TYPE C AMPGARD STARTER

HIGH VOLTAGE (25L4C AND 50L4C) NEMA CLASS E2

DESCRIPTION

APPLICATION

The Westinghouse Ampgard is a high voltage starter designed for starting and controlling AC motors with horsepower and voltage ratings as indicated in the Rating Table below. Check Table and starter nameplate against motor nameplate and power system. The Type C model includes a side operated isolating switch, with the handle of a two-high starter less than 78 inches above the mounting surface.

This industrial type control is designed to be installed, operated, and maintained by adequately trained workmen. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, checkout, safe operation, or maintenance. Care must be exercised to comply with local, state, and national regulations, as well as safety practices, for this class of equipment.

ENCLOSURE

Ampgard starters are supplied in a basic NEMA 1 steel floor mounted enclosure that is 36" wide X 30" deep X 90" high. A 10" high main bus enclosure can be added at the top which increases the total enclosure height to 100". Each basic 90" high enclosure can accommodate one or two Ampgard starters depending on the requirements.

INSTALLATION

Prepare a level mounting per standard floor plan (Fig. 2) or per special drawings supplied separately. Installation procedures are specified on 6379D27H01, a copy of which is supplied with this leaflet. Following the recommended procedures will save you time. The cable connections can be made by access through the front of the enclosure. When there is access space behind the installation the rear panel of the enclosure can be removed in order to facilitate the wiring. Adequate space has been provided near the left hand enclosure wall for high voltage line and load cables while low voltage cables may be conveniently arranged near the right hand enclosure wall.

MECHANICAL INTERLOCKS

BEFORE PUTTING THE STARTER INTO SERVICE, IT IS RECOMMENDED THAT THE USER BECOME FAMILIAR WITH THE MECHANICAL INTERLOCKS.

GENERAL

This ampgard starter uses the LF50H430C contactor, LFR4C Isolating Switch and current limiting motor starting fuses. These three major components are arranged as shown in Fig. 3 with the starter shown in the de-energized position. LFC or through type current transformers are mounted on the L.H. enclosure wall. The contactor and isolating switch are mounted on rails for ease of installation and maintenance.

The flow of power (Fig. 4, Pg. 3) from incoming line terminals (1) to lower stab assembly (11) is directly through the three major components eliminating need for making any internal bus or cable connections.

The line stab assembly mounted at the back of the enclosure serves as the starter incoming line terminals (1). The stabs are engaged by the fuse jaws (2) of the isolating switch. The fuse jaws (2) also engage the line ferrules (3) of the motor starting current limiting fuses (4). The load

Starter Type	Voltage	Freq. Cyc.	Contactor 8-Hour Enclosed Rating (Amperes)	SYMMETRICAL # Phase Available Short Circuit Capacity in KVA	Horseposer Rating		
					Synchronous		Induct
					100% P.F.	80%P.F.	Motor
Ampgard 25L4C	2200-2500	50-60	360	200,000	1750	1500	1500
Ampgard 50L4C	4000-5000	50-60	360	350,000	3000	2500	2500

The isolating Switch is not load break nor load make. It is to be operated only when the line contactor is open. Mechanical Interlocking is intended to prevent manually opening or closing a power load. Do not connect auxiliary control devices to the control circuits to exceed max. total control burden of 750 VA at 2500 volts or 600 VA at 5000 volts.

Fig. 1. Rating Table

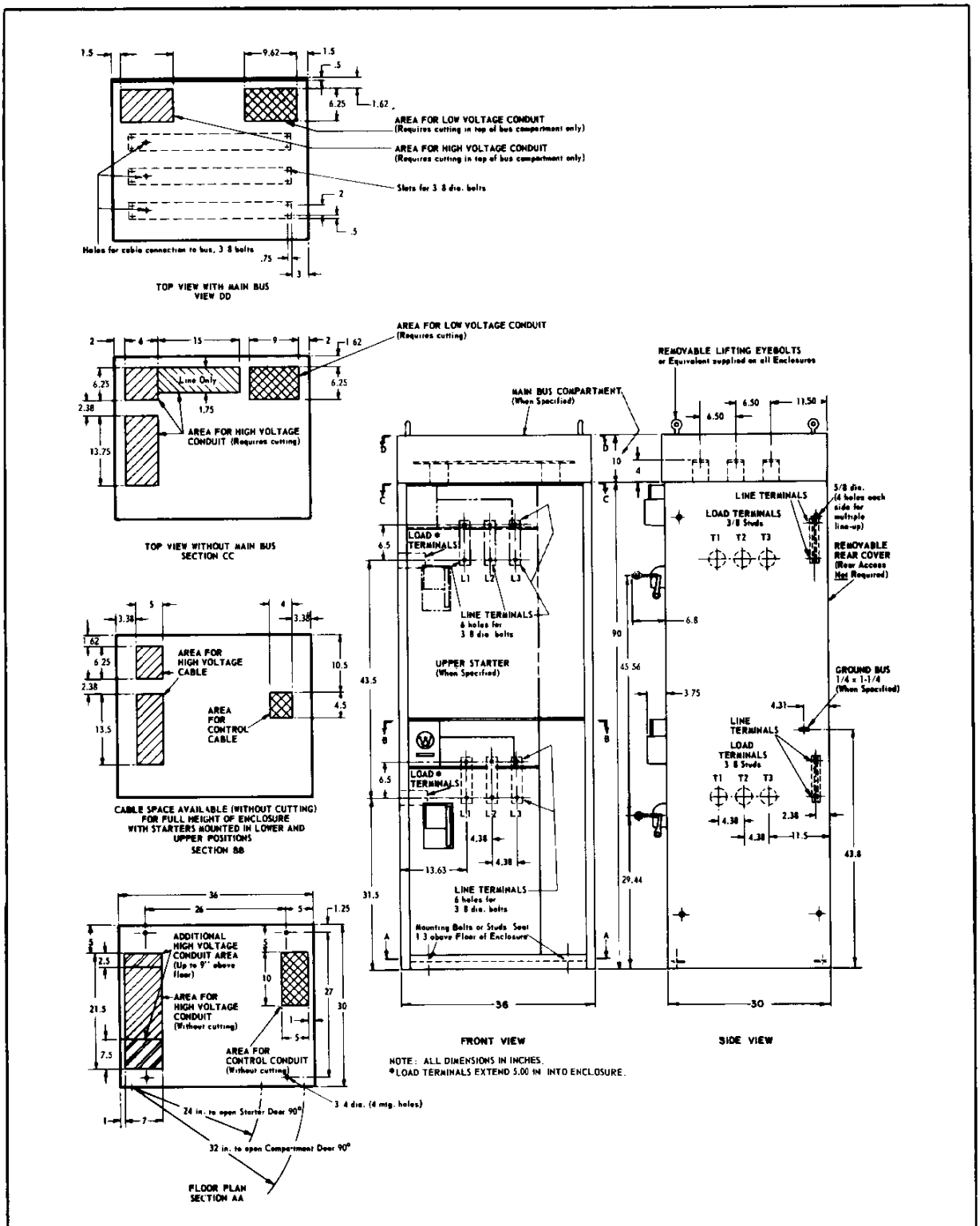


Fig. 2 Mounting and Installation Dimensions of Type C Ampgard Starters (Dwg 6486D79)

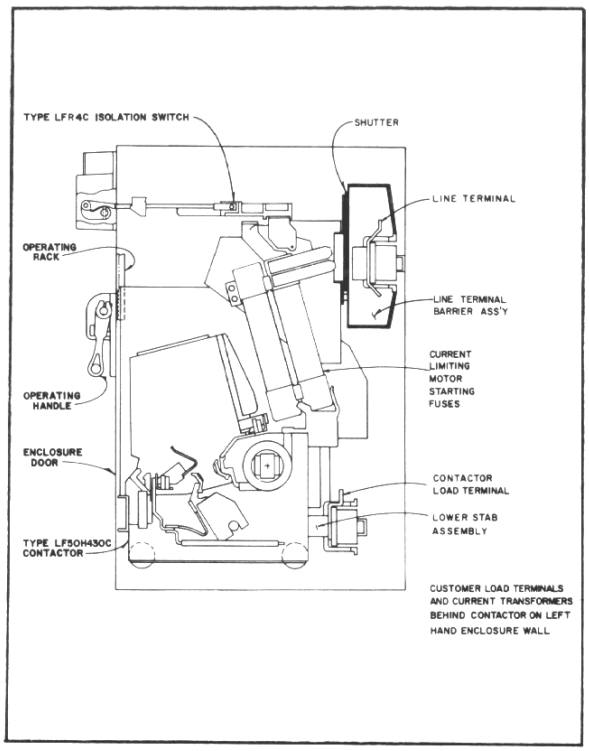


Fig. 3 (Dwg 6486D80)
Starter in De-energized Position

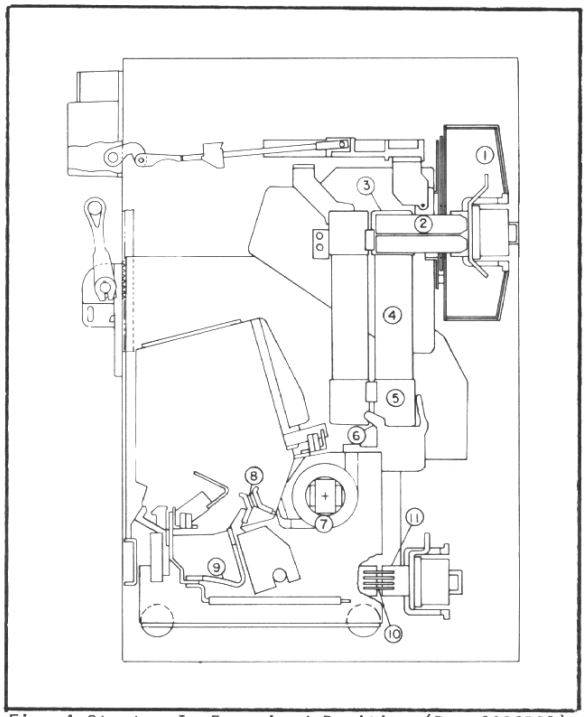


Fig. 4 Starter In Energized Position (Dwg 6486D81)

ferrules (5) fit into fuse holders (6) which are part of the contactor assembly. The electromagnetic blowout coils (7) are connected to the fuse holder (6). The stationary contacts of (8) are connected to the electromagnetic blowout coils (7). The moving contacts of (8) are connected to shunts (9). The shunts are connected to spring loaded contact jaws (10) which engage the lower stab assembly (11). Connections are made from the lower stab assembly (11) through current transformers to motor load terminals supported on standoff insulators mounted on the L.H. side wall of the enclosure (Fig. 2).

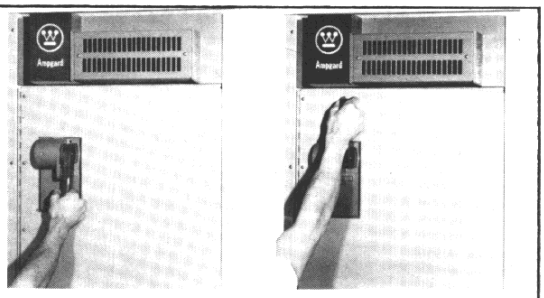
Isolating Switch Handle (Fig. 5). The starter is shipped with the isolating switch in the on position. The isolating switch handle is operated by moving it through a vertical arc from the ON to the OFF position.

With the handle in the OFF position, up to three padlocks can be used to lock the switch, preventing the handle from being moved to the ON position, or the high voltage door being opened. This prevents both unauthorized entry into the high voltage compartment and accidental closing of the isolating switch while maintenance work is being done.

Door Interlocks

With the isolating switch handle in the OFF position the high voltage door can be opened. As soon as the door opens, a mechanical interlock becomes effective. It is designed to prevent the user from accidentally operating the isolating switch handle and closing the starter on to the line with the high voltage door open.

This interlock is a spring loaded latch located just above the handle housing (Fig. 6). This



A (Photo B-24239) B (Photo B-24240)

The operating handle has two distinct positions.

In the OFF position (A), the handle is down, the isolating switch is open, the starter is de-energized and grounded, and the high voltage door may be opened.

In the ON position (B), the handle is up, the isolating switch is closed, the high voltage door is mechanically interlocked shut, and the starter may be energized.

prevents the handle from being accidentally returned to the ON position. This interlock may be deliberately cheated by depressing the plunger with a screwdriver so that the handle can be moved to the ON position to observe the operation of the isolating switch during installation or maintenance. To do this, it is necessary to deliberately cheat the interlock. The operator should be aware of what he is doing and take appropriate safety precautions. The door interlock is automatically reset when the handle is returned to the OFF position.

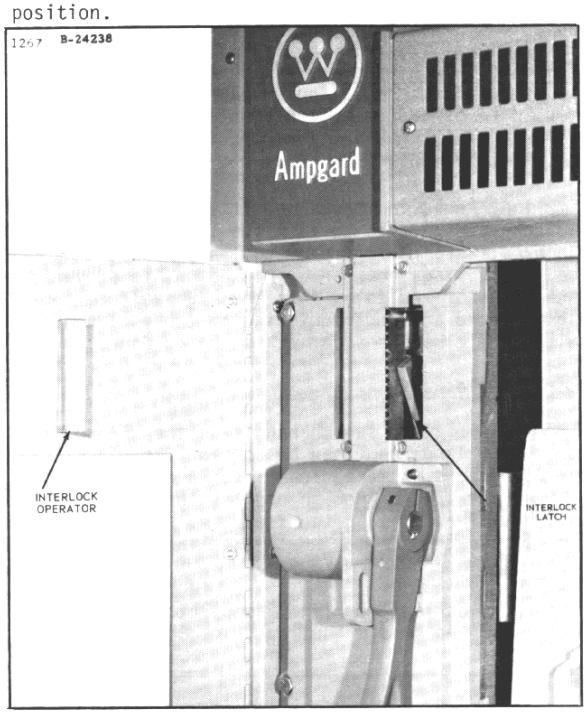


Fig. 6 (Photo B-24238)
Interlock Operator and Interlock Latch

Contactor To Isolating Switch Mechanical Interlock (Fig. 7). The Type LFR4C Isolating Switch functions only as a disconnect; it must never close, or interrupt a power load. To prevent this, the interference lever roller (30) on the contactor is engaged by a cam (24) on the isolating switch. If the contactor is closed, the isolating switch cannot be moved either from the OFF to the ON, or from the ON to the OFF positions. This is a positive interlock, it cannot be cheated without disassembly of the interlocking parts.

Line Stab Insulating Shutter. Both the shutter and the rear line stab barrier are mounted in the starter structure and are intended to prevent accidental access to the line bus. As the isolating switch is opened, the molded cam surface of the sliding tray mechanically drives the insulating shutter closed across the three line stab openings in the rear barrier. As the shutter closed the openings, green and white striped labels are uncovered to visually indicate that the shutter is closed. With the isolating switch in the full open position, the fuse jaw finger assemblies and the line side of the main fuses are connected to the ground bar.

As a final precaution before touching any of the electrical parts of the starter, visually check to make certain that the shutter is closed, the green and white striped labels are visible, the grounding fingers are in contact with the ground bar, and the tips of the fuse fingers are visible.

When the isolating switch is removed from the starter structure, a latch lever on the shutter assembly is activated. It is designed to hold the insulating shutter closed. This latch may be deliberately cheated and the shutter moved to the open position. CAUTION should be observed since the exposed line terminal stabs of the starter may be energized at line potential.

When the isolating switch is replaced in the structure, the latch member is automatically released to allow the shutter to operate normally.

CONTROL PANEL AND LOW VOLTAGE COMPONENTS

The low voltage components comprising the interposing relay, protective relays and rectifier, are mounted on a fixed panel. The control power transformer, nominally rated at 750 VA up thru 2500 volts 600 VA from 2501 to 5000 volts, single phase, is bolted to the L.H. contactor frame. The primary of the control transformer is connected to the line through the current limiting motor starting fuse

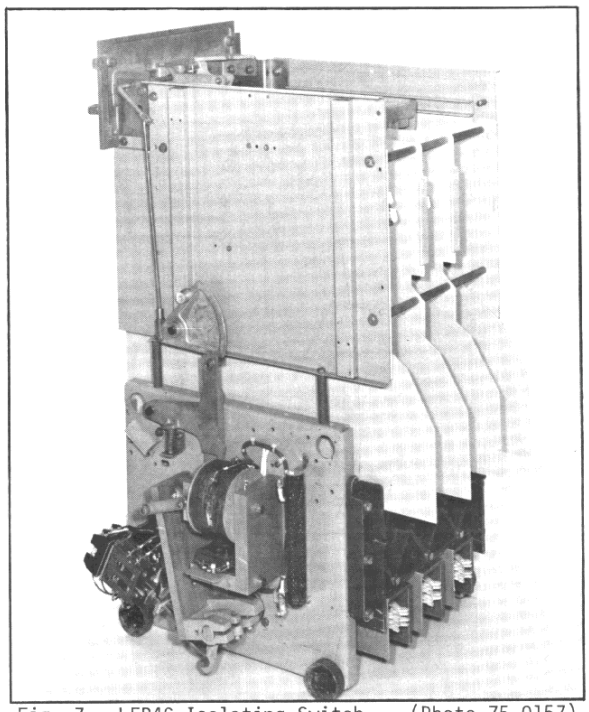


Fig. 7. LFR4C Isolating Switch (Photo 75-0157)
and Type LF50H430C Contactor

assembly, and is protected by two additional low rating current limiting fuses mounted in insulating fuse blocks located in front of the transformer. The secondary of the control transformer supplies power to the 115 volt ungrounded control circuit through 115 volt, 10 ampere fuses mounted on the right hand contactor frame. When specified, control transformers with 230 volts secondaries can be supplied.

To energize the primary of the control transformer, the contactor must be pushed into the enclosure to the latched position, the main power fuses must be installed, and the isolating switch must be closed on to the line.

Test-Run Plug. For convenience during maintenance, when it may be desirable to energize the contactor or the control circuit, a control plug is provided. WITH THE ISOLATING SWITCH OPEN, disconnect the plug from the socket, under the fuse blocks on the contactor, and plug it into a 60 cycle, 115 volt single phase extension cord or 230 volt when specified. Special plugs may be provided when specified by the user.

Disconnect this temporary circuit and restore the plug to its socket on the contactor before returning unit to service.

SHORT CIRCUIT AND OVERLOAD PROTECTION

Electrical protection is provided by the current limiting motor starting power fuses and by the overload relay. The current limiting motor starting power fuses have a special time/current characteristic for motor service, and this characteristic is coordinated with the characteristics of the overload relay. Currents greater than full load motor current, up through locked rotor current, will operate the overload relay and trip the contactor before the fuses blow. This prevents unnecessary blowing of the fuses. Since the interrupting capacity of the contactor is 50,000 KVA, the power fuses must operate faster than the over load relay when the current corresponding to 50,000 KVA exceeds this value, in order to prevent damage to the starter or motor. In all faults above 50,000 KVA and within the rating of the equipment, the current limiting motor starting fuses will operate first.

The current transformers, overload relay heaters, and power fuses are coordinated with the motor characteristics, so that the starter must be used with the motor for which it was designed. Motors with special characteristics or loads requiring special protection often require other or additional protective relays. Consult the instruction leaflet for that particular protective relay before attempting any adjustment or service.

START-UP PRECAUTIONS

Before attempting to put a newly installed starter into service, study the wiring diagram and available instruction literature.

General Precautions. Be sure that:

1) The corresponding starter and motor are connected as shown on the Westinghouse drawings. This is particularly essential in this class of motor starter as the fuse ratings, current transformers, and overload heater elements are based on the characteristics of the particular motor to be controlled.

2) The starter is connected to a suitable power supply with characteristics agreeing with motor and starter nameplate markings.

3) The motor and machine it drives are properly lined up, bolted down, lubricated, free of obstructions, and ready to go.

4) Connections are neat, tight, of proper capacity and in agreement with the diagram.

5) Equipment has been cleaned of dirt, scraps of wire, tools, and all other foreign material.

6) THE INSULATION LEVEL OF THE STARTER SHOULD BE CHECKED BEFORE THE STARTER IS ENERGIZED. Refer to maintenance and repair section for additional information regarding the checking of insulation level.

7) All possible safety precautions have been taken and the installation conforms with applicable regulations and safety practices.

Isolating Switch. Be sure that:

1) The main current limiting motor starting power fuses have been properly installed. See the permanent operating instructions on the inside of the high voltage door.

2) The mechanical interlocking system operates freely, is properly adjusted, and will operate to provide the intended protection.

Contactor. Be sure that:

1) The blowout iron is forward and down. If the arc boxes won't go into place the blowout iron is probably in the wrong position.

2) The arc boxes are in the operating position. Push them firmly into place to be sure that the front knife blades engage and deflect the knife jaws mounted adjacent to the main contacts.

3) THE FOUR CONTACTOR PHASE BARRIERS ARE INSTALLED.

4) The drawout latch, located on L.H. contactor end plate, is positioned behind the stop bracket mounted on L.H. contactor rail.

5) The magnet armature and moving contact system move freely.

Control Circuit. Be sure that:

1) The high voltage and low voltage control fuses are properly installed.

2) The female low voltage, control plug,(on the right hand enclosure frame) has been pushed into the male control receptacle on the contactor.

3) The test-run plug is plugged into the socket mounted on the L.H. side of the contactor.

Close the high voltage door, the low voltage door, and then tighten the door latches. Move the isolating switch handle to the OFF position. The Ampgard starter is now ready for operation.

MAINTENANCE AND REPAIR

GENERAL

This industrial type control is designed to be installed, operated, and maintained by adequately trained workmen. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, checkout, safe operation, or maintenance. Care must be exercised to comply with local, state, and national regulations, as well as safety practices, for this class of equipment.

Ampgard starters should be operated by authorized personnel only. Personnel authorized to operate the isolating switch and those authorized to inspect, adjust, or replace equipment inside the enclosure should have a complete understanding of the operation of the starter, and must have thorough training in the safety precautions to be followed when working with high voltage equipment.

A maintenance program should be established as soon as the starter has been installed and put into operation. After the starter has been inspected a number of times at monthly intervals and the conditions noted, the frequency of inspection can be increased or decreased to suit the conditions found, since this will depend upon the severity of the duty.

Before attempting maintenance, consult the specific diagram and the general and specific device instruction leaflets. These are listed at the end of this leaflet.

Insulation Level. After installation, and before energizing the starter for the first time, the insulation resistance between poles and from each pole to ground should be measured and recorded. It is not practical to specify an absolute value for this reading since it is dependent on other connected apparatus and conditions of service. However, any unusually low reading or abrupt reduction in a reading when compared to original readings would indicate a possible source of trouble, and the cause should be determined and corrected.

Fuses (Fig. 8). The current limiting motor starting fuses should be inspected after each fault-clearing operation, since this is the most severe service to which they will be subjected. Visual indication of a blown fuse is provided by an indicator in the top of the fuse. This indicator pops up and is visible over the top of the contactor arc chutes when the fuse is blown.

Blown fuses may be removed and replaced by using the fuse puller provided. The isolating switch must be open before attempting to remove any fuse.

The correct procedure for replacing fuses is described on the instruction sheet (NP 160P323H01) which is premanently fastened inside the door. This instruction sheet also lists the correct fuse rating and fuse part number for that particular starter. Starting in 1975, some fuses have "R" designations. The continuous amp rating indicated may be the same or higher than older fuses without "R" designations. In this case, replace by identical part number, disregarding the amp rating.

If preferred, fuses may be removed and replaced by hand.

If for any reason, there is doubt about the condition of a fuse, a simple test is to check its electrical continuity.

Contactor. WITH ISOLATING SWITCH OPEN, the Type LF contactor contacts can be examined by simply pulling the arc chutes forward to rotate them out of the operation position (Fig. 8). To make a more detailed examination, to replace contacts, or to carry out any maintenance work, the contactor can be withdrawn from the enclosure to a drawout position. To do this:

1) Rotate the arc boxes forward and then remove the current limiting motor starting power fuses.

2) Rotate the arc boxes back into the operating position and then remove all four phase barriers by lifting slightly, pulling forward, and then rotating the top outwards.

3) LIFT the contactor latch on the left hand side of the contactor, grip the contactor and pull sharply to free the contactor from the lower stab assembly at the back.

4) Carefully slide the contactor out to the detent position.

   It will again be stopped by the contactor latch (located at the front lower left corner of the contactor) about 3/4 of the way out.

In this drawout position, all routine maintenance can be carried out. For major overhaul, the

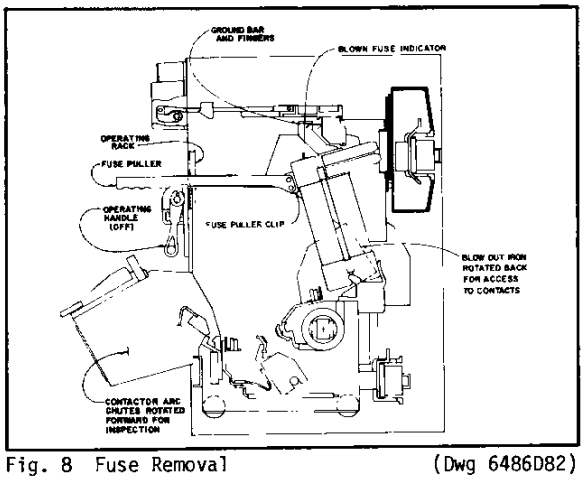


Fig. 8 Fuse Removal (Dwg 6486D82)

contactor can be completely removed from the enclosure by taking two more steps:

5) Remove the female multi-point low voltage control plug from R.H. side of the contactor.

6) Press down the contactor latch, and roll the contactor out of the enclosure onto the floor, or in the case of an upper unit onto a fork truck or other suitable platform of the right height.

TYPE LFR4C ISOLATING SWITCH

Removal. Any maintenance beyond visual examination should be carried out with the switch removed from the enclosure. This will avoid the possible hazard of closing the switch on to an energized line when the door mechanical interlock has been defeated manually.

To remove the isolating switch from the enclosure:

1) Open the isolating switch and then open the high voltage door.

2) Remove the current limiting motor starting power fuses and the four contactor phase barriers.

3) Remove the Type LF Contactor.

4) Remove the two bolts located in each top corner of the isolating switch front casting. Disconnect leads to Auxiliary Switch terminal block (if used).

5) Slide the isolating switch out of the enclosure.

6) Refer to IL 16-200-24 for examination, lubrication and adjustment procedure.

Opening the Main Door Under Abnormal Conditions.

In the unlikely event that either the isolating switch fuse jaws or the contactor contacts should weld closed, or if an event should occur so that the isolating switch handle cannot be moved from the ON to the OFF position, provision has been made so that the high voltage door can be opened in an emergency. The door can be opened by using the following procedure:

1) MAKE SURE THAT THE MAIN INCOMING POWER LINE IS DE-ENERGIZED, to avoid a hazardous situation when the door is opened.

2) Loosen the socket head cap screw holding the operating handle to its shaft. Pull the handle off the end of the shaft.

3) Remove the two screws holding the interlock operator (Fig. 6). These screws are located in the door just above the handle operating shaft. This will disengage the door from the mechanical interlock, and allow it to be opened. Maintenance can then be performed.

4. CAUTION - THIS INTERLOCK OPERATOR MUST BE RE-INSTALLED BEFORE THE STARTER IS AGAIN ENERGIZED, TO PROVIDE FOR CORRECT OPERATION OF THE MECHANICAL INTERLOCK.

LUBRICATION

Periodically, apply a light coating of Dow Corning DC-4 high temperature silicone grease (or equivalent) to the tips of the fuse jaw fingers where they engage the line terminal stabs. Also clean and lubricate the tray guide rails and the rollers above and below the clevis.

LIST OF PUBLICATIONS APPLYING TO DEVICES

USED IN THESE STARTERS

Device	Instruction Leaflet No.	Renewal Parts Data No.
Type LFR4C Isolation Switch	IL 16-200-24	LFR4C
Type LF-25H430C & LF-50H430C Contactors	IL 16-200-25*	16-200A3
Slipsyn Synchronous Motor Control	IL 14-000-1B	--------
Ampgard Installation Instructions	6379D27H01	

*Type C Contactors have high voltage control fuses mounted in front of the control transformer.

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