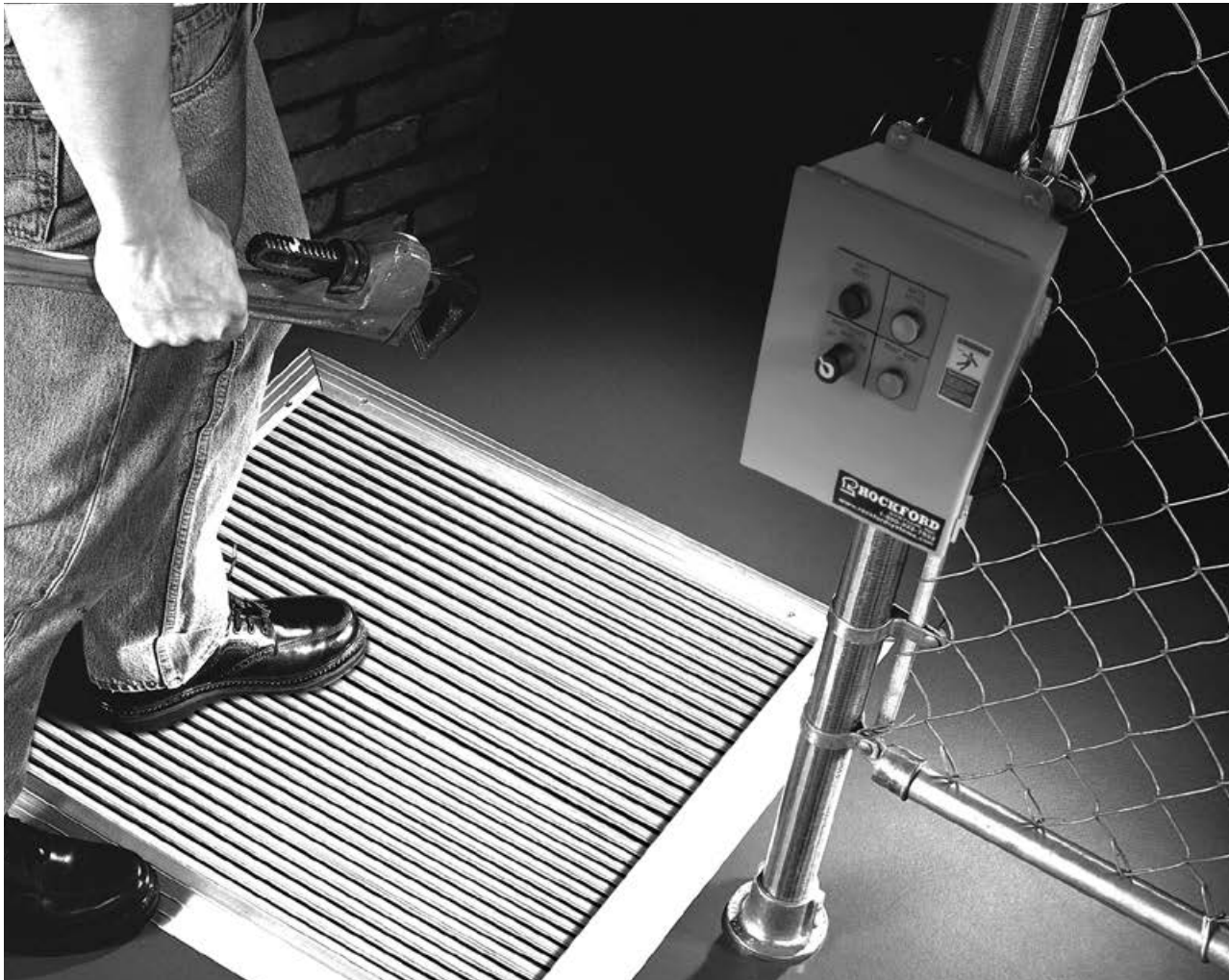




INSTALLATION INSTRUCTIONS FOR MAT CONTROL BOX



IMPORTANT: PLEASE REVIEW THIS ENTIRE PUBLICATION BEFORE INSTALLING, OPERATING, OR MAINTAINING THE MAT CONTROL BOX.

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Safety Map Control

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SECTION 1—IN GENERAL

Safety Map Control

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, a thorough safety training program for all machine personnel, that includes instruction on the proper operation of the machine, 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 into your program include:

DANGER

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

DANGER

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



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



Never operate this machine if it is not working properly – stop operating 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 should 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 MACHINE MANUFACTURER'S) MAINTENANCE MANUAL OR OWNER'S MANUAL. If you do not have an owner's manual, please contact the original equipment manufacturer.

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:

U.S. Government Printing Office
P.O. Box 979050
St. Louis, MO 63197-9000
(202) 512-1800

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.

B11–2008	General Safety Requirements
B11.1	Mechanical Power Presses
B11.2	Hydraulic Power Presses
B11.3	Power Press Brakes
B11.4	Shears
B11.5	Iron Workers
B11.6	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	Withdrawn (Now see ANSI B11.18)
B11.15	Pipe, Tube and Shape Bending Machines
B11.16	Metal Powder Compacting Presses
B11.17	Horizontal Hydraulic Extrusion Presses
B11.18	Coil Processing Systems
B11.19	Performance Criteria for Safeguarding
B11.20	Integrated Manufacturing Systems
B11.21	Lasers
B11.22	CNC Turning Machines
B11.23	Machining Centers
B11.24	Transfer Machines
B11.TR1	Ergonomic Guidelines
B11.TR2	Mist Control Considerations
B11.TR3	Risk Assessment
B11.TR4	Programmable Electronic Systems (PES/PLC)
B11.TR5	Sound Level Measurement Guidelines
B11.TR7	Risk Assessment
R15.06	Robotic Safeguarding
B15.1	Mechanical Power Transmission Apparatus
B56.5	Guided Industrial Vehicles and Automated Function of Manned Industrial Vehicles
B65.1	Printing Press Systems
B65.2	Binding and Finishing Systems
B65.5	Stand-Alone Pattern Presses
B151.1	Horizontal (Plastic) Injection Molding Machines
B152.1	Hydraulic Die Casting Presses
B154.1	Rivet Setting Machines
B155.1	Packaging Machinery
01.1	Woodworking Machinery

These standards can be purchased by contacting:

ANSI—American National Standards Institute
25 West 43rd Street
New York, New York 10036
Phone: (212) 642-4900
www.ansi.org

(Continued on next page.)

SECTION 1—IN GENERAL

Safety Mat Control

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 - 5th Edition
- Safeguarding Concepts Illustrated - 7th Edition
- Forging Safety Manual

These manuals can be obtained by contacting:

National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143-3201
1-800-621-7615
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
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
www.roboticonline.com

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

NFPA (National Fire Protection Association)
1 Batterymarch Park
Quincy, MA 02269-9101
Phone: (617) 770-3000
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

Under no circumstances, including any claim of negligence, strict liability, or otherwise, shall Rockford Systems, LLC be liable for any incidental or consequential damages, or any loss or damage resulting from a defect in the product of Rockford Systems, LLC

(Continued on next page.)

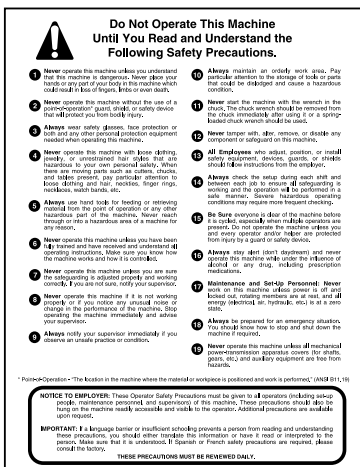
Operator Safety Precautions Signs



KSC-000 Front



KSC-048 Front



Safety Precautions On Reverse Side



Accompanying this equipment are 8½" x 11" operator safety precautions signs, Part Nos. KSC-000 and KSC-048, for anyone operating the machine where this equipment will be installed. These precautions signs are to be given to all operators, including setup people, maintenance personnel and supervisors.



These signs should also be attached to the machine, readily accessible and visible to the operator. (A hole in the corner of these signs is provided for attaching purposes.) Additional copies of these precautions are available. Please call, write, fax, or use the order form found on a later page in this manual.



When a language barrier or insufficient education prevents a person from reading or understanding the contents of these operator safety precautions signs, you should either translate this information or have it read or interpreted to the person. Make sure that the person understands the information. To order these signs in Spanish, use Part No. KSC-000S or Part No. KSC-048S; in French, use Part No. KSC-000F or Part No. KSC-048F.




These precautions must be reviewed daily.

SECTION 1—IN GENERAL

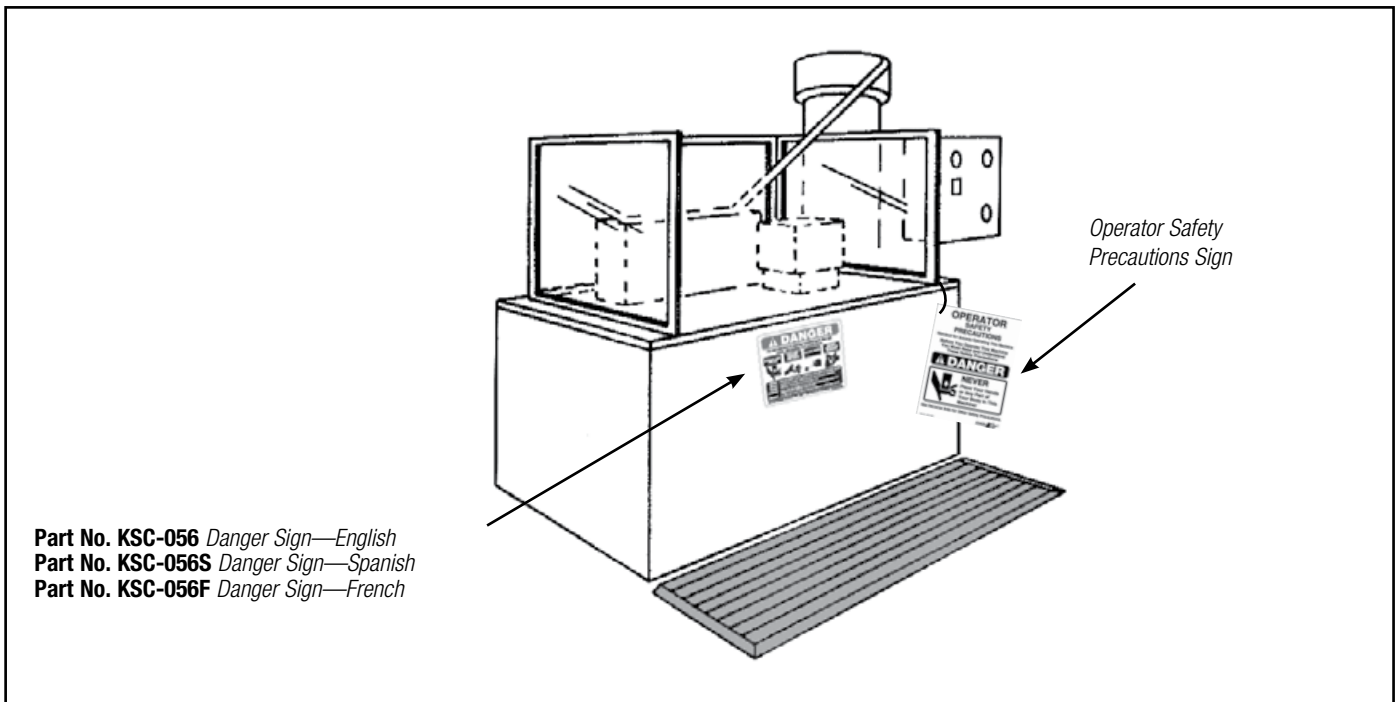
Safety Mat Control


Danger Sign to be Mounted on Machine

 Accompanying this equipment is a 10" x 12" polyethylene danger sign, Part No. KSC-056. This sign **MUST BE PERMANENTLY MOUNTED IN A PROMINENT LOCATION** on the machine where this equipment is installed. This sign **must be in a LOCATION THAT IS EASILY VISIBLE to the operator, setup person, or other personnel who work on or around this machine.** ALWAYS mount this sign with bolts or rivets when installing the enclosed equipment.

If any danger sign becomes destroyed or unreadable, the sign **must** be replaced immediately. Contact factory for replacement danger sign(s).

 **Never operate this machine unless the danger sign(s) is in place.**



 **This control box and mat configuration are not intended for use without point-of-operation safeguarding. A mat is auxiliary safeguarding only.**

“Mechanical Power Press Safety” Booklet

A copy of Booklet No. MPPS (*Mechanical Power Press Safety*) is available upon request. This booklet is copied verbatim from the CFR (Code of Federal Regulations) and contains all relevant sections of the OSHA standards concerning power presses with which an employer (user) must comply. The enclosed equipment must be installed, used and maintained to meet these standards. Specifically, any time a foot switch is used, a suitable **point-of-operation safeguard or device must be used** to prevent bodily injury. In addition, **every press must be provided with a point-of-operation safeguard!** Please review this booklet before installing the enclosed equipment. If you are unfamiliar with these detailed safety regulations, which include regulations on safeguarding the point of operation properly, you may want to attend our regularly scheduled machine safeguarding seminars. To obtain detailed information about these training seminars, please call, fax, write, or check our Web site. Our telephone, fax number, Web site, and mailing address are on the front cover of this manual.

(Continued on next page.)

General Description of Components in the System

The mat control box system includes the following items.

1. Installation manual, danger signs, and electrical control schematics
2. Safety mat control box

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.

Safety Mats

Safety mats may have been included with your order. The mat consists of an electrical switch that is completely sealed inside of a molded vinyl mat. It is waterproof, highly resistant to wear, oils, grease, and most common chemicals. The surface of the mat is a slip-resistant corrugated material and the built-in switch is sensitive to foot pressure (3 lbs), yet durable enough to withstand the harsh industrial environment. Some mats are designed to accommodate aluminum hold-down ramp edging; others have a molded ramp edge.

These types of mats are constructed for machines where operator safety is required. The mat has four wires. When they are connected to the mat control (see page 9 and the enclosed drawing), the control relay deenergizes when the mat leads are either shorted or broken open.

NOTE: In the mat control box, one side of the mat control box must be connected between terminals 103 and 105; the other side of the mat contact must be connected between terminals 104 and 106. See the connection diagram on page 9 and the enclosed drawing.

To install a safety mat, lay the mat in position on the floor where protection is required. Some mats have an aluminum ramp edging that can secure the mat to the floor. Depending on the area that the mats will cover, other edging and multiple mats may be furnished.

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 instruction manual.
2. Refer to the front cover, other line drawings and photos, then make a sketch of your installation to plan the location of the enclosed equipment on the machine.
3. **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.

4. Verify that the machine is in first-class condition and operating properly; shut off all power to the machine. Padlock all electrical 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.

(Continued on next page.)

SECTION 2—CONTROL BOX

Safety Mat Control

Control Box



Outside View of Control Box

This mat control box provides an interface between the safety mats and the existing machine control. The mat control is furnished in a dust- and oil-tight enclosure. It includes a mat control relay, two force-guided relays, a mat reset push button, a maintenance off/on selector switch, a red indicator light, and a green indicator light.

The mat control will require a reset when the control box is first turned on. As long as the mat is clear when the reset button is pushed, the machine will be allowed to start—the green light will be on, thus indicating mat active. If the mat is stepped on, the green light will go off and the reset button must be pushed to allow the machine to restart.

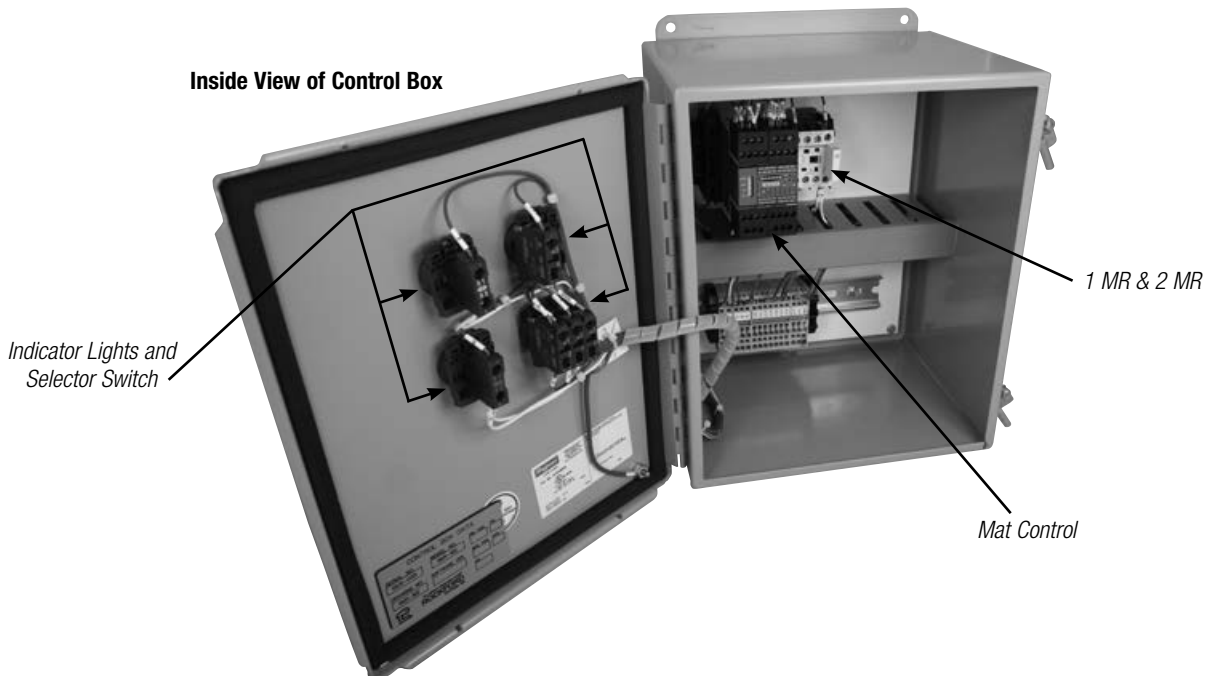
A maintenance off/on selector switch is furnished for use during maintenance of the machine. When the maintenance mode is set to on, the red light will illuminate—thus indicating maintenance mode on. This will allow the machine to run even if the mat is stepped on during maintenance. When the maintenance mode is set to off, the control will function as described above.

Mount the control box in an accessible and readily visible location, either on or near the machine where the mats are to be located. Although operation of this control will not be adversely affected by normal machine operation, excessive shock or vibration may require shock mounting in specific applications.

SPECIFICATIONS

Part Number.....	RKR-162
Enclosure	NEMA 12—12" x 10" x 8"
Voltage	120V AC 60Hz
Machine Enable Circuit	2 Sets of 2 NO Contacts @ 10A 120V AC

Inside View of Control Box



(Continued on next page.)

Installation Considerations

Wiring

We recommend that National Electrical Code practices be followed for wiring, especially color coding and the use of numbered wire markers on **both ends of every wire**. Color coding is black for power circuits, red for 120V AC control circuits, white for current carrying ground (frequently referred to as the right hand common), and green for any equipment grounding conductor.



Do not use solid wire.

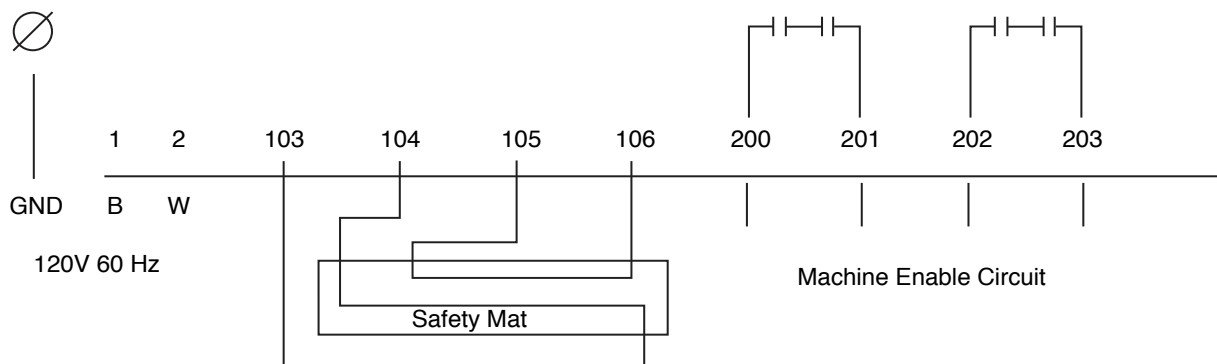
Input Connections

Connect 120V AC three-wire service to the mat control box. Ground should be connected to the panel with the furnished ground screw. Connect the hot side (black) of the 120V AC to terminal 1. Connect the common (white) to terminal 2. If the 120V AC is not available on the machine, then a transformer must be incorporated to step down the line voltage. This transformer must be rated in accordance with the control load requirement. On most installations, the incoming power for the mat control is interfaced with the motor-starter circuit so that power is only applied to the mat control box when the drive motor is running. This does not apply to machine applications where the emergency-stop circuit is ahead or upstream of the motor-starter circuit.

Mat Connections

Connect the leads from one side of the mat to terminals 103 and 105. Connect the leads from the other side of the mat to terminals 104 and 106. See diagram below and refer to the enclosed RKR-162 drawing.

Connection Diagram



Output Connections

The output relays (mat relays 1 & 2) are wired to the terminal. With power applied and the mat clear, circuits 200-201 and provide 2 NO contacts in series to be tied in to the machine enable circuit.

(Continued on next page.)

SECTION 3—INSTALLATION

Safety Mat Control

Initial Checkout Procedure



Before performing the initial checkout procedure, make certain all power is disconnected from the machine to be controlled. Always disconnect power to the machine control elements before opening the safety mat control box.



If multiple mats are connected to the safety mat control, run this procedure individually for each mat.

1. Remove power to the machine control elements.
2. Apply force to the mat's sensing area.
3. Apply input power to the mat control relay at terminals A1 and A2, or B1 and B2. Verify that only the power indicator LED is on.
4. Clear the mat sensing area.
5. **Manual Rest Mode:** Ch1 and Ch2 indicators should be flashing. Manually reset the mat control.
6. Verify that Ch1 and Ch2 indicators both come on. If only one indicator comes on or if any indicator is flashing, refer to the troubleshooting section on the next page for more information. Return to step 2 after correcting the problem.
7. Apply force in several locations to the mat's sensing area. Verify that the Ch1 and Ch2 indicators turn off simultaneously. If either indicator does not go off, disconnect the input power and check all wiring. Return to step 2 after correcting the problem.
8. Repeat for each safety mat individually if more than one mat is connected.
9. Close and secure the safety mat control box. Apply power to the machine control elements and perform the periodic checkout procedure below.

Periodic Checkout Procedure



If multiple mats are connected to the safety mat control, run this procedure individually for each mat.

1. With the machine running, apply force to the mat's sensing area. Verify that the machine stops within the expected time period.
2. Remove force from the safety mat. Verify that the machine does not restart.
3. Manually reset the mat control. Verify that the machine cycle can be restarted by normal initiation.
4. Repeat for each safety mat individually if more than one mat is connected.

(Continued on next page.)

Troubleshooting



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

Condition	Indicator Status	Possible Causes or Solution
Module will not reset	Power LED ON	Waiting for manual reset: <ul style="list-style-type: none"> • EDM monitoring contacts are not closed. Check 1 MR & 2 MR. • Check jumper at S32-S35 (auto reset) or S32-S33 (manual reset). • Check reset button connection.
	Fault LED OFF	
	Ch 1 LED Flashing	
	Ch 2 LED Flashing	
No fault indicated	Power LED ON	Safety mat appears actuated: <ul style="list-style-type: none"> • Check mat for damage or heavy debris. • Check for proper wiring. • Check for short in the wiring.
	Fault LED OFF	
	Ch 1 LED OFF	
	Ch 2 LED OFF	
No fault indicated	Power LED ON	Channel 1 open: <ul style="list-style-type: none"> • Check wiring to S11-S12. • Check connectors are properly seated.
	Fault LED OFF	
	Ch 1 LED Flashing	
	Ch 2 LED Flashing	
No fault indicated	Power LED ON	Channel 2 open: <ul style="list-style-type: none"> • Check wiring to S21-S22. • Check connectors are properly seated.
	Fault LED OFF	
	Ch 1 LED Flashing	
	Ch 2 LED Flashing	
Fault	Power LED ON	Possible temporary fault: <ul style="list-style-type: none"> • Check for loose wiring. • Actuate the mat to clear the fault. Possible internal fault: <ul style="list-style-type: none"> • Return to factory for repair or replacement.
	Fault LED ON	
	Ch 1 LED ON	
	Ch 2 LED ON	
	All LEDs OFF	Possible fault in the machine control or wiring to the module: <ul style="list-style-type: none"> • Check input power connections or external fuses. • Check connectors are properly seated.
	Dim LEDs	Power LED dim: <ul style="list-style-type: none"> • Check power supply capacity and load. Other LEDs dim: <ul style="list-style-type: none"> • May glow during power-up (normal). • Check power supply load and capacity.
Fault LED Flickers	This is normal while the Fault LED is ON.	
1 MR & 2 MR do not energize	Power LED ON	Possible fault in machine control or an open circuit between machine control and mat relays: <ul style="list-style-type: none"> • Check continuity of safety outputs (e.g. between terminals 13 & 14). • Check control wires and connectors. • Check mat relays.
	Fault LED OFF	
	Ch 1 LED ON	
	Ch 2 LED ON	

(Continued on next page.)

SECTION 5—ORDER FORM FOR SIGNS & LITERATURE—RMA FORM

Safety Mat Control

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-286	Instruction Manual—Mat Control Box	_____
KSC-000	Operator Safety Precautions Sign—Metalforming (English)	_____
KSC-000S	Operator Safety Precautions Sign—Metalforming (Spanish)	_____
KSC-000F	Operator Safety Precautions Sign—Metalforming (French)	_____
KSC-000	Operator Safety Precautions Sign—Metal-Cutting (English)	_____
KSC-000S	Operator Safety Precautions Sign—Metal-Cutting (Spanish)	_____
KSC-000F	Operator Safety Precautions Sign—Metal-Cutting (French)	_____
KSC-056	Danger Sign (General Machine) 10" x 12" (English)	_____
KSC-056S	Danger Sign (General Machine) 10" x 12" (Spanish)	_____
KSC-056F	Danger Sign (General Machine) 10" x 12" (French)	_____
KSL-051	<i>Mechanical Power Press Safety</i> Booklet	_____

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

Your Signature _____ Date _____

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 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 RMA No. _____ Original Invoice No. _____ Date _____

Part No. _____ Serial No. _____ Description _____

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

Reason for return (describe in detail): _____

Return Materials Authorized By _____ Date _____