GEH-1938A
Supersedes GEH-1938

INSTRUCTIONS

IC7160 LIMITAMP* CONTROLLERS

WITH AIR-BREAK CONTACTOR AND 30-INCH-DEEP PANEL

2300, 4000, and 4600 Volts, A-c (Utilization Voltage)

2400, 4160, and 4800 Volts, A-c (Distribution Voltage)

INTRODUCTION

Individual Limitamp controllers are designed for specific applications; the components and function being dictated by the purchaser's specifications and needs.

Complete instructions covering individual units are furnished with each panel lineup, and the instruction book is identified on the equipment nameplate.

These instructions were prepared as a guide to the application and maintenance of Limitamp controllers, and form a portion of the over-all instructions on individual panels. For information covering handling and installation of Limitamp controllers, refer to instruction book GEH-1940.

GENERAL

IC7160 Limitamp control is a high interrupting-capacity, magnetic control for squirrel-cage, wound-rotor and synchronous motors; for transformer feeders; and for equipment used in special applications. It can include control for auxiliary and accessory equipment such as incoming line panels, lighting panels, low-voltage a-c and d-c motor starters, and relaying and metering equipment. See Fig. 1 and 2 for typical full-voltage Limitamp controllers.

Limitamp control can be designed to meet a variety of control requirements. It can be provided with a full complement of protective functions and includes fast-acting fuses with current-limiting characteristics to protect connected equipment from the high short-circuit currents available from modern industrial power systems. These fuses and protective functions are fully co-ordinated to give protection to both the motor or other load, and the controller, over the complete range of overload and fault conditions.

*Reg. Trade-mark of General Electric Company.

DESCRIPTION

PHYSICAL FEATURES

The enclosure of the IC7160 Limitamp controller is 90-inches high and 30-inches deep. The basic, full-voltage, non-reversing starter is 38-inches wide. Since the control is completely accessible

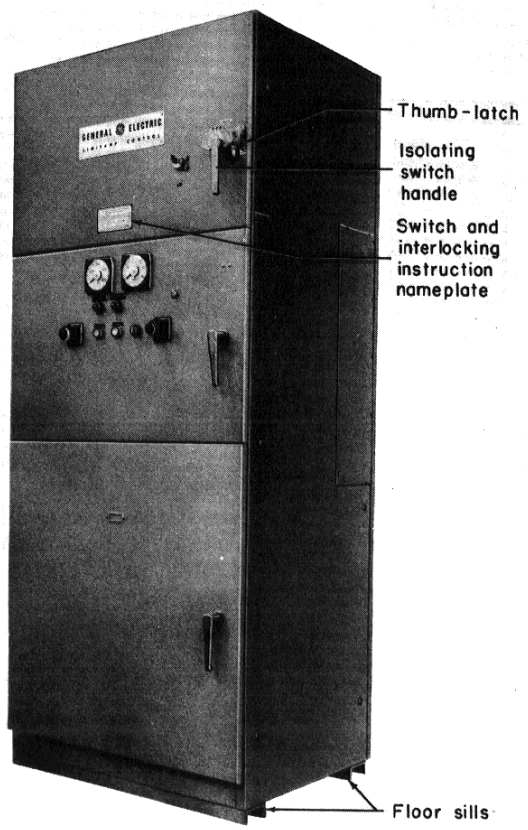

Fig. 1. Typical full-voltage Limitamp controller

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

GENERAL ELECTRIC

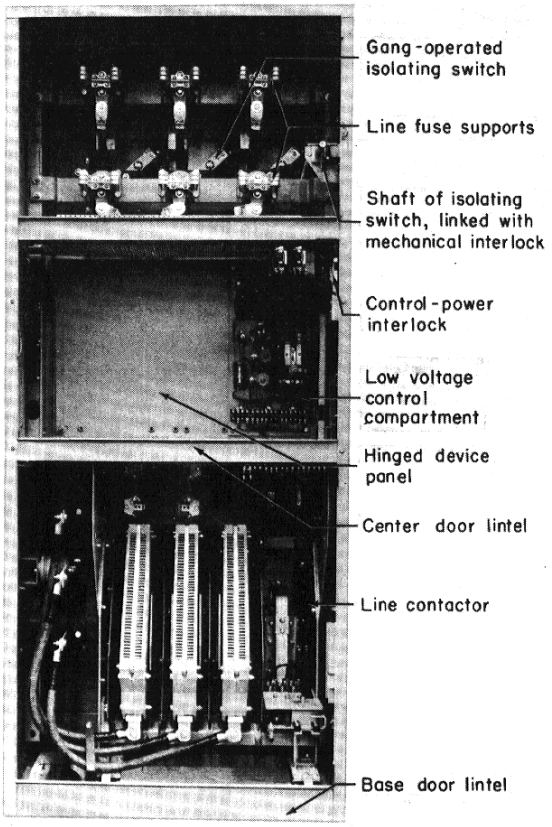

Fig. 2. Typical Limitamp controller showing location of principal components

from the front and no rear aisle space is required, either back-to-back or back-to-wall mounting is possible.

Limitamp control is a free-standing equipment which may be furnished in general purpose NEMA 1, rubber-gasketed NEMA 1, drip-proof NEMA 2, weather-resistant NEMA 3, water-tight NEMA 4, or dust-tight NEMA 5 enclosures.

The principal components of the Limitamp controller are shown in Fig. 2.

CURRENT-LIMITING LINE FUSES

Type EJ-2 current-limiting fuses, designed for use on motor circuits, provide full short-circuit protection within their rating. The current-limiting action of Type EJ-2 fuses is shown in Fig. 3.

In complete short circuit (when fault currents are at the maximum rating of the fuse), melting of the fuse element occurs before the current peak and the fault is cleared during the first half-cycle. Thus,

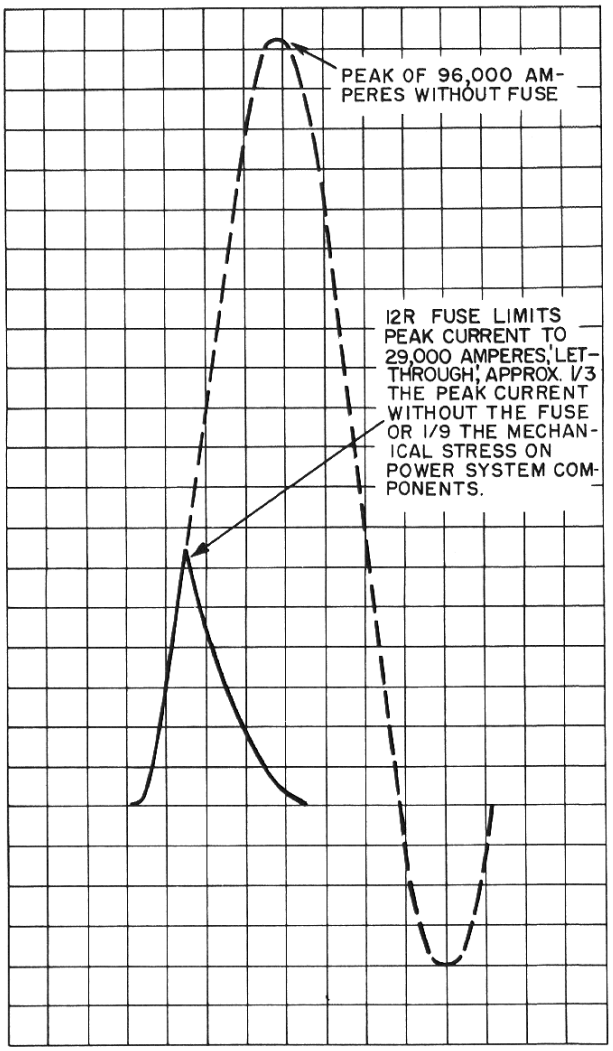

Fig. 3. Current-limiting action of Type EJ-2 fuse

since the strength and duration of the fault current is limited, the amount of "let-through" energy is restrained.

OVERLOAD PROTECTION

Motor overload protection is provided by temperature-compensated, thermal-overload relays whose tripping characteristics closely approximate the motor's heating curve.

The coordination of fuses and overload relays is shown graphically in Fig. 4. The overload relays are selected to protect the motor from damaging overloads (both running overloads and stalled conditions) by opening the line contactor before damage occurs. The fuses are chosen so that they will not

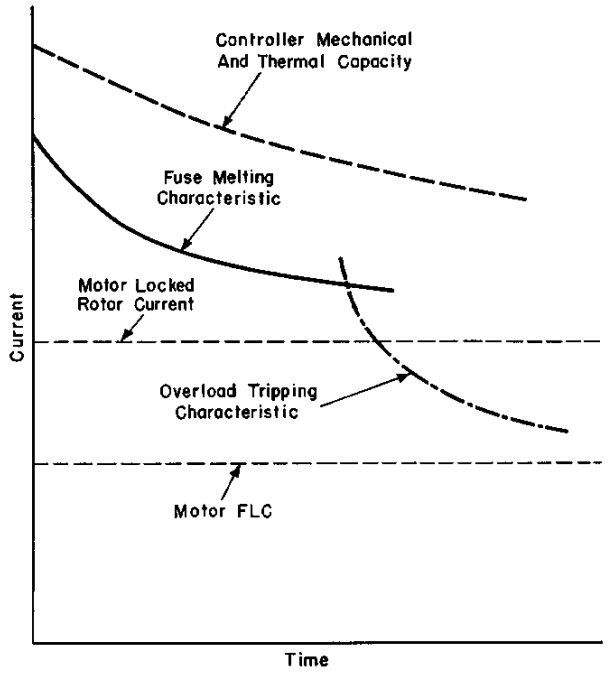

Fig. 4. Coordination of line fuses and overload relay (log scale)

melt under motor overload conditions but will interrupt fault conditions.

The thermal and mechanical strength of all the components subjected to fault currents (bus, cable, current transformers, isolating switch and contactor) is great enough to withstand any "let-through" current of the Type EJ-2 line fuses.

For synchronous motors, Limitamp controllers assure maximum motor utilization through the use of precision-angle field application and load-angle field removal, in addition to the graduated squirrel-cage winding protection. Details of synchronous motor control features are given in instruction book GEH-1504.

UNDERVOLTAGE PROTECTION

Time-delay undervoltage protection is provided in standard Limitamp controllers to prevent the removal of machinery from the line on a momentary loss of power of 1.5- to 2-seconds. (This time delay feature should only be used provided that the power supply system and/or the driven equipment controlled by the Limitamp starter can withstand the surges which restarting after a momentary loss of power might involve.) This circuit is easily reconnectable to provide instantaneous undervoltage protection if it is required by the application or desired by the customer.

ISOLATING SWITCH AND INTERLOCK PROTECTION

An externally operated isolating switch, with all blades connected to a common shaft, isolates from the line the high-voltage components connected on the load side of the switch. The "Switch Open" and "Switch Closed" positions are clearly indicated by suitable nameplates.

> ***NOTE:*** This isolating switch is for isolating purposes only. It should not be opened or closed with any load greater than the magnetizing current of the control transformer connected to it. OPENING OR CLOSING OPERATION SHOULD BE DONE WITH A QUICK POSITIVE MOTION.

The system of mechanical interlocks is for the purpose of preventing opening or closing of the isolating switch while the high-voltage contactor is closed. Until the isolating switch is in the "Switch Open" position, this system also acts to prevent opening the doors to compartments having high-voltage components connected to the load side of the switch. UNDER NO CIRCUMSTANCES SHOULD SWITCHES OR INTERLOCKS BE FORCED. With the door open, the isolating switch is visible and the blade position can be seen. Good safety principles require the operator to actually LOOK at the position of the isolating switch blades to SEE that they are OPEN BEFORE WORKING ON THE LOAD SIDE OF THE SWITCH.

This interlocking also is for the purpose of preventing the closing of the isolating switch until these same high-voltage compartment doors are closed by means of a "Door-Forgetter" mechanism, shown in Fig. 5 and 6.

The isolating switch can be locked in the "Switch Open" position by as many as three padlocks entering locking holes in the switch handle.

A control-power interlock (see Fig. 7 and 8) mounted in the control compartment serves as a means of preventing opening of the isolating switch until all control load has been disconnected by contacts of this control-power interlock.

> ***NOTE:*** If it is desired to connect additional devices to the control circuit, care must be taken that these devices are added to the load side of the control circuit fuse so that the control-power interlock, connected ahead of the fuse, also will interrupt the added load.

Operation of the control-power and door-interlocking system is as follows:

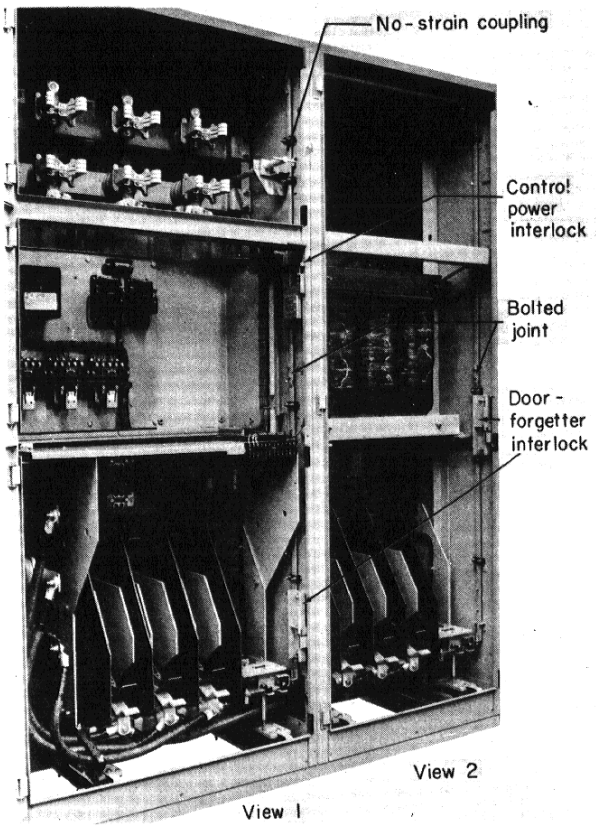

Fig. 5. View 1 shows mechanical door interlock as used on basic panels containing isolating switches; view 2 shows additional interlocking arrangement used when panel has one or more sections of high-voltage components connected to the load side of the isolating switch

1. To open the isolating switch and all compartment doors:

a. Open all contactors connected to the load side of this switch by operating the stop button or other control device provided for this purpose.

b. Open the center door and move the operating handle of the control-power interlock (inside center compartment on right sidewall) to the "Open" position.

c. Shut the center compartment door.

d. Turn the switch handle to the "Switch Open" position and operate the thumb-latch.

e. The high-voltage compartment doors mechanically interlocked with this switch are now unlocked.

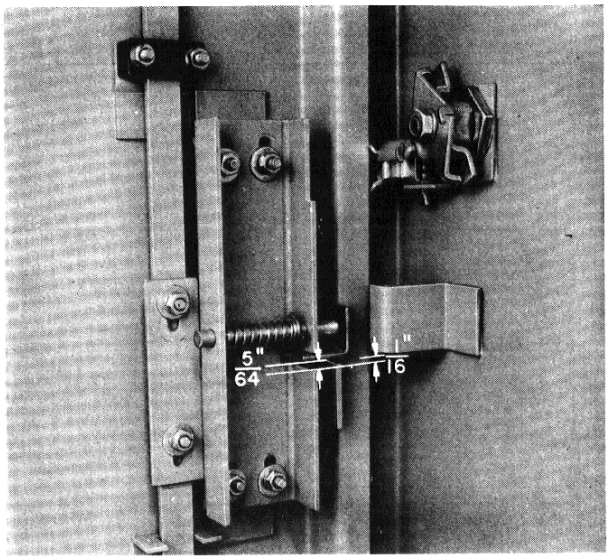

Fig. 6. Close-up view of "door forgetter" interlock adjustment

2. To close the isolating switch and energize the starter:

a. Shut all doors.

b. Operate the thumb-latch and turn the switch handle to the "Switch Closed" position.

c. Open the center door and move the operating handle on the control-power interlock to the "Closed" position.

d. Shut the center door.

e. Operate the starter in the normal manner.

Instructions for operating the control-power interlock are given on its nameplate. A nameplate on the upper door provides instructions for operating both the isolating switch and the control-power interlock.

See Table I for control-power interlock ratings.

KEY LOCKING

Key locks are furnished for doors to high-voltage compartments in which components are connected to the line side of the isolating switch and thus not isolated when the switch is open. ONLY COMPETENT PERSONNEL SHOULD BE AUTHORIZED TO OPERATE SUCH LOCKS. Keylocks for all panel doors may be specially ordered.

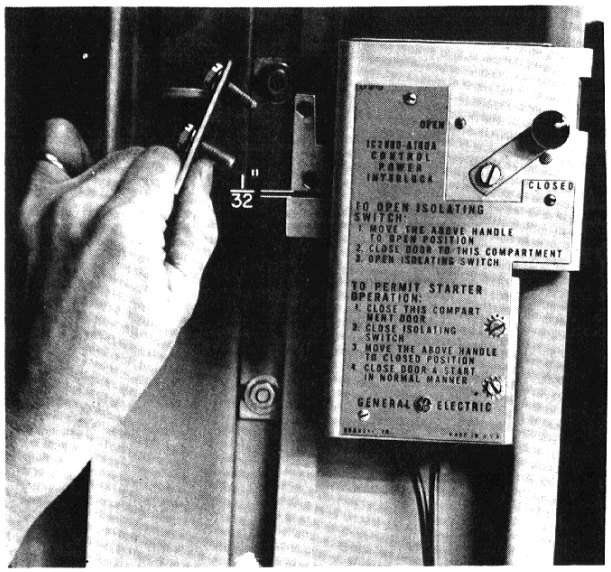

Fig. 7. Control-power interlock adjustment

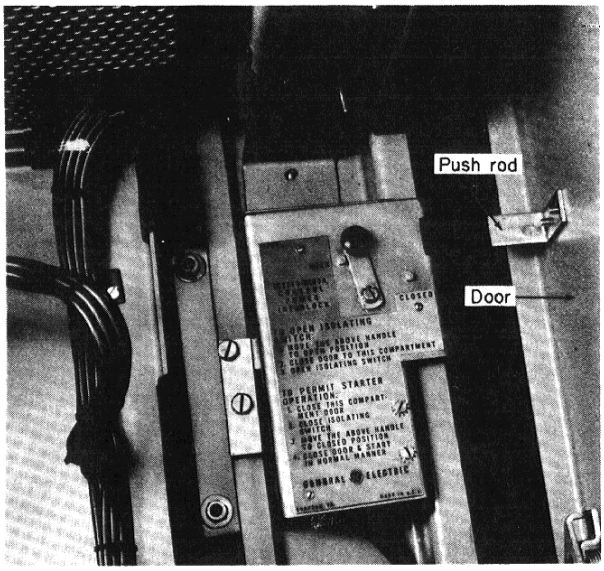

Fig. 8. Control-power interlock and push rod on door

TABLE 1

Volts	Amperes					
			Break – Inductive Load (See Note)		Break – Non-Inductive Load	
	Carry	Make	One Contact	Two Contacts in Series	One Contact	Two Contacts in Series
115 d-c	10	60	1.8	4.0	5.4	12.0
230 d-c	10	60	0.5	1.2	1.5	3.6
550 d-c	10	60	0.2	0.35	0.6	1.05
110 a-c	15	60	60.0	-	60.0	-
220 a-c	15	60	30.0	-	30.0	-
440 a-c	15	60	12.0	-	12.0	-
550 a-c	15	60	8.0	-	8.0	-

Note: Inductive-load ratings are based on contactor coil circuits, not brake or field coil circuits.

Kirk Locks are often ordered for interlocking with various components, such as other switches, feeder breakers, etc. These locks must be operated either before the doors of their respective compartments can be opened or before additional functional sequences can be performed. The keys to these locks are identified by lock serial numbers. Spare keys are intended for use only if the original keys are lost, and should be kept in a safe place away from locks so that interlocking cannot be defeated. Refer to diagrams for the locking sequence.

HIGH-VOLTAGE CONTACTOR ASSEMBLY

GENERAL

The IC2812 high-voltage air-break contactor is mounted in the lower compartment and is accessible for normal maintenance and inspection. It may be rolled out of the cubicle for inspection of high-voltage connections in the panel and on the rear of the contactor. The rollout assembly also contains the control transformer with its associated primary fuses. (See Fig. 9.)

The contactor is designed for equipment that is used in starting a-c motors with voltage ratings up to and including 4800 volts. It has a continuous rating of up to 400 amperes, and is suitable for use with induction motors to a maximum of 2500 hp and with synchronous motors up to 3000 hp and 4800 volts.

NOTE: Arc chutes are essential to contactor operation. They must be properly installed prior to operation of the Limitamp controller. See that the chutes are inserted in the position indicated by the decals on the chutes.

The rollout contactor assembly is secured to the base door lintel (see Fig. 2) of the panel, which bolts to the contactor and to the enclosure. This lintel should always be kept bolted properly in place except when rolling the contactor in or out of the panel.

SPECIAL APPLICATIONS

In some specific cases (such as a rapidly reversing starter) it is necessary to assure that the arc on the one contactor has been completely interrupted before the other contactor can be closed.

This transfer time is dependent on the type of pilot devices used. An example of this would be the use of a selector switch with "Start" and "Stop" push buttons for reversing the starter. For a complete reversal, the operator would follow this sequence.

1. Push the "Stop" button.
2. Turn the selector switch.
3. Push the "Start" button.

Since the usual time required for a person to manipulate these pilot devices is in excess of normal arcing time, no additional interlocking is required. If, however, this operating time does not exist, current or potential interlocking would be necessary.

LOW-VOLTAGE AND BUS COMPARTMENTS

The low-voltage control compartment (center-front, Fig. 2) contains the relays and low-voltage contactors of the IC7160 Limitamp controller.

This compartment has terminal boards for the purchaser's external low-voltage connections.

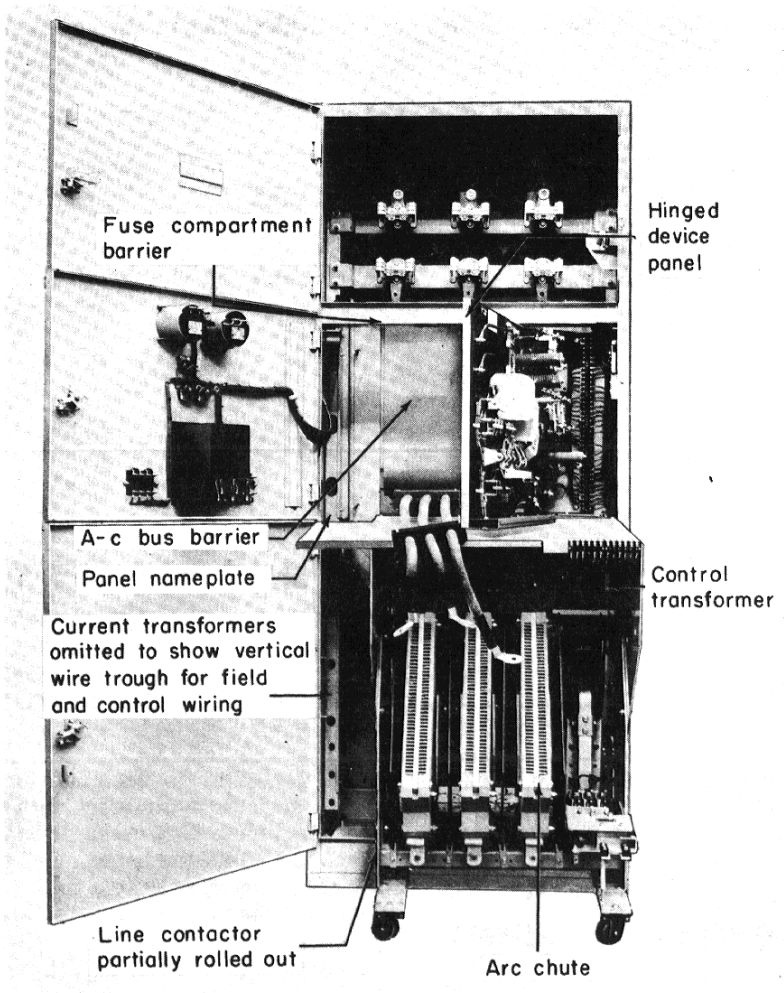

Fig. 9. Free entrance to controller gained by rolling out IC2812 contactor

Metering equipment, push-buttons, indicating lights, etc. are mounted on its door. The compartment has a hinged base which can be swung out to provide access to the isolated high-voltage a-c bus compartment. A wiring trough (see Fig. 10) is provided in the panel for neat and convenient wiring to the control terminal board.

Power bus or (if bus is not furnished) purchaser's incoming power terminals are located in the center rear compartment behind the isolating steel barrier (see Fig. 10).

CAUTION: This barrier should not be removed, nor should any attempt be made to reach behind it until power has been completely removed from the bus and the panel.

PANEL INSTALLATION

Refer to instruction book GEH-1940 for complete details on receiving, handling, electrical connections, placement and preparation of Limitamp control panels for operation. These instructions should be thoroughly followed before the panel is put into operation.

PANEL OPERATION

After all connections have been properly made, all parts properly assembled, and all components thoroughly inspected and adjusted, power may be applied to the panel. Preliminary operation with the motor disconnected is desirable in order to check relay operation, device time settings, etc. The motor should then be hooked up and checked for proper direction of rotation. The controller should be put through its complete operating sequence as a final check.

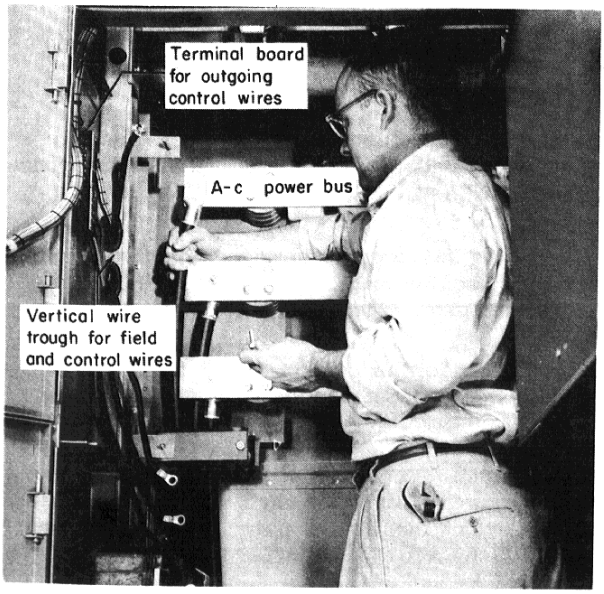

Fig. 10. Connection of incoming power leads to bus

Wiring diagrams and other instruction material contain information concerning proper functioning of the control relay settings, sequence of operation, etc. This data should be thoroughly read and applied in order that the control can be kept in the best operating condition.

MAINTENANCE

GENERAL

Basic Limitamp control is designed for front connection and maintenance. A few special purpose panels require back access. Where required, back access will be indicated on the outline diagram.

CAUTION: Before any work is done, all components must first be de-energized.

With the doors open, the various components can be visually inspected. Relays and contactors are readily accessible and normal maintenance can be performed without removing them from the panel. Four basic tools are required to service Limitamp control:

1. An 8- to 10-inch screw driver.
2. An 8- to 10-inch crescent wrench.
3. Channel-lox pliers.
4. Ratchet wrench with two 15-inch extension arms and 1/2-inch swivel socket.

The ratchet wrench is required only to change tips on the high-voltage contactor, but it is also useful as a means of speeding up servicing.

REMOVAL OF HIGH-VOLTAGE CONTACTOR

It should not be necessary to roll out the high-voltage air-break contactor unless it is desired to inspect the rear of the contactor or to check cables which are inaccessible with the contactor in place. In order to remove the contactor from the panel the following steps are necessary (refer to Fig. 2 and 9):

1. Open the isolating switch in the controller in which the contactor is located. Check visually to see that the switch is open.
2. Remove the main line power fuses located in the isolating switch compartment.
3. Open the door to the compartment containing the contactor.

4. Remove the center door lintel which separates the center (low voltage) compartment from the roll-out contactor compartment by loosening the two nuts and sliding out. To remove the base lintel, remove the five screws on the front and the two screws on the roll-out contactor assembly.

5. Release all wires and cables connected to the roll-out contactor assembly as follows:

a. Disconnect the wires on the panel side of the terminal board at the top right hand side of the roll-out contactor assembly.

b. Unbolt the cables connected to the front side of the current transformers.

c. Unbolt the cables from the bottom supports of the main power fuses.

6. Disconnect any field power and/or control wiring connected to the left hand side of the hinged control panel. This panel may be swung out after removing the two nuts on the left hand side of this panel.

7. The cables which were disconnected from the bottom of the fuse support may now be dropped over the top of the roll-out contactor assembly and the contactor rolled out.

NOTE: If the starter contains more than one contactor with cross-cabling it may be necessary to disconnect and remove the cables which interconnect these two contactors. If flexible steel cables are provided for mechanical interlocking between contactors, remove the cable from its terminator on the contactor and bend it to one side to permit the removal of the contactor. Do not disconnect the complete mechanical interlocking mechanism on the contactor. If the floor sills have not been grouted, a wooden inclined plane, 1-3/4-inch high by 6-inch or more wide and 36-inch long, will be required to lower the contactor to floor level.

8. The contactor now may be rolled out of the enclosure.

In certain panels where more than one contactor is required, the cable connections may differ slightly from those mentioned. From the wiring diagram and visual observation, the cables which must be disconnected in order to remove the contactor can be readily determined.

With the contactor out of the panel, the a-c bus barrier and incoming power cables are accessible. THE A-C BUS BARRIER SHOULD BE LEFT IN PLACE AND NO ATTEMPT SHOULD BE MADE TO REACH PAST IT OR TO TOUCH INCOMING POWER CABLES. If an inspection of incoming line connections and buswork is to be made, the feeder breaker supplying the panel should be locked open. If there are alternate feeders, such as bus-tie breakers, which could also energize the panel, they should likewise be locked open. With all power removed from the panel, the bus barrier can then be removed.

REPLACEMENT OF HIGH-VOLTAGE CONTACTOR

After the desired work has been accomplished, the contactor can be rolled back into the panel. It should be rolled as far back in the panel as possible. The following steps should then be taken to place the panel in working order once again. (NOTE: The main line power fuses have not yet been replaced in their clips and must not be until all this work has been completed.)

1. See that the arc chutes are properly inserted on the contactor.

2. Replace the base lintel. To secure the contactor and complete the enclosure, this must be kept properly in place.

3. Reconnect the power cables to the contactor as they were before contactor removal. See that the cable clamps hold the cables away from the surrounding metal surfaces.

4. Replace any cross-cabling which was removed between contactors in the same starter. Inspect the cable carefully to determine if there is proper clearance between live parts and ground. Replace any mechanical interlocking cables which were removed when the contactor was removed from the panel. Be careful not to create binding in this cable by kinking it or tightening bolts in such a manner as to restrict freedom of movement. (Refer to instruction book GEI-42593.)

5. Swing the hinged base of the low-voltage compartment back into place and fasten. Reconnect all field and control wires.

6. Reconnect the control wires from the hinged base to the roll-out contactor assembly terminal board.

7. It is very important that the isolating switch, control-power interlock switch, and the mechanical door interlock function properly. These have been carefully checked at the factory, but should be re-examined to make sure no damage has occurred during shipment and installation (see Fig. 5, 6, 7 and 8).

To check the proper alignment of the interlocking mechanism, the following steps are necessary:

a. Open all the doors.

b. Slowly close the control compartment door and watch the mating of the switch push-rod on the door with the cutout on the front of the control-power interlock (see Fig. 8.) When these do not align properly, it is usually an indication that the panel needs leveling. If some adjustment is still required, the push-rod may be adjusted slightly up or down.

c. With the control-power interlock switch in the "Open" position, close the control compartment door.

d. Visually check to see that the main line power fuses are NOT in their clips. Close the top door and latch by means of the thumb-latch. It should not be possible to close the isolating switch due to the "Door-Forgetter" interlock on the doors to compartments which mount high-voltage components connected to the load side of the isolating switch (see Fig. 6). Push in this interlock by hand and throw the isolating switch to the "Switch Closed" position. It should close completely with a small amount of force indicating that the vertical link is not binding in the guides along the enclosure wall. Reopen the control compartment door and close the control-power interlock switch. It should operate freely indicating that the bolt is engaging in the right position with the vertical link on the panel sidewall.

e. Attempt to open the isolating switch and observe the isolating switch blades by looking up through holes in the barrier between the control compartment and the line fuse compartment. A flashlight is necessary for this observation. They should not move more than four or five degrees from the fully closed position.

f. Hand operate the line contactor to make sure that the contactor's mechanical interlock lever is free to operate without binding with the vertical link on the panel sidewall. The vertical clearance between the contactor lever and the vertical link on the panel sidewall should be 1/16 inch. (See Fig. 11 and 12).

g. Block the line contactor in the closed position, open the control-power interlock and, using a screw driver, depress the control-power interlock cam normally depressed by the push-rod on the door. Again try to open the isolating switch and observe by looking up through the perforated barrier. The blades should not move more than four or five degrees.

8. Unblock the contactor, open the isolating switch (as previously described in these instructions), and replace the main line power fuses.

9. Close all doors and reclose the isolating switch and control-power interlock according to instructions.

10. The panel is now ready for operation.

CORRECTING CONTACTOR WELDING

All high-voltage, high-power contactors may weld under certain severe operating conditions. The one condition which accounts for practically all contactor welding occurs when the coil circuit is closed momentarily and then opened. This may permit the contactor to just touch its tips so that, at this time when there is no pressure on the tips, it has to make locked-rotor currents and any transient currents that may occur.

This condition generally occurs during jogging operations. If the drive is to be jogged, it is recommended that an anti-weld circuit (or "anti-kiss," as it is frequently called) be incorporated in the control panel. Such a circuit seals in a contactor to apply full tip closing action before it can drop open.

If welding should occur, proceed as follows:

CAUTION : Only authorized personnel with complete instructions should be allowed to perform maintenance on the mechanical door interlock.

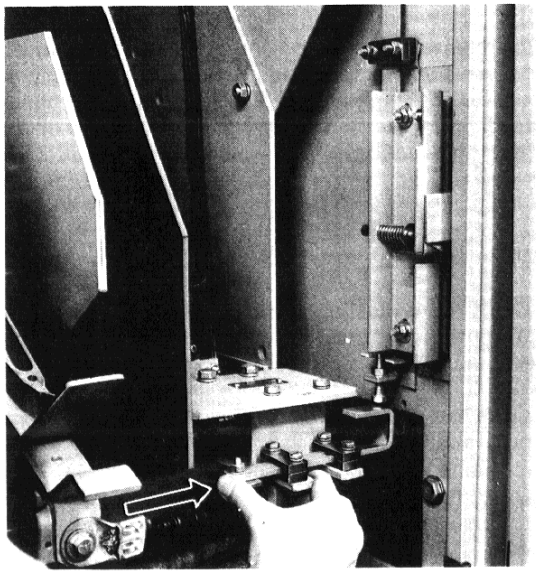

Fig. 11. View showing vertical rod mechanically connected to gang-operated isolating switch; interference interlock prevents vertical rod from being lowered when the contactor is energized. To check freedom of movement of contactor interlock, move horizontal arm to right with one finger at point of arrow. Little force should be required and action should be smooth and positive

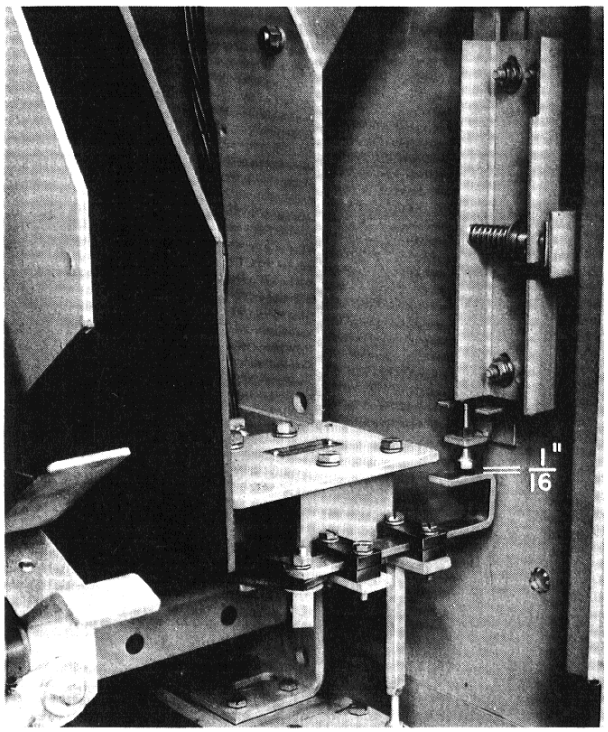

Fig. 12. Contactor mechanical interlock adjustment

1. Trip the breaker or other load-break device feeding power to the panel.

2. As described on page 3 in the "Isolating Switch and Interlock Protection" section of this publication, the doors to the high-voltage compartments cannot be opened until the high-voltage contactor is open. However, the vertical rod between the isolating switch and the contactor is in two parts which are bolted together. This bolted joint is in the low-voltage control compartment (see Fig. 5). Remove the bolts in this joint so that the rod is in two pieces.

3. Open the isolating switch. Refer to page 3 of this publication for the procedure to follow in opening the switch.

4. Open the center door to the low-voltage compartment, and manually raise the rod to the lower compartment. When it has been raised about four inches, the door to the lower (contactor) compartment can be opened.

5. Operate the contactor manually to break the weld loose. Such welds rarely require much force to break.

6. Inspect the contactor, paying particular attention to the condition of the contactor tips, since badly worn tips may be a cause of welding. (Refer to point 7 in the "Monthly Inspection" section.)

7. Reassemble the vertical interlocking rod by bolting the two pieces together. This will restore the normal mechanical interlocking between the isolating switch and the contactor. Operate it to be sure it has been properly reassembled.

8. Place the controller in operation in the normal manner.

9. If the contactor has welded in another section of a multi-section panel, first comply with steps one through four, listed above. The screws holding the door catch in place on the other high-voltage compartment doors can be removed, allowing the doors to be opened. After steps 5 through 7 have been completed, replace the door catch and operate the controller in the normal manner.

INSPECTION

GENERAL

All electrical apparatus should provide maximum trouble-free service if given the benefit of preventive maintenance, inspection and periodic cleaning. It is important that a definite inspection schedule be maintained. Of course, the frequency of the inspection periods will depend upon the operating conditions.

The publication, "How to Maintain Industrial Control," GET-1195, will be helpful in establishing a maintenance schedule, and in locating trouble when faulty operation is encountered. The individual device publications, with maintenance instructions and data on contact gap and wipe, will also be helpful in maintaining the equipment. A recommended maintenance schedule for Limitamp equipment follows, but the user may find that conditions in his installation will dictate various modifications to this program.

CONTACTOR

Contact life depends on the severity of the service required of the device.

The contactor should have a complete inspection after every 50,000 operations. All power should be disconnected from the contactor before any inspection is made. Check for loosened screws, nuts, bolts, cable clamps, and electrical interlocks. Contact wear and contact force should be checked. The contactor should be blown-out to remove all dirt and dust which may have accumulated.

Refer to instruction book GEH-1937 on the IC2812 air-break contactor for information on adjusting or replacing parts.

MONTHLY INSPECTION

The following components of the Limitamp controller should be inspected on a monthly schedule:

1. The cabinet. See that all bolts and nuts are tight; any loosened by vibration may indicate a need to check the high-voltage connections. Inspect surfaces for dust, oil, and moisture, and thoroughly clean all devices and contacts with dirty surfaces.

2. Overload relays (10L and 20L). Check as indicated under thermal-operated devices, page 75 of GET-1195.

3. Relays (UV, SCX, FR, FRX, PFR and other magnetic devices). Check as indicated under magnet-operated devices, page 74 of GET-1195.

4. Field contactors (FC or F). Check as indicated under magnet-operated devices, page 74, and arc chutes or barriers, page 76, of GET-1195.

5. Push buttons, rheostats, selector switches and other mechanically operated devices (1PB, 2PB, exciter field rheostat, SB-1 switches, field switches, etc). Check as indicated under mechanically operated devices, page 75 of GET-1195.

6. Timing relays (1TR, etc). Check as indicated under motor-operated devices, page 75 of GET-1195.

7. Line contactor (M) and other high-voltage contactors. Check as indicated under magnet-operated devices, page 74, and how to care for copper contacts, etc., pages 77 – 80, of GET-1195. For more detailed instructions, refer to instruction book GEH-1937.

8. Isolating switch, mechanical interlock and control-power interlock switch. Each time high-voltage components are inspected, their alignment and operation should be checked as directed in this publication.

9. Fuse clips. All fuse clips should be checked to see that fuses are tightly gripped and that proper contact is made. Power fuses should be checked against the fuse nameplate on the inside of the top compartment to be sure that the right size fuses for protecting the motor are in the clips. See that the fuses are mounted with the "blown-fuse" indicator down.

NOTE: Fuses and clips are silver-plated. Do not use abrasives for cleaning.

SEMIANNUAL INSPECTION

Static accessories such as resistors, capacitors, transformers, wiring, fuses and bus, and cable should be inspected semiannually. Check as indicated under static accessories, page 75 of GET-1195. Any cracked or broken cable braces should be replaced.

ANNUAL INSPECTION

The IC2812-E100, -E101, -F100 and -G100 high-voltage contactors are provided with a pressure fitting for lubrication. They should be lubricated once a year with a good grade of ball bearing lubricant. The adjustment of the moving part of the armature to the stationary part should be checked to see that the coil gaps line up. The coil should be resting in the bottom of the gaps and should not interfere with movement of the armature.

RENEWAL PARTS

When ordering renewal parts, address the nearest General Electric Company apparatus sales office, specify the quantity required, and give the catalog number or describe the required parts in detail. Give the complete nameplate rating of the equipment.

INDUSTRY CONTROL DEPARTMENT

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