WINTRISS®

User Manual

WPC APEX®

Wintriss® Clutch/Brake Control
1145700
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IMPORTANT CHANGES: STOP FUNCTIONS AND TERMINOLOGY

The WPC APEX introduces updated stop function and terminology to align with current industry standards, while maintaining the same operational functionality as previous Wintriss Press Control (WPC) models.

BACKGROUND FOR PREVIOUS WPC USERS/OPERATION

Earlier WPC models featured two types of stops:

- E Stop – Stopped press motion but did not remove power from the motor.
- E Stop Lockout – Stopped the press and also removed power to the motor for enhanced safety.

While the functions remain the same, the WPC APEX uses updated terminology consistent with current industry standards to reduce ambiguity and align with common practices in modern industrial safety systems.

NEW WPC APEX STOP TERMINOLOGY

- **Immediate Stop (I STOP)** (formerly E STOP) - Red button
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC)** (formerly E Stop Lockout)
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP)** (System wide stoppage) – Red button w/ yellow halo
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

KEY POINTS FOR TRANSITIONING USERS

- No functional change has been made to the stop circuitry of the press; only the naming convention has been updated.
- Operators familiar with the WPC 2000 should note
  - the former Emergency Stop (E STOP) is now called Immediate Stop (I STOP)
  - the former E Stop Lockout is now called Immediate Stop Lockout (I LOC).
- What is now called Emergency Stop did not exist in the WPC 2000. It stops the press, removes power to the motor via the lockout relay, and signals ancillary equipment to perform an emergency stop, thereby preventing any unintended restart.
- This update aligns the WPC APEX with standard industrial terminology, making it easier for new users and maintenance personnel to understand and comply with common safety practices.

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HOW TO USE THIS MANUAL

This manual shows you how to install, set up, operate, and troubleshoot the WPC APEX Wintriss Clutch/Brake Control.

Chapter 1 provides an overview of WPC APEX features and components, describes the locations and functions of the switches and LEDs on the front panel and display, and lists WPC APEX specifications.

Chapter 2 shows you how to install both enclosure and non-enclosure versions of WPC APEX, including optional components, and perform installation verification tests.

Chapter 3 shows you how to initialize and set up WPC APEX and perform final checkout tests.

Chapter 4 shows how to program settings for up to 50 tools stored on WPC APEX.

Chapter 5 shows you how to run the press, using WPC APEX's Inch, Single Stroke, and Continuous stroke selections and Two-hand, One-hand, and Foot modes. It also describes making adjustments in Run mode.

Chapter 6 shows you how to respond to and correct the fault codes that appear on the display when WPC APEX detects an error.

Appendix A provides OSHA regulations and ANSI standards pertaining to the use of presence-sensing devices for point-of-operation guarding on mechanical power presses.

Appendix B provides the safety standards you must meet when building your own Operator Station.

The Glossary explains some terms that may be unfamiliar to you.

Figures at the end of the manual provide wiring diagrams that you can use in conjunction with the instructions in Chapter 2 to wire WPC APEX and its components.

Download documents for Wintriss products at http://www.wintriss.com/wcg/general/downloads.html

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

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For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

Important Highlighted Information

Important danger, warning, caution, and notice information is highlighted throughout the manual as follows:

⚠ DANGER

A DANGER symbol indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

A WARNING symbol indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

A CAUTION symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

NOTICE

A NOTICE symbol indicates important information that you should remember, including tips to aid you in performance of your job.

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 (SFC/ LETS), 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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WPC APEX
USER MANUAL
1145700
Wintriss Controls Group, LLC

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

- **Technical Assistance**

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

- **Return Authorization**

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

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

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

- **Expedited Repair Program**

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

- **Board Exchange Program**

  If your needs are urgent, you can take advantage of our Board Exchange (EX) program. Call our 800 number between 8 a.m. and 3:30 p.m. Eastern Time and we will send a replacement to you overnight. A fee does apply to this service. Contact Wintriss Technical Support at 800-586-8324 for details.

- **Service Center**

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

  Nationwide field service is also available. Contact the Wintriss Technical Support group at 800-586-8324.

- **Product Training**

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

- **Restocking Charge**

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

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

Chapter 1 – Introduction

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

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Wintriss WPC APEX Clutch/Brake Control is an easy-to-use, dual-microprocessor-based system that controls part-revolution mechanical power presses. Housed in a single modular enclosure, both microprocessors function independently. Each has its own power source (3.3 V), reads/converts the resolver signal, and provides separate information to the operator. As a result of its "dual diverse redundancy," WPC APEX is able to provide optimum clutch/brake control and improved operator safety while increasing productivity.

WPC APEX meets or exceeds all ANSI B11.1-2009, OSHA 1910.217, and Canadian Z142-02 standards for Control Reliability, the benchmarks that govern the operation of mechanical power presses. Control Reliability demands that a single component failure in a clutch/brake control circuit not prevent the normal stopping action of the press, not create an unintended stroke, and not allow initiation of a subsequent stroke until the failure has been corrected.

Figure 1-1. WPC APEX

WPC APEX Components

WPC APEX can be configured as a complete system with all the components necessary to operate a pneumatic clutch/brake system.

Resolver

The resolver, which is mounted on the press, turns one-to-one (1:1) with the crankshaft, allowing WPC APEX to know the exact position of the crankshaft on every stroke.

The resolver is similar to an electrical generator and works on the principle of inductance. The resolver's two outputs vary in amplitude and phase as the resolver turns. WPC APEX translates these analog signals to a number that indicates the position of the resolver (and press crankshaft) in degrees.

The resolver eliminates the need for a mechanical rotary limit switch. Operators no longer have to climb on top of the press to make timing adjustments. In addition, the resolver on the WPC APEX can be shared with other Wintriss resolver-based products, such as DiPro 1500.

Control Enclosure

The WPC APEX control enclosure (Figure 1-1, page 28) can be ordered with the display and controls mounted on the door, or with a remote panel mount display or with no display. Up to three of the following selector key switches can be mounted in the enclosure:

- Stroke Select (Standard)–Provides switch settings for selection of Inch, Single Stroke, or Continuous operation or Inch or Single Stroke.
- Mode Select (Optional)–Provides switch settings for selection of One-hand, Two-hand, or Foot operation. Optional One-hand/Two-hand/Foot firmware is required for use of One- hand and Foot settings.
- Micro-inch (Optional)– Provides a switch setting for turning on the Micro-inch feature (see *Standard Features*, page 33).
- Automatic (Optional)–Provides a switch setting for turning on the Automatic Single- stroke (External Trip) or Continuous On-demand feature.
- Operator Station Select (Optional)– Provides switch settings for selection of Operator Station A, Operator Station B, or both Operator Station A and B in dual Operator Station configurations. If more than two operator stations, select Stations C and/or D on screen (see *Setting the Operator Station Selection Method*, page 126).

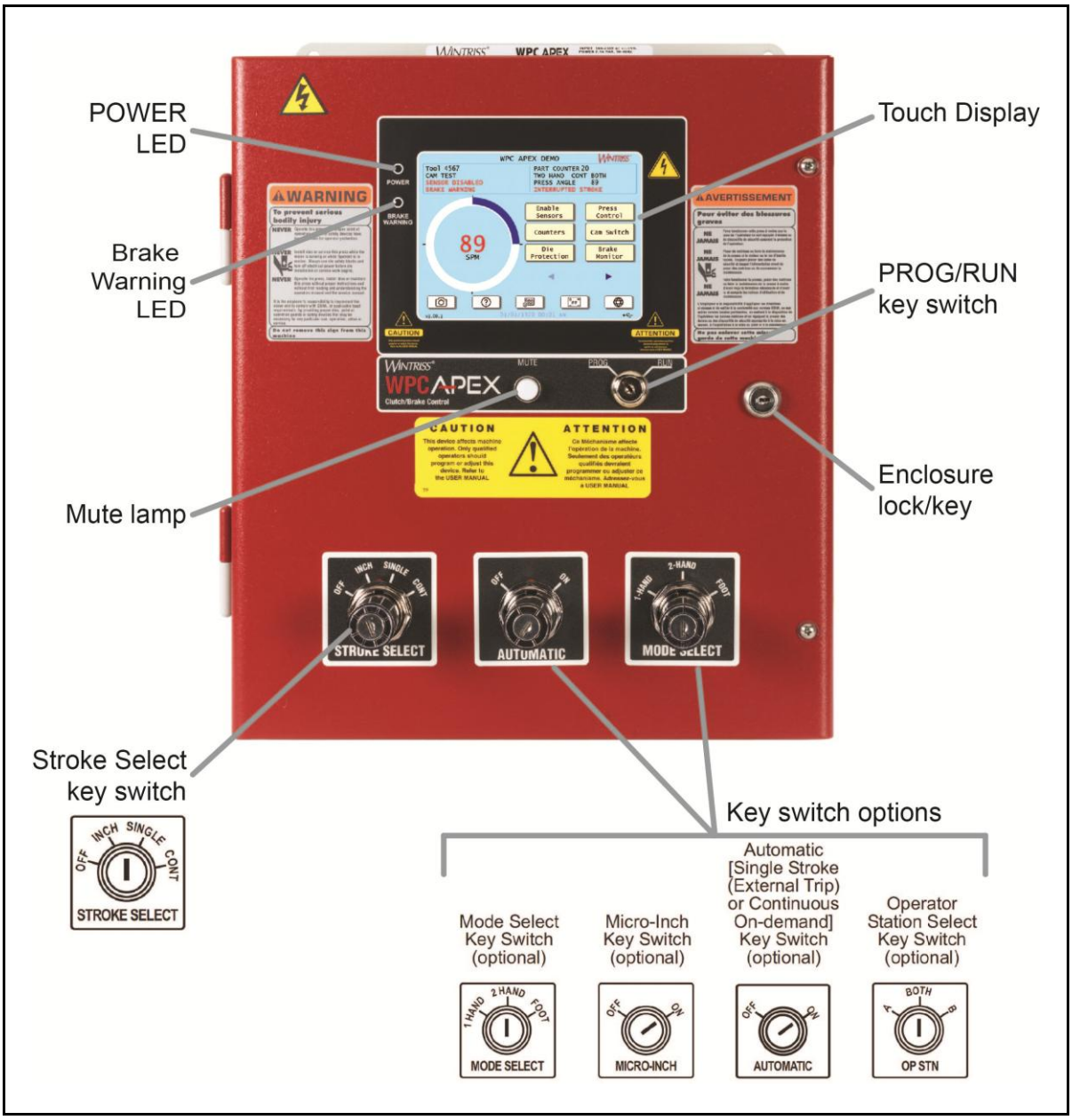


Figure 1-2. WPC APEX Control Enclosure and Display

Operator Station

The Operator Station is normally the device used to run the press in all Stroke Select positions. Wintriss provides operator stations with Run/Inch palm switches mounted on either the top or sides (see *Installing Operator Station(s)*, page 58, for available configurations). Figure 1-3 shows the switches and indicator lamps on an Operator Station with side-mounted Run/Inch palm switches. Functions of these components are shown below.

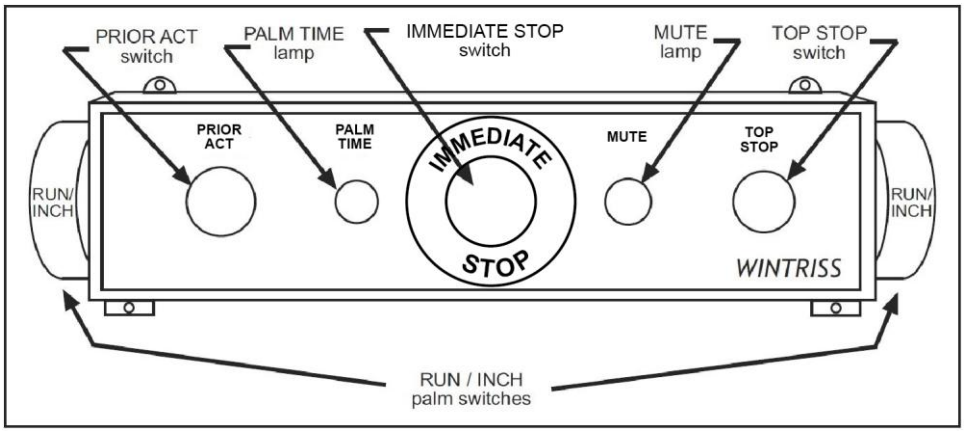


Figure 1-3. Operator Station Components (Side-mounted Run/Inch Palm Buttons)

- Run/Inch Palm Switches (2)–Initiate press action when both switches are pressed at the same time (Two-hand mode) or when only the left switch is pressed (One-hand mode).
- Prior Act Lamp and Switch–An arming device that must be pressed in Continuous Two- hand and Continuous Foot operating modes before a stroke can be initiated. When the switch is pressed, the lamp illuminates for 8 seconds, indicating the interval within which the operator must press the Run/Inch buttons or Foot Switch in order to stroke the press. Also used in Automatic Single Stroke operation (see *Operating the Press in Automatic Single Stroke* Mode, page 239).
- Immediate Stop Switch–Stops the press immediately when you push it. The switch is not spring-loaded, so you must pull it back to its original position to clear the Immediate stop (F13) fault (see page 251).
- Top Stop Switch–Stops the press at the top of its stroke when pressed during Continuous operation.
- Palm Time Lamp–Illuminates when one Run/Inch palm button is depressed, turning off after the 1/2 second palm time ("synchronous" time in ANSI terminology) on a standalone Operator Station or the 5 second concurrent time on multiple Operator Stations. The other palm button on a standalone Op. Station or all pairs of buttons on multiple Operator Stations must be pressed before the lamp turns off in order to initiate a stroke.
- Mute Lamp–Illuminates during muting of the light curtain on the upstroke. Requires installation of a Shadow light curtain and optional light curtain muting firmware.

Other Components

Dual-monitored Safety Valve (DSV)

The DSV controls the flow of air to the press clutch and brake. Wintriss provides 3/4 in. and 1 in. Ross DM2 DSVs. See *Installing a Dual Safety Valve*, page 55, for further details.

System Air Pressure Switch

This switch monitors the system air pressure. See Installing Air Pressure Switches, page 57, for additional information.

Shadow Light Curtain

The Shadow light curtain is a presence-sensing device that places an infrared light field between the point-of-operation and the operator. When an object, like the operator's hand, enters the sensing field and blocks a light beam, the light curtain detects the object and issues an Immediate stop command to the press.

The Shadow light curtain is required for point-of-operation guarding if WPC APEX is used with a Foot Switch or in One-hand operating mode. Multiple light curtains can be wired to a WPC APEX. WPC APEX tests up to four pairs of Shadow inputs every time that the press is started and stopped. See *Installing a Light Curtain*, page 64, for more information.

WPC APEX is designed to be used with a Shadow light curtain. If you order WPC APEX without a light curtain, the control enclosure does not have a Mode Select switch, and the unit operates only in Two-hand mode.

The light curtain is placed between the Operator Station and the die space. Shadow's mounting-bracket design allows plenty of room for adjustment.

WPC APEX Display

The WPC APEX color LCD touch display provides the following features on the Run screen (see Figure 1-4):

Crankshaft angle presented graphically with a "crank angle clock" and digital readout in degrees
Press speed (when running) in strokes/min
Press name
Tool number, part number
Sensor status: enabled, disabled, none programmed
Error/Fault codes
Messages such as Interrupted Stroke
Counter
Run mode
Operator station configuration

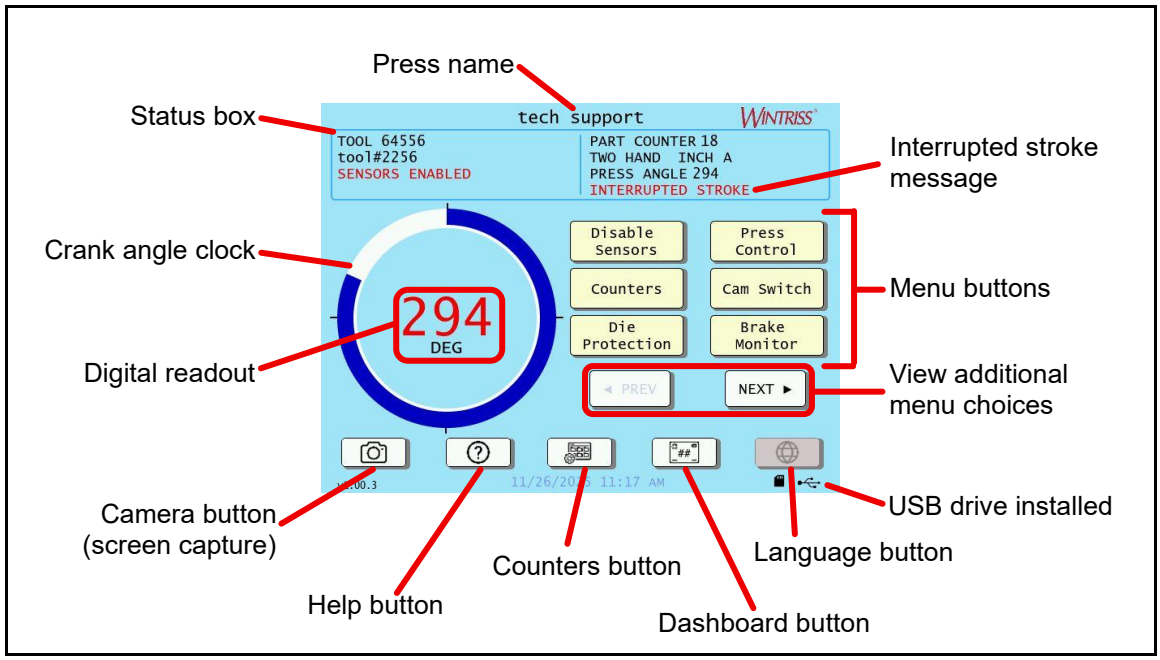


Figure 1-4. Main Run Screen

- A color LCD touch display that shows press speed (SPM), crankshaft angle, stopping time, and other press parameters. The information displayed depends on the current Stroke Select setting (see *Control Enclosure*, page 29).
- Crank-angle clock–A circular graphic that dynamically displays the approximate angular position of the crankshaft whether the press is running or idle. The digital readout inside the crank-angle clock displays the press speed when it is running, the crank angle when the press is stopped, WPC APEX fault codes and other alphanumeric messages.
- Brake Warning LED–An amber LED that flashes when the stopping time of the press increases to within 10 milliseconds of the preset Stop-time Limit, alerting the operator that it is time to schedule maintenance on the brake. The LED can be turned off only by powering down WPC APEX, then powering the unit back up.
- Interrupted Stroke Message–A red message that flashes when an Interrupted Stroke (see *Standard Features*, below) occurs.

Standard Features

WPC APEX provides the following standard features:

- Interrupted Stroke–An Interrupted Stroke occurs when the press is Immediate stopped before the completion of a stroke by either the operator or an automatic device for personnel or equipment protection. When this happens, an Interrupted Stroke message appears in the status box, and WPC APEX switches to “Two-hand Maintained Single Stroke” mode. (If WPC APEX were set to Inch mode, the press would stay in Inch mode.) To clear the Interrupted Stroke, the operator pushes both Run/Inch buttons simultaneously and holds them until the press reaches the top of the stroke. At this point, the Interrupted Stroke message turns off, and WPC APEX automatically reverts to the original operating mode.

- Customized Status Codes–WPC APEX provides user inputs that allow you to monitor auxiliary press functions, such as lubrication systems. When one of these functions issues a Stop command, a unique status code is displayed on the digital readout to identify why the press stopped. Up to seven of the inputs are cross-checked pairs, which you can use for safety interlocks. you can connect additional non-control-reliable inputs and up to 7 additional control-reliable, cross-checked input pairs.
- Brake Monitor–WPC APEX's Top-stop brake monitor checks the press's braking performance every time a Top-stop command is initiated or when the press completes a stroke at Top-stop. When the press's stopping time is within ten milliseconds of the preset Stop-time Limit, the Brake Warning LED flashes. When the stopping time exceeds the Stop-time Limit, WPC APEX issues a Stop command to the press and prevents the press from being restarted until the brake has been serviced.
- 90° Stop-Time Test–This standard feature is required in order to set the correct safety distance for personnel-guarding devices including light curtains, two-hand controls, and type-B movable barriers. The test is performed at 90°, the press's most critical stopping point, with the press running in Continuous and the heaviest die installed. The results of the test provide the stopping time (Ts) value specified in both OSHA 1910.217 and ANSI B11.1-2009 (see Appendix A).
- Counter and Counter Preset–The counter maintains a cumulative total of the number of strokes made by the press. When the count total reaches the value set on the Counter Preset (see Counters screen, Figure 5-2, page 223), WPC APEX stops the press. The counter is reset to "1". The counter preset feature is useful for batch sizing or periodic QC checks.
- Micro-inch–A feature that allows you to set the amount of time that the Dual Safety Valve is open in Inch mode when you push the Run/Inch palm buttons. Normally, in Inch mode the DSV is open for only as long as the Run/Inch buttons are depressed. The Micro-inch setting specifies the length of time the DSV is open regardless of how long the Run/Inch buttons are held. Allowing finer adjustments than are possible in Inch, Micro-inch is designed to facilitate setup on high-speed or short-stroke presses. Requires installation of optional Micro-inch selector switch (see *Control Enclosure*, page 29).
- Fault Codes–WPC APEX displays a numeric fault code preceded by the letter "E," "F," or "H whenever the press is stopped because of a fault. The numeric code identifies the specific problem that caused the fault. The initial letter indicates how the fault should be reset, and in the case of F and H errors, specifies the processor (A or B) that detected the problem. Underlying causes and remedies for each fault code are provided in Chapter 6.
- Lockout–Selected error codes that are associated with serious error conditions generate the lockout message "Loc," which appears in the digital readout when the error has been reset. The lockout function provides an added safety feature to WPC APEX, forcing the operator to perform two different Reset operations. Clear the lockout message by pressing OK in the lockout window.
- Automatic Single Stroke (External Trip)–Allows feed equipment to signal WPC APEX to initiate a stroke upon completion of a feed. This option is useful in applications where the feed must be completed before the press can be stroked.
- Automatic Continuous On-demand–Allows an external device to signal WPC APEX to start the press in Continuous mode and maintain operation in Continuous.

Optional Features

WPC APEX can be ordered with any of the following optional features:

- Counterbalance Air Pressure Switch–Operating identically to the clutch air pressure switch, this switch is used with the counterbalance air supply on presses equipped with counterbalances, as required by OSHA regulations.
- Eight-channel Programmable Cam Output–Provides cam timings for feed, pilot release, air blow-off, lubricator, or other non-safety press equipment.
- One-hand Control–A low-force switch that can be used with WPC APEX running One-hand/Two-hand/Foot firmware and equipped with a Shadow light curtain guarding the point of operation. The One-hand Control switch can be mounted on or near the press, allowing the operator to press the switch as part of the normal hand motion after loading a part.
- Foot Switch–A device that frees the operator's hands for increased, fully-guarded protection and productivity. One-hand/Two-hand/Foot firmware is required, and a Shadow light curtain must be installed.
- Bar Mode Control–Allows operators and setup personnel to bar the press by hand for die setting and adjustment. Recommended for smaller-capacity presses of 65 tons or less.
- Auto Compensated Top Stop (ACTS)–A feature that automatically adjusts the Top-stop "On" Angle to an earlier point in the stroke to compensate for increases in press speed. ACTS is designed specifically for variable-speed presses. See *Switch 4 (S101) – Enabling Auto Compensated Top Stop (ACTS)*, page 173, for additional information about this feature.
- Additional Operator Stations–Four Operator Stations can be connected directly to WPC APEX (see *Installing Multiple Operator Stations*, page 63).

⚠ DANGER

HAZARDS EXPOSED BY NON-WORKING OPERATOR STATION

- Safeguard the point of operation exposed by the non-working Operator Station when using multiple Operator Stations. The exposed area near a disabled Operator Station must be properly guarded.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

Use light curtains in addition to multiple operator stations for best personnel safeguarding.

- Display Configuration Options–WPC APEX is available without an enclosure. Installation instructions for panel mount and display board kit options are provided beginning with *Installing the Panel-Mount* Display, page 97.
- Auxiliary E STOP Output Relay Board–Allows up to three auxiliary devices such as a feed or transfer to be stopped or prevented from starting when an E STOP button is pressed.

  Layout of the Auxiliary E STOP Output Relay board is shown Figure 1-10, page 42. Wiring connections are shown in Table 2-17, page 106 and Table 2-18, page 107.

WPC APEX Clutch/Brake Control User Interface

WPC APEX has three operating modes. The main, or top, menu for each mode is shown in Figure 1-5.

- **Initialization Mode.** Used to create (mostly) global settings that control operation of WPC APEX when any tool is loaded.
- **Program Mode.** Used to create, modify, and load settings that control WPC APEX operation for specific tools.
- **Run Mode.** Used to operate the press and make adjustments to programmed settings such as sensor and cam timing for the currently running tool.

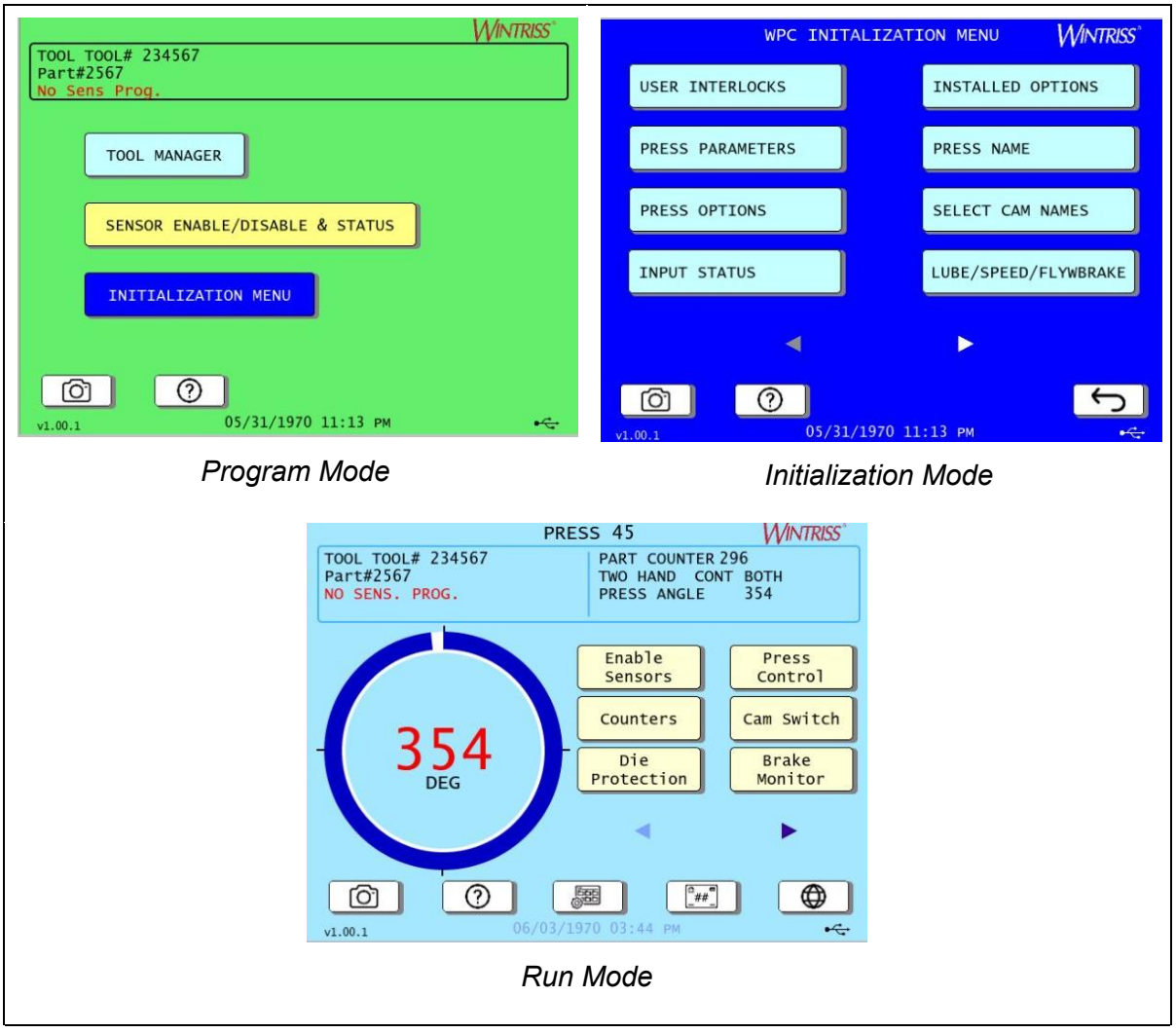


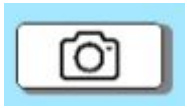
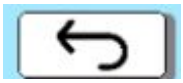
Figure 1-5. Main Menu Screens for Run, Initialization and Run Modes

Table 1-1. Initialization, Program and Run Modes: Entry and Exit Procedures

Mode	How to Enter This Mode	How to Exit This Mode
Initialization White text on dark blue display, see Figure 1-5, above. Make settings that control operation of WPC APEX with all tools. You use Initialization mode extensively when you install a new WPC APEX. You will use this mode only occasionally after you set up WPC APEX and the press is running. See *Chapter 3– Initialization, Setup, and Checkout*, page111.	Turn the key switch to “PROG” and select “INITIALIZATION MENU” from the Main Programming Menu.	To switch to Program mode: Press ⮌ repeatedly until the Program menu appears. To switch to Run mode: Turn the PROG/RUN keyswitch to RUN.*
Program Black text on green display, see Figure 1-5, above. Create, modify, and load settings for individual tools that control WPC APEX operation when that tool is loaded. See *Chapter 4– Program Mode*, page 199.	From Run mode: Turn the PROG/RUN key switch to PROG.* From Initialization mode: Go to the WPC Initialization menu, and press ⮌. – or – Turn the PROG/RUN keyswitch to RUN and then back to PROG.*	To switch to Run mode: Turn the PROG/RUN keyswitch to RUN.* To switch to Initialization mode: Select “INITIALIZATION MENU” from the Main Programming Menu
Run Black text on light blue display, see Figure 1-5, above. Run the press. In this mode you can adjust counters, cams, sensors, and other functions while the press is running. See *Chapter 5 – Run* Mode, page 219.	Turn the PROG/RUN keyswitch to RUN.*	To switch to Program mode: Turn the PROG/RUN keyswitch to PROG.*
* If you turn the PROG/RUN key and nothing happens, press ⮌ repeatedly until WPC APEX changes modes. Before you turn the PROG/RUN keyswitch, make sure WPC APEX is in the Main (or top) menu for the mode it is in. If it is not, press ⮌ repeatedly until the Main menu appears.		

Control and Navigation Buttons

Table 1-2. Control and Navigation Buttons

	**Camera Button** Press to save a screenshot to the USB drive.
	**Help Button** Press to access help for the current screen.
	**Tool Manager Button** Press to access the Tool Manager screen.
	**Dashboard Button** Press to magnify some commonly used screens.
	**Language Selection Button** (not currently available) Press to change the language on the display.
	**Back Button** Press to return to the previous screen.
	**Plus (+) Button** Press to increase a value.
	**Minus (–) Button** Press to increase a value.
NEXT	**NEXT Button** Press to access the next screen of menu choices.
PREV	**PREV Button** Press to access the previous screen of menu choices

On-Screen Keyboard

Figure 1-6. On-Screen Keyboard

Whenever you select a field that requires the input of a combination of letters, numbers, and/or symbols, WPC APEX displays its on-screen keyboard. (see Figure 1-4).

- Backspace key clears the value.
- Checkmark (✓) key accepts the value entered into the field.
- ✕ key cancels and exits without making any changes.
- ABC key functions like a Caps Lock key, converts the keyboard to upper case, returns it to lower case.
- 1# key changes the keyboard to show numbers and symbols.

NOTICE

When the on-screen keypad or keyboard is displayed, the  button on the screen is disabled. The keypad or keyboard value must be entered or cancelled before you can access any other buttons on the screen.

On-Screen Numeric Keypad

Figure 1-7. Numeric Keypad

Whenever you select a field that requires numbers only, WPC APEX displays an on-screen numeric keypad, Figure 1-7.

- Backspace clears the value.
- Checkmark accepts the value entered into the field.
- X closes the numeric keypad without making any changes.

WPC APEX Boards

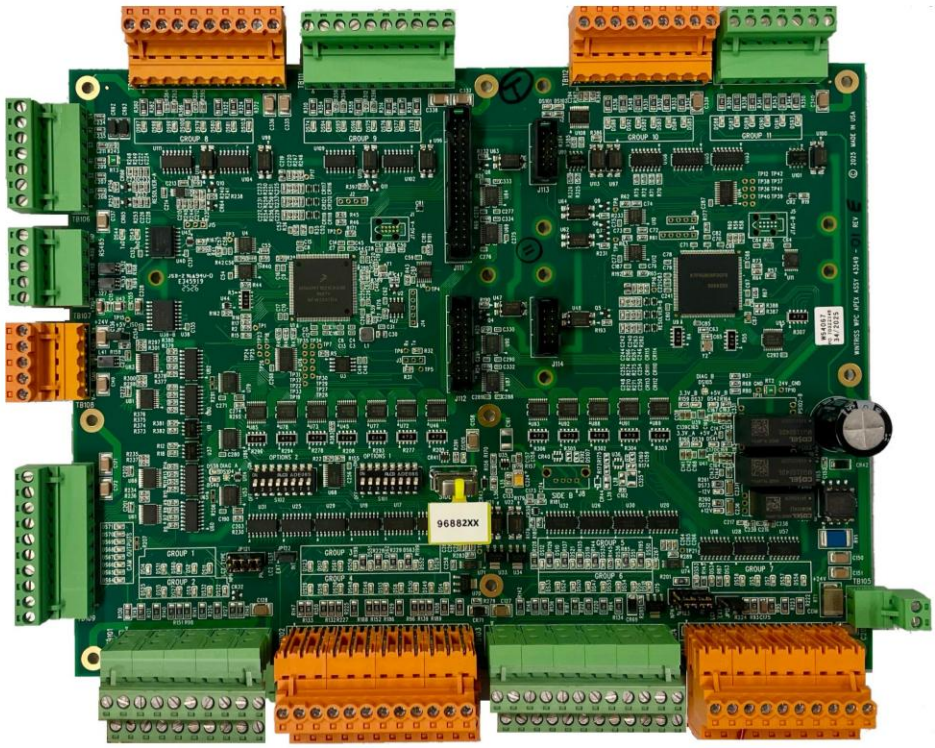


Figure 1-8. WPC APEX Processor Board

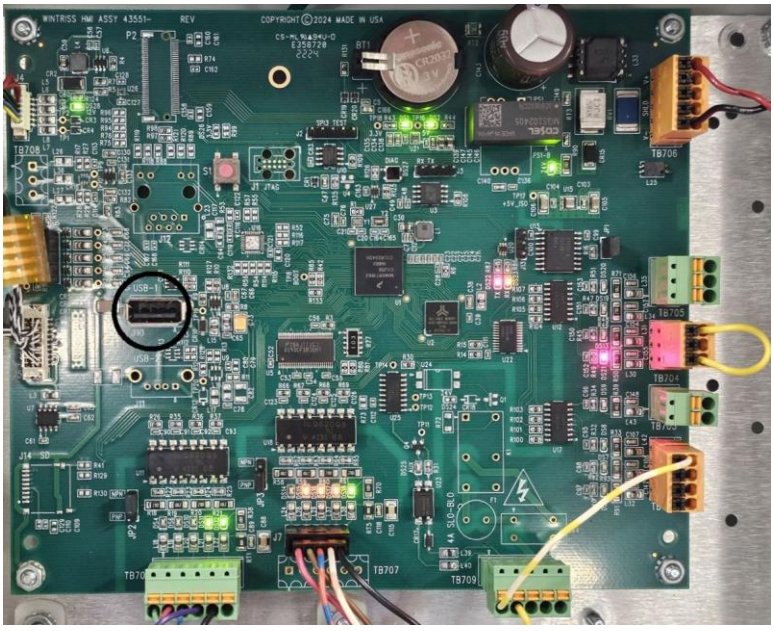


Figure 1-9. WPC APEX Display Board

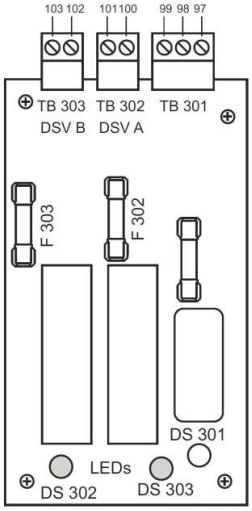


Figure 1-10. WPC APEX DSV Lockout Board

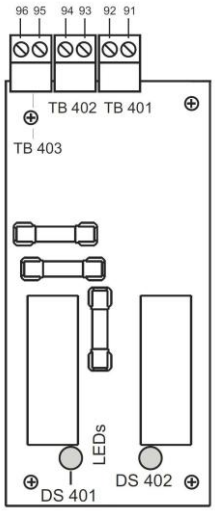


Figure 1-11. WPC APEX AUX E STOP Board

Specifications

WPC APEX specifications are shown in Table 1-1.

Table 1-3. WPC APEX Specifications

Control	Enclosure: 14.00 x 16.00 x 5.75 in. (355.6 x 406.4 x 146.1 mm), NEMA 12, shock-mounted. Panel Mount: 8.75 x 9.25 in. (222.3 x 235.0 mm) Standard items include 6.5-in. LCD color touch display. Mute lamp, and Settings key switch. Enclosure also provides Stroke Select key switch and holes for two optional key switches.
Equipment Available from Wintriss Controls	**Resolver** 0.75 in. (19 mm) keyed shaft. Rated shaft loading: 200 lb axial, 200 lb radial. **Operator Station** NEMA 12. Includes two palm buttons, Top-stop, Immediate stop, and Prior Act buttons, and palm time and mute lamps. Pre-wired; unwired version also available. **Dual Safety Valve (DSV)** Available in 0.75 in. (19 mm) or 1 in. (25 mm) Ross DM2 models. **Air Pressure Switch** 12-150 PSI. Monitors clutch air supply pressure.
Wintriss AC Power Supply (Included)	Input: 100-240 ± 10% Vac (universal switching), 2.1 A, 50/60 Hz. Output: 24 ± 1% Vdc, 200 mA maximum for customer use including auxiliary outputs.
Power Requirements if not Using Wintriss AC Power Supply	24 Vdc ± 5%, 4 A. Must be certified to CSA C22.2 No. 234 Standard.
Operating Temperature	32° to 122° F (0° to 50° C).
Inputs	Resolver Overrun limit switch Four operator stations DSV monitor Air pressure switch
Die Protection	Provides up to 4 die protection sensor inputs Power for electronic sensors (NPN only): 15 Vdc min., 100 mA total DiPro Sensor Interface, DSI 2*: 5.88 x 5.41 x 3.42 in. (149 x 137 x 87 mm) * Consult product user manual. DSI 2: #1121900

Additional Inputs	**Motor** Forward and reverse contacts **Shadow Light Curtains (4)** Checks proper functioning at every stroke initiation and stop. **Customized Status Codes** Seven for: Unused, T STOP, I STOP T STOP/LOCKOUT (T LOC), or I STOP/LOCKOUT (I LOC) Seven cross-checked pairs for I STOP or I STOP/LOCKOUT (I LOC)
Outputs	**DSV** Two monitored relays, rated 4 A @ 120 Vac, for stopping press. **Lockout** One monitored relay, rated 4 A @ 120 Vac, for de-energizing motor and other devices under critical conditions. **Optional Auxiliary E STOP Output Relays** Two monitored relays, rated 4 A @ 120 Vac, for up to three auxiliary devices (e.g., feed, transfer, etc.), which can be stopped or prevented from starting if any E STOP button is depressed.
Speed	7-1000 SPM (Standard); 1001-2000 SPM (High Speed Option)
Displays	6.5-in. resistive touch color LCD display LED indicator for Brake Warning. Diagnostic LEDs on Main Processor board for power and for all inputs, including buttons and switches. **Presettable Counter** Counts number of strokes, good parts, and total number of hits per tool; can be used to stop the press for batch sizing or QC checks.
Options	**Shadow V, Shadow VI, Shadow VII, Shadow 8, or Shadow 9** Heights from 6 to 60 in. (138 to 1524 mm), scanning ranges from 23’ to 65’ (7 to 20 m). Refer to Shadow literature for more information. **Firmware** Muting for Shadow light curtain on the upstroke. Two-hand only. One-hand*, two-hand or foot operation*. Auto compensated top stop (ACTS). High Speed (>500 SPM). **Selector Switches** Mode (One-hand*, two-hand, or foot operation*). Micro-inch on/off. Automatic (single stroke or continuous on-demand) on/off to slave the press to an external device. Operator station select for up to two operator stations. **8-Channel Programmable Cam** Enclosure: 8 x 10 x 3.5 (203 x 254 x 89 mm) shock-mounted Relay: SPDT 0-3A resistive at 240V (standard) DC Solid State: SPST 2A at 5-60 Vdc optional AC Solid State: SPST 1A at 70-250 Vac (optional) **Foot Switch** Safety switch for foot actuation* (1-hand/2-hand/foot firmware required).

Options, continued	**One-hand Control** Control for one-hand actuation* (1-hand/2-hand/foot firmware required). **Counterbalance Air Pressure Switch** 12-150 PSI. Monitors counterbalance air supply (uses one custom input). **Bar Mode Control** Allows manual turning of crankshaft. **Motor Control and Custom Packages** Refer to Press Control/Motor Starter literature, and/or contact your Wintriss representative or factory for more details. **Option 2 User Inputs, Lube, and/or Speed Control** See Option 2 manual for details

* Shadow light curtain required

Chapter 2 – Installation

⚠ DANGER

IMPROPER INSTALLATION, USE OR MAINTENANCE

- Follow all procedures in this manual. Perform only the tests and repairs listed in this manual. Use only factory-supplied replacement parts.
- Ensure that WPC APEX clutch/brake control is installed, tested, and repaired by qualified personnel.
- Wire, install and maintain WPC APEX clutch/brake control in accordance with the applicable safety standards. Carry out all inspection procedures in OSHA 1910.217.
- Wire and install all equipment in accordance with the requirements of OSHA 1910.147 Control of Hazardous Energy (Lockout/Tagout).
- Install and maintain your machine guarding system according to OSHA standard 1910.217, ANSI B11.1, ANSI B11.19 and any other regulations and standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.
- Perform the checkout sequence after installation and after any modification or repair of the WPC APEX clutch/brake control.
- Lockout/Tagout the press during all installation, modification, repair, or maintenance procedures.
- Ensure that supervisors, die-setters, maintenance persons, machine operators, foremen, and any others responsible for operation of the machinery have read and understood all instructions for use of the WPC APEX clutch/brake control.
- Disconnect the “Continuous” mode position of your stroke selector switch and cover the “CONT” label on your control if the press is not properly guarded for use in Continuous mode.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

FAULTY INSTALLATION

- Ensure that wiring is correct.
- Use only safety-certified components for safety functions, including interlock switches used in safety applications.
- Install guarding to prevent access to hazardous areas. Prevent access to hazardous areas over, under, or around any guarding devices.
- Ensure that there is one active Operator Station for each operator if you are using Two-hand mode.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

ELECTRIC SHOCK OR HAZARDOUS ENERGY

- Disconnect main power before installation.
- Remove all power to the press, press control, and other equipment used with the press.
- Remove all fuses and “tag out” per OSHA 1910.147 Control of Hazardous Energy (Lockout/ Tagout).
- Ensure that installation is performed by qualified personnel.
- Complete all installation procedures before connecting to the AC power source.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

When you have completed installation procedures, perform the tests in the *Installation Verification*, page 100, to ensure that WPC APEX is installed correctly and working properly before proceeding to Chapter 3.

NOTICE

ALL SIGNAL GROUNDS MUST BE CONNECTED THROUGH MAIN PROCESSOR BOARD

Connect all signal grounds through pins on the WPC APEX Main Processor board.

NOTICE

READ INSTALLATION INSTRUCTIONS BEFORE STARTING INSTALLATION

If you install WPC APEX yourself, read this installation chapter carefully and plan how you are going to proceed before you start drilling holes, running conduit, or cutting wires. Make sure you are familiar with the WPC APEX display (see Chapter 1). If you encounter problems during installation, contact Wintriss Tech. Support.

NOTICE

PRESS MUST BE AT TDC

Before starting installation, make sure that the die has been removed from the press and the press ram has been moved to top dead center (TDC). The press must be at TDC when you make final adjustments for the resolver. The TDC setting should be 0° ±2°. Use a dial indicator on the face of the ram, if necessary, to ensure that the ram is positioned correctly.

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

- **Immediate Stop (I STOP) (formerly E Stop) - Red button**
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC) (formerly E Stop Lockout)**
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP) (System wide stoppage) – Red button w/ yellow halo**
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

Installation Guidelines

Observe the following guidelines when installing WPC APEX, referring to Figure 2-1, page 50 when necessary.

- For AC wiring, use 16 AWG wire (14 AWG if required by local codes) with a minimum 75° C temperature rating. For other wiring, use 18 AWG with 600 V insulation.
- All signal grounds must run through the WPC APEX Main Processor board. Use chassis ground only for terminating cable shields.
- Run flexible, liquid-tight conduit for high voltage lines (120V power, relay circuits) to the upper left knockout on the WPC APEX enclosure.
- Never run wires for 120V and for lower voltages (such as 24V or 60V) inside the same conduit. For example, the Operator Station cables should not share the same conduit with 120 VAC wiring. However, power and logic wiring for the light curtain or Dual Safety Valve (DSV) can be run in the same conduit.
- Provide a dedicated 120V power circuit from the press control transformer to the WPC APEX input power connection. Do not power any relays or solenoids from this circuit or the auxiliary power terminals on WPC APEX. Doing so may cause erratic press shutdowns due to electrical noise.
- Run one or two low-voltage conduits for the resolver wires to the knockouts on the bottom of the WPC APEX enclosure.
- Because WPC APEX 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.

- Make sure the WPC APEX is properly grounded.
- All relays and solenoids controlled by WPC APEX must be suppressed. Suppressors should be installed across the load and as close to the load as possible. Never install a suppressor across the relay contacts. The suppressors tend to fail shorted. In some cases, suppressors are required in the Top stop and Immediate stop circuits. Additional suppressors (part number 2238801) can be obtained from Wintriss.

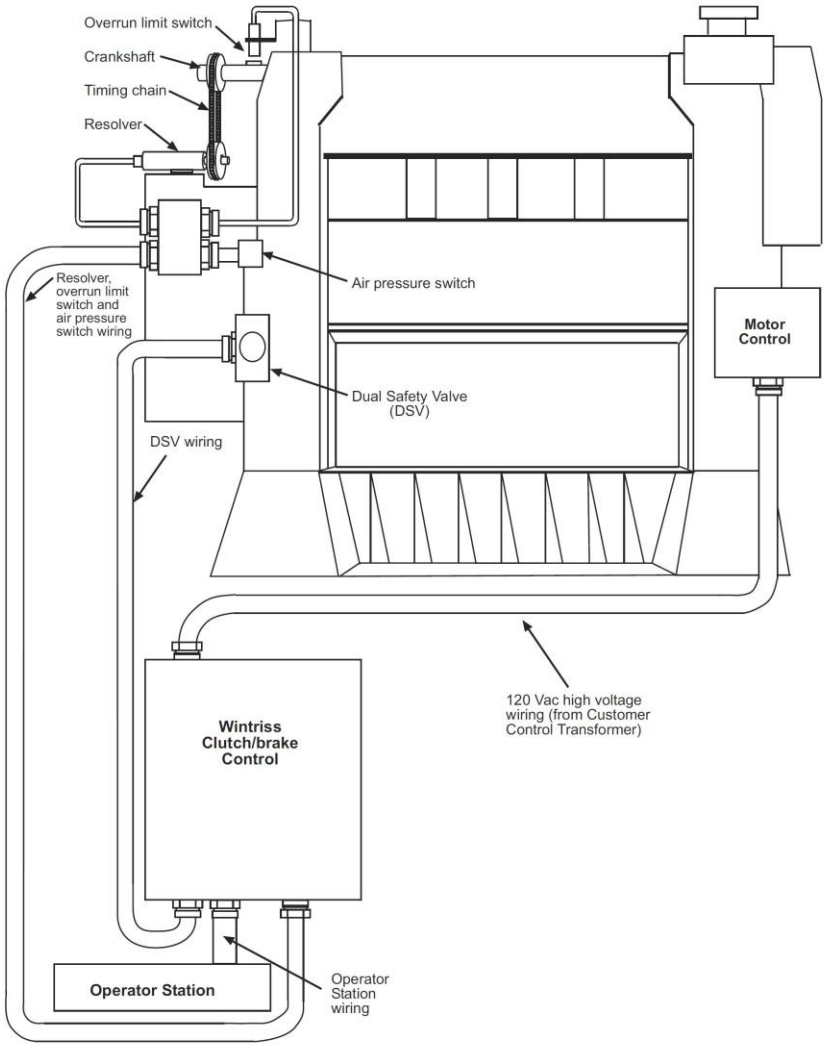


Figure 2-1. WPC APEX Wiring Overview

Connecting Wires to Terminal Block Connectors

When connecting wires to terminal block connectors, follow these steps:

1. Find the correct terminal and loosen the screw over it by turning the screw counterclockwise (see Figure 2-2).
2. Strip the correct wire for this terminal 1/4 in. (6.4 mm) from the end.
3. Insert bare wire into the terminal 90% of the way.
4. 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.

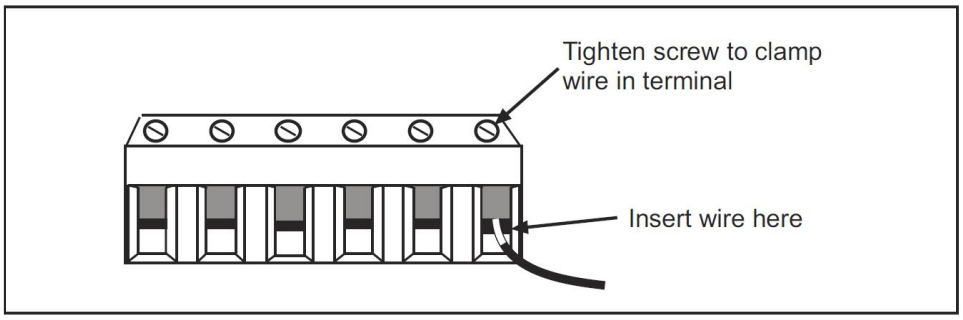


Figure 2-2. Correct Way to Attach Wires to Terminal Block Connectors

Terminating Cable Shields

NOTICE

TERMINATE BOTH ENDS OF SHIELD

Be sure to terminate the cable shield at both ends where possible.

Perform the following steps to terminate shielded cables to the ground studs located inside the WPC APEX enclosure near the cable's point of entry, referring to Figure 2-3.

1. Strip the cable jacket as far as the end of the conduit fitting.
2. Cut the drain wire to a length that can wrap at least once around the nearest ground stud. Loosen the nut, wrap the drain wire clockwise around the stud, and tighten the nut.
3. Connect the rest of the wires in the cable to the terminal block as appropriate.

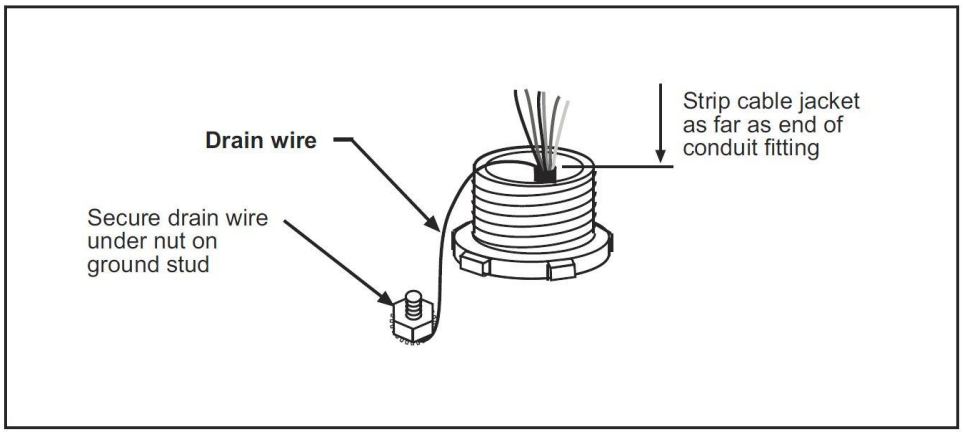


Figure 2-3. Cable Shield Termination

Mounting the Control Enclosure

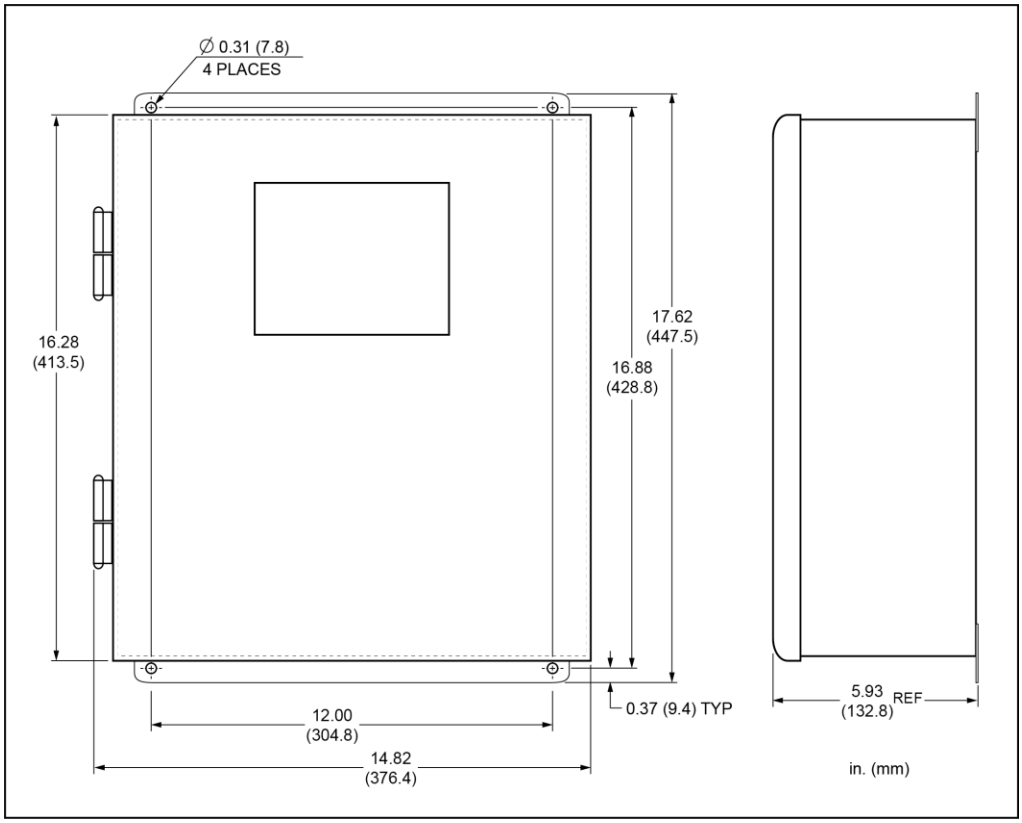


Figure 2-4. WPC APEX Control Enclosure Mounting Dimensions

Mount the control enclosure (see Figure 2-4 for mounting dimensions) so that it is convenient to the operator. An optimal location is one that allows the operator to read the digital display and reach the touch display while standing at the front of the press.

The enclosure does not have to be mounted to the press but can be installed on a free-standing pedestal, pendant, or column.

For easy access to the interior of the enclosure, make sure that there is enough room to open the control enclosure door at least 120°.

Plastic cable ties and self-sticking cable clamps are provided in the accessory parts bag. Use them to organize the cables and wiring inside the control enclosure.

Wiring the Control Enclosure

WPC APEX requires the following electrical components:

- Motor forward auxiliary contact (24V)
- Slide adjust monitor circuit (24V)
- Motor stop circuit (110V), if applicable
- Motor reverse auxiliary contact (24V), if applicable

Power to WPC APEX should be provided by a step-down control transformer capable of handling 75 VA at 115 Vac ± 10%.

Most of the original controls on the press will be replaced during rewiring except the disconnect, motor starter, and control transformer. Make sure to rewire so that the motor starter operates properly.

Slide Adjust Considerations

If your press has a motorized slide adjustment for the ram, you must prevent slide adjustment while the press is running. Connect spare contacts on the slide adjustment switches (i.e., Slide Adjustment "On" or Slide Adjustment "Up"/"Down" switch) to the WPC APEX Immediate stop circuit or a user interlock to stop the press as soon as the ram adjust switches on. For help in determining how to connect this wiring, call Wintriss Tech. Support.

Connecting AC Wiring

⚠ DANGER

ELECTRIC SHOCK OR HAZARDOUS ENERGY

- Disconnect main power before installation.
- Remove all power to the press, press control, and other equipment used with the press.
- Remove all fuses and "tag out" per OSHA 1910.147 Control of Hazardous Energy (Lockout/ Tagout).
- Ensure that installation is performed by qualified personnel.
- Complete all installation procedures before connecting to the AC power source.

Failure to comply with these instructions will result in death or serious injury.

All wires can be run through flexible, liquid-tight conduit to the control as long as all circuits are 115V. If your Top-stop circuits and Immediate stop circuits are low voltage (for example, 24V), run two conduits–one for 115V wires and one for 24V wires. Be sure to number all wires so they are consistent with the electrical prints for your press.

Bring the wiring connections for AC power to a convenient point so that you can connect them to the power terminal block at the top left of the enclosure (see Figure 2-5). No. 16 wire (No. 14, if local codes require it) is recommended for these circuits with a minimum 75° C temperature rating.

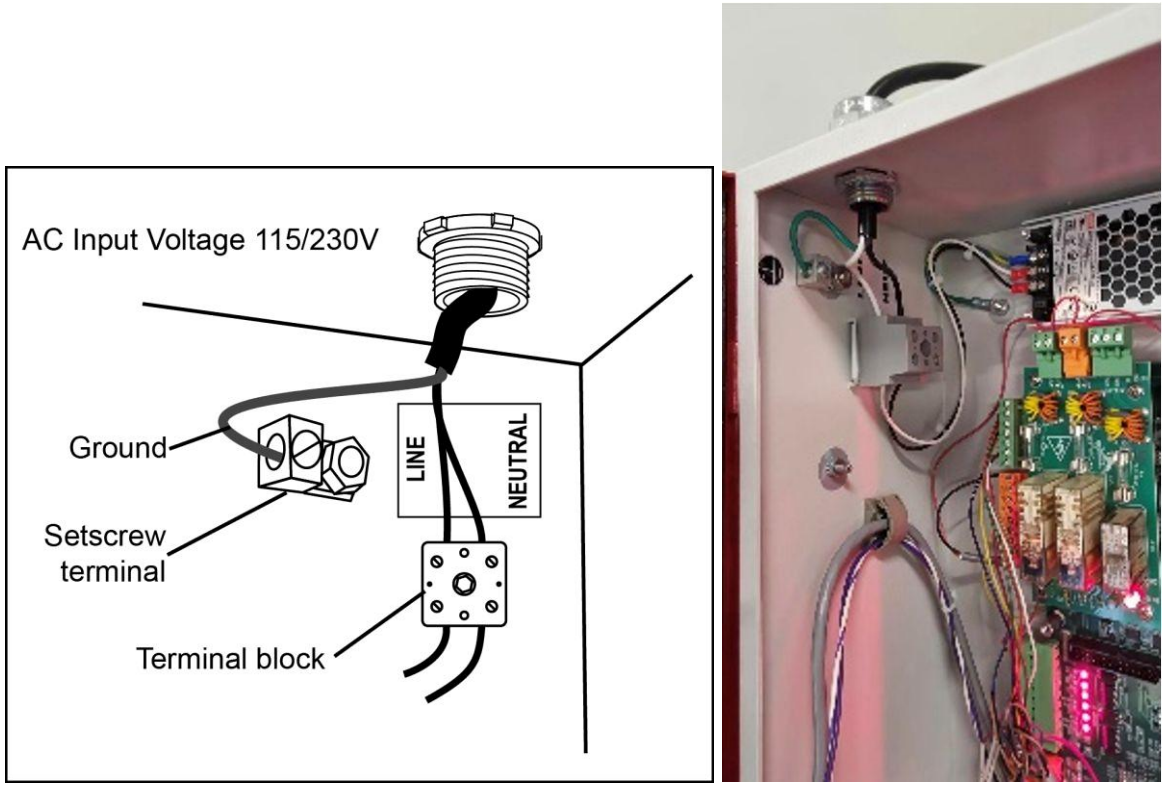


Figure 2-5. AC Input Wiring Connections

NOTICE

WPC APEX AUTOMATICALLY ADJUSTS TO 115 OR 230 VOLT INPUT POWER

You do not need to use a switch or other device to set the level of input power.

To make AC power wiring connections, perform the following steps:

1. Locate the power supply input terminal block on the back wall at the top left of the enclosure, as shown in Figure 2-5.
2. Determine how you will bring wiring from your 115 or 230 Vac power source to the enclosure. 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. Run the power wires to the enclosure through flexible, liquid-tight conduit. Because WPC APEX 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.
4. Connect the ground wire to the set screw terminal on the left wall of the enclosure, referring to Figure 2-5 and to Figure 13 (Ross Serpar DSV), Figure 14 (Herion DSV), or Figure 17 (Ross DM2 DSV) at the end of the manual.

5. Connect the power wires.

   For 115 Vac power, connect the black wire to the LINE terminal and the white wire to NEUT.

   For 230 Vac, connect the black wire to the LINE terminal and the red wire to NEUT.

   Strip the wire 1/4 in. from the end. Loosen the screw in the input power terminal block, insert the stripped portion of the wire, and tighten the screw.

6. Double-check connections.

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

Installing a Dual Safety Valve

⚠ DANGER

USER-SUPPLIED DUAL SAFETY VALVE NOT SUITABLE FOR SAFETY USE

Ensure that your dual safety valve meets the applicable safety standards. Contact the valve manufacturer for information.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INSTALL DSV CLOSE TO CLUTCH/BRAKE ASSEMBLY TO REDUCE STOPPING TIME

Install the dual safety valve as close as possible to the clutch/brake assembly. Any excess piping between the valve and the clutch/brake assembly increases the Stopping Time of the press.

Failure to comply with these instructions will result in death or serious injury..

⚠ WARNING

DSV MUFFLER CLOGGING OR LOOSENING

- Clean the DSV muffler periodically. A clogged muffler can degrade Stopping Time.
- Tighten the muffler securely to the valve body. Periodically check to make sure the muffler is securely installed. Vibration may cause it to loosen and fall. To tighten the muffler, secure the valve body, hold the muffler with both hands, and turn clockwise as tightly as possible without stripping the threads.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

ALL SIGNAL GROUNDS MUST BE CONNECTED THROUGH MAIN PROCESSOR BOARD

Connect all signal grounds through pins on the WPC APEX Main Processor board.

If you have ordered a Ross or Herion DSV with your WPC APEX, refer to the appropriate wiring diagram at the end of this manual and to the documentation that came with your valve to install the DSV. Note the following requirements:

- Ross DM2

To wire the Ross DM2 DSV, refer to Figure 17 at the end of the manual.

The Reset circuit requires that a diode be installed across the coil in the solenoid to provide noise suppression (see Figure 17). This wiring has already been done for you in the Hirschmann connector for the 24 Vdc Reset solenoid, which is provided along with two Hirschmann connectors for the 120 VAC valve solenoids in the Ross DM2 kit.

NOTICE

MAKE SURE TO INSTALL NOISE SUPPRESSION DEVICES

Noise suppression devices (Pactrons) are provided in the WPC Installation Kit. Be sure to install them across the two Hirschmann connectors for the 120 Vac valve solenoids as shown in Figure 2-17, page 86.

The Reset solenoid connector comes in two styles. One has a black shell with an electrical circuit including a diode symbol (⊣◁⊢) printed on it, the other a transparent shell with a red LED indicator visible inside. You install this connector on the Reset solenoid at one end of the DSV. The Reset solenoid connector is the only connector at this end of the DSV. The other two connectors are installed on the two valve solenoids at the other end of the DSV, which has three connectors altogether, including one for the DSV monitor that is already installed. You wire the Reset solenoid and valve solenoid connectors to WPC APEX as shown in Figure 17 at the end of the manual.

CAUTION

DO NOT WIRE RESET CIRCUIT TO 110 VAC

The Reset circuit works only on 24 Vdc. Do not wire the Reset circuit to 110 VAC.

Failure to comply with these instructions could result in property damage.

Note that the DM2 Reset circuit is wired to the OFF position on the WPC APEX Stroke Select switch (see Figure 6). To reset the Ross DM2 DSV after an F47 error (see page 256), press OK, and turn the Stroke Select switch to OFF, then back to one of the other operating modes (i.e., Inch, Single Stroke, or Continuous).

Make sure to install air supply lines that match the inlet port size of the DM2 DSV to provide sufficient air to reset the unit in case of a fault (see *Resetting Ross DM2 DSV Faults*, page 272).

- **Ross Serpar with EP Monitor**

  This Ross DSV requires a separate user-supplied reset switch. See Figure 14 at the end of this manual. Also, all jumpers except those shown in the wiring diagram must be removed; otherwise, the WPC APEX Main Processor board may be damaged.

- **Herion XSZ**

  Make sure that you wire the Herion DSV monitor between pin #20 and a +24 Vdc output. See Figure 13 at the end of the manual.

Installing Air Pressure Switches

Your WPC APEX requires switches to monitor clutch air pressure and counterbalance air pressure if there is a counterbalance.

NOTICE

Both the clutch air and counterbalance air pressure switches are held closed when pressure is applied above the setpoint limit.

Installing a Clutch Air Pressure Switch

Install and wire the clutch air pressure switch as follows:

1. Install a filter regulator and lubricator in-line before the clutch air pressure switch if they are not already present.
2. Connect shop air to the clutch air pressure switch input port.
3. Run the cable through flexible, liquid-tight conduit, observing NEMA 12 requirements.
4. Wire the normally open terminals of the switch between pin #8 and ground (e.g., pin #54) on the WPC APEX Main Processor board, referring to Figure 2 at the end of the manual.
5. Set the clutch air pressure switch to 35 PSI, or the pressure recommended by the press manufacturer.

Installing a Counterbalance Air Pressure Switch

Install and wire a counterbalance air pressure switch as follows if there is a counterbalance:

1. Install a filter regulator and lubricator in-line before the counterbalance air pressure switch if they are not already present.
2. Connect shop air to the counterbalance air pressure switch input port.
3. Run the cable through flexible, liquid-tight conduit, observing NEMA 12 requirements.
4. Wire the normally open terminals of the switch to pin # 524 (Counter Balance Pressure SW Input) and ground (e.g., pin # 518).
5. Set the counterbalance air pressure switch to the pressure recommended by the press manufacturer, typically the pressure required for the smallest upper die you plan to use in this press.

NOTICE

USING RAMPAC (SMARTPAC 1, 2, OR PRO) TO CONTROL COUNTERBALANCE PRESSURE

If you use RamPAC to control the counterbalance pressure, set the WPC APEX counterbalance pressure switch to the pressure required to balance the empty ram.

Installing Operator Station(s)

The Operator Station should be installed in a location from which the operator can conveniently run the press. On most gap-frame (OBI or OBG) presses, this will be on the front of the bolster. For straight-side presses, the Operator Station may be installed on the press or on a pedestal.

The Operator Station should not be permanently mounted until you have calculated the correct safety distance (see *Calculating the Safety Distance*, page 159) and performed the applicable verification (see page 100) and checkout (see page 177) tests. When you have finished wiring, you can place the Operator Station temporarily on the floor or on a cart.

If you are not installing a light curtain, and if you are planning to use the Operator Station as a two-hand safety device, the Operator Station must be mounted at the correct safety distance from the nearest pinch point on the press. This distance must be calculated based on the Stopping Time of your press. See *Calculating the Safety Distance*, page 159, for details.

Mounting the Operator Station at the correct safety distance prevents an operator from leaving the station and reaching the pinch point before the press stops.

If you are installing a light curtain, the Operator Station must be placed outside the area guarded by the light curtain. You do not need to calculate a specific safety distance for your Operator Station since the light curtain now prevents access to the pinch point. You must not, however, mount the Operator Station between the light curtain and the pinch point.

Wiring a Pre-wired Operator Station

Checking Pre-wired Operator Station Wiring

Before connecting your pre-wired Operator Station to WPC APEX, check the wiring to the mute lamp inside the Operator Station and modify, if necessary, according to the instructions below. Operator stations shipped as part of WPC APEX systems should not need modification.

1. Find the mute lamp on the Operator Station, as shown in Figure 2-6.

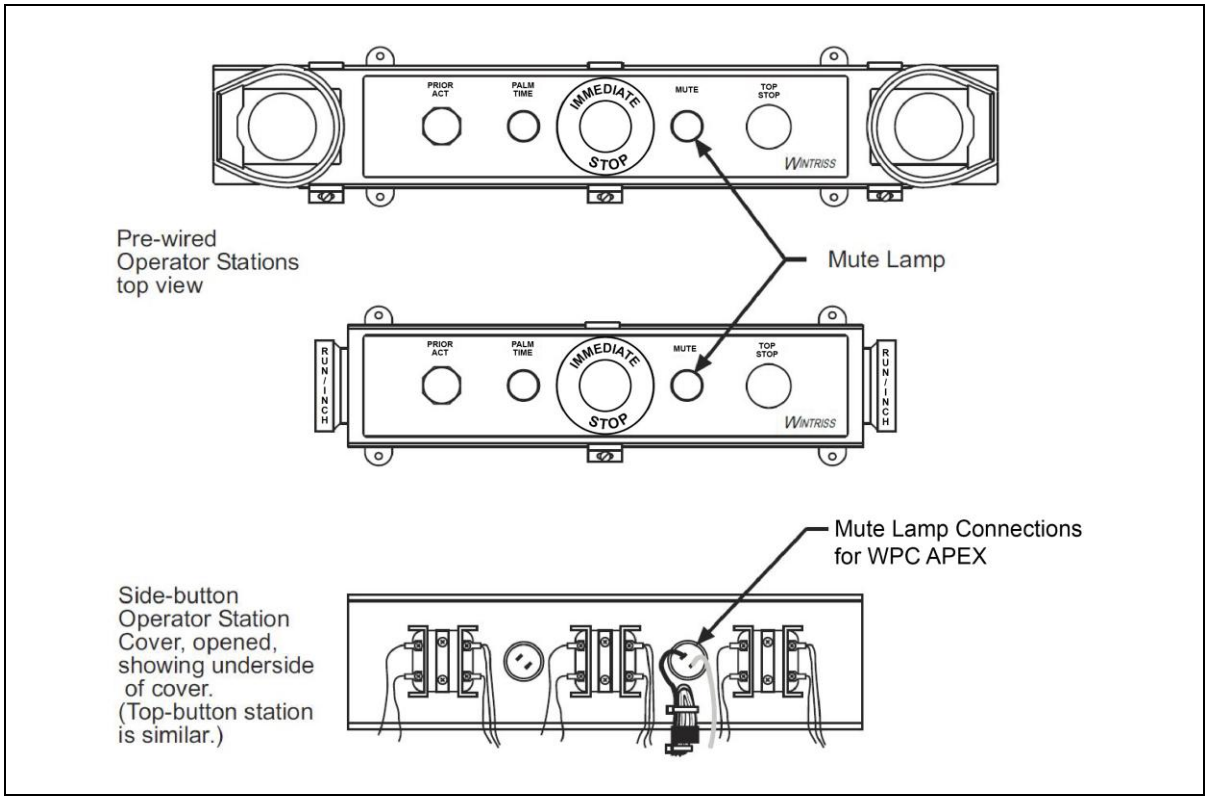


Figure 2-6. Pre-wired Operator Stations Showing Mute Lamp Connections

2. Open the Operator Station, and locate the mute lamp connections on the underside of the cover.
3. Determine whether you need to modify the mute lamp wiring:
   - If your mute lamp wiring looks like panel "E" in Figure 2-7 (i.e., the black wire is connected, the red-and-white wire not connected), the wiring is correct.
   - If your mute lamp wiring looks like panel "A," follow steps A through E in Figure 2-7 to disconnect the white-and-red wires and connect the black wire.
4. When the mute lamp wiring is correct, connect the Operator Station to WPC APEX.

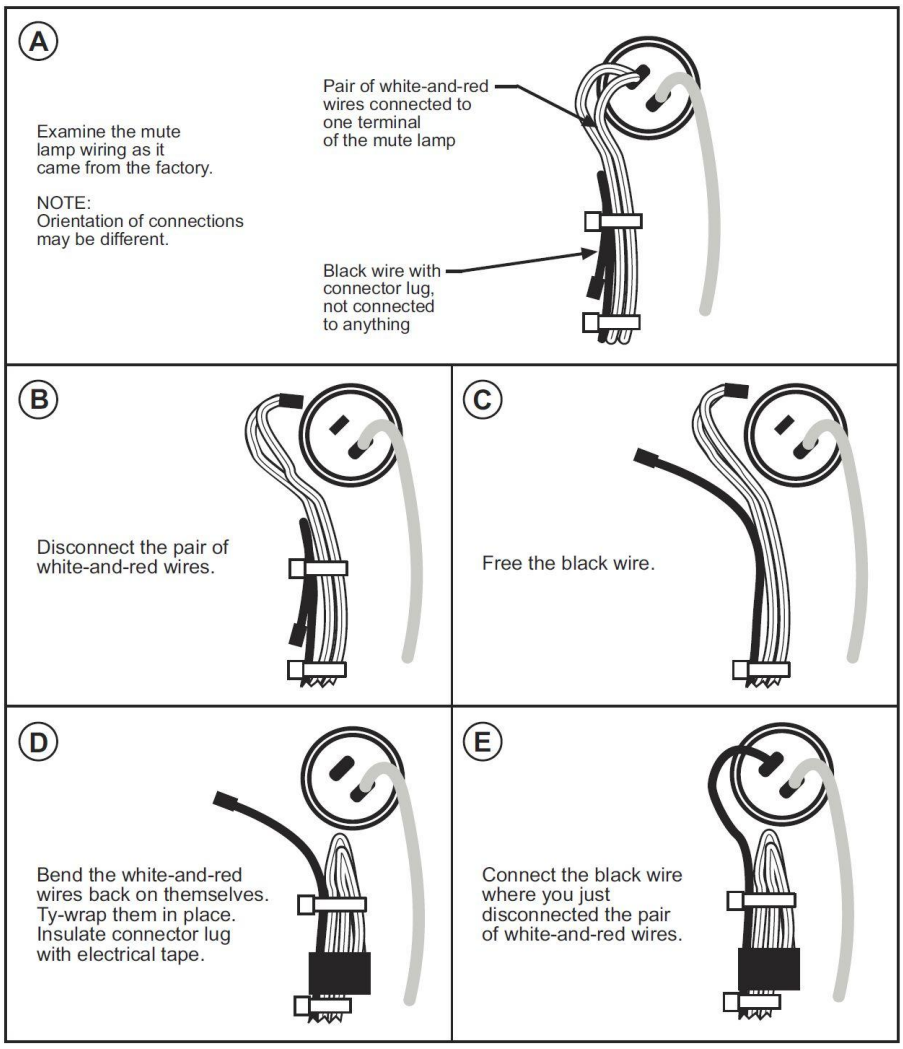


Figure 2-7. Wiring Steps to Modify Operator Station for WPC APEX

Making Wiring Connections

To wire a pre-wired Operator Station, perform the following steps:

1. Punch a hole in the Operator Station enclosure for conduit or sealtight.
2. Connect the conduit or sealtight to the hole; then open the Operator Station box.

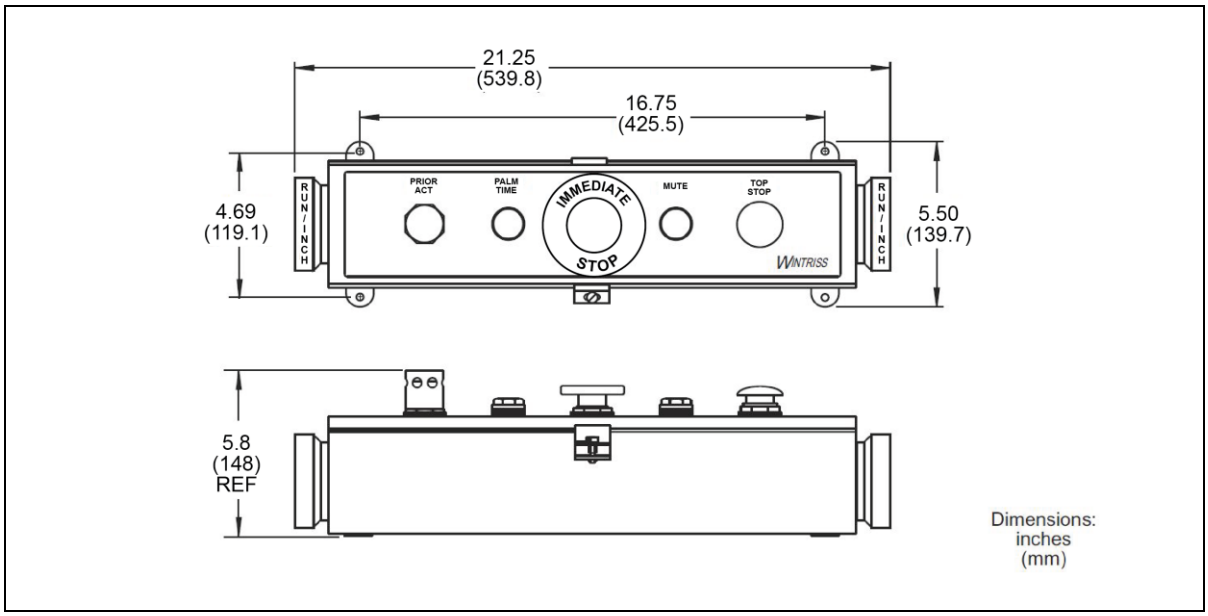


Figure 2-8. Pre-wired Operator Station with Side Run Buttons: Mounting Dimensions

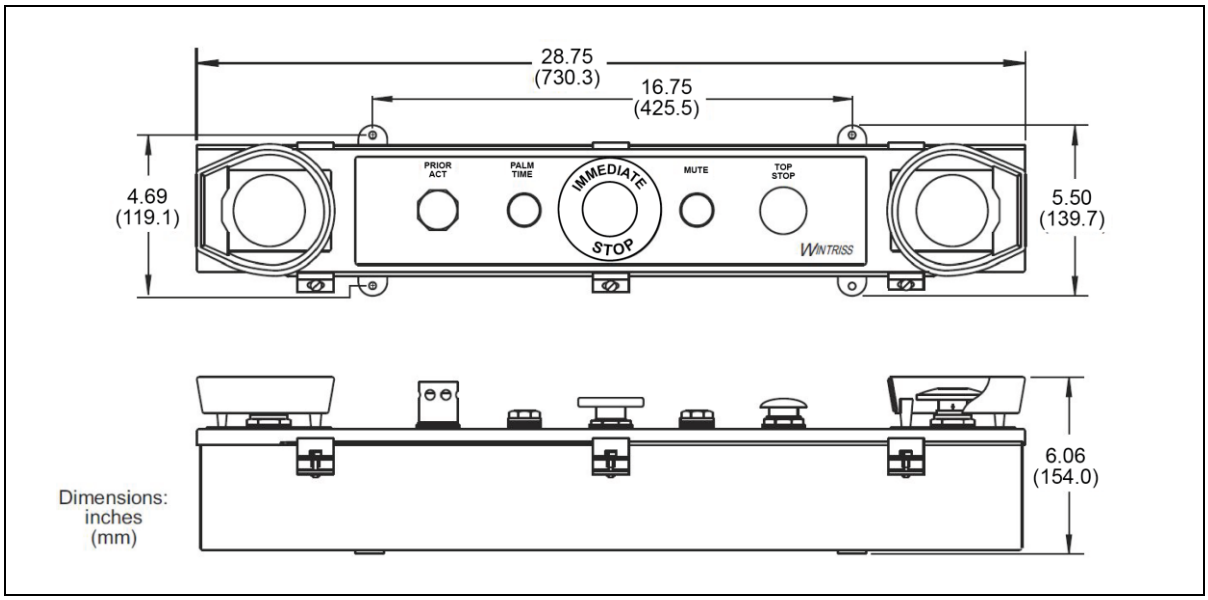


Figure 2-9. Pre-wired Operator Station with Top Run Buttons: Mounting Dimensions

3. Run the Operator Station cable in the sealtight.
4. Plug the connector end of the cable into the Operator Station.
5. At the other end of the cable, connect the wires to the Main Processor board connector terminals, as shown in Table 2-18, page 107, and Figure 1 at the end of the manual.

6. Mount the Operator Station in a permanent location after performing the applicable verification and checkout tests and calculating the correct safety distance. Refer to Figure 2-8 and Figure 2-9, above, for mounting dimensions.

Wiring an Unwired Operator Station

⚠ DANGER

OPERATOR STATION MAY NOT MEET SAFETY REQUIREMENTS

- Ensure that the Operator Station is wired correctly.
- Run all necessary tests to verify that each Operator Station is wired correctly and provides proper anti-tiedown and anti-repeat protection. Test procedures are provided at the end of this chapter and at the end of Chapter 3.

Failure to comply with these instructions will result in death or serious injury.

To wire the unwired Wintriss Operator Station, follow the wiring diagram in Figure 7 at the end of this manual. Before using your press, be sure to check the wiring carefully, run all the applicable verification and checkout tests, and calculate the safety distance. You can then mount the Operator Station in a permanent location, referring to Figure 2-10 for mounting dimensions.

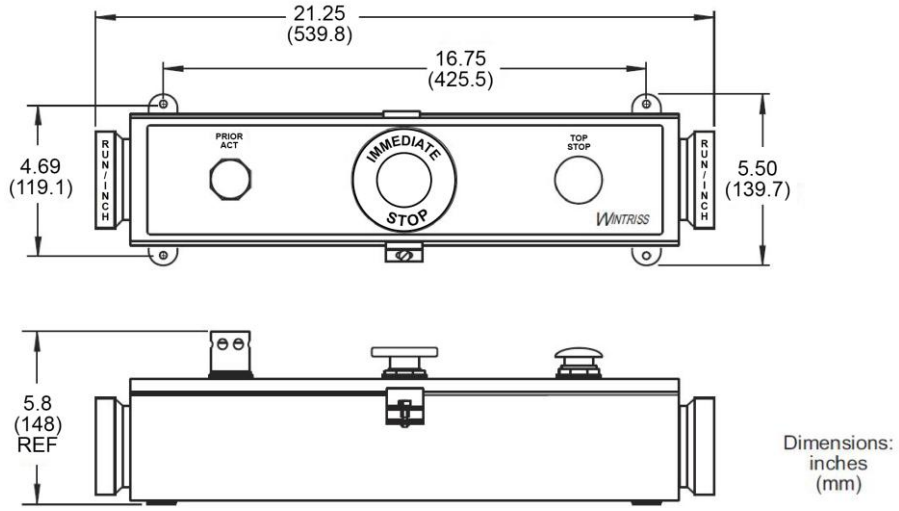


Figure 2-10. Unwired Operator Station: Mounting Dimensions

Wiring a User-built Operator Station

⚠ DANGER

NON-WINTRISS OPERATOR STATION MAY NOT MEET SAFETY REQUIREMENTS

- Ensure that the Operator Station is wired correctly.
- Ensure that on any non-Wintriss Operator Station the Run buttons are placed so that two hands are required to push them at the same time and that buttons cannot be pushed simultaneously with one hand or with one hand and one elbow.
- Ensure that on any non-Wintriss Operator Station the Run buttons comply with the requirements specified in Table B-2, page B-2.
- Ensure that on any non-Wintriss Operator Station the Run buttons have ring guards or other means in place to prevent unintentional operation.
- Run all necessary tests to verify that each Operator Station is wired correctly and provides proper anti-tiedown and anti-repeat protection. Test procedures are provided at the end of this chapter and at the end of Chapter 3.

Failure to comply with these instructions will result in death or serious injury.

If you build your own Operator Station, refer to Appendix A for applicable safety requirements. To wire your user-built Operator Station, refer to Figures 7 and 24 at the end of the manual. Before using your press, be sure to check the wiring carefully and run all the applicable verification and checkout tests. After calculating the correct safety distance, you can mount the user-built Operator Station in a permanent location.

Installing Multiple Operator Stations

⚠ DANGER

HAZARDS EXPOSED BY NON-WORKING OPERATOR STATION

- Safeguard the point of operation exposed by the non-working Operator Station when using multiple Operator Stations. The exposed area near a disabled Operator Station must be properly guarded.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

Use light curtains in addition to multiple Operator Stations for best personnel safeguarding..

You can wire up to four Operator Stations to the WPC APEX (see Figure 4 and/or Figure 24 at the end of the manual for dual Op. Station wiring). Make sure that switch 6 on S102 on the WPC APEX Main Processor board is set to OFF if you connect two or more Operator Stations (see page *Switch 6 on S102 – Selecting Concurrent Time for More Than Two* Operator Stations, page 176).

Do not order standard Wintriss “Multiple Operator Stations” when installing more than two Op. Stations. All Operator Stations in a multi-Op.-Station configuration except the Op. Station connected to the “A” inputs must contain a Two-hand Control module. When you install more than two Operator Stations, set switch 6 on S102 to ON.

When wiring multiple operator stations, make sure to label each Operator Station correctly. Install labeling prominently as follows:

- "A" on the Operator Station wired into inputs for Operator Station "A" or "1."
- "B" on the Operator Station wired into inputs for Operator Station "B" or "2."
- "C" on the Operator Station wired into inputs for Operator Station "C" or "3."
- "D" on the Operator Station wired into inputs for Operator Station "D" or "4."

Test each Operator Station individually. Confirm that selector switch position "A" controls Operator Station "A," selector switch position "B" controls Operator Station "B," and so on.

When using an A/B/Both selector switch, test switch position "Both" to confirm that it controls both Operator Station "A" and Operator Station "B."

When done, turn the Stroke Select key switch to OFF and then turn it to one of the operating modes.

See also *Setting the Operator Station Selection Method*, page 126, and *Setting the Maximum Number of Operator Stations*, page 126.

Installing a Light Curtain

⚠ DANGER

PREVENT OPERATOR FROM STANDING BETWEEN LIGHT CURTAIN AND HAZARDOUS AREA

Ensure that the operator cannot position himself between the light curtain and the hazardous area. Use another pair of light curtains or a mechanical barrier at knee to waist height to prevent the operator or a passerby from being "trapped" between the light curtain and the hazard..

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INCORRECT LIGHT CURTAIN INSTALLATION

- Mount the light curtains at the correct safety distance as instructed in *Calculating the Safety Distance*, page 159. The light curtain will only provide full protection for operators when mounted at the correct safety distance.
- Install and wire your light curtains correctly, following the instructions in your Shadow manual and referring to Figures 3, 10, 11, 15, 16, 18, 19, 25, 26, and 27 at the end of this manual.

Failure to comply with these instructions will result in death or serious injury.

The light curtain is normally mounted in front of the die space and must be located at least the safety distance from the pinch point. This location ensures that the light curtain can send a Stop command to the press in time for the press to stop before anyone can reach the pinch point. Any opening or access to the die space that is not guarded by the light curtain must be guarded by mechanical barriers.

To determine the Stopping Time of the press, refer to *Determining the Stopping Time of Your Press*, page 154. To calculate the correct safety distance, see *Calculating the Safety Distance*, page 159.

NOTICE

You cannot permanently mount the light curtain until the WPC APEX is working properly and you have measured the Stopping Time, set the brake monitor, and calculated the correct safety distance. However, you will be able to wire the light curtain.

WPC APEX provides wiring connections for up to four pairs of light curtain heads (see the wiring tables, Table 2-17, page 106 through Table 2-20, page 109). If you wire two or more sets of light curtains, you must enable them on S101 option switch 6 and on S102 option switch 7 (see Table 3-13, page 174).

Installing Shadow Light Curtains

Wiring connections for Shadow light curtains are provided in the following wiring diagrams at the end of the manual:

- Shadow V–Figure 3
- Shadow VI–Figure 10
- Shadow VI–Integrated–Figure 11
- Shadow VII–Figures 15 and 16
- Shadow 8–Figures 18 and 19
- Shadow 9–Figures 25, 26, and 27

For Shadow I or Shadow II wiring, contact Wintriss Tech. Support. For complete Shadow light curtain mounting instructions, see your Shadow user manual.

Setting Jumpers for Shadow VII, Shadow 8, and Shadow 9 Light Curtains

When you install Shadow VII, Shadow 8, or Shadow 9 light curtains on your press, you must set jumpers JP121-JP124 on the WPC APEX Main Processor board (see Figure 2-11, page 67) to the positions shown in Table 2-1. Wiring diagrams are provided in figures 15 (Shadow VII control box), 16 (Shadow VII DIN controller), 18 (Shadow 8 optional control), 19 (Shadow 8 wired directly to WPC APEX), 25 (Shadow 9 optional control), 26 (Shadow 9 wired directly to WPC APEX), 27 (dual Shadow 9 wired directly to WPC APEX) at the end of the manual.

Table 2-1. Shadow VII, Shadow 8, and Shadow 9 Light Curtain Jumper Settings

	Jumper on Main Processor Board	Settings
Light Curtain #1	JP123	PNP
	JP124	INT
Light Curtain #2	JP121	PNP
	JP122	INT

Installing Non-Shadow Light Curtains

⚠ WARNING

It is your responsibility to ensure that your light curtains are control reliable and intended for use on a mechanical power press as a primary point-of-operation guard. The manufacturer of your light curtain should be able to provide the necessary information.

Failure to comply with these instructions could result in death or serious injury.

If you plan to interface a light curtain system other than Shadow with your WPC APEX, please call Wintriss Tech. Support for instructions. Be ready to provide the following information:

- Light curtain manufacturer
- Light curtain model number
- WPC model (i.e., WPC APEX)
- WPC APEX firmware version number (located on A or B microprocessor chip label)
- Wiring diagram from the light curtain manufacturer's manual

If your WPC APEX does not have the firmware that allows Foot or One-Hand control and/or muting of a light curtain on the upstroke, you can connect the light curtain's dry contact outputs directly in series with WPC APEX's I STOP string.

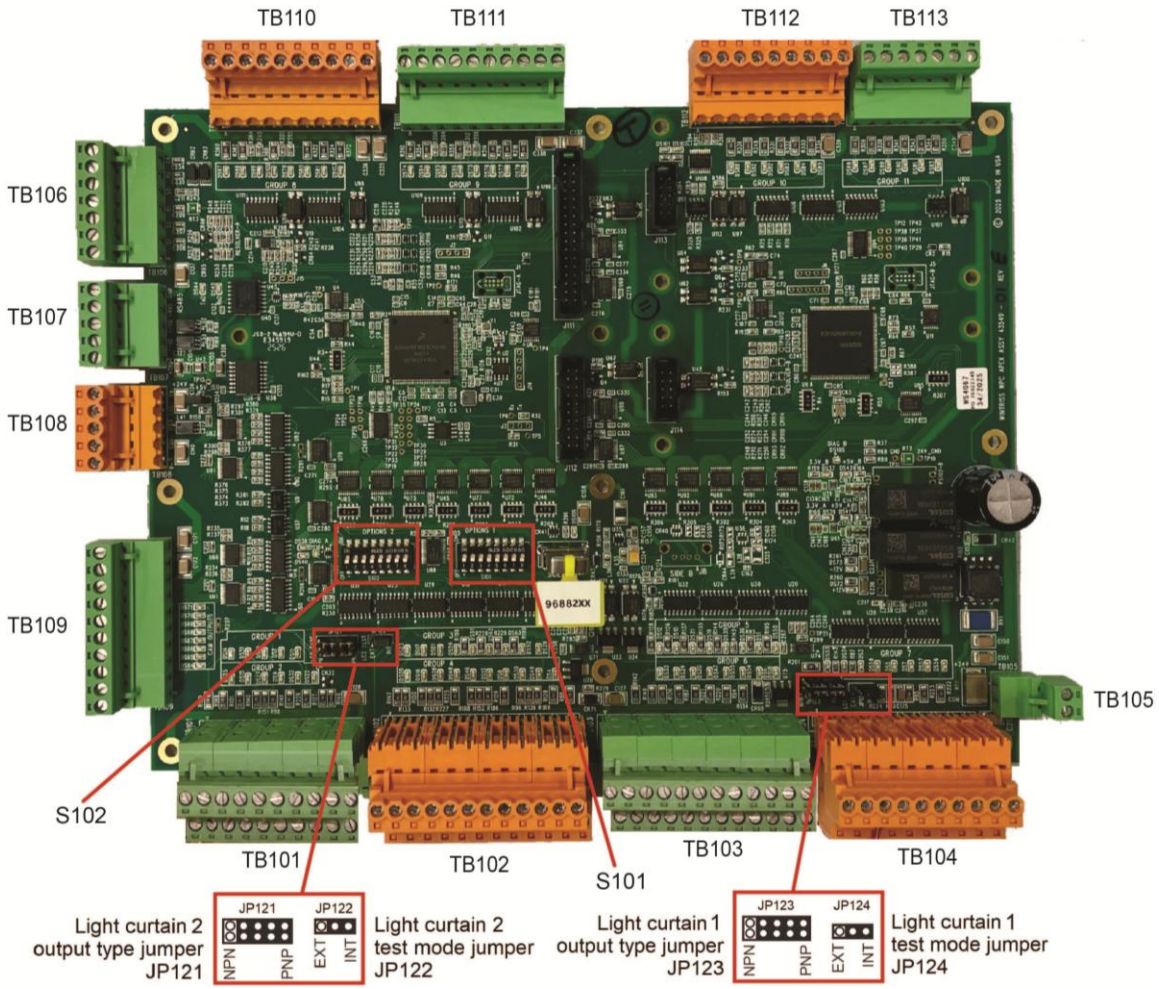


Figure 2-11. WPC APEX Main Processor Board Showing Important Components

Installing the Resolver

⚠ DANGER

RESOLVER OUT OF SYNCH WITH CRANKSHAFT

Retain the sprockets on the crankshaft and resolver shaft mechanically so they cannot shift or move out of radial alignment. Be sure that the key on the resolver shaft retains the resolver sprocket. Use a pin or other method to fix the position of the sprocket on the crankshaft.

Failure to comply with these instructions will result in death or serious injury.

Because the resolver must provide WPC APEX with the exact position of the crankshaft at every degree of the stroke (see *Resolver*, page 28), the device must be driven smoothly at a 1:1 ratio with the crankshaft of the press. 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 a spring-loaded resolver base to compensate for slack or stretch.

CAUTION

DAMAGE TO RESOLVER

Be sure that the sprocket or gear driving the resolver chain or timing belt is mounted so it is centered on the crankshaft. If the gear or sprocket is mounted off-center, the resulting loads on the resolver shaft may cause the unit to fail.

Failure to comply with these instructions could result in property damage.

The drive method 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. Wintriss Controls Group stocks a spring-loaded base with a hole pattern to match the resolver.

When designing the drive for the resolver, observe the following precautions:

- Do not use a chain more than three feet in length
- Do not use gears, right-angle joints, or shafts with universal joints, which will develop either too much backlash or too much play
- Do not try to couple the resolver directly to the crankshaft. Such a placement requires extreme precision. If the resolver is only slightly off-center, its bearing will be subjected to side loads well in excess of its rated capacity and will ultimately fail.
- Do not use flexible couplings, which can be inaccurate, or V belts, which can also be inaccurate and will slip
- Do not use a flexible shaft like a speedometer cable. The resolver will lag the crankshaft because of the twisting of the shaft on start-up. When the crankshaft stops, the resolver will turn past the true stopping point and snap backward.

Wiring the Resolver

To wire the resolver, perform the following steps:

1. If the resolver cable is not already connected to the resolver, locate the cable, plug the molded connector into the resolver (it only goes one way), and twist the locknut so the connection is tight.
2. Run the resolver cable through conduit from the resolver to one of the knockouts in the bottom of the WPC APEX enclosure.

NOTICE

You can run the resolver and overrun limit switch cables through the same conduit (see Figure 2-1, page 50,for an example). If you do so, make sure not to cut the cable and wires until both the resolver and the overrun limit switch are installed.

3. Find the resolver terminal block, TB 106, on the WPC APEX Main Processor board (see Figure 2-11, page 67), and remove the L-shaped connector.
4. Viewing the resolver from the shaft end, determine whether the shaft will turn clockwise or counterclockwise when the press runs.
5. Measure and cut the resolver wires so they reach TB 106, then wire them to the L-shaped connector, referring to Table 2-17, page 106, and Figure 2 at the end of the manual. Make sure you connect the black and yellow wires correctly, based on the direction in which your resolver

will rotate–clockwise or counterclockwise. Refer to *Connecting Wires to Terminal Block Connectors*, page 51, if you need help wiring the TB 106 connector.

NOTICE

CONNECTOR WIRING

Before wiring, place the connector over its base the way it will plug in (it can plug in only one way) and double-check pin assignments to make sure you wire correctly.

6. Double-check connections when you finish wiring.

7. Plug the L-shaped connector firmly into its base. It can plug in only one way.

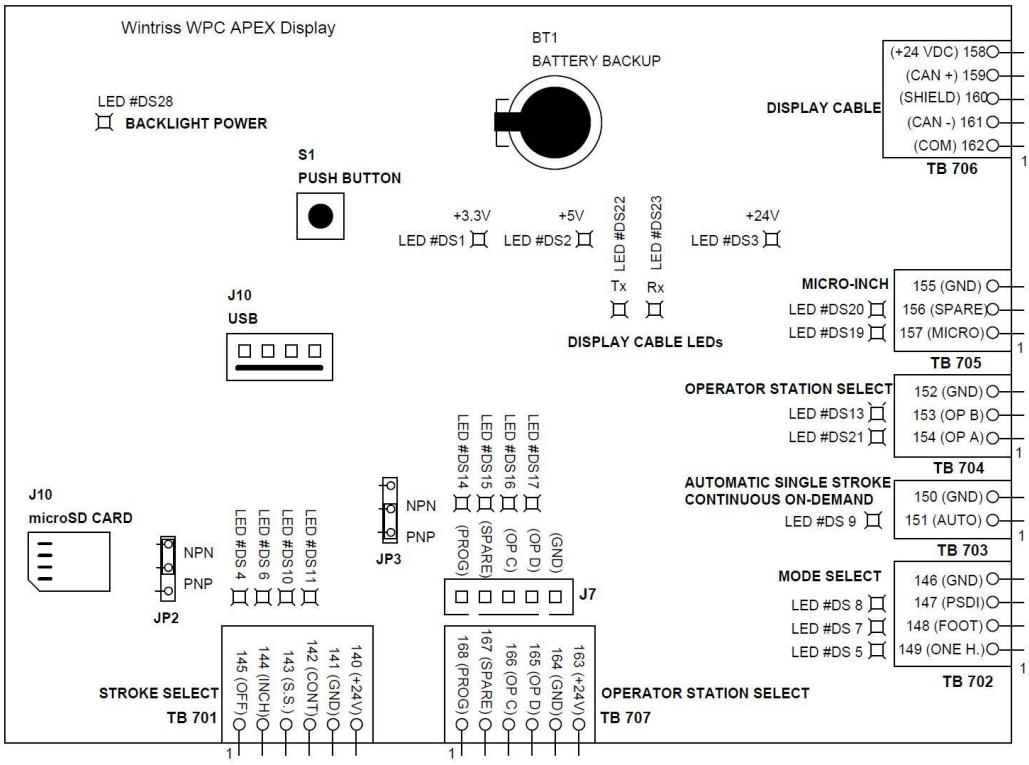


Figure 2-12. WPC APEX Display Board Showing Important Components

Checking the Resolver's Direction of Rotation

To determine whether you have wired the resolver so that it rotates in the correct direction, do the following:

1. Run the press in Inch mode, and observe whether the crankshaft angle shown in the digital LED display increases or decreases.

   - If the angle increases (i.e., moves from 0° to 1°, 2°, 3°, etc.), the resolver wiring is correct. Go to the next section.
   - If the angle decreases (moves from 0° to 359°, 358°, 357° etc.), the yellow and black resolver wires are reversed. Go to step 2.

2. Rewire the yellow and black resolver wires correctly, referring to Table 2-17, page 106, and Figure 2 at the end of the manual.
3. Inch the press again, and observe the movement of the crankshaft angle on the display. The angle should now increase.
4. If the direction of rotation is still incorrect, contact Wintriss Tech Support.

Replacing the Resolver

If you need to replace your resolver, do the following:

1. Perform the procedures *Mounting the Resolver,* page 73 and *Wiring the Resolver*, page 68.
2. Rezero the resolver, following the instructions in *Zeroing the Resolver*, page 115.

Installing the Overrun Limit Switch

⚠ DANGER

MOUNT OVERRUN LIMIT SWITCH SO IT PROVIDES CORRECT TIMING

- Install the overrun limit sensor magnet on a component, such as the crankshaft, that moves independent of the resolver and whose motion is not affected by the condition of the resolver or the resolver's drive mechanism. Safe operation of the press depends on the overrun limit sensor working correctly when the resolver or its drive mechanism fails.
- Install the overrun limit sensor magnet in the correct angular location according to the instructions in *Installing the Overrun Sensor Magnet*, page 142.

Failure to comply with these instructions will result in death or serious injury.

The overrun limit sensor, also called the "overrun sensor," enables WPC APEX to monitor operation of the resolver and to stop the press whenever the resolver fails to work properly, as can happen when the resolver drive chain breaks or slips or when the resolver is broken. The overrun sensor provides a signal to WPC APEX at the same resolver angle on every stroke.

Whenever this angle changes, WPC APEX detects that the resolver is no longer rotating at a 1:1 ratio with the crankshaft and sends an Immediate stop command to the press, simultaneously displaying an error code.

Planning Your Overrun Sensor Installation

The overrun sensor consists of a magnetic switch and a magnet. Select a mounting location for both components that ensures that the magnet moves past the switch once on every stroke and within 1-1/4" to 1-3/4 in. (31.7 mm to 44.4 mm) of the switch, close enough for the switch to sense the magnet's presence. The magnet is mounted to the crankshaft or another component that rotates identically on every stroke. The switch is hard-mounted to the press or other surface and remains stationary.

There must be no connection between the overrun limit sensor and the resolver to ensure that the overrun sensor continues to operate if the resolver or its drive mechanism fails.

To obtain an adequate overrun signal at high speeds, the magnet should be mounted so that it can be sensed by the switch for 15° to 25° of the stroke. The interval during which the magnet is sensed,

called the “dwell,” decreases as the diameter of the rotating shaft increases (see Figure 2-13). Select a shaft whose diameter will allow the sensor to detect the magnet for the required dwell.

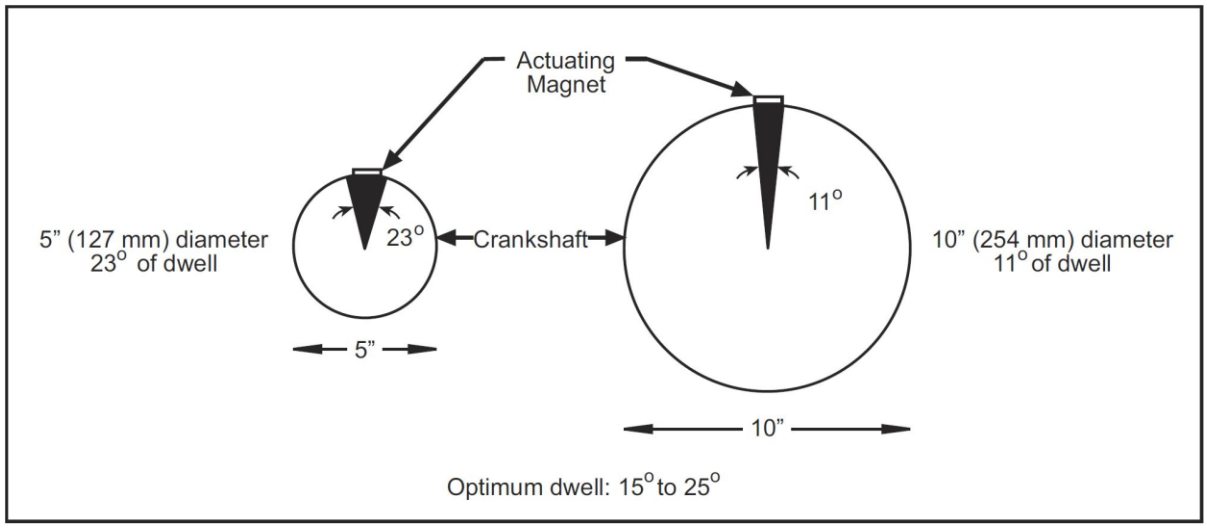


Figure 2-13. Overrun Sensor Magnet Placement: Dwell as a Function of Shaft Diameter

Mounting the Overrun Sensor Switch

NOTICE

INSTALL MAGNET AFTER MOUNTING SWITCH

Install the overrun magnetic switch as instructed in this section. Refer to *Installing the Overrun Sensor Magnet*, page 142 for instructions on installing the overrun magnet.

The overrun sensor magnetic switch comes already installed in a bracket. Mount the bracket and switch at a location past which the magnet will pass on every stroke and within 1¼ in. to 1¾ in. (31.7 mm to 44.4 mm) of the magnet, referring to Figure 2-14, below.

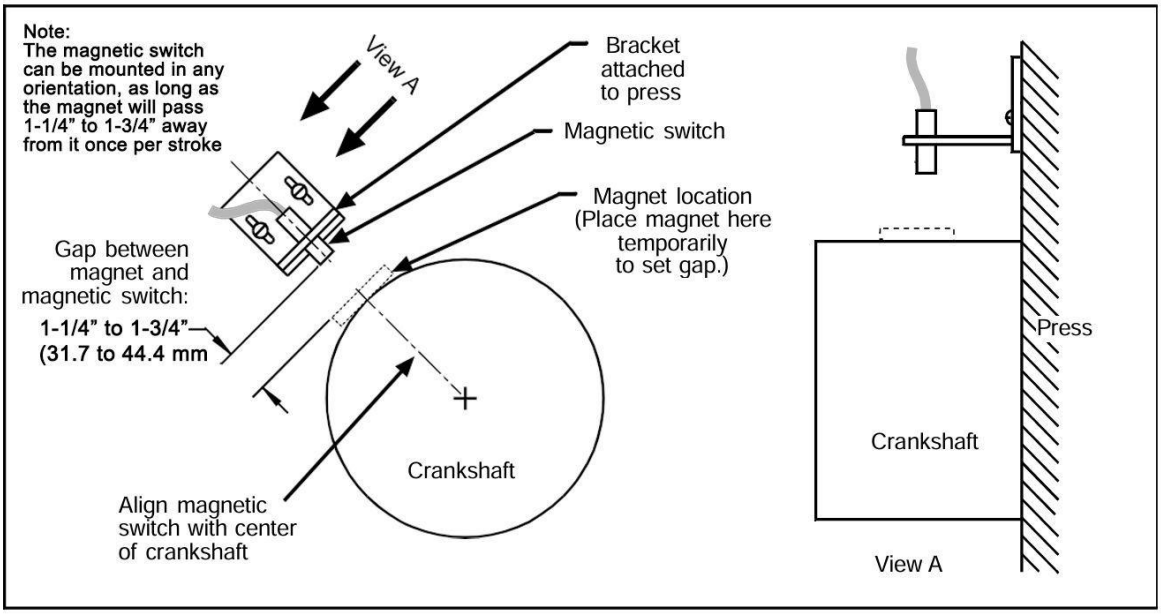


Figure 2-14. Overrun Sensor Magnetic Switch: Installation Example

Place the magnet temporarily on the crankshaft or other mounting surface while you set the gap between the switch face and the magnet. After tightening down the bracket's mounting screws, remove the magnet and put it in a safe place until you mount it permanently.

Wiring the Overrun Sensor Switch

NOTICE

You can run both the resolver wires and the overrun limit sensor cable through the same conduit. If you do so, wait to cut the cable and wires until both the resolver and the overrun limit sensor are installed.

Run the cable for the magnetic switch through conduit to the WPC APEX. Connect the wires to terminal blocks on the WPC APEX Main Processor board, as shown in Table 2-2 and Figure 2 at the end of the manual.

Table 2-2. Overrun Sensor Switch Wiring Connections

Pin #	Signal	Wire Color
23	+24 Vdc	Red
24	Overrun input to WPC APEX	White
25	Ground	Black

Mounting the Resolver

To mount the resolver, perform the following steps:

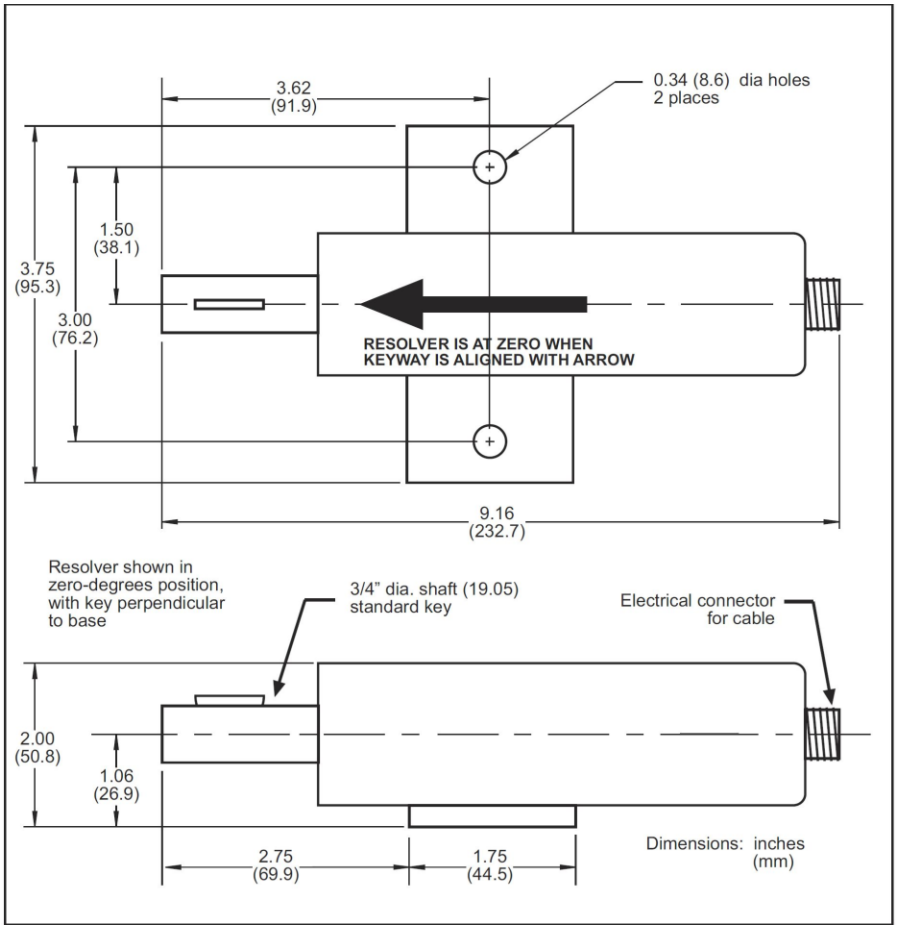


Figure 2-15. Resolver: Mounting Dimensions

NOTICE

It does not matter which direction the resolver turns when the press runs. You adjust for the direction of rotation when you wire the unit (see *Wiring the Resolver*, next section).

1. Mount the resolver by bolting it to the press or other platform at the desired location.
2. Make sure the press is at TDC.
3. Rotate the resolver shaft so that the keyway is aligned with the arrow on the housing (see Figure 2-15).
4. Keeping the keyway aligned with the arrow, attach the chain or drive mechanism.

Wiring WPC APEX User Inputs and Interlocks

⚠ DANGER

USER INPUTS 1 THROUGH 7 NOT SUITABLE FOR SAFETY USE

DO NOT use inputs 1 through 7 as part of any personnel-protection system. These inputs are not control reliable.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

USER INPUTS ADD DELAY TO STOPPING TIME

DO NOT connect light curtains or other presence-sensing devices to any user inputs. The cross-checked input pairs (8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49), though control reliable, are suitable only for applications such as connecting to safety switches used with interlocking barrier guards.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MAKE SURE TO WIRE CROSS-CHECKED INPUT PAIR CORRECTLY

Input pairs 8/9 and 10/11 are control reliable only if wired correctly in a pair according to the instructions in this section.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

CHECK PRESS TO MAKE SURE IT STOPS WHEN USER INPUT ACTUATES

- WPC APEX comes from the factory with the inputs bypassed by jumpers. Make sure to remove the appropriate jumper from the Main Processor board connector when you wire a user input. Otherwise, WPC APEX will not receive the signal from the input. Leave all unused inputs jumpered/bypassed.
- Perform checkout procedures to ensure that the user inputs are wired correctly and that WPC APEX responds correctly when the user input faults (see *Checking Operation of the User Inputs*, page 197).

Failure to comply with these instructions will result in death or serious injury.

NOTICE

ADDITIONAL E STOP INPUT INFORMATION

For details on E STOP inputs, see Wiring Diagram 21 at the end of the manual.

WPC APEX user inputs allow you to connect signals from other equipment in order to monitor auxiliary press functions such as lubrication systems. WPC APEX provides connections for up to seven pairs of cross-checked inputs and seven independent inputs that are not control reliable.

When one of these inputs issues a Stop command by opening a normally closed (N/C) relay, a fault code for the input(s) appears on the LED display. User inputs 1 through 7 can be programmed to generate a T STOP, I Stop, T LOC, or I LOC. User inputs 8/9, 40/41, 42/43, 44/45, 46/47, and 48/49 are cross-checked pairs that can be programmed to generate an I STOP or an I LOC, which will simultaneously open the Lockout relay and display the Lockout Error message on the screen. The stop type, fault code, and wiring connections for each input are shown in Table 2-3, page 75 and

Table 2-4, page 76. Cross-checked pair 10/11 can be programmed only as I LOC, must be jumpered if not used, and cannot be disabled.

To name and set stop type for User Inputs and User Interlocks, see the following:

- *Changing User Inputs*, page 119
- *Changing User Interlocks,* page 121.

Table 2-3. WPC APEX User Inputs and Interlocks: Stop Types, Fault Codes, and Wiring Connections with Standard No Light Curtain Firmware

User Input	Default Stop Type	Pin #	Jumper Connection (Bypass)	Fault Code	Name of Auxiliary Equipment
User Input 1	I STOP	21	+24 Vdc	51	
User Input 2	I STOP	82	+24 Vdc	52	
User Input 3	I STOP	71	+24 Vdc	53	
User Input 4	I STOP	83	Ground	54	
User Input 5	I STOP	72	Ground	55	
User Input 6	I STOP	84	Ground	56	
User Input 7	I STOP	73	Ground	57	
Stop types available for User Inputs 1-7: I STOP (default), T STOP, T LOC, I LOC					
User Interlock	**Stop Type**	**Pin #**	**Jumper Connection (Bypass)**	**Fault Code**	**Name of Auxiliary Equipment**
User Interlock 8	I STOP / I LOC	85	Ground	58, 17	
User Interlock 9		74	Ground		
User Interlock 10	I LOC	86	Ground	50, 18	
User Interlock 11		18	Ground		
User Interlock 40	I STOP/ I LOC	544	+24 Vdc	350, 351	
User Interlock 41		534	+24 Vdc		
User Interlock 42	I STOP/ I LOC	542	+24 Vdc	352, 353	
User Interlock 43		532	+24 Vdc		
User Interlock 44	I STOP/ I LOC	540	+24 Vdc	354, 355	
User Interlock 45		530	+24 Vdc		
User Interlock 46	I STOP/ I LOC	539	+24 Vdc	356, 357	
User Interlock 47		529	+24 Vdc		
User Interlock 48	I STOP/ I LOC	541	+24 Vdc	358, 359	
User Interlock 49		531	+24 Vdc		

Table 2-4. WPC APEX User Inputs and Interlocks: Stop Types, Fault Codes, and Wiring Connections with Light Curtain Firmware and fault codes

User Input	Default Stop Type	Pin #	Jumper Connection (Bypass)	Fault Code	Name of Auxiliary Equipment
User Input 1	I STOP	21	+24 Vdc	51	
User Input 2	I STOP	82	+24 Vdc	52	
User Input 3	I STOP	71	+24 Vdc	53	
User Input 4	I STOP	83	Ground	54	
User Input 5	I STOP	72	Ground	55	
User Input 6	I STOP	84	Ground	56	
User Input 7	I STOP	73	Ground	57	
Stop types available for User Inputs 1-7: I STOP (default), T STOP, T LOC, I LOC					
User Interlock	**Stop Type**	**Pin #**	**Jumper Connection (Bypass)**	**Fault Code**	**Name of Auxiliary Equipment**
User Interlock 8	I STOP/ I LOC	85	Ground	58, 17	
User Interlock 9		74	Ground		
User Interlock 10	I LOC	86	Ground	50, 18	
User Interlock 11		18	Ground		
User Interlock 40	I STOP/ I LOC	544	+24 Vdc	350, 351	When using LC FW these are for LC 3
User Interlock 41		534	+24 Vdc		
User Interlock 42	I STOP/ I LOC	542	+24 Vdc	352, 353	When using LC FW these are for LC 4
User Interlock 43		532	+24 Vdc		
User Interlock 44	I STOP/ I LOC	540	+24 Vdc	354, 355	
User Interlock 45		530	+24 Vdc		
User Interlock 46	I STOP/ I LOC	539	+24 Vdc	356, 357	
User Interlock 47		529	+24 Vdc		
User Interlock 48	I STOP/ I LOC	541	+24 Vdc	358, 359	
User Interlock 49		531	+24 Vdc		

The cross-checked input pairs generate a fault either when one or both inputs in the pair are open or when the inputs “disagree” (i.e., one input is open, the other closed) for longer than 100 mS.

Cross-checked input pairs 8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49 can be used to detect critical safety problems such as the removal of die receptacle blocks.

Since faults for inputs 8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49 cross-checked input pairs can be programmed to open the Lockout relay, you can wire these outputs to your motor starter so the opening of either input in the input pair will shut off the motor.

To clear the Lockout error message on the display, turn the Stroke Select switch to OFF and then back to INCH (see *Wiring the Lockout Relay*, next section, and *Lockout Message*, page 247).

NOTICE

ALL SIGNAL GROUNDS MUST BE CONNECTED THROUGH THE MAIN PROCESSOR BOARD
Connect all signal grounds through pins on the WPC APEX Main Processor board.

To wire the user inputs, run conductors from the appropriate terminal number on the Main Processor board to your equipment and then back to either +24 Vdc or ground, as shown in the applicable table and wiring diagram:

- Table 2-3, page 75 (no-light-curtain firmware) and Figure 2 at the end of the manual
- Table 2-4, page 76 (with light curtain firmware) and Figure 2 at the end of the manual

After you have wired the inputs you will use, be sure to bypass all the unused inputs by connecting them to +24 Vdc or Ground. There are several "Ground" and "+24 Vdc" terminals available on the Main Processor board from which to choose.

NOTICE

If you do not bypass the unused inputs, WPC APEX will not work properly.

Wiring the Lockout Relay

The Lockout relay, which is designed to be wired to critical press functions such as the motor starter, provides an added safety feature to WPC APEX. Whenever a serious error condition occurs, the Lockout error message will appear in the digital LED display. To clear the Lockout error message, turn the Stroke Select switch to OFF, then back to INCH or one of the other operating modes.

Wire the function you want to be controlled by the Lockout relay to TB 301 on the DSV/ Lockout relay board, Figure 2-28, page 102 (which is located on top of the main processor board, Figure 2-11, page 67).

Wiring connections are shown in Table 2-5 and in Figures 13 (Herion DSV), 14 (Ross Serpar DSV), and 17 (Ross DM2 DSV) at the end of the manual.

Table 2-5. Lockout Relay Wiring Connections (DSV/Lockout Relay Board)

TB301 Pin #	Signal
97	Lockout relay input
98	Lockout relay output
99	Lockout relay output

Wiring Auxiliary Outputs

⚠ DANGER

NON-SAFETY OUTPUT USED FOR SAFETY FUNCTIONS

Use Auxiliary outputs 1, 2, and 3 for non-safety functions only, such as convenience in automation. They cannot protect personnel from a moving hazard.

Failure to comply with these instructions will result in death or serious injury.

WPC APEX provides three optional Auxiliary outputs that you can use to automate equipment connected to your clutch/brake control. A summary of wiring connections and change conditions for these three outputs is provided in Table 2-6, below. Details about each output are given following the table. Additional wiring details are provided in Table 2-17, page 106, and in Figure 2 at the end of the manual.

Table 2-6. Auxiliary Output Wiring Connections and Change Conditions

Output	Pin # (WPC APEX Cntrl Bd.)	Normal State	Change State	Change Conditions
Aux. 1	28	On (N/C)	Off (or Open)	WPC APEX fault I STOP string open Light curtain interruption Interrupted Stroke (controlled by option switch 8; see Table 2-7)
Aux. 2	36	Off (N/O)	On (or Closed)	WPC APEX fault Interrupted stroke Key switch in Inch and DSV energized
Aux. 3	29	Off (N/O)	On (or Closed)	DSV energized

Auxiliary Output 1

Auxiliary 1 is normally closed (N/C), or On. The output opens, or turns Off, when a fault condition occurs, an I Stop string opens, or a light curtain is interrupted while the press is running. The output can also be programmed to turn Off during an Interrupted Stroke (see page 222 for an explanation of Interrupted Stroke).

Aux. Output 1 response to an Interrupted Stroke is controlled by option switch 8 on the WPC APEX Main Processor board. Switch settings are shown in Table 2-7.

Table 2-7. Option Switch 8 Settings for Auxiliary Output 1 State Change

Option Switch 8	Auxiliary Output 1 State Change during Interrupted Stroke
OFF	Output turns OFF when an Interrupted Stroke occurs
ON	Output remains ON during an Interrupted Stroke unless the Interrupted Stroke is preceded by a WPC APEX fault or an Immediate stop, in which case the output turns OFF

When switch 8 on S101 is set to OFF, Auxiliary Output 1 opens, or turns Off, at the occurrence of an Interrupted Stroke. When switch 8 (S101) is set to ON, the output turns Off during an Interrupted Stroke only when there is also a fault or Immediate-stop condition; otherwise, the output remains On during an Interrupted Stroke. See *Switch 8 (S101) – Auxiliary Output* 1 Response to Interrupted Stroke, page 175, for additional details.

The switch 8 (S101) ON setting allows the press to be "inched" during an Interrupted Stroke, when the WPC APEX is in Two-hand Maintained Single Stroke mode. Normally, in Two-hand Maintained Single Stroke, the operator must hold down the Run/Inch palm buttons until the press reaches its Top stop position in order to avoid another Interrupted Stroke. With switch 8 (S101) set to ON, the operator may release the Run/Inch buttons while inching the press to Top stop without initiating an Interrupted Stroke.

Auxiliary Output 1 can be wired to a customer-supplied control relay and used to stop auxiliary equipment such as scrap choppers, conveyors, etc. when one of the conditions described above causes the press to stop. When a warning beacon is connected to the control relay, the beacon illuminates when a fault occurs and Aux. Output 1 opens.

Auxiliary Output 2

Auxiliary Output 2 is normally open (N/O), or Off. The output closes to ground, or turns on, whenever there is an interrupted stroke or fault condition or the press is placed in Inch mode.

Auxiliary Output 2 can be connected to the Setup Mode inputs of DiPro 1500 and AutoSet 1500/1504 Plus. The output is used to disable green sensors in DiPro 1500 or repeatability setpoints in AutoSet 1500/1504 Plus whenever the press is switched to Inch mode or an interrupted stroke or fault condition occurs. A customer-supplied output relay can be wired into this circuit. Refer to the applicable manuals for wiring details.

Auxiliary Output 3

Auxiliary Output 3 is normally open (N/O), or Off. The output closes, or turns On, when the DSV is energized. When Bar Control is in use (see *Operating the Press in Bar Mode*, page 242), Aux. Output 3 remains open, or Off, when the DSV is energized.

Auxiliary Output 3 can be wired to the input check circuit of DiPro 1500 or ProCam 1500 and is used to prevent Loss of Rotation faults on these units when Bar Control is activated.

When WPC APEX is in Bar Control mode, the DSV is energized to enable the crankshaft to be turned by hand. Under normal conditions, whenever the DSV is energized, Aux. Output 3 turns On, sending a low voltage (i.e., 24 Vdc) input check signal to the DiPro 1500 or ProCam 1500.

DiPro/ProCam 1500 uses the input check signal to initiate monitoring of the programmed start time limit, the interval within which the crankshaft must begin rotating in order to avoid a Loss of Rotation

fault. In Bar Control mode, Aux. Output 3 disables the input check signal, preventing the 1500 unit from monitoring the start time limit.

Wire Auxiliary Output 3 to the "A" connection of the input check circuit of DiPro 1500 or ProCam 1500. Wire one of the +24 Vdc outputs on the WPC APEX Main Processor board (pins #38 through #42) to the "B" connection of DiPro 1500 or ProCam 1500. If your DiPro 1500 or ProCam 1500 is equipped with a voltage selector switch for the input check circuit, set it to the 12-60 volt position. Refer to the DiPro 1500 or ProCam 1500 manual for details.

Connecting Multiple Controls to the Resolver

NOTICE

MAKE WPC APEX THE "MASTER" WHEN CONNECTING MULTIPLE CONTROLS

When connecting multiple controls to the resolver, make sure that the connection between the resolver and WPC APEX is direct, thereby making WPC APEX the "master" control. Wire the other Wintriss controls in parallel to the resolver as "slaves."

You can connect the resolver to as many as three additional Wintriss controls (e.g., WPC APEX, DiPro 1500). To do so, perform the following steps:

1. Check the resolver connector TB106 on the WPC APEX Main Processor board (see Figure 2-11, page 67) to make sure that the resolver is wired to the WPC APEX as instructed in *Wiring the Resolver*, page 68.
2. Locate the 7-conductor shielded resolver cable. Run the cable through 1/2 in. conduit from the WPC APEX to the other control. If there is a connector on one end of the cable, cut it off.
3. Pull the TB106 resolver connector out of its socket.
4. Attach the wires to TB106 as shown in Table 2-17, page 106, and in Figure 2 at the end of the manual. You will be wiring in parallel (#104 brown to brown, #105 orange to orange, etc.), so that when you are finished, you should have two wires of the same color connected to each terminal on that connector.
5. Connect the cable from TB106 to the resolver connector in the first "slave" unit. Remember to wire in parallel.
6. Locate the master/slave jumper on the Main Processor board of the "slave" unit(s). Move each of these jumpers to the pins designating "slave." Refer to the applicable user manual.
7. Repeat steps 5 and 6 to connect additional "slave" units.

Connecting Other Wintriss Products to WPC APEX

You can connect other Wintriss products to WPC APEX, such as DiPro 1500 and ProCam 1500. Before you wire, complete all WPC APEX installation, initialization, and checkout procedures. Then run the press in all modes of operation–Inch, Single Stroke, and Continuous (if applicable). Also make sure that the press has working Top stop and Immediate stop circuits. Since WPC APEX is connected to the press stop circuits, it is extremely important to verify that the press operates and stops properly before connecting WPC APEX to other units. Do not forget to mark on your electrical prints where you wire in WPC APEX.

When the Stopping Time is critical to your operation, as it is with die protection, be sure to wire as follows. Whenever you have Immediate stop circuits, wire them between terminals #67 and #68 or terminals #68 and #69 on the Main Processor board. For Top stop circuits, wire them between terminals #79 and #80 or terminals #80 and #81. Refer to Figure 1 at the end of the manual for specific wiring schematics.

Use customized status code wiring (see *Mounting the Resolver*, page 73) when the auxiliary equipment that you are connecting does not have its own self-explanatory displays, as are available in DiPro 1500 or AutoSet load analyzers.

Wiring Micro-inch

Micro-inch is a feature that enables you to control the amount of time (and, therefore, the distance) that the ram moves when the Run/Inch palm buttons are depressed in Inch mode. Allowing finer adjustments than are possible in Inch, Micro-inch is designed to facilitate setup on high-speed or short-stroke presses.

Micro-inch can be wired to be permanently enabled or to be switched on and off.

To wire Micro-inch so that it is permanently enabled, install a jumper between pins #157 and #155 (Ground) on TB705 on the WPC APEX Display board (see Figure 2-12, 69, and Table 2-8, below).

To wire Micro-inch so that it can be turned on and off, wire a switch to pins #157 and #155 on TB705 as shown in Table 2-8, below, and Figure 5 at the end of the manual. An optional Micro-inch On/Off switch is available from Wintriss (see page 30).

To set the Micro-inch time, refer to *Micro-Inch Settings*, page 166.

Table 2-8. Micro-inch Wiring

Display Board TB705 Pin #	Signal
157	Micro-inch input
155	Ground

Disabling Top Stop in Inch

By default, Inch mode is set so that the ram top stops whenever the Run/Inch palm buttons on the Operator Station are pressed and held continuously (see *Top Stop in Inch*, page 232). You can disable this default setting, allowing the ram to continue cycling in Inch mode as long as the Run/Inch buttons are depressed. To do so, connect pin #13 on the Main Processor board to +24 Vdc. You can connect to any convenient terminal that supplies +24 Vdc, such as pin #9. See Table 2-17, page 106. When pin #13 is connected to +24 Vdc, the “Top stop inch disable” LED on the WPC APEX Main Processor board is illuminated (see Figure 3-54, page 178).

Wiring a Remote Reset Switch

If you would like to be able to reset the WPC APEX from a location remote from the enclosure, the WPC APEX Main Processor board provides a terminal (i.e., pin #70) for wiring a remote Reset switch (see Table 2-9 and Figure 2 at the end of the manual). The remote Reset terminal can be wired to other equipment or you can use a simple switch to activate the Reset function.

To wire the remote Reset circuit, connect a wire from pin #70 to a normally open switch. Connect another wire from the switch to a ground terminal (e.g., pin #54). WPC APEX is reset with a momentary connection to ground.

Table 2-9. Remote Reset Switch Wiring Connections

Main Processor Board Pin #	Signal
70	Remote Reset input
54	Ground

Installing 8-channel Programmable Cam

⚠ DANGER

NON-SAFETY OUTPUTS USED FOR SAFETY FUNCTIONS

Use cams for non-safety functions only, such as convenience in automation. They cannot protect personnel from a moving hazard.

Failure to comply with these instructions will result in death or serious injury.

You connect the cam channels from TB 109 on the WPC APEX Main Processor board (see Figure 1-8, page 41) to the cam output assembly, which contains the output relay modules that control the timing signals for your connected equipment. These relays open and close circuits to your equipment at the crankshaft angles you program (see *CAM SWITCH (Program Mode),* page 211).

Mounting and Wiring the 8-Channel Cam Output Assembly

The cam output assembly can be ordered in an enclosure or as a PC board. To mount and wire either option, do the following:

CAUTION

BOARD DAMAGE OR SHORT CIRCUIT WHEN MOUNTED WITHOUT ENCLOSURE

- Mount the cam output assembly in a clean area where it will be safe from damage.
- Provide at least 0.5 in. (12.7 mm) clearance between the back of the board and any metal surface.

Failure to comply with these instructions could result in property damage.

1. Select a convenient location for mounting the cam output assembly, choosing one that allows you to easily run conduit from WPC APEX to the cam outputs. You do not need to access the cam outputs once they are installed and wired.

2. Mount the cam output assembly, referring to Figure 2-16, below, for mounting dimensions. Use the holes on the flanges to mount the cam output enclosure or the corner holes to mount the cam output board.
3. The relays that will control your equipment should already be plugged into the cam output board. If you need to replace a relay, simply pull the device out of its socket. Before installing a relay, make sure that all the pins match the socket holes so you do not bend the pins; then, press the relay in firmly.
4. Locate the twelve-conductor shielded cable that connects the WPC APEX Main Processor board to the cam outputs, and terminate the shield at each end near the entry point to the enclosure or console (see *Terminating Cable Shields*, page 51).
5. Remove the TB109 connector from the WPC APEX Main Processor board, and attach the wires at one end of the cable to the terminals shown in Table 2-10, page 85, and Figure 6 at the end of the manual. Plug each connector back into its socket when you are finished.
6. Run the twelve-conductor cable through flexible, liquid-tight conduit to the terminal points at the cam output assembly. You can use the knockouts directly below the connectors if you have the cam output enclosure.
7. Remove the TB1 connector from the Cam Output board, and attach the wires at the other end of the cable to the terminals shown in Table 2-10, page 85, and Figure 6. If you ordered the enclosure, a wire from the CHAS terminal (pin #1) to a lug on the enclosure should already be connected. Plug the connector back into its socket when you are finished.

NOTICE

TRIM UNUSED WIRES

If your installation does not require all the wires in the cable to be used, trim the unused wires, cutting them flush with the ends of the cable jacket.

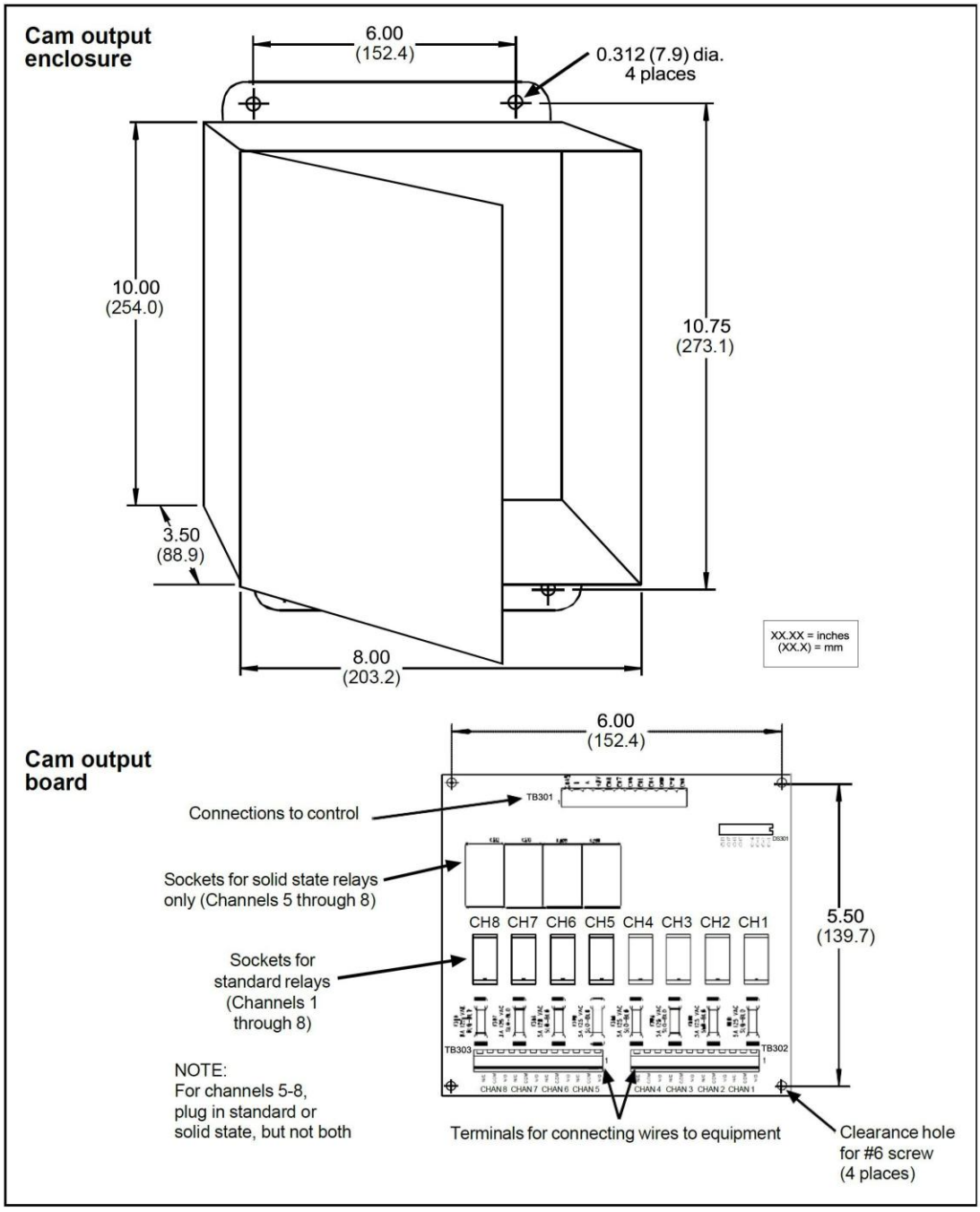


Figure 2-16. Cam Output Enclosure and Board: Mounting Dimensions

Table 2-10. WPC APEX (TB109) to Cam Output Assembly (TB1): Wiring Connections

Wire Color	WPC APEX Main Proc. Board Pin #	WPC APEX Main Proc. Board Signal	8-channel Cam I/O Assembly (TB1) Pin #	8-channel Cam I/O Assembly (TB1) Signal
Brown	130	Cam 1	12	Channel 1
Violet	129	Cam 2	11	Channel 2
Orange	128	Cam 3	10	Channel 3
Yellow	127	Cam 4	9	Channel 4
Blue	126	Counter	8	Channel 5
Gray	125	Zero Cam	7	Channel 6
Pink	124	Spec 1	6	Channel 7
Tan	123	Spec 2	5	Channel 8
Black	122	Ground	2	Ground
Red	121	+24 Vdc	3	+24 Vdc
Shield	Terminate drain wire to ground stud		1	Chassis

Making Wiring Connections to Cam Relays

⚠ DANGER

NON-SAFETY OUTPUTS USED FOR SAFETY FUNCTIONS

Use cams for non-safety functions only, such as convenience in automation. They cannot protect personnel from a moving hazard.

Failure to comply with these instructions will result in death or serious injury.

To connect the cam relays on the Cam Output board to your equipment, do the following:

1. Remove the TB2 through TB5 connectors (for cam channel 1 through cam channel 8) from the cam output board and wire them as follows, referring to Figure 2-16, page 84:

   - Connect one wire to the terminal labelled “C”
   - Connect the other wire to the terminal labelled “N/O” if you want your equipment to be “on” during the cam angle interval set in WPC APEX

     or

     Connect the other wire to the terminal labelled “N/C” if you want your equipment to be “on” except during the cam angle interval set in WPC APEX

NOTICE

Generally, you use the N/O terminal so that equipment is “off” except when you use WPC APEX to turn it “on.” Use the N/C terminal only if it is more practical to do the reverse.

2. Plug TB2 through TB5 back into the Cam Output board.

⚠ WARNING

SUPPRESSORS INSTALLED ACROSS RELAY CONTACTS

DO NOT install suppressors across the relay contacts in the cam output assembly. If a suppressor is installed across the relay contacts and the relay fails shorted, the equipment controlled by that relay will remain energized.

Failure to comply with these instructions could result in death or serious injury.

3. To reduce electrical noise and extend the life of the relays, do the following:

   a. Install arc suppressors across each inductive AC load (motors, coils, etc.) that is connected to a cam relay. Suppressors are supplied with your WPC APEX cam outputs. 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. Figure 2-17 shows the correct way to install suppressors.

   b. Install a diode across each DC load, such as relays, solenoids, and PLC inputs, as shown in Figure 2-18, below.

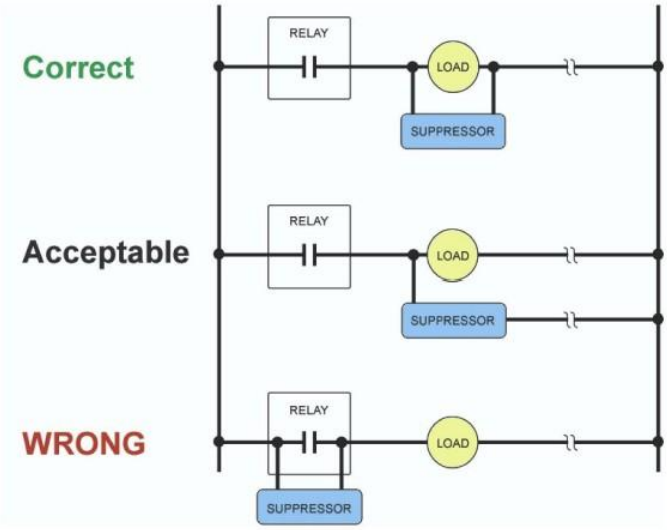


Figure 2-17. Installing a Suppressor across an AC Load

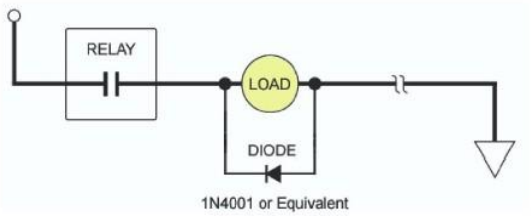


Figure 2-18. Installing a Diode across a DC Load

Wiring Zero Cam Output to AutoSet

WPC APEX provides a zero cam output that automatically turns on at 270° and turns off at 30° on every stroke. You can wire this output to AutoSet 1500 and 1504 load analyzers, as shown in Table 2-10, below, and Figure 6 at the end of the manual.

Table 2-11. Zero Cam Output Wiring Connections

WPC APEX Main Processor Board (TB 109)		AutoSet 1500 (TB101B) or 1504 (TB101A)	
Pin #	**Signal**	**Pin#**	**Signal**
pin # 125	Zero Cam Output	pin # 2	Zero Cam

Wiring a Foot Switch

⚠ DANGER

UNGUARDED HAZARDS

When using a foot switch, ensure that light curtains and other safeguards are properly installed and operating to protect operators.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

IMPROPER FOOT SWITCH

Ensure that any foot control switch complies with OSHA 1910.217 (b) (7) (x), including protection from accidental actuation by falling or moving objects or unintentional stepping on the control.

Failure to comply with these instructions will result in death or serious injury.

Foot Switch, an option available from Wintriss, enables the operator to use both hands during operation of the press as, for example, when manually feeding parts. If you choose to order a foot switch, you must obtain optional One-hand/Two-hand/Foot firmware from Wintriss and install a Shadow safety light curtain.

Wire the Foot Switch's normally closed contact to pin #4 on the WPC APEX Main Processor board and the normally open contact to pin #14, then wire both contacts to +24 Vdc, as shown in Table 2-11, below, and Figure 2 at the end of the manual.

Table 2-12. Foot Switch Wiring Connections

WPC APEX Main Processor Board Pin #	Foot Switch Contacts
4	N/C input
14	N/O input
+24 Vdc (e.g., #38)	Common

Refer to *Switch 3 (S101) – One-hand Control and Foot* Switch Settings, page 171, for Foot Switch settings

Installing a One-hand Control

⚠ DANGER

INSTALL SAFEGUARDS TO PREVENT ACCESS TO HAZARDOUS AREA

- Follow all applicable OSHA and ANSI regulations for safeguarding your press system. Point-of-operation safeguarding is the single most important factor in the prevention of injuries.
- Follow all applicable OSHA and ANSI regulations when installing a one-hand control.
- Ensure that proper safeguarding devices are installed and working properly. Wintriss takes no responsibility if safeguarding devices are not installed or working correctly.
- DO NOT use WPC APEX or a one-hand control as a safeguarding device.
- Install and operate WPC APEX and a one-hand control in accordance with OSHA and ANSI regulations.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

PREVENT OPERATOR FROM STANDING BETWEEN LIGHT CURTAIN AND HAZARD

Ensure that the operator cannot position himself between the light curtain and the hazardous area. Use another pair of light curtains or a mechanical barrier at knee to waist height to prevent the operator or a passerby from being “trapped” between the light curtain and the hazard.

Failure to comply with these instructions will result in death or serious injury.

One-hand Control is a switch available from Wintriss that allows operators to use their free hand to feed a part while their other hand operates the switch. This option can only be used with WPC APEX systems equipped with One-hand and Single Stroke modes, employing a Shadow light curtain to guard the point of operation, and running One-hand/Two-hand/Foot firmware.

The One-hand Control is mounted on or near the press and allows the operator to cycle the press without using the Operator Station. To stroke the press, the operator simply pushes the button as part of his normal hand motion after loading a part.

The One-hand Control can be used in two different modes. In Normal mode, the press cycles in Single Stroke whenever you push the One-hand Control button. In “Light Curtain Break” mode, the press cycles only when you push the One-hand Control button within eight seconds after removing your hand(s) from the light curtain. If the button is pushed after this interval expires, the press does not cycle.

Light Curtain Break mode prevents inadvertent operation of the press when an operator is loading or unloading parts.

The mode used for One-hand Control is determined by the setting on option switch 3 (see Enabling Light Curtain Break Mode in a One-hand Control, page 171). When switch 3 is set to OFF, One-hand Control operates in Normal mode. When switch 3 is set to ON, One-hand Control operates in Light Curtain Break mode.

Mounting a One-hand Control

⚠ DANGER

DO NOT MOUNT OPERATOR CONTROL TOO CLOSE TO HAZARD

Mount the One-hand Control outside the area protected by the light curtain. DO NOT mount the One-hand Control between the light curtain and the point of operation.

Failure to comply with these instructions will result in death or serious injury.

To mount the One-hand Control, perform the following steps, referring to Figure 2-19 and Figure 2-20, below, for mounting dimensions:

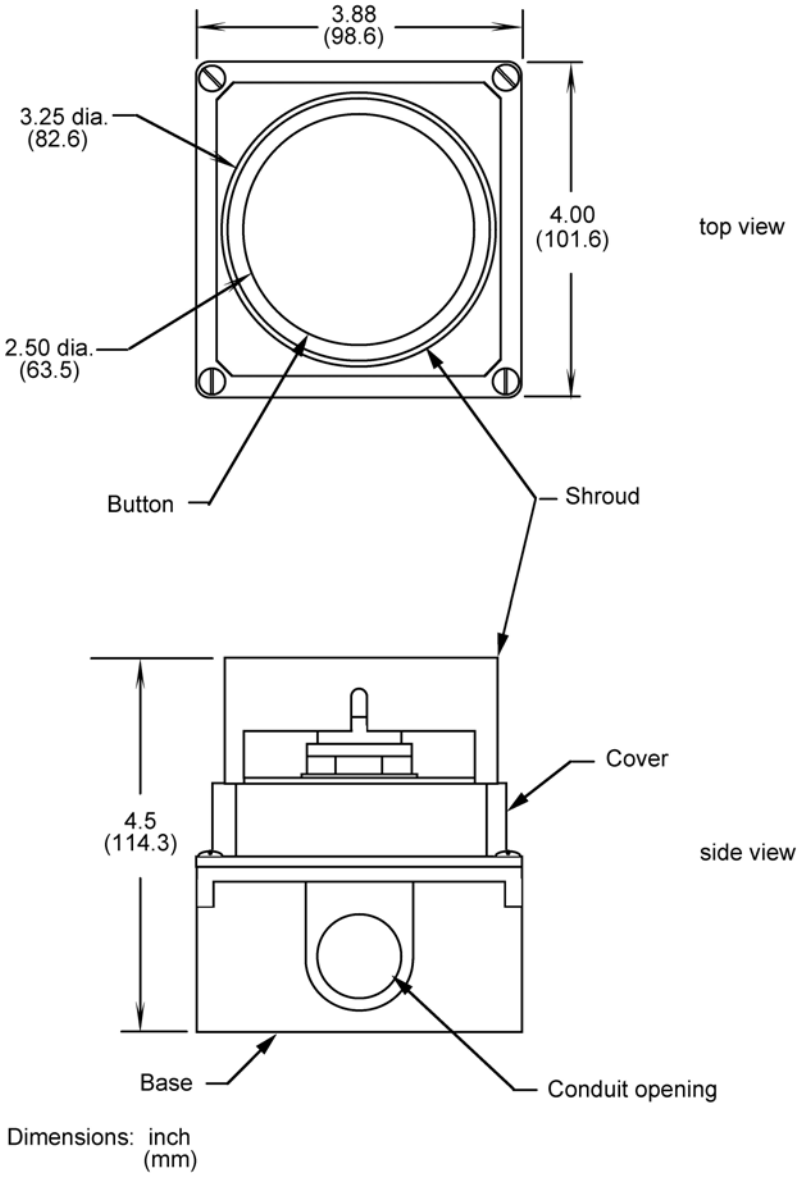


Figure 2-19. One-hand Control Switch: Mounting Dimensions

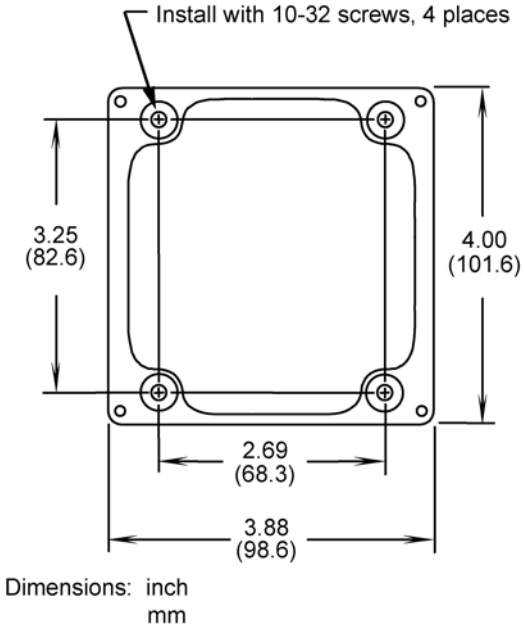


Figure 2-20. One-hand Control Switch Base: Mounting Dimensions

1. Shut off power to the press and to WPC APEX.
2. Choose a mounting location on or near the press convenient to the operator. The One-hand Control should be mounted so the operator can reach it as part of normal hand movement after loading a part. An adjustable bracket may be necessary.
3. Mount the One-hand Control, using the tapped holes on the bottom of its metal enclosure.

Wiring a One-hand Control to WPC APEX

⚠ DANGER

ELECTRIC SHOCK OR HAZARDOUS ENERGY

- Disconnect main power before installation.
- Remove all power to the press, press control, and other equipment used with the press.
- Remove all fuses and “tag out” per OSHA 1910.147 Control of Hazardous Energy (Lockout/ Tagout).
- Ensure that installation is performed by qualified personnel.
- Complete all installation procedures before connecting to the AC power source.

Failure to comply with these instructions will result in death or serious injury.

To wire One-hand Control, you need to make connections to both the Operator Station and to the WPC APEX Main Processor board. To do so, perform the following steps:

1. Turn off power to the press and to the WPC APEX.
2. Loosen the clips at the bottom of the front panel of the Operator Station. Swing the front panel up and support it so you can work inside the box. (The cover will stay up if you slide it slightly to the left or right.)

3. Knock out a hole in the bottom of the Operator Station near the existing conduit from the WPC APEX control enclosure.

4. Using the conduit hole provided in the base of the One-hand Control, run conduit and wiring to the Operator Station, referring to Figure 2-21 for terminal locations on the bottom of the One-hand Control.

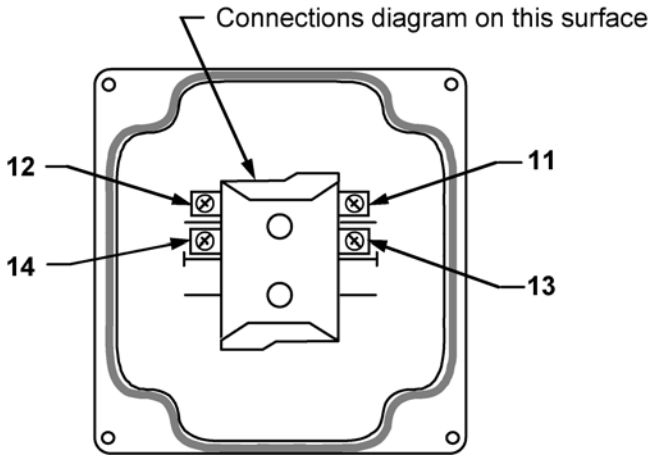


Figure 2-21. Wiring Connections in One-hand Control Switch (Switch Cover, Bottom View)

5. Measure wires to fit before cutting, then make the appropriate wiring connections, referring to Table 2-13, below, and Figure 8 at the end of the manual.

Table 2-13. One-hand Control Wiring Connections

One-hand Control Terminal # *	WPC APEX Main Processor Board and Operation Station Connections	
	Pin#	Signal
11	1	Palm switch A N/C input +
12	Blue wire in Operator Station cable	
13	3	One-hand A input +
14	Blue wire in Operator Station cable	

* Refer to Figure 2-21, above

6. Fasten the switch cover onto the base with the screws provided.

7. Tighten all conduit connections that may have been loosened during installation.

8. Close and latch the cover of the Operator Station and WPC APEX.

9. Make sure that you have run all your ground wires. Do not use conduit as ground.

Mounting and Wiring the Bar Control Enclosure

Mount the Bar Control enclosure in a location that is convenient to the operator while he is releasing the machine's brake and barring the press. Make sure that the operator will not block a light curtain while pressing the Bar control Operate button. Refer to Figure 2-22 for mounting dimensions.

To wire the Bar Control, connect the Bar selector switch input to pin #6 on the WPC APEX Main Processor board and the Bar actuator input to pin #16, as shown in Table 2-14 and Figure 2 at the end of the manual.

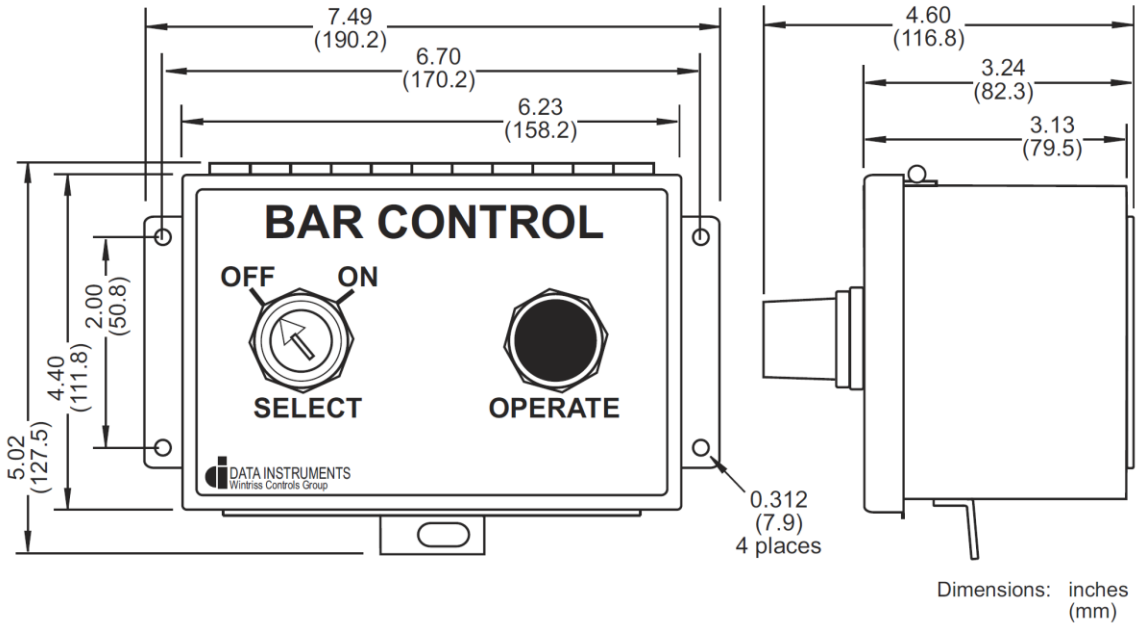


Figure 2-22. Bar Control Enclosure: Mounting Dimensions

Table 2-14. Bar Control Wiring Connections

WPC APEX Main Processor Board Pin #	Bar Control Contacts
16	Bar actuator input
6	Bar selector switch input
+24 Vdc (e.g., #38)	Common

Wiring Automatic Single Stroke

⚠ DANGER

PRESS STARTING UNEXPECTEDLY

- Ensure that light curtains and other safeguards are properly installed and operating to protect operators when using Automatic Single Stroke. Since the external trigger starts the stroke, a stroke can occur unexpectedly.
- Ensure that guarding is properly installed to prevent access to the machine over, under, or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

Automatic Single Stroke is an operating mode that enables the operator to automate a manual press using a feeding device or robot. To wire the switch that turns on this feature, refer to Figure 5 at the end of the manual. To wire the Automatic Single Stroke actuating mechanism, refer to Table 2-15 and Figure 2 at the end of the manual.

Table 2-15. Automatic Single Stroke Wiring Connections

WPC APEX Main Processor Board Pin #	Foot Switch Contacts
15	N/C input
5	N/O input
+24 Vdc (e.g., #38)	Common

Though an SPDT contact is shown in Figure 2, you can also use solid state switches (proximity switches, for example) or outputs from a programmable logic controller (PLC). To make sure that the contacts are clear and reliable, the switch or relay should be new and unused.

You set the wait time for Automatic Single Stroke with option switch 5 (see *Switch 5 (S101) – Prior Act Time for Automatic Stroke Modes*, page 174). To operate the press in this operating mode, refer to *Operating the Press in Automatic Single Stroke Mode*, page 239.

Wiring Automatic Continuous On-demand

⚠ DANGER

PRESS STARTING UNEXPECTEDLY

- Ensure that light curtains and other safeguards are properly installed and operating to protect operators when using Automatic Single Stroke. Since the external trigger starts the stroke, a stroke can occur unexpectedly.
- Ensure that guarding is properly installed to prevent access to the machine over, under, or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

Contact Wintriss Tech. Support for information on using this operating mode.

Installing Revised WPC APEX Firmware

⚠ DANGER

MACHINE MALFUNCTION AFTER INSTALLING REVISED SOFTWARE

Perform the installation verification (see page 100) and final checkout (see page 177) tests after performing the firmware installation.

Failure to comply with these instructions could result in death or serious injury.

⚠ DANGER

ELECTRIC SHOCK OR HAZARDOUS ENERGY

- Disconnect main power before installation.
- Remove all power to the press, press control, and other equipment used with the press.
- Remove all fuses and “tag out” per OSHA 1910.147 Control of Hazardous Energy (Lockout / Tagout).
- Ensure that installation is performed by qualified personnel.
- Complete all installation procedures before connecting to the AC power source.

Failure to comply with these instructions will result in death or serious injury.

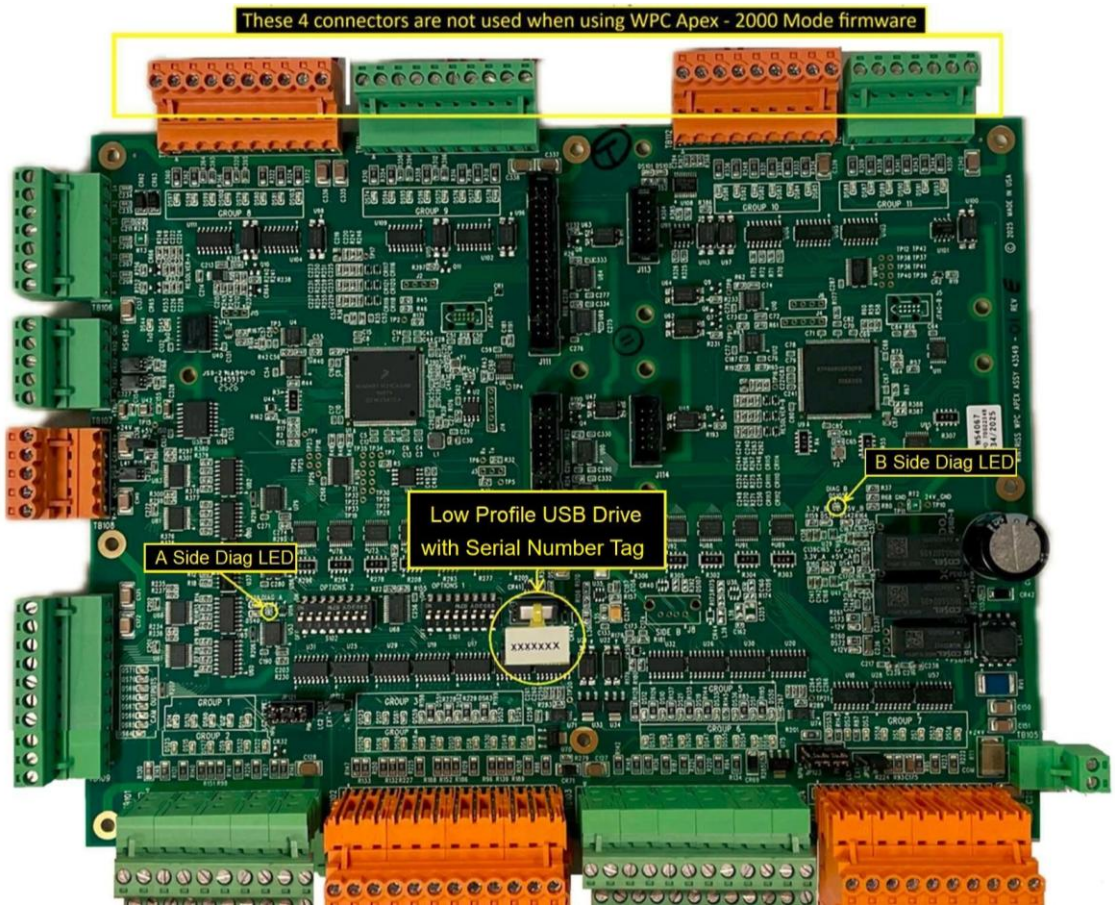


Figure 2-23. WPC APEX Processor Board Showing Serialized USB and Diagnostic LEDs

WPC APEX firmware resides within the program memory space inside each of the two microcontrollers. To perform an update, download and install new firmware using the USB drive on the WPC APEX processor board (refer to Figure 2-23). All WPC APEX boards ship with a low-profile USB drive that contains its currently loaded firmware as *.hex* files, as well as the press parameter values.

CAUTION

DAMAGE TO BOARD FROM STATIC DISCHARGE

Ground yourself before touching circuit boards or chips by touching a large metal object such as the press. Static electricity can destroy electronic components.

Failure to comply with these instructions could result in property damage.

NOTICE

INSTALLED OPTIONS SCREEN SHOWS APEX SERIAL NUMBER AND FIRMWARE VERSIONS

See Figure 3-19, page 129, for APEX serial number and firmware versions.

Notice in Figure 2-23 that a tag showing the system serial number is tie-wrapped onto the resident USB drive. The firmware can be updated by copying the A & B *.hex* files provided by Wintriss to the USB drive root directory. Follow the steps below to update the firmware.

1. Record the following WPC APEX settings, referring to PRESS PARAMETERS, page 123, for help in viewing them.
    - Stop-time Limit
    - Auto Carry-up Angle
    - Top stop Angle
    - Micro-inch time
    - Cam On/Off settings
    - Counter Preset
    - Counter (if necessary)
2. From the email sent by Wintriss, use the link provided to download and extract the .zip file to the Downloads folder on a computer. If there are any prior downloads with the same name, then a copy number in parentheses will be appended to the filename. If this happens, remove the copy number from the filename.
3. Power down the press control system and unplug/retrieve the USB drive (see Figure 2-23) from the WPC APEX board.
4. Plug the WPC APEX USB drive into the computer that did the download and copy all files from inside the unzipped folder from step 2 (e.g., *A9688XXX.hex*, *B9688XXX.hex*, and the *.key* file if present) into the root directory of APEX's USB drive.
5. With the system still powered off, insert the USB drive back into the WPC APEX board's USB receptacle.
6. Power up the system and the WPC APEX A-side processor should detect that the USB drive has different firmware from what is in its flash memory and then begin loading the firmware. During

this phase, the A and B side diagnostic LEDs illuminate blue for a moment, which indicates the processor is processing the files from the USB drive. First, WPC APEX loads the A firmware and then the B firmware, Check and delete all of which should take less than 30 seconds.

7. When the firmware load process is successfully completed, both A and B side diagnostic LEDs blink green. If there is an issue, they blink red.
8. When the system finishes booting up, it displays the new firmware version number. Cycle the power. This completes the firmware update.
9. Re-initialize the system, following the instructions for initializing the press parameters in *Initializing WPC APEX*, page 112.

⚠ DANGER

MAKE SURE THAT STOP TIME LIMIT IS CORRECT AFTER INITIALIZATION

Whenever you initialize WPC APEX, the Stop-time Limit is reset to its factory value of 500 mS. Make sure to set the Stop-time Limit to a value based on the actual stopping time of your press. Use the stopping time measured in the 90º stop-time test to calculate the safety distance.

Failure to comply with these instructions will result in death or serious injury.

10. Re-enter the settings you recorded in step 1.
11. Perform installation verification (see page 100) and final checkout (see page 177) tests.

Installing WPC APEX Without Enclosure

When you order WPC APEX without enclosure, you receive a Main Processor board, power supply, and input power terminal block mounted on an aluminum plate, and either a panel mount display or display board kit. First, install the mounting plate as instructed in the next section, then mount the display according to instructions in *Installing the Panel-Mount Display*, page 97, OR refer to the instruction sheet included with the display board kit.

Installing the WPC 2000 Mounting Plate

The mounting plate has a hole in each corner to facilitate mounting of the WPC APEX Main Processor board and related components in your enclosure or console. When installing the mounting plate, refer to Figure 2-24 for mounting dimensions.

Be sure to allow at least 1 in. clearance on top, bottom, and left sides of the plate and above the power supply and Main Processor board. Allow at least 2 1/2 in. clearance on the right side of the plate for making wiring connections to terminal blocks TB101-TB104.

The power supply on the mounting plate is pre-wired to the power terminal, TB105, on the Main Processor board and to the input power terminal block on the plate. To connect AC wiring to the input power terminal block, follow the instructions in *Connecting AC Wiring*, page 53.

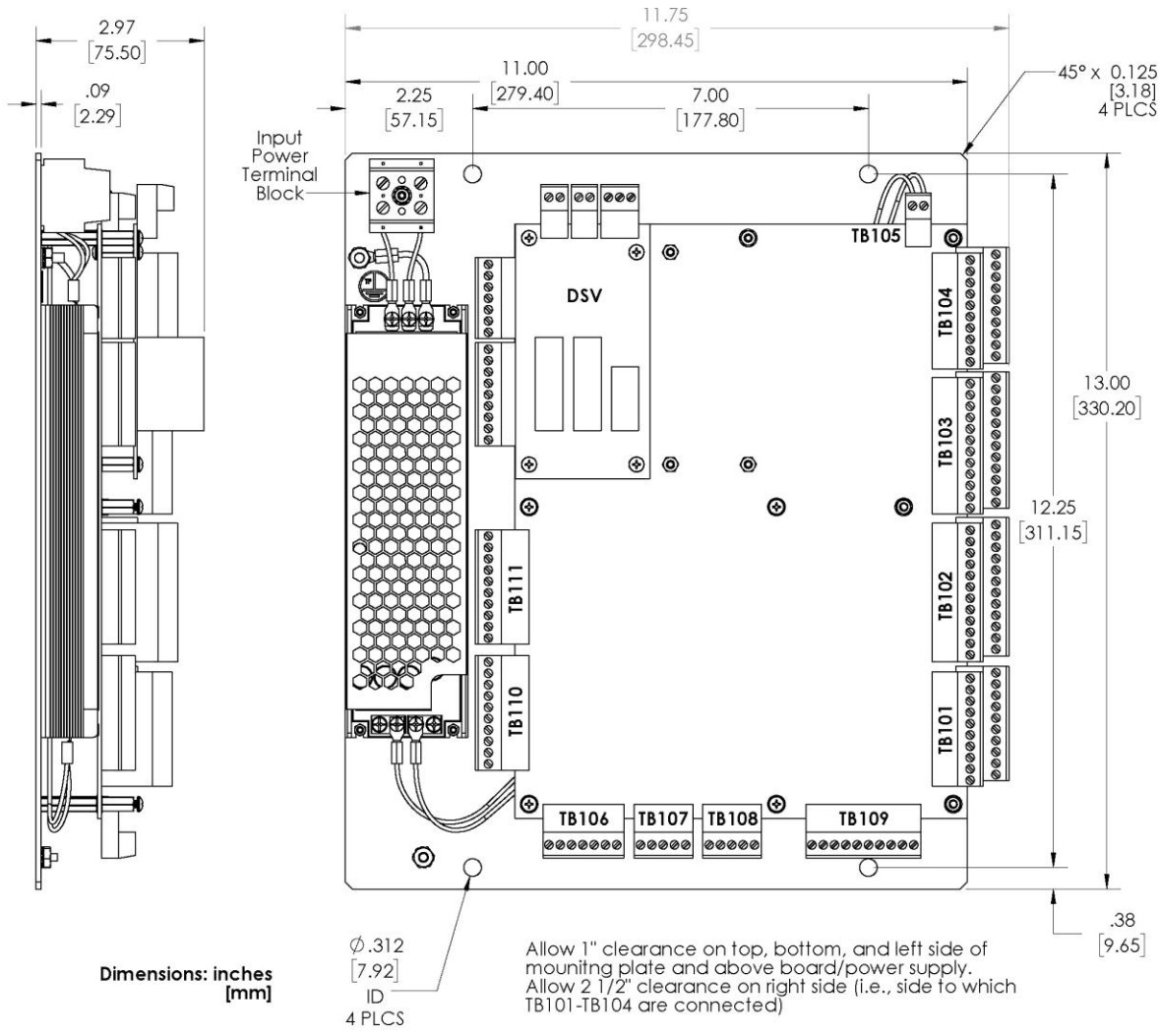


Figure 2-24. WPC APEX Mounting Plate and Power Supply

Installing the Panel-Mount Display

NOTICE

Install the panel mount display at a height convenient for all users. Experiment to determine a good height for every user before mounting the display.

To install the panel-mount display in your enclosure or console, do the following, referring to Figure 2-25 and Figure 2-26 for mounting and cutout dimensions:

1. Determine a convenient location to mount the display panel and selector switches in your enclosure or console. Mount the display so that operators and setup personnel can easily see the readouts and reach the switches. Make sure that all switches are no more than one ft. (300 mm) from the display. Allow at least 4 in. (100 mm) clearance behind the panel.

2. Cut out a hole in your enclosure or console, and drill and tap twelve holes for #10-32 screws, referring to Figure 2-25.

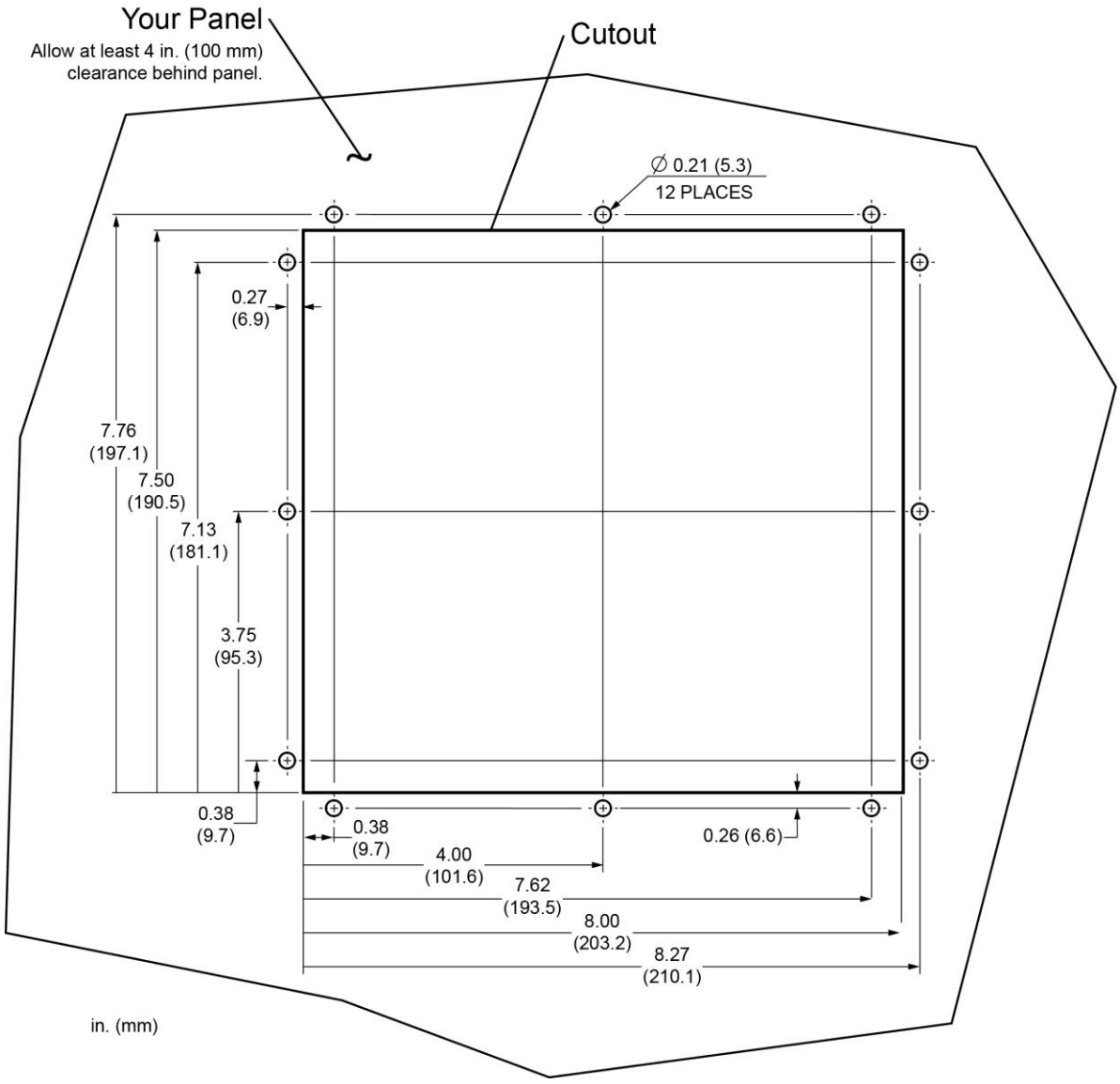


Figure 2-25. WPC APEX Panel Mount Cutout Dimensions

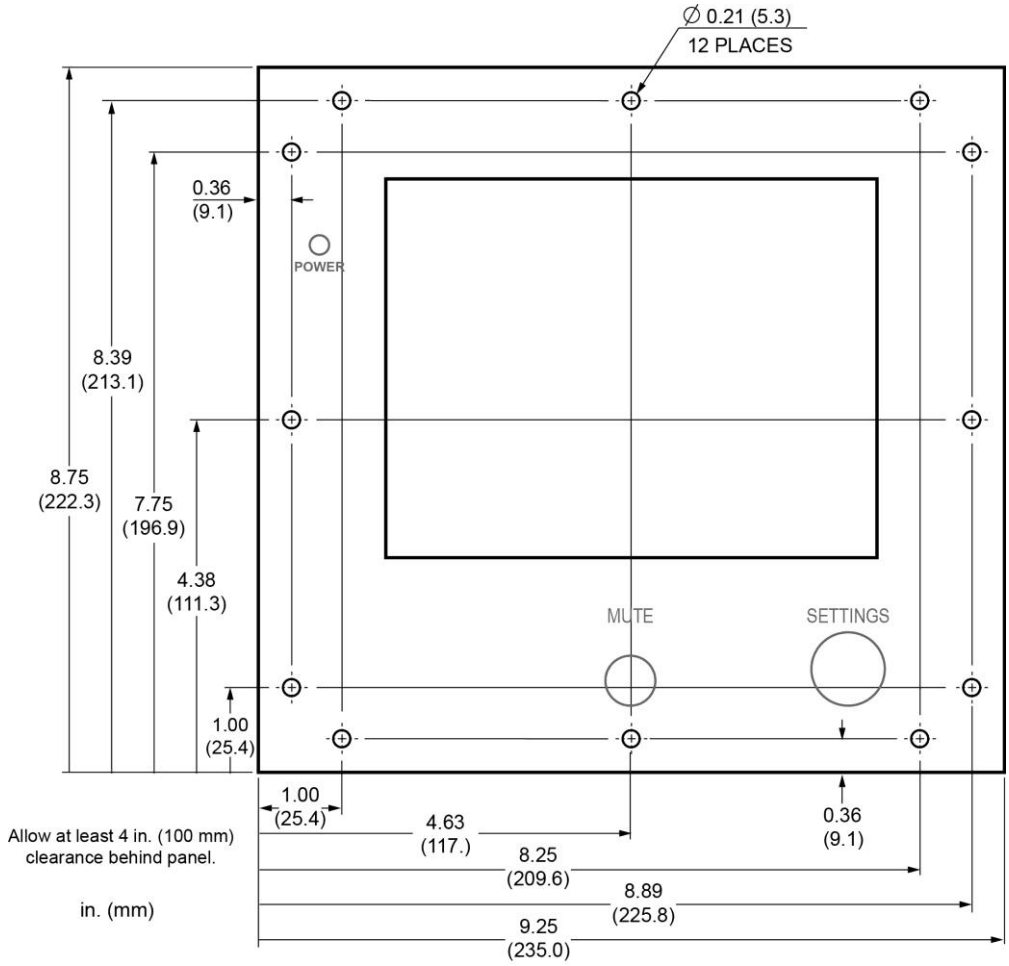


Figure 2-26. WPC APEX Panel-Mount Faceplate Dimensions

3. Prop the display panel near the location where you plan to mount it. You can do this by connecting ty wraps from two of the left holes on the panel to the corresponding holes on the enclosure or console, creating hinges. Allow 9 in. of service loop when performing the wiring connections, and make sure all cables will reach the connectors.

Installing Selector Switches and Final Assembly

⚠ DANGER

DO NOT USE CONTINUOUS MODE ON PRESS WITHOUT PROPER GUARDING

Disconnect the “Continuous” position on the stroke selector switch and cover the “CONT” label on your control if your press is not guarded properly for use in Continuous mode or you do not run your press in Continuous mode.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

Mount selector switches within 1 ft. (300 mm) of the Display board.

1. Select a mounting location for the selector switches. Switches must be mounted within 1 ft. (300 mm) of the display.
2. Cut holes in your enclosure or console for the selector switches, referring to Figure 2-27 for cutout dimensions. Dimensions are the same for all switches.

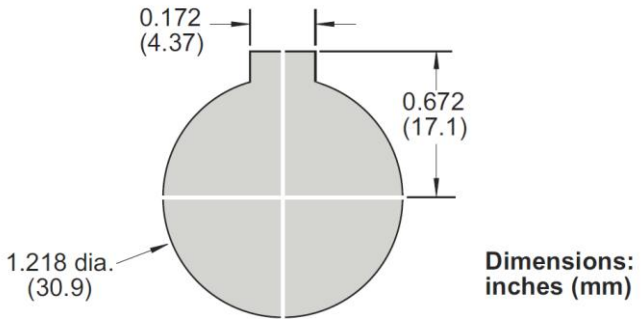


Figure 2-27. Selector Switch: Cutout Dimensions

3. Install the selector switches.
4. Wire each selector switch to the appropriate terminal block on the WPC APEX Display board, referring to Table 2-16 and Figure 5 at the end of the manual for wiring connections

Table 2-16. Selector Switch Wiring Connections

Selector Switch	Terminal Block on WPC APEX Display Board
Stroke Select	TB701
Mode Select	TB702
Automatic Single Stroke (External Trip)	TB703
Operator Station Select	TB704 and TB707
Micro Inch	TB705

Installation Verification

⚠ DANGER

PERFORM INSTALLATION VERIFICATION BEFORE OPERATING PRESS

Complete Installation Verification procedures before operating the press.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

ALL SIGNAL GROUNDS MUST BE CONNECTED THROUGH THE MAIN PROCESSOR BOARD

Connect all signal grounds through pins on the WPC APEX Main Processor board.

When you have completed all the installation procedures in this chapter, perform the following Installation Verification steps before setting up and initializing WPC APEX as instructed in

Chapter 3. When you have completed initialization and set-up procedures, be sure to perform the Final Checkout tests at the end of Chapter 3.

Checking Safeguarding Devices

⚠ DANGER

DO NOT USE NON-SAFETY INTERLOCK SWITCHES IN SAFETY APPLICATIONS

- Ensure that all interlock switches used on safeguards are designed and rated for safety applications. Check with the manufacturer to verify the rating of each interlock switch.
- Ensure that safety interlock switches are connected to control-reliable inputs if they are used for safeguarding applications.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

PREVENT INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.
- Use extreme caution when testing moveable guards. Keep hands and other body parts outside the guarded area.

Failure to comply with these instructions will result in death or serious injury.

Before turning on the press, check to verify the following conditions:

- All fixed safeguards prevent entry of a hand or other body part into the hazardous area.
- All moveable safeguards are correctly installed and wired to prevent operation of the press when they are open and prevent entry of a hand or other body part into the hazardous area.
- All interlock switches used with safeguards are designed and rated for use in safety applications. Check with the switch manufacturer to confirm their suitability for safety use.
- Interlock switches used for safeguarding are connected to control-reliable inputs.
- Any light curtains are installed and working properly.
- Any Two-hand controls used as safeguarding devices are mounted at least the safety distance from the hazardous area.
- Safeguards are in place to prevent entry to the hazardous area under, over or around light curtains or other safeguarding devices.

Test safeguarding devices as follows:

1. Run the press in Inch mode. Block each light curtain, if installed, with an opaque object. The press should stop immediately.
    - If the press stops, go to the next step.
    - If the press does not stop, check the wiring of the light curtain and correct any problems. Repeat the test. If the press still does not stop, call Wintriss Tech. Support.
2. Run the press in Inch mode. Keeping hands outside the guarded area, open one of the moveable guards just enough to open the interlock switch. The press should stop immediately.

- If the press stops immediately when you open the guard, go to the next step.
- If the press does not stop, check the wiring of the moveable guard and correct any problems. Repeat the test. If the press still does not stop, call Wintriss Tech. Support.

3. Close the guard you just tested, reset the press control, and repeat step 2 for each moveable guard. When you have tested all moveable guards, go to the next section.

Checking Dual Safety Valve (DSV) Wiring

⚠ WARNING

PREVENT ELECTRIC SHOCK WHEN WORKING INSIDE THE ENCLOSURE

Turn off and disconnect power from the WPC APEX, the press, and any other machinery it is connected to before working inside the enclosure. This includes power to the press motor.

Failure to comply with these instructions could result in death or serious injury.

Follow the checkout procedure below to ensure that the dual safety valve is wired correctly. Proper installation and operation of the DSV is crucial to personnel safety.

1. Power down the press and press control.
2. On the DSV/Lockout Relay board, Figure 2-28, remove fuse F302 or F303. F302 and F303 are the DSV fuses.

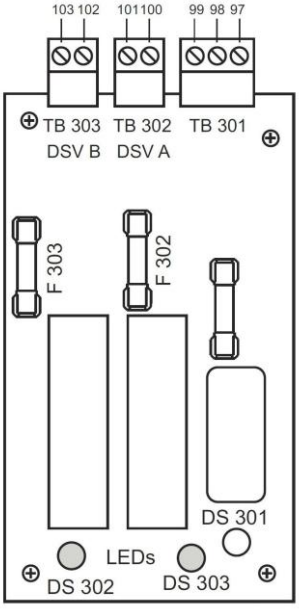


Figure 2-28. DSV Lockout Relay Board

3. Power up the press and press control, select INCH with the Stroke Select switch, and push both Run/Inch buttons. Observe what happens.
   - If the ram does not move and the display shows F79 or one of the DSV faults (see *DSV Interface and Lockout Relay Failures,* page 261), the DSV is operating properly. Go to the next step.

- If the ram moves and/or the display shows a fault other than F79 or one of the DSV faults, check the wiring of the DSV and correct any problems, then repeat step 3. If the ram still moves and/or the display still shows a fault other than F79 or one of the DSV faults, power down the press immediately and call Wintriss Tech. Support.

4. Power down the press and press control.
5. On the DSV/Lockout Relay board, replace the DSV fuse (i.e., F302 or F303) you removed in step 2, and remove the other DSV fuse.
6. Power up the press and press control, make sure the press is in Inch mode, and push both Run/Inch buttons. Observe what happens.

   - If the ram does not move and the display shows F79 or one of the DSV faults, the DSV is operating properly. Go to the next step.
   - If the ram moves and/or the display shows a fault other than F79 or one of the DSV faults, check the wiring of the DSV and correct any problems, then repeat step 6. If the ram still moves and/or the display still shows a fault other than F79 or one of the DSV faults, power down the press immediately and call Wintriss Tech. Support.

7. Power down the press and press control, and replace the fuse you removed in step 5.
8. Power up the press and press control, make sure the press is still in Inch mode, and push both Run/Inch buttons briefly. The ram should move.

   - If the ram moves, go to the next section.
   - If the ram does not move, check the wiring of the DSV and correct any problems. Power up the press and press control. Push the Run/Inch buttons again. If the ram still does not move, call Wintriss Tech. Support.

Checking for Faults

To check for faults, do the following:

Run the press in Inch for a few strokes.

- If the press runs normally, go to the next section.
- If a fault appears on the display, look up the fault code in Chapter 6, and follow the remedy provided. Once the problem is corrected, press OK, and run the press again in Inch for a few strokes, checking for error codes. If you need assistance, call Wintriss Tech. Support.

Checking the Emergency Stop Circuit

Emergency Stop buttons may be installed wherever needed. They are red buttons with yellow haloes. See Figure 21 at the end of the manual for wiring details.

To check the Emergency Stop circuit, do the following:

1. Run the press in Inch mode. While the ram is moving, have someone push an Emergency Stop button. The press should Emergency Stop immediately.

- If the press Emergency Stops, go to the next section.
- If the press does not Emergency Stop, there is a problem in your E STOP circuit. Recheck wiring and correct any problems; then repeat this test. If the press still does not Emergency Stop, call Wintriss Tech. Support. Do not continue with this checkout procedure until the press Emergency Stops correctly.

Checking the Immediate Stop Circuit

To check the Immediate Stop circuit, do the following:

2. Run the press in Inch mode. While the ram is moving, have someone push the Immediate Stop button on the Operator Station. The press should Immediate Stop immediately.

- If the press Immediate Stops, go to the next section.
- If the press does not Immediate Stop, there is a problem in your I STOP circuit. Recheck wiring and correct any problems; then repeat this test. If the press still does not Immediate Stop, call Wintriss Tech. Support. Do not continue with this checkout procedure until the press Immediate Stops correctly.

Installation Verification Complete

The WPC APEX Installation Verification procedure is complete. Clear any error message by OK in the error message window.

Wiring Tables

Tables on the following pages show WPC APEX wiring connections.

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

- **Immediate Stop (I STOP) (formerly E Stop) - Red button**
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC) (formerly E Stop Lockout)**
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP) (System wide stoppage) – Red button w/ yellow halo**
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

Table 2-17. WPC APEX Terminal Block Pinout and LEDs

TB107 - RS 485				
115	1	+TxD		
114	2	-TxD		
113	3	+RxD		
112	4	-RxD		
111	5	Ground		
TB106 - Resolver				
110	1	Shield		
109	2	S1 (sine); Black		
108	3	S2 (cosine); Green		
107	4	R1 (drive); Red		
106	5	S3 (Ground); Yellow		
105	6	R2 (Ground); Orange		
104	7	S4 (Ground); Brown		
TB303 (Relay bd)				
103	1	DSVA Relay		
102	2	DSVA Relay		
TB113 - I/O Estop Codes			Net Name	
511	7	+24V		
512	6	Estop String Input 2 +	A_ES_2	
513	5	ESTOP Code 5 Input +	F13_5	
514	4	ESTOP Code 4 Input +	F13_4	
515	3	ESTOP Code 3 Input +	F13_3	
516	2	ESTOP Code 2 Input +	F13_2	
517	1	ESTOP Code 1 Input +	F13_1	**GRN**
TB110 - I/O			Net Name	
537	10	+24V		
538	9	Com		
539	8	User Interlock 4A Input +	A_IN_61	
540	7	Die Block (USR INTRLK) 3A Input +	A_XC_3_1	
541	6	Flywheel Cover 1 (USR INTRLK 5A) Input +	A_FWC_1	
542	5	Die Block (USR INTRLK/LC 4) 2A Input +	A_XC_2_1	
543	4	Palm Switch D N/O Input +	A_IN_60	
544	3	Die Block (USR INTRLK/LC 3) 1A Input +	A_XC_1_1	
545	2	RUN D N/O Input +	A_IN_59	
546	1	Palm Switch C N/C Input +	A_IN_58	**GRN**
TB302 (Relay bd)				
101	1	DSVB Relay		
100	2	DSVB Relay		
TB301 (Relay bd)				
99	1	Lockout Relay OUT		
98	2	Lockout Relay OUT		
97	3	Lockout Relay IN		
TB105 - Power				
90	1	+24VDC input		
89	2	COM		

TB108 - Display				
116	5	+24V		
117	4	CAN +		
118	3	Shield		
119	2	CAN -		
120	1	V Com		
TB109 - Cam Outputs				
121	10	+24V		
122	9	Com		
123	8	Spare 2		
124	7	Spare 1		
125	6	Zero Cam		
126	5	Counter		
127	4	Chan 4		
128	3	Chan 3		
129	2	Chan 2		
130	1	Chan 1		
TB112 - I/O Die Protection			Net Name	
518	9	Com		
519	8	Die Pro 4 Input -	B_DP_4	
520	7	Die Pro 3 Input -	B_DP_3	
521	6	Die Pro 2 Input -	B_DP_2	
522	5	Die Pro 1 Input -	B_DP_1	
523	4	Estop String Input 1 +	A_ES_1	
524	3	Counter Balance Pressure SW Input -	CBAL_PS	
525	2	BDC Output -	B_BDC	
526	1	TDC Output -	B_TDC	**GRN**
TB111 - I/O			Net Name	
527	10	+24V		
528	9	Com		
529	8	User Interlock 4B Input +	A_IN_57	
530	7	Die Block (USR INTRLK) 3B Input +	A_XC_3_2	
531	6	Flywheel Cover 2 (USR INTRLK 5B) Input +	A_FWC_2	
532	5	Die Block (USR INTRLK/LC 4) 2B Input +	A_XC_2_2	
533	4	Palm Switch D N/C Input +	A_IN_56	
534	3	Die Block (USR INTRLK/LC 3) 1B Input +	A_XC_1_2	
535	2	RUN C N/O Input +	A_IN_55	
536	1	Palm Switch C N/O Input +	A_IN_54	**GRN**
TB403 (Aux Relay bd)				
96	1	N/O #3		
95	2	N/O #3		
TB402 (Aux Relay bd)				
94	1	N/O #2		
93	2	N/O #2		
TB401 (Aux Relay bd)				
92	1	N/O #1		
91	2	N/O #1		

Table 2-18, WPC APEX Terminal Block Pinout and LEDs, continued

			LED Location					LED Location	
TB104 - I/O			Group . #		**TB104 - I/O**			Group . #	
44	10	Analog Ground (not connected to 24V GND)			**88**	20	Light Curtain B 2 input	5 . 6	
43	9	Analog 2 input (cntr balance air)			**87**	19	Light Curtain A 2 input	7 . 3	
42	8	+24V			**86**	18	User Input 10 -	7 . 8	
41	7	+24V			**85**	17	User Input 8 -	7 . 7	
40	6	+24V			**84**	16	User Input 6 -	7 . 6	
39	5	+24V			**83**	15	User Input 4 (Counter balance) -	7 . 5	
38	4	+24V			**82**	14	User Input 2 +	7 . 4	
37	3	Estop String Drive Output **see Notice, below**			**81**	13	User Top Stop String in (connects internally to 49)		
36	2	Aux 2 output -			**80**	12	User Top Stop center loop connection		
35	1	Light Curtain 2 Enable output -			**79**	11	Top Stop String Drive Output		

			LED Location					LED Location	
TB103 - I/O			Group . #		**TB103 - I/O**			Group . #	
34	12	Analog Ground (not connected to 24V GND)			**78**	24	Light Curtain B 1 input	1 . 4	
33	11	Analog 1 input (Main system air)			**77**	23	Light Curtain A 1 input	7 . 2	
32	10	+24V			**76**	22	Mute Lamp 2 output +		
31	9	Ground			**75**	21	Special 3 (DSVA poppet pos.) input -	6 . 8	
30	8	Ground			**74**	20	User Input 9 -	6 . 7	
29	7	Aux 3 Output -			**73**	19	User Input 7 -	6 . 6	
28	6	Aux 1 Output -			**72**	18	User Input 5 -	6 . 5	
27	5	Light Curtain 1 Enable output -			**71**	17	User Input 3 +	6 . 4	
26	4	Special 1 (Flywheel Sen. Dis.) input +	6 . 2		**70**	16	Special 5 (Rem Reset) input -	6 . 3	
25	3	Ground			**69**	15	User I_stop String in (connects internally to 45)		
24	2	Overrun Limit Sw input -	6 . 1	GRN	**68**	14	User I stop center loop connection		
23	1	+24V			**67**	13	I_stop String Drive Output		

			LED Location					LED Location	
TB102 - I/O			Group . #		**TB102 - I/O**			Group . #	
22	12	Ext Top Stop Limit Sw (Flywheel sensor) -	4 . 10		**66**	24	Mute Lamp 1 output +		
21	11	User Input 1 +	3 . 9		**65**	23	Palm Time Lamp output -		
20	10	DSV Monitor input +	4 . 9		**64**	22	Prior Act Lamp output -		
19	9	Special 4 (DSVB poppet pos) input -	4 . 7		**63**	21	Prior Act Input N/C +	4 . 8	
18	8	User Input 11 -	4 . 6		**62**	20	Prior Act B out		
17	7	Motor Reverse Input +	4 . 5		**61**	19	Prior Act A in (connects internally to 62)		
16	6	Bar Mode Actuator Input +	4 . 4		**60**	18	Top Stop B input +	4 . 3	
15	5	Automatic Actuator N/C input +	3 . 4		**59**	17	Top Stop B 2 (out)		
14	4	Foot Switch N/O (RUN B2 N/O) Input +	3 . 3		**58**	16	Top Stop A 2 (in) (connects internally to 59)		
13	3	Special 2 (No Top Stop in INCH) +	4 . 1	GRN	**57**	15	I_stop B 2 input +	4 . 2	
12	2	Palm Switch B N/O Input +	3 . 2		**56**	14	I_stop B2 (out)		
11	1	Palm Switch A N/O Input +	3 . 1	GRN	**55**	13	I_stop A2 (in) (connects internally to 56)		

			LED Location					LED Location	
- I/O			Group . #		**TB101 - I/O**			Group . #	
10	10	Ground			**54**	20	Ground		
9	9	+24V			**53**	19	+24V		
8	8	Main System Air Pressure Sw Input -	1 . 5		**52**	18	Top Stop A Input +	2 . 6	
7	7	Motor Forward Input +	1 . 3		**51**	17	Top Stop B1 (out)		
6	6	Bar Mode Selector Switch Input +	2 . 5		**50**	16	Top Stop A1 (in) (connects internally to 51)		
5	5	Automatic Actuator N/O input +	2 . 4		**49**	15	Top Stop A out		
4	4	Foot Switch N/C Input +	1 . 2		**48**	14	I_stop B 1 Input +	2 . 3	
3	3	One Hand Button N/O (RUN A2 N/O) Input +	2 . 2		**47**	13	I_stop B1 out		
2	2	Palm Switch B N/C Input +	2 . 1	GRN	**46**	12	I_stop A1 in (connects internally to 47)		
1	1	Palm Switch A N/C Input +	1 . 1	GRN	**45**	11	I_stop Out A		

NOTICE

WIRING DIFFERENCE FROM PREVIOUS VERSIONS OF WPC: PIN 37 IS NOW USED IN THE ESTOP STRING

If you are upgrading from a previous version WPC, be careful to connect any wiring previously connected to Pin 37 to a 24V output pin, such as Pin 38 through Pin 42.

Table 2-19. WPC APEX LEDs

All LED Groups Listed by Group		
Name	**Group**	
Palm Switch A N/C Input +	1 . 1	GRN
Foot Switch N/C Input +	1 . 2	
Motor Forward Input +	1 . 3	
Light Curtain B 1 input	1 . 4	
Main System Air Pressure Sw Input -	1 . 5	
Palm Switch B N/C Input +	2 . 1	GRN
One Hand Button N/O Input +	2 . 2	
Istop B 1 Input +	2 . 3	
Automatic Actuator N/O input +	2 . 4	
Bar Selector Switch Input +	2 . 5	
Top Stop A Input +	2 . 6	
Palm Switch A N/O Input +	3 . 1	GRN
Palm Switch B N/O Input +	3 . 2	
Foot Switch N/O Input +	3 . 3	
Automatic Actuator N/C input +	3 . 4	
Aux-B Contact Check	3 . 5	
Aux-A Contact Check	3 . 6	
Aux-A Drive Check	3 . 7	
Aux-B Drive Check	3 . 8	
User Input 1 +	3 . 9	
Special 2 (No Top Stop in INCH) +	4 . 1	GRN
Istop B 2 input +	4 . 2	
Top Stop B input +	4 . 3	
Bar Mode Actuator Input +	4 . 4	
Motor Reverse Input +	4 . 5	
User Input 11 -	4 . 6	
Special 4 (DSVB poppet pos) input -	4 . 7	
Prior Act Input N/C +	4 . 8	
DSV Monitor input +	4 . 9	
Ext Top Stop Limit Sw (Flywheel sensor) -	4 . 10	
DSVA Drive Check	5 . 1	GRN
Lock out Contact Check	5 . 2	
Lock out Drive Check	5 . 3	
DSVB Drive Check	5 . 4	
DSVA Contact Check	5 . 5	
Light Curtain B 2 input	5 . 6	
DSVB Contact Check	5 . 7	
Mute Lamp 1 Check	5 . 8	
Overrun Limit Sw input -	6 . 1	GRN
Special 1 (Flywhl Sen. Dis.) input +	6 . 2	
Special 5 (Rem Reset) input -	6 . 3	
User Input 3 +	6 . 4	
User Input 5 -	6 . 5	
User Input 7 -	6 . 6	
User Input 9 -	6 . 7	
Special 3 (DSVA poppet pos.) input -	6 . 8	
Mute Lamp 2 Check	7 . 1	GRN
Light Curtain A 1 input	7 . 2	
Light Curtain A 2 input	7 . 3	
User Input 2 +	7 . 4	
User Input 4 -	7 . 5	
User Input 6 -	7 . 6	
User Input 8 -	7 . 7	
User Input 10 -	7 . 8	
NOTE: Unless otherwise specified, all LEDs are red.		

All LED Groups Listed by Name		
Name	**Group**	
Aux-A Contact Check	3 . 6	
Aux-A Drive Check	3 . 7	
Aux-B Contact Check	3 . 5	
Aux-B Drive Check	3 . 8	
Bar Mode Actuator Input +	4 . 4	
Bar Mode Selector Switch Input +	2 . 5	
DSV Monitor input +	4 . 9	
DSVA Contact Check	5 . 5	
DSVA Drive Check	5 . 1	GRN
DSVB Contact Check	5 . 7	
DSVB Drive Check	5 . 4	
Istop B 1 Input +	2 . 3	
Istop B 2 input +	4 . 2	
Automatic Actuator N/C input +	3 . 4	
Automatic Actuator N/O input +	2 . 4	
Foot Switch N/C Input +	1 . 2	
Foot Switch N/O Input +	3 . 3	
Light Curtain A 1 input	7 . 2	
Light Curtain A 2 input	7 . 3	
Light Curtain B 1 input	1 . 4	
Light Curtain B 2 input	5 . 6	
Lock out Contact Check	5 . 2	
Lock out Drive Check	5 . 3	
Motor Forward Input +	1 . 3	
Motor Reverse Input +	4 . 5	
Mute Lamp 1 Check	5 . 8	
Mute Lamp 2 Check	7 . 1	GRN
One Hand Button N/O Input +	2 . 2	
Overrun Limit Sw input -	6 . 1	GRN
Palm Switch A N/C Input +	1 . 1	GRN
Palm Switch A N/O Input +	3 . 1	GRN
Palm Switch B N/C Input +	2 . 1	GRN
Palm Switch B N/O Input +	3 . 2	
Prior Act Input N/C +	4 . 8	
Special 1 (Flywhl Sen. Dis.) input +	6 . 2	
Special 2 (No Top Stop in INCH) +	4 . 1	GRN
Special 3 (DSVA poppet pos.) input -	6 . 8	
Special 4 (DSVB poppet pos) input -	4 . 7	
Special 5 (Rem Reset) input -	6 . 3	
Main System Air Pressure Sw Input -	1 . 5	
Top Stop B 1 Input +	2 . 6	
Top Stop B 2 input +	4 . 3	
Top Stop Limit Sw (Flywheel sensor) -	4 . 10	
User Input 1 +	3 . 9	
User Input 10 -	7 . 8	
User Input 11 -	4 . 6	
User Input 2 +	7 . 4	
User Input 3 +	6 . 4	
User Input 4 -	7 . 5	
User Input 5 -	6 . 5	
User Input 6 -	7 . 6	
User Input 7 -	6 . 6	
User Input 8 -	7 . 7	
User Input 9 -	6 . 7	

Table 2-20. WPC APEX Display Board Terminal Block Pinout and LEDs

TB705 (Display bd)			**LED Location**
157	1	Micro inch selector -	DS750
156	2	Program Cams selector -	DS755
155	3	Ground	
TB704 (Display bd)			
154	1	Operator Station 1 input -	DS762
153	2	Operator Station 2 input -	DS749
152	3	Ground	
TB703 (Display bd)			
151	1	Automatic mode -	DS748
150	2	Ground	
TB702 (Display bd)			
149	1	One hand mode -	DS760
148	2	Foot mode -	DS761
147	3	Spare mode -	DS747
146	4	Ground	
TB701 (Display bd)			
145	1	Off select -	DS759
144	2	Inch select -	DS752
143	3	Single Stroke select -	DS753
142	4	Continuous select -	DS754
141	5	Ground	

TB706 (Display bd)			**LED Location**
162	1	-V (Gnd)	
161	2	- CAN	
160	3	Shield	
159	4	+ CAN	
158	5	+V (24 VDC)	
J706 (Display bd)			
	1	Up Button -	DS756
	2	Dwn Button -	DS757
	3	Reset Button -	DS758
	4	Spare	DS751
	5	Ground	

Chapter 3 – Initialization, Setup, and Checkout

⚠ DANGER

OPERATOR STATION WIRED INCORRECTLY

Run all necessary tests to verify that each Operator Station is wired correctly and provides proper anti-tiedown and anti-repeat protection.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MORE OPERATORS THAN OPERATOR STATIONS

- Ensure that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.
- During setup, lockout/tagout the press if there are more operators than operator stations.
- Verify at every shift change that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

TWO-HAND CONTROL TOO CLOSE TO HAZARDOUS AREA

Verify at each shift change that any moveable Two-hand controls are located at least the safety distance from the pinch point or hazardous area.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

- **Immediate Stop (I STOP) (formerly E Stop) - Red button**
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC) (formerly E Stop Lockout)**
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP) (System wide stoppage) – Red button w/ yellow halo**
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

This chapter shows you how to initialize and set up your WPC APEX and perform final checkout tests.

Initializing WPC APEX

After you have completed installation of WPC APEX and run the Installation Verification tests, you should first initialize the WPC APEX Press Parameters. To do so, perform the procedure below and select INITIALIZE PRESS PARAMETERS.

⚠ DANGER

INCORRECT STOP-TIME LIMIT AFTER INITIALIZATION

Determine the Stopping Time and set the Stop-time Limit to a value that reflects the actual Stopping Time of your press whenever you initialize WPC APEX. Use the stop time measured in the 90° stop time test to calculate the safety distance. When you initialize WPC APEX, the Stop-time Limit is returned to its factory setting of 500 mS.

Failure to comply with these instructions will result in death or serious injury.

WPC APEX offers multiple initialization options, delete certain programmed data or reset certain parameters to their factory settings. See Table 3-1.

Table 3-1. WPC APEX Initialization Button Functions

INITIALIZE CUSTOM NAMES
All user customized names for Cam Channels, User Interlocks, ESTOP Codes, etc. are set to their default names, such as: Cam names to “CHANNEL 1, 2, 3…etc.” User Interlocks, E STOP codes to “UNNAMED”
INITIALIZE PRESS PARAMETERS **This is the initialization required after WPC APEX installation and verification**
Resets all press parameters to their default values. NOTE: If an Option 2 board is installed, this also resets Option 2 parameters to their default values.
ERASE ALL TOOLS
Deletes all stored tools
RESET INITIALIZATION DATA
Assigns the following to their default state or starting value: TDC/BDC Angles set to default angles: TDC (ON-350°, OFF-10°), BDC (ON-170°, OFF-190°) Cam Outputs 5, 6, 7 and 8 set to their default, non-programmable names E STOP codes inputs set to not used (N/U) Op-Station settings, set to default condition: ON-SCREEN mode and all ENABLED. Counterbalance Pressure Switch set as DISABLED. Password Security Disabled. Security Access is not password protected. Die Protection Sensor Enable Mode, set to AUTO BY TOOL.
APPLY ALL
Applies all 4 initialization button functions at once

To initialize the WPC APEX in one or all of the ways shown in Table 3-1, follow these steps:

1. Verify that your press is at top dead center (TDC), using a dial indicator or other means. TDC is considered to be any position between 358° and 2°. Inch the press to TDC if necessary.

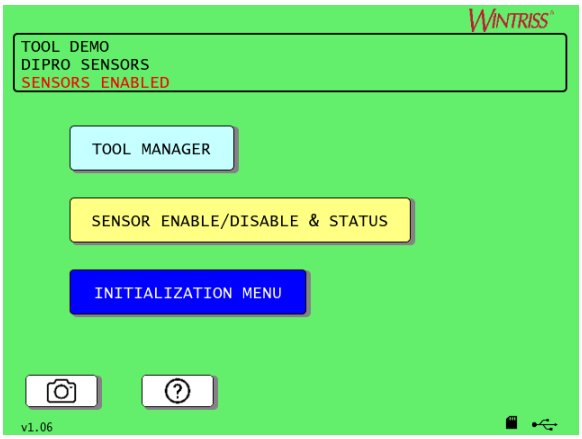


Figure 3-1. Main Program Menu

2. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.

3. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.

Figure 3-2. WPC Initialization menu

4. Press SYSTEM INIT MENU. The Initialize WPC APEX System menu appears, Figure 3-3. Table 3-1 lists the initialization buttons and their functions.

5. Press the type of initialization you want to perform, or press APPLY ALL to complete all four types at once.
   NOTE: If you do not want to perform any initialization, press the Back button to exit this screen.

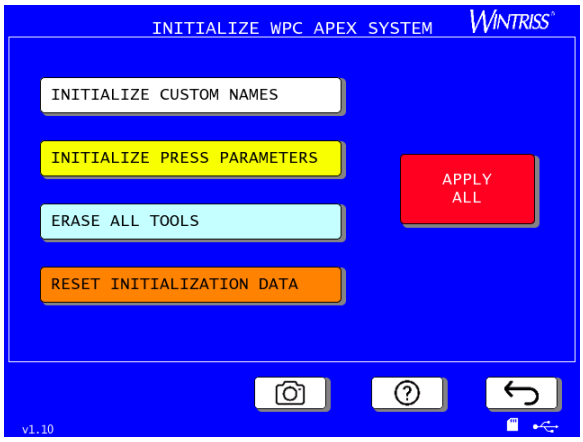


Figure 3-3. System Initialization Menu

6. After you press one of the buttons on the System Initialization Menu (see Table 3-1, page 113), a confirmation window appears, similar to Figure 3-4. Press OK to proceed or CANCEL to quit. The initialization process completes and returns to the System Initialization Menu.

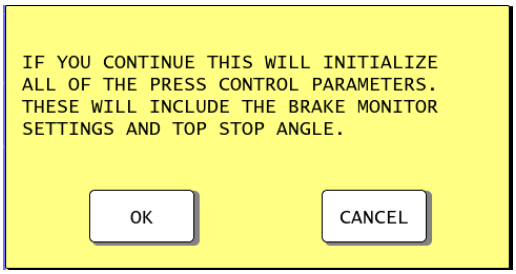


Figure 3-4. Initialization Operation Confirmation Window

Zeroing the Resolver

NOTICE

WHY ZERO THE RESOLVER?

The resolver provides precise crankshaft angle feedback to the WPC APEX. Due to mechanical mounting tolerances, coupling play, and installation variations, it can be challenging to align the resolver's raw output exactly with the press's true top dead center (0°).

Zeroing electronically compensates for any offset by storing a correction value. This ensures the displayed "current resolver angle" always matches the actual mechanical position of the ram. Without this step, functions like top stop timing, brake monitoring, and overrun protection would be inaccurate.

When you use this procedure to zero the resolver WPC APEX electronically adds or subtracts any offset between the resolver and the crankshaft, so the resolver always knows the true zero position of the ram. After zeroing, if the press is at TDC, the crank angle value on the display should read 0°. If it does not, repeat the zeroing process.

To zero the resolver, follow these steps:

1. Verify that your press is at top dead center (TDC), using a dial indicator or other means. TDC is considered to be any position between 358° and 2°. Inch the press to TDC if necessary.
2. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.
3. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.
4. Press RESOLVER ZERO. The Resolver Zero screen appears, Figure 3-5.

   The value shown in the CURRENT RESOLVER ANGLE field should be as close as possible to 0°, preferably between 355° and 5°, but anywhere between 330° and 30° is acceptable.

   If the current resolver angle is outside the range of 330° to 30°, loosen the tension on your drive mechanism and turn the resolver shaft by hand (either direction is acceptable) until the resolver angle is as close to zero as possible. Then tighten the drive mechanism, making sure not to change the resolver angle reading.

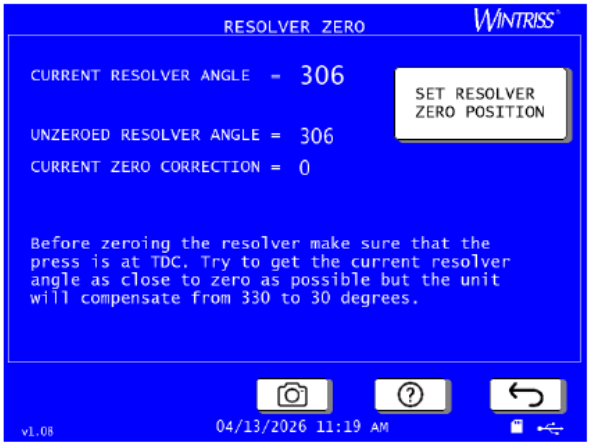


Figure 3-5, Resolver Zero Screen

5. On the Resolver Zero screen, press CLEAR RESOLVER ZERO CORRECTION.
   - If the resolver angle is not within range, an alert window opens (Figure 3-6, left) instructing you to re-position the resolver and zero it again.
   - If the resolver angle is set correctly, a caution/confirmation window opens, Figure 3-6, right. Press OK to continue with zeroing the resolver. Press CANCEL to quit. WPC APEX electronically adds or subtracts the offset and shows the Resolver Zero screen with the new values, Figure 3-7.

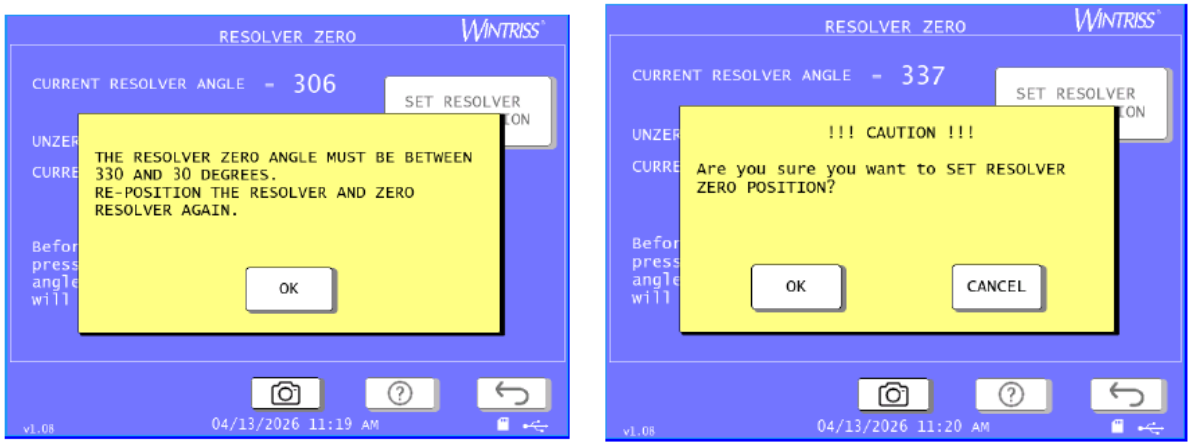


Figure 3-6. Resolver Zeroing Alert (left) and Caution/Confirmation Screens

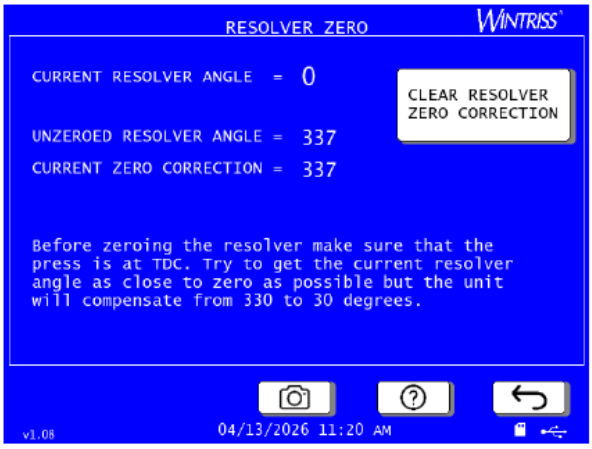


Figure 3-7. Resolver Zero Screen with New Values

6. Press the Back button to return to the WPC Initialization menu.

USER INPUTS & INTERLOCKS

(INITIALIZATION MENU – USER INPUTS & INTERLOCKS)

⚠ DANGER

USER INPUTS 1 THROUGH 7 NOT SUITABLE FOR SAFETY USE

DO NOT use inputs 1 through 7 as part of any personnel-protection system. These inputs are not control reliable.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INPUT PAIRS 8/9, 10/11, 40/41, 42/43, 44/45, 46/47, AND 48/49 ARE CONTROL RELIABLE ONLY IF WIRED CORRECTLY

User input pairs 8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49 are control reliable only if wired correctly in a pair according to the instructions in this section.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

USER INPUTS ADD DELAY TO STOPPING TIME

DO NOT connect light curtains or other presence-sensing devices to any user inputs. Inputs 40-43 are used for light curtains ONLY when using the WPC APEX with Light curtain firmware.

The crosschecked input pairs (8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49), though control reliable, are suitable only for applications such as connecting to safety switches used with interlocking barrier guards.

Failure to comply with these instructions will result in death or serious injury.

The USER INTERLOCKS item on the WPC Initialization Menu gives you access to the Press Control User Interlock Menu, on which you can set the stop type and input name for WPC APEX's 21 user inputs and user interlocks. Follow the instructions below to make these settings.

NOTICE

LIGHT CURTAIN FIRMWARE USES CROSS-CHECKED PAIRS 40/41 AND 42/43

If you have light curtain firmware installed, it uses user interlock crosschecked pairs 40/41 and 42/43 for light curtains C and D, respectively.

NOTICE

ADDITIONAL USER INPUTS WITH WPC OPTION 2 BOARD

WPC has the inputs described above. If you have the WPC Option 2 Board installed, 49 inputs are available. See your Instruction Sheet for WPC Option 2.

These 21 inputs and interlocks are used to connect signals from other equipment in order to monitor auxiliary press functions such as lubrication systems. Up to seven input pairs are cross-checked so they are control reliable when wired correctly to safety devices and can be used to connect equipment such as interlocked barrier guards.

When one of these inputs issues a Stop command by opening a normally closed (N/C) relay, a fault code for the input appears on the WPC APEX display. If you do not want to use an input, select "UNUSED."

The type of stop is determined by the setting you make on this screen. For inputs 1 through 7, you can set the stop type to I STOP (default), I LOC, T STOP, or T LOC. Inputs 8/9, 40/41, 42/43, 44/45, 46/47, and 48/49 are cross-checked pairs that can be programmed to generate an I STOP (default) or an I LOC.

Note that cross-checked input pair 10/11 offers only I LOC (by default) and cannot be programmed differently.

These input pairs cause WPC APEX to I STOP the press and generate errors when one or both inputs in a pair are open or the inputs in a pair "disagree" for longer than 100 msec. (i.e., one input is open and the other is closed).

Input pairs 8/9, 10/11, 40/41, 42/43, 44/45, 46/47, and 48/49 are always activated and cannot be turned off. If you do not want to use these pairs of inputs, leave them wired to ground, as indicated in the WPC APEX User Inputs: Stop Types, Fault Codes, and Wiring Connections tables: Table 2-3, page 75, and Table 2-4, page 76.

As a help to troubleshooting and installation, you can also display the status of the interlocks by selecting the INPUT STATUS item on the Initialization menu, Figure 3-2.

To set the stop type and input name for each of the user inputs, do the following:

1. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.
2. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.
3. Press USER INPUTS & INTERLOCKS. The Change User Inputs/Interlocks screen appears, Figure 3-8.

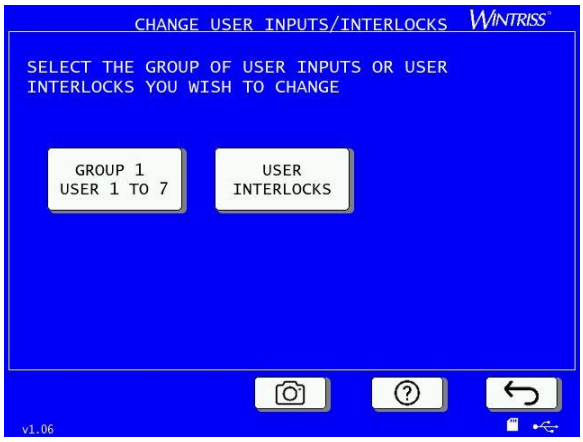


Figure 3-8. Select User Inputs or Interlock

4. To proceed with User Inputs or User Interlocks:
   - For user inputs, press GROUP 1 USER 1 TO 7 and go to the next section, *Changing User Inputs*.
   - For user interlocks, press USER INTERLOCKS and go to *Changing User Interlocks,* page 121.

Changing User Inputs

(INITIALIZATION MENU – USER INPUTS & INTERLOCKS – GROUP 1 USER 1 TO 7)

The Change User Inputs screen appears showing the input numbers at left and boxes for stop type and input name. Press NEXT or PREV to see all the available inputs. You can set the stop type to I STOP, I LOC, T STOP, or T LOC. The default is I STOP (see Table 2-3, page 75, and Table 2-4, page 76).

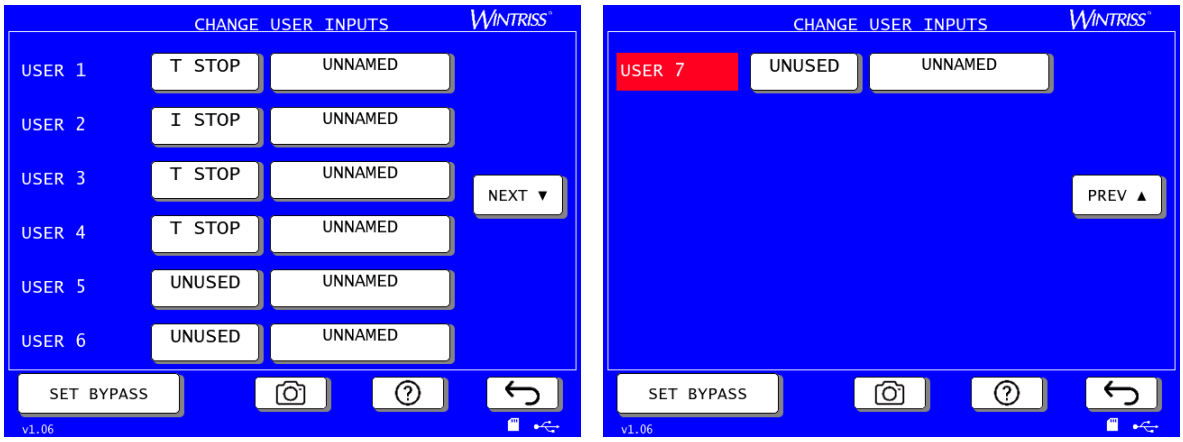


Figure 3-9. Change User Inputs Screens

Table 3-2. Available Stop Types for User Inputs

User Input Number	Name	Stop Type Options (default is I STOP)
1		UNUSED, T STOP, I STOP, T LOC, I LOC
2		UNUSED, T STOP, I STOP, T LOC, I LOC
3		UNUSED, T STOP, I STOP, T LOC, I LOC
4		UNUSED, T STOP, I STOP, T LOC, I LOC
5		UNUSED, T STOP, I STOP, T LOC, I LOC
6		UNUSED, T STOP, I STOP, T LOC, I LOC
7		UNUSED, T STOP, I STOP, T LOC, I LOC

1. Press the left entry box repeatedly to toggle through the available stop types until the one you want appears. Toggle to UNUSED for input you are not using. The default is I STOP.
2. To enter a name for an input, press in the right entry box. The on-screen keyboard appears.
3. Enter the desired name. Press ✓ (checkmark) to accept the name. Press ✕ to cancel.
4. Repeat for all the inputs you are using.
5. When done, you can
   - Press the Back button to exit or
   - Go to the next section to set user input bypass.

Setting User Input Bypass

(INITIALIZATION MENU – USER INPUTS & INTERLOCKS – GROUP 1 USER 1 TO 7 – SET BYPASS)

You can set a bypass condition for any of the user inputs, 1 through 7, to deactivate or ignore the input for specific stroke modes. You can set bypass for up to three modes for each input.

Follow the instructions below to set bypass for inputs and stroke modes.

1. On the Change User Inputs screen, Figure 3-9, press SET BYPASS. The User Inputs Op Mode Bypass screen appears, Figure 3-10.

2. The User Inputs Op Mode Bypass screen, Figure 3-10, lists the User Inputs on the left and shows four columns for operating modes: dead motor, inch, single stroke (S.S.), and continuous. Green squares indicate that the user input is operational in the mode selected.

   To set bypass for a User Input, press the green bypass square(s) corresponding to the mode or modes you want to bypass. Each bypass square turns red and shows a checkmark to indicate bypass is in effect for that input and mode. Note that each input must have at least one mode active; you cannot bypass all four modes for any input. The User Input number also shows red to indicate at least one bypass has been set. To remove a bypass condition, press the square again; it returns to a green color, indicating no bypass is set for that input and stroke mode.

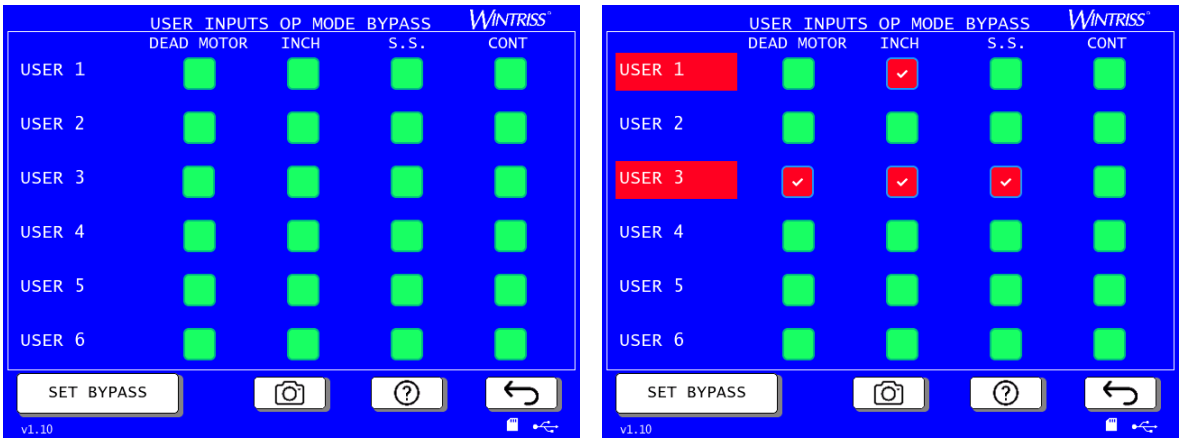


Figure 3-10. User Inputs Op Mode Bypass Screen

3. After you finish, press the Back button to exit and save your bypass settings.

Changing User Interlocks

(INITIALIZATION MENU – USER INPUTS & INTERLOCKS – CHANGE INTERLOCKS)

1. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.

2. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.

3. Press USER INPUTS & INTERLOCKS. The Change User Inputs/Interlocks screen appears, Figure 3-11.

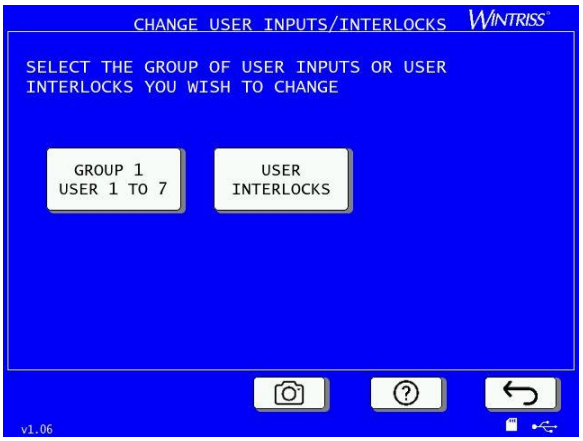


Figure 3-11. Select User Inputs or Interlock

4. Press USER INTERLOCKS. The Change User Interlocks screen appears, Figure 3-12. You can enter a stop type and name for each. Table 3-3 shows the stop types available for each crosschecked pair and provides a place to record the name. For default stop type, see (see Table 2-3, page 75, and Table 2-4, page 76).

Figure 3-12. Change User Interlocks, 8/9 and 10/11, and 40/41 through 48/49

Table 3-3. Stop Types for User Interlock Crosschecked Pairs

User Interlock Pair	Name	Options
8		Crosschecked pair I STOP (default), I LOC
9		
10		Crosschecked pair I LOC
11		
40		Crosschecked pair I STOP (default), I LOC
41		
42		Crosschecked pair I STOP (default), I LOC
43		
44		Crosschecked pair I STOP (default), I LOC
45		
46		Crosschecked pair I STOP (default), I LOC
47		
48		Crosschecked pair I STOP (default), I LOC
49		

PRESS PARAMETERS

(INITIALIZATION MENU – PRESS PARAMETERS)

The WPC APEX allows you to view and, in some cases, to set values for press parameters, including the following:

- Crankshaft angle or strokes per minute (SPM)
- Counter
- Counter preset
- 90° stop time test result
- Stopping time
- Stopping angle
- Top stop angle
- Stop-time limit
- Auto carry-up angle
- Micro-inch time setting

To select a parameter, navigate to the appropriate screen and follow the instructions on the screen and in this manual.

1. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.

2. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.

3. Press PRESS PARAMETERS. The press control parameter menu appears, Figure 3-13.

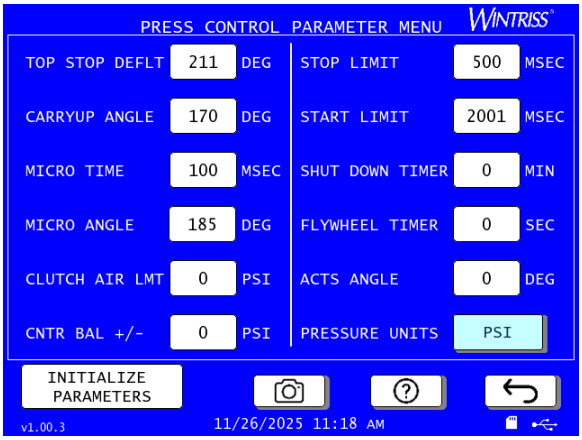


Figure 3-13. Press Control Parameter Menu

4. To change a parameter, press the white value box for that parameter. The on-screen numeric keypad appears. To set pressure units see the next section.

5. Enter the parameter value. Press ✓ (checkmark) to accept the value. Press ✕ to cancel.

Setting Pressure Units

In the press control parameter menu, Figure 3-13 (previous section), press the button next to PRESSURE UNITS repeatedly to show the pressure unit options until the one you want appears.

- PSI (pounds per square inch)
- Kp (kilopascals)
- BAR (bars)

PRESS OPTIONS

(INITIALIZATION MENU – PRESS OPTIONS)

1. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 3-1.

2. Press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2. Press PREV or NEXT to see additional menu items.

3. Press PRESS OPTIONS. The Press Control Option Switch menu, Figure 3-14, appears. Press NEXT or PREV to see the screens.

Figure 3-14. Press Control Option Switch Menu Screens

Viewing Press Option Switch Settings

(INITIALIZATION MENU – PRESS OPTIONS)

NOTICE

MAKE SWITCH SETTINGS ON SWITCH BLOCKS S101 AND S102

You can view the option switch settings on the WPC APEX display, as shown below. However, you must set the switches on switch blocks S101 and S102 on the processor boar*d. See Making Settings on Switch Blocks S101 and S102, page 170.*

Follow these steps to view the press option switch settings:

1. On the WPC Initialization menu, Figure 3-2, press PREV or NEXT to access additional choices.
2. Press PRESS OPTIONS. The press control option switch menu appears, Figure 3-14. You can view the switch settings on this screen. The switch settings must be changed on the processor board (see *Setting Press Option Switches*, page 168.)

Setting the Operator Station Selection Method

(INITIALIZATION MENU – PRESS OPTIONS)

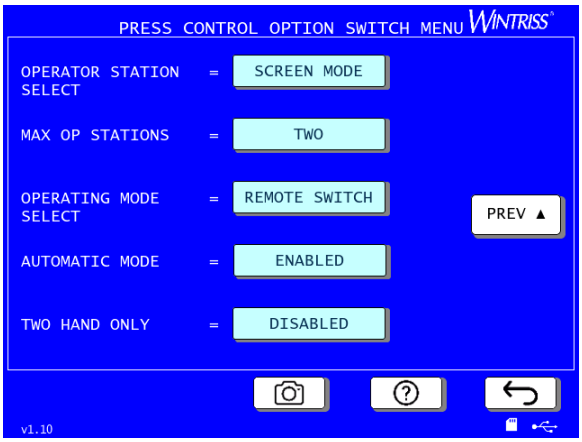


Figure 3-15. Press Control Option Switch Menu Screen 2

You can select operator stations in two different ways: on the display or using an optional selection switch. On the screen above, press the button next to OPERATION STATION SELECT. A dropdown menu appears showing the options: SCREEN MODE and REMOTE SWITCH. Press to select the one you want.

Setting the Maximum Number of Operator Stations

(INITIALIZATION MENU – PRESS OPTIONS)

On the Press Control Option Switch menu, Figure 3-15 (previous section), to set the maximum number of operator stations, press the box next to MAX OP STATIONS. A dropdown menu appears listing ONE, TWO, THREE, and FOUR. Press the maximum number of operator stations that will be used with this press.

Enabling/Disabling Automatic Mode

(INITIALIZATION MENU – PRESS OPTIONS)

On the Press Control Option Switch menu, Figure 3-15, above, to enable or disable Automatic mode, press the box next to AUTOMATIC MODE. A dropdown menu appears listing ENABLED and DISABLED. Press the one you want.

Enabling/Disabling Two Hand Only Mode

(INITIALIZATION MENU – PRESS OPTIONS)

On the Press Control Option Switch menu, Figure 3-15, above, to enable or disable Two Hand Only mode, press the box next to TWO HAND ONLY. A dropdown menu appears listing ENABLED and DISABLED. Press the one you want.

INPUT STATUS

(INITIALIZATION MENU – INPUT STATUS)

1. On the Main Program menu, Figure 3-1, page 114, press INITIALIZATION MENU. The WPC initialization menu appears,
2. On the WPC Initialization menu, Figure 3-2, press PREV or NEXT to access additional choices. Press INPUT STATUS. The display WPC input status screen appears,

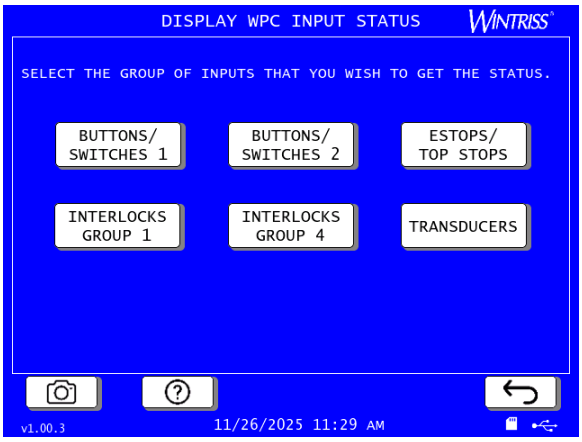
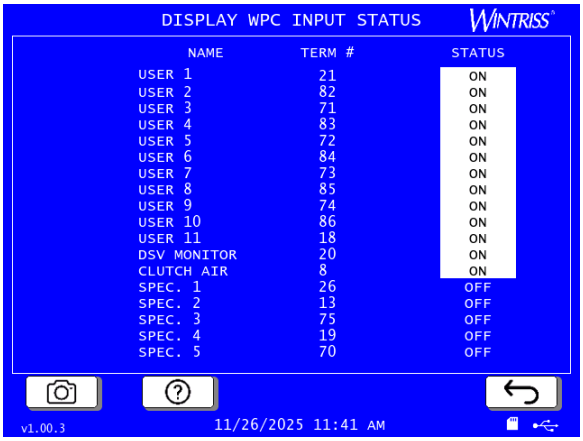
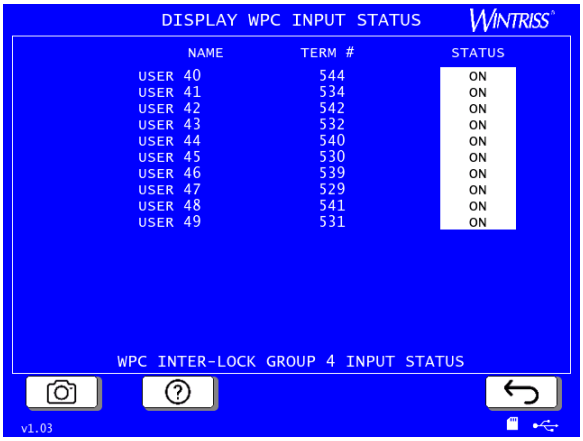


Figure 3-16. Display WPC Input Status Screen

3. Press the item you want to view. The corresponding screen appears showing the inputs and their status. See the screens in the figures below. Some show inputs available only with WPC APEX options.





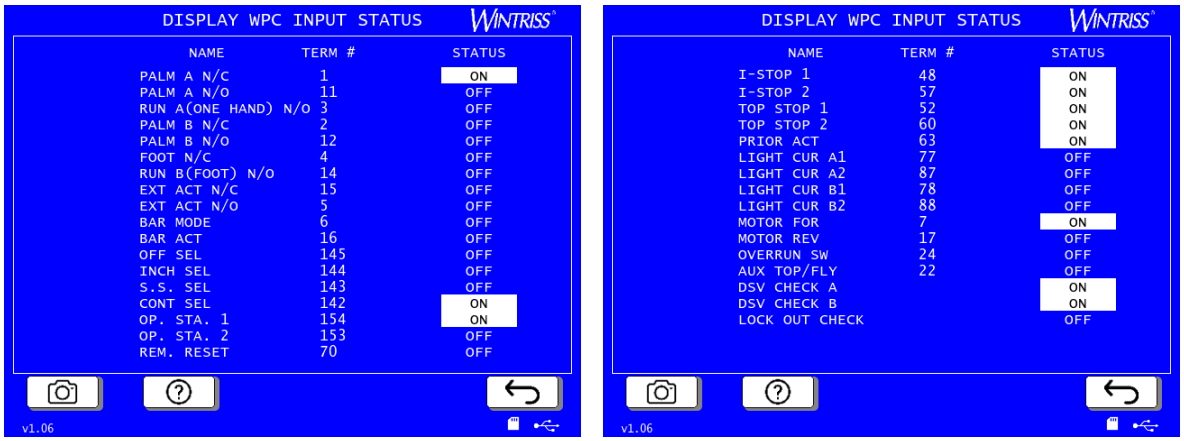


Figure 3-17. Display WPC APEX Input Status Screens

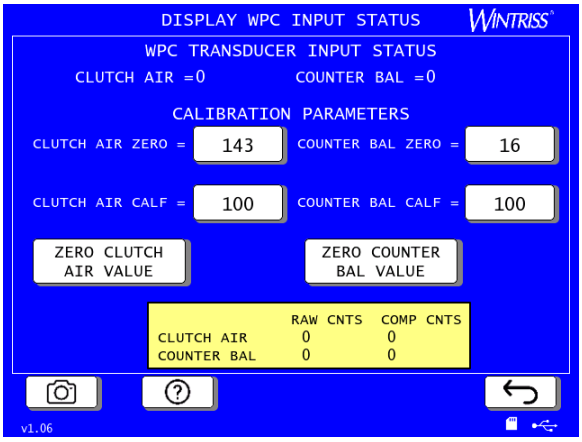


Figure 3-18. Display WPC APEX Input Status Screens, Continued

INSTALLED OPTIONS

(INITIALIZATION MENU – INSTALLED OPTIONS)

NOTICE

APEX SERIAL NUMBER AND FIRMWARE REVISIONS ON INSTALLED OPTION SCREEN

In addition to showing installed options, the Installed Options screen also shows the WPC APEX serial number and the firmware versions for the display and control boards, as indicated in Figure 3-19.

To see the installed options, follow the instructions below.

1. On the Main Program menu, Figure 3-1, press INITIALIZATION MENU. The WPC initialization menu appears,

2. On the WPC Initialization menu, Figure 3-2, press PREV or NEXT to access additional choices. Press INSTALLED OPTIONS, The installed options screen appears, Figure 3-19. It lists the unit serial number and installed boards, including display, control, and option boards, if any.

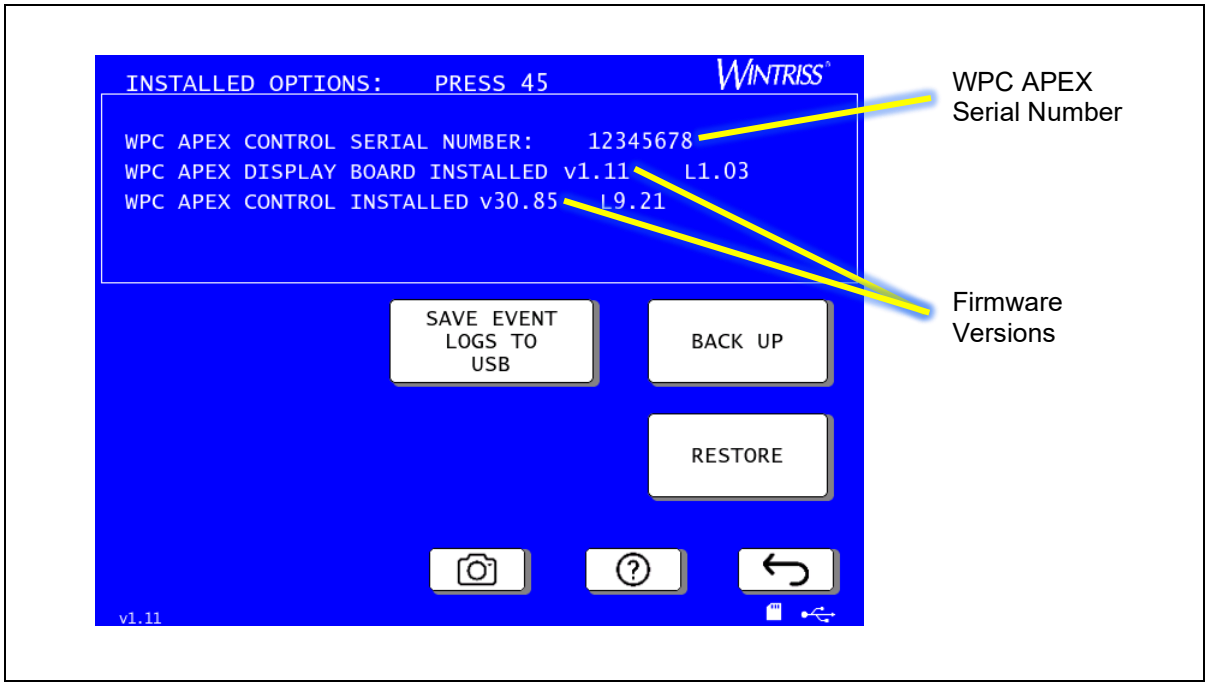


Figure 3-19. Installed Options Screen

SAVE EVENT LOGS TO USB

(INITIALIZATION MENU – INSTALLED OPTIONS – SAVE EVENT LOGS TO USB)

1. On the Main Program menu, Figure 3-1, press INITIALIZATION MENU. The WPC Initialization menu appears,
2. On the WPC Initialization menu, Figure 3-2, press PREV or NEXT to access additional choices. Press INSTALLED OPTIONS, The installed options screen appears, Figure 3-19.
3. Press SAVE EVENT LOGS TO USB. The event logs are saved to the USB drive and the messages in Figure 3-20 appear.

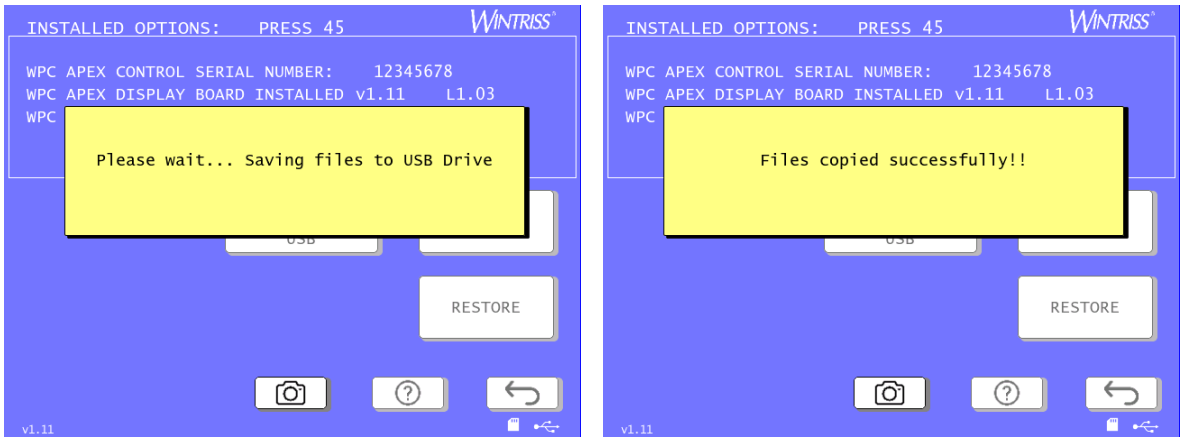


Figure 3-20. Saving Event Log, In-Process and Completed

BACK UP AND RESTORE

Backing Up Data to a USB Drive

(INITIALIZATION MENU – INSTALLED OPTIONS – BACK UP)

To back up WPC APEX initialization and program data to a USB drive, follow these instructions. To restore this data, see the next section, *Restoring Data from a USB Backup.*

1. Plug a USB drive into the plug on the display board.
2. On the Main Program menu, Figure 3-1, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
3. On the WPC Initialization menu, press PREV or NEXT to access additional choices. Press INSTALLED OPTIONS. The installed options screen appears, Figure 3-19.
4. Press BACK UP. WPC APEX backs up data to the USB drive.
5. Remove the USB drive and keep it in a safe place for later restoring the data if necessary.

Restoring Data from a USB Backup

(INITIALIZATION MENU – INSTALLED OPTIONS – RESTORE)

To restore WPC APEX initialization and program data from a USB drive backup you previously made, follow these instructions. To back up this data, see the previous section, *Backing Up Data to a USB Drive.*

1. Plug the backup USB drive into the plug on the display board.
2. On the Main Program menu, Figure 3-1, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
3. On the WPC Initialization menu, press PREV or NEXT to access additional choices. Press INSTALLED OPTIONS, The installed options screen appears, Figure 3-19.
4. Press RESTORE. WPC APEX restores the data from the USB drive.

SELECT LANGUAGE (Optional)

(INITIALIZATION MENU – INSTALLED OPTIONS – SELECT LANGUAGE)

1. To change language on the display, if you have the language option installed, navigate to the installed options screen, Figure 3-19, and press SELECT LANGUAGE. The select language screen appears, Figure 3-21.
2. Press the language you want. The language on the display changes to the one you selected.

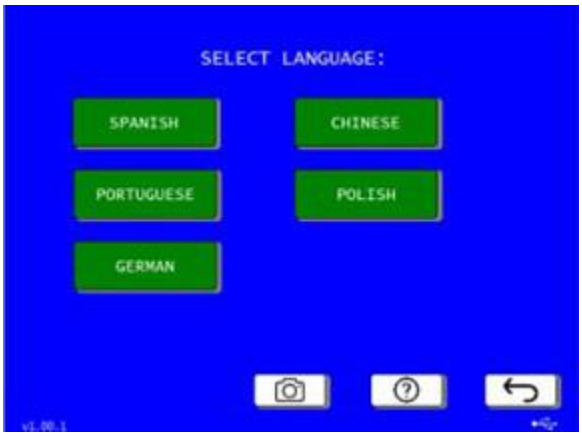


Figure 3-21. Select Language Screen

PRESS NAME

(INITIALIZATION MENU – PRESS NAME)

1. On the Main Program menu, Figure 3-1, page 114, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
2. On the WPC Initialization menu press PREV or NEXT to access additional choices. Press PRESS NAME. The onscreen keyboard appears.
3. Enter the press name. Press ✓ (checkmark) to accept the name. Press ✕ to cancel.

SELECT CAM NAMES

(INITIALIZATION MENU – SELECT CAM NAMES)

You can provide default cam names for cam channels 1 through 4 by following the instructions below. Later, when programming a tool, you can enter a different cam name for a cam channel.

NOTICE

NAMES FOR CAM CHANNELS 5 THROUGH 8 ARE FACTORY SET

Cam channels 5 through 8 are set at the factory with the following names:

- Cam Channel 5: Counter Output
- Cam Channel 6: Zero Cam Output
- Cam Channel 7: N/U (not used)
- Cam Channel 8: Off Mode Output

To program any of these cam channels with different names, see SET PROGRAM CAMS, page 135.

1. On the Main Program menu, Figure 3-1, page 114, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
2. Press PREV or NEXT to access additional choices. Press SELECT CAM NAMES. The cam channel name menu appears, Figure 3-22.

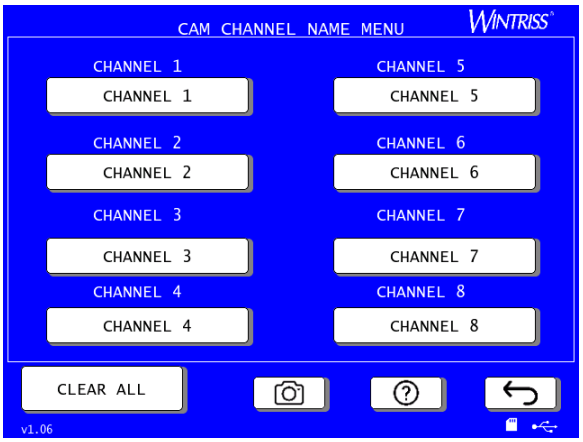


Figure 3-22. Cam Channel Name Menu

3. Press the entry box below a channel number. The on-screen keyboard appears.
4. Enter the name for that channel and press ✓ (checkmark) to accept the name and return to the previous menu. Press ✕ to cancel.
5. Repeat steps 3 and 4 to name other channels.
6. If you want to delete all the cam channel names, press CLEAR ALL.

ESTOP CODES PROG

(PROGRAM MENU – INITIALIZATION MENU – ESTOP CODES PROG)

1. On the Main Program menu, Figure 3-1, page 114, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
2. On the WPC Initialization menu press PREV or NEXT to access additional choices. Press ESTOP CODES PROG. The E STOP code program screen appears.

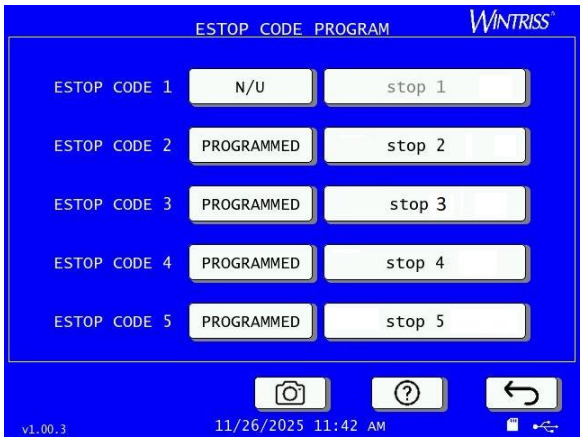


Figure 3-23. ESTOP Code Program Screen

3. For the ESTOP code you want to program, press the entry box to the far right. The on-screen keyboard appears.
4. Enter the desired ESTOP code. Press ✓ (checkmark) to accept the code and return to the ESTOP Code Program screen. Press ✕ to cancel.
5. Repeat steps 3 and 4 for each of the ESTOP codes you want to program. Press the Back button to exit.

SENSOR ENABLE MODE

(PROG – INITIALIZATION MENU – SENSOR ENABLE MODE)

To set how sensors are enabled, follow the instructions below. Your enable options are:

- MANUAL ENABLE. When this option is selected, sensors are not automatically re-enabled after the press is restarted following a setup or other procedure in which the sensors have been temporarily disabled. You must enable or disable sensors manually in Program and Run modes; see *SENSOR ENABLE/DISABLE & STATUS*, page 216.
- AUTO BY TOOL. When this option is selected, APEX automatically re-enables all sensors programmed for a specific tool whenever the press is restarted. You specify in Program mode the number of strokes to allow after the press starts before APEX re-enables all sensors for the tool.

1. On the Main Program menu, Figure 3-1, page 114, press INITIALIZATION MENU. The WPC Initialization menu appears, Figure 3-2.
2. On the WPC Initialization menu press PREV or NEXT to access additional choices. Press SENSOR ENABLE MODE. The Sensor Enable Mode screen appears, Figure 3-24.

Figure 3-24. Sensor Enable Mode Screen

3. Press the blue button next to Sensor Enable Mode. It toggles between AUTO BY TOOL and MANUAL ENABLE. When it shows the mode you want, press the Back button to save and exit.

RESOLVER ZERO

(PROG – INITIALIZATION MENU – RESOLVER ZERO)

To zero the resolver, follow the instructions in *Zeroing the Resolver*, page 115.

SET CLOCK

(PROG – INITIALIZATION MENU – SET CLOCK)

1. On the WPC Initialization menu, Figure 3-2, page 114, press NEXT or PREV to see additional menu items. Press SET CLOCK. The DATE AND TIME screen appears, Figure 3-25.

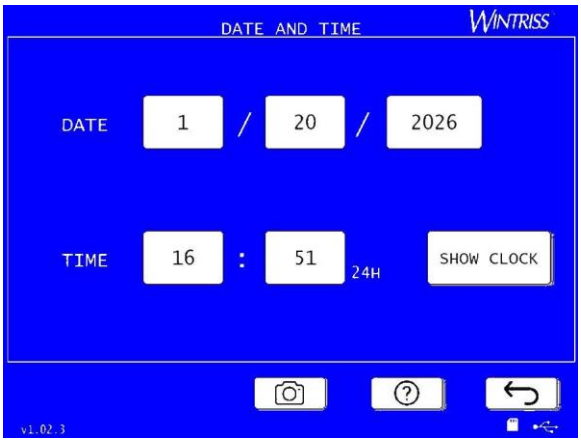


Figure 3-25. Date and Time Screen

2. Press the date and time entry boxes one at a time. On the on-screen numeric keypad that appears, enter the value. Press ✓ (checkmark) to accept. Press ✕ to cancel.

3. When you finish entering the date and time, press the Back button to save and return to the previous screen.

Show Date and Time on the Display

To show or hide the date and time at the bottom of the display, follow these steps:

1. Navigate to the DATE AND TIME screen, Figure 3-25, as described in the previous section.

2. The button to the right of the TIME toggles between SHOW CLOCK and HIDE CLOCK. Press it repeatedly until the setting you want appears.

3. Press the Back button to save and return to the previous screen.

SET PROGRAM CAMS

(PROG – INITIALIZATION MENU – SET PROGRAM CAMS)

Cam channels 5 through 8 are factory set as shown in Table 3-4. They cannot be programmed unless you follow the instructions below to make them programmable. Then you can program them for each individual tool.

Table 3-4. Cam Channels 5 Through 8 Factory-Set Names

Channel Number	Factory-Set Name
Cam Channel 5	Counter output
Cam Channel 6	Zero cam output
Cam Channel 7	Not used (N/U)
Cam Channel 8	Off mode output

For cam channels 5 through 8, if you do not use the function named, you can make any or all of the channels programmable. Follow the instructions below.

1. On the WPC Initialization Menu screen, Figure 3-2, press SET PROGRAM CAMS. The Set Programmable Cams screen appears, Figure 3-26.

Figure 3-26. Cam Channel 5-8 Defaults (left) and Channel 6 Changed to "Programmable"

2. Press the white box next to the cam channel you want to make programmable once or more. The box label toggles between DEFAULT and PROGRAMMABLE. When the desired setting shows, go on to set a different cam channel or press the Back button to exit.

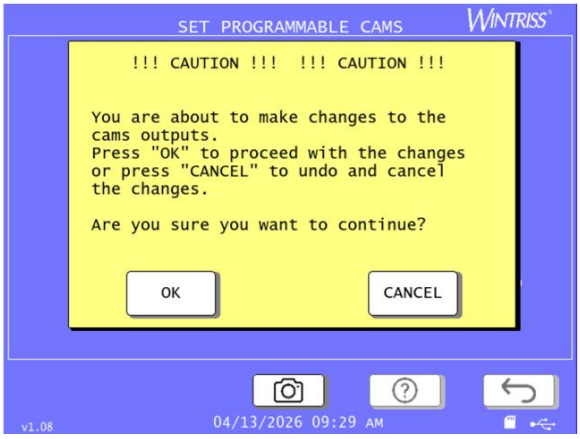


Figure 3-27. Cam Change Caution

When a window similar to Figure 3-27 appears, press OK to continue or CANCEL to exit. The cam channel(s) you changed indicate "Programmable" on the Set Programmable Cams screen, Figure 3-28.

Figure 3-28. Cam Channels 6 and 7 Programmable

SECURITY ACCESS

(INITIALIZATION MENU – SECURITY ACCESS)

The SECURITY ACCESS item on the WPC Initialization menu, Figure 3-2, allows you to control user access to WPC APEX operating modes and settings. You set user access on the Security Access Menu, Figure 3-29.

For most items on the Security Access Menu, you can specify three types of access:

- PROGRAM AND RUN MODES. Allows users to change settings in both Program and Run modes. This access type is the least secure.
- PROGRAM MODE ONLY. Allows users to change settings only in Program mode (i.e., when the PROG/RUN keyswitch is in the PROG position). To prevent users from entering the Program mode, you should remove the PROG/RUN keys with the key switch in the RUN position.
- PASSWORD REQUIRED. Allows users to change settings only after they have entered a password. This access type is the most secure.

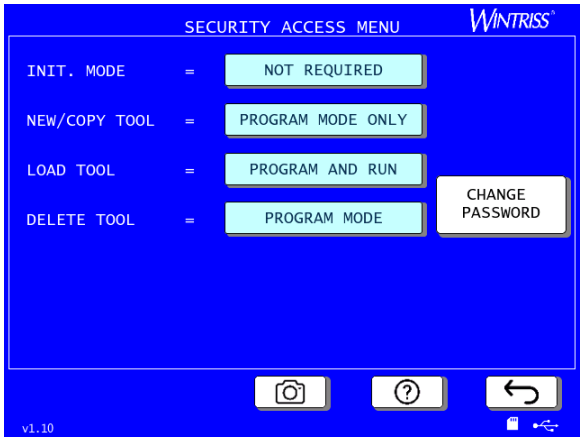


Figure 3-29. Security Access Menu

NOTICE

IF YOU FORGET OR DO NOT KNOW YOUR PASSWORD(S)

Call Wintriss Tech. Support at the telephone number on the cover of this manual. Give the Tech. Support person the 5-digit number from the "Enter your password" window, Figure 3-30.

When you attempt to access a menu that is password-protected, the on-screen numeric keypad appears, Figure 3-30. Enter the appropriate password. Press ✓ (checkmark) to accept. Press ✕ to cancel. The password-protected menu appears.

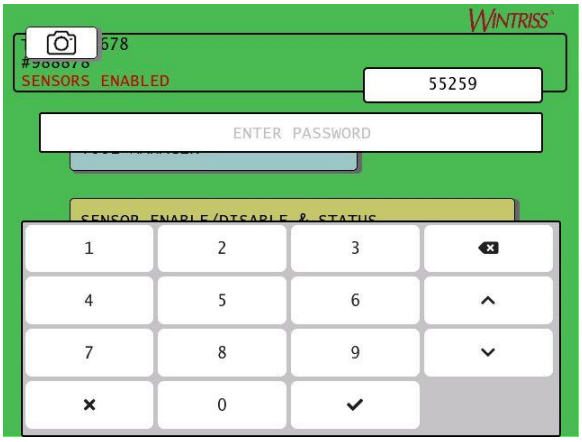


Figure 3-30. Enter Password Window

Setting Security Access

NOTICE

DO NOT ENABLE INIT. PASSWORD UNTIL YOU HAVE CHECKED YOUR PASSWORDS

Field upgraded WPC APEX units may have different passwords than those listed in this manual. If you do not know the Initialization password and change the INIT. PASSWORD item to MUST BE USED, you will not be able to access the Initialization Menu.

To make security access settings, do the following:

1. Select SECURITY ACCESS on the Initialization Menu, Figure 3-2, page 114. The Security Access Menu appears, Figure 3-29, above. Note that the factory settings allow all actions to be performed in both Program and Run modes.
2. To change the security access for an item, repeatedly press the box to the right of the item. The different types of access appear (see Table 3-5). Stop when the one you want displays.
3. Repeat this for each of the items you want to set.
4. Press the Back button to save and exit.

Table 3-5. Security Access Settings

Security Access Menu Item	Security Access Settings
INIT MODE	MUST BE USED NOT REQUIRED
NEW/COPY TOOL	PROGRAM MODE ONLY PASSWORD REQUIRED
LOAD TOOL #	PROGRAM AND RUN PROGRAM MODE ONLY PASSWORD REQUIRED
DELETE TOOL #	PROGRAM MODE PASSWORD REQUIRED

Changing Passwords

WPC APEX allows you to set two different passwords:

- **Init. Password** – Provides access to the Initialization Menu
- **General Password** – Provides access to all WPC APEX menus and settings unless the following specific password is also required

NOTICE

DEFAULT PASSWORDS

Your WPC APEX comes from the factory with the passwords set to the default password "1234." If you have upgraded your WPC APEX in the field, your passwords may be different.

To change passwords, perform the following steps:

1. On the Security Access Menu, Figure 3-29, page 137, press CHANGE PASSWORD to display the Set Passwords Menu, Figure 3-31

Figure 3-31. Security Access Set Passwords Menu

2. Press the entry box labeled as the password you want to change. The on-screen numeric keypad appears.

3. Key in the new password. Press ✓ (checkmark) to accept. Press ✕ to cancel.

TDC/BDC ADJUST SET

(INITIALIZATION MENU – SELECT PROGRAM CAMS)

Two global programmable cam outputs are included on WPC APEX. Table 3-6 shows the cam output connection locations and the default ON/OFF settings. If you want to change the TDC or BDC cam on or off angles, follow the instructions below.

Table 3-6. TDC and BDC Cams Connections and Default Settings

	TDC	BDC
Output Connection on TB112	Pin 526	Pin 525
Default ON/OFF Settings	ON 350° OFF 10°	ON 170° OFF 190°

Adjusting TDC and BDC Timing

1. On the WPC Initialization menu, Figure 3-2, page 114, press TDC/BDC ADJUST SET. The TDC and BDC Adjust Settings screen appears, Figure 3-32.

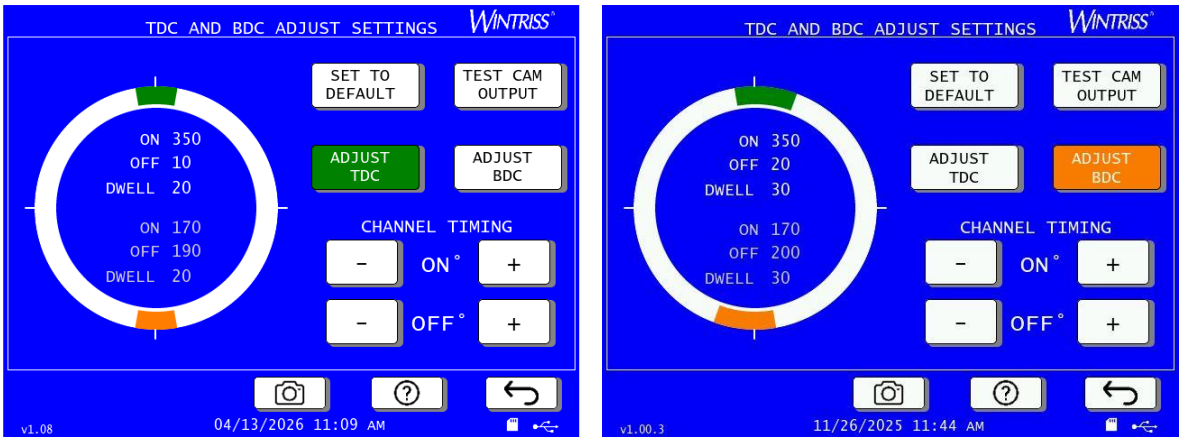


Figure 3-32. TDC and BDC Adjust Settings Screen

2. To adjust TDC, press ADJUST TDC. The button turns green, which corresponds to the green timing arc on the crank angle circle. (For BDC, the button turns orange, corresponding to the orange timing arc.)
3. Press the + and – buttons labelled ON to change the ON timing.
4. Press the + and – buttons labelled OFF to change the OFF timing.
5. To adjust BDC, press ADJUST BDC and repeat steps 4 and 5 to adjust ON and OFF timing.
6. When done, press the Back button.

Setting TDC or BDC to Its Default Timing

To reset the TDC or BDC cam timing to the default values, Table 3-6, page 140, do the following.

On the TDC and BDC Adjust Settings screen, Figure 3-32, previous section,

- For TDC: Press ADJUST TDC. Then, press SET TO DEFAULT.
- For BDC: Press ADJUST BDC. Then, press SET TO DEFAULT.

Testing TDC and BDC Cam Outputs

⚠ DANGER

EQUIPMENT STARTING UNEXPECTEDLY

Ancillary equipment may operate when this cam output is tested.

Warn all personnel to stand clear.

Failure to comply with these instructions will result in death or serious injury.

1. On the TDC and BDC Adjust Settings screen, Figure 3-32 (previous section), press TEST CAM OUTPUT. The test screen appears, Figure 3-33.
2. Press the button for the cam you want to test, TDC or BDC.
3. Press the ON and OFF buttons to turn the cam on and off. The ON or OFF button turns black when you press it. Observe the cam output and ensure it goes on and off as indicated.

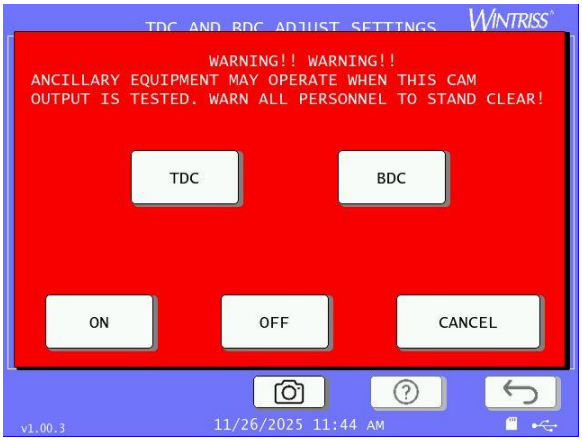


Figure 3-33. Test TDC and BDC Cam Outputs Screen

Installing the Overrun Sensor Magnet

⚠ WARNING

INCORRECT INSTALLATION OF OVERRUN LIMIT SWITCH

Ensure that the overrun sensor magnet is installed at a proper location if you have Two-hand Control without light curtains, or light curtains with muting. Proper installation of the magnet ensures that if the Top stop output relay fails, a hazardous situation will not occur on the downstroke. The magnet must be mounted as close as possible to the Top Stop "On" Angle (see Table 3-7, page 148).

Failure to comply with these instructions could result in death or serious injury.

NOTICE

The terms *Top Stop Angle* and *Top Stop "On" Angle* are used interchangeably.

This section shows you how to install the magnet that, with the overrun sensor, makes up the overrun limit switch. You should already have installed the overrun sensor (see *Installing the Overrun Limit*

Switch, page 70). The overrun limit switch enables WPC APEX to monitor operation of the resolver and to stop the press whenever the resolver fails to work properly.

The press cannot be run in Continuous or Single Stroke unless the overrun sensor and magnet are installed and working correctly. Without the overrun limit switch, you can only operate the press in Inch.

The angle at which you mount the magnet depends on the Top Stop "On" Angle. You must first determine and set the Top Stop "On" Angle before installing the magnet.

The following sections show you how to

1. Determine the correct angle at which to mount the overrun magnet, based on your Top-stop "On" Angle calculation
2. Determine the setting for option switches based on your Top-stop "On" Angle calculations
3. Install the magnet

Determining and Setting the Top Stop "On" Angle

NOTICE

The terms *Top Stop Angle* and *Top Stop "On" Angle* are used interchangeably.

NOTICE

For a variable-speed press, you need to determine the latest Top Stop "On" Angle, which is the angle at which the press top stops at its slowest speed and with the shortest stopping angle/time.

NOTICE

BEFORE YOU SET THE TOP STOP "ON" ANGLE, MAKE SURE THAT

- The press ram has been mechanically set to top dead center (TDC) (see NOTICE, "PRESS MUST BE AT TDC," on page 48)
- The resolver has been aligned as close as possible to TDC (i.e., 0° ±2°) (see *Mounting the Resolver*, page 73)
- The resolver has been zeroed (see *Zeroing the Resolver*, page 115).

To determine the angle at which the Top Stop command is given on your press and change the Top Stop "On" Angle setting on the WPC APEX display, follow the steps in the sections below.

NOTICE

In addition to setting the Top Stop "On" Angle in preparation for mounting the overrun sensor magnet (see *Determining and Setting the Top Stop* "On" Angle, page 143), you can periodically adjust the Top Stop "On" Angle to ensure that your press stops at top dead center. Each time you adjust the Top Stop "On" Angle, you must verify that your overrun sensor is still set properly.

Temporarily Setting the Top Stop "On" Angle to 211°

NOTICE

The Top Stop "On" Angle is set at the factory to 211°. If you have not changed the default setting, you can skip this section.

Before stroking the press to determine the correct Top Stop "On" Angle, temporarily set it to 211° as follows.

1. Turn the PROG/RUN key switch to RUN. The Main Run Menu appears, Figure 3-34.

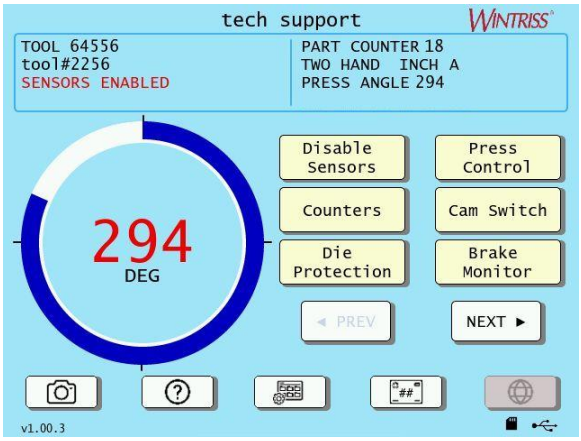


Figure 3-34. Main Run Menu

2. Press the Press Control button. The Press Control Screen appears, Figure 3-35.

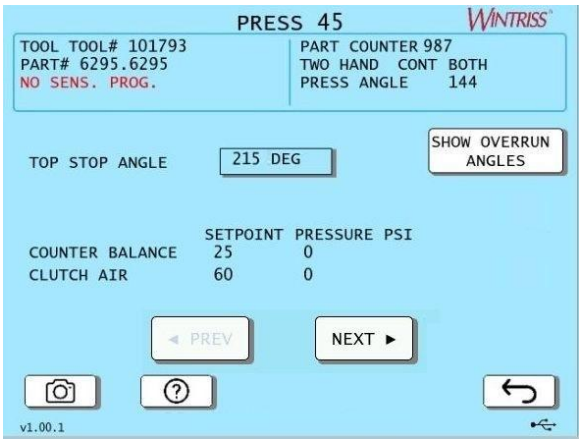


Figure 3-35. Press Control Screen

3. Press the entry box next to TOP STOP ANGLE. The on-screen numeric keypad appears.
4. Key in 211. Press ✓ to accept and return to the previous screen. Continue to the next section.

Testing to Determine the Required Top Stop "On" Angle

1. Make sure the following WPC APEX options are set as follows before determining the correct Top Stop "On" Angle:
   - Pin #13 on the WPC APEX Main Processor board should not be wired in order to disable Top stop in Inch (see *Top Stop Bypass (Top Stop in* Inch Disabled), page 233).
   - Micro-inch (if you have wired this feature) should be disabled (see *Wiring Micro-inch*, page 81).

- Option switch 4 on switch block S101 should be set to OFF to disable the Auto Compensated Top Stop (ACTS) feature (see *Switch 4 (S101) – Enabling Auto Compensated Top Stop (ACTS)*, page 173). ACTS compensates for increases in press speed by adjusting the Top stop "On" Angle backward (i.e., decreasing the "on" angle).

2. Turn the PROG/RUN key switch to RUN.
3. Power down, then power up the WPC APEX to enable the settings made in step 1.
4. Clear the Lockout Error message on the WPC APEX display by turning the Stroke Select switch to OFF, then to INCH.
5. With the press still in Inch mode and the main motor on, press and hold both Run/Inch palm buttons until the press top-stops.
6. Note the crankshaft angle shown inside the crank angle clock on the Main Run Menu screen, Figure 3-36, which in this example shows 294 degrees.

Displayed angle = _____°

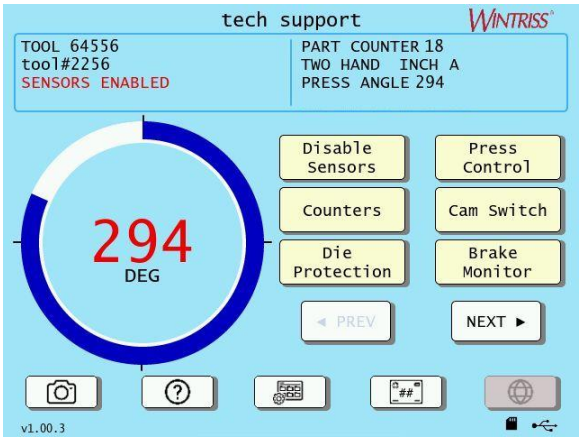


Figure 3-36. Main Run Menu

Calculating the Top Stop "On" Angle

Calculate the Top Stop "On" Angle based on the crankshaft angle displayed and noted in step 7, above:

1. Subtract the displayed angle from 360°
2. Add the result to the default 211° Top Stop "On" Angle setting. This is your calculated Top Stop "On" Angle.

EXAMPLE

If the displayed angle is 294°, you would calculate as follows:

360° – 294° = 66°

211° + 66° = 277°

You would set the Top Stop "On" Angle to 277°.

3. Proceed to the next section to enter this new Top Stop "On" Angle and test to make sure it is correct.

NOTICE

WHEN DETERMINING TOP STOP "ON" ANGLE

Remember that the Top stop angle has an internal dwell of 20°. The internal Top stop timing turns off 20° after the Top stop angle that you set. This internal Top stop timing must turn off before the overrun limit switch turns on. If the Top stop timing and the overrun limit switch are "on" simultaneously, an "80 series" error code displays (see *Top Stop and Overrun Setting* Faults, page 263).

Setting and Testing the New Top Stop "On" Angle

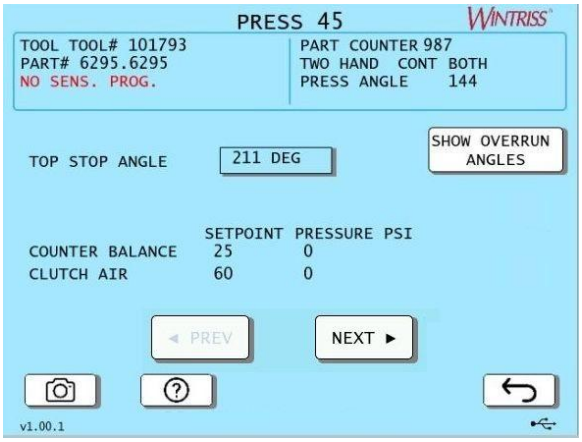


Figure 3-37. Press Control Screen

1. On the Press Control screen, Figure 3-37, press the entry box next to TOP STOP ANGLE. The on-screen numeric keypad appears.
2. Press the entry box for Top Stop Angle. The on-screen numeric keypad appears.

Figure 3-38. On-Screen Numeric Keypad

3. Enter the Top Stop "On" Angle you calculated. Press ✓ (checkmark) to accept.
4. Press the Back button repeatedly to return to the Main Run menu.
5. To show that the Top Stop "On" Angle you set is correct, perform at least five top stops following the procedure in steps 3 through 7 under *Testing to Determine the Required Top Stop "On" Angle*, page 144. The press should Top Stop consistently at 359° or 0° (TDC). If it does not, adjust the Top Stop "On" Angle by one or two degrees and re-test to show the press does Top Stop consistently at or close to TDC.

NOTICE

After you finish setting the Top Stop "On" Angle, check and reset appropriately the options settings you made in step 1 of *Determining the Top Stop "On" Angle*, page 151.

Where to Install the Overrun Sensor Magnet

NOTICE

WHEN DETERMINING TOP STOP "ON" ANGLE

Remember that the Top stop angle has an internal dwell of 20°. The internal Top stop timing turns off 20° after the Top stop angle that you set. This internal Top stop timing must turn off before the overrun limit switch turns on. If the Top stop timing and the overrun limit switch are "on" simultaneously, an "80 series" error code displays (see *Top Stop and Overrun Setting* Faults, page 263).

NOTICE

Two magnet mounting angles are provided for each range of Top Stop "On" Angle. This is necessary due to the tolerances involved. Use one magnet mounting angle and if that does not work well, try the other one.

Find the two options for the angle at which to install the overrun sensor magnet, referring to Table 3-7, below.

1. Locate the cell in the first row, Top Stop "On" Angle," that shows the range of angles within which your calculated Top Stop "On" Angle falls.

2. Move down one row in that column to find the two possible mounting angles for the overrun sensor magnet. If you wish, you can use the "Your Settings" column in the second row to record the mounting angle you choose.

Table 3-7. Overrun Test Angle Setting Table

Top Stop "On" Angle	< 240°		241° to 270°		271° to 300°		> 301°		Your Settings
Magnet Mounting Angle	270°	285°	300°	315°	330°	345°	359°	15°	
S101 Switch 1 Setting	ON	ON	ON	ON	OFF	OFF	OFF	OFF	
S101 Switch 2 Setting	ON	ON	OFF	OFF	ON	ON	OFF	OFF	
S102 Switch 8 Setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON	

Example

In this example, you calculated in *Calculating the Top Stop "On" Angle*, page 145, that your Top Stop "On" Angle is 277°, which falls in the 271° to 300° column in Table 3-7. The correct mounting angle for the overrun sensor magnet would be either 330° or 345°. See Figure 3-39.

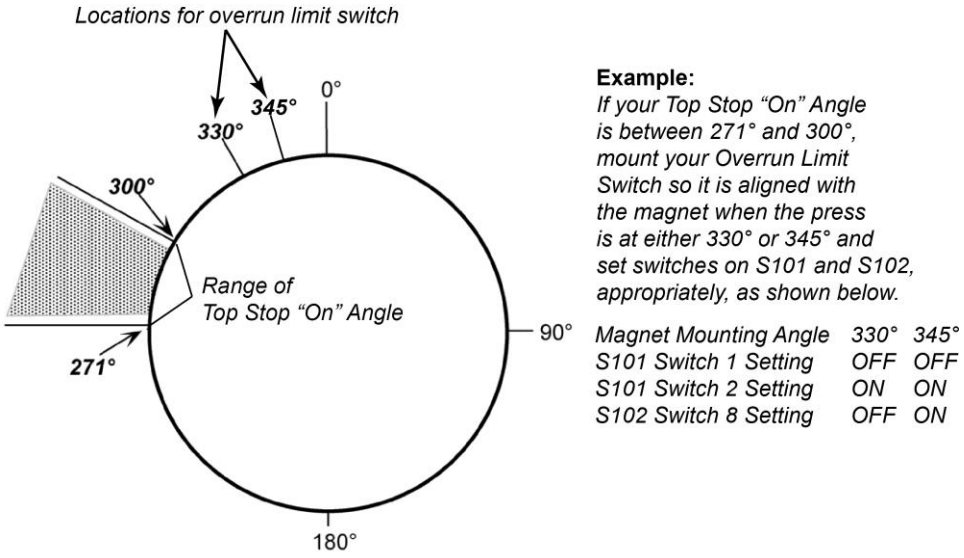


Figure 3-39. Setting Overrun Timing: Example

3. From Table 3-7, your calculated Top Stop "On" Angle, and the Magnet Mounting Angle you chose find the settings for option switches 1 and 2 on S101 and option switch 8 on S102 (see also *Switches 1 and 2 on S101 and Switch 8 on S102 – Top Stop "On" Angle Range*, page 170). WPC APEX uses these settings to determine at what angle to begin the overrun sensor closure test, which is used to make sure that the overrun limit switch closes at the same angle on every stroke.

Example

You calculated in *Calculating the Top Stop "On" Angle*, page 145, that your Top Stop "On" Angle is 277°, which falls in the 271° to 300° column in Table 3-2.

- If you choose 330° as the Magnet Mounting Angle, set the option switches on S101 and S102 as follows:
  S101 Switch 1 OFF S101 Switch 2 ON S102 Switch 8 OFF
- If you choose 345° as the Magnet Mounting Angle, set the option switches on S101 and S102 as follows:
  S101 Switch 1 OFF S101 Switch 2 ON S102 Switch 8 ON

4. As shown in the example, set option switches 1 and 2 on S101 and switch 8 on S102 on the WPC APEX Main Processor board to the positions you found in Table 3-7. See *Switches 1 and 2 on S101 and Switch 8 on S102 – Top Stop "On" Angle Range*, page 170, for instructions.

5. Power down WPC APEX, then power it back up to enable the new option switch settings.

Mounting the Overrun Sensor Magnet

To mount the overrun sensor magnet, perform the following steps:

1. With the press in Inch mode, press the Run/Inch palm buttons until you have inched the press to the overrun sensor magnet position you determined in step 11 of the previous procedure.

2. Using double-sided foam tape or other means, temporarily install the magnet directly beneath the overrun sensor, referring to *Mounting the Overrun Sensor Switch*, page 71.

3. Check to make sure that the "Overrun Limit Switch" LED in LED Group 6 on the WPC APEX Main Processor board is lit, referring to the LED map in Figure 3-54, page 178 for location. This LED illuminates when the overrun magnetic switch senses the magnet.

NOTICE

Make sure that the overrun limit switch has enough dwell to provide an adequate signal at high speeds. Optimally, the magnet should actuate the switch for 15° to 25°. The larger the diameter of the shaft on which the magnet is mounted, the shorter the dwell (see Figure 2-13, page 71). The ideal shaft diameter is 4-6 in.

4. Run the press in Inch mode for about 4 strokes, viewing the overrun sensor's On/Off angles on each stroke. To display the On/Off angles, press SHOW OVERRUN ANGLES. A popup window shows the overrun sensor on and off angles, Figure 3-41.

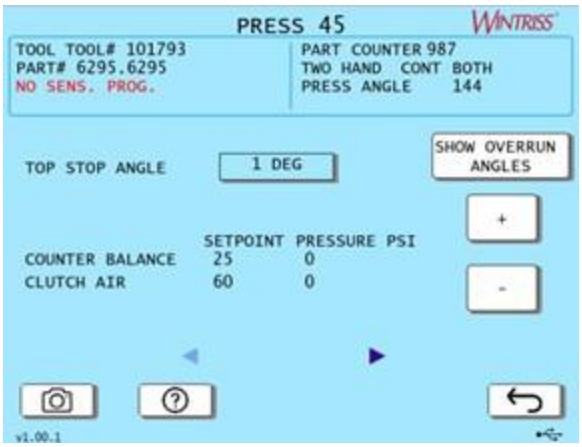


Figure 3-40. Top Stop Angle (Show Overrun Angles)

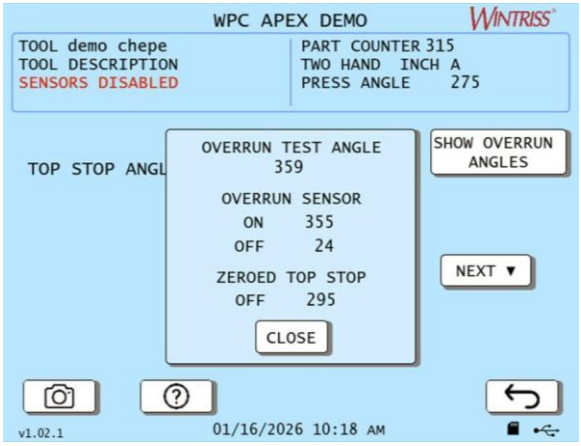


Figure 3-41. WPC APEX Display Showing Overrun Sensor "On" Angle

Example

If you mounted the magnet at an angle of 330°, the magnetic switch might come "ON" at, say, 321°, and go "OFF" at 337°.

5. Run the press in Inch, Single Stroke, and Continuous modes for about 4 strokes each.

- If the press cycles in every mode without a fault, go to step 6.
- If a fault occurs while you are cycling the press in one or more modes, do the following:
  - If a fault occurs on the first stroke after you install the magnet, press OK and execute another stroke.
  - If the fault code is between F80 and F89 (or H80 through H89), there is a problem with the overrun sensor. Re-check your installation of the magnetic switch (see *Installing the Overrun Limit Switch*, page 70) and the magnet (see step 2) and your settings for option switches (see steps 12 and 13 of *Determining and Setting the Top Stop* "On" Angle, page 143), then press the OK and run the press again for a few strokes. If the press stops and the same error code displays, call Wintriss Tech. Support.

- If another fault code displays, look up the fault in Chapter 6 and follow the suggested remedy. After correcting the problem, press OK and run the press again for a few strokes, checking for faults. If you need assistance, contact Wintriss Tech. Support.
- If you are unable to successfully run the press using the first Magnet Mounting Angle you chose, try the mounting it at the other Magnet Mounting Angle given in Table 3-7, page 148, for the range containing the Top Stop "On" Angle. Go back to *Where to Install the Overrun Sensor Magnet*, page 147, and complete the procedures using the other Magnet Mounting Angle.

⚠ WARNING

INJURY FROM MAGNETS THAT DETACH

Mount the magnets with the brass screws provided. Plastic screws or adhesive could fail, causing the magnets to become dangerous projectiles, especially on high-speed presses.

Failure to comply with these instructions could result in death or serious injury.

NOTICE

Use a brass or other non-ferrous screw to mount the magnet. Steel or ferrous screws can cause false signals.

6. Permanently install the magnet in the position in which you temporarily mounted it in step 2. Drill and tap a hole, using a No. 36 drill and 6-32 tap. Mount the magnet, plastic side up, with the 6-32 brass screw provided.

Adjusting the Top Stop Angle

⚠ DANGER

INCORRECT OVERRUN SENSOR ANGLE AFTER RESETTING TOP STOP ANGLE

Re-check the overrun sensor angle setting whenever you change the Top stop angle, and reset the overrun sensor setting if necessary.

Failure to comply with these instructions will result in death or serious injury.

In addition to setting the Top Stop "On" Angle preparatory to mounting the overrun sensor magnet (see *Determining and Setting the Top Stop* "On" Angle, page 143), you can periodically adjust the Top stop angle to ensure that your press stops at top dead center. Each time you adjust the Top stop angle, you must verify that your overrun sensor is still set properly. To adjust the Top Stop "On" Angle, do the following:

1. Determine how many degrees you need to increase or decrease the Top Stop "On" Angle.
   - If the press top stops after 0°, you should decrease the Top stop angle by the number of degrees beyond 0° that the ram stops at the slowest press operating speed.
   - If the press top stops before 0°, you should increase the Top stop >On" angle by the number of degrees before 0° that the ram stops at the slowest press operating speed.
2. Install the heaviest upper die in your press. Adjust the counterbalance for ram weight (if the press has a counterbalance).

3. With WPC APEX powered up and the press in Inch mode, set the Top Stop "On" Angle you determined in step 1.

   a. In the Main Run Menu, press Press Control.
   b. On the screen that appears, press the entry box next to TOP STOP ANGLE.
   c. On the on-screen numeric keypad, enter the new Top Stop "On" Angle and press ✓ (checkmark) to accept.
   d. Press the Back button to return to the Main Run menu.

4. Run the press in Continuous mode by turning the Mode Select switch to "CONT." Check the press speed shown on the display.

   If your press does not run in Continuous, initiate a stroke with the Mode Select switch set to "SINGLE."

5. When the press reaches normal operating speed in Continuous or the Auto Carry-up Angle is passed in Single Stroke, Top Stop the press. Note the crankshaft angle shown on the display.

   - If the Top Stop angle is 0° ±2°, go to step 6.
   - If the Top Stop angle is more than 2° beyond 0°, repeat steps 3 through 6 until the press top stops at 0° ±2°.

NOTICE

CHECK OVERRUN SENSOR SETTING WHEN YOU CHANGE TOP STOP ANGLE

Check and reset the overrun sensor angle when you reset the Top stop angle. Remember that the Top stop angle has an internal dwell of 20°. The internal Top stop timing turns off 20° after the Top stop angle that you set. This internal Top stop timing must turn off before the overrun sensor turns on. If the Top stop timing and the overrun sensor are "on" simultaneously, an "80 series" error code will display (see *Top Stop and Overrun Setting Faults,* page 263).

6. Repeat step 5 at least five times to make sure that the press top stops at 0° ±2°.

Setting the Auto Carry-up Angle

⚠ DANGER

INCORRECT OVERRUN SENSOR ANGLE AFTER RESETTING TOP STOP ANGLE

Re-check the overrun sensor angle setting whenever you change the Top-stop angle, and reset the overrun sensor setting if necessary.

Failure to comply with these instructions will result in death or serious injury.

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE THE ENCLOSURE

Turn off and disconnect power from the WPC APEX clutch/brake control, the press, and any other machinery it is connected to before working inside the enclosure. This includes power to the press motor.

Failure to comply with these instructions could result in death or serious injury.

NOTICE

The following Auto Carry-up function also applies to Foot Control. For more information about using Foot Control for Single Stroke mode, see *Single Stroke, Foot* Operation, page 238 and *Enabling Foot Control in a Foot Switch*, page 172.

WPC APEX's Auto Carry-up feature enables the press to complete a stroke whenever the operator releases the Run/Inch palm buttons after the ram has passed the Auto Carry-up Angle.

The default Auto Carry-up Angle is factory-set to 149° if your WPC APEX has light curtain firmware and to 170° if you have non-light curtain firmware. If you change the auto carry-up default setting, you must use an angle value that is at or past the crankshaft angle at which the pinch point openings on the press have closed to less than 1/4 in. (6 mm). Pinch points that are less than 1/4 in. (6 mm) are considered non-hazardous to the operator.

With large presses where the stroke is long and press speed is slow, you must ensure that the operator cannot release the buttons and reach the pinch point before it closes. This applies only when Two-hand Control is used to safeguard the point of operation (without light curtain) and only if any opening allowing access to the pinch point is 1/4 in. (6 mm) or larger.

Set the Auto Carry-up Angle at the correct value to protect the operator. To do so, perform the following steps:

Figure 3-42. Press Control Parameter Menu

1. In the Press Control Parameter menu, Figure 3-42, press the entry box next to CARRYUP ANGLE. The on-screen numeric keypad appears.
2. Enter the desired Auto Carry-up Angle. Press ✓ (checkmark) to accept.

Running Brake Monitor Tests and Making Settings

⚠ DANGER

INCORRECT STOP TIME LIMIT

Determine the Stopping Time and set the Stop time Limit at a value that reflects the actual Stopping Time of your press. Use the stop time measured in the 90° stop time test to calculate the safety distance.

Failure to comply with these instructions will result in death or serious injury.

WPC APEX's built-in brake monitor constantly checks the condition of the brake by measuring the Stopping Time each time the press top stops. Stopping time is the amount of time in milliseconds that it takes the crankshaft to stop once the Dual Safety Valve (DSV) has been de-energized.

The Stop time Limit is a setting used by the brake monitor to determine when the press needs to be stopped to alert the operator to the need for brake repair. The Stop time Limit is factory-set to 500 milliseconds.

Determining the Stopping Time of Your Press

First, you need to determine the Stopping Time of your press at Top stop. To do so, perform the following steps:

1. Install the heaviest upper die in your press. Adjust the counterbalance for ram weight (if the press has a counterbalance).
2. Turn power on to the WPC APEX, and observe the current crankshaft angle shown on the display.
3. Run the press in Continuous mode by turning the Mode Select switch to "CONT" and check the press speed shown on the display.

   If your press does not run in Continuous, initiate a stroke with the Mode Select switch set to "SINGLE."
4. When the press reaches normal operating speed in Continuous or the Auto Carry-up Angle is passed in Single Stroke, Top stop the press.

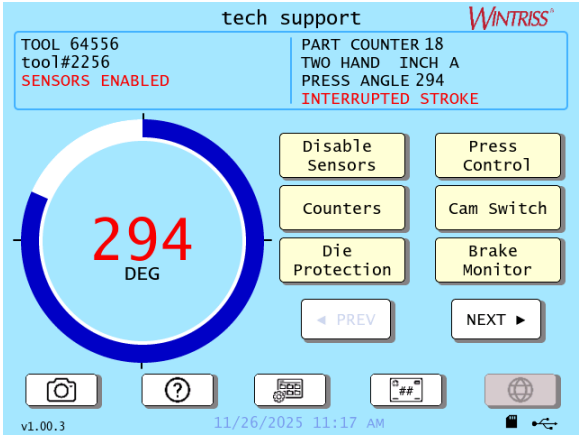


Figure 3-43. Main Run Screen

5. On the main Run screen, press Brake Monitor. The Press Control Stop Time screen appears, Figure 3-44.

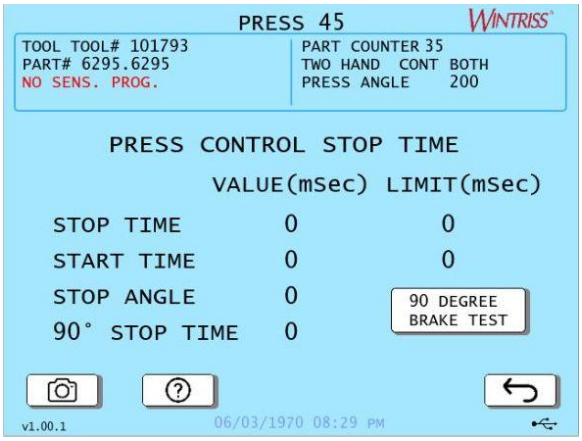


Figure 3-44. Press Control Stop Time Screen

6. Observe the reading on the display. This is the Stopping Time of your press in milliseconds.

7. Run this test at least five more times, recording the highest test reading. This is the Stopping Time value you use to set the Stop-time Limit.

Calculating the Stop-time Limit

Once you know the actual Stopping Time of your press at Top stop, you can calculate the Stop-time Limit, the setting WPC APEX uses to determine when to alert the operator to the need for brake service. The Stop-time Limit is calculated by adding a percentage factor, abbreviated "Tbm" (i.e., Time, brake monitor), to the Stopping Time.

stop-time limit = stopping time + Tbm

The Tbm value represents normal wear on the brake and ensures that WPC APEX does not stop the press for small increases in Stopping Time. The minimum value that you can set is 10 mS.

NOTICE

STOP-TIME LIMIT ADJUSTMENT: ADD 10% FOR OLD BRAKES, 20% FOR NEW BRAKES

The rule of thumb for calculating the Stop-time Limit is to add 20% to the Stopping Time of your press if your brakes are new, 10% if your brakes are old. The reasoning is that since Stopping Time should be shorter with new brakes, the 20% value should yield roughly the same Stop-time Limit for new brakes as the 10% value yields for old brakes.

Stop-time Limit Calculation Examples

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

Take 10% of 207 (0.10 x 207 = 20.7; round it up to 21)
Add 21 to 207 (207 + 21 = 228)
228 mS is the calculated stop-time limit.

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

Take 20% of 175 (0.20 x 175 = 35)
Add 35 to 175 (175 + 35 = 210)
210 mS is the calculated stop-time limit.

Viewing and Setting Stop Time and Start Time Limits

(INITIALIZATION – PRESS CONTROL – PRESS PARAMETERS)

⚠ DANGER

INCORRECT SAFETY DISTANCE DUE TO INCORRECT STOP TIME

- Determine and enter the correct Stop-time Limit when you set up your WPC APEX.
- Perform a 90° Stop Test any time you change the Stop-time Limit of WPC APEX. (See Determining the 90° Stop Time, page 156.) Base the Stop-time Limit on the actual Stopping Time.
- Recalculate the safety distance based on the new Stop-time Limit and adjust or reinstall safeguarding devices according to the new safety distance (see *Calculating the Safety Distance*, page 159).

Failure to comply with these instructions will result in death or serious injury.

To set the stop time and start time limits, do the following:

1. On the WPC Initialization Menu, Figure 3-2, page 114, press PRESS PARAMETERS. The Press Control Parameter menu appears, Figure 3-13, page 124.
2. Press the entry box for STOP LIMIT. The on-screen numeric keypad appears.
3. Key in a value (maximum is 1000 milliseconds) and press ✓ (checkmark). You are returned to the Press Control Parameter menu displaying the value you entered.

The next time you start the press, WPC APEX will set the Start-time Limit to twice the Start Time measured on the first stroke.

Determining the 90° Stop Time

The 90° stop-time test is required to set the proper safety distance for personnel guarding devices including light curtains, Two-hand controls, and type-B movable barriers. The test is performed at the press's most critical stopping point– 90°– and provides the Ts + Tc value in the ANSI safety distance formula. If possible, run this test in Continuous mode (see next section). If your press does not have a Continuous setting, perform the test in Single Stroke as instructed in *Performing the 90° Stop Test (Single Stroke Mode)*, page 158.

Performing the 90° Stop Test (Continuous Mode)

⚠ DANGER

INCORRECT SAFETY DISTANCE DUE TO INCORRECT STOP TIME

- Perform a 90° Stop Test any time you change the Stop-time Limit of WPC APEX.
- Recalculate the safety distance based on the new Stop-time Limit and adjust or reinstall safeguarding devices according to the new safety distance (see *Calculating the Safety Distance*, page 159).

Failure to comply with these instructions will result in death or serious injury.

1. Install the heaviest upper die in your press. Adjust the counterbalance for ram weight if your press has a counterbalance.

2. Set the Stroke Select switch to "CONT," and start the press.

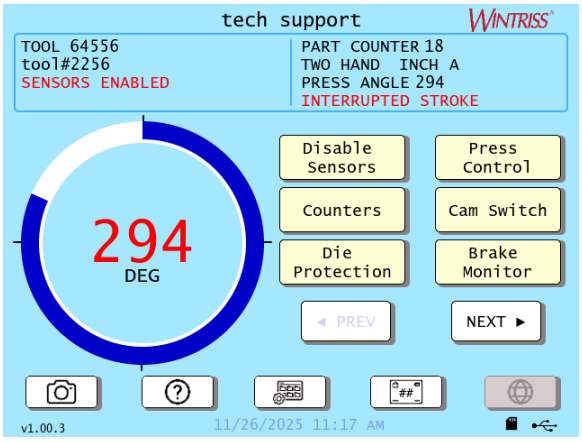


Figure 3-45. Main Run Screen

1. On the Main Run Screen, press Brake Monitor. The Press Control Stop Time screen appears,

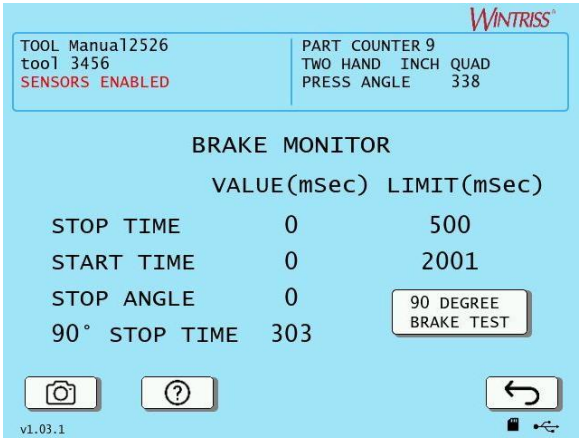


Figure 3-46. Brake Monitor Screen

2. Press the 90 DEGREE BRAKE TEST button. The button flashes red. Follow the on-screen instructions. The press strokes and performs a stop at 90°. The screen shows the values measured during the test.

NOTICE

To cancel the test, press Back arrow before starting the press.

NOTICE

The first time you run this test, the display shows a value of "0" (zero) until the test is completed. In subsequent tests, the display shows the Stopping Time measured in the last test.

3. When the press stops, record the value shown on the display.
4. Run the test 5 more times. Record the highest reading from all your tests to use as the Stop-time value when calculating the safety distance.

Performing the 90° Stop Test (Single Stroke Mode)

⚠ DANGER

INCORRECT SAFETY DISTANCE DUE TO INCORRECT STOP TIME

- Perform a 90° Stop Test any time you change the Stop-time Limit of WPC APEX.
- Recalculate the safety distance based on the new Stop-time Limit and adjust or reinstall safeguarding devices according to the new safety distance (see *Calculating the Safety Distance*, page 159).
- Run the 90° Stop Test in Continuous mode if your press can operate in Continuous. See the instructions in the previous section.

Failure to comply with these instructions will result in death or serious injury.

1. Install the heaviest upper die in your press. Adjust the counterbalance for ram weight if your press has a counterbalance.
2. Set the Stroke Select switch to "SINGLE."
3. On the Main Run Screen, Figure 3-43, previous section, press Brake Monitor. Brake Monitor screen appears, Figure 5-14. Press Control Stop Time Screen.

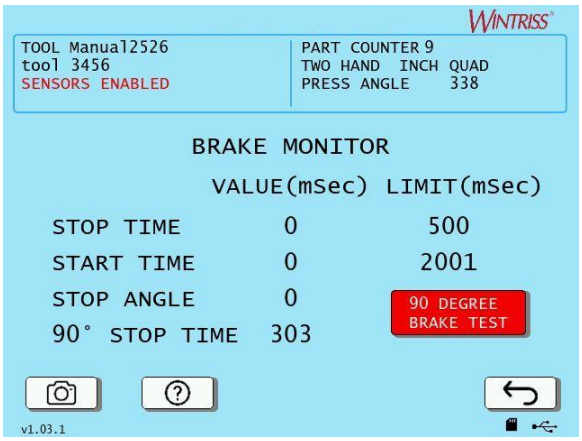


Figure 3-47. Brake Monitor Stop Time Test Screen

4. Press the 90 DEGREE BRAKE TEST button. It blinks RED.

NOTICE

To cancel the test, press the Back button before starting the press.

NOTICE

The first time you run this test, the display shows a value of "0" (zero) until the test is completed. In subsequent tests, the display shows the Stopping Time measured in the last test.

5. Press and hold the Run/Inch palm buttons to initiate a stroke. WPC APEX will stop the press when it reaches 90°.
6. When WPC APEX stops the press, record the value shown on the display.
7. Run the test 5 more times. Record the highest reading from all your tests to use as the Stop-time value in calculating the safety distance.

Calculating the Safety Distance

⚠ DANGER

PRESS MAY NOT STOP BEFORE OPERATOR REACHES PINCH POINT

- Calculate the safety distance according to the applicable safety regulations, the instructions in this chapter and in your light curtain user manual.
- Mount the Shadow light curtain heads at least the safety distance from the nearest pinch point or hazardous area of your press (see Figure 3-48, page 160).
- Mount your Two-hand Control at least the safety distance from the nearest pinch point or hazardous area of your press if you are using the Two-hand Control as a safety device.
- Mount your light curtain heads at least 7 1/2 in. (191 mm) from the nearest pinch point hazard, even if that is greater than the safety distance you calculate.

Failure to comply with these instructions will result in death or serious injury.

The "safety distance," as shown in Figure 3-48, is the distance from the pinch point (or hazardous area) of the press that Shadow light curtains must be mounted to allow enough time for Shadow to

react, and the press to stop, before the operator can penetrate the light curtain and reach the hazard. The “pinch point” is the area of the press where moving parts can cause injury.

If you have not installed light curtains and are using a Two-hand Control as a safety device, you must mount the Two-hand Control at least the safety distance from the pinch point.

The safety distance is calculated using a formula that incorporates the Stopping Time of your press as determined by the 90° stop-time test (see *Determining the 90° Stop Time*, page 156). You must mount your light curtains slightly beyond this calculated distance to ensure that they are able to stop the press before an operator’s hand reaches the hazardous area.

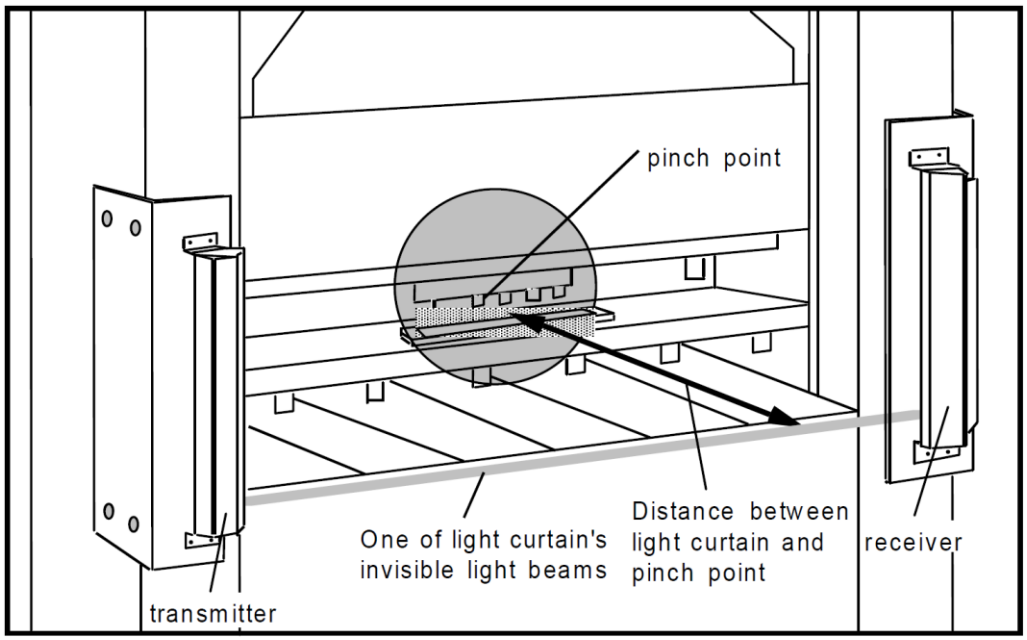


Figure 3-48. Safety Distance: Distance between Pinch Point and Light Curtain

ANSI and OSHA Safety Distance Formulas

⚠ DANGER

PRESS MAY NOT STOP BEFORE OPERATOR REACHES PINCH POINT

- Calculate the safety distance carefully according to the instructions below.
- Mount your light curtain heads at least the safety distance from the hazardous area. If a light curtain is too close to the hazard, there may not be enough time for the press to stop before the operator’s hand (or another object) reaches the hazard.
- Mount your Two-hand Control, if you are using it as a safety device, at least the safety distance from the hazardous area. If the Two-hand Control is too close to the hazard, there may not be enough time for the press to stop before the operator’s hand (or another object) reaches the hazard.
- Call Wintriss Tech. Support if you are not sure how to calculate the safety distance.

Failure to comply with these instructions will result in death or serious injury.

OSHA regulations and ANSI standards mandate that all machine safeguarding devices, including Shadow light curtains and Two-hand controls, be located at the correct safety distance from the pinch

point. OSHA regulation 1910.217 governs the mounting of infrared light curtains to protect mechanical power presses.

Wintriss, however, recommends that you use the formula contained in ANSI standard

B11.1-2009. This standard has been developed specifically for guarding of mechanical power presses, and the formula contained in B11.1-2009 represents a new consensus on the proper installation of light curtains. More variables are included in the ANSI than in the OSHA formula, and the ANSI calculation is, therefore, more precise.

For complete information on OSHA regulation 1910.217 and ANSI standards B11.1-2009 and B11.19-2003, see Appendix B, page 275.

OSHA and ANSI formulas are explained below. If you need additional assistance in calculating the safety distance, call Wintriss Tech. Support.

ANSI Safety Distance Formula

The ANSI B11.1 safety distance formula, which is recommended by Wintriss, is

$$Ds = K \times (Ts + Tc + Tr + Tbm) + Dpf$$

where

Ds is the ANSI safety distance in inches

K is the OSHA-recommended hand-speed constant of 63 inches per second

Ts is the stopping time of the press in seconds

Tc is the response time of the press control

Tr is the response time of the light curtain

Tbm is the additional stopping time of the press allowed by the brake monitor

Dpf is the depth penetration factor

The hand-speed constant indicates how far you could theoretically move your hand and arm in one second.

The Stopping Time of the press (Ts) is measured at approximately 90° of crankshaft rotation, or at maximum closing velocity. The response time of the press control (Tc), which is the time it takes for the control to activate the press's brake, is included in the result of the 90° stop-time test run on the WPC APEX (see *Determining the 90° Stop Time*, page 156). You can use the value generated by the 90° stop-time test for the variables Ts + Tc in the ANSI formula.

Response times Tr for Shadow light curtains are shown in Table 3-8.

Table 3-8. Shadow Light Curtain Response Time and Object Sensitivity

Shadow Model	Head Length *	Response Time	Object Sensitivity
Shadow V	12 in. to 24 in.	30 mS	1.25 in.
	36 in. and 48 in.	50 mS	
Shadow VI	6 in. to 24 in.	30 mS	1.25 in.
	30 in. to 48 in.	35 mS	

Shadow Model	Head Length *	Response Time	Object Sensitivity
	60 in.	40 mS	
Shadow VII	6 in. to 30 in.	20 mS	1.18 in.
	36 in. to 59 in.	23 mS	
	Up to 96 in.	28 mS	
	Up to 135 in.	32 mS	
Shadow 8	Up to 42 in.	23 mS	1.18 in.
	Up to 85 in.	32 mS	
	Up to 128 in.	41 mS	
	Up to 171 in.	50 mS	
	Up to 202 in.	59 mS	
Shadow 9	Standalone up to 31.5 in. (800 mm)	8mS	1.18 in.
	Standalone greater than 31.5 in. (800 mm)	13 mS	
	Cascaded up to 110 in. (2800 mm) combined	13 mS	
	Cascaded greater than 110 in. (2800 mm) combined	18 mS	

* Includes extensions/cascaded heads for Shadow VII, Shadow 8, and Shadow 9 models

Tbm is the additional time added to the Stopping Time of the press to allow for brake wear and is used to calculate the brake monitor's Stop-time Limit (see *Calculating the Stop-time Limit*, page 155). The Tbm value is usually calculated by multiplying the press's Stopping Time at Top-stop by a predetermined factor based on the age of the brakes. The factor for new brakes is 0.20 (i.e., 20%), that for old brakes 0.10 (i.e., 10%).

The depth penetration factor (Dpf) is a measure of how far an object, like an operator's hand, can move through the light curtain before the light curtain reacts. Dpf is related to the light curtain's object sensitivity, which is the smallest diameter object the light curtain can detect anywhere in its field.

Object sensitivity (S) for Shadow 9 is 1.18 in. (30 mm) with beam centers of 0.79 in. (20 mm). (See Table 3-8 for the object sensitivity of other Shadow models.) Based on S and ANSI B11.1-2009, **Dpf** = 3.07 in. (78 mm).

NOTICE

ANSI SAFETY DISTANCE FORMULA FOR USE WITH TWO-HAND CONTROL

The formula for safety distance when using a Two-hand Control as a safeguarding device is similar to the formula above, but does not include the response time of the light curtain nor the depth penetration factor. The following is the ANSI formula for calculating the safety distance for use with Two-hand controls:

Ds = K x (Ts + Tc + Tbm)

If you use a Two-hand Control as a safeguarding device, use this formula and perform the calculation in a fashion similar to that described for the light curtain formula.

Example: Calculating the Safety Distance for a Light Curtain Using the ANSI Formula

The ANSI formula is

Ds = K x (Ts + Tc + Tr + Tbm) + Dpf

The following value is a constant:

K = 63 inches per second

We will use the following values for the variables in the formula:

Ts + Tc = 0.190 sec. (result of the 90° stop-time test)

Tr = 0.018 sec. (response time of Shadow 9 with greater than 110 in. (2800 mm) combined length including cascaded heads

Tbm = 0.035 sec. (see Example 2 in Stop-time Limit Calculation Examples, page 155)

Dpf = 3.07

Putting these values into the formula, we get:

Ds = 63 x (0.190 + 0.018 + 0.035) + 3.07

Ds = (63 x 0.284) + 3.07

Ds = 15.309 + 3.07

Ds = 18.379 in.

The light curtain must be mounted 18.379 in. away from the pinch point.

When using the ANSI formula, be sure to perform the calculations in this order:

(1) Add **Ts + Tc + Tr + Tbm** first.

(2) Multiply the result by 63.

(3) Add this result to **Dpf**. This is **Ds**.

If you do not follow this order, your safety distance calculation will be incorrect.

OSHA Safety Distance Formula

⚠ DANGER

INCORRECT SAFETY DISTANCE

Use the Stopping Time measured in the 90° stop-time test. If you do not do this, the safety distance may be too small to allow the press to stop before someone reaches the hazardous area. See *Determining the 90° Stop Time*, page 156, for instructions on performing this test.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

Wintriss recommends that you use the American National Standards Institute (ANSI) formula for calculating safety distance because it contains more factors, allowing you to calculate the safety distance more precisely. The ANSI formula is explained in the previous section (see *ANSI Safety Distance Formula*, page 161).

The OSHA safety distance formula as specified in OSHA 1910.217 is

$$Ds = K \times Ts$$

where

Ds is the OSHA safety distance in inches

K is the OSHA-recommended hand-speed constant of 63 inches per second

Ts is the stopping time of the press in seconds

The hand-speed constant indicates how far you could theoretically move your hand and arm in one second.

The Stopping Time of the press (Ts) is measured at approximately 90° of crankshaft rotation, or at maximum closing velocity. In addition to the Stopping Time of the press, the OSHA Ts value must include the following factors:

- Response time of the press control that activates the brake
- Response time of the light curtain
- Additional time (Tbm) added to the Stopping Time to compensate for brake wear

The response time of the press control is included in the result of the 90° stop-time test run on the WPC APEX (see Determining the 90° Stop Time, page 156).

Response times of Shadow light curtains are shown in Table 3-8, page 161. Calculation of the Tbm value is described in *Calculating the Stop-time Limit*, page 155.

NOTICE

OSHA SAFETY DISTANCE FORMULA FOR USE WITH TWO-HAND CONTROL

The formula for safety distance when using a Two-hand Control as a safeguarding device is similar to the formula above, but does not include the response time of the light curtain. Use the following OSHA formula for calculating the safety distance for a Two-hand Control:

Ds = K x Ts

As indicated above, Ts must include all factors that are involved in stopping the press, including the response time of the press control but excluding the response time of the light curtain.

Example: Calculating the Safety Distance for a Light Curtain Using the OSHA Formula

The OSHA formula is

Ds = K x Ts

The following value is a constant:

K = 63 inches per second

We will use the following values for the variables in the formula:

Stopping time of press + response time of press control = 0.190 sec. (result of the 90° stop-time test)

Response time of light curtains =0.018 sec. (response time of Shadow 9 with greater than 110 in. (2800 mm) combined length including cascaded heads. See Table 3-8, page 161.

Additional time for brake wear = 0.035 sec. (see Example 2 in Stop-time Limit Calculation Examples, under *Calculating the Stop-time Limit*, page 155)

Putting these values into the formula, we get:

Ds = 63 x (0.190 + 0.018 + 0.035)

Ds = 63 x 0.243

Ds = 15.309 in.

The light curtain must be mounted 15.309 in. away from the pinch point.

When using the OSHA formula, be sure to do the calculations in this order:

(1) Add the factors involved in the stopping time Ts first.

(2) Multiply the result by 63. This is Ds.

If you do not follow this order, your safety distance calculation will be incorrect.

Adding to Safety Distance for Blanking Windows

When using fixed or floating blanking windows with your Shadow 9 light curtain, you must add a factor to the calculated safety distance for each beam that is blanked. This applies whether you use the ANSI or the OSHA formula. For a one-beam fixed blanking window, you must add 5.38 in. (136.6 mm) to the calculated safety distance (ANSI formula). You must add 5.76 in. (146.3 mm) to the calculated safety distance for a one-beam floating blanking window (ANSI formula). See your Shadow 9 user manual for further details about fixed and floating blanking.

If you are using another Shadow light curtain, refer the appropriate Shadow user manual for the additional distance factor to add to the safety distance formula for each blanking window.

Micro-Inch Settings

Normally, when the press is running in Inch (see *Top Stop in Inch*, page 232), the DSV is open and the clutch engaged as long as the Run/Inch palm buttons are depressed. When Micro-inch is enabled (see *Wiring Micro-inch*, page 81), the clutch remains engaged only for the length of time specified in the Micro-inch setting unless the operator releases the Run/Inch palm buttons before the period has expired.

Enabling and Disabling Micro-Inch

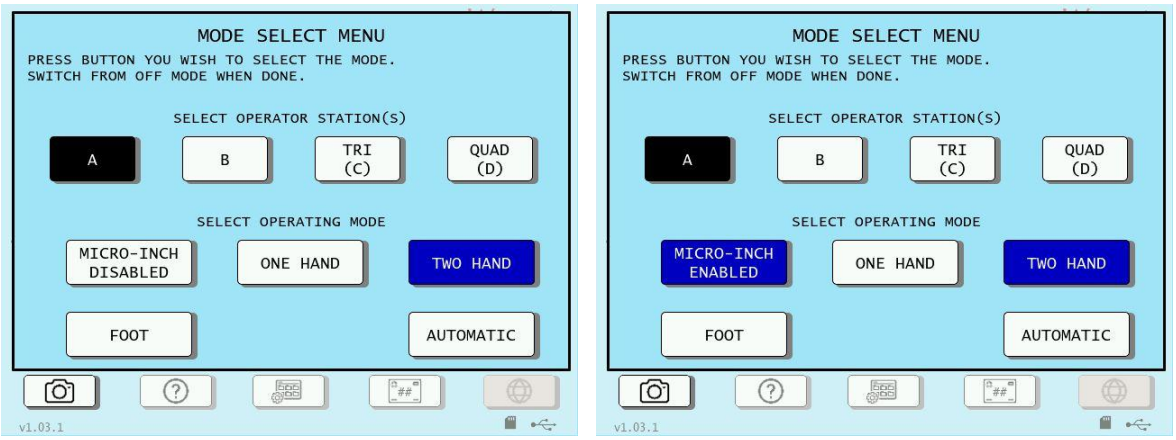


Figure 3-49. Mode Select Menu, with Micro-Inch Disabled (left) and Enabled (right)

Enable Micro-inch via the Micro-Inch Enable/Disable button on the Mode Select Menu, which appears whenever you are in Run mode and turn the stroke select key switch to OFF.

Press the Micro-Inch Enable/Disable button to show the condition you want; the button toggles between MICRO-INCH ENABLED and MICRO-INCH DISABLED.

Setting Micro-Inch Time and Angle

Micro-inch time is the length of time in milliseconds that the Dual Safety Valve is open when the operator presses the Run/Inch buttons on the Operator Station while the press is in Inch mode.

You can enter Micro-inch time values from 6 to 600 milliseconds. The default value, set at the factory, is 100 mS.

NOTICE

INTERRUPTED STROKE

If an interrupted stroke occurs when Micro-inch is enabled, WPC APEX automatically changes to Two-hand Maintained Single Stroke mode. See *Responding to an Interrupted Stroke*, page 222.

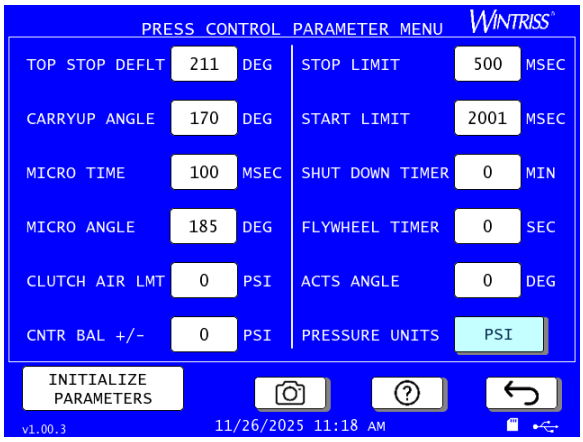


Figure 3-50. Press Control Parameters Menu

To set Micro-inch time and angle, do the following:

1. In the Press Control Parameters menu, Figure 3-50, press the entry box next to MICRO TIME. The on-screen numeric keypad appears.
2. Key in the value. Press ✓ (checkmark) to accept. Press ✕ to cancel.
3. In the Press Control Parameters menu press the entry box next to MICRO ANGLE. The on-screen numeric keypad appears.
4. Key in the value. Press ✓ (checkmark) to accept. Press ✕ to cancel.

Setting Clutch and Counterbalance Air Pressure Limits

NOTICE

If you set the counterbalance setpoint adjustment (CNTR BAL +/–) to zero (0) it will not appear on the Press Control Parameters screen in Program mode.

The CLUTCH AIR LIMIT and CNTRBAL +/- items on the Press Control Parameters menu allow you to establish a setpoint for Clutch Air Pressure and a setpoint range for Counterbalance Air Pressure. Instructions for installing sensors or switches to monitor Clutch and Counterbalance Air pressures are provided under *Installing Air Pressure Switches*, page 57.

The value you enter in the CLUTCH AIR LIMIT field sets the low limit for Clutch Air Pressure. If clutch pressure drops below the limit, an F45 fault displays on the display (see *Chapter 6 – Troubleshooting*).

You can view the current Counterbalance and Clutch Air Pressure setpoint and current pressure on the Press Control Parameters Screen in Run mode (Figure 3-51).

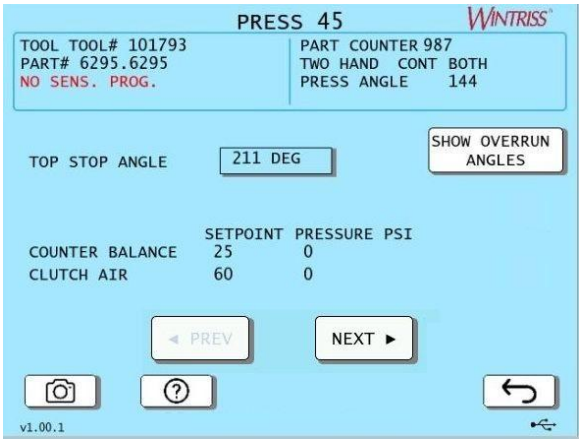


Figure 3-51. Press Control Parameters Screen (Run Mode)

To disable clutch pressure monitoring, in Initialization mode, enter zero (0) in the Clutch Air LMT field in the Press Control Parameters menu, Figure 3-50, previous section. When you do so, clutch pressure readings and the Low Limit setting are not displayed in Run mode.

The value you enter in the CNTR BAL +/- field sets the tolerance for the Counterbalance Setpoint you establish in Program mode (see Figure 4-28, page 216). For example, if you program a Counterbalance Setpoint of 40 psi and a Counterbalance Tolerance of +/- 5 psi, Counterbalance Air pressures must remain within a range of 35 to 45 psi whenever the press is at or passing through Top Dead Center (TDC). (Counterbalance pressure can vary outside this range at Bottom Dead Center (BDC)). If the counterbalance pressure falls outside the tolerance you set, an F46 fault appears on the display.

You can view the current Counterbalance Air Pressure and Counterbalance Setpoint on the Tool screen in Run mode (see *Viewing Press Control Settings*, page 227).

To disable counterbalance pressure monitoring, enter zero (0) in the CNTR BAL +/- field in the Initialization Menu. When you do so, the CNTR BAL SETPOINT field will not appear on the Press Control Parameters screen in Program mode, and counterbalance pressure readings and the Counterbalance Setpoint will not display in Run mode.

Setting Press Option Switches

⚠ DANGER

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE THE ENCLOSURE

Turn off and disconnect power from WPC APEX and from the machinery it is connected to before making any wiring connections or settings inside the enclosure. This includes power to the machine control and motor.

Failure to comply with these instructions could result in death or serious injury.

NOTICE

CYCLE POWER AFTER CHANGING OPTION SWITCH SETTINGS

Whenever you change an option switch setting, you must power down the WPC APEX and power it back up again in order to enable the new setting. If you do not cycle power, the previous switch setting will remain in effect.

Two switch blocks are provided on the WPC APEX Main Processor board that you can use to set various operating parameters for your presses. The two switch blocks, S101 and S102, are located on the processor board as shown in Figure 1-8, page 41, in the lower left quadrant. Note that S102 is to the left of S101. The following sections describe how to make the appropriate settings on these two switch blocks.

On S102, only switches 5 through 8 are active. Switches 7 and 8 on S102 are used in combination with switches on S101, as described below.

NOTICE

Many WPC APEX option switch settings are different from previous WPC models.
For example, switches 1 through 4 on switch block S102 are not used.

Making Settings on Switch Blocks S101 and S102

This section shows you how to make settings on the switch blocks (for their location, see Figure 3-53). All eight switches on each block are factory-set to the OFF position. To set a switch to ON, as in Figure 3-52, push up on the switch with a small screwdriver or your fingernail.

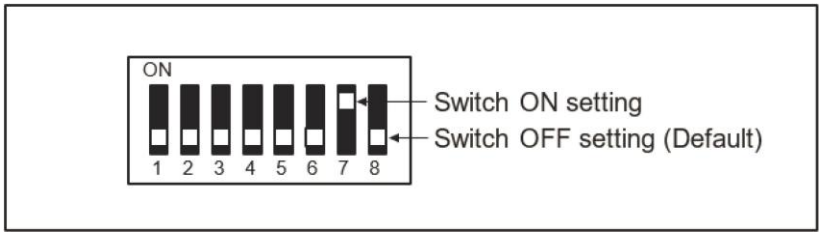


Figure 3-52. S102 and S101 Switch OFF and ON Settings

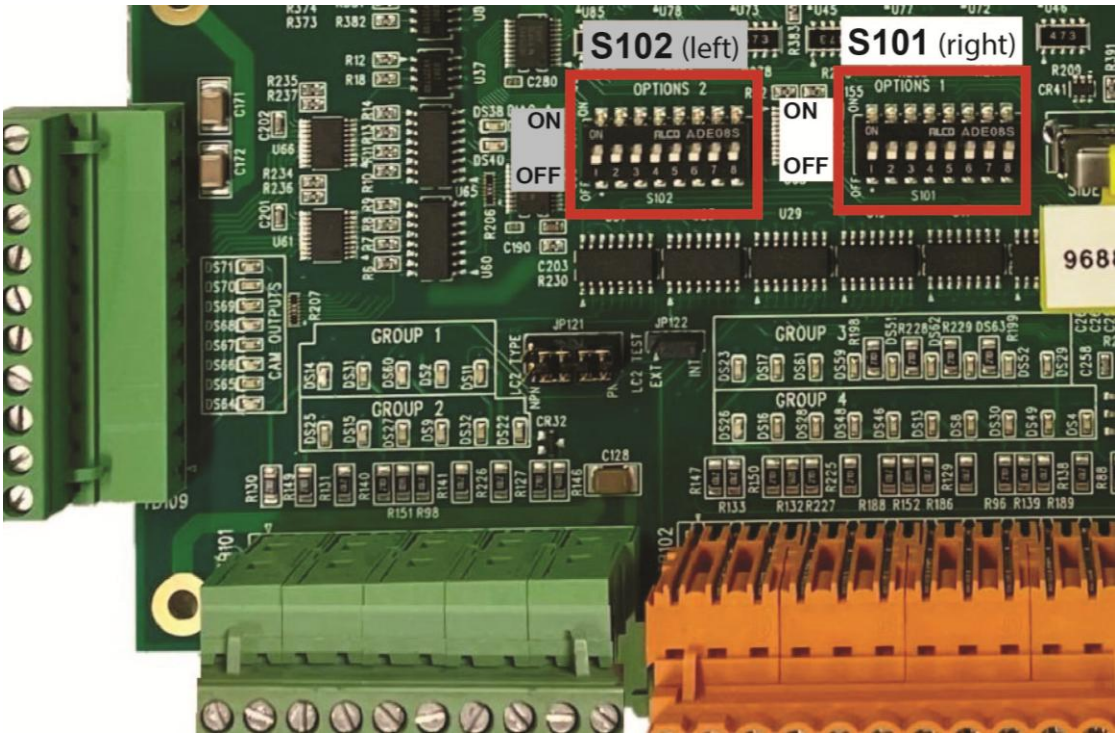


Figure 3-53. Locations of Option Switch Blocks S101 and S102

Switches 1 and 2 on S101 and Switch 8 on S102 – Top Stop "On" Angle Range

Options switches 1 and 2 on switch block S101 and switch 8 on S102 control the range of angles within which the Top stop "On" Angle falls (see *Installing the Overrun Sensor Magnet*, page 142). WPC APEX uses these switch settings to determine at what angle to begin the overrun sensor closure test, which is used to make sure that the overrun limit switch closes at the same angle on every stroke. Settings for option switches are shown in Table 3-9. (See also *Installing the Overrun Sensor Magnet,* page 142 and subsequent sections.)

Table 3-9. Overrun Test Angle Setting Table

Top stop Angle	< 240°		241° to 270°		271° to 300°		> 301°		Your Settings
Magnet Mounting Angle	270°	285°	300°	315°	330°	345°	359°	15°	
S101 Switch 1 Setting	ON	ON	ON	ON	OFF	OFF	OFF	OFF	
S101 Switch 2 Setting	ON	ON	OFF	OFF	ON	ON	OFF	OFF	
S102 Switch 8 Setting	OFF	ON	OFF	ON	OFF	ON	OFF	ON	

Switch 3 (S101) – One-hand Control and Foot Switch Settings

When you have optional One-hand/Two-hand/Foot firmware, option switch 3 on S101 provides settings for a One-hand Control or Foot Switch. Switch 3 on S101 enables Light Curtain Break mode in a One-hand Control when the Mode Select switch is set to "1 HAND." Switch 3 enables either Foot Trip or Foot Control in a Foot Switch when the Mode Select switch is set to "FOOT."

Enabling Light Curtain Break Mode in a One-hand Control

When the Mode Select switch is set to "1 HAND," switch 3 (S101) controls the conditions under which a One-hand Control (see *Installing a One-hand Control*, page 88) is active, as shown in Table 3-10.

When switch 3 (S101) is set to OFF, the One-hand Control is continuously active, allowing you to initiate a stroke any time you push the One-hand Control switch.

When switch 3 (S101) is set to ON, the One-hand Control is active only during the window within which the operator breaks the light curtain to feed a part and for eight seconds after his hand has cleared the light curtain. This condition is called Light Curtain Break mode. If the operator presses the switch after this window has expired, the press will not start. The light curtain must be broken again before the next stroke can be initiated.

Table 3-10. Setting Switch 3 (S101): Enable Light Curtain Break Mode

Mode	Switch 3 (S101) Setting	Description of Operation	NOTES
ONE HAND MODE	OFF	NORMAL OPERATION	**One-hand Control Functionality**: Normal Operation (Default). One-hand control is always active. Stroke can be initiated at any time by pressing switch. • Stroke can be initiated in INCH and SS mode. • In S.S., stroke is initiated and auto carries to the top stop angle once auto carry-up angle is reached. • If try to run in any other mode, such as Continuous, Automatic, etc. F23(Illegal Mode Displays)
	ON	LIGHT CURTAIN BREAK MODE	**One-hand Control Functionality:** Light Curtain Break Mode. One-hand Control is active only during window between initial breaking of light curtain and 8 seconds after light curtain is cleared. • In S.S. Mode, One Hand is active only during window between initial breaking of light and 8 seconds after light curtain is cleared. • PRIOR ACT lamp turns ON after light curtain enables one hand and goes off after time out period. • If try to run in any other mode, such as Continuous, Automatic, etc. F23(Illegal Mode Displays)

Enabling Foot Control in a Foot Switch

When the Mode Select switch is set to "FOOT," switch 3 (S101) controls how the Foot Switch must be activated in order to initiate and complete a stroke, as shown in Table 3-11.

- Switch 3 (S101) Foot Switch settings apply only to Single Stroke operation.
- When switch 3 (S101) is set to OFF, the Foot Switch is in Foot Trip mode, which requires only that the operator depress the Foot Switch, without holding it down, to initiate and complete a stroke.
- When switch 3 (S101) is set to ON, the Foot Switch is in Foot Control mode, which requires that the operator depress and hold down the Foot Switch through the Auto Carry-up Angle in order to complete a stroke. If the Foot Switch is released before the Auto Carry-up Angle, WPC APEX issues an Immediate stop command to the press.

Table 3-11. Setting Switch 3 (S101): Enable Foot Control

Mode	Switch 3 (S101) Setting	Description of Operation	NOTES
FOOT MODE	OFF	NORMAL OPERATION	**Foot Switch Functionality:** Normal operation–Foot Trip (Default). When operator depresses Foot Switch, press strokes. • Stroke can be initiated in SS and Continuous mode. Interrupted stroke is first cleared in two hand mode only • In S.S. stroke is initiated and acts as trip mode and auto carries to the top stop angle • In Continuous mode, Stroke is only initiated after PRIOR ACT has been pressed. Then acts as trip mode and auto carries to the top stop angle • If try to run in any other mode, such as Continuous, Automatic, etc. F23 (Illegal Mode Displays)
	ON	FOOT CONTROL MODE	**Foot Switch Functionality:** Enables Foot Control. Operator must depress and hold down Foot Switch until the press has passed the Auto Carry-up Angle in order to execute a stroke. • Stroke can be initiated in SS and Continuous mode • Interrupted stroke is first cleared in two hand mode only • In S.S. stroke, FOOT SW must be pressed until the press has passed the Auto Carry-Up Angle. • In Continuous mode, Stroke is only initiated after PRIOR ACT has been pressed. Then acts as trip mode and auto carries to the top stop angle • If try to run in any other mode, such as Continuous, Automatic, etc. F23 (Illegal Mode Displays)

Switch 4 (S101) – Enabling Auto Compensated Top Stop (ACTS)

When you have Auto Compensated Top Stop (ACTS) firmware, switch 4 controls enabling of the ACTS feature (see Table 3-7). ACTS is a WPC APEX option that adjusts the Top Stop "On" Angle to an earlier point in the stroke to compensate for increases in press speed.

ACTS is designed specifically for variable-speed presses. As the speed of the press increases, the stopping angle increases, pushing the point at which the press actually top stops past 360°, or TDC. ACTS senses when the press has not stopped at TDC and compensates for this, lengthening the stopping angle by moving the Top Stop Angle back an equivalent number of degrees. The Top Stop Angle cannot be adjusted backward beyond 211°, the factory setting.

Adjustment of the Top Stop Angle always lags behind press speed changes because ACTS requires several Top Stops to fine tune its settings.

If you use the ACTS feature, it is critical that you set the Stop-time Limit on your brake monitor correctly so that you have advance warning of the need for brake maintenance. Since increases in stopping angle may be due to brake wear rather than to speed changes, ACTS may increase the difficulty of detecting brake problems unless back-up systems are in place.

When switch 4 is set to OFF, ACTS is disabled and the press operates normally. When switch 4 is set to ON, the ACTS feature is enabled, allowing the Top Stop angle to be adjusted as press speed increases.

Table 3-12. Setting Switch 4 (S101): Enabling ACTS

Setting	ACTS Functionality
OFF	Normal operation (Default). ACTS disabled.
ON	ACTS enabled. Top-stop angle is retarded as speed of the press increases.

Switch 5 (S101) – Prior Act Time for Automatic Stroke Modes

Switch 5 on S101 controls the Prior Act time for Automatic Single Stroke and Automatic Continuous On-demand operating modes if one or both of these options have been installed on your press (see Table 3-13). The Prior Act time is the interval within which the activating signal from the feed device or robot must be received in order to initiate a stroke.

When switch 5 (S101) is set to OFF, its default setting, the activating signal must be received within a 30-second window for Automatic Single Stroke and a 1-minute window for Automatic Continuous On-demand. When switch 5 (S101) is set to ON, the window increases to 5 minutes for Automatic Single Stroke and 10 minutes for Automatic Continuous On-demand.

Wiring instructions for Automatic Single Stroke are provided in *Wiring Automatic Single* Stroke, page 93. Operating instructions for Automatic Single Stroke are provided inn *Operating the Press in Automatic Single Stroke* Mode, page 239. For information on wiring and operating Automatic Continuous On-demand, call Wintriss Tech. Support.

Table 3-13. Setting Switch 5 (S101): Prior Act Times for Automatic Modes

Switch 5 (S101) Setting	Prior Act Time Automatic Single Stroke	Prior Act Time Automatic Continuous On-demand
OFF	30 seconds (Default)	1 minute (Default)
ON	5 minutes	10 minutes

Switch 6 (S101) and Switch 7 (S102) – Enabling Multiple Light Curtains

Switch 6 (S101) and Switch 7 (S102) control whether WPC APEX recognizes multiple light curtains when they are wired to the system, as shown in Table 3-14. Refer to *Installing a Light Curtain*, page 64, for general light curtain installation instructions.

When Switch 6 (S101) and Switch 7 (S102) are set to OFF WPC APEX recognizes only a single light curtain. Table 3-14 shows the combination of switch settings for different numbers of light curtains.

Table 3-14. Setting Switch 6 (S101) and Switch 7 (S102) to Enable Multiple Light Curtains

Switch 7 (S102) Setting	Switch 6 (S101) Setting	Light Curtains Enabled	NOTES
OFF	OFF	A	
OFF	ON	A, B	
ON	OFF	A, B, C	
ON	ON	A , B, C, D	

Switch 8 (S101) – Auxiliary Output 1 Response to Interrupted Stroke

⚠ DANGER

NON-SAFETY OUTPUTS USED FOR SAFETY FUNCTIONS

Use auxiliary outputs 1, 2, and 3 for non-safety functions only, such as convenience in automation. They cannot protect personnel from a moving hazard.

Failure to comply with these instructions will result in death or serious injury.

If you have wired Auxiliary Output 1 (see *Wiring Auxiliary Outputs,* page 78), switch 8 also controls how this output responds to an Interrupted Stroke condition, as shown in Table 3-15.

When switch 8 is set to OFF, its default setting, Aux. Output 1 turns "off" during an Interrupted Stroke and whenever a fault occurs, an I Stop string opens, or a light curtain is broken with the press running. When switch 8 is set to ON, the Auxiliary Output stays "on" during an Interrupted Stroke when no fault condition or I Stop occurs but turns "off" whenever there is a fault, an open I Stop string, or a light curtain interruption.

Table 3-15. Setting Switch 8 (S101): Auxiliary Output 1 Response to Interrupted Stroke

Switch 8 (S101) Setting	Description of Aux. Output 1 Operation
OFF	Aux. Output 1 turns OFF when one of the following occurs: • An Interrupted Stroke* condition • A fault condition (error code displays) • An open I Stop and/or E Stop string • A light curtain interruption while press is running
ON	Aux. Output 1 stays ON during Interrupted Stroke if no fault condition, I Stop, and/or E Stop occurs. Aux. Output 1 turns OFF when one of the following occurs: • A fault condition (error code displays) • An open I Stop and/or E Stop string • A light curtain interruption while press is running

Switch 5 on S102 – Selecting Stop Test Angle

Set Switch 5 on S102 according to where you want the stop initiated during a stop test. Refer to Table 3-16.

Table 3-16. Setting Switch 8 (S102) for Stop Test Angle

Switch 5 (S102) Setting	Stop Test Angle	Notes
OFF	Test angle is 90 degrees.	Stop test stops at 90 degrees.
ON	Test angle is 60 degrees.	Stop test stops at 60 degrees.

Switch 6 on S102 – Selecting Concurrent Time for More Than Two Operator Stations

NOTICE

You should only change this switch from its default setting if you have installed two or more Operator Stations on your WPC APEX.

Option switch 6 on S102 allows you to select a 5-second concurrent time for WPC APEX configurations with two or more Operator Stations installed, as shown in Table 3-17.

Concurrent time is the 5-second interval within which each pair of palm switches on all connected Operator Stations must be activated in order to start the press. If the concurrent time is exceeded, the press will not start.

When switch 6 (S102) is set to OFF, its default position, and two or more Operator Stations are connected to WPC APEX, the palm switches on each Operator Station must be pressed within a 1/2-second window (called the “palm” or “synchronous” time) and both pairs of palm switches must be pressed within a 5-second concurrent time window in order to stroke the press.

When switch 6 is set to ON and two or more Operator Stations are connected to WPC APEX, palm switches on all connected Operator Stations must be pressed within a 5-second concurrent time window to start the press. All Op. Stations connected to the “B” inputs must contain a Two-hand Control module to provide the required 1/2-second palm (or synchronous) time.

Table 3-17. Setting Switch 6 (S102): Selecting Concurrent Time for Multiple Op. Stations

Switch 6 (S102) Setting	Concurrent Time for Multiple Op. Stations
OFF	Normal Operation (Default). Establishes a 1/2-second palm (or synchronous) time and a 5-second concurrent time for two or more Operator Stations.
ON	Establishes a concurrent time of 5 seconds when two or more Operator Stations are connected to WPC APEX. Also keeps a 1/2-second palm (or synchronous) time for the Op. Station connected to the “A” inputs. Each Operator Station connected to the “B” inputs must contain a Two-hand Control module to provide the required 1/2-second palm (or synchronous) time.

Final Checkout

⚠ DANGER

INCORRECT INSTALLATION

- Perform the necessary checkout procedures according to the instructions in this manual.
- Ensure that all procedures are performed by qualified personnel.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Use test equipment only on the terminals specified in the instructions.
- Ensure that the tests are performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Use test equipment only on the terminals specified in the instructions.
- Ensure that the tests are performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

TOOLS OR OTHER MATERIAL IN THE DIE

Ensure that there are no tools or other material in or near the die before running the press.

Failure to comply with these instructions could result in death or serious injury.

NOTICE

Before performing checkout procedures, set the switches on the control enclosure to the following positions:

- Stroke Select to “OFF”
- Mode Select to “2 HAND”

This section provides the tests you need to perform to verify that your WPC APEX is installed and set up correctly. These tests must be performed before you proceed to Chapter 4.

Perform the tests in order, skipping tests for optional components that do not apply to your WPC APEX setup. If your WPC APEX fails a test, you will be directed to follow step-by-step procedures to isolate and correct the problem. If you are unable to correct a problem, contact Wintriss Tech. Support for assistance. Do not run the press until the problem has been corrected. Do not attempt to replace any components in your new WPC APEX unless instructed to by Wintriss Tech. Support.

In order to run the tests, you need to know how to operate the press in Inch, Single Stroke, and Continuous modes using Two-hand, One-hand, or Foot control. Refer to the instructions starting with *Operating the Press in Inch Mode*, page 232, if you need help running the press using these settings.

Many of the tests ask you to check the state of LEDs on the WPC APEX Main Processor and Display boards. LED maps of the Main Processor board, showing the locations of all LEDs, are provided in Figure 3-54, page 178, which are shown on the following pages. An LED map of the Display board is shown in Figure 3-55, page 179.

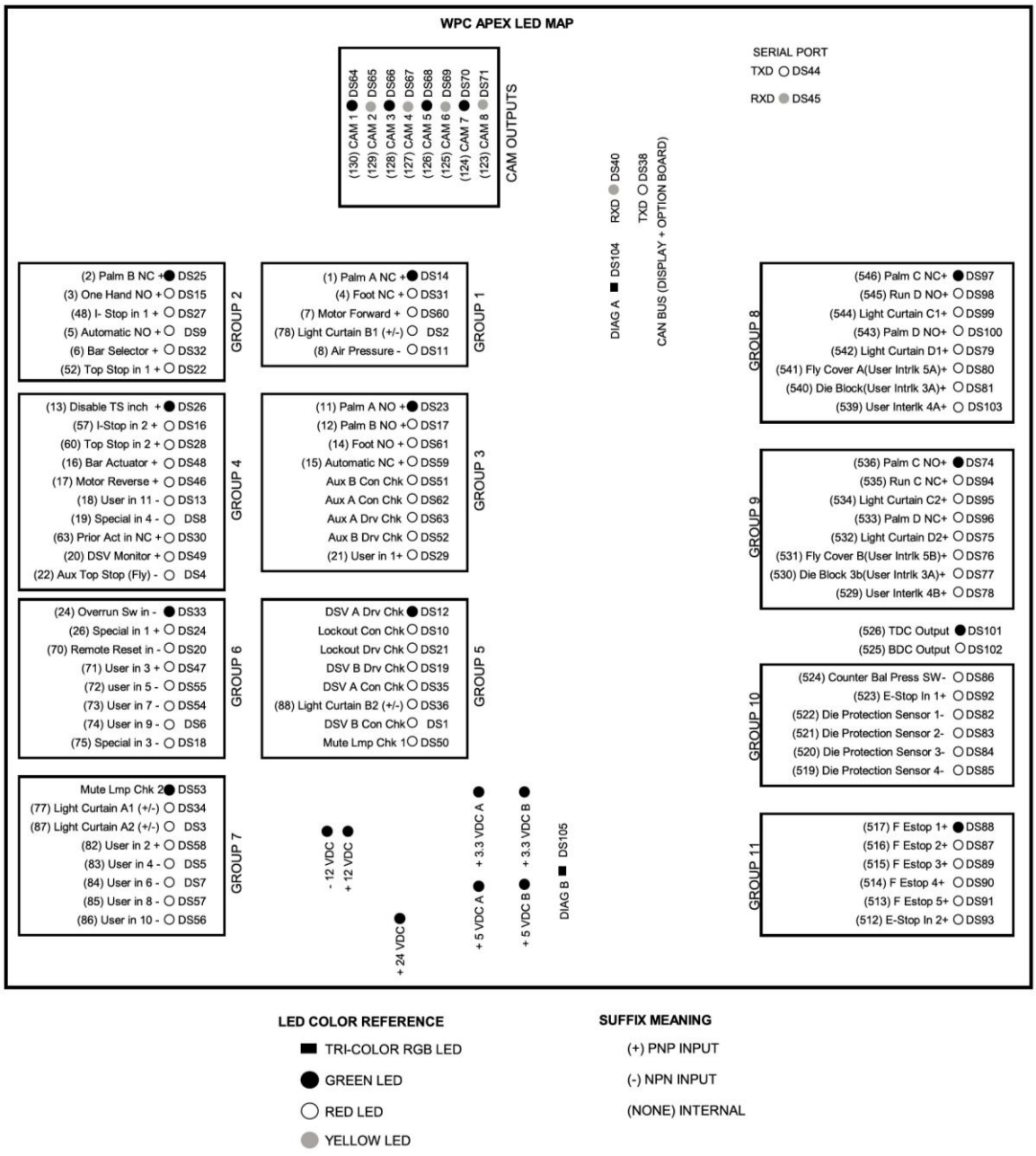


Figure 3-54. WPC APEX Processor Board LED Indicator Map

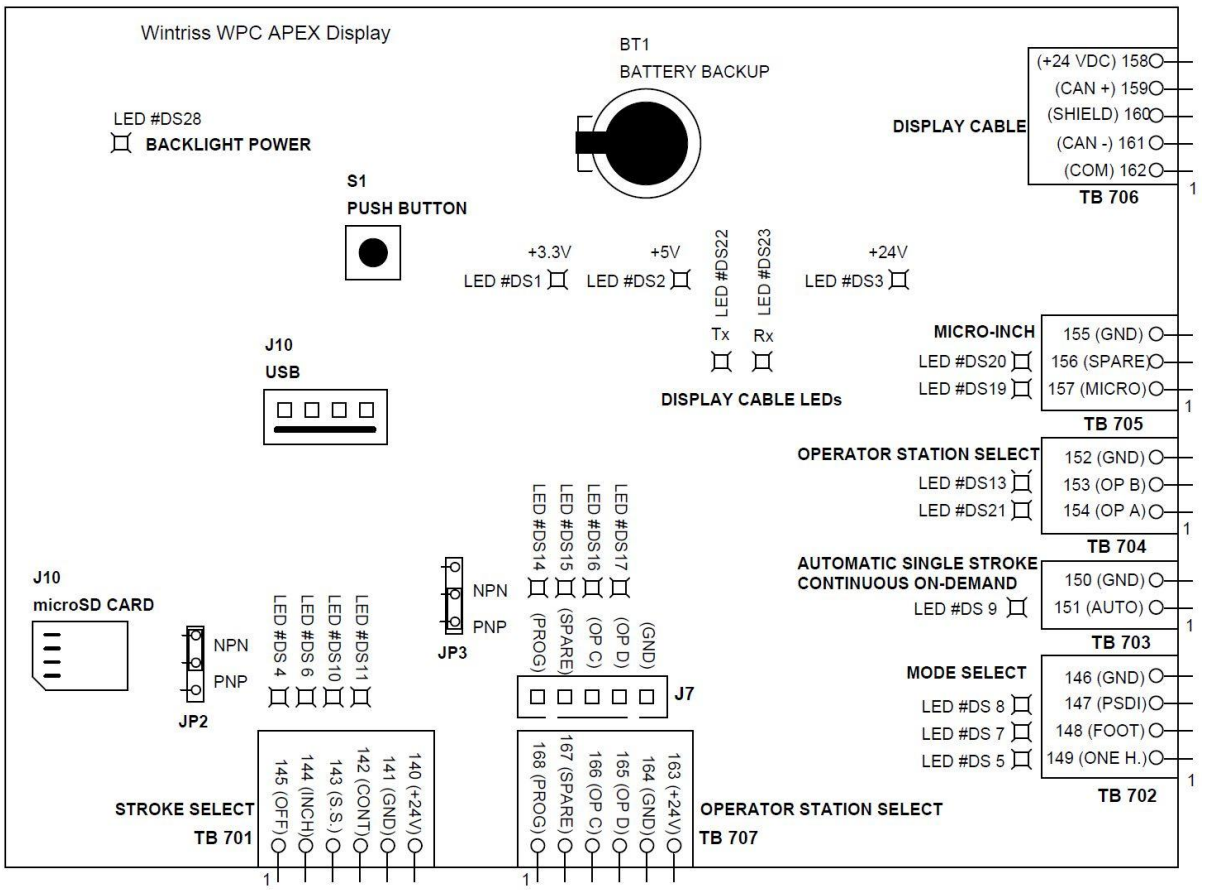


Figure 3-55. WPC APEX Display Board LED Indicator Map

Checking the Emergency Stop Circuit

NOTICE

CHECKING THE EMERGENCY STOP CIRCUIT IN SINGLE STROKE MODE

If your press does not run in Continuous mode, run this test while the press is making a stroke in Single Stroke mode.

Emergency Stop buttons may be installed wherever needed. They are red buttons with yellow haloes. See Figure 21 at the end of the manual for wiring details.

To check the Emergency stop circuit, do the following:

Run the press in Continuous mode, and press an Emergency Stop button. The press should stop immediately.

- If the press Emergency stops, go to the next applicable test.
- If the press does not Emergency stop, check the wiring of your E STOP circuit, correcting any problems, and run the test again. If the press still does not Immediate stop, call Wintriss Tech. Support. Do not continue with this checkout procedure until the press I Stops correctly.

NOTICE

RESET EMERGENCY STOP BUTTON AFTER USE

Emergency stop buttons are not spring loaded. You must pull a button up to its original position to reset the Emergency stop (F13) fault.

Checking the Immediate Stop Circuit

NOTICE

CHECKING THE IMMEDIATE STOP CIRCUIT IN SINGLE STROKE MODE

If your press does not run in Continuous mode, run this test while the press is making a stroke in Single Stroke mode.

To check the Immediate stop circuit, do the following:

Run the press in Continuous mode, and press the Immediate Stop button on the Operator Station. The press should stop immediately.

- If the press Immediate stops, go to the next applicable test.
- If the press does not Immediate stop, check the wiring of your I STOP circuit, correcting any problems, and run the test again. If the press still does not Immediate stop, call Wintriss Tech. Support. Do not continue with this checkout procedure until the press I Stops correctly.

NOTICE

RESET IMMEDIATE STOP BUTTON AFTER USE

The Immediate stop button is not spring loaded. You must pull it up to its original position to reset the Immediate stop (F13) fault.

Checking the Top Stop Circuit

NOTICE

CHECKING THE TOP STOP CIRCUIT IN SINGLE STROKE MODE

If your press does not run in Continuous mode, single stroke the press with Top stop in Inch enabled, or run this test while holding down the Run/Inch palm buttons in Single Stroke mode.

To check the Top stop circuit, do the following:

Run the press in Continuous mode, and press the Top Stop button on the Operator Station. The press should stop at top dead center.

- If the press top stops, go to the next applicable test.
- If the press does not top stop, check the wiring of your Top stop circuit, correcting any problems, and run the test again. If the press still does not top stop, call Wintriss Tech. Support. Do not continue with this checkout procedure until the press top stops correctly.

Checking for Faults When the Press Is Running

To determine whether any fault messages display when the press is running, do the following:

Run the press in Single Stroke for a few strokes.

- If the press runs without displaying an error, go to the next applicable test.
- If a fault code between F80 and F89 (or between H80 and H89) appears on the display, this indicates a problem with the overrun limit sensor. Check to make sure that you installed the overrun limit sensor (see *Installing the Overrun Limit Switch*, page 70) and overrun limit sensor magnet (*Installing the Overrun Sensor Magnet*, page 142) correctly. Press OK and single stroke the press again for a few strokes. If the press stops and the same fault code displays, call Wintriss Tech. Support.
- If another fault code appears on the display, look up the fault in Chapter 6, and perform the remedy provided. After you correct the problem, press OK and run the press again for a few strokes, checking for fault codes. If you need assistance, call Wintriss Tech. Support.

Power Supply Test

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Use test equipment only on the terminals specified in the instructions.
- Ensure that this test is performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

To run the power supply test, do the following, referring to Figure 3-54, page 178 for LED locations on the WPC APEX Main Processor board:

1. Open the front cover of the control enclosure or the door of your console.
2. Turn on power to WPC APEX.
3. On the WPC APEX Main Processor board, check to see whether the +24 VDC, +5 VDC A, +5 VDC B , 3.3 VDC A, 3.3 VDC B, +12 VDC, and -12 VDC LED indicators are illuminated.
   - If all LEDs are lit, go to the next applicable test.
   - If all LEDs are unlit, check to make sure that line voltage is being applied to the system (see step 2), and correct any problems. If the LEDs are still unlit, call Wintriss Tech. Support.

Shadow Light Curtain Test

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Use test equipment only on the terminals specified in the instructions.
- Ensure that this test is performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

WPC APEX tests whether your Shadow(s) are working properly by momentarily de-energizing the Shadow transmitter whenever the press is started and stopped, checking at the same time to make sure that the stop relays are open.

Perform the following test to verify that your Shadow light curtain is installed and wired correctly and operating properly, referring also to the troubleshooting information in your light curtain user manual if necessary. If you have more than one light curtain on your press, perform this test on each light curtain.

1. Power up the light curtain.
2. Check to see whether there is power to the Shadow. On Shadow V and Shadow VI units, the amber (Power On) LED on the transmitter indicates that the light curtain has power.

   On Shadow VII units, the presence of power is indicated by an illuminated diagnostic code LED display. The green Power LED on the optional Shadow 8 control or the LEDs on Shadow 8 Main Receiver and Transmitter indicate the presence of power.

   On Shadow 9, the green power LED on the optional control, the green POWER LED on the transmitter, and the ON/OFF LED illuminated red or green on the receiver indicate the presence of power.

   - If the Shadow has power, go to the next step.
   - If the Shadow does not have power, turn off the light curtain, and check the input power wiring and the power fuse. (The fuse is located in the Shadow V receiver or in the Shadow VI, Shadow VII, Shadow 8, or Shadow 9 (optional) control box. The Shadow VII DIN controller has no fuse.) Rewire power connections and/or replace the fuse if necessary. Power up again. (On Shadow V and Shadow VI units, if there is still no power, turn off the transmitter and try replacing the amber indicator. Power up again.) If there is still no power to the unit, call Wintriss Tech. Support.
3. At the Shadow receiver, check to see whether the green (Curtain Unobstructed) indicator is lit.
   - If the green indicator is lit, go to the next step.
   - If the receiver's red (Curtain Obstructed) indicator is lit, realign the light curtain heads. If the red indicator is still lit, check the interrupt circuit (Shadow V and Shadow VI) or the Light Curtain Test mode jumper (Shadow VII, Shadow 8, Shadow 9). To check the interrupt circuit, make sure that the following terminal reads 0 V relative to ground:

     Shadow V: INT terminal in the transmitter (see Figure 3 at end of manual)
     Shadow VI: pin #19 on auxiliary TB4 in the control (see Figure 10 at end of manual)
     Shadow VI/WPC Interface Board: pin #5 on TB4 (see Figure 11 at end of manual)

If the applicable terminal does not read 0 V relative to ground, check and correct the ground wiring for the unit.

The Light Curtain Test Mode jumper (JP124 for Light Curtain 1, JP122 for Light Curtain 2– see Figure 2-11, page 67, for location on the WPC APEX Main Processor board), should be positioned at the "INT" setting when Shadow VII or Shadow 8 light curtains are installed. Reposition the jumper to the correct setting if necessary. The Light Curtain Output Type jumper (JP123 for Light Curtain 1, JP121 for Light Curtain 2) should be set to "PNP."

If the red indicator is still illuminated, call Wintriss Tech. Support.

- If both the receiver's green and red indicators are unlit, power down the unit and check the wiring to the receiver. Also check the power fuse (located in the Shadow V receiver, in the Shadow VI, Shadow VII, Shadow 8, or Shadow 9 (optional) control box, not present in the Shadow VII DIN control), and replace if necessary. Power up again. If the receiver's green and red indicators are still off, replace them. If none of these remedies corrects the problem, call Wintriss Tech. Support.

4. Block the light curtain. On the receiver, the green indicator should turn off and the red indicator should illuminate.
   - If the receiver's green indicator goes off and the red indicator comes on, go to the next step.
   - If the receiver's green indicator stays on when the curtain is blocked, call Wintriss Tech. Support.
5. Remove the obstruction from the light curtain. At the receiver, verify that the red indicator goes off and the green indicator comes on.
6. Go to the next applicable test.

System Static Test

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Use test equipment only on the terminals specified in the instructions.
- Ensure that this test is performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

To perform the system static test, do the following, referring to Figure 3-54, page 178 for LED locations:

1. Turn off the system air and bleed down the system air pressure to less than 35 PSI.
2. Set the Stroke Select switch to "INCH" and press the Run buttons
3. Check to see whether an F48 error is displayed, then press reset and confirm that an Interrupted Stroke message appears.
   - If the Interrupted Stroke message is there, go to the next step.
   - If F48 does not display, check to see whether the "System air pressure" LED on the WPC APEX Main Processor board is unlit. If the LED is unlit, check the wiring of the system air

pressure switch input and correct any problems. Press both Run/Inch palm buttons again. If F48 still does not display, call Wintriss Tech. Support.

- If the Interrupted Stroke message is absent, check to see whether the "Inch stroke select" LED on the WPC APEX Display board is lit. If the LED is unlit, check the wiring of the Stroke Select switch and correct any problems. If the "Inch stroke select" LED is still unlit, call Wintriss Tech. Support.

4. Press the Immediate Stop button on the Operator Station.
5. Check to see whether fault code F13 appears on the LED display.
   - If F13 displays, go to the next step.
   - If F13 does not display, check to see whether the "I stop A input" and "I stop B input" LEDs on the WPC APEX Main Processor board turn off when the Immediate Stop button is pressed. If the two LEDs do not turn off, check the wiring of the I stop A and I stop B input connections, and correct any problems. If the two LEDs still do not turn off, call Wintriss Tech. Support.

NOTICE

RESET IMMEDIATE STOP BUTTON AFTER USE

The Immediate stop button is not spring-loaded. You must pull it up to its original position to reset the Immediate stop (F13) fault.

6. Turn on the press motor in forward rotation (if applicable).
7. Check to see whether the "Motor forward" LED on the WPC APEX Main Processor board is lit.
   - If the "Motor forward" LED is lit, go to the next step.
   - If the "Motor forward" LED is unlit, check the wiring of the Motor Forward input connection, and correct any problems. If the LED is still unlit, call Wintriss Tech. Support.

NOTICE

If the I stop and T stop circuits are not connected according to the wiring shown in Figure 1 at the end of the manual, the fault code that displays may be different. Call Wintriss Tech. Support for assistance.

8. Apply system air pressure to the press.
9. Check to see whether the "System air pressure" LED on the WPC APEX Main Processor board is lit. Clear the error code on the display by pressing OK.
10. Turn off the counterbalance air and bleed down the counterbalance air pressure.
11. Press both Run/Inch palm buttons on the Operator Station at the same time. The ram should not move, and the fault code associated with the input the counterbalance pressure switch is connected to (normally, F51 for User 1 Input) should display.
    - If the ram does not move and the appropriate fault code appears, restore the counterbalance air, press OK, and go to the next step.
    - If the ram moves and/or the appropriate fault code does not display, check the wiring of the counterbalance air pressure switch input, and correct any problems. Push both Run/Inch palm

buttons again. If the ram still moves and/or the appropriate fault code still does not display, call Wintriss Tech. Support.

NOTICE

If the I stop and T stop circuits are not connected according to the wiring shown in Figure 1 at the end of the manual, the fault code that displays may be different. Call Wintriss Tech. Support for assistance.

12. Press the Immediate Stop button on the Operator Station.

- If fault code F13 displays, go to the next applicable test.
- If F13 does not display, contact Wintriss Tech. Support.

Single Stroke Mode Test with Light Curtain(s)

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

CONTINUOUS MODE USED ON PRESS NOT GUARDED PROPERLY FOR CONTINUOUS

Disconnect the "Continuous" position on the Stroke Select switch to prevent your press from being run in Continuous mode if it is not guarded correctly for use in Continuous mode. Also cover the "CONT" label on your control's Stroke Select switch.

Failure to comply with these instructions will result in death or serious injury.

⚠ WARNING

ELECTRIC SHOCK HAZARD WHEN WORKING INSIDE ENCLOSURE WITH POWER ON

- DO NOT touch electrical connections or circuit boards.
- Ensure that this test is performed by qualified personnel.

Failure to comply with these instructions could result in death or serious injury.

To test Single Stroke mode when light curtains are installed, perform the following steps, referring to Figure 3-54, page 178 for LED locations. To verify Single- stroke operation on a press without light curtains, go to the next test (page 187).

1. Set the Stroke Select switch to "SINGLE," and verify that the "Single stroke select" LED on the WPC APEX Display board is lit.

2. Verify that the light curtain is unobstructed and that the "Light curtain A1 input" and "Light curtain A2 input" LEDs on the WPC APEX Main Processor board are lit. (If you are testing a second pair of light curtains, verify that "Light curtain B1 input" and "Light curtain B2 input" LEDs are lit.) These LEDs turn off when the light curtain is obstructed.

3. Press and hold both Run/Inch palm buttons on the Operator Station, observing the ram's motion.

- If the ram makes a complete stroke, stopping at top dead center, go to the next step.
- If the ram moves but does not make a complete stroke or does not stop at top dead center and a fault code between F80 and F89 (or between H80 and H89) displays, there is a problem with the overrun limit switch. Try the remedies suggested for overrun limit switch faults, starting on page 264; then, inch the ram to the top of the stroke and repeat this test. If the ram still does not make a complete stroke or does not stop at top dead center, call Wintriss Tech. Support.
- If the ram moves but does not make a complete stroke or does not stop at top dead center and an overrun limit switch fault does not display, check the wiring of the palm buttons and light curtains, correcting any problems; then inch the ram to the top of the stroke, and repeat the test. If the ram still does not make a complete stroke or does not stop at top dead center, call Wintriss Tech. Support.
- If the ram does not move at all, check to make sure that the correct version of WPC APEX firmware is installed, and check the wiring of the palm buttons, correcting any problems. Re-run the test, starting with step 1. If the ram still does not move when you press the Run/Inch palm buttons, call Wintriss Tech. Support.

4. Interrupt the light curtain by placing a piece of cardboard or other object between the light curtain heads to block at least two inches of the light field. Leave the object in place while you perform step 5.

5. Press and hold both Run/Inch palm buttons, observing the behavior of the ram.

   - If the ram does not move and you have only one light curtain, go to the next step.
   - If the ram does not move and you have two light curtains, repeat the test, starting with step 3, removing the obstruction from the first light curtain and blocking the second light curtain. Once the test on the second light curtain is successful, go to the next step.
   - If the ram does move, check to make sure the correct version of WPC APEX firmware is installed, and check the wiring of the palm buttons and light curtains, correcting any problems. Re-run the test, starting with step 4. If the ram still moves with the light curtain blocked, call Wintriss Tech. Support.

6. Remove the object you used to interrupt the light curtain field in step 4. Prepare to insert it into the field while the ram is on the downstroke. Be sure to keep hands and other objects away from the press.

7. While one person presses and holds both Run/Inch palm buttons, have another person move the cardboard or other object into the light field while the ram is on the downstroke. Observe the action of the ram.

   - If you are using one light curtain, and the ram stops immediately and the Interrupted Stroke message flashes, go to the next step.
   - If you are using two light curtains, and the ram stops immediately and the Interrupted Stroke message flashes, inch the ram to the top of the stroke and repeat the test by interrupting the second light curtain, starting with step 6. When you have successfully completed the test with the second light curtain, go to the next step.
   - If the ram does not stop immediately, check the wiring of the light curtains, correcting any problems; then, inch the ram to the top of the stroke and re-run the test, starting with step 6. If the ram moves again when the light curtain is interrupted, call Wintriss Tech. Support.

8. Clear the Interrupted Stroke by holding the Run/Inch palm buttons until the ram stops at top dead center.

9. Press and immediately release the Run/Inch palm buttons, observing the behavior of the ram.

   - If the ram moves when you press the Run/Inch palm buttons, then stops when you release them, and the Interrupted Stroke message appears, go to the next step.
   - If the ram does not move, or if it moves but does not stop immediately when you release the Run/Inch palm buttons, or if the Interrupted Stroke message does not appear, check the wiring of the palm buttons and light curtains, correcting any problems, and run this test again, repeating step 9. If the ram still does not move or moves but does not stop immediately, or if the ram stops but the Interrupted Stroke message does not flash, call Wintriss Tech. Support.

10. Complete the stroke by pressing and holding the Run/Inch palm buttons.

11. Go to the next applicable test.

Single Stroke Mode Test Without Light Curtain(s)

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

CONTINUOUS MODE USED ON PRESS NOT GUARDED PROPERLY FOR CONTINUOUS

Disconnect the "Continuous" position on the Stroke Select switch to prevent your press from being run in Continuous mode if it is not guarded correctly for use in Continuous mode. Also cover the "CONT" label on your control's Stroke Select switch.

Failure to comply with these instructions will result in death or serious injury.

To test Single Stroke mode when light curtains are not installed, perform the following steps, referring to Figure 3-54, page 178 for LED locations on the WPC APEX Main Processor board:

1. Set the Stroke Select switch to "SINGLE." Verify that the "Single stroke select" LED on the WPC APEX Display board is lit.

2. Press and hold both Run/Inch palm buttons, observing the motion of the ram.

   - If the ram makes a complete stroke and stops at or near top dead center, go to step 6.
   - If the ram does not make a full stroke or does not stop at top dead center, go to the next step.

3. Check for fault codes on the LED display.

   - If a fault code between F80 and F89 (or between H80 and H89) displays, there is a problem with the overrun limit switch. Try the remedies suggested for overrun limit switch faults, starting on page 263; then, inch the ram to the top of the stroke and run the test again, starting with step 2. If the ram still does not make a complete stroke or does not stop at top dead center, call Wintriss Tech. Support.

- If the LED display is blank or shows an error other than an overrun limit switch fault, check and correct the wiring of the palm buttons and light curtains, correcting any problems; then, run the test again, starting with step 2. If the ram still does not complete a stroke or stop at top dead center, call Wintriss Tech. Support.

4. Turn the Stroke Select switch to "INCH," and bring the ram to top dead center.
5. Press and then immediately release the Run/Inch palm buttons, observing the behavior of the ram.

    - If the ram moves when you press the Run/Inch buttons, then stops when you release them, and the Interrupted Stroke message flashes, go to the next step.
    - If the ram does not move, or if it moves but does not stop immediately when you release the Run/Inch buttons, or if the Interrupted Stroke message does not flash, check the wiring of the palm buttons and light curtains, correcting any problems, and run the test again, repeating step 5. If the ram still does not move or moves but does not stop immediately, or if the ram stops but the Interrupted Stroke message does not flash, call Wintriss Tech. Support.

6. Complete the stroke by pressing and holding the Run/Inch palm buttons.
7. Go to the next applicable test.

Anti-tiedown Test

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

OPERATOR STATION MAY NOT MEET SAFETY REQUIREMENTS

- Ensure that the Operator Station is wired correctly.
- Ensure that on any non-Wintriss Operator Station the Run buttons are placed so that two hands are required to push both buttons at the same time and no one can press both buttons with one hand or with one hand and one elbow.
- Ensure that on any non-Wintriss Operator Station the Run buttons have ring guards or other means in place to prevent unintentional operation.

Failure to comply with these instructions will result in death or serious injury.

The anti-tiedown test verifies that the Operator Station is installed correctly and is wired so that both hands are needed to press the Run/Inch buttons simultaneously. To perform the test, do the following:

1. Set the Stroke Select switch to "SINGLE."
2. Press and hold down both Run/Inch palm buttons to cycle the press through one stroke. When the press top stops, continue to hold down the left button, and remove your hand from the right button; then, after a moment, replace your hand on the right button and continue to hold down both buttons.

    - If the press does not initiate the stroke, go to the next step.

- If the press does initiate the stroke, check the wiring of the palm buttons. When the problem has been corrected, repeat step 2. If the press still initiates the stroke, call Wintriss Tech. Support.

3. Remove both hands from the Run/Inch buttons.

4. Press and hold down both Run/Inch buttons to cycle the press through one stroke. When the press top stops, continue to hold down the right button, and remove your hand from the left button; then, after a moment, replace your hand on the left button and continue to hold down both buttons.

   - If the press does not initiate the stroke, the test has been completed successfully. Go to the next applicable test.
   - If the press does initiate the stroke, check the wiring of the palm buttons, correcting any problems, then repeat step 4. If the press still initiates the stroke, call Wintriss Tech. Support.

Anti-repeat Test

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

OPERATOR STATION MAY NOT MEET SAFETY REQUIREMENTS

Ensure that the Operator Station is wired correctly.

Failure to comply with these instructions will result in death or serious injury.

The anti-repeat test verifies that the press cycles only once when WPC APEX is in

Single Stroke mode and both Run/Inch buttons are pressed simultaneously. To perform the test, do the following:

1. Set the Stroke Select switch to “SINGLE.”

2. Press and hold down both Run/Inch palm buttons until the press completes a stroke and for ten seconds after the press stops.

   - If the press makes one stroke and then top stops, WPC APEX is operating correctly. Go to the next applicable test.
   - If the press cycles again after making one stroke, check the wiring of the Operator Station and correct any problems; then, repeat the test. If the press still cycles after it makes one stroke, call Wintriss Tech. Support.

Continuous Mode Test with Light Curtain(s)

⚠ DANGER

IMPROPER SAFEGUARDING

- Install safeguarding devices as needed to ensure operator safety. Follow the machine guarding requirements of OSHA regulation 1910.217 and any other regulations and standards that apply.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INJURY DURING TESTING

Keep all personnel away from the press during testing.

Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

This test verifies that your press and the light curtains connected to it operate correctly in Continuous mode. To verify Continuous mode operation on a press without light curtains, go to the next test (page 192). If your press does not run in Continuous mode, go to the next applicable test. To run the Continuous mode test with light curtains, do the following, referring to Figure 3-54, page 178, for LED locations:

1. Set the Stroke Select switch to "CONT." Verify that the "Continuous stroke select" LED on the WPC APEX Main Processor board is lit.
2. Verify that the light curtain is unobstructed and that the "Light curtain A1 input" and "Light curtain A2 input" LEDs on the WPC APEX Main Processor board are lit. (If you are testing a second pair of light curtains, verify that "Light curtain B1 input" and "Light curtain B2 input" LEDs are lit.) These LEDs turn off when the light curtain is obstructed.
3. Press the Prior Act button on the Operator Station. The Prior Act lamp should illuminate, then turn off after eight seconds.
   - If the Prior Act lamp turns off after eight seconds, go to step 4.
   - If the Prior Act lamp does not turn off after eight seconds, stop! Do not go any further! Call Wintriss Tech. Support.
4. Press the Prior Act button and, before the indicator lamp goes out, press both Run/Inch palm buttons, releasing them after bottom dead center on the first stroke. The press should continue running.
   - If the press continues to run, go to the next step.
   - If the press stops, check the wiring of the palm buttons, correct any problems, press and hold both Run/Inch buttons to return the ram to top dead center, and run the test again. If the press still stops, call Wintriss Tech. Support.
5. Press the Immediate Stop button on the Operator Station. The ram should stop immediately, the F13 fault code should appear on the display, and the Interrupted Stroke message should flash. If these conditions are not present, check the wiring of the Operator Station, particularly the I STOP

wiring, and correct any problems. Rerun this test from step 4. If the conditions are still not present, call Wintriss Tech. Support.

NOTICE

RESET IMMEDIATE STOP BUTTON AFTER USE

The Immediate stop button is not spring-loaded. You must pull it up to its original position to reset the Immediate stop (F13) fault.

6. Press and hold the Run/Inch palm buttons until the press returns to top dead center.
7. Press the Prior Act button and, before the indicator lamp goes out, press both Run/Inch palm buttons, releasing them after bottom dead center on the first stroke. The press should continue running.
8. Press the Top Stop button on the Operator Station. The ram should stop near top dead center, and the Stopping Time in milliseconds should appear in the WPC APEX display.
9. Restart the press in Continuous mode.
10. Block the light curtain. The press should come to an immediate stop, and the Interrupted Stroke message should flash.
    - If the press comes to an immediate stop and the Interrupted Stroke message flashes, go to the next step.
    - If your WPC APEX has the muting option, and the ram stops as soon as it reaches the non-muted (i.e., downward) portion of the stroke, go to the next step.
    - If your WPC APEX has the muting option, and the ram does not stop in the non-muted portion of the stroke, check the wiring of the light curtain, correcting any problems, and run the test again, starting with step 10. If the ram still does not stop in the non-muted part of the stroke, call Wintriss Tech. Support.
    - If your WPC APEX does not have the muting option and the press does not come to an immediate stop when you interrupt the light curtain, check the wiring of the light curtain, correcting any problems, and run the test again, starting with step 10. If the press still does not stop immediately, call Wintriss Tech. Support.

NOTICE

When a stroke is interrupted, WPC APEX automatically switches to Two-hand Maintained Single Stroke mode for the remainder of the stroke.

11. Press and hold both Run/Inch palm buttons to return the ram to top dead center.
12. Go to the next applicable test.

Continuous Mode Test without Light Curtain(s)

⚠ DANGER

IMPROPER SAFEGUARDING

- Install safeguarding devices as needed to ensure operator safety. Follow the machine guarding requirements of OSHA regulation 1910.217 and any other regulations and standards that apply.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

This test verifies that your press operates correctly in Continuous mode. To verify Continuous mode operation on a press with light curtains, return to the previous test (see page 190). If your press does not run in Continuous mode, go to the next applicable test. To run the Continuous mode test without light curtain, do the following, referring to Figure 3-54, page 178, for LED locations:

1. Set the Stroke Select switch to "CONT." Verify that the "Continuous stroke select" LED on the WPC APEX Display board is lit.
2. Press the Prior Act button on the Operator Station. The Prior Act lamp should illuminate, then turn off after eight seconds.
   - If the Prior Act lamp turns off after eight seconds, go to the next step.
   - If the Prior Act lamp does not turn off after eight seconds, stop! Do not go any further! Call Wintriss Tech. Support.
3. Press the Prior Act button and, before the indicator lamp goes out, press both Run/Inch palm buttons, releasing them after bottom dead center on the first stroke. The press should continue running.
   - If the press continues to run, go to the next step.
   - If the press stops, check the wiring of the palm buttons, and correct any problems. Run the test again. If the press still stops, call Wintriss Tech. Support.
4. Press the Immediate Stop button on the Operator Station. The ram should stop immediately, the F13 fault code should appear on the display, and the Interrupted Stroke message should flash. If these conditions are not present, check the wiring of the Operator Station, particularly the I stop wiring, and rerun this test from step 3. If the conditions are still not present, call Wintriss Tech. Support.

NOTICE

RESET IMMEDIATE STOP BUTTON AFTER USE

The Immediate stop button is not spring-loaded. You must pull it up to its original position to reset the Immediate stop (F13) fault.

5. Press and hold the Run/Inch palm buttons until the press returns to top dead center.
6. Press the Prior Act button and, before the indicator lamp goes out, press both Run/Inch palm buttons, releasing them after bottom dead center on the first stroke. The press should continue running.
7. Press the Top Stop button on the Operator Station. The ram should stop near top dead center, and the Stopping Time in milliseconds should appear in the WPC APEX display.
8. Go to the next applicable test.

Foot Switch Test

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MISSING SAFEGUARDS

Install a light curtain for use with the Foot Switch option. A light curtain is required for using the Foot Switch.

Failure to comply with these instructions will result in death or serious injury.

This test, which should be run only if you have an optional Foot Switch, verifies that your Foot Switch is operating properly. To perform the test, do the following, referring to Figure 3-54, page 178, for LED locations:

NOTICE

These instructions refer to the Auto Carry-up Angle, which is factory set to one of the following values:

- 170° if the press does not have a light curtain
- 149° if the press does have a light curtain

Refer to *Setting the Auto Carry-up Angle*, page 152, for information about the Auto Carry-up feature.

1. Set the Stroke Select switch to “SINGLE” and the Mode Select switch to “FOOT.” Verify that the “Single stroke select” and “Foot control select” LEDs on the WPC APEX Display board are lit.
2. Make sure that option switch 3 on the WPC APEX Main Processor board is set to OFF, its default setting (see *Enabling Foot Control in a Foot Switch*, page 172).
3. Power down, then power back up the WPC APEX, if necessary, to enable the settings change. The WPC APEX is now in Foot Trip mode, the press stroking each time the Foot Switch is depressed.

NOTICE

Depress the Foot Switch quickly and fully to initiate a stroke. If you depress the Foot Switch slowly or partially, the press will not stroke.

4. Depress the Foot Switch and immediately release it. The press should make a single stroke and stop at top dead center. Verify that the "Foot switch N/C" LED on the WPC APEX Main Processor board turns off when the Foot Switch is depressed and that the "Foot switch N/O" LED illuminates.

NOTICE

If the Interrupted Stroke message flashes, you must depress and hold the Run/Inch buttons on the Operator Station to bring the press back to top dead center and clear the Interrupted Stroke before you can operate the Foot Switch.

5. Set option switch 3 to ON.
6. Power down, then power back up WPC APEX to enable the settings change. You are now in Foot Control mode. The press should cycle to Top stop only if the Foot Switch is held down past the Auto Carry-up Angle.
7. Press and hold the Foot Switch through the Auto Carry-up Angle, then release the Foot Switch. The press should complete the stroke, stopping at Top stop.
8. Press and hold the Foot Switch again, but release it before the Auto Carry-up Angle. The press should begin to cycle but stop immediately when the Foot Switch is released.
9. Press and hold both Run/Inch buttons. The press should complete the stroke, stopping at Top stop.
10. Set the Stroke Select switch to "CONT."
11. Press the Prior Act button on the Operator Station, and, before the indicator lamp goes out, depress and hold down the Foot Switch. The press should run as long as the Foot Switch is depressed.
12. Release the Foot Switch. The press should complete the stroke, stopping at Top stop.
13. Press the Prior Act button and, before the indicator lamp goes out, depress the Foot Switch, immediately releasing it. The press should stop after a single stroke.
14. If you want to repeat testing of the Foot Switch in Continuous mode, make sure to press the Prior Act button before attempting to initiate another stroke.
15. Go to the next applicable test.

One-hand Control Test

⚠ DANGER

INJURY DURING TESTING

- Keep all personnel away from the press during testing.
- Be sure there is no die or other tooling in the press during testing.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MISSING SAFEGUARDS

Install a light curtain for use with the One-hand Control option. A light curtain is required for using the One-hand Control.

Failure to comply with these instructions will result in death or serious injury.

This test, which should be run only if you have an optional One-hand Control, verifies that your One-hand Control is operating properly. To perform the test, do the following, referring to Figure 3-54, page 178, for LED locations:

1. Set the Stroke Select switch to "SINGLE" and the Mode Select switch to "1 HAND." Verify that the "Single stroke select" and "One-hand control select" LEDs on the WPC APEX Display board are lit.

2. Make sure that option switch 3 on the WPC APEX Main Processor board is set to OFF, its default setting (see *Enabling Light Curtain Break Mode in a One-hand Control*, page 171).

3. Power down, then power back up the WPC APEX, if necessary, to enable the settings change. The WPC APEX is now in normal One-hand Control operation, the press stroking each time the One-hand Control switch is depressed.

NOTICE

Depress the One-hand Control switch quickly and fully to initiate a stroke. If you depress the One-hand Control switch slowly or partially, the press will not stroke.

4. Press the One-hand Control switch and release it immediately. The press should make a single stroke and stop at top dead center. Verify that the "Palm switch A N/C" LED on the WPC APEX Main Processor board turns off when the One-hand Control is depressed and that the "One-hand A N/O" LED illuminates.

NOTICE

If the Interrupted Stroke message flashes, you must press and hold the Run/Inch buttons on the Operator Station to bring the press back to top dead center and clear the Interrupted Stroke before you can operate the One-hand Control.

5. Set option switch 3 to ON.

6. Power down, then power back up WPC APEX to enable the settings change. You are now in Light Curtain Break mode. The press should cycle to Top stop only if the One-hand Control is pressed within eight seconds of the operator's hand clearing the light curtain.

7. Break the light curtain to activate the One-hand Control, then remove your hand and press the One-hand Control within eight seconds. The press should complete the stroke, stopping at Top stop.
8. Go to the next applicable test.

Bar Mode Control Test

⚠ DANGER

INJURY DURING BAR MODE TESTING

- Be sure there is no die or other tooling in the press during testing.
- Keep all personnel away from the press during testing.
- Use a spring-loaded turnover bar when you bar the press.

Failure to comply with these instructions will result in death or serious injury.

This test, which should be run only if you have an optional Bar Mode Control, verifies that your Bar Mode Control is operating properly. To perform the test, do the following, referring to Figure 3-54, page 178 for LED locations on the WPC APEX Main Processor board:

1. Set the Stroke Select switch to "INCH" and the Mode Select switch to "2 HAND."
2. Set the Select switch on the Bar Control to "ON." Verify that the "Bar selector switch" LED on the WPC APEX Main Processor board is lit.
3. Turn the press motor off.
4. While the press's flywheel is still turning, press and release the Operate button on the Bar Mode Control. Verify that the following events occur:
   - The Dual Safety Valve should energize while the Operate button is depressed and de-energize when the button is released
   - The "Bar actuator input" LED should illuminate while the Operate button is depressed
   - The F26 fault code should appear in the LED display
5. Press OK to clear the fault.
6. When the flywheel has stopped turning, press and hold the Operate button on the Bar Mode Control. The Dual Safety Valve should energize and stay energized.
7. You can now bar the press, using a spring-loaded turnover bar.

NOTICE

As you bar the press, WPC APEX monitors the speed of the crank. If you bar the press too quickly, the DSV de-energizes and an F26 fault code displays, stopping the press.

8. Go to the next applicable test.

Checking Operation of the User Inputs

This test verifies that any user inputs you have connected to auxiliary press functions are wired and operating correctly. If you have not wired any user inputs, go to the next section. To perform this test, do the following:

1. Run the press. Actuate one of the user inputs.
    - If the press stops and the appropriate fault code displays, the input is wired and operating properly. Repeat the test for the other user inputs. When you have checked all of the inputs, go to the next step.
    - If the press does not stop and/or the appropriate fault code does not display, check the wiring of that input and rerun the test. If the press still does not stop and/or the correct fault code does not display, call Wintriss Tech. Support.
2. You have completed the Final Checkout tests. Proceed to Chapter 4.

Chapter 4 – Program Mode

This chapter shows you how to make settings in WPC APEX Program mode. The Program Mode settings, accessed through the Main Program Menu (next section) - control WPC APEX operation for individual tools.

The WPC APEX press control can store the settings for 50 tools. The TOOL MANAGER enables you to view, edit, create, copy, delete, and load tools.

After you create a tool, you must program it before loading it. The programming process is described in the sections below.

Managing and Programming Tools

(PROGRAM MENU – TOOL MANAGER)

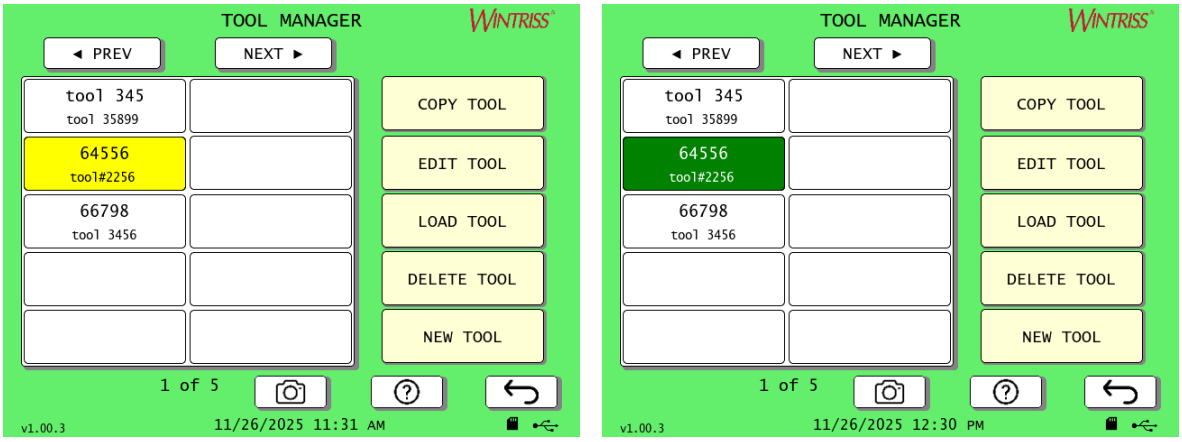


Figure 4-1. Tool Manager Screen

The Tool Manager screen displays a list of the tools that have already been created. The currently loaded tool is highlighted yellow. When you press to select a tool it is highlighted green, indicating it is the one to edit or perform other functions on.

To view, edit, load, delete, create, or copy a tool, press the appropriate button; see detailed instructions in the sections below.

Accessing the Tool Manager

(PROGRAM MENU – TOOL MANAGER)

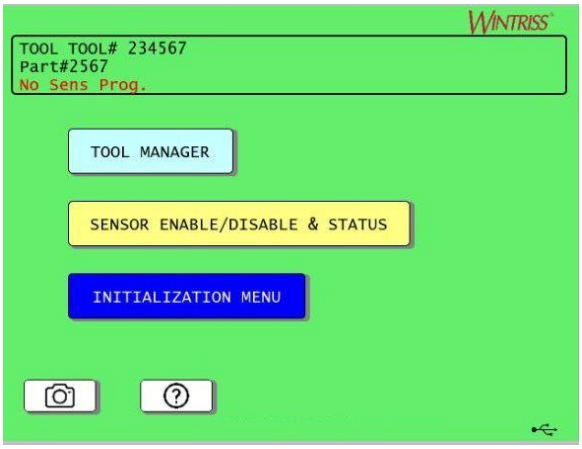


Figure 4-2. Main Program Menu

1. On the Main Program menu, Figure 4-2, press TOOL MANAGER. The Tool Manager screen appears, Figure 4-3. This shows the tools that are already programmed, if any. If a tool is currently loaded, it is highlighted in yellow.

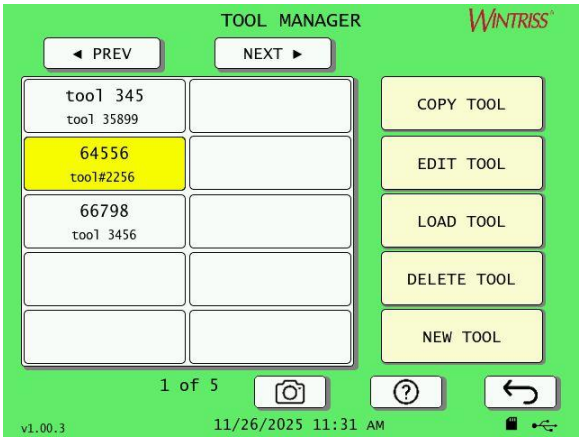


Figure 4-3. Tool Manager Screen

2. Press PREV and NEXT to access additional tools. Follow the instructions referenced below to perform the indicated operations, including creating a new tool.

   - *Accessing the Tool Manager*, page 200
   - *Copying an Existing Tool*, page 201
   - *Editing a Tool*, page 201
   - *Viewing the Tool Data Summary*, page 202
   - *Loading a Tool*, page 202
   - *Deleting a Tool*, page 204

- *Creating a New Tool*, page 204
- *Programming or Editing a Tool*, page 204

Copying an Existing Tool

(PROGRAM – TOOL MANAGER – Select Tool – COPY TOOL)

If you want to copy the settings programmed for an existing tool to a new tool, perform the following steps:

1. On the Tool Manager screen, press NEXT or PREV to see additional tools. Press the existing tool you want to copy. It is highlighted green to indicate it is selected.
2. Press COPY TOOL. The on-screen keyboard displays, Figure 4-4, showing the tool number you are copying.
3. Key in the tool number for the new tool, and press ✓ (checkmark) to accept; press ✕ to cancel.

Figure 4-4. On-Screen Numeric Keypad

4. The newly copied tool now appears in the Tool Manager. Go to *Programming or Editing a Tool*, page 204, and change the tool's settings as needed.

Editing a Tool

(PROGRAM – TOOL MANAGER – Select Tool – EDIT TOOL)

On the Tool Manager screen, Figure 4-3, press the tool you want to edit. It is highlighted green to indicate it is selected. Press EDIT TOOL. The program tool screen appears. Edit the tool according to *Programming or Editing a Tool*, page 204.

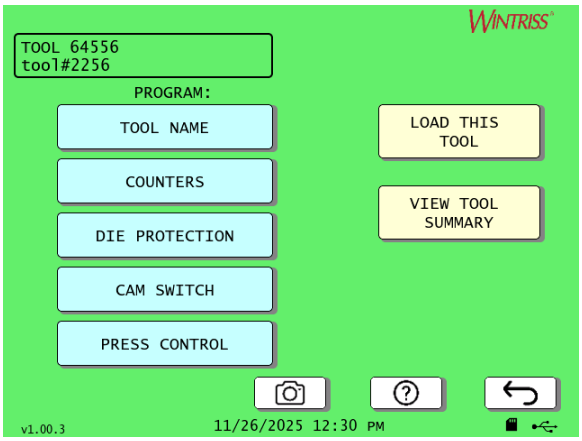


Figure 4-5. Tool Program Screen

Viewing the Tool Data Summary

(PROGRAM MENU – TOOL MANAGER – Select Tool – VIEW TOOL SUMMARY)

To view the data for a tool including counters, cams, and sensors, on the Tool Program screen, Figure 4-5, previous section, press VIEW TOOL SUMMARY. The Tool Data Summary screen appears, Figure 4-6.

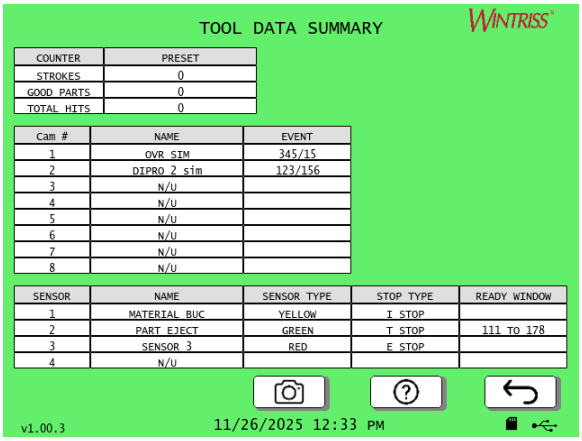


Figure 4-6. Tool Data Summary Screen

Loading a Tool

(PROGRAM – TOOL MANAGER – Select Tool – LOAD TOOL)

NOTICE

- If an error message displays, go to Chapter 6 and follow the instructions for correcting the problem.
- If the error is not covered in Chapter 6, or you cannot fix the problem, call Wintriss Tech. Support.

1. On the Tool Manager screen, press the tool you want to load.

2. Press LOAD TOOL. The warning shown in Figure 4-7 appears.
3. Press OK to continue loading the tool or CANCEL to cancel. The message in Figure 4-8 appears while the tool is loading; when loading is complete, the message in Figure 4-9 appears.

Figure 4-7. Load Tool Warning

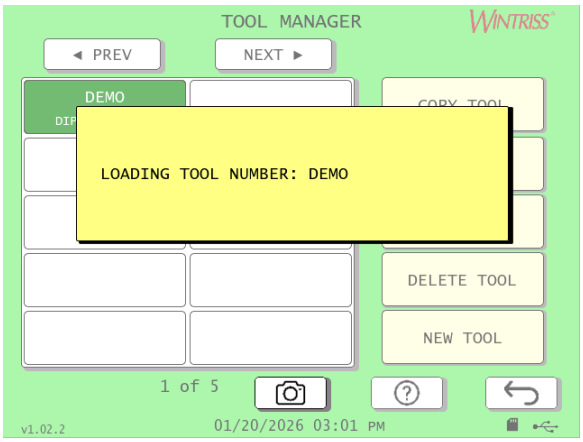


Figure 4-8. Loading Tool Message

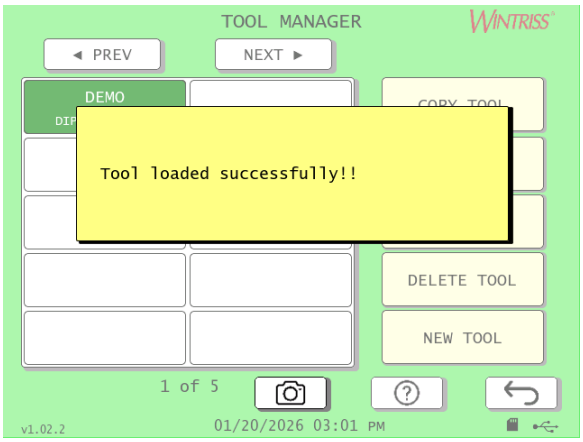


Figure 4-9. Tool Loaded Successfully Message

Editing a Loaded Tool

(PROGRAM – TOOL MANAGER – Select the Loaded Tool – EDIT TOOL)

NOTICE

RELOAD CURRENTLY LOADED TOOL IF YOU CHANGE IT

If you change settings for a tool that is currently loaded, you should load the tool again after you make the changes. If you do not re-load the tool, the old settings will be used until you load the tool again.

To change settings for a loaded tool, do the following:

1. With the currently loaded tool highlighted on the Tool Manager screen, press EDIT TOOL. The Tool Program menu is displayed. To change settings for the tool, follow the instructions in *Programming or Editing a Tool*, page 204.
2. When you have made the changes and backed out of the tool program menu, in the Tool Manager screen, load the tool as described in the previous section, *Loading a Tool*.

Deleting a Tool

(PROGRAM – TOOL MANAGER – Select Tool – DELETE TOOL)

To delete a tool, perform the following steps:

1. On the Tool Manager screen, press to highlight the tool you want to delete, and press the DELETE TOOL button. The window shown in Figure 4-10 appears, asking you to confirm that you want to delete the tool.

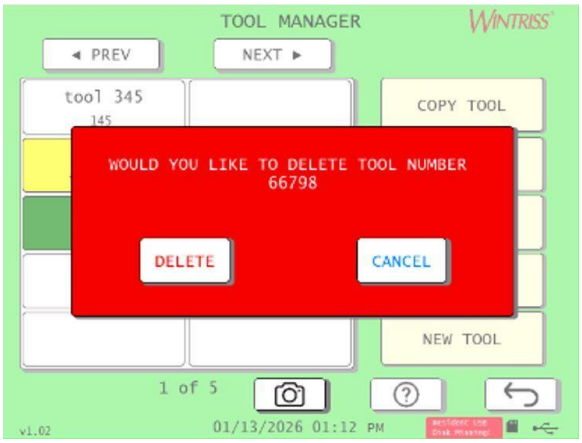


Figure 4-10. Delete Tool Confirmation Message

2. Press Yes to delete the tool. A message displays indicating that the tool has been deleted, and you are returned to the tool manager screen with the deleted tool removed.

Creating a New Tool

(PROGRAM – TOOL MANAGER – NEW TOOL)

On the tool manager screen, press NEW TOOL. The tool program menu opens. Program the new tool as described under *Tool Program Menu*, starting page 141.

Programming or Editing a Tool

TOOL NAME

1. Press TOOL NAME. The on-screen keyboard appears.
2. Key in the tool name. Press ✓ (checkmark) to accept. Press ✕ to cancel.

COUNTERS (Program Mode)

The counters maintain counts of press cycles (strokes), good parts, and the total number hits on each die that is run in the press. Enter the preset values on the counters screen.

APEX provides counts for the following:

Strokes Counter

Counts the number of cycles made by the press. When the user-programmed preset value has been reached, WPC APEX top stops the press and displays a message. The counter resets to zero (0) when the message is cleared.

Good Parts Counter

Counts the number of strokes made by the press; however, it will NOT increment if a fault was detected during the stroke. WPC APEX top stops the press and displays a message when the programmed preset value has been reached. When the message is cleared, the counter resets to zero (0).

Total Hits Counter

This counter is useful for tracking when die maintenance is required. The total hits counter keeps a running total of the number of hits on the currently loaded tool. It is incremented each time the press makes a cycle while the tool is loaded. When the programmed preset has been reached, a flashing message displays in the Status Box in Run mode. This is the only counter that stores and "carries over" the actual count when the tool is unloaded and rerun again at a later date.

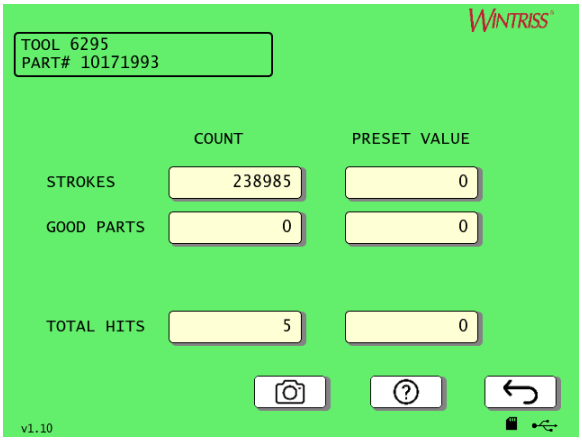


Figure 4-11. Tool Program Counter Screen

1. Press COUNTERS. The counters screen appears, Figure 4-11.
2. Press the box for the preset value you want to enter. The on-screen numeric keypad appears.
3. Key in the value for this preset. Press ✓ to accept the value and exit. Press ✕ to cancel.

DIE PROTECTION

WPC APEX provides four die protection sensors. Select the type of sensor monitoring for each one and set it up according to the information below.

Understanding Sensor Terminology

In order to make proper sensor settings on the WPC APEX, you need to be familiar with basic sensor terminology. Some of the terms that appear on the programming screens are explained in the following sections.

Ready Signal

Events such as part ejection, blow-off, or feed advance are expected to occur at certain times during the cycle. The die can be damaged if these events do not occur at the proper angle. The Ready Signal is a timing signal you specify for a sensor to tell the WPC APEX when to expect that sensor to actuate. If the event does not occur during this Ready Signal, the WPC APEX stops the press. You set a Ready signal only for green sensors, which monitor events that must occur on every stroke.

Sensor Types

NOTICE

For more detailed information on sensor types, visit https://wintriss.com/wcg/knowledgebase/dieprotection.html.

Sensors used with die protection systems are classified as Red, Yellow, or Green. Green sensors require an event to occur on every stroke.

When you make settings for a tool, you select the sensor type for each sensor connected to WPC APEX. You can program any combination of red, yellow, or green sensors. See the next two sections.

Static Sensors: Yellow and Red Sensors

Red and yellow sensors are easy to program: First name the sensor, select Red or Yellow, and select the stop type. Their operation is simple, too: If a Yellow sensor turns On, or a Red sensor turns Off, the press stops. Because these sensors operate independently of the crankshaft, you do not set a Ready signal for them.

Yellow Sensors

Yellow sensors are normally open. When a yellow sensor closes (actuates), WPC APEX sends a stop command to the press.

Red Sensors

Red sensors are normally closed (actuated). A stop command is sent to the press whenever a red sensor turns off.

Cyclic Sensors: Green Sensors

Green sensors monitor cyclic events that must occur during a certain portion of each stroke. Examples are part ejection, stock feed, and part transfer.

WPC APEX stops the press if a green sensor fails to actuate during its ready signal, or if it actuates at the wrong time. You set a ready signal for each green sensor

A green sensor must turn on, at least momentarily, at some point during its ready signal and turn off, at least momentarily, at some point outside the Ready signal.

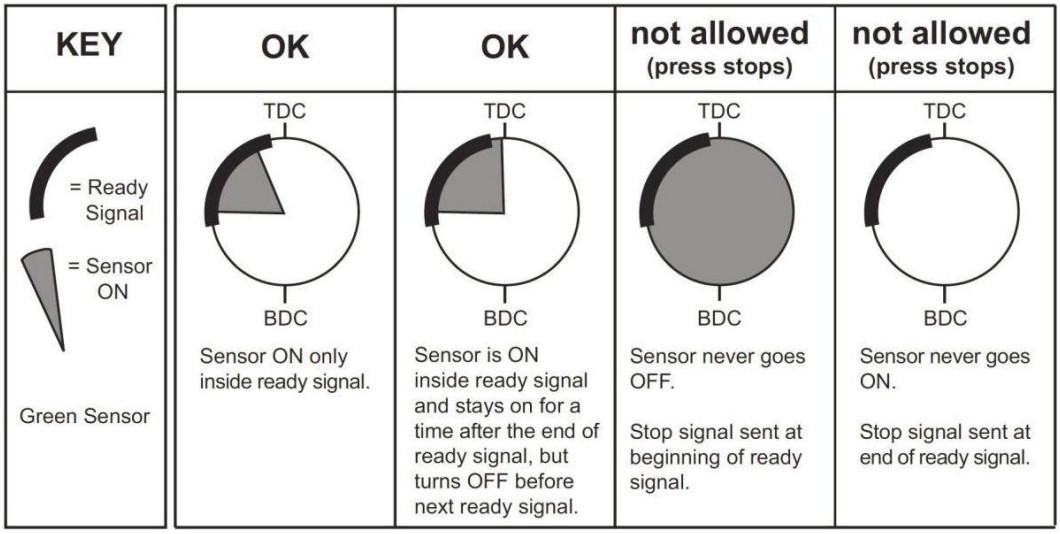


Figure 4-12. Ready Signal Programming for a Green Sensor

Programming Sensor Settings

(PROGRAM MENU – TOOL MANAGER – Select Tool – EDIT TOOL – DIE PROTECTION)

Follow the procedures below to program the four die protection sensors.

1. Turn the PROG/RUN key switch to PROG. The Main Program menu appears, Figure 4-2, page 200.
2. Press TOOL MANAGER. The Tool Manager screen appears, Figure 4-3, page 200. This shows the tools that are already programmed, if any.
3. Press PREV and NEXT to access additional tools. Press to select the tool for which you want to program sensors. Press EDIT TOOL. The Tool Editing Menu appears, Figure 4-13.

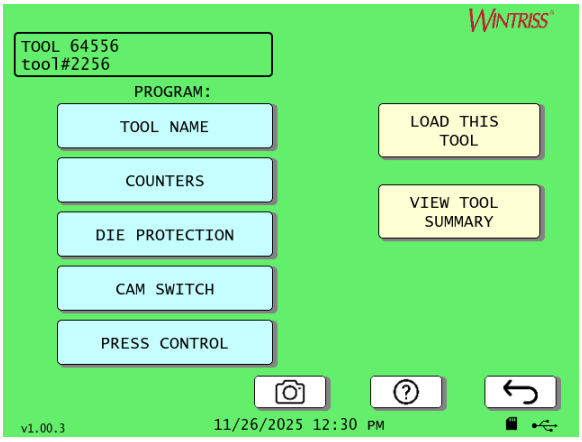


Figure 4-13. Tool Programming Menu

Press DIE PROTECTION. The Sensor Selection menu appears, Figure 4-14.

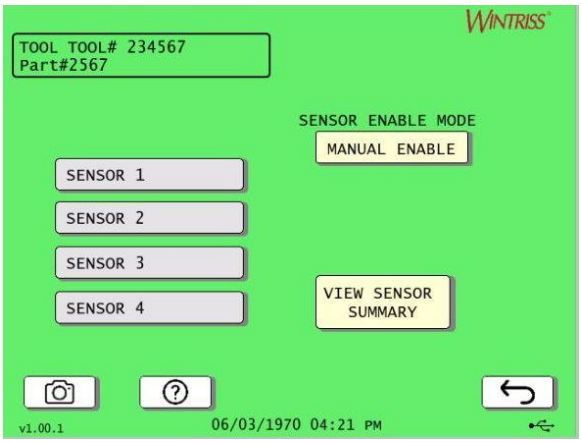


Figure 4-14. Sensor Selection Menu

4. Go to the next section to program this sensor.

Programming Sensor Name, Stop Type, and Sensor Type

On the die protection sensor program menu, select a sensor to program. Then, in the sensor program screen, enter settings for the sensor: name, stop type, and sensor type. If it is a Green sensor, proceed to setting the ready window.

- Assign a name to each sensor, next section.
- Set the sensor type (i.e., red, yellow, green), page 194.
- Set stop type (i.e., Top Stop, Immediate Stop, Emergency Stop), page 195.
- Set the Ready signal for a green sensor, page 198.
- Change sensor settings (page 200).
- View the sensor summary (page 201).
- Delete sensors (page 201).

1. In the Program main menu, press TOOL MANAGER. The Tool Manager screen appears.
2. Press the tool you want to program to highlight it. Press EDIT TOOL. The Tool Program screen appears.
3. Press DIE PROTECTION. The tool's sensor selection list appears, Figure 4-14, previous section.
4. Press the sensor you want to program. The sensor program screen appears, Figure 4-15.

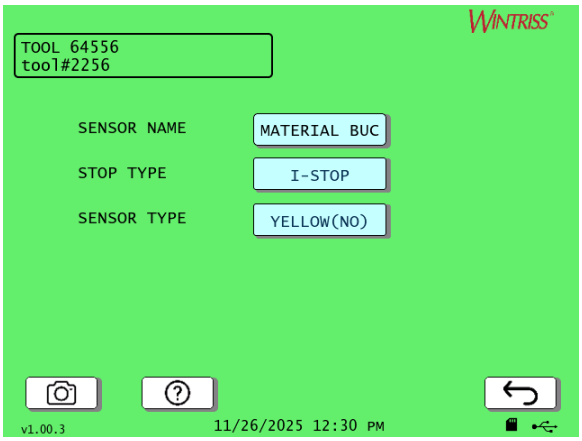


Figure 4-15. Sensor Program Screen

In the sensor program screen, make the appropriate settings by following these steps:

5. Press the entry box by SENSOR NAME. The on-screen keyboard appears.
6. Enter the name of the sensor. Press ✓(checkmark) to accept and exit; press ✕ to cancel.
7. Repeatedly press the entry box for STOP TYPE until it shows the stop type you want: T STOP or I STOP (Top Stop or Immediate Stop).
8. Repeatedly press the entry box for SENSOR TYPE until it shows sensor type you want: RED, YELLOW, or GREEN.
9. If this sensor is a GREEN type sensor, set the ready window, the crank angle range during which the sensor must turn on. Press the entry box by READY WINDOW. The ready window screen opens, Figure 4-16.
10. Set the ready window ON angle using the – and + buttons labeled ON. Likewise, set the ready window off angle using the – and + buttons labeled OFF. Press the Back button when done. The Ready on and off angles appear on the sensor program screen.

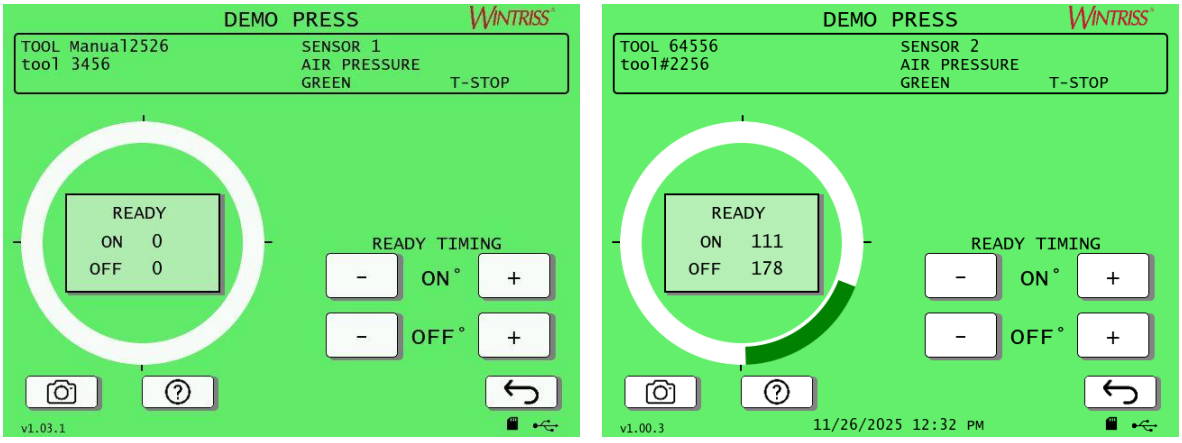


Figure 4-16. Ready Window Screens

11. Press the Back button to exit the sensor program screen.

Setting Sensor Enable Mode

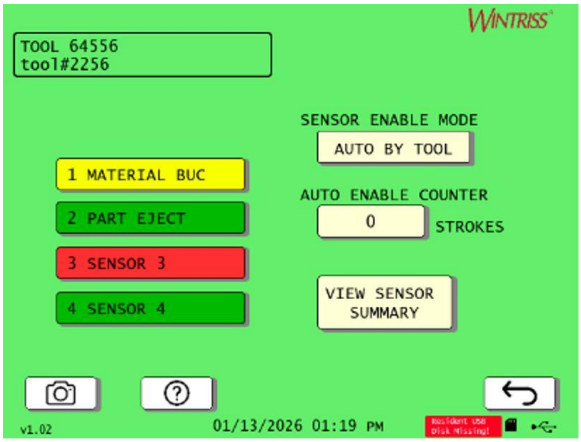


Figure 4-17. Sensor Program Menu

The options for sensor enabling are

MANUAL ENABLE – You manually enable sensors in Run mode.

AUTO BY TOOL – All sensors for this tool are enabled after the number of strokes you specify.

On the die protection sensor program menu, Figure 4-17, press the button below SENSOR ENABLE MODE. It toggles between MANUAL ENABLE and AUTO BY TOOL. Stop when it shows the enable mode you want.

- If you select MANUAL ENABLE, no further action is needed.
- If you select AUTO BY TOOL, below the sensor names, enter the number of strokes after which the sensors are enabled. Press the box for AUTO ENABLE COUNTER and the on-screen numeric keypad appears. Enter the number of strokes. Press ✓ (checkmark) to accept; press ✕ to cancel.

Viewing Sensor Status

To see which sensors are programmed and other information about them, in the sensor program menu, Figure 4-14, page 208, press VIEW SENSOR SUMMARY. The Sensor ON/OFF Status screen appears, Figure 4-18. On this screen you can enable or disable all sensors. See the next section.

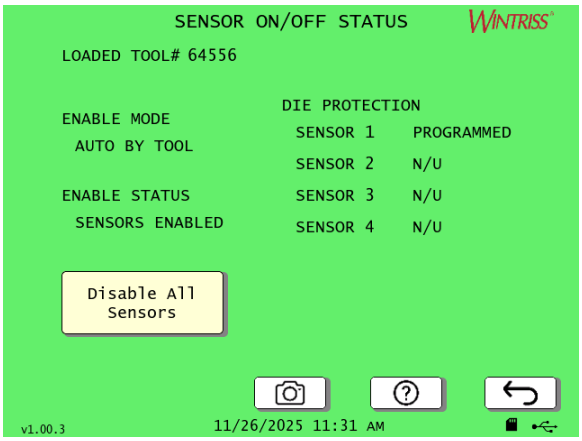
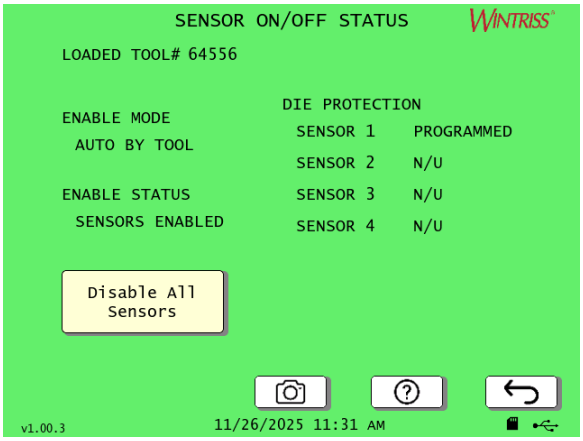


Figure 4-18. Sensor ON/OFF Status Screen

Enabling/Disabling All Sensors



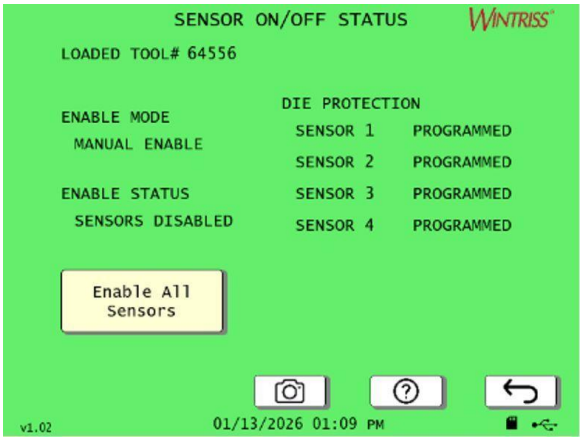


Figure 4-19.Sensor On/Off Status Screen

On the sensor ON/OFF screen, to enable or disable the sensors, do the following:

- If the sensors are enabled, disable them by pressing Disable All Sensors. If the button does not toggle to Disable, they may be set to "Auto by Tool" with the number of strokes set to 0 (zero). This would keep the sensors always enabled.
- If the sensors are disabled, enable them by pressing Enable All Sensors.

CAM SWITCH (Program Mode)

(PROGRAM MENU – CAM SWITCH)

WPC APEX provides eight cam channels. Follow the instructions below to make cam channel settings for the tool you are programming. Cam channels 5 through 8 are preset at the factory and

cannot be programmed unless you change them to allow programming, as instructed in *SET PROGRAM CAMS*, page 135.

1. On the Tool Programming menu, Figure 4-5, page 202, press CAM SWITCH. The Cam Switch menu appears, Figure 4-20. Programmed cams buttons are blue. Unprogrammable cams buttons are gray.

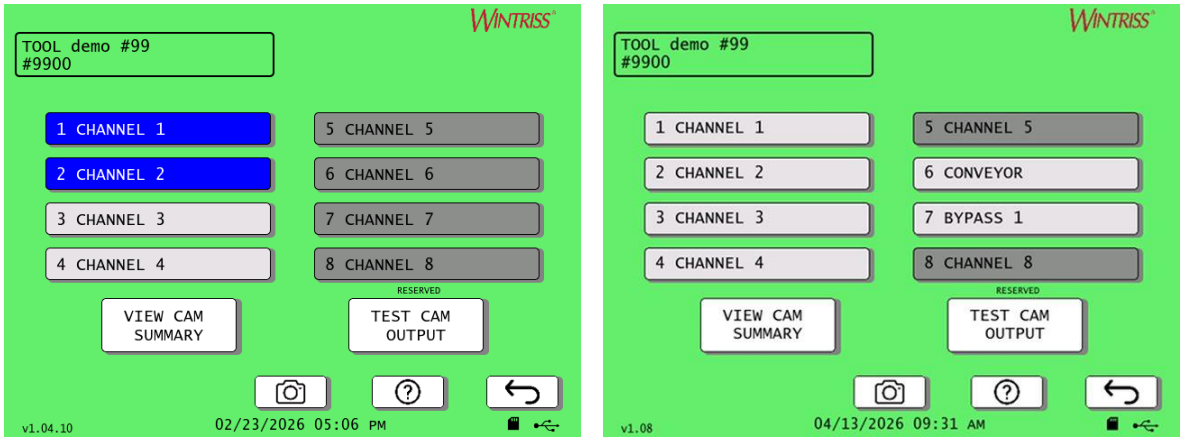


Figure 4-20. Cam Switch Menu, 5-8 Unprogrammable (left), 5 and 8 Unprogrammable (right)

2. Press the cam channel you want to program. The Cam Channel Program Screen appears, Figure 4-21.

3. Press the type of cam timing you want to use for the cam: ON/OFF ANGLES (go to *Setting Cam ON/OFF Angles*, page 213) or TIMED OUTPUT (go to *Setting Cam Timed Output*, page 213).

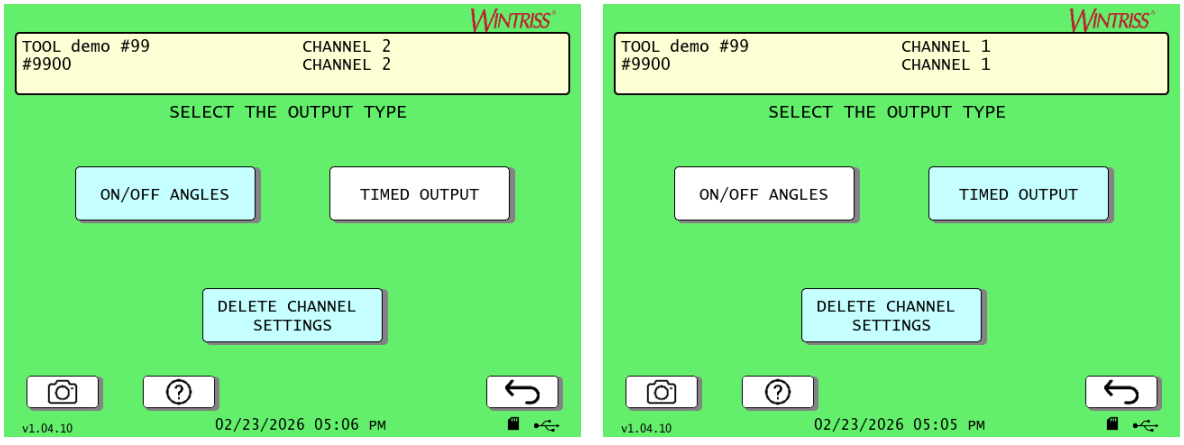


Figure 4-21. Cam Channel Program Screen

Setting Cam ON/OFF Angles

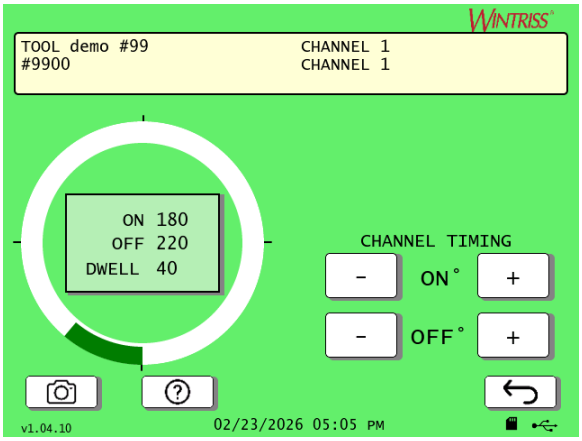


Figure 4-22. Cam Program, On and Off Angles

For an ON angle/OFF angle cam output, set the ON and OFF angles as follows.

1. Set the ON angle by pressing the + and – buttons labelled “ON°.”
2. Set the OFF angle by pressing the + and – buttons labelled “OFF°.”
3. Press the Back button when done.

Setting Cam Timed Output

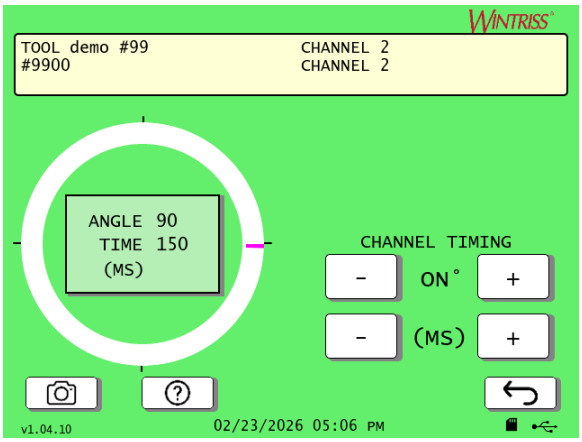


Figure 4-23. Cam Program, Angle and Time

For a timed output cam, set the angle at which it turns on and the length of time it stays on, in milliseconds (mS).

1. Set the ON angle by pressing the + and – buttons labelled “ON°.”
2. Set the ON time by pressing the + and – buttons labelled “(MS).”
3. Press the Back button when done.

Viewing Cam Summary

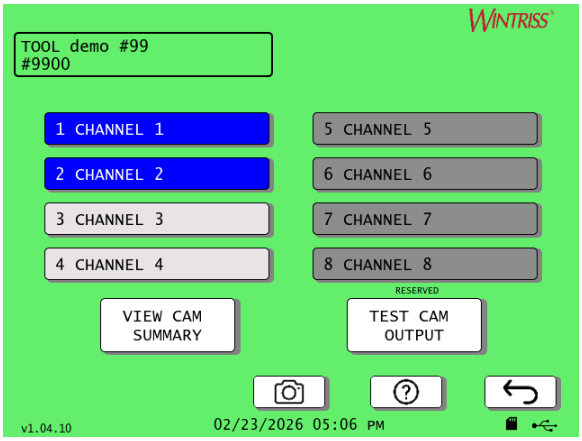


Figure 4-24. Cam Switch Menu

To view the cam summary, on the Cam Switch Menu press VIEW CAM SUMMARY. The Cam Summary screen appears, Figure 4-25, showing the cam numbers, names, and settings. Blue buttons indicate the cam is programmed.

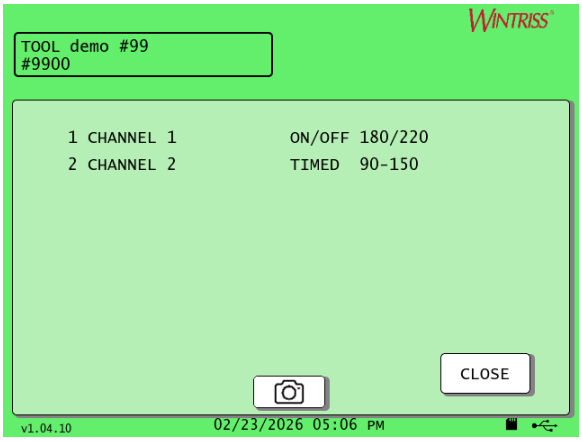


Figure 4-25. Cam Summary

Testing the Cam Outputs

⚠ DANGER

EQUIPMENT STARTING UNEXPECTEDLY
Ancillary equipment may operate when this cam output is tested.
Warn all personnel to stand clear.
Failure to comply with these instructions will result in death or serious injury.

You can test the cam outputs by turning them on and off from the display.

1. On the Cam Switch Menu, Figure 4-24, previous section, press TEST CAM OUTPUT. The Cam Output Testing screen appears, Figure 4-26.

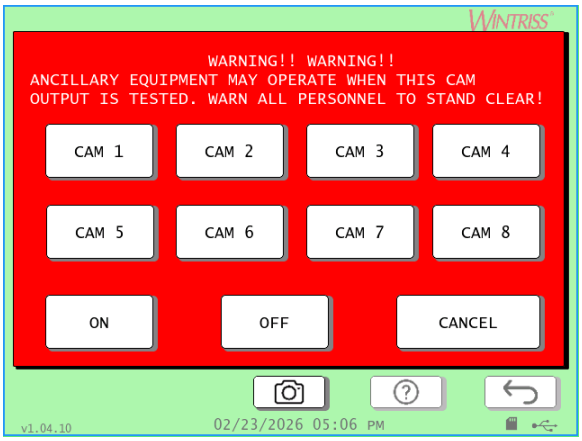


Figure 4-26. Cam Output Testing Screen

2. Press the cam you want to test. The button turns blue.

3. Press the ON and OFF buttons to turn the cam on and off. The button turns black when you press it. Observe the cam output and ensure it goes on and off as indicated. Figure 4-27 shows the Cam Output Testing screen during testing.

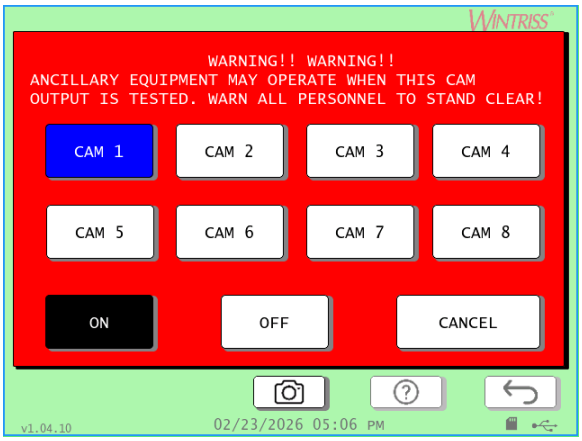


Figure 4-27. Cam Output Testing Screen During Testing of Cam 1

PRESS CONTROL (Program Mode)

(PROGRAM MENU – PRESS CONTROL)

On the Tool Programming menu, Figure 4-13, page 207, press PRESS CONTROL. The Press Control Parameters screen appears, Figure 4-28.

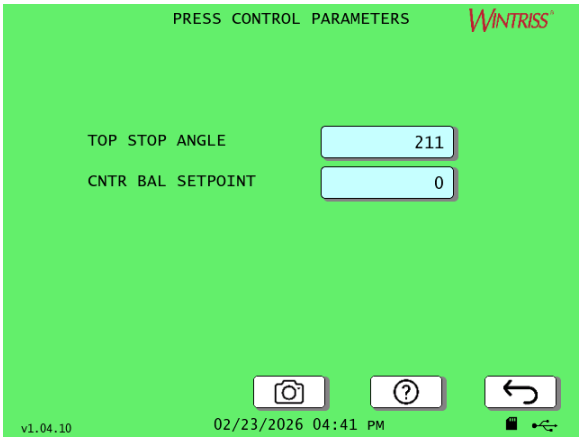


Figure 4-28. Press Control Parameters Screen

Setting Top Stop Angle for a Tool

1. To set the Top Stop Angle for the tool you are programming, press the entry box next to TOP STOP ANGLE. The on-screen numeric keypad appears.
2. Key in the desired Top Stop Angle. Press ✓ (checkmark) to accept; press ✕ to cancel.

Setting the Counterbalance Setpoint for a Tool

1. To enter the Counterbalance Setpoint, press the entry box next to CNTR BAL SETPOINT. The on-screen numeric keypad appears.
2. Key in the desired Top Stop Angle. Press ✓ (checkmark) to accept; press ✕ to cancel.

SENSOR ENABLE/DISABLE & STATUS

(PROGRAM MENU – SENSOR ENABLE/DISABLE & STATUS)

To examine the status of the sensors, including which are programmed, the sensor enable mode, and whether the sensors are enabled, follow the instructions below.

1. On the Main Program menu, Figure 4-2, page 200, press SENSOR ENABLE/DISABLE & STATUS. The Sensor Enable/Disable and Status screen appears, Figure 4-29. It shows the sensor enable mode, enable status, and whether the sensors are programmed.

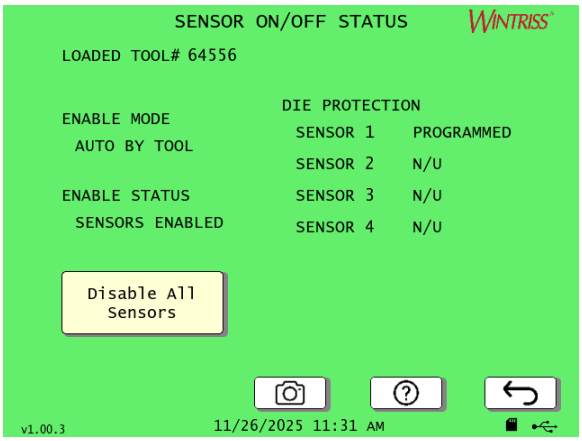


Figure 4-29. Sensor Enable/Disable and Status Screen

2. To disable all the sensors, press Disable All Sensors.

Chapter 5 – Run Mode

⚠ DANGER

IMPROPER INSTALLATION, USE OR MAINTENANCE

- Follow all procedures in this manual. Lockout Tagout the press during all installation, modification, repair, or maintenance procedures.
- Perform and ensure that WPC APEX passes all tests described in previous chapters.
- Ensure that the machine guarding system is installed and maintained according to OSHA standard 1910.217, ANSI B11.1, ANSI B11.19 and any other regulations and standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.
- Perform the checkout sequence (see *Final Checkout, page* 177) after installation and after any modification or repair of the WPC APEX.
- Ensure that supervisors, die-setters, maintenance persons, machine operators, foremen, and any others responsible for operation of the machinery have read and understood all instructions for use of the WPC APEX.
- Disconnect the “Continuous” position on the Stroke Select switch to prevent your press from being run in Continuous mode if it is not guarded correctly for use in Continuous mode. Also cover the “CONT” label on your control’s Stroke Select switch.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MORE OPERATORS THAN OPERATOR STATIONS

- Ensure that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.
- During setup, lockout/tagout the press if there are more operators than operator stations.
- Verify at every shift change that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INCORRECT AUTO CARRY-UP ANGLE

- Ensure that the Auto Carry-up Angle is correct. If the operator can reach the pinch point, the Auto Carry-up Angle must be set so that any hazardous openings are smaller than 1/4 in. by the time the crankshaft reaches the Auto Carry-up Angle.
- Determine the Auto Carry-up Angle for each tool based on the crank angle at which the tool’s hazardous openings are smaller than 1/4 in.
- Change the Auto Carry-up Angle to the correct value for the new tool whenever you change tools.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

TWO-HAND CONTROL TOO CLOSE TO HAZARDOUS AREA

Verify at each shift change that any moveable Two-hand controls are located at least the safety distance from the pinch point or hazardous area.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

FAULTY INSTALLATION

- Ensure that wiring is correct.
- Use only safety-certified components for safety functions, including interlock switches used in safety applications.
- Install guarding to prevent access to hazardous areas. Prevent access to hazardous areas over, under or around any guarding devices.
- Ensure that there is one active Operator Station for each operator if you are using Two-hand mode.
- Use Foot Switch or One-hand Control only with properly installed light curtains.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

CLEARING LOCKOUT ERROR MESSAGE WHEN YOU TURN ON POWER TO THE PRESS

Whenever you turn on power to your press, the Lockout Error message appears on the display (see *Lockout Message*, page 247). To clear this message, simply turn the Stroke Select switch to “OFF” and then back to the previous operating mode. If the Stroke Select switch is already in the “OFF” position when you power up, turn it to the desired stroke selection to clear the Lockout Error message. Once the Lockout Error message has been cleared, you can resume operation.

NOTICE

PRESS STOPS WHEN SYSTEM FAULT DETECTED OR LIGHT CURTAIN BLOCKED

- The WPC APEX stops the press if a system fault is detected or if the light curtain is blocked during the non-muted portion of the stroke.
- If the press stops, the Interrupted Stroke message in the WPC APEX display status box (see Figure 1-4, page 33) will flash and a three-character fault code, consisting of the letter “E,” “F,” or “H” followed by a two-digit number, will appear.
- When an Interrupted Stroke occurs, WPC APEX automatically switches to Two-hand Maintained Single Stroke mode for the remainder of the stroke (see *Responding to an Interrupted Stroke*, page 222). To clear a system fault, press OK on the WPC APEX display.

NOTICE

You can make changes to certain settings in Run mode if allowed by Security Access and/or allowed with the appropriate security access passcode. See *SECURITY ACCESS*, page 137.

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

- **Immediate Stop (I STOP) (formerly E Stop) - Red button**
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC) (formerly E Stop Lockout)**
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP) (System wide stoppage) – Red button w/ yellow halo**
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

This chapter shows you how to operate your WPC APEX, using each Stroke and Mode setting. To enter RUN Mode, turn the PROG/RUN key switch to RUN. The Main Run screen appears,

Figure 5-1. Main Run Screens

Responding to an Interrupted Stroke

⚠ DANGER

INTERRUPTED STROKE DUE TO MACHINE MALFUNCTION

Investigate and correct the cause of the Interrupted Stroke before resuming operation of the press.

Failure to comply with these instructions will result in death or serious injury.

An Interrupted Stroke is a condition that occurs whenever the press is stopped before a stroke can be completed, forcing the operator to return the press to its Top Stop position. The command that stops the press may be issued by the operator or a safety device or be the result of a fault condition. When an Interrupted Stroke occurs, an Interrupted Stroke message appears in the WPC APEX status box (see Figure 1-4, page 33, for location of status box), and WPC APEX automatically switches to Two-hand Maintained Single Stroke mode. To clear the Interrupted Stroke, press both Run/Inch palm buttons on the Operator Station until the press returns to top dead center. When the press has returned to Top Stop, the Interrupted Stroke message disappears, and WPC APEX switches back to the stroke and mode selected when the Immediate stop occurred.

When the Immediate stop is caused by a system fault, you must first clear the error by pressing OK on the WPC APEX display; then you can return the press to top dead center.

If the press is being operated in Inch mode when the Immediate stop occurs, WPC APEX stays in Inch mode, allowing the operator to return the press to Top Stop by simultaneously pressing and holding the Run/Inch palm buttons just as he does in Two-hand Maintained Single Stroke mode.

Responding to a Brake Warning

The amber-colored Brake Warning LED on the WPC APEX display (see Figure 1-2, page 30, for location) illuminates whenever the Stopping Time of the press, which is recorded by the Brake Monitor on every Top stop, increases to within 10 milliseconds of the Stop-time Limit set in Initialization (see Viewing and Setting Stop Time and Start Time Limits, page 156). The brake warning alerts you to the need for maintenance on or repair of the brake (see *Brake Warning LED*, page 248).

WPC APEX compares the Stopping Time of the press with the Stop-time Limit each time the press top stops.

Whenever the Stopping Time of the press becomes longer than the Stop-time Limit, the out-of-limit value flashes on the display, and WPC APEX prevents the press from being run until the problem has been completely corrected (see *Stop Time Exceeded*, page 248).

Stopping Angle

Stopping Angle is the number of degrees of crankshaft rotation required for the press to stop after a “stop” command is issued. The Stopping Angle is calculated by subtracting the crankshaft position when the dual safety valve (DSV) is closed from the press’s position when it actually stops. This parameter is useful in determining where to set Top Stop and in die-protection settings.

Enabling/Disabling Sensors

On the Main Run Screen, Figure 5-1,

- If the sensors are disabled, press Enable Sensors to enable them.
- If the sensors are enabled, press Disable Sensors to disable them.

This button toggles between Enable Sensors and Disable Sensors

Counters (Run Mode)

(RUN – COUNTERS)

This menu selection allows you to make adjustments to counter settings made in Program mode. Adjustments are entered on the Counters screen (see Figure 5-2), which displays when you press Counters on the Main Run Screen.

On the Counters screen, you can change or reset the values for the strokes, good parts, and total hits counters and presets. For instructions on entering counter and preset values in Program mode, see *COUNTERS (Program Mode)*, page 205.

1. On the Main Run screen, Figure 5-1, page 221, press Counters. The Counters screen appears, Figure 5-2, showing the preset values set during programming and the current counts for strokes, good parts, and total strokes.

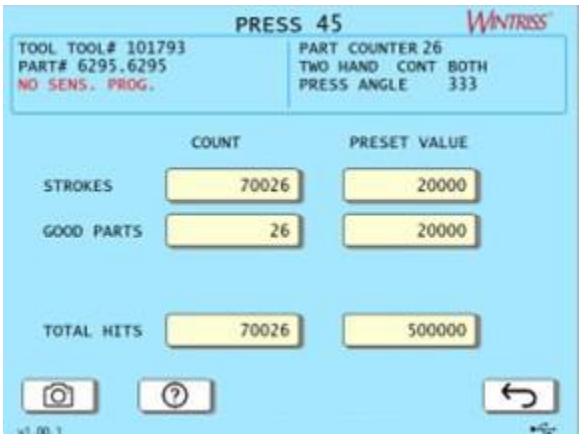


Figure 5-2. Counters Screen

2. On this screen, you can change or reset the values for the strokes, good parts, batch and total hits counters and presets if you have the appropriate security access. Press the box containing the value you want to change. The on-screen numeric keypad appears.

3. Enter the value you want. Press ✓ (checkmark) to accept; press ✕ to cancel.

For information about the counters and how to enter them, see *COUNTERS (Program Mode)*, page 205.

Die Protection (Run Mode)

(RUN – DIE PROTECTION)

You program die protection sensors for each tool in Program Mode (see *Programming Sensor Settings*, page 207). You can also view the settings and adjust them in Run Mode.

Viewing Die Protection Sensors and Status

(RUN – DIE PROTECTION – VIEW SENSOR SUMMARY)
(RUN – DIE PROTECTION – SHOW SENSOR STATUS)

1. On the Main Run screen, Figure 5-1, page 221, press NEXT or PREV to see additional menu items. Press Die Protection. The die protection screen appears, showing the sensors that have been programmed, Figure 5-3.

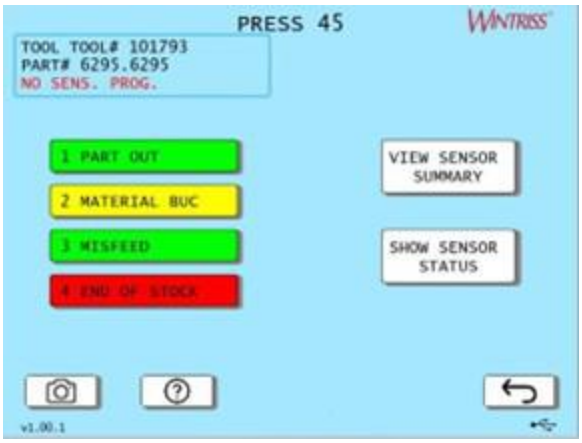


Figure 5-3. Die Protection Sensors Screen

2. To view the sensor summary or status in the die protection sensors screen do the following:

   - **Sensor Summary**: Press VIEW SENSOR SUMMARY. The summary appears, Figure 5-4.
   - **Sensor Status:** Press VIEW SENSOR STATUS. The sensor status screen appears, Figure 5-5.

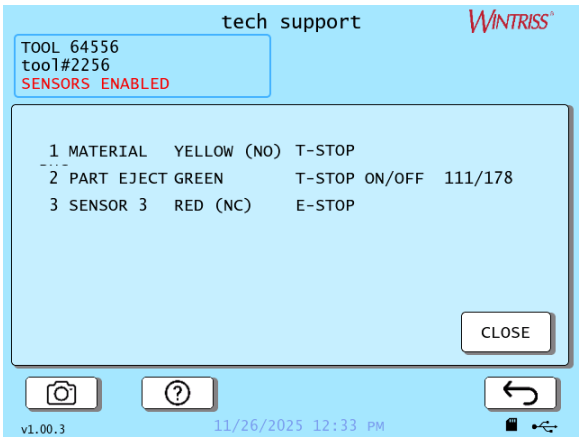


Figure 5-4. Die Protection Sensor Summary Screen

The die protection sensor summary screen shows the following for programmed sensors. It does not show unprogrammed sensors.

- sensor number
- sensor name
- sensor type
- stop type
- for green sensors, the ready window type and ON/OFF angles

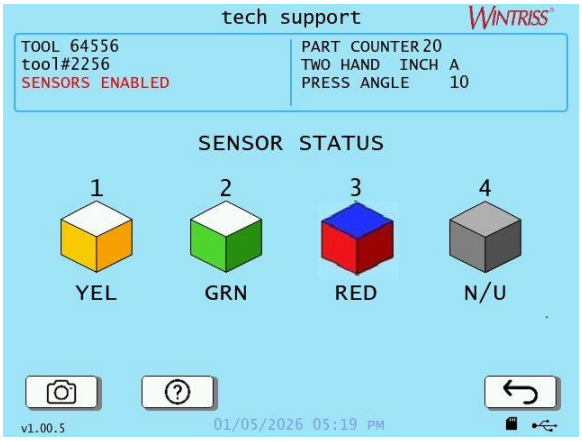


Figure 5-5. Die Protection Sensor Status Screen

The Sensor Status screen is designed so you can quickly check the status of all your sensors. A gray cube graphic indicates the sensor is not programmed. The top of colored cube graphics indicates the status of the sensors:

- Blue top: actuated.
- White top: not actuated

Adjusting the Ready Window for a Green Die Protection Sensor (Run Mode)

(RUN – DIE PROTECTION – Select sensor)

In Run mode you can adjust the ready angle for green sensors.

When you run the press, the angles at which the selected sensor turns on and off during each stroke are shown in the window labeled SENSOR at the right of the screen (Figure 5-6), and the number of degrees that the sensor is on is represented graphically by a black arc on the crank angle clock. This information allow you to fine-tune the Ready window settings made in Program mode.

Recall that a standard green sensor must turn on, at least momentarily, at some point during the Ready window and turn off, at least momentarily, at some point outside the Ready window (See *Cyclic Sensors: Green Sensors*, page 206).

To adjust the ready signal for a green sensor, follow the instructions below.

1. In the Main Run screen, press Die Protection. The die protection screen appears, showing the sensors that have been programmed, Figure 5-3, 224.

2. Press the button for the green sensor you want to adjust the ready angle for. The Ready Window Adjust screen appears, Figure 5-6, showing a crank angle clock and these items:

    - the currently set ready window (wide green arc)
    - ready window ON and OFF angles
    - sensor activation on last stroke (narrow dark blue arc)
    - sensor ON and OFF angles on last stroke
    - Ready window ON/OFF angle adjust buttons

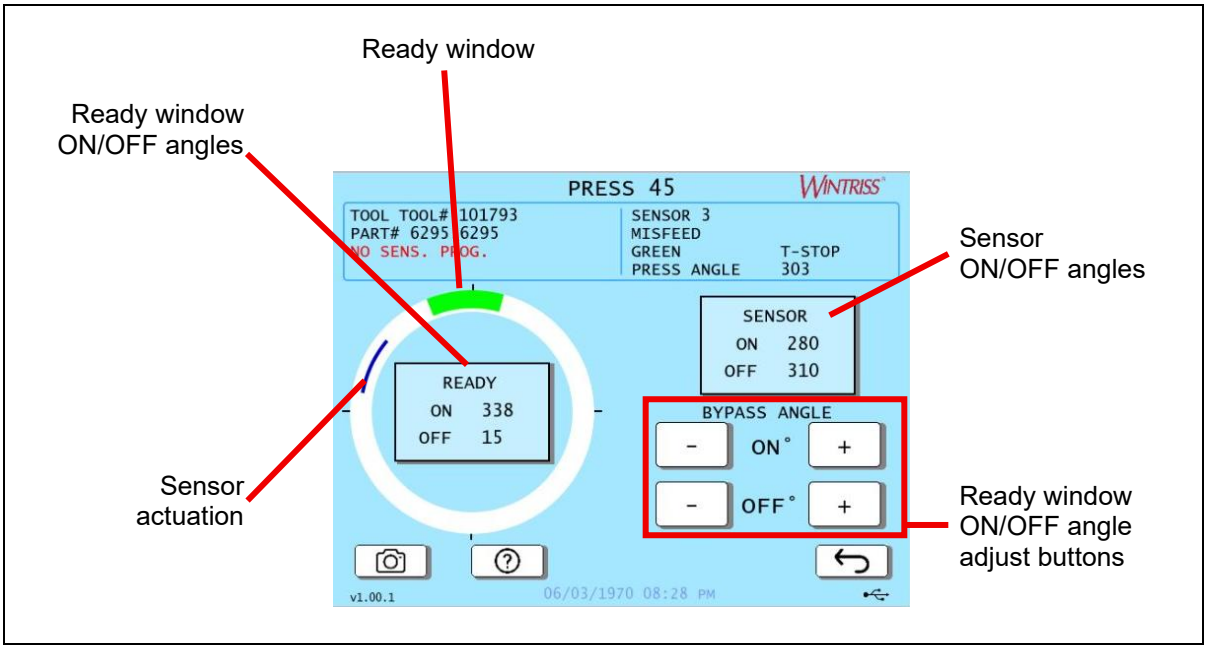


Figure 5-6. Ready Window Adjust Screen

3. Adjust the Ready window ON and OFF angles using the + and – buttons to the right, labelled "ON" and "OFF."

4. When done, press the Back button to return to the Die Protection Sensors Screen.

Press Control: Setting Press Control Parameters

(RUN – PRESS CONTROL)

Press Control

The Press Control Screen enables you to adjust the top-stop angle, maximum and minimum press speed limits, and counterbalance setpoint established for the selected tool in Program mode, *PRESS CONTROL (Program Mode)*, page 216. (The Counterbalance Setpoint field does not display if the Counterbalance Tolerance has been set to zero (0) in Initialization mode.) Make these adjustments on the press control screen, Figure 5-7.

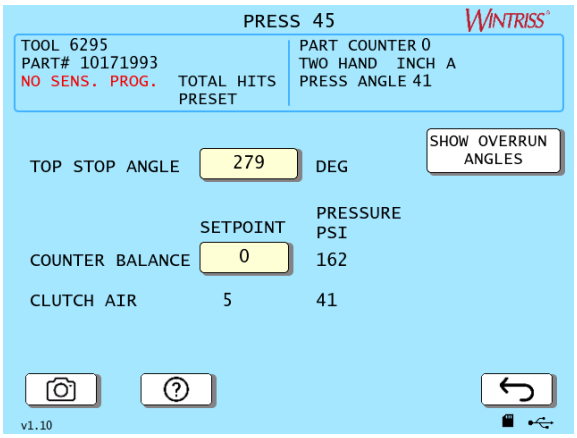


Figure 5-7. Press Control Screen

You can also view (but not adjust) the angles at which the overrun sensor turns on and off (see *Displaying Overrun Sensor On/Off Angles*, page 229).

In addition, the current counterbalance air pressure may be displayed if the counterbalance tolerance is set to a value other than zero (0) in Initialization, and the main air pressure setpoint and current main air pressure are shown if the main air limit has been set to a non-zero value in Initialization.

Viewing Press Control Settings

Follow the instructions below to view the following in Run mode:

- Top stop angle
- Counterbalance pressure and setpoint (tolerance)
- Clutch air pressure and setpoint (tolerance)

The top-stop angle is the crankshaft angle at which the press top-stops. The top-stop angle default value is set in Initialization (see *Setting the Auto Carry-up Angle,* page 152) and adjusted in Program mode to account for differences in die weight, press speed, etc. for each tool.

The counterbalance setpoint is used together with the counterbalance tolerance you set in Initialization (see *Setting Clutch and Counterbalance Air Pressure Limits*, page 167) to specify the pressure range outside of which an F46 (Counterbalance Air Outside Sensor Limits) error displays on the WPC APEX. This field does not display if the Initialization tolerance value is set to zero (0), disabling the Counterbalance Setpoint feature.

To adjust one or more of these settings, do the following:

1. Press PRESS CONTROL on the Main Run menu, Figure 5-1, page 221. The press control screen displays, Figure 5-7, above.
2. Press the entry box next to the parameter you want to change. The on-screen numeric keypad appears.

Figure 5-8. On-screen Numeric Keypad

3. Key in a new value and press ✓ (checkmark) to accept it and return to the previous screen. To cancel, press ✕.
4. Repeat steps 3 and 4 for each item you want to adjust.
5. When you are finished, press the back button to return to the main run menu.

Displaying Overrun Sensor On/Off Angles

You can display the angles at which the overrun sensor turns on and off, in order to verify that you have installed the overrun sensor magnet correctly. To do so, perform the following steps:

On the press control parameters screen, press SHOW OVERRUN ANGLES. A window like the one shown in Figure 5-9 displays.

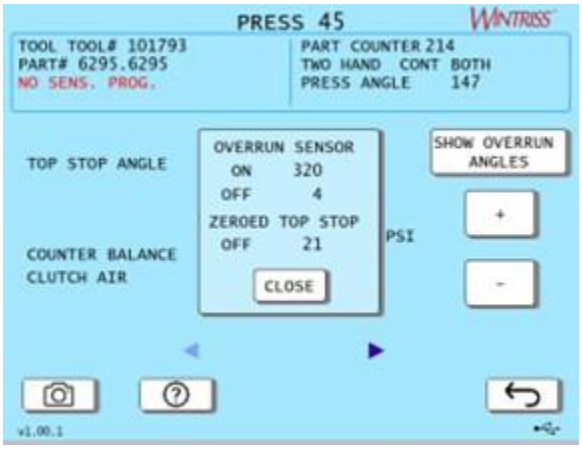


Figure 5-9. Press Control Screen showing Overrun Angles Window

In addition to the overrun sensor on and off angles, the window displays the angle at which the Top-stop cam turns off. The value displayed in the zeroed top stop off field allows you to verify that the Top-stop cam, which normally stays on for 20°, turns off before the overrun sensor turns on.

CAM SWITCH (Run Mode)

(RUN – CAM SWITCH)

On the Main Run Screen, Figure 5-1, page 221,press Cam Switch. The Cam Channels Programmed screen appears, Figure 5-10, showing the programmed cams. From this screen, you can choose to adjust the cam timing, view a summary of the programmed cams, or view the timing of the programmed cams.

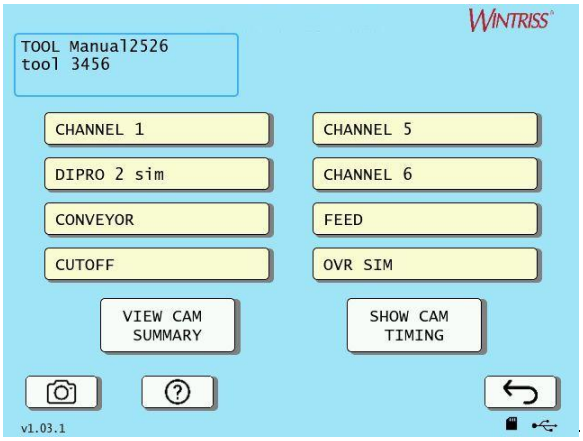


Figure 5-10. CAM Channels Programmed Screen

- To adjust the cam timing, press the box with the number of the cam you want to adjust. Go to the next section, *Adjusting Cam Timing in Run Mode*, page 230.
- To view the cam summary, press VIEW CAM SUMMARY. The Cam Summary Screen appears, Figure 5-11. This screen shows the cam channel numbers, names and on/off angles for the cams that are programmed.
- To view the cam timing, press SHOW CAM TIMING. The Cam Timing Screen appears, Figure 5-12. This shows a graph of the timing of all the cam channels. In this example, only cam channel 6 is programmed.

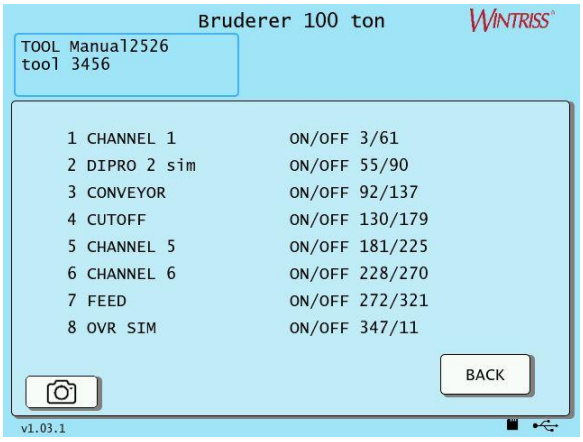


Figure 5-11. Cam Summary Screen

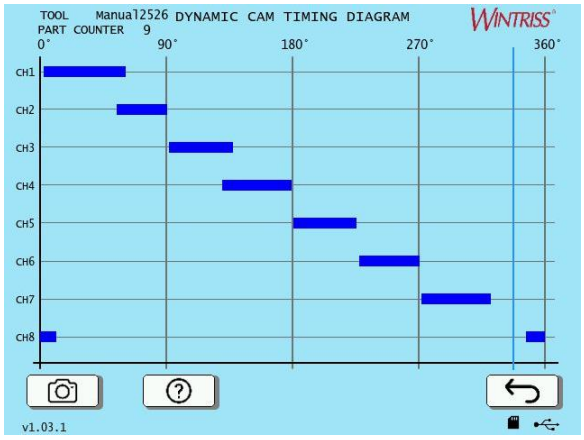


Figure 5-12. Cam Timing Screen

Adjusting Cam Timing in Run Mode

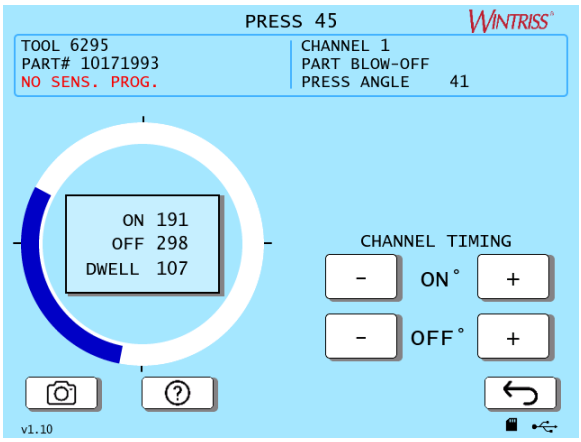


Figure 5-13. Adjust Cam ON/OFF

Follow the instructions in the previous section to navigate to this Adjusting Cam Angles screen. It shows an angle clock graphic and reports the ON and OFF angles, as well as the resulting dwell angle.

To adjust the ON angle, press the + and – buttons labelled “ON” until the desires angle shows inside the graphic. Adjust the OFF angle in similar fashion. When done, press the Back button to return to the previous screen.

BRAKE MONITOR

To perform a 90° stop test, follow the instructions below.

1. On the Main Run Screen, Figure 5-1, page 221, press Brake Monitor. The Press Control Stop Time screen appears,

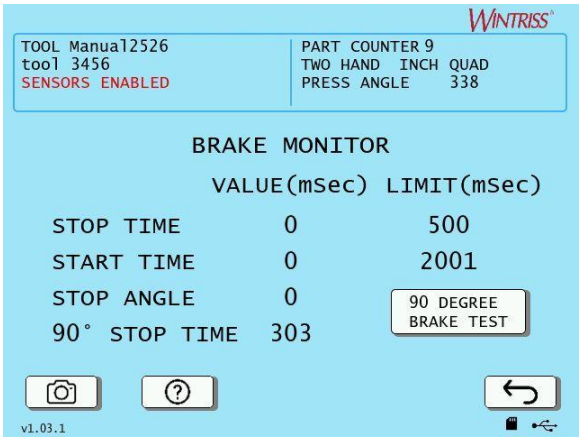


Figure 5-14. Press Control Stop Time Screen

2. Press 90 DEGREE BRAKE TEST and follow the on-screen instructions.

Viewing the Event Log

The event log records fault codes and other information about events that occur. Follow the instructions below to view the event log.

1. On the main run menu, Figure 5-1, page 221, press PREV or NEXT to show additional menu items.

2. Press Event Log. The Event Log screen appears, Figure 5-15, showing the most recent event first. Press NEXT or PREV to view additional event log items. Press the back button to return to the Main Run screen.

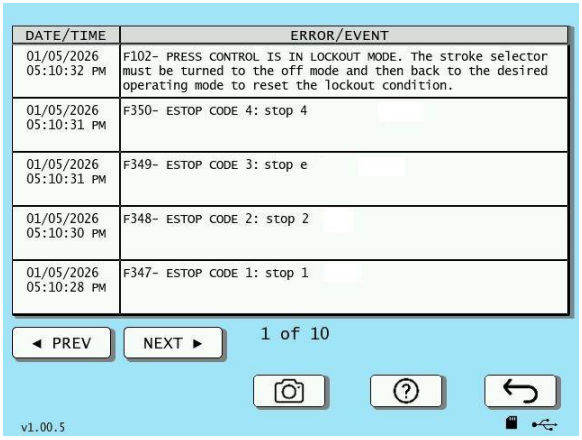


Figure 5-15. Event Log Screen

Operating the Press in Inch Mode

⚠ DANGER

IMPROPER SAFEGUARDING

Ensure that the machine guarding system is installed and maintained according to OSHA regulation 1910.217, ANSI standards B11.1 and B11.19, and any other regulations or standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury..

⚠ DANGER

INCH MODE NOT SUITABLE FOR PRODUCTION

DO NOT use INCH mode as a production mode, per ANSI B11.1-2009.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

I STOP/INTERRUPTED STROKE WHEN IN INCH MODE

If the press is in Inch mode when it is Immediate stopped, it does not switch to Two-hand Maintained Single Stroke but stays in Inch for the remainder of the stroke.

To operate the press in Inch mode, do the following:

1. Set the Stroke Select switch to “INCH.”
2. Set the Mode Select switch as follows:

If a light curtain is installed on the press, set the switch to “2 HAND” or “1 HAND.” The light curtain will be muted on the upstroke if WPC APEX has the muting option.

If no light curtain is installed, set the switch to “2 HAND.” If you set the switch to “1 HAND,” WPC APEX defaults to Two-hand mode.

There are four different ways to operate the press in Inch mode:

- Top stop in Inch
- Top stop Bypass
- Micro-inch
- Dead Motor Inch

Top Stop in Inch

Top Stop in Inch is the default Inch mode. To run the press in Top Stop in Inch, do the following:

1. To move the ram a short distance, press and hold both Run/Inch palm buttons on the Operator Station at the same time, releasing them when the ram has reached the desired point in the stroke.

NOTICE

If you are running the press in One-hand mode, you need to depress the left Run/Inch button only.

The ram moves only as long as both Run/Inch buttons are depressed. Releasing one of the buttons stops the ram immediately.

NOTICE

The ram will also stop if the light curtain is blocked during the non-muted portion of the stroke, or if a system fault is detected.

2. Repeat the previous step to continue "inching" the ram.
3. To move the ram to Top stop, press and hold both Run/Inch palm buttons until the ram comes to a stop at the top of the stroke.
4. To initiate another stroke, release the Run/Inch buttons, then press and hold them until the ram again comes to rest at the Top stop position.

NOTICE

When "inching" the press, you may not notice when the ram top stops.

Top Stop Bypass (Top Stop in Inch Disabled)

Top Stop in Inch can be disabled so that the ram continues to cycle, without coming to a Top Stop, as long as the Run/Inch buttons on the Operator Station are depressed. In this alternative Inch mode, called Top Stop Bypass, the ram stops only when one or both buttons are released.

To disable Top Stop in Inch, refer to *Disabling Top Stop in* Inch, page 81.

Micro-inch

Micro-inch allows finer adjustments than are possible in Top Stop in Inch or Top Stop Bypass and is designed to facilitate setup on high-speed or short-stroke presses. In Micro-inch, the distance the ram moves is controlled by a time setting you make on the WPC APEX display (see *Micro-Inch* Settings, page 166). When that time has elapsed, the ram comes to a stop even though the Run/Inch palm buttons are still depressed.

The ram can be stopped before the end of the Micro-inch time by releasing one or both Run/ Inch buttons. To move the ram through a complete stroke in Micro-inch, you must "inch" the press. Micro-inch has no Top Stop feature.

Wiring instructions are provided in *Wiring Micro-inch*, page 81.

Enabling/Disabling Micro-Inch

Enable or disable Micro-inch as follows:

1. Turn the PROG/RUN key switch to RUN.
2. Turn the Stroke Select key switch to OFF. The following menu appears:

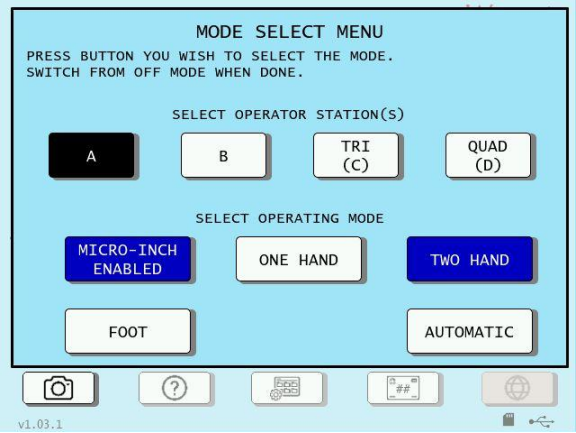


Figure 5-16. Mode Select Menu

3. Press the button to toggle between MICRO-INCH ENABLED and MICRO-INCH DISABLED. Stop when the desired setting shows.

NOTICE

INTERRUPTED STROKE

When Micro-inch is enabled, WPC APEX automatically switches to Two-hand Maintained Single Stroke during an Interrupted Stroke even though the press is in Inch. Normally, WPC APEX remains in Inch during an Interrupted Stroke. See *Responding to an Interrupted Stroke*, page 222.

Dead Motor Inch

Dead Motor Inch is a feature that allows you to operate the press in Inch mode for a short time after the main motor is turned off, using the energy stored in the flywheel. Dead Motor Inch allows the press to be inched in smaller increments than is possible when the press is running, and is useful during setup. To activate Dead Motor Inch, do the following:

1. Turn off the press motor.
2. Turn the Stroke Select switch to “INCH.”
3. Press both Run/Inch buttons to initiate a stroke, releasing them when the ram has moved the desired distance. Repeat this process until the flywheel has stopped turning.

Changing the Operating Mode on the Display

You can select the operating mode using a Mode Select key switch, if installed, or you can set the operating mode on the display, as follows:

1. With the PROG/RUN key switch turned to RUN, Turn the Stroke Select Switch to OFF. The Mode Select Menu appears, Figure 5-16, page Figure 5-1221234.
2. Press ONE HAND, TWO HAND, or FOOT to set the desired operating mode.

Operating the Press in Single Stroke Mode

⚠ DANGER

IMPROPER SAFEGUARDING

Ensure that the machine guarding system is installed and maintained according to OSHA regulation 1910.217, ANSI standards B11.1 and B11.19, and any other regulations or standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

To operate the press in Single Stroke mode, do the following:

1. Turn the Stroke Select switch to "SINGLE."
2. Turn the Mode Select switch to "2 HAND" for operation in Two-hand mode, to "1 HAND" for operation in One-hand or One-hand Control mode, or to "FOOT" for operation in Foot mode. Instructions for operating the press in each mode are provided below.

NOTICE

If you are running Two-hand Only firmware, One-hand and Foot modes are not available.

Single Stroke, Two-hand Operation

⚠ DANGER

OPERATOR STATION WIRED INCORRECTLY

Run all necessary tests to verify that each Operator Station is wired correctly and provides proper anti-tiedown (see *Anti-tiedown Test*, page 188, and *Anti-repeat Test*, page 189) protection.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

MORE OPERATORS THAN OPERATOR STATIONS

- Ensure that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.
- During setup, lockout/tagout the press if there are more operators than operator stations.
- Verify at every shift change that there are the same number of active operator stations as there are operators if the press is not equipped with properly installed and operating light curtains.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

TWO-HAND CONTROL TOO CLOSE TO HAZARDOUS AREA

Verify at each shift change that any moveable Two-hand controls are located at least the safety distance from the pinch point or hazardous area.

Failure to comply with these instructions will result in death or serious injury.

When performing the following procedure, make sure to press both Run/Inch buttons on each installed Operator Station within the 1/2 second palm time ("synchronous" time in ANSI

terminology) and all pairs of Run/Inch buttons on all installed Operator Stations within the 5 second concurrent time. Also, confirm that the setting on S102 switch 6 is correct for your Operator Station setup (see *Switch 6 on S102 – Selecting Concurrent Time for More Than Two Operator Stations*, page 176).

To run the press, using Single Stroke, Two-hand operation, do the following:

1. With the Mode Select switch set to "2 HAND," initiate a stroke by pressing both Run/Inch buttons, holding them until the ram reaches the Auto Carry-up Angle, then releasing them (see *Setting the Auto Carry-up Angle*, page 152). The ram completes its stroke automatically, stopping at Top stop.

NOTICE

Both Run/Inch palm buttons on each Operator Station must be pressed within 1/2 second. Each pair of Run/Inch buttons on all Operator Stations must be pressed within 5 seconds. Make sure that the setting on S102 switch 6 is correct for your setup (see *Switch 6 on S102 – Selecting Concurrent Time for More Than Two Operator Stations*, page 176).

   If one or both Run/Inch buttons are released before the ram reaches the Auto Carry-up Angle, the press stops. The press will also be stopped on the downstroke if a system fault is detected or a light curtain is blocked.

Single Stroke, One-hand Operation

⚠ DANGER

INCORRECT INSTALLATION

You must install a Shadow light curtain correctly and connect it to WPC APEX properly in order to run the press in Single Stroke, One-hand mode.

Failure to comply with these instructions will result in death or serious injury.

Single Stroke, One-hand operation can only be used with WPC APEX systems running

Two-hand/One-hand/Foot firmware, equipped with a Mode Select key switch, and employing a Shadow light curtain to guard the point of operation. To run the press in this mode, do the following:

1. With the Mode Select switch set to "1 HAND," initiate a stroke by pressing the left Run/ Inch palm button, then releasing it. The ram completes its stroke automatically, stopping at Top stop.

   The press is stopped if a system fault is detected or if a light curtain is blocked during the downstroke.

Single Stroke, One-hand Control Operation

⚠ DANGER

INSUFFICIENT SAFEGUARDS ALLOWING ACCESS TO HAZARD

- Follow all applicable OSHA and ANSI regulations for safeguarding your press system. Point-of-operation safeguarding is the single most important factor in the prevention of injuries.
- Follow all applicable OSHA and ANSI regulations when installing a One-hand Control.
- Ensure that proper safeguarding devices are installed and working properly. Wintriss takes no responsibility if safeguarding devices are not installed or working correctly.
- DO NOT use WPC APEX or a One-hand Control as a safeguarding device.
- Install and operate WPC APEX and a One-hand Control in accordance with OSHA and ANSI regulations.

Failure to comply with these instructions will result in death or serious injury..

⚠ DANGER

PREVENT OPERATOR FROM STANDING BETWEEN LIGHT CURTAIN AND HAZARDOUS AREA

Ensure that the operator cannot position himself between the light curtain and the hazardous area. Use another pair of light curtains or a mechanical barrier at knee to waist height to prevent the operator or a passerby from being “trapped” between the light curtain and the hazard.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

INCORRECT INSTALLATION

You must install a Shadow light curtain correctly and connect it to WPC APEX properly in order to run the press in Single Stroke, One-hand Control mode.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

When a One-hand Control is installed, you cannot use the Run/Inch palm buttons on the Operator Station while the press is in One-hand mode. All other modes work normally as described in this manual.

One-hand Control is a switch available from Wintriss that allows operators to use their free hand to feed a part while their other hand operates the switch. This option can only be used with WPC APEX systems running Two-hand/One-hand/Foot firmware, equipped with a Mode Select key switch, and employing a Shadow light curtain to guard the point of operation.

One-hand Control can be used in two different modes. In Normal mode, the press cycles in Single Stroke whenever you push the One-hand Control button. In “Light Curtain Break” mode, the press cycles only when you push the One-hand Control button within 8 seconds of removing your hand(s) from the light curtain. If the button is pushed after this interval expires, the press does not cycle.

Light Curtain Break mode prevents inadvertent operation of the press when an operator is loading or unloading parts.

You select the mode by setting option switch 3 on switch block S101 on the WPC APEX Main Processor board (see step 1, below).

To run the press in Single Stroke, One-hand Control mode, do the following:

1. Set option switch 3 on S101 to OFF to operate the press in Normal One-hand Control mode (see *Enabling Light Curtain Break Mode in a One-hand Control*, page 171). Set switch 3 to ON to operate in Light Curtain Break mode.

NOTICE

If the Interrupted Stroke message flashes on the display, press and hold the Run/Inch palm buttons on the Operator Station to return the press to Top stop. The Interrupted Stroke message should stop flashing.

2. With the Stroke Select switch set to SINGLE, use the One-hand Control to operate the press as follows:

   - Press and release the One-hand Control button if option switch 3 is set for Normal operation.
   - Break the light curtain, then remove your hand and press the One-hand Control button within 8 seconds if option switch 3 is set for Light Curtain Break mode.

   The press will make a complete stroke, coming to rest at Top stop.

NOTICE

The Prior Act lamp illuminates after the light curtain has been broken, and stays on for 8 seconds. If the One-hand Control button is not pushed within that time, the Prior Act lamp will turn off. The press will not start until you break the light curtain again and push the One-hand Control button within 8 seconds of removing your hand.

NOTICE

If the press does not run, turn off power to the press and WPC APEX. Recheck all wiring connections. Try One-hand Control again. If the press still does not run, call Wintriss Tech. Support.

Single Stroke, Foot Operation

⚠ DANGER

INCORRECT INSTALLATION

You must install a Shadow light curtain correctly and connect it to WPC APEX properly in order to run the press in Single Stroke, Foot mode.

Failure to comply with these instructions will result in death or serious injury.

Single Stroke, Foot operation can only be used with WPC APEX systems running Two-hand/ One-hand/Foot firmware, equipped with a Mode Select key switch, and employing a Shadow light curtain to guard the point of operation.

Two modes are available when you run the press in Single Stroke Foot. In Foot Trip mode, you can initiate a complete stroke by simply pressing and releasing the Foot Switch. In Foot Control mode, you must press and hold the Foot Switch through the Auto Carry-up Angle to complete a stroke. You select the mode by setting option switch 3 on switch block S101 on the WPC APEX Main Processor board (see step 1, below).

To run the press in Single Stroke, Foot mode, do the following:

1. Set option switch 3 on S101 to OFF to operate the press in Foot Trip mode (see *Enabling Foot Control in a Foot Switch*, page 172). Set switch 3 to ON to operate in Foot Control mode.
2. With the Stroke Select switch set to "FOOT," depress the Foot Switch to initiate a stroke, releasing or holding the pedal depending on the option switch 3 setting.
   - Release the Foot Switch if option switch 3 is set for Foot Trip
   - Hold the Foot Switch through the Auto Carry-up Angle if option switch 3 is set for Foot Control

   The ram completes the stroke, coming to rest at Top stop.

NOTICE

INTERRUPTED STROKE

In Foot Control mode, if you remove your foot from the Foot Switch before the ram reaches the Auto Carry-up Angle, the press will stop, the Interrupted Stroke message will flash, and WPC APEX will switch to Two-hand Maintained Single Stroke mode for the remainder of the stroke. To clear the Interrupted Stroke and return to Single Stroke, Foot operation, press both Run/Inch palm buttons on the Operator Station and hold them until the press returns to Top stop.

Operating the Press in Automatic Single Stroke Mode

⚠ DANGER

PRESS STARTING UNEXPECTEDLY

Ensure that light curtains and other safeguards are properly installed and operating to protect operators when using Automatic Single Stroke. Since an external trigger initiates press operation, a stroke can occur unexpectedly.

Failure to comply with these instructions will result in death or serious injury..

The Automatic Single Stroke function allows an external event to automatically initiate a single stroke within a 30-second or 5-minute window, depending on the setting of option switch 5 on S101 (see step 1, below). Generally, material feed is used as the signaling event. However, other events such as part ejection or positive part transfer can be used.

There are three requirements for Automatic Single Stroke:

- An Automatic Single Stroke switch must be installed (see Figure 5 at the end of the manual)
- There must be a trigger mechanism. A single-pole, double-throw (SPDT) contact (switch or relay) or two solid-state switches (NPN, open collector) can be used.
- Proper guarding equipment, such as a Shadow light curtain and fixed guards, must be installed to protect personnel

If you intend to use Automatic Single Stroke, contact Wintriss Tech. Support.

To run the press in Automatic Single Stroke, first install the sensors and other components required for this function, then do the following:

1. Set option switch 5 on switch block S101 on the WPC APEX Main Processor board to OFF to select 30 seconds as the prior act timing or to ON to select 5 minutes (*Switch 5 (S101) – Prior Act Time for Automatic Stroke Modes*, page 174).

2. Set the selector switches as follows:
   - Stroke Select to “SINGLE STROKE”
   - Mode Select to “2-HAND”
   - Automatic to “ON”
3. To initiate the first stroke, depress the Prior Act button – the Prior Act lamp remains lit when Prior Act is armed. Then press and hold the Run/Inch palm buttons until the ram passes bottom dead center. When the press stops at top, the Prior Act Lamp will blink.

   The up stroke and all other strokes will be automatic.

   It is not unusual for the press to pause at Top Stop. It is waiting for the “go” signal from the external switch.

   The external signal must occur after Top Stop within the time selected on switch 5 (30 seconds or 5 minutes). If WPC APEX does not receive the signal within this period, it assumes a problem has occurred and will not start the next stroke. If this happens, repeat step 3.

Operating the Press in Continuous Mode

⚠ DANGER

IMPROPER SAFEGUARDING

Ensure that the machine guarding system is installed and maintained according to OSHA regulation 1910.217, ANSI standards B11.1 and B11.19, and any other regulations or standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

To operate the press in Continuous mode, do the following:

1. Turn the Stroke Select switch to “CONT.”
2. Turn the Mode Select switch to “2 HAND” for operation in Two-hand mode or to “FOOT” for operation in Foot mode. Instructions for operating the press in each mode are provided below.

Continuous, Two-hand Operation

To run the press in Continuous, Two-hand mode, do the following:

NOTICE

You must press both Run/Inch palm buttons on the Operator Station within 8 seconds after you press the Prior Act button in order to initiate Continuous mode operation. Otherwise, the press will not start. The Prior Act lamp illuminates when you press the Prior Act button and turns off after 8 seconds.

1. With the Mode Select switch set to “2 HAND,” press the Prior Act button on the Operator Station, then, within 8 seconds, press both Run/Inch palm buttons and hold them through the Auto Carry-up Angle. The ram will complete the stroke and continue stroking until one of the following events occurs:

- You press the Top Stop button
- You press the Immediate stop button
- A system fault is detected
- The light curtain is blocked during the non-muted portion of the stroke

The ram will stop in mid-stroke if you do not hold the Run/Inch palm buttons through the Auto Carry-up Angle.

NOTICE

If the press is Immediate stopped, WPC APEX automatically changes to Two-hand Maintained Single Stroke mode and the Interrupted Stroke message flashes. To clear the Interrupted Stroke, press and hold both Run/Inch buttons to complete the stroke and return the ram to Top stop.

Continuous, Foot Operation

⚠ DANGER

INCORRECT INSTALLATION

You must install a Shadow light curtain correctly and connect it to WPC APEX properly in order to run the press in Continuous, Foot mode.

Failure to comply with these instructions will result in death or serious injury.

Continuous, Foot operation can only be used with WPC APEX systems running Two-hand/ One-hand/Foot firmware, equipped with a Mode Select key switch, and employing a Shadow light curtain to guard the point of operation.

Option switch 3 settings, which govern *Single Stroke, Foot Operation*, page 238, do not apply to Continuous, Foot operation.

To run the press in Continuous, Foot mode, do the following:

NOTICE

You must depress the Foot Switch within 8 seconds after you press the Prior Act button in order to initiate Continuous mode operation. Otherwise, the press will not start. The Prior Act lamp illuminates when you press the Prior Act button and turns off after 8 seconds.

1. With the Mode Select switch set to "FOOT," press the Prior Act button on the Operator Station, then, within 8 seconds, depress and hold the Foot Switch pedal. The ram will complete the stroke and continue stroking until you release the Foot Switch, at which point the press will return to Top stop.

   As long as the Foot Switch is depressed, the press will continue to stroke but will stop if one of the following events occurs:

   - You press the Top Stop button
   - You press the Immediate stop button
   - A system fault is detected
   - The light curtain is blocked during the non-muted portion of the stroke

NOTICE

If the press is Immediate stopped, WPC APEX automatically changes to Two-hand Maintained Single Stroke mode and the Interrupted Stroke message flashes. To clear the Interrupted Stroke, press and hold both Run/Inch buttons on the Operator Station to complete the stroke and return the ram to Top Stop.

Operating the Press in Automatic Continuous On-demand Mode

⚠ DANGER

IMPROPER SAFEGUARDING

Ensure that the machine guarding system is installed and maintained according to OSHA standard 1910.217, ANSI B11.1, ANSI B11.19 and any other regulations and standards that apply. Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

PRESS STARTING UNEXPECTEDLY

- Ensure that light curtains and other safeguards are properly installed and operating to protect operators when using Automatic Continuous On-demand mode, in which a stroke can occur unexpectedly.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

For information on using Automatic Continuous On-demand mode, call Wintriss Tech. Support.

Operating the Press in Bar Mode

⚠ DANGER

INJURY WHEN USING BAR MODE

- Keep all personnel away from the press while it is being barred
- Use a spring-loaded turnover bar when you bar the press.

Failure to comply with these instructions will result in death or serious injury.

To operate the press in Bar mode, you must have the Bar Mode Control option. To activate Bar mode and bar the press, do the following:

1. Turn the Stroke Select switch to “INCH.”
2. Turn the Mode Select switch to “2 HAND.”
3. Turn off the press motor.
4. On the Bar Control enclosure (see Figure 2-22, page 92), turn the Select switch to “ON.”

5. When the flywheel stops turning, press the Operate button on the Bar Control enclosure.
6. Bar the press using a spring-loaded bar.

NOTICE

When barring the press, do not rotate the flywheel too quickly. If the crankshaft moves faster than 6 SPM, WPC APEX will stop the ram and fault code F26 will appear on the display. Press OK to continue barring the press.

7. If an F26 error appears in the display, press OK to clear it, and continue with the barring operation.

Multiple Operator Stations

⚠ DANGER

HAZARDS EXPOSED BY NON-WORKING OPERATOR STATION

- Safeguard the point of operation exposed by the non-working Operator Station when using multiple operator stations. The exposed area near a disabled Operator Station must be properly guarded.
- Ensure that guarding is properly installed to prevent access to the machine over, under or around any guarding device.

Failure to comply with these instructions will result in death or serious injury.

If you have wired two or more Operator Stations to your WPC APEX (see *Installing Multiple Operator Stations*, page 63) and option switch 6 on S102 is set to OFF (see page 176), the Run/Inch palm switches on each Operator Station must be pressed within a 1/2-second "palm time" ("synchronous time" in ANSI terminology) window, and both pairs of palm switches must be pressed within a 5-second "concurrent time" window.

NOTICE

All Operator Stations in a mutli-Op.-Station configuration except the Op. Station wired to the "A" inputs must contain a Two-hand Control module.

If you have installed more than two Operator Stations, you must set option switch 6 on S102 to ON to establish a 5-second concurrent time for all Op. Stations. In addition, all Operator Stations except the Op. Station connected to the "A" inputs must contains a Two-hand Control module to provide the required 1/2-second palm time ("synchronous" time in ANSI terminology).

If you have two or more Operator Stations, make sure to set the Operator Station Select Switch on the front panel of your WPC APEX to enable the desired run stations.

Chapter 6 – Troubleshooting

⚠ DANGER

IMPROPER REPAIR PROCEDURES

- Follow all procedures in this manual.
- Perform only the tests and repairs listed in this manual.
- Lockout/Tagout the press during all installation, modification, repair, or maintenance procedures.
- Use only factory-supplied replacement parts.
- Ensure that all safety procedures are followed during installation, operation, and repair of WPC APEX.
- Ensure that WPC APEX is installed, tested, and repaired by qualified personnel.
- Perform the tests for *Installation Verification*, page 100 and *Final Checkout*, page 177, after every modification, repair, or change to the press, press control or other equipment.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

IMPROPER SAFETY SWITCHING RELAY REPAIR

Replace the DSV/Lockout Relay board (Figure 2-28, page 102), or Auxiliary E Stop Relay board (see Figure 1-11, page 42) before placing the WPC APEX back into operation after the first occurrence of a fused relay.

If a relay fuses

- DO NOT reset the WPC APEX to restart the machine.
- Remove the WPC APEX from operation immediately and replace the defective relay board before operating the press again.

Failure to comply with these instructions will result in death or serious injury.

NOTICE

ALL SIGNAL GROUNDS MUST BE CONNECTED THROUGH THE MAIN PROCESSOR BOARD

Connect all signal grounds through pins on the WPC APEX Main Processor board.

NOTICE

INFORMATION NEEDED BY WINTRISS TECH. SUPPORT DURING TROUBLESHOOTING

Whenever you need to contact Wintriss Tech Support for technical assistance, be ready to provide some important information to help solve the problem. Please supply: product name (e.g., WPC APEX), serial number, installed options, and firmware version number (e.g., Vs. 2.77).

See Figure 3-19, page 129, for serial number and version numbers.

NOTICE

SEE OTHER DOCUMENTS FOR ERROR MESSAGES 120 TO 300

Error numbers equal to or higher than 120 are covered in these documents:

- WPC APEX Option 2 User Manual (1130700)
- WPC APEX Option 2 Additional Inputs Only Instruction Sheet (1141900)

NOTICE

WPC APEX HAS DIFFERENT STOP FUNCTIONS AND TERMINOLOGY FROM WPC 2000

New WPC APEX Stop Terminology:

- **Immediate Stop (I STOP) (formerly E Stop) - Red button**
  - Function: Stops the press motion immediately but maintains motor power.
  - Use Case: This stop is intended for process-related interruptions, such as clearing a misfeed or addressing a non-hazardous issue, without shutting down the entire press system.
- **Immediate Stop Lockout (I LOC) (formerly E Stop Lockout)**
  - Function: Stops the press and removes power to the motor.
  - Use Case: Intended for safety action upon press (i.e., Die blocks and some removable safety gates). Power is removed from the motor to remove any potential energy.
- **Emergency Stop (E STOP) (System wide stoppage) – Red button w/ yellow halo**
  - Function: Stops the press and removes power to the motor via the lockout relay and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E STOP relay), preventing any unintended restart.
  - Use Case: This stop is intended for situations involving personnel safety or potential equipment damage, where full removal of motion power to the entire system is required.

For more details, see *Important Changes: Stop Functions and Terminology*, page 3.

Responding to WPC APEX Faults

Whenever WPC APEX detects a problem with the clutch/brake control, the press, or peripheral equipment, it sends a Stop command to the press and generates a fault on the WPC APEX display in a red message window, similar to Figure 6-1. A three or four-character alphanumeric code identifies the fault. The initial letter, E, F, or H, indicates how to clear the fault after it has been corrected and, in the case of F and H faults, specifies the processor (WPC APEX has two processors) that reported the problem, as shown in Table 6-1.

Figure 6-1. Fault Code Message Window

Table 6-1. Fault Codes: Significance of Initial Letter

Initial Letter	Significance
E	To clear the fault, you must power down the WPC APEX, then power the unit back up.
F	Generated by the main processor. To clear the fault, press OK.
H	Generated by the second processor. To clear the fault, press OK.

The two or three-digit number following the initial letter identifies the specific WPC APEX fault. For example, fault code F13, which is shown in Figure 6-1, indicates that The Immediate stop button was depressed or the I STOP circuit was open after initiation of the stroke. All E, F, and H faults are documented in numerical order starting on page 249.

To respond to a fault, do the following:

1. Correct the problem that caused the fault.
2. Clear the fault code or message on the WPC APEX display by doing one of the following:
   - To clear F and H faults, press OK on the display or a Remote Reset switch if one is installed.
   - To clear E faults, power down the WPC APEX, then power the unit back up

Lockout Message

Certain faults, called Lockout faults, generate a Lockout error message on the display after the fault is cleared. These are serious error conditions and require an additional step. When the problem has been corrected and the fault cleared, you must turn the Stroke Select switch to "OFF," then back to "INCH" or one of the other stroke selections to clear the Lockout error message. Fault codes that generate the Lockout error message are identified by an asterisk (*) in documentation of the faults (see *E, F, and H Faults*, page 249).

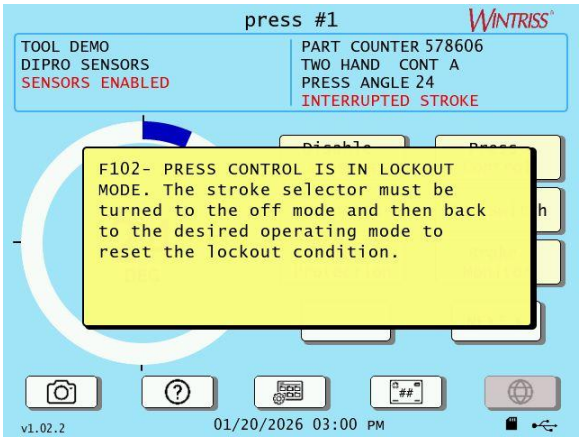


Figure 6-2. WPC APEX Display Showing a Lockout Message

Brake Monitor Faults

Brake Warning LED

When the Stopping Time of the press increases to within 10 mS of the Stop-time Limit, the amber Brake Warning LED will flash. Illumination of this LED often means that the brake is wearing and/or defective. To respond to this error, do the following:

1. Contact your maintenance crew immediately and have them investigate the condition of the brake.
2. If the brake checks out, your Stop-time Limit is too tight, not allowing for normal wear. Set a new Stop-time Limit, following the instructions in *Running Brake Monitor Tests and Making Settings*, page 154.
3. Power down the WPC APEX, then power the unit back up to turn off the Brake Warning LED.

Stop Time Exceeded

⚠ DANGER

INCORRECT SAFETY DISTANCE DUE TO INCORRECT STOP TIME

- Perform a 90° Stop Test any time you change the Stop-time Limit of WPC APEX. See *Determining the 90° Stop Time*, page 156.
- Recalculate the safety distance based on the new Stop-time Limit and adjust or reinstall safeguarding devices according to the new safety distance. See *Calculating the Safety Distance*, page 159.

Failure to comply with these instructions will result in death or serious injury.

⚠ DANGER

PRESS MALFUNCTION

Correct or repair any press malfunction or wiring error before restarting the press.

Failure to comply with these instructions will result in death or serious injury.

When the Stopping Time of the press exceeds the Stop-time Limit, a red error window appears on the display (see Figure 6-3), and WPC APEX prevents the press from being operated until the brake has been completely repaired.

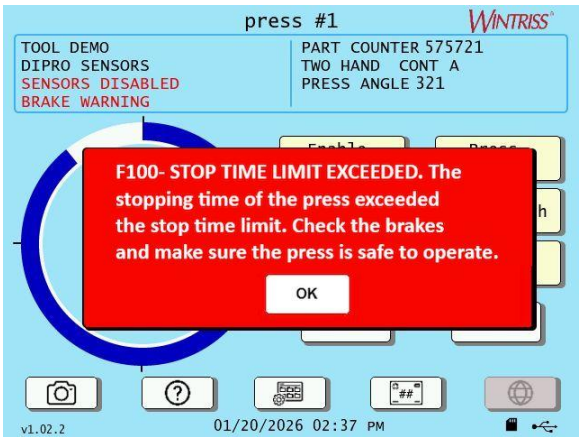


Figure 6-3. WPC APEX Display Showing Stopping Time Fault

NOTICE

BRAKE WARNING

The Brake Warning LED alerts you when the Stopping Time of the press is within 10 mS of the Stop-time Limit.

To respond to this fault, do the following:

NOTICE

If you try to run the press without first repairing the brake, WPC APEX will stop the press on the next stroke and again display the Stop Time Exceeded fault. The fault will continue to display until the brake has been repaired.

1. Contact your maintenance crew and have them repair the brake immediately.
2. When the brake has been repaired, press OK to clear the Stopping Time fault.
3. When the Lockout message displays (see *Lockout Message*, page 247), turn the Stroke Select switch to "OFF," then to "INCH" to clear the message.
4. Run the press several times to determine its Stopping Time, and compare this value to the result of your last Stop-time tests, referring to *Running Brake Monitor Tests and Making Settings,* page 154.
5. Determine whether you need to adjust the previous Stop-time Limit, and make adjustments if necessary.

E, F, and H Faults

⚠ DANGER

PRESS MALFUNCTION

Correct or repair any press malfunction or wiring error before restarting the press.

Failure to comply with these instructions will result in death or serious injury.

This section documents in numerical order all WPC APEX E, F, and H fault codes, providing for each code a description of the problem that caused the fault and suggestions for how to correct it. When you are unable to rectify a fault by following the suggested remedy, contact Wintriss Tech. Support for assistance.

Resolver Faults

E06

Problem: The press is running faster than 1000 SPM, the resolver has failed, or the wiring in the resolver circuit to WPC APEX is loose or bad.

Remedy: If WPC APEX's rated press speed is exceeded, reduce the speed. If press speed is not the problem, check the resolver wiring for shorts, breaks, or loose connections (see *Installing the Resolver*, page 67). If wiring is not the problem, the resolver is probably bad and will have to be replaced. If necessary, contact Wintriss Tech. Support for assistance or replacement of the resolver.

F04 or F05

Problem: Resolver wiring is faulty, or the resolver itself is bad.

Remedy: Check resolver wiring, making sure that the screws on the terminals *are* tightened on bare wire and not on insulation (see *Installing the Resolver*, page 67). Also check the resolver. If necessary, contact Wintriss Tech. Support for assistance or replacement of the resolver.

E07

NOTICE

CLEARING "E" FAULT CODES

To clear E fault codes, do the following:

1. Turn the Stroke Select switch to "OFF"
2. Power down WPC APEX.
3. Power up WPC APEX.

Problem: During zeroing, the resolver has been set outside the range of 330° to 30°.

Remedy: Re-zero the resolver at top dead center (see *Zeroing the Resolver*, page 115).

Operational Faults

F10

NOTICE

This code is not displayed when Two-hand Inch operating mode is selected to enable Dead Motor Inch.

Problem: The main motor has been turned off.

Remedy: Turn the motor back on, clearing the Lockout error message first if the motor was deactivated during Lockout (see *Lockout Message*, page 247). If the motor will not turn on, you may need to replace the Forward contact blocks on the starter with new, unused ones.

F11

Problem: The resolver moved when the output relays to the Dual Safety Valve (DSV) were off (i.e., open) and the DSV was de-energized.

Remedy: Check clutch, brake, and DSV components for correct operation. Correct or repair any malfunction.

F13

Problem: The Immediate stop button on the WPC APEX Operator Station has been depressed or the I STOP circuit was open after initiation of the stroke.

Remedy: If another control is connected to the WPC APEX I STOP circuit, refer to the user manual for that control to check for a specific error condition, and correct the error.

F14

Problem: The Prior Act button on the Operator Station was depressed (i.e., switch was open) after initiation of the stroke.

Remedy: Press OK. If the problem persists, check the wiring from the Operator Station to WPC APEX. If necessary, Contact Wintriss Tech. Support.

F15

Problem: The preset on the counter has been reached.

Remedy: Press OK to reset the counter to 1. The counter preset value remains the same until you change it.

F16

Problem: The Top Stop button on the Operator Station was depressed or the Top stop circuit was open after initiation of the stroke.

Remedy: Check other equipment (e.g., DiPro 1500, AutoSet, etc.) wired into the Top stop string. Correct the problem. Reset the other equipment first; then reset WPC APEX and restart the press.

F17

Problem: Cross-checked inputs 8 & 9 were in different states (i.e., open or closed) for longer than 100 mS.

Remedy: Diagnose and correct the condition that the inputs are monitoring (see Table 6-2, page 257).

F18

Problem: Cross-checked inputs 10 & 11 were in different states (i.e., open or closed) for longer than 100 mS.

Remedy: Diagnose and correct the condition that the inputs are monitoring (see Table 6-2, page 257).

F19 or H19

Problem: Auxiliary E STOP relay did not open properly.

⚠ DANGER

IMPROPER SAFETY SWITCHING RELAY REPAIR

- Replace the Auxiliary E STOP Relay board (Figure 1-10, page 42) before placing the WPC APEX back into operation after the first occurrence of a fused relay.

If a relay fuses

- DO NOT reset the WPC APEX to restart the machine.
- Remove the WPC APEX from operation immediately and replace the Auxiliary E STOP Relay board before operating the press again.

Failure to comply with these instructions will result in death or serious injury.

Remedy: Press OK. If the problem persists, contact Wintriss Tech. Support for assistance or replacement of the relay board,

F20

Problem: You are attempting to run the main motor in reverse without selecting Two-hand Inch mode.

Remedy: Switch to Two-hand Inch mode, then run the motor in reverse.

F21

Problem: The N/O inputs from the Run/Inch palm buttons on the Operator Station do not turn off (i.e., open) when they should.

Remedy: Check to make sure that the palm buttons are the correct switch type. Check and correct the palm switch wiring. If the error persists, call Wintriss Tech. Support.

F22

Problem: The operating mode was changed while the press was running.

Remedy: Make your operating mode selection before running the press.

F23

Problem: The operating mode you selected (i.e., One-hand, Two-hand, or Foot) is not valid for your stroke selection (i.e., Inch, Single Stroke, or Continuous).

Remedy: Refer to the discussion of operating modes starting on page 232 to determine the correct operating mode for your stroke selection.

F24

Problem: Both Run/Inch palm buttons on the Operator Station were pressed in One-hand mode

-or-

Run/Inch buttons on an unselected Operator Station were pressed in a dual-Operator-Station setup.

Remedy: Press only one Run/Inch palm button when running the press in One-hand mode

-or-

Select both Operator Stations in a dual-Operator-Station setup, then initiate a stroke.

F25

Problem: The flywheel speed sensor is not turning off and on properly when spin-down is enabled.

Remedy: For Bliss non-integrated, disable by connecting pin #26 to +24 Vdc.

F26

Problem: The flywheel turned faster than 6 SPM while the press was in Bar mode, creating a potentially unsafe barring condition.

Remedy: After clearing the error, bar the press more slowly. Refer to *Operating the Press in Bar Mode*, page 242.

F27

Problem: I STOP inputs were in different states (i.e., open or closed) for longer than 100 mS.

Remedy: Check the I STOP circuit wiring and the I STOP buttons.

F30* through F37* and H38* and H39*

Problem: One of the following processor errors has occurred:

F30	Resolver angles for A and B processors disagree by more than 2°
F31	No reply to Check Start request received from second processor
F33	Incorrect reply to Mode Change message received from second processor
F34	No reply to Mode Change message received from second processor
F35	Incorrect reply to Power-up message received from second processor
F36	No reply to Reset Error message received from second processor
F37	No reply to Compare Input Buffers message received from second processor
H38	Second processor did not receive Power-up information correctly
H39	Second processor did not receive Mode information correctly

Remedy: Try pressing OK. If error persists, contact Wintriss Tech. Support.

Input Buffer Test Failures

F41* through F44*

Problem: Problem: The following errors may occur when WPC APEX performs input buffer tests, which compare the input data provided by processor A with the data provided by processor B. When the input data does not match, an error is generated.

- F41 Input buffer 1 check incorrect. This test checks system air pressure and motor forward inputs and user inputs 1 and 8.
- F42 Input buffer 2 check incorrect. This test checks remote reset, motor reverse, and bar mode selector inputs.
- F43 Input buffer 3 check incorrect. This test checks the DSV monitor input and user inputs 2 and 9.
- F44 Input buffer 4 check incorrect. This test checks the motor forward input and user inputs 2, 5, 7, 8, and 10.

Remedy: Try pressing OK. If errors persist, contact Wintriss Tech. Support.

Component Failures

F45 through F48

Problem: Failures have occurred to standard equipment connected to WPC APEX.

- F45 The transducer-measured main system air pressure was below the setpoint
- F46 The transducer-measured counterbalance air pressure was outside the
- F47 Dual Safety Valve (DSV) monitor switch input open
- F48 Clutch air pressure switch input open

Remedy: Correct the problem, then press OK. If the error persists, contact Wintriss Tech. Support.

For F47 errors, try resetting the unit by pressing OK and turning the Stroke Select key switch to OFF, then back to one of the other operating modes. If the DSV continues to fault, check to make sure that the air pressure is not set too low, and correct if necessary. Also, check to make sure that there are no restrictions in the air supply line (e.g., restrictive fittings, quick-disconnect fittings, low flow filters or regulators, or clogged filter elements) and that the supply line is sized to match the DSV inlet port. If the air pressure and air supply are sufficient, check for dirt or water in the DSV, and rebuild the valve if necessary.

For F48 errors, check to see whether the air pressure is turned off or set too low, and correct if necessary.

Customized Status Codes

F50 through F58

Problem: A failure has occurred in an auxiliary press function (e.g., lubrication system) wired to a WPC APEX user input. Refer to Table 6-2, below, for specific faults. See also the separate remedies for faults F17, F18, F50, and F58, which apply to the cross-checked input pairs 8/9 and 10/11.

Remedy: Diagnose and correct the condition that the input is monitoring. If the error persists after you reset the unit, contact Wintriss Tech. Support.

NOTICE

See *Cross-Checked User Interlocks Errors*, page 268, for codes F336 through F345 relating to cross-checked pairs 40/41, 42/43, 44/45, 46/47, and 48/49.

Table 6-2. Fault Codes for User Inputs

Fault Code	User Input (Interlock)	Stop Type	Pin #	Jumper Connection (Bypass)
51	User 1	T STOP I STOP T LOC I LOC	21	+24 Vdc
52	User 2	T STOP I STOP T LOC I LOC	82	+24 Vdc
53	User 3	T STOP I STOP T LOC I LOC	71	+24 Vdc
54	User 4	T STOP I STOP T LOC I LOC	83	Ground
55	User 5	T STOP I STOP T LOC I LOC	72	Ground

Fault Code	User Input (Interlock)	Stop Type	Pin #	Jumper Connection (Bypass)
56	User 6	T STOP I STOP T LOC I LOC	84	Ground
57	User 7	T STOP I STOP T LOC I LOC	73	Ground
58, 17	User 8 paired with 9	I STOP I LOC	85	Ground
	User 9 paired with 8		74	Ground
50, 18	User 10 paired with 11	I LOC	86	Ground
	User 11 paired with 10		18	Ground

F50

Problem: A failure has occurred in an auxiliary press function wired to WPC APEX cross-checked input pair 10 and 11 (see Table 5-2). One or both inputs are open.

Remedy: Diagnose and correct the condition that the inputs are monitoring. If the error persists after you reset the unit, contact Wintriss Tech. Support.

F58

Problem: A failure has occurred in an auxiliary press function wired to WPC APEX cross-checked input pair 8 and 9 (see Table 5-2). One or both inputs are open.

Remedy: Diagnose and correct the condition that the inputs are monitoring. If the error persists after you reset the unit, contact Wintriss Tech. Support.

Light Curtain Faults

F60 or H60

- and -

F61 or H61

Problem: Light curtain A (fault #60) or light curtain B (fault #61) failed the WPC APEX internal test.

Remedy: Check to make sure that the light curtain is wired correctly, referring to figures 3, 10, 11, 15, 16, 18, 19, 23, 25, 26, 27 at the end of the manual if you have Shadow light curtains, referring to the appropriate user manual if you have another product. If you need additional assistance, contact Wintriss Tech. Support.

F62

Problem: Two or more pairs of light curtains are wired to WPC APEX, but only one pair has been enabled on option switch 6 (S101) and option switch 7 (S102) on the WPC APEX Main Processor board.

Remedy: Set option switch 6 on S101 and option switch 7 on S102 for dual light curtains (see *Switch 6 (S101) and Switch 7* (S102) – Enabling Multiple Light Curtains, page 174).

F63

Problem: Light curtain A is obstructed during the stroke.

Remedy: Remove the obstruction.

F64

Problem: Light curtain B is obstructed during the stroke.

Remedy: Remove the obstruction.

F65

Problem: A light curtain is connected with Two-hand Only firmware installed in WPC APEX.

Remedy: Remove the Two-hand Only firmware, and install a firmware version intended for use with a light curtain, referring to *Installing Revised WPC APEX Firmware*, page 94. Contact Wintriss Tech. Support for help in selecting the right firmware for your application.

Immediate Stop Circuit Driver Failure

F66 or H66

Problem: The Immediate stop input circuit driver has failed or is about to fail.

Remedy: Check I Stop circuit wiring, and correct any problems. If the error persists after you reset the unit, contact Wintriss Tech. Support for assistance or replacement of the driver.

Top Stop Circuit Driver Failure

F67 or H67

Problem: The Top Stop input circuit driver has failed or is about to fail.

Remedy: Check Top stop circuit wiring, and correct any problems. If the error persists after you reset the unit, contact Wintriss Tech. Support for assistance or replacement of the driver.

Shadow Light Curtain Input Faults

F68 or H68

-and-

F69 or H69

Problem: Shadow light curtain A (fault #68) or B (fault #69) inputs to WPC APEX are not in the same state (i.e., one input is "on," the other is "off").

Remedy: Check "Light curtain A1 input" and "Light curtain A2 input" LEDS on the WPC APEX Main Processor board if light curtain A is generating the fault, or check "Light curtain B1 input" or "Light curtain B2 input" LEDs if light curtain B is generating the fault (see Figure 3-54, page 178).

If one of the two LEDs is unlit, receiver wiring is bad or one of the receiver outputs may be shorted. Check the wiring at the receiver and correct if necessary.

If the wiring is good, either the receiver needs to be replaced, or there is a problem with WPC APEX. Contact Wintriss Tech. Support for assistance.

DSV Interface and Lockout Relay Failures

F70* through F78*

- or -

H72* through H78*

⚠ DANGER

IMPROPER SAFETY SWITCHING RELAY REPAIR

- Replace the DSV/Lockout Relay board before placing the WPC APEX back into operation after the first occurrence of a fused relay.
- If a relay fuses
- DO NOT reset the WPC APEX to restart the machine.
- Remove the WPC APEX from operation immediately and replace the DSV/Lockout relay board before operating the press again.

Failure to comply with these instructions will result in death or serious injury.

Problem: The following errors indicate failures on the WPC APEX Main Processor board or the DSV/Lockout Relay board. Error codes F70, F71, F72/H72, F73/H73, and F76/H76 indicate failures with the DSV driver logic on the Main Processor board. Codes F74/H74, F75/H75, and F77 indicate failures with the relays on the DSV/ Lockout Relay board. F78 indicates an issue with the poppet position sensors in the DSV valve itself.

F70 DSV relay driver A was not off at start of stroke

F71 DSV relay drivers A and B did not turn on properly or have shorted

F72 or H72 DSV Control Flip-flop is not functioning properly

F73 or H73 DSV Missing Pulse Detector window is not functioning properly

F74 or H74 DSV relay A or B did not close properly at start of stroke

F75 or H75 DSV relay A or B did not open properly at end of stroke

F76 or H76 Lockout relay driver did not turn on properly during testing

F77 Lockout relay check contacts were not closed before lockout relay was turned on

F78 The position of the DSV poppets is incorrect (Minster version only).

Remedy: Press OK. If the error persists, contact Wintriss Tech. Support for assistance or replacement of either board.

Loss of Rotation

F79

Problem: The Dual Safety Valve (DSV) has been activated, but the resolver did not start rotating within the Start-time Limit set on the WPC APEX.

The Start-time Limit setting may be too short. Alternatively, the drive belt on the resolver may be loose or broken, and the resolver may not be turning continuously with the press crankshaft, or have stopped turning altogether. Also, the resolver may be defective.

Air pressure to the clutch may be low, or the clutch may be bad, resulting in no movement of the crankshaft (and resolver) even though the DSV is energized. In addition, an internal WPC APEX problem could have occurred.

Remedy: Check the Start-time Limit setting, and re-initialize if necessary. Check the resolver and resolver drive, and replace the resolver if necessary. Check the clutch and repair if necessary. If these solutions do not work, contact Wintriss Tech. Support. Screens from slide show.

Internal Timing Input Failures

F80 or H80

-and-

F82 or H82

Problem: There is an internal problem with the WPC APEX timing inputs.

Remedy: Press OK. If the error persists, contact Wintriss Tech. Support for assistance or replacement of the timing inputs.

Top Stop and Overrun Setting Faults

F81, F83, F84, F86 and F87

-and-

H81, H83, H84, H86 and H87

Problem: The overrun limit switch has turned on before the Top Stop "On" Angle timing has turned off. The Top stop Angle internal dwell is 20°.

Remedy: Check to make sure that the Top Stop "On" Angle has been set correctly and that the overrun sensor magnet has been installed at the correct angle (see *Determining and Setting the Top Stop* "On" Angle, page 143). If settings are correct and the error persists, contact Wintriss Tech. Support.

Overrun Limit Switch Fault

F85

Problem: The overrun limit switch has provided more than one signal to WPC APEX during a stroke. The switch should open and close only once per stroke.

Remedy: Check the overrun limit switch installation to make sure that the switch opens and closes only once per stroke, referring to *Installing the Overrun Sensor Magnet*, page 142, and the LED map, Figure 3-54, page 178. Check to make sure that the switch is installed correctly, referring to *Installing the Overrun Limit Switch*, page 70, and that the magnet is installed at the correct angle. Also, check to make sure that the magnet is attached using a brass or other non-ferrous screw.

Check the diameter of the shaft on which the magnet is mounted to make sure there is enough dwell for the overrun limit switch to provide an adequate signal (see *Planning Your Overrun Sensor Installation*, page 70). An ideal diameter is 4 in. to 6 in. If the shaft is larger than this, mount the magnet on a shaft with a smaller diameter.

Check to make sure that the press is not encountering excessive shock and vibration due to operations such as blanking. If you cannot resolve the problem, contact Wintriss Tech. Support.

Overrun Limit Switch Test Angle Fault

F88 - or - H88

Problem: The overrun limit switch was not closed during the overrun sensor closure test window (see step 12, page 148) or open at 180°.

Remedy: The resolver drive may have slipped or broken. If this is the case, the resolver needs to be repaired or replaced. If the resolver drive checks out, also check the wiring and installation of the resolver (see *Installing the Resolver*, page 67).

Check the diameter of the shaft on which the magnet is mounted to make sure there is enough dwell for the switch to provide an adequate signal (see *Planning Your Overrun Sensor Installation*, page 70). An ideal diameter is 4 in. to 6 in. If the shaft is larger than this, mount the magnet on a shaft with a smaller diameter.

Check installation of the overrun sensor and magnet and wiring of the overrun sensor, referring to *Installing the Overrun Limit Switch*, page 70, and *Mounting the Overrun Sensor Magnet*, page 149.

Overrun Limit Switch Setting Fault

F89 - or - H89

Problem: The angle range (e.g., 271° to 300°) within which the Top-stop "On" Angle must fall has not been set correctly on option switches 1 and 2 on S101 and option switch 8 on S102 on the WPC APEX Main Processor board.

Remedy: Set switches 1 and 2 on S101and switch 8 on S102 for the correct Top-stop "On" Angle window, referring to Table 3-7, page 148. If the error persists, contact Wintriss Tech. Support.

Internal Memory Failures

F90* through F98*

- or -

H90* through H98*

Problem: There is a problem with the main or second processor on the WPC APEX Main Processor board. The board may need to be serviced or replaced. Errors are as follows:

F90 or H90 Program memory checksum 1 is incorrect

F91 or H91 Program memory checksum 2 is incorrect

F95 or **H95** Angle table memory checksum is incorrect

F96 or **H96** RAM memory failed memory test

F97 or **H97** No angle setup is loaded

F98 or **H98** The option switch image changed during operation

F99 or **H99** +24 Vdc failed, or the fuse blew

Remedy: Press OK. If the error persists, contact Wintriss Tech. Support for assistance or replacement of the Main Processor board or firmware chip.

NOTICE

SEE OTHER DOCUMENTS FOR ERROR MESSAGES 120 TO 299

Error numbers from 120 through 299 are covered in these documents:

- WPC APEX Option 2 User Manual (1130700)
- WPC APEX Option 2 Additional Inputs Only Instruction Sheet (1141900)

WPC APEX Display CAN Coms Interrupted Error

Table 6-3. CAN Coms Interrupted Error

Error Number	Error	Description
F300	WPC_APEX_DISPLAY_CAN_COMS_INTERRUPTED_ERROR	Display White box if CAN COMS between display board and Main Processor was interrupted

Shadow/LC C and D Errors

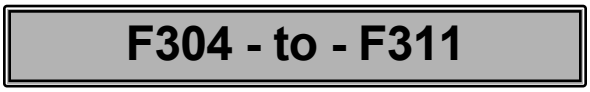


Table 6-4. Shadow/LC C and D Errors (Light curtain Firmware Only)

Error number	Error	Description
F304	SHADOW C DROP ERROR	
F305	SHADOW D DROP ERROR	
F306	SHADOW D CON ERROR	
F307	SHADOW C OPEN ERROR	
F308	SHADOW D OPEN ERROR	
F309	SHADOW C CON ERROR	
F310	SHAD C IN DISAGREE ERROR	
F311	SHAD D IN DISAGREE ERROR	

Die Protection Errors

F312 - to - F335

Table 6-5. Die Protection Errors

Error number	Error	Description
F312	DIPRO SENSOR 1 RED ERROR	Did not go OFF outside ready window.
F313	DIPRO SENSOR 1 YELLOW ERROR	Did not go ON inside ready window.
F314	DIPRO SENSOR 1 GREEN ERROR	Did not come ON inside the ready window, however it went ON outside the ready.
F315	DIPRO SENSOR 1 GREEN MISSED ERROR	Sensor is ON ALL the time
F316	DIPRO SENSOR 1 GREEN LATE ERROR	
F317	DIPRO SENSOR 1 GREEN SHORTED ERROR	
F318	DIPRO SENSOR 2 RED ERROR	Did not go OFF outside ready window.
F319	DIPRO SENSOR 2 YELLOW ERROR	Did not go ON inside ready window.
F320	DIPRO SENSOR 2 GREEN ERROR	Did not come ON inside the ready window, however it went ON Outside the ready window.
F321	DIPRO SENSOR 2 GREEN MISSED ERROR	Sensor is ON ALL the time
F322	DIPRO SENSOR 2 GREEN LATE ERROR	
F323	DIPRO SENSOR 2 GREEN SHORTED ERROR	
F324	DIPRO SENSOR 3 RED ERROR	Did not go OFF outside ready window.
F325	DIPRO SENSOR 3 YELLOW ERROR	Did not go ON inside ready window.
F326	DIPRO SENSOR 3 GREEN ERROR	Did not come ON inside the ready window, however it went ON outside the ready.
F327	DIPRO SENSOR 3 GREEN MISSED ERROR	Sensor is ON ALL the time
F328	DIPRO SENSOR 3 GREEN LATE ERROR	
F329	DIPRO SENSOR 3 GREEN SHORTED ERROR	

Error number	Error	Description
F330	DIPRO SENSOR 4 RED ERROR	Did not go OFF outside ready window.
F331	DIPRO SENSOR 4 YELLOW ERROR	Did not go ON inside ready window.
F332	DIPRO SENSOR 4 GREEN ERROR	Did not come ON inside the ready window, however it went ON Outside the ready window.
F333	DIPRO SENSOR 4 GREEN MISSED ERROR	Sensor is ON ALL the time
F334	DIPRO SENSOR 4 GREEN LATE ERROR	
F335	DIPRO SENSOR 4 GREEN SHORTED ERROR	

Cross-Checked User Interlocks Errors

F336 - to - F345

Table 6-6. Cross-Checked User Interlocks Errors

Error Number	Error	Description
F336	USER_40_ERR / USER_41_ERR	User Interlock 40 / User Interlock 41
F337	USER_40_41_DISAGREE_ERR	User Interlock 40 & 41 Disagree
F338	USER_42_ERR / USER_43_ERR	User Interlock 42 / User Interlock 43
F339	USER_42_43_DISAGREE_ERR	User Interlock 42 & 43 Disagree
F340	USER_44_ERR / USER_45_ERR	User Interlock 44 / User Interlock 45
F341	USER_44_45_DISAGREE_ERR	User Interlock 44 & 45 Disagree
F342	USER_46_ERR / USER_47_ERR	User Interlock 46 / User Interlock 47
F343	USER_46_47_DISAGREE_ERR	User Interlock 46 & 47 Disagree
F344	USER_48_ERR / USER_49_ERR	User Interlock 48 / User Interlock49
F345	USER_48_49_DISAGREE_ERR	User Interlock 48 & 49 Disagree

NOTICE

See *Customized Status Codes*, page 257, for codes F50 through F58 relating to cross-checked pairs 8/9 and 10/11.

Counter Balance Pressure Switch Error

F346

Table 6-7. Counterbalance Pressure Switch Error Numbers

Error Number	Error	Description
F346	COUNTER BALANCE PRESS SW ERR	Pin 524 (CNTR BAL PRESS SW) is open

Non Safety Predefined E STOP Inputs Errors

F347 - to - F351 and F364

Table 6-8. Non Safety Predefined ESTOP Inputs Error Numbers

Error Number	Error	Description
F347	ESTOP CODE 1	Pin 517 (ESTOP CODE 1) is ON
F348	ESTOP CODE 2	Pin 516 (ESTOP CODE 2) is ON
F349	ESTOP CODE 3	Pin 515 (ESTOP CODE 3) is ON
F350	ESTOP CODE 4	Pin 514 (ESTOP CODE 4) is ON
F351	ESTOP CODE 5	Pin 513 (ESTOP CODE 5) is ON
F364	ESTOP CODE NOT DETECTED	An ESTOP error happened and nothing was detected for the programmed ESTOP CODE inputs

E STOP Inputs Errors

F352 - to - F353

Table 6-9. ESTOP Inputs Error

Error Number	Error	Description
F352	ESTOP OPEN ERR	Pin 523(ESTOP IN 1) and Pin 512(ESTOP IN 2) are Open
F353	ESTOP DISAGREE ERROR	Pin 523(ESTOP IN 1) and Pin 512(ESTOP IN 2) Disagree

Check Inputs Request

F354 - to - F358

Table 6-10. Check Inputs Request Error

Error Number	Error	Description
F354	CHK_COMP_BUF_1_INPUT_ERR	
F355	CHK_COMP_BUF_8_INPUT_ERR	
F356	CHK_COMP_BUF_2_INPUT_ERR	
F357	CHK_COMP_BUF_7_INPUT_ERR	
F358	CHK_COMP_BUF_6_INPUT_ERR	

Stroke Part Counter Preset Reached

F359

Table 6-11. Stroke Part Counter Preset Reached Error

Error Number	Error	Description
F359	STROKE_CNT_PRE_ERR	

Auxiliary Estop Drivers Errors

F360 - to - F361

Table 6-12. Auxiliary ESTOP Drivers Errors

Error Number	Error	Description
F360	AUX_A_DRIVE_ERR	
F361	AUX_B_DRIVE_ERR	

Speed Exceeded Errors

F362 - to - F363

Table 6-13. Speed Exceeded Errors

Error Number	Error	Description
F362	MIN_PRESS_SPEED_EXCEEDED_ERR	
F363	MAX_PRESS_SPEED_EXCEEDED_ERR	

E STOP Drive Test Errors

F365 - to - F366

Table 6-14. E STOP Drive Test Errors

Error Number	Error	Description
F365	EMERGENCY STOP DRIVE ERROR	The E STOP circuit was tested at the start of the stroke and it did not turn off. Check the E STOP wiring.
F366	BOTH I STOP AND E STOP CIRCUITS HAVE FAILED THE DRIVE TEST	Either the line driver has failed or this could be an indication of an incorrect electrical connection.

Resetting Ross DM2 DSV Faults

If your Ross DM2 DSV faults when air is first applied to the unit, one or both poppets may have been jarred into a faulted position during shipment. When the poppets are faulted, input air can escape through the muffler port. To reset the fault, air must be applied to DSV to return the poppets to their unfaulted position.

If the fault occurs before the unit has been wired, the problem will be signalled by air escaping from the muffler port when input air is applied to the DSV. To reset the unit, press the brass button on the bottom of the Reset solenoid while air is being applied to the DSV (see Figure 6-4, page 272).

If the fault occurs after the unit has been wired, an F47 error will appear on the WPC APEX display. To clear the fault and reset the DSV, press OK and turn the Stroke Select key switch to OFF, then to one of the other operating modes (see *Component Failures,* page 256).

If you have trouble resetting the DSV, the problem may be that both poppets are faulted, requiring more air for a reset than can be supplied by the system. In this case, try resetting the unit with the muffler port obstructed. Place your hands or a rag or plastic packaging material over the muffler to restrict the escape of air, then actuate the Reset solenoid.

If the DSV still will not reset, check to see if there are restrictions in the air supply line (e.g., restrictive fittings, quick-disconnect fittings, low flow filters or regulators, or clogged filter elements) and correct if necessary. Also, check to make sure that the air supply line matches the inlet port size of the DSV, and replace with a properly-sized supply line if it does not.

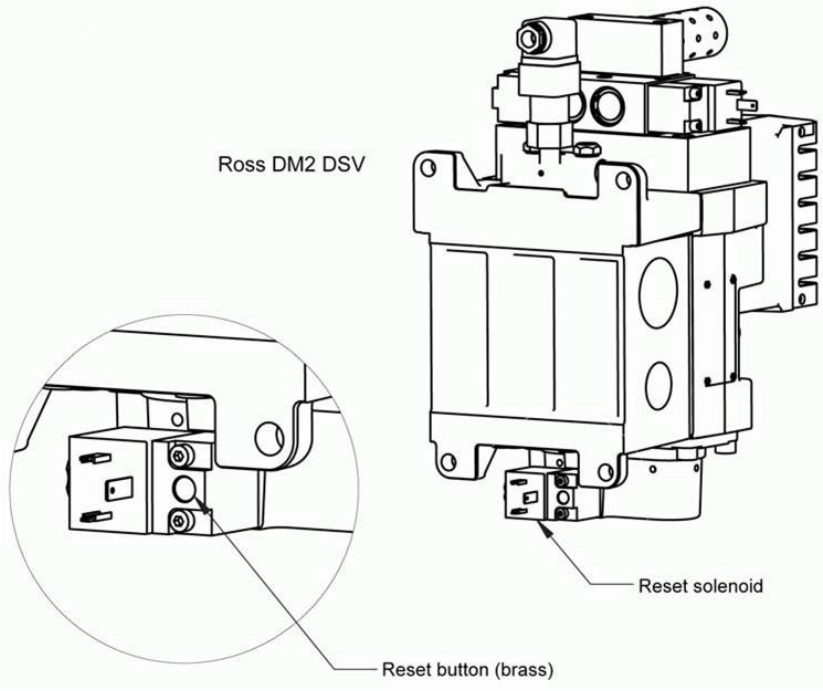


Figure 6-4. Ross DM2 DSV Showing Reset Button

Appendix A – Specifications for User-Built Operator Stations

⚠ DANGER

NON-WINTRISS OPERATOR STATION MAY NOT MEET SAFETY REQUIREMENTS

- Ensure that the Operator Station meets the requirements of all applicable safety regulations.
- Ensure that the Operator Station is wired correctly.
- Ensure that on any non-Wintriss Operator Station the Run buttons are placed so that two hands are required to push them at the same time and that buttons cannot be pushed simultaneously with one hand or with one hand and one elbow.
- Ensure that on any non-Wintriss Operator Station the Run buttons comply with the requirements specified in Table B- 2, page 274.
- Ensure that on any non-Wintriss Operator Station the Run buttons have ring guards or other means in place to prevent unintentional operation.
- Run all necessary tests to verify that each Operator Station is wired correctly and provides proper anti-tiedown and anti-repeat protection. Test procedures are provided at the end of chapters 2 and 3.

Failure to comply with these instructions will result in death or serious injury.

If you build your own Operator Station, be sure that it meets all the safety requirements in this manual and in the applicable safety regulations. Minimum requirements are shown in Table B-1.

Table B- 1. Operator Station Requirements

Minimum Configuration Single Stroke Operation Only	Minimum Configuration Single Stroke and Continuous Operation
2 Palm buttons	2 Palm buttons
1 Immediate stop button	1 Immediate stop button
	1 Prior Act button

Run Button Installation

Install the Run buttons on the Operator Station according to the following requirements:

- The Run buttons must be protected against unintended operation and placed so that the concurrent use of both hands is required.
- A ring guard must be installed for each run button.
- If the buttons are in the same plane, they must be separated by a distance of at least 24 in. (610 mm). If the Run buttons are not in the same plane, they may be placed closer together. For examples of correctly designed operator stations, see the illustrations of Wintriss operator stations, starting on page 61.

NOTICE

A Run-button timer is built into the WPC APEX. If the Run buttons on a standalone Operator Station are not pressed within the 1/2-second “palm time” (“synchronous time” in ANSI terminology) or the Run buttons on multiple Op. Stations are not pressed within the 5-second “concurrent time,” the press will not cycle. See the description of the “Palm Time Lamp and Switch” on page 31 and *Switch 6 on S102 – Selecting Concurrent Time for More Than Two* Operator Stations*, page 176.*

Switch Requirements

Switches used for the Run, Immediate stop, Top Stop and Prior Act buttons must meet the specifications shown in Table B- 2:

Table B- 2. Specifications for Operator Station Switches

Switch	Specifications
Run	NEMA 12 or 13, UL rated 1-NC/1-N0 single contact block with transfer-style contacts. One contact bar moves from N/C contacts to the N/O contacts to ensure that the N/C and N/O contacts cannot be closed simultaneously. (Allen Bradley AB-S 800T-D1JA, Square D 9001KR25GH13, or equivalent) Must be guarded against accidental operation per ANSI and OSHA requirements.
E Stop	NEMA 12 or 13, UL rated 2-NC contacts, positive opening operation, “self-latching”
Top Stop	NEMA 12 or 13, UL rated 2-NC contacts, positive opening operation
Prior Act	NEMA 12 or 13, UL rated 1-NC with integral green pilot lamp for 24 Vdc operation. This lamp indicates when the Prior Act timer is armed. Must be guarded against accidental operation per ANSI and OSHA requirements.

Appendix B – Regulations and ANSI Standards

⚠ WARNING

REFER TO CURRENT REVISIONS OF OSHA/ANSI DOCUMENTS

The following extracts from OSHA and ANSI documents are provided for the user's convenience only. Refer to the most recent revisions of the original OSHA safety regulations and ANSI standards to ensure that you have the most up-to-date information.

Failure to comply with these instructions could result in death or serious injury.

This appendix provides extracts from the Occupational Safety and Health Administration (OSHA) regulations and the American National Standards Institute (ANSI) standards covering presence-sensing devices.

Extracts from OSHA Regulation 1910.217

⚠ WARNING

REFER TO CURRENT REVISIONS OF OSHA/ANSI DOCUMENTS

The following extracts from OSHA and ANSI documents are provided for the user's convenience only. Refer to the most recent revisions of the original OSHA safety regulations and ANSI standards to ensure that you have the most up-to-date information.

Failure to comply with these instructions could result in death or serious injury.

Reprinted below are extracts from OSHA regulation 1910.217 pertaining to the use of presence-sensing devices for point-of-operation guarding on mechanical power presses. Also reprinted here are interpretations of selected regulations provided by the Precision Metalforming Association (PMA). Extracts from the OSHA regulation are printed in the left-hand column; interpretations by PMA are shown in the right-hand column.

Wintriss makes no claim for the accuracy or effectiveness of the PMA interpretations, and persons making use of this material do so at their own risk. PMA interpretations should not be relied upon for use in any specific application. The material is provided, with PMA's permission, for informational purposes only.

Refer to the most recent versions of OSHA documents. To obtain copies of OSHA regulations, write to: OSHA's Office of Information and Consumer Affairs, 200 Constitution Avenue NW, Room N3647, Washington, DC 20210. Tel (202) 219-8151; fax (202) 219-5986.

Extracts from OSHA Regulation 1910.217

OSHA Regulations	PMA Interpretation
OSHA 1910.217 (c).	TABLE 0-10
(c) SAFEGUARDING THE POINT OF OPERATION. –	*Distance of opening from point of operation hazard (inches)* — *Maximum width of opening (inches)*
(1) General requirements.	
(i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table 0-10.	*1/2 to 1 1/2 . . . . . 1/4* *1 1/2 to 2 1/2 . . . . . 3/8* *2 1/2 to 3 1/2 . . . . . 1/2* *3 1/2 to 5 1/2 . . . . . 5/8* *5 1/2 to 6 1/2 . . . . . 3/4* *6 1/2 to 7 1/2 . . . . . 7/8* *7 1/2 to 12 1/2 . . . . . 1 1/4* *12 1/2 to 15 1/2 . . . . . 1 1/2* *15 1/2 to 17 1/2 . . . . . 1 7/8* *17 1/2 to 31 1/2 . . . . . 2 1/8*
OSHA 1910.217 (c) (3) (i) (a)	
(3) Point of operation devices.	*Presence-sensing device*
(i) Point of operation devices shall protect the operator by:	
(a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation.	*(c) (3) (i) (a) Refers to the functional requirement of a presence-sensing device which prevents and/or stops normal stroking of the press.*
OSHA 1910.217 (c) (3) (iii)	
(iii) A presence-sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (i) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the downstroke of the press slide.	
(a) The device may not be used on machines using full revolution clutches.	
(b) The device may not be used as a tripping means to initiate slide motion.	*European method (curtain of light) uses self trip safety system effectively. Variance applied for 11/17/73 by Interlake Stamping Company to use this fail safe system.*
(c) The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.	*When failure occurs, the best indication is the press won't run.*

Extracts from OSHA Regulation 1910.217

OSHA Regulations	PMA Interpretation
(d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking and feeding.	*Top of stroke is the point at which muting shall cease as it is not possible to set a point on the downstroke as the exact position where the hazard of die closing starts.*
(e) The safety distance (Ds) from the sensing field to the point of operation shall be greater than the distance determined by the following formula:	*Safety distance represents the distance an operator can move his hand during the time it takes a press to stop. The internationally recognized hand reach speed is 63 inches/ second.*
Ds = 63 inches/second x Ts, where Ds = minimum safety distance (inches); 63 inches/second = hand speed constant; and Ts = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).	*To determine this safety distance, the stopping time of the press is measured with some appropriate measuring device. The measurement is taken such that the stop signal is given to the press at the 90 degree point of the crank position.* *Since some stopping time increase must be accommodated due to braking system deterioration, a percentage factor must be added to the measured time to obtain the factor for use in the equation for determining safety distance. A percentage factor of 20% is recommended for presses with new brakes or brakes of good condition. For older brakes, a 10% factor is recommended.* *Example:* *Measured stopping time = 0.190 seconds* *Time factor = 1.2 x 0.19 = 0.228 seconds* *Calculation = 63 x 0.228* *Safety distance = 14.4 inches*
(f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence-sensing device.	*(3) (iii) (f) Great care must be taken to assure that no access to the die area exists unguarded.*
OSHA 1910.217 (c) (3) (5) (5) Additional requirements for safe-guarding. Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence-sensing device, Type B gate or movable barrier (on a part revolving clutch) is used for safeguarding:	*This paragraph tells the condition under which a brake monitoring system is required after November 1, 1975.*
(i) The employer shall use a control system and brake monitor which comply with paragraphs (b) (13) and (14) of this section. This requirement should be complied with by November 1, 1975.	*(b) (13) Control reliability* *(b) (14) Construction requirements.*

Extracts from OSHA Regulation 1910.217

OSHA Regulations	PMA Interpretation
OSHA 1910.217 (c) (3) (vii) (c)	
(c) The safety distance (Ds) between each two hand control device and the point of operation shall be greater than the distance determined by the following formula:	
Ds = 63 inches/second x Ts, where	*Example:*
Ds = minimum safety distance (inches);	*Measured stopping time = 0.190 seconds*
63 inches/second = hand speed constant;	*Time factor = 1.2 x 0.19 = 0.228 seconds*
and	*Calculation = 63 x 0.228*
Ts = stopping time of the press measured at approximately 90° position of crankshaft rotation (seconds).	*Safety distance = 14.4 inches*
OSHA 1910.217 (e) (1)	
(e) INSPECTION, MAINTENANCE, AND MODIFICATION OF PRESSES	
(i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment, and safeguards are in safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed.	*Records of clutch and brake will be weekly. Other inspections are periodic subject to time factor determined by employer.*
(ii) Each press shall be inspected and tested no less than weekly to determine the condition of the clutch/brake mechanism, anti-repeat feature and single stroke mechanism. Necessary maintenance or repair or both shall be performed and completed before the press is operated. The employer shall maintain records of these inspections and the maintenance work performed. These requirements do not apply to those presses which comply with paragraphs (b) (13) and (14) of this section.	*If brake monitoring system is installed, weekly inspection and records are not required for clutch/brake mechanism. Other parts of the press will require periodic inspections and records.*

Extracts from ANSI Standards for Presence-sensing Devices and Two-hand Controls

⚠ WARNING

REFER TO CURRENT REVISIONS OF OSHA/ANSI DOCUMENTS

The following extracts from OSHA and ANSI documents are provided for the user's convenience only. Refer to the most recent revisions of the original OSHA safety regulations and ANSI standards to ensure that you have the most up-to-date information.

Failure to comply with these instructions could result in death or serious injury.

Reprinted below are the American National Standards Institute (ANSI) standards for presence-sensing devices (light curtains) and Two-hand controls. ANSI, a national federation of trade associations, technical societies, professional groups, and consumer organizations, is the United States clearinghouse and coordinating body for voluntary standards activity. Approximately 1000 companies are affiliated with the Institute as company members.

ANSI creates voluntary standards to eliminate duplication and to weld conflicting standards into single, nationally accepted standards under the designation "American National Standards." The standards reflect a national consensus of manufacturers, consumers, scientific, technical, and professional organizations, and governmental agencies.

Shown below are extracts of standards requirements and explanatory information from ANSI B11.1-2009 and B11.19-2003 for presence-sensing devices (light curtains) and Two-hand controls. Complete versions of these documents can be obtained by writing to: ANSI, 1430 Broadway, New York, NY 10018.

Extracts from ANSI B11.1-2009 8.6.2.1

Standards Requirements	Explanatory Information
8.6.2.1.7 Each operator's hand controls shall be located at a distance from the point-of-operation so that the operator(s) cannot release either hand actuating control and reach into the point-of-operation during the hazardous portion of the cycle.	***E8.6.2.1.7*** The total stopping time of the press should include the total response time of the control system and the time it takes hazardous motion to stop. The following formula should be used when calculating the safety distance (*Ds*): Ds = K (Ts + Tc + Tbm) Where: *K* = 63 inches/second (hand speed constant). *Ts* = the stop time of the press measured from the final de-energized control element, usually the air valve. *Tc* = the response time of the control. *Tbm* = the additional time allowed by the stopping-performance monitor (brake monitor) before it detects stop time deterioration. NOTE – *Ts* + *Tc* are usually measured by a stop time measuring device. When the press stopping-performance monitor setting is changed, the safety distance should be recalculated. See also Annex C.

Extracts from ANSI B11.1-2009 8.6.3

Standards Requirements	Explanatory Information
8.6.3 Presence-sensing safeguarding device	
8.6.3.1 A presence-sensing device, when used for safeguarding, shall protect the operator as specified in E8.6.1 (a).	***E8.6.3.1*** Various presence-sensing devices employ different sensing and adjustment techniques. The point at which a device responds to an intrusion can vary. Safety mats and area scanners may not be suitable (effective) safeguards when utilized as primary point-of-operation safeguarding. Factors which can affect this suitability include but are not limited to: a) response time; b) minimum object sensitivity; c) measurement accuracy; d) breach ability; e) penetration before detection; f) single point of failure; g) large safety distances. These devices may be utilized as supplemental safeguarding.
8.6.3.2 The device shall be interfaced with the control circuit to prevent or stop slide motion if any object is within the sensing field of the device during the hazardous portion of the cycle.	***E8.6.3.2*** The device should be located or adjusted so that the device always responds to the intrusion at or prior to the safety distance *Ds*. Also, care should be taken when installing the device so that it does not detect false signals from other devices or equipment in the area. The presence-sensing device cannot protect against a catastrophic failure of the press, which causes unintended cycling action. See Annex A, Figure A.3.
8.6.3.3 The device shall not be used for safeguarding the point-of-operation on presses using full-revolution clutches.	
8.6.3.4 When the sensing field has been interrupted, use of the normal press cycle-actuating means shall be required after clearing the sensing field to resume press operation.	
8.6.3.5 When the device is used in the PSDI mode, re-initiation of the press motion shall be in accordance with 6.4.3.8.1.	
8.6.3.6 Muting of the device shall be permitted only during the non-hazardous portion of the press cycle.	***E8.6.3.6*** Muting is typically accomplished by interface circuits or auxiliary controls. The die closing portion of the cycle is always considered hazardous. In some cases, feeding and transfer automation or die features can cause additional hazardous conditions even during the opening portion of the cycle (upstroke). See also ANSI B11.19 for additional information.

Extracts from ANSI B11.1-2009 8.6.3

Standards Requirements	Explanatory Information
8.6.3.7 Muting of the device shall be accomplished in a manner that conforms to the requirements of 6.11 and 8.8.	***E8.6.3.7*** Muting is typically accomplished by interface circuits or auxiliary controls. The muting element should incorporate a similar level of control reliability as the presence-sensing device itself. A simple cam-operated limit switch wired in parallel with the device's output is inadequate, as its failure can remain undetected.
8.6.3.8 The device shall have an identifiable minimum object sensitivity so that an obstruction of an equal or greater size will be detected anywhere within the sensing field regardless of the plane of intrusion.	***E8.6.3.8*** The device should have a minimum object sensitivity stated by the device supplier. For example, an electro-optical device may detect a 32 mm (1¼ inch) diameter opaque object anywhere in its sensing field but allow 25 mm (1 inch) obstructions to pass undetected at certain points in the field.
8.6.3.9 The device shall have a maximum response time, which shall not be affected by object sensitivity adjustments or environmental changes.	***E8.6.3.9*** The device supplier should state the maximum total response time, including output devices, of the presence-sensing device.
8.6.3.10 Devices which require adjustments to accommodate variations in operating conditions, or which incorporate fixed blanking or floating blanking features, shall be designed so that the adjustments or features are capable of supervisory control by the user.	***E8.6.3.10*** Typically, these adjustments or controls are key-operated or located under lockable covers.
8.6.3.11 The device shall be provided with a means that visibly indicates when it is functioning properly.	***E8.6.3.11*** Red and green indicators or other means that can be easily seen by the operator and others should be provided to indicate that the device is functioning.
Indication that the sensing field is being blanked shall be provided. For fixed blanking, the blanked area shall be identified. Supplemental safeguarding shall be provided to prevent access to the hazard through the fixed blanked area.	The blanking function of a presence-sensing safeguarding device desensitizes a portion of the sensing field by disabling one or more channels such that a specific interruption is ignored. Presence-sensing devices can be provided with either fixed or floating blanking. For fixed blanking, the desensitized area does not move or change once configured. Floating blanking allows the blanked area to move within the sensing field. Means to identify the desensitized area may include but are not limited to: a) Indicators within the device; b) Signage or marking of the fixed blanked area; c) The physical location of the object in the blanked area if movement or removal of the object can be detected and it results in a stop command.

Extracts from ANSI B11.1-2009 8.6.3

Standards Requirements	Explanatory Information
8.6.3.11 (cont)	Means of supplemental safeguarding can include completely filling the fixed blanked area to restrict access to the hazard, installing the device at a distance that accounts for the worse case object sensitivity (see 8.6.3.16), or alternate safeguarding may be provided to prevent access to the hazard.
If means are provided to bypass the device, visible indication that the device is bypassed shall be provided.	Means to provide visible indication may include but are not limited to: a) colored indicator lights; b) signage; c) physical position; d) awareness barrier (i.e., safety tape); e) other means.
8.6.3.12 The device shall not fail to respond to the presence of the individual's hand or other body part due to the presence of a reflective object or workpiece.	
8.6.3.13 The device shall conform to the requirements of 6.11 and 8.8. In the event of a power failure to the device, the device shall initiate a stop command to the press control system.	
8.6.3.14 The interface of the presence-sensing device to the press control shall conform to the requirements of 6.11 and 8.8.	
8.6.3.15 The sensitivity of the device to intrusion shall not be adversely affected by changing conditions around the press.	
8.6.3.16 The effective sensing field of the device shall be located at distance from the nearest point-of-operation hazard so that individuals cannot reach into the point-of-operation with a hand or other body part before cessation of motion during the hazardous portion of the cycle.	***E8.6.3.16*** The total stopping time of the press should include the total response time of the presence-sensing device, as stated by the supplier, the response time of the interface, the response time of the control system, and the time it takes the press to cease slide motion. The following formula should be used when calculating the safety distance: Ds = K (Ts + Tc + Tr + Tbm) + Dpf where *K* = 63 inches/second (hand speed constant) T_S = the stop time of the press measured from the final de-energized control element, usually the air valve T_C = the response time of the press control *Tr* = the response time of the presence-sensing device and its interface, if any, as stated by the supplier or measured by the user.

Extracts from ANSI B11.1-2009 8.6.3

Standards Requirements	Explanatory Information
8.6.3.16 (cont)	*Tbm* = the additional stopping time allowed by the stopping-performance monitor before it detects stop time deterioration. *Dpf* = the added distance due to the penetration factor as recommended in ANSI B11.19, Annex D, Figure D.2. The minimum object sensitivity is stated by the supplier. If beam blankouts or floating window features are used, these figures should be added to the object sensitivity figure before using the chart. NOTE - *Ts* + *Tc* is usually measured by a stop time measuring device. See also ANSI B11.19, Annex C and D. Whenever the press-cycle STOP command or stopping-performance monitor time or angle setting is changed, the safety distance should be recalculated. See also "stopping-performance monitor" (6.12). NOTE – No increase in safety distance is required for fixed blanking applications if the blanked area is entirely occupied by the material or fixtures. In some instances, the use of blanking does not allow efficient production of certain piece parts. Horizontal placement of the sensing field, so that it detects that operator's waist area, may present a solution. In this application, the operator may freely manipulate the workpiece and operate the press as long as the operator stands outside of the horizontal sensing field. The sensing field should be located so that the operator cannot reach the point-of-operation prior to interrupting the sensing field and completion of the stopping action. Where possible, the sensing field should be of sufficient depth to prevent the operator from standing between the field and the point-of-operation. See also ANSI B11.19, Annex C and D.

Extracts from ANSI B11.1-2009 8.6.3

Standards Requirements	Explanatory Information
8.6.3.17 If the position of the device will allow the operator or others to place themselves between the sensing field and the point-of-operation, additional means shall be provided in conjunction with the device to prevent the operator or others from exposure to the point-of-operation hazard.	***E8.6.3.17*** Additional means may include manual reset outside of the sensing field of the device or additional barrier guards, safety mats, light curtains, or other devices. Operator controls for each operator located outside of the sensing field of the presence-sensing device may be used. As an alternative to the reset control and to prevent an individual from stepping behind the sensing field of a PSD, the maximum distance between the light curtain and the machine structure should not exceed 75mm (3 inches). Supplemental safeguarding may be utilized to eliminate a space greater than 75mm.
8.6.3.18 The device shall not be affected by ambient light or by light-source decay so that the increase in response time or object sensitivity is greater than the value used to calculate the safety distance.	***E8.6.3.18*** Examples of ambient light are associated with windows, light fixtures, skylights, bay doors, or die lights.
8.6.3.19 All areas of entry to the point-of-operation not protected by the presence-sensing device shall be otherwise safeguarded.	***E8.6.3.19*** Usually the electro-optical presence-sensing devise is used in a manner that provides a protected zone in front of the primary work area with auxiliary devices or guards used to protect secondary access areas. In some cases, mirrors may be used in conjunction with the device to provide two-, three- or four-sided protection.
8.6.3.20 Press production systems with a configuration that would allow an individual to enter, pass through, and become clear of the presence-sensing device sensing field shall not be operated in the PSDI mode of operation.	***E8.6.3.20*** For PSDI applications see Clause 10.
8.6.3.21 When a device is used on a press production system and the protection of the operator is dependent upon the stopping action of the press, a stopping-performance monitor shall be required in conformance with 6.12. See section 8.3.9 for exceptions.	

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
8.3 Electro-optical, RF, and area scanning presence-sensing safeguarding devices	
8.3.1 Design and construction	
8.3.1.1 The presence-sensing device shall be designed and constructed to create a field that detects the presence of an individual(s). The presence-sensing device shall not create a hazard in and of itself.	***E8.3.1.1*** The presence-sensing device should be designed and constructed such that it does not present hazards to individuals from: • sharp edge or pinch point hazards; • radiated light or energy hazards; • electromagnetic interference hazards; • electrical shock hazards.
8.3.1.2 The presence-sensing device shall have a minimum object sensitivity such that an obstruction of a same or greater size will always be detected anywhere within its sensing field, regardless of the plane of intrusion. The RF (radio frequency) presence-sensing device shall provide means to adjust the sensitivity of the field. The field, once adjusted, shall not decrease in sensitivity below this established level.	***E8.3.1.2*** The presence-sensing device should have a minimum object sensitivity stated by the supplier. For example, an electro-optical device may detect an opaque object with a diameter of 32 mm (1.25") anywhere in its sensing field, but allow an obstruction with a diameter of 25 mm (1") to pass undetected at certain points in the field.
8.3.1.3 The presence-sensing device shall not fail to change its output state, if not bypassed or muted, when it detects the presence of an individual.	
8.3.1.4 Adjustment or configuration of presence-sensing devices shall be capable of being supervised.	***E8.3.1.4*** Methods of meeting this requirement include, but are not limited to, the use of key operated controls, controls located under lockable covers, or controls that require a tool or password to access. Adjustment or configuration should only be performed by authorized individuals. Adjustments or configuration can include, but are not limited to: • muting; • blanking; • power adjustments; • sensing field configuration; • reset functions.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
8.3.1.5 The presence-sensing device shall incorporate visual means to indicate that the device is detecting an individual within the effective sensing field of the device.	***E8.3.1.5*** Indicators, (usually red and green), displays or meters should be provided to indicate the status of the presence-sensing device. The visual means may be integral to the presence-sensing device or part of the interface or machine control system. Due to the prevalence of color blindness (10% in males for red/green), methods such as unambiguous positioning, patterning, labeling or flashing of the indicators may be effective in providing the indication required.
8.3.1.6 The presence-sensing device shall have a maximum response time that shall not be affected by object sensitivity or environmental changes. The safeguarding supplier shall provide the maximum response time of the presence-sensing device.	
8.3.1.7 The electro-optical and area scanner presence-sensing devices shall not be affected by ambient light conditions or by changes in the device light source characteristics, such that an increase in response time or object sensitivity occurs.	***E8.3.1.7*** When the electro-optical and area scanner presence-sensing devices are exposed to signals from other electro-optical presence-sensing devices or to changes in ambient light commonly associated with windows, light fixtures, skylights, bay doors or work area lights, the response time or object sensitivity should not be adversely affected.
8.3.1.8 Components, subassemblies or modules of electro-optical, RF, and area scanning presence-sensing devices shall conform to the requirements of 6.1, or shall be designed and constructed to meet the safety performance level (risk reduction) as determined by a risk assessment.	***E8.3.1.8*** See also, clause 5 and ANSI B11.0 (B11.TR3).
8.3.1.9 The area scanning presence-sensing device shall provide a means or operating mode to verify the size, shape, and detection capabilities of the detection area or zone. Information shall be provided by the area scanning device supplier to identify the: • maximum safeguarding range; • minimum object sensitivity within the stated safeguarding range; • maximum field of view in degrees; • tolerance in the range measurement; and • detection capabilities with respect to the reflectivity of an object versus the distance to the object.	***E8.3.1.9*** These presence-sensing devices typically operate on the principle of “diffuse reflectance,” which is a principle of transmitting beam(s) of light to form a detection area or zone. When an object enters the detection area, it reflects the transmitted light back to the device, which then evaluates the object‘s position. The amount of reflected light (degree of reflectance in percent) that can be reliably detected typically ranges from 1.8% to over 90% and can be represented graphically by reflectivity versus distance. For more information see IEC 61496 parts 1 and 3.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
8.3.2 Installation, operation and maintenance	
8.3.2.1 Exposure to the hazard(s) shall not be possible by reaching over, under or around the sensing field of the presence-sensing device. Additional guards or safeguarding devices shall be provided to protect those areas.	***E8.3.2.1*** The user should select a presence-sensing device adequate to prevent individuals from reaching over, under or around the sensing field during the hazardous portion of the machine cycle. Additional safeguarding may be required in conjunction with the device to meet this requirement.
The effective sensing field shall be of adequate height, width, and depth so that entry of the individual into the hazard zone is detected.	If individuals can place themselves between the sensing field and the hazard zone, additional safeguarding should be used in conjunction with the device to prevent the individual from exposure to the hazard. It has been found by practical application that this situation can occur with as little as 75 mm (3") depending on the positioning (e.g., height) and the minimum object sensitivity of the sensing field, and the ability of the individual to lean against the machine frame or guarding. It should not be possible to climb on or walk on the machine support structure to avoid detection by the presence-sensing device when the sensing field is orientated horizontally. When an individual can pass through the sensing field, it is considered perimeter guarding (see also, the requirements of 6.5 and 8.3.2.4). The electro-optical and area scanning presence-sensing devices may fail to detect an individual's presence due to reflective workpieces or objects in the vicinity of the device. Care should be used to ensure that these reflections do not render the device ineffective. Some examples of reflective objects include, but are not limited to: • machine surfaces; • tooling; • work pieces; • hand tools; • auxiliary equipment; • workholding tables and fixtures. Testing each set-up for minimum object sensitivity should be done with an appropriate test rod, following the supplier's recommendation.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
	Where objects are placed within the defined sensing field of an area scanner presence-sensing device, care should be taken to ensure that: • no shadows exist behind the objects such that the device is rendered ineffective; • removal of the object will not allow undetected access to a hazard zone.
8.3.2.2 The presence-sensing device shall be installed such that it does not create additional hazards.	***E8.3.2.2*** Some installation hazards include, but are not limited to: • pinch point hazards created by interference between the presence-sensing device and moving members of the machine; • tripping hazards; • electrical shock hazards; • overhead or other “strike against” hazards; • thermal hazards. Where such conditions can exist, additional safeguarding may be required.
8.3.2.3 The presence-sensing device shall be installed at a location so that the effective sensing field prevents individuals from reaching the hazard(s) during the hazardous portion of the machine cycle.	**E8.3.2.3** The safety distance calculation is dependent upon the: • speed of approach of the individual; • total response time of the safeguarding device as stated by the supplier; • response time of the interface; • response time of the control system; • time it takes the machine to stop hazardous motion; and • depth penetration factor of the safeguarding device. See Annex D for further explanation and an example method to calculate the safety distance. Additional methods might be used as determined by the supporting risk assessment documentation. For installations in which the direction of approach is perpendicular to the sensing field (i.e., normal approach), the minimum distance between the sensing field and the closest hazard should be no less than 100mm (4”) regardless of the outcome of a safety distance calculation. Practical application has shown that less than 100 mm (4”) of safety distance can result in increased risk of harm. See also, ISO 13855.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
	RF presence-sensing devices have sensing fields that can vary due to: • antenna(e) design; • effects of adjacent machinery and equipment; • field sensitivity adjustments; and • environmental factors (such as humidity or temperature). Before the machine is used for production purposes, the RF presence-sensing device should be checked to ensure that the effective field protects individuals at the safety distance.
8.3.2.4 The presence-sensing device shall protect individuals from hazards by initiating an immediate stop command to the machine control system when the sensing field of the device is interrupted during the hazardous portion of the machine cycle. It shall require re-initiation of the normal actuating means prior to the start or continuation of motion of the machine.	***E8.3.2.4***
When an individual can pass through the sensing field of the presence-sensing device, the device shall initiate an immediate stop command to the machine control system and shall require that the device or machine control be manually reset before hazardous situation can occur. The reset function and devices shall comply with 6.5.	The operator should ensure that no individual is in the safeguarded area before re-setting the presence-sensing device or machine control and initiating a hazardous situation
8.3.2.5 Indication that the sensing field is being blanked shall be provided. For fixed blanking, the blanked area shall be identified. Supplemental safeguarding shall be provided to prevent access to the hazard through the fixed blanked area.	***E8.3.2.5*** The blanking function of an electro-optical presence-sensing device desensitizes a portion of the sensing field by disabling one or more channels such that a specific interruption is ignored. Electro-optical presence- sensing devices can be provided with fixed or floating blanking. Floating blanking allows the blanked area to move within the sensing field. When floating blanking is enabled and the object sensitivity increases, the sensing field must be placed at a greater distance from the hazard, see 8.3.2.2 and Annex D and Figure D.1.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
	For fixed blanking, the desensitized area does not move or change once configured. Means to identify the desensitized area may include but are not limited to: • indicators within the electro-optical presence-sensing device; • signage or marking of the fixed blanked area; • the physical location of the object in the blanked area if movement or removal of the object can be detected and results in a stop command. Means of supplemental safeguarding can include: • completely filling the fixed blanked area to restrict access to the hazard; • the electro-optical presence-sensing device installed at a distance that accounts for the worst case object sensitivity; (see 8.3.2.2) or • alternate safeguarding may be provided to prevent access to the hazard.
8.3.2.6 Components, subassemblies or modules of the interface or machine control system shall conform to the requirements of 6.1, or shall be designed and constructed to meet the safety performance level (risk reduction) as determined by a risk assessment. **8.3.2.7** Bypassing of the presence-sensing device shall comply with 6.6. **8.3.2.8** Muting of the presence-sensing device shall comply with 6.7.	***E8.3.2.6*** See also, clause 5 and ANSI B11.0 (B11.TR3).
8.3.2.9 The RF presence-sensing device shall not be adversely affected by changes around the machine that may alter the sensitivity of the device such that individuals are no longer detected in the sensing field at the proper safety distance.	**E8.3.2.9** The RF presence-sensing device may be affected by changes in the conditions around the machine such as ambient conditions, the placement of parts and tote boxes, grounding conditions of the operator, or the movement of industrial trucks. These changes should not adversely affect the performance of the device.

Extracts from ANSI B11.19-2010 8.3

Standards Requirements	Explanatory Information
8.3.2.10 The total tolerance in the range measurement of an area scanning presence-sensing device shall be included in determining the distance from the nearest recognized hazard to the detection area or zone. This detection area shall be identified and tested to ensure that the device is able to detect individuals entering the detection area. The effective sensing field shall be verified for proper size and coverage upon installation, replacement, or changes of the detection area.	**E8.3.2.10** When the area scanning presence-sensing device is horizontally mounted, the detection area or zone should be visibly marked on the floor. This verification can be accomplished by using a programming device or by physically identifying the perimeter of the detection area with an appropriate test rod, following the supplier's recommendation. This verification is to ensure that a pre-programmed area scanning presence-sensing device with a small or improper detection area is not used by mistake in an installation requiring a larger field. Area scanning presence-sensing device may not be suitable (effective) safeguards when used to protect an individual's hands or fingers from hazards. Items which can affect this suitability are: • response time; • minimum object sensitivity; • measurement accuracy.

Glossary

NOTICE

Cross-references to other glossary entries are shown in *italics.*

ACTS	See *Auto-compensated Top Stop.*
ANSI	Stands for American National Standards Institute, a U.S. clearinghouse and coordinating body for voluntary standards activity on the national level.
Auto Carry-up	A signal that causes the press to automatically complete the stroke, stopping at TDC, when the operator releases his hands from the palm buttons after the Auto Carry-up Angle has been reached. Also called "Operator Station mute."
Auto Carry-up Angle	The crank angle at which the pinch point has closed to less than 1/4 in. (6 mm), an opening determined by OSHA to be too small to pose a hazard to the operator.
Auto-compensated Top Stop (ACTS)	A WPC APEX feature, designed specifically for variable-speed presses, which adjusts the Top-stop angle automatically as press speed changes or the brake wears.
Automatic Continuous On-demand	A WPC APEX feature that allows an external device like a feeder or robot to signal WPC APEX to start the press in Continuous mode and maintain operation in Continuous.
Automatic Single Stroke	A WPC APEX feature that allows an external device like a feeder or robot to signal WPC APEX to stroke the press when a feed has been completed.
BDC	Abbreviation for Bottom Dead Center.
brake monitor	A WPC APEX feature that checks for brake wear.
calculated safety distance	See *safety distance*.
cam channels	Relays that open and close on signals from the programmable cam switch to turn auxiliary equipment on and off at specified crankshaft angles.
concurrent time	The length of time within which each pair of palm switches on all Operator Stations connected to WPC APEX must be pressed in order to start the press. This interval is 5 seconds. If the concurrent time is exceeded by any Operator Station, the press will not start.
control component failure	Another name for control reliability.

control reliability	A regulation defined in ANSI B11.1-1988 and OSHA 1910.217 requiring that a single component failure in a clutch/ brake control circuit not prevent the normal stopping action of the press, not create an unintended stroke, and not allow initiation of a subsequent stroke until the failure has been corrected.
crank angle clock	A circular graphic on the WPC APEX LCD display that shows the angle of rotation of the press's crankshaft.
depth penetration factor	A value used in the ANSI formula for calculating the safety distance. The depth penetration factor is a measure of how far an object, like an operator's hand, can move through the light curtain before the light curtain reacts.
dual diverse redundancy	A WPC APEX feature in which both microprocessor systems belong to different architectures, are programmed using different programming languages, function independently of one other, have separate power supplies, and provide different information to the operator. Dual diverse redundancy provides optimum clutch/brake control and operator safety
Dual Safety Valve	The control-reliable device on the press that controls the flow of air to the press's clutch.
emergency stop	A signal sent to the press that stops it, removes power to the motor via the lockout relay, and signals ancillary equipment to perform an emergency stop or removal of power via the AUX Relay (now functioning as an E Stop relay), preventing any unintended restart.
fault (error) message	An alphanumeric code that appears on the WPC APEX display when an error condition occurs.
hand-speed constant	A value used in the ANSI formula for calculating the safety distance. The hand-speed constant is the distance one can theoretically move one's hand and arm in one second. OSHA recommends a hand-speed constant of 63 inches-per-second.
immediate stop	A signal sent to the press in response to a malfunction that stops the press immediately. An Immediate stop can be initiated manually by the operator or automatically by WPC APEX or external devices.
interrupted stroke	A condition that occurs when the press has been Immediate stopped before the completion of the stroke by either the operator or an automatic device for personnel or equipment protection. During an interrupted stroke condition, the Interrupted Stroke message flashes on the WPC APEX display.
lockout	A WPC APEX function that prevents the press from being restarted after clearing of fault messages that indicate serious errors. The lockout condition is indicated by the lockout message, which appears on the WPC APEX display. Lockout provides an added safety feature to the WPC APEX.
lockout message	An Error message that appears on the WPC APEX display indicating that a serious error condition has occurred.

Micro-inch	A WPC APEX feature that allows the operator to set the amount of time in milliseconds that the Dual Safety Valve is open and, therefore, the distance the ram will travel when the Run/Inch switches on the Operator Station are pushed in Inch mode. Micro-inch is designed for high-speed and/or short-stroke presses.
NEMA 12	A rating certifying that an electrical device is protected against dust, water, and oil.
ninety degree (90°) stop- time test	A test required to set the proper safety distance for personnel- guarding devices, including light curtains, two-hand controls, and type-B movable barriers. This test checks the stopping time of the press at its most critical stopping point, normally the midpoint of the downstroke (i.e., 90°), while the press is running in Continuous mode (or Single Stroke if the press does not have a selector setting for Continuous). Stopping time is a value required in the ANSI formula for calculating the safety distance.
object sensitivity	A value required in deriving the depth penetration factor for a light curtain. Object sensitivity specifies the smallest diameter object that a light curtain will detect anywhere in its field.
ON-OFF setting	Stroke angle settings at which the cam channel is to turn ON (activate) and turn OFF (deactivate)
OSHA	Stands for Occupational Safety and Health Administration, a government agency that has established regulations for mechanical power presses including presence-sensing devices for point-of-operation guarding.
overrun limit switch	A device mounted on the press to check the accuracy of the crankshaft angle maintained by the resolver. The overrun limit switch consists of a magnet, which is mounted on the crankshaft (or other shaft), and a stationary magnetic switch, which is mounted just above the magnet so that it detects the magnetic field on every stroke. The magnetic switch is also called an “overrun sensor.” WPC APEX checks the resolver crankshaft angle by comparing it to the signal received from the overrun limit switch. When the signal is not received at the same resolver angle on every stroke, WPC APEX knows that the resolver is no longer rotating at a 1:1 ratio with the press.
overrun timing	A WPC APEX feature that provides a backup for top stop timing, stopping the press if the top stop output relay should fail. Overrun timing is a function of the stopping time of the press and is influenced by the condition of the brake linings and press speed. It is also dependent on proper installation of the overrun limit switch.
palm time	The length of time within which the two palm switches on each Operator Station connected to WPC APEX must be activated in order to start the press. This interval is 1/2 (0.5) second as required by ANSI. If the palm time on any Operator Station is exceeded, the press will not start. ANSI standards refer to the palm time as synchronous time.

pinch point	The hazardous area between the upper and lower die from which OSHA mandates that the operator should be protected by installation of safety equipment such as light curtains, two- hand controls, and other barriers.
PMA	Stands for Precision Metalforming Association.
reset	A command issued by pressing the OK button on the display that allows the press to resume operation after it has been stopped due to a malfunction. The “reset” command clears the fault message from the WPC APEX display.
resolver	An electrical component mounted on the press used by WPC APEX to provide continuous information about the position of the crankshaft and to maintain a count of the number of revolutions it makes. The resolver, which has internal windings and works on the principle of inductance, turns at a one-to-one ratio (1:1) with the crankshaft.
response time	The length of time it takes the WPC APEX control to activate the machine’s brake.
safety distance	The distance from the pinch point that OSHA requires safety equipment such as light curtains, two-hand controls, and type- B movable barriers to be mounted to assure the safety of the operator. The safety distance is calculated using a precise formula set by OSHA regulations and/or ANSI standards. The formula uses the results of the ninety degree (90°) stop-time test.
start time	The amount of time it takes the resolver to start turning after the Dual Safety Valve (DSV) is energized.
stopping angle	The number of degrees of crankshaft rotation required for the press to stop after a “stop” command is issued. The stopping angle is calculated by subtracting the crankshaft position when the dual safety valve (DSV) is closed from the press’s position when it actually stops. The stopping angle is useful in determining where to set Top Stop and in die-protection settings.
stopping time	The length of time it takes the crankshaft to stop moving after the Dual Safety Valve (DSV) deactivates.
strokes counter	A counter that maintains a count of the number of strokes made by the press. The strokes counter is incremented once for each cycle of the press.
suppressor	A component that reduces or eliminates electrical noise.
synchronous time	The ANSI term for palm time.
TDC	Abbreviation for Top Dead Center.
timing	“ON” settings for critical press parameters like Auto Carry-up Angle and Top Stop, and “ON” and “OFF” settings for cam channels.
top stop	A signal sent to the press in response to a malfunction that stops the press at the top of its current stroke (0°). A Top Stop can be initiated manually by the operator or automatically by WPC APEX or other devices.

top stop constant	A feature used to accommodate a press automation function at WPC APEX. This feature works best on presses that have speed ranges of several hundred to over a thousand strokes per minute.
zero cam	A closure-to-ground signal that turns on at approximately 270° and turns off at 30°. Zero cam can be used with AutoSet load monitors to “zero,” or clear, the current tonnage reading. Zero cam is also used with RamPAC to check counterbalance air pressure and with MultiPAC to increment the lube counter.

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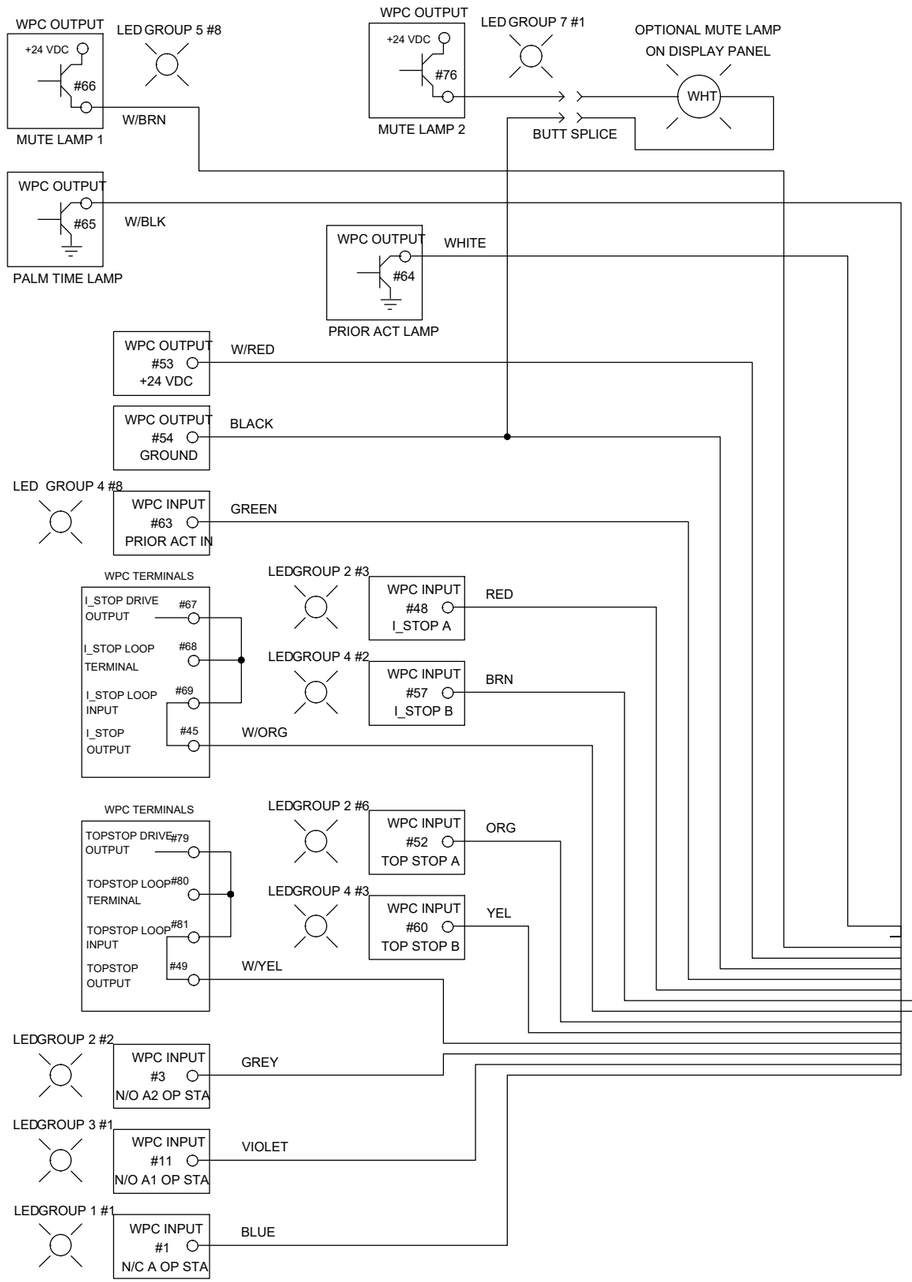
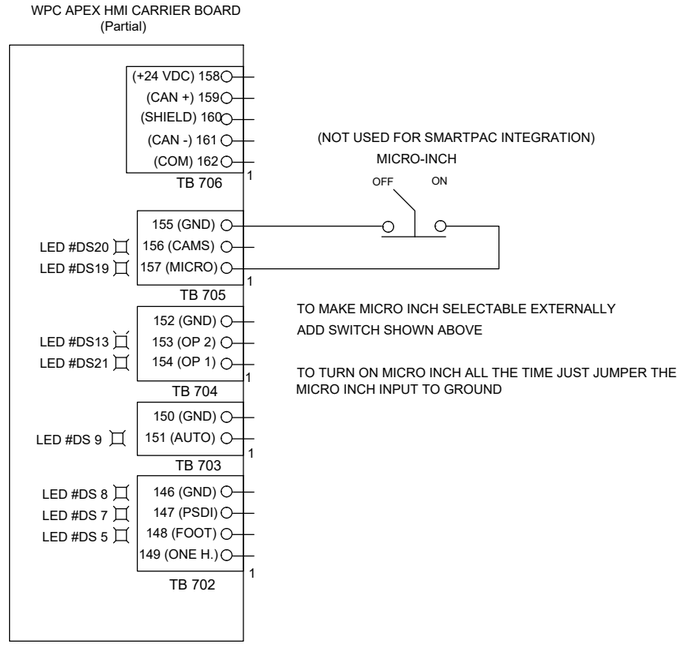
REVISIONS			
REV	DESCRIPTION	DATE	APP'D





(NOT USED FOR SMARTPAC INTEGRATION)

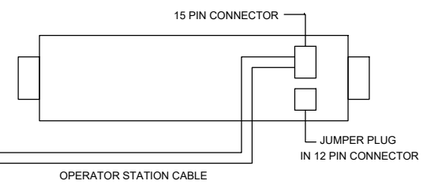
MICRO-INCH

OFF ON

TO MAKE MICRO INCH SELECTABLE EXTERNALLY ADD SWITCH SHOWN ABOVE

TO TURN ON MICRO INCH ALL THE TIME JUST JUMPER THE MICRO INCH INPUT TO GROUND

Note: Ensure that on any non-Wintriss supplied operator station run buttons comply with the requirements in table B-2 on page B-2 of the press control manual.



DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		WPC APEX OPERATOR STATION A WIRING	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 1 / REV
REL		SCALE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

* PROGRAMMABLE FOR THE SMARTPAC INTEGRATION

WPC OUTPUT #38 +24 VDC

LED GROUP 3 #9 — WPC INPUT #21 USER 1 IN — USER 1 INTERLOCK ESTOP* F51

LED GROUP 7 #4 — WPC INPUT #82 USER 2 IN — USER 2 INTERLOCK ESTOP* F52

LED GROUP 6 #4 — WPC INPUT #71 USER 3 IN — USER 3 INTERLOCK TOP STOP* F53

WPC TERM #31 GROUND

LED GROUP 7 #5 — WPC INPUT #83 USER 4 IN — USER 4 INTERLOCK ESTOP* F54

LED GROUP 6 #5 — WPC INPUT #72 USER 5 IN — USER 5 INTERLOCK TOP STOP* F55

LED GROUP 7 #6 — WPC INPUT #84 USER 6 IN — USER 6 INTERLOCK TOP STOP* F56

LED GROUP 6 #6 — WPC INPUT #73 USER 7 IN — USER 7 INTERLOCK ESTOP/LOCKOUT* F57

CROSS CHECKED PAIR

LED GROUP 7 #7 — WPC INPUT #85 USER 8 IN — USER 8 INTERLOCK ESTOP* F58

LED GROUP 6 #7 — WPC INPUT #74 USER 9 IN — USER 9 INTERLOCK ESTOP* F58 Disagree F17

CROSS CHECKED PAIR

LED GROUP 7 #8 — WPC INPUT #86 USER 10 IN — USER 10 INTERLOCK ESTOP/LOCKOUT* F50

LED GROUP 4 #6 — WPC INPUT #18 USER 11 IN — USER 11 INTERLOCK ESTOP/LOCKOUT* F50 Disagree F18

LED GROUP 1 #5 — WPC INPUT #8 SYS AIR IN — F48 — MAIN SYSTEM AIR PRESSURE ESTOP — WPC TERM #54 GROUND

LED GROUP 6 #3 — WPC INPUT #70 REM RESET IN — REMOTE RESET BUTTON

WPC OUTPUT #23 +24 VDC — RED

LED GROUP 6 #1 — WPC INPUT #24 OVRRUN IN — WHT — Overrun sensor

WPC TERM #25 GROUND — BLK

WPC OUTPUT #38 +24 VDC

LED GROUP 1 #2 — WPC INPUT #4 FOOT N/C IN — FOOT SWITCH

LED GROUP 3 #3 — WPC INPUT #14 FOOT N/O IN

LED GROUP 3 #4 — WPC INPUT #15 AUTO N/C IN — Automatic mode actuator

LED GROUP 2 #4 — WPC INPUT #5 AUTO N/O IN

LED GROUP 1 #3 — WPC INPUT #7 MOTOR FOR IN — MOTOR FORWARD CONTACT

LED GROUP 4 #5 — WPC INPUT #17 MOTOR REV IN — F20 — MOTOR REVERSE CONTACT

ENABLE NO TOPSTOP IN INCH MODE — OFF ON

LED GROUP 4 #1 — WPC INPUT #13 NO TS IN INCH

CONNECT THE SHIELD TO THE ENCLOSURE NEAR THE POINT OF ENTRY. — SHIELD

RESOLVER CONNECTOR ON THE EDGE OF WPC 2000 PROCESSOR BOARD

TB106

110 (GND)	
109 (S1)	BLK
108 (S2)	GRN
107 (R1)	RED
106 (S3)	YEL
105 (R2)	ORG
104 (S4)	BRN

RESOLVER — RESOLVER CABLE

SHOWN FOR CW ROTATION FACING SHAFT FOR CCW ROTATION SWAP THE BLACK AND YELLOW WIRES

FLYWHEEL SENSOR FOR SMARTPAC'S ONLY

LED GROUP 4 #10 — WPC INPUT #22 FLYWHEEL IN — RED — WHT — BLK — Flywheel sensor — Red tape — Blue magnet — Red Magnet

WPC OUTPUT #28 — AUX 1 OUTPUT

CUSTOMER SUPPLIED AUXILIARY CONTROL RELAY TURNS ON WHEN THERE IS NO FAULT CONDITIONS OR NO INTERRUPTED STROKE.

NOTE 1:
N/C CONTACTS OF BAR CONTROL ON/OFF SWITCH CAN BE WIRED TO MOTOR STARTER CIRCUIT SO THAT MAIN MOTOR TURNS OFF WHEN BAR MODE IS SELECTED

BAR CONTROL BOX — off on actuator

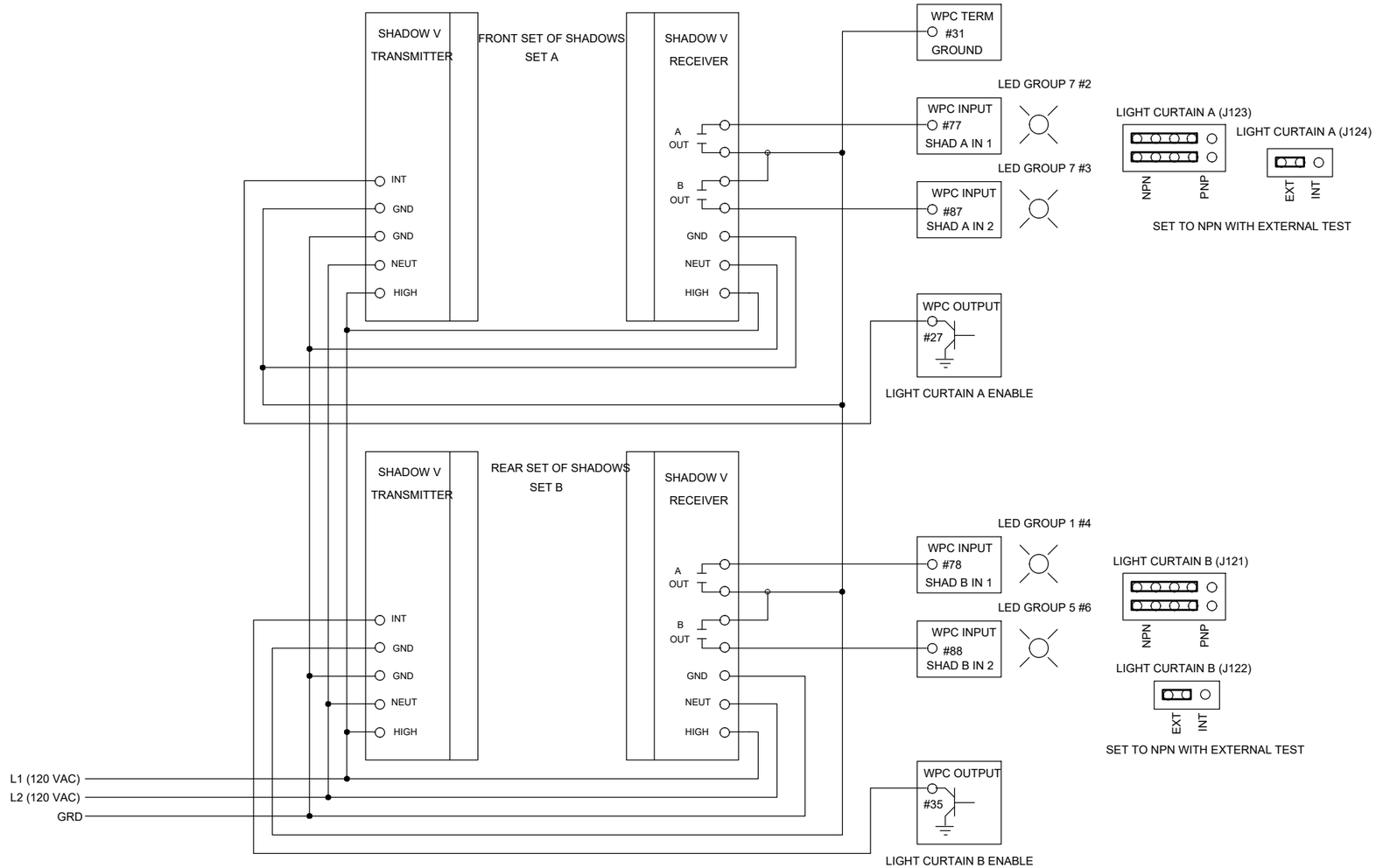
LED GROUP 2 #5 — WPC INPUT #6 BAR SELCT IN

LED GROUP 4 #4 — WPC INPUT #16 BAR ACT IN

SEE NOTE 1

DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		WPC APEX EXTERNAL WIRING	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 2 / REV
REL		SCALE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

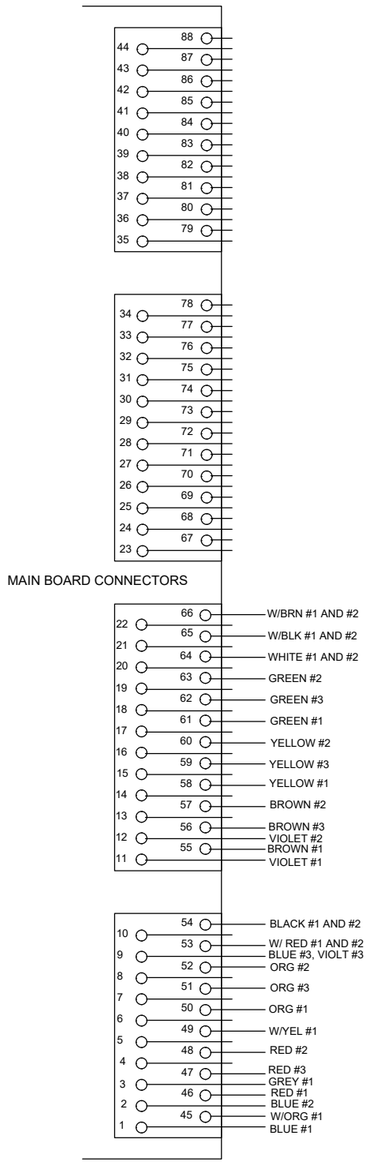
TITLE

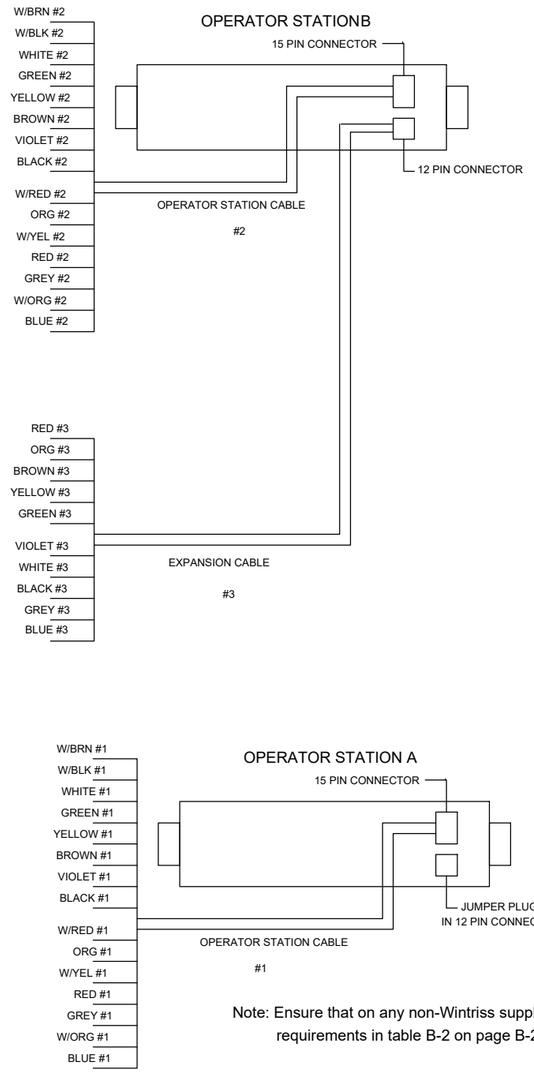
WPC APEX DUAL SHADOW V WIRING

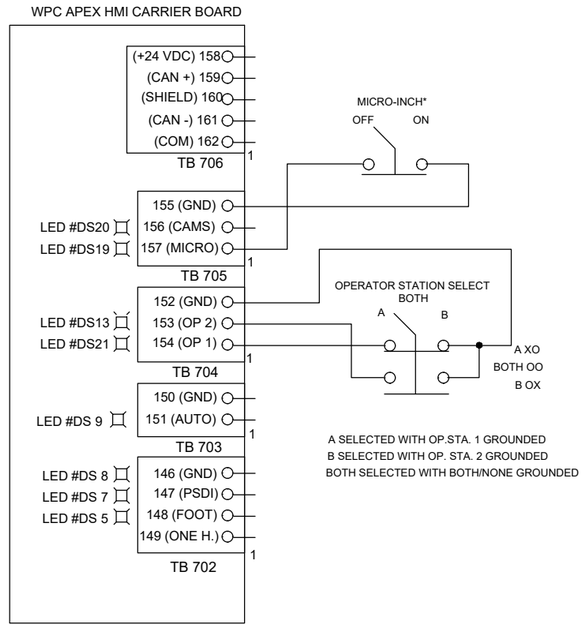
CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 3	

SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D







TO MAKE MICRO INCH SELECTABLE ADD SWITCH SHOWN ABOVE*

TO TURN ON MICRO INCH ALL THE TIME JUST JUMPER THE MICRO INCH INPUT TO GROUND*

* NOT USED FOR PROCAM OR SMARTPAC INTEGRATION

Note: Ensure that on any non-Wintriss supplied operator station run buttons comply with the requirements in table B-2 on page B-2 of the press control manual.

NO CONNECTIONS FOR THE FOLLOWING WIRES:

W/ORG # 2
W/YEL #2
WHITE #3
BLACK #3
GREY #2
GREY #3

DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

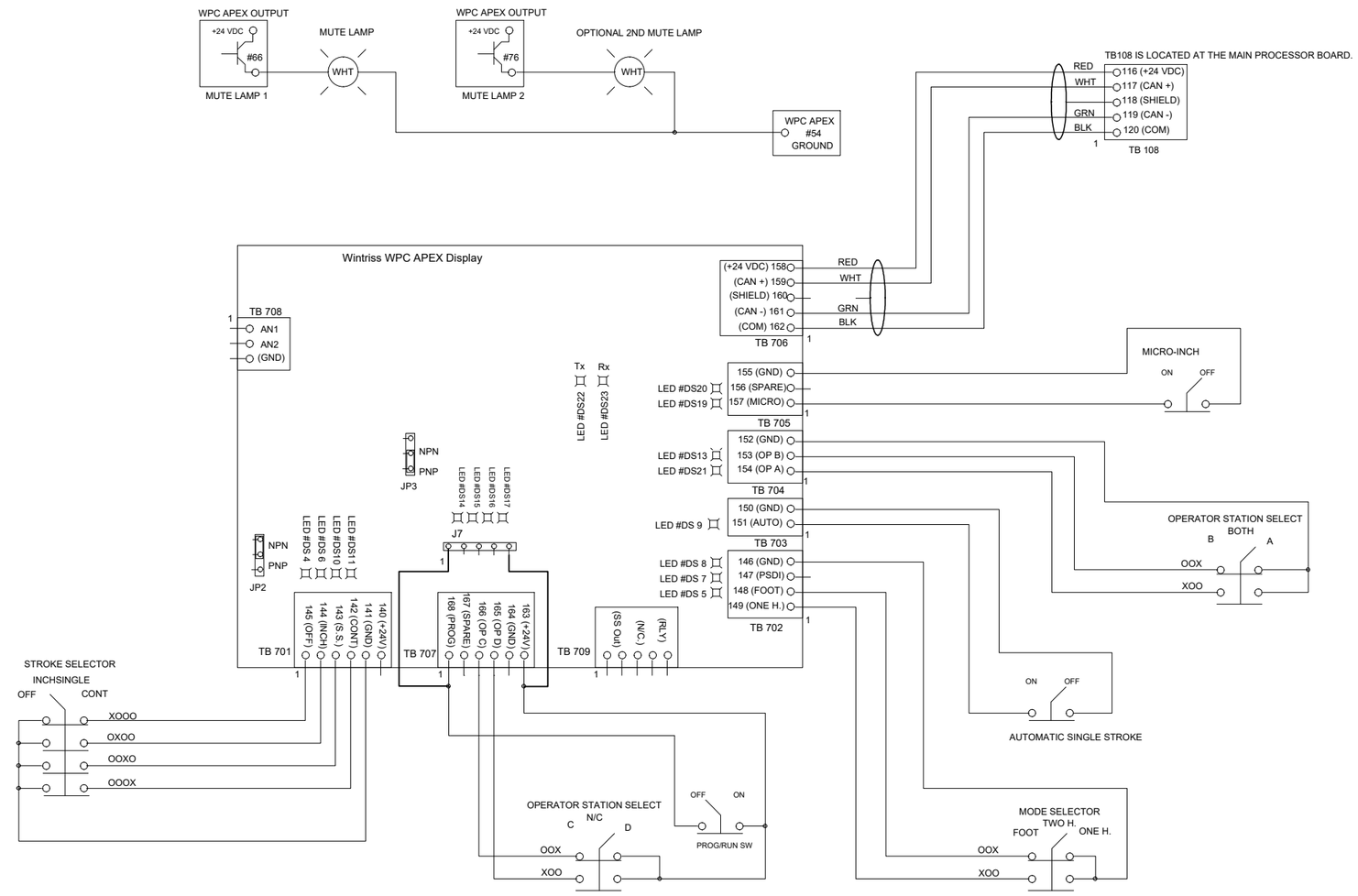
WINTRISS CONTROLS GROUP

TITLE: WPC APEX WITH DUAL OPERATOR STATION WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 4	

SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



NOTE: SELECTING OP STATION C WILL AUTOMATICALLY SELECT A + B AS WELL
SELECTING OP STATION D WILL AUTOMATICALLY SELECT A + B + C AS WELL

DRAWN	JOC	DATE	2/4/26
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

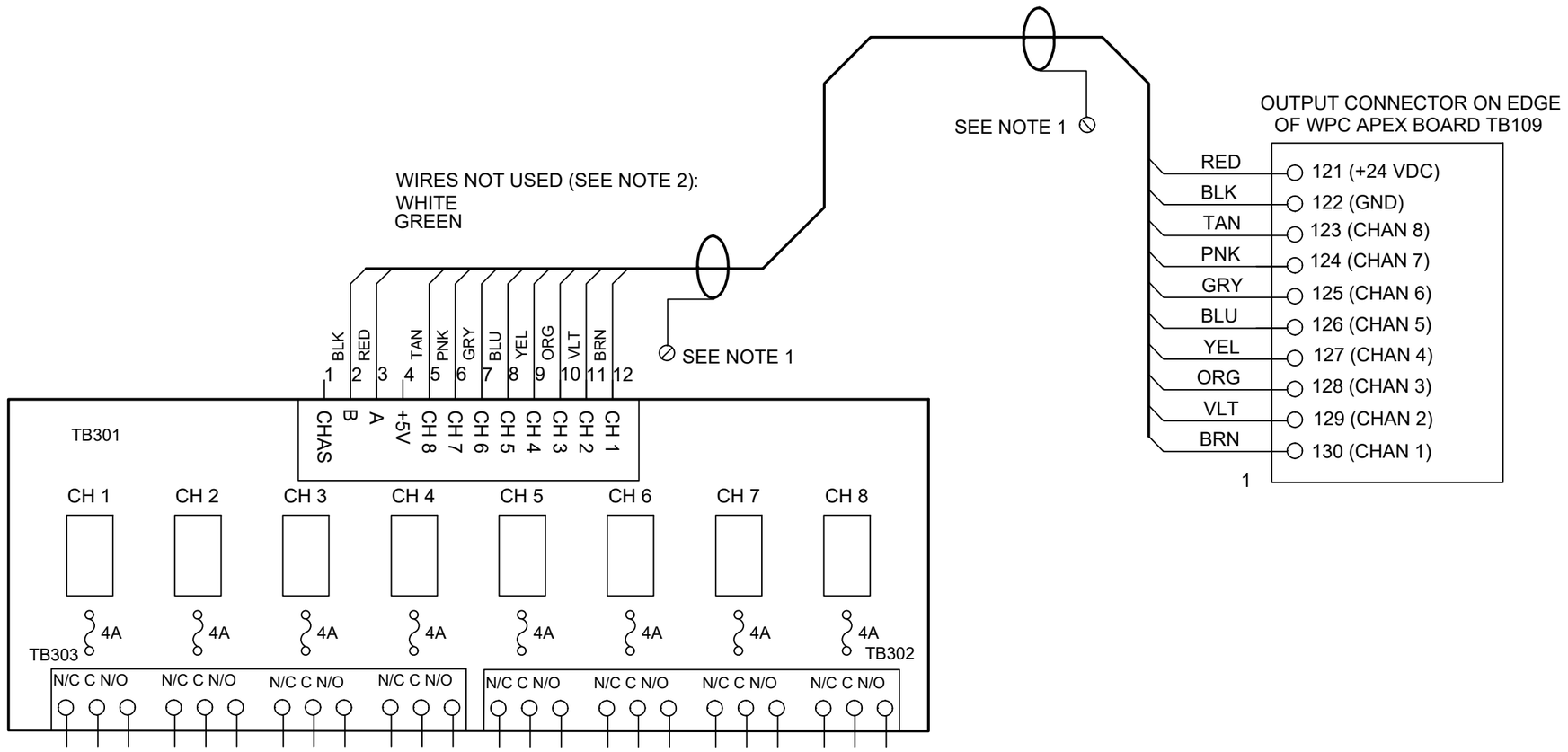
TITLE
WPC APEX MODE
SELECTOR SWITCH WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 5	
SCALE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

NOTE 1: CONNECT THE SHIELD TO THE ENCLOSURE CLOSE TO THE CONDUIT ENTRY POINT.

NOTE 2: CUT THESE WIRES OFF CLOSE TO THE END OF THE CABLE JACKET.



THE CUSTOMER CONNECTS THE ANCILARY EQUIPMENT TO THESE RELAY OUTPUT TERMINALS.

DRAWN	JOC	DATE	2/4/26
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

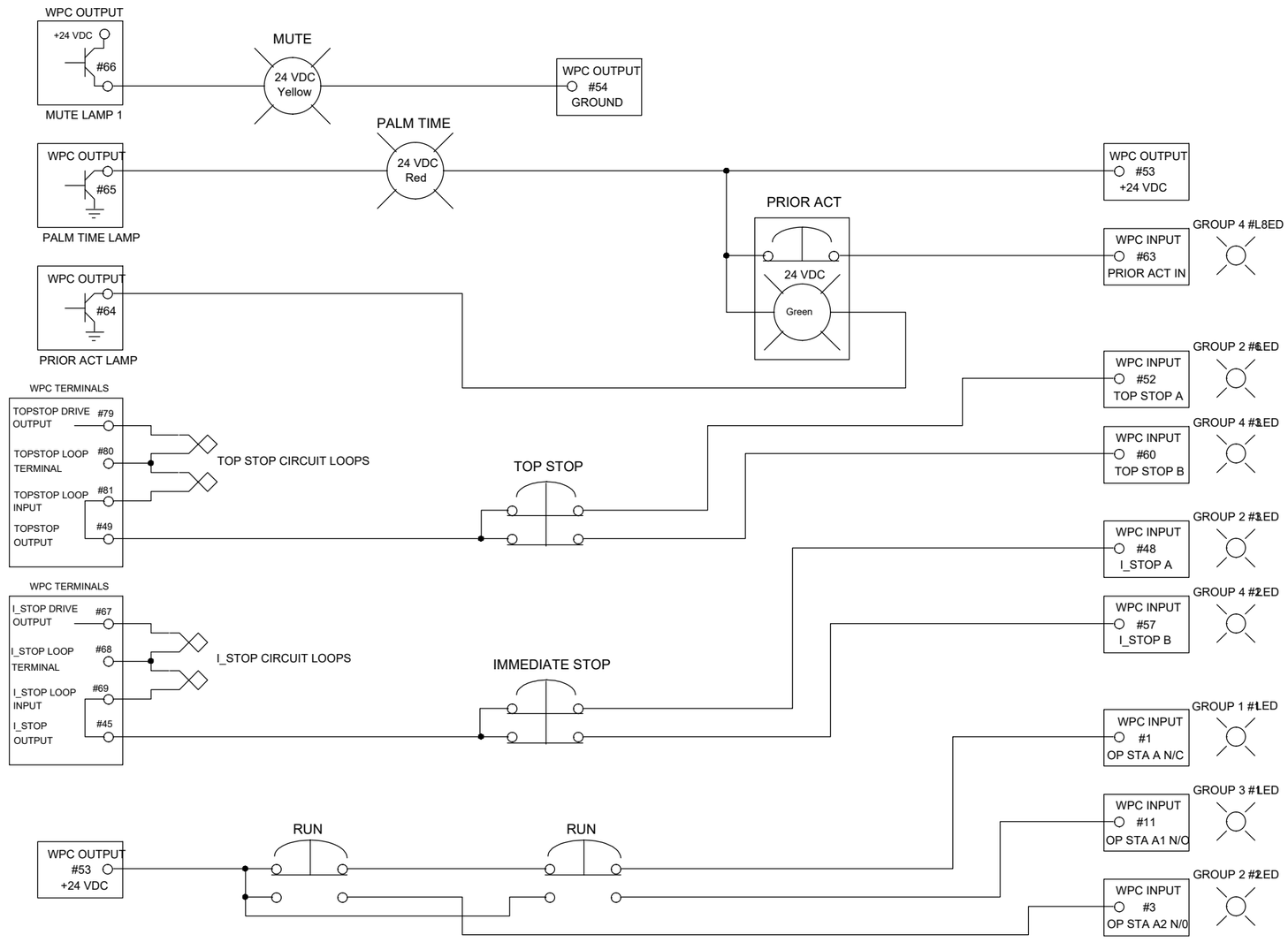
TITLE

WPC APEX CAM OUTPUT WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 6	

SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



Note: Ensure that on any non-Wintriss operator station the Run buttons comply with the requirements in Table B-2 on page B-2.

DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

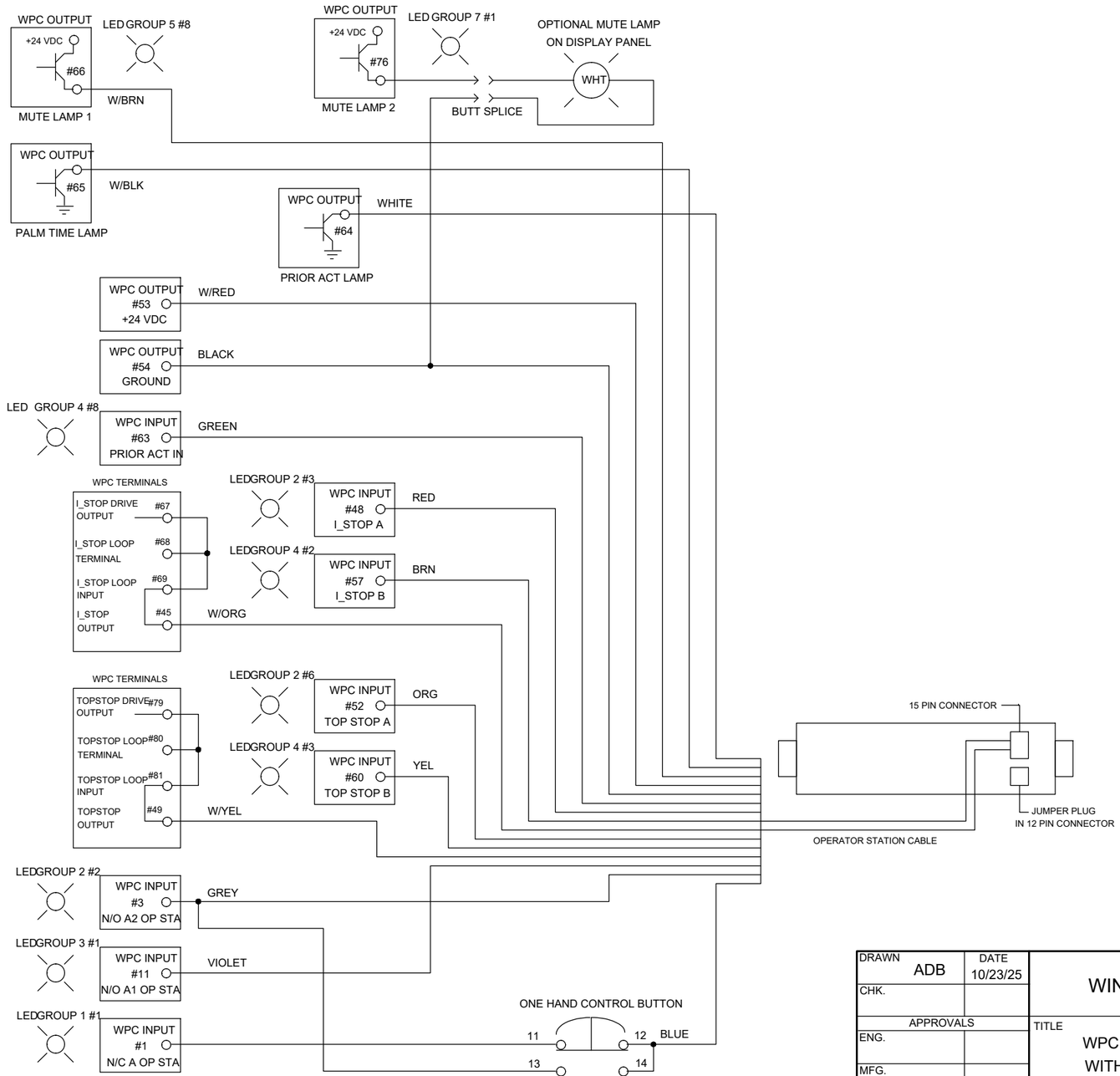
TITLE

WPC APEX OEM OPERATOR STATION

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 7	

SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

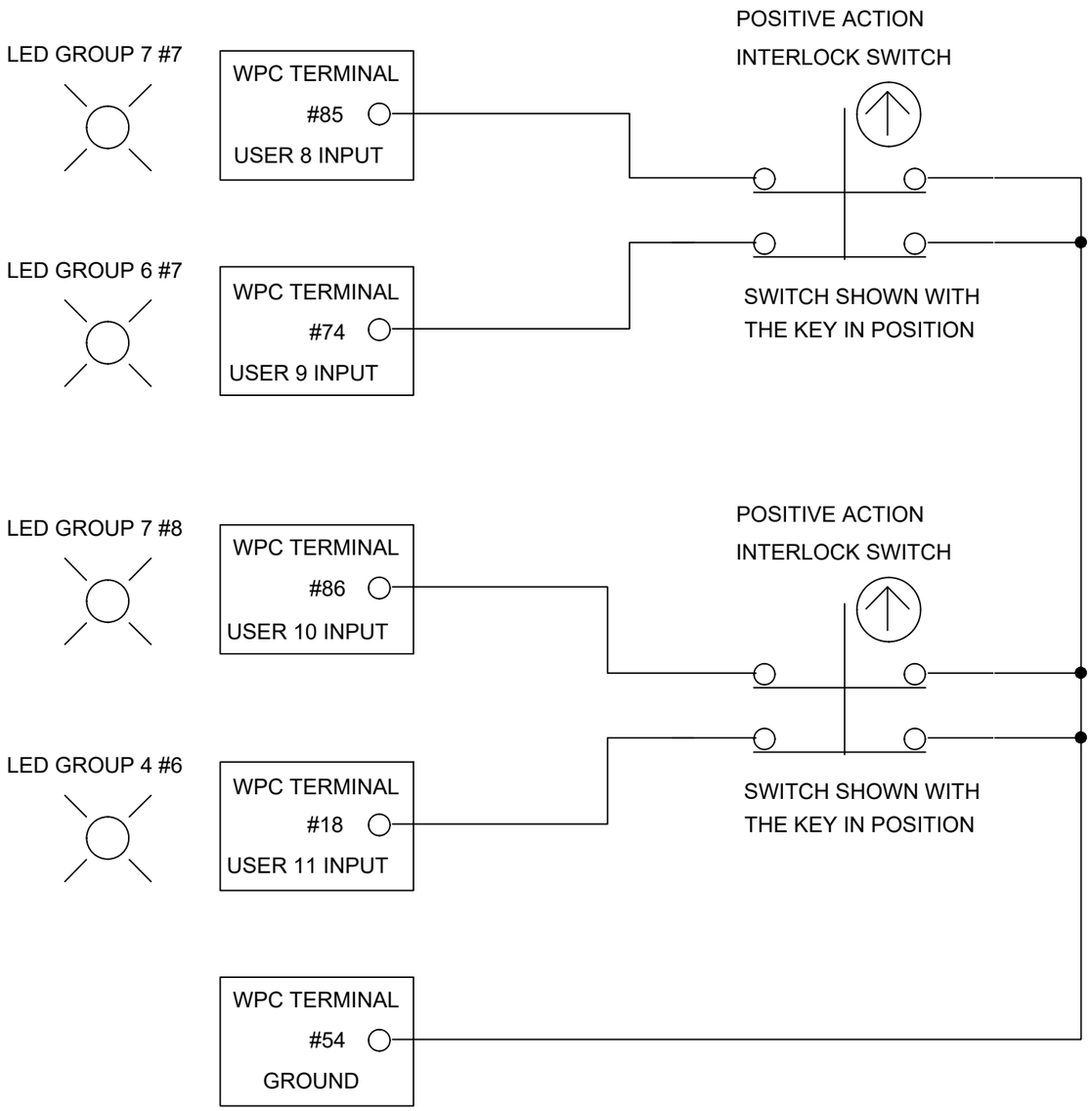
WINTRISS CONTROLS GROUP

TITLE

WPC APEX OPERATOR STATION WIRING
WITH SEPARATE ONE HAND CONTROL

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 8	
SCALE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



THESE TWO CONTACTS MUST WORK TOGETHER.
IF EITHER SWITCH OPENS AN ESTOP WILL OCCUR.

IF THE TWO SWITCHES DO NOT BOTH OPEN WITHIN APPROX. 100 MSEC THEN A FAULT WILL OCCUR.

DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

TITLE
WPC APEX CROSS CHECKED USER INTER-LOCKS WITH POSITIVE ACTION SWITCHES

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 9	
SCALE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

GRD
L2 (120 VAC)
L1 (120 VAC)

WPC TERM
#31
GROUND

LED GROUP 7 #2

WPC INPUT
#77
SHAD A IN 1

LED GROUP 7 #3

WPC INPUT
#87
SHAD A IN 2

LIGHT CURTAIN A (J123)

NPN PNP

LIGHT CURTAIN A (J124)

EXT INT

SET TO NPN WITH EXTERNAL TEST

WPC OUTPUT
#27

LIGHT CURTAIN A ENABLE

WPC TERM
#31
GROUND

SHADOW VI CONTROL BOX

1 (L1) 2 (L2/N) 3 4

TB 1 MAIN POWER CONNECTOR

TB5 LAMP OUTPUTS

1 (GRN) 2 (AMB) 3 (RED) 4 (YEL) 5 (VOUT)

TB4 OUTPUT CONNECTOR

FSD1 FSD2 STAT

1 2 3 4 5 6 7 8 9 10 (GND)

TB4 AUXILIARY CONNECTOR

MPCE1 MPCE2 RESETXT INT

11 12 13 14 15 16 17 18 19 20

TB3 TRANSMITTER 1 CONNECTOR

1 (VCR) 2 (VCC) 3 (GND) 4 (SHTD) 5 (SHTD) 6 (SYNC) 7 (GND)

TB3 TRANSMITTER 2 CONNECTOR

8 (VCR) 9 (VCC) 10 (GND) 11 (SHTD) 12 (SHTD) 13 (SYNC) 14 (GND)

TB2 RECEIVER 1 CONNECTOR

1 (FWIN) 2 (VCC) 3 (GND) 4 (1B) 5 (1A) 6 (SYNC) 7 (GND)

TB2 RECEIVER 2 CONNECTOR

8 (FWIN) 9 (VCC) 10 (GND) 11 (2B) 12 (2A) 13 (SYNC) 14 (GND)

SHADOW VI RECEIVER UNIT

CONNECT TO THE ENCLOSURE

SHIELD
YEL
GRN
BRN
BLK
BLUE
RED
ORG

SHADOW VI TRANSMITTER UNIT

CONNECT TO THE ENCLOSURE

SHIELD
YEL
GRN
BRN
BLK
BLUE
RED
ORG

DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

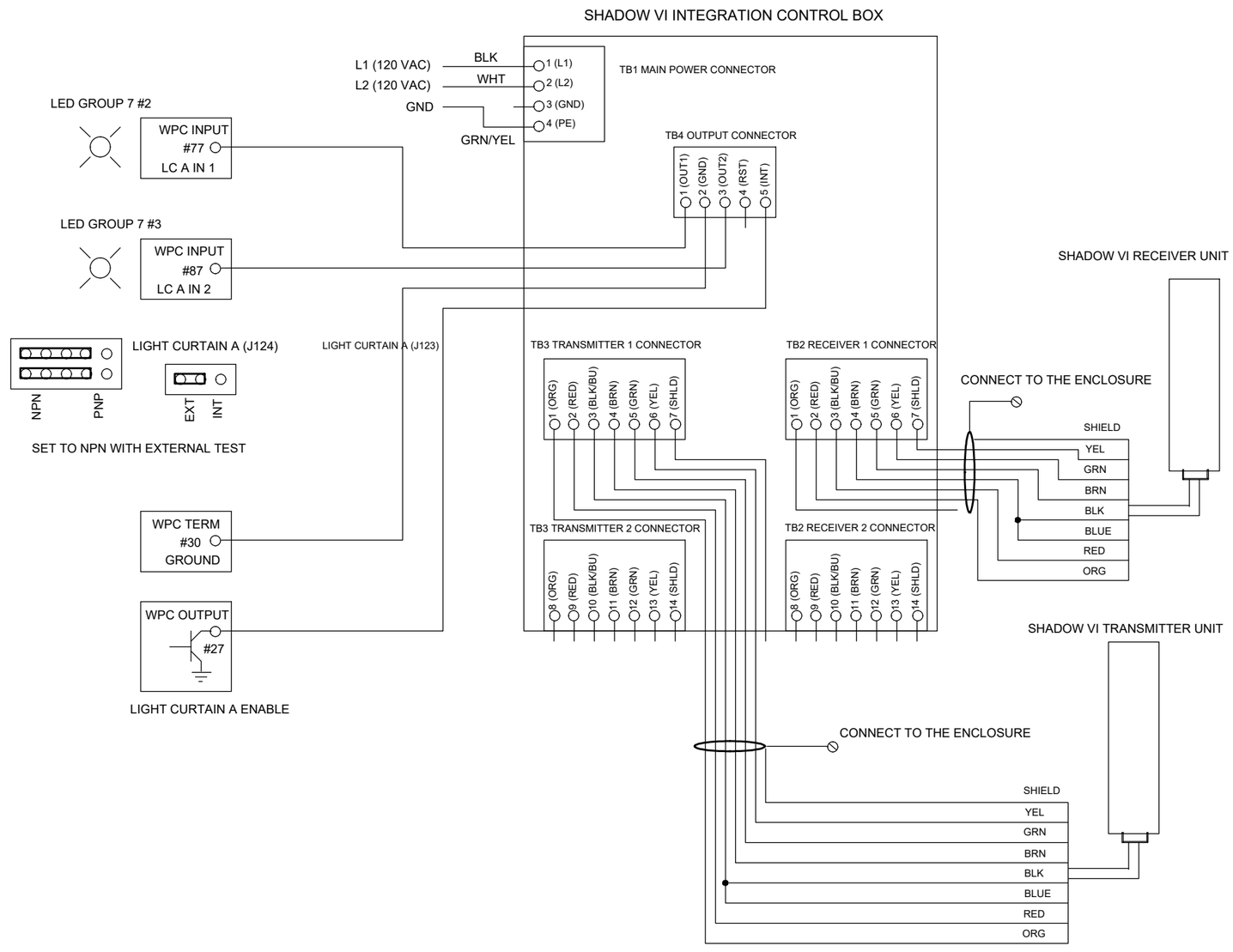
TITLE

WPC APEX SHADOW VI A WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 10	

SCALE | SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

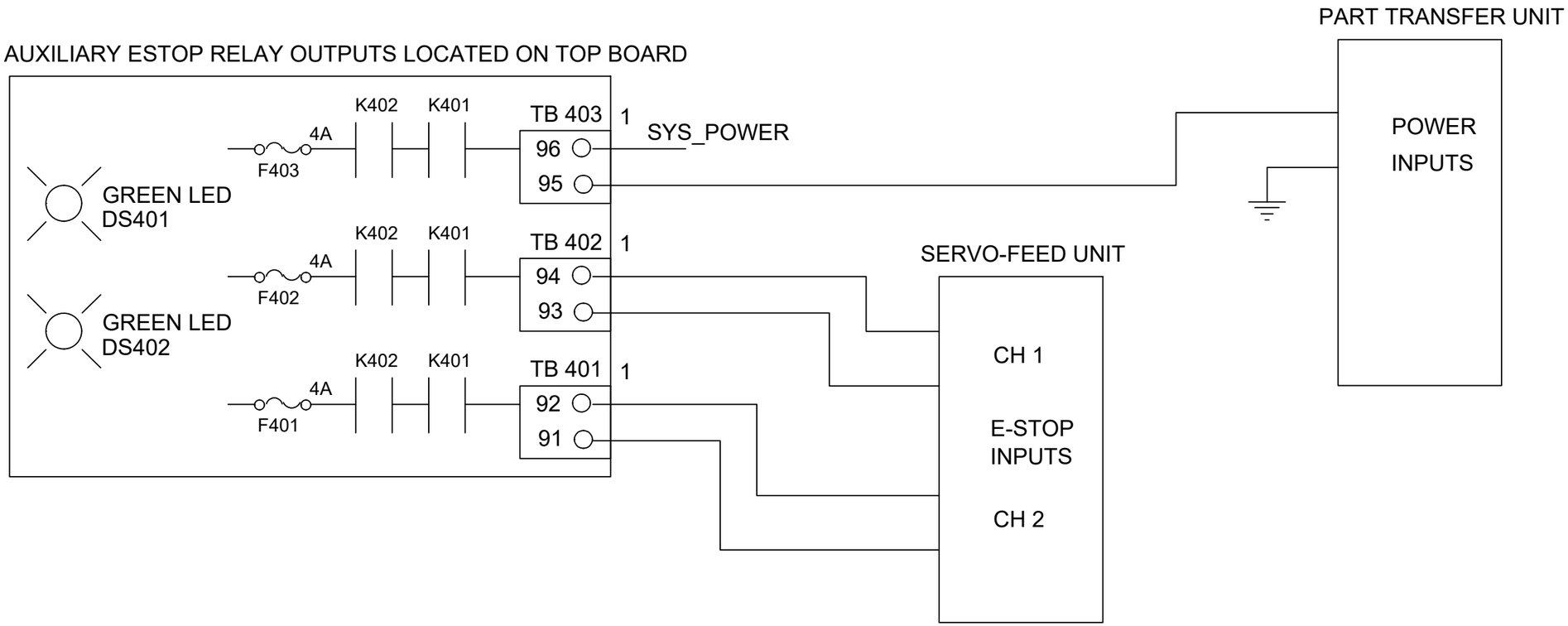
WINTRISS CONTROLS GROUP

TITLE

WPC APEX SHADOW VI
INTEGRATION A WIRING

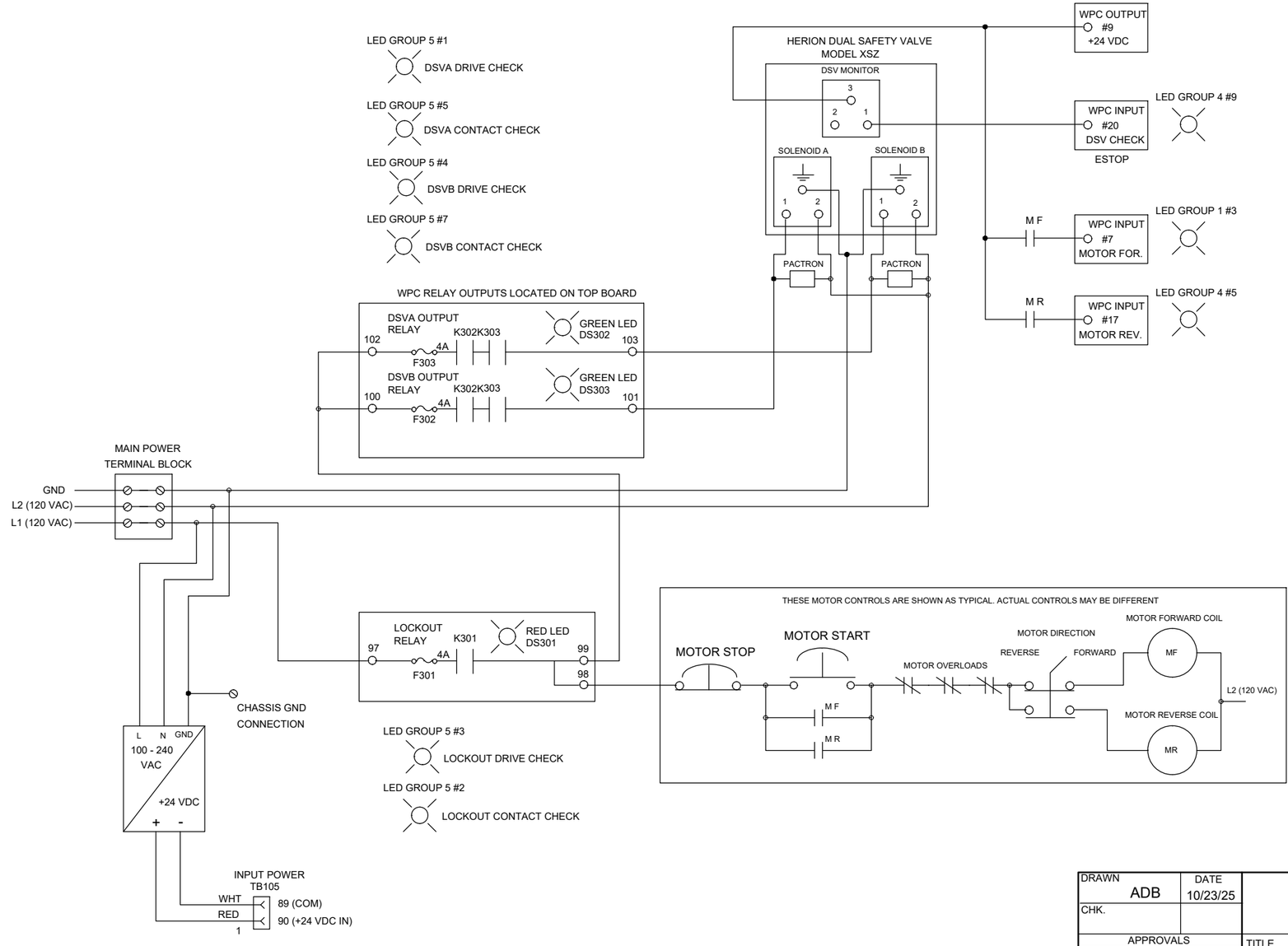
CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 11	
SCALE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX EMERGENCY STOP OUTPUTS WIRING	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 12 / REV
REL		SCALE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

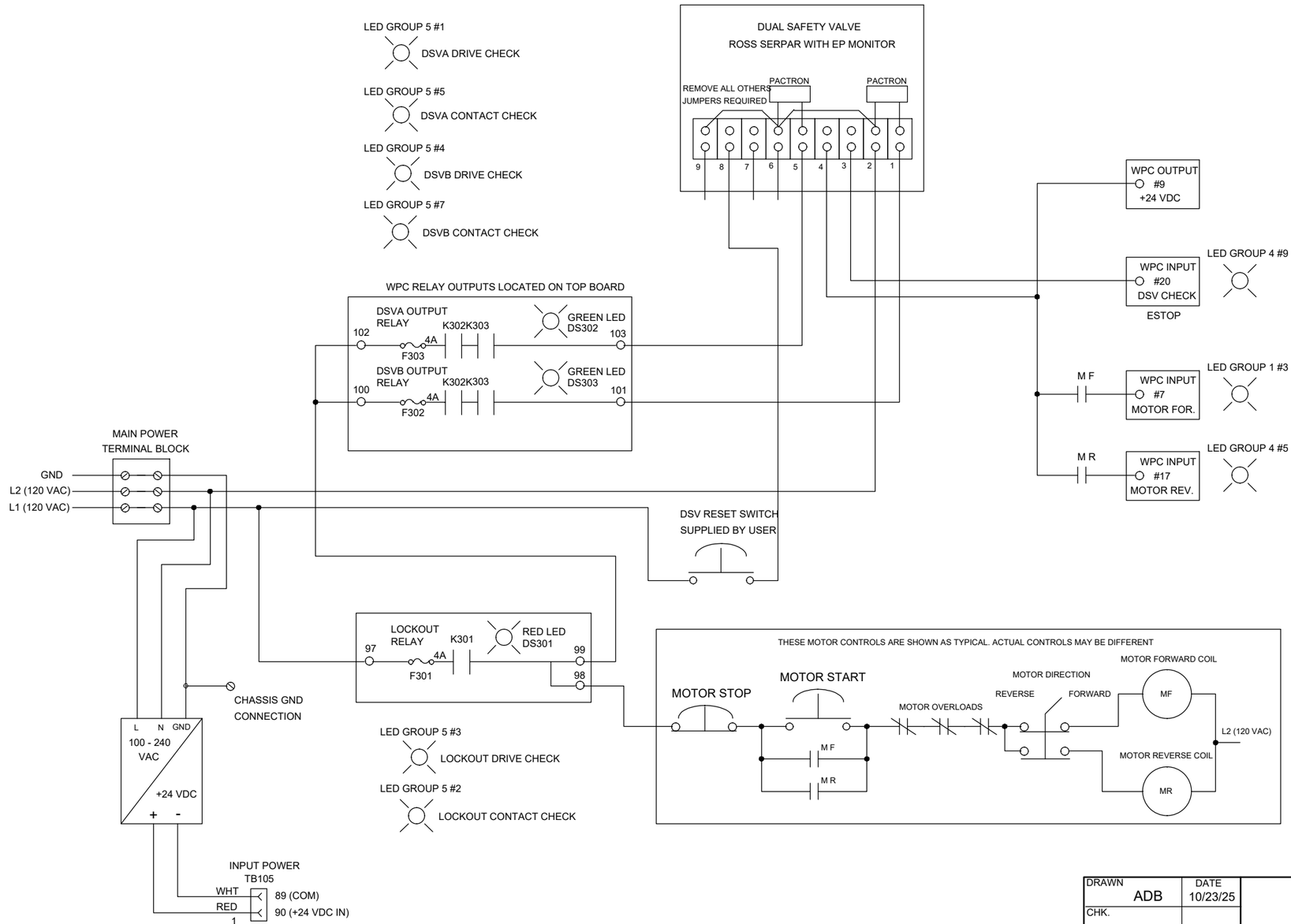
WINTRISS CONTROLS GROUP

TITLE

WPC APEX HERION DSV WIRING

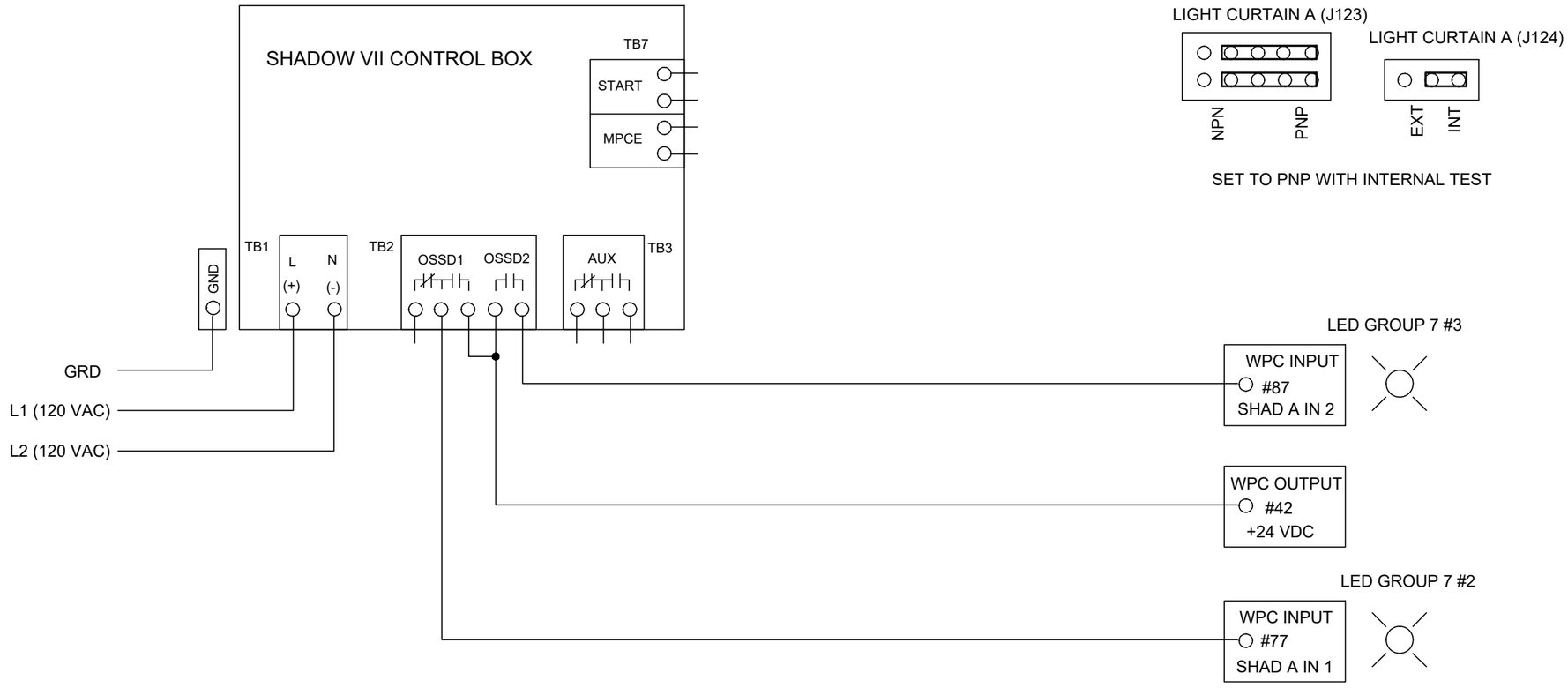
CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 13	
SCALE NONE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		WPC APEX ROSS DSV WIRING	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 14 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

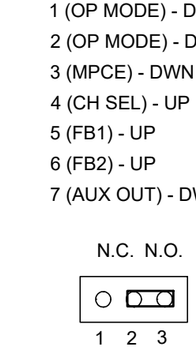


DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX SHADOW VII WIRING	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 15 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

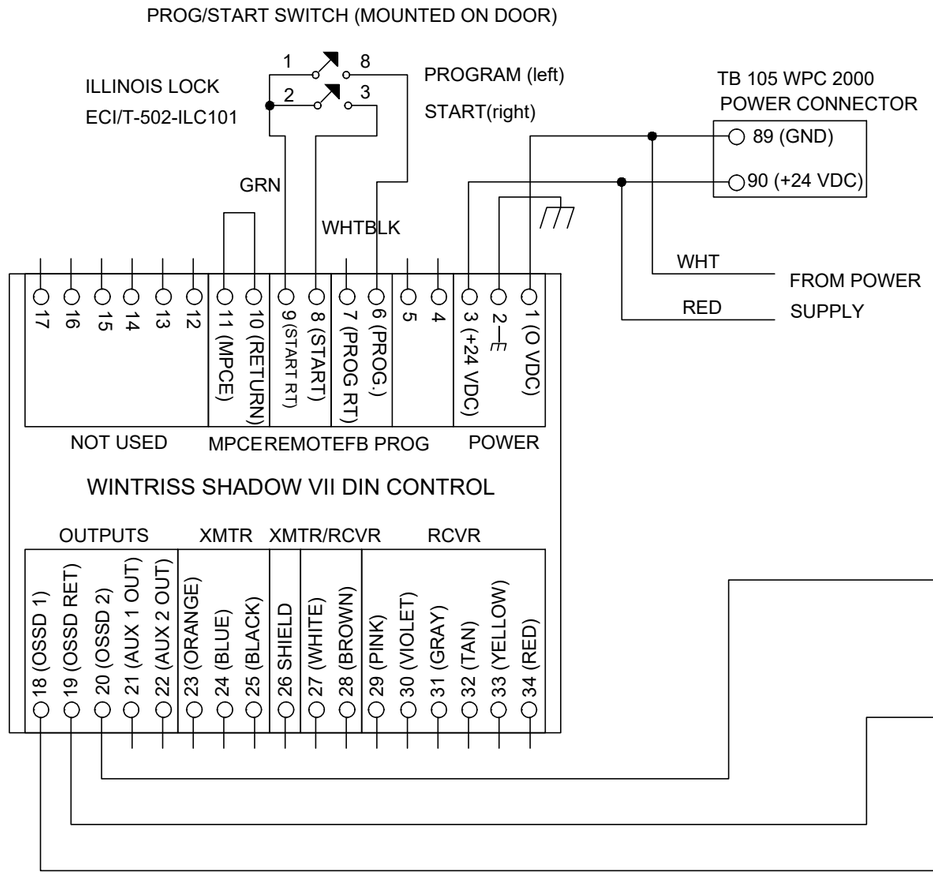
SET MODE SWITCHES SWA AND SWB
UNDER THE COVER AS FOLLOWS:
(BOTH MUST MATCH)

1 (OP MODE) - DWN
2 (OP MODE) - DWN
3 (MPCE) - DWN
4 (CH SEL) - UP
5 (FB1) - UP
6 (FB2) - UP
7 (AUX OUT) - DWN

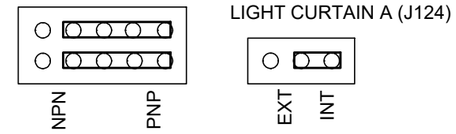


REMOTE START SW.
SENSE SELECTION
SET TO N.O.

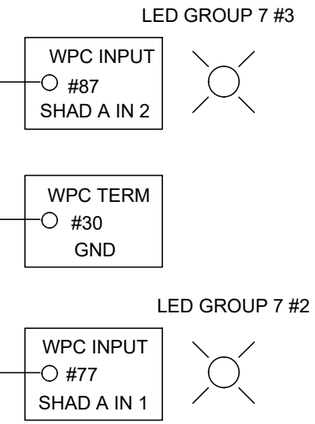
(LOCATED UNDER COVER
IN UPPER LEFT)



WPC 2000 LIGHT CURTAIN MODE JUMPERS
(LOCATED ON WPC MAIN BOARD)

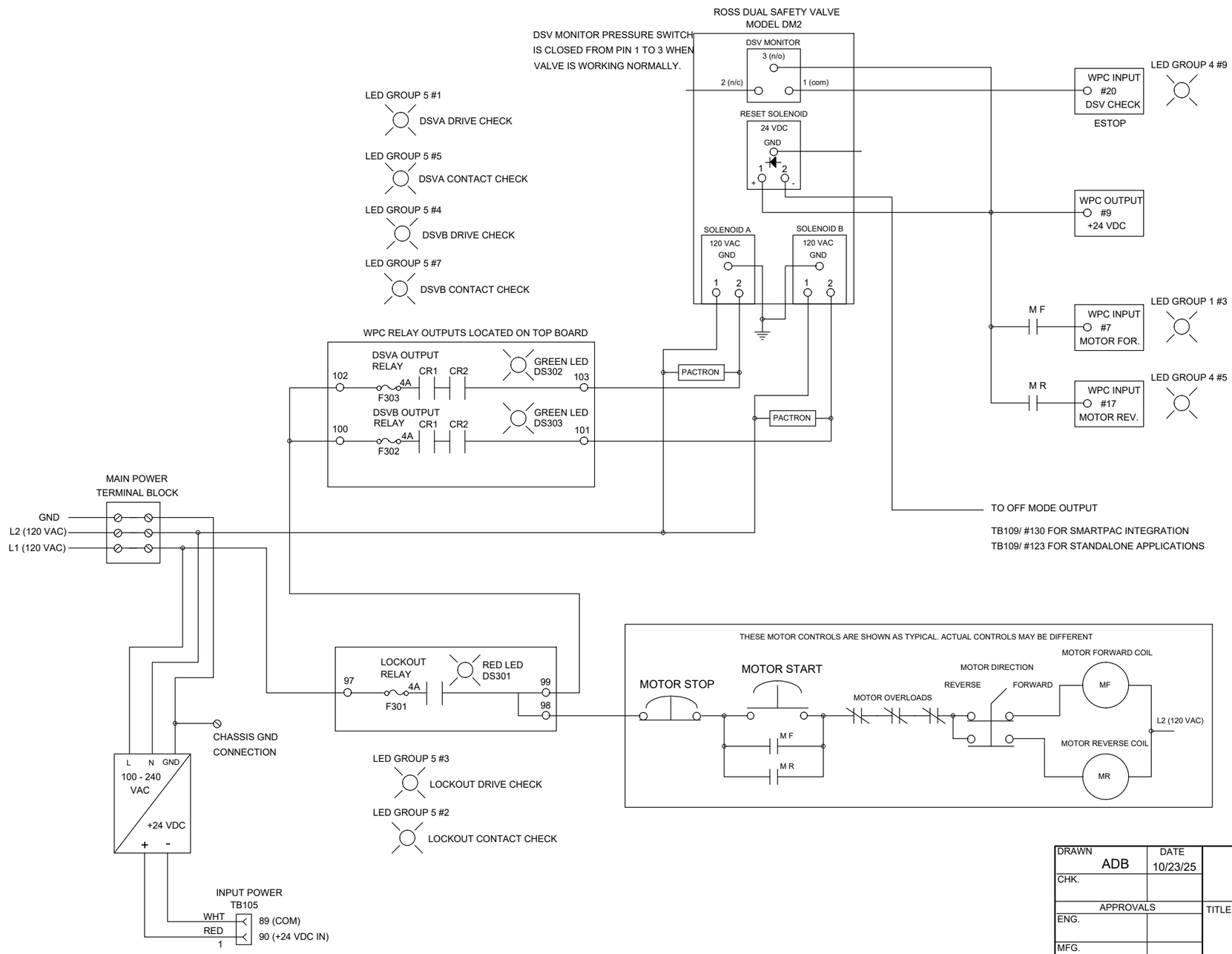


SET TO PNP WITH INTERNAL TEST



DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		SHADOW VII DIN CONTROL WPC APEX WIRING DIAGRAM	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 16 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

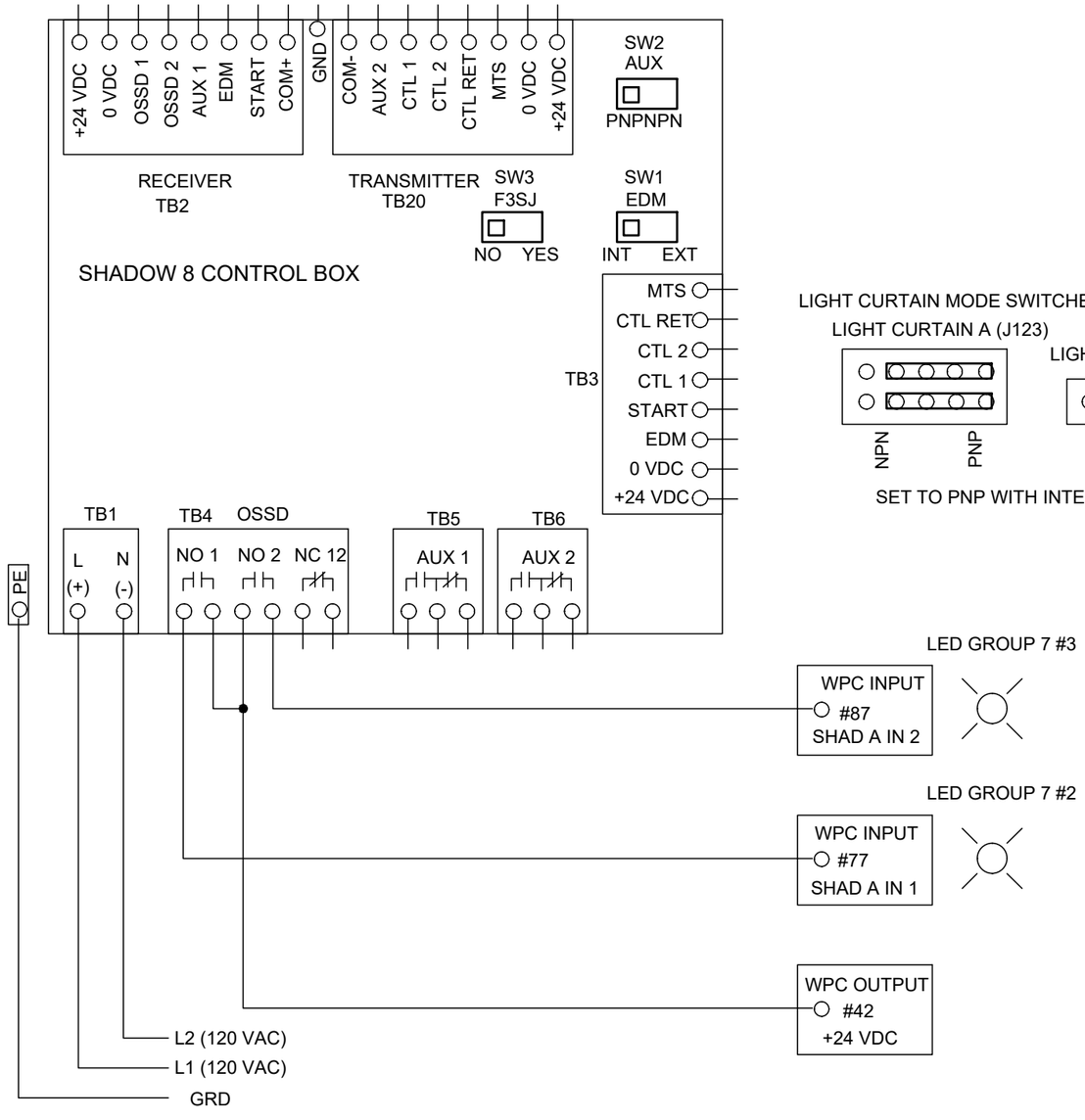
WINTRISS CONTROLS GROUP

TITLE

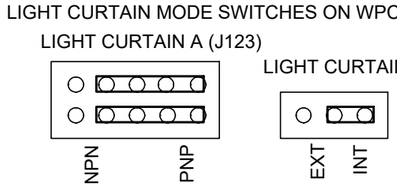
WPC APEX ROSS DM2 DSV WIRING

CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 17	
SCALE NONE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



LIGHT CURTAIN MODE SWITCHES ON WPC 2000 BOARD



SET TO PNP WITH INTERNAL TEST

SET MODE SWITCHES SWA AND SWB
BEHIND A FLIP DOOR ON BOTTOM OF THE
RECEIVER UNIT AS FOLLOWS:

		SWA	SWB
FOR AUTOMATIC START	SW1 - OFF	OFF	
EDM ENABLED	SW2 - ON	ON	
SCAN CODE A (Set to match transmitter)	SW3 - OFF	OFF	
SCAN CODE B	SW3 - ON	ON	
FLOATING/BLANKING 1 BEAM DISABLED	SW4 - OFF	OFF	
FLOATING/BLANKING 1 BEAM ENABLED	SW4 - ON	ON	
FIXED BLANKING DISABLED	SW5 - OFF	OFF	
FIXED BLANKING ENABLED	SW5 - ON	ON	
SHORT RANGE	SW6 - OFF	OFF	
LONG RANGE	SW6 - OFF	ON	

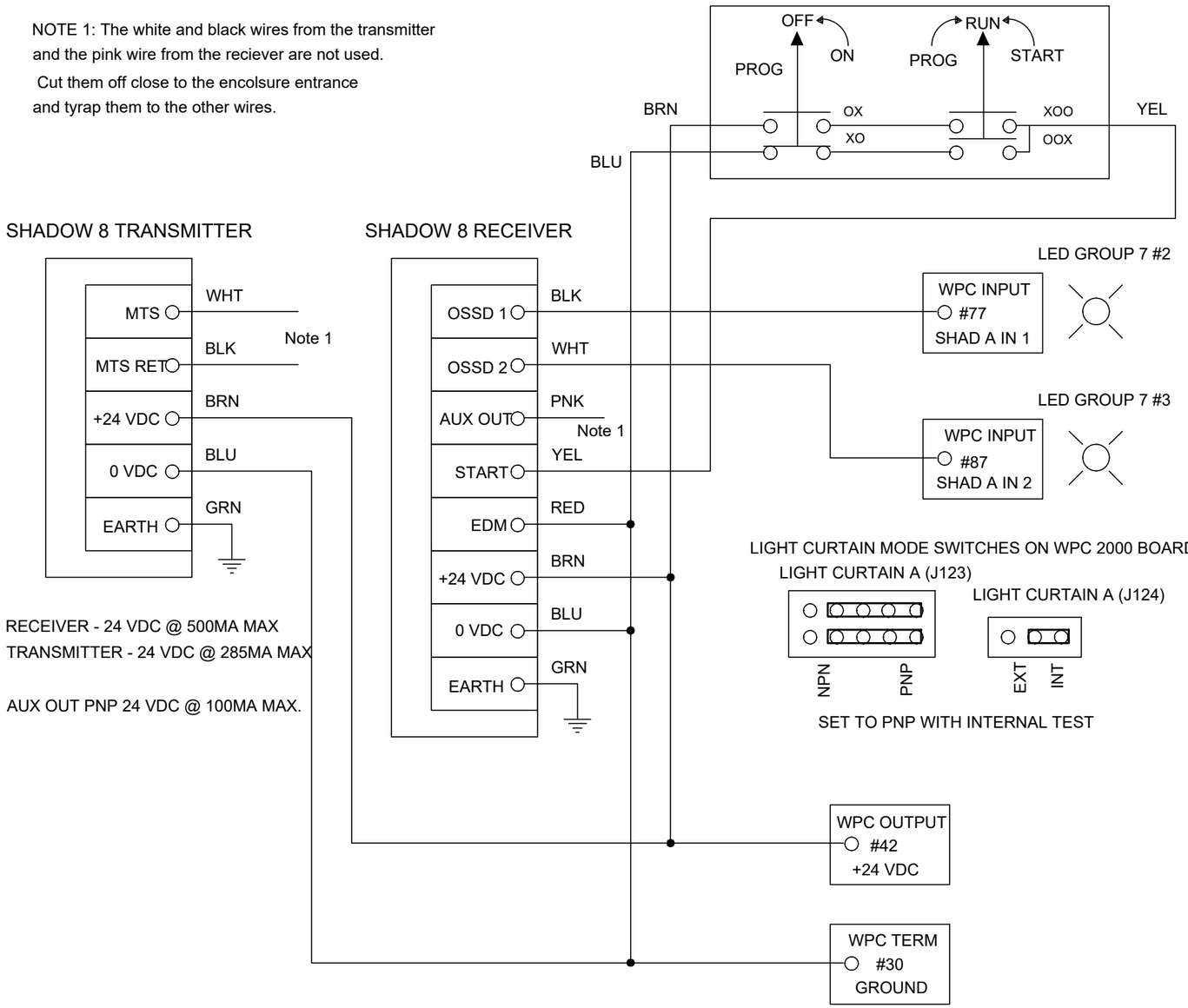
SET MODE SWITCH BEHIND THE FLIP DOOR
ON BOTTOM OF THE TRANSMITTER UNIT
AS FOLLOWS:

SCAN CODE A (Set to match receiver)	SW1 - OFF
SCAN CODE B	SW1 - ON
MTS DISABLED	SW2 - OFF

DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX AND SHADOW 8 CONTROL BOX WIRING DIAGRAM	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 18 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

NOTE 1: The white and black wires from the transmitter and the pink wire from the reciever are not used.
Cut them off close to the encolsure entrance and tyrap them to the other wires.



RECEIVER - 24 VDC @ 500MA MAX
TRANSMITTER - 24 VDC @ 285MA MAX

AUX OUT PNP 24 VDC @ 100MA MAX.

LIGHT CURTAIN MODE SWITCHES ON WPC 2000 BOARD

LIGHT CURTAIN A (J123)

LIGHT CURTAIN A (J124)

SET TO PNP WITH INTERNAL TEST

SET MODE SWITCHES SWA AND SWB BEHIND A FLIP DOOR ON BOTTOM OF THE RECEIVER UNIT AS FOLLOWS:

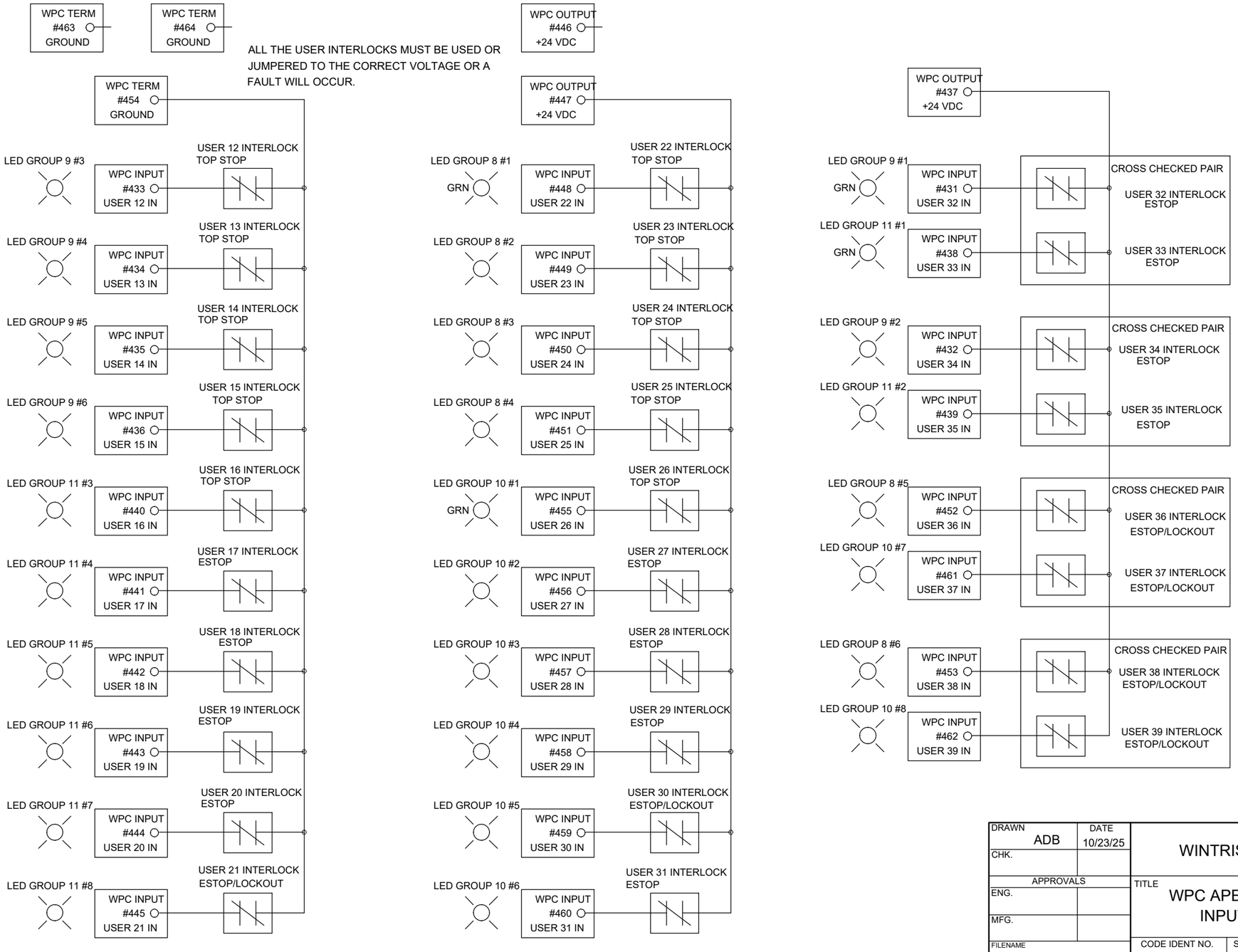
	SWA	SWB
FOR AUTOMATIC START	SW1 - OFF	OFF
EDM DISABLED	SW2 - OFF	OFF
SCAN CODE A (Set to match transmitter)	SW3 - OFF	OFF
SCAN CODE B	SW3 - ON	ON
FLOATING/BLANKING 1 BEAM DISABLED	SW4 - OFF	OFF
FLOATING/BLANKING 1 BEAM ENABLED	SW4 - ON	ON
FIXED BLANKING DISABLED	SW5 - OFF	OFF
FIXED BLANKING ENABLED	SW5 - ON	ON
SHORT RANGE	SW6 - OFF	OFF
LONG RANGE	SW6 - OFF	ON

SET MODE SWITCH BEHIND THE FLIP DOOR ON BOTTOM OF THE TRANSMITTER UNIT AS FOLLOWS:

SCAN CODE A (Set to match receiver)	SW1 - OFF
SCAN CODE B	SW1 - ON
MTS DISABLED	SW2 - OFF

DRAWN ADB	DATE 10/23/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX AND SHADOW 8 WIRING DIAGRAM	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 19 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



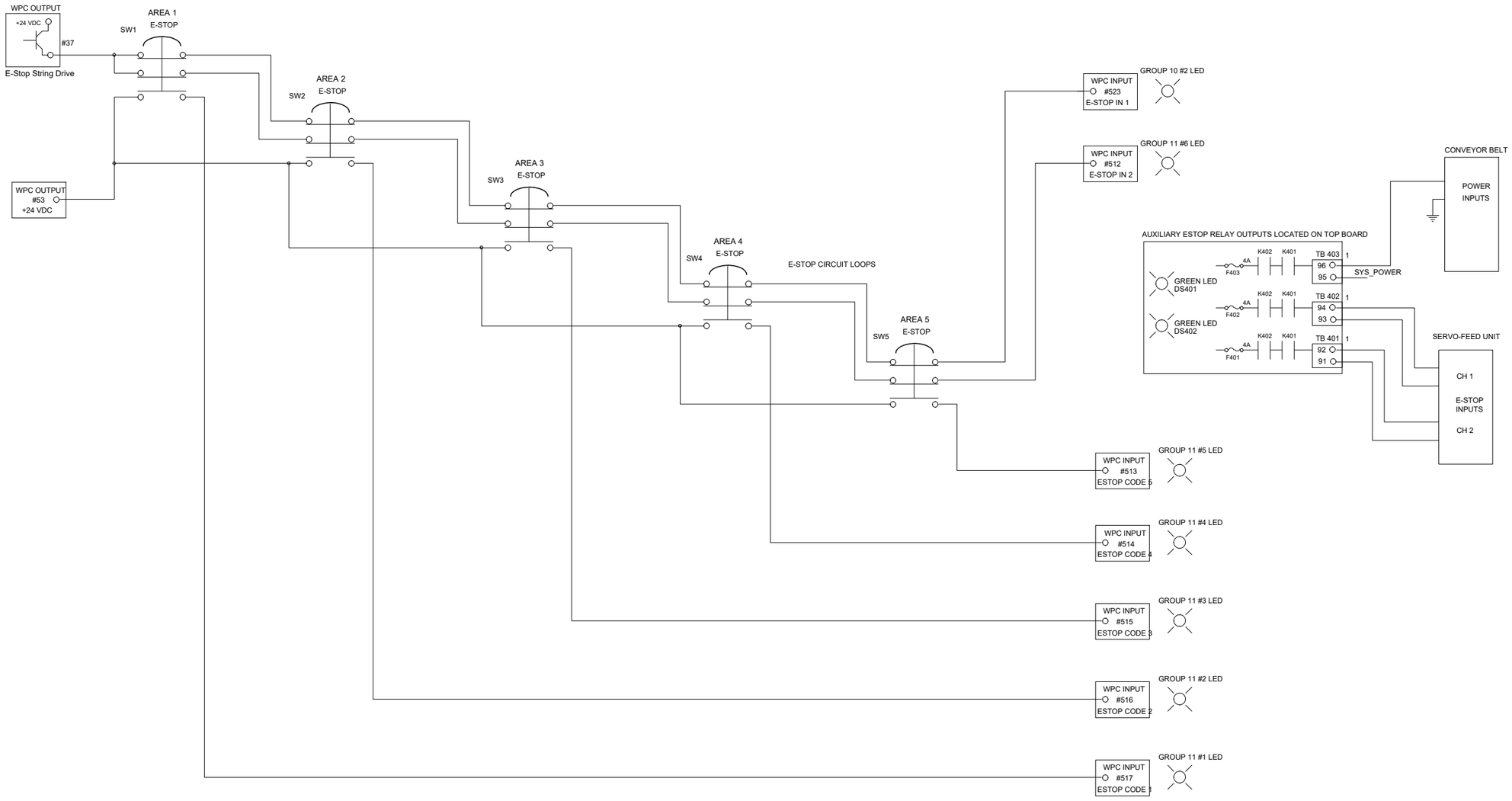
DRAWN	ADB	DATE	10/23/25
CHK.			
APPROVALS			
ENG.			
MFG.			
FILENAME			
REL			

WINTRISS CONTROLS GROUP

TITLE
WPC APEX PLUS OPTION 2 USER INPUT EXTERNAL WIRING

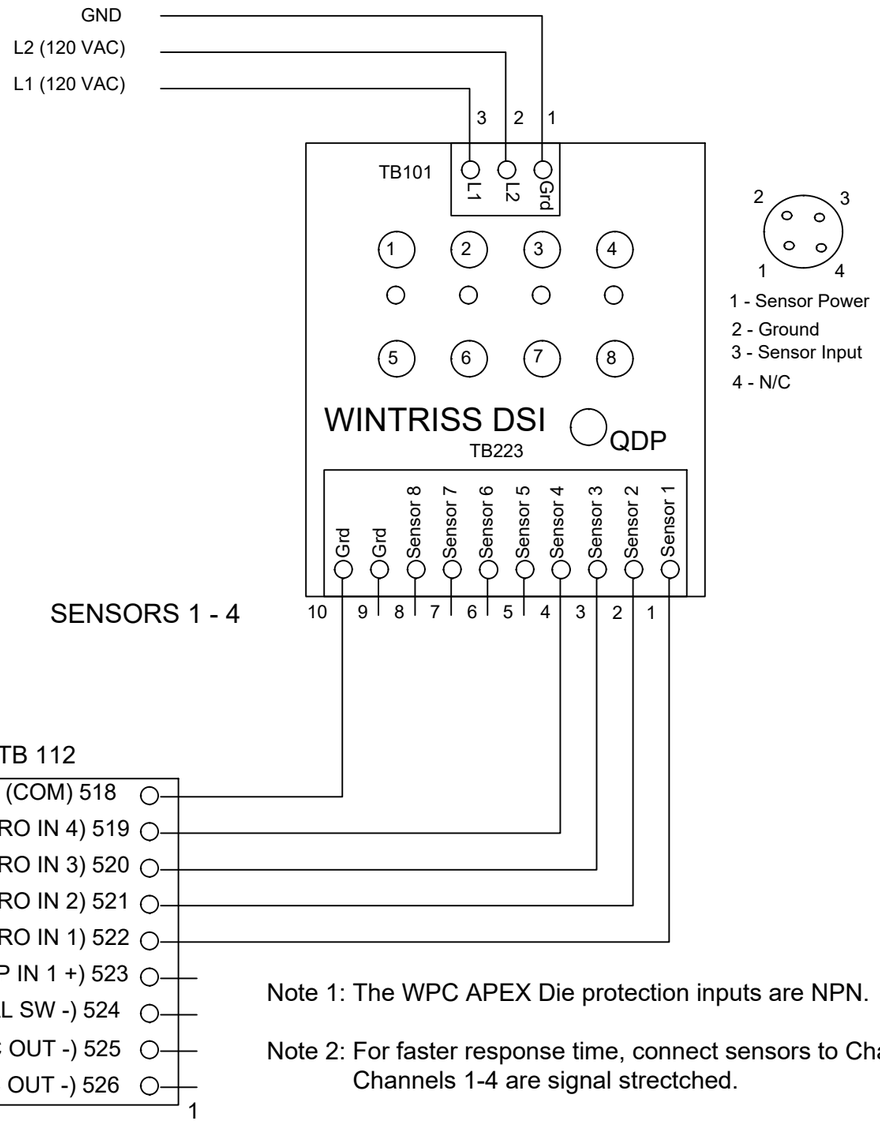
CODE IDENT NO.	SIZE	DRAWING NUMBER	REV
	B	FIGURE 20	
SCALE NONE		SHEET OF	

REVISIONS			
REV	DESCRIPTION	DATE	APP'D



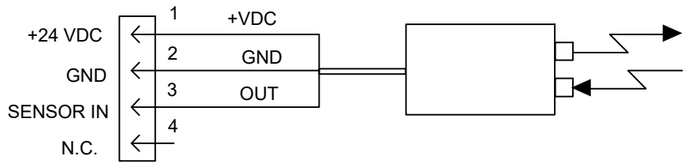
DRAWN LFT	DATE 10/24/25	WINTRISS CONTROLS GROUP
CHK.		
APPROVALS		TITLE WPC APEX OEM EMERGENCY STOP WIRING DIAGRAM
ENG.		
MFG.		
FILENAME		CODE IDENT NO. / SIZE B / DRAWING NUMBER FIGURE 21 / REV
REL		SCALE NONE / SHEET OF

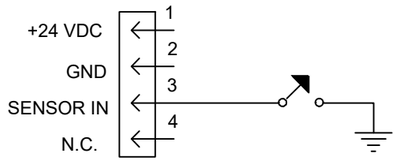
REVISIONS			
REV	DESCRIPTION	DATE	APP'D



1 - Sensor Power
2 - Ground
3 - Sensor Input
4 - N/C

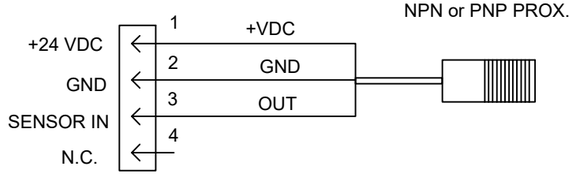
NPN or PNP PHOTO SENSOR

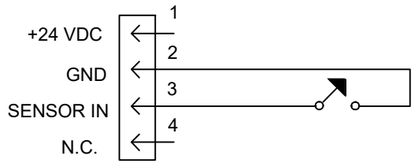




TYPICAL FOR MECHANICAL SENSORS.
USE THIS FOR MECHANICAL SWITCHES
AND SWITCHED PROBES.

NPN or PNP PROX. SENSOR





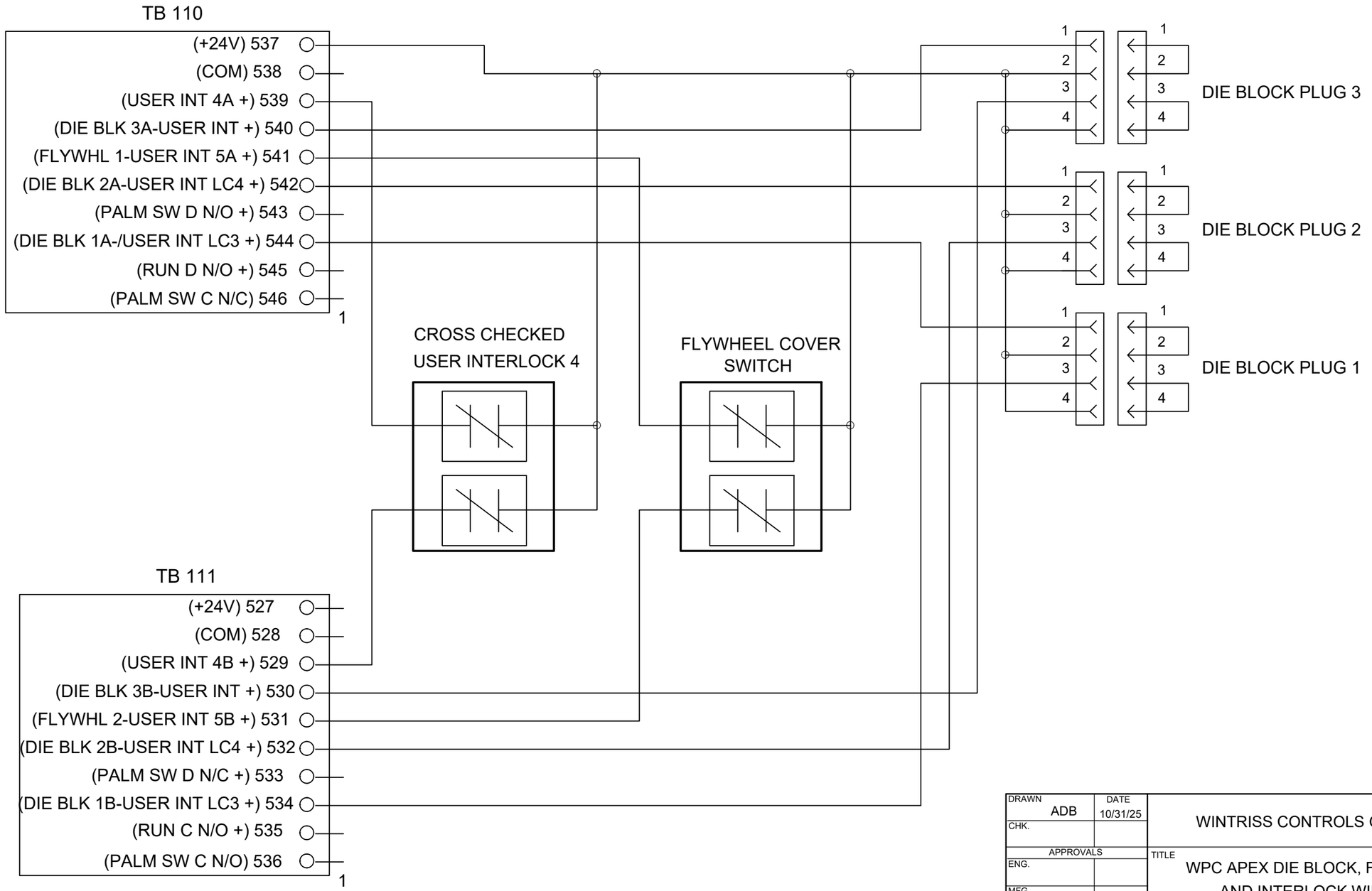
Note 1: The WPC APEX Die protection inputs are NPN.

Note 2: For faster response time, connect sensors to Channels 5-8. Channels 1-4 are signal strectched.

Note 3: The DSI2 does not accept Push-Pull type sensors. Only PNP or NPN sensors will function. If a Push-Pull type is used, the DSI2's output will always be ON.

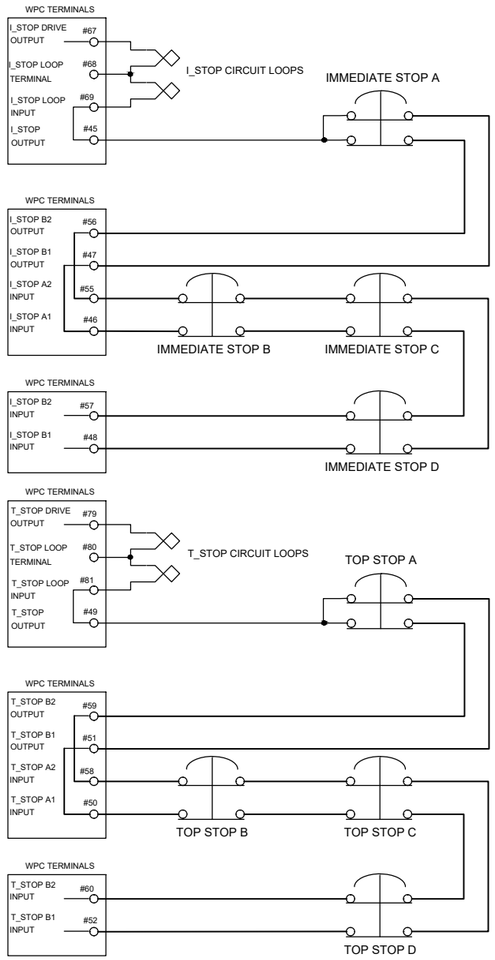
DRAWN RMB	DATE 2/24/2026	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		WPC APEX DIE PROTECTION WIRING	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 22 / REV
REL		SCALE NONE	SHEET OF

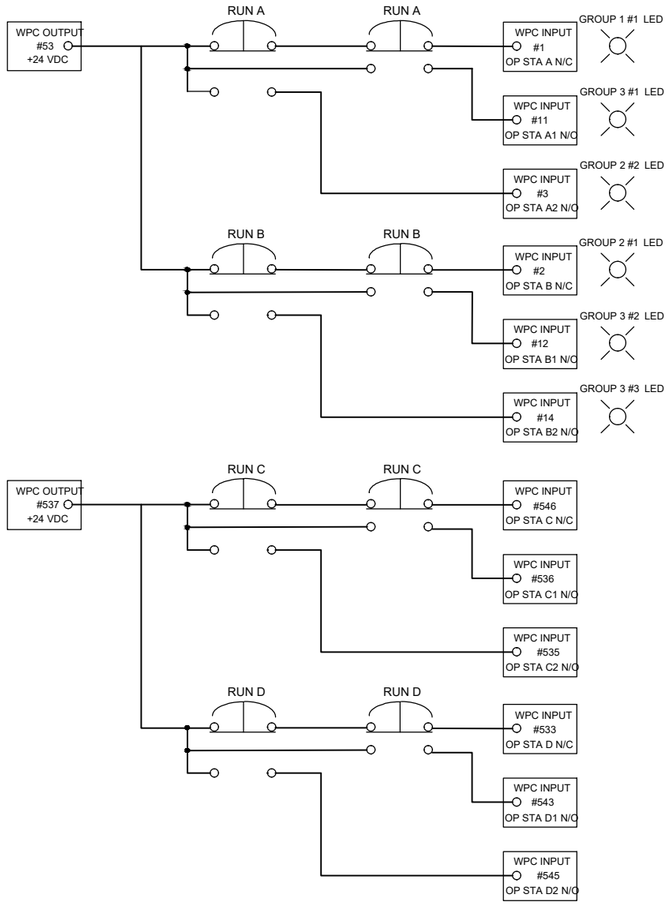
REVISIONS			
REV	DESCRIPTION	DATE	APP'D

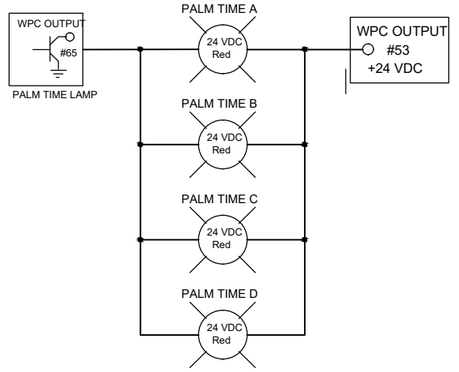


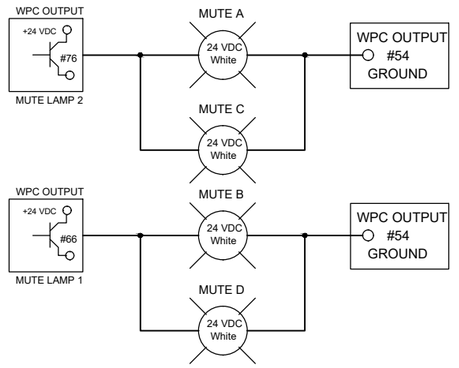
DRAWN ADB	DATE 10/31/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX DIE BLOCK, FLYWHEEL AND INTERLOCK WIRING	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 23 / REV
REL		SCALE NONE	SHEET OF

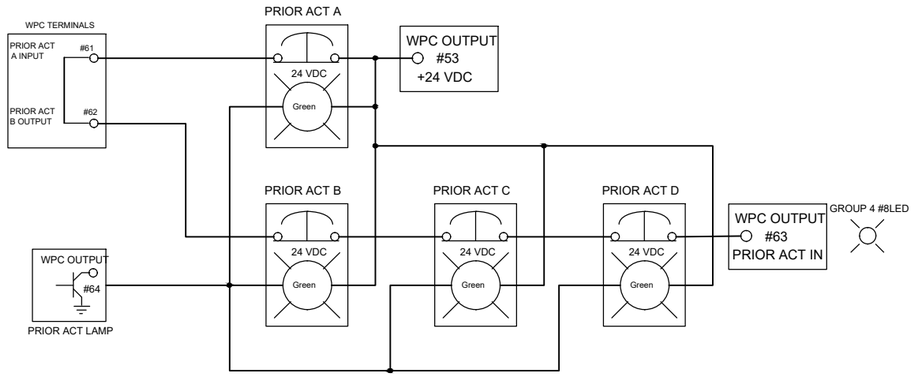
REVISIONS			
REV	DESCRIPTION	DATE	APP'D







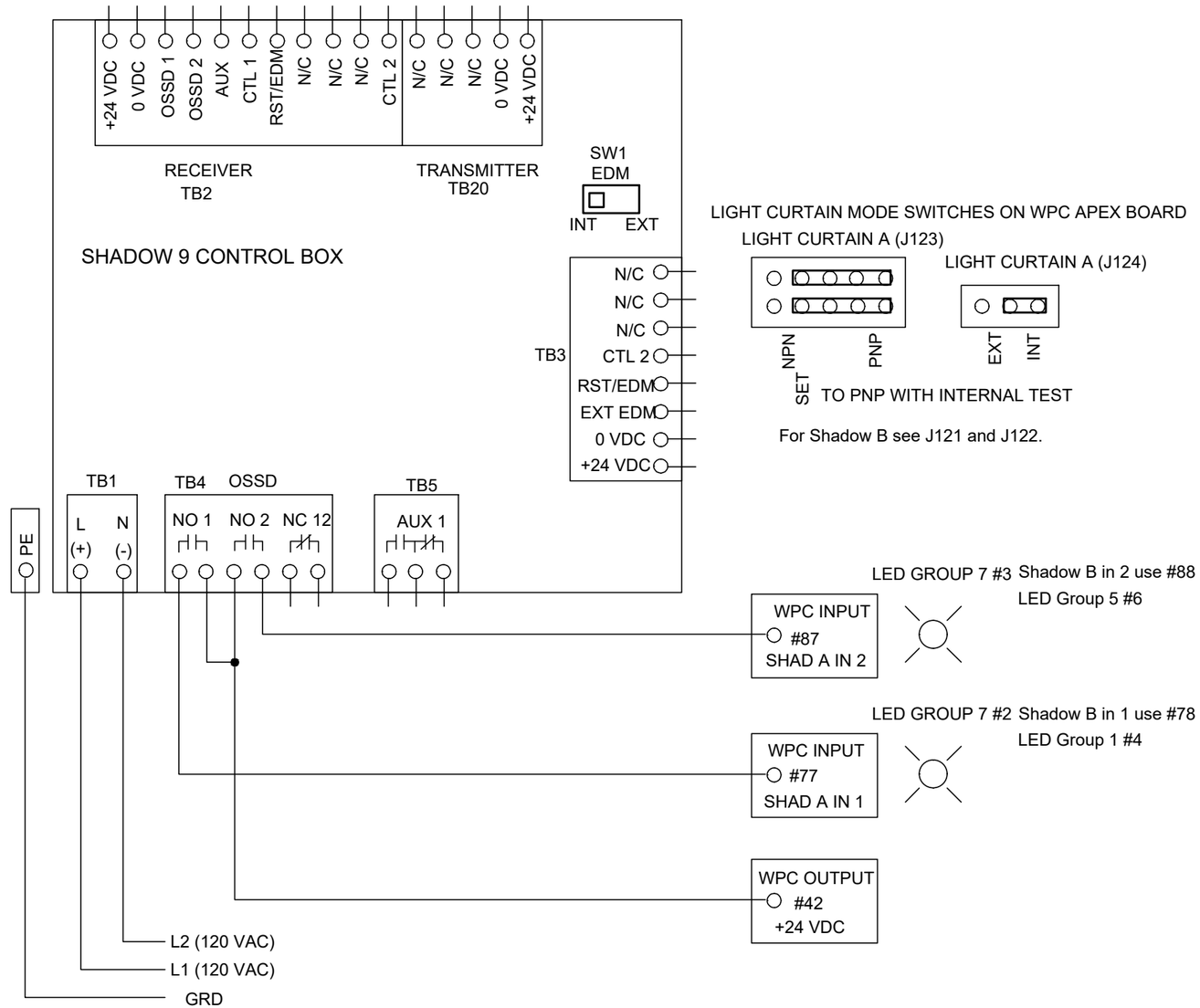




DRAWN RMB	DATE 1/23/26	WINTRISS CONTROLS GROUP	
CHK. DJD	1/23/26		
APPROVALS		TITLE WPC APEX OEM OPERATOR STATION	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 24 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

WARNING !!! - When the heads are connected to the control box make sure that the EDM is enabled. Turn on SW1 and SW2 position 2 DIP switches in the receiver unit.



SET DIP SWITCHES SW1 AND SW2
BEHIND A FLIP DOOR ON BOTTOM OF THE
RECEIVER UNIT AS FOLLOWS:

	SW1	SW2
SCAN CODE A (Deflt)	POS 1 - OFF	OFF
SCAN CODE B	POS 1 - ON	ON
EDM ENABLED (Deflt)	POS 2 - ON	ON
EDM DISABLED	POS 2 - OFF	OFF
AUTOMATIC START (Deflt)	POS 3 - OFF	OFF
START/RESTART INTERLOCK	POS 3 - ON	ON
NOT USED	POS 4 - OFF	OFF
FIXED BLANKING ENABLED (Deflt)	POS 5 - ON	ON
BLANKING DISABLED	POS 5 - OFF	OFF
FLOATING BLANKING DISABLED (Deflt)	POS 6 - OFF	OFF
FLOATING BLANKING ENABLED	POS 6 - ON	ON
NOT USED	POS 7 - OFF	OFF
NOT USED	POS 8 - OFF	OFF

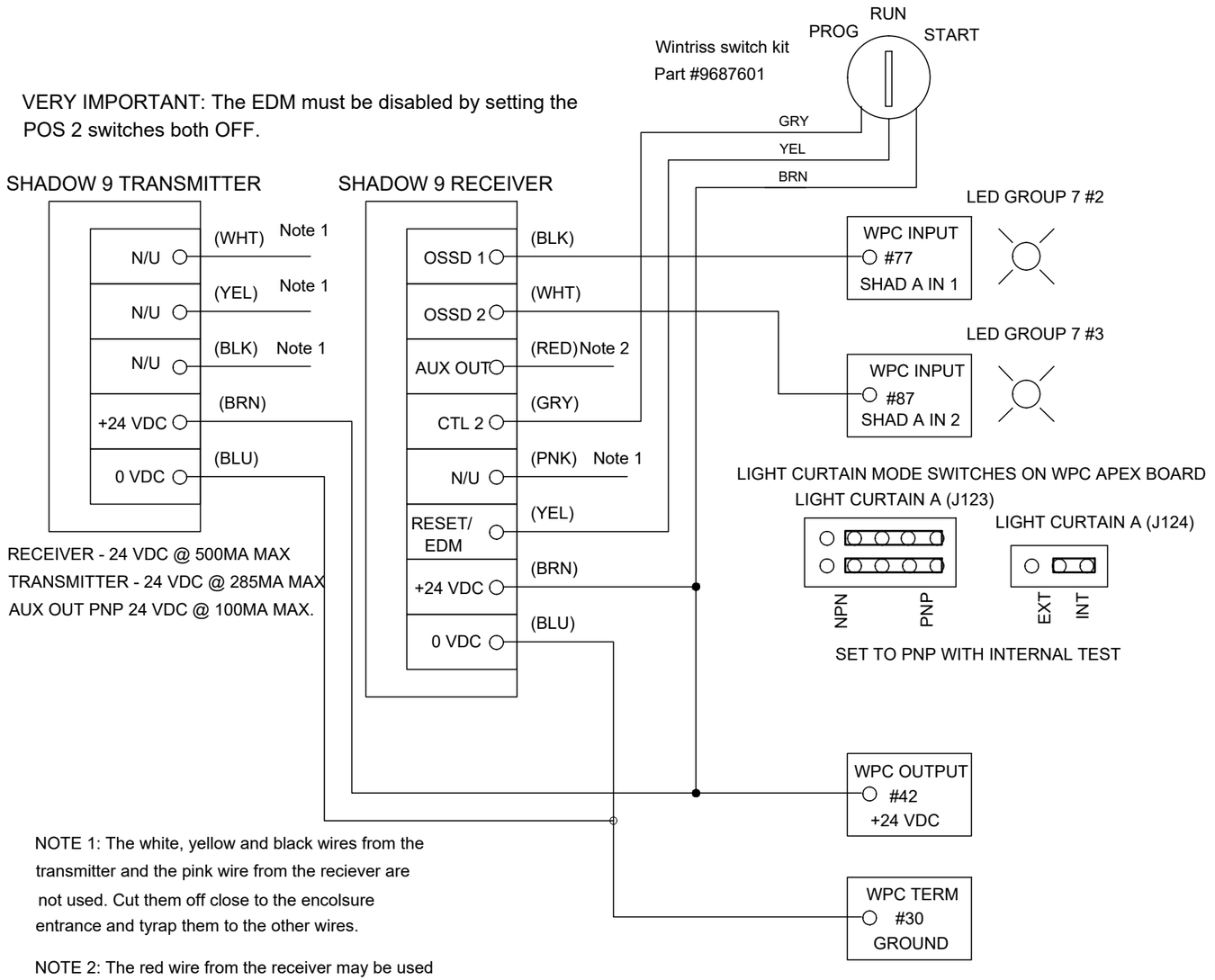
SET DIP SWITCHES BEHIND THE FLIP DOOR
ON BOTTOM OF THE TRANSMITTER UNIT
AS FOLLOWS:

SCAN CODE A (Deflt)	POS 1 - OFF	
SCAN CODE B	POS 1 - ON	
SHORT RANGE	POS 2 - OFF	POS 3 - OFF
LONG RANGE (Deflt)	POS 2 - ON	POS 3 - ON
NOT USED	POS 4 - OFF	

DRAWN ADB	DATE 11/28/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE	
ENG.		WPC APEX AND SHADOW 9 CONTROL BOX WIRING DIAGRAM	
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 25 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

VERY IMPORTANT: The EDM must be disabled by setting the POS 2 switches both OFF.



NOTE 1: The white, yellow and black wires from the transmitter and the pink wire from the reciever are not used. Cut them off close to the encolsure entrance and tyrap them to the other wires.

NOTE 2: The red wire from the receiver may be used latter to control a remote status indicator. Preserve it's length. Just coil up and tyrap to the other wires.

SET DIP SWITCHES SW1 AND SW2 BEHIND A FLIP DOOR ON BOTTOM OF THE RECEIVER UNIT AS FOLLOWS:

		SW1	SW2
SCAN CODE A (Deflt)	POS 1 - OFF	OFF	
SCAN CODE B	POS 1 - ON	ON	
EDM ENABLED (Deflt)	POS 2 - ON	ON	
EDM DISABLED	POS 2 - OFF	OFF	
AUTOMATIC START (Deflt)	POS 3 - OFF	OFF	
START/RESTART INTERLOCK	POS 3 - ON	ON	
NOT USED	POS 4 - OFF	OFF	
FIXED BLANKING ENABLED (Deflt)	POS 5 - ON	ON	
BLANKING DISABLED	POS 5 - OFF	OFF	
FLOATING BLANKING DISABLED (Deflt)	POS 6 - OFF	OFF	
FLOATING BLANKING ENABLED	POS 6 - ON	ON	
NOT USED	POS 7 - OFF	OFF	
NOT USED	POS 8 - OFF	OFF	

SET DIP SWITCHES BEHIND THE FLIP DOOR ON BOTTOM OF THE TRANSMITTER UNIT AS FOLLOWS:

SCAN CODE A (Deflt)	POS 1 - OFF	
SCAN CODE B	POS 1 - ON	
SHORT RANGE	POS 2 - OFF	POS 3 - OFF
LONG RANGE (Deflt)	POS 2 - ON	POS 3 - ON
NOT USED	POS 4 - OFF	

DRAWN ADB	DATE 11/28/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX AND SHADOW 9 WIRING DIAGRAM	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 26 / REV
REL		SCALE NONE	SHEET OF

REVISIONS			
REV	DESCRIPTION	DATE	APP'D

SET A

SHADOW 9 TRANSMITTER

N/U (WHT) Note 1
N/U (YEL) Note 1
N/U (BLK) Note 1
+24 VDC (BRN)
0 VDC (BLU)

SHADOW 9 RECEIVER

OSSD 1 (BLK)
OSSD 2 (WHT)
AUX OUT (RED) Note 2
CTL 2 (GRY)
N/U (PNK) Note 1
RESET/ EDM (YEL)
+24 VDC (BRN)
0 VDC (BLU)

LED GROUP 7 #2

WPC INPUT #77 SHAD A IN 1

LED GROUP 7 #3

WPC INPUT #87 SHAD A IN 2

LIGHT CURTAIN MODE SWITCHES ON WPC APEX BOARD
LIGHT CURTAIN A (J123)
LIGHT CURTAIN 1 (J124)
NPN PNP EXT INT
SET TO PNP WITH INTERNAL TEST

SET A RUN
PROG START
GRY
YEL
BRN

Double switch kit Part #9687602

SET B RUN
PROG START
GRY
YEL
BRN

VERY IMPORTANT: The EDM must be disabled by setting the POS 2 switches both OFF.

NOTE 1: The white, yellow and black wires from the transmitter and the pink wire from the reciever are not used. Cut them off close to the encolsure entrance and tyrap them to the other wires.

NOTE 2: The red wire from the receiver may be used latter to control a remote status indicator. Preserve it's length. Just coil up and tyrap to the other wires.

SET B

SHADOW 9 TRANSMITTER

N/U (WHT) Note 1
N/U (YEL) Note 1
N/U (BLK) Note 1
+24 VDC (BRN)
0 VDC (BLU)

SHADOW 9 RECEIVER

OSSD 1 (BLK)
OSSD 2 (WHT)
AUX OUT (RED) Note 2
CTL 2 (GRY)
N/U (PNK) Note 1
RESET/ EDM (YEL)
+24 VDC (BRN)
0 VDC (BLU)

LED GROUP 1 #4

WPC INPUT #78 SHAD B IN 1

LED GROUP 5 #6

WPC INPUT #88 SHAD B IN 2

LIGHT CURTAIN MODE SWITCHES ON WPC APEX BOARD
LIGHT CURTAIN B (J121)
LIGHT CURTAIN 2 (J122)
NPN PNP EXT INT
SET TO PNP WITH INTERNAL TEST

WPC OUTPUT #42 +24 VDC

WPC TERM #30 GROUND

RECEIVER - 24 VDC @ 500MA MAX
TRANSMITTER - 24 VDC @ 285MA MAX
AUX OUT PNP 24 VDC @ 100MA MAX.

DRAWN ADB	DATE 11/28/25	WINTRISS CONTROLS GROUP	
CHK.			
APPROVALS		TITLE WPC APEX AND DUAL SHADOW 9 WIRING DIAGRAM	
ENG.			
MFG.			
FILENAME		CODE IDENT NO.	SIZE B / DRAWING NUMBER FIGURE 27 / REV
REL		SCALE NONE	SHEET OF