Honeywell

User Manual

AutoSet® 1504

Wintriss® Four-channel Load Analyzer
1099500
Rev. B January 1997

Tech Support Hotline 800-586-8324 8-5 EST

WINTRISS®

Wintriss Controls Group
100 Discovery Way
Acton MA 01720-3648 USA
Phone (978) 264-9550 (800) 586-8324
Fax (978)263-2491

PRINTED IN USA DA46000

www.wintriss.com

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  Please call our "800" number for a return authorization (RMA) number to return a product for repair. Returned goods must arrive freight prepaid. In order to process your return quickly, we ask that you provide us with the following pertinent information when you call: purchase order number, shipping address, contact name and telephone number, and product type. The assigned RMA number should appear on all packages returned to Wintriss Controls Group to ensure prompt service.

  At the time of requesting an RMA, you will be quoted a flat-rate repair price for the product you are returning. We ask that you either fax us a PO for that amount or enclose the PO with the returned item. This will enable us to ship the item back to you as soon as the repair has been completed. If the item cannot be repaired or there are additional charges, you will be contacted for approval.

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- **Restocking Charge**

  Returned goods are subject to a 20% restocking charge if returned for credit. The minimum charge is $50, not to exceed $250 per item.

Whatever the product, we are committed to satisfying you with innovative engineering, quality construction, reliable performance, and ongoing, helpful support. Call us whenever you need assistance.

Changes for Revision B of the AutoSet 1504 User Manual

Revision B of the AutoSet 1504 User Manual covers all AutoSet 1504 models.

Change(s) for Revision B include:

- The1504 processor board has been revised. Only major components are shown and labeled.
    - The connections at TB101 have been changed. Pin 5 is unused and Pin 10 is ground (GND).
- Final Checkout section has been added to the end of Chapter 2. This is done once all the installation, initialization, and calibration procedures have been completed and before operation.
- An additional instruction has been added to Chapter 3 Calibration on the proper calibration factor for metric tons.
- Illustration and related instructions have been added to Chapter 3 for users to record calfactors and gain settings on the AutoSet operator label.
- AutoSet Dialog Station is no longer compatible with AutoSet 1504.

PROVIDE IMPORTANT INFO
DURING TROUBLESHOOTING WITH DI TECH SUPPORT!

Whenever you need to contact Data Instruments for technical assistance, be ready to provide some important information to expedite a resolution to the problem. Please supply: **product name** (e.g. AutoSet); **model** (e.g. 1500 or 1504); **type** (e.g. standard or plus); and **firmware version number** (e.g. Vs. 2.00). You can determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

Table of Contents

How to use the manual

This is the installation and reference manual for AutoSet 1504. It has information about how to install and use AutoSet 1504 to monitor load.

Chapter 1 introduces you to AutoSet 1504, tells how it works, and specifically about "repeatability", lists features, and explains how to use this product.

Chapter 2 is the installation chapter. Use it to install AutoSet 1504 if you are installing it yourself. The 1504 board has been revised (and specifically terminal block TB101 - discussed in the zero cam section of this chapter).

Chapter 3 talks about calibration. Read this chapter to calibrate AutoSet 1504 properly.

Chapter 4 explains how to use AutoSet 1504. Use it to create and adjust setpoints.

Chapter 5 talks about what happens when AutoSet 1504 stops the press and what to do to remedy the situation. It displays the alarms that AutoSet 1504 will provide, explains what they mean, and how to correct them. Chapter 5 also discusses how to troubleshoot certain situations that may occur during normal press operation.

Appendix A explains how to install AutoSet 1504 as a panel mount. Mounting and "cutout" dimensions are provided.

Appendix B is specifically included for specially modified AutoSet load monitors with custom selectable sampling. It explains how to use stroke sampling for 1, 15, 30, and 60 strokes.

Warranty

Data Instruments Inc. (D.I.) warrants that Data Instruments / Wintriss electronic controls are free from defects in material and workmanship under normal use and service for a period of one year (two years for Shadow V) from date of shipment. All electro-mechanical assemblies and sensors are warranted to be free from defects in material and workmanship under normal use and service for a period of 90 days from date of shipment. D.I.'s obligations under this warranty are limited to repairing or replacing, at its discretion and at its factory or facility. Any products which shall, within the applicable period after shipment, be returned to D.I. freight prepaid, and which are, after examination, disclosed to the satisfaction of D.I., to be defective. This warranty shall not apply to any equipment which has been subjected to improper installation, misuse, misapplication, negligence, accident, or unauthorized modification. The provisions of this warranty do not extend the original warranty of any product which has either been repaired or replaced by D.I. No other warranty is expressed or implied. D.I. accepts no liability for damages, including any anticipated or lost profits, incidental damages, consequential damages, costs, time charges, or other losses incurred in connection with the purchase, installation, repair or operation of our products, or any part thereof.

Please note:

It is solely the user's responsibility to properly install and maintain Wintriss controls and equipment. Data Instruments manufactures its products to meet stringent specification and cannot assume responsibilities for those consequences arising from their misuse. AutoSets, DiPro 1500, IC Controllers, and ProCam 1500, Sensors, Spectrum Systems, and Wintriss Load Analyzers are not designed or intended for use as personnel protection devices.

DATA INSTRUMENTS®
Wintriss® Controls Group
75 Discovery Way
Acton, MA 01720
Telephone: (800) 586-TECH (8324)
(978) 264-9550
Fax: (978) 263-2491

AUTOSET® 1504
USER MANUAL
Revision B
January 1997

Chapter 1
The AutoSet® 1504

Your AutoSet 1504 load monitor from Data Instruments is a simple, easy-to-use load monitor. It protects your press and dies from overloads without the need to change or readjust settings from die to die. That is because the AutoSet 1504 creates load limits (or setpoints) automatically—for any job. You never have to calculate and dial in settings yourself. With AutoSet, you get overload protection, and you are freed from the repetitive process of calculating and setting new setpoints every time you change dies.

How AutoSet will benefit your operation

AutoSet provides these benefits for any press operation:

- It identifies machine overloading. AutoSet helps reduce unnecessary wear on load bearing components.

- While AutoSet cannot anticipate a bad stroke, it can signal the press to stop after a bad stroke occurs. This eliminates successive bad hits that can cause catastrophic damage.

- Tooling setups are more accurate because of the actual tonnage information AutoSet provides. The correct information about tonnage can be stamped on the die shoe, per OSHA regulation 1910.217 (d) (6) (i).

- AutoSet can detect die malfunctions through tonnage variations and can therefore monitor misfeeds, slug stacking, misuse of stop blocks, increases in material thickness and hardness, broken stripper springs, and broken punches in the die. AutoSet makes it possible for one operator to monitor several presses because it stops the press when these malfunctions are detected.

- AutoSet helps you keep track of tonnage and tool wear so repairs to dies and punches can be made on a schedule which permits more efficient use of the press. This results in faster parts production and higher quality parts. You know the tool is wearing if tonnage increases as the die is used again and again.

- AutoSet enables better matching of dies to press capacity since it tells you the exact tonnage produced for each die. Therefore you can avoid using large capacity presses for smaller jobs.

The AutoSet 1504 front panel

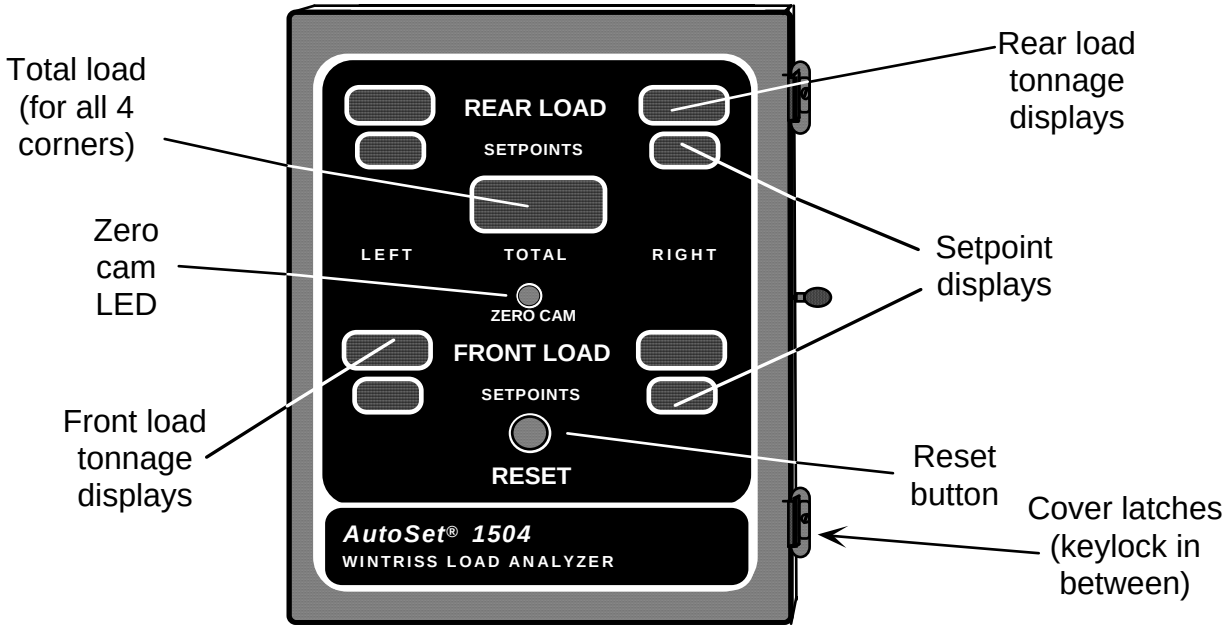


Figure 1-1. AutoSet 1504 front panel

Tonnage displays. Three-digit tonnage displays show the tonnage at each strain link. Total load displayed at center just above the "zero cam" LED. Tonnage displays flash when an overload occurs.

Setpoint displays. Three-digit setpoint displays show the upper load limits (or setpoints). AutoSet creates setpoints automatically based on the load. AutoSet stops the press if these limits are exceeded.

Reset button. This button has two functions. Pushing it momentarily (less than two seconds) resets AutoSet after it signals an overload and stops the press. When an overload occurs, the tonnage display for the strain link where the overload occurred will flash. (Both displays will flash if an overload occurs on both sides of the press.) The press stops. Once AutoSet is reset, the displays stop flashing. You can once again run the press. Be sure to check for the cause of the overload first. Holding the button down for two seconds or more signals AutoSet to recalculate setpoints the next time the press is started. (This can be done while the press is running.) To recalculate, the button should always be held down until the numbers in the setpoint display blink once and change to 120% of the full scale tonnage set on AutoSet. *Complete instructions for using the reset button are in Chapter 4.*

Keylock. AutoSet 1504 has a lock and key so the cover can be locked. This prevents unauthorized changes to settings.

Cover latches. The two cover latches keep the AutoSet front panel door firmly closed. To make settings on AutoSet, you unlock the enclosure and loosen the two latches. Then just swing the front panel door open. All settings are made inside the enclosure.

Zero Cam LED (optional). Illuminates every time the zero cam is closed (generally through the top of the stroke). *Zero cam is an optional feature in AutoSet 1504.*

How tonnage is displayed

The way AutoSet displays tonnage depends on the full scale tonnage of your press. (You make the full scale tonnage setting during calibration.)

400 tons or less

If AutoSet is installed on a press with a capacity of 400 tons or less, it displays tonnage up to 100 tons in tenths of a ton (5.5, 6.0, 45.5, 90.1, 99.9, etc.). Over 100 tons, it displays tonnage in whole numbers only.

Between 400 and 3000 tons

For presses with full scale tonnage between 400 and 3000 tons, AutoSet displays only whole numbers for tonnage (5, 10, 200, 750, etc.).

Over 3000 tons

For presses with full scale tonnage over 3000 tons, you must multiply the displayed tonnage by 10. For instance, a display of 5.5 tons would be 55 tons, a display of 105 tons would be 1050 tons, and so on. *See "Setting full scale tonnage" in Chapter 2 for more details on how AutoSet displays tonnage.*

Strain links

Strain links are used with AutoSet to measure press tonnage. Strain links are mounted to the press frame, or other structural members, where strain is proportional to load and wired to AutoSet. Four strain links are used. The strain links convert press frame deflection into an electrical signal. They detect and measure the forces -- tension or compression -- acting on the press frame.

When the press is loaded, the strain link is either stretched or compressed. On straight side presses, .i.strain links; measure tension (stretching of the frame). On gap frame presses (OBI or OBG), strain links can measure either tension (front mounted) or compression (rear mounted). The tensile (or compressive) force changes the output signal of the resistance bridge located inside the strain link body. The electrical signal sent to the AutoSet 1504 is proportional to the force being exerted by the press.

The four strain links provided with the AutoSet 1504 are called .i.differential strain links;. The part number on your links should be 9641601 (30' cable), 9641602 (100' cable), or 9641801 (with Hirschmann connector), depending on the cable length or connector you choose. Contact Data Instruments before trying to use any other strain link. Strain link mounting is described in Chapter 2 – Installation.

Calibration

AutoSet must be calibrated before use. To calibrate, you load the press to a certain tonnage using load cells. You measure tonnage on an independent load monitor you know will give correct readings. You then adjust the tonnage readings on AutoSet until they match the tonnage readings of the independent load monitor. *Calibration is covered in Chapter 3.*

How AutoSet 1504 works

AutoSet is so easy to use because it creates and displays load setpoints automatically. You never have to calculate and dial in setpoints.

Once AutoSet is installed and properly calibrated, there are only two settings you have to make. You set the sample period and a percentage (the percent tolerance setting). The sample period can be set to 1 or 15 strokes. The tolerance setting tells AutoSet how high above the load the setpoints should be. The percentages you can select are 2%, 5%, 10%, 15%, 20%, 25%, 35%, 50%, or 100%. Settings are made using switches located inside the enclosure.

Once selected, these same settings can be used for any die on the press (in most cases). You do not have to change the setting from job to job. (See Chapter 4 for more details on when changing settings may be necessary).

AutoSet calculates setpoints automatically based on a sample of the load just like you would figure out setpoints yourself on paper. Here is how it does it:

1. Once the press is running, AutoSet begins measuring and recording the load (in tons) at each strain link. It records the load for each stroke in the sample period.
2. After the sample period ends, AutoSet determines the highest load at each strain link. It ends up with four numbers: the highest measured load for each strain link.
3. It then calculates the setpoints using this formula:

   Highest measured load during sample period +
   percentage of load selected = high setpoint.

4 This calculation is performed on all of the numbers in step 2. The results are the setpoints for each corner of the press. See the following example. The setpoints are displayed in the setpoint displays.

During the sample period (while AutoSet is recording tonnage), setpoints are maintained at 120% of the full scale capacity of the press. Therefore, AutoSet offers protection from overloads even during the sample period.

SETPOINTS NEVER EXCEED 120%
AutoSet will not create setpoints greater than 120% of the full scale capacity of the press.

AutoSet will calculate new setpoints when you press the reset button and hold it for two seconds or more. Afterwards, it will also change setpoints when you change the high percentage setting switch. *Complete instructions for making settings on AutoSet, how to use the reset button, and how and when you need to change settings is in Chapter 4 - AutoSet 1504 Operation.*

Example of how setpoints are calculated

To better understand how AutoSet 1504 automatically creates setpoints, let's look at an example. Let's say AutoSet is installed on a 100 ton press. The percent tolerance setting is at 10%, indicating that AutoSet will create setpoints 10% higher than the highest measured load during the sample period. The sample period is set to 15 strokes.

The press is started. Then the reset button is pushed and held for at least two seconds. This signals AutoSet to begin the calculation. It also changes the setpoint displays to 30.0 tons each (120% of 25 tons). 25 tons is the full scale tonnage on each corner of the press. Next, the press is run for 15 strokes. The highest measured tonnage on the left/rear is 16 tons and on the right/rear is 10 tons. The highest measured tonnage on the left/front is 14 tons and on the right/front is 12 ton. See Figure 1-2.

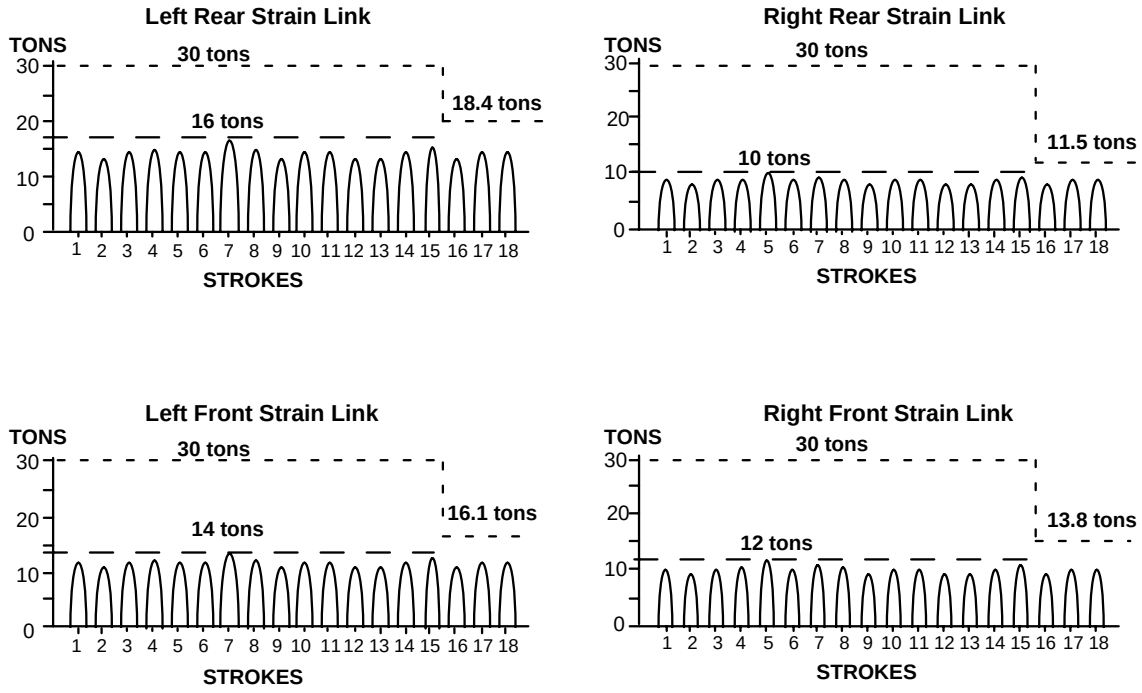


Figure 1-2. Tonnage produced at each strain link in example.

Highest load is on stroke 7 for left side strain links and stroke 5 for right side strain links. Tonnage at far right on each graph is setpoint calculated by AutoSet after sample period.

Instantaneously after the 15 stroke sample period ends, setpoints are calculated as follows:

The setpoint for the left rear strain link is:		**16 tons + (16 tons x 15%)**
	or	**16 tons + 2.4 tons**
	or	**18.4 tons**
The setpoint for the right rear strain link is:		**10 tons + (10 tons x 15%)**
	or	**10 tons + 1.5 ton**
	or	**11.5 tons**
The setpoint for the left front strain link is:		**14 tons + (14 tons x 15%)**
	or	**14 tons + 2.1 tons**
	or	**16.1 tons**
The setpoint for the right front strain link is:		**12 tons + (12 tons x 15%)**
	or	**12 tons + 1.8 tons**
	or	**13.8 tons**

These setpoints are now shown in the setpoint display.

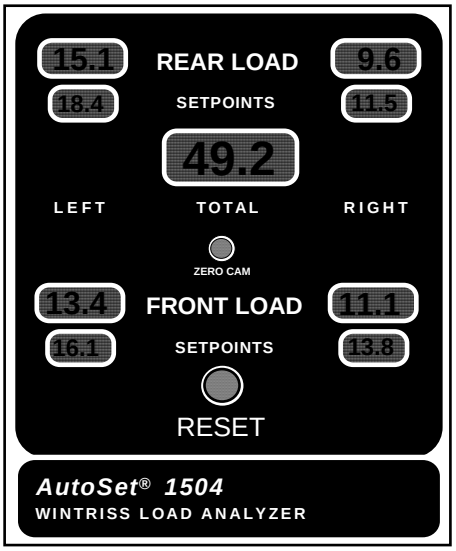


Figure 1-3. Setpoints that AutoSet created in example

Specifications

Equipment	System enclosure 10.25" x 12" x 4" (26 x 30.5 x 10.2 cm), NEMA 12, shock-mounted
Power	115 or 220 Vac ±15%, 50-60 Hz, 30 W
Operating temperature	32° to 122° F (0° to 50° C)
Relay contact rating	5 amps @ 120 or 240 Vac Normally open, held closed
Speed	To 400 SPM without zero cam, to 2000 SPM with optional zero cam
Display	Four 3-digit .43" (1.1 cm) high for tonnages Four 3-digit .30" (.76 cm) high for setpoints One 4-digit .43" (1.1 cm) high for total tons
Strain links **Size** **Cable**	(four provided) 3.75" x 1.19" x 0.75" (9.5 x 3 x 1.9 cm) 30 ft (9.1m) standard, other lengths optional
Drill fixture	One provided

Chapter 2
AutoSet 1504 Installation

Installation of AutoSet involves mounting the AutoSet control enclosure and connecting wiring for power, strain links, and other devices.

This chapter covers:

- Mounting the control enclosure
- Connecting AC wiring and stop circuit
- Mounting and connecting strain links
- Connecting AC wires to power source
- Zero cam installation and other optional wiring connections

In some cases, installation of a zero cam switch is necessary. Optional wiring connections include: connecting a remote reset switch and connecting a strip chart recorder.

Mounting the AutoSet control enclosure

To mount the enclosure, follow these steps:

1. Determine a convenient place for the control enclosure. Ideally it should be close to the press control so operators and setup personnel can easily see the readouts and reach the reset button. (Installing a remote reset button is discussed later in this chapter.)

   Also make sure the strain link cables will reach to the mounting site selected. Leave enough room to open the door at least 120°. The enclosure can be mounted to the press or on a free-standing pedestal.

2. Drill holes for mounting (see Figure 1-1). Shockmount studs are 5/16–18. Tap holes and mount the enclosure using the enclosed shock mounts. Use a No. 7 drill and 1/4-20 tap.

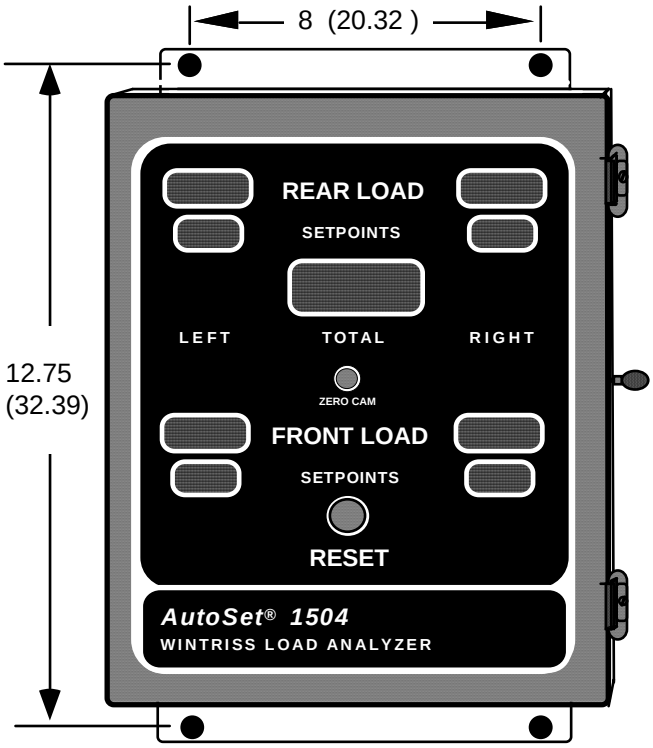


Figure 2-1. AutoSet 1504 mounting dimensions

Connecting AC wiring and stop circuit

Wiring connections for AC power and for the stop circuit are on two connectors. To make the connections, follow these steps.

> **WARNING! PREVENT SHOCK!**
> Disconnect main power before installation. All power to the press, press control, and other equipment used with the press must be off during installation. Also "tag out" per OSHA 1910.147 Control of Hazardous Energy (Lockout/ Tagout). Installation must be performed by qualified personnel only.

1. Determine how you will bring wiring from your 115 Vac power source (or 230V source if applicable) to the control enclosure. For 115 Vac, you need three wires—high (black), neutral (white) and ground (green). No. 16 wire is recommended (No. 14 if local codes require it). For 230 Vac, wires are black and red with green or green/yellow for ground.
2. Determine how you will connect the wires from AutoSet to your press control stop circuit. You need two wires (No. 16 recommended, No. 14 if local codes require it). *You should wire the AutoSet into the top stop circuit to avoid sticking the press on bottom if AutoSet stops the press due to an overload.*

   NOTE: Top stop circuits are active only in continuous (automatic) operations on most press controls. If overload protection is required during inch or single stroke mode, you may have to install an additional control relay so AutoSet will stop the press.

3. Open the cover of the enclosure. See Figure 2-2 for a drawing of the inside of the enclosure. Near the top of the enclosure, you will see a black metal cover. This cover protects the power supply. To remove it, unsnap the two white plastic plugs at the bottom of the cover (pull plug straight up). Then loosen the screw on top, and remove the cover. You will see the connector for AC power and the stop circuit at right.

WARNING
SHOCK HAZARD

Never apply power to AutoSet when the power supply cover is removed. To prevent shock, always replace the cover before applying power.

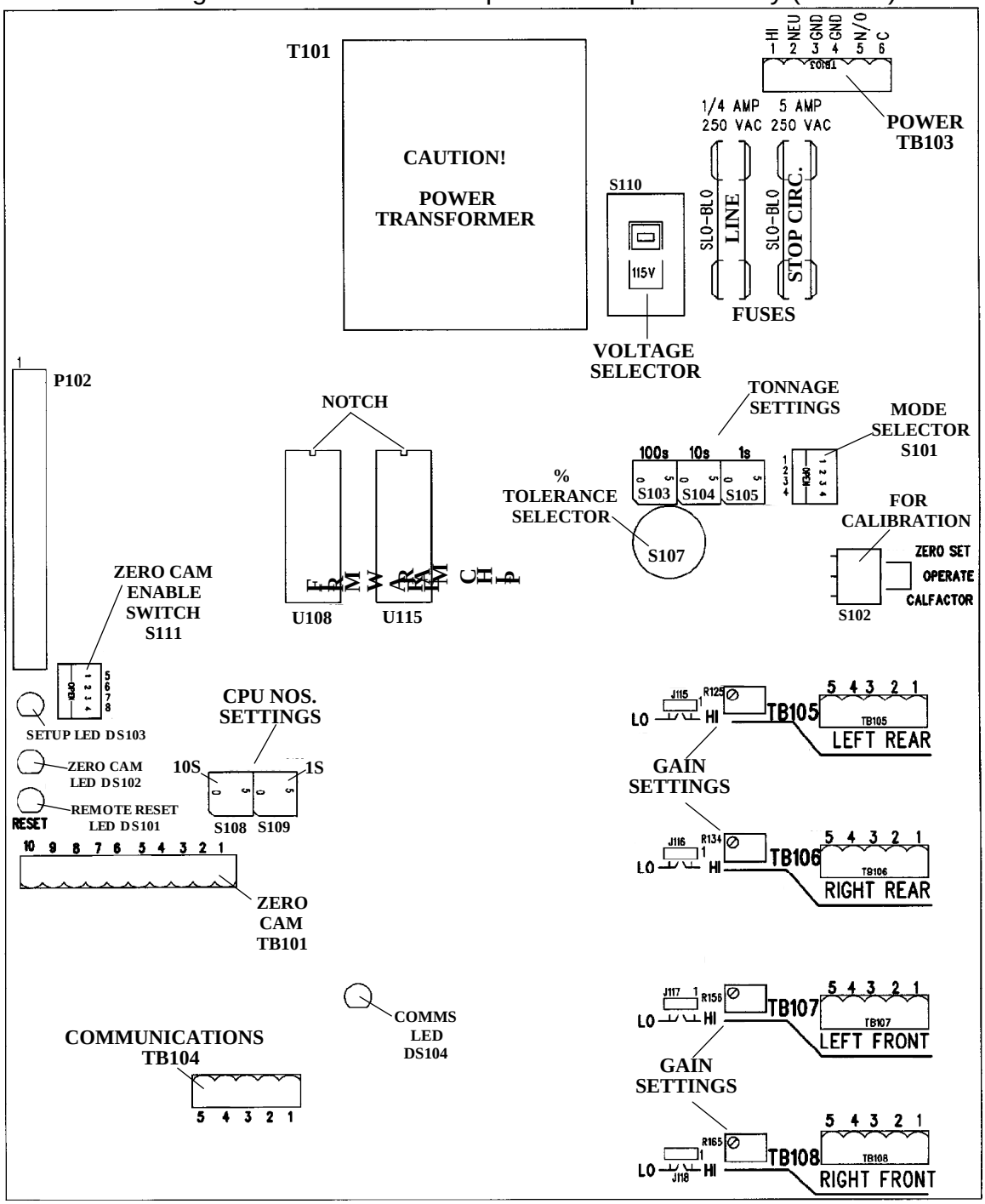
4. Locate the 115V-230V voltage selector switch (at S110). It is just below the power connection to the left. It is a black rectangular box with a red handle and a cavity in the middle. At the bottom of the cavity, you should see "115V." This is the factory setting. This means AutoSet is set for 115 V operation.

   If your AutoSet will be used with 230 Vac, push the red handle extending out of the cavity towards you (away from top of the box). You will see 230 V displayed. With the switch in this position, AutoSet will only work with 230 Vac power.

5. Run power and stop circuit wires through flexible liquid tight conduit to the enclosure. The AutoSet enclosure is rated NEMA 12 (protected against dust and oil). You must use conduit of the same rating and make proper connections to ensure NEMA 12 protection. Wires go through top right knockout hole. Leave a small service loop inside enclosure.

6. First connect the ground (green or green/yellow) wire. It must be connected to the ground block as shown in Figure 2-3, not to "GND" pin on the connector. The ground block is located on the wall of the enclosure at top right. To connect to ground block, strip ground wire about 1/4" (6.4 mm) from end, loosen screw on block, slide wire in hole, and tighten screw to pin wire in place.

Figure 2-2. Location of important components only (labeled)



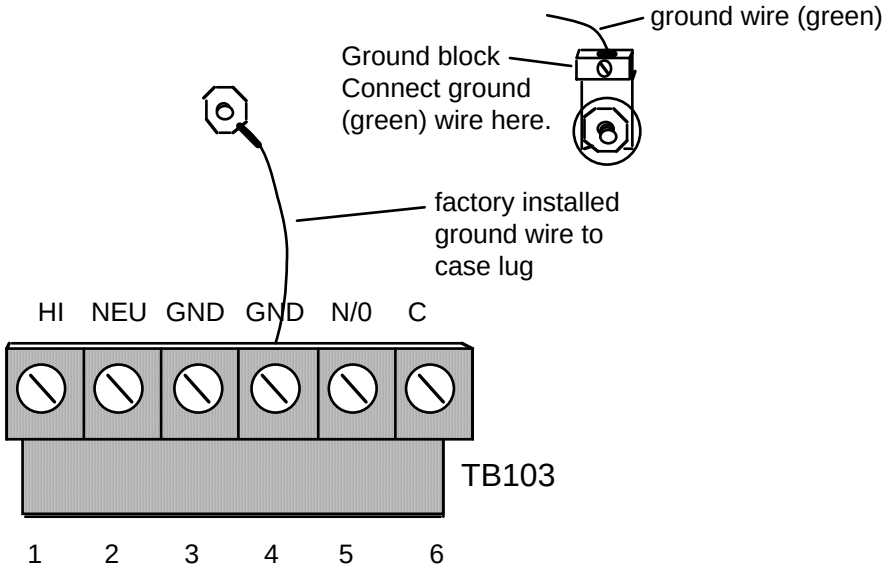


Figure 2-3. Wiring connector and ground block for AC power and stop circuit.

7. Now find the connector TB103 for the other AC wires and stop circuit. It is at top right. The connector consists of an L-shaped top section and base. Pull the L-shaped part away from its base. This is the part to which you will connect wiring.

NOTE: A ground wire is attached from the connector to a case lug as shown in Figure 2-3. Leave the ground wire attached to the connector while making connections. *If you remove this wire in order to pull the connector all the way out of the enclosure, be sure to replace it when done.*

8. Connect wires to the L-shaped terminal block as shown in Figure 2-3. For 115 Vac, connect black wire to HI slot and white wire to NEU. (For 230 Vac connect black wire to HI slot and red wire to NEU). To connect a wire, find the correct slot and loosen the screw over that slot by turning it counterclockwise (see Figure 2-4). Strip the correct wire for this slot 1/4" (6.4 mm) from end. Insert bare wire into slot 90% of the way. Tighten the screw. The metal tooth inside the slot will clamp down on the bare wire for a tight connection. Make sure the metal tooth is clamped down on the bare part of the wire, not on the insulation. If it is on the insulation, you will have a bad connection.

   Connect both wires and double-check connections when done.

NOTE: The connector can only plug in one way. Make sure you do not start at the wrong end when connecting AC wires. Put the connector over the base the way it will plug in and note wire marking next to base before starting.

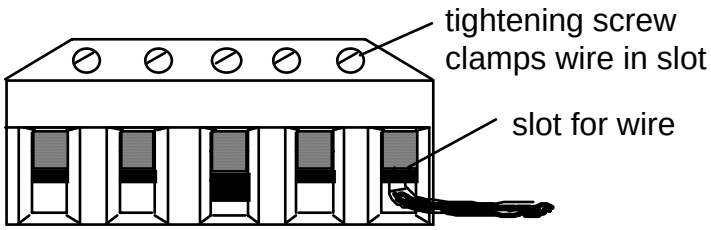


Figure 2-4. Inserting wires into connector

9. Connect one of the two wires from the press control stop circuit to the pin marked N/O (normally open) and the other wire to C (common). It does not matter which wire goes to which terminal.

10. Plug the connector back into its terminal. Double check connections with markings at the connector base to make sure you did not wire it backwards. (Note: first "GND" from left in Figure 2-3 is not used).

11. Make all necessary conduit connections to ensure NEMA 12 protection.

12. Replace the power supply cover removed earlier. Snap in the white plastic plugs at the bottom of the cover and tighten down the screws at the top.

13. Do not connect wires to AC power source until you are done with all other installation procedures. Also make sure you number all wires in a way consistent with your press's electrical prints.

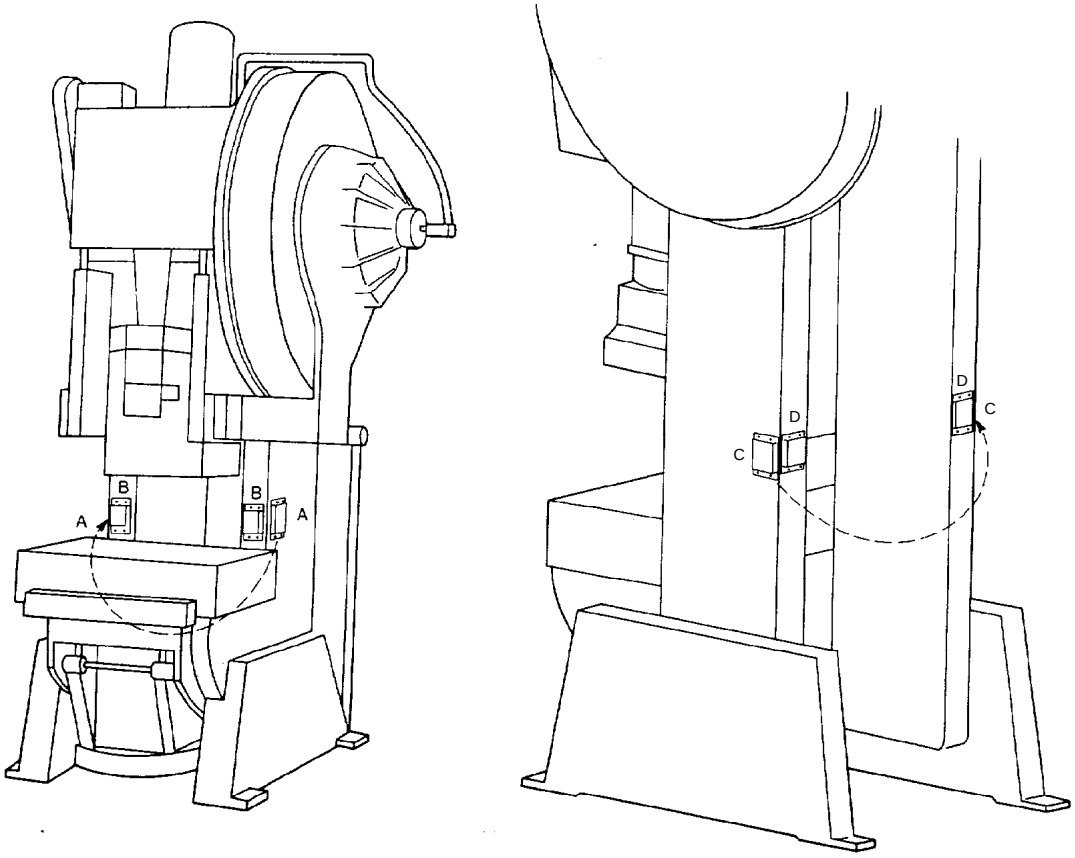
WARNING
PREVENT SHOCK
Do not connect AC wires to the power source until after all other installation procedures are finished.

Mounting and connecting strain links

The four strain links provided with the AutoSet 1504 are called differential strain links. The part number on your links should be 9641601, 9641602, 9641603 or 9641801, depending on the cable length or connector you chose. If you plan to use other strain links, contact Data Instruments to find out if they will work with the AutoSet 1504.

To install strain links, follow these steps:

1. Select mounting sites on the press for the strain links. On straight side presses, strain links are typically mounted on the columns. They measure tension (stretching of the frame). For gap frame (OBI or OBG) presses, strain links can be mounted on the front of the press to measure tension or on the back of the press to measure compression. Usually mounting on back is better because the strain links are away from the work area. Typical strain link locations for most gap frame and straight side presses are shown in Figures 2-5 and 2-6.



A – Side of frame (arrow indicates second link mounted opposite)

B – Front face of frame

(A and B—forward load read as tension)

D – Rear face of frame (similar to "A" but on rear of machine)

E – Similar to B but on rear face of frame

(D and E—forward load read as compression)

Figure 2-5. Strain link mounting options on OBI/OBG presses

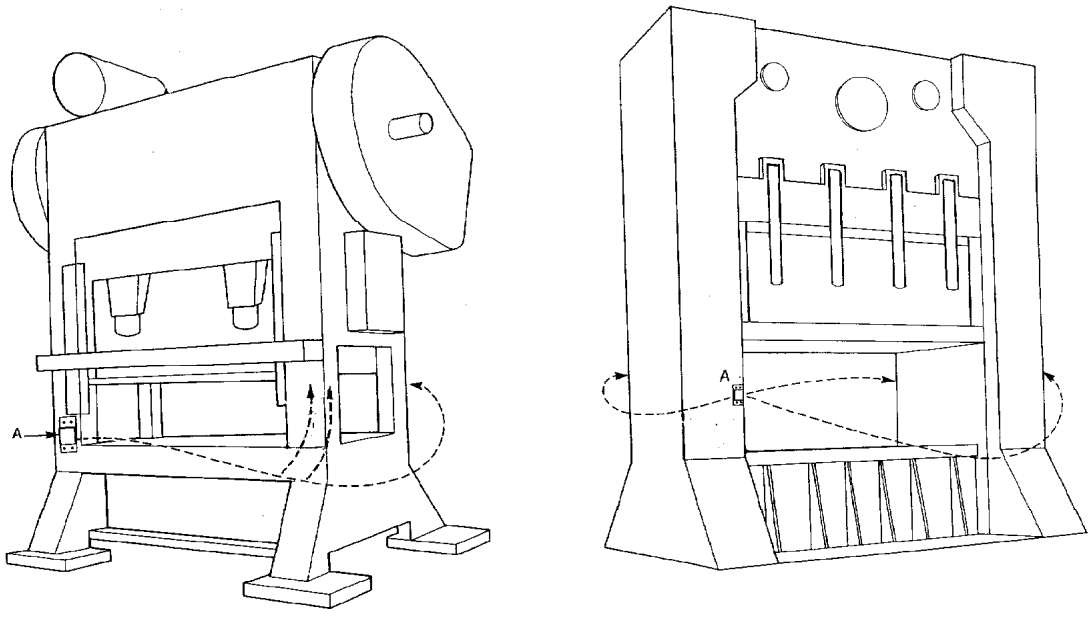
2. Sand down the frame's surface to remove all paint or plastic filler which will affect strain link readings. Cast frames may need light grinding to provide a flat surface.

Strain links must be mounted flat

There should be no imperfections, ridges, or cavities on the mounting surface. Such imperfections will make it hard or impossible to zero the links later and cause inaccurate tonnage readings.

WARNING

Use caution when determining an appropriate location for each strain link! Do not mount any strain link under or above a hole (1" in diameter or larger) on the press column. Avoid mounting the strain link inside the die area where it would be subjected to harsh chemicals. If necessary, use a cover to protect the strain link.



A – Column mounting. (Forward load read as tension).

Strain links can be mounted either on front or side of columns.

Figure 2-6. Strain link mounting options on a straight side press

3. Select the area for the first mounting hole. Using a No. 7 drill bit, drill the hole 1/2" deep and bottom tap for a 1/4 x 20 thread.

> **WARNING**
>
> When drilling, make sure the holes are at right angles to the surface. The strain link will not work if the mounting holes are cocked or angled.

4. Mount the drill fixture supplied with the strain links, align it, and use the long strain link screw to tighten it to the frame. Use the big hole in the fixture. The screw will not fit through the other holes.
5. Using the drill fixture as a guide, drill the three remaining holes.
6. Remove the drill fixture and tap the three holes.
7. Mount the strain link (use semi-permanent Loctite—blue, no. 242 or equivalent — on the mounting screws). Mark each strain link at the cable end to identify its position on the press. Mark as "left rear" and "right rear" or "left front" and "right front".

   Leave the mounting screws loose for now. Strain links must be properly zeroed (set close to a 0 volt electrical output under no load) before mounting screws are tightened. *This zeroing procedure must be done as part of the calibration procedure in Chapter 3.* Therefore, do not tighten links until you get to that part of the calibration procedure.
8. Run the strain link cables through flexible conduit to the bottom right knockout on the control enclosure. You must use conduit of the same rating and make proper connections to ensure NEMA 12 protection. AutoSet 1504 is rated NEMA 12 (protected against dust and oil).

> **CAUTION**
>
> Do not run strain link wires through the same conduit as power wires. Strain link wires are sensitive to electrical noise. Separate conduit will provide protection and shielding.

Plan to leave a service loop inside enclosure, but do not coil excess cable there. Measure cable for length and cut cable. Strip outer cable 1" to 2" (2.5 to 5 cm) from end–enough to separate and work with individual wires. Strip wires 1/4" (6.4 mm) from end.

9. The strain link connectors are at the lower right inside the enclosure. They are marked "left rear" TB105, "right rear" TB106, "left front" TB107 and "right front" TB108. Determine to which connector each set of strain link wires goes.
10. Determine the correct wiring connections for your strain links. The way you connect the wires depends on whether you mounted the strain links to read tension or compression forces on the press. Each wiring scheme is shown in Figure 2-7.

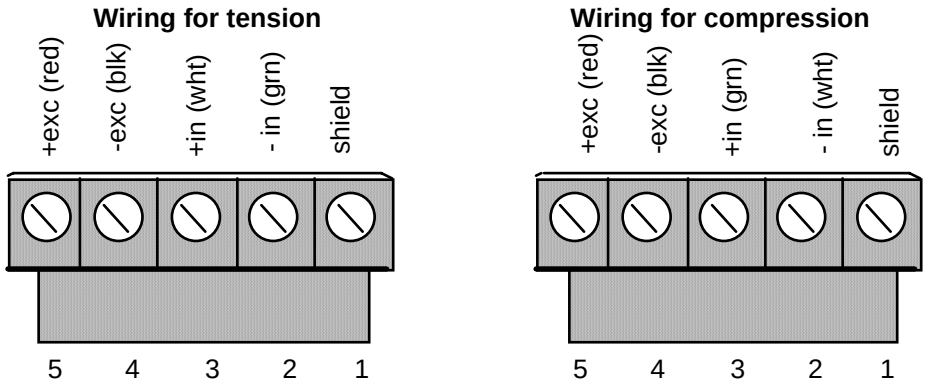


Figure 2-7. Wiring connections for strain links

11. Start with connector TB108 for the right front strain link. Strain link connectors are the same L-shaped type as used for the AC wires. Pull the L-shaped top section of connector from base. Make wiring connections in the same way as for AC wires.

12. Replace the connector. It only goes in one way. Double check connections.

13. Remove connector TB107 for the left front strain link. Connect wires from second strain link.

14. Replace the second connector. Double check connections.

15. Repeat this procedure for the right rear (TB106) and left rear (TB105) strain links.

16. You are done installing the strain links and connecting them to the AutoSet. Go on to next section— "Connecting AC wires to power source".

Connecting AC wires to power source

Connect AC wires from the AutoSet control to your AC power source only when you are finished connecting all wiring inside the control enclosure. If you need to install a zero cam or plan to make other optional connections to AutoSet (remote reset switch and chart recorder), go to the sections that follow and do this wiring first. Then connect AC power.

WARNING
PREVENT SHOCK
Make sure main power is off when you connect AutoSet to main power source.

WARNING
Make sure power supply cover is in place
Make sure you replaced the power supply cover (which fits over the power supply near the top of the enclosure). The power supply cover helps prevent shock if you are working inside the enclosure with power on.

What you should see when power is turned on

After connecting AutoSet to a power source, set switch S102 to "zero", close the cover, and turn power on. The LOAD displays should show 0's or other numbers. The setpoint displays should show either numbers, dashes (- - -) or the letters "HI" or "LO". It does not matter what at this point.

If the displays are not active, *turn off power to AutoSet.* Re-check connections for power and strain links. Make sure the voltage selector switches are set correctly . Then turn power on again. Make sure that the displays are active as noted above. If not, and AutoSet has power, call Data Instruments or your sales representative.

Once all connections are made

Once you have made all connections and AutoSet has power, you are ready to begin calibration. Calibration is covered in Chapter 3. Go to Chapter 3 and begin the calibration procedure.

Optional wiring; connections

The following sections explain other connections you can make to AutoSet. Except for zero cam wiring (required in some cases), these connections are optional.
The sections below cover: Optional wiring connections

- connecting a zero cam switch
- connecting a remote reset switch
- connecting a strip chart recorder

Installing a zero cam switch

There will be instances where you will need a cam switch to signal AutoSet to erase tonnage readings after the work portion of the stroke. This signal is called the zero signal. In general, AutoSet zeroes automatically. However, for high speed presses and for certain other applications, you must install a cam switch to provide AutoSet with the zero signal. Those situations when you may need a zero cam switch are discussed below.

Zero cam needed for high speed presses

For presses that operate over 400 strokes per minute, a zero cam must be wired to the AutoSet 1504. AutoSet cannot automatically zero itself fast enough at these press speeds. The zero cam may be any type of rotary limit switch running one to one with the crankshaft of the press. It must signal AutoSet near top dead center of each stroke. AutoSet will then erase tonnage readings from the previous stroke and get ready to record readings for the next stroke.

Other conditions when a zero cam is needed

For slower presses, a zero cam is not usually needed. AutoSet has enough time during the stroke to zero itself automatically. However, in some instances, a zero cam may be needed even for a slower press. Without a zero cam connected, AutoSet will not read tonnages less than 5% of full scale tonnage. Therefore, if you will be using AutoSet on jobs where less than 5% of press capacity is used, you will need a zero cam.

There are other instances where a zero cam may be needed. Some presses produce tonnage over five percent of full scale at the beginning or end of a stroke. For instance, some presses in single stroke operation will produce tonnages over 5% when they stop at top stop. Also, some presses in continuous mode produce abnormally high or low tonnage at the beginning or end of the stroke for the first few strokes only. This tonnage is produced by vibrations (also called ringing) or start-up torque.

A zero cam should be used in these cases. With a zero cam, AutoSet will record tonnage only during the portion of the stroke when the zero signal is absent (off). When the zero signal is set on between 240° and 30°, AutoSet will ignore the stray tonnage produced during the beginning or end of the stroke. Before installing a zero cam, be sure some other condition (loose wires, improper calibration) is not causing erroneous tonnage readings. Also, do not hesitate to contact Data Instruments if you need assistance in determining whether to install a zero cam.

CORRECT ZERO SIGNAL SETTING

The zero signal must come on approximately at 240° and turn off at 30° (approximately). The zero signal is a closure to ground. That means during the zero signal the cam switch must be closed. The closed switch makes a connection between the zero cam terminal (pin 2) and GND (pin 10) on connector TB101 (see Figure 2-9). If using a latching magnetic cam switch (LMCS) that uses magnets to turn the switch on and off, make sure you install the magnets at 240° and 30°. See instructions with switch for proper installation. Make sure that the zero signal does not turn off until after top dead center (TDC). For other types of switches (like a candy switch), you can set the switch after wiring is complete.

Data Instruments provides a latching magnetic cam switch (LMCS) which you can obtain for AutoSet. The following steps explain how to install the LMCS and magnets.

How to install the LMCS and magnets

1. Select a mounting site for the LMCS and the magnets so that the magnets rotate 1:1 with the crankshaft of the press. Ideally this is the crankshaft itself. However, you might also use the pitman *above* the adjusting screw or a drive shaft to a feed or other device.
2. Fabricate a bracket to position the LMCS 1/16" to 1/8" from the face of the magnets. If possible, make the bracket adjustable. To aid in mounting, the LMCS is supplied with a slotted mounting bracket. These slots are 1.5" apart, and approximately .1875" (3/16) wide by .75" long. Install the LMCS as shown in Figure 2-8.
3. To mount the magnets, make sure that you use non-magnetic brass or nylon screws, or epoxy adhesive. The magnets should be installed plastic side up with a non-ferrous metal screw. It is important not to use a ferrous screw because it could cause false signals. A brass screw (6-32) is supplied. Use a No. 36 drill and a 6-32 tap.

NOTE: *For high-speed presses, DI recommends that you use the brass screw, not epoxy or nylon screws, to mount the magnets. If the epoxy does not hold or if the nylon screws break, the magnets can become dangerous projectiles.*

   Position the red magnet so that it closes the cam switch at 240° of stroke. Set the blue magnet to open the cam switch at 30° of stroke. There should be a dwell of 150° between the two magnets across the top of the stroke, and the switch will be open during the forming portion of the stroke.

4. Once the LMCS is installed, you are ready to wire it to the connector for TB101. Open the AutoSet cover and find connector TB101. See Figure 2-2 (location of components). Black wire goes to pin 10 (GND); white or clear goes to terminal 2 (zero cam); red goes to terminal 4 (+12 Vdc sensor power).

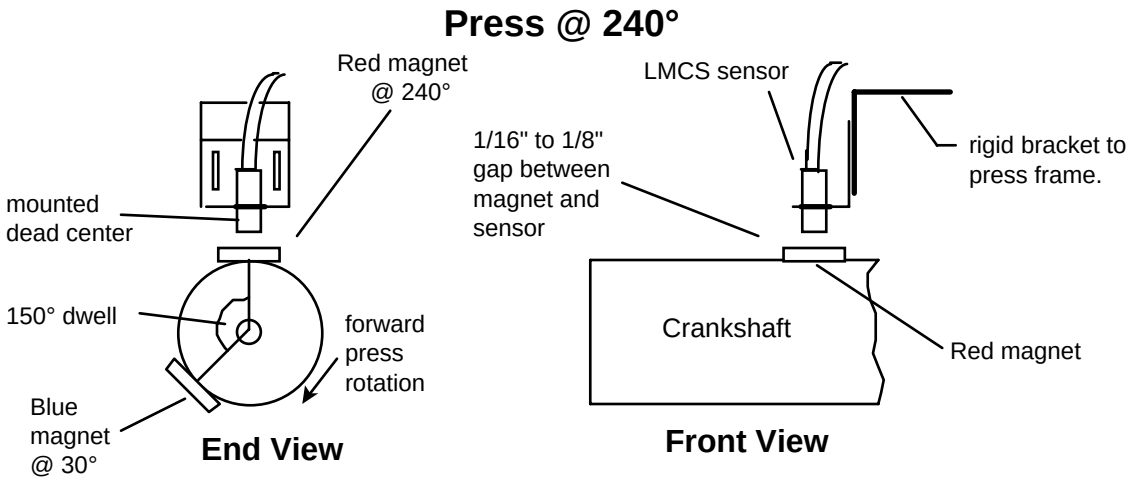


Figure 2-8. Installing the LMCS and magnets

5. Run wires from the cam switch through flexible, liquid-tight conduit to the bottom left knockout on enclosure. The control enclosure is rated NEMA 12 (protected against dust and oil). Therefore, you must use conduit rated NEMA 12 and make proper conduit connections to ensure NEMA 12 protection.
6. Pull connector out of socket. How you wire the switch depends on the type used. The LMCS will require power for the switch. Some other switches are mechanical so you do not need to apply power to the switch. If you are using a programmable limit switch (PLS) to supply the zeroing signal, you will not need power for the switch either. See below for more information.
   a. If your cam switch needs power, connect power using the terminals marked +12 Vdc (pin 4) and GND (pin 10). See instructions for the cam switch used to make proper connections to switch.
   b. For all switches, connect the zero cam circuit by connecting the switch to the terminals ZERO CAM (pin 2) and GND (pin 10).
   c. Connections are made in the same way as for AC power and strain link connections (see "Mounting and connecting strain links" and "Connecting AC wires to power source" in this chapter). Make sure you did not get wiring backwards due to turning connector the wrong way once removed from socket.

NOTE

Data Instruments' latching magnetic cam switch (LMCS) has no separate ground connection for the zero signal. The ground for power and the ground for the signal are the same. Other switches requiring power may be the same. Check instructions for your switch.

7. Plug the connector back in socket. It only goes in one way. Check the wiring.
8. If not done previously, adjust the cam switch so the zero signal comes on at 240° and goes off at 30° (approximately). In other words, the switch should close to ground between 240° and 30°.

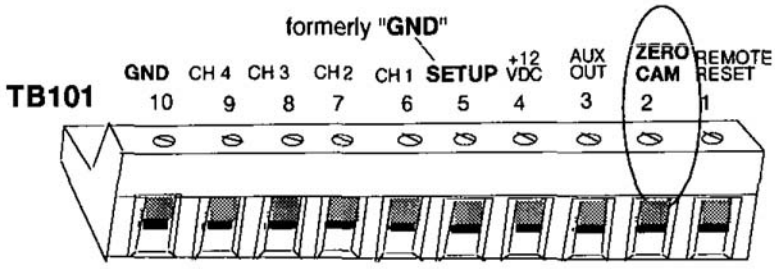


Figure 2-9. Connector for zero cam, and optional remote reset and chart recorder

9. The last thing you need to do is set DIP switch #2 on switch block S101. You must set switch 2 to "ZERO CAM ENABLE". The switch block marked S101 is located to the right of the full scale tonnage switches. With a ball point pen (not a pencil) or your thumbnail, push the switch #2 to the right—to the "zero cam enable" position. See Figure 2-10. Make sure you push the switch all the way to the right. *Also, if power is on, press and hold the Reset button for at least two seconds (toggle switch S102 must be set to "operate" before pushing Reset).* This must be done any time the switch is changed with power on. If power is off, AutoSet automatically resets at start-up.

Figure 2-10. Zero cam enable switch S101

Wiring a remote reset switch to AutoSet Plus (optional)

A remote reset switch allows you to reset AutoSet Plus without using the display/reset switch on the control enclosure cover. A simple normally open momentary pushbutton switch can be used. Here are the steps to wire in a remote reset switch.

NOTE: You can still use the display/reset switch on AutoSet Plus even when a remote switch is connected.

1. Choose a location for the switch and connect wires of appropriate length to it.
2. Run wires through conduit to bottom left knockout. (Use conduit rated NEMA 12 and make proper conduit connections to ensure NEMA 12 protection.)
3. Open the AutoSet cover and find the connector TB101. This connector is located at the left center of the enclosure.
4. Run wires through the bottom left knockout to connector.
5. Pull the connector out of socket.
6. Connect one of the wires to pin 1 (RESET) and the other to pin 10 (GND). See Figure 2-9 for connections.
7. Replace the connector. You are done installing the remote reset switch.

Wiring a strip chart recorder to AutoSet Plus (optional)

You can connect a strip chart recorder to AutoSet Plus to graphically plot tonnage produced at both strain links. The AutoSet Plus outputs for a strip chart recorder are -5V to +5Vdc. Follow these steps to connect a strip chart recorder.

1. Open AutoSet Plus front cover and find the connector (TB101) for the recorder. This connector is located at the left center of the enclosure.
2. Run wires through the bottom left knockout. You need at least five wires. (Use conduit rated NEMA 12 and make proper conduit connections to ensure NEMA 12 protection.)
3. Pull the connector out of its socket. Which wire you select is determined by the strain links location that you wish to monitor. Connect the wire that will record tonnage at the left rear strain link to pin 6 (channel 1). Connect wire for right rear strain link to pin 7 (channel 2), then pin 8 for left front (channel 3) and pin 9 for right front (channel 4). See Figure 2-9 for connections.
4. Connect fifth wire/common to pin 10 (GND).
5. Replace the connector and close the cover.
6. Connect wires to chart recorder. Follow manufacturer's instructions for your chart recorder.

Final checkout for AutoSet 1504

CAUTION

The Final Checkout needs to be performed after installation (Chapter 2), and initialization/calibration procedures (Chapter 3) have been completed. You should ensure that AutoSet 1504 will properly stop the press *before* running parts.

You need to make a few test press runs to ensure that AutoSet 1504 is working properly and will stop on a fault condition. You will have to load tonnage-related settings and then run a test tool (refer to Chapter 4 (Operation) for more assistance). Here are the steps for the final checkout:

- Set a high setpoint % value using the "% High Percent Tolerance Selector" on the AutoSet board (see location of components - Figure 2-2). For simplicity, program the high setting at 2% ("position 1" on the selector).
- Run a few parts.
- Check that the press top stops and that an error condition *("HI")* flashes on the AutoSet LED display and the display flashes the strain link input(s) affected.
- If AutoSet 1504 displayed a message but the press did not top stop, there is a problem in your top stop circuit. Recheck all wiring and trace the cause of the problem. Do not continue with this procedure until the press top stops when you trip the high setpoint.
- If you got to this step, and everything is working right, clear the error message by pressing Reset. Change the high setpoint % to a proper value.

Chapter 3
AutoSet 1504 Calibration

This chapter explains calibration of AutoSet. Calibration means adjusting AutoSet 1504 so that tonnage readings are accurate.

After calibration, the tonnage AutoSet displays will indicate the true tonnage applied by the press. You must calibrate the AutoSet after installation and any time you move the strain links to a different location on the press, restress the tie rods, or perform major repair work to the press frame.

The calibration procedure consists of the following general steps:

(1) Zeroing the strain links. This means you adjust the strain links until they provide a "zero" signal with no load on the press. Once the strain links are set for "0" at no load, they can properly record the tonnage developed once the press is under load.

(2) Applying a load to the press and measuring this load using load cells and a separate calibration unit. You can use either an AutoSet 1500 calibration kit as the calibration unit or Data Instruments' Wintriss Load Analyzer (WLA) calibration kit. How to use both units is described in this chapter.

NOTE: Calibration with a hydraulic jack is also possible, although much less accurate than load cells. It is also not as easy a procedure as using load cells. Data Instruments does not recommend hydraulic jack calibration, and it is not covered in this manual. For more information on hydraulic jack calibration, contact a Data Instruments service representative.

(3) Setting the full scale tonnage of AutoSet to equal the maximum tonnage capacity of your press. This lets AutoSet know the highest tonnage it will be recording.

(4) Adjusting AutoSet until its tonnage display agrees with the tonnage recorded on your calibration unit. Once you do that, your AutoSet is reading the proper tonnage, and it is ready for use.

The exact procedures for calibration follow.

Calibration

Before starting calibration, make sure the press is adjusted to optimal condition – the gib/ways adjustment should be correct and the ram should be parallel to the bed and tie rod tension checked.

Data Instruments recommends calibrating the AutoSet at the tonnage the press will normally operate. If you usually run between 60-90% of press capacity, for instance, calibrate at 75% of capacity. For example, if the press is a 100 ton press, calibrate for 75 tons. Do not calibrate at less than 50% of press capacity.

Types of calibration kits you can use

As noted earlier, you must use a separate tonnage monitor with a calibration kit to calibrate AutoSet. You first connect this tonnage monitor to the load cells. Then you apply tonnage to the load cells and display the tonnage on this monitor. Finally, you adjust the AutoSet until it displays the same tonnage. You can use either a WLA Wintriss Load Analyzer calibration kit or a AutoSet 1500 calibration kit to read the tonnage applied to the load cells. How to use each type of calibration kit is described below.

How many load cells to use

Use one load cell (single point calibration) if your press has only one connecting rod (Pitman). The load cell is placed under the rod. If your press has two (or more) connecting rods, use at least two load cells (double point calibration). Both methods are covered below.

How to begin

The calibration procedure is divided into four parts:

- Zeroing the strain links
- Setting up and adjusting the Wintriss Load Analyzer (WLA) calibration kit
- Setting up and adjusting an AutoSet 1500 calibration kit
- Calibrating your AutoSet 1504

First follow the procedure for setting up and adjusting the calibration unit you are using. Then go directly to the section titled "Calibrating your AutoSet 1504".

Zeroing strain links

1. Before you can adjust the AutoSet 1504 to the tonnage on your calibration unit, you have to set the strain links to read zero (0) at no load. This is called zeroing the strain links.

   First, make sure there is no load on the load cells. Move the ram to top dead center if it is not already there.

2. Make sure the strain link mounting screws are loose. There can be no stress on the link. You will zero and tighten links to the frame at the same time. (Remember you left the strain links loose in the installation procedure — this is the reason why.)

   NOTE: If you did not put Loctite no. 242 (or equivalent) on the mounting screws when following the installation procedure, do so now.

3. Apply power to AutoSet if not already on.
4. Turn the toggle switch (marked S102) on the control board to "ZERO". This is the switch next to the "percent tolerance selector" just above the strain link connectors. The displays will be lit. The top load LED displays will show numbers. The bottom setpoint LED displays will show dashes or the letters "HI" or "LO".
5. Start with the left rear strain link. Remove its two cover screws and pull the cover off.

6. Find the potentiometer for zeroing the link. It is a small cube on the circuit board with a tiny screw on top as shown in Figure 3-1.

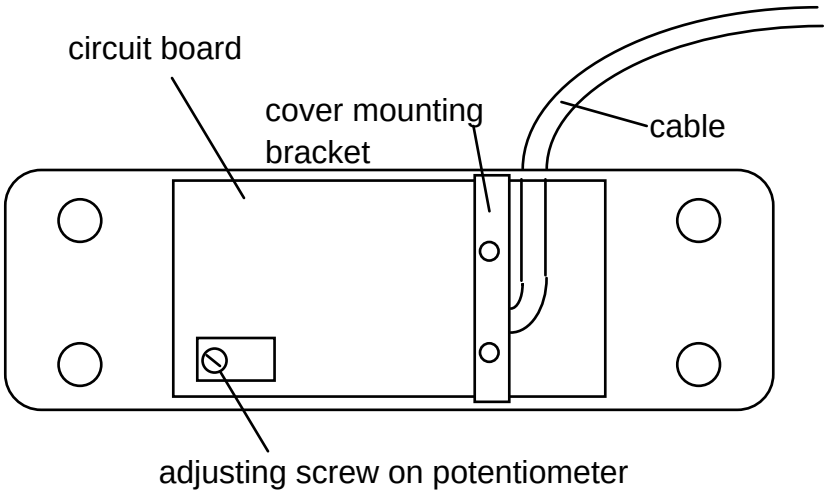


Figure 3-1. Zeroing screw for strain links

7. Turn the screw on the strain link. You will see the numbers in the upper left display window change. Adjust the display by turning the screw one way or another until the display reads between ±5. The setpoint display will now show dashes (- - -).

> **NOTE**
> If you cannot get the tonnage displays to read between ±5, make sure strain link connections are tight and connector is firmly seated. Loose connections can cause the problem. If nothing has worked, the strain link is not working properly. Contact Data Instruments for assistance.

8. Now begin tightening the strain link screws evenly all around. As you tighten, check the display. The numbers on the tonnage display will change. When the strain link is fully tightened (150 inch-pounds), the number on the display must be between ±90.

   If the number is not between ±90, loosen and adjust the mounting screws until you get it. Make sure you get it right. By doing so, you ensure that there is no stress on the link at no load.

> **NOTE**
> If you cannot get the tonnage displays to read between ±90, you may have drilled the holes crooked, or there may be some other problem with the installation. Contact Data Instruments for assistance.

NOTE: At this point, the setpoint display may say "HI" or "LO" or show dashes (- - -). Ignore this display for now. A "HI" or "LO" means the setting is still too close to the outer limits of the range, but we will take care of that in the next step.

9. Once the strain link is tight, set the display as close to zero as possible, between ±50. Set the display by turning the screw on the potentiometer on the strain link, as before. The setpoint display will now show dashes (- - -).
10. Replace the strain link cover. You are done zeroing the link.
11. Repeat Steps 5–10 for the remaining strain links.

Setting up and adjusting a WLA calibration kit

Follow the steps below if you are using a Wintriss Load Analyzer 2000. You must obtain a WLA2000 unit, up to two calibration modules, and up to two load cells and cables.

NOTE

For two load cell calibration: Ignore total tonnage readings displayed on the WLA during calibration. Use left side reading for left tonnage and right side reading for right tonnage.

For single load cell calibration: Disregard the total tonnage reading. Make sure the load cell is centered under the connecting rod. Use the left side readout and divide it by two for left and right side tonnage readings.

Follow these steps to set up and adjust the WLA calibration unit:

1. Make sure the power to the Wintriss Load Analyzer is off. Then remove *both* signal conditioning modules if installed. These modules are the ones which have knobs for setting tonnage setpoints and a span adjustment. Loosen the screw at the bottom of the module and pull it out. *(Important: You must remove both modules.)*
2. Insert the calibration modules, which have a large, green Amphenol plug, in place of the conditioning modules. (For single cell calibration, only insert the left module.)
3. Remove the display module from the WLA. This is the module with the LED display for tonnage readings. It is located between the two conditioning modules. To remove, loosen the screw at the bottom of the module and slide module out. You will see three dial switches with numbers on them.

   For two cell calibration, set the tonnage switches to the *sum* of the load cell capacities.

   For single cell calibration, set the tonnage switch to the load cell capacity.

   To set the dial switches, use a screwdriver to aim the pointer at the number you want. The switch for the most significant digit (the "1" in 100 for instance) is at the left. When done, replace the display module.

4. Connect the cables to calibration modules—they attach to the front of the module—and to the load cells. Make sure the left cell is connected to the left module and the right cell to the right module. For one cell calibration, of course, you are only connecting one module (the left module).
5. Plug in power cord and turn power on. (If your unit does not have a power cord, refer to your WLA User Manual for instructions on connecting power.)
6. On the WLA computation module:
   - Set the mode switch to ZERO.
   - Set the TENSION/COMPRESSION switch to COMPRESSION.
   - Set the display switch to LEFT.
7. Use a screwdriver to adjust the span control on the left calibration module until the display flickers between "00" and "L0".
8. For two cell calibration only:
   - Set the display switch to RIGHT.
   - Adjust the right calibration module span control with screwdriver until the display flickers between "00" and "L0".
9. On the WLA:
   - Set the mode switch to CALFACTOR.
   - Set the display switch to LEFT.

   Press and release the RESET button.
10. You should now see a number between 170 and 190 on the display.
    - If no calibration number appears, change the TENSION/COMPRESSION switch to the opposite position.
    - If the calibration number is incorrect, stop the calibration procedure. Call Data Instruments for help.
11. For two cell calibrations, set the display switch to RIGHT.
    - Press and release the RESET button.
12. You should now see a number between 170 and 190 on the display.

    If no calibration number appears, change the TENSION/COMPRESSION switch to the opposite position.

    If the calibration number is incorrect, stop the calibration procedure. Call Data Instruments for help.

13. On the WLA computation module:

    Set the mode switch to OPERATE and the TENSION/COMPRESSION switch to COMPRESSION.

    Press and release the RESET button. Set the display switch to LEFT. The letters "cA" will now appear in the displays.

14. If not already done, you must connect a switch to the WLA so you can zero it after every complete stroke. Manually zeroing the WLA is required because it has no zero cam connected to it which tells it when the press reaches top dead center. Without a zero signal, the WLA does not know when to clear the readings for one stroke and display readings for the next. You tell it when by manually zeroing it. You should zero the WLA after every stroke of the press.

    A normally open, momentary push-button switch is recommended. Install the switch between terminals #1 and #4 on terminal TB2. TB2 is on the left end of the WLA. Remove the screws on the left end panel and remove panel to see TB2. It is on the edge of the circuit board. Connect the switch. Then re-assemble the end panel.

15. Press the zero switch you just installed. The letters *"cA"* will disappear from the displays and a zero will appear. Note: The status function light on the WLA will light each time the switch is pressed.

16. You are done setting up the WLA calibration unit. The WLA will now read the correct tonnage when you apply a load to the load cells. Go to the procedure titled "Calibrating your AutoSet 1504" to set up the press and calibrate your AutoSet 1504.

Setting up and adjusting an AutoSet 1500 calibration kit

Follow the steps below if you are using an AutoSet 1500 calibration kit (includes calibration modules) for calibrating your AutoSet 1504. You must also obtain up to two load cells and cables. The steps below tell you how to set up and adjust the AutoSet 1500 to display the correct tonnage applied to the load cells.

1. Find the calibration modules. They are small enclosures with cables attached. The end of each cable has a connector that fits into the strain link connector in the AutoSet enclosure. These modules also have a connector on the enclosure where the load cell cable connectors screw in.
2. Swing open the front cover of the AutoSet that you are using as the calibration unit. If your unit does not have a plug, connect power to it as described in Chapter 1—"Connecting AC power and stop circuit". (Do not connect the stop circuit.)

WARNING

Make sure power supply cover is in place

If you remove the power supply cover to connect 115 Vac wires, make sure you put the cover back on. The cover fits over the power supply near the top of the enclosure. It helps prevent shock if you are working inside the enclosure with power on.

3. For one cell calibration, take one calibration module and plug the cable into the slot marked "left input" in the AutoSet enclosure. This slot is at the lower right hand corner of the enclosure. The connector goes in one way only. If there already is a connector plugged into this slot, remove it to plug in the connector to the calibration module.

   For two cell calibration, also plug the other calibration module into the slot marked "right input".

   For one cell calibration, you must attach a jumper wire to the connector on the unused channel. So pull out the connector from the right input slot. If there is no connector in this slot, you will have to put one in. Put a jumper wire between terminals 2 and 3 (see Figure 2-7 in Chapter 2). Plug the connector back in. This connector should have no other wires attached to it.

NOTE

You can use either the right or left input for one cell calibration. We will use the left in this procedure. The unused connector in the other slot must have the jumper wires connected.

4. Get the load cells you are using (one or two). Screw the connector on each load cell cable into the connector on the calibration module.
5. Plug in your AutoSet calibration unit if you have not done so. If your unit does not have a plug, connect wiring to an AC outlet, then apply power. Make sure power at the outlet is off before connecting the wires.

WARNING

PREVENT SHOCK

If your AutoSet does not have a plug and you wire it to a power source, make sure power at that outlet is off before you connect the wires.

6. Check the AutoSet displays. Once AutoSet has power, the displays will show numbers, dashes, or letters (it does not matter what at this point). Recheck all connections if displays do not light up.
7. Familiarize yourself with the location of the switches and dials inside the enclosure. See Figure 2-2 in Chapter 2 of the AutoSet 1500 manual for the location of the components inside the enclosure.
8. *You must set the full scale tonnage on the AutoSet calibration unit to 2 times the tonnage of one load cell. Even if you are using two load cells, you still set this number to 2 times the tonnage of 1 load cell.*

> **NOTE**
> Figure 2-2 in Chapter 2 of the AutoSet 1500 user manual is a drawing of the components. If necessary, use it to locate the dials and switches which will be mentioned in the following steps.

Determine the number you will use for your setting. Here are two examples of how to determine the correct number:

Example 1: You are using one 100 ton load cell for calibration. The full scale tonnage must be set to 200.

Example 2: You are using two 100 ton load cells for calibration. The full scale tonnage must be set to 200.

9. Set full scale tonnage as follows:

   Find the three blocks in a column with white dials on them. See Figure 3-2. They are at the right middle of the enclosure.

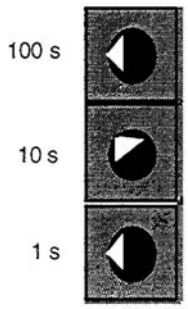


Figure 3-2. Blocks for setting full scale tonnage on calibration unit

The blocks are labeled 100's, 10's and 1's (for the 100's digit, 10's digit and 1's digit in a number). These labels tell you how to dial in your number. For instance, if your number is 250, you would set the blocks like this: 100's = 2, 10's = 5, 1's = 0. If your number is 50, you would do this: 100's = 0, 10's = 5, 1's = 0.

You set tonnage by turning the dial screw on each block until the arrow points at the right number. Set your number on the calibration unit as instructed below:

If you are setting a number from 1 to 999

Set the 100's, 10's and 1's digits to the number. For load cells under 200 tons, AutoSet will display tonnage in tenths of a ton (15.5 20.0, 99.9, etc.) up to 100 tons. For 200 tons and above, AutoSet displays tonnage in whole numbers only.

NOTE: Make sure the decimal point switch (No. 3 on S6) is set to the "ON" position. See Figure 3–2. If not set to "ON", push switch all the way to the left with a pen or your thumbnail.

If you are setting a number between 1000 and 1500

Leave out the least significant digit when setting the switches. For instance 1500 would be set as "1", "5", "0"—the same as if you were setting full scale tonnage to 150 tons. You must also set DIP switch number 3 on switch block S6 to the closed position (decimal point off). Switch block S6 is located below the full scale tonnage switches. See Figure 3-3. With a ball point pen (not a pencil) or your thumbnail, push the switch to the right (away from the OPEN position). Make sure you push it all the way to the right. This allows AutoSet to display accurate readings within the 1000 to 1500 tonnage range.

NOTE: Changing this switch shuts off the decimal point. Tonnage will only be displayed in whole numbers.

Figure 3-3. Setting decimal point switch on calibration unit

If you are setting a number more than 1500

Leave out the least significant digit when setting the switches. For instance 2000 would be set as "2", "0", "0"—the same as if you were setting full scale tonnage to 200 tons. When your setting is greater than 1500, you must multiply all tonnage readings on your displays by 10. For instance, 15.5 tons would be read as 155 tons. A display of 150 tons would be read as 1500 tons.

NOTE: Make sure the decimal point switch (No. 3 on S6) is set to the "ON" position. See Figure 3–3. If not set to "ON", push switch all the way to the left with a pen or your thumbnail.

10. Turn off the power to AutoSet, then back on again. This must be done to reset the unit after changing the tonnage switches. (Also resets decimal point if decimal point switch was changed.)

11. Find the toggle switch marked S3. It is next to the "percent tolerance selector" just above the strain link connectors. Set the switch to "ZERO". Look at the tonnage displays. For one cell calibration, the number on the left display must be between ±50. For two cell calibration, the number on both displays must be between ±50.

    If the numbers are not within this range, there is a problem with your calibration unit. Call Data Instruments for assistance.

12. Set toggle switch S3 to "CALFACTOR".
13. Find the potentiometers for setting gain. They are small blocks labeled R17 and R25 at the bottom center of the box. A tiny screw protrudes from the upper left corner of each block.

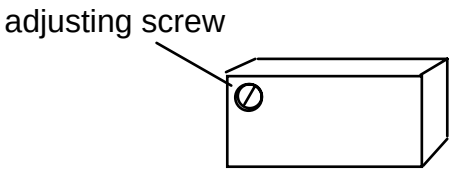


Figure 3-4. Gain potentiometer for setting calfactors

14. Find the block marked R17 (top block). This controls the left display. Turn the screw one way or another until the left tonnage display reads 157 ±2. For two cell calibration, adjust the right display as well. Turn the screw on block R25 (bottom block) until the right display reads 157 ±2. To calibrate the press in metric tons, set the calfactor to read 173 ±2.
15. Set the toggle switch to "OPERATE". The tonnage displays should now show 0 tons.
16. Find the percent tolerance selector dial near the bottom right of the enclosure (see Figure 2-2). Turn the dial until the pointer is at 0. Press the reset button and hold for at least two seconds until the displays flash.

    Setting the percent tolerance selector to 0 disables AutoSet's automatic setpoint function. Some numbers will appear in the setpoint displays after the unit is reset. Ignore these numbers. You only use the tonnage displays on your calibration unit.

17. You are done setting up the AutoSet calibration unit. It will now read the correct tonnage when you apply a load to the load cells. Go to the next procedure—"Calibrating your AutoSet 1504".

Calibrating your AutoSet 1504

Whether you are using the AutoSet 1504 or the WLA calibration kit, the unit should now be set up so it will read the correct tonnage applied to the load cells. Follow the steps below to set up the loads cells on the press and calibrate the AutoSet 1504 installed on your press.

Setting up the press

1. Make sure that the die is removed from the press and that any bolster/bed openings or ram holes are covered with a plate or plates rigid enough to prevent flexing. Data Instruments strongly recommends using 1" to 2" thick steel plates (parallels) above and below the load cells to more evenly distribute the load on the bed and ram. This helps to improve calibration accuracy and linearity.
2. Bring the ram to bottom dead center and turn off the power to the press. *The press must be at 180°*. Use a dial indicator if necessary.
3. Place the load cell (or cells) and parallels under the connecting rod(s). Make sure they are centered under the connecting rods to ensure even load distribution on the press frame.
4. Turn on the press and cycle the press through one stroke.
5. Use the shut height adjustments to lower the ram 0.003" or 0.004" (0.076–0.102 mm) on successive strokes until the readout on your calibration unit indicates that contact on the load cell(s) is being made at bottom dead center.

NOTE: *DO NOT STOP THE RAM ON THE LOAD CELLS. ALWAYS CYCLE THE PRESS THROUGH A COMPLETE STROKE.*

NOTE

If you are using the Wintriss Load Analyzer (WLA) as your calibration unit, you should zero it after every complete stroke using the switch you installed on the WLA calibration kit earlier.

You do not have to zero the AutoSet calibration unit.

6. Determine the load you should put on the press. Tonnage on the load cells should be equal to the tonnage normally used when making parts. For example, if you usually run between 60–90% of press capacity, then set the press at 75% of capacity. This will give you the most accurate tonnage readings within this range. In any case, make sure that you set tonnage to greater than 50% of press capacity.

   Also make sure the capacity of the press is not exceeded.

7. Adjust the ram downward and cycle the press. Check the tonnage displays on your calibration unit. Keep cycling the press and adjusting the ram downward until you are at the tonnage you want.

WARNING
Do not stick press on bottom

Do not overload the press by bringing the ram too far down at once. *You may stick the press on bottom!* Bring the load up gradually. Load cells are extremely stiff compared to normal material used for making parts. Unlike softer material, they provide no compressive cushion to bring the ram through bottom dead center if you over-adjust.

For two cell calibration, check the left and right load cell readouts. Make sure they display equal tonnage ± 2%.

If one load cell reading is not equal to the other, add shim stock to the load cell that shows the lower tonnage. Cycle the press. Recheck tonnage. If tonnage is still not equal, add more shim stock until tonnage is equal.

8. When tonnage is correct, lock the shut height adjustment.
9. Check to make sure the load cells, shims, and parallels will not move during calibration. If using the WLA as the calibration unit, zero it first, then recheck tonnage. If using the AutoSet calibration kit, recheck tonnage (no zeroing is required). See if there has been a decrease in tonnage on the load cells. If so, re-adjust the press to the correct tonnage. Be sure to lock the shut height again if you had to adjust tonnage.
10. Your calibration unit should now display the tonnage you are using for calibration. Your objective from this point on is to adjust the AutoSet 1504 so it that reads the same tonnage as displayed on the calibration unit. At this point, your AutoSet 1504 and strain links must be installed (as described in Chapter 2) with all the wiring completed.

    Open the front cover of the AutoSet 1504 control enclosure. If necessary, familiarize yourself with the location of the switches and dials you see inside the enclosure.

NOTE

Figure 2-2 in Chapter 2 is a drawing of the components in the AutoSet 1504 enclosure. If necessary, use it to locate the dials and switches which will be mentioned in the following steps.

Setting full scale tonnage

1. Determine the full scale tonnage for your press. Full scale tonnage is the rated capacity of the press (2000 tons, 1500 tons, 100 tons, 20 tons, etc.)
2. Find the three rotary switches in a row with white dials on them. See Figure 3-5. They are at the right middle of the main board. These are the settings for full scale tonnage.

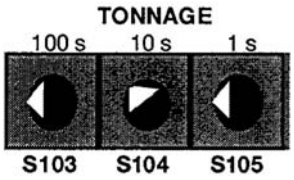


Figure 3-5. Blocks for setting full scale tonnage on AutoSet 1504

3. You set tonnage by turning the dial screw on each switch until the arrow points at the right number. The dials are factory set to 200 tons.

   The switches are labeled 100's, 10's and 1's (for the 100's digit, 10's digit and 1's digit in a number). These labels tell you how to set tonnage. For instance, you would set tonnage for a 150 ton press like this: 100's = 1, 10's = 5, 1's = 0. For a 20 ton press, you would do this: 100's = 0, 10's = 2, 1's = 0.

   Set full scale tonnage of your press as instructed below:

   When full scale tonnage is from 1 to 999

   Set the 100's, 10's and 1's digits to the full scale tonnage of your press. For presses under 400 tons, AutoSet 1504 will display tonnage in tenth's of a ton (15.5 20.0, 99.9, etc.) up to 100 tons. For presses 400 tons and over, AutoSet 1504 displays tonnage in whole numbers only.

   NOTE: Make sure the decimal point switch (No. 3 on S101) is set to the "ON" position. See Figure 3–5. If not set to "ON", push switch to the bottom with a pen or your thumbnail.

When full scale tonnage is between 1000 and 3000

Leave out the least significant digit when setting the switches. For instance 1500 would be set as "1", "5", "0"—the same as if you were setting full scale tonnage to 150 tons. You must also set DIP switch number 3 to the closed position (decimal point off). This is the third switch on switch block S101 located below the full scale tonnage switches. See Figure 3-6. With a ball point pen (not a pencil) or your thumbnail, push the switch to the right (away from the OPEN position). Make sure you push it all the way to the right. This allows AutoSet to display accurate readings within the 1000 to 3000 tonnage range.

NOTE: Changing this switch shuts off the decimal point. Tonnage will only be displayed in whole numbers.

Figure 3-6. Switch block S101 showing decimal point switch

When full scale tonnage is more than 3000 tons

Leave out the least significant digit when setting the switches. For instance, 4000 would be set as "4", "0", "0"—the same as if you were setting full scale tonnage to 400 tons. For presses over 3000 tons, you must multiply all readings by 10. For instance, 155 tons would be displayed as 15.5 tons. 1500 tons would be displayed as 150 tons.

NOTE: Make sure the decimal point switch (No. 3 on S101) is set to the "ON" position. See Figure 3–6. If not set to "ON", push switch all the way toward the bottom with a pen or your thumbnail.

4. Turn power to AutoSet 1504 off, then back on. This must be done to reset the unit after changing the tonnage switches. (Also resets decimal point if decimal point switch was changed.)

Adjusting AutoSet to read the correct tonnage

1. Now you are ready to make the all-important adjustments so the tonnage displayed for each strain link reads the same as on your calibration unit.

   Turn the toggle switch S102 to "OPERATE".

2. Find the four potentiometers for setting gain in a row along the middle right side of the main board. They are the four small blocks with a tiny screw protruding from the corner of each block. (See Figure 3-7). You adjust the tonnage by turning this screw.

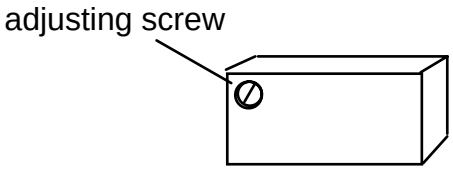


Figure 3-7. Potentiometer for setting gain

3. Start with the left rear strain link. The gain potentiometer (R125) adjusts the gain for this strain link. First take a look at the jumpers (J 115) to the left of R125 (see Figure 2-2 for exact location). It should be set to the left (in other words, the right pin of the jumper connections will not be covered by the jumper block). See Figure 3-8. This jumper setting is the *low gain* setting. If necessary, you will need to move the jumper to the *high gain* setting later. For now, make sure the jumper is at the low gain setting.

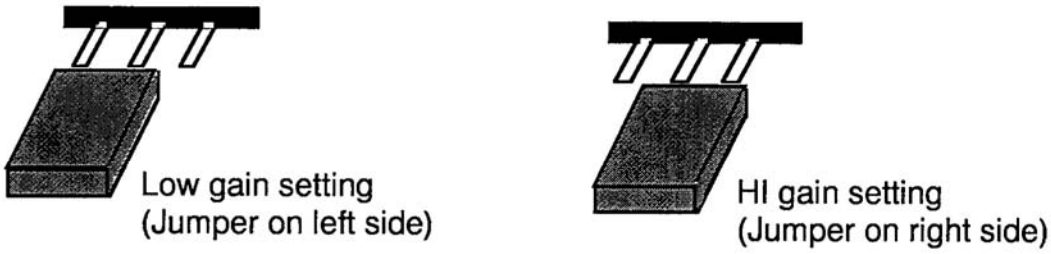


Figure 3-8. Jumper position for low gain and high gain

4. Cycle the press and determine whether the "left rear" tonnage on AutoSet is greater or less than the tonnage displayed on your calibration unit.

> **NOTE**
> You must divide the load cell tonnage shown on your calibration unit in half if you are using two load cells and divide by four if you are using only one cell. Use the appropriate number as the tonnage for each AutoSet 1504 input.

5. If half the total left side tonnage (two-cell calibration) or one-quarter (1/4… one-cell calibration) is greater on the AutoSet 1504 than on your calibration unit, turn the potentiometer screws on R125 counterclockwise. Cycle the press to see the new tonnage displayed.

> **IMPORTANT**
> You must stroke the press after each adjustment. Otherwise, the display will not change.

6. Continue cycling the press and adjusting AutoSet 1504 until the tonnages shown for the left rear input equals half the tonnage on the left side of the calibration unit or *one-quarter (1/4)* if you are only using *one* load cell. The potentiometer screw has a 25-turn limit. The potentiometer screw has a 25-turn limit. You may need to turn it quite a few times to make the adjustment. When the display shows the correct tonnage, stop. You are done calibrating the left rear input. Go to step 8.

   NOTE

   If you are using the WLA as the calibration unit, remember to zero the WLA (as mentioned earlier) after every stroke so a new tonnage is recorded. Do this just in case tonnage on the load cell changes for any reason.

7. If tonnage is less on AutoSet than on your calibration unit, turn the screws clockwise while cycling the press and watching the left rear display. (If you do not see any tonnage displayed on AutoSet, do not worry. Just keep turning the screws clockwise while cycling the press, and tonnage will begin to appear.)

   Continue adjusting AutoSet 1504 tonnage upward, following the instruction provided in step 6. If you get the tonnage on AutoSet 1504 to match, you are done. Go to step 8.

   If you reach the end of the adjustment (tonnage display will not change anymore) and the tonnage is still less than the tonnage on your calibration unit, you must set the jumper J115 described in step 3 to *high gain*. First turn power to AutoSet 1504 off. Pull the jumper straight out and place it over the top and center pins. See Figure 3-8. Turn power on and cycle the press.

   You will now probably see a tonnage much higher than what you want. Also, it is likely that the load displays will be flashing because tonnage is now over 120% of full scale. If so, press the reset button momentarily. The displays will stop flashing. Then turn the screw counterclockwise and keep cycling the press until tonnages match. Reset the unit any time the displays flash. Keep adjusting tonnage downward. When tonnage on AutoSet 1504 matches tonnage on your calibration unit, you are done.

8. Find the potentiometer (R134) for the right rear strain links (below the potentiometer R125). Go to step 3 and repeat the procedure through step 7 for the right rear strain link. Right rear strain link connector is TB106. The jumper J116 sets the gain for the right rear strain link.

9. Find the potentiometer (R156) for the left front strain links (below the potentiometer R134). Go to step 3 and repeat the procedure through step 7 for the left front strain link. Left front strain link connector is TB107. The jumper J117 sets the gain for the left front strain link.

10. Find the potentiometer (R165) for the right front strain links (below the potentiometer R156). Go to step 3 and repeat the procedure through step 7 for the right front strain link. Right front strain link connector is TB108. The jumper J118 sets the gain for the right front strain link.

11. You are done with the calibration procedure, but you must do one more thing. Switch the toggle switch S101 from "OPERATE" to "CALFACTOR". Now you will see numbers (not tonnage) in the setpoint displays between 40 and 960 (tonnage displays show "CAL"). These are *calfactor* numbers. Record them (make sure you record them as left rear, right rear, left front, and right front) and *save them.* Then if you ever have to replace a control board, you can simply set the switch to calibrate and adjust each potentiometer screw until the calfactor number you recorded is displayed. You will not have to go through the whole calibration process again.

    Record the gain setting for each strain link as well. (For example, low gain–jumper to left, high gain–jumper to right.) The gain has to be set properly in order to set the right calfactor number.

    Write the calibration and gain information right on the "AutoSet operating instructions" label (pictured below) which is affixed to your unit.

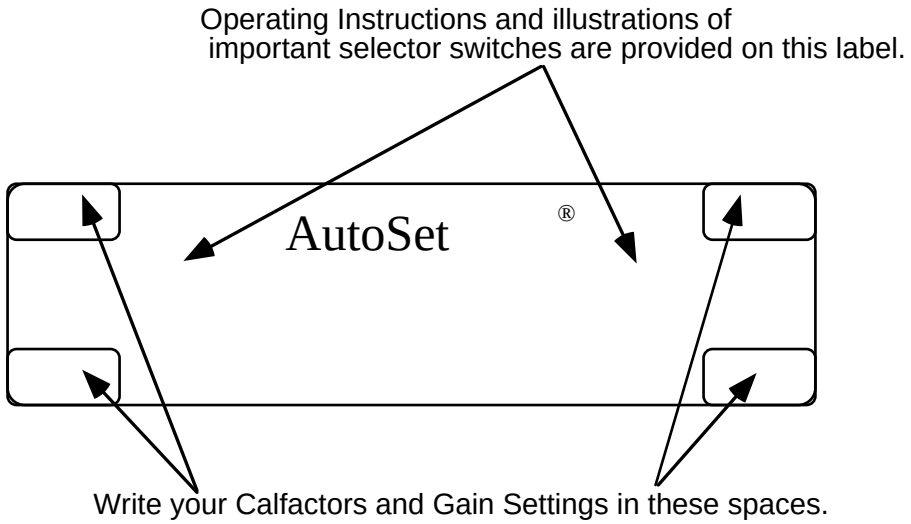


Figure 3-9. Schematic of AutoSet label

12. Set the toggle switch S101 back to operate. Calibration is finished and AutoSet 1504 is now ready for use.

Linearity check

After calibration, you can check linearity to see how accurately tonnage is being recorded at different loads. Linearity means that AutoSet tonnage readings increase proportionately to the load. For instance, if AutoSet reads 40 tons with 40 tons on the load cells, it should read 80 tons with 80 tons on the load cells.

To check linearity, change the load on the press. For instance, if you calibrated at 75% capacity, reduce the load on the load cells to about 45%. If you calibrated at 50%, increase the load to about 80%. The tonnage on AutoSet at each strain link should equal 1/2 of the tonnage on the calibration unit at each load cell.

If the tonnages disagree, the problem may be the positioning of your strain links or twisting forces on the press. Consult your service representative or Data Instruments. Note, however, that perfect linearity is unachievable. Typically tonnages are 5% to 10% off at 20-80% of press capacity.

Chapter 4
AutoSet 1504 Operation

The AutoSet 1504 load monitor automatically sets high tonnage limits based on measured load. It measures the load at four points on the press—the points where its four strain links are mounted.

Operation is very simple. You make only two settings:

- sampling period
- percent high tolerance selector

This chapter tells you how to make these settings and when you have to change settings for different jobs. Most of the time you will not. This is what makes AutoSet so easy to use. In general, you can use the same settings for all your jobs. There are some cases where you may have to or will want to change settings. These cases are discussed later in this chapter in the section, "When you may want to change the setpoint percentage".

How to make settings on AutoSet

AutoSet requires only two settings before it calculates setpoints: selecting the sample period and setting the percent tolerance selector. Here's how to make these settings:

Selecting the sample period

AutoSet has two different sampling periods—15 strokes or 1 stroke. As a rule of thumb, use the 15 stroke sample period when running in continuous mode or when the percent tolerance selector is set at values less than or equal to 50% of full scale.

Use the 1 stroke sampling period when the percent tolerance selector is set higher than 50%. Then a sampling period of one stroke would suffice.

> **NOTE**
>
> If you are not sure what sample period to use, set it for 15 strokes. The 15 stroke sample period allows AutoSet to make a more accurate measurement of tonnage. The one stroke setting is used mainly for convenience in low tolerance jobs.

To select the sampling period, follow these steps:

1. Open the cover and find the (position #1) switch on the DIP switch blocks marked (S101). This switch block is located just above the "Percent Tolerance Selector". Switch #1 is factory set to 15 strokes.

2. To set the sample period for 15 strokes, push switch #1 to the left (toward the "OPEN" position) on the switch block S101. See Figure 4-1. Use a small screwdriver or ball point pen (not a pencil) to push on the dimple at the bottom end of the switch. The switch will snap over. Make sure the switch is set all the way to the bottom and not in between positions.

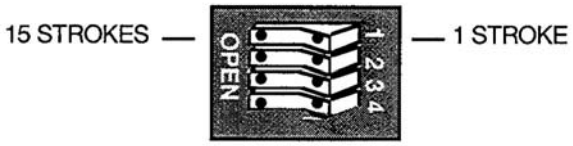


Figure 4-1. Stroke select switch (#1) with 15 strokes selected

3. To set the sample period for 1 stroke, just press the switches to the right (away from the "OPEN" position).
4. If you change the switch's position, press the RESET button on the front cover and hold for at least two seconds until the setpoint displays flash and change to 120% of full scale tonnage. The next time you run the press, the new sample period will be in effect.

> **REVIEW "HOW AUTOSET WORKS"**
> It is a good idea to review "How AutoSet Works" in Chapter 1 *before* you go any further. Even though you do not have to understand how AutoSet calculates these setpoints in order to create these setpoints, it may help to clarify the next sections more for you. The steps, which tell you how AutoSet calculates high setpoints based upon the percent tolerance setting, have been designed so that you can make the right settings for the job.

Setting the percent tolerance selector

The percent tolerance selector tells the AutoSet what percentage to use in calculating setpoints. The procedure below tells you how to determine the correct setting for your die. You will not have to follow this procedure for every die. In most cases, once you make the setting for one die, it will work for most of the dies you use on the press.

See "When you may want to change the setpoint percentage" later in this chapter for a discussion of when you may need to readjust the percent tolerance selector.

Here is how to set the percent tolerance selector to the correct setting:

1. First make sure the die you are using is installed and adjusted and you are ready to make parts.

2. Open the AutoSet control enclosure and find the percent tolerance selector, a round, white dial with numbers around it.

3. Look at Figure 4-2 to become familiar with the selector setting switch. (This drawing is also shown on a label inside the AutoSet door.) The selector dial has settings from 0 to 9. Each setting represents a percentage. The first dot to the right of 0 is 1. 1= 2%; 2 = 5%; 3=10%; 4 = 15%, and so on.

> **IMPORTANT**
>
> A "1" setting on the percent selector is the lowest you can go. A "0" setting will *not* create setpoints. The "0" position automatically disables AutoSet (it *does not* create any setpoints). In other words, you do not have overload protection. However, it will stop the press if tonnage exceeds 120% of full scale.

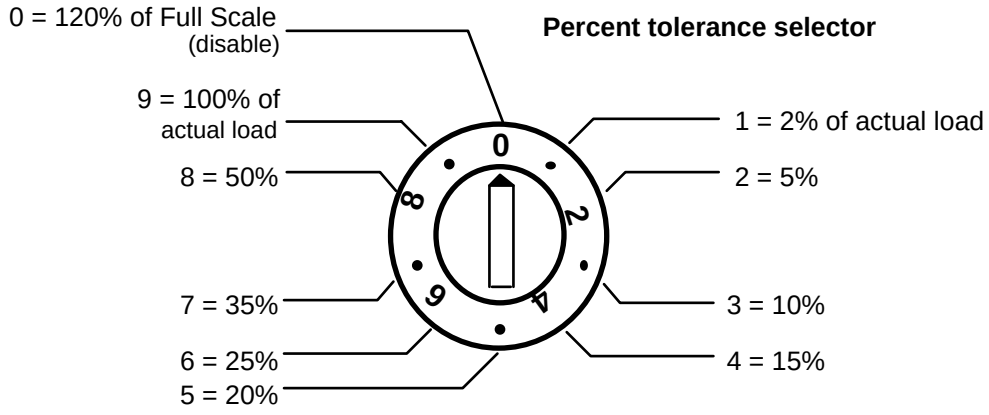


Figure 4-2. Percent tolerance selector switch

4. Set the percent tolerance selector to 15%. Do this by clicking the dial until the pointer is at "4". (This setting means AutoSet will create setpoints 15 percent above the highest tonnage recorded during the sample period.) The 15% setting is a good setting to start with for most jobs. As you become more experienced using AutoSet, you may want to start at different settings depending on the job.

> **NOTE**
>
> It is important that you set the percent tolerance selector to the same percentage. Failure to do so can cause the AutoSet to create erratic setpoints.

Creating setpoints for the job

1. You are ready to create setpoints for the job. How you do this depends on your operation.

If your operation is set up for continuous stroke

A. Press and hold the RESET button for at least two seconds until the setpoint displays flash and change to 120% of the press's full scale tonnage. This action tells AutoSet to calculate new setpoints when the press is started.

If your press produces erratic tonnage at start-up

Some presses have erratic tonnage at start-up. In these cases, press the reset button to recalculate setpoints again after the press is started and tonnage has stabilized. This allows AutoSet to ignore the strokes producing erratic tonnage.

You can eliminate this problem completely by installing a zero cam switch as described in Chapter 2. Then you can reset before starting the press, and AutoSet will automatically ignore erratic tonnage at start-up. It is a good idea to install the switch on any press where this problem occurs. That is because if you forget to reset after starting the press, your setpoints may be too high and you will not have adequate protection—or too low and AutoSet will stop the press unnecessarily.

B. Start and run the press. After the sample period is completed, AutoSet will display new setpoints based on the sampled load. If AutoSet shuts down the press because these setpoints are exceeded at one or more strain links, go to step 2. (You know AutoSet stopped the press if one or more LOAD displays flash.)

C. If the press does not stop after the sample period is completed, run the press for about 20 more strokes beyond the sample period. See if AutoSet stops the press. Then stop the press and go to Step 2.

If your operation is set up for single stroke:

A. Press the RESET button for approximately two seconds before starting the press. Make sure you hold the button down until the setpoint displays flash and change to 120% of full scale tonnage. This tells AutoSet to calculate new setpoints.

B. Run the press and make a part. Keep making parts until the number of strokes exceeds the strokes set in the sample period. After the sample period ends, setpoints will be created based on the highest load produced during the sample period.

C. If AutoSet signaled an overload after the sample period ended, go to Step 2.

D. If AutoSet did not shut down operation, cycle the press a few more times to see if AutoSet stops operation. Then go to step 2.

2. Proceed below based on whether or not AutoSet shut down the press in Step 1. However, be sure you understand the difference between a *nuisance stop* and a *tonnage fault* before you go any further.

> A nuisance stop occurs when setpoints are so tight that normal variations in tonnage cause AutoSet to shutdown the press. Our goal is to create setpoints just high enough, yet tight enough so that nuisance stops will not occur.
>
> A tonnage fault occurs when the tonnage has fluctuated enough to exceed the high setpoints being used by the load monitor. A fault may be a number of die malfunctions. To correct the problem, carefully inspect the die area. *For your information, the different tonnage faults are discussed in detail in Chapter 5 .*

WARNING

If the press stopped due to a real fault, do not continue until you have completely corrected the problem! Failure to do so may result in damage to the press and tooling.

If AutoSet did not shut down the press in Step 1:

A. Click the dial down to 3 (10%). Start the press. (For continuous stroke only: if your press produces erratic tonnage at start-up, reset again after tonnage stabilizes).

B. Run the press beyond the sample period to see if a nuisance stop occurs. If one occurs, go to Step D. If not, move the dial down to 2, and run the press.

C. If a nuisance stop occurs at 2, go to Step D. If none occurs, go down to 1, and run the press. If no nuisance stop occurs now, this is the right setting for the job. (Note: A "1" setting is the lowest you can go. A zero setting will not create setpoints)

D. Complete this step only if a nuisance stop occurred in Step B or C. If so, make sure the press did not stop for some other reason. Then click the dial up one (from 2 back to 3, for instance). Reset and run the press. If no nuisance stop occurs now, and it should not, this is the right setting for the job.

If AutoSet shut down the press in Step 1:

A. First make sure the press stopped because setpoints were too low. Check for a stuck part, load imbalance, a misfeed, or any other cause besides a nuisance stop.

B. When you are satisfied the press stopped because setpoints were too low (a nuisance stop), click the selector up to 5 (20%). Then run the press again. (For continuous stroke only: If your press produces erratic tonnage at start-up, reset again after tonnage stabilizes).

C. Check for a nuisance stop. If a nuisance stop does not occur now, this is the right setting for the job.

D. If a nuisance stop still occurs, click the selector up to 6. Run the press again. Check for a nuisance stop. Continue moving the dial to a higher percentage. This is the right setting for the job.

IMPORTANT: If you have to keep moving the dial up and AutoSet still keeps shutting down the press, there may a problem with the die or with your setup. Check for other causes of press stoppage besides nuisance stops.

When you may want to change the setpoint percentage

Once you select the sample period and determine the right percent tolerance setting for one die, you can use these settings for all the other dies used on the press. However, there may be times when you may want to change the percent tolerance setting.

For some jobs, you may want much tighter setpoints even though the existing percent tolerance setting would work just as well for the new job. On other jobs, normal tonnage variations may require setpoints wider than usual. The wider variations could then occur without a press shutdown.

In these cases, you would readjust AutoSet for the new die. Use the "percent tolerance selector" to decrease the percentage or increase the percentage. AutoSet will recalculate the new setpoints at the end of the sample period.

You may have to experiment to find the right setting if nuisance stops occur (as described in the steps above).

NOTE

Always record existing settings before changing them for a new die. Then you can recreate the old settings whenever you run the old die again without trial and error.

When you must recalculate setpoints

You always have to recalculate setpoints after a tool change. This is so that setpoints will be based on the new press load. This is done by pressing and holding the "RESET" button until the numbers in the setpoint display flash once and change to 120% of full scale (approximately 2 seconds). Run the press to get new setpoints. After the sample period is completed, AutoSet will display the new setpoints.

NOTE: The setpoints can be recalculated while the press is running.

When power is turned off and restored

When the power to the AutoSet is turned off, the tonnage readings and setpoints are lost. The calibration information and full scale tonnage settings are retained. When power is restored, the tonnage displays will read zero and the setpoint displays will read 120% of full scale. The AutoSet will calculate setpoints after the appropriate number of strokes.

Disabling AutoSet

AutoSet can be disabled. This means AutoSet will display tonnages but will not stop the press unless tonnage at any strain link exceeds 120% of full scale tonnage. Setpoints will not be created. To disable AutoSet, you set the percent tolerance selector to 0. This clears the old setpoints.

Chapter 5
AutoSet 1504 Troubleshooting

AutoSet Alarms

AutoSet 1504 is designed to let you know when fault conditions occur. This chapter explains the faults that occur when AutoSet shuts down the press and how to correct them. Four types of faults are explained here:

- When AutoSet detects an overload condition (high setpoint exceeded)
- When AutoSet displays an offset error

Before you reset AutoSet

Before you reset AutoSet, you want to be sure that you have completely corrected the problem, and that you have determined if the press shutdown because of a nuisance stop or a tonnage fault. Here is the difference between the two:

A nuisance stop occurs when setpoints are so tight that normal variations in tonnage cause AutoSet to shutdown the press.

A tonnage fault occurs when the tonnage has fluctuated enough to exceed the high and/or repeatability setpoints being used by the load monitor. A fault may be caused by a various die malfunctions. To correct the problem, carefully inspect the die area.

WARNING

If the press stopped due to a real fault, do not continue until you have completely corrected the problem! Failure to do so may result in damage to the press and tooling.

The next sections explain how AutoSet displays different fault conditions, and how to resolve each.

When AutoSet displays a high setpoints fault

When the actual "LOAD" tonnage exceeds the "SETPOINT" tonnage on one or more inputs, an overload condition exists. AutoSet will open the output relay. The "LOAD" display for the overloaded input will flash, and "HI" will flash on the one or more of the setpoints displays, depending upon which strain link(s) have been affected. See Figure 5-1.

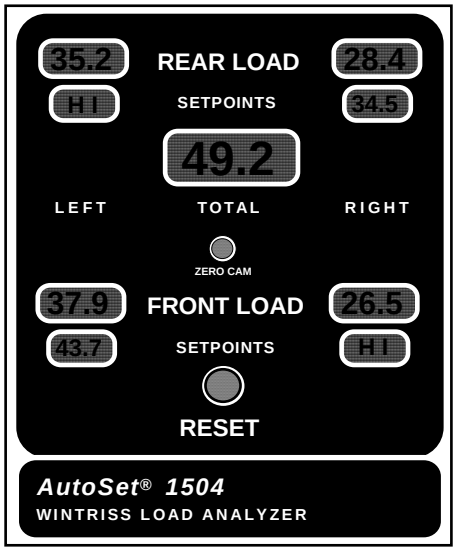


Figure 5-1. Displaying high setpoints exceeded on inputs #1 and #4
— flashing error and Total load —

Check to see why AutoSet stopped the press. Is it due to a problem in the die, such as stuck part, variation in shut height, drastic change in material thickness, etc.? If so, correct the problem immediately.

Or is it due to a nuisance stop because the high setpoints are too tight? Then see "Creating setpoints for the job" to change the high tolerance percent.

AutoSet is cleared by holding the reset button down for less than two seconds. The displays will stop flashing, and the overload values remain on the "LOAD" displays until the next stroke, or until power has been turned off.

Remember that holding the reset button for more than two seconds signals AutoSet to recalculate setpoints. Therefore, when clearing an overload condition, press and release the button quickly (less than two seconds). This will clear the overload, but *will not* signal AutoSet to recalculate setpoints.

Note: *Data Instruments recommends you connect AutoSet to the top stop circuit (not E-Stop circuit) of the press. This is so that the press will not stick on bottom if an overload occurs.*

Remember that top stop circuits are active only in continuous (automatic) operations on most press controls. If overload protection is required during inch or single stroke mode, you may have to install an additional relay so that AutoSet will stop the press.

When AutoSet displays an offset error

If a strain link loosens, is damaged, or otherwise fails, its output signal may go too high or too low. When this happens, the strain link is no longer sending accurate tonnage information to AutoSet. AutoSet will stop the press when this condition occurs. It will display the message *"Err"* on the setpoint display for the strain link(s) affected. The tonnage display(s) will also flash *"HI"* or *"LO"*. See Figure 5-2.

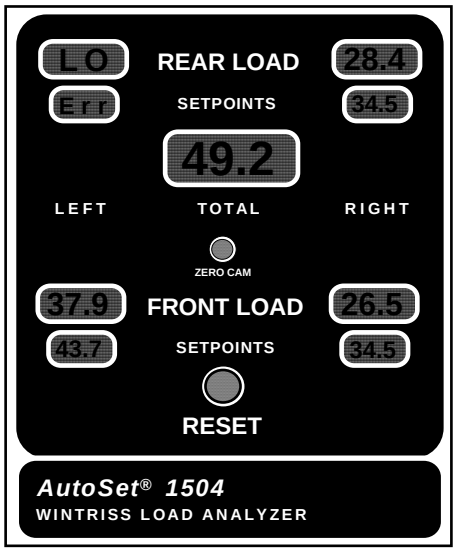


Figure 5-2. Displaying an offset error on input #1

Check to see if the strain link has loosened or is damaged. Also check wiring. If the strain link looks okay, the strain link may have broken internally. Correct the problem by remounting the strain link if it has loosened, or replacing the strain link if it is damaged or broken. In both cases, you must re-zero the strain link. (To re-zero, refer to the section, "Zeroing the strain links" in Chapter 3 - Calibration.) You do not have to recalibrate AutoSet, even when replacing the strain link, unless it has been moved to a different location. When you reset AutoSet, *"Err"* will disappear and the setpoint display will once again show the correct setpoints and the affected tonnage display will show 0.

Resetting AutoSet

Once you have determined the problem and have corrected the fault condition, reset AutoSet. Hold the reset button momentarily to clear the error condition, and the displays return to normal. You can once again run the press.

RESET AUTOSET 1500

To reset after an overload, press the reset button briefly—for less than two seconds. The setpoint display indicating the overload will stop flashing. If you hold in the reset button too long to clear an overload (more than two seconds), the setpoints will change to 120% of full scale tonnage. This indicates AutoSet will recalculate setpoints once the press is started. Most of the time, you will not want to recalculate setpoints after an overload.

AutoSet Troubleshooting

As you are running your press, you may come across some situations that you will need to correct. Here are some situations that you may encounter and how to troubleshoot them.

When none of the load or setpoint LEDs are displayed

If you are not getting any load or setpoint readings:

- Check that you have power. Also check that power is present at both sides of fuse #1. Refer to "Connecting AC wires to power source" in Chapter 2.
- Check the wiring of the strain links. Refer to "Mounting and connecting strain links" in Chapter 2 of this manual. If you are still having difficulty, contact Data Instruments.

When either of the load displays shows no tonnage

If one or both of the load displays always reads "0" tons:

- If you had installed the optional zero cam switch (LMCS), check that it has been connected properly. Be sure that the zero cam is closed to ground during the top of the stroke and that it opens at bottom. Also look at where the red and blue magnets are positioned on the crankshaft. See "Installing a zero cam", in Chapter 2 for more information.
- Check that the mounting and wiring of the strain link affected was done correctly. Were the strain links mounted on a flat, clean surface? Were they wired correctly? See "Mounting and connecting strain links" in Chapter 2 for more information.
- Check for a stretched or broken tie rod on straight side presses.

When the tonnage is lower than it should be

If when running your press, you find that that tonnage is lower than you think it should be:

If new installation or calibration:

- If you had installed the optional zero cam switch (LMCS), check that it is closed to ground during the top of the stroke and that it opens at bottom. Also look at where the red and blue magnets are positioned on the crankshaft. See the section, "Installing a zero cam", in Chapter 2 for more information.
- Check that the mounting and wiring of the strain link(s) affected was done correctly. Were they wired for tension or compression? See the section "Mounting and connecting strain links" in Chapter 2 for more information.

If existing installation:

- Check that the calibration was done properly. Are the calfactor(s) correct? Are the calfactor(s) you set the same as the one(s) you wrote down during the calibration? Refer to Chapter 3 AutoSet Calibration if needed.

What happens when power is turned off and restored

When the power to the AutoSet is turned off, the tonnage readings and setpoints are lost. However, the calibration information and full scale tonnage settings are retained. When power is restored, the tonnage displays will read zero and the setpoint displays will read 120% of full scale tonnage. The AutoSet will automatically recalculate setpoints after the appropriate number of strokes.

Appendix A
AutoSet 1504 Panel Mount

This appendix explains how to install your AutoSet 1504 panel mount. Refer to Chapter 2 for the remainder of the installation steps.

Standard Enclosure versus Optional Panel Mount

AutoSet 1504 is available either with an enclosure or as a panel mount. The panel mount can be mounted from the inside or outside. Be sure to allow *at least* 4" (10.2 cm) of clearance behind the panel mounting plane to allow enough room for the electronics.

Preparation for mounting AutoSet using your enclosure

To prepare for mounting AutoSet 1504 using your panel enclosure, follow these steps:

1. Determine a convenient place to mount AutoSet 1504 into your panel enclosure. Ideally it should be close to the press control so operators and setup personnel can easily see the readouts and reach the keyboard.
2. Cut out a hole in your panel enclosure, and drill and tap fourteen holes for 1/4-20 screws. Refer to the drawings in Figure A-1 for mounting dimensions.
3. Prop AutoSet near the location where it will ultimately be mounted (see Figure A-1). You can do this by connecting ty wraps from two of the left holes on the panel to the corresponding holes on the enclosure for a hinge-like effect. Allow at least 9" of service loop when performing the wiring connections. Also make sure all cables will reach.
4. Refer to Chapter 2 of the AutoSet 1504 user manual to complete the entire installation.

PLACE AUTOSET 1504 AT A CONVENIENT HEIGHT

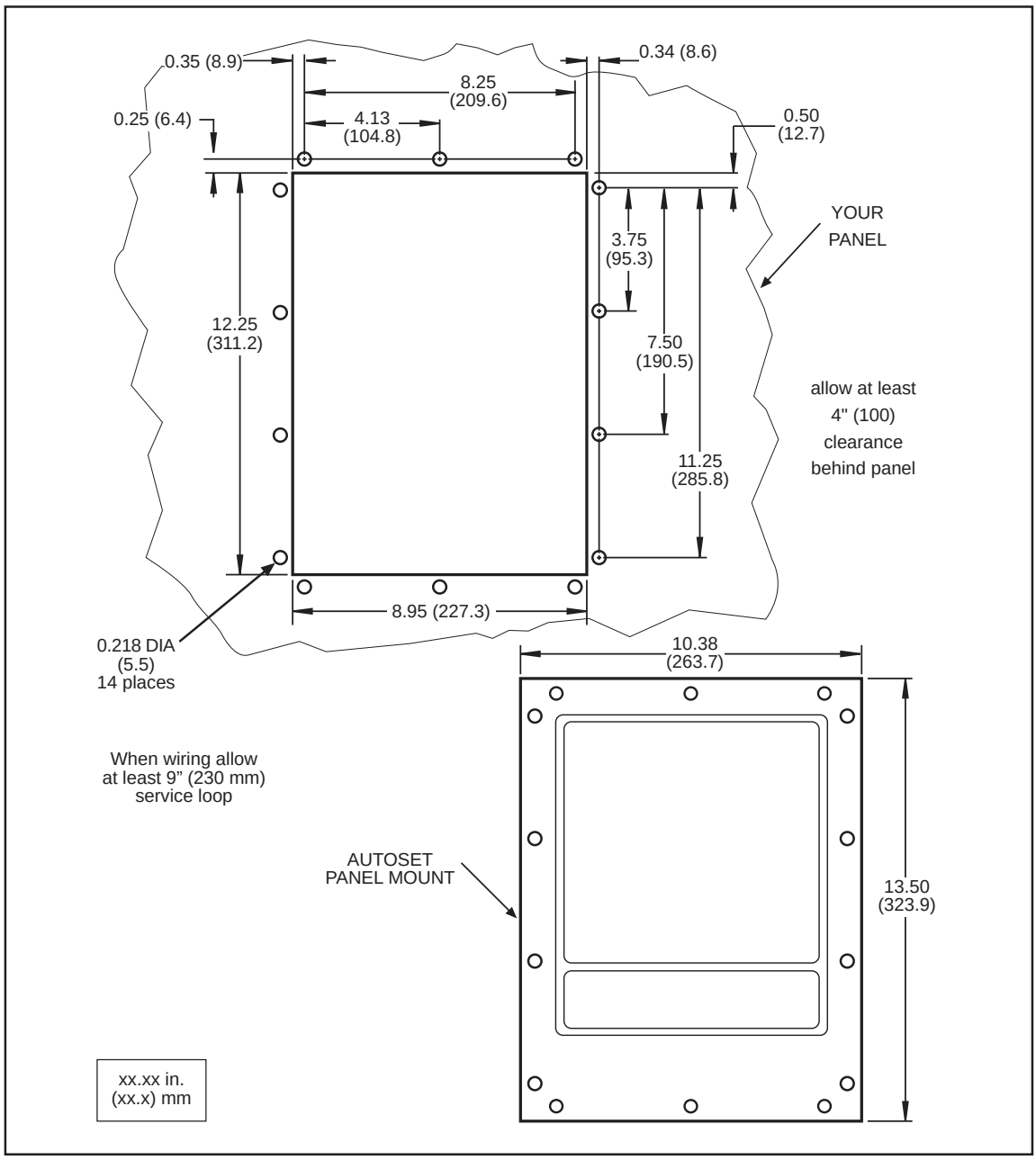
AutoSet should be installed at a convenient height for all users. An ideal height is to have the top edge of the unit approximately at chin level. Experiment to determine a good height for everybody prior to wiring and mounting.

Final assembly

Once the final checkout has been confirmed and AutoSet is working satisfactorily while it has been sitting outside the enclosure, you are ready to completely install the AutoSet 1504 panel mount into your enclosure.

Remember earlier you had cut out a hole in your panel enclosure. Mount the AutoSet panel assembly into this cavity using fourteen 1/4-20 screws. Refer to Figure A-1 for mounting and "cutout" dimensions for AutoSet 1504 panel and your enclosure.

Figure A-1. Mounting and "cutout" dimensions for AutoSet 1504 panel enclosure



Appendix B
Modification for selectable sampling

For those AutoSet 1504 load monitors which include custom selectable sampling, the stroke sample length can be set to 1, 15, 30 or 60 strokes.

Dip switches 1 and 4 on switch block S101 are used to make the settings. On the standard AutoSet, dip switch 4 is not used.

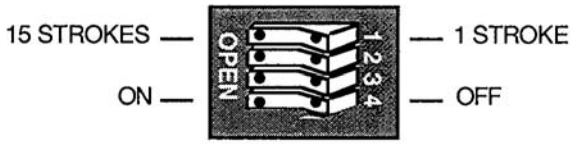


Figure B-1. Stroke select switch (S101) with on-off positions for switch 4 shown

The following chart shows how to set dip switches 1 and 4 for 1, 15, 30 or 60 stroke settings:

To set sample to	set stroke select #1 to:	set switch #4 to:
1 stroke	1 stroke	ON
15 strokes	15 strokes	ON
30 strokes	15 strokes	OFF
60 strokes	1 stroke	OFF

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