORE OPERATING CONTROLLER.
7. ANY PAN HEAD SCREW REQUIRING A SIX POINT STAR DRIVE IS NOT INTENDED FOR CUSTOMER USE.
8. ONLY AUTHORIZED PERSONNEL SHOULD BE PERMITTED TO OPERATE OR SERVICE THE CONTROLLERS.

LOCATION AND IDENTIFICATION OF CONTROLLER PARTS



GLOSSARY

VERTICAL SECTION: is a free standing unit available in NEMA-1, NEMA-1 with gasketed doors, NEMA-3 or NEMA-12 enclosures with or without horizontal power bus. Dimensions: 34"W, 35"D, 90"H (NEMA-1 & 12 without horizontal bus)
34"W, 35"D, 100"H (NEMA-1 & 12 with horizontal bus)
38"W, 39¼"D, 106½"H (NEMA 3 with or without horizontal bus)

LOW VOLTAGE COMPARTMENT: is the area behind the top 45" door. It contains terminal blocks on the fixed left side wall, control relays on the swing open panel, and door mounted equipment (meters, overload relays, push buttons etc.) on the low voltage compartment door.

MEDIUM VOLTAGE COMPARTMENT: is the area behind low voltage swing open panel at the top and medium voltage contactor door in the bottom. It contains medium voltage contactor, frame assembly,

current transformer assembly, line and load cables and other medium voltage equipment.

FRAME ASSEMBLY: consists of 'L' shaped frame, contactor rails, drawout arms, and connection box assembly with line and load connection box.

DRAWOUT HANDLE ASSEMBLY: consists of drawout handle and drive rod which is connected to the drawout arms on frame assembly used to rack contactor in and out of line and load stabs.

PREPARED CELL: is a vertical section with frame assembly and drawout handle assembly suitable for future controller installation in the field.

SERVICE RAMPS: stored inside medium voltage contactor compartment door on a bracket. When the ramps are attached to the vertical section in front of contactor wheels, the contactor can be rolled out of enclosure on to the floor.

INTRODUCTION

This manual covers the description, installation, operation and maintenance of the Square D Class 8198 Model 2 Series B medium voltage motor controller. These instructions apply primarily to the controller less the contactor. The Class 8110 Type E Series A contactor is covered in detail in Service Bulletin 8110-7.

This controller is designed in accordance with UL, NEMA and CSA Standards

NOTE: Read all installation instructions before installing equipment.

CONTROLLER RATINGS

Refer to the nameplate on the enclosure door for detailed ratings applicable to a specific controller. Basic controller maximum ratings are per NEMA Standard ICS No. 2-324 as indicated below.

	Contactor Rating		2300 Volt 60 Hertz	4000 Volt 60 Hertz	4600 Volt 60 Hertz
	NEMA Size	Amperes (Enclosed)			
Squirrel Cage Motors	H3	360	1500 HP	2500 HP	2500 HP
Wound Rotor Motors	H3	360	1500 HP	2500 HP	2500 HP
Synchronous Motors (0.8 Pf) (1.0 Pf)	H3	360	1500 HP	2500 HP	2500 HP
	H3	360	1750 HP	3000 HP	3000 HP
Interrupting Rating Class E1 (Unfused) Class E2 (Fused)	H3	360	50 MVA	50 MVA	50 MVA
	H3	360	200 MVA	350 MVA	400 MVA
Basic Impulse Level	H3	360	60 KV	60 KV	60 KV

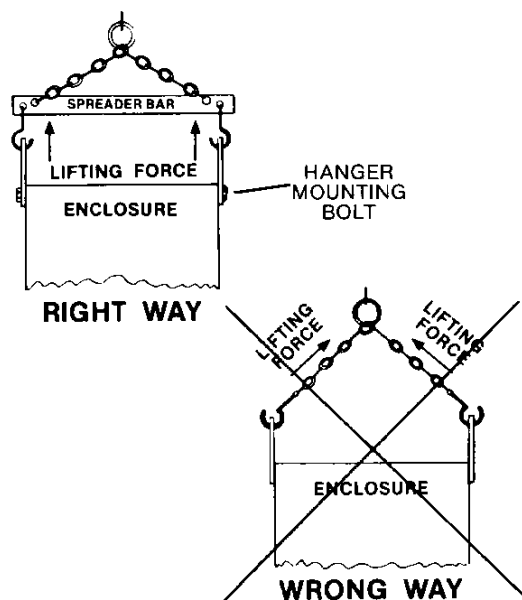
LIFTING

A. NEMA 1 & 12 VERTICAL SECTIONS

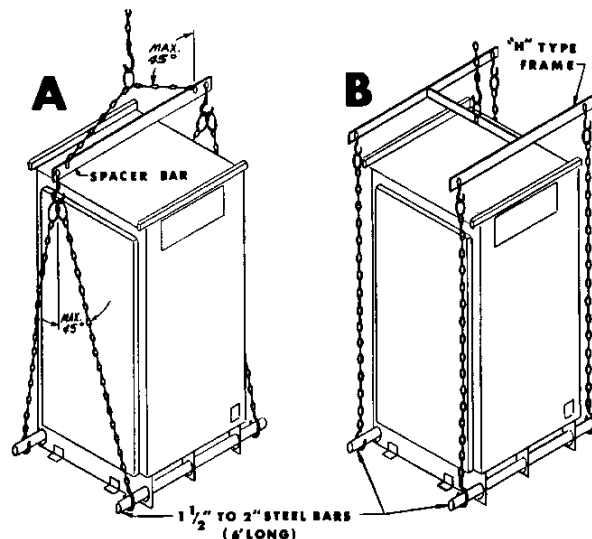
When lifting controller by lifting hangers, use spreader bar to keep lifting force vertical (see illustration).

CAUTION

BEFORE LIFTING ENCLOSURE
INSPECT HANGER MOUNTING BOLTS
FOR MAXIMUM THREAD ENGAGEMENT.



B. NEMA 3 VERTICAL SECTIONS: (FOR DETAILS SEE ILLUSTRATION)



PRELIMINARY INSPECTION

UNCRATING

Check the packing list against the order to make sure shipment is complete and all components have been received. Contactor and all control devices are shipped installed in the vertical section.

Examine the shipping crate before unpacking the controller to make sure it has not been damaged in transit. If the shipping crate is damaged, note the area and pay particular attention when unpacking to see if contents are also damaged. If damage is found, notify the carrier. Also notify the local Square D field office of the damage claim.

Take care when unpacking not to damage contents by inserting tools into crates. Use a nail puller and wire cutter. Do not insert pry bar in crate to force open.

INSPECTION

CAUTION

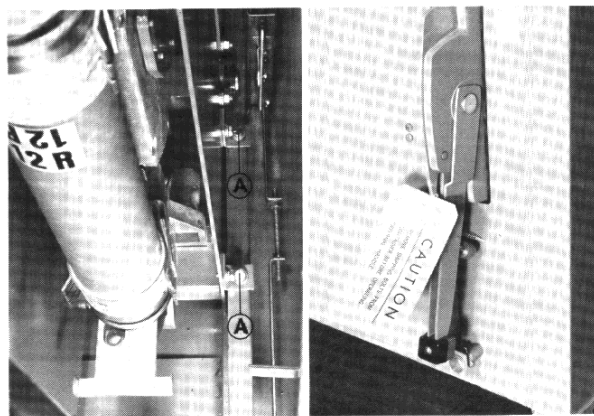
DO NOT MOVE OPERATING HANDLE UNTIL THE CONTACTOR SHIPPING RESTRAINTS ARE REMOVED. IN CASE CONTROLLER WITH CONTACTOR IN VERTICAL SECTION IS RESHIPED TO ANOTHER LOCATION, ALL SHIPPING RESTRAINTS MUST BE REINSTALLED.

PRELIMINARY INSPECTION

INSPECTION (cont'd)

Inspect components as follows: (see photograph, page 4 for identification and location of various parts)

- Check visually for good condition. Inspect all parts for secure mounting and good electrical connections.
- Check that the vertical section is not dented or otherwise damaged.
- Check medium voltage contactor compartment door for free movement by loosening thumbscrew fasteners and swinging door. Repeat for low voltage compartment door.
- Contactor is held in place for shipment. With medium voltage door open, remove two hold-down brackets (A), each secured by two screws between rail and contactor right side frame.
- Close the medium voltage contactor door securely by tightening all thumbscrew fasteners. The drawout handle is tied in open (down) position during shipment. Remove this shipping restraint to free the handle. Check drawout handle for free movement with contactor inside, by operating handle up and down. If movement is not free, refer to contactor installation procedure page 9.



- Check that wiring harnesses are securely fastened except for the control cable assembly.

CONTACTOR INSPECTION

For information pertaining to the inspection and operation of the Class 8110 medium voltage contactor, refer to Square D Company Service Bulletin 8110-7.

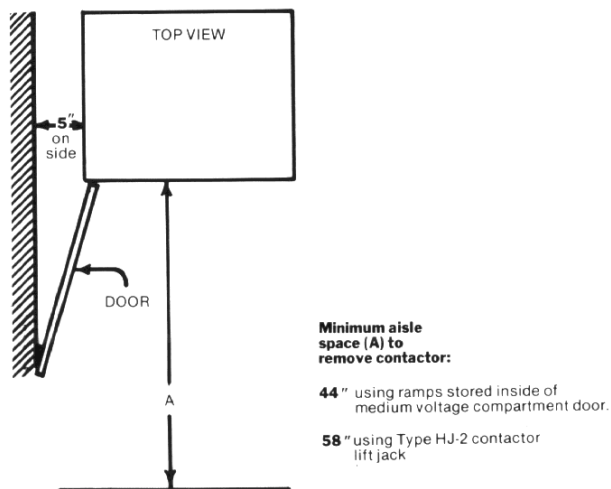
INSTALLATION INSTRUCTIONS

CONTROLLER MOUNTING

Class 8198 controllers are completely front accessible. Space is required in front to remove the contactor.

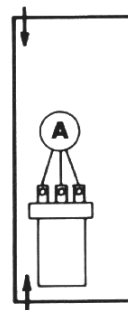
See Figure 1 below for minimum dimension requirements. Make sure vertical section is level and fully supported when mounted. Vertical section should be bolted in place. If vertical section is not securely supported and level, doors may not swing properly and drawout mechanism may not operate properly.

Figure 1



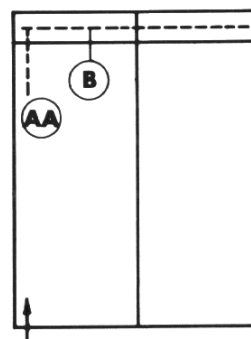
ARRANGEMENTS FOR TERMINATING LINE CABLES

Following sketches indicate arrangements available for terminating line cables. Refer to drawings furnished with the order to check the specific arrangement supplied for your equipment.



Single vertical section without horizontal power bus.

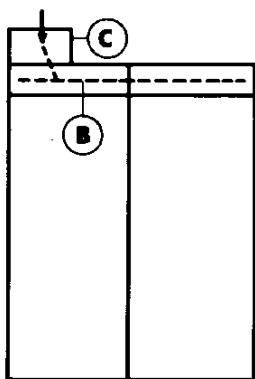
- Line cable terminations on terminals (A).
- Cable entry from top or bottom.
- For detailed installation instructions, see page 8.



Two or more vertical sections bussed together by horizontal power bus (B).

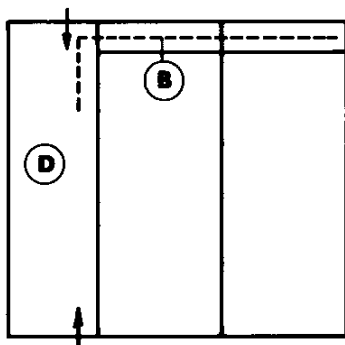
- Line cable terminations on terminals (AA).
- Cable entry from bottom only.
- Maximum cable size, one 500 MCM cable per phase.

INSTALLATION INSTRUCTIONS



Two or more vertical sections bussed together by horizontal power bus (B).

1. Line cable terminations in pull box (C).
2. Cable entry from top only.



Two or more vertical sections bussed together by horizontal power bus (B).

1. Line cable terminations in incoming line cable compartment (D).*
2. Cable entry from top or bottom.

* This compartment may be full 100" high or an overhang extending about 50" down from top.

POWER AND GROUND BUS CONNECTIONS BETWEEN SHIPPING SECTIONS

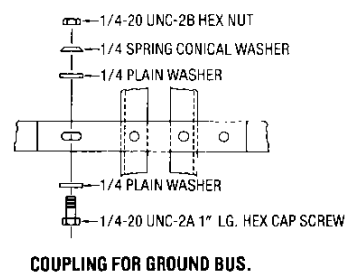
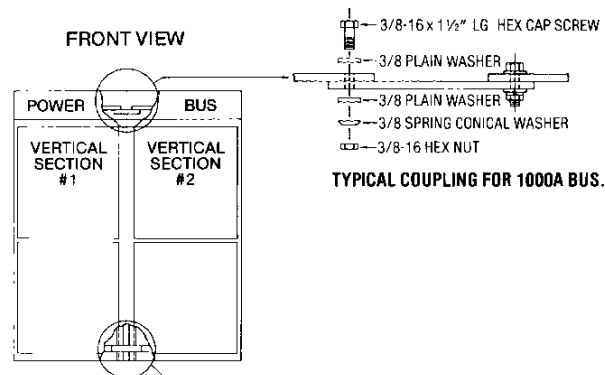
If motor control center consists of two or more shipping sections, power bus and ground bus splice bars will be supplied and should be added after sections are firmly in place. Necessary hardware is included to secure the buses together. Refer to the instructions included with splice bars for details.

CAUTION

BEFORE PROCEEDING, BE SURE INCOMING LINE IS DE-ENERGIZED.

Tighten each $\frac{3}{8}$ " bolt to 220 inch pounds (power bus)

Tighten each $\frac{1}{4}$ " bolt to 60 inch pounds (ground bus)



PREPARATION FOR INSTALLING POWER CABLES

NEMA 1 and 12 enclosures

Remove contactor using service ramps supplied with controller before making any cable connections. The service ramps are stored inside medium voltage contactor compartment door. Refer to installation instruction label on door for details.

NEMA 3 enclosures

Remove contactor using service tray supplied with controller before making any cable connections. The service tray is stored inside the enclosure behind the low voltage compartment. Refer to label on door for details.

NOTE: Service tray is secured with a bolt for shipping. This bolt is to be discarded after initial use of service tray.

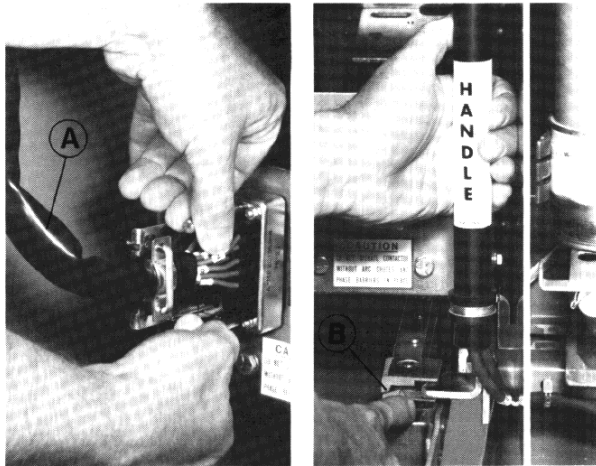
CAUTION

IF SERVICE RAMP ARE NOT AVAILABLE, A SEPARATE MEANS TO REMOVE CONTACTOR FROM ENCLOSURE MUST BE USED EQUIVALENT TO RAMPS (CONTACTOR WEIGHS 350 LBS.).

INSTALLATION INSTRUCTIONS

PREPARATION FOR INSTALLING POWER CABLES (cont'd)

Disconnect control cable (A) from the contactor by simultaneously loosening two thumbscrews. Using service ramps roll the contactor out onto floor by releasing the contactor stop (B) located on the left rail. Use handle (marked "HANDLE" on left front of contactor) to roll contactor out and away from the vertical section. Open the low voltage compartment door and swing open the low voltage panel. The vertical section is now accessible for installing power cables. Store the service ramps on door as before.



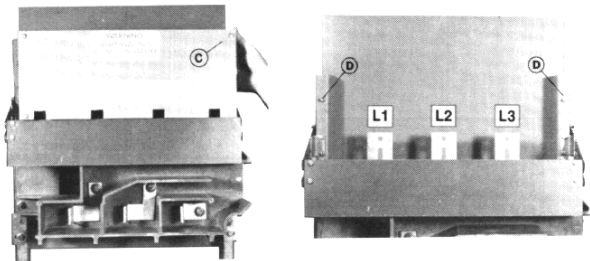
POWER CABLE CONNECTIONS

NOTE: TWO-HOLE LUGS MUST BE USED TO PREVENT ROTATION OF LUGS. Use $\frac{3}{8}$ " bolts (maximum $1\frac{1}{2}$ " long), nuts and spring washers for cable connections.

A. LINE CABLE CONNECTIONS: SINGLE VERTICAL SECTION

For bottom entry of line cables, use $5'' \times 5''$ opening located at left rear corner (front view) of vertical section. For top entry use $4'' \times 4''$ opening at top left rear of vertical section. Refer to outline drawing supplied with equipment for exact locations of the openings.

Incoming line terminals are located behind line terminal cover (C) located in the middle of the enclosure backplate. To gain access to terminals, loosen two screws (D) and lift line terminal cover (C) off.



Connect incoming line cables to the terminals. Incoming line cable phase sequence from left to right is L1, L2, L3, as viewed from front of the controller.

Stress cones may be added in the space above the incoming line terminals. Make sure cables are supported by cable clamps located on the left rear side of enclosure.

CAUTION

BE SURE TO RE-INSTALL LINE TERMINAL COVER OVER INCOMING LINE TERMINALS.

B. LOAD CABLE CONNECTIONS

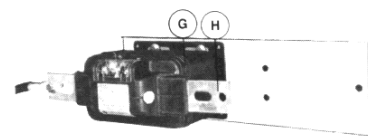
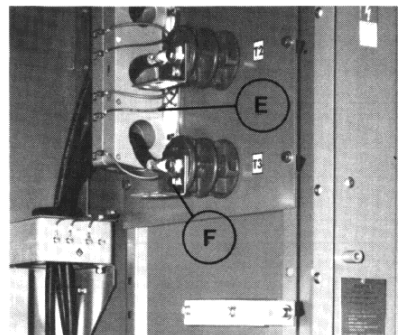
WARNING

BEFORE PROCEEDING, BE SURE INCOMING LINE IS DE-ENERGIZED

For bottom entry of load cables use $5'' \times 5''$ opening located at right rear corner (front view) of vertical section. For top entry use $4'' \times 4''$ opening at top right rear of vertical section. Refer to outline drawing supplied with the equipment for exact location of the openings.

Connect load cables with two-hole lugs to the load side of current transformers located on the middle right side of vertical section. For donut type current transformers (E), connect cables to separate terminal pad on stand off insulators (F). For instrument type current transformers (G), connect cables directly to the bar (H) of the current transformer. The load cable phase sequence from top to bottom or front to back is T1, T2, T3.

Make sure cables are supported by the cable clamp located on right front side of vertical section, and positioned to prevent interference with contactor drawout linkage.



INSTALLATION INSTRUCTIONS

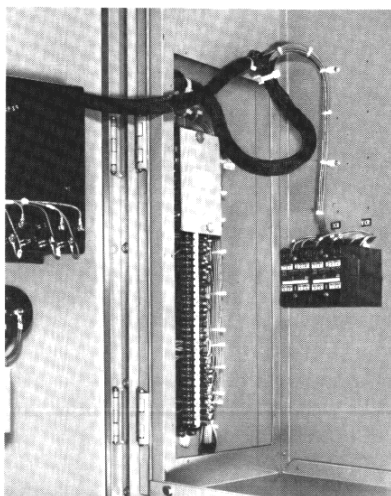
WARNING

**BEFORE PROCEEDING, BE SURE
INCOMING LINE IS DE-ENERGIZED**

LOW VOLTAGE CONTROL CONNECTION

Open low voltage compartment door by loosening two door screws. Swing door to left and out of the way for access to devices and terminal blocks. Use area shown on outline drawing for low voltage control wire entry.

Conduit opening must be made by customer in the designated area for top entry. For bottom entry use 3" x 3" opening located at left front corner (front view) of vertical section. Refer to outline drawing supplied with the equipment for exact location of the openings. Remove barrier located at left lower front of vertical section to install control wires entering from bottom. Be sure to reinstall barrier before energizing controller to isolate the low voltage control wires from the medium voltage equipment.



CONTACTOR INSTALLATION

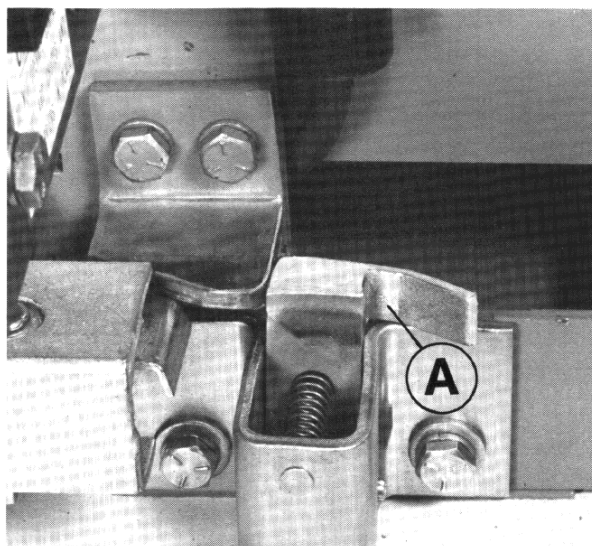
Note: Before installing medium voltage contactor, check that contactor part number on contactor nameplate matches contactor part number on label located inside medium voltage compartment door.

Attach service ramps to the controller enclosure as described on page 7.

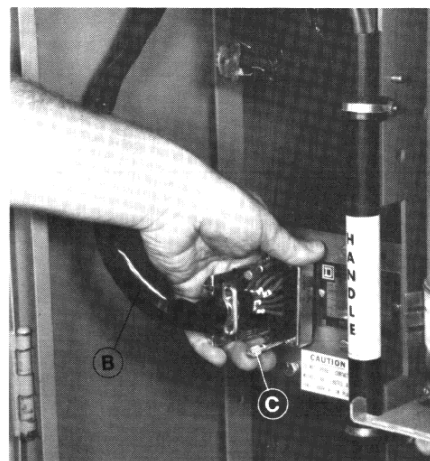
CAUTION

**CONTACTOR STOP MUST BE ENGAGED TO
PREVENT CONTACTOR FROM ROLLING
OUT OF COMPARTMENT.**

Make sure drawout handle is in down position. While maintaining drawout handle in down position, roll contactor from the floor onto ramps and into enclosure until the contactor stop (A) engages.



Connect control cable (B) to contactor by simultaneously tightening two thumbscrews (C) on plug. Remove service ramps and return these to storage position (figure 2, page 7), as per instructions on label attached to inside of medium voltage compartment door.



CHECKING OPERATION OF SAFETY INTERLOCKS

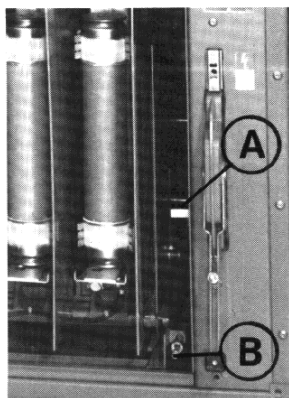
A combination of four mechanical and electrical interlocks provides personnel and equipment protection. It is important to check operation of these safety interlocks.

1. Door interlock (A) (see page 10) prevents opening medium voltage compartment door when contactor is engaged.

Check the door interlock by closing the door and moving drawout handle to horizontal position. Attempt to open the door. The door must not open.

INSTALLATION INSTRUCTIONS

CHECKING OPERATION OF SAFETY INTERLOCKS (cont'd)



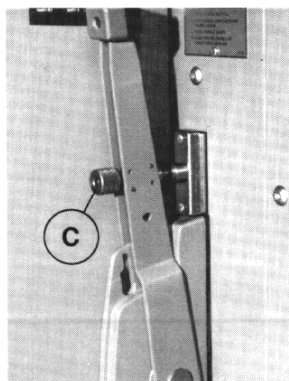
2. Shutter door interlock (B) combined with door interlock (A) prevents engaging contactor when medium voltage compartment door is open.

Check interlock (B) as follows:

Press down on door interlock lever arm (A) and attempt to engage the contactor by moving the drawout handle slowly toward the up position. The interlock must prevent the contactor from being engaged.

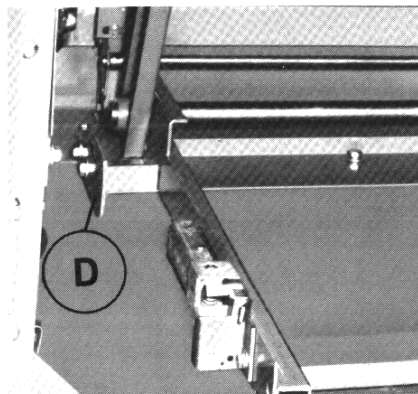
3. Drawout handle thumbscrew interlock (C) prevents disengaging contactor when it is energized. (This interlock is not functional for mechanically latched contactors supplied without electric release).

Since this is an electrical interlock, use continuity test at the terminal blocks inside the low voltage compartment to check operation. Refer to wiring diagrams supplied with equipment. When the thumbscrew interlock (C) is fully engaged, there should be circuit continuity. With thumbscrew disengaged, the circuit should be open.



4. Contactor position interlock (D) prevents engaging or disengaging contactor unless contact tips are open.

Refer to top left photos on page 11 and check that contactor bar interlock (A) interferes with contactor position interlock (B) when contact tips are closed manually by moving the armature plate towards the coil as shown. For detailed instructions refer to page 11.



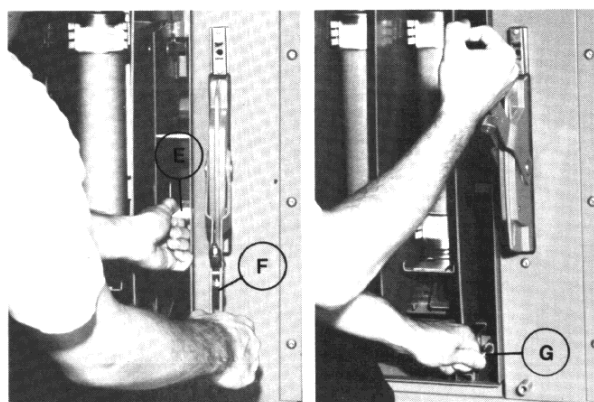
DRAWOUT MECHANISM AND CONTACTOR ALIGNMENT

Check drawout mechanism and contactor alignment with door open using the following procedure. Note that door interlocks must be bypassed.

CAUTION

DO NOT FORCE DRAWOUT HANDLE. EXCESSIVE FORCE CAN DAMAGE INTERLOCK MECHANISMS.

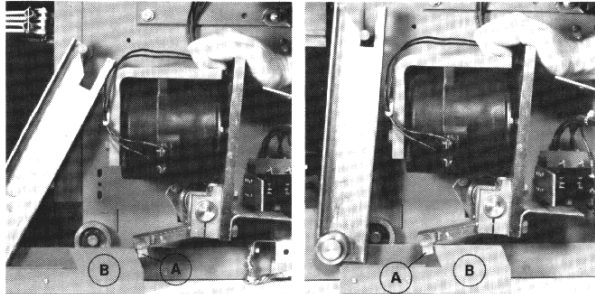
1. Press down on door interlock lever arm (E) and hold while moving the operating handle (F) towards the "UP" position until it stops.
2. While maintaining the drawout handle in this position using minimum amount of pressure, press in on the shutter door interlock (G) connecting rod and ...
3. Simultaneously continue moving the operating handle until it is in the "UP" position. Contactor should now be in the engaged position.
4. Pull drawout handle down to draw out contactor to test position.
5. Repeat steps 1 through 4 to insure that mechanisms operate freely.



INSTALLATION INSTRUCTIONS

Check free movement of the contactor armature by manually moving the armature plate towards the contactor coil. This movement should be checked in the disengaged (test) position and the engaged position. Armature should move freely until contact tips meet.

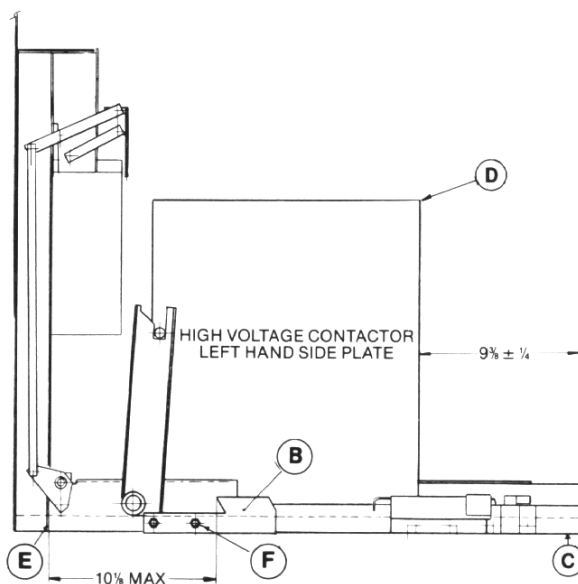
Contactor bar interlock (A) interferes with contactor position interlock (B) as shown in photographs when contact tips meet. This interlock prevents engaging or disengaging contactor unless contact tips are open.



If the contact tips do not meet when the armature plate is operated while the contactor is in the disengaged (test) position, check contactor for mechanical interference such as loose objects around armature or contact tips.

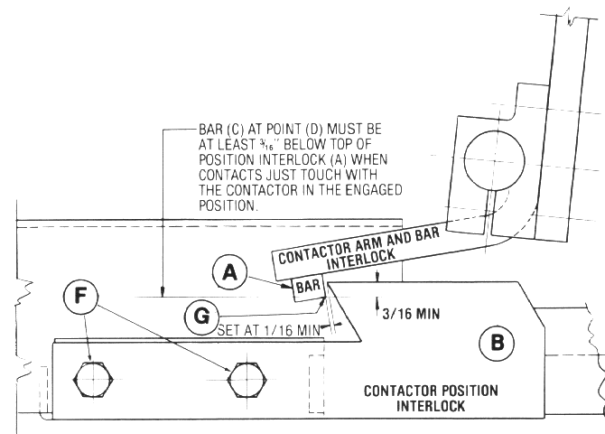
If the contact tips do not meet when the armature plate is operated while the contactor is in engaged position, the contactor interlock bar (A) may be striking the contactor position interlock (B).

If so, check the following dimensions before making any adjustment:

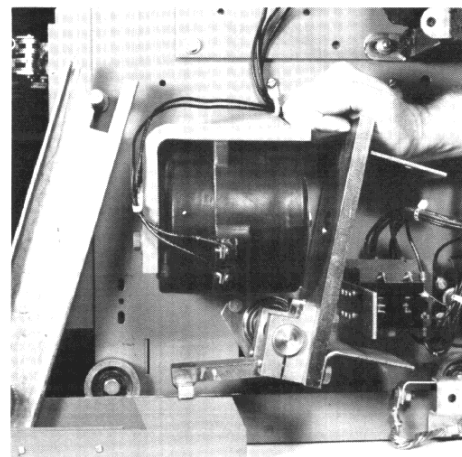


- Distance from end of drawout frame (C) to front edge of contactor left hand side plate (D) should be $9\frac{1}{2}$ inches \pm $\frac{1}{4}$ inch to assure proper contactor engagement. Check for mechanical interference if this distance is less than $9\frac{1}{2}$ inches.
- Distance from front flange (E) of vertical mounting channel to the nearest tip of contactor position interlock (B) shall not be greater than $10\frac{1}{2}$ inches. This distance is factory set and normally does not require adjustment.

Adjustment may be made if necessary to prevent contactor bar (A) from striking the contactor position interlock (B), by loosening two mounting bolts (F). Be sure the distance from flange (E) to tip of position interlock (A) does not exceed $10\frac{1}{2}$ inches. Retighten bolts after adjustment. Note also that the edge (G) of the contactor interlock bar (A) must be below the top of the contactor position interlock (B) by at least $\frac{3}{16}$ inch when contact tips first touch.



Check contactor position interlock by moving the contactor about 2 inches from the engaged position toward the test position. Manually move the armature plate towards the contactor coil. The contact tips must not close due to interference from contactor position interlock.



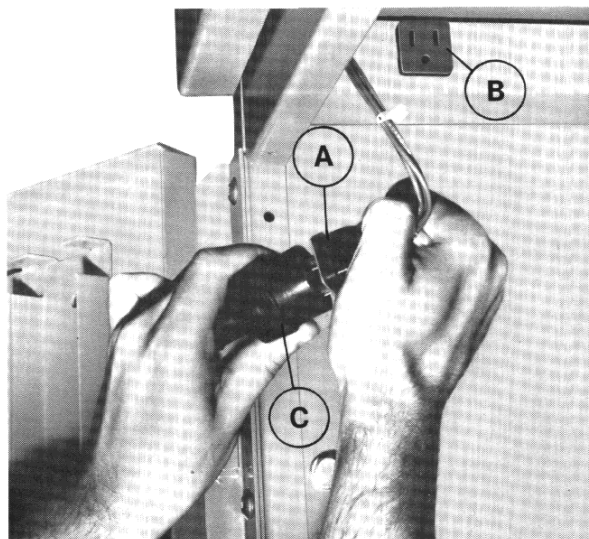
START-UP PROCEDURE

CONTROLLER TEST CIRCUIT

To test the control circuit and contactor with the contactor in the disengaged (test) position (withdrawn against the contactor stop):

1. Unplug the cord (A) from receptacle (B) on a bracket located in front left corner of medium voltage contactor compartment. Access to the test cord can be gained by opening the medium voltage contactor compartment door.
2. Plug test cord into a grounded (3-wire) extension cord (C).
3. Plug the other end of the extension cord into a grounded 120 volt circuit.
4. Close low voltage compartment door.
5. Check that control cable plug is securely fastened to contactor.
6. Refer to elementary wiring diagram supplied with the controller and check the control circuit sequence.

NOTE: For testing contactor only (in or out of enclosure) use separate portable test cord supplied as an option.



CONTROLLER CONTROL CIRCUIT SEQUENCE

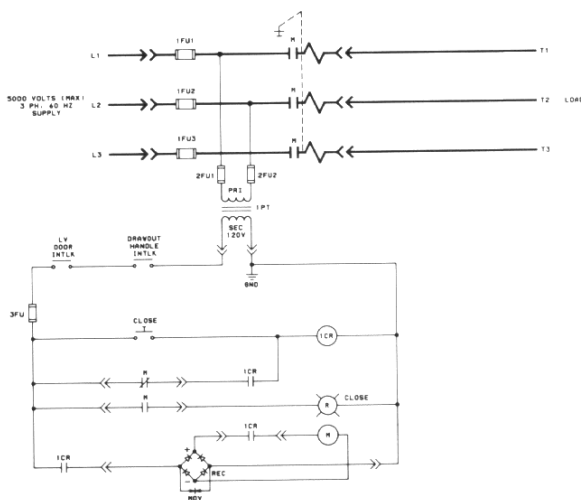
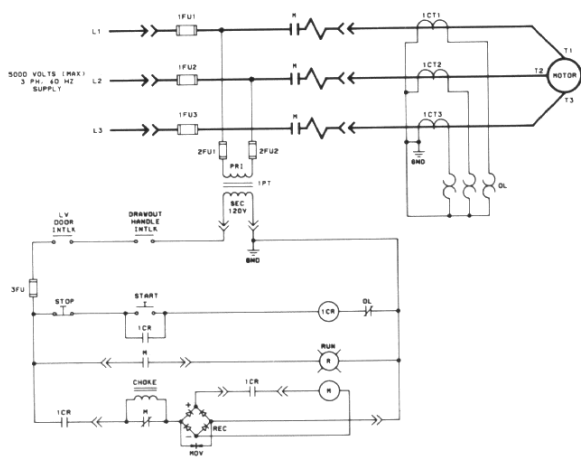
A. Standard Electrically Held (Type FC-11, & FC-21)

1. Depress the start push button.
2. The relay "1CR" energizes and seals in.
3. "1CR" contact energizes the contactor coil "M".
4. "M" contact closes and energizes the red indicating light "R" indicating that the contactor has closed.
5. Another "M" contact opens, inserting the "Choke" in series with the contactor coil.
6. To stop, depress the stop push button.

NOTE: If the contactor fails to operate on the test circuit, check for test power then refer to the elementary and connection diagrams supplied with the specific equipment for complete circuit information.

B. Latched Mechanically Held (Type FL-11 & FL-21).

1. Depress the "CLOSE" push button.
2. The relay "1CR" energizes.
3. A "1CR" contact energizes the contactor coil "M."
4. The mechanical latching mechanism locks the contactor closed.
5. An "M" contact opens; de-energizing "1CR"
6. Another "M" contact closes and energizes the red indicating light "R," indicating that the medium voltage contactor has closed.
7. To trip the contactor, pull the release handle down. (The release handle is located on the front of the medium voltage compartment door. This handle is spring returned to "up" position.) (continued on page 13)



CONTROLLER CONTROL CIRCUIT SEQUENCE

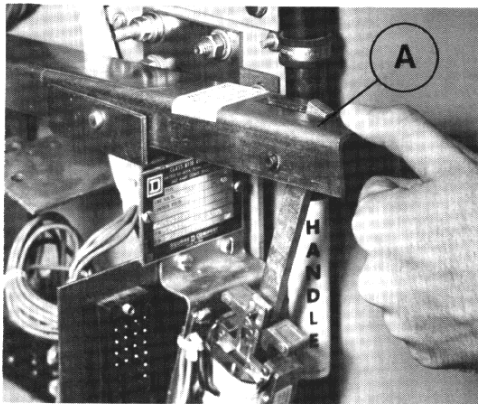
B. Latched Mechanically Held (continued)

8. If electrical release is provided, the contactor may be tripped by depressing the "OPEN" push button.

Note: A manual trip is standard for each latched contactor, and an electrical trip is available as option.

CAUTION

AFTER TESTING CONTACTOR IN DISENGAGED POSITION, BE SURE CONTACTOR IS TRIPPED MANUALLY BY PRESSING DOWN ON TRIP BAR (A) AS SHOWN.

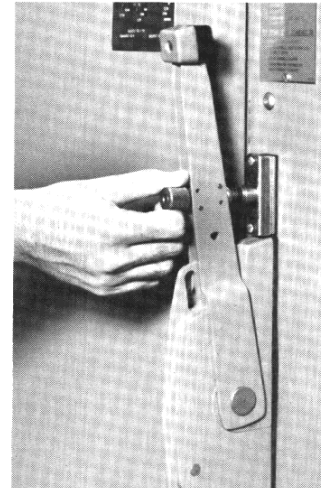


OPERATION

Be sure that test cord is removed and plug is replaced in receptacle. Close and secure medium voltage and low voltage doors. Engage contactor by raising the drawout handle to the "UP" position and tightening drawout handle interlock thumbscrew. Apply medium voltage power to incoming line.

Depress "start" button. Sequence should be as per elementary wiring diagram supplied with the controller.

NOTE: If controller fails to operate, refer to "TROUBLE-SHOOTING" (Page 15).

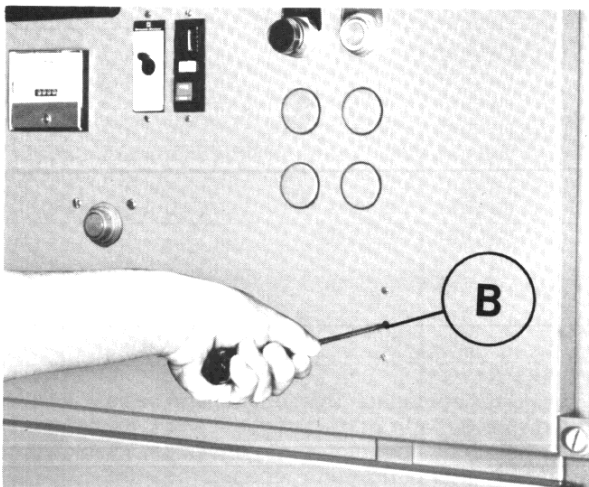


ACCESS TO LOW VOLTAGE & MEDIUM VOLTAGE COMPARTMENTS

LOW VOLTAGE COMPARTMENT

Normally, if access to the low voltage compartment is attempted while the controller is energized, it will automatically shut down because interlock switch (C) opens. Qualified personnel may, however, bypass the interlock in the following manner:

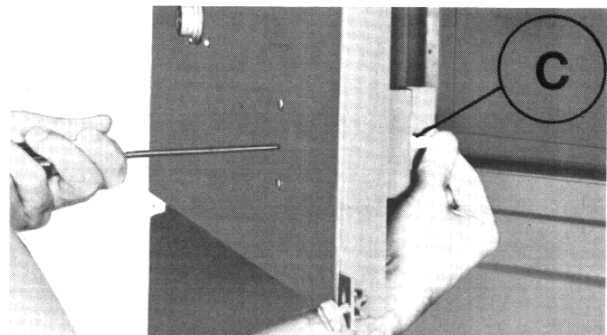
1. Insert a small tool through the hole (B) on the low voltage door which depresses a switch.



WARNING

**WHEN DOOR IS OPENED
LIVE TERMINALS WILL BE EXPOSED.**

2. While holding this switch depressed, open the low voltage compartment door until the interlock switch (C) inside bottom right of low voltage compartment door can be operated by pulling. After activating switch, tool may be removed.
3. To close while energized, hold door switch depressed with small tool; close the door and tighten the door fasteners; then remove the tool.



ACCESS TO LOW VOLTAGE & MEDIUM VOLTAGE COMPARTMENTS (Cont.)

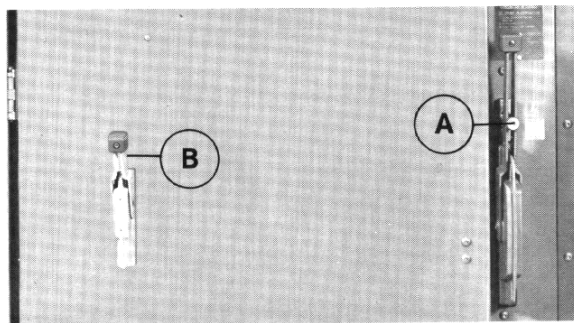
MEDIUM VOLTAGE COMPARTMENT

A. Access under normal conditions

Access to medium voltage compartment is gained by loosening door fasteners and opening medium voltage contactor compartment door. This door can only be opened when drawout handle is in down position (contactor disengaged from line and load stabs). Opening low voltage compartment door and then low voltage panel, permits access to the entire medium voltage compartment.

When the contactor is energized, or engaged to line and load stabs, access to medium voltage compartment may be obtained as follows:

1. Loosen the drawout handle interlock (A). This will de-energize contactor if it was energized. In case of mechanically latched contactor, pull release handle (B) down. (The release handle is mounted on left side of medium voltage compartment door and is spring return to UP position) This will open contactor.
2. Pull drawout handle to down position.
3. Loosen door fasteners and open door. Contactor is now in disengaged (test) position, completely isolated from line and load stabs.



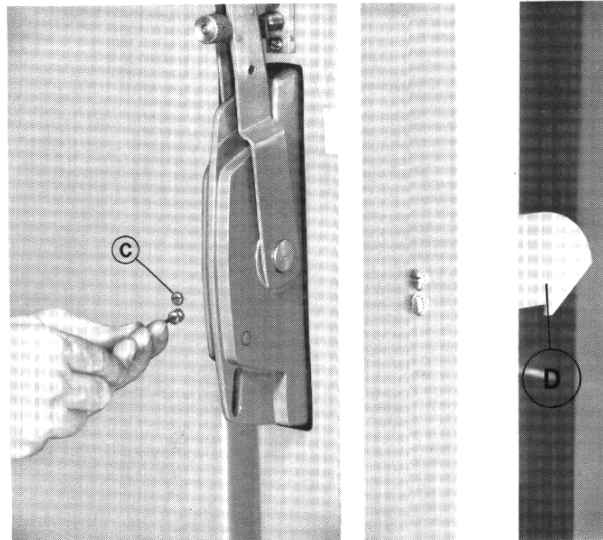
B. Access under emergency conditions

WARNING

**BEFORE PROCEEDING, BE SURE
INCOMING LINE IS DE-ENERGIZED.**

In the event that it becomes necessary to open the door of a medium voltage controller with the contactor engaged (i.e. welded contact tips on the contactor), access may be obtained as follows:

Remove the two screws (C) located on lower right side of medium voltage contactor compartment door. Door catch (D) mounted inside medium voltage door is held by these two screws. Removal of screws will cause the door catch to fall, allowing medium voltage contactor compartment door to be opened.



CAUTION

**DOOR CATCH (D) MUST BE RE-INSTALLED
WITH TWO SCREWS (C) BEFORE
ENERGIZING THE CONTROLLER. CHECK
THE DOOR INTERLOCK BY CLOSING THE
DOOR AND MOVING THE DRAWOUT HANDLE
TO HORIZONTAL POSITION. WITH
HANDLE IN HORIZONTAL POSITION, AT-
TEMPT TO OPEN THE DOOR. THE DOOR
MUST NOT OPEN.**

MAINTENANCE AND REPAIRS

SEE SERVICE BULLETIN 8110-7 FOR CONTACTOR MAINTENANCE

WARNING

**BEFORE PROCEEDING, BE SURE
INCOMING LINE IS DE-ENERGIZED.**

ROUTINE MAINTENANCE

1. Be sure all connections are tight.
2. Be sure all insulators are clean.
3. Lubricate all pivot points of the drawout linkage with grease. Carefully wipe off all excess grease.

4. Contacting surfaces of line and load stabs are coated with special deoxidizing lubricant (part no. PJC-7201) prior to shipping. It is recommended that stabs be coated with this lubricant at all times. Under no circumstances should any other lubricant be used on these surfaces.

REPAIRS

Major repairs should not be attempted with the contactor in the enclosure. Remove the contactor as explained on page 8. See pages 17, 18 and 19 for identification of enclosure components and parts list. Refer to Service Bulletin 8110-7, pages 7 and 8 for contactor parts list. Install contactor into enclosure as explained on page 9, after performing necessary repairs.

TROUBLESHOOTING SUGGESTIONS

WARNING

ALL POWER SHOULD BE DISCONNECTED FROM CONTROLLER EQUIPMENT PRIOR TO ANY TROUBLESHOOTING OR SERVICE WORK. HOWEVER, THE EQUIPMENT HAS BEEN DESIGNED TO PERMIT LIMITED MAINTENANCE AND/OR TROUBLESHOOTING ON THOSE COMPONENTS THAT HAVE BEEN ISOLATED FROM MAIN POWER. WHEN PERFORMING THIS WORK *EXTREME CAUTION* MUST BE EXERCISED IN VIEW OF THE PRESENCE OF HAZARDOUS VOLTAGE.

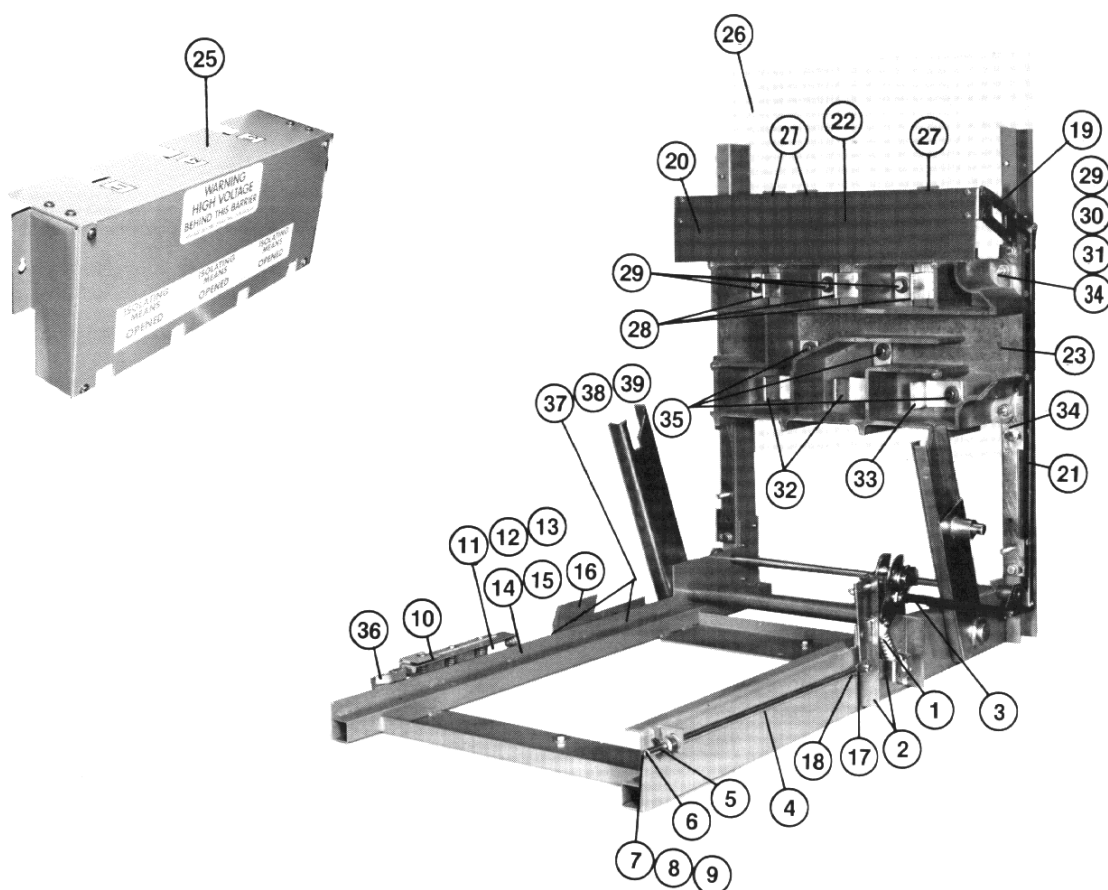
DO NOT UNDER ANY CIRCUMSTANCES LEAN ON SHUTTER PLATE ASSEMBLY OVER LINE STABS OR OPERATE SHUTTER MECHANISM WHILE MAIN POWER IS ENERGIZED.

Possible Causes For Controller Not Operating	Reasons This Might Cause Controller Not To Work	Corrective Steps To Be Taken
Low voltage compartment door ajar	Low voltage compartment interlock not engaged	Close and secure low voltage compartment door
Drawout handle interlock thumb thumbscrew loose	Drawout interlock not engaged	Tighten drawout interlock thumbscrews
Control cable assembly not secured properly	Control circuit interlock and control voltage not connected to contactor	Secure control cable assembly (See page 9)
Test cord not secured properly	No control power getting to low voltage compartment	Secure plug
Contactor fails to engage line and load stabs	Contactor not properly installed in drawout mechanism	Refer to contactor installation instructions page 9
Contactor will not operate	No control power to contactor coil	Refer to Service Bulletin 8110-7, maintenance
Contactor cannot be disengaged	Contact tips welded together	WARNING: BEFORE PROCEEDING BE SURE INCOMING LINE IS DE-ENERGIZED 1) Open door bypassing interlock (refer to page 14) and attempt to break the welded tips free. 2) If tips cannot be broken free, loosen four bolts and remove armature plate (refer to Service Bulletin 8110-7).
* Contactor will not latch	Latch mechanism binding	Check for bent parts
* Contactor fails to trip when mechanically released	Inoperative release handle	Check for bent parts spring
* Contactor fails to trip when electrically released	1. No control power to solenoid 2. Defective solenoid coil	Check control circuit

* Applicable to mechanically latched contactors only.

Note: Refer to the elementary and connection diagrams supplied with the specific equipment for complete circuit information.

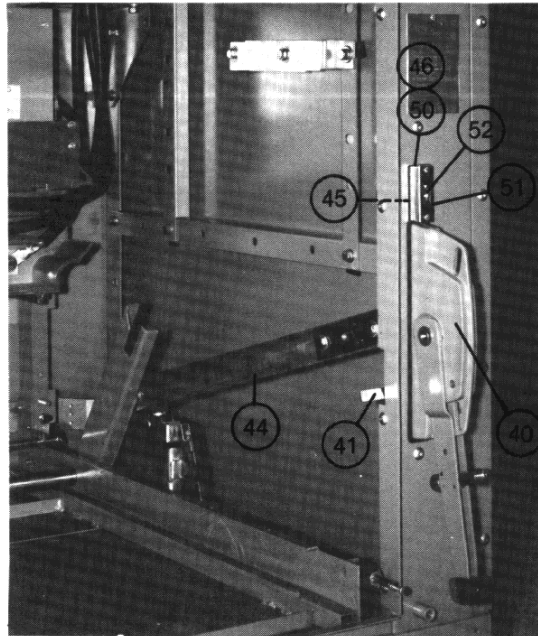
PARTS LIST FOR FRAME ASSEMBLY



Item No.	Part Number	Description
1	51204-412-50	Assembled Shutter Operating Mechanism
2		1/4 - 28UNF - 2A x 1/2 Long Hex Cap Screw
3	51204-404-01	Connecting Rod (Shutter Mechanism)
4	51204-411-01	Interlock Connecting Rod
5	50502-602-09	Spring (Not Shown)
6		1/8 x 1" Roll Pin (Not Shown)
7		10 - 32UNF - 2A x 1" Long Pan Head Screw (Not Shown)
8		#10 Standard Lockwasher (Not Shown)
9		#10 - 32UNF - 2A Hex Nut (Not Shown)
10	51204-492-50	Contactors Ground System Assembly
11		1/4 - 28UNF - 2A x 1" Long Hex Head Screw
12		1/4 Standard Plain Washer (Not Shown)
13		1/4 Standard Lockwasher (Not Shown)
14		3/8 Lockwasher, Ext. Tooth (Not Shown)
15		3/8 Plain Washer (Not Shown)
16	51204-425-01	Contactors Position Interlock Plate
17	51204-400-01	Shutter Connection Arm Pin
18		Cotter Pin
19	51204-454-50	Right Hand Assembly Shutter Lifting Arm

Item No.	Part Number	Description
20	51204-454-51	Left Hand Assembly Shutter Lifting Arm
21	51204-397-01	Connecting Rod
22	51204-403-50	Shutter Plate Assembly
23	51203-866-50	Assembled Connection Box
24	51203-960-50	Assembled Connection Box For Third Stab (Not Shown)
25	51204-442-50	Assembled Line Terminal Cover
26	51204-444-01	Insulator, Barrier
27	51204-415-50	Assembled Copper Bus Bar (Not Shown)
28	51203-650-01	Stab Assembly
29		5/16 - 18UNC - 2A x 1" Large Hex Head Screw
30		5/16 Standard Lockwasher
31		5/16 Plain Washer
32	51203-653-01	Load Stab
33	51203-655-01	Load Stab (Right Side)
34		5/16 - 18 UNC - 2B Hex Nut
35	51204-167-01	Special Length Screw 7/8" (For Items 32 & 33)
36	51204-488-50	Contactors Stop Mechanism
37		3/8 - 16 - 4UNC - 2AC x 3/4 Long Hex Head
38		3/8 Plain Washer (Not Shown)
39		3/8 Spring Washer (Not Shown)

PARTS LIST FOR DRAWOUT HANDLE ASSEMBLY



Item No.	Part Number	Description
40	51204-670-*	Drawout Handle Assembly
41	51204-463-01	Locking Lever Arm
42		#10 - 32 UNF - 2A x 3/8 Large Pan Head Screw (Not Shown)
43		#12 Spring Lock Washer (Not Shown)
44	51204-430-01	Drive Rod
45	Class 9007 Type A02	Snap Switch
46	51203-915-01	Snap Switch Gasket

* Specify Color of Paint Finish

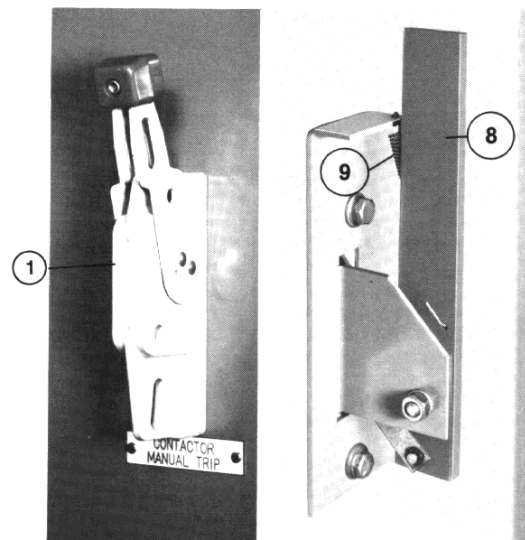
Item No.	Part Number	Description
47		#6 - 32 UNF - 2A x 1 1/2 Large Pan Head Screw (Not Shown)
48		#6 Spring Lock Washer (Not Shown)
49		#6 Flat Washer
50	51204-666-01	Backing Plate
51	51204-665-01	Nut Cage
52		3/8 - 16 UNC - 2B Sq Nut, Brass

PARTS FOR RELEASE HANDLE FOR LATCHED CONTACTOR

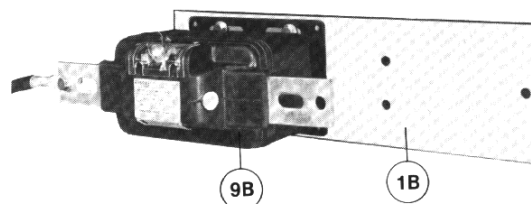
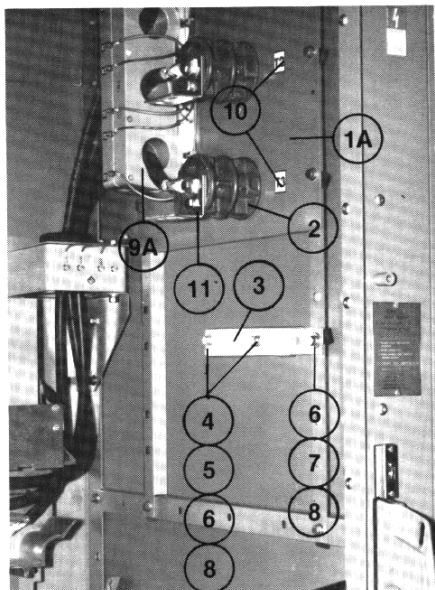
These parts are used in addition whenever a latched contactor is supplied.

Item No.	Part Number	Description
1	51033-445-50	Trip Handle Assembly
★2	51033-456-01	Pivot Link
★3	51033-457-01	Pivot Pin
★4	29907-01210	Retaining Ring
★5	23602-11401	Plain Washer
★6	50502-054-16	Release Arm Bushing
★7	31008-004-01	Gasket (NEMA 3 only)
8	51033-458-01	Release Arm
9	30017-143-01	Spring

* Required Parts Not Shown

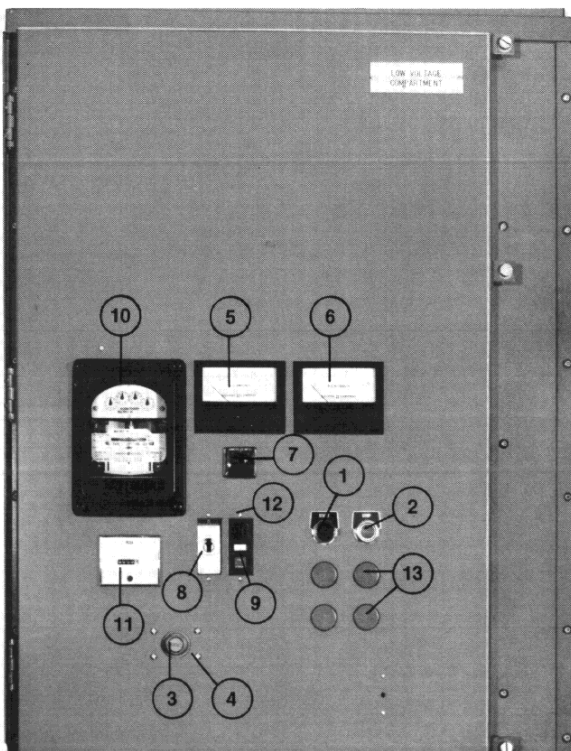
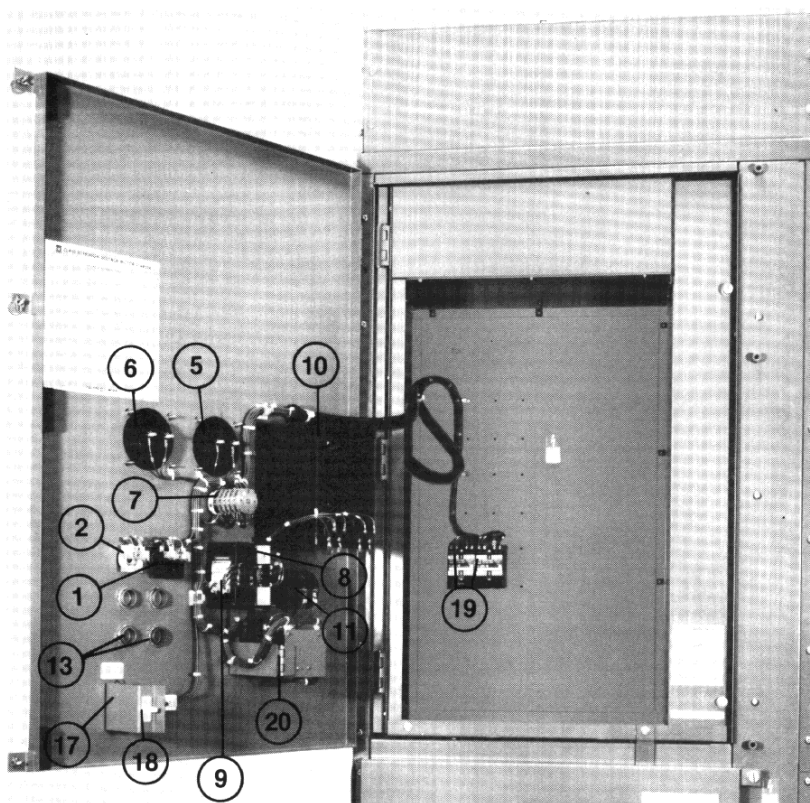


PARTS LIST FOR CURRENT TRANSFORMER ASSEMBLY



Item No.	Part Number	Description
1A	51204-457-01	Donut Current Transformer Mounting Pan (for 3-Window Type Current Transformers, 1 Required)
1B	51204-866-50	Bar Type Current Transformer Mounting Pan Assembly
2	51204-293-50	Insulator Assembly
3	51203-849-01	Cable Clamp
4		5/16 - 18 Hex Head Cap Screw - Length to Suit
5		5/16 Lock Washer
6		5/16 Plain Washer
7		5/16 - 18 x 3/4 Hex Head Cap Screw
8		5/16 - 18 Retaining Nuts
9A		Donut Current Transformer: Contact your local Square D Company Field Office for part number. Supply complete nameplate data.
9B		Instrument Current Transformer: Contact your local Square D Company Field Office for part numbers. Supply complete nameplate data.
10	51140-130-01 51140-130-02 51140-130-03	T1 } Connection Identification Labels T2 } T3 }
11	51204-293-50	Insulator Assembly for Donut Current Transformers (Includes hardware & terminal plate)

PARTS LIST FOR LOW VOLTAGE COMPARTMENT



Item No.	Part Number	Description
1	Class 9001, Type KILIR	Illuminated Start Push Button
2	Class 9001, Type KA-2	Contact Block (N.O.)
3	Class 9001, Type KRIR	Stop Push Button
4	Class 9001, Type KA-3	Contact Block (N.C.)
5	30019-113-50	Reset Push Button Assembly
6	30019-121-01	Nut
7		10-32 x 3/8 Pan Head Screw Slotted
8		#10 Lock Washer
9		Ammeter (per factory order)
10		Voltmeter (per factory order)
11		Meter Selection Switch
12		Ground Censor® , Relay, Type GA
13		Ground Censor, Test Module, Type GA
14		Watthour Meter
15		Elapsed Time Meter
16		6 - 32 x 1/2 Pan Head Screw
17		#6 Lock Washer
18	Class 9001, Type K52	Cover Plate for Push Buttons
19	Class 9080, Type KCA-1	Terminal Block (Not Shown)
20	Class 9080, Type KH-1	Fused Terminal Block (Not Shown)
	25419-20625	Fuse (Not Shown)
	Class 9007, Type A0-2	Snap Switch
	51204-855-01	Switch Mtg Bracket
	51203-915-01	Seal, Panel Defeat Switch (Not Shown)
		6-32 x 1 Pan Head Screw
		#6 Washer
		#6 Lock Washer
		#6 - 32 Hex Nut
	26202-02010	Switch, Momentary Interlock
	Class 8501, Type L040	Control Relay
		120V, 60 Hz, Coil
		Overload Relay

• Optional equipment, not supplied unless specified on factory order