



# INSTALLATION MANUAL FOR Multiple-Operator Junction Box



**IMPORTANT: PLEASE REVIEW THIS ENTIRE PUBLICATION  
BEFORE INSTALLING, OPERATING, OR MAINTAINING THE  
MULTIPLE-OPERATOR JUNCTION BOX.**

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*Multiple-Operator Junction Box*

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## Safety Precautions

### **DANGER**

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



This safety alert symbol identifies important safety messages in this manual. When you see this symbol, be alert to the possibility of personal injury, and carefully read the message that follows.

### **CAUTION**

**CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Efficient and safe machine operation depends on the development, implementation and enforcement of a safety program. This program requires, among other things, the proper selection of point-of-operation guards and safety devices for each particular job or operation and a thorough safety training program for all machine personnel. This program should include instruction on the proper operation of the machine, instruction on the point-of-operation guards and safety devices on the machine, and a regularly scheduled inspection and maintenance program.

Rules and procedures covering each aspect of your safety program should be developed and published both in an operator's safety manual, as well as in prominent places throughout the plant and on each machine. Some rules or instructions which must be conveyed to your personnel and incorporated in to your program include:

### **DANGER**

**Never** place your hands or any part of your body in this machine.



**Never** operate this machine without proper eye, face and body protection.



**Never** operate this machine unless you are fully trained and instructed and unless you have read the instruction manual.



**Never** operate this machine if it is not working properly—stop operating it and advise your supervisor immediately.



**Never** use a foot switch to operate this machine unless a point-of-operation guard or device is provided and properly maintained.



**Never** operate this machine unless two-hand trip, two-hand control or presence- sensing device is installed at the proper safety distance. Consult your supervisor if you have any questions regarding the proper safety distance.



**Never** tamper with, rewire or bypass any control or component on this machine.

A company's safety program must involve everyone in the company, from top management to operators, since only as a group can any operational problems be identified and resolved. It is everyone's responsibility to implement and communicate the information and material contained in catalogs and instruction manuals to all persons involved in machine operation. If a language barrier or insufficient education would prevent a person from reading and understanding various literature available, it should be translated, read or interpreted to the person, with assurance that it is understood.



**FOR MAINTENANCE AND INSPECTION ALWAYS REFER TO THE OEM'S (ORIGINAL EQUIPMENT MANUFACTURER'S) MAINTENANCE MANUAL OR OWNER'S MANUAL. If you do not have an owner's manual, please contact the original equipment manufacturer.**

*(Continued on next page.)*

# SECTION 1—IN GENERAL

## Multiple-Operator Junction Box

### Safety References

#### OSH ACT AND FEDERAL REGULATIONS

Since the enclosed equipment can never overcome a mechanical deficiency, defect or malfunction in the machine itself, OSHA (Occupational Safety and Health Administration) has established certain safety regulations that the employers (users) must comply with so that the machines used in their plants, factories or facilities are thoroughly inspected and are in first-class operating condition before any of the enclosed equipment is installed.

#### 1. U.S. Government—An Act—Public Law 91-596, 91st Congress, S. 2193, December 29, 1970:

##### Duties

SEC. 5. (a) Each employer—

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.

#### 2. OSHA 29 CFR Sections that an employer (user) must comply with include:

1910.211 Definitions.

1910.212 General requirements for all machines.

1910.217 Mechanical power presses.

1910.219 Mechanical power-transmission apparatus.

#### 3. OSHA 29 CFR 1910.147 The control of hazardous energy (lockout/tagout).

#### 4. OSHA Publication

“General Industry Safety and Health Regulations Part 1910,” Code of Federal Regulations, Subpart O

This publication can be obtained by contacting:

Superintendent of Documents  
U.S. Government Printing Office  
P.O. Box 371954  
Pittsburgh, PA 15250-7954  
Phone: (202) 512-1800  
Fax: (202) 512-2250  
[www.gpo.gov](http://www.gpo.gov)

#### ANSI SAFETY STANDARDS FOR MACHINES

The most complete safety standards for machine tools are published in the ANSI (American National Standards Institute) B11 series. The following is a list of each ANSI B11 Standard available at the printing of this publication.

B11.1	Mechanical Power Presses
B11.2	Hydraulic Power Presses
B11.3	Power Press Brakes
B11.4	Shears
B11.5	Iron Workers
B11.6	Manual Turning Machines (Lathes)
B11.7	Cold Headers and Cold Formers
B11.8	Drilling, Milling and Boring Machines
B11.9	Grinding Machines
B11.10	Metal Sawing Machines
B11.11	Gear and Spline Cutting Machines
B11.12	Roll Forming and Roll Bending Machines
B11.13	Automatic Screw/Bar and Chucking Machines
B11.14	Coil Slitting Machines/Systems
B11.15	Pipe, Tube and Shape Bending Machines
B11.16	Metal Powder Compacting Presses (Withdrawn)
B11.17	Horizontal Hydraulic Extrusion Presses
B11.18	Coil Processing Systems
B11.19	Performance Criteria for Safeguarding
B11.20	Safety Requirements for Manufacturing Systems/Cells
B11.21	Lasers
B11.22	CNC Turning Machines
B11.23	Machining Centers
B11.24	Transfer Machines
B11.TR1	Ergonomics
B11.TR2	Mist Control
B11.TR3	Risk Assessment
B11.TR4	Control Reliability for Design, Construction, and Validation of PESs
R15.06	Robotic Safeguarding

These standards can be purchased by contacting:

American National Standards Institute  
25 West 43rd Street  
New York, New York 10036  
Phone: (212) 642-4900  
Fax: (212) 398-0023  
[www.ansi.org](http://www.ansi.org)

OR

AMT—The Association for Manufacturing Technology  
7901 Westpark Drive  
McLean, Virginia 22102  
Phone: (703) 893-2900  
Toll-Free: 1-800-524-0475  
Fax: (703) 893-1151  
E-Mail: [AMT@amtonline.org](mailto:AMT@amtonline.org)  
[www.amtonline.org](http://www.amtonline.org)

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## NATIONAL SAFETY COUNCIL SAFETY MANUALS

Other good references for safety on machine tools are the National Safety Council's Safety Manuals. These manuals are written by various committees including the Power Press, Forging and Fabricating Executive Committee. Copies of the following publications are available from their library:

- Power Press Safety Manual - 4th Edition
- Safeguarding Concept Illustrations - 6th Edition
- Forging Safety Manual

These manuals can be obtained by contacting:

National Safety Council  
1121 Spring Lake Drive  
Itasca, IL 60143-3201  
1-800-621-7619 ext. 2199  
Fax: (630) 285-0797  
www.nsc.org

## OTHER SAFETY SOURCES

National Institute of Occupational Safety and Health (NIOSH)  
4676 Columbia Parkway  
Cincinnati, OH 45226  
Toll-Free: 1-800-35-NIOSH (1-800-356-4674)  
Phone: (513) 533-8328  
Fax: (513) 533-8573  
www.cdc.gov/niosh

## OTHER SAFETY SOURCES (continued)

Robotic Industries Association (RIA)  
900 Victors Way, Suite 140  
P.O. Box 3724  
Ann Arbor, MI 48106  
Phone: (734) 994-6088  
Fax: (734) 994-3338  
www.roboticonline.com

NEMA (National Electrical Manufacturers Association)  
1300 North 17th Street, Suite 1847  
Rosslyn, VA 22209  
Phone: (703) 841-3200  
Fax: (703) 841-5900  
www.nema.org

NFPA (National Fire Protection Association)  
1 Batterymarch Park  
Quincy, MA 02269-9101  
Phone: (617) 770-3000  
Fax: (617) 770-0700  
www.nfpa.org

For additional safety information and assistance in devising, implementing or revising your safety program, please contact the machine manufacturer, your state and local safety councils, insurance carriers, national trade associations and your state's occupational safety and health administration.

## Warranty, Disclaimer and Limitation of Liability

### WARRANTY

Rockford Systems LLC warrants that this product will be free from defects in material and workmanship for a period of 12 months from the date of shipment thereof. ROCKFORD SYSTEMS LLC'S OBLIGATION UNDER THIS WARRANTY IS EXPRESSLY AND EXCLUSIVELY LIMITED to repairing or replacing such products which are returned to it within the warranty period with shipping charges prepaid and which will be disclosed as defective upon examination by Rockford Systems LLC. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction and use not in accordance with Rockford Systems LLC's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of Rockford Systems LLC. Rockford Systems LLC's warranties as to any component part is expressly limited to that of the manufacturer of the component part.

### DISCLAIMER

The foregoing Warranty is made in lieu of all other warranties, expressed or implied, and of all other liabilities and obligations on the part of Rockford Systems LLC, including any liability for negligence, strict liability, or otherwise, and any implied warranty of merchantability or fitness for a particular purpose is expressly disclaimed.

### LIMITATION OF LIABILITY

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## SECTION 2—INTRODUCTION

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### *Multiple-Operator Junction Box*

## General Description of Components in the System

A multiple-operator junction box system includes the following:

1. Installation manual and electrical control schematics
2. Palm button assemblies or control bars
3. Foot switches
4. Supervisory control stations

Individual packages may vary in contents. However, a packing list is always enclosed showing exactly what material was shipped on this order. Please check the components actually received against this packing list immediately.

## Preliminary Steps Before Installation

Before proceeding with the installation of the enclosed equipment, you should undertake the following preliminary steps.

1. Read and make sure you understand this entire installation manual.
2. Please make sure the machine is in first-class condition. Before starting any installation, it is essential that the machine is thoroughly inspected. Be sure all mechanical components and all collateral equipment are in first-class operating condition. Your inspection should be done according to the machine manufacturer's installation and maintenance instruction manual. If you have any doubts or questions concerning the condition of the machine, contact the machine manufacturer for assistance. Repair or replace all parts not operating properly before proceeding.



**Inspection and maintenance programs must be established and implemented to keep machines in first-class condition. Safety programs must include thorough inspections of each machine on a weekly basis and records kept of these inspections. Any part of the machine that is worn, damaged or is not operating properly must be replaced immediately or repaired before the machine is used.**

3. Verify that the machine is in first-class condition and operating properly; shut off all power to the machine. Padlock all electrical, hydraulic, and pneumatic energy in the off position and do not actuate the machine again until the installation of all package components has been completed. Lockout/tagout energy isolation procedures must always be practiced and enforced.

## General Features of the Multiple-Operator Junction Box

- Will not allow the machine to cycle if a station that is turned off is used
- Nonresumption of an interrupted stroke
- Anti-tie-down
- Preset time for concurrent operation of the actuating means
- Will not give an output for the machine to cycle when all stations are bypassed (turned off)

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### Overview of the Multiple-Operator Junction Box

When multiple operator stations are required, this multiple-operator junction box is furnished to interface up to four operator stations to the machine control. This junction box interfaces palm buttons and foot switches, and it will not allow the machine to run if an operator station is actuated without being turned on. This helps prevent a potentially unsafe condition in which operators think their station is turned on when it really isn't. In addition, to meet the requirements of the OSHA 29 CFR 1910.217 and ANSI B11.1 standards for mechanical power presses, the multiple-operator junction box will not give an output for the machine to cycle when all stations are bypassed (turned off).

Here's how it works: If the palm buttons or foot switch at an operator station is actuated when that station is not turned on, a fault condition will occur, and the multiple-operator junction box will not give an output to the control to cycle the machine (even if the palm buttons or foot switch is actuated at a station that is turned on). When a fault condition occurs, the amber "fault reset" push button on the door of the junction box will illuminate, and the green "station on" indicator light will flash for the turned-off station that was used to try to cycle the machine. The machine will not be allowed to cycle until the "fault reset" button is pushed.

The multiple-operator junction box can accommodate the following:

- a. Up to four pairs of run/inch/jog palm buttons
- b. Up to four run foot switches
- c. Up to four top-stop or return buttons
- d. Up to four station off/on selector switches and "station on" indicator lights

*NOTE: The printed circuit board in the multiple-operator junction box does not interface emergency-stop buttons (nor does it interface the prior-action button for continuous and automatic modes of operation). To comply with NFPA 79, Electrical Standard for Industrial Machinery, all emergency-stop buttons (one is required at each operator control station) should be tied in directly to the motor starter circuit so the emergency-stop function has only hardwired electromechanical components. However, for wiring convenience, these buttons can be run in to the junction box, through its terminal blocks, and out to the machine. Please refer to the enclosed wiring schematics.*

### NORMAL OPERATION (USUALLY WITH A PRESS)

The multiple-operator junction box is designed to operate up to four separate operator stations; each of these stations can be used independently or in conjunction with any of the other stations.

*NOTE: The same actuating means must be used at all active stations. For example, if you use the palm buttons at one station, the palm buttons must be used at the other station(s); you can't use the palm buttons at one station and the foot switch at another.*

When palm buttons are being used, there are two anti-tie-down timers. One timer times between both palm buttons at a single station (0.5 seconds), and the other times between the stations (2 seconds per station). Both timers will start once the first palm button is actuated at one of the active stations. Once the timers start, all of the other palm buttons (at the active stations) will have to be actuated within the time limits. If either time limit is reached before the other palm buttons are actuated, the junction box will not give the output to the control for the machine to cycle, and all of the palm buttons will have to be released and reactuated. If all of the palm buttons are actuated within the time limits, a relay in the junction box will energize, providing an output to the machine control for the machine to cycle.

When foot switches are being used, there is only one anti-tie-down timer—the one that times between the stations (2 seconds per station). The timer will start once the foot switch is actuated at one of the active stations. Once the timer starts, the other foot switch(es) (at the active stations) will have to be actuated within the time limit. If the time limit is reached before the other foot switch(es) is actuated, the junction box will not give the output to the control for the machine to cycle, and all of the foot switches will have to be released and reactuated. If all of the foot switches are actuated within the time limit, a relay in the junction box will energize, providing an output to the machine control for the machine to cycle.

*(Continued on next page.)*

## SECTION 2—INTRODUCTION

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### *Multiple-Operator Junction Box*

#### **MASTER/SLAVE FOOT SWITCH OPERATION (USUALLY WITH A PRESS BRAKE)**

Master/slave foot switch operation is usually used with a press brake when multiple operators are bending large parts. There is one master foot switch that is wired in to Station 1 (Terminal Strip P8), and the other foot switches are slave foot switches that are wired in to Stations 2, 3, and 4 (Terminal Strips P9, P11, and P10). The slave operator or operators depress their foot switches and hold them down, and then the master operator depresses his or her foot switch to cycle the machine. As long as all active slave foot switches remain depressed, the master operator will have complete control of the machine and will be able to inch the machine through the bending portion of the stroke. If any of the active slave foot switches are released, the machine will stop cycling, and those slave foot switches that were released will have to be reactivated before the master operator will be able to cycle the machine. When the slave foot switch operation is used, there is no anti-tie-down timer between the stations.

For master/slave foot switch operation, a jumper needs to be installed between Terminals P4-7 and P4-8 in the multiple-operator junction box. Please refer to the enclosed wiring schematics.

*NOTE: When the jumper is installed for master/slave foot switch operation, the palm buttons, if used, will operate in the normal way as outlined in the "Normal Operation" section.*

#### **INPUTS**

The inputs to the multiple-operator junction box are 24-V DC current-sinking (NPN) inputs that are optically isolated for noise immunity. Required inputs are as follows:

- |  |                   |
|--|-------------------|
| a. Each palm button                    | 1 N.O. and 1 N.C. |
| b. Each foot switch                    | 1 N.O. and 1 N.C. |
| c. Each top-stop or return button      | 1 N.C.            |
| d. Each station off/on selector switch | 1 N.C.            |

#### **OUTPUTS**

The outputs are capable of up to 120 V AC and are fused for 4 A. The outputs are as follows:

- |                              |                   |
|------------------------------|-------------------|
| a. Palm buttons              | 2 N.C. and 1 N.O. |
| b. Foot switches             | 1 N.O. and 1 N.C. |
| c. Top-stop or return button | 1 N.C.            |
| d. Fault condition           | 1 N.C.            |

#### **CONNECTIONS**

The palm buttons, top stop or return button, and the station off/on switch and indicator light are set up to use just one cable from the operator station to the multiple-operator junction box. The foot switch is designed to use just one cable from each foot switch to the multiple-operator junction box.

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# SECTION 3—INSTALLATION OF COMPONENTS

*Multiple-Operator Junction Box*

## Introduction

The following additional materials are required to install the equipment in this shipment.

1. Wire: Size and type will depend on local ordinances or plant practices. We recommend stranded machine tool wire with appropriate color-coding. Never use solid wire—the vibration caused by these machines precludes the successful use of solid wire for these installations.
2. Numbered wire markers: Made of suitable material to resist oil, grease, etc., and remain firmly attached to the wire.
3. Conduit: Rigid, liquid-tight flexible, or any other suitable tubular connecting means which complies with local ordinances and provides adequate mechanical protection for the wires. Most of the electrical products supplied have an oil-tight construction.
4. Miscellaneous wiring components such as electrical tape, wire connectors, and terminals, as required.

## Multiple-Operator Junction Box

The multiple-operator junction box is housed in a NEMA 12 enclosure.

**Photo 3.1**  
**Multiple-Operator Junction Box**  
**Outside View**



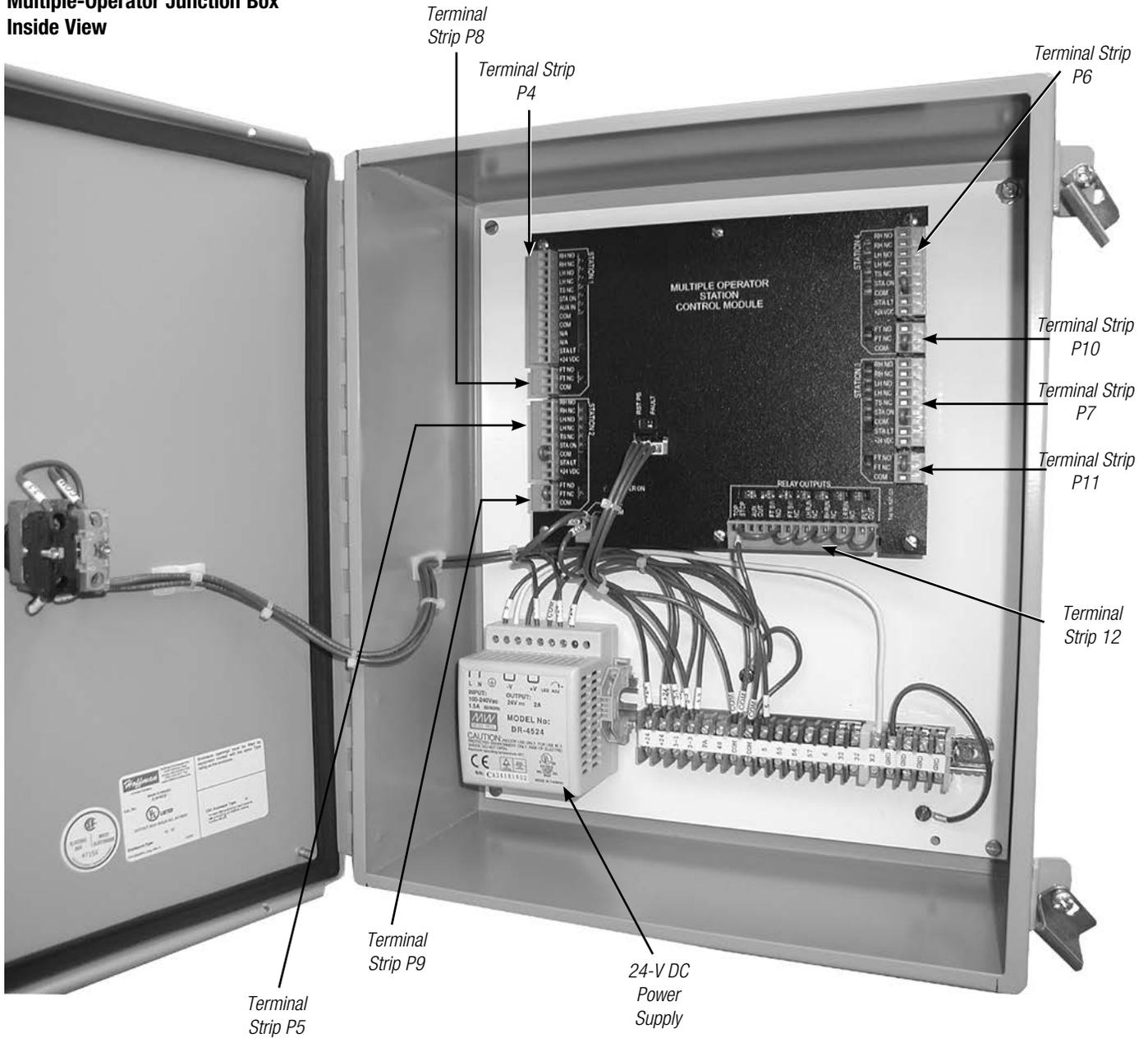
*(Continued on next page.)*

# SECTION 3—INSTALLATION OF COMPONENTS

Multiple-Operator Junction Box

## Multiple-Operator Junction Box (continued)

**Photo 3.2**  
**Multiple-Operator Junction Box**  
**Inside View**



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# SECTION 3—INSTALLATION OF COMPONENTS

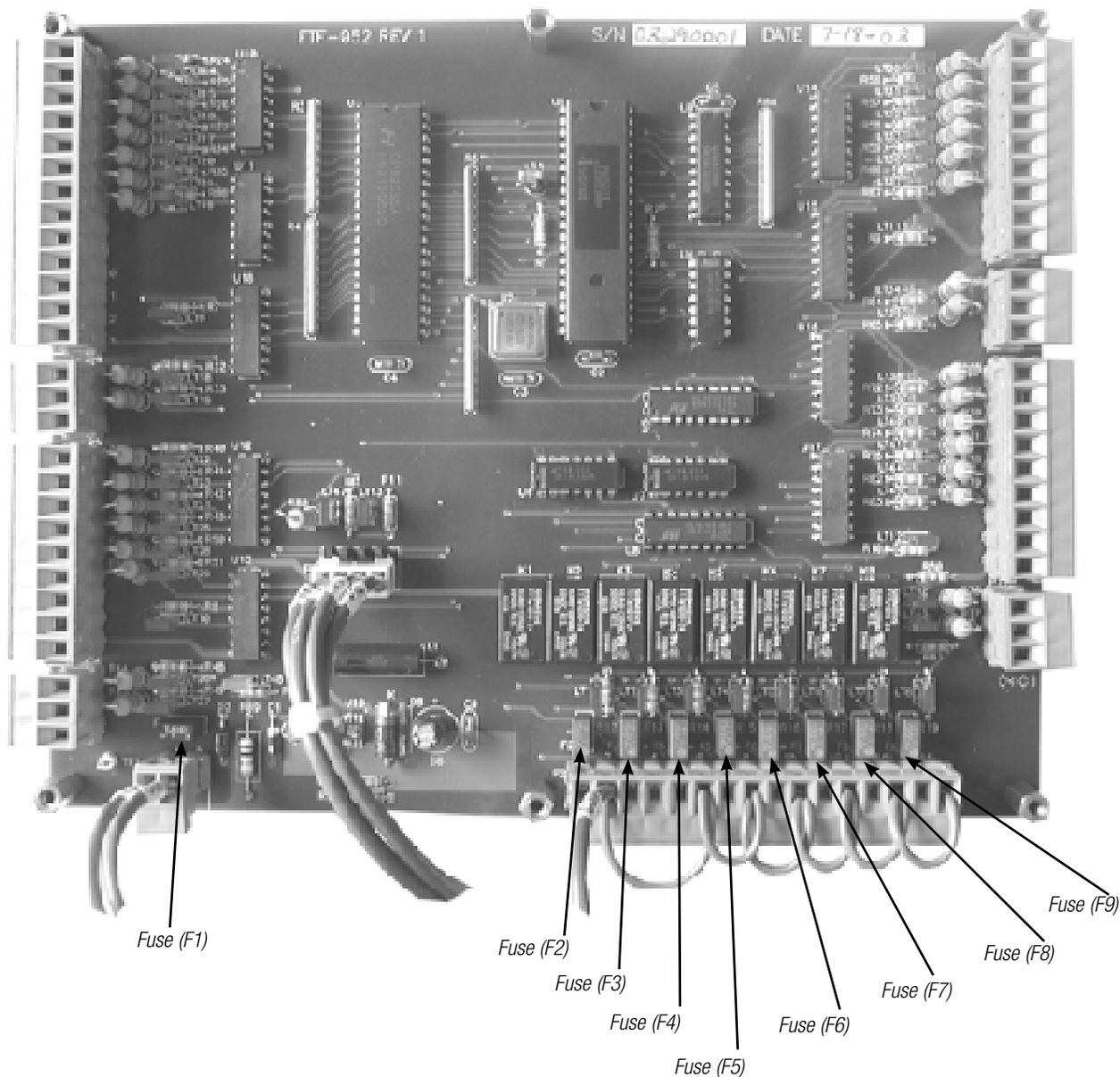
*Multiple-Operator Junction Box*

## Multiple-Operator Junction Box (continued)

### USER-SERVICEABLE PARTS

User-serviceable parts on the multiple-operator junction box are the single incoming power fuse and the CPU (PROM) fuses for the outputs. Fuse F1 is for incoming power and fuses F2–F9 are for the output relays.

**Photo 3.2**  
**Multiple-Operator Junction Box**  
**Inside View With Cover Plate Removed**



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# SECTION 3—INSTALLATION OF COMPONENTS

## Multiple-Operator Junction Box

### Multiple-Operator Junction Box *(continued)*

#### FUNCTION TEST OF THE MULTIPLE-OPERATOR JUNCTION BOX

Before running production, the palm buttons or foot switches of the stations that have been selected must be function-tested. This is to avoid an improper first cycle in which the operators think their station is turned on when it really isn't.

To function test, make sure the stations that will be used are turned on. Depress the palm buttons or foot switches of these stations. If the "fault reset" push button on the door of the multiple-operator junction box illuminates, it means that a necessary station has not been turned on. The "station on" indicator light will flash at this station. Turn that station on and press the "fault reset" push button to reset the system. Repeat this function test until the machine cycles.

#### Palm Buttons (If furnished—See enclosed Manual No. KSL-073)

The multiple-operator junction box accommodates up to four operator stations. Each station consists of palm buttons and/or a foot switch. The palm buttons can be used as a point-of-operation safeguarding device as long as they are located at the proper safety distance. There are many requirements that must be met before two-hand control can be used as a point-of-operation device. For your convenience we have reproduced the pertinent sections of OSHA 29 CFR 1910.217 as well as the safety distance formula for two-hand control from ANSI B11.1. These sections cover two-hand control as an initiating means and two-hand control as a point-of-operation safeguard for part-revolution-clutch presses.

Please read and make sure you understand the following sections before proceeding with the mounting of the palm buttons.

#### TWO-HAND CONTROL

##### OSHA 29 CFR 1910.217 (b)(7)(v) for two-hand control used as a method of initiating a press cycle only:

Two-hand controls for single stroke shall conform to the following requirements:

- (a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.
- (b) The control system shall be designed to permit an adjustment, which will require concurrent pressure from both hands during the die closing portion of the stroke.
- (c) The control system shall incorporate an antirepeat feature.
- (d) The control system shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed.



**The above description covers the use of two palm buttons as a method of actuating a press cycle. It does not provide any form of point-of-operation safeguarding. Some other properly applied and installed guard or device must be provided in accordance with OSHA 29 CFR 1910.217 (c) using the run palm buttons as an actuating means.**

##### OSHA 29 CFR 1910.217 for two-hand control used as a method of safeguarding the point of operation as follows:

###### (c)(3) Point-of-Operation Devices

- (i) Point-of-Operation devices shall protect the operator by:
  - (e) Requiring the application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands;
- (vii) The two-hand control device shall protect the operator as specified in paragraph (c)(3)(i)(e) of this section.

*(Continued on next page.)*

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# SECTION 3—INSTALLATION OF COMPONENTS

*Multiple-Operator Junction Box*

## Palm Buttons (continued)

### TWO-HAND CONTROL (continued)

- (a) When used in press operations requiring more than one operator, separate two-hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operator controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop.
- (b) Each two-hand control shall meet the construction requirements of paragraph (b)(7)(v) of this section.
- (c) The safety distance ( $D_S$ ) between the two-hand control device and the point of operation shall be greater than the distance determined by the following formula: (Also, see Figure 3.1.)

$$D_S = 63 \text{ inches/second} \times T_S; \text{ where:}$$

$D_S$  = minimum safety distance (inches);  
 63 inches/second = hand-speed constant; and  
 $T_S$  = stopping time of the press measured at approximately 90° position of the crankshaft rotation (seconds).

- (d) Two-hand controls shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

Chart for OSHA Formula Only

$T_S$  = stopping time in seconds  
 $D_S$  = safety distance for two-hand control

**Figure 3.1**

$T_S$	$D_S$								
.055	3½"	.158	10"	.261	16½"	.365	23"	.468	29½"
.063	4"	.166	10½"	.269	17"	.373	23½"	.476	30"
.072	4½"	.174	11"	.277	17½"	.380	24"	.484	30½"
.079	5"	.182	11½"	.285	18"	.388	24½"	.492	31"
.087	5½"	.190	12"	.293	18½"	.396	25"	.500	31½"
.095	6"	.198	12½"	.301	19"	.404	25½"	.507	32"
.103	6½"	.206	13"	.309	19½"	.412	26"	.515	32½"
.111	7"	.214	13½"	.317	20"	.420	26½"	.523	33"
.119	7½"	.222	14"	.325	20½"	.428	27"	.531	33½"
.126	8"	.230	14½"	.333	21"	.436	27½"	.539	34"
.134	8½"	.238	15"	.341	21½"	.444	28"	.547	34½"
.142	9"	.246	15½"	.349	22"	.452	28½"	.555	35"
.150	9½"	.253	16"	.357	22½"	.460	29"	.563	35½"
								.571	36"

*\*Based on the 63 inches/second hand-speed constant.*

*(Continued on next page.)*

# SECTION 3—INSTALLATION OF COMPONENTS

## Multiple-Operator Junction Box

### Palm Buttons (continued)

#### TWO-HAND CONTROL (continued)

3. According to ANSI B11.1-2001, the total stopping time of the press (for two-hand control) should include the total response time of the control system and the time it takes the press to cease ram motion. The following formula should be used when calculating the safety distance:

$$D_s = K(T_s + T_c + T_r + T_{spm}); \text{ where:}$$

$K$  = the hand speed constant = 63 inches/second.

$T_s$  = stop time of the press measured from the final deenergized control element, usually the air valve.

$T_c$  = the reaction time of the control system.

*Note:  $T_s + T_c$  are usually measured by a portable or built-in stop-time measuring device.*

$T_r$  = the reaction time of the two-hand control and its interface.

$T_{spm}$  = the additional time allowed by the stopping performance monitor (brake monitor) before it detects stop-time deterioration.

When the press stroke stop command or stopping performance monitor (brake monitor) timer or angle setting is changed, because the machine is taking longer to stop, the safety distance should be recalculated. The safeguarding device should also be placed at a greater safety distance if the stopping time or distance has increased.

*Note: When obtaining the stopping time using the ANSI formulas, a stopping position of crankshaft rotation is not provided. (The OSHA formula uses 90°.) To calculate the safety distance, the stop signal should be given on the downstroke at a point that would provide the longest stopping time.*



**When applying the two run palm buttons to meet the requirements for a point-of-operation safeguarding device, make certain these buttons are located on the machine so they meet the minimum safety distance required by the OSHA or ANSI formulas.**

**Simply stated, safety distance is the mounting location of the palm buttons at a distance where the operator cannot reach into the point-of-operation hazard before the ram has stopped or completed its downward travel.**

**To obtain the stopping time at 90° position of crankshaft rotation, either a built-in system or portable stop-time measurement unit can be used.**

#### TWO-HAND TRIP

**OSHA 29 CFR 1910.217 (b)(6) for two-hand trip used as a method of initiating a press cycle only:**

- (i) A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.
- (ii) Two-hand trip systems on full-revolution-clutch machines shall incorporate an antirepeat feature.
- (iii) If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.



**The above description covers the use of two palm buttons as a method of initiating a press cycle. It does not provide any form of point-of-operation safeguarding. Some other properly applied and installed guard or device must be provided in accordance with OSHA 29 CFR 1910.217 Section (c) using the run palm buttons as an initiating means.**

*(Continued on next page.)*

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# SECTION 3—INSTALLATION OF COMPONENTS

*Multiple-Operator Junction Box*

## Palm Buttons (continued)

## TWO-HAND TRIP (continued)

**OSHA 29 CFR 1910.217 for two-hand trip used as a method of safeguarding the point of operation as follows:**

(c)(3) Point-of-Operation Devices

(i) Point-of-Operation devices shall protect the operator by:

(e) Requiring the application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his hands;

(viii) The two-hand trip device shall protect the operator as specified in paragraph (c)(3)(i)(e)(see above) of this section.

(a) When used in press operations requiring more than one operator, separate two-hand trips shall be provided for each operator, and shall be designed to require concurrent application of all operator controls to activate the slide.

(b) Each two-hand trip shall meet the construction requirements of paragraph (b)(6) of this section.

(c) safety distance ( $D_m$ ) between the two-hand trip and the point of operation shall be greater than the distance determined by the following formula: (Also, see Figure 3.2 on page 14.)

$D_m = 63 \text{ inches/second} \times T_m$ ; where:

$D_m =$  minimum safety distance (inches);

63 inches/second = hand-speed constant; and

$T_m =$  the maximum time the press takes for the die closure after it has been tripped (seconds). For full-revolution-clutch presses with only one engaging point,  $T_m$  is equal to the time necessary for one and one-half revolutions of the crankshaft. For full-revolution-clutch presses with more than one engaging point,  $T_m$  shall be calculated as follows:

$$T_m = 1/2 + \left[ \frac{1}{\text{Number of engaging points per revolution}} \right] \times \text{time necessary to complete one revolution of the crankshaft (seconds)}$$

(d) Two-hand trips shall be fixed in position so that only a supervisor or safety engineer is capable of relocating the controls.

*(Continued on next page.)*

# SECTION 3—INSTALLATION OF COMPONENTS

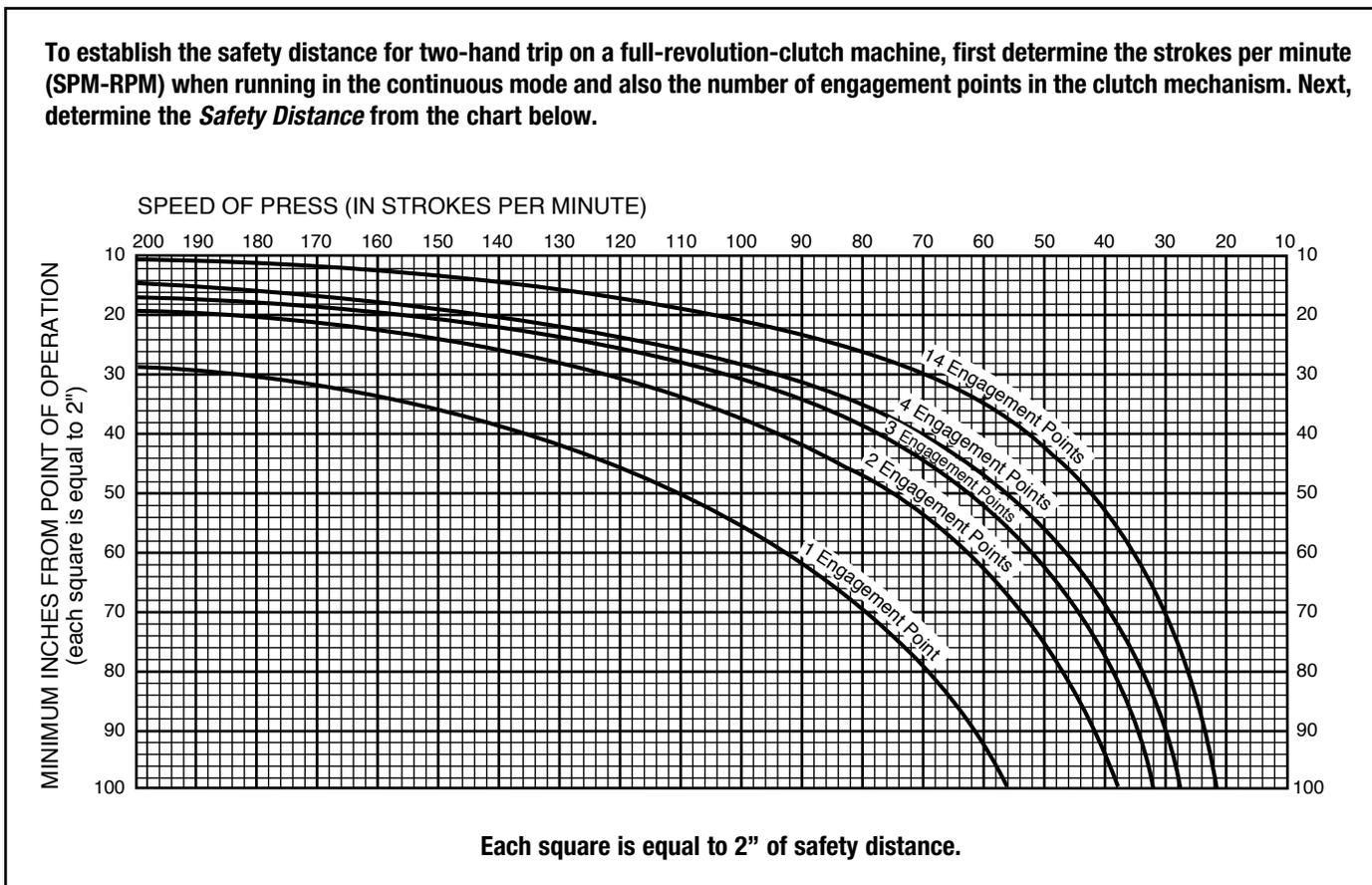
Multiple-Operator Junction Box

## Palm Buttons (continued)



When applying the two palm “run” buttons to meet the requirements for a “point-of-operation safeguarding device,” make certain these buttons are located on the machine so they meet the minimum safety distance required by the OSHA formula described previously, or refer to the chart in Figure 3.2 below.

Figure 3.2



Simply stated, safety distance is the mounting and location of the palm buttons at a distance where the operator cannot reach into the point-of-operation hazard before the ram has completed its downward travel.



In order to meet the requirements, an inspection and preventive maintenance program is mandatory. Two-hand trips, when used as a point-of-operation device, only initiate the machine stroke. Once the stroke is started, it will make one full stroke. Other mechanical components in the press and press system provide top stop. Two-hand trips can safeguard the point of operation provided there is no mechanical failure of the machine. No trip control system can overcome a mechanical deficiency, defect or malfunction in the machine itself.

(Continued on next page.)

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# SECTION 3—INSTALLATION OF COMPONENTS

*Multiple-Operator Junction Box*

## FUNCTION TESTS OF TWO-HAND CONTROL

If two-hand control is going to be used as a point-of-operation device, the following function tests should be run before operating the machine. These tests should be done at every operator, die, or shift change, and every time maintenance is performed.

1. Verify the two-hand control complies with the following before stroking the machine.
  - a. Are the palm buttons protected against accidental operation (with ring guards or fabricated shields)?
  - b. Are the palm buttons separated by enough distance or configured to require the use of both hands to actuate the machine?
  - c. Are the palm buttons at the proper safety distance based on the stopping time of the machine on the downstroke? (See pages 11-12 for details.)
  - d. Are the palm buttons fixed in position?
2. With the main motor drive on, the actuating means selector switch set to HAND, and the mode selector switch set to SINGLE, perform the following tests.
  - a. Depress both palm buttons at a single station concurrently within the anti-tie-down setting (0.5 s) and the machine will begin a stroke.
  - b. Hold the palm buttons down for the entire stroke. Release one palm button and try to start another stroke by reactuating the palm button that was just released. The machine should not begin another stroke. Repeat this step with the other palm button. The machine should not begin another stroke. This verifies the control has antirepeat.
  - c. Depress both palm buttons and release only one palm button on the downstroke. The ram should stop. Reactuate the palm button that was released. The machine should not finish the stroke. Both palm buttons must be released and reactuated in order for the machine to finish the stroke. Repeat this test while releasing the other palm button. The machine should not finish the stroke. Both palm buttons must be released and reactuated in order for the machine to finish the stroke. This verifies the control has nonresumption of interrupted stroke.

**If any of these function tests fail, corrective action must be taken before running production.**

## Foot Switch (If furnished—See enclosed Manual KSL-001)



**If you elect to use a foot switch, all personnel must be warned that it is impossible for a foot switch to provide any form of point-of-operation safeguarding. It is the responsibility of the employer (user) to always provide an appropriate guard and/or device to prevent bodily injury whenever a foot switch is used to initiate a machine cycle.**



**A method of safeguarding (light curtain, guard, gate, pullback, or restraint) the point of operation must be provided before installing or using a foot switch.**



**Never use a foot switch to operate this machine unless a point-of-operation guard or device is provided and properly maintained.**



**The mechanical guard or device must be properly installed, used and maintained. It must always prevent all personnel from bodily injury.**



**Photo 3.3**  
**Part No. CTD-011**

When installing the optional foot switch, be sure the wiring schematics are referenced for proper connections. Be sure to maintain the foot switch in first-class condition. It must always be wired properly and the protection on the top, sides, and front must always remain in place.

*(Continued on next page.)*

# SECTION 3—INSTALLATION OF COMPONENTS

## Multiple-Operator Junction Box

### Supervisory Control Station (If furnished)

When two or more palm button or foot switch operating stations are required on one machine, one supervisory control station is required at each operator station. This remote control station consists of one station on indicator light and an off/on keyed selector switch in an enclosure. The on position allows the operator to use that station and the off position deactivates only that station. If all the supervisory control stations are in the on position, the palm buttons or foot switches must be depressed within the anti-tie-down time limit in order to initiate a machine stroke.



**Photo 3.4**  
**Supervisory Station**  
**Part No. LLD-283**

### Other Installation Considerations

#### WIRING

National Electrical Code practices, including NFPA 79, are usually followed for wiring the control system, especially color coding and the use of numbered wire markers on both ends of every wire. Color coding is red for 115-V AC control circuits, blue for 24-V DC control circuits, white for current-carrying ground (commonly referred to as the neutral), and green for any equipment grounding conductor. All terminal blocks in the control cabinet are color coded for easy identification.

#### SUPERVISORY CONTROL STATION (See above)

Mount the station in a convenient location where it is easily accessible, or as part of a palm button assembly. See the wiring schematic for proper wiring of the supervisory control station.

### Electrical Troubleshooting

**All troubleshooting, as well as installation, must be performed by qualified and properly trained personnel. Also, when a defective component is found, do not operate the machine until that component has been replaced with an exact replacement part.**

This procedure is written as a general guide for troubleshooting the multiple-operator junction box system. In all cases, please refer to the individual control wiring schematic for particular test points and terminal numbers. Be sure to follow the schematic when troubleshooting.

The printed circuit board inside the multiple-operator junction box has red LEDs for visual indication of control operation and input and output status. There is also one green LED for CPU status.

If a defective component (contact) is found, always verify with an ohm meter. Lock the disconnect switch in the off position, isolate the component or contact from other wiring and check its integrity with an ohm meter. At the same time, manually operate the device (in the case of a contact) to check its function.

The following should be checked if your machine is not functioning properly at this time:

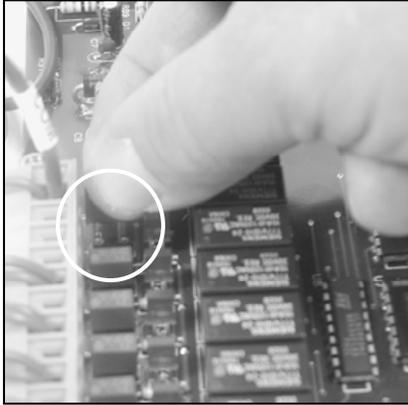
- Check the electrical circuitry. A meter with scales covering 115 V AC and some resistance ranges (ohms) is all that is required.

*(Continued on next page.)*

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### Replacing Fuses F1-F9

Photo 4.1



**All power to the machine must be off before replacing the fuses.**

1. Remove the top cover plate from the multiple-operator junction box circuit board by removing the six small screws.
2. Locate fuses F1-F9. Grasp the faulty fuse and pull straight up.
3. Insert the new fuse by lining up the pins with the holes on the circuit board. See Photo 4.1.
4. Replace the cover plate back on the circuit board and secure it with the six screws.

*(Continued on next page.)*

# SECTION 5—ORDER FORM & RETURN MATERIALS REQUEST FORM

*Multiple-Operator Junction Box*

## ORDER FORM FOR SIGNS AND LITERATURE

This instruction manual references signs and literature available for your machines. This order form is for your convenience to order additional signs and/or literature as needed. (This order form is part of your installation manual so please make a copy of it when ordering.)

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Name \_\_\_\_\_ Purchase Order No. \_\_\_\_\_ Date \_\_\_\_\_

Part No.	Description	Quantity Required
KSL-266	Installation Manual—Multiple-Operator Junction Box	_____
FAB	Catalog— <i>Controls and Safeguarding for Fabricating Machines</i>	_____
SFM	Catalog— <i>Safeguarding Cutting and Turning Machines</i>	_____

For prices and delivery, please use address, phone or fax number listed on the front cover of this manual.

Your Signature \_\_\_\_\_ Date \_\_\_\_\_

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## RETURN MATERIALS AUTHORIZATION REQUEST FORM

To return material for any reason contact the sales department in our organization at 1-800-922-7533 for an RMA Number. All return materials shipments must be prepaid. Complete this form and send with material to Rockford Systems LLC, 5795 Logistics Parkway, Rockford, IL 61109. Make sure the RMA Number is plainly identified on the outside of the shipping container.

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Contact Name \_\_\_\_\_ Representative \_\_\_\_\_

**Items Authorized To Return on R.M.A. No.** \_\_\_\_\_

Part No. \_\_\_\_\_ Serial No. \_\_\_\_\_ Description \_\_\_\_\_

**Service Requested**    Full Credit    25% Restocking    Repair & Return    Warranty Replacement

Reason for return (describe in detail): \_\_\_\_\_

\_\_\_\_\_

Original Invoice No. \_\_\_\_\_ Date \_\_\_\_\_ Replacement Invoice No. \_\_\_\_\_ Date \_\_\_\_\_

Return Materials Authorized By \_\_\_\_\_ Date \_\_\_\_\_