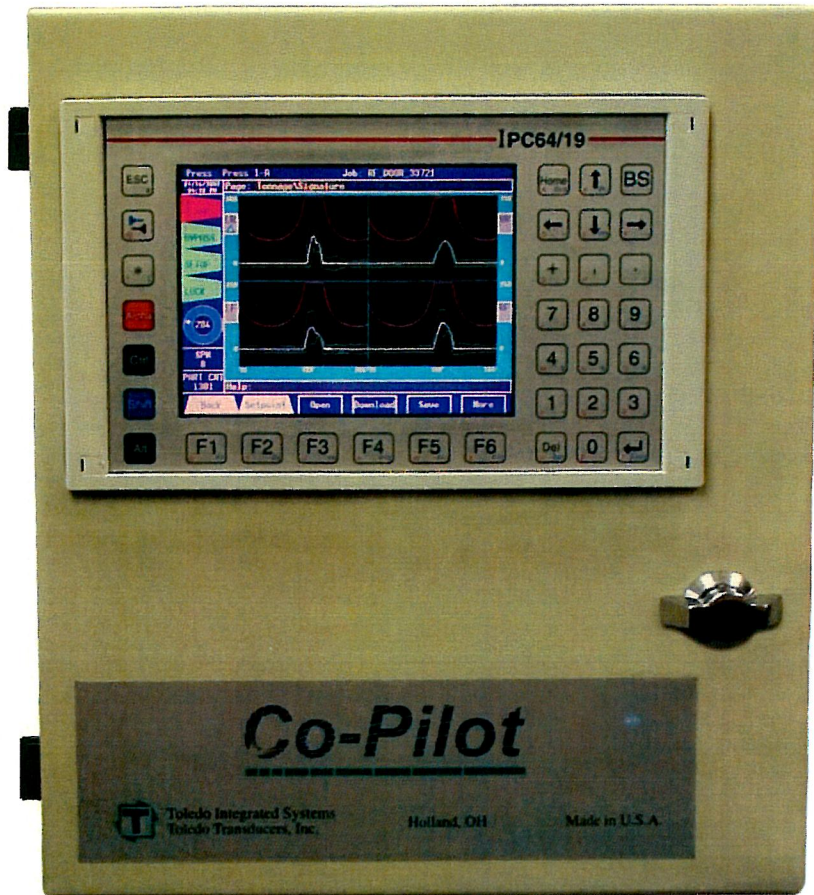


# Co-Pilot

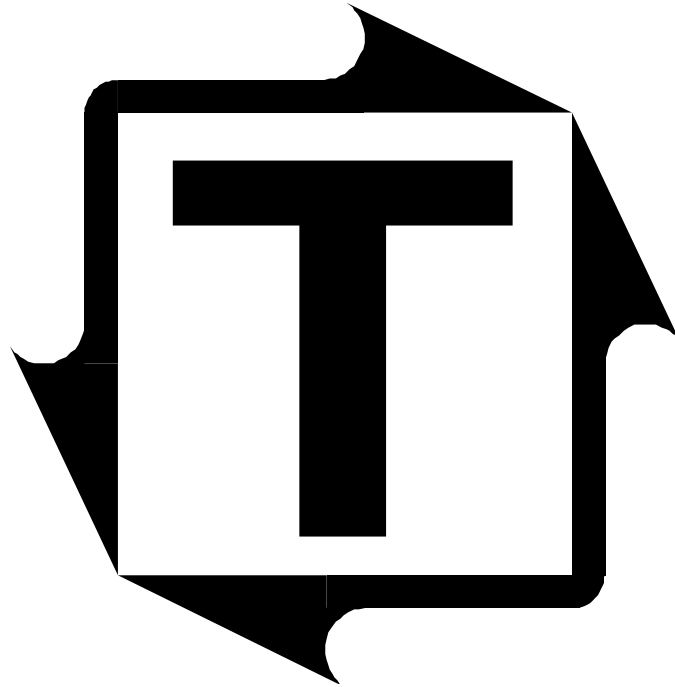


## Automation and Control with Signatures

By Toledo Integrated Systems

Installation and Operation Manual





# **Co-Pilot Installation Manual**

**Revision: E**



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## Limited Warranty

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This unit is warranted by the manufacturer, Toledo Transducers, Inc., to be free of defects in workmanship and materials for one year from date of manufacturer's shipment. This warranty is limited to repairing or replacing products which manufacturer's investigation shows were defective at the time of shipment by the manufacturer.

All products subject to this warranty must be returned for examination, repair or replacement

F.O.B. to: Toledo Transducers, Inc.  
6834 Spring Valley Drive  
Holland, Ohio 43528

***The express warranty set forth herein is in lieu of all other warranties, expressed or implied, including without limitation any warranties of merchant-ability or fitness for a particular purpose. All such warranties are hereby disclaimed and excluded by the manufacturer.***

Repair or replacement of defective products as provided above is the sole and exclusive remedy provided thereunder. The manufacturer shall not be liable for any further loss, damages, or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product.

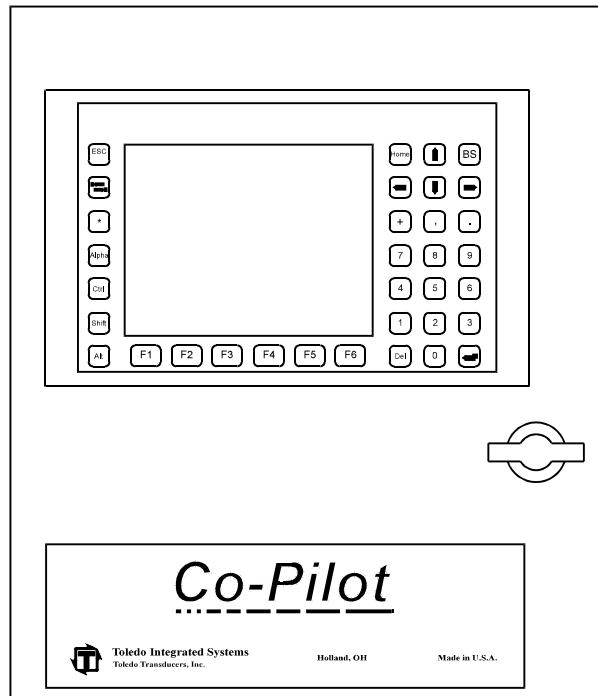
Any unauthorized repair voids this warranty.

There are no warranties that extend beyond those expressly set forth herein.



## Features Overview

The Co-Pilot is a press automation and control system with signatures. It integrates tonnage monitoring, die protection, programmable limit switches, brake monitoring, motion detection, signatures with enveloping, and more into ONE resolver-based system. The display is a 6.5" color screen. Signatures and press information can clearly be seen from many angles.



### FEATURES

- 2 or 4 channel tonnage monitoring
- Reverse tonnage
- 16 die protection inputs
- 8 or 16 programmable limit switch outputs
- PLS relays - mechanical or solid state
- Signatures - each press corner and total
- 5 signature zones for enveloping
- Critical Curve Monitoring - CCM
- Brake monitoring with 90 degree stop test
- Motion detection
- Drift detection fault
- Part, stroke, batch, and good part counters
- Speed compensation
- Up to 200 job storage
- 3 password levels

### OPTIONS

- Additional 2 or 4 channels for tonnage monitoring or analog input
- Shut-height control
- Counterbalance control
- Part measurement control
- Servo-feed interface
- Preventative maintenance
- TR-1 Resolver
- Universal Sensor Interface box
- Press Pilot clutch/brake control



**Specifications**

<b>Tonnage</b>	No. of Channels Sensor Inputs  Sensor Excitation  Sensor Input Connections Automatic Zero Balance Balance Range Gain Range Analog Output Analog Output Connection Inaccuracy Non-linearity Frequency Response Resolution  Calibration Shunts	Two or Four (Six or Eight optional) Full bridge strain gage sensors 120 to 1,000 ohms Up to (8) 350 ohm sensors Built-in 10VDC @ 500mA max (Short circuit protected) 7-pin .2" pitch Phoenix connector Yes +/- 1mV/V of offset (digitally controlled) 100 to 11,000x (digitally controlled) 1.25VDC @ Press Capacity .15" pitch Phoenix connector +/- 1% of full scale max +/- .1% of full scale max Flat DC to 6 KHz Each channel provides a 4-digit load value in 1024 count resolution Calculation based on 1 Meg Ohm shunt resistor
<b>PLS</b>	8 outputs Position output Timed output Speed compensation Turn on every # of cycles Mechanical relay  Solid state relay (optional)	16 outputs (optional) Up to 2 on/off windows 1 to 10 seconds Individual speed compensation value for each output Every 1 to 250 cycles N.O. and N.C. contacts 10 AMP @ 250VAC 10 AMP @ 30VDC N.O. contact 3 AMP @ 140VAC
<b>Die Protection</b>	16 inputs Sensor type  Built in power for sensors	Momentary (1 to 50 max cycle) Maintained (1 to 50 max cycle) Static N.O. Static N.C. 24VDC 750mA max.
<b>Motion Detect</b>	Start time limit SPM limit  Drift detection Brake monitor  Dual safety valve input	Adjustable up to 800ms Max and min limits SPM motion output relay (Same relay type as selected in PLS) Alarm when 3 degrees or more of incorrect motion is detected Adjustable stop time limit 90 degree stop test 110VAC mechanical relay (other voltage available)





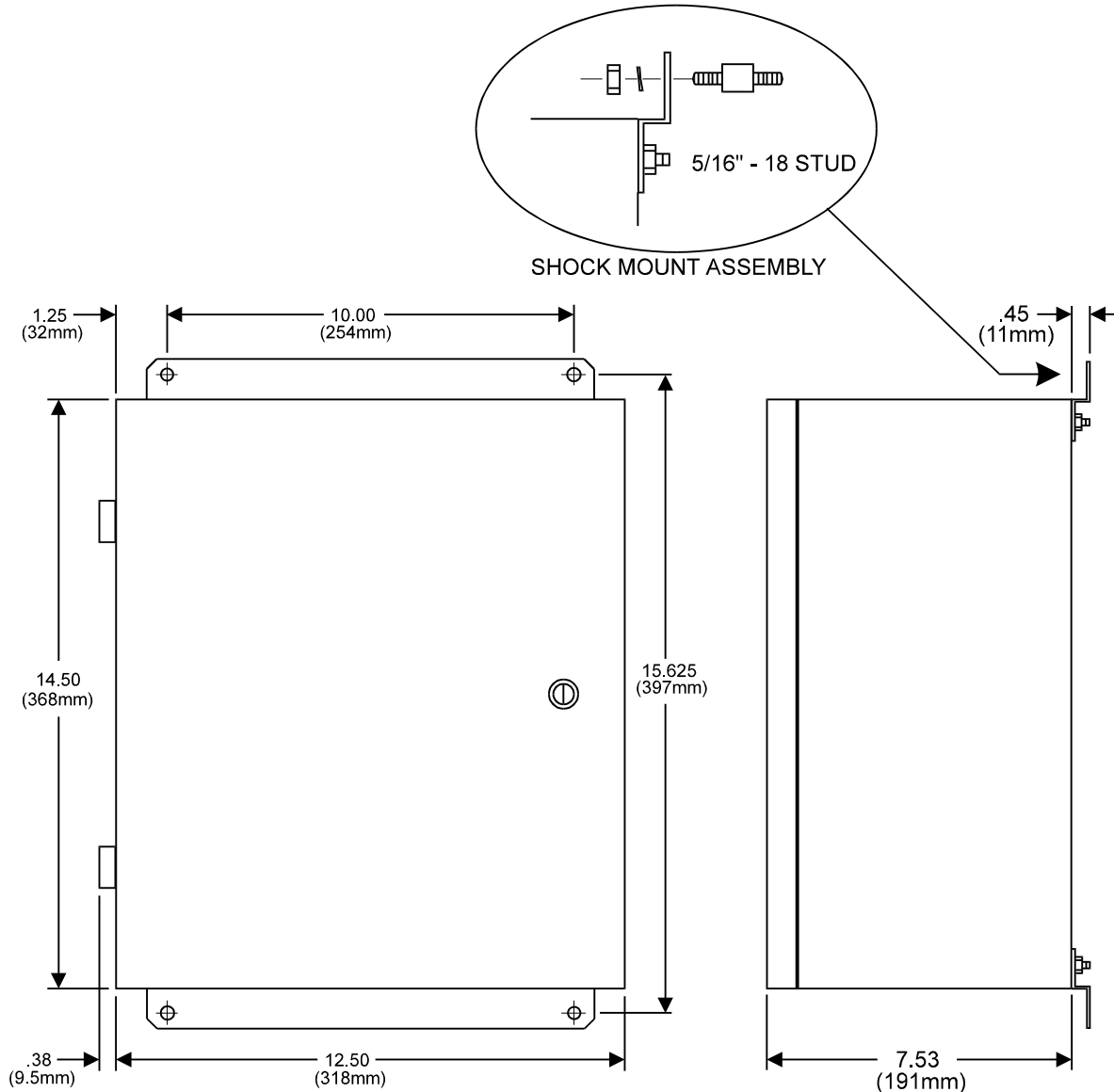
<b>Counters</b>	Stroke counter Part counter Good part counter (2) Batch counters	9-digit, for Press Preventive Maintenance 8-digit, 1 to 10 parts/stroke (programmable) 8-digit 8-digit, Top stop Toggle or pulse control relay for diverter
<b>Job Storage</b>	200 jobs	
<b>Password</b>	Master level Setup level Operator level	For supervisor For die setter For general operation
<b>Speed Limit</b>	Up to 400 SPM	
<b>Human Machine Interface (HMI) Unit</b>	Display  Keypad Flash Disk Serial Port	Bright 6.5" diagonal TFT LCD display VGA graphic with 16 colors  Menu driven keypad with alpha-numeric input 16 Mega Byte CompactFlash for data storage and transfer RS-232 for data transfer
<b>Shutdown Relays</b>	Top Stop relay and E-Stop relay	Mechanical relay with N.O. and N.C. contacts 10 AMP @ 250VAC 10 AMP @ 30VDC
<b>General</b>	Resolver  Computer Interface  Power requirements  Operating temperature Dimensions	Built-in excitation supports standard 5000Hz rotor excited positional resolver (3) RS-422/232 serial ports (9,600 to 115,200 baud)  95 Watts max. 85-132VAC @ 50-60Hz or 170-264VAC @ 50-60Hz 0-50 degrees Celsius 12.5" W x 14.5" H x 7.53" D, or 318mm W x 368mm H x 191mm D



## Mounting the Co-Pilot

The Co-Pilot is an electronic instrument and must therefore be protected from physical stresses such as shock and vibration. Shock mounts are provided with every Co-Pilot for this purpose. Failure to use these shock mounts may result in premature failure of the instrument and possibly void your warranty.

The Co-Pilot may be mounted directly to the press or to an adjacent structure. It should be positioned so that the display is easily read and the instrument is readily accessible. Figure 1 below provides the mounting dimensions and demonstrates the proper attachment of the provided shock mounts.



**Figure 1: Mounting Dimensions**

## Co-Pilot Components

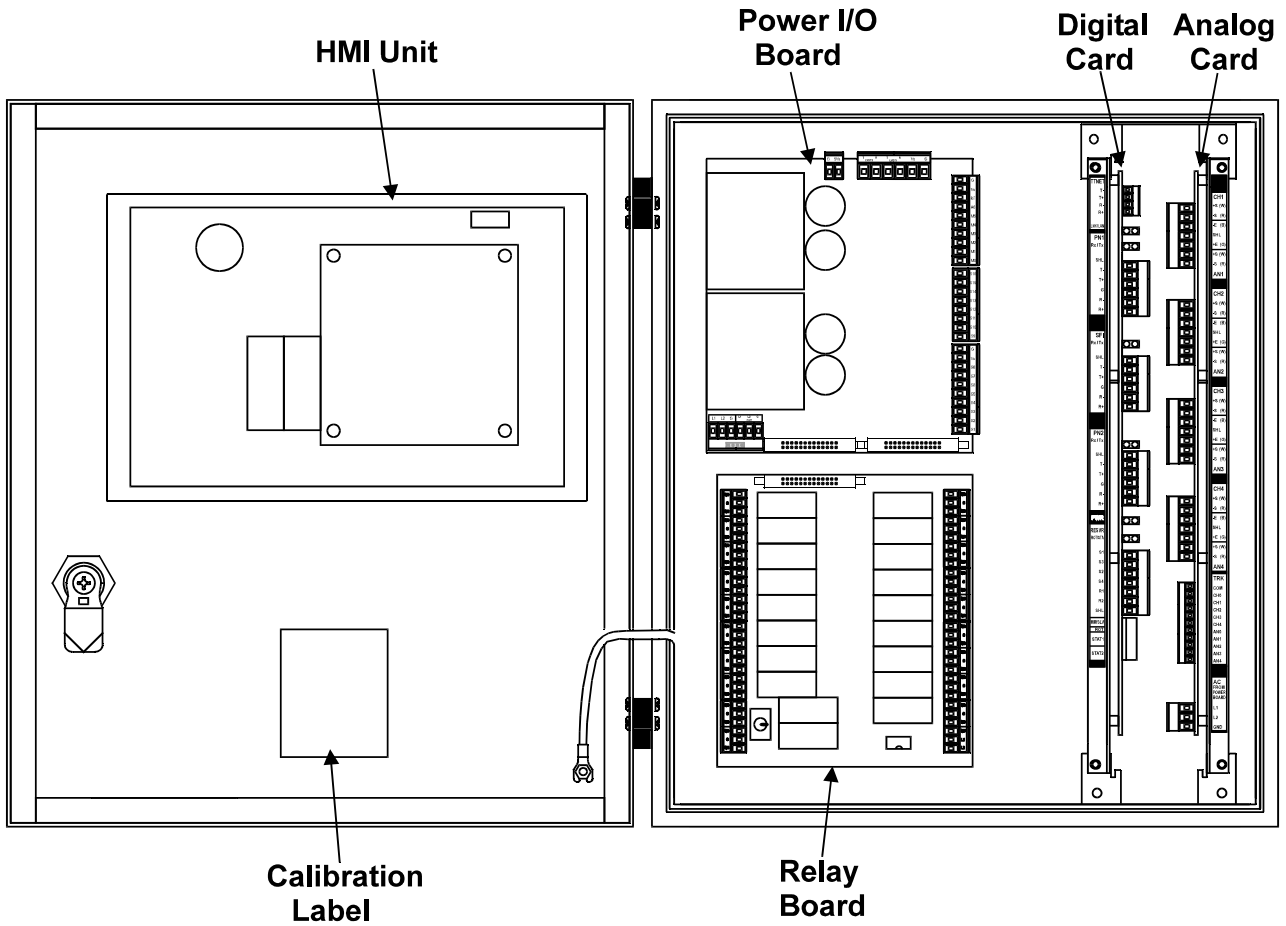
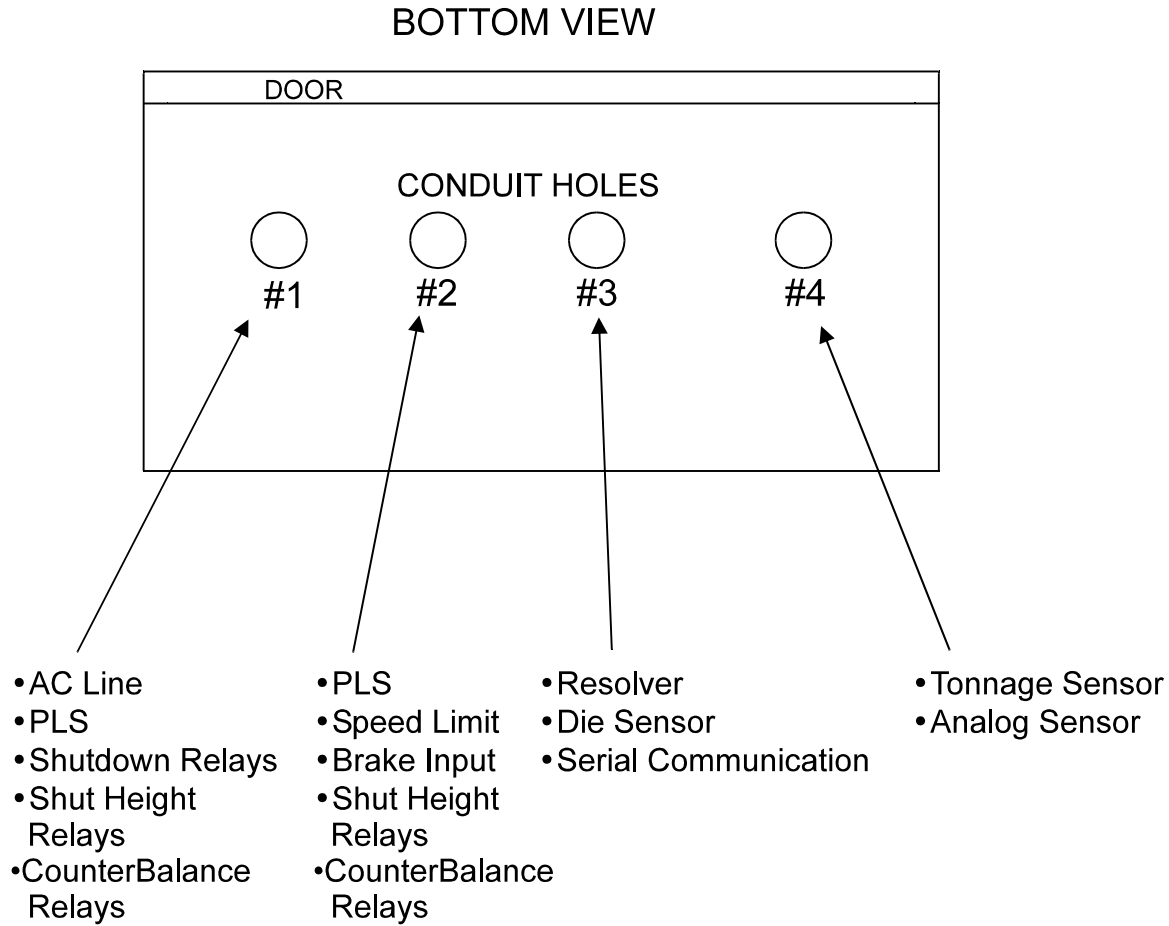


Figure 2: Co-Pilot Components

**Conduit Hole Selection**

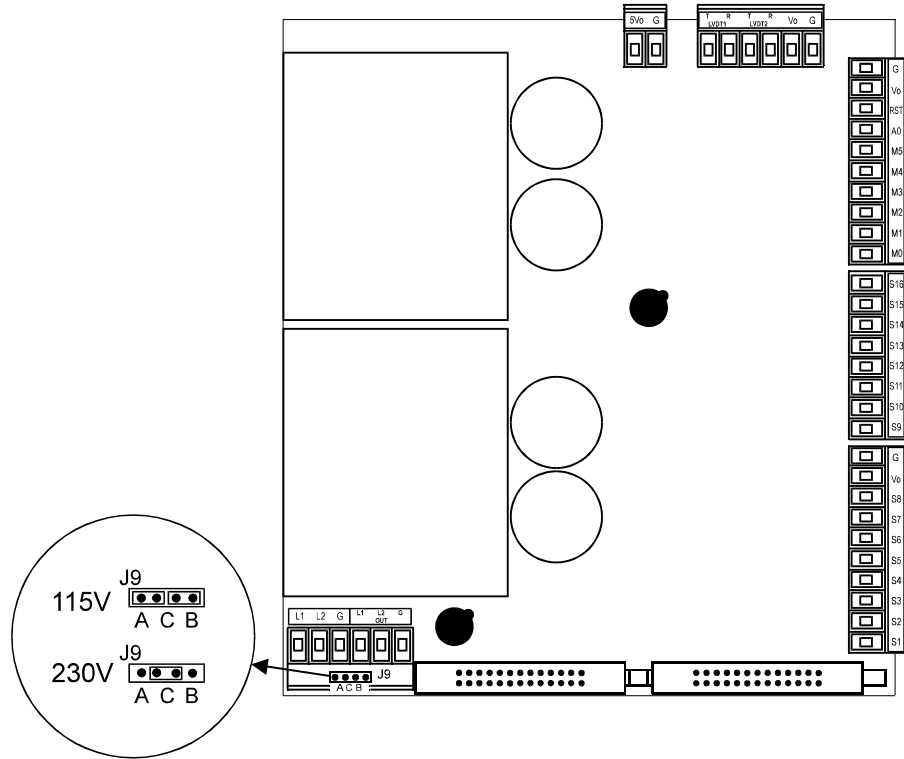
Follow Figure 3 to select the proper conduit hole for cabling. The holes are for 3/4" conduit, but they can be enlarged in the field if a larger fitting is required.



**Figure 3: Conduit Hole Selection**

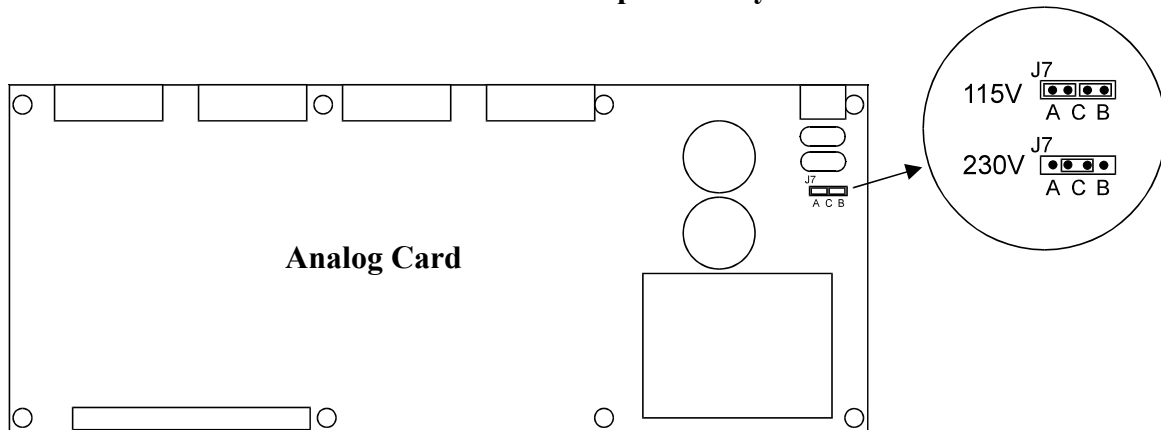
## AC Power Requirement

With the proper jumper settings, the Co-Pilot can be powered by either 115 VAC or 230 VAC (Factory set at 115 VAC.) The jumpers are located on the Power I/O Board as shown in Figure 4, and on the Analog Card as shown in Figure 5. Both sets of jumpers must be set for the desired AC voltage.



**Figure 4: Power I/O Board AC Power Jumper Settings**

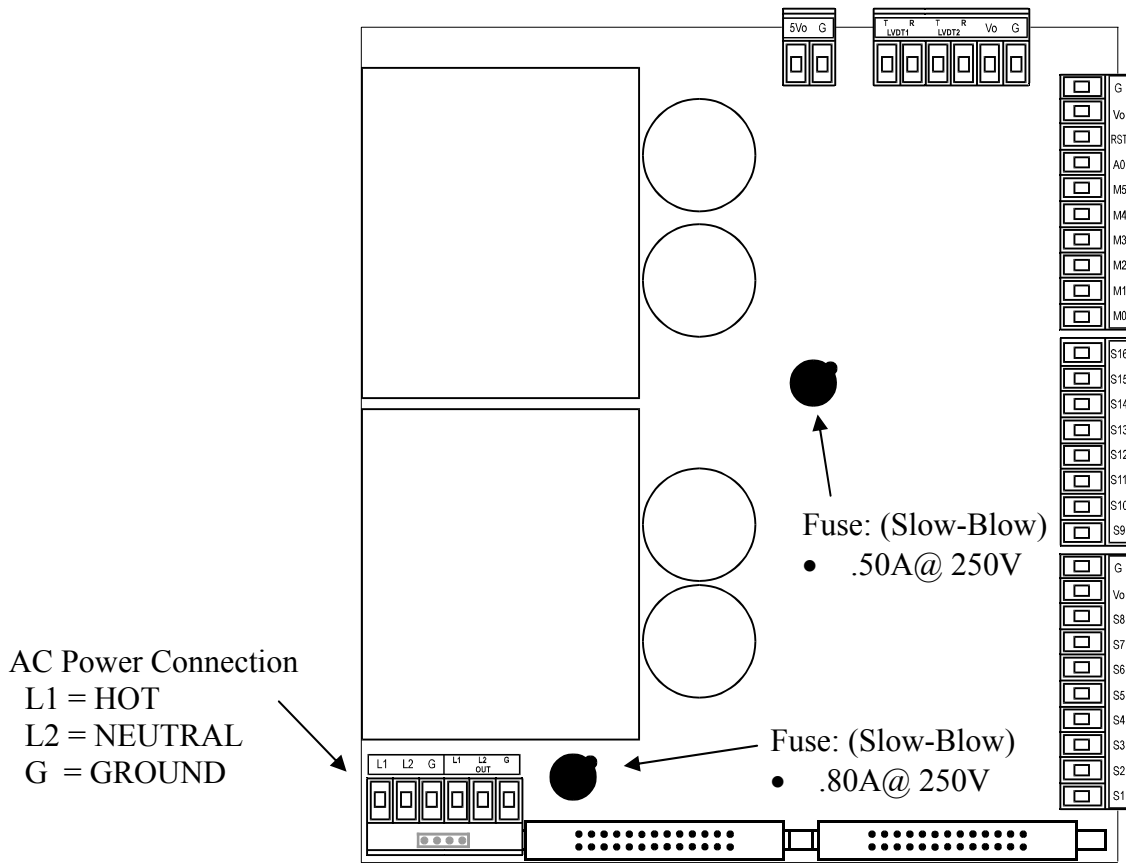
**115 VAC = Jumpers A & B**  
**230 VAC = Jumper C Only**



**Figure 5: Analog Card AC Power Jumper Settings**

**AC Power Connection**

AC power is connected to the Co-Pilot as shown in Figure 6. Use Conduit Hole #1 (see Figure 3) for the AC Power Wiring. Use the proper fuse as indicated.



**Figure 6: AC Power Wiring**

## **Tonnage Sensor Connection**

Refer to Figure 7 for the procedures below to connect tonnage sensors properly:

- 1) Power down the unit. Open the door of the Co-Pilot enclosure.
- 2) Run Tonnage Sensor Cables through the Conduit Hole #4 (see Figure 3), and route cables upward to the right of the Analog Card.
- 3) Prepare the sensor cable for termination as described in Illustration A on page 15.
- 4) Remove the four 7-pin Phoenix plugs from the analog card and wire each sensor cable as described in Illustration B on page 16.
- 5) The 7-pin phoenix plugs can then be inserted into the corresponding sockets. The tonnage sensor cable connections are now complete.



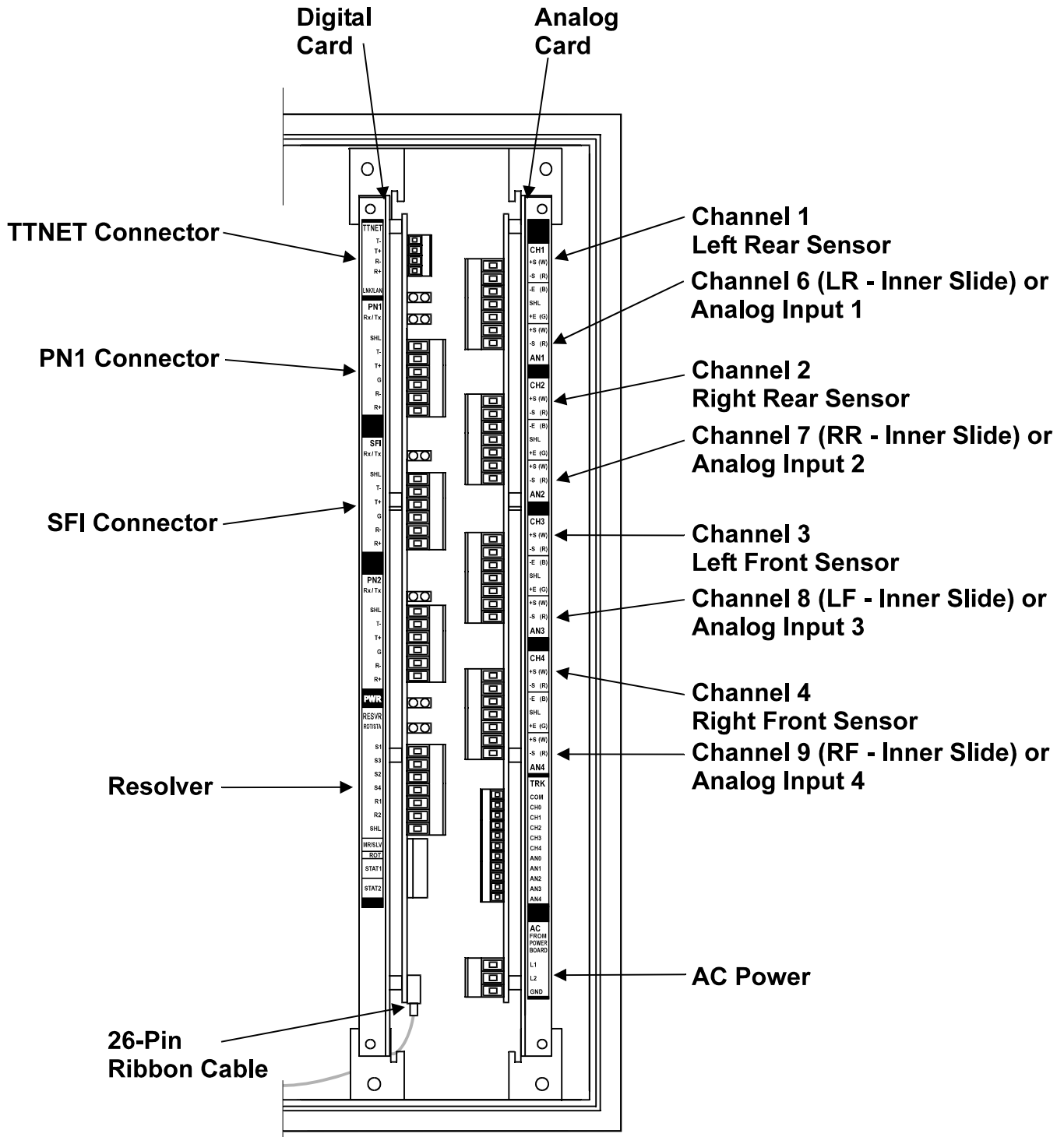


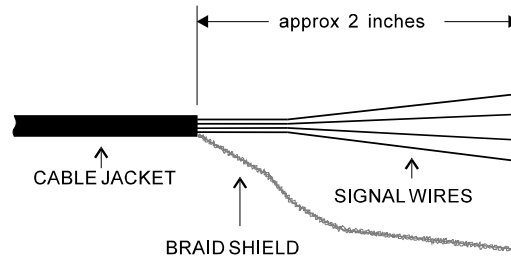
Figure 7: Tonnage Sensor Input





### Illustration A - Sensor Cable Termination

- 1) Strip the sensor cable as shown in Figure 8 below. Be sure not to nick any of the signal conductors or cut the braid shield.



**Figure 8: Tonnage Sensor Cable Stripping**

- 2) Strip approximately  $\frac{1}{4}$ " of insulation from each of the four signal conductors.

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

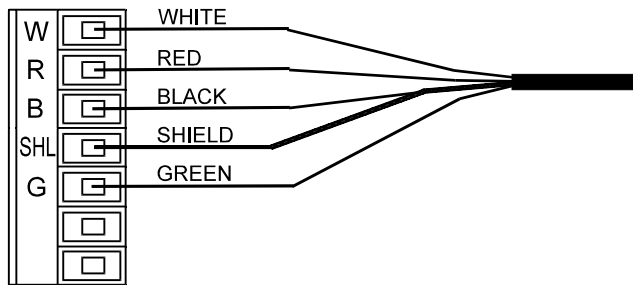
### Illustration B - Sensors Connection

The Co-Pilot accepts the signals from Toledo Transducers T-400 sensors as well as other strain gage sensors. Figure 9 illustrates the sensor connections.



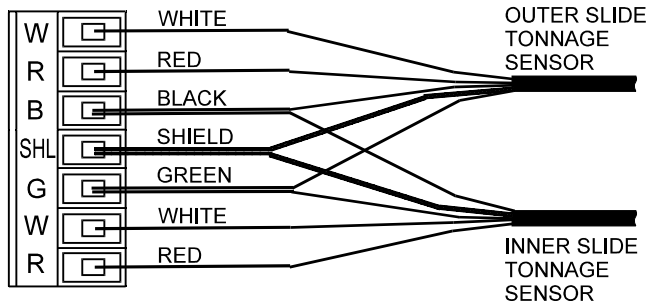
Tension connection shown.  
For compression connections,  
switch the red and white  
wires

#### CONNECTION FOR 2- OR 4-CHANNEL UNITS



**Figure 9: Tonnage Sensor Wiring**

#### CONNECTION FOR 6- OR 8-CHANNEL UNITS



If two sensors share the same  
connector, the black wires  
from both sensors are wired  
to the black terminal. Wire  
the shield and green wires  
from both sensors in a similar  
manner.



## Networking Connection

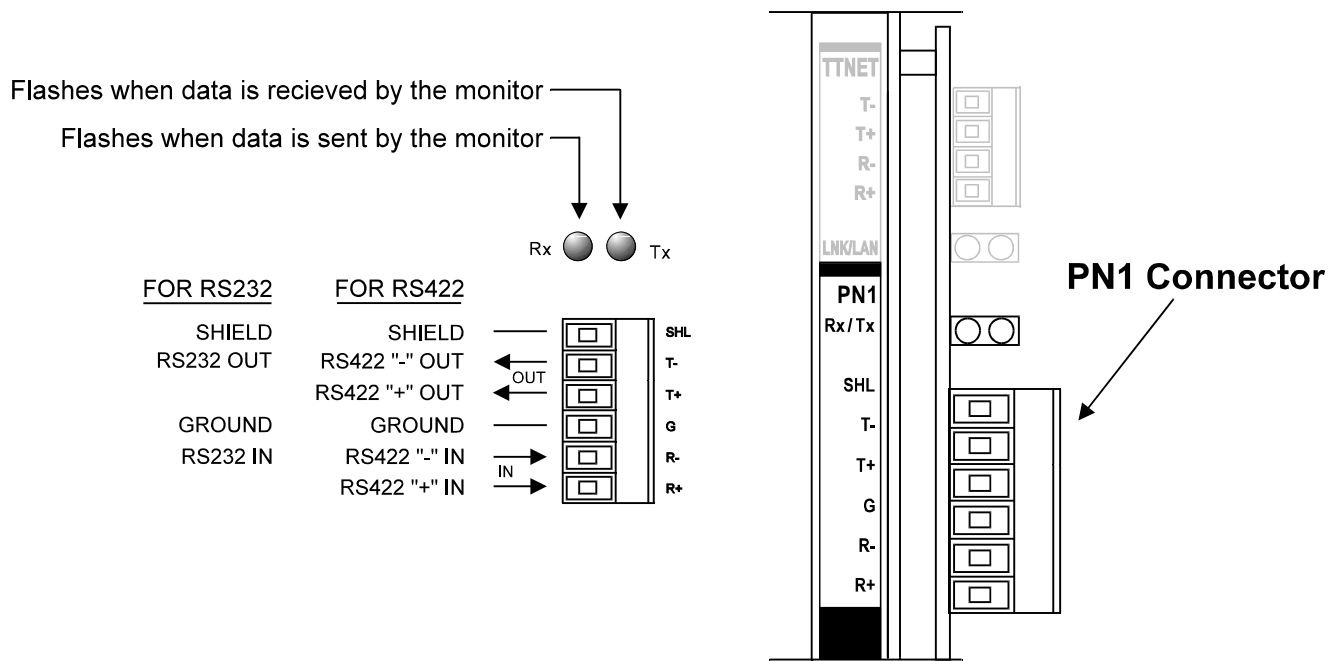
The **PN1** RS422 serial port is available for interfacing the Co-Pilot with a computer running the PressNet networking software. RS422 allows the implementation of a daisy chain (multi-drop) serial network as a standard feature.

The PN1 port can be configured for the following baud rates:

- 9600
- 38400
- 76800
- 115200

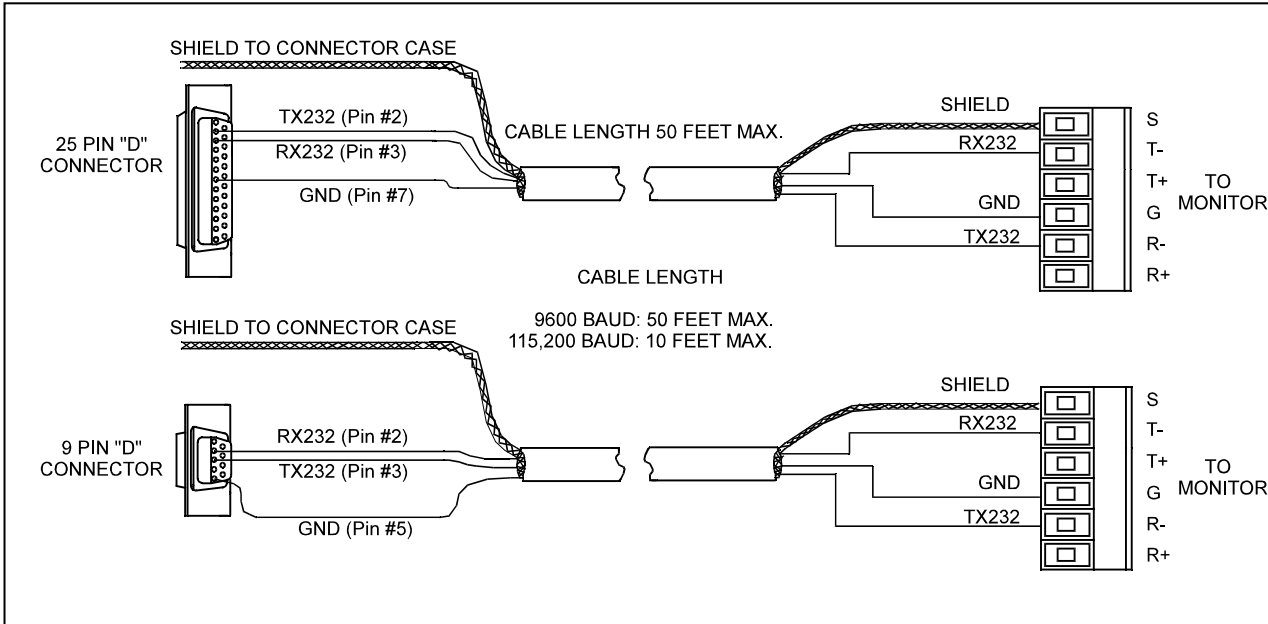
Configuration is performed via the HMI (see **System\Settings\Communication** detail screen in the Operation section of the manual).

The PN1 port can be found on the Digital Card and its location is detailed in the illustration below. Wiring diagrams can be found on the next page.

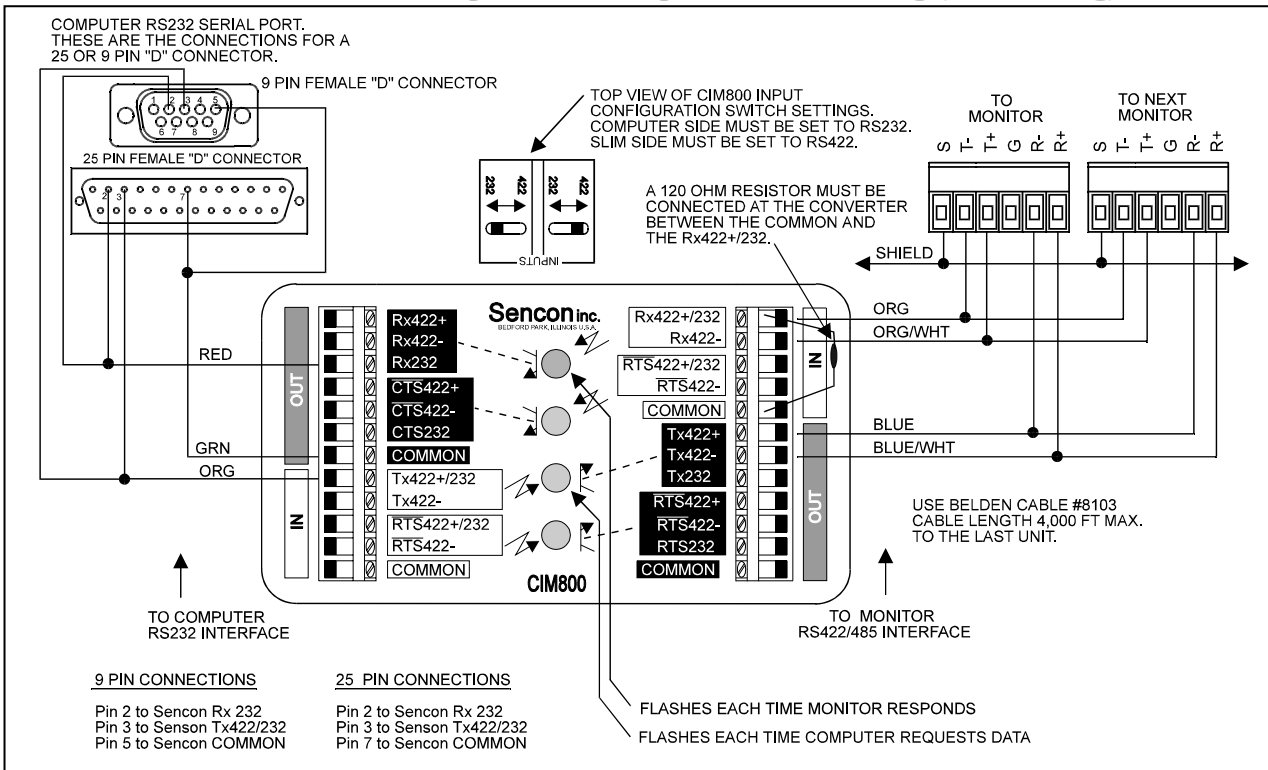


**Figure 10: PressNet Serial Connection**

**Figure 11: Computer to single monitor wiring**



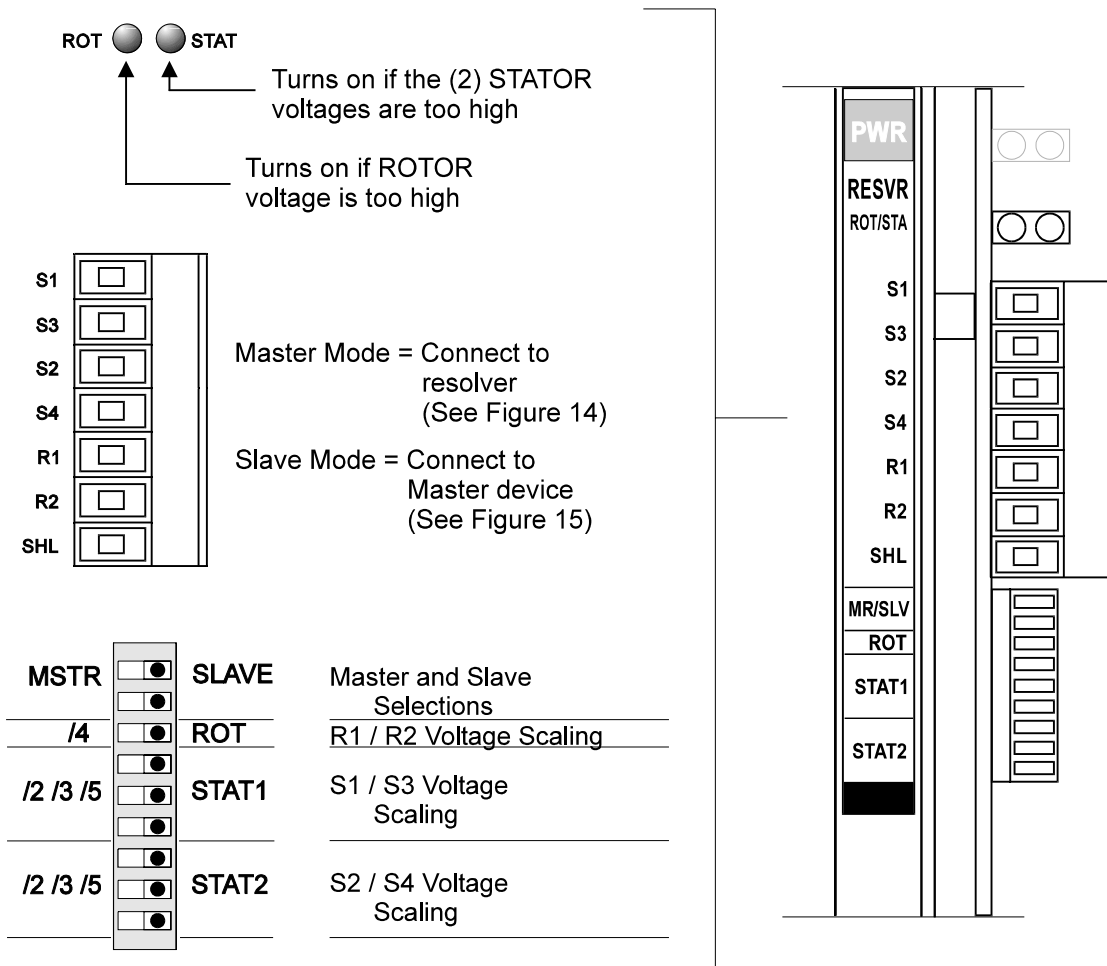
**Figure 12: Computer to multiple monitors wiring (Networking)**



## Resolver Connection

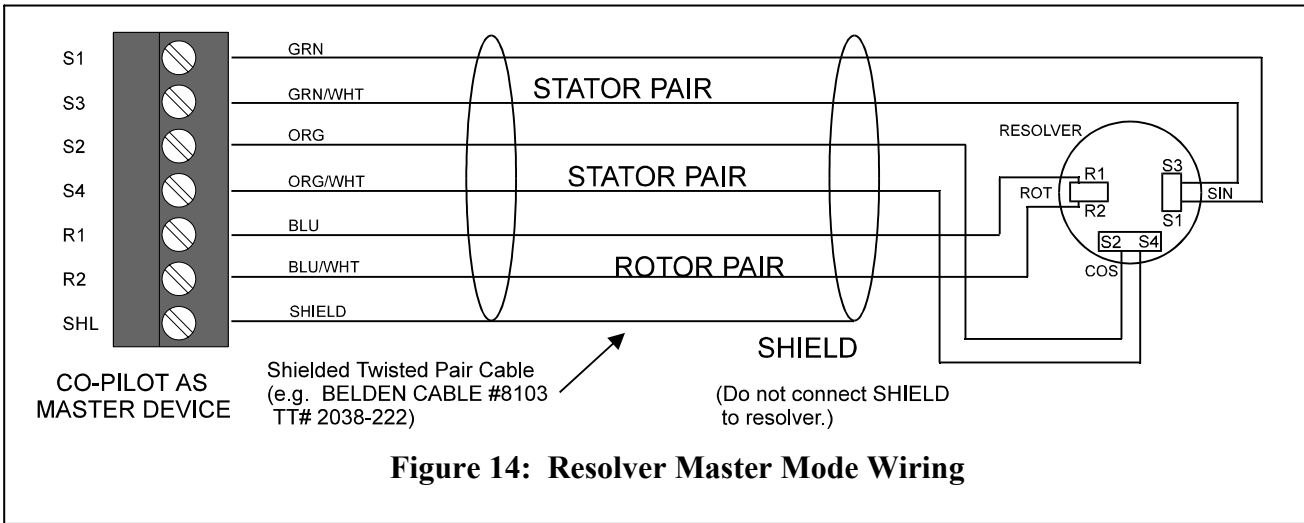
The Co-Pilot resolver input has a built-in excitation which supports standard 5,000 Hz rotor excited positional resolvers. The input can be configured in Master Mode or Slave Mode. In Master Mode, the Co-Pilot supplies excitation voltage to the resolver and is wired directly to the resolver. In Slave Mode, the Co-Pilot does not supply excitation voltage to the resolver and is wired to the resolver input terminal of a Master device, where the resolver signal is shared.

Use Conduit Hole #3 (see Figure 3) for the Resolver Cable. The resolver input consists of the following components:

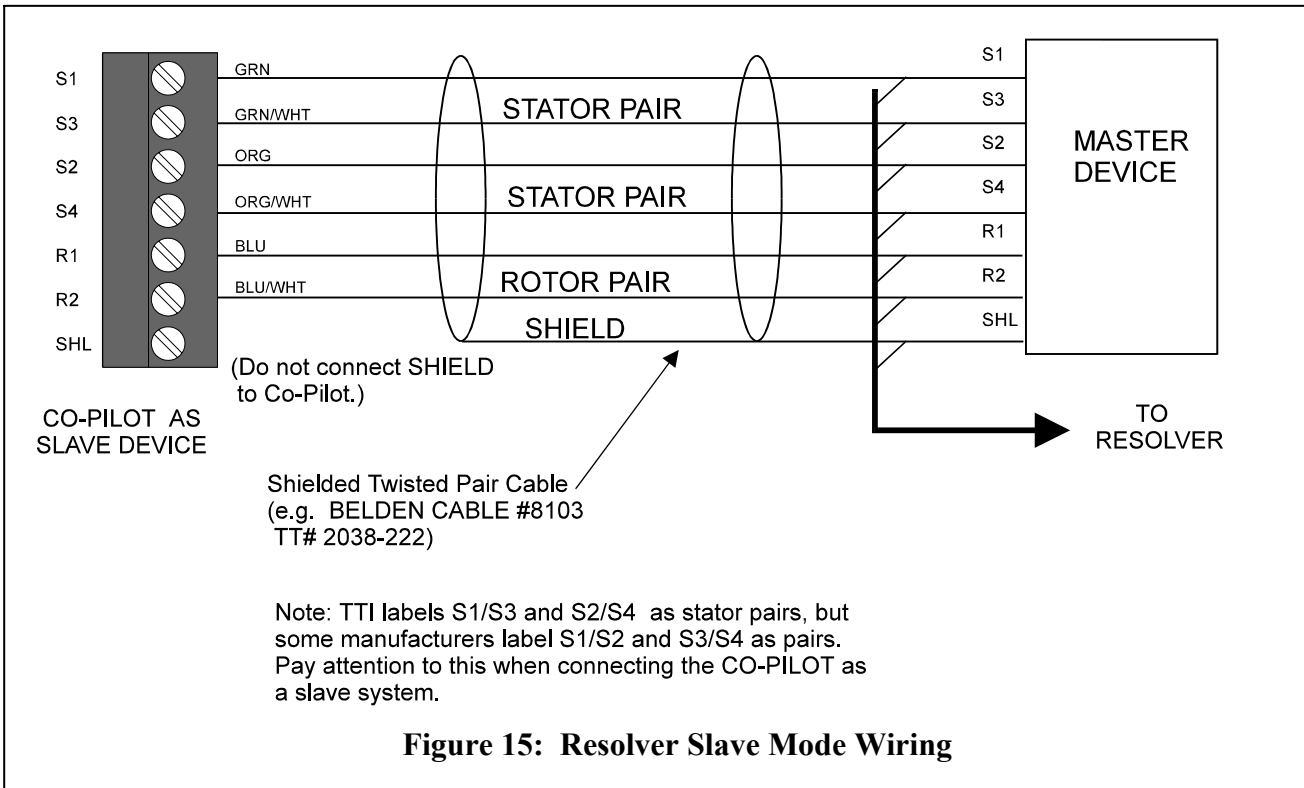


**Figure 13: Resolver Input Descriptions**

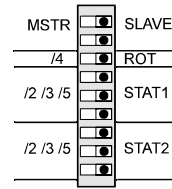
**Master Mode Wiring:**



**Slave Mode Wiring:**

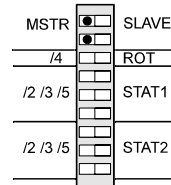


## Resolver Input Setup

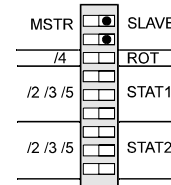


- 1) Set all DIP switches to the OFF (right) position.
- 2) Determine whether the resolver input should be in MASTER mode or SLAVE mode and make the proper setting.

Master Mode

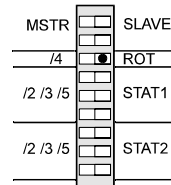


Slave Mode

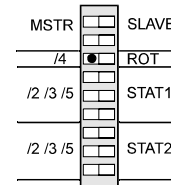


- 3) Make resolver connection.
- 4) With the system on (press can be either running or not running), check to see if the “ROT” LED turns on. Scale down the rotor input voltage by 4X if the “ROT” LED does turn on.

No Scale



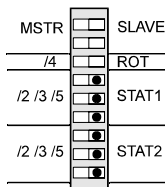
Scale Down 4X



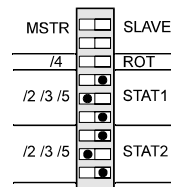
- 5) With the press running, check to see if the “STAT” LED turns on. If it turns on, scale down both stator input voltages first by 2X. If it still turns on, scale it down further by 3X and then by 5X until the “STAT” LED is not turned on. Perform the test in this order to give our unit the highest workable voltage and therefore more accurate results.

NOTE: Two stator inputs must have the same scale down factor. Therefore, the setting of STAT1 must be the same as STAT2.

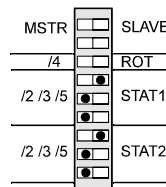
No Scale



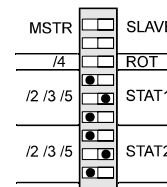
Scale Down 2X



Scale Down 3X



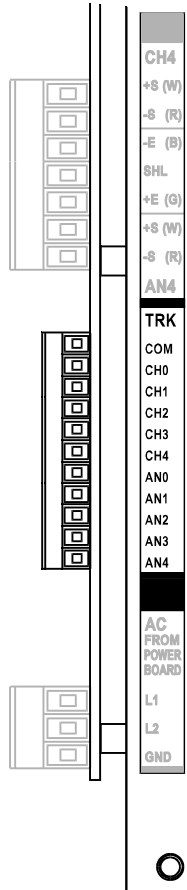
Scale Down 5X



- 6) Record all DIP switch settings on the calibration card.
- 7) Setup is basically completed. Refer to the Operation Manual for resolver offset adjustment.

## Analog Output

The analog outputs are provided on an 11-pin connector for easy access and for interfacing with other peripherals. Use Conduit hole #4 (see Figure 3) for Analog Output wiring.



### Analog Voltage Output:

- Swing between  $\pm 5V$
- 1.25V @ Capacity

Com = Common

CH 0 = Channel 0 (Tonnage)

CH 1 = Channel 1 (Tonnage)

CH 2 = Channel 2 (Tonnage)

CH 3 = Channel 3 (Tonnage)

CH 4 = Channel 4 (Tonnage)

AN 0 = Channel 0 (Analog) or  
Channel 5 (Tonnage)

AN 1 = Channel 1 (Analog) or  
Channel 6 (Tonnage)

AN 2 = Channel 2 (Analog) or  
Channel 7 (Tonnage)

AN 3 = Channel 3 (Analog) or  
Channel 8 (Tonnage)

AN 4 = Channel 4 (Analog) or  
Channel 9 (Tonnage)

**Figure 16: Analog Output Wiring**



## Die Sensor Input

All sensor inputs require an active low (NPN type) signal. Therefore, a ground signal is required to turn on an input, and a high signal (24VDC) or an open circuit is required to turn off an input.

The corresponding Input LED will turn on when an input is active. Connection is usually made to Die sensor interface box. Use Conduit Hole #3 (see Figure 3) for the Die Sensor Cable.

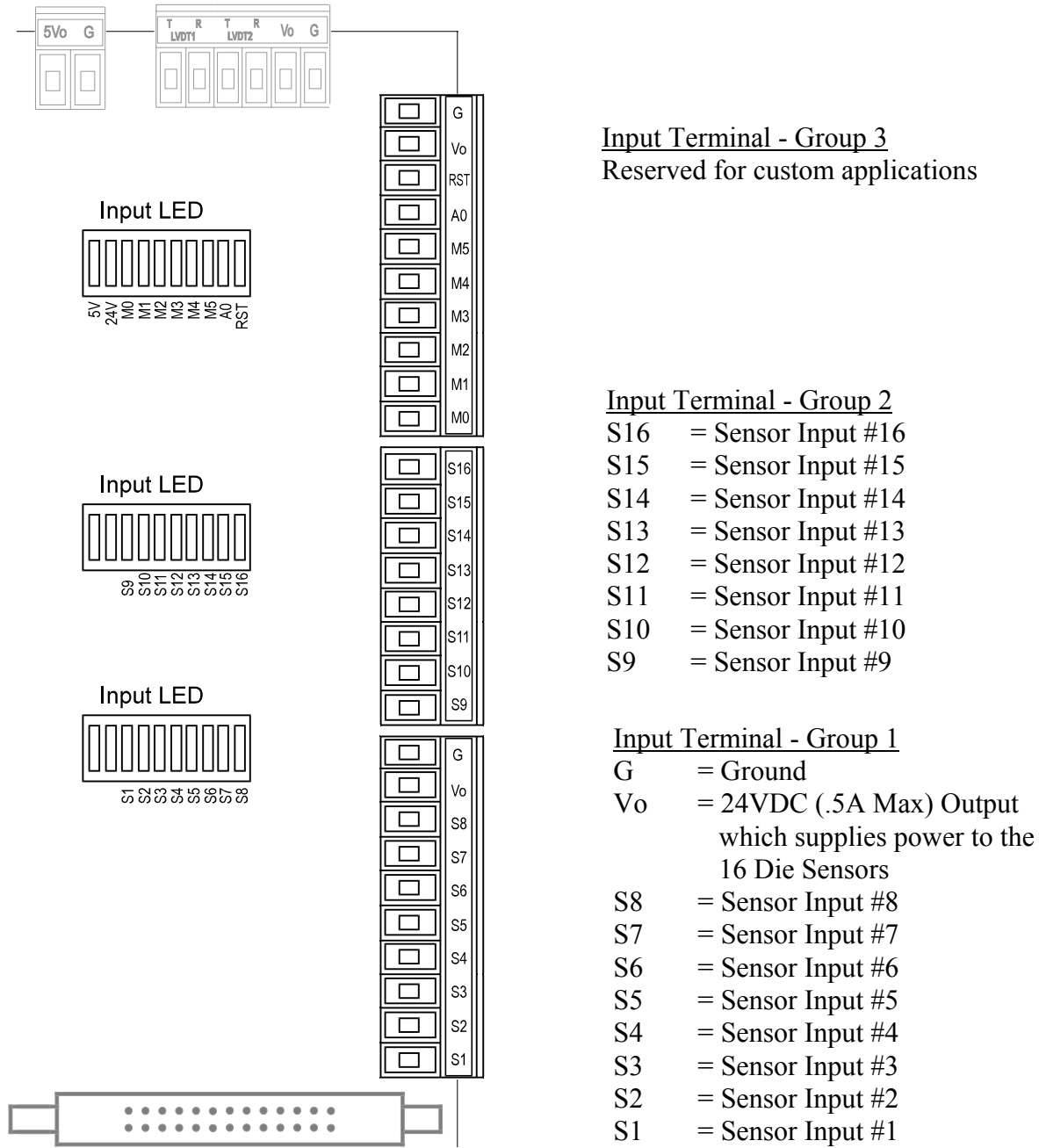


Figure 17: Die Sensor Input Wiring

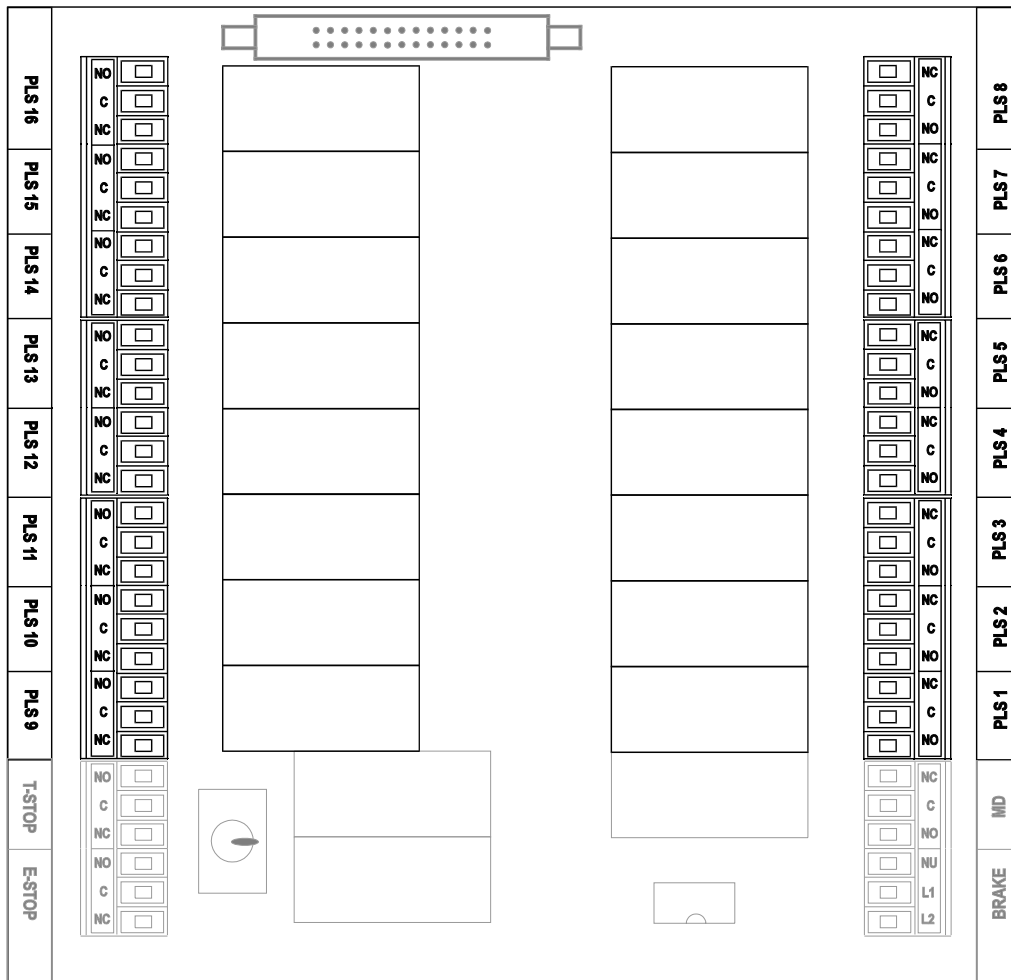


## PLS Output (Mechanical Relay Version)

Each PLS output provides both Normally Open (N.O.) and Normally Close (N.C.) contacts. The standard unit comes with the PLS1 to PLS8 outputs. The PLS9 to PLS16 outputs are available as an option.

If the PLS output is used to control an inductive load (i.e. solenoid valve), a RC network (electrical noise suppresser) is required to be installed across the “Hot” and “Neutral” terminals at the load end. Do not install RC network at the PLS output relay end. The non-polarized RC network can be installed in either direction. The RC networks come with the Co-Pilot unit.

Use Conduit Hole #1 or #2 (see Figure 3) for the PLS Output Wiring.



<u>PLS Terminals</u>	<u>Relay Contacts</u>
PLS1 = PLS Output #1	NC = Normally Close Contact
PLS2 = PLS Output #2	C = Common
...	NO = Normally Open Contact
...	Ratings: 10 AMP @ 250VAC or 30VDC
PLS16 = PLS Output #16	Type: Mechanical Relay

**Figure 18: PLS Output Wiring**



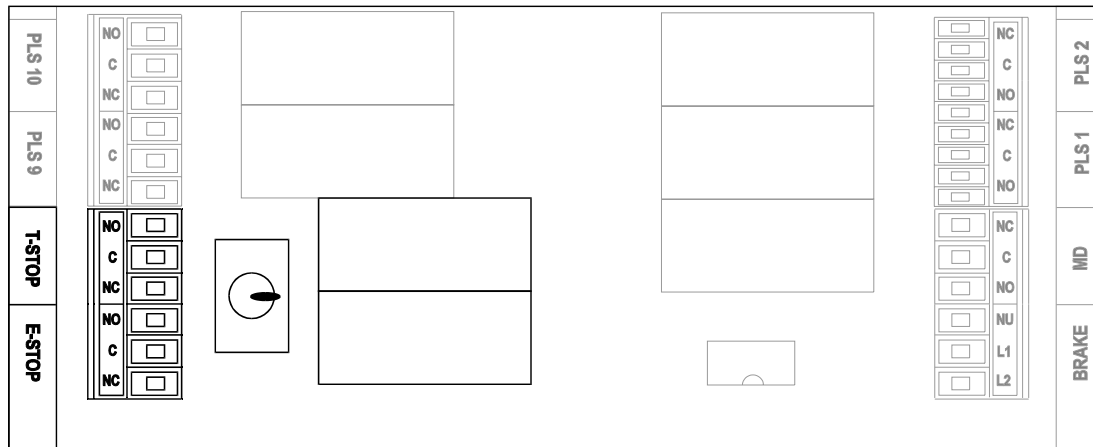
## Shutdown Relays

The Co-Pilot provides a Top Stop Relay and an E-Stop (Emergency Stop) Relay. Each relay provides both Normally Open (N.O.) and Normally Close (N.C.) contacts. A toggle switch is provided to manually bypass the shutdown relays, if necessary.

**\*\*CAUTION\*\***

**Bypassing the shutdown relays is a potentially dangerous situation. The monitor will not shut down the press when this switch is in the bypass position. Equipment can be damaged and personnel may be seriously injured without shut down protection.**

Use Conduit Hole #1 (see Figure 3) for the Shutdown Relay Wiring.



### Shutdown Relay Terminals

Top Stop = For use in the Press Top Stop circuitry

E-Stop = For use in the Press Emergency Stop circuitry

### Relay Contacts

NC = Normally Close Contact

C = Common

NO = Normally Open Contact

Ratings: 10 AMP @ 250VAC or 30VDC

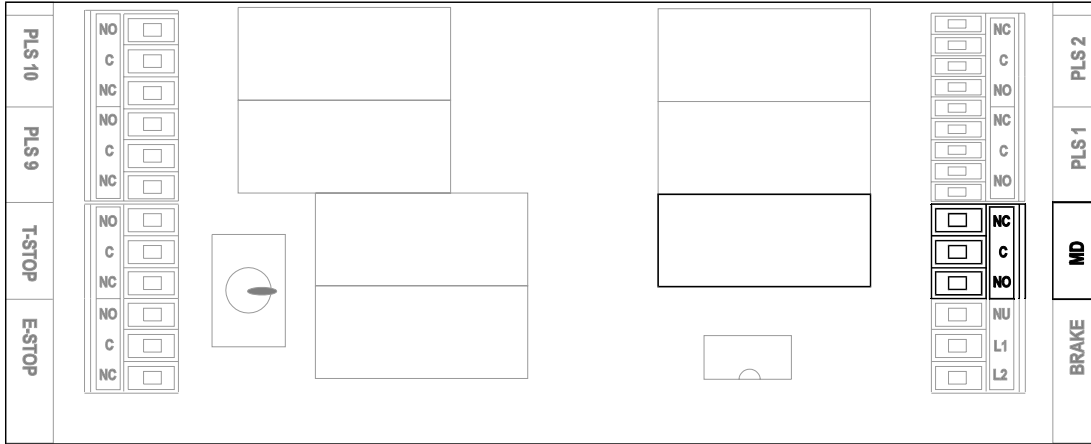
Type: Mechanical Relay

**Figure 19: Shutdown Relay Wiring**

## SPM Limit (Motion Detection) Relay

This relay is energized when the press is running within the user defined SPM Limits. It provides both Normally Open (N.O.) and Normally Close (N.C.) contacts.

Use Conduit Hole #2 (see Figure 3) for the SPM Limit Wiring.



### Relay Contacts

NC = Normally Close Contact

C = Common

NO = Normally Open Contact

Ratings: 10 AMP @ 250VAC or 30VDC

Type: Mechanical Relay

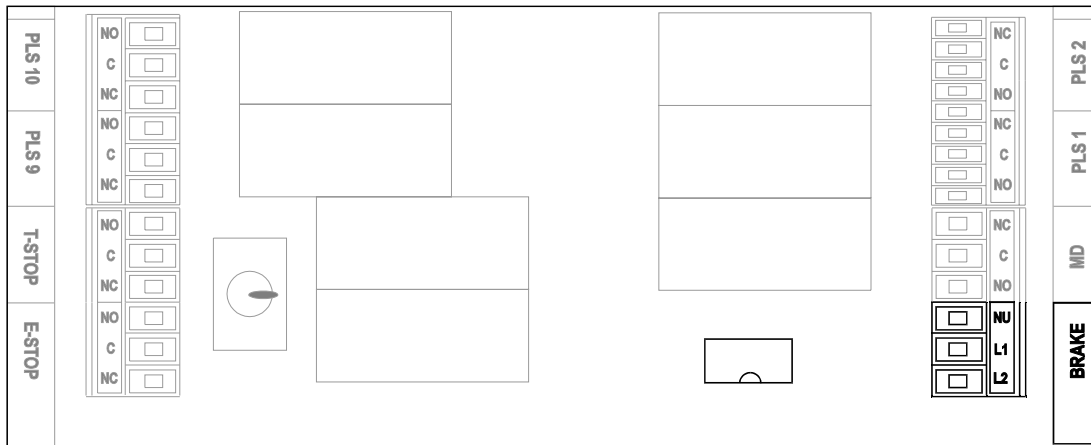
**Figure 20: SPM Limit Relay Wiring**

## **Brake Input Relay**

This relay is served as an input relay. It is connected in parallel with one of the coils in the Dual Safety Valve (DSV) that control the Press Clutch/Brake circuitry. This input relay is used to provide the press starting and stopping signals for the Motion Detection and Brake Monitor functions in the Co-Pilot.

If this Brake Input is used, a RC network (electrical noise suppresser) is required to install across the “Hot” and “Neutral” terminals at each coil of the DSV end. Therefore, two RC networks are required. Do not install RC network at the Brake input relay end. The non-polarized RC network can be installed in either direction. The RC networks are come with the Co-Pilot unit.

Use Conduit Hole #2 (see Figure 3) for the Brake Input Wiring.



### Relay Input

L1 = Connected to the Hot Terminal of a coil in the DSV

L2 = Connected to the Neutral Terminal of the same coil in the DSV

Ratings: 120VAC (Other voltages are available as an option)

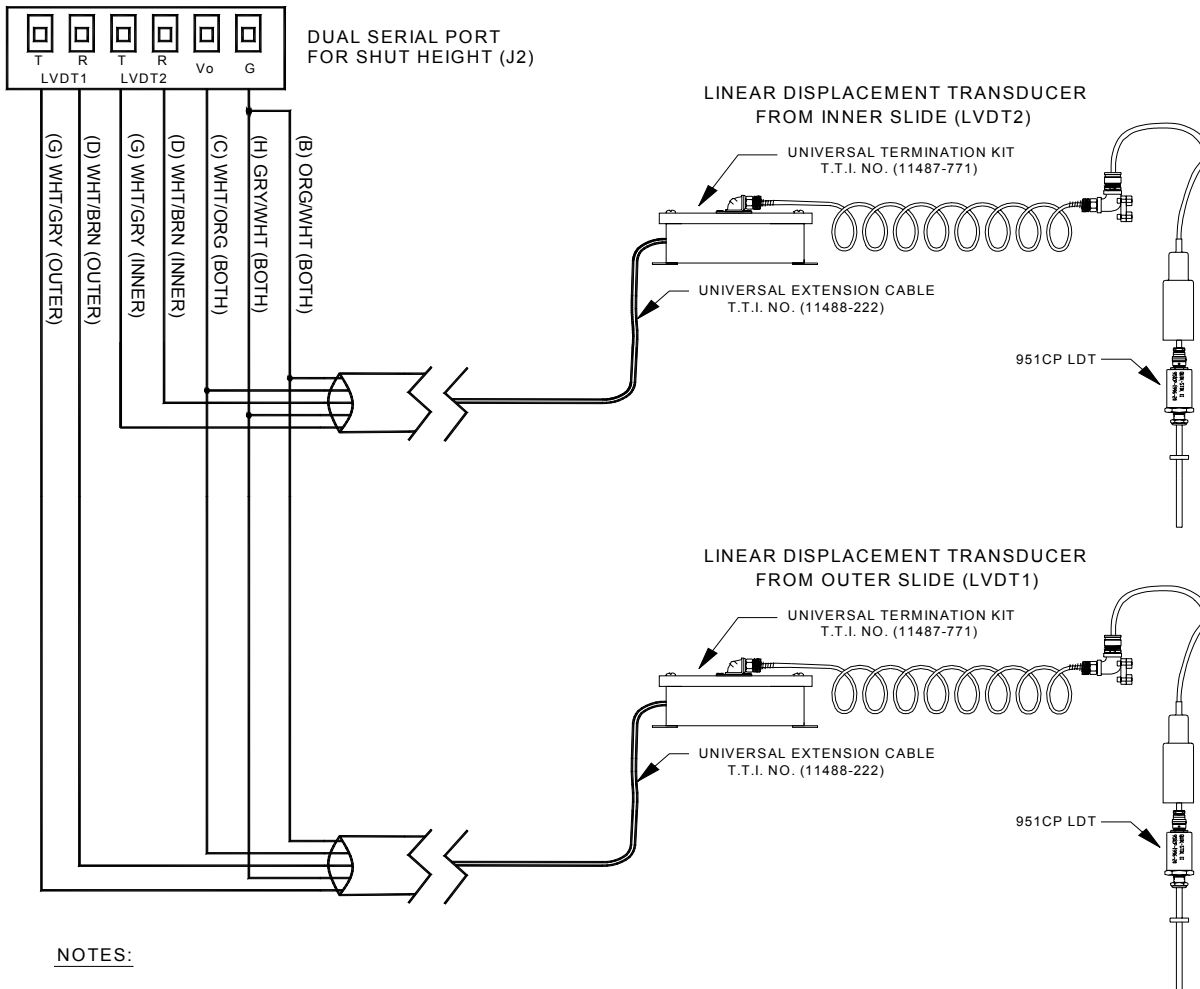
Type: Opto-Coupler

**Figure 21: Brake Input Relay Wiring**

## Shut Height Control (optional)

This feature is provided to measure and adjust the shut height automatically. It supports up to two shut height systems. There is one Linear Displacement Transducer (LDT) input and two control relays for each shut height system.

### Linear Displacement Transducer Wiring



NOTES:

- 1) THE LINEAR TRANSDUCERS FOR BOTH THE OUTER AND INNER SLIDES MUST BE MOUNTED IN THE SAME DIRECTION OF TRAVEL.
- 2) TERMINATE UNUSED WIRES IN A MANNER THAT THEY WILL NOT SHORT.
- 3) SEE DRAWING #11487 FOR UNIVERSAL TERMINATION KIT ASSEMBLY.
- 4) SEE DRAWING #11488 FOR UNIVERSAL EXTENSION CABLE ASSEMBLY.

**Figure 22: Linear Displacement Transducer Wiring**



## Control Relays

This feature comes with relays to interface with shut height adjustment circuitry for up to two shut height systems. Each relay provides both Normally Open (N.O.) and Normally Close (N.C.) contacts.

If the shut height relays are used to control an inductive load (i.e. solenoid valve), a RC network (electrical noise suppresser) is required to be installed across the “Hot” and “Neutral” terminals at the load end. Do not install RC networks at the Shut Height relay end. The non-polarized RC network can be installed in either direction. The RC networks come with the Co-Pilot unit.

Use Conduit Hole #1 or #2 (see Figure 3) for the Shut Height Relay Wiring.

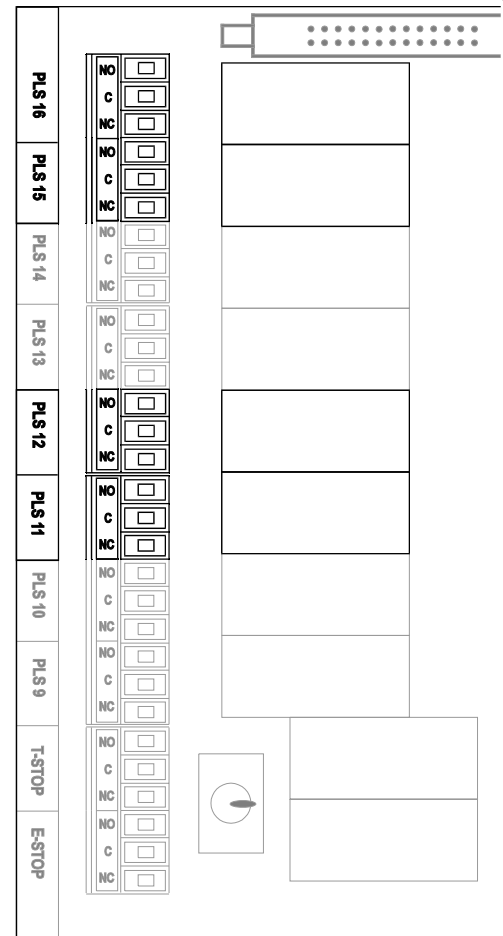
### Shut Height Relay Terminals

- PLS16 = For use in the Shut Height Increase circuitry for LDT1
- PLS15 = For use in the Shut Height Decrease circuitry for LDT1
- PLS12 = For use in the Shut Height Increase circuitry for LDT2
- PLS11 = For use in the Shut Height Decrease circuitry for LDT2

**note:** Refer to the shut height section of the Operation Manual for instructions on configuring the PLS for shut height operation in the HMI.

### Relay Contacts

- NC = Normally Close Contact
- C = Common
- NO = Normally Open Contact
- Ratings: 10 AMP @ 250VAC or 30VDC
- Type: Mechanical Relay



**Figure 23: Shut Height Control Relay Wiring**

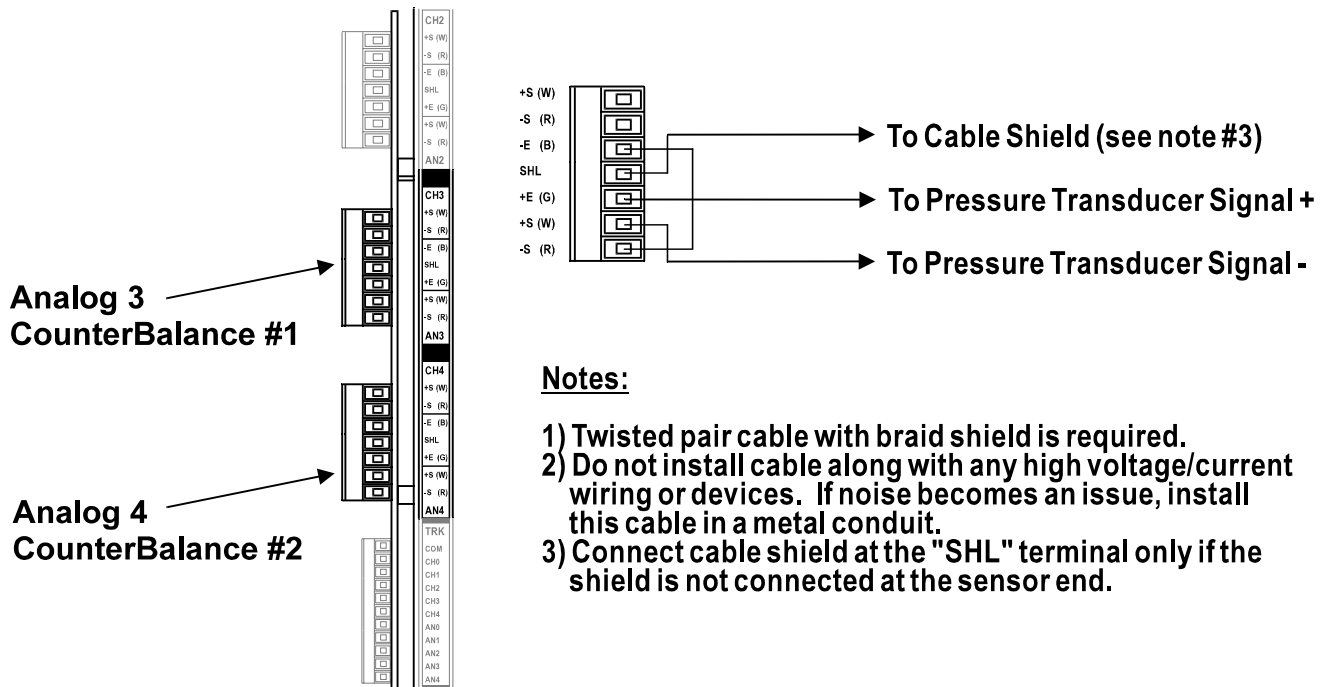
## CounterBalance Control (optional)

This feature is provided to measure and adjust counterbalance pressure automatically. It supports up to two counterbalance systems. There is one pressure transducer input and two control relays for each counterbalance system.

### Pressure Transducer Specifications

Electrical Output:	4-20mA 2-wire
Input Pressure Range:	0-100 psi
Excitation:	10VDC

### Pressure Transducer Wiring



#### Notes:

- 1) Twisted pair cable with braid shield is required.
- 2) Do not install cable along with any high voltage/current wiring or devices. If noise becomes an issue, install this cable in a metal conduit.
- 3) Connect cable shield at the "SHL" terminal only if the shield is not connected at the sensor end.

Figure 24: Pressure Transducer Wiring





## Control Relays

This feature comes with relays to interface with counterbalance pressure adjustment circuitry for up to two counterbalance systems. Each relay provides both Normally Open (N.O.) and Normally Close (N.C.) contacts.

If the counterbalance relays are used to control an inductive load (i.e. solenoid valve), a RC network (electrical noise suppresser) is required to be installed across the “Hot” and “Neutral” terminals at the load end. Do not install RC networks at the CounterBalance relay end. The non-polarized RC network can be installed in either direction. The RC networks come with the Co-Pilot unit.

Use Conduit Hole #1 or #2 (see Figure 3) for the CounterBalance Relay Wiring.

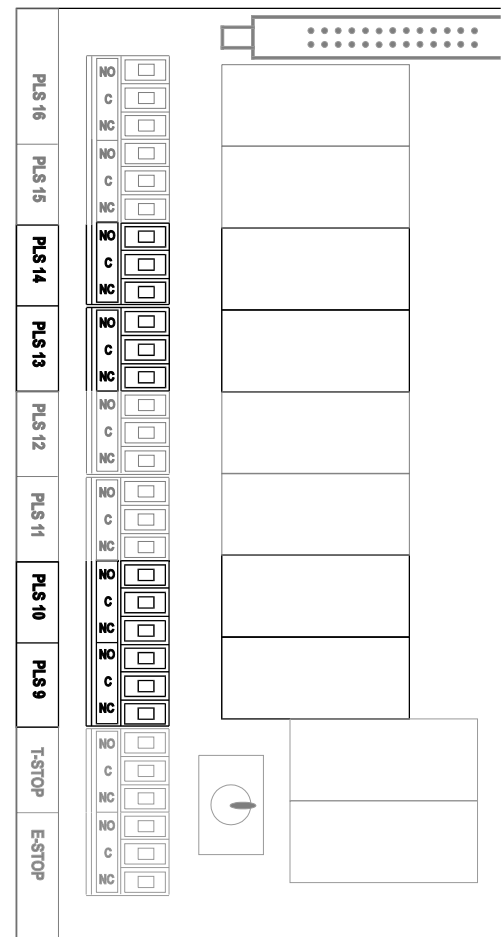
### CounterBalance Relay Terminals

- PLS14 = For use in the CounterBalance Fill circuitry for CounterBalance #1
- PLS13 = For use in the CounterBalance Dump circuitry for CounterBalance #1
- PLS10 = For use in the CounterBalance Fill circuitry for CounterBalance #2
- PLS9 = For use in the CounterBalance Dump circuitry for CounterBalance #2

**note:** Refer to the CounterBalance section of the Operation Manual for instructions on configuring the PLS for Counter Balance operation in the HMI.

### Relay Contacts

- NC = Normally Close Contact
- C = Common
- NO = Normally Open Contact
- Ratings: 10 AMP @ 250VAC or 30VDC
- Type: Mechanical Relay



**Figure 25: CounterBalance Control Relay Wiring**

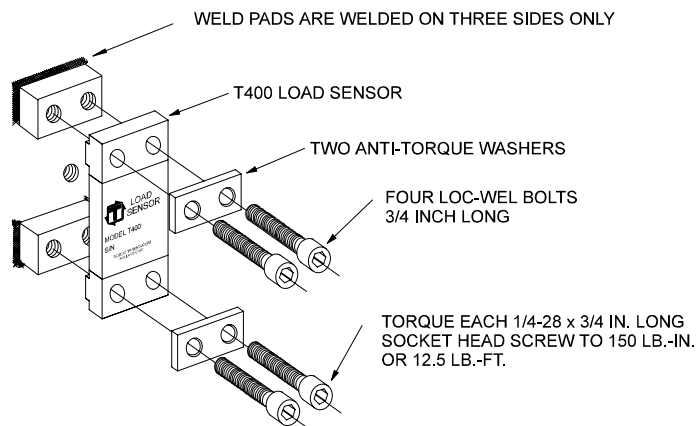
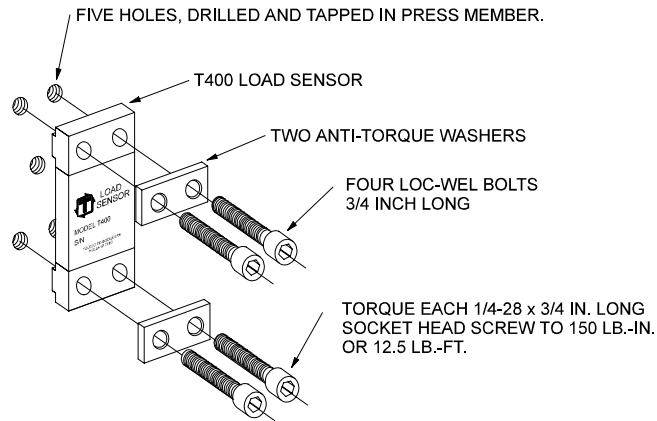


# **Appendix**

## **I) Sensor Installation (Doc# 11080)**



# INSTALLING T400 LOAD SENSORS



The above illustrations represent the proper arrangement of Model T400 Load Sensor kit parts using either the Drill and Tap method or the Weld method.

A proper installation is necessary to produce good results.

Before installing the sensors, please read the appropriate instructions listed below.

Sensor Placement	Page 2
Press Frame	Page 3
Pitman Mount	Page 4
Drill and Tap Method of Installing Sensors	Page 5
Weld Method of Installing Sensors	Page 6
T400 Enclosure Mounting Details	Page 7

**NOTES:**

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

## SENSOR PLACEMENT

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

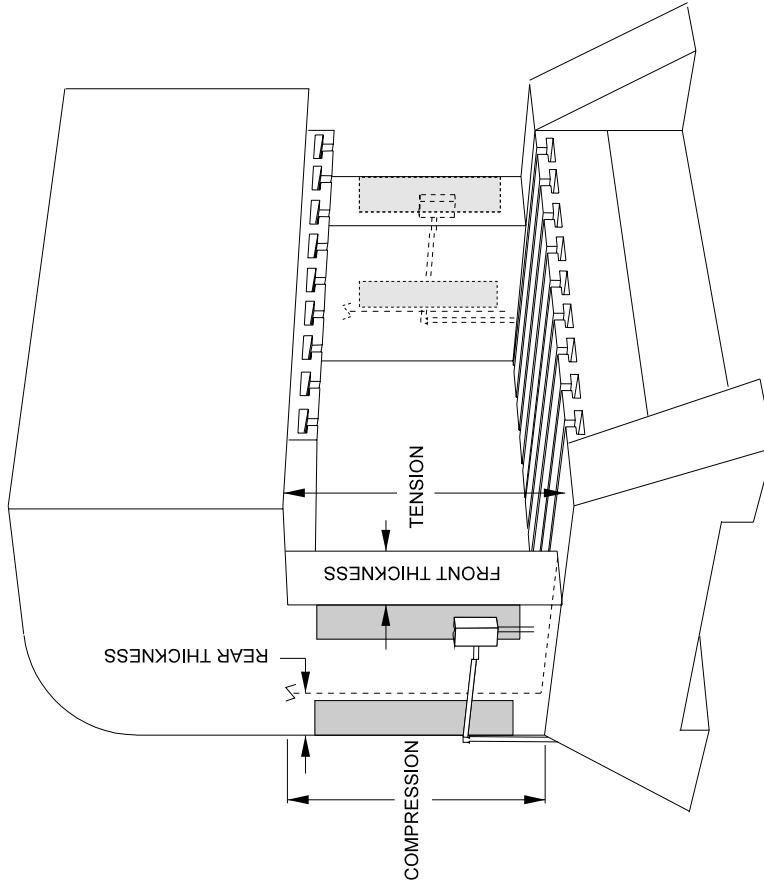
### HOW TO DETERMINE THE BEST LOCATION

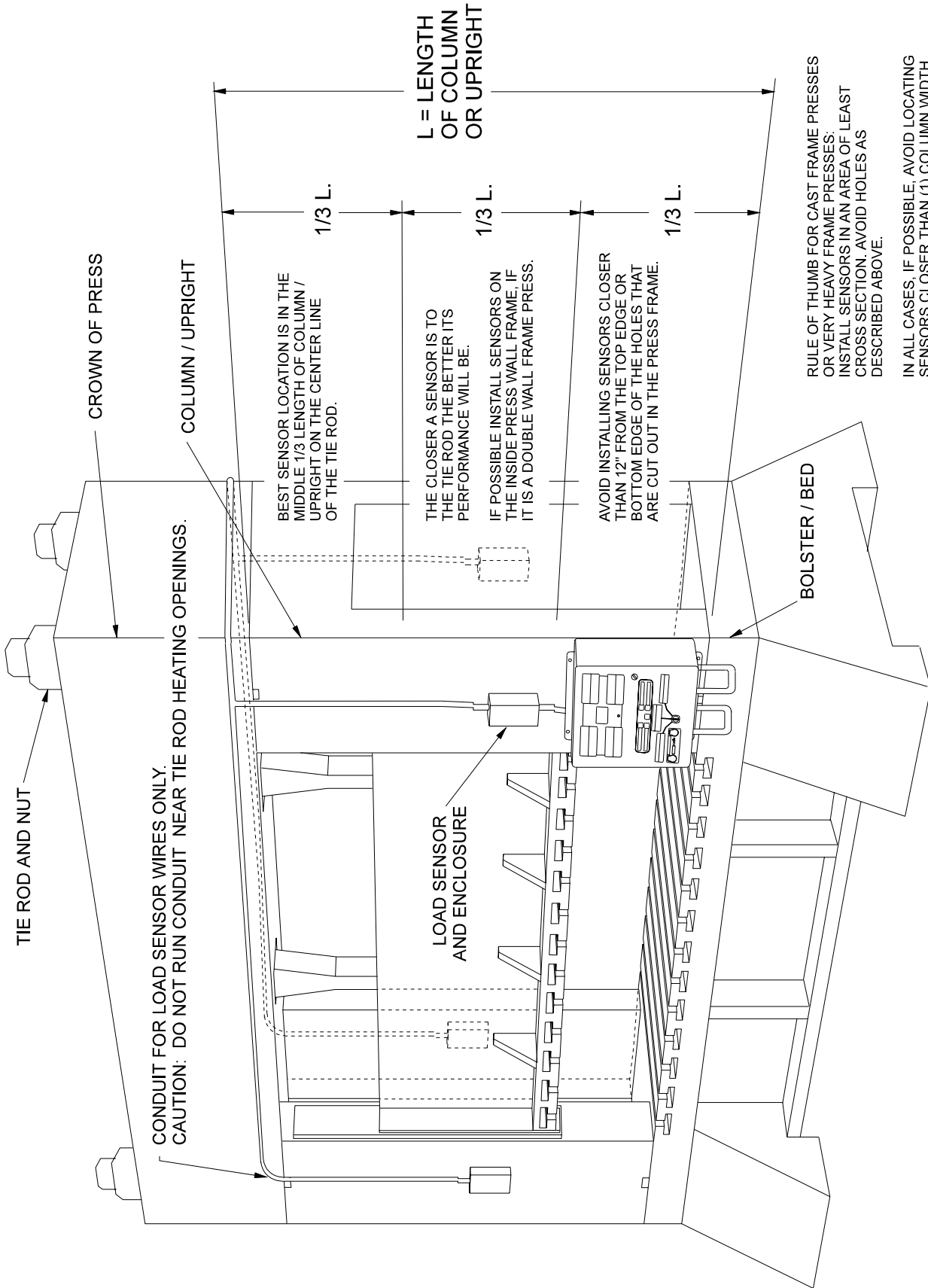
\* MEASURE THE REAR THICKNESS \_\_\_\_\_ REAR

\* 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.





L = LENGTH OF COLUMN OR UPRIGHT

1/3 L.

1/3 L.

1/3 L.

CROWN OF PRESS

COLUMN / UPRIGHT

BEST SENSOR LOCATION IS IN THE MIDDLE 1/3 LENGTH OF COLUMN / UPRIGHT ON THE CENTER LINE OF THE TIE ROD.

THE CLOSER A SENSOR IS TO THE TIE ROD THE BETTER ITS PERFORMANCE WILL BE.

IF POSSIBLE INSTALL SENSORS ON THE INSIDE PRESS WALL FRAME, IF IT IS A DOUBLE WALL FRAME PRESS.

AVOID INSTALLING SENSORS CLOSER THAN 12" FROM THE TOP EDGE OR BOTTOM EDGE OF THE HOLES THAT ARE CUT OUT IN THE PRESS FRAME.

RULE OF THUMB FOR CAST FRAME PRESSES OR VERY HEAVY FRAME PRESSES: INSTALL SENSORS IN AN AREA OF LEAST CROSS SECTION. AVOID HOLES AS DESCRIBED ABOVE.

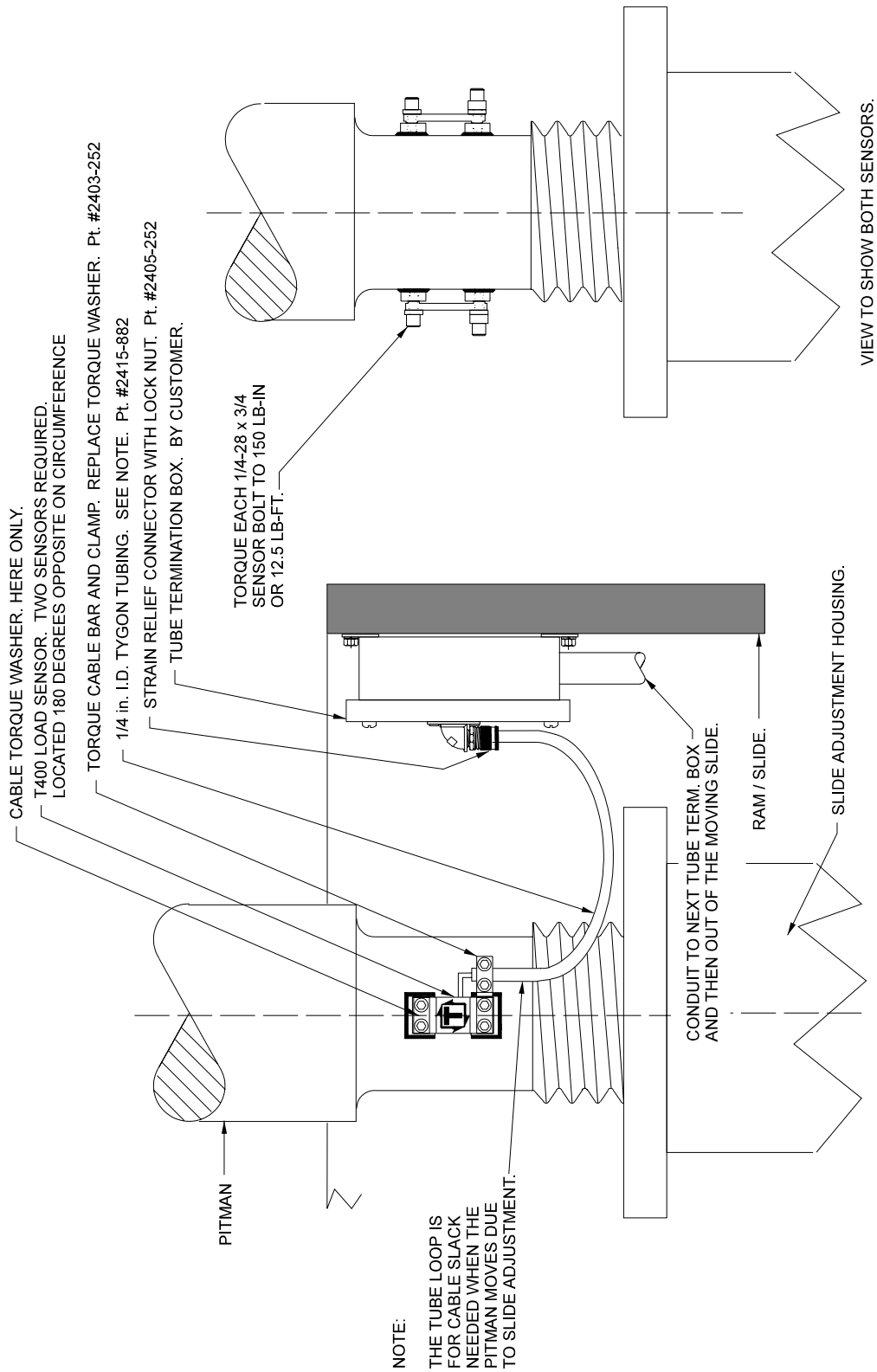
IN ALL CASES, IF POSSIBLE, AVOID LOCATING SENSORS CLOSER THAN (1) COLUMN WIDTH FROM THE CROWN OR BOLSTER.

CONDUIT FOR LOAD SENSOR WIRES ONLY. CAUTION: DO NOT RUN CONDUIT NEAR TIE ROD HEATING OPENINGS.

LOAD SENSOR AND ENCLOSURE

BOLSTER / BED

TIE ROD AND NUT



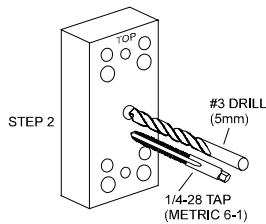


# USING THE T400 SENSOR INSTALLATION FIXTURE KIT No. 1977-749

## (METRIC INSTALLATION FIXTURE KIT No. 1974-749)

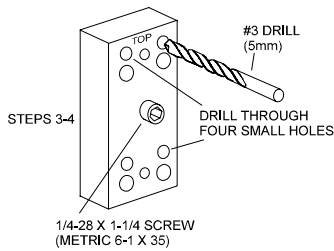
### *DRILL AND TAP METHOD FOR MOUNTING SENSORS*

BE SURE THE SENSOR LOCATION FOLLOWS THE BEST LOCATION DESCRIBED ON THE PREVIOUS PAGES.



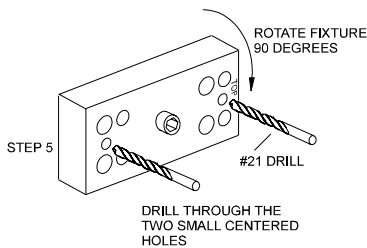
STEP 1 Remove all paint and grease from sensor mount area. If the machine surface is flat (total indicated reading of .002”) and smooth (125 μ in.) the load sensor can be bolted directly to the surface.

STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be ½ inch (13mm) deep.

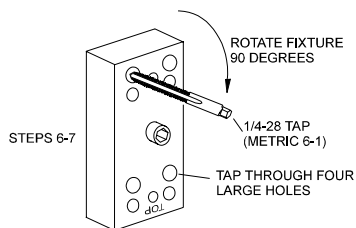


STEP 3 Bolt the fixture to the press member using the ¼-28 by 1-¼ inch (M6-1 x 35) long socket head cap screw in the center of the fixture.

STEP 4 Insert the number 3 drill (5mm) into the smaller corner hole and drill out all four holes to a depth of ¾ of an inch (19mm.)



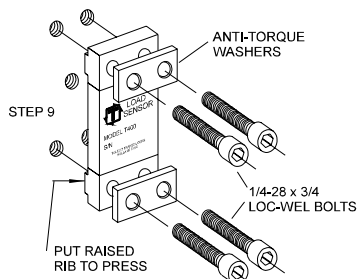
STEP 5 Loosen the fixture. Rotate the fixture 90 degrees clockwise. Tighten the center screw of the fixture. Insert the number 21 drill into the small centered hole and drill out both holes to a depth of 3/8 of an inch. These holes are for mounting the sensor enclosure. The fixture does not allow for tapping these holes. They are tapped without the fixture. Enclosure mounting is not done in metric.



STEP 6 Loosen the fixture. Rotate the fixture another 90 degrees clockwise such that the larger corner holes line up with the holes drilled in Step 4. Insert a tap to be sure the holes line up. Lock the fixture in place by tightening the center screw.

STEP 7 Insert the tap into the larger tap guide holes and tap each hole.

BE SURE TO USE PLENTY OF TAPPING FLUID.



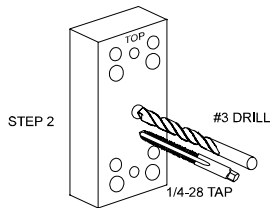
STEP 8 Remove the fixture and repeat Steps 1-7 for each additional sensor mounting position.

STEP 9 Mount the sensor with the raised rib to the press. The anti-torque washers should go between the screw and the sensor body. Torque each ¼-28 x ¾ in. long socket head cap screw to 150 LB.-IN or 12.5 LB.-FT.

# USING THE T400 SENSOR INSTALLATION FIXTURE KIT No. 1977-749

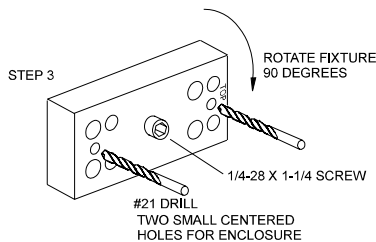
## *WELD PAD METHOD FOR MOUNTING SENSORS*

BE SURE THE SENSOR LOCATION FOLLOWS THE BEST LOCATION DESCRIBED ON THE PREVIOUS PAGES.

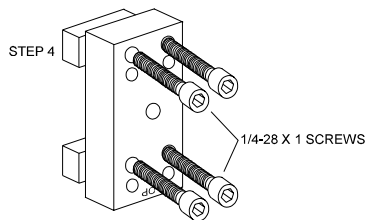


STEP 1 Remove all paint, grease, and or rust from surface to be welded. (Surface should be flat T.I.R. 1/32 of an inch.)

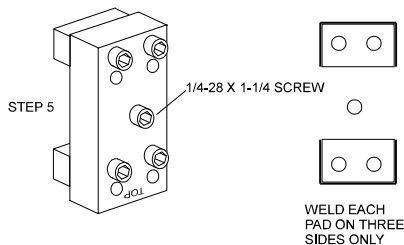
STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be 1/2 inch deep. (Optional)



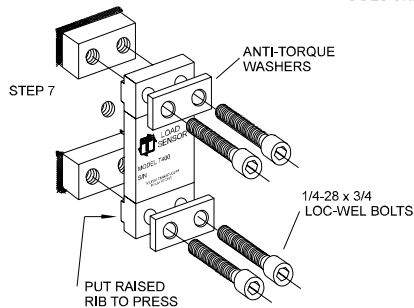
STEP 3 Bolt the fixture to the press member using the 1/4-28 by 1-1/4 inch long socket head cap screw in the center of the fixture. Orient the fixture as shown and drill out the #21 holes to a depth of 3/8 of an inch for the enclosure mounting. The fixture is not used for tapping these holes. (Optional)



STEP 4 Remove the fixture from the press member. Bolt the weld pads to the fixture with 1/4-28 by 1 inch long socket head cap screws provided. Reattach the fixture with the weld pads bolted on using the center hole as in Step 3. Orient the fixture as shown.



STEP 5 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 the fixture until slag is removed and or assembly has cooled. When welding cast iron, use a dry nickel rod such as: Lincoln Electric "Soft Weld", Hobart "NI Cast 99", or MB Weld Prod. "MG 210. Strike arc on steel then puddle into the cast iron.



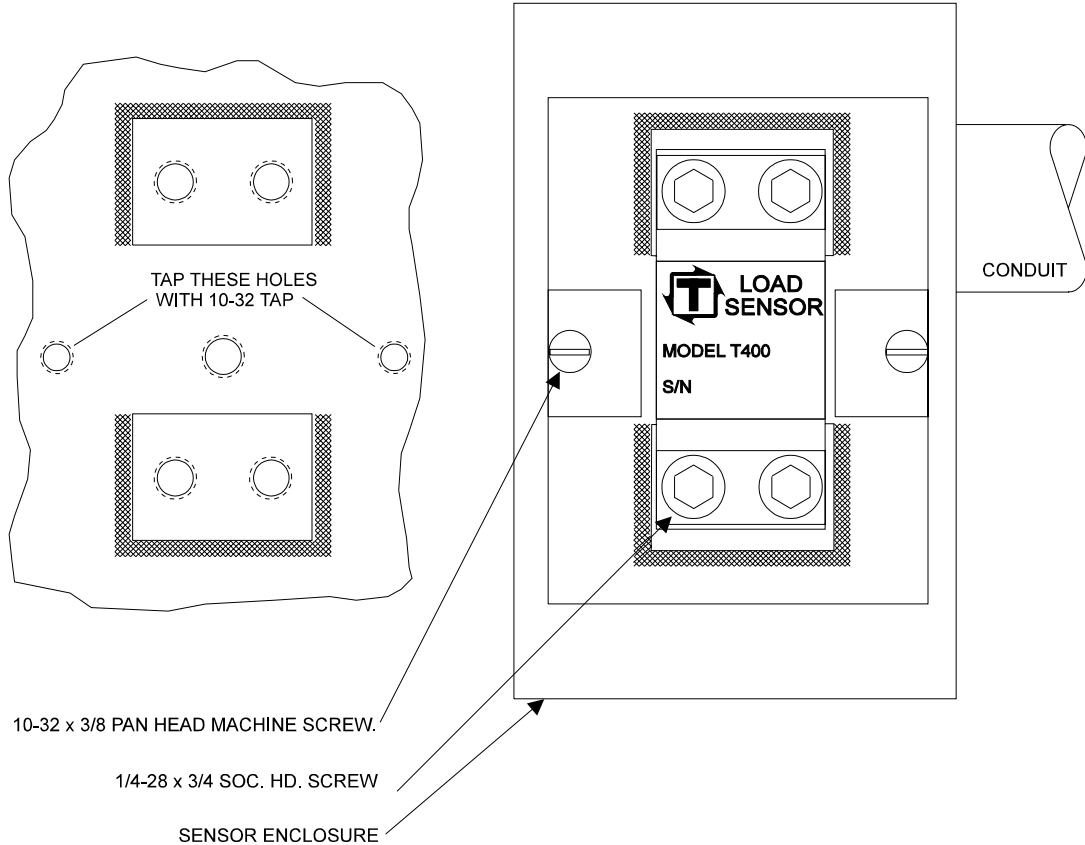
STEP 6 Remove the weld fixture. DO NOT WELD AFTER FIXTURE IS REMOVED. The 4 screws holding the pads to the fixture and the 1 center screw may be discarded. DO NOT USE THE FOUR 1 INCH LONG SCREWS TO ASSEMBLE SENSOR. The sensor kit contains four 3/4 inch long screws for assembling the sensor to the press member. Weld pad surface must be clean – no weld bumps, scratches, etc. Be sure the weld pad tapped holes are clean and bottom of holes are free of weld flash.

STEP 7 Mount the sensor with the raised rib to the press. The anti-torque washers should go between the screw and the sensor body. Torque each 1/4-28 x 3/4 in. long socket head screw to 150 LB.-IN or 12.5 LB.-FT.

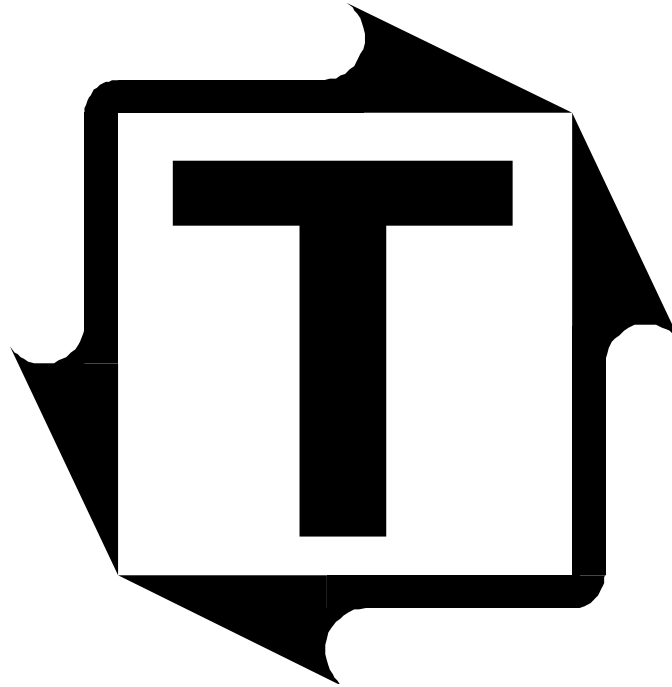
# SENSOR ENCLOSURE MOUNTING

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 SENSORS BOLTS, (4) EACH, FINGER TIGHT. USE ONLY THE 1/4-28 x 3/4" "LOC-WEL" BOLTS THAT ARE IN THE SENSOR PACKAGE. TORQUE EACH 1/4-28 x 3/4" SCREW TO 150 LB.-IN. OR 12.5 LB.-FT. ASSEMBLE BOX COVER.







# **Co-Pilot Operation Manual**

**Revision: J**

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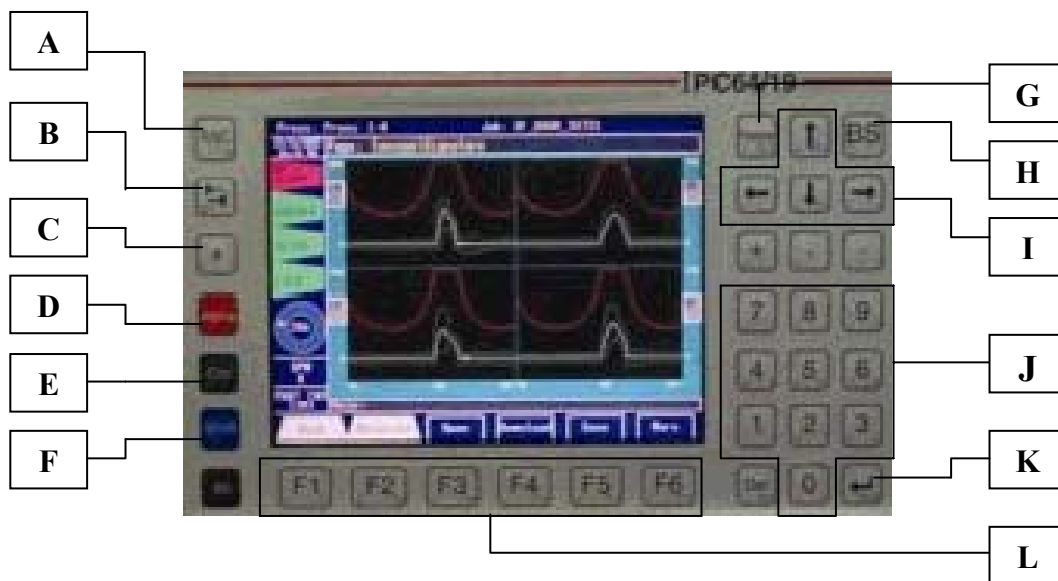
# 1: Common Features

The Co-Pilot HMI (Human-Machine Interface) unit allows you to interact with the versatile Co-Pilot system unit. The HMI is highly intuitive so even first time users will adapt quickly. This chapter describes the common features of the HMI.

## Keypad Layout

To navigate through the Co-Pilot's screens and change settings, you will need to become familiar with the unit's various keys and their functions. The keys and their functions are explained in Figure 1.1

**Figure 1.1: Keypad Layout**



- A. ESC** – This key opens the Alarm window.
- B. Tab** – Opens the Setup window.
- C. \*** - Locks the password to prevent unauthorized access to features.
- D. Alpha** – Used to input text. Hold this key and press another key to enter the letter or character indicated in red on the lower left corner of the key.
- E. Ctrl** – On the Main screen, hold this key and hit the **BS** key to exit the HMI program.
- F. Shift** – Used to input text. Hold this key and press another key to enter the character indicated in blue on the lower right corner of the key.

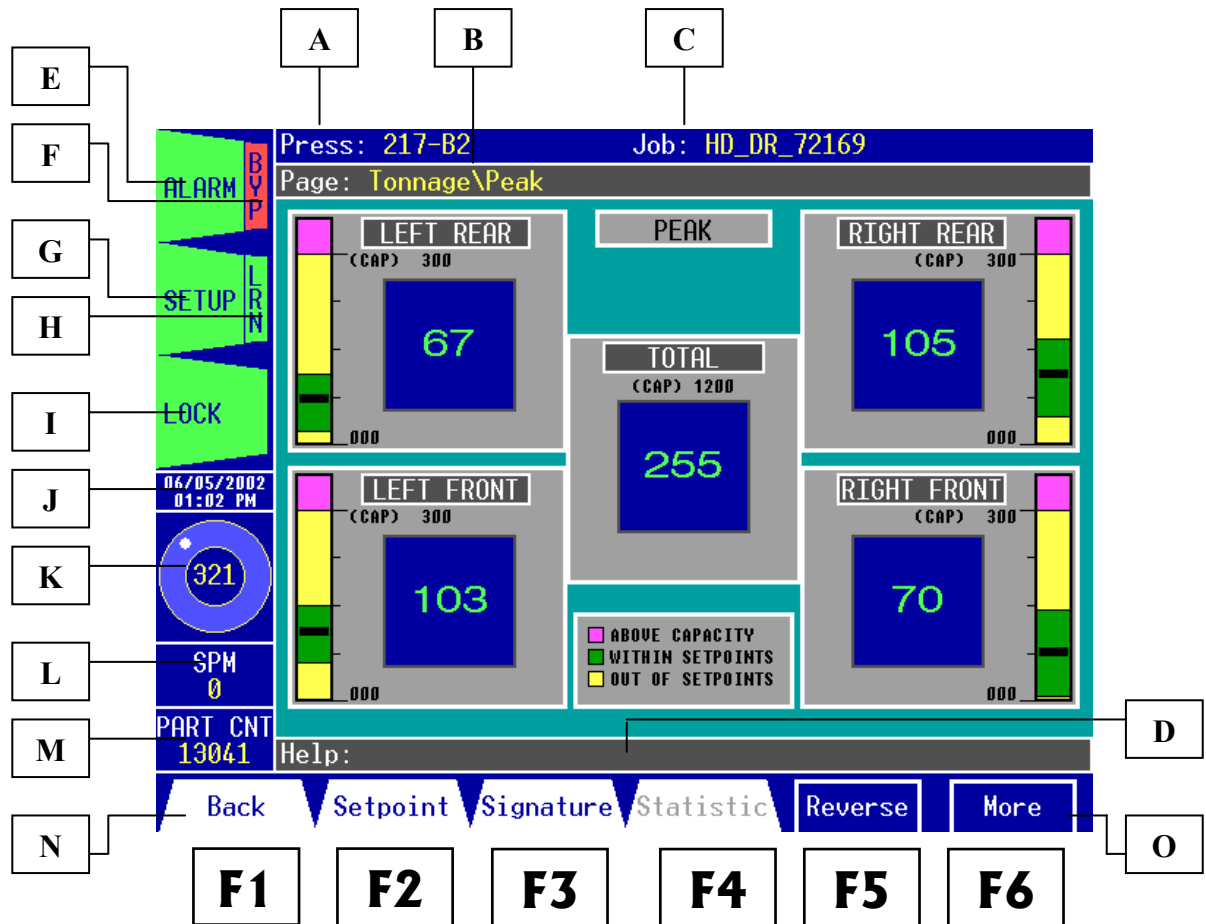
- G. Home** – Returns you to the Main Page quickly.
- H. BS** – When entering text, this key is used to erase the last character that was typed. It is also used in combination with the **Ctrl** key to exit the HMI program from the Main screen.
- I. Arrows** – Used to move the triangle-shaped cursor to select various elements on many of the screens. This key also is used to change setting values and to enter text. This will be further explained as you read this manual.
- J. Number Keys** – These are used for text entry.
- K. Enter** – Press this key after entering passwords and to make selections on some screens.
- L. Function Keys** – Performs the action or enters the screen indicated by the text located directly above each key. More on this later.



## Screen Layout

Many objects and functions are common to every screen. Figure 1.2 explains these screen elements further.

**Figure 1.2: Screen Layout**



- A. Press:** – The press name.
- B. Page:** – Name of the current page/screen.
- C. Job:** – Name of the job that is currently loaded.
- D. Help:** – This field is used to provide the user with instructions and is used to enter text such as passwords, job names, die sensor names, etc.
- E. ALARM Flag** – Selecting this opens the Alarm window. This flag is red when an alarm is present and green when there are no alarms.
- F. BYPASS** – Indicates if an alarm is being bypassed. This flag is red when an alarm is bypassed and green when no alarms are bypassed.
- G. SETUP Flag** – Selecting this opens the Setup window. This flag is yellow when Setup Mode is active and green when not in Setup Mode.
- H. LEARN** – Indicates if the Co-Pilot is in Learn Mode. This flag is yellow when the unit is learning its new benchmark and tonnage setpoints and green when it is not learning.



- I. LOCK Flag** – When this flag is yellow, the HMI’s access is “unlocked.” When it is green, the access is “locked.” This feature will be explained later in this chapter.
- J. Date/Time** – Displays the current date and time.
- K. Press Position** – This indicates the current press position. The number in the center of the circle is the current resolver angle in degrees.
- L. SPM** – Shows the current press speed in strokes per minutes.
- M. PART CNT** – The part counter shows the number of parts produced since the part counter was last reset.
- N. Back** – Takes you back one level in the menu tree when F1 is hit. This feature is not present on all pages.
- O. More** – Shows more options for the current page when F6 is hit. This feature is not present on all pages.





## The Function Buttons

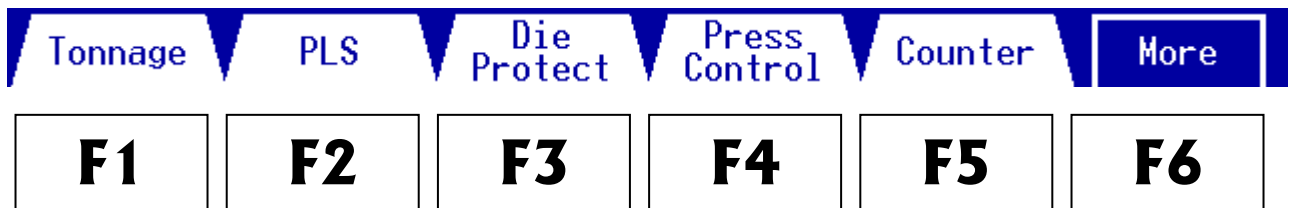
The function buttons are located at the bottom of the display. An example of the function buttons is shown in Figure 1.3

**Figure 1.3: The Function Buttons**



Each of the buttons corresponds to an “F” key (function key) that is located directly below on the keyboard (see Figure 1.4 below).

**Figure 1.4: "F" Key Equivalents**

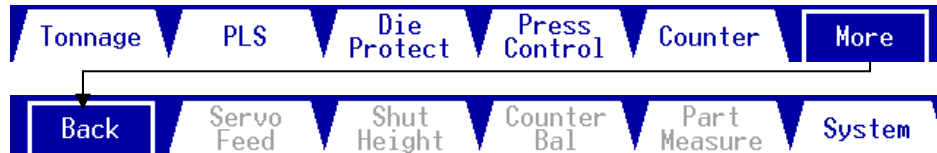


There are two types of function buttons: Tabs and Boxes. In Figure 1.4, **F1-F5** are tabs while **F6** is a box. The difference between the two types is the action that takes place when the “F” key corresponding to that button is hit. Tabs represent different pages. When a tab button is hit, you are taken to another page. For example, pushing the *F1* key takes you to the Tonnage page, pushing *F3* takes you to the Die Protect page, and so on. Pushing a Box button has a different effect. Box buttons perform a function on the current screen. In the above example, pushing *F6* presents more options for the current page. It does not take you to another page. Examples of “box” functions on other screens include “Change,” “Apply,” “Copy,” and many others.

## The “More” Button

Some pages have more than six function button options to choose from. On those pages, the **F6** function button will display the word “**More**” (see Figure 1.4 above). This indicates that more options are available. Hit the *F6* key and the row of function buttons will change to show the additional options. Note that the **F1** button will change to the word “**Back**.” If you hit the *F1* key now, the function buttons will change back to the original six options.

**Figure 1.5: The More/Back Function Buttons**

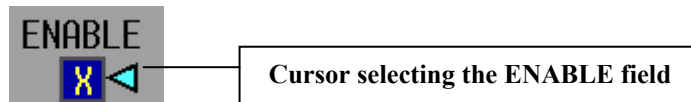


**Note:** It is important to understand the notation used throughout this manual for pages that have two sets of function buttons available. When referring to the function keys for these pages, the function key is listed followed by the set of function buttons in parentheses. For example, on the Main page, to access the Die Protect tab (see Figure 1.5 above) we would hit the *F3 (1)* key. To access the System tab we would first hit the *F6 (1)* key to bring up the second set of function buttons. Then we would hit the *F6 (2)* key to access the System tab. For pages that have only one set of function buttons available, we refer to the function keys without using a number in parentheses after it.

### The Cursor

When a page contains information that can be altered by the user, you will see a cursor on the screen. The cursor is a triangle that points to information that is changeable. The cursor can point up, down, left, or right, and can be moved around the screen using the four *arrow keys* on the keypad. Moving the cursor to point to different fields (boxes containing information) on the screen is called **selecting**. The cursor is shown in Figure 1.6 below.

**Figure 1.6: The Cursor**



### Types of Fields

There are three types of fields: Fixed information fields, Read-only fields, and Changeable fields. Figure 1.7 illustrates all three types.

**Figure 1.7: Types of Fields**

Press: 217-B2 Job: HD\_DR\_72169  
Page: Counter

ENABLE	PART/ STROKE	COUNT IN SETUP	COUNT IN ALARM	COUNTER	VALUE
<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	STROKE	8476
<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PART	13041
<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	GOOD PART	13008

06/05/2002 11:05 AM  
321  
SPM 0  
PART CNT 13041  
Help:

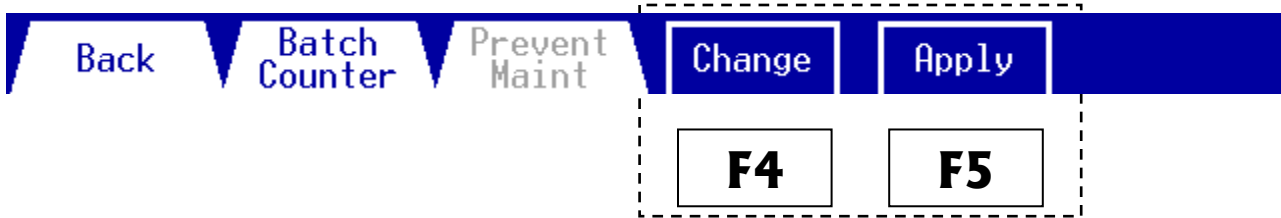
Back Batch Counter Prevent Maint Change Apply

Callouts: Read-only (points to 8476), Fixed (points to 13041), Change-able (points to 2 in PART/STROKE column).

- Fixed fields** – These fields contain information that never changes. They are not selectable. The fixed fields contain black text on a gray background.
- Read-only fields** – These fields contain information that changes, but not by the user. They are generally not selectable, with the exception of the counter value fields, which can be reset by the user. The read-only fields contain yellow text on a black background.
- Changeable fields**– These fields are selectable and contain information that can be changed by the user. The changeable fields contain yellow text on a blue background.

### Changing and Applying Information

Some pages contain information that can be changed by the user. This changeable information can be setpoints, limits, enable check boxes, names, etc. To change any field, you use the cursor and the **Change** and **Apply** function buttons (Figure 1.8).

**Figure 1.8: The Change and Apply Function Buttons**

To change information on the screen, you use the same method for all pages:

- a. Move the cursor with the *arrow keys* to select the field that you wish to change.
- b. Push the *F4* key. The cursor begins to flash to indicate that you are in Change Mode.
- c. Make whatever changes to the information you need. In general, you will use the *arrow keys* to make the changes. This will be explained in the Page Details section for each page.
- d. Hit the *F5* key to **Apply** the changes. You may also hit the *F4* key again to cancel the changes if you change your mind and do not wish to apply the changes.

## Entering/Editing Text

From time to time you will occasionally need to enter text. Entering job names, job remarks, PLS names, die sensor names, batch counter names, and other names all require text entry. It is easy to do and there are different methods that you can use. First, you must select the field whose contents you wish to rename. Hit *F4* to start Change Mode. You will notice that the arrow cursor starts blinking and the “**Help:**” field becomes “**Change to:**” followed by text cursor (    ) and the text you are editing. The text cursor is where the text entry will take place. See Figure Figure 1.9 below.

**Figure 1.9: Text Entry and Editing**

Simply use one of the following methods (or any combination of methods) to make your changes:

1. **Arrow Key Method:** The first method involves use of the *arrow keys*. Use the *Left* and *Right arrow keys* to select the location where you wish to insert or delete text. You can then use the *Del (delete) key* to erase the selected character, the *BS (backspace) key* to delete the character to the left of the cursor, or you can use the *Up* and *Down arrow keys* to insert letters or a space. When you are inserting letters, each time you hit the *Up arrow key*, the character at the underscore increments alphabetically by one letter. The *Down arrow key* decrements by one letter. There is also a *space* character (→) that you can select, located between *A* and *Z*. When the letter you want is displayed, simply hit the *Right arrow key* to advance. When you are finished, hit *F5* to **Apply**.

2. **Alpha Key Method:** This method involves the use of the *Alpha key* (see Figure 1.1). Most keys on the keypad have a red letter or character printed on the lower left corner. Find the key with the “alpha character” you want to enter, hold down the red *Alpha key*, then press the key with the “alpha character” printed on it to insert the character. Repeat this procedure until you are done, then hit *F5* to **Apply**.
3. **External Keyboard Method:** If you have an external keyboard connected to the Co-Pilot, you can use it to enter the text. This method is recommended if there is a large amount of text that you need to type (for example, entering job remarks on the Job page). As with the other methods, hit *F5* to **Apply** when finished.

**Notes:**

- If you are using the **External Keyboard Method**, the keyboard’s Num Lock must be turned off for some keys, such as the *arrow keys*, to function properly. Also be aware that the left *shift key* is not functional. You must use the *right shift key* to enter capital letters.
- Some characters must be entered using the keypad’s *Shift key*. Those characters are printed in blue on the lower right corner of the keys. To enter these “shift characters,” use the same procedure as the **Alpha Key Method**, but hold down the *Shift key* instead.
- For all text entry methods, pressing the *F4 key* cancels the editing process and the original name or text is not changed. Also, be aware that each name or text field has a maximum number of characters that can be entered. Refer to the Page Details section for more information.

## Passwords

Many functions in this program are password protected. If you try to access or alter something that is password protected, the program will prompt you to enter a password. Program functions that require a password include: text entry/editing, changing setpoints, resetting alarms, enabling Setup or Learn Mode, loading jobs, accessing the password page, and exiting the program. When a password is required, the “**Help:**” field at the bottom of the screen will change and prompt you to enter a password (see Figure 1.10).

**Figure 1.10: Entering a Password**



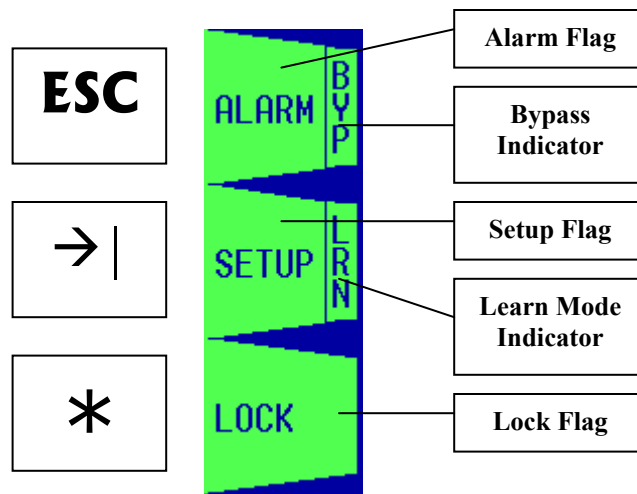
Use the keypad to enter the password. The characters that you enter will not be shown on the screen. Instead, an asterisk ( \* ) will be displayed for each character that you enter. This prevents any unauthorized person from seeing the password. Note that the **Arrow Key Method** of text entry will not work for entering passwords. When you are finished typing the password, hit the *Enter key* (or hit *F4* to abort). If the password is correct, you will be able to make the changes. If

the password is wrong or the permissions are set to bar users of that password from making the changes, the message “Access Denied!” will be displayed and you will not be allowed to make the changes. For more about password permissions, read the System\Password Page section in the Page Details chapter.

### The Three Status Flags

There are three flags located on the left side of the screen: the **Alarm** flag, the **Setup** flag, and the **Lock** flag (see Figure 1.11). These flags indicate the current operating status and provide access to other functions. To access the flags, you use the *Escape key* (ESC), the *Tab key* (→|) and the *Asterisk key* (\*) located on the keypad to the left of the flags.

**Figure 1.11: The Three Status Flags and Their Keypad Equivalents**



Each of the three flags performs a different function.

#### a. The Alarm Flag

The color of the larger left portion of this flag indicates the alarm status of the press. When there are no alarms, this flag will be green to indicate that the status is OK. When an alarm occurs, this flag will change to red to indicate an alarmed status. The Alarm window will automatically appear and you will be able to see where the alarm took place and reset the alarm. You can also access this window at any time by pressing the *ESC key*.

The right portion of this flag is the **Bypass Indicator**. The color of this section indicates if any alarms are being bypassed. When there are no alarms being bypassed, this portion of the flag will be green to indicate that the bypass status is OK. When an alarm is being bypassed, this will change to red to indicate a Bypass status. Note that bypassing an alarm is a potentially **dangerous** situation that can result in damage to the press or even injury to personnel.

**b. The Setup Flag**

The color of the larger left portion of this flag shows if the monitor is currently in Setup Mode. When the monitor is not in Setup Mode, the color of this flag will be green to indicate normal operational status. If the monitor is in Setup Mode, the color will be yellow. Accessing the **Setup** flag opens the Setup window where you can toggle the monitor in and out of Setup Mode, place the monitor in Learn Mode, and access the Setup\Job page.

The right portion of this flag is the **Learn Mode Indicator**. The color of this section indicates if the monitor is currently in Learn Mode. When the monitor is not in Learn Mode, this section is green to indicate normal operation. If the monitor is currently learning a new benchmark, the color will be yellow.

**c. The Lock Flag**

This flag's color tells you if the program's access is currently locked or unlocked. If this flag is green, the access is locked, which means that the user must enter a password to access the password-protected functions of the program. If this flag is yellow, the access is unlocked. An unlocked condition means that the user has already entered a correct password to make changes. The user will not be required to re-enter their password to access other protected areas of the program until the password is locked again. This helps to speed up the process of making multiple setting changes because you will not need to enter the password every time you make a change – just the first time. For security reasons, when you are finished making changes in the program you should always remember to lock the access. You do this by pressing the *asterisk key* (\*). This will change the flag color back to green to indicate a locked status.

**Note:** The program will automatically lock the access approximately four minutes after the last settings change takes place in order to help prevent unauthorized access. However, someone can still make changes during those four minutes if you leave the program unattended. The best way to prevent unauthorized access is to **always remember to lock the access after you are done.**



### Toggleing the Inner & Outer Slides

If the Co-Pilot is equipped with 6 or 8 channels, it is likely that the tonnage sensors are arranged to provide tonnage data for the outer and inner slide. Typically, the sensors for the outer slide are wired to channels 1-4 of the Analog Board and the sensors for the inner slide are wired to channels 6-9. In this situation, channel 0 displays the total tonnage for the outer slide, while channel 5 displays the total for the inner slide. Many of the HMI's tonnage-related pages show information about either the outer or the inner slide at one time. Therefore, it is necessary to "toggle the slide" occasionally. On the pages where only one slide is viewed at a time, you will notice two items:

- 1) The page title indicates the slide that is currently displayed.
- 2) There is a "Toggle Slide" function button at the bottom of the screen. This button allows you to toggle the slide that is currently displayed.

**Figure 1.12: Toggleing the Slide**

	Total	LR (1)	RR (2)	LF (3)	RF (4)
Capacity	1000	250	250	250	250
Hi Setpt.	467	135	141	119	118
Peak Ton.	271	84	92	71	68
Benchmark	267	85	91	69	68
Lo Setpt.	66	35	41	19	18
High %	20	20	20	20	20
Low %	20	20	20	20	20
Reverse	-52	-10	-12	-13	-17
Rev Setpt.	-100	-25	-25	-25	-25

The above figure is showing the Tonnage\Peak\Setpoint page for the outer slide (channels 0-4). To view the inner slide (channels 5-9) simply press the Toggle Slide button. The page title at the top of the screen will now change to indicate that you are viewing the inner slide.



### The Low Battery Indicator

The Co-Pilot stores its data, such as the part count and calibration information, in its internal memory. This memory is safe-guarded by a 3-volt lithium battery (type CR-1/3N) located on the Co-Pilot's Digital Board (see the Installation section of this manual for the location of the Digital Board). If the battery's voltage becomes low, the low battery indicator will appear on the Alarm flag as a reminder to replace the battery soon.

**Figure 1.13: The Low Battery Indicator**



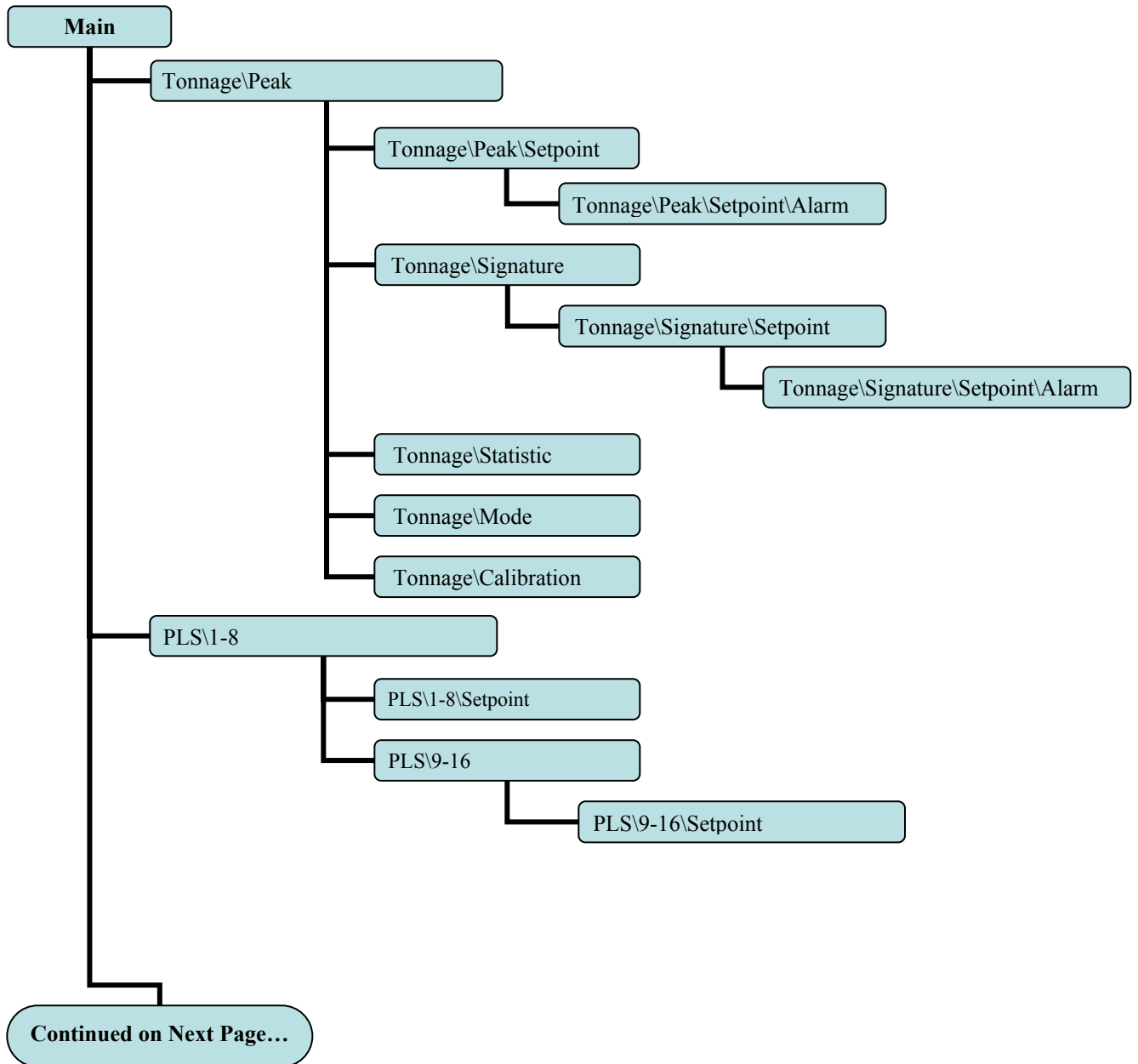
If the low battery indicator appears, contact Toledo Integrated Systems at 419-867-4170, Monday through Friday, 8:00 AM to 5:00 PM for detailed instructions on replacing the battery.



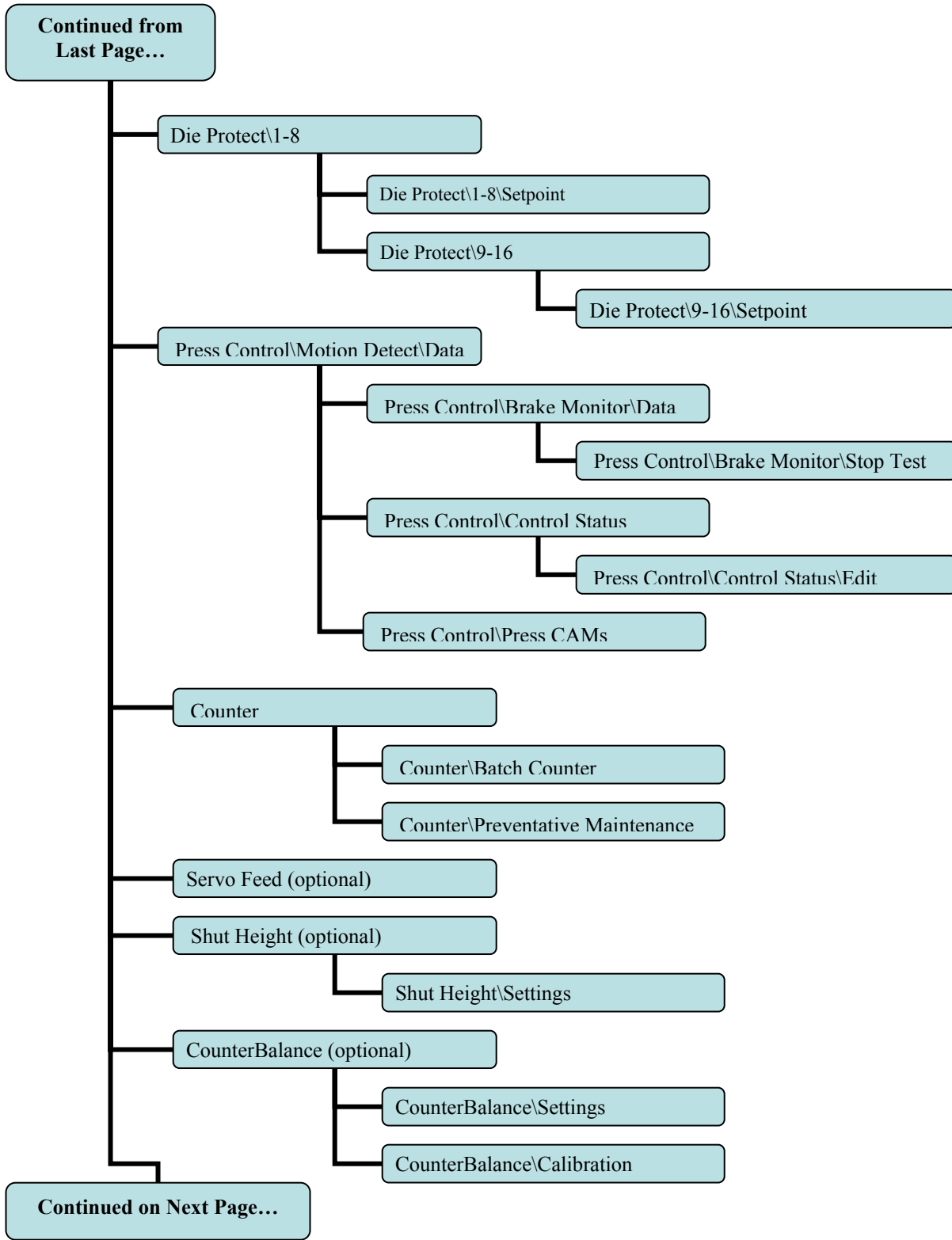
## 2: Page Navigation

The many functions that are available to you are arranged in a series of pages. Each page presents a certain feature of the Co-Pilot. Figure 2.1 shows the layout of the pages.

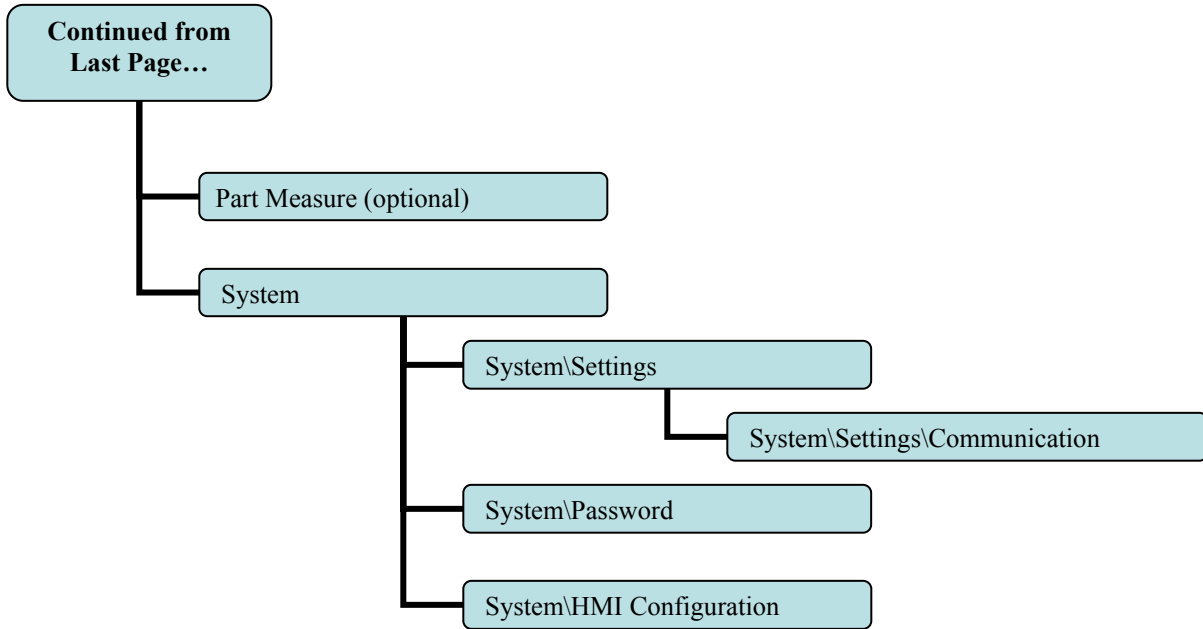
**Figure 2.1: Page Menu Tree**



**Figure 2.1 (cont.): Page Menu Tree**

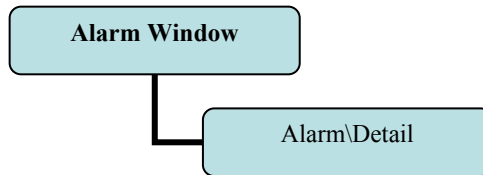


**Figure 2.1 (cont.): Page Menu Tree**

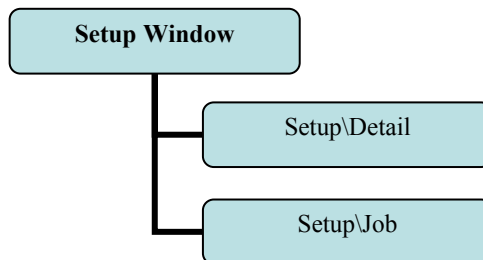


The Alarm and Setup Flags also have their own layout structure. This is shown in Figure 2.2 and Figure 2.3.

**Figure 2.2: Alarm Flag Menu Tree**



**Figure 2.3: Setup Flag Menu Tree**





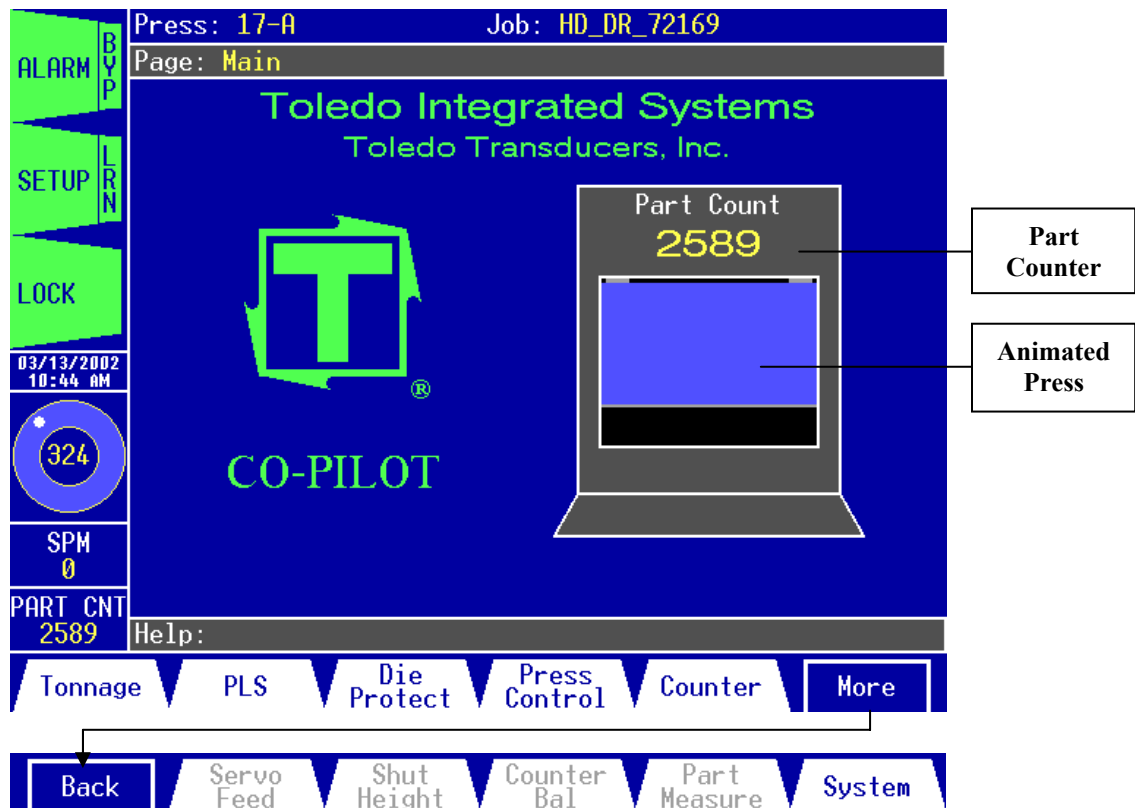
## 3: Page Details

In this chapter we will discuss each page and its features in detail. We will start with the Main Page.

### Main:

This is the first page you will see when you power-on the Co-Pilot.

**Figure 3.1: The Main Page**



The Main Page allows you to:

1. Access the main Co-Pilot functions.
2. View a large-digit Part Counter.
3. View a large animated press. The press graphically depicts the current physical press position.
4. View up to (4) other frequently-viewed items in large text for easier reference. See the System\Setting\HMI Configuration page for customizing options.



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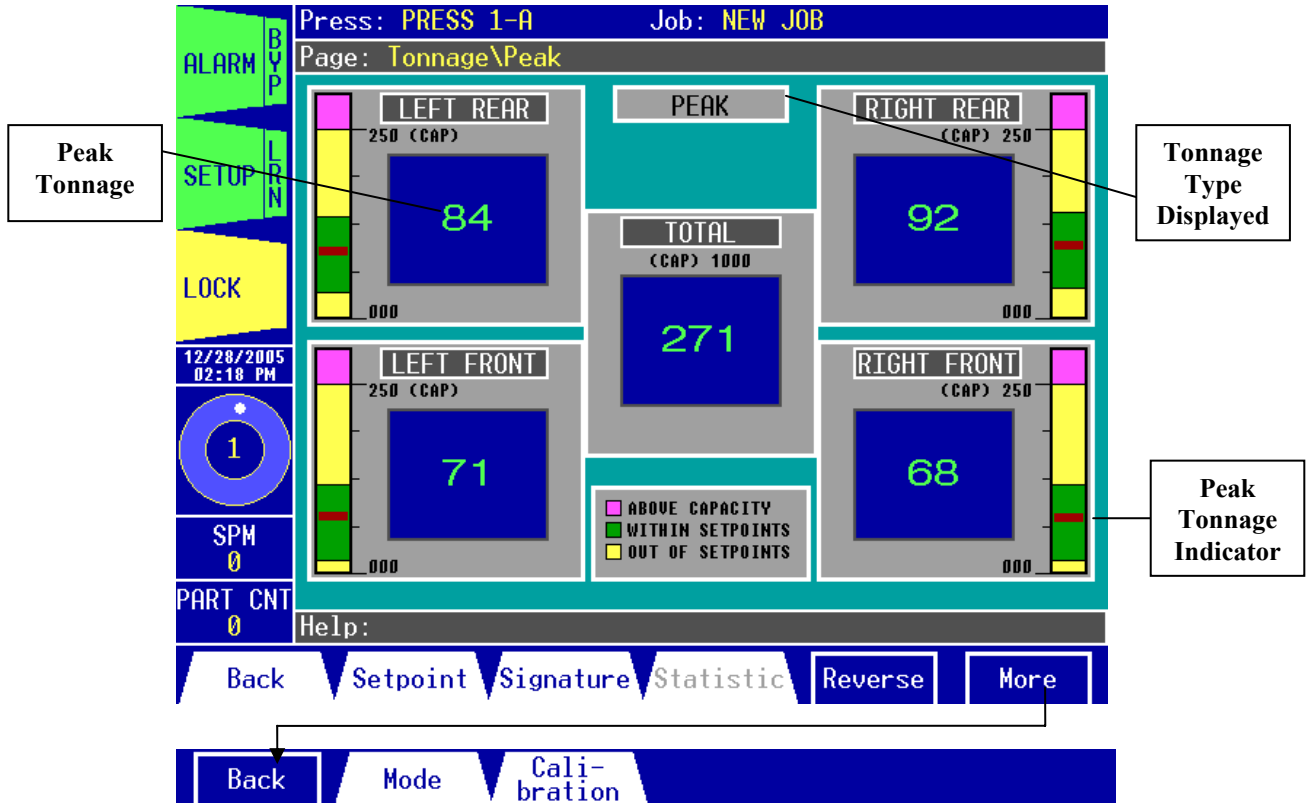
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 (1) – Tonnage:** Go to the Tonnage\Peak page.
  2. **F2 (1) – PLS:** Go to the PLS\1-8 page.
  3. **F3 (1) – Die Protect:** Go to the Die Protect\1-8 page.
  4. **F4 (1) – Press Control:** Go to the Press Control\Motion Detect\Data page.
  5. **F5 (1) – Counter:** Go to the Counter page.
  6. **F2 (2) – Servo Feed:** Go to the Servo Feed page.
  7. **F3 (2) – Shut Height:** Go to the Shut Height page.
  8. **F4 (2) – Counter Balance:** Go to the Counter Balance page.
  9. **F5 (2) – Part Measure:** Go to the Part Measure page.
  10. **F6 (2) – System:** Go to the System page.
- The *arrow keys* are not used on this page.

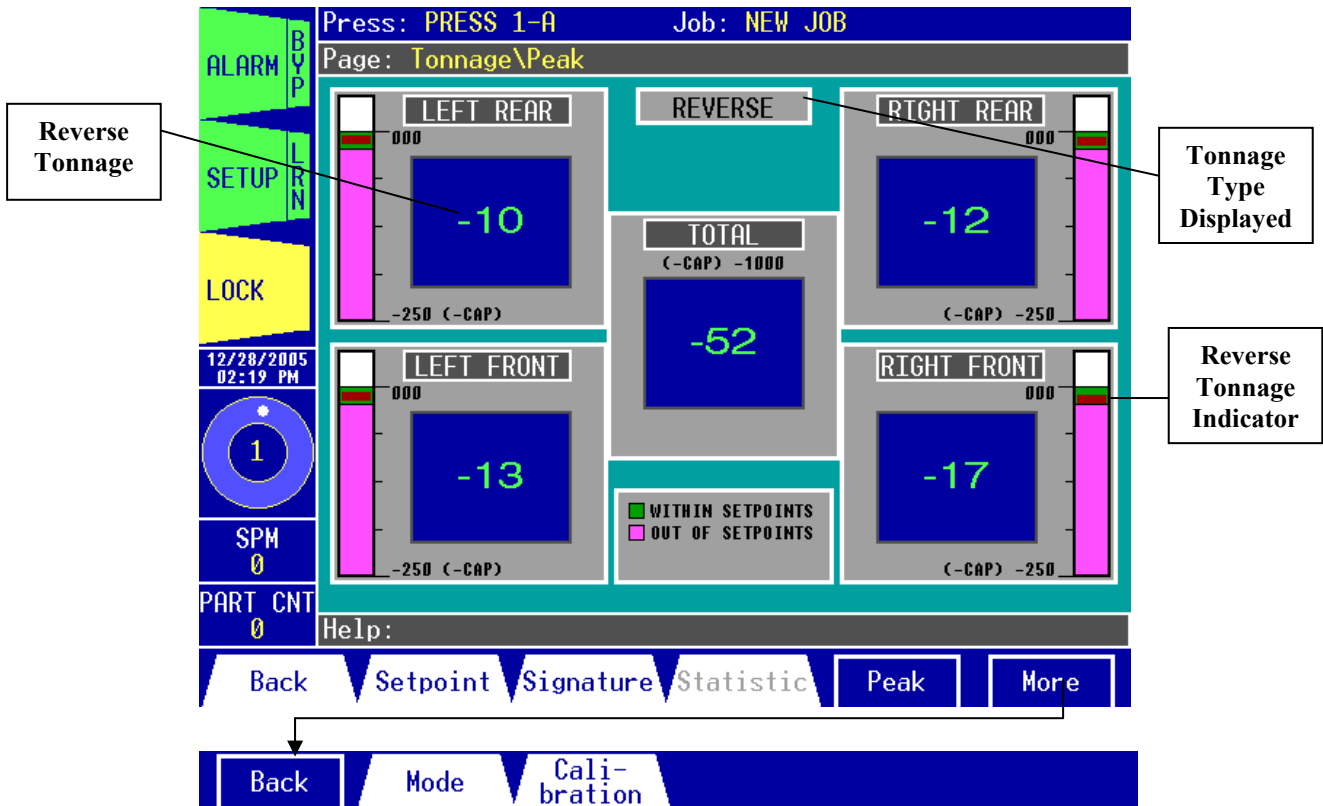


Tonnage\Peak:

**Figure 3.2: The Peak\Tonnage Page Displaying Peak Tonnage**



**Figure 3.3: The Tonnage\Peak Page Displaying Reverse Tonnage**



The Tonnage\Peak Page allows you to:

1. View the peak or reverse tonnage for each of the press corners and the total. Notice the color of the tonnage digits. When the tonnage is within the tonnage setpoints, these digits will be green. Any time the tonnage strays outside of the setpoint limits, these digits will be red.
2. Get valuable tonnage information at a glance from the bar graphs. Each bar graph represents one of the press channels.

**Viewing Peak or Reverse Tonnage:**

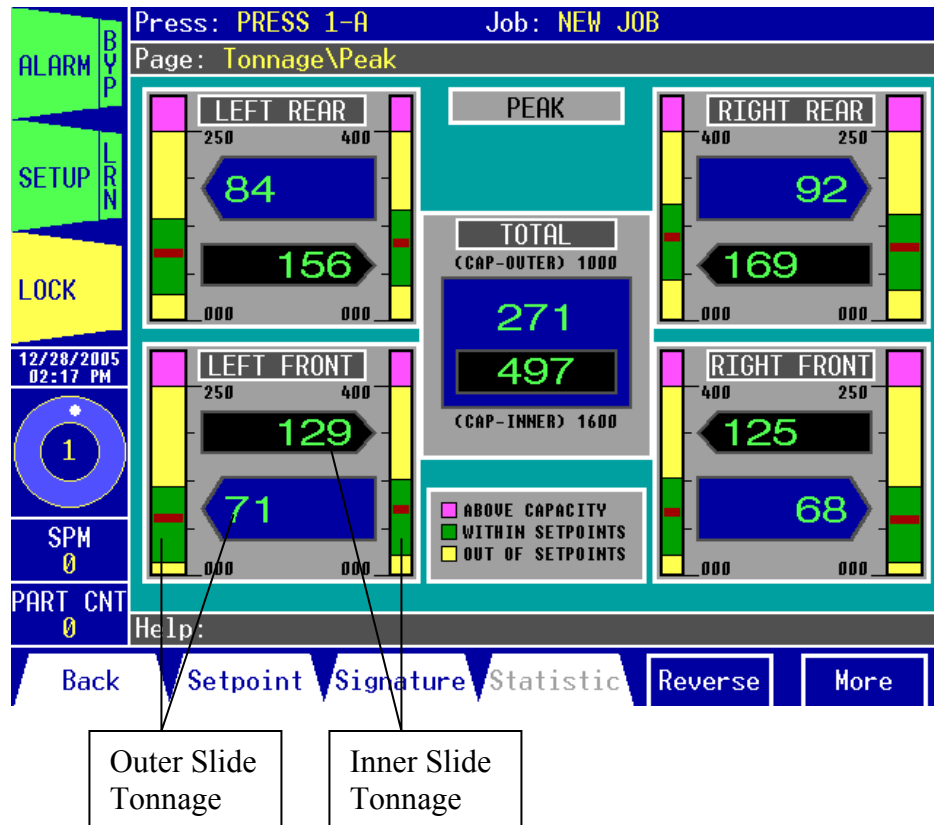
Hit the *F5 (1)* key. The displayed tonnage will toggle between peak and reverse. Hitting *F5 (1)* when the *F5* button reads “Reverse” will change to reverse tonnage. Hitting *F5 (1)* when the *F5* button reads “Peak” will change to peak tonnage. When peak tonnage is displayed, the bar graphs show where the current peak tonnage lies relative to the high and low setpoints and the channel capacity. The red indicator represents the current peak tonnage for the channel. The magenta region at the top of the bar graph is the “Above Capacity” zone, the yellow region represents the “Out of Setpoints” zone, and the green region is the “Within Setpoints” zone. When reverse tonnage is displayed, the bar graphs show where the current reverse tonnage lies relative to the low

reverse setpoint and the negative channel capacity. The red indicator represents the current reverse tonnage for the channel. The magenta region of the bar graph is the “*Out of Setpoints*” zone and the green region is the “*Within Setpoints*” zone. The tonnage indicator should always fall within the green zone under normal operating conditions.

### Viewing Tonnage For 8-Channel Configurations:

When the Co-Pilot is configured for 8 channels, the Tonnage\Peak page displays tonnage information for all channels simultaneously. See the figure below for an example of the Tonnage\Peak page displaying 8 channels.

**Figure 3.4: The Tonnage\Peak Page Displaying 8 Channels**

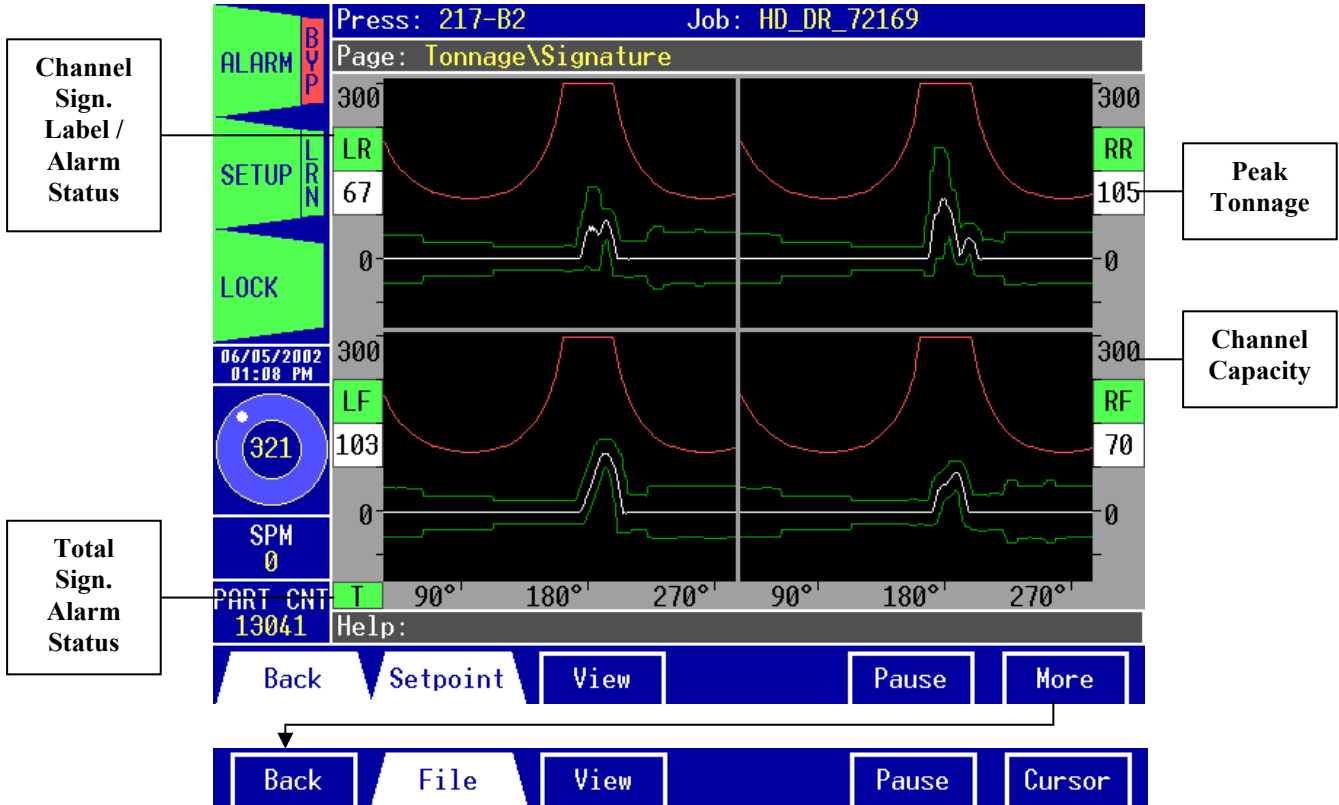


Active keys for this page:

- The *function keys* allow you to:
  - F1 (1) – Back:** Go back to the previous page.
  - F2 (1) – Setpoint:** Go to the Tonnage\Setpoint page.
  - F3 (1) – Signature:** Go to the Tonnage\Signature page.
  - F4 (1) – Statistic:** Go to the Tonnage\Statistic page.
  - F5 (1) – Reverse or Peak:** Toggle between displaying reverse or peak tonnage on this page.
  - F2 (2) – Mode:** Go to the Tonnage\Mode page.
  - F3 (2) – Calibration:** Go to the Tonnage\Calibration page.
- The *arrow keys* are not used on this page.

**Tonnage\Signature:**

**Figure 3.5: The Tonnage\Signature Page**



The Tonnage\Signature Page allows you to:

1. View the tonnage signature for each channel from 35° to 284° of the stroke, scaled to capacity. The white line on each graph represents the track tonnage, the green lines are the high and low enveloping for the channel, and the red line is the CCM (Critical Curve Monitoring). The signatures are updated once per stroke automatically.
2. View the peak tonnage for each signature. The peak tonnage is updated once per stroke.
3. View the signature alarm status for each channel. The status indicators (shown in Figure 3.5) are green when the channel's status is OK, red when the status is alarmed, and yellow when the signature alarms are being bypassed.
4. Access the Signature File window. From this window you can save the current signature file, open a previously saved signature, open a signature file as a reference, and other functions.
5. Toggle the Cursor function to view each corner's signature (track), CCM, high enveloping, or low enveloping tonnage data at any angle of the stroke (from 35° to 284°).
6. Pause the automatic signature updating and refresh the current signature.
7. Cycle through the signature views.



### Changing the Signature View:

Hit the *F3* key. You can view a summary of the four channels (corners), a close-up of the total tonnage signature, or a close-up of each of the four channels. Each press of the *F3* key displays a different view. Choices include: **4 Channel Summary** (shown in Figure 3.5 above), **Total (Close-Up)**, **Left Rear Channel (Close-Up)**, **Right Rear Channel (Close-Up)**, **Left Front Channel (Close-Up)**, and **Right Front Channel (Close-Up)**.

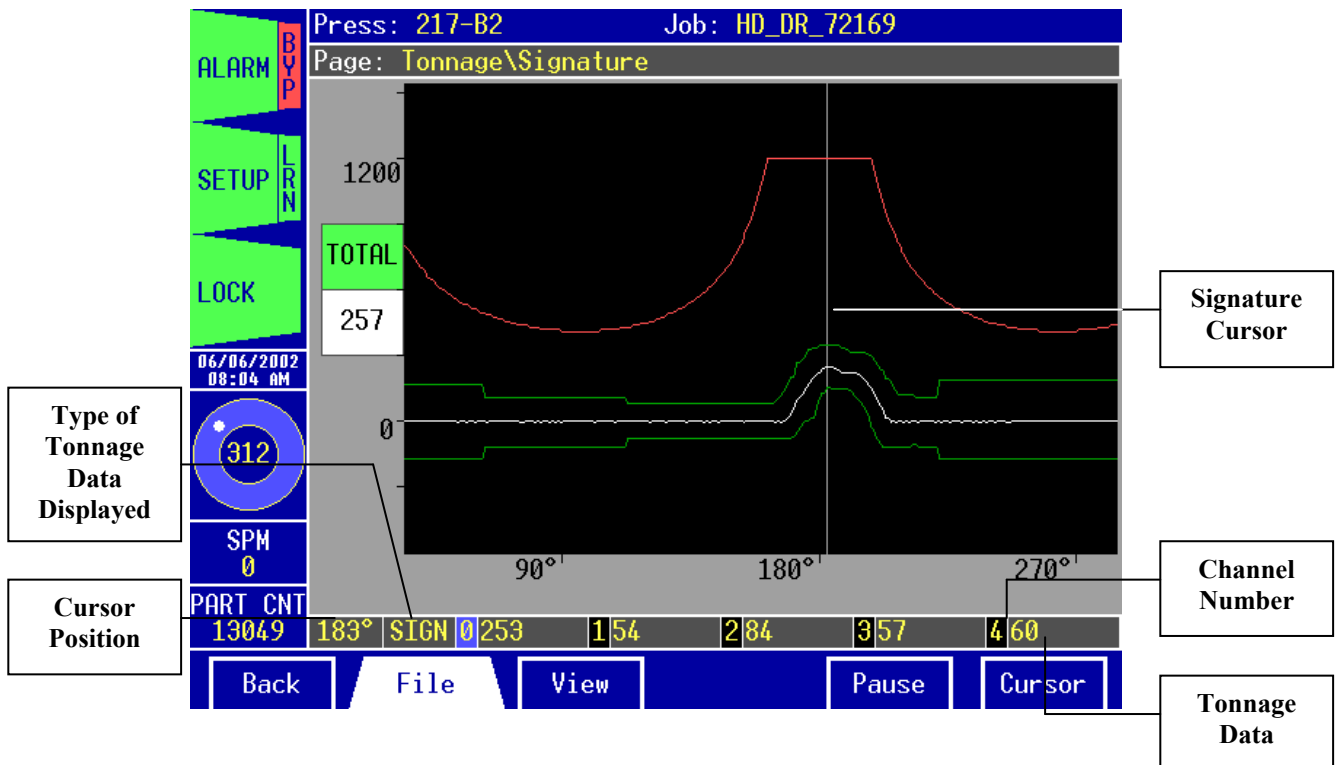
### Pausing the Signature:

Hit the *F5* key. The automatic signature updating is turned off. This allows you to examine a signature more closely or use other functions. For example, with the updating paused, you can open the File window and capture the signature to a file or use the View function to examine each of the signatures for that particular stroke. Hit *F5* again to resume automatic updating. When the HMI is removed from pause, the screen is updated with the most current signature available.

### Using the Signature Cursor Function:

Hit the *F6 (2)* key at any time to enable the cursor function. A vertical gray line (the cursor) will appear on the on-screen signature at 180° and the “**Help:**” field will now display tonnage data at the cursor position for each of the channels (see Figure 3.6).

**Figure 3.6: The Signature Cursor**

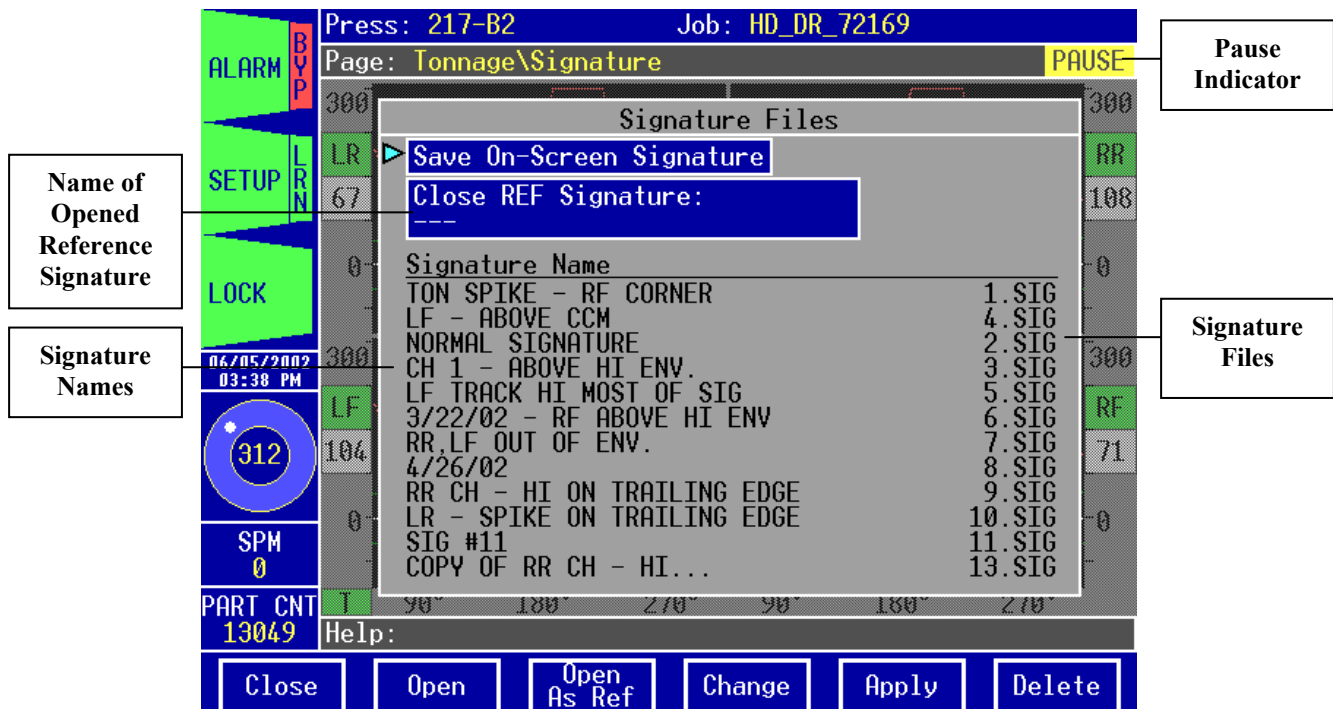


To change the cursor position by 1° use the *right* and *left arrow keys* or to change the cursor position by 10° hold down the *shift key* and then use the *right* and *left arrow keys*. You can change the type of tonnage data displayed by using the *up* and *down arrow keys*. Choices include **SIGN** (track), **CCM**, **HI** (high enveloping), and **LO** (low enveloping). To toggle the on-screen signature cursor off, hit *F6 (2)* again.

**Accessing the Signature File Window:**

Hit the *F2 (2)* key. A window displaying a list of all previously saved signatures appears (see Figure 3.7). The name/description of the signature is listed on the left side of the box with the file name of each signature displayed to the right.

**Figure 3.7: The Signature File Window**



**Opening a Signature File:**

In the Signature File window, use the *arrow keys* to select the name of the signature that you wish to open for viewing. 12 signature/file names can be displayed in the window at one time. If more than 12 signatures have been saved, you can select them by using the *arrow keys* to move the cursor to the bottom signature in the list. Press the *down* or *right arrow key* once more and the window will display the next 12 signatures available. Once the signature that you want to view is selected, hit the *F2* key to open the file.

**About Signature Files:**

A Signature file allows you to examine a previous tonnage signature. When you open a signature file, you will notice that the Pause function is enabled. This prevents the opened signatures from being updated if the press is running. Also, notice that the name of the signature file is now displayed in the “**Page:**” field at the top of the screen. With the signature file displayed, you can use the View and Cursor functions to examine the signature. To close the signature file, simply hit *F5* to turn the Pause function off.

**Opening a Signature File as a Reference:**

In the Signature File window, select the signature file that you want to open as a reference using the method described in the **Opening a Signature File** section above. Once the signature that you want is selected, hit the *F3* key to open the file as a reference.

**About Reference Signatures:**

When you open a signature file as a reference, you are displaying two signatures at once. When opened, the reference signature appears in gray behind the current signature. This allows you to compare the current signature to the signature file graphically. Also, when the Cursor function is used in one of the close-up views, you can compare the tonnage data from the two signatures at each degree. You can run the press while a reference signature is displayed so that you can compare each stroke’s signature to the reference. To close the reference signature, open the Signature File window, move the cursor to the **Close REF Signature** field, and hit *F5*.

**Renaming a Signature File:**

In the Signature File window, move the cursor to select the name of the signature that you wish to change. Hit the *F4* key. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The signature name can be up to 30 characters long. Hit the *F5* key to apply the change or hit the *F4* key to cancel.

**Saving a Signature:**

In the Signature File window, move the cursor to the **Save On-Screen Signature** field and hit the *F5* key. You will be prompted to enter a name for the current signature. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The signature name can be up to 30 characters long. Hit the *F5* key to save or hit the *F4* key to cancel. If you hit the *F4* key, the signature will still be saved, but a default name will be assigned. You can save as many signature files as disk space allows. When you are finished, hit the *F1* key to close the window and return to the signature page.

**Deleting a Saved Signature:**

In the Signature File window, move the cursor to select the signature file that you wish to delete. Hit the *F6* key to delete the file. Repeat this process to delete as many files as you want, then hit the *F1* key when you are done to close the window and return to the signature page.



---

Active keys for this page:

- When viewing the signatures, the *function keys* allow you to:
  1. **F1 (1) – Back:** Go back to the previous page.
  2. **F2 (1) – Setpoint:** Go to the Tonnage\Signature\Setpoint page.
  3. **F3 (1) or (2) – View:** Cycle through the available signature views.
  4. **F4 (1) or (2) – Toggle Slide (if 6- or 8-channel unit):** Toggle between outer and inner slide.
  5. **F5 (1) or (2) – Pause:** Pause or resume the automatic updating and refresh the on-screen signatures.
  6. **F2 (2) – File:** Open the Signature File window.
  7. **F6 (2) – Cursor:** Toggle the signature cursor function on or off.
- When the Signature File window is displayed, the *function keys* allow you to:
  1. **F1 – Close:** Close the Signature File window.
  2. **F2 – Open:** Open a selected signature file.
  3. **F3 – Open As Ref:** Open a selected signature file as a reference.
  4. **F4 – Change:** Rename a selected signature.
  5. **F5 – Apply:** Save the on-screen signature or close the reference signature (if there is one opened).
  6. **F6 – Delete:** Delete the selected signature file.
- The *arrow keys* allow you to move the on-screen signature cursor if you are using the cursor function. Also allows you to move the cursor to select the functions and signature names when the Signature File window is opened.



**Tonnage\Signature\Setpoint:****Figure 3.8: The Tonnage\Signature\Setpoint Page**

Press: 217-B2 Job: HD\_DR\_72169

Page: Tonnage\Signature\Setpoint

CH 0	Hi	30	20	15	20	32
APPLY CH0	Lo	29	20	14	19	30
CH 1	Hi	30	20	15	20	32
	Lo	29	20	14	19	30
CH 2	Hi	30	20	15	20	32
	Lo	29	20	14	19	30
CH 3	Hi	30	20	15	20	32
	Lo	29	20	14	19	30
CH 4	Hi	30	20	15	20	32
	Lo	29	20	14	19	30

06/06/2002 08:43 AM

312

SPM 0

PART CNT 13049

Pos: 35° 59 109 200 224 284°

Zone: 1 2 3 4 5

Help:

Back Sign Alarm Change Apply

The Tonnage\Signature\Setpoint Page allows you to:

1. View and change the high and low enveloping setpoints for channels 1-4 and the total (channel 0). There are five enveloping zones for each channel. The high and low enveloping setpoints allow you to determine the amount that the track tonnage can deviate from the benchmark in a particular zone before triggering an alarm.
2. View and change the end position for zones 1-4. This lets you define the zones so that you can set different tolerances for each critical stage of the stroke.
3. Apply the settings for channel 0 to the other zones for fast zone setup.

**Changing High and Low Enveloping Setpoints:**

Use the *arrow keys* to select the **Hi** or **Lo** setpoint field for the channel and zone you wish to change. Hit the *F4* key.

- Use the *Up/Down arrow keys* to increase or decrease the setpoint by 1%, or
- Use the *Left/Right arrow keys* to increase or decrease the setpoint by 5%.

Hit the *F5* key to apply your changes or hit the *F4* key to cancel.

**Setting Up the Enveloping Setpoints Quickly:**

Adjust the channel 0 setpoints as you like by following the above procedure. Next, use the *arrow keys* to select the **APPLY CH0** field. Hit the *F5* key to apply the channel 0 setpoints to all other channels.



### Changing the Zone End Positions:

Use the *arrow keys* to select the zone end position (**Pos** field) you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease by 10°.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the high and low enveloping setpoints for each channel and zone and change the zone end positions.
  3. **F5 – Apply:** Apply the changes you have made and apply the channel 0 setpoints to all channels.
  4. **F6 – Toggle Slide (if 6- or 8-channel unit):** Toggle between outer and inner slide.
- The *arrow keys* allow you to move the cursor to select the **Hi** and **Lo** setpoint fields for each channel and zone, the zone end positions, and the **APPLY CH0** field.

Tonnage\Signature\Setpoint\Alarm:**Figure 3.9: The Tonnage\Signature\Setpoint\Alarm Page**

ALARM		Press: 217-B2 Job: HD_DR_72169					
SETUP		Page: Tonnage\Signature\Setpoint\Alarm					
LOCK		APPLY CH0	CH 0	CH 1	CH 2	CH 3	CH 4
06/06/2002 08:49 AM		CCM					
312		Stop Type	EMR	EMR	EMR	EMR	EMR
SPM 0		Status	OK	OK	OK	OK	OK
PART CNT 13049		Hi					
Help:		Stop Type	TOP	TOP	TOP	TOP	TOP
Back		Status	OK	OK	OK	OK	OK
Change		Lo					
Apply		Stop Type	BYP	BYP	BYP	BYP	BYP
		Status	---	---	---	---	---

The Tonnage\Signature\Setpoint\Alarm Page allows you to:

1. View and change the alarm stop type for channels 0-4 for each of the signatures (**CCM**, **Hi** Enveloping, and **Lo** Enveloping). Each signature for each channel can have its own stop type.
2. View the alarm status for each signal/channel combination. If the status is normal, **OK** will be displayed. **ALARM** indicates that the track tonnage violated the enveloping setpoints. “---“ indicates that the alarm stop type is bypassed.
3. Apply the settings for channel 0 to the other channels for fast signature alarm setup.

### Changing the Signature Alarm Stop Type:

Use the *arrow keys* to select one of the **Stop Type** fields. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different alarm stop type selections. You can choose from three settings:

- a. **TOP** – When the stop type is set to **TOP**, an alarm condition will result in a top stop. The press will complete its current stroke, return to its top dead center position, then stop.
- b. **EMR** – If the stop type is set to **EMR**, an alarm condition will result in an emergency stop (E-Stop). The press will stop immediately when the alarm occurs, regardless of the press position.
- c. **BYP** – When the stop type is set to **BYP**, the alarm for this signature/channel is bypassed. The press will not stop due to a signature setpoint violation.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.



### Setting Up the Signature Alarm Stop Type Quickly:

Adjust the channel 0 stop type for each signature as you like by following the above procedure. Next, use the *arrow keys* to select the **APPLY CH0** field. Hit the *F5 key* to apply the channel 0 stop types to all other channels.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the stop type for each channel and signature.
  3. **F5 – Apply:** Apply the changes you have made and apply the channel 0 stop types to all channels.
  4. **F6 – Toggle Slide (if 6- or 8-channel unit):** Toggle between outer and inner slide.
- The *arrow keys* allow you to move the cursor to select the **Stop Type** fields for each channel and signature and the **APPLY CH0** field.



**Tonnage\Peak\Setpoint:**

**Figure 3.10: The Tonnage\Peak\Setpoint Page**

	Total	LR (1)	RR (2)	LF (3)	RF (4)
Capacity	1200	300	300	300	300
Hi Setpt.	564	111	168	150	144
Peak Ton.	257	67	108	104	71
Benchmark	264	66	108	105	69
Lo Setpt.	23	21	45	60	9
High %	25	15	20	15	25
Low %	20	15	21	15	20
Reverse	-8	-3	-4	-4	-2
Rev Setpt.	-325	-50	-50	-45	-46

Peak Tonnage Section (rows: Capacity, Hi Setpt., Peak Ton., Benchmark, Lo Setpt., High %, Low %)

Reverse Tonnage Section (rows: Reverse, Rev Setpt.)

The Tonnage\Peak\Setpoint Page allows you to:

1. View the capacity, high and low tonnage setpoints, peak tonnage, benchmark, high and low % deviation, reverse tonnage, and reverse setpoints for channels 1-4 and the total.
2. Change the capacities, high % deviation, low % deviation, and reverse setpoints for each channel and the total. The high and low setpoints are calculated based on the capacity and % deviation using the following formulas:

$$Hi\ S.P. = Benchmark + (Cap. \times Hi\ \%)$$

$$Lo\ S.P. = Benchmark - (Cap. \times Lo\ \%)$$

**Note:** High setpoint, benchmark, and low setpoint are calculated automatically by the Learn Mode. Changing the capacity, high %, and low % will have no effect on the benchmark, high setpoints, or low setpoints until the monitor is placed in Learn Mode. After adjusting the capacity, high %, or low %, always place the monitor in Learn Mode to relearn the benchmark and setpoints. To place the monitor in Learn Mode, refer to the Setup window Details Page.

**Changing the Capacity:**

Use the *arrow keys* to select the **Capacity** field for the channel you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the capacity by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the capacity by 100, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the capacity by 1000.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

**Changing the High % Deviation:**

Use the *arrow keys* to select the **High %** field for the channel you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease by 1%, or
- Use the *Left/Right arrow keys* to increase or decrease by 5%.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

**Changing the Low % Deviation:**

Use the *arrow keys* to select the **Lo %** field for the channel you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease by 1%, or
- Use the *Left/Right arrow keys* to increase or decrease by 5%.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

**Changing the Reverse Setpoint:**

Use the *arrow keys* to select the **Reverse Setpoint** field for the channel you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the tonnage by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the tonnage by 10, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the tonnage by 100.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

---

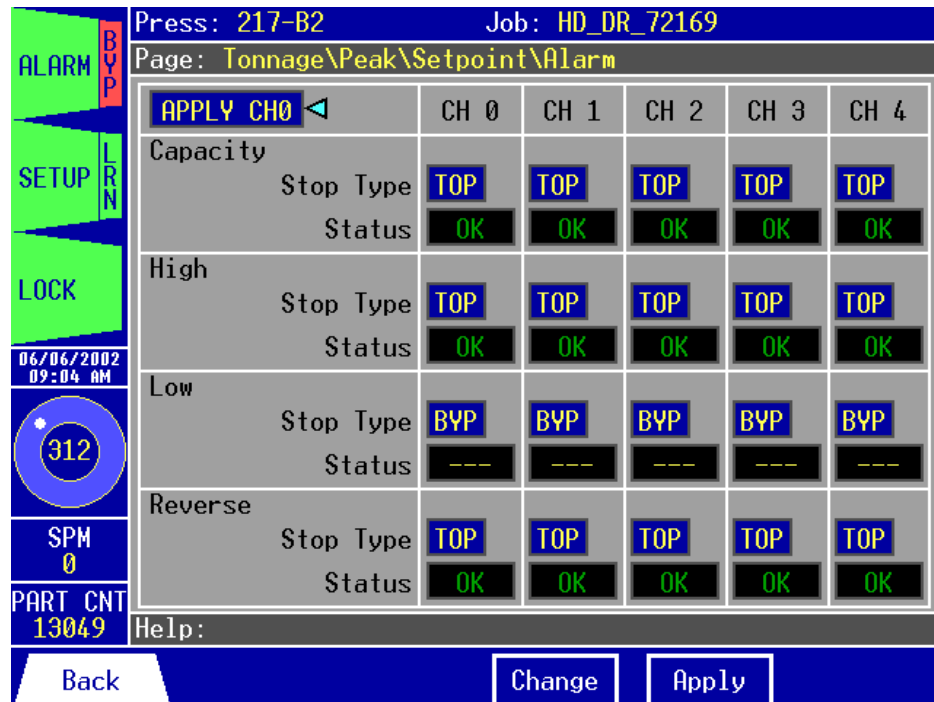
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Peak Alarm:** Go to the Tonnage\Peak\Setpoint\Alarm page.
  3. **F4 – Change:** Change the capacity, high %, low %, and reverse setpoint for each channel.
  4. **F5 – Apply:** Apply the changes you have made.
  5. **F6 – Toggle Slide (if 6- or 8-channel unit):** Toggle between outer and inner slide.
- The *arrow keys* allow you to move the cursor to select the **Capacity**, **High %**, **Low %**, and **Reverse Setpoint** fields for each individual channel and the total.



**Tonnage\Peak\Setpoint\Alarm:**

**Figure 3.11: The Tonnage\Peak\Setpoint\Alarm Page**



The Tonnage\Peak\Setpoint\Alarm Page allows you to:

1. View and change the channel 0-4 alarm stop type for each of the tonnage setpoint types (Capacity, High, Low, and Reverse). Each tonnage setpoint type for each channel can have its own stop type.
2. View the alarm status for each tonnage setpoint type/channel combination. If the status is normal, **OK** will be displayed. **ALARM** indicates that the tonnage violated the tonnage setpoints for the Capacity, High, Low, or Reverse. “---“ indicates that the alarm stop type is bypassed.
3. Apply the settings for channel 0 to the other channels for fast peak tonnage alarm setup.

**Changing the Peak Tonnage Alarm Stop Type:**

Use the *arrow keys* to select one of the **Stop Type** fields. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different alarm stop type selections. You can choose from two settings:

- a. **TOP** – When the stop type is set to **TOP**, an alarm condition will result in a top stop. The press will complete its current stroke, return to its top dead center position, then stop.
- b. **BYP** – When the stop type is set to **BYP**, the alarm for this tonnage setpoint type/channel is bypassed. The press will not stop due to a tonnage setpoint violation.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.



### Setting Up the Peak Tonnage Alarm Stop Type Quickly:

Adjust the channel 0 stop type for each tonnage setpoint type as you like by following the above procedure. Next, use the *arrow keys* to select the **APPLY CH0** field. Hit the *F5 key* to apply the channel 0 stop types to all other channels.

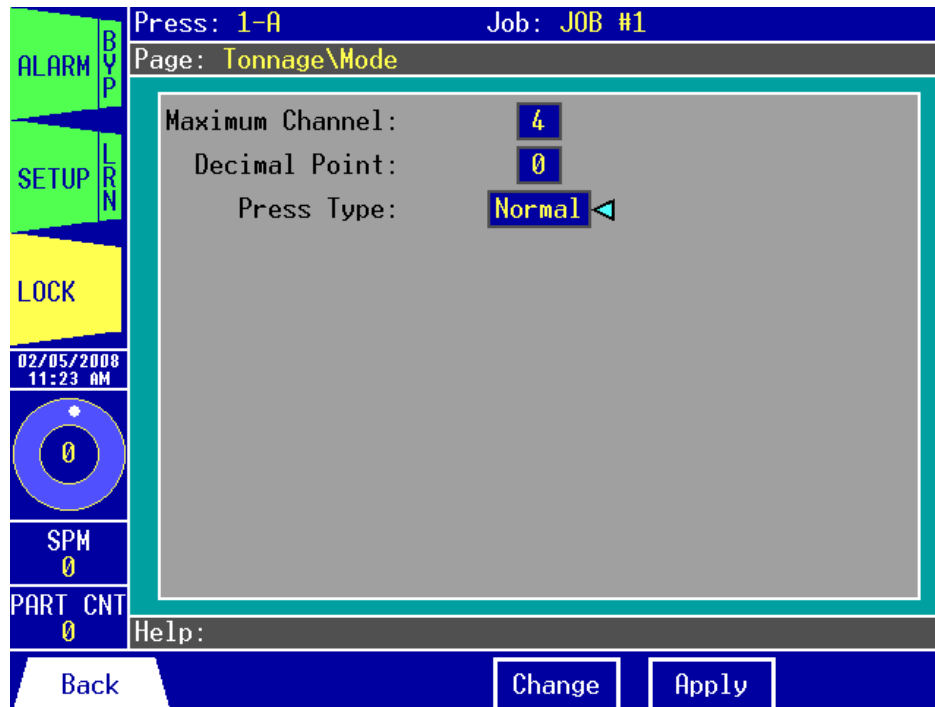
---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the stop type for each channel and tonnage setpoint type.
  3. **F5 – Apply:** Apply the changes you have made and apply the channel 0 stop types to all channels.
  4. **F6 – Toggle Slide (if 6- or 8-channel unit):** Toggle between outer and inner slide.
- The *arrow keys* allow you to move the cursor to select the **Stop Type** fields for each channel and tonnage setpoint type and the **APPLY CH0** field.





**Tonnage\Mode:****Figure 3.12: The Tonnage\Mode Page**

The Tonnage\Mode Page allows you to:

1. View and change the maximum channel number for the press. You can choose from 2, 4, 6, and 8 channels. Note that some options, such as counter balance, may limit this to less than 8.
2. View and change the number of decimal places that are displayed for tonnage values. You can view tonnage values with 1, 2, or 3 decimal places or you can turn off the decimal point by setting the value to 0.
3. Configure the unit for non-standard press types, if needed.

**Note:** Changing the maximum channel will change the appearance of the pages in the Tonnage section. Here is the information that will be displayed for various channel configurations:

- 2 Channels: Only a left and a right channel with the total is displayed.
- 4 Channels: The left rear, right rear, left front, and right front channels with the total is displayed.
- 6 Channels: The left rear, right rear, left front, right front, and total is displayed for the outer slide and the left, right, and total is displayed for the inner slide.
- 8 Channels: The left rear, right rear, left front, right front, and total is displayed for the outer slide and inner slide.

Also note that most pages displayed in this manual are shown with a 4-channel configuration.



### Changing the Maximum Channel Displayed:

Use the *arrow keys* to select the **Maximum Channel** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to change the maximum channel setting to match the sensor configuration for the press. When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Decimal Point:

The decimal point setting allows you to view tonnage values with greater precision. This is particularly useful for presses with low capacities. Use the *arrow keys* to select the **Decimal Point** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to change the decimal point setting to the desired precision. When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Press Type:

The Press Type setting allows you to configure the unit for non-standard press types, if needed. You can choose from the following:

- a. **Normal** – For standard underdrive presses. This is the most commonly used type.
- b. **STI** – For top-drive double action presses. STI (**Slide Tonnage Isolation**) tonnage mode allows both the outer slide (blankholder) load and the inner slide (punch) load to be displayed using only four frame-mounted sensors. For more details, refer to the **Co-Pilot / PW-LS STI Supplemental Manual** (doc.# 16368).

**Note:** Selecting STI tonnage mode will automatically set the maximum channel to 8.

Use the *arrow keys* to select the **Press Type** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to change the press type to match your application. When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

---

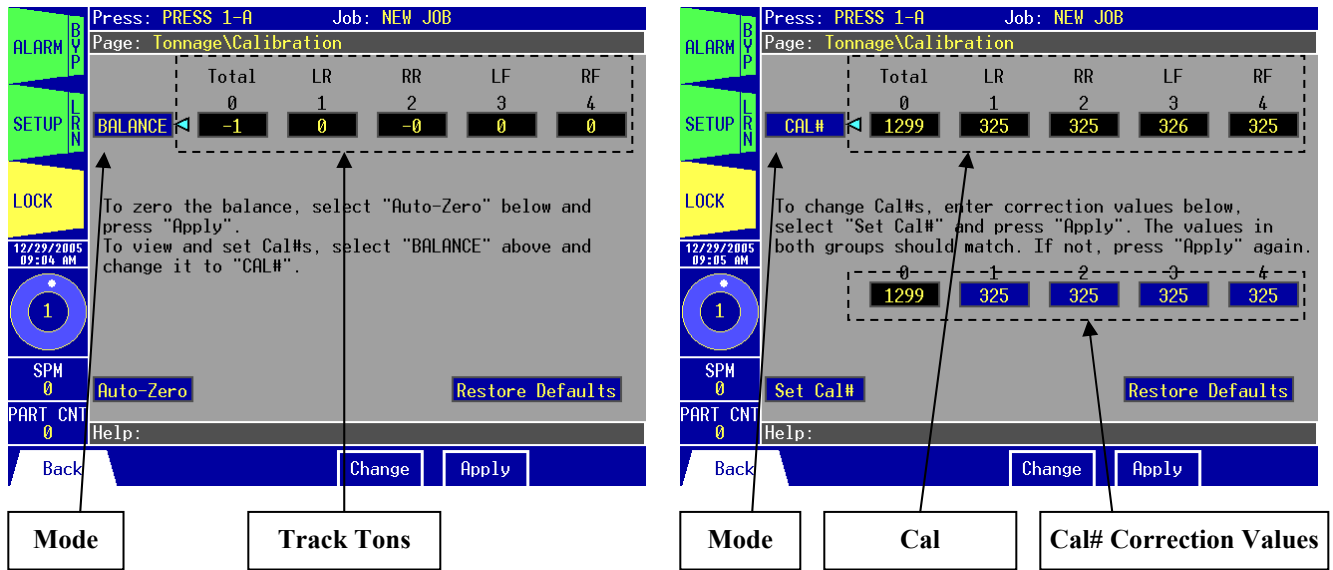
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the maximum channel displayed for the press, the decimal point precision of the tonnage values, and the type of press.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Maximum Channel**, **Decimal Point**, and **Press Type** fields.



**Tonnage\Calibration:**

**Figure 3.13: The Tonnage\Calibration Page**



The Tonnage\Calibration Page allows you to:

1. View the balance and calibration (Cal) numbers for each of the tonnage channels. The balance is the track tonnage that is currently being read from the tonnage sensors, while the Cal numbers are the gain values applied to the sensors in order to display the correct tonnage.
2. Balance the track tonnage.
3. Change and set the Cal# correction values for each of the channels.
4. Restore the default balance/gain values.

**Note:** The calibration procedure is described in detail in chapter 4.

**Note:** When you attempt to access the Calibration page, you will be asked for your password. Only users with the Master-level password will be able to gain access to the Calibration page.

**Viewing the Track Tonnage or Cal#:**

- To view the track tonnage (balance), the mode must be set to **BALANCE**. If it is not, use the *arrow keys* to select the Mode field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the mode to **BALANCE**. Hit the *F5 key* to accept. The track tonnage is now displayed.
- To view the Cal numbers (gain), the mode must be set to **CAL#**. If it is not, use the *arrow keys* to select the mode field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the mode to **CAL#**. Hit the *F5 key* to accept. Two sets of Cal numbers are now displayed. The top set of Cal numbers are the actual Cal# values. The bottom set of Cal numbers are the Cal# correction values. The correction values are the values that you want the actual Cal numbers to read.

### Balancing the Track Tonnage:

With the mode set to **BALANCE** (see Figure 3.13, left), use the *arrow keys* to select the **Auto-Zero** field. Hit the *F5 key* to begin the balancing routine. While the channels are being balanced, you should see the track tonnage values start to get closer to zero and the **Auto-Zero** field will flash “**Wait...**”. If the gain is high, the auto-zeroing process may repeat. Once all of the channels reach zero, the **Auto-Zero** field will read “**Auto-Zero**” again. The channels are now balanced. If you wish to cancel the auto-zero process before it is complete, press the *F5 key* again at any time.

### Changing the Cal# Correction Values:

With the Mode set to **CAL#** (see Figure 3.13, right), use the *arrow keys* to select the Cal# correction value field (the bottom set of Cal numbers) for the channel you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the correction value by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the correction value by 10, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the value by 100.

Hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Setting the Cal Numbers:

Before setting the Cal numbers, make sure that you have set the Cal# correction values as described above. With the mode set to **CAL#** (see Figure 3.13, right), use the *arrow keys* to select the **Set Cal#** field. Hit the *F5 key* to set the Cal numbers to the Cal# correction values.

### Restoring the Default Balance/Gain Values:

Use the *arrow keys* to select the **Restore Defaults** field. Hit the *F5 key*. The default balance and gain values have now been restored.

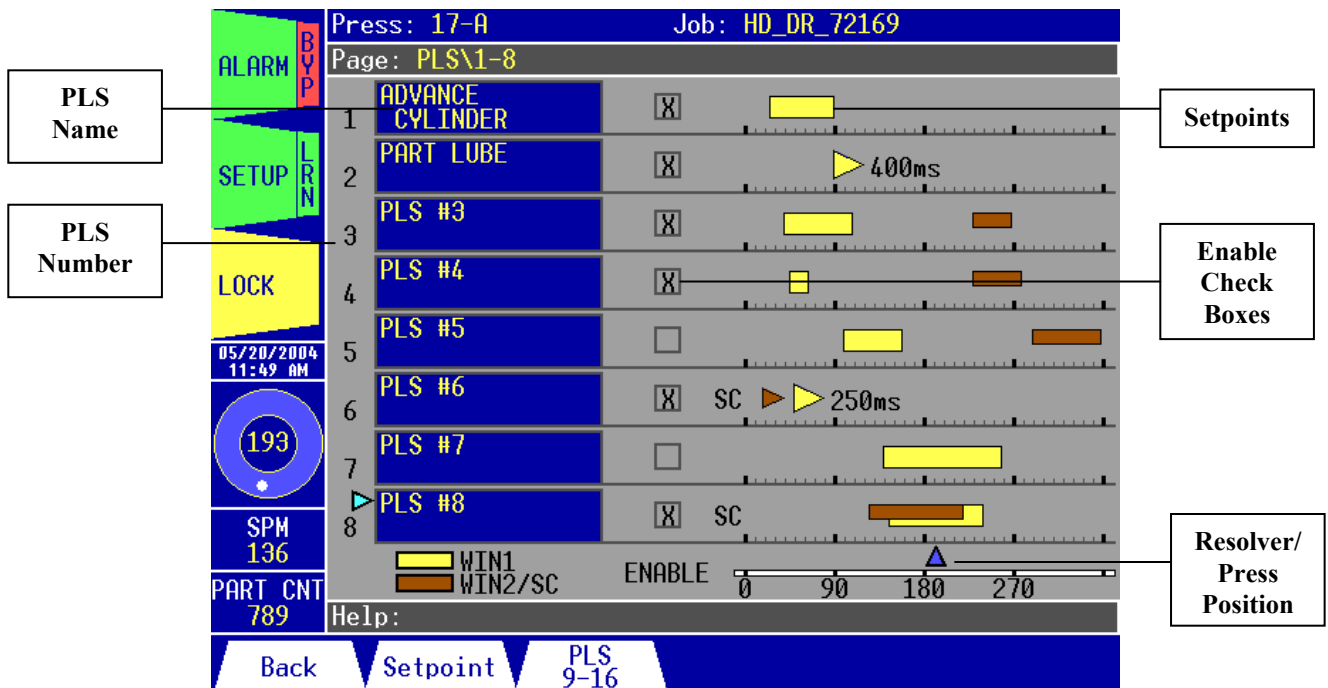
**Note:** You do not normally need to restore the default values. This feature should only be used if the balance and/or Cal numbers become unresponsive, or if you have been instructed to do so by Toledo Integrated Systems technical support personnel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Toggle the mode between **BALANCE** and **CAL#** and set the Cal# correction values.
  3. **F5 – Apply:** Apply the changes you have made, start the Auto-Zero process, set the Cal numbers, and restore the default balance/gain values.
- The *arrow keys* allow you to move the cursor to select the mode field, the **Auto-Zero/Set Cal#** field, the **Restore Defaults** field, and the Cal# correction fields.



**PLS\1-8:****Figure 3.14: The PLS\1-8 Page**

The PLS\1-8 Page allows you to:

1. View a quick and informative summary of PLS 1-8 settings. This summary includes the PLS names, which of the switches are enabled, which of the switches are using speed compensation, the window setpoints for each PLS, and the current resolver/press position. You can also tell if a switch's output type is set to Timed mode by looking at the setpoints. If the setpoints for a PLS are represented by a blue triangle with a value in milliseconds beside it, that switch's output type is set to Timed mode. If speed compensation is enabled for a particular switch, "SC" will appear to the left of the window setpoints graph and the actual on/off window degrees will be displayed graphically along with the window 1 setpoints. For example, by looking at Figure 3.14, you can tell that PLS #1 is enabled, that only the window 1 setpoints are set, and that the switch is not currently actuated. As another example, PLS #6 is enabled, speed compensation is being used, and the PLS is set up for Timed output type for a pulse of 250 milliseconds. We can also tell that the PLS is set to actuate at approximately 50° (WIN1), and that it is actually turning on at approximately 15° (WIN2/SC) due to speed compensation.
2. Access each of the switches' setpoint pages.

**Accessing the Setpoints for a PLS:**

Use the *arrow keys* to select the name for the PLS whose setpoints you wish to access. Hit the *F2 key*. For example, to adjust the setpoints for PLS #5, use the *arrow keys* to select PLS #5, then hit *F2* to go to the setpoints page.



**Note:** PLS that are dedicated to a specific function, such as shut height adjust or counterbalance adjust, do not have changeable setpoints therefore these switches are not selectable. If a PLS is configured for shut height or counterbalance control, the name of the shut height or counterbalance system is displayed in place of the PLS name.

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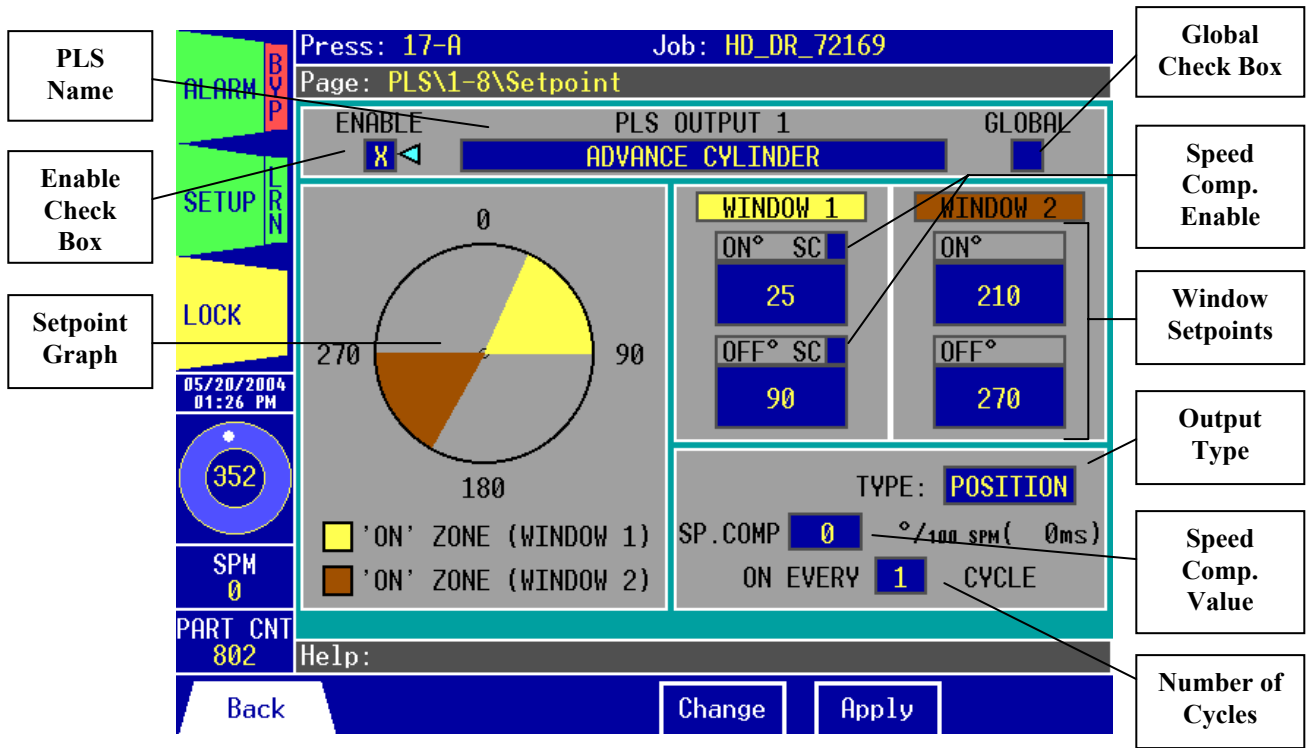
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Setpoint:** Go to the PLS\1-8\Setpoint page.
  3. **F3 – PLS 9-16:** Go to the PLS\9-16 page.
- The *arrow keys* allow you to move the cursor to select any of the PLS switches, from 1 to 8.

**Note:** The PLS\9-16 page is identical to the PLS\1-8 page, therefore it will not be covered in this manual.

**PLS\1-8\Setpoint:**

**Figure 3.15: The PLS\1-8\Setpoint Page**



The PLS\1-8\Setpoint Page allows you to:

1. Enable or disable the PLS. An “X” in the **ENABLE** check box indicates that the switch is enabled.
2. View a graphical representation of the switch’s window setpoints. Each PLS can have up to two setpoint windows, which allow the switch to activate up to two times each stroke. If the switch’s output type is set to Timed mode, this graph shows the starting angle that the switch is turned on.
3. Rename the PLS.
4. Configure the PLS as global (same for every job) or non-global (varies per job).
5. View and change the Degree On and Degree Off angles for window 1 and window 2 when output type is set to **POSITION**. The Degree On angle is the angle at which the PLS output is to turn on. Each window can have its own Degree On value. The Degree Off angle is the angle at which the PLS output is to turn off. Each window can have its own Degree Off value.
6. View and change the Degree On angle and Time On for window 1 when output type is set to **TIMED**. The Degree On angle is the angle at which the PLS output is to turn on. The Time On value is the length of time in milliseconds that the PLS output remains on after it is actuated.
7. View and change the output type for the switch. This setting determines how the PLS reacts when it is actuated.
8. Enable or disable speed compensation for the PLS and adjust the speed compensation value. This feature provides a compensating delay for external devices.
9. Change the number of cycles (i.e. frequency) that occur between PLS actuations.

### Enabling or Disabling the PLS:

Use the *arrow keys* to select the **ENABLE** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Renaming the PLS:

Use the *arrow keys* to select the PLS name field. Hit the *F4 key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The PLS name can be up to 30 characters long. Hit the *F5 key* to apply the new name or hit the *F4 key* to cancel.

### Configuring as a Global PLS:

By default, the PLS settings are saved and recalled according to each job. Checking the **GLOBAL** check box allows the PLS settings to apply for all jobs. This can be used to control devices whose settings are not job-related. Changing the settings of a global PLS will apply the changes to all jobs. Use the *arrow keys* to select the **GLOBAL** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** The Master-level password is required to enable/disable the **GLOBAL** check box. Also, once a PLS has been configured as global, the Master password will be required to access the PLS’s setpoint page.

### Changing the Window Setpoints:

The Window Setpoints determine the position that the PLS relays turn on and off during the cycle. To change the Window Setpoints, use the *arrow keys* to select the window setpoint field you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the setpoint angle by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the setpoint angle by 10°.

Notice that the setpoint graph changes as you increase or decrease the angle. The angle can be set from 0°-359°. You can disable a PLS setpoint window by setting both the **ON°** and **OFF°** fields for the window to 0°. When you have finished adjusting the angle, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Changing the PLS Output Type:

Use the *arrow keys* to select the **TYPE** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different type selections. You can choose from two settings:

- a. **POSITION** – When the switch is set to **POSITION**, its output will turn on at the angle specified in the **ON°** field and it will turn off at the angle specified in the **OFF°** field.
- b. **TIMED** – If the type is set to **TIMED**, the PLS is turned on at a specified angle and remains on for a specified time duration (also called the *dwell*). This setting is ideal for situations where you do not wish the PLS output to remain on if the press is stopped inside the switch’s window. Examples may include part lubrication spray or blow-off. When the type is set to **TIMED**, you should note four things: 1) The **WINDOW 1 ON°** field is the angle at which the output is activated. 2) The **WINDOW 1 OFF°** field’s title changes to “**TIME ON (ms)**” and now represents the duration time in milliseconds that the output remains on. The value can be set from 0 - 10,000 ms. 3) The **WINDOW 2 ON°** and **OFF°**





fields are set to 0° and are no longer selectable. Each PLS can have only one timed output per stroke. 4) The Window 1 setpoints on the setpoint graph change from a pie wedge shape to an arrow to indicate Timed output.

When you have selected the setting you want to use, hit the *F5* key to accept or hit the *F4* key to cancel.

### Changing the PLS Number of Cycles:

This setting controls how often the PLS is actuated. The number of cycles can be set from 1 - 255. When the number of cycles is set to 1 (default setting), the PLS is actuated on every cycle according to its setpoints. To change this setting, use the *arrow keys* to select the **ON EVERY \_\_\_ CYCLE** field. Hit the *F4* key.

- Use the *Up/Down arrow keys* to increase or decrease the number of cycles by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the number of cycles by 5.

When you have finished adjusting the number of cycles, hit the *F5* key to apply your changes or hit the *F4* key to cancel.

**Note:** When this feature is used with both windows enabled and the output type set to **POSITION**, the window with the lowest **DEGREE ON** setpoint will actuate first in the cycle.

### Using the Speed Compensation Feature:

Speed Compensation (speed comp) is a feature that can be used to activate the PLS earlier in the cycle automatically as press speed increases. This feature can be used with the PLS set to either Position or Timed output type.

#### When using Position output type:

- Either or both of the window 1 setpoints (**ON°** and/or **OFF°**) can use speed comp by enabling or disabling their respective speed comp check boxes.
- Window 2 now displays the Actual ON and OFF angle at which the PLS is actuating. As a result, you cannot have two separate windows for a speed compensated PLS.
- The window 2 setpoint fields are no longer selectable.
- The Actual ON and OFF angles are shown in the setpoint graph as a small pie wedge.

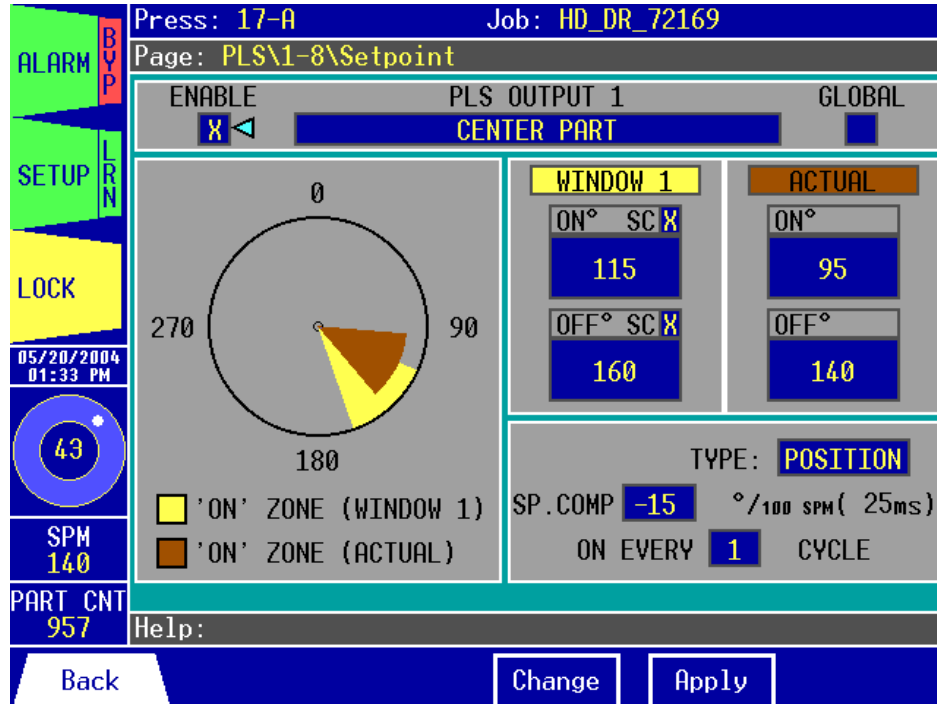
#### When using Timed output type:

- Only the window 1 **ON°** setpoint can use speed comp.
- Window 2 **ON°** now displays the Actual ON angle at which the PLS is actuating.
- The Actual ON angle is shown in the setpoint graph as a small arrow.



An example of a PLS configured for Position output type with speed comp can be seen in the following figure:

**Figure 3.16: Speed Compensated PLS**



To enable speed compensation for either the window 1 ON° or OFF°, use the *arrow keys* to select the appropriate “SC” check box (see Figure 3.15 and Figure 3.16). Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( X = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

To change the speed comp rate in milliseconds, select the **SP. COMP** value field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the speed comp value by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the speed comp value by 5°.

Note that the equivalent value in milliseconds is also shown as the value changes. The speed comp value can be set from 0° to -200°. When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

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Active keys for this page:

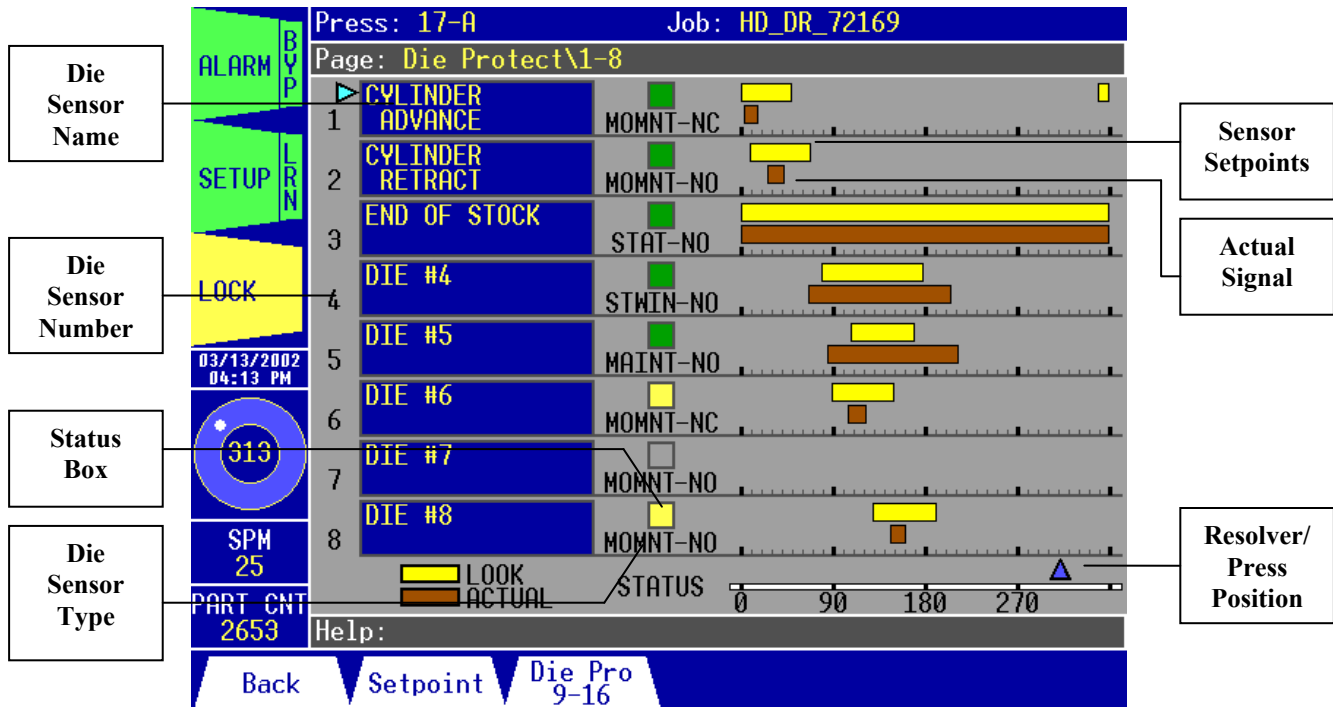
- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the PLS name, the global attribute of the switch, the On/Off setpoints for each window, the output type, the speed compensation settings, the number of cycles, and enable or disable the switch.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **ENABLE** check box, the name field, the **GLOBAL** check box, the **WINDOW 1 ON°** and **OFF°** fields, the **WINDOW 2 ON°** and **OFF°** fields, the **TYPE** field, the **SP. COMP** enable and value fields, and the **ON EVERY \_\_\_\_ CYCLE** field.

**Note:** The PLS\9-16\Setpoint page is identical to the PLS\1-8\Setpoint page, therefore it will not be covered in this manual.



**Die Protect\1-8:**

**Figure 3.17: The Die Protect\1-8 Page**



The Die Protect\1-8 Page allows you to:

1. View a quick and informative summary of the die sensor 1-8 settings. This summary includes the die sensor names, which of the sensors are enabled, the look window setpoints for each sensor, the actual sensor signal, and the current resolver/press position. You can also see each sensor’s type setting and alarm status. The sensor type can be momentary (**MOMNT-**), maintained (**MAINT-**), static (**STAT-**), or static with window (**STWIN-**). In addition, each sensor can be configured as normally-open (**NO**) or normally-closed (**NC**). The alarm status is indicated by the color of the status box. Green means the status is OK, red indicates an alarm, yellow indicates that the alarm is bypassed, and gray indicates that the die sensor is disabled. Looking at an example from Figure 3.17, you can tell that Die Sensor #2 is enabled, its alarm status is OK, it is configured as a momentary normally-open switch, and the last signal fell within the look window setpoints. As another example, Die Sensor #3 is enabled, its alarm status is OK, it is configured as a static normally-open switch, and the signal is indeed constant.
2. Access each of the die sensors’ setpoints pages.

**Accessing the Setpoints for a Die Sensor:**

Use the *arrow keys* to select the name for the die sensor whose setpoints you wish to access, then hit the *F2 key*. For example, to view or adjust the setpoints for die sensor #7, use the *arrow keys* to select **DIE #7**, then hit *F2* to go to the setpoints page.

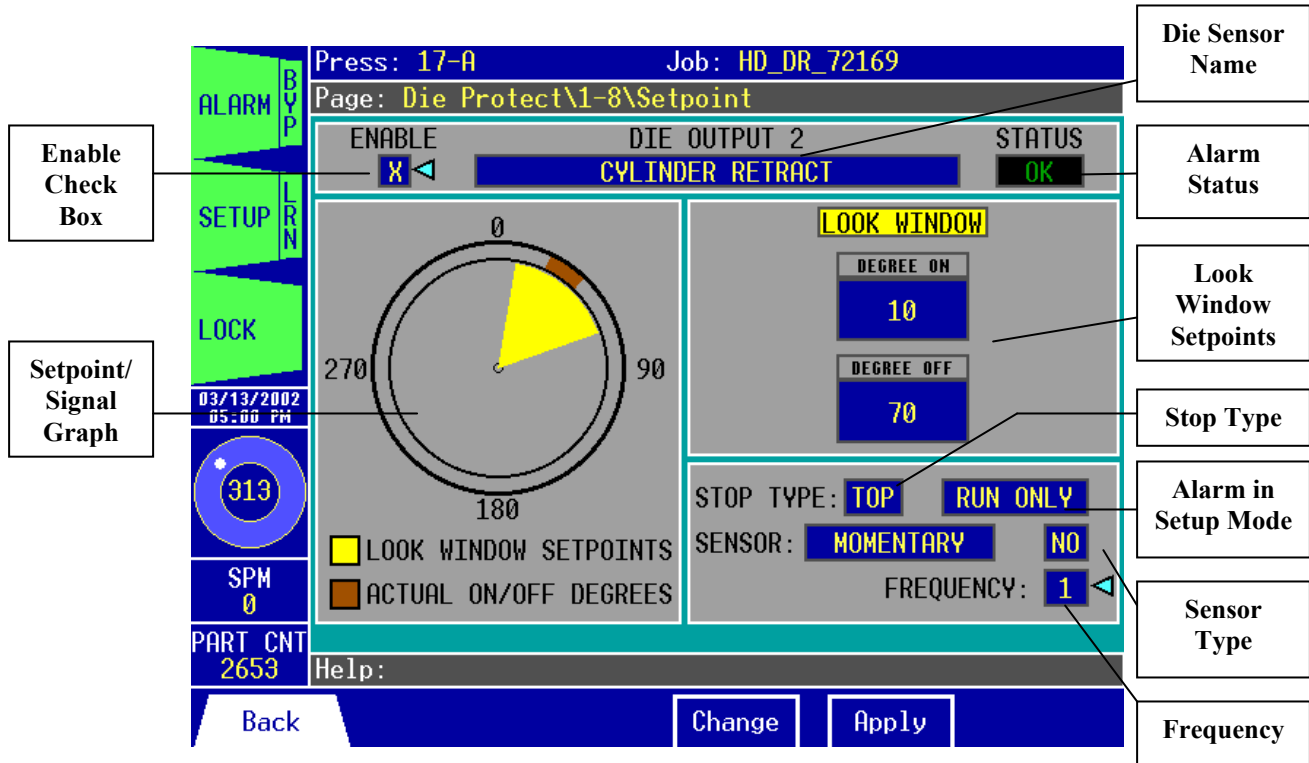
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Setpoint:** Go to the Die Protect\1-8\Setpoint page.
  3. **F3 – Die Protect 9-16:** Go to the Die Protect\9-16 page.
- The *arrow keys* allow you to move the cursor to select any of the die sensors, from 1 to 8.

**Note:** The Die Protect\9-16 page is identical to the Die Protect\1-8 page, therefore it will not be covered in this manual.

**Die Protect\1-8\Setpoint:**

**Figure 3.18: The Die Protect\1-8\Setpoint Page**



The Die Protect\1-8\Setpoint Page allows you to:

1. Enable or disable the die sensor. An “X” in the **ENABLE** check box indicates that the sensor is enabled.
2. View a graphical representation of the sensor’s look window setpoints. The graph also shows the actual on/off degrees of the sensor signal for the last stroke, allowing for easy setpoint setup.
3. Rename the die sensor.
4. View the alarm status for the sensor. If the status is normal, **OK** will be displayed. **ALARM** indicates that the signal violated the requirements set by the window setpoints, sensor type, and/or frequency. “---” indicates that the stop type is set to **BYP** (bypassed) or the sensor is disabled.
5. View and change the Look Window Degree On and Degree Off angles. The Degree On angle is the angle at which the Co-Pilot should begin looking for the die sensor signal. The Degree Off angle is the angle at which the Co-Pilot should stop looking for the die sensor signal.
6. View and change the Stop Type for the sensor. This setting determines how the press stops when an alarm occurs.
7. Configure how the Co-Pilot should react if there is an alarm situation for the sensor while in Setup Mode. You can choose if you want the Co-Pilot to ignore alarms for the sensor while in Setup Mode or stop the press if a violation occurs.



8. View and change the Sensor Type. This setting determines how you should set the look window and how the Co-Pilot handles the sensor signal. You should set this based on the actual sensor type and its application.
9. View and change the Frequency value for the sensor. This setting accounts for a certain amount of error or non-regularity in your sensor signal. Frequency refers to the maximum number of errors in the sensor signal that can occur before an alarm is generated. For example, say you are using a sensor for slug ejection and the sensor actuates when it detects that a slug is ejected. Sometimes a slug gets jammed and it does not eject on every stroke, but no harm is caused to the die unless 5 slugs or more are jammed in the die at one time. So it would be acceptable if a slug became jammed on the first stroke, then both slugs are ejected on the second stroke. So if we set the sensor type to **MOMENTARY** and the Frequency to 5, this means that 4 strokes can occur without the sensor seeing a slug ejected, but if a fifth stroke occurs without seeing an ejection, the press is stopped. **The Frequency method for slug ejection is not perfect, however.** It assumes that when the sensor detects a slug ejection, all previously jammed slugs were ejected as well. This is not always the case. If 4 slugs become jammed and only 1 is ejected on the fifth stroke, the sensor requirements are met but there are still 4 slugs jammed in the die. If 2 more slugs become jammed without any others being ejected, the die could be damaged.

### Enabling or Disabling a Die Sensor:

Use the *arrow keys* to select the **ENABLE** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Renaming the Die Sensor:

Use the *arrow keys* to select the die sensor name. Hit the *F4 key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The name can be up to 30 characters long. Hit the *F5 key* to apply the new name or hit the *F4 key* to cancel.

### Changing the Look Window Setpoints:

The Look Window Setpoints determine the position at which the Co-Pilot should look for a signal during the cycle. To change the Look Window Setpoints, use the *arrow keys* to select the look window setpoint you wish to change (**LOOK WINDOW DEGREE ON** or **DEGREE OFF** fields). Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the setpoint angle by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the setpoint angle by 10°.

Notice that the setpoint/signal graph changes as you increase or decrease the angle. This makes it easy to set the correct look window angles. The angle can be set from 0°-359°. If the Sensor Type is set to **STATIC**, the look window setpoints are not selectable. They will automatically be set to 0° for the Degree On and 359° for the Degree Off. When you have finished adjusting the angle, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



### Changing the Die Sensor Stop Type:

The Stop Type determines which shutdown relay should be opened when a die alarm situation occurs. To change the Stop Type, use the *arrow keys* to select the **STOP TYPE** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different stop type selections. You can choose from three settings:

- a. **TOP** – When the stop type is set to **TOP**, the press will complete its current stroke, return to its top dead center position, then stop.
- b. **EMR** – If the stop type is set to **EMR** (E-Stop), the press will stop immediately when the alarm occurs, regardless of the press position.
- c. **BYP** – When the stop type is set to **BYP** (bypassed), the press will not stop due to a sensor setpoint violation.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Alarm in Setup Mode Option:

The Alarm in Setup Mode option lets you choose whether a die protection violation should result in an alarm during Setup Mode. To change the Alarm in Setup Mode option, use the *arrow keys* to select the Alarm in Setup Mode field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the options. You can choose from two settings:

- a. **RUN ONLY** – When the Alarm in Setup Mode option is set to **RUN ONLY**, the Co-Pilot will ignore die alarms for the sensor while running in Setup Mode. Die alarms for the sensor are active in Run Mode only.
- b. **RUN/SETUP** – If set to **RUN/SETUP**, die alarms are active for the sensor while in Run Mode or Setup Mode.

If the stop type is set to **BYP** (bypassed), the Alarm in Setup Mode field will display “---”. When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Sensor Type:

The sensor type is determined by the **SENSOR** field and the **NO/NC** field. The **SENSOR** setting reflects the application of the sensor, while the **NO/NC** reflects the operating logic. To set up the sensor type, use the *arrow keys* to select the **SENSOR** field. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different selections. You can choose from four settings:

- a. **MOMENTARY** – Use this setting if the sensor signal must start inside the look window’s Degree On and Degree Off setpoints. The signal must be on *momentarily* inside of the window. In other words, after the signal turns on inside of the window, it may toggle on and off at any point without alarming.
- b. **MAINTAINED** – Use this setting if the sensor signal must start inside the look window’s Degree On and Degree Off setpoints and remain on until the end of the window. Once the signal turns on inside of the window, it must be *maintained* for the duration of the window.
- c. **STATIC with WINDOW** – Use this setting if the sensor signal must start before the look window’s Degree On angle and end after the Degree Off angle. During the look *window*, the signal must be *static*.





- d. **STATIC** – This setting applies if the sensor signal must remain on under normal operating conditions. Because the Degree On is always 0° and Degree Off is always 359°, an alarm is generated if a change in state occurs at any point of the stroke. For example, if a sensor is used to monitor if stock is present and it is always on until the stock runs out, you would set this sensor to **STATIC**.

When you have selected the setting you want to use, hit the *F5* key to accept or hit the *F4* key to cancel.

Next, use the *arrow* keys to select the **NO/NC** field. Hit the *F4* key. Use the *Up/Down arrow* keys to toggle through the different selections. You can choose from two settings:

- a. **NO** – Use for normal operation.
- b. **NC** – Use when reverse logic is required.

When you have selected the setting you want to use, hit the *F5* key to accept or hit the *F4* key to cancel.

### Changing the Frequency for a Die Sensor:

This value represents the number of consecutive alarms that can occur before the press is stopped. If you want the press to stop any time an alarm is generated, this value should be set to 1 (default). To change the frequency, use the *arrow* keys to select the **FREQUENCY** field. Hit the *F4* key.

- Use the *Up/Down arrow* keys to increase or decrease the frequency by 1, or
- Use the *Left/Right arrow* keys to increase or decrease the frequency by 5.

The frequency can be set from 1 to 30. When you have finished adjusting the frequency value, hit the *F5* key to apply your changes or hit the *F4* key to cancel.

---

Active keys for this page:

- The *function* keys allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Rename the die sensor, change the Look Window Degree On/Off angles, change the Stop Type, change the Alarm in Setup Mode option, change the Sensor Type, adjust the Frequency value, and enable or disable the sensor.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow* keys allow you to move the cursor to select the **ENABLE** check box, the name field, the **LOOK WINDOW DEGREE ON** and **OFF** fields, the **STOP TYPE** field, the Alarm in Setup Mode field, the **SENSOR** and **NO/NC** fields, and the **FREQUENCY** field.

**Note:** The Die Protect\9-16\Setpoint page is identical to the Die Protect\1-8\Setpoint page, therefore it will not be covered in this manual.



**Press Control\Motion Detect\Data:****Figure 3.19: The Press Control\Motion Detect\Data Page**

ENABLE	MOTION FUNCTIONS	VALUE	STATUS
<input checked="" type="checkbox"/>	Start Time Limit (ms)	300	OK
	Start Time (ms)	128	
	Start Angle (deg)	36	
<input checked="" type="checkbox"/>	SPM Limit		
	Max SPM Limit	140	OK
	Min SPM Limit	20	OK
<input checked="" type="checkbox"/>	SPM Motion Relay		
<input checked="" type="checkbox"/>	Drift Detection		OK
	All Stop Types	E-STOP	

Callouts on the right side of the table:

- Start Time Section (points to Start Time Limit, Start Time, and Start Angle)
- SPM Section (points to SPM Limit, Max SPM Limit, and Min SPM Limit)
- Drift Detect Section (points to Drift Detection)

Page Information: Press: 17-A, Job: HD\_DR\_72169, Page: Press Control\Motion Detect\Data, Date: 03/14/2002, Time: 08:24 AM, SPM: 0, PART CNT: 2653, Help: [Back] [Brake Monitor] [Control Status] [Change] [Apply] [Press CAMs]

The Press Control\Motion Detect\Data Page allows you to:

1. Enable or disable the start time monitoring feature. Note that start time is the time required to detect motion after the DSV (Dual Safety Valve) is engaged. An “X” in the **ENABLE** check box indicates that the start time monitoring feature is enabled. If this check box is cleared, the start time alarm is disabled.
2. View and change the Start Time Limit based on the press’s normal start time.
3. View the press’s last Start Time and Start Angle.
4. View the Start Time alarm status. The status can be **OK** (normal operation), **ALARM** (start time has exceeded the start time limit), or “---“ (start time monitoring feature is disabled).
5. Enable or disable the Strokes Per Minute (SPM) monitoring. An “X” in the **ENABLE** check box indicates that the SPM monitoring feature is enabled. If this check box is cleared, the maximum and minimum SPM alarms are disabled.
6. View and change the Maximum SPM Limit and the Minimum SPM Limit based on the press’s normal operating speed.
7. View the Min SPM alarm status and the Max SPM alarm status. The status for either min or max SPM can be **OK** (normal operation), **ALARM** (SPM is either greater than the max SPM limit or below the min SPM limit), or “---“ (SPM monitoring feature is disabled).
8. Enable or disable the SPM Motion Relay.
9. Enable or disable the Drift Detection feature. Drift detection monitors the resolver angle and generates an alarm if the angle changes without the DSV being actuated.



10. View the Drift Detection alarm status. The status can be **OK** (normal operation), **ALARM** (resolver angle has drifted), or “---“ (drift detection feature is disabled).
11. Access the Brake Monitor, Control Status, and Press CAMs pages.  
*Note:* You will need the Master level password to access the Press CAMs page.

### Enabling or Disabling the Start Time Monitoring Feature:

The Start Time Monitoring feature allows the Co-Pilot to keep track of how long it takes the press to start moving after the DSV is engaged. Use the *arrow keys* to select the **ENABLE** check box for the Start Time section. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “**X**” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Start Time Limit:

If the press takes longer than the Start Time Limit value to start moving after the DSV is engaged, an alarm will be generated. Typically, you’ll want to set this value slightly higher than your normal operating start time. To change the start time limit, use the *arrow keys* to select the **Start Time Limit** value field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1 ms, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 100 ms.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Enabling or Disabling the SPM Monitoring Feature:

The SPM Monitoring feature is used to monitor the press’s speed and generate an alarm if the press violates the user-defined minimum and maximum SPM limits. To enable or disable the SPM Monitoring feature, use the *arrow keys* to select the **ENABLE** check box for the SPM Limit. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “**X**” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Maximum SPM Limit:

If the press speed exceeds the Maximum SPM Limit, an alarm will be generated and the press will stop (if the SPM Monitoring feature is enabled). Typically, you’ll want to set this value slightly higher than your normal operating speed. To change the Max SPM Limit, use the *arrow keys* to select the **Max SPM Limit** value field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1 SPM, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10 SPM.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



### Changing the Minimum SPM Limit:

If the press speed falls below the Minimum SPM Limit, an alarm will be generated and the press will stop (if the SPM Monitoring feature is enabled). Typically, you'll want to set this value a little less than your normal operating speed. To change the Min SPM Limit, use the *arrow keys* to select the **Min SPM Limit** value field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1 SPM, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10 SPM.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Enabling or Disabling the SPM Motion Relay:

When the SPM Motion Relay is enabled, the SPM motion relay on the Relay Board will actuate when the press speed is between the Min and Max SPM Limit. Use the *arrow keys* to select the **ENABLE** check box for the SPM Motion Relay. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Enabling or Disabling the Drift Detection Feature:

When the Drift Detection feature is enabled, an alarm will be generated if the press moves without the DSV being actuated. Use the *arrow keys* to select the **ENABLE** check box for the Drift Detect section. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Brake Monitor:** Go to the Press Control\Brake Monitor\Data page.
  3. **F3 – Control Status:** Go to the Press Control\Control Status page.
  4. **F4 – Change:** Adjust the Start Time Limit, Max SPM Limit, Min SPM Limit, and enable/disable the SPM Motion Relay and the Start Time, SPM, and Drift Detection monitoring features.
  5. **F5 – Apply:** Apply the changes you have made.
  6. **F6 – Press CAMs:** Go to the Press Control\Press CAMs page.
- The *arrow keys* allow you to move the cursor to select the **Start Time Limit** field, **Max SPM Limit** field, **Min SPM Limit** field, and the **ENABLE** check boxes for the SPM Motion Relay, Start Time, SPM, and Drift Detection monitoring features.



**Press Control\Brake Monitor\Data:****Figure 3.20: The Press Control\Brake Monitor\Data Page**

ENABLE	BRAKE FUNCTIONS	VALUE	STATUS
<input checked="" type="checkbox"/>	Brake Monitor		OK
	Stop Time Limit (ms)	800	
	Stop Time (ms)	602	
	Stop Angle (deg)	68	
	Stop Type	E-STOP	

Press: 17-A      Job: HD\_DR\_72169  
 Page: Press Control\Brake Monitor\Data

03/14/2002 09:27 AM  
 355  
 SPM 63  
 PART CNT 2671  
 Help:

Back   Stop Test   Change   Apply

The Press Control\Brake Monitor\Data page allows you to:

1. View the Brake Monitor alarm status. An **OK** status indicates that the brake is functioning normally. An **ALARM** status indicates that the Stop Time Limit has been exceeded.
2. Set the Stop Time Limit in milliseconds for the press.
3. View the Stop Time and Stop Angle results from the last time the press was stopped. The stop time and stop angle are the time and number of degrees that it took for the press to stop moving after the DSV was disengaged.

### Changing the Stop Time Limit:

If the press takes longer than the Stop Time Limit value to stop moving after the DSV is disengaged, an alarm will be generated. In general, you want to add 20% to the press's normal stopping time if the brakes on the press are new or 10% if the brakes are old. To change the Stop Time Limit, use the *arrow keys* to select the **Stop Time Limit** value field. Hit the *F4* key.

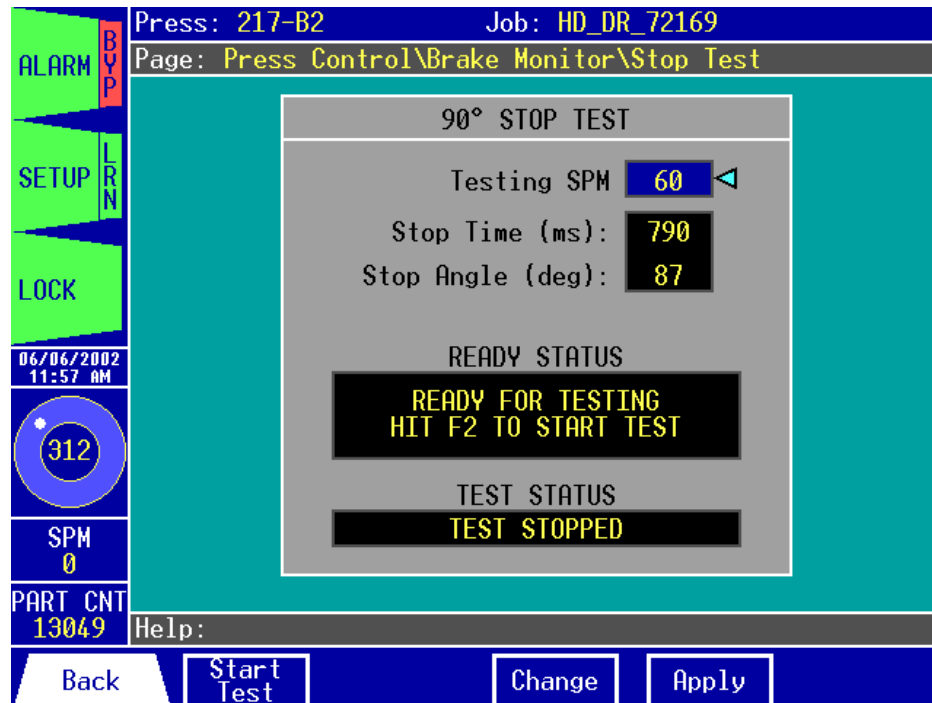
- Use the *Up/Down arrow keys* to increase or decrease the limit by 1 ms, or
- Use the *Left/Right arrow keys* to increase or decrease the limit by 100 ms.

When you have finished adjusting the value, hit the *F5* key to apply your changes or hit the *F4* key to cancel.



Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Stop Test:** Go to the Press Control\Brake Monitor\Stop Test page.
  3. **F4 – Change:** Change the Stop Time Limit.
  4. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Stop Time Limit** field.

**Press Control\Brake Monitor\Stop Test:****Figure 3.21: The Press Control\Brake Monitor\Stop Test Page**

A 90° Stop Test is a test that provides you with valuable information that you need in order to calculate the minimum distance away from the press's pinch point that operator safe guard equipment should be installed. The test is performed at the critical angle of 90°, the point at which the press is in its downward motion, halfway between top dead center (0°) and bottom dead center (180°).

The Press Control\Brake Monitor\Stop Test page allows you to:

1. Perform the 90° Stop Test and view the results.
2. View and change the Testing SPM. The testing SPM is the speed that the press must reach by 90° before the test will start.

**IMPORTANT:**

The 90° Stop Test must be performed and the safety distance must be recalculated every time the Stop Time Limit is changed.



### Changing the Testing SPM:

The Testing SPM value is the speed at which the press must be traveling when the resolver angle reaches 90°. If the press speed has not reached this speed when the resolver angle reaches 90°, the test will not be performed. To change the Testing SPM value, hit the *F4* key with the cursor at the **Testing SPM** field.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1 SPM, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10 SPM.

When you have finished adjusting the value, hit the *F5* key to apply your changes or hit the *F4* key to cancel.

### Performing the 90° Stop Test:

1. Set the Testing SPM.
2. Load the heaviest die into the press. If the press has a counterbalance, adjust it for ram weight.
3. Run the press continuously. If the press has a variable speed drive, set it to the maximum normal running speed.
4. If the ready status indicates that the test is ready, hit *F2* to start the test. The current test run status on the screen will change from “**TEST STOPPED**” to “**TEST RUNNING...**” If the ready status indicates that the test is not ready, you will need to open the Alarm window to reset the alarms. Afterwards, return to this page to continue the stop test.
5. When the press angle reaches 90° and the Testing SPM requirement is met, the E-Stop relay will open and the press will stop.
6. The display will update to give you the Stop Time in milliseconds and the Stop Angle in degrees.

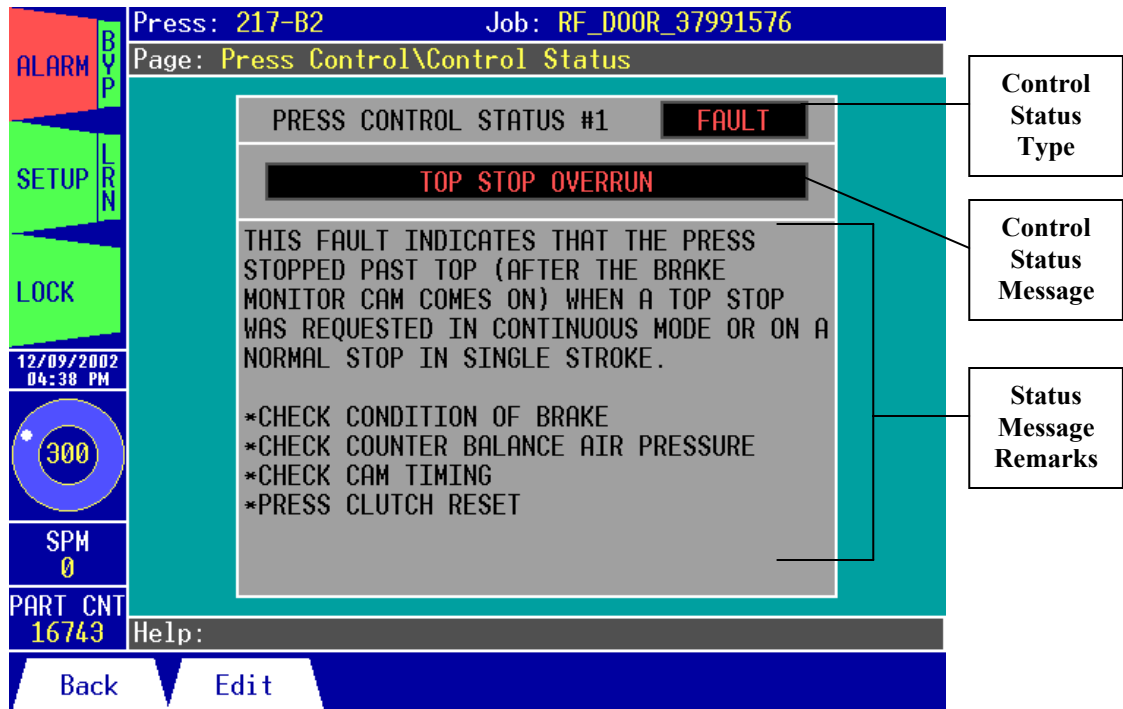
---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Start Test:** Start and stop the test.
  3. **F4 – Change:** Change the Testing SPM.
  4. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* are not used on this page.





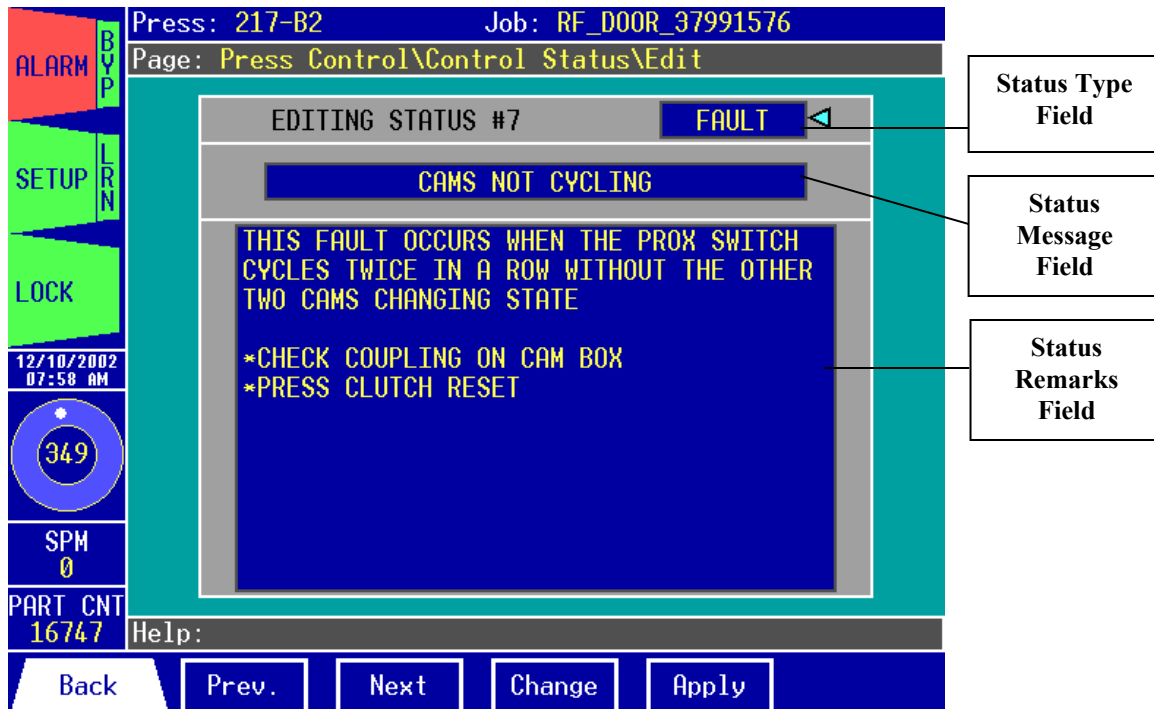
**Press Control\Control Status:****Figure 3.22: The Press Control\Control Status Page**

The Press Control\Control Status page allows you to:

1. View the current status of a press control, if one is connected to the Co-Pilot. This includes the press control status number, the status type, the status message, and the remarks for the status message.
2. Access the Press Control\Control Status\Edit page.

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Edit:** Go to the Press Control\Control Status\Edit page.
- The *arrow keys* are not used on this page.

**Press Control\Control Status\Edit:****Figure 3.23: The Press Control\Control Status\Edit Page**

The Press Control\Control Status\Edit page allows you to:

1. Cycle through each of the press control status messages (64 total messages).
2. Change the status type, rename the status message and enter remarks for each message.  
Remarks are any descriptions or notes related to the status message.

**Finding a Control Status Message:**

Each screen displays one control status message. The first status message displayed is #0. To view other status messages, use the *F3* key to advance to the next status message or use the *F2* key to go back to the previous status message. Continue hitting the *F2* or *F3* key until you see the status message you want.

**Changing the Status Type for a Control Status Message:**

Use the *arrow* keys to select the status type field. Hit the *F4* key. Use the *Up/Down* arrow keys to toggle through the different selections. You can choose from five settings:

- a. **N/A** – This status type implies that its associated status message indicates nothing about the press's status.
- b. **FAULT** – This implies that the status message indicates a fault for the press control's processor A and/or B.



- c. **FAULT (B)** – The status message indicates a fault for the press control’s processor B only.
- d. **PROMPT** – The status message indicates a situation that is preventing the press from running. The situation must be corrected in order for the press to cycle.
- e. **OK** – The status message indicates no press control error.

When you have selected the setting you want to use, hit the *F5* key to accept or hit the *F4* key to cancel.

**Note:** Setting a status message’s type to **FAULT**, **FAULT (B)**, or **PROMPT** will result in an alarm when the particular status message event occurs.

### Renaming a Control Status Message:

Use the *arrow* keys to select the status message field. Hit the *F4* key. Type the new message as described in the **Entering/Editing Text** section in chapter 1. The status message can be up to 36 characters long. Hit the *F5* key to apply the new message name or hit the *F4* key to cancel.

### Entering/Editing Remarks for a Control Status Message:

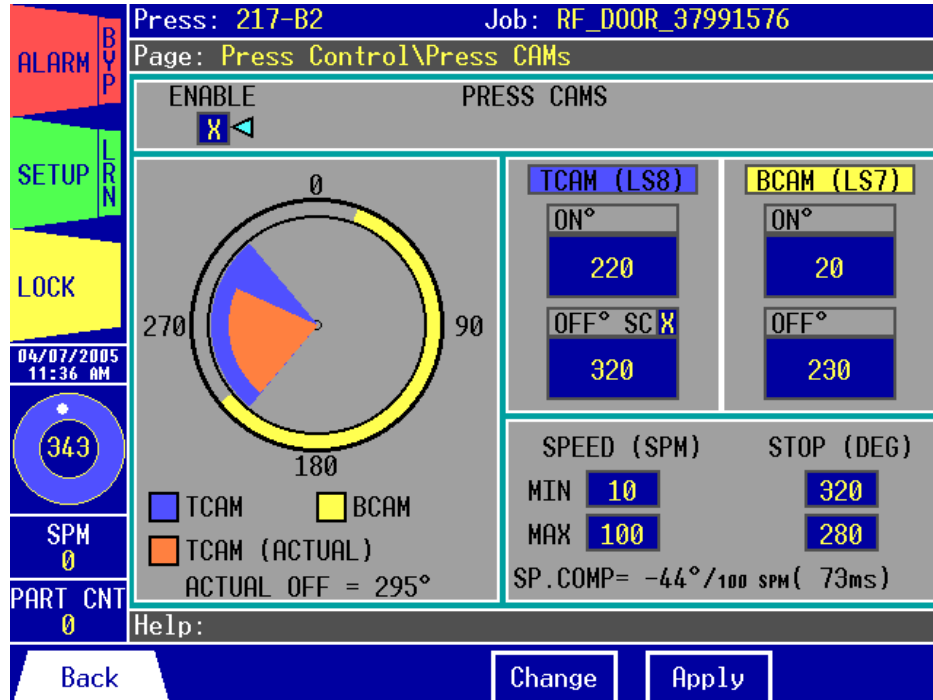
Use the *arrow* keys to select the remarks field of the status message. Hit the *F4* key to begin entering the remarks. As you enter text, you will reach the end of the line in the “**Change to:**” field. Keep typing and the field will empty to allow you to enter more text. Notice the left arrow at the far right end of the “**Change to:**” field. This indicates that there is more text on the previous line. You may enter up to 400 characters for each status message’s remarks. Hit the *F5* key when done to apply the changes or hit the *F4* key to abort the changes.

---

Active keys for this page:

- The *function* keys allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Prev.:** View the previous control status message.
  3. **F3 – Next:** View the next control status message.
  4. **F4 – Change:** Change the status type, rename the control status message, or change the remarks for the control status message.
  5. **F5 – Apply:** Save the changes you have made.
- The *arrow* keys allow you to move the cursor to select the control status type field, the control status message, or the control status message remarks field.



Press Control\Press CAMs:**Figure 3.24: The Press Control\Press CAMs Page**

The Press Control\Press CAMs page allows you to:

1. Enable or disable the Press CAMs. When the Press CAMs are enabled, PLS 8 on the relay board is used to control the TCAM and PLS 7 is used to control the BCAM.
2. Change the Degree On and Degree Off windows for the TCAM and BCAM.
3. Enable or disable speed compensation for the TCAM's Degree Off setpoint.
4. Adjust the minimum and maximum speed and stop angle for the speed compensation.
5. View a graphical diagram of the TCAM and BCAM windows, as well as the actual TCAM window when speed compensation is used.

### Understanding the Press CAMs Diagram:

The TCAM and BCAM windows are displayed in a graphical diagram as a visual tool to aid in setup. The circle in the diagram depicts the press stroke with the top of the stroke at 0° and the bottom of the stroke at 180°.

The BCAM is on during the down-stroke. It should turn on near the top of the stroke (typically, 10°) and it should turn off near the bottom of the stroke (typically, when or after the TCAM turns on). The BCAM window is represented as a yellow arc along the outside of the circle.

The TCAM is on during the up-stroke. It should turn on near the bottom of stroke (typically, at 200° when or before the BCAM turns off) and it should turn off at the angle that allows the press to stop at the top of the stroke. The TCAM Off° can vary widely and should be adjusted for each individual press. The TCAM window is represented as a large blue pie wedge inside of the circle.



Speed compensation can be used to obtain a more precise stopping angle if needed. When speed compensation is used, the Actual Off angle is displayed under the diagram and the Actual TCAM window is represented as a small brown pie wedge inside of the circle.

### Enabling or Disabling the Press CAMs:

Use the *arrow keys* to select the **ENABLE** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Press CAM Window Setpoints:

Use the *arrow keys* to select the **ON°** or **OFF°** value field for the CAM that you wish to adjust. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10°.

Notice that the corresponding window on the graph changes as you adjust the value. When you have finished adjusting, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

**Note:** You cannot select the TCAM’s Off° field when speed compensation is enabled. The Off° will be determined by the **Minimum Stop** angle.

### Enabling or Disabling TCAM Speed Compensation:

Use the *arrow keys* to select the **TCAM OFF° SC** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel. When enabled, the off angle for the TCAM will adjust to open the TCAM control relay earlier in the stroke depending on the minimum and maximum speed and stop angle settings (these are explained in the next section).

### Adjusting the TCAM Speed Compensation :

The minimum and maximum speed and stop angle settings determine the speed compensation value for the TCAM’s Off angle. The **Minimum Stop** is the angle at which the TCAM control relay must turn off in order to stop the press at the top position when it is traveling at the **Minimum Speed**. The **Maximum Stop** is the angle at which the TCAM control relay must turn off in order to stop the press at the top position when it is traveling at the **Maximum Speed**. The following formula is used to determine the speed compensation value:

$$\text{Speed Comp } (\%100\text{SPM}) = \frac{(\text{Min Stop}^\circ - \text{Max Stop}^\circ)}{(\text{Max Stop Speed} - \text{Min Stop Speed})} \times 100$$



To adjust the speed compensation, use the *arrow keys* to select the field for the speed compensation setting that you wish to change. Hit the *F4* key.

- Use the *Up/Down arrow keys* to increase or decrease the **Minimum** or **Maximum Stop** angle by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the **Minimum** or **Maximum Stop** angle by 10°.
- Use the *Up/Down arrow keys* to increase or decrease the **Minimum** or **Maximum Speed** by 1 SPM, or
- Use the *Left/Right arrow keys* to increase or decrease the **Minimum** or **Maximum Speed** by 10 SPM.

Notice that the speed compensation value changes as you adjust the settings. Hit the *F5* key to accept or hit the *F4* key to cancel.

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the **ENABLE** and Speed Compensation (SC) check boxes, change the TCAM and BCAM window setpoints, and change the **Minimum** and **Maximum Stop** and **Speed** settings for speed compensation.
  5. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **ENABLE** check box, the TCAM and BCAM **ON**° and **OFF**° fields, the TCAM's Speed Compensation (SC) check box, and the **Minimum** and **Maximum Stop** and **Speed** fields.



**Counter:****Figure 3.25: The Counter Page**

ENABLE	PART/STROKE	COUNT IN SETUP	COUNT IN ALARM	COUNTER	VALUE
<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	STROKE	8476
<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	PART	13041
<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	GOOD PART	13008

Press: 217-B2      Job: HD\_DR\_72169  
 Page: Counter  
 06/05/2002 11:05 AM  
 321  
 SPM 0  
 PART CNT 13041  
 Help:

Back    Batch Counter    Prevent Maint    Change    Apply

The Counter page allows you to:

1. Enable or disable the Stroke, Part, or Good Part counters.
2. Change the Part/Stroke value for the Part and Good Part counters. Part/Stroke for the Stroke counter is always 1. Also note that only Part/Stroke for the Part counter is selectable. This is because the Part and Good Part counters should always increment by the same number. Therefore, if you change the Part/Stroke value for the Part counter, the Good Part counter's Part/Stroke value changes also.
3. Enable or disable the Count in Setup option for the Part and Good Part counters. Count in Setup is always enabled for the Stroke counter.
4. View and reset the counter values.

**Note:** You cannot change the status of the **COUNT IN ALARM** check boxes. Count in Alarm is always enabled for the Stroke and Part counters, and disabled for the Good Part counter.

### **Enabling or Disabling the Stroke, Part, or Good Part Counters:**

Use the *arrow keys* to select the **ENABLE** check box of the counter that you wish to enable or disable. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** The Master-level password is required to enable or disable the stroke counter.



### Changing the Part per Stroke for the Part and Good Part Counters:

The Part per Stroke value is the number of parts that are produced with each press cycle. To change the Part per Stroke value, use the *arrow keys* to select the **PART/STROKE** value field for the Part counter. Hit the *F4 key*. Use the *Up/Down arrow keys* to increase or decrease the value by 1. Notice that the Part/Stroke value for the Good Part counter changes also. When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Enabling or Disabling Count in Setup for the Part and Good Part Counters:

When the Count in Setup feature is enabled, the counter will advance when the press is cycling in Setup Mode. Use the *arrow keys* to select the **COUNT IN SETUP** check box for the counter that you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( X = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Clearing the Stroke, Part, and Good Part Counters:

Use the *arrow keys* to select the **VALUE** field for the counter that you wish to clear. Hit the *F5 key*. You will be prompted to confirm the clear. Hit the *F5 key* again to clear the counter or hit the *F4 key* to cancel.

**Note:** The Master-level password is required to clear the stroke counter.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Batch Counter:** Go to the Counter\Batch Counter page.
  3. **F3 – Prevent Maint:** Go to the Counter\Preventative Maintenance page.
  4. **F4 – Change:** Change the **ENABLE** check boxes for each counter, change the Part/Stroke value for the Part and Good Part counters, and change the **COUNT IN SETUP** check boxes for the Part and Good Part counters.
  5. **F5 – Apply:** Apply the changes you have made and reset the Value for each counter to zero.
- The *arrow keys* allow you to move the cursor to select the **ENABLE** check boxes for each counter, the **PART/STROKE** field for the Part and Good Part counters, the **COUNT IN SETUP** check boxes for the Part and Good Part counters, and the **VALUE** fields for each counter.





Counter\Batch Counter:**Figure 3.26: The Counter\Batch Counter Page**

Press: 217-B2		Job: RF_DOOR_37991576	
Page: Counter\Batch Counter			
Batch Counter 1	Status	Batch Counter 2	Status
BATCH #1	RUN	BATCH #2	RUN
Enable	<input checked="" type="checkbox"/>	Enable	<input checked="" type="checkbox"/>
Top Stop	<input type="checkbox"/>	Top Stop	<input checked="" type="checkbox"/>
Control (LS6)	PULSE	Control (LS5)	NONE
Pulse (ms)	250	Pulse (ms)	---
Advance By	PART	Advance By	STROKE
Limit	100	Limit	2000
Current	8	Current	0

02/15/2005 09:54 AM

SPM 0

PART CNT 8

Help:

Back Change Apply

The Counter\Batch Counter page allows you to:

1. Enable or disable each of the batch counters.
2. Choose the method that advances each of the batch counters.
3. Enable or disable Top Stop for each counter.
4. Choose how each batch counter affects its corresponding PLS relay. Counter #1 controls PLS 6 relay and counter #2 controls PLS 5 relay. When one of the batch counters reaches its limit, it triggers its corresponding relay according to the settings for the **Top Stop** and **Control** fields.
5. Set the pulse length for the batch counter's control relay, if the **Control** method is set to **PULSE**.
6. Rename each batch counter.
7. Set the preset limit for each batch counter.
8. View the status of each batch counter. "RUN" means that the counter is counting and the limit has not yet been reached. "FULL" means that the count has met or exceeded the preset limit. "---" indicates that the batch counter has been disabled.
9. View, change, and reset the batch counter's current value.

**Renaming the Batch Counters:**

Use the *arrow keys* to select the **Batch Counter** name field for the counter you wish to change. Hit the *F4 key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The name can be up to 15 characters long. Hit the *F5 key* to apply the new name or hit the *F4 key* to cancel.

**Enabling or Disabling the Batch Counters:**

Use the *arrow keys* to select the **Enable** check box for the batch counter that you wish to enable or disable. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box (X = Enabled). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Enabling or Disabling Top Stop for the Batch Counters:**

When the Top Stop feature is enabled for a batch counter, the press will stop when the batch counter’s limit is reached. Use the *arrow keys* to select the **Top Stop** check box for the batch counter that you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box (X = Enabled). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Changing the Control Method for the Batch Counters:**

The Control Method determines the action that the batch counter’s PLS relay should take when the batch counter’s limit is reached. Use the *arrow keys* to select the **Control** field for the batch counter you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different selections. You can choose from three settings:

- a. **NONE** – Reaching the batch limit will have no effect on its corresponding PLS relay. The relay can be configured for other purposes via the PLS\Setpoint pages.
- b. **TOGGLE** – The relay’s output state will be reversed. If the relay was closed when the limit is reached, it will be opened, and vice versa.
- c. **PULSE** – The relay will be actuated for an adjustable amount of time when the batch counter’s limit is reached.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Changing the Pulse Length for the Batch Counters:**

If the batch counter’s control method is set to **PULSE**, you can adjust the length of time that the control relay remains closed after the limit is reached. The pulse length can be adjusted from 0ms to 10,000ms. Use the *arrow keys* to select the **PULSE** value field for the batch counter you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the pulse length by 1ms, or
- Use the *Left/Right arrow keys* to increase or decrease the pulse length by 100ms, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the pulse length by 1,000ms (1 second).

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



### Changing the Advance Method for the Batch Counters:

The Advance Method determines which counter should be used to advance the batch counter. Use the *arrow keys* to select the **Advance By** field for the batch counter you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different selections. You can choose from three settings:

- a. **STROKE** - The batch counter is advanced by the stroke counter.
- b. **PART** – The batch counter is advanced by the part counter.
- c. **GOOD PART** – The batch counter is advanced by the good part counter.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Changing the Limit for the Batch Counters:

The Batch Counter Limit is the value at which the batch count should terminate. To change the limit, use the *arrow keys* to select the **Limit** value field for the batch counter you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the limit by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the limit by 100, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the limit by 1,000.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Clearing and Adjusting the Batch Counters:

Use the *arrow keys* to select the **Current** field for the batch counter that you wish to clear or adjust.

- To clear the batch counter, hit the *F5 key*. You will be prompted to confirm the clear. Hit the *F5 key* again to clear the counter or hit the *F4 key* to cancel.
- To adjust the batch counter's current value, hit the *F4 key*. Use the *arrow keys* to increase or decrease the current value. When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the **Enable** check boxes for each counter, the advance method, the **Top Stop** check boxes, the control method for the PLS relays, the control relay's pulse length, the batch counters' names, the count limits, and the current count values.
  3. **F5 – Apply:** Apply the changes you have made and reset the batch counter values to zero.
- The *arrow keys* allow you to move the cursor to select each batch counter's **Enable** check box, the **Advance By** field, the **Top Stop** check box, the **Control** field, the **Pulse** field, the **Batch Counter** name field, the counter **Limit** field, and the batch counter **Current** count field.



**Servo Feed (optional):****Figure 3.27: The Servo Feed Page**

ALARM SETUP LOCK 01/31/2005 03:24 PM 340 SPM 0 PART CNT 4	Press: 217-B2	Job: RF_DOOR_37991576	
	Page: Servo Feed		
	Enable	Servo Feed Model	Status
	<input checked="" type="checkbox"/>	DALLAS	OK
	Feed Length (in)	Target	Actual
		2.125	2.125
	Rate (%)	90%	90%
	Accel (%)	70%	70%
	Decel (%)	70%	70%
	Help:		
Back	Change	Apply	

The Servo Feed page allows you to:

1. Enable or disable the Servo Feed Interface.
2. Change the feed length.
3. Change the feed rate.
4. Change the acceleration/deceleration rate.
5. View the status of the servo feed interface. The status will depend of the model of servo feed. If the status displays “SFI FAULT” communication between the Co-Pilot and the servo feed has been lost.

**Enabling or Disabling the Servo Feed Interface:**

Use the *arrow keys* to select the **Enable** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( X = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Changing the Feed Length:**

Use the *arrow keys* to select the **Feed Length** field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the feed length by one one-thousandth (0.001) of an inch, or
- Use the *Left/Right arrow keys* to increase or decrease the feed length by one tenth (0.100) of an inch, or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the feed length by one (1.000) inch.

Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Changing the Feed Rate:**

Use the *arrow keys* to select the **Rate** field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the feed rate by one percent (1%), or
- Use the *Left/Right arrow keys* to increase or decrease the feed rate by ten percent (10%).

Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** For some types of servo feeds, the feed rate may be represented as units instead of a percentage (i.e. inches per second).

**Changing the Feed Acceleration/Deceleration Rate:**

Use the *arrow keys* to select the **Accel** or **Decel** field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the acceleration/deceleration rate by one percent (1%), or
- Use the *Left/Right arrow keys* to increase or decrease the acceleration/deceleration rate by ten percent (10%).

Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** For some types of servo feeds, the acceleration and deceleration rate are not adjustable. In these cases, the value would be shown as “N/A” and the fields would not be selectable.

**Note:** For some types of servo feeds, the acceleration and deceleration rates cannot be individually adjusted. If this is the case, both **Accel** and **Decel** fields may change simultaneously.

**Note:** For some types of servo feeds, the acceleration and/or deceleration rate may be represented as units instead of a percentage (i.e. inches per second<sup>2</sup>).

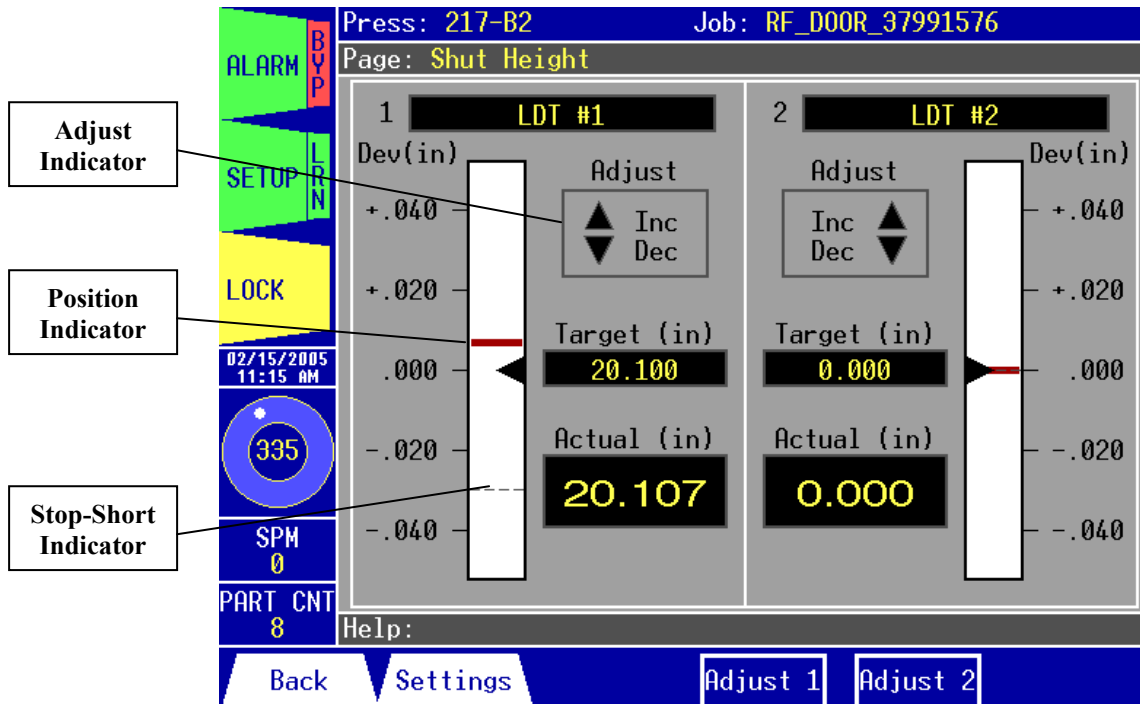
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the **Enable** check box, the feed length, the feed rate, and the feed acceleration/deceleration rate.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Enable** check box, the **Feed Length** field, the **Rate** field, the **Accel** field, and the **Decel** field.



**Shut Height (optional):**

**Figure 3.28: The Shut-Height Page**



The Shut Height page allows you to:

1. Access the Shut Height\Settings page.
2. Adjust the shut height for LDT #1 and/or LDT #2.
3. View shut height information including the name of the LDT, the target value, and the actual value. You can also view a graphical representation of the actual shut height value in relation to the target value.

**Adjusting the Shut Height:**

To automatically adjust the shut height, the following conditions must be met:

1. The Linear Displacement Transducer (LDT) must be correctly wired to the shut height port on the Co-Pilot I/O board. If two LDTs are to be used, both must be connected.
2. The circuitry to increase and decrease the shut height must be connected to the appropriate PLS output on the relay board.
 

Circuitry to increase shut height for LDT 1	→	PLS 16
Circuitry to decrease shut height for LDT 1	→	PLS 15
Circuitry to increase shut height for LDT 2	→	PLS 12
Circuitry to decrease shut height for LDT 2	→	PLS 11
3. The LDT to be adjusted must be enabled and its **CONTROL** must be enabled on the Shut Height\Settings page.

If all of these conditions are met, pressing the appropriate function key (*F4* for LDT 1 and *F5* for LDT 2) will start the shut height adjust process. If the conditions are not met for one of the LDTs, its corresponding button will not be visible. Once the adjust process has begun, the Adjust up or down indicator on the screen will turn green. Depending the relation of the actual shut height value to the target value, the increase or decrease PLS relay will activate until the actual meets the target value. When this happens, the Adjust indicators will turn black to indicate that the process is over. If you wish to cancel the adjust process before it is completed, press the Adjust button again.

---

Active keys for this page:

- The *function keys* allow you to:
  1. ***F1* – Back:** Go back to the previous page.
  2. ***F2* – Settings:** Go to the Shut Height\Settings page.
  3. ***F4* – Adjust 1:** Start the shut height adjust process for LDT 1.
  4. ***F5* – Adjust 2:** Start the shut height adjust process for LDT 2.
- The *arrow keys* are not used on this page.

**Shut Height\Settings:****Figure 3.29: The Shut Height\Settings Page**

ALARM SETUP LOCK 02/15/2005 11:32 AM 335 SPM 0 PART CNT 8	Press: 217-B2	Job: RF_D00R_37991576
	Page: Shut Height\Settings	
	Shut Height 1	
	LDT #1	
	Enable	<input checked="" type="checkbox"/>
	Control (LS16 & 15)	<input checked="" type="checkbox"/>
	Direction	REVERSE
	Offset (in)	10.000
	Stop Short (in)	0.030
	Target (in)	20.100
Actual (in)	20.107	
Shut Height 2		
LDT #2		
Enable	<input checked="" type="checkbox"/>	
Control (LS12 & 11)	<input checked="" type="checkbox"/>	
Direction	REVERSE	
Offset (in)	0.000	
Stop Short (in)	0.000	
Target (in)	0.000	
Actual (in)	0.000	
Help:		
Back		
Change		
Apply		

The Shut Height\Settings page allows you to:

1. Change the name for one or both of the Linear Displacement Transducers (LDT).
2. Enable or disable LDT 1 and/or LDT 2.
3. Enable or disable shut height control for each LDT.
4. Change the direction for both LDTs (both must be configured to the same direction).
5. Change the offset value for each LDT.
6. Change the stop short value for each LDT.
7. Change the target shut height for each LDT.
8. View the actual shut height.

**Renaming the LDT:**

Use the *arrow keys* to select the **Shut Height** name field for the LDT that you wish to rename. Hit the *F4* key. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The name can be up to 20 characters long. Hit the *F5* key to apply the new name or hit the *F4* key to cancel.



**Enabling or Disabling a LDT:**

Use the *arrow keys* to select the **Enable** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** If one of the LDTs is disabled, it will not be shown on the Shut Height page.

**Enabling or Disabling Shut Height Control for a LDT:**

Use the *arrow keys* to select the **Control** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** See page 82 of this manual for additional shut height requirements.

**Changing the LDT Direction:**

Use the *arrow keys* to select the **Direction** field for the LDT you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different selections. You can choose from **FORWARD** or **REVERSE**. This setting will vary depending on the orientation in which the LDT is mounted. The normal direction of increasing shut height is for the magnet to be traveling away from the LDT body. If this is the case, use the **FORWARD** setting. Otherwise, use the **REVERSE** setting. If two LDTs are used, both must be set to the same direction.

**Changing the LDT Offset:**

The offset is used initially to adjust the actual shut height displayed to a desired value. To determine this value, set the offset to zero initially. Measure to determine the current shut height and compare this value to the displayed actual shut height.

If the actual measurement is greater than the displayed value:

$$\text{Offset} = \text{Actual measurement} - \text{Displayed value}$$

If the actual measurement is less than the displayed value:

$$\text{Offset} = 99.999 - (\text{Displayed value} - \text{Actual value})$$

To change the shut height offset, use the *arrow keys* to select the **Offset** value field for the LDT you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the offset by one-thousandth of an inch (0.001), or
- Use the *Left/Right arrow keys* to increase or decrease the offset by one-tenth of an inch (0.100), or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the offset by one inch (1.000).

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



### Changing the LDT Stop Short Value:

The stop short value is used to fine-tune the stopping position when using the shut height adjust feature. This value is essentially the amount of travel in inches that can be expected after the adjust sequence ends. To determine the stop short value, start with a stop short of zero. Follow the procedures on the Shut Height page to complete the adjust sequence. When the sequence ends, the actual shut height value will probably be a few thousandths of an inch greater than the target value. This is the amount of travel after the adjust sequence ends. Subtract the target value from actual value to get the stop short value. To change the stop short value, use the *arrow keys* to select the **Stop Short** field for the LDT you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the stop short value by one-thousandth of an inch (0.001), or
- Use the *Left/Right arrow keys* to increase or decrease the stop short value by one-hundredth of an inch (0.010), or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the stop short value by one-tenth of an inch (0.100).

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Changing the LDT Target:

The target value is the actual value that should be displayed when the shut height is at the correct height. Use the *arrow keys* to select the **Target** value field for the LDT you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the target by one-thousandth of an inch (0.001), or
- Use the *Left/Right arrow keys* to increase or decrease the target by one-tenth of an inch (0.100), or
- Use the *Shift key + Left/Right arrow keys* to increase or decrease the target by one inch (1.000).

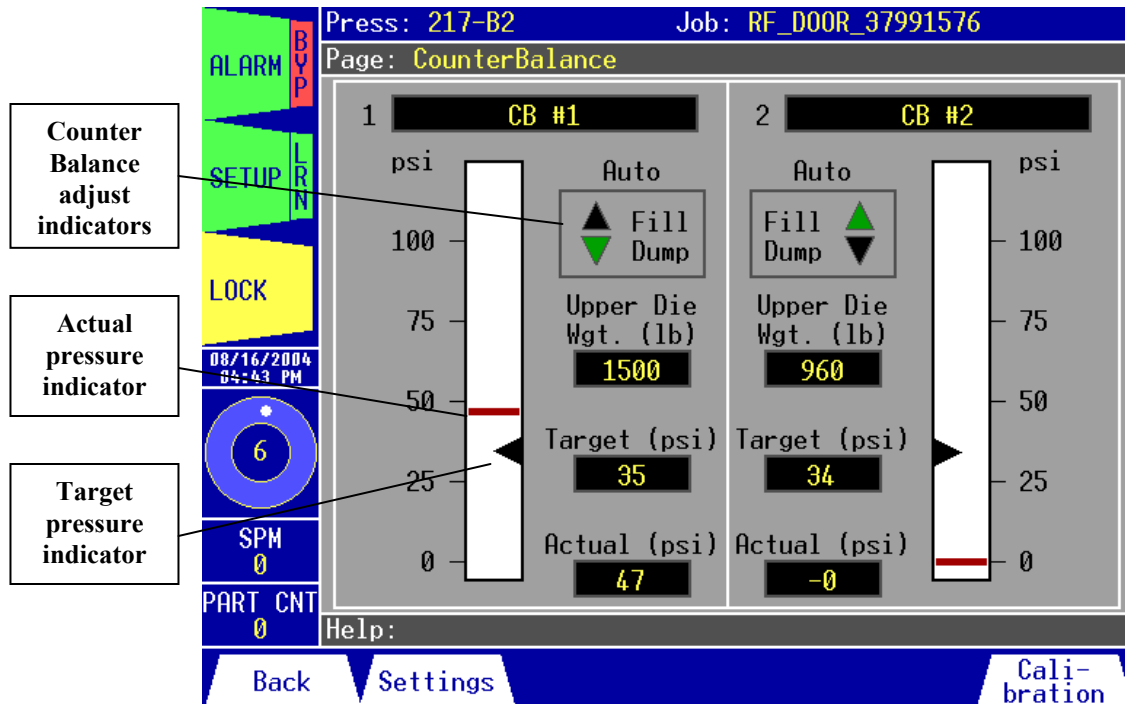
When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Rename a LDT, enable or disable a LDT, enable or disable shut height control for a LDT, and change the direction, offset, stop short, and target values.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Shut Height** name, **Enable**, **Control**, **Direction**, **Offset**, **Stop Short**, and **Target** fields.



**CounterBalance (optional):****Figure 3.30: The CounterBalance Page**

The CounterBalance page allows you to:

1. Access the CounterBalance\Settings page.
2. Access the CounterBalance\Calibration page.
3. View counterbalance information including the name of the counterbalance system, the current counterbalance mode setting (Auto, Manual, or Display), the upper die weight in pounds, the target value in psi, and the actual value in psi.
4. View a graphical representation of the actual and target psi values on a scale of 0-100 psi.
5. Check the status of the counterbalance relays which control the fill/dump valves for automatic counterbalance pressure adjust.

**Target Pressure Calculation:**

The target pressure is the ideal pressure for the counterbalance system in psi. It is automatically calculated based on the maximum and minimum upper die weight values, the maximum and minimum pressure values, and the upper die weight for the current die. The max. and min. upper die weight (in pounds) and max. and min. pressure (in psi) can usually be found on the press manufacturer's data plate. Target pressure is calculated with the following formula:

$$\text{Target} = \frac{(\text{Max pressure} - \text{Min pressure})}{(\text{Max Upper Die Wgt} - \text{Min Upper Die Wgt})} \times \text{Upper Die Wgt}$$



### Automatic CounterBalance Pressure Adjust:

To automatically adjust the counterbalance pressure, the following conditions must be met:

1. The pressure transducer must be correctly wired to the AN3 terminals of the Analog board. If two counterbalance systems are to be used, a second pressure transducer must be wired to the AN4 terminals of the Analog board.
2. The circuitry to control the fill and dump valves of the counterbalance (CB) system must be connected to the appropriate PLS output on the relay board.
 

Circuitry to turn on fill valve for CB 1	→	PLS 14
Circuitry to turn on dump valve for CB 1	→	PLS 13
Circuitry to turn on fill valve for CB 2	→	PLS 10
Circuitry to turn on dump valve for CB 2	→	PLS 9
3. The Counterbalance system must be enabled and its mode must be set to AUTO on the CounterBalance\Settings page.

If all of these conditions are met, the system will automatically adjust the counterbalance pressure. When the pressure drops below the target value, the appropriate relay will actuate the fill valve to bring the pressure back up to the target value. If the pressure increases above the target value, the appropriate relay will actuate the dump valve to lower the pressure back down to the target value. Note that the relay for the dump valve will only actuate when the current press angle is within a certain user-defined window (the dump zone) that is programmable from the CounterBalance\Settings page. When the fill or dump relay is triggered, the corresponding adjust indicator on the screen will turn green. When the pressure meets the target value ( $\pm 1$  psi), the adjust indicator will turn black to indicate that the fill or dump relay is off.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Settings:** Go to the CounterBalance\Settings page.
  3. **F6 – Calibration:** Go to the CounterBalance\Calibration page.
- The *arrow keys* are not used on this page.

**CounterBalance\Settings:****Figure 3.31: The CounterBalance\Settings Page**

CounterBalance 1		CounterBalance 2	
CB #1		CB #2	
Enable	<input checked="" type="checkbox"/>	Enable	<input checked="" type="checkbox"/>
Control (LS13 & 14)	AUTO	Control (LS9 & 10)	MANUAL
Upper Die Weight (lb)	1500	Upper Die Weight (lb)	960
Target (psi)	35	Target (psi)	34
Actual (psi)	32	Actual (psi)	-0

Press: 217-B2      Job: RF\_DOOR\_37991576  
Page: CounterBalance\Settings

ALARM      BVP  
SETUP      L R N  
LOCK  
08/17/2004  
08:26 AM  
6  
SPM  
0  
PART CNT  
0  
Help:

Back      Change      Apply

The CounterBalance\Settings page allows you to:

1. Change the name for one or both of the counterbalance (CB) systems.
2. Enable or disable the Counterbalance 1 and/or Counterbalance 2 system.
3. Change the control mode for each CB system.
4. Change the upper die weight for each CB system for the current job.
5. View the target pressure in psi for each CB system.
6. View the actual pressure in psi for each CB system.

**Renaming the CounterBalance System:**

Use the *arrow keys* to select the **CounterBalance** name field for the system that you wish to rename. Hit the *F4 key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The name can be up to 20 characters long. Hit the *F5 key* to apply the new name or hit the *F4 key* to cancel.

### Enabling or Disabling a CounterBalance System:

Use the *arrow keys* to select the **Enable** check box. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( **X** = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** If one of the CounterBalance systems is disabled, it will not be shown on the other CounterBalance pages.

### Changing the CounterBalance Control Mode:

Use the *arrow keys* to select the **Control** field for the system that you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle through the different selections. You can choose from three settings:

- a. **AUTO** – Allows the relays to automatically actuate the fill and dump valves to adjust the counterbalance pressure based on the actual pressure’s relation to the target pressure.
- b. **MANUAL** – Disables the relay for the dump valve. The fill valve is always actuated.
- c. **NONE** – The counterbalance pressure is not automatically adjusted. The relays can be configured for other purposes via the PLS/Setpoint pages. The user may still view the actual pressure.

When you have selected the setting you want to use, hit the *F5 key* to accept or hit the *F4 key* to cancel.

**Note:** See page 88 of this manual for additional requirements of the automatic pressure adjust feature.

### Changing the Upper Die Weight:

Use the *arrow keys* to select the **Upper Die Weight (lb)** field for the CB system that you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the upper die weight by 10 pounds, or
- Use the *Left/Right arrow keys* to increase or decrease the upper die weight by 1000 pounds.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Rename a counterbalance system, enable or disable a CB system, and change the mode and upper die weight values.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **CounterBalance** name, **Enable**, **Control**, and **Upper Die Weight (lb)** fields.



CounterBalance\Calibration:**Figure 3.32: The CounterBalance\Calibration Page**

ALARM SETUP LOCK 08/17/2004 08:52 AM 6 SPM 0 PART CNT 0	Press: 217-B2	Job: RF_D00R_37991576		
	Page: CounterBalance\Calibration			
	1 CB #1	2 CB #2		
	Press Data:			
	Upper Die Wgt. (lb)	Pressure (psi)	Upper Die Wgt. (lb)	Pressure (psi)
	Max. 3500	75.0	Max. 2800	87.0
	Min. 500	5.0	Min. 500	5.0
	Dump Zone (deg):		Dump Zone (deg):	
	From 330	To 30	From 320	To 350
	Dump/Fill if (psi) ± 6		Dump/Fill if (psi) ± 4	
Actual (psi) -0		Actual (psi) -1		
Offset (psi) -30		Offset (psi) -30		
Help:				
Back		Change	Apply	

The CounterBalance\Calibration page allows you to:

1. Change the maximum and/or minimum upper die weight value for each of the counterbalance systems.
2. Change the maximum and/or minimum pressure value for each of the counterbalance systems.
3. Change the dump zone window for each counterbalance system.
4. Adjust the hysteresis (+/- psi) value that controls at what point from the Target value that the fill and/or dump valves actuate.
5. Calibrate the pressure transducer(s) by adjusting the pressure offset value.

**Changing the Maximum and Minimum Upper Die Weight:**

The maximum and minimum upper die weight values can usually be found on the press manufacturer's data plate. Use the *arrow keys* to select the **Max. or Min. Upper Die Wgt (lb)** field for the CB system that you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 10 pounds, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 1000 pounds.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



### Changing the Maximum and Minimum Pressure:

The maximum and minimum pressure values can usually be found on the press manufacturer's data plate. Use the *arrow keys* to select the **Max.** or **Min. Pressure (psi)** field for the CB system that you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1 psi, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10 psi.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Changing the Dump Zone Window:

The dump zone is the window during which the dump valve is allowed to actuate. The dump zone window is usually located at the top of the press stroke (typically 340° to 10°). The window's ON/OFF degrees can be adjusted for each counterbalance system. Use the *arrow keys* to select the **From** or **To** field for the CB system that you wish to change. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the value by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the value by 10°.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Changing the Hysteresis:

The hysteresis determines the point away from the Target value that the fill and dump valves are allowed to actuate. For example, if the Target value is 35 psi and the hysteresis value is set to +/-3 psi, the dump valve will actuate when the pressure increases to 38 psi and the fill valve will actuate when the pressure decreases to 32 psi. Use the *arrow keys* to select the **Dump/Fill if (psi) ±** field for the CB system that you wish to change. Hit the *F4 key*. Use the *Up/Down arrow keys* to increase or decrease the value by 1 degree. When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

### Adjusting the CounterBalance Pressure:

The actual counterbalance pressure should accurately reflect tank pressure. If it does not, you must adjust the reading. First, you need to know the actual pressure that is applied to the transducer. You can get this known pressure from a trusted pressure gauge mounted on the system, or you can drain all air from the tank and calibrate the transducer at zero psi. Compare the value from the known source to the value displayed in the **Actual** field. Calculate the offset needed by subtracting the value shown in the **Actual** field from the known value. Use the *arrow keys* to select the **Offset (psi)** field for the CB system that you wish to adjust. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the offset value by 1 psi, or
- Use the *Left/Right arrow keys* to increase or decrease the offset value by 10 psi.

When you have finished adjusting the value, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

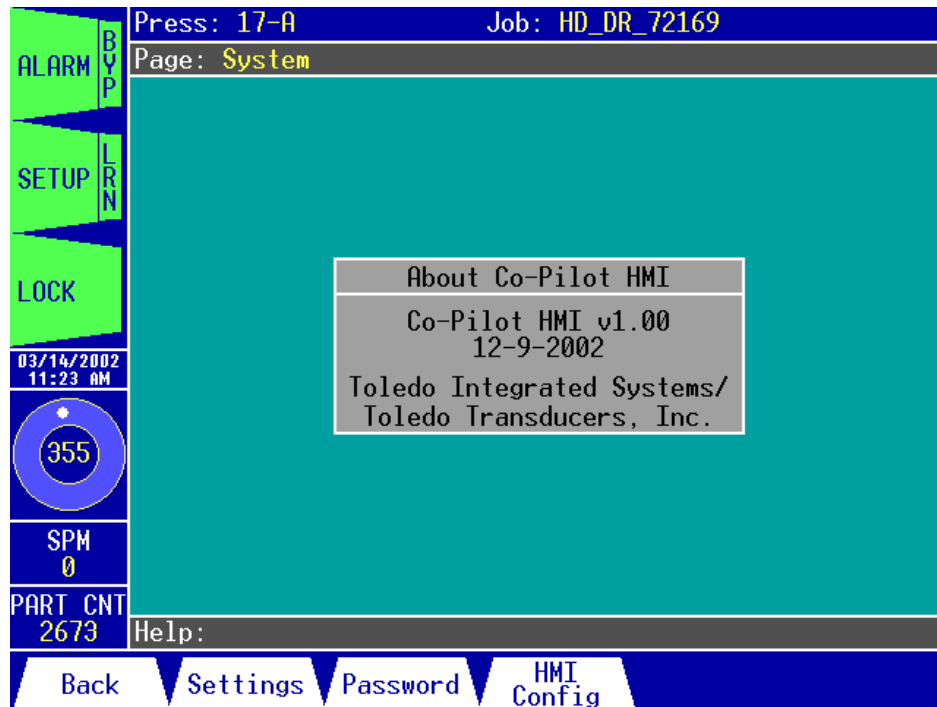




---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the maximum and minimum upper die weight, the maximum and minimum pressure, the dump zone window setpoints, and the hysteresis.
  3. **F5 – Apply:** Zero the actual pressure reading and apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Zero** button, the **Max.** and **Min. Upper Die Wgt (lb)**, the **Max. and Min. Pressure (psi)**, the **Dump From**, the **Dump To** field, and the **Dump/Fill is (psi) ±** field.

System:**Figure 3.33: The System Page**

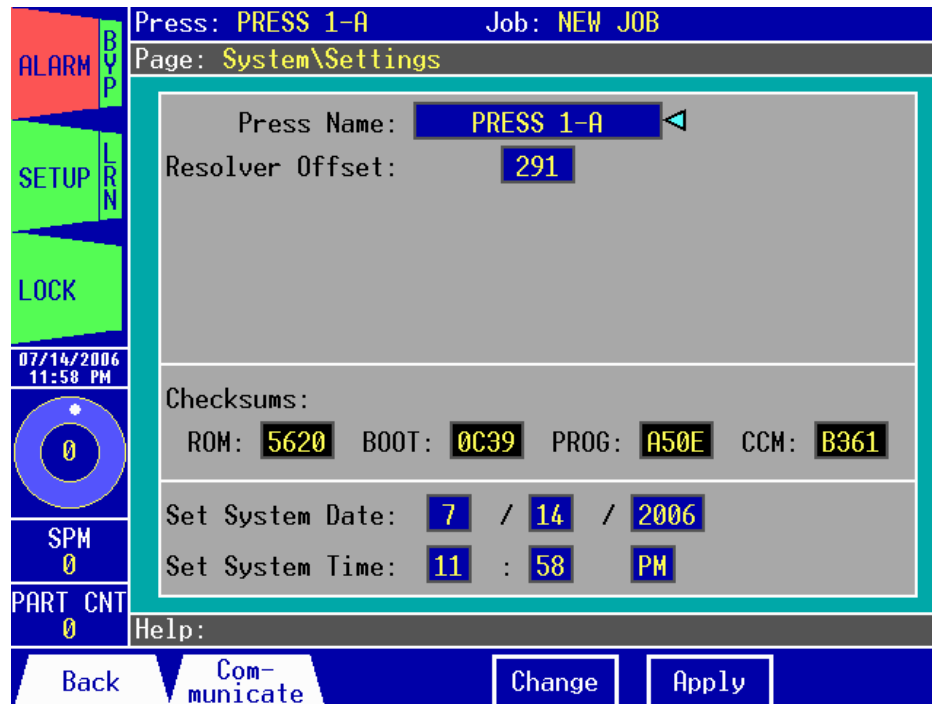
The System page allows you to:

1. Access the System\Settings page.
2. Access the System\Password page. When you attempt to access the password page, you will be asked for your password. Only users with the master level password will be able to gain access to the password page.
3. Access the System\HMI Configuration page.
4. View information about the HMI program.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Settings:** Go to the System\Settings page.
  3. **F3 – Password:** Go to the System\Password page.
  4. **F4 – HMI Config:** Go to the System\HMI Configuration page.
- The *arrow keys* are not used on this page.

**System\Settings:****Figure 3.34: The System\Settings Page**

The System\Settings page allows you to:

1. Change the press name.
2. View and change the Resolver Offset angle.
3. View the various program checksums (used for diagnostic purposes).
4. Change the system date and time.

**Renaming the Press:**

Use the *arrow keys* to select the **Press Name** field. Hit the *F4 key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The name can be up to 15 characters long. Hit the *F5 key* to apply the new name or hit the *F4 key* to cancel.

**Changing the Resolver Offset Angle:**

The resolver offset is used to adjust the Co-Pilot's position to the resolver's actual position. To determine the resolver offset needed, stop the press at top dead center, then note the position on the Co-Pilot's HMI. Subtract this angle from 360 to get the resolver offset. To change the resolver offset, use the *arrow keys* to select the **Resolver Offset** field. Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the resolver offset by 1°, or
- Use the *Left/Right arrow keys* to increase or decrease the resolver offset by 10°.

When you have finished adjusting the angle, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.



**Changing the System Date:**

Use the *arrow keys* to select one of the **System Date** fields (month/day/year). Hit the *F4 key*. Use the *Up/Down arrow keys* to increase or decrease the month, day, or year by 1. When you have finished adjusting the date, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

**Changing the System Time:**

Use the *arrow keys* to select one of the **System Time** fields (hour:minute AM/PM). Hit the *F4 key*.

- Use the *Up/Down arrow keys* to increase or decrease the hour or minute by 1, or
- Use the *Left/Right arrow keys* to increase or decrease the minute by 10.

To adjust the time of day (AM/PM) select the field and use the *Up/Down arrow keys* to toggle between AM and PM. When you have finished adjusting the time, hit the *F5 key* to apply your changes or hit the *F4 key* to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Communicate:** Go to the System\Settings\Communication page.
  3. **F4 – Change:** Rename the press, change the resolver offset angle, and change the system date and/or time.
  4. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Press Name**, **Resolver Offset**, **System Date**, and **System Time** fields.



**System\Settings\Communication:****Figure 3.35: The System\Settings\Communication Page**

Press: PRESS 1-A Job: NEW JOB  
Page: System\Settings\Communication

Monitor Address: 7

Baud Rates:

PN1 Port (bps): 115200

SFI Port (bps): 9600

PN2 Port (bps): 76800

07/15/2006  
12:00 AM

SPM  
0

PART CNT  
0

Help:

Back Change Apply

The System\Settings\Communication page allows you to:

1. View and change the monitor's network address.
2. View and change the baud rate for the serial ports.

**Changing the Monitor Address:**

The Monitor Address is the networking communication address at which the Co-Pilot will be seen on the PressNet networking software. There are 32 available addresses (0-31) and each tonnage monitor on the network must have its own unique address. Use the *arrow keys* to select the **Monitor Address** field. Hit the *F4* key. Use the *Up/Down arrow keys* to increase or decrease the value by 1. When you have finished adjusting the address, hit the *F5* key to apply your changes or hit the *F4* key to cancel.

**Changing the Serial Port Baud Rate:**

The serial port baud rate is the speed in bits per second (bps) at which the Co-Pilot's serial ports communicate. There are (3) serial ports: The PN1 port is used for PressNet communication, the SFI port is used for Servofeed communication and software updates, and the PN2 port is reserved for future use. See the Installation section of the manual for serial port locations. There are 4 communication speeds available for each serial port: 9600, 38400, 76800, and 115200 bps. To change the baud rate, use the *arrow keys* to select the **Baud Rate** field for the port you wish to change. Hit the *F4* key. Use the *Up/Down arrow keys* to scroll through the available baud rate speeds. When you have finished adjusting the baud rate, hit the *F5* key to apply your changes or hit the *F4* key to cancel.



Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Change the monitor address and change the baud rate for each of the serial ports.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Monitor Address**, the **PN1 Port Baud Rate**, the **SFI Port Baud Rate**, and the **PN2 Port Baud Rate** fields.

System\Password:**Figure 3.36: The System\Password Page**

Press: 217-B2 Job: HD\_DR\_72169  
Page: System\Password

	MASTER	SETUP	OPERATOR
Password:	1	2	3
Reset General Alarms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Enable Setup/Learn	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Job Setup Tasks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Change Limits	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Change Config.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Master Functions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

06/06/2002 03:52 PM  
312  
SPM 0  
PART CNT 13049  
Help:

Back Detail Change Apply

The System\Password page allows you to:

1. View and change the Master-level, Setup-level, and Operator-level passwords.
2. View and change the permissions for the Setup-level and Operator-level passwords. Of course, the Master-level password always has permission for all features.
3. View the details for each of the permission categories.

**About permissions:**

As you can see in the figure above, there are six different categories of permissions.

1. **Reset General Alarms** – Gives permission to reset all alarms except for capacity and CCM tonnage alarms.
2. **Enable Setup/Learn** – User can enable and disable Setup Mode and Learn Mode.
3. **Job Setup Tasks** – Allows user to load new jobs, clear most counters, and adjust the shut height (if the shut height option is installed).
4. **Change Limits** – Gives permission to change various limits and setpoints including counter limits, PLS and die sensor windows, and other settings.
5. **Change Config.** - User can change alarm, PLS, and die sensor types. They can also enable or disable PLS and die sensors, alarms, counters, etc.
6. **Master Functions** – Allows the user to access the System\Password page, change critical press information, calibrate the tonnage sensors, reset capacity and CCM tonnage alarms, and configure other major settings. Only the master-level password can do this.



### Changing the Passwords:

Use the *arrow keys* to select the **Password** field for the password you wish to change. Hit the *F4 key*. Type the new password as described in the **Entering/Editing Text** section in chapter 1. The password can be up to 8 characters long. Hit the *F5 key* to apply the new password or hit the *F4 key* to cancel. By default, the Co-Pilot unit ships with the Master password set to 1, the Setup password set to 2, and the Operator password set to 3.

### Enabling or Disabling Password Permissions:

Use the *arrow keys* to select the check box of the feature for which you wish to change the permissions. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( X = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

### Viewing Details About Password Permission Categories:

From the Password page, hit the *F2 key* to open the details window. The details window displays information about each of the password permission categories (Reset General Alarms, Change Limits, etc.) including which features and functions a category covers. To cycle through each of the categories, press the *F2* and *F3* keys. To close the details window and return to the Password page, press the *F1 key*.

---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F2 – Detail:** Open the detail window.
  3. **F4 – Change:** Change the passwords for each of the 3 password levels, enable or disable feature permissions for the Setup-level and Operator-level.
  4. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the **Password** fields for each of the 3 password levels and select the permission check boxes for Setup and Operator.



**System\HMI Configuration:****Figure 3.37: The System\HMI Configuration Page**

The System\HMI Configuration page allows you to:

1. Select up to (4) items to be shown on the Main page.

**Configuring the Main Page:**

You can select up to (4) frequently viewed items to display on the Main page. The data will be displayed with larger text for easier viewing. You can choose to show **Position**, **Job Name**, **Stroke Count**, **Good Part Count**, **Batch1 Count**, and/or **Batch2 Count**. Use the *arrow keys* to select the checkbox for the item you wish to add or remove from the Main page. Hit the *F4 key*. Use the *Up/Down arrow keys* to toggle the “X” inside the check box ( X = Enabled ). Hit the *F5 key* to accept or hit the *F4 key* to cancel.

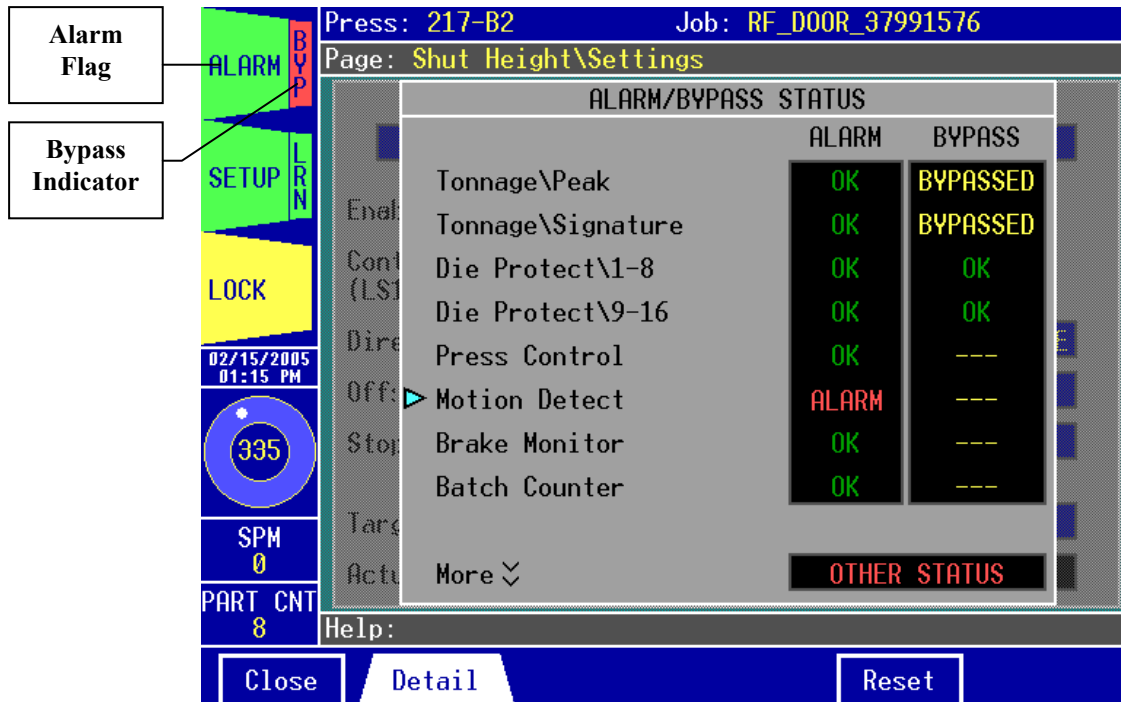
Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Back:** Go back to the previous page.
  2. **F4 – Change:** Enable or disable the items to be displayed on the Main page.
  3. **F5 – Apply:** Apply the changes you have made.
- The *arrow keys* allow you to move the cursor to select the checkboxes for each item to be displayed on the Main page.



**Alarm Window:**

**Figure 3.38: The Alarm Window**



The Alarm window allows you to:

1. View the alarm status for the various pages and jump to those pages. For example, Figure 3.38 shows that there is an alarm on the Motion Detect page.
2. View the ready status for the Brake Monitor Stop Test.
3. View the Servo Feed Interface status.
4. View the Resolver status.
5. View the Backup Battery status.
6. View the alarm bypass status for the various pages and jump to those pages. For example, Figure 3.38 shows that there is an alarm being bypassed on the Tonnage\Peak and the Tonnage\Signature pages.
7. Reset the alarms if there are any present and reset the ready status for the Brake Monitor Stop Test.

**Note:** You cannot reset a Press Control alarm from the Co-Pilot. These alarms must be reset from the press control unit.

**Resetting an Alarm:**

To reset an alarm, simply hit the *F5* key. All alarms are reset immediately and their status in the **ALARM** status field changes to **OK** (the Brake Monitor Stop Test status will also be reset to **READY**).

**Note:** The Master-level password will be required to reset capacity and CCM tonnage alarms.



### Resetting the Brake Monitor Stop Test:

To reset the Brake Monitor Stop Test, simply hit the *F5* key. The Stop Test status in the **Brake Monitor Stop Test** field will change from **NOT READY** to **READY** (all alarms will also be reset to **OK**).

### Getting More Information on an Alarm:

Use the *arrow* keys to select the page that contains the alarm. Hit the *F2* key to go to the selected page.

### Getting More Information on an Alarm Bypass:

Use the *arrow* keys to select the page that contains the bypass. Hit the *F2* key to go to the selected page.

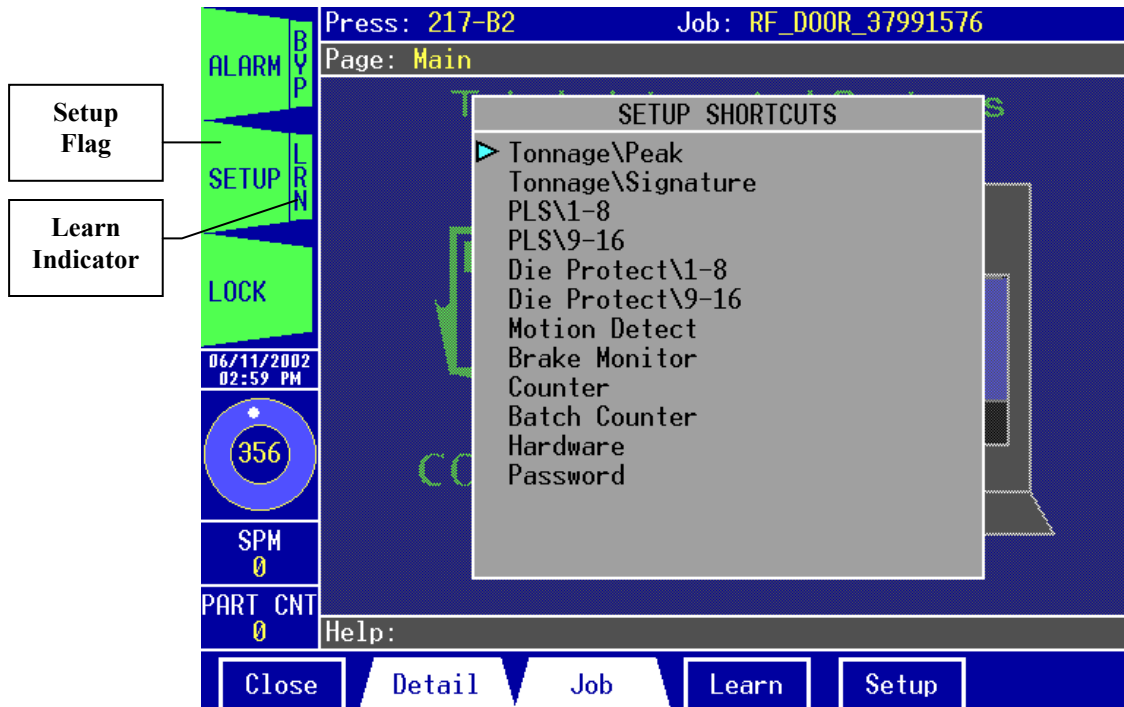
### Accessing More Status Information :

Some status information is located on a second alarm window. At the bottom of the alarm window, you will see a selection called **More** (see Figure 3.38). Use the *arrow* keys to select **More**, then either hit the *F2* key or hit the *Down arrow* key again to bring up the second alarm window. This window contains the Brake Monitor Stop Test status, the Servo Feed Interface status, the Resolver status, and the Battery status. To return to the first alarm window, select **More** at the top of the alarm window, then either hit the *F2* key or hit the *Up arrow* key again to bring up the first alarm window.

---

Active keys for this page:

- The *function* keys allow you to:
  1. **F1 – Close:** Close the Alarm window and return to the last page visited.
  2. **F2 – Detail:** Go to the page that is selected by the cursor.
  3. **F5 – Reset:** Reset the alarms if there are any present and reset the Brake Monitor Stop Test.
- The *arrow* keys allow you to move the cursor to select any of the pages in the list.

**Setup Window:****Figure 3.39: The Setup Window**

The Setup window allows you to:

1. Take a “tour” of the pages listed to view and change the various settings on each page.
2. Access the Job page.
3. Turn the Learn Mode on.
4. Toggle Setup Mode.

**Turning the Learn Mode On:**

To turn on the Learn Mode, hit the *F4* key. Notice that the Learn Indicator on the Setup Flag is now yellow to signify that Learn Mode is active. When in Learn Mode, all alarms are active with the exception of the tonnage alarms, which are disabled (Capacity and CCM alarms are still enabled). Pushing this key also turns off Setup Mode if it was previously turned on. After eight press strokes, a new benchmark is learned and new high and low setpoints are calculated. Learn Mode will end and the Learn Indicator’s color will return to green.

**Note:** You can also hit the *F4* key again to cancel Learn Mode before eight strokes are complete.



**Beginning and Ending Setup Mode:**

To begin Setup Mode, hit the *F5* key. The Setup Flag will change from green to yellow to indicate that you are in Setup Mode. When in Setup Mode, only the drift detection, brake monitor, die protection (if configured), tonnage capacity, and tonnage CCM alarms are active. All other alarms are disabled. Make any changes needed then return to this window when you are done. Hit *F5* again to end Setup Mode (you can also hit *F4* to start Learn Mode and disable Setup Mode simultaneously). The Setup Flag's color will return to green to indicate that Setup Mode is now off.

**Take a Tour of the Pages:**

Use the *arrow keys* to select the page from which you wish to begin your tour. Hit the *F2* key to go to that page. When you return to the Setup window, the page you last visited will be selected. Select the next page in the list to continue your tour. This feature is helpful for configuring the various settings for a new job, or for new installations.

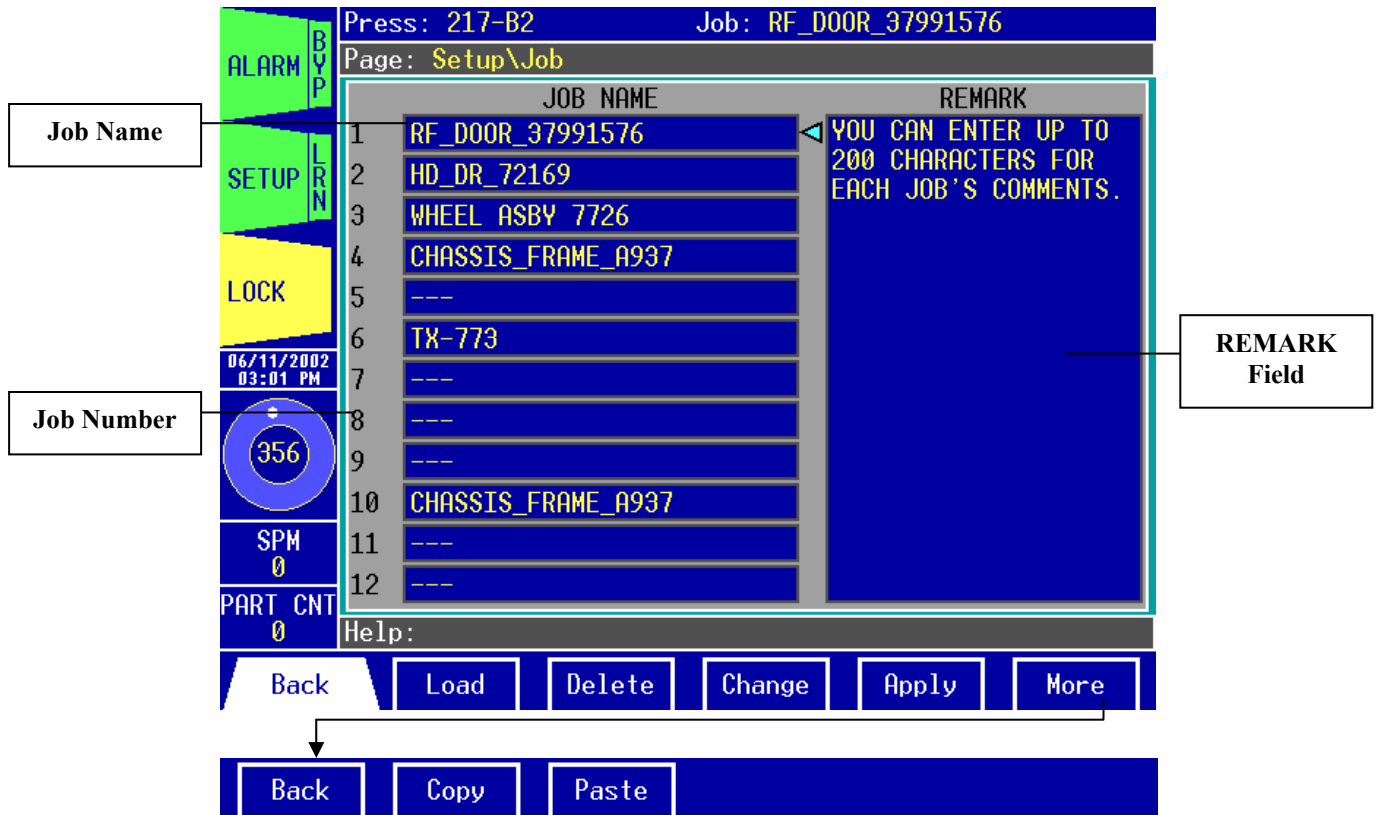
---

Active keys for this page:

- The *function keys* allow you to:
  1. **F1 – Close:** Close the Setup window and return to the last page visited.
  2. **F2 – Detail:** Go to the page that is selected by the cursor.
  3. **F3 – Job:** Go to the Setup\Job page.
  4. **F4 – Learn:** Turn Learn Mode on.
  5. **F5 – Setup:** Toggle Setup Mode.
- The *arrow keys* allow you to move the cursor to select any of the pages in the list.

**Setup\Job:**

**Figure 3.40: The Setup\Job Page**



The Job page allows you to:

1. View the list of jobs.
2. Rename the jobs and enter remarks for each one. Remarks are any descriptions or notes related to a job.
3. Load a job.
4. Delete the selected job.
5. Copy the selected job.
6. Paste the copied job.

**What is a Job?**

A job is a collection of all the names and settings that you have entered. All of this information is stored in a file and can be recalled at a later time.



**Viewing the Job List:**

Each screen can display up to 12 jobs. If you wish to view a job number higher than 12, simply move the arrow cursor down the list until job #12 is selected. Push the *down arrow key* once more and the screen will display job #13 – job #24. Continue hitting the *down arrow key* until you see the job you want. You can also use the *Page Up* and *Page Down keys* to advance 12 jobs at a time.

**Renaming a Job:**

Use the *arrow keys* to select the **JOB NAME** field (make sure the arrow is facing left) of the job you wish to rename. Hit the *F4 (I) key*. Type the new name as described in the **Entering/Editing Text** section in chapter 1. The job name can be up to 25 characters long. Hit the *F5 (I) key* to apply the new name or hit the *F4 (I) key* to cancel.

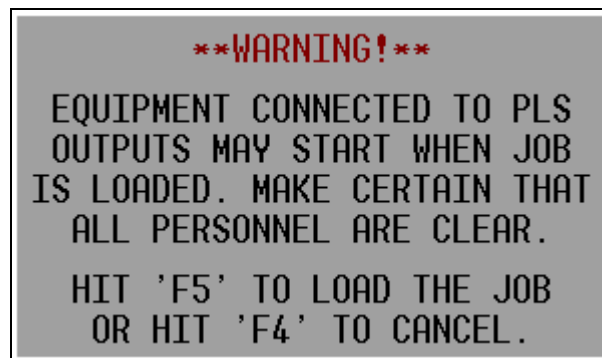
**Entering/Editing Remarks for a Job:**

First, select the **JOB NAME** field of the job for which you wish to enter remarks. Push the *right arrow key* so that the cursor is pointing to the **REMARK** field. Hit the *F4 (I) key* to begin entering the remarks. As you enter text, you will reach the end of the line in the “**Change to:**” field. Keep typing and the field will empty to allow you to enter more text. Notice the left arrow at the far right end of the “**Change to:**” field. This indicates that there is more text on the previous line. You may enter up to 200 characters for each job’s remarks. Hit the *F5 (I) key* when done to apply the changes or hit the *F4 (I) key* to abort the changes.

**Loading a Job:**

Select the **JOB NAME** field of the job that you want to load. Hit the *F2 (I) key*. The following warning will appear:

**Figure 3.41: Load Job Warning**



Hit *F4 (I)* if you would like to cancel loading the job or hit *F5 (I)* to confirm that you wish to load the job. Before you load a job, **always** make sure that all personnel are a safe distance away from the press and all devices controlled by the PLS outputs. Once you hit *F5 (I)* the selected job will be loaded.

**Deleting a Job:**

To delete a job, select the **JOB NAME** field of the job you wish to delete and hit the *F3 (1)* key. You will receive a warning that the job will be erased. Hit *F3 (1)* again to confirm that you want to delete or hit any other key to cancel.

**Copy a Job:**

The Copy function is helpful if you wish to start a new job with settings that are similar to an existing job. To copy a job, first select the **JOB NAME** field of the job you wish to copy. Hit *F2 (2)* to copy the job. Then use the Paste function (described below) to complete the process.

**Paste a Job:**

The Paste function is used in combination with the Copy function. After you have already used the Copy function to copy an existing job, select the location where you wish to paste the job. Once you selected the location to which you want to paste the copied job, hit the *F3 (2)* key. You will receive a warning that the selected job's contents will be erased. Hit *F3 (2)* again to paste the job or hit any other key to cancel.

---

Active keys for this page:

- The *function keys* allow you to:
  1. *F1 (1)* – **Back:** Go back to the previous page.
  2. *F2 (1)* – **Load:** Load a different job.
  3. *F3 (1)* – **Delete:** Delete the selected job.
  4. *F4 (1)* – **Change:** Rename the selected job or change the remarks for the job.
  5. *F5 (1)* – **Apply:** Save the changes you have made.
  6. *F2 (2)* – **Copy:** Copy the selected job.
  7. *F3 (2)* – **Paste:** Paste a previously copied job to the location currently selected.
- The *arrow keys* allow you to move the cursor to select the **JOB NAME** field or **REMARK** field.



# 4: Co-Pilot Calibration Procedure

In order to calibrate the Co-Pilot you will need stands, spacers, shims, and load cells (one for each sensor installed). Use the following steps for proper tonnage calibration:

## 1) Set Press Capacity

- A. In the Co-Pilot’s HMI, use the unit’s keypad to navigate to the Tonnage\Peak\Setpoint Page.
  - B. Enter the press capacity in the **Total** field, as well as the capacity for each of the four corners (**LR, RR, LF, RF**). This procedure is explained on page 42 in the *Tonnage\Peak\Setpoint* section in chapter 3.
- Note:** If calibrating a 6- or 8-channel unit, make sure you enter the capacity for both the outer and inner slides.

**Figure 4.1: Press Capacity Settings**

Enter the press and corner capacities here.

	Total	LR (1)	RR (2)	LF (3)	RF (4)
Capacity	1000	250	250	250	250
Hi Setpt.	396	97	154	115	105
Peak Ton.	246	59	114	78	69
Benchmark	245	59	116	78	68
Lo Setpt.	95	22	79	40	30
High %	15	15	15	15	15
Low %	15	15	15	15	15
Reverse	-7	-4	-3	-2	-2
Rev Setpt.	-100	-25	-25	-25	-25

Press: 217-B2      Job: RF\_D00R\_37991576  
 Page: Tonnage\Peak\Setpoint  
 06/24/2002 03:48 PM  
 33  
 SPM 0  
 PART CNT 1405  
 Help:

Back    Peak Alarm    Change    Apply

## 2) Balance the Tonnage Sensors

- A. Make sure the press is under no load.
- B. Go to the Tonnage\Calibration page.
- C. Select the **Auto-Zero** field.
- D. Press the *F5 (Apply)* key to begin the auto-zero process. Note that the “Auto-Zero” prompt changes to “Wait...” while the channels are being balanced.
- E. The channels are balanced to zero when the prompt returns to “Auto-Zero”.

**Figure 4.2: Balance the Tonnage Sensors**

The screenshot shows the 'Tonnage\Calibration' page. At the top, it displays 'Press: PRESS 1-A' and 'Job: NEW JOB'. Below this, the page title is 'Page: Tonnage\Calibration'. The main display area is divided into columns for 'Total', 'LR', 'RR', 'LF', and 'RF'. The values shown are: Total: -0, LR: 1, RR: 2, LF: 3, RF: 4. Below these values, a dashed box highlights the 'BALANCE' field, which is currently set to '-1'. To the right of the 'BALANCE' field, there are five input fields for each channel, all showing '0'. Below the input fields, there is a section for 'Auto-Zero' and 'Restore Defaults'. At the bottom of the screen, there are three buttons: 'Back', 'Change', and 'Apply'. On the left side of the screen, there is a vertical menu with options: 'ALARM', 'SETUP', 'LOCK', '12/29/2005 09:04 AM', '1', 'SPM 0', 'PART CNT 0', and 'Help:'. Callouts from the text boxes point to the 'BALANCE' field, the balance values, and the 'Auto-Zero' field.

When this field is set to “BALANCE” the fields to the right represent the balance for each channel.

These are the balance values for each channel.

Select the Auto-Zero field and hit the *F5 (Apply)* key to balance the channels to zero.

## 3) Find the Shut Height of the Press

- A. Jog the press until the ram is at bottom dead center (BDC) or 180° without any load cells or the die in the press.
- B. Determine the amount of spacers needed with your load cells. Cycle the press without load cells to insure correct height.

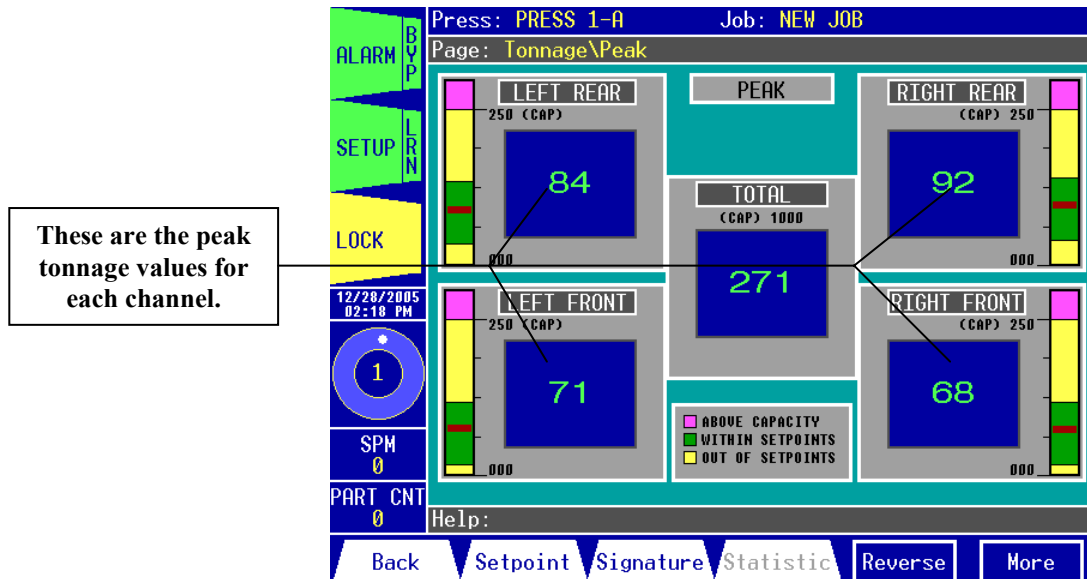
#### 4) Place the Load Cells in the Correct Position in the Press

- A. All load cells should be equal distance from the sides and front and rear. For example, 12” from side, 10” from front and rear. Load cells are typically placed at each corner of the press’s bed.
- B. Cycle the press without hitting the load cells first.
- C. Place cardboard on the top and bottom of the load cells.

#### 5) Cycle the Press

- A. Go to the Tonnage\Peak page.

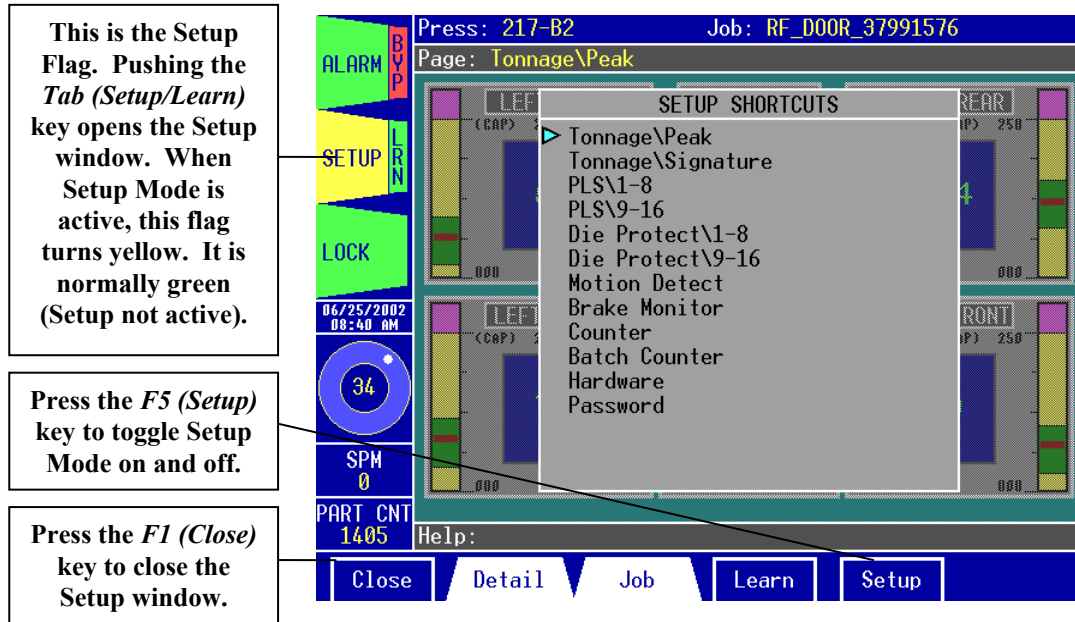
**Figure 4.3: The Tonnage\Peak Page**



#### B. Put the Co-Pilot in Setup Mode:

- i. Press the *Tab* (*Setup/Learn*) key to open the Setup window (see Figure 4.4).
- ii. Press the *F5* (*Setup*) key to enable Setup Mode.
- iii. Press the *F1* (*Close*) key to close the Setup window.

**Figure 4.4: The Setup Window**



- C. Cycle the press once. Make sure the press impacts the load cells. Add the load cell values to determine the total load on the press.
- D. Adjust the shut height and cycle the press until the press impacts the load cells (total load) at 100% of press capacity. See warning below.

**WARNING**

Depending on the press capacity and the size of the load cells being used, loading the press at capacity with load cells could indent the ram or bolster. To prevent this from happening, consider one of the following:

- (1) Calibrate the press only up to 80% of capacity, or
- (2) Use larger load cells to increase the loading surface. For instance, to calibrate a 400-ton press, use (4) 250-ton load cells instead of (4) 100-ton load cells.

- E. Check the load cells. Ideally, their individual loads should match. If not, use shims on the load cells as needed until you get an evenly distributed load.

**6) Gather, Record, and Enter Data**

- A. Record the load cell numbers for each of the channels. These are the load values of the press corners.
- B. Record the peak tonnage values from the Co-Pilot’s Tonnage\Peak page.

- C. Return to the Tonnage\Calibration page and select the **BALANCE** field. Hit *F4 (Change)*, use the up or down arrow keys to toggle the field to **CAL#**, then hit *F5 (Apply)*. This enables the Co-Pilot's shunt. The top set of values in the black boxes represent the current gain numbers for each channel. Record these numbers.

**Figure 4.5: Displaying and Entering Cal Numbers**

The screenshot shows the 'Tonnage\Calibration' page. At the top, it says 'Press: PRESS 1-A' and 'Job: NEW JOB'. Below that, 'Page: Tonnage\Calibration'. The main display area is divided into two sections. The top section shows a table of current gain values for five channels (Total, LR, RR, LF, RF) with values 1299, 325, 325, 326, and 325 respectively. The bottom section shows the same table with blue boxes for entering correction values, with values 1299, 325, 325, 325, and 325. A 'Set Cal#' button is visible below the bottom table. Callouts point to the 'CAL#' field, the current gain values, the 'Set Cal#' field, and the correction value boxes.

Change this field to **CAL#** to display the current gain for each channel.

These are the current gain values for each of the channels.

Select this field and hit the *F5 (Apply)* key to set the current gain to the correction values.

Enter Cal# correction values here.

- D. Use the following formula to determine the new gain number:

$$\text{New Gain Number} = (\text{Load Cell reading} \div \text{Peak Tonnage reading}) \times \text{Current Gain Number}$$

- E. Repeat the calculation for each channel.
- F. Enter the new gain numbers into the bottom set of blue boxes. These new gain numbers are the Cal# correction values for each channel.
- G. Select the **Set Cal#** field and hit the *F5 (Apply)* key to set the current gain for each channel to the Cal# correction values that you entered. The top and bottom sets of numbers should now match.
- H. Set the **CAL#** field back to **BALANCE** and use the **Auto-Zero** to re-adjust the zero balance (if needed).

## 7) Verify Results and Repeat

- A. Go to the Tonnage\Peak page and cycle the press.
- B. Verify that the load cell values and the Co-Pilot's peak tonnage values are the same. If not, repeat step 6 until the values are the same.

**8) Make Linearity Check**

- A. Raise the shut-height in .020 to .030 inch increments to decrease tonnage.
- B. Cycle the press and impact the load cells.
- C. Compare the tonnage applied to the load cells to the tonnage displayed on the Co-Pilot's Tonnage\Peak page. These values should be documented.

**9) Document calibration details on Calibration Sheet (Form #1224) provided and file it for future reference.**

**10) Record CAL#s on label which is located on the door inside the unit.**

**11) Calibration Complete**

The calibration procedure is now complete. Contact Toledo Integrated Systems' Service Department for assistance if needed. Our Service Department can be reached at 419-867-4170, Monday through Friday, 8:00 AM to 5:00 PM.

# **Appendix**

## I) Calibration Sheets (2) (Form# 1224)





COMPANY: \_\_\_\_\_

DATE: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

PRESS SERIAL No: \_\_\_\_\_

PRESS (Type and & No.): \_\_\_\_\_

CONTACT: \_\_\_\_\_

PRESS CAPACITY: \_\_\_\_\_

PHONE: (\_\_\_\_) \_\_\_\_\_

LOAD MONITOR MODEL: \_\_\_\_\_

SERVICE ORDER #: \_\_\_\_\_

MONITOR SERIAL No. \_\_\_\_\_

SLIDE-ADJUST INDICATOR

TONNAGE APPLIED TO **LOAD CELLS** ON PRESS

TONNAGE DISPLAYED ON **LOAD MONITOR**

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

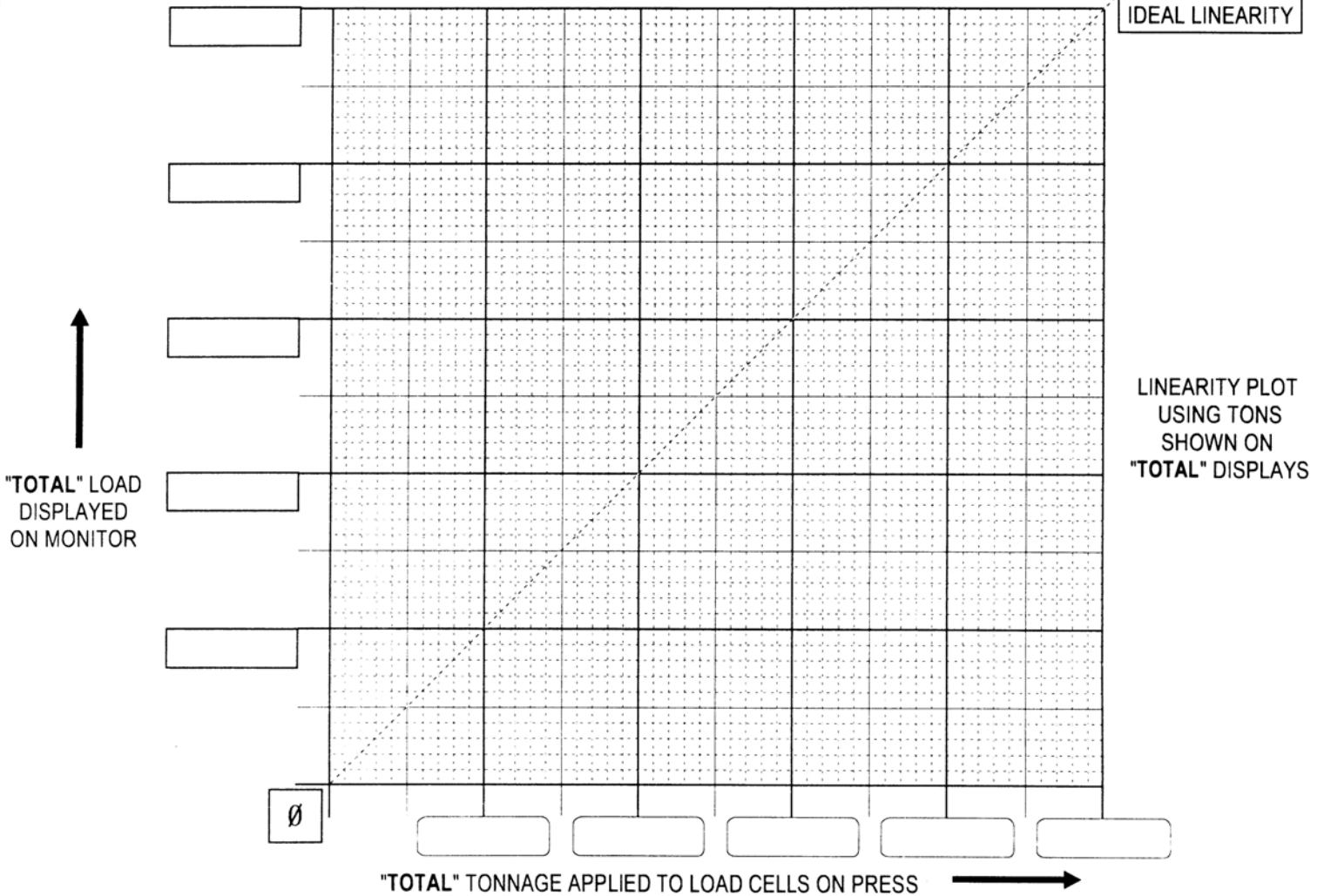
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF



IDEAL LINEARITY

LINEARITY PLOT USING TONS SHOWN ON "TOTAL" DISPLAYS

- DRAW IN :** \_\_\_\_\_
- CHANNEL NUMBER
  - SENSOR LOCATION
  - MONITOR LOCATION
  - LOAD CELL LOCATION
  - DIRECTION OF MATL. FLOW

**SHUNT RESISTORS:**  
ONE MEG ? YES \_\_\_ NO \_\_\_

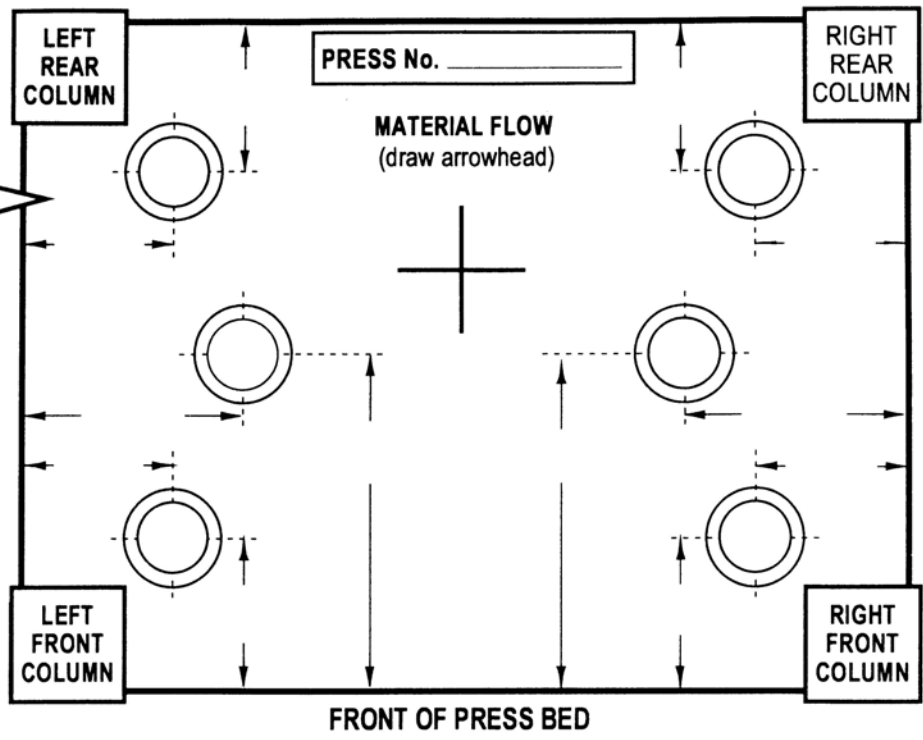
**OTHER RESISTORS:**

CHAN. 1 \_\_\_\_\_

CHAN. 2 \_\_\_\_\_

CHAN. 3 \_\_\_\_\_

CHAN. 4 \_\_\_\_\_



TYPE OF LOAD CELLS: \_\_\_\_\_ TYPE OF LOAD CELL READOUT: \_\_\_\_\_

**TONNAGE SENSORS**

**CALIBRATION LOAD CELLS**

SENSOR NUMBER	SERIAL NO.	CAL. NO.	X 10	LOCATION (LF, RF, LR, RR)
1				
2				
3				
4				

CELL NUMBER	CAPACITY TONS	SERIAL NO.	CAL. NO.
1			
2			
3			
4			

CCM TYPE: \_\_\_\_\_ CCM OFFSET: \_\_\_\_\_ STI REFERENCE NUMBER: LOW: \_\_\_\_\_ HIGH: \_\_\_\_\_

STI DEGREES IN CHANNEL No. 1: \_\_\_\_\_

TRIGGERED FROM PROBE ? YES \_\_\_ NO \_\_\_ (Show threshold value if not triggered from probe): \_\_\_\_\_

TRIPPED ALARM RELAY STOPS PRESS ? YES \_\_\_ NO \_\_\_ EXPLAIN: \_\_\_\_\_

ALL STICKERS AND DOCUMENTS FILLED OUT ? YES \_\_\_ NO \_\_\_ IF NOT, EXPLAIN WHY: \_\_\_\_\_

TFP No.: HIGH 2 \_\_\_\_\_ LOW 2 \_\_\_\_\_ HIGH 4 \_\_\_\_\_ LOW 4 \_\_\_\_\_ HIGH 6 \_\_\_\_\_ LOW 6 \_\_\_\_\_ HIGH 8 \_\_\_\_\_ LOW 8 \_\_\_\_\_

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTS MADE BY: \_\_\_\_\_ TESTS ACCEPTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

**MAIL ADDRESS:**  
TOLEDO TRANSDUCERS, INC.  
P.O. BOX 10  
HOLLAND, OHIO 43528

**SHIPPING ADDRESS:**  
TOLEDO TRANSDUCERS, INC.  
6834 SPRING VALLEY DR.  
HOLLAND, OHIO 43528

**PHONE:** 1 (419) 867-4170  
**FAX:** 1 (419) 867-4180

COMPANY: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 CONTACT: \_\_\_\_\_  
 PHONE: (\_\_\_\_) \_\_\_\_\_  
 SERVICE ORDER #: \_\_\_\_\_

DATE: \_\_\_\_\_  
 PRESS SERIAL No: \_\_\_\_\_  
 PRESS (Type and & No.): \_\_\_\_\_  
 PRESS CAPACITY: \_\_\_\_\_  
 LOAD MONITOR MODEL: \_\_\_\_\_  
 MONITOR SERIAL No. \_\_\_\_\_

SLIDE-ADJUST INDICATOR

TONNAGE APPLIED TO **LOAD CELLS** ON PRESS

TONNAGE DISPLAYED ON **LOAD MONITOR**

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

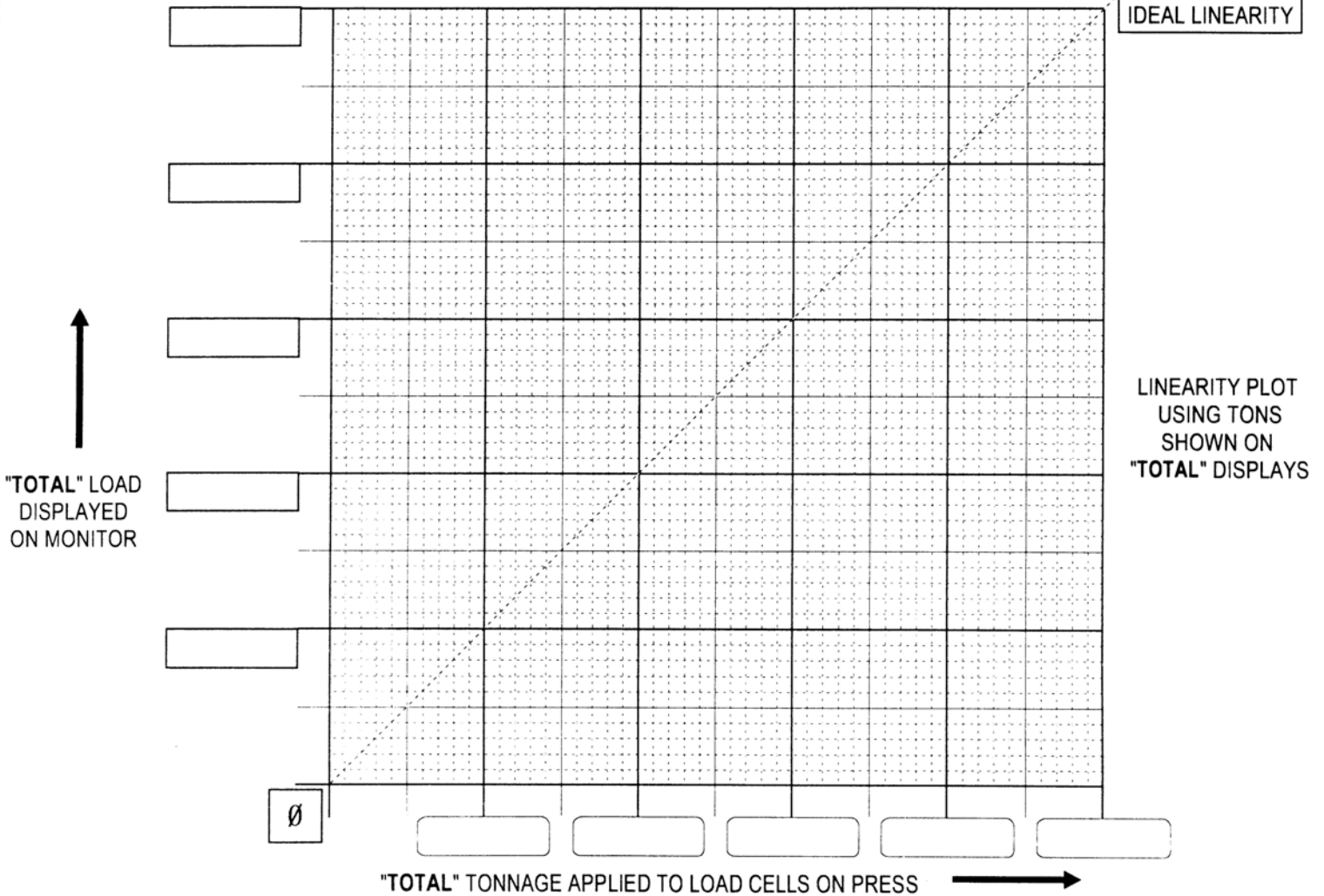
LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF

LR	<input type="text"/>	TOTAL	<input type="text"/>	RR
LF	<input type="text"/>	<input type="text"/>	<input type="text"/>	RF



**DRAW IN :** \_\_\_\_\_

- CHANNEL NUMBER
- SENSOR LOCATION
- MONITOR LOCATION
- LOAD CELL LOCATION
- DIRECTION OF MATL. FLOW

**SHUNT RESISTORS:**  
ONE MEG ? YES \_\_\_ NO \_\_\_

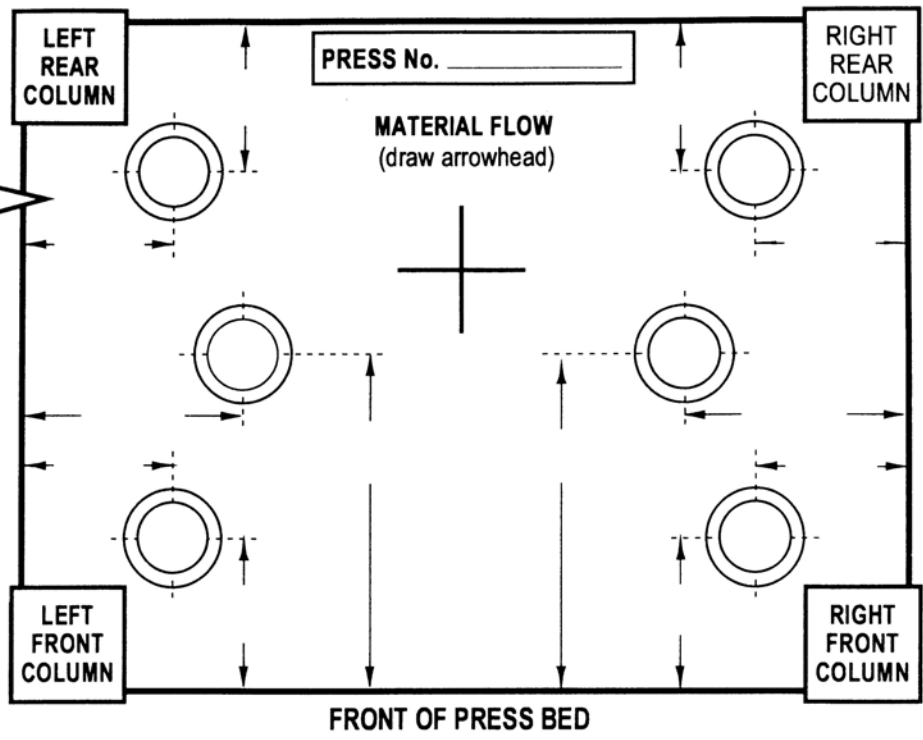
**OTHER RESISTORS:**

CHAN. 1 \_\_\_\_\_

CHAN. 2 \_\_\_\_\_

CHAN. 3 \_\_\_\_\_

CHAN. 4 \_\_\_\_\_



TYPE OF LOAD CELLS: \_\_\_\_\_ TYPE OF LOAD CELL READOUT: \_\_\_\_\_

**TONNAGE SENSORS**

**CALIBRATION LOAD CELLS**

SENSOR NUMBER	SERIAL NO.	CAL. NO.	X 10	LOCATION (LF, RF, LR, RR)
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CELL NUMBER	CAPACITY TONS	SERIAL NO.	CAL. NO.
1			
2			
3			
4			

CCM TYPE: \_\_\_\_\_ CCM OFFSET: \_\_\_\_\_ STI REFERENCE NUMBER: LOW: \_\_\_\_\_ HIGH: \_\_\_\_\_

STI DEGREES IN CHANNEL No. 1: \_\_\_\_\_

TRIGGERED FROM PROBE ? YES \_\_\_ NO \_\_\_ (Show threshold value if not triggered from probe): \_\_\_\_\_

TRIPPED ALARM RELAY STOPS PRESS ? YES \_\_\_ NO \_\_\_ EXPLAIN: \_\_\_\_\_

ALL STICKERS AND DOCUMENTS FILLED OUT ? YES \_\_\_ NO \_\_\_ IF NOT, EXPLAIN WHY: \_\_\_\_\_

TFP No.: HIGH 2 \_\_\_\_\_ LOW 2 \_\_\_\_\_ HIGH 4 \_\_\_\_\_ LOW 4 \_\_\_\_\_ HIGH 6 \_\_\_\_\_ LOW 6 \_\_\_\_\_ HIGH 8 \_\_\_\_\_ LOW 8 \_\_\_\_\_

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTS MADE BY: \_\_\_\_\_ TESTS ACCEPTED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

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