

User  
Manual

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**ProCam® 1500**

**Programmable Cam Switch**

**1095000**

**Rev. A5 September 2010**

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



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## Changes for Revision A5 of the ProCam 1500 User Manual

Revision A5 of the ProCam 1500 User Manual covers all ProCam 1500 versions.

The changes for Revision A5 include:

- All references throughout the manual to CPR<sup>®</sup> (Computerized Pressroom Reporting) have been changed to PACNet<sup>®</sup>. For more details on PACNet, consult that user manual.
- Operating temperature added to ProCam 1500 Specifications in Chapter 1.
- ProCam 1500 circuit board illustrated in Chapter 2 ("location of components") has been modified to show important components only (components labeled).

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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. ProCam 1500); **installed options** (e.g. SFI, etc.); and **firmware version number** (e.g. Vs. 2.00). You can determine firmware version number from the chip on the processor board (see "location of components" in Chapter 2).

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## How to use the manual

This is the installation and reference manual for ProCam 1500. It has information about how to install ProCam 1500 and how to use all the displays to make cam and counter settings.

Chapter 1 introduces you to ProCam 1500, lists features, and explains key terms required to use ProCam.

Chapter 2 is the installation chapter. Use it to install ProCam 1500 if you are installing ProCam yourself.

Chapter 3 is an introduction to the ProCam displays and keyboard. Read this chapter to get started using ProCam. It shows you how to select items on the ProCam displays and how to perform key tasks. It also explains the keyboard. This chapter is the place to start for learning how to use the ProCam 1500 displays and keyboard.

Chapter 4 explains how to use ProCam 1500 in Initialization mode. Use it to look up things you need to know about using ProCam in Initialization mode.

Chapter 5 explains how to use ProCam 1500 in Program mode. Use it to look up things you need to know about Program mode.

Chapter 6 explains how to use ProCam 1500 in Run mode. 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 ProCam sends a stop command to the press or when there is an equipment or programming problem. What the message means and how to correct the problem is explained. Use this chapter to learn about all the ProCam 1500 fault and error messages.

The headings in Chapters 4, 5, and 6 are, in general, the same as the menu items listed on your screen. To learn about a menu item in one of the modes (Initialization, Program, Run), go to the chapter for that mode and find the page showing the menu item. Topic headings are set to the left of the text.

## Warranty

Wintriss Controls warrants that 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 (LETS and SBR), 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. Wintriss'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 Wintriss Controls freight prepaid, and which are, after examination, disclosed to the satisfaction of Wintriss 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 Wintriss Controls. No other warranty is expressed or implied. Wintriss 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. Wintriss Controls manufactures its products to meet stringent specifications and cannot assume responsibility for consequences arising from their misuse.

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PROCAM 1500  
USER MANUAL  
1095000  
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# Chapter 1

## Introduction to ProCam® 1500

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ProCam 1500 is an easy-to-use programmable cam switch that controls the opening and closing of circuits in applications requiring accurate, repetitive, and sequential operations. Replacing rotary limit switches, and multiple single action switches, such as: proximity, limit, magnetic, and Candy switches, ProCam integrates various process control functions into one system.

With ProCam, you no longer need to manually set rotary limit switches on the press. Nor do you have to stop and start the press to make fine-tuned adjustments, or reset the cams for each tool.

ProCam allows you to set timing for your feed, lubricator, part blow-off, transfer devices, etc. You set the portion of the stroke when these devices will activate. ProCam will then turn these devices on during the portion of the stroke that you set.

ProCam is part of an automation system that allows you to optimize timing for each tool. With ProCam, you can make all settings for your cams at the keyboard. And because ProCam is a microprocessor, you can save all your settings for up to 200 tools in ProCam's electronic memory. You just recall the settings when you use the tool again.

### How ProCam 1500 will benefit your operation

The ProCam 1500 operates in theory like other programmable cam systems in use today. ProCam sets timing on up to eight channels for feed, pilot release, air blow-off, lubricator, and other press equipment. Any channel can be adjusted while the press is running. (See "Theory of Operation" for a complete explanation of how ProCam works). Here are some of the benefits you will come to appreciate when using your ProCam 1500.

- You make all settings for cam channels right at the operator console using ProCam's liquid crystal display (LCD) and keyboard.
- There are no complicated instructions to learn. The messages that appear in the LCD display screen tell you what to do next.
- You can turn unused channels off at the console and ProCam will ignore them.
- All settings for cam channels are automatically saved in ProCam 1500's non-volatile memory (with battery back-up). To use the same settings when you run the same job again, you simply re-load your stored tool number and you are ready to go. ProCam can save up to 200 tool numbers.
- ProCam gives you specific fault messages on its display screen when a malfunction occurs, and it tells you when any of three counter presets have been reached and when stopping/starting timings exceed set timings.
- ProCam contains a brake monitor which constantly checks brake wear by measuring stop time every time the press stops and displays that value in milliseconds.

## ProCam 1500 Front Panel

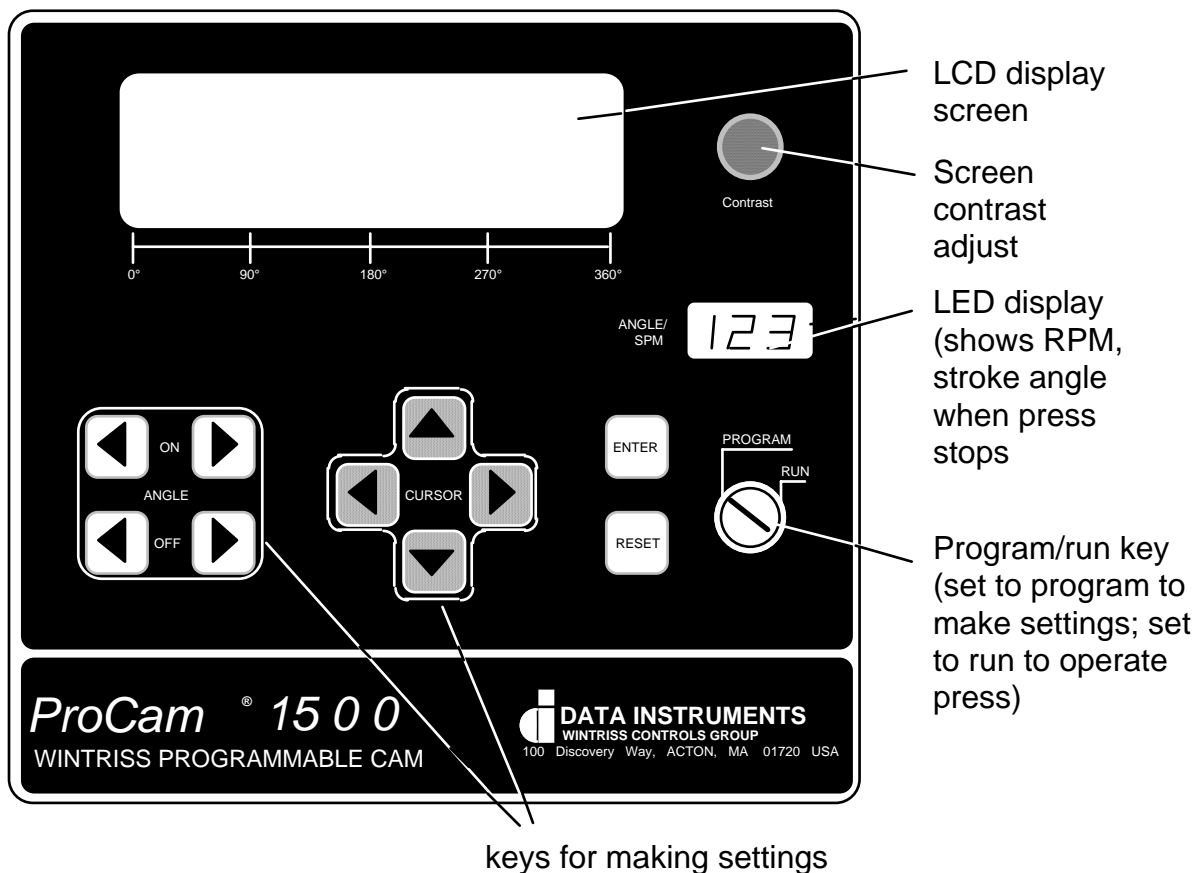


Figure 1-1. ProCam front panel

<b>LCD display</b>	A 40 character, 8 line liquid crystal display which you use along with the keyboard to make and adjust settings, to load tool numbers, and to view messages when ProCam stops the press.
<b>Screen contrast</b>	This knob adjusts the brightness of the LCD display.
<b>LED display</b>	Three-digit display which shows strokes per minute when the press is running. When the press stops, the display shows the angle of the stroke in degrees, where the press stopped. For instance, it would show 0° for top dead center.
<b>Program/Run key</b>	Allows you to lock the Program mode so settings cannot be changed. Settings for cam channels can only be made when the key is at "program". The key must be at "run" to operate the press. Minor adjustments can be made in Run mode.
<b>Keyboard</b>	The keyboard consists of the angle on and angle off keys, the cursor keys, the Reset key, and the Enter key. You use these keys along with the LCD display to make settings. The keyboard is covered in detail in Chapter 3. See "Using the Keyboard."

## How ProCam 1500 works

### The resolver lets ProCam 1500 know where the crankshaft is

A key element of ProCam operation is that it always knows the position of the crankshaft during the stroke. ProCam is connected to a resolver mounted on the press which turns one to one (1:1) with the crankshaft. The resolver is similar to an electrical generator. It has a lot of windings inside and works on the principle of inductance. The resolver has two outputs. As the resolver turns the amplitude and the phase of the two outputs varies, these signals are interpreted by ProCam 1500's electronics to determine the correct angle. Thus, the purpose of the resolver is to tell ProCam where the crankshaft is at every point in the stroke.

### ProCam converts the resolver signal to the crank angle

ProCam's electronics convert the analog signal from the resolver at any point in its rotation to a number. This number is the position of the resolver (and press crankshaft) in degrees.

### ProCam 1500 makes many decisions simultaneously

ProCam can simultaneously control eight cam channels. It can turn a channel on and off at the exact point in the stroke you set. Because ProCam is a microprocessor, it can control all these different functions during a press stroke even for very high speed presses. And it saves all your settings so you do not have to make them over and over. You just reload them when the tool is used again.

### A brake monitor is built into ProCam 1500

ProCam 1500's brake monitor constantly checks abnormal brake wear by measuring the amount of time it takes to stop the the press, every time the press is signalled to stop. The brake monitor measures the time it takes the dual safety valve to close to the actual stopping of the press crankshaft. And ProCam 1500 then displays this value in milliseconds.

### ProCam 1500 stops press when a preset is reached

ProCam 1500 can send a stop signal when one of its counters reaches the preset value and when actual stopping/starting timings exceed set timings. You simply press the RESET key, and then you can continue to make parts.

## Connecting ProCam cam channels to your equipment

With ProCam you have received a separate assembly for wiring the cam channels to your equipment (enclosure is optional). The assembly contains the relay modules that will open and close on signal from ProCam to turn your equipment on and off. You wire it to the main ProCam assembly. Different types of relays can be used depending upon the voltages of your equipment and your special needs.

### **WARNING!**

ProCam 1500 can be used to provide timing inputs for Wintriss Press Control. With any other clutch / brake controls, ProCam 1500 should not be used to control clutch / brake timing. It is designed to control auxiliary functions only.

## Settings you can make on ProCam

All settings are made using the keys on the ProCam keyboard. Eight channels for controlling press equipment are available. For complete instructions on how to make settings, see Chapter 4—Programming.

Here are settings you can make:

- **Set timing for cam channels.** You can set the on and off angle for each cam channel, or set the on angle and time in milliseconds you want the channel to be on. You can also make an auto output setting whenever you want ProCam to automatically compensate the cam timing for changes in press speed. The channel will close the circuit to the device to which it is connected for that angle of the stroke (or for the time set). You can activate your feed pilot release, assembly operations, air cylinders, transfer devices, lubricators, air blow off, cut off, loader/unloader controls and other equipment that requires precise timing with the press. And you can assign a name to each cam channel.
- **Assign tool numbers for tools.** You assign a tool number to your settings for a tool. This is how you keep track of all settings you make.
- **Lock settings.** You can lock settings in Initialization mode, so that no one can change settings in Run mode. This prevents anyone from changing settings without the Program/Run key.
- **Load settings by tool number.** ProCam saves all counter presets modes, and cam switch settings in its electronic memory. The settings are stored by tool number. To use the settings for a tool again, you can recall them by selecting the tool number from the tool number 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 ProCam to save settings by pushing a key or issuing a command. When you load the stored tool number, ProCam loads all the settings for the tool. ProCam retains all settings for a tool even with ProCam has been powered off. A lithium battery on the memory chip supplies power and lasts for ten years.
- **Set parts counter.** The parts counter counts strokes while the press is running. The counter will top stop the press (open the top stop relay) when the preset count is reached.
- **Set batch counter.** There are three batch counter modes available in ProCam. "Top stop" mode is where ProCam stops the press (opens the top stop relay) when the preset count is reached. This counter is useful for stopping the press to change bins or chutes. "Toggle" mode switches the state of the counter relay output from open to closed, and vice versa. This is effective when using a parts diverter. "Pulse" mode turns channel 8 on for a certain amount of time (in milliseconds) that you set. You can tie a timed output module to a parts chopper or a lubricator.
- **Set total hits counter.** This counter counts every stroke for the tool number loaded. In other words, it keeps a running total of hits on the tool. It is useful to determine when the tool needs regrinding. You can reset this counter after the tool is reground to start the count again from 0.

- **Set Brake Monitor.** You set the brake monitor to a certain value (in milliseconds), that is longer than the actual stop time. This extra time compensates for normal brake wear. When the stop time reaches the brake monitor setting, 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.
- **Reset ProCam.** You reset ProCam after it stops the press and signals that a counter preset has been reached, or if the stopping/starting timings exceed set timings. ProCam clearly displays the appropriate message on the LCD display. See Chapter 7 for a complete list of fault messages.

## ProCam modes of operation

You can do different things using your screen and keyboard depending on which mode you are in. ProCam has three modes of operation.

- **Initialization Mode.** Used to make settings that only need to be made once after installation. For instance, you select names for your cam timing channels in Initialization mode and set brake monitor. You also can lock settings and set reset mode. All settings are made using the keyboard and display. To get into Initialization mode, you turn the Program/Run key to "program" and then press both the left and right "angle off" keys at the same time for one second. This mode is explained in Chapter 4.
- **Programming Mode.** Used to make all your cam timing settings for your tools. You also set counters. You cannot use this mode while the press is running. You can load settings for a tool in this mode. Load means you tell ProCam what tool you are using for the job. You switch to Program mode by turning the Program/Run key to "program". The displays you see in Program mode are described in Chapter 5.
- **Run Mode.** You must be in Run mode to run the press. In Run mode you can adjust timing for your cam channels while the press is running, and you can see stop time and start time. You can also load tool settings in Run mode, as long as the press is stopped. To switch to Run mode, you turn the Program/Run key to "run". The settings you can make in Run mode are explained in Chapter 6.

## Specifications

<b>Equipment</b>	<ul style="list-style-type: none"> <li>Resolver: 0.75" (1.9 cm) keyed shaft, rated shaft loading: 200 lb axial, 200 lbs radial</li> </ul>
<b>Electrical</b>	<ul style="list-style-type: none"> <li>Input: 120/240 Vac 50/60 Hz, 25 VA</li> <li>Input check circuit: 12-130Vac or DC (130 maximum)</li> </ul>
<b>Oper. Speed Oper. Temp.</b>	<ul style="list-style-type: none"> <li>7-800 SPM, 14-1600 SPM optional at reduced accuracy</li> <li>32° to 122° F (0 to 50 C)</li> </ul>
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>±.66° (±1.33° for 14-1600 SPM)</li> </ul>
<b>Counters</b>	<ul style="list-style-type: none"> <li>Parts, batch— Preset for max count. Set to 7 digits.</li> <li># hits on tool counter—Reset to 0 after tool has been reground, counts all hits on tool</li> </ul>
<b>Memory</b>	<ul style="list-style-type: none"> <li>Executive program—EPROM</li> <li>User program: battery on chip static RAM. Allows storage of settings for 200 tools</li> </ul>
<b>Inputs</b>	<ul style="list-style-type: none"> <li>Inputs for resolver, position sensor, input check circuit, remote reset input</li> </ul>
<b>Outputs</b>	<ul style="list-style-type: none"> <li>Programmable cam switch channels - 8</li> <li>Top stop, emergency stop: ratings 0-4A resistive @ 240V max (AC or DC)</li> </ul>
<b>Relay types for cam switch channels</b>	<ul style="list-style-type: none"> <li>Relay SPDT 0-3A resistive @ 240V</li> <li>DC solid state SPST 2A @ 5-60 Vdc</li> <li>AC solid state SPST 1A @ 70-250 Vac</li> </ul>
<b>Optional</b>	<ul style="list-style-type: none"> <li>Enclosure 12" x 11" x 4.5" (30.5 x 27.9 x 11.4 cm), NEMA 12 protection, shock mounted</li> <li>Cam switch relay box : 9" x 11" x 3.5" (22.9 x 27.9 x 8.9 cm), NEMA 12 protection</li> <li>Position sensor to detect resolver slippage</li> <li>Firmware to connect ProCam 1500 to Data Instruments PACNet® pressroom monitoring software network, <u>OR</u> Firmware to integrate Servo Feed Interface (SFI™) to save your servo feed settings with ProCam 1500 tool memory</li> <li>Firmware to connect ProCam 1500 to PACNet RSR® Remote Storage and Retrieval provides unlimited setup memory (RSR can be purchased as part of PACNet or separately.)</li> </ul>

# Chapter 2

## Installing ProCam 1500

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### **WARNING!**

ProCam 1500 can be used to provide timing inputs for Wintriss Press Control. With any other clutch / brake controls, ProCam 1500 should not be used to control clutch / brake timing. It is designed to control auxiliary functions only.

This chapter describes how to install ProCam 1500. It covers:

- Installation guidelines and overview
- Preparation for mounting ProCam 1500 using your panel enclosure
- Preparation for mounting ProCam 1500 using the optional enclosure
- Mounting the resolver (plus multiple controls connected to one resolver)
- Connecting AC power, stop circuits and input check circuit
- Connecting programmable cam channels
- Power-up prechecks and turning power on
- Zeroing the resolver
- Installing the position sensor (optional)
- Installing high speed version of ProCam 1500 (optional)
- Final checkout
- Final assembly

### **WARNING PREVENT SHOCK**

Disconnect main power before installation. All power to the press, press control, and other equipment used with the press must be off during installation. Installation must be performed by qualified personnel only.

## **Before you start**

If you plan to install ProCam yourself instead of leaving the job to Data Instruments service personnel, read this installation chapter entirely before you start. Find out what is required and plan your steps before taking any action. ProCam is not hard to install. But like anything else, when you are working with something new, the best way to proceed is to learn all you can about it first *before* cutting wires, drilling holes, and running conduit.

You will need to use the keyboard and display during installation to zero the resolver and to install the position sensor (installing the position sensor is optional). You may also need to load some settings to run the press for zeroing the resolver. Therefore, before you start installation, you should have a good basic knowledge of how to use the ProCam keyboard and displays in order to make settings. This will speed things along. *If you run into any problems installing ProCam, remember that Data Instruments service advisors are standing by to help you. Just call us. Look for the toll free number in the front of the manual.*



**An installation tip**

Here is a tip for learning how to use ProCam before you install it. Hook up AC power and the resolver only. You can do this in an office rather than on the press floor. You can then use all the menus and make settings. Once you are familiar with the ProCam displays and keyboard, start the installation. You will be able to get ProCam up and running faster.

## Installation Guidelines

These guidelines cover major points that are important for proper ProCam 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 upper right-hand corner of ProCam 1500. Run one or two low voltage conduits into the lower left-hand corner of ProCam for the resolver and communications control wires. Because ProCam 1500 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.
- The AC power supply wires to ProCam 1500 should be run separately from the DC control wires run to the ProCam output assembly which contains the relays for cam channels. Never use the ProCam power terminals as a junction point to provide power for devices controlled by the cam switch relays. In most cases, the AC power supply wires should be connected directly to the press control transformer at the press control.
- The communications wiring must not be run with any other wires. These wires will be installed only if ProCam 1500 is used to send to or receive data from PACNet<sup>®</sup> pressroom monitoring software, Servo Feed Interface (SFI<sup>™</sup>), or Remote Storage & Retrieval (RSR<sup>®</sup>).
- Do not use the ProCam output enclosure as a junction box for all of the AC control wires. Provide a separate junction box for this purpose.
- Good grounds at ProCam are important. Make sure ProCam is properly grounded (see Figures 2-10A and 2-10B).
- The ground wire from ProCam should be connected to the main ground point of the press control. This may be in the area where the control transformer is grounded. Finding a good place for a ground is sometimes difficult, but it should be close to where the press receives its ground.
- All relays and solenoids that are controlled by ProCam must be suppressed. Suppressors should be installed across the load and as close to the load as possible. *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. Additional suppressors can be obtained from Data Instruments. See Figure 2-13.

## Overview of the installation

Figure 2-1 on the next page shows ProCam 1500 installed on a press. Study the drawing to get a general idea of what you will receive and what you will need to do. Of course, where you put the components (resolver, the ProCam, etc.) will probably be different for your installation. Your exact wiring scheme may also be different (where you connect AC power, stop circuits, etc.) However, in general, this is what your installation should look like when done.

The drawing also shows how to properly run your wiring based upon the previous guidelines. If you have top stop and emergency stop circuits that are 24V or other voltage besides 120V, you must run the 24V wires separately.

Before you begin the installation, you will need to prop the unit near the location where it is to be mounted. Once you have completed the entire installation, you will be ready to connect the unit either to our optional enclosure or to your panel enclosure.

A communications hook-up to a computer is not shown in the drawing. If you are installing wiring for communications, remember that communications wires must not be run with other wires.

## Panel Mount versus Optional Enclosure

ProCam 1500 is available as a panel mount or with an optional enclosure. 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. If you order the optional enclosure, you can drop the panel mount into it from the outside.

## The first step—checking the press

Before starting the installation, make sure the die has been removed from the press. Then **check all modes of press operation**. Run the press in INCH, SINGLE STROKE, and CONTINUOUS modes. Make sure the press has working top stop and emergency stop circuits. Verification that the press operates and stops properly is extremely important because ProCam 1500 will be tied in to the press stop circuits. Do not forget to mark your electrical prints where you wire in ProCam.

## Set press to top of stroke (TDC)

Set the press ram to top dead center (TDC).

### **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  $0^{\circ} \pm 2^{\circ}$ . *Use a dial indicator on the face of the ram if necessary.*

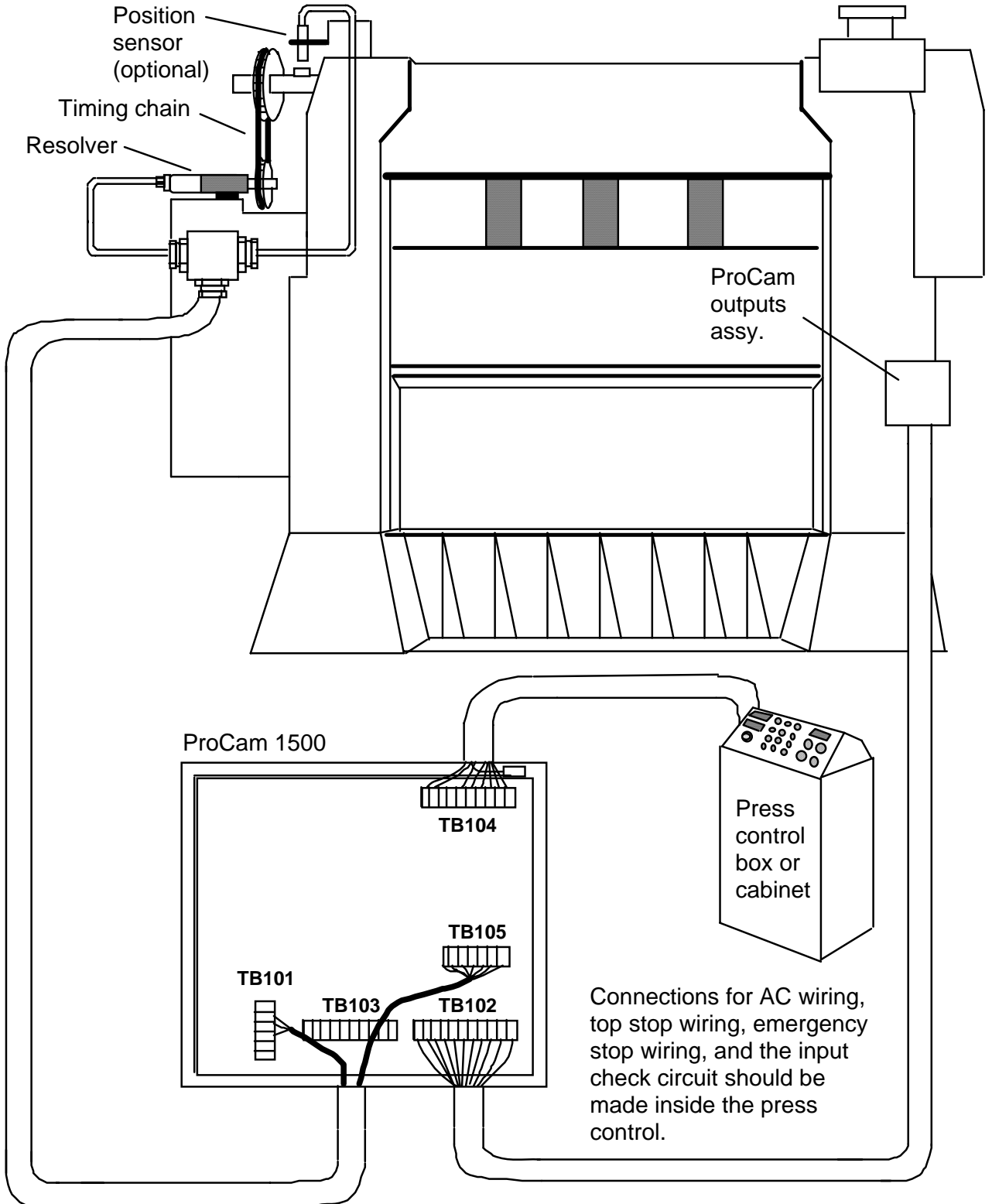


Figure 2-1. Wiring scheme for ProCam 1500

### Preparation for mounting ProCam using your enclosure

To prepare for mounting ProCam 1500 using your panel enclosure, follow these steps:

1. Determine a convenient place to mount ProCam 1500 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 the drawings in Figures 2-2 and 2-3A for mounting dimensions.
3. Prop ProCam near the location where it will ultimately be mounted (see Figure 2-3A). 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.

#### PLACE PROCAM 1500 AT A CONVENIENT HEIGHT

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

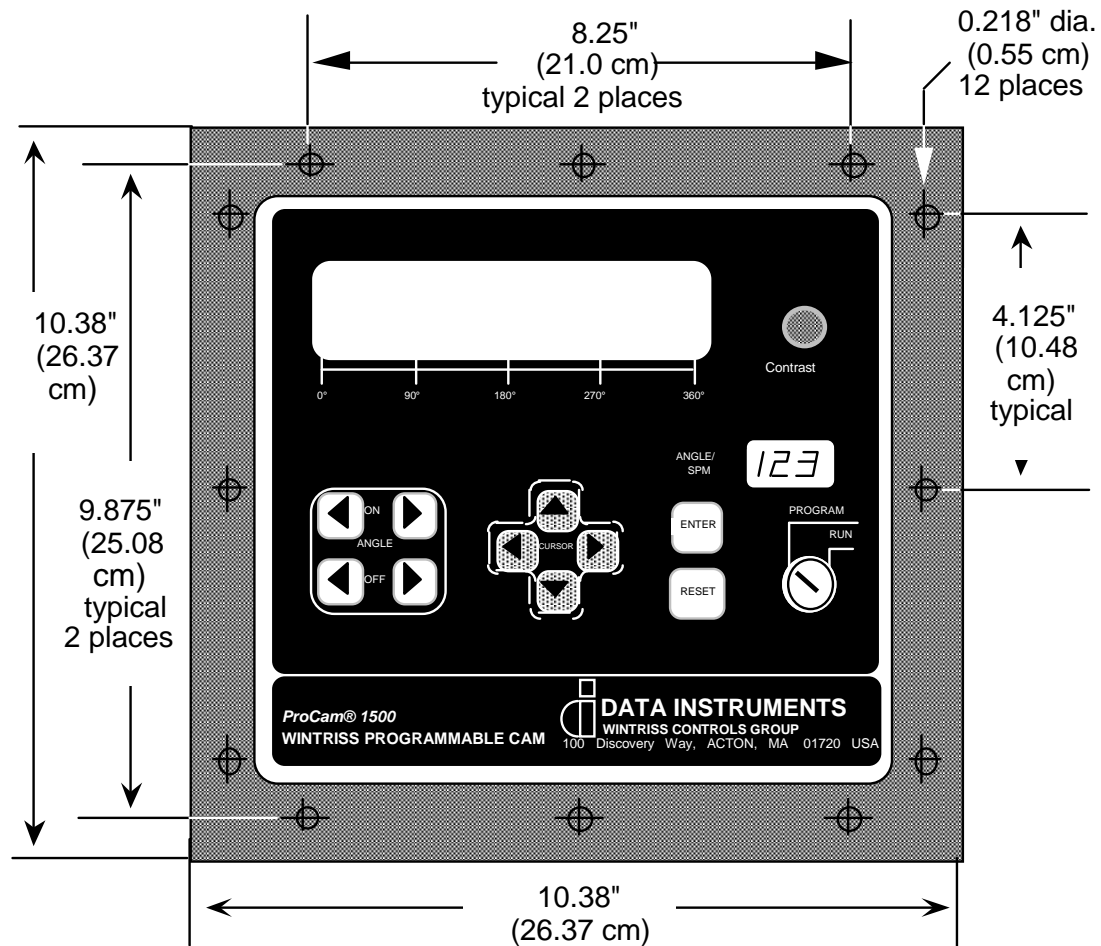


Figure 2-2. ProCam 1500 Panel Mount mounting dimensions

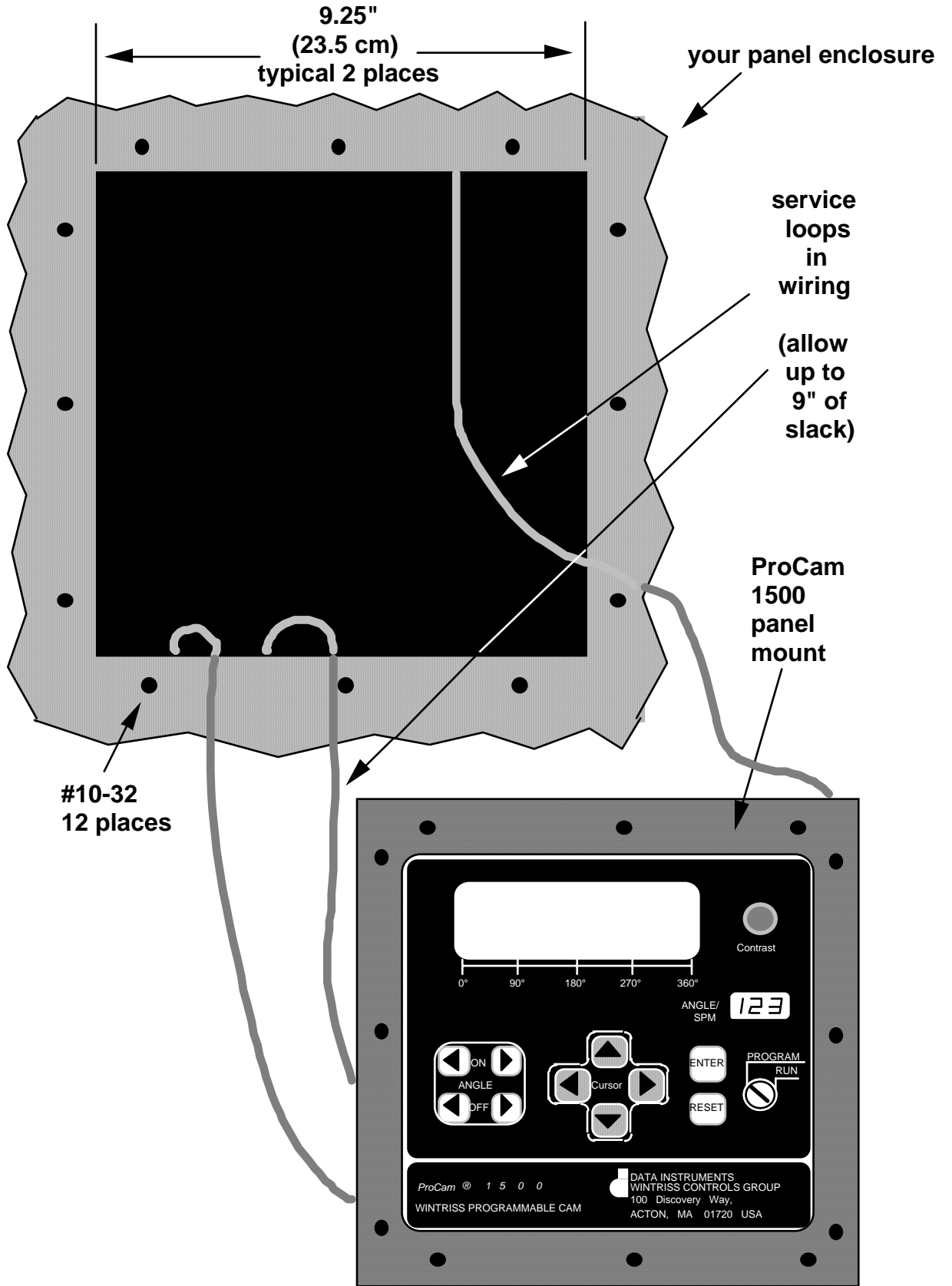


Figure 2-3A. ProCam 1500 "cutout dimensions" for your panel enclosure

Preparation for mounting ProCam using the optional enclosure

To mount ProCam 1500 using the optional enclosure, follow these steps:

1. Determine a convenient place to mount ProCam 1500 into the optional enclosure. Ideally it should be close to the press control so operators and setup personnel can easily see the readouts and reach the keyboard. The enclosure can be mounted to the press, on a free-standing pedestal, or on a pendant.
2. Drill four holes for mounting, and tap (if necessary). Shockmount studs are 1/4-20. Mount the enclosure using the enclosed shock mounts and mounting flanges. Use a No. 7 drill and 1/4-20 tap. Refer to the drawings in Figures 2-2 and 2-3B for dimensions.
3. Prop ProCam near the location where it will ultimately be mounted (see Figure 2-3B). Allow up to 9" of service loop when performing the wiring connections. Also make sure all cables will reach.

**PLACE PROCAM 1500 AT A CONVENIENT HEIGHT**

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

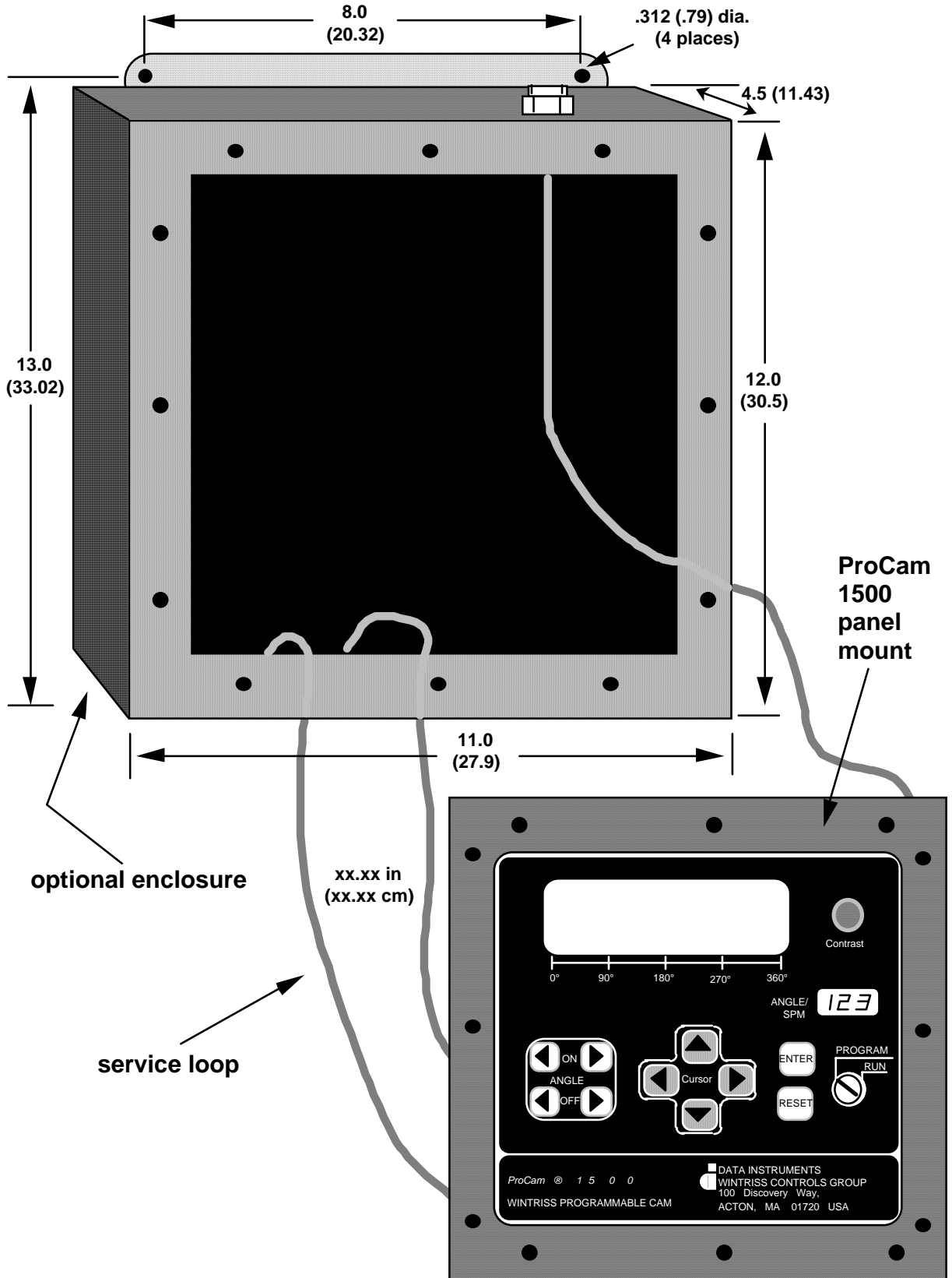


Figure 2-3B. ProCam 1500 with optional enclosure

### Mounting the resolver

The resolver must be driven smoothly at a 1:1 ratio with the crankshaft of the press. The resolver signals ProCam the exact position of the crankshaft at every degree of the stroke (see "How ProCam 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.

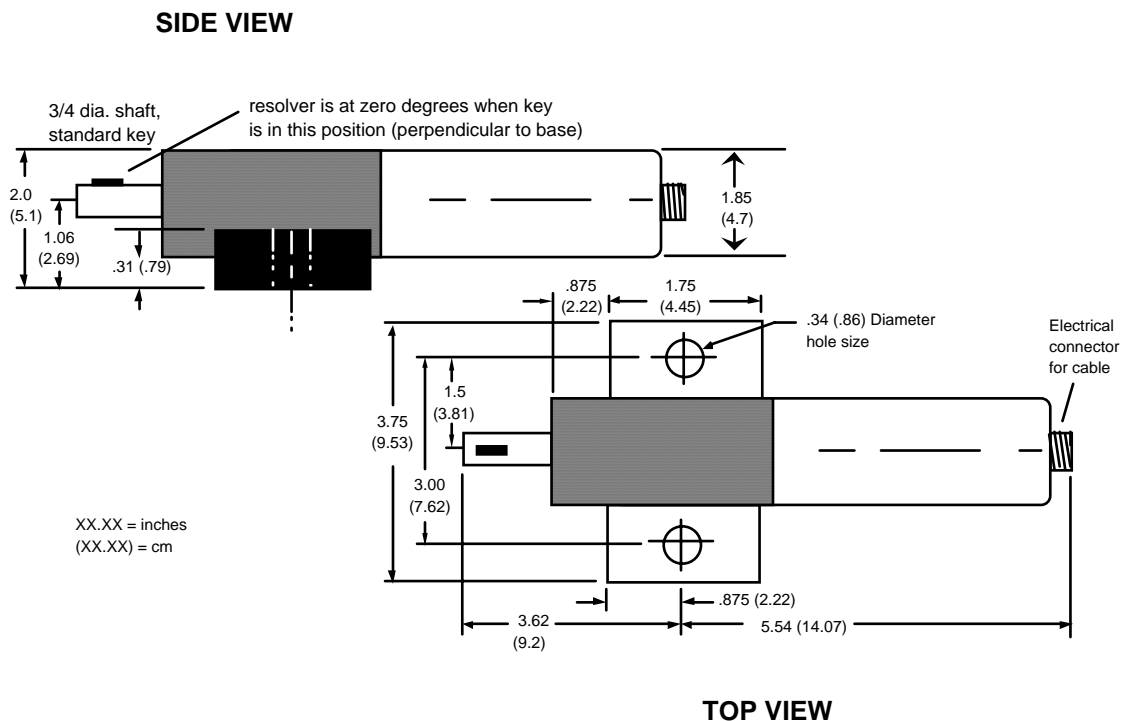


Figure 2-4. Resolver (reflects dimensions with military-style connector)

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

1. Do not use a long, sloppy chain.
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 2-4. *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:

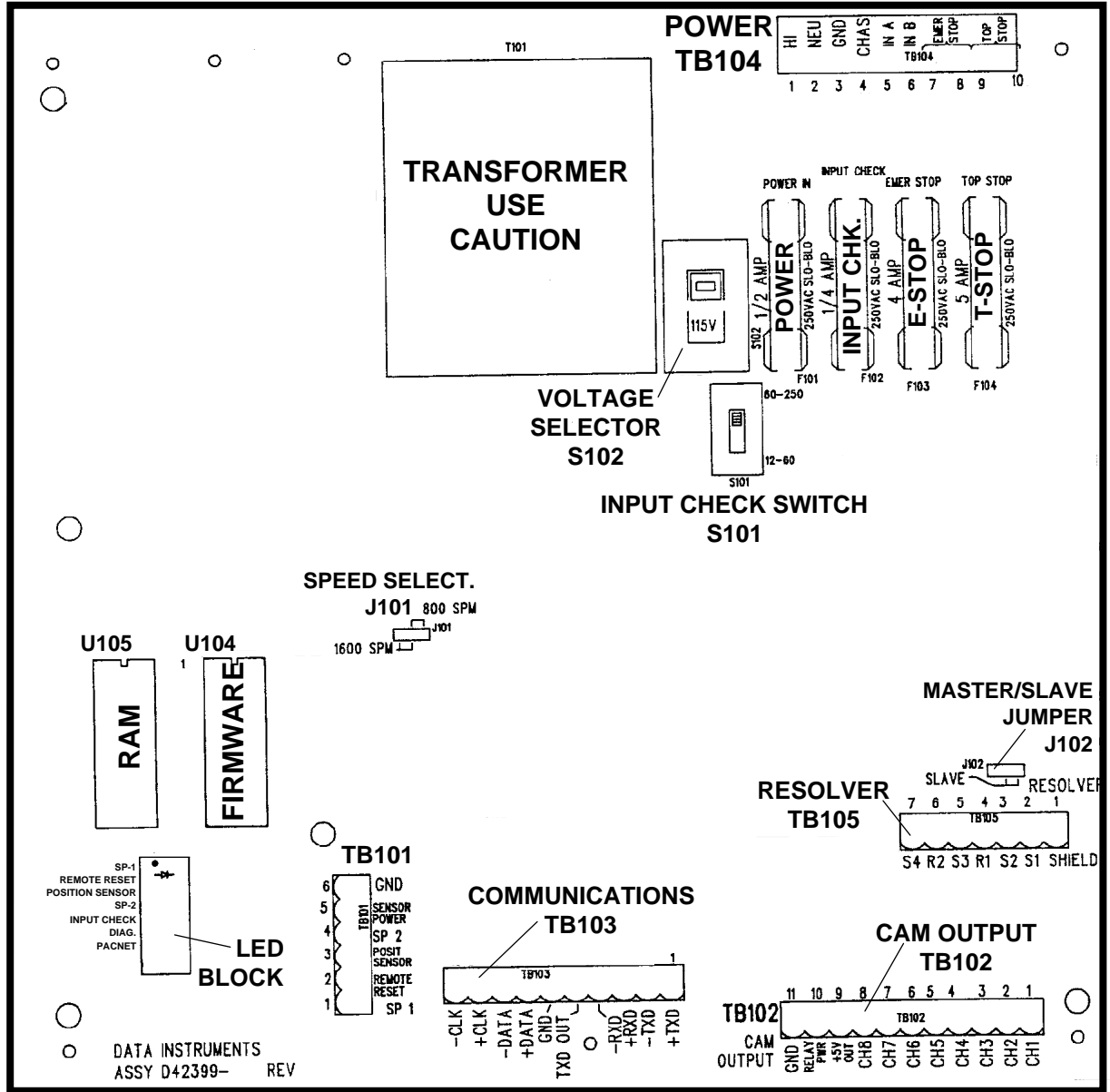
1. Find the resolver cable (if not connected to the resolver). Plug the end with the molded connector into the resolver (it only goes one way). Twist the locknut so the connection is tight.
2. Run the resolver cable through 1/2" conduit from the resolver to the bottom right of ProCam.

#### **IF YOU INSTALL THE POSITION SENSOR (optional)**

If you are installing the position sensor, you can also run the position sensor cable through the same conduit as the resolver wires. (See "Installing the position sensor" for an illustration of the position sensor—the cable is attached). You cannot install the position sensor 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 position sensor must be installed. It is usually near the resolver.

3. See Figure 2-5 for the location of the resolver connector TB105. Measure the resolver wires to fit and cut the wires. (If you also ran the position sensor cable through, do not cut these wires until the position sensor is installed).
4. Notice the connector for the resolver wires is plugged into TB105. Pull this L-shaped connector out of its socket.
5. Attach the wires to the L-shaped connector as shown in Figure 2-6. 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 Figure 2-7). 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.

Figure 2-5. Location of components in ProCam 1500  
(back side of panel mount - important items shown and labeled)



**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.*

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

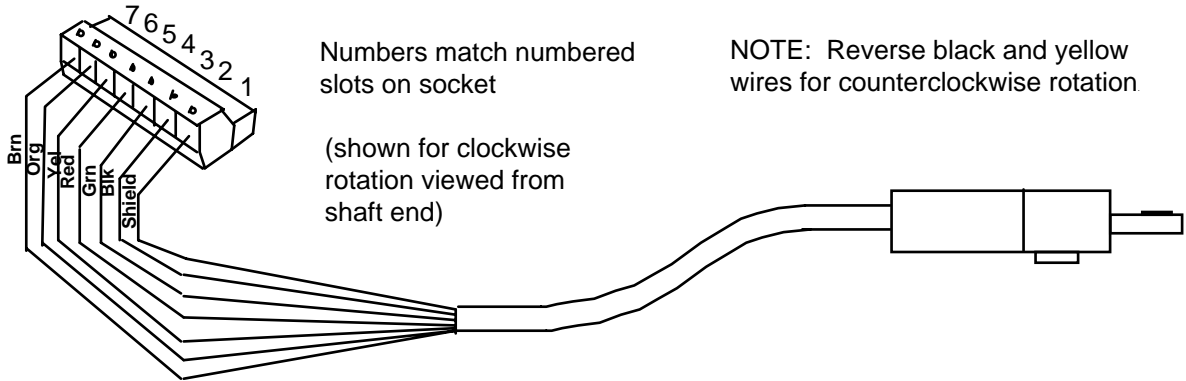


Figure 2-6. Wiring for resolver cable (see table below)

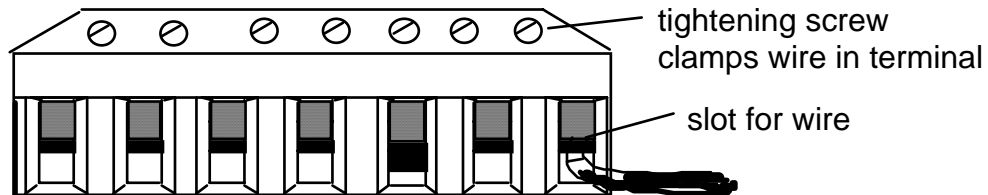


Figure 2-7. Attaching wires to connector

Resolver Wiring Table for TB105

Pin #	Wire Color
1	Shield
2	Black
3	Green
4	Red
5	Yellow
6	Orange
7	Brown

### 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 3.

## Multiple controls connected to a single resolver

You can connect ProCam 1500's resolver to as many as three other controls (for instance - Spectrum, DiPro 1500, or another ProCam 1500).

### **IMPORTANT!**

*Any Wintriss Controls product that is providing press control timing signals to a clutch/brake control must always be MASTER. In general, if there is either a Spectrum or ProCam 1500 involved in addition to DiPro 1500, DiPro 1500 will always be SLAVE, and either Spectrum or ProCam 1500 can be MASTER.*

1. See Figure 2-5 for the location of the resolver connector TB105 and the jumper J102.
2. Locate the 6-conductor shielded resolver cable. Run the cable through 1/2" conduit from TB105 to the bottom right knockout of the "master" unit. If there is a connector on the other end, cut it off.
3. Pull connector TB105 in the "master" unit out of its socket.
4. Attach the wires to the connector as shown in Figure 2-6. You will be wiring in parallel (#4 red to red, #5 yellow to yellow, etc.), so that when you are finished, you should have two wires of the same color connected to each terminal on TB105. To connect a wire, refer to Step 5 in "To wire the resolver". Also see Figure 2-7.
5. Connect the cable from TB105 in the "master" unit to TB105 in the first "slave" unit. Remember to wire in parallel. If there is an additional "slave" unit, again wire from TB105 to TB105 in parallel.
6. See that the jumper J102 on the control board of the "master" unit is set so that it is on pins 1 and 2, "master" position. Locate J102 on the control board of the other "slave" units. Move each of those jumpers to pins 2 and 3, "slave".

## Wiring a remote reset switch

Connector TB101 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.

### To connect a remote reset switch

Connect a wire from TB101, terminal 2, to a normally open switch. Connect another wire from the switch to GND (TB101, terminal 6). ProCam is reset with a momentary connection to ground.

## Connecting AC wiring, stop circuits, and input check circuit

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, for the emergency stop and top stop circuits, and for the input check circuit to a convenient point so that you can tie them to the appropriate connector, or just below the top right knockout if you have the optional enclosure (see Figure 2-5). No. 16 wire is recommended for these circuits (No. 14, if local codes require it).

To wire the connector, follow these steps.

1. Look at the back side of the unit. Near the top, you will see a metal cover. This cover protects the power supply. Loosen the three screws on top and remove the cover. You will see the connector for AC power and the stop circuit at right (TB104).

**WARNING  
SHOCK HAZARD**

Never apply power to ProCam 1500 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. These wires should be connected directly to the press control transformer at the press control. 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. Determine how you will connect the wires from ProCam to your press control top stop circuit and emergency stop circuit. You can wire these circuits at your press control. Refer to your press control manual or other electrical prints. You need four wires. Two for the emergency stop circuit and two for the top stop circuit.
4. Determine how you will connect wires to the input check circuit (terminals marked "IN A" and "IN B.") You need two wires. These inputs must be in parallel with one of the coils of the dual safety valve that controls the clutch/brake. When the clutch is engaged, 12–250 Vac or Vdc (50-60 Hz) must be present across terminals A and B. See Figure 2-8A. The connection can be made inside the press control where the circuits to the valve relays are wired in. Refer to your press control manual and electrical prints. It does not matter which wire goes to which terminal on the connector.
  - a. For applications where voltage is 60-250 V: Set switch S101 to the left. This is the factory setting.
  - b. For applications where dual safety valve coil voltage is 12-60 Vac or Vdc: Set switch S101 to the right. The switch is marked 12-60 V. (*This switch is located at the upper right-hand portion of the board. See Figure 2-5 for location of switch. See Figure 2-8B for illustration.*)

### HOW THE INPUT CHECK CIRCUIT DETECTS RESOLVER CHAIN BREAKAGE

When the dual safety valve relay is energized by the press control to start the press, voltage will be produced in the input check circuit. This signals ProCam that the press ram should begin to move. If ProCam gets no signals from the resolver within a short period of time (resolver not turning), it opens the emergency stop circuit. A "loss of rotation" fault message is displayed on the screen. The press could have started but the resolver belt or chain broke or was significantly too loose so that the resolver shaft did not move. Other possible reasons for the fault could be low air pressure to the clutch or a bad clutch.

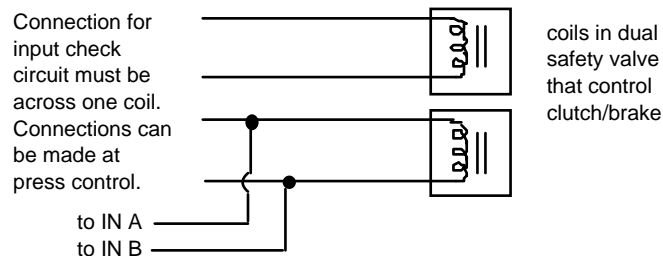


Figure 2-8A. Schematic of input check circuit for 10-130 Vac or Vdc

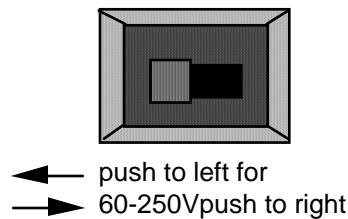


Figure 2-8B. Input check switch (S101)

- Find the 115V-230V voltage selector switch. It is just below the power connection to the left. 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 down.

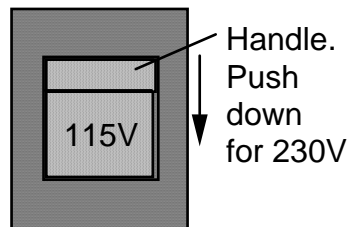
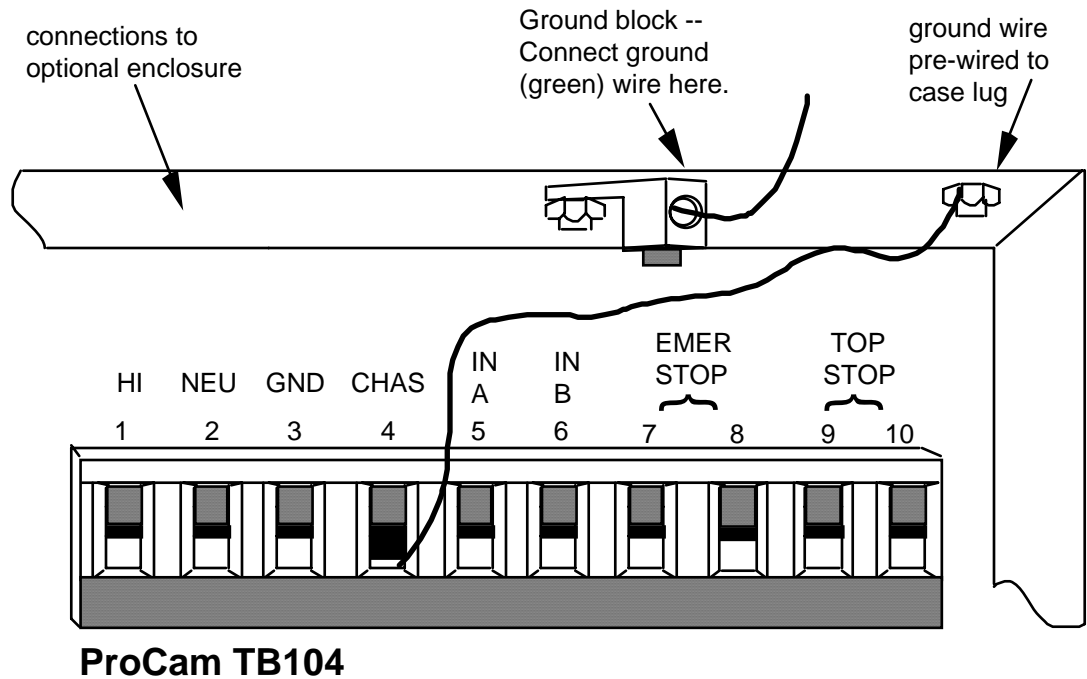


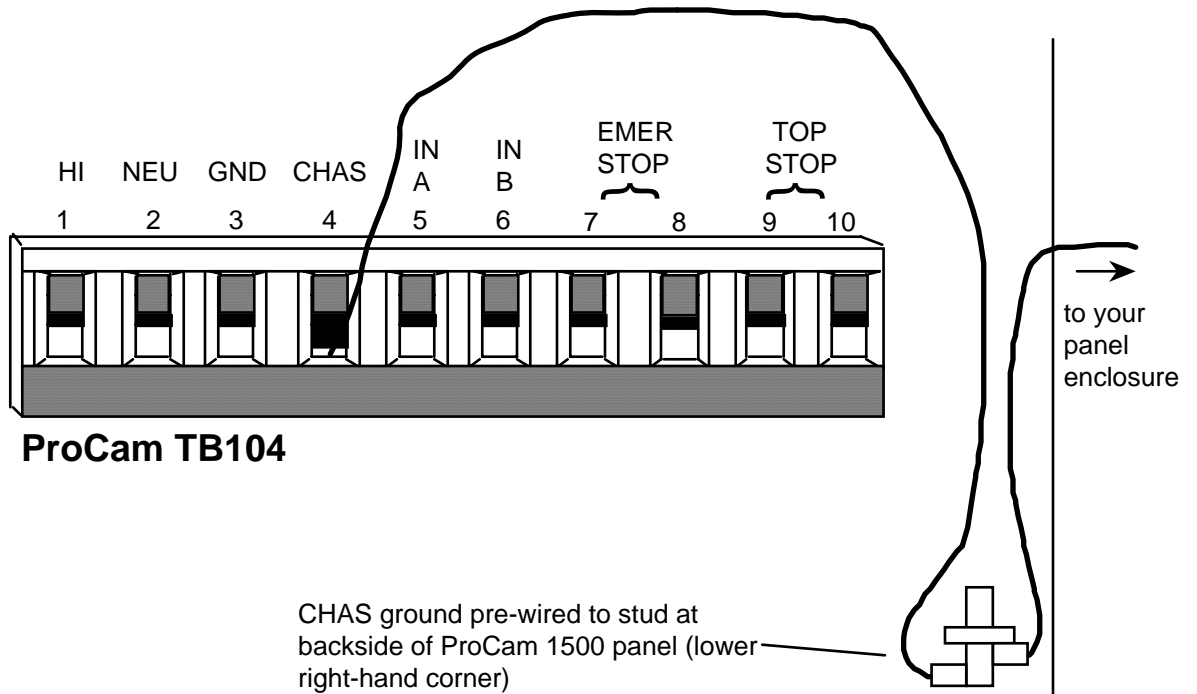
Figure 2-9. Setting voltage selector switch

- Run the power, stop circuit, and input check circuit wires to ProCam through flexible liquid tight conduit to the enclosure. Because ProCam 1500 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.

**Figure 2-10A. ProCam 1500 with optional enclosure**



**Figure 2-10B. ProCam 1500 with your panel enclosure**



*Connections and ground block for AC power. Also on connector are terminals for input module, top stop and emergency stop circuits.*

7. To make ground connections:  
For the optional enclosure: Refer to Figure 2-10A. Your ground (green or green/yellow) wire must be connected to the ground block, not to "GND". The ground block is located on the wall of the unit just above the connector as shown. To connect to the ground block, strip the ground wire about 1/4" (6.4 mm) from end, loosen screw on block, slide wire in hole, and tighten screw to pin wire in place. A ground wire is attached from the connector to a case lug. Leave the ground wire attached to the connector while making connections. *If you remove this wire in order to pull the connector all the way out of the unit, be sure to replace it when done.*  
For your enclosure: Refer to Figure 2-10B. Connect your ground wire (green or green/yellow) to the case lug found on the lower right-hand side of the ProCam panel. A ground wire is already attached from this case lug to CHAS on terminal block TB104. Leave this ground wire attached. Hardware is provided; so you can attach your own ring lug on top of the case lug. *If you remove the wire from CHAS on TB104 in order to pull the connector all the way out, be sure to replace it when done.*
8. Now find the connector TB104 for the other AC wires and stop circuits. It should be plugged into the socket.
9. Connect power wires as shown in the above illustration. For 115 Vac, 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.*
10. Connect wires from the press control top stop circuit to the terminals marked top stop (9 and 10). It does not matter in which order you connect the wires.
11. Connect wires from the press control emergency stop circuit to the terminals marked "emer stop" (7 and 8). It does not matter in which order you connect the wires.
12. Connect wires for the input check circuit to the terminals marked "IN A" and "IN B." It does not matter in which order you connect the wires. See Figure 2-8A.
13. Plug connector back into its slot. Double check connections with markings at the connector base to make sure you did not wire it backwards.
14. Connect top stop, E-stop, and check input circuit wires at the press control or other box into which you are tying them. *Do not connect wires to AC power source until you are done with all other installation procedures.*
15. Make all necessary conduit connections to ensure NEMA 12 protection. ProCam 1500 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**

Be sure you replaced the power supply cover. Do not connect AC wires to the power source until all other installation procedures are finished.



## Connecting programmable cam channels

### Important change about the cam outputs assembly/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, contact the factory before installation.

You connect the cam channels inside the ProCam controller to the ProCam output assembly. The enclosure (optional -- you can obtain the board only) contains the relays that control the timing signals for your equipment. You connect your equipment to the relays. The relays open and close circuits to your equipment at the angles (degrees of the stroke) that you set.

### Making the connections

1. Select a convenient location for running conduit from ProCam to your equipment. 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 2-11a).

**NO CONTACT TO METAL:** Mount the cam output board 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 travelled 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 — slots labeled K301 through K305, K307, K309, and K311 (see Figure 2-11b).
  - b. If you plan to use solid state relays, then they can only be plugged into channels 5 through 8 only — slots 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 2-11b.
  - 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.

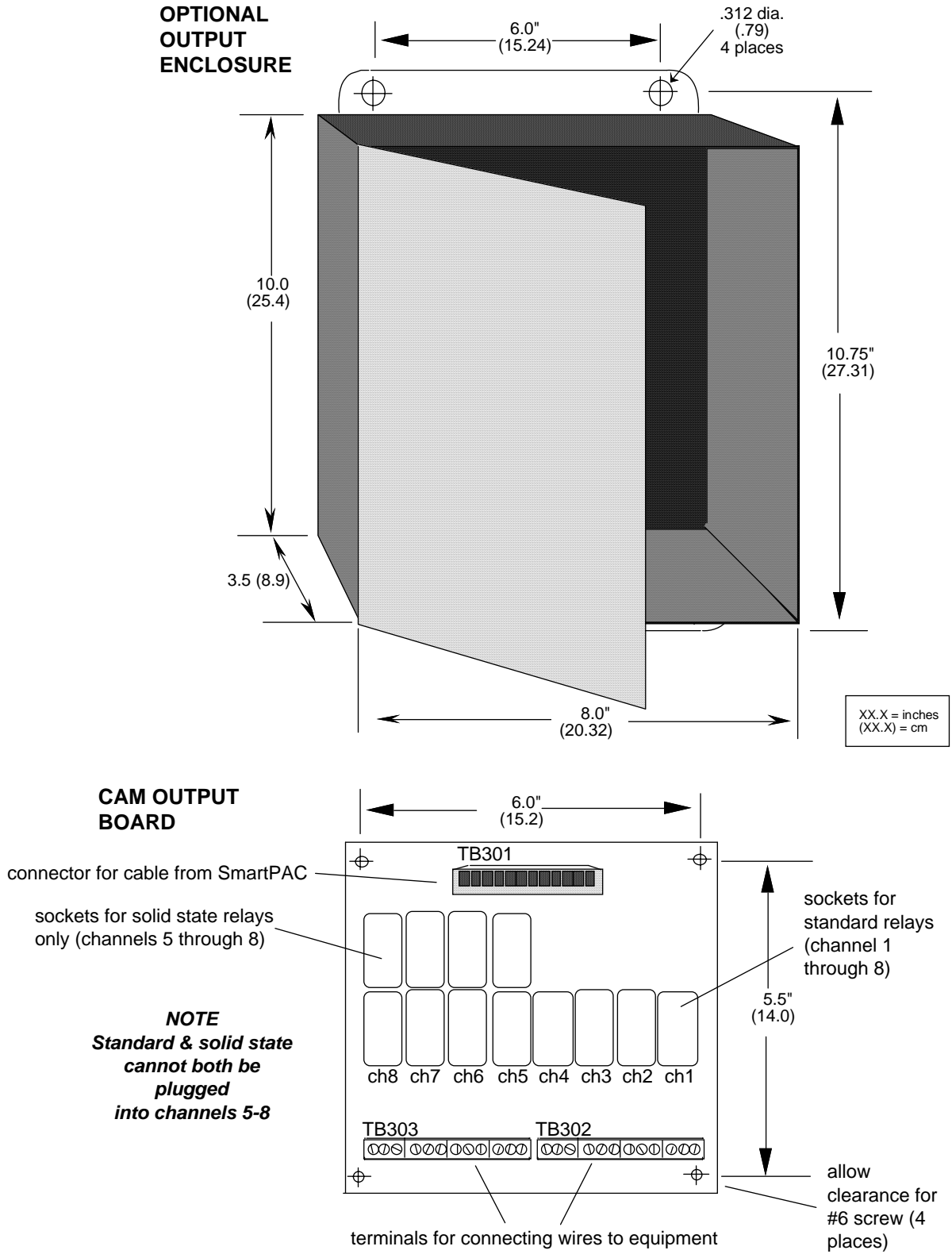
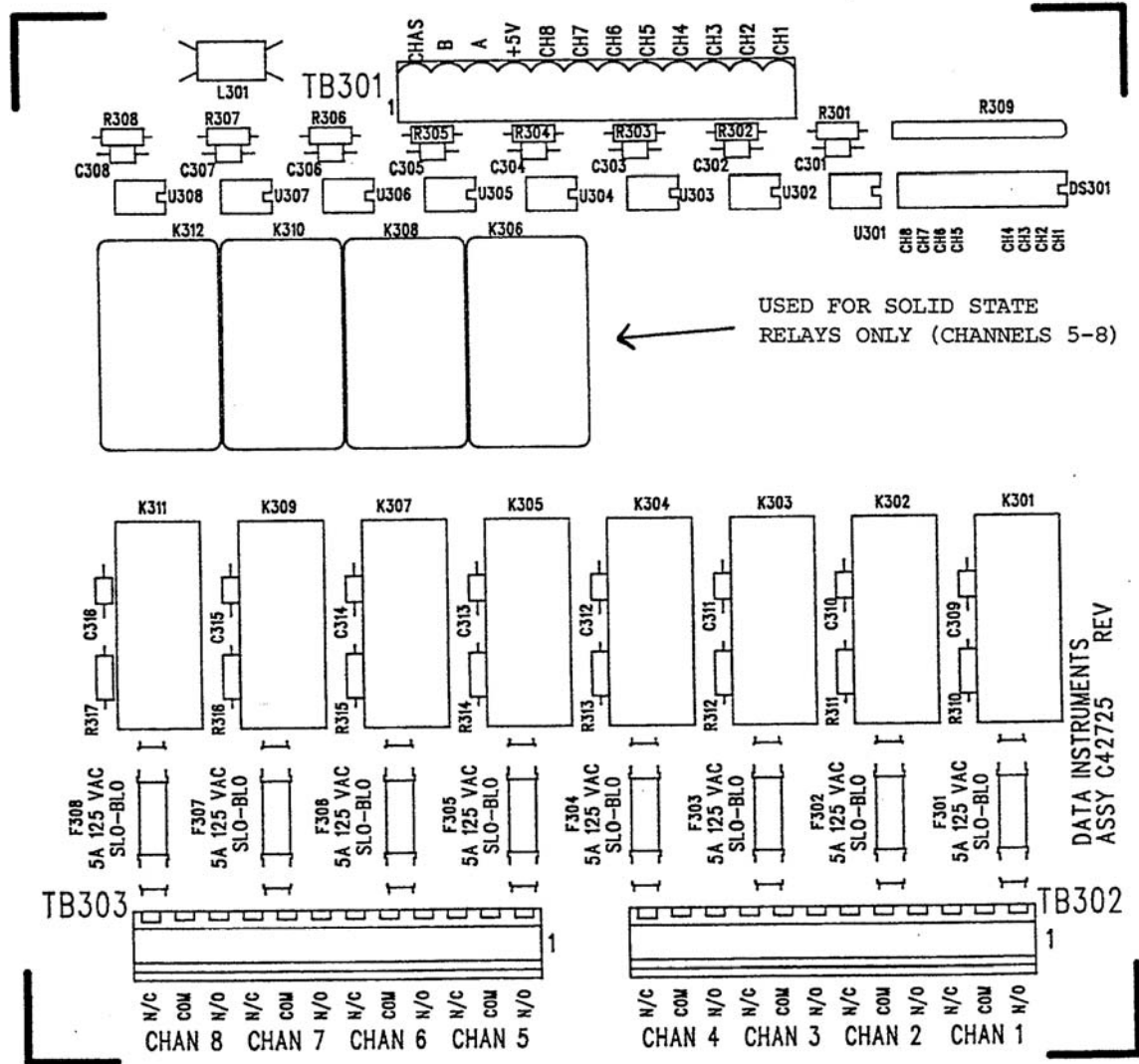


Figure 2-11a. Cam outputs assembly

Figure 2-11b. Location of components - Cam outputs assembly



**Table 2-1. ProCam 1500 (TB102) to ProCam Output assembly (TB301)**

Wire	TB102 (Pin #)	TB301 (Pin #)
Black	GND (11)	A (3)
White	Relay PWR (10)	B (2)
Red	+5V OUT (9)	+5V (4)
		Opt. CHAS GND (1)

Power Connections

Wire	TB102 (Pin #)	TB301 (Pin #)
Brown	CH 1 (1)	CH 1 (12)
Purple	CH 2 (2)	CH 2 (11)
Orange	CH 3 (3)	CH 3 (10)
Yellow	CH 4 (4)	CH 4 (9)
Blue	CH 5 (5)	CH 5 (8)
Gray	CH 6 (6)	CH 6 (7)
Pink	CH 7 (7)	CH 7 (6)
Tan	CH 8 (8)	CH 8 (5)

Channel Connections

**Table 2-2. 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

4. Find the cable that runs from the ProCam connector TB102 to TB301 inside the ProCam output enclosure. The cable has twelve wires.
5. Attach one end of the cable to the connector for TB102. Refer to Table 2-1 for proper wiring. (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 box.
7. Attach the other end of the cable to the connector for TB301. See Table 2-1. A wire from CHAS to a lug on the ProCam output enclosure should already be connected (unless you bought the board only).
8. Plug cable connectors into their sockets.
9. To connect the relays to your equipment, use connector TB302. See Figure 2-13.

**NOTE**  
See Table 2-2 and Specifications in Chapter 1 for additional information on the cam channel relays.

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 ProCam. 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 the ProCam keyboard to set 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 Table 2-2.

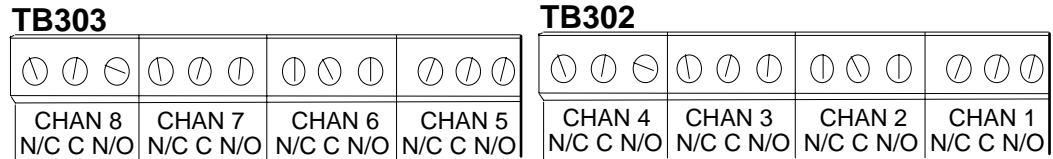


Figure 2-12. Connectors TB302 and 303 for wiring from relays to equipment

10. You must install arc suppressors across each inductive load (motors, relays, coils, etc) that is connected to an output relay. Suppressors are supplied with each relay. The suppressors reduce electrical noise and will extend the life of the relays. Find the suppressors supplied with the relays. They are blue and cylindrical in shape with leads at each end (they look like a capacitor).

**DO NOT INSTALL SUPPRESSORS ACROSS RELAYS**  
Suppressors must not be installed across the relay contacts inside the ProCam output 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 or as close to the load as possible. Attach suppressors by connecting leads across existing terminals or junction points. See Figure 2-13 for the correct way to install them.

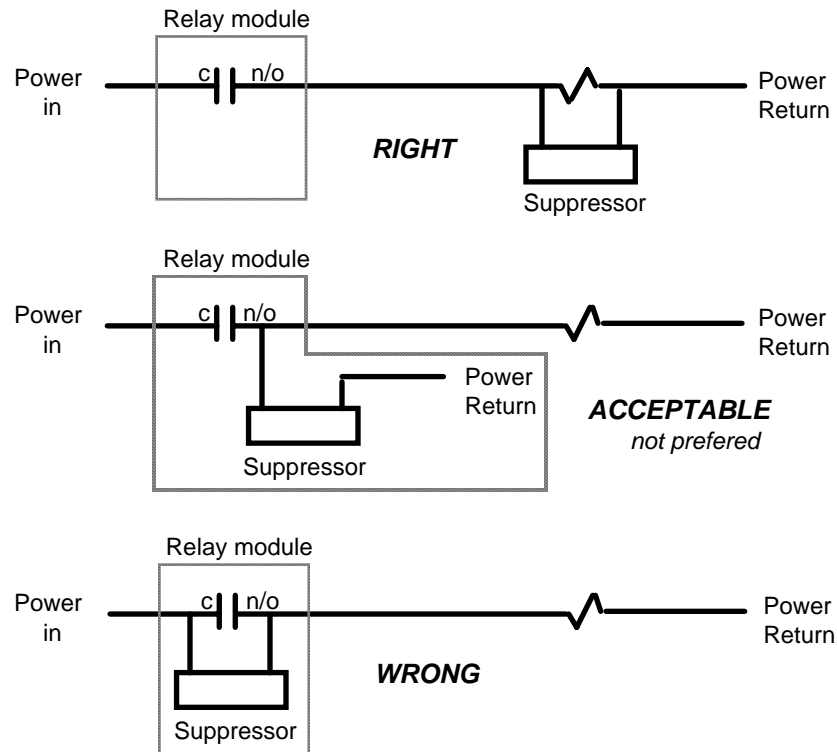


Figure 2-13. How to connect suppressors across the load

## Power-up prechecks

You are almost ready to turn ProCam on. Before continuing, make sure that you have completed all the procedures in this chapter up to this point. Then go through the checklist below to be sure ProCam is wired correctly.

<b>Check these items before turning ProCam on</b>	
<input type="checkbox"/>	Is the ProCam 1500 voltage selector switch set for the right voltage—115 Vac or 230 Vac)? See Figure 2-9.
<input type="checkbox"/>	Is the resolver cable wired to the connector correctly. See Figure 2-6.
<input type="checkbox"/>	Is there an output relay for each wired output terminal?

Everything checked? Now, if you installed the ProCam output enclosure, pull the connector at TB301 out of its socket. This prevents any equipment from running when you turn ProCam on. We will check out this part of the unit later.

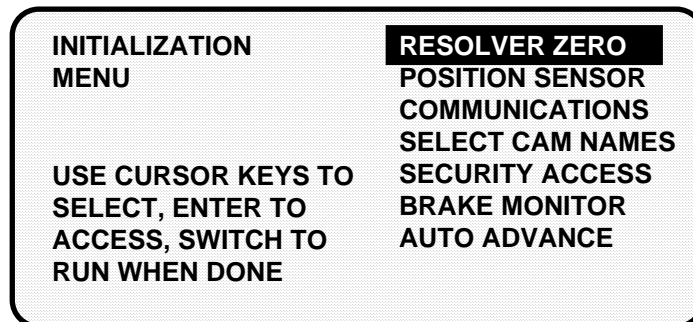
For those who are installing the position sensor, remember that we ran wires to ProCam for it but have not yet connected the wires. Tape the ends of these wires and get them out of the way for now. (if you have the optional enclosure, push the wires into the lower corner of the box). We will attach these wires after zeroing the resolver.

## Connect AC power wires from ProCam 1500 to power source

Connect AC power wires from connector TB104 in ProCam to power source. Be sure power is off at the terminals to which you are connecting wires.

## Turn on power to ProCam and check display

Turn on power to ProCam. Turn the Program/Run key to "program". Then press down on both the left and right "angle off" keys at the same time for one second. You should see this display on your screen:



If your screen is blank, first check the setting for the contrast adjust knob to the right of the screen. If it is all the way to the left, the screen is completely dimmed. Turn the knob one quarter turn to the right. You will see the menu now. Adjust the knob for best viewing.

If the contrast adjust knob was not the problem, there is probably a problem with power to ProCam. Turn power to ProCam 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.

## Zero Resolver

With the Initialization Menu on your screen, you can now zero the resolver. *Important: the press must be at top dead center  $-0^\circ \pm 2^\circ$ —before you zero.* If you set the resolver to zero degrees when the press is, say at  $160^\circ$ , your timing settings will be way off.

### If your press is at TDC

If you set the press to TDC ( $0^\circ \pm 2^\circ$ ) before starting the installation and have not moved the ram, go to the instructions for zeroing.

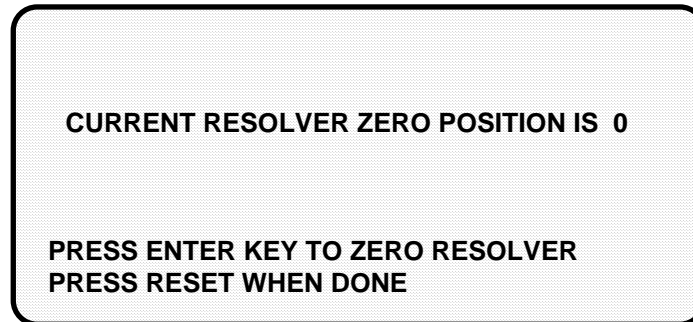
### If your press is not at TDC

If the ram is not at TDC, you must inch the press to  $0^\circ \pm 2^\circ$ . To do this now, you have to load settings for a tool. ProCam 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 settings for a tool. As long as you do not have a die in the press, it does not matter what settings you use.

After settings are loaded, set the Program/Run key to "run". Inch the press to  $0^\circ \pm 2^\circ$ . Do not rely on the readout to tell you where TDC is. This is inaccurate until the resolver is zeroed. Use a dial indicator or some other means to determine  $0^\circ$ . Once you are at  $0^\circ$ , go back to Initialization mode. Then go to the instructions below for zeroing the resolver.

To zero the resolver:

1. Select "Resolver zero" from the Initialization menu. This is the first choice on the menu. To select, use the cursor keys to move the bar over the words "resolver zero". ("Resolver zero" may already be highlighted.) Then press ENTER.
2. You will see this display:

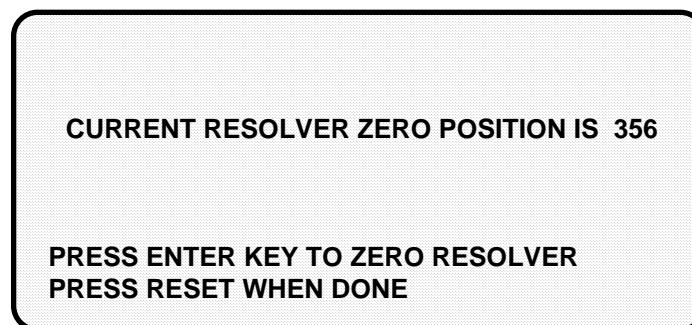


Look at the LED readout. It will now show the resolver position. If the resolver is anywhere between  $330^\circ$  and  $30^\circ$ , you can go to step 3. ProCam will automatically correct the offset and the angle readouts will indicate the true angle of the ram.

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

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  $330^\circ$  and  $30^\circ$ .* Then press ENTER. You will see a display like the following example (in this example, the angle is  $356^\circ$ ):



The number shown will be the zero position of the resolver. ProCam electronically adds or subtracts the offset (4 in our example) so 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 close 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.

## Installing the position sensor (optional)

Installing a position sensor is optional. It must be installed only after the resolver is zeroed. It is a magnetic proximity switch that monitors the resolver's position. It consists of a magnet which you mount on the crankshaft (or other shaft) and a stationary sensor which is mounted just above the magnet so that it detects the magnetic field every time the shaft passes 0°. ProCam receives the signal from the sensor at 359° and checks that the resolver is also signalling 359°. If it is not, this means the resolver is no longer rotating at a 1:1 ratio with the press. The resolver drive has slipped or has broken, or the resolver itself is broken. ProCam will signal an emergency stop and display an error message.

To install the position sensor:

1. First you must load a tool number. This is so that you can switch ProCam to Run mode and see the angle of the crankshaft in the LED readout. If you have not made any settings for a tool, you will have to do so now. This is why we told you to become familiar with the ProCam displays before starting installation. It does not matter what settings you make for now since no die is in the press. You can simply enter a tool number and make some counter settings. You can create any settings, then delete or change them later.
2. After loading a tool number, switch to Run mode (set the Program/Run key to "run").
3. Check the number in the LED readout. If it is not zero, inch the press until the readout shows zero. *The press must be at zero resolver degrees before the position sensor can be installed.*

*NOTE: If the numbers in the readout decrease as you run the press instead of increasing (that is, the numbers go from 359°, 358°, 357°, ... to 0° instead of 0°, 1°, 2°, ... to 359°), swap the black wire and yellow wire (terminals 2 and 5) on connector TB105.*

4. Now shut off power to ProCam and the press control.
5. You are ready to install the position sensor. Select a mounting site for the switch and the magnet so that the magnet rotates 1:1 with the crankshaft of the press. Ideally this is on the crankshaft itself. See Figure 2-1 for an 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 position sensor would then be out of alignment with the crank if a failure occurred, but they might stay in alignment with each other. The position sensor would not signal the fault, and ProCam would not provide accurate timing for anything it controls.
6. Install the position sensor as shown in Figure 2-14 below. The magnet should be installed plastic side up with a non-ferrous metal screw. It is important not to use a ferrous screw because it could cause false signals. A brass screw (6-32) is supplied. Use a No. 36 drill and a 6-32 tap.

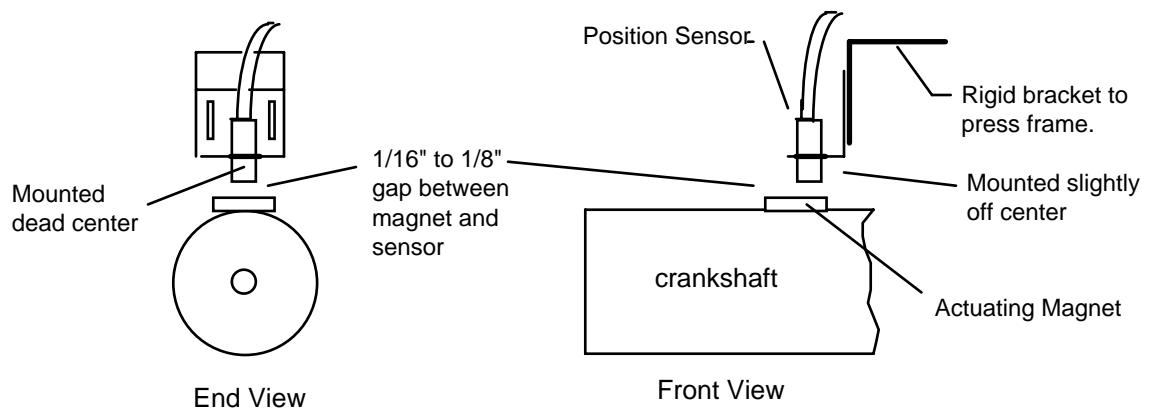
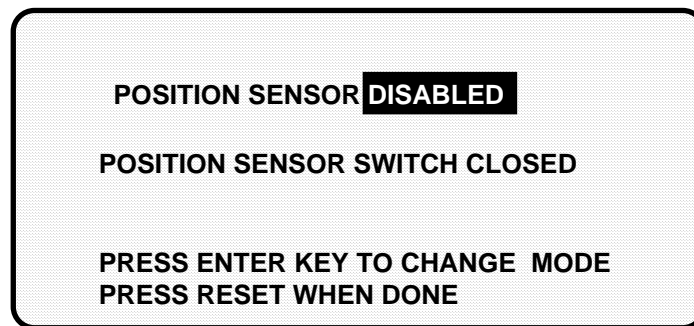


Figure 2-14. How to install the position sensor

7. Once the switch is installed, wire it to the connector for TB101. Black wire goes to terminal 6 (GND); white or clear goes to terminal 3 (position sensor); red goes to terminal 5 (sensor power).
8. Turn on power to ProCam. Turn the Program/Run key to "program". Then press both the left and right "angle off" keys at the same time for one second.
9. You will now see the Initialization menu on your screen. Select "position sensor" from the menu. You will see a display like the following:



10. Press ENTER to enable the position sensor. The top line in the display above will say: *POSITION SENSOR ENABLED*
11. If you properly installed the position sensor, the second line in your display will say "position sensor switch closed." If so, go to step 12.

If it says "position sensor switch open", there is a problem. Since you just mounted the sensor and aligned it with the magnet, the sensor should be closed. Double-check the wiring. Make sure the ram has not moved since you installed the sensor. If so, bring it back to 359°. You will have to load settings for a tool and switch to Run mode to do this so it is not likely that you moved the ram. But check anyway.

If the ram has not moved, check the distance between the position switch and the magnet. Re-adjust if necessary. If you got a "position sensor incorrect" error message after running the press, it is also possible that the position sensor may not have enough dwell to provide an adequate signal at high speeds. The larger the diameter of the object on which the magnet is mounted, the shorter the dwell, as shown here. If this is the problem, the solution is to mount the magnet on a smaller shaft.

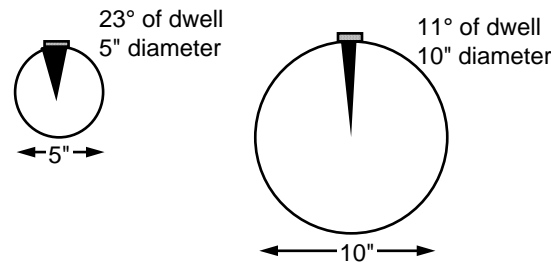


Figure 2-15. Position sensor dwell on different diameter shafts

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 Data Instruments' technical advisors for help. Do not go further until the problem is solved.

12. You are done installing the position sensor. Now you can start the final checkout.

**DO NOT DISABLE POSITION SENSOR**

Once installed, never disable the position sensor using the Initialization Menu to clear an error message. Misalignment between the resolver and crankshaft will not be detected.

## Installing high speed version of ProCam 1500 (optional)

If you have a standard ProCam 1500 and wish to change the system to a high speed version (1600 SPM maximum), follow these instructions:

### Moving the jumper:

1. See Figure 2-5 for the location of the jumper J101. Notice that the jumper is set on pins 2 and 3 (for 800 SPM).
2. Move the jumper so that it will be on pins 1 and 2 (for 1600 SPM).

### Upgrading the firmware:

1. **Verify that power has been turned off to ProCam 1500!** The LCD display on the front panel should be blank and the angle/RPM display should be unlit.
2. Looking at the underside of ProCam 1500, locate the firmware chip (see Figure 2-5). Notice that the firmware chip has a label on it.
3. Note the orientation of the firmware chip. There is a semi-circular notch on the bottom of the chip. When you replace the chip, the notch on the new chip *MUST* also be facing downward.
4. 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.
5. Open the package containing the new firmware chip. Before you remove the chip 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.
6. Once you are "grounded", remove the chip from its holder. *Orient the chip so that the notch faces downward. If you plug the chip in backwards, it will be destroyed.*
7. 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 .
8. 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 eachother.
  - C. Try plugging the chip into the socket again, as in Step 7. If necessary, repeat Steps 8A and 8B.
9. Make sure that the notch in the chip is at the bottom and that all of the pins are in the socket.
10. 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 repeat Step 9. Sometimes one or more pins are bent and not plugged in properly. If the unit is still malfunctioning, call Data Instruments for assistance.

## Final checkout

If you have completed all procedures in this chapter, ProCam is almost ready to use. All you need to do is to make a few test press runs to ensure that ProCam is working properly. You will have to make some settings for a tool and load the tool number to run the press (refer to Chapter 5 if you need more assistance). If you are not familiar with how to use the ProCam keyboard and displays to create and load settings for a tool, begin to learn how to make settings now, and see Chapter 3 if necessary. Then complete the steps below:

### Check and set direction of rotation of resolver

1. If you installed the position sensor, go to Step 2 (resolver rotation has already been checked). If not, inch the press. Watch the angle/SPM readout. If the angle of the crankshaft decreases (goes from 359° towards 0°) instead of increasing, you have to switch two wires on resolver connector TB105. Switch the wires in terminals 2 and 5 (black and yellow). The angle will now increase as the ram moves.

### Check for error messages when the press is run

2. Single stroke the press for a few strokes. See if the press stops automatically and you get an error message on your screen. If no error message appears, go to Step 6. If you installed a position sensor and a position sensor fault occurs, refer to Step 11 of the position sensor installation procedure. For other error messages, go to Chapter 7 for a description of the error message. Follow the instructions under the error message for solving the problem. Once you correct the problem, press RESET and run the press again for a few strokes, checking for error messages. If none occur, go to Step 3. If you cannot solve the problem, call Data Instruments' technical advisors for help.

### Check the top stop circuit

3. Set a counter preset using the keyboard and display. See Chapter 5 -- "Set counters" if you need help. Run the press in continuous mode until the preset value is reached. Check that the press top stops and that a message is displayed on the screen (see Chapter 7 for counter preset messages). If so, go to Step 4. If the press did not top stop and ProCam displayed a message, there is a problem in your top stop circuit. Recheck all wiring and trace the cause of the problem. Do not continue with this procedure until the press top stops when the preset is reached.

### Check the emergency stop circuit

4. Clear the error message by pressing RESET. Keep ProCam in Programming mode. Try to run the press again. Check that the press does not start to run (there will not be any error message displayed on the screen) If all this occurs, go to Step 6.
5. If the press starts to run, there is a problem in your emergency stop circuit. Recheck all wiring and trace the cause of the problem. Do not continue with this procedure until you get an immediate emergency stop when you perform this step.

### Check cam channels

6. Turn ProCam off, and plug in the connector to TB301. (Remember we told you to unplug this earlier). Go into Run mode and create some settings for your cam channels. Load the tool settings, go into Run mode, and run the press. Ensure that the equipment (feed, blow off, lube, etc.) controlled by each channel is working properly according to the settings you made.

Test complete

7. If you got to this step, everything is working right. Clear any error message by pressing RESET. *Delete the test settings.* You can now load a tool, create settings for the tool, and begin to make parts using your new ProCam 1500.

## Wiring Top Stop with your mechanical cam switch (optional)

This is how to wire the ProCam with your mechanical cam switch to be used for Top Stop.

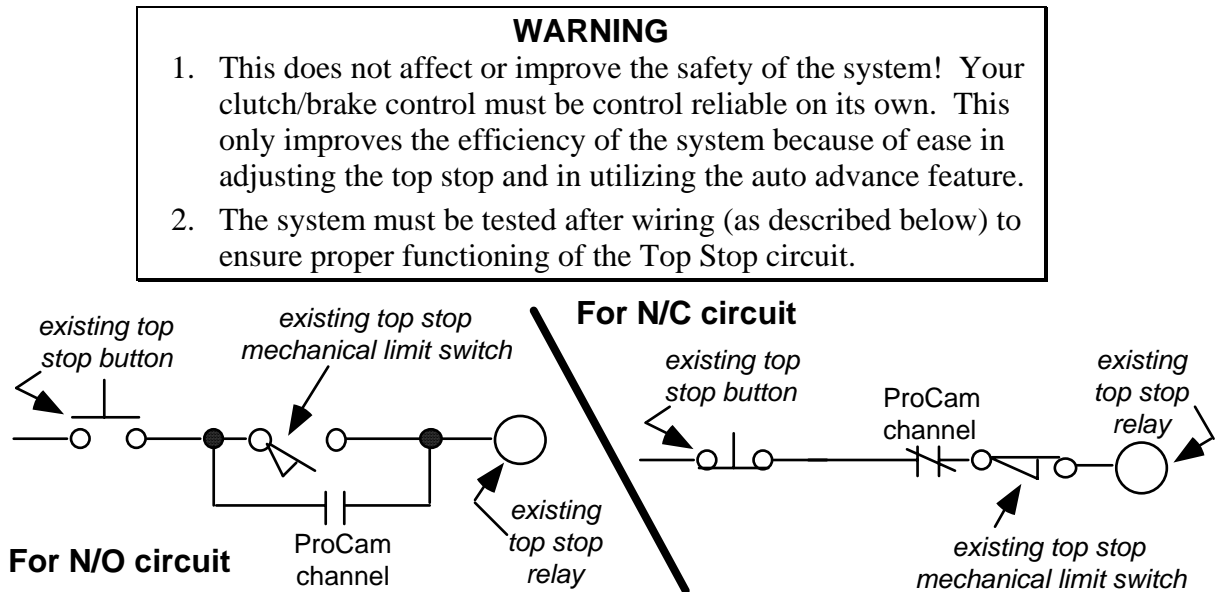


Figure 2-16. Optional top stop wiring

### How to test the wiring

1. For N/O circuit: *Temporarily* do not program the ProCam channel used for this wiring, so that it is "off" (open) all the time. Confirm that the press will still top-stop as before.
2. For N/C circuit: *Temporarily* program the ProCam 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 ProCam 1500*

## Final assembly

Once the final checkout has been confirmed and ProCam is working satisfactorily while it has been sitting outside the enclosure, you are ready to completely install the ProCam 1500 panel mount into the enclosure.

If you are using your panel enclosure: Remember earlier you had cut out a hole in your panel enclosure. Mount the ProCam panel assembly into this cavity using twelve #10-32 screws. Refer to Figure 2-2 and Figure 2-3 for mounting dimensions.

If you are using the optional enclosure: Remember earlier you had mounted the optional enclosure to the press or some other convenient location. Mount the ProCam panel assembly to the enclosure and tighten the hardware.



# Chapter 3

## About the keyboard and displays

---

This chapter gets you started in learning how to use the ProCam 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 ProCam is easy

If you are used to working with equipment with dials, switches, knobs, and flashing lights, using ProCam will be a little different. You will be dealing with a computer now, instead of those knobs and switches. Now you have a display screen to look at. At the bottom of each display on the screen, you will see messages telling you how to proceed. Just read these simple messages to see what key to press to get to the next step. Once you get the knack of it, you will find it a very fast and easy way 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 ProCam by pushing a wrong key or making a wrong selection. This chapter gives you the basics that will get you started.

### Your starting point in each mode

When you use ProCam, you choose the displays you want to see to get the task at hand done. The displays you see depend upon the mode of operation you are in. ProCam 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 only need to make once after installing ProCam.

In Programming mode, you make all the settings for your cam channels, create and load tool numbers, and do other things.

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

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

When you switch to a mode, you will see a display. From this first display, you can call up other displays you need to carry out your 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. Here are the first displays—or menus—you see in each mode.

### Initialization Mode

INITIALIZATION MENU	<b>RESOLVER ZERO</b>
	POSITION SENSOR
	COMMUNICATIONS
	SELECT CAM NAMES
USE CURSOR KEYS TO SELECT, ENTER TO ACCESS, SWITCH TO RUN WHEN DONE	SECURITY ACCESS
	BRAKE MONITOR
	AUTO ADVANCE

To see this display, turn Prog/Run key to program. Then press both the left and right "angle off" " keys once.

### Programming Mode

TOOL #'S	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	<b>4400</b>	24561	1150000
34	4567	35650	2150001
567	6666	65233	3456
666	1230	100000	5599999
USE CURSOR KEYS TO CHANGE SELECTION PRESS ENTER TO SELECT, RESET WHEN DONE			

To see this display, turn Prog/Run key to program. The currently loaded tool number is highlighted; or if none is loaded then "NEW" is highlighted.

### Run Mode

TOOL NUMBER 4400	<b>COUNTERS</b>
	ADJUST CAMS
	STOP/START
	SHOW TIMING
	LOAD TOOL #
USE CURSOR KEYS TO MAKE SELECTIONS. PRESS ENTER TO ACCESS SELECTION.	

To see this display, turn Prog/Run key to run.

**NOTE**  
Before you switch modes, the first display in the mode that you are in must be on your screen.

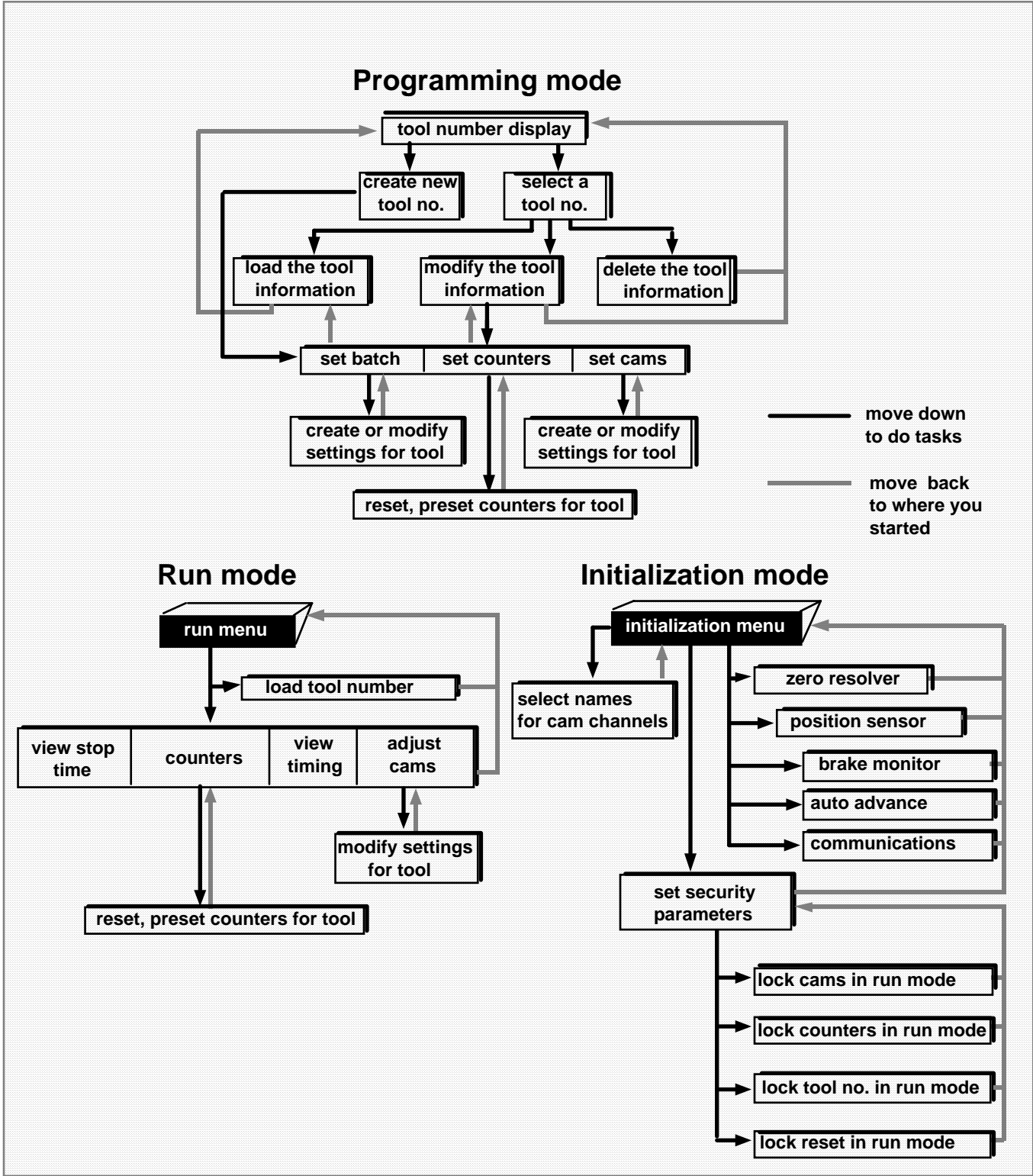
### From the first display down

Now look at the flow charts for each mode on the next page. They show how you move through the ProCam displays starting with the first display. Each box represents a choice you can make or a task you can perform. Follow the black arrows that point down. See how you work your way down, choosing the tasks you want to perform.

When you do this on ProCam, you will see a new display each time you make a selection. You continue to select items from each new display until your task is complete.

When you complete a task (like making settings for a tool), you have to go back up to start other tasks. You can go back just as easily as you go forward. See the gray arrows that point up. That is the route back. Try tracing a path down from the first

menu. Then go back up. Try different routes. This will give you a good idea of how you carry out tasks using the displays.



## 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.

Selection bar

TOOL #'s	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	<b>4400</b>	24561	1150000
34	4567	35650	2150000
567	6666	65233	3456789
666	1230	100000	5500000

USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE

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

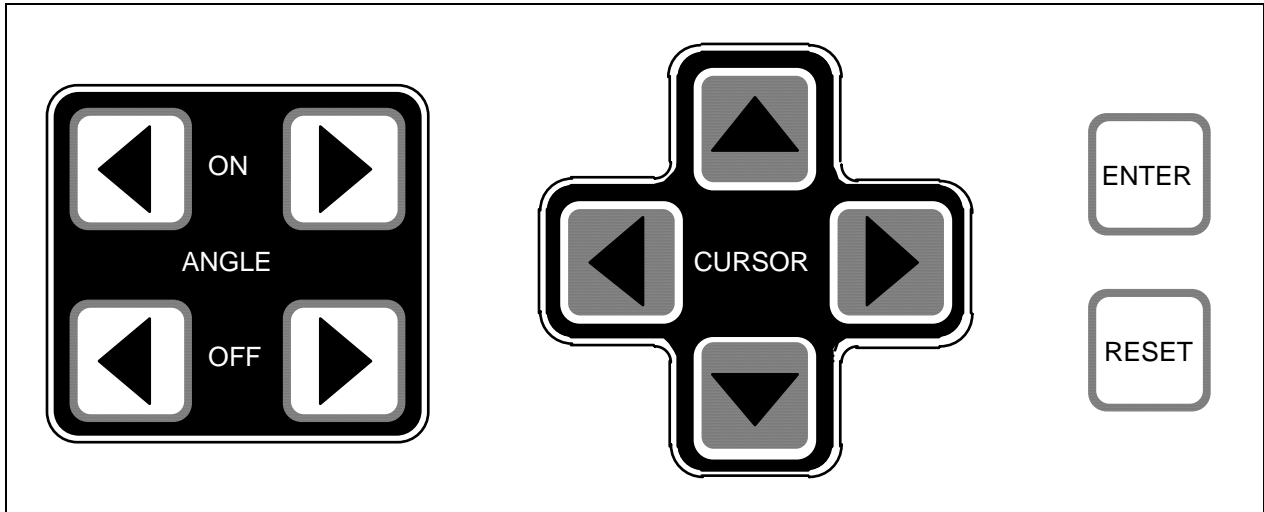
When we say SELECT in this manual, it means highlight the item and press ENTER.

Make the appropriate selection, and then press ENTER. ProCam 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 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 ProCam 1500 in Program mode" to learn what happens when you make the selections above.

## Using the keyboard

The ProCam keyboard is made up of cursor keys, angle keys, a RESET key, and an ENTER key. The cursor keys are at the right. The angle keys are at the left.



### Cursor keys

You use these keys to move the selection bar over the item on the display you want to select. You also use these keys to enter a number.

#### 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.

Right (▶), Left (◀)

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

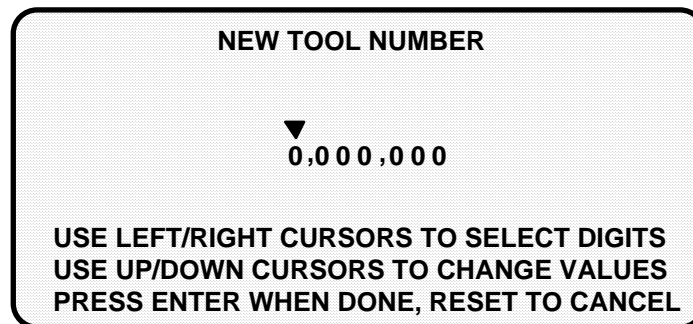
right key to move the bar to the right-most column, then press the key again. A new column will appear at the right if there are more tool numbers.

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" 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.

**Entering a number with the cursor keys** Whenever you select a menu item where you have to key in a number, you will see a display that looks similar to this:



Notice how the displays shows all zeros and a pointer is on top of the 0 at the far left. The message below the zeros tells you how to proceed. You use the cursor keys to enter the number.

To enter a number:

1. Let's say you want to enter 3456700. Press the up (▲) cursor key. You see the number under the pointer change to 1. Push it again, it changes to 2. Push it again and it changes to 3. You have set the first digit of the number.  
NOTE: If you were to hold the key down instead of just pressing it, the numbers under the pointer will keep changing from 0 to 9 over and over again until you let up. This is the speedy way to set your digit.
2. To set the next digit, which is 4, press the right (▶) cursor key. The pointer moves to the next digit to the right.

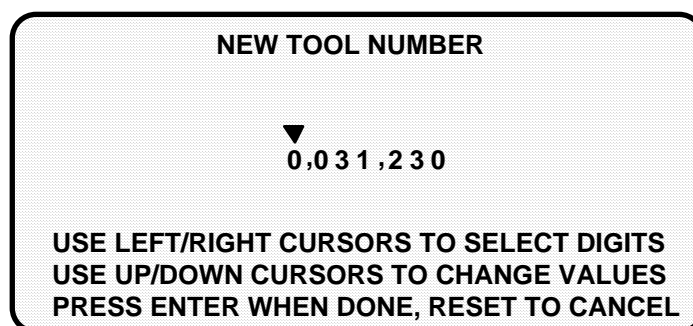
3. Use the up (▲) key to dial in 4. You can use the down (▼) key to back up if you go past it.
4. Now you can see how to continue. Use the "right" cursor key to move the pointer to the right. Use the "up" and "down" cursor keys to change the digit under the pointer. Continue in this way until you have entered the complete number.

If you make a mistake or want to change the number, just use the cursor keys to move back to the incorrect digits and change them. The "left" cursor key moves the pointer to the left.

5. When you are done, press ENTER. ProCam will accept the number and move on to the next display.

ProCam accepts numbers up to seven digits in length. If your number has fewer digits, leave unused zeros at the left. For instance, for 31230, enter 0031230. ProCam will recognize this number as 31230.

Here is how 31230 would look on the display:



### Angle keys

You use the angle keys to set timing for your cam switch, in other words to set the degrees of the stroke where you want a cam channel to turn on and off.

Notice the scale, just below your screen, which is shown in increments from 0° to 360° (see the next example). The angle keys graphically move a horizontal bar just above this scale. These angle keys function only when you have selected a display to make or change timing settings.

#### Angle on

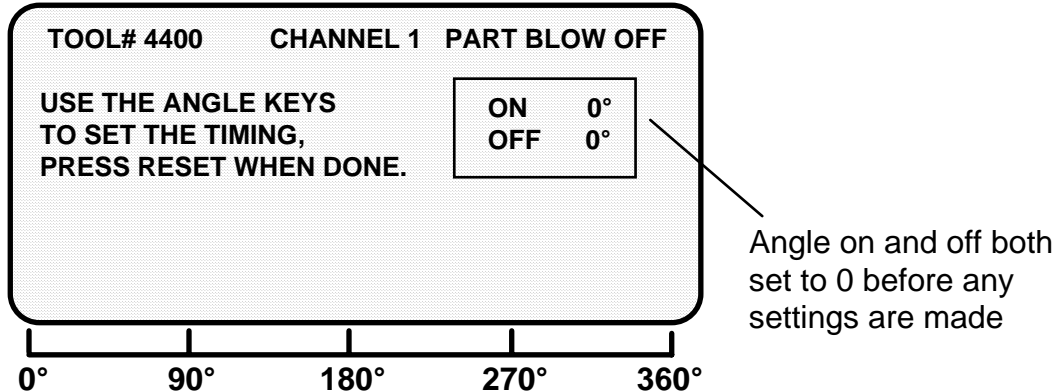
The angle on keys move the left edge of the bar to the "on" setting. The right (▶) key moves the left edge to the right. The left (◀) key moves the left edge to the left.

#### Angle off

The angle off keys move the right edge of the bar to the "off" setting. The (▶) key moves the right edge to the right. The (◀) key moves the right edge to the left.

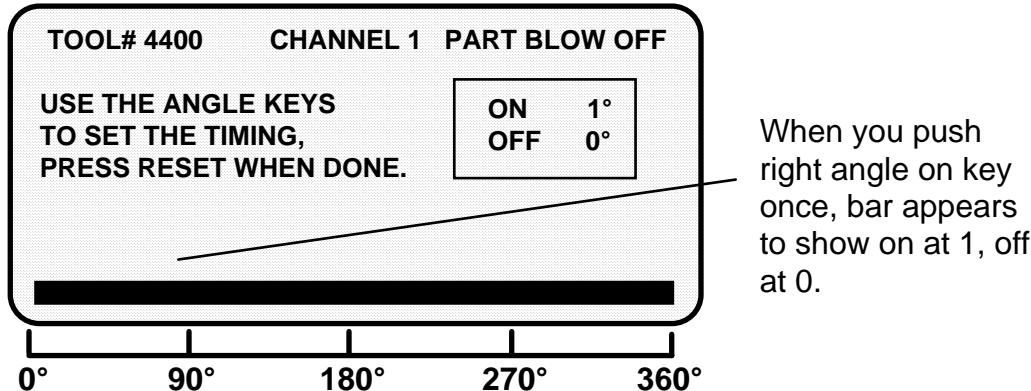
#### Example using the keys to make a setting

We are setting the cam channel to 250° on and 40° off. Bring up the display below on your screen. See Chapter 5 for complete instructions on how to create a tool number and make all settings. This example only covers how to make on-off settings.



#### Setting angle on

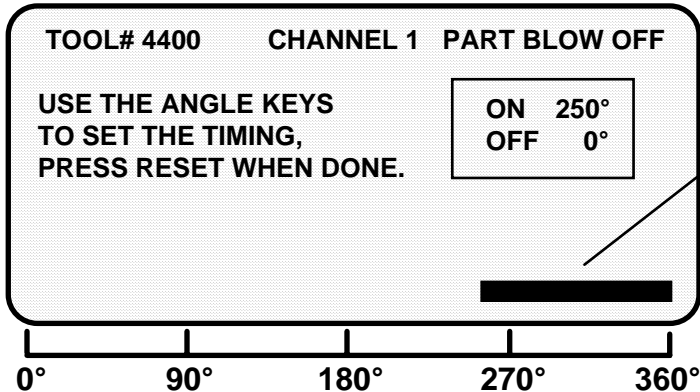
Push the right (▶) angle on key once. You will see this display:



A bar now appears from 0 to 360. The on/off box shows on at 1, off at 0. The bar shows this graphically. At this point, the cam is on for the whole stroke.

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

Continue to push the right (▶) angle on key. You can hold it down and the bar will keep moving until you let up. The left edge of the bar moves to the right. Stop when the left edge is at 250°. Check the "on" setting in the box. It should show 250°. If you go too far, use the left (◀) angle on key to back up. You will see this display:

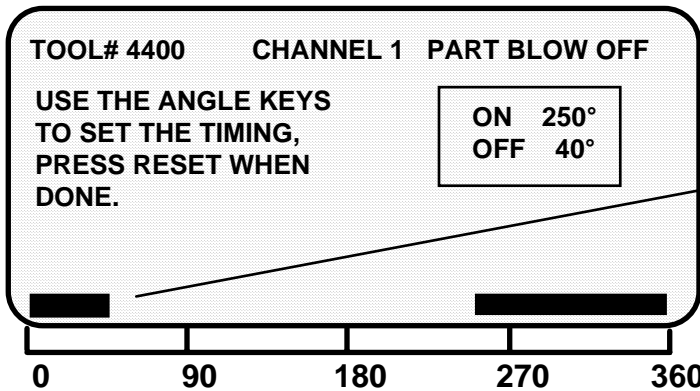


Left edge of bar now at 250. This is the "angle on" setting.

Now your cam channel is on at 250°, off at 0°.

**Setting angle off**

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



Right edge of bar wraps around 360° and moves to 40°. This is the final setting, as shown in the box.

You are done making the on-off setting for the cam channel. You can adjust this setting any time you want using the angle on and off 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.

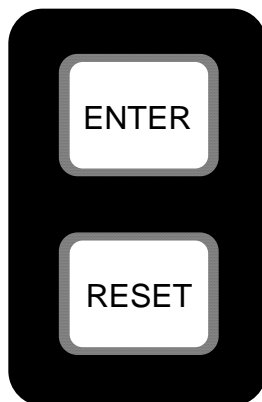
You are always told at the bottom of your screen when you can use the RESET key to go back to the previous display. The message will say, "Press Reset when done," or "Press Reset to cancel."

#### Resetting ProCam after stop or start time is exceeded or a when a counter preset is reached

The RESET key is used to reset ProCam after stop or start time is exceeded or when a counter preset has been reached. When you press RESET, you see the Run menu on your screen. 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, ProCam shows you a new display based on your selection. Using the cursor keys to make a selection and then pressing ENTER are the two most frequent things you will do when using ProCam. You also press the ENTER key after keying in a number. This tells ProCam to accept the number.



# Chapter 4

## Using ProCam in Initialization mode

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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 communications parameters, selecting cam channel names, setting the auto advance constant and the brake monitor, locking settings in Run mode, and setting Reset modes.

### About Initialization mode

In Initialization mode you make settings in ProCam that you only need to make once during or after installation. For example, you name your cam channels in Initialization mode. You only need to do this once. Also, you enable the position sensor (if installed), check position sensor operation, and zero the resolver using Initialization mode. These actions are only done once during installation.

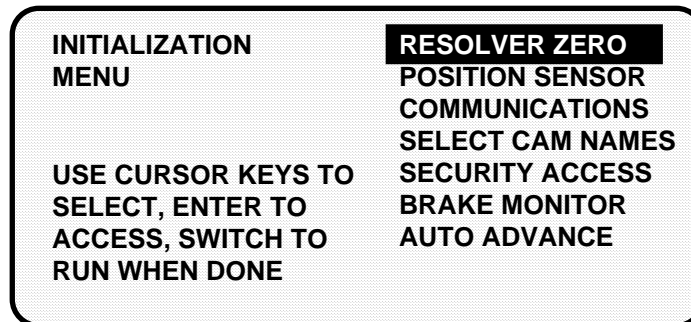
In addition, you can lock certain settings in Initialization mode so personnel cannot make adjustments or reset faults. If ProCam is connected to a computer, you can set the communications number for the unit.

### The first display—the Initialization menu

#### 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.

To get into Initialization mode, turn the Program/Run key to "program" and then press both the left and right "angle off" keys at the same time for one second. (See "Using the keyboard" - Chapter 3) You will see this display:



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 and carry out your tasks. Each choice is described next.

### **To get out of Initialization mode**

To get out of Initialization mode, turn the Program/Run key to "run" to go into Run mode and back to "program" to go into Programming mode. 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.

## **Resolver zero**

When you select "resolver zero" on the Initialization menu, you will see the current zero position of the resolver. The number displayed is the position (in degrees) of the resolver when the press is at top dead center. The number should be zero (or close to it) when the resolver is properly installed and zeroed.

How to use "resolver zero" is fully explained in Chapter 2—Installation. You only use this menu item when installing the resolver or replacing the resolver. Otherwise you never need to check what the resolver zero is. For more information on zeroing the resolver, see "Zero resolver" in Chapter 2.

### **SELECT = HIGHLIGHT + ENTER**

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

## **Position sensor**

This choice on the Initialization menu allows you to enable the position sensor if one is used. (Using a position sensor is optional.) This choice also allows you to check that the position sensor is working properly after it has been installed.

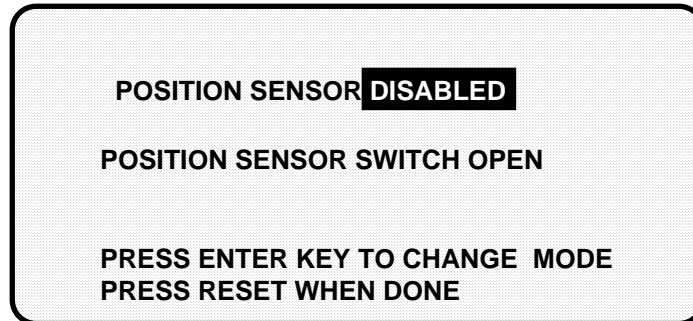
If you do not have a position sensor installed, the only time you need to use this choice is when you check that the position sensor has been turned off. You should check the setting if ProCam stops the press and you get this error message: "position sensor incorrect." This means you need to turn the position sensor off as described below.

If a position sensor is installed

You use this menu item only after the position sensor has been installed to turn the position sensor on and check operation. See "Install position sensor" in Chapter 2 for more information on the position sensor and how to use this menu choice.

If no position sensor is installed

If you do not use a position sensor, you should see this display when you select "position sensor." This is the factory setting:

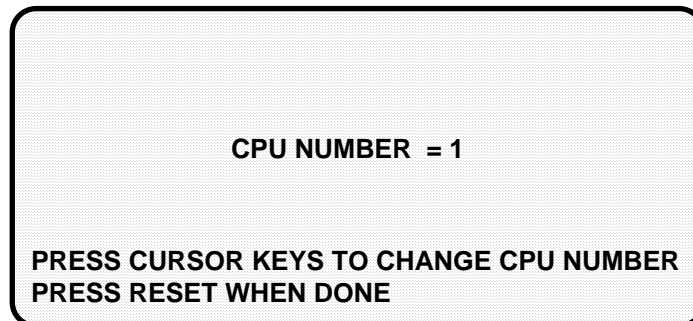


If the message says "POSITION SENSOR ENABLED", press ENTER. The message will then correctly say, "POSITION SENSOR DISABLED". Then press RESET to return to the Initialization menu.

## Communications

This choice on the Initialization menu lets you set an identification number for your ProCam if it is connected to PACNet®. ProCam 1500 can send and receive data from a computer using PACNet or Remote Storage and Retrieval (RSR — if purchased separately). If you do not use PACNet, then ignore this item.

If you are connected to PACNet, select "communications" to set the CPU number. You will see this display:



The CPU number shown is the identifying number of your unit. For instance, if you had many ProCams (and possibly other communications-compatible controls), you would identify them as 1, 2, 3, 4, etc.

To change the number, use the "up" and "down" cursor keys. The "up" key increases the number, and the "down" key decreases it. Set a CPU number for the unit. See your PACNet® or PACNet RSR user manual for more information on which CPU number to use. Then press RESET to go back to the Initialization menu.

## Select cam names

You can name your cam channels in Initialization mode to describe their function.

**SELECT = HIGHLIGHT + ENTER**

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

To name your cam channels:

1. Select "select cam names" from the Initialization menu. You will see this display:

<p><b>SELECT CAM CHANNEL TO NAME</b></p> <p><b>USE CURSOR KEYS TO MAKE SELECTION PRESS ENTER TO SET RESET WHEN DONE</b></p>	<p><b>CHANNEL 1</b></p> <p>CHANNEL 2</p> <p>CHANNEL 3</p> <p>CHANNEL 4</p> <p>CHANNEL 5</p> <p>CHANNEL 6</p> <p>CHANNEL 7</p> <p>CHANNEL 8</p>
--	--

2. You can name any channel by selecting it. Start with channel 1. You will see this display:

<p><b>SELECT NAME FOR CAM CHANNEL 1</b></p> <p><b>MORE NAMES▼ USE CURSOR KEYS TO MAKE SELECTION PRESS ENTER TO SET RESET WHEN DONE</b></p>	<p>UNNAMED</p> <p><b>ACTIVATE GAG</b></p> <p><b>ADVANCE SLIDE</b></p> <p>BYPASS 1</p> <p>BYPASS 2</p>
---	---

The display shows a list of names with the present name for the channel—channel 1—highlighted. You can select this name if no other name fits. Usually you will want to give the channel a name that best describes its function; so check the list for a suitable name.

3. To see more names on the list, push the "down" cursor key until the bottom name on the list is highlighted, then keep pushing it. A new name will appear each time you press the key.

There are 29 available names, and you can choose not to name a channel by selecting "unnamed". Use the "up" and "down" cursor keys to move backward and forward through the list to select the name you want.

4. After you select a name for channel 1, you will go back to the previous menu where you can select channel 2 and select a name for it. Continue in this manner until all your cam channels have been named.

*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. The channel names will appear in Program and Run modes along with the channel numbers.*

### Cam Channel Names

These are the names you can select for cam channels 1 through 8:

activate gag	mute one*	part lube	side action
advance slide	mute two*	pick	spray lube
bypass 1	outlet 1	pilot release	top stop
bypass 2	outlet 2	ready 1	trans forward
conveyor	part blow off	ready 2	trans grip
cutoff	part ejector	recoiler	trans lift
feed advance	parts kicker	retract slide	zero cam
feed complete			"unnamed"

\*For Pro Cam with Wintriss Press Control

## Security access

You use this choice on the Initialization menu to lock one or more actions so unauthorized personnel cannot perform these actions in Run mode. You also use this choice to set reset modes.

### **SELECT = HIGHLIGHT + ENTER**

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

### Locking Run mode

You can lock these actions: load a tool number, adjust counters, adjust cams, and reset faults. Once locked, personnel cannot carry out the action in Run mode. (Note: Program mode is not affected).

To prevent unauthorized personnel from unlocking these actions, you must remove the Program/Run key once ProCam is switched to Run mode. Then personnel cannot get into Initialization or Program modes to unlock or change settings. The key has to be positioned at "program" to get into these modes.

See Chapter 5—"Using ProCam in Program mode" and Chapter 6—"Using ProCam in Run mode" for more information on these modes.

To lock actions in Run mode:

1. Select "security access" from the Initialization menu. You will see the display below. The default settings (settings made at the factory) allow all actions at the left to be made in Program and Run mode.

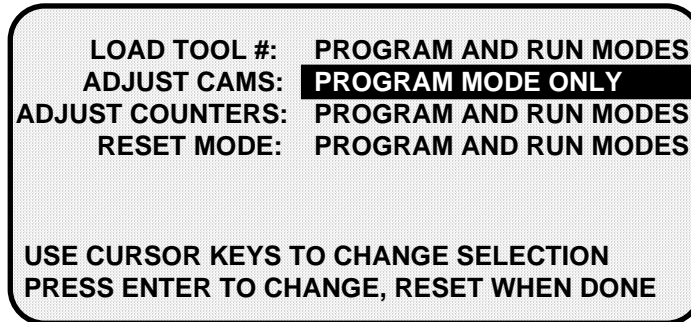
<b>LOAD TOOL #:</b>	<b>PROGRAM AND RUN MODES</b>
<b>ADJUST CAMS:</b>	<b>PROGRAM AND RUN MODES</b>
<b>ADJUST COUNTERS:</b>	<b>PROGRAM AND RUN MODES</b>
<b>RESET MODE:</b>	<b>PROGRAM AND RUN MODES</b>
<b>USE CURSOR KEYS TO CHANGE SELECTION</b>	
<b>PRESS ENTER TO CHANGE, RESET WHEN DONE</b>	

2. To lock out the action so it cannot be taken in Run mode, select "Program and Run modes" next to the setting. The setting is locked out. You will see the words "Program mode only" next to the action. You can lock out any of the other actions, or press RESET to go back to the Initialization menu.

*Example*

You want to prevent personnel from adjusting cams in run mode. Select "Program and Run mode" next to "Adjust cams."

You will now see this display:



Personnel can now adjust cams in Program mode only.

**Locking Reset mode**

Setting Reset mode to "Program mode only" means personnel cannot reset ProCam in Run mode after a malfunction occurs that stops the press. ProCam must be switched to Program mode to clear the fault message. Pressing the Reset key in Program mode clears the fault. The press can be run again once ProCam is switched back to Run mode.

Preventing the resetting of faults in Run mode is useful if you want one person to record or be aware of all faults that occur. This person would have the Program/Run key. Only he could reset faults by turning the key to "program" and pressing the Reset key.

## Brake Monitor

You use this choice in the Initialization menu to allow ProCam to set the stop (brake) and start (clutch) time limits of the press. In Run mode, you see the press's actual stop and start times and then compare them to the maximum values that you set in the Initialization mode.

You will not set these values in Initialization mode until the entire installation has been completed and everything is operating properly. Also before you set the brake monitor, you must first go into Run Mode and determine the actual stopping time and starting time of the press. See "Stop time" in Chapter 6 for step-by-step instructions.

A brake monitor is built into the ProCam. The brake monitor constantly checks brake wear by measuring stop time every time the press stops. The brake monitor measures the time from the closure of the dual safety valve to the stopping of the press crankshaft. It displays this number in milliseconds.



You set the brake monitor to a number (in milliseconds - mS) that is longer than the measured stop time. This extra time compensates for normal brake wear. When the stop time reaches the brake monitor setting, the brake monitor disables the press from further usage. This is telling you that your brake has worn to a point where it needs servicing.

The rule of thumb for setting the brake monitor is to add 20% to the stopping time of your press if your brakes are new. Add 10% if your brakes are old. The next step tells you how to calculate the brake monitor setting.

## Calculating the brake monitor setting

Once you have determined the press's stopping time in Run mode, you need to add extra time to this number to compensate for normal wear in your brake. Otherwise, the brake monitor would stop the press as soon as the stopping time increased just slightly. This extra time, referred to as " $T_{bm}$ ", must be a multiple of 10 mS. The minimum value of  $T_{bm}$  must be 20 mS. The stopping time plus  $T_{bm}$  will be the brake monitor setting.

*10% for old brakes, 20% for new brakes*

Here is the general rule that you can use to figure in this extra time. If your brake is older, add 10% to the stopping time. If your brake is new, add 20% to stopping time.

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 figure should be approximately the same as the figure you get when you add 10% to stopping time for an older brake.

*Examples for calculating the brake monitor setting*

Example 1: Your recorded stopping time is 200 mS and your brake is new:

$$\text{Take 20\% of 200:} \quad T_{bm} = .20 \times 200 = 40$$

$$\text{Add 40 to 200} \quad 200 + 40 = 240$$

240 mS is the calculated brake monitor setting.

Example 2: Your recorded stopping time is 250 mS and your brake is old:

$$\text{Take 10\% of 240:} \quad T_{bm} = .10 \times 240 = 24$$

Round to nearest multiple of 5 (5 and over, round up; 1-4, round down). After rounding,  $T_{bm} = 25$

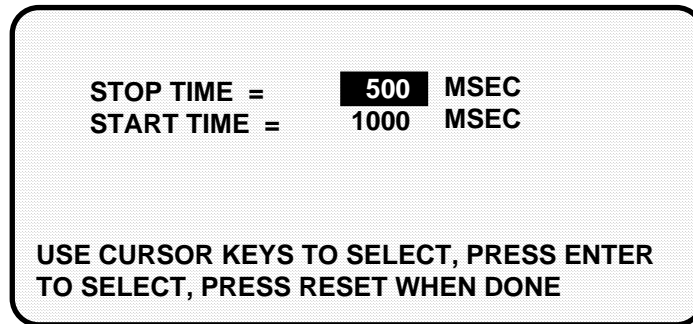
$$\text{Add 25 to 240} \quad 240 + 25 = 265$$

265 mS is the calculated brake monitor setting.

## Setting stop time limit

Stop time is the time that it takes the press crankshaft to stop once the dual safety valve has been closed to ground. The factory setting is 500 mS.

1. Select "Brake monitor" from the Initialization menu. You will see this display:



2. The bar highlights the stop time value. To change "stop time", press ENTER. Now the message at the bottom of the display reads:

USE CURSOR KEYS TO CHANGE VALUE  
PRESS RESET WHEN DONE

3. Use the cursor keys to change the stop time. Notice that each time you press either of the "up" or "down" cursor keys the number will change by 5 milliseconds. Press RESET when you are done. The start time value is now highlighted, and the message at the bottom of the display again reads:

USE CURSOR KEYS TO SELECT, PRESS ENTER  
TO CHANGE, PRESS RESET WHEN DONE

## Setting start time limit

Start time is the time it take for the clutch to be engaged in order to initiate the press. The factory setting is 1000 mS. It is a good rule of thumb to add 40% to the actual start time of your press.

Example: Your recorded starting time is 250 mS:

$$\text{Take 40\% of 250:} \quad = .40 \times 250 = 100$$

$$\text{Add 100 to 250} \quad 250 + 100 = 350$$

1. To change "start time", press ENTER. Change the value using the cursor keys. Press RESET when done.
2. Press RESET again, and you will see the Initialization menu.

## Auto Advance

You use this choice in the Initialization menu to set auto advance constants for up to two press auto advance functions. Some cam functions that may use auto advance are top stop, feed advance, 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.

$$\text{A.C.} = \# \text{ } ^\circ / 100 \text{ RPM}$$

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

1. Determine the fastest press speed (RPMa) and the optimum angle at which the press stops at this speed (Aa).
2. Determine the slowest press speed (RPMb) and the optimum angle at which the press stops at this speed (Ab).

### NOTE

If either of the stopping angles 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 "Ac".  

$$\text{Aa} - \text{Ab} = \text{Ac}$$
4. Subtract the two press speeds. We will call this result "RPMc".  

$$\text{RPMa} - \text{RPMb} = \text{RPMc}$$
5. Divide Ac (the difference between the angles) by RPMc (the difference between the press speeds), and multiply that value by 100. That is the number of degrees per 100 RPM.

$$\frac{\text{Ac}}{\text{RPMc}} \times 100 = \# \text{ } ^\circ / 100 \text{ RPM}$$

*Examples for calculating the auto advance setting:*

Example 1: Your fastest speed is 100 RPM and the stopping angle is at 325°. Your slowest speed is 50 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.

$$\frac{25}{50} \times 100 = 50.00 \implies \underline{50^\circ / 100 \text{ RPM}}$$

Example 2: Your fastest speed is 186 RPM and the stopping angle is at 340°. Your slowest speed is 120 RPM and the stopping angle is at 355°.

Subtract 186 RPM from 120 RPM.

$$186 - 120 = 66$$

Subtract 355° from 340°.

$$355 - 340 = 15$$

Divide the difference in angles by the difference in RPM, and multiply this by 100.

$$\frac{15}{66} \times 100 = 22.72$$

Round the number to get an actual angle reading.

$$22.72 \text{ rounds to } 23 \implies \underline{23^\circ / 100 \text{ RPM}}$$

23° is your advance constant.

Example 3: Your fastest speed is 355 RPM and the stopping angle is at 340°. Your slowest speed is 220 RPM and the stopping angle is at 16°.

Subtract 355 RPM from 220 RPM.

$$355 - 220 = 135$$

Subtract 376° (which is 360° + 16°) from 340°.

$$376 - 340 = 36$$

Divide the difference in angles by the difference in RPM, and multiply this by 100.

$$\frac{36}{135} \times 100 = 26.66$$

Round the number to get an actual angle reading.

$$26.66 \text{ rounds to } 27 \implies \underline{27^\circ / 100 \text{ RPM}}$$

27° is your advance constant.

The examples provided can be used to determine auto advance for top stop. To determine auto advance for other functions, such as feed, other methods must be employed.

#### **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. ProCam uses that value as a starting point to begin the auto advance process. If the incorrect number was entered in "slow RPM", ProCam would not auto advance certain press functions at the right time.

#### **To set auto advance constant and slow RPM:**

1. To set the auto advance constants and slow RPM, select "Auto Advance" from the Initialization menu. You will see this display:

```

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

```

**YOU CAN RUN PRESS TO ADJUST SETTINGS  
USE CURSOR KEYS TO SELECT, PRESS ENTER  
TO CHANGE, PRESS RESET WHEN DONE.**

2. 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.) Now the display reads:

YOU CAN RUN PRESS TO ADJUST SETTINGS  
USE CURSOR KEYS TO CHANGE VALUES  
PRESS RESET WHEN DONE.

3. Use the cursor key to change advance constant #1. Notice that when you use either the "up" cursor key or the "left" cursor key, the number increases by 1, starting with 1. If you use the "down" cursor key or the "right" cursor key, the number decreases by 1, and then jumps from 0 to 500, 499, 498, etc.
4. Press RESET when you are done setting advance constant #1. As soon as you do this, the bar jumps down to advance constant #2. Press ENTER to change this constant value.
5. Again use the cursor key to change advance constant #2. Notice that when you use either the "up" cursor key or the "left" cursor key, the number increases by 1, starting with 1. If you use the "down" cursor key or the "right" cursor key, the number decreases by 1, and then jumps from 0 to 500, 499, 498, and so forth.
6. When you are done, press RESET. As soon as you do this, the bar jumps down to slow RPM. Press ENTER to change this value.
7. Just as before, use the cursor key to change slow RPM. Notice that when you use either the "up" cursor key or the "left" cursor key, the number increases by 5, starting with 5. If you use the "down" cursor key or the "right" cursor key, the number decreases by 5, and then jumps from 0 to 2000, 1995, 1990, etc.
8. When you are done with slow RPM, press RESET. As soon as you do this, the bar jumps back to advance constant #1. You can repeat the above steps if you decide to modify any of your entries.
9. Press RESET one more time and you will see the Initialization menu.

#### **Auto Advance is adjustable**

One of the nicest things about the auto advance feature in ProCam 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".



# Chapter 5

## Using ProCam 1500 in Program mode

---

### **WARNING!**

ProCam 1500 can be used to provide timing inputs for Wintriss Press Control. With any other clutch / brake controls, ProCam 1500 should not be used to control clutch / brake timing. It is designed to control auxiliary functions only.

This chapter describes how to use all the displays you will see in Program mode. It covers making settings for a tool, loading tool information, deleting a tool number, modifying a tool number (setting counters, cam timing, batch mode, and counter increment angle).

### **About Program mode**

You use Programming mode to make all settings for your cams, counters, batch mode, and counter increment angle. All settings must be assigned a tool number. That is how you keep track of settings for each 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".

### **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.



If you are already in Run mode, just turn the Program/Run key to "program". You will see this display -- the tool number display.

TOOL #'s	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	<b>4400</b>	24561	1150000
34	4567	35650	2150000
567	6666	65233	3456789
666	1230	100000	5500000

USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE

This is the first display you see in Programming mode. It either highlights the currently loaded tool number, or "NEW" if no tool number has been loaded. From this display, you can call up all the other displays in Programming mode and carry out your tasks.

This section explains how to set (program) cam channels for a tool. To load tool numbers, see "Load the tool information" later in this chapter.

**SELECT = HIGHLIGHT + ENTER**

When you see SELECT in this manual, it means highlight the item and press ENTER.

## Selecting a Tool Number

You are at the tool number display. It will look like the one shown here with the word NEW in the first column and a list of tool numbers. (If no tool numbers have been created, you will only see the word NEW.).

TOOL #'s	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	<b>4400</b>	24561	1150000
34	4567	35650	2150000
567	6666	65233	3456789
666	1230	100000	5500000

USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE

Follow the steps below, depending on whether you are making settings for a new tool or modifying an existing tool.

## Creating a new tool number

1. Select NEW to enter in a new tool number. You will see this display:

**NEW TOOL NUMBER**

▼  
**0,000,000**

**USE LEFT/RIGHT CURSORS TO SELECT DIGITS  
USE UP/DOWN CURSORS TO CHANGE VALUES  
PRESS ENTER WHEN DONE, RESET TO CANCEL**

2. Key in the number for the tool. The messages at the bottom of the display tell you how to enter the number. See "Entering a number with the cursor keys" in Chapter 3 if you need assistance.
3. Press ENTER after keying in the tool number. You will see this display. The tool number is shown at the top left. (In this example, the tool number is 4400).

**TOOL# 4400**

**SET COUNTERS**  
**SET CAMS**  
**SET BATCH MODE**  
**SET COUNTER ANGLE**

**USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE**

## Selecting an existing tool number

1. Select the the tool number from the tool number display. In our example, we are selecting tool #4400.

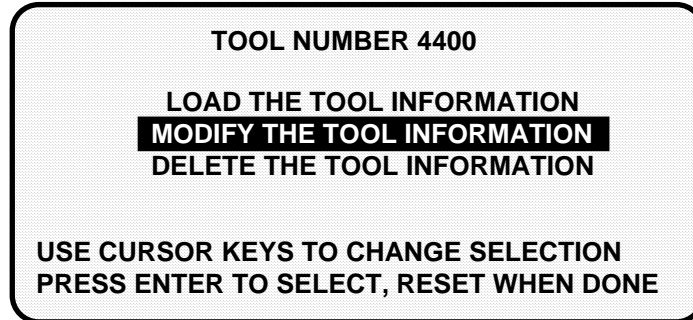
TOOL #'s	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	4400	24561	1150000
34	4567	35650	2150000
567	6666	65233	3456789
666	1230	100000	5500000

**USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE**

You can move the selection bar to any number using the cursor keys (see "Using the keyboard" in Chapter 3). 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.

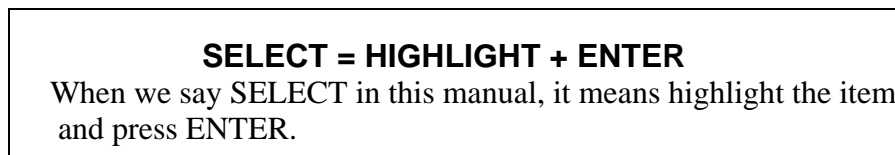
2. Next select " Modify the tool information" as shown here:



## Set Cams

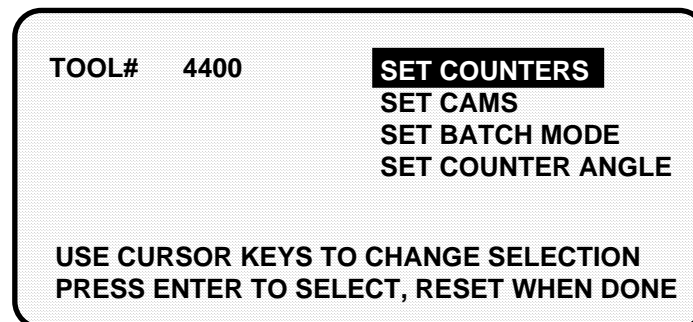
To set cam channels, you need to:

- Switch ProCam to Program mode
- Select a tool number (see the previous steps)
- Bring up the display of cam channels for the tool
- Select a channel and make an on-off, auto, or timed output setting
- Set all other channels for the tool

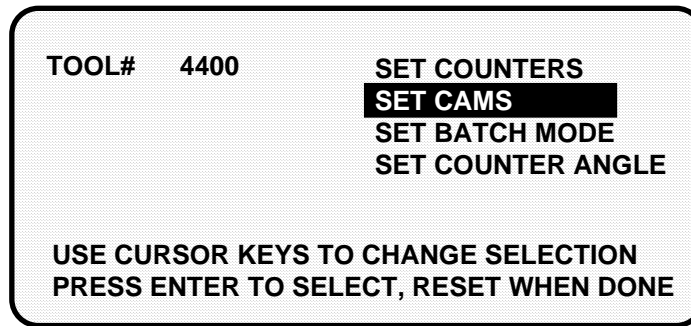


## Bringing up the display of cam channels

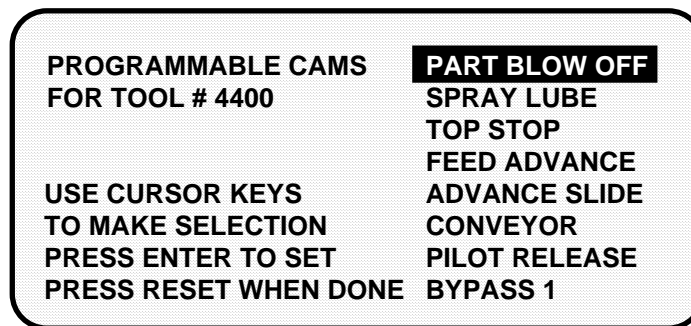
1. You will see this display after entering a tool number or selecting an existing one:



2. Select "Set cams", as shown here:



3. This is your list of cam channels. Now you can select and set a channel. (Your cam channels may have different names than these. Remember, you select your own names for cam channels in Initialization mode.)

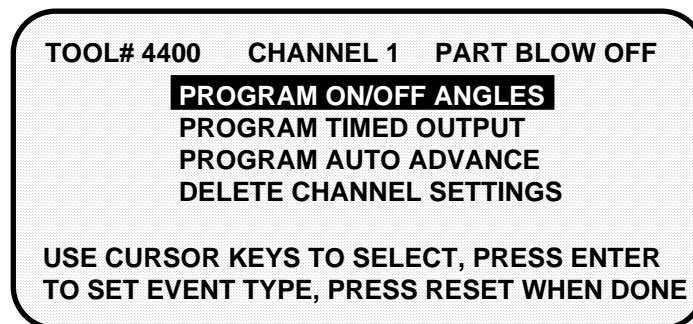


### Selecting a channel and making an on-off setting

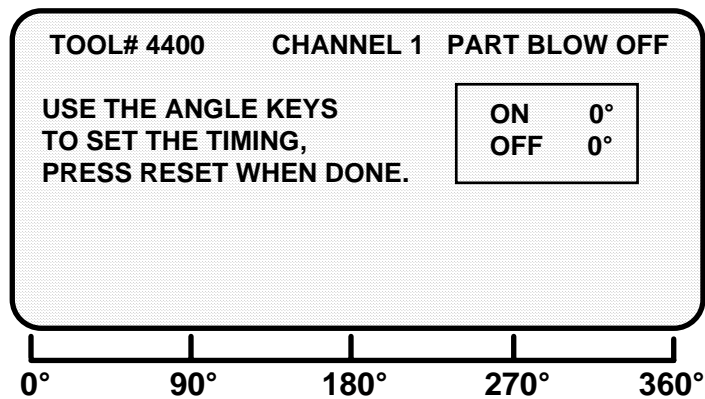
An on-off setting means you set the stroke angles where you want the channel to turn on and turn off.

To make an on-off setting for a channel:

1. Select a channel from the list of cam channels. 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".

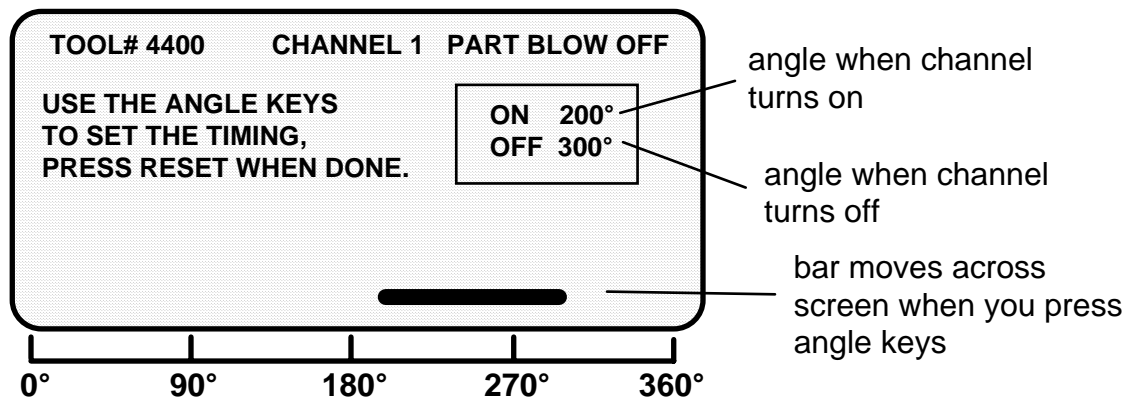


2. You see a display like this. Notice the scale at the bottom of the display which is shown in increments from 0° to 360°.



3. Key in the "on angle" and "off angle" using the "Angle keys". A horizontal bar above this scale will move to the point that you set for the "on" and the "off" angles. These settings are also shown numerically in the box on the display. See "Angle 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 200° on, 300° off.



## Selecting a channel and making a timed output setting

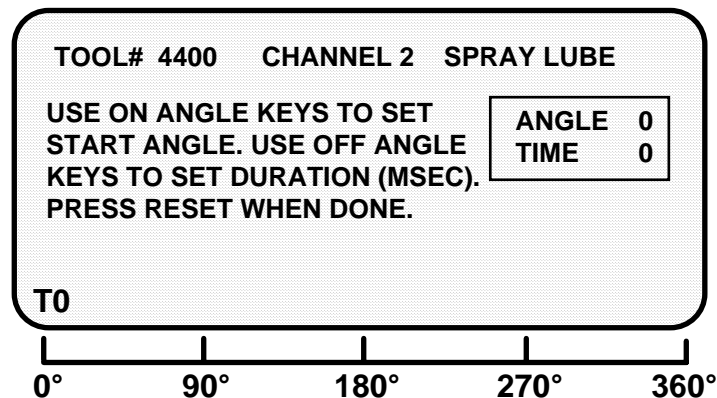
A timed output setting means that you set the stroke angle where you want the channel to turn on and the time in milliseconds you want the channel to stay on. This makes the channel on-time independent of press speed.

With on-off settings, "on-time" decreases with press speed. Timed output settings are recommended for controlling air, lubricators, etc. 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".*

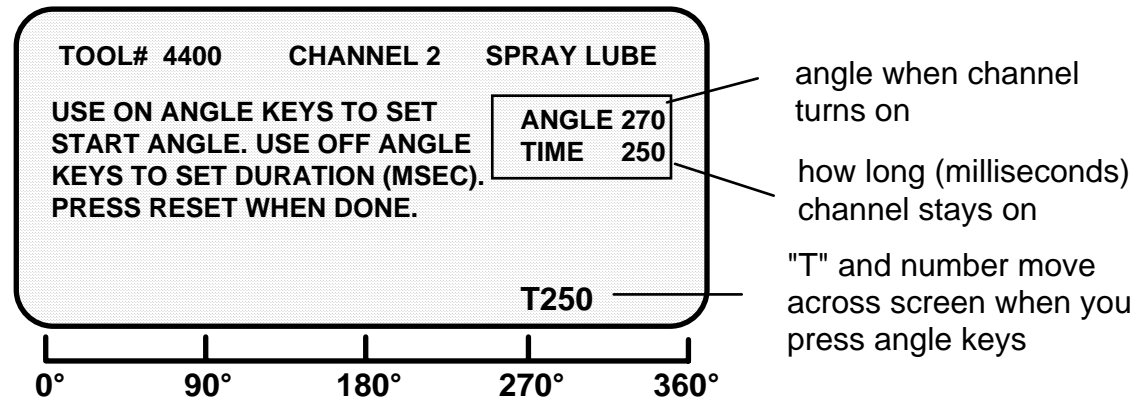
### To make a timed output setting for a channel:

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 like this (with the tool number and name of the channel you are setting shown at the top). Notice the scale at the bottom of the display which is shown in increments from 0° to 360°.



3. Use the right "on" angle key 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 "on" angle 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 "Angle off" keys to set the time that the channel should be on in milliseconds. (A millisecond is 1/1000th of a second.) Press the right "angle off" key until you reach the right number. The number will change in increments of 10 milliseconds. If you overshoot, use the left "angle off" 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 this (the settings here are 270° on-angle, 250 mS on-time):



5. Press RESET to go back to the list of channel names.

#### NOTE

ProCam 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 ProCam 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.

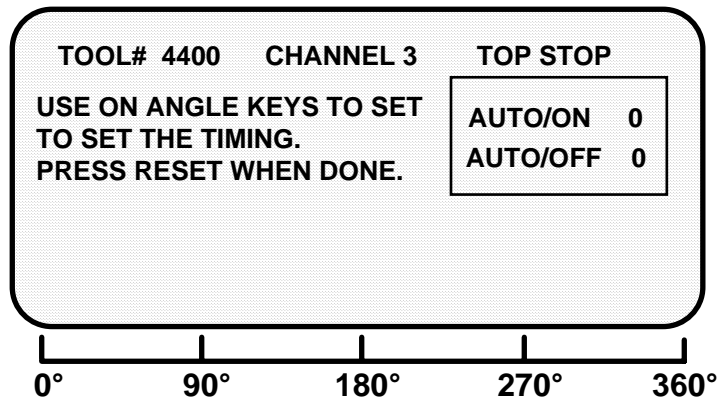
*You can set up a maximum of two channels as "auto".*

#### IMPORTANT

You can make up to two "auto" output settings in Program mode. The first advance constant that you set in Initialization mode affects the numerically first channel that you set as "auto" in Program mode, and likewise the numerically second advance constant affects the second "auto" output 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.

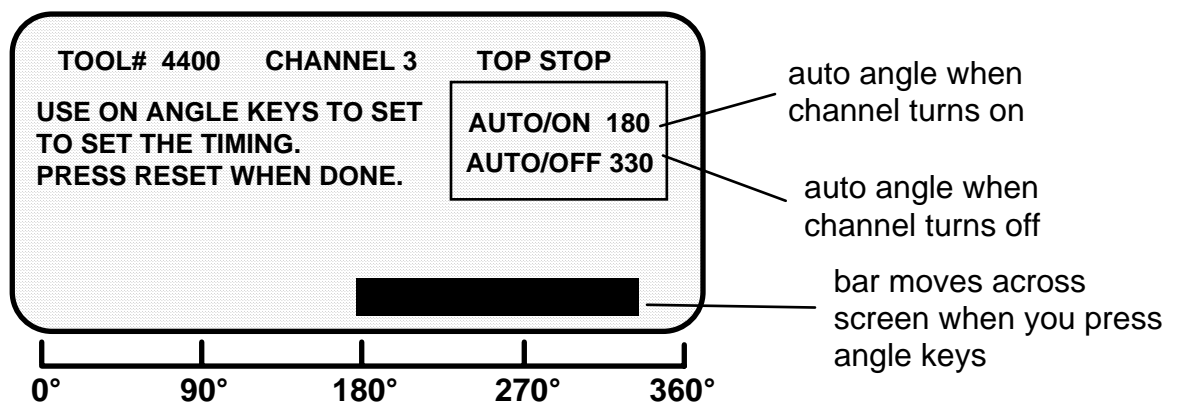
To make an auto advance setting for a channel:

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 like this (with the tool number, channel number, and name of the channel you are setting shown at the top):



3. Notice the scale at the bottom of the display which is shown in increments from 0° to 360° (shown above). Key in the "on angle" and "off angle" using the "angle keys". A horizontal bar above this scale will move to the point that you set for the "auto on" and the "auto off" angles. These settings are also shown numerically in the box on the display. See "Angle keys" under "Using the keyboard" in Chapter 3 if necessary.

When you are done with the setting, your display should look like this (the settings here are 180° auto on, 330° auto off):



4. Press RESET to go back to the list of channel names.



**NOTE**

ProCam saves your settings automatically. You do not have to push any key or issue any command to save settings.

**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.

**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.

**Set counters**

To set counters, you need to:

- Switch ProCam to Program mode
- Select a tool number (see the beginning of this chapter)
- Select "Set counters"
- Bring up the counters display for the tool
- Change one or more counter or preset values

**SELECT = HIGHLIGHT + ENTER**

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

## Bringing up the counter display

You will see this display after selecting "Set counters":

	COUNT	PRESET VALUE
PARTS	0	0
BATCH	0	0
TOTAL HITS	0	

USE CURSOR KEYS TO MAKE SELECTION  
PRESS ENTER TO SET COUNTER  
PRESS RESET WHEN DONE

The parts counter counts all the press strokes up to the preset value (all the parts you plan to make).

The batch counter counts the same parts and can be used to signal the end of a batch so that a bin or chute can be changed.

When either of the presets, parts or batch, has been reached, ProCam signals the press to top stop.

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.

## Resetting the parts or batch counters

1. Highlight the number displayed in the "count" column that you want to reset, and press ENTER. You will see this display. It will reference either batch or parts:

*PRESS ENTER IF YOU REALLY WANT TO CLEAR  
THE BATCH (or PARTS) COUNTER.  
PRESS RESET IF YOU DO NOT.*

2. If you want to clear the counter, press ENTER, and the counter resets to 0. If not, just press RESET to go back to the counter display without resetting the value.
3. Press RESET to go back to the previous display.

## Resetting the total hits counter

1. Highlight the number displayed in the "count" column and press ENTER.
2. You will see this message:

*PRESS THE RIGHT-ON KEY IF YOU REALLY  
WANT TO CLEAR THE TOTAL HITS COUNTER.  
PRESS RESET IF YOU DO NOT.*

3. Press the right ANGLE-ON key to reset the total hits counter to 0. Press RESET to go back to the counter display without resetting the value.

## Setting the parts or batch counter presets

1. Highlight the number displayed in the "preset" column. Press ENTER. You will see the display allowing you to enter a number for the counter.
2. Enter a number using the cursor keys. See "Entering a number with the cursor keys" in Chapter 3 for step-by-step instructions for entering a number.
3. Press ENTER when done. You will see the new preset value on the counter display. (You can press RESET to go back without entering a number.)

NOTE: You can disable counters by setting the preset value for parts and batch counters to zero.

## Setting batch mode

To set the batch mode, you need to:

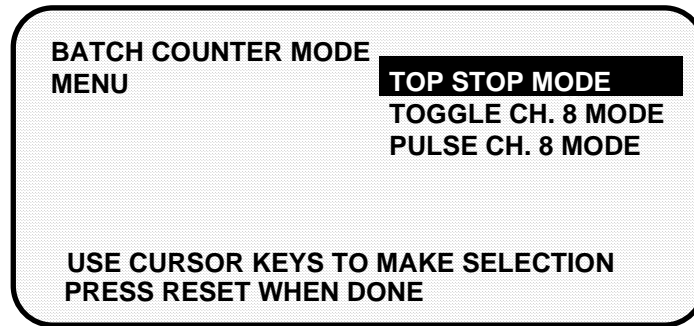
- Switch ProCam to Program mode
- Select a tool number (see the beginning of this chapter)
- Select "Set batch mode"
- Bring up the batch counter mode menu for the tool
- Change the batch mode for the tool

### **SELECT = HIGHLIGHT + ENTER**

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

## Bringing up the batch counter mode menu

You will see this display after selecting "Set batch mode":



The batch mode lets you determine what will happen when the batch counter reaches the batch size that you set in "Set counters". You have three choices.

If you select top stop, the top stop relay is opened when the batch preset is reached. This is good to use when you want to stop the press to change bins or chutes before resuming production.

If you choose toggle, this switches the state of the output relay in channel 8. 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 turns channel 8 (the factory-set counter channel that controls the counter) on for a certain amount of time (in milliseconds) that you set. You can tie the timed output module to a parts chopper or a lubricator, that needs to be turned on once every fixed number of strokes (equal to the batch counter).

### IMPORTANT

If you want to use the toggle or pulse Ch. 8 modes, you cannot program channel 8 as a cam to control a press function.

## Setting top stop

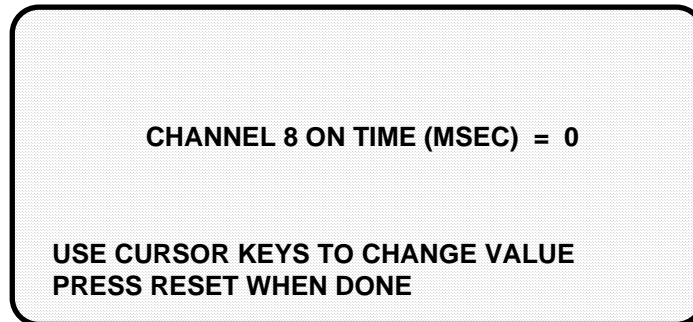
1. Using cursor keys, highlight "top stop mode".
2. Press RESET to confirm that selection.
3. You will return to the display allowing you the choice of setting counters, cams, or batch mode. You can perform other tasks. If you press RESET again, you will return to the first display in Programming mode.

## Setting toggle mode

1. Using cursor keys, highlight "toggle ch. 8 mode".
2. Press RESET to confirm that selection, and return to the previous display.

## Setting pulse mode

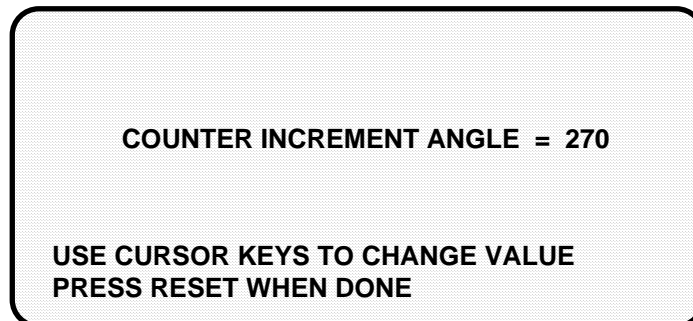
1. Using cursor keys, highlight "pulse ch. 8 mode". Then press RESET to confirm that selection. You will then see this display.



2. Key in the channel on-time (in milliseconds), using the cursor keys. Notice that the number you key in will increase or decrease in increments of 5 (maximum 5000 milliseconds, or 5 seconds).
3. Press RESET when done. 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.
4. It is not necessary to create counter on/off settings for channel 8 in "Set cams" because it is already factory-set. However, if you decide not to use "toggle" or "pulse", then it is okay to program channel 8 for other press functions.

## Setting counter angle

1. Select "Set counter angle" from the display giving you the choice of settings. You will see a display that looks like this:



2. The counter increment angle is factory set at 270°. In most applications, this is satisfactory. However, in situations where you have a top knock-out die, or when your part comes out later than 270°, you can change this setting. To do so, use the UP or DOWN cursor keys to increase or decrease the value.
3. When you are done, press RESET to see the display to select settings.
4. Press RESET again, and you see the display to load, modify, or delete the tool number.

## Load the tool information

Before you run the press, you have to load the ProCam settings for the tool being used. This puts the settings for the tool in a place in ProCam's electronic memory where it can 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/load tool numbers" from the programming menu —the first display in Programming mode.

### **SELECT = HIGHLIGHT + ENTER**

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

*NOTE: You can also load tool numbers in Run mode, 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).

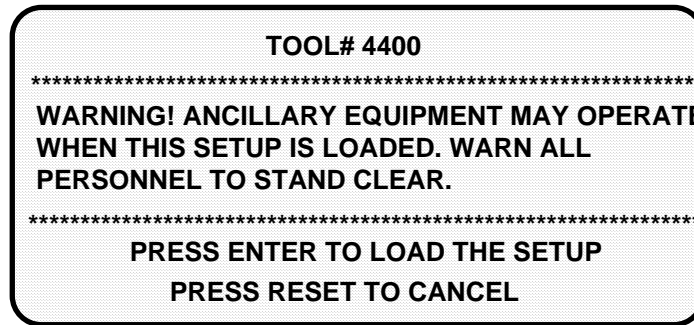
After selecting the tool number, you will see a display like this:

**TOOL NUMBER 4400**

**LOAD THE TOOL INFORMATION**  
**MODIFY THE TOOL INFORMATION**  
**DELETE THE TOOL INFORMATION**

**USE CURSOR KEYS TO CHANGE SELECTION**  
**PRESS ENTER TO SELECT, RESET WHEN DONE**

3. Select "Load the tool information." You will see this warning message:



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: (Remember, your tool number may be different.)

**PLEASE WAIT ..... LOADING TOOL 4400**

**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.

5. Once the tool is loaded, you will again see the 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.

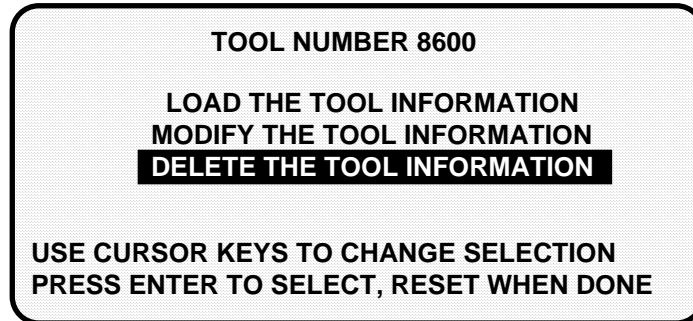
## Delete the tool information

When you delete a tool number, you remove it completely from the tool number display and from ProCam's memory. All tool information will be lost.

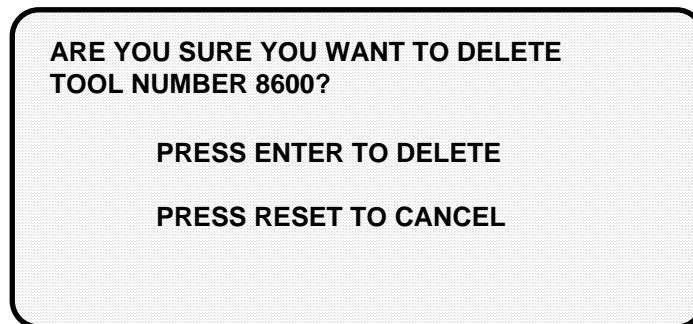
### To delete a tool number:

1. Select "Program/load tool numbers" from the Programming menu (first display in Program mode).
2. Select the actual 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 the tool information", as shown in this display (here, we are deleting tool #8600):



3. Next, you see this message. Your tool number will be different:



4. Delete the tool number by pressing ENTER. You will then get this confirmation:  

DELETING TOOL NUMBER 8600
5. If you do not want to delete the tool number, just press RESET to go back to the first display in Programming mode.



## Modifying the tool information

### 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.

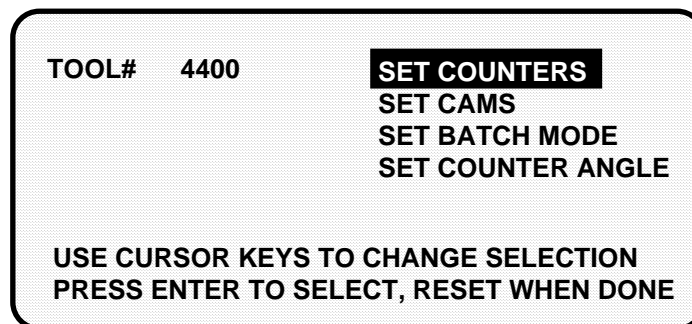
To change settings for a tool you need to:

- Bring up the display allowing you to select counters, cams, or batch mode
- Select the item you want to modify
- Change the settings

### Bringing up the display to select counters, cams, batch, or counter angle

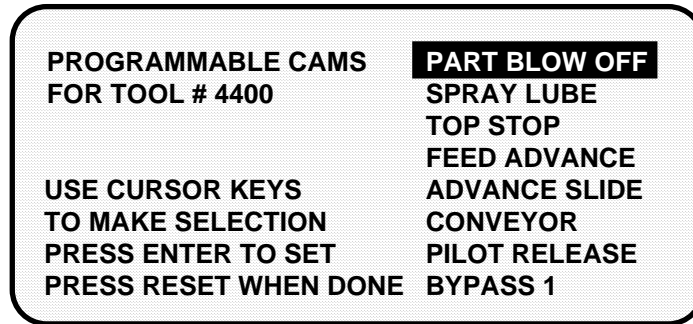
To bring up the display to select counters, cams, or batch mode:

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. Select "Modify the tool information". Then in the next display, select which setting you want to change.



## Modifying cam channels

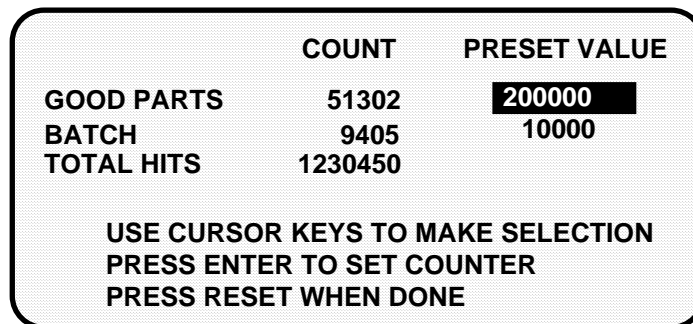
1. Select "Set cams" from the display giving you the choice of settings. You will see a display listing your cam channels like the one shown here. (Your channels may be named differently. Remember, you set names for your channels in Initialization mode— Chapter 4).



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. See "Set cams" earlier in this chapter.
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.

## Modifying counters

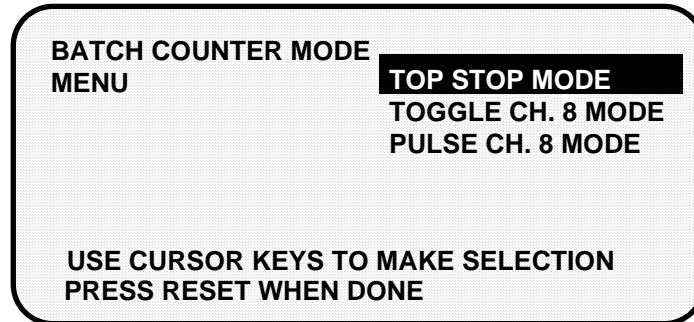
1. Select "Set counters" from the display giving you the choice of settings. You will see a display that looks like this:



2. Change counters or reset counters in the same way as when you first set them. See "Set counters" earlier in this chapter.
3. When you are done, press RESET to see the display to select settings. Press RESET again, and you see the tool number display.

## Modifying batch mode

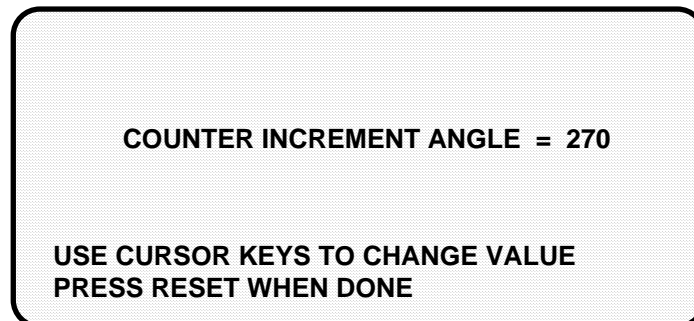
1. Select "Set batch mode" from the display giving you the choice of settings. You will see a display that looks like this:



2. Change the batch mode in the same way as when you first did it. See "Set batch mode" earlier in this chapter.
3. When you are done, press RESET to see the display to select settings. Press RESET again, and you see the tool number display.

## Modifying counter angle

1. Select "Set counter angle" from the display giving you the choice of settings. You will see a display that looks like this:



2. Change the counter increment angle in the same way as when you first did it. See "Set counter angle" earlier in this chapter.
3. When you are done making changes, press RESET to see the display to select settings. Press RESET again, and you see the tool number display.

### **REMEMBER TO LOAD THE TOOL NUMBER**

When you change settings for a currently loaded tool number, a display will pop up allowing you to 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.

# Chapter 6

## Using ProCam 1500 in Run mode

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This chapter describes how to use all the displays you will see in Run mode. It covers how to adjust settings for a tool (counters and cams), set stop and start times, view timing, and load a tool number.

### 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. In Run mode, you can only adjust certain settings for the loaded tool number. You cannot view settings for a tool number if it is not loaded.

#### 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 ProCam 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 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 choices on the Run menu to prevent personnel from changing settings or loading tool numbers. You can lock cam settings and counters so that they cannot be changed in Run mode. You can lock tool numbers so they cannot be loaded. You can lock one or more of these menu items in Initialization mode. See Chapter 4—"Security access"—for instructions on how to lock these menu items.

## The first display in Run mode—the Run menu

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 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 is loaded, you cannot switch from Initialization mode or Program mode to Run mode. A tool number must be loaded before ProCam will allow the press to run.

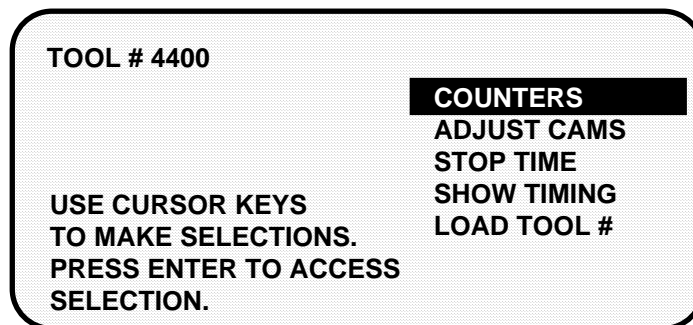
If you try to switch to Run mode without a tool number loaded, you will get this error message on your screen:

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

The Run menu is the first display you see in Run mode.



From this display you can call up all the other displays you will need to do your work.

**Settings locked in Run mode**

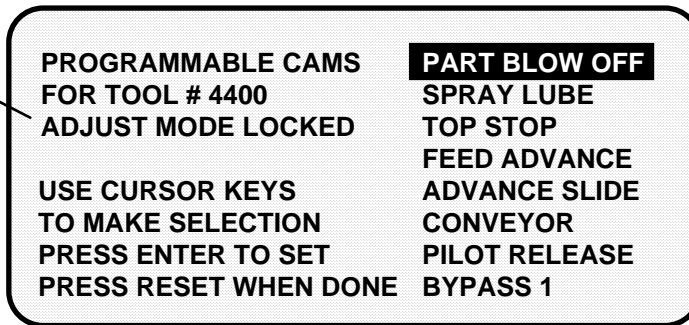
Whenever settings are locked in Run mode, you will see a message on the screen telling you so when you select the item.

"Adjust mode locked" means you cannot adjust cam settings. You can display the information, but nothing will happen when you press the keys to adjust.

**If cam settings are locked**

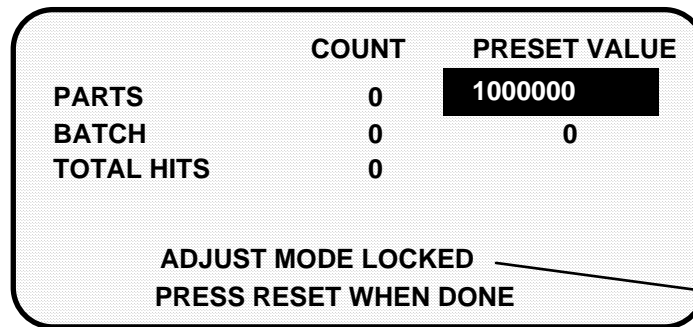
For instance, if cam settings are locked, you will see a message appear at the upper left of the screen as shown here.

Indicates  
cam settings  
are locked



**If counters are locked**

If counters are locked, this is how the message will appear.



Indicates  
counters  
are locked

**If tool numbers are locked in Run mode**

The item "Load tool #" does not appear on the Run menu if tool numbers are locked in Run Mode.

## Counters

To set or adjust counters in Run mode, select "Counters" from the run menu. You will see this display:

	COUNT	PRESET VALUE
GOOD PARTS	51302	<b>200000</b>
BATCH	9405	10000
TOTAL HITS	1230450	

USE CURSOR KEYS TO MAKE SELECTION  
PRESS ENTER TO SET COUNTER  
PRESS RESET WHEN DONE

Now you can change or reset the batch and parts counters in exactly the same way you do when you first set them. *You cannot adjust the total hits counter.* See "Set counters" in Chapter 5.

## Adjust cams

In Run mode, you can adjust all timing signals for each cam channel. To adjust cam switch settings for the loaded tool number:

1. Select "Adjust cams" from the first display you see in Run mode.
2. You will see the display below. The names of your cam channels will be different (Remember, you named your cam channels in Initialization mode).

PROGRAMMABLE CAMS FOR TOOL # 4400	<b>PART BLOW OFF</b> SPRAY LUBE TOP STOP FEED ADVANCE ADVANCE SLIDE CONVEYOR PILOT RELEASE BYPASS 1
USE CURSOR KEYS TO MAKE SELECTION PRESS ENTER TO SET PRESS RESET WHEN DONE	

3. Select the channel you want to change. You adjust the on-off time for the channel the same way you made settings in Program mode—using the angle "on" and "off" keys. If you are unfamiliar with these keys, see "Angle keys" in Chapter 3 for complete instructions. (For instructions on setting cam channels in Program mode, see "Set cams" in Chapter 4.)
4. When you are done with one channel, press RESET to go back to the display of channels. You can adjust other channels. When you are done adjusting the timing for your channels, press RESET to go back to the Run menu.

## Stop Time, Stop Angle, and 90° Stop Test

In Run mode, you can view actual stop time and stop angle, and you can perform the 90° stop test to determine the longest stop time of the press. You can also get a reading for the start time of the press.

*Stop time* is the time that it takes the crankshaft to stop once the dual safety valve (DSV) has been closed. *Start time* is the time it takes for the clutch to be engaged in order to initiate the press. *Stop angle* is the crankshaft angle that it takes the press to stop. It is the stopping position in degrees minus the crankshaft position when the DSV is closed. (Stop angle does not compensate for the complete rotation when it takes more than 360° to stop.) The stop angle helps you when you set up the top stop cam. For example, if the stop angle is 100°, set the top stop cam to turn on at 260°. For a discussion on brake monitor, see "Brake Monitor" in Chapter 4.

You need to determine the press's stopping time under normal stopping conditions, which is usually top stop. Therefore, the stop time limit must be calculated based upon stopping time at *top stop*.

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 on the down stroke at 90° while the press is running in continuous mode. Therefore, ProCam 1500 is designed to check stopping time at that critical crankshaft angle.

### To perform the 90° stop test

1. Install the heaviest upper die set into your press. Adjust the counterbalance for ram weight, if your press has a counterbalance.
2. At ProCam, select "Stop time" from the first display you see in Run mode. You will see this display:

	VALUE (MSEC)	LIMIT (MSEC)
STOP TIME	160	195
START TIME	25	50
STOP ANGLE	80	

THE LIMITS MAY BE SET IN INITIALIZATION.  
PRESS ENTER TO START 90 DEGREE BRAKE TEST. PRESS RESET WHEN DONE.

3. Press ENTER to arm the 90° stop test. The message at the bottom of the display will now say:  
THE LIMITS MAY BE SET IN INITIALIZATION.  
90 DEGREE BRAKE TEST ARMED.  
PRESS RESET TO CANCEL TEST.
4. Start the press. The next time that the press reaches 90°, the emergency stop relays will open and stop the press. A 90° stop time will appear on the LED display at "STOP TIME VALUE".



*This test should be performed in continuous mode. While the press is running in continuous, select "Stop time" from the first display in Run mode. Press enter to arm the test. The press will automatically be initiated to stop at 90°.*

5. Record the information displayed on the screen. The stop time value is in milliseconds (mS). One millisecond (MSEC or mS) equals 1/1000th of a second (1mS =.001 sec). The stopping angle is in degrees.
6. Repeat the test (steps 2 through 5 above) *at least* five more times to see if you get higher readings. Record the highest reading from all your tests. This is the stop time value that you will use to calculate your safety distance.
7. Press RESET when done. You will be returned to the first display in Run mode.

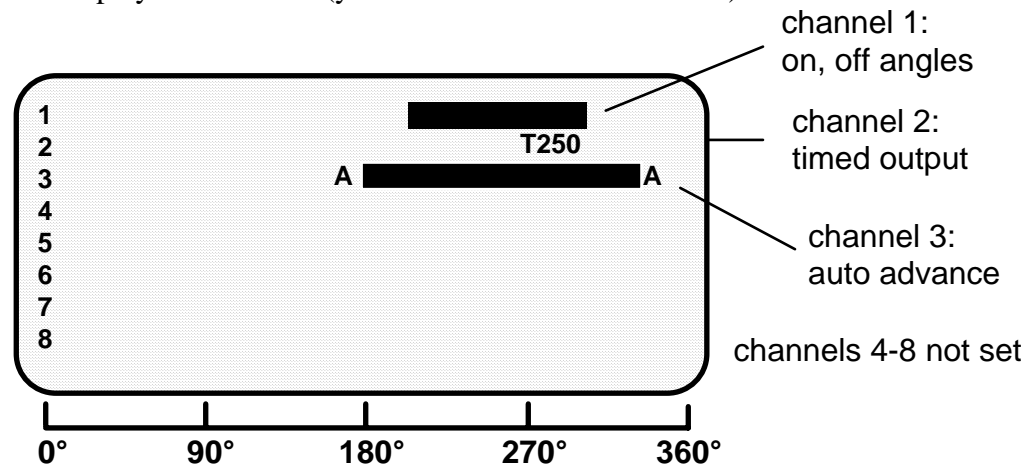
### CAUTION

*Any time you change the stop time limit at ProCam 1500, you **must** perform the 90° stop test, and you also must recalculate the new safety distance!*

## Show Timing

You can view real-time graphic information about the currently loaded tool in Run mode. When you select "Show timing", you will see a chart showing channel numbers from 1 to 8 at the left of the display, and degrees of rotation from 0° to 360° at the bottom 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. The display is updated once per second with the current timing information.

1. Select "Show timing" from the first display in Run mode. You will see a display like this one (your channels will be different):



2. Press RESET when you are done viewing your cam timing settings. You will return to the first display in Run mode.

## Load 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.

### NOTE

If "loading tool numbers" has been locked in Program mode, you cannot load any tool settings in Run mode. You will notice that the item "Load tool #" will not appear on the first display in Run mode.

To load a tool number in Run mode:

1. Select "Load tool #" from the Run menu. You will see a Tool Number display like this:

TOOL #'s	24 USED	176 AVAILABLE	
NEW	6789	6800	250000
17	<b>4400</b>	24561	1150000
34	4567	35650	2150000
567	6666	65233	3456789
666	1230	100000	5500000

USE CURSOR KEYS TO CHANGE SELECTION  
PRESS ENTER TO SELECT, RESET WHEN DONE

The display is the same as in Program mode, but you can only select an existing tool number. You cannot select NEW to create a new tool number. The display shows all the existing tool numbers.

2. Select the tool number you want to load. You will see a display like this:

**TOOL# 4400**

\*\*\*\*\*

**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**

3. Press ENTER to load the tool number (setup). Press RESET to back up without loading the tool number. Once the tool number is loaded (which takes a few seconds), you will go back to the first display in Run mode.

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.

# Chapter 7

## ProCam 1500 Fault Messages

---

This chapter explains the fault, or error, messages, and other types of messages you may see on your LCD display when the press stops or when problems occur. Two types of messages are explained here:

- Messages displayed when a counter preset has been reached
- Messages displayed for brake monitor equipment or programming problems

### 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 ProCam 1500, see the beginning of Chapter 1.)



If the press stops because one of the counter presets count is reached, the letters "Ctr" will blink on the LED (shown below).



### How to clear the fault or error message from the display

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.

## Messages displayed when a counter preset is reached

### *Parts counter*



*Problem:* 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 parts count is automatically reset to 0.

### *Batch parts counter*



*Problem:* The value set for the batch counter has been reached. The press should stop at top dead center.

*Remedy:* Press RESET to clear the message. You may need to empty or replace the parts container or perform some other function. You can then run the press again.

NOTE: When this message appears, the batch parts count is automatically reset to 0.

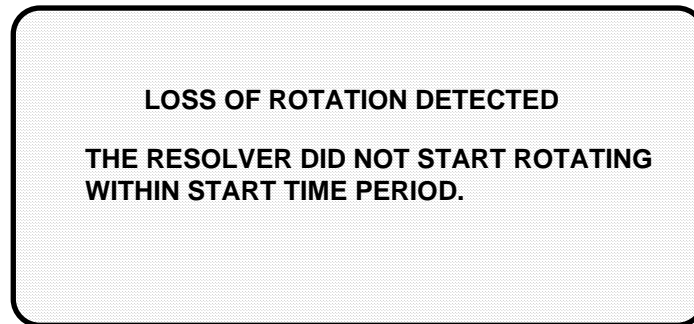
## Messages displayed for equipment or brake monitor problems

These messages tell you that something is wrong with the ProCam resolver, input circuit, or position sensor or with the way your press is running. Some fault messages indicate that there is a problem related to the brake monitor. These messages may also indicate an internal problem with ProCam 1500 itself.

If you cannot correct the problem yourself after reading the remedy for the problem below, contact a Data Instruments representative. Whenever you need help, just remember that we have expert technical service representatives available to help you by phone. Never hesitate to call Data Instruments if you have trouble with ProCam 1500.

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.

### *Loss of rotation*



*Problem:* As stated in the message, the resolver did not start rotating within the start time limit that you set in Initialization mode. Also, the resolver could have stopped turning for one second with the press running. ProCam 1500 knows when the brake/clutch valve is activated through the input check circuit. If it sees that the valve has been activated but the resolver is not turning, this message appears. For an explanation of how the input check circuit works, see "How the input check circuit works" in Chapter 2.

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 ProCam problem could also have occurred, or the resolver could be defective.

*Remedy:* 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 service advisors.

**Resolver failure****ANGLE RESOLVER FAILURE**

**THE PRESS IS GOING FASTER THAN 800 SPM  
OR THE ANGLE RESOLVER HAS FAILED OR THE  
CONNECTIONS FROM THE RESOLVER ARE BROKEN.**

*Problem:* As the message states, the press is going faster than 800 SPM (ProCam's rated press speed), or the resolver has failed. Or it may just be that wiring in the resolver circuit to ProCam is loose or bad.

**NOTE**

If you have a ProCam 1500 allowing press speeds up to 1600 SPM, the message will state 1600 SPM, instead of 800.

*Remedy:* If ProCam'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.

**NOTE:** This fault cannot be cleared by pressing the RESET key. You must turn ProCam off, then on, to clear the fault.

**Input failure**

**INPUT CHECK CIRCUIT FAILURE**  
**THE RESOLVER TURNED FIVE TIMES WITHOUT**  
**INPUT CHECK BEING TURNED ON**

*Problem:* The resolver turned five times (in other words, the press was running), but ProCam 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.

**Position sensor incorrect**

**POSITION SENSOR INCORRECT**  
**THE POSITION SENSOR WAS NOT CLOSED AT**  
**0 DEGREES OR WAS NOT OPEN AT 180 DEGREES**

*Problem:* The position sensor (optional) is not closing at 0° or opening at 180°. The position sensor monitors the position of the resolver to ensure that it is working correctly. It is 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 totally at high RPM's. See Figure 2-14 in Chapter 2 for a discussion of this problem. Also, the resolver or position sensor may be defective or not installed properly. Check the wiring and installation of the resolver and position sensor. See 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.

*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.*



**Angle table checksum incorrect**

**ANGLE TABLE CHECKSUM INCORRECT**  
**THE INFORMATION CREATED WHEN A TOOL**  
**NUMBER IS LOADED WAS CORRUPTED. RELOAD**  
**THE TOOL NUMBER**

*Problem:* As the message indicates, the information, or "checksum", created for the tool number loaded has become corrupted.

*Remedy:* First reload the tool number that you want to use. If the error occurs again, contact Data Instruments technical service advisors.

**E-Stop error messages**

**ESTOP . . . .**  
**ONE OR BOTH OF THE EMERGENCY STOP RELAY**  
**CIRCUITS IS NOT WORKING PROPERLY. THIS**  
**ERROR CAN NOT BE RESET. YOU MUST TURN**  
**OFF THE UNIT.**

*Problem:* If a message appears on the display that references "ESTOP", this has to do with either of the emergency stop relay circuits not working satisfactorily. One or both of these E-STOP circuits may be defective.

*Remedy:* As the message says, you cannot reset the error. Instead, turn the unit off, then on. If the error continues to occur, contact Data Instruments technical service advisors for assistance.

**Onboard ram test failure****ONBOARD RAM TEST FAILURE**

**THIS ERROR CANNOT BE RESET. CALL DATA INSTRUMENTS FOR ASSISTANCE.**

*Problem:* This means that something is wrong with the main ProCam circuit board and the system cannot be reset. ProCam needs to be serviced or replaced.

*Remedy:* Contact Data Instruments technical service advisors for assistance or replacement.

**Resolver failures****RESOLVER SIGNALS INCORRECT**

**THE VOLTAGE LEVELS ON THE RESOLVER SIGNALS S1, OR S2 ARE NOT CORRECT. CHECK THE RESOLVER WIRING FOR LOOSE OR SHORTED WIRES.**

**RESOLVER DRIVE SIGNAL INCORRECT**

**THE VOLTAGE LEVEL ON THE RESOLVER DRIVE SIGNALS R1 IS NOT CORRECT. CHECK THE RESOLVER WIRING FOR LOOSE OR SHORTED WIRES.**

*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 service advisors for assistance or replacement.

## 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 ProCam 1500 itself.

If you cannot correct the problem yourself after reading the remedy for the problem below, contact a Data Instruments representative for assistance.

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 loaded*

**NO TOOL NUMBER HAS BEEN LOADED**

**CREATE A TOOL NUMBER OR LOAD A CURRENTLY PROGRAMMED TOOL NUMBER. THIS WILL CLOSE THE ESTOP RELAY AND ALLOW THE PRESS TO RUN.**

*Problem:* 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 checksum incorrect*

**TOOL NUMBER CHECKSUM INCORRECT**

**THE INFORMATION CREATED WHEN A TOOL NUMBER IS LOADED WAS CORRUPTED. RELOAD THE TOOL NUMBER.**

*Problem:* The "checksum" for the tool number loaded, when ProCam was turned off, does not match the checksum when ProCam was turned back on. See the fault message "tool number table checksum error" for information on checksums.

*Remedy:* First reload the tool number that you want to use. If the error occurs again, contact Data Instruments technical service advisors.

**Tool number table checksum error****TOOL NUMBER TABLE CHECKSUM ERROR**

**THE INFORMATION CREATED WHEN A TOOL NUMBER IS PROGRAMMED WAS CORRUPTED. GO BACK AND REVIEW THE TOOL NUMBER PROGRAM. MAKE CHANGES IF NECESSARY, THEN RELOAD THE TOOL NUMBER.**

*Problem:* The checksum for the tool number that is computed when the tool number is loaded does not match the checksum computed and stored the last time the tool number was modified. This message will appear whenever you load a tool number and the checksums do not match.

*What is a*

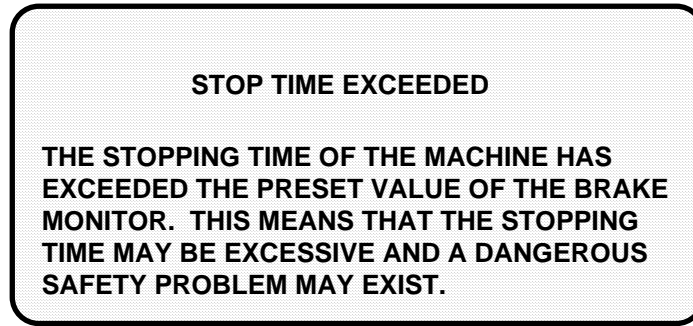
*Checksum:* ProCam creates a checksum for a tool number to check that the data stored in memory for the tool is the same as the data that comes out of memory when you load the tool number. The checksum calculated when data went into memory must be the same as the one calculated when the data is loaded. Here is a simple way to think of a checksum: A group takes a bus to a game. The driver counts everybody who gets off the bus (the checksum). After the game, he counts everybody who gets on the bus. He does not leave until he counts the same number getting on as got off (the checksums must match).

*Remedy:* The checksums may not match if ProCam 1500 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 ProCam malfunction.

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. ProCam will create a new checksum for the tool number.
- 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.

**Stop time exceeded**

*Problem:* The actual stopping time of the press has exceeded whatever limit that you set in ProCam Initialization mode. This could be because your limit is not large enough to account for normal wear, or because the brake is actually wearing and needs to be serviced by your maintenance personnel.

*Remedy:* 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. Decide if the stop time limit that you had set is realistic or needs to be changed slightly. Or you may need to have your maintenance service the brake. See Chapter 4 -- "Brake Monitor" to calculate the correct stop time and Chapter 6 -- "Stop Time and Stop Angle" to perform the 90° brake test.

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# PROCAM 1500 WIRING CONNECTIONS FORM

Press no. \_\_\_\_\_ Developed by \_\_\_\_\_ Date \_\_\_\_\_

CHAN.	CAM FUNCTION (NAME)	N/O	N/C	COMMON	Output module type
1					
2					
3					
4					
5					
6					
7					
8					

# PROCAM 1500 WIRING CONNECTIONS FORM

Press no. \_\_\_\_\_ Developed by \_\_\_\_\_ Date \_\_\_\_\_

CHAN.	CAM FUNCTION (NAME)	N/O	N/C	COMMON	Output module type
1					
2					
3					
4					
5					
6					
7					
8					

# PROCAM 1500 WIRING CONNECTIONS FORM

Press no. \_\_\_\_\_ Developed by \_\_\_\_\_ Date \_\_\_\_\_

CHAN.	CAM FUNCTION (NAME)	N/O	N/C	COMMON	Output module type
1					
2					
3					
4					
5					
6					
7					
8					

# PROCAM 1500 WIRING CONNECTIONS FORM

Press no. \_\_\_\_\_ Developed by \_\_\_\_\_ Date \_\_\_\_\_

CHAN.	CAM FUNCTION (NAME)	N/O	N/C	COMMON	Output module type
1					
2					
3					
4					
5					
6					
7					
8					

# PROCAM 1500 WIRING CONNECTIONS FORM

Press no. \_\_\_\_\_ Developed by \_\_\_\_\_ Date \_\_\_\_\_

CHAN.	CAM FUNCTION (NAME)	N/O	N/C	COMMON	Output module type
1					
2					
3					
4					
5					
6					
7					
8					

# PROCAM 1500 SETUP FORM

**SETUP INFORMATION FOR TOOL #:** \_\_\_\_\_

CAM FUNCTION (NAME)	Auto (√)	"ON" Angle	"OFF" Angle or Time (mS)

**This tool should be serviced when the TOTAL HITS  
count reaches:** \_\_\_\_\_ .

**Parts Counter Preset:** \_\_\_\_\_

**Batch Counter Preset:** \_\_\_\_\_

**COMMENTS:**

# PROCAM 1500 SETUP FORM

**SETUP INFORMATION FOR TOOL #:** \_\_\_\_\_

CAM FUNCTION (NAME)	Auto (√)	"ON" Angle	"OFF" Angle or Time (mS)

**This tool should be serviced when the TOTAL HITS count reaches:** \_\_\_\_\_ .

**Parts Counter Preset:** \_\_\_\_\_

**Batch Counter Preset:** \_\_\_\_\_

**COMMENTS:**



# PROCAM 1500 SETUP FORM

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**COMMENTS:**

# PROCAM 1500 SETUP FORM

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**Batch Counter Preset:** \_\_\_\_\_

**COMMENTS:**