PressCam 7

Master Punch Press Controller with Programmable Cam Switch

Installation
and
Operation Manual

Triad Controls, Inc.

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KEY PAD	ABBREVIATION REFERENCE
(F)	Function Key
(P/T)	Position/Tachometer Key
(SF)	Scale Factor Key
(O)	Offset Key
(MD)	Motion Detector Key
(I/O)	Status Output Key
(LI)	Limit/Offset Increment Key
(LD)	Limit/Offset Decrement Key
(CL)	Move Cursor Left Key
(CR)	Move Cursor Right Key
(P)	Program Key
(LS)	Limit Switch Channel Key
(NK)	Next Key
(DP)	Die Protection Key
(T/C)	Timers/Counters Key
(AA)	Auto Advance Key
(BM)	Brake Monitor Key
(C)	Clear Key
(E)	Enter Key

OBJECTIVE

The objective of this manual is to explain the operation, installation, programming and servicing of PressCam 7. It is strongly recommended that the user read the following instructions. If after reading this manual there are any unanswered questions, call the factory. An applications engineer will be available to assist you. You may void your warranty if these instructions are not followed.

INTRODUCTION TO PRESSCAM 7

PressCam 7 utilizes the latest microcomputer technology and design to assure high accuracy, speed, reliability and maintenance-free operation. PressCam 7 is a direct replacement for cam-operated limit switches, providing single or multiple ON/OFF (dwell) setpoints per channel (circuit). They will accurately synchronize machine functions to the absolute position of the crankshaft. It can be used as a stand alone system wtih relay outputs or can be used wtih programmable controllers or industrial computers. Additional standard features include motion detector and tachometer. PressCam 7 features simple programming which can be mastered by anyone. Always refer to the table of contents for the specific function or operation programming you want to perform.

PRESSCAM 7 APPLICATIONS

The PressCam 7 has been designed to synchronize the complete punch press operation. The system has been designed specifically for the metal stamping/metal forming industry for use on punch presses.

The Triad PressCam 7 is a versatile programmable limit switch that also includes many additional features that give an existing punch press control much more flexibility and control. This is not to be confused with the basic punch press control that is used to control the clutch/brake which incorporates control reliability and component monitoring. PressCam 7 is a feature packed addition to any standard punch press control.

For a quick system overview refer to page 38 which shows the entire PressCam 7 system.

Standard features include:

- 12 Channel Programmable Limit Switch, plus 4 fixed channels.
- Crankshaft position indicator in degrees
- Tachometer and motion detector built-in
- Brake monitor (time based)
- Digital readout of brake stopping time in milliseconds
- Self Contained die protection systme wtih separate timing windows for each die protection station
- Four individual adjustable timers
- Three counters: Batch, Total Parts, Counter with Preset

PRESSCAM 7 SYSTEM DESCRIPTION (continued)

- Powerful 60 program memory - Remembers 60 different die setups at the punch press
- Pre-programmed function keys provide ease of use for operators
- Simple English commands
- PressCam 7 shields punch press control signals for safety
- Safeguards of both electrical and mechanical interlocks assure safe and dependable operation
- Self-diagnostics of resolver transducer and PressCam 7 Controller
- No cumbersome menus or configurations to access
- The easiest device of its kind to use on the press floor

The Triad PressCam 7 is designed to synchronize the complete operation of the punch press from the press feed to the part eject verification and all in stroke signaling required. All timing adjustments are done by the operator at the floor level and with the large job memory (60) at the press gives the PressCam 7 a very rapid ROI. Installation ease and versatility give the PressCam 7 the capability to interface easily on OEM and retrofit projects and on both solid state and electromechanical relay control systems.

PressCam 7 comes complete with the master controller, transducer, transducer connector ended cabling, relay boards, installation and operation manual, dimensional and technical data on all components.

Triad Controls also offers a complete line of punch press and press brake guards and controls, safety mats, safety light curtains and a wide variety of standard industrial machine guards and controls if you have a need for these products.

PressCam 7 Systems consist of a Transducer (brushless resolver (and a Master controller. The Transducer, coupled to the shaft of the punch press, supplies a pair of analog signals proportional to shaft position. The microcomputer based electronics of the PressCam 7 Master Controller converts these analog signals to digital format by a ratiometric A to D converter. This digital shaft position data is compared to the user programmed setpoints contained in non-volatile memory. When the Transducer shaft reaches these setpoints, the outputs are turned ON or OFF, starting or stopping the desired function. Maximum scan time is 200 microseconds from input to output. The number of limits programmed or channels used does not effect system scan time.

PressCam 7 programming is accomplished with the use of a self-contained keyboard and display. Open collector outputs can be used to interface to a programmable controller or computer. A RB1 Relay Board connected to PressCam 7 outputs will provide optical load isolation for external AC and DC loads.

PRESSCAM 7 SYSTEM DESCRIPTION (continued)

PressCam 7 consists of the following components/features:

I) An electronic, digital, programmable cam/limit switch.

Twelve (12) different cam switches are available for switching various devices involved with the operation of a mechanical power press. Switches can be set to come ‘on’ and ‘off’ multiple times during a single press cycle. Switches 9-12 can optionally be set to come ‘on’ at a specific degree in the press cycle (stroke) and to go ‘off’ in a certain number of milliseconds. This is particularly useful on variable speed presses, and especially if the limit switch channel is used to operate an air blow-off for parts ejection. The same amount of air for parts ejection will be avail able froms stroke to stroke, regardless of changes in press speed.

PressCam 7 is different than most electroic cams in that it is designed specifically for a mechanical power press applicaiton. Some of these features include:

A) Brushless resolver used for shaft posistion sensing.
B) Internal circuit diagnostics provide fail-safe operation.
C) Resolver diagnostics provide electrical interlock to ensure circuit to resolver.
D) Motion detector provides ‘mechanical’ interlock for broken chain detection.
E) Limit switches 1-4 can be used for press control signals and ‘locked out’ from inadvertent tampering after installation.

II) A programmable die protection system. Section 12:15

There are three (3) timed inputs. A signal must be received each stroke of the press in order to allow the press to continue to run. These are typically used for such things as parts(s) eject detection and feed complete signal. Each of the three inputs has its own timing reference window during which the signal must be received. Multiple signals can be hooked together into on input, if they all have the same timing window. An example might be a die with three air or hydraulic cylinders. Microswitches on all three cylinders could be connected in series into one Press Cam 7 input. Then, all three cylinders would have to be returned to position by a certain degree of crank angle rotation in order to allow the press to continue to run automatically.

There are two (2) non-timed auxiliary latching inputes. For these, a signal is not received every stroke, but if a signal is ever received, the press will stop. These are typically used for buckling detection of the coil material and end of coil sensing. Examples are available in the typical die protection section of this manual, on page 53.

PRESSCAM 7 SYSTEM DESCRIPTION (continued)

III) A digital time-based brake monitor. Section 12:20

Every time the brake circuit is activated, a timer circuit gives the stopping time in milliseconds, and a stop-time limit can be programmed. If the limit is exceeded by an actual stop time, a fault appears on input number six (6). The fault must be cleared to run the press. Section 14.

A digital time-based brake monitor is particularly useful when infrared light curtains are used as the point of operation guard. The light curtain must be installed a dis tance from the pinch point that is equal to 63 inches/second times the number of seconds to stop the device. Knowing the stop time is critical for initial installation. Having a stop-time limit insures a safe light curtain installation despite brake wear. Always refer to the Federal Register Section 1910.217 for proper guarding guide lines.

IV) Counters. Section 12:17

Three (3) counters are included which can be used for:

a) total strokes in run.
b) number in current batch wtih a preset.
c) number of batches complete
(The batch size is programmable with five (5) digits maximum.

V) Motion Detector. Section 12:9

A programmable motion detector circuit is included. The M.D. output can be used in either the N.C. or the N.O. mode. When interfaced with the press control, the mo tion detector gives broken chain detection to the resolver. Further, on variable speed presses, the motion detector can be used to insure that a certain die runs in a particular speed range of SPM.

VI) 60 Program Memory.

All features of the PressCam 7 are assigned to an individual program. Sixty (60) programs are storable in the EEPROM memory. No battery back-up is required to save programs. This large memory of jobs will be a big time saver as the dies are changed.

SYSTEM CONFIGURATION

After installation on the press, there is some basic programming which needs to be done in order to configure the system. Some parameters or settings are press specific, not die specific. Each of the features listed below will need to be addressed for each program used.

The scale factor is 1000 unless otherwise programmed. This means that one revolution of the press crank is divided into 1000 increments. If the scale factor is set to 0360, then the position indicator will relate to degrees of crank angle rotation. On higher speed machines, it might be useful to program scale factor to 0720 or to 1000, in order to make the die protection system respond a little faster. Section 12.6

Offset can be programmed to align electrical zero with mechanical zero. After installing the resolver, run the press to top of stroke and see section 12.8 for programming of auto-zero for offset.

Motion detector, if used for broken chain detection, must be preogrammed with the lowest limit to be some positive number greater than zero. The higher the number, the longer the time delay before the M.D. output is enabled after the start of the press stroke. Section 12.9

Brake monitor, section 12.20. Make several single strokes of the press to obtain a typical brake stopping time. Check placement distance of point of opration guarding. Program brake stop-time limit accordingly above the actual stop-time but at a number where the point of operation guard is safely installed. Refer to 1910.217 of the Federal Register for point of operation guarding requirements.

For security reasons, those settings which are press specific (not die specific), can be locked out from inadvertent reprogramming. These include:

a) limit switches 1-4 (important when used for press control signals.)
   Section 19 securing press control signals
b) scale factor.
c) offset.
d) motion detecotr.
e) brake monitor limit.

To review the entire PressCam 7 system refer to page 38 which shows the input/output assignments.

PressCam 7 Master Controller

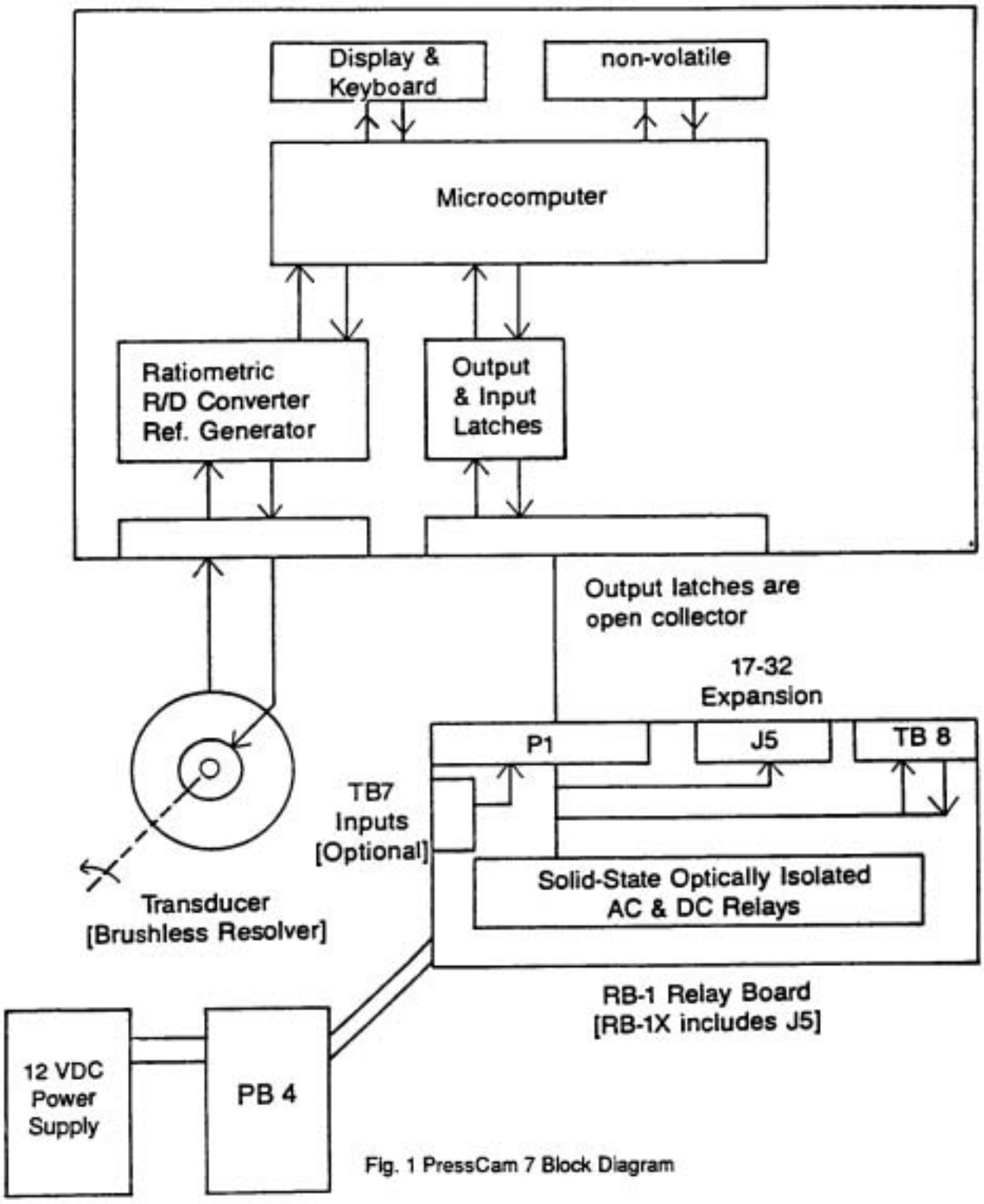


Fig. 1 PressCam 7 Block Diagram

OSHA and ANSI STANDARDS

On all equipment on which the Triad PressCam 7 is applied, compliance to the OSHA Regulation 1910.217 and ANSI Code B11.1-2001 must be adhered to. This is the responsibility of the user. Contact your Triad representative or the factory if there are any questions or if additional quipment is needed for compliance.

1910.217 (C) (3) (iii)
SAFEGUARDING THE POINT OF OPERATION
(iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (i) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.

(a) The device may not be used on machines using full revolution clutches.

(b) The device many not be used as a tripping means to initiate slide motion.

(c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.

(d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking and feeding.

(e) The safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:

Ds = 63 inches/second x Ts

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

(f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.

1910.217 (c) (3) (5)
(5) Additional requirements for safeguarding
Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding:

(i) The employer shall use a control system and a brake monitor which comply with paragraphs (b) (13) and (14) of this section.

(e) Inspection, maintenance, and modification of presses -
(i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment and safeguards are in a safe operating condition and adjust ment. The employer shall maintain records of these inspections and the mainte nance work performed.

(ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, anti-repeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. The employer shall maintain records of these inspections and the maintenance work performed. These requirements do not apply to those presses which comply with paragraphs (b) (13) and (14) of this section. (i.e. those presses equipped with brake monitors.)

1910.212 General requirements for all machines (covers press brakes, hydraulic and pneumatic machines not covered by mechanical power press standards).

(a) Machine guarding - (1) Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are: barrier guards, two-hand tripping devices, electronic safety devices, etc.

NOTE: This is only a partial reprint, refer to your Federal Register for total construction and control reliability requirements.

Triad Controls manufactures a complete line of punch press and press brake guards and controls that conform to OSHA standard 1910.217 and ANSI Code B11.1-2001 for control reliability and component monitoring. Contact your local Triad representative or the factory for additional information.

INSTALLATION PRACTICES

The proper installation of the PressCam 7 System is essentail if the system is to operate properly. This section provides the user with general wiring, grounding, and surge suppression guidelines that should be followed when installing a PRessCam 7 System.

These guidelines are presented as a tool in the hopes of avoiding potential electromagnetic interference (EMI, also called noise) problems. Because of the many ways that EMI problems can be generated, these guidelines are not meant as a cure-all, but instead as a list of basic rules that will help suppress or eliminate most common sources of EMI interference. These Guidelines are not a substitute for the safety practices called out in Local Electrical Codes or the National Electrical Code which is published by the National Fire Protection Association. If any discrepancies exist, the local or National Codes mulst be followed. IT IS THE RESPONSIBILITY OF THE USER to determine what installation practices must be followed to conform to all National and Local Codes.

These guidelines are organized into the following sections:

1.) Raceway Layout (Wiring) Considerations
2.) Grounding
3.) EMI Suppression Networks

1.0) RACEWAY LAYOUT CONSIDERATIONS

1.1) RACEWAY PLANNING

Before planning a raceway layout, all wires and cables in or around the controller system should be broken into the following categories:

Type 1: High-Power Conductors

This category includes all high-power conductors. High Power Lines are usually quite tolerant of EMI noise problems but may also generate large amounts of EMI noise that may disturb other conductors near them. These conductors include:

1) High-Power AC and DC Lines.
   This includes all power lines to and from Mechanical switches, relays, solenoids, motors, generators, arc welders, etc.

INSTALLATION PRACTICES: (continued)

1.1) RACEWAY PLANNING: (continued)

Type 2: Low-Power Conductors

This category includes all low-power conductors. Low-power lines are usually less tolerant of EMI noise problems than Type 1 Conductors but also gener ate less EMI noise. These conductors include:

1) Transducer Cables.
   This is the cabling that connects the transducer to the unit.
2) Serial Communication Cables.
   These connect between processors and remote units such as displays, terminals, or other processors.
3) Low-Power AC/DC Switcher Lines.
   These lines include all lines that carry low currents and input circuits with short time-constant filters that are designed to detect short, single event pulses. Typically, these lines are connected to devices such as proximity switches, photoelectric sensors, and low power analog or digital devices.

Type 3: System Interconnect Cables

These cables interconnect the system components within an enclosure. They include:

1) ALL Ribbon Cables.
   This includes cables that interconnect system units or connect units to relay boards.
2) All other system interconnect cables.
   This includes serial interface cables, transducer cables, and unit power cables.

1.2) RACEWAY LAYOUT GUIDELINES:

Once the cables of the system have been classified, the following sugges tions should be followed when possible to guard against coupling noise from one conductor to another in a raceway. These guidelines apply to cable routing both inside and outside the enclosure.

1) All Type - 1 conductors should be routed in a separate raceway from type - 2 and 3 conductors. Type - 1 conductors may be routed with machine power conductors of up to 600 VAC if it is done in accordance with all safety codes. The raceway must be weel grounded along its entire path.

INSTALLATION PRACTICES: (continued)

1.2) RACEWAY LAYOUT GUIDELINES (continued)

2) All Type-2 conductors must be properly shielded, where applicable, and routed in a separate raceway. The raceway must be well grounded along its entire length.

3) Route Type-2 conductor raceways at least 1 foot (30 cm) from 120 VAC Type-1 conductor raceways, 2 feet (60 cm) from 240 VAC Type-1 conductor raceways, and 3 feet (100 cm) from 480 VAC Type-1 con ductor raceways whenever possible.

4) Route Type-2 conductors at least 3 feet (100 cm) from any high power electric device such as motors, generators, transformers, etc. whenever possible.

5) If a Type-2 conductor raceway must cross Type-1 conductor race way, it should do so at right anges to the Type-1 raceway.

6) All Type-3 conductors should be routed external to all raceways or, preferrably, in a raceway separate from any Type-1 or Type-2 conduc tor raceways.

1.3) CABLE INSTALLATION IN RACEWAYS:

Care must be exercised when installing Type-2 or Type-3 cables in raceway conduit. Unlike Type-1 cables, Type-2 and Type-3 cables have small conduc tors covered wtih light insulation and will not withstand as much strain in installation. All cables sent with controllers from Triad Controls are com pletely tested. Warranties on cables will be void if the cable is damaged by improper installation.

As the length of a conduit increases, the force needed to pull the cable through also increases. If the needed force becomes too great then the cable can be damaged when it is installed. To minimize the amount of force needed, it is suggested that only a portion of the entire cross-sectional area of the conduit is used, based on the total length of the conduit.

For conduit runs of 0 to 50 feet, no more than 40% of the conduit area should be used.

For conduit runs of 50 to 100 feet, no more than 33% of the conduit area should be used.

For conduit runs of over 100 feet, no more than 25% of the conduit area should be used.

INSTALLATION PRACTICES: (continued)

1.3) CABLE INSTALLATION IN RACEWAYS: (continued)

When determining the maximum area of the conduit that should be used, any bends in the conduit must be considered. It requires more force to pull a cable through a bent conduit than a straight conduit of equal length. The table below lists common angles along with the equivalent length of straight conduit. The **angle length** must be added to the **actual length** of the con duit to determine the **effective length** of the conduit. The **effective length** is used when determining the maximum conduit area that should be used.

ANGLE	ANGLE LENGTH
30°	15 feet
45°	20 feet
60°	25 feet
90°	30 feet

If the **total** of the bends in the conduit exceeds 180°, a pull-box should be installed after every 180° of bends to make it easier to pull the cable through.

In order to determine the minimum conduit size that hsould be used for a raceway, four items must be known.

1) The direction that the cables will be pulled.
2) Number, and angles, of the bends in the conduit.
3) Length of the conduit from pull box to pull box.
4) Combined cross-sectional areas of the cables to be housed in the conduit.

Once the direction that the cable will be pulled through the conduit is deter mined, the angles of the bends in the conduit can be summed up. If the total of the angles exceeds 180°, a pull box should be inserted to keep the angular totals less than 180°. Note that a pull box con be used to eliminate a bend in the conduit.

INSTALLATION PRACTICES: (continued)

1.3) CABLE INSTALLATION IN RACEWAYS: (continued)

The next step in determining the conduit size is finding the effective length of the conduit. The effective length = actual length + angle length. For ex ample: A conduit run of 30 feet has one 90° bend in it.

Actual length	+	Angle length	=	Effective length
30 feet	+	30 feet	=	60 feet

The third step is to determine the amount of area of the conduit that should be used.

Effective length = 0 - 50 feet..... 40% of conduit

Effective length = 50 - 100 feet..... 33% of conduit

Effective length = 100 + feet..... 25% of conduit

In the example above, the effective length was 60 feet. This means that only 33% of the conduit area should be used.

The fourth step is to determine the cross-sectional areas of the cables to be installed in the conduit. The area of a cable can be determined by the formula:

$$\text{Area} = \pi * (\text{O.D.})^2 / 4$$

Where: π = Pi = 3.14
O.D. = Outside diameter of the cable in inches.

The following table lists the outside diameters and teh cross-sectional areas of cables supplied by Triad Controls. The diameters are listed in inches, the areas in square inches.

Cable Name	O.D.	Area
CT - X	.345	.094
CTT - X	.476	.178
Serial	.168	.022

If the conduit above was to carry a CCT-x Cable and a Serial Interface Cable, the combined areas of the cables would be:

.178 inches^2 + .022 inches^2 = .200 inches^2

INSTALLATION PRACTICES: (continued)

1.3) CABLE INSTALLATION IN RACEWAYS: (continued)

The final step in selecting the conduit size is summed up in the table below. The required conduit size can be determined by looking down the proper percent column until the number listed equals or exceeds the cross-sectional area of the cables. The row that contains the number lists the proper conduit size on the left-hand side.

As an example, the doncuit above should be only 33% of its area and the cables to be installed in the conduit total 0.200 inches^2. By following the 33% column down, the person sees that 0.283 inches^2 is the closest area that exceeds the 0.200 inches^2 needed for the cables. By following the row to the left, the person sees that Number 1 Conduit size is needed for the raceway.

Conduit Size	AREA in SQUARE INCHES		
	40%	33%	25%
1/2	.122	.099	.075
3/4	.213	.175	.132
1	.346	.283	.215
1 1/4	.598	.495	.375
1 1/2	.814	.673	.510
2	1.34	1.11	.840

2.0) GROUNDING GUIDELINES

After the raceway layout has been established, the mounting of the components in the system and the proper grounding of each component should be done.

Proper grounding is important for safety reasons in electrical installations. With solid-state controls, such as the PressCam 7 Controller, proper grounding proce dures (including the elimination of ground loops) has the added advantage of reduc ing the effects of EMI interference. A proper grounding path must be permanent and continuous, and must be able to safely conduct all ground-fault currents to earth ground with a minimum impedance.

INSTALLATION PRACTICES: (continued)

2.0) GROUNDING GUIDELINES: (continued)

The following guidelines are broken into the following three sections:

1) Grounding - Electrode
2) Equipment Grounding System
3) Shielded Cables

2.1) GROUNDING-ELECTRODE SYSTEM

The grounding-electrode system is the central grounding system for all electrical equipment and AC power within a facility. It provides a low imped ance return path to earth ground for all lunwanted currents. Usually, the Ground Bus is connected to this system and then all necessary components of the equipment including the enclosure are connected to the Ground Bus. Use a minimum of 8 AWG multi-strand copper wire for the conductor between the Grounding-Electrode System and the equipment Ground Bus.

2.2) EQUIPMENT GROUNDING

Equipment grounding to the Ground Bus should be accomplished by using two different grounding methods:

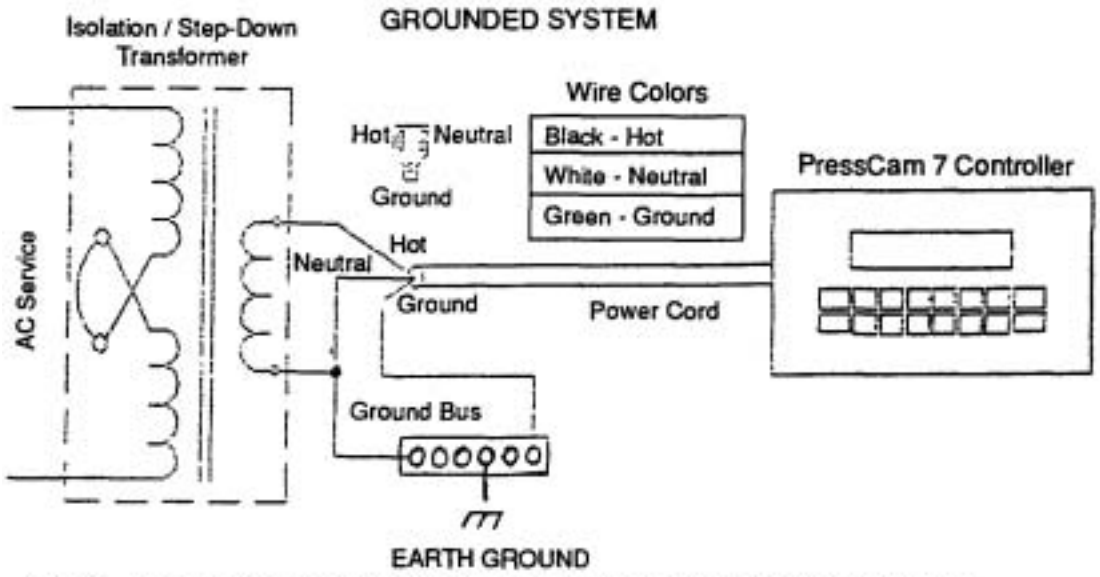
The first method is by having a good electrical connection between the Module cases and the back panel or the equipment enclosure. The way to accomplish this is by having a good electrical connection through the mounting studs. Remove paint or other non-conductive finishes from around the mounting stud or tapped holes and use Star Lock Washers so that good electrical contact is made at each point.

The second method is by using a grounding wire. This method should be used in conjunction with the first method to ensure adequate grounding. Each Controller has a ground lead (green or green with a yellow tracer) in the power cord. These wires must be connected to the Gound Bus.

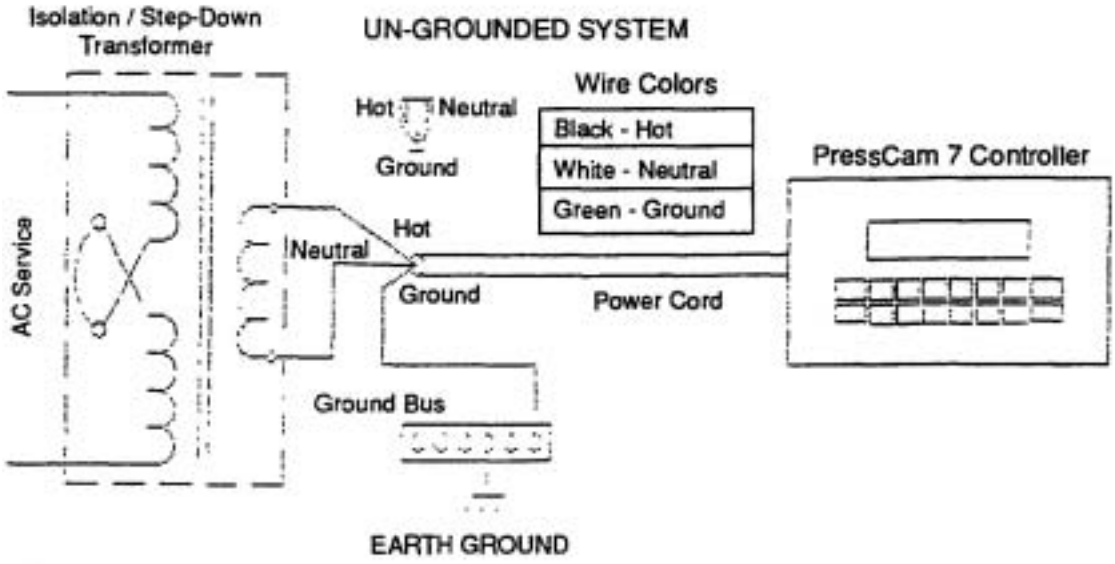
There are two methods to bring AC Power into the PressCam 7 Controller. The first is by connecting the NEUTRAL side of the AC Power to the Ground Bus. This is called the GROUNDED METHOD. The second method is to leave the AC Power un-connected, to the Ground Bus. This is the UN GROUNDED or FLOATING method. The next page shows botyh wiring schemes. THE PROCEDURES SHOWN ARE ONLY SUGGESTED METHODS. LOCAL OR NATIONAL ORDINANCES DICTATE THE METHOD THAT MUST BE FOLLOWED.

INSTALLATION PRACTICES: (continued)

2.0) GROUNDING GUIDELINES: (continued)



Note: All connections to Earth Ground MUST be made at the GROUND BUS. Connections Must NOT be made on the controller or the Transformer.



Note: In an un-grounded system, the Ground wire in the power cord MUST be connected to the Ground Bus.

INSTALLATION PRACTICES: (continued)

2.0) GROUNDING GUIDELINES: (continued)

There should be a grounding wire from the system enclosure to the Ground Bus that is mounted on the back panel. A heavy copper braid or minimum 16 AWG multi-strand wire should be used. Solid wire should be avoided. Transient currents (such as EMI currents) travel along the surface of a conductor and therefore braided or multistranded wire should be used because it has a larger surface area than single strand wire. **If the enclosure has a door, do not rely on the hinge for an adequate electrical connection. Install a bonding sire between the door and the rest of the enclosure.**

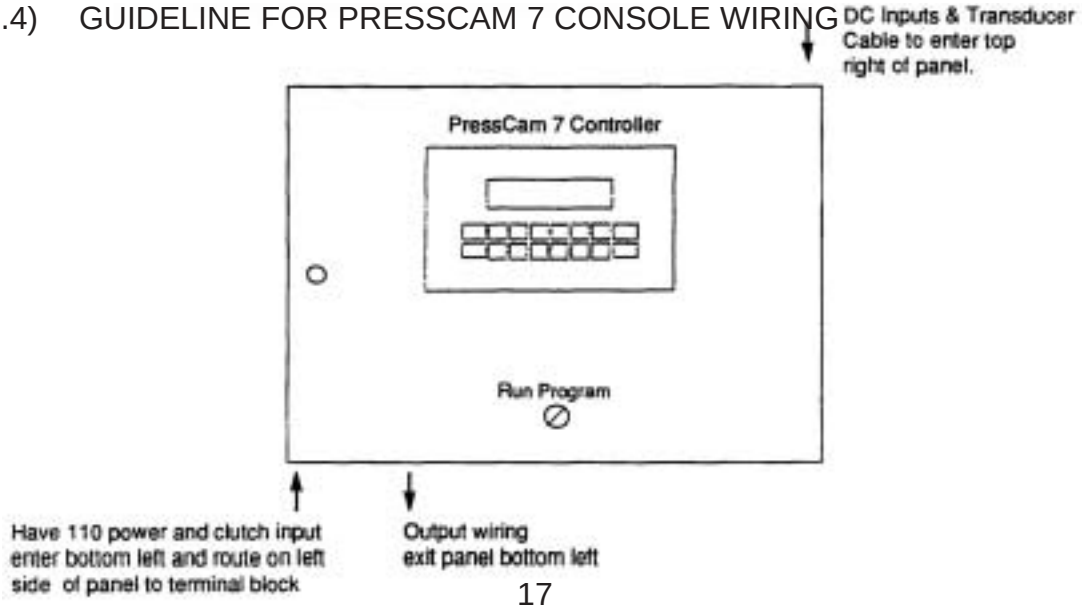
2.3) SHIELDED CABLES

Certain connections such as transducer connections, serial interface connec tions, and sensitive inputs require shielded cables to help reduce the effects of induced EMI noise from other conductors. It is imperative that the shield is grounded, but only at one end.

The shield should be grounded at the point that the signal is generated. For instance, a transducer cable should be grounded at the controller because it is the controller that generates the signals that operate the transducer. If a shield is not grounded, the shield will act as an antennae and will actually help induce the unwanted EMI noise into the cable! However, if the shield is grounded at both ends of the cable, there is the potential for a ground loop formed that could cause faulty system operation.

If a calbe just be spliced somewhere along its length, the splice must be made in grounded metal enclosure. The drain wires of the shielded pairs MUST be connected to ensure that the cable is shielded along its entire length. However, the shields and drain wires of the cable must be isolated from the enclosure to prevent the possiblity of a ground loop.

2.4) GUIDELINE FOR PRESSCAM 7 CONSOLE WIRING



INSTALLATION PRACTICES: (continued)

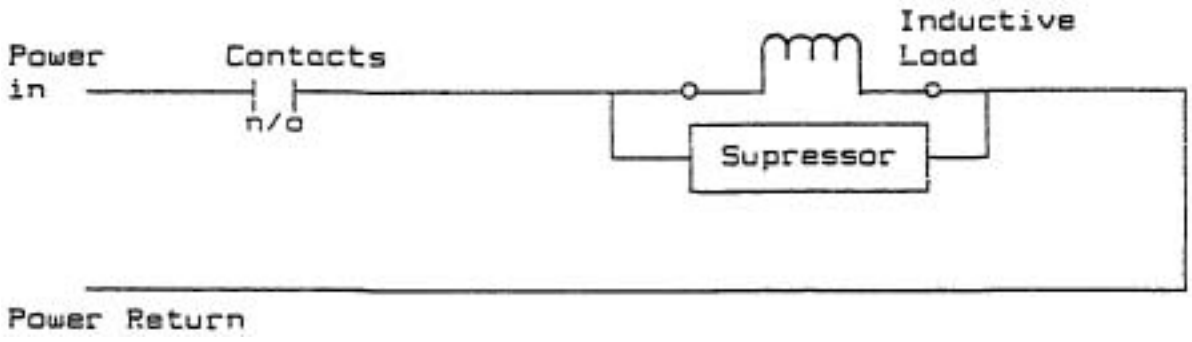
3.0) EMI SUPPRESSION NETWORKS

EMI can be generated whenever inductive loads such as motors, motor starters, relays and solenoids are turned on or off. The wiring and grounding guidelines presented will help supress EMI; however, it may be necessary to use suppression networks on indusctive loads to suppress EMI and protect solid-state devices from the large voltage spikes that can be generated by switching inductive loads on or off. **Suppression networks must be used whenever Type-2 or Type-3 conductors pass near inductive loads.**

Suppression networks must be connected as close as possible to the induc tive load instead of at the switching device. If the suppression networks are connected at the switching device, the wires connecting the switching device to the load will act as antennaes and radiate EMI. RC networks with the appropriate power rating can be used as suppressors on AC systems. If the inductive load is a three phase device such as a three-phase motor, then a suppressor is needed across each phase of the input power. With low power DC devices such as small relays or solenoids, free-wheeling diodes with the appropriate power rating can be put in parallel with the coil of the device.

The diagrams below and on the folloiwng page show where suppressor netowrks should be connected on inductive loads.

PREFERED CONNECTION:

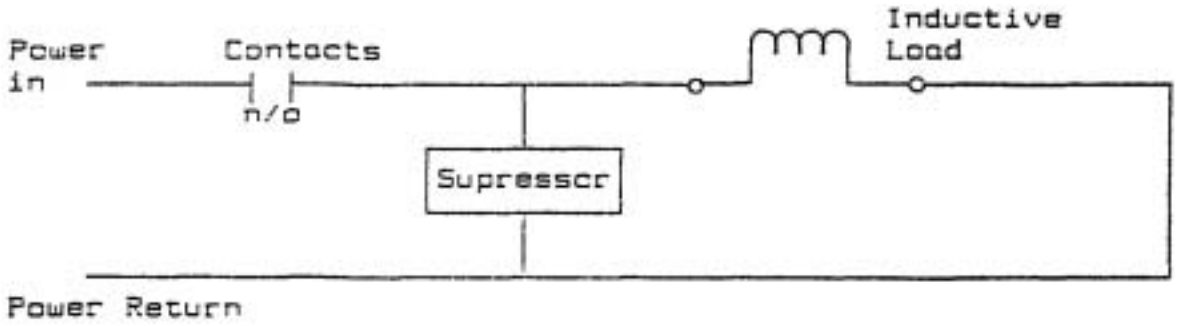


With this connection, the EMI noise is suppressed at its source. The cables connecting the inductive load to the contacts and power source will not radiate EMI noise. The contacts on the relay will not arc when they de-energize.

INSTALLATION PRACTICES: (continued)

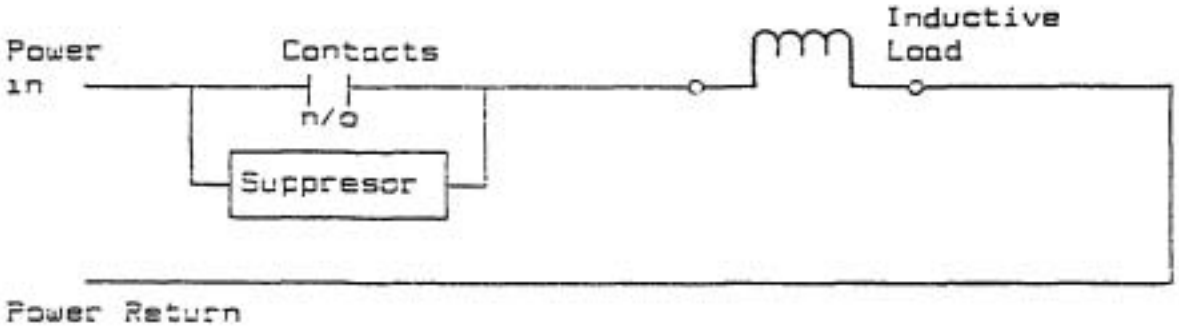
3.0) EMI SUPPRESSION NETWORKS: (continued)

ACCEPTABLE:



With this connection, the EMI noise is suppressed, but not at its source. The cable connecting the inductive load to the suppressor will radiate EMI noise that may be coupled into other conductors near it. The contacts on the relay will not arc when the de-energize.

UNACCEPTABLE:



With this connection, there is no effective noise suppression. The entire length of the cables connecting the inductive load to both the contacts and ther power supply will radiate EMI noise that may be coupled into other conductors near it. The con tacts on the realy will not arc when the de-energize; however, if there is too much suppression, the operation of the contact may be impaired.

INSTALLATION

PRESSCAM 7 CONTROLLER MOUNTING

The PressCam 7 has excellent mounting versatility. Controllers can be provided that will mount in the front panel of an existing control, ref. DWG #B1010 Rev. A on page 40 or on the rear mounting plate of an existing control, ref. DWG #B1011 Rev. A on page 41. Both styles are referenced wtih dimensional drawings at the back of this manual. PressCam 7 can also be supplied with its own NEMA 12 stand-alone enclosure in which the controller, relay board and input board are completely prewired and mounted.

When mounting PressCam 7, shock mounts should be used whenever possible to minimize vibration transmission to the controller.

TRANSDUCER MOUNTING

The TR-20 Transducer mounting bracket should be of rigid design. Dimensional layout of the transducer can be seen on Drawing #B1001 at the back of this manual.

The transducer must be driven by gears, chain, timing belt or couplings. The 5/8" transducer shaft has a keyway to ease the attachment of these items. Please refer to Drawing #B1001 for specifications and layout for mounting.

RELAY BOARD MOUNTING

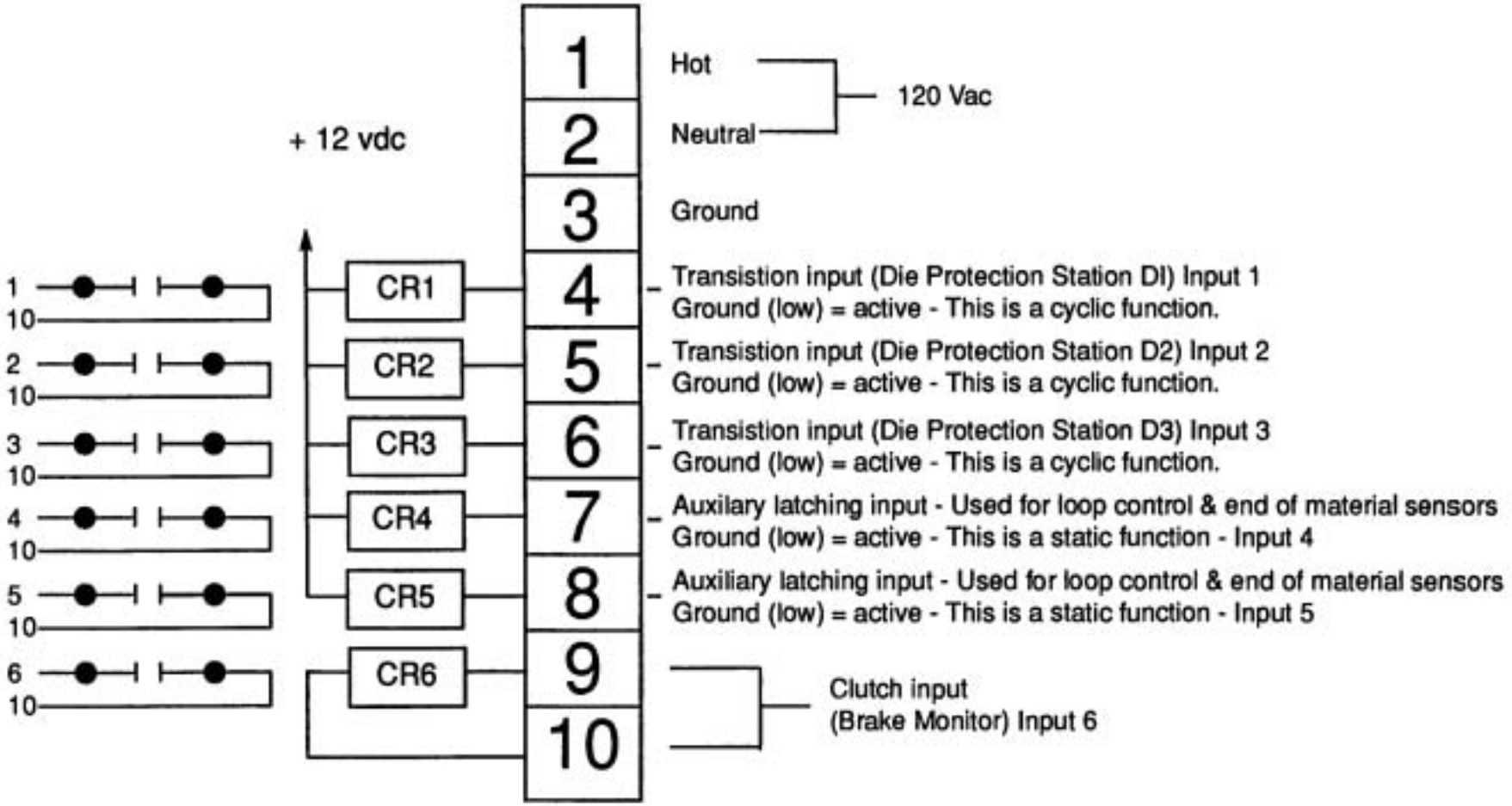
Refer to Drawing #B1014 for Mechanical Relay Board. Refer to Drawing #C1002-Rev.A for Solid State Relay Board. This component is mounted when PressCam 7 Controller Console is supplied. Relays - when installing PressCam 7 make sure the proper voltage relay is being used (120 VAC or 12-60 VDC) to properly signal the equipment that PressCam 7 is to control. PressCam 7 design versatility permits mixing of both DC & AC relays on the same solid state relay board.

TRANSDUCER CABLING

Simple connector ended cabling is supplied standard in 30' lengths. CW or CCW rotation can be had by reversing leads at connector. Refer to drawing #B1013 for specifics. Maximum transducer to controller distance 600'.

OPTO-ISOLATION INPUT BOARD -- MODEL PB4

Refer to page 49 for dimensional layout.
This component is mounted and prewired when the PressCam 7 Controller Console is supplied.



TERMINAL STRIP WIRING INPUT ASSIGNMENTS

TRIAD CONTROLS			
C '89	REV	PG 1	OF 1
PressCam 7 Installation Wiring			

MODEL TR-20 TRANSDUCER DESCRIPTION

Mechanically connected to the shaft of the controlled machine, the transducer is designed to withstand severe envirnomental conditions such as continuous mechanical shock and vibrations, extreme temperature and humidity variations and exposure to contaminants such as oil mist, coolants and solvents. PressCam 7 utilizes a brushless resolver-based transducer package in a rugged NEMA 13 housing.

The resolver is unsurpassed by any other type of rotary position transducer in terms of reliability, cost effectiveness and ability to withstand industrial environments. Originally developed for military applications, the resolver has benefited from more than 40 years of continuous use and development. THe resolver is essentially a variable rotary transformer, with one primary winding located in the rotor and two secondary windings located in the stator mechanically displaced 90° to each other. In general, the rotor winding is excited by an AC voltage called the Reference Voltage. The induced voltages in the stator windings are proportional to the product of the sine/cosine of their angular displacement with the rotor winding, and the instantaneous value of the Reference Voltage. If you consider the ration of the stator voltages, it is obvious that the result is proportional only to the angular displacement. Thus, the resolver is excited by a Reference Voltage can provide a set of voltages with their ratio uniquely representing the absolute position of the shaft. In a brush-less resolver, the Reference Voltage is supplied to its rotor wtihout the use of brushes and slip rings.

PressCam 7 uses the folloiwng transducer:

TR-20 Single turn transducer DWG #B1001

TR-20 Transducer **Connector Cabling**

PRESSCAM 7 MASTER PRESS CONTROLLER PANEL

PRESSCAM 7 GENERAL KEYBOARD INFORMATION

The keyboard has two assignments for most keys. The upper blue portion on the keys are functional assignments. (SF, OFFSET, etc.). They allow the user to access a specific function. If the FUNCTION key LED is ON, the keyboard is in the FUNCTION mode. The lower gray portion of the keys are numerical and instructional assignments. (NEXT, 0, 1, 2, etc.). If the FUNCTION LED is OFF, the keyboard is in the numerical mode.

PressCam 7 will automatically switch to the numericcal mode if the user is required to enter data. (This is indicated by a BLINKING cursor or digit.) This would occur in programming and limit inspection.

In most cases, the keyboard can be put into either mode by pressing the FUNCTION key. The exception is when no data entry is required. In this case, the FUNCTION key will be disabled/locked in the function mode.

DISPLAY Information is easily read on a bright vacuum fluorescent 10 character alpha numeric display.

KEYBOARD Data is entered on a sealed keyboard with 16 tactile feel keys. Two level keys are organized for efficient data entry and inspection. Ease of use is assured by the plain English description on each function key.

KEY DESCRIPTIONS

(LED)
(FUNCTION)

FUNCTION KEY (F) - The keyboard has two levels for most keys. The function key selects by alternate action which level is active. When the function LED is illuminated the keyboard is in the FUNCTION mode (POS/TACH, SF, etc.). When the function LED is OFF, the keyboard is in the numerical mode (0,1,2, NEXT, etc.). The function keys are blue and the numbered keys are gray.

POS/TACH
0

POSITION/TACHOMETER KEY (P/T) - This key displays 3-digit scaled shaft angle position data and 4-digit tachometer data (RPM) simultaneiously. (Shaft Angle and Speed) P.359-T.0000).

SCALE FACTOR
1

SCALE FACTOR KEY (SF) - This key is used to display or program the number of angular divisions within one revolution of the transducer saft. Its value can be 2 to 1000 depending on the application. For degree increments, the scale factor is 360. (S.FAC.0360).

OFFSET
2

OFFSET KEY (O) - This key is used to display or program an angular displacement of the transducer shaft from electrical (true) zero. The offset value is a positive displacement which is added to the angle read from the transducer. The display shows the offset value and the transducer position iwth offset simultaneously.

MOTION
DETECTOR
3

MOTION DETECTOR (MD) - This key is used to display or program the FROM-TO setpoints in RPM (revolutions per minute) of the motion comparator. If the FROM limit setpoint is less than the TO setpoint, the MD output will be enabled if the transducer speed is between the setpoints. If the FROM limit setpoint is greater than the TO setpoint, the MD output will be enabled if the transducer speed is outside the setpoints. (M.D. 010-050). The motion detector has a dual speed limit display.

STATUS
I/O
4

STATUS LIMIT OUTPUT KEY (I/O) - This key displays the status of all the limit switch set point outputs and the status of the six inputs. (Die Protection 1-3, auxiliary latching inputs 4 & 5, Brake Monitor Input 6). The complete status of the PressCam 7 system can be viewed by depressing the status I/O key 3 times while in the function mode.

KEY DESCRIPTIONS

+
<

LIMIT/OFFSET INCREMENT KEY (LI) - The key is useful in online fine-tuning of the limit setpoints and offset. The key will increment the data by one (1) count, directly into E2PROM memory, every time the key is pressed.

-
>

LIMIT/OFFSET DECREMENT KEY (LD) - The same as above except for decrementing limit setpoints and offset.

+
<

MOVE CURSOR LEFT KEY (CL) - Moves blinking cursor to the left by one character. The cursor indicates the digit that will be changed when entering data. The cursor will move one digit to the right when a numbered key is pressed. When INCREMENTING or DECREMENTING setpoints, the position of the cursor will indicate whether the FROM or TO setpoint or BOTH setpoints will be changed.

-
>

MOVE CURSOR RIGHT KEY (CR) - Same as above except cursor moves to the right.

(LED)
PROGRAM

PROGRAM KEY (P) - This key is used to enter the Program Mode. User selected 4-digit Program Codes can be used to restrict entry into any of the available programs. (PROGRAM 4); (P.CODE 0000)

LIMIT
SWITCH

LIMIT SWITCH (LS) **CHANNEL # KEY** (LS) - This key is used to select the channel circuit number to be inspected or programmed. (LS 01), (01-100-135).

- - - -
NEXT

NEXT KEY (NK) - This key advances to the next step in an inspection or programming sequence, eg. it is used to sequentially read out all the stored limits. (01-100-135), (02-321-350), etc.

DIE
PROTECTION
5

DIE PROTECTION KEY (DP) - This key is used to access the die protection/malfunction detection program. Once in the program, simple entry of the parameters for when an event is to happen is entered. There is no need to make manual timing adjustments of the machine for switches or encoders.

TIMERS/
COUNTERS

TIMERS/COUNTERS KEY (T/C) - Used to access timer/counter functions, up to four different timers can be used and these can be placed on any or all of channels LS9-12. PressCam 7 has three counters: a stroke counter, a counter with a presettalbe limit and a batch counter.

AUTO ADVANCE 7	**AUTO ADVANCE KEY** (AA) - The key is used to compensate for fixed delays in variable speed running operations. This function can be placed on limit switch channels 1 through 8.
BRAKE MONITOR 8	**BRAKE MONITOR KEY** (BM) - This key is used to access the time based brake monitor for the digital readout of the brake stopping time in milliseconds and for the programming of the programmable brake warning setpoints.
CLEAR 9	**CLEAR KEY** (C) - In conjunction with the LS key the CLEAR key can be used to delete an existing dwell setpoint. It is also used in the Auto-Zero command.
ENTER	**ENTER KEY** (E) - This key is used in the Program Mode and in Limit Setpoint inspection. When the ENTER key is pressed in the Program Mode two things happen: 1) Entered data is immediately executed. 2) Entered data is stored in E2PROM permanent memory. In Limit Setpoint inspection the ENTER key enters the circuit number.
(X)	**LED-LIGHT EMITTING DIODE** - When the LED is illuminated, the function and program keys are active. When the LED is off, keyboard is in the numerical mode (0,1,2, Next, etc.).

12. PRESSCAM 7 MASTER CONTROLLER PROGRAMMING INSTRUCTIONS

DATA ENTRY

Numerical data can only be entered if the display cursor is BLINKING. Data is entered digit by digit by pressing the appropriate numbered keys. The BLINKING cursor shows the location of the next entry. After a digit is entered on the display, the cursor will move to the right for the next entry. The cursor can be moved using the (<) (>) keys, if necessary. After each display line of data has been changed, the (ENTER) key must be pressed. The entry will now be executed and stored in memory. Illegal data will not be accepted.

PROGRAM SELECTION

PressCam 7 allows the user to run or program any one (1) of the 60 programs. On power failure or loss, the last program in operation before power outage will be reinstated on power up.

* - Will be shown throughout this manual. This is a reminder to be in the program mode.

PROGRAM CODE

A program code P.CODE is available for each program to restrict access to program commands. All factory supplied units are P.CODE programmed wtih 0000 (4 zeros) in all programs. This code will allow universal access to all programs. If a user wants to have his own code for a specific program or set-up, one can do so in the program mode. A maximum of sixty (60) different programs or set-ups can be assigned different P.Codes.

12.1 PROGRAM MODE WITHOUT P.CODE

You want to enter the program mode of program 1, which has the universal access P.CODE = 0000.

PRESS	DISPLAY	COMMENTS
(PROGRAM)	(PROGRAM 4)	Current running program
(1), (ENTER)	(PROGRAM 1)	Program LED ON. Program 1 ready to program. Program 1 running.
(PROGRAM)	(P.XXX-T.XXXX)	Program LED OFF. Out of program mode. Program 1 running. XXXX=Any 4-digit number.

12.2 NEW PROGRAM CODE

You want to enter your own program code for program 2.

PRESS	DISPLAY	COMMENTS
(PROGRAM)	(PROGRAM 1)	Current running program
(2), (ENTER)	(PROGRAM 2)	Program LED ON, Program 2 ready to program
(FUNCTION)	(PROGRAM 2)	Function LED “OFF”
(NEXT)	(P.CODE-0000)	Old program 2 code (0000).
(1,2,3,4), (ENTER)	(P.CODE-1234)	New program code
(PROGRAM)	(P.XXXX-T.XXXX)	Program LED OFF. Out of program mode.

12.3 PROGRAM MODE with P.CODE

You want to enter program 2 program mode. P.CODE (1234) is necessary for access.

PRESS	DISPLAY	COMMENTS
(PROGRAM)	(PROGRAM 2)	Current running program
(ENTER)	(P.CODE-_ _ _ _)	Asking for program 2 code.
(1,2,3,4), (ENTER)	(PROGRAM 2)	Program LED ON. Program 2 ready to program.
(PROGRAM)	(P.XXXX-T.XXXX)	Program LED OFF. Out of program mode. Program 2 running.

12.4 TO READ OR CHANGE THE PROGRAM CODE (P.CODE)

PRESS	DISPLAY	COMMENTS
(PROGRAM), (ENTER)	(PROGRAM 1)	Current running program.
(FUNCTION)	(PROGRAM 1)	Function LED “OFF”
(NEXT)	(P.CODE-XXXX)	Current P.CODE

To change P.CODE, enter new P.CODE, press ENTER.

12.5 TO CLEAR ALL DATA IN A PROGRAM

PRESS	DISPLAY	COMMENTS
(PROGRAM), (1) Selected program to be cleared.	(PROGRAM 1)	
(ENTER)	(PROGRAM 1)	
(CLEAR)	(CLR. PRG 1)	
(ENTER)	(CLR. PRG1)	Program 1 cleared after five (5) seconds.

12.6 PROGRAM SCALE FACTOR

You want to set the scale factor to degree increments. (360 Divisions)

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(SF)	(S.FAC.XXXX)	Current scale factor.
(0,3,6,0), (ENTER)	(S.FAC.0360)	New scale factor.

12.7 PROGRAM OFFSET

You want to program an offset of 250

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(OFFSET)	(P.XXX-OF.XXX)	Current position and offset
(2,5,0), (ENTER)	(P.XXX-OF.250)	New position and offset.

12.8 PROGRAM AUTO-ZERO

The transducer is aligned to mechanical zero. You want the electrical position to be zero.

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(OFFSET)	(P.XXX-OF.XXX)	Current position and offset
(FUNCTION), (CLEAR)	(P.000-OF.ABC)	ABC=auto calculated offset needed to produce electrical zero.

* - A reminder to be in the program mode.

12.9 PROGRAM MOTION DETECTOR

The press speed parameters (SPM) must be programmed into the motion detector for the current running die on all set-ups to incorporate an interlock for the transducer.

A) You want to program the MD output to turn OFF if the speed of the transducer falls below 10RPM or equals or exceeds 50 RPM.

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(MD)	(M.D.XXX-XXX)	Current motion detector dwell limits.
(0,1,0), (0,5,0), (ENTER)	(M.D. 010-050)	10 RPM ≥ MD ON > 50 RPM.

B) You want to program the MD output to turn ON if the speed of transducer falls below 10 RPM or equals or exceeds 50 RPM.

(MD)	(M.D.XXX-XXX)	Current limits
(0,5,0),(0,1,0), (ENTER)	(M.D. 050-010)	10 RPM ≥ MD OFF > 50 RPM

12.10 LIMIT INSPECTION

You want to inspect limit channels (circuits) 6.7 and 8 or the running program. (Does not require being in the program mode).

PRESS	DISPLAY	COMMENTS
(LS)	(L.S.XX)	Limit channel display
(0,6), (ENTER)	(06-XXX-XXX)	First dwell on channel 6.
(NEXT)	(07-XXX-XXX)	First dwell on channel 7.
(NEXT)	(07-XXX-XXX)	Second dwell on channel 7.
(NEXT)	(08-XXX-XXX)	First dwell on channel 8.

Note: The limits will be read out in the order they were programmed.

12.11 LIMIT SWITCH (LS) PROGRAMMING (no existing setpoints)

You want to program the following limits (From-To).

Note* - Channels 1-4 are the secured channels for the punch press control signals. Refer to Section 19 for application and installation data.

Channel 1 (10-35)
Channel 2 (150-233)
Channel 3 (78-96), (180-247) 2 Setpoints
Channel 4 (340-35) thru zero setpoint

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3. Scale factor must be pro grammed to a value greater than 340.
(LS)	(L.S.XX)	Limit channel display
(0,1), (ENTER)	(01-__-__)	Channel 1 limit display.
(0,1,0),(0,3,5)		
(ENTER)	(01-010-035)	Ch.1, first limit
(NEXT)	(01-__-__)	Ch.1, second limit display. Since there is not any, press NEXT again.
(NEXT)	(02-__-__)	Ch.2 limit display
(1,5,0),(2,3,3)		
(ENTER)	(02-150-233)	Ch.2, first limit.
(NEXT), (NEXT)	(03-__-__)	Ch.3 limit display.
(0,7,8),(0,9,6)		
(ENTER)	(03-078-096)	Ch.3, first limit
(NEXT)	(03-__-__)	Ch.3, second limit display
(1,8,0),(2,4,7)		
(ENTER)	(03-180-247)	Ch.3, second limit.
(NEXT), (NEXT)	(04-__-__)	Ch.4 display.
(3,4,0),(0,3,5)		
(ENTER)	(04-340-035)	Ch.4 limit.

12.12 LIMIT SWITCH (LS) PROGRAMMING (from existing setpoints)

You want to change the second setpoint on channel 12 to (35-47).

PRESS	DISPLAY	COMMENTS
*		
(LS)	(L.S.XX)	Limit channel display
(1,2), (ENTER)	(12-XXX-XXX)	Ch.12, first limit
(NEXT)	(12-XXX-XXX)	Current Ch.12, second limit
(0,3,5),(0,4,7)		
(ENTER)	(12-035-047)	New Ch.12, second setpoint.

12.13 LIMIT SWITCH (LS) ERASING (single setpoint)

You want to erase the first limit on channel 6.

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(LS)	(L.S.XX)	Limit channel display
(0,6), (ENTER)	(06-XXX-XXX)	Channel 6 limit display
(FUNCTION), (CLEAR)	(06-__-__)	Limit erased.

12.14 LIMIT SWITCH (LS) INCREMENT/DECREMENT

You want to “Fine Tune” channel 4, first limit FROM setpoint.

PRESS	DISPLAY	COMMENTS
*		Must be in program mode. See 12.1 or 12.3
(LS)	(L.S.XX)	Limit channel display.
(0,4), (ENTER)	(04-XXX-XXX)	Ch.4, first limit display
(>),(>)	(04-XXX-XXX)	Cursor positioined on LSD (least significant digit) of FROM setpoint.
(FUNCTION). (+or-)	(04-XXX-XXX)	Each keystroke will increment/ decrement the FROM setpoint by 1 count.

Note: 1. If the cursor is placed on the LSD of the TO setpoint, the + and - key will increment/decrement the TO setpoint by 1.

2. If the cursor is positioned between the setpoints, both setpoints will change.

3. In all the above operations, the limit increment/decrement execution and memory storage will take place when the +/- keys are pressed.

NOTE: Scale factor can only be a whole number. All fractions will be ignored.

12.15 DIE PROTECTION	**3 Transition Detectors**	**LS 13 is the fault output.**
Press DP key	D1-_ _ _-_ _ _	Setpoint for input 1
NEXT	D2-_ _ _-_ _ _	Setpoint for input 2
NEXT	D3-_ _ _-_ _ _	Setpoint for input 3

Status outputs and die protection fault outputs will go “low” if an input transition is not detected between programmed limits. This is shown by a * on the PressCam 7 screen when reviewing inputs 123-45-6 by depressing the status i/o key three (3) times. The * shows the exact die protection station that has faulted. A typical die protection system layout can be seen on page 53.

Press CLEAR in program mode to delete limits.

Note: Inputs can be N.O. or N.C. PressCam 7’s internal logic is programmed to detect a change in the input status during the transition window or dwell time. Refer to page 50 for input board wiring diagram and page 53 for typical die protection layout. Inputs for die protection (1-3) and auxiliary inputs (4 & 5) require its own power source (12 vcd) that is supplied.

12.16 TIME OUT TIMERS **Max 4 Timers can be placed on LS9-12**

In LS mode	09-_ _ _-_ _ _	Standard limit display
Enter From Position on display	09-XXX-_ _ _	Timer starts at this position
Enter time out in m Sec.	09-XXX-YYY	Limit will time out in YYY ms.
Press (FUNCTION) then (T/C)	09-XXX<YYY	Time Function enabled

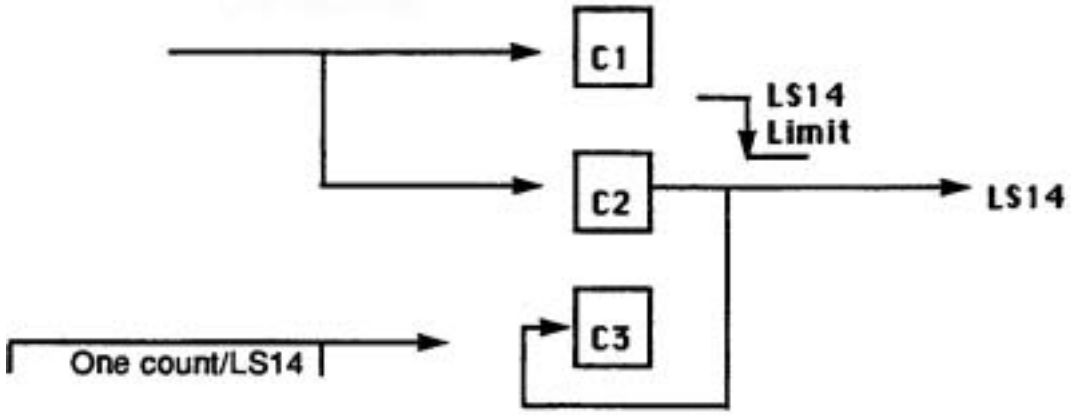
Press (ENTER)
Press the (CLEAR) key in program mode to delete limits.

Note: The timers will not work if outputs 15 & 16 are not clear or if the die protection auxiliary inputs or brake monitor status outputs are open. Die protection requires the usage of DC relays.

12.17 COUNTERS

Press T/C Key		Counters increase at top of press stroke, zero position.
	C1-_ _ _ _ _ _	Stroke Counter
(T/C)	C2- _ _ _ _	Counter with Limit
(T/C)	C3- _ _ _ _	Batch Counter
(T/C)	C2LIM _ _ _ _	Counter 2 Limit

When displaying a counter, pressing the (CLEAR) key will reset the counter to zero



Press the (CLEAR) key while displaying C2 to clear LS14.

12.18 AUTO ADVANCE **Max. 8 Channels can be placed on LS1-8**

Press ADV key	Delay _ _ _	Compensated delay in m sec.
In LS mode	06-_ _ _-_ _ _	Standard limit display
Enter From-To setpoints on display	06-XXX-ZZZ	
Press (FUNCTION) then (ADV)	06-XXX ^ ZZZ	Advance routine enabled
Press (ENTER)	06-XXX ^ ZZZ	Advance setpoint.

To display # of counts advance, press the (POS/TACH) key while on position display.

Press the (CLEAR) key in program mode to delete limits.

12.19 AUXILIARY LATCHING INPUTS

The auxiliary latching inputs are used for static function control such as end of material, buckle detection or loop control.

A logic “0” on input 4 or 5 will cause Status Ouptut to be latched LOW.

A faulted auxiliary latching input can be seen on the PressCam 7 screen by examining the inputs 123-45-6 of the status i/o key. A fault on either input 4 or 5 will show an * instead of the number. Depress the status i/o key three (3) times to view the status of the inputs.

12.20 BRAKE MONITOR Monitor Stopping Time in Milliseconds

Press (BM) Key	S. TIME 0.000	Stop Timer display
(BM) Key	ST.LIM 000	Stop Time limit setpoint in m sec.

If Stop Time Limit is exceeded, Status Ouputs will go “LOW”.

Iniput 6 - Clutch Input. “1” to “0” Logic change starts Stop Timers. Timer will count until zero transducer shaft speed is sensed.

To clear a “LOW” Status Output caused by inputs 1-6, press the (CLEAR) key while in Input Status Display mode. See section 14 for further information on the Status Display.

A faulted brake monitor function can be seen on the PressCam 7 screen by examining the inputs 123-45-6 of the status i/o key. An exceeded brake monitor stop limit or setpoint will show 123-45-*. Depress the status i/o key three (3) times to view the status of the inputs.

13. MODE SELECT INPUTS

INPUTS 8	INPUT 7	COMMENTS
Logic “1”	Logic “1”	All functions can be programmed if the P.CODE is known.
Logic “1”	Logic “0”	All functions can be programmed if the P.CODE is known except the following: LS. 1-4 and the program cannot be cleared.
Logic “0”	Logic “1”	Program mode cannot be entered. C2LIM can be altered. New program # can be entered if P.CODE is known.
Logic “0”	Logic “0”	Same as “0”, “1” above except that a new program # cannot be loaded.

Note: Logic “0” is defined as less than 1 VDC or no input.
Logic “1” is definced as 3-15 VDC.

Input 8 is the key switch. In the run mode the key switch applies logic “0” to input 7. In the program mode logic “1” no voltage is applied, allowing programming.

14. STATUS DISPLAYS

Press I/O key		01._+_ _+_ _ _	1-8 Output Status of limit switches 9-16 Output Status of limit switches
I/O		09._+_ _ _ _ _ _	An “+” indicates ON.
I/O	Inputs	1,2,3 - Die Protection 4,5 - Auxiliary Latching 6 - Brake Monitor	1-6 Input Status Display. If any input caused the Status Output to go LOW, it will change from a number to an *.

To CLEAR Status Output press the (CLEAR) key while showing the Input Status Display and in the Program Mode.

15. DIAGNOSTICS

To clear a transducer fault.
(A functioning transducer must be connected)

Press the (CLEAR) key while in POS/TACH function.

NOTES: 1. When in transducer fault mode, all outputs are off.
2. To see transducer position in Transducer Fault mode, press (OFFSET) key.

16. TO DISPLAY MODEL NUMBER AND EPROM MEMORY CHECK SUMS

PRESS	DISPLAY	COMMENTS
(PROGRAM)	(PROGRAM 1)	Current running program
(NEXT)	(IPLC-32-X)	Model and Revision Number: (X)
(NEXT)	(EPROM XXXX)	XXX=Check Sum Changes based on the Revision Number.

17. TO CLEAR AN EEROM ERROR

PRESS	DISPLAY	COMMENTS
	(EEROM ERR.*)	

Turn power to unit OFF then ON. If the display is the same, continue to next step.

(CLEAR)	(CLEAR PRG XX)	X=1 to 60 - CURRENT PROGRAM
(ENTER)	(CLEAR PRGXX)	Program cleared after five (5) seconds.

NOTE: Only an (EEROM ERR.*) with a blinking asterisk (*) can be cleared. If the asterisk (*) is not blinking after power interruption, unit must be returned for repair.

NOTE: An EEROM error may be displayed when entering a new program for the first time. This is normal. All programs on new units or on units with new EEROM's must be initialized before they can be accessed. Factory units with under ten (10) programs are initialized at the factory. New units with over ten (10) programs must be initialized by the end users when the programs are accessed for the first time and first time only. To initialize a program, follow the procedure for clearing an EEROM error.

18. TO CLEAR A RAM ERROR (RAM ERROR*)

Turn power to unit OFF then ON. If display is the same, unit must be returned for repairs.

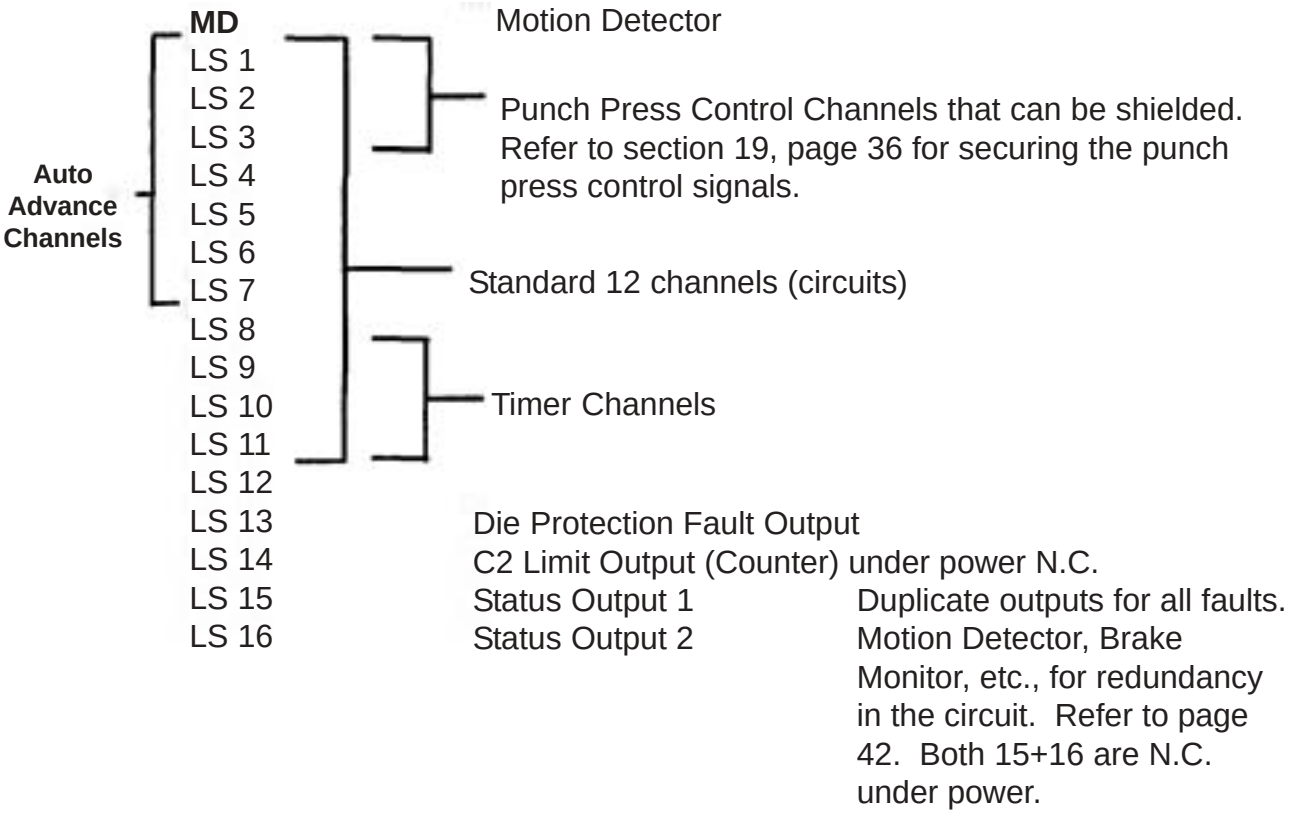
19. SECURING PRESS CONTROL SIGNALS

A jumper must be supplied from Input 7 to Input 10 to prevent programming of Channels 1 through 4 which are to be used for the press control signals. This will prevent random and inadvertent programming changes of the press control signals. The jumper is to be installed immediately after the press control signals are programmed.

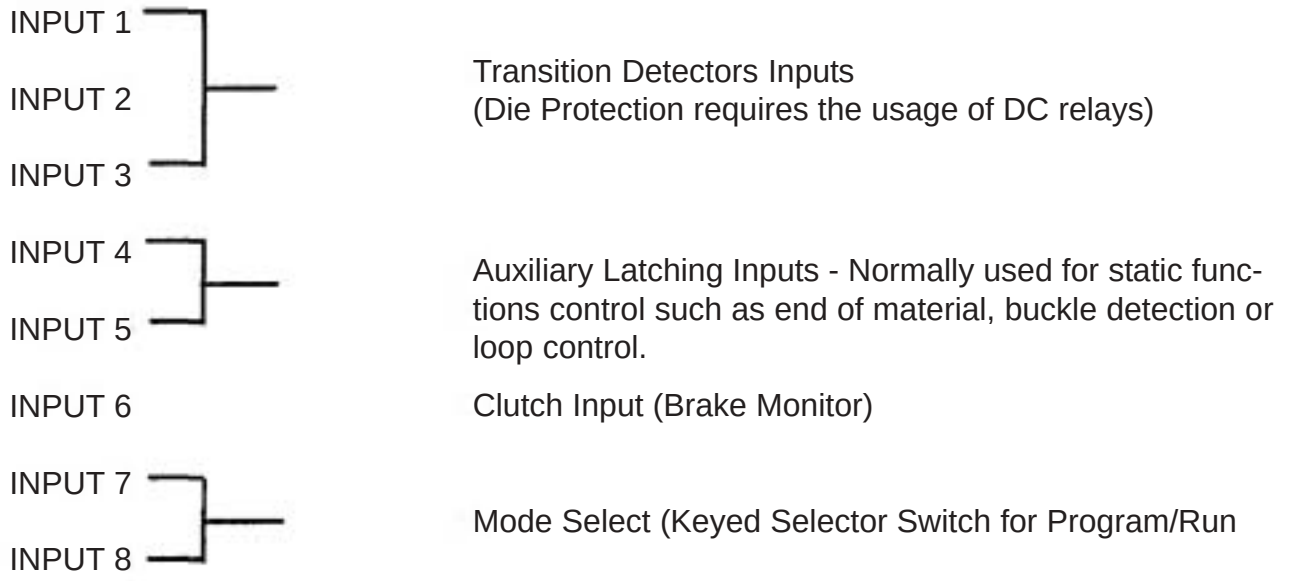
8-10 Key Switch is wired, this is the program/run mode.

INPUT/OUTPUT ASSIGNMENTS OF PRESSCAM 7 - System Overview

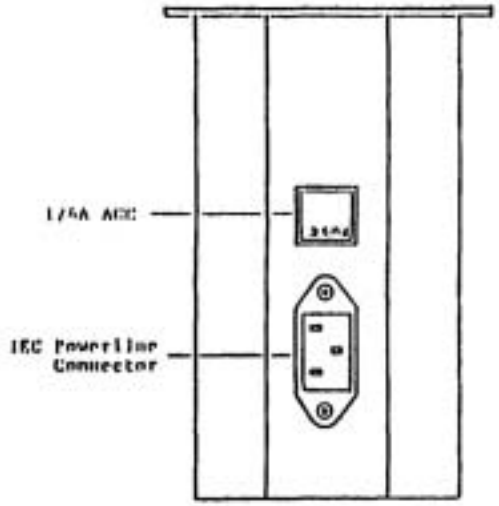
OUTPUTS RB-1 Relay Board. Uses standard relays.

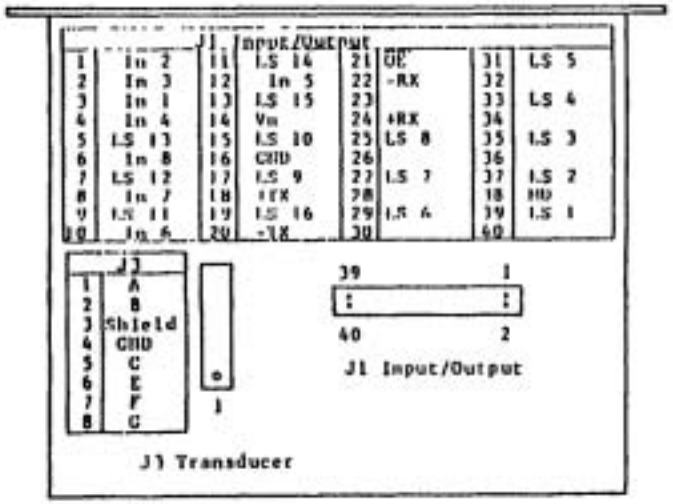


INPUTS Requires external Opto-Isolation Input Board (PB4) and modules connected to RB-1 Relay Board back.

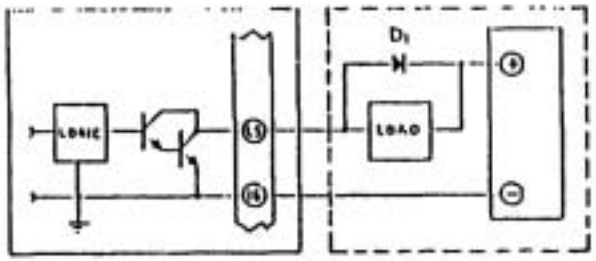


Note: Inputs for die protection (1-3) and auxiliary latching (4&5) require its own power source (12 VDC).





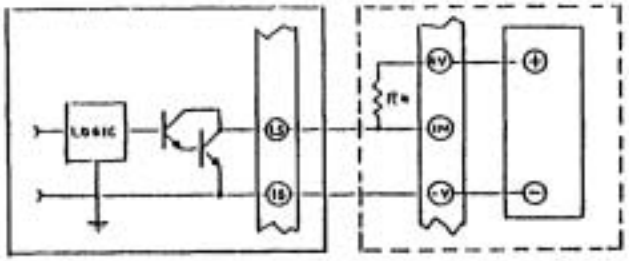
J1 Input/Output - IDC Flat cable connector
J3 Transducer- Buchanan SSB4V08S (Black)
Phoenix MSTBI.5/8-ST-5.08 (Green)



Output Typical User Connection

1. Driving Inductive Loads (Relays, Solenoids, etc.)

D1- Clamp Diode 1N4007 or equiv.



Output Typical User Connection

2. Driving Logic Circuits (P.C.'s, etc.)

*Add 1K resistor on each LS output driving TTL type input modules.

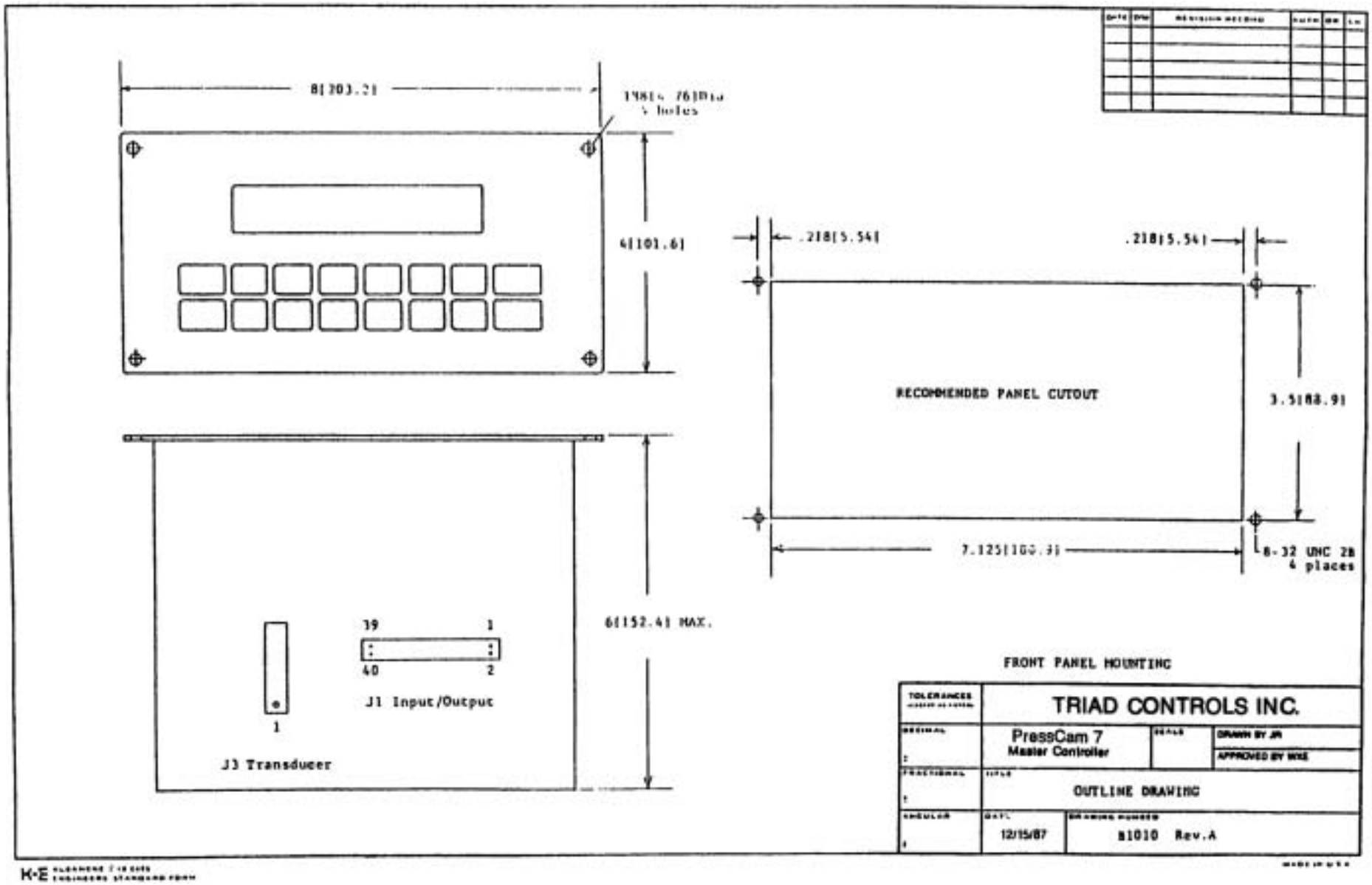
Open Collector Output
Vce Max. 50Vdc
Vce(sat) @ 100Ma =.9Vdc

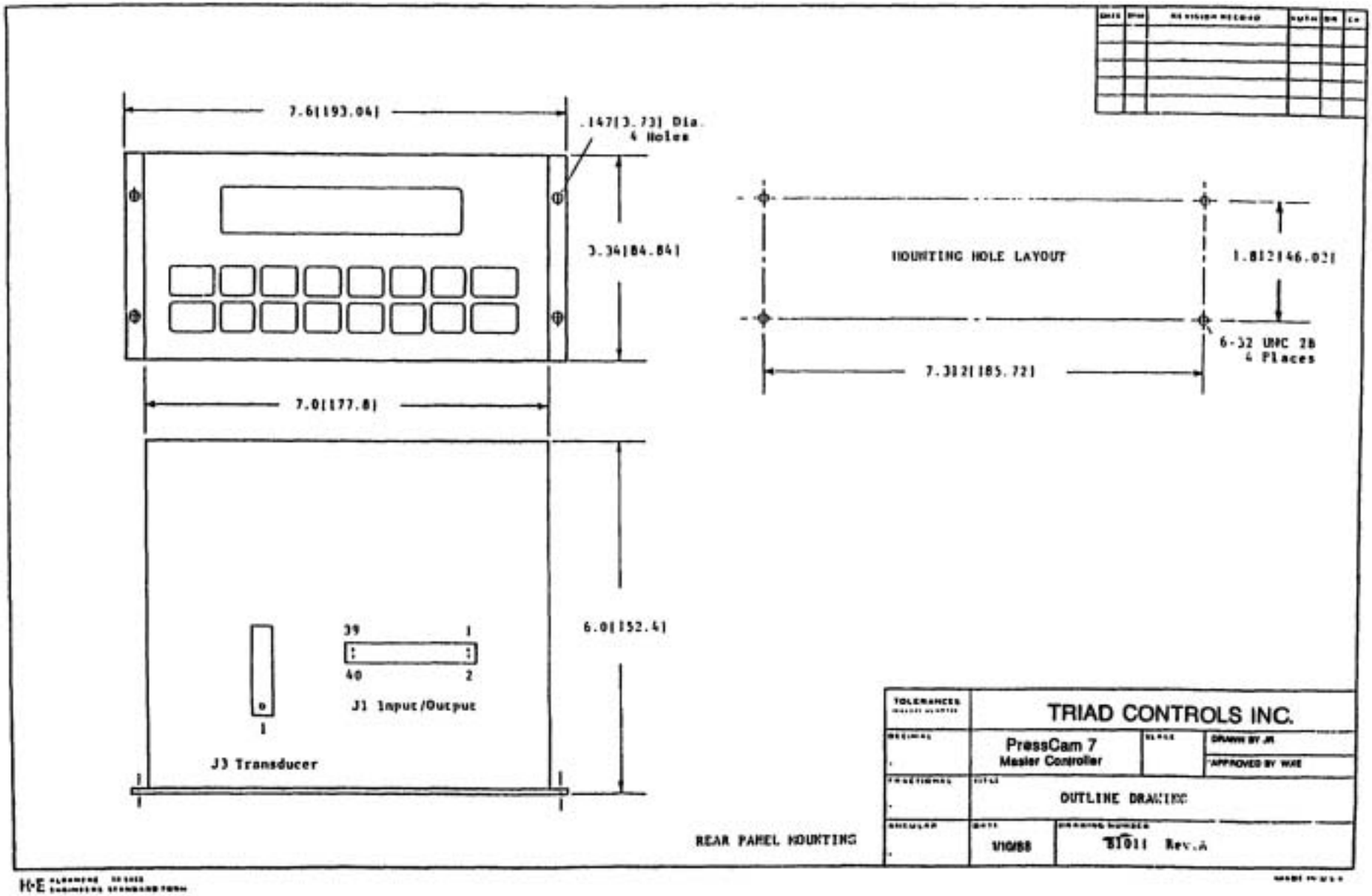
Inputs 1-8,Tx,Rx- Optional Assignments

OE- Output Enable, Gnd. for normal operation.

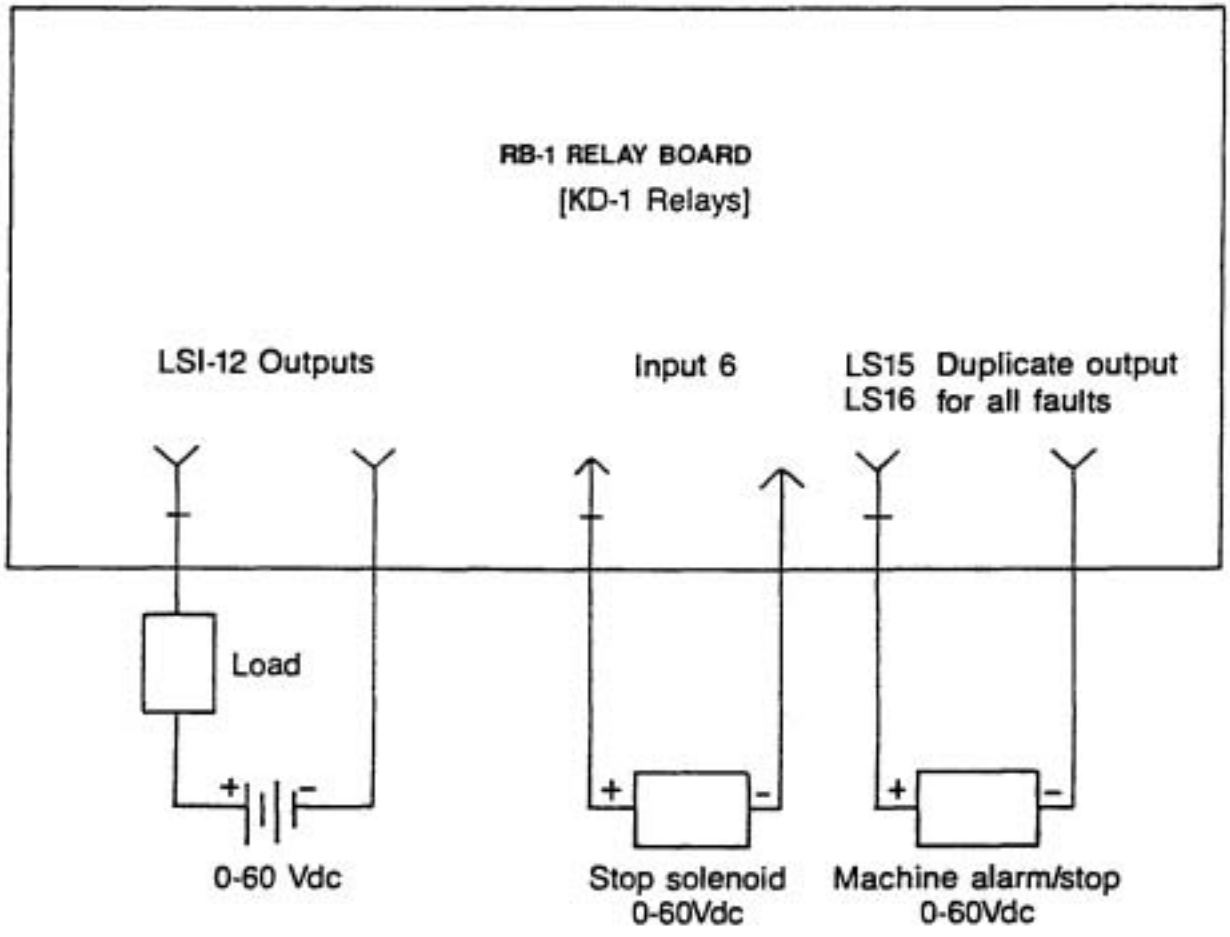
TOLERANCES	TRIAD CONTROLS INC.
DECIMAL .	SCALE — DRAWN BY JR
FRACTIONAL .	APPROVED BY WSE
ANGULAR .	TITLE: PressCam 7 Master Controller
	DATE: 12/10/87 — DRAWING NUMBER: B1012 REV.B

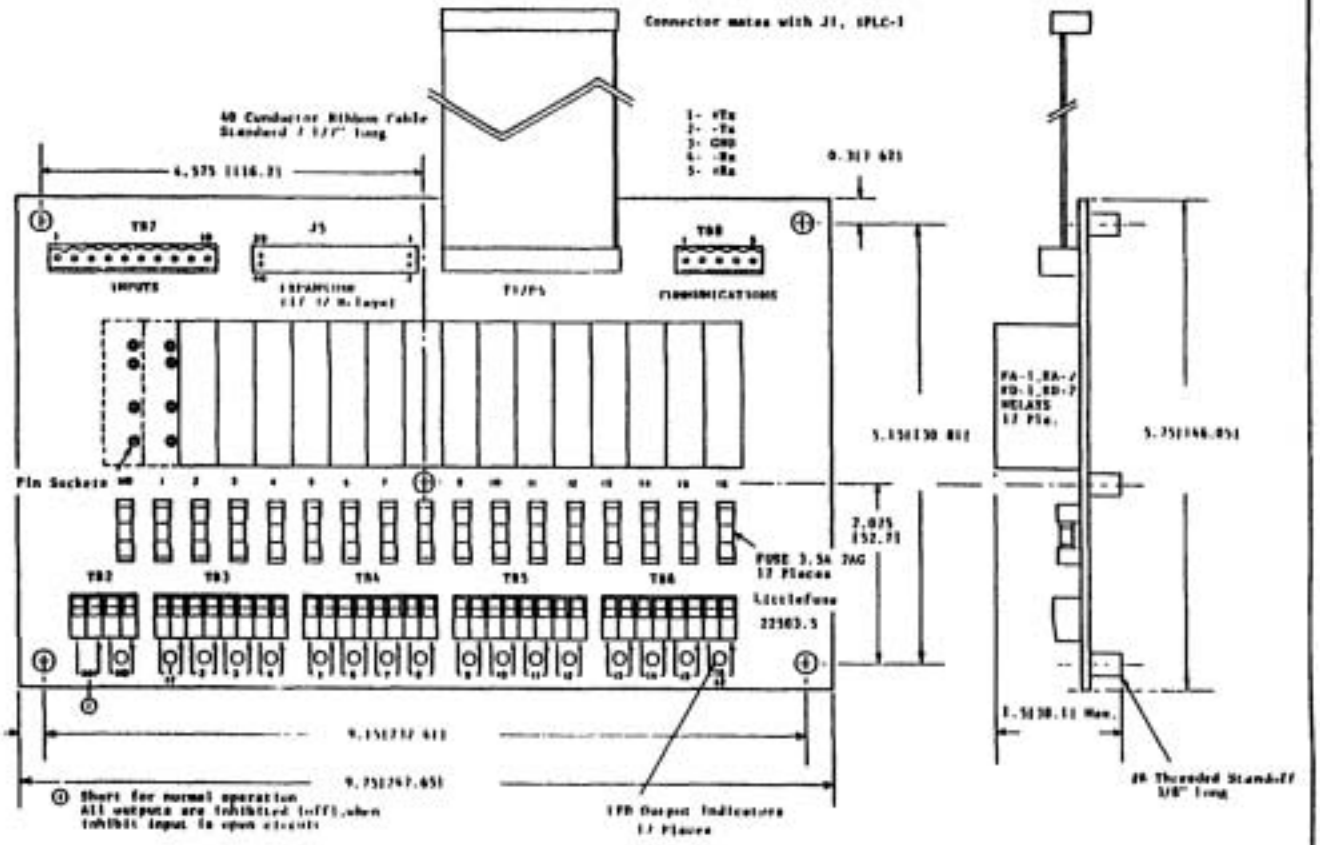
MADE IN U.S.A.


8[203.2]
4[101.6]
.218[5.54]
.218[5.54]
RECOMMENDED PANEL CUTOUT
3.5[88.9]
7.125[180.3]
8-32 UNC 2B
4 places
6[152.4] MAX.
19
1
40
2
J1 Input/Output
1
J3 Transducer
FRONT PANEL MOUNTING
TRIAD CONTROLS INC.
PressCam 7
Master Controller
DRAWN BY JR
APPROVED BY MKE
OUTLINE DRAWING
12/15/87
81010 Rev.A


7.6[193.04]
.147[3.73] Dia.
4 Holes
3.34[84.84]
7.0[177.8]
6.0[152.4]
39
1
40
2
J1 Input/Output
J3 Transducer
MOUNTING HOLE LAYOUT
1.812[46.02]
6-32 UNC 2B
4 Places
7.312[185.72]
REAR PANEL MOUNTING
TRIAD CONTROLS INC.
PressCam 7
Master Controller
DRAWN BY JR
APPROVED BY WAE
OUTLINE DRAWING
1/10/88
81011 Rev.A

TYPICAL RELAY BOARD CONNECTIONS





AC RELAYS

	KA-1	KA-2
AC line voltage — nominal	120	240
Operating voltage range	12-140	24-280
Peak repetitive voltage	600	600
Current rating (resistive) — amps	5	5
1 Cycle surge — amps peak	85	85
Output voltage drop — peak	1.6	1.6
Off-state leakage — max rms at nominal voltage — MA rms	1	1
LED Rating (+ 0.5 mA)	20	20
Breakdown — volts min	1.2	1.2
dv/dt — V/Msec	0.5	0.5
Isolation voltage — Vrms	4000	4000
Control Pick-up Voltage	3 VDC	5 VDC
Control Drop-out Voltage	1 VDC	1 VDC
Current Voltage Range	3.5-32 VDC	3.5-32 VDC
Control Input Impedance	1800 Ohms ± 10%	4800 Ohms ± 10%

ADDITIONAL SPECIFICATIONS — ALL MODELS

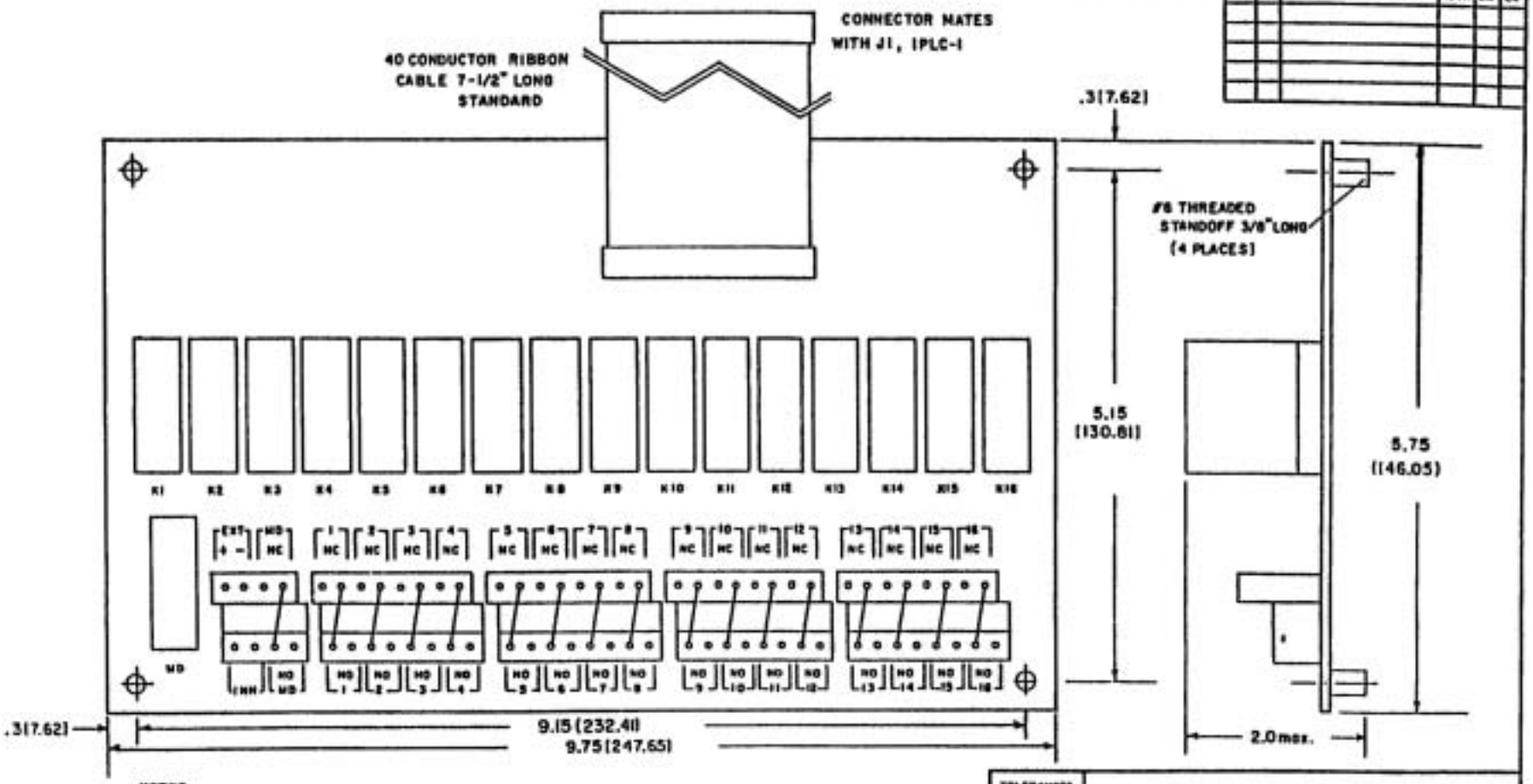
Operating Frequency: 25-65 Hz
Operating Temperature: -40°C to +100°C
Turn-on Time: 1/2 cycle maximum — zero voltage
Turn-off Time: 1/2 cycle maximum — zero current
On/Off-On Time: 200 Msec
On/Off Commutating: Unlimited for rated load at 1 power factor

DC RELAYS

	KD-1	KD-2
DC line voltage	5V	30V
Operating voltage range	4-60 VDC	4-200 VDC
Off-state blocking voltage	60 VDC	200 VDC
Current rating (resistive) — amps	2	1
1 second surge — amps	5	2
Output voltage drop at Nominal Current Output	1.5	1.5
Off-state leakage — MA at maximum operating voltage	1.0	1.0
Isolation Voltage — Vrms	4000	4000
Control Pick-up Voltage	3 VDC	3 VDC
Control Drop-out Voltage	1 VDC	1 VDC
Control Voltage Range	3-5V	3-5V
Control Input Impedance	1000 Ohms ± 10%	4000 Ohms ± 10%

ADDITIONAL SPECIFICATIONS

Operating Temperature: -40°C to +100°C
Turn-on Time: 100 Microseconds
Turn-off Time: 150 Microseconds



NOTES:

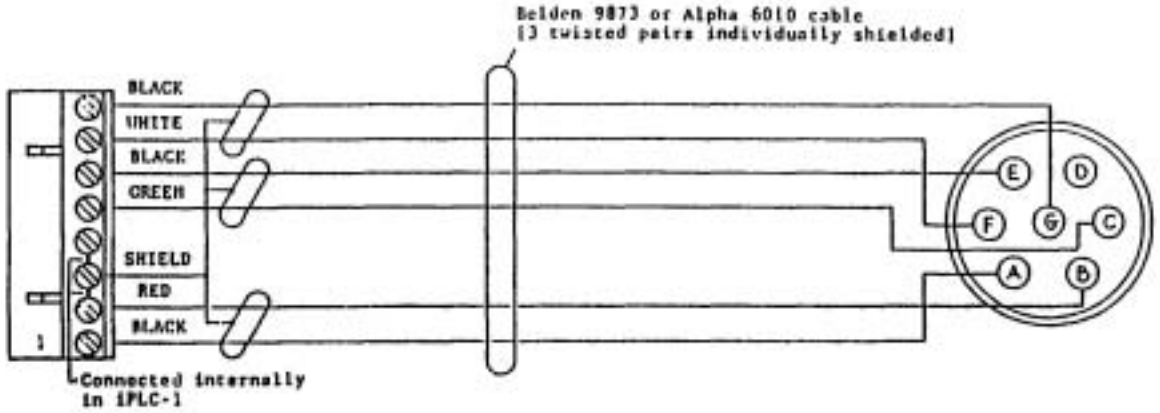
K1-K16,MD - Omron relay G2R-1125-V-US, 12Vdc coil, SPDT contact 10A @ 250Vac, 10A @ 30Vdc.

Input and output terminal blocks are Phoenix Contact MSTB1.5/5.08 plug-in type.

Short INH input for normal operation. All relays are inhibited (off), when INH input is open circuit.

Connect +12Vdc @ 1A max. relay supply to EXT input.

TOLERANCES	TRIAD CONTROLS INC.
RM-1	DRAWN BY JR
	APPROVED BY WSE
MECHANICAL RELAY BD. OUTLINE DRAWING	
12/13/87	81014

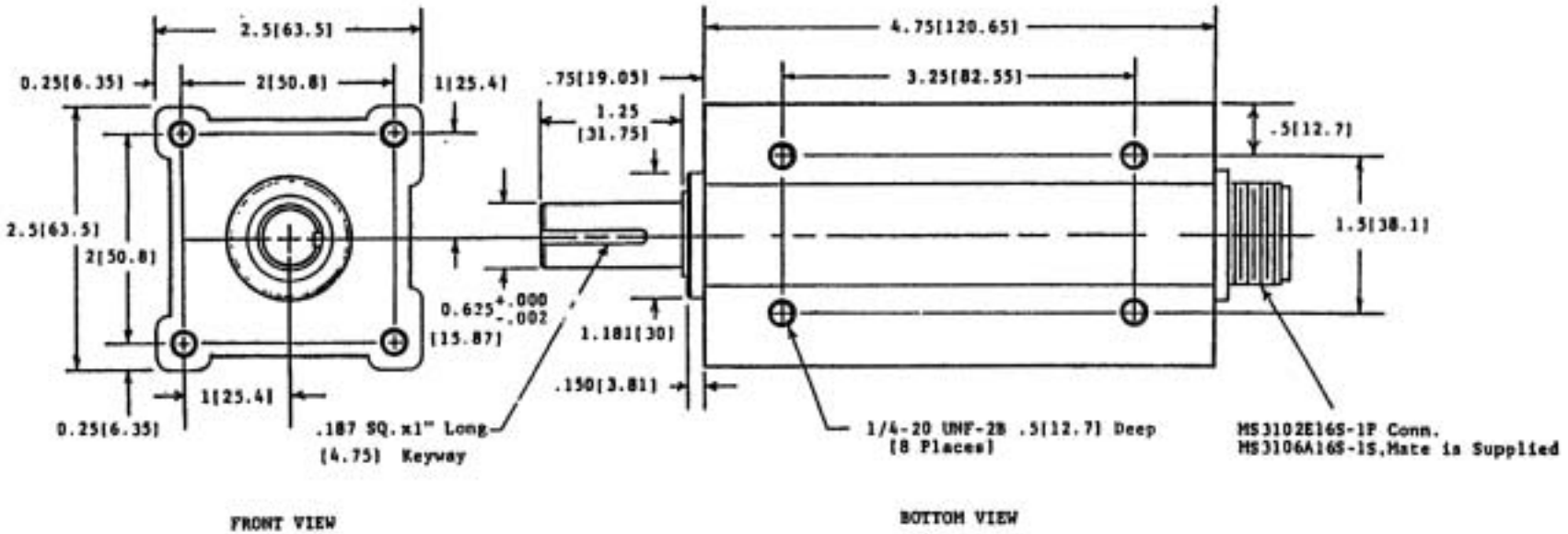


Buchanan SSB4V08S Connector

MS3106A16S-1S Connector
(mates with HT-20 output conn.)

Connections are for CW increasing readings
(looking at transducer shaft), for CCW increasing
readings, reverse C & E

TOLERANCES	TRIAD CONTROLS INC.
DECIMAL	CT -(X) X- Length in Feet
SCALE	DRAWN BY JR APPROVED BY WSE
FRACTIONAL	TITLE TR-20 TRANSDUCER CABLE CONNECTION DWG.
ANGULAR	DATE 12/11/87
	DRAWING NUMBER B10:3



FRONT VIEW

BOTTOM VIEW

MECHANICAL SPECS.

Max. Starting Torque @ 25°C.		8 oz.in.
Moment of Inertia		45 gm-cm.^{2}
Max. Slew Speed		5000 rpm.
Max Shaft Load	Radial	400 lbs.
	Axial	200 lbs.
Weight		4 lbs.

ENVIRONMENTAL SPECS.

Shock	200g for 11 msec.
Vibration	20g to 2000 Hz.
Operating Temp	-20 to 125°C
Enclosure	Nema 13

INCHES/[MM]

TOLERANCES	TRIAD CONTROLS INC.	
DECIMAL	TR-20 TRANSDUCER	SCALE: DRAWN BY WKE; APPROVED BY PB
FRACTIONAL	TITLE: OUTLINE & SPEC. DWG.	
ANGULAR	DATE: 12/13/87	DRAWING NUMBER: B1001

MADE IN U.S.A.

K+E ALBANENE ® 10 2405 ENGINEERS STANDARD FORM

MODEL TR-20 RESOLVER ENCODER EXPLANATION

INCREMENTAL vs ABSOLUTE

There are two basic types of shaft angle encoders - incremental and absolute. An incremental encoder provides an output that describes a change in shaft position (series of pulses), while an absolute encoder indicates the actual position of the shaft. Incremental encoders require auxiliary up-down counting circuits to accumulate the number of ouput pulses and thus indicate finite changes in shaft position, ie. encoded position is an accumulation of all prior shaft movements.

Incremental encoders, although less expensive than absolute types, have several disadvantages. Since encoders tend to be used in interference-prone environments, there is always a danger that a noise pulse will create a false count which will remain unless corrected. A similar probelm results if the shaft position is changed during power down conditions. Also during the power down period, the accumulated count (shaft position data) will be lost unless a non-volatile memory is used. Errors can also be accumulated if the encoder shaft is accelerated or decelerated in excess of the counters ability to follow such changes. Self-correction or synchronization can minimize these problems by recycling the shaft through mechanical zero, while resetting the counters to zero (not always possible). Absolute encoders are not upset by power down conditions but can be affected by noisy environments and high shaft accelerations, although only for the duration of the disturbance. Unlike incremental systems, after the disturbance has passed, the output data will be correct. Therefore, synchronization is not necessry.

PRESSCAM 7 MODEL TR-20 SERIES RESOLVER ENCODER

Model TR-20 series encoder is a single resolver input system which can be programmed as an absolute single turn encoder.

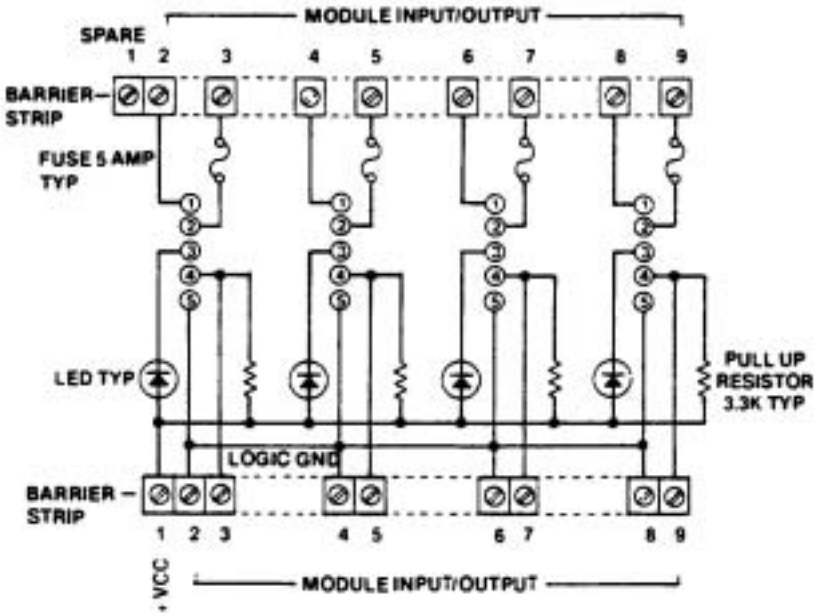
4 POSITION SINGLE CHANNEL MOUNTING RACK

MODEL PB4

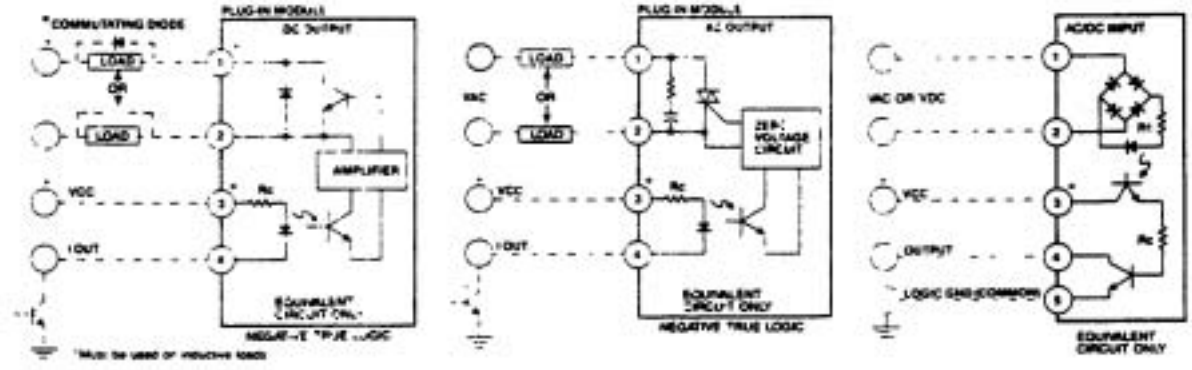
DESCRIPTION

The PB4 mounting rack is designed for use with either single channel input or output modules in applications which require barrier strips on both the field and the logic sides.

SCHEMATIC



TYPICAL SINGLE CHANNEL PLUG-IN I/O MODULES



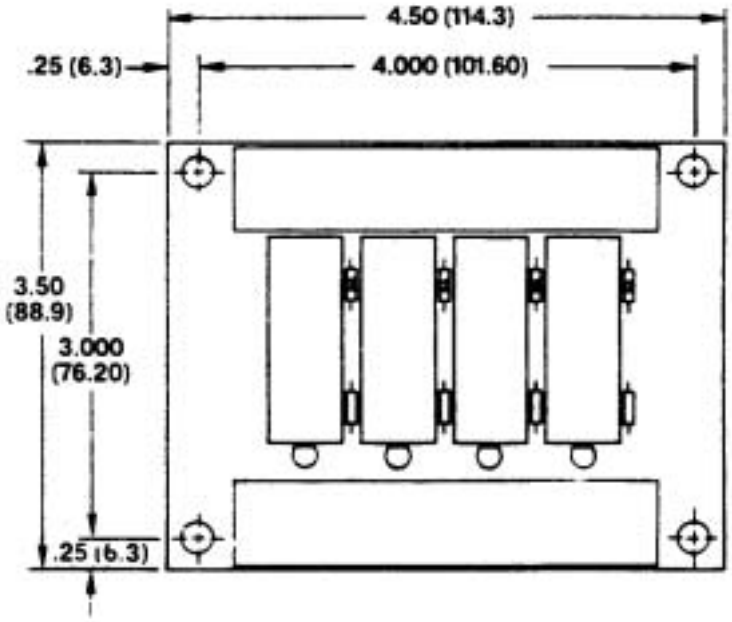
4 POSITION
SINGLE CHANNEL
MOUNTING RACK

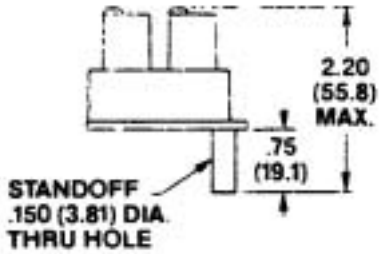
MODEL PB4

SPECIFICATIONS

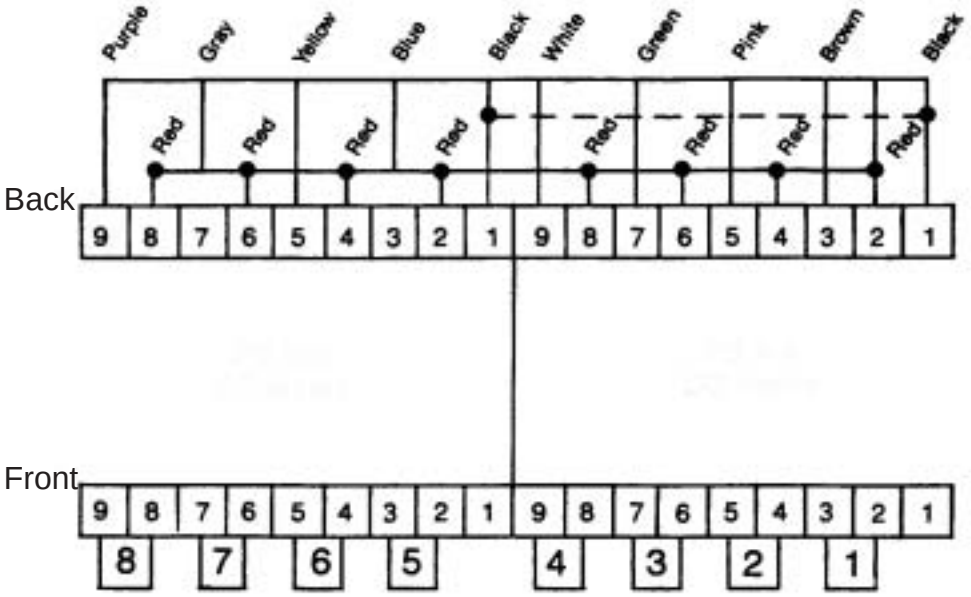
Operating Temperature:	0 to +70°C
	95% relative humidity, non-condensing
Interface Connector	(Field) 6-32 screw terminals
	(Logic) 6-32 screw terminals

DIMENSIONS



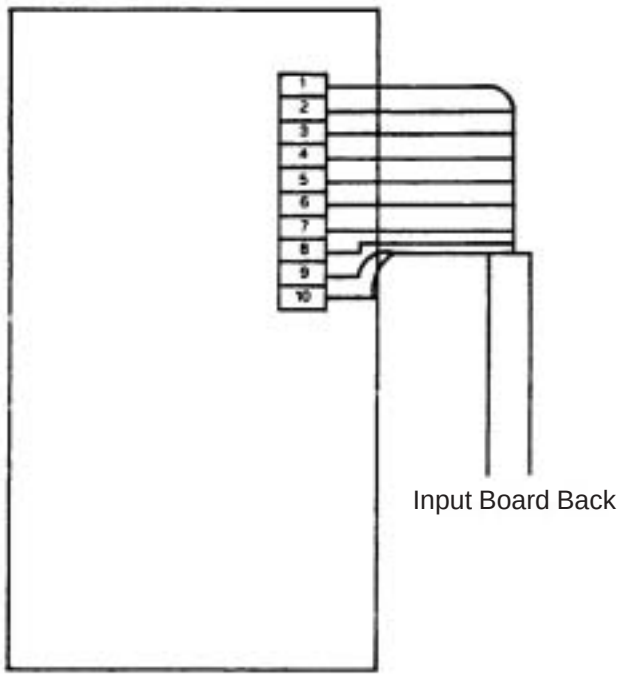


PB 4 WIRING



INPUTS

LSide



1-Brown
2-Pink
3-Green
4-White
5-Blue
6-Yellow
7-Grey
8-Purple
9-Red
10-Black

IDC-15 AND IAC-15 INPUT MODULES
Single Channel - Plug In

DESCRIPTION

The IAC-15 and the IDC-15 input modules are used for sensing on/off alternating current (AC) or DC voltage levels. Both styles of input module are designedd with filtering on the input and a hysteresis amplifier for high noise rejection and transient free “clean” switching. Each module provides up to 4000 Vrms of optical isolation between the field inputs and the logic side of the circuit.

Typical uses and applications include sensing the presence of absence of voltage or sensing contact closures.

FEATURES

Industry Standard Plug in Module
4000 VAC Optical Isolation
VL Recognized #E58169
CSA Certified #35852
Operating Temperature: -30 to +70°C

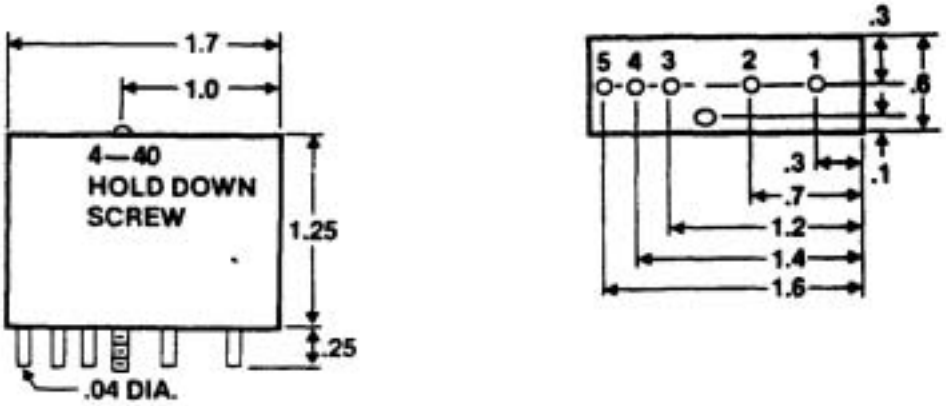
SPECIFICATIONS

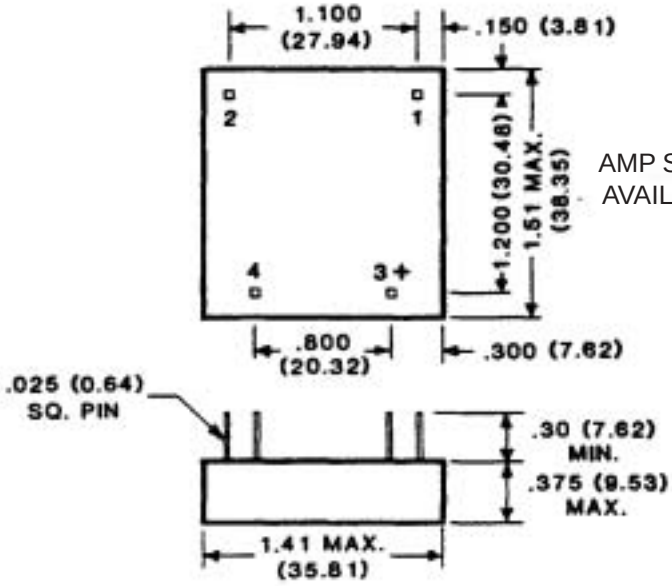
Operating Ambient Temperature	-30 to +70°C
Isolation Input-to-Output	4000 Vrms
Output Voltage Drop	.4 Volts at 50 mA
Output Current	50 mA
Output Leakage with no Input	100 microAmps max. at 40 VDC
Output Transistor	30 Volt Breakdown

	UNITS	IAC15	IDC15
Input Voltage Range	VAC	90-140	12-32
Input Current at Max. Line	mA	11	25
Turn On Time	mSec	20	5
Turn Off Time	mSec	20	5
Input Allowed for No Output	mA,V	3,45	1,3
Logic Supply Voltage-Nominal	VDC	15	15
Logic Supply Voltage Range (Vcc)	VDC	12-18	12-18
Logic Supply Current at Nominal Logic Voltage*	mA	15	15
Input Resistance (R1 in Schematic Diagram)	Ohms	14k	1.5k
Control Resistance (Rc in Schematic Diagram)	Ohms	1k	1k

AC and DC Input Modules -- Single Channel Plug In

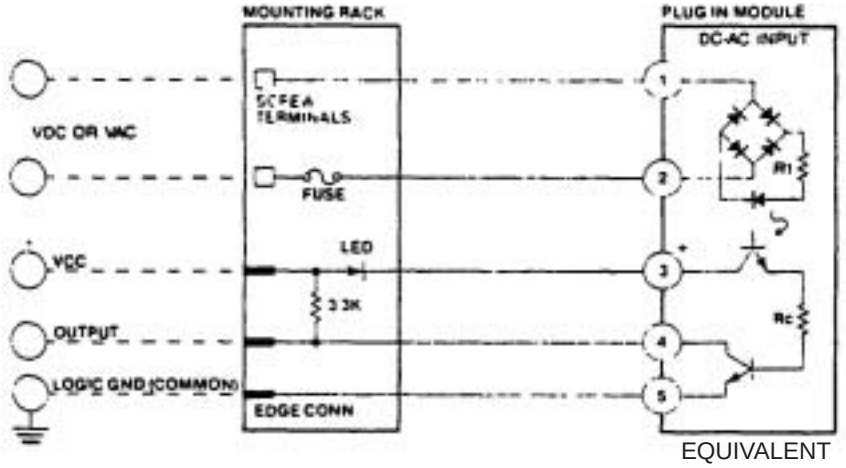
DIMENSIONS



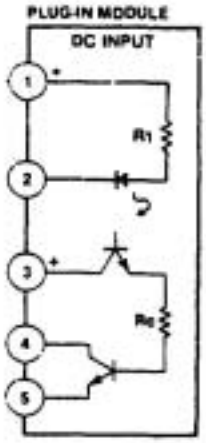


AMP SOCKET #50864-7 IS AVAILABLE FOR PLUG-IN APPLICATION

SCHEMATIC



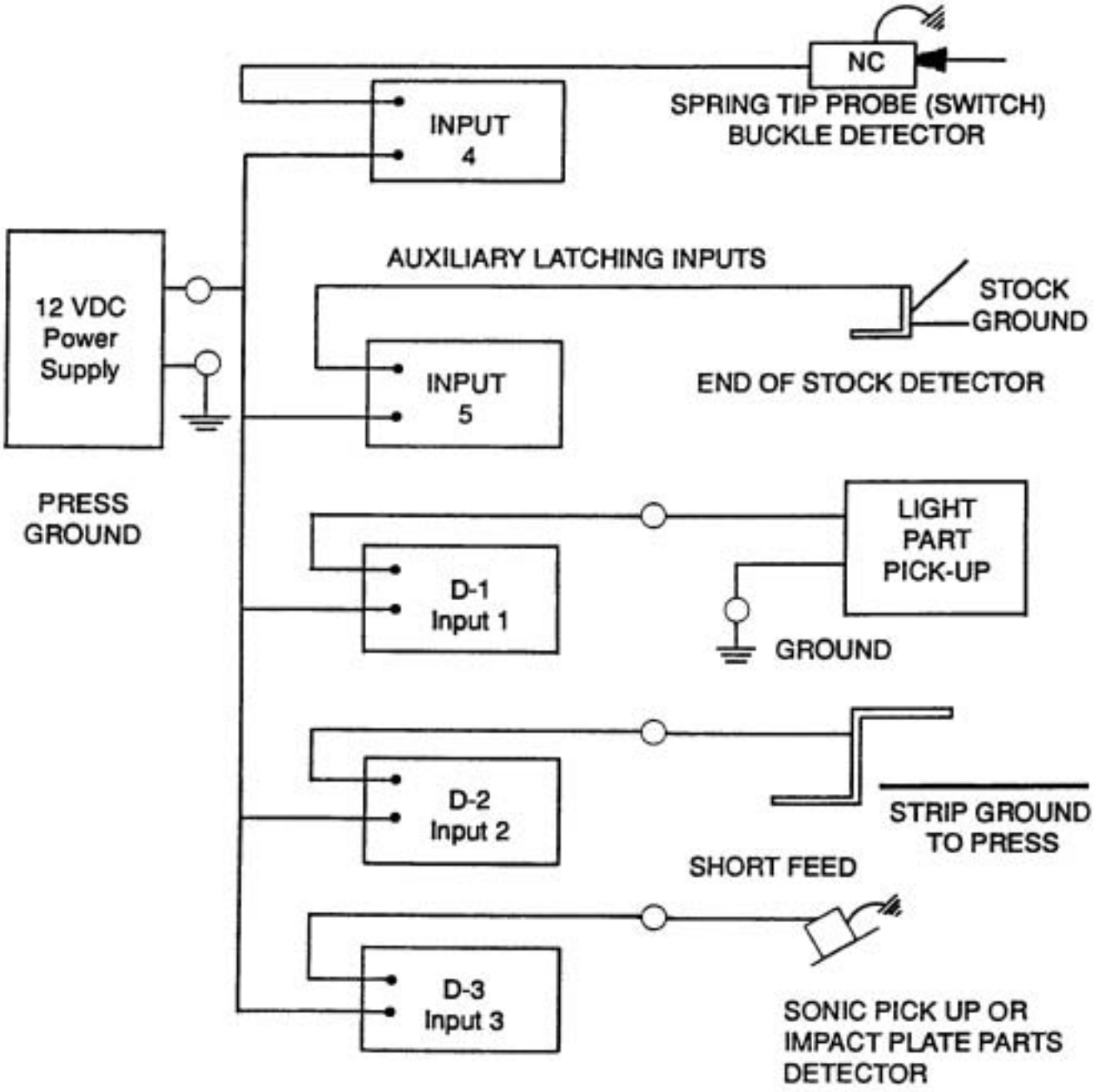
EQUIVALENT CIRCUIT ONLY
NEGATIVE TRUE LOGIC



EQUIVALENT CIRCUIT ONLY
NEGATIVE TRUE LOGIC

PressCam 7 Die Protection

(Typical Layout)



PRESSCAM 7 REPLACEMENT PARTS

PART #

PressCam 7 PressCam 7 Controller only.....

TR-20 Nema 13 Brushless Resolver Transducer.....

RB-1 Solid State Relay Board.....

MRB-1 Mechanical Relay Board.....

EN-1 PressCam 7 Controller Console Enclosure (Nema 12).....

CT-(X) Transducer Cable (X) = Total length in feet including connectors.....

CR-(X) Relay Board Cable (X) = Total length in feet including connectors.....

MS-16 TR-20 Mating Connector.....

PB-4 Four position mounting rack board.....

IAC-15 120 VAC Input Module.....

IDC-15 10-32 VDC Input Module.....

Relays One required for each channel used (maximum 16)

Part #

1. KM-1 Mechanical Relay: 12 VDC coil, SPDT Contact 10 A @ 240 VAC
2. KA-1 Solid State Relay: 120 VAC @ 3 Amps.....
3. KD-1 Solid State Relay: 60 VDC @ 3 Amps.....

WARRANTY

Manufacturer warrants that this product will be free from defects in material and workmanship for a period of one year from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned to it with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction, and use not in accordance with manufacturer's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

DISCLAIMER

The provisions of the paragraph "Warranty" are the sole obligations of the manufacturer and exclude all other warranties of merchantability, expressed or implied.

Further, there are no warranties which extend beyond the above warranty.

LIMITATION OF LIABILITY

In the event of any claim or breach of any obligations of manufacturer under any order, whether expressed or implied, and particularly in the event of any claim or a breach of the warranty or warranties contained in the paragraph "Warranty" or of any other warranties, expressed or implied which might, despite the paragraph entitled "Disclaimer," be determined to be incorporated in any order, the company shall under no circumstances be liable for any consequential or special damages, either in law or in equity, or for losses or expenses or claims for the same arising from the use of, or inability to use, the products of the manufacturer for any purpose whatsoever.

WARNING: The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.

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Customer Service (630) 443-9320

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We cannot and do not accept responsibility for any overall system performance when factors, such as these, are beyond our control.

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