Honeywell

User Manual

SmartPAC®

Press Automation Control with Wintriss Clutch/Brake Control

includes optional DiPro® PAC and ProCam® PAC

1101000

Rev. C1   October 1998

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

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www.wintriss.com

Requirements you must meet when installing and using the Wintriss Clutch/Brake Control

The Wintriss Clutch/Brake Control (WPC) is designed solely for controlling operation of metal stamping presses. Before installing or using WPC, be sure you understand and follow these requirements:

- All metal stamping presses on which WPC is used must meet the requirements of OSHA regulation 1910.217 and ANSI B11.1-1988. All inspection procedures in 1910.217 must be followed and all presses must be maintained as stated in the regulations. Data Instruments takes no responsibility in cases where stopping mechanisms of machinery or other devices are not maintained or do not meet their applicable regulations or standards.
- If the brake or other mechanism that stops the machine is not working properly, the machine may not stop safely even though WPC is working properly. Data Instruments takes no responsibility for improper machine operation in cases where the appropriate machine stopping mechanisms are not working properly.
- WPC must be installed by qualified personnel.
- Point of operation safeguarding, the single most important factor in the elimination of injuries, can only be determined by the press user. All applicable OSHA and ANSI regulations for safeguarding press systems must be followed when installing and operating WPC. The two hand control must be installed at the correct safety distance as defined in the OSHA and ANSI regulations, and additional safeguarding devices may be needed to ensure operator safety. WPC is not in itself a safeguarding device. Data Instruments takes no responsibility for injury if the proper safeguarding devices are not installed or working properly.
- Data Instruments further takes no responsibility for operator injury if the proper safety procedures are not followed during installation or operation of WPC.
- Before making any wiring connections to WPC, all power to the machinery must be off. This includes power to the machine control and motor. Make sure power is off at the point where wiring for WPC is connected.
- Wiring and installation must be performed in accordance with the requirements of OSHA lockout/tagout regulation 1910.147.
- Once WPC is installed, all checkout procedures in this manual must be performed. Any problems detected must be corrected before use. Data Instruments takes no responsibility in cases where the checkout procedures listed in this manual have not been followed prior to use.
- Only the procedures and repairs listed in this manual should be performed on WPC. Tests and repairs must be performed by qualified personnel. Data Instruments takes no responsibility for improper operation if any other repairs or modifications are made.
- Never operate any machinery controlled by WPC if the machinery is not in working order.
- Make sure that supervisors, die-settors, maintenance persons, machine operators, and foremen have read and understand all instructions pertaining to the use of WPC.
- Make sure all operators and other affected personnel know which machinery WPC controls. Other equipment or devices which may be operating along with the machinery WPC is connected to will not be signaled to stop by WPC.
- All procedures in this manual must be followed for proper WPC operation. Data Instruments takes no responsibility for operation if you do not follow the procedures and comply with warning statements in this manual.

The enforcement of the above requirements is beyond Data Instruments' ability to control. For proper WPC operation, it is your responsibility to follow these requirements and any other requirements and procedures which may be specific to your machinery.

Thank you for purchasing a Honeywell Wintriss Product. We appreciate your business and want to do whatever we can to ensure your satisfaction. Wintriss products are built to stay on the job day after day, and are backed by an ironclad guarantee, international standards approvals, and unbeatable support. Whenever you need assistance or service, we back all our products with excellent spare parts inventories, training programs, and prompt repair service. We would like to share with you a list of service options– probably the largest number of service options offered in the industry.

- **Technical Assistance**

  We offer a toll-free line for technical assistance. Call our Wintriss Technical Support Hotline at 1-800-586-TECH (8324) should you have any questions about your equipment. Our technical staff is ready to assist you Monday through Friday, 8 a.m. to 5 p.m. EST. In many cases our experienced technical staff can resolve your inquiry right over the phone.

- **Return Authorization**

  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.

  Please be sure to carefully pack all returned items and ship to our Acton, MA location.

- **Expedited Repair Program**

  Rush service providing 48 hour turnaround is available for most products upon request. An Expedite Fee will be applied to our standard repair rate.

- **Board Exchange Program**

  If your needs are urgent, you can take advantage of our Board Exchange (EX) program. Call our "800" number between 8 a.m. and 5 p.m. EST and we will send a replacement to you overnight. A fee does apply to this service. Contact Wintriss Technical Support at 800-586-8324 for details.

- **Service Center**

  Our Service Center for product repairs is located at our headquarters in Acton MA. If your equipment requires repair, please contact us at 800-586-8324 to obtain a return authorization number.

  Nationwide field service is also available. Contact the Wintriss Service Manager at 800-586-8324, ext. 1949 or Wintriss Technical Support group at 800-586-8324.

- **Product Training**

  We also offer both product training and maintenance/troubleshooting courses at our Acton, MA and Chicago-area facilities. On-site training is available from the factory or through your local Wintriss representative.

- **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 C1 of the SmartPAC with WPC User Manual (1101000)

Revision C1 of the SmartPAC with WPC User Manual covers software versions 4.70 and above. The changes for Revision C include:

- Addition of notes regarding use of RamPAC for monitoring and controlling the counterbalance pressure. (Chapters 4 and 7).
- Clarification of Start Time Limit setting (Chapter 4).
- Addition of One-hand Control test (Chapter 4)
- Revision of Figures 4 and 9 (at the end of the manual).

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. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

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How to use the manual

This is the installation and reference manual for SmartPAC with WPC, DiProPAC, and ProCamPAC. It has information about how to install the SmartPAC System and use all the displays to make die protection sensor settings and programmable cam settings.

Chapter 1 introduces you to SmartPAC with WPC, DiProPAC, and ProCamPAC, how it works, features, and how to use this product.

Chapter 2 is the installation chapter. Use it to install SmartPAC with WPC if you are installing it yourself. This chapter also includes installation the DiProPAC and ProCamPAC options.

Chapter 3 is an introduction to the SmartPAC displays and keyboard. Read this chapter to get started using SmartPAC. It shows you how to select items on the SmartPAC displays and how to perform key tasks, and explains the various keys available.

Chapter 4 explains how to use SmartPAC in Initialization mode for WPC, DiProPAC, and ProCamPAC. Use it to understand how to initialize SmartPAC.

Chapter 5 explains how to use SmartPAC in Program mode for WPC, DiProPAC, and ProCamPAC. Use it to look up things you need to know to program SmartPAC setups.

Chapters 6 explains how to use SmartPAC in Run mode for WPC, DiProPAC, and ProCamPAC. You can look up things you need to know about Run mode.

Chapter 7 shows you fault messages or other types of messages you will see on your display when SmartPAC sends a stop command to the press or when there is an equipment or software problem. What the message means and how to correct the problem is explained. Use this chapter to learn about all the SmartPAC diagnostic messages.

Appendix A includes an explanation of OSHA regulations and ANSI standards. Appendix B explains how to install the optional 4-in-1 Enclosure. Appendix C talks about and explains how to set up and use the optional PM (Preventative Maintenance) Monitor. Lastly, the Glossary provides a quick aid in understanding SmartPAC terms. Setup forms for ProCamPAC (including counters) and for DiProPAC are at the very end of this manual, along with wiring schematics.

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 light curtains) from date of shipment. All software products (PACNet and RSR), 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. SmartPAC, AutoSet load monitors, DiPro 1500, IC Controllers, 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 01720-3648
Telephone: (800) 586-TECH (8324)
(978) 264-9550
Fax: (978) 263-2491
Internet: http://www.wintriss.com

SMARTPAC® with WPC
DiProPAC® & ProCamPAC®
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Chapter 1
Introduction to the SmartPAC System

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

SmartPAC

SmartPAC is a smart modular interface for a multiple of press automation functions, including die protection and programmable cam switch. Every SmartPAC includes a control-reliable, resolver-based brake monitor, and extensive counter capabilities. SmartPAC features a large, bright LCD display, highly visible LED readout, a numeric keypad, and other easy-to-use keys to program and run the job.

SmartPAC can be optionally configured to include: up to sixteen-sensor die protection system, up to sixteen-channel programmable cam switch, and two or four-input load monitoring. Each of these add-ons optimizes SmartPAC as a comprehensive press automation package.

WPC and Control Reliability

Wintriss Clutch/Brake Control (WPC) is an easy-to-use, dual micro-processor-based system that controls part revolution mechanical power presses. With its two independent micro-processor systems in a single modular enclosure, WPC provides dual diverse redundancy — the latest technology in maintaining optimum clutch/brake control and operator safety. Both of these micro-processor systems function independently of each other, have separate power supplies, and provide separate information to the operator.

WPC meets or exceeds all ANSI B11.1-1988 and OSHA 1910.217 regulations for Control Reliability, also referred to as "Control Component Failure". Operation of mechanical power presses is completely governed by these two standards. Control Reliability demands that a single component failure in a clutch/brake control circuit shall not prevent the normal stopping action of the press, shall not create an unintended stroke, and shall prevent the initiation of a successive stroke until the failure has been corrected. Proper operation of the press consists of such considerations as: presence-sensing point of operation devices, two hand controls, all requirements for safeguarding including safety distance and response time, and periodic and regular inspections of power presses to ensure safe operating conditions and adjustment. In the event that any of the conditions in these standards are not complied with, WPC will diagnose and communicate the reason for the error condition, and will prevent the operation of the press until the problem is completely solved.

WPC comes with a resolver, which provides precise crank angle position information at every point in the stroke. As a result, the need for a mechanical rotary limit switch is totally eliminated. It is no longer necessary to climb on top of the press again and again to make timing adjustments.

SmartPAC with WPC

When you combine SmartPAC with Wintriss Clutch/ Brake Control, SmartPAC provides a comprehensive user interface for all WPC functions and WPC Initialization. You can enable and set Micro-inch, and program such press control parameters as Top Stop Angle and Stop Time Limit right from the SmartPAC keypad. In addition, you can program up to sixteen other cam channels which can be used for press automation.

Standard features

SmartPAC brings a multitude of press automation functions to one central location. All of SmartPAC's settings are made at the operator console using SmartPAC's large LCD display and keyboard. The settings made for each die are automatically saved in SmartPAC's non-volatile memory. To use the settings when you run the job again, simply re-load your stored tool number and you are ready to go. SmartPAC can save settings for up to 200 tools. SmartPAC's built-in brake monitor constantly checks brake wear by measuring stop time every time the press stops and displays that value in milliseconds. SmartPAC also displays the number of degrees it took the press to stop. SmartPAC displays specific diagnostics when a malfunction occurs, when any of counter presets have been reached, and when stopping/starting timings exceed set limits.

SmartPAC with WPC features an Interrupted Stroke provision to increase productivity. An Interrupted Stroke occurs when the press has been emergency-stopped before the completion of the stroke by either the operator or an automatic device for personnel or equipment protection. Traditional controls force the operator to take several steps to correct the problem: switch to "inch" mode, inch to the stop, reselect the normal stroke mode, and then reinitiate the press. All this causes is operator frustration and wasted time, and may even result in the key being left in the selector, which then defeats its supervisory intent. When an interrupted stroke occurs, the Interrupted Stroke LED at SmartPAC illuminates. The system immediately switches to "Two Hand Maintained Single Stroke" mode. Once the press has been inched to the top of the stroke, the system automatically reverts to the original operating mode. This saves time and allows the keylock mode to be used more effectively. Interrupted stroke is defined in Chapter 7.

SmartPAC with WPC provides you with eleven user-installed customized status codes which you can use to monitor auxiliary press functions, such as lubrication systems. When any of these functions issues a stop command, a unique status code is displayed at the digital readout to help you to identify why the press has stopped.

SmartPAC with WPC includes a built-in top-stop brake monitor which checks the press's braking performance every time that a top stop command is initiated or at the end of a single stroke. When the press's actual stopping time is within ten milliseconds of the pre-determined stop time limit, the Brake Warning LED illuminates. The digital readout displays the amount of time in milliseconds that it took for the press to stop.

You can perform a 90° stop-time test (discussed in Chapter 4). The 90° stop-time test is required in order to set the proper safety distance for personnel guarding devices including light curtains, two-hand controls, and type-B movable barriers. This test is done at the press's most critical stopping point . The worst case scenario occurs halfway on the down stroke at 90° while the press is running in continuous mode. Therefore, SmartPAC with WPC is designed to check stopping time at that critical crankshaft angle, and provides you the stopping time (T_S) value referenced in ANSI B11.1 1988 (Appendix A).

SmartPAC with WPC provides you with inputs for multiple Shadow V light curtains. The system tests up to two Shadows every time that the press is started and stopped. SmartPAC with WPC comes with Micro-inch. Micro-inch is the amount of time in milliseconds that the Dual Safety Valve is open when "Micro-inch" is enabled. In this mode, you determine how long the ram will travel once the RUN/INCH switches on the operator station are pressed. This feature is ideal for high-speed and/or short stroke presses. You can connect two operator stations to your system directly and many more using the Dual Operator Selection Control.

Whenever fault conditions occur, SmartPAC describes the error message on the LCD screen and displays the corresponding two-digit error number on the LED display. This helps to diagnose the problem and resolve the problem more expeditiously.

The lockout function built into the system provides an added safety feature to the product. Whenever a serious error condition occurs, *"Loc"* will appear in the LED display, alerting you of a problem (see Chapters 2 and 7 for more information).

Via the optional "Auto Compensated Top Stop" feature ("ACTS"), SmartPAC with WPC notices when the press has not stopped at the top of the stroke, compensates the Top Stop Angle that you already programmed by advancing its position, and finally stops the press as close to 0° as possible. ACTS is described further in "Setting WPC switches using SmartPAC's Press Options" in Chapter 4.

Optional die protection and programmable cam switch features:

- Monitors up to 16 sensors to detect malfunctions such as stock buckling, misfeeds, and improper part ejection
- Provides cam timings for feed, pilot release, air blow-off, lubricator, and other press equipment

SmartPAC Front Panel

When you turn power on to SmartPAC, the crankshaft angle reading appears in the LED display. As soon as the press is running, the display switches to show the press speed. A description of each component on the front panel plus an illustration of the front of SmartPAC follows:

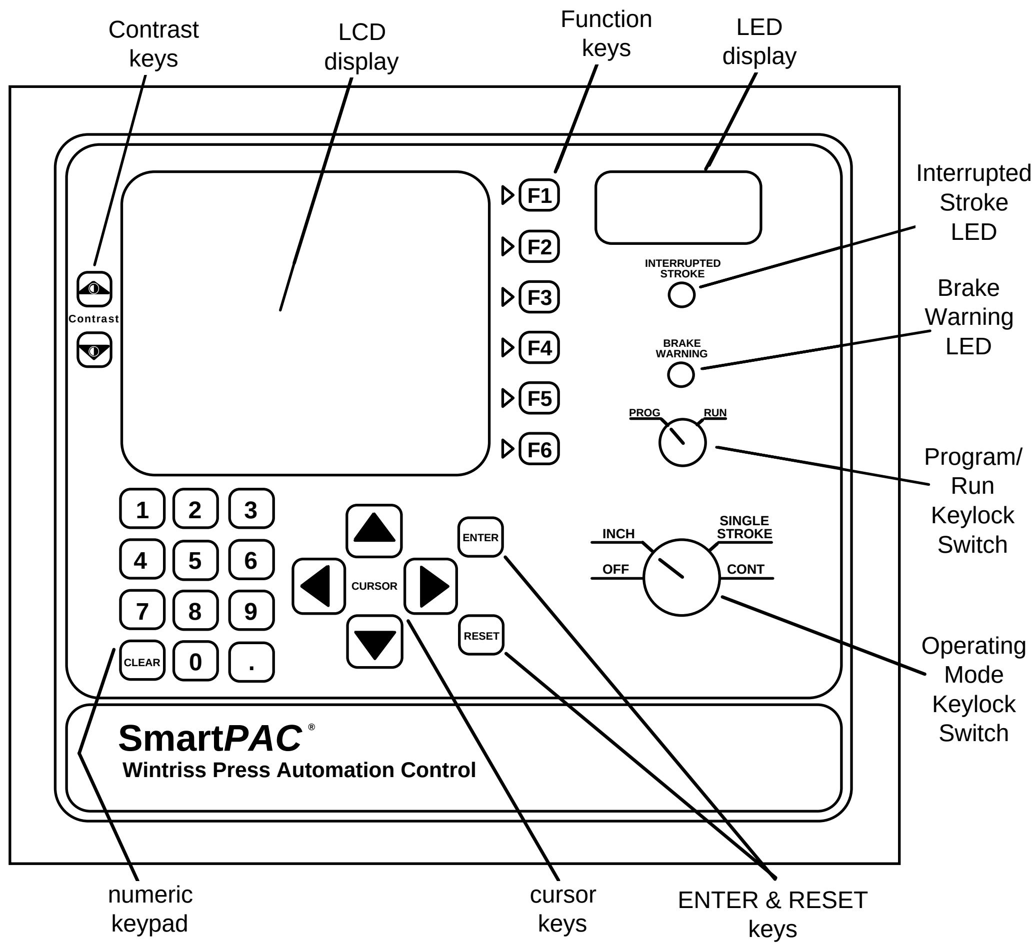


Figure 1-1. SmartPAC front panel

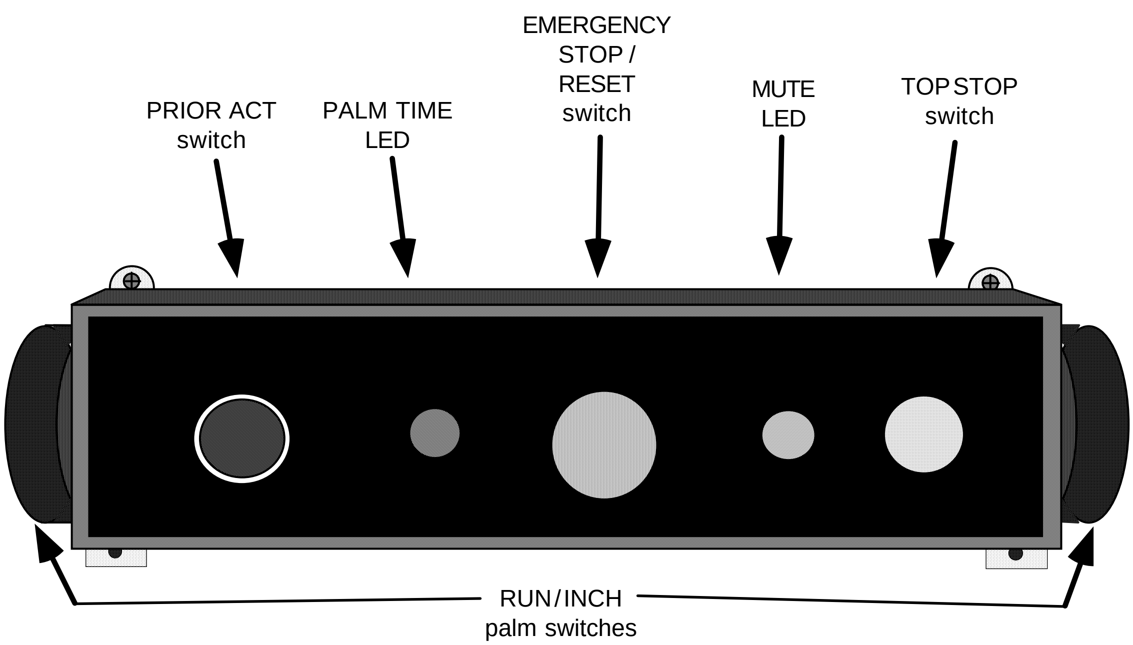
	Three-digit display shows strokes per minute when the press is running; when the press stops, the display shows the crankshaft angle
LCD display	A large, bright 4.88" x 3.69" (10.91 x 9.37 cm) liquid crystal display used along with the keyboard to make and adjust settings, to load tool numbers, and to view diagnostic messages
Screen contrast keys	These keys adjust the brightness of the LCD display; simply press either one to make the necessary adjustment
Program/Run key	Allows you to lock the Program mode so settings cannot be changed. The key must be set at "Run" to operate the press. Minor adjustments, including loading an existing tool number, can be made in Run mode

Keyboard	Consists of various key and a numeric keypad described below. You use these keys along with the LCD display to make settings (covered in detail in Chapter 3, "Using the keyboard")
Cursor keys	Used to move the selection bar over the item on the display you want to select; also used to select alphabetic characters and special symbols when naming the press, tools, cam channels, and sensors
Number keys	Used to input numeric values, such as counter presets or tool numbers
Function keys	Periodically used to perform certain tasks in SmartPAC. The message on the LCD display will identify the specific function key number to depress (from F1 to F6).
Enter key	Used after making a selection on the display. You also press the ENTER key after keying in a number to accept the number.
Reset key	Used to reset SmartPAC after fault messages appear on the display. Also used to let SmartPAC know you are "all done".

SmartPAC with WPC components

Stroke Select keylock switch used to operate the press in INCH, SINGLE STROKE, or CONTINUOUS modes

WPC Operator Station components



    - Two **RUN/INCH palm switches**, used to initiate press action
    - **PRIOR ACT switch**, used as an arming switch that, in certain operating modes, must be pressed before the press will initiate a stroke
    - **PALM TIME LED**, which illuminates when any one palm button is pressed; to run the press, the other palm button must be pressed before the light goes out
    - **EMERGENCY STOP / RESET switch**, which can be used to immediately stop the press; either this switch or the Reset/Select switch resets WPC when a fault condition occurs
    - **MUTE LED**, which illuminates when the light curtain is muted during the up stroke (requires optional, extra cost software)
    - **TOP STOP switch**, which stops the ram at the top of stroke during continuous operation
- **Herion Dual-monitored 3/4" Safety Valve** (or optional Ross DSV), which controls the air flow that operates the clutch and brake of the press.
- **System air pressure sensor**, which monitors the system air pressure.
- **Shadow light curtain(s)**: The Shadow V light curtain is a presence-sensing device that places an infrared light field between the point-of-operation and the operator. When something enters the sensing field and a light beam is blocked, the object is detected and the press is immediately stopped. One or more light curtains are located between the Operator Station and the die space. The mounting bracket design should allow plenty of room for adjustment.

Basic settings you can make on SmartPAC

All settings are made using the keys on the SmartPAC keyboard. Up to sixteen sensors can be used with SmartPAC along with up to sixteen channels for controlling press equipment. For complete instructions on how to make settings, see Chapter 4—Programming. Here are settings you can make:

- **Assign tool numbers for tools**. You assign a tool number to your settings. This is how you keep track of all settings you make. Every tool can also be assigned a name for easy identification, and you can store additional reference information about each tool and its settings.
- **Load settings by tool number.** SmartPAC saves all counter settings, sensor settings, and cam switch settings (if DiProPAC and ProCamPAC are installed) in its electronic memory. The settings are stored by tool number. To use the settings for a tool again, you recall them by selecting the tool number from the tool display. You never need to make the same settings for a tool over again. You can save up to 200 tool numbers. Settings are saved automatically as you make them. You do not have to tell SmartPAC to save settings by pressing a key or issuing a command. When you load the stored tool number, SmartPAC loads all the settings for the tool. SmartPAC retains all settings for a tool even with power off. A lithium battery within the memory chip supplies power to save these settings for up to ten years when the unit is turned off.

- **Record information for each tool number.** With this option you can record up to 30 characters of customized information for each tool, plus six other useful pieces of information, such as feed rate, press speed, or material.
- **Protect settings with keyswitch lockout or optional password security.** Using SmartPAC's security access menu in Initialization mode, you can lock many of the settings in Run mode or require a password in order to change them. This prevents anyone from changing settings in Run mode without the Program/Run key, or changing them at any time without the necessary password. To prevent unauthorized changes to the SmartPAC setup, you can require a special password in order to access the Initialization menu.
- **Set Brake Monitor**. You set the brake monitor stop time limit to a certain value (in milliseconds), that is longer than the actual stopping time. This extra time compensates for normal brake wear. When the stop time reaches the stop time limit, the brake monitor disables the press from further usage. This tells you that your brake has been worn to a point where it needs servicing. The brake monitor also flashes a brake warning light when the stopping time of the press gets within 10 milliseconds of the stop time limit. This allows you to schedule maintenance on the brake *before* the situation gets to the point where the press will not run.
- **Set counters.** The stroke counter increments at each press cycle. The good parts counter counts only "good" parts if the die protection and/or tonnage monitoring option does not generate a fault. SmartPAC has three batch counters that can be set to either top-stop the press or signal programmable limit switch (PLS) outputs when their presets are reached. The total hits counter counts all hits on a tool, and keeps track of the last recorded number for the previous job. With the optional Advanced counter mode, you can set up the good parts counter to give an accurate parts count when multiple parts are produced at each stroke or when multiple strokes are required to produce one part.
- **Reset SmartPAC**. You reset the unit after SmartPAC stops the press when a malfunction is detected. SmartPAC gives you specific fault messages for a malfunction, which makes it easy to troubleshoot. See Chapter 7 for a complete description of errors.
- **Review recent errors.** SmartPAC's new Error Log feature displays the 32 most recent errors that caused the press to stop. You can easily view the Error Log from the Run menu at any time. It lists the error code along with the stroke count and crankshaft angle when the error occurred.
- **Check the input status.** From the Initialization mode, you can display the status of SmartPAC's inputs on the screen.

Sensors available for optional DiProPAC

SmartPAC with the optional DiProPAC is the controller, the part of your die protection system that checks signals from sensors and sends a stop signal to the press when a malfunction is detected. Sensors connected to SmartPAC are mounted to the press or die to monitor what is happening in the dies.

Any electro-mechanical sensor can be used with SmartPAC as long as it can switch between an open state (sensor circuit to SmartPAC open) and a closed state (sensor circuit closed to ground or "grounded"). All types of NPN electronic sensors (proximity, photoelectric, fiberoptic) can be used. Simple contact sensors and probes can be used as well. If you have questions about whether a certain sensor will work with SmartPAC, do not hesitate to call Data Instruments.

Data Instruments makes or sells a wide range of sensors. Below are sensors which can be connected to SmartPAC with DiProPAC. Many sensors made by other manufacturers can also be used. Detailed application information is available on Data Instruments sensors listed below.

- **Miniature fiberoptic photoelectric sensors**—thru-beam and reflective types with adjustable sensitivity detect objects as small as .0006 in. (.015 mm). Requires 12 to 24 Vdc for power.
- **Proximity sensors**—miniature electronic sensors that detect metal objects passing in front of the sensor barrel. Sensors have no moving parts and are not affected by water or oil. Requires 12 to 24 Vdc power source.
- **Misfeed detectors**—designed to monitor non-working spring loaded pilot punch position, stripper position, or other material location applications.
- **Short feed sensors**—for contacting material at the fully advanced position.
- **Overload sensors**—for preventing expensive die damage due to overload from slugging, material thickness variations, broken tooling, or other causes.
- **Die overload sensors**—designed to detect minor changes in shut height.
- **Buckling sensor**—for detecting material buckle
- **End of material sensor**—signals when material runs out.
- **Probes**—three types available for diverse applications.

Understanding sensor terminology

In order to make the proper settings for your sensors using the SmartPAC display, it is beneficial to know what certain terms mean. You will see words on the display, such as ready on, ready off, N/C (normally closed), N/O (normally open), green, green quick check, green constant, yellow, and red. If you are familiar with die protection sensors and controllers, you will know what most of these terms mean already. If you do not, these key words are explained below.

Normally open, normally closed

These terms refers to the way a sensor operates. A **normally open** (N/O) sensor actuates (signals SmartPAC) when the sensor circuit to SmartPAC switches from open to closed to ground. Normally open sensors are broadly classified as yellow or green sensors.

A **normally closed** (N/C) sensor works just the opposite of normally open. The sensor circuit to SmartPAC is closed to ground in its normal state. The sensor actuates when the circuit opens. Normally closed sensors are classified as red sensors. Most contact type sensors can be used as either normally open or normally closed depending on how they are connected. Most sensors are used as normally open just because you do not have any current flowing in the normal state. Some electronic sensors can be switched to work either as normally open or normally closed.

Ready signal

The **ready signal** is the portion of the stroke where a sensor must actuate. For many of your sensors, like those that monitor part ejection, blow-off, or feed advance, you need to be sure that the event occurs during a specific portion of each stroke. If the event occurs late, or not at all, you are likely to have tooling damage. The ready signal tells SmartPAC when to expect the actuation (closure to ground) from the sensor. A ready signal is set only for sensors classified as cyclic (green) sensors. These are sensors which monitor events that must occur on every stroke.

The term "ready signal" comes from older die protection systems where you had to set a mechanical cam switch on the press to send a signal to the die protection unit during the portion of the stroke where the sensor had to actuate. SmartPAC eliminates all this extra work because it automatically knows the position of the ram at every point in the stroke. But we still use the term "ready signal" because it is widely understood.

To set a ready signal on SmartPAC, you just key in the degrees of the stroke where the sensor must actuate. The beginning point is called **ready on**. The end point is **ready off**. A separate ready signal can be set for each green sensor. If the sensor does not actuate during the ready signal, SmartPAC will send a stop command to the press. The type of stop can be a top stop, emergency stop, or smart stop (see "Considerations for setting sensor stop type" in this chapter).

Impedance

The term **impedance** refers to the opposition to the flow of electric current. Some die protection controls have inputs with different impedances for electromechanical sensors. As a rule of thumb, use a high-impedance input if the part is dirty or covered with a non-conductive lubricant. Use a low-impedance input if the part is covered with a water-based or conductive lubricant.

An optional "low impedance" 16-channel DiProPAC module (#9632904) is available. This option is necessary when wire probes depend upon a part/strip to complete the circuit, and the part/strip is covered with a water-based conductive lubricant. If you decide that you require this option rather than the standard DiProPAC, contact Data Instruments immediately to order that part, *prior to installing DiProPAC* (discussed in Chapter 2).

Sensor types

Sensors used with die protection systems are classified as red, yellow, or green. For SmartPAC with DiProPAC, there are four types of greens—green, green quick check, green constant, and green special.

When you make settings for a tool, you select the sensor type for each sensor connected to SmartPAC's sensor inputs. You can have any combination of reds, yellows, or greens for a tool. You will see how to select sensor type in Chapter 5 where you learn how to make sensor settings. Here we discuss what each type means.

Yellow sensors

Yellow sensors are normally open to ground. They are ideally suited to monitor events like stock buckling, end of stock, or die overload. SmartPAC sends a stop command to the press as soon as the sensor actuates. The stop type can be set for either an emergency, top stop, or smart stop (see "Considerations for setting sensor stop type" below). Because yellow sensors work independent of the crankshaft angle and do not actuate every stroke like green sensors, you do not set a ready signal for yellow sensors.

Red sensors

Red sensors are normally closed to ground. SmartPAC sends a stop command to the press — either top stop, emergency stop, or smart stop (see "Considerations for setting sensor stop type" below) — as soon as the sensor opens (actuates). Red sensors are used where it is more convenient to use a normally closed sensor instead of a normally open one. Red sensors can monitor the same types of events as yellow sensors—die overload, end of stock, buckling, etc. No ready signal is set for red sensors.

Green sensors

Any sensor set to green, green quick check, or green constant must be cyclic. In other words, it must actuate during a portion of each stroke (during the ready signal). An actuation is a closure to ground. If the sensor does not actuate, SmartPAC sends a stop signal to the press. You can select an emergency stop or top stop.

Green sensors are used to detect events that must occur during a certain portion of each stroke or intermittently every designated number of strokes. Examples are part ejection, stock feed, and part transfer.

SmartPAC displays the degrees of the stroke where the sensor turns on and where it turns off. This makes it easy to set the ready signal for the sensor. You just make the ready signal a little longer or shorter than the actuation time (depending on the sensor). See the procedures in Chapter 5 and Chapter 6 for complete instructions on making and adjusting sensor settings. The four types of green sensors are described next.

Green

When you set a sensor input to "green," the sensor must turn on at least momentarily during the ready signal. Also the sensor must be off, at least momentarily, at any point outside of the ready signal.

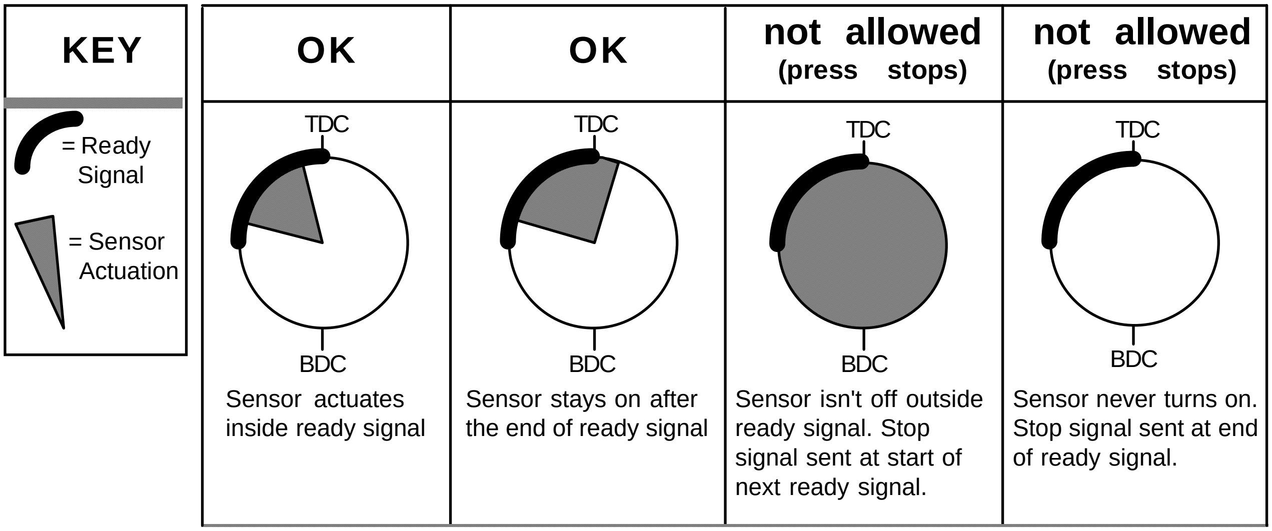


Figure 1-2. How SmartPAC interprets signals from a sensor set to "green"

Green quick check

A sensor input set to "green quick check" is almost the same as the "green" setting. The sensor must turn on at least momentarily within the ready signal. However, a green quick check sensor *cannot stay on or turn on* outside the ready signal. The sensor must turn on, then turn off within the ready signal. Otherwise, SmartPAC sends the stop signal to the press.

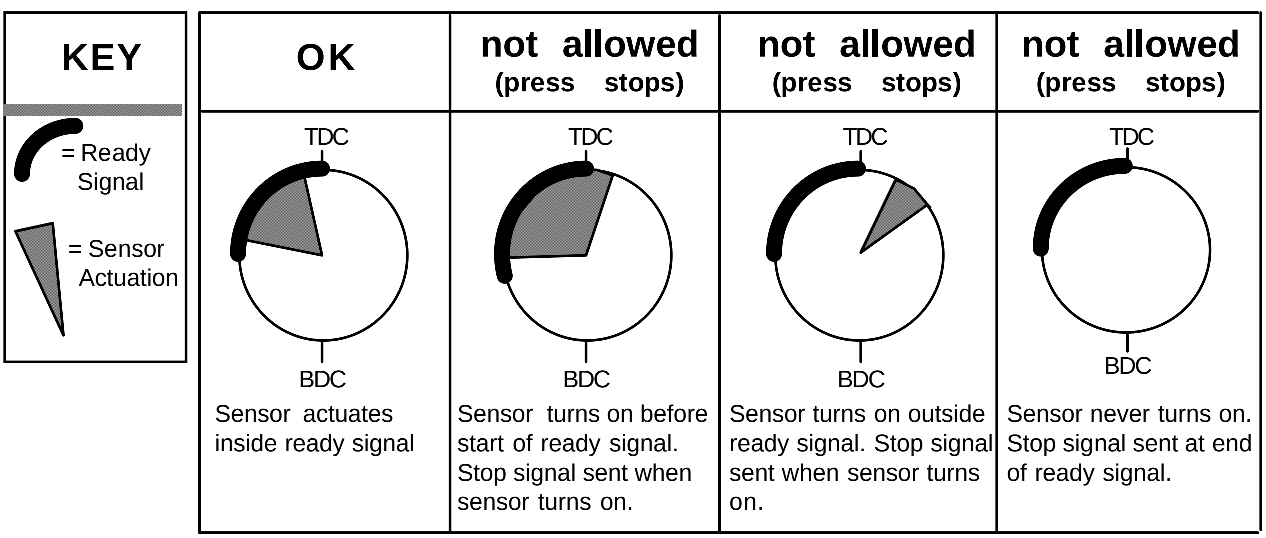


Figure 1-3. How SmartPAC interprets signals from a sensor set to "green quick check

Green constant

When you set a sensor input to "green constant," the sensor must turn on before the ready signal begins and turn off after the ready signal ends. That is, it must stay actuated constantly during the ready signal. However, the sensor must turn off, at least momentarily, outside the ready signal.

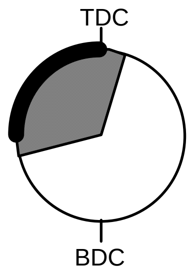
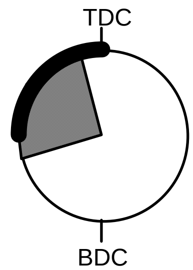
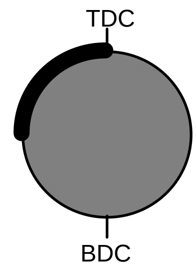
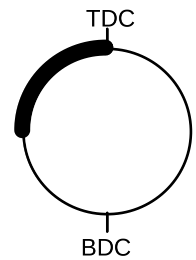
OK	not allowed (press stops)	not allowed (press stops)	not allowed (press stops)
			
Sensor stays on during complete ready signal.	Sensor turns off before ready signal ends. Stop signal sent when sensor turns off.	Sensor doesn't turn off outside ready signal. Stop signal sent at start of next ready signal.	Sensor never turns on. Stop signal sent at beginning of ready signal.

Figure 1-4. How SmartPAC interprets signals from a sensor set to "green constant

Green special sensors

Green special sensors are specifically designed to effectively monitor slug ejection. They are generally used to detect slugs excessively stacking up in a slug ejection hole. When slugs are ejected through the bottom of the die, they do not necessarily discharge on every stroke. It is normal for several strokes to occur with the slugs sticking in the hole before they finally break free and all fall out of the bottom of the die. If the slugs jam and too many stack up in the hole, the die can be damaged.

Slug stacking is virtually impossible to monitor with a standard green sensor. A red or yellow sensor is equally ineffective because the slugs must come out at some time and will cause the sensor to change state. Instead of happening once per stroke like a typical green sensor, the green special must actuate at least once during a preset number of strokes. Rather than setting a ready signal, you set the maximum number of strokes that the press can make without this sensor actuating.

Here is how it works: You install a sensor so that it will actuate when a slug passes through the slug ejection hole. In this example, assume that the die clears all the slugs out of this particular ejection hole about every four strokes. You know that something is wrong if the press makes six stokes without ejecting a slug. You would set the sensor type to "Green Special" and set the number of stokes to six. If no slugs are ejected after six strokes, the press will stop.

CAUTION

This sensor type is not foolproof. It is possible that an undesirable number of slugs could stack up in an ejection hole, while still satisfying a green special sensor's requirements.

Here is how it can happen: Referring to the example above, assume that the press makes five strokes without ejecting a slug. On the sixth stroke, one slug ejects and actuates the sensor. The green special sensor is satisfied and the press continues to run (remember, there are still five slugs in the ejection hole). The press then makes five more strokes without ejecting a slug. There are now ten slugs stuck in the hole! Using this logic, it is conceivable that an infinite number of slugs could stack up in the hole without the press stopping! Luckily, the laws of physics make this scenario unlikely. When slugs jam, it is usually because the bottom one is stuck. If the bottom slug ejects, it is very likely that the rest will soon follow.

Considerations for setting sensor stop type

You can set the way SmartPAC stops the press for each sensor — emergency stop, top stop, and smart stop. Here are a few general guidelines for how to set stop type.

Use **emergency stop** (E-Stop) when you want to stop the press before the next hit. For instance, when monitoring part ejection on the upstroke, you can use the E-stop setting so SmartPAC will send a stop signal to the press immediately if a malfunction occurs. This ensures that the press will stop in time before the next hit.

However, if you are monitoring a feed that takes place well into the downstroke (like a roll feed) you would probably want to set the feed sensor for a **top stop**. An E-stop setting here may cause the press to stick on bottom. That is because the stop signal would be sent just as the ram is about to contact the material.

A **smart stop** is one where you set the critical angle (the last angle position in the crankshaft rotation to signal an emergency stop so that the ram can be stopped before the punches make contact with the material). If a die protection error is detected before the critical angle, the stop type executed becomes emergency-stop. Otherwise, if the error is detected after this angle, the stop type executed is top stop.

The general rule is to use smart stop when you have properly identified the critical angle, and you want SmartPAC to select the ideal stop type depending upon the die protection situation. Use emergency stop when you always want to ensure that the press will stop before the next hit. Use top stop when an E stop setting might cause the press to stick on bottom, and when one hit after a malfunction will not damage the die or press.

Connecting cam channels to your equipment

With SmartPAC and the optional ProCamPAC you have received a separate assembly for wiring up to sixteen cam channels to your equipment. The assembly contains the relays that open and close on signals from SmartPAC to turn your equipment on and off. Different types of relays can be used depending upon the voltages of your equipment and your special needs.

> **WARNING!**
> SmartPAC with programmable cam capability can be used with Wintriss Clutch/Brake Control. However, SmartPAC should not be used to provide timing inputs for any other clutch/brake control. It is designed to control auxiliary functions only.

SmartPAC's three modes of operation

You can do various things with SmartPAC depending on the mode you are in.

- **Initialization Mode.** Used to make settings that generally only need to be made once after installation. You can set cam names and lock out certain setting parameters. Initialization mode is discussed in detail in **Chapter 4**.
- **Programming Mode.** Used to make your sensor and cam timing, counter, and other settings (if installed) for your tools. You cannot use this mode while the press is running. You can load settings for a tool in this mode. The displays you see in Program mode are described in **Chapter 5**.
- **Run Mode.** You must be in Run mode to operate the press. You can adjust timing for your sensors and cam channels (if installed) while the press is running. You see actuation angles for green sensors. You can also load tool settings in Run mode. The settings you can make in Run mode are explained in **Chapter 6**.

Specifications

Equipment	Main enclosure 12.76" x 10.53" x 5.28" (32.41 x 26.75 x 13.41 cm), NEMA 12, shock mounted
	Panel mount: 12.3" x 10.3" (31.24 x 26.16 cm) Resolver: 0.75" (1.9 cm) keyed shaft; rated shaft loading: 200 lb axial, 200 lbs radial
Electrical	Input: 115/230 Vac 50/60 Hz, 30 VA Input check circuit: 12-250 Vac or Vdc
Operating Temperature	32˚ to 122˚ F (0˚ to 50˚ C)
Speed	7-800 SPM; 14-1600 SPM optional at reduced accuracy
Accuracy	±. 2/3° (± 1.33° for high speed version)
Counters	Good parts, strokes, 3 batch with presets (7 digits) Number of hits on tool counter: Resettable to 0 after maintenance; counts all hits on tool
Display **Memory**	20 line x 40 character; 4.88" x 3.69" (10.91 x 9.37 cm) liquid crystal display (LCD) 3-digit LED readout — displays SPM when press running, crank angle when stopped Brake warning LED, Interrupted stroke LED (only active with WPC) Executive program: EPROM User program: non-volatile static RAM; allows storage of settings for 200 tools
Inputs/ Outputs	Inputs for resolver, position sensor (resolver slippage detection), input check circuit, remote reset input, setup mode input. Top stop, emergency stop outputs: ratings 0-5A resistive @ 120V max (AC or DC); Normally open—Held closed Fault condition or power off opens relay(s) Sensor-disabled output: open collector, 8 mA max *Operator mode: 7 open-collector NPN opto-isolated outputs switch 24V load @ 8 mA max *Auxiliary outputs: Allow you to stop auxiliary equipment during interrupted stroke *For automation only; not control reliable

Options	• DiProPAC which provides up to 16 sensor inputs
	  • Power for electronic sensors (NPN only): 12 Vdc min, 100 mA total
	  • Sensor inputs 1 through 4 and 9 through 12: Low impedance
	  • Sensor inputs 5 through 8 and 13 through 16: High impedance
	  • Optional sensor inputs for all 1-16: Low impedance (<1000 Ω)
	  • Die protection sensor-disabled output: open collector, 8 mA max.
	  • DiPro Sensor Interface[1] : 5.88" x 4.35" x 3.35" (14.94 x 11.05 x 8.51 cm)
	  • DiPro RCB: 4.56" x 2.56" x 4.06" (11.6 x 6.5 x 10.3 cm)
	• ProCamPAC which provides up to 16 programmable cam switch output channels
	  • Programmable cam output assembly (NEMA 12; holds up to 8 outputs)
	  • Enclosure: 9" x 11" x 3.5" (22.9 x 27.9 x 8.9 cm) shock-mounted
	  • Relay SPDT 0-3A resistive @ 240V
	  • DC solid state SPST 2A @ 5-60 Vdc
	  • AC solid state SPST 1A @ 70-250 Vac
	• AutoSetPAC (refer to AutoSetPAC user manual #1101600 for more information)
	  • 2 or 4 strain link inputs
	  • Ability to store high, low, and repeatability setpoints with tool number
	  • Display, adjust, recalculate "auto" setpoints and display actual load
	• RamPAC [1] which automatically sets shut height and counterbalance and cushion pressures
	• WPC[1] (Wintriss Clutch/Brake Control) 16" x 16" x 9" (40.6 x 40.6 x 22.8 cm)

[1] Consult that product's user manual. (e.g. DSI: #1100000; AutoSetPAC: #1101600; RamPAC: #1115200,PACNet Computerized Pressroom Reporting #1109000 [includes RSR] or RSR Standalone: #1110700)

Specifications, continued

Options, continued:

- Ability to set press parameters using keyboard
- Easy-to-understand error diagnostic messages at LCD display
- Stroke selector switch
- Optional 4-in-1 enclosure to hold WPC, AutoSetPAC, and 2 Programmable Cam outputs; 16" x 24" 9" (40.6 x 61 x 22.9 cm)
- SFI ServoFeed Interface to integrate servofeed
- Communications with PACNet Computerized Pressroom Reporting[1] and RSR™[1] at host PC
- Preventative Maintenance (PM) Monitor
- Bilingual[2] (English/Spanish) status/adjust menus

WARNING

The operator mode and auxiliary outputs listed above are NOT control reliable. They can, however, be used as a convenience to interface automation.

[1] Consult that product's user manual. (e.g. DSI: #1100000; AutoSetPAC: #1101600; RamPAC: #1115200,PACNet Computerized Pressroom Reporting #1109000 [includes RSR] or RSR Standalone: #1110700)

[2] Optional bilingual (English/Spanish) manual available upon request (#1102900).

Chapter 2
Installation

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

Chapter 2 provides you with general instructions for installing the SmartPAC with WPC. It also includes installation of the optional DiProPAC and ProCamPAC. This chapter is divided into three sections described as follows:

Section 1 covers the installation of SmartPAC with WPC.

Section 2 details the installation of various WPC display configurations.

Section 3 also covers installation of optional features and final installation steps and other miscellaneous references:

WARNING!

SmartPAC's optional programmable cam capability can be used with Wintriss Clutch/Brake Control. However, ProCamPAC, SmartPAC's programmable cam switch, should not be used to provide timing signals for any other clutch/brake control. It is designed to control auxiliary functions only.

Be sure that once you have performed the complete installation, you review "Final Checklist", to ensure that WPC is working properly *before* proceeding to the next chapters.

Section 1 SmartPAC with WPC

Before you start

If you plan to install the SmartPAC with WPC yourself instead of leaving the job to Data Instruments service personnel, read this installation chapters entirely and carefully before you start. Find out what is required, and plan your steps before taking any action. The best way to proceed is to learn all you can about the products first *before* cutting wires, drilling holes, and running conduit.

You may need to use the display during installation. Therefore, before beginning, learn how to use SmartPAC with WPC to speed things along. If you run into any problems during installation, contact Data Instruments for assistance.

The first step— Checking the press

Before starting the installation, make sure the die has been removed from the press. Set the press to top dead center (TDC).

WARNING! PREVENT SHOCK!
ELECTRICAL HAZARD!

To avoid dangerous high voltage, be sure to 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 remove all fuses and "tag out" per OSHA 1910.147 Control of Hazardous Energy (Lockout/ Tagout). Installation must be performed by qualified personnel only.

PRESS MUST BE AT TDC!

This is an important step because the press must be at top dead center (TDC) when you make final adjustments for the resolver. Be accurate when setting the press to TDC. Set to 0° ±2°. *Use a dial indicator on the face of the ram if necessary*.

Installation Guidelines These guidelines cover major points that are important for proper WPC operation. By following these guidelines, you will eliminate problems that could occur later. The points below are addressed again in the installation procedures. Never run wires for 120V and for lower voltages (such as 24V, 60V) inside the same conduit.

- Run flexible, liquid-tight conduit for high voltage lines (120V power, input check circuit, relay circuits) to the lower right-hand corner of WPC.
- Provide a dedicated 120V power circuit from the press control transformer to WPC input power connection. *Do not power any relays or solenoids from this circuit or the auxiliary power terminals on WPC.* Doing this may cause erratic press shutdowns due to electrical noise.
- Run one or two low voltage conduits into the lower left-hand corner of WPC for the resolver wires.

Because WPC 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 with the enclosure. As an example, the operator station cables should not share the same conduit with 115 Vac wiring. There are two exceptions to this rule:

- The power and logic wiring for the light curtains can be in the same conduit.
- The power and logic wires for the Dual Safety Valve can be in the same conduit.

Good grounds at WPC are important. *Make sure WPC is properly grounded.*

All relays and solenoids that are controlled by WPC must be suppressed. Suppressors should be installed across the load and as close to the load as possible (see Figure 2-31). *Never install the suppressor across the relay contacts.* The suppressors tend to fail shorted. In some cases, suppressors are required in the top stop and emergency stop (E-stop) circuits. A package of suppressors is included with each system. Be careful not to discard them when you unpack your equipment. Additional suppressors can be obtained from Data Instruments.

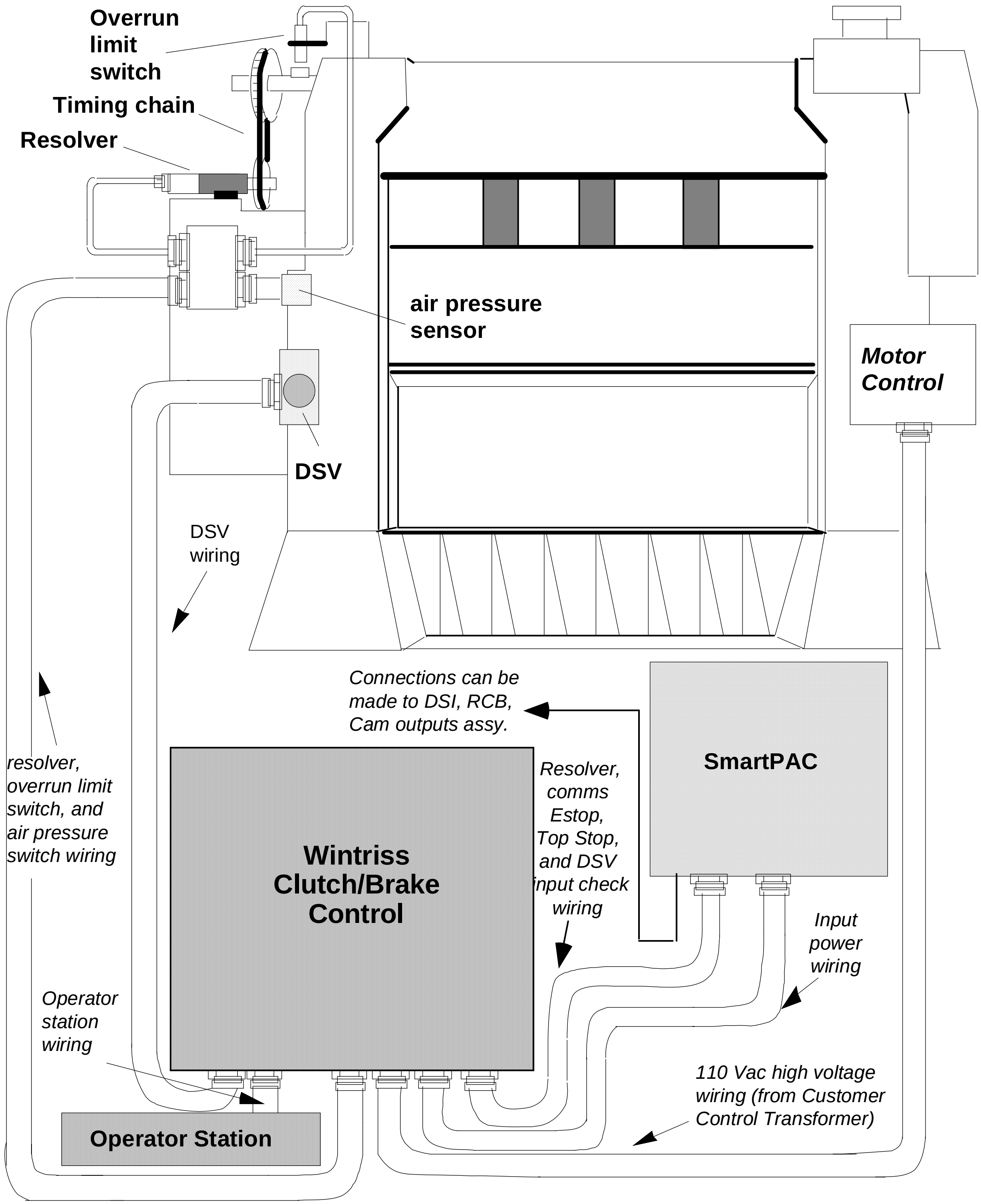


Figure 2-1. Installation Overview of SmartPAC with WPC

Mounting and wiring the WPC control enclosure

Refer to Figure 2-2a for specific dimensions when mounting the WPC control enclosure. It does not matter where you mount the control enclosure since the displays and keypad reside at SmartPAC. However, mount it so that it will be easy to perform maintenance, when necessary.

The control enclosure does not have to be mounted to the press. It can be mounted on a free standing pedestal, pendant, or column. For easy access to the interior, make sure that there is enough room to open the control enclosure door at least 120°. Plastic cable ties and self-sticking cable clamps are provided in the accessory parts bag. Use them to position the cable and wiring inside the control enclosure in a neat and orderly fashion.

Wiring the control enclosure

WPC requires:

- motor forward auxiliary contact (24V)
- slide adjust monitor circuit (24V)
- motor stop circuit (110V) if applicable, and
- motor reverse auxiliary contact (24V) if applicable

The power to WPC should come from the step-down control transformer and should be capable of handling 100 VA at 115 Vac ± 10%.

Most of the original controls on the press will be replaced except the disconnect, motor starter, and control transformer. It is important that rewiring allows proper operation of the motor starters.

Slide Adjust Considerations

If your press has a motorized slide (ram) adjustment, use this method to prevent slide adjustment while the press is running. Connect spare contacts on the slide adjustment switches (up, down) to the WPC emergency stop circuit.

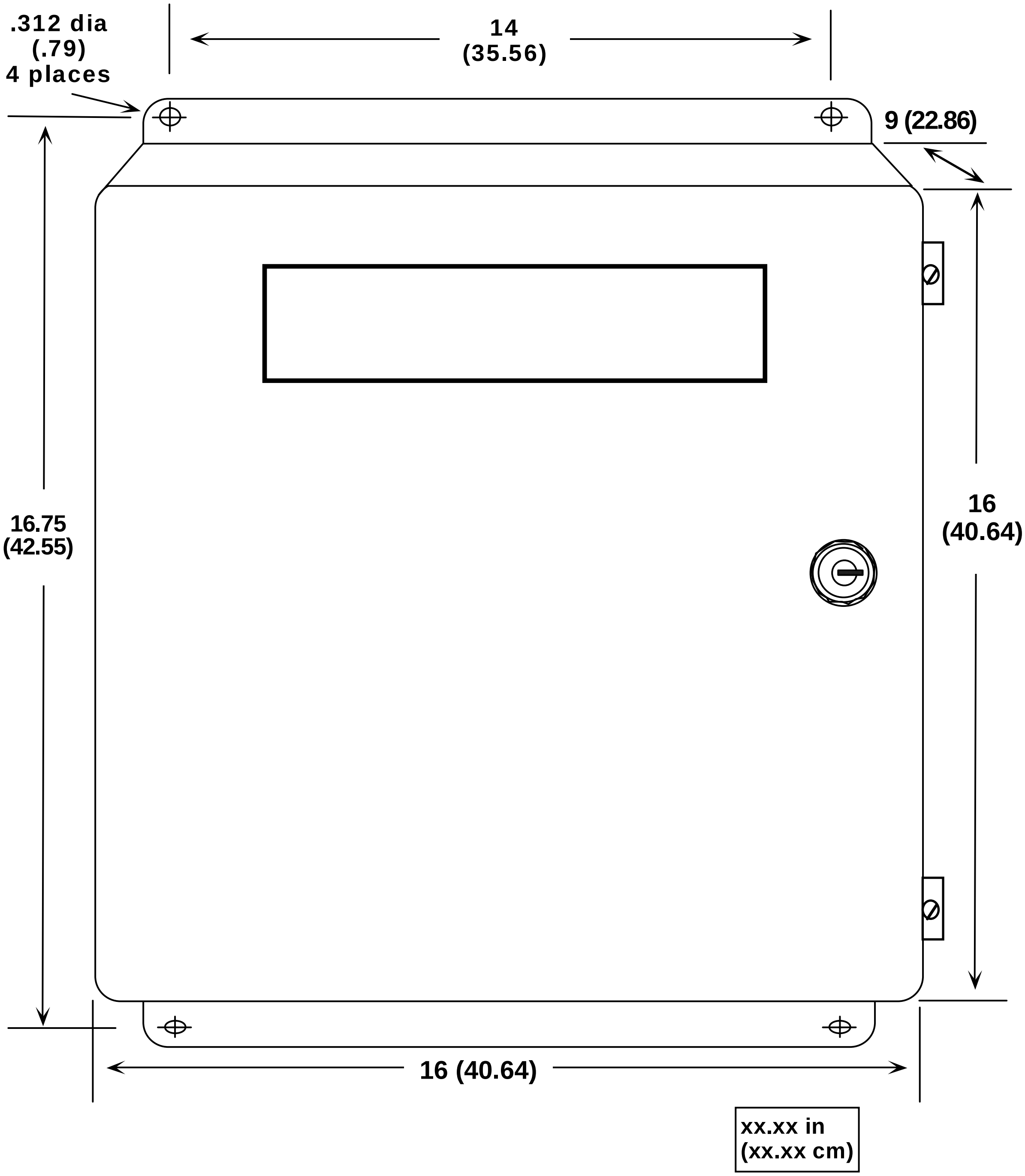


Figure 2-2a. WPC enclosure mounting dimensions

Mounting the SmartPAC control enclosure

At this point, you will need to mount SmartPAC. To mount the enclosure, follow these steps (see Figure 2-2b):

> Be sure to read and follow the steps outlined in this chapter as you proceed with this installation.

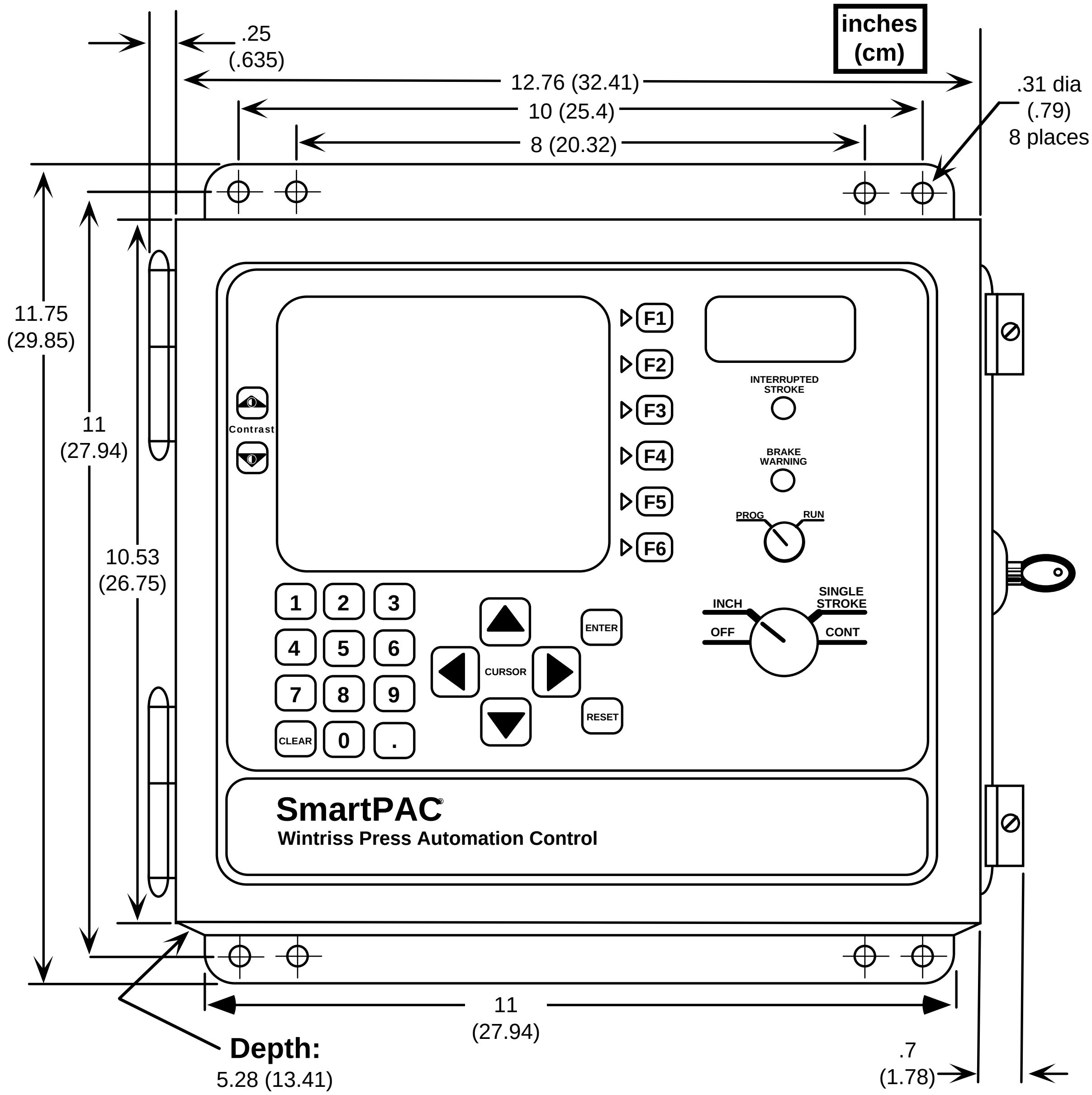


Figure 2-2b. SmartPAC mounting dimensions

PLACE SMARTPAC AT A CONVENIENT HEIGHT

SmartPAC 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 before mounting.

1. Determine a convenient place for the control enclosure. Ideally it should be close to where operators and setup personnel can easily see the readouts and reach the keyboard. Make sure all cables will reach. Leave enough room to open the door at least 120°. The enclosure can be mounted on a pedestal, pendant, or on the press itself. SmartPAC is also available for panel mounting

NOTE

If your SmartPAC is a panel mount, go to the next section for special installation instructions, as well as mounting and cutout dimensions.

2. Drill holes for mounting. Shockmount studs are 1/4–20. Tap holes (if necessary) and mount the enclosure using the enclosed shock mounts. Use a No. 7 drill and 1/4–20 tap.

Installing SmartPAC as a panel mount

This section explains how to install your SmartPAC as a panel mount. After you complete this section, refer to the remainder of the chapter to complete your installation.

Standard Enclosure versus Optional Panel Mount

SmartPAC 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 SmartPAC using your enclosure

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

1. Determine a convenient place to mount SmartPAC 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 twelve holes for #10-32 screws. Refer to Figure 2-2c for mounting and "cutout" dimensions.
3. Temporarily mount SmartPAC near the location where it will ultimately be mounted. 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 up to 9" of service loop when performing the wiring connections. Also make sure all cables will reach.
4. Refer to the remainder of this chapter to complete the entire installation.
5. After you have completed the remaining installation discussed in this chapter, go to the section "Final Assembly" at the end of this chapter to complete the panel mount installation.

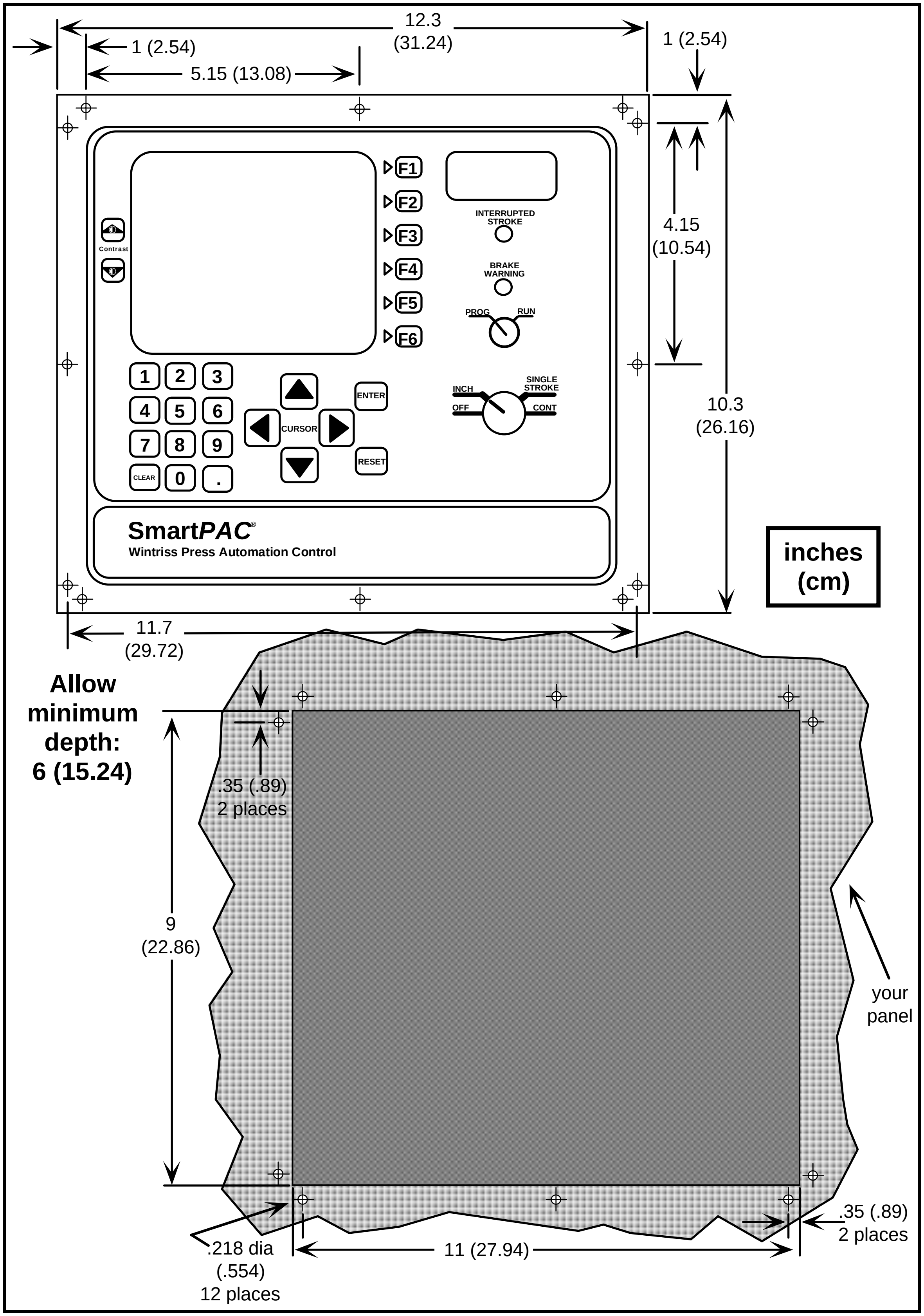


Figure 2-2c. Mounting and cutout dimensions, SmartPAC panel mount

Connecting AC wiring for WPC

All wires can be run through a flexible liquid-tight conduit to the control as long as all circuits are 115V. If your top stop circuits and emergency stop circuits are low voltage circuits (for example, 24V), run two conduits—one for 115V wires and one for 24V wires.

Bring the wiring connections for AC power to a convenient point so that you can connect them to the power supply board (see Figure 2-6b). No. 16 wire (No. 14, if local codes require it) is recommended for these circuits with a minimum 75°C temperature rating. To perform the wiring, follow these steps.

1. Locate the power supply board (situated under the main processor board). You will see the connector for AC power.

> **WARNING**
> **SHOCK HAZARD**
> Never apply power to WPC when the power supply cover is removed. To prevent shock, always replace the cover before applying power.

2. Determine how you will bring wiring from your 115 Vac power source (or 230V source if applicable) to the unit. For 115 Vac, you need three wires—high (black), neutral (white) and ground (green). For 230 Vac, wires are black and red with green or green/yellow for ground.
3. Find the 115V-230V voltage selector switch. It can be found on the side of the power supply board (See Figure 2-6b).

   If your AC power is 115V, check to see that "115V" is displayed in the switch cavity. If your AC power is 230V, push the handle to the right.

Push handle
to the left for
115V
(to the right for
230V)

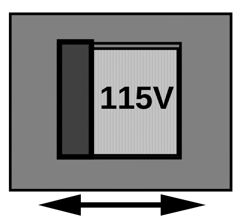


Figure 2-3. Setting voltage selector switch

4. Run the power wires to WPC through flexible liquid-tight conduit to the enclosure. Because WPC 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 with the enclosure.
5. To make ground connections, refer to the wiring schematics illustrated in Figure 4 (for Herion DSV) or Figure 6 (for Ross). Also refer to the power supply board layout (Figure 2-6b).

6. Connect power wires. For 115 Vac power, connect the black wire to HI terminal and white wire to NEU. (For 230 Vac connect black wire to HI terminal and red wire to NEU). Attach wires the same way that you did for resolver wires. Make sure that you do not start at the wrong end of the connector. Put it over the socket the way it will plug in, and note wire markings next to the socket before starting.

7. Plug connector back into its slot. Double check connections with markings at the connector base to make sure you did not wire it backwards.

8. Make all necessary conduit connections to ensure NEMA 12 protection. WPC is rated NEMA 12 (protected against dust and oil). *Be sure to 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 all other installation procedures are finished.

Installing Dual Safety Valve

Your WPC was supplied with a Dual Safety Valve (DSV) manufactured by either of these manufacturers, Herion or Ross.

1. Make sure that you wire the Herion DSV monitor (Figure 4) between terminal #20 and +24 Vdc out. For Ross, note in the wiring schematic (Figure 6) that a separate user-supplied reset switch is required.
2. Before installing the valve, make sure the muffler on the valve is tight. The muffler has a threaded shaft which screws into the body of the valve. If you can turn the muffler by hand without applying excessive force, it is not tight enough.
3. To tighten, secure the valve body, grab the muffler with both hands and turn it clockwise as tight as you can get it (without stripping the threads).
4. Be sure to periodically check the muffler for tightness. Vibration may cause the muffler to loosen and fall, possibly causing damage or injury. Also clean the muffler periodically. A clogged muffler can reduce stopping time.

Installing air pressure & counterbalance sensors

1. Install a filter regulator and lubricator in-line before the air pressure sensor, if not already present.
2. Connect shop air to the air pressure sensor input port (1/4" NPT). The sensor's case should never be used to apply torque to make or break the pressure connection. Always use a wrench on the hex directly behind the threaded port.
3. Connect the cable to the connector that accompanies the sensor.
4. Run the cable through flexible, liquid-tight conduit. Because WPC 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. Ground terminal #8 (refer to Figure 1 at the end of manual).
5. Wire sensor according to Figure 1 (reference "SA-200"). If the press is equipped with a counterbalance system, install a second air pressure sensor after the counterbalance regulator.
6. Follow steps 2 through 5 to install the counterbalance sensor.

Note: *If you use RamPAC to control the counterbalance pressure, you must use a counterbalance pressure switch with the WPC, see "Installing air pressure & counterbalance switches instead of air pressure sensors", below.*

Installing air pressure & counterbalance switches instead of air pressure sensors

1. Install a filter regulator and lubricator in-line before the air pressure switch, if not already present.
2. Connect shop air to the air pressure switch input port.
3. Set the system air pressure switch to 35 PSI.
4. Run the cable through flexible, liquid-tight conduit as noted above (NEMA 12).
5. Wire the normally open terminals between terminal #8 and ground (Refer to Figure 1 at the end of manual). *Both the system and counterbalance air pressure switches are held closed when pressure is applied above the setpoint limit.
6. If the press is equipped with a counterbalance system, install a second air pressure switch after the counterbalance regulator.
7. Set the counterbalance switch 10 PSI less than the minimum counterbalance pressure.
8. Wire the normally open* counterbalance terminals between #83 and ground. If #83 has already been assigned for other user-selected auxiliary equipment, then be sure to wire the counterbalance contacts across a terminal on the WPC main processor board which generates an E-stop and is connected to ground. See "Wiring auxiliary equipment to WPC for Customized Status Codes" for more information.

Note: *If you use RamPAC to control the counterbalance pressure, you must use a counterbalance pressure switch with the WPC. Call the factory for further assistance.*

Mounting and wiring the Operator Station and light curtain(s)

This section explains how to wire and mount the Operator Station and light curtain (optionally two light curtains).

The Operator Station should be located where the operator will run the press. On most OBIs this will be on the front of the bolster. For straight side presses, it may be on the press or on a pedestal. No one means is preferred or recommended. Each application will be different.

If you are not installing a light curtain, and if you are planning to use the operator station as a two-hand safety device, the operator station must be mounted at the correct distance away from the pinch point of the press. This distance must be calculated based upon the stopping time of your press. Mounting the operator station at the correct safety distance prevents an operator from leaving the station and reaching the pinch point before the press stops.

If you are installing light curtains, the operator station needs to be installed outside of the area guarded by the light curtain. The light curtain is normally mounted in front of the die space. Any opening or access to the die space not guarded by the light curtain must be guarded by mechanical barriers. Refer to Chapter 4 for instructions on determining the stopping time of the press and calculating the correct safety distance. For complete Shadow mounting instructions, see your Shadow user manual.

CAUTION

You cannot permanently mount the operator station and light curtain until you have the WPC working and the brake monitor set. You will, however, be able to wire the operator station and light curtain.

Refer to Figure 2-4a (front view of the operator station), Figure 2-4b (underside view).

Punch a hole in the operator station enclosure for conduit or sealtight. Connect the conduit or sealtight to the hole; then open the operator station box. Run the operator station cable in the sealtight. Plug the connector end of the cable into the operator station. At the other end of the cable, connect the wires to control enclosure main connector terminals, which are shown in the wiring diagram in Figure 2 (end of manual).

For the time being, place the operator station in a temporary location for now. Just leave it on the floor or on a cart. Then wire the operator station to the control enclosure and continue with all other installation, initialization checkout steps, and operation procedures. Once you find the proper safety distance (covered in Chapter 6), you can permanently mount the operator station at that distance.

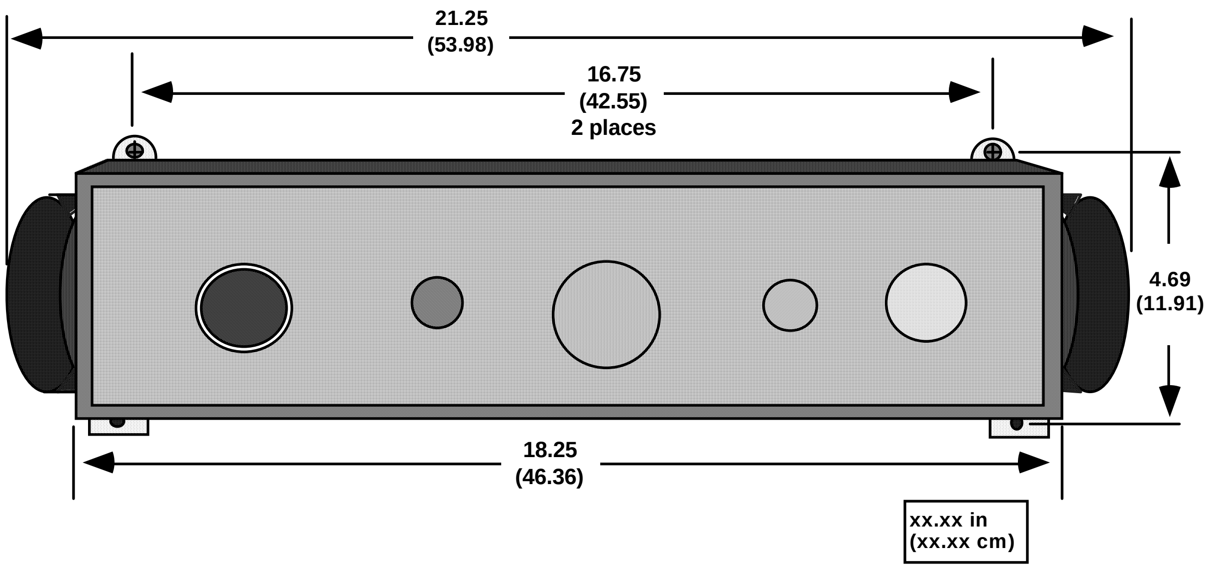


Figure 2-4a. Operator Station mounting dimensions (front view)

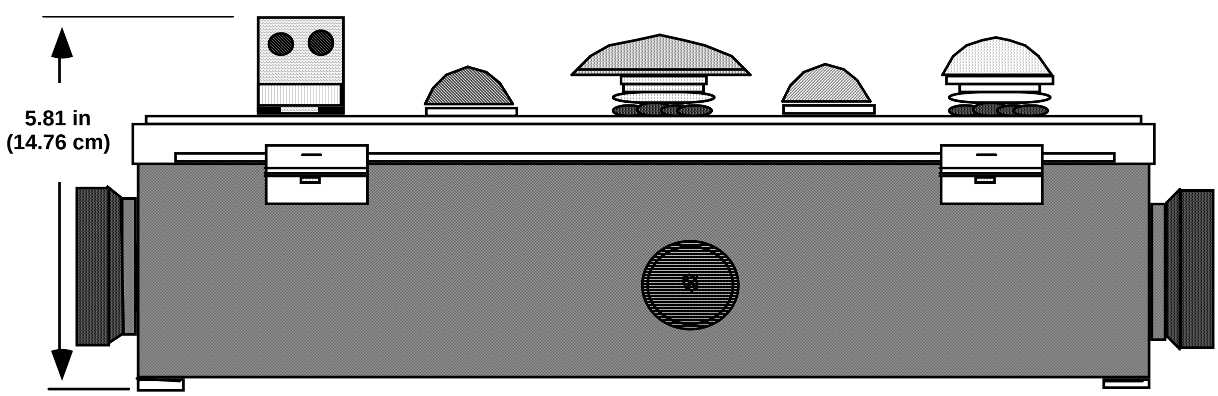


Figure 2-4b. Operator Station mounting dimensions (underside)

Follow these steps whether or not you are installing light curtains with WPC.

> **WARNING**
>
> Shadow light curtains must be installed and wired correctly. You must follow the instructions in your Shadow manual when installing Shadows.
>
> *Improperly installed light curtains can compromise operator safety.*

If you are using light curtains on your press:

You do not need to calculate a specific safety distance for your operator station. However, you must mount the light curtain at the correct safety distance. This ensures that a stop command sent to the press by the light curtain will result in a complete stop before anyone can reach the pinch point.

> **WARNING**
>
> The light curtain will only provide full protection for operators when mounted at the correct safety distance.

Proper mounting of the light curtain eliminates the need to mount the operator station at a set distance from the pinch point. That is because the light curtain now prevents access to the pinch point.

Remember this however: *You must not mount the operator station between the light curtain and the pinch point.* Mount the operator station where convenient following the above guidelines.

If you do not use light curtains:

You must mount the operator station at the correct safety distance. This is required by OSHA regulation 1910.217 Section C—Safeguarding the point of operation. The formula used for finding the correct distance is from the American National Standards Institute (ANSI) standard B11.1–1988 (for more information, see Appendix A of this manual).

Data Instruments recommends the ANSI formula because it is more specific than the OSHA regulations. It allows you to account for brake wear when calculating your press's total stop time.

The OSHA formula is basically the same as the ANSI formula except it does not account for brake wear. When using the OSHA formula, the Precision Metalforming Association (PMA) recommends that you add additional time for brake wear as shown in the ANSI formula found in Chapter 6. By not adding in this additional time, you may compromise operator safety as the brake wears (for more information, see Appendix A).

If you have two light curtains on your press:

Refer to the wiring schematics at the end of this manual to wire dual light curtains. See Figure 4 (for Herion valve) or Figure 6 (for Ross valve). Also, you will have to make a program selection setting to switch #6 in order to enable dual light curtains (see Chapter 4).

Installing the resolver

The resolver must be driven smoothly at a 1:1 ratio with the crankshaft of the press. The resolver signals WPC the exact position of the crankshaft at every degree of the stroke (see "How WPC works" in Chapter 1). Design a method of driving the resolver directly from the crankshaft using a chain or timing belt (not a V belt) and sprockets. Use either an idler sprocket or spring loaded resolver base to compensate for slack or stretch. Data Instruments stocks a spring loaded base with a hole pattern to match the resolver. It does not matter which way the resolver turns. You can switch two wires on the resolver connector to set the direction of rotation.

The drive you choose must also allow for adjustment of the resolver to its zero position at top dead center. All sprockets must be keyed or pinned. The resolver shaft has a standard key.

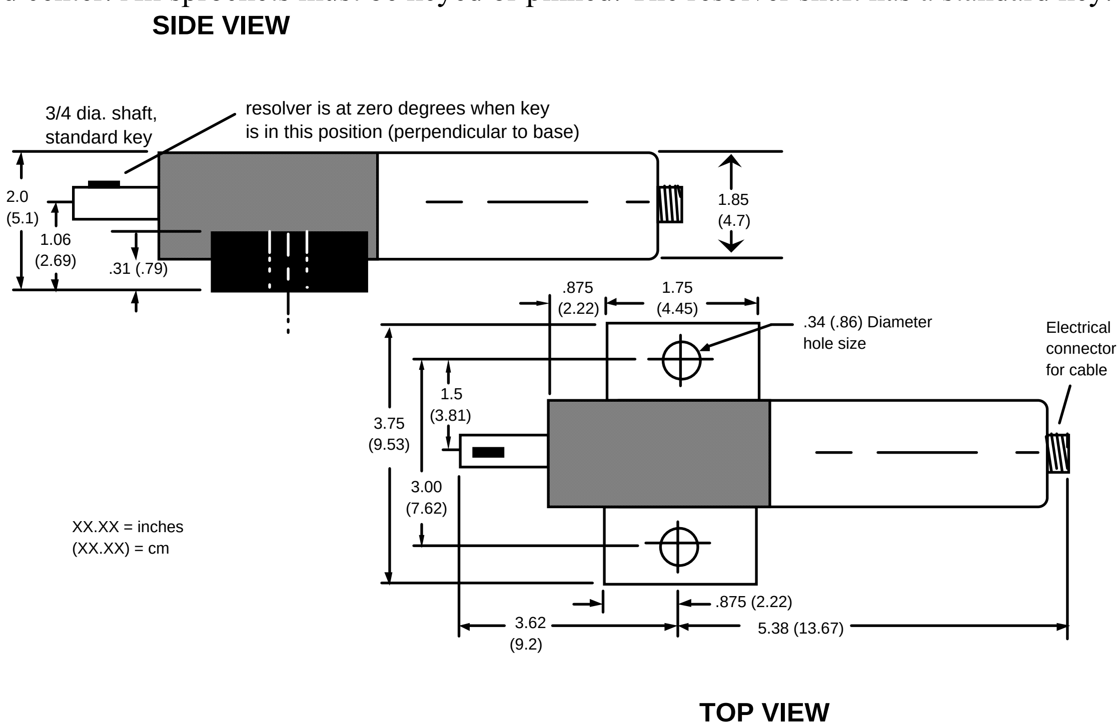


Figure 2-5. Resolver

When designing the drive for the resolver, here is what you should *not* do:

1. Do not use a long, sloppy chain (no more than three feet in length).
2. Do not use gears, right angle joints, shafts with universal joints because these will develop too much backlash or too much play.
3. Do not try direct coupling to the crank because this requires extreme precision. If the resolver is only slightly off-center, the resolver bearing will be subjected to side loads well in excess of its rated capacity and will ultimately fail.
4. Do not use flexible couplings (can be inaccurate) or V belts (inaccurate, will slip).
5. Do not use a flexible shaft like a speedometer cable. The resolver will lag the crank because the shaft twists on start-up. When the crank stops, the resolver will turn past the true stopping point and snap backward.

Install and wire resolver

Once you have thought out your design and gathered the parts, mount the resolver by bolting it to the press or other platform at the spot you selected. Install your drive mechanism. It does not matter which way the resolver turns. You will set the direction of rotation when you wire it. You will also electronically zero the resolver later. Set the resolver as close to zero as you can by turning the shaft so the keyway is aligned with the arrow on the housing. See Figure 2-5. *The press should be at top dead center when you do this.* Turn the shaft before attaching the chain or other drive mechanism.

To wire the resolver:

1. Refer to Figure 2-6a for the WPC components board layout. Also refer to Figure 1 for the resolver wiring schematic.

   Find the resolver cable (if not connected to the resolver). Plug the end with the molded connector into the resolver (it only goes one way). Twist the locknut so the connection is tight.
2. Run the resolver cable through 1/2" conduit from the resolver to WPC. If you have the right or center configuration, the resolver cable will go into WPC from the bottom left corner of the enclosure. If you have the left configuration, the resolver cable goes in from the lower right side and feeds through the right-hand side of the enclosure.

WHEN INSTALLING THE OVERRUN LIMIT SWITCH

When installing the overrun limit switch, you can also run the cable through the same conduit as the resolver wires. (See "Installing the overrun limit switch" for an illustration of the overrun limit switch — the cable is attached). You cannot install the overrun limit switch until the resolver is electronically set to 359°. So run the cable through for now, and leave installation until later. Refer to installation overview Figure 2-1 to see where the overrun limit switch must be installed. It is usually near the resolver.

3. Refer to Figure 2-6a for the location of the resolver connector. Measure the resolver wires to fit and cut the wires. (If you also ran the overrun limit switch cable through, do not cut these wires until the overrun limit switch is installed).
4. Notice that the resolver wires are plugged into the L-shaped resolver connector on the edge of the main board, at terminals #89 through #95.
5. Attach the wires to the connector as shown in Figure 1. Make sure you connect the black and yellow wires correctly based upon the way your resolver will rotate—clockwise or counterclockwise.

   To connect a wire, find the correct terminal and loosen the screw over it by turning it counterclockwise (see below). Strip the correct wire for this terminal 1/4" (6.4 mm) from end. Insert bare wire into the terminal 90% of the way. Tighten the screw. The metal tooth inside the terminal will clamp down on the bare wire for a tight connection.

Make sure that the metal tooth is clamped down on the bare part of the wire, not on the insulation.

6. Connect all wires and double check connections when done. Plug the L-shaped top firmly into base. It only can go one way.

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

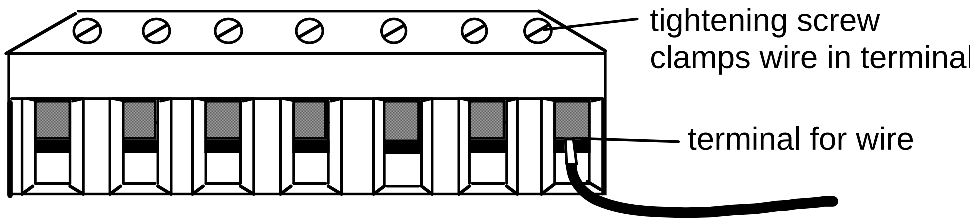


Figure 2-7. Attaching wires to connector

If you replace your resolver

If you need to replace your resolver, follow the instructions outlined in this section. *Remember that you will also have to rezero the resolver*. Refer to "Zeroing the resolver" and more specifically "How to replace and rezero the resolver" found in Chapter 4.

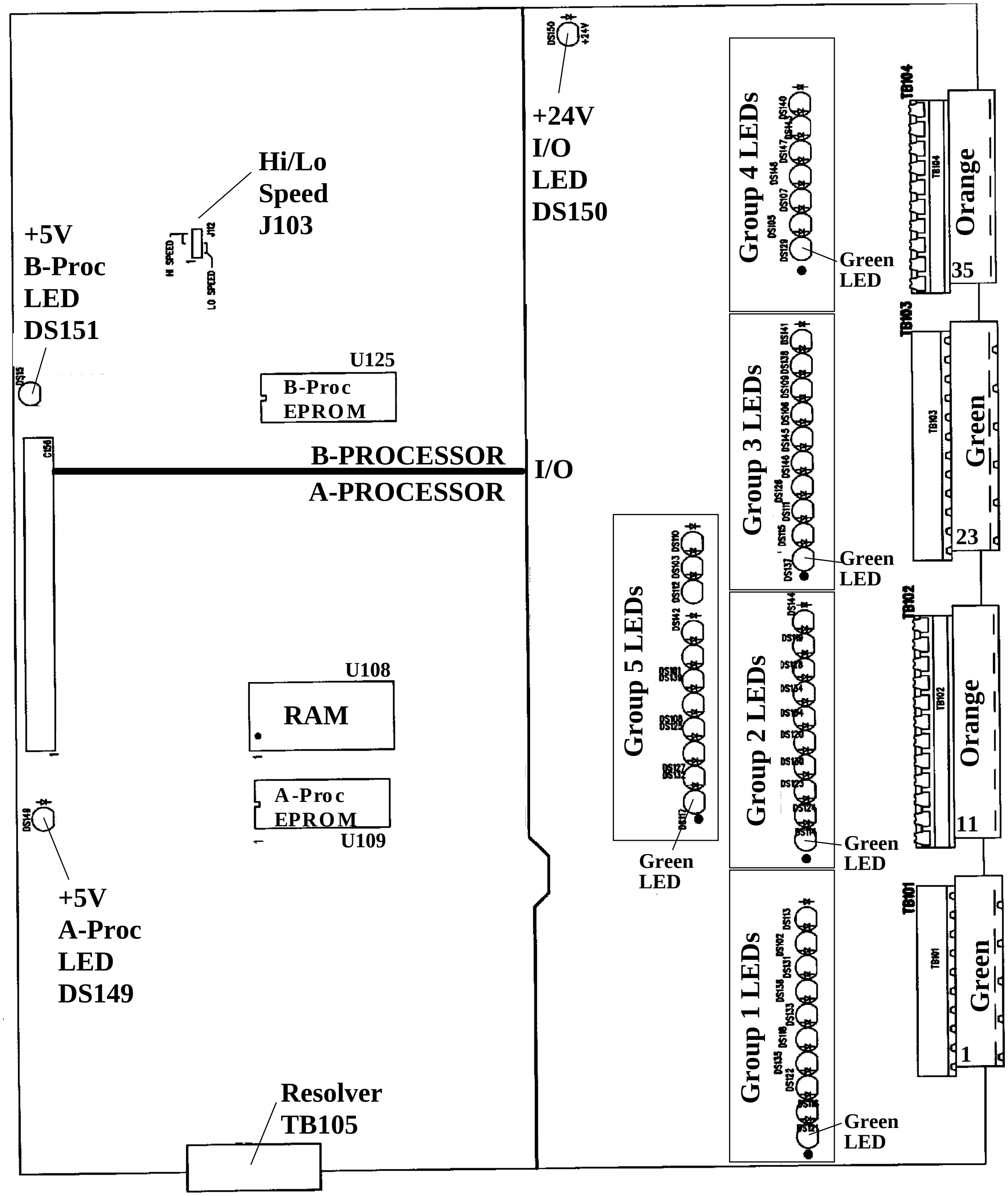


Figure 2-6a. WPC processor boardlayout,
important components shown and labeled

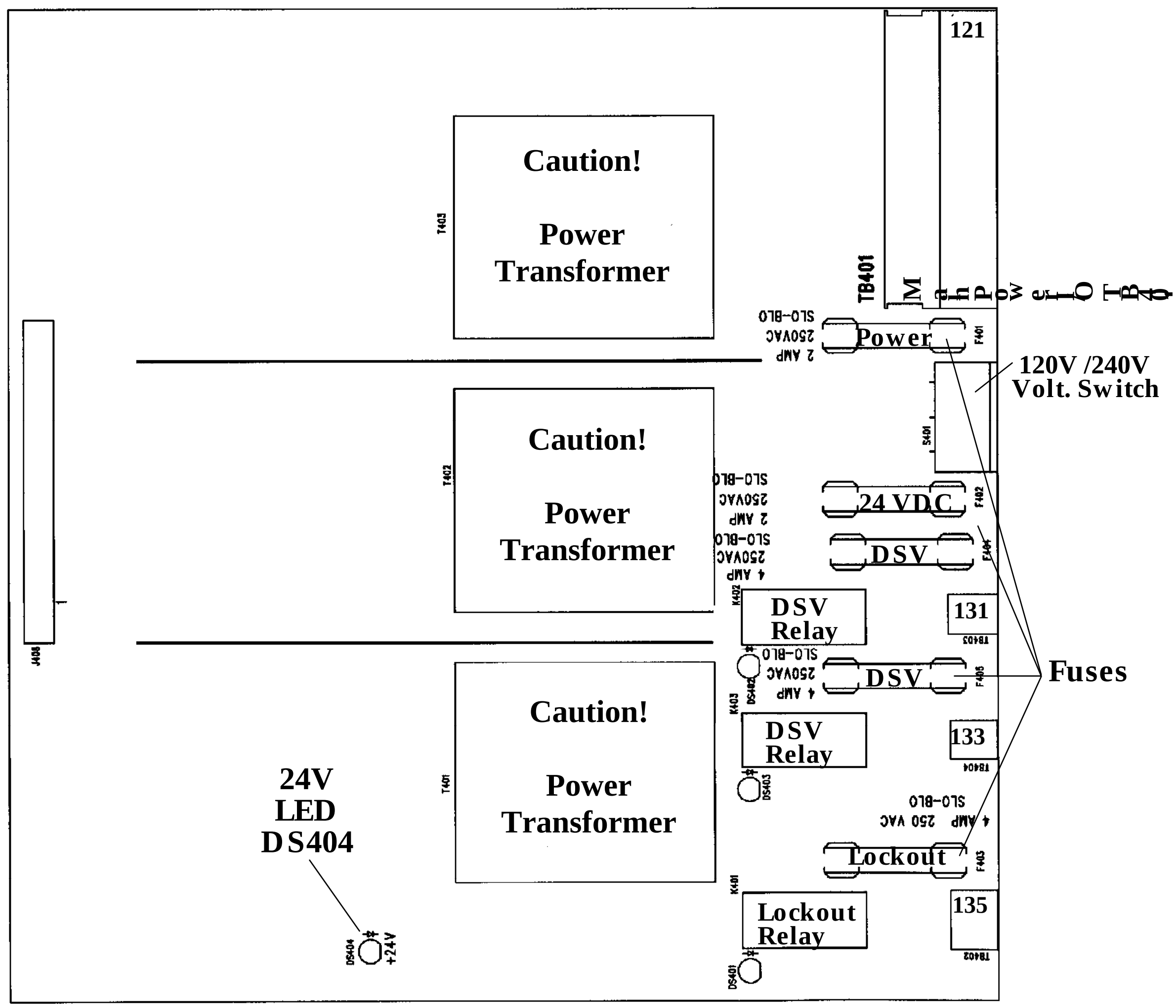


Figure 2-6b. WPC power supply boardlayout
important components shown and labeled

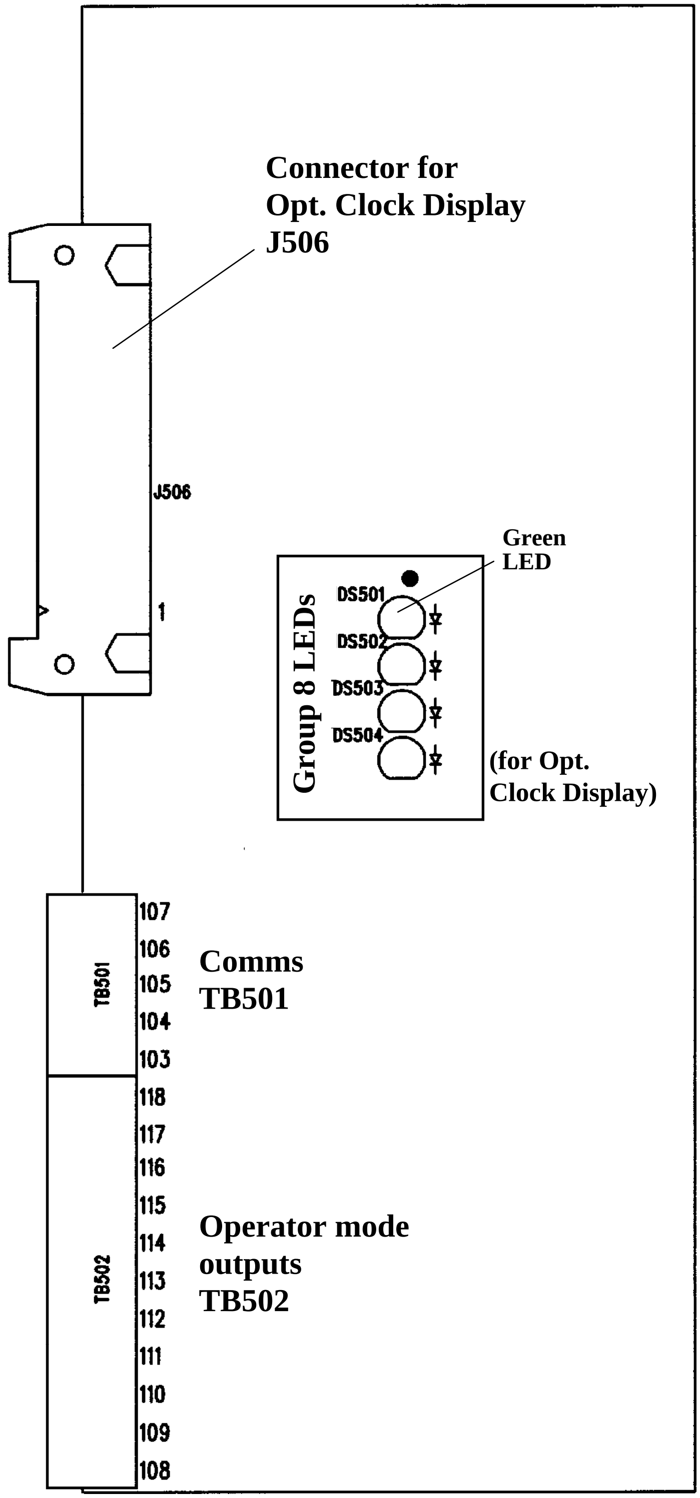


Figure 2-6c. WPC serial interface boardlayout - important components shown and labeled

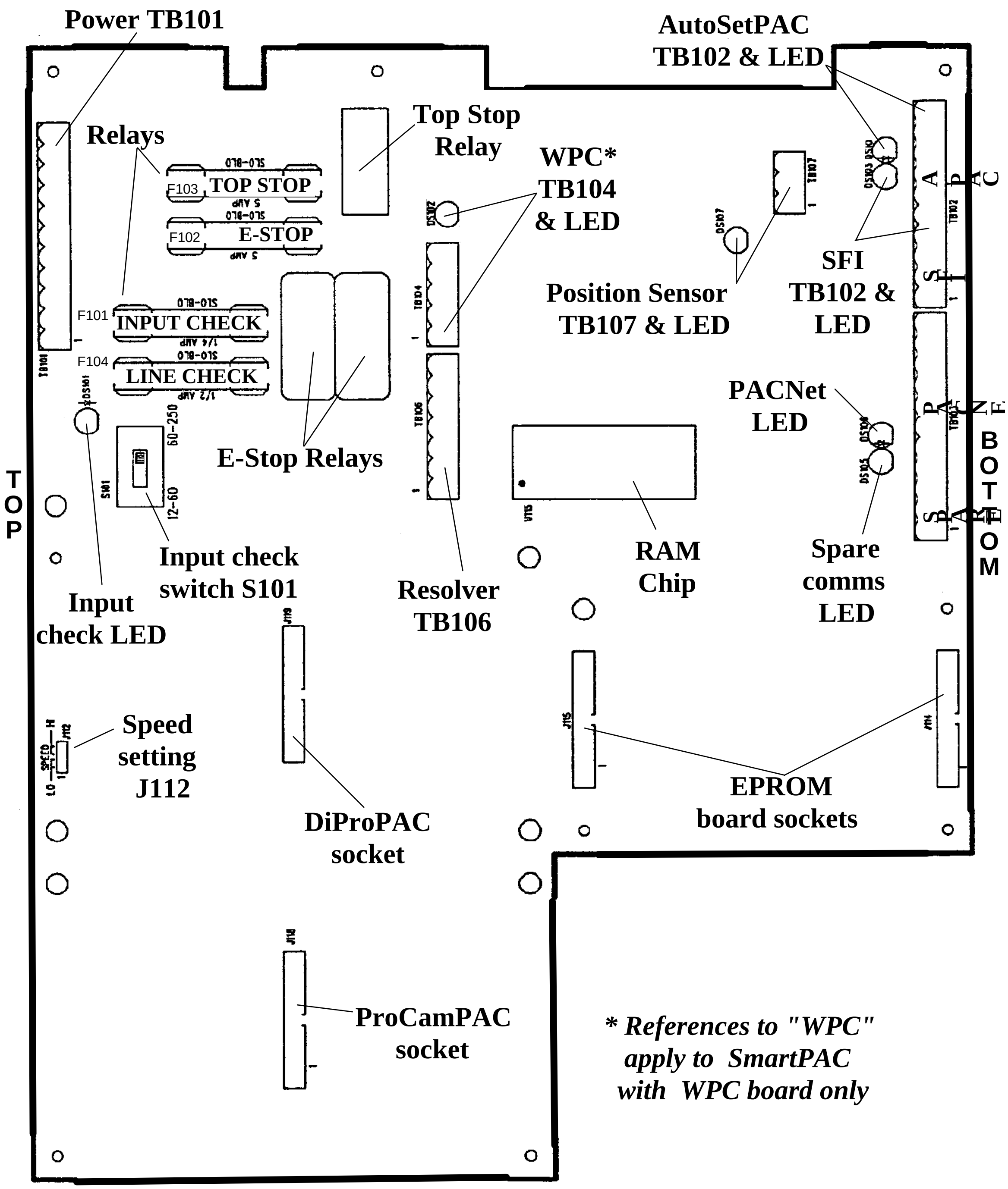


Figure 2-6d. SmartPAC main processor board layout
important components shown and labeled (sideways)

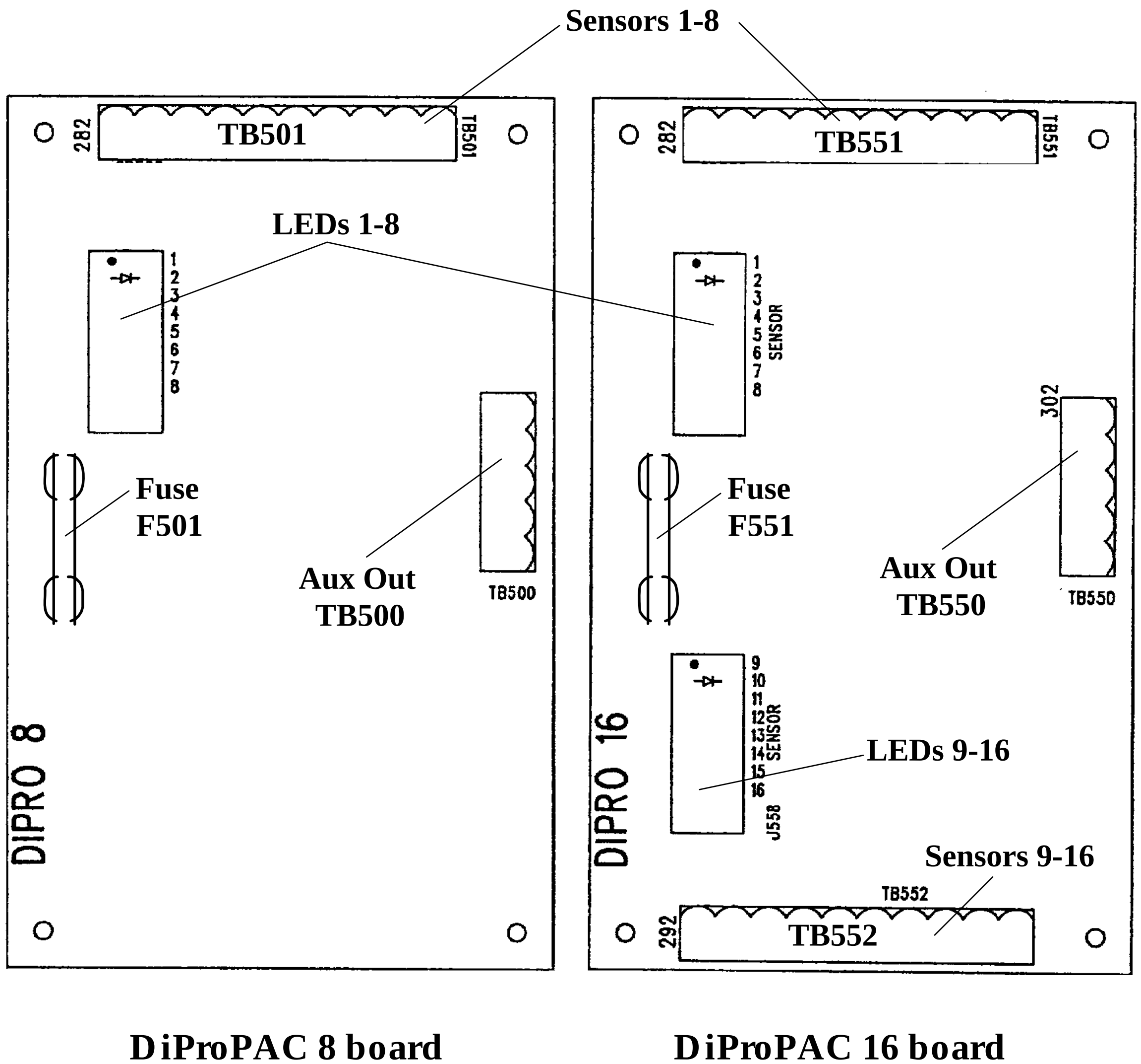
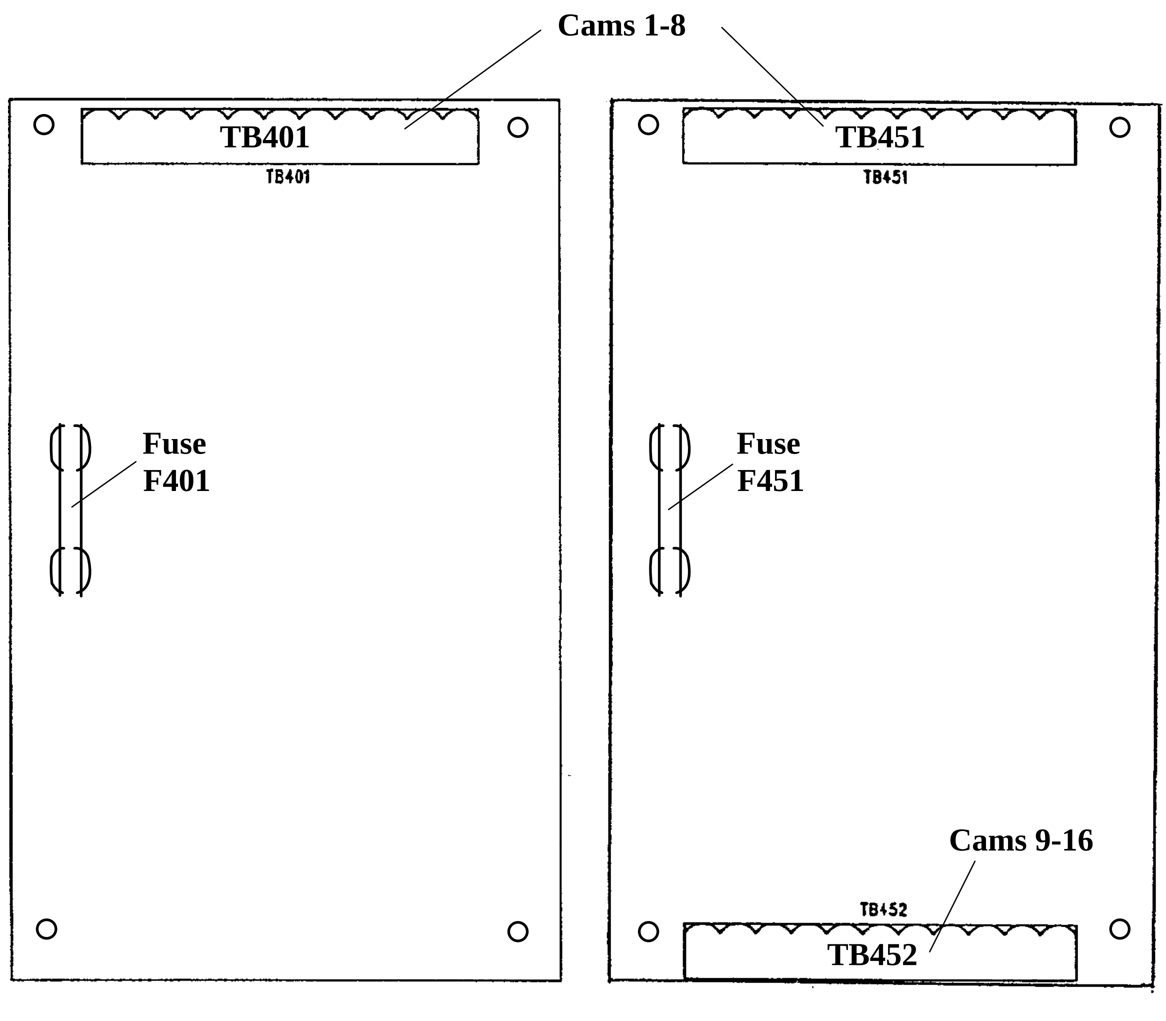


Figure 2-6e. DiProPAC boards 8 (left) and 16 (right) layout
important components shown and labeled



ProCamPAC 8 board **ProCamPAC 16 board**

Figure 2-6f. ProCamPAC boards 8 (left) and 16 (right) layout
important components shown and labeled

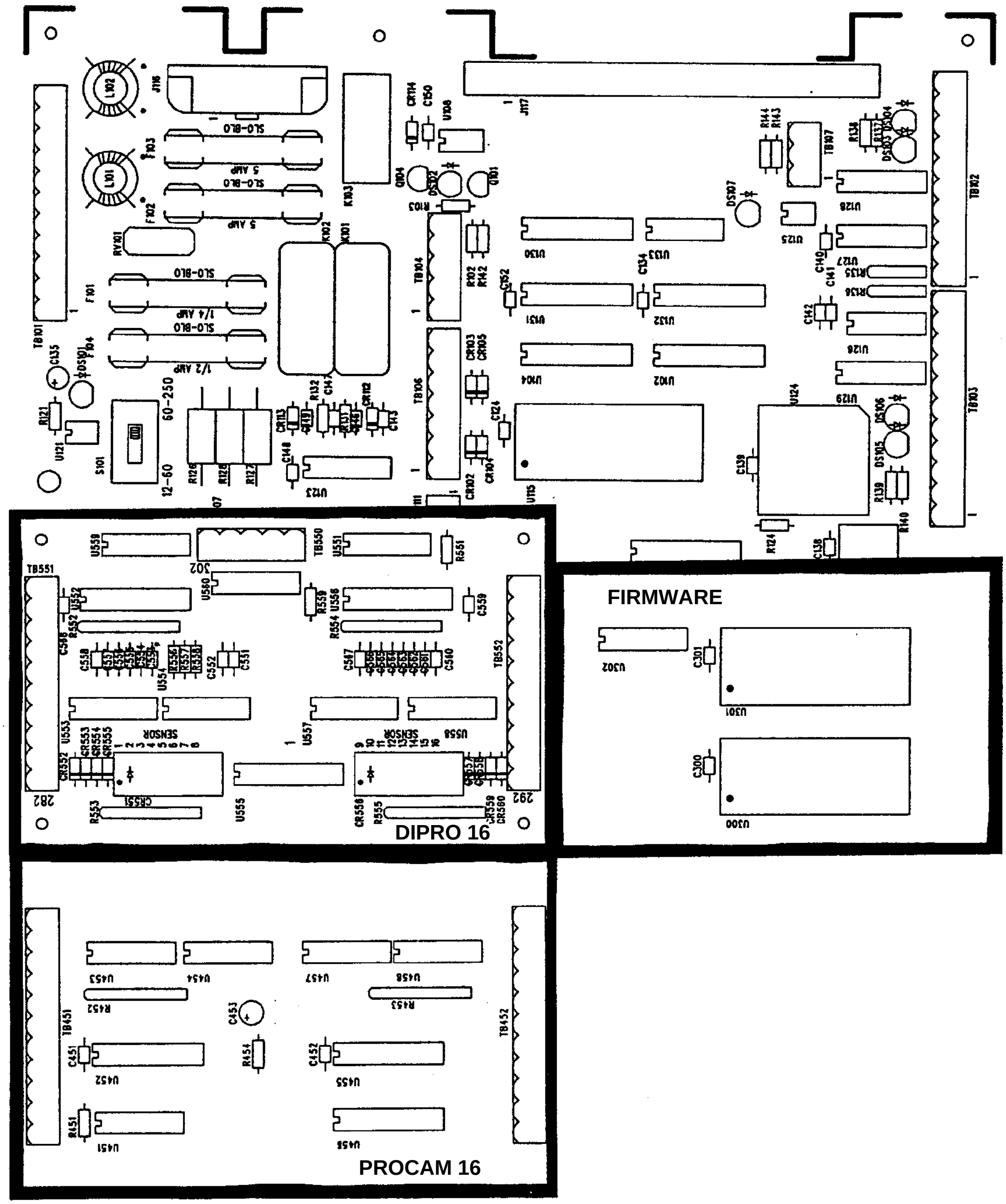


Figure 2-6g. ProCamPAC, DiProPAC, & Firmware boardssuperimposed on SmartPAC

NEITHER the Firmware, ProCamPAC, or DiProPAC boards are interchangeable. Therefore, it is important that you install each of them correctly. The 8 and 16 channel ProCamPAC boards are interchangeable, as are the 8 and 16 sensor DiProPAC boards. SmartPAC will recognize whether the board is 8 or 16 configuration.

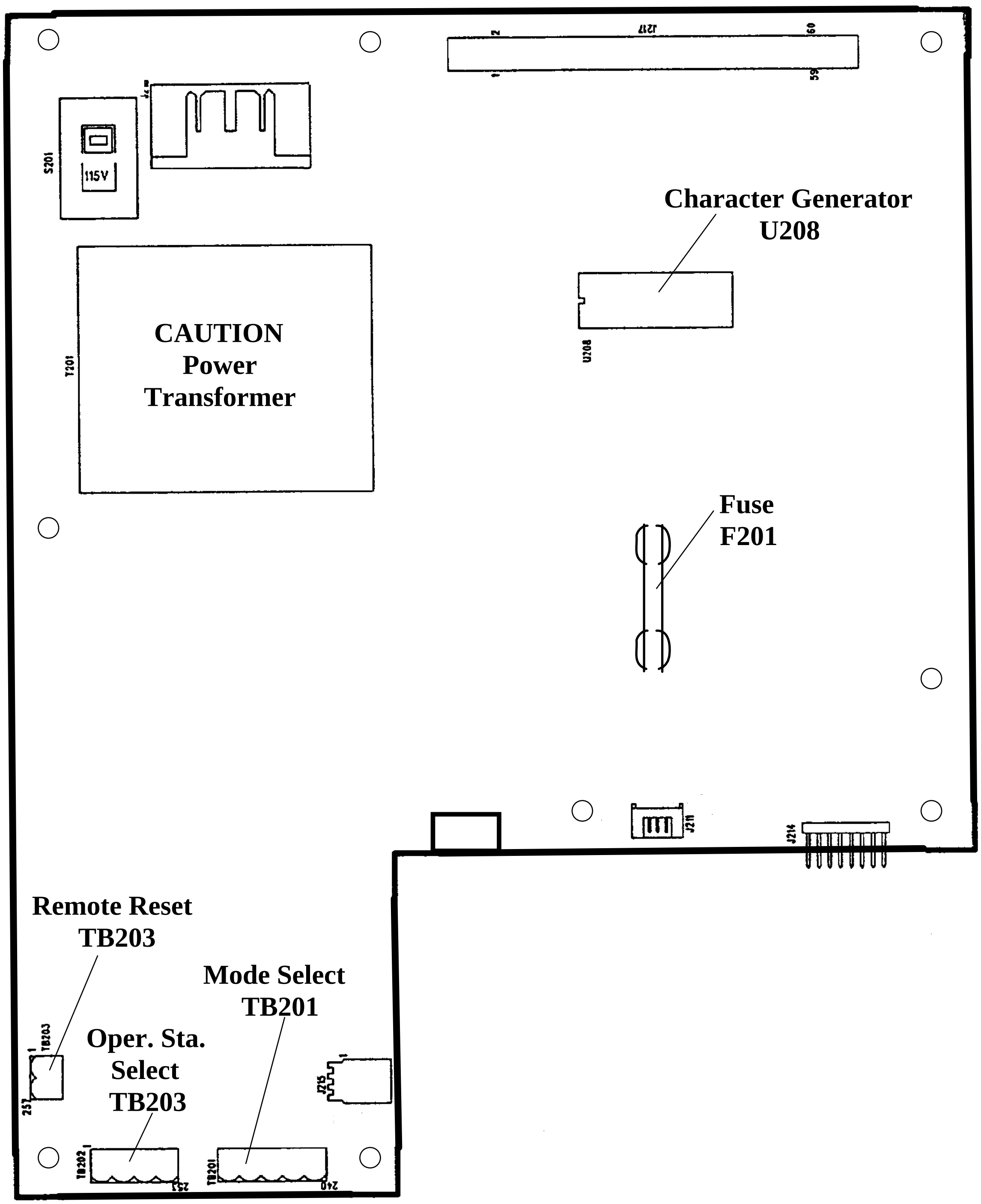


Figure 2-6h. SmartPAC power supply board layout
important components shown and labeled

Wiring between WPC and SmartPAC

You will be making several wiring connections between WPC and SmartPAC, including connecting the resolver. Keep in mind that you will be dividing the wiring into two conduits: one for *low* voltage (connected at the *bottom* of each enclosure), and the other *high* voltage for the A/C power (connected at the *top* of each enclosure).

If necessary, refer to these Figures to make the appropriate connections:

- Figure 2-6a for the location of the resolver connector;
- Figure 1 at the end of the manual

Connecting WPC's resolver to SmartPAC

IMPORTANT!

The resolver must be connected directly to WPC; thus making WPC "master". SmartPAC, which is connected in parallel to WPC's resolver is the "slave".

1. Locate the 4-conductor shielded cable without connector. You will use this wire for both slaving the resolver and the communications described below. Run the cable through 1/2" *low-voltage* conduit from terminals #89 to #95 on the main processor board to the bottom right knockout of WPC. This cable should be routed through the knockout located at the bottom right of SmartPAC. Both WPC and SmartPAC are rated NEMA 12 (protected against dust and oil). Use conduit of the same rating and make proper connections to ensure NEMA 12 protection.
2. Pull the connector in WPC out of its socket.
3. Attach the wires to the connector as shown in Figure 1. You will be wiring in parallel (#95 shield to shield, #94 black to black, #93 green to green, #92 red to red, and #91 yellow to white). You do not need the brown and orange connections for slaving the resolver.
4. Connect the cable from that terminal strip in WPC to TB106 in SmartPAC, the "slave" unit. Remember to wire in parallel except for brown and orange.
5. Locate J111 on SmartPAC's control board. Move this jumper to pins 2 and 3, designating "slave".

Connecting communications from SmartPAC to WPC

1. Locate TB104 on the SmartPAC board and TB501 on the WPC Interface Board. See Figure 1 at the end of this manual for wiring and Figure 2-6c earlier in this chapter for the board layout.
2. Run the four-conductor shielded cable through the same flexible liquid-tight *low-voltage* conduit (referenced above) from SmartPAC to WPC.

Wiring the input check and stop circuits from SmartPAC to WPC

Run multi*-conductor shielded cable (minimum 6) through the same flexible liquid-tight *low-voltage* conduit (referenced above) from SmartPAC TB101 (pins #205 through #210) to the WPC main processor board. **You must supply your own cable for this top stop, E-stop, and input check circuit wiring.*

Wiring incoming power between SmartPAC and WPC

You will now perform *high-voltage* wiring for A/C power. Run 3-conductor shielded cable** through a second, flexible liquid-tight conduit from the top knockout of the WPC main processor board to SmartPAC TB101 (pins #201 through #203). ***You must supply your own cable for this A/C wiring.*

Connecting other Wintriss products to WPC

You can connect stop circuits of other products/monitors to WPC. To do so, follow the above instructions. Before you wire, run the press in all modes of press operation — Inch, Single stroke, and Continuous. Also make sure that the press has working top stop and emergency stop circuits. Verification that the press operates and stops properly is extremely important because WPC will control the Dual Safety Valve on the press. Do not forget to mark your electrical prints where you wire in WPC.

When the stopping time is critical to your operation, as it is with die protection, be sure to wire as follows. Whenever you have emergency stop circuits, wire them between terminals #67 and #69 or between terminals #68 and #69 on the main processor board. For top stop circuits, wire them between terminals #79 and #80 or between terminals #80 and #81. Refer to Figure 2 at the end of this manual for specific wiring schematics.

Use customized status code wiring (see "Wiring auxiliary equipment to WPC for customized status codes" earlier in this chapter) when the auxiliary equipment that you are connecting does not have its own self-explanatory displays, as is available in DiPro 1500 or AutoSet load analyzers.

Installing the overrun limit switch

The overrun limit switch works in conjunction with the resolver by constantly monitoring its crankshaft angle position. WPC receives a signal from the overrun sensor and compares it to the resolver angle. WPC expects to see the overrun limit switch at the same resolver angle every stroke. If this does not occur, this means that the resolver is no longer rotating at a 1:1 ratio with the press. It could be because the resolver drive has slipped or has broken, or the resolver itself is broken. SmartPAC with WPC will signal an emergency stop and display an error message.

The overrun limit switch consists of a magnet, which you mount on the crankshaft (or other shaft), and a stationary magnetic switch, which is mounted just above the magnet so that it detects the magnetic field on every stroke. The magnetic switch is also called an "overrun sensor".

IMPORTANT! PLEASE NOTE!

The magnet <u>cannot</u> be installed until you first determine where the top stop angle is, as explained in "Setting up the Top Stop Angle" in Chapter 4. At that time, you will be choosing the proper position — 270°, 300°, 330°, and 359° — as described in the section "Setting up the Overrun Limit Switch", also in Chapter 4. Remember: The overrun limit switch must be mounted <u>as close as possible</u> after the latest top stop angle as per the table referenced in that section. Examples in this section illustrate the sensor being mounted to signal WPC at 359°.

1. Set the press at top dead center (TDC).
2. With SmartPAC on, go into the Initialization mode and select "Position sensor" from the menu to see this display (Figure 2-8). Press Enter so that the top line in the display above reads: "POSITION SENSOR DISABLED".
3. Shut off power to SmartPAC and WPC.

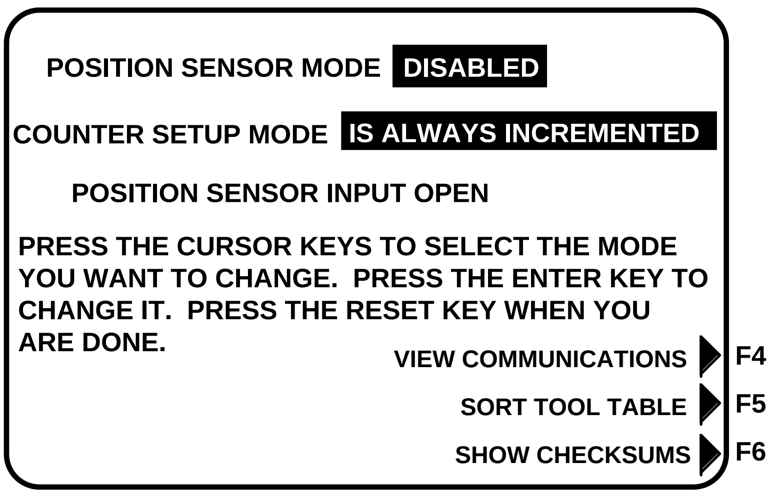


Figure 2-8. Position sensor display in Initialization

4. Refer to Figure 2-9 as you prepare for installation. You will be mounting the magnetic switch so that it can be wired through the resolver conduit. Select the appropriate crank angle position to mount the magnetic switch, (You have four possible *unzeroed* resolver angle positions, which include 270°, 300°, 330°, and 359° — as explained in "Setting up the Overrun Limit Switch" in Chapter 4.)

   Select a mounting site for the magnetic switch so that the magnet rotates 1:1 with the crankshaft of the press. Ideally the magnet should be mounted on the crankshaft itself. See Figure 2-1 earlier in this chapter for an installation overview. However, you might also use the pitman *above* the adjusting screw or a drive shaft to a feed or other device.

   Never mount the magnet to the resolver shaft or sprocket or any of the drive components leading to the resolver. This is because both the resolver and overrun limit switch would then be out of alignment with the crank if a failure occurred, but they might stay in alignment with each other. The overrun limit switch would not signal the fault, and WPC would be dangerously out of "sync" with the press.

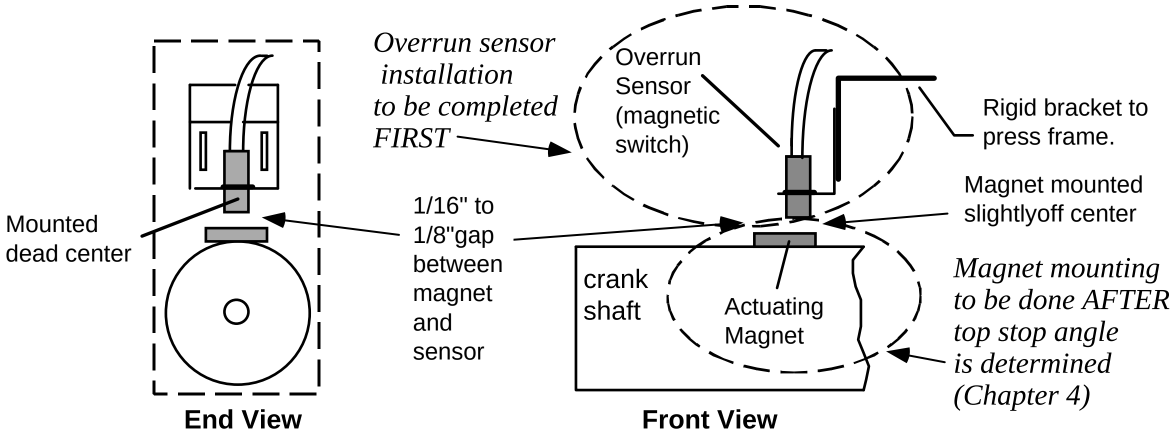


Figure 2-9. Installing overrun limit switch (359° used as an example)

5. Once the magnetic switch is installed, wire it to terminals #23 through #25 on the main processor board. The black wire goes to terminal #25 (GND); white or clear goes to terminal #24 (overrun limit switch); red goes to terminal #23 (sensor power). If the resolver and the overrun limit switch share the same conduit, wire at the same time.
6. Now that you have installed the magnetic switch, you are ready to mount the magnet. You need to determine where to mount the magnet — four possible *unzeroed* resolver angle positions — 270°, 300°, 330°, and 359°. Go to "Setting up the Overrun Limit Switch" in Chapter 4 to determine this angle *before* proceeding to the next step.

What "unzeroed" means

"Unzeroed" is the true crankshaft angle position, that is, before the resolver has been "zeroed" in Initialization.

7. *This step assumes you have determined the unzeroed resolver angle in Chapter 4 (from the previous step).* Turn power on to SmartPAC and WPC. Bring the press to that angle position, and then temporarily place the magnet as close as possible to the magnetic switch (use double-face tape for now). Run the press in Inch mode for about 4 strokes.
8. As you perform the previous step, take time to view the overrun sensor's on/off angles from SmartPAC's "Press Control" screen. Here is how to view overrun:

Important

SmartPAC must already have been properly connected to WPC before attempting to view overrun in SmartPAC's Run mode.

   a. Go into SmartPAC's Run mode. If you are not sure how to access Run mode, consult Chapter 6.
   b. Select "Press Control" from the main Run menu. This is the WPC interface screen. Press the F2 function key ("OVR") to view the *unzeroed* overrun sensor's on/off angles. See the next illustration:

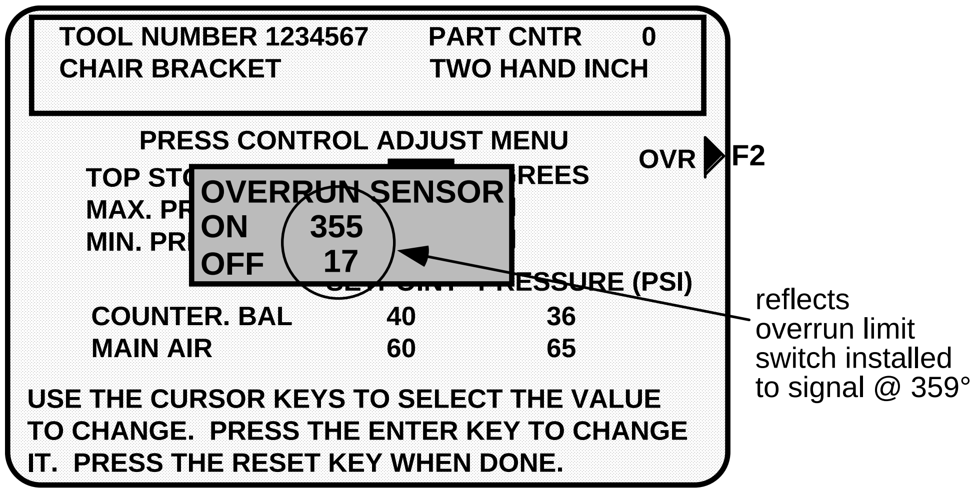


Figure 2-10. View Overrun Sensor "on" and "off" angles in Run mode

c. Jog the press (while in Inch mode) to the desired angle position. Watch the screen, paying attention to the "on" and "off" angles. These angles should correspond directly with one of the the four possible unzeroed angle positions that you selected for the magnetic switch (270°, 300°, 330°, or 359°).

d. As you prepare to install the magnet, make sure that the overrun limit switch has enough dwell to provide an adequate signal at high speeds. It is a good idea for the magnet to actuate for 10 to 15 degrees. The larger the diameter of the shaft on which the magnet is mounted, the shorter the dwell, as shown next. If this is the problem, then mount the magnet on a smaller shaft. See next illustration.

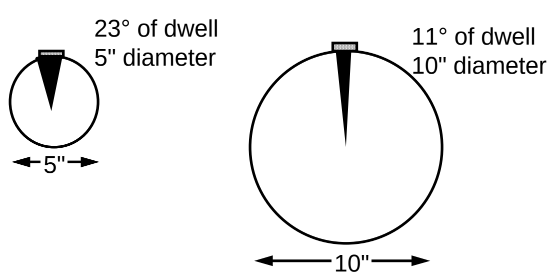


Figure 2-11. Overrun limit switch dwell on different sized shafts (@ 359°)

Example to help you determine the proper angle

Say you determined 359° to be your unzeroed angle position. Your magnetic switch might conceivably go "on" just before that angle, say at 355°, and go "off" just after, at 17°.

9. Install the magnet plastic side up using a non-ferrous metal screw (see Figure 2-9). 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.

10. After the magnet is installed, run the press in Inch mode for about 4 strokes. Next run the press in Single Stroke or Continuous. If you properly installed the overrun limit switch, the press will cycle without any overrun-related error conditions.
11. Open the WPC enclosure. Locate the green "Overrun Limit Switch" LED in Group 3 (refer to the LED maps found in Chapter 4).
12. If the installation was done correctly, the "Overrun Limit Switch" LED will be illuminated which indicates that the overrun limit switch closed. If so, you are done with this portion of the installation.
13. If the "Overrun Limit Switch" LED on the WPC board is <u>not</u> illuminated at this position, there is a problem. Since you just mounted the magnetic switch and aligned it with the magnet, the switch should be closed. Double check your wiring. Make sure the ram has not moved since you installed the switch. If so, repeat the wiring procedure explained in Step 5 in this section. You will have to run the press in Inch mode to do this. Therefore, it is unlikely that you moved the ram, but check anyway. If the ram has not moved, check the distance between the magnetic switch and magnet. Make sure they are <u>as close as possible</u> to each other. Re-adjust if necessary.

    If SmartPAC displays an overrun-related error message after running the press, it is also possible that the overrun limit switch may not have enough *dwell* to provide an adequate signal at high speeds. The larger the diameter of the shaft on which the magnet is mounted, the shorter the dwell, as shown in Figure 2-11. If this is the problem, the solution is to mount the magnet on a smaller shaft.
14. If none of the above procedures change the state of the overrun limit switch to closed, the magnetic switch may be defective. Try another switch, if one is available. Otherwise, call Data Instruments for further technical assistance.

Wiring auxiliary equipment to WPC for customized status codes (optional)

WPC provides you with 11 user-installed customized status codes which you can use to monitor auxiliary press functions, such as lubrication systems. When any of these functions issues a stop command by opening a normally closed (N/C) relay, a unique status message is displayed at SmartPAC's LCD display which helps identify why the press stopped. The stop can be programmed to be either Top Stop, Emergency Stop, or Lockout. You can program unused inputs as "unused". In any case, no bypassing is required.

Wiring the lockout relay to your motor starter will stop the motor, plus emergency-stop the press. This input can be used to detect critical operational problems, such as the low lubrication levels. This error must be reset by pressing SmartPAC's Reset key. Then *"Loc"* will be displayed on SmartPAC's LED display, which can be cleared by turning the Stroke Select switch to OFF (refer to the next section and also Chapter 7 for more on "lockout"). Also refer to Figure 3 (end of manual) to wire these inputs.

Wire from the referenced terminal number (Table 2-1) on the main processor board to your equipment and then back to either +24 Vdc or ground ("wire between or bypass").

> There are several available "ground" and "+24 Vdc" terminals on the main board from which to choose.

Table 2-1. Wiring table for auxiliary equipment (with status codes)

User Interlocks	Indicate stop type	Wire terminals between	Status code	Name of Auxiliary Equip.
User #1		21 and +24 VDC	51	
User #2		82 and +24 VDC	52	
User #3		71 and +24 VDC	53	
User #4		83 and GROUND	54	
User #5		72 and GROUND	55	
User #6		84 and GROUND	56	
User #7		73 and GROUND	57	
User #8		85 and GROUND	58	
User #9		74 and GROUND	59	
User #10		86 and GROUND	50	
User #11		18 and GROUND	49	

> **User Interlocks are not control reliable!**
>
> Because these user interlocks are NOT control reliable, they mustn't be used to protect personnel from a moving hazard. However, they can be used as a convenience to interface automation.

Wiring lockout relay (optional)

The lockout function in WPC provides an added safety feature to the product. Whenever a serious error condition occurs, *"Loc"* will appear in the digital readout, alerting you of a problem. To clear *"Loc"*, turn the STROKE SELECT switch towards "OFF".

To wire this relay to the WPC power supply board, refer to the wiring schematics at the end of this manual (Figure 4 for Herion DSV or Figure 6 for Ross). Note that the relay can be wired to critical press functions, such as the motor starter (see Figure 7 for an example).

Wiring a remote reset switch (optional)

The main processor board has two terminals for wiring a remote reset switch**.** The remote reset terminal can be wired to the equipment that you choose, or you can just use a simple switch to activate the circuit. Connect a wire from terminal #70 on the main processor board to a normally open switch. Connect another wire from the switch to ground. WPC is reset with a momentary connection to ground.

Wiring operator mode outputs (optional)

SmartPAC with WPC provides outputs to customer-supplied solid-state relays to monitor WPC's operator mode. As an example, the following schematic illustrates how to monitor when WPC is in Automatic Single Stroke.

WARNING

These operator mode outputs are NOT control reliable. They can, however, be used as a convenience to interface automation.

Pin #	Pin Designation
118	+13.5 VDC (Power)
117	Ground
116	+5 VDC
115	(Unused)
114	ON in Continuous (2-Hand or Foot)
113	ON in Automatic Single Stroke
112	ON in Foot Single Stroke
111	ON in One-Hand Single Stroke
110	ON in Two-Hand Single Stroke
109	ON in Inch Mode (1-Hand or 2 Hand)
108	(Unused)

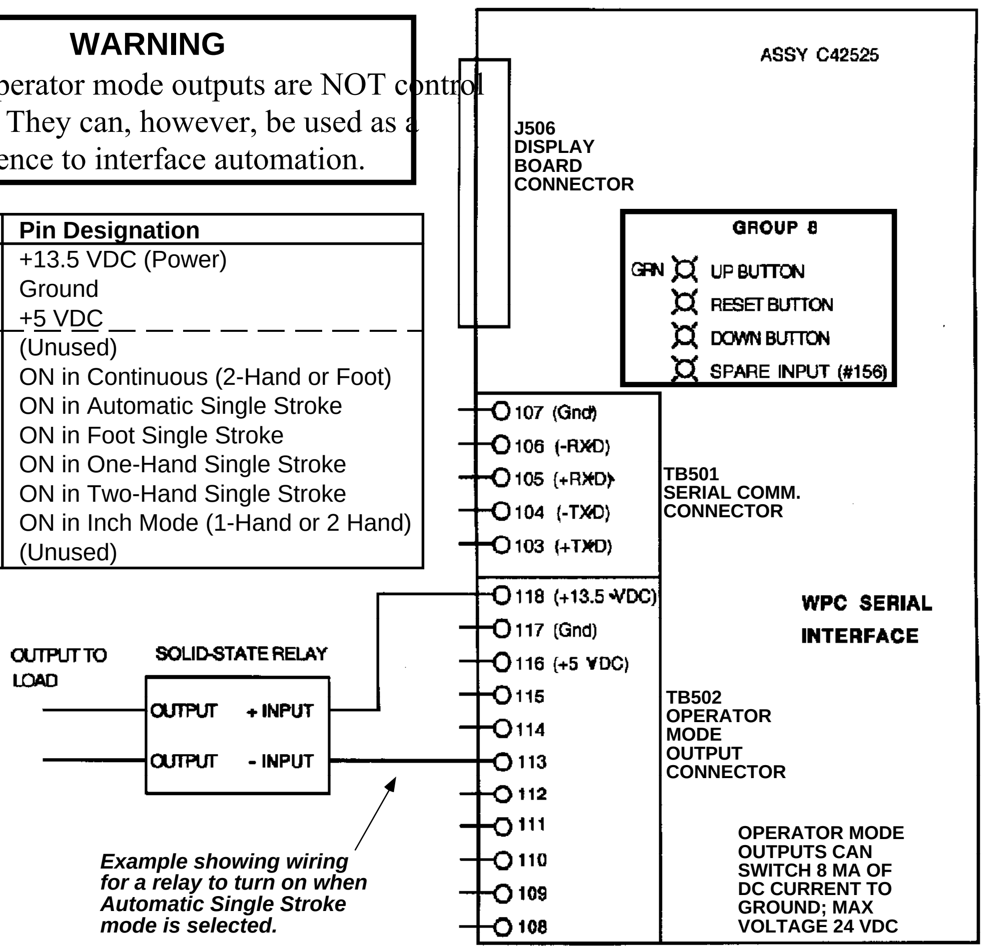


Figure 2-12. One way to wire WPC operator mode outputs

Installing One-hand Control (optional)

One-hand Control is a switch that can only be used with Wintriss Clutch/Brake Control systems with a Shadow light curtain that have ONE HAND and SINGLE STROKE modes. *One-hand Control must be used in conjunction with a Shadow light curtain for guarding point of operation.* One-hand Control is mounted on or near the press and allows the press operator to cycle the press without using the operator station.

To cycle the press, you simply push the button as part of your normal hand motion after you load a part.

> **WARNING**
>
> Point of operation safeguarding, the single most important factor in the elimination of injuries, can only be determined by the press user. All applicable OSHA and ANSI regulations for safeguarding press systems must be followed when installing One-hand Control . Neither WPC nor One-hand Control is a safeguarding device. They must be installed and operated in accordance with OSHA and ANSI regulations. Data Instruments takes no responsibility if the proper safe-guarding devices are not installed or working properly.

"Light curtain break" mode

You can use One-hand Control in "light curtain break" mode. In this mode, you must push the button on One-hand Control within eight seconds after removing your hands from the light curtain. Otherwise, the press will not cycle. This mode prevents inadvertent operation when an operator is loading or unloading parts. If this mode is not used, One-hand Control cycles the press in single stroke mode whenever you push the button on the One-hand Control.

One-hand Control will work with or without the "light curtain break" mode turned on (refer to Chapter 4 for more information about setting WPC switches using Press Options). If on, One-hand Control will cycle the press only within a fixed time after the operator withdraws his hands from the light curtain. If the "light curtain break" mode is not on, One-hand Control will cycle the press in single stroke mode any time that its button is pushed.

Mounting One-hand Control

1. Shut off power to the press and WPC.
2. Choose a location on or near the press convenient to the operator. An adjustable bracket may be necessary.

   The idea is to mount One-hand Control so the operator can reach it as part of his normal hand movement after loading or unloading a part. Mount One-hand Control using the tapped holes on the bottom of its metal enclosure (see below).

   Do not mount One-hand Control between the light curtain and the point of operation.

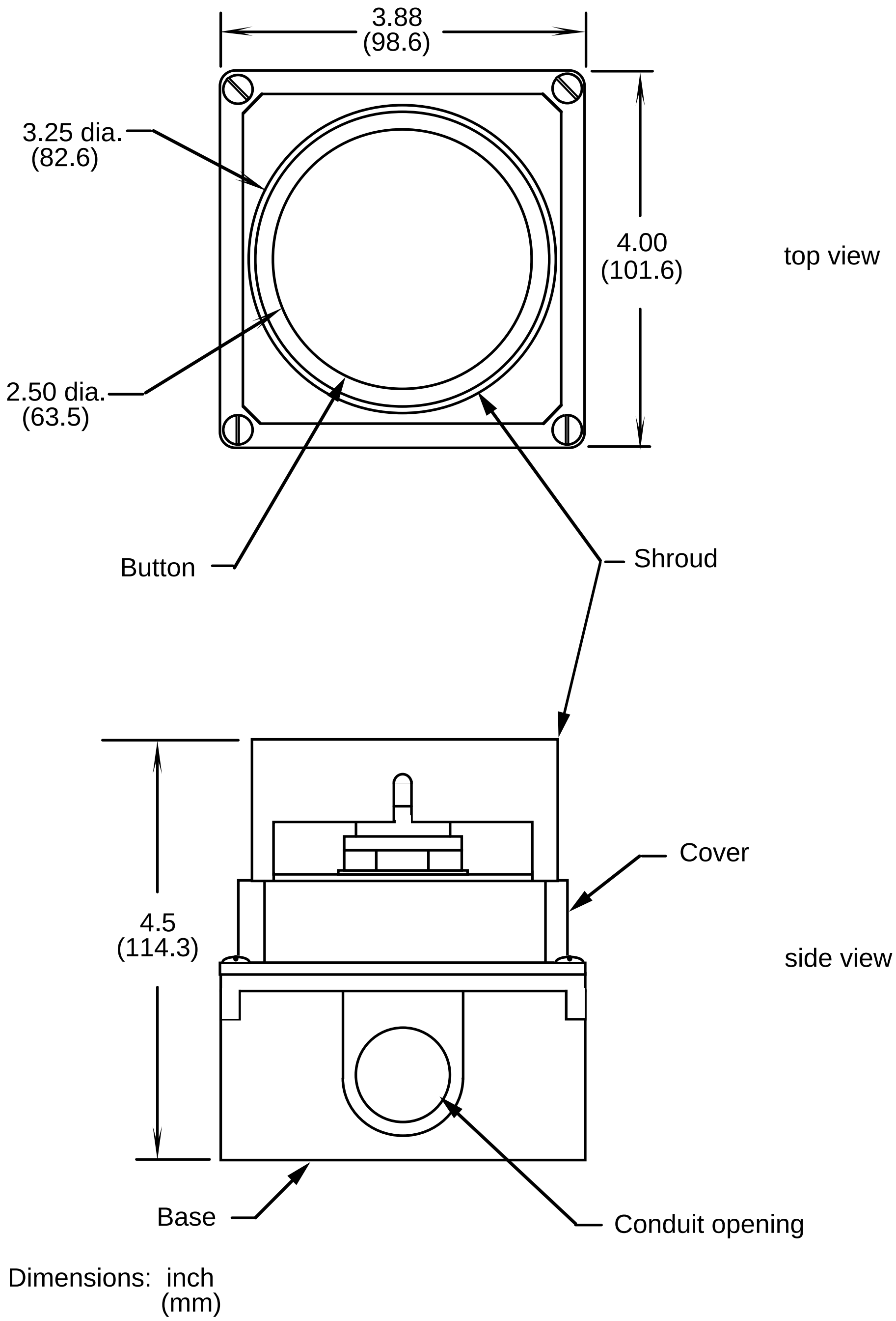


Figure 2-13. One-hand Control switch dimensions

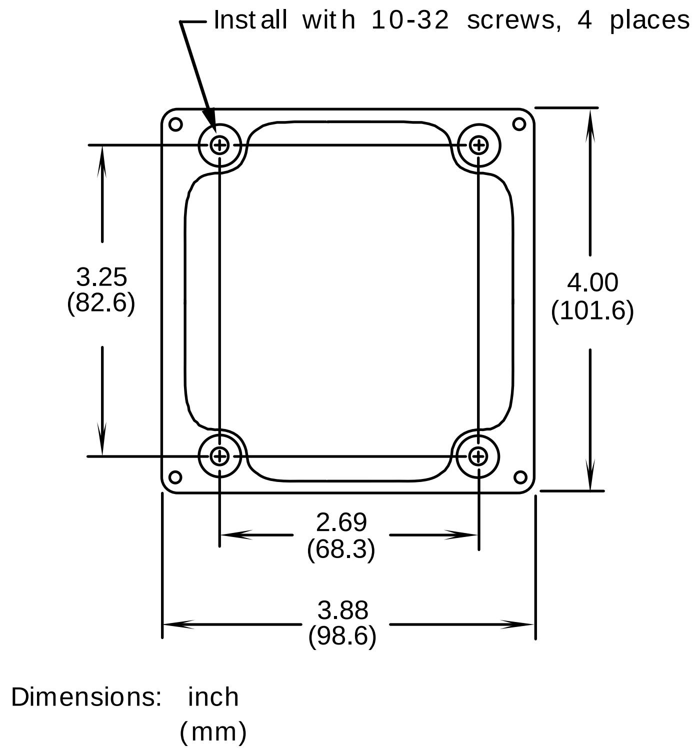


Figure 2-14. One-hand Control switch base, showing mounting holes

Wiring One-hand Control to WPC

To wire One-hand Control to WPC, you need to connect three wires from the One-hand Control to contact blocks inside the operator station. Follow these instructions to wire One-hand Control . *Be sure to refer to Figure 9 at the end of this manual for specific wiring schematics.*

1. Turn off power to the press and to the WPC.

> **WARNING! PREVENT SHOCK**
> Shut off power to the WPC and the press before doing any work. Do not work inside the operator station, One-hand Control, or WPC enclosure with power on. All procedures must be carried out by qualified personnel only.

2. Loosen the clips at the bottom of the front panel of the operator station. Swing the front panel up and support it so you can work inside the box. (The cover will stay up if you slide it slightly to the left or right.)
3. Knock out a hole in the bottom of the operator station near the existing conduit from the WPC control enclosure. Use the conduit hole provided in the base of the One-hand Control.
4. Run conduit and wiring from One-hand Control to the operator station. Refer to Figure 9 for wiring connections.
5. Measure wires to fit before cutting. Make proper connections, by running the wires as noted in Figure 9. Fasten the switch cover onto the base with the screws provided.

6. Tighten all conduit connections that may have been loosened during installation. Close and latch the cover of the operator station and WPC. Make sure that you have run all your ground wires. Do not use conduit as ground. You are done installing the One-hand Control .

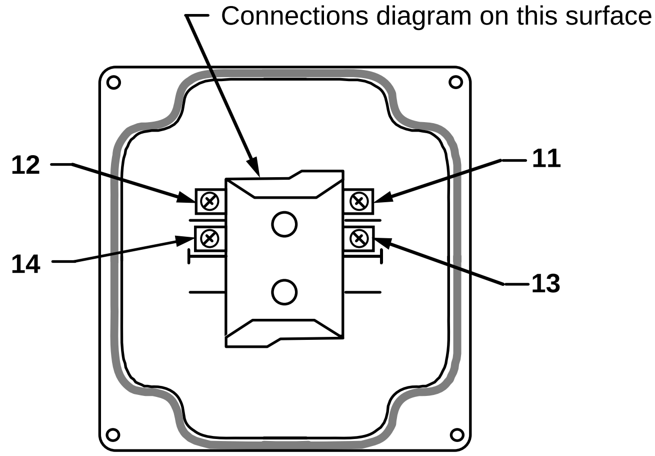


Figure 2-15. Wiring connections in One hand control switch
(switch cover, bottom view)

Auxiliary outputs (optional)

Auxiliary outputs 1, 2, and 3 are not control reliable!
The auxiliary outputs discussed below are NOT control reliable. They must not be used to protect personnel from a moving hazard. They, however, can be used as a convenience to interface automation.

Wiring auxiliary 1 output (optional)

The WPC provides an output called Auxiliary 1 (pin #28) which, when connected to a user-supplied control relay, can be used to stop auxiliary equipment such as scrap choppers, conveyors, etc. when the press stops. Additionally, the N/C contacts of the relay can be used to illuminate a message beacon on the press during a fault condition. WPC switch #8 controls how the Auxiliary 1 output operates (see descriptions below). For information on setting the switch, refer to Chapter 4's "Setting WPC switches using Press Options". Also see Figure 3 at the end of this manual for wiring.

When switch #8 is set to "OPEN"

Auxiliary 1 is normally "ON" and turns "OFF", whenever:

1. an error number is displayed (fault condition exists);
2. an E-Stop string is open or the Shadow light curtain has been interrupted while the press is running; **OR**

3. an Interrupted Stroke condition occurs. (In Inch mode, you can run a complete stroke without causing an Interrupted Stroke. Interrupted stroke is caused only when you release your hands from the run/inch buttons in the middle of the stroke. If you inch the entire stroke without releasing your hands, no Interrupted stroke is caused.)

When switch #8 is set to "CLOSED"
Auxiliary 1 is normally "ON" and turns "OFF", whenever:

1. an error number is displayed (fault condition exists); **OR**
2. an E-Stop string is open or the Shadow light curtain has been interrupted while the press is running.

Note that with switch #8 closed, aux 1 is not affected by an Interrupted Stroke. You may want to use this option when you want aux 1 stay activated while you are inching the press during an Interrupted Stroke.

Wiring auxiliary 2 output (optional)

The auxiliary 2 in WPC (pin #36) is normally "OFF" and turns "ON", whenever there is an Interrupted Stroke or there is a fault condition present. Also while inching in INCH stroke, auxiliary 2 stays "on".

Auxiliary outputs 1, 2, and 3 are not control reliable!

The auxiliary outputs discussed above are NOT control reliable. They must not be used to protect personnel from a moving hazard. They, however, can be used as a convenience to interface automation.

Wiring auxiliary 3 output (optional)

If you plan to use the Bar Control with your WPC, you must use auxiliary 3 whenever ProCam 1500 or DiPro 1500 is installed on the same press. Auxiliary 3 turns a low voltage (24 Vdc) input check signal "on" when the DSV is energized. This is true except when Bar Control is in use so that "loss of rotation" errors are not generated.

Wire auxiliary 3 (pin #29) to the "A" connection of the input check circuit of DiPro 1500, and wire one of the +24 Vdc outputs of WPC (pins #37 through #41) to the "B" connection of DiPro 1500. Or wire the "A" and "B" terminals of DiPro 1500 in parallel with the "A" and "B" terminals of SmartPAC. If your DiPro 1500 is equipped with a voltage selector switch for the input check circuit, set it to the 12-60 volt position. (Refer to the DiPro 1500 manual for details.)

Wiring a Keylock Switch (optional)

You can use a keylock switch (not supplied by Data Instruments) to provide additional security for SmartPAC with WPC, which supersedes the Run mode lockout provided in SmartPAC. Refer to the section, "Additional Security" at the end of Chapter 6 for more information.

To install your keylock switch, simply ground terminal #253 on TB203 at SmartPAC. By closing the switch (grounding it out), both the Program and Run modes are automatically secured. Opening the contacts unsecures these operating mode, as in the standard product.

Mounting and wiring the Bar Control enclosure

Whenever the press is in Bar mode, you will need to release the machine's brake. Therefore, mount the Bar Control enclosure in a place that is convenient to the operator while he is barring the press. *Make sure that the operator will not possibly block a light curtain while pressing the BAR control operate button.* Refer to Figure 2-16a and Figure 2-16b for dimensions. See Figure 3 (end of manual) for wiring.

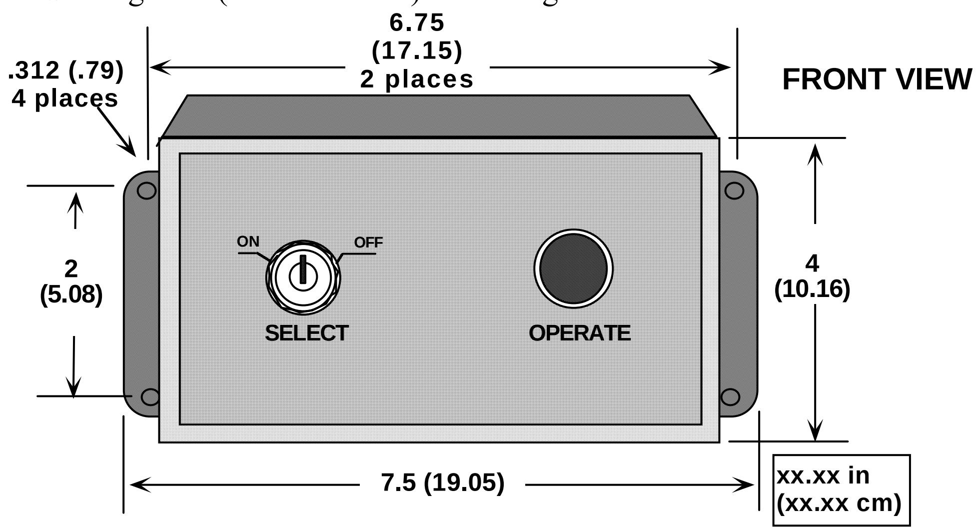


Figure 2-16a Bar Control enclosure mounting dimensions (front view)

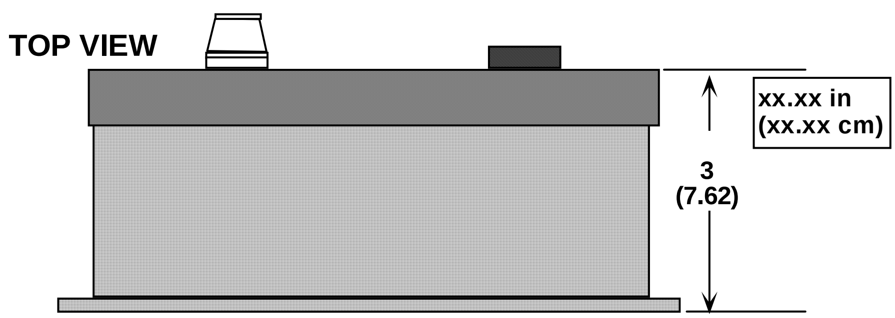


Figure 2-16b. Bar Control enclosure mounting dimensions (top views)

Wiring Foot Switch

The Foot Switch, when used with Shadow V, frees up the operator's hands without sacrificing safety. Wire the Foot Switch's normally closed contact to terminal #4 and the normally open contact to terminal #14 on the main processor board. Both switches are then wired to +24 Vdc (see Figure 3).

Wiring Automatic Single Stroke (External Trip)

Automatic Single Stroke allows the operator to automate a manual press using a feeding device or robot. Wiring information for the Automatic Single Stroke (External Trip) switch mechanism is shown in Figure 3 (end of manual). Though a SPDT contact is shown in this figure, you can also use solid state switches (proximity, for example), or outputs from a programmable logic controller (PLC). To make sure that the contacts are clean and reliable, the switch or relay should be new and unused.

Installing Multiple Operator Stations

You can connect an unlimited number of operator stations to your WPC. However, you can only wire up to two operator stations directly to the main processor board. Refer to Figure 5 for specific wiring information about the dual operator stations (center wiring diagram). *Ignore the wiring reference to the "WPC Display Board" (found in the upper-right-hand corner of the drawing).*

If you wire more than two stations, you will need to connect each additional one to a Dual Operator Selection Control (DI part no. 4152100). Serving as a junction box, the Dual Operator Selection Control has a switch which allows you to select those operator stations that should be enabled in series.

See Chapter 6 for more information about multiple operator stations. If you have any more questions, contact Data Instruments.

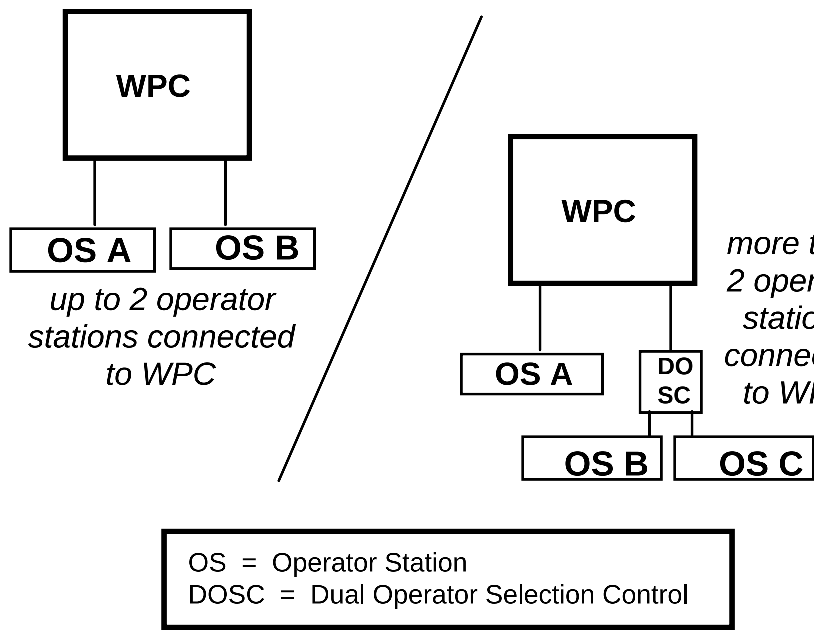


Figure 2-17. Illustrating multiple operator station configurations

Installing flywheel speed sensor (optional hardware required)

1. Select a mounting location for the LMCS and the magnets so that the LMCS can detect the magnets as they rotate on the flywheel. The magnets should be mounted approximately 180 degrees apart. This will ensure that the LMCS turns from off to on once per revolution.
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.
3. Install the LMCS as shown in Figure 2-18. To mount the magnets, make sure 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 is supplied.

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.

Remember to position the red and blue magnets so that there is an approximate dwell of 180° between them. The exact angle positions of the magnets are not critical.

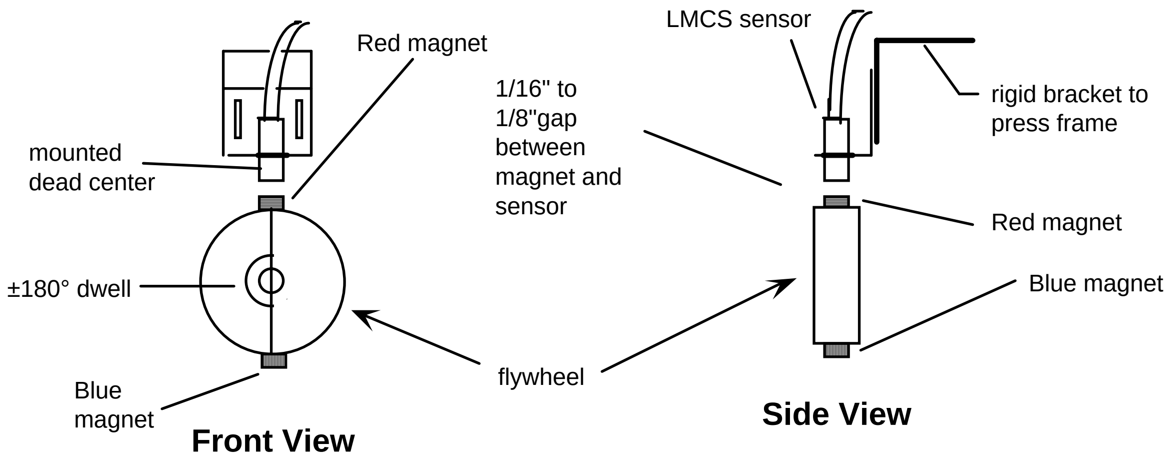


Figure 2-18. Installing the LMCS and magnets

4. Once the LMCS is installed, you are ready to wire it to the WPC main processor board. Black wire goes to terminal 25; white goes to terminal 22; red goes to terminal 23.
5. Run wires from the cam switch through flexible, liquid-tight conduit to WPC. WPC 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. Check your wiring. You are done installing the LMCS and magnets.

Installing revised software into WPC

If you wish to install revised software into WPC, follow these instructions:

1. ***Verify that power has been turned <u>off</u> to WPC!*** The LED display and the crank-angle clock on the front panel should be blank.
2. Open the front cover by unlocking the latch on the side, loosening the two cover screws and sliding back the two hold down clips.
3. Locate the firmware chips "A" (at U108) and "B" (at U125). See Figure 2-6a for exact locations. A separate label is affixed on each chip.
4. Note the orientation of each firmware chip. There is a semi-circular notch on the bottom of each chip. When you replace them, the notches on them *MUST* also be face down.

5. Insert a small screwdriver between the bottom of the chip and the socket and carefully pry the chip out of its socket. Be careful not to get the screwdriver under the socket itself. Put the chip aside.
6. Open the package containing the new firmware chips. Before you remove the chips from the package, you should ground yourself by touching any large metal object (the press will do nicely). This will remove any static electricity that you may be carrying around. A static electricity "zap" will destroy the chip.
7. Once you are "grounded", remove the chips from their holder. *Orient the chip so that the notch faces downward. If you plug the chip in backwards, it will be destroyed.*
8. Plug the chip into its socket by first plugging in the left row of pins and then aligning the right row of pins over the socket and pushing straight in .
9. If the two rows of pins are spread too far apart to plug easily into the socket:

A. Hold the chip on its side on a desk or a flat surface with the pins pointing towards you.

B. Being careful NOT to overbend the pins, gently flex the top of the chip towards you. Turn the chip over so that the other row of pins is now on the desk pointing towards you. Flex it again, thus bending the other row of pins towards each other.

C. Try plugging the chip into the socket again, as in Step 8. If necessary, repeat Steps A and B.

10. Make sure that the notch in the chip is at the bottom and that all of the pins are in the socket.
11. Turn the power on and verify the normal operation of the unit. If the unit powers up with "rolling" LEDs, turn the power off and repeat Step 10. Sometimes one or more pins are bent and not plugged in properly. If the unit is still malfunctioning, call Data Instruments for assistance. Be ready to provide some important information to expedite a resolution to the problem. Please supply: **product name** (e.g. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).
12. You will need to re-initialize the system. Refer to the next chapter for complete WPC initialization steps. If this is a first-time installation, complete "Final Checklist" before proceeding to the next chapters.

Section 2 Installation of display options

Installing various WPC display configurations

By this time, if you completed installation of your WPC enclosure with SmartPAC, you are done with the installation (already discussed in this chapter). Go to "Final Checklist".

You may, however, have ordered one of these configurations:

- Installing WPC without enclosure
- Installing optional clock configurations — one or two in any combination
    - Panel mount clock display
    - Clock display kit

If you chose any of these above options, you are not done yet. Follow along to the next set of sections to complete your installation. After that, you can go to "Final Checklist" at the end of this chapter.

Installing WPC without enclosure

When you order WPC without enclosure, you literally receive the control assembly — the various processor boards that make up the basic system (refer to the illustrated boards at Figure 2-6).

Mounting dimensions and required clearance for control assembly

In order to mount the control assembly into your enclosure, you need to know the mounting dimensions as well as the space required. See Figure 2-19 for this information.

Mount the control assembly so that it is convenient during installation and maintenance. Your control enclosure does not have to be mounted to the press. It can be mounted on a free standing pedestal, pendant, or column. For easy access to the interior, make sure that there is enough room to open your control enclosure door at least 120°.

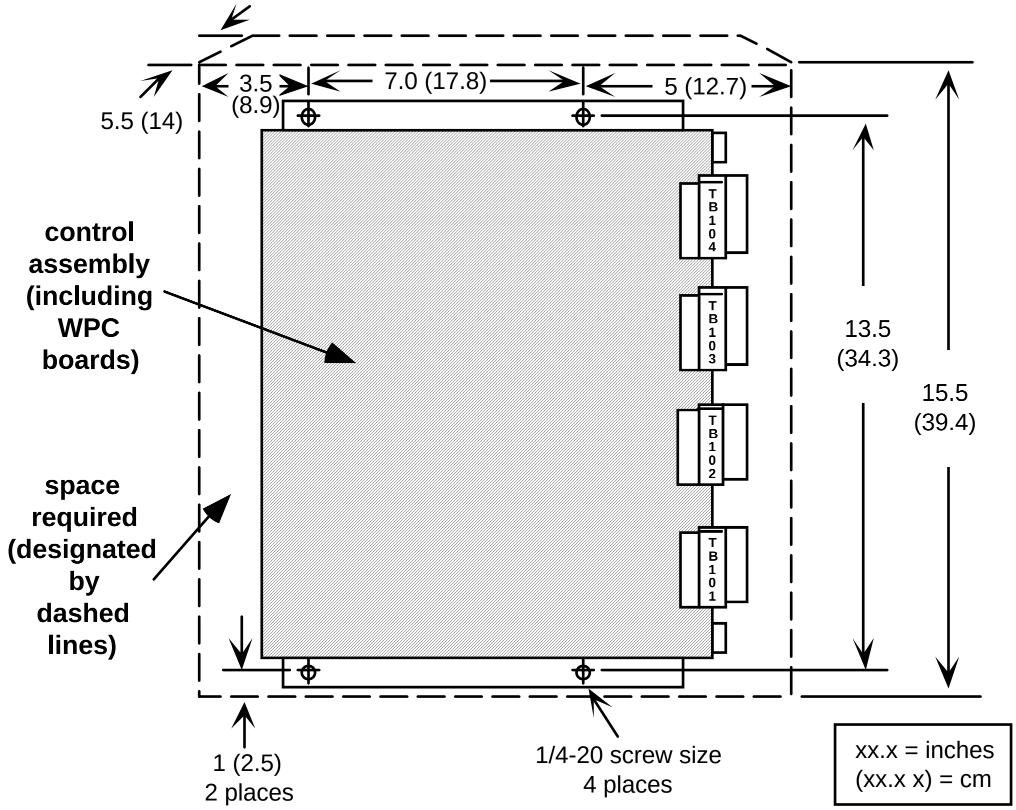


Figure 2-19. Mounting dimensions and required space for control assembly

Installing optional clock configurations

Along with WPC and SmartPAC, you may have purchased one or two optional clock configurations — panel mount clock display and / or clock display kit. We will present both combinations. Refer to the appropriate set of instruction(s).

Panel mount clock display

Panel Mounting instructions

1. Determine a convenient place to mount your panel mount clock display and switches into your panel enclosure. Ideally it should be convenient so that operators and setup personnel can easily see the readouts and reach the push button.
2. Cut out a hole in your panel enclosure, and drill and tap twelve holes for #10-32 screws. Refer to the following illustration for mounting and cutout dimensions.

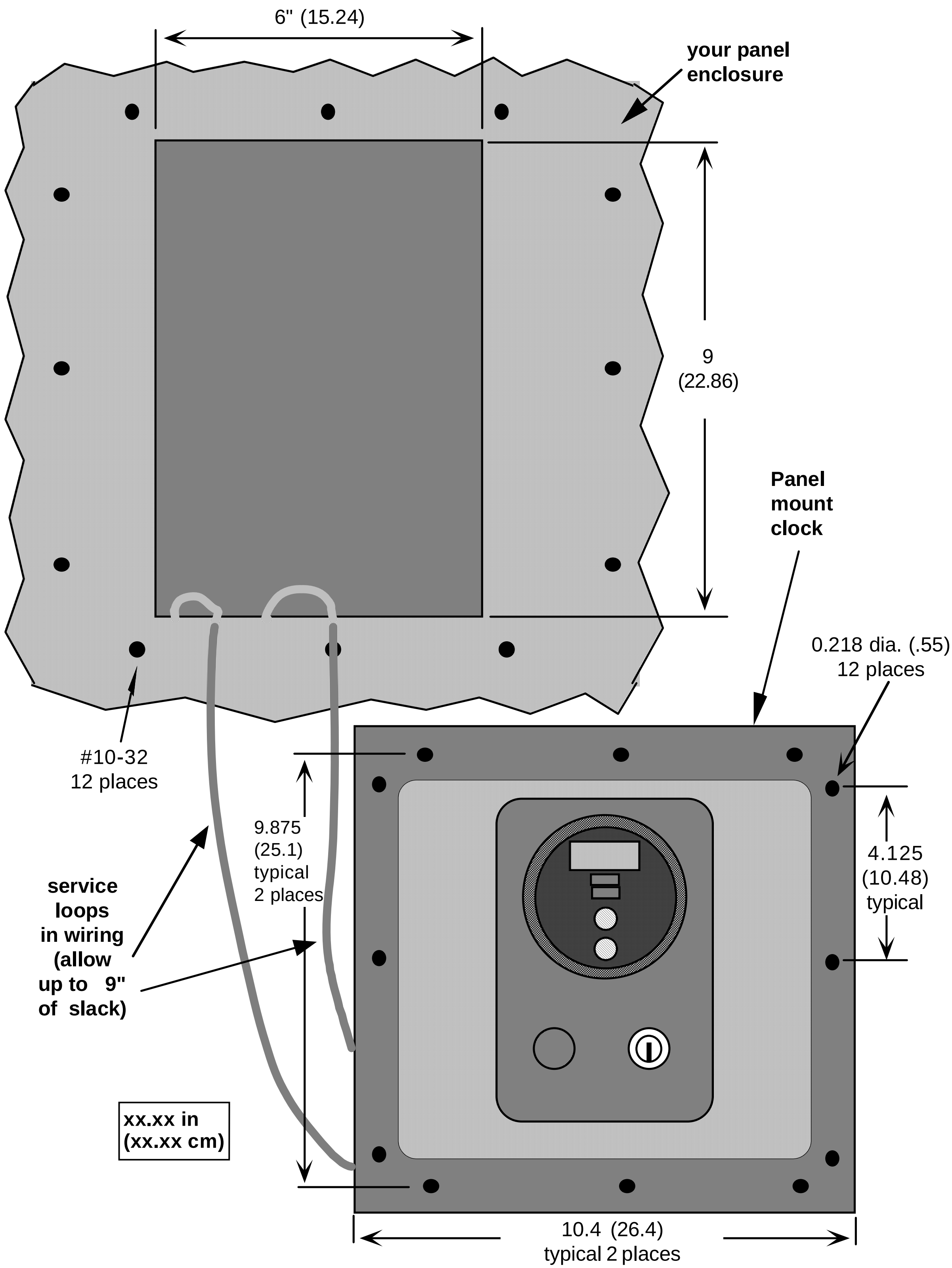


Figure 2-20. Panel mount clock mounting and cutout dimensions (allow ± 4" clearance)

3. Prop the panel mount clock near the location where it will ultimately be situated. 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 up to 9" of service loop when performing the wiring connections. Also make sure all cables will reach.

MOUNT AT A CONVENIENT HEIGHT

The panel mount clock display should be installed at a convenient height for all users. Experiment to determine a good height for everybody prior to wiring and mounting.

Connection from WPC to panel mount clock

1. Along with the WPC control assembly and the panel mount clock display, you also received a ribbon cable (10', 30', or 100') to connect WPC with clock display. One of the two ends of the cable has a connector. Notice that an extra connector is included.
2. Run the 34-conductor shielded cable through a flexible, liquid-tight conduit to a knockout at WPC. Because WPC is rated NEMA 12 (protected against dust and oil), you must use conduit of the same rating and make proper connections to ensure
3. Pull the ribbon cable until there is just enough cable to reach the connector inside WPC. Attach the ribbon cable connector to the 34-pin connector at the display connector at WPC. *Be sure to align the arrows on the connectors.*
4. Locate the first flat (not twisted) area of the ribbon cable after the cable enters the console by looking for groove marks every 18" stamped on the cable (see below). *You must cut the cable at a flat area in order to attach the connector*. Find the first set of marks that will reach to WPC. Cut the cable at the center of the marking.

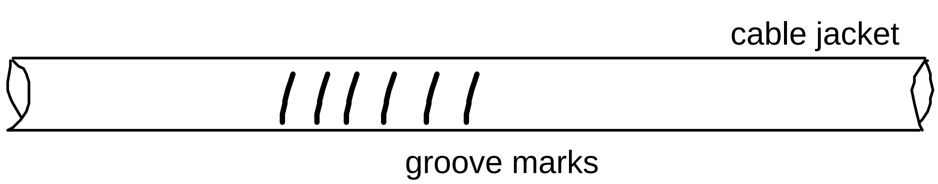


Figure 2-21. Groove marks on cable indicating flat area

5. Strip the black outer jacket from the end of the cable to expose about 4" of wiring.

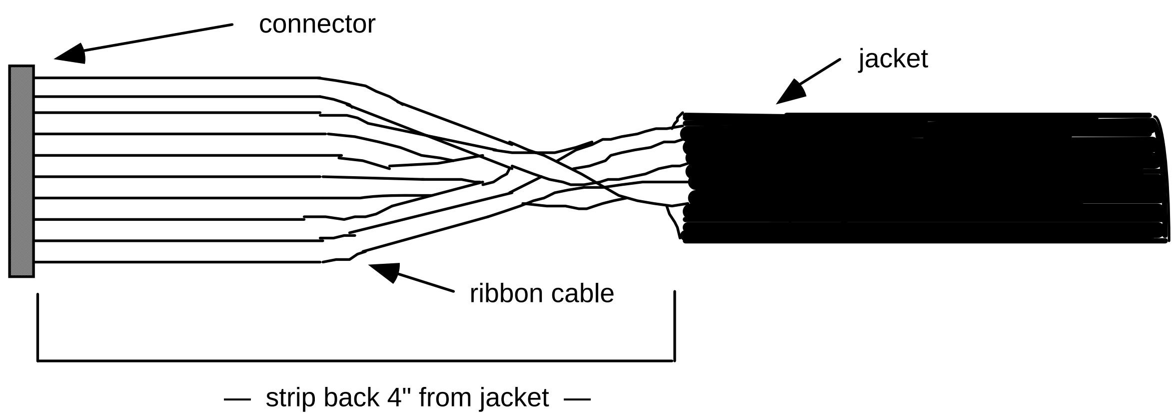


Figure 2-22. Portion of WPC ribbon cable

6. Now install the loose 34-pin connector onto the flat area of the ribbon cable. Refer to the instructions below.
7. Locate the connector top and bottom. See below.

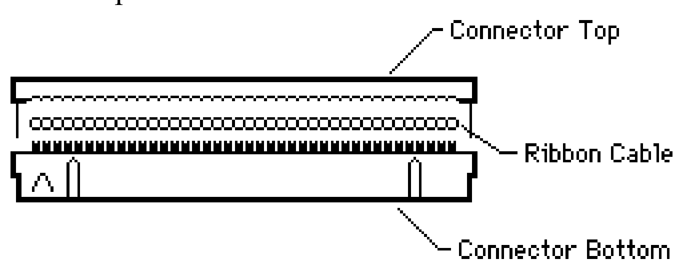


Figure 2-23. Ribbon cable connector

8. Align the cable to the arrow on the connector bottom. Refer to the TOP VIEW in the following drawing (see below).

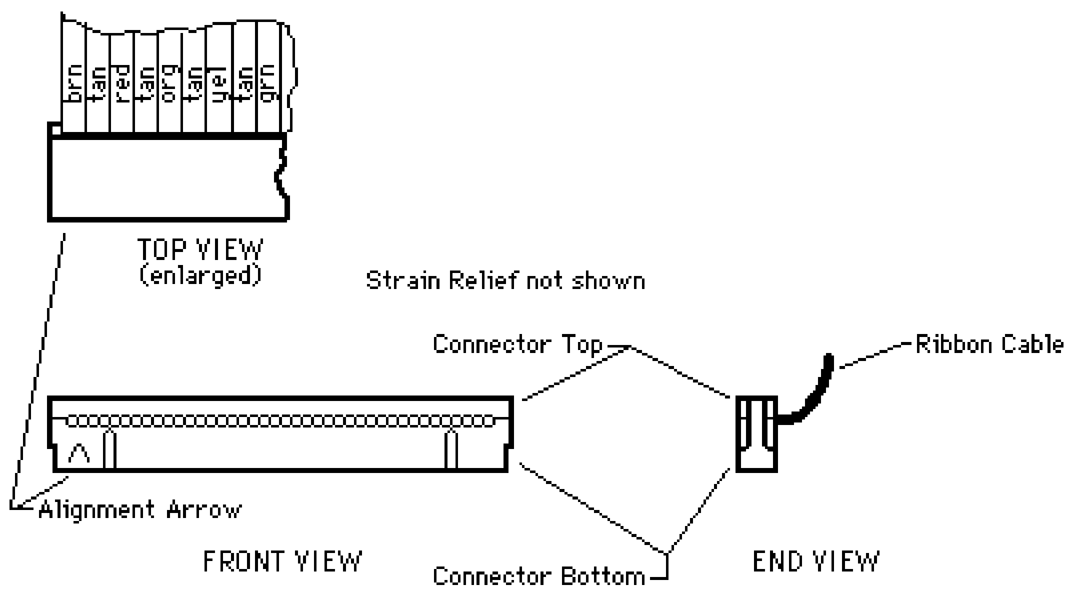


Figure 2-24. Views of ribbon cable connector

9. Position the connector top over the cable and over the connector bottom, but do not squeeze the halves together yet.
10. Recheck the alignment of the cable to the connector halves. The wires of the cable should be centered in the vee's of the forks on the connector bottom.
11. Use a 4" drill press vise to squeeze the two halves of the connector together until there is no gap between the connector halves. It is important that you apply the clamping force across the entire long dimension of the connector. *Do not* use slip joint or channel lock pliers to crimp this connector assembly. Wide jaw vise grips are an acceptable substitute for the 4" drill press vise.
12. Fold the cable over the connector top and snap the strain relief into place. You *must* use the strain relief. See below.

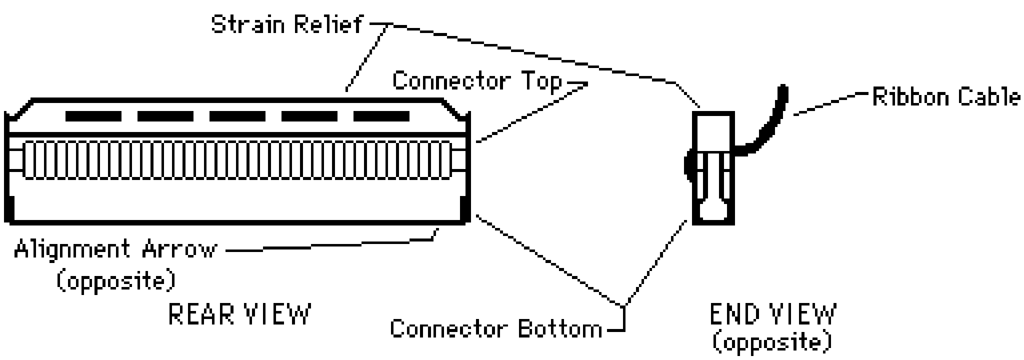


Figure 2-25. Rear view of ribbon cable connector with strain relief

13. Connect the 34-pin ribbon cable to the 34-pin connector at the back of the serial interface board. *Ensure that the arrows on the two connectors line up.*
14. Locate terminal port J506 on the WPC serial interface board (see Figure 2-6c) which can be found on the main WPC processor board. Now locate terminal port J706 at the clock display. Connect the ribbon cable from J506 to J706. Note that the distance between the control assembly and the clock display will be determined by the length of the ribbon cable that you selected.
15. Go to the section "Final Checklist" at the end of this chapter, to ensure that WPC and the clock display are working properly.

Clock display kit

Clock display kit mounting instructions

1. In your kit you should have received: a label, a PC board, a push button, a keylock switch with a wiring harness, four standoffs, and four lock nuts.
2. Determine a convenient place to mount your clock display kit and switches into your enclosure. You must be sure that all the switches are in close proximity to the clock display kit assembly. The switches can be no more than one foot away from the clock. Ideally the display should be convenient so that operators and setup personnel can easily see the readouts and reach the switches.

3. Cut out three holes in your enclosure, and mount four #6-32 5/8 studs from inside. Refer to Figure 2-25 for mounting and cutout dimensions.
4. Install the PC board on the four studs with standoffs and lock nuts. Make sure that the three-digit LED display is at the top facing outward. Orient the label correctly from the outside and affix it in place by removing the protective paper.
5. Install the push button on the left and keylock on the right. Connect the keylock harness to the PC board and the outer pins of the push button.

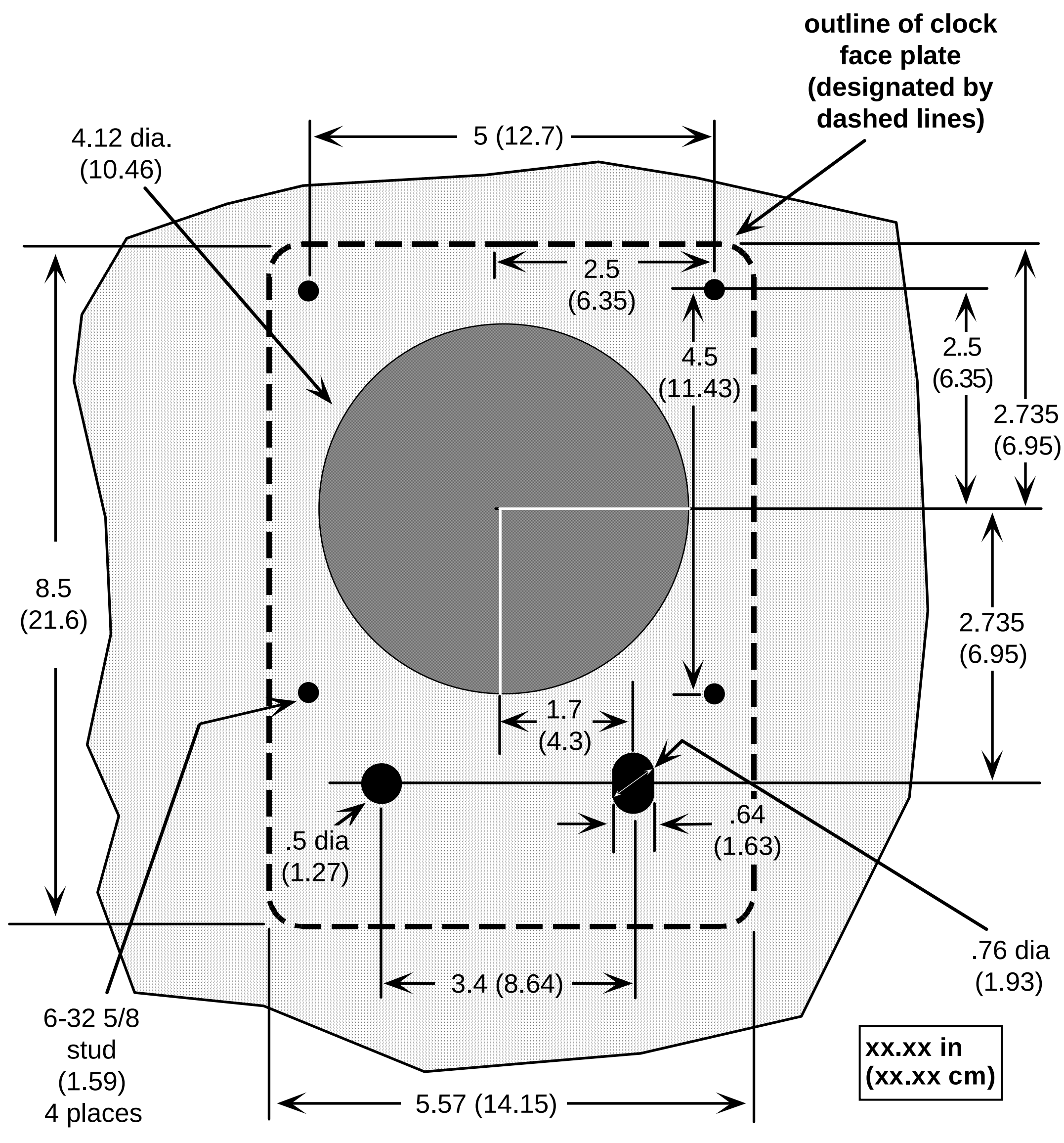


Figure 2-26. Clock display kit mounting and cutout dimensions (allow ± 4" clearance)

Connection from WPC to clock display kit

Refer to the section, "Connection from WPC to panel mount clock". Follow those steps to complete this portion of the installation.

Second Clock Display

Installing second clock display

At this point, you have already installed your first clock display, and you have followed the instructions preceding this section. In addition, you ordered a second clock display — either a panel mount clock display or just the clock display kit. If so, you first need to follow the instructions that pertain to either of those options. Therefore, you will repeat steps mentioned earlier to install that second display. Depending upon which configuration you ordered as your second clock display option, refer to the corresponding set of instructions mentioned in the table below:

Second clock display option:	Refer to instructions in section:
• Panel mount clock display	"Panel mount clock display"
• Clock display kit only	"Clock display kit "

Connecting twin display adapter

1. Locate the twin display adapter in the kit you received. It is a short ribbon cable with three connectors on it — female connector at one end and two male connectors, one in the middle and one at the other end.

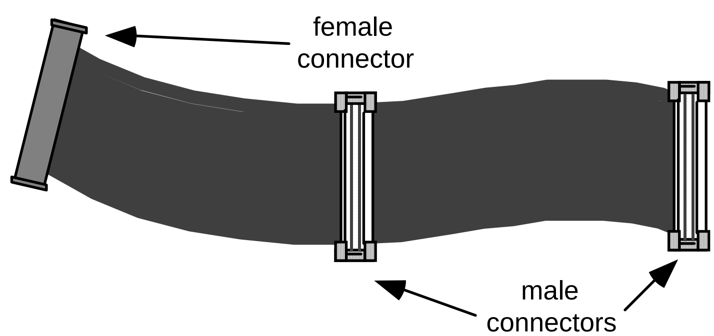


Figure 2-27. Illustration of twin display adapter

2. Unplug the ribbon cable from the "primary" clock display (the one closest to the selector switches. More than likely this is at J301 on the WPC display interface board.
3. Plug the female connector of the twin display adapter to that port.

4. Reconnect the original ribbon cable (identified in step 2) to one of the male connectors on the twin display adapter. Connect the other end to the clock display (J706).
5. Connect the ribbon cable from the "second" clock display to the other male connectors on the twin display adapter. Connect the other end to the clock display (J706).

Section 3 SmartPAC optional features

Adding or upgrading ProCamPAC or DiProPAC

The following instructions describe how to add die protection and/or programmable limit switch capabilities to a basic SmartPAC or upgrade your 8-cam or 8-sensor system to 16 cams or 16 sensors. *Make sure that you already completed the wiring before proceeding. For ProCamPAC, see "Connecting programmable cam channels". For DiProPAC, refer to "Connecting DiPro Sensor Interface to SmartPAC" or "Installing the DiPro RCB".*

Note: A "low impedance" 16-channel DiProPAC (#9632904) is available. This option is necessary when wire probes depend upon a part/strip to complete the circuit, and the part/strip is covered with a water-based conductive lubricant. For more information about this option, see "Sensor Terminology" in Chapter 1. If you decide that this is what you require, contact Data Instruments immediately to order that part. The installation procedure is the same as the standard version.

CAUTION!
Always verify that power has been turned off to SmartPAC!

1. Turn power off to SmartPAC. The LCD display on the front panel should be blank and the angle/RPM display should be unlit.
2. Before you proceed, you should ground yourself by touching any large metal object. This will remove any static electricity that you may be carrying around. A static electricity "zap" will destroy the components.

CAUTION
The ProCamPAC and DiProPAC boards are NOT interchangeable! Therefore, it is important that you install them correctly. The 8 and 16 channel ProCamPAC boards are interchangeable; and the 8 and 16 sensor DiProPAC boards are also interchangeable. SmartPAC will recognize whether the board is 8 or 16 configuration. See Figure 2-6g.

- If you are replacing an existing board, go to step 3.
- If you are adding a new board, then locate where on the main SmartPAC processor board it should be placed (Figure 2-6g). Then go to step 4.

3. If replacing an existing board (or boards): Complete these steps for each board you are replacing.
   a. Look inside SmartPAC, and locate the board that you wish to replace. Figure 2-6g illustrates ProCamPAC and DiProPAC superimposed on the main processor board.
   b. Remove the connector(s) attached to this board. If you have an 8-sensor or 8-cam system, there will only be one connector. Conversely if you have a 16-cam or 16-sensor board, there will be two connectors to remove.

If you are upgrading ProCamPAC, the connector or connectors in question go to the ProCam outputs assembly. If DiProPAC, the connector or connectors go to DiPro Sensor Interface or DiPro RCB. If you need to connect 9-16 of the cams or sensors, go back to the previous sections and complete the wiring.

c. Remove the four screws which hold the board to the standoffs under the board, and put them aside for now.

d. Unplug and remove the board. Be sure not to confuse the old board with the new one you will be installing.

e. Verify that you are still "grounded", and then get the new board.

f. Plug the board in. The connectors on the underside of the board are keyed, so that they can only be plugged in one way. These connectors will connect correctly with the mating pins on the main SmartPAC processor board.

g. Once the board is properly seated, screw the four corners down again (from step 3c).

h. Reconnect the connector(s) from SmartPAC to the new board(s). Note that if you went from 8 to 16, you will have to connect cables to the board. These are the terminal blocks to which you will connect the cables:
   - ProCamPAC 8: Cam channels 1-8 to TB401
   - ProCamPAC 16: Cam channels 1-8 to TB451; 9-16 to TB452
   - DiProPAC 8: Sensors 1-8 to TB501
   - DiPro 16: Sensors 1-8 to TB551; 9-16 to TB552

i. You will have to verify that you properly installed the boards. Go to the next section, and specifically to the subsection "Checking that ProCamPAC and/or DiProPAC are properly installed". *You need to complete this before you use SmartPAC.*

4. <u>If installing a new board (or boards)</u>: Complete these steps for each board you are adding. Refer to Figure 2-6g for the location of the board to be installed.

   a. Verify that you are still "grounded", and then get the new board.

   b. Plug the board in. The connectors on the underside of the board are keyed, so that they can only be plugged in one way. These connectors will connect correctly with the mating pins on the main SmartPAC processor board.

   c. Once the board is properly seated, use the four screws that came with the kit to secure the board.

   d. Connect the cable(s) to the new board(s). Note that if you are going from an 8 to 16 system, you will have to connect two cables to the board.

   If you are upgrading ProCamPAC, the connector or connectors in question go to the ProCam outputs assembly. If DiProPAC, the connector or connectors go to DiPro Sensor Interface or DiPro RCB. *If you need to connect 9-16 of the cams or sensors, go back to the previous sections and complete the wiring.*

   These are the terminal blocks to which you will connect the ribbon cables:
   - ProCamPAC 8: Cam channels 1-8 to TB401
   - ProCamPAC 16: Cam channels 1-8 to TB451; 9-16 to TB452
   - DiProPAC 8: Sensors 1-8 to TB501
   - DiPro 16: Sensors 1-8 to TB551; 9-16 to TB552

e. You will have to verify that you properly installed the boards. Go to the section, and specifically to the subsection "Checking that ProCamPAC and/or DiProPAC are properly installed". *You need to complete this before you use SmartPAC.*

Connecting DiPro Sensor Interface to SmartPAC

If you are connecting DiPro Sensor Interface, connect the cable as shown below. You can also refer to Figure 10 at the end of this manual. There are 8 inputs for sensors at DiPro Sensor Interface (DSI). If SmartPAC is configured for 16 sensor inputs, you must use a second DSI. The wiring tables below explain how to install the sixteen-sensor style; therefore, use the first table for eight sensor inputs. *If you have an 8-sensor board only, then connect sensors 1-8 to TB501.* Consult the DSI user manual for complete installation and operating instructions.

Table 2-2: SmartPAC to DiPro Sensor Interface

Wire	SmartPAC TB501 or TB551 (pin #)	1st DSI (pin #)
		Gnd (10)
Black	Gnd (291)	Gnd (9)
	Sensor power (290)	*no connection*
Gray	Sensor 8 (289)	Sensor 8 (8)
Violet	Sensor 7 (288)	Sensor 7 (7)
Blue	Sensor 6 (287)	Sensor 6 (6)
Green	Sensor 5 (286)	Sensor 5 (5)
Yellow	Sensor 4 (285)	Sensor 4 (4)
Orange	Sensor 3 (284)	Sensor 3 (3)
Red	Sensor 2 (283)	Sensor 2 (2)
Brown	Sensor 1 (282)	Sensor 1 (1)

Wire	SmartPAC TB552 (pin #)	2nd DSI (pin #)
		Gnd (10)
Black	Gnd (301)	Gnd (9)
	Sensor power (300)	*no connection*
Gray	Sensor 16 (299)	Sensor 8 (8)
Violet	Sensor 15 (298)	Sensor 7 (7)
Blue	Sensor 14 (297)	Sensor 6 (6)
Green	Sensor 13 (296)	Sensor 5 (5)
Yellow	Sensor 12 (295)	Sensor 4 (4)
Orange	Sensor 11 (294)	Sensor 11 (3)
Red	Sensor 10 (293)	Sensor 3 (3)
Brown	Sensor 9 (292)	Sensor 1 (1)

Installing the DiPro Remote Connection Box (RCB)

If you are using the DiPro RCB with your SmartPAC, it should be installed near the die opening of the press where it can easily be reached but also is protected from lubricant and coolant splash or drip. The RCB is wired permanently to SmartPAC. The RCB can connect up to six sensors to SmartPAC, and is supplied with the interconnect cable already installed.

To install and wire the DiPro RCB:

1. Mount the RCB to the press with the shock mounts provided using the mounting holes on each flange. Make sure sensor cables can be easily connected to it and that the RCB cable will reach SmartPAC.
2. Connect the RCB cable to SmartPAC's terminal block TB501 (if DiPro 8) or TB551 (if DiPro 16). If you are connecting a second RCB to SmartPAC, connect to terminal block TB552 at SmartPAC's DiPro 16. Refer to the wiring in the following tables. You can also refer to Figure 11 at the end of this manual. Because SmartPAC 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 with the enclosure.
3. Plug the connector into TB501 (or TB551). See Figure 2-6e. This connector can only go one way. Double check your connections to make sure you started at the right end when connecting wires.

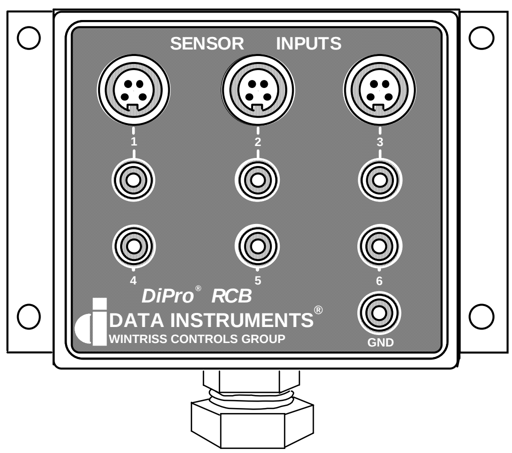


Figure 2-28. DiPro remote connection enclosure for sensors

Table 2-3: DiPro RCB to SmartPAC

Wire	RCB Sen. #	SmartPAC TB501 or TB551	At SmartPAC
Brown	1	282	Sensor 1
Violet	2	283	Sensor 2
Orange	3	284	Sensor 3
Yellow	4	285	Sensor 4
Green	5	286	Sensor 5
Blue	6	287	Sensor 6
Red*****	none	290	Sensor power
Black	GND	291	GND

Table 2-3: DiPro RCB to SmartPAC (continued)

Wire	RCB Sen. #	SmartPAC TB552	At SmartPAC
Brown	1	288	Sensor 7
Purple	2	289	Sensor 8
Orange	3	292	Sensor 9
Yellow	4	293	Sensor 10
Green	5	294	Sensor 11
Blue	6	295	Sensor 12
Red*	none	300	Sensor power
Black	GND	301	GND

* Provides power for electronic sensors used in inputs #9-11 (Lumberg connectors); 12 Vdc; 100 mA total

Connecting programmable cam channels

WARNING!

SmartPAC with programmable cam capability can be used with Wintriss Clutch/Brake Control. However, SmartPAC's programmable cam switch should not be used to provide timing signals for any other clutch/brake control. It is designed to control auxiliary functions only.

Important change about the cam outputs assembly with enclosure

If you ordered the 8-channel cam outputs assembly with enclosure (item #4245301), it has been substituted with item #4245302, because the standard relays that had been used are no longer available. If you had ordered the 8-channel cam outputs assembly without enclosure (item #4241601), it is being substituted with item #4272501. The new standard relay item number is #XI20366A21. The same solid state relays will continue to be used as before (item #2212501 for DC solid state; item #2215301 for AC solid state). If you require more than 4 solid state outputs with the 8-cam assembly (or more than 8 solid state outputs with the 16-cam assembly) contact the factory before installation.

Making the connections

If installed, you must connect the optional cam channel board (either eight or sixteen configuration) inside the SmartPAC controller to the ProCam output assembly. The output assembly contains the relays that control the timing signals for your equipment. The relays open and close circuits to your equipment at the angles (degrees of the stroke) that you set.

You can purchase either the eight or the sixteen-cam option. While the instructions below explain how to install the sixteen-cam style, you can still use these steps if you have eight cams. *If you have an 8-cam board only then connect channels 1-8 to TB401.* Refer to Table 2-4a later in this section for wiring connections. You can also refer to Figure 12 at the end of this manual. To mount and wire ProCam output assembly:

1. Select a convenient location for running conduit from the output assembly to the equipment that it will control. Once installed and wired, you will not have to work with the ProCam output assembly again.
2. Mount the output enclosure using mounting holes on the flanges (see Figure 2-30).

> **NO CONTACT TO METAL**
>
> If you are installing the output assembly without the enclosure, mount it in a clean area that is not contacting metal. The underside of the board must not touch metal, because this can cause shorting. Do not mount the board in highly traveled areas where it could get damaged.

3. The relays that will control your equipment should already be plugged into the board. The type of relays you have is marked on the relay. Decide which relays will be used with which channels and arrange them in the box. The relays just pull out of their sockets. When inserting, make sure that the pins line up with the socket holes. Then press in firmly. *Proceed further for important information about where to plug each style of relay:*
    a. If you are using only *standard relays* in your programmable cam (not optional solid state relays), they are plugged into channels 1 through 8 — terminals labeled K301 through K305, K307, K309, and K311 (see Figure 2-30b).
    b. If you plan to use solid state relays, then they can only be plugged into channels 5 through 8 only — terminals labeled K306, K308, K310, and K312.
    c. *Do not* plug both standard and solid state relays in the same channel locations for 5 through 8. For example, if you plug a solid state relay into channel 5 (location "K306"), you cannot plug a standard relay into location "K305". See Figure 2-28b.
    d. As an example, say you wish to use three standard relays and one solid state. You would install the three standard relays in channels 1 through 3, and the solid state relay in channel 5 on the cam outputs board assembly. Then you must skip SmartPAC's channel 4 output for all wiring and programming, and instead use channel 5 for all wiring and programming.
4. Find the 12-conductor cables that run from the SmartPAC ProCam 16 PC board (see Figure 2-6f for an illustration of the board) to the terminal blocks marked TB301 inside the ProCam output enclosure. Notice that there are two cables: one for 1 through 8, and another for 9 through 16.
5. Attach one end of the cable to the connector for TB451 for channels 1-8. Note that TB452 on the 16-channel board is for channels 9-16. Refer to the Table 2-4a and Table 2-4b in this section for proper wiring. *If you have an 8-cam board only then connect channels 1-8 to TB401.* The connector should be plugged into the socket.
6. Run the cable through conduit to TB301 in the ProCam output enclosure. You can use the knockouts directly below the connectors on each enclosure.

7. Attach the other end of the cable to the connector for TB301. A wire from CHAS to a lug on the ProCam output enclosure should already be connected (unless you bought the board assembly only).
8. Plug cable connectors into their sockets.
9. To connect the relays to your equipment, use connector TB302 and TB303. See Figure 2-29.

How you make connections depends on the type of relay you use. For 120 Vac relays you can connect wires from your equipment to "C" and either the N/O or N/C side of the relay. If you connect to N/O, the equipment will be on for the degrees set on SmartPAC. If you connect to N/C, the equipment will be on except for the degrees set. Generally, you use the N/O terminal; so equipment is off except when you use SmartPAC to turn it on. Use the N/C terminal only if it is more practical to do the reverse.

All solid state relays work only when the C and the N/O side is connected. Polarity must be right for some relays — refer to the above Table 2-4b ("Making connections to relays").

Table 2-4a: SmartPAC to ProCamPAC Output Assembly TB301

Wire	**SmartPAC 8-cam TB401 (1-8) or 16-cam TB451 (1-8) (pin #)**	**1st TB301 (pin #)**
		CHAS (1)
Black	Gnd (269)	B (2)
White	Relay Pwr (270)	A (3)
Red	+5 (268)	+5 Vdc (4)
Tan	Ch 8 (267)	Ch 8 (5)
Pink	Ch 7 (266)	Ch 7 (6)
Gray	Ch 6 (265)	Ch 6 (7)
Blue	Ch 5 (264)	Ch 5 (8)
Yellow	Ch 4 (263)	Ch 4 (9)
Orange	Ch 3 (262)	Ch 3 (10)
Purple	Ch 2 (261)	Ch 2 (11)
Brown	Ch 1 (260)	Ch 1 (12)

Table 2-4a: SmartPAC to ProCamPAC Output Assembly TB301 (continued)

Wire	SmartPAC 16-cam TB452 (9-16) (pin #)	2nd TB301 (pin #)
		CHAS (1)
Black	Gnd (280)	B (2)
White	Relay Pwr (281)	A (3)
Red	+5 (279)	+5 Vdc (4)
Tan	Ch 16 (278)	Ch 8 (5)
Pink	Ch 15 (277)	Ch 7 (6)
Gray	Ch 14 (276)	Ch 6 (7)
Blue	Ch 13 (275)	Ch 5 (8)
Yellow	Ch 12 (274)	Ch 4 (9)
Orange	Ch 11 (273)	Ch 3 (10)
Purple	Ch 10 (272)	Ch 2 (11)
Brown	Ch 9 (271)	Ch 1 (12)

Table 2-4b: Making connections to relays

Module	How to connect	Type
Relay	one wire to C, one wire to N/O or N/C, polarity does not matter	SPDT
DC Solid State	- to C, + to N/O	SPST
AC Solid State	one wire to C, one wire to N/O, polarity does not matter	SPST

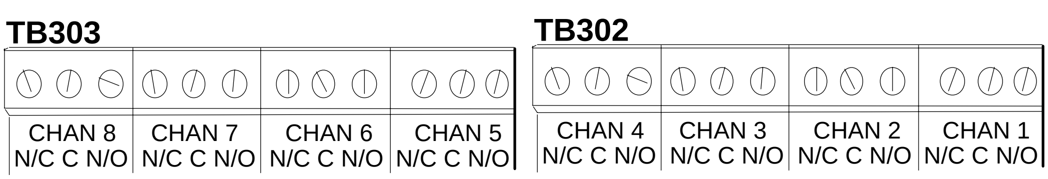


Figure 2-29. TB302 and TB303, wiring relays to equipment

10. You must install the arc suppressors that come with your unit. They are cylindrical in shape, with a lead at each end. Install a suppressor across each inductive load (motors, relays, coils, etc.) that is connected to an output relay. Suppressors reduce electrical noise and will extend the life of the relays. One suppressor is supplied for each relay.

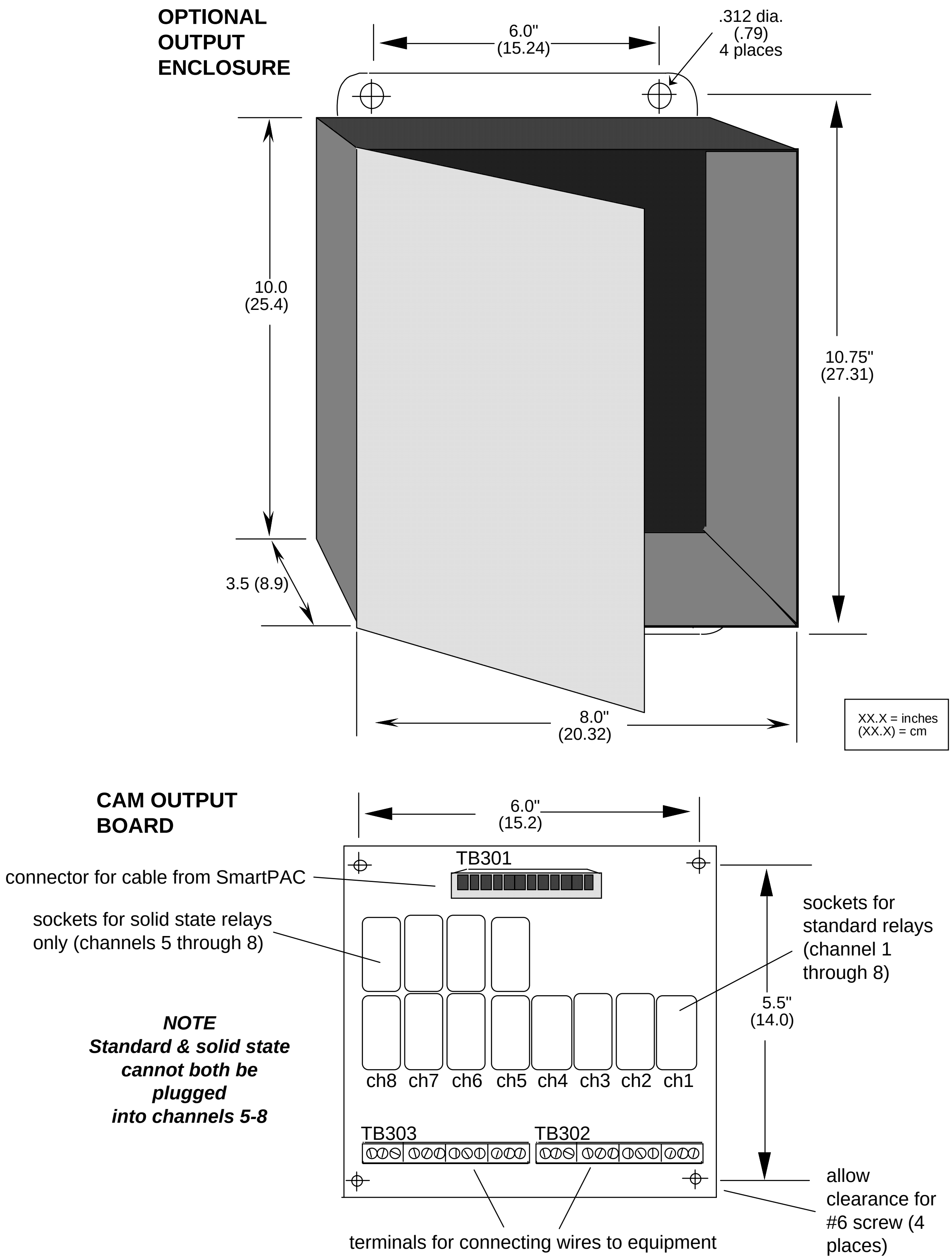


Figure 2-30a. ProCamPAC output assembly

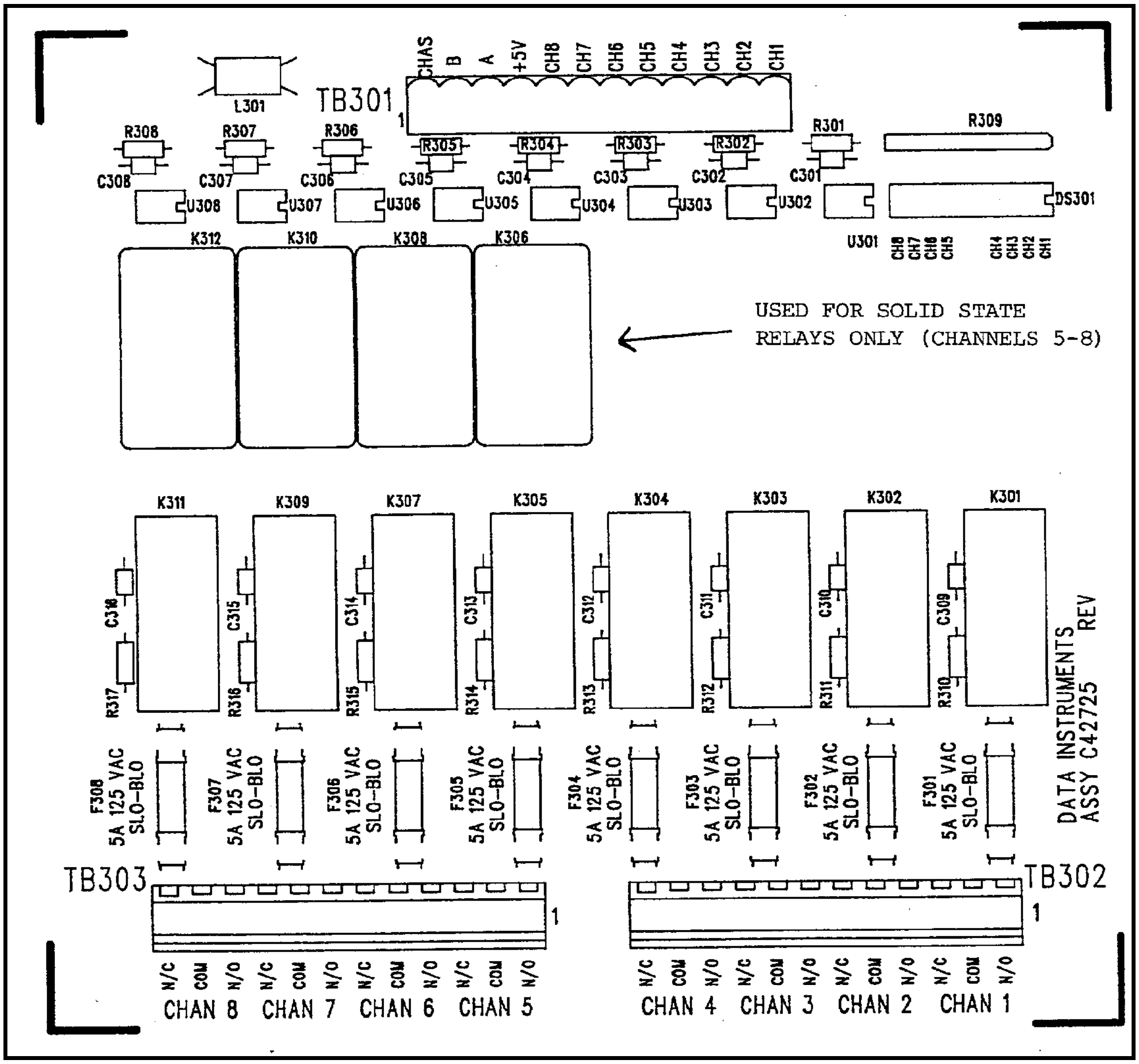


Figure 2-30b. Cam outputs board assembly

DO NOT INSTALL SUPPRESSORS
ACROSS RELAY CONTACTS

Suppressors must not be installed across the relay contacts inside the cam outputs enclosure. If a suppressor is installed across the relay contacts and it fails shorted, the equipment controlled by that relay will remain energized all the time.

11. Install the suppressors across the load and as close to the load as possible. Attach suppressors by connecting leads across existing terminals or junction points. See the following illustration for the correct way to install them.

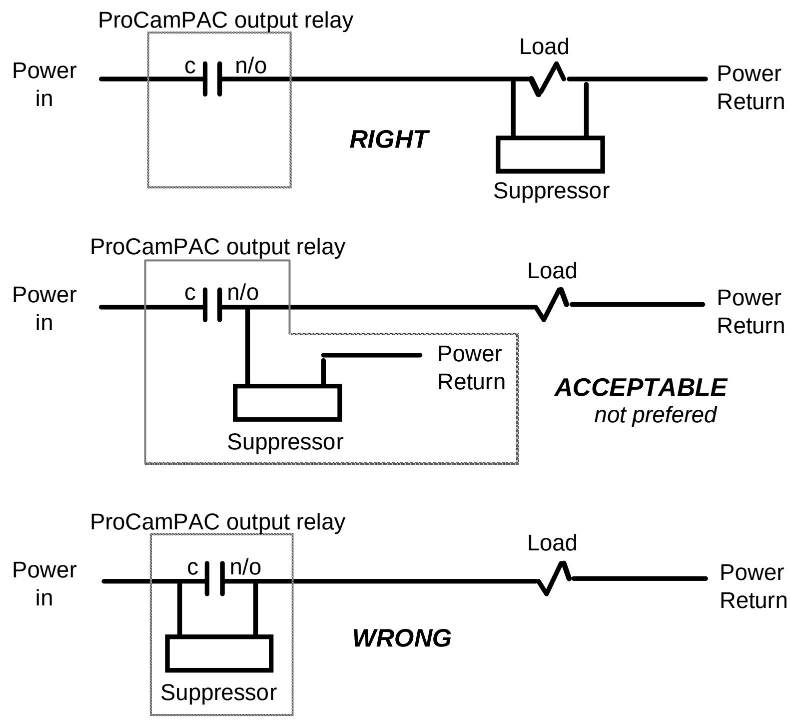


Figure 2-31. How to connect suppressors across the load

Setting high speed version of WPC

If you have a standard WPC and wish to change the system to a high speed version (1600 SPM maximum), follow these instructions. You will also have to upgrade the SmartPAC firmware. To do this, refer to the next section.

1. See Figure 2-6a for the location of the jumper J112. Notice that the jumper is set on pins 1 and 2 (for "Low" speed).
2. Move the jumper so that it will be on pins 2 and 3 (for "High" speed).
3. You will also have to upgrade SmartPAC's firmware. Proceed to the next section.

Upgrading SmartPAC firmware

There may be times when you will need to upgrade SmartPAC high speed version, or add SFI™ Servo Feed Interface, communications capabilities, or other future product enhancements. Many times these upgrades require that you change SmartPAC's firmware. Follow these steps to upgrade the firmware.

> **CAUTION**
>
> *The SmartPAC firmware board is not interchangeable.* Notice, too, that the style of the firmware board has changed. It is called the "4-meg" board and contains only 1 firmware chip, with 1 extra available slot (reserved by DI for future enhancements). It must be installed on the main processor board as illustrated in Figure 2-6g of this chapter.

1. Turn power off to SmartPAC. The LCD display on the front panel should be blank and the angle/RPM display should be unlit.

   > **CAUTION!**
   >
   > Always verify that power has been turned off to SmartPAC!

2. Before you proceed, you should ground yourself by touching any large metal object. This will remove any static electricity that you may be carrying around. A static electricity "zap" will destroy the components.
3. Look inside SmartPAC and locate the firmware board, which is located toward the bottom left of the main processor board (Figure 2-6a). Take note of its orientation.
4. Remove the four screws which hold the board to the standoffs under the board, and put them aside for now.
5. Unplug and remove the board. Be sure not to confuse the old firmware board with the new one you will be installing. If necessary, jot down the version number that is found on the firmware chip's white label.
6. Verify that you are still "grounded", and then remove the new board from the package.
7. Plug the board in. The connectors on the underside of the board are keyed; so they can only be plugged in one way. These connectors will connect correctly with the mating pins on the main SmartPAC processor board.
8. Once the board is properly seated, screw the four corners down again (from step 4).
9. Turn the power on and verify the normal operation of the unit. If the unit powers up with a garbled display or "rolling" LEDs, turn the power off and check that the board is properly seated.

   After some upgrades, you might find that SmartPAC generates a tool number checksum error the first time you try to reload each setup. SmartPAC creates a checksum to check that the data stored in memory for the tool is the same as the data that comes out of memory when you load that tool number. (Checksum errors are explained in Chapter 7.) To correct this problem, go back into programming and review the currently loaded tool number setup. Make sure that what you programmed is correct; then reload this tool number again. (Chapter 7 details the steps to take.) If the unit is still malfunctioning, call Data Instruments for assistance. Remember to provide pertinent information about the unit to expedite the resolution of the problem.

Connecting AC power wires to power source

Connect AC power wires from connector TB101 in SmartPAC to the power source. Be sure that power is off at the terminals where you are connecting wires.

Turning on power to SmartPAC

Turn on power to SmartPAC. Turn the Program/Run key to "Program". Then press down on both the "1" and "CLEAR" keys at the same time for one second. (See "Using the keyboard" - Chapter 3 for assistance in using the keys) You will see a display similar to the one illustrated at the very beginning of Chapter 4 of this manual.

If this display is blank, first check the setting for the contrast adjust keys at the upper left-hand corner of SmartPAC (consult Chapter 3 for assistance). You will see the menu now. Adjust accordingly for best viewing.

If the contrast was not the problem, there is probably a problem with power to SmartPAC. Turn power to SmartPAC off and recheck all power connections. If you still cannot get the Initialization menu, call the technical staff at Data Instruments for assistance.

If you received an error message on your screen when you turned power on, first press the RESET key to clear the error message. If the message still appears, go to Chapter 7 in this manual and find the section describing that error message. Follow the instructions there for correcting the problem. If the error message is not described there, or you cannot fix the problem, call Data Instruments' technical advisors. Remember to provide pertinent information about the product to expedite the resolution of the problem.

Verifying ProCamPAC and/or DiProPAC installation

If you had installed ProCamPAC and/or DiProPAC into SmartPAC, you need to verify that the installation was done correctly and that these options appear on the screen.

To do this, briefly get yourself out of Initialization mode and into the Run menu by turning the Program/Run key to "Run". Now look for these menu choices:

For ProCamPAC: "Cam Switch"

For DiProPAC: "Die Protection"

If you do not see these menu choices on your screen, go back to "Adding or upgrading ProCamPAC or DiProPAC" and verify that you proceeded with the installation properly. If you still cannot fix the problem, call Data Instruments' technical advisors. Remember to provide pertinent information about the product to expedite the resolution of the problem.

Wiring a sensor-disabled output

You can wire a sensor-disabled output to a customer-supplied solid-state relay. This output can be used to warn personnel that the die protection capability (if installed) is disabled. You might connect this relay to a warning light, for instance. Connect the positive input wire from your 12Vdc solid-state relay to DiProPAC TB550, terminal 302 (relay power). Connect the negative input wire from this relay to DiProPAC TB550 terminal 306 (auxiliary 1). You cannot use more than 8 mA for your relay.

Wiring the ProCamPAC output with your mechanical top stop cam switch

This is how to wire ProCamPAC and your mechanical cam switch to be used for Top Stop.

WARNING

1. This does not affect or improve the safety of the system! Your clutch/brake control must be control reliable on its own. This only improves the efficiency of the system because of ease in adjusting the top stop and in utilizing the auto advance feature.
2. The system must be tested after wiring (as described below) to ensure proper functioning of the Top Stop circuit.

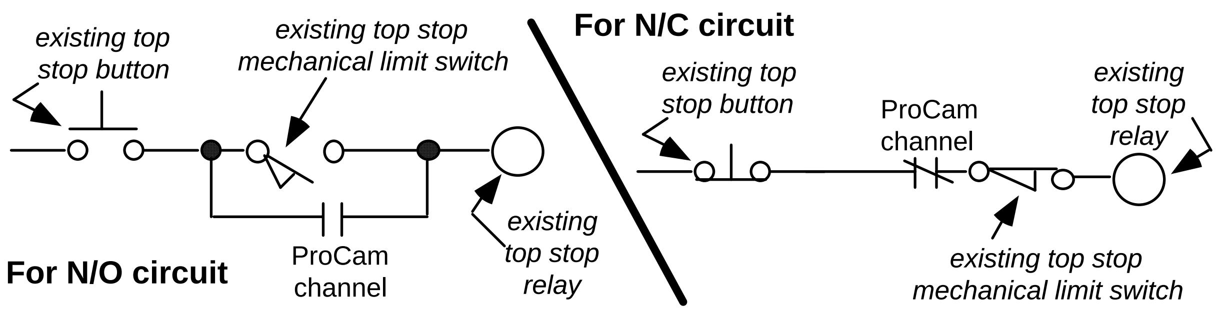


Figure 2-32. Optional top-stop wiring

How to test the wiring

For N/O circuit: *Temporarily* do not program the ProCamPAC channel used for this wiring, so that it is "off" (open) all the time. Confirm that the press will still top-stop as before.

For N/C circuit: *Temporarily* program the ProCamPAC channel used for this wiring, so that it is "on" (closed) all the time (i.e. On = 1°, Off = 0°). Confirm that the press top-stops as before.

Refer to Chapter 5 for proper programming of SmartPAC.

Zeroing Resolver

You can now zero the resolver. To perform the necessary steps, refer to "Zero Resolver", found at the beginning of the section, "Using SmartPAC with WPC Initialization menu choices" at the start of Chapter 4 of this manual.

Final Checklist

If you have completed all the procedures in this chapter, WPC is almost ready to use. All you need to do is to make a few test press runs to ensure that WPC is working properly. You may have to make some settings. Complete the steps below.

Check and set direction of rotation of resolver

- Inch the press. Watch the angle/SPM readout. If the angle of the crankshaft decreases from 359° instead of increasing, recheck that your resolver wiring has been completed correctly (see the section "Mounting the resolver" in this chapter. Once you have corrected the wiring, the angle will now increase as the ram moves.

Check for error messages when the press is running

- Single stroke the press for a few strokes. See if the press stops automatically and you get an error message on your screen.

  If an overrun limit switch fault occurs, check that you installed the magnetic switch and magnet correctly (Chapter 2) and set the overrun limit switch properly (Chapter 4). For other error codes, go to Chapter 7 for a description. Follow the instructions under the error message for solving the problem. Once you correct the problem, press the Reset/Select button and run the press again for a few strokes, checking for error codes. Any time that you cannot solve a problem, call Data Instruments for help. Remember to provide pertinent information about the product to expedite the resolution of the problem.

Check the top stop circuit

- Run the press in continuous mode, and depress the TOP STOP palm button. The press should stop at top.

  If the press did not top-stop, there may be a problem in your top stop timing. Recheck all wiring and trace the cause of the problem. Do not continue with this procedure until the press top stops.

Check the emergency stop circuit

- Run the press in continuous mode, and depress the EMERGENCY STOP palm button. The press should emergency-stop.

  If the press did not emergency-stop, there may be a problem in your E-stop wiring. Recheck all wiring and trace the cause of the problem. Do not continue with this procedure until the press E-stops.

Test complete

- If you got to this step, everything is working right. Clear any error message by pressing the Reset/ Select button. You are now ready to initialize and set up your new WPC. Proceed to Chapter 4.

When the "Press control" menu options do not appear in any of SmartPAC's operating modes

If you are not getting any "Press Control" menu choices in Initialization, Program, or Run modes:

- Locate the LED labeled "DS102" on the SmartPAC processor board near TB104, resolver cable, (see Figure 2-6d in the SmartPAC user manual).

  Notice if this LED is blinking. If it is not blinking at all, then this indicates that the connection between SmartPAC and WPC is not satisfactory. Recheck your wiring. If necessary, refer to "Connecting communications from SmartPAC to WPC" in this chapter.

Displaying the Status of the Inputs

As an installation and troubleshooting aid, the SmartPAC with WPC can display the status of the inputs. See Chapter 7.

Final assembly

Once the final checkout has been confirmed and both WPC and ProCam 1500 are working satisfactorily, you are ready to completely install the SmartPAC panel mount into your enclosure.

Mount the SmartPAC panel assembly to your enclosure and tighten the hardware.

IMPORTANT

When you set up a new SmartPAC with WPC or install new SmartPAC firmware, be sure to initialize the press parameters before you start programming your unit. See Chapter 4, Initialization, for instructions.

Table 2-5. Connector pinouts for Wintriss Clutch/Brake Control (WPC)

44 Ground	88 Light curtain B 2 input -
43 Analog 2 input	87 Light curtain A 2 input -
42 +13.5 VDC out	86 User input 10 -
41 +24 VDC out	85 User input 8 -
40 +24 VDC out	84 User input 6 -
39 +24 VDC out	83 User input 4 -
38 +24Vdc out	82 User input 2 +
37 +24 VDC out	81 Top stop string in (connects internal to 49)
36 Aux. 2 out	80 Top stop string center loop connection
35 Light curtain 2 enable	79 Top stop string drive output
34 Ground	78 Light curtain B 1 input -
33 Analog 1 input	77 Light curtain A 1 input -
32 +13.5 VDC out	76 + 24 VDC out
31 Ground	75 DSVA popet position -
30 Ground	74 User input 9 -
29 Aux. 3 out	73 User input 7 -
28 Aux. 1 out	72 User input 5 -
27 Light curtain 1 enable	71 User input 3 +
26 Mute limit switch input +	70 Remote reset input -
25 Ground	69 Estop string in (connects internal to 45)
24 Overrun limit switch input -	68 Estop string center loop connection
23 +13.5 VDC out	67 Estop string drive output
22 Top stop limit switch input -	66 Mute lamp output
21 Carry-up limit sw. input (User input 1)+	65 Palm time lamp output
20 DSV Lifeguard input +	64 Prior act lamp output
19 DSVB popet position input -	63 Prior act B input +
18 Chain break switch input -	62 Prior act B out
17 Motor reverse input +	61 Prior act A in (connects internal to 62)
16 Bar actuator input +	60 Top stop B 2 input + pulse
15 Automatic Single Stroke (Ext. Trip) actuator N/C +	59 Top stop B 2 out
14 Foot switch N/O input +	58 Top stop A 2 in (connects internal to 59)
13 One hand B input +	57 Estop B 2 input + pulse
12 Palm switch B N/O input +	56 Estop B 2 out
11 Palm switch A N/O input +	55 Estop A 2 in (connects internal to 56)
10 Ground	54 Ground
9 + 24 VDC out	53 + 24 VDC out
8 System air pressure switch input -	52 Top stop B 1 input + pulse
7 Motor forward input +	51 Top stop B 1 out
6 Bar selector switch input +	50 Top stop A 1 in (connects internal to 51)
5 Automatic Single Stroke (Ext. trip) actuator N/O +	49 Top stop A out
4 Foot switch N/C input +	48 Estop B 1 input + pulse
3 One hand A input +	47 Estop B1 out
2 Palm switch B N/C input +	46 Estop A 1 in (connects internal to 47)
1 Palm switch A N/C input +	45 Estop out A

Table 2-6. Resolver Connections

(Shown for CW viewing shaft reverse black, yellow for CCW)
89 S4 ground (Brown)
90 R2 ground (Orange)
91 S3 ground (Yellow)
92 R1 (Red)
93 S2 Cosine (Green)
94 S1 Sine (Black)
95 Shield

Table 2-7. Power supply Connections

121 L1
122 L2
123 Ground
124 Chassis ground
125 L1 out
126 L2 out
127 Ground
128 L1 out
129 L2 out
130 Ground
131 DSVA relay in
132 DSVA relay out
133 DSVB relay in
134 DSVB relay out
135 Lockout relay in
136 Lockout relay out
137 Lockout relay out

Chapter 3
About the keyboard and displays

This chapter gets you started in learning how to use the SmartPAC keyboard and displays. It explains how the displays are organized and how you perform tasks by selecting items on a display. It also explains the function of all keys on the keyboard.

Why using SmartPAC is easy

It is easy to use SmartPAC. Just read the messages to see which key to press in order to proceed to the next step. Once you get the knack of it, you will find it very fast and easy to make settings.

When you are learning, do not be afraid to try things. Push the keys. Select items on the displays. See what happens. You cannot hurt SmartPAC by pushing a wrong key or making a wrong selection. This chapter gives you the basics that will get you started. Later chapters explain in more detail how to use the different operating modes in SmartPAC.

Your starting point in each mode

When you use SmartPAC, you choose the displays you want to see to get the task at hand done. The displays you see depend upon which mode of operation you are in. SmartPAC has three modes of operation—Initialization, Programming, and Run. Each mode allows you to do different tasks.

In Initialization mode, you make certain settings you generally only once after installing SmartPAC. Chapter 4 explains this mode.

In Programming mode, you make counter settings, create, modify, and load tool numbers, and do other programming functions. See Chapter 5 for details.

You must be in Run mode to operate the press. In this mode, you can adjust your cams and sensors even while the press is running. You can switch between Program mode and Run mode by turning the Program/Run key to "Program" or "Run". Use Chapter 6 to operate SmartPAC.

Remember, what you can do in each mode is described in detail in later chapters. Here we show you how to get started in each mode.

The first displays in each mode - menus

From the first display in each mode, you can call up other displays to carry out specific tasks (set counters, adjust settings, etc.). Think of these displays as **menus**. You select from the menu what you want to do. Then you will see another display for that task.

Selecting an item on a display

Here is the first display you see in Programming mode -- the tool number display. Notice that the currently loaded tool number is highlighted If no tool number has been loaded, then the word "NEW" is highlighted.

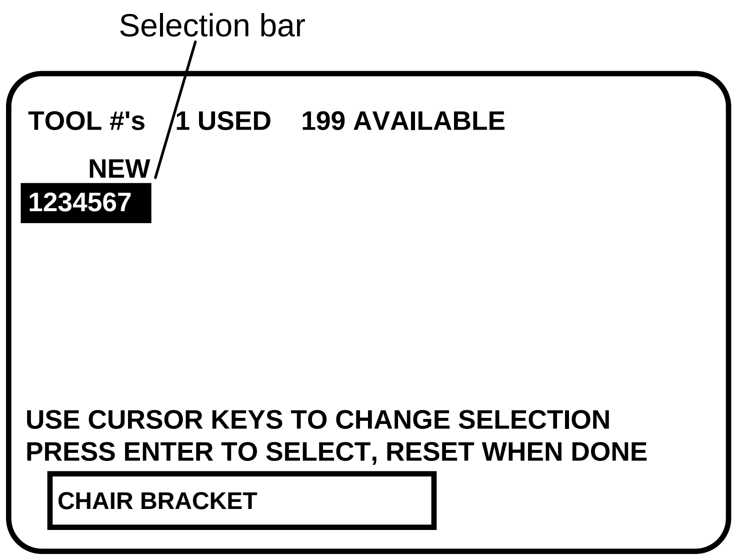


Figure 3-1. Illustrating selection bar at tool number display

The numbers (or letters) are white and are surrounded by a black box. The black box is the selection bar. Whenever an item in a display is highlighted like this, it is the one selected. In every menu you see, an item will be highlighted. You can move the selection bar to any item on the screen using the "up" and "down" cursor keys.

SELECT = HIGHLIGHT + ENTER
When we say SELECT in this manual, it means highlight the item and press ENTER.

Make the appropriate selection, and then press ENTER. SmartPAC shows you the next display, allowing you to make another selection or make a setting. A message at the bottom of every display tells you what to do next.

You will use the cursor keys, the RESET key, and the ENTER key a lot to move through the menus to get your work done. It is fast and easy. See "Using the keyboard" next for a description of all the keys. See Chapter 5—"Using SmartPAC in Program mode" to learn what happens when you make the selections above.

Using the keyboard

The SmartPAC keyboard is made up of number keys, cursor keys, function keys, an ENTER key, and a RESET key.

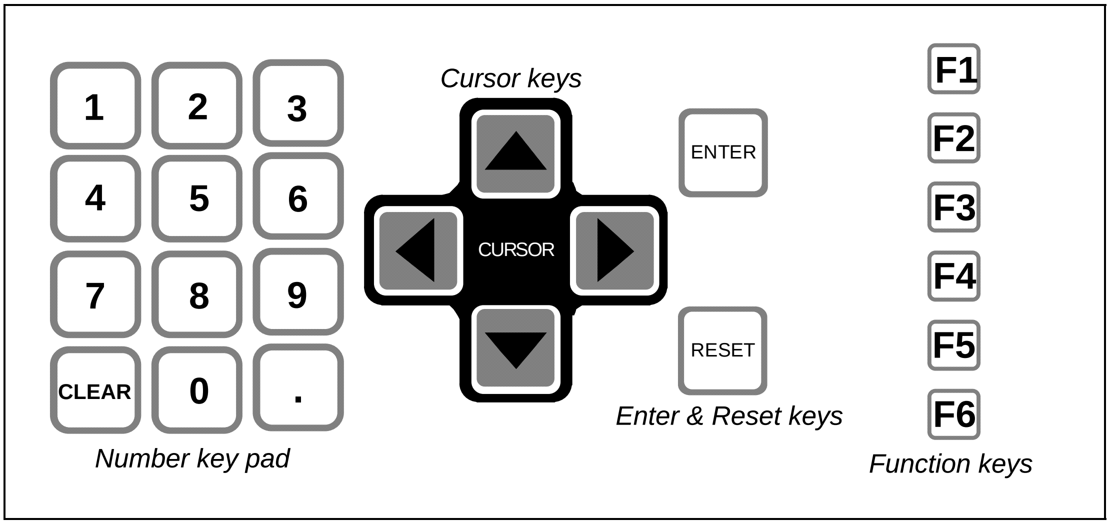


Figure 3-2. Illustrating available keys at SmartPAC

Number keys

You use the number keys to input numeric values, such as counter presets or tool numbers. You will see a display similar to the illustration below, which guides you on how to use the number keys, as well as the cursor keys. When you are done entering a number using the number keypad, press ENTER. SmartPAC will accept the number and move on to the next display. SmartPAC accepts numbers up to seven digits in length.

0
USE THE KEYPAD TO ENTER NUMBERS.
USE THE UP/DOWN CURSOR KEYS TO
INCREMENT/DECREMENT. PRESS ENTER
WHEN DONE. PRESS RESET TO CANCEL.

Figure 3-3. Superimposed instructions for entering numbers

You may also see the following display. This superimposed screen enables you to enter a variety of characters including: alpha-numeric, symbols, spaces, etc. Pressing the CLEAR key clears the text. You can "custom" name your press, cam channels, sensors, and the tool.

a. To key in <u>letters</u>: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press ENTER.

b. To key in <u>numbers</u>: Use the number keypad; then press ENTER.

c. To accept your selection, press function key **F6** (to the right of the LCD display). To cancel you selection, press RESET.

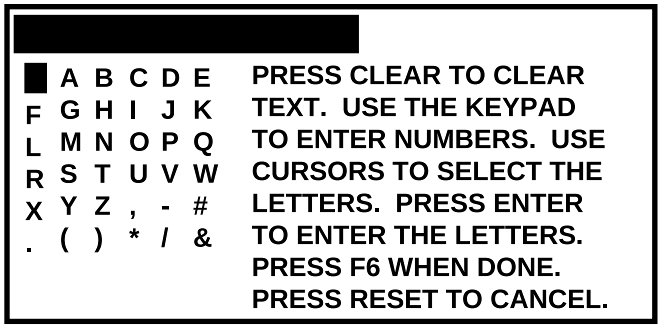


Figure 3-4. Superimposed custom name screen

Cursor keys

You use the cursor keys to move the selection bar over the item on the display you want to select.

Moving the selection bar with the cursor keys

Every menu has an item highlighted (usually the first item). The selection bar—a black bar—covers the item. The cursor keys control the selection bar.

Up, (▲), Down (▼)

These keys move the selection bar up and down a column of items on the display. For instance, if there are four items on a display, and you want to get to the fourth item, press the "down" key three times. You can also hold it down until you see the selection bar over the fourth item. If you go too far, press the "up" key to go back. When you hold a key down, the bar keeps moving.

If you have more than one column of items on a display, the bar will move from the bottom of one column to the top of the next column. It will continue moving through all the columns (and keep repeating) until you let up.

Left (◀), Right (▶)

If you have a display with two columns of items, you can move the selection bar from the first column to the second column quickly by pressing the "right" key. To go back to the first column, press the left key.

Sometimes a display has more columns than appear on the screen. A good example is the tool number display. It can have up to 40 columns (for 200 numbers). However, only four columns can appear on the screen at once. To see a new column, press the "right" cursor key to move the bar to the right-most column, then press the key again. A new column will appear at the right if there are more tool numbers.

You can keep pressing the "right" key to see more columns. To go back to the first four columns, move the selection bar to the left-most column using the "left" cursor key, then press the key again. New columns will appear at the left until you get back to the beginning.

If you keep holding the "right" key down when there are more than four existing columns, columns will continuously appear on the right until you let up. If you get to the end of all the columns, the columns will repeat from the beginning.

If you keep holding the "left" key down, columns will continuously appear on the left until you let up. When you get to the beginning of all the columns, they will repeat from the end.

Using cursor keys to set timing

You use the cursor keys to set timing for your optional programmable cam switch and sensors — in other words to set the angles where you want a cam channel or ready signal to turn "on" and "off".

Notice the circle diagram on your screen (see the next illustration). The **circle diagram** dynamically illustrates the on and off angle settings that you programmed for a sensor and/or cam channel. The cursor keys graphically move a circular arc around this circle diagram. These cursor keys function only when you have selected a display to make or change timing settings. See Chapter 5 for complete instructions on how to create a tool number and make all settings.

The "right" (▶) cursor key increases the "ON" setting — moves the arc clockwise.

The "left" (◀) key decreases the "ON" setting — moves the arc counter-clockwise.

The "up" (▲) cursor key increases the "OFF" setting — moves the arc clockwise.

The "down" (▼) key decreases the "OFF" setting — moves the arc counter-clockwise.

This is the starting point for setting sensor timings using cursor keys.

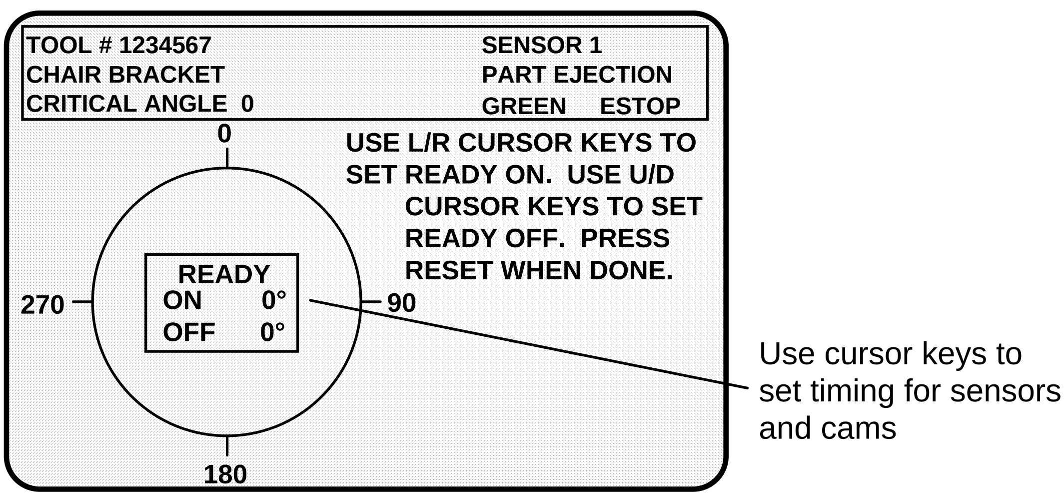


Figure 3-5. Setting timings using cursor keys

Press the "right" (▶) cursor key once. You will see this display:

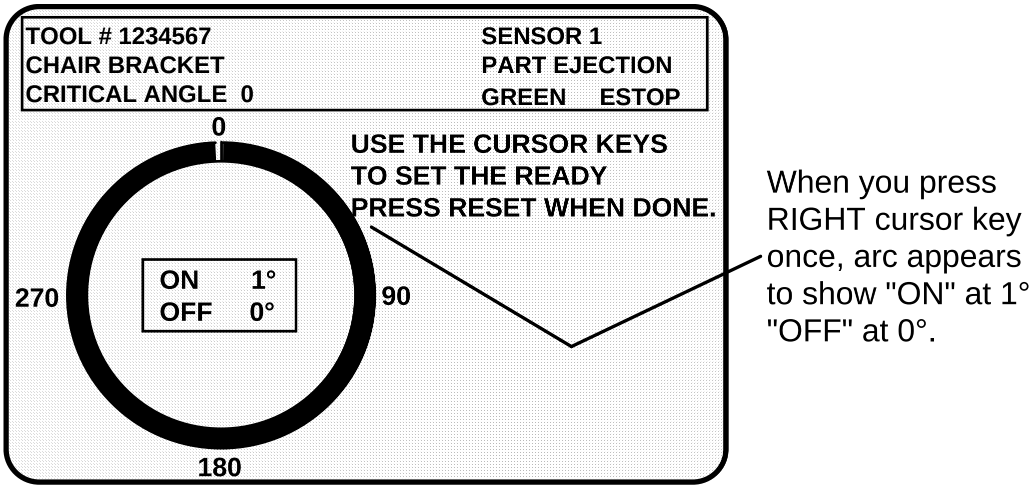


Figure 3-6. Illustrating "on" at 1°, "off" at 0°

The on/off box shows on at 1°, off at 0°, and the arc shows this graphically on the circle diagram.

NOTE: *Remember, the 0 point and the 360 point on the scale beneath the screen are the same point on the crankshaft.*

To make the "on" setting, press the right (▶) cursor key. You can hold it down so the arc keeps moving. The arc will wrap around and begin to extend from 0 towards 90°. Stop when the arc reaches 40°. This is the desired setting. Look to see that "angle ON" in the box shows 40°. If you go too far, use the left (◀) cursor key to back up. The display will look like the following illustration:

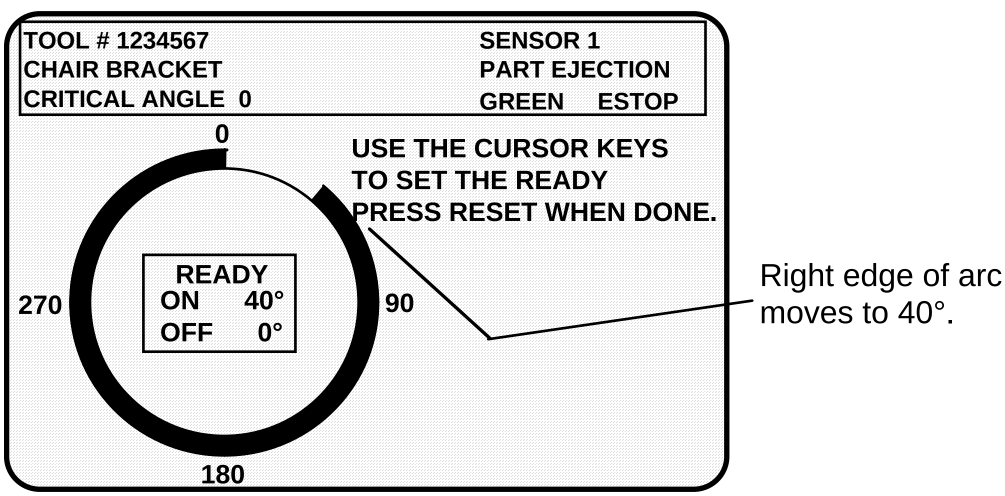


Figure 3-7. Setting "Angle ON"

To set the "off" setting use either the "up" or "down" cursor keys. In this example, press the "down" (▼) cursor key. You can hold it down and the arc will keep moving until you let up. The left edge of the arc moves counter-clockwise. Stop when the left edge is at 250°. Check the "off" setting in the box. It should show 250°. If you go too far, use the "up" (▲) cursor key to back up. Now your sensor is on at 40°, off at 250°. Here is an illustration:

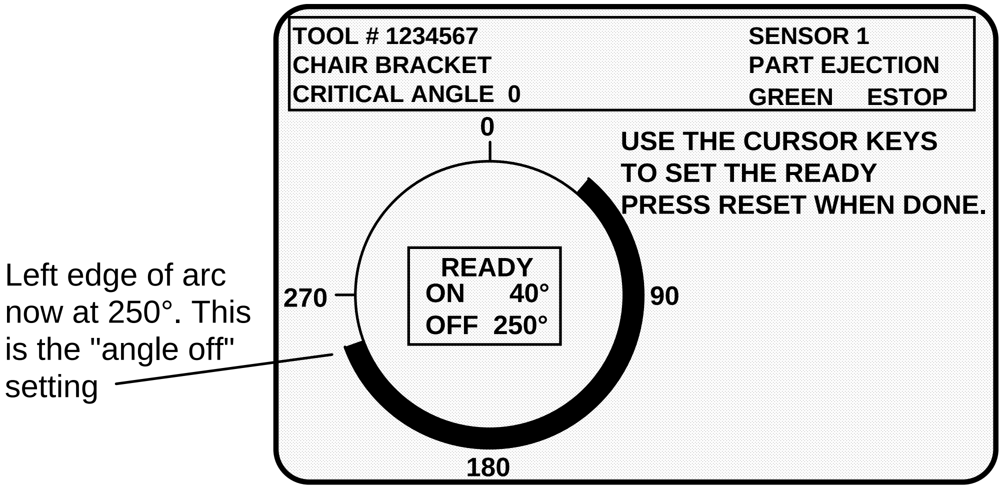


Figure 3-8. Setting "Angle OFF"

You are done making the ON-OFF setting for the sensor. You can adjust this setting any time you want using the cursor keys. The on and off setting will always show in the "ON/OFF" box.

RESET and ENTER keys

Reset key

The Reset key has two functions.

Going back to the previous display

The Reset key is used to go back to the previous display when making settings. For instance, say that you displayed your list of tool numbers on your screen. The next step is to create a new tool number or change settings for an existing one. But if you just want to see the tool numbers and then do something else, just press the Reset key, and you will go back to the previous display.

You are always told at the bottom of your screen when you can use the Reset key to go back to the previous display. For instance, the message will say, "Press Reset when done," or "Press Reset to cancel."

Resetting SmartPAC

The Reset key is used to reset SmartPAC when an error is generated or a counter preset is reached. When you press Reset, you are returned to the display where you were before the message appeared. You can once again run the press.

Enter key

You press the Enter key after moving the selection bar to an item on the display. When you press Enter, SmartPAC shows you a new display based on your selection. Using the cursor keys to make a selection and then pressing Enter or Reset are the three most frequent things you will do when using SmartPAC. You also press the Enter key after keying in a number. This tells SmartPAC to accept the number.

Function keys

Periodically you will be instructed to use function keys to perform certain tasks in SmartPAC. The message on the LCD display will identify the specific function key number (from **F1** to **F6**) to press, if applicable.

Chapter 4
Using SmartPAC in Initialization mode

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

This chapter describes how to use all the displays you will see in Initialization mode. It covers checking the resolver zero position and the position sensor, setting the brake monitor, locking settings in Run mode, and setting the reset mode. It also describes how to initialize, set up, and check out your WPC combined with SmartPAC. Here, you will be making settings on SmartPAC that will be used when you actually operate WPC. Some of these settings, such as the 90° stop time test and calculating the proper safety distance, are extremely critical to conform with OSHA and ANSI standards. You will also be guided to perform certain key tests to ensure proper operation of WPC.

This chapter also includes programmable cam-related functions, such as: selecting channel names, locking settings in Run mode, and setting the auto advance constants; and die protection-related functions, such as setting auto enable; die protection settings such as sensor enable mode and setup mode, and also setting communications parameters.

IMPORTANT

When you set up a new SmartPAC with WPC or install new SmartPAC firmware, be sure to initialize the press parameters before you start programming your unit. See “Initializing Press Parameters” later in this chapter.

Section 1 Initializing SmartPAC

In Initialization mode you make settings in SmartPAC that you typically only need to make once during or after installation. For example, you set Stop and Start Time Limits in Initialization mode. Also, you zero the resolver using Initialization mode, and you can lock certain settings in Initialization mode so unauthorized personnel cannot make adjustments or reset faults. These actions are only done once during installation. If installed, you can also enable the position sensor and check position sensor operation using Initialization mode. These actions are done only once during installation.

How to get into SmartPAC Initialization mode

> **SELECT = HIGHLIGHT + ENTER**
>
> When we say SELECT in this manual, it means highlight the item and press ENTER.

> **NOTE**
>
> Before changing modes, make sure your screen shows the first display in the mode you are in. If that display is not shown, nothing will happen when you turn the Program/Run key. In that case, keep pressing the RESET key. When the first display in the mode is reached, SmartPAC will instantly switch to the new mode.

To get into Initialization mode, turn the Program/Run key to "Program" and then press both the "**1**" and "**CLEAR**" keys simultaneously for one second. (See "Using the keyboard" - Chapter 3.) You will see a display that looks similar to the next illustration.

NOTE: *Your screen may vary depending upon the additional capabilities built into your SmartPAC. This display shows ProCamPAC and DiProPAC options.*

MAIN INITIALIZATION MENU

USE CURSOR KEYS TO CHOOSE MENU ITEMS. PRESS THE ENTER KEY TO SELECT. SWITCH TO RUN WHEN DONE.	RESOLVER ZERO POSITION SENSOR INSTALLED OPTIONS PRESS NAME SELECT CAM NAMES AUTO ADVANCE CUSTOM SENSOR NAMES SENSOR ENABLE MODE USER INTERLOCKS PRESS CONTROL TOOL INFORMATION SECURITY ACCESS

Figure 4-1. SmartPAC Initialization menu

(the order may vary depending upon the options you have installed)

> **IMPORTANT! ABOUT THIS CHAPTER**
>
> The above menu choices are explained in this chapter in the order that they appear on the above screen. Your installed options may vary.

This is the Initialization menu—the first display in Initialization mode. From this display, you can call up all the other displays in Initialization mode.

Each of the available menu choices is described next.

To get out of Initialization mode

To get out of Initialization mode and into Program mode: Turn the Program/Run key to "Run" to go into Run mode and back to "Program." If the Initialization menu was not displayed on your screen when you turned the key, this means that you were farther into Initialization mode. Keep pressing the RESET key until you get back to the Initialization menu. Now when you turn the key, the new mode will appear. *Get into the habit of always backing out of one mode* *before* *entering another mode.*

Initializing Press Parameters

When you first set up your SmartPAC with WPC or install new SmartPAC firmware, initialize the press parameters by following the steps below.

IMPORTANT

Initializing the press control parameters resets them to their default settings. Initialize the press parameters **only** when you set up a new SmartPAC with WPC or install new SmartPAC firmware.

1. Select "Press Control" from the Initialization menu (Figure 4-1). TheWPC Intialization menu appears:

WPC INITIALIZATION MENU

USE THE CURSOR KEYS	USER INTERLOCKS
TO SELECT THE ITEM	PRESS PARAMETERS
YOU WISH TO SEE.	PRESS OPTIONS
PRESS ENTER TO	INPUT STATUS
ACCESS IT. PRESS	
RESET WHEN DONE.	

Figure 4-2. WPC Initialization menu

2. Select "Press Parameters." You will see this display:

PRESS CONTROL PARAMETER MENU

TOP STOP DEFLT	=	220 DEG
CARRYUP ANGLE	=	149 DEG
MICRO TIME	=	100 MSEC
MICRO ANGLE	=	185 DEG
MAIN AIR LIMIT	=	0 PSI
CNTR BAL +/-	=	0 PSI
STOP LIMIT	=	250 MSEC
START LIMIT	=	199 MSEC
SHUT DOWN LIMIT	=	5 MIN
FLYWHEEL TIMER	=	6 SEC
ACTS ANGLE	=	0 DEG

INITIALIZE PARAMETERS

USE THE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE VALUE.
PRESS THE RESET KEY WHEN DONE.

Figure 4-3. "Press Parameters" display in SmartPAC's Initialization mode

3. Select "Initialize parameters." The following warning message appears:

IF YOU CONTINUE THIS WILL INITIALIZE ALL OF THE PRESS CONTROL PARAMETERS.
THESE INCLUDE THE BRAKE MONITOR SETTINGS AND TOP STOP ANGLE.
PRESS THE ENTER KEY TO CONTINUE.
PRESS RESET TO CANCEL.

4. To initialize the parameters, press ENTER. Press RESET if you do not want to initialize parameters.

Using Initialization mode in your SmartPAC with WPC

Zero Resolver

Return to the Initialization Menu, if you are not already there. You can now zero the resolver.

Important

The press must be at top dead center — 0° ± 2°—before you zero.

If you set the resolver to zero degrees when the press is, say at 160°, your timing settings will be way off.

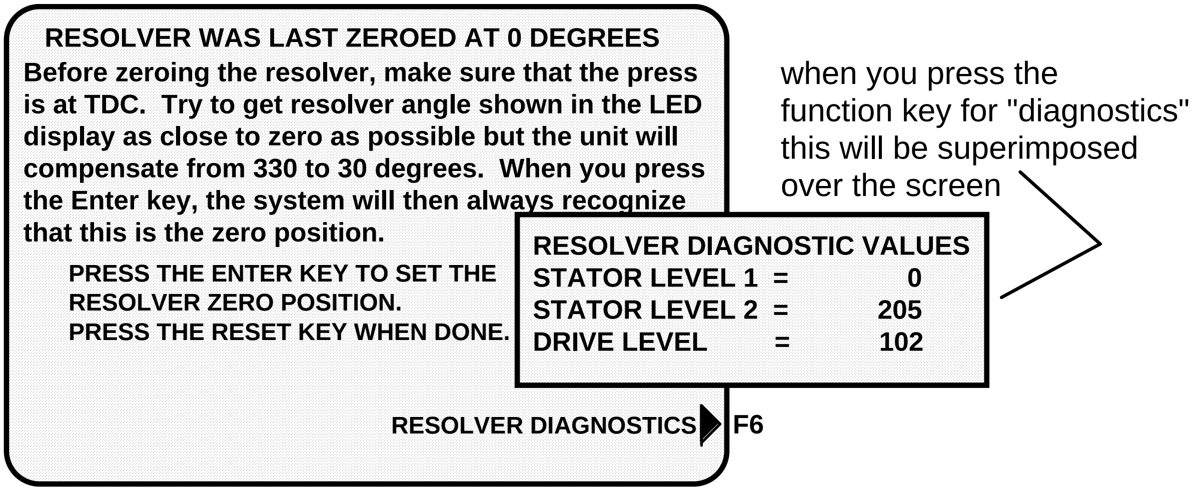


Figure 4-4. Resolver display

If your press is at TDC

If you set the press to TDC (0° ±2°) before starting the installation and have not moved the ram, go to the instructions for zeroing.

If your press is not at TDC

If the ram is not at TDC, you must inch the press to 0°±2°. To do this now, you have to load settings for a tool. SmartPAC is now connected to your stop circuits; so you can no longer run the press without loading settings for a tool. Go into Program mode (see Chapter 5) and create some counter settings for a tool.

After settings are loaded, set the Program/Run key to "Run." Inch the press to 0° ±2°. <u>Do not rely on the readout to tell you where TDC is</u>. This is inaccurate until the resolver is zeroed. Use a dial indicator or some other means to determine 0°. Once you are at 0°, go back to Initialization mode. Then go to the instructions below for zeroing the resolver. (Zeroing the resolver is also mentioned in Chapter 4, Initialization.)

Any time that you want to zero the resolver, follow these steps. 1. Select "Resolver zero" from the Initialization menu (above). This is the first choice on the menu. ("Resolver zero" may already be highlighted.)

2. You will see a display similar to the following. Here you can see actual resolver position. If the resolver is anywhere between 330° and 30°, you can go to step 3. SmartPAC will automatically correct the offset and the angle readouts will indicate the <u>true</u> angle of the ram. By pressing the appropriate function key, a superimposed display LED readout also displays resolver diagnostic information.

If the resolver is outside the range of 330° to 30°, you will have to turn the resolver shaft by hand until the LED display shows zero. <u>The press must be at top dead center before you do this</u>. Loosen the tension on your drive mechanism and turn the resolver shaft by hand until the reading on the Angle/SPM readout is 0°. It does not matter which way you turn the shaft. Set the resolver right at 0° (so the readout shows 0°).

Once the resolver is set, tighten the drive mechanism, and go to step 3.

3. To zero, make sure the display shown in step 2 is on your screen. *Double check that the readout is between 330° and 30°.* Then press ENTER.

The number shown will be the zero position of the resolver. SmartPAC electronically adds or subtracts the offset (3 in our example). Therefore, it always knows the true zero position of the ram. If the number is 0, it means the zero position of the resolver at TDC is 0°.

4. Press RESET to go back to the Initialization menu when you are done. If you are installing the position sensor, do it next. If not, go to "Final checkout."

How to replace and rezero the resolver

After you have successfully installed the new resolver (discussed in the section "Installing the resolver" in Chapter 2, you will need to rezero.

1. Go to the "Resolver Zero" screen. Notice the value in the LCD display (e.g. "Current Resolver Zero Position is 356" reflecting the original zeroed position) may not match the "unzeroed" angle position shown in the LED display.
2. Move the ram so that the crank-angle position shown in the LED display matches as <u>close</u> as possible to the value appearing in the LCD display. Remember that the readout must be between 330° and 30°.
3. Once you have done this, you can rezero the resolver. To do this, press ENTER.
4. Press RESET to go back to the Initialization menu when you are done.

Position sensor

This choice allows you to disable the position sensor, (see "Installing the Overrun Limit Switch" in Chapter 2 of this manual) when SmartPAC is configured with WPC.

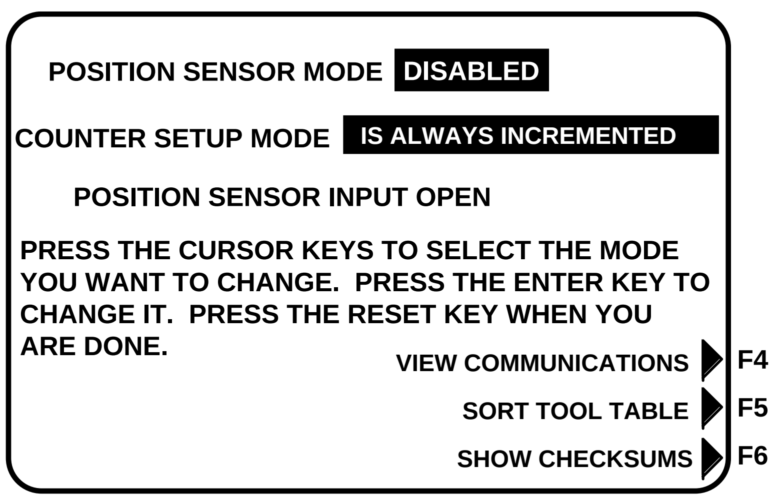


Figure 4-5. Position sensor display in Initialization

When the position sensor is not used, the only time you need to use this choice is to ensure that the position sensor is turned off. You should check this setting if SmartPAC stops the press and you get this error message: "Position sensor incorrect." This means you need to turn the position sensor off as described below. Refer to Chapter 7 for more information about this error message.

To disable position sensor

If you do not use a position sensor, you should see this display when you select "Position sensor." This is the factory setting. If the message says "POSITION SENSOR ENABLED", press ENTER. The message will then correctly say, "POSITION SENSOR DISABLED." Then press RESET to return to the Initialization menu.

Counter setup mode

You can disable or enable the counter setup mode, interrupted stroke, etc. (Refer to a description of "Interrupted stroke" in Chapters 1 and 7.) In other words, you can activate (enable) or deactivate (disable) the various modes at this screen.

Select "Counter setup mode" and determine the most appropriate choice by pressing Enter to toggle among items explained below. *Once you press RESET to exit the screen, your choice is confirmed.*

> **How any of your choices affect Strokes Counter**
>
> In all cases, strokes counter will increment regardless of the mode that you are in.

"IS ALWAYS INCREMENTED"

This means that the batch and parts counters will increment on every stroke whether you are in setup mode or not.

"NOT INCREMENTED IN INCH MODE"

This means that the parts counter and batch counter *(when tied to "parts" counter only)* will not increment when you are in Inch mode.

"NOT INCREMENTED IN INCH MODE OR INT. STROKE"

This means that the parts counter and batch counter *(when tied to "parts" counter only)* will not increment when you are in Inch mode or in an Interrupted ("INT.") Stroke condition.

View communications - press F4

Perform this function when there is a need to verify the communications port between SmartPAC and the various installed modules, including SFI, Module (for AutoSetPAC), PACNet®, WPC, etc. Press function key **F4** for "View communications."

Now select the module in question that you want to test, such as: "PORT 5 (WPC)."

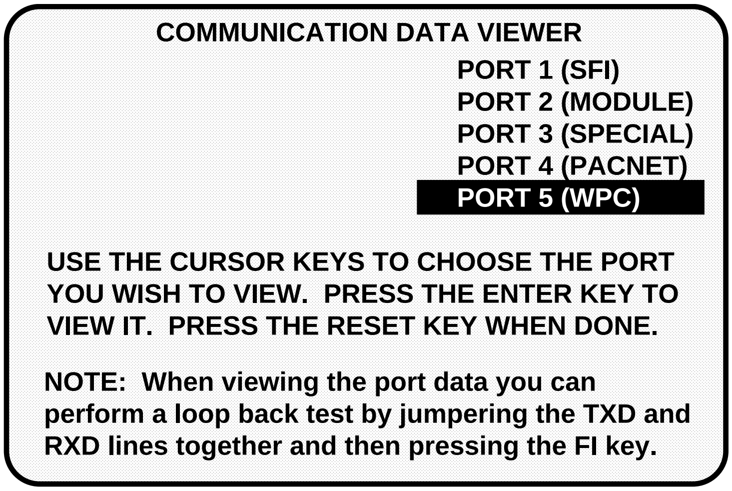


Figure 4-6. Communications data viewer screen

Here is the screen that will appear:

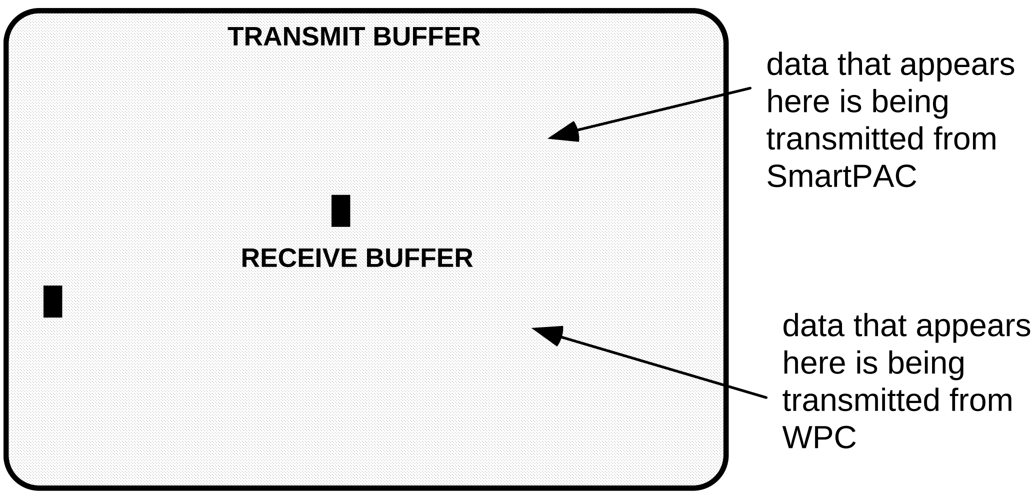


Figure 4-7. Actual communications

To view normal communications between SmartPAC and the communicating module (e.g SFI), you should expect to see some text (data) in both the "transmit buffer" and "receive buffer" locations on the above screen. If you do not see any data (or only partial data), this means that SmartPAC and the other module are not communicating properly.

At this point if you detect a problem in communications, you may decide to perform a "loop-back test" (see Figure 13 for RS232 connections, or Figure 14 RS485 connections to properly wire the loop-back test for SmartPAC, located at the end of the manual). A loop-back test is one where you connect (or jumper) the TXD (transmit) and RXD (receive) lines together, and then press **F1** to check communications. In effect, you are actually "receiving" the communications data that you are transmitting. This test is useful when verifying the accuracy of the transmit and receive hardware and wiring. If you need further assistance or direction on performing the loop-back test, contact Data Instruments for assistance.

Sort tool table - press F5

Perform this function when there is a need to sort the tool number display in Program and Run modes. Sometimes, when you are adding more tools, or deleting some, SmartPAC may display them in a random order. Simply press the appropriate function key (see Figure 4-5), and the tool numbers are automatically resorted. Don't worry. The tool information is still intact.

Show checksums - press F6

The purpose for this display is to show checksum information. SmartPAC creates a checksum for a tool number to verify that the data stored in memory for the tool is the same as the data that comes out of memory when you load the tool number. *More than likely, you will never have to use this function unless specifically instructed to by Data Instruments technical personnel.*

Installed options

This is a very useful display that indicates how your SmartPAC has been configured. It includes software version numbers and the specific optional capabilities that have been installed. It also tells you how many cam channels and/or sensors you can connect to SmartPAC, as well as if WPC is installed. Here is an example:

INSTALLED OPTIONS

SOFTWARE V1.53 9/94
COPYRIGHT 1994
CHARACTER GENERATOR V1.07

ProCamPAC 16 channels installed
DiProPAC 16 sensors installed
Clutch/Brake Control installed

Figure 4-8. Installed options for easy identification

Press name

You use this choice to name the press on which SmartPAC is installed. As the screen suggests (refer to Chapter 3 for more information on using the SmartPAC number display), certain keys enable you to name the press. The name you choose can be any combination of alpha-numeric characters, symbols, etc. Pressing the CLEAR key clears the text. To make other entries, do the following:

1. To key in <u>letters</u>: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press ENTER.
2. To key in <u>numbers</u>: Use the number keypad; then press ENTER.
3. To accept your selection, press function key **F6** (to the right of the LCD display). To cancel your selection, press RESET. (For assistance in using the various keys, refer to Chapter 3.)

Stopping Time and Stop Time Limit

Because of its built-in brake monitor, WPC constantly checks the condition of the brake by measuring stopping time every time the press top stops. *Stopping time* is the time that it takes the crankshaft to stop once the Dual Safety Valve (DSV) has been closed. WPC measures how long it takes from the time that the dual safety valve is de-energized to the actual stopping of the press crankshaft. WPC then displays this value in milliseconds. When WPC is first initialized, the stop time limit is factory set at 500 milliseconds. (One millisecond equals 1/1000th of a second -- 1 mS =.001 second)

Be sure that you have completed the entire installation and that everything is operating properly. If so, you are ready to:

- determine what your press's top stopping time is
- calculate the press's stop time limit, and
- set the stop time limit.

Determining the press's stopping time

First you need to determine the press's stopping time under normal stopping conditions, which is usually at top stop. Therefore, the stop time limit *must* be calculated based upon stopping time at top stop. To find the press's stopping time, follow these steps:

1. Install the heaviest upper die set into your press. Adjust the counterbalance for ram weight (if the press has a counterbalance).

   > Before you can go into Run mode, a tool number must be programmed and loaded in Programming mode. Consult Chapter 5 in the SmartPAC user manual for assistance.

2. At SmartPAC, position the PROG/RUN key to "Run." This will get you into SmartPAC's Run menu. Now select "Brake Monitor", as illustrated here.

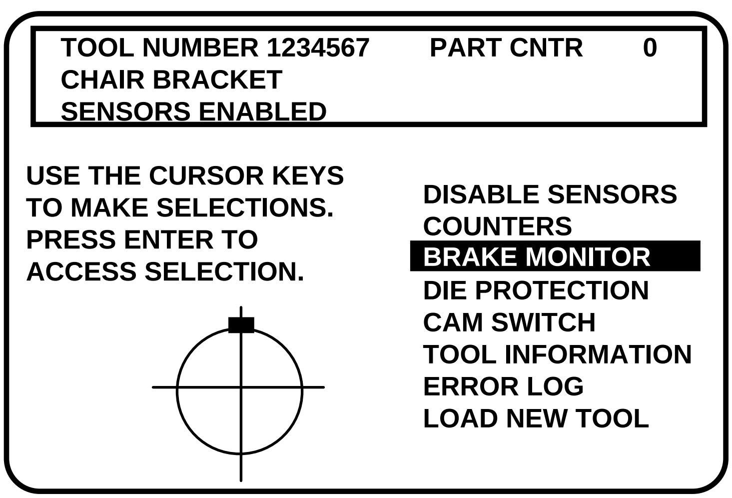


Figure 4-9. Selecting "Brake Monitor" from SmartPAC's Run menu

3. Start the press. Run it in continuous mode, allowing it to reach normal operating speed. Notice now that the actual press speed -- "SPM" -- automatically appears in the LED display.

4. Top stop the press. Look at the reading in the LCD display (Figure 4-10). This is the stopping time of your press. Note: The number in the display is in milliseconds (mS).
5. Do this test at least 5 more times. Record the highest reading from all your tests. This is the stopping time you will use to calculate and set the Stop Time Limit.

TOOL NUMBER 1234567 PART CNTR 0
CHAIR BRACKET
SENSORS ENABLED

STOP TIME STATUS

	VALUE (MSEC)	LIMIT (MSEC)
STOP TIME	250	300
START TIME	155	200
STOP ANGLE	75	75
90 STOP	0	

PRESS THE UP CURSOR KEY TO START THE
90 DEGREE BRAKE TEST.
PRESS THE RESET KEY WHEN DONE.

Figure 4-10. Viewing "Stop Time"

Calculating the press's stop time limit

Once you know the press's actual stopping time, you need to add extra time to this number to compensate for *normal* wear in your brake. Otherwise, WPC would stop the press as soon as the stopping time increased just slightly. This extra time is referred to as "T_{bm}." The minimum value that you can set is 10 mS. The stopping time plus T_{bm} will be the stop time limit setting.

10% for old brakes, 20% for new brakes

The rule of thumb for determining the best stop time limit is to add 20% to the stopping time of your press if your brakes are new. Add 10% if your brakes are old.

Here is the reasoning behind this rule. Stopping time should be less with a new brake. So when the 20% is added to stopping time, the number should be approximately the same as the number you get when you add 10% to stopping time for an older brake.

Examples for calculating the stop time limit

Example 1: Your recorded stopping time is 207 mS and your brake is old:

Take 10% of 207: T_{bm} = .10 x 207 = 20.7 -- *round it up to 21* --

Add 21 to 207 207 + 21 = 228

228 mS is the calculated stop time limit.

Example 2: Your recorded stopping time is 175 mS and your brake is new:

Take 20% of 175: T_{bm} = .20 x 175 = 35

Add 35 to 175 175 + 35 = 210

210 mS is the calculated stop time limit.

Setting Stop Time Limit at Press Parameters

1. Select "Press Control" from the Initialization menu (Figure 4-1). TheWPC Intialization menu appears:

WPC INITIALIZATION MENU

USE THE CURSOR KEYS	USER INTERLOCKS
TO SELECT THE ITEM	PRESS PARAMETERS
YOU WISH TO SEE.	PRESS OPTIONS
PRESS ENTER TO	INPUT STATUS
ACCESS IT. PRESS	
RESET WHEN DONE.	

Figure 4-11. WPC Initialization menu

2. Select "Press Parameters." You will see this display:

PRESS CONTROL PARAMETER MENU

TOP STOP DEFLT	=	220 DEG
CARRYUP ANGLE	=	149 DEG
MICRO TIME	=	100 MSEC
MICRO ANGLE	=	185 DEG
MAIN AIR LIMIT	=	0 PSI
CNTR BAL +/-	=	0 PSI
STOP LIMIT	=	250 MSEC
START LIMIT	=	199 MSEC
SHUT DOWN LIMIT	=	5 MIN
FLYWHEEL TIMER	=	6 SEC
ACTS ANGLE	=	0 DEG

INITIALIZE PARAMETERS

USE THE CURSOR KEYS TO CHOOSE THE VALUE
YOU WANT TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE VALUE.
PRESS THE RESET KEY WHEN DONE.

Figure 4-12. "Press Parameters" display in SmartPAC's Initialization mode

3. The bar highlights the Stop Time Limit value. To change this value, press ENTER. Now the message at the bottom of the display reads

4. Use the number keys to change the Stop Time Limit. Press ENTER to accept the change. Use the cursor key to select the Start Time Limit value. Do as you did in step 2 for start time limit. Press RESET when done.

> **CAUTION**
> *Any time* you change the stop time limit on WPC, you *must* perform the 90° stop-time test, and you also must recalculate the new safety distance! Go to the next section, which explains the 90° stop-time test.

About the 90° stop-time test

The 90° stop-time test is required in order to set the proper safety distance for personnel guarding devices including light curtains, two-hand controls, and type-B movable barriers. This test is done at the press's most critical stopping point. The worst case scenario occurs halfway on the down stroke at 90° while the press is running in continuous. Therefore, WPC is designed to check stopping time at that critical crankshaft angle, and provides you the T_S value referenced in ANSI B11.1 1988.

To properly perform the 90° stop-time test, follow the steps in "Performing the 90° stop-time test" and "Calculating the safety distance", found in "Brake Monitor" in Chapter 6.

Setting the Start Time Limit at Press Parameters

Every press takes a finite amount of time from the point when the Dual Safety Valve (DSV) is energized to when the resolver signal indicates to WPC that it is turning. This elapsed time, primarily taken by the clutch mechanism, is called Start Time. WPC needs an internal limit for the start time to detect resolver drive failure.

After initialization, the start time limit defaults to 1998 mS. After the press makes its first stroke, WPC automatically resets the start time to twice the actual start time.

However, if you want to set the start time manually, follow the steps below.

1. Select "Press Control" from SmartPAC's Initialization menu (Figure 4-1). The WPC Initialization menu (Figure 4-2) appears.
2. Select “Press Parameters.” You will see a display similar to Figure 4-12. Use the cursor keys to select "Start Limit." Notice the value for Start Time Limit will be highlighted.
3. To change this value, press ENTER. Change the value using the number keys and then press ENTER to accept the change. (For assistance in using the number keys, refer to Chapter 3.) Press RESET when done.

Note: *If you manually set the start time limit, you should normally use a value at least 40% greater than the measured start time of your press.*

Example: *Your measured start time is 250 mS. You want to set a start time limit 40% greater than the measured time.*
Take 40% of 250: = 0.40 x 250 = 100
Add 100 to 250 250 + 100 = 350 mS.

Setting up the Top Stop "ON" Angle and determining the correct test angle for the Overrun Limit Switch

> **WARNING**
> **Overrun Limit Switch location must be correct to ensure operator safety**
>
> You must install the overrun limit switch (explained in Chapter 2) at a proper location if you have one of the following versions: 2-Hand control without light curtains, light curtains with muting, or PSDI.
>
> Proper installation of the overrun limit switch ensures that if the top stop timing fails, a hazardous situation will not occur on the downstroke. The overrun limit switch must be mounted <u>as</u> <u>close</u> <u>as</u> <u>possible</u> after the top stop "on" angle as per the table in the next section, "Setting "Press Options" to test the overrun limit switch."

We use the overrun sensor and magnet (which both make up the overrun limit switch) to provide overrun timing to WPC. Overrun timing is solely dependent upon the proper installation of the overrun limit switch. A function of the stopping time of the press, overrun timing provides a backup for top stop timing and is influenced by the condition of the brake linings and the press speed. Should the top stop output relay fail, the overrun limit switch will provide the signal to stop the press. If the overrun limit switch isn't properly installed, overrun timing in WPC will not work.

The overrun limit switch location is dependent upon the Top Stop Angle. You can determine and set the Top Stop Angle before installing the overrun limit switch. You cannot run the press in CONT (continuous) or SINGLE STROKE modes without the overrun limit switch. However, you can inch the press.

> **IMPORTANT**
>
> For a variable speed press, you need to know the latest Top Stop Angle. Typically that would be at the slowest speed resulting in the shortest stopping angle / time.

1. Select "Press Control " from SmartPAC's Initialization menu (Figure 4-1). The WPC Initialization menu appears (Figure 4-2). Select “Press Options.” Confirm that program select switch #7 is set to "OPEN" in order to provide "TOP STOP IN INCH" mode.

   You must also confirm that program select switch #4 is in the "OPEN" position to disable the "Auto Compensated Top Stop" feature. Press RESET to return the WPC Initialization menu.
2. Select "Press Parameters" from the WPC Initialization menu (Figure 4-2). Make sure that "Micro Angle" is set at 185°, which means that Micro-inch is *disabled*.
3. Press RESET until you see the Main Initialization menu. Switch the Program/Run key to "Run." If the display says, "No tool loaded", go to step 4. Otherwise, go to step 5.

4. Switch the Program/Run key to "Program." Create a new tool (you may need to refer to Chapter 5 to do this). You only need to program one of the counters in SmartPAC. When done, load the new tool, and switch to "Run."
5. Select "Press Control" from the Run mode. Notice the value of the Top Stop Angle is highlighted. Press ENTER to change. To adjust the number, press the UP or DOWN cursor keys as necessary. You must press RESET to activate any changes made to the Top Stop Angle.

   From this screen, you can also view the overrun *unzeroed* on/off angles (as determined during the overrun limit switch installation in Chapter 2. Press the F2 function key ("OVR").

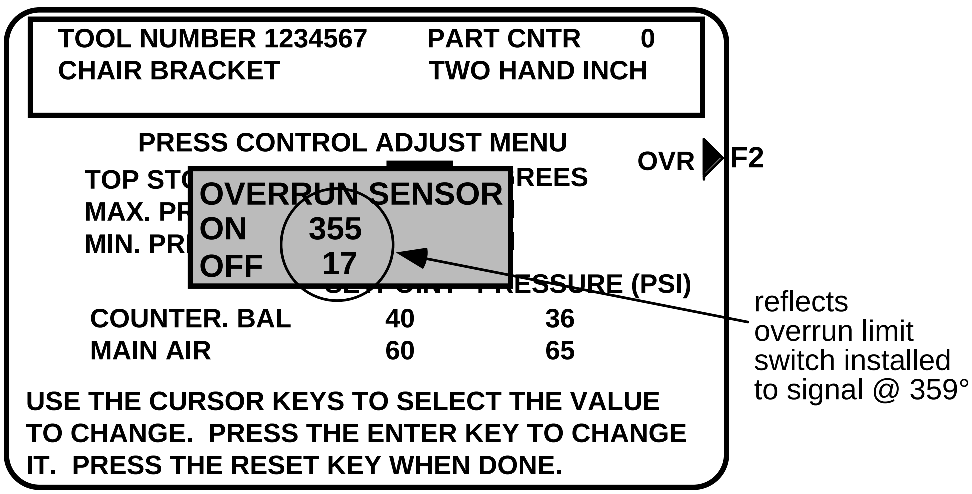


Figure 4-13. View Overrun "on" and "off" angles in Run mode

   Watch the screen as you jog the press while in Continuous mode to see the "on" and "off" angles. These angles correspond directly with one of the four unzeroed angles you selected for the overrun limit switch (270°, 300°, 330°, or 359°) in Chapter 2.

6. Keep the stroke select in INCH. Press both the INCH/RUN switches throughout the stroke until the press top-stops.
7. Note the crankshaft angle value in degrees shown in the LED display. Advance or retard your Top Stop Angle value based upon where the press stopped at top, by repeating the previous steps.
8. Once you have determined the Top Stop Angle, you need to set the Top Stop Default angle in the Initialization menu, based on the <u>unzeroed</u> resolver angle for the overrun limit switch (Chapter 2). Inch the press to the Top Stop Angle that you determined.
9. Now go back to the Main Initialization menu (Figure 4-1). Select “Press Control.” The WPC Initialization menu appears, Figure 4-2. Select "Press Parameters.” A menu like Figure 4-12 appears. Notice that the value of the Top Stop Default angle is highlighted. Press ENTER. Using the number keys, change it to the same angle as the Top Stop Angle and then press ENTER. Press RESET twice to return to the Initialization menu.

Now anytime that you create a new tool number, this value will automatically be set in the Top Stop Angle.

10. Select "Resolver zero." This automatically displays the unzeroed resolver angle, which is the true crankshaft angle position before the resolver has been "zeroed",
11. *Refer back to the section "Installing the overrun limit switch" in Chapter 2 of this manual to properly install the overrun sensor and magnet.* Remember to use the selections you have just determined.

WHEN DETERMINING TOP STOP ANGLE!

Keep in mind that the Top Stop Angle has an internal 20° dwell associated with it. In other words, the internal top stop timing actually turns off 20° *after* the Top Stop Angle that you set. This internal top stop timing must turn off completely before the overrun limit switch turns on.

If the top stop timing and the overrun limit switch are ON simultaneously, an "80 series" error code will appear (see Chapter 7).

Setting "Press Options" to test the overrun limit switch

WPC checks that the overrun limit switch is closed at a precise angle on every stroke. The switch settings #1 and #2 are used by WPC to perform the overrun closure test. In Chapter 2, you chose the proper *unzeroed resolver* angle settings from one of these choices: 270°, 300°, 330°, or 359°. If not done already, record them below. Remember that the overrun limit switch must have been mounted as close as possible after the latest top stop angle as per the table below. Setting these switches is explained in the section "Setting WPC switches using SmartPAC's Press Options" later in this chapter. *To enable these settings, you must remember to power SmartPAC down, then up:*

Top Stop Angle	Less than 240°	241° to 270°	271° to 300°	More than 301°	Your selection
Overrun Limit Switch location	270°	300°	330°	359°	
Switch Setting 1 Switch Setting 2	CLOSED CLOSED	CLOSED OPEN	OPEN CLOSED	OPEN OPEN	

Be sure to record your selection!

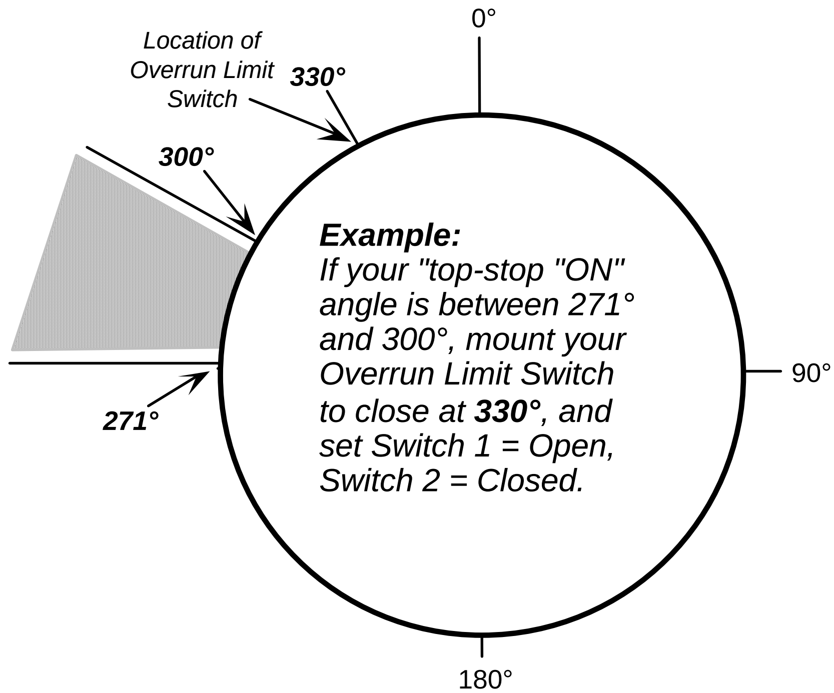


Figure 4-14. Illustration of overrun timing

Setting Auto Carry-up Angle

Auto Carry-up is another name for operator station mute. Auto Carry-up bypasses the operator station during the non-hazardous portion of the stroke. When the operator releases his hands from the palm buttons, the press automatically completes the stroke and stops at TDC. So in order to properly set the Auto Carry-up Angle value (in degrees), you need to know at what point it is safe to let the operator's hands release from the palm buttons.

In order to determine Auto Carry-up, you need to know at what crank angle the die closes. Pinch points which are less that 1/4" (6 mm) are considered non-hazardous to the operator. You need to determine at what crank angle the pinch points are less than 1/4" (6 mm) open.

> **WARNING**
>
> **Auto Carry-up timing must be correct to ensure operator safety**
>
> The Auto Carry-up switch triggers the operator station mute feature when the press is operated in single stroke mode. Auto Carry-up means that the press will run until top stop if the palm buttons are held until approximately bottom dead center of the stroke.
>
> Auto Carry-up is factory set at 120°. Therefore, the operator can release the palm buttons at 120° (or later) and the ram will automatically complete the stroke. With large presses where the stroke length is large and press speed is slow, you must ensure that the operator cannot release the buttons and reach the pinch point before bottom dead center. This applies only when two-hand control is used to safeguard the point of operation and only if any opening allowing access to the pinch point is 1/4" (6 mm) or larger. *If the operator can reach the pinch point, the Auto Carry-up Angle must be set greater than 120°.*

1. Go to the SmartPAC's Main Initialization menu (Figure 4-1), and select "Press Control." The WPC Initialization menu appears. Select “Press Parameters." Use the cursor keys to highlight "Carry-up Angle" in the display shown below. Then press ENTER to select.

PRESS CONTROL PARAMETER MENU

TOP STOP DEFLT	=	220 DEG
CARRYUP ANGLE	=	149 DEG
MICRO TIME	=	100 MSEC
MICRO ANGLE	=	185 DEG
MAIN AIR LIMIT	=	0 PSI
CNTR BAL +/-	=	0 PSI
STOP LIMIT	=	250 MSEC
START LIMIT	=	199 MSEC
SHUT DOWN LIMIT	=	5 MIN
FLYWHEEL TIMER	=	6 SEC
ACTS ANGLE	=	0 DEG

INITIALIZE PARAMETERS

USE THE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE VALUE.
PRESS THE RESET KEY WHEN DONE.

Figure 4-15. Selecting "Auto Carry-up Angle"

2. Now use the number keys to enter the new value, and then press ENTER.
3. Press RESET twice when you are done, and you will return to the Initialization menu.

Setting Micro-Inch Time and Angle

Now we are going to set Micro-inch Time and Micro-inch Angle (also known as "Micro-inch ON Angle"). Micro-inch time is the amount of time *in milliseconds* that the Dual Safety Valve is open when the Inch stroke is selected. In this mode, you determine how long the ram will travel once the RUN/INCH switches on the operator station are pressed. The value you select can range from 6 to 600 milliseconds. The press operates the same way that it does during TOP STOP INCH. However, no matter how long the switches have been pressed, the clutch is engaged for the time that you set at SmartPAC. You can stop the ram before the set time by releasing the switches. To jog the ram through a complete stroke, press and release the RUN/INCH switches as often as necessary.

Micro-inch Angle is the crank-angle position at which you want Micro-inch to commence, when enabled. The Micro-inch Angle can be set at any angle. A setting of 185° (default value) will result in turning OFF — disabling — Micro-inch. Conversely, a setting of 186° will turn Micro-inch ON all the time. Here is an example of how to set Micro-inch Angle. If you set the Micro-inch Angle to 300°, the press will automatically micro-inch from 300° to 185°. Normal inching resumes from 185° to 300°.

> **NOTE**
> If an interrupted stroke occurs, WPC automatically switches to TWO HAND MAINTAINED SINGLE STROKE, no matter if Micro-inch or top stop bypass has been enabled. See Chapter 7 for an explanation of "Interrupted stroke."

1. If you are not already there, get into SmartPAC's Initialization mode (Figure 4-1), and select "Press Control." In the WPC Initialization menu that appears, select "Press Parameters." Use the cursor keys to first highlight "Micro Time" in this display. Then press ENTER to select.

```
PRESS CONTROL PARAMETER MENU

TOP STOP DEFLT     =    220 DEG
CARRYUP ANGLE      =    149 DEG
MICRO TIME         =    100 MSEC
MICRO ANGLE        =    185 DEG
MAIN AIR LIMIT     =      0 PSI
CNTR BAL +/-       =      0 PSI
STOP LIMIT         =   250 MSEC
START LIMIT        =   199 MSEC
SHUT DOWN LIMIT    =      5  MIN
FLYWHEEL TIMER     =      6 SEC
ACTS ANGLE         =      0  DEG
      INITIALIZE PARAMETERS

USE THE CURSOR KEYS TO CHOOSE THE VALUE
YOU WANT TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE VALUE.
PRESS THE RESET KEY WHEN DONE.
```

Figure 4-16. "Micro-Inch" display

2. Use the number keys to make your selection, and then press ENTER.

3. Use the cursor keys to select "Micro Angle", and repeat step 2. Press RESET when done.

Setting Main Air and Counterbalance Limits (optional)

Instead of pressure switches, you can optionally use pressure sensors to set, monitor, and view both system air and counterbalance pressure levels. You can set a minimum lower limit for your main system air pressure. If the main system air pressure drops below the limit, an error message "F45" (Main system air below sensor limit) appears on the display. Refer to Chapter 7 for more on this error message. A main air value of 0 set in Initialization disables the main system air limit entirely, and the level is not displayed in SmartPAC's Adjust mode.

You can also set up tolerance to monitor your press's counterbalance pressure level. Counterbalance air pressure is used to compensate for customary variations in upper die weights. The target setpoint can be tied to a tool number in SmartPAC's Programming mode. To program the setpoint value, refer to "Making WPC Settings in SmartPAC's Programming mode" in Chapter 5. A tolerance value of 0 set in Initialization disables the counterbalance limits altogether, and are not displayed in SmartPAC's Programming and Adjust modes.

Here is an example of how it works: We set the counterbalance tolerance (Cntr. Bal. Diff. +/-) to 5 PSI in Initialization. And we program tool #1's counterbalance setpoint to 40 PSI in SmartPAC's Programming mode. This means that our counterbalance air pressure levels cannot deviate outside the range of 35 to 45 PSI whenever the press is at or passing through "0" degrees or Top Dead Center (TDC). It is acceptable for the counterbalance air pressure to vary outside the limits at Bottom Dead Center (BDC). If the counterbalance air pressure limits at TDC has deviated, error message "F46" (Counterbalance air outside sensor limits) appears on the display. See Chapter 7 for more on this message.

1. If you are not already there, get into SmartPAC's Initialization mode, and select "Press Control.” In the WPC Initialization menu that appears, select “Press Parameters." Highlight and select "Main Air Limit" (see Figure 4-13). Then press ENTER.
2. Use the number keys to set the value, and then press ENTER to confirm your selection.
3. Use the cursor key to highlight "Cntr. Bal. Diff + / -." Press ENTER to select.
4. Repeat step 2 for "Cntr. Bal. Diff + / -."
5. Press RESET when you are done to exit back to the Initialization menu.

Note: *If you use RamPAC to control the counterbalance pressure, you must use a counterbalance pressure switch with the WPC. See “Installing air pressure & counterbalance switches instead of air pressure sensors” in Chapter 2.*

Setting Shutdown and Flywheel Timer Limits (optional)

You can set two other optional features under “Press Control.” They are "Shutdown Limit" and "Flywheel Timer."

Description of Shutdown Limit

IMPORTANT
The Auto Compensated Top Stop ("ACTS") firmware option for WPC is required for "Shutdown Limit" to function. ACTS is explained in the section "Setting WPC switches at "Press Options" later in this chapter.

When the DSV is closed, the press is not actually running but the motor may still be on. Therefore, you set a Shutdown Limit (in minutes, ranging from 0 to disable this limit to 100 minutes) at "Press Parameters" in SmartPAC Initialization. WPC keeps track of how long the motor has been on while the press was not operating. If the DSV has not been re-energized in that time frame, WPC stops the motor and flashes an error message (#F10) to let you know. See Chapter 7 for details on this message. Note: The lockout relay must be wired to the motor starter (see "Wiring the lockout relay" in Chapter 2).

Description of Flywheel Timer (optional hardware required)

With Flywheel Timer, WPC prohibits starting the motor in the reverse direction or activating the Bar mode while the flywheel is still turning. With this feature, WPC monitors the flywheel movement. A flywheel speed sensor, including an LMCS and two magnets mounted on the flywheel, detects approximately how long it takes for the flywheel to turn one revolution. As the flywheel slows down, the amount of time it takes for one revolution increases.

You set a Flywheel Timer (in seconds ranging from 0 to disable this limit up to 60 seconds) at "Press Parameters" in SmartPAC Initialization to indicate the slowing down of the flywheel sufficiently.

Here is an example of how it works: If your press is running at 60 SPM, the amount of time that it takes for one revolution would be 1 second. As the press slows down to 3 SPM, this time increases to 20 seconds. Therefore in this example, if you select "20 SEC" as your Flywheel Timer, WPC will not allow you to reverse the motor or bar the press until the flywheel has slowed down to less than 3 SPM. Similarly this limit also prevents you from changing the motor from reverse to forward direction until the flywheel has slowed down less than 3 SPM. Here is how you set Flywheel Timer and Shut Down Limit.

1. If you are not already there, get into SmartPAC's Initialization mode (Figure 4-1) and select "Press Control.” In the WPC Initialization menu that appears, select “Press Parameters."
2. Use the cursor key to highlight "Shut Down Limit." Press ENTER to select it.

PRESS CONTROL PARAMETER MENU

TOP STOP DEFLT	=	220 DEG
CARRYUP ANGLE	=	149 DEG
MICRO TIME	=	100 MSEC
MICRO ANGLE	=	185 DEG
MAIN AIR LIMIT	=	0 PSI
CNTR BAL +/-	=	0 PSI
STOP LIMIT	=	250 MSEC
START LIMIT	=	199 MSEC
SHUT DOWN LIMIT	=	5 MIN
FLYWHEEL TIMER	=	6 SEC
ACTS ANGLE	=	0 DEG

INITIALIZE PARAMETERS

USE THE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE VALUE.
PRESS THE RESET KEY WHEN DONE.

Figure 4-17. "Press Parameters" screen displaying "more" selections

3. Use the number keys to set the value, and then press ENTER to confirm the value.
4. Now select "Flywheel Timer."
5. Use the number keys to set the value, and then press ENTER.
6. Press RESET twice to return to the Main Initialization menu.

Setting the ACTS Angle

The Auto Compensated Top Stop ("ACTS") firmware option for WPC is discussed in the next section, "Setting WPC switches using Press Options." Refer specifically to the description at "switch 4." In most variable speed applications, the ACTS angle should be set at 0° (the default value). However, there are exceptions. In top knock-out applications, the angle might be set after 0°, while in some high-speed applications, the angle setting might be set before 0°. SmartPAC will only allow you to enter the ACTS angle setting between 330° and 30°. See Figure 4-17 to see "ACTS angle." For technical assistance, contact the factory.

Setting WPC switches at "Press Options"

There are several switch settings that you need to make so that the integration is fully operational. These changes are made right at the SmartPAC keypad. *The steps that you need to follow to program these settings are explained in the next section "How to make Press Option settings at SmartPAC."* Read the description below of each switch setting, in order to select the appropriate state (either OPEN or CLOSED). To make the settings, see “Setting switches” later in this chapter.

REMEMBER

Any time that you make switch setting changes after initialization, be sure that you power down your SmartPAC with WPC, and then power it up again to enable these changes.

Switches 1 and 2 — Overrun limit switch setting

There are four combinations that you can make to set the overrun limit switch. Choose the proper *unzeroed resolver* angle settings: 270°, 300°, 330°, or 359°, and record them below. Remember that the overrun limit switch must be mounted as close as possible after the latest top stop angle as per the table below. *See the section "Setting up the Overrun Limit Switch" in order to determine the correct angle settings.*

Top Stop Angle	Less than 240°	241° to 270°	271° to 300°	More than 301°	Your selection
Overrun Limit Switch location	270°	300°	330°	359°	
Switch Setting 1 Switch Setting 2	CLOSED CLOSED	CLOSED OPEN	OPEN CLOSED	OPEN OPEN	

Be sure to record your selection!

Switch 3 — One-hand Control or Foot Switch

If you are using either the One-hand Control switch or Foot switch, Switch 3 changes functionality of one of these options installed with your WPC.

In **One-hand mode**, the One-hand Control switch can be used instead of the operator station to single stroke the press. When Switch 3 is set to "CLOSED", this activates Light Curtain Break mode, so that the press runs only after you remove your hands from the light curtain and push the One-hand Control switch within eight seconds. Otherwise, the press will not start. The light curtain must be broken again before you can initiate the next stroke. When Switch 3 is set to "OPEN", One-hand Control is enabled all the time, just like the One-Hand control on your operator station. This allows you to initiate a single stroke every time you push the One-hand Control switch.

If you are using **Foot Switch mode**, Switch 3 enables either Foot Trip or Foot Control. Set Switch 3 to "OPEN" for Foot Trip, so the press runs for one stroke after you depress the Foot Switch. Set Switch 3 to “CLOSE" for Foot Control. In Foot Control, you must depress and **hold** the Foot Switch through the Auto Carry-up Angle to single stroke the press. If you release the Foot Switch early, the press stop command is issued immediately.

Switch 3:	***One-hand Control***	***Foot Switch***
OPEN—	*One-hand Control active all the time*	*Normal operation (Foot Trip)*
CLOSED —	*One-hand Control active only for 8 sec. after light curtain is broken*	*Enables Foot Control— depress and **hold** foot switch*

Switch 4 — Auto Compensated Top Stop ("ACTS") enabled (optional)

Set this switch to CLOSED to activate the "Auto Compensated Top Stop" feature. Set to "OPEN" to run the press in normal mode.

This feature is specifically designed for variable speed presses. WPC assumes that the Top Stop Angle (programmed previously) is set at the slowest speed resulting in the shortest stopping angle (if necessary, refer to "Setting up the Top Stop Angle and determining the correct test angle for the Overrun Limit Switch" earlier in this chapter). As the press runs faster, the stopping angle increases. Auto Compensated Top Stop (ACTS) notices when the press has not stopped at top, and compensates the Top Stop Angle by advancing its position. ACTS cannot advance beyond 211 degrees (the same limit as with the manual Top Stop Angle setting). ACTS will require a few top-stops so that the press stops as close to 0° as possible (or the angle position you set at "Press Parameters"). See "Setting ACTS angle located just before this section). ACTS will also compensate against a longer stopping angle due to brake wear.

It is, therefore, critical to set your brake monitor correctly so that the Brake Warning feature gives you advance notice for proper brake maintenance.

If you only wish to use ACTS without WPC's "Auto Advance" feature, be sure to set your "Top Stop Constant" to a value of zero. For more information on Top Stop Constant, see "Setting Auto Advance Constants, Top Stop Constant, and Slow RPM."

Switch 4: *OPEN— normal operation*
CLOSED — "Auto Compensated Top Stop" feature enabled

Switch 5: Unused

Switch 6 — Dual light curtain enabled

Set to CLOSED if you have two light curtains connected to WPC.

Switch 6: *OPEN — normal operation — single light curtain*
CLOSED — Dual light curtains enabled

Switch 7 — Top Stop in Inch enabled

With this switch OPEN, only one stroke can be made in INCH mode without having to reinitiate the stroke. With it CLOSED, the press will run continuously as long as the RUN/INCH switches are pressed.

If Micro-inch is selected, you may not notice the top stop function. During an interrupted stroke, WPC automatically switches to the Two Hand Maintained Single Stroke mode and stops at top stop no matter how Switch 7 is set.

Switch 7: *OPEN — Top-stops in INCH mode*
CLOSED — Does not top stop in INCH mode

Switch 8 — Auxiliary 1 functionality

The setting of this switch affects the functionality of WPC auxiliary 1 output. Refer to "Wiring auxiliary 1 output" in Chapter 2 of this manual.

Auxiliary output 1 is not control reliable!

Auxiliary 1 referenced here is NOT control reliable and cannot be used to protect personnel from a moving hazard. However, it can be used as a convenience to interface automation.

Initializing "Press Option" settings at SmartPAC

Setting switches

1. From SmartPAC Initialization (Figure 4-1), select "Press Control." The WPC Initialization menu appears. Select "Press Options." "SW1" (for Switch #1) will be highlighted on the new display.

```
            PRESS CONTROL OPTION SWITCH MENU
                                         SW 1  =  OPEN
USER CURSOR KEYS TO                      SW 2  =  OPEN
SELECT THE SWITCH.                       SW 3  =  OPEN
PRESS ENTER TO CHANGE.                   SW 3  =  OPEN
PRESS RESET WHEN DONE.                   SW 4  =  OPEN
                                         SW 5  =  OPEN
                                         SW 6  =  OPEN
                                         SW 7  =  OPEN
                                         SW 8  =  OPEN
      DUAL OPERATORS    = NOT USED
      AUTOMATIC S.S.    = DISABLED
      INCH SETUP MODE   = ENABLED
      TWO HAND ONLY     = DISABLED
NOTE: You must power down and up the press control to
make the Switch changes become effective.
```

Figure 4-18. "Press Options" display

2. Notice that it is showing a particular state — OPEN. Press ENTER to toggle the state to either "CLOSED" or back to "OPEN", depending upon your application (see previous section "Description of Switch Settings."
3. Once you have set the correct state for SW1, press RESET once to confirm that selection. Use the cursor keys to select "SW2."
4. Repeat steps 2 and 3 for the remaining switches (SW2 through SW8).
5. If you are done, press RESET to return to the main menu. If not, proceed to "Setting operator mode settings" below.

> **REMEMBER**
> Make sure that you program all eight switches properly at SmartPAC. Any time that you make switch setting changes after initialization, be sure that you power down your SmartPAC with WPC, and then power it up again to enable these changes.

Setting operator mode settings

From the same screen (Figure 4-18), you can also set specific operator mode settings, including Dual Operators, Automatic Single Stroke, Inch Setup Mode, and Two Hand Only.

Dual Operators

1. You initialize "Dual Operators" when you have two or more operator stations wired to WPC. Installation of Dual Operator Stations is discussed in Chapter 2 of this manual. Press ENTER to toggle to the appropriate choice, explained below.
2. Setting to "Screen Mode": This choice lets you enable station A, B, or Both by using SmartPAC's LCD display in Run mode.
3. Setting to "Remote Switch." If you have wired a three-position switch to WPC, choose "Remote Switch." This means that an external switch (for instance, D.I. part no. 4256601) can be used to switch from one station to another or both.
4. Setting to "Not used." This choice disables the "Dual Operators" option. SmartPAC should be set in this way if only one operator station is wired to WPC.
5. Use the "down" cursor key to highlight the next selection, "Automatic S.S.", or press RESET to exit.

Automatic Single Stroke

1. You initialize "Automatic S.S." when you wish to enable Automatic Single Stroke. Automatic Single Stroke allows the operator to automate a manual press using a feeding device or robot. Installation of Automatic Single Stroke (also known as External Trip) is discussed in Chapter 2 of this manual, and activating this option in Run mode for one or more operator stations is discussed in Chapter 6.
2. Press ENTER to toggle from "Disabled" to "Enabled." Remember that if you set it for "Disabled", the Automatic Single Stroke choice will not be available in the Mode Select Menu.
3. Use the "down" cursor key to highlight the next selection, "Inch Setup Mode", or press RESET to exit.

Inch Setup Mode

1. You initialize "Inch Setup Mode" to enable the Setup Mode when there is an Interrupted Stroke present or while inching in INCH stroke. In Setup Mode the green sensors are disabled in DiProPAC and the repeatability and low setpoints are disabled in AutoSetPAC.
2. Press ENTER to toggle from "Disabled" to "Enabled."
3. Use the "down" cursor key to highlight "Two Hand Only", or press RESET to exit.

Two Hand Only

1. *This selection affects only the WPC controls installed with Shadow V light curtains. One Hand and Foot modes are not available when there is no Shadow V installed.*

   You initialize "Two Hand Only" to make WPC a Two Hand Only control. Enabling this choice means that the other operating modes — One Hand and Foot — are not available.
2. Press ENTER to toggle from "Disabled" to "Enabled." Press RESET to exit.

Setting User Interlocks for Customized Status Codes

> **User Interlocks are not control reliable!**
>
> The user interlocks that you set are NOT control reliable and cannot be used to protect personnel from a moving hazard. They however can be used as a convenience to interface automation.

WPC provides you with up to eleven user-installed customized status codes which you can use to monitor auxiliary press functions, such as lubrication systems. When any of these functions issues a stop command, a unique status code is displayed at SmartPAC's LED display and a descriptive message appears at the LCD display. The specific information that you set here will be included in the status code message (see Chapter 7). As a help to troubleshooting and installation, you can also display the status of the interlocks from Initialization mode. See "Using the WPC Input Status Display" in Chapter 7.

Refer to Table 4-1 at the end of this section as you make the appropriate settings in SmartPAC (see the next section). You need to determine the type of stop (E-Stop, Top Stop, Lockout, or unused) that you want to program for each of these press functions. *The default is "ESTOP." All unused inputs must be set to "UNUSED."* You can also select a specific name from the list of function names provided.

1. From SmartPAC Initialization (Figure 4-1), select "Press Control." The WPC Initialization menu appears. Select "User Interlocks ." The display appears similar to:

```
PRESS CONTROL USER INTERLOCK MENU

    USER  1 = UNUSED UNNAMED
    USER  2 = UNUSED UNNAMED
    USER  3 = UNUSED UNNAMED
    USER  4 = UNUSED UNNAMED
    USER  5 = UNUSED UNNAMED
    USER  6 = UNUSED UNNAMED
    USER  7 = UNUSED UNNAMED
    USER  8 = UNUSED UNNAMED
    USER  9 = UNUSED UNNAMED
    USER 10 = UNUSED UNNAMED
    USER 11 = UNUSED UNNAMED

USE THE CURSOR KEYS TO CHOOSE THE USER
STOP TYPE YOU WISH TO CHANGE.
PRESS THE ENTER KEY TO CHANGE THE USER
STOP TYPE
PRESS THE RESET KEY WHEN YOU ARE DONE.
```

Figure 4-19. "User Interlocks" display

2. Notice that "UNUSED" is highlighted for "USER 1." Press ENTER repeatedly, and the entry toggles from "TSTOP" (Top Stop) to "ESTOP" (Emergency Stop) to "LOCKT "(Lockout — discussed in Chapters 2 and 7) and then back to "UNUSED."
3. Once you have set the stop type for USER 1, press the right cursor key to scroll to USER 1's name. Notice that "UNNAMED", is now highlighted. Press ENTER.

SELECT STOP TYPE	UNNAMED
	CUSTOM NAME
	BEARING TEMP.
USE THE CURSOR KEYS	CHAIN BREAK
TO TO MAKE SELECTION.	CONVEYOR
PRESS ENTER TO SET.	COUNTER BAL.
RESET WHEN DONE.	DIE NITROGEN
	DIE PROTECTION
	DUAL VALVE
	END OF STOCK
	FEEDER
	HIGH AIR PRES.
	HIGH LOOP
MORE NAMES ▼	HIGH OIL PRES.
	HYDRAULIC OVLD
	LOAD MONITOR

Figure 4-20. "Select Stop Name" display

4. You will see a screen like the one above. Use the down cursor key to scroll to the appropriate name. Press ENTER to select that name.
5. You are now returned to the "User Interlocks" display (Figure 4-19). Use the cursor keys to position the highlight bar on USER 2's "ESTOP."
6. Repeat steps 2 through 6 for the remaining items on the screen.
7. When you are completely done, press RESET twice to return to the Main Initialization menu.

Table 4-1. Setup table for auxiliary equipment

USER INTERLOCK	INDICATE STOP TYPE	WIRE BETWEEN	STATUS CODE	NAME OF AUX. EQUIP.
User #1		21 and +24 VDC	51	
User #2		82 and +24VDC	52	
User #3		71 and +24 VDC	53	
User #4		83 and GROUND	54	
User #5		72 and GROUND	55	
User #6		84 and GROUND	56	
User #7		73 and GROUND	57	
User #8		85 and GROUND	58	
User #9		74 and GROUND	59	
User #10		86 and GROUND	50	
User #11		18 and GROUND	49	

Using the ProCamPAC Initialization menu choices

Select cam names (optional)

If your SmartPAC is equipped with ProCamPAC, you can provide individual names for each of your cam channels to adequately describe their function. You can name up to 16 cam channels depending upon your SmartPAC configuration.

1. Select "Select cam names." You will see this display (shows 16 channels to be named):

```
CAM CHANNEL        CHANNEL 1   UNNAMED
NAME MENU          CHANNEL 2   UNNAMED
                   CHANNEL 3   UNNAMED
                   CHANNEL 4   UNNAMED
                   CHANNEL 5   UNNAMED
                   CHANNEL 6   UNNAMED
                   CHANNEL 7   UNNAMED
                   CHANNEL 8   UNNAMED
                   CHANNEL 9   UNNAMED
                   CHANNEL 10  UNNAMED
                   CHANNEL 11  UNNAMED
                   CHANNEL 12  UNNAMED
                   CHANNEL 13  UNNAMED
                   CHANNEL 14  UNNAMED
                   CHANNEL 15  UNNAMED
                   CHANNEL 16  UNNAMED

USE CURSOR KEYS TO SELECT THE CHANNEL.
PRESS ENTER TO CHANGE THE NAME.
PRESS RESET WHEN DONE.
```

Figure 4-21. "Select cam names" display

Note: *Notice that we are illustrating 16 cams. Depending upon the way that your SmartPAC has been configured (with ProCam 8 cams or with ProCam 16 cams), your display may vary. We are showing the complete ProCamPAC.*

2. You can name any channel by selecting it. You will see the following display. Notice that each cam channel is "unnamed." When you start, notice that the display highlights channel 1. Usually you will want to give the channel a name that best describes its function; so first check the list for a suitable name. However, if you wish, you can leave it unnamed, and move onto the next channel.
3. To see the complete list of names press the "down" cursor key until the bottom name on the list is highlighted, then keep pressing it. A new name will appear each time you press the key.

SELECT NAME FOR
CAM CHANNEL 1

USE THE CURSOR KEYS
TO CHOOSE A NAME.
PRESS THE ENTER
KEY TO SELECT THE
NAME.
PRESS THE RESET
KEY WHEN DONE.

MORE NAMES ▼

UNNAMED
"CUSTOM" NAME
ACTIVATE GAG
ADVANCE SLIDE
ANTI-BACK REL.
BYPASS 1
BYPASS 2
CONVEYOR
CUTOFF
FEED ADVANCE
FEED COMPLETE
FEED ENABLE
INSPECT DEV 1
INSPECT DEV 2
OUTLET 1
OUTLET 2

Figure 4-22. Selecting cam name for "channel 1"

4. If you do not find a suitable name but you still want to name the cam, you can select " 'Custom' Name", by highlighting it and pressing ENTER.
5. As the screen suggests (see the detailed explanation and illustration in Chapter 3), certain keys enable you to custom name the tool. Your names can be any combination of alpha-numeric characters, symbols, etc. Pressing the CLEAR key clears the text. To make other entries, do the following:

    a. To key in <u>letters</u>: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press ENTER.
    b. To key in <u>numbers</u>: Use the number keypad; then press ENTER.
    c. To accept your selection, press function key **F6** (to the right of the LCD display). To cancel your selection, press RESET. (For assistance in using the various keys, refer to Chapter 3.)

6. After you have named channel 1, you will be returned to the previous menu where channel 2 automatically is highlighted for you. You can select a name for it. Continue in this manner until all your cam channels have been named.
7. When you are completely done, press RESET to return to the Main Initialization menu.

NAMING CAM CHANNELS IN INITIALIZATION

Whatever name you select for the cam channel in Initialization is set for that channel number *no matter* what tool you program. For instance, if you "custom-named" channel 1 as "bypass 3", then channel 1 will always be "bypass 3" in the Programming mode for every tool loaded.

The display showing your channels will not change to show the new channel names. It will always say "channel 1," "channel 2," etc. This is so that you always know which channel you are naming. However, the actual channel names will appear in Program and Run modes along with their respective channel numbers.

Setting Auto Advance Constants, Top Stop Constant, and Slow RPM

You use this choice in the Initialization menu to set two auto advance constants and one top stop constant to accommodate up to three press auto advance functions. Some cam functions, other than top stop, that may use auto advance are feed advance, conveyors, pilot release, advance slide, and part lube. This feature works best on presses that have speed ranges of several hundred to over a thousand strokes per minute. Advance constant is equal to the number of degrees of advance per 100 RPM increase in press speed. One of the nicest things about the auto advance feature in SmartPAC is that it is adjustable *while the press is running*. In other words, you can enter auto advance constants and a slow RPM value, and then run your press while you are in Initialization to see how accurate they are. If you need to, you can tweak the values until you get them right. This is especially useful when determining the auto advance constant for press feed functions, for instance, since you must use "trial and error."

Advance constant is equal to the number of degrees of advance per 100 RPM increase in press speed… ***Advance Constant = # degrees /100 RPM***

To calculate the auto advance constant for top stop, follow these steps:

1. Determine the fastest press speed (**RPM_a**) and the angle at which the press stops at this speed (**A_a**).
2. Determine the slowest press speed (**RPM_b**) and the angle at which the press stops at this speed (**A_b**).

> **NOTE**
> If either stopping angle occurs after 0° (or 360°), then add 360° to the angle. For instance, 12° would really be 12°+360° or 372°.

3. Subtract the two angle values. We will call this result "**A_c**."

$$A_a - A_b = A_c$$

4. Subtract the two press speeds. We will call this result "**RPM_c**."

$$RPM_a - RPM_b = RPM_c$$

5. Divide **A_c** (the difference between the angles) by **RPM_c** (the difference between the press speeds), and multiply that value by 100. That is the number of degrees per 100 RPM.

$$\frac{A_c}{RPM_c} \times 100 = \#^\circ / 100\ RPM$$

Example for calculating the auto advance setting:

Your slowest speed is 50 RPM and the stopping angle is at 325°.

Your fastest speed is 100 RPM and the stopping angle is at 350°.

Subtract 100 RPM from 50 RPM… ***100 - 50 = 50***

Subtract 350° from 325… ***350 - 325 = 25***

Divide the difference in angles by the difference in RPM, and multiply this by 100. 50° is your advance constant.

25 / 50 x 100 = 50.00 ==> 50° / 100 RPM

LIMIT ON AUTO OUTPUT SETTINGS

You can make up to two "auto" output settings in Program mode. The first advance constant that you set in Initialization affects the first channel that you set as "auto" in Program mode, and likewise the second advance constant affects the second "auto" output setting. It does not matter which channel numbers you set as "auto", so long as you do not set more than two of them.

See "Selecting a channel and making an auto output setting" in Chapter 5 for more information about making auto output settings.

IMPORTANT TO SET SLOW RPM

When you determine the correct auto advance constant, you also need to identify the "Slow RPM", or the slowest speed at which you will run your press. SmartPAC uses that value as a starting point to begin the auto advance process. If the incorrect number was entered in "slow RPM", SmartPAC would not auto advance certain press functions at the right time.

1. Confirm that program select switch #4 is "OPEN" to disable the "Auto Compensated Top Stop" feature (refer to "Setting WPC switches using SmartPAC's Press Options").
2. To set the auto advance constants, top stop constant, and slow RPM, select "Auto Advance" from the Initialization menu. You will see this display:

AUTO ADVANCE MENU

ADVANCE CONST.	1 =	35	DEG / 100 SPM
ADVANCE CONST.	2 =	40	DEG / 100 SPM
TOP STOP CONST.	=	270	DEG / 100 SPM
SLOW RPM =		30	SPM

YOU CAN OPERATE THE PRESS WHILE IN THIS
SCREEN TO HELP YOU ADJUST THE SETTINGS.

USE THE CURSOR KEYS TO SELECT A VALUE.
PRESS THE ENTER KEY TO CHANGE IT.
PRESS THE RESET KEY WHEN DONE.

Figure 4-23. WPC / SmartPAC's "Advance Constant" display

3. The bar highlights advance constant #1. Press ENTER to change advance constant #1. (If you prefer changing one of the other items on the screen, simply use the "down" cursor key to select that item. Then press ENTER.)
4. Use the number key to change advance constant #1, and then press ENTER.

AUTO ADVANCE IS ADJUSTABLE

One of the nicest things about SmartPAC's auto advance is that it is adjustable *while the press is running*. In other words, you can enter auto advance constants and a slow RPM value, and then run your press while you are in Initialization to see how accurate they are. If you need to, you can tweak the values until you get them right. This is especially useful when determining the auto advance constant for press feed functions, for instance, since you must use "trial and error."

5. Use the cursor keys to scroll down to advance constant #2. Repeat steps 3 and 4.

6. Scroll down to Top Stop Constant. Repeat step 4 to make this entry.

7. Scroll down to Slow RPM. Again repeat step 4 to make this entry.

IMPORTANT TO SET SLOW RPM

When you determine the correct auto advance constant, you also need to identify the "Slow RPM", or the slowest speed at which you will run your press. SmartPAC uses that value as a starting point to begin the auto advance process. If the incorrect number was entered in "slow RPM", SmartPAC would not auto advance certain press functions at the right time. The Slow RPM value must be the same as you used to determine the Top Stop Default Angle, discussed earlier in this chapter.

8. When you are done, press RESET to return to the Initialization menu.

Using the DiProPAC Initialization menu

Custom Sensor names

You select this choice to set custom sensor names (if DiProPAC is installed). This is the screen you will see.

HOW YOU USE THE CUSTOM SENSOR NAMES

You can create up to sixteen custom names for your sensors, *regardless if you have DiProPAC-8 or DiProPAC 16.* What this means is that when you actually assign names for each of your sensors in Programming mode, you can interchangeably choose from your entire list of customized names (created in Initialization). For example, you assign "custom 12" the name of "transfer arm" in Initialization mode. In Programming mode, you set sensor #1 to be named "transfer arm."

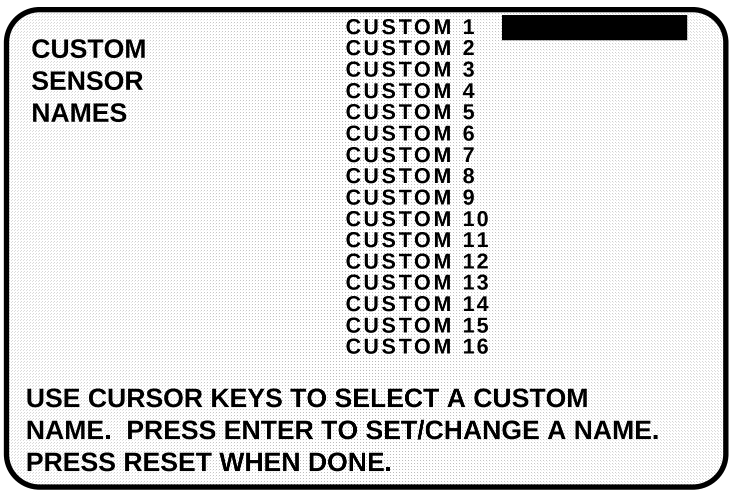


Figure 4-24. Custom naming sensors

1. Select "Custom 1", by highlighting and pressing Enter. Note that the custom name screen is superimposed over the above display (see Chapter 3 for assistance).

2. As the screen suggests (see the illustration below), certain keys enable you to custom name the tool. Your names can be any combination of alpha-numeric characters, symbols, etc. Pressing the CLEAR key clears the text. To make other entries, do the following:

   a. To key in letters: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press ENTER.

   b. To key in numbers: Use the number keypad; then press ENTER.

   c. To accept your selection, press function key F6 (to the right of the LCD display). To cancel your selection, press RESET. (For assistance in using the various keys, refer to Chapter 3.)

3. After you have named custom 1, you will be returned to the previous menu where custom 2 automatically is highlighted for you. You can select a name for it. Continue in this manner until you are done initializing the custom sensor names.

Sensor Enable mode

You use "Sensor Enable mode" screen if you have DiProPAC installed.

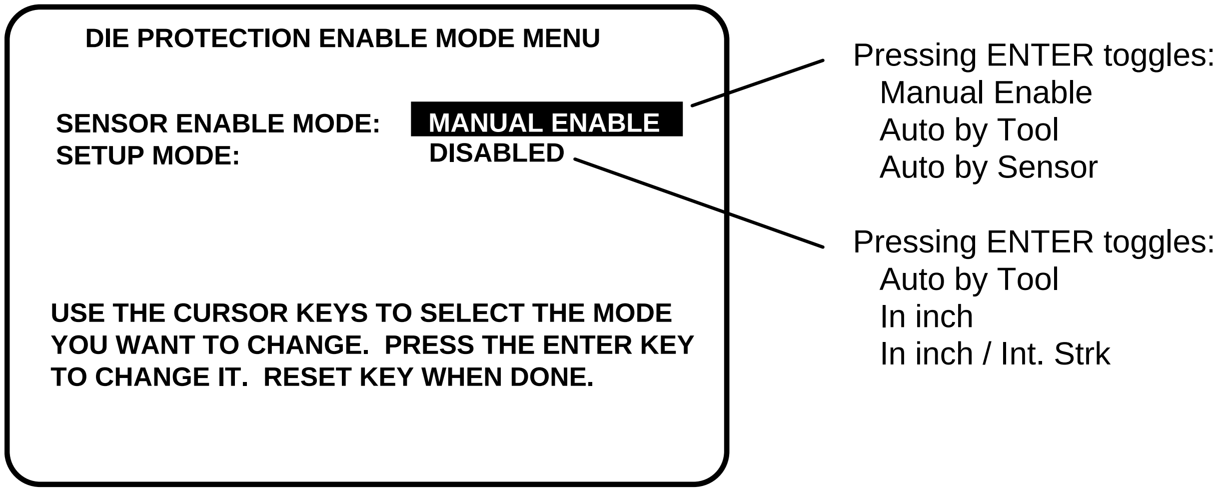


Figure 4-25. Sensor Enable mode (used with DiProPAC only)

Enabling sensors

Select **manual enable**, when you wish to manually enable or disable sensors in DiProPAC. Keep in mind that if you make this selection, DiProPAC will not re-enable sensors for you. You have to remember to do that yourself in Programming and Run modes. See "Disable (enable) sensors" discussed in both Chapter 5 and Chapter 6. *If you want SmartPAC to "remember" to re-enable sensors for you, choose one of the following "auto by" choices.* Select **auto by tool** when you want DiProPAC to automatically re-enable ALL sensors programmed to a specific tool. You set the specific number of "auto enable" strokes for the tool in Programming mode. Refer to the section "Die Protection" in Chapter 5. Select **auto by sensor (and tool)** when you want DiProPAC to automatically re-enable each sensor individually. You set the specific number of " auto enable" strokes for each sensor in Programming mode. Refer to the section "Die Protection" in Chapter 5.

Sensor setup mode

You can disable (or enable) the sensor mode. In other words, you can now activate (enable) or deactivate (disable) the setup mode from this screen (Figure 4-25). Enabling the setup mode in effect *disables* the green sensors under certain circumstances, as explained next.

SmartPAC provides 3 "Sensor setup mode" options. Press ENTER (second line on the screen) to toggle among: "DISABLED", "IN INCH" or "IN INCH/INT. STRK"

Choose **IN INCH** when you want the green sensors to be disabled while you are inching the press in Inch Mode but <u>not</u> during Interrupted Stroke. An example would be a Feed-in-place application. If the material slips from its desired position, you cannot run the press during an interrupted stroke. You can select Inch mode however, and inch the press.

Choose **IN INCH/INT. STRK** when you want the green sensors to be disabled while in Inch Mode and during Interrupted Stroke. An example would be a transfer application. If the transfer fingers drop a part, you can take the press to the top of stroke during an interrupted stroke. You can also select Inch mode and inch the press.

Choose **DISABLED** (even with the auxiliary 2 output wiring done), when you want the green sensors to function normally and are always active.

Setting up tool information (optional)

With this option, you can record information about the same six items for every tool. In addition, you can enter up to 30 characters of special information about each tool. (See "Tool information", chapters 5 and 6.) Follow the steps below to set up the six items.

> **IMPORTANT**
>
> Tool Information serves only as a convenient place to record information about the tool. It does not control any aspect of press operation.

Note: *This feature is not available if you have the optional PLC interface installed.*

1. From the main Initialization menu (Figure 4-1), select "Tool information." You will see a display similar to the following:

```
                NAME           UNITS      PLACES

TOOL     1   NAME 1          UNS 1         0
INFO.    2   NAME 2          UNS 2         0
NAMES    3   NAME 3          UNS 3         0
         4   NAME 4          UNS 4         0
         5   NAME 5          UNS 5         0
         6   NAME 6          UNS 6         0

USE CURSOR KEYS TO SELECT A NAME. PRESS
ENTER TO CHANGE.  PRESS RESET WHEN DONE.
```

Figure 4-26. Tool information setup

2. Highlight the name next to number 1. Press ENTER. A screen like this appears:

```
                                   "CUSTOM"

                                   FEED LENGTH
USE THE CURSOR KEYS                FEED RATE
TO CHOOSE A NAME.                  FEED ACCEL
PRESS THE ENTER                    FEED SPEED
KEY TO SELECT THE                  SHUT HEIGHT
NAME.                              PASS LINE HT
PRESS THE RESET                    LUBE TEMP.
KEY WHEN DONE.                     MATERIAL #
                                   CNTL. BAL.
                                   CUSHION PRES
                                   INSPECTION
                                   LUBE PRESS.
                                   LUBE TYPE
                                   PILOT ANGLE
                                   PRESS SPEED
              MORE NAMES ▼         CONVEYOR
```

4-27. Tool information names

3. Use the cursor keys to highlight the name you want. Press ENTER to select it. If you want to make up a custom name, highlight "CUSTOM" and press ENTER. A screen overlay appears that allows you to enter up to twelve characters of text for a custom name, Figure 4-28.

```
 A B C D E   PRESS CLEAR TO CLEAR
F G H I J K  TEXT. USE THE KEYPAD
L M N O P Q  TO ENTER NUMBERS. USE
R S T U V W  CURSORS TO SELECT THE
X Y Z , - #  LETTERS. PRESS ENTER
. ( ) * / &  TO ENTER THE LETTERS.
             PRESS F6 WHEN DONE.
             PRESS  RESET TO CANCEL.
```

Figure 4-28. Overlay for entering text

3. To enter the units for each item, select the units column next to the desired item. A screen appears from which you can select the unit you want (see table below) or choose to enter a "Custom" unit.

Table 4-2. Units for Tool Information setup;

Screen name	Units	Screen name	Units
IN	inches	METERS	meters
FT	feet	FT/MIN	feet per minute
MM	millimeters	FT/SEC	feet per second
CM	centimeters	MM/SEC	millimeters per second
PSI	pounds per square inch	MM/MIN	millimeters per minute
BAR	bars	GALS	gallons
LBS	pounds	QTS	quarts
TONS	tons	GRAMS	grams
OUNCES	ounces	SPM	strokes per minute
DEG. F	degrees Farenheit	FPM	feet per minute
DEG. C	degrees Celsius	MPM	meters per minute

4. To enter the number of decimal places for each item, select the "places" column next to the desired item. A screen appears where you can enter the number of decimal places you want, from 1 to 4. For items that will list YES or NO instead of numeric values, enter eight (8) for the number of places. Table 4-3, below, gives examples of the different numbers of decimal places you can enter.

		NAME	UNITS	PLACES
TOOL	1	PASS LINE HT	IN	2
INFO.	2	STRAIGHTENER	IN	2
NAMES	3	HYD. OVLD.	TONS	0
	4	PRESS SPEED	SPM	0
	5	CONVEYOR		8
	6	PART LUBE		8

USE CURSOR KEYS TO SELECT A NAME. PRESS ENTER TO CHANGE. PRESS RESET WHEN DONE.

Figure 4-29. Completed Tool Number Information screen

IMPORTANT

Do not change the number of decimal places after you have entered values for any specific tools. If you change the number of decimal places, any value you entered will be changed by a factor of ten for each decimal place added or removed.

5. When you have finished setting up the tool number information, press RESET to return to the main Initialization menu.

Table 4-3. Decimal places and formats

Number of decimal places Example	digits to left of decimal point	digits to right of decimal point	Range
0 **whole numbers: press speed (SPM)**	up to seven (7)	none (0)	0 to 9,999,999.
1	up to five (5)	one (1)	0.0 99,999.9
2	up to four (4)	two (2)	0.00 9,999.99
3	up to three (3)	three (3)	0.000 999.999
4 **precise values: material thickness**	up to two (2)	four (4)	0.0000 99.9999
8 **Yes or No designation**	not applicable		NO (0) YES (1)

Security access

Use the Security access choice in the Initialization menu to prevent unauthorized access to SmartPAC settings.   For most items shown in Figure 4-31 (later in this chapter) you can choose the level of security that meets your needs:

- PROGRAM AND RUN MODES - least secure: anyone can make changes anytime.
- PROGRAM MODE ONLY - changes can be made only when the Program/Run key is in the Program position. To keep users from entering Program mode and making changes, you must remove the Program/Run key after switching it to Run.
- PASSWORD REQUIRED (optional) - most secure: changes can be made only after the user enters a password.

Exceptions

The following items have different or additional security options:

- **Change Count** has an additional option of: No Changes Allowed. This prevents changes to actual counter values (for strokes, good parts, total hits, and batch counters) so that these counter values cannot be altered in either Program or Run modes.
- **Init Password,** if you have the password option, enables you to require the user to enter a password in order to access the Initialization menu. To require a password, select “Must Be Used.” For no password, select “Not Required”
- **Load Monitor** has four options: Allow Recalc/Adjust, Allow Recalc Only, No Recalc/Adjust, and, if you have the password option, Password required.

DO NOT SET INIT PASSWORD TO “MUST BE USED” UNTIL YOU HAVE CHECKED YOUR PASSWORDS.

Field upgraded SmartPACs may have different passwords from those listed in this manual. If you do not know the initialization password and change Init password to “Must be used” you will not be able to access the initialization menu again.

See Chapter 5—"Using SmartPAC in Program mode" and Chapter 6—"Using SmartPAC in Run mode" for more information about program and run modes.

When you attempt to access a menu that is password protected, the SmartPAC asks for your password in a display that looks like this:

ENTER YOUR PASSWORD

USE THE KEYPAD TO ENTER NUMBERS. USE THE UP/DOWN CURSON KEYS TO INCREASE/DECREASE. PRESS ENTER WHEN DONE. PRESS RESET TO CANCEL.

60599

If you forget or do not know your password(s), call DI and give this number to the tech support person.

Note: *Your number may be different.*

Figure 4-30. “Enter your password” screen

If you forget or do not know your password(s

Call DI tech support at the telephone number on the cover of this manual. Give the tech support person the 5-digit number from the bottom of the “Enter your password” display).

Selecting Security access options

1. In the Initialization menu, select "Security access"

   You will see a display similar to the one below. Yours may look different, depending on your SmartPAC's system configuration. Notice that the factory (default) settings allow all actions to be performed in both Program *and* Run modes.

SECURITY ACCESS MENU

LOAD TOOL #:	PROGRAM AND RUN MODES
SET CNTR PRESET:	PROGRAM AND RUN MODES
CHANGE COUNT:	PROGRAM AND RUN MODES
RESET MODE:	PROGRAM AND RUN MODES
ADJUST SENSORS:	PROGRAM AND RUN MODES
DISABLE SENSORS:	PROGRAM AND RUN MODES
ADJUST CAMS:	PROGRAM AND RUN MODES
ADJ. PRESS CNTL:	PROGRAM AND RUN MODES
ADJUST FEED:	PROGRAM AND RUN MODES
LOAD MONITOR:	ALLOW RECALC/ADJUST
ADJ. TOOL INFO:	PROGRAM AND RUN MODES
INIT PASSWORD:	NOT REQUIRED

**USE THE CURSOR KEYS TO MAKE CHOICES.
PRESS THE ENTER KEY TO CHANGE THE MODES.
PRESS F1 TO CHANGE PASSWORDS.
PRESS THE RESET KEY WHEN DONE.**

Figure 4-31. Security Access default settings

> **IMPORTANT**
>
> If you have the password option, be sure to check your passwords before changing any security access settings. Record the passwords in a safe place. See “Changing passwords” later in this chapter to check and change passwords.

2. To change the security access of an item, use the up and down arrows to highlight the access information for the item. Press ENTER one or more times until the type of access you want appears.

   For most items, you can choose from the following access levels:

   - “PROGRAM AND RUN MODES”
   - “PROGRAM MODE ONLY”
   - “PASSWORD REQUIRED” (if you have the password option)

> If you have the password option:
>
> **DO NOT SET INIT PASSWORD TO “MUST BE USED” UNTIL YOU HAVE CHECKED YOUR PASSWORDS.**
>
> Field upgraded SmartPACs may have different passwords than those listed in this manual. If you do not know the initialization password and change Init password to “Must be used” you will not be able to access the initialization menu again.

3. Press RESET to save your choice and return to the Initialization menu.

Examples

You want to prevent **loading a tool number** in Run mode. Set the security access for this item to Program Mode Only. Highlight the access level next to “Load Tool #.” Press ENTER one or more times until “PROGRAM MODE ONLY” appears. Press RESET. Now a tool can be loaded only when the Prog/Run key is switched to Prog.

You have the password option and want only certain individuals to **adjust the cams**. Set Adjust Cams to “PASSWORD REQUIRED,” and tell those individuals the password. Highlight the access level next to “Adjust Cams.” Press ENTER one or more times until “PASSWORD REQUIRED” appears. Press RESET. Now the the cams cannot be adjusted without the user entering the correct password.

Reset Mode

Set the Reset mode security access with care. If you set access to "Program mode only" or “Password required,” personnel cannot reset SmartPAC in Run mode after a malfunction that stops the press. If you want the operator to reset the machine after errors, select “Program and Run Modes.” If you want one person to record or be aware of all faults that occur, give that person the Program/Run key, and set the access to Program mode only. He or she would be able to reset faults by turning the key to "Program" and pressing the RESET key. Turning the key back to “Run” allows the press to run again.

Changing passwords

If it has the password option, your SmartPAC has three passwords that secure different parts of its operation:

- **Init. password** allows access to the initialization menu
- **General password** allows access to all other menus and settings, except for PM Monitor (see next bullet).
- **PM password** allows access to the PM (preventive maintenance) Monitor setup in Program mode. See Appendix C, “SmartPAC PM Monitor (optional).”

> **IMPORTANT**
>
> Your SmartPAC comes from the factory with all three passwords set to the default password, “1234.” If you have upgraded your SmartPAC in the field, it may have different passwords.

A password is a one-to-four-digit number. Follow the steps below to change password(s).

1. In the Initialization menu, select Security access.
2. The display appears similar to Figure 4-31. Press **F1**.
3. The display shows the Set Passwords menu, Figure 4-32.

```
SET PASSWORDS MENU

INIT. PASSWORD         = 1234
GENERAL PASSWORD = 1234
PM PASSWORD            = 1234


USE THE CURSOR KEYS TO CHOOSE THE ITEM
YOU WISH TO CHANGE. PRESS THE ENTER KEY
TO CHANGE.
```

Figure 4-32. Set passwords menu

4. Highlight the password you want to change. Press ENTER. The display looks like Figure 4-33.

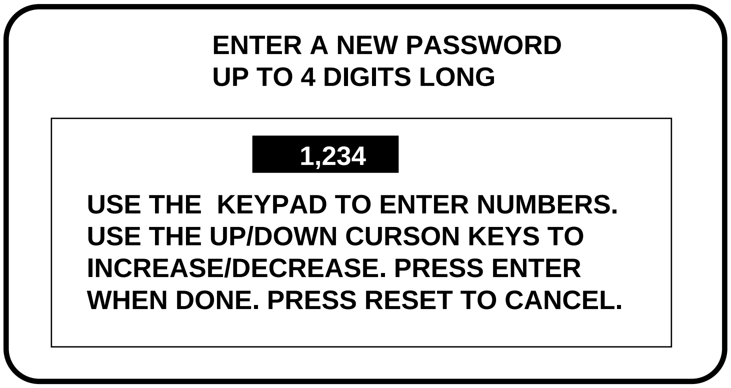


Figure 4-33. “Enter a new password” screen

5. Key in the new password. Press ENTER. The display returns to the Set passwords menu.

Communications (optional)

This choice on the Initialization menu lets you set an identification number for your SmartPAC if it is connected to one of Data Instruments' software products. SmartPAC can send and receive data from a computer running Computerized Pressroom Reporting or RSR™, Remote Storage and Retrieval. Follow these steps to set the CPU number. *If you do not require communications, then ignore this item.*

Select "Communications" . You will see this display:

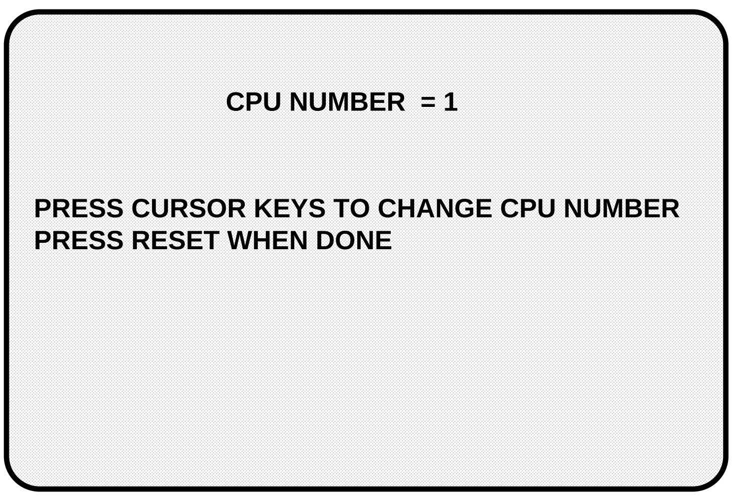


Figure 4-34. Setting CPU number

The CPU number is the identifying number of your unit. For instance, if you had several SmartPAC and other Wintriss controls in the network, identify them as 1, 2, etc.

You have the choice of using either the number keypad or the cursor keys. If you use the number keys, press the appropriate numbers and press enter. If you use the "up" or "left" cursor keys, the number increases by 1. If you use the "down" or "right" cursor keys, the number decreases by 1, and then jumps down from 0 to 99, 98, etc. Once you have set a CPU number for the unit, press RESET to go back to the Initialization menu.

For more information on which CPU number to use or on other information about the Data Instruments' software products, refer to the user manual for either of those products.

Section 2 Checkout

This next section describes the checks and tests that you need to perform in order to verify that your WPC integration is fully operational. You must go through these tests *before* your proceed to Chapter 5.

> **NOTE**
> Before performing the checkout and troubleshooting procedures, set the switches on SmartPAC to the following positions:
> STROKE SELECT to OFF
> MODE SELECT to TWO HAND
> Also make sure that the air pressure and power to the press are turned off.

These procedures will help you check out your newly installed Wintriss Clutch/Brake Control combined with SmartPAC. Start with "Power Supply Tests", and continue through "Continuous Mode Test." If your WPC has a foot switch or a Bar Mode Control, then complete the remaining tests, "Control Enclosure Test — with foot switch" and "Control Enclosure Test — with optional Bar Mode Control."

> **WARNING! ELECTRICAL HAZARD!**
> Many of the procedures below require work inside the control enclosure with power on. Dangerous high voltage is present inside the control enclosure. Only qualified technicians should work inside the enclosure with the power on.

In the event your WPC fails a test, you will be directed to a particular set of step-by-step procedures so that you can isolate and ultimately correct the problem. If you are unable to correct a certain problem, contact Data Instruments for assistance. Do not attempt to replace any components on your new WPC until you first check with our technical staff. These procedures will also help you troubleshoot malfunctions that may occur with the control system.

> **WARNING! KEEP HANDS AWAY!**
> Before performing testing or troubleshooting procedures, make sure all tools are removed from the press. Keep your hands away from the die area when testing.

Power supply test

Refer to the LED maps in Figure 4-35a (right/center) or Figure 4-35b (left) to perform this test.

> **WARNING ELECTRICAL HAZARD**
> Dangerous high voltage is present inside the control enclosure. Only qualified technicians should work inside the enclosure with the power on.

1. At the control enclosure, open the front cover.
2. Turn on the power to WPC.

3. At the control board, check that the +24 Vdc, +5 Vdc A, and +5 Vdc B LED indicators are illuminated.
   If all the LEDs are off, go to the next step.
   If only the +12 Vdc LED is off, skip to step 7.
4. If all the LEDs are off, check power fuse labeled F1 found on the power supply board (refer to Chapter 2 for board layouts). Replace it if necessary.
5. If only the +24Vdc is unlit, check the 24 volt power fuse found on the power supply board. Replace it if necessary.
6. If the LEDs are still off, check that line voltage is being applied to the system.

Shadow test

WPC tests whether your Shadow(s) are working properly by momentarily de-energizing the Shadow transmitter whenever the press is started and stopped. WPC also ensures that the Emergency stop relays in the receiver are open.

WARNING ELECTRICAL HAZARD

Dangerous high voltage is present inside the Shadow transmitter and receiver. Only qualified technicians should work inside the Shadow transmitter and receiver when the power is on.

Look at the Shadow Transmitter, and check that the amber indicator is illuminated. At the Shadow Receiver, check that the green indicator is also lit.

Now block the light curtain. At the receiver, look to see that the green indicator has turned off and that the red indicator instead has lit up.

Remove the obstruction from the light curtain. At the receiver, verify that the opposite happens — the red indicator goes off and that the green indicator comes on.

If the receiver is good but the transmitter's amber indicator is off, complete step 1.

1. Remove the transmitter's cover and replace the amber indicator. If the transmitter's amber indicator is off and the receiver's red indicator is on, complete steps 2 and 3.
2. Turn off the power.
3. Check the transmitter's power fuse. Replace it if necessary.
   If the transmitter's amber indicator is on and the receiver's red indicator is on when the light curtain is unobstructed, complete steps 4 through 7.
4. Check that the receiver and the transmitter are properly aligned.
5. At the transmitter, check that the "INT" terminal shows 0 Vdc when referenced to ground.
6. If the "INT" terminal does not show 0 Vdc referenced to ground, check the wiring.
7. If the wiring has been done correctly and the "INT" terminal does not show 0 Vdc, either the WPC board, the Shadow transmitter, or Shadow receiver may be at fault.

If you have any difficulty with this test, do not hesitate to contact Data Instruments' technical advisors for assistance in determining the nature of the problem.

System static test

WARNING ELECTRICAL HAZARD

Dangerous high voltage is present inside the control enclosure. Only qualified technicians should work inside the box with the power on.

1. At SmartPAC, set the STROKE SELECT switch to INCH.
2. If there is an Interrupted Stroke message on SmartPAC's LCD display and "F10" is shown on the LED display, go to step 4. If there is a different message, go to step 3.
3. Inside the control enclosure, at the control board, check that "INCH SEL" LED is on.
4. At the Operator Station, press and hold the EMERGENCY STOP / RESET button.
5. Notice that "F13" appears at the LED display (Emergency stop circuit open). If a status code "F13" does not appear, go to step 6. If "F13" does appear, go to step 7.
6. At the control board, check that the "E-stop #1 input" and "E-stop #2 input" LEDs turn off when the EMERGENCY STOP / RESET button has been pressed.
7. Turn on the press motor (forward rotation, if applicable).
8. Notice that the LED display goes blank. If the LED display does not go blank, go to step 9. If the LED display goes blank, go to step 10.
9. At the control board, check that the "Motor Forward" LED is on when the motor is running in forward.
10. At the Operator Station, push both RUN/INCH switches at the same time.
11. Notice that "F48" appears on the LED display (Main system air pressure switch open). If the appropriate code does not appear, go to step 12. If the appropriate code does appear, go to step 13.

IMPORTANT

If the E-stop and top stops are not connected according to Figure 2 (end of manual), the status code may be different.

12. At the control board, locate the "E-stop #1 input" LED and check that it is not illuminated.
13. Apply air pressure to the press.
14. At the control board, check that "E-stop #1 input" LED is turned on.
15. At the Operator Station, press the EMERGENCY STOP / RESET button.

NOTE

While the EMERGENCY STOP / RESET button is pressed, "F13" should appear on the LED display indicating that the Emergency Stop circuit is open.

Single stroke mode test

1. Set the STROKE SELECT switch to SINGLE STROKE.
2. Block the light curtain.
3. Push and hold both RUN/INCH switches.
4. Notice that the press does not cycle and the LED display remains blank.

   If the press cycles or the LED display does not remain blank, go to step 5.

   If the press does not cycle, go to step 6.
5. At the Shadow V, make sure the red indicator is on. Then go to the next step.

> **WARNING ELECTRICAL HAZARD**
> Dangerous high voltage is present inside the control enclosure. Only qualified technicians should work inside the box with the power on.

6. At the control board, make note that the "INCH SEL" LED is not illuminated, that the "SNGL STK SEL" LED is lit, and that the "SHAD IN 1 and 2 N/C" LED is on. (It should be off when the curtain is blocked.)
7. Hold down the RUN/INCH switches.
8. Observe that the ram makes a full stroke and stops at or near top dead center.

   If the ram does not cycle or does not stop at top dead center, go to step 10.

   If the ram stops at top dead center, go to step 12.
9. At the LED display, observe that an error code between F80 and F89 (or H80 through H89) is displayed. This indicates a problem with the overrun limit switch.
10. Bring the ram to top dead center.
11. Look at "Stop Time" on SmartPAC's LCD display by selecting "Press Control" from the Run menu. Refer to "Determining the press's stopping time" earlier in this chapter if you are not sure how to view Stop Time.
12. Momentarily, press and release the RUN/INCH switches.
13. Observe that the ram starts then stops, and that an Interrupted Stroke message appears on the LCD display.
14. The press will now be in the TWO HAND MAINTAINED SINGLE STROKE mode. Complete the stroke by pressing and holding the RUN/INCH switches.

Continuous mode test

1. Set the STROKE SELECT switch to CONT (continuous).

2. At the control board, the "SNGL STK SEL" LED should turn off and the "CONT SEL" LED should light up.

3. At the operator station, press the PRIOR ACT switch/indicator.

   If the switch/indicator does not turn off within eight seconds, *stop! Do not go any further! Call your Data Instruments representative. Remember to provide pertinent information about your product to expedite the solution to the problem.*

   If the switch/indicator does turn off within eight seconds, go to step 4.

4. Press the PRIOR ACT switch/indicator and, before the light goes out, press both RUN/INCH switches.

   Release the RUN/INCH switches after bottom dead center (BDC) of the first stroke. The press should continue running.

5. At the operator station, press the TOP STOP button. Notice that the ram stops near top dead center (TDC) and that a three digit stop time is displayed (when selected on the LED display).

6. Restart the press in continuous (CONT) mode.

7. Now block the light curtain.

8. Make sure that the press comes to an immediate stop. If you have a WPC with the muting option, the ram will stop in the non-muted part of the stroke (down stroke). Whether or not you have the muting option, the Interrupted Stroke LED light should be illuminated.

IMPORTANT

When a stroke is interrupted, WPC automatically switches to TWO HAND MAINTAINED SINGLE STROKE mode for the remainder of the stroke.

9. Press and hold both RUN/INCH switches. Inch the ram to TDC.

Control enclosure test with Foot Switch — optional

You only need to perform this test if your WPC is equipped with a Foot Switch. If necessary, refer to Figure 4-35a and Figure 4-35b (LED maps) when you are directed to the control board.

IMPORTANT
If the Foot Switch is not depressed quickly and fully, a stroke will not be initiated. Foot initiation requires rapid and full actuation.

1. Set the STROKE SELECT switch to SINGLE STROKE and set the MODE SELECT MENU to FOOT.
2. Set switch 3 (SW3) at SmartPAC Initialization's "Press Options" to CLOSED. Remember to power down, then power back up SmartPAC to take the change. The WPC is now in the FOOT TRIP mode. Once tripped, the press should run to top stop.
3. On the control board, the "Continuous selector" LED should be off, the "Single Stroke selector" LED should be on, and the "Foot selector" LED should be on.
4. Momentarily depress the Foot Switch. The press should make a single stroke and stop at top dead center.
5. At the control board, notice that the "Foot switch N/C" LED goes off and the "Foot switch N/O" LED comes on when the Foot Switch is depressed.
6. Set switch 3 (SW3) at SmartPAC Initialization's "Press Options" to OPEN. Power down, then power up SmartPAC to retain the setting. You are now in the foot control mode. The press should cycle to top stop only if the Foot Switch is held down until after bottom dead center.
7. Press and hold the Foot Switch through bottom dead center. Release Foot Switch after bottom dead center. The press should run and stop at top stop.
8. Press and hold the Foot Switch again. This time, release the switch before bottom dead center. The press should start but stop immediately when the Foot Switch is released.
9. Press and hold both RUN/INCH switches. The press will run and top stop.
10. Set the STROKE SELECT switch to CONT (continuous).
11. At the Operator Station, depress the PRIOR ACT switch.
12. Then depress and hold down the Foot Switch. The press should run as long as the Foot Switch is depressed.
13. Release the Foot Switch. The press should automatically top-stop.

    If the Foot Switch is only momentarily depressed, the press stops after a single stroke. If allowed to stop, the PRIOR ACT switch must be depressed before another stroke is initiated.

One-hand Control Switch test — optional

You only need to perform this test if your WPC is equipped with a One-hand Control Switch. If necessary, refer to Figure 4-35a and Figure 4-35b (LED maps) when you are directed to the control board.

> **IMPORTANT**
>
> If the One-hand Control Switch is not depressed quickly and fully, a stroke will not be initiated. One-hand initiation requires rapid and full actuation.

1. Set the STROKE SELECT switch to SINGLE STROKE and set the MODE SELECT switch to ONE HAND.
2. On the control board, the "Continuous selector" LED should be off, the "Single Stroke selector" LED should be on, and the "One-hand selector" LED should be on.
3. Momentarily depress the One-hand Control Switch. The press should make a single stroke and stop at top dead center.
4. At the control board, notice that the "Palm Switch N/C A" LED goes off and the "One-hand A N/O" LED comes on when the One-hand Control Switch is depressed.

Control enclosure test with Bar Mode Control — optional

You only need to perform this test if your WPC is equipped with the Bar Mode Control.

1. Set the STROKE SELECT switch to INCH and the MODE SELECT MENU to TWO HAND.
2. At the Bar Mode Control, set the SELECT switch to "on."
3. At the control board, the "Bar Selector" LED should come on.
4. Turn the press motor off.
5. While the press's flywheel is still turning, press the OPERATE button on the Bar Mode Control.
6. Notice that the Dual Safety Valve momentarily energizes and then de-energizes.
7. At the control board, the "Bar actuator" LED should remain illuminated while the Bar Mode Control OPERATE button is depressed.
8. At the LED display, "F26" (Ram moved too fast in Bar mode) will be displayed.
9. At the Operator Station, push the EMERGENCY STOP / RESET button. Wait for the flywheel to stop spinning.
10. At the Bar Mode Control, push the OPERATE button.
11. Notice that the Dual Safety Valve turns on.
12. You can now bar the press.

NOTE

As you bar the press, WPC combined with SmartPAC monitors the speed of the crank. If you bar the press too quickly, the Dual Safety Valve closes and a status code of "F26" (Ram moved too fast in Bar mode) is displayed, thus stopping the press.

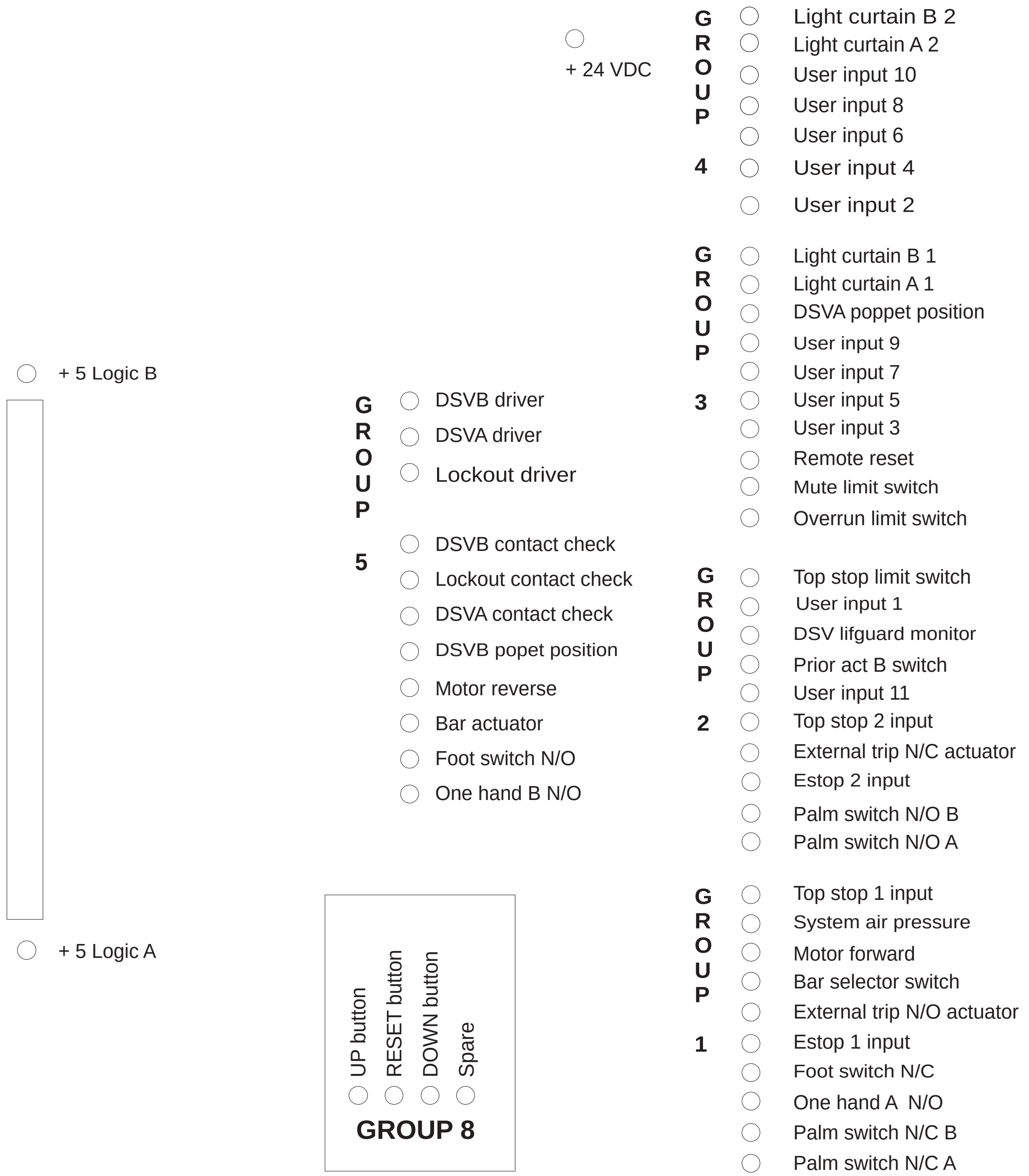


Figure 4-35a. WPC LED indicator map **(Right or Center Configurations)**

Note: *To view the status of the inputs on the display, see "Using the WPC Input Status Display" in Chapter 7.*

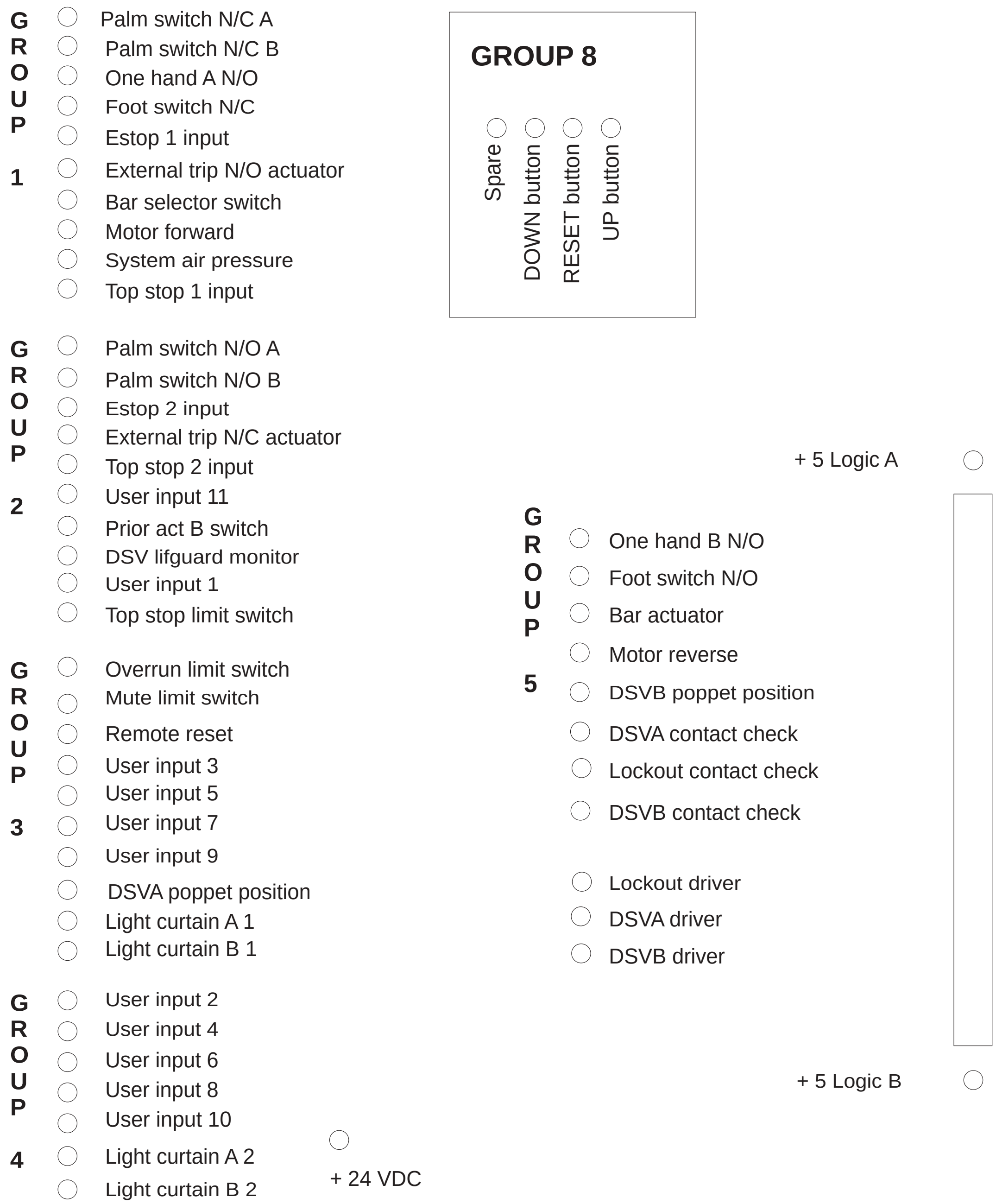


Figure 4-35b. WPC LED indicator map (Left Configuration)

Note: *To view the status of the inputs on the display, see "Using the WPC Input Status Display" in Chapter 7.*

Chapter 5
Using SmartPAC in Program mode

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

This chapter describes how to use all the displays you will see in Program mode. The topics will be covered in the order that they appear on the Main Programming menu, as pictured at Figure 5-4. Specifically, it covers programmable cam-related functions, such as setting cam timing, and programming timed and auto events; and die protection-related functions, such as enabling and disabling sensors, and configuring sensors. Lastly, it covers press control-related functions, such as: setting top stop angle, minimum and maximum press speed limits, and counterbalance setpoint.

About Program mode

You use Programming mode to make all the settings for the tool. In Program mode, you enter a tool number; then make appropriate settings for that tool. You can change settings and delete (erase) all settings for the tool. You can see a display of all the tool numbers for which you have made settings.

You cannot run the press in Program mode. That can only be done in Run mode. Here is how you use the two modes. In Program mode, you can make settings for all your tools, but you cannot run the press. In Run mode, you can run the press and make certain minor adjustments for the installed tool only.

The first display—the Programming menu

To get into Programming mode from Initialization mode, turn the Program/Run key first to "Run", then to "Program". This is the first display that you will see.

SELECT = HIGHLIGHT + ENTER

When we say SELECT in this manual, it means highlight the item and press Enter.

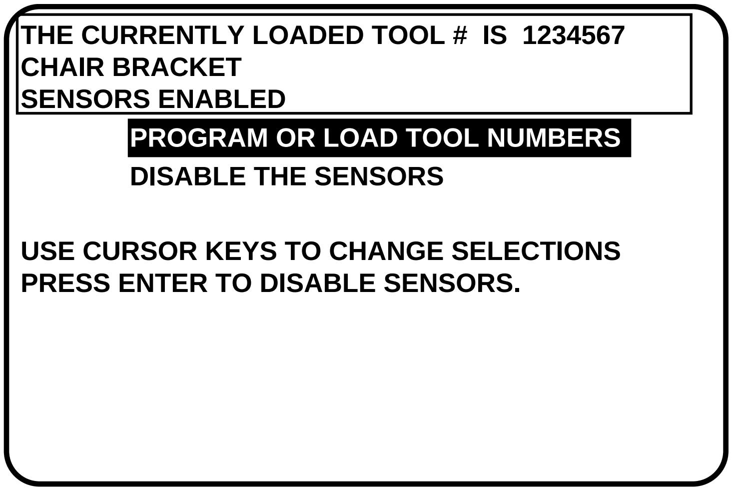


Figure 5-1. First display in Program mode

Select "Program/Load Tool Number" and you will see a list of available tools. This display will either highlight the currently loaded tool number, or "NEW" if no tool number has been programmed. From this display, you can call up all the other displays in Programming mode and carry out your tasks from this point. Notice that when a tool is highlighted, its "tool name" (if programmed) is also shown. However, when "NEW" is highlighted, it remains unnamed until you assign a number and name.

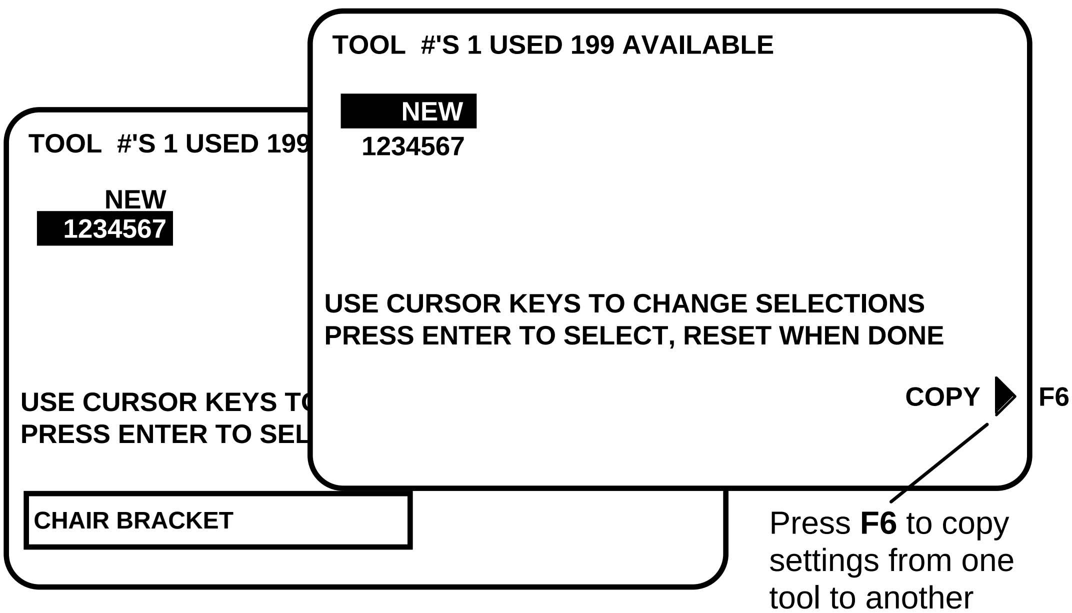


Figure 5-2. Highlighting "NEW" or "currently loaded" tool

NOTE

Before changing modes, make sure your screen shows the first display in the mode you are in. If that display is not shown, nothing will happen when you turn the Program/Run key. In that case, keep hitting the Reset key. When the first display in the mode is reached, you will instantly switch to the new mode.

This section explains how to create or select a tool number and then set (program) various parameters for that tool.

Before you can run the press, you have to load the SmartPAC settings for the tool being used. This retrieves the settings for the tool from SmartPAC's memory.

To load a tool number, see "Load the tool information" later in this chapter. To delete a tool number, refer to the section "Delete the tool information" also in this chapter.

Copying a tool number

Notice that from this screen, you can also copy all the parameters of one tool to another. To copy a tool, press **F6**. A message appears, "Tool number # has been selected to be copied. Enter the new tool number". To do this, use the number keys and then press Enter. For assistance on using the number keys, see Chapter 3.

Creating a new tool number

1. Select NEW to enter in a new tool number. You will see the following display superimposed over the tool display (described and illustrated in Chapter 3):
2. Key in the number for the tool. If you need assistance, see "Entering a number" in Chapter 3.
3. Press Enter after keying in the tool number. You will see the Main Programming menu display (Figure 5-4). Once you are done, go to "Set tool name".

Selecting an existing tool number

1. Select the tool number from the tool number display (Figure 5-3). In this example, we are selecting tool #1234567.

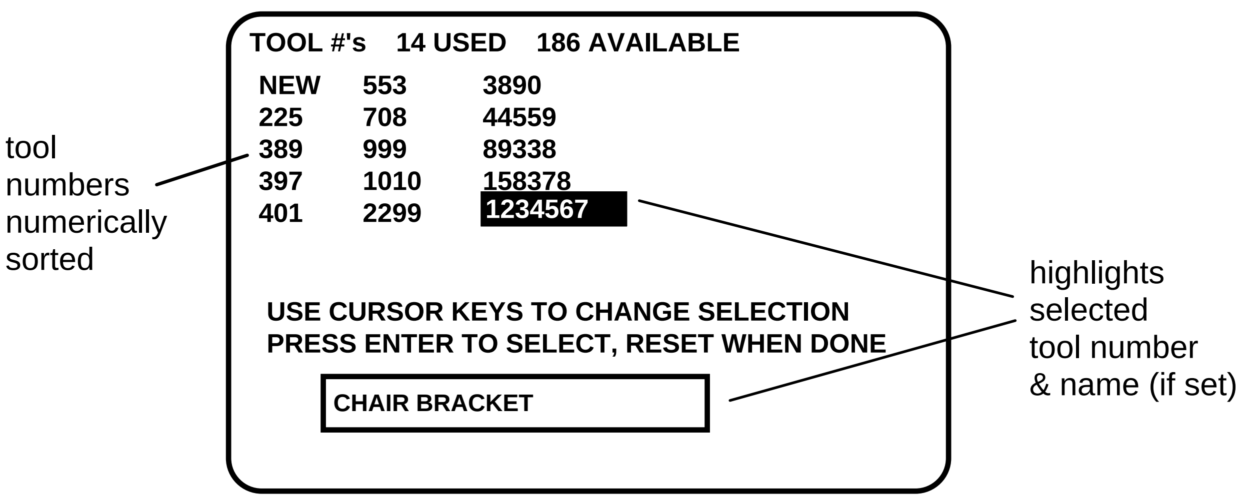


Figure 5-3. Selecting an existing tool number

2. You can move the selection bar to any number using the cursor keys (see "Using the keyboard" in Chapter 3 for more assistance). The tool number display can contain up to 200 tool numbers.

If you have more than four columns of numbers, you can see more tool numbers by pressing the "right" cursor key to move your selection to the right until a new right column appears. To go back, use the "left" cursor key to move your selection to the left until a new left column appears.

3. Press Enter to select the tool. The next screen that appears is the "Main Programming menu" (Figure 5-4). Next, go to "Set tool name".

Set tool name

To set tool name, you need to:

- Switch SmartPAC to Program mode
- Select either a new or existing tool number (see the beginning of this chapter)
- Select "Tool name" and bring up that display

Bringing up the tool name display:

1. Select "Tool name" as shown below:

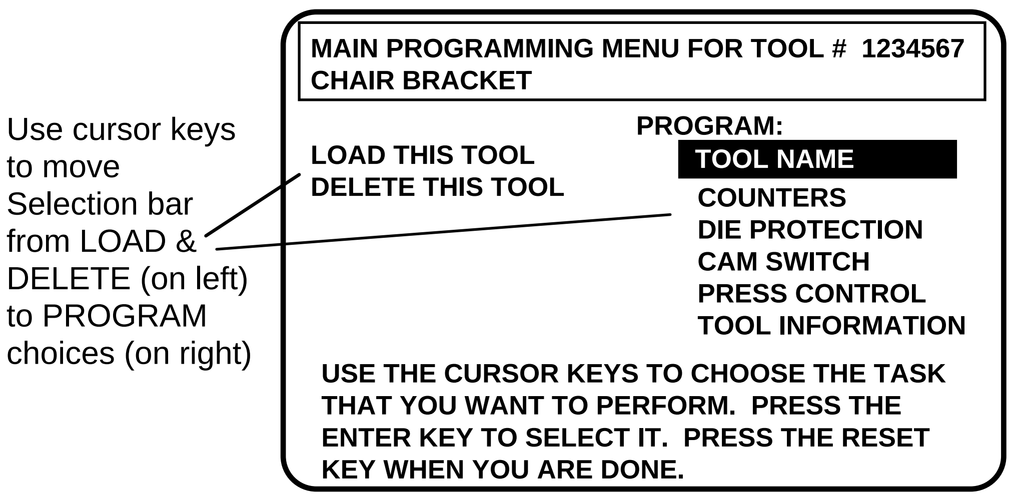


Figure 5-4. Main Programming Menu (the order may vary depending on the options installed)

IMPORTANT! ABOUT THIS CHAPTER

The above menu choices are explained in this chapter in the order that they appear on the above screen. Your installed options may vary.

2. You will then see a display superimposed over the "Tool name" screen (described and illustrated in Chapter 3 of this manual):

3. As the screen suggests, certain keys enable you to name the tool. Pressing the CLEAR key clears the text. To make other entries, do the following:
   a. To key in letters: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press Enter.
   b. To key in numbers: Use the number keypad; then press Enter.

4. To accept your selection, press function key **F6** (to the right of the LCD display). (For assistance in using function keys, refer to Chapter 3.)

5. Once you are completely done naming your tool, press Reset to return to the Programming mode menu choices.

Counters

To set up the Counters, you need to:

- Switch SmartPAC to Program mode
- Select either a new or existing tool number (see the beginning of this chapter)
- Select "Counters" and bring up the counters display for the tool

Bringing up the counter display:

1. Select "Counters" from the Main Programming menu (Figure 5-4):

> **ARE YOU 'LOCKED OUT"?**
>
> If you cannot change items in this display, the ability to make these changes may be locked out or limited to password access . To check the security access setting, see "Security Access" in Chapter 4.

2. You will then see this display:

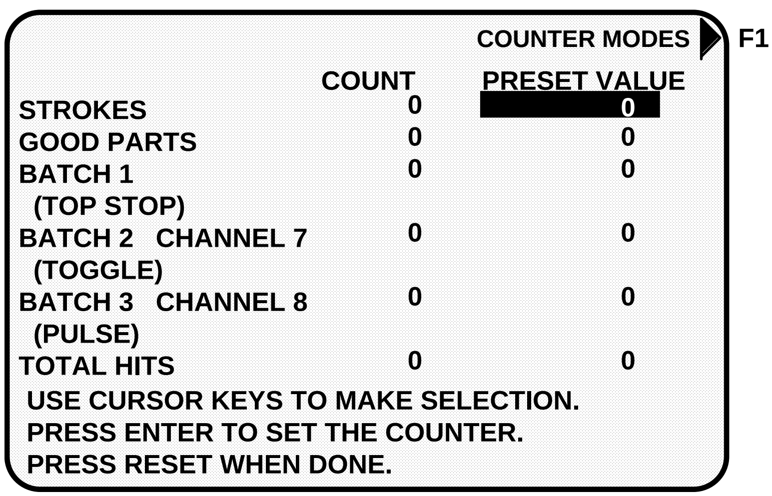


Figure 5-5. Counter display

The <u>strokes counter</u> counts all press strokes.

The <u>good parts counter</u> counts the press strokes unless a die protection or other fault occurred. When the good parts preset has been reached, SmartPAC signals the press to top stop.

There are three <u>batch counters</u>. You can set individual preset values for each of the batch counters. The batch counts can be incremented either to the good parts counter or the strokes counter. You can also set each batch counter to either top stop or toggle, or pulse a programmable limit switch (PLS) output when its preset is reached. If you set the batch counters to either toggle or pulse, the counter display shows the PLS channel that is controlled by that batch counter (see Figure 5-5).

The total hits counter counts all hits on a tool. If the tool number is loaded again after other tools are used, the counter starts counting from the last recorded number for the previous job. The counter is useful for deciding when a tool needs regrinding.

Note: *In Run mode, when the Total Hits counter reaches its preset value, the status box flashes to indicate that this has happened.*

Setting or clearing the counter presets

1. Highlight the value displayed in the "preset" column that you want to set, and press Enter. You will see a display superimposed over the Counter display (see Figure 5-5). This applies to either strokes, good parts, or batch.
2. As the screen suggests, use the number keys to input a value. See "Entering a number" in Chapter 3 for step-by-step instructions for entering a number. Then press Enter, and the value will "jump to" the designated preset value location.
3. If you want to clear the counter, press the CLEAR key, then Enter. If you do not want to make a change to that counter preset value, just press Reset.
4. To set another counter preset value, move the cursor down to the desired choice, press Enter, and then repeat the steps shown above.

Setting or clearing the counter values

Note: *If “Change count” was set under security access to “no changes allowed”, you cannot change the count.*

1. Highlight the number displayed in the "counter value" column that you want to set, and press Enter. This applies to either strokes, good parts, or batch counters. Under some circumstances, you may want to "adjust" the count upward or downward. In this case, use the Up/Down keys.
2. Sometimes, you may want to start the count at some value other than zero. As the screen suggests (Figure 5-6), use the number keys to input a value. See "Entering a number" in Chapter 3 for step-by-step instructions for entering a number. Then press Enter, and the value will "jump to" the designated counter value location.
3. If you want to clear the counter, press the Clear key. A warning message will appear asking you to confirm the "Clear" command. Press the "Up" cursor key to confirm this selection. If you do not want to make a change to that counter value, just press Reset.
4. To set another counter value, cursor down to the desired choice, press Enter, and then repeat the steps explained above.

Note: *You can disable counters by setting the preset value for parts and batch counters to zero.*

Clearing the total hits counter

1. Select "total hits".
2. To clear, press the "Clear" key. A warning message will appear asking you to confirm the "Clear" command. Press the "Up" cursor key to confirm this selection. If you do not want to make a change to that counter value, just press Reset.

Setting counter mode

The counter mode provides several selections. First, it lets you determine what will happen when any of the three batch counters reach their presets. You have three choices:

If you select **top stop**, the top stop relay is opened when the batch preset is reached. This is useful when stopping the press to change bins or chutes before resuming production.

If you choose **toggle**, this switches the state of the output relay. In other words, if the state of the relay is open, it would then be closed, and vice versa. You can use this option to activate a parts diverter. If you select **pulse**, this actuates the channel for a presettable amount of time in milliseconds. You can connect this output to any device that needs to be turned on once every fixed number of strokes (equal to the batch counter).

> **IMPORTANT**
>
> *"Pulse" and "toggle" are only available when the optional ProCamPAC is installed.* If you attempt to use these features without programmable cam, SmartPAC will display a message telling that it is not available. With ProCamPAC installed, you can still program channels 6 through 8 and get two on-off settings per cycle by programming the batch preset to 1.

You can also determine if the strokes or good parts counter will increment each batch.

Setting counter output mode:

1. Press **F1** to select "Counter mode" (Figure 5-5). To illustrate the various options in counter setup mode, Figure 5-5 shows batch 2 set to "toggle", and batch 3 to "pulse". Factory settings are configured to "top stop" and "stroke".
2. Using cursor keys, highlight the output mode for "batch 1".
3. As you press Enter, notice that the selections change from "top stop", to "toggle" to "pulse", and back again. Make your selection, and then cursor down to "batch 2".

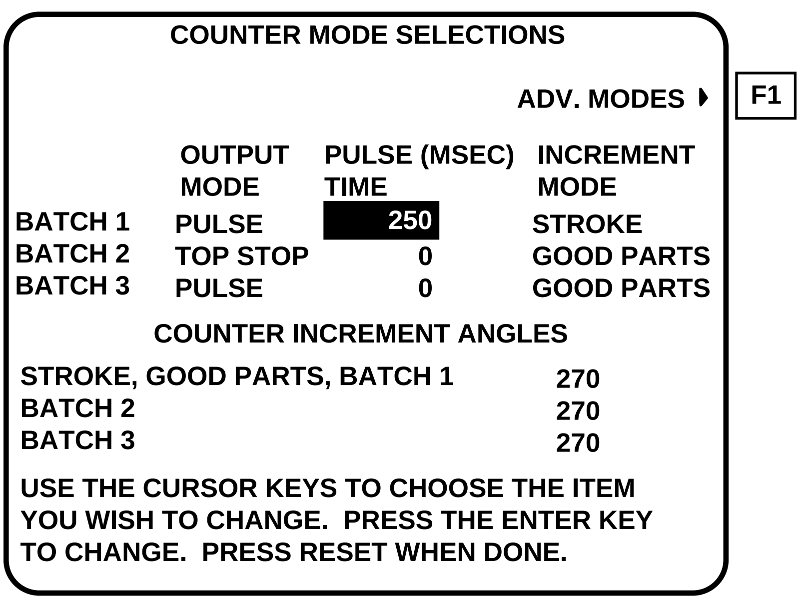


Figure 5-6. Counter setup mode menu

4. Repeat step 2 for "batch 2" and "batch 3".
5. If you selected "pulse" for any of the batch counts, use your "right" cursor key to scroll to the "pulse (msec) time" column for that counter. Press Enter.
6. A screen overlay appears enabling you to enter a value for channel on-time. Use the number keys to set the channel on-time in milliseconds, up to a maximum of 9,999 ms, or about 10 seconds. See "Entering a number" in Chapter 3 if you need assistance. Then press ENTER to accept the change.

Note: *When you select "toggle" or "pulse", the channel affected appears with the batch counter on the original counter display (Figure 5-5).*

Setting counter increment angle

SmartPAC also provides the ability to set counter increment angles for strokes, good parts, and batch counters. The factory setting is 270°, which is satisfactory for counting parts, means that the counters are incremented when the press passes 270°. However, if the batch counter outputs are being used to control automation, the increment angles for these counters should be set to the angle where you want the automation to activate.

1. Move the cursor over and down to the "increment mode" column at the bottom of the screen. You will be setting "stroke, good parts, batch 1". Press Enter, then use the number keys to make your selection. Press enter when done.
2. Next, move the cursor down to the next one (batch 2), and repeat step 1.
3. Repeat the above steps for batch 3.

Setting counter increment mode

A third selection in "count mode" is the ability to set counter increment mode. Here you determine whether the batch counter increments with the good parts counter or the strokes counter. If you want the batch to count ALL strokes, then select "stroke". However, if you want the batch to count the press strokes unless a die protection or other fault occurred, then select "good parts". Follow these steps:

1. Move the cursor to the third column "increment mode". You will be setting batch 1. Press Enter to toggle the selection between "stroke" and "good parts".
2. Next, move the cursor down to the next one (batch 2), and repeat step 1.
3. Move the cursor down to the last one (batch 3), and again repeat step 1. Once you are completely done, press Reset to return to the Main Programming menu.

Setting Parts/stroke or strokes/part (optional)

If your SmartPAC has the Advanced counter option, you can set the number of parts produced per stroke or the number of strokes per part to make the parts count reflect the actual number of parts made.

1. From the Counter Mode Selections screen, press **F1** (ADV. MODES). The screen appears similar to Figure 5-7:

```
ADVANCED COUNTER MODE SELECTIONS

PARTS MADE PER EACH STROKE     =     1
STROKES TO MAKE EACH PART      =     1
```

Figure 5-7. Advanced counter mode

2. Highlight the item you want to set. Press ENTER. A box appears on the screen, as shown below.

```
ADVANCED COUNTER MODE SELECTIONS

PARTS MADE PER EACH STROKE     =     1
STROKES TO MAKE EACH PART      =     1

              1
USE THE KEYPAD TO ENTER NUMBERS.
USE THE UP/DOWN CURSOR KEYS TO
INCREASE/DECREASE. PRESS ENTER
WHEN DONE. PRESS RESET TO CANCEL.
```

Figure 5-8. Setting parts/stroke or strokes/part

3. Use the keypad or cursor keys to change the number of parts/stroke or strokes to make each part. Press ENTER. Press RESET to return to Counter Mode Selections.

Die Protection

To set Die Protection parameters, you need to:

- Select "Die protection" from the Main Programming menu
- Set the "Auto enable by tool" stroke counter *if this was your selection in Initialization ***
- Assign a name for each sensor
- Set the "Auto enable by sensor" stroke counter *if this was your selection in Initialization***
- Set sensor type
- Set stop type
- Set the ready signal (for a green sensor)
- Set the other sensors for the tool

** *Depending on how you Initialized DiProPAC, you may be prompted to do one or the other, not both.*

1. You will see the Main Programming menu (Figure 5-4) after entering a new tool number or selecting an existing one. Select "Die Protection".

ENTER YOUR PASSWORD

USE THE KEYPAD TO ENTER NUMBERS.
USE THE UP/DOWN CURSON KEYS TO
INCREASE/DECREASE. PRESS ENTER
WHEN DONE. PRESS RESET TO CANCEL.

60599

If this display appears, you need to enter the general password to access these settings. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

Setting "Auto Enable by Tool" counter value

2. *If you had selected "Auto enable by tool" in Initialization mode (Chapter 4), a screen appears asking you to enter the stroke value. If you had selected "Auto Enable by Sensor and tool" in Initialization, this screen will not appear (refer to Figure 5-12, f567arther down in this section) .*

   Use cursor keys to change the number of strokes. *The maximum number of strokes that you can program is 24.* Then press Enter when done (see Chapter 3 for help in using cursor keys).

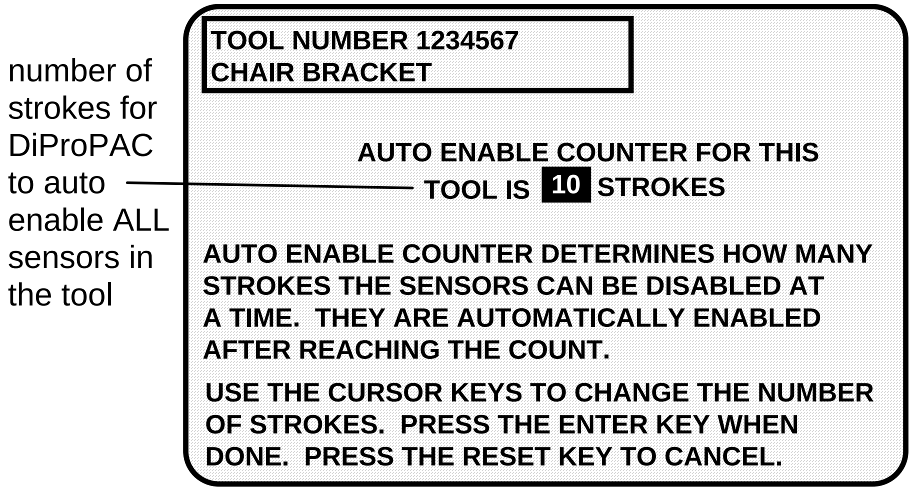


Figure 5-9. Setting "Auto enable by tool" counter

3. Next you will see a list of sensors to program.

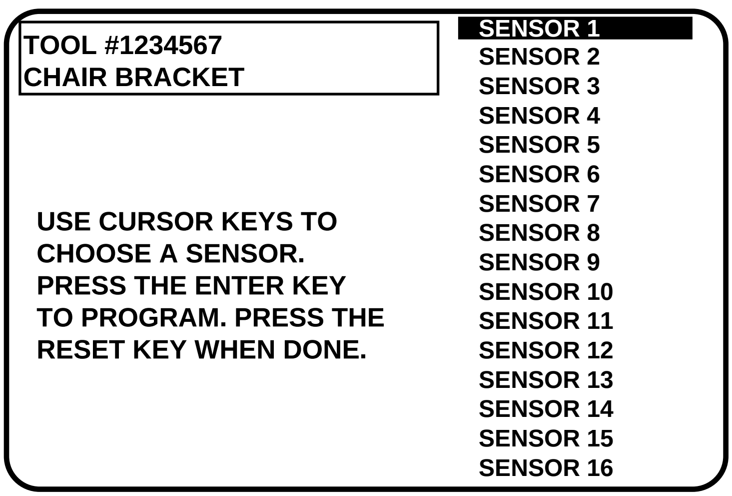


Figure 5-10. List of sensors to program

NOTE: Notice that we are illustrating 16 sensors. Depending upon the way that your SmartPAC has been configured (with DiPro 8 sensors or with DiPro 16 sensor), your display may vary. We are showing the complete DiPro module.

4. You can select any sensor, but it is a good idea to start with the first sensor. Select "sensor 1". After selecting it, the first thing you do is name it.

Naming the sensor

1. You see this display when you select a sensor. It allows you to name the sensor.

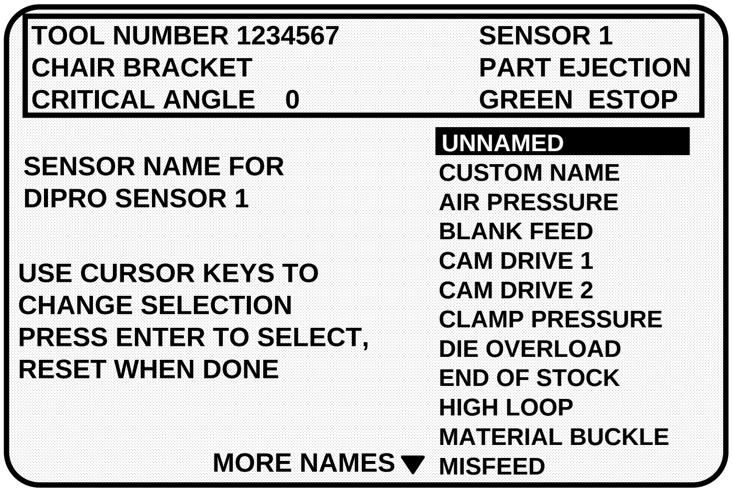


Figure 5-11. Naming the sensor

2. Use the "down" cursor key to move the bar and highlight the name you want. More names appear from the bottom of the name column as you keep pressing the key. You can scroll back and forth through the name column using these keys.
3. There are several names from which to choose. You can also choose not to name a sensor by selecting "unnamed".
4. If you do not find a suitable name but you still want to select a name the sensor, you can select "Custom Name", by highlighting it and pressing Enter.
5. If you select "Custom name", another display appears that lists all the customized names (up to 16 possible choices) that you set in Initialization mode (see "Custom sensor names" in Chapter 4).

   Assign any one of these names to each of your sensors by highlighting the name and pressing Enter. The names are interchangeable. This means, for instance, that you can assign "Sensor 3" the custom name set for "Custom 15".

Setting the "Auto Enable by Sensor and Tool" counter value

6. *If you had selected "Auto enable by sensor and tool" in Initialization mode (Chapter 4), a screen appears asking you to enter the stroke value. If you had selected "Auto Enable by tool" in Initialization, this screen will not appear (refer to Figure 5-9 toward the beginning of this section) .*

   Use cursor keys to change the number of strokes. *The maximum number of strokes that you can enter is 24.* Then press Enter when done (see Chapter 3 for help in using cursor keys).

number of strokes for DiProPAC to auto enable the specified sensor in this tool

TOOL NUMBER 1234567
CHAIR BRACKET

AUTO ENABLE COUNTER FOR THIS
SENSOR IS **10** STROKES

AUTO ENABLE COUNTER DETERMINES HOW MANY STROKES THE SENSORS CAN BE DISABLED AT A TIME. THEY ARE AUTOMATICALLY ENABLED AFTER REACHING THE COUNT.

USE THE CURSOR KEYS TO CHANGE THE NUMBER OF STROKES. PRESS THE ENTER KEY WHEN DONE. PRESS THE RESET KEY TO CANCEL.

Figure 5-12. Setting "Auto enable by sensor" counter

7. After you have assigned a name for sensor 1 and set the auto enable counter value, you will be returned to the previous menu where sensor 2 automatically is highlighted for you. You can select a name for it. Continue in this manner until all your sensors have been configured accordingly.

Setting sensor type

After selecting the sensor name, you will see this display. You can set sensor type. Notice that the sensor name now appears at the top right of the display. This display shows "Part ejection".

TOOL NUMBER 1234567 | SENSOR 1
CHAIR BRACKET | PART EJECTION
CRITICAL ANGLE 0 | GREEN ESTOP

NOT USED	GREEN
RED (NC)	GREEN QUICK CHECK
YELLOW (NO)	GREEN CONSTANT
	GREEN SPECIAL

USE CURSOR KEYS TO CHANGE SENSOR TYPE. PRESS ENTER TO SELECT. PRESS RESET WHEN DONE.

Figure 5-13. Setting sensor type

Select the sensor type you want for that sensor. You have six choices: yellow, red, green, green quick check, green constant, and green special. See Chapter 1 for a detailed description of each of these sensors. (The "not used" setting is for sensor inputs that are not used with the tool.) Notice that the sensor function appears at the top middle of the display and the sensor type at the top right.

Setting stop type

After selecting sensor type, you will see this display for all sensors except green special.

You do not have to set the stop type for a green special sensor. SmartPAC automatically stops the press on the upstroke.

You can set stop type for the other sensors — emergency stop, top stop, or smart stop. Emergency stop is highlighted.

Use **emergency stop** (E-Stop) when you want to stop the press before the next hit. For instance, when monitoring part ejection on the upstroke, you can use the E-stop setting so SmartPAC will send a stop signal to the press immediately if a malfunction occurs. This ensures that the press will stop in time before the next hit.

If you are monitoring a feed that takes place well into the downstroke (like a roll feed) you would probably want to set the feed sensor for a **top stop**. An E-stop setting here may cause the press to stick on bottom. That is because the stop signal would be sent just as the ram is about to contact the material.

Selecting **smart stop** allows SmartPAC to initiate either an emergency stop or top stop depending upon the angle where the sensor detected the fault. Highlight "variable" stop" and press Enter.

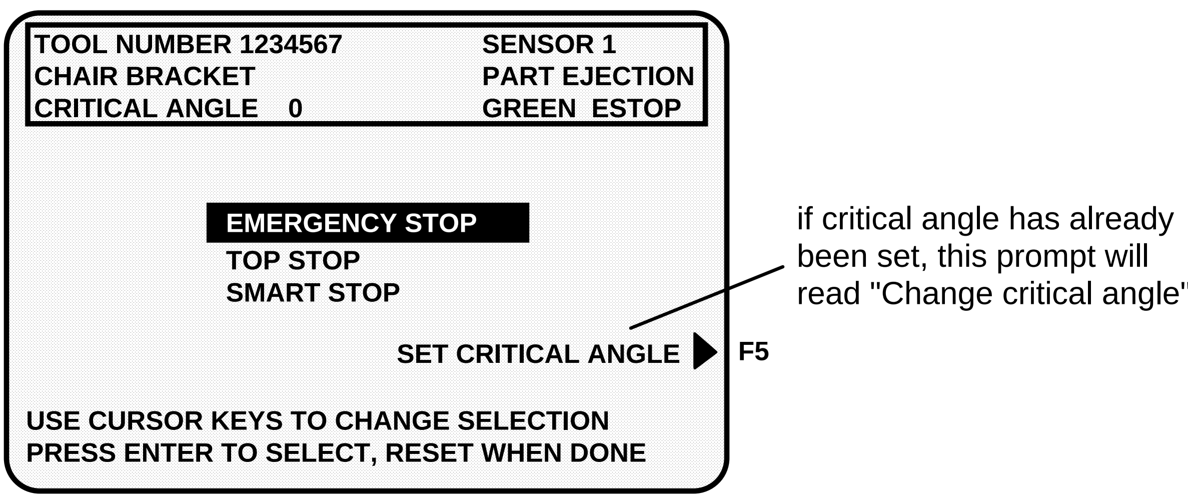


Figure 5-14. "Setting stop type" display

When you highlight "Smart stop" and press Enter, a display immediately appears which asks you to set "critical angle".

Critical angle is the last angle position in the crankshaft rotation to signal an emergency stop so that the ram can be stopped before the punches make contact with the material. The critical angle affects all the sensors that are set for smart stop, and only needs to be set *once* for the tool. However, a critical angle can vary for different tools. *In other words, you cannot change the critical angle from sensor to sensor in the same tool. You just have to set it once for the tool.*

The purpose of the critical angle is to avoid jamming the press at the bottom of the stroke. If a die protection error is detected before the critical angle, SmartPAC will execute an emergency-stop. Otherwise, if the error is detected between this angle and 185°, SmartPAC will execute a top stop.

Note that if you need to modify the critical angle at a later time, you can access the "Set the critical Angle" display by pressing F5 from the "Setting stop type" display (Figure 5-14).

Now set the stop type. To make a setting for red, yellow, green, green quick check, and green constant, select the setting you want for the sensor—emergency stop, top stop, or smart stop.

Once you make the stop type settings for red and yellow sensors, you are done. Green sensors, however, need additional settings to be made. SmartPAC brings you back to the display listing the remaining sensors. You can set another sensor. Go to the section, "Setting the other sensors for the tool".

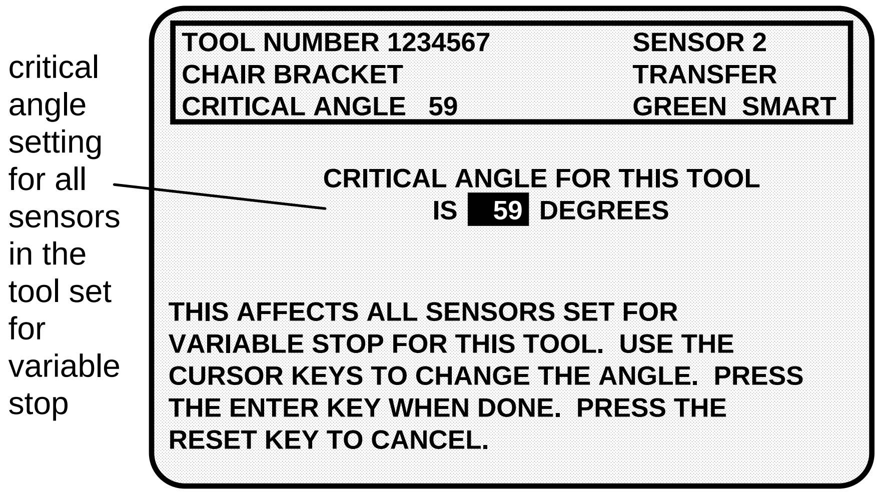


Figure 5-15. Setting critical angle for variable-stop sensors

Use cursor keys to change the angle value. Then press Enter when done (see Chapter 3 for help in using cursor keys). You will be able to continue setting up the sensor.

Next we explain how to set the ready signal for green, green quick check, and green constant sensors and the counter for green special sensors.

Setting the ready signal for a green sensor

After selecting stop type for a green sensor, you will see the display in which you set the ready signal the "ready on" angle and "ready off" angle (the "ready signal"). The ready signal is the timing window during which the sensor must actuate or SmartPAC sends the stop signal to the press.

You set the ready signal so that it is a little longer than the sensor's actuation time for green and green quick check sensors. For green constant sensors, you set it so that it is a little shorter than the sensor's actuation time. See Chapter 1 for an explanation of the different types of green sensors.

NOTE: *If you are not sure how to set the ready signal, estimate it. You can adjust the setting later in Run mode after you run the press. SmartPAC will display the sensor actuation angles in the Run mode.*

Setting the "ready on" and "ready off" angles

1. Use the cursor keys to move the arc around the "circle diagram". The **circle diagram** dynamically illustrates the on and off angle settings that you programmed for a sensor and/or cam channel. To set the "Ready ON" time, you increase the angle with the "right" cursor key and decrease with the "left" cursor key. Conversely, to set the "Ready OFF" time, you increase the angle with the "up" cursor key, and decrease with the "down" key. Notice how the bar changes to reflect these keystrokes. Also the numeric values appear in the "Ready" box on the screen.

   If necessary, see "Cursor keys" under "Using the keyboard" in Chapter 3 for step-by-step instructions. This display shows a green sensor with the ready signal for part ejection set to 180° on, 265° off.

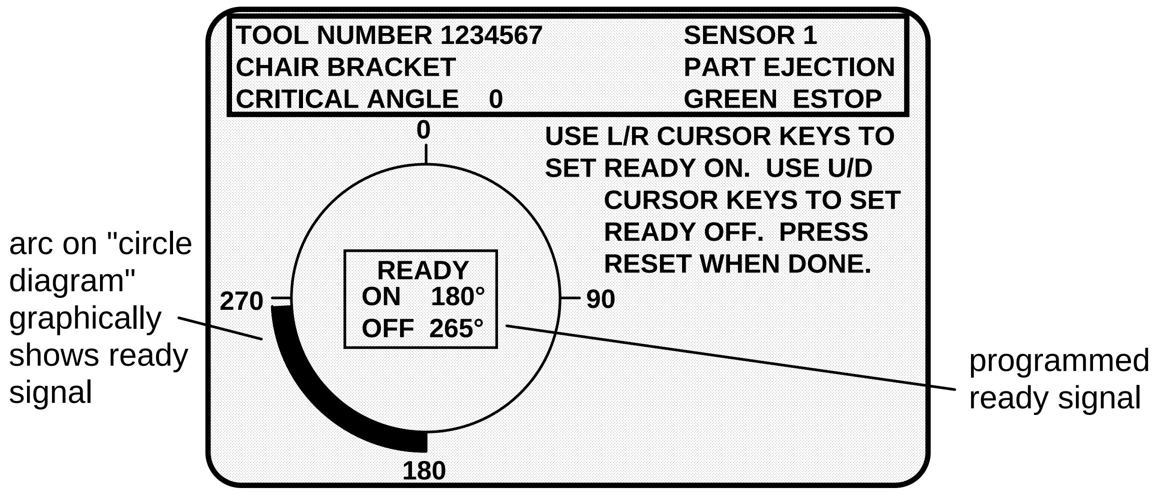


Figure 5-16. Example of a programmed ready signal for part ejection

2. After setting the ready signal, press Reset to go back to the sensor menu. If you are completely done, press Reset one more time to return to the Programming mode menu. *The highlight bar automatically scrolls down to the next sensor to program.*

Setting counter value for green special sensor

After setting the sensor type for a green special sensor, you will see the following display. You can set the maximum number of strokes that the press can make without this sensor actuating. The preset limit is 99. Use your up or down cursor keys to set the value. Then press the Reset key to set the next sensor.

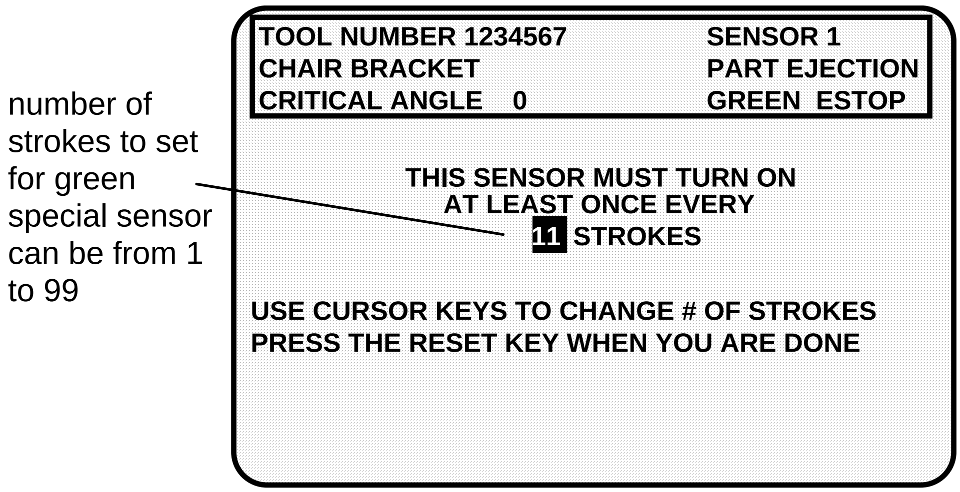


Figure 5-17. Setting "green special" sensor

FOR MORE INFORMATION

Refer to "Understanding Sensor Technology" in Chapter 1 for detailed descriptions of the green special sensor and other types of sensors.

Setting the other sensors for the tool

After you make the last setting for the sensor, you will again see this display (Figure 5-10). The name of your sensor will appear in the display. The next sensor is automatically highlighted.

To set more sensors, select the next sensor from the list and make settings for the sensor. Make settings in the same way for the rest of the sensors you are using.

Going back to the Main Programming menu

When you are done making settings for all sensors and have the list of sensors on your display, press Reset once more. You will again see the main Programming menu (Figure 5-4). You can select tool name, counters, or cam timing and make those settings for the tool. You can also select "Die Protection" again to display the list of sensors for the tool and check or change settings.

If you press Reset again instead of choosing to make more settings, you will see the display allowing you to load, modify, or delete the tool number (Figure 5-3). If you press Reset again, you go back to the first Programming display in Program mode (Figure 5-4).

NOTE: *SmartPAC saves your settings automatically. You do not have to press any key or issue any command to save settings.*

ABOUT CHANGING SETTINGS FOR A TOOL

When you change settings for a loaded tool number, a display will pop up allowing you to immediately load the tool number with the new settings. This display appears when you press Reset to go back to the Programming menu. You can load the tool number or go back without loading it. *You should load the tool number*. The old settings will be used until you reload the tool number with the new settings.

What to do about sensor inputs that are not used

If a sensor input is not used for a tool, do not make any settings for the sensor. SmartPAC will ignore any signals from that input, even if a sensor is connected. SmartPAC will list an unused sensor on the sensor list as "sensor 1" or "sensor 2", whatever number it is. Sensor type is automatically set to "not used" if no settings have been made.

To change a sensor input to "not used", select "not used" for sensor type. The list of sensors will be immediately displayed. Any sensor settings for this sensor are erased.

Going back to the sensor list using the Reset key

If you press Reset instead of Enter when making a setting for a sensor, you go back to your list of sensors. The item highlighted when you pressed Reset is the item selected.

Fine tuning the settings for green sensors

To set a precise ready signal for your green sensors, you should fine-tune the ready signal after seeing each sensor's actuation angle. You do this by loading the settings, then turning the Program/Run key to "Run". When you run the press, SmartPAC will record all actuation times and display the earliest "on" and latest "off" times for each sensor.

In Run mode, you can call up the display for each green sensor. The display will show each green sensor's actuation angle along with the ready signal you set. It is easy to adjust the ready signal based on what the actuation angle is. You can display and adjust your sensors quickly, even while the press is running. To learn how to use Run mode, see Chapter 6—"Using SmartPAC in Run Mode".

Disable (enable) sensors

Depending on how you initialized the "Sensor enable mode" in Initialization (Chapter 4), there are various ways to enable die protection. If you selected "Manual enable/disable" in Initialization, you can manually enable and disable your sensors using the keyboard and display screen. If you chose either of the "Auto enable" selections in Initialization, refer to the sensor programming section called "Die Protection" in Chapter 5 to make the appropriate settings for the tool. *Even in Auto mode, you can manually enable sensors at any time.*

No matter which choice you had made, you should always have sensors enabled to protect your tool. But sometimes you may want to disable sensors during setup. SmartPAC will *not* stop the press when sensors are disabled even if a sensor signals a malfunction. *If you do this, be sure to set sensors to "enabled" before you start making parts.*

Follow these steps to disable sensors.

IMPORTANT

When sensors are disabled, the LED display will *flash* while the press is running to remind you to reactivate die protection.

1. Return to the Programming menu — the first display you see in Program mode. Notice that the second line shows whether sensors are enabled or disabled. The factory setting is enabled. In the display shown below, sensors are enabled.

```
THE CURRENTLY LOADED TOOL #  IS  1234567
CHAIR BRACKET
SENSORS ENABLED
          PROGRAM OR LOAD TOOL NUMBERS
          DISABLE THE SENSORS

USE CURSOR KEYS TO CHANGE SELECTIONS
PRESS ENTER TO DISABLE SENSORS.
```

Figure 5-18. Disable/enable sensors

2. To disable sensors, highlight that second line and press Enter.
3. Now notice at the top left of the display, it shows that sensors have been "disabled". Note that "Disable sensors" has changed to "Enable sensors". To enable sensors, just repeat the process, and "disabled" will toggle back to "enabled".

Cam switch

> **WARNING!**
>
> SmartPAC with programmable cam capability can be used with Wintriss Clutch/Brake Control. However, SmartPAC's programmable cam switch should not be used to provide timing signals for any other clutch/brake control. It is designed to control auxiliary functions only.

To cam switch, you need to:

- Select "Cam switch" from the Main Programming menu
- Select a channel and make an on-off, auto, or timed output setting
- Set all other channels for the tool

Bringing up the display of cam channels:

1. Select "Cam switch" from the Main Programming menu (Figure 5-4)

> **ENTER YOUR PASSWORD**
>
> **USE THE KEYPAD TO ENTER NUMBERS. USE THE UP/DOWN CURSON KEYS TO INCREASE/DECREASE. PRESS ENTER WHEN DONE. PRESS RESET TO CANCEL.**
>
> **60599**
>
> If this display appears, you need to enter the general password to access these settings. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

2. This is your list of cam channels. Now you can select and set a channel. (If you named your cam channels in Initialization mode, those names will appear, instead of channel 1, channel 2, etc.)

NOTE: Notice that we are illustrating 16 cams. Depending upon the way that your SmartPAC has been configured (with ProCam 8 cams or with ProCam 16 cams), your display may vary. We are showing the complete ProCamPAC module. Also, if you had named the cam channels in Initialization mode (Chapter 4), the channel number will be replaced with the name.

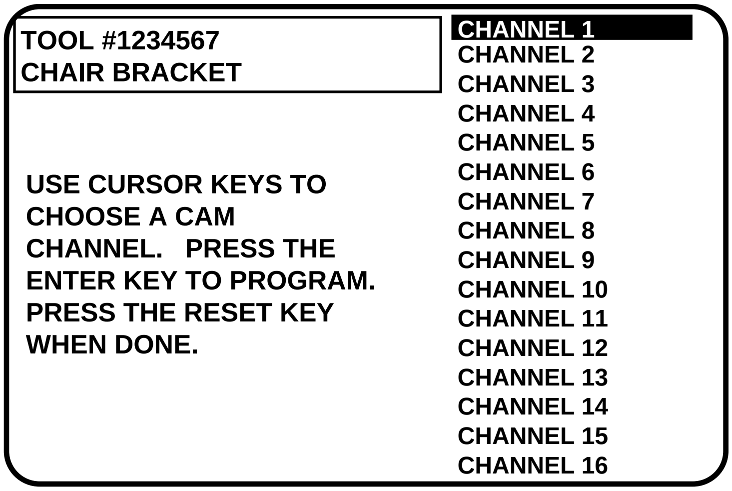


Figure 5-19. Programming cam channels

Selecting a channel and making an on-off setting

An on-off setting means you set the stroke angles where you want the channel to turn on and turn off.

To make an on-off setting for a channel:

1. Select a channel from the complete list. You will see the display below. Notice that the tool number and channel name selected are shown in the display. Select "Program on/off angle".

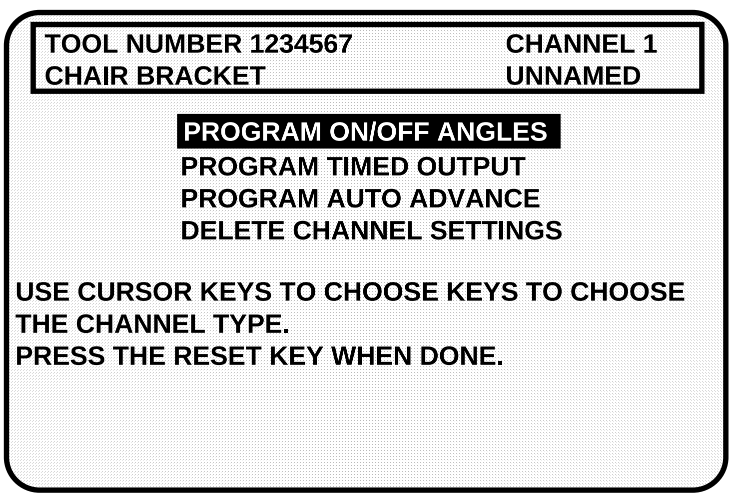


Figure 5-20. Selecting "Program on/off angles"

2. You see a display (similar to Figure 5-21) which includes information about the tool and cam channel. Notice also the circle diagram on the display.
3. Set the "on angle" and "off angle" using the cursor keys. An arc will move around the circle diagram as you set the "on" and the "off" angles. These settings are also shown numerically in the box on the display. See "Cursor keys" under "Using the keyboard" in Chapter 3 for step-by-step instructions on how to set the "on" and "off" angles.

4. Press Reset to go back to the display showing the cam channels. You can select another channel to set.

   Here is an example of a display for a part blow-off set at 185° on, 220° off.

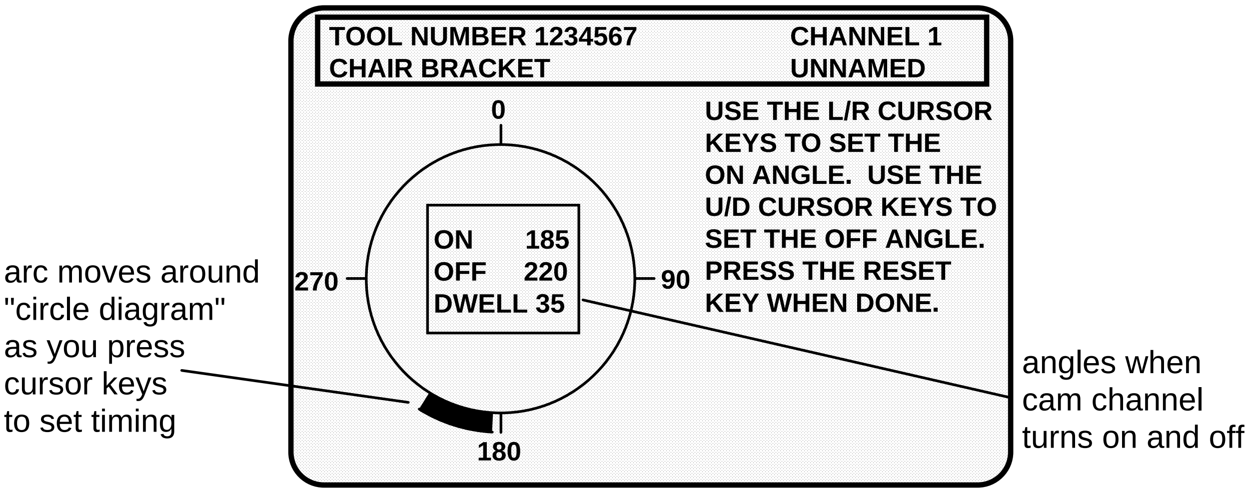


Figure 5-21. Illustrating programmed channel 1 "part blow-off"

Selecting a channel and making a timed output setting

A timed output setting means that you set the stroke angle where you want the channel to turn on and the dwell duration time in milliseconds (in other words, how long you want the channel to stay on). This makes the channel "on-duration" independent of press speed.

With on-off settings, "on-duration" decreases with press speed. Timed output settings are recommended for functions such as controlling air and lubricators to ensure consistent "on-duration" regardless of press speed. Also, when you use the timed output setting, the channel will turn off after the set time, even if the press stops at the "on" angle. With "on-off" settings, the channel will stay on if the press stops within the "on" setting for the channel. Therefore, you could waste air or lube. *You can set up a maximum of four channels as "timed".*

To make a timed output setting for a channel:

1. Select the channel you want to set from the list of cam channels. You will then see the display for choosing an on/off output, timed output, or auto advance settings.
2. Select "Program timed output." You see a display which includes the tool number and name of the channel you are setting shown at the top.
3. Use the RIGHT or LEFT cursor keys to set the degrees where the channel should turn on. The letter "T" and the 0 next to it will move across the scale at the bottom of the display as the key is pressed. Hold down the key until the "T" moves to the degrees you want. If you overshoot your setting, press the left cursor key to go back. The degrees setting is also shown in the box next to "angle."

NOTE: *The zero next to the "T" indicates the "on-time" which is set next.*

4. Use the UP or the DOWN cursor keys to set the time that the channel should be on in milliseconds. (A millisecond is 1/1000th of a second.) Press these keys to increment (up)

or decrement (down) until you reach the right number. The number will change in increments of 10 milliseconds. If you overshoot, use the DOWN cursor key to go back. The number is shown in the box and next to the "T" on the scale. You can go up to 500 milliseconds (.5 seconds). When you are done with the setting, your display should look similar to the next illustration (the settings here are 270° on-angle, 250 mS on-time):

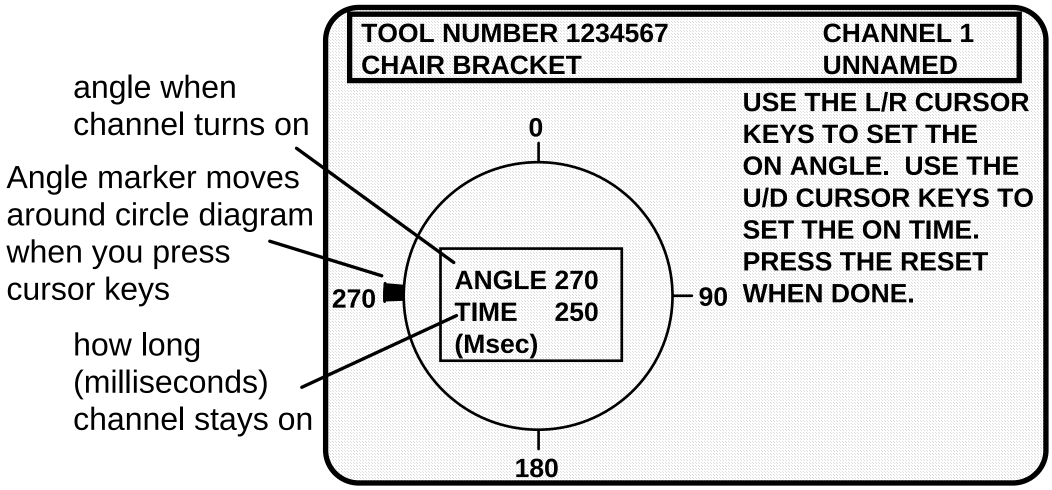


Figure 5-22. Illustrating a timed output channel

5. Press Reset to go back to the list of channels.

For applications requiring more than 500 milliseconds

If you have an application where more than a 500-millisecond "on-time" is required, use one of the batch counters instead of programming a timed output setting (as explained above). To accomplish this, set the "batch count" to a value of 1 and the "counter angle" accordingly. Next, set the cam's "on-time" as the batch's "pulse time". For more assistance in programming batch counters, see "Setting Counter Mode" earlier in this chapter.

NOTE

SmartPAC saves your settings automatically. You do not have to push any key or issue any command to save settings.

Selecting a channel and making an auto advance setting

You can make an auto advance setting whenever you want SmartPAC to automatically compensate the cam timing for changes that occur in press speed. A good example of this is top stop because it ensures the same top stop position, regardless of varying press speeds. You can also use "auto" settings for feed, pilot release, lube, etc. *You can set up a maximum of two channels as "auto".*

IMPORTANT

You can program up to two "auto" output settings in Program mode. The first advance constant set in Initialization mode affects the *lowest-numbered* channel that you set as "auto" in Program mode, and likewise the next *numerically higher* channel number uses the second "advance constant" setting. In other words, if channel 3 and channel 5 are programmed using Auto Advance, channel 3 will use the first advance constant, and channel 5 will use the second. See "Auto Advance" in Chapter 4 for more information about advance constants.

To make an auto advance setting for a channel:

1. Select the channel you want to set from the list of cam channels. You will then see the display for choosing an on/off output, timed output, or auto advance settings.
2. Select "Program auto advance." You see a display showing the tool number, channel number, and name of the channel you are setting shown at the top of the screen.
3. Set the "on angle" and "off angle" using the cursor keys. Notice that an arc will move around the circle diagram as you set the "auto on" and the "auto off" angles. These settings are also shown numerically in the box on the display along with the dwell. See "Cursor keys" under "Using the keyboard" in Chapter 3 if necessary.

   When you are done with the setting, here is an example of how your display would look like. (the settings here are 270° auto on, 330° auto off):

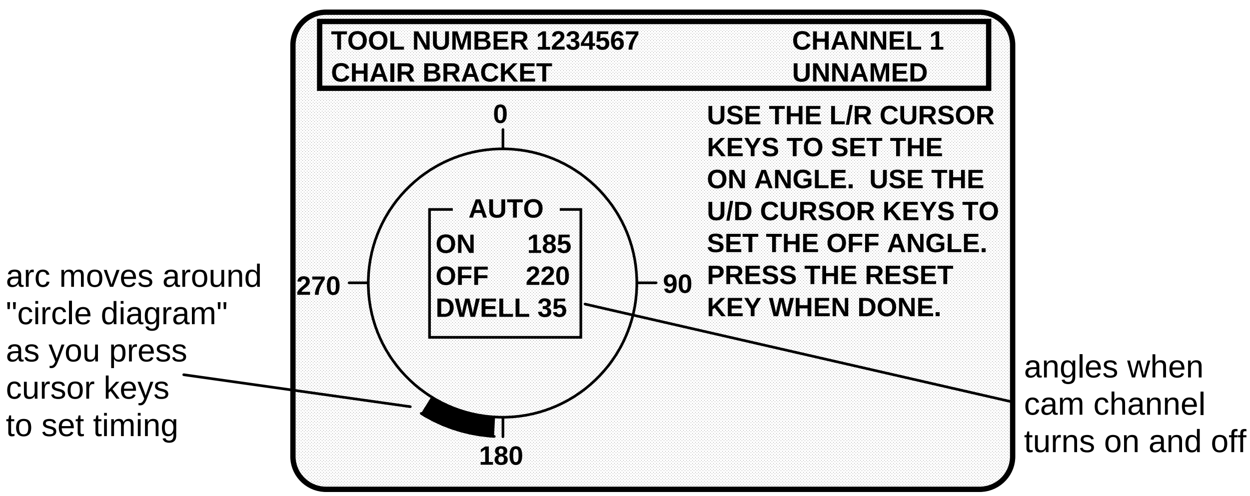


Figure 5-23. Illustrating an auto advance channel

4. Press Reset to go back to the list of channel names.

Setting other channels for the tool

When you are done setting a channel, make settings for the rest of your channels. To finish making settings:

1. Choose the next channel from the list of channel names. Make settings for that channel.
2. Make settings for all your other channels.

3. When you are done with all channels, display the list of channels. Then press Reset. You will return to the display allowing you the choice of setting counters, cams or batch mode. You can perform other tasks. If you press Reset again, you will return to the first display in Programming mode.

> **NOTE**
>
> SmartPAC saves your settings automatically. You do not have to push any key or issue any command to save settings.

Deleting channel settings

To delete settings for a cam channel, select the cam channel, then select "Delete channel settings" from the next display. The settings for the channel will go back to 0° on—0° off (or 0° On—0° time on for timed settings). You will automatically go back to the list of cam channels.

Press Control Settings

You can set certain press control parameters in SmartPAC, including Top Stop Angle, Maximum Press Speed, and Counterbalance Setpoint. To access these choices, select "Press Control" from the main Programming menu (see Figure 5-1).

ENTER YOUR PASSWORD

USE THE KEYPAD TO ENTER NUMBERS. USE THE UP/DOWN CURSON KEYS TO INCREASE/DECREASE. PRESS ENTER WHEN DONE. PRESS RESET TO CANCEL.

60599

If this display appears, you need to enter the general password to access these settings. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

A display similar to the following appears:

PRESS CONTROL PARAMETERS

TOP STOP ANGLE	288 DEGREES
MAXIMUM PRESS SPEED	200 SPM
MINIMUM PRESS SPEED	100 SPM

USE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE. PRESS THE ENTER KEY TO CHANGE IT. PRESS RESET WHEN DONE.

Figure 5-24. Press speed parameters

Top Stop Angle

It is assumed that you already set the Top Stop Default Angle in SmartPAC's Initialization mode ("Setting the Top Stop Default Angle" in Chapter 4). If so, then that value will automatically appear on the "Press Control" display (Figure 5-2 shown below).

If your press does not have a variable speed drive, you do not need to program the Top Stop Angle or the Maximum Press Speed. Whatever appears in Initialization mode (Top Stop Default) will appear automatically in Programming mode and will be used with the currently loaded tool.

If you have a variable speed press and if you have already set the Top Stop Constant in Initialization ("Setting Auto Advance Constants and Top Stop Constants" in Chapter 4), and/or you have set WPC switch #4 (Press Options) to enable the "Auto Compensated Top Stop" feature ("ACTS"), then you do not need to modify the Top Stop Angle because WPC can compensate for the change in press speed.

If you have a variable speed press but you have not set the Top Stop Constant in Initialization mode or you have not enabled ACTS, then you can advance the Top Stop Angle to match the press speed.

Maximum and minimum press speed limits

If you have a variable speed press, you can program different speed limits for different tools. This choice allows you set upper and lower limits for the press's operating speed. Make sure that you set a greater value for the "Maximum" than for the "Minimum". SmartPAC will not allow you to inadvertently enter a smaller number in "Maximum". Instead, it will display a value one digit greater than the "Minimum". If you wish to disable this choice, set both maximum and minimum press speed parameters to 0 (zero).

Counterbalance Setpoint (optional)

You can program a setpoint to monitor the counterbalance air pressure used to compensate for customary variations in upper die weights. This value, as with maximum press speed, can be tied to a tool number. If the counterbalance air pressure limits have been exceeded, an error message "F46" (Counterbalance air outside sensor limits) appears on the display (see Chapter 7).

How to set the Top Stop Angle

Here are the steps to set the Top Stop Angle:

1. Select "Press Control" from SmartPAC's Programming menu (Figure 5-4).
2. You will see this display. Notice the value for Top Stop Angle is highlighted. Press ENTER to select.

PRESS CONTROL PARAMETERS

TOP STOP ANGLE	270	DEGREES
MAX. PRESS SPEED	200	SPM
MIN. PRESS SPEED	150	SPM
CNTR BAL SETPOINT	40	PSI

USE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE. PRESS THE ENTER KEY TO CHANGE IT. PRESS RESET WHEN DONE.

Figure 5-25. "Press Control" display

3. Use the number keys to set the Top Stop Angle. Then press Enter to confirm. For assistance on using number keys, refer to Chapter 3 of the SmartPAC user manual.
4. To set the remaining items, go to the next section.

   If you are completely done, just press Reset. You will be returned to the Main Programming menu. Do not forget to load the tool before running the job. (For assistance in loading the tool, refer to "Load the Tool Number" at the end of this chapter.)

How to set Maximum and Minimum press speeds, Main air, and Counterbalance setpoint (optional)

Here are the steps to set Maximum press speed, Minimum press speed, Main air setpoint, and Counterbalance setpoint:

1. Select "Press Control" from SmartPAC's main Programming menu (Figure 5-4).
2. You will see the display shown above at Figure 5-24. Notice the value for Top Stop Angle is highlighted. Select "Max. press speed".
3. Use the number keys to set the Maximum Press Speed. Then press Enter to confirm. For assistance on using number keys, refer to Chapter 3 of the SmartPAC user manual.
4. Repeat steps 2 and 3 for "Min. press speed". Remember the minimum press speed value must be lower than the maximum value. SmartPAC will not let you make an incorrect entry.
5. To set the Counterbalance setpoint, select that item and repeat step 3.

Note: *The Counterbalance Setpoint only appears on this screen when the Counterbalance Tolerance had previously been initialized to a value other than zero. For more information, refer to "Setting Main Air and Counterbalance Limits" in Chapter 4 of this manual.*

6. When you are completely done, press Reset. You will be returned to the Main Programming menu. Do not forget to load the tool before running the job. (For assistance in loading the tool, refer to "Load the Tool Information" at the end of this chapter.)

Tool number information (optional)

IMPORTANT

Tool Information serves only as a convenient place to record information about the tool. It does not control any aspect of press operation.

Note: *This feature is not available if you have the optional PLC interface installed.*

Select "Tool Information" under the main Programming menu (Figure 5-4) to record useful information about the tool you are programming. See "Tool number information" in Chapters 4 to set up the information items.

ENTER YOUR PASSWORD

USE THE KEYPAD TO ENTER NUMBERS.
USE THE UP/DOWN CURSON KEYS TO
INCREASE/DECREASE. PRESS ENTER
WHEN DONE. PRESS RESET TO CANCEL.

60599

If this display appears, you need to enter the general password to access these settings. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

You will see a display similar to the following:

Use cursor keys to move selection bar to desired item. Press ENTER.

TOOL NUMBER INFORMATION

PASS LINE HT	**4.50**	**IN**
STRAIGHTENER	**4.25**	**IN**
HYD. OVLD.	**100**	**TONS**
PRESS SPEED	**65**	**SPM**
CONVEYOR	**NO**	
PART LUBE	**YES**	

MEMO BOX

CAREFULLY CHECK
DIE PLACEMENT

MEMO LINE 1 ▸ **F4**

MEMO LINE 2 ▸ **F5**

USE CURSOR KEYS TO CHOOSE THE VALUE YOU WANT TO CHANGE. PRESS THE ENTER KEY TO CHANGE IT. PRESS RESET KEY WHEN DONE.

Figure 5-26. Tool number information screen

To enter information about the items:

1. Select the desired item. A screen overlay appears in which you can enter the appropriate value. For Yes/no items, enter 0 (zero) for NO, and 1 (one) for YES.
2. Enter text into the memo box, by pressing **F4** for the first line, and **F5** for the second line. A screen overlay (Figure 5-27) appears that enables you to enter fifteen characters of numbers and alphabetic text for each line. When you complete each line, press **F6** to accept it.

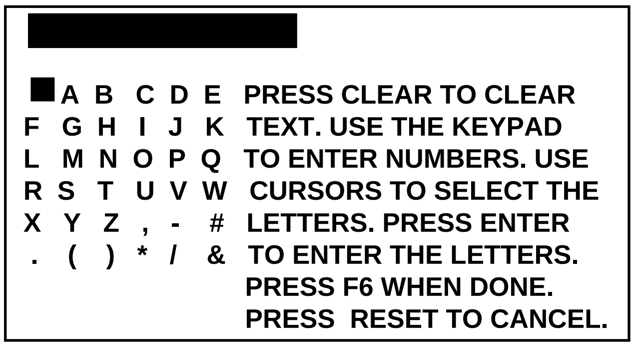


Figure 5-27. Overlay for entering memo box text

3. When you have finished entering information into the tool number information screen, press RESET to return to the main Programming menu.

Load the tool number

Before you run the press, you have to load the SmartPAC settings for the tool being used. This retrieves the settings for the tool from SmartPAC's memory and allows SmartPAC to use the settings to control the press.

> ***** WARNING *****
> **Equipment may operate**
> **when you load tool settings**
>
> When you load a tool number, auxiliary press equipment may start if the press crankshaft is within the on-off setting for that device. All employees must stay away from the press and equipment that the cam operates before a tool number is loaded.

To load the settings for a tool number:

1. Select "Program or load tool numbers" from the first Programming menu.

> **ENTER YOUR PASSWORD**
>
> **USE THE KEYPAD TO ENTER NUMBERS.**
> **USE THE UP/DOWN CURSON KEYS TO**
> **INCREASE/DECREASE. PRESS ENTER**
> **WHEN DONE. PRESS RESET TO CANCEL.**
>
> **60599**
>
> If this display appears, you need to enter the general password to load the tool number. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

Note: *You can also load tool numbers in Run mode, if allowed by security access, as long as the press is stopped.*

2. Select the tool number you want to load from the tool number display. (See the beginning of this chapter if you need assistance in selecting a new or existing tool number). After selecting the tool number, the main programming menu for the tool appears:

MAIN PROGRAMMING MENU FOR TOOL # 1234567
CHAIR BRACKET

PROGRAM:

LOAD THIS TOOL
DELETE THIS TOOL

TOOL NAME
COUNTERS
DIE PROTECTION
CAM SWITCH
PRESS SPEED
TOOL INFORMATION

USE THE CURSOR KEYS TO CHOOSE THE TASK THAT YOU WANT TO PERFORM. PRESS THE ENTER KEY TO SELECT IT. PRESS THE RESET KEY WHEN YOU ARE DONE.

Figure 5-28. Main Programming menu for tool number

NOTE: If you started programming the tool and then pressed RESET, SmartPAC interprets this as an order to load the tool, and shows you the warning screen shown in Figure 5-29.

3. Select "Load the tool information." You will see this warning message superimposed over the "Load Tool" screen (above):

WARNING! ! WARNING!!
ANCILLARY EQUIPMENT MAY OPERATE WHEN THIS SETUP IS LOADED. WARN ALL PERSONNEL TO STAND CLEAR.

PRESS ENTER TO LOAD THE SETUP
PRESS RESET TO CANCEL

Figure 5-29. Warning message when loading tool number

4. Press Enter to load the tool settings (a setup). You can go back without loading the tool settings by pressing Reset. When the tool number has been loaded (which takes only a few seconds), this message quickly appears on the screen:

TOOL NUMBER 12345678 IS BEING LOADED

NOTE

If you did not receive this message, but instead received an error message on your screen when you tried to load the tool, go to Chapter 7 and find the section describing that error message. Follow the instructions there for correcting the problem. If the error message is not described there, or you cannot fix the problem, call Data Instruments. Be ready to provide some important information to expedite a resolution to the problem. Please supply: **product name** (e.g. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

5. Once the tool is loaded, you will again see the first Programming menu. Note that the Programming menu shows the tool number you just loaded. You can always check which tool number is loaded on this display. With settings loaded, you can switch to Run mode and run the press.

How to modify the tool number settings

NOTE

When you change settings for a currently loaded tool number, a display will pop up allowing you to immediately load the tool number with the new settings. This display appears when you press Reset to go back to the Programming menu. You can load the tool number or go back without loading it. *You should load the tool number*. The old settings will be used until you reload the tool number with the new settings.

After you have created a tool number (see the beginning of this chapter if you need to review the steps), it is easy to change settings for the tool. Changing settings is done the same way as you made them originally. Proceed below:

Bringing up the display to modify counters, cams, batch, or counter angle

To bring up the Main Programming menu (Figure 5-4):

1. Select "Program/load tool numbers" from the first display in Programming mode (the Programming menu) to see the list of tool numbers already created.
2. Select the tool number you want to change. (Remember, if you need help in selecting an existing tool, refer to the beginning of this chapter.)
3. You will be at the Main Programming menu. Select which action you wish to perform (counters, die protection, cam switch, etc.)

ENTER YOUR PASSWORD

USE THE KEYPAD TO ENTER NUMBERS. USE THE UP/DOWN CURSON KEYS TO INCREASE/DECREASE. PRESS ENTER WHEN DONE. PRESS RESET TO CANCEL.

60599

If this display appears, you need to enter the general password to access these settings. Password access is set under Security Access in Initialization mode. See "Security Access" in Chapter 4.

Modifying sensor settings

1. Select "Die Protection" from the Main Programming menu (Figure 5-4). You will see your list of sensors for the tool.

NOTE: If necessary, refer to the section "Die Protection" earlier in this chapter for illustrations of the different displays, plus detailed step-by-step instructions.

2. To change a setting, select the sensor you want to change. Then modify settings in the same way you originally made them. You can change any setting for a sensor. Or you can leave any setting the same by not changing the selection already made. (When you change sensor type, you have to reset the ready signal).
3. When you are done making changes, display your list of sensors, then press Reset to see the Main Programming menu again. If you press Reset again and the tool number you changed is loaded, you will see a display allowing you to immediately reload the tool number with the new settings. If the tool number you changed is not loaded, you will see the display allowing you to load, modify, or delete the tool number. Press RESET once more and you go back to the Programming menu.

Modifying cam channels

1. Select "Cam switch" from the display giving you the choice of settings. You will see a display listing your cam channels. Remember, you set names for your channels in Initialization mode— Chapter 4.

NOTE: *If necessary, refer to the section "Cam switch" earlier in this chapter for illustrations of the different displays, plus detailed step-by-step instructions.*

2. To modify a setting for a channel, select the channel you want to change. Then you can modify settings in the same way as you originally made them.
3. When you are done making changes, display your list of cam channels; then press Reset to go back to the display to select settings. Press Reset again, and you see the tool number display.

REMEMBER TO LOAD THE TOOL NUMBER

When you press Reset after changing settings for a tool, a display pops up allowing you to load its new settings. You can load the tool number or go back without loading it. <u>You should load the tool number</u>. The old settings will be used until you reload the tool number with the new settings.

Delete the tool number

When you delete a tool number, you remove it completely from the tool number display and from SmartPAC's memory. All tool information will be lost. Here is how to delete a tool number.

1. Select "Program/load tool numbers" from the Programming menu (first display in Program mode).
2. Select the tool number that you want to delete (erase) from the tool number display. (See the beginning of this chapter if you need assistance to select a tool number.)
3. Select "Delete this tool" (see Figure 5-4).
4. Next, you see this message superimposed over the above display (here, we are deleting tool #1).

ARE YOU SURE YOU WANT TO DELETE TOOL NUMBER 1?
PRESS THE CLEAR KEY TO DELETE **PRESS THE RESET TO CANCEL**

Figure 5-30. Confirmation message to delete tool

5. Delete the tool number by pressing the "Clear" key. You will then get this confirmation (your tool number may vary):

DELETING TOOL NUMBER 1

6. If you do not want to delete the tool number, just press Reset to go back to the first display in Programming mode.

Chapter 6
Using SmartPAC in Run mode

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

This chapter describes how to use all the displays you will see in Run mode. The topics will be covered in the order that they appear on the Main Programming menu, as pictured at Figure 6-1. Specifically it covers adjusting counter settings for a tool, setting stop time and stop angle, and start time, and loading a tool number.

This chapter includes programmable cam-related functions, such as: adjusting and viewing cam timing; die protection-related functions, such as: adjusting sensors, viewing sensor timing, and enabling and disabling sensors; and press control-related functions such as: adjusting top stop angle, maximum and minimum press speed limits, counterbalance setpoints, and main system air limits. At the end of the chapter is an explanation on how to operate the press in various operating modes.

About Run mode

The Program/Run key must be set to "Run" before you can operate the press. In Run mode, you can select from the displays to perform tasks just as you do in Program mode. The difference between Program mode and Run mode is this: in Program mode you can make and change settings for all existing tools and any new tool numbers you create.

What you can and cannot do in Run mode

In Run mode you can load a tool number, adjust counters and cam settings, view stop time and view cam channel timing. You cannot create new tool numbers, nor can you modify settings for a tool number if it is not already loaded.

Why some tasks are duplicated in each mode

If you are wondering why certain tasks (like loading a tool number and adjusting timing) are duplicated in Run mode and Program mode, here is why. Sometimes you may not want personnel to get into Program mode. So you keep SmartPAC in Run mode by setting the key to "Run" and removing the key. Now Program mode is locked out. However, the operator can still load a tool number in Run mode and make timing adjustments when necessary in order to correct malfunctions. He or she cannot change tool settings in any other way, however, or create new tool numbers. Creating and organizing tool settings might be left to another person, such as a supervisor or setup person.

Locking Run mode

You can lock out choices on the Run menu or, if you have the password option, require a password to prevent personnel from changing settings or loading tool numbers. See Chapter 4—"Security access"—for instructions on how to lock and unlock Run menu items, and how to require a password.

The first display in Run mode — the Run menu

To get into Run mode, set the Program/Run key to Run.

SELECT = HIGHLIGHT + ENTER

When we say SELECT in this manual, it means highlight the item and press ENTER.

NOTE

Before changing modes, make sure your screen shows the first display in the mode you are in. If that display is not shown, nothing will happen when you turn the Program /Run key. In that case, keep hitting the RESET key. When the first display in the mode is reached, you will instantly switch to the new mode.

A tool number must be loaded before switching to Run mode

If no tool number has been loaded, you cannot switch from Initialization mode or Program mode to Run mode. A tool number must be loaded before SmartPAC will allow the press to run.

If you try to switch to Run mode without a tool number loaded, you will get this error message on your screen:

NO TOOL NUMBER HAS BEEN LOADED

If so, turn the Program/Run key to "program". Press RESET to clear the error message. Then load a tool number. Now set the Program/Run key to "run". You will go into Run mode. The Run menu is the first display you see in Run mode. From this display you can access all the other Run menu. A description of these displays follows.

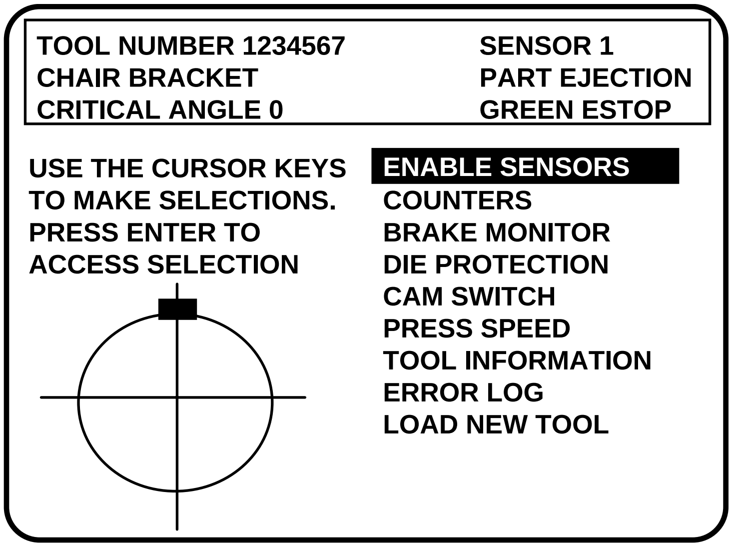


Figure 6-1. Main Run menu (the order may vary depending on the options installed)

IMPORTANT! ABOUT THIS CHAPTER

The above menu choices are explained in this chapter in the order that they appear on the above screen. Your installed options may vary.

Settings locked in Run mode, or password required

SmartPAC's security access feature can lock settings in run mode, or require a password for settings to be changed if you have the password option. Whenever settings are locked in Run mode, you will see a message on the screen telling you so when you select the item. If a password is required, enter it at the screen overlay that appears, Figure 6-2.

Figure 6-2. "Enter your password" display

If settings are locked in Run mode, you can display the information, but nothing happens if you try to make an adjustment. "Adjust mode locked" means you cannot adjust settings. If counters are locked, you cannot change the current count. If cam settings are locked, a message appears on the screen that reads, "CAM ADJUSTMENT IS LOCKED OUT. PRESS RESET WHEN DONE." The item "Load new tool" does not appear on the Run menu if tool numbers are locked in Run Mode.

For more detail, see "Security access" in Chapter 4.

Disable (enable) sensors

Depending on how you initialized the "Sensor enable mode" in Initialization (Chapter 4), there are various ways to enable die protection. If you selected "Manual enable/disable" in Initialization, you can manually enable and disable your sensors in Run mode. If you chose either of the "Auto enable" selections in Initialization, refer to the sensor programming section called "Die Protection" in Chapter 5 to make the appropriate settings for the tool. *Even in Auto mode, you can manually enable sensors at any time.*

No matter which choice you had made, you should always have sensors enabled to protect your tool. But sometimes you may want to disable sensors during setup or for troubleshooting. SmartPAC will not stop the press when sensors are disabled even when a sensor signals a malfunction. *If you do this, be sure to set sensors to "enabled" before you start making parts.*

NOTE: *With sensors disabled, the LED display will flash when the press is running.*

1. Get the first Run menu on your screen (Figure 6-1). Look at the next display.
2. Depending on how the sensors are set, you will see either of these status settings. Selecting the first line item toggles the status from "disabled" to "enabled" and back.

NOTE: *If you manually disable sensors, you will get an additional message "PRESS THE FIVE KEY TO DISABLE SENSORS". This is your confirmation that you really want to disable sensors. Press "5" to confirm, or RESET to cancel.*

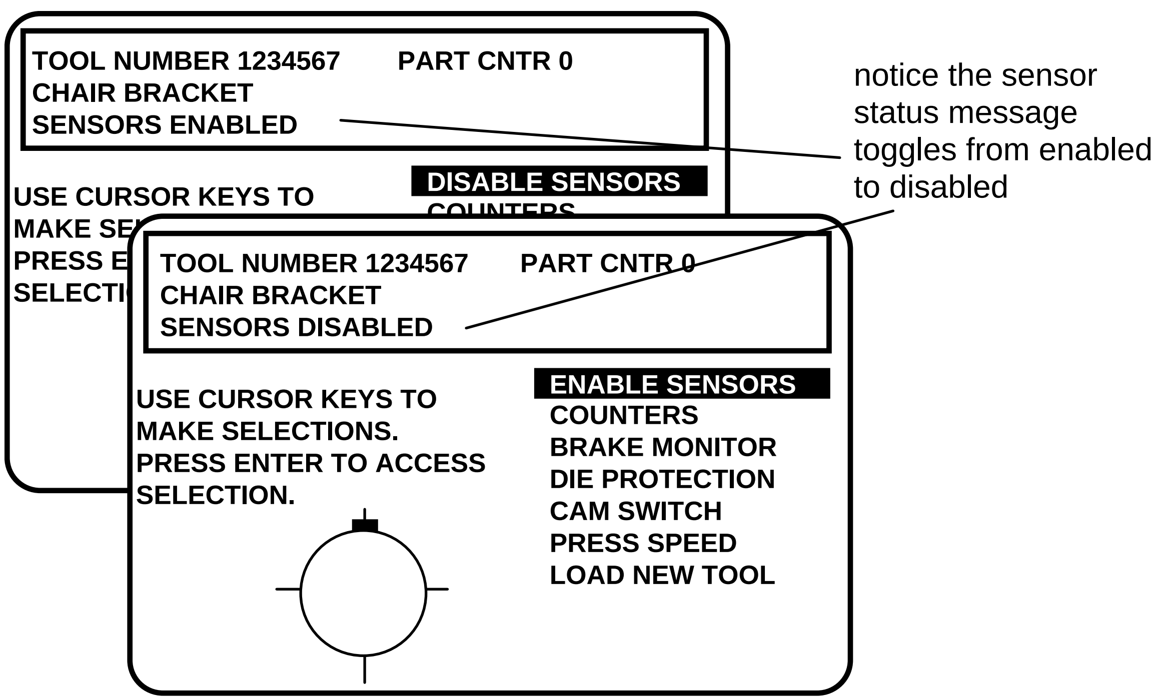


Figure 6-3. Display showing "sensors enabled" or "sensors disabled"

Counters

To set or adjust counters in Run mode, select "Counters" from the Run menu. You will see this display:

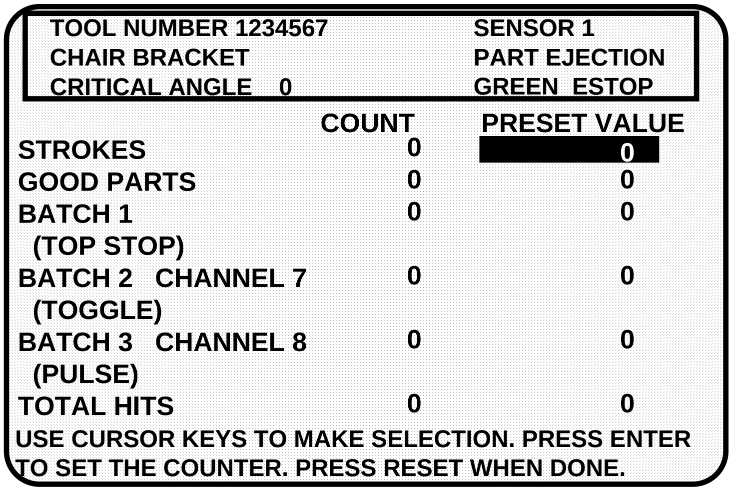


Figure 6-4. Modifying counters screen

Now you can change or reset the strokes, good parts, and batch counters in exactly the same way you did when you first set them. *You cannot adjust the total hits counter.* See "Counters" in Chapter 5 for detailed step-by-step instructions.

Brake Monitor

Start Time

Every press takes a finite amount of time from the point when the Dual Safety Valve (DSV) is energized to when the resolver signal indicates to WPC that it is turning. This elapsed time, primarily taken by the clutch mechanism, is called **Start Time**. WPC needs an internal limit for the start time to detect resolver drive failure. The display provides the Start Time the last time that the press was started.

Stopping Angle

Stopping angle is the crankshaft rotation angle that it takes for the press to stop. It is the stopping position in degrees minus the crankshaft position when the Dual Safety Valve (DSV) is closed. Stopping angle will compensate for the complete rotation when it takes *more* than 360 degrees to stop. You can use Stopping angle to help you when you determine critical angle for your die protection system.

Brake Warning

The brake monitor in WPC accurately monitors the stopping time of the press on every top stop. Each time the press top stops, WPC determines if the stopping time is within the preset stop time limit. Any time that the stopping time is within ten milliseconds of the stop time limit that you set in SmartPAC, "**Brake Warning**" LED on the front of SmartPAC illuminates. This warning alerts maintenance to perform the necessary repairs on the press.

Whenever the stopping time is outside the safety range, WPC immediately inhibits the press from further operation and displays a message on the LCD display (see Chapter 7). When this happens, you cannot run the press, until you have completely corrected the problem.

Interrupted Stroke

An **Interrupted stroke** occurs when the press has been emergency-stopped before the completion of the stroke by either the operator or a safety device. When an interrupted stroke occurs, a stop command is immediately issued to the press, and the Interrupted Stroke LED at SmartPAC is illuminated.

> **IMPORTANT**
>
> The WPC will stop the press if a system fault is detected or if the light curtain is blocked during any non-muted portion of the stroke.
>
> If this occurs, the Interrupted Stroke LED on the SmartPAC display will be illuminated. If the ram stops because of a system fault, there will also be a two-digit number (preceded by a letter) and an explanation in the LCD display.
>
> WPC automatically switches to TWO-HAND MAINTAINED SINGLE STROKE for the remainder of the stroke. In the case of a system fault, press the EMERGENCY STOP / RESET switch to reset WPC.

Performing the 90° stop-time test

The 90° stop-time test is required in order to set the proper safety distance for personnel guarding devices including light curtains, two-hand controls, and type-B movable barriers. This test is done at the press's most critical stopping point -- 90°. The worst case scenario occurs half-way through the downstroke at 90° while the press is running in continuous mode. Therefore, SmartPAC is designed to check stopping time at that critical crankshaft angle, and provides you the T_S value referenced in ANSI B11.1 1988. Follow these steps to perform the 90° stop-time test:

1. Install the heaviest upper die set into your press. Adjust the counterbalance for ram weight, if your press has a counterbalance.

> **IMPORTANT**
>
> Before you can go into Run mode, a tool must be programmed and loaded in Program mode. Consult Chapter 5 for assistance.

2. Set the PROG/RUN key to "Run" to get into Run mode. Then select "Brake monitor" from the Main Run menu. You will see this display:

TOOL NUMBER 1234567 PART CNTR 0
CHAIR BRACKET
SENSORS ENABLED

STOP TIME STATUS

	VALUE (MSEC)	LIMIT (MSEC)
STOP TIME	250	300
START TIME	155	200
STOP ANGLE	75	75
90 STOP	0	

PRESS THE UP CURSOR KEY TO START THE
90 DEGREE BRAKE TEST.
PRESS THE RESET KEY WHEN DONE.

Figure 6-5. Using "Brake Monitor" display for 90° Test

3. Run the press in Continuous mode. If the press has a variable speed drive, set the speed to the fastest that you will normally run.
4. Press the UP cursor key to start the 90° stop-time test. The message at the bottom of the display will now say:

   90 DEGREE BRAKE TEST ARMED. PRESS RESET TO CANCEL TEST
5. The next time that the press reaches 90°, the emergency stop relays will open and stop the press.
6. Record the information displayed on the LCD display. The stop time value is displayed in milliseconds. One millisecond = 1/1000th of a second =.001 sec.
7. Repeat the test at least 5 more times. Record the highest reading from all your tests. This is the stop time value to use when calculating safety distance.
8. Press RESET when done to be returned to the Main Run menu.

CAUTION

Any time you change the stop time limit on SmartPAC, you *must* perform the 90° stop-time test, and you also must recalculate the new safety distance!

Calculating the safety distance

Before you can calculate the correct safety distance, you must know your press's stopping time. You can find the press's stopping time using SmartPAC. You must use the 90° stop time test to find stopping time. This is required by OSHA regulation 1910.217. During this test, the press control stops the press at 90° of the stroke and displays stop time. How to perform this test is covered in the previous section.

Once you know the press's stopping time, you can calculate the safety distance. Shadows must be mounted away from the pinch point (or hazardous area) of the machinery at a specific distance. This distance is based on stopping time. The safety distance must be calculated using a precise formula. This ensures that Shadow can send the stop signal to the press, and the press will stop, before the operator's hand reaches the hazardous area. (The safety distance is also discussed in the Shadow user manual.)

CAUTION

No matter what safety distance you calculate, it is recommended that Shadow units *never* be mounted closer than 7-1/2" (19.1 cm) from the nearest pinch point hazard. The illustration below shows how you would measure the distance between the pinch point (or hazardous area) of your press and the light curtain. This distance must be greater than the calculated safety distance or Shadow may not be able to stop the machinery before an operator's hand reaches the hazardous area.

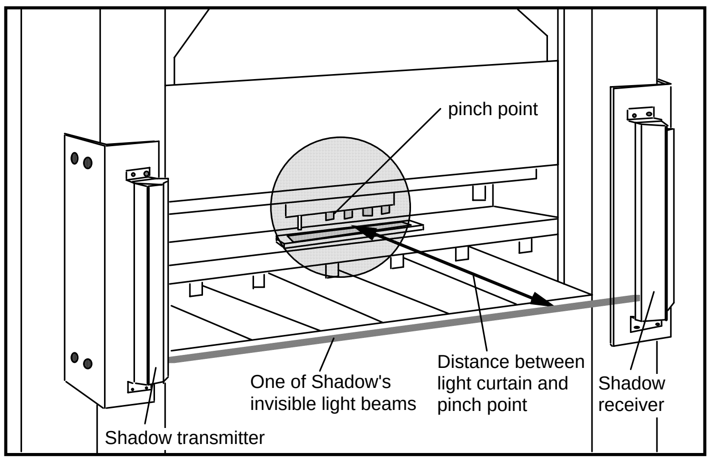


Figure 6-6. Measuring distance between pinch point and light curtain on a press

ANSI and OSHA safety distance formulas

You are governed by Occupational Safety and Health Administration (OSHA) regulations when mounting Shadows. The Shadow, must be located at the correct safety distance from the pinch point. OSHA regulation 1910.217 specifies requirements for light curtains when used with mechanical power presses.

Warning! Safety distance must be correct!

Properly calculating the safety distance is a very important part of Shadow installation. If you install Shadows too close to the point of operation, the Shadow may not be able to stop the press before an intrusion, like an operator's hand, reaches the dangerous area. Then the machine guarding function of Shadow is lost. If you are not sure how to calculate the safety distance for your press, contact Data Instruments. We will be able to provide you with the information to properly calculate safety distance.

When calculating safety distance, however, Data Instruments recommends you use the formula from the American National Standards Institute (ANSI)—standard B11.1-1988. The formula represents a new consensus among manufacturers on the proper installation of light curtains. It takes into account more factors (such as brake monitor setting, object sensitivity, and depth penetration factor) than the OSHA formula. It has been developed specifically for guarding of mechanical power presses. Both the ANSI and OSHA formulas are explained in the next sections.

The ANSI safety distance formula

This is the formula Data Instruments recommends for calculating the safety distance:

$$D_S = K \times (T_S + T_C + T_r + T_{bm}) + D_{pf}$$

D_S is the safety distance we will find using the formula.

K is the OSHA-recommended hand-speed constant. This constant is 63 inches-per-second. The hand-speed constant indicates how far you could theoretically move your hand and arm in one second.

T_S is the stopping time of a press in seconds. It is measured at approximately 90° of crankshaft rotation (or at maximum closing velocity).

T_C is response time of the press control. This is the time it takes for the control to activate the machine's brake. In the 90° stop time test using SmartPAC, the stop time readout includes the stop time of the press and response time of the press control. How to do the 90° stop time test is described earlier in this chapter.

T_r is response time of the light curtain. Response time for Shadow is 30 milliseconds (50 milliseconds for 36" and 48" Shadow light curtains).

T_{bm} is additional time added to the stop time of the press to allow for brake wear. You must allow extra time for brake wear because any safety distance based only on stop time will become too short as the brake wears. T_{bm} is calculated when you set the brake monitor for SmartPAC. You must calculate and set the stop time limit before calculating safety distance for the light curtain. You are told how to calculate T_{bm} when setting the stop time limit.

D_{pf} is the depth penetration factor. This is a measure of how far an object, like an operator's hand, can move through the light curtain before the light curtain reacts. D_{pf} is related to the object sensitivity of Shadow. Object sensitivity is the smallest diameter object Shadow will detect anywhere in its field. Object sensitivity (**S**) for Shadow is 1.25" (3.2 cm). Based on **S** and ANSI B11.1–1988, D_{pf} = 3.3" (8.4 cm).

For Shadow with one beam blanked, **S** = 2" (5.1 cm) and D_{pf} = 5.9" (15 cm). This means D_{pf} increases by 2.6" (6.6 cm) when you add one blanking window.

An example for calculating the safety distance using the ANSI formula

Below is an example of how to use the formula to calculate safety distance (D_S). First take another look at the formula we must use:

$$D_S = K \times (T_S + T_C + T_r + T_{bm}) + D_{pf}$$

Let's use these numbers for our variables in the formula, and assume that the 90° Stop-time Test indicated 190 milliseconds:

K (hand speed constant) = 63 inches per second (set by OSHA)

$T_S + T_C = 0.190$ ***sec.***

$T_r = .030$ ***sec. (response time of Shadow)***

Let's take $\mathbf{T_{bm}}$ from example 2 from the Stop Time Limit calculations performed earlier in this chapter.

$T_{bm} = 0.210$ ***sec. (brake monitor setting) – 0.175 sec = .035 sec.***

$D_{pf} = 3.3$

Now let's put our numbers into the formula:

$D_S = K \times (T_S + T_C + T_r + T_{bm}) + D_{pf}$

$D_S = 63 \times (0.190 + .030 + .035) + 3.3$

$D_S = (63 \times .255) + 3.3$

$D_S = 16.1 + 3.3$

$D_S = 19.4''$

The distance the light curtain must be mounted from the pinch point in our example is 19.9". When using the formula, be sure to do all calculations in this order:

(1) Add $\mathbf{T_S} + \mathbf{T_C} + \mathbf{T_r} + \mathbf{T_{bm}}$ first.
(2) Multiply the result by 63.
(3) Add this result to $\mathbf{D_{pf}}$. This is $\mathbf{D_S}$.

If you do no follow this order, your safety distance calculation will be incorrect.

The OSHA safety distance formula

The OSHA safety distance formula as specified in OSHA regulation 1910.217 is explained below. *As noted earlier, Data Instruments recommends you use the American National Standards Institute (ANSI) formula for calculating safety distance. It contains more factors that allow you to calculate the safety distance more precisely. The ANSI formula is explained in the previous section.*

Here is the OSHA formula:

$\mathbf{D_S}$ *= 63 inches/second x* T_S

$\mathbf{D_S}$ *is safety distance.*

63 inches-per-second *is the OSHA-recommended hand-speed constant.*

$\mathbf{T_S}$ *is the stop time of the press in seconds.*

$\mathbf{T_S}$ is measured at approximately 90° of crankshaft rotation (or at maximum closing velocity). T_S must include all components that are involved in stopping press. It must include response time of the press control that activates the brake and response time of the light curtain (30 mS for Shadow).

WARNING

Your number for T_S must include stop time of the press, the response time of the SmartPAC, response time of the light curtain, and the percentage factor added in for brake wear. Otherwise, the safety distance will be too short.

In the 90° stop time test using SmartPAC, the stop time readout includes the stop time of the press and response time of the press control. How to do the 90° stop time test is described earlier in this chapter.

Since some increase in stop time can invariably be anticipated due to clutch/brake system deterioration, a percentage factor must also be added to the actual measured stop time of your press when determining your safety distance.

A percentage factor of 20 percent is recommended for presses with new brakes or brakes in good condition; a percentage factor of 10 percent is recommended for presses with older brakes. This is because the stopping time for older brakes will be longer due to wear. Therefore, you add less time for older brakes.

An example for calculating the safety distance using the OSHA formula

The OSHA formula for finding safety distance is: **D_S = 63 inches/sec. x T_S**

We will use a stop time of .190 seconds for this example. This number includes press stopping and response time of SmartPAC. Next, we will add in the braking percentage factor. Let's say our brakes are new. Then we will add 20% additional time to the stop time measurement (.20 x .190 = .038).

We also must add response time of Shadow (.030 seconds). Then:

T_S = .190 sec. + .038 sec (braking factor) + .030 sec. (Shadow response time) T_S = .258

Now, we will calculate safety distance:

D_S = 63 in/sec x Ts
D_S = 63 x .258
D_S = 16.3 in.

Shadow must be mounted more than 16.3 inches from the pinch point using the OSHA formula.

Adding to safety distance for floating or blanking windows

The above examples showed how to calculate the safety distance for Shadows when blanking windows were not used. If using blanking windows, you must add 2.6" (6.6 cm) to the calculated safety distance. This applies whether you use the ANSI or OSHA formulas. So, remember this rule: When a blanking or floating window is used, you must add 2.6" (6.6 cm) to the safety distance. Blanking windows and floating windows are discussed in your Shadow user manual.

Refer to Figure 3 (for Herion valve) or Figure 5 (for Ross) found at the end of this manual for wiring connections between Shadow and SmartPAC.

For Shadow I or Shadow II wiring, contact Data Instruments. Note that when you connect Shadow I to SmartPAC, SmartPAC requires the use of a device called a level shifter, available from Data Instruments. This is because SmartPAC checks Shadow I for proper operation on every stroke. The level shifter is required for Shadow I because it has no specific terminals for making this test. Shadow, on the other hand, has built-in terminals.

Cam Switch

> **WARNING!**
> SmartPAC with programmable cam capability can be used with Wintriss Clutch/Brake Control. However, SmartPAC's programmable cam switch should not be used to provide timing signals for any other clutch/brake control. It is designed to control auxiliary functions only.

In Run mode, you can adjust the timing signals for each programmed cam channel. To adjust cam timings for the loaded tool number:

1. Select "Cam switch" from the first display you see in Run mode.
2. You will see a display showing the list of cam channels. If you assigned names for your cam channels in Initialization mode, you will see the names, instead of channel 1, channel 2, etc. You will only see those changes that are programmed.
3. Select the channel number you want to change. You adjust the on-off time for the channel in much the same way you made settings in Program mode—using the cursor keys. For help with these keys, see "Cursor keys" in Chapter 3 for complete instructions. *For instructions on setting cam channels in Program mode, see these sections in Chapter 5:*
   - Standard on/off channel: "Selecting a channel and making an on-off setting"
   - Timed channel: "Selecting a channel and making a timed output setting"
   - Auto channel: "Selecting a channel and making an auto advance setting"
4. When you are done adjusting a particular cam channel, press RESET to go back to the display of channels. You can adjust other channels. When you are completely done adjusting the timing for your channels, press RESET to return to the Run menu.

Show cam timing

You can view real-time graphic timing information about the currently loaded tool in Run mode. You will see the degrees of rotation from 0° to 360° at the bottom of the display, and a chart showing channel numbers from 1 through 8 (press ENTER to see 9 through 16, if installed) at the left of the display. The on-off angles and auto advance for each channel are shown on the diagram as horizontal bars. These bars indicate when a channel is to be activated.

Auto advance is shown with the letter "A" on both sides of the horizontal bar. You can actually see how auto advance timing changes whenever you change press speed.

The **timed outputs** are shown with the letter "T" and a number designating the number of milliseconds that the channel is to be activated.

This display is updated once per second with the current timing information.

1. Select "Cam switch" from the main Run menu and you will see the list of cam channels that you set in Program mode. Now press **F6** to access "Show timing". You will see a display like the one below (your channels will be different).
2. Press ENTER for channels 9-16 (if installed). When you are done viewing your cam timing settings, simply press RESET. You will return to the list of cam channels.

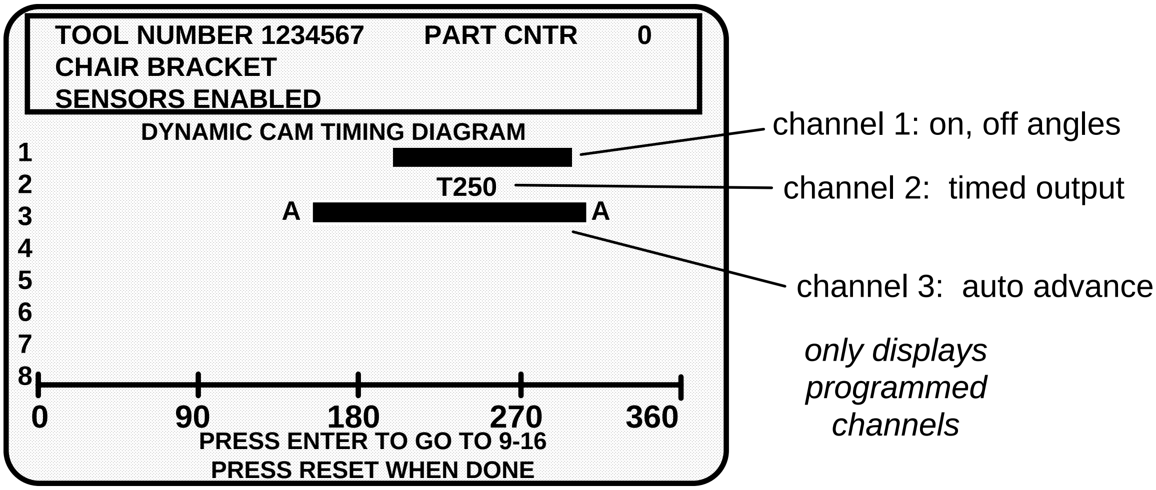


Figure 6-7. Displaying cam timing

Die Protection

In Run mode, the tool number must be loaded before you can adjust settings for the tool. You can only change the ready signal for green sensors and the preset value for the green special sensors. You cannot change any other sensor settings. Sensors set to "unused" in Program mode will not appear in Run mode. For example, if two sensor inputs are set to "unused", you will only see the sensors used displayed in Run mode. To adjust settings for the loaded tool number:

1. Select "Die Protection" from the first display you see in Run mode.
2. You will see the list of sensors names you assigned for your programmed tool.
3. Choose the sensor you want to adjust. The display will show the sensor number, name, and type. For green sensors, it will show the ready signal and sensor actuation angle. If you choose a yellow or red sensor, settings will be displayed, but you cannot make any changes.

ARE YOU LOCKED OUT?

Access to changing the information on this screen may be limited to Program mode or may require a password. The security access settings in the Initialization menu determine when changes can be made. See “Security access” in Chapter 4.

4. For green, green quick check, and green constant sensors, you can adjust the ready signal while the press is running or stopped. *The next section for more information on how to use the display to easily adjust the ready signal for green sensors.*
5. Adjust the maximum number of strokes for the green special sensor, in the same way you set it in Program mode (Chapter 5). Use the up or down cursor keys to adjust the number from 1 to 99.
6. When you are done adjusting sensors, return to the Run menu (the first display in Run mode), by pressing Reset. You will go back to the display of your sensors. You can choose another sensor to view and/or adjust.

FOR MORE INFORMATION

Refer to "Understanding Sensor Technology" in Chapter 1 for a detailed description of the different types of sensors available in SmartPAC with die protection. Refer to "Die Protection" in Chapter 5 for more in-depth instructions on modifying sensors.

Adjusting the ready signal for green sensors

Adjusting the ready signal in Run mode is almost the same as adjusting it in Program mode. To adjust sensors, select "Die Protection" from the Main Run menu. There are two differences from adjusting sensors in Program mode.

First, you see the sensor's on and off time (its actuation angle), so that it is easy to set the ready signal precisely.

Second, the ready signal arc moves around the circle diagram much slower than in Program mode when you press the cursor keys. This is so that it is easier to zero in on an exact setting (and so it is harder to make big changes in the setting).

Here is an example of a display for a green sensor:

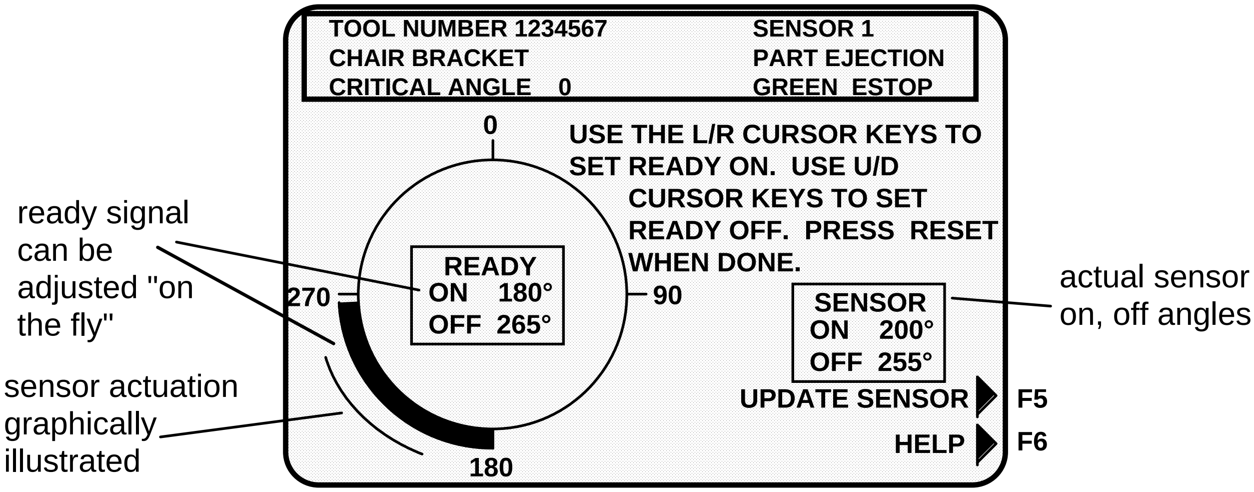


Figure 6-8a. Programmed green sensor

The above display is for a part ejection sensor. This display shows that the sensor turns on and off within the ready signal. You can change the ready signal using the cursor keys. To update the sensor information or to get additional help, press the appropriate function key. (Function keys are discussed in Chapter 3.) Below is the "Help" display:

TOOL #1234567 SENSOR 1

The box labeled "SENSOR" shows the earliest sensor "ON" and latest sensor "OFF" angles. Press F5 to update.

The arc outside of the circle diagram graphically displays the same on and off angles. F5 updates this also.

If the sensor is likely to be actuated through the top of the stroke and the angles in the sensor box appear to be inaccurate, press F3.

Figure 6-8b. Sensor "Help" screen (superimposed over Figure 6-8a display)

Sensor on-off marker

Notice the "sensor on-off" box at the right of the screen and the on-off marker outside the ready signal arc. The numbers in the box show the degrees the sensor actuated when you ran the press. You can press the **F5** function key to refresh the screen (refer to the section on "Function keys" in Chapter 3 if help is needed). The marker outside the arc graphically shows the sensor's actuation time — the earliest "on" angle and latest "off" angle.

It is easy to adjust the ready signal so it is just a little shorter than the sensor's actuation angle (for green constant sensors) or just a little longer (for green and green quick check sensors).

Any time you run the press and display the ready signal for a green sensor, you will also see the sensor's actuation angle. Notice in the above illustration how the sensor actuation marker wraps around with the ready signal circle diagram. The **circle diagram** dynamically illustrates the on and off angle settings that you programmed for a sensor and/or cam channel.

How SmartPAC displays sensor actuation times

SmartPAC does not show every stroke-to-stroke change when displaying sensor actuation time. For sensors set to green and green quick check, it shows the earliest on angle for the sensor and the latest off angle (that is, shows an increase in the actuation angle). For sensors set to green constant, it shows the latest on angle and earliest off angle (shows a decrease in the actuation angle).

For instance, if a green quick check sensor's on angle fluctuates between 190° and 195° from stroke to stroke, SmartPAC would show 190°. However, if the on angle changed to 189° or lower, SmartPAC would immediately display the earlier on angle.

A green quick check sensor's off angle is recorded the same way. Only with the off angle, SmartPAC displays the *latest* off angle.

For green constant sensors, SmartPAC only shows a change when the actuation angle decreases, not increases. That is, it shows the latest on and earliest off. SmartPAC displays actuation angles this way so that you can set the ready signal using the worst case actuation angles for the sensor. Another reason is because if SmartPAC showed every change on the display, it might change so rapidly that you could not read it from stroke to stroke.

Updating the sensor's on and off angles for a sensor

Press the **F5** function key. This clears the actuation angles displayed for any sensor. Zeros will be displayed. SmartPAC will display the actuation angles for the very next stroke. You can press the key while the press is running or stopped.

If a sensor is "on" through the top of the stroke, you may notice that the actuation angles shown in the Sensor on/off box may appear to be inaccurate. The angles shown are the earliest and latest actuations of the sensor in reference to 0° (top of stroke). If a sensor turns "on" before 0° (say, at 350°), SmartPAC will not recognize 350° as the earliest actuation because the number "350" is higher in value than the number "0". If the information in the Sensor on/off box does not appear to match the arc on the circle diagram, press the **F3** function key, which changes the on/off reference point to 180° instead. This allows SmartPAC to correctly display the timing for a sensor that is actuated through the top of the stroke.

NOTE: *When you press F3 you will see dashes (— —) next to "ON" and "OFF" in the sensor box just before the information updates. Press F3 again to toggle back to normal actuation mode.*

> **NOTE**
>
> Pressing **F3** will not properly update sensor actuations when you are using a mechanical sensor which vibrates constantly during the stroke. In cases like this, it is better to use an electronic sensor which is not prone to constant contact bounce.

Show sensors

To access "Show sensors", first select "Die Protection" from the Main Run menu and you will see a list of sensors. Press the **F6** function key for "Show sensors" which allows you to see the status of all your sensors at once while the press is running or stopped.

The following display shows the status of every sensor for a loaded tool number. The sixteen sensor inputs are indicated by the numbers 1 through 8, and 9 through 16 (if installed). The type of sensor connected to each input is indicated by the letters (and/or numbers) under the numbered inputs. G = green; GCON = green constant; RED is a red sensor; GQC = green quick check; YEL = yellow; GS = green special (11 represents maximum number of strokes allowed); N/U = not used. The dark square above a sensor — the "actuation block" — indicates that it is actuated.

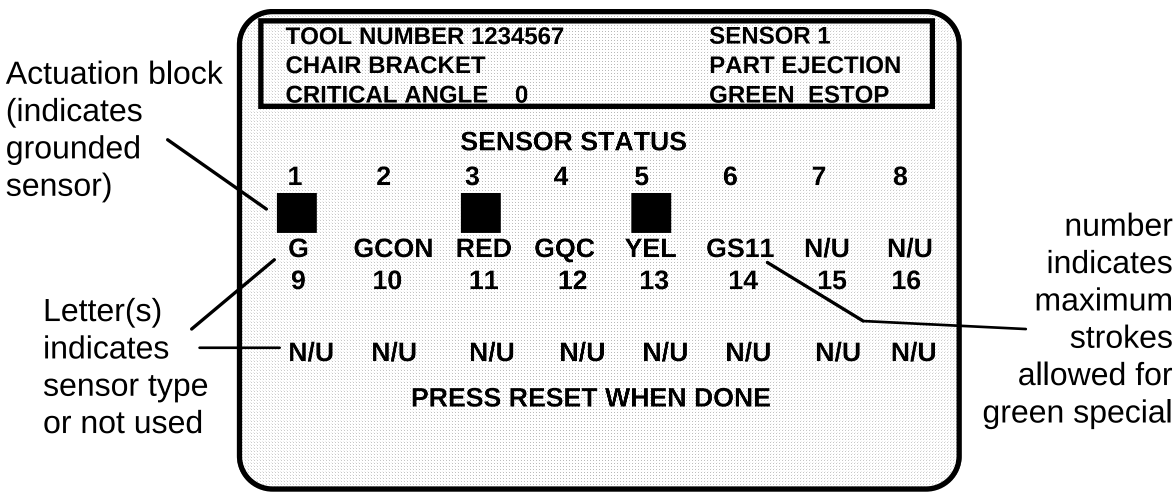


Figure 6-9. Show sensors

How to use the show sensors display

The "Show sensors" display can be used to quickly check the status of all your sensors and correct programming or wiring mistakes. When you select the show sensors display with the press running, you will see the actuation blocks for green sensors flashing. That is because green sensors normally actuate once every stroke. You will periodically see an actuation block for a green special sensor because they should actuate at least once during the preset value. You will always see an actuation block for any red sensor since they are normally grounded. You will never see an actuation block for a yellow sensor. When the press is stopped, you will see the condition that the sensor is in at that point in the stroke.

- Red sensors: Normally grounded
- Yellow sensors: Normally ungrounded
- Green , green quick check, and green constant sensors: Can be either grounded or ungrounded depending upon when they actuate during the stroke.
- Green special sensors: The counter decrements as the press runs. For example, if the counter starts at 11 and the press makes a stroke without the sensor activating, the counter will count down to 10. If another strokes occurs without a sensor actuation, the counter drops down to 9, and so forth. When the sensor activates, the counter automatically resets to 11.
- Unused sensors: It is possible to see an actuation block. This may occur if you had a sensor connected to the input by mistake. The display shows any change in an input's state, whether the sensor input is being used or not.

Due to the slow update rate, this display oftentimes misses the actuation of some sensors. This display, however, is an ideal way to catch mistakes in setting a sensor or mistakes in wiring sensors during setup. If a yellow sensor was mistakenly plugged into an input that is set to red, you could immediately detect the error when you saw that the red input has not actuated. You can also check actuation of all your green sensors, making sure the actuation blocks are flashing when the press is running. No actuation blocks would indicate wiring or setup problems. When a sensor signals a fault, you could use the display to see the status of all your sensors at the stroke angle where the press stopped.

REMEMBER

Actuation signals from green sensors may not be seen in this display on every stroke.

Setup mode message

If the setup mode circuit is connected and active, you will see this message at the top left of the Run menu under the tool number: SENSORS IN SETUP MODE

This means green sensors are disabled. SmartPAC will not send a stop signal to the press when a green sensor signals a fault. The setup mode circuit is typically connected to the press control. When the press control is set to INCH, the circuit is grounded and green sensors are automatically disabled.

Press Control

Once you have programmed and loaded a tool number in SmartPAC's Programming mode, you can make minor adjustments to certain WPC parameters in Run mode. The parameters that you can adjust — Top Stop Angle, Maximum press speed, Minimum press speed, Counterbalance setpoint — are discussed earlier in this chapter in the section "Making WPC Settings in SmartPAC's Programming mode". To set the Counterbalance tolerance and the Main system air limit, go to "Setting Main Air and Counterbalance Limits" in Chapter 4.

Adjusting Top Stop Angle, Maximum and Minimum press speed limits, Counterbalance setpoint, and Main system air limit

1. Select "Press Control" from the Run menu. This display shows the screen.

```
TOOL NUMBER 1234567          PART CNTR       0
CHAIR BRACKET                TWO HAND INCH
SENSORS ENABLED
        PRESS CONTROL ADJUST MENU
  TOP STOP ANGLE          270 DEGREES
  MAX. PRESS SPEED        200 SPM
  MIN. PRESS SPEED        150 SPM
                   SETPOINT  PRESSURE (PSI)
  COUNTER. BAL        40          36
  MAIN AIR            60          65

USE THE CURSOR KEYS TO SELECT THE VALUE
TO CHANGE.  PRESS THE ENTER KEY TO CHANGE
IT.  PRESS THE RESET KEY WHEN DONE.
```

Figure 6-10. "Press Control" display in Run mode

2. If you want to adjust "Top Stop Angle", press Enter to let SmartPAC know that you want to change the value.

> **ARE YOU LOCKED OUT?**
>
> Access to changing the information on this screen may be limited to Program mode or may require a password. The security access settings in the Initialization menu determine when changes can be made. See “Security access” in Chapter 4.

3. Use the cursor keys to increase or decrease the value one digit at a time.
4. Press RESET to set the value and activate the change.
5. If you want to adjust the other items, select the desired item from the Press control display (Figure 4-6), then repeat steps 2 through 5. (You cannot adjust "Main air".)
6. Press Reset to exit from this screen and return to the main Run menu.

Viewing Actual Counterbalance and Main Air Pressure Limits (optional)

From the screen where you were just making adjustments ("Press Control" — Figure 4-6), you can also view your press's actual counterbalance and main system air pressure limits. Keep in mind that if you did not set limits for Counterbalance and Main Air in SmartPAC's Initialization, these values will not be displayed in Adjust mode. *Note: You cannot make changes to these values.* Again press RESET to exit from this screen and return to the first Run menu.

Tool number information (optional)

IMPORTANT

Tool Information serves only as a convenient place to record information about the tool. It does not control any aspect of press operation.

Note: *This feature is not available if you have the optional PLC interface installed.*

If you have this option, select "Tool Information" from the Run menu (Figure 6-1) to change the information about the tool you are using. (See "Tool information" in Chapter 5.) You will see a display similar to the following.

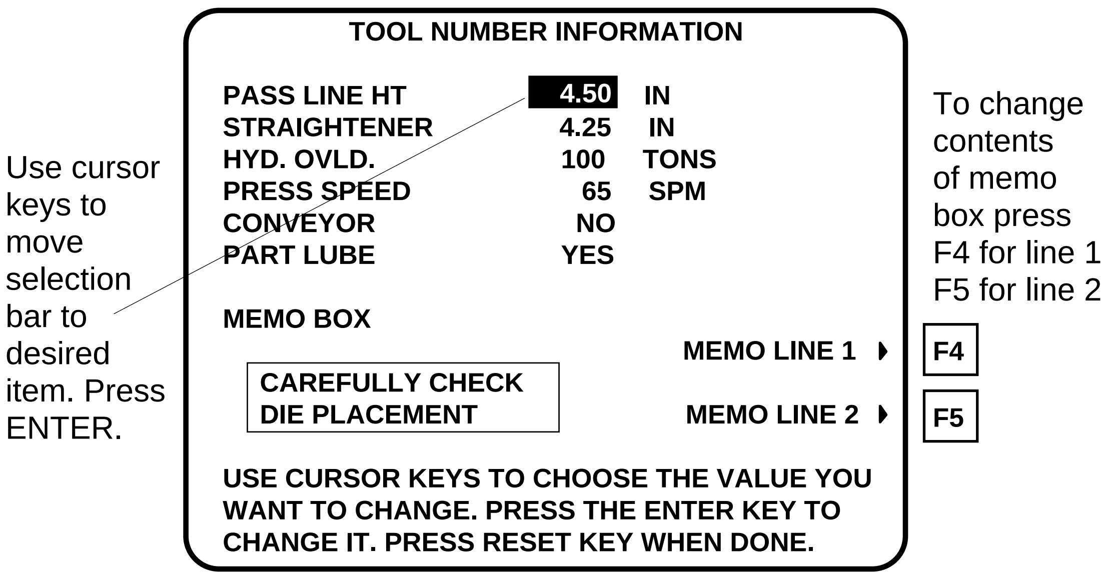


Figure 6-11. Tool number information screen

ARE YOU LOCKED OUT?

Access to changing the information on this screen may be limited to Program mode or may require a password. The security access settings in the Initialization menu determine when changes can be made. See "Security access" in Chapter 4.

To enter information about the items:

1. Select the desired item. A screen overlay appears in which you can enter the appropriate value. For Yes/no items, enter 0 (zero) for NO, and 1 (one) for YES.
2. Enter text into the memo box, by pressing **F4** for the first line, and **F5** for the second line. A screen overlay appears that enables you to enter fifteen characters of numbers and alphabetic text for each line. When you complete each line, press **F6** to accept it.
3. When you have finished entering information into the tool number information screen, press RESET to return to the main Programming menu.

Load new tool number

You can load any *existing* tool number in Run mode from the tool number display. *However, a tool number cannot be loaded while the press is running.*

If the press is running when you attempt to load a tool number, a message will appear telling you that the press must be stopped before a tool number can be loaded. Follow these steps to load a tool number in Run mode.

> **IMPORTANT**
>
> "Load new tool" does not appear on the display in Run mode if "loading tool numbers" has been locked out by the security access setting in Initialization mode. You cannot load a tool from Run mode if it is locked out. With other security settings, a password may be required. For more information, see "Security access" in Chapter 4.

1. Select "Load new tool" from the Run menu. A Tool number display appears similar to the one below.

> **ARE YOU LOCKED OUT?**
>
> Loading a new tool number may be limited to Program mode or may require a password. The security access settings in the Initialization menu determine when changes can be made. See "Security access" in Chapter 4.

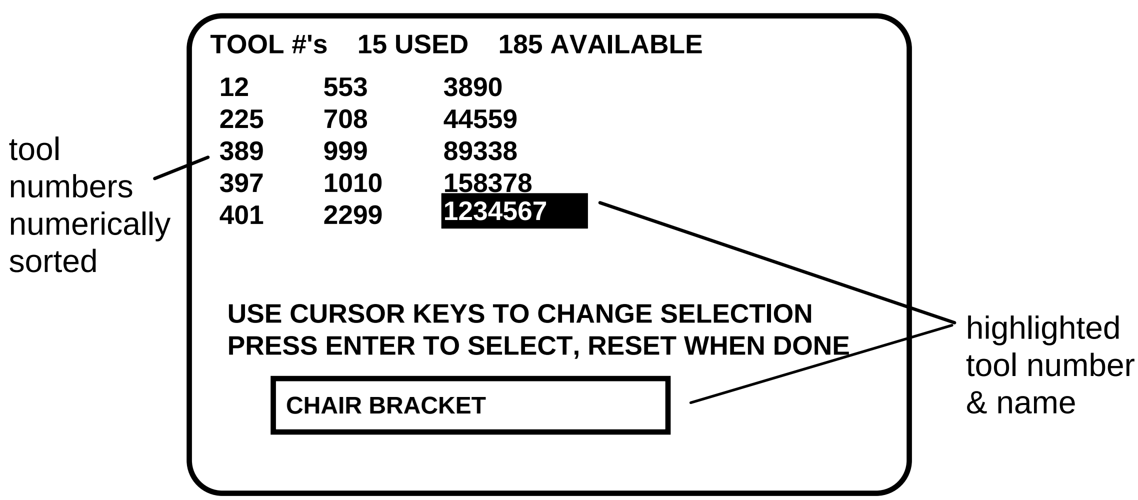


Figure 6-12. Tool display shows available tools with selected tool highlighted

The display is the same as in Program mode, but you can only select an existing tool number. Notice that the tool numbers are numerically sorted on the screen and that when a tool is highlighted, its "tool name" (if set) is also shown. You cannot select a "NEW" tool number. The display shows only the *existing* tool numbers.

2. Highlight the tool you want to load and press ENTER. You will see this warning message superimposed over the Tool Number display screen (shown above):

WARNING! ! WARNING!!
ANCILLARY EQUIPMENT MAY OPERATE
WHEN THIS SETUP IS LOADED. WARN
ALL PERSONNEL TO STAND CLEAR.
PRESS ENTER TO LOAD THE SETUP
PRESS RESET TO CANCEL

Figure 6-13. Warning message when loading tool number

3. Press ENTER to load the tool settings (a setup). You can go back without loading the tool settings by pressing RESET. When the tool number has been loaded (which takes only a few seconds), this message quickly appears on the screen: (Remember, your tool number may be different.)

TOOL NUMBER 1234567 IS BEING LOADED

NOTE

If you did not receive this message, but instead received an error message on your screen when you tried to load the tool, go to Chapter 7 and find the section describing that error message. Follow the instructions there for correcting the problem. If the error message is not described there, or you cannot fix the problem, call Data Instruments' technical advisors, and be ready to provide some important information to expedite a resolution to the problem. Please supply: **product name** (e.g. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

4. Note that the first display shows the tool number you just loaded. You can always check which tool number is loaded on this display.

***** WARNING *****

Equipment may operate when you load tool settings

When you load a tool number, auxiliary press equipment may start if the press crankshaft is within the on-off setting for that device. All employees must stay away from the press and equipment that the cam operates before a tool number is loaded.

Operating the press in INCH mode

If you have a Shadow light curtain, you will have to set SmartPAC to either TWO HAND or ONE HAND in INCH mode. The light curtain will be muted on the upstroke *only if WPC has the muting option.* To operate the press in Inch mode:

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (see next illustration).
2. Use the appropriate function key to select either ONE HAND or TWO HAND. Instructions for each setting are explained below.
3. Next, set the Stroke Select Switch at SmartPAC to INCH.

> **CAUTION!**
> **INCH MODE IS NOT A PRODUCTION MODE**
> The INCH mode shall not be used as a production mode as per ANSI B11.l–1988.

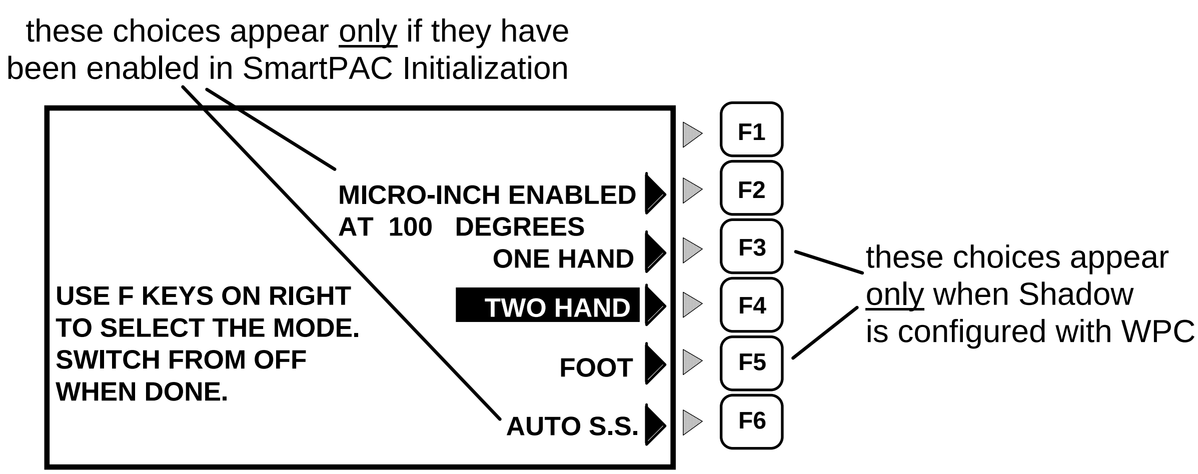


Figure 6-14. Mode Select menu

Three ways you can operate the press in INCH mode

You can choose three different ways to operate the press in INCH mode. These modes are called Top Stop, Top Stop Bypass, and Micro-inch. See Chapter 6 on how to make the settings for these operating modes. This is how you operate the press in each mode.

> **NOTE**
> These steps assume that you are running in TWO HAND mode. If you run in ONE HAND mode, you need to depress the left RUN/ INCH switch only (unless the operator station has an optional right/ left hand selector switch).

Top Stop

To move the ram in this mode, depress both RUN/INCH switches on the operator station at the same time. Notice that the ram will move only as long as both RUN/INCH switches are depressed. The ram will automatically top stop, even if both RUN/INCH switches are pressed down. If you wish to re-initiate a stroke, simply release and press the RUN/INCH switches again. To stop the ram before top stop, release one of the RUN/INCH switches. The ram will also stop if the light curtain is blocked during the non-muted portion of the stroke, or if a system fault is detected. If you jog the press, you may not notice that the ram has top-stopped.

Top Stop Bypass

In this mode, the press will now operate just as it would in the TOP STOP INCH mode, only it will not automatically top stop. Rather, the press will run continuously as long as the RUN/INCH switches are depressed.

Micro-inch

The press operates the same way it does during TOP STOP INCH mode. However, no matter how long the switches are pressed, the clutch is engaged for the Micro-inch time that you set at SmartPAC Initialization. You can stop the ram before the set time by releasing the switches.

If you set the Micro-inch angle to some angle position *other than* 185° (where normal inching resumes), you will see "Micro-inch" displayed on the Mode Select menu in Run mode (Figure 6-14). By pressing the designated function key you can disable or enable Micro Inch when running the press in INCH. For details on Micro-inch, refer to the section "Setting Micro-Inch Time and Angle" in Chapter 4 of this manual.

> **NOTE**
>
> If an Interrupted stroke occurs, WPC automatically switches to TWO HAND MAINTAINED SINGLE STROKE, regardless if Micro-inch or Top Stop bypass has been selected.

Operating the press in SINGLE STROKE mode

To operate the press in Single Stroke mode:

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
2. Use the appropriate function key to select either ONE HAND, TWO HAND, or FOOT. Instructions for each setting are explained below.
3. Next, set the Stroke Select Switch at SmartPAC to SINGLE STROKE.

> **NOTE**
>
> There are no ONE HAND and FOOT modes on two-hand only systems.

One-hand operation

Set the Mode Select menu to ONE HAND by pressing the designated function key. To initiate a stroke, press the left RUN/INCH switch on the operator station. (The left RUN/INCH switch must be used, unless the operator station has an optional right/left hand selector switch.)

You can release that switch any time, and the ram will complete the stroke. The ram, however, will stop if a system fault is detected or if the light curtain is blocked during the down stroke.

WARNING

Shadow light curtains must be installed and connected to WPC in order to use ONE HAND or FOOT modes.

Two hand operation

Set the Mode Select menu to TWO HAND by pressing the designated function key. To initiate a stroke, press the RUN/INCH switches on the operator station. Both switches must be depressed within a half second (.5 sec) of each other. Hold them down at least until bottom dead center (BDC) or until Auto Carry-up. The upstroke is automatic. The ram will stop if any RUN/INCH switch is released during the down stroke, if a system fault is detected, or if the light curtain is blocked during the down stroke.

Foot operation

You can single stroke the press in one of two foot modes — foot trip or foot control. The mode is set in SmartPAC's Initialization mode. Setting this switch (SW7) is explained in Chapter 4 ("Setting WPC switches using SmartPAC's Press Options").

In *Foot Trip* mode, once you depress the Foot Switch, the press runs for one stroke. To run the press, set the stroke select switch to FOOT. Then press the Foot Switch. The press will run for one stroke and then will top stop.

In *Foot Control* mode, you must depress and hold the Foot Switch through bottom dead center or Auto Carry-up to single stroke the press. If you do not, the press stops immediately.

To run the press, set the Mode Select menu to FOOT by pressing the designated function key. Press and hold the foot switch through the bottom of the stroke. The press will complete one stroke and then will top stop.

NOTE

The Interrupted Stroke LED will illuminate whenever the press stops in TWO HAND operation or foot control mode because the switches were not depressed beyond bottom dead center. WPC automatically reverts to TWO HAND MAINTAINED SINGLE STROKE mode for the remainder of the stroke.

Operating the press in continuous mode

Important
The Program/Run key must be in the "RUN" position

To operate the press in Continuous mode:

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
2. Use the appropriate function key to select either TWO HAND or FOOT.
3. Next, set the Stroke Select Switch at SmartPAC to CONT (Continuous). Instructions for each setting are given below.

Two hand operation

To operate the press in TWO HAND/CONT Mode, set the Mode Select menu to TWO HAND by pressing the designated function key (Figure 6-14). Then depress the PRIOR ACT switch on the operator station.

While the PRIOR ACT indicator LED is lit (for eight seconds), press both RUN/INCH switches on the operator station.

Keep the switches pressed until after the ram reaches bottom dead center. The press will now operate continuously. The ram will stop if either of these situations occur:

- a system fault is detected
- you press the EMERGENCY STOP / RESET switch.
- the light curtain is blocked during the non-muted portion of the stroke
- you press the Top Stop switch
- you did not keep palm switches pressed until Auto Carry-up

Foot operation

To operate the press in the foot continuous mode, perform the following steps.

Set the Mode Select menu to FOOT by pressing the designated function key (Figure 6-14), and then press the PRIOR ACT switch on the operator station. While the PRIOR ACT LED is lit (for eight seconds), depress the foot switch.

The press will run in continuous as long as the foot switch is depressed. If the foot switch is released, the press will top stop. If you remove your foot from the foot switch and the ram top-stops, you will have to press the PRIOR ACT switch again and then depress the foot switch again while the LED is illuminated to initiate another stroke.

The press will operate continuously while the foot switch is depressed. However, the ram will stop if either of these situations occur:

- a system fault is detected
- you press the EMERGENCY STOP / RESET switch
- you press the Top Stop switch
- the light curtain is blocked during the non-muted portion of the stroke

Using One-hand Control

One-hand Control is a switch that can only be used with any Wintriss Press Control systems having One Hand and Single Stroke modes. One-hand Control must be used in conjunction with a Shadow light curtain for guarding point of operation.

To start the press, the operator pushes the One-hand Control switch button as part of his normal hand motion after loading a part.

WARNING

Point of operation safeguarding, the single most important factor in the elimination of injuries, can only be determined by the press user. All applicable OSHA and ANSI regulations for safeguarding press systems must be followed when installing One-hand Control. Neither WPC nor One-hand Control is a safeguarding device. They must be installed and operated in accordance with OSHA and ANSI regulations. Data Instruments takes no responsibility if the proper safe-guarding devices are not installed or working properly.

"Light curtain break" mode

You can use One-hand Control in "light curtain break" mode. In this mode, you must push the switch button on the control within eight seconds after removing your hands from the light curtain. Otherwise the press will not start. This mode prevents inadvertent operation when an operator is loading or unloading parts. If this mode is not used, One-hand Control starts the press whenever it is pushed.

You *must* have the right software in your WPC to use One-hand Control in "light curtain break" mode. If you are unsure of what you have, contact Data Instruments.

One-hand Control will work with or without the "light curtain break" mode set to OPEN (explained in "Setting WPC switches using SmartPAC's Press Options" in Chapter 4). If on, One-hand Control will start the press only within the set time after the operator withdraws his hands from the light curtain. If the "light curtain break" mode is not on, One-hand Control will start the press any time it is pressed.

Operating the press using One-hand Control

1. To use the "light curtain break" mode, refer to the section "Setting WPC switches using SmartPAC's Press Options" in Chapter 4 to properly configure this mode (Switch 3).
2. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
3. Press the designated function key to select ONE HAND mode.
4. Next, set SmartPAC's Stroke Select Switch to SINGLE STROKE.
5. If an Interrupted Stroke message appears on SmartPAC's LCD display, make one stroke with the dual palm buttons to clear the interrupted stroke mode.

6. If you are using "light curtain break", start the press by first breaking the light curtain and removing your hands, then pushing the button on the One-hand Control within eight seconds. The press will run and stop at the top of the stroke.

> **NOTE**
> The PRIOR ACT LED illuminates after the light curtain has been interrupted, and stays on for the time set. If the One-hand Control button is not pushed within the set time, the PRIOR ACT LED will turn off. The press will not start until you break the light curtain again and then push the One-hand Control button within eight seconds.

7. If you are using One-hand Control without "light curtain break" selected, just press the switch button. The press will run and stop at the top of the stroke.
8. If the press does not run, turn off power to the press, WPC, and SmartPAC. Recheck all wiring and connections. Try One-hand Control again. If the press still does not run, contact Data Instruments for assistance. Remember to provide pertinent information about your unit to expedite the resolution of the problem.

> **NOTE**
> With One-hand Control installed, you cannot use the palm buttons in ONE HAND mode. All other modes work normally as described in this manual.

Automatic Single Stroke (External Trip)

The Automatic Single Stroke function allows an external event to automatically start a single stroke within thirty seconds. Generally, material feed is used as the signaling event. However, other events such as part ejection or positive part transfer, can be used.

There are three requirements for Automatic Single Stroke.

- you must have a trigger mechanism,
- you must install proper guarding equipment to protect personnel, such as Shadow light curtain, and
- you must have enabled Automatic Single Stroke in SmartPAC Initialization ("Press Options" — see Chapter 4).

As a triggering mechanism you can use a single pole double throw (SPDT) contact (switch or relay) or two solid state switches (NPN, open collector).

Assuming the correct sensors have been installed, perform these steps:

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
2. Press the designated function key to select AUTOMATIC S.S.
3. Next, set the Stroke Select Switch at SmartPAC to SINGLE STROKE.
4. To initiate the first stroke:
   a. Depress the PRIOR ACT switch on the operator station.
   b. Press the RUN/INCH switches until the ram passes bottom dead center.

The up stroke and all other strokes will be automatic.

It is not unusual for the press to pause at top stop. It is waiting for the "go" signal from the external switch. The external signal must occur within thirty seconds after top stop. If WPC does not receive the signal within this amount of time, it assumes a problem has occurred and will not start the next stroke. If this happens, repeat the above steps to re-initiate.

Operating the press in BAR mode

You can operate in Bar mode if you have the Bar control option. To operate the press in the Bar mode, perform these steps.

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
2. Press the designated function key to select TWO HAND.
3. Next, set the Stroke Select Switch at SmartPAC to INCH.
4. Turn off the press's main motor.
5. Turn the select switch to ON at the Bar control box, and then wait for the press flywheel to stop turning.
6. Now press the OPERATE button, and bar the press.

Make sure you do not rotate the flywheel/crank too quickly (more than an equivalent of 6 SPM), or WPC will stop the ram. If this happens, error code "F26" will appear on SmartPAC's display ("Ram moved too fast in Bar mode" message appears on the LCD display). Press the RESET at SmartPAC to continue barring the press.

Multiple Operator Stations (optional)

You can have an unlimited number of operator stations as part of your WPC system. However, up to two operator stations are standard. More than two operator stations need to be connected to WPC via a Dual Operator Selection Control (DI part no. 4152100).

When you have more than one operator station connected to WPC, the palm time allotment switches from a half second (.5 sec) to 2 seconds. This means that all the palm buttons on every station must be actuated within a 2-second time frame. If the first operator depresses his palm button, then all other palm buttons in the series must be actuated within 2 seconds. If not, the allowable "palm time" expires, and you must depress the palm button again.

In Chapter 4 of this manual, you were guided to initialize Dual Operator Station. You either initialized this choice to be settable at SmartPAC's LCD display, to be set using a remote switch, or not used (disabled). For more information see "Press Options" in Chapter 4.

If you set "Dual Operator Station" for "Screen mode" in SmartPAC Initialization, follow these steps:

1. Make sure that SmartPAC's "Program/Run" key is set to the "RUN" position, and set the Stroke Selector Switch to the "OFF" position. You will see the Mode Select menu (Figure 6-14).
   a. For TWO HAND control, press the designated function key to enable either "A" (first station), "B" (second station), or "BOTH. Notice that the highlight bar will toggle between each of these selections as you keep pressing that function key.
   b. For AUTOMATIC S.S. control, press the designated function key to enable either "A" (first station), "B" (second station), or "BOTH. Notice that the highlight bar will toggle between each of these selections as you keep pressing that function key.
2. Next, set the Stroke Select Switch at SmartPAC to the appropriate operating mode (INCH, Single Stroke, or Continuous).

If you initialized "Dual Operator Station" for "Remote Switch", there is a Operator Station Select Switch located on your control panel. Set the mechanical switch so that it enables either the first station, the second station, or both.

Contact Data Instruments if you need more information relative to Multiple Operator Stations.

Settings locked in Run mode

You can lock choices on the Run menu or require a password to prevent personnel from changing settings or loading tool numbers. See Chapter 4—"Security access"—for instructions on how to lock (or unlock) Run menu items. Whenever settings are locked in Run mode, you will see a message on the screen telling you so when you select the item.

"Adjust mode locked" means you cannot adjust settings. You can display the information, but nothing will happen if you try to make an adjustment. The item "Load new tool" does not appear on the Run menu if tool numbers are locked in Run Mode. If counters are locked, a message reading "ADJUST MODE LOCKED, PRESS RESET WHEN DONE" will appear. If cam settings are locked, you will see a message appear at the upper left of the screen that reads "ADJUST MODE LOCKED.

Additional Security

In Chapter 2 we mentioned that you can secure your WPC adjustments by installing a user-supplied keylock switch. We provided wiring information for this keylock switch (not supplied by Data Instruments).

By using a user-supplied keylock switch, you can mechanically prevent the ability to make WPC adjustments in both the Program mode and Run mode. This keylock switch will also override "Security access", discussed in Chapter 4, which only provides security in the Run mode.

Here are the messages that you will see in SmartPAC's Program and Run modes when the keylock switch is closed at input 1.

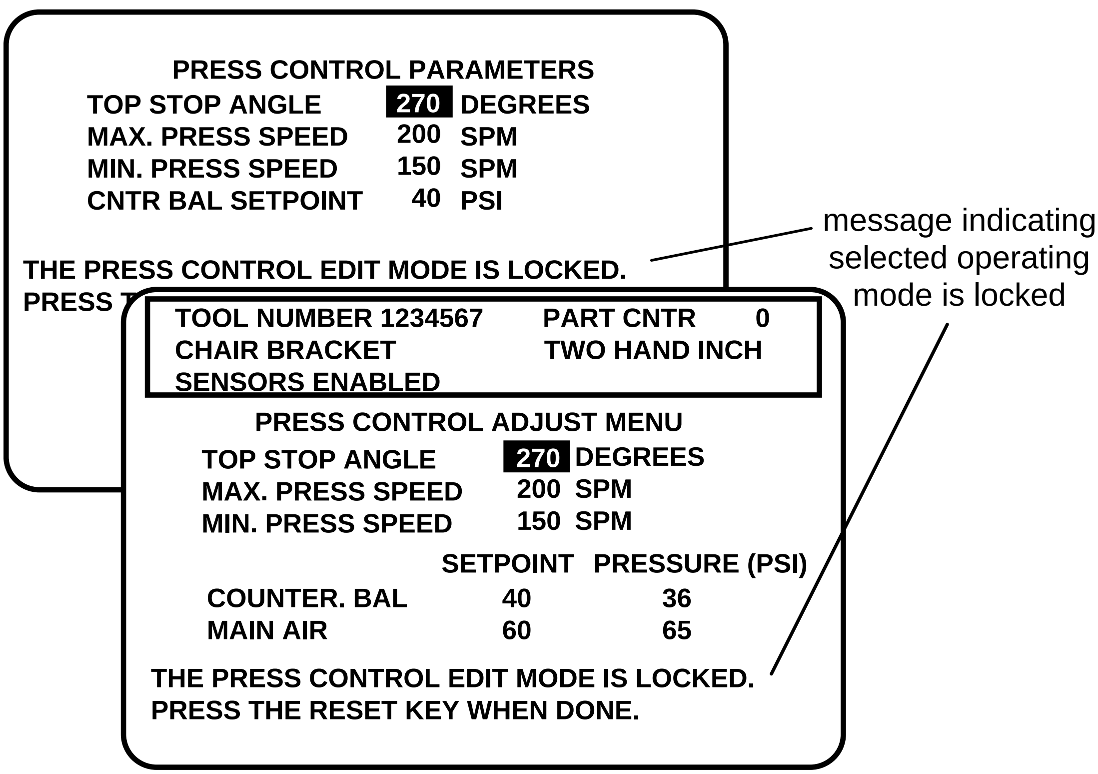


Figure 6-15. Operating modes locked

Error Log

As a troubleshooting aid, your SmartPAC keeps an error log that you can view in Run mode. Each time the press is stopped, the log records the error number (which gives the reason for the stop), the stroke count when the stop occurred, and the crankshaft angle when the stop occurred. When you stop the press to load a new tool, the error log shows the tool number. The log retains this information for the 32 most recent errors.

To see the error log, select "Error Log" from the Run menu. The display shows the log of the latest sixteen errors, with the most recent error first. To see information about the previous sixteen errors, press **F6**. To see the most recent errors again, press **F6** again. For more information about the error log and a listing of error numbers and what they mean, see "Using the error log" in Chapter 7.

Chapter 7
SmartPAC Fault and Status Messages

PLEASE NOTE! ABOUT THIS MANUAL

Your SmartPAC System comes standard with press control capabilities. However, you can optionally include either or both of the following: Die Protection (called "DiProPAC"), Programmable Cam Switch (called "ProCamPAC"). The functionality of these optional features is discussed in detail in this chapter as well as throughout this manual. Remember that they are options and might not be included in your system.

If you ordered SmartPAC with AutoSetPAC (load monitoring option), refer to the AutoSetPAC user manual, DI Part no. 1101600 for complete details on its functionality and troubleshooting.

This chapter explains the diagnostics, and other messages that you may see on your LCD display when the press stops or when fault conditions occur, including:

- Interrupted Stroke
- Customized Status Codes
- Lockout
- Brake warning
- Stop time exceeded
- Description of status codes and how to correct
    - Messages displayed due to press control problems
    - Other equipment-related messages
    - Messages displayed when a counter preset has been reached
    - Messages displayed for programming problems
    - Messages displayed when a sensor signals a fault
    - Miscellaneous Fault messages
- How to use the Error log
- How to use the Input status display

What happens when you get a fault message

If you get a fault or error message when the press is stopped or you are in Run mode, the letters *"Err"* will blink in the LED display, as shown here. (To see where the "LED" display is located on the SmartPAC, refer to Chapter 1.)

Figure 7-1. "Err" on LED display

If the press stops because one of the counter presets count is reached, the letters *"Ctr"* will blink on the LED (shown below).

Figure 7-2. "Ctr" on LED display

When Wintriss Clutch/Brake Control detects various problems or malfunctions, SmartPAC displays this information in easy-to-understand messages which appear on the LCD display, and the corresponding status code number shows up in the LED display. In addition, SmartPAC gives a short description / recommendation related to the problem. Here is how status code #13 is displayed by SmartPAC. SmartPAC flashes the status code number in the LED display.

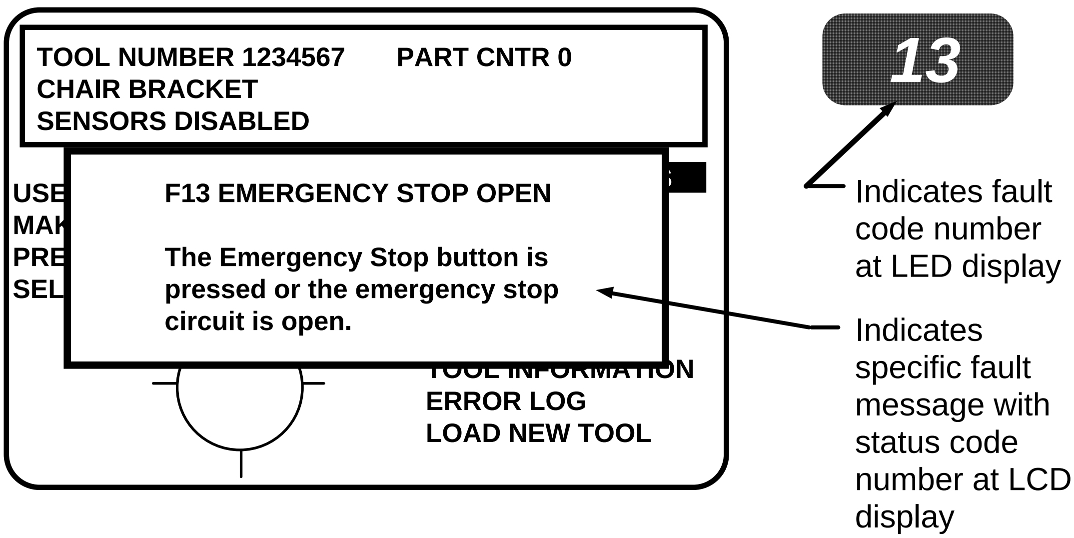


Figure 7-3. Emergency stop fault message

When you want to resume operation after a fault condition occurs, you can clear the fault condition by pressing the SmartPAC's Reset key or the EMERGENCY STOP / RESET button on the operator station (or the remote reset switch, if installed). *Correct and and all malfunctions* <u>*before*</u> *running the press.*

How to clear a fault message

To resume operation after an error message occurs, clear the error message by pressing the Reset key (or Remote Reset Button, if installed). Correct the malfunction or other problem *before* running the press.

If you cannot correct the problem after reading the remedy, contact Data Instruments technical support. Whenever you need help, just remember that we have expert representatives available to help you by phone. Never hesitate to call Data Instruments if you have trouble with SmartPAC.

PROVIDE IMPORTANT INFO!

When you 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. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

More on status code #10

You may notice that when status code #10 appears, it will either reference "Motor off" or "Energy saver shut down". In both cases the motor has been turned off. In the first case, you physically turned it off, and in the second case, WPC automatically turned it off after a certain period of time that you set in SmartPAC's Initialization mode to save energy. See Chapter 4 for more details ("Press Parameters").

F10 PRESS MOTOR IS OFF
The main motor on the press is not on. Switch to the Inch mode to access the Adjust menu.

F10 ENERGY SAVER SHUT DOWN

The main motor was shut down to save energy. Switch to Inch mode to access the Adjust menu.

Figure 7-4. Status code #10

Interrupted Stroke

An interrupted stroke occurs when the press has been emergency-stopped before the completion of the stroke by either the operator or a safety device. When an interrupted stroke occurs, a stop command is immediately issued to the press, and the Interrupted Stroke LED at the front of SmartPAC illuminates.

Customized Status Codes

In addition to the standard messages, you also get up to eleven user-definable customized status codes. Status codes #49 through #59 are reserved for this purpose. See the next illustration for one that SmartPAC might display. A complete listing of standard and customized WPC status codes is provided later in this chapter. To set the user-interlock customized status codes in Initialization, refer to Chapter 4.

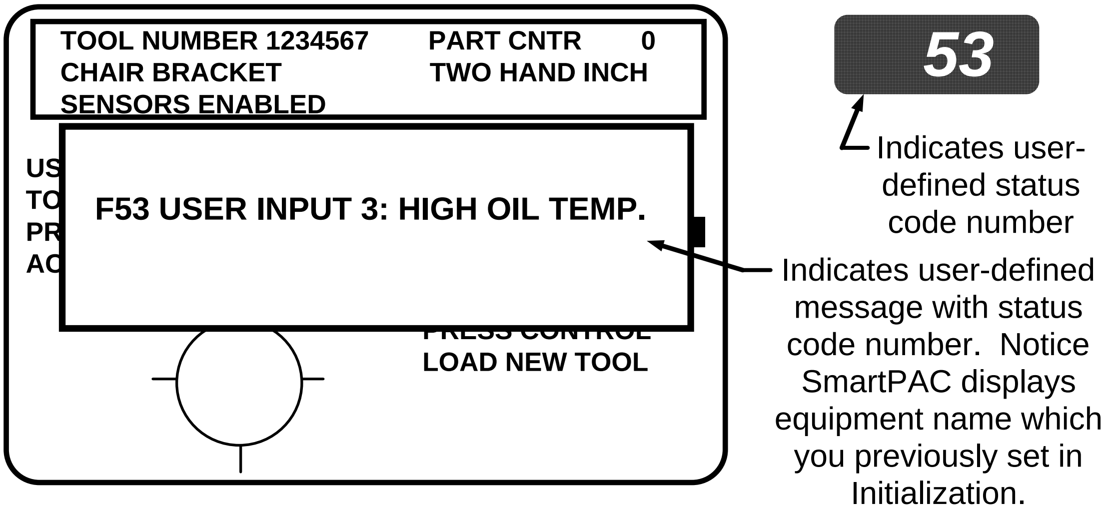


Figure 7-5. Customized status code message

Lockout

In some cases, after you clear an error condition, *"Loc"* will appear in SmartPAC's LED display and the following message appears in the LCD display. This message indicates that a serious error condition has occurred. *Correct the problem before continuing!*

To clear *"Loc"*, turn the STROKE SELECTOR switch to "OFF"; then *wait a second* before switching to the desired operating mode. *"Loc"* will be replaced by "OFF" and you will be able to resume operation.

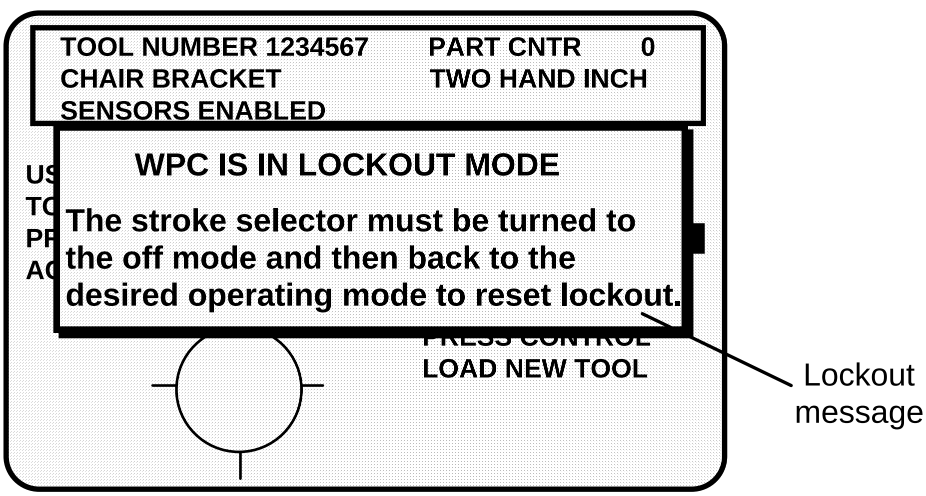


Figure 7-6. Lockout message

Read on for detailed descriptions of fault conditions (and corresponding status messages) generated and also to see which codes will be followed by a lockout message. The applicable "lockout" fault conditions described in this chapter will be identified with an asterisk (*****).

Brake warning

When the stopping time is within 10 milliseconds of the stop time limit set in SmartPAC, the "**Brake Warning**" LED on the front of SmartPAC illuminates. This means that the stopping time of the press is getting *extremely* close to the safety limit set.

To clear this message, you need to power down and up both WPC and SmartPAC. Keep in mind, though, that the message will keep reappearing as long as the stop time is within 10 mS of the preset limit. In order to remedy the situation, the first thing to consider is that your brake may be defective and/or wearing, and needs *immediate* attention from your maintenance personnel. Or if that is not the problem, it could also mean that your stopping time limit is not great enough to account for *normal* wear.

You should have your maintenance crew immediately investigate the condition of the brake to ensure that it is not wearing and/or defective before you adjust the stop time limit.

Brake Monitor - Stop time exceeded*

When the Stop Time Limit has been exceeded, a message appears on SmartPAC's LCD display. This means that the actual stopping time of the press has completely exceeded whatever limit was set at SmartPAC, and therefore the press can not be used until the brake has been repaired. It indicates a potentially dangerous safety problem which must be corrected immediately.

The Stopping Time of the press has exceeded the Stop Time Limit. Check the brakes and make sure that the press is safe to operate.

Figure 7-7. Stop Time Exceeded message

(with offending stopping time appearing at LED display)

> **NOTE**
>
> Before reaching this condition, SmartPAC normally would have pre-warned you via the brake warning LED (explained in the previous section). The Brake Warning occurs when the stopping time is within 10 milliseconds of the stop time limit.

Once you've cleared the stopping time error, SmartPAC with WPC will immediately display a **lockout** message.

Refer to the section "Lockout", earlier in this chapter, which explains what lockout is and how to clear this condition. Review it carefully before further operation.

Investigate and correct the problem that generated the stopping time fault immediately.

Here are some recommendations:

First perform a 90° brake test several times to get an actual reading for your press's stop time. Compare these results to the last time that you performed the test, and make sure you record the current results.

Decide if the stop time limit that you had set is realistic or needs to be changed slightly. See Chapter 4 to determine and set the correct Stop Time Limit. See Chapter 6 — "Brake Monitor" to calculate the correct stop time and "Stop Time and Stop Angle" to perform the 90° brake test.

If you change the limit, you may have to relocate your light curtains and/or two-hand controls. Refer to the appropriate manual for assistance. Have your maintenance attend to the brake problem immediately. Press Reset to clear.

CAUTION

Any time you change the stop time limit on SmartPAC with WPC, you *must* perform the 90° stop-time test, and you also must recalculate the new safety distance! Chapter 6 explains the 90° stop-time test.

Remember! Your maintenance personnel must repair the brake immediately. If you try to continue the operation, the same error will persist every time that the press stops to remind you that a potentially serious situation exists. Contact Data Instruments tech support if you cannot correct the problem.

Description of status codes and how to correct

WPC provides a group of status codes tell you that something is wrong with WPC, its internal components, peripheral equipment, the way that it is set, or the way that your press is running.

If you cannot correct the problem yourself after reading the remedy for the problem below, contact Data Instruments, and be ready to provide some important information to expedite a resolution to the problem. Please supply: **product name** (e.g. SmartPAC with WPC); **installed options** (e.g. DiProPAC, ProCamPAC, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine the last two items, by going into "Installed options" in the Initialization mode (see Chapter 4 for details). You can also determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

Notice that the two-digit status codes that WPC communicates when a fault condition occurs, are preceded by a letter on the LCD display. Only the two-digit number will appear on the LED display. Here is a description of each type.

F Series status codes

Any codes preceded by the letter "F" are operator-resettable, and are being generated by the main system. This means that once you correct the malfunction, you can press SmartPAC Reset key or the EMERGENCY STOP / RESET button on the operator station (or remote reset switch, if installed). and resume operation. If the problem is corrected, you will be able to run the press again. If not, you will get the same fault message again.

H Series status codes

Some "F" errors codes are followed by "H" status codes. Like "F" errors, these "H" codes are operator-resettable. "H" status codes are generated by the second internal processor. With its two independent processor systems in a single modular enclosure, WPC provides dual diverse redundancy — the latest technology in maintaining optimum clutch/brake control and operator safety. Both of these processor systems function independently of each other and provide separate information to the operator. Therefore, error conditions will be detected from either or both of the two processors resident in the system. As with "F" series status codes, once you correct the malfunction, you can press SmartPAC's Reset key or the EMERGENCY STOP / RESET button on the operator station (or remote reset switch, if installed). and resume operation.

Important note about clearing error messages

Remember to CORRECT the problem first!

Messages displayed due to press control problems

These messages (appearing as numeric values at the LED display) tell you that something is wrong with the SmartPAC with WPC configuration or with the way your press is running. Some fault messages indicate that there is a problem specifically related to the brake monitor and/or press control. These messages may also indicate an internal problem with SmartPAC itself.

If you cannot correct the problem after reading the remedy, contact Data Instruments technical support. Whenever you need help, just remember that we have expert representatives available to help you by phone. Be sure to provide pertinent information to expedite the resolution to your problem.

Once you have corrected the problem, press Reset. If the problem is corrected, you will be able to run the press again. If not, you will get the same fault message.

Resolver faults

04* or *05

Problem: In either of these cases, there is a problem with the resolver assembly.

Remedy: You will need to check the resolver and wiring. Specifically check that the terminals are tightened on bare wire and not on insulation. See Chapter 2 - "Mounting the resolver". If necessary, contact Data Instruments technical advisors for assistance or replacement.

06

Problem: The press is going faster than WPC's rated speed, or the resolver has failed. Or it may just be that wiring in the resolver circuit to WPC is loose or bad.

Remedy: If WPC's rated press speed is exceeded, reduce the speed. If not, check the resolver wiring and connections for shorts, breaks, or loose connections. See Chapter 2 "Mounting the resolver" for complete information about resolver wiring. If the wiring is not the problem, the resolver is probably bad and will have to be replaced. If necessary, contact Data Instruments technical advisors for assistance or replacement.

Problem: "The resolver position is different from when the unit was turned off". This message will only appear if SmartPAC detects a different resolver angle position from the time that the press was turned off to when it was turned on again. This can happen when you move the press or upgraded SmartPAC firmware.

Remedy: Press Reset to clear. If the message reappears, call Data Instruments.

07

Problem: This error occurs during the resolver zeroing process. It means that the resolver had been set outside the range of 330° to 30°.

Remedy: The resolver needs to be re-zeroed properly at top dead center (TDC). (see in Chapter 4).

Operational faults

10

Problem 1: This means that the main motor has been turned off by the operator. (Note: This code is not displayed when TWO HAND INCH operating mode is selected to enable "Dead Motor Inch".) The motor may also have been deactivated during the lockout mode. *"Loc"* is described earlier in this chapter.

Remedy 1: Turn the motor back on. If you want to access the Run menu without starting the motor, then set SmartPAC to TWO HAND using the Mode Select menu and set the STROKE SELECTOR SWITCH TO INCH. If this does not resolve the problem, it could also mean that when the motor is on forward, you need to replace the contact blocks on the starter with new, unused ones. If you need assistance in making the "Two Hand" setting, refer to Chapter 6 of this manual.

Problem 2: This means that the main motor has been turned off by WPC to save energy. The only way that you will get this message if is the lockout relay is physically wired as discussed in Chapter 2. Also you would have had to set the number of minutes for WPC to shut down the motor (see Chapter 4 — Press Parameters for more information).

Remedy 2: Turn the motor back on. Switch to INCH modef you want to access the Run menu without starting the motor. If the amount of time set at "Shut down time" in Initialization is too short, adjust as necessary.

13

Problem: This either means that the E-Stop button on WPC has been depressed, that the E-Stop circuit is open, or the E-stop relay circuits are not working properly.

Remedy: Check for and correct another control manufactured by Data Instruments or another company connected to WPC's E-stop circuit which may indicate a specific error condition present. Refer to that product's user manual if unsure how to correct the problem. If the error persists, contact Data Instruments for assistance.

14

Problem: This means that the PRIOR ACT button was depressed or appears open to WPC after the stroke commenced.

Remedy: Reset. If the problem persists, check the wiring from the operator station to WPC. Contact Data Instruments if this cannot be solved.

16

Problem: This means that either the TOP STOP button was depressed or the top stop circuit was open after the stroke commenced.

Remedy: Check other equipment (e.g. AutoSetPAC) wired into the Top Stop string. Correct the problem. Reset at that equipment; then reset at WPC and restart.

20

Problem: This means that the main motor is in reverse without TWO HAND INCH mode selected.

Remedy: Set SmartPAC to TWO HAND using the Mode Select menu and set the STROKE SELECTOR SWITCH TO INCH. Then run the motor in reverse. If you need assistance in making the "Two Hand" setting, refer to Chapter 6 of this manual.

22

Problem: This means that the operating mode was changed with the press running.

Remedy: Reset. Run the press after you have made the operating mode selection. Consult Chapter 6 for the correct operating mode to select.

23

Problem: This means that the operating mode you selected is not a valid one.

Remedy: Reset. Consult Chapter 6 to determine the correct operating mode to select.

24

Problem: This means that both palm buttons were pressed while in One Hand mode.

Remedy: After clearing the error, run the press pressing only one button.

25

Problem: This error is related to the flywheel motion monitoring option. When you see this error, it means that WPC does not detect that the position sensor installed on the flywheel has turned on or off when the flywheel is turning.

Remedy: After clearing the error, check the installation and wiring of the position sensor. If you wish to disable this feature, set the flywheel timer to a value of 0 (zero). Refer to the section "Setting Shutdown and Flywheel Timer Limits" in Chapter 4 for more information.

26

Problem: This means that the flywheel turned too fast, potentially creating an unsafe barring condition (more than an equivalent of 6 SPM) while the press was in Bar mode.

Remedy: After clearing the error, bar the press more slowly.

28

Problem: This means that the flywheel was still in motion when the motor was started in the opposite direction, or when Bar mode was selected.

Remedy: Reset and wait until the flywheel stops turning. If the number of seconds set at "Spin down time" in Initialization is too long, adjust as necessary. See Chapter 4 for a description of this option.

Inter-processor failures

31* through 39*

Problem: These errors indicate failures that may occur within the main processor or in the case of status code #38 and #39, in the second processor. The errors are as follows:

F31 No reply received from second processor to check start request
F33 Incorrect reply received from second processor to mode change message
F34 No reply received from second processor to mode change message
F35 Incorrect reply received from second processor to power-up message
F36 No reply received from second processor to reset error message
F37 No reply received from second processor to compare input buffers message
H38 The second processor did not receive the power up information correctly
H39 The second processor did not receive the mode information correctly

Remedy: Try to reset. If errors persist, contact Data Instruments for assistance.

Input buffer test failures

41* through 44*

Problem: These errors indicate failures that may occur when WPC performs input buffer tests within the main processor. The errors are as follows:

F41 Input buffer 1 check incorrect

F42 Input buffer 2 check incorrect

F43 Input buffer 3 check incorrect

F44 Input buffer 4 check incorrect

Remedy: Try to reset. If errors persist, contact Data Instruments for assistance.

Air pressure limits exceeded

45

Problem: These errors indicate that the main system air pressure is below the sensor limit set in SmartPAC's Programming mode. This error can also be generated by the second processor.

Remedy: Check the level of your press's system air pressure. If necessary, refer to Chapter 4 to reset the limit. If you need more assistance, contact Data Instruments.

46

Problem: These errors indicate that the counterbalance air pressure is outside the sensor limits set in SmartPAC's Programming mode. This error can also be generated by the second processor.

Remedy: Check the level of your press's counterbalance air pressure. If necessary, refer to Chapter 4 to reset the limits.

Note to RamPAC users

This error should not appear if you use RamPAC to monitor the counterbalance pressure.

If this error does appear, make sure that RamPAC is wired correctly to its counterbalance pressure sensor and that WPC is wired correctly to its pressure switch. See “Installing air pressure & counterbalance switches instead of air pressure sensors” in Chapter 2. Contact Data Instruments if you need further assistance.

Component failures

47 through 48

Problem: These errors indicate failures that have occurred to standard equipment connected to WPC. If "47" occurs, possibly dirt or water has gotten into the DSV. You may need to rebuild the valve. Regarding "48", the air pressure may be turned off or set too low. If you are using the Air Pressure sensor instead of the Air Pressure switch, "48" will occur if you have not wired terminal #8 to ground (see Chapter 2).

F47 Dual Safety Valve (DSV) monitor switch input open

F48 Main system air pressure switch input open

Remedy: Reset and correct the problem. If the errors persist, contact Data Instruments for assistance.

Customized Status Codes

49 through 59

Problem: These errors indicate failures that have occurred to auxiliary equipment that you connected to WPC, such as lubrication systems:

STATUS CODE	USER INTERLOCK	WIRE BETWEEN	INDICATE STOP TYPE	NAME OF AUX. EQUIP.
49	User #11	18 and GROUND		
50	User #10	86 and GROUND		
51	User #1	21 and +24 VDC		
52	User #2	82 and +24 VDC		
53	User #3	71 and +24 VDC		
54	User #4	83 and GROUND		
55	User #5	72 and GROUND		
56	User #6	84 and GROUND		
57	User #7	73 and GROUND		
58	User #8	85 and GROUND		
59	User #9	74 and GROUND		

Remedy: Check the auxiliary equipment that signaled the stop (see "Wiring Auxiliary Equipment to WPC for Customized Status Codes" in Chapter 2). Correct the problem. Reset SmartPAC. If the error does not go away, contact Data Instruments for assistance.

User Interlocks are not control reliable!
The user interlocks that you set are NOT control reliable. They must not be used to protect personnel from a moving hazard. They however can be used as a convenience to interface automation.

Note: *You can display the status of the user interlocks from Initialization mode. See "Using the WPC Input Status Display" later in this chapter.*

Light Curtain faults

60 or 61

Problem: These errors indicate that the light curtain(s) failed the internal light curtain test conducted by WPC. There may be a problem with the wiring of either the first or second light curtain connected to WPC (#60 applies to the first, #61 applies to the second). This error can also be generated by the second processor.

Remedy: Check that your light curtain wiring is correct. Refer to Chapter 2 either in this manual in the Shadow V user manual. If you need more assistance, contact Data Instruments.

62

Problem: This error indicates that while two light curtains are wired to WPC, only one light curtain has been selected on the WPC.

Remedy: Check that WPC is properly configured for a second light curtain. Clear the first light curtain. Refer to the section "Setting Press Options" in Chapter 4 to properly configure the dual setting.

63

Problem: This error indicates that the first light curtain (A) is blocked at the start of or during the stroke.

Remedy: Check to see that light curtain A is clear.

64

Problem: This error indicates that the second light curtain (B) is blocked at the start of or during the stroke. It could also indicate that you have dual light curtain selected at the program select switches in WPC, but only one set of light curtains is wired.

Remedy: Check to see that light curtain B is clear. If necessary, check that you have properly wired both sets of light curtains and that the program select switches are set properly (refer to the section in Chapter 4, "Setting Press Options").

65

Problem: This error indicates that the light curtains are connected with TWO HAND ONLY software installed in WPC.

Remedy: Be sure that the correct version of software is installed in WPC. It should be one that expects to work with light curtains. Because there are several versions of software available, consult Data Instruments if you are not sure which is the correct one for your application.

Emergency stop circuit driver failure

66

Problem: The driver circuitry which controls the emergency stop (E-Stop) input circuitry has a failure. This error can also be generated by the second processor.

Remedy: Reset. Check the E-Stop wiring. If the error persists, contact Data Instruments for immediate assistance or replacement.

Top stop circuit driver failure

67

Problem: The driver circuitry which controls the top stop input circuitry has a failure. This error can also be generated by the second processor.

Remedy: Reset. Check the Top Stop wiring. If the error persists, contact Data Instruments for immediate assistance or replacement.

DSV Interface and Lock-out relay failures

70* through 76*

Problem: These errors indicate failures that have occurred in the DSV interface. Note that #72 through #76 can also be generated by the second processor. The errors are as follows:

F70	The first (DSV-A) DSV relay driver did not open at start of stroke
F71	The two DSV relay drivers have shorted together
F72 or H72	The DSV control flip-flop not functioning properly
F73 or H73	The DSV missing pulse detector window not functioning properly
F74 or H74	The DSV relay driver did not close properly at the start of the stroke
F75 or H75	The DSV relay driver did not open properly at the end of the stroke
F76 or H76	The Lock-out relay driver did not open properly at the end of the stroke

Remedy: Reset. If you still get these errors, contact Data Instruments for assistance or replacement.

Loss of rotation

79

Problem: WPC sees that the valve has been activated but the resolver did not start rotating within the start time limit that was set by WPC. Also, the resolver could have stopped turning briefly while the press was running.

Remedy: The Start time limit may not have been set properly (see Chapter 4).

The drive belt on the resolver may be loose or broken so the resolver does not turn or stops turning even though the press crankshaft is turning. Also you may have low air pressure to the clutch or a bad clutch; so the crankshaft (and therefore the resolver) did not move even though the clutch control valve has been activated.

An internal WPC problem could also have occurred, or the resolver could be defective.

Reset. Re-initialize the start time limit (see Chapter 4). Check the resolver and resolver drive. Check and repair the clutch. If these solutions do not work, an internal problem may have occurred. Call Data Instruments' technical advisors.

Internal timing input failures

80** or **82

Problem: This indicates an internal problem with the WPC timing inputs.

Remedy: Reset. If you still get these errors, contact Data Instruments for assistance or replacement.

Top Stop and Overrun setting faults

81, 83 through 87

Problem: These errors indicate that the overrun limit switch is on before the Top Stop timing is off. Remember that the Top Stop Timing (actual internal dwell) is on for twenty degrees.

Remedy: Check that you have properly set Top Stop angle and installed and set the Overrun Limit Switch correctly. Refer to the corresponding sections in Chapter 4. If you are still having difficulty, contact Data Instruments for assistance.

Overrun limit switch fault

_85_

Problem: The overrun limit switch (made up of the overrun sensor and magnet) provides overrun timing to WPC. WPC checks that the overrun limit switch opens and closes only once per stroke, and compares that with the other timing signals (such as auto carry-up and top stop). If WPC detects more than one on/off occurrence, it generates the following error message: "NOT ALL OF THE TIMING SIGNALS WERE SEEN IN SEQUENCE".)

Remedy: Review "Installing the overrun limit switch" in Chapter 2, and also Chapter 4 for an illustration of the LED map as you correct this problem. Check the overrun limit switch installation to make sure that it opens and closes only once per stroke. Check that you are using a non-brass screw. Other considerations: Make sure that the overrun limit switch has enough dwell to provide an adequate signal at high speeds. The larger the diameter of the shaft on which the magnet is mounted, the shorter the dwell. If this is the problem, the solution is to mount the magnet on a smaller shaft. Also, ensure that the press is not encountering undue shock and vibration due to excessive blanking. If you cannot resolve this problem, contact Data Instruments technical staff immediately for further direction.

Overrun limit switch test angle fault

88

Problem: The overrun limit switch is not closing at the overrun test angle or opening at 180°. The overrun limit switch monitors the position of the resolver to ensure that it is working correctly. The switch must be installed so that it closes at the overrun test angle. Therefore, if it does not close there or open by 180°, the press stops and you see this status code. This error can also be generated by the second processor.

Remedy: The resolver drive has slipped or broken. It is also possible that the overrun limit switch may not have enough dwell to close totally at high RPM's. Also, the resolver or overrun limit switch may be defective or not installed properly. Check the wiring and installation of the resolver and overrun sensor and magnet. Refer to an explanation of the overrun limit switch in Chapters 2 and 4.

Overrun limit switch setting fault

89

Problem: These errors indicate that the overrun limit switch setting was not set correctly.

Remedy: Check that you have properly set the test angle correctly. Refer to the section "Setting the program select switches" in Chapter 4. If you are still having difficulty, contact Data Instruments for assistance.

Internal memory failures

90* through 98*

Problem: This means that something may be seriously wrong with the main WPC processor board or the second processor (designated by "H"), which may need servicing or replacement.

Remedy: Reset. If you still get these errors, contact Data Instruments for assistance or replacement.

When the "Press control" menu options do not appear in any of SmartPAC's operating modes

If you are not getting any "Press Control" menu choices in Initialization, Program, or Run:

- Locate the LED labeled "DS102" on the SmartPAC processor board near TB104, resolver cable, (see Figure 2-5a in the SmartPAC user manual).
- Notice if this LED is blinking. If it is not blinking at all, then this indicates that the connection between SmartPAC and WPC is not satisfactory. Recheck your wiring. If necessary, refer to "Connecting communications from SmartPAC to WPC" in this chapter.

Other equipment-related messages

Input check circuit failure

Explanation: The resolver turned five times (in other words, the press was running), but SmartPAC received no signal from the input check circuit.

Remedy: The input check circuit has not been connected or wired properly. If this message occurs when the press stops, your press is taking more than five revolutions to stop after the brake is activated. You should check your brake for wear. For wiring the input check circuit, see "Connecting AC wiring, stop circuits and input check circuit" in Chapter 2.

Angle Resolver Failure

Explanation: The problem may be that wiring in the resolver circuit to SmartPAC is loose or bad or that the resolver has failed. It may also be that the press is going faster than 800 (or 1600 SPM, depending on the speed setting at SmartPAC).

Remedy: If SmartPAC's rated press speed is exceeded, reduce the speed. If not, check the resolver wiring and connections for shorts, breaks, or loose connections. See Chapter 2 "Mounting the resolver" or Setting high speed version of SmartPAC" (be sure you set the speed correctly). If these are not the problem, the resolver may need to be replaced. Contact the factory for assistance.

NOTE: *To clear this fault, you must turn SmartPAC off. (RESET will not work.)*

Position sensor incorrect

Explanation: If installed, the position sensor has not closed at 0° or was not open at 180°. The position sensor cross-checks the position of the resolver to ensure that it is working correctly. It is supposed to be installed so that it closes at 0 resolver degrees. If it does not close at 0° or is not open by 180°, the press stops and you see this message.

Remedy: The resolver drive has slipped or broken. It is also possible that the position sensor may not have enough dwell to close at high speeds (covered in "Installing the overrun limit switch in Chapter 2). The larger the diameter of the object on which the magnet is mounted, the shorter the dwell. If this is the problem, the solution is to mount the magnet on a smaller shaft.

If none of the above procedures change the display to "position sensor switch closed," the sensor may be bad. Try another sensor if available. Otherwise, call the factory for help. Do not go further until the problem is solved.

Also, the resolver or position sensor may be defective or not installed properly. Check the wiring and installation of the resolver and position sensor. Refer to the installation procedures in Chapter 2. If the position sensor is not installed, the position sensor has not been disabled. To disable it, use the Initialization menu. See Chapter 4.

NOTE: If a position sensor is used, do not disable it in Initialization mode to clear the error message. Misalignment between the resolver and crankshaft will not be detected.

Onboard ram test failure

Explanation: This means that something is wrong with the main SmartPAC main processor board and the system cannot be reset. SmartPAC may need to be serviced or replaced.

Remedy: As stated above, pressing RESET will not reset the error. Try turning the power off then on. If the problem does not go away, contact Data Instruments technical service advisors for assistance or replacement.

Messages displayed when a counter preset is reached

Good parts counter preset reached

Explanation: The value set for the parts counter has been reached. The press should stop at top dead center.

Remedy: Press RESET to clear the message. If your part run is complete, you would need to change tooling, material, etc. You can then run the press again.

NOTE: *When this message appears, the good parts count is automatically reset to 0.*

Strokes counter preset reached

Explanation: The value set for the strokes counter has been reached. The press should stop at top dead center.

Remedy: Press RESET to clear the message. If your part run is complete, you would need to change tooling, material, etc. You can then run the press again.

NOTE: *When this message appears, the strokes count is automatically reset to 0.*

Batch # counter preset reached

Explanation: The value set for the one of the three batch counters has been reached when they are set to "top stop" (not "toggle" or "pulse"). The press will stop at top dead center (see Chapter 5 Program Mode, "Setting count mode")

Remedy: Press RESET to clear the message.

NOTE

When this message appears, the corresponding batch count is automatically reset to 0.

Messages displayed for programming problems

These messages tell you that there is a problem with the tool number or that a tool number is not properly loaded. These messages can also may indicate an internal problem with SmartPAC itself.

If you cannot correct the problem yourself after reading the remedy for the problem below, contact a Data Instruments representative for assistance. Remember to provide pertinent information to expedite the resolution of the problem.

Once you have corrected the problem, press RESET. If the problem is corrected, you will be able to run the press again. If not, you will get the same fault message.

No tool number has been loaded

Explanation: A tool number is not presently loaded. You will see this message if you try to go into Run mode without a tool number loaded. A tool number must be loaded before entering Run mode.

Remedy: Turn the Program/Run key to "Program", and then press RESET. Now you can program and load the appropriate tool number in Program mode.

Tool number table checksum error

Explanation: The information, or "**checksum**", created for the tool number loaded has become corrupted. This can occur when SmartPAC has been turned off while you are in the middle of programming a setup, or when you have not properly exited (by pressing RESET) from a Programming or Run menu.

This can also occur when you upgrade SmartPAC. Sometimes the information in the older firmware does not correspond properly with the new firmware.

What is a Checksum: SmartPAC creates a checksum for a tool number to check that the data stored in memory for the tool is the same as the data that comes out of memory when you load the tool number. The checksum value calculated when data went into memory must be the same as the value calculated when the data is loaded.

Remedy: These checksum values may not match if SmartPAC has been turned off while you were in the middle of programming or adjusting settings for a tool. It will also happen if the stored tool number settings got damaged due to an internal SmartPAC malfunction.

Go back into programming and review the tool number setup in question. Make sure that all the information you programmed is correct; then reload this tool number. If the problem was caused because the system was turned off while in Program or Run modes, perform these steps:

1) Press the RESET key to clear the fault message.
2) Go to Program mode, and select "Program/load tool numbers."
3) Select the tool number in question from the tool number display.
4) Select "Modify the tool information" from the next display.
5) Select "Set cams" from the next display.

6) Press RESET. SmartPAC will create a new checksum for the tool.
7) Select the tool number again, bring up the display of cams, and verify that all settings are correct.
8) Reload the tool number. You should not get this fault message.

If the problem is due to a system malfunction, the tool number settings will have to be created again from scratch. If this happens more than once, contact Data Instruments for assistance.

One of the sensor auto enable counters is greater than 24

Explanation: Normally this fault will not ever occur since SmartPAC does not let you enter a value greater than 24. However, it could appear if there is a problem with the internal workings of SmartPAC.

Remedy: First press Reset. If the message reappears, contact Data Instruments.

Messages displayed when a sensor signals a fault

Fault messages for green sensors

Green sensor missed

Explanation: A green or green quick check sensor did not turn on during the ready signal and it did not come on late (within 50 milliseconds after the ready signal). No stroke angle is displayed with this error message since the sensor never turned on.

Remedy: Check for the malfunction that the sensor was supposed to detect (part ejection problem, misfeed, transfer problem, etc.). If that is not the cause, check to be sure that the ready signal is set properly for this sensor. Check that a sensor is actually plugged into this input on the remote connection box. Remember, if no sensor is connected to a sensor input, that input must be set to "unused". Check connections between sensors and controller.

Green sensor actuated late

Explanation: A green or green quick check turned on late after its ready signal was completed. That is, it turned on within 50 milliseconds after the end of the ready signal. If a green or green quick check sensor does not come on during its ready signal, SmartPAC continues to look for the sensor signal. If it saw the sensor come on within 50 milliseconds after the ready signal, the angle where the sensor turned on is shown in the message.

Remedy: Check for the malfunction the sensor was supposed to detect (like a part ejection problem or misfeed, etc.). Check that the ready signal is set properly. You may just have to adjust the ready signal.

Green sensor failure

Explanation: For a green or green constant sensor, the sensor has stayed on from the end of one ready signal to the beginning of the next ready signal for the next stroke. No stroke angle is shown with this fault.

Remedy: Check for a shorted sensor. Make sure the ready signal has been set correctly. Check to see if a press or equipment malfunction is causing the sensor to stay on—for instance, a part wedged against a sensor or a pinched wire.

Green constant fault

Explanation: A green constant sensor turned off during its ready signal. Green constant sensors must stay on throughout the entire ready signal. The angle where the sensor turned off is shown.

Remedy: Check for the malfunction that the sensor was supposed to detect.
If no malfunction at the press has occurred, check to be sure that the ready signal is set properly. Remember, for green constant sensors, the ready signal must be a little shorter than the sensor's actuation angle. Check that a sensor is actually plugged into this input. Check connections between remote connection box and controller.

Green quick check sensor actuated outside ready

Explanation: A green quick check sensor actuated or stayed on outside the ready signal. The stroke angle where the sensor was first detected on outside the ready is shown.

Remedy: Check for the malfunction the sensor is supposed to detect (part ejection problem, misfeed, etc.) Check for a part wedged against the sensor, a shorted sensor, a pinched wire, or other cause that would keep the sensor on or cause it to go on outside its ready signal. Make sure the ready signal is set correctly.

Green special fault

Explanation: A green special sensor did not actuate within the maximum number of strokes set in Programming mode (SmartPAC did not see a contact closure to ground). In other words, the press made strokes without this sensor actuating.

Remedy: Check for the press or equipment malfunction that the sensor was supposed to detect. Check for any cause that would keep the sensor from going on. Make sure the maximum number is set correctly — not too low. See Chapter 1 for a complete description, and Chapter 5 to program this type of sensor.

Fault message for yellow sensors "This N/O sensor is grounded"

Explanation: A yellow sensor turned on (there was a contact closure to ground). When this message appears, the angle where the condition was detected is also shown on the LCD display.

Remedy: Check for the press or equipment malfunction that the sensor was supposed to detect. If none has occurred, check for a shorted sensor or pinched wire.

Fault message for red sensors "This N/C sensor is open"

Explanation: A red sensor has actuated (is open to ground). When this message appears, the angle where the condition was detected is also listed shown on the LCD display.

Remedy: Check for the press or equipment malfunction that the sensor was supposed to detect. If none has occurred, check for a malfunctioning sensor. Check for loose or detached wiring at the remote connection box or controller. Check for a severed wire from the sensor to the RCB or controller.

Miscellaneous Fault messages

Maximum press speed exceeded

Explanation: This message is generated when the press is running at a speed greater than the maximum limit set at SmartPAC.

Remedy: After clearing the error, either run the press at a slower speed, or adjust the maximum limit set at SmartPAC. Refer to Chapter 4.

Minimum press speed exceeded

Explanation: This message is generated when the press is running at a speed less than the minimum limit set at SmartPAC.

Remedy: After clearing the error, either run the press at a higher speed, or adjust the minimum limit set at SmartPAC. Refer to Chapter 4.

Host computer top stop

Explanation: This message is only generated when SmartPAC is communicating with PACNet® pressroom monitoring software. The user at the computer has sent a top stop command to that SmartPAC. When this occurs, SmartPAC in turn stops the press.

Remedy: Because this condition was generated by someone at PACNet, it is important to investigate why this individual initiated the stop command from the PC. A problem may be present. Check with the personnel before proceeding. Once the situation has been corrected, press Reset to continue.

Error log

As a troubleshooting aid, your SmartPAC keeps an Error Log that you can view in Run mode. Each time the press is stopped, the log records the error number (which gives the reason for the stop), the stroke count when the stop occurred, and the crankshaft angle when the stop occurred. When you stop the press to load a new tool, the error log shows the tool number. The log retains this information for the 32 most recent errors.

To see the error log, select "Error Log" from the Run menu. The display shows the log of the latest sixteen errors, with the most recent error first. To see information about the previous sixteen errors, press **F6**. To see the most recent errors again, press **F6** again. See Table 7-1 on the following pages for a listing of error numbers and what they mean.

ERROR LOG

ERROR #	STROKE CNT	ANGLE
116	7487	279
116	4122	90
NEW TOOL	6216	345
10	50000	345
25	41001	110
13	36885	225
221	25324	303
116	15999	230
25	15990	183
45	9889	100
31	3546	320
NEW TOOL	5400	359
10	11125	359
116	10805	090
25	2756	125
46	2512	5

MORE ▸ **F6**

Number of new tool

Press **F6** to see more logged information

Figure 7-7. Error Log Display

Table 7-1. Error log status codes (find other codes in the text of this chapter)

Error #	Description
General status codes	
0	System OK
8	Estop driver failure
12	Position sensor incorrect
13	System failure
14	Angle resolver problem
17	Input module failure
19	Module, WPC, SFI, or PLC communication error
23	Stop time exceeded
24	Loss of rotation or outside max/min speed
25	Setup table checksum, loaded setup checksum or no setup loaded
31	Stroke counter preset
32	Good parts counter preset
33	Batch counter preset (1, 2, and 3)
34	Host computer top stop
35	MultiPAC fault
36	RamPAC fault
AutoSetPAC status codes	
51-58	High setpoint exceeded, ch. 1-8
61-68	Low setpoint exceeded, ch. 1-8
71-78	Repeatability setpoint exceeded, ch 1-8
101-108	Zero offset exceeded, ch. 1-8
DiProPAC status codes	
114-129	Yellow probes 1-16
131-146	Red Probes 1-16
148-163	Green quick check on outside ready 1-16
165-180	Green missed 1-16
182-197	Green failure 1-16
199-214	Green late 1-16
Dialog status codes	
221	Coil change
222	Tool change
223	Bin full
224	Forklift

Table 7-1, continued. Error log status codes

Dialog status codes, continued	
Error #	**Description**
225	Quality control
232	Lube problem
233	Air problem
234	Electrical problem
235	Mechanical problem
237	Part ejection
239	Part quality
227	Special #1
228	Special #2
229	Special #3
230	Special #4
241	Special #5
242	Special #6
243	Special #7
244	Special #8
245	Special #9
246	Special #10
247	Special #11
248	Special #12
249	Special #13
250	Special #14
251	Special #15
252	Special #16
WPC A processor status codes (F1 - F107)	
F100	Stop time exceeded
F102	Lockout mode
F103	Off mode
F104	Undefined operating mode F23
F105	Motor off F10
F106	Motor in reverse F20
F107	Power saver shutdown F10

Table 7-1, continued. Error log status codes

SmartPAC module status messages	
411	RamPAC: any status message
WPC B processor status codes (H1 - H99)	
RamPAC error codes: 600 + the RamPAC error number	
601	Shut height incorrect
602	RamPAC counterbalance error
603	RamPAC shut height error
604	Ram is out of limits
605	Counterbalance pressure is incorrect
606	Counterbalance pressure is too low
607	Loss of ram motion
608	Shut height adjust enabled
609	Cushion pressure error
610	RamPAC checksum error

Using the WPC Input Status Display

As an aid to installation and troubleshooting, you can read the status of the inputs on the screen of your SmartPAC. Access this information from Initialization mode by following the steps below.

Note: *The LED indicators inside the housing also show the status of these inputs. See the figures at the end of Chapter 4.*

1. Enter the Intialization mode as described in Chapter 4. The Main Initialization menu appears.
2. Select “Press Control.” The WPC Initializaton menu, Figure 7-8, appears on the screen.

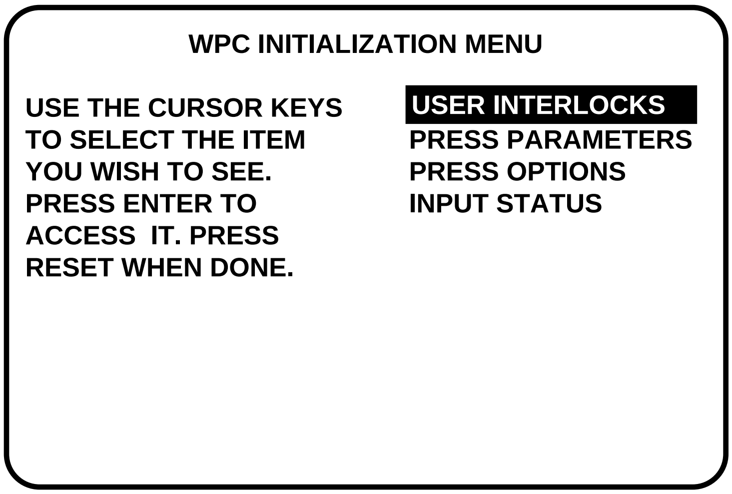


Figure 7-8. WPC Initialization menu

3. Select “Input Status.” The Display WPC Input Status display, Figure 7-9, appears. Select the type of input you want to see.

   Press **F2** for “Buttons/Switches.” See Figure 7-10.

   Press **F3** for “Estops/Top Stops.” See Figure 7-11.

   Press **F4** for “Interlocks.” See Figure 7-12.

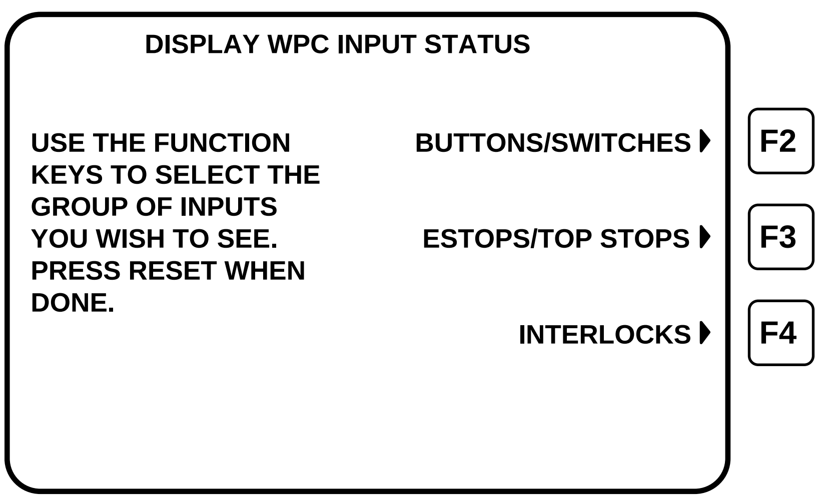


Figure 7-9. Display WPC Input Status menu

NAME	TERM#	STATUS	
PALM A N/C	1	ON	
PALM A N/O	11	ON	
ONE HAND N/O	3	ON	WPC BUTTONS
PALM B N/C	2	ON	AND SWITCHES
PALM B N/O	12	ON	INPUT STATUS
FOOT N/C	4	ON	
FOOT N/O	14	ON	
EXT ACT N/C	15	ON	
EXT ACT N/O	5	ON	
BAR MODE	6	ON	
BAR ACT	16	ON	
OFF SEL	S248	OFF	
INCH SEL	S249	OFF	
S.S. SEL	S250	OFF	
CONT SEL	S251	OFF	
OP. STA. 1	S253	OFF	
OP. STA. 2	S254	OFF	
WPC LOCK	S255	OFF	
REM RESET	S257	OFF	

Figure 7-10. Display of Buttons/switches Input Status

NAME	TERM#	STATUS	
ESTOP 1	48	OFF	
ESTOP 2	57	ON	WPC ESTOP
TOP STOP 1	52	ON	AND TOP STOP
TOP STOP 2	60	ON	INPUT STATUS
PRIOR ACT	63	ON	
LIGHT CUR A1	77	ON	
LIGHT CUR A2	87	OFF	
LIGHT CUR B1	78	ON	
LIGHT CUR B2	88	OFF	
MOTOR FOR	7	ON	
MOTOR REV	17	ON	
OVERRUN SW	24	ON	
AUX TOP/FLY	22	ON	
DSV CHECK A		ON	
DSV CHECK B		ON	
LOCKOUT CHECK		ON	

Figure 7-11. Display of Estops/Top Stops Input Status

NAME	TERM#	STATUS
LOW OIL LEVEL	21	ON
LOW OIL PRESS.	82	ON
DIE NITROGEN	71	ON
MOTOR OVLD.	83	ON
USER 5	72	ON
USER 6	84	ON
USER 7	73	ON
USER 8	85	ON
USER 9	74	ON
USER 10	86	ON
USER 11	18	ON
DSV MONITOR	20	ON
MAIN AIR	8	ON
SPEC. 1	26	ON
SPEC. 2	13	ON
SPEC. 3	75	ON
SPEC. 4	19	ON
SPEC. 5	70	ON

WPC INTER-
LOCK INPUT
STATUS

Figure 7-12. Display of Interlock Input Status

The user interlocks are set up under the Initialization menu as described in Chapter 4.

Appendix A
OSHA and ANSI Regulations

The Occupational Safety and Health Administration (OSHA) regulations and the American National Standards Institute (ANSI) standards for presence-sensing devices are listed here. The OSHA regulations are in Section 1. ANSI standards are in Section 2.

Section 1—OSHA Regulation 1910.217

Reprinted below are excerpts from OSHA regulation 1910.217 pertaining to the use of presence-sensing devices for point-of-operation guarding on mechanical power presses. Portions from the text of the OSHA regulations are presented in the left-hand column of the pages in this section. Additionally, an interpretation provided by the Precision Metalforming Association (PMA) is presented in the right-hand column.

Data Instruments makes no claim regarding the accuracy or effectiveness of the PMA interpretation reprinted here. The material is listed for informational purposes only. It should not be relied upon for use in any specific application. Persons making use of this interpretive material do so at their own risk. It has been reprinted with the permission of the PMA.

OSHA Regulations	PMA Interpretation
OSHA 1910.217 (c) (3) (i) (a) (3) Point of operation devices. (i) Point of operation devices shall protect the operator by: (a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation.	Presence-sensing device
OSHA 1910.217 (c) (3) (iii) (iii) A presence-sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (i) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.	(c) (3) (i) (a) Refers to the functional requirement of a presence-sensing device which prevents and/or stops normal stroking of the press.

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

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

European method (curtain of light) uses self trip safety system effectively. Variance applied for 11/17/73 by Interlake Stamping Company to use this fail safe system.

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

When failure occurs, the best indication is the press won't run

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

Top of stroke is the point at which muting shall cease as it is not possible to set a point on the downstroke as the exact position where the hazard of die closing starts.

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

Safety distance represents the distance an operator can move his hand during the time it takes a press to stop. The internationally recognized hand reach speed is 63 inches/second.

D_S = 63 inches/second x T_S where

D_S = minimum safety distance (inches);

63 inches/second = hand speed constant and

T_S = stopping time of the press measured approximately 90° position of crankshaft rotation (seconds)

To determine this safety distance, the stopping time of the press is measured with some appropriate measuring device. The measurement is taken such that the stop signal is given to the press at the 90 degree point of the crank position.

Since some stopping time increase must be accommodated due to braking system deterioration, a percentage factor must be added to the measure time to obtain the factor for use in the equation for determining safety distance. A percentage factor of 20% is recommended for presses with new brakes or brakes of good condition. For older brakes, a 10% factor is recommended.

Example:
Measured stopping time = 0.190
Time factor = 1.2 x 0.19 x = 0.228 seconds
Calculation = 63 x 0.228
Safety distance = 14.4 inches

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

(3) (iii) (f) Great care must be taken to assure that no access to the die area exists unguarded.

OSHA 1910.217 (c) (3) (5)

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

This paragraph tells the condition under which a brake monitoring system is required after November 1, 1975.

(i) The employer shall use a control system and brake monitor which comply with paragraphs (b) (13) and (14) of this section. This requirement should be complied with by November 1, 1975.

(b) (13) Control reliability

(b) (14) Construction requirements.

OSHA 1910.217 (c) (3) (vii) (c)

(c) The safety distance (D_S) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula:

Ds = 63 inches/second x T_S, where:

Ds = minimum safety distance (inches);

63 inches/second = hand speed constant;

and

T_S = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).

Example

Measured stopping Time = 0.190 seconds
Time Factor = 1.2 x 0.19 = 0.228 seconds
Calculation = 63 x 0.228
Safety Distance = 14.4 inches

OSHA 1910.217 (e) (1)

(e) INSPECTION, MAINTENANCE, AND MODIFICATION OF PRESSES

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

Records of clutch and brake will be weekly. Other inspections are periodic subject to time factor determined by employer.

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

If brake monitoring system is installed, weekly inspection and records are not required for clutch/brake mechanism. Other parts of the press will require periodic inspections and records.

Section 2—ANSI standards for presence-sensing devices and two-hand controls

Reprinted below are the American National Standards Institute (ANSI) standards for presence-sensing devices (light curtains). Also included is Section 6.3.5 on two hand controls. ANSI is the United States clearinghouse and coordinating body for voluntary standards activity on the national level. It is a federation of trade associations, technical societies, professional groups, and consumer organizations. Some 1000 companies are affiliated with the Institute as company members.

ANSI creates voluntary standards to eliminate duplication and to weld conflicting standards into single, nationally accepted standards under the designation "American National Standards." The standards reflect a national consensus of manufacturers; consumers; scientific, technical, and professional organizations; and governmental agencies.

The ANSI standards below are American National Standard Institute B11.1-1988 for presence-sensing devices (light curtains) and two hand controls. Both the ANSI standard and its interpretation are part of ANSI standard B11.1-1988. To get a complete copy of the ANSI standard, write to: ANSI, 1430 Broadway, New York, NY 10018.

Standard Requirements

6.3.2 Presence-Sensing Point of Operation Device.

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

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

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

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

Explanatory Information

E6.3.2 Presence-Sensing Point-of-Operation Device. Various presence-sensing devices employ different sensing and adjustment techniques. The point at which a device responds to an intrusion may vary. The device should be located or adjusted so that the device always responds to the intrusion at or prior to the safety distance D ($_S$). See E6.3.2 (13). Also, care should be taken when installing the device so that it does not detect false signals from other devices or equipment in the area.

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

(3) Muting is typically accomplished by interface circuits or auxiliary controls. The muting element should incorporate a similar level of control reliability as the presence-sensing device itself. A simple cam-operated limit switch wired in parallel with the device's output is inadequate as its failure can remain undetected.

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

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

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

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

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

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

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

(4) The device should have a minimum object sensitivity stated by the device manufacturer. For example, electro-optical devices may detect a 1-1/4-inch-diameter opaque object anywhere in its sensing field but allow 1 inch obstructions to pass undetected at certain points in the field.

(5) The device manufacturer should state the maximum total response time, including output devices, of the presence-sensing device.

(6) Typically, these adjustments or controls are key-operated or located under lockable covers.

(7) It is useful to observe a display such as a meter or signal lamp to indicate the degree of penetrations as an aid to setup and shaping of the radio frequency field as well as the separate signal to indicate intrusion resulting in a STOP command. Red and green indicator lamps or other means that can be easily seen by the operator and others should be provided to indicate that the device is functioning. When the device is bypassed, an amber indicator lamp or other means should be used to indicate to the operator and others that the device is bypassed.

(9) See *Control Component Failure* (4.10)

(10) See *Control Component Failure* (4.10). Also see *Ensure* (3.22).

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

(11) Some devices may be affected by changes in the conditions around the press such as the placement of parts and tote boxes, grounding conditions of the operator, or the movement of forklift trucks.

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

(12) The total stopping time of the press should include the total response time of the presence-sensing device, as stated by the manufacturer, the response time of the interface, the response time of the control system, and the time it takes the press to cease slide motion. The following formula should be used when calculating the safety distance:

$$Ds = K \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$$

where

K = the hand speed constant = 63 inches per second

T_s = the stop time of the press measured from the final de-energized control element, usually the air valve

T_c = the response time of the press control

NOTE: $T_s + T_c$ = are usually measured by a stop time measuring device.

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

T_{bm} = the additional stopping time allowed by the stopping performance monitor before it detects stop time deterioration. See *Stopping-Performance Monitor* (4.11)

D_{pf} = the added distance due to the penetration factor as recommended in Figure 2. The minimum object sensitivity is stated by the manufacturer. If beam blankouts or floating window features are used, these figures should be added to the object sensitivity figure before using the chart.

Whenever the press-stroke stop command or stopping-performance monitor time or angle setting is changed, the safety distance should be recalculated. See *Stopping-Performance Monitor* (4.11).

NOTE: No increase in safety distance is required for fixed-channel blanking applications if the blanked area is entirely occupied by the material or fixtures.

In some instances, the use of blanking does not allow efficient production of certain piece parts. Horizontal placement of the sensing field, so that it detects the operator's waist area, may present a solution. In this application, the operator may freely manipulate the workpiece and operate the press as long as the operator stands outside of the horizontal sensing field. The sensing field should be located so that the operator cannot reach the point of operation prior to interrupting the sensing field and completion of the stopping action. Where possible, the sensing field should be of sufficient depth to prevent the operator from standing between the field and the point of operation.

However, if the position of the device will allow the operator or others to place themselves between the sensing field and the point of operation, auxiliary guards or devices such as but not limited to barrier guards, safety mats, or other devices should be used in conjunction with the device to prevent the operator or others from exposure to the point-of-operation hazard.

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

(13) Examples of ambient light are associated with windows, light fixtures, skylights, bay doors, or die lights.

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

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

(15) See *Stopping-Performance Monitor* (4.11).

Excerpt from section 6.3.5 on safety distance fo two-hand controls

6.3.5 Two-Hand Control Device

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

(3) The total stopping time of the press should include the total response time of the control system and the time it takes the press to cease slide motion. The following formula should be used when calculating the safety distance:

Ds = K (Ts + Tc + Tbm)

where

K = the hand speed constant = 63 inches per second.
Ts = the stop time of the press measured from the final de-energized control element, usually the air valve.
Tc = the response time of the control.
NOTE: Ts + Tc are usually measured by a stop time measuring device.

Tbm = the additional time allowed by the brake monitor before it detects stop time deterioration. See *Stopping-Performance Monitor* (4.11)

Appendix B
SmartPAC 4-in-1 Enclosure (opt)

This appendix provides installation information for the optional SmartPAC 4-in-1 Enclosure.

About the 4-in-1 Enclosure

The optional 4-in-1 enclosure is built to centralize the SmartPAC and WPC control components in a single location: WPC boards, two cam outputs assembly boards, and AutoSetPAC board. WPC and cam outputs assembly boards are situated in the enclosure itself, divided by a metal plate, and AutoSetPAC is installed separately on the door of the enclosure. Refer to Figure A-1 for an illustration of the unit and A-2 for specific mounting dimensions. This enclosure is designed to ensure proper separation of high and low voltage wiring.

About installing the enclosure

Here are some comments regarding the installation of the enclosure.

1. The metal plate in the main part of the enclosure separates high voltage from other wiring. *DO NOT drill through this metal plate.*
2. AutoSetPAC's power and top stop are pre-wired to WPC. However, you need to complete all the wiring for the strain links, zero cam, and communications (connection between AutoSetPAC and SmartPAC). Refer to related wiring information found in Chapter 2 of the AutoSetPAC manual (DI part no. 1101600). Run the wiring through the loom situated just over the hinge of the enclosure (see Figure A-1). The other end of the loom leads to the bottom knockouts of the enclosure. Continue to run the wiring through the knockouts at the lower left-hand side of the enclosure.
3. You also need to complete all the wiring for WPC and the cam outputs assembly, as well as to wire the communications between WPC and SmartPAC, and between the cam outputs and SmartPAC. Refer to the instructions that relate to these topics in Chapter 2 of this manual. Instructions to wire the cam outputs can be found in the SmartPAC user manual (DI part no. 1100500).

Figure A-1. Illustration of 4-in-1 Enclosure

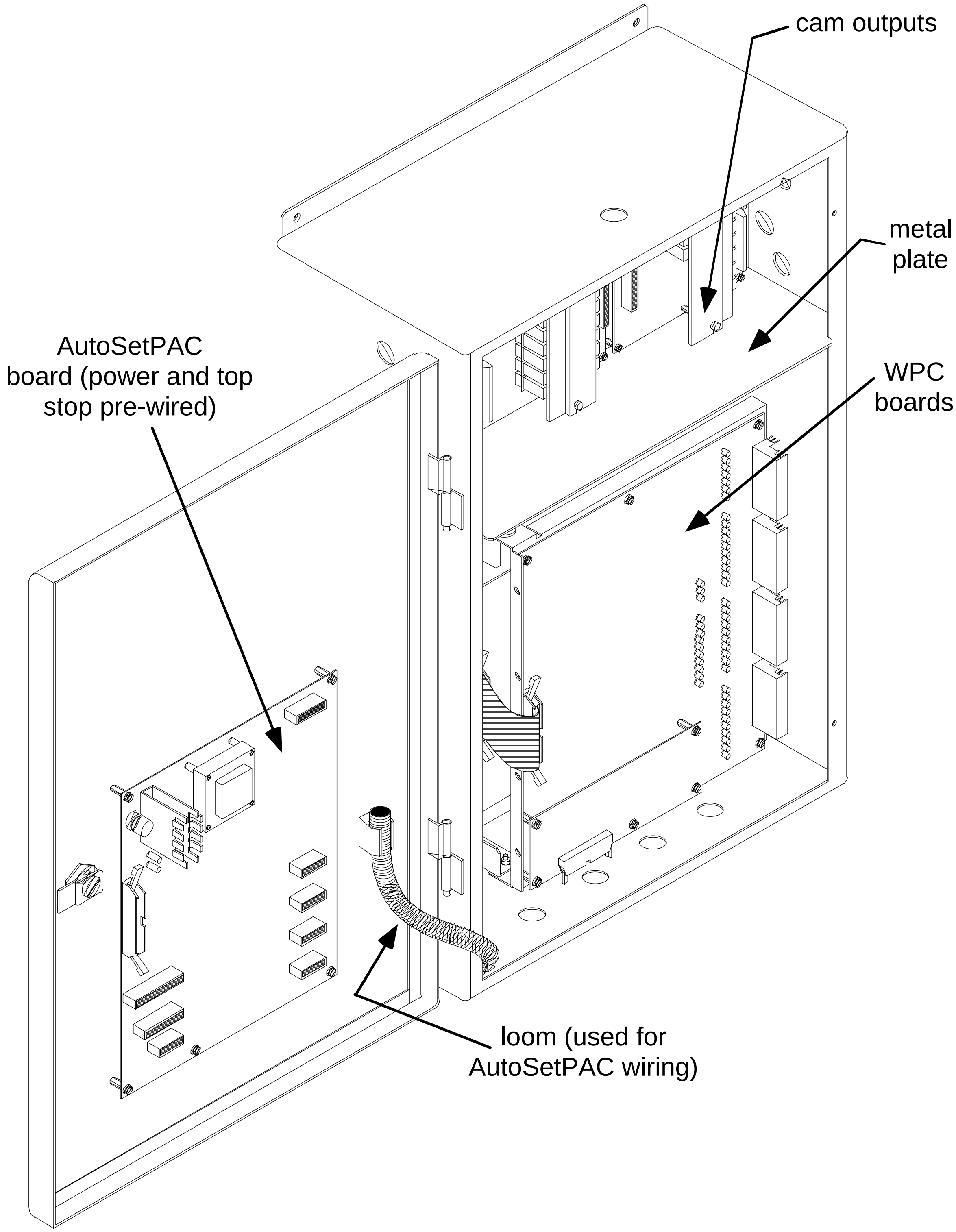
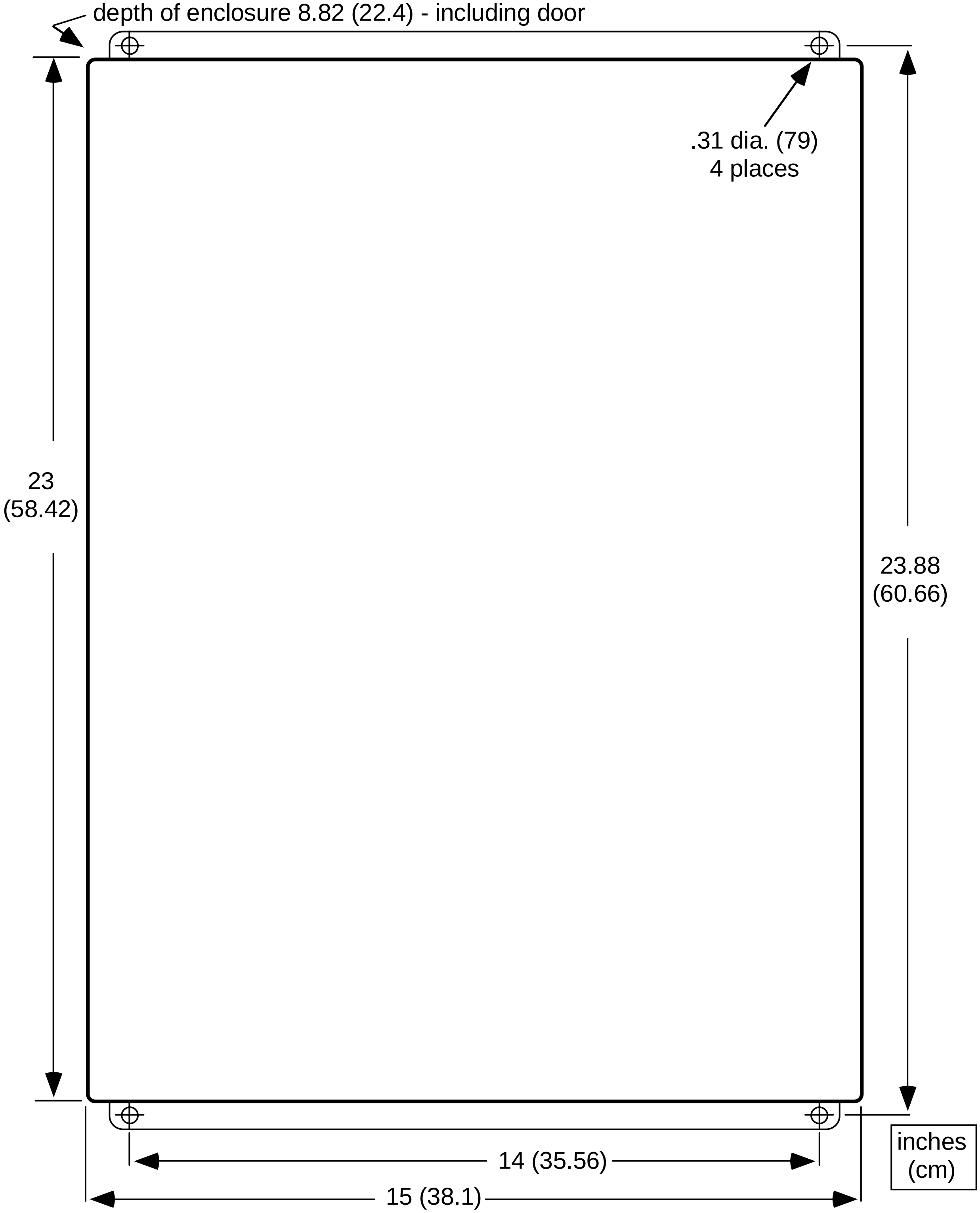


Figure A-2. Mounting dimensions for 4-in-1 Enclosure



Appendix C
SmartPAC™ PM Monitor (optional)

This appendix explains how to initialize, set up, and use the features of the SmartPAC PM Monitor. This appendix serves as an add-on to the chapters in this manual. References will be made to certain sections. Complete all the steps in each of those sections unless otherwise noted.

> **UPGRADING FIRMWARE FOR PM MONITOR**
>
> If you have a SmartPAC system with WPC and/or AutoSetPAC, you must upgrade the firmware to accept PM Monitor functionality. Check the version of your WPC firmware at "Installed Options" in the Initialization mode. If your firmware is less than vs. 2.37, contact technical support immediately to receive the correct WPC firmware. Also check your AutoSetPAC firmware here. If you have 2-channel AutoSetPAC and your firmware is less than vs. 1.26 (or 4-channel AutoSetPAC with firmware less than vs. 1.22), contact technical support immediately to receive the correct AutoSetPAC firmware.

About SmartPAC PM Monitor

The SmartPAC PM (Preventative Maintenance) Monitor is an option which allows the maintenance department to manage its time more effectively. The PM Monitor tracks up to 64 items on the press based on specific usage, rather than merely signaling when a period of time has passed. Consequently, the entire stamping process is monitored automatically, and maintenance is alerted only when equipment requires attention.

Comparison with traditional preventive maintenance

Equipment used on or around the press need to be checked at regular intervals, such as daily, weekly, or number of strokes. Traditional preventive maintenance programs are based upon elapsed time, and would be adequate if your presses were used in the same way all the time. However, with just-in-time manufacturing, shorter job runs, and more tool changes, presses and auxiliary equipment must frequently change the way that they operate. Each change results in varying degrees of wear and tear on the machinery. As a result, traditional PM programs are not the most effective way to handle these kinds of variations.

Here is an example. A traditional PM program may alert maintenance to inspect a press's braking system every three months. During that time, the press is idle or running a continuous coil-fed job, and the brake experiences minimal wear. As a result, any time spent checking the brake will be wasted. On the other hand, if the press were running a hand-fed job in the single stroke mode, the many starts and stops of the machine will have caused greater-than-normal brake wear, and three months may be too long to wait between inspections.

How the PM Monitor works

In the previous example, the SmartPAC PM monitor would keep track of machine stops and could be set to signal a PM alert for the braking system after 50,000 machine stops, for example. If the press is idle or running coil fed jobs, the time between alerts will be long. If the press is used for hand-fed jobs, the time between alerts will be shorter.

Up to 64 items can be set up in the PM Monitor's schedule. "**Tracking units**", such as machine starts or stops, strokes, motor-on hours, cam channel actuations, die changes, tonnage overloads, etc., (depending on how SmartPAC is configured) can be assigned to each item in the schedule. The PM Monitor can also track hours, days, weeks and months for items that need to be maintained according to a specific time schedule. A **tracking frequency** is assigned to each item to tell the PM Monitor when to signal an alert. At that time, an alert message appears in SmartPAC's status bar in the Run mode.

The entire PM **schedule** can be viewed in the Run mode. The schedule shows each item, its units, frequency, and current value. Any items in **alert status** are highlighted. Items with alert status will be highlighted until the alert is cleared and the item is reset. The PM monitor continues to track alerted items until they are reset. Please note that SmartPAC does not stop the press when an item is in alert status. SmartPAC's PM schedule is password-protected to keep unauthorized personnel from clearing an alert.

Examples on how to use the PM Monitor

Here are some examples to help you properly set up your PM monitor. Refer to the lists (shown below) — "PM items" and "PM tracking units". If you do not find a suitable PM item name, you can program in a "custom" name to match your application. Examples below provide such "custom" suggestions. To obtain further assistance on using the PM Monitor, don't hesitate to contact the Data Instruments technical advisors. The tracking unit "**Ch. cycles**" (for cam channels 1 through 8 or 16[2]), can be used to track the usage of various ancillary devices controlled by SmartPAC. Some PM items might include: feeder, pilot release solenoid, and ejection cylinders. The tracking unit "**Die changes**" can be used to track the usage of components that are directly related to changing tools at SmartPAC. Some PM item examples might include: hydraulic clamping mechanism and the ram adjust motor. "**F##**" WPC press control faults can be used to monitor items connected to the user-definable inputs set when SmartPAC is integrated with the Wintriss Clutch/Brake Control (WPC). Here are some examples: lube pressure, lube level, Nitrogen pressure (related to Nitrogen die spring systems).

PM items

air rotary seals	back shaft bearing (1 through 4)
brake	bull gear
clutch valve	conveyor (1 through 6)
counterbalance system	drive belts
DSV	feeder
flywheel bearing	gibs
lube filter	lube motor
lube system	main bearing (1 through 4)
main motor	oil level
pilot solenoid	pinion key
pitman bearing (1 through 4)	*"Custom" name*

PM tracking units

run hours[1]	days
weeks	months
die changes	ch. cycles (1 through 16)[2]
F## WPC press control faults (#: 45 - 59)[3]	press overloads[4]

1 For SmartPAC (without WPC), "run hours" refers to the length of time that SmartPAC is "on". For SmartPAC with WPC, it means how long the motor is "on".

2 Ch. cycles 1 through 16 can be used only if you have a 16-channel ProCamPAC. Only ch. cycles 1 through 8 can be used for an 8-channel configuration.

3 These are only available if you have SmartPAC with WPC and if you have wired and assigned press functions to the user-definable inputs.

4 "Press overload" is only available with AutoSetPAC option.

Installing the PM Monitor

For new systems from the factory

If you purchased a SmartPAC system with the PM Monitor *pre-installed* at the factory, there is nothing more to install, as it was already done prior to shipment. Proceed to the section, "Using the PM Monitor in Initialization mode", for further instructions.

For existing systems

If you ordered the PM Monitor options separately (in other words, if you already had a SmartPAC, and you were just adding on the PM option), you must first physically upgrade your SmartPAC system for compatibility. To upgrade your SmartPAC firmware, refer to the section called "Upgrading SmartPAC firmware", found in Chapter 2 of this manual.

Once this has been completed, proceed to the section, "Using the PM Monitor in Initialization mode", and you will be instructed to access and initialize this option. *The PM Monitor must be initialized before you can use it.*

Using the PM Monitor in Initialization mode

How to get into SmartPAC Initialization and PM Monitor

SELECT = HIGHLIGHT + ENTER

When we say SELECT, it means highlight the item and press ENTER.

NOTE

Before changing modes, make sure your screen shows the first display in the mode you are in. If that display is not shown, nothing will happen when you turn the Program /Run key. In that case, keep pressing the Reset key. When the first display in the mode is reached, SmartPAC will instantly switch to the new mode.

1. To get into Initialization mode, turn the Program/Run key to "Program" and then press <u>both</u> the "**1**" and "**CLEAR**" keys <u>simultaneously</u> for one second.

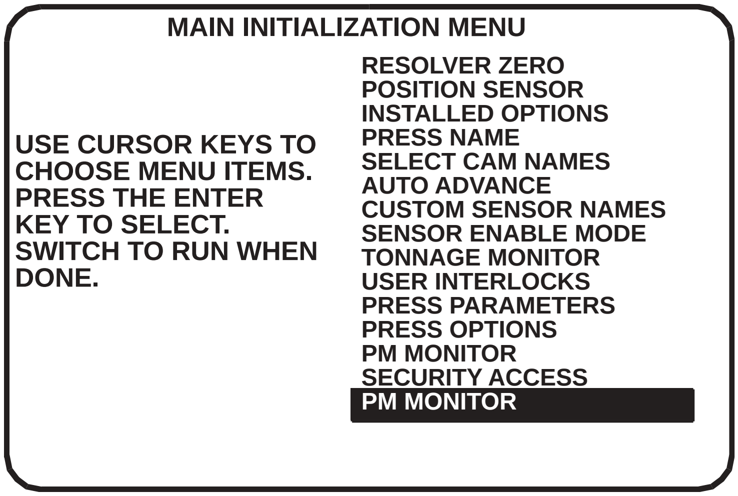


Figure C-A-1. "PM Monitor" highlighted at SmartPAC Initialization menu (the list of options may vary depending upon the features you have installed)

2. Select "PM Monitor" from the main Initialization menu (Figure C-A-1). A screen will appear asking for your password.

Note: The password prompt will appear EVERY time that you select "PM Monitor" from the Initialization mode.

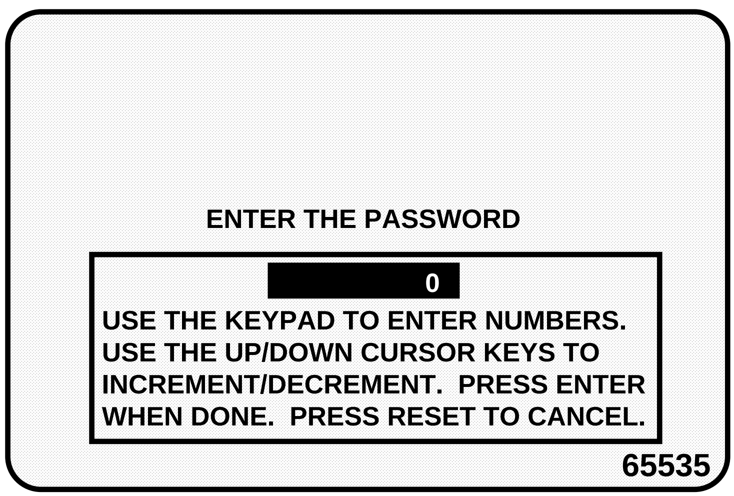


Figure C-A-2. PM password screen

3. At this point, consider the applicable alternatives below, depending on whether you have a *new system* (which includes the PM option already installed at the factory), or an *existing* SmartPAC (where you have to install and initialize this option yourself). Proceed with the one that corresponds with your system.

For new systems from the factory

If you purchased a SmartPAC system with the PM Monitor pre-installed at the factory, it is not necessary for you to clear/initialize the PM Monitor. However, you do need to complete the steps below as directed.

1. Enter the password "1234" at the "PM password" screen. This will take you immediately to the "PM Entry" screen.
2. As we mentioned above, you do not need to initialize your PM Monitor option, as it has already been done at the factory. However, it is advisable for you to change your password from the default "1234" to a different number, for security reasons.
3. To do this, press **F6** which is labeled "Init". It is at this screen ("Initialize PM" - see Figure C-A-5) where you can also change your password. Proceed to the section "Assigning a new PM password number" to change your password (skip "Initializing the PM Monitor" altogether). Once you have done that, you can use the PM Monitor.

For existing systems

If you ordered the PM Monitor options separately, you *must* initialize this option before you can actually use it. Complete all the steps in this section to initialize the PM Monitor.

Note: You should already have installed the upgrade. If not, go back to the section, "Installing the PM Monitor" before proceeding further.

Initializing the PM Monitor

1. Select "PM Monitor" from the main Initialization menu (Figure C-1). A screen will appear asking for your password.

Note: The password prompt will appear EVERY time that you select "PM Monitor" from the Initialization mode.

2. To determine the password for your system, note the number at the bottom-right corner of the password screen, and call the factory at (800) 586-8324 (TECH). *(Because you have an upgraded system, the password may not be "1234".)*

Note: *You can also check and change your password in Security Access in Initialization mode. See Chapter 4.*

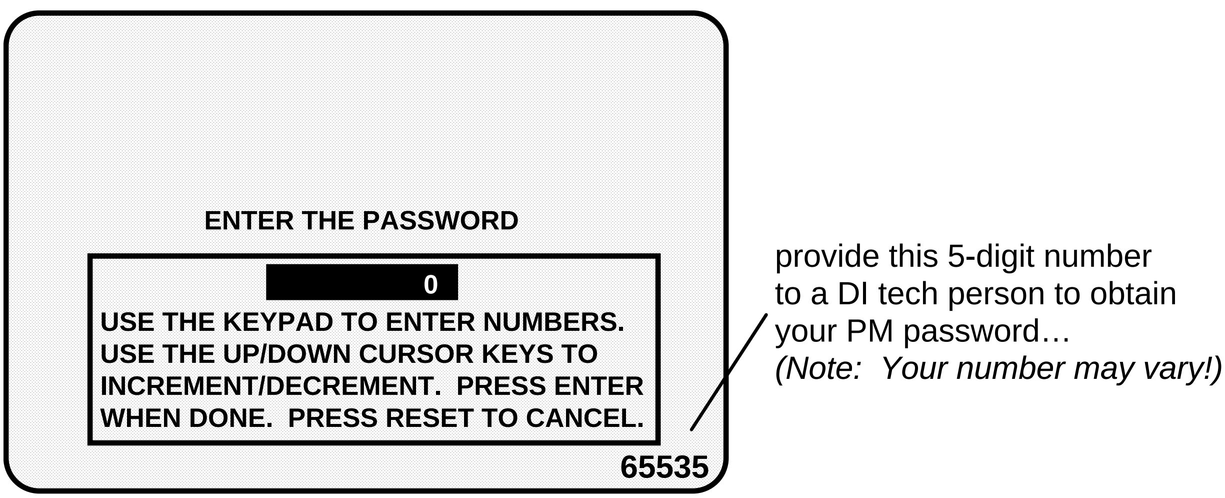


Figure C-3. PM password screen

3. Enter the password, that you obtained from Data Instruments, by using the number keypad. This will take you to the PM Screen (see below). Don't worry if erroneous information appears on the screen, as it will disappear once you have completed step 5.

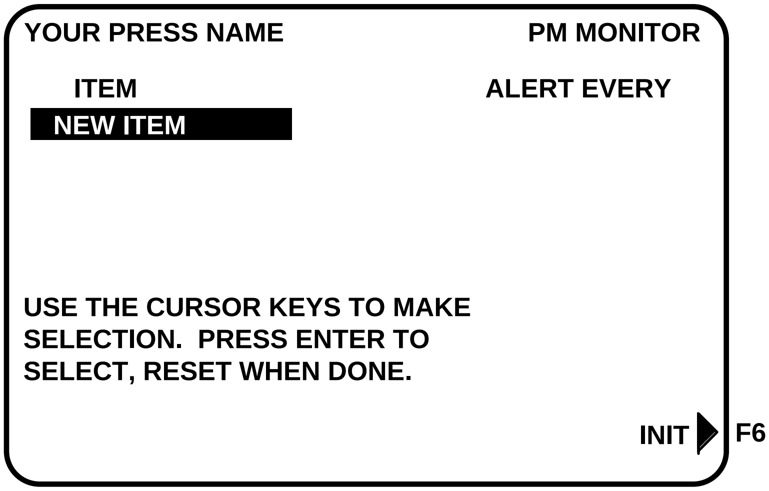


Figure C-4. PM entry screen

4. Press the function key **F6**, which is labeled "Init".
5. From this screen you can initialize the PM Monitor. To initialize, select "Clear PM Info". (Notice that you can also change your password at this screen. To change your password, refer to the next section, "Assigning a new PM password number".)

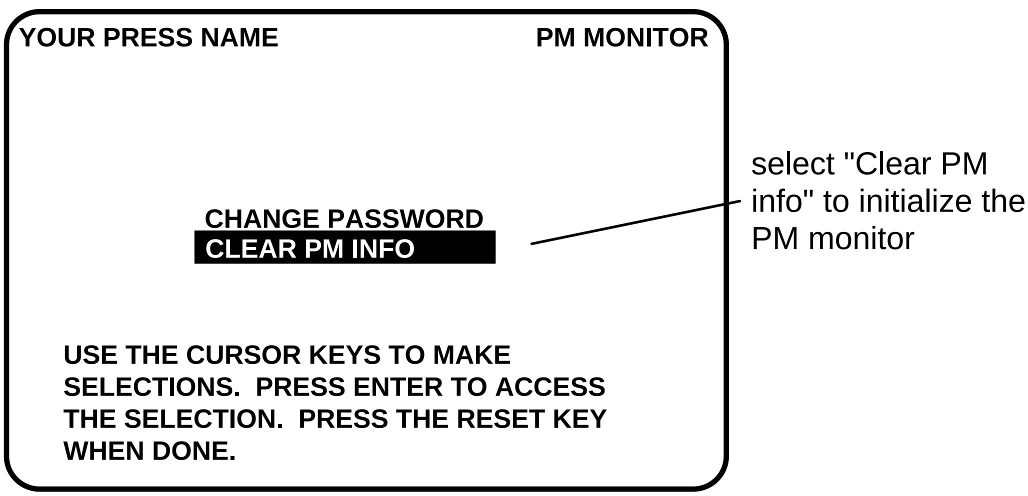


Figure C-5. Initialize PM screen

6. Notice the "Warning" message and accompanying instructions appearing on the screen (see below). Press the "Clear" key to initialize. (If you decide not to, then press Reset.)

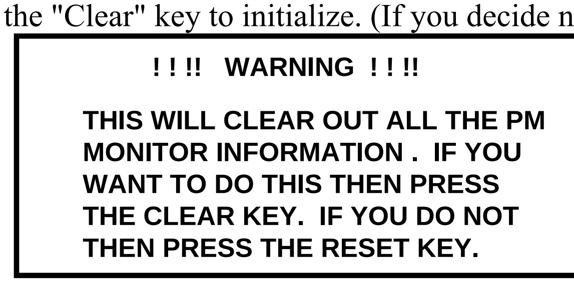


Figure C-6. Initialize warning screen

6. Once you press "Clear", you will briefly see the confirming message "INITIALIZING PM MONITOR".
7. Next, press Reset to exit from the "Initialize PM" screen. You will be returned to the PM entry screen. Proceed to the next section to assign a new password number.

Assigning a new PM password number

Before you can actually set up and use the PM Monitor, you may want to assign a new password number. (The default password is "1234".) For security reasons, it is advisable to change it. Follow these steps to do so.

1. Go to the "PM Entry" screen (Figure C-4). Press F6 "Init".
2. You will see the "Initialize PM" screen (Figure C-5). Select "Change Password".
3. As the screen indicates, enter a new password, up to 4 digits (numeric only). Use the number keypad or the up/down cursor keys. Then press Enter.
4. Make sure that you record this number somewhere else. Without it, you cannot change settings in the PM Monitor. You are now ready to use the PM Monitor. Go to the next section.

Select PM Item names

You are now ready to set up PM parameters in Initialization. You can select names for each preventative maintenance item which adequately describes its function. SmartPAC provides about 35 names. If there is a function for which you cannot find a suitable name, you can create a new name using the "Custom" feature (This procedure is explained in step 5 below.)

1. Select "New item" from this display. (You may be asked for a password before getting to this screen. If so, enter it):

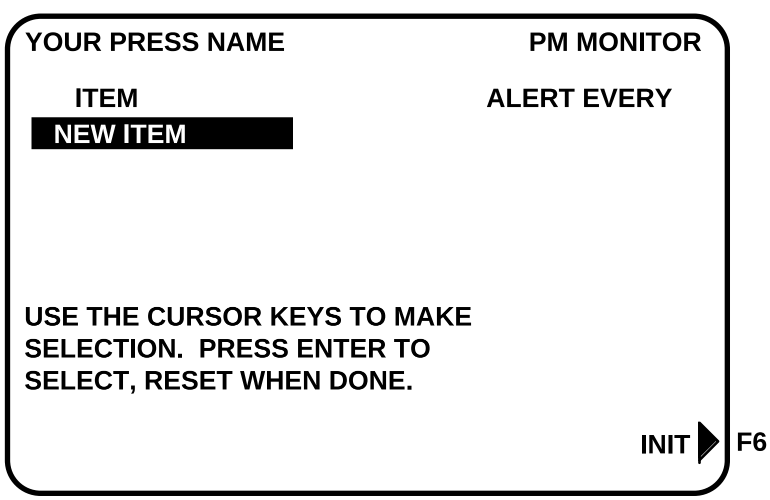


Figure C-7. PM monitor screen

2. Next, you will see the following display. You can give the item a name that best describes its function; so first check the list for a suitable name.

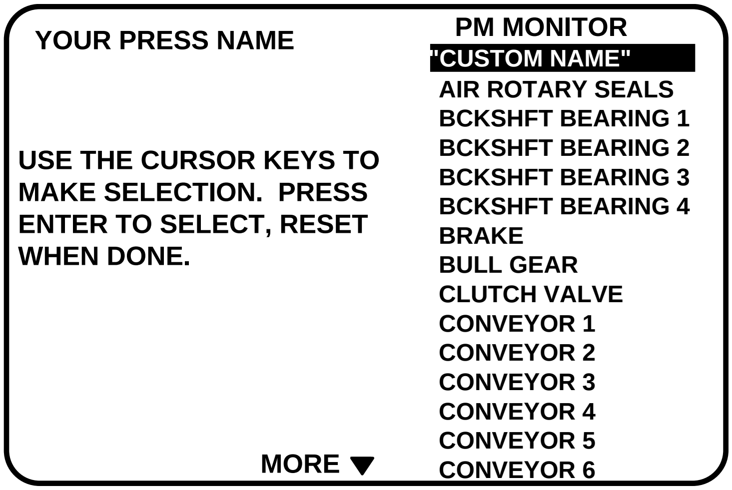


Figure C-8. Displaying available list of PM names

3. To see the complete list of names press the "down" cursor key until the bottom name on the list is highlighted, then keep pressing it. A new name will appear each time you press the key. You can also use the "up" cursor key to reverse direction.
4. If you do not find a suitable name but you still want to name the item, you can select "Custom Name", by highlighting it and pressing Enter.
5. As the screen suggests (see the next illustration), certain keys enable you to custom name the item. The name you select can be any combination of alpha-numeric characters, symbols, etc. Pressing the CLEAR key clears the text. To create a custom name, do the following:
   a. To select letters or symbols: Use the up, down, left, and/or right cursor keys to highlight the desired letter; then press ENTER.
   b. To select numbers: Use the number keypad.
   c. When finished, press function key **F6** (to the right of the LCD display). To cancel you selection, press Reset. (For assistance in using the various keys, refer to Chapter 3 of this manual.)

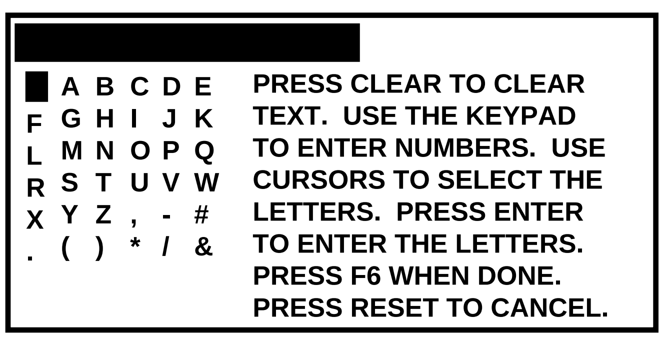


Figure C-9. Alpha-numeric display superimposed over PM names screen

6. After you have named the item, you are prompted to set the PM monitor tracking units. You can select a time-based measure, such as: run hours, days, weeks, months; or you can select measures linked to the process, such as: strokes, die changes, or programmable cam channel cycles. Select the most applicable tracking unit of measure.

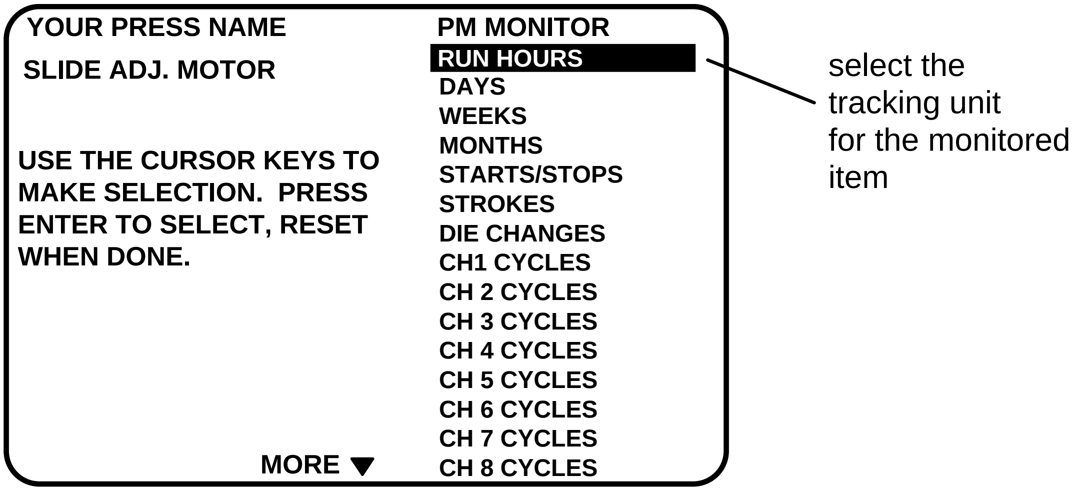


Figure C-10. Selecting tracking unit of measure

7. Next, the number display appears superimposed over the previous display (see the next illustration). Use the number keys or cursor keys to set the tracking frequency for the PM item.

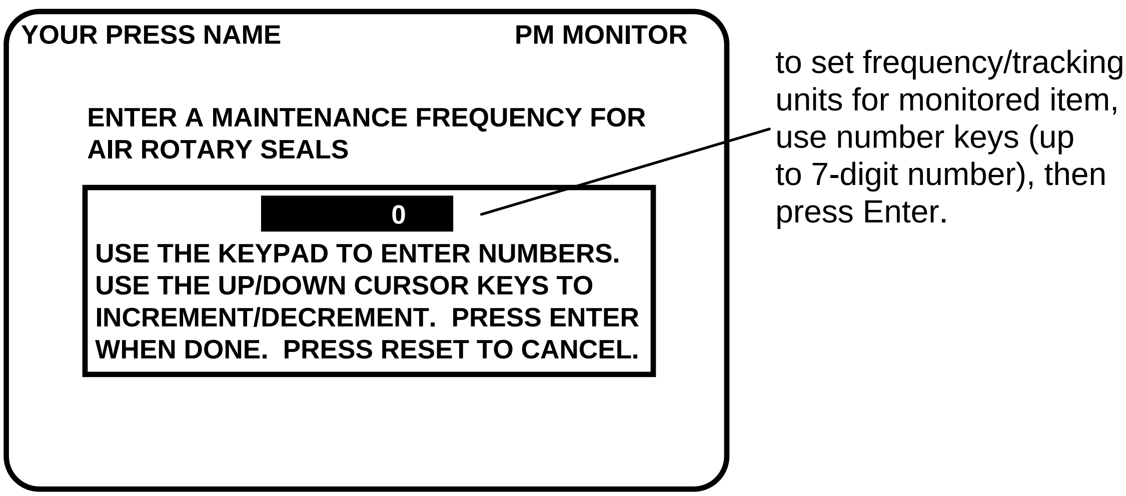


Figure C-11. Superimposed number display

8. In the following illustration, we entered the slide adjust motor as our first PM item, set the tracking unit of measure to be "die changes", and the frequency at "100". Notice that item is listed just below "new item".

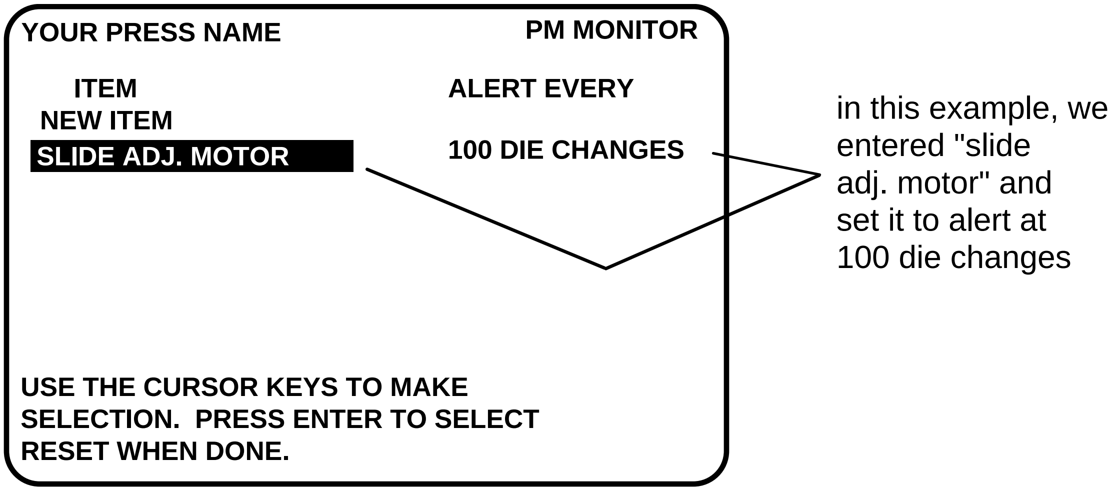


Figure C-12. Example

9. To set more PM items, repeat steps 1 through 8. When you are completely done initializing the PM items, press Reset to return to the main Initialization mode.
10. You can now go to the Run mode to view the PM Monitor status conditions. There is no PM information to set in SmartPAC's Program mode. You made all the required settings in the Initialization mode.

Using the PM Monitor in Run mode

How to get into SmartPAC Run mode

To get into Run mode, set the Program/Run key to Run.

> **NOTE**
>
> Before changing modes, make sure your screen shows the first display in the mode you are in. If that display is not shown, nothing will happen when you turn the Program /Run key. In that case, keep pressing the RESET key. When the first display in the mode is reached, you will instantly switch to the new mode.

A tool number must be loaded before switching to Run mode

If no tool number has been loaded, you cannot switch from Initialization mode or Program mode to Run mode. A tool number must be loaded before SmartPAC will allow the press to run.

If you try to switch to Run mode without a tool number loaded, you will get this error message on your screen:

NO TOOL NUMBER HAS BEEN LOADED

If so, turn the Program/Run key to "Program". Press Reset to clear the error message. Then load a tool number. Now set the Program/Run key to "Run". The Run menu, shown below, is the first display you see in Run mode. From this display you can access the PM Monitor selection.

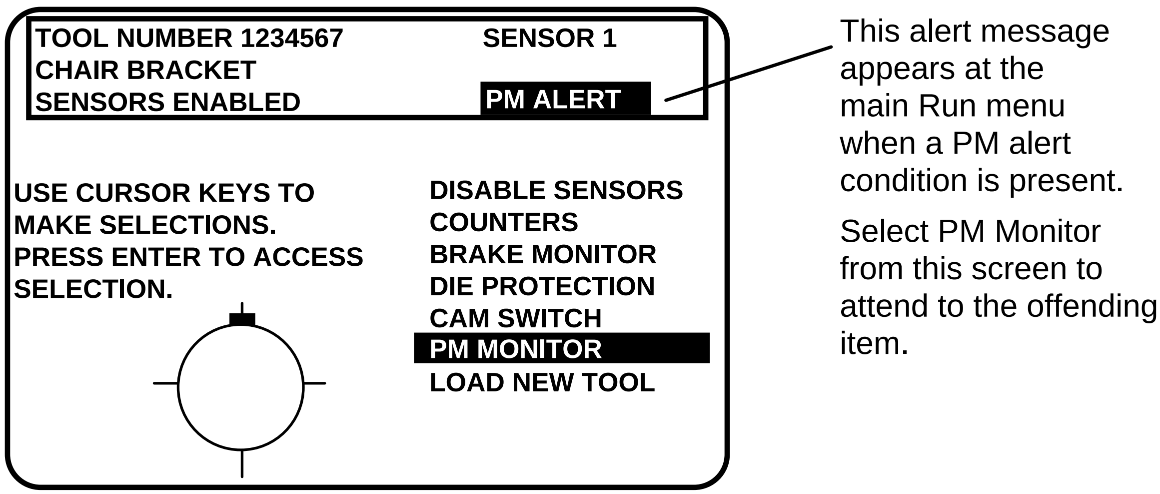


Figure C-13. "PM Monitor" highlighted at SmartPAC Run menu

(the list of options may be different, depending upon the features you have installed)

Viewing and modifying PM Alerts

1. Select "PM Monitor" from the first display in Run mode.
2. You will see the list of PM items that you previously assigned in the Initialization status. The first item is highlighted in the next example. Use the cursor keys to view the other items on the schedule. Currently the PM status for all items is "normal" (see display). This means that none of the items have reached the limits set in Initialization.

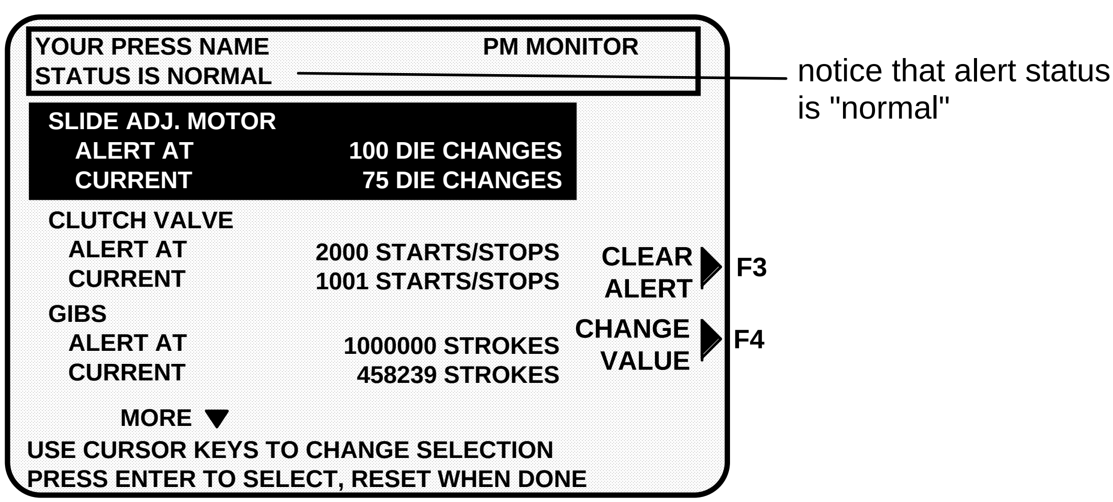


Figure C-14. Display showing PM monitor in "normal" status mode

Note

You may notice that some of the current values do not update on every stroke while the press is running. SmartPAC is keeping track of these items, but does not refresh the display until the press actually stops.

3. The next display shows that one of the items, "Slide Adjust Motor" is now in "alert" status mode. It flashes on the screen. Also, the number of items in alert status mode appears at the top of the screen.

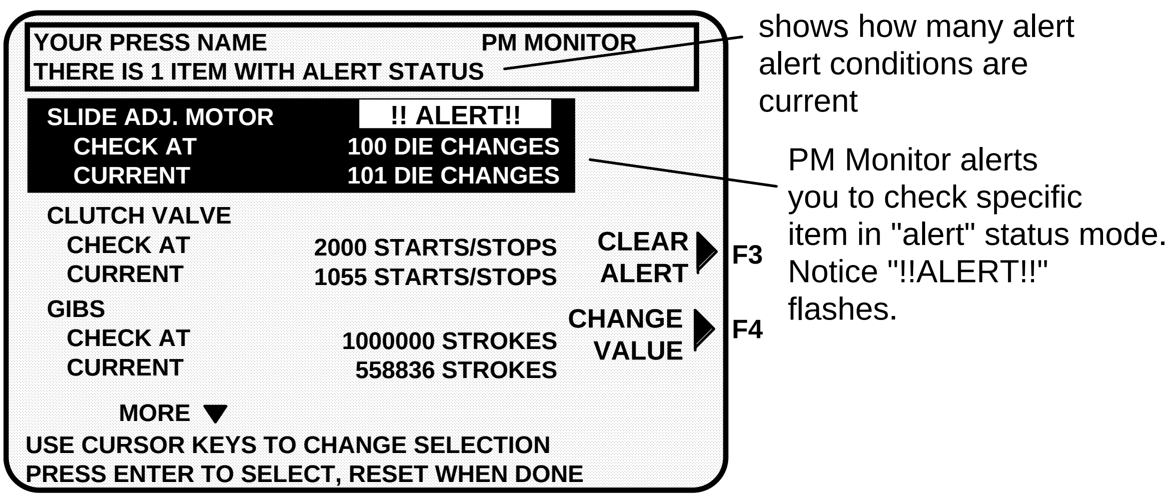


Figure C-15. Shows "Slide Adjust Motor" in "alert" mode

4. To view other items in the schedule that may or may not be in "alert" status, use the cursor keys. If more than three PM items were set in Initialization, they will not all appear on the screen. To view them, simply use the cursor keys to scroll down the list.
5. To clear the alert, first highlight that item, press the appropriate function key (designated on your screen), and enter the PM password.

CAUTION

When you clear the alert condition for a certain item, you automatically reset its current value to zero. You cannot recall the previous value.

6. If you want to change the frequency value on a given PM item, first highlight that item, press the designated function key, and enter the PM password. The number display will be superimposed over the screen (similar to Figure C-11). Use the number keys or cursor keys to modify the tracking frequency for that PM item.
7. Once you are done viewing or modifying this screen, press Reset to return to the main Run menu.

Glossary of Terms

ACTS feature	also known as "Auto Compensated Top Stop"; specifically designed for variable speed presses; WPC assumes that the Top Stop Angle (programmed previously) is set at the slowest speed resulting in the shortest stopping angle (see Chapter 4)
actuation block	dark square above a sensor on the "Show sensors" display in Run mode which indicates that a sensor is actuated
actuation	change in state or condition
actuation angle	sensor's on and off angle; dwell
ANSI	stands for American National Standards Institute; U.S. clearinghouse and coordinating body for voluntary standards activity on the national level
auto advance	equal to the number of degrees of advance per 100 RPM increase in press speed
Auto Carry-up	another name for operator station mute; bypasses the operator station during the non-hazardous portion of the stroke; when the operator releases his hands from the palm buttons, the press automatically completes the stroke and stops at TDC (see Chapter 4)
auto enable by sensor	die protection mode where the die protection module automatically enables an *individual* sensor after a designated number of strokes
auto enable by tool	die protection mode where the die protection module automatically enables *all* sensors in a tool after a designated number of strokes
Automatic Single Stroke	allows the operator to automate a manual press using a feeding device or robot
batch counter	can be set to either top-stop the press or signal programmable limit switch (PLS) outputs when its preset is reached
brake monitor	built-in mechanism that checks for brake wear
calculated safety distance	calculated formula using the results from the 90° stop-time test to determine the distance outside which the light curtains, two-hand controls, and type-B movable barriers must be mounted (see also "safety distance" later in this Glossary)

cam channels	relays that open and close on signals from the programmable cam switch to turn equipment on and off
checksum	numeric value created for a tool number to check that the data stored in memory for the tool is the same as the data that comes out of memory when the tool number is loaded; this value is calculated when data went into memory and must be the same as the value calculated when the data is loaded
circle diagram	arc that dynamically illustrates the on and off angle settings that have been programmed for a sensor and/or cam channel
communications	ability to send and receive data from a computer running PacNET™ and/or RSR™, Remote Storage Retrieval
Control Component Failure	another name for "Control Reliability"
control reliability	as per ANSI B11.1-1988 and OSHA 1910.217 regulations, demands that a single component failure in a clutch/brake control circuit shall not prevent the normal stopping action of the press, shall not create an unintended stroke, and shall prevent the initiation of a successive stroke until the failure has been corrected
counters	incremented press cycles; see also *strokes*, *good parts*, and *batch*
CPU number	identifying numeric designation of the unit communicating with PacNET or RSR software products
critical angle	the last angle position in the crankshaft rotation to signal an emergency stop so that the ram can be stopped before the punches enter the material
cursor keys	used to move the selection bar over the item on the display to be selected; also used to make certain programming and adjusting entries, and to select alphabetic characters and special symbols when naming the press, tools, cam channels, and sensors
depth penetration factor	measurement of how far an object, like an operator's hand, can move through the light curtain before the light curtain reacts
dual diverse redundancy	the latest technology in maintaining optimum clutch/brake control and operator safety, where both of the micro-processor systems ("dual micro-processors") function independently of each other, have separate power supplies, and provide separate information to the operator

Dual Safety Valve	controls the air flow that operates the clutch and brake of the press
dwell duration time	how long the cam channel and/or sensor are expected to stay activated
enable mode	ability to activate or deactivate sensors connected to the die protection mode; see also *manual enable*; *auto enable by tool*; and *auto enable by sensor*
emergency stop	signal sent to the press as soon as a malfunction occurs; should be used when the operator wants the press to stop immediately
Enter key	used after highlighting a selection or keying in a value on the display
fault (error) message	diagnostics that indicate why the press was stopped, identify the problem, and suggest how to correct
Flywheel Timer	proper setting of this WPC feature prohibits starting the motor in the reverse direction or activating the Bar mode while the flywheel is still turning
Function keys	periodically used to perform certain tasks in SmartPAC; the message on the LCD display will identify the specific function key number to depress (from F1 to F6)
good parts counter	increments only "good" parts if the die protection and/or tonnage monitoring option does not generate a fault
green sensor	must actuate at least momentarily during the ready signal
green special sensor	designed to effectively monitor slug ejection (see Chapter 1)
green constant sensor	must turn on before the ready signal begins and turn off after the ready signal ends; in other words, it must stay actuated constantly during the ready signal
green quick check sensor	like a green sensor, *except* that it cannot stay on or turn on outside the ready signal
hand-speed constant	indicates how far one could normally move one's hand and arm in one second; OSHA recommended measurement at 63 inches-per-second
impedance	refers to the opposition to the flow of electric current; some die protection controls have inputs with different impedances for electromechanical sensors; as a rule of thumb: use a high-impedance input if the part is dirty or covered with a non-conductive lubricant; use a low-impedance input if the part is covered with a water-based or conductive lubricant

Interrupted Stroke	occurs when the press has been emergency-stopped before the completion of the stroke by either the operator or an automatic device for personnel or equipment protection
keyboard	consists of various key and a numeric keypad described below; used along with the LCD display to make settings
LCD display	**L**iquid **C**rystal **D**isplay used along with the keyboard to make and adjust settings, to load tool numbers, and to view diagnostic messages
LED Display	three-digit **L**ight **E**mitting **D**iode display showing strokes per minute when the press is running, and crankshaft angle when the press is stopped
Loc	appear on SmartPAC's LED display, which indicates that a serious error condition ("lockout") has occurred (see Chapter 7)
lockout	function built into the system which provides an added safety feature to the product; see "Loc"
manual enable	die protection mode where sensors are manually enabled or disabled by the operator
menu	display enabling one to carry out a specific task such as: set counters, adjust settings, etc.
Micro-inch	amount of time in milliseconds that the Dual Safety Valve is open when WPC's "Micro-inch" feature is enabled, where the operator determines how long the ram will travel once the RUN/INCH switches on the operator station are pressed; this feature is ideal for high-speed and/or short stroke presses
N/C (normally closed)	when the sensor circuit to the die protection control is closed to ground in its normal state
NEMA 12	rating indicating that the control is protected against dust and oil; imperative to use conduit of this same rating and make proper connections to ensure NEMA 12 protection with the enclosure
ninety (90)° stop-time test	test that is required in order to set the proper safety distance for personnel guarding devices including light curtains, two-hand controls, and type-B movable barriers. This test is done at the press's most critical stopping point; the worst case scenario occurs halfway on the down stroke at 90° while the press is running in continuous that WPC can check stopping time at that critical crankshaft angle, and provide the T_S value referenced in ANSI B11.1 1988.

N/O (normally open)	when the sensor circuit to the die protection control switches from open to closed to ground
number keys	used to input numeric values, such as counter presets or tool numbers
object sensitivity	smallest diameter object that a light curtain will detect anywhere in its field
on-off setting	stroke angle settings where the cam channel and/or sensor is to turn on (actuate) and turn off (deactivate)
OSHA	stands for Occupational Safety and Health Administration, which governs regulations pertaining to presence-sensing devices for point-of-operation guarding on mechanical power presses
overrun limit switch	works in conjunction with the resolver by constantly monitoring its crankshaft angle position. WPC receives a signal from the overrun sensor and compares it to the resolver angle. WPC expects to see the overrun limit switch at the same resolver angle every stroke. If this does not occur, this means that the resolver is no longer rotating at a 1:1 ratio with the press. It could be because the resolver drive has slipped or has broken, or the resolver itself is broken. SmartPAC with WPC will signal an emergency stop and display an error message. The overrun limit switch consists of a magnet, which you mount on the crankshaft (or other shaft), and a stationary magnetic switch, which is mounted just above the magnet so that it detects the magnetic field on every stroke. The magnetic switch is also called an "overrun sensor".
overrun sensor	see "overrun limit switch"
overrun timing	dependent upon the proper installation of the overrun limit switch, and is a function of the stopping time of the press; provides a backup for top stop timing and is influenced by the condition of the brake linings and the press speed; should the top stop output relay fail, overrun will provide the signal to stop the press; if the overrun limit switch has not been properly installed, overrun timing in WPC will not work
pinch point	hazardous area in and around the die; light curtains, two-hand controls, and/or other barriers must be mounted to protect the operator from it
PMA	acronym that stands Precision Metalforming Association

Program/Run key	allows one to access the Program and Run modes by positioning the key to "Program" or "Run"; can also be used to lock out access to these modes so settings cannot be changed by removing the key
ready signal	portion of the stroke where activity in the die area is monitored
red sensors	normally closed to ground; a stop command is sent to the press as soon as the sensor actuates — opens to ground
reset	ability to resume operation after the control stops the press when a malfunction is detected; a specific fault message for a malfunction is communicated along with suggestions on how to troubleshoot
Reset key	used to reset the control after fault messages appear on the display; also used to communicate "all done" completing a function
resolver	mounted on the press which turns one to one ratio (1:1) with the crankshaft; has windings inside and works on the principle of inductance
response time	how long it takes for the control to activate the machine's brake
safety distance	represents the distance an operator can move his hand during the time it takes a press to stop (the internationally recognized hand reach speed is 63 inches/second); determined by using a precise formula set by OSHA regulations and/or ANSI standards; critical for proper machine guarding
screen contrast keys	adjust the brightness of the LCD display
Security access	ability to prevent or allow personnel access to programming and operating functions in the control
selection bar	black box with white alpha-numeric characters that appears on menu displays; to select, use cursor keys to move the bar up or down and press Enter
sensor on-off box	contains numbers showing the degrees the sensor actuated when you ran the press
settings	modifications made using the keypad on the control
slow RPM	slowest speed at which the press will be operated
smart stop	signal where the critical angle is set; if a die protection error is detected before the critical angle, the stop type executed becomes emergency-stop; otherwise, if the error is detected after this angle, the stop type executed is top stop

stop type	ability to set the way the control stops the press for a malfunction
stopping angle	crankshaft rotation angle that it takes for the press to stop; stopping position in degrees minus the crankshaft position when the dual safety valve (DSV) is closed; useful when setting up die protection system
stopping time	how long it takes the crankshaft to stop once the Dual Safety Valve (DSV) deactivates
strokes counter	increments each press cycle
suppressor	reduces or eliminates electrical noise
timing	"on" and "off" settings for sensors and/or cam channels
tool name	alpha-numeric designation linked to the tool number which aids in easier identification
tool number	a numeric value assigned to keep track of all settings made
top stop	signal which allows the press to stop at top of stroke (0°); used when an emergency-stop setting might cause the press to stick on bottom, and when one hit after a malfunction will not damage the die or press
top stop constant	used to accommodate a press automation function at WPC; feature that works best on presses that have speed ranges of several hundred to over a thousand strokes per minute (see Chapter 4)
total hits counter	increments all hits on a tool; if the tool number is loaded again after other tools are used, the counter starts counting from the last recorded number for the previous job; useful for deciding when a tool needs regrinding
voltage selector switch	enables the setting of the power supply from 115V to 230V; located on the power supply board
yellow sensors	normally open to ground; a stop command is sent to the press as soon as the sensor actuates — closes to ground

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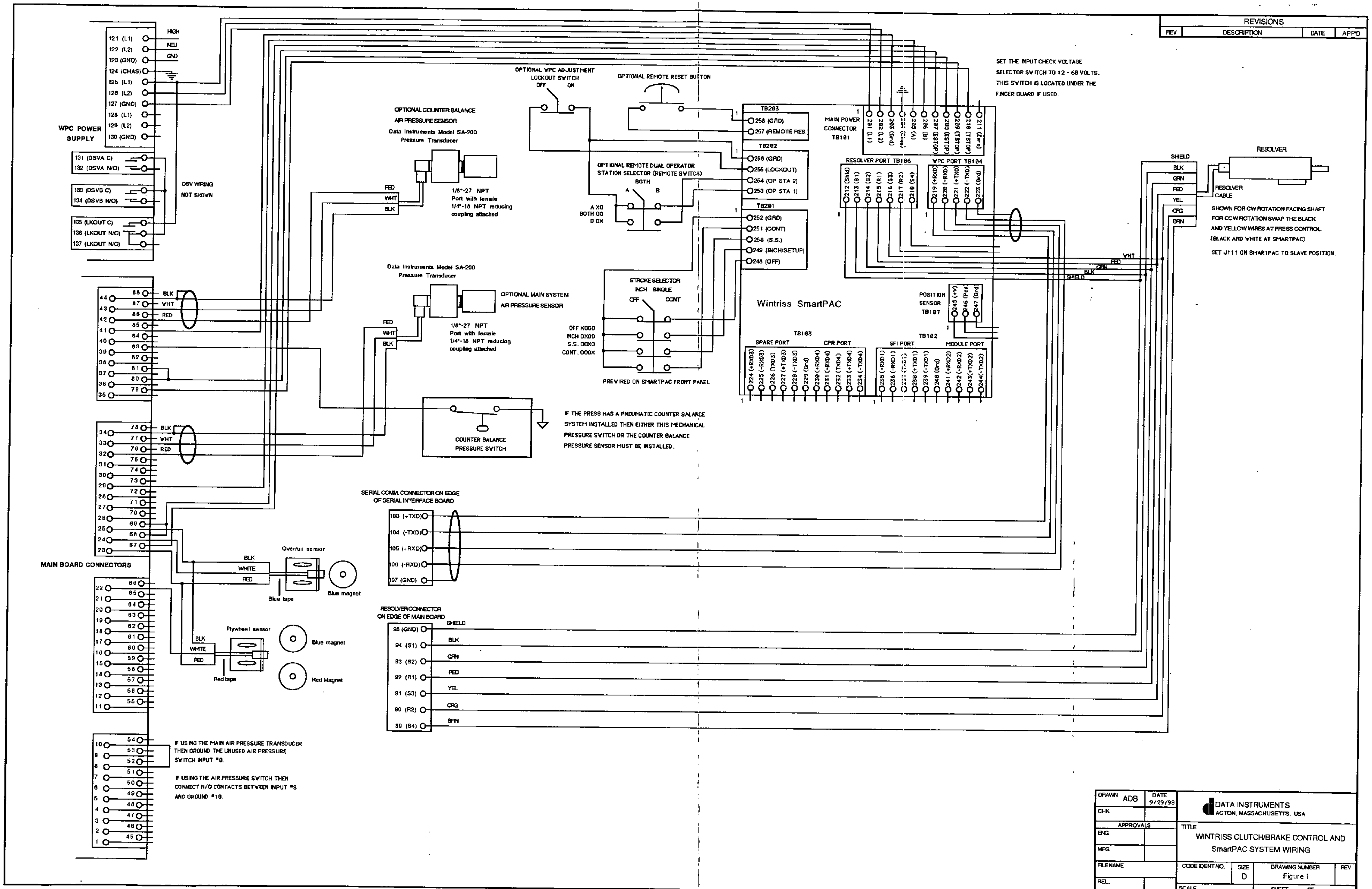
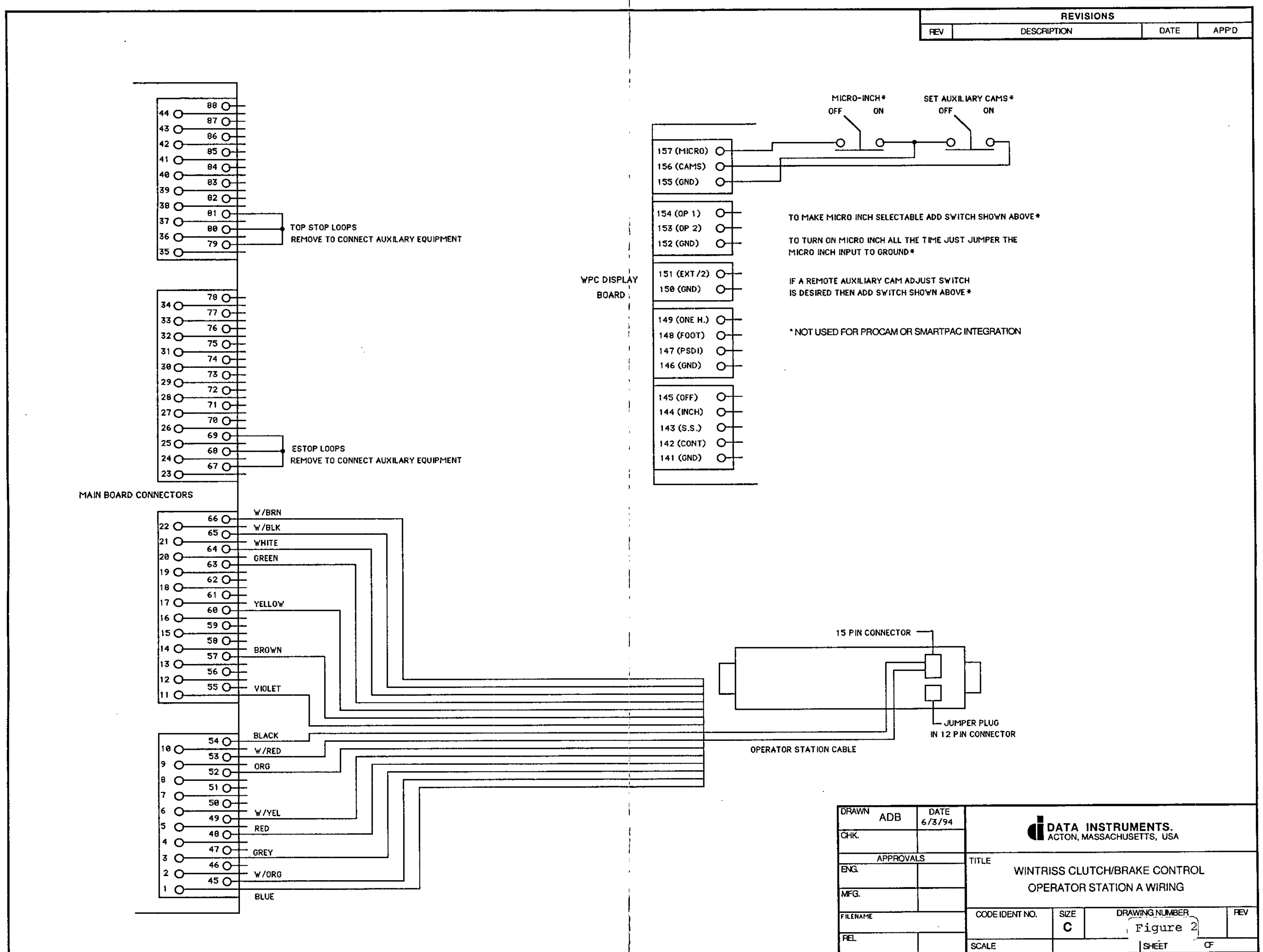
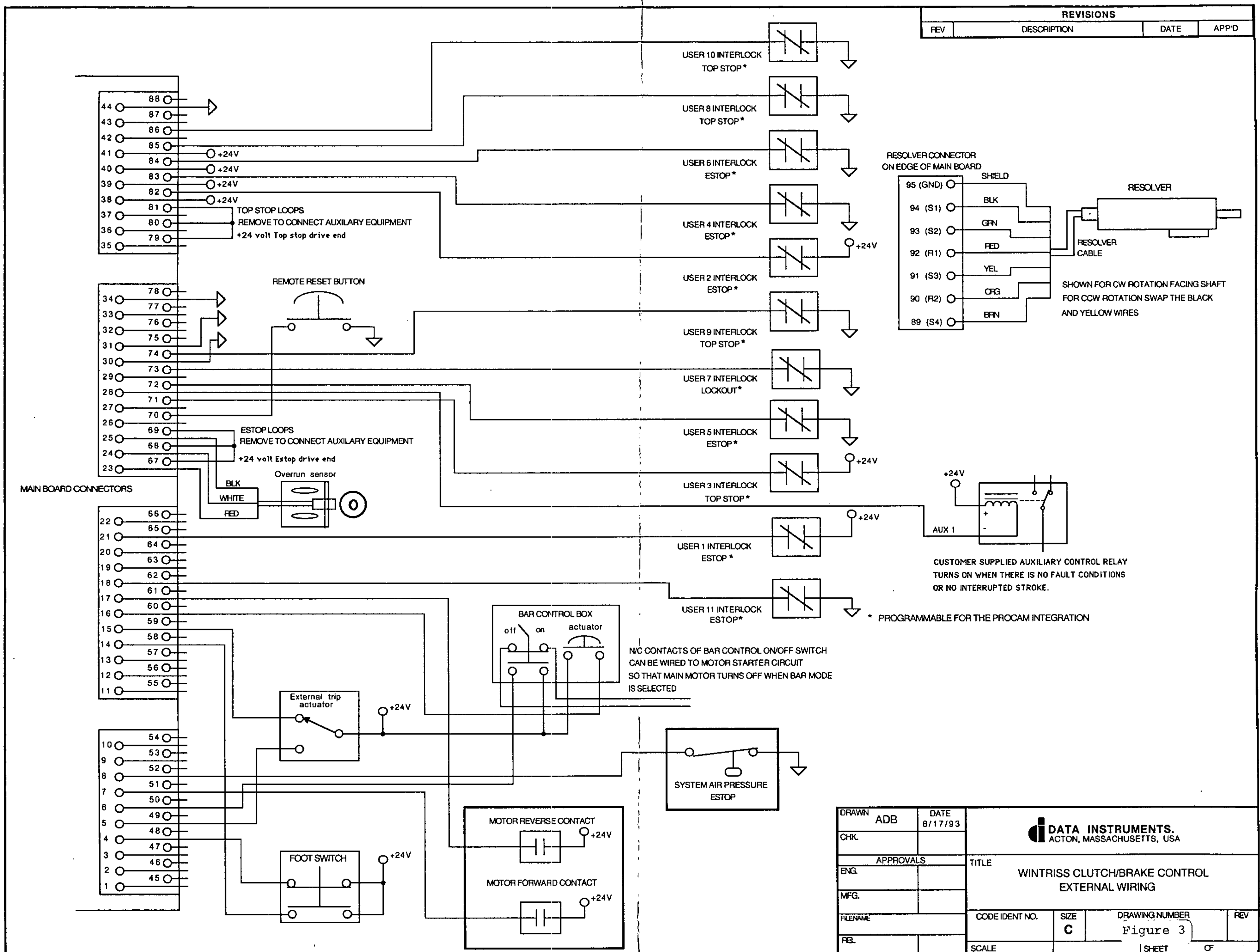
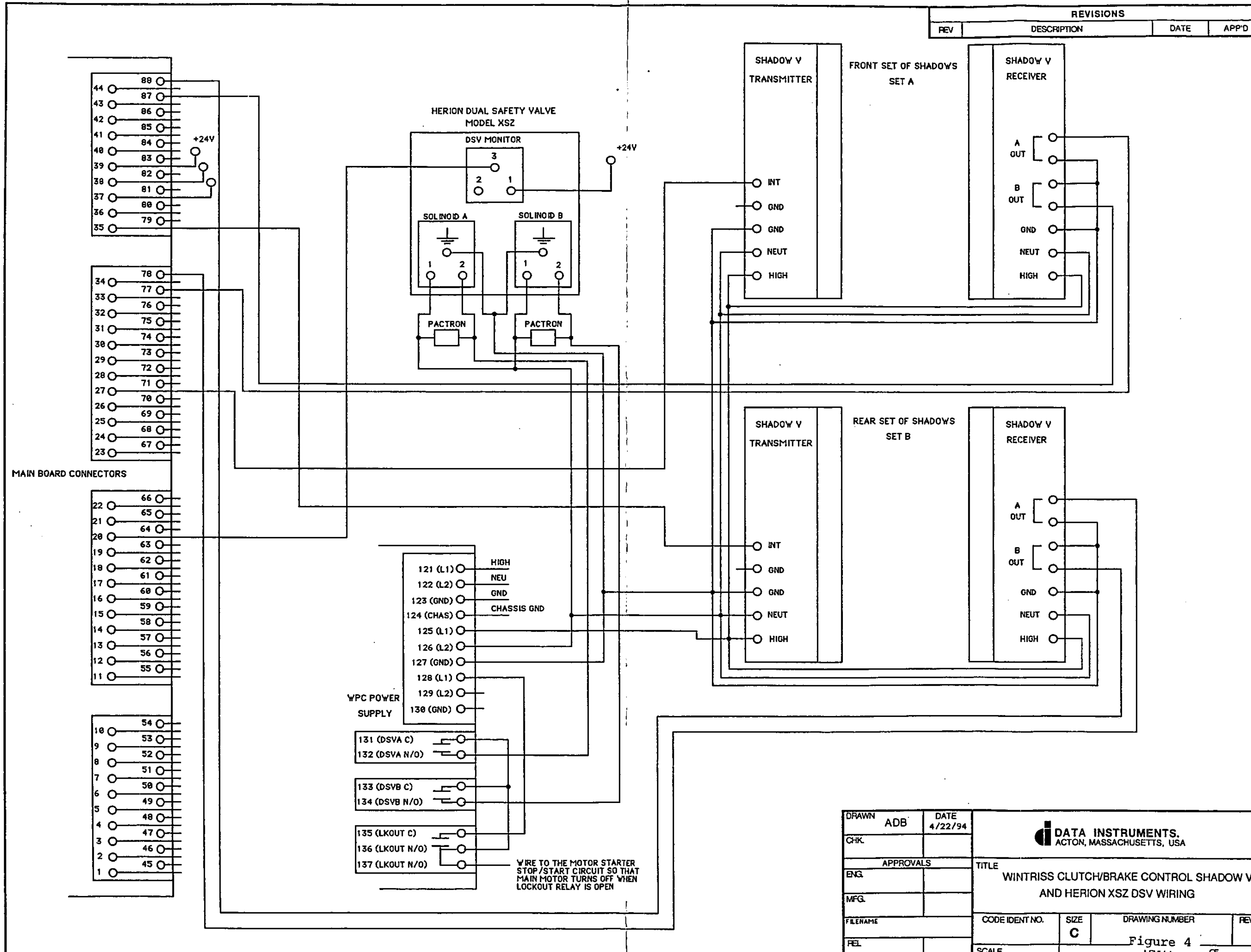
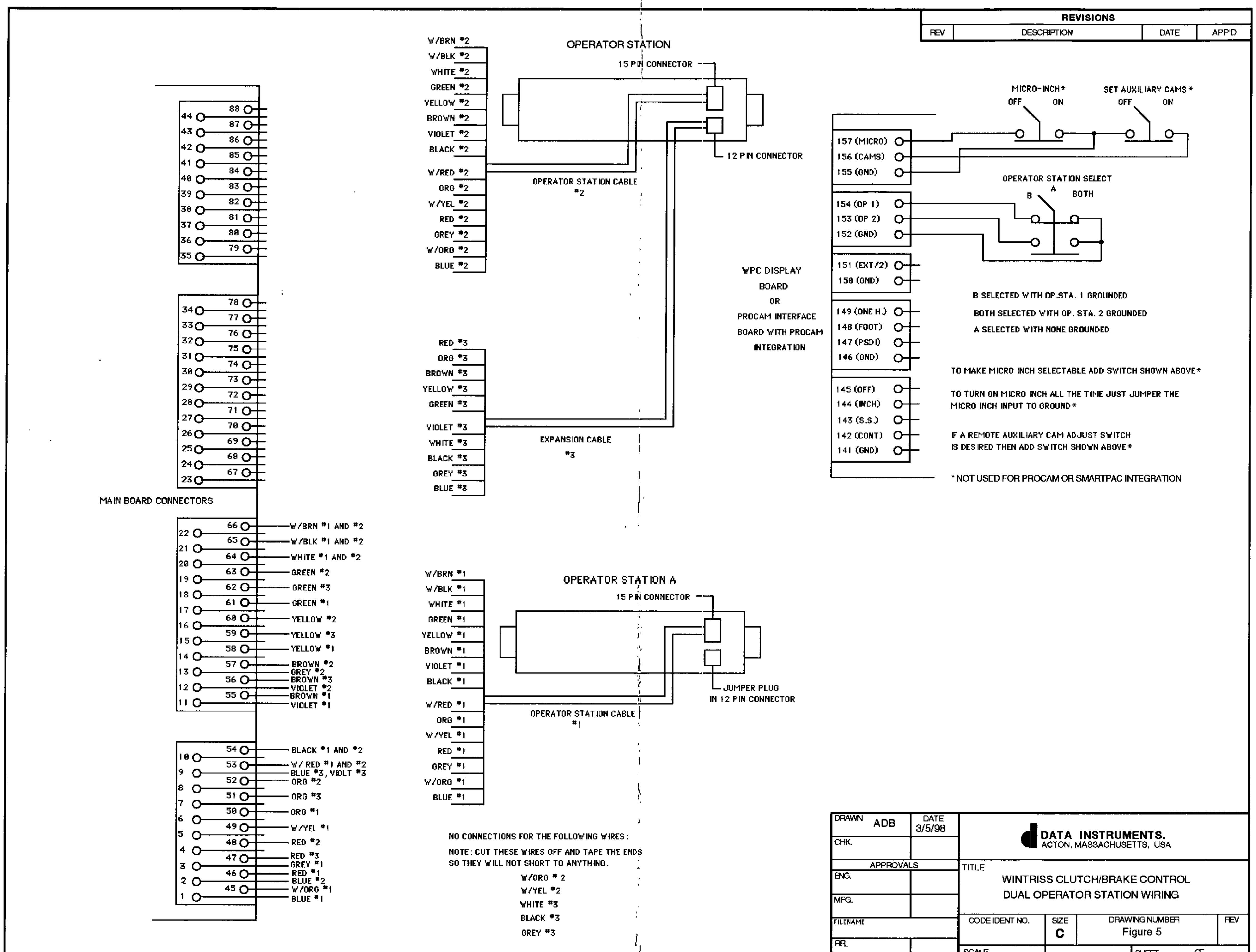
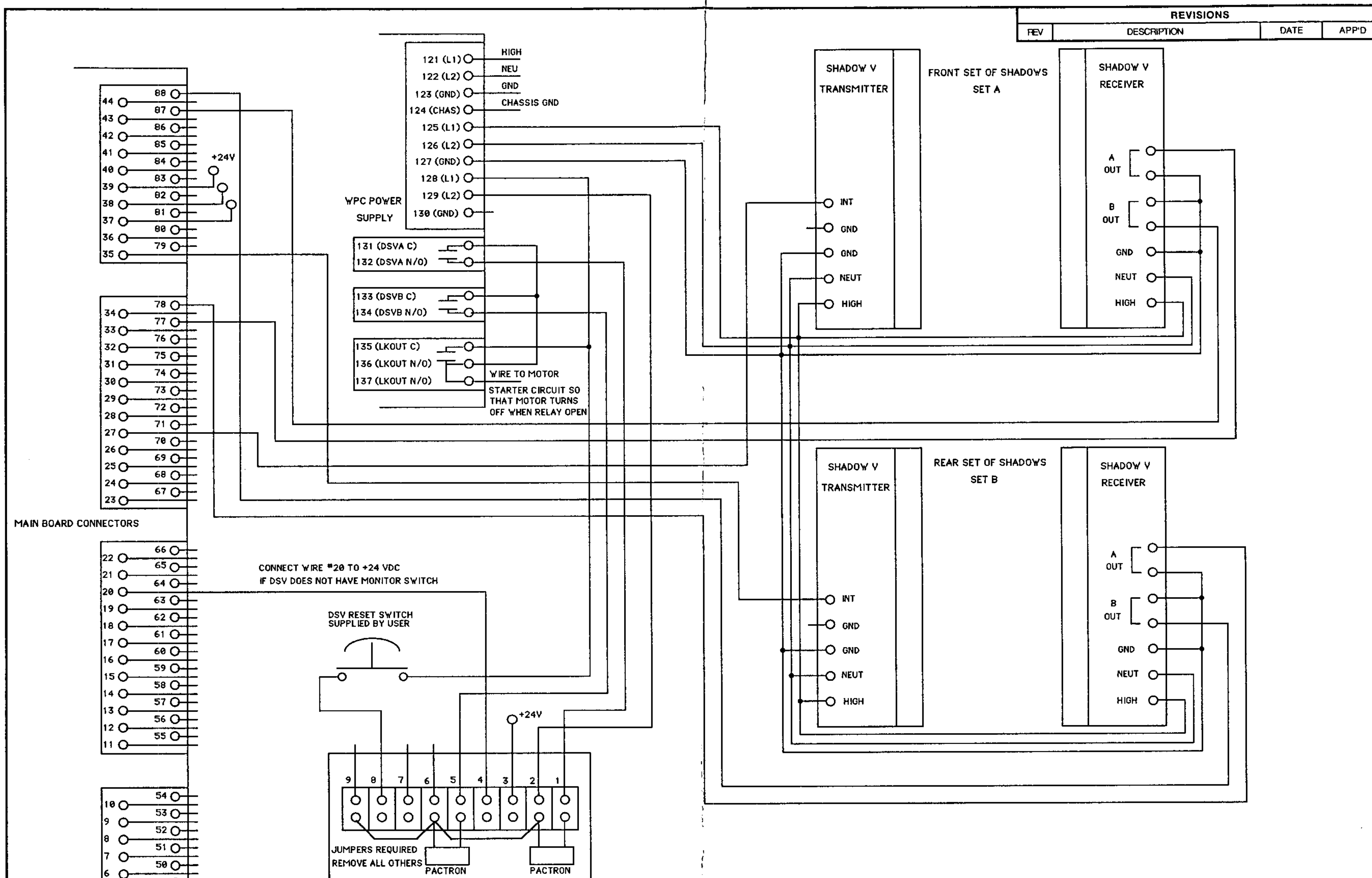

REVISIONS
REV DESCRIPTION DATE APP'D
WPC POWER SUPPLY
121 (L1) 122 (L2) 123 (GND) 124 (CHAS) 125 (L1) 126 (L2) 127 (GND) 128 (L1) 129 (L2) 130 (GND)
HIGH NEU GND
131 (DSVA C) 132 (DSVA N/O) 133 (DSVB C) 134 (DSVB N/O) 135 (LKOUT C) 136 (LKOUT N/O) 137 (LKOUT N/O)
DSV WIRING NOT SHOWN
MAIN BOARD CONNECTORS
OPTIONAL COUNTER BALANCE AIR PRESSURE SENSOR
Data Instruments Model SA-200 Pressure Transducer
1/8"-27 NPT Port with female 1/4"-18 NPT reducing coupling attached
OPTIONAL MAIN SYSTEM AIR PRESSURE SENSOR
OPTIONAL WPC ADJUSTMENT LOCKOUT SWITCH
OFF ON
OPTIONAL REMOTE RESET BUTTON
OPTIONAL REMOTE DUAL OPERATOR STATION SELECTOR (REMOTE SWITCH)
BOTH A B
A XO BOTH OO B OX
STROKE SELECTOR
INCH SINGLE OFF CONT
OFF XOOO INCH OXOO S.S. OOXO CONT. OOOX
PREWIRED ON SMARTPAC FRONT PANEL
COUNTER BALANCE PRESSURE SWITCH
IF THE PRESS HAS A PNEUMATIC COUNTER BALANCE SYSTEM INSTALLED THEN EITHER THIS MECHANICAL PRESSURE SWITCH OR THE COUNTER BALANCE PRESSURE SENSOR MUST BE INSTALLED.
Wintriss SmartPAC
TB203 258 (GRD) 257 (REMOTE RES.)
TB202 256 (GRD) 255 (LOCKOUT) 254 (OP STA 2) 253 (OP STA 1)
TB201 252 (GRD) 251 (CONT) 250 (S.S.) 249 (INCH/SETUP) 248 (OFF)
MAIN POWER CONNECTOR TB101
201 (L1) 202 (L2) 203 (Grd) 204 (Chas) 205 (A) 206 (B) 207 (ESTOP) 208 (ESTOP) 209 (TSTOP) 210 (TSTOP) 211 (Zero)
RESOLVER PORT TB106 212 (Shld) 213 (S1) 214 (S2) 215 (R1) 216 (S3) 217 (R2) 218 (S4)
WPC PORT TB104 219 (+RXD) 220 (-RXD) 221 (+TXD) 222 (-TXD) 223 (Grd)
POSITION SENSOR TB107 245 (+V) 246 (Pos) 247 (Grd)
TB103 SPARE PORT 224 (+RXD3) 225 (-RXD3) 226 (TXD3) 227 (+TXD3) 228 (-TXD3) 229 (Grd)
CPR PORT 230 (+RXD4) 231 (-RXD4) 232 (TXD4) 233 (+TXD4) 234 (-TXD4)
TB102 SFI PORT 235 (+RXD1) 236 (-RXD1) 237 (TXD1) 238 (+TXD1) 239 (-TXD1) 240 (Grd)
MODULE PORT 241 (+RXD2) 242 (-RXD2) 243 (+TXD2) 244 (-TXD2)
SET THE INPUT CHECK VOLTAGE SELECTOR SWITCH TO 12 - 68 VOLTS. THIS SWITCH IS LOCATED UNDER THE FINGER GUARD IF USED.
RESOLVER
RESOLVER CABLE
SHIELD BLK GRN RED YEL ORG BRN
SHOWN FOR CW ROTATION FACING SHAFT FOR CCW ROTATION SWAP THE BLACK AND YELLOW WIRES AT PRESS CONTROL (BLACK AND WHITE AT SMARTPAC)
SET J111 ON SMARTPAC TO SLAVE POSITION.
SERIAL COMM. CONNECTOR ON EDGE OF SERIAL INTERFACE BOARD
103 (+TXD) 104 (-TXD) 105 (+RXD) 106 (-RXD) 107 (GND)
RESOLVER CONNECTOR ON EDGE OF MAIN BOARD
95 (GND) 94 (S1) 93 (S2) 92 (R1) 91 (S3) 90 (R2) 89 (S4)
Overrun sensor
Blue tape
Blue magnet
Flywheel sensor
Red tape
Red Magnet
BLK WHITE RED WHT
IF USING THE MAIN AIR PRESSURE TRANSDUCER THEN GROUND THE UNUSED AIR PRESSURE SWITCH INPUT #8.
IF USING THE AIR PRESSURE SWITCH THEN CONNECT N/O CONTACTS BETWEEN INPUT #8 AND GROUND #18.
DRAWN ADB DATE 9/29/98
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL.
DATA INSTRUMENTS ACTON, MASSACHUSETTS, USA
TITLE WINTRISS CLUTCH/BRAKE CONTROL AND SmartPAC SYSTEM WIRING
CODE IDENT NO. SIZE D DRAWING NUMBER Figure 1 REV
SCALE SHEET OF


REVISIONS
REV
DESCRIPTION
DATE
APP'D
MICRO-INCH*
OFF
ON
SET AUXILIARY CAMS*
OFF
ON
157 (MICRO)
156 (CAMS)
155 (GND)
154 (OP 1)
153 (OP 2)
152 (GND)
151 (EXT/2)
150 (GND)
149 (ONE H.)
148 (FOOT)
147 (PSDI)
146 (GND)
145 (OFF)
144 (INCH)
143 (S.S.)
142 (CONT)
141 (GND)
WPC DISPLAY
BOARD
TO MAKE MICRO INCH SELECTABLE ADD SWITCH SHOWN ABOVE*
TO TURN ON MICRO INCH ALL THE TIME JUST JUMPER THE
MICRO INCH INPUT TO GROUND*
IF A REMOTE AUXILIARY CAM ADJUST SWITCH
IS DESIRED THEN ADD SWITCH SHOWN ABOVE*
* NOT USED FOR PROCAM OR SMARTPAC INTEGRATION
TOP STOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
ESTOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
MAIN BOARD CONNECTORS
W/BRN
W/BLK
WHITE
GREEN
YELLOW
BROWN
VIOLET
BLACK
W/RED
ORG
W/YEL
RED
GREY
W/ORG
BLUE
15 PIN CONNECTOR
JUMPER PLUG
IN 12 PIN CONNECTOR
OPERATOR STATION CABLE
DRAWN ADB
DATE 6/3/94
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA
TITLE
WINTRISS CLUTCH/BRAKE CONTROL
OPERATOR STATION A WIRING
CODE IDENT NO.
SIZE C
DRAWING NUMBER
Figure 2
REV
SCALE
SHEET
OF


REVISIONS
REV
DESCRIPTION
DATE
APP'D
MAIN BOARD CONNECTORS
TOP STOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
+24 volt Top stop drive end
ESTOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
+24 volt Estop drive end
REMOTE RESET BUTTON
Overrun sensor
BLK
WHITE
RED
+24V
USER 10 INTERLOCK TOP STOP*
USER 8 INTERLOCK TOP STOP*
USER 6 INTERLOCK ESTOP*
USER 4 INTERLOCK ESTOP*
USER 2 INTERLOCK ESTOP*
USER 9 INTERLOCK TOP STOP*
USER 7 INTERLOCK LOCKOUT*
USER 5 INTERLOCK ESTOP*
USER 3 INTERLOCK TOP STOP*
USER 1 INTERLOCK ESTOP*
USER 11 INTERLOCK ESTOP*
* PROGRAMMABLE FOR THE PROCAM INTEGRATION
RESOLVER CONNECTOR ON EDGE OF MAIN BOARD
95 (GND)
94 (S1)
93 (S2)
92 (R1)
91 (S3)
90 (R2)
89 (S4)
SHIELD
BLK
GRN
RED
YEL
ORG
BRN
RESOLVER
RESOLVER CABLE
SHOWN FOR CW ROTATION FACING SHAFT
FOR CCW ROTATION SWAP THE BLACK
AND YELLOW WIRES
AUX 1
CUSTOMER SUPPLIED AUXILIARY CONTROL RELAY
TURNS ON WHEN THERE IS NO FAULT CONDITIONS
OR NO INTERRUPTED STROKE.
BAR CONTROL BOX
off
on
actuator
N/C CONTACTS OF BAR CONTROL ON/OFF SWITCH
CAN BE WIRED TO MOTOR STARTER CIRCUIT
SO THAT MAIN MOTOR TURNS OFF WHEN BAR MODE
IS SELECTED
External trip actuator
SYSTEM AIR PRESSURE ESTOP
FOOT SWITCH
MOTOR REVERSE CONTACT
MOTOR FORWARD CONTACT
DRAWN ADB
DATE 8/17/93
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA
TITLE
WINTRISS CLUTCH/BRAKE CONTROL
EXTERNAL WIRING
CODE IDENT NO.
SIZE C
DRAWING NUMBER Figure 3
REV
SCALE
SHEET
OF


REVISIONS
REV
DESCRIPTION
DATE
APP'D
MAIN BOARD CONNECTORS
+24V
HERION DUAL SAFETY VALVE
MODEL XSZ
DSV MONITOR
SOLINOID A
SOLINOID B
PACTRON
PACTRON
SHADOW V
TRANSMITTER
FRONT SET OF SHADOWS
SET A
SHADOW V
RECEIVER
REAR SET OF SHADOWS
SET B
INT
GND
GND
NEUT
HIGH
A OUT
B OUT
GND
NEUT
HIGH
121 (L1)
122 (L2)
123 (GND)
124 (CHAS)
125 (L1)
126 (L2)
127 (GND)
128 (L1)
129 (L2)
130 (GND)
HIGH
NEU
GND
CHASSIS GND
WPC POWER
SUPPLY
131 (DSVA C)
132 (DSVA N/O)
133 (DSVB C)
134 (DSVB N/O)
135 (LKOUT C)
136 (LKOUT N/O)
137 (LKOUT N/O)
WIRE TO THE MOTOR STARTER STOP/START CIRCUIT SO THAT MAIN MOTOR TURNS OFF WHEN LOCKOUT RELAY IS OPEN
DRAWN ADB
DATE 4/22/94
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA
TITLE
WINTRISS CLUTCH/BRAKE CONTROL SHADOW V
AND HERION XSZ DSV WIRING
CODE IDENT NO.
SIZE
C
DRAWING NUMBER
Figure 4
REV
SCALE
SHEET
OF


REVISIONS
REV
DESCRIPTION
DATE
APP'D
OPERATOR STATION
15 PIN CONNECTOR
12 PIN CONNECTOR
OPERATOR STATION CABLE #2
EXPANSION CABLE #3
OPERATOR STATION A
15 PIN CONNECTOR
JUMPER PLUG IN 12 PIN CONNECTOR
OPERATOR STATION CABLE #1
W/BRN #2
W/BLK #2
WHITE #2
GREEN #2
YELLOW #2
BROWN #2
VIOLET #2
BLACK #2
W/RED #2
ORG #2
W/YEL #2
RED #2
GREY #2
W/ORG #2
BLUE #2
RED #3
ORG #3
BROWN #3
YELLOW #3
GREEN #3
VIOLET #3
WHITE #3
BLACK #3
GREY #3
BLUE #3
W/BRN #1
W/BLK #1
WHITE #1
GREEN #1
YELLOW #1
BROWN #1
VIOLET #1
BLACK #1
W/RED #1
ORG #1
W/YEL #1
RED #1
GREY #1
W/ORG #1
BLUE #1
MAIN BOARD CONNECTORS
66 W/BRN #1 AND #2
65 W/BLK #1 AND #2
64 WHITE #1 AND #2
63 GREEN #2
62 GREEN #3
61 GREEN #1
60 YELLOW #2
59 YELLOW #3
58 YELLOW #1
57 BROWN #2
GREY #2
56 BROWN #3
VIOLET #2
55 BROWN #1
VIOLET #1
54 BLACK #1 AND #2
53 W/RED #1 AND #2
BLUE #3, VIOLT #3
52 ORG #2
51 ORG #3
50 ORG #1
49 W/YEL #1
48 RED #2
47 RED #3
GREY #1
46 RED #1
BLUE #2
45 W/ORG #1
BLUE #1
WPC DISPLAY BOARD OR PROCAM INTERFACE BOARD WITH PROCAM INTEGRATION
157 (MICRO)
156 (CAMS)
155 (GND)
154 (OP 1)
153 (OP 2)
152 (GND)
151 (EXT/2)
150 (GND)
149 (ONE H.)
148 (FOOT)
147 (PSDI)
146 (GND)
145 (OFF)
144 (INCH)
143 (S.S.)
142 (CONT)
141 (GND)
MICRO-INCH*
OFF ON
SET AUXILIARY CAMS*
OFF ON
OPERATOR STATION SELECT
B A BOTH
B SELECTED WITH OP.STA. 1 GROUNDED
BOTH SELECTED WITH OP. STA. 2 GROUNDED
A SELECTED WITH NONE GROUNDED
TO MAKE MICRO INCH SELECTABLE ADD SWITCH SHOWN ABOVE*
TO TURN ON MICRO INCH ALL THE TIME JUST JUMPER THE MICRO INCH INPUT TO GROUND*
IF A REMOTE AUXILIARY CAM ADJUST SWITCH IS DESIRED THEN ADD SWITCH SHOWN ABOVE*
*NOT USED FOR PROCAM OR SMARTPAC INTEGRATION
NO CONNECTIONS FOR THE FOLLOWING WIRES:
NOTE: CUT THESE WIRES OFF AND TAPE THE ENDS SO THEY WILL NOT SHORT TO ANYTHING.
W/ORG #2
W/YEL #2
WHITE #3
BLACK #3
GREY #3
DRAWN ADB
DATE 3/5/98
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA
TITLE
WINTRISS CLUTCH/BRAKE CONTROL
DUAL OPERATOR STATION WIRING
CODE IDENT NO.
SIZE C
DRAWING NUMBER Figure 5
REV
SCALE
SHEET OF



DRAWN	ADB	DATE 8/17/93
CHK.		
APPROVALS		
ENG.		
MFG.		
FILENAME		
REL		

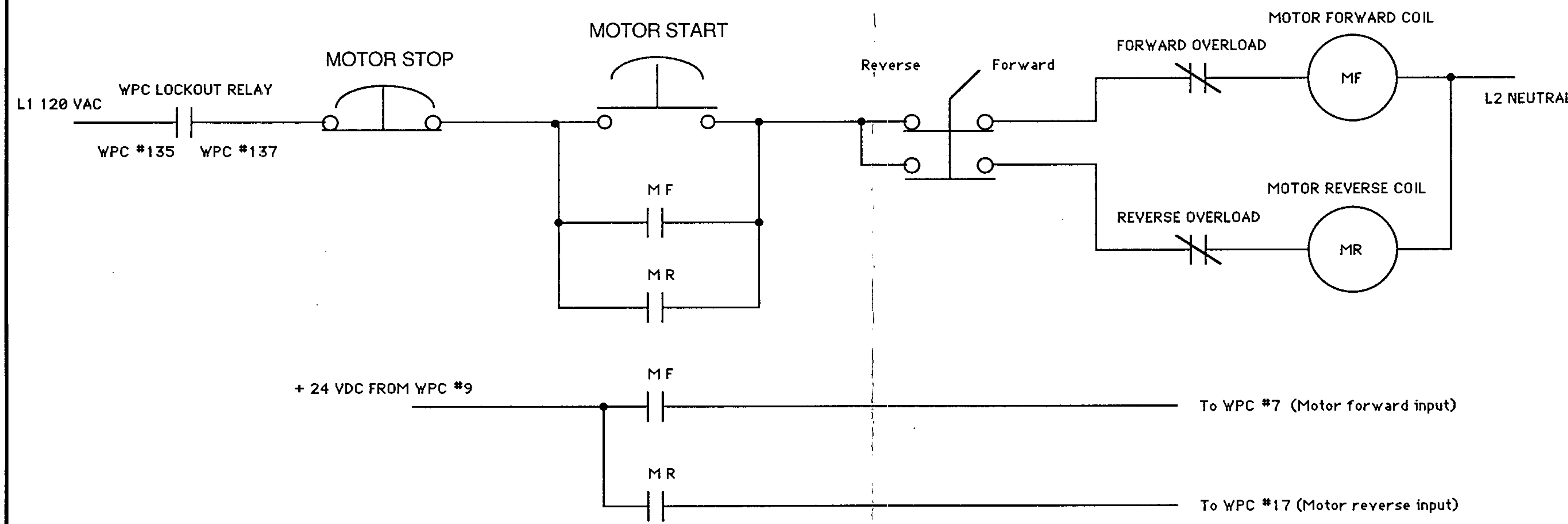
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA

TITLE
WINTRISS CLUTCH/BRAKE CONTROL SHADOW V
AND ROSS EP DSV WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	C	Figure 6	
SCALE		SHEET OF	

REVISIONS

REV	DESCRIPTION	DATE	APP'D



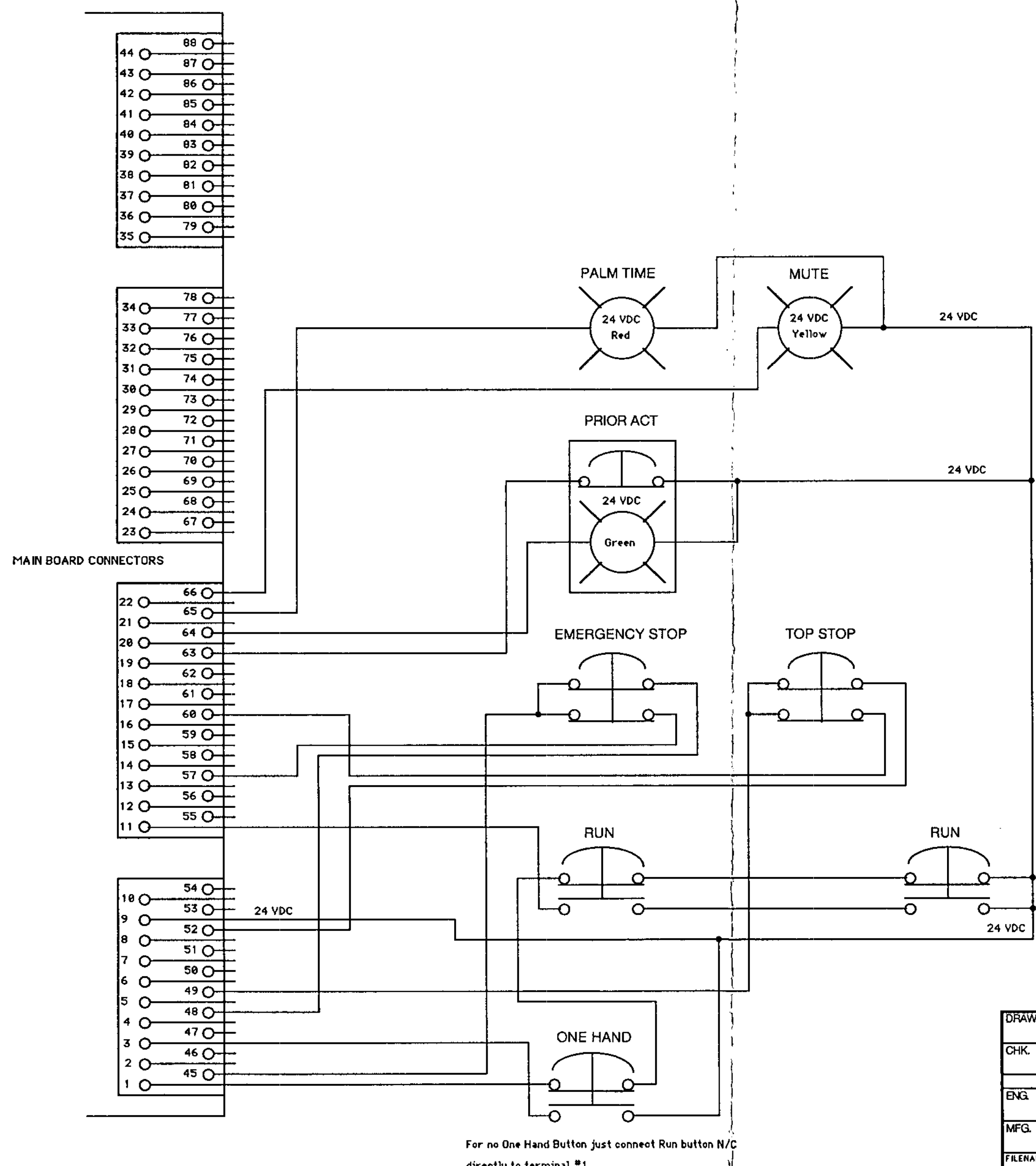
DRAWN ADB	DATE 6/7/93
CHK.	
APPROVALS	
ENG.	
MFG.	
FILENAME	
REL.	

DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA

TITLE
STOP/ START MOTOR CONTOL STATION
WIRING WITH LOCKOUT

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	Figure 7	

SCALE		SHEET	OF



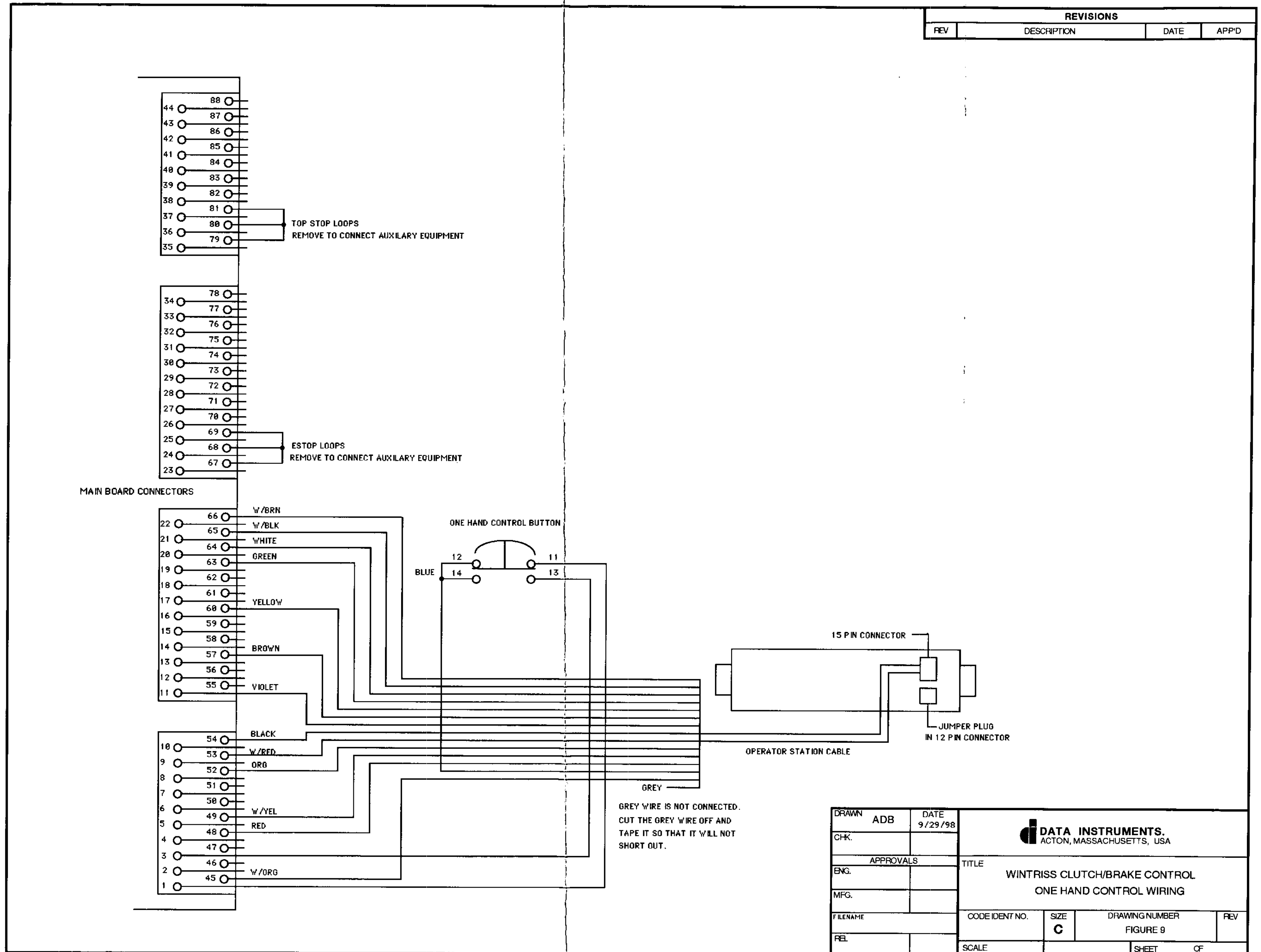
REVISIONS			
REV	DESCRIPTION	DATE	APP'D

DRAWN	ADB	DATE 4/9/93
CHK.		
APPROVALS		
ENG.		
MFG.		
FILENAME		
REL		

DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA

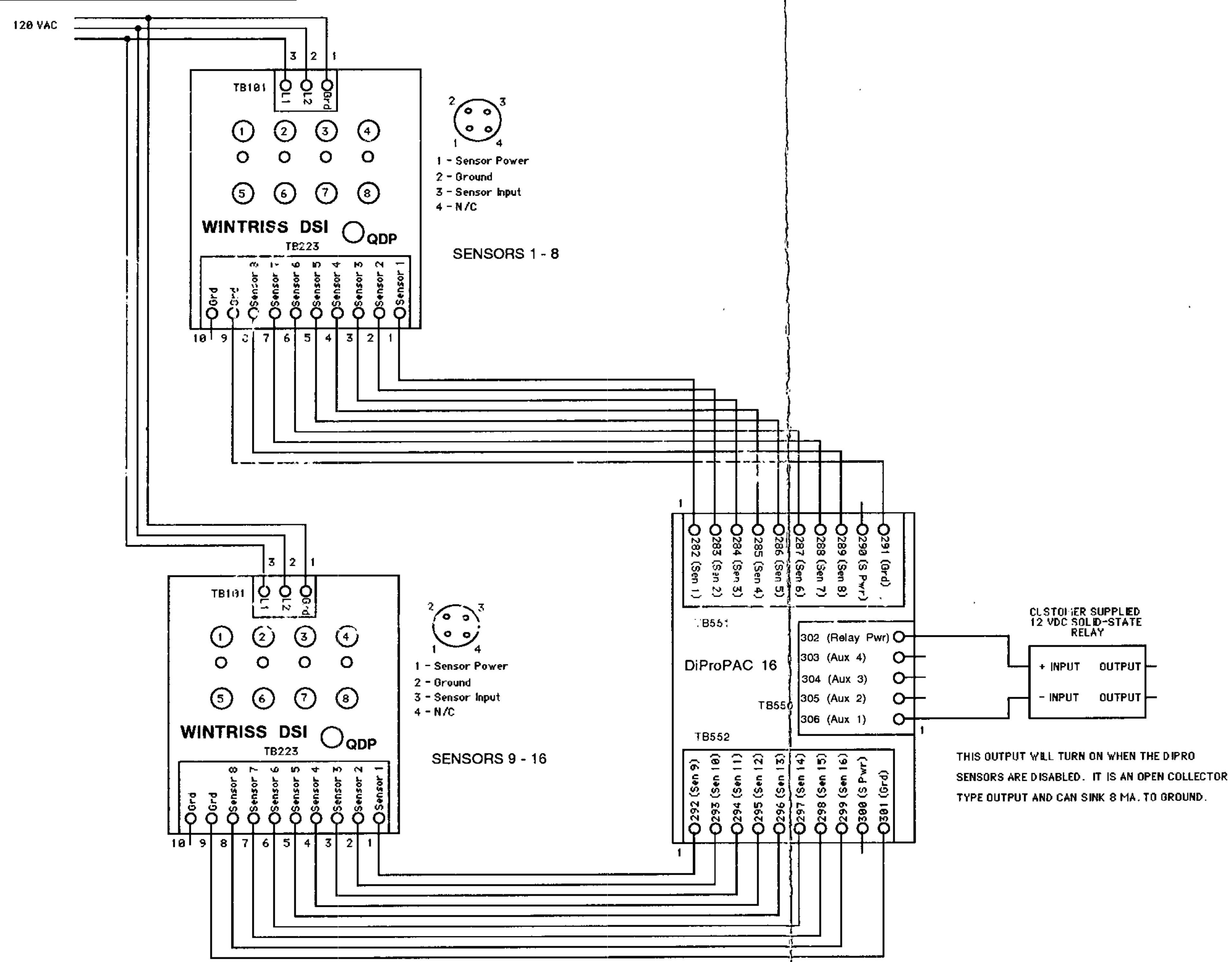
TITLE
WINTRISS CLUTCH/BRAKE CONTROL
OEM OPERATOR STATION WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	C	Figure 8	
SCALE		SHEET	OF


REVISIONS
REV
DESCRIPTION
DATE
APP'D
TOP STOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
ESTOP LOOPS
REMOVE TO CONNECT AUXILARY EQUIPMENT
MAIN BOARD CONNECTORS
W/BRN
W/BLK
WHITE
GREEN
YELLOW
BROWN
VIOLET
BLACK
W/RED
ORG
W/YEL
RED
W/ORG
ONE HAND CONTROL BUTTON
BLUE
15 PIN CONNECTOR
JUMPER PLUG
IN 12 PIN CONNECTOR
OPERATOR STATION CABLE
GREY
GREY WIRE IS NOT CONNECTED.
CUT THE GREY WIRE OFF AND
TAPE IT SO THAT IT WILL NOT
SHORT OUT.
DRAWN ADB
DATE 9/29/98
CHK.
APPROVALS
ENG.
MFG.
FILENAME
REL
DATA INSTRUMENTS.
ACTON, MASSACHUSETTS, USA
TITLE
WINTRISS CLUTCH/BRAKE CONTROL
ONE HAND CONTROL WIRING
CODE IDENT NO.
SIZE C
DRAWING NUMBER FIGURE 9
REV
SCALE
SHEET
OF

REVISIONS

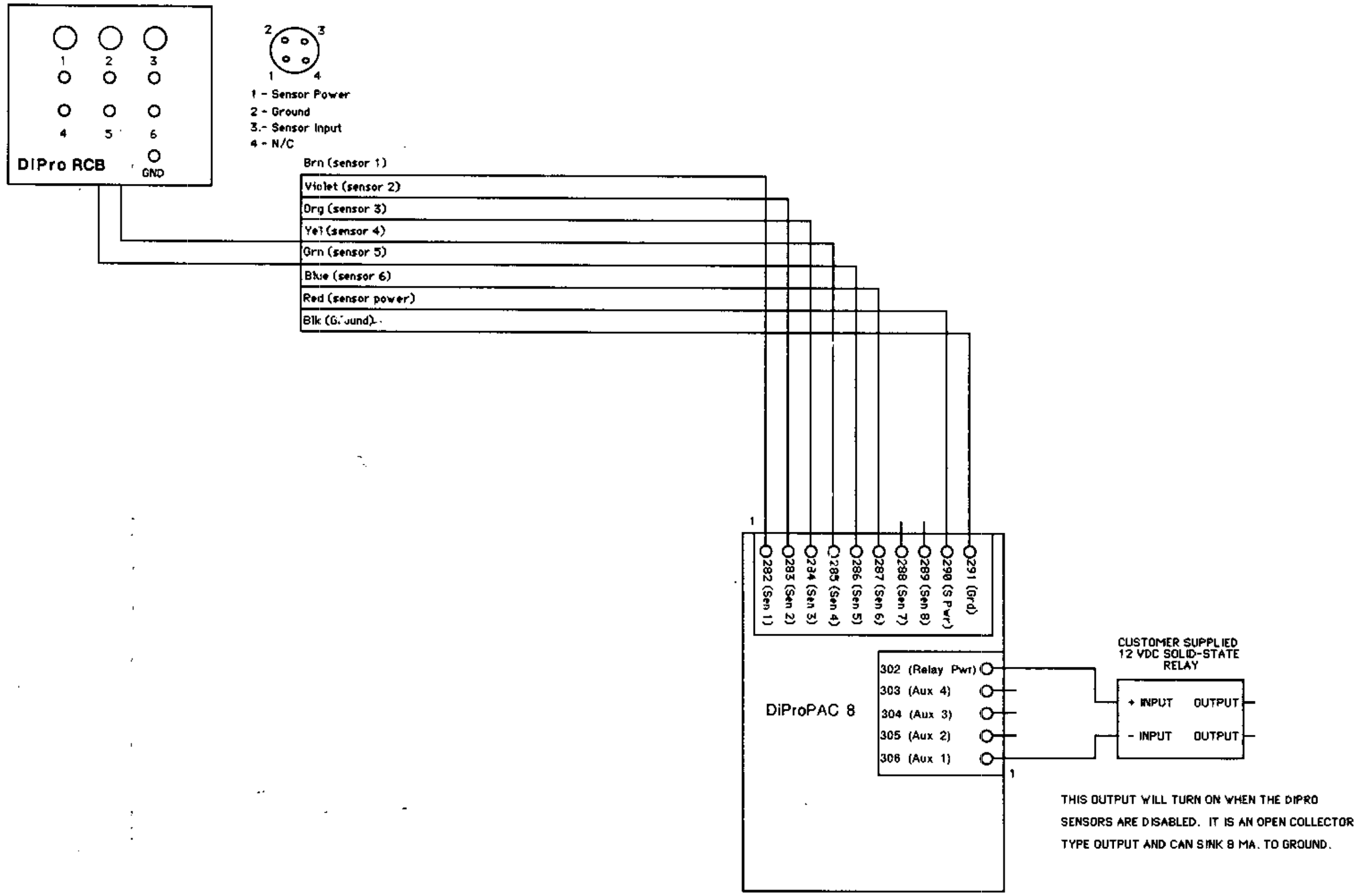
REV	DESCRIPTION	DATE	APP'D



THIS OUTPUT WILL TURN ON WHEN THE DIPRO SENSORS ARE DISABLED. IT IS AN OPEN COLLECTOR TYPE OUTPUT AND CAN SINK 8 MA. TO GROUND.

DRAWN ADB	DATE 3/5/98	**DATA INSTRUMENTS.** ACTON, MASSACHUSETTS, USA		
CHK.				
APPROVALS		TITLE: DiProPAC to DSI Wiring Diagram		
ENG.				
MFG.				
FILENAME		CODE IDENT NO.	SIZE C	DRAWING NUMBER FIGURE 10 / REV
REL.		SCALE		SHEET OF

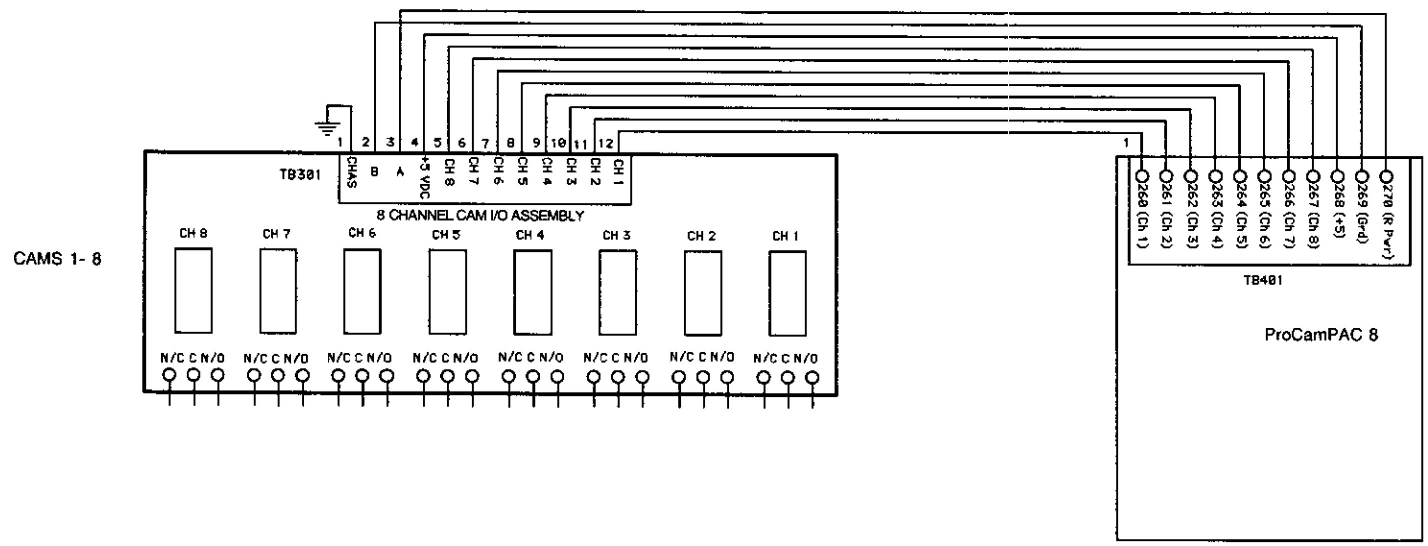
REVISIONS			
REV	DESCRIPTION	DATE	APP'D



THIS OUTPUT WILL TURN ON WHEN THE DIPRO SENSORS ARE DISABLED. IT IS AN OPEN COLLECTOR TYPE OUTPUT AND CAN SINK 8 MA. TO GROUND.

DRAWN ADB	DATE 3/5/98	DATA INSTRUMENTS. ACTON, MASSACHUSETTS, USA
CHK.		
APPROVALS		TITLE DiProPAC to RCB Wiring Diagram
ENG.		
MFG.		
FILENAME		CODE IDENT NO. | SIZE C | DRAWING NUMBER FIGURE 11 | REV
REL		SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



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CHK.		
APPROVALS		TITLE ProCamPAC 8 to Cam Output Wiring Diagram
ENG.		
MFG.		
FILENAME		CODE IDENT NO. / SIZE C / DRAWING NUMBER Figure 12 / REV
REL		SCALE

RS 232 CONNECTIONS

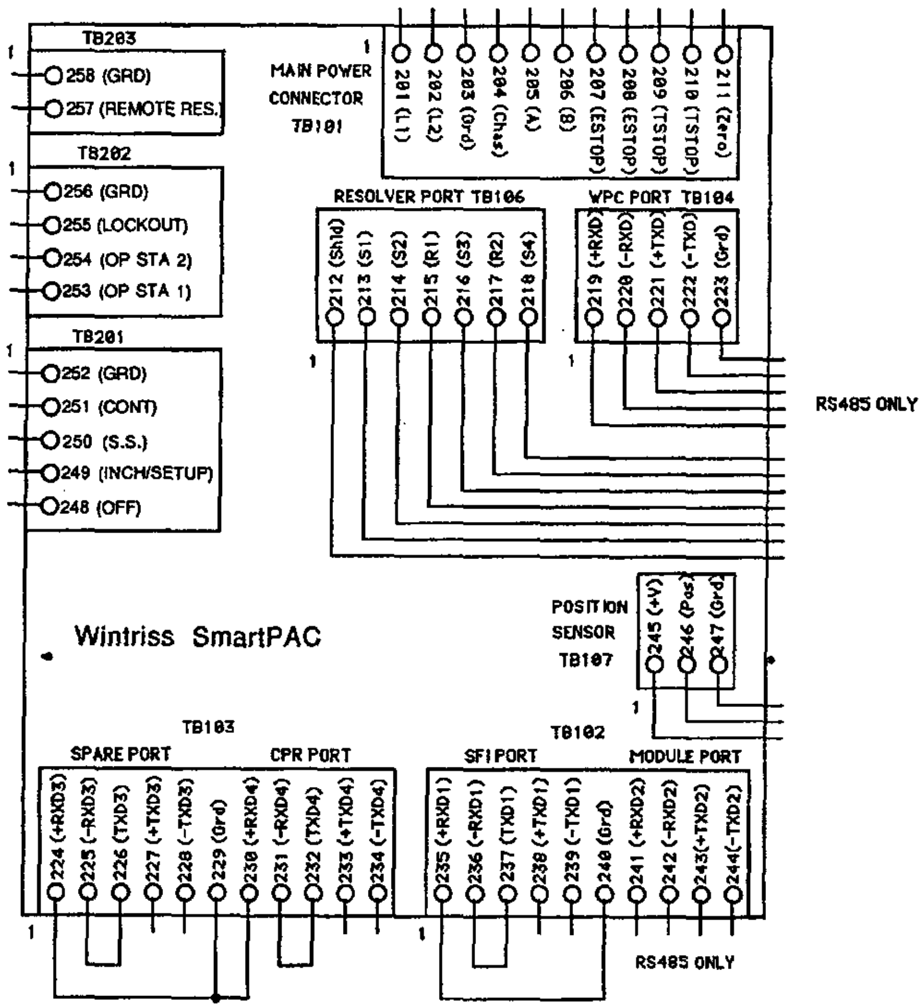

Figure 13. Loop-back test for RS232 SmartPAC connections

RS 485 CONNECTIONS

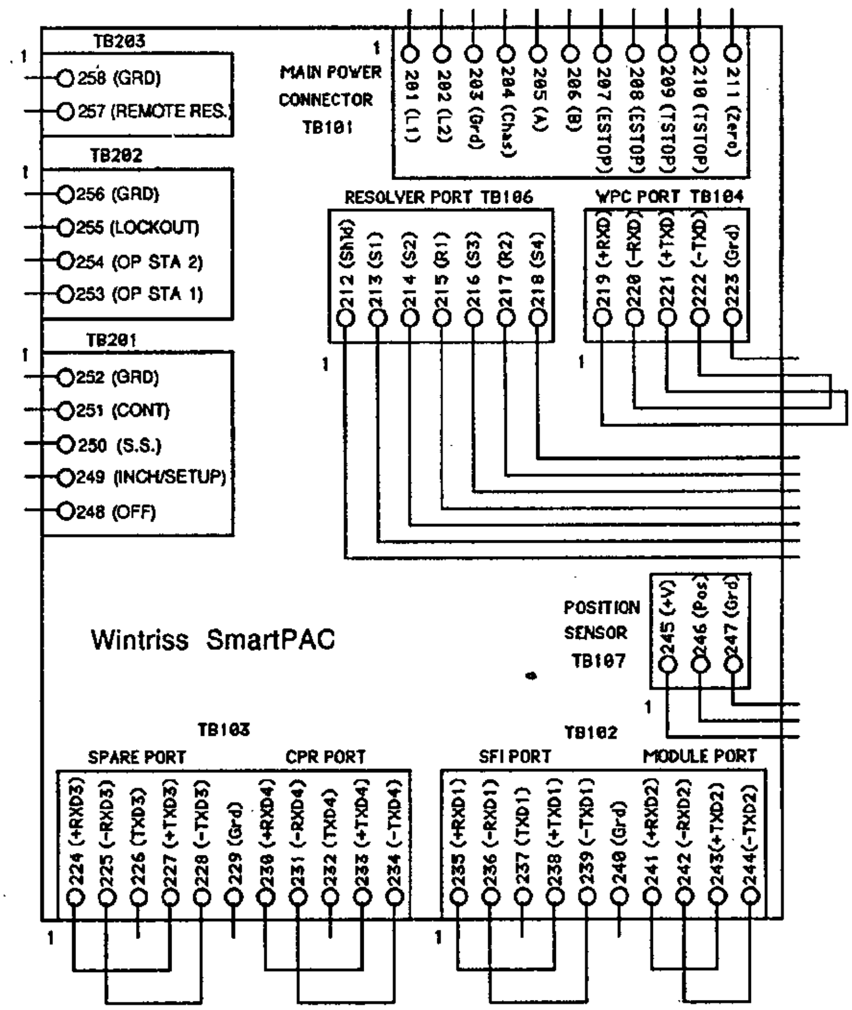

Figure 14. Loop-back test for RS485 SmartPAC connections

SmartPAC™ Setup Form

Tool #: ______________________________

Counter Presets

Strokes: ______________ **Good Parts:** ______________

	Batch 1 *(Ch. 6)*	**Batch 2** *(Ch. 7)*	**Batch 3** *(Ch. 8)*
Preset value			
Output mode *(circle one)*	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS
Increment mode *(circle one)*	STROKES GOOD PARTS	STROKES GOOD PARTS	STROKES GOOD PARTS
Increment angle *(degrees)*			

This tool should be serviced when the TOTAL HITS count reaches: ____________ .

Tool Name: ______________________________

ProCamPAC

Chan. No.	**Cam Name (function)** *(same for all tools)*	**Auto** (√)	**ON angle** *(degrees)*	**OFF angle** *(degrees)* **or Time** *(mS)*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

SmartPAC™ Setup Form

Tool #: ______________________________

Counter Presets

Strokes: ______________ **Good Parts:** ______________

	Batch 1 *(Ch. 6)*	Batch 2 *(Ch. 7)*	Batch 3 *(Ch. 8)*
Preset value			
Output mode *(circle one)*	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS
Increment mode *(circle one)*	STROKES GOOD PARTS	STROKES GOOD PARTS	STROKES GOOD PARTS
Increment angle *(degrees)*			

This tool should be serviced when the TOTAL HITS count reaches: ____________ .

Tool Name: ______________________________

ProCamPAC

Chan. No.	Cam Name (function) *(same for all tools)*	Auto (√)	ON angle *(degrees)*	OFF angle *(degrees)* or Time *(mS)*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

SmartPAC™ Setup Form

Tool #:______________________________

Counter Presets

Strokes: ______________ **Good Parts:** ______________

	Batch 1 *(Ch. 6)*	**Batch 2** *(Ch. 7)*	**Batch 3** *(Ch. 8)*
Preset value			
Output mode *(circle one)*	TOP STOP TOGGLE PULSE FOR____mS	TOP STOP TOGGLE PULSE FOR____mS	TOP STOP TOGGLE PULSE FOR____mS
Increment mode *(circle one)*	STROKES GOOD PARTS	STROKES GOOD PARTS	STROKES GOOD PARTS
Increment angle *(degrees)*			

This tool should be serviced when the TOTAL HITS count reaches: ____________ .

Tool Name: ____________________________

ProCamPAC

Chan. No.	**Cam Name (function)** *(same for all tools)*	**Auto** (√)	**ON angle** *(degrees)*	**OFF angle** *(degrees)* **or Time** *(mS)*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

SmartPAC™ Setup Form

Tool #:______________________________

Counter Presets

Strokes:__________________ **Good Parts:** __________________

	Batch 1 *(Ch. 6)*	**Batch 2** *(Ch. 7)*	**Batch 3** *(Ch. 8)*
Preset value			
Output mode *(circle one)*	TOP STOP TOGGLE PULSE FOR____mS	TOP STOP TOGGLE PULSE FOR____mS	TOP STOP TOGGLE PULSE FOR____mS
Increment mode *(circle one)*	STROKES GOOD PARTS	STROKES GOOD PARTS	STROKES GOOD PARTS
Increment angle *(degrees)*			

This tool should be serviced when the TOTAL HITS count reaches: ______________ .

Tool Name: ______________________________

ProCamPAC

Chan. No.	Cam Name (function) *(same for all tools)*	Auto (√)	ON angle *(degrees)*	OFF angle *(degrees)* or Time *(mS)*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

SmartPAC™ Setup Form

Tool #: ______________________________

Counter Presets

Strokes: ______________ **Good Parts:** ______________

	Batch 1 *(Ch. 6)*	Batch 2 *(Ch. 7)*	Batch 3 *(Ch. 8)*
Preset value			
Output mode *(circle one)*	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS	TOP STOP TOGGLE PULSE FOR ____ mS
Increment mode *(circle one)*	STROKES GOOD PARTS	STROKES GOOD PARTS	STROKES GOOD PARTS
Increment angle *(degrees)*			

This tool should be serviced when the TOTAL HITS count reaches: ____________ .

Tool Name: ______________________________

ProCamPAC

Chan. No.	Cam Name (function) *(same for all tools)*	Auto (√)	ON angle *(degrees)*	OFF angle *(degrees)* or Time *(mS)*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

SmartPAC™ Setup Form

Tool #: ______________________________

DiProPAC

Sensor Number	Sensor Name (function)	Sensor Type *(circle one)*	Stop Type *(circle one)*	Ready Signal Timing
1		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
2		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
3		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
4		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
5		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
6		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
7		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
8		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
9		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
10		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
11		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
12		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
13		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
14		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
15		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
16		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF

Auto Enable Counter _____ *Critical Angle* ______° *(for Smart Stop)*

G=GREEN STD; R=RED; Y=YELLOW; GC=GREEN CONSTANT; GQ=GREEN QUICK-CHECK; GS=GREEN SPECIAL

SmartPAC™ Setup Form

Tool #: ______________________________

DiProPAC

Sensor Number	Sensor Name (function)	Sensor Type *(circle one)*	Stop Type *(circle one)*	Ready Signal Timing
1		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
2		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
3		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
4		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
5		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
6		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
7		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
8		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
9		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
10		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
11		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
12		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
13		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
14		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
15		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
16		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF

Auto Enable Counter _____ *Critical Angle* ______ *° (for Smart Stop)*

G=GREEN STD; R=RED; Y=YELLOW; GC=GREEN CONSTANT; GQ=GREEN QUICK-CHECK; GS=GREEN SPECIAL

SmartPAC™ Setup Form

Tool #: ______________________________

DiProPAC

Sensor Number	Sensor Name (function)	Sensor Type *(circle one)*	Stop Type *(circle one)*	Ready Signal Timing
1		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
2		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
3		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
4		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
5		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
6		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
7		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
8		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
9		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
10		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
11		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
12		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
13		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
14		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
15		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
16		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF

Auto Enable Counter _____ *Critical Angle* ______° *(for Smart Stop)*

G=GREEN STD; R=RED; Y=YELLOW; GC=GREEN CONSTANT; GQ=GREEN QUICK-CHECK; GS=GREEN SPECIAL

SmartPAC™ Setup Form

Tool #: ______________________________

DiProPAC

Sensor Number	Sensor Name (function)	Sensor Type (circle one)	Stop Type (circle one)	Ready Signal Timing
1		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
2		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
3		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
4		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
5		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
6		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
7		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
8		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
9		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
10		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
11		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
12		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
13		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
14		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
15		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
16		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF

Auto Enable Counter _____ *Critical Angle* ______° *(for Smart Stop)*

G=GREEN STD; R=RED; Y=YELLOW; GC=GREEN CONSTANT; GQ=GREEN QUICK-CHECK; GS=GREEN SPECIAL

SmartPAC™ Setup Form

Tool #: ______________________________

DiProPAC

Sensor Number	Sensor Name (function)	Sensor Type *(circle one)*	Stop Type *(circle one)*	Ready Signal Timing
1		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
2		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
3		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
4		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
5		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
6		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
7		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
8		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
9		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
10		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
11		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
12		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
13		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
14		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
15		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF
16		G GC R GQ Y GS	E-STOP TOP STOP SMART STOP	ON OFF

Auto Enable Counter _____ *Critical Angle* _____*° (for Smart Stop)*

G=GREEN STD; R=RED; Y=YELLOW; GC=GREEN CONSTANT; GQ=GREEN QUICK-CHECK; GS=GREEN SPECIAL

SmartPAC
Press Control Parameters

SETUP FORM

Top Stop Default Angle	=	________	degrees
Carryup Angle	=	________	degrees
Micro Inch Time	=	________	msec.
Micro Inch Angle	=	________	degrees
Main Air Limit *(if sensor installed)*	=	________	PSI
Counterbalance (+/-) *(if sensor installed)*	=	________	PSI
Stop time limit	=	________	msec.
Start time limit	=	________	msec.
Shutdown limit	=	________	minutes
Flywheel timer *(if sensor installed)*	=	________	seconds
ACTS angle *(if configured and if other than 0°)*	=	________	degrees

SmartPAC
Press Control Parameters

SETUP FORM

Top Stop Default Angle	=	________	degrees
Carryup Angle	=	________	degrees
Micro Inch Time	=	________	msec.
Micro Inch Angle	=	________	degrees
Main Air Limit	=	________	PSI
(if sensor installed)			
Counterbalance (+/-)	=	________	PSI
(if sensor installed)			
Stop time limit	=	________	msec.
Start time limit	=	________	msec.
Shutdown limit	=	________	minutes
Flywheel timer	=	________	seconds
(if sensor installed)			
ACTS angle	=	________	degrees
(if configured and if other than 0°)			

SmartPAC
Press Control Parameters

SETUP FORM

Top Stop Default Angle	=	________	degrees
Carryup Angle	=	________	degrees
Micro Inch Time	=	________	msec.
Micro Inch Angle	=	________	degrees
Main Air Limit *(if sensor installed)*	=	________	PSI
Counterbalance (+/-) *(if sensor installed)*	=	________	PSI
Stop time limit	=	________	msec.
Start time limit	=	________	msec.
Shutdown limit	=	________	minutes
Flywheel timer *(if sensor installed)*	=	________	seconds
ACTS angle *(if configured and if other than 0°)*	=	________	degrees

SmartPAC
Press Control Parameters

SETUP FORM

Top Stop Default Angle	=	________	degrees
Carryup Angle	=	________	degrees
Micro Inch Time	=	________	msec.
Micro Inch Angle	=	________	degrees
Main Air Limit	=	________	PSI
(if sensor installed)			
Counterbalance (+/-)	=	________	PSI
(if sensor installed)			
Stop time limit	=	________	msec.
Start time limit	=	________	msec.
Shutdown limit	=	________	minutes
Flywheel timer	=	________	seconds
(if sensor installed)			
ACTS angle	=	________	degrees
(if configured and if other than 0°)			

SmartPAC
Press Control Parameters

SETUP FORM

Top Stop Default Angle	=	________	degrees
Carryup Angle	=	________	degrees
Micro Inch Time	=	________	msec.
Micro Inch Angle	=	________	degrees
Main Air Limit *(if sensor installed)*	=	________	PSI
Counterbalance (+/-) *(if sensor installed)*	=	________	PSI
Stop time limit	=	________	msec.
Start time limit	=	________	msec.
Shutdown limit	=	________	minutes
Flywheel timer *(if sensor installed)*	=	________	seconds
ACTS angle *(if configured and if other than 0°)*	=	________	degrees