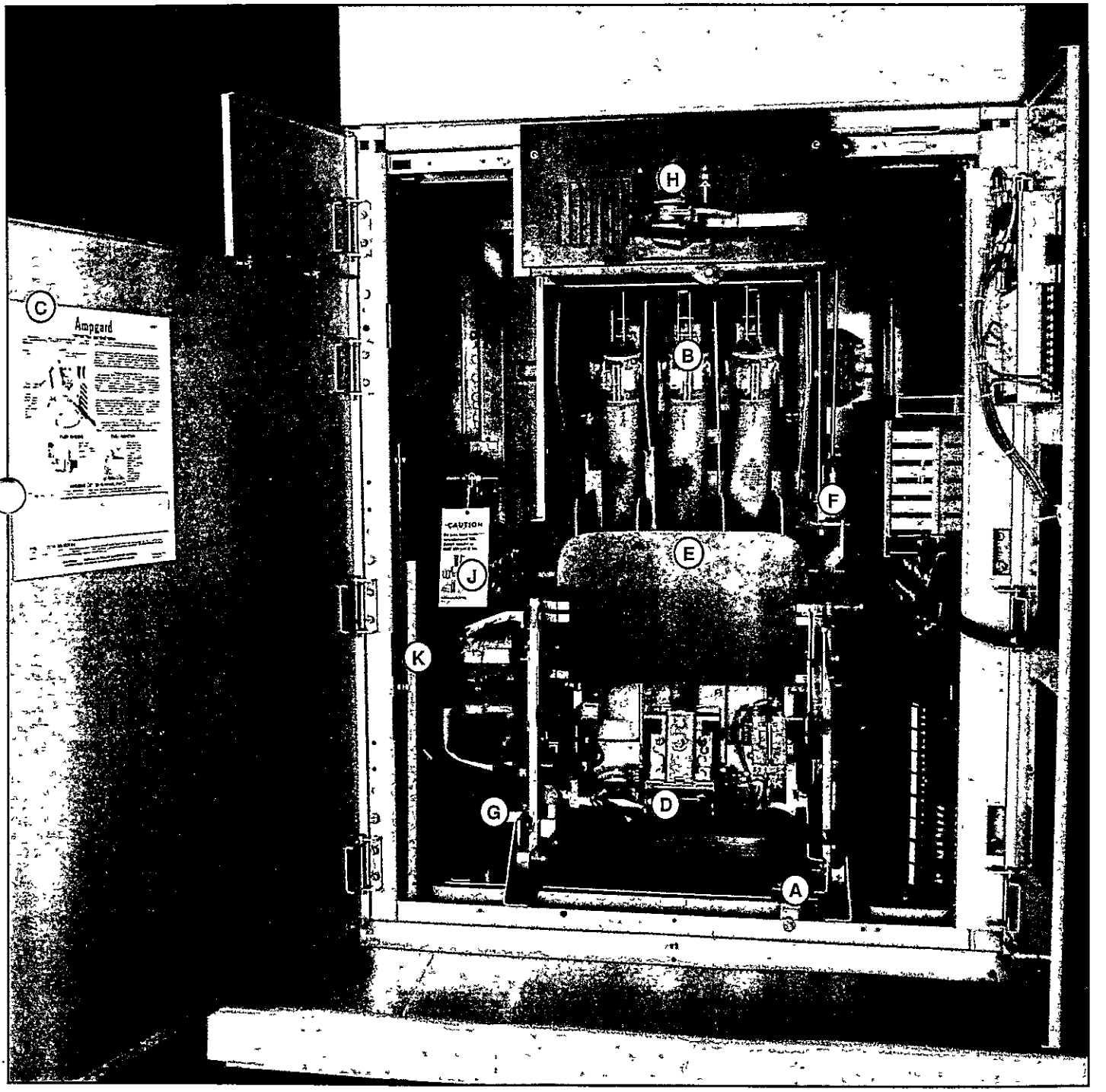
Ampgard®

INSTALLATION INSTRUCTIONS

V202 Roll-out Vacuum Starters, 400 Amperes, 7200Volts

Follow these instructions for easy installation of Ampgard Starters



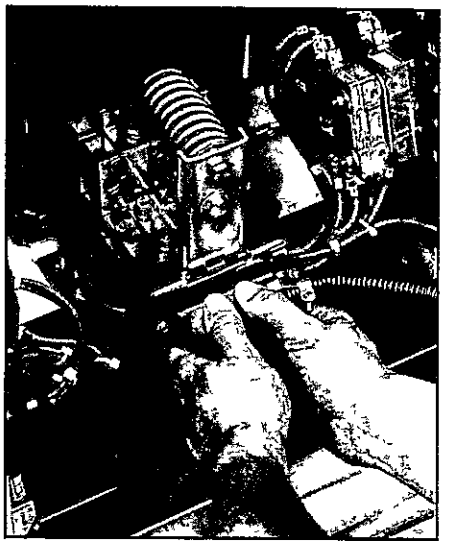
A. Shipping Clamp
B. Main Fuses
C. Operating Instructions
D. Control Plug
E. Vacuum Contactor
F. Auxiliary Interlock Terminal Block
G. Contactor Detent Latch
H. Isolating Switch
J. Load Cable Instruction Tag
K. Fuse Puller

Ampgard®

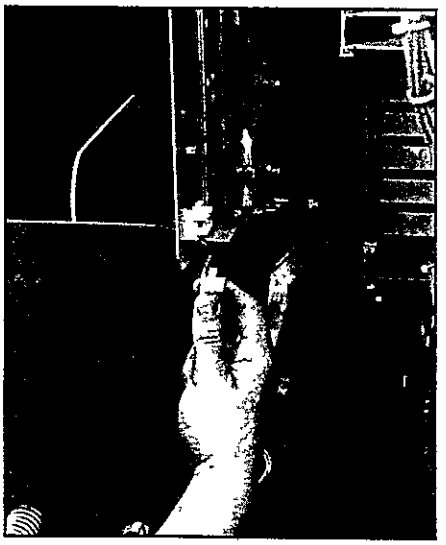
INSTALLATION INSTRUCTIONS

1 Remove the shipping clamp (A) by taking out two bolts.

2 Remove three main fuses (B) using the fuse puller (K) supplied. See operating instructions (C) inside medium-voltage door.

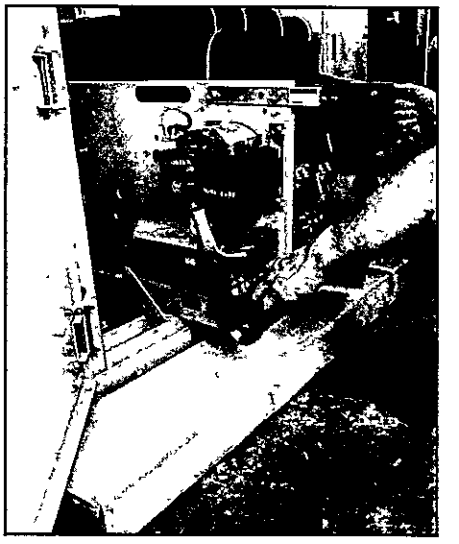


3 Remove the control plug (D) from the contactor (E).



4 Disconnect the auxiliary interlock terminal block (F) on the Isolating Switch.

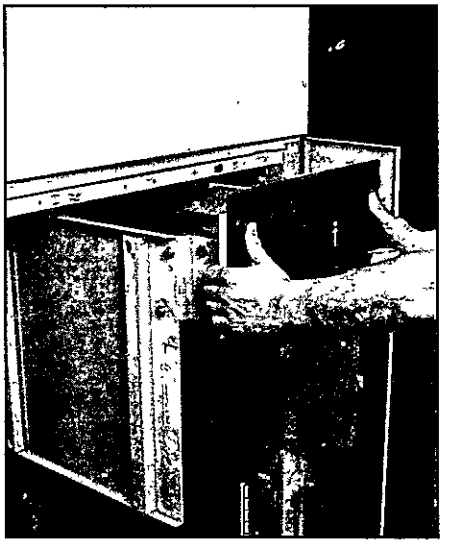
5 To remove contactor (E), lift latch (G) on bottom left-hand corner of contactor and at the same time give the contactor a sharp pull forward.



6 Part way out the contactor will relatch in a "detent" position. To remove the contactor, press the latch bar down and at the same time pull the contactor forward. Lower the contactor to the floor and roll out of the way. (The contactor weighs approx. 125 lbs.)

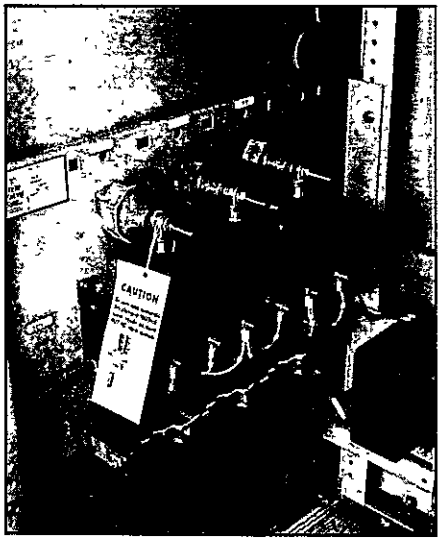
If a top starter is used, an industrial lift with a platform is useful. Before moving the lift with the contactor on board, block the contactor wheels.

7 To remove the Isolating Switch (H), remove two bolts as shown.



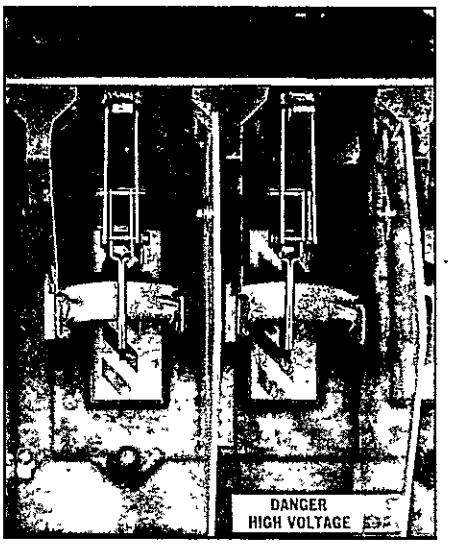
8 Pull Isolating Switch forward. **Caution:** It has no latch and will pull completely out. However, it weighs only 75 lbs. and can usually be handled without a crane or lift.

9 If cable is used to connect the line stabs, loosen four pan head screws approximately three turns. Lift rear barrier and shutter assembly up and off the screws. Disconnect the shutter drive lever using the keyhole in the lever. Starter is now ready to wire.

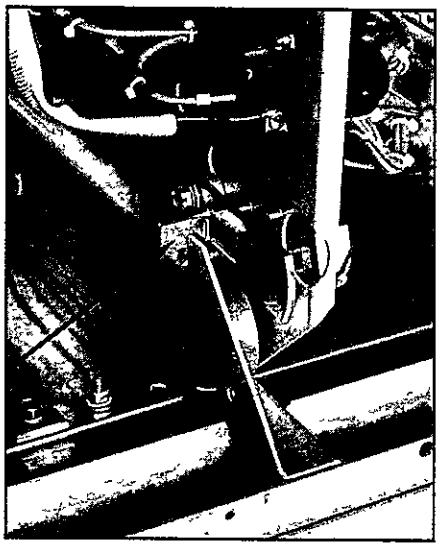


10 Refer to load cable instruction tag (J) located in starter at motor terminal for load wiring instructions.

11 After wiring, reverse the procedure to reassemble. Slide Isolating Switch in place and secure with two bolts. **Refer to Steps 7 and 8.**

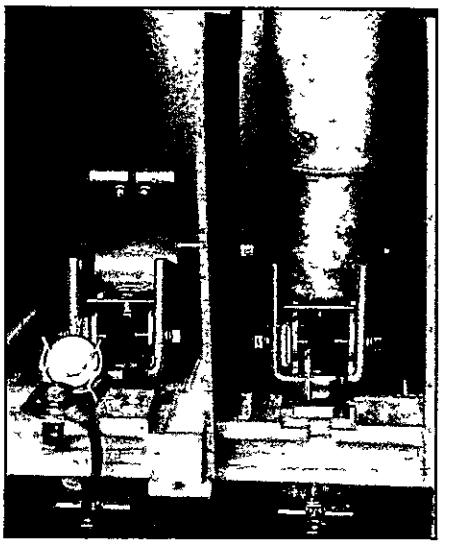


12 Check to make sure fuse finger is in correct position in fuse locator. Refer to instructions on starter door.

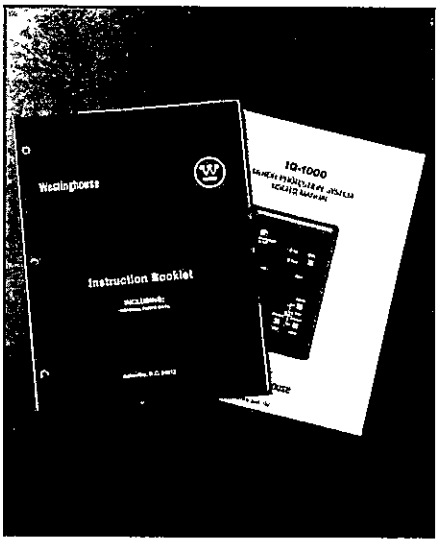


13 Return contactor to its compartment and make sure detent latch is engaged.

14 Reconnect the auxiliary switch terminal block. Install the contactor control plug. **Refer to Steps 3 and 4.**



15 Install the three main power fuses. Make sure fuse is fully seated on bottom fuse holder located on the contactor.



16 Read the instruction manual and set all protective relays BEFORE ENERGIZING UNIT.

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Westinghouse Electric Corporation
Construction Equipment Division
Asheville, NC 28813

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Instructions for Type SJA 360 Ampere, 7200 Volt Vacuum Contactor

I.L. 16-200-32C
Model W

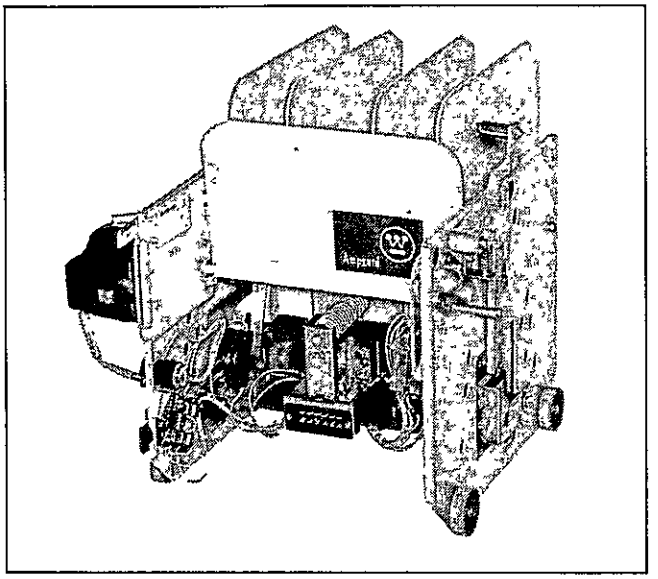


Fig. 1 - Front View

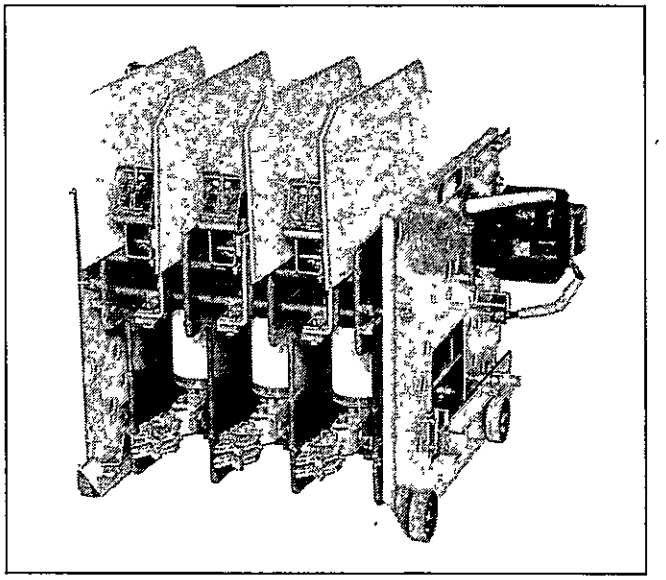


Fig. 2 - Rear View

THE CONTACTOR

The Type SJA vacuum contactor is a NEMA Size H3 contactor designed for starting and controlling three-phase, 50 or 60 Hz AC motors on nominal 2400, 4160, 4800 and 6900 volt systems. Horsepower ratings are shown in Table I. Motor full-load current should not exceed the contactor current rating. Two-pole contactors have the same current ratings as 3-pole devices but are not suitable for controlling three-phase motors.

The contactor is referred to as the Type SJA, for simplicity. The exact catalog number is more complex. Any communication with Westinghouse should include the complete style or part, and catalog numbers, exactly as they appear on the nameplate.

SHORT-CIRCUIT PROTECTION

The short-circuit capacity of the power system may exceed the interrupting capacity of the contactor. The contactor should have short-circuit protection with current-limiting motor-starting fuses as specified for the application. Substitute fuses should not be used without proper authorization by a qualified person.

INSTALLATION

This industrial type control is designed to be installed, operated, and maintained by adequately trained personnel, with adequate supervision. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, 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.

WARNING: ALL WORK ON THIS CONTACTOR SHOULD BE DONE WITH THE MAIN DISCONNECT DEVICE OPEN. AS WITH ANY CONTACTOR OF THIS VOLTAGE, THERE IS DANGER OF ELECTROCUTION AND/OR SEVERE BURNS. MAKE CERTAIN THAT POWER IS OFF.

The Type SJA contactor is intended to be mounted in a Westinghouse Ampgard® starter with overload relays and power fuses. In a factory assembled starter, the contactor is ready for service except for routine check-out as described later.

TABLE I — CONTROLLER RATINGS

Enclosed Current Rating Continuous	System Voltage	Horsepower Ratings			Interrupting Capacity In A Coordinated Starter 3-Phase, Symmetrical MVA*	
		Synchronous Motor		Induction Motor		
		1.0 P.F.	0.8 P.F.		Unfused NEMA Class E1	Fused NEMA Class E2
360	2200-2500	1750	1500	1500	25	200
360	4000-5000	3000	2500	2500	50	350
360	6200-7200	5000	4000	4000	50	570

** The asymmetrical interrupting rating is 1.6 times the symmetrical values shown.*

INSTALLATION (cont.)

If the Type SJA contactor is a replacement for an air-break Type LF contactor in an Ampgard® starter, make the exchange as follows:

1. Unplug the 12 point Jones Plug and interchange the contactors.
2. Check the wiring of the control plug to make certain that the control functions correctly.
3. Continue with routine check-out.

CONTACTOR OPERATION

The Type SJA contactor has its main contacts sealed inside ceramic tubes from which all air has been evacuated, i.e., the contacts are in vacuum. No arcboxes are required, because any arc formed between opening contacts in a vacuum has no ionized air to sustain it. The arc simply stops when the current goes through zero as it alternates at line frequency. The arc usually does not survive beyond the first half cycle after the contacts begin to separate. The ceramic tube with the moving and stationary contacts enclosed is called a **vacuum interrupter** or a **bottle,** and there is one such bottle for each pole of the contactor. A two pole contactor has two vacuum bottles, and a three pole contactor has three vacuum bottles. A metal bellows (like a small, circular accordian) allows the moving contact to be closed and pulled open from the outside without letting air into the vacuum chamber of the bottle. Both the bellows and the metal-to-ceramic seals of modern bottles have been improved to the point that loss of vacuum is no longer cause for undue concern.

The moving contacts are driven by a molded plastic crossbar (See Figure 4.) rotating with a square steel shaft supported by two shielded, pre-lubricated ball bearings that are clamped in true alignment for long life and free motion. Only the end edges of the square shaft are rounded to fit the bearings, so that portions of the four shaft flats go through the bearings for positive indexing of mechanical safety interlocks.

The contacts in an unmounted bottle (vacuum interrupter) are normally-closed, because the outside air pressure pushes against the flexible bellows. For contactor duty, the contacts must be open when the operating magnet is not energized. Therefore, the contacts of the vacuum bottles must be held apart mechanically against the air pressure when used in a contactor. In the Type SJA contactor, all of the bottles are held open by a single kickout spring on the front of the contactor. (See Figure 4.) The kickout spring presses against the moving armature and crossbar and thereby forces the bottles into the open contact position. Note that in the open position, the crossbar is pulling the moving contacts to hold them open.

Up to an altitude of 3300 feet, the contactor is designed to tolerate normal variations in barometric pressure. The contact force at sea level when fully closed is intended to be 28 to 34 pounds. This will decrease approximately 0.75 pounds per 1000 feet above sea level.

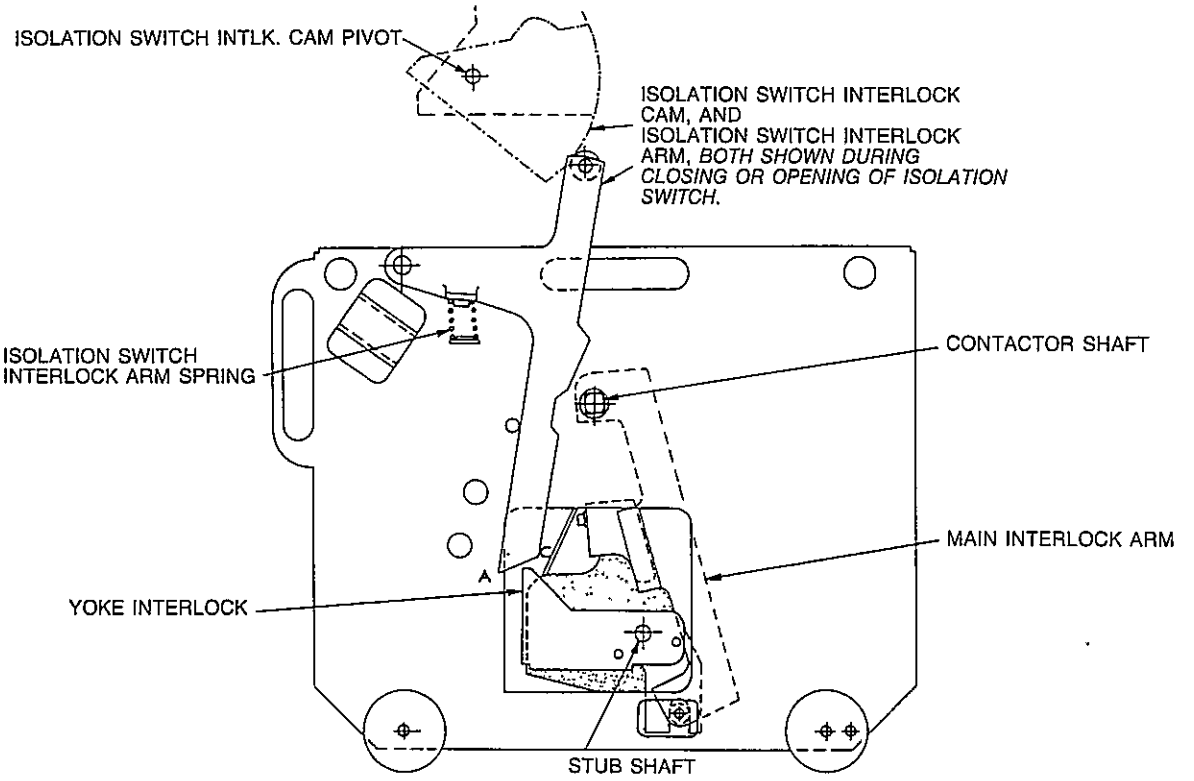
If the contact force is below 28 pounds, it should be increased by adding one or more extra-wide flat washers to the bottle stud ON TOP OF THE SHUNT and underneath the contact spring. This will increase the contact force provided by the spring. See **Contact Force Measurement** under **MAINTENANCE.**

The kickout spring is adjustable and occupies the space above the operating magnet. The kickout spring must be removed before the magnet coil can be changed if that becomes necessary. The normal position of the kickout spring lever is vertical, but it might be set slightly differently as will be explained later. The lever can be loosened to unload the kickout spring (after loosening the setscrew that locks the adjusting screw) by unscrewing the 5/16" screw immediately below the kickout spring itself. Although it can be loosened, the lever is captive. As the 5/16" screw is loosened, the kickout spring will reach its relaxed, free length and can be removed easily. To re-install it, reverse the procedure. Insert the uncompressed, free spring into position; then apply load by tightening the 5/16" adjusting screw on the lever until the lever is approximately vertical. See specific instructions later. Because the spring forces exceed 100 pounds, it is recommended that the free hand be placed over the kickout spring as a precaution while turning the 5/16" adjusting screw in either direction.

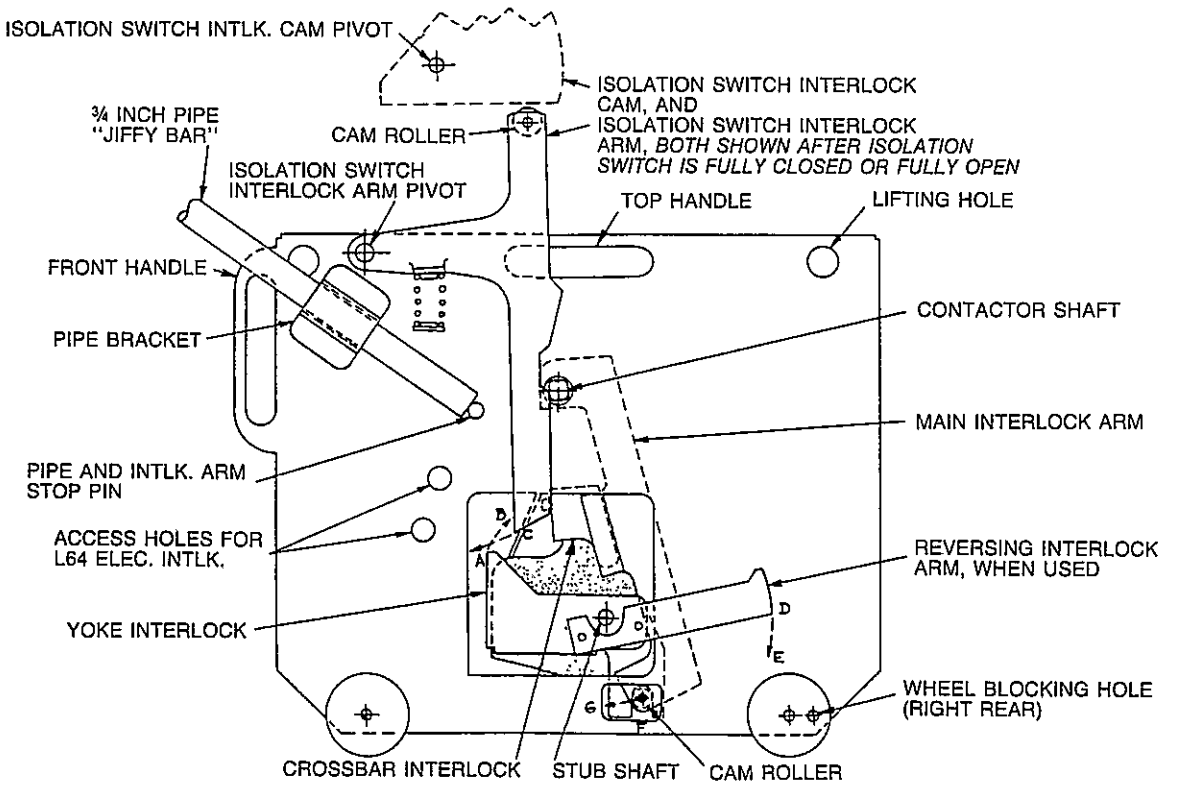
The operating magnet (See Figure 4.) is on the front of the contactor. The coil has a "figure-eight" shape and is really two coils in series, with a connection to their common point. Both coils are encapsulated in one environmentally-immune coil shell, which also contains a full-wave silicon diode rectifier. An AC or DC source can be connected to terminals A and B on the coil shell. When an AC source is applied, the rectifier converts the AC to unfiltered DC to excite the magnet. When a DC source is applied, only two legs of the full-wave rectifier are active and pass DC current for magnet excitation. The magnet will not chatter as AC magnets sometimes do, but at less than rated voltage, it may hum slightly. A normally-closed auxiliary contact, set to open slightly before the armature fully closes, is connected to terminals C and D on the coil shell. When adjusted correctly, this auxiliary contact allows a relatively high current through the pick-up winding, and as the contactor closes, the auxiliary contact inserts the holding winding, which reduces the coil current to a low value, sufficient to hold the magnet closed without overheating.

In the description of the bottles, it was mentioned that no arcboxes are required. However, because of electrical clearances, **four** phase barriers and **one** front barrier **must be installed before the contactor is energized.**

There are two control plugs on the typical Type SJA contactor. The first is the 12 point plug for the control cable from the Ampgard® cell. The second plug is for control power and is in the secondary of the control transformer. The male plug can be plugged into a standard 120 volt (or 240 volt, depending on coil voltage rating) extension cord socket for testing the control circuit and sequence without energizing the Ampgard® at power circuit voltage. When the male plug is transferred to the extension cord, it automatically disconnects from the control transformer to prevent feedback of high voltage into the power circuits. It is recommended that a routine check be made to assure no inadvertent bypass

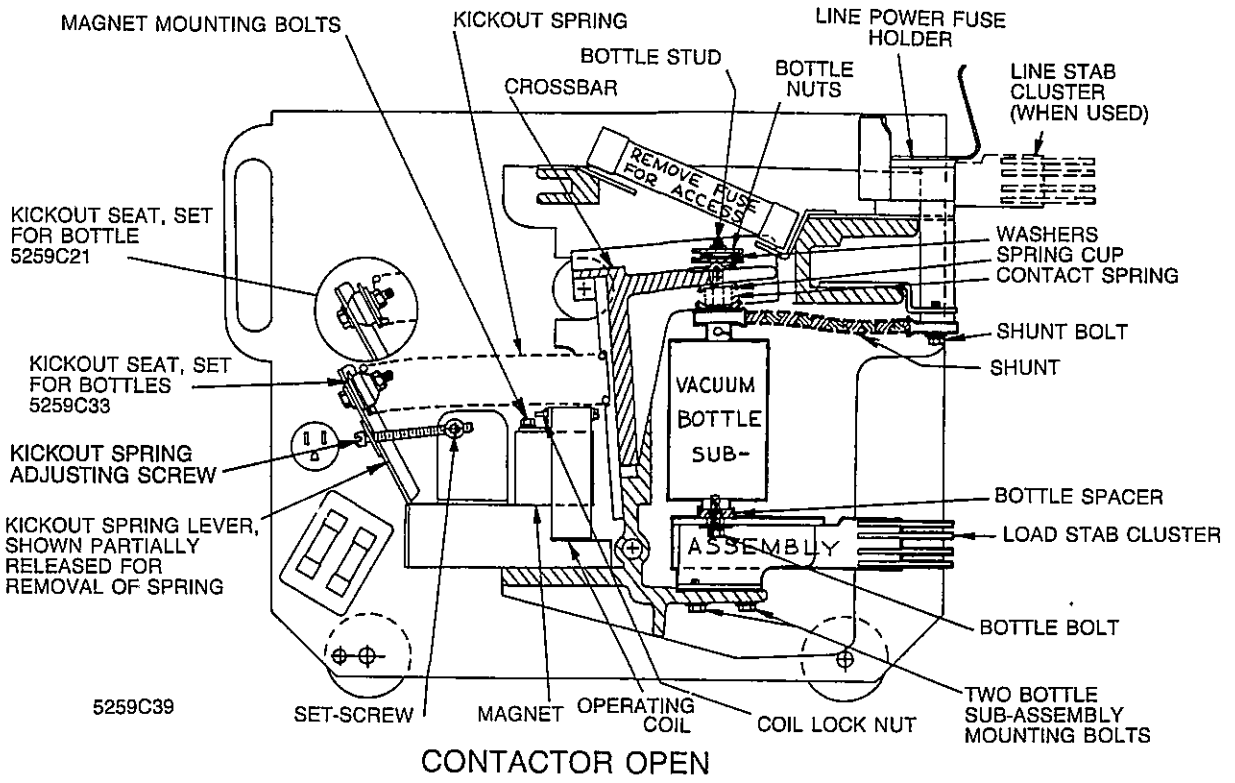


CONTACTOR *INTERLOCKED* OPEN

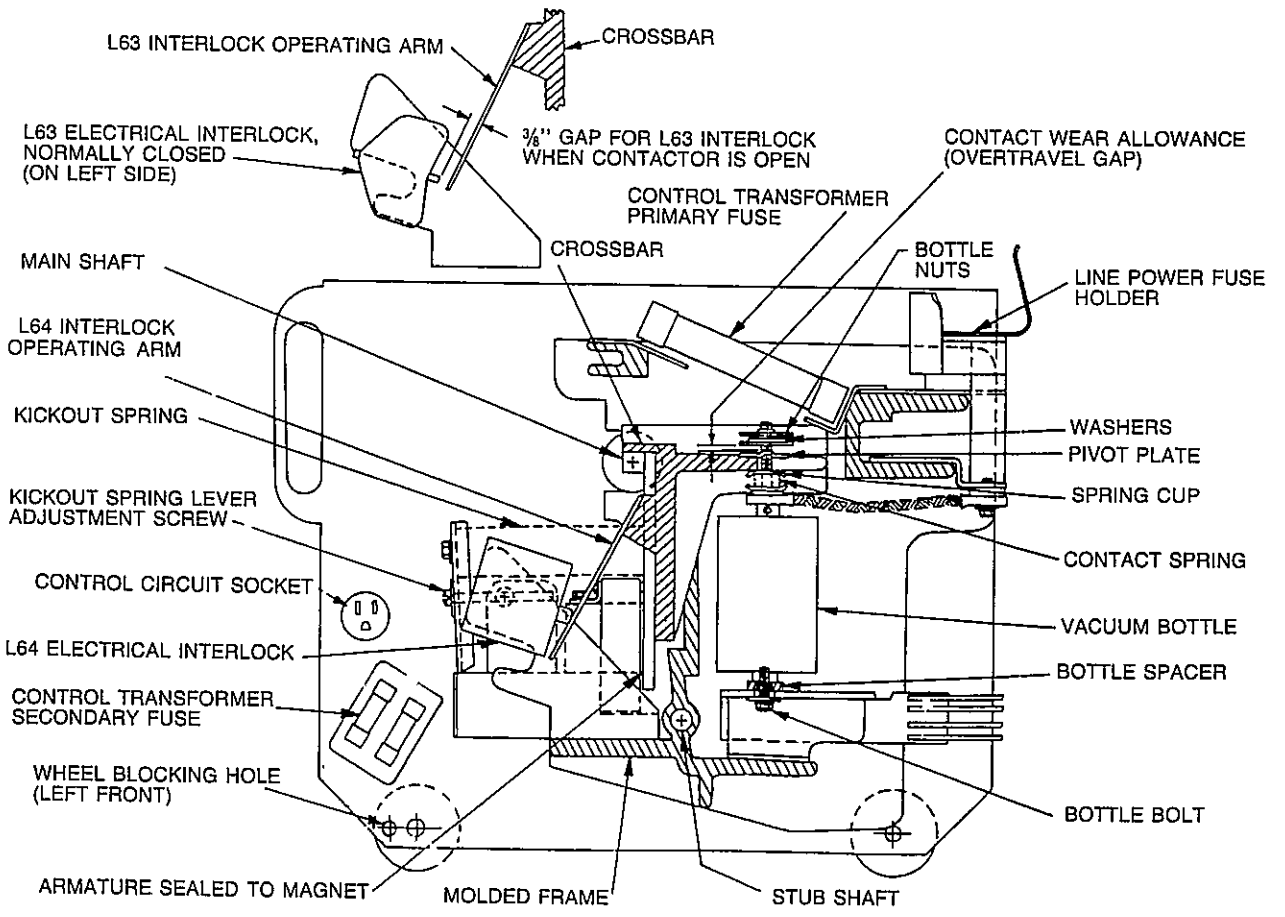


CONTACTOR OPEN, INTERLOCKS NEUTRAL

Fig. 3 Interlock Operation



CONTACTOR OPEN



CONTACTOR CLOSED

Fig. 4 Contactor Positions

of this has been made in the wiring before relying on this safety feature.

HANDLING

The contactor weighs about 140 pounds. An oblong hand-hole is provided in each side for lifting if desired.

There are two handles at the front for pulling the contactor out of its cell, or for pushing it back into place.

If a mechanical lift is used, hooks can be put into the two front handles and into the 1 inch diameter holes at the top rear of each side sheet. See Figure 3.

If the Type SJA is installed in an Ampgard® starter, it can be removed as follows:

1. **Make sure all circuits are deenergized.**
2. If the contactor is in a cell above floor level, provide a lift truck and platform to receive the contactor as it comes out.
3. Remove the 3 main fuses using the fuse puller supplied with the Ampgard® starter.
4. Disconnect the 12 point control plug and stow it so that the cable will not get damaged.
5. Trip the latch on the left side by holding it upward (using your foot if desired, when unit is at floor level).
6. While holding the latch up, pull the contactor outward. It will roll forward and should re-latch at a detent position, partially out of the cell.
7. To remove the contactor completely, reverse the latch, pressing it downward. The contactor can then be rolled out of its cell.

Once the contactor is on the floor, it can be moved easily by means of a short length of ¾ inch pipe inserted into a bracket on the top front of the right side sheet. The contactor can be pushed or pulled like a wagon in this manner. See Figure 3.

When the contactor is on a work table, it is recommended that the wheels be blocked to prevent an accidental roll-off. A ¼" diameter bolt or pin can be inserted into the left front or right rear wheel, entering any of the holes in the wheel flange and then into a hole in the side sheet, provided for this purpose.

The four lower corners of the contactor side sheets are cut at 45°. When the contactor is on a level firm work surface, it can be temporarily tilted backward or forward off its wheels onto these 45° pads for easy access during maintenance. It is not absolutely stable in this position and therefore due care should be exercised. A contactor should not be left in this position unless actually being worked on. Refer to Figure 5.

CHECK-OUT, MECHANICAL

Make sure all power circuits are deenergized and/or isolated. The contactor can be checked in its cell or outside. If the starter is a new factory assembly, it is probably easiest to test the contactor as installed. Any mechanical interlocks **must** be checked as installed, to make certain that safety interlocks function properly.

If the contactor is a replacement, pay attention to the ease with which it rolls into place and latches. If any mechanical obstruction is observed, check and eliminate before proceeding.

DOOR INTERLOCK

The SJA contactor is equipped with a door interlock bolted to the upper side of the left-hand side sheet. Its function is to further ensure that the contactor is properly racked into position by providing an obstacle to door closure if the line and/or load stab clusters are not fully engaged with the main power stabs.

WARNING! DO NOT OPERATE CONTACTOR IF INTERLOCK PREVENTS DOOR CLOSING.

If the contactor is checked in its cabinet, make certain that the contactor coil is electrically isolated, to prevent feedback into a control transformer that could be hazardous.

With an extension cord and a separate power source of correct AC voltage, connect to the control power plug on the contactor chassis. Operate the appropriate pushbuttons to close and open the contactor, and to check out the sequence. If the contactor does not close fully or does not drop out fully, refer to the **MAINTENANCE** section, page 6.

While the contactor is **closed**, push down on the isolation switch interlock arm on the right side of the contactor. (See Figure 3.) It must latch into the yoke driven by the armature. If it does not latch, corrective action must be taken.

While the contactor is **closed,** observe the overtravel gap between the pivot plates on the crossbar and the underside of the lower bottle nut on each pole. This overtravel gap should be no less than .075 inch when the contactor is new. If less, refer to **Contact Wear Allowance.**

While the contactor is **open,** push the armature rearward with a long screwdriver or other rod applied to the lower end of the armature above the coil terminals. The armature should not move because it should be firmly against the plastic main frame. See Figure 4. To correct a problem, see paragraph 11 under **CHANGING OPERATING COIL.**

Disconnect extension cord and restore plug into socket on contactor chassis.

CHECK-OUT, VACUUM INTERRUPTERS

The dielectric strength of the interrupters should be checked before the contactor is energized for the first time and regularly thereafter to detect at the earliest possible date any deterioration in the dielectric strength of the contact gap since this may result in an interruption failure. Although an AC dielectric test is recommended, a DC test may be performed if only a DC test unit is available. A good interrupter will withstand a 16kV-60 Hz test or a 23kV-DC test across a .156 inch contact gap. This is the nominal contact gap for a new contactor. When performing DC tests, the voltage should be raised to test value in discrete steps and held for a period of one minute.

When a vacuum bottle is tested with voltages over 5000 volts across its open gap, there is some possibility of generating X-rays. Test time should be minimized, and personnel should not be closer than 10 feet and preferably located behind some barrier. This is a

precaution until such time as the possible hazard is better understood and standards are published.

Periodic dielectric tests across open contacts should not be omitted on the basis of satisfactory contactor performance since under certain operating conditions, the contactor may perform satisfactorily even though one vacuum interrupter becomes defective.

The interval between periodic tests depends on the number of operations per day, environmental factors, and experience. It is a matter of operator judgement.

CAUTION: SOME DC HIGH POTENTIAL UNITS, OPERATING AS UNFILTERED HALF-WAVE RECTIFIERS, ARE NOT SUITABLE FOR TESTING VACUUM INTERRUPTERS, BECAUSE THE PEAK VOLTAGE APPEARING ACROSS THE INTERRUPTERS CAN BE SUBSTANTIALLY GREATER THAN THE VALUE INDICATED.

CHECK-OUT, MECHANICAL INTERLOCKING

One of the features of Ampgard®motor control is the interlocking of the contactors and isolation switch.

The SJA is interchangeable with an airbreak LF contactor in a standard Ampgard® structure. To compensate for the smaller angular travel of the SJA, a multiplying linkage is used. Refer to Figure 3. The main interlock arm rotates with the main shaft and drives the yoke interlock (through an angle approximately three times greater) around a stub shaft. The cam roller on the main interlock arm travels in a slot in the yoke interlock and moves from F to G as the SJA contactor closes. This motion moves the latch end of the yoke interlock from A to B, so that when the SJA contactor is closed, the lower end of the isolation switch interlock arm cannot move from C to A, which prevents **opening** the isolation switch when the contactor is closed, and prevents **closing** the isolation switch if the contactor is already closed due to some malfunction. The isolation switch interlock arm does not move, except when the isolation switch is being opened or closed.

Similarly, **during** the **opening** or **closing** of the isolation switch, the pie-shaped interlock cam on the isolation switch rotates clockwise downward, driving the isolation switch interlock arm on the SJA contactor clockwise so that the bottom end moves from C to A. During this action, the contactor cannot close because the latch end of the yoke interlock is prevented from moving from A to B. As mentioned in the previous paragraph, if the contactor is closed before the operation of the isolation switch is attempted, it is the isolation switch interlock arm that cannot move from C to A, which stops the pie-shaped interlock cam on the isolation switch from rotating, which in turn latches the isolating switch operating handle in either the open or the closed position.

The purpose of this interlocking is to prevent the accidental closing of the isolation switch while the contactor is closed or the accidental opening of the isolation switch while the contactor is closed. Neither closing nor opening of the isolation switch under load is safe.

One note in this regard: The control transformer and control circuit burden on factory assembled Ampgard® starters is within the make and break capability of the isolation switch. This electrical load should not be increased without consulting Westinghouse.

On all reversing and most reduced-voltage assembled control, the contactors must be mechanically interlocked with each other. This is done with a reversing interlock arm attached to the yoke interlock, and rotating around the stub shaft with the yoke. As seen in Figure 3, the yoke moves from A to B, the reversing interlock moves from D to E and thereby functions with the mechanical interlock built into the Ampgard starter.

All these interlocks are intended to protect against malfunction. But they should be tested with main **POWER OFF** prior to start-up (and at intervals thereafter) by simulating improper operation and sequencing of the contactors and isolating switch. Failure to interlock must be corrected before power is applied.

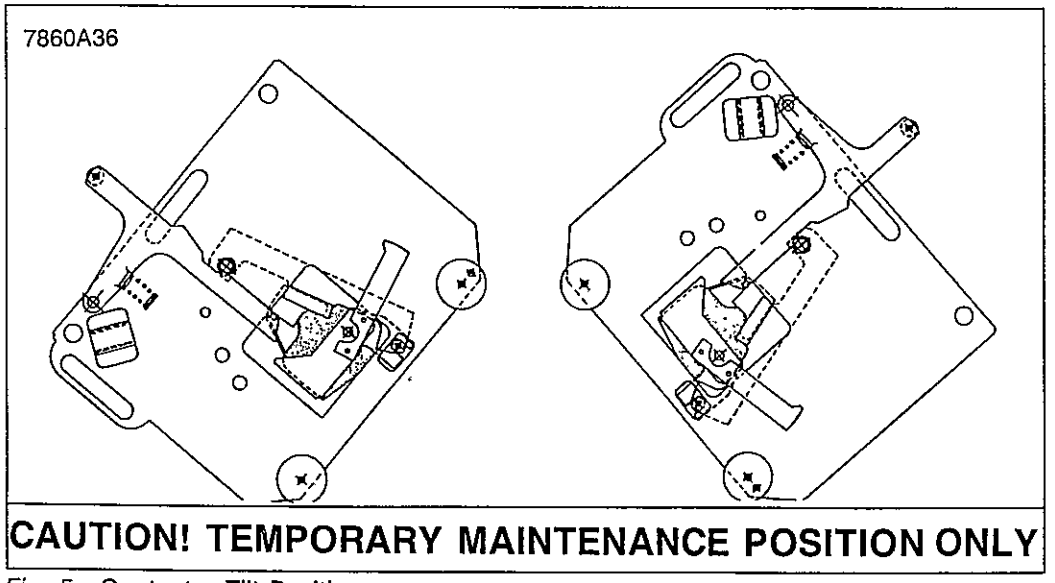


Fig. 5 Contactor Tilt Position

MAINTENANCE

General

This industrial type control is designed to be installed, operated, and maintained by adequately trained personnel, with adequate supervision. These instructions do not cover all details, variations, or combinations of the equipment, its storage, delivery, installation, check-out, 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.

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

All work on this contactor should be done with the main circuit disconnect device open, and using a separate source of control power to operate the magnet. Before applying external control circuit power, make certain that the contactor coil circuit is electrically isolated, to prevent feedback into a control transformer that could be hazardous. Disconnect power from any other external circuits. Also, discharge any hazardous capacitors.

Refer to page 5, **HANDLING** on the operation of the latch and the withdrawal of the contactor from its cell. Much routine maintenance on the low voltage portion can be done with the contactor partially withdrawn to the latched-detent position, rather than completely removed. However, the contactor can also be completely removed and taken to a bench.

Insulation Level

Refer to the insulation resistance measurements between poles and from each pole to ground that were recorded at start-up and subsequent intervals. Measure the same points in the same manner and record. Investigate any abrupt reduction in resistance or any unusually low reading.

Dust and moisture are detrimental to electrical equipment. Industrial equipment is designed to tolerate a less-than-perfect environment. However, excessive dust can cause trouble, and should be wiped or blown off at appropriate intervals. If the contactor is wet for any reason, it must be dried until insulation resistance between poles and from each pole to ground has returned to normal.

The contacts inside the interrupters are immune to dust and moisture and require no attention of this type.

Vacuum Interrupters

Gross loss of vacuum is highly unlikely, but it can be checked easily. With the contactor open, pull upward on the bottle nuts, one pole at a time, using an effort of about 20 pounds. If the bottle nuts move easily away from their pivot, the vacuum has probably failed and the bottle subassemblies must be replaced.

It is also unlikely, but possible, to have a very sli leak that does not change the bottle force appreciab but which might seriously damage the ability of the bo tle to interrupt. In this regard, it must be remembere that in a three phase circuit, it is possible for any tw good interrupters to successfully interrupt the circuit even if the third interrupter is weak. But this condition should not be allowed to continue. It can be detected only by a dielectric test.

The dielectric strength of the interrupters should be checked before the contactor is energized for the first time and regularly thereafter to detect, at the earliest possible date, any deterioration in the dielectric strength of the contact gap since this may result in an interruption failure. The vacuum interrupters should be tested as specified by the section **CHECK-OUT, VACUUM INTERRUPTERS.**

Contact Force Measurement

Contact force can be measured with the contactor on a bench or on the floor in the tilt position. Energize the contactor via the control power plug and an extension cord. Place a loop of wire or string between the bottle nuts of each vacuum interrupter in turn and pull on a spring scale as shown in Figure 6. Connect a continuity checker between the line and load side of each pole and determine the force required to pull the contacts open.

Contact Wear Allowance

Contact material vaporizes from the contact faces during every interruption and condenses elsewhere

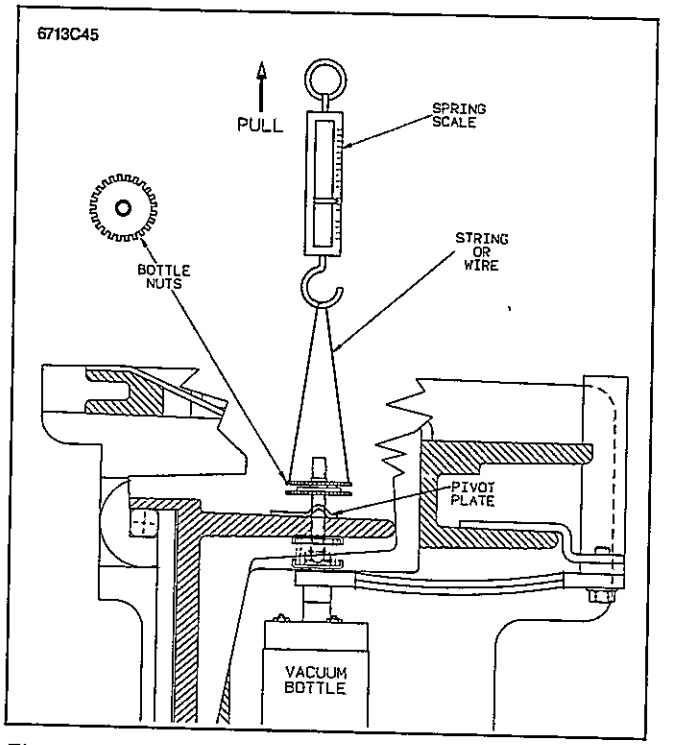


Fig. 6 Measuring Contact Force

NCE (cont.)

bottle. This is normal, and is provided for by el, or wear allowance. When the contactor is sed, there is a gap between the lower bottle nut e pivot plate. See Figures 4 and 6. As the con- wear, this gap decreases. When the gap goes **ow .020 in.** on any pole, all the bottle subassem- es should be replaced. Use the .020 inch thick fork- haped overtravel gauge supplied for this measure- ment, part no. 5259C11. DO NOT RE-ADJUST THE BOTTLE NUTS TO RESET OVERTRAVEL AS THE CONTACTS WEAR. Once placed into service, overtravel should be checked but not adjusted.

Inspection After Short Circuit or Overload

The Type SJA contactor is intended to be protected by power fuses in accordance with the NEC. However, the magnitude of a short circuit may exceed the damage threshold of the vacuum bottles. After the interruption of a short circuit at the maximum MVA rating of the contactor, the unit should be examined for any apparent physical damage, or deformation of conductor bars and cables. If there is any evidence of severe stress, it is recommended that all bottle subassemblies be replaced. If the overtravel has changed significantly (from the last inspection) on one or more bottles, all bottle subassemblies should be replaced.

A dielectric test would not by itself confirm that the bottles should be returned to service after a fault. However, if there is no physical evidence of stress, and if the overtravel exceeds the .020 in. minimum, the bottles can then be dielectrically tested as outlined previously. If physical stress, overtravel, and dielectric are within acceptable limits, it is reasonable to return the bottles to service after a fault.

If the SJA contactor opens locked rotor current as a result of a relay tripping, the mechanical damage typical of a short circuit will not occur. However, the bottles should be dielectrically tested as specified in the section **CHECK-OUT, VACUUM INTERRUPTERS** before returning to service.

MAGNET OPERATING RANGE

When properly adjusted as described in previous sections, the contactor should operate within the ranges shown in Table IV.

If the magnet chatters, look for mechanical interference that prevents the magnet from sealing. If there is no interference, then the magnet itself may be misaligned. The magnet gap can be seen from the left and right sides with the help of a flashlight. The stationary magnet can be aligned with a ½" diameter steel rod inserted into the two holes in the core of the magnet and used as a lever to put a corrective set into the magnet frame. It should not be necessary to do this unless the contactor has been damaged and it can be seen that the armature does not fit against the magnet. A poor magnet-to-armature fit usually produces a high dropout voltage and/or chatter.

Mechanical interference can be produced by various incorrect adjustments. Two specific points to check are:

A. Armature travel incorrect, causing the contact springs to be compressed into a solid, non-resilient "tube" that stops the crossbar rigidly. Call Westinghouse Service for assistance.
B. The auxiliary contact operating arms are misadjusted, so that an interlock plunger bottoms solidly before the magnet seals. When the contactor is fully sealed closed, there should still be a small amount of travel remaining for these plungers. Adjust as described below.

AUXILIARY CONTACTS (ELECTRICAL INTERLOCKS)

Two Type L64 electrical interlocks are mounted on the front (right side) to provide four auxiliary, isolated 600V, 10A, double-break contacts for use in control circuits. Any combination of normally open or normally closed circuits is available by selection of the appropriate style of interlock assembly from Table II.

TABLE II — L64 AUXILIARY CONTACTS

Part Number	Circuit Combination Provided By One Interlock Assembly
843D943G21	One Normally Open, One Normally Closed
843D943G22	Two Normally Open
843D943G23	Two Normally Closed

The normally closed Type L63 auxiliary mounted on the front (left side) has only one circuit, and is connected to coil terminals C and D. This auxiliary contact (578D461G03) is equipped with permanent magnet blowouts on the contacts.

AUXILIARY CONTACT ADJUSTMENT

The 3/8" gap shown for the L63 interlock (normally closed) in the insert picture in the center portion of Figure 4 is important and must be held between .365 and .385 inch. If the gap is too big, the hold winding of the operating coil will not be inserted as the contactor closes, and the pick-up winding will burn out, because the pick-up winding is only intermittently rated. If the .375 inch gap is too small, the hold winding will be inserted too soon, reducing the pull force before the contactor is closed, and producing an oscillation like an old doorbell.

The L64 interlocks are not as critical. In the open position, their plungers should rest lightly against the interlock operating arm.

However, neither L63 nor L64 interlocks should bottom solidly in the closed contactor position, as discussed under **MAGNET OPERATING RANGE.**

If required, the interlock operating arms can be adjusted by bending, using the forked end of the bottle wrench. See Figure 7.

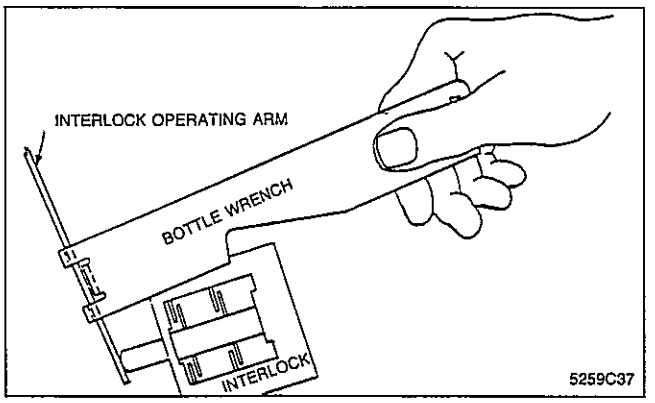


Fig. 7 Use of Bottle Wrench

OPERATING COIL

The standard operating coils are shown in Table III. They should be supplied directly from an AC or DC source with sufficient volt-ampere capacity to maintain coil voltage during inrush while closing. No external resistors are required.

TABLE III — OPERATING COILS		
COIL PART NO.	7860A34G02	7860A34G02
AC RATING	110-120 VAC 50-60 HZ	220-240 VAC 50-60 HZ
AC INRUSH AC SEALED	1300 VA 25 VA	1400 VA 26 VA
DC RATING	125 VDC	250 VDC
DC INRUSH DC SEALED	1500 VA 28 VA	1600 VA 29 VA
REPLACEMENT COIL KIT PART NO.	2147A48G11	2147A48G21

CHANGING OPERATING COIL

The operating coil has a pick-up winding which is intermittently rated. It may burn out in only minutes if continuously energized at rated voltage and the L-63 interlock does not open correctly.

The coil contains its own rectifier to convert applied AC into unfiltered full-wave rectified DC. When parts are in alignment and the coil is at rated voltage, the magnet will be silent. At reduced voltage, some slight hum may be heard. However, the magnet must not chatter.

If for some reason a coil must be changed, proceed as follows:

1 De-energize **all** circuits.

2. Loosen the setscrew holding the kickout spring adjusting screw. See Figure 4.
   Loosen the kickout spring adjusting screw until the kickout spring can be removed easily.
   Note: Whenever adjusting the kickout spring lever, put your free hand over the kickout spring as a precaution.
3. Remove leads to coil terminals, noting their position for later reconnection.
4. Remove the two 5/16" magnet mounting bolts. Remove bolts completely and set aside until later.
5. Lift magnet and coil upward and out..
6. Remove coil clip from old coil and install on the new coil. Note that the coil clip is THREADED. Remove coil lock nut before removing screw. When installing clip on new coil, tighten the screw only to snug, then lock the screw into the coil clip with the lock nut. Note that the head of the screw must be toward the armature.
7. Re-install magnet into coil, and lower both into position. Do not force. Sometimes it is necessary to jiggle the coil slightly into its seated position.
8. Install the two magnet mounting bolts, but do not tighten. .
9. Re-connect the coil circuit.
10. After checking for safety, energize the coil and close the contactor. While magnet is sealed, tighten the two magnet mounting bolts, using continuing care against shock. Then de-energize the coil.
11. Re-install the kickout spring, making sure to put the two ends of the spring wire downward, so that the spring will take a natural bow. Tighten the adjusting screw until the kickout spring lever is approximately vertical, and the armature is solidly against its stop on the molded frame. See Figure 4. When a screwdriver is pushed against the bottom end of the armature in the open position, the armature must not move. If it does, the kickout spring should be tightened further to push the armature to a solid position. Tighten setscrew to lock the kickout spring adjusting screw.

TABLE IV — COIL PERFORMANCE				
Rated Coil Voltage	Pick-Up-To-Seal Voltage		Drop-Out-To-Full-Open Voltage	
	Above	Below	Below	Above
110-120 VAC 125 VDC	50 55	96 100	75 82	10 11
220-240 VAC 250 VDC	100 110	192 200	150 164	20 22

VACUUM BOTTLE SUBASSEMBLY REPLACEMENT

If it becomes necessary to replace vacuum bottles, obtain Vacuum Bottle Subassembly Replacement Kit part number 2147A47G03, and follow the enclosed instructions (I.L. 16-200-34). This kit includes three bottle subassemblies, as **all bottle subassemblies must be replaced at the same time.**

TABLE V — RENEWAL PARTS	
ITEM	REPLACEMENT KIT NO.
VACUUM BOTTLE (3) SUBASSEMBLIES	2147A47G03
12-POINT PLUG WITH WIRES	2147A15G03
12-POINT RECEPTACLE WITH WIRES	2147A15G04
FEELER GAUGE AND BOTTLE WRENCH	2147A47G15

CONNECTION DIAGRAM

Figure 8 shows the routing of the conductors and connection points to the internal portion of the SJA control circuit. The conductor cable pattern shown in Figure 8 is used for both two-pole and three-pole contactors. For interconnections with other Ampgard components, see the wiring diagram furnished with the Ampgard starter.

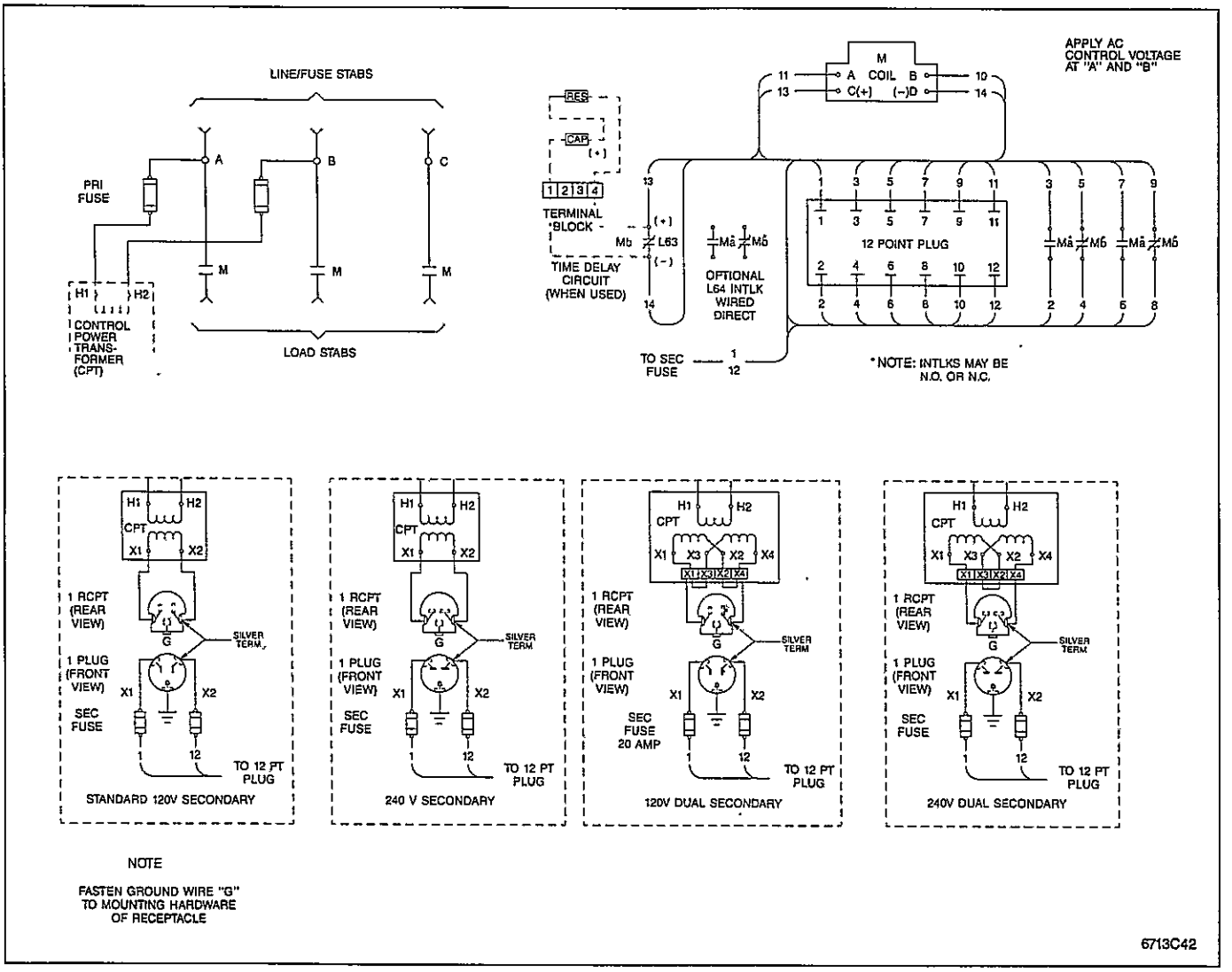


Fig. 8 Cable and Connection Diagram

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