

INSTALLATION MANUAL FOR ALL-IN-ONE TWO-HAND CONTROL



**IMPORTANT: PLEASE REVIEW THIS ENTIRE PUBLICATION
BEFORE INSTALLING, OPERATING, OR MAINTAINING THE
TWO-HAND CONTROL.**

IN GENERAL

All-in-One Two-Hand Control

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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.

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 into 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.)

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

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
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	Safeguarding Performance Criteria
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

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
www.amtonline.org

(Continued on next page.)

SECTION 1—IN GENERAL

All-in-One Two-Hand 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 - 4th Edition
- Safeguarding Concept Illustrations - 6th Edition
- Forging Safety Manual

These manuals and 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 System 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 System 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 System LLC's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of Rockford System LLC. Rockford System 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 System 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 System LLC. be liable for any incidental or consequential damages, or any loss or damage resulting from a defect in the product of Rockford System LLC.

(Continued on next page.)

General Description of Components in the System

A THC-XX-X series two-hand control system includes the following:

1. Installation manual, danger sign, and electrical control schematics
2. Control box—with danger and warning signs attached, two buttons, and ring guards

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 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.

Safeguard Interlocks

The machine will not operate or must not be operated until you either: (1) electrically interlock or (2) mechanically safeguard the machine's point of operation with a guard or device.

When an electrically interlocked method of safeguarding the point of operation is chosen, connect the interlock to the safeguard interlock terminals 3 and 4 in the control box, and as shown on the control wiring schematic. If a light curtain(s) is used as the point-of-operation safeguard, it does not need to be interlocked in to 3 and 4 safeguard interlock terminals. Refer to the control wiring schematic for proper terminal connection of the light curtain.

Point-of-operation electrically interlocked safeguards, when opened, prevent or stop normal machine operation during operator cycling modes. Examples of these types of interlocks are barrier guard interlocks and gate device interlocks.

When a mechanical guard or device (nonelectrically interlocked) is chosen, the safeguard interlock terminals 3 and 4 are not used. In order for the machine to operate with the use of a mechanical guard or device, the safeguard interlock terminals must be connected. Please see the wiring schematic.



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



If the mechanical guard or device is not used, is removed, or is defeated, an electrically interlocked method of safeguarding must be used and connected to the safeguard interlock terminals 3 and 4.



Never operate this machine without point-of-operation safeguarding.

(Continued on next page.)

SECTION 2—INTRODUCTION

All-in-One Two-Hand Control

General Features of the Two-Hand Control System

- Nonresumption of an interrupted stroke
- Provides two-hand anti-tie-down
- 115-V RSI Control Monitor
- Preset time for concurrent operation of the buttons
- Provides control reliability of the two-hand control portion of the control

Overview of the Two-Hand Control System

The two-hand control system is versatile and can be applied to most any machine or device that is pneumatically, hydraulically, or electrically operated (and usually manually fed). It can control various types of three-way and four-way valves, spring-return and double-acting cylinders, air or hydraulic. These machines or devices include small presses, stakers, riveters, and assembly machines. The all-in-one two-hand control can be used as a point-of-operation safeguarding device as long as it is located at the proper safety distance (see pages 10-14). Both palm buttons must be depressed within the preset time (adjustable between .25 and 6 seconds. \pm 2 seconds) in order to control the machine actuating device. When one palm button is released, the control initiating output is deactivated and both palm buttons must be released and reactivated to initiate another cycle.

(Continued on next page.)

SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

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.

DANGER SIGN

Photo 3.1



Photo 3.2



1. Locate the furnished danger sign.
2. Determine the mounting location for the danger sign on the machine.



It must be permanently mounted in a prominent location on the machine where it is readily accessible and visible to the operator, setup person, or other personnel who work on or around this machine.

3. Drill a hole(s) in the sign and the machine at the mounting location. See Photo 3.1.
4. Attach the sign to the machine with screws or rivets. See Photo 3.2.



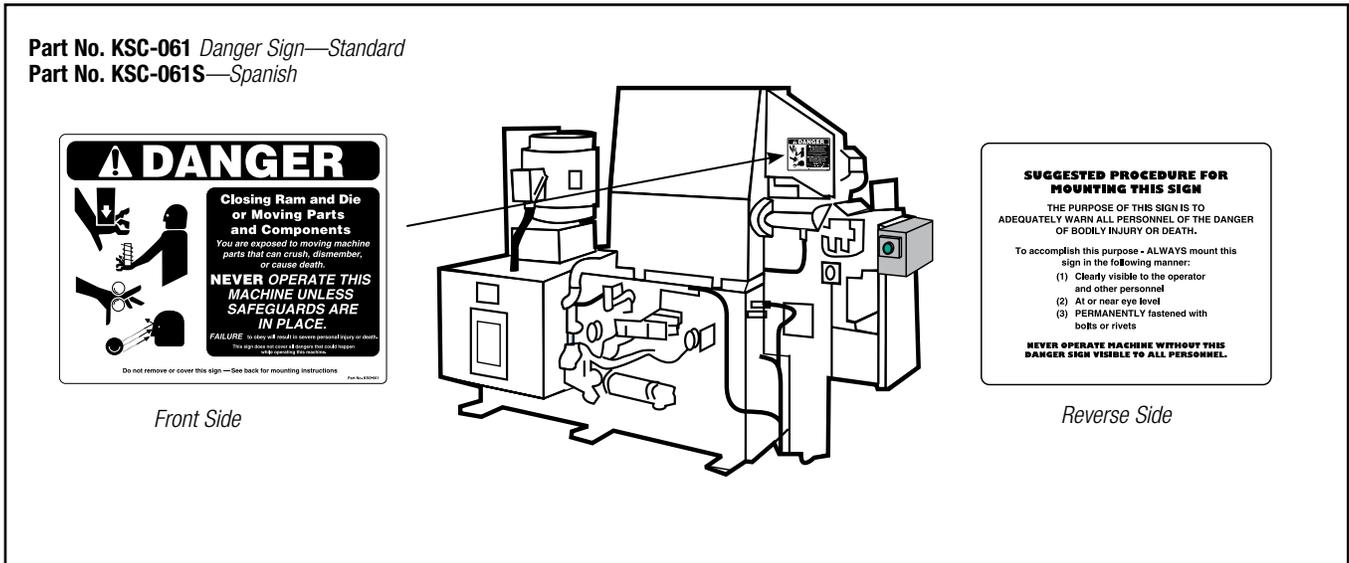
Never operate this machine unless the danger sign is in place. Also make sure the sign is read and understood before operating the machine.

(Continued on next page.)

SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

Figure 3.1 - Illustration of the Placement of the Danger Sign



Control Box

DANGER AND WARNING LABELS PROVIDED

The illustrated danger and warning labels are affixed to all control boxes provided. All personnel operating or working around the machine, where this control box is installed, must be required to read, understand and adhere to all dangers and warnings. If any of these labels become destroyed or unreadable, they MUST be replaced. Contact the factory immediately for replacement labels and do not operate the equipment until danger and warning labels are all in place.

Photo 3.3 All-In-One Control Outside View



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SECTION 3—INSTALLATION OF COMPONENTS

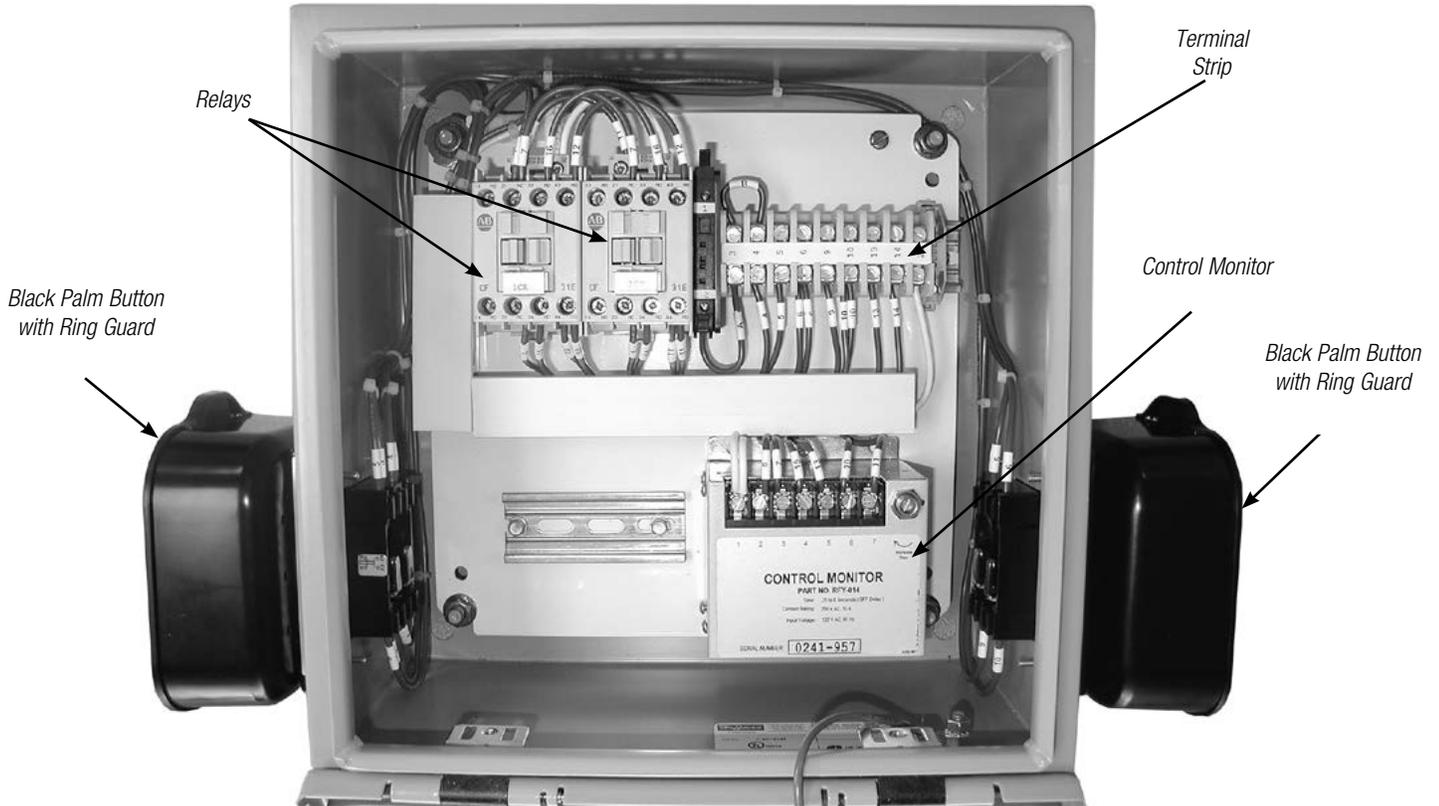
All-in-One Two-Hand Control

Control Box (continued)

TWO-HAND CONTROL SYSTEM

The all-in-one two-hand control is housed in a NEMA 12 enclosure. It includes a control monitor, two relays, a terminal strip, and two buttons.

Photo 3.4
All-In-One Control
Inside View



The basic control includes a special time delay adjustment. This time delay adjustment is located inside the control box at the upper right corner of the time delay relay. This is a single turn potentiometer which allows the timer to be set from .25 to 6 seconds, ± 2 seconds. The factory setting is .25 seconds, but may be adjusted to accommodate specific conditions.

This adjustment feature is commonly referred to as anti-tie-down, which is the amount of time within which all actuating means (palm buttons) must be concurrently depressed. Once one of the palm buttons is depressed, the timer starts. If the set time is reached before the other palm button is depressed, the control will not allow another stroke to begin.

(Continued on next page.)

SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

TWO-HAND CONTROL SYSTEM (continued)

When both palm buttons are depressed concurrently within the preset time interval of the control monitor, relays in the control system could energize through the closed normally open TR (timed relay) contact. Once these relays are energized, TR deenergizes which closes the normally closed TR contact, energizing a solenoid valve. If one palm button is released, the solenoid valve will deenergize. Both palm buttons must be released in order to reenergize TR and start the sequence over again. On multiple operator machines, the timer starts when any one button is depressed.

All palm buttons must be released at the end of each operation in order to reset the control and permit the next operation. If one of the palm buttons is tied down, the control monitor renders the control inoperable.

PALM BUTTONS

The all-in-one two-hand control includes a set of actuating means. Each set consists of two palm buttons and two button guards mounted on the sides of



the two-hand control box. The all-in-one two-hand control can be used as a point-of-operation safeguarding device as long as it is 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 all-in-one control.

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:

- (v) 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.

(Continued on next page.)

SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

PALM BUTTONS (continued)

TWO-HAND CONTROL (continued)

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.

(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 3.2.)

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

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 3.2

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

All-in-One Two-Hand Control

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:

$D_S = K (T_S + T_C + T_R + T_{spm})$; 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.)

SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

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) The 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 3.3 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.

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SECTION 3—INSTALLATION OF COMPONENTS

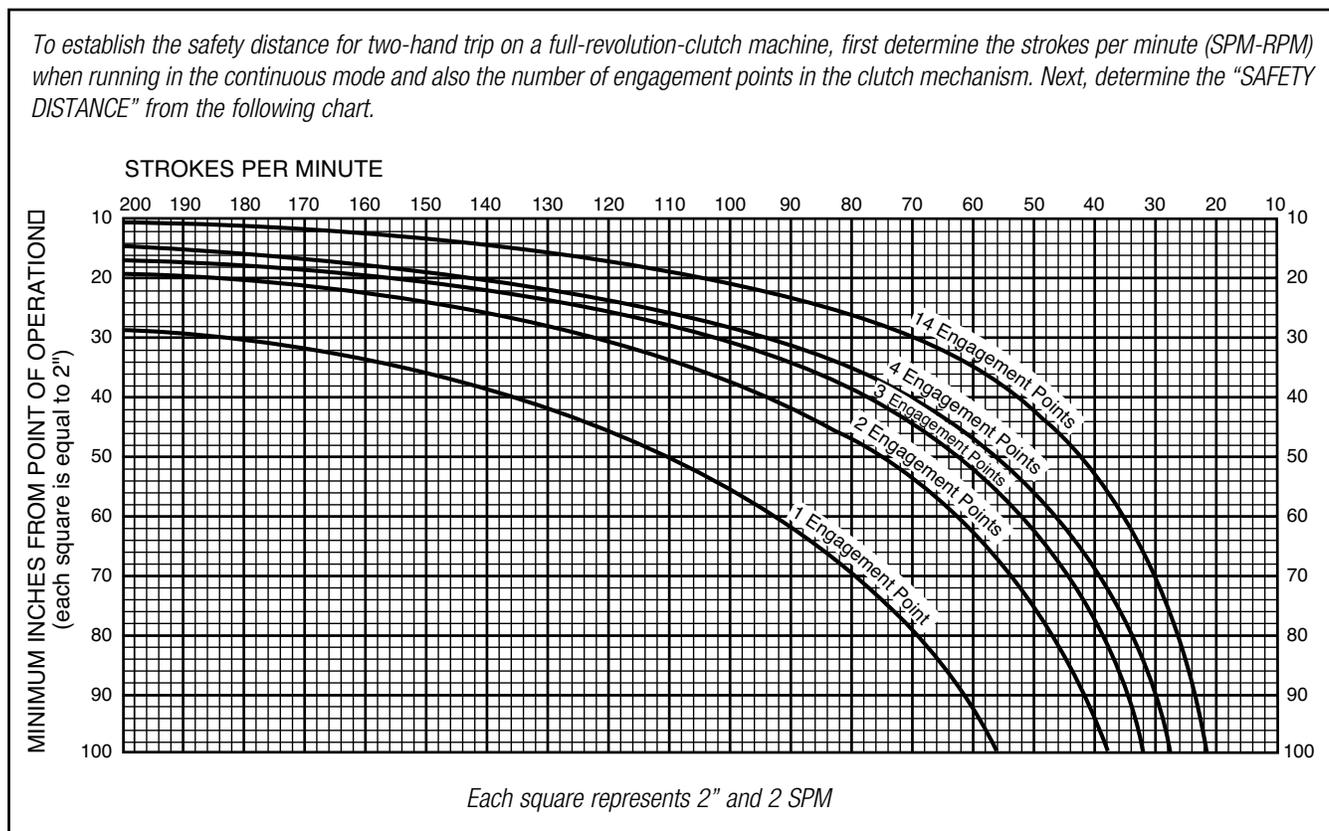
All-in-One Two-Hand Control

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 3.3 below.

Figure 3.3



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.

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SECTION 3—INSTALLATION OF COMPONENTS

All-in-One Two-Hand Control

Other Installation Considerations

WIRING

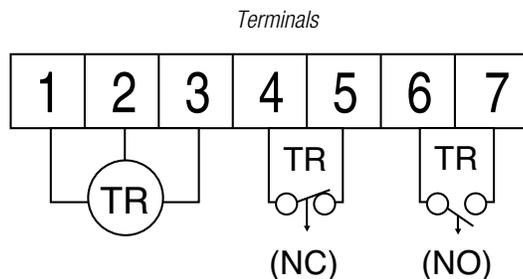
National Electrical Code practices, including NFPA 79, are usually followed for wiring the control system, especially color coding and the use of numbered wire markers on both ends of every wire. Color-coding is black for line voltage (208, 230, 460, or 575 V) and control at line voltage, red for 115-V AC 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.

TWO-HAND CONTROL BOX

The two-hand control box should be mounted in a convenient location, keeping ergonomics in mind. To comply with the OSHA regulation for two-hand control, the run/inch buttons must be located according to the minimum safety distance requirements of each individual machine as defined by OSHA 29 CFR 1910.217 (c)(3)(vii) (see page 11 of this manual).

INTERLOCK

Figure 3.4
Control Monitor Connection
Diagram



Wire the interlock in accordance with the schematic diagram supplied. An example of an interlock is an interlocked barrier guard, a safety block, an air supply pressure switch, or an air pressure switch.

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 most two-hand control systems. 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.

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 timer adjustment. Too short an adjustment may prevent normal stroke initiation.
- 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.)

SECTION 5—RETURN MATERIALS AUTHORIZATION & ORDER FORM

All-in-One Two-Hand Control

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 System 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 RMA No. _____ Original Invoice No. _____ Date _____

Part No.	Serial No.	Description
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Service Requested Full Credit 25% Restocking Repair & Return Warranty Replacement

Reason for return (describe in detail): _____

Return Materials Authorized by _____ Date _____

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-259	Installation Manual—Two-Hand Control System	_____
KSL-051	Booklet—Mechanical Power Press Safety (MPPS)	_____
FAB	Catalog—Controls and Safeguarding for Fabricating Machines	_____
SFM	Catalog—Safeguarding Cutting and Turning Machines	_____

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

Your Signature _____ Date _____

(Continued on next page.)