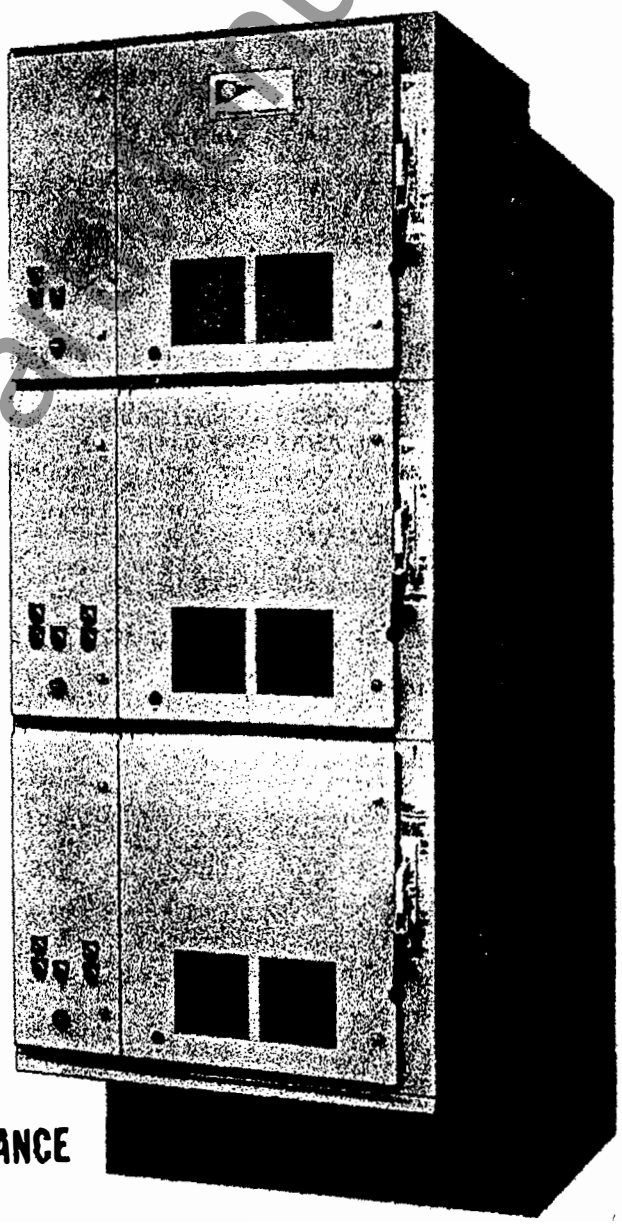
INSTRUCTION
BULLETIN IB-6.5.1
FEBRUARY, 1975

GOULD

SERIES 7850
High Voltage Motor Starter



INSTALLATION
OPERATION
MAINTENANCE

WESTMINSTER, MARYLAND 21157

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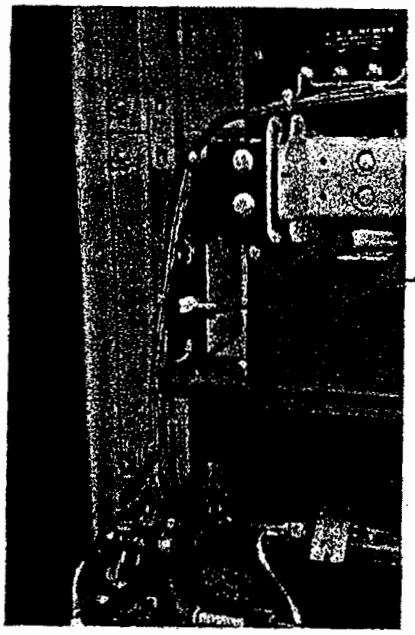

Figure 5
Electrical Interlock Switch

ENCLOSURES

Rugged, heavy gauge steel, NEMA 1 construction is provided as standard (for optional NEMA types, consult the factory). Five (5) different arrangements of enclosures are available covering a broad range of customer requirements.

Features:

Basic welded starter modules, 29" wide by 30" high by 29" deep. All enclosures use this basic module, providing great flexibility and interchangeability. (See page 9 for enclosure variations.)

Add-on type modular, separate low voltage compartments with individual doors.

Ventilated openings in starter module doors, between units, and at the top of the enclosure for heat dissipation.

Optional load terminals can be provided for customer motor leads in a separate compartment on fully rated standoff type insulators, easily accessible from the inside of the controller compartment by removing a barrier.

For added safety, optional isolation of load connections can be provided in addition to the isolated line connections which are provided as standard.

Completely self-contained drawout mechanism with all wheels and moving parts mounted in the enclosure, allowing a lighter controller assembly.

FINISH

The metal is thoroughly cleaned, degreased and phosphated after which it is given a clear water rinse followed by a chromic acid rinse. The metal is then thoroughly dried after which an epoxy dry powder is applied electrostatically to a minimum thickness of 1-3/4 mils and then cured in an oven at a temperature of 375 degrees. Our standard finish exceeds requirements for the 200 hour salt spray test for corrosion resistant enclosures. Standard color is ASA-61, Gray.

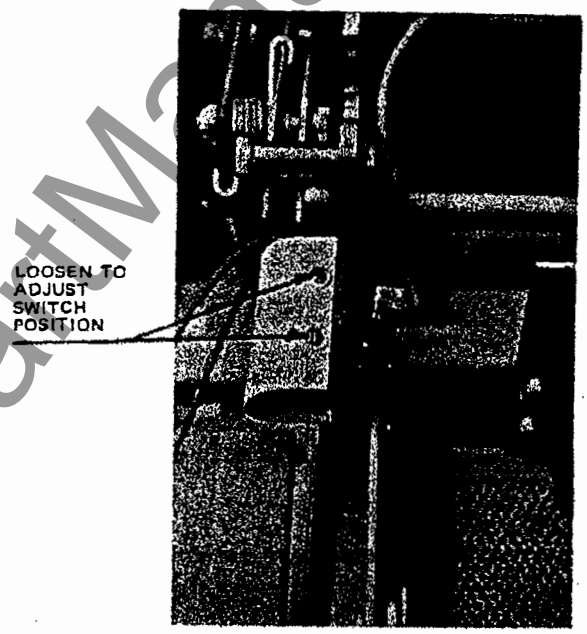

Figure 6
Test Power Switch Adjustment

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CONTACTOR OPERATION DATA

Voltage	2500/5000 volts
Frequency	50/60 Hz.
Current	360 amps (enclosed rating) 400 amps (open rating)
Interrupting Capacity	50 MVA
Control Voltage	120 volts, 50/60 Hz.
Control Current: (120 volts 60 Hz.)	
Inrush	11.5 amp
Sealed	0.25 amp
Cycles to Close	13 cycles
Cycles to Open	6 cycles

"R" RATED AMP-TRAP FUSE SPECIFICATIONS

2400 VOLTS

I-T-E CAT. NO.	SIZE	CONTINUOUS RATING - 55° C	INTERRUPTING RATING 60HZ
A240R-2R	2R	70A	Single Phase
A240R-3R	3R	100A	80,000 Amperes RMS Asymmetrical at 2400 Volts
A240R-4R	4R	130A	
A240R-6R	6R	170A	
A240R-9R	9R	200A	70,000 Amperes RMS Asymmetrical at 2750 Volts
A240R-12R	12R	230A	
A240R-18R	18R	390A	Three Phase 210 MVA Symmetrical at 2400 Volts
A240R-24R	24R	450A	210 MVA Symmetrical at 2750 Volts

4800 VOLTS

A480R-2R	2R	70A	Single Phase
A480R-3R	3R	100A	100,000 Amperes RMS Asymmetrical at 4800 Volts
A480R-4R	4R	130A	
A480R-6R	6R	170A	
A480R-9R	9R	200A	90,000 Amperes RMS Asymmetrical at 5200 Volts
A480R-12R	12R	230A	
A480R-18R	18R	390A	Three Phase 500 MVA Symmetrical at 4800 Volts
A480R-24R	24R	450A	500 MVA Symmetrical at 5200 Volts

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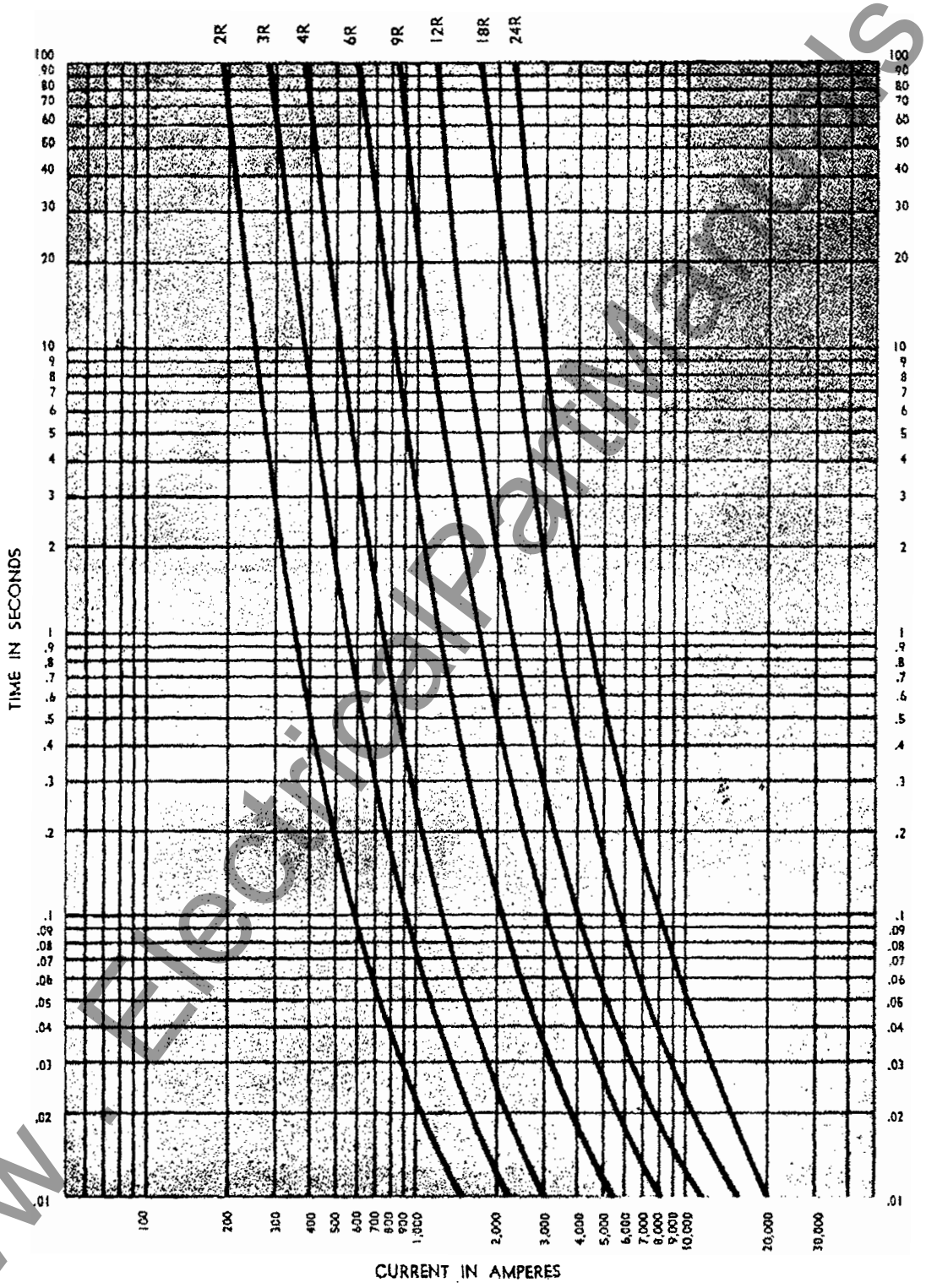
TOTAL CLEARING TIME-CURRENT CURVES
For 2400 and 4800 Volt
A240R and A480R Amp-trap "R" Rated Fuses



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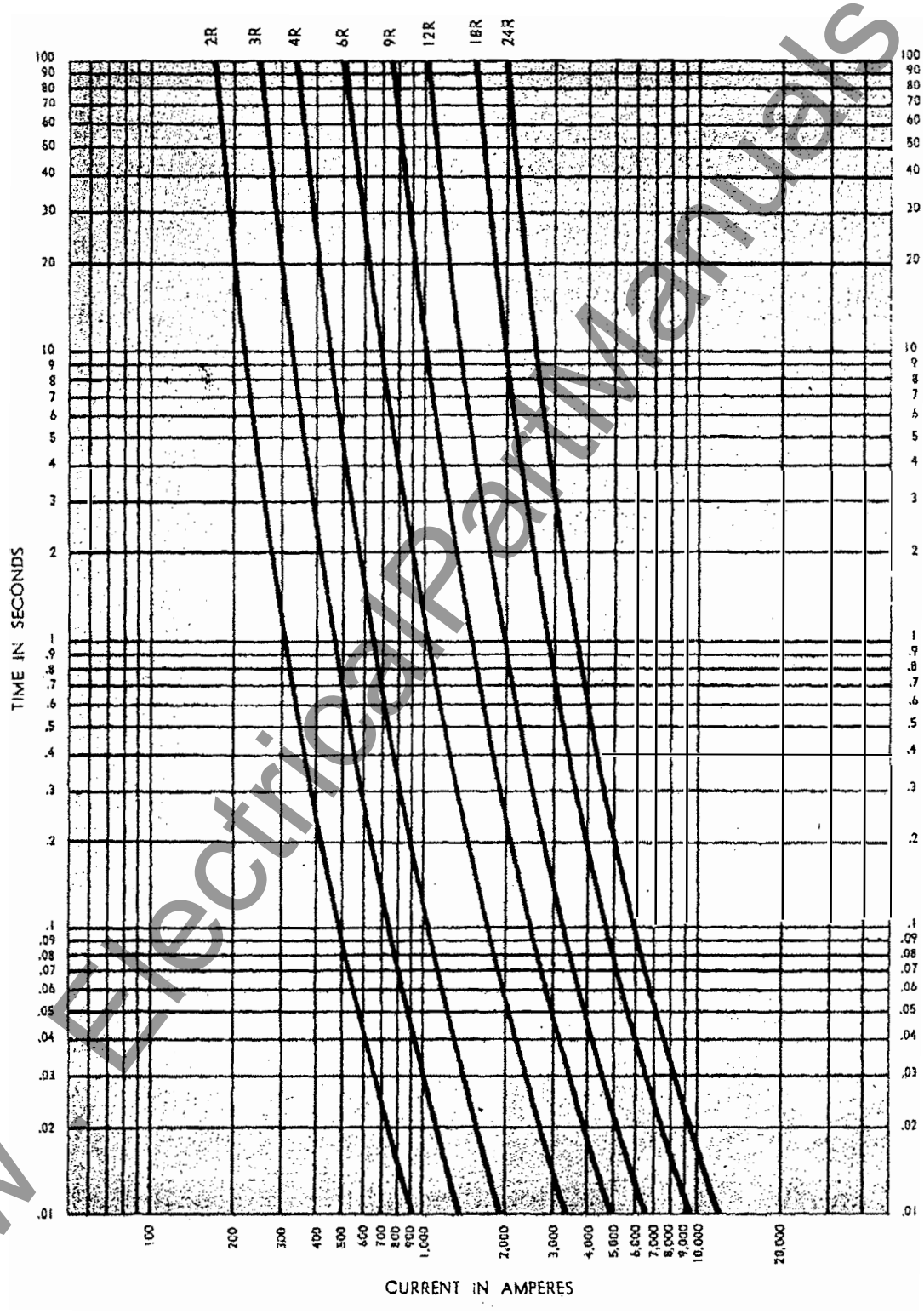
MINIMUM MELT TIME-CURRENT CURVES
For 2400 and 4800 Volt
A240R and A480R Amp-trap "R" Rated Fuses



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INSTALLATION

RECEIVING

Before accepting shipment from the transportation company, a thorough inspection of the Series 7850 High Voltage Starters should be made. If damage has been incurred during transit, the carrier should be notified at once and damage claim filed. I-T-E Imperial Corporation is not responsible for damage after equipment is released to the carrier. I-T-E Imperial Corporation will, upon request, assist in filing a claim with the carrier. The nearest I-T-E Imperial Corporation Sales Office should be notified and all pertinent information provided.

STORAGE

After receipt and in the event that installation cannot be made at once, the unit should be stored in a clean, dry, well-ventilated location. Indoor types of equipment should not be stored outdoors even if completely covered. If units are subjected to either low temperature or moisture, approximately 100 watts of heat should be introduced into each section. It is recommended that the factory-installed plastic covering be left intact until the equipment is ready for installation.

HANDLING

All Series 7850 Starters should be handled with utmost care to avoid possible damage due to severe shock. Shipping skids, plastic covering, and open crating should be left intact as long as possible to facilitate handling and protection. Equipment may be moved with fork lift type equipment or by the use of rollers. Any force used to move equipment should be applied to the skid rather than the units themselves. Equipment should be stabilized while being moved to prevent any possibility of tipping. 7850 Starters may also be moved with an overhead crane. When using overhead equipment, the slings should be supported under the skids and cable spreaders should be used above the equipment to avoid damage. 7850 Starters may be supplied with lifting angles, if specified, to facilitate more convenient overhead handling.

UNCRATING

CAUTION

DO NOT UNPACK UNITS BEFORE READING ALL UNPACKING INSTRUCTIONS FULLY

Care should be taken during unpacking to avoid damage to units. Equipment should be allowed to attain room temperature before removing the covering in order to minimize condensation. When the unit is at room temperature, remove covering and crating material.

"DO NOT MOVE THE OPERATING HANDLE"

For shipping purposes the handle interlock mechanism has been blocked. Damage will occur if the handle is operated before the unit is completely and properly unpacked. Reference Figure No. 7 & 8 for illustration of unpacking procedure.

Unlatch the two (2) 1/4 turn latches and open the door. Remove the tie wraps holding the interlock mechanism behind the operating handle. Remove the shipping stop in the front of the left contactor carriage rail. The contactor is now free to be slowly pulled forward out of the enclosure. The contactor will latch in the test position. See Figure No. 8. Once in this position the protective packing over the fuses and arc chutes should be removed. Reference Figure No. 7. After the equipment is unpacked it should be checked against the packing list. Should any shortages or deviations occur, contact the local I-T-E Imperial Corporation office.

GENERAL PRE-INSTALLATION INSPECTION

1 – With the 7850 PLD lift mechanism or other lifting means in position, defeat the mechanical latch mechanism as described in section "C", page 2. Roll the contactor out of the cabinet and follow steps 2 – 8 below.

2 – Check all parts for secure mounting and good electrical connections. Inspect visually for overall good condition.

3 – Check fuses for snug fit in clips. Check fuse clips for deformity and secure mounting.

4 – By defeating door and handle interlocks (reference interlock section of description, page 2) while contactor is removed from the cabinet, inspect the line finger assembly and operation of isolation shutters.

5 – Manually operate the contactor shaft. Release the shaft and check that the shaft rotates freely and instantly out of engagement.

6 – Inspect cabinet for dents or other damage. Swing door to make sure it pivots easily. Check wiring for secure connections and to be sure insulation is in good condition.

7 – Check control circuit plug and receptacles for bent pins or other damage.

8 – Make sure cable clamps and insulators are in good condition.

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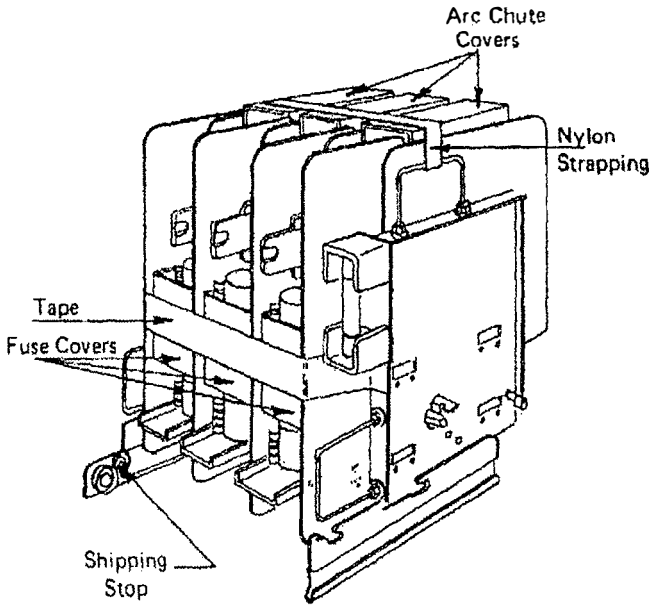

Figure 7
Unpacking Instructions

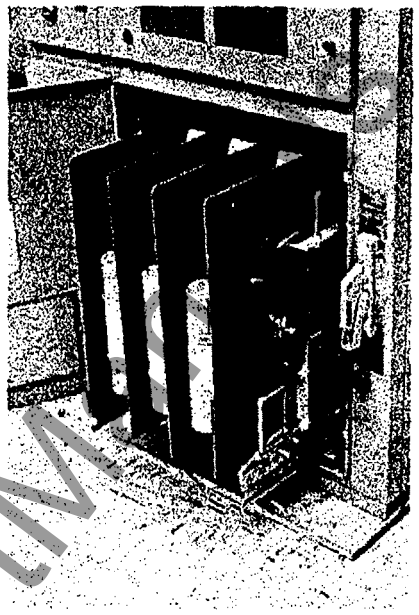

Figure 8
Test Position

POSITIONING

All 7850 Starters should be positioned with as much clearance as possible away from all columns and obstructions. At least the minimum space as allowed by local code should be provided in front of the unit. If the No. 7850 PLD lift mechanism is to be used, allow at least 39" in front of units. The rear of these devices may be placed against the wall, however, the rear covers are removable and the units may be mounted with space behind them for installation convenience. Reference page 9 for basic cabinet dimensions. Refer to outline drawings supplied with specific equipment for exact mounting bolt locations and conduit areas.

Each unit is provided with mounting channels that may either be set on the floor or embedded in it. Although these units are free standing and self-supporting, they should be securely bolted down with anchor bolts to eliminate the possibility of "walking" in the event of a seismic event. In addition, all units should be level to insure proper operation. When positioning the Type V1 wall-mounted unit, care should be taken that adequate support is provided for specified weight.

ELECTRICAL CONNECTIONS

Line and load leads can be connected to the terminals provided simply by removing the contactor from the cabinet. Be sure to disconnect the control plug before attempting removal of contactor.

To simplify wiring when heavy cables are required, the contactor carriage assembly and the horizontal frame work between compartments may be removed. Reference Figure No. 9.

Line connections should be made first. On units provided with horizontal bus, a separate incoming line section can be supplied for cable sizes as specified by the customer. When separate incoming line section is not specified, the units are bused to the supply. Units without horizontal bus have the terminals located behind the removable red isolation barriers in the rear of the cabinet. Remove bolts No. A, Figure 10, then remove barriers No. B. Line cables coming into the line compartment of the enclosure are connected to terminals No. C. After connection is made, replace isolation barriers No. B.

Load cables are connected directly to the stationary stabs or to optional load terminal shown on outline drawing supplied with the specific equipment. On V4 and V5 type enclosures, load terminals are located behind the low voltage compartment.

These terminals can be reached by removing the barrier between the contactor compartment and the terminal compartment. See Figure No. 11.

External control connections are made to the terminal blocks located in the low voltage compartment. Location of low voltage compartment is specified on the dimensional drawing which is supplied with the individual equipment.

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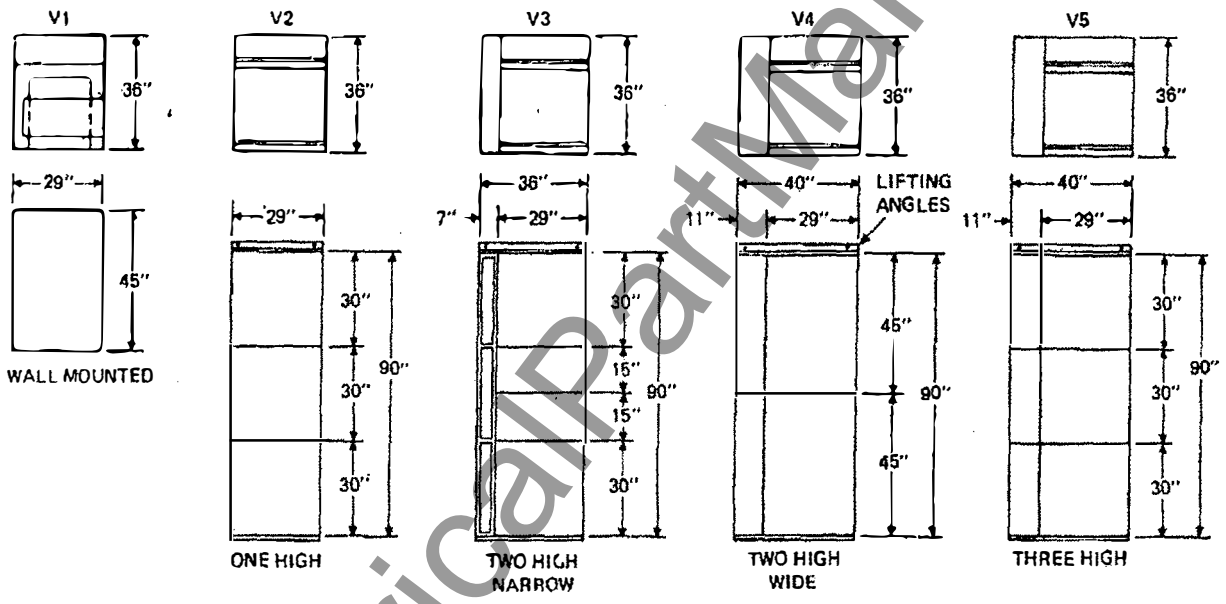
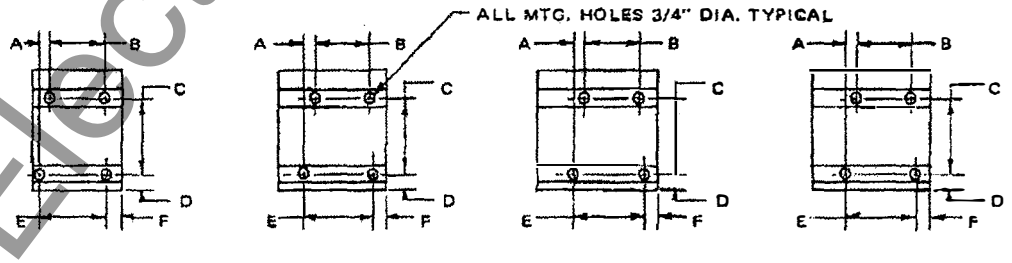
HIGH VOLTAGE STARTER ENCLOSURES

Enclosure Series 7850	Dimensions – Inches Height	Depth	Width	Space Modules Available
V1	45	36	29	1
V2	90	36	29	1
V3	90	36	36	2
V4	90	36	40	2
V5	90	36	40	3

TOP VIEW



FRONT VIEW



MOUNTING LOCATIONS (Dimensions in Inches)

Unit	A	B	C	D	E	F
V2	3-9/16	17-1/4	20-7/8	2-1/4	24-1/4	2-3/8
V3	3-9/16	17-1/4	20-7/8	2-1/4	24-1/4	2-3/8
V4	3-9/16	17-1/4	20-7/8	2-1/4	24-1/4	2-3/8
V5	3-9/16	17-1/4	20-7/8	2-1/4	24-1/4	2-3/8

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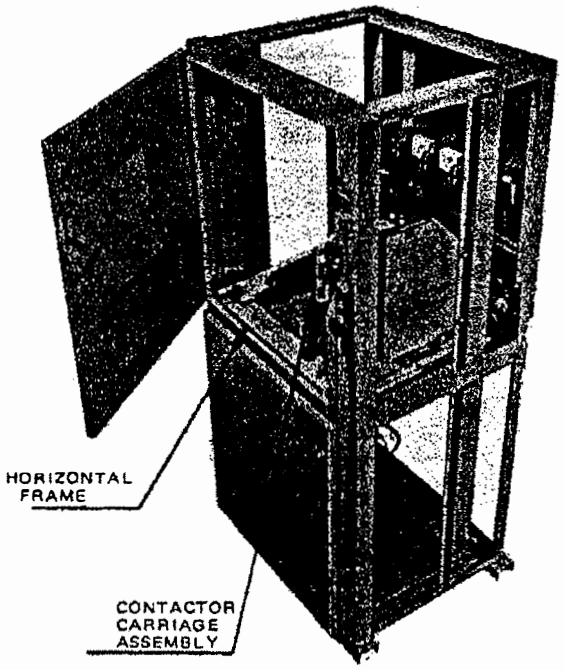

Figure 9

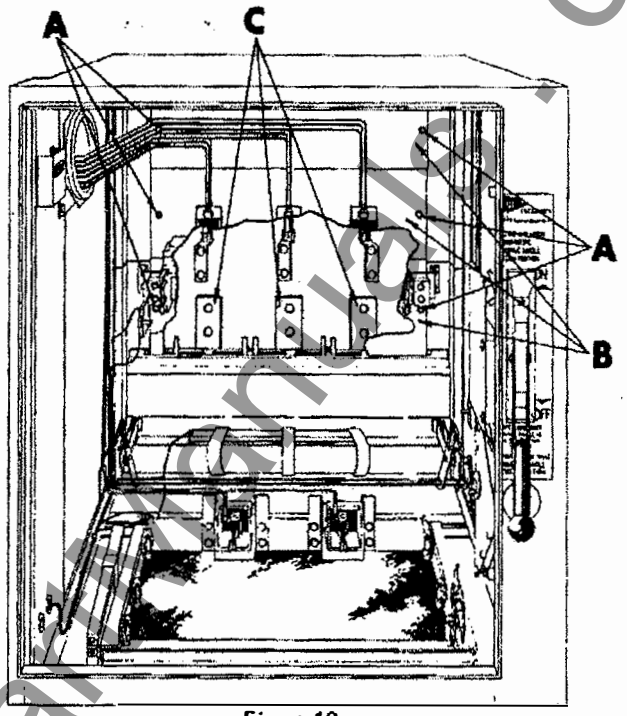

Figure 10
Wiring Without Horizontal Bus

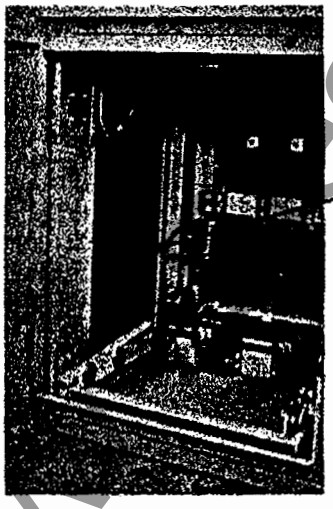

Figure 11
Load Terminals Access on Type V4 and V5 Units

FINAL CHECKOUT AND INSTALLATION

CAUTION

MAKE SURE MAIN SWITCH IS LOCKED OPEN BEFORE INSTALLING CONTACTOR

Install contactor in the cabinet in the test position. See Figure No. 8 for test position. Connect the control plug. Connect 120 volt AC test source to the proper test terminals as shown in the wiring diagram provided with the specific device. (The high voltage control transformer is not connected to the circuit in the test position.) Move the "TEST-RUN" selector switch, located in the low voltage compartment, to the "TEST" position. Energize the contactor. Tilt back the arc chambers and inspect the contacts to be sure they mate fully and evenly across the full surface of the contacts. Return the arc chutes to their normal position. Check that the arc chutes are fully engaged. Reference Figure No. 12. While the unit is energized, depress the anti-single phasing bar, the contactor should de-energize. Re-energize the unit and push the contactor back into the enclosure to its stop position. The contactor should de-energize during this procedure. If the contactor has not de-energized by the time the unit has reached this position, return it to the test position. De-energize the contactor using the control circuit stop button. Disconnect the control plug and remove the unit from the cabinet. Check the operation of the test power micro-switch at the back of the left contactor carriage rail and adjust or replace as necessary. See "interlock systems" section of description, page 2, section E.

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Figure 12
Engagement of Arc Chutes

All other contactor operating assemblies have been set and checked at the factory. If, during start up, the main contactor does not close, refer to maintenance section for trouble shooting information.

OPERATION

CAUTION

BEFORE PLACING UNIT INTO OPERATION, VERIFY THAT ALL NECESSARY FIELD INSTALLATION TESTS, INCLUDING DIELECTRIC AND PROPER PHASING, HAVE BEEN MADE.

With the operating handle in the "Off" position, check to be sure all parts removed during inspection and testing have been replaced. Close the doors and latch the two (2) 1/4 turn latches. The operating handle may now be moved to the "On" position, moving the contactor into the engaged position. Complete electrical sequence of a typical starter can be traced on the schematic diagram, Figure No. 13.

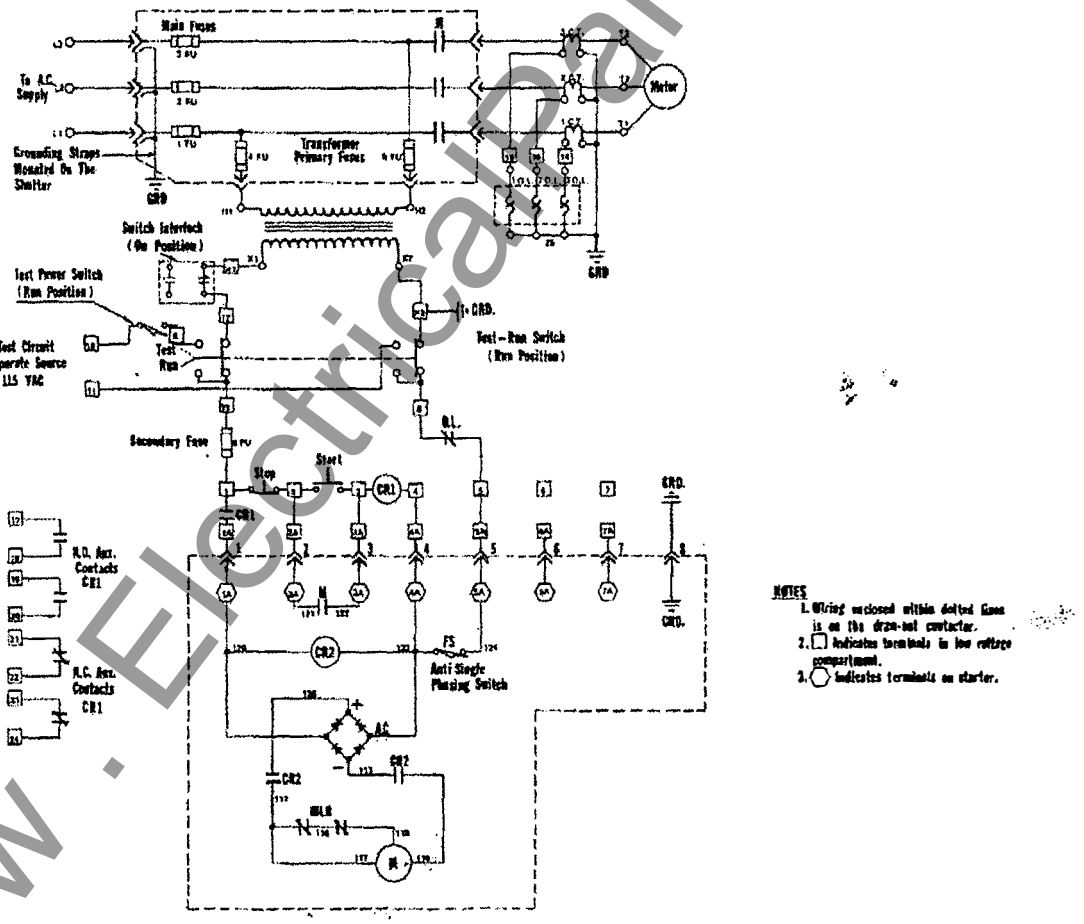

Figure 13
Schematic Diagram 5000 Volt Starter

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ROUTINE INSPECTION AND MAINTENANCE

CAUTION

MAKE SURE THE CONTACTOR IS DISENGAGED BEFORE ANY INSPECTION OR MAINTENANCE PROCEDURES ARE ATTEMPTED.

Under normal operating conditions, starters should be inspected monthly. In applications where frequent starting is required or where unusually dirty or corrosive conditions exist, a more frequent inspection interval is recommended.

Contactors should be routinely cleaned and all dirt and dust removed. Special attention should be paid to the stationary and movable contact faces. If the contacts are excessively pitted or worn, they should be replaced.

TROUBLE SHOOTING CHART

PROBLEM	PROBABLE CAUSES	CORRECTIVE ACTION
Contacts chatter	Loose connection in control circuit	Tighten connections in control circuit
	Defective control relay	Check control relay - replace as required
	Defective magnet	Check coil or rectifier
	Low control voltage	Check line voltage
Contacts overheat	Loose connection	Tighten connections
	Contacts not making firmly	Check for weak or deformed contact spring - replace as required
	Dirt or foreign matter on contact surfaces	Clean contacts
	Contact material consumed	Replace contacts
Contactor will not close	Control circuit or main fuses blown	Inspect fuses, replace if blown
	Magnet coil defective	Check magnet operation - replace coil as necessary
	Control relays defective	Check control relays and replace if defective
	Potential transformer defective	Check potential transformer - replace if defective
	Overload relay defective	Check overload relay and replace if defective
	Rectifier defective	Check rectifier and replace if defective
	Remote reset button or solenoid defective	Replace defective parts
	TEST-RUN switch in test position	Move switch to RUN position
	Anti-single phase	Check adjustment, alignment and switch function - adjust per figure 1
	Electrical interlocks defective	Check function of interlocks - replace as required

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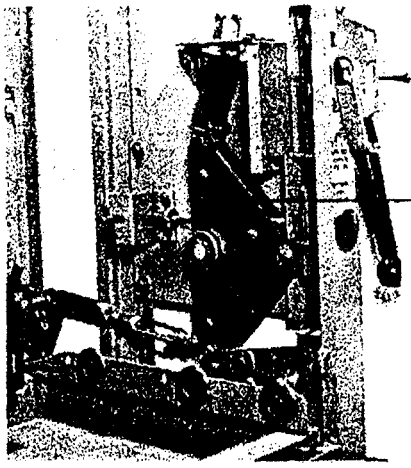
Cabinet – Internal Components



No. 160045000 Handle Assembly – 1 Per Switch

No. 170019600 Over-Center Mechanism Assembly – 1 Per Switch

Figure 14

No. 170019100 Rack Assembly –
1 Per Switch

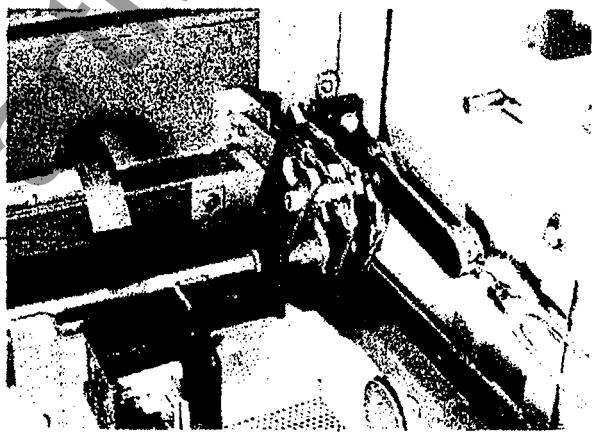
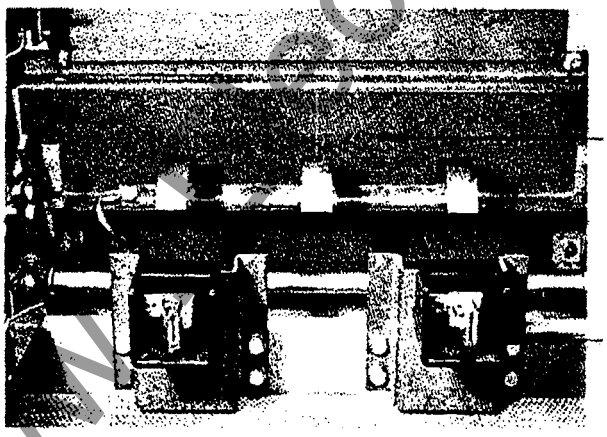


Figure 15



No. 160044900 Shutter and Ground Assembly –
1 Per Switch

No. 150115000 Stab Assembly (Transformer to
Bus Bar) – 2 Per Switch

Figure 16

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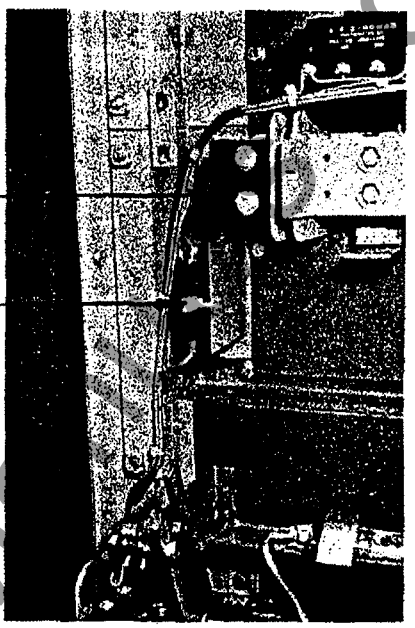

Figure 17

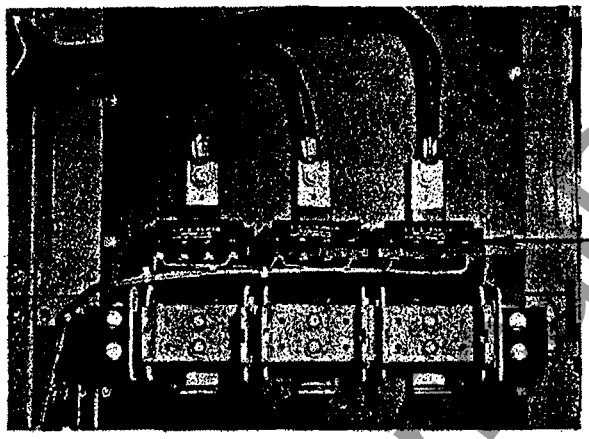

Figure 18

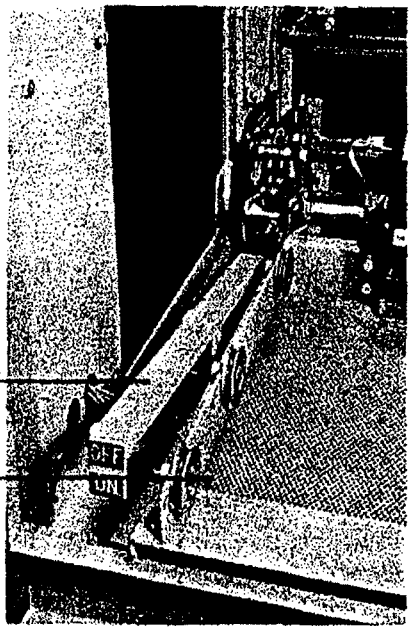

Figure 19

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Figure 20. Contactor – Exploded View

Fig. & Index No.	Part Number	Description	Req'd Per Unit
20–1	150137801	Leftside Frame Assembly	1
20–2	150137802	Rightside Frame Assembly	1
20–3	150118100	Moving Contact Support Assembly	1
20–4	064449000	Stationary Contact Support	2
20–5	150108700	Stationary Contact Support Assembly	1
20–6	064449001	Stationary Contact Support	2
20–7	150119100	Bus Bar Assembly Center Pole	1
20–8	150120700	Bus Bar - Fuse to Stab - Line Side	2
20–9	150120600	Bus Bar - Fuse to Contact - Line Side	3
20–10	140278800	Stationary Contact Assembly	3
20–11	150104500	Connector – Blow Out Coil	3
20–12	140279000	Nut Plate – Blow Out Coil	3
20–13	140277600	Insulator – Blow Out Coil	3
20–14	140296300	Stab Clip	3
20–15	150133901	Core Support – Left Side	3
20–16	150133902	Core Support – Right Side	3
20–17	150104600	Blow Out Coil Assembly	3
20–18	150103600	Blow Out Core Assembly	3
20–19	140289000	Shim Washer – Main Shaft	2
20–20	150101800	Bearing – Main Shaft	2
20–21	140277800	Contact Spring	3
20–22	700057989	Separable Contact Finger Assembly	6
20–23	150118400	Arc Horn & Support Assembly	3
20–24	150107200	Flexible Shunt Assembly	3
20–25	150105400	Movable Contact Assembly	3
20–26	150108800	Fuseblock Assembly Control Fuse	4
20–27	140295700	Insulator – Fuseblock – Primary	2
20–28	150117200	Main Shaft Barrier	4
20–29	140295800	Service Handle	4
20–30	160043101	Left Hand Slide	1
20–31	160043102	Right Hand Slide	1
20–32	160042500	Fuse Clip	6
20–33	150105100	Fuse Clip Support Spring	6
20–34	140277900	Fuse End Stop & Guide	3
20–35	See info supplied with equip	Main Fuse	3
20–36	160043400	Arc Chute Assembly	3
20–37	150122700	Lever Assembly	1
20–38	100288800	Nameplate	1
20–39	140299300	Insulator – Microswitch	1
20–40	700231520	Microswitch	1
20–41	150123004	Leftside Support Assembly	1
20–42	150123005	Rightside Support Assembly	1
20–43	700145050	Flat Head Cotter Pin	2
20–44	011027900	Collar	2
20–45	140299400	Support	3
20–46	140299200	Plunger	3
20–47	012474900	Contact Carrier	3
20–48	700099600	Glastic Insulator	4
20–49	140296300	Stab Contact	2
20–50	021002400	Spring	1
20–51	140283400	Stop – Handle Release Mechanism	1
20–52	160042700	Core Support Assembly	1
20–53	150118700	Coil – 110-120 V 50/60 Hz	1
20–54	150134100	Connector Cord Assembly	1
20–55	700033177	Wire Clamp	1
20–56	160043500	Support Bracket	1
20–57	033788805	Channel For Terminal Blocks	1
20–58	700016320	3-Pole Terminal Block	3
20–59	700228275	Terminal Marker Strip	1
20–60	034238000	Rectifier Assembly	1
20–61	150092900	Adaptor Plate	1
20–62	150117400	Support for Contact Block	1
20–63	140292600	Contact Block Insulator	1
20–64	150118300	Contact Block	1
20–65	850800060	Relay	1
20–66	140277000	Stop – Armature Frame	1
20–67	150104200	Frame Assembly	1
20–68	150104000	Armature	1
20–69	140295000	Inner Plate	1
20–70	140295200	Bumper	1
20–71	010325300	Spring	1
20–72	140273400	Armature Striker Plate	1
20–73	140273300	Striker Plate Shim	1
20–74	150117500	Lever – Contact Block	1
20–75	023604100	Reset Button End	1

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Figure 20. Contactor – Exploded View – Continued

Fig. & Index No.	Part Number	Description	Req'd Per Unit
20–76	010325300	Spring	1
20–77	140295400	Spacer	1
20–78	150125200	Support - Arm - Visual Indicator	1
20–79	140300200	Visual Indicator Arm Assembly	1
20–80	140279600	Spring Return Clip	1
20–81	140288300	Return Spring – Armature	1
20–82	700020010	Eye Bolt	1
20–83	140280300	Roller for Carriage	2
20–84	140284200	Slide Latch Stop	1
20–85	See info supplied with equip	Control Fuse	2
20–86	140296700	3/8 x 1-1/4 Socket Hd. Shoulder Scr.	1
20–87	700188050	No. 6-32 x 1.125 Rd. Hd. SMS	2
20–88	700129100	No. 6-32 Hex Nut	4
20–89	700249750	No. 6 Lock Washer	2
20–90	700249425	No. 6 Flat Washer	6
20–91	700199810	No. 10-32 x 1/2" Pan Hd. SMS	19
20–92	700199575	No. 10-32 x 3/8" Hex Indented W/W T F	1
20–93	700250950	No. 10 Split Lockwasher	33
20–94	700250550	No. 10 Flat Washer	14
20–95	700130200	No. 10-32 Steel Hex Nut	4
20–96	700202350	1/4-20 x 3/8" Phil. Pan Hd. TT Screw	2
20–97	700204250	1/4-20 x 1" Hex Hd. SCS	3
20–98	700203150	1/4-20 x 5/8" Hex Hd. SCS	11
20–99	700203652	1/4-20 x 3/4" Hex Hd. SCS	6
20–100	700204950	1/4-20 x 1-1/4" Hex Hd. SCS	1
20–101	700205700	1/4-20 x 1.750" Hex Hd. SMS	1
20–102	700251950	1/4 Split Lockwasher S.S.	26
20–103	700251605	1/4 Flat Washer	20
20–104	700130800	1/4-20 Steel Hex Nut	15
20–105	700208100	5/16-18 x 5/8" Hex Hd. SCS	5
20–106	700208750	5/16-18 x 1" Hex Hd. SCS	5
20–107	700209200	5/16-18 x 1-1/4" Hex Hd. SCS	20
20–108	700209450	5/16-18 x 1-1/2" Hex Hd. SCS	15
20–109	700209850	5/16-18 x 2" Hex Hd. SCS	18
20–110	700252625	5/16 Split Lock Washer	62
20–111	700252450	5/16 Flat Washer - Type KD (S.A.E.)	59
20–112	700131300	5/16-18 Steel Hex Nut	53
20–113	700131760	5/16-18 Nylon Insert Nut	2
20–114	700211800	3/8-16 x 1-1/4" Hex Hd. SCS	18
20–115	700253250	3/8 Split Lock Washer	29
20–116	700131900	3/8-16 Steel Hex Nut	33
20–117	700254425	3/8 Belleville Washer	9
20–118	700213510	1/2 x 1-1/4" Socket Hd. Shoulder Scr.	2
20–119	700129900	No. 10-24 Steel Hex Nut	2
20–120	700211052	3/8-16 x 5/8" Hex Hd. SMS	3
20–121	700253300	3/8 Lock Washer	3
20–122	010543000	3/8 S.S. Flat Washer	3
20–123	700130350	No. 10-32 Palnut	1
20–124	700201150	No. 10-32 x 1-1/4" Round Hd. SMS	1
20–125	700251400	No. 10 Flat Washer S.S.	1
20–126	700203750	1/4-20 x 7/8" Fil. Hd. SMS	1
20–127	700130950	1/4-20 Palnut	1
20–128	700194250	No. 10-24 x 3/4 Fil. Hd. SMS	1
20–129	700129950	No. 10-24 Palnut	1
20–130	700201000	No. 10-32 x 1" Rd. Hd. SMS	3
20–131	700130175	No. 10-32 Hex Nut	3
20–132	700185950	No. 6-32 x 3/8" Phil. Pan Hd. Taptite Scr.	2
20–133	700191050	No. 8-32 x 5/8" Rd. Hd. SMS	2
20–134	700250125	No. 8 Split Lock Washer	2
20–135	700250000	No. 8 Flat Washer	2
20–136	700198800	No. 10-32 x 3/8" Phil. Pan Hd. Taptite Scr.	2
20–137	700189200	No. 8-32 x 1-1/4 Phil. Hd. Taptite Scr.	2
20–138	700249850	No. 6 SS Split Lock Washer	2
20–139	700186700	No. 6-32 x 1/2" Phil. Pan Hd. SMS Swage	6
20–140	700199000	No. 10-32 x 3/8" Pan Hd. SMS	9
20–141	700253100	3/8" Flat Washer	18
20–142	700202850	1/4-20 x 1/2" Rd. Hd. SMS	3
20–143	700252550	5/16 Flat Washer – U.S. Std.	6
20–144	700211550	3/8-16 x 1" Hex Hd. SCS	3
20–145	140292400	Retaining Nut	3

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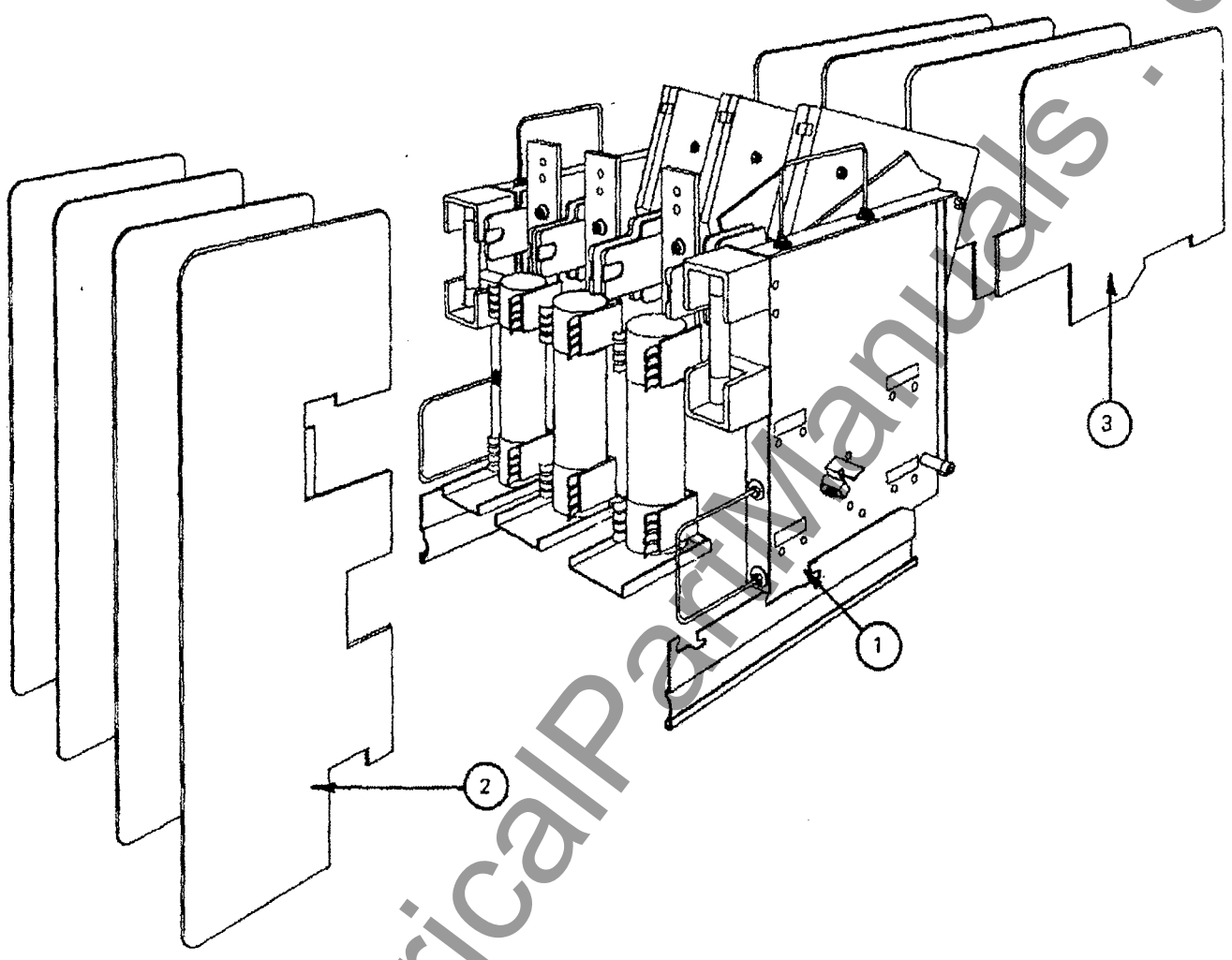

Figure 21

Fuse and Arc Chute Barriers

Fig. & Index No.	Part Number	Description
21-1		Typical Controller
21-2	150104800	Fuse Barriers (4 required)
21-3	150104700	Center Switch Barrier (4 required)

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