PressCam 8

Installation & Operations Manual

SAFETY INSTRUCTIONS

⚠WARNING

Read and fully understand this manual. Failure to do so could result in death or serious injury.

Pressroom Electronics™

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

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

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to physical injury.

Safety Instructions (or equivalent) signs indicate specific safety-related instructions or procedures.

Machinery Guards and Controls

✓ for info

- ☐ **Punch Press Controls** (Resolver or Rotary Cam Based)
- ☐ **Punch Press Automation Controllers**
- ☐ **Time-Based Brake Monitors**
- ☐ **Mute-out Packages**
- ☐ **Components & Accessories**
- ☐ **Brake Performance Tester**
- ☐ **PressCam 8-"Control Reliable" Punch Press Automation Controller**

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Proper Usage and Warnings

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You MUST read and fully understand the following information pertaining to the proper use and limitations of your PressCam 8:

- The PressCam 8 MUST be installed by qualified personnel only.
- The PressCam 8 MUST NOT be used on full revolution presses or any machine that cannot be commanded to stop at any time.
- The press on which the PressCam 8 is installed MUST meet OSHA 1910.217 regulations which include inspection and maintenance procedures that MUST be followed to meet these regulations. And is highly recommended that the press meet current ANSI B11.1-2009 standards. The manufacturer WILL NOT take responsibility for improperly maintained machinery.
- The PressCam 8 MUST be checked out before put into use, follow this manual for the proper procedures.
- The PressCam 8 SHALL NOT be modified or repaired except by qualified personnel and/or upon authorization of the manufacturer. Never operate machinery that is not in full working order.
- Make sure that all maintenance people, machine operators, die-setters, foremen, and supervisors have read and understand this manual.
- All procedures in this manual MUST be followed. The manufacturer WILL NOT take responsibility for operation if all procedures and warnings listed in all manuals are not followed.

Warranty

Manufacturer warrants that this product will be free from defects in material and workmanship for a period of two years from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned 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 person's 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 not warranties which extend beyond the above warranty.

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This equipment has been designed to the very highest performance and safety standards known to the current technological state of the art. However, the installation, usage, suitability, and fitness of our equipment for any purpose, known or unknown, is interdependent upon the performance of other equipment not manufactured, installed, or secured or maintained by the manufacturer.

We WILL NOT and DO NOT accept responsibility for any overall system performance when factors, such as these, are beyond our control.

⚠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.

Warning on Actuating Press Valves

⚠WARNING Control Reliability requires that all Press's use only monitored DUAL SAFETY VALVES for the CLUTCH and monitored DUAL SAFETY VALVES on the BRAKE systems. Never operate a Press that uses a monitored DUAL SAFETY VALVE system on the CLUTCH but not the BRAKE (or vice versa). Dual Safety Valves used on press clutch/brake applications must be rated by the manufacturer for use on press clutch/brake applications.

PressCam 8

Installation and Operation Manual

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PressCam 8 (all styles, Front panel & Stand alone)

Ordering Procedure

1. **Specify Mounting Style**
   F ..... Front Panel Mounting to be installed in an existing control panel.
   C ..... Stand alone NEMA12 enclosure
   T ..... Stand alone NEMA12 enclosure with room for the Tonnage Module
2. **Specify Output Relays (13)**
   M ..... Mechanical Dry contact relays SPDT 10A@250VAC
   A ..... AC Solid State - single Pole N.O. 3A@140VAC, 12-140VAC, 25-70Hz
   D ..... DC Solid State - single Pole N.O. 3A@60VDC, 12-60VDC
3. **Specify Controller input power**
   1 ..... 24VDC
   2 ..... 120VAC 50-60Hz
   3 ..... 240VAC 50-60Hz
4. **Resolver Connector Cabling**
   30' (9m) of cable with connectors is supplied standard. If additonal length is needed, specify in feet, 150' (46m) maximum.
5. **Specify Tonnage Monitoring (optional)**
   T1 ..... One Channel monitoring with strain sensor and cable
   T2 ..... Two Channel monitoring with strain sensor and cable
   T3 ..... Three Channel monitoring with strain sensor and cable
   T4 ..... Four Channel monitoring with strain sensor and cable

Example Part #

PC8	-	C	-	2	-	M	-	30'	-	T4
		Style		Power		Relays		Resolver		Tonnage

Tonnage Monitoring (optional)

T1	One channel monitor module with strain sensor and cable
T2	Two channel monitor module with strain sensor and cable
T3	Three channel monitor module with strain sensor and cable
T4	Four channel monitor module with strain sensor and cable

System Overview

The PressCam 8 is a resolver-based press automation controller that incorporates a programmable cam limit switch, timed brake monitor, four counters, die protection system, and (optional) tonnage monitor in one complete package. The unit contains two 16-bit computers that are configured to cross check each other as well as the resolver and cable every cycle of code. All faults generate descriptive error messages and special watchdogs shut down the system should either computer become erratic. The software can be upgraded in the field using a PC computer with a standard serial port.

Features

- Up to seven Limit Switch outputs can be set to cycle (non-timed) up to three times per crank rotation by setting an open / close crank angle.
- The last four outputs can be set for timed, non-timed, delayed and hold or cycled two times per crank revolution.
- The five additional outputs are used to indicate when the batch counter is reached, sensor faults, general faults, and motion detection.
- The first thirteen outputs can be either solid-state (AC or DC) or relay logic. The last three are force-guided (Form B Safety) relays between the begin/end crank angles. A missed transition outside the declared window will generate a die sensor fault.
- Brake and die sensor inputs are optically coupled and can be either AC or DC (sourcing or sinking).
- Up to 75 Jobs can be saved using nonvolatile memory chips. These memory chips are removable for ease of transfer. Each job number stores a name and/or number up to 13 characters for easy identification.
- Built-in Brake Monitor will issue a warning when the programmed warning time is exceeded and will issue a failure signal when programmed stop time is exceeded.
- True Motion Detection system that checks for Lack of Motion (Motion Fault) and Unintended Motion (Drift Fault).
- SPM Indicator (Strokes per Minute).
- Crank angle shown graphically and in large numbers.
- Speed compensation of user selected outputs.
- Servo feed setup.
- Stroke, Batch, Quality, and Part Counters to keep track of operation.
- Digital contrast adjustment of LCD screen.
- Password and/or Supervisory Controlled Selector Switch to prevent altering of parameters, except counters and LCD contrast.
- Four-channel tonnage monitoring.
- PCLink to allow offline job storage and creation.

Specifications

Input Power

3 VOLTAGE RANGES:
24 VDC (optional)
120 VAC (standard)
240 VAC (optional, jumper selectable)
All AC voltages work with 50 or 60 Hz
24 watts with all relays

Fuses

I/O board

F1 to F16	LS Outputs	5A Fast Blow (20-023)
F17	Power	1A Slow Blow (20-022)
F18 to F33	DIE Inputs	5A Fast Blow (20-023)
F35	12VDC	5A Fast Blow(20-023)

Computer

F1	Power	5A Fast Blow (20-023)

Indicator

Computer Monochrome LCD display 640 x 480 (8” Diagonal)

-LCD BIAS	(GRN)	D16
Vpp	(YELL)	D2
-5v	(GRN)	D10

I/O Board +12Vdc (RED) D35

17 Optically Coupled inputs (Die’s are YEL & 12VDC, Brake is RED & 120VAC)

13 Solid-State or mechanical relay outputs (Form C output). Customer must specify which type of output (i.e., AC or DC, Voltage Range, Solid State or Relay 5A SPDT) (GRN)

3 Force guided/monitored relay outputs (N.O. output 8A) (GRN)

D52 = RED (power down indicator)
D53 = RED (AUX)

Introduction

Set Points

STROKE COUNT:	0 to 999,999	strokes
BATCH COUNT:	0 to 999,999	strokes
QUALITY COUNT:	0 to 999,999	parts
PART COUNT:	0 to 4	parts/stroke
	0 to 999,999	parts total
BATCH SIZE:	0 to 999,999	strokes
Limit switch angle:	0 to 359	degrees
Limit switch timer:	0 to 9999	milliseconds
Die sensor angle:	0 to 359	degrees
Speed Compensation:	0 to 99	degrees
MIN SPEED:	0 to 999	SPM
MAX SPEED:	0 to 999	SPM
Brake WARNING:	1 to 999	milliseconds
Brake FAILURE:	1 to 999	milliseconds
Brake ACTUAL:	1 to 999	milliseconds (+/-1 millisecond accuracy)
MOTION:	0 to 5.9	seconds (1/10-sec increments)
DRIFT:	preset to 2	SPM (1/10 SPM increments)
Crank Angle:	0 to 359	degrees (1° increments)
SPM:	0 to 999	strokes/minute (+/- 1 SPM accuracy)

Resolver

+/- 1º Resolution up to 600 RPM (+/- 2º Resolution from 601 to 1000 RPM)
Shaft loading: Radial 400 lbs., Axial 200 lbs.
Standard cable 30’ (maximum length of 600’)

Construction

Stand Alone Unit
All 18 Gauge painted steel NEMA 12 lockable box with sealed front panel (see dimensional information in *System Installation* section).

Panel Mount Unit
All 18 Gauge painted steel NEMA 12 lockable box with sealed front panel (see dimensional information in *System Installation* section).

Temp. Range

0 to 50ºC

Dimensions

See “System Installation” section.

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.

Important Notes

- When using step down or isolation transformers make sure to ground one side to prevent the Neutral from floating above ground and causing the surge suppressors (MOV's) to short out.
- The resolver cable must be kept away from high current and/or high voltage lines, or run in its own conduit to prevent excessive noise from causing nuisance faults to occur.
- All remotely wired switches, buttons, etc. must use shielded cable and be kept away from high current and/or high voltage to prevent nuisance faults.
- If you use the +12VDC source on the I/O board for die inputs, **do not bring a wire from the "GND" terminal out to your machine.** Simply connect the "GND" to the earth ground and use the machine itself as the ground.

Resolver Mounting

The resolver may be driven directly through a Lovejoy coupler, gear and chain, or timing belt.

If a chain or belt is used, it must be set for a 1:1 ratio. CW or CCW rotation can be setup by changing the lead configuration. Bring the press up to top dead center and set the new top dead center (see "Speed Compensation" in *Function Description* section of this manual for instructions).

Refer to Drawing #28-100 for Resolver Dimensions & Wiring as well as Drawing #28-101 for Internal Wiring at the end of this section.

Controller Mounting

Control Box Mount. If you purchased a PressCam 8 in its own enclosure, then the I/O board is already mounted inside the box so it is only necessary to find a location with good access and clearance to prevent the LCD from being damaged from the door hitting nearby objects. If the location has vibration, you must shock mount the box to prevent damage.

Four mounting holes are all that is necessary to mount the box (see Drawing #28-102 for dimensional layout and Drawing #28-101 for wiring diagram in this section).

Panel Mount. If you purchased a PressCam 8 without its own enclosure then you must find a location on your control cabinet that will allow you to mount the I/O board as close as possible to the PressCam 8 controller. There is a 40 pin ribbon cable that connects both boards together and must remain as short as possible to prevent nuisance faults due to electrical noise getting into the system through this cable. If the controller is to be on a door, make sure that when the door is opened nothing will come into contact with the LCD. Mounting the unit closer to the hinge is probably a good idea. Cut out a hole in your control cabinet and drill eight mounting holes. Insert the PressCam 8 into the hole and install the eight #6 keps nuts. Refer to Drawing #28-103 for Panel Cut-Out Dimensions, Drawing #28-104 for Control Panel Dimensions, and Drawing #28-101 for Internal Wiring on the following pages.

I/O Board Mounting. If you are installing a panel mount unit, then mount the I/O board as close as possible to the panel mount controller. Dress the 40 pin ribbon cable between the controller and the I/O board to find out how long the cable needs to be. Cut the excess cable and crimp on the 40 pin connector making sure the arrow on the connector points to the red lead of the cable (just like the other end of the cable). Use an arbor press, or similar, to squeeze both halves of the connector around the cable. Be sure to keep the cable straight while crimping, otherwise, the cable contacts will be shorted. Refer to Drawing #28-104 for Control Panel Dimensions and Drawing #28-101 for Internal Wiring on the following pages.

Internal System Wiring

1. Assemble 40 pin cable and install between control unit (P1) and I/O board (P1). Be sure to watch for pin1.
2. Install resolver cable between resolver and control unit (J11).
3. Install five wire power cable and install between I/O board (J9) and control board (J1).
4. Install tuning knob cable on J2 (left side) on control board.
5. Install RUN/PROG key switch cable on J5 (right side) on control board.
6. Install LCD cable to J14 on control board.
7. Install LCD inverter cable to J3 on control board.

See Drawing #28-101 for wiring diagram in this section.

External Wiring Installation

Power

Power for the entire PressCam 8 system is brought in through connector J7 on the I/O board.

Power for the control board J1 comes from J9 on the I/O board.

See Drawing #28-105 for the External Wiring Diagram in this section.

Die Inputs

- All inputs used are optically coupled and can be either 12 to 24VDC or 120VAC (optional). The voltage type must be selected before hand.
- Standard setup: all inputs are setup for 12 to 24VDC except for the brake/clutch input which is setup for 120VAC.
- Terminals 17 & 18 are dedicated for the brake/clutch signal.
- Terminals 1 to 12 are Die Sensor Inputs and use the terminal just to the right of 12 as their common.
- Terminals 13 to 16 are Die Sensor Inputs and use the terminal just to the left of 13 as their common.
- Tie the common terminals to the +12VDC terminal of J6 for systems with sensors that go to ground when closed.

Example: Connect the output from all die sensors to terminals #1 to #12, then connect +12VDC from J6 on the I/O board to the COM terminal (just below terminal #12 on the I/O board).

See Drawing #28-105 for External Wiring Diagram in this section.

LS Outputs (1-11)

- There is space for eleven limit switch outputs and one counter output, and four fault outputs.
- The first thirteen outputs use either a solid-state or mechanical relay modules. The solid-state modules are selected for either AC or DC and for the proper voltage/current range.
- Determine the output logic you need for your press control (i.e., Sinking, Sourcing, AC).
- For solid state outputs, the “NO” terminals are the + positive side, and the “C” terminals are the -ground side. For relays, all terminals are DRY contacts and the terminal labels are correct.
- For Sinking DC systems, you must ground the “C” terminals and your output is provided at the “N.O.” terminal. When the output LED is on, the “N.O.” terminal will pull down to ground.
- For Sourcing DC system, you must place a DC voltage on the “N.O.” terminal (the voltage level must be within the range written on the module) and your output is provided at the “C” terminal. When the output LED is on, the “C” terminal will provide voltage. This is the fastest and simplest method of wiring.
- For an AC system using solid state outputs, you must apply line voltage to either terminal “N.O.” or “C” and take the output for the other terminal.
- For relay systems, all terminals are DRY and provide you with simple N.O. and/or N.C. switches. You can place any voltage and current (up to 1/2 the relay rating) on the terminals.

See Drawing #28-105 for External Wiring methods in this section.

Outputs (12-16)

The speed, die fault, and general fault outputs should be placed in stop circuits of the machine. The counter output #12 should be placed in an alarm or top stop input of the machine control.

See Drawing #28-105 for External Wiring and Drawing #28-106 for Terminal Chart in this section.

Chain Driven Resolver Installations

⚠CAUTION Normally the Resolver is mounted at one end of the Press Crank Shaft and directly driven 1:1 through a Coupler.

If it is not possible to directly couple the Resolver to the Crank Shaft, and you are forced to use a Chain, you MUST follow the guide below:

1) **You MUST install a Resolver "Spring Plate" device PN# 39-149 with a "Chain Break" microswitch wired in series with your STOP or ESTOP circuit.**
2) **The Chain & Sprocket must keep the Resolver and Crank Shaft 1:1 (PN# 52-308 Chain & Sprocket)**
3) You will probably need to install an idler pulley along the chain to take up slack and bounce in the chain that may cause Faults during operation.

(Below) Shown with Resolver mounted to the Spring Plate:

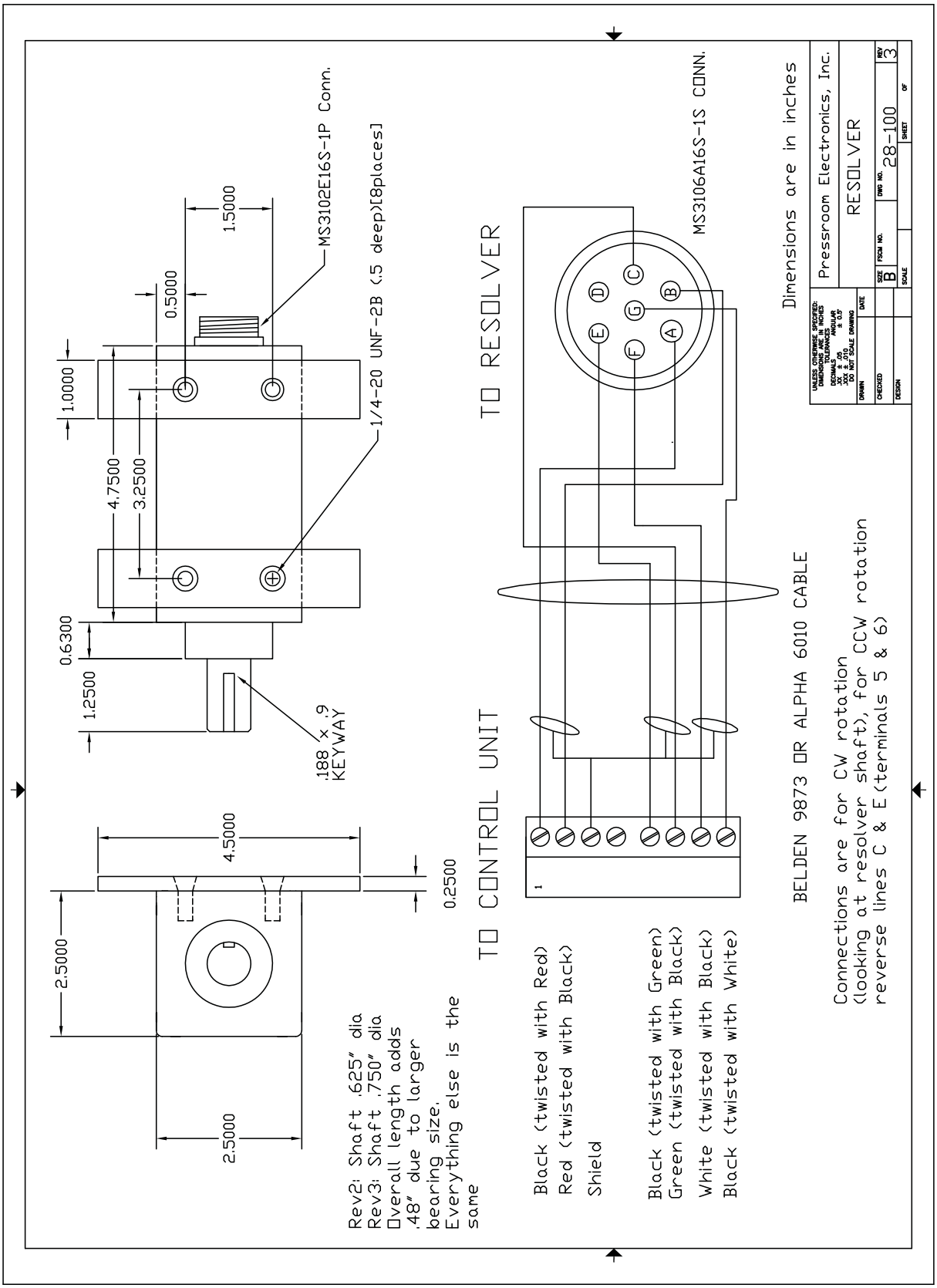
System Installation

Resolver Dimensions & Wiring (#28-100R3)

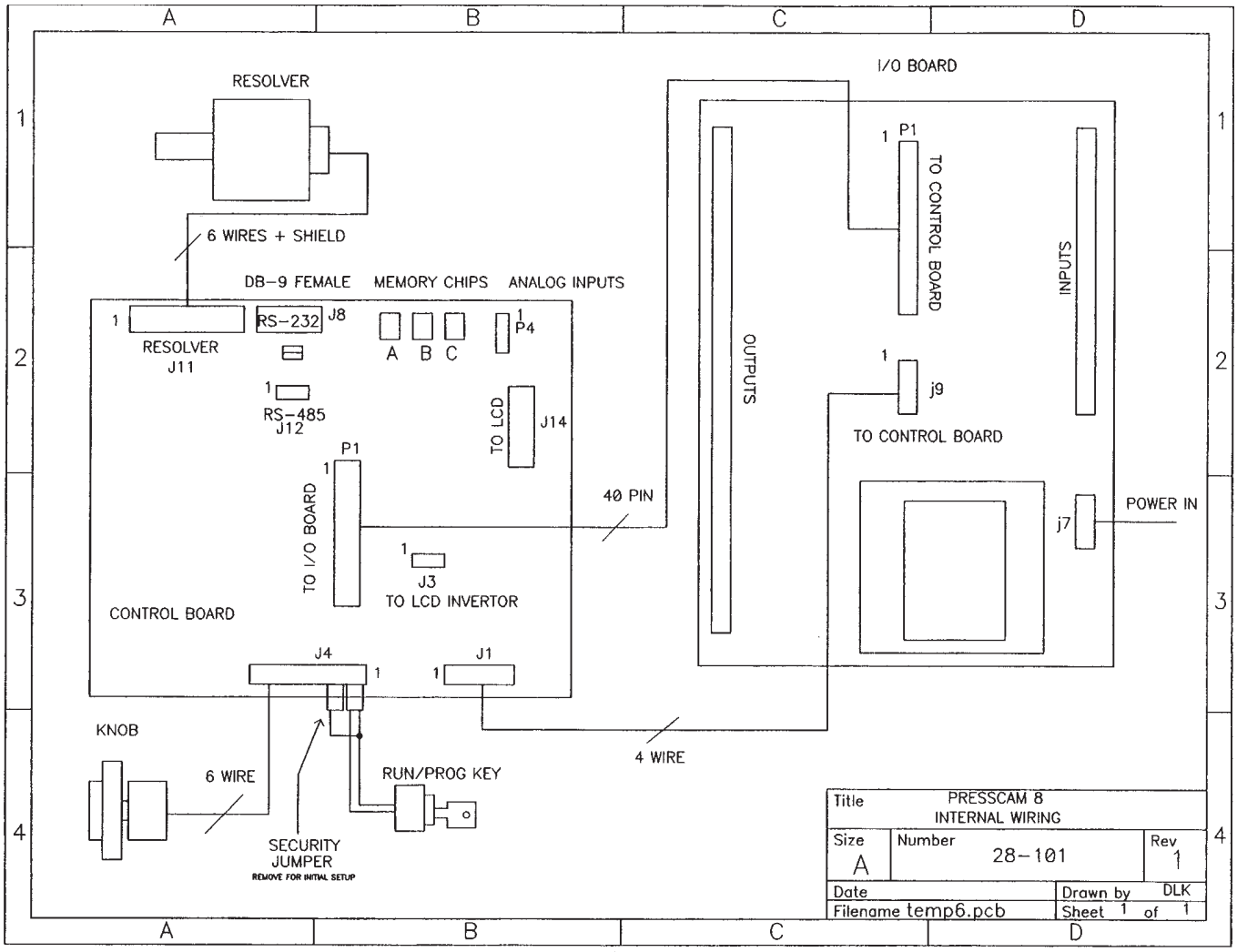
SAFETY INSTRUCTIONS

⚠CAUTION For Chain driven Resolvers, you MUST Install Chain Break detection, please refer back to page 5 for installation requirements.

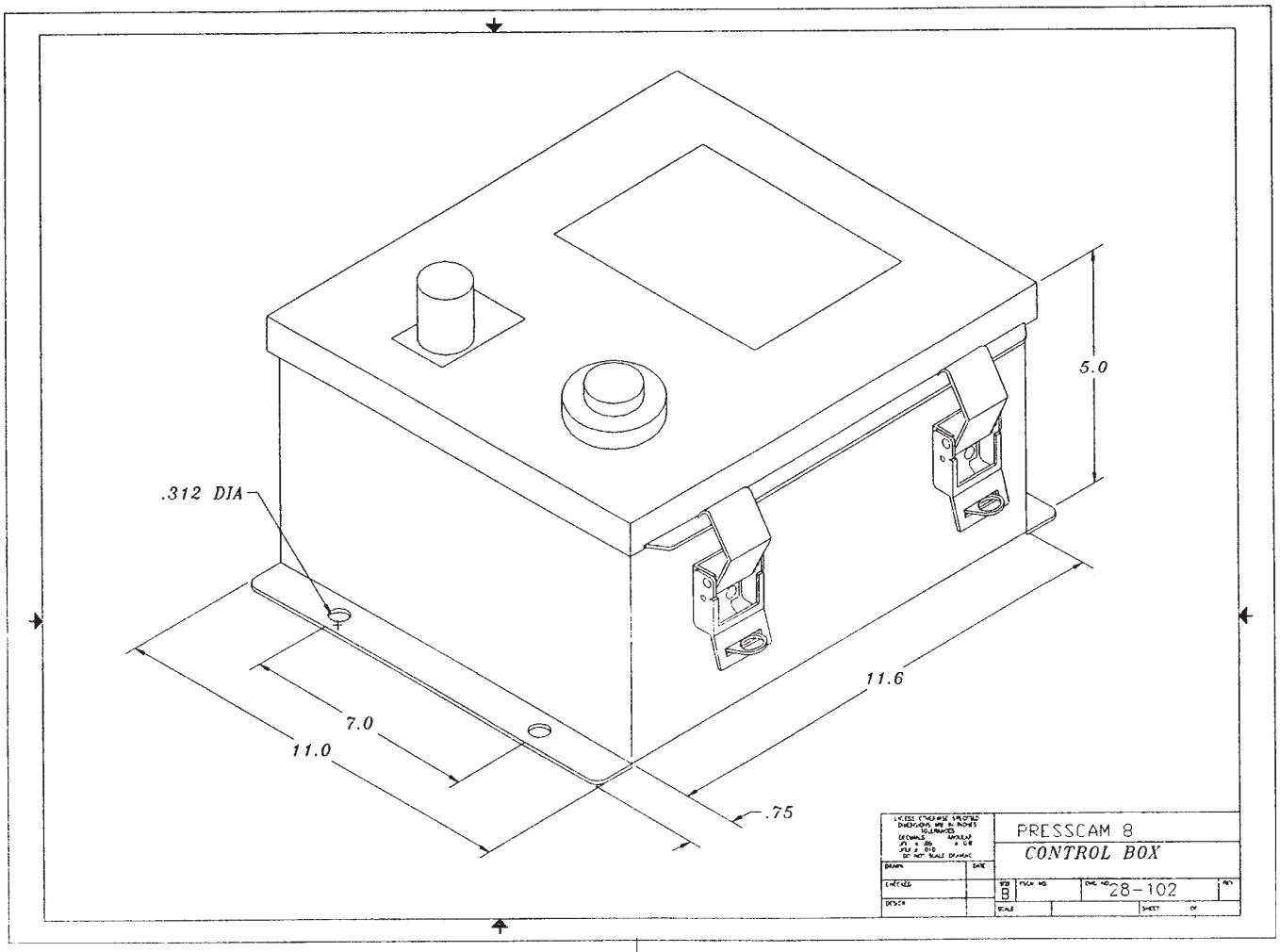
Dimensions in inches
For millimeters multiply by 2.54
Note: Rev3 diameter shaft is from 9/2015 forward. Rev2 is up to 9/2015.



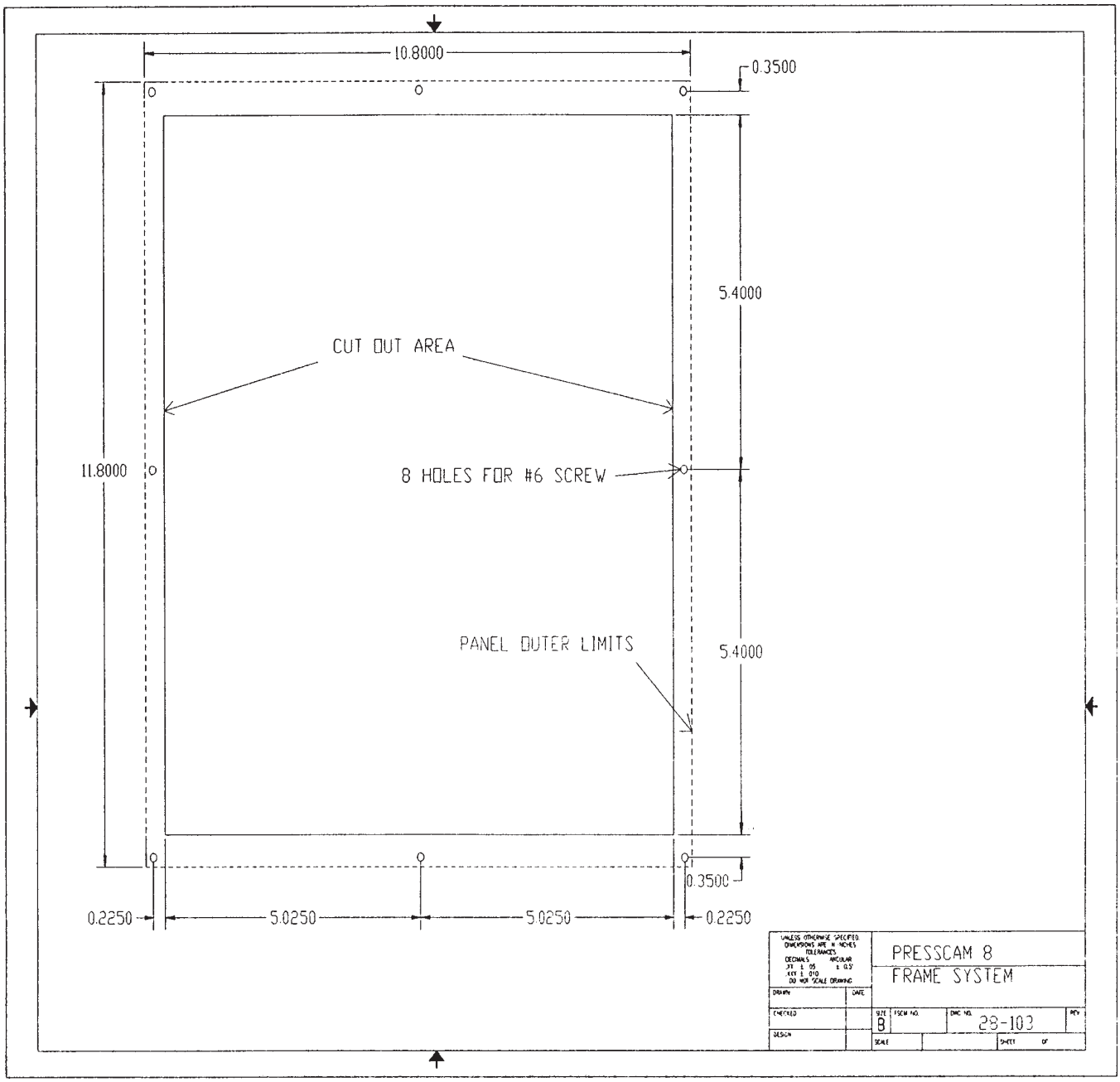
Internal Wiring Diagram (#28-101)



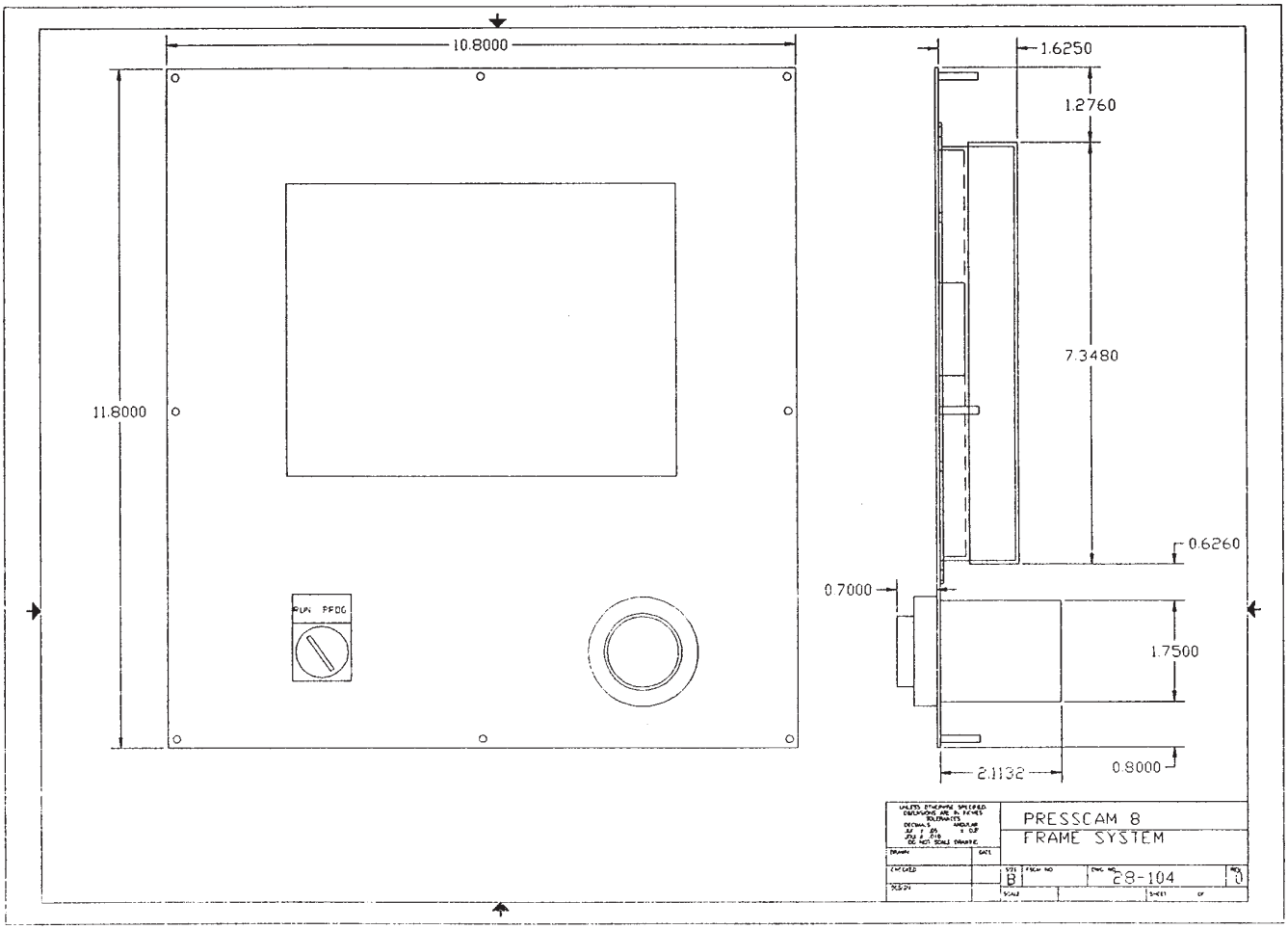
Control Box Dimensions (#28-102)



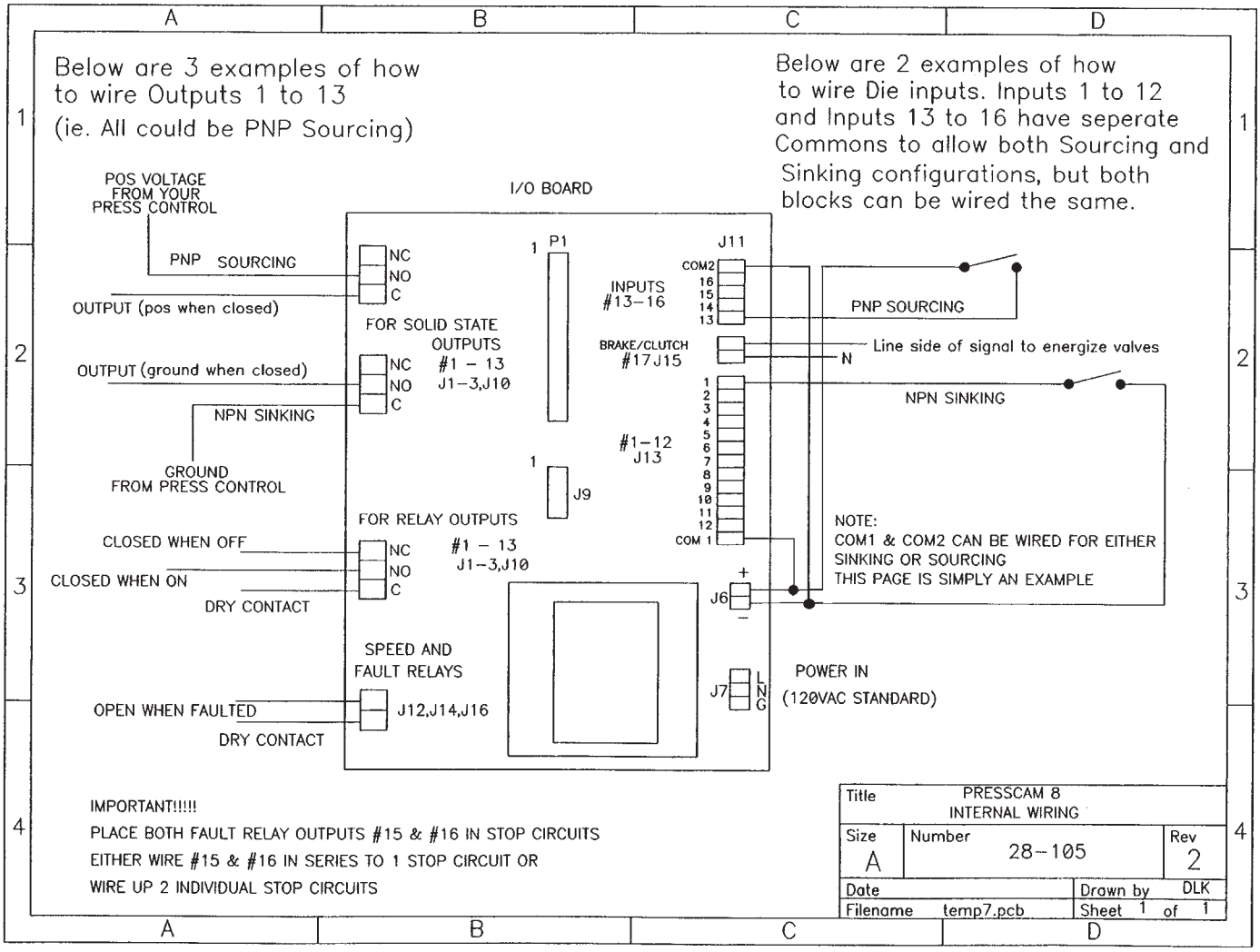
Panel Cut-Out Dimensions (#28-103)



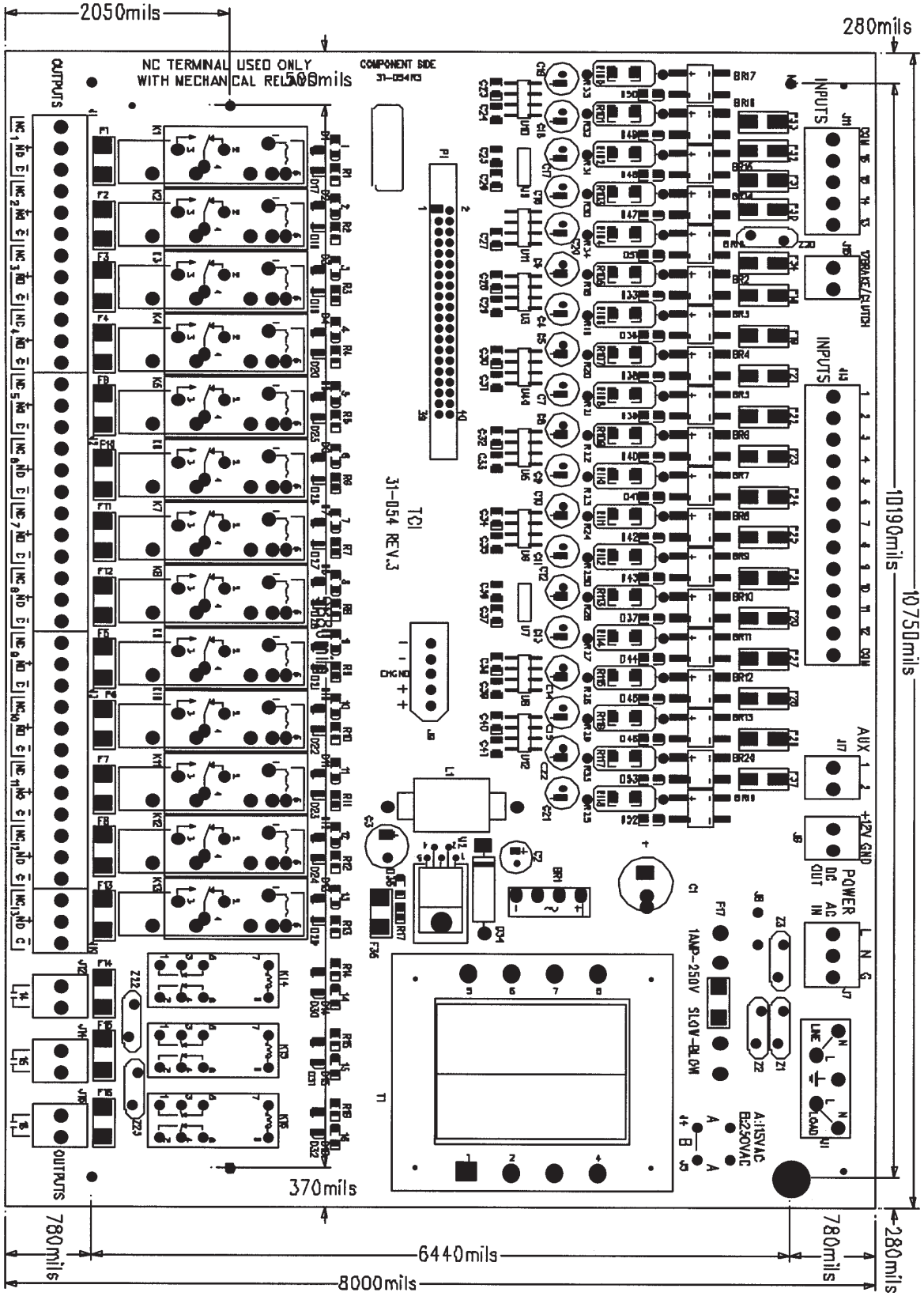
Control Panel Dimensions (#28-104)



External Wiring Diagram (#28-105)



I/O Board Dimensions (#28-106)



Control Board Terminal Chart (#28-107)

Resolver	J11	Connection to resolver	See Resolver #28-100 for details
RS-232	J8	Standard serial port interface	Standard DB-9 female port
RS-485	J12	Optional interface	Half duplex
LCD	J14	Connection to LCD	
LCD invertor	J3	Connection to LCD backlight	
KNOB	J2	Connection to encoder KNOB and pushbutton	
KEY	J6	Connection to key switch	Pin 1 = ground Pin 2 = key input Pin 3&4 = optional inputs
Power Input	J1	+24vdc unregulated input	Pin 1&2 = +24vdc Pin 4&5 = ground
I/O connection	P1	I/O connection to I/O board	
Software update mode	J4	Jumpers allow in field software upgrades	Consult factory on procedure.

I/O Board Terminal Chart (#28-108)

Output #1-11(form C)	J1-J3	Limit Switch 1 -11	Up to 3 output windows based on crank angle. LS 8-11 can be timer based if desired.
Output #12(form C)	J3	Counter	Opens when Batch counter incremented, or Quality Count reached.
Output #13(form C)	J10	Die Fault	Remains closed in PROG mode. Opens in RUN mode when Die fault occurs.
Output #14(N.O.)	J12	Speed	Closes when press speed falls with the Min and Max speed setpoints.
Output #15 & #16(N.O.)	J14-J16	General Faults	Opens when any fault occurs, except when a Die fault occurs in PROG mode.
Inputs #1-12 (with their own common term.) (12Vdc standard)	J13 (Input #7 is parts counter)	Die Sensor signals	Signal sent back from sensors using a simple contact closer. One side of sensor is grounded, the other side is the signal.
Inputs #13-16 (with their own common term.) (12Vdc standard)	J11	Die Sensor signals	
Input #17 (120Vac standard)	J15	Brake/Clutch signal	Parallel signal sent by the press control going to the valves.Voltage = press movement.
+24Vdc unregulated	J9	Power Out to Control board	Pin 1&2 = +24vdc Pin 4&5 = ground
+12Vdc regulated	J6	Output for Die Sensors only	Connect the + to the Die Sensor common terminals and the - to the grounded side of the Die Sensors.
Power Input (120Vac standard)	J7	Power input for entire system	Supply Line, Neutral, Ground
I/O connection	P1	I/O connection to control board	

Operator Interface

The PressCam 8 has no conventional input device like a keyboard or keypad. Instead it uses a Tuning Knob integrated with a push button to act like the mouse you use on your PC.

After wiring is complete, power up the system and make sure all red LED's (D35, D52) on the I/O Board are lit up. Look at the LCD, the first screen shows the software version number and any optional installed software.

Tuning Knob

Selecting a function. Rotate the knob until the desired field you wish to see and/or change is highlighted. Press the knob to select that field.

Changing the value in a field. When changing a value, numbers are entered one digit at a time (i.e., to enter a value 459: dial 4, push knob, dial 5, pushknob, dial 9, push knob).

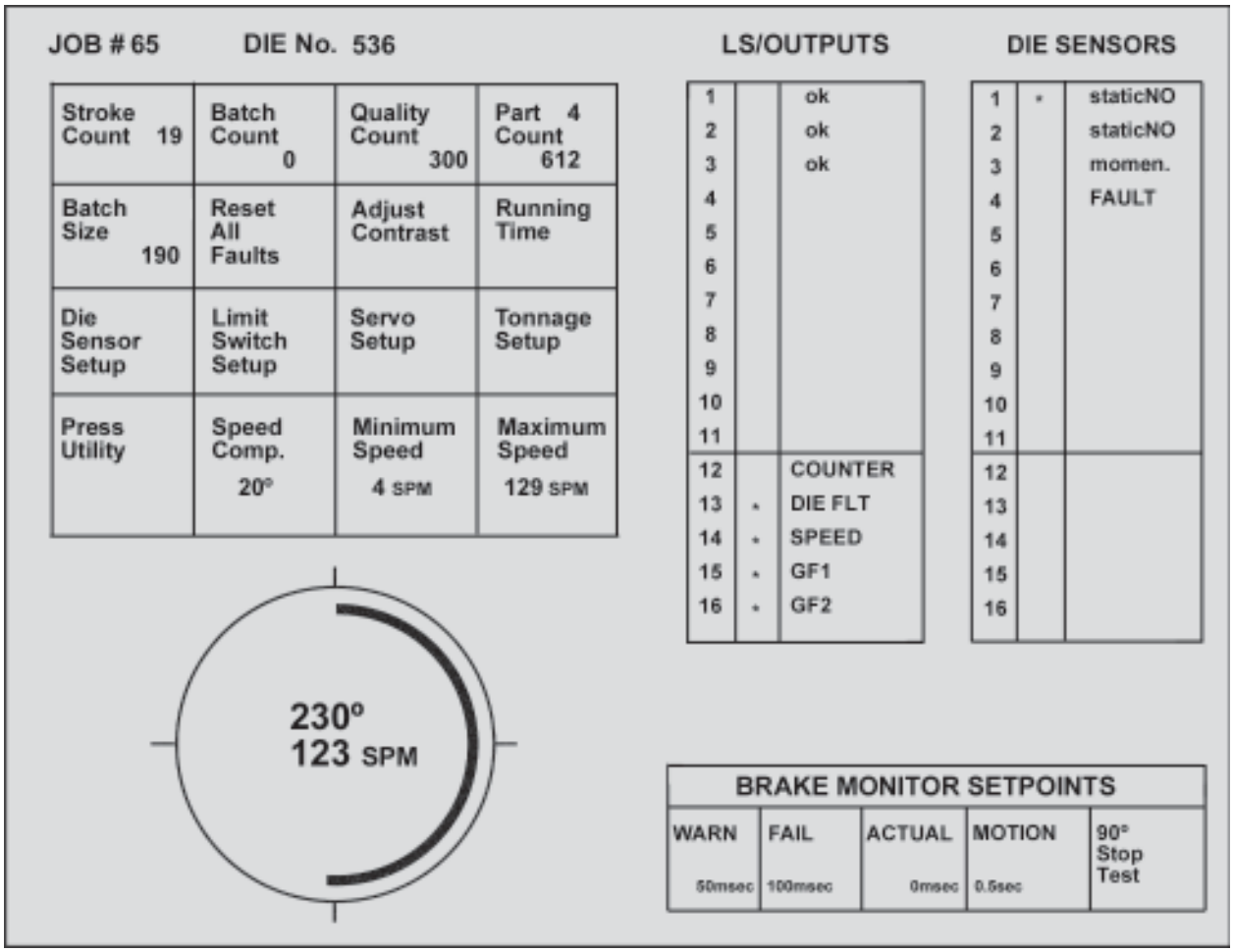
Run/Prog Keyswitch

In RUN mode you are not allowed to alter any parameter or change JOB's.

In RUN mode, you are only allowed to clear counters and reset die sensor faults.

When in PROG mode the Die Fault Output #13 and General Fault Outputs #15 and #16 are held closed to allow die setup. All other faults will cause the General Fault Outputs #15 and #16 to open. If the password feature is enabled, you must first enter in the three digit password in order to pass into the PROG mode and be allowed to change parameters. Additional menu items will be displayed and the operator will be allowed to change parameters and jobs.

⚠WARNING In PROG mode, the die inputs can fault out but will not shut down your machine. You can only run ten cycles in PROG mode.



To program, the programmer must have the Supervisory Controlled Key and the PROG mode must be selected. The programmer has the capabilities to do all items that the operator has capabilities of, plus the following:

Adjust Contrast

The LCD contrast is adjusted up or down when selected. Also, the screen can be inverted from black on white to white on black. This feature is adjustable in either RUN or PROG modes. The contrast may change slightly under different temperature conditions and at start-up.

Job Selection

If you choose to select an empty job, the computer will automatically copy the entire contents for the currently selected job into the empty job. This is so you start with the same Top Dead Center offset and limit switch outputs that control the stopping of the press (see *Press Utility* description for other job functions).

Job Number (must be in PROG mode). The PressCam 8 has a total storage capacity of 75 jobs. The Job Number displayed indicates which Job Number is currently being run or selected.

1. Press the Knob while over the JOB NUMBER.
2. Rotate the Turning Knob till the JOB NUMBER desired is present and Press the Knob.

The PressCam 8 is now ready to run the JOB NUMBER that you have selected.

Job Name (must first select a job number). The Job Name can consist of up to ten characters. These characters can be alphanumeric and may also include symbols such as /, \, !, ?, =, etc….

1. Press the Turning Knob and hold in for two seconds. Once the far-left character space is shown, the name is now ready to be programmed or change.
2. If the character is correct, press the Turning Knob, which now moves to the next character. If changes are desired, rotate the Turning Knob to the character desired.

NOTICE After the letter “Z”: There is a “backspace” to correct mistakes. There is an “enter” to end the Job Name function.

Limit Switch/Die Sensor Names. To change the names of either the Limit Switches or Die Sensors, you perform the same acts that you would to change the job name.

1. Select a job number then hit the knob.
2. Once the job name is highlighted, turn the knob clockwise until you highlight the Limit Switch or Die Sensor field you wish to change.
3. Hold in the knob until only the first character of the name is showing; now change the name. Follow the same rules as you would for the job name except you have only eight characters.

Reset Die Faults (RUN Mode Only)

Reset Die Faults is the default window that is highlighted upon power up or when switching between RUN and PROG. This function is used by the operator to reset a die protection fault when one occurs.

Reset All Faults (PROG Mode Only)

Reset All Faults is the default window that is highlighted when changing modes from RUN to PROG. It is used by someone with a supervisory controlled key to reset any and all faults that appear below the Limit and Die protection section of the screens.

Minimum Speed

Minimum Speed is the point at which the Speed Output #14 will turn on. If the press speed exceeds the minimum and then drops below, a fault will occur.

If you set this to 0, then Output #14 will always be on unless you exceed the maximum speed value. This is also used by the Speed Compensation function to determine compensation.

Maximum Speed

Maximum Speed is the point at which the Speed Output #14 will turn off. If the press speed exceeds the maximum a fault will occur.

This is also used by the Speed Compensation function to determine compensation.

Running Time

This time increments only when the clutch is engaged. The display is in Hours:Minutes. This value can be cleared from PROG mode only.

Counters

NOTICE All counters are automatically stored at power down.

The PressCam 8 provides four types of counters: Stroke, Batch, Quality, and Part. When programmed properly a counter will increment each time a part is ejected from the machine. When the programmed value is met, the controller will initiate an action.

Stroke Count. The Stroke Counter is used to indicate the total number of strokes that has occurred since the last stroke counter reset. This number increases by one every time the resolver passes 340° regardless of job changes or faults. You can reset this count in RUN or PROG modes.

Part Count. This box has two fields—In the upper right, a *Part Increment* field which represents the number of parts produced per stroke, and a *Part Count* field which shows the number of parts produced. You can only set the *Part Increment* field in PROG mode.

The programmer can set the number of how many parts are being counted or produced on each stroke of the press. They can set the unit to count 0 through 4. If the unit is set to zero, then the PressCam 8 will not increment the Part Count, Batch Count or the Quality Count.

You can reset the *Part Count* in RUN or PROG modes.

NOTICE The Part count automatically increments off the Stroke count, unless DIE #7 is activated as a "Momentary" die type with different "Begin" and "End" angles. In this case, you will need to provide a sensor input to DIE #7 to increment the Part count.

The Part Increment field is used by the Batch and Quality counters. Resetting the Part Counter will not affect the other counters.

Batch Size. The Batch Size determines when the Batch Count increments. This can only be changed in PROG mode. The Batch Size is based on the Part Increment field size (the upper right of the Part counter box)

Batch Count. The Batch Counter is used to indicate the number of batches completed and/or stop the machine when a batch is complete (using Output Relay #12). This can be reset in RUN or PROG modes.

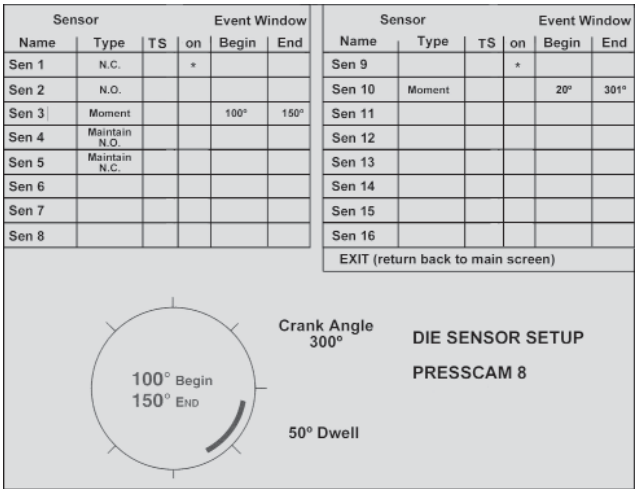
NOTICE Batch Counter only works when Part Count is wired to a sensor and is activated.

Quality Count. The Quality Counter is used to stop the machine when the parts produced reaches the value in the "Quality Count". This is used to indicate to the operator that the last part should be checked for quality purposes based on your company's SPC requirements.

Die Sensor Setup

This function is used by the programmer to program any one of the sixteen die protection inputs and can only be highlighted and accessed in the PROG mode.

Die Sensor Inputs 1 to 16 can have custom selected names. The names can only be changed while in PROG mode (refer to the "Job Selection" section for details on how to enter in names). If Sensor #7 is setup for "Momentary" and has a valid angle window, the computer will use this input to increment the Parts Counter. This is why the default name is "Part Cnt."



To change the name of a Die Sensor Input, refer to "Job Selection" section.

NOTICE In PROG mode, the PressCam 8 will not shut down on a die fault but will limit you to ten cycles.

Main Screen Die Sensor Display

When a die sensor input faults an "f" is indicated. When in the die window the faulted sensor shows "F".
A faulted sensor also shows the last CLOSE-OPEN angles seen by the computer, to help determine if and where the sensor changed states.
If the sensor faults, but the angles shown are within the die settings, then the sensor did not change states the last cycle.

To program a die sensor, you must first understand the five types of sensor windows that we use.

1. *Momentary Inputs* - The die input must see a change of state from the sensor somewhere within the programmed window. The change can be open to closed or closed to open and may occur multiple times within the same window. No change of state within the window will cause the PressCam 8 to fault.
2. *Maintain N.O. Inputs* - The die input must not see a change of state from the sensor from the beginning of the window through the end of the window. The signal must also be open. If a signal is received from the sensor while in the window, the PressCam 8 will fault.
3. *Maintain N.C. Inputs* - The die input must not see a change of state from the sensor from the beginning of the window through the end of the window. This signal must also be closed. If no signal is received from the sensor while in the window, the PressCam 8 will fault.
4. *Static N.O. Inputs* - This type of input is typically used for Buckle Detection. Being static means that it should never see a signal from the sensor anytime. If a signal is seen, the PressCam 8 will fault. This type of input works 360° of the press rotation.
5. *Static N.C. Inputs* - This type of input is typically used for End of Stock detection. Being static means that it should see a signal from the sensor at all times. If a signal is not seen, the PressCam 8 will fault. This type of input works 360° of the press rotation.

NOTICE Because a “Maintained” die input does not check outside its window, you may wish to run the same die sensor to a second die input and set it to check either for a “Momentary” or for an opposite “Maintained” state during some other portion of the cycle (i.e., Die #1 Maintained N.C. 180 to 270, Die #2 Maintained N.O. 50 to 120, both Die #1 and #2 inputs tied together).

How to Program a Die Input

NOTICE The Screen does not update if you are currently changing a Begin or End angle. New or changed information is stored in nonvolatile memory as soon as the entire value is entered.

The status of all sensor inputs is indicated in the upper right-hand corner of the display. An asterisk beside a die input indicates that the input is receiving a signal from the sensor.

NOTICE When in PROG mode, all die-input sensors are active and working, however, the press will not stop due to a die fault. All input faults are bypassed in the PROG mode.

To program a Die Input, ensure that the unit is in PROG mode.

With the unit in PROG mode,

1. Highlight the Die Input Sensor you want to program.
2. Press the Knob to highlight the Sensor “TYPE.”
3. If you wish to select a different “TYPE,” press the Knob again then rotate the Knob to select.
4. Rotate the knob over to TS and select the die fault stop type (see paragraph below)
5. Rotate the Knob over to the Begin / End fields and program in an angle (not used by Static types).

You must move the cursor back to the Sensor Name field in order to update the memory with the new sensor values.

How To Turn Off a Die Input: Select Momentary and 0° for both open/close angles.

Die Fault TS type: Select whether you want a Die input sensor fault to E-Stop (select E) or Top Stop (select T) the machine. Use the “Enter” key to toggle between E or T modes. The Default is to E-Stop the machine, but you may have a need to finish the current cycle should a particular die input fault out. (i.e. The parts counter Die #7)

⚠WARNING The Top Stop / E-Stop feature is only available on 31-053R7 boards running Software Ver 3.0 or better. Earlier boards/software only E-Stop on Die Faults.

Automatic Safety Distance

The Presscam 8 can automatically compute a safety distance required for light curtain installations. The Safety Distance uses the 63in/sec hand speed constant and includes 35msec for the light curtain response time, control system response time (if you hook up the light curtain output to the Presscam 8 through the AUX input) and Depth Penetration factor (determined by the beam spacing and set in Press Utility).

Auxiliary Input: You must hook up an isolated light curtain contact to the AUX input found on the Presscam 8 Input/Output board. The AUX input requires a 24vdc input (standard) or 120vac input (optional). D53 should be lit when the curtain is GREEN (no blockage).

See *Press Utility* function on how to set the Dpf (Depth Penetration Factor). The Dpf is determined from an ANSI chart *(see Regulations & Guidelines for Safe Operation, "ANSI Standards B11.19-1990")*. You must first determine the worst case object sensitivity of the light curtain (this will be found in your light curtain manual)

To perform the Safety Distance test to include control system response time:

1) Select the 90° stop test.
2) Start the press and block the light curtain on the way down (block from 30° to 80°).

To perform the Safety Distance test not including control system response time:

1) Make sure nothing is attached to the AUX input on the Presscam 8
2) Select the 90° stop test.
3) Start the press and don't block the light curtain.

Time-Based Brake Monitor

The PressCam 8 is a time-based brake monitor as opposed to a position-based brake monitor. It does not know or care when the press comes to a stop but rather how long it takes for the press to stop from the time the brake/clutch signal is removed.

Monitoring the stop time allows you to determine a safety distance for placing electronic guarding equipment and to shut down the press should the press take longer to stop than allowed for in your safety distance. Refer to the *Regulations & Guidelines for Safe Operation* section in this manual for the safety distance formula as well as the manual that came with your electronic guarding equipment.

The brake monitor function will automatically prevent a successive stroke of the press if the stopping time deteriorates beyond the brake FAIL set-point. The keyswitch is the only way to clear this fault. A brake warning (WARN) set-point is also provided as a notification before the press brake must be repaired.

The PressCam 8 stores only one WARN and FAIL set-point set, therefore, you must set these for the worst case situation (heaviest tool, fastest speed, and 90º stop test).

Determining the Stop Time of Your Press to Find Your Safety Distance

ANSI Standard B11.19-1990 E5.6

E5.6.1 When using a time-based brake monitor it becomes necessary to measure the stopping time at both the end of the cycle (top stop) and during the closing portion of the machine cycle (90º from top stop test).

a. If the stop time is greater than the time measured during the closing cycle, set the brake monitor to this time plus the variance factor.

b. If the stopping time measured at the end of the machine cycle is less than the closing stop time, there are two methods of setting the brake monitor and calculating the safety distance:

1. Set the brake monitor at the end of cycle time (top stop) plus the variance factor* and use the closing time plus the variance factor for calculating the safety distance. This method will allow the safety device to be located closer to the hazardous area but may cause nuisance tripping of the brake monitor if the machine tool stops during the closing portion of the machine cycle.

2. Set the brake monitor to the closing cycle stop time. When this is done, it is necessary to increase the safety distance since the brake can now deteriorate from its normal stop time at the end of the machine cycle before the brake monitor will detect an adverse deterioration.

The following formula may be used to determine the stop time for calculating the safety distance:

Ts=Tsa x Tsa / Tta

where:

Tsa = measured closing stop time (90º from top stop test)
Tta = measured end of cycle (top stop) time
Ts = time used in the safety distance calculation

This method of setting the brake monitor forces the safeguarding device to be located at a greater distance from the hazardous area but eliminates the nuisance tripping of the brake monitor if the machine tool is stopped during the closing cycle.

E5.6.4 The following factors may affect stopping performance of the machine tool: clutch air supply, counter balance air supply, tooling weight or tonnage requirements, machine cycle speed, brake wear, and so forth. When the stopping time changes as a result of these conditions, it may become necessary to change the top stop limit switch position, readjust the brake monitor or adjust the brake mechanism. If such readjustment is made, care should be taken that the safety distance used to locate the safeguarding device is recalculated and, if necessary, the safeguarding should be relocated to ensure safe operation of the machine tool.

The *variance factor* mentioned in the above ANSI standard is a number to be determined by the employer that allows for changes in the stopping time due to factors listed above in E5.6.4.

Determining the WARN and FAIL Set Points

The Failure set point is the stop time value that you have just determined above and will use in your safety distance equation (this equation should be found in the manual of all equipment used to activate or guard your equipment). This value includes the variance factor discussed above to allow for a certain amount of wear in the brake before you have to change it. The larger the failure set point, the further back your guarding equipment will have to be from the pinch point.

NOTICE Do not set the failure set-point so large as to allow the press to stop at the top but slide forward down to the pinch point. Your press control should have a position-based monitor to prevent that situation from occurring.

For example: If you calculate a stop time of 140msec, but your press varies a little and you want to allow for brake wear so you use a failure stop time of 230msec. The variance factor is then 90msec. The 230msec should be used as your press stop time in calculating your safety distance. Set your warning set point at some value below 230msec to let you know that you are approaching the failure point ahead of time.

Input Signal. The brake/clutch signal should be tied to Input Terminals 17 and 18 of the I/O Board. For example, if you are running a 120VAC system, run a line parallel from the brake/clutch signal back to the PressCam 8. There should be 120VAC across Input Terminals 17 and 18 when the brake is released.

See Drawing #28-105 for External Wiring Diagram in this section.

Altering the WARN and FAIL Set Points

1. Insert the maintenance key and turn the keyswitch from RUN to PROG (enter the password when asked).
2. Turn the Knob until the WARN field is highlighted.
3. Push the Knob and enter in the new value (one digit at a time, left to right).
4. Do the same for the FAIL field.

NOTICE Since there is only one FAIL set point, it should be the worst case value for all the die and speeds used.

Motion Detection: The PressCam 8 needs to see motion within the time period selected or a fault will occur (lack of motion). Set this value to the minimum value that does not generate a fault. This will enable it to detect faults faster.

Drift Detection: The PressCam 8 has built in Drift Detection. If the press starts to move without a brake/clutch signal, a drift fault will occur. The threshold is .2 spm and cannot be user altered.

Output	sp	First Close	First Open	Second Close	Second Open	Third Close	Third Open	Crank Angle 300°
LS1	*	300°	320°					
LS2		200°	150°					
LS3	*	50°	100°	180°	230°			
LS4								
LS5								
LS6								
LS7								

Limit Switch Output

						DLY CY	HLD CY	Start Angle	Hold Time
LS8						25	3		
LS9								100°	1000
LS10									
LS11									
EXIT	LIMIT SWITCH OUTPUT SETUP SCREEN								

90° Stop Test: Inch the press up to top. Select this feature and press the Knob. Now, run the press. The PressCam 8 will shut down when the press reaches 90°. The press will come to stop at some point after. This shows the worst case stop time.

Servo Setup

Interface. Output of data is via a RS-232 DB-9 connector located on backside of LCD screen. 9600 Baud, 8 bit no parity, 1 stop bit.

The PressCam 8 can be configured for either DCE (standard; J6 & J7 jumpers horizontal) or DTE (optional; both jumpers removed and installed vertical, straddling both J6 & J7).

PressCam 8 DB-9 pin out (DCE configuration):

1	DCD	2	TX, TO SERVO
3	RX, FROM SERVO	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	NC		

(DTE configuration reverses pins 2 and 3)

The only pins used by the PressCam 8 are 2,3,5. Pins 1,6,8 are tied to +15V, and Pins 4,5,7,9 are tied to ground.

Each PressCam 8 job stores individual Servo Setup information and outputs thru the RS-232 every time the unit is powered up (after the Knob is pushed), after you exit from the Servo Setup screen, and after a job change. The Servo Setup screen can be accessed only while in PROG mode.

Standard:

Indramat Servo Interface

The operator selects:
- Speed from 1 to 100%
- Length of Feed from 0 to 999.999 inches

Optional:

COE Press Servo Interface

The operator selects:
- Acceleration from 1 to 100%
- Speed from 1 to 100%
- Minimum Press Cycle time from 0 to 25.0 seconds (0 to 250)
- Length of Feed from 0 to 999.999 inches

Cooper-Weymouth Peterson Interface

The operator selects:
- Speed from 1 to 100%
- Length of Feed from 0 to 999.999 inches

Limit Switch Setup

Limit Switch Outputs 1 to 11 can have custom selected names. The names can only be changed while in PROG mode. Refer to “Job Selection” section for details on how to enter or change names.

1. Insert the supervisor key into the switch and turn from RUN to PROG mode (enter password if asked).
2. Select the JOB you wish to setup (see “Job Selection ” in this section).
3. Select Limit Switch Setup.

Cyclical Outputs. Outputs LS1-LS7 can have up to three limits (open/close); LS8-LS11 can have two. Closed segments take precedence over opens, so if you overlap a closed segment on top of an open segment, the output will stay closed.

Turn the Knob to highlight the proper field, push the Knob to select it.

4. Select the proper Limit Switch output.
5. Select whether you want this output to be Speed Compensated. To select Speed Compensation, push the Knob while your in the “sp” field and an “*” will appear. Push the Knob again and it will disappear to deselect Speed Compensation.
6. Select the proper Close and Open values (up to three sets per output).

Cycle Delay & Hold Outputs. Outputs LS8-LS11 can be delayed for a specific number of press cycles and then held on for a specific number of cycles. Selecting Delay or Hold fields erases cyclical data for the selected Output (use this for Lubrication, etc.).

Time Outputs. Outputs LS8-LS11 can be set to turn on at a specific angle and then hold for a specific time period. Selecting the Hold Time output field erases cyclical data for the selected Output. The Hold Time is in milliseconds (i.e., 1000=1 sec, 500= 1/2sec).

⚠WARNING LS1, LS2, and LS3 can only be adjusted with the j5 jumper removed. When LS1, LS2, and LS3 are used in place of rotary limit switches, you must be careful not to re-adjust them after the initial job setup. Adjusting these values would alter the stopping position of the press from the top center to an unknown value. Also, do not speed compensate Auto Return or Mute Out signals. Refer to “Speed Compensation” below for instructions on how to operate this feature.

Combining Cycle Delay with Hold Timer

If you enter in a Delay Cycle value and a Hold Timer value, the designated output will turn on at the timer setpoint angle only after the specified number of delay cycles.

Speed Compensation

As the press speeds up beyond its original set point, certain outputs may not respond fast enough to keep up with the increased speed of the press. Also, stop time increases as the press speed increases and therefore the Top Stop signals (LS1 and LS2) will need to be compensated in order for the press to stop on top. Outputs that the user selects for speed compensation will occur sooner (in angular position) as the press speed increases from the minimum speed to maximum speed. When setup correctly, the press will come to a stop on top at any speed between the minimum and maximum set points. Each JOB has its own Speed Compensation set point and can be turned off simply by setting the value to 0º.

The user can select which outputs you want to have Speed Compensation by going to the Limit Switch Setup screen and selecting the “*” for the appropriate outputs in the “sp” column.

NOTICE The Speed Compensation value is the amount of compensation that will occur only when the press is operating at the maximum speed set point. As the press slows back down (i.e., brake applied), the amount of compensation is linearly reduced down to 0 (when the press is operating at minimum speed). If the press is run at below minimum speed, there is also no compensation.

Steps

1. Set the Speed Compensation set point to 0º (this turns off the function).
2. Set the press Minimum Speed and Maximum Speed set points to the slowest and fastest operating speeds, respectively.
3. Go to the Limit Switch Setup screen and setup the output windows and run the press at the minimum speed. Adjust windows for correct operation at this speed only.

Now you should have a correctly operating press running at minimum speed.

4. Cycle the press at maximum speed. Note the angle where it stopped. Enter the angle at which the press came to a stop (something past 0º in the Speed Compensation field. If the press came to a stop at 30º, then enter this value into the field.
5. Go back to the Limit Switch Setup screen and turn on Speed Compensation for top speed signal outputs (usually LS1 and LS2) by selecting the "*" in the "sp" column.
6. Operate the press at maximum speed again and check for proper stopping position. Adjust the Speed Compensation angle (up or down) accordingly to force the press to stop on top.
7. Go back (one more time) to the Limit Switch Setup screen and select all the LS outputs you wish to have speed compensation on by selecting the "*" in the "sp" column.

⚠WARNING Some outputs must not be compensated. An example would be Auto Return / Mute Out Limit Switch (usually LS3 or LS4).

If the press is stopped during a normal cycle (not at top stop), it is possible that a Speed Compensated Output will trigger again as the press starts to move again to finish the current cycle. This is because you are now starting from 0 SPM and the stopped press location may have not reached the true output angle for the compensated output. If you are using a servo feed initiate, you may have to turn it off before you return back to top stop to prevent a possible double feed.

Press Utility

This function has six sub-functions that can only be accessed in PROG mode and the J5 access plug is removed (located on the backside of the LCD).

Set Password (SETPAS): The operator enters a three digit number to be used as a password when the key switch is moved from RUN to PROG mode. Set to 000 to turn off the password feature. If you forget your password, contact the manufacturer.

Clear JOB (CLRJOB): Erases the entire currently selected job. You must hold in the knob for two seconds.

Clear DATA (CLRDTA): Erases data from the current selected job but keeps the name. This prevents the system from automatically copying data from another existing job.

Clear ALL memory (CLRALL): Warning! Erases ALL memory of unit entirely. You must hold in the knob for two seconds. The lower left corner of the LCD should now tell you that its "Powering Down". You must cycle power to the Presscam 8. When you power up, you will notice "Cleaning Memory" in the lower left corner of the LCD, wait until the normal screen reappears (about 1 minute). You must reset the Top Dead Center for this unit over again.

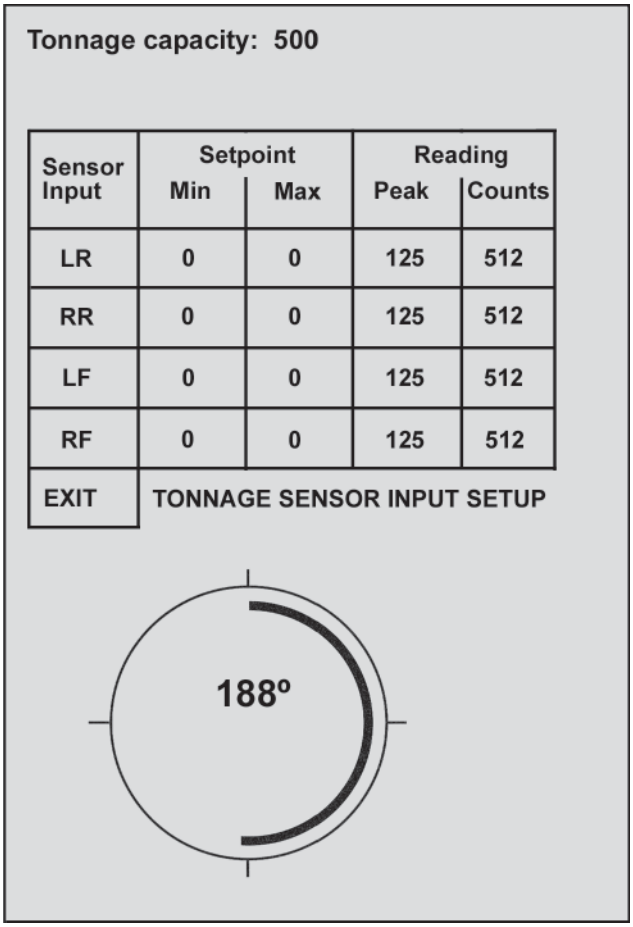
Top Dead Center (SETTDC): This allows you to zero the press when the Ram is at TDC. Start by inching the press up to TDC. Then hold in the knob for five seconds.

⚠WARNING This function should only be used during installation or when hardware changes. Never change TDC to fix a timing problem or any other problems with limit switches.

Remote Status (Remote): This allows J8 RS-232 serial port to be used as a Remote Status output port "RMT ON", or allows the use of the External Ethernet board Option "TCP ON", or for the Servo Control output "RMT OFF" (default). (See page 24 for details)

Language Selection (English / Spanish / French): This changes text between languages.

Tonnage Capacity (TONCAP): This is an optional field to be used only if you are using the tonnage feature. Set this to the maximum capacity for the machine (all four sensors combined).



PCLink (PCLINK) (off-line Job Programmer). This feature puts the PressCam 8 into a mode that allows the serial port to communicate with the PCCAM8.exe Windows-based software (provided on CD). Install the CD onto any Windows machine. Make sure the PC and the PressCam 8 are connected before running the PCCAM8 or enabling the PCLINK function on the PressCam 8. Now you can backup, transfer, save, add, delete, and modify job data between your PC and multiple PressCam 8's.

Depth Penetration Factor (DepthF): This is used to calculate the safety distance for your lightguard *(see Function Descriptions, "Automatic Safety Distance")*.

Tonnage Setup

Installation between the TLM and PC8

1) Connect the TLM to the PC8 (plug P4 behind the LCD) using the provided shielded cable.

NOTICE Make sure to place a 1K resistor in series with the TLM analog output (between the TLM and the cable). This helps with preventing noise on the analog signal.

P4 connector (pin1 = top pin)

Pin	Color	Function
1	White	Left Rear module input (from TLM)
2	Red	Right Rear module input (from TLM)
3	Green	Left Front module input (from TLM)
4	Blue	Right Front module input (from TLM)
5	NC	Do not use this connection (for internal voltage reference.)

2) Connect one of the limit switch outputs to the PROBE circuit of the TLM (i.e., connect the "N.O." and "C" of LS7 to the "NPN" and "COM" of the TLM PROBE connector. Install a jumper wire from the "+12v" to "PNP" of the TLM PROBE connector).

3) Flip the Dip Switches on the TLM to PEAK and N.O. (to enable peak reading mode)

NOTICE The PC8 analog inputs can handle 0 to 5vdc. You should calibrate the TLM outputs for 2.5vdc at full load / leg. This allows each input to catch an overload condition (i.e. > 2.5v)

NOTICE You will need to rent a "LOAD CELL" from Toledo Transducer in order to calibrate the sensor outputs. The "LOAD CELL" will tell you the actual load during a hit so you can adjust the zero and gain settings of the TLM to match.

Setup and Calibration

1) Go to “Press Utility” and set the Total maximum tonnage capacity of your machine, from 10 to 9999 tons.
2) Go to “Tonnage setup” and follow the Toledo instructions on how to calibrate the TLM load sensors. You can use the Tonnage setup screen “Counts” column as a voltage meter to help you set the proper voltages. (0 counts = 0v, 512 counts=2.5v (full load), 1024=5.0v)
3) You must set the “Min” column above 0 to activate that sensor and just below the minimum tonnage you expect for this job. The sensor input is turned off if this is set to 0.
4) Set your “Max” column to the maximum tonnage for this job, but less than 1/4th of the total machine capacity.
5) Go to “Limit Switch Setup screen” and select the limit switch output that you decided on above in step 2) of the Installation section. This will trigger the peak reading function on the TLM. Set this angular window for 140° to 300°.
6) The Presscam 8 will expect the tonnage sensor to be less than the Max value during the entire tonnage window (140° to 270°, these values are built in to the Presscam 8)
7) The Presscam 8 will expect the tonnage sensor to be greater than the Min value only after the press reaches 270°. The TLM peak value must be greater than the Min value. This dictates that you set up a window for the TLM that goes beyond 270° (around 300°).

NOTICE Do not run the Press in PROGRAM mode, this mode is only for setup. Faults are generated, but the fault relays will not open up.

Operation

- You must have a value placed into the “MIN” column of the “Tonnage Setup” screen. 1 ton or more activates the sensor. 0 tons turns off the sensor.
- The “MAX” column of the “Tonnage Setup” screen should be set to the maximum tonnage needed for the Job, but not greater than ¼ the capacity of the machine.
- The “PEAK” column of the “Tonnage Setup” screen shows the last cycle peak reading, not a live value.
- The “COUNT” column of the “Tonnage Setup” screen shows actual live value in counts.
- Make sure the PROBE LED on the TLM lights up just before the hit takes place and remains lit until just after 270°.
- The RUN screen will show the last stroke’s peak readings.

Remote Status

The J8 RS-232 port is normally used for the Servo Control 9600 baud 8N1 xon/xoff. The “Press Utility” REMOTE menu is by default set to “RMT OFF”.
When the “Press Utility” REMOTE menu is set to “RMT ON”, the J8 RS-232 serial port is enabled for 57600 baud 8N1 xon/xoff Remote Status Commands (see table below). (see page 21 Remote Status section).
When the “Press Utility” REMOTE menu is set to “TCP ON”, the J8 RS-232 serial port needs to be connected to the Optional Ethernet board. This 6.5” x 5.0” board contains an Ethernet Jack with built in Web server. The CD that came with the Presscam 8 contains an Ethernet folder with the documentation on finding the IP address of the Ethernet device and how to attach and run the board.

PressCam 8 J8: RS-232 Remote Status Commands

Command String to PCS	Function	Return Size	Return Format
$A:	Job #	Byte (0 to 255)	@ job # &
$C:	Press Angle	Word (0 to 359)	@ angle &
$D:	SPM	Word (0 to 999)	@ SPM &
$E:	Die Fault	Byte (bit: 0=ok, 1=fault)	@ die &
$F:	PLS Status	Byte (bit: 0=off, 1=on)	@ PLS &
$G:	Status	Byte (see table)	@ status &
$H:	Fault codes1	Word (see Appendix A, each bit represents a fault code)	@ fault1 &
$I:	Fault codes2	Word (see Appendix A, each bit represents a fault code)	@ fault2 &
$J:	Fault codes3	Word (see Appendix A, each bit represents a fault code)	@ fault3 &
$K:	StopTime	Word (0 to 999 msec)	@ stoptime &
$L:	Runtime meter	Long (in seconds)	@ runtime &
$M:	Strokes	Long	@ strokes &
$N:	Parts	Long	@ parts &
$O:	Batches	Long	@ batches &
$P:	Tonnage CH 1	Word	@ tonnch1 &
$Q:	Tonnage CH 2	Word	@ tonnch2 &
$R:	Tonnage CH 3	Word	@ tonnch3 &
$S:	Tonnage CH 4	Word	@ tonnch4 &
$T:	Opto Input status	Long (Each bit corresponding to each input)	@ input &

= Command String not completed within time allowed, reset command.

$ ASCII character sent to PressCommander to initiate command sequence
: ASCII character sent to PressCommander to complete command sequence

$ ASCII character sent from PressCommander to indicate valid initiate
! ASCII character sent from PressCommander to indicate command number received
@ ASCII character sent from PressCommander to indicate valid command number
? ASCII character sent from PressCommander to indicate invalid command number
& ASCII character sent from PressCommander to indicate end of transmission

Word 2 Bytes
Long 4 Bytes

System Setup Procedure

⚠WARNING Make sure that GF 1 and 2 outputs #15 and #16 are installed in series with your ESTOP circuit. These outputs open up in the event of a fault in the PressCam 8.

1. Install and verify proper internal system wiring. Refer to Drawing #28-101 in the *System Installation* section.
2. Install and verify proper external system wiring (i.e., power, die inputs, limit outputs, fault outputs).
3. Power up the system and push the Knob to get past the Start Up screen.
4. Select the Adjust Contrast field and adjust the screen to your viewing preference.
5. Remove the J5 security jumper (backside of LCD).
6. Turn the keyswitch from RUN to PROG mode and select the Password field. Enter a new password to prevent unauthorized altering of job data (the password will remain on the screen until you leave this screen or go back to RUN mode).
7. Select JOB 1 and enter a new name (up to ten characters).
8. Select the Minimum and Maximum Speed fields and enter in the speed range of the press for this particular job.
9. Follow the instructions for the time-based brake monitor function and select the 90º Stop Test field. The press will now travel 90º past top and stop. The ACTUAL stop time can now be used to calculate the WARN and FAIL stop time values as well as help determine proper safety distances for press guarding equipment.
10. Select the MOTION field and enter in a value slightly larger that the time it takes for the press to start moving once it gets the signal to move.
11. Set up the Counter fields for the particular job.
12. Select the Limit Switch Setup field. Select the proper open /close windows to satisfy your press control inputs (LS 1-11). Select the hold time for the timed outputs (LS 8-11).
13. Cycle the press, check the press control, adjust the Limit Switch Outputs. Repeat this step until all outputs are correct.
14. Set up Speed Compensation (if running variable speed).
15. Select the Die Sensor Setup field. Select which input(s) are static (input #1-3) and the proper start / end window for the cyclical die inputs (inputs #1-16).
16. Return back to the main PROG mode screen and cycle the press. Watch the Die Sensor screen for faults. Repeat step 14 until faults disappear.
17. Turn the keyswitch back from PROG to RUN mode and replace the J4 security jumper. You are finished.

NOTICE If you wish to use the current selected JOB as a starting point for a new job, go back to the JOB field and find a JOB NUMBER that has the name “NOT USED” and select it. Push the Knob to change the job name to a new name. This new job has a copy of all the data from the previous job.

To clear fault code(s) you must switch from RUN to PROG mode and select the Reset Fault field. Die faults and counters can be cleared in RUN mode.

Fault Codes

10 CYCLE LIMIT

Cause: Press cycled ten times while in PROGRAM mode.

Cure: Hit “Reset All Faults.”

A/D FAULT

Cause: One of the analog inputs used by the Tonnage sensor showed a voltage reading while the press was outside of the tonnage sensor window (i.e., window = 140° to 270°).

Cure:
a) Window not setup for correctly (see *Tonnage Setup*); or
b) Tonnage sensor module not setup or tuned correctly yet (see *Tonnage Installation*); or
c) Bad connection from tonnage sensor module to P4 plug on PressCam 8 computer board.

BATCH LIMIT REACHED (NOT DISPLAYED)

Cause: The Part Count field reached the Batch Size setpoint causing the counter output to drop out.

Cure: Push the Knob to reset in either RUN or PROG modes. Batch Count will increment unless you use the Knob to move the cursor over that field and clear it.

BELOW MIN SPEED

Cause: The press (after three cycles) was below the Minimum Speed setpoint.

Cure:
1) Make sure resolver is coupled 1:1.
2) Check your press.
3) Lower setpoint.

BRAKE FAULT

Cause: Press ACTUAL stop time exceeded the FAIL time.

Cure: Fix the press brake.

BRAKE WARNING

Cause: Press ACTUAL stop time exceeded the WARN time.

Cure: Fix the press brake.

CHECKSUM FAILURE (Zero, Job0, Job1)

Cause: Data stored in nonvolatile memory has been corrupted.

Cure: 1) Check for > 0.2A load on +12v output. The drain can corrupt memory when powered down
2) Check Electrical noise
3) Check Job memory chip

DIE SENSOR FAULT (NOT DISPLAYED)

Cause: Die Sensor table will display all faults and indicate the first fault with an "*".

Cure:
1) Press had die fault.
2) Angle window for sensor is incorrect.
3) Check that unit is receiving the signal from the sensor.

DRIFT FAULT

Cause: The press moved faster than 1 SPM when the "control" was not signaled to move. (i.e. no clutch signal)

Cure:
1) Check that the LED on the I/O Board for the brake/clutch input is lighting up when the brake is released.
2) Value set in DRIFT may be too low and the press may be vibrating from nearby machinery.
3) Examine brake, clutch, and valves on the press.
4) Resolver miss-wired or bad.

FEATURE NOT AVAILABLE

Cause: The selected feature cannot be accessed at the present time.

Cure:
1) Reset any faults you have.
2) Remove the J5 security jumper.

LACK OF MOTION

Cause: The press showed no motion within the MOTION time period setpoint.

Cure:
1) Check that the resolver is linked to the crank shaft properly.
2) The setpoint may be too low and not allowing enough time for the press to start moving.

MAX SPEED FAULT

Cause: The press was going faster then the Maximum Speed setpoint.

Cure:
1) Make sure resolver is coupled 1:1.
2) Check for press.
3) Lower setpoint.

MEMORY CORRUPTION

Cause: Internal computer RAM is corrupted or data coming from the slave CPU has been corrupted.

Cure: 1) Excessive electrical noise.

MOVING BACKWARDS

Cause: While in RUN mode the press move backwards. This fault will not occur in PROG mode.

Cure: If press is moving forward, then check the resolver wiring at the Master and Slave board connections. Hit Enter to reset fault.

POWERING DOWN

Cause: Occurs when the 120VAC that powers the PressCam 8 is removed. Current data is saved and system locks up to prevent data from being corrupted.

Cure:
1) Check power input to Presscam 8. Especially if you are using 24VDC. Your supply may not be able to handle the load.
2) Consult factory.

QUALITY CHECK LIMIT REACHED

Cause: The Part Count field reached the Quality Count setpoint causing the Counter Output to drop out.

Cure: Push the Knob to reset in either RUN or PROG modes. Part Count field will reset to 0.

RELAY OFF S/B ON

Cause: Output #15 or #16 relay detected off but should be energized (on)

Cure:
1) Excessive electrical noise.
2) Bad relay.
3) Faulty circuitry.

RELAY ON S/B OFF

Cause: Output #15 or #16 relay detected energized, but should be off.

Cure:
1) Relay contact welded closed.
2) Excessive electrical noise.
3) Bad relay.
4) Faulty circuitry.

RESOLVER FAULT 1,2,3,or 4

Cause: Hardware problem (1), jumping backwards (2), jumping forwards (3), wrong voltage levels (4)

Cure: (same as before)

Check: Unplug the 8pos connector from the PCB. Expect about 21 ohms RED to BLK wires, 44 ohms GRN to BLK or WHT to BLK wires.

SLAVE FAILURE

Cause: The slave computer is not sending valid data back to the master.

Cure:
1) Excessive electrical noise.
2) Computer failure.

SLV DATA or JOB FLT

Cause: Data transfer between computers failed

Cure:
1) Check for Electrical Noise
2) Check Job memory chip
3) Check Hardware

SPM > 999

Cause: Unit is only designed to operate up to 999 SPM. If you are not operating outside this range, then there is a fault in the system.

Cure:
1) The resolver is faulty.
2) Excessive electrical noise.
3) Computer failure.

TDC OFFSET FLT 1 or 2 (Top Dead Center)

Cause: Master (1) or Slave (2) reports the OFF SET does not match the other

Cure:
1) Off-Line job programmer setup incorrectly.
2) Faulty Job memory chip(s)
3) Electrical Noise
4) Faulty circuitry

TONNAGE BELOW MINIMUM

Cause: Tonnage never rose above minimum during the stroke.

Cure:
1) Connection from Load Module to Presscam 8 is bad.
2) Minimum set too high.
3) Computer board bad.
4) Load module bad or needs calibration.

TONNAGE ABOVE MAXIMUM

Cause: Tonnage above maximum during the stroke.

Cure:
1) Adjust your stamping pressure.
2) Maximum set too low for job.
3) Computer board bad.
4) Load module bad or needs calibration.

TONNAGE A/D FAULT

Cause: Calibration input used by the computer is not reading correctly

Cure:
1) Computer board bad.

American National Standards Institute (ANSI)

B11.1-2009

6.3.2 Presence-sensing Point of Operation Devices

A presence-sensing point-of-operation device, if used, shall protect the operator and others and shall be interfaced with the control circuit to prevent or stop slide motion if the operator's hand or other body part is within the sensing field of the device during the closing portion of the stroke. In addition:

(1) Presence-sensing devices shall not be used for safeguarding the point of operation on presses using full-revolution clutches.

(2) When the sensing field has been interrupted, use of the normal press stroke initiating means shall be required after clearing the sensing field to resume press operation.

(3) Muting (bypassing of the protective function) of the device shall be permitted after the hazardous portion of the press stroke has been completed. Muting of the device shall be accomplished in such a manner that no single component failure shall prevent the normal stop command but shall prevent subsequent press strokes until the failure is corrected.

(4) The device shall have an identifiable minimum object sensitivity so that an obstruction of an equal or greater size will be detected anywhere within the sensing field regardless of the plane of intrusion.

(5) The device shall have a maximum response time which shall not be affected by object sensitivity adjustments or environmental changes.

(6) The devices which require adjustments to accommodate variations in ambient or operating conditions or which incorporate channel blanking or floating window features shall be designed so that the adjustments or features are capable of being supervised by the employer.

(7) The presence-sensing device shall be provided with a means that visibly indicates when it is and is not in use and functioning properly. The device shall also indicate which sections, if any, have been blanked out.

(8) The device shall not fail to respond to the presence of the operator's or other's hand or body part due to the presence of a reflective object or work piece.

(9) The device shall be designed and constructed so that any single component failure, including output devices, shall not prevent the normal "Stop" command from being sent to the press, but shall prevent operation of the press stroke until the failure has been corrected. In the event of a power failure to the device, it shall initiate a "Stop" command to the press-control system.

(10) The device and the press-control system shall be interfaced so that the device's "Stop" command shall initiate stopping action during the closing portion of the press stroke. The interface shall be designed to ensure that a single component failure within the interface of the control system shall not prevent the normal "Stop" command from being sent to the press, but shall prevent operation of the press stroke until the failure has been corrected.

(11) The device's sensitivity to intrusion shall not be adversely affected by changing conditions around the press.

(12) The effective sensing field of the device shall be located at a distance from the nearest point-of-operation hazard so that the operator or others cannot reach into the point of operation with a hand or other body part before cessation of motion during the closing portion of the stroke.

(13) The device shall not be affected by ambient light or by light-source decay so that the increase in response time or object sensitivity is greater than the value used to calculate the safety distance.

(14) All areas of entry to the point of operation not protected by the presence-sensing device shall be otherwise safeguarded.

(15) When a device is used on a press in a single-stroke mode and when the protection of the operator is dependent upon the stopping action of the press, a stopping performance monitor shall be required.

Regulations & Guidelines for Safe Operation

B11.19-2010
6.3.5 Two-Hand Control Device

(3) Each operator hand control shall be located at a distance from the point of operation so that the operator cannot release either hand control and reach into the point of operation prior to die closure or prior to cessation of slide motion during the closing portion of the stroke.

Below is the formula for calculating the safety distance of a light curtain or palm buttons. The machine stop time should be measured with the machine running at its fastest speed with its heaviest die or tooling and the stop time being measured at the 90° position in the downstroke. The following formula should be used when calculating the safety distance:

$$DS = K \times (TS + TC + Tr + Tbm)$$

DS = Minimum safety distance between the device and the nearest point of operation hazard (in inches).

K = Hand speed constant. This value has been determined by various studies and, although these studies indicate speeds of 63 in/sec to over 100 in/sec, they are not conclusive determinations. The employer should determine this value by considering all factors, including physical ability of the operator.

TS = Stop time of the machine tool measured at the final control element.

TC = Response time of the control system. NOTE: TS and TC are usually measured by a stop time measurement device.

Tr = Response time of the presence-sensing device and its interface, if any, as stated by the manufacturer or measured by the employer.

Tbm = Additional time allowed for the brake monitor to compensate for variations in normal stopping time.

Occupational Safety & Health Administration (OSHA)

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 may not be used as a tripping means to initiate slide motion.
(c) The device shall not 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) Refer to ANSI B11.19-2010 above for calculating safety light curtain distance from the point of operation.
(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) (iii)
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 or 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 adjustment. The employer shall maintain records of these inspections and maintenance work performed.

(ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, antirepeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. These requirements do not apply to those presses, which comply with paragraphs (b) (13) and (14) of this section. The employer shall maintain a certification record of inspections, tests and maintenance work which includes the date of inspection, test or maintenance; the signature of the person who performed the inspection, test, or maintenance, and the serial number or identifier of the press that was inspected, tested or maintained.

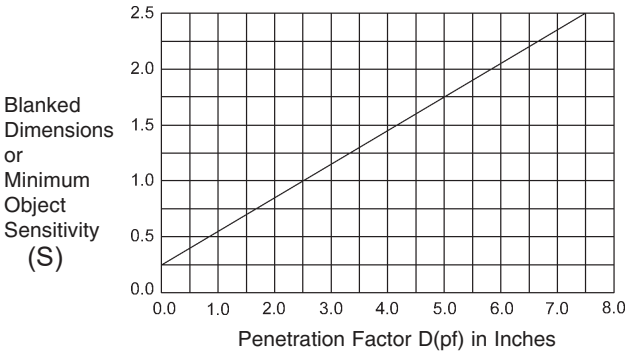
1910.212
General requirements for all machines (covers press brakes, hydraulic, and pneumatic machines not covered by mechanical power press standards).

(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 in going nip points, rotation parts, flying chips, and sparks. Examples of guarding methods are: barrier guards, two-handed tripping devices, electronic safety devices, etc.

NOTICE These are only partial reprints, refer to your Federal Register for total construction, control reliability, and machine guarding requirements for the subject machine being guarded for all applicable OSHA Standards.

ANSI Standards B11.19-2010

Formula for calculating safety light curtain distance from point of operation.



The effective sensing field of the device shall be located at a distance from the nearest recognized hazards such that the operator or others cannot reach the hazard with a hand or other body part before cessation of motion during the hazardous portion of the machine cycle.

The point at which a device responds to an intrusion may vary. The devices should be located or adjusted such that the device always responds to the intrusion at or prior to the safety distance. Care should be exercised when installing the device to ensure that it does not detect false signals from other devices in the area.

Usually the electro-optical presence-sensing device is used in a manner that provides a protected zone in front of the primary work area with auxiliary devices or guards used to protect secondary access areas. In some cases, however, mirrors may be used in conjunction with the device to provide 2, 3, or 4 sided protection.

The machine stop time should be measured with the machine running at its fastest speed with its heaviest die or tooling and the stop time being measured at the 90º position in the downstroke.

The following formula should be used when calculating the safety distance:

$Ds = K\ (Ts + Tc + Tr + Tbm) + D(pf)$

Ds = Minimum safety distance between the device and the nearest point of operation hazard (in inches).

K = Hand speed constant. This value has been determined by various studies and although these studies indicate speeds of 63 in/sec to over 100 in/sec, they are not conclusive determinations. The employer should determine this value by considering all factors, including physical ability of the operator.

Regulations & Guidelines for Safe Operation

Ts = Stop time of the machine tool measured at the final control element.

Tc = Response time of the control system.

NOTE: Ts and Tc are usually measured by a stop time measurement device.

Tr = Response time of the presence-sensing device and its interface, if any, as stated by the manufacturer or measured by the employer.

Tbm = Additional time allowed for the brake monitor to compensate for variations in normal stopping time.

D(pf) = Added distance as indicated by the chart above. The minimum object sensitivity is stated by the manufacturer. If beam blanking or floating blank features is used, these figures should be added to the object sensitivity figure before using the above chart.

Machine Control Reliability Requirements

Control Reliability:

"...control circuits shall be designed and constructed so that a single failure or fault within the system does not prevent the normal stopping action from being applied to the press when required, or does not create an unintended stroking action, but does prevent initiation of a successive stroke until the failure is corrected." (ANSI B11.1-2009)

"...control shall be designed to prevent initiation of a stroke signal in the event that a failure occurs within the press control." (ANSI B11.2-2013)

"Robots shall be designed and constructed so that any single, reasonably foreseeable failure will not cause hazardous motion of the robot." (ANSI/RIA R15.06-2012)

"...control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of the control component to function properly, including relays, limit switches, and static output circuits." (ANSI B11.1-2009)

"...control system 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 initiation of a successive stroke until the failure is corrected." (ANSI B11.1-2009)

"...the control system 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 initiation of a successive stroke until the failure is corrected." (OSHA CFR 1910.217)

Safety Guidelines for Management

Operational Safety

1. Appoint a Safety Coordinator to be responsible for safety regulations, requirements, and suggestions. He must review and investigate all accidents and "close calls."
2. Establish and issue safety rules. Inform each employee of his responsibilities. Make sure he understands them and knows what is expected of him.
3. A thorough review and an early inspection must be made of existing presses, dies, and point of operation guarding to attain the degree of responsibility required by ANSI B11.1-2009 Safety Standards and Federal State laws. Review what mandatory modifications are necessary.
4. Equipment that is no longer safe and cannot be economically upgraded should be destroyed.
5. Never allow persons legally under age to operate or assist in the operation of machinery.
6. All personnel must be properly trained to eliminate accidents and injuries.
7. Regardless of the operator's experience, education or language barrier, it is the responsibility of the supervisor to give him a thorough explanation with each new job assignment.
8. No employee should be given a work assignment that he does not fully understand. Only properly instructed and thoroughly trained personnel should be assigned to work on or with any machine.
9. It shall be the responsibility of the employer to provide an adequate, clean, safe, and uncluttered work area around each machine.
10. If a malfunction is reported, stop the machine immediately, correct the problem, then resume production.

11. Investigate all accidents and close calls. Analyze the reason for occurrence. Take action to prevent recurrences. Keep records of the investigation and preventative steps that were taken.

12. Only employees who understand the machines' operation and safety requirements and who are able to communicate this knowledge should be given the responsibility of instructing and training others to perform as operators.

13. Management must decide that personnel protective safety equipment is required to perform each job safely. Items such as safety glasses, shoes, gloves, helmets, hand pads, spats, protective sleeves, and material handling equipment are common in the metal working industry. If noise levels are excessive, protective head sets and ear muffs are recommended.

14. When designing point of operation guarding, the manufacturing process should be weighed heavily in favor of operational safety.

15. Establish safe and convenient material handling methods and procedures.

16. Post in convenient areas the names, addresses, and phone numbers of physicians and hospitals, and members of the organization who are to be called in case of emergency.

17. All equipment must be electrically connected according to the National Electric Code and be consistent with other accepted practices.

18. Provide adequate and proper fire protection equipment.

Power Press Guarding

1. Press manufacturers do not know and cannot foresee the magnitude of potential applications of power presses. Therefore, only the press user can determine the type of guards that have to be used in order to perform the job safely. It is the responsibility of the user management to make certain that point of operation guarding and other necessary safety devices are installed. The press should be guarded in such a manner that it is impossible for the operators to place their hands or any other part of the body in the die area.

2. The press user should become thoroughly acquainted with the safety devices commonly employed in power press operations.

3. Feeding devices are strongly recommended since they remove the operator from the die area and, therefore, allow more effective utilization of guards and safety devices.

4. Do not release a press for production before installing and testing all guards and covers.

5. Make frequent evaluation checks of all guarding and devices while the press is running. Correct all unsafe findings immediately.

Power Press Care Through Inspection and Maintenance

1. All maintenance and inspection personnel should be specifically instructed and must understand proper maintenance and inspection procedures contained in this manual.

2. Set up a daily, weekly, and monthly press inspection program. Use a checklist and verify that the job is done correctly.

3. Establish a preventative maintenance program. Records of all maintenance work performed must be kept.

4. Since all equipment has a limited life, quality maintenance personnel are required to obtain maximum usage of your equipment.

5. Releasing a power press for production following maintenance should be the responsibility of a qualified individual assigned by management.

6. To maintain the original level of press reliability, careful inspection of mechanical, electrical, and pneumatic areas must be made. This may give an advance warning of a hazard which then can be corrected to prevent possible injuries and damage.

Regulations & Guidelines for Safe Operation

Safety Enforcement

In order to have an effective safety program, management at all levels must enforce every safety rule and regulation. Strong disciplinary measures are sometimes required. They should consist of a warning, written reprimand, work suspension, transfer, demotion, or possibly a dismissal. All infractions must be reported and recorded. Once an infraction in noted, it shows that an unsafe practice or condition has existed. This may be the result of poor planning or improper training and instructing. The reason for the infraction should be analyzed in order to take corrective action.

Supervisor Training

It should be the responsibility of management to instruct their supervisors on safety, giving job instructions, supervising operators, determining accident causes, and building safety attitudes among the machine operators. Accidents can occur due to inadequate training of supervisors.

Operator Training

It shall be the responsibility of management to insure proper training of operators. A specific training program should be instituted to instruct the operator in safety, proper usage of the equipment, and correct operational procedure in performing each and every job. In addition to the supervisor, the operator should be familiar with the proper guarding of the point of operation. Never permit an operator to start a job without complete instructions from his immediate supervisor.

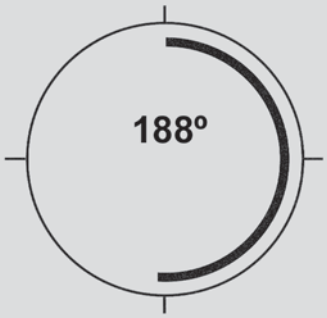
Tonnage Load Monitor (optional)
Mounting & Connecting

Overview

The Tonnage Load Monitor has been designed with user friendliness in mind. The analog output of the TLM provides a shielded/twisted pair cable to the P4 plug on the Presscam 8 computer board. That is, each analog output must have a ground wire twisted around it. All the twisted pairs (up to 4) are then encased in a shield which must be connected to the case (usually the nut holding down the aluminum cover). The TLM should be mounted within 3 feet. Several useful functions such as auto-zeroing and peak hold circuits have been incorporated to make the TLM a versatile signal conditioner.

Tonnage capacity: 500

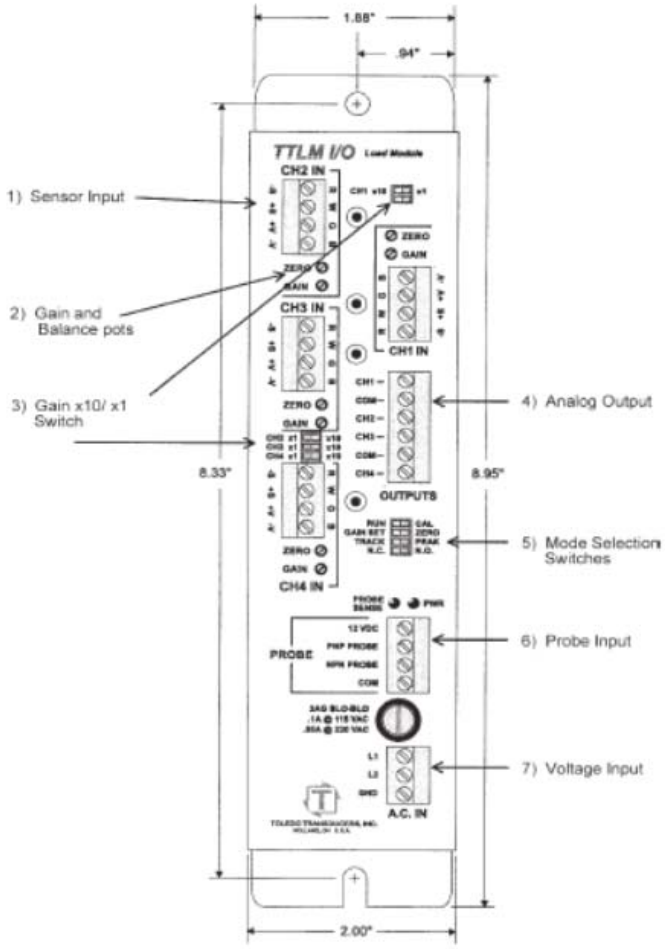
Sensor Input	Setpoint		Reading	
	Min	Max	Peak	Counts
LR	0	0	125	512
RR	0	0	125	512
LF	0	0	125	512
RF	0	0	125	512
EXIT	TONNAGE SENSOR INPUT SETUP			



The "counts" is a digital representation of the voltage on the sensor input. 0 = 0v, 512 = 2.5v, 1024 = 5.0v 2.5v = machine tonnage capacity / 4. Tonnage on all 4 channels can be viewed while in RUN mode. The tonnage for any channel will only be displayed on the RUN screen when the minimum tonnage value is set above 0. You can still only change the setpoints from the Tonnage Setup screen in the PROG mode.

Mounting the TLM

Use #10 screws to securely mount the TLM in an enclosure suited to the environment. The dimensions and recommended mounting hole arrangements are shown below in Figure 1.



Connecting Sensors to the TLM Sensor Connection Guidelines

1. Strip the sensor cable as shown in Figure 2. Be sure not to nick any of the signal conductors or strip the shield completely away. At least a ½ inch of cable shield should be exposed for proper insertion into the wire lug.

Tonnage Load Monitor (optional)
Mounting & Connecting

Figure 2

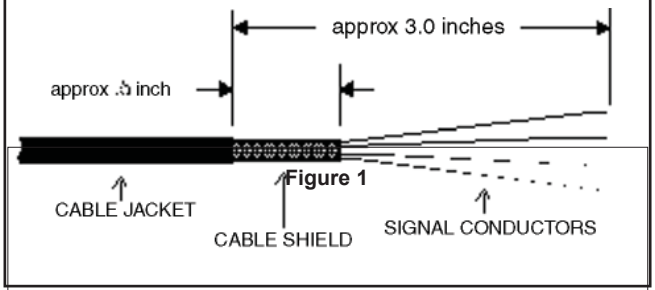


Figure 1

2. Insert the cable through the lug as shown in Figure 2a. Make sure the cable shield is aligned with the portion of the wire lug which will be crimped.

3. Next, crimp the lug on to the cable shield, do not crimp too tight and risk smashing the wires. This could cause them to short to ground. Figure 2b shows a side view of the completed operation after crimping.

Figure 2a

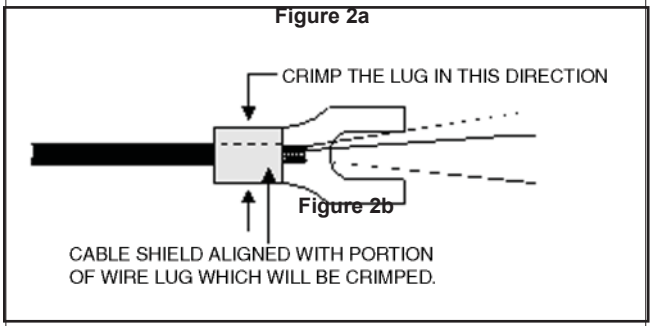


Figure 2b

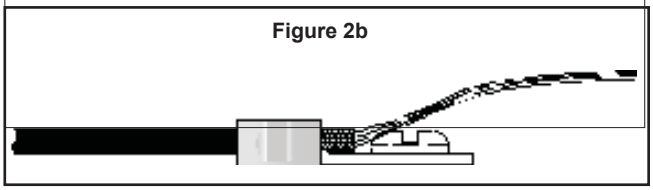


Figure 2b

4. Attach the wire lug to a ground terminal on the front of the TLM. Use a 6-32 x ¼' screw for the grounding lug connection.

Note: If your sensor is not double shielded with both foil and a braid, electrical noise may affect your output readings.

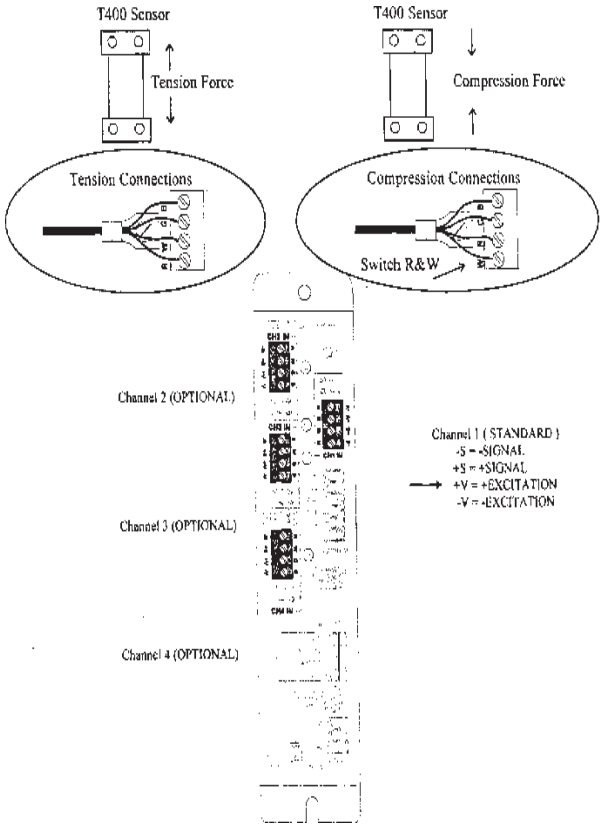
Note: Some brands of sensors use a different color code than the red/white/black colors. It is important to check the spec sheet of the sensor. The spec sheet will indicate the excitation and signal.

Connecting Sensors to the TLM

The TLM Load Module accepts signals from strain gauges.

Figure 3 illustrates the sensor connections available on the
TLM.

Figure 3



The TLM can use an input of either 115 VAC or 220 VAC (factory set at 115 VAC).

Input power is connected by means of the front panel “A.C. IN” connector and fused with either a 100mA fuse for 115 VAC, or a 50mA fuse for 220 VAC.

These jumpers can be accessed by removing the six screws securing the cover and then pulling the cover off from the front.

115 VAC = Jumpers A & C

220 VAC= Jumper B Only

TLM Cam Switch Wiring Connections

Figure 4
TLM Printed Circuit Board

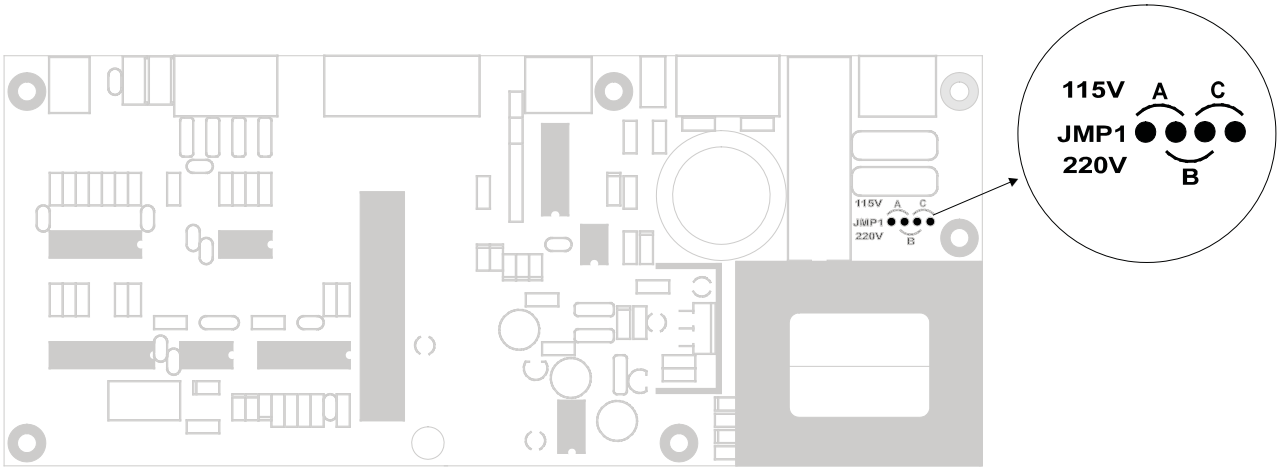
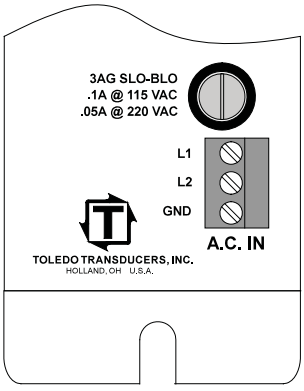


Figure 4a
Front Panel A.C. Power Connections



Tonnage Load Monitor (optional)
Mounting & Connecting

The probe supply voltage is provided by the TLM via the +12VDC output connection on the PROBE interface connector.

Figure 5 illustrates the wiring for both the PNP and NPN probe types.

Either a normally open or normally closed probe may be used.

The LED directly above the probe input connector (PROBE SENSE) indicates the actual state of the probe.

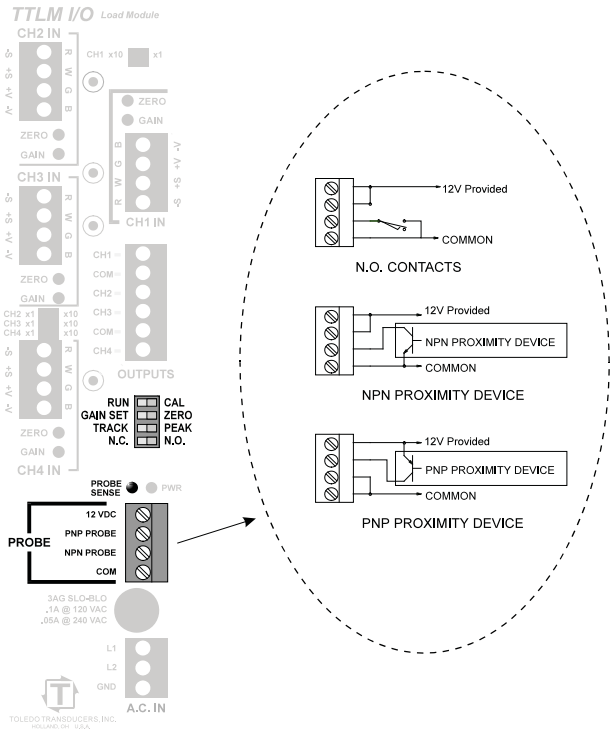
This LED should turn on at 140° and turn off at 240°. If it is working just the opposite, simply flip the N.C. -N.O. Dip Switch.

If the probe is ON during this time, the DIP switch may be moved to N.C. to invert the logic of the probe signal in the TLM.

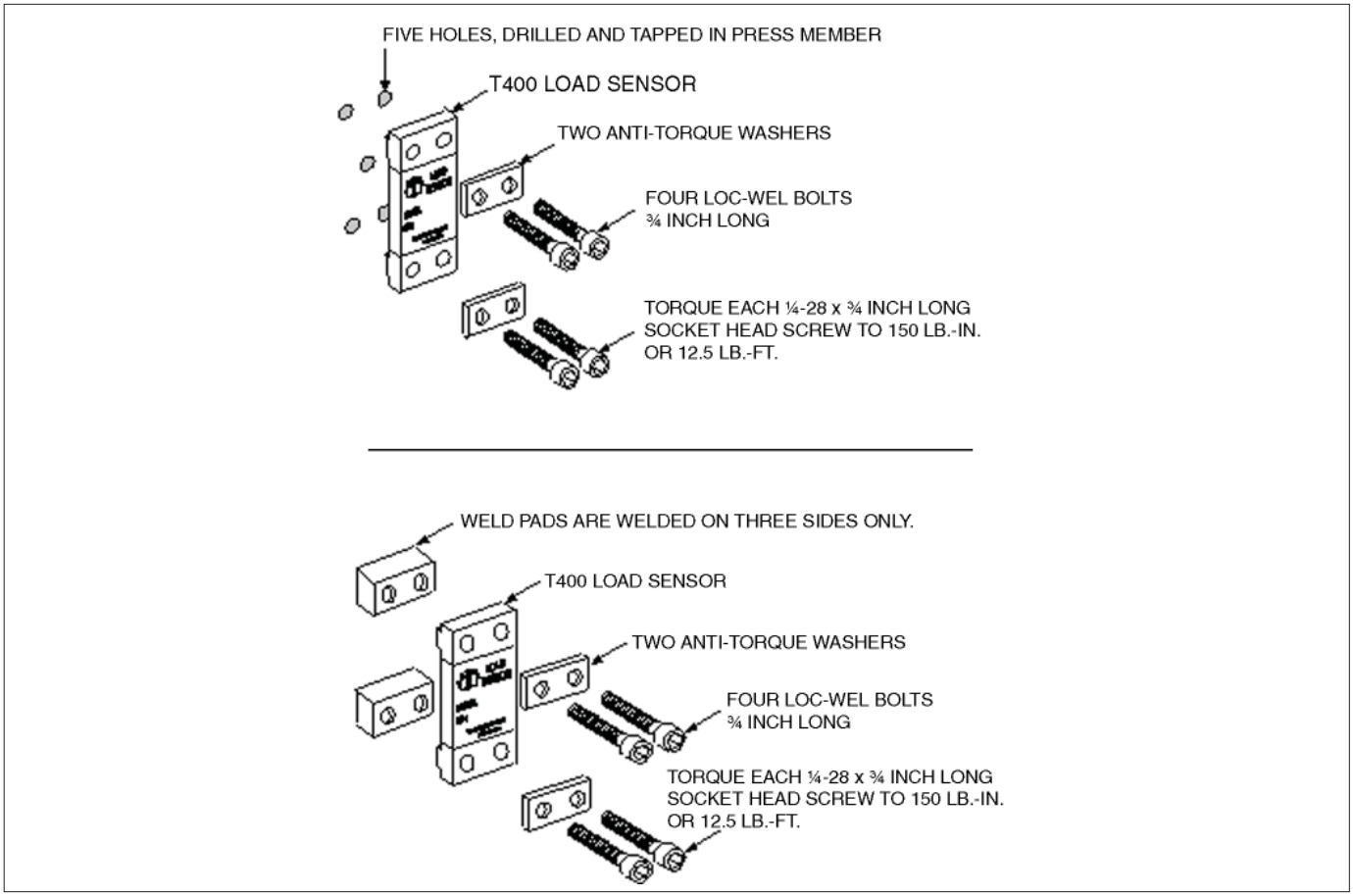
(* The state of the LED is not affected with this switch.)

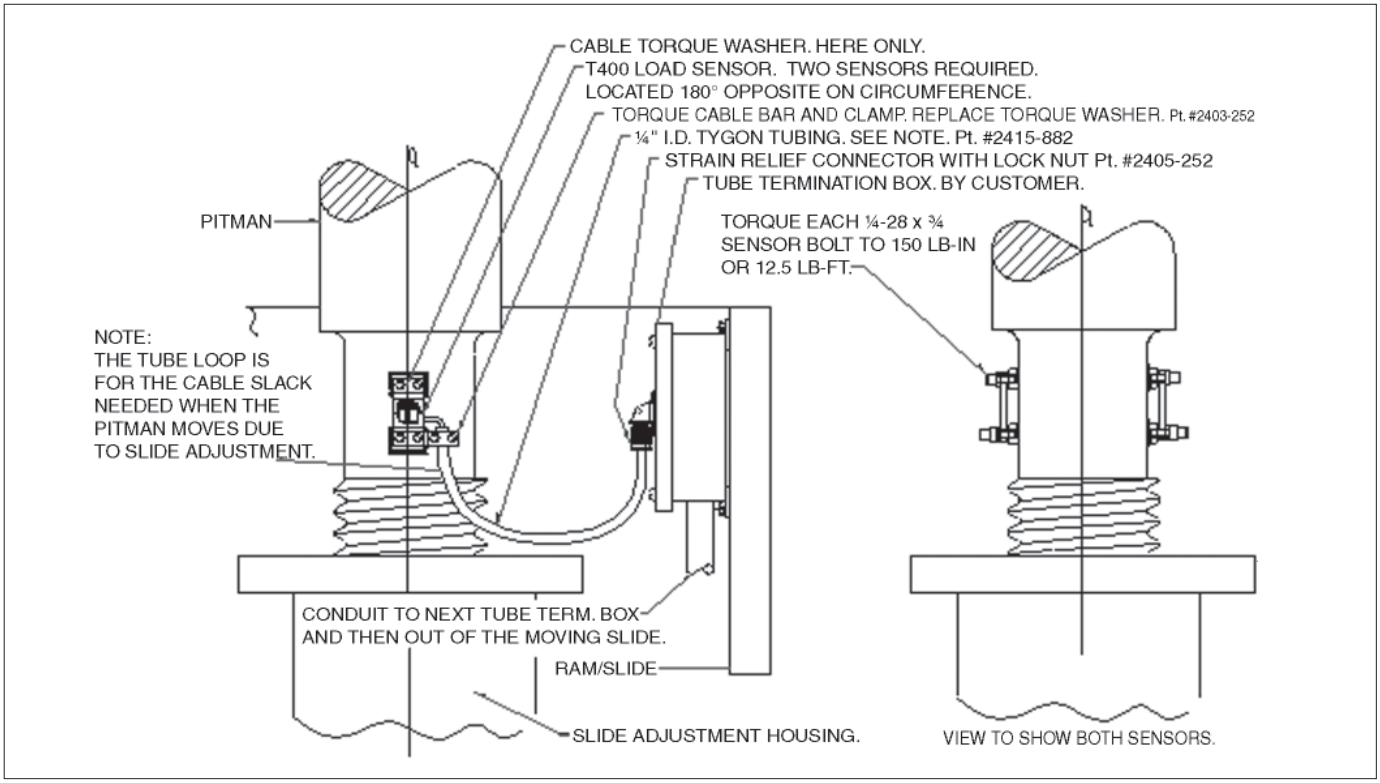
(See Function Descriptions, “Tonnage Setup”.)

Figure 5
TLM Probe Interface Connections



T400 Installation

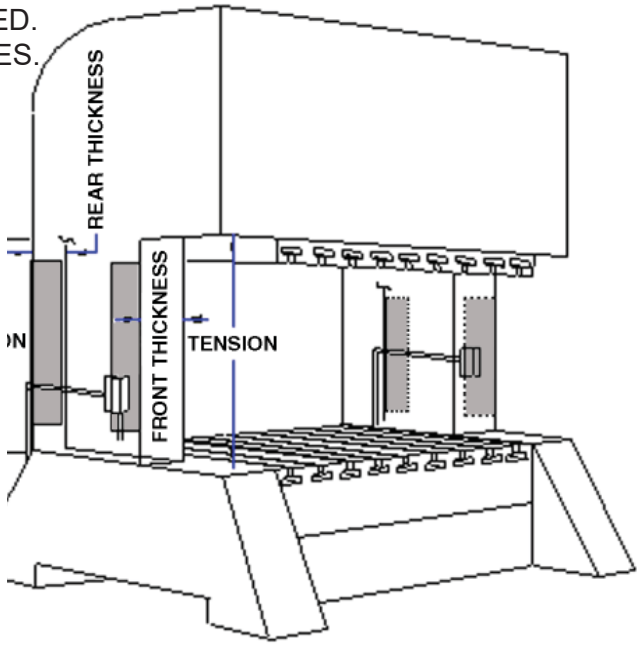




Tonnage Load Monitor (optional) Installation

NOTES:

1) (2) SENSORS REQUIRED
2) (2) SENSOR ENCLOSURES ARE INCLUDED. THESE HELP PROTECT THE T400 SENSOR GAUGES. THESE ENCLOSURES INCLUDE ½" KNOCKOUT HOLES. IF CONDUIT IS USED, WE SUGGEST USING ½" STRAIN RELIEFS IN THE KNOCK OUT HOLES.

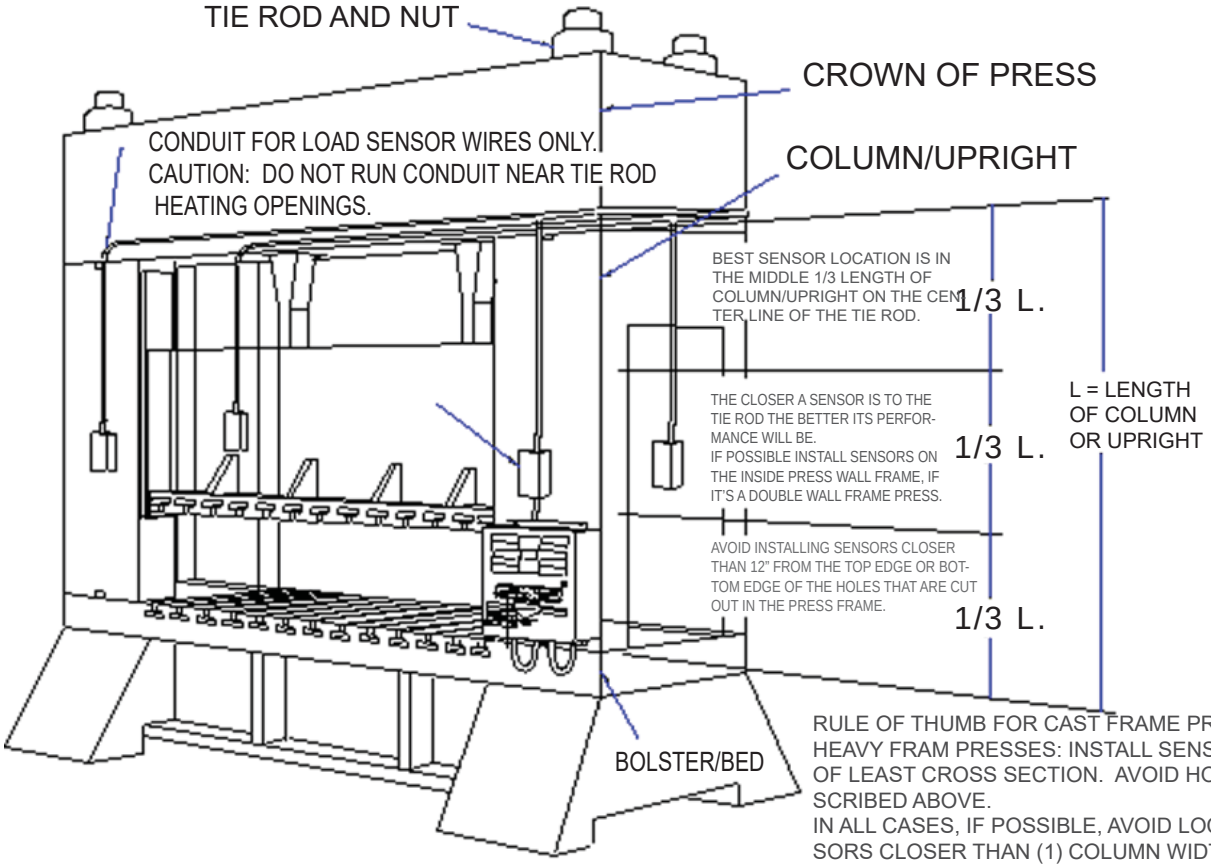


SENSOR PLACEMENT

Sensor location must be determined. COMPR ON
You have two locations, the front or the rear of the press. (Shown in the shaded area.)

HOW TO DETERMINE THE BEST LOCATION
* MEASURE THE REAR THICKNESS
_____REAR
* MULTIPLY BY THREE x 3 = ☐
* MEASURE THE FRONT THICKNESS
_____FRONT

If the front thickness is smaller than value in ☐, then mount sensors in the front. (This is the most common.) If the front thickness is larger, then place the sensor in the rear. Adjust the input connection for compression readings instead of tension.



RULE OF THUMB FOR CAST FRAME PRESSES OR VERY HEAVY FRAM PRESSES: INSTALL SENSORS IN AN AREA OF LEAST CROSS SECTION. AVOID HOLES AS DESCRIBED ABOVE.
IN ALL CASES, IF POSSIBLE, AVOID LOCATING SENSORS CLOSER THAN (1) COLUMN WIDTH FROM THE CROWN OR BOLSTER.

Using the T400 Sensor Installation Fixture Kit No. 1977-749

(Metric Installation Fixture Kit No. 1974-749)

Drill and Tap Method for Mounting Sensors

Step No. 1 Paint must be sanded off and or grease removed from sensor mount area. If the machine surface is flat (total indicated reading of .002") and smooth (125 µ in.) the load sensor can be bolted directly to the surface.

Step No. 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be 1/2 of an inch deep. **Be sure the sensor location follows the best location described on the print. (Drawing Numbers 3021, 4557).**

Step No. 3 Bolt the drill guide to the press member using the 1/4-28 by 1-1/4 inch (M6-1 X 35) long socket head cap screw in the center of the guide.

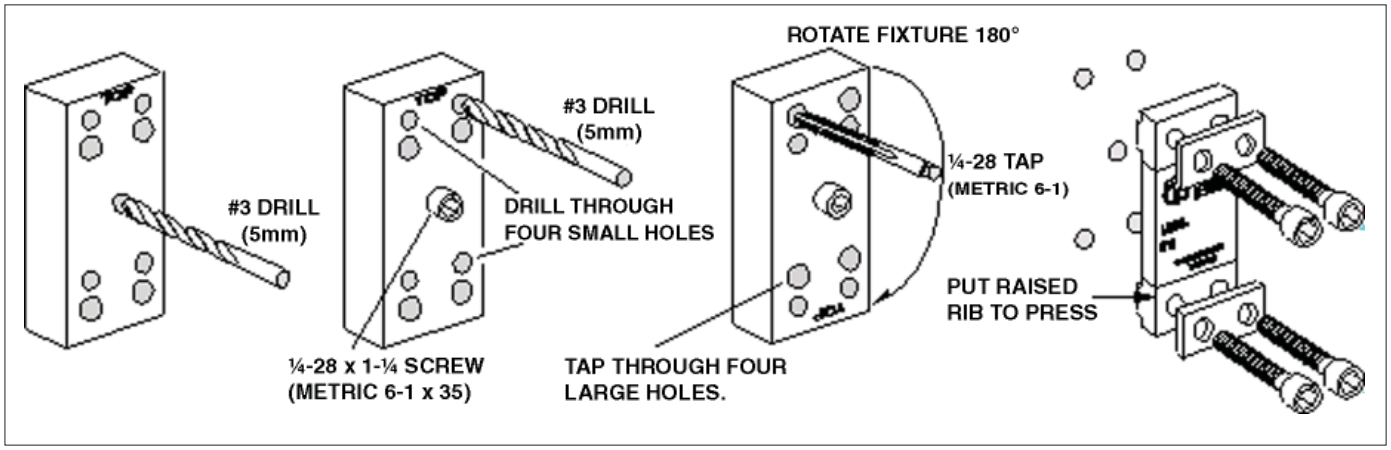
Step No. 4 Insert the number 3 drill (5mm) into the smaller hole and drill out all four holes to a depth of 3/4 of an inch.

Step No. 5 Loosen the drill guide. Rotate the drill guide 180° such that the larger holes line up with the fresh drilled holes in the press member. Insert a tap to be sure the holes line up. Lock the drill guide by tightening the center socket head screw.

Step No. 6 Insert the tap into the larger tap guide holes and tap each hole. **Be sure to use plenty of tapping fluid.**

Step No. 7 Remove the tap guide and continue with more holes where needed.

Step No. 8 Mount the sensor with raised rib to the press. The anti-torque washers should go between the screw and the sensor body.



Tonnage Load Monitor (optional) Installation

Using the T400 Sensor Installation Fixture Kit No. 1977

Weld Pad Method for Mounting Sensors

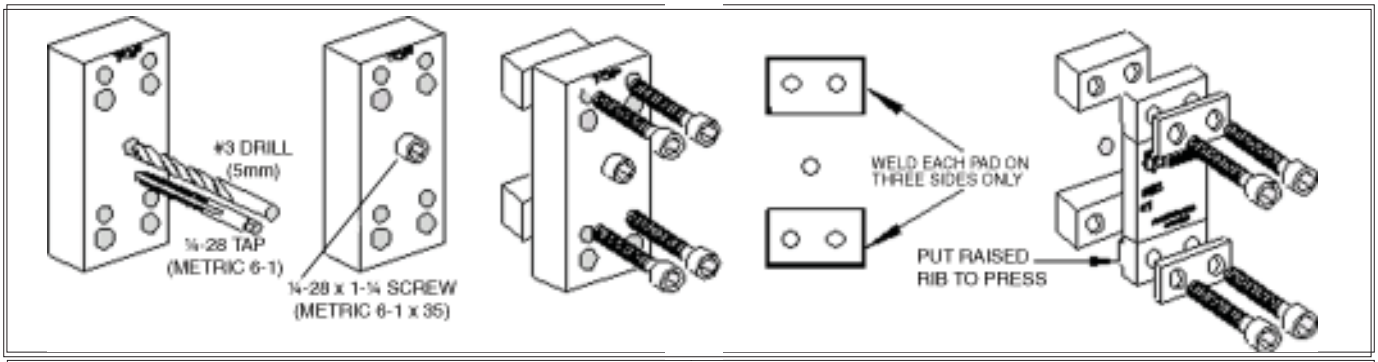
Step No. 1 Remove all paint, grease, or rust from surface to be welded (surface should be flat T.I.R. 1/32 of an inch).

Step No. 2 Bolt the weld pads to the fixture with the socket head cap screws provided. The user may want to drill and tap for the center holding screw. The center hole may be used to hold the fixture down flat and tight while welding the weld pads to the press member.

Step No. 3 Hold the fixture flat and tight. Weld the weld pads to the press member. **Be sure to only weld the weld pads on three sides, as shown.** A single pass is sufficient. Do not remove fixture until slag is removed and or assembly has cooled. The four screws may be discarded. **Do not use screws to assemble sensor**. When welding to cast iron, use a dry nickel rod such as: Lincoln Electric "Soft Weld" Hobart "NI Cast 99" MB Weld Prod. "MG 210" Strike arc on steel then puddle into the cast iron.

Step No. 4 Remove weld fixture. **Do not weld after fixture is removed**. Weld Pad surface must be clean - no weld bumps, scratches, etc. **Be sure tapped holes are clean and bottom of holes are free of weld flash**.

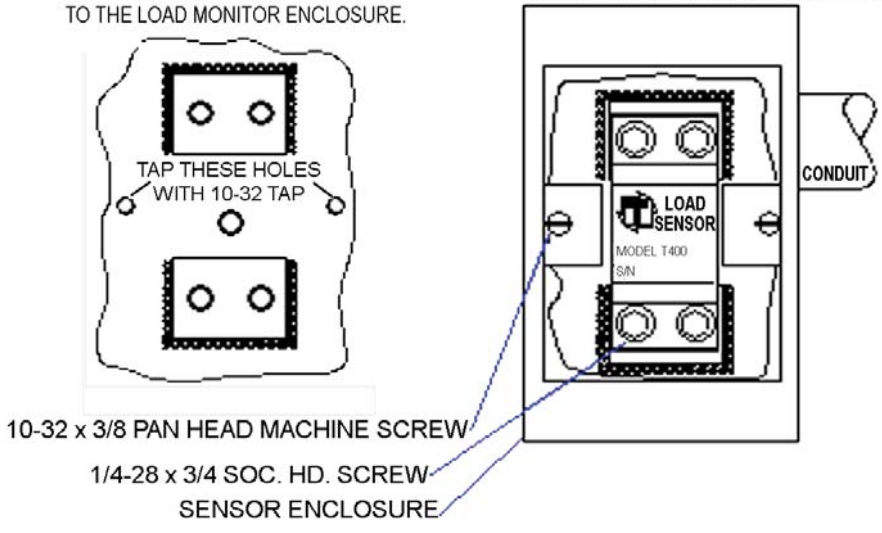
Step No. 5 Mount the sensor with raised rib to the press. The anti-torque washers should go between the screw and the sensor body.



SENSOR ENCLOSURE MOUNTING

USE 10-32 TAP IN THE TWO 3/8 DEEP HOLES THAT WERE DRILLED WITH THE FIXTURE IN THE PREVIOUS INSTRUCTIONS. MOUNT THE ENCLOSURE TO THE PRESS MEMBER AND RUN 1/2 INCH CONDUIT TO THE LOAD MONITOR ENCLOSURE.

RUN SENSOR CABLE THROUGH CONDUIT. PLACE SENSOR ON MOUNTING HOLES. PLACE ANTI-TORQUE WASHERS OVER SENSOR HOLES. SCREW IN SENSOR BOLTS, (4) EACH, FINGER TIGHT. USE ONLY THE 1/4-28 x 3/4 "LOC-WEL" BOLTS THAT ARE IN THE SENSOR PACKAGE.



Wiring a Triggering Device Into the TLM

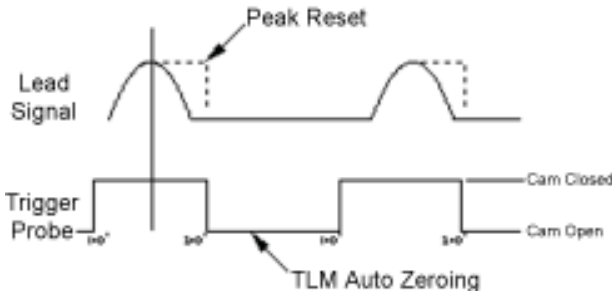
The TLM remains in the auto-zeroing mode of operation until an external probe is applied.

The auto zero feature is important for accurate readings. Over time the press frame will slightly change in its structure. This may be due to temperature or press frame tension. The TLM will compensate for the slight change. It will readjust the zero base line. This zero base line is the no-load value of the press. With a consistent zero value, the tonnage output readings should remain accurate.

When the probe turns on, the TLM opens the window to read a load signal. In peak mode the load level rises to the highest value.

When the probe turns off, the peak level is reset and the auto-zeroing function is resumed (notice the dotted line in Figure 6).

Figure 6
The recommended timing of the probe
vs.
The loading on the machine



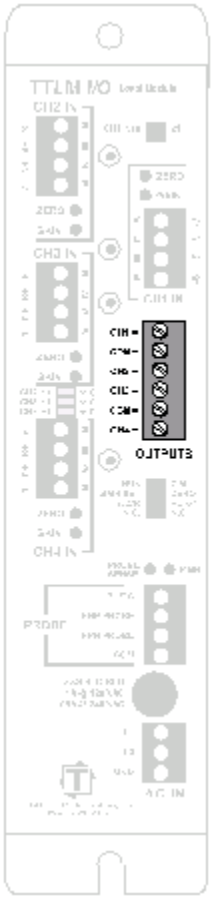
The timing of the probe should be such that it turns on just before the machine begins generating a load (140°) and remains on until the load is removed (240°) and the TLM outputs have been read.

The Analog Output Connector

The analog outputs are provided on a 6 pin Phoenix connector for easy access. The voltage level at these outputs ranges from 0V at no load, up to approximately 9V at maximum.

This output voltage level is directly related to the gain setting of each channel.

Figure 7
The analog output connections provided for interfacing to other peripherals



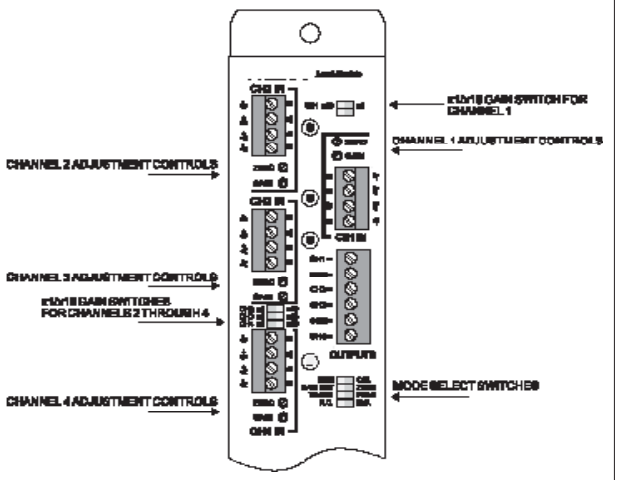
Analog Voltage Output Connector
Pin 1 = Ch 1 out
Pin 2 = Common
Pin 3 = Ch 2 out
Pin 4 = Ch 3 out
Pin 5 = Common
Pin 6 = Ch 4 out

Tonnage Load Monitor (optional) Calibration

Calibrating the TLM Load Module

**If you have a Maximizer Load Monitor (Allen Bradley based system), please refer to that manual for proper calibration of the TLM .*

Figure 8
Switches and controls used to calibrate the TLM Load Module.



Step 1: Now that you have found the best possible sensor location, torque all of the sensors down to 150 in/lbs on the sensor bolts. Do not put the sensor enclosure covers on yet. You will need to test each sensor location.

Step 2: Flip mode select switches to:

Perform the steps found on the "Tonnage Setup" page of this manual to connect the TLM to the Presscam 8, and configure machine capacity.

Step 3: On the Presscam 8 Tonnage setup screen, set the Low limit of each channel to 1 and the High limit to the maximum limit for each leg. Now you can watch the COUNTS column on the screen and adjust the zero pot on the TLM for ~0 counts.

NOTE: The Presscam 8 can only read positive voltages, to avoid damage check to make sure voltages going to the Presscam are positive)

Step 4: Again connect your volt meter to the output plug on channel one and common. Have someone put pressure on channel one's sensor with their thumb. It should slightly change as pressure is applied. This will verify your sensor location. Normally we locate our sensors:

Ch1 = Left Rear Ch3 = Left Front

Ch2 = Right Rear Ch4 = Right Front

Step 5: Coat the sensors with silicone if you are calibrating a forging press. This will help prevent water damage when the presses are washed. Put the sensor enclosure covers on each box.

Step 6: Without load cells in the press, cycle the press and stop it at bottom dead center. Measure between the ram and the bed to determine the size of the spacers you will need. Be careful to allow around a 1/8 inch gap between the ram and the load cells.

* Damage to the press could occur if the ram locks up the load cells due to an improper measurement.

Step 7: Cycle the press so the ram goes to the top. Insert the load cells and spacers. Keep the load cells symmetrical with each other in the bed of the press. Record their placement on a calibration sheet.

Step 8: Cycle the press over and over. Each time lower the adjustment until you reach the tonnage rating of the press.

* The load will increase approximately 1 ton for every 1/1000 inch as you begin to lower the adjustment.

Step 9: Once you have evened out load distribution (using shims) at the press capacity, you are ready to adjust the gain pots on the TLM. Turn the mode selector switches to:

Step 10: If your PLC readout device does not adjust the tonnage, then the TLM will need to be adjusted.

Set the mode switches to:

Adjust the gain pot after each press cycle until your readings on the Presscam 8 match the readings on the load cells. To obtain more gain use the

switch.

Step 11: After your readings match up, check the tonnage at lighter values by backing off the slide adjustment little by little and record the results. This should be done at least four times to see the accuracy at lower tonnages. This is called a “linearity check.”

Step 12: You are now done with the calibration. Refer back to the “Tonnage Setup” page for instructions on how to setup the tonnage limits.

Setup the TLM with Pre-calibrated Load Cells

Follow these steps after you have installed the TLM and place the load cell in the press *(Complete the following formulas if your TLM has anything other than a 1 meg shunt).*

Step 1: Locate the following information from the load cell calibration data sheet:

- Shunt Output Resistance _____
- Shunt Output Voltage in mV/V _____

Step 2: Find the New Shunt Output by completing the following formula:

(.000001) x (Shunt Output Resistance) x (Shunt Output Voltage) = New Shunt Output Voltage

Step 3: Set your TLM to a Full Scale voltage. Common settings are 5VDC or 2.5VDC. Label this V Full Scale.

Step 4: Find voltage output at full scale on the calibration sheet. Label this V Out Full Scale _____.

Step 5: Find the calibration voltage by completing the following formula:

(V Full Scale) X (New Shunt Voltage) = Calibration Voltage Number
(V Out Full Scale)

The Calibration Voltage Number = _____

Step 6: Switch the TLM to:

_____

And Adjust the balance to ZERO.

Step 7: Switch the TLM to:

And adjust the gain pot to the Calibration Voltage Number from Step 5. You can read this voltage with a DC voltmeter. Read from the output of the TLM.

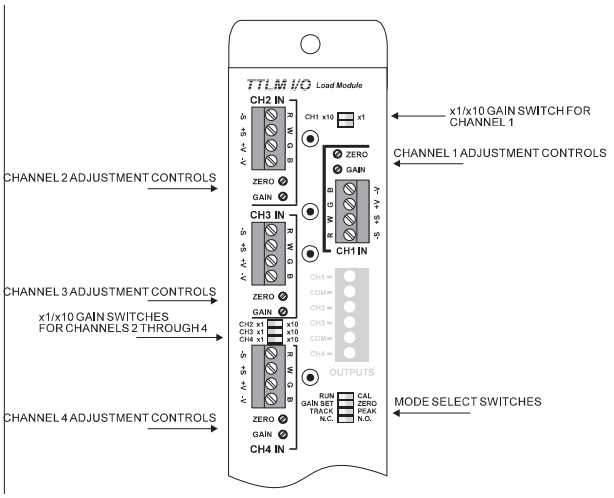
Step 8: Switch the TLM back to Run:

Tonnage Load Monitor (optional) Operation

Operating the TLM

Once the TLM has been calibrated it is ready for continuous use. To ready the TLM for load conversions, follow these four steps: (Figure 9)

Figure 9



Step 1: Enter the run mode by switching from CAL to RUN.

Step 2: Make sure that the GAIN SET/ZERO switch is set to ZERO.

Step 3: Insure that the external probe signal is turned on before the load is generated and off after the operation is complete. If the logic of the probe is reversed, use the N.C./N.O. switch to invert the probe signal logic or adjust the probe accordingly.

Step 4: Set the TRACK/PEAK switch to the desired mode. While in TRACK mode each channel's output will follow the loading on the sensor as the load on the machine increases and decreases. In PEAK mode, the output will increase to the highest load level and remain at that voltage until the probe is released.

Alarm. A reading that is out of the high or low limit range causing the relay to de-energize. Once alarmed, the relay opens to stop the press/machine.

Balance. The balance adjustment equalizes the sensor to the monitor. The balance pot is used to bring the display to zero.

Calibration Number. A reference value dialed in during the calibration process. When the calibration number is correct, the gain/span settings are correct.

Calibration. The process in which the Tonnage Monitor mounted on the machine is adjusted to read the same tonnage as the reference load cells in the bed of the press.

Cam Input. A switching input to the unit allowing tonnage to be read at a certain position in the stroke. It is usually obtained from a rotary cam wheel or a programmable limit switch. (Only 24 VDC devices.)

Compression. The force generated by the sensor or load cell by compressing. It is usually found in the rear of a C-Frame press or on a Pitman arm.

Gain / Span. Gain, also called Span, is the amplification used by the monitor. A small amount of elongation of the sensor needs a large amount of gain to show a high reading. The gain is adjusted during calibration.

Reverse Load. The “snap through” or damaging negative forces occurring in the machine. Typically, the snap through rating is 10% of the capacity of the press.

Shut Height. The distance from the top of the bed of the press to the bottom of the ram when on BDC. Most OBI/OBS presses have a shut height of approximately fifteen inches and a ram adjust of approximately four inches.

Track Mode. When using the track mode, the output will adjust between 0 and 9VDC. The value goes back to 0V when there is no load.

Peak Mode. When using the Peak Mode the output will hold the highest force seen during the time the probe switch is on. Most PLC units use this mode.

Presscam 8

Replacement Parts List:

11-131 Panel Mount (with gasket)
11-134 Metal Box enclosure (with gasket)
11-132 LCD mounting bracket (blue)
11-133 Aluminum Shield cover for computer board
11-135 Solid State Relay hold-down for I/O board
11-159 Large Metal Box enclosure (includes space for TTLM module)

18-005 B/W LCD display panel (with backlight)
18-006 LCD Backlight power supply
18-007 LCD Backlight fluorescent tube

20-022 1A Fuse (white nano)
20-023 5A Fuse (white nano)

21-047 Tuning Knob (black knob)
21-048 Tuning Knob (black ring)
26-071 Graphic overlay skin

30-009 Replacement Tonnage Controller (3 or 4 channel input unit)
30-010 Replacement Tonnage Sensors & 35' of cable
30-013 Replacement Tonnage Controller (1 or 2 channel input unit)

32-001 Safety Valve Relay (blue or white Dold, clear or green Elesta)
32-038 Ouput Module (Solid State AC)
32-039 Ouput Module (Solid State DC)
32-041 Output Relay (G2R-1-S)

35-065 EEPROM JOB memory chip (100 jobs)
39-051 RUN/PROG Keyswitch (with keys and cable)

40-002 Tuning Encoder device
45-019 LCD cable (from LCD to Computer board)
45-020 Resolver cable (30')

52-115 Power & I/O board (without output modules) specify solid-state or relay
52-116 Dual Computer board (with 100 job memory)
52-122 I/O ribbon cable (from I/O board to Computer board) 4'
52-123 Power cable (from I/O board to Computer board) 4'
52-227 Resolver unit (no cable) (formerly 40-003)

Notes

Notes

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.

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⚠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.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be reassigned to fix or establish key specifications for your application. Please consult the factory.

Pressroom Electronics™

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We have designed our equipment to the very highest performance and safety standards known to the current technological state of the art, as evidenced by our U.S.A. and foreign patents issued and pending. However, the installation, usage, suitability, and fitness of our equipment for any purpose, known or unknown, is interdependent upon the performance of other equipment not manufactured, installed, secured or maintained by Pressroom Electronics, Inc.

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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