

Acco[®] WRIGHT[®]

end truck accessories
electrical
controls

installation
operation
and parts
manual

WARNING

This equipment should not be installed, operated or maintained by any person who has not read all the contents of these instructions. Failure to read and comply with these instructions or any one of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

Only competent engineering and fabrication personnel, familiar with standard crane design and fabrication practices, should be employed to design and fabricate cranes using this equipment because of the necessity of properly interpreting these instructions and for the purposes of determining appropriate compatible equipment and product applications. Acco disclaims any responsibility for the quality of design and workmanship employed in the design and fabrication of a crane or other system using this equipment or the sufficiency of the structure in which and to which this equipment is to be installed or the sufficiency of the crane or system to sustain any particular load that may be imposed upon it. Contact Acco Chain & Lifting Products for additional information if necessary.

There are no other warranties which extend beyond the description on the Order Acknowledgment and as it may apply to the specifications provided in this publication. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXCLUDED. Acco shall in no event be liable for any special, direct, indirect, incidental or consequential damages to anyone beyond the cost of replacement of the goods sold hereby.

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NOTICE

Manual 69499 covers information in reference to standard models of the WRIGHT® end truck accessories electrical controls. This manual includes instructions and parts information for a variety of electrical control types. Therefore, all instructions or parts information may not apply to any one type or size of specific electrical control. Disregard those portions of the manual that do not apply. Manuals for special engineered end truck accessory electrical controls will contain additional pages in accordance with product specifications.

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NOTICE

TO ORDER PARTS: Provide part number, part description, and quantity required.

IMPORTANT INFORMATION AND WARNINGS

SAFETY ALERT SYMBOL

The Safety Alert Symbol is used in this manual to indicate hazards and to alert the reader to information that should be known, understood, and followed in order to avoid DEATH or SERIOUS INJURY.

Read and understand this manual before using the crane.

Important issues to remember during operation are provided at the crane control stations, at various locations on the crane and in the manuals by **DANGER**, **WARNING**, or **CAUTION** instructions or placards, that alert the personnel to potential hazards, proper operation, load limitations, and more.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION

These general instructions deal with the normal installation and operation situations encountered with the equipment described herein. The instructions should not be interpreted to anticipate every possible contingency or to anticipate the final system, crane, hoist, or configuration that uses this equipment.

This manual includes instructions and parts information for a variety of crane types. Therefore, all instructions and parts information may not apply to any one type or size of specific crane. Disregard those portions of the instructions that do not apply.

Use only Wright® authorized replacement parts in the service and maintenance of this crane.

WARNING

Equipment described herein is not designed for and should not be used for lifting, supporting, or transporting humans.

Equipment described herein should not be used in conjunction with other equipment unless necessary and/or required safety devices applicable to the system, hoist, or application are installed by the system designer, system manufacturer, crane manufacturer, hoist manufacturer, installer, or user.

Modifications to upgrade, rerate, or otherwise alter this equipment shall be authorized only by the original equipment manufacturer or qualified professional engineer.

Equipment described herein may be used in the design and manufacture of cranes. Additional equipment or devices may be required for the crane to comply with applicable crane design and safety standards. The crane designer, crane manufacturer, or user is responsible to furnish these additional items for compliance. Refer to ASME B30.17, Safety Standard for Top-Running Single Girder Cranes; ASME B30.2, Safety Standard for Top-Running Double Girder Cranes; and B30.11 Safety Standard for Underhung Cranes and Monorails. If a hoist is used with a crane, refer to ASME B30.16, Safety Standard for Overhead Hoists (Underhung). If a below-the-hook lifting device or sling is used with a crane, refer to ASME B30.9, Safety Standard for Slings, or ASME B30.20, Safety Standard for Below-the-Hook Lifting Devices.

Hoists and cranes, used to handle hot molten metal may require additional equipment or devices. Refer to ANSI Z241.2, Safety Requirements for Melting and Pouring of Metals in the Metalcasting Industry.

Electrical equipment described herein is designed and built in compliance with ACCO Chain & Lifting Products Interpretation of ANSI/NFPA 70, National Electrical Code. The system designer, system manufacturer, crane designer, crane manufacturer, installer, or user is responsible to assure that all installation and associated wiring of these electrical components is in compliance with ANSI/NFPA 70, and all applicable, Federal, State, and Local Codes.

Failure to read and comply with any of the limitations noted herein can result in serious bodily injury or death, and/or property damage.

IMPORTANT INFORMATION AND WARNINGS

DANGER

HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL ENCLOSURE, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

Before performing ANY mechanical or electrical maintenance on the equipment, de-energize (disconnect) the main switch supplying power to the equipment; and lock and tag the main switch in the de-energized position. Refer to ANSI Z244.1, Personnel Protection — Lockout/Tagout of Energy Sources.

Do not operate the equipment without control enclosure cover or covers in place.

Only trained and competent personnel should inspect and repair this equipment.

NOTICE

It is the responsibility of the owner/user to install, inspect, test, maintain, and operate a crane in accordance with ASME B30.2, Safety Standard for Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder), B30.11 Monorail and Underhung Cranes, B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist), OSHA Regulations, and ANSI/NFPA70, National Electrical Code. If the crane is installed as part of a total lifting system, such as in conjunction with a hoist, it is also the responsibility of the owner/user to comply with the applicable ASME B30 volume that addresses that type of equipment.

It is the responsibility of the owner/user to have all personnel that will install, inspect, test, maintain, and operate a crane read the contents of this manual and applicable portions of ASME B30.2 Safety Standard for Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder), B30.11 Monorail and Underhung Cranes, B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist), OSHA Regulations, and ANSI/NFPA70, National Electrical Code. If the crane is installed as part of a total lifting system, such as in conjunction with a hoist, the applicable ASME B30 volume that addresses that type of equipment must also be read by all personnel.

Any ANSI Standards referenced in this manual may be obtained from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

This manual contains information for safe operation of an overhead crane. Taking precedence over any specific rule, however, is the most important rule of all — "USE COMMON SENSE". Operation of any overhead crane involves more than operating the controls. The operator must consider and anticipate the motions and actions that will occur as a result of operating the controls.

If the crane owner/user requires additional information, or if any information in the manual is not clear, contact ACCO Chain & Lifting Products, York Pennsylvania or the distributor or builder of the crane. Do not install, inspect, test, maintain, or operate the crane unless this information is fully understood.

When contacting the distributor or builder of the crane, always make reference to the serial number of the crane. When contacting ACCO Chain & Lifting Products, provide as much information concerning the components (end trucks, controls or drives) as possible.

A regular schedule of inspection of the crane in accordance with the requirements of the applicable ASME B30 Safety Standard should be established and records maintained.

WARNING

Before installing, removing, inspecting, or performing any maintenance on a hoist or crane, the main switch shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1. Follow other maintenance procedures outlined in this manual and applicable ASME B30 volumes.

Additional WARNINGS are listed in various portions of this manual. Personnel shall read and follow these WARNINGS. Failure to read and comply with these WARNINGS as well as other instructions or any limitations noted in this manual and applicable ASME B30 volumes could result in serious bodily injury or death, and/or property damage.

INSTALLATION

NOTICE

The following installation instructions are offered as general information concerning the use of WRIGHT® crane control panels, and should not be construed as complete instructions for wiring cranes.

CONTROL PANELS - WRIGHT® bridge control panels are equipped with UL Class "J" fuseblocks for motor circuit protection. Class "J" fuses provide excellent protection from high fault currents associated with industrial power supply systems, and when properly sized also provide motor overcurrent protection (per ANSI/NFPA 70 art. 610). The motor circuit fuseblock will accept either Bussman "LPJ", Littlefuse "JTD" or Gould Shawmut "AJT" Class "J" fuses that may be ordered from WRIGHT®. Fuses must be sized per ANSI/NFPA 70 (Canadian Electrical Code in Canada) and fuse manufacturers instructions.

The crane designer, crane manufacturer or user must insure that all interconnecting wiring on, and to the crane meets applicable Federal, State and Local Codes, as well as The National Electrical Code (Canadian Electrical Code in Canada).

GROUND CONDUCTOR - The National Electrical Code allows grounding of the Bridge and Trolley frames through metal-to-metal contact between the Bridge and Trolley wheels and their respective tracks, unless local conditions, such as paint or other insulating material, prevent reliable metal-to-metal contact. WRIGHT® End Trucks are shipped with unpainted wheel treads, however, if the wheels are painted by others, the track the crane is intended to run on is painted, or local conditions introduce some sort of insulating material between the wheels and track, a separate bonding conductor must be provided.

A dedicated ground conductor is recommended on crane systems with any inverter controlled motions.

CONTROL ENCLOSURES - WRIGHT® standard Bridge control enclosures are designed for use in NEMA Type 12 environments, with NEMA 4 available as an option. Cable connections to the enclosure should be made with strain relief type connectors approved for the intended application. Both conduit and cable connections to the enclosure should include sealing washers or Bullet (Myers type) hubs to retain the integrity of the NEMA 4 or 12 rating. For applications requiring NEMA 1 wiring classification, sealing washers or hubs are not required, but are recommended to help keep dust, dirt and similar contaminants from entering the control enclosure.

The disconnect switch handle has an enclosure locking feature that prohibits opening of the enclosure cover when the disconnect is energized. This is intended as a safety feature and should not be relied upon to secure the cover in the closed position. Always use the quarter turn fastener on the enclosure cover, to latch the cover in the closed position.

PAINTING CONTROL ENCLOSURES - If it is desirable to repaint the control enclosure, the following instructions must be followed to insure proper adhesion to the existing base coat.

- Wipe down the surfaces to be painted with acetone or lacquer thinner. Use a clean cloth, changing to a clean area on the cloth frequently. This step is mandatory to obtain good adhesion, and must be done thoroughly.
- Apply finish coats per your paint manufacturers instructions.
- Allow paint to cure properly for best durability and adhesion. Consult your paint manufacturer for proper curing times and temperatures.
- **OPTIONAL** - For best results, thoroughly sand the surface with 240 grit sandpaper before painting. Remove all sanding dust with a clean cloth and tack rag prior to applying paint.

BRIDGE DISCONNECT FUSING - Bridge control panels ordered with a 30 ampere disconnect switch will be provided with 30 amp fuses, and when ordered with a 60 ampere disconnect switch will be provided with 60 amp fuses.

CONTROL VOLTAGE - The control voltage for WRIGHT® standard bridge controls is 115 VAC. For control voltages other than 115 VAC, consult the factory.

MOTORS - Acco standard bridge motors are 30 minute duty (single speed) and 30 minute duty high speed/15 minute duty low speed (two-speed), with class F insulation and motor thermostats.

WIRING DIAGRAM - The wiring and interconnection diagrams included in this publication are "typical" examples of crane controls with the most commonly used options. The bridge control wiring diagram glued to the inside of the enclosure cover of your bridge control accurately depicts the control panel as it was shipped.

INVERTER CONTROL - WRIGHT® inverter Bridge control kits are hardwired for up to five steps of multi-speed operation. Inverter drives will be factory programmed for two-speed operation (20 & 60 Hz.), traverse mode with five seconds acceleration time and three seconds deceleration time. If you require the drive to be pre-programmed differently by the factory, please specify when ordering.

Depending on size and application, some inverter Bridge controls are supplied with braking resistors that require mounting external to the bridge control panel. External mounting resistors are shipped loose for field mounting, in a ventilated enclosure. For outdoor applications consult the factory.

INSTALLATION

INVERTER CONTROL (continued) -

Wiring on inverter controlled equipment must have the power and control conductors routed through separate raceways. Power and control wiring must also be kept separated in control boxes and junction boxes. When it is necessary for power and control wiring to cross, they must cross at a right angle to one another.

Load reactors should be used on inverter controls utilizing wound rotor motors, power circuit limit switches, applications with electrification bar and collectors between the motor and inverter drive, or when the distance between the motor and inverter drive exceeds 150 feet.

In applications where electrical noise (line spikes, power surges, etc.) are likely to be present, a line reactor may have to be added to protect the inverter. Some common sources of electrical noise include induction furnaces, electrical smelters, arc welders, and by power utility company load switching. Line reactors may also be required when the power source KVA is 500 KVA or larger.

Overhead crane systems commonly receive power from a conductor bar system with sliding collectors. Misalignment, or gaps in the conductor bar can cause current surges or momentary power losses that can damage electronic devices. The use of double collector shoes can greatly reduce the chances of inverter damage and nuisance tripping from this type of occurrence.

For detailed information concerning the variable frequency drive provided in the bridge control panel, refer to the inverter manual provided with the equipment.

CONNECTING POWER SUPPLY TO CRANE:

DANGER

1. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE CONNECTING POWER SUPPLY TO CRANE.
2. Only a qualified electrician should connect the power supply to the crane.
3. Check power supply that will be furnished to the crane. It must be the same as shown on the crane serial number plate. If the power supply that will be connected to the crane is not the same as shown on the crane serial number plate, DO NOT connect power supply to crane.
4. Make all electrical connections in accordance with wiring diagram located in control enclosure.

BEFORE OPERATING CRANE:

1. Before energizing the power supply, and inspecting and testing the crane prior to initial operational use, check that all electrical connections are in accordance with the wiring diagram located in crane control enclosure.
2. ASME B30.11, B30.2, and B30.17 require that all new, altered, or modified cranes be inspected by a designated person prior to initial use to verify that the equipment and installation comply with applicable provisions of the standard. Such an inspection should be performed at this time, using the applicable ASME B30 standard as the basis for inspection procedures.
3. Check that end stops are installed on all open ends of the bridge runway girders. If end stops are not present on all open ends, DO NOT operate bridge crane until end stops are installed.
4. Energize the power supply to the crane.
5. Check crane travel for correct crane motion direction (crane drive motor or motors are properly phased). Since motor rotation of a three-phase AC motor can be changed by reversing any two of the lines feeding power to the motor, the direction of crane motion must be checked to verify that it is correct in accordance with the crane control device markings.

To check crane motion direction or crane drive motor phasing:

MOMENTARILY activate one button or lever of the crane control device and observe the direction of crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when the crane EAST control device is activated), crane motor is improperly phased and must be corrected. DO NOT USE CRANE until motor phasing is corrected.

INSTALLATION

WARNING

DO NOT OPERATE CRANE IF DIRECTION OF CRANE MOTION DOES NOT AGREE WITH THE DIRECTION MARKING ON THE CRANE CONTROL DEVICE ACTIVATED.

WARNING

DO NOT ATTEMPT TO CORRECT AN IMPROPERLY PHASED CRANE BY CHANGING ANY WIRING IN THE CRANE CONTROL DEVICE OR AT THE CRANE CONTACTORS; OR BY CHANGING THE MARKINGS ON THE CRANE CONTROL DEVICE.

6. To correct crane motor phasing:

DANGER

- a. DISCONNECT POWER AND LOCKOUT DISCONNECTING MEANS BEFORE RECONNECTING (REVERSING) POWER LINES TO CRANE.
- b. Only a qualified electrician should reconnect the power lines to the crane.
- c. Interchange any two lines supplying power to the crane motor only. DO NOT reverse main power leads to the crane as this will also effect the phasing of other motors in the system (i.e. hoist motors).
- d. Re-energize power supply to the crane.
- e. Re-check crane travel for correct crane motion. If direction of crane travel agrees with the direction marking of the crane control device activated (i.e., crane direction is EAST when the crane EAST control device is activated), crane motor is properly phased. If the direction of crane travel does not agree with the direction marking of the crane control device activated (i.e., crane direction is WEST when crane EAST control device is activated), crane motor is improperly phased and must be corrected by repeating steps a through e.
7. If a trolley hoist is mounted on the crane, check that end stops are installed on all open ends of the bridge girder or girders. If end stops are not present on all open ends, DO NOT operate trolley hoist until end stops are installed.
8. Operate crane in both travel directions, without load on the crane, and stop motion to check operation of the crane drive motor brake. The crane should stop within a distance equal to 10% of the full load travel speed of the crane. If the crane does not stop within this distance, the crane drive motor brake requires adjustment. Refer to the CRANE MOTOR BRAKE manual for instructions on motor brake adjustment.
9. If travel limit switches are installed on the runway or bridge girders, operate the crane or trolley hoist to verify limit switch operation.
10. Operate the crane, without a load on the crane, for the entire travel distance of the runway monorail to check that crane and trolley hoist do not interfere with any other items or pieces of equipment located in the path of travel.
11. If crane has a trolley hoist, operate the trolley hoist, without a load on the hoist hook, for the entire travel distance of the trolley to check that trolley, hoist, load block, and hook do not interfere with any other items or pieces of equipment located in the path of travel.
12. If crane operates in a system with interlocks or transfer sections, operate crane or trolley through all such devices to verify alignment and operation.
13. Check operation of ACM V and adjust as required. Refer to ACCELERATION CONTROL MODULE section of this manual.

INSTALLATION

CRANE LOAD TEST:

1. Complete cranes must be load tested in accordance with ASME B30.11, B30.2, or B30.17. Therefore it is the responsibility of the owner/user to load test the crane or final lifting system in accordance with the applicable safety standards.
2. All personnel that will operate the crane or trolley hoist shall read: the OPERATION section of this manual, the WARNINGS contained in this manual; instruction and WARNING labels on the crane; the instruction manual furnished with the hoist; and instruction and WARNING labels on the hoist before operating the hoist or lifting system.



OPERATION

Operation of a crane usually includes the operation of an overhead hoist. Information in this section addresses both the crane and hoist; however, the operation section of the manual furnished with the hoist must be reviewed for specific operation procedures that apply to the hoist.

Operation of an overhead hoist and crane involves more than activating the buttons or levers of the hoist and crane control devices. It is emphasized in the ASME B30 Standards that the use of overhead hoist and cranes are subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care, common sense, and experience in anticipating the motions that will occur as a result of activating the hoist or crane controls. Certain precautions are necessary before moving the load and this includes the proper rigging of loads to the hoist hook.

WARNING

CRANE AND HOIST OPERATORS SHALL BE REQUIRED TO READ THE OPERATION SECTION OF THIS MANUAL, THE WARNINGS CONTAINED IN THIS MANUAL, INSTRUCTION AND WARNING LABELS ON THE CRANE, THE OPERATION SECTION AND WARNINGS CONTAINED IN THE MANUAL FURNISHED WITH THE HOIST, INSTRUCTION AND WARNING LABELS ON THE HOIST, AND THE OPERATION SECTIONS OF THE APPLICABLE ASME B30 STANDARD; AND TO BE FAMILIAR WITH THE CRANE AND HOIST, AND CRANE AND HOIST CONTROLS BEFORE BEING AUTHORIZED TO OPERATE THE CRANE AND HOIST OR LIFTING SYSTEM.

CRANE AND HOIST OPERATORS SHOULD BE TRAINED IN PROPER RIGGING PROCEDURES TO BE FOLLOWED IN THE ATTACHMENT OF LOADS TO THE HOIST HOOK.

CRANE AND HOIST OPERATORS SHOULD BE TRAINED TO BE AWARE OF POTENTIAL MALFUNCTIONS OF THE EQUIPMENT THAT REQUIRE ADJUSTMENT OR REPAIR, AND TO BE INSTRUCTED TO STOP OPERATION IF SUCH MALFUNCTIONS OCCUR, AND TO IMMEDIATELY ADVISE THEIR SUPERVISOR SO CORRECTIVE ACTION CAN BE TAKEN.

CRANE AND HOIST OPERATORS SHOULD HAVE NORMAL DEPTH PERCEPTION, FIELD OF VISION, REACTION TIME, MANUAL DEXTERITY, AND COORDINATION.

CRANE AND HOIST OPERATORS SHOULD NOT BE SUBJECT TO SEIZURES, LOSS OF PHYSICAL CONTROL, PHYSICAL DEFECTS, OR EMOTIONAL INSTABILITY THAT COULD RESULT IN ACTIONS OF THE OPERATOR BEING A HAZARD TO THE OPERATOR OR OTHERS.

CRANE AND HOIST OPERATORS SHOULD NOT OPERATE A CRANE, HOIST OR LIFTING SYSTEM WHEN UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR MEDICATION.

CRANES AND OVERHEAD HOISTS ARE INTENDED ONLY FOR VERTICAL LIFTING SERVICE OF FREELY SUSPENDED UNGUIDED LOADS. DO NOT USE CRANE OR HOIST FOR LOADS THAT ARE NOT LIFTED VERTICALLY, LOADS THAT ARE NOT FREELY-SUSPENDED, OR LOADS THAT ARE GUIDED. IF SUCH CONDITIONS EXIST, CONTACT ACCO CHAIN & LIFTING PRODUCTS.

BEFORE EACH SHIFT OR BEFORE THE FIRST TIME THE CRANE IS TO BE USED EACH SHIFT:

THE OPERATOR:

SHALL visually inspect wire rope for broken wires, broken strands, kinks, and any type of deformation or damage of the rope structure.

SHALL visually inspect hooks for nicks, gouges, deformation of the throat opening, wear on saddle or load bearing point, and twisting.

SHALL replace warning label if missing or illegible.

SHALL report any damage or malfunctions to the supervisor.

SHALL NOT operate crane or hoist if any damage or malfunctions exist.

SHALL NOT operate crane or hoist if it is tagged with an out-of-order sign.

BEFORE OPERATING THE CRANE AND APPLYING THE LOAD:

THE OPERATOR:

SHALL be familiar with all operating controls of the crane and hoist.

OPERATION

- SHALL be familiar with the OPERATION Section of this manual, the WARNINGS contained in this manual, instructions and WARNING labels on the crane and hoist or lifting system, the OPERATION Section of the manual furnished with the hoist and crane, and the OPERATION Sections of all applicable ASME B30 standards.
- SHALL be instructed in the operation or operations to be performed.
- SHALL NOT operate crane or hoist if any damage or malfunctions exist; and SHALL report any damage or malfunctions to the supervisor.
- SHALL NOT operate crane or hoist if it is tagged with an out-of-order sign.
- SHALL center crane and hoist over load.
- SHALL NOT use the hoist wire rope as a sling to wrap around the load.
- SHALL attach the load to the hoist hook by suitable means such as slings or lifting devices.
- SHALL only attach loads to the hoist hook that do not exceed the rated load capacity of the crane or hoist.
- SHALL verify that the size of the attachment of the sling or other lifting device to be used is compatible with the size of the hoist hook.
- SHALL verify that the attachment part of the sling or other lifting device is properly seated in the base, bowl, or saddle of the hoist hook.
- SHALL verify that the hook latch operates properly and that the hook latch properly bridges and closes the hook throat opening.
- SHALL verify that the latch of the hoist hook will not support any part of the load.
- SHALL verify that the load or any part of the load will not be applied to and/or not supported by the tip or point of the hook.
- SHALL verify that load will be properly balanced when it is lifted.
- SHALL verify that side loads will not be applied to the crane or hoist when the load is lifted.
- SHALL verify that hoist wire rope is not kinked or twisted, and that wire rope parts are not twisted about each other.
- SHALL verify that hoist wire rope is properly seated in the drum grooves and sheaves.
- SHALL notify personnel in the area that a load will be lifted and verify that all personnel are clear of the load.
- SHALL verify that when the load is lifted, it will clear all material, machinery, or other obstructions in the area.

WHILE OPERATING THE CRANE AND MOVING THE LOAD:

THE OPERATOR:

- SHALL NOT engage in any activity that will divert the attention of the operator.
- SHALL NOT lift, lower, or transport a load with the crane or hoist until the operator and all other personnel are clear of the load and the path of the load.
- SHALL verify that the load, crane, and hoist will clear all obstacles before moving or rotating the load.
- SHALL avoid moving loads over personnel.
- SHALL NOT lift, lower, or transport personnel by means of the crane, hoist, trolley, hoist hook, or load.
- SHALL slowly inch the hook into engagement with the load to eliminate wire rope slack and reduce impact loading of the crane and hoist.
- SHALL avoid unnecessary inching and quick reversals of direction.
- SHALL only lift the load a few inches to verify that the load is properly balanced before continuing with the lift.
- SHALL only lift the load a few inches to verify that the hoist braking system is functioning properly before continuing with the lift.
- SHALL only traverse the load a few inches to verify that the crane braking system is functioning properly before continuing with travel.
- SHALL avoid swinging of the load or hoist hook when the crane and/or hoist is traveling.

OPERATION

SHALL avoid sharp contact between trolleys or between trolleys and stops.

SHALL avoid sharp contact between cranes or between cranes and stops.

SHALL NOT use hoist limit switches or devices as a normal means of stopping the hoist.

SHALL NOT lower the load beyond the point where less than two wraps of wire rope remain at each anchorage on the drum, unless a lower limit device is provided, in which case no less than one wrap of wire rope shall remain at each anchorage on the drum.

PARKING THE LOAD:

THE OPERATOR:

SHALL NOT lower a load with the hoist until the operator and all other personnel are clear of the load and the path of the load.

SHALL verify that the load will clear all obstacles before lowering the load.

SHALL block loads before landing if slings or other lifting devices must be removed from under the landed load.

SHALL exercise care when removing a sling from under a landed and blocked load.

SHALL NOT leave a suspended load unattended unless specific precautions to prevent the load from inadvertent lowering have been instituted and are in place.

SHALL position the hoist load block and hook above head level for storage when the hoist is not in use.

GENERAL:

THE OPERATOR:

SHALL know hand signals used for hoist and crane operations if a signal-person is used in the operation, and accept signals of only persons authorized to give hand signals EXCEPT to obey a stop signal regardless who gives it.

SHALL NOT adjust or repair a crane or hoist unless qualified and authorized to perform maintenance.

SHALL NOT use a hoist load limiting device as a means to measure the load.

GENERAL DO'S AND DO NOT'S:

DO establish a regular inspection schedule and maintain a record of all inspections performed with special attention directed to wire ropes, hooks, and brakes.

DO remove the crane and hoist from service and perform necessary maintenance and repair.

DO follow recommended maintenance procedures for taking a crane and hoist out of service to inspect and perform maintenance and repair.

DO use the original crane and hoist manufacturer's recommended parts when repairing a crane or hoist and replacing worn or damaged parts.

DO NOT allow unqualified or unauthorized personnel to operate, inspect, maintain, or repair a crane or hoist.

DO NOT operate a crane and hoist that is damaged or has any actual or suspected mechanical or electrical malfunction.

DO NOT attempt to lengthen wire rope or repair damaged wire rope.

DO NOT use the wire rope, any part of the crane, hoist, or the load block and hook as a ground for welding.

DO NOT allow a welding electrode to be touched to the wire rope.

DO NOT remove or obscure any warnings or warning labels on the crane or hoist.

DO NOT walk under a suspended load.

DO NOT perform ANY work on a suspended load that requires a worker to be positioned under the suspended load.

OPERATION

WARNING

DO NOT WALK UNDER A SUSPENDED LOAD.

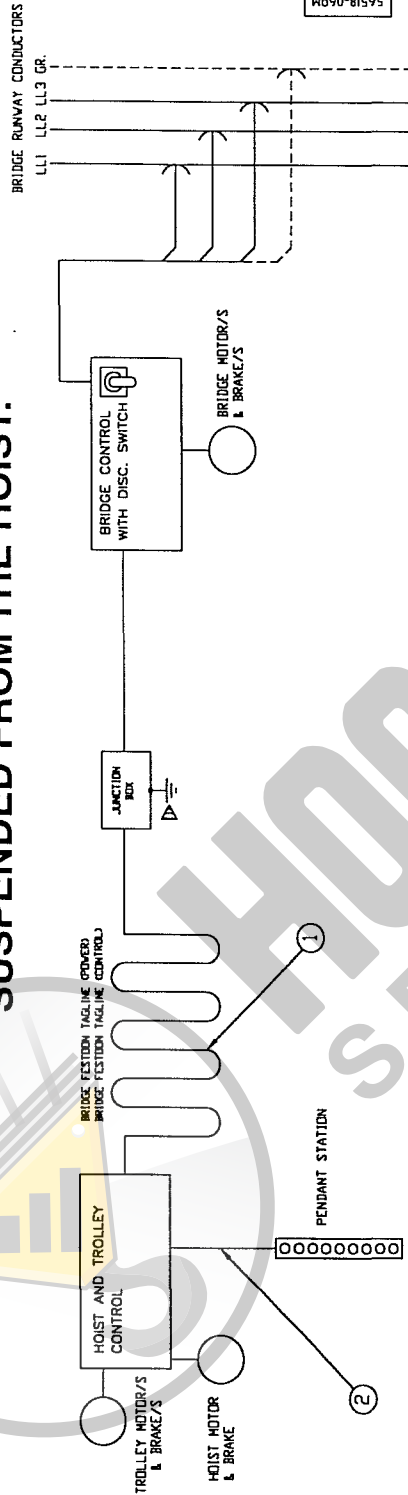
DO NOT PERFORM ANY WORK ON A SUSPENDED LOAD THAT REQUIRES A WORKER TO BE POSITIONED UNDER THE SUSPENDED LOAD.

IF IT IS NECESSARY THAT A WORKER BE POSITIONED UNDER A SUSPENDED LOAD TO PERFORM WORK ON THE SUSPENDED LOAD; SUCH WORK SHALL NOT BE STARTED OR PERFORMED UNTIL OTHER AUXILIARY SUPPORTING MEANS ARE PLACED UNDER THE SUSPENDED LOAD. FAILURE TO USE OTHER AUXILIARY SUPPORTING MEANS COULD RESULT IN SERIOUS BODILY INJURY OR DEATH, AND/OR PROPERTY DAMAGE.



HOOSIER CRANE
SERVICE COMPANY

TYPICAL BRIDGE INTERCONNECTION DIAGRAM WHEN THE PENDANT STATION IS SUSPENDED FROM THE HOIST.



WIRE GROUP	SINGLE SPEED BRIDGE WITH:			
	SINGLE-SPEED TROLLEY	SINGLE-SPEED HOIST	SINGLE-SPEED TROLLEY	MULTI-SPEED HOIST
1	CONTROL CABLE X1, 30, 31, 40, 41, GR.			MULTI-SPEED TROLLEY X1, 30, 31, 40, 41, GR.
	POWER CABLE L1, L2, L3, GR.			L1, L2, L3, GR.
2	P.B. CORD X1, GR., 10, 11, 20, 21, 30, 31, 40, 41			X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25), 30, 31, 40, 41
WIRE GROUP	MULTI-SPEED BRIDGE WITH:			
	SINGLE-SPEED TROLLEY	SINGLE-SPEED HOIST	SINGLE-SPEED TROLLEY	MULTI-SPEED HOIST
1	CONTROL CABLE X1, 30, 31, 32, (33), (34), (35), 40, 41, GR.			MULTI-SPEED TROLLEY X1, 30, 31, 32, (33), (34), (35), 40, 41, GR.
	POWER CABLE L1, L2, L3, GR.			L1, L2, L3, GR.
2	P.B. CORD X1, GR., 10, 11, 20, 21, 30, 31, 32, (33), (34), (35), 40, 41			X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25), 30, 31, 32, (33), (34), (35), 40, 41

WIRE	DESCRIPTION
10	HOIST UP
11	HOIST DOWN
12	HOIST 2ND SPEED
(13)	HOIST 3RD SPEED
(14)	HOIST 4TH SPEED
(15)	HOIST 5TH SPEED
20	TROLLEY RIGHT
21	TROLLEY LEFT
22	TROLLEY 2ND SPEED
(23)	TROLLEY 3RD SPEED
(24)	TROLLEY 4TH SPEED
(25)	TROLLEY 5TH SPEED
30	BRIDGE FORWARD
31	BRIDGE REVERSE
32	BRIDGE 2ND SPEED
(33)	BRIDGE 3RD SPEED
(34)	BRIDGE 4TH SPEED
(35)	BRIDGE 5TH SPEED
40	MAINLINE ON
41	MAINLINE OFF

NOTE:
 BOND ALL GROUNDING CONDUCTORS TO METALLIC JUNCTION BOXES OR CONTROL PANEL GROUNDING TERMINAL.
 CONDUCTOR SIZE MUST BE IN ACCORDANCE WITH SECTION 610 OF ANSI/NFPA 70 (NATIONAL ELECTRICAL CODE) OR SECTION 40 OF THE CANADIAN ELECTRICAL CODE.
 REFERENCE CHART LISTED ON THE DRAWING TO IDENTIFY CONDUCTOR NUMBER/FUNCTION.
 WHEN VARIABLE FREQUENCY INVERTER DRIVES ARE USED TO CONTROL ANY MOTION, POWER AND CONTROL CONDUCTORS MUST BE KEPT SEPARATE INSIDE OF CONTROL PANELS AND ROUTED THROUGH SEPARATE CONDUITS ON THE EQUIPMENT.
 "MULTI-SPEED" IN THE CHART MATRIX INCLUDES CONDUCTOR REQUIREMENT INFORMATION FOR TWO-SPEED, TWO-STEP INFINITELY VARIABLE SPEED, THREE-SPEED, THREE-STEP INFINITELY VARIABLE SPEED, FOUR-SPEED AND FIVE-SPEED MOTION CONNECTIONS.
 FOR TWO-SPEED OR TWO-STEP INFINITELY VARIABLE SPEED OPERATION, PROVIDE ALL CONDUCTORS NOT LISTED IN PARENTHESIS IN THE MULTI-SPEED MATRIX BLOCK.
 FOR THREE-SPEED OR THREE-STEP INFINITELY VARIABLE SPEED OPERATION, CONDUCTOR NUMBERS (13)-HOIST, (23)-TROLLEY AND/OR (33)-BRIDGE ARE ADDED TO THE TWO-SPEED CONDUCTORS.
 FOR FOUR-SPEED OPERATION, CONDUCTOR NUMBERS (14)-HOIST, (24)-TROLLEY AND/OR (34)-BRIDGE ARE ADDED TO THE CONDUCTOR REQUIREMENT FOR THREE-SPEED OPERATION.
 FOR FIVE-SPEED OPERATION, CONDUCTOR NUMBERS (15)-HOIST, (25)-TROLLEY AND/OR (35)-BRIDGE ARE ADDED TO THE CONDUCTOR REQUIREMENT FOR FOUR-SPEED OPERATION.
 X1'S FROM ALL CONTROL TRANSFORMERS ARE CONNECTED TOGETHER, UNLESS X2'S ARE GROUNDING.

⚠ DANGER

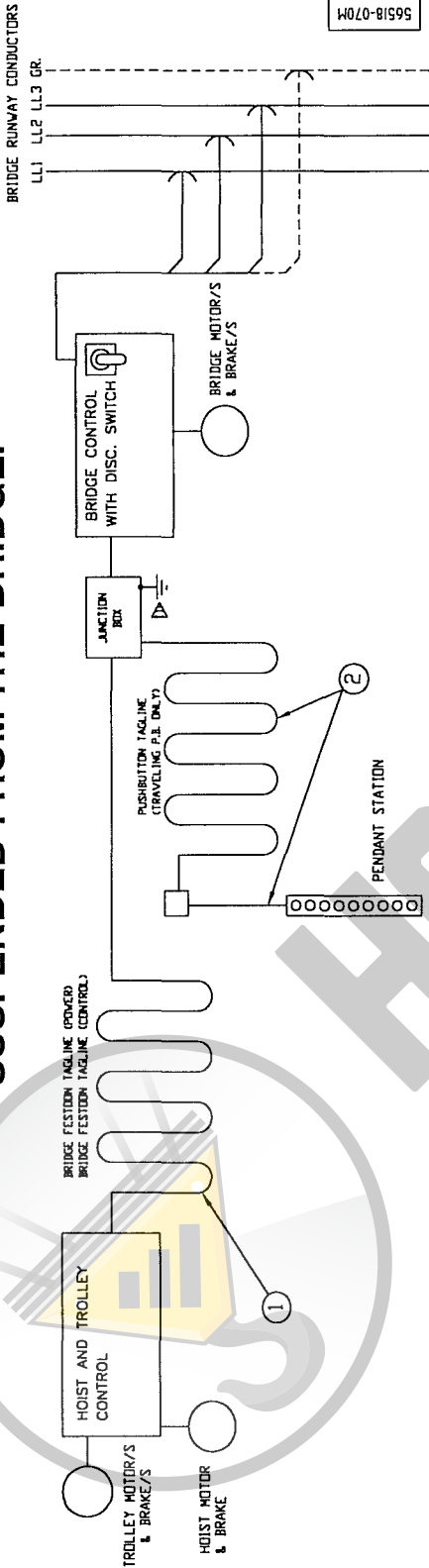
DO NOT OPERATE THIS EQUIPMENT WITHOUT THE MAINLINE COVER OR REMOVING THE EQUIPMENT COVER OR SERVICING THIS EQUIPMENT. SERVICE SHOULD BE PERFORMED ONLY BY A QUALIFIED ELECTRICIAN.

DO NOT OPERATE WIT-HOUT COVER IN PLACE.

⚠ CAUTION

WIRING DIAGRAMS SHOWN ARE "TYPICAL" AND MAY NOT INCLUDE ALL DEVICES SUPPLIED WITH A PARTICULAR CONTROL. ALWAYS REFER TO THE WIRING DIAGRAM PROVIDED INSIDE OF THE CONTROL ENCLOSURE COVER OF A SPECIFIC PIECE OF EQUIPMENT BEFORE PERFORMING ANY SERVICE.

TYPICAL BRIDGE INTERCONNECTION DIAGRAM WHEN THE PENDANT STATION IS SUSPENDED FROM THE BRIDGE.



56518-070M

WIRE GROUP		SINGLE SPEED BRIDGE WITH:			
		SINGLE-SPEED HOIST		MULTI-SPEED HOIST	
		SINGLE-SPEED TROLLEY	MULTI-SPEED TROLLEY	SINGLE-SPEED TROLLEY	MULTI-SPEED TROLLEY
1	CONTROL CABLE	X1, 10, 11, 20, 21, GR.	X1, GR., 10, 11, 20, 21, 22, (23), (24), (25)	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25)
	POWER CABLE	L1, L2, L3, GR.	L1, L2, L3, GR.	L1, L2, L3, GR.	L1, L2, L3, GR.
2	P.B. CORD	X1, GR., 10, 11, 20, 21, 30, 31, 40, 41	X1, GR., 10, 11, 20, 21, 22, (23), (24), (25), 30, 31, 40, 41	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 30, 31, 40, 41	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25), 30, 31, 40, 41
WIRE GROUP		MULTI-SPEED BRIDGE WITH:			
		SINGLE-SPEED HOIST		MULTI-SPEED HOIST	
		SINGLE-SPEED TROLLEY	MULTI-SPEED TROLLEY	SINGLE-SPEED TROLLEY	MULTI-SPEED TROLLEY
1	CONTROL CABLE	X1, 10, 11, 20, 21, GR.	X1, GR., 10, 11, 20, 21, 22, (23), (24), (25)	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25)
	POWER CABLE	L1, L2, L3, GR.	L1, L2, L3, GR.	L1, L2, L3, GR.	L1, L2, L3, GR.
2	P.B. CORD	X1, GR., 10, 11, 20, 21, 30, 31, 32, (33), (34), (35), 40, 41	X1, GR., 10, 11, 20, 21, 22, (23), (24), (25), 30, 31, 32, (33), (34), (35), 40, 41	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 30, 31, 32, (33), (34), (35), 40, 41	X1, GR., 10, 11, 12, (13), (14), (15), 20, 21, 22, (23), (24), (25), 30, 31, 32, (33), (34), (35), 40, 41

WIRE	DESCRIPTION
10	HOIST UP
11	HOIST DOWN
12	HOIST 2ND SPEED
13	HOIST 3RD SPEED
14	HOIST 4TH SPEED
15	HOIST 5TH SPEED
20	TROLLEY RIGHT
21	TROLLEY LEFT
22	TROLLEY 2ND SPEED
23	TROLLEY 3RD SPEED
24	TROLLEY 4TH SPEED
25	TROLLEY 5TH SPEED
30	BRIDGE FORWARD
31	BRIDGE REVERSE
32	BRIDGE 2ND SPEED
33	BRIDGE 3RD SPEED
34	BRIDGE 4TH SPEED
35	BRIDGE 5TH SPEED
40	MAINLINE ON
41	MAINLINE OFF

NOTE:
BOND ALL GROUNDING CONDUCTORS TO METALLIC JUNCTION BOXES OR CONTROL PANEL GROUNDING TERMINAL.
CONDUCTOR SIZE MUST BE IN ACCORDANCE WITH SECTION 610 OF ANSI/NFPA 70 (NATIONAL ELECTRICAL CODE) OR SECTION 40 OF THE CANADIAN ELECTRICAL CODE.
REFERENCE CHART LISTED ON THE DRAWING TO IDENTIFY CONDUCTOR NUMBER/FUNCTION.
WHEN VARIABLE FREQUENCY INVERTER DRIVES ARE USED TO CONTROL ANY MOTION, POWER AND CONTROL CONDUCTORS MUST BE KEPT SEPARATE INSIDE OF CONTROL PANELS AND ROUTED THROUGH SEPARATE CONDUITS ON THE EQUIPMENT.
"MULTI-SPEED" IN THE CHART MATRIX INCLUDES CONDUCTOR REQUIREMENT INFORMATION FOR TWO-SPEED, TWO-STEP INFINITELY VARIABLE SPEED, THREE-SPEED, THREE-STEP INFINITELY VARIABLE SPEED, FOUR-SPEED AND FIVE-SPEED MOTION CONNECTIONS.
FOR TWO-SPEED OR TWO-STEP INFINITELY VARIABLE SPEED OPERATION, PROVIDE ALL CONDUCTORS NOT LISTED IN PARENTHESIS IN THE MULTI-SPEED MATRIX BLOCK.
FOR THREE-SPEED OR THREE-STEP INFINITELY VARIABLE SPEED OPERATION, CONDUCTOR NUMBERS (13)-HOIST, (23)-TROLLEY AND/OR (33)-BRIDGE ARE ADDED TO THE TWO-SPEED CONDUCTORS.
FOR FOUR-SPEED OPERATION, CONDUCTOR NUMBERS (14)-HOIST, (24)-TROLLEY AND/OR (34)-BRIDGE ARE ADDED TO THE CONDUCTOR REQUIREMENT FOR THREE-SPEED OPERATION.
FOR FIVE-SPEED OPERATION, CONDUCTOR NUMBERS (15)-HOIST, (25)-TROLLEY AND/OR (35)-BRIDGE ARE ADDED TO THE CONDUCTOR REQUIREMENT FOR FOUR-SPEED OPERATION.
X1'S FROM ALL CONTROL TRANSFORMERS ARE CONNECTED TOGETHER, UNLESS X2'S ARE GROUNDING.

⚡ DANGER
DISCONNECT POWER AND LOCKOUT/TAGOUT.
DISCONNECT ALL POWER TO THE EQUIPMENT.
COVER OR INSULATE THIS EQUIPMENT.
SERVICE SHOULD BE PERFORMED ONLY BY A QUALIFIED ELECTRICIAN.
DO NOT OPERATE WITHOUT COVER IN PLACE.

⚠ CAUTION
WIRING DIAGRAMS SHOWN ARE "TYPICAL" AND MAY NOT INCLUDE ALL DEVICES SUPPLIED WITH A PARTICULAR CONTROL. ALWAYS REFER TO THE WIRING DIAGRAM PROVIDED INSIDE OF THE CONTROL ENCLOSURE COVER OF A SPECIFIC PIECE OF EQUIPMENT, BEFORE PERFORMING ANY SERVICE.

TYPICAL WIRING DIAGRAM SINGLE SPEED BRIDGE WITH ACM

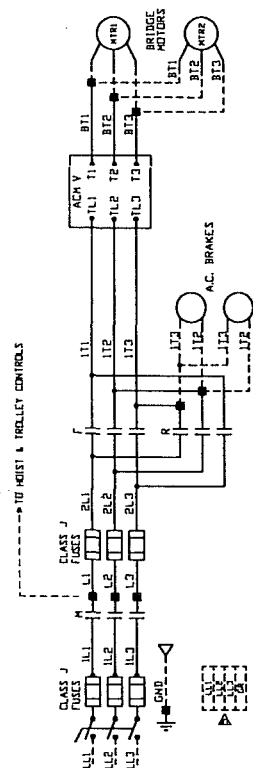
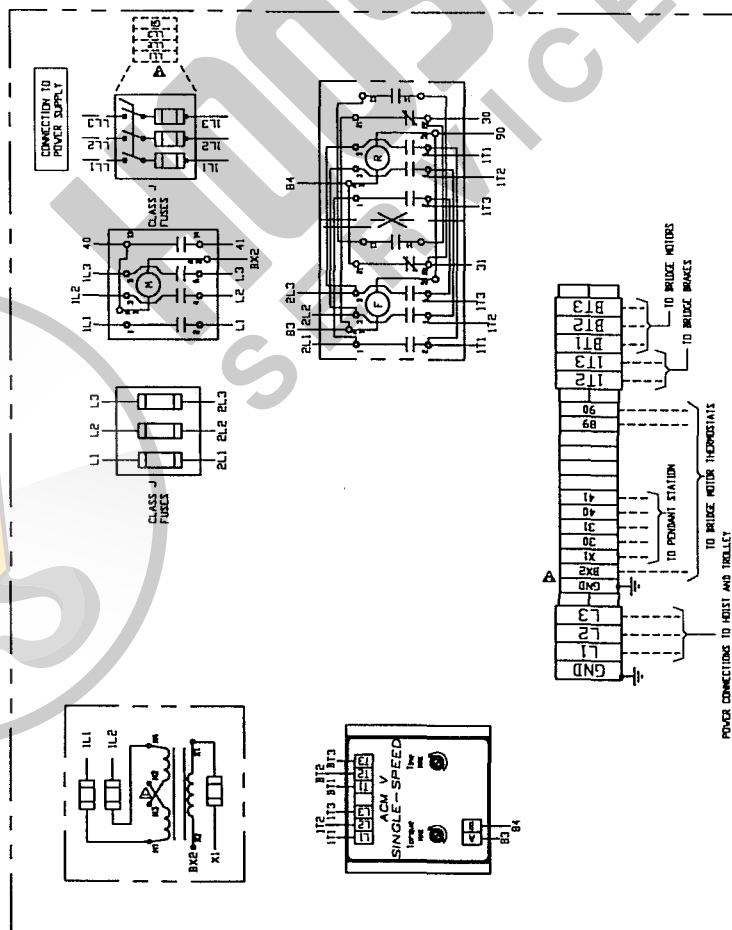
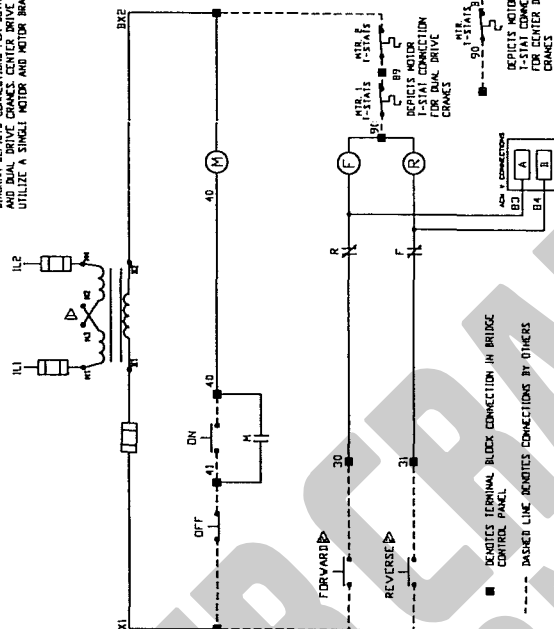


DIAGRAM DEPICTS CONNECTIONS FOR BOTH CENTER AND DUAL DRIVE CRANES. CENTER DRIVE CRANES UTILIZE A SINGLE MOTOR AND MOTOR BRAKE.

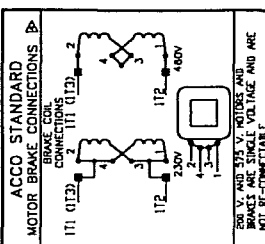


DANGER
DISCONNECT POWER AND LOCKOUT/TAGOUT. DISCONNECTING MEANS BEFORE REMOVING COVER OR SERVICING THIS EQUIPMENT. SERVICE SHOULD BE PERFORMED ONLY BY A QUALIFIED ELECTRICIAN.
DO NOT OPERATE WITHOUT COVER IN PLACE.

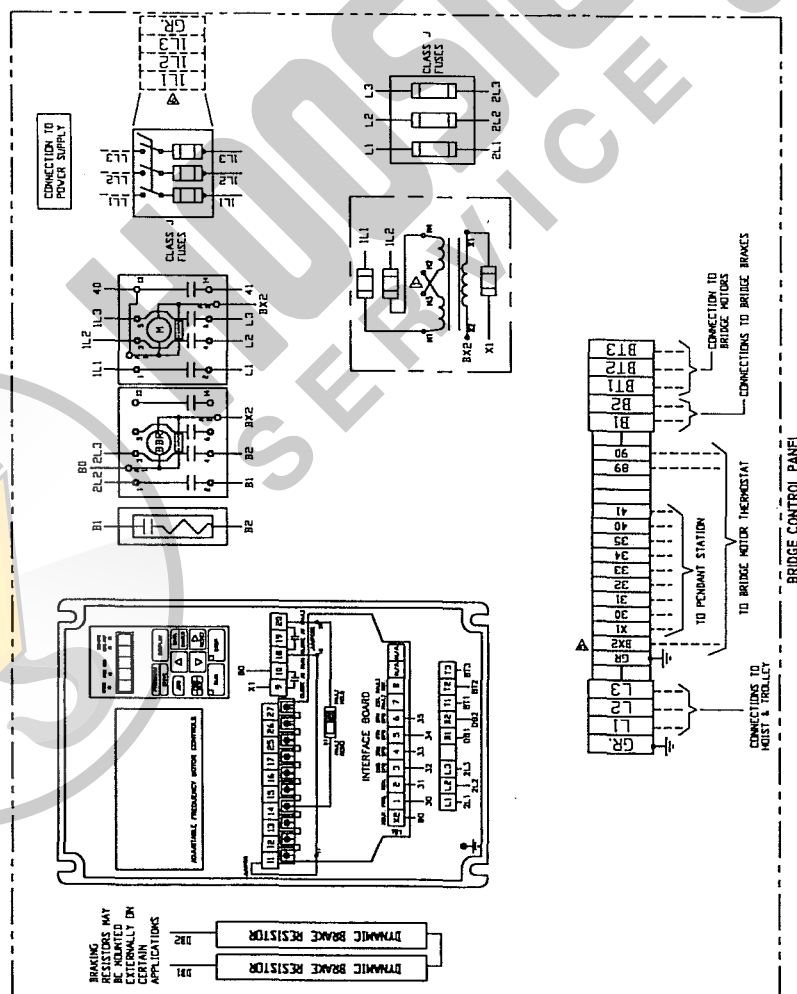
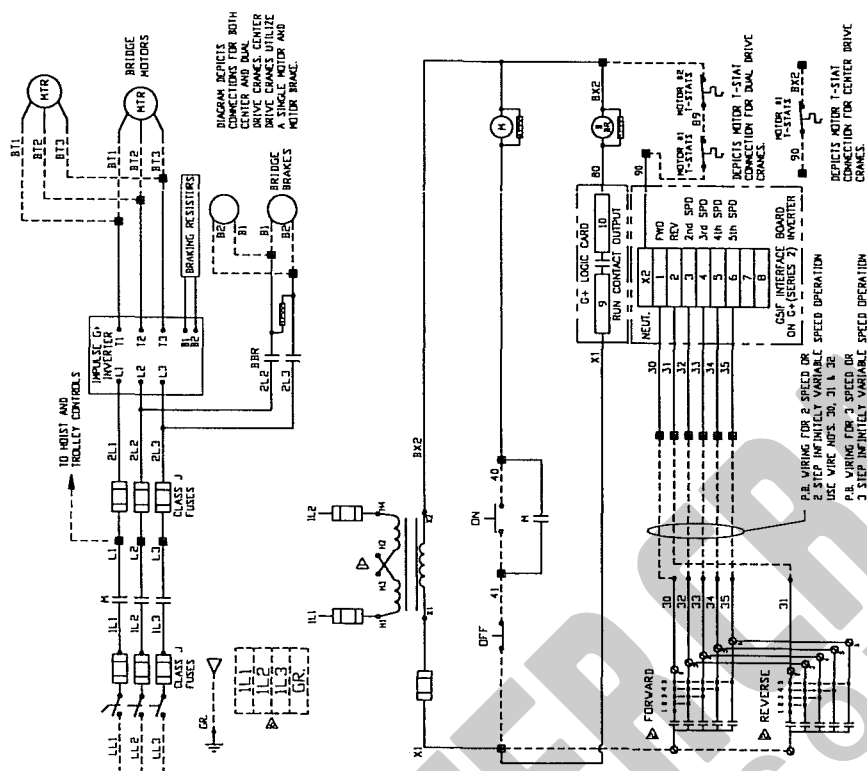
80558-001H

- POWER CONNECTION TERMINALS ARE SUPPLIED ON CONTROL PANELS ORDERED WITHOUT INTEGRAL FUSED DISCONNECT SWITCH.
- BRIDGE CONNECTION DETAIL SHOWN DEPICTS ACCO STANDARD MOTOR BRAKE. ON MOTORS PROVIDED WITH A NON-STANDARD MOTOR BRAKE, CONSULT WIRING DETAIL INSIDE MOTOR BRAKE COVER FOR CONNECTION INFORMATION.
- TO GROUND TRANSFORMER 32, CONNECT A JUMPER WIRE FROM CONTROL CIRCUIT GROUND TERMINAL TO TERMINAL 32. SIZE AND COLOR OF JUMPER MUST COMPLY WITH CURRENT NEC AND CEC REQUIREMENTS. WHEN GROUNDING KEYS, ATX FROM MULTIPLE TRANSFORMERS MUST NOT BE CONNECTED IN COMMON.
- SUBSTITUTE RIGHT-LEFT, NORTH-SOUTH, EAST-WEST WHEN APPLICABLE.
- MULTIPLE VOLTAGE COMPONENTS MUST BE CONNECTED AS PER NAMEPLATE DATA, TO MATCH SUPPLY VOLTAGE.

ACCO STANDARD MOTOR CONNECTIONS				
VOLTAGE	BT1	BT2	BT3	CONNECT TOGETHER
208	T1, T7	T2, T8	T3, T9	T4, T5, T6
480	T1	T2	T3	T4, T7, T8, T9, T10, T11



TYPICAL WIRING DIAGRAM INVERTER CONTROLLED BRIDGE

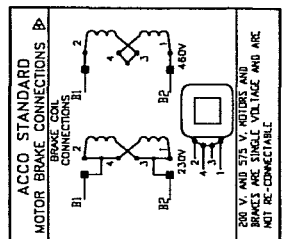


- POWER CONNECTION TERMINALS ARE SUPPLIED ON CENTRO. PANELS ORDERED WITHOUT INTEGRAL FUSED DISCONNECT SWITCH.
- TO GROUND TRANSFORMER B22, CONNECT A JUMPER FROM CENTER, GROUND TERMINAL, TO TERMINAL B22, SITE AND CENTER OF THE JUMPER MUST COMPLY WITH CURRENT CODE AND NEC REQUIREMENTS. WHEN GROUNDING B22'S, ITS FROM MULTIPLE TRANSFORMERS MUST NOT BE CONNECTED IN COMMON.
- BRAKE CONNECTION DETAIL SHOWN REFERS ACO STANDARD MOTOR BRAKE, ON MODELS PROVIDED WITH A STANDARD MOTOR BRAKE, CONSULT WITH DETAIL INSIDE MOTOR BRAKE COVER FOR CONNECTION INFORMATION.
- ALL POWER AND CONTROL WIRING MUST BE RUN IN SEPARATE RACEWAYS AND CROSS AT RIGHT ANGLES IN CONTROL PANELS AND JUNCTION BOXES.
- SUBSTITUTE NORTH-SOUTH, EAST-WEST, RIGHT-LEFT, FOR PENDANT MARKINGS, AS REQUIRED.
- 230/440 VOL.1 TRANSFORMERS ARE RECONNECTABLE AS ILLUSTRATED ON THIS DRAWING, 200 AND 375 VOL.1 TRANSFORMERS ARE SINGLE VOLTAGE, AND ARE NOT RECONNECTABLE.

ACCO STANDARD MOTOR CONNECTIONS					
VOLTAGE	B11	B12	B13	CONNECT TOGETHER	
208	11, 17	12, 18	13, 19	T4, T5, 16	
480	11, 17	12	13	(14, 17) (15, 18) (16, 19)	

SINGLE SPEED
MOTOR

ALL MOTOR THERMISTALS TO BE WIRED IN SERIES



⚠ DANGER

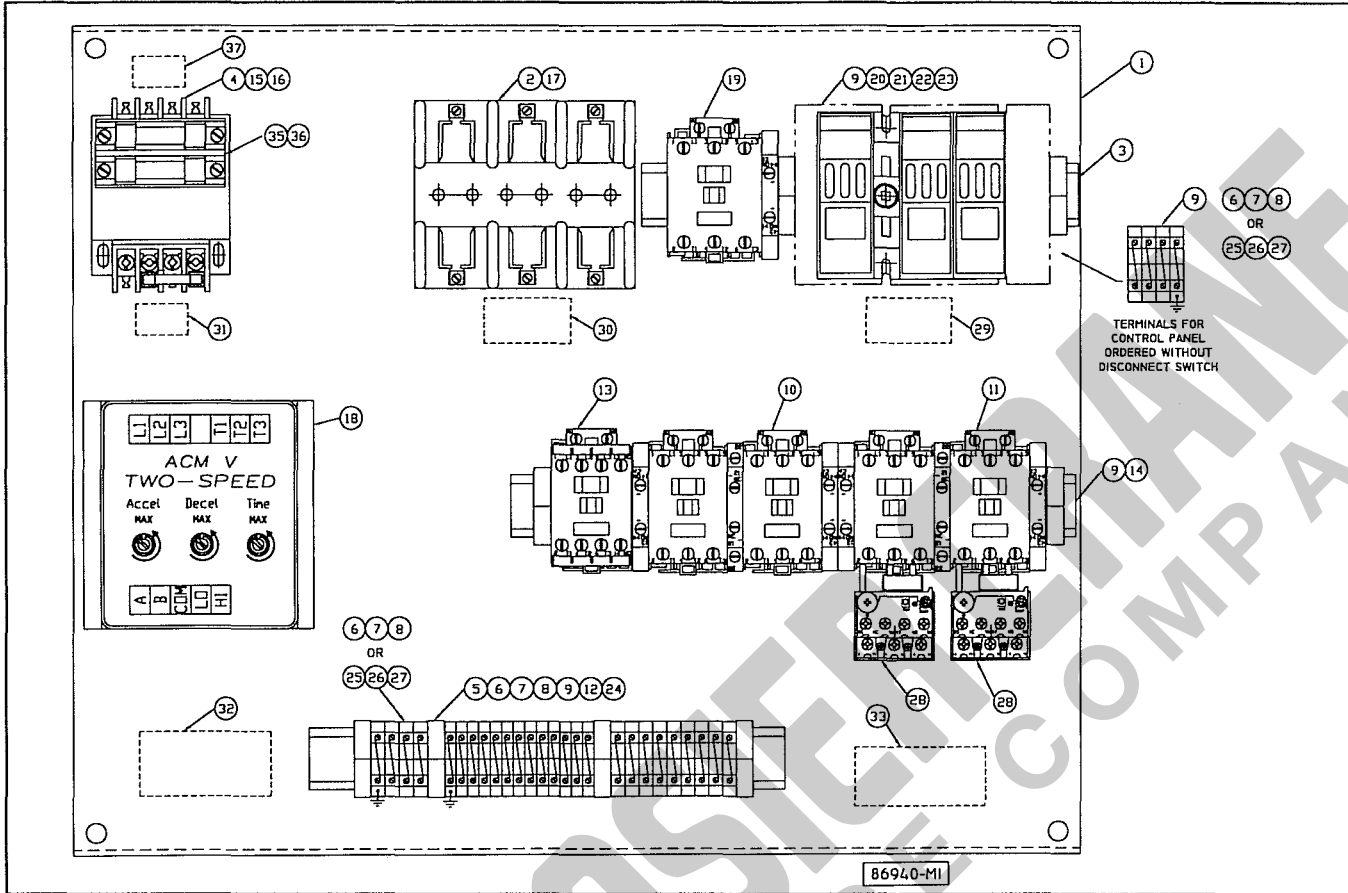
DISCONNECT POWER AND LOCKOUT/TAGOUT.
DISCONNECTING MEANS BEFORE REMOVING
COVER OR SERVICING THIS EQUIPMENT.

SERVICE SHOULD BE PERFORMED ONLY BY A
QUALIFIED ELECTRICIAN.

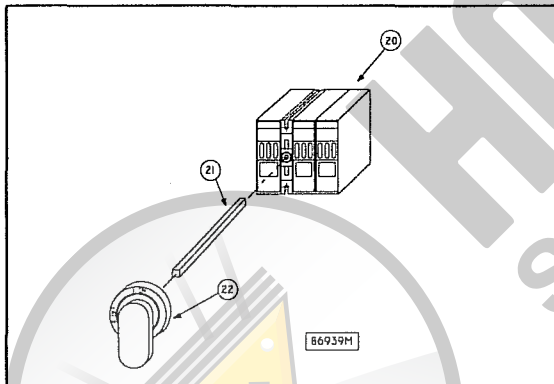
DO NOT OPERATE WITHOUT COVER IN PLACE

SINGLE AND TWO-SPEED BRIDGE CONTROL

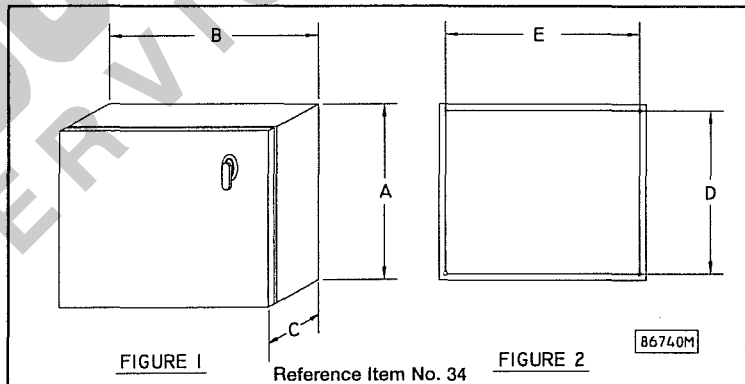
CONTROL PANEL ASSEMBLY



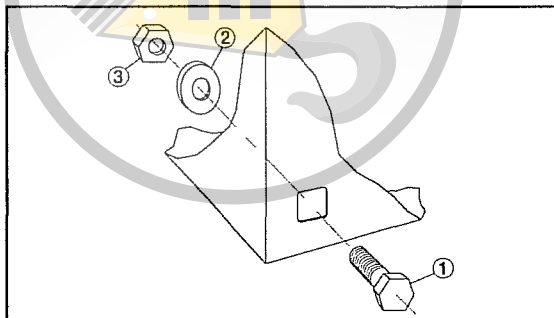
DISCONNECT SWITCH ASSEMBLY



CONTROL ENCLOSURE



ENCLOSURE MOUNTING HARDWARE



Enclosure mounting hardware (included) consists of (4) bolts (item 1), (4) sealing washers (item 2), and (4) nuts (item 3). Tighten to 180 inch pounds.

ENCLOSURE DIMENSIONS (figure 1)

A	B	C
20 inches	24 inches	8 inches

ENCLOSURE MOUNTING DIMENSIONS (figure 2)

D	E	MOUNTING HOLE DIA.
18.5 inches	22.5 inches	7/16 inches

SINGLE AND TWO-SPEED BRIDGE CONTROL

REPLACEMENT PARTS FOR SINGLE AND TWO-SPEED CONTROL PANELS

ITEM	P/N	DESCRIPTION
1	86836	Panel, Component Mounting
2	PA7341	Fuse Block, Bridge Motor Circuit
3	86714-03	Din Rail, 9-1/2" Long
4	52429-80	Fuse Holder, Transformer
5	86710-01	Terminal, Control
6	86710-02	Terminal, Power
7	86710-04	Terminal, Grounding
8	86710-06	Terminal End Barrier, Power
9	86710-05	Terminal End Anchor
▲10	86727-01	Contactor, Reversing, Size B
	86729-01	Contactor, Reversing, Size C
▲11	86727-01	Contactor, Two-Speed, Size B (see note)
	86729-01	Contactor, Two-Speed, Size C (see note)
12	PA7556	Din Rail, Elevated, 10-1/2" Long
13	86737-03	Relay, Control (two-speed only)
14	86714-10	Din Rail, 12-1/2" Long
▲15	PA7329	Transformer Fuse, (for 100 VA)
	PA6333	Transformer Fuse, (for 200 VA)
16	52429-04	Transformer, 200-115 V. (100 VA)
	52429-16	Transformer, 230/460-115 V. (100 VA)
	52429-39	Transformer, 575-115 V. (100 VA)
	52429-06	Transformer, 200-115 V. (200 VA)
	52429-18	Transformer, 230/460-115 V. (200 VA)
	52429-41	Transformer, 575-115 V. (200 VA)
▲17	86709-XXX	Fuse, Bridge Motor Circuit (see notes)
18	86715-017	ACM, S.S. 1 H.P. @ 200-230 V. 2 H.P. @ 460 V.
	86715-018	ACM, 2SP 1 H.P. @ 200-230 V. 2 H.P. @ 460 V.
	86715-002	ACM, S.S. 2 H.P. @ 575 V.
	86715-006	ACM, 2 SP 2 H.P. @ 575 V.

ITEM	P/N	DESCRIPTION
18	86715-019	ACM S.S. 2.5 H.P. @ 200-230 V. 5 H.P. @ 460 V.
	86715-020	ACM 2SP 2.5 H.P. @ 200-230 V. 5 H.P. @ 460 V.
	86715-004	ACM S.S. 5 H.P. @ 575 V.
	86715-008	ACM 2SP 5 H.P. @ 575 V.
19	86733-01	Mainline Contactor, Size C
	86734-01	Mainline Contactor, Size D
20	PA7649	Fusible Disc. Switch, 30 A.
	PA7650	Fusible Disc. Switch, 60 A.
21	PA7651	Disc. Switch Operating Rod, 30 A.
	PA7652	Disc. Switch Operating Rod, 60 A.
22	PA7653	Disc. Switch Operating Handle
▲23	86709-300	Fuse, Disc. Switch, 30 A.
	86709-600	Fuse, Disc. Switch, 60 A.
24	86710-07	Terminal End Barrier, Control
25	86710-03	Terminal, Power Connection
26	86710-08	Terminal End Barrier, Power Connection
27	86710-11	Terminal, Grounding, Power Connection
28	86736-XX	Overload Relay, Optional (see note)
29	71380	Label, Fuse I.D., Disconnect Switch
30	70726	Label, Fuse I.D., Motor Circuit
31	70266	Label, Fuse I.D., Transformer
32	71379	Nameplate
33	69505-02	Label, Danger, Electrical
34	86740-01	Enclosure, NEMA 12
	86740-02	Enclosure, NEMA 4
35	52429-81	Fuse Block, Transformer
▲36	86724-XXX	Fuse, Transformer Primary (see chart below)
37	71399	Label, Fuse I.D., Transformer Primary

▲ Denotes Recommended Spare Parts

NOTES:

- (1) When ordering replacement fuses or overload relays, provide fuse or overload relay amperage rating and/or total full load amperage of all bridge motors and the operating (line) voltage.
- (2) Two-speed contactors are provided as reversing contactors. Remove load (bottom) side power jumpers to use as two-speed contactors.
- (3) When control is provided without fusible disconnect switch (item 20, 21, 22, and 23), power terminals are provided in their place.
- (4) Parts list is not unique. Not all parts are required for every control panel.

CONTROL PANEL RATING

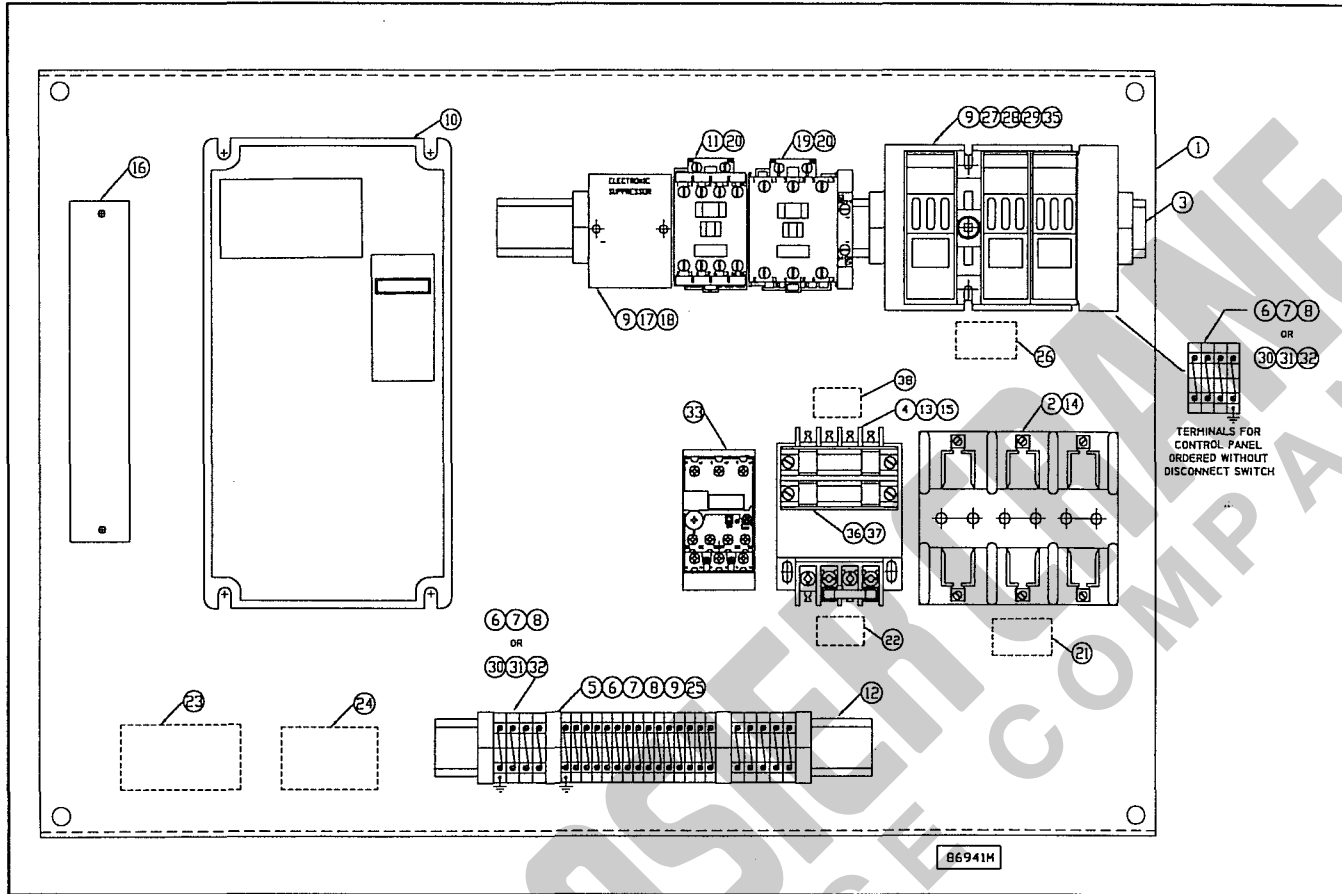
LINE VOLTAGE	200 V.	230 V.	460 V.	575 V.
Size "B" Control w/ ACM	1 H.P.	1 H.P.	2 H.P.	2 H.P.
Size "B" Control w/o ACM	2 H.P.	2 H.P.	5 H.P.	5 H.P.
Size "C" Control w/ ACM	2.5 H.P.	2.5 H.P.	5 H.P.	5 H.P.
Size "C" Control w/o ACM	7.5 H.P.	7.5 H.P.	10 H.P.	25 H.P.

TRANSFORMER PRIMARY FUSE, ITEM 36

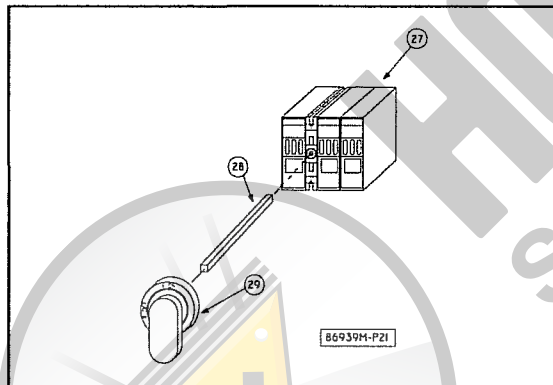
FUSE P/N (ITEM 36)	USE WITH TRANSFORMER P/N
86724-005	52429-16 when connected @ 460 V, 52429-39, and 52429-41
86724-012	52429-04, 52429-16 when connected @ 230 V, and 52429-18 when connected at 460 V.
86724-020	52429-06 and 52429-18 when connected @ 230 V.

VARIABLE FREQUENCY INVERTER, BRIDGE CONTROL

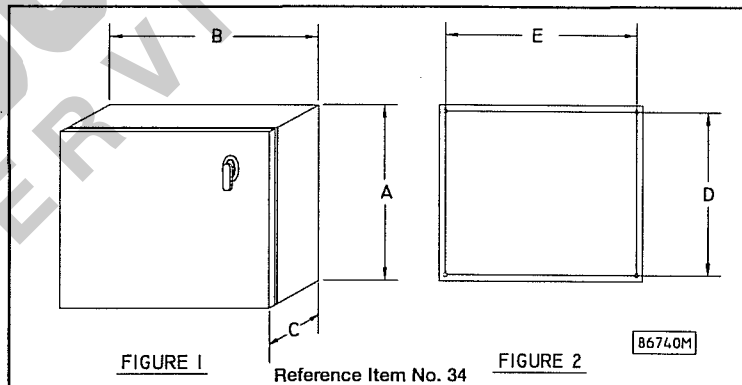
CONTROL PANEL ASSEMBLY



DISCONNECT SWITCH ASSEMBLY



CONTROL ENCLOSURE



INVERTER BRAKING RESISTORS

BRAKING RESISTOR ASSY. P/N

VOLTS	USE WITH	CMAA CLASS C	CMAA CLASS D
460	86738-41	86739-05	86739-16*
	86738-42	86739-06	86739-17*
	86738-43	86739-07	86739-18*
	86735-45	86739-08	86739-19*
	86738-47	86739-09*	86739-20*
230	86738-21	86739-01	86739-12*
	86738-22	86739-02	86739-13*
	86738-23	86739-03	86739-14*
	86738-25	86739-04	86739-15*

ENCLOSURE DIMENSIONS (figure 1)

A	B	C
20 inches	30 inches	8 inches

ENCLOSURE MOUNTING DIMENSIONS (figure 2)

D	E	MOUNTING HOLE DIA.
18.5 inches	28.5 inches	7/16 inches

* Denotes resistor assy's. that mount externally to control enclosure.

VARIABLE FREQUENCY INVERTER, BRIDGE CONTROL

REPLACEMENT PARTS FOR INVERTER CONTROLLED BRIDGE PANEL

ITEM	P/N	DESCRIPTION
1	86837	Panel, Component Mounting
2	PA7341	Fuse Block, Bridge Motor Circuit
3	86714-08	Din Rail, 16 in. Long
4	52429-80	Fuse Holder, Transformer
5	86710-01	Terminal, Control
6	86710-02	Terminal, Power
7	86710-04	Terminal, Grounding
8	86710-06	Terminal End Barrier, Power
9	86710-05	Terminal End Anchor
10	86738-41	Inverter Drive, 460 V. 1.9 A. Max.
	86738-42	Inverter Drive, 460 V. 3.6 A. Max.
	86738-43	Inverter Drive, 460 V. 5.1 A. Max.
	86738-45	Inverter Drive, 460 V. 8.5 A. Max.
	86738-47	Inverter Drive, 460 V. 11.7 A. Max.
	86738-21	Inverter Drive, 230 V. 6 A. Max.
	86738-22	Inverter Drive, 230 V. 8 A. Max.
	86738-23	Inverter Drive, 230 V. 11 A. Max.
	86738-25	Inverter Drive, 230 V. 17.5 A. Max.
11	86737-05	Relay, Brake Control
12	PA7556	Din Rail, Elevated, 10-1/2" Long
▲ 13	PA7329	Fuse, Transformer (use with 100 VA)
	PA6333	Fuse, Transformer (use with 200 VA)
▲ 14	86709-030	Fuse, Motor Ckt. Use w/ P/N: 86738-41
	86709-060	Fuse, Motor Ckt. Use w/ P/N: 86738-42
	86709-080	Fuse, Motor Ckt. Use w/ P/N: 86738-43
	86709-100	Fuse, Motor Ckt. Use w/ P/N: 86738-21
	86709-120	Fuse, Motor Ckt. Use w/ P/N: 86738-22
	86709-150	Fuse, Motor Ckt. Use w/ P/N: 86738-45
	86709-200	Fuse, Motor Ckt. Use w/ P/N: 86738-47 and P/N: 86738-23
15	52429-04	Transformer, 200-115 V. (100 VA)
	52429-16	Transformer, 230/460-115 V. (100 VA)
	52429-39	Transformer, 575-115 V. (100 VA)

ITEM	P/N	DESCRIPTION
15	52429-06	Transformer, 200-115 V. (200 VA)
	52429-18	Transformer, 230/460-115 V. (200 VA)
	52429-41	Transformer, 575-115 V. (200 VA)
16	86739-XX	Inverter D.B. Resistors, see chart
17	PA7606	Suppressor, Brake Coil, 230 V.
	PA7607	Suppressor, Brake Coil, 460 V.
18	PA7608	Din Rail Adapter (460 V. suppressor, qty. 2)
19	86733-01	Contactor, Mainline, "C"
	86734-01	Contactor, Mainline, Size "D"
20	PA7263	Suppressor, Relay Contactor Coil
21	70726	Label, Fuse I.D., Motor Circuit Fuses
22	70266	Label, Fuse I.D., Transformer Fuse
23	71739	Nameplate
24	69505-02	Label, Danger, Electrical
25	86710-07	Terminal End Barrier, Control
26	71380	Label, Fuse I.D., Disc. Switch
27	PA7649	Fusible Disc. Switch, 30 A.
	PA7650	Fusible Disc. Switch, 60 A.
28	PA7651	Disc. Switch Operating Rod, 30 A.
	PA7652	Disc. Switch Operating Rod, 60 A.
29	PA7653	Disc. Switch Operating Handle
30	86710-03	Terminal, Power Connection
31	86710-08	Terminal End Barrier, Power Connection
32	86710-11	Terminal, Grounding, Power Connection
▲ 33	86736-XX	Overload Relay, Optional (see notes)
	86736-50	Overload Relay Mtg. Base (see notes)
34	86740-04	Enclosure, NEMA 12
	86740-05	Enclosure, NEMA 4
▲ 35	86709-300	Fuse, Disc. Switch, 30 A.
	86709-600	Fuse, Disc. Switch, 60 A.
36	52429-81	Fuse Block, Transformer
▲ 37	86724-XXX	Fuse, Transformer Primary (see chart below)
38	71399	Label, Fuse I.D., Transformer Primary

▲ Denotes Recommended Spare Parts

NOTES:

- (1) When ordering replacement fuses or overload relays, provide fuse or overload relay amperage rating and/or total full load amperage of all bridge motors and the operating (line) voltage.
- (2) When control is provided without fusible disconnect switch (item 27, 28, and 29), power terminals are provided in their place.
- (4) Parts list is not unique. Not all parts are required for every control panel.

TRANSFORMER PRIMARY FUSE, ITEM 37

FUSE P/N (ITEM 37)	USE WITH TRANSFORMER P/N
86724-005	52429-16 when connected @ 460 V, 52429-39, and 52429-41
86724-012	52429-04, 52429-16 when connected @ 230 V, and 52429-18 when connected at 460 V.
86724-020	52429-06 and 52429-18 when connected @ 230 V.

ACCELERATION CONTROL MODULE V (OPTIONAL)

The ACM V is a solid state device designed to provide reduced starting torque and controlled acceleration of three-phase motors. The ACM V offers a soft controlled start that reduces the swinging action of suspended loads caused by uncontrolled abrupt starts. Starting torque and acceleration rate can be adjusted to accommodate differing requirements.

DANGER

HAZARDOUS VOLTAGES ARE PRESENT IN THE CONTROL BOX, OTHER ELECTRICAL COMPONENTS, AND CONNECTIONS BETWEEN THESE COMPONENTS.

The main switch (disconnect) of the hoist, crane, or lifting system shall be de-energized. Lock and tag the main switch in the de-energized position in accordance with ANSI Z244.1.

Only qualified electricians should inspect, adjust, service, repair, or replace electrical components.

All adjustments of ACM V must be made with the main switch locked and tagged in the de-energized position. After adjustments are made, re-energize power supply and test operation of ACM V. If additional adjustment is required, repeat this procedure.

NOTICE

Multi-Voltage Controls must be set for correct voltage before operating.

ACM V SINGLE SPEED ADJUSTMENT:

1. Set the TIME adjustment at the maximum point and the INITIAL TORQUE adjustment at the minimum point. (This initial setting provides the softest start, but the initial torque may be too small to start the motor for the first few cycles.)
2. Set the INITIAL TORQUE adjustment first; usually 1/4 to 1/2 of a turn from the minimum torque setting is adequate.
3. Decrease the TIME adjustment if the starting is too soft under a half load condition. Strive for a smooth even transition from zero to maximum speed with a minimal INITIAL TORQUE setting.

ACM V TWO SPEED ADJUSTMENT:

1. Set the TIME adjustment at the maximum point and the ACCELERATION and DECELERATION INITIAL TORQUE adjustments at the minimum points. (The setting provides the softest start, but the initial torque may be too small to start the motor for the first few cycles.)
2. Set the ACCELERATION TORQUE adjustment first; usually 1/4 to 1/2 of a turn from the minimum torque setting is adequate.
3. Next set the DECELERATION TORQUE adjustment by turning it to the minimum torque setting. If the transition from high to low speed is too soft, increase the setting until an appropriate transition is obtained. Usually setting the DECELERATION TORQUE adjustment to minimum proves to be the best setting.

DANGER

SERVICE CHECKS OF THE ACM V REQUIRE THAT THE ELECTRICAL POWER SUPPLY BE ENERGIZED.

THEREFORE, only electricians qualified and certified to work on energized circuits and equipment should perform this service.

ACCELERATION CONTROL MODULE V (OPTIONAL)

NOTICE

All readings should be taken with a standard analog type VOM (volt-ohm-meter)

ACM V SINGLE SPEED SERVICE:

1. Disconnect motor from T1, T2, and T3.
2. Set INITIAL TORQUE adjustment to minimum and the TIME adjustment to maximum.
3. Energize the contactor. For proper operation the following readings should be taken (example is for a 460 VAC, three-phase system with 115 VAC control voltage):
 - a. TL1 to TL2, TL2 to TL3, and TL1 to TL3 – 460 VAC.
 - b. Control signal point A and B terminals – 115 VAC. It is important that this reading be taken across the A and B terminal screws on the ACM unit. If no voltage can be read across these two points, first check for misplacement of an electrical interlock from the reversing or two-speed contactor. The "common" side of the control signal is sensed through the coil which is not energized, so do not interlock the common wire out of the circuit. Simply checking for 115 VAC from one screw terminal and the "common" wire is NOT sufficient. Without a proper signal to the A and B terminals (and the HI, LO, and COMMON on two-speed models), the output of the ACM at T1, T2, and T3 will remain zero (0) VAC. A and B must only be connected to the contactor coils, **NEVER THE CONTROL TRANSFORMER.**
 - c. After six seconds, take readings at T1, T2, and T3 (with the motor disconnected).
 - (1) From T1 to T2, T2 to T3, and T1 to T3, the voltage is approximately 80-95% of line voltage. For the 460 VAC ACM, the reading is approximately 405 VAC.
 - (2) A zero (0) VAC output will occur if the proper control signal is not being received (See b above and a, b, and c listed under two-speed service).
 - d. With the TORQUE adjustment at minimum and the TIME adjustment at maximum, take a meter reading across terminals T1, T2, and T3 (as in c(1) above), from the instant the contactor is closed. The meter should move slowly during the first five seconds, then quickly for the last second. The total time to reach 88% of the line voltage should be approximately six to nine seconds. Each phase to phase test should be similar in voltage profile, no matter where the TIME and TORQUE adjustments are set. Due to the dampening factor in volt-ohm-meters, it is difficult to detect the exact voltage level at a particular torque setting. However, the varying of the TORQUE and TIME settings can be readily identified on the meter. **THE IMPORTANT POINT IS THAT ALL THREE VOLTAGE PROFILES ARE THE SAME.**

ACM V TWO SPEED SERVICE:

Steps 1, 2, and 3 are the same as for single-speed control. The difference lies with the control signal circuitry. For proper operation, check the following control signals across the screws on the ACM. See 3b of single-speed service for general testing procedure.

- a. When the contactor is energized for low speed operation, the meter will read:
 - (1) Between HI and COMMON0 VAC
 - (2) Between LO and COMMON115 VAC
 - (3) Between LO and HI115 VAC
 - (4) Between A and B115 VAC
- b. When the contactor is energized for high speed operation, the meter will read:
 - (1) Between HI and COMMON115 VAC
 - (2) Between LO and COMMON0 VAC
 - (3) Between LO and HI115 VAC
 - (4) Between A and B115 VAC
- c. If another control voltage is used, it will appear instead of the 115 VAC listed above.

GENERAL CONDITIONS OF WARRANTY

WARRANTIES: The Seller warrants to the original using Buyer thereof that the goods sold under this Agreement are free from defects in workmanship and materials for a period of one year from the date of shipment to the original using Buyer. No other express warranties are given and no affirmation of Seller or Seller's agents, by word or action, shall constitute a warranty. No warranty is made for components and accessories made by others when such items are warranted by their respective manufacturers.

Installation or operation of the equipment in any manner other than as recommended by Seller, shall void the warranty.

Any variations in details between the goods furnished herein and those covered in Buyer's specifications are due to standards of manufacture not to be construed as exceptions to the specifications.

DISCLAIMER OF IMPLIED WARRANTIES:

- (a) SELLER MAKES NO WARRANTY OF MERCHANTABILITY IN RESPECT TO THE GOODS SOLD UNDER THIS AGREEMENT.
- (b) This sale is made WITHOUT ANY WARRANTY BY SELLER THAT THE GOODS ARE SUITABLE FOR ANY PARTICULAR PURPOSE.
- (c) Buyer hereby waives all other warranties, guarantees, obligations, liabilities, rights, and remedies arising by law or otherwise including any obligation or liability of the Seller arising from tort, and Buyer shall indemnify Seller from any liability, loss, damage, or claim arising from Buyer's tortious use of the goods sold hereby.

REMEDIES:

- (a) Under no conditions shall any goods be returned to Seller without its prior written consent.
- (b) The Buyer's sole and exclusive remedy for breach of any warranty is limited to Seller furnishing, at its expense, duplicate or repaired parts F.O.B. Seller's plant with installation at Buyer's expense if discovery of a claimed defect occurs during the allowable warranty period, and if Seller's inspection determines a defect exists.
- (c) The quantity of material shown by invoice shall in all cases govern settlement for shortages, unless notice of shortage, appropriately documented, is given to the carrier and the Seller upon delivery by the Carrier.
- (d) Claims for errors, deficiencies or imperfections shall be deemed waived by the Buyer unless Seller is notified in writing of the basis of such claims within 10 days after discovery of claimed defect and such discovery occurs within the warranted period.
- (e) Neither Buyer nor User shall be entitled under this Agreement to recover from Seller any incidental or consequential damages of any nature including but not limited to the cost of any labor expended by others in connection with the goods sold hereby by reason of any alleged nonconformity or breach of warranty on the part of the Seller, nor costs of material or account thereof, nor any lost profits whether determinable or speculative.



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