N600

Force Monitor

By Toledo Integrated Systems

User's Manual

N600
User's Manual

Revision: A

Scan to visit us
on the web

Table of Contents

Table of Figures

1: Installation

Limited Warranty

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

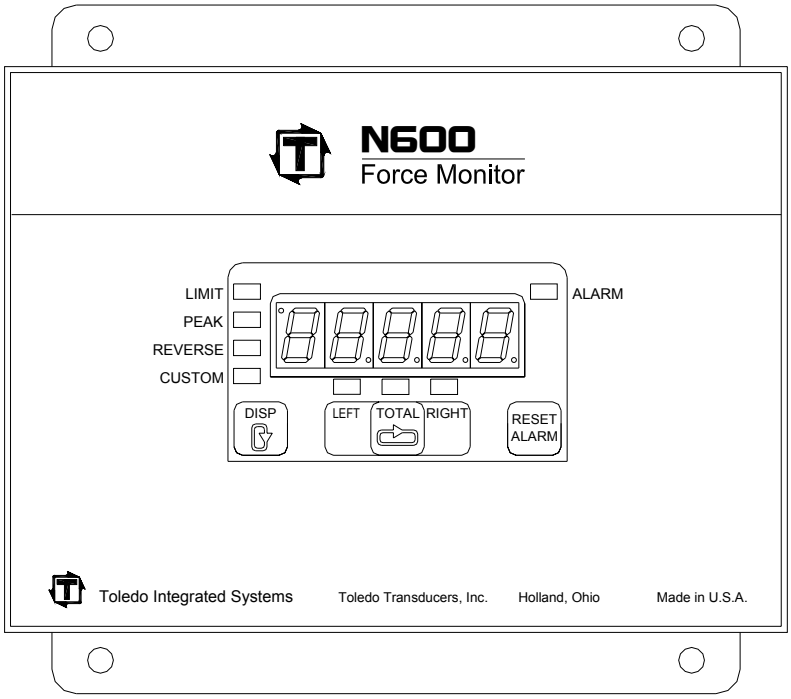
The express warranty set forth herein is in lieu of all other warranties, expressed or implied, including without limitation any warranties of merchant-ability or fitness for a particular purpose. All such warranties are hereby disclaimed and excluded by the manufacturer.
Repair or replacement of defective 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 N600 is a load monitor that interfaces with load sensors to provide force measurement for press protection and quality control. Load is displayed on high-visibility 7-segment LED display. The user interface consists of three tactile switches and a 7-segment LED display that provides a user-friendly interface.



FEATURES

- 2 channel load monitoring
- Reverse load
- 5-digit LED display
- 24VDC power input
- 1 shutdown relay (Top-Stop or E-Stop)
- Compact dust-proof enclosure

OPTIONS

- One RS422 serial port
- PressNet Software compatible
- Flush mount
- Ethernet port
- 110 and 220 VAC power input

Specifications

Load Input	No. of Channels	Two
	Sensor Inputs	Full bridge strain gage sensors 120 to 1,000 ohms Up to (4) 350 ohm sensors
	Sensor Excitation	Built-in 12VDC @ 300mA max (Short circuit protected)
	Sensor Input Connections	5-pin .15" pitch Phoenix connector
	Balance Adjustment	25-turn potentiometer
	Balance Range	+/- 1mV/V of offset
	Gain Adjustment	25-turn potentiometer
	Gain Range	Low Gain = 50 to 550 times High Gain = 500 to 5,500 times
	Analog Output	1.25VDC @ Press Capacity
	Analog Output Connection	4-pin header on PCB
	Inaccuracy	+/- 1% of full scale max
	Non-linearity	+/- .1% of full scale max
	Frequency Response	Flat DC to 6 KHz
	Resolution	Each channel provides a 5-digit load value in 1024 count resolution
	Calibration Shunts	1 Meg Ohm, 0.1% resistor
Speed Limit		Up to 400 SPM with threshold trigger Up to 2,000 SPM with probe trigger
User Interface	Display	5-Digit LED 7-segment display
	Keypad	Keypad consisting of three tactile switches
Computer Interface	Serial Port (Optional)	RS422 (9,600 or 115,200 baud) for PressNet serial interface
	Ethernet port (Optional)	10 Base T for PressNet Ethernet interface
Probe Input		Built-in voltage source (12VDC, 100 mA max) provides power for the probe. It supports NPN or PNP proximity probes, and solid state or dry contact relay.
Shutdown Relays	Top Stop relay	Mechanical relay with N.O. and N.C. contacts 8 AMP @ 250VAC or 30VDC

Supply Power	Requirements	20 Watts max 16-28VDC
	Fuse	1.0A for 24VDC input Fuse is TE5 type, Slow-Blow
Operating Temperature		0 to 70 degrees Celsius
Dimensions	Enclosed unit	8.07" W x 5.83" H x 2.80" D, or 205.0mm W x 148.1mm H x 71.1mm D
	Flush mount unit	8.07" W x 5.83" H x 1.80" D, or 205.0mm W x 148.1mm H x 45.7mm D

Mounting the N600 – Standard Installation

> ***Note:*** *This section is for mounting standard N600 units. If the flush mount option was purchased, refer to the next section for instructions on mounting the N600 with the flush mount option.*

The N600 is an electronic instrument and must therefore be protected from physical stresses such as shock and vibration. Shock mounts are provided with every standard N600 for this purpose. Failure to use these shock mounts may result in premature failure of the instrument and possibly void your warranty.

The N600 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 1.1 below provides the mounting dimensions and demonstrates the proper attachment of the provided shock mounts.

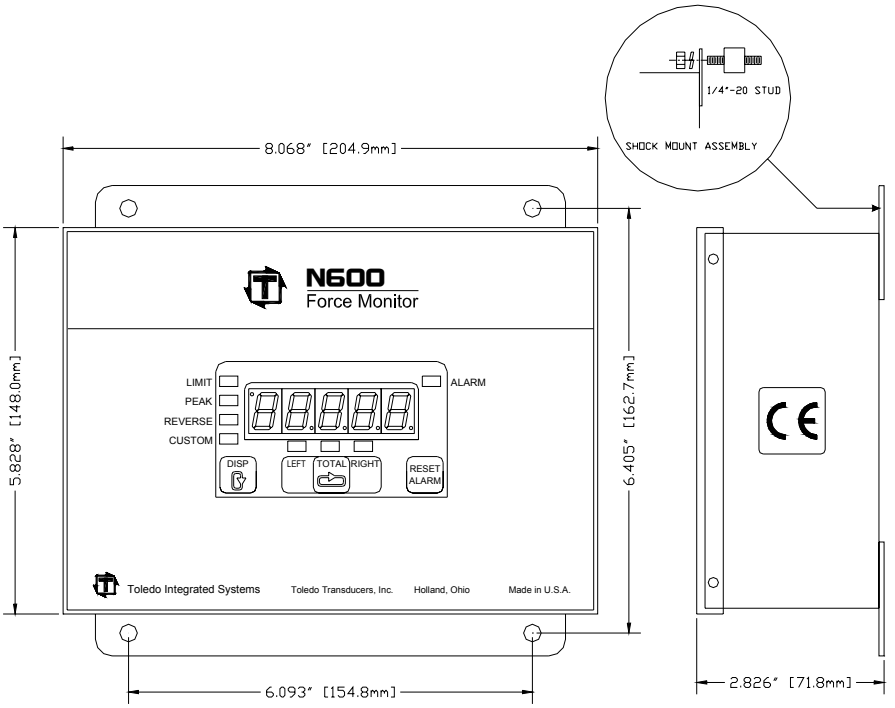


Figure 1.1: Standard Mounting Dimensions

Mounting the N600 – Flush Mount Option

An optional flush mounted installation is possible as shown in
Figure 1.2. The flush mount option has built-in anti-shock components, therefore external shock mounts are not required. As with the standard installation, the flush mount option allows the N600 to 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.

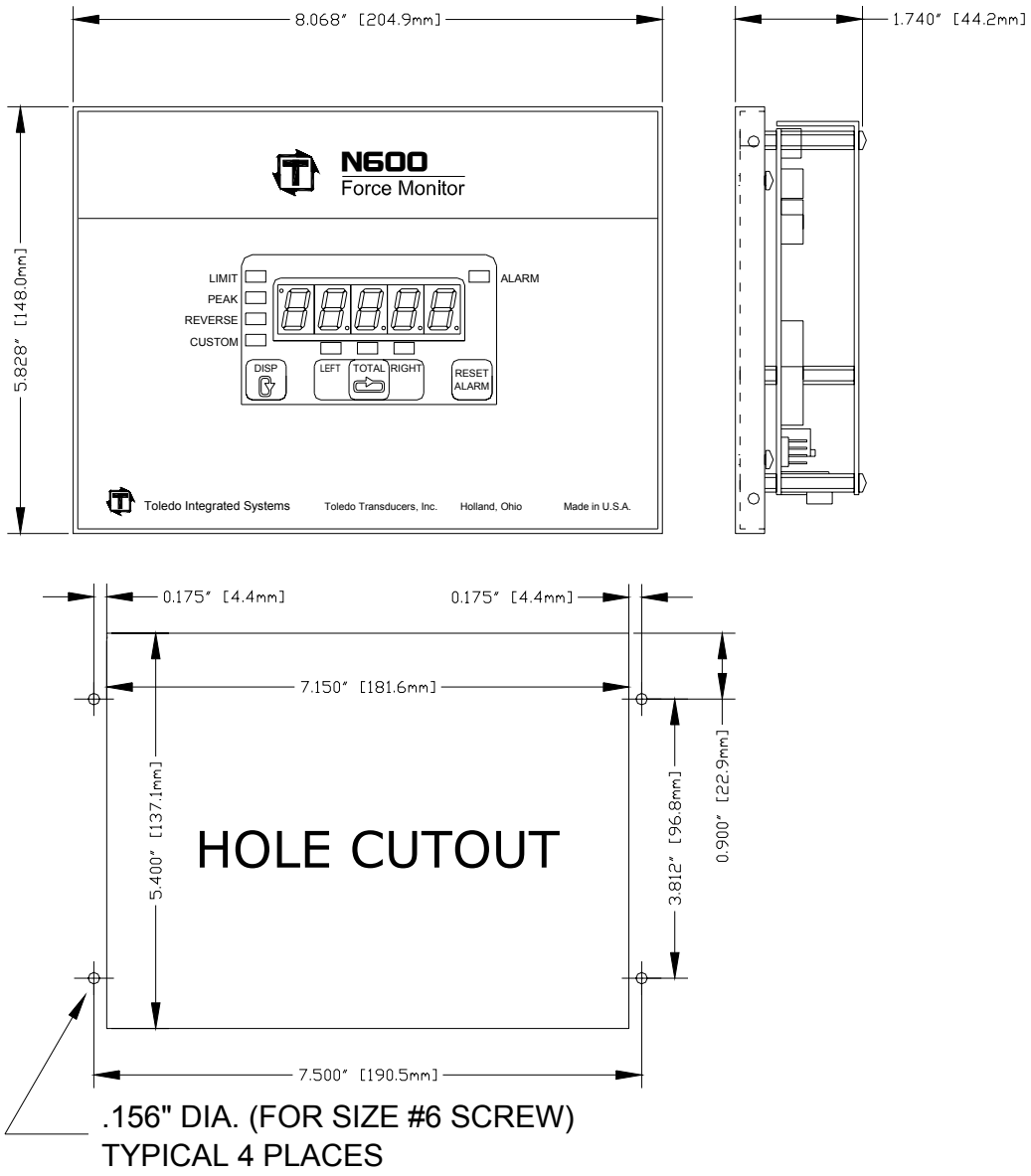


Figure 1.2: Flush Mount Mounting Dimensions

Note:

- A full size template is available in the Appendix section.

N600 Components

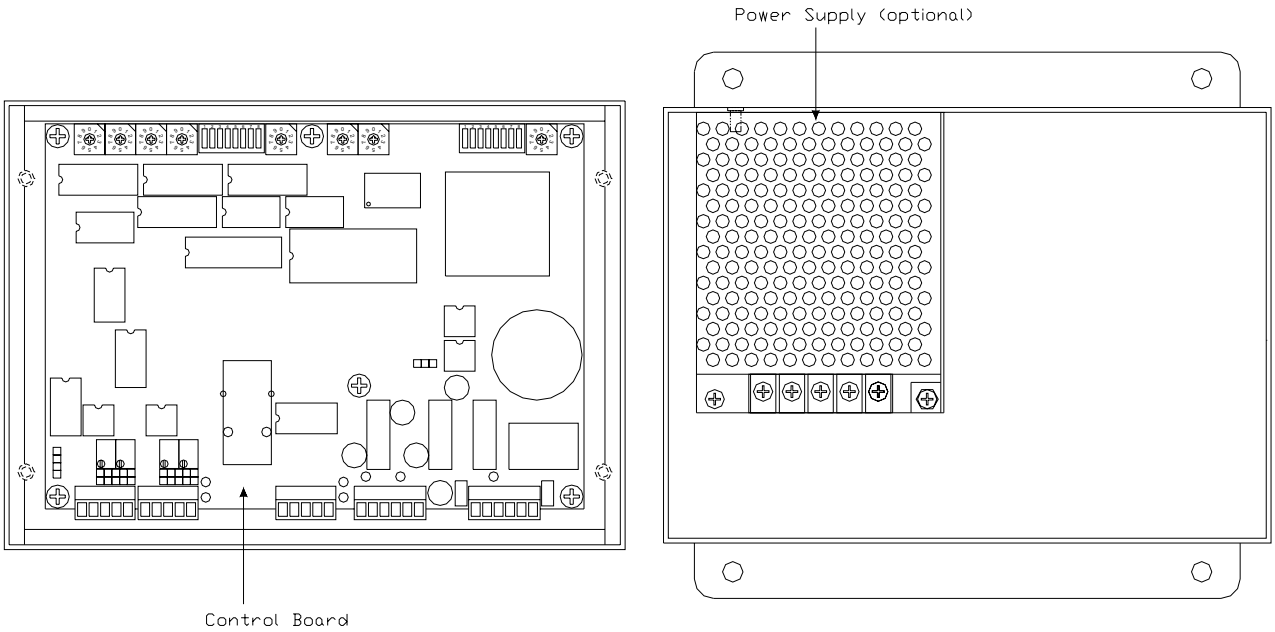


Figure 1.3: N600 Components

Hanging the Door

To make working inside the N600 Standard Unit more convenient, the door can be hung on the left side of the enclosure base.

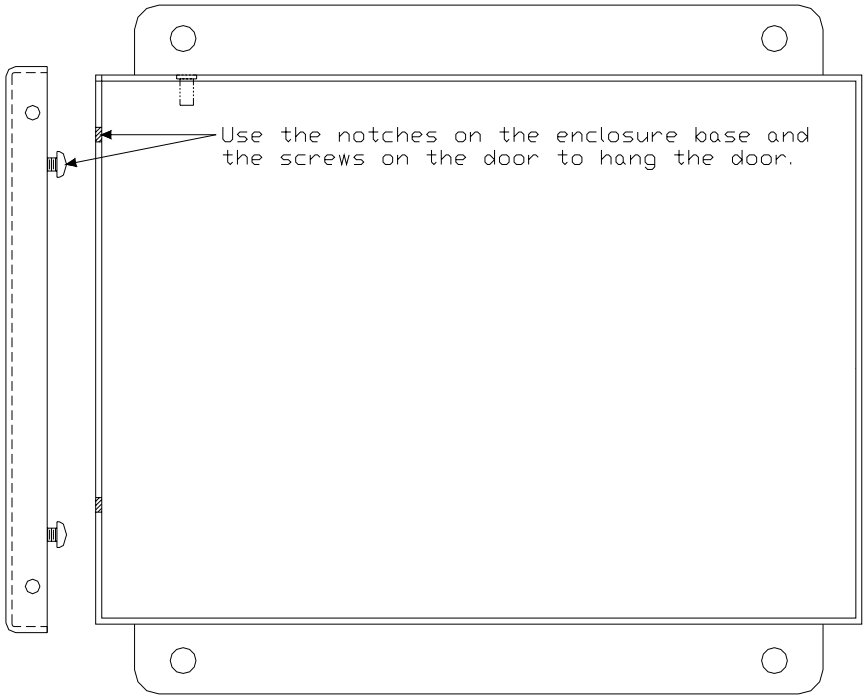


Figure 1.4: Hanging the Door

Conduit Hole Selection

Follow Figure 1.5 to select the proper conduit hole for cabling. The holes are for ½" conduit, but they can be enlarged in the field if a larger fitting is required.

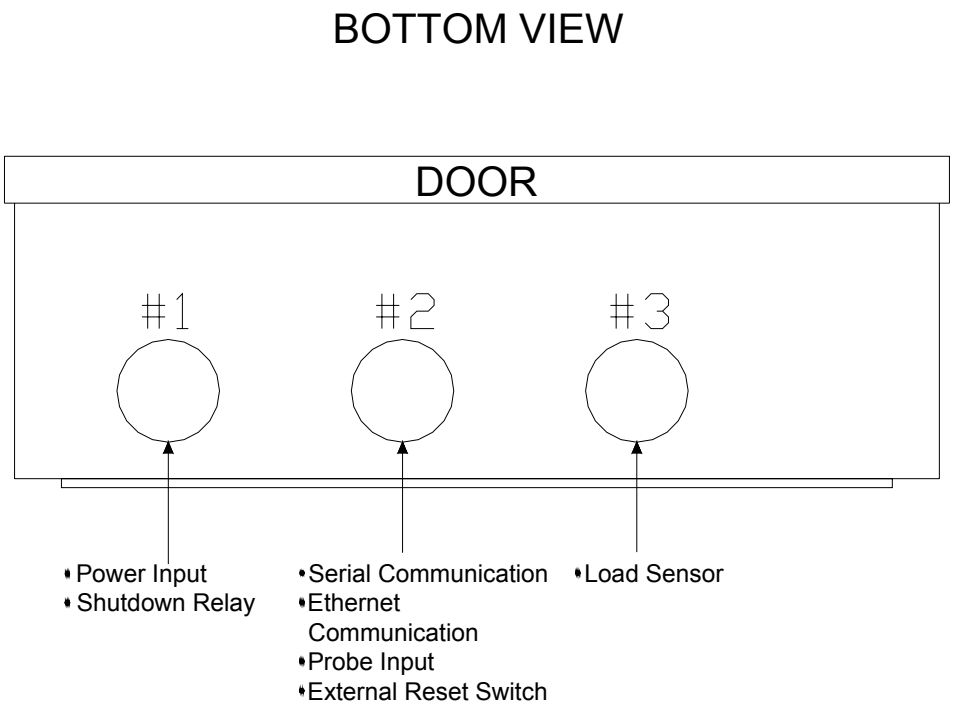


Figure 1.5: Conduit Hole Selection

DC Power Connection

DC power is connected to the N600's Control Board as shown in Figure 1.6. Use Conduit Hole #1 (see Figure 1.5) for the DC Power Wiring. Use the proper fuse as indicated.

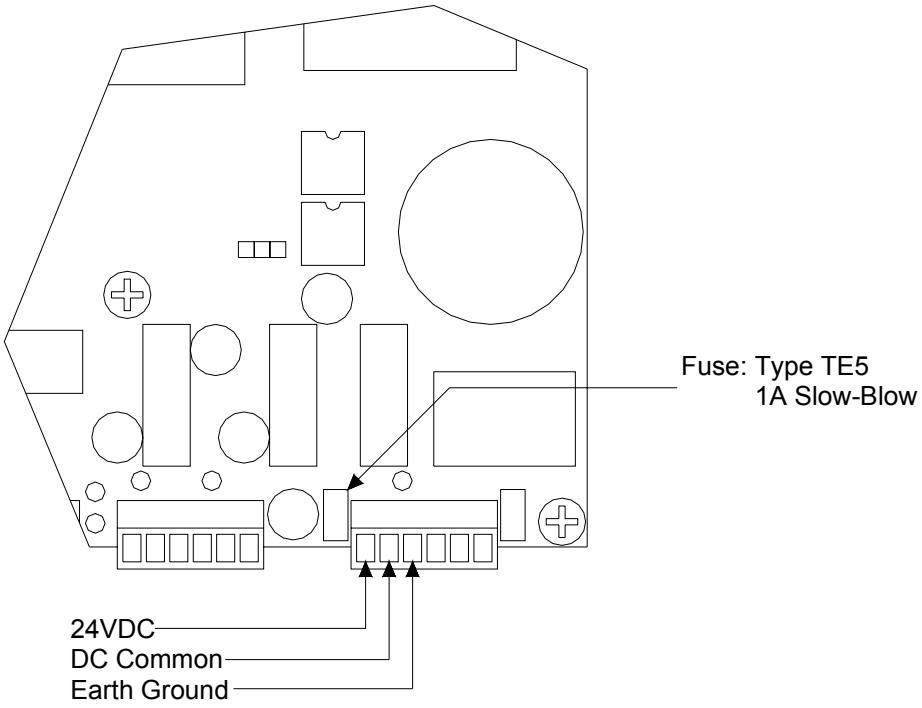


Figure 1.6: DC Power Connection

Sensor Input Configuration

Each channel input on the N600 can be configured to accept a signal from a strain gage sensor, a 4-20 mA signal, or a 0-10 VDC signal. Balance and gain adjustments are made via two potentiometers for each channel. When configured for tonnage sensor input, gain ranges of X1 and X10 are also selectable. Refer to the illustration below for the location of the balance and gain adjustments and available sensor input configurations.

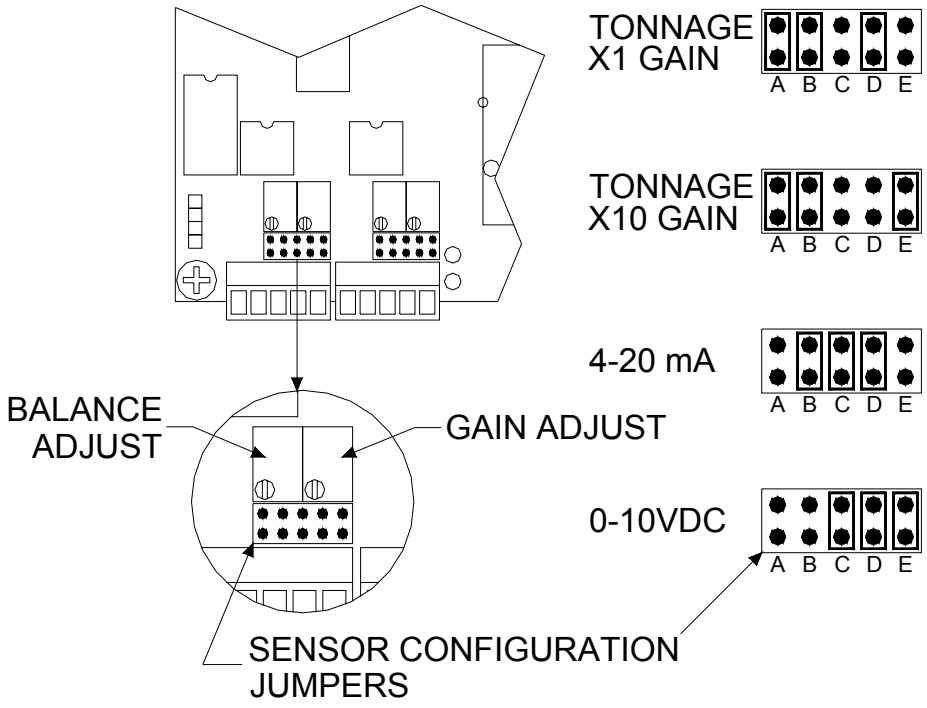


Figure 1.7: Sensor Configuration Jumper Settings

Load Sensor Connection

Refer to Figure 1.8 for the procedures below to connect tonnage sensors properly:

1) Power down the unit. Open the door of the N600 enclosure.

2) Run Load Sensor cables through Conduit Hole #3 (see Figure 1.5), and route cables upward to the Control Board.

3) Prepare the sensor cable for termination as described on page 17.

4) Remove the two 5-pin Phoenix plugs from the analog board and wire each sensor cable as described on page 18.

5) The 5-pin phoenix plugs can then be inserted into the corresponding sockets. The load sensor cable connections are now complete.

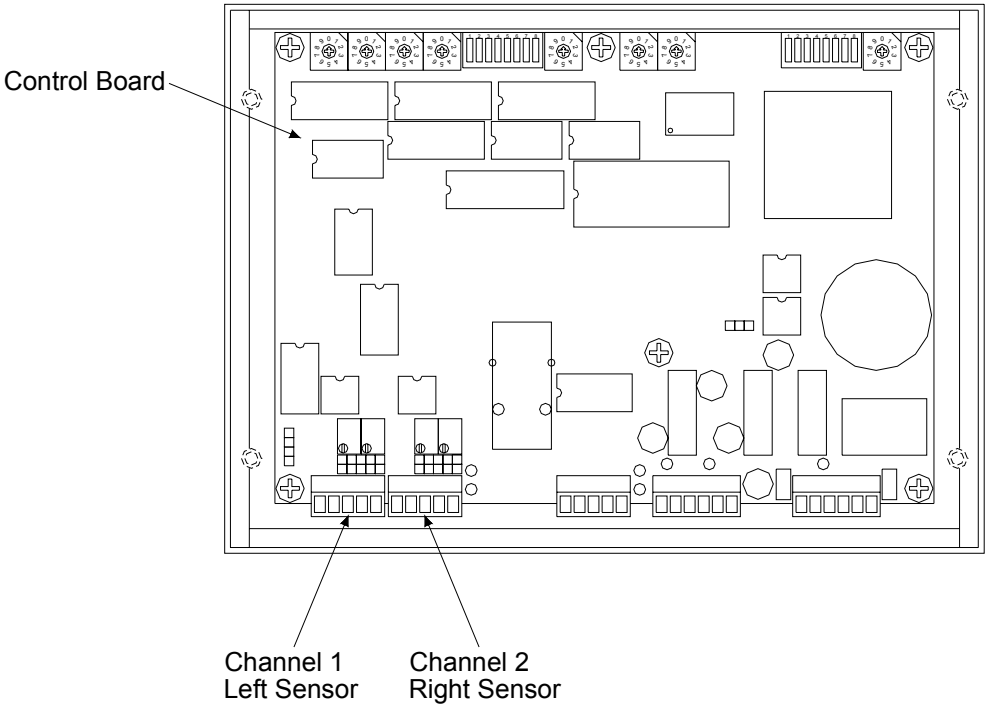


Figure 1.8: Sensor Input Locations

Sensor Cable Termination

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

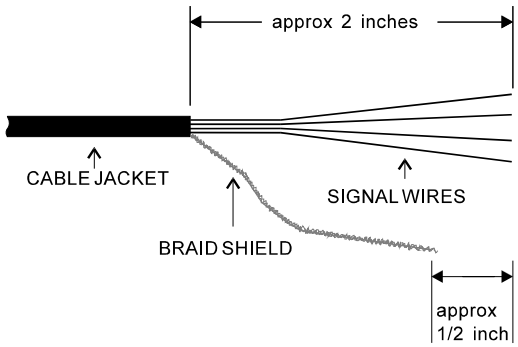


Figure 1.9: Sensor Cable Stripping

2) Strip approximately ¼" of insulation from each of the four signal conductors.
3) Trim braid shield so that it is ¼" to ½" shorter than the signal wires.

Note:

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

Sensors Connection

The N600 accepts the signals from Toledo Transducers T-400 sensors as well as other strain gage sensors. Figure 1.10 illustrates the sensor connections.

(Column-mounted sensor) (Pitman-mounted sensor)

Tension connection shown. For compression connections, switch the red and white wires. Make sure the shield braid does not contact the signal wire terminals.

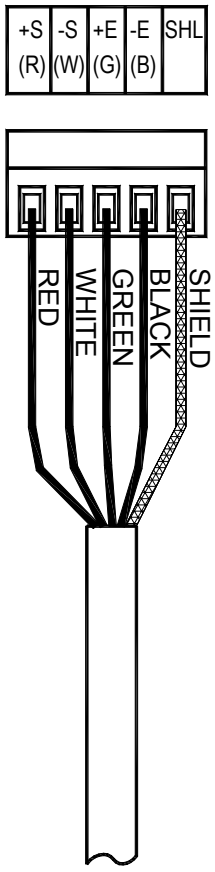


Figure 1.10: Sensor Wiring

Analog Output

The analog outputs are provided on a 4-pin header on the left side of the Control Board.

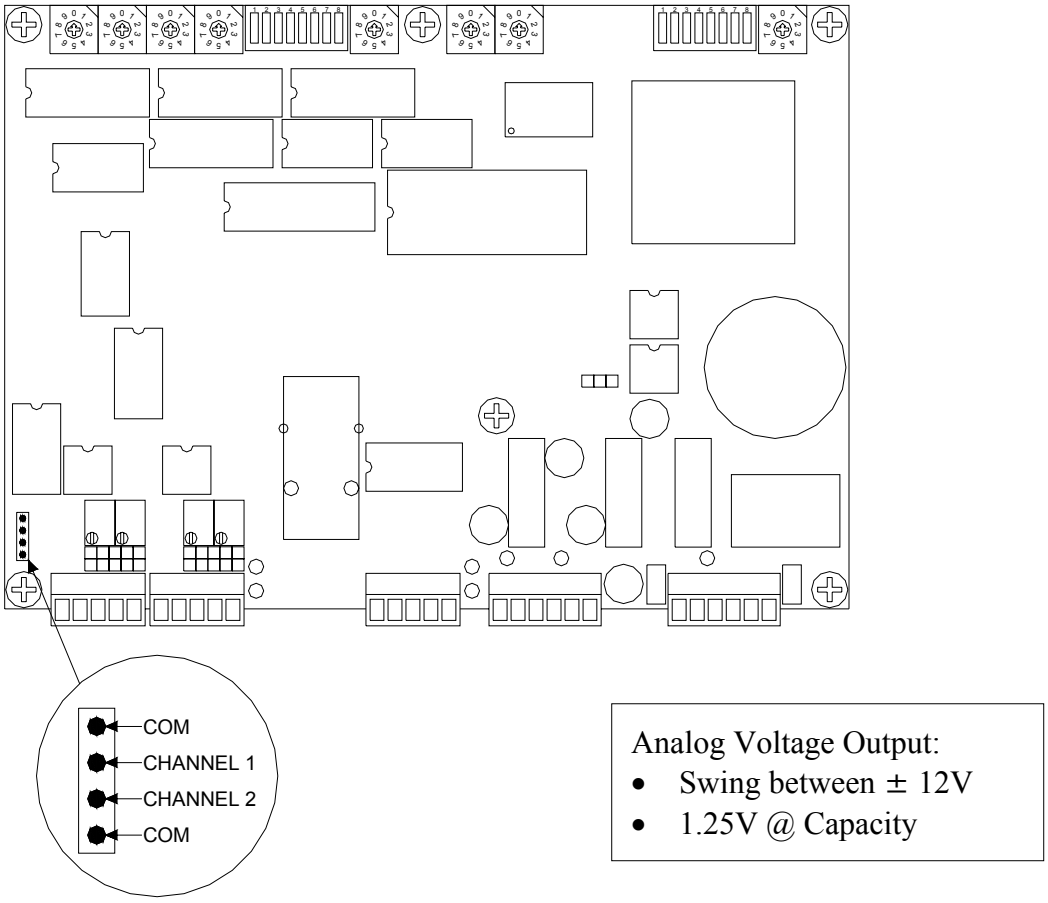


Figure 1.11: Analog Output Wiring

Probe Input

The probe supply voltage (+12VDC) is supplied by the N600 on the Vo terminal. The figure below shows the probe input location on the Control Board and illustrates different wiring possibilities. Use Conduit Hole #2 (see Figure 1.5) to run the probe wiring. After wiring is completed, you must configure the unit for Probe triggering (see Page 34).

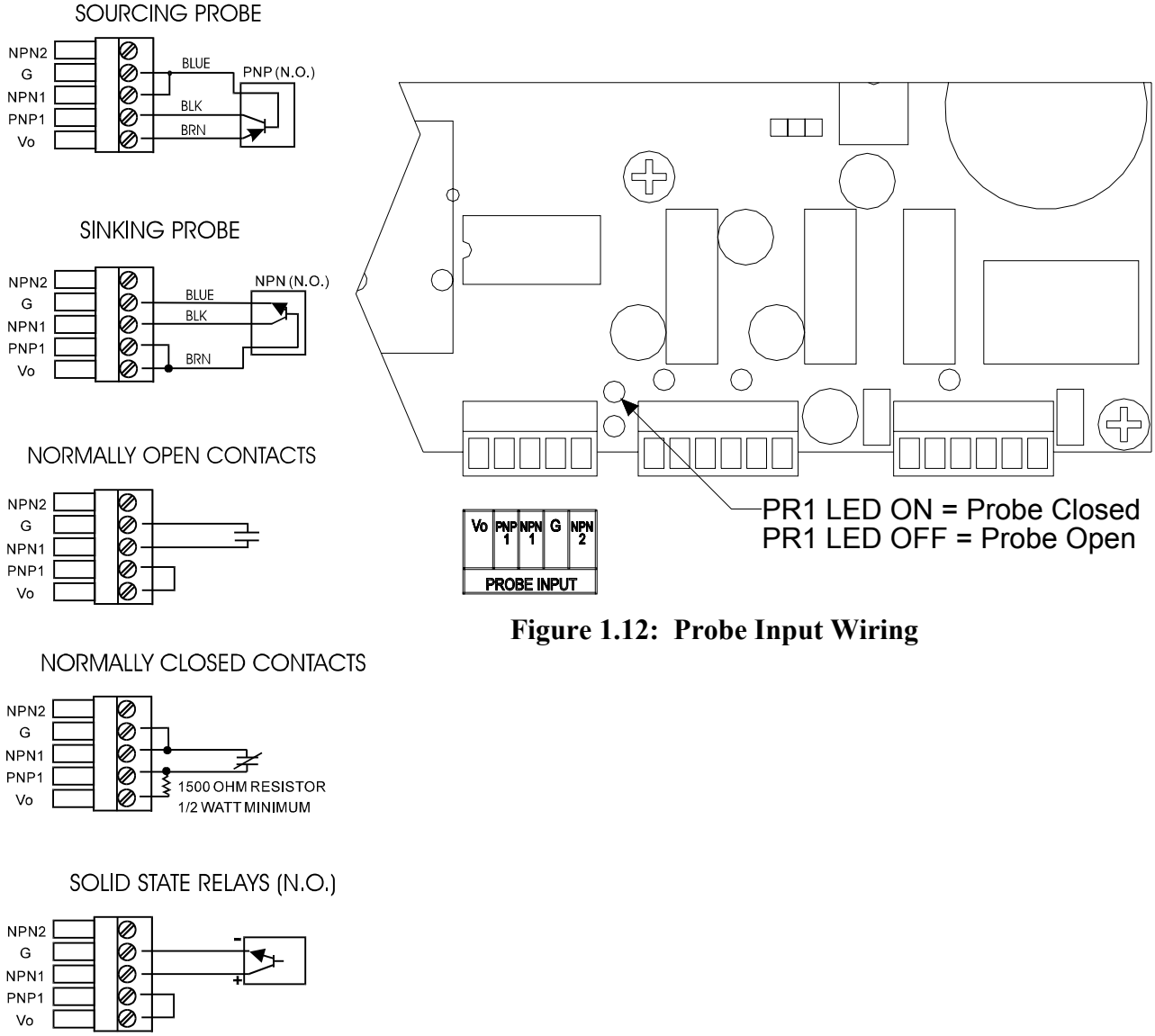


Figure 1.12: Probe Input Wiring

The timing of the probe should be such that it turns on just before the machine begins generating a load, typically at (140°) and remains on until the load is removed, typically at (240°).

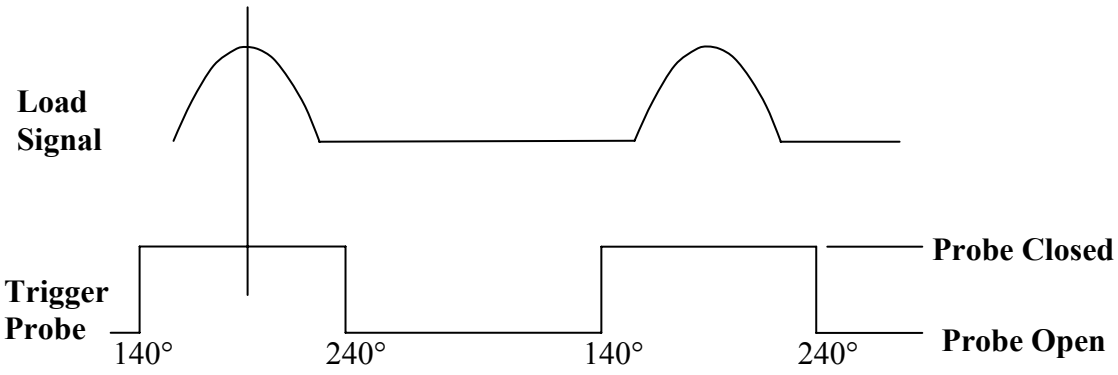


Figure 1.13: Probe Timing

External Reset Switch Connection

Two terminals are provided for connecting an external reset switch. The rating of the switch and wiring can be minimal because they interface with a small signal. Use Conduit Hole #2 (see Figure 1.5) to run the wiring for the reset switch.

NOTE – In order to reduce noise that may trigger false reset:

- Use twisted pair wires for the connection.
- Do not run this pair of wires along with any high voltage or high current cables.
- Keep the wiring no longer than 12 feet.

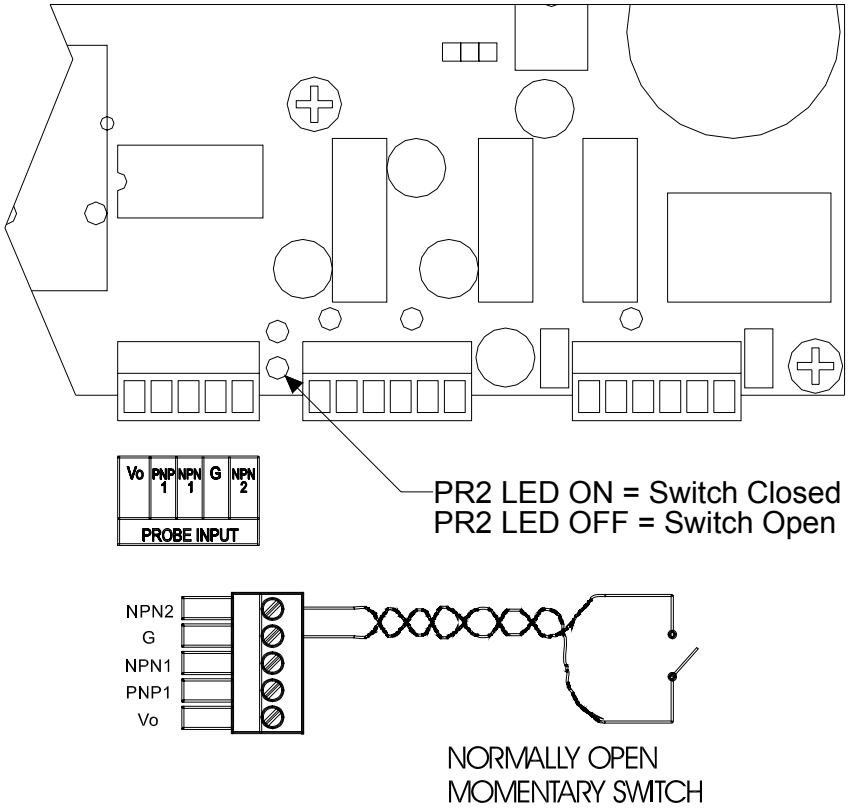


Figure 1.14: External Reset Switch Wiring

Serial Port Connection (Optional)

An RS422 serial port is available for interfacing the N600 with a computer running the PressNet software. RS422 allows the implementation of a daisy chain (multi-drop) serial network.

The RS422 port can be configured for the following baud rates:

- 9600
- 115.2k

The figure below details the location of the RS422 port. Wiring diagrams can be found on the next page.

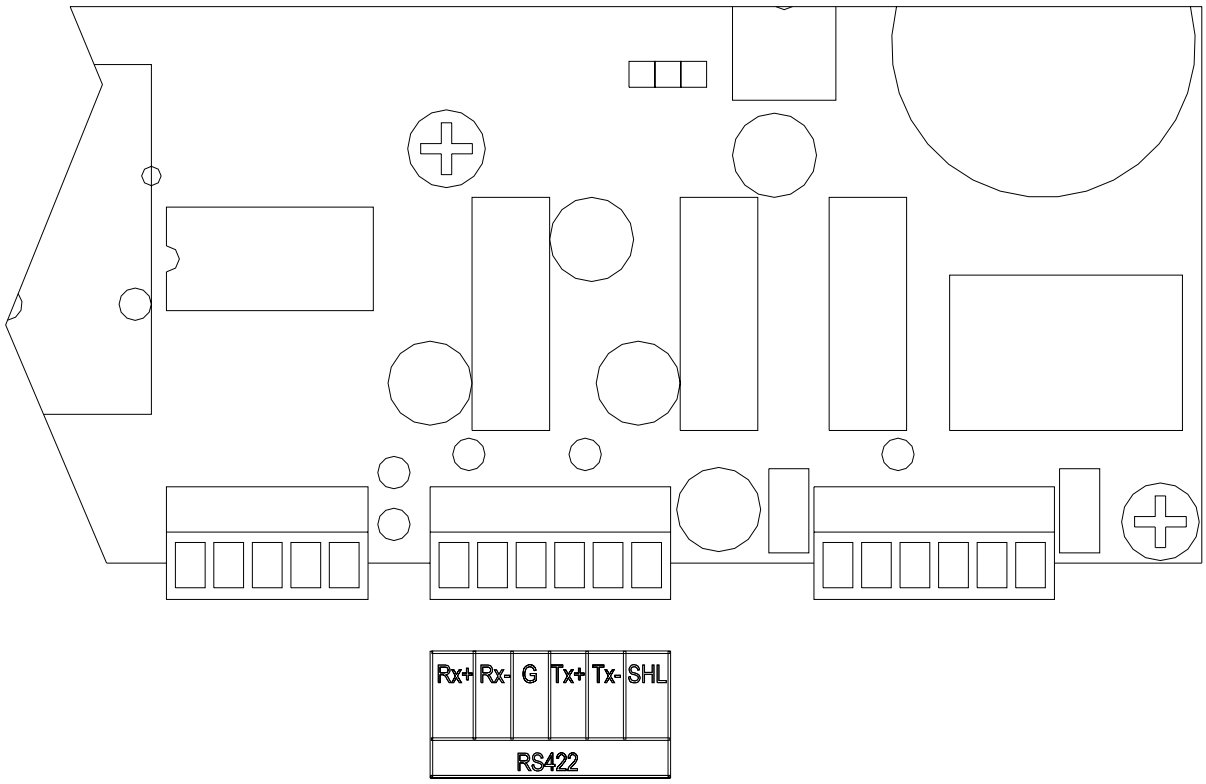


Figure 1.15: Serial Connection

Computer to single N600N600 monitor wiring:

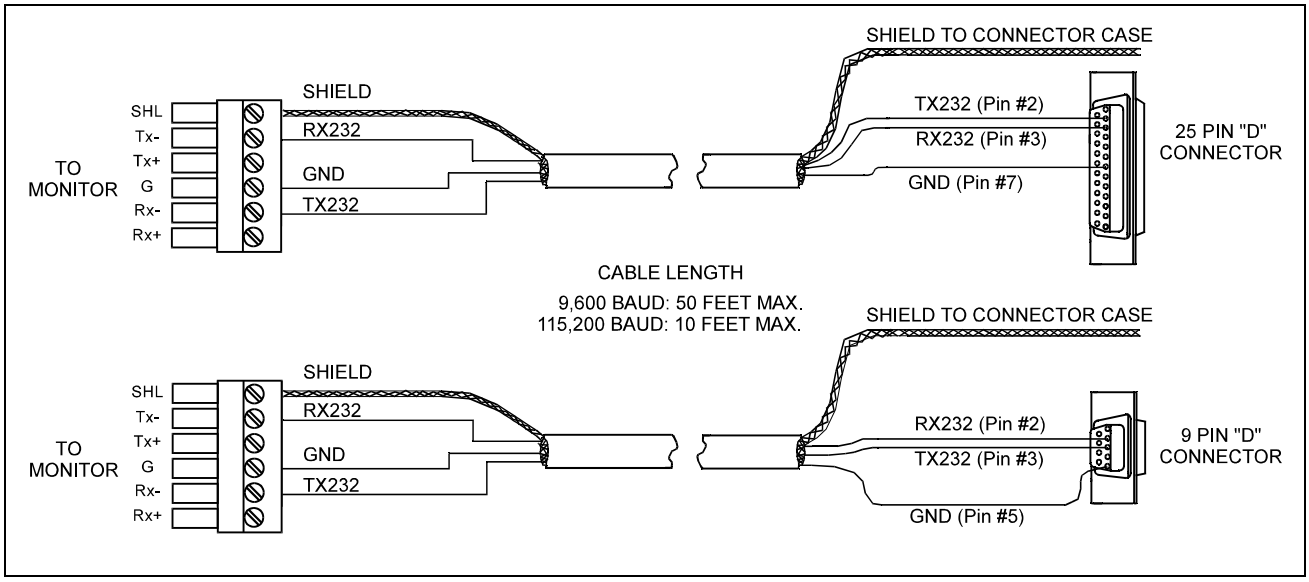


Figure 1.16: RS232 Serial Port Wiring

Computer to multiple N600N600 monitors wiring (Networking):

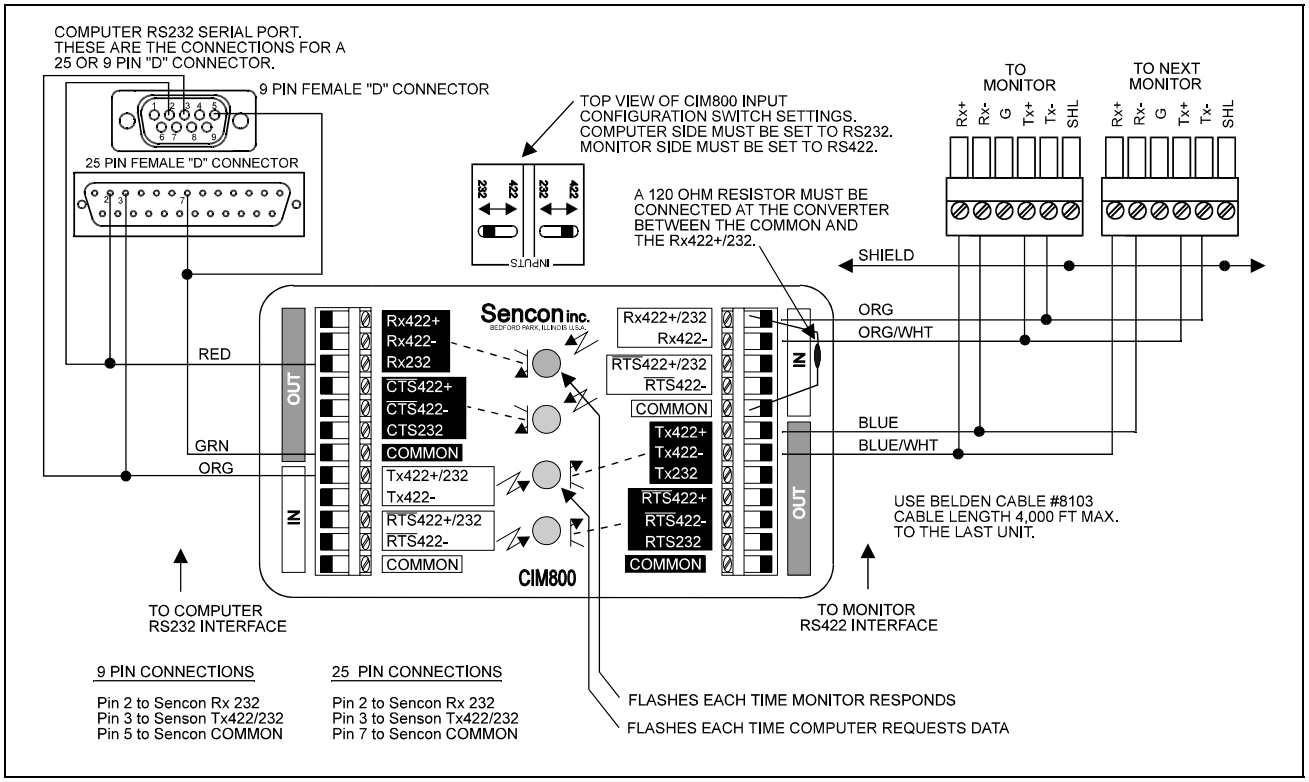
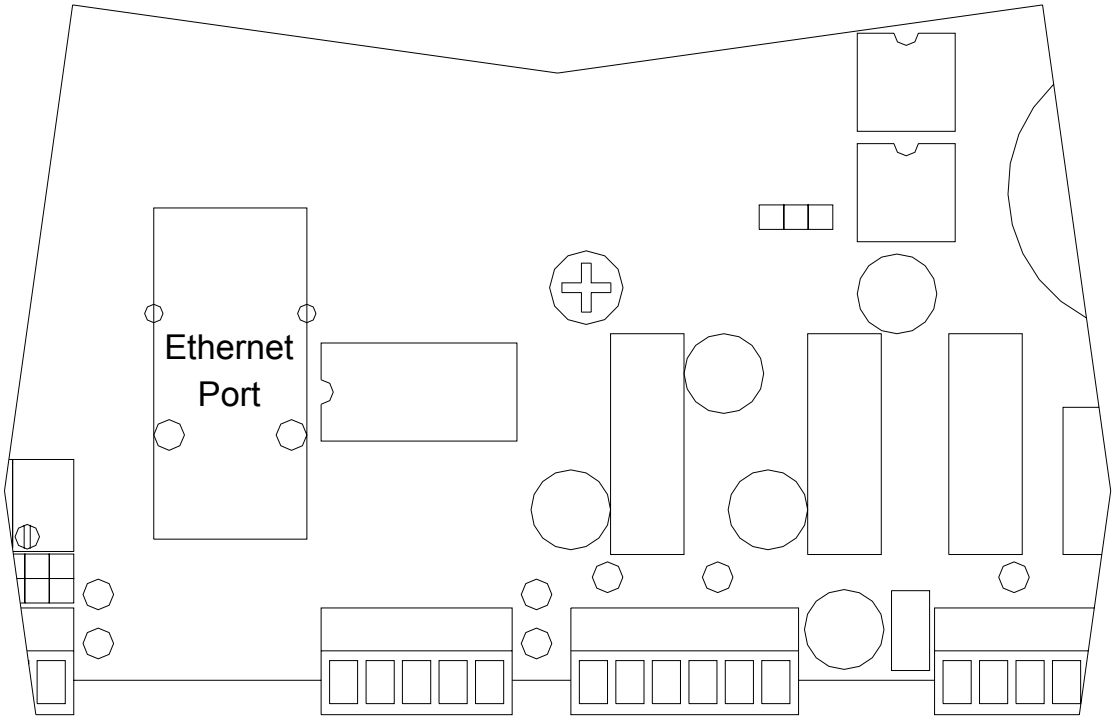


Figure 1.17: RS422 Serial Network Wiring

Ethernet Port Connection (Optional)

An Ethernet port is available for interfacing the N600 with a computer running the PressNet software.

The figure below details the location of the Ethernet port and the pin out of the RJ45 jack. Standard Ethernet cable can be used for the connection.



ETHERNET CABLE PINOUT (STRAIGHT-THROUGH)

RJ45 PIN#	WIRE COLOR	SIGNAL
1	WHITE/ORANGE	TRANSMIT+
2	ORANGE	TRANSMIT-
3	WHITE/GREEN	RECEIVE+
4	BLUE	UNUSED
5	WHITE/BLUE	UNUSED
6	GREEN	RECEIVE-
7	WHITE/BROWN	UNUSED
8	BROWN	UNUSED

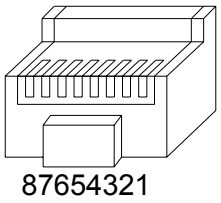


Figure 1.18: Ethernet Connection

Shutdown Relay

The N600 can be configured to issue a Top Stop, or an E-Stop (Emergency Stop). The relay provides both Normally Open (N.O.) and Normally Close (N.C.) contacts.

Use Conduit Hole #1 (see Figure 1.5) for the Shutdown Relay Wiring.

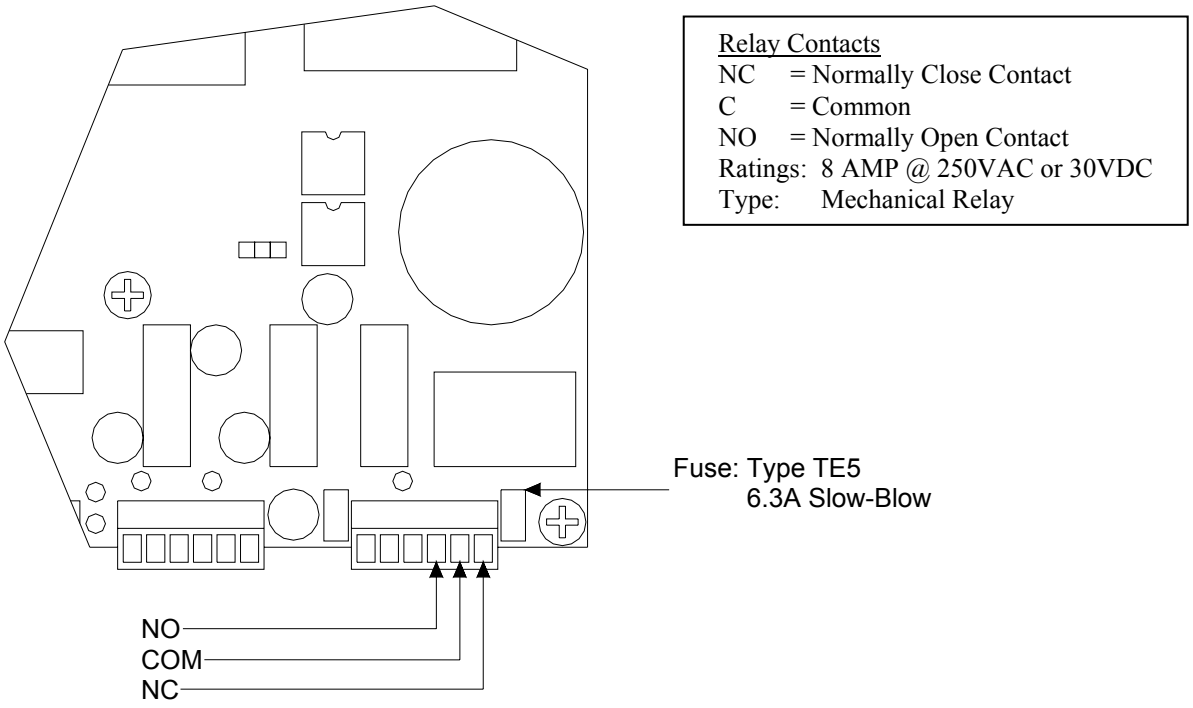


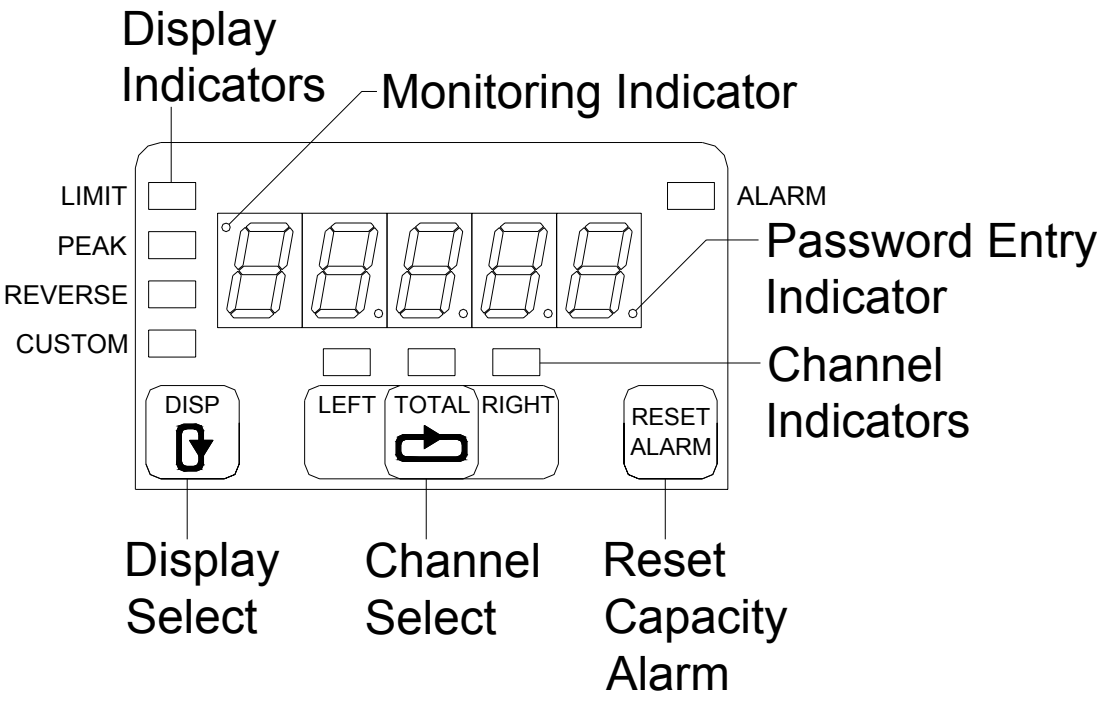
Figure 1.19: Shutdown Relay Wiring

Shutdown Relay Terminals
T-Stop = For use in the Press Top Stop circuitry.
E-Stop = For use in the Press Emergency Stop circuitry.

2: Operation

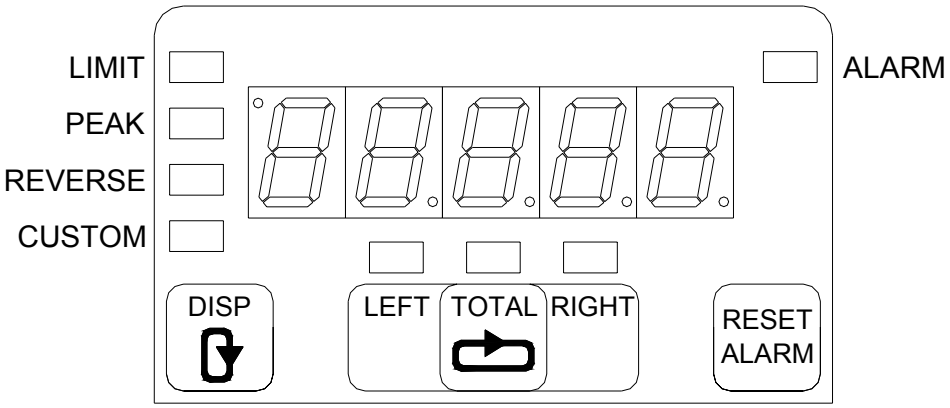
User Interface

The N600 is equipped with an easy to use user interface. The three push buttons are used to view parameters. The following describes the layout of the LED screen and the push buttons.



Understanding the Display

The layout of the 7-segment LED display and the eight other LED's are designed to be simple and require little explanation.



The N600 has four data types that can be displayed on the screen. To select the display press DISP to cycle through the different data types. The display will cycle from LIMIT to PEAK to REVERSE and CUSTOM if it is enabled.

- **LIMIT:** It will display the Capacity Limit of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders. The Capacity Limit can be set to equal to, greater than or less than the capacity (See page 38).
- **PEAK:** It will display the current peak load of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders.
- **REVERSE:** It will display the current reverse load of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders.
- **CUSTOM:** It will only be functional if it has been enabled. If enabled the custom display is capable of displaying the number of strokes (Count), strokes per minute (SPM), load in percent of capacity for each channel (Load in % of Cap), balance values for each channel (Balance), gain values for each channel (Cal. No.) or Diagnostic.

Note:

- If the information of the Left and Right channels needs to be reviewed frequently, you may put the display into a toggle mode. In this mode the display will automatically toggle between the Left and Right channels. To do this, cycle the display to TOTAL. Then press and hold TOTAL for three seconds. To take unit out of toggle mode cycle the display to TOTAL.
- The Monitoring Indicator will light up when the forming load is being analyzed.

Custom Display

The custom display can be easily configured by setting the Custom Display switch on the PCB.

To change the Custom Display

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the Custom Display switch.
2) Set the switch to the desired setting.

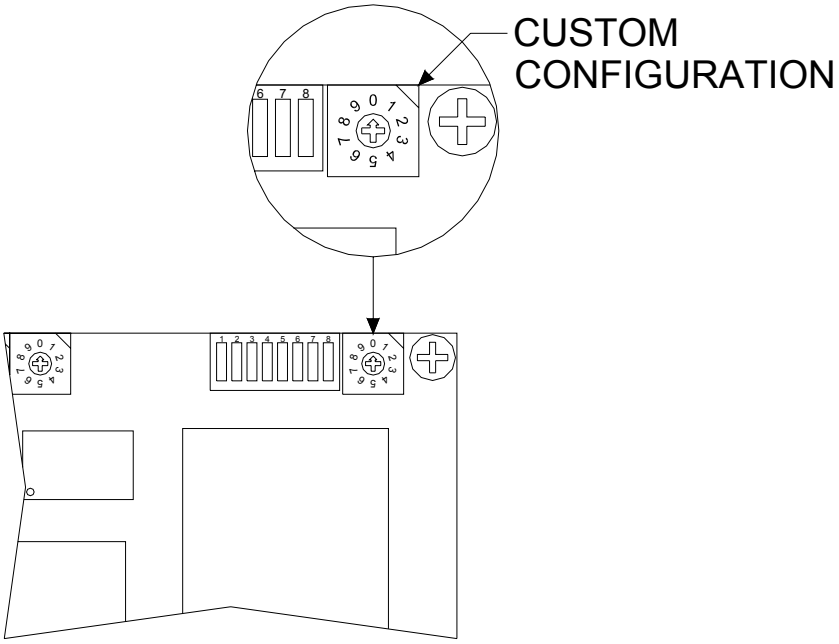


Figure 2.1: Custom Mode Configuration

Count

- To enable the Count set the Custom Display switch to 1.
- Press DISP until the unit is in Custom mode.
- The count records and displays the number of hits the press has made. This can be reset by pushing and holding RESET ALARM for three seconds.

SPM

- To enable SPM set the Custom Display to 2.
- Press DISP until the unit is in Custom mode.
- The SPM displays the current speed of the press in strokes per minute.

Load in % of Cap

- To enable Load in % of Cap set the Custom Display to 3.
- Press DISP until the unit is in Custom mode.
- Press TOTAL to cycle between the Left, Right and Total channels.
- The Load in % of Cap displays the current tonnage of each channel in a percentage of the capacity of that channel.

Balance

- To enable Balance set the Custom Display to 6.
- The mode will automatically switch to Custom.
- Press TOTAL to cycle between the Left, Right and Total channels.
- The Balance displays the balance values for each channel.

Cal. No.

- To enable Cal. No. set the Custom Display to 7.
- The mode will automatically switch to Custom.
- Press TOTAL to cycle between the Left, Right and Total channels.
- The Cal. No. displays the gain values for each channel.

Diagnostic

- To enable Diagnostic set the Custom Display to 9.
- The mode will automatically switch to Custom.
- The Diagnostic will display a diagnostic value.

Disable

- To Disable the Custom mode set the Custom Display to 0.

Alarm

When an Alarm occurs it is easy to reset. If no password is set up simply press RESET ALARM. If a password is set up you will be required to enter the pass code. To do this, follow the procedure below.

1. First let's assume the password is 313.
2. Press RESET ALARM. An LED will light up in the lower right corner of the LED display. This identifies that the keypad is in password entry mode. If you do not start entering the password within 10 seconds, the password entry will expire and the LED will turn off.
3. Press TOTAL three times. This is equal to the first number of the password.
4. Press RESET ALARM to enter the number.
5. Press TOTAL one time. This is equal to the second number of the password.
6. Press RESET ALARM to enter the number.
7. Press TOTAL three times. This is equal to the third number of the password.
8. Press RESET ALARM to enter the number.
9. The password is now entered and the alarm should be reset. When entering the password, if a mistake is made press DISP and start over at step 3.

Configuration

Decimal Point

- The Decimal Point controls the precision with which the load values are displayed. Up to 3 decimal places can be displayed.

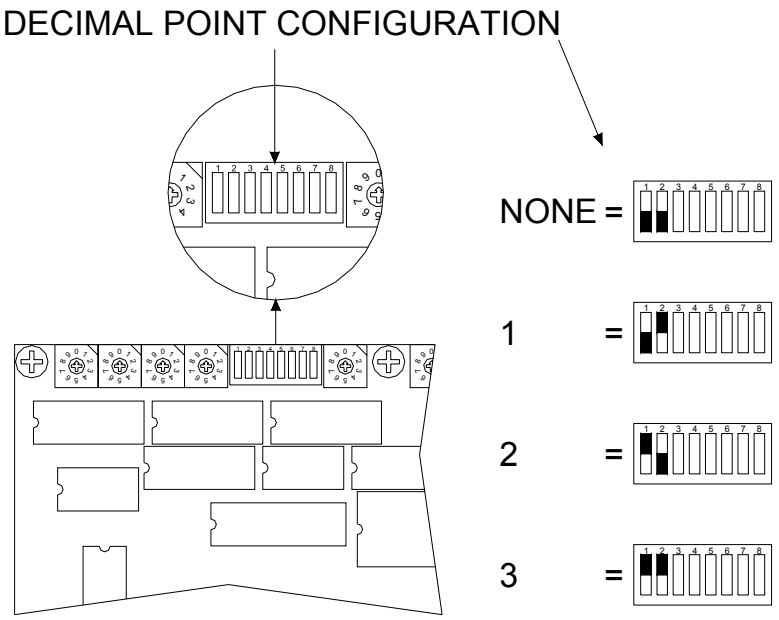


Figure 2.2: Decimal Point Configuration

To change Decimal Point

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Set the dip switches to the desired setting as shown in Figure 2.2 above.

Capacity

- The Capacity allows the total rated capacity value for the press to be entered.

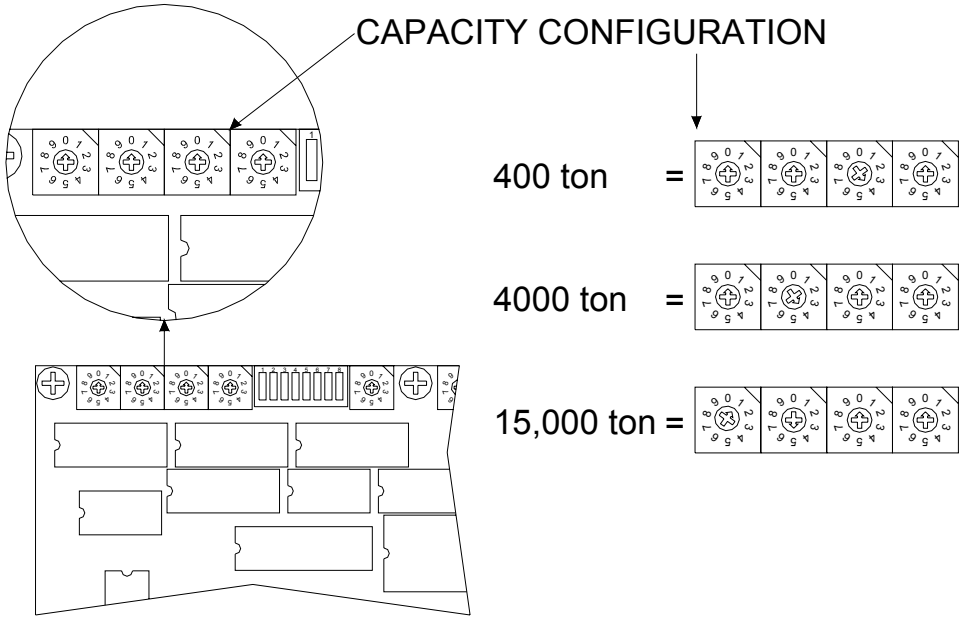


Figure 2.3: Capacity Configuration

To view Capacity Values

Capacity values are shown on the LED display. To view the capacities press DISP until the LIMIT LED is lit. The LEFT, RIGHT and TOTAL capacities can be viewed from this point. Press TOTAL to cycle between the capacity values.

To change Capacity Values

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the capacity switches.
2) Set the switches to the desired setting as shown in Figure 2.3 above.

Note:

- Always take the decimal point into account.
- The right most digit will always be a zero.
- When the Total Channel value is changed, the values of the corner channels are updated automatically with a value of Total Capacity divided by the number of channels. For example, if a total capacity of 800 is entered, the corner channel capacities will become 400 (800 ÷ 2).

Threshold

- When using threshold triggering for load capture, use the steps below to set the load value at which the monitor will capture the stroke. Total loads below this value will be ignored.

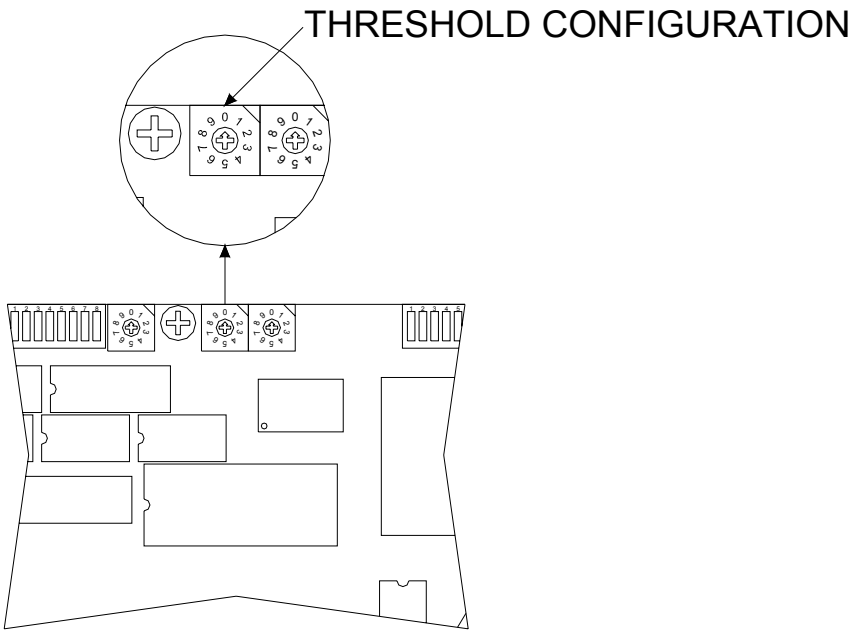


Figure 2.4: Threshold Configuration

To change the Threshold Value

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the threshold switch.
2) Set the Threshold to the desired setting.

Available Settings

0 = Use Probe
1 = 4%
2 = 8%
3 = 12%
4 = 16%
5 = 20%
6 = 24%
7 = 28%

Threshold Delay **(only available when trigger mode is set to Threshold)**

- When using threshold triggering for load capture, the Delay Menu provides a means of manually controlling the duration of the stroke capture. Load capture begins when the load crosses the threshold value and ends after the fixed delay time. This is advantageous for applications that produce a load that drops below and rises above the threshold value more than once within a single press stroke (i.e. a double hit).

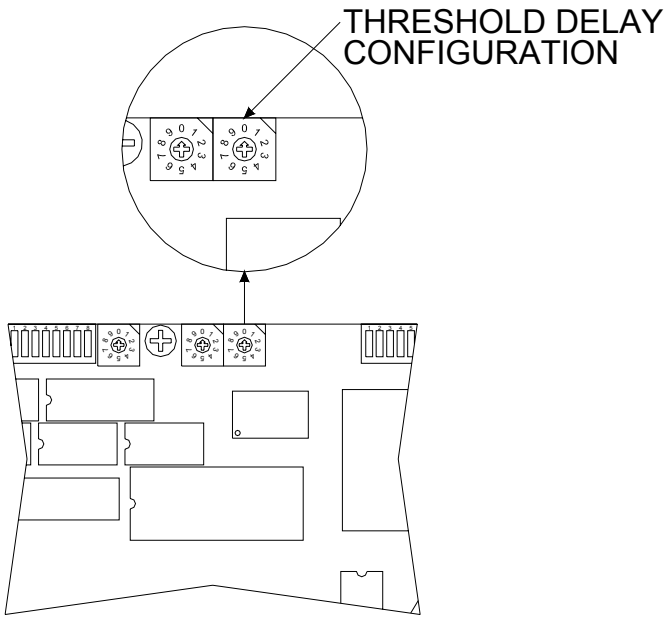


Figure 2.5: Threshold Delay Configuration

To change the Delay Value

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the threshold delay switch.
2) Set the Threshold Delay to the desired setting.

Available Settings

0 = Disable
1 = 15ms (>=1000 SPM) Should use a probe instead of a threshold value to trigger at this speed.
2 = 30ms (>=500 SPM)
3 = 60ms (>=250 SPM)
4 = 125ms (>=125 SPM)
5 = 0.25s (>=60 SPM)
6 = 0.5s (>=30 SPM)
7 = 1.0s (>=15 SPM)
8 = 2.0s (>=8 SPM)
9 = 4.0s (>=4 SPM)

Capacity Alarm Enable

- The unit can be configured so that the alarm function of each channel can be enabled or disabled.

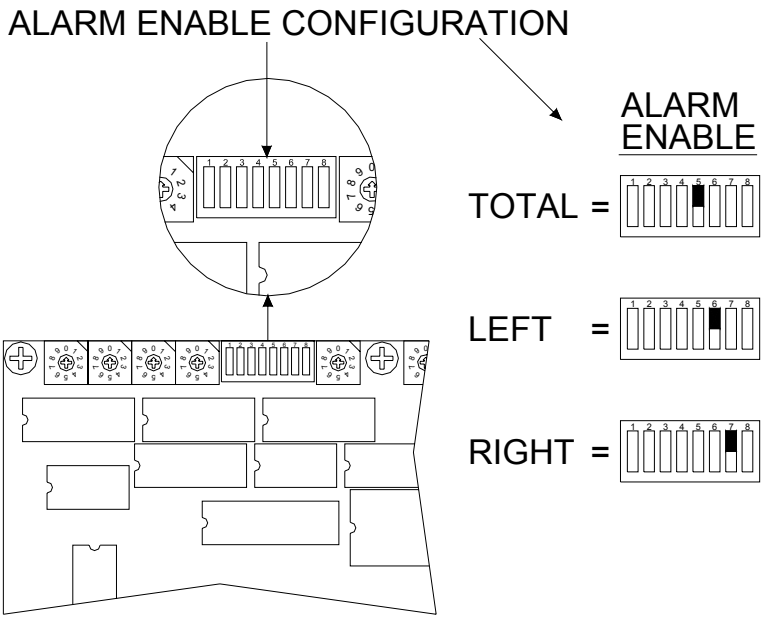


Figure 2.6: Alarm Enable Configuration

To change the Alarm Enable setting

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Set the unit to have the alarm enabled on the desired channels.

****CAUTION****

Disabling a capacity alarm function of any channel is a potentially dangerous situation. The monitor will not shut down the press when a press overload occurs. Equipment can be damaged and personnel may be seriously injured without shut down protection.

Alarm Reset Password

- The unit can be configured so that a password must be entered to reset an alarm.

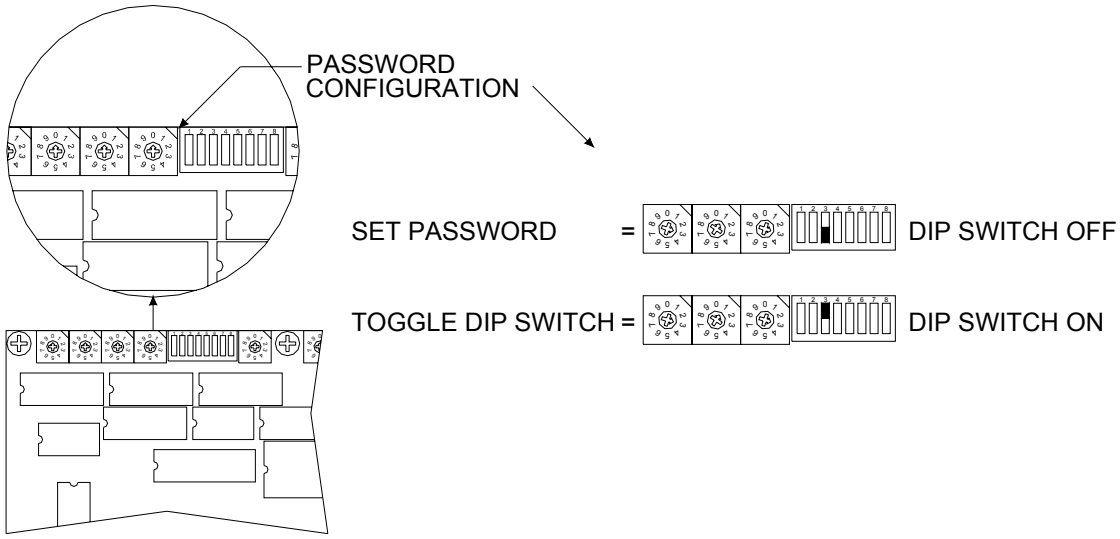


Figure 2.7: Password Configuration

To change the Password

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Power the unit back up.
3) Set the last three capacity switches to the desired password.
4) The third dip switch is normally in the "OFF" position. Toggle it to "ON" and then "OFF" again.
5) Set the capacity switches back to the original configuration.

Note:

- To configure the unit with no password set the pass code to 000.
- To configure the unit to use an external reset switch, set the pass code to 999.

Capacity Limit

- The unit can be configured so that the alarm triggers at a percentage of the press capacity. Capacity Limit is usually set to 100% of press capacity.

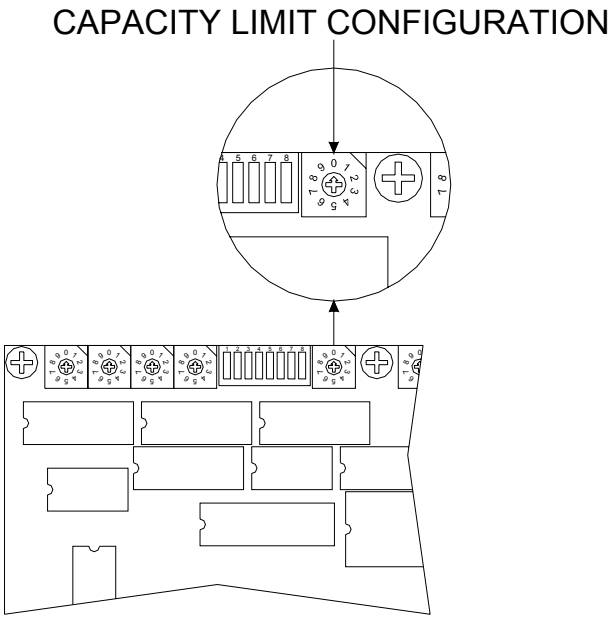


Figure 2.8: Capacity Limit Configuration

To change the Capacity Limit setting

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the switch.
2) Set the capacity limit to the desired setting.

Available Settings

0 = 100% (Typical Setting)
1 = 110%
2 = 120%
3 = 130%
4 = 140%
5 = 150%
6 = 60%
7 = 70%
8 = 80%
9 = 90%

Shutdown Relay

- The following describes how to configure the operation of the shutdown relay. It can be configured to stop the press at the end of the cycle (Top-Stop), or immediately (Emergency Stop).

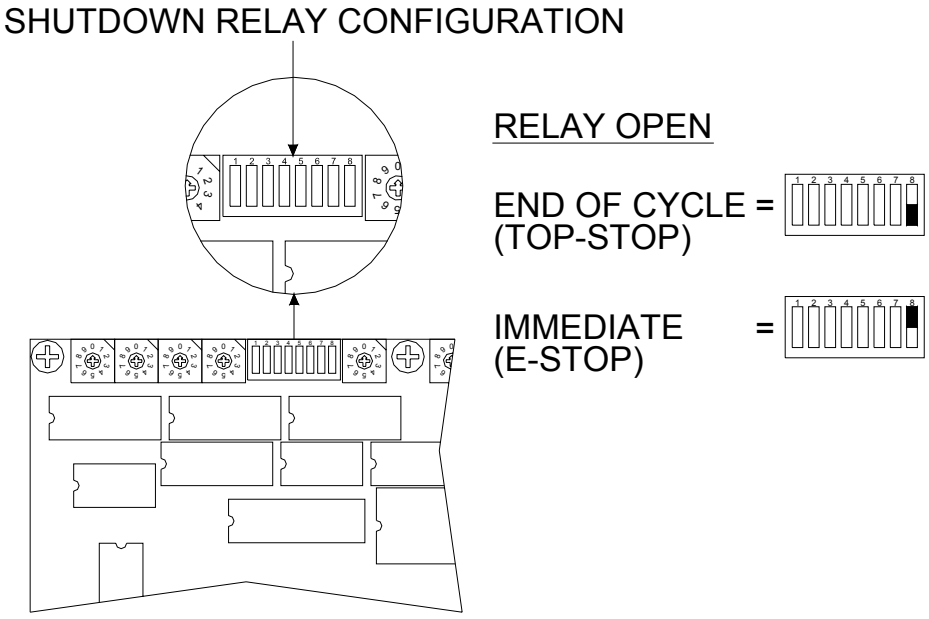


Figure 2.9: Shutdown Configuration

To change the Shutdown setting

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Set the Shutdown configuration to the desired setting.

Note:

- When T-Stop in used, the N600 shutdown relay must be connected to the press Top Stop circuit.
- When E-Stop in used, the N600 shutdown relay must be connected to the press Emergency Stop circuit.

Address (Optional)

- The Address Configuration only applies to units with a serial or Ethernet port. This sets the current communications address of the monitor and allows it to be changed to provide a unique networking address for use with PressNet or other communications software.

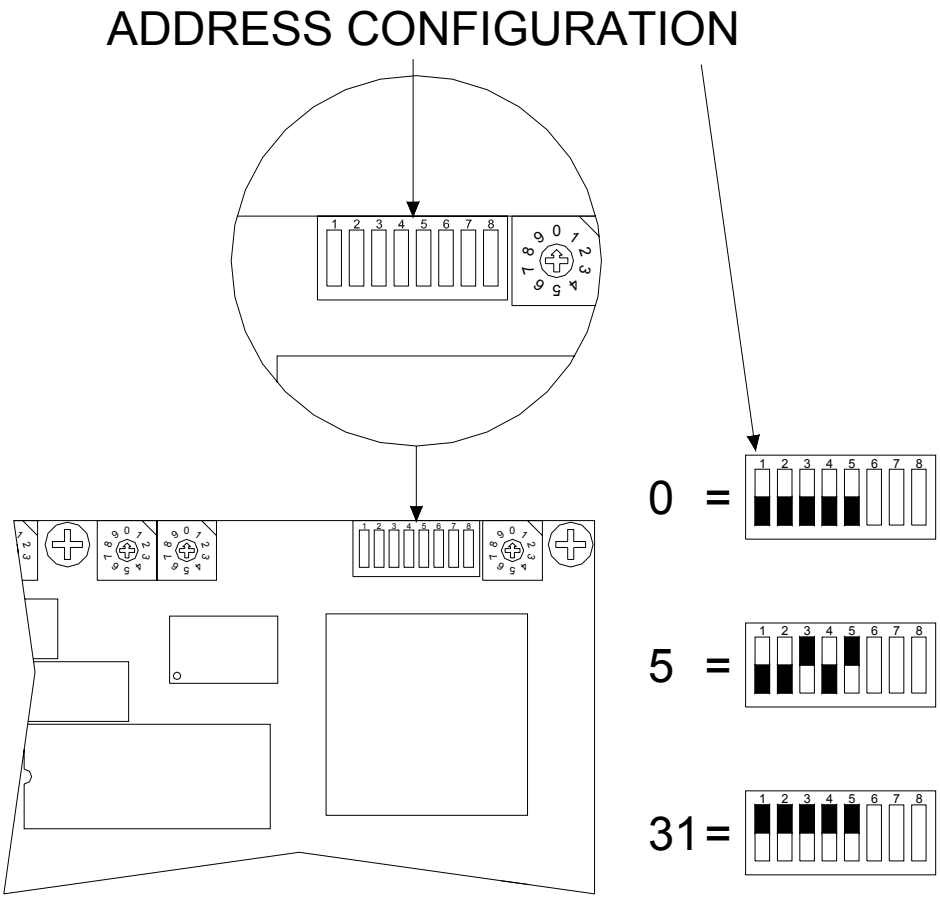


Figure 2.10: Address Configuration

To change the Address

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Set the address to the desired setting.

Note:

- The 5 dip switches work like a binary presentation of its decimal value.

Baud Rate (Optional)

- The Baud Rate Configuration allows the communications speed for the PressNet (RS422) Port to be adjusted.

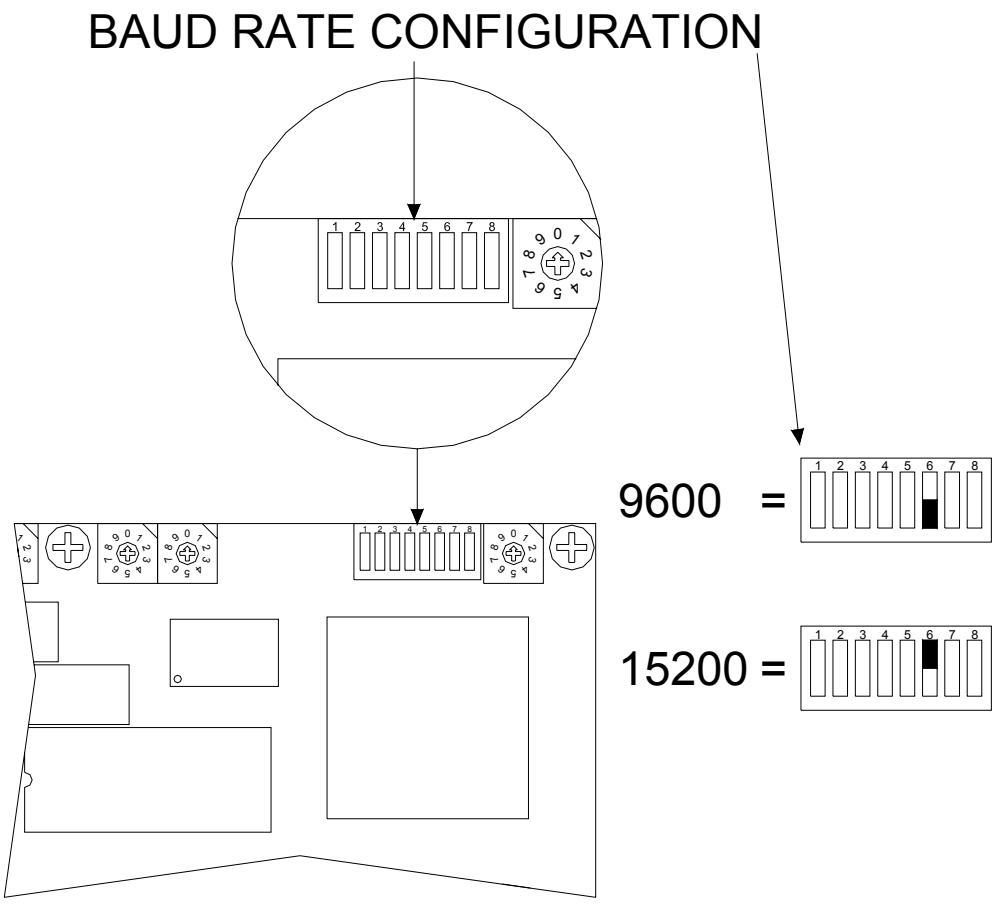


Figure 2.11: Baud Rate Configuration

To change Baud Rate

1) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.
2) Set the baud rate to the desired setting.

3: Calibration Procedure

Use the following steps for proper load calibration of the N600 unit.

1) Verify Sensor Input Jumpers are set to "Load with X10 gain" for each channel. See page 14.

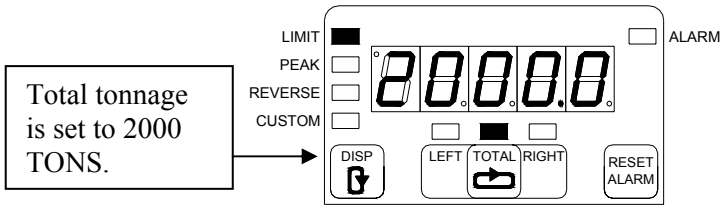
2) Set Decimal Point

A) Power down the unit. Open the door of the N600 enclosure so that you can gain access to the dip switches.

B) Set the dip switches as shown in Figure 2.2 to get the most accurate tonnage reading on the display.

3) Set Press Capacity

A) Taking into account the decimal point use the capacity switches to set the total capacity as shown in Figure 2.3.

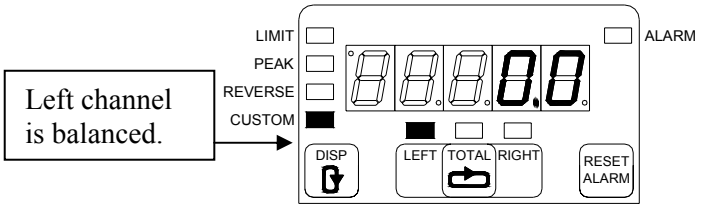


4) Balance the Tonnage Sensors

A) Make sure the press is under no load.

B) Open the N600 enclosure and locate the Custom Display switch on the Control Board (see Figure 2.1). Set the Custom Display to 6 to view the balance.

C) Locate the Balance and Gain pots on the Control Board (see Figure 1.7). Adjust the balance pot for the Left Channel until the balance value for channel 1 reads zero. Turn the pot clockwise to increase the balance value and counter-clockwise to decrease the balance value.



D) Repeat for the Right channel.

5) Find the Shut Height of the Press

A) Jog the press until the ram is at bottom dead center (BDC) or 180º without any load cells or 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.

6) 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 the sides, 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.

7) Cycle the Press

A) Set the Custom Display switch to zero.

B) Push DISP until the N600 is showing PEAK data.

C) Further adjust the shut height so that the press impacts the load cells and generates a 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 situation from happening, do one of the following:

a) Calibrate the press only up to 80% of capacity, or

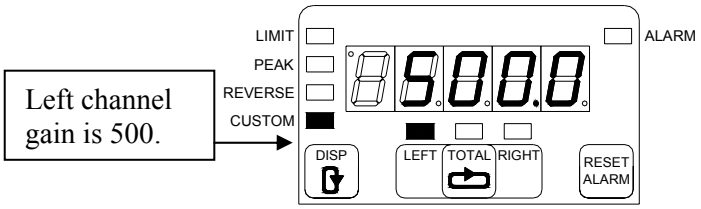
b) Use larger load cells to increase the loading surface. For instance, to calibrate a 400 Ton press at capacity, use (4) 250 Ton load cells instead of (4) 100 Ton load cells.

8) 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 N600.

C) Set the Custom Display switch to seven to display the Gain numbers. Record the Gain numbers for the Left and Right channels.



D) Use the following formula to determine the new gain number:

New Gain Number = (Load Cell reading ÷ Peak Tonnage reading) x Current Gain Number

E) Repeat the calculation for each channel.

F) Adjust the gain pot for the Left channel until the gain number equals the new calculated gain number. Turn the pot clockwise to increase the gain number and counter-clockwise to decrease the gain number. Repeat for the right channel. If the gain number cannot go any lower, set the sensor input jumper to X1 gain. See page 14.

G) Set the Custom Display to six to display the Balance values. Use the balance pots to re-balance the channels if needed.

H) Set the Custom Display to seven to display the Gain numbers. If they are not equal to the calculated gain numbers, re-adjust them. Repeat steps **F-H** as needed.

9) Verify Results and Repeat

A) Set the Custom Display switch to zero.

B) Push DISP until the N600 is showing PEAK data.

C) Cycle the press.

D) Verify that the load cell values and the N600's peak tonnage values are same. If not, repeat step 7 until the values are the same.

10) 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 N600. These values should be documented.

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

12) Record Gain Numbers

A) Set the Custom Display to seven to display the Gain numbers.

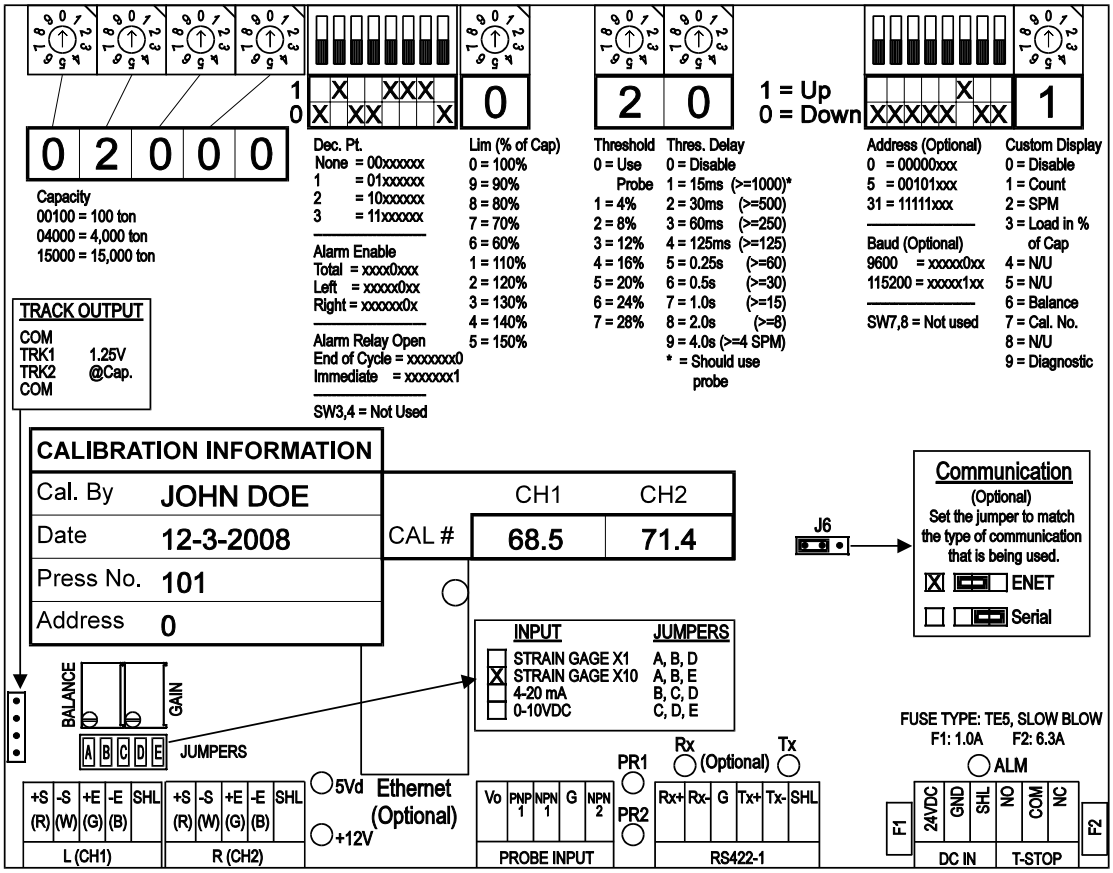
B) Record these numbers on the calibration card located inside of the unit. See section 4 for details on the calibration card.

13) 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.

4 : Calibration Information Card

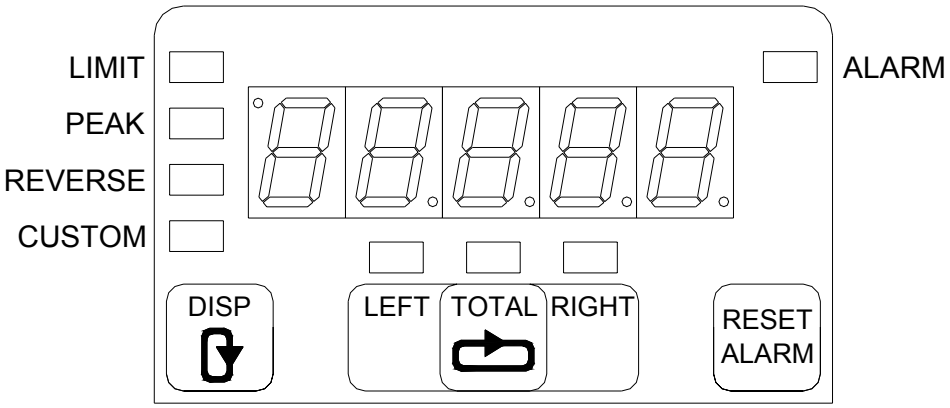
The Calibration Information Card is provided to document the Gain Numbers (CAL#), Capacity and other important configuration data. This card is located inside of the unit. Below is an example of the information that should be documented.



1) **Capacity (Total)**
   The total capacity of the press.
2) **Dec. Pt.**
   The number of decimal places.
3) **Alarm Enable**
   The channels that can trigger the alarm.
4) **Alarm Relay Open**
   The point at which the Shutdown relay will open when an alarm occurs.
5) **Limit**
   The percentage of the capacity that will trigger the alarm.
6) **Thres. Value**
   The load level (% of capacity) the monitor will start monitoring at. If set to zero the monitor will use a probe to trigger.
7) **Thres. Delay**
   The delay time after the forming load exceeds the threshold.

8) **Address (Optional)**
   The network/communication address for the monitor.
9) **Baud Rate (Optional)**
   The speed of communication.
10) **Custom Display**
   The item that will be showing when CUSTOM display is selected.
11) **Cal By**
   The name of the person that performed the calibration procedure.
12) **Date**
   The date that the calibration was completed.
13) **Press No.**
   The press on which the monitor is installed.
14) **Address (Optional)**
   The network/communication address for the monitor.
15) **CAL# (CH1&2)**
   Record the Gain Numbers from step 11 of the Calibration Procedure here.
16) **Jumper Configuration (CH1&2)**
   Record the jumper configuration for CH 1&2.
17) **Communication Type (Optional)**
   Mark the J6 setting for the type of communication the monitor is using.

5: Operator's Guide



The layout of the 7-segment LED display and the eight other LED's are designed to be simple and require little explanation.

The N600 has four data types that can be displayed on the screen. To select the display push DISP to cycle through the different data types. The display will cycle from LIMIT to PEAK to REVERSE and CUSTOM if it is enabled.

- **LIMIT:** It will display the Capacity Limit of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders. The Capacity Limit can be set to equal to, greater than or less than the capacity (See page 38).
- **PEAK:** It will display the current peak load of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders.
- **REVERSE:** It will display the current reverse load of the Left, Right and Total channels. Press TOTAL to cycle between the Left, Right and Total channels in their respective orders.
- **CUSTOM:** It will only be functional if it has been enabled. If enabled the custom display is capable of displaying the number of strokes (Count), strokes per minute (SPM), load in percent of capacity for each channel (Load in % of Cap), balance values for each channel (Balance), gain values for each channel (Cal. No.) or Diagnostic.

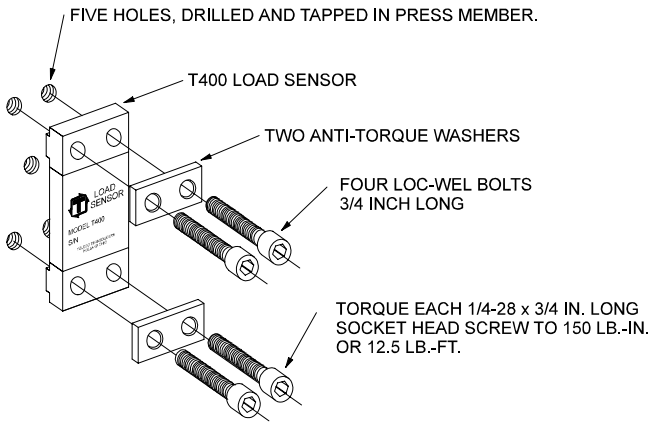
- If the information of the Left and Right channels needs to be reviewed frequently, you may put the display into a toggle mode. In this mode the display will automatically toggle between the Left and Right channels. To do this, cycle the display to TOTAL. Then press and hold TOTAL for three seconds. To take unit out of toggle mode cycle the display to TOTAL.

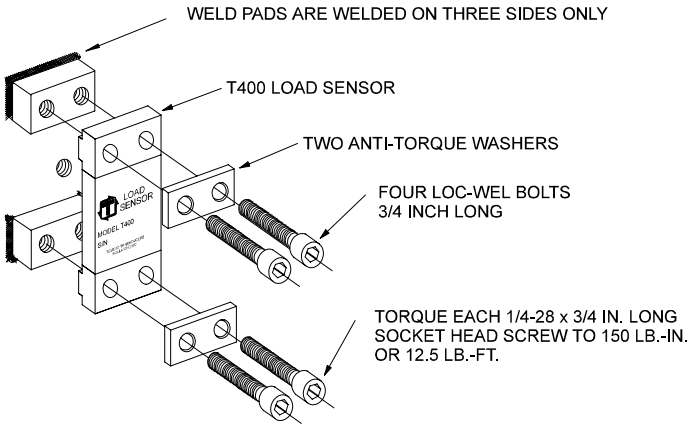
- When an alarm occurs, the Alarm LED will blink. After the faulty condition is corrected, press RESET ALARM to reset the alarm. If password is needed, refer to page 31.

6: Appendix

I) Sensor Installation (Doc# 11080)
II) Flush Mount Template
III) Calibration Sheets (2) (Form# 1224)

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.

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

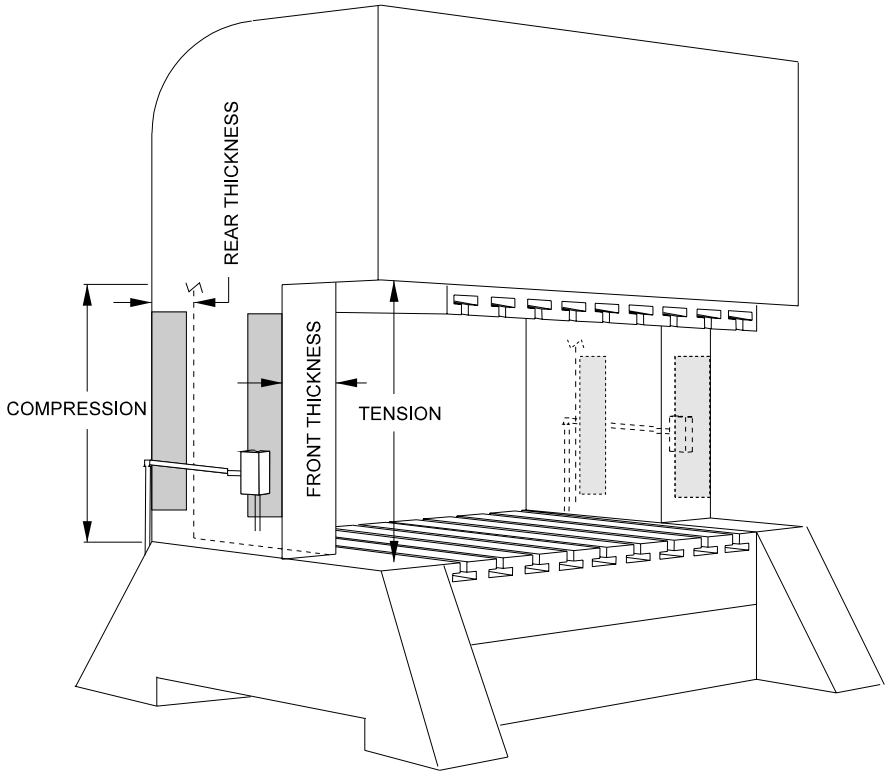
_____REAR

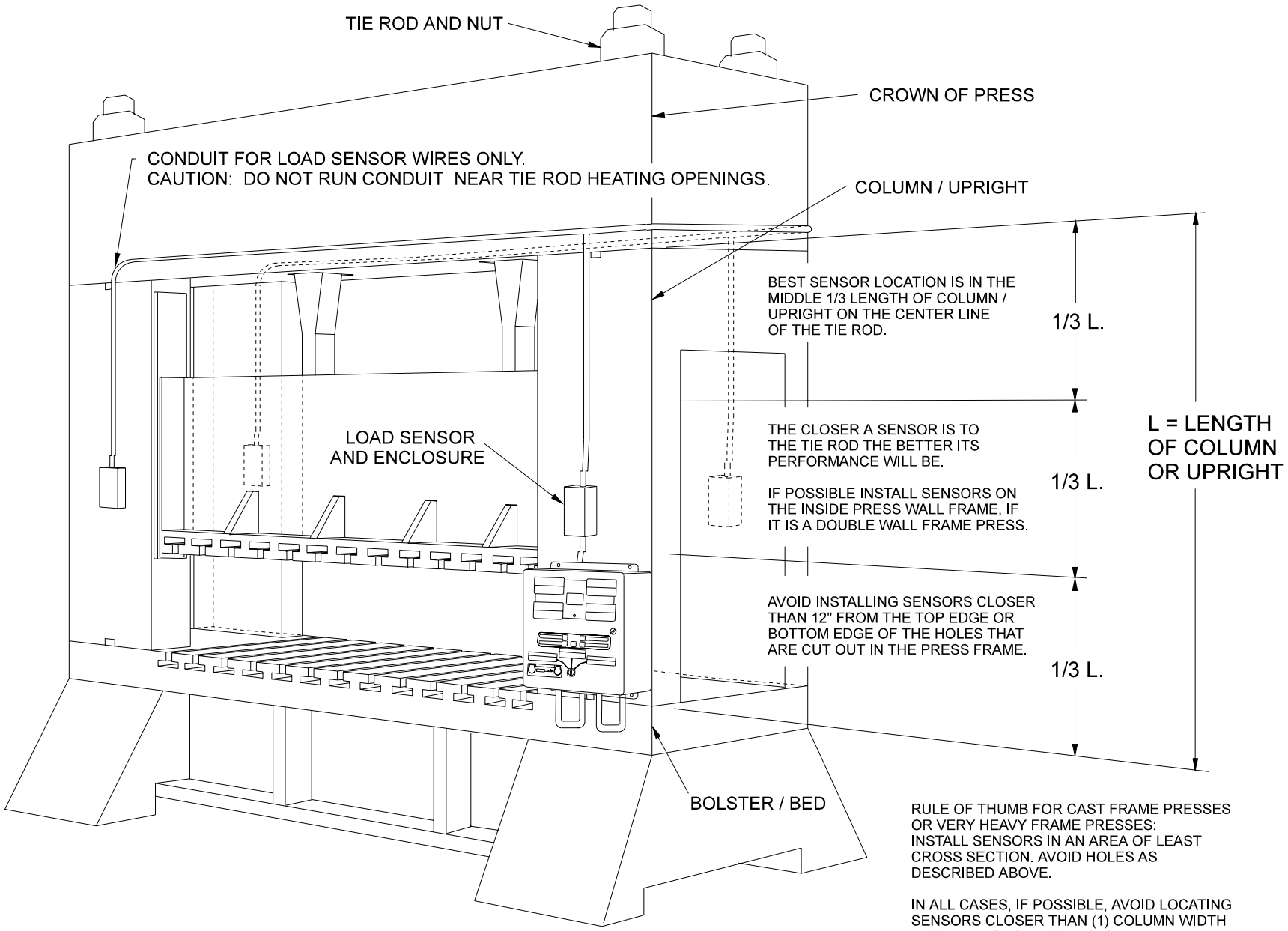
* MULTIPLY BY THREE X 3 = ☐

* MEASURE THE FRONT THICKNESS

_____FRONT

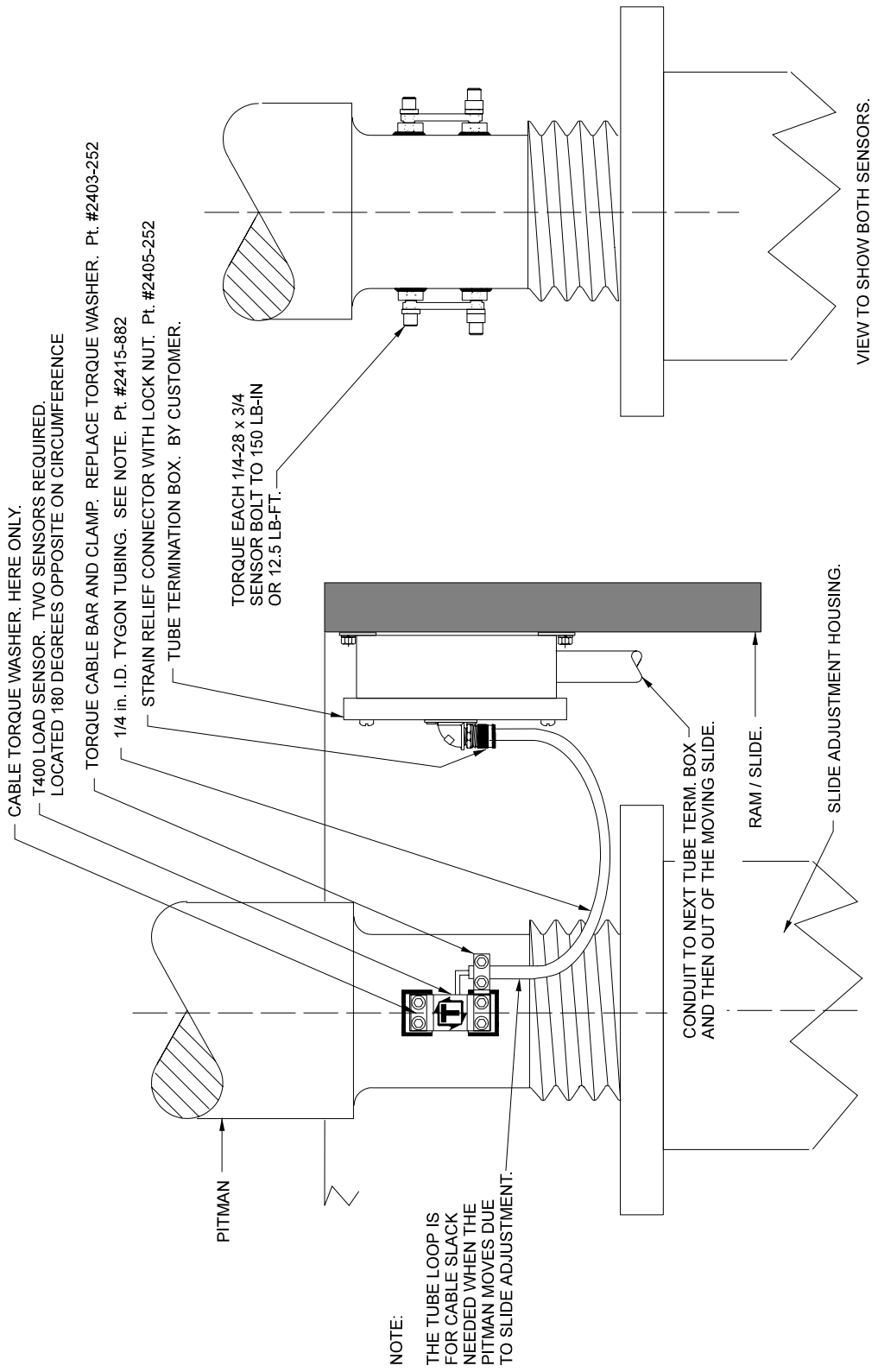
If the front thickness is smaller than value in ☐, then mount sensors in the front. (This is the most common.) If the front thickness is larger, then place the sensor in the rear. Adjust the input connection for compression readings instead of tension.





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.

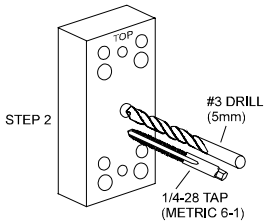

CABLE TORQUE WASHER. HERE ONLY.
T400 LOAD SENSOR. TWO SENSORS REQUIRED.
LOCATED 180 DEGREES OPPOSITE ON CIRCUMFERENCE
TORQUE CABLE BAR AND CLAMP. REPLACE TORQUE WASHER. Pt. #2403-252
1/4 in. I.D. TYGON TUBING. SEE NOTE. Pt. #2415-882
STRAIN RELIEF CONNECTOR WITH LOCK NUT. Pt. #2405-252
TUBE TERMINATION BOX. BY CUSTOMER.
TORQUE EACH 1/4-28 x 3/4
SENSOR BOLT TO 150 LB-IN
OR 12.5 LB-FT.
VIEW TO SHOW BOTH SENSORS.
CONDUIT TO NEXT TUBE TERM. BOX
AND THEN OUT OF THE MOVING SLIDE.
RAM / SLIDE.
SLIDE ADJUSTMENT HOUSING.
PITMAN
NOTE:
THE TUBE LOOP IS
FOR CABLE SLACK
NEEDED WHEN THE
PITMAN MOVES DUE
TO SLIDE ADJUSTMENT.

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

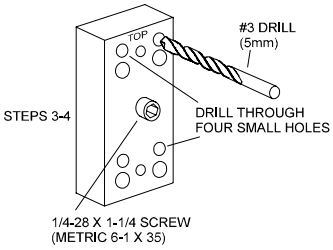
(METRIC INSTALLATION FIXTURE KIT No. 1974-749)

DRILL AND TAP METHOD FOR MOUNTING SENSORS

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



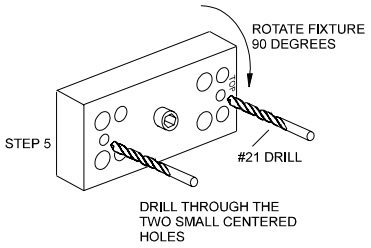
STEP 1 Remove all paint and grease from sensor mount area. If the machine surface is flat (total indicated reading of .002") and smooth (125 µ in.) the load sensor can be bolted directly to the surface.



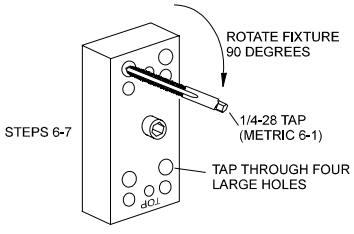
STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be ½ inch (13mm) deep.

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.)



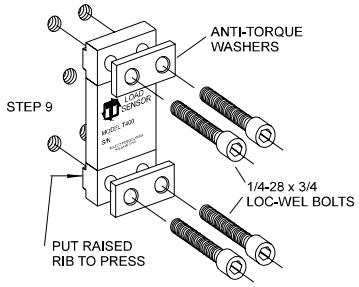
STEP 5 Loosen the fixture. Rotate the fixture 90 degrees clockwise. Tighten the center screw of the fixture. Insert the number 21 drill into the small centered hole and drill out both holes to a depth of 3/8 of an inch. These holes are for mounting the sensor enclosure. The fixture does not allow for 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.



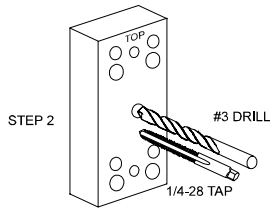
STEP 8 Remove the fixture and repeat Steps 1-7 for each additional sensor mounting position.

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

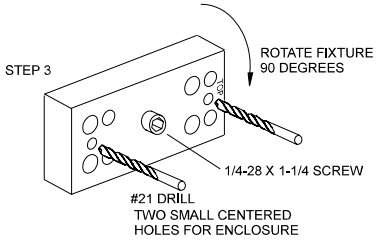
WELD PAD METHOD FOR MOUNTING SENSORS

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

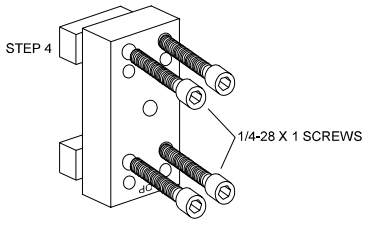


STEP 1 Remove all paint, grease, and or rust from surface to be welded. (Surface should be flat T.I.R. 1/32 of an inch.)

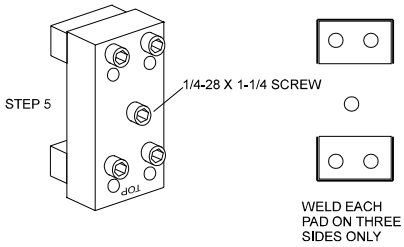
STEP 2 Drill and tap the center hole for mounting the fixture to the press member. This hole should be ½ inch deep. (Optional)



STEP 3 Bolt the fixture to the press member using the ¼-28 by 1-¼ 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)

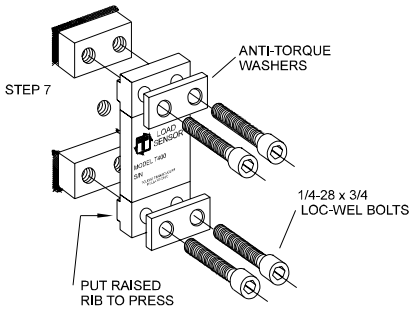


STEP 4 Remove the fixture from the press member. Bolt the weld pads to the fixture with ¼-28 by 1 inch long socket head cap screws provided. Reattach the fixture with the weld pads bolted on using the center hole as in Step 3. Orient the fixture as shown.



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. <u>DO NOT WELD AFTER FIXTURE IS REMOVED.</u> The 4 screws holding the pads to the fixture and the 1 center screw may be discarded. <u>DO NOT USE THE FOUR 1 INCH LONG SCREWS TO ASSEMBLE SENSOR.</u> The sensor kit contains four ¾ 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.

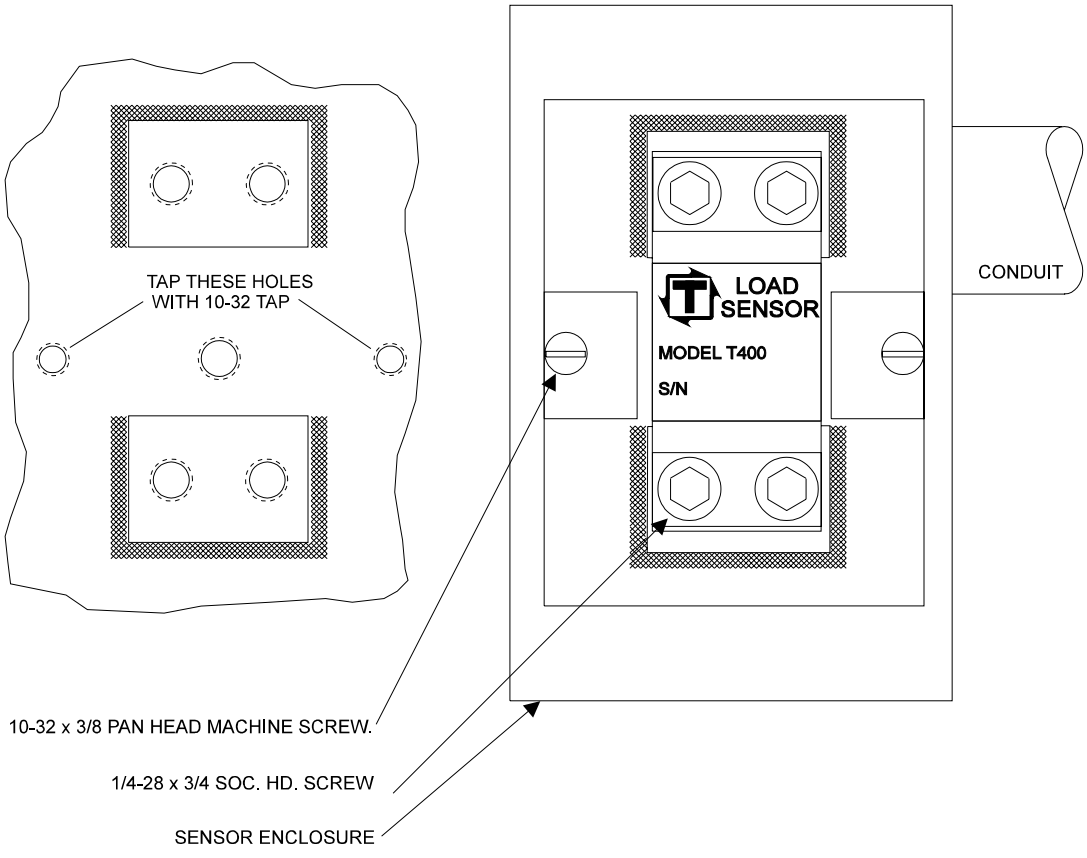


STEP 7 Mount the sensor with the raised rib to the press. The anti-torque washers should go between the screw and the sensor body. Torque each ¼-28 x ¾ in. long socket head screw to 150 LB.-IN or 12.5 LB.-FT.

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 12.5LB.-FT. ASSEMBLE BOX COVER.



TOLEDO TRANSDUCERS, INC **PRESS CALIBRATION TEST DATA** HOLLAND, OHIO U.S.A.

COMPANY: _____ **DATE:** _____

_____ **PRESS SERIAL No:** _____

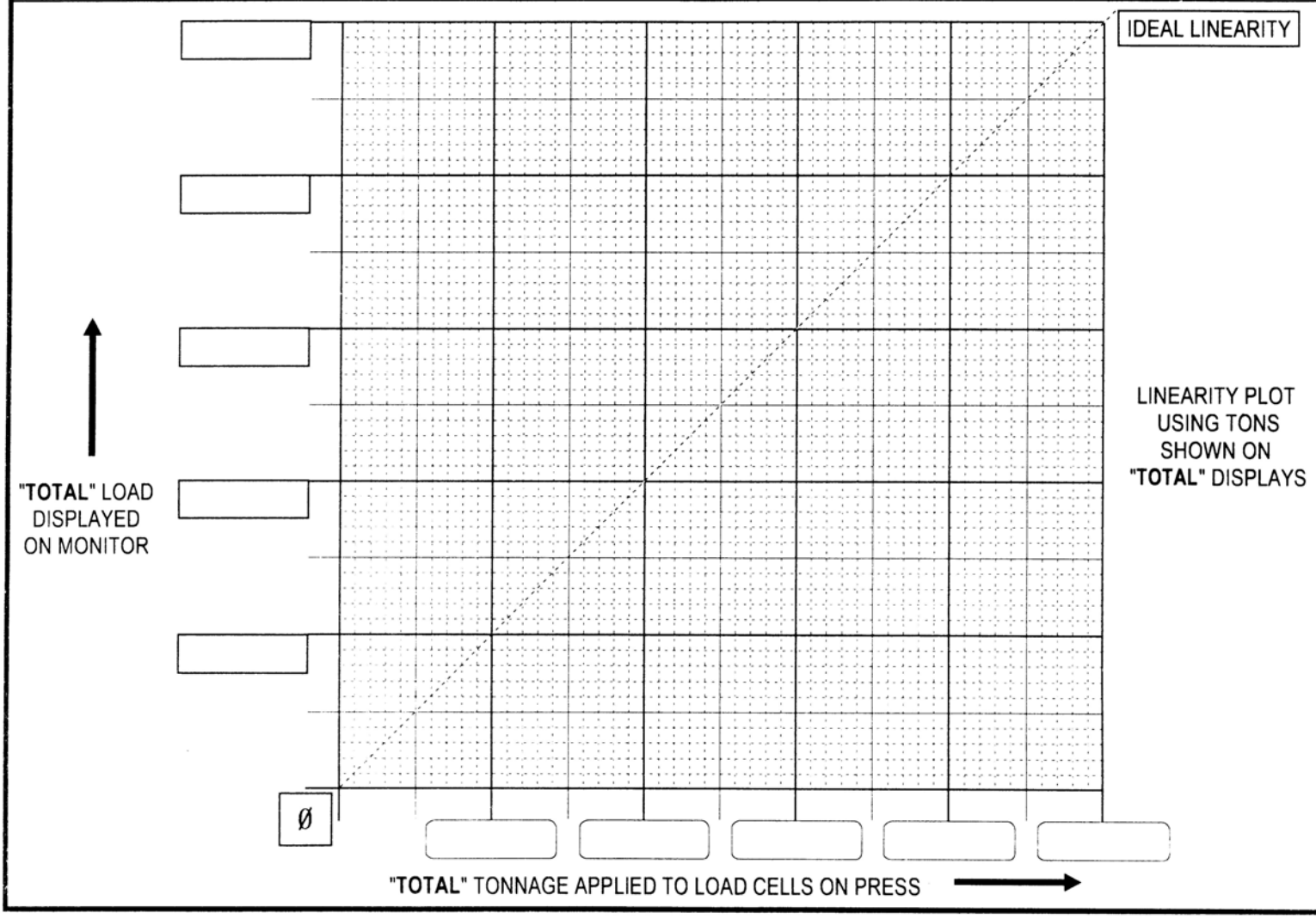
_____ **PRESS (Type and & No.):** _____

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 / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF



DRAW IN :

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

SHUNT RESISTORS:

ONE MEG ? YES ___ NO___

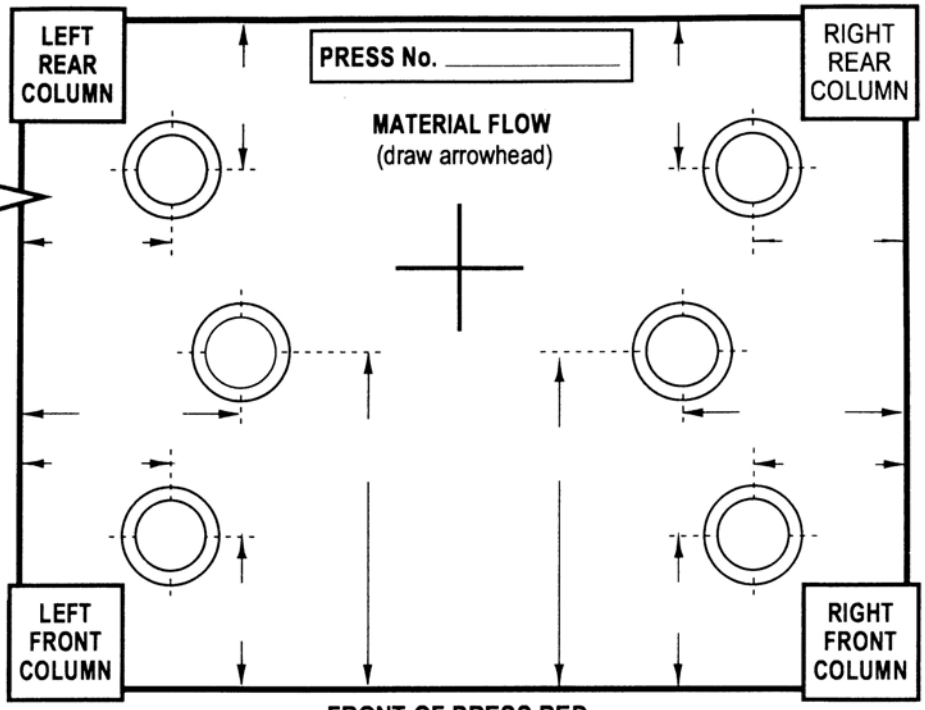
OTHER RESISTORS:

CHAN. 1 _____

CHAN. 2 _____

CHAN. 3 _____

CHAN. 4 _____



FRONT OF PRESS BED

TYPE OF LOAD CELLS: _____ **TYPE OF LOAD CELL READOUT:** _____

TONNAGE SENSORS

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

CALIBRATION LOAD CELLS

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

TOLEDO TRANSDUCERS, INC **PRESS CALIBRATION TEST DATA** HOLLAND, OHIO U.S.A.

COMPANY: _____ **DATE:** _____

_____ **PRESS SERIAL No:** _____

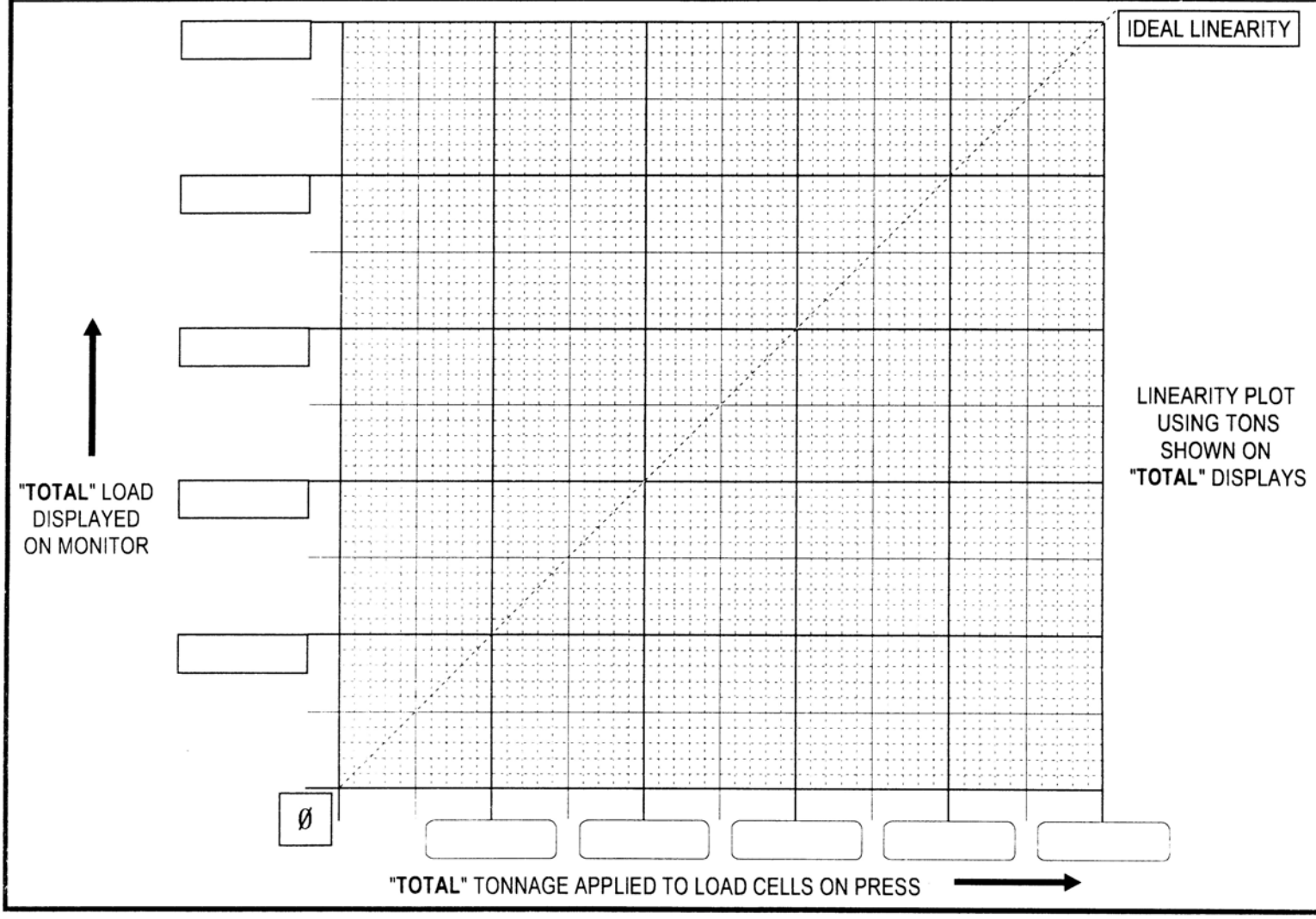
_____ **PRESS (Type and & No.):** _____

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 / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF
	LR / TOTAL / RR LF / RF	LR / TOTAL / RR LF / RF



DRAW IN :

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

SHUNT RESISTORS:

ONE MEG ? YES ___ NO___

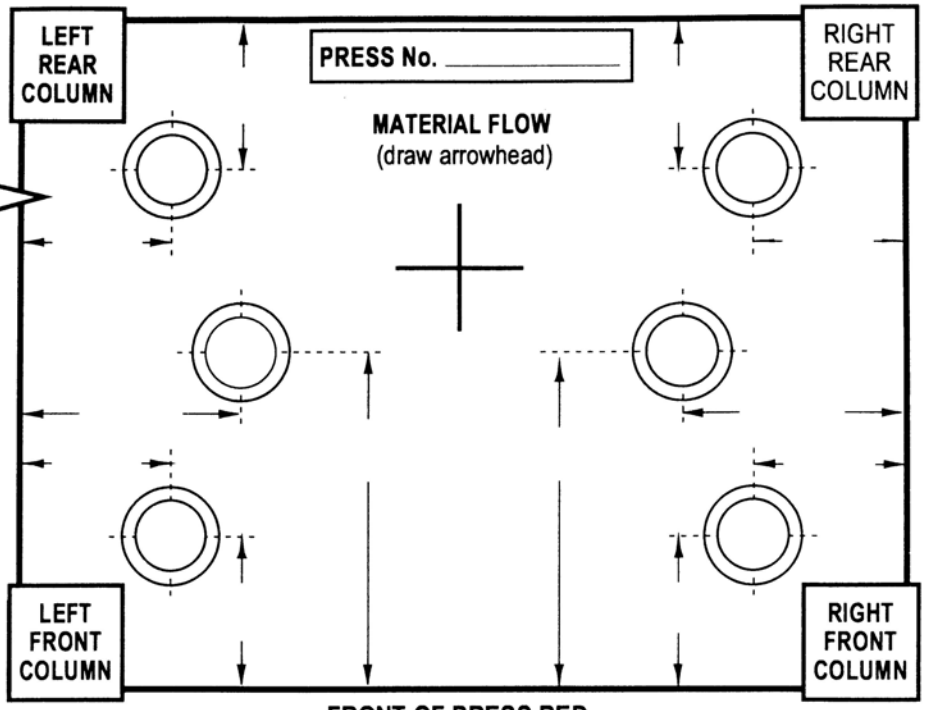
OTHER RESISTORS:

CHAN. 1 _____

CHAN. 2 _____

CHAN. 3 _____

CHAN. 4 _____



FRONT OF PRESS BED

TYPE OF LOAD CELLS: _____ **TYPE OF LOAD CELL READOUT:** _____

TONNAGE SENSORS

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

CALIBRATION LOAD CELLS

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