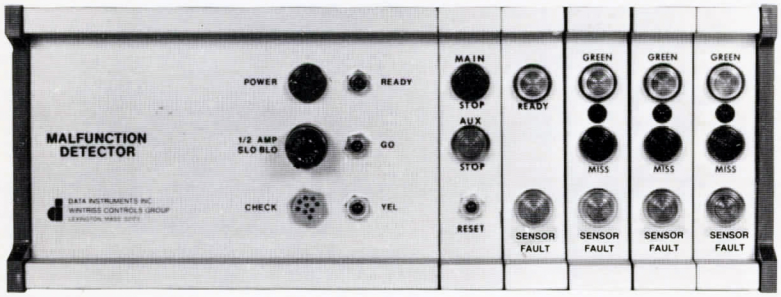
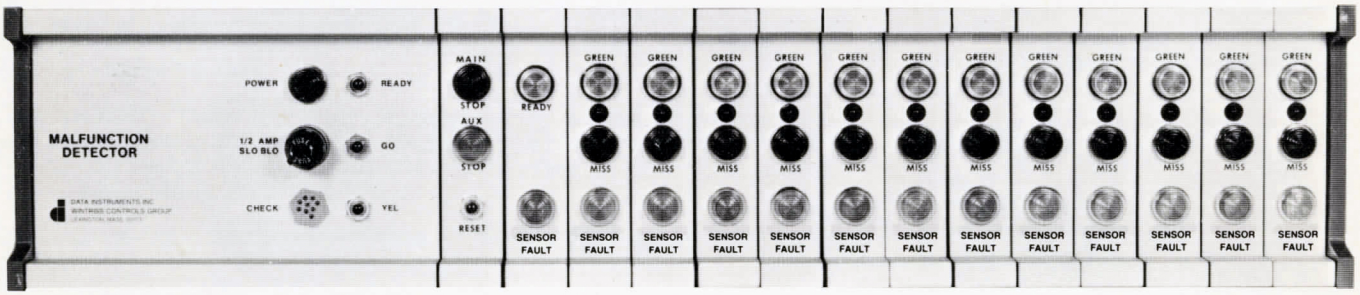
THE

WINTRISS

IC CONTROLLER TECHNICAL MANUAL





DATA INSTRUMENTS
Wintriss Controls Group

Data Instruments Inc., 4 Hartwell Place, Lexington, MA 02173, (617) 861-7450 TWX (710) 326-0672

This manual provides Descriptive, Operational, Installation, Service and Maintenance instructions for the Data Instruments/Wintriss IC Controller, as well as its standard and optionally available modules, and IC Controller accessories.

Warranty and Service Information

Each IC Controller is manufactured by Data Instruments and is warranteed for a period of one year from its date of delivery to the original purchaser. For complete warranty information, see the Purchase Order Agreement under "Terms of Sale". Should you require service information of any kind during installation or over the normal course of IC Controller use, contact Data Instruments Inc., Wintriss Controls Group, 4 Hartwell Place, Lexington, MA, USA 02173 (617) 861-7450.

Wintriss Die Protection/IC Controls and sensors are not intended for use as personnel protection devices.

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Chapter 2 effectively describes the theory of IC Controller operation. If you are completely unfamiliar with the nature of Wintriss equipment, and how it is used to control a press, Data Instruments suggests that you read Chapter 1, sections 1.1 and 1.2 first, and then, that you proceed directly to Chapter 2, "Principles of IC Controller Operation" and read it in full before returning to the normal sequence of the manual.

FIGURE LIST

TABLE LIST

1. DESCRIPTION

1.1 Introduction

Wintriss Controllers are intended to be used as die protection and automation controls. They do not, as such, provide operator protection.

The Wintriss IC Controller (otherwise known as the Wintriss Malfunction Detector) receives signals from external sensors, then evaluates and displays data on a Wintriss controlled machine's condition during each stroke.

Wintriss plug-in modules provide flexibility, expandability, and ease of servicing. A Wintriss IC Controller can operate at speeds of up to 1500 strokes per minute.

The Wintriss Controller normally acts as a Stop switch in the controlled machine's electrical circuit. To this end, the Controller is dependent upon the efficient working of the parent machine's clutch/brake control system in order to stop the machine in the event of a malfunction.

Typical applications for the Wintriss IC Controller include the monitoring of cyclic "green" functions (those events which must occur once during each stroke, such as positive part ejection, proper die closure, parts transfer, and positive feed); and the monitoring of static "red"/"yellow" functions (those conditions which may occur at any given point in a machine's stroke, such as stock buckling, or material run-out).

The Wintriss IC Controller requires the use of one IC-410 or IC-400 module for each cyclic event that is monitored.

Wintriss IC-3 and IC-12 Controllers have the capacity to accommodate 3 and 12 IC-410 modules, respectively. A dash number (IC-3-1) indicates the number of IC-410 modules installed in your Wintriss IC Controller unit. For example, an IC-3 with one IC-410 module is designated an IC-3-1; with two modules, an IC-3-2, etc.. Blank modules, which serve no active purpose other than to preserve the environmental integrity of the IC Controller, are installed at the factory if the number of modules ordered is fewer than 3 or 12, respectively. These blank modules are called IC-500 Modules.

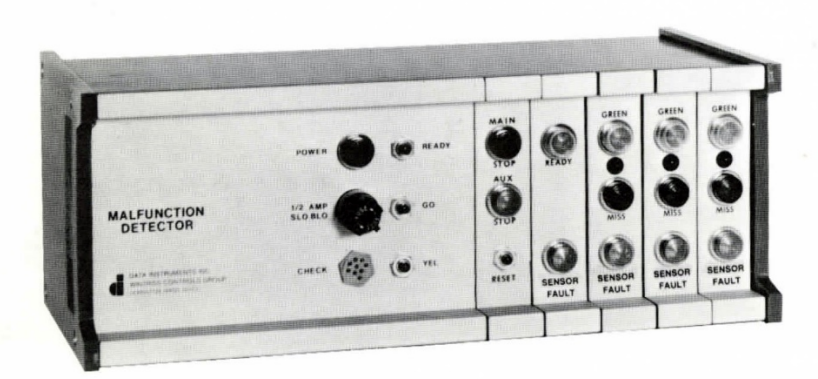

Figure 1. The Wintriss IC-3 Controller.

1.2 Operation

Basically, the IC Controller works like this: Should any pre-determined cyclic (green) signals not be received at the proper position during the machine's cycle, your IC Controller will signal the machine to stop and visually identify the problem's location.

Should a malfunction occur in any of the static (red/yellow) areas, your IC Controller will, again, signal the machine to stop (regardless of stroke position) and visually identify the problem's location for you.

Further, Sensor Fault detection provisions are built into all Wintriss IC Controllers. If any cyclic (green) event sensor itself should fail, a stop command is generated. This stop command may be programmed to either Top- or Emergency-Stop the machine, at your discretion, and this capability is built in as a feature. It does not require the installation of any additional hardware.

1.3 Specifications

Table 1 on the following page lists the specifications of the Wintriss IC Controller.

Figure 2. The Wintriss IC-12 Controller.

Table 1. Specifications of the Wintriss IC Controller.

Input Power Requirements	115.:_ 12 V AC, 60 Hz, 1/2 amp maximum	
Environmental Tolerances	Temperature	32 - 120°F
	Humidity, '.Vibration, etc.	Normal Pressroom Environment
Overload Protection	Input AC Power	1/2 amp. Slo-Blo fuse
	Surge Protection	Metal oxide varistors across relay contacts.
	Output contacts	Normally open held closed 8 amps resistive.
Mechanical Data	Weight - IC-3	10 lbs., complete
	Weight - IC-12	14 lbs., complete

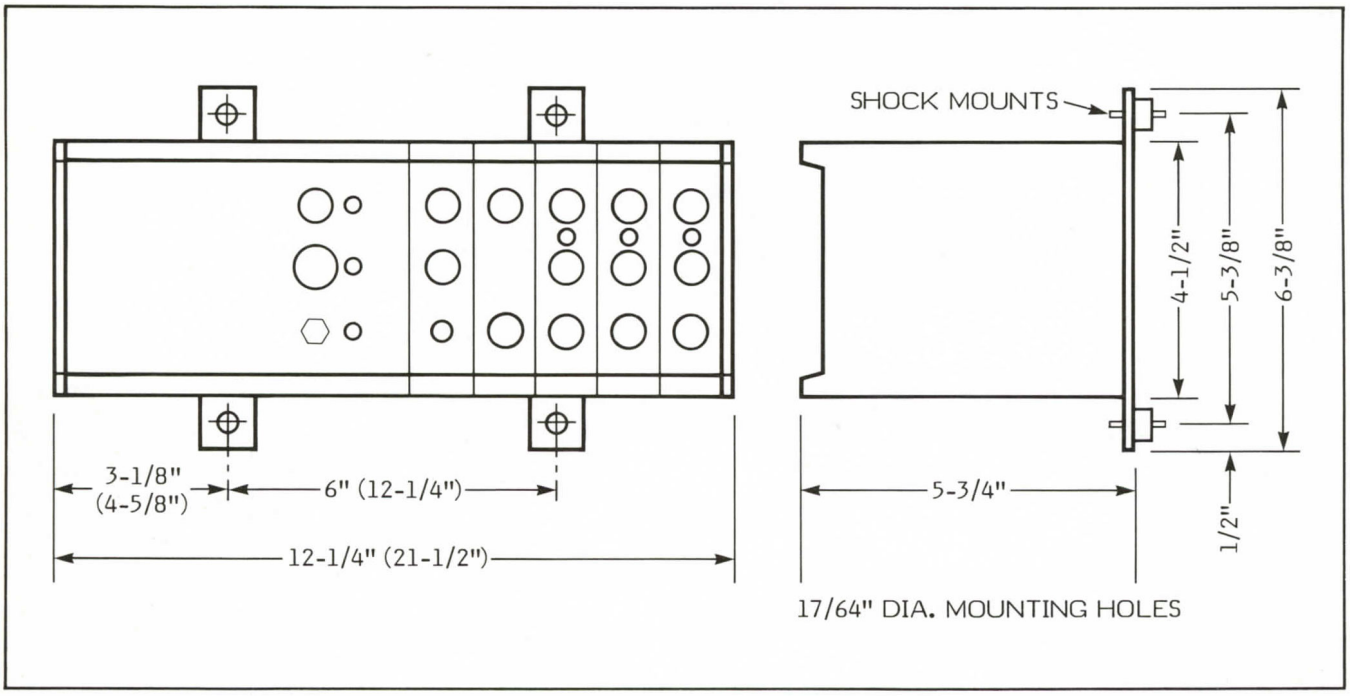

Figure 3. Measurements for the IC-3 (& IC-12) Controllers.

All IC Controller modules are of printed circuit board construction, and all have board-edge connectors, which plug into a mother-board assembly. Individual modules have special 'keyed' connectors to prevent them from being accidentally installed in the wrong position. Green modules are keyed identically; they are interchangeable in any of the last 3 through 12 module stations.

1.4 Standard Modules

The following standard modules are supplied with each unit:

1.4.1 The IC-110 Power Module

This module consists of a solid state power supply that provides +135 V DC and -22 V DC and -12 V DC for the operation of all other modules. It also contains two high-speed relays which provide Main and Auxiliary Stop switching. The front panel has a red neon Power lamp, a 1/2 amp 'Slo-Blo' fuse, and a Check receptacle for connecting the Shorting Plug. Three pushbuttons are provided on the IC-110. These are Signal Simulators, used to test overall IC Controller function.

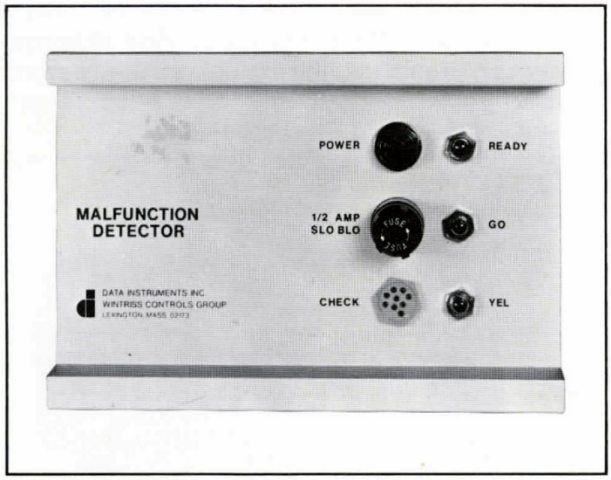

Figure 4. The IC-110 Power Module.

The IC-200 Red/Yellow Module

This module can monitor up to two "red" circuits and one "yellow" circuit. The red circuits provide normally closed-to-ground (NC) sensing; the yellow circuit provides normally open-to-ground (NO) sensing. Additional sensors may be connected to this module in series or in parallel configurations, depending on your own application. The IC-200 Module provides the Main Stop and the Auxiliary Stop neon indicators on its front panel, along with a Reset button.

Figure 5. The IC-110 Power Module

1.4.2 The IC-300 Ready Module

This module receives the cam- or shaft-operated press switch output, and initiates a "sampling" process for the IC Controller

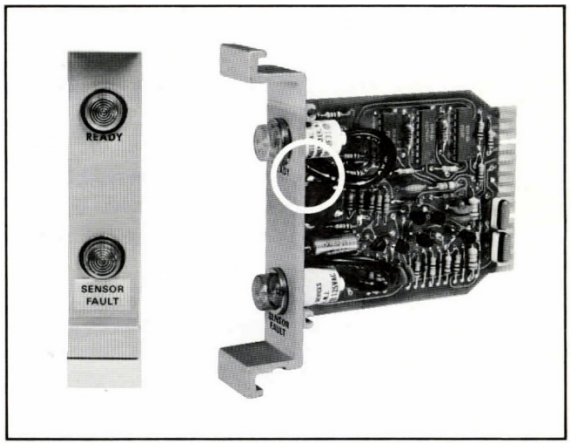

Figure 4. The IC-110 Power Module.

The IC-300 Module incorporates an internally adjusted Sensor Fault detection timer (see Figure 6). The Sensor Fault detection circuit provides an output to the Auxiliary Stop circuit. If a Ready signal is not received within three to fifty seconds on every press cycle or, conversely, if a Ready signal is continuously present during that three-to-fifty second time period, the Auxiliary Stop circuit is enabled, and the press is signaled to stop (normally, at top-of-stroke).

During installation and testing, the sensor fault timer for the Ready signal may be inhibited by using the Shorting Plug, or by grounding Pin 39. (This prevents the need for constant resetting of the Wintriss IC Controller. If desired, the timer may be defeated completely, via internal strapping. This module provides both the Ready and Sensor Fault neon indicators on its front panel.

> NOTE
> The Wintriss IC Controller may be disabled during set-up.

To change the timing on the Sensor Fault circuit, proceed as follows:

1. Remove the fuse from the IC-ll0 Power Module.
2. Remove the screw from the bottom panel which secures the Ready Module, and carefully withdraw the module.
3. Locate the variable resistor between the two neon lamps.
4. To increase the time adjustment, move the resistor clockwise (in the direction marked MAX on the printed circuit board).
5. To decrease the time adjustment, move the resistor counter clockwise, (in the direction marked MIN on the printed circuit board). -
6. Re-install the Ready Module.
7. Re-install the fuse, and press the Reset button.
8. Check the time that elapses before the Auxiliary Stop and Sensor Fault lamps light.
9. Repeat steps 4-8 again as they are required.

1.4.4 The IC-410 Green Module

One IC-410 Module is required to correspond with each cyclic, green event sensor. The IC-410 samples the output from the green sensor during the Ready time period, in order to determine whether the press is in proper operation. The front panel Green neon lamp blinks to indicate normal conditions as the press runs. Any absence of a green signal at the end of a Ready signal's time period will cause the Miss lamp to light, and a Main Stop to occur.

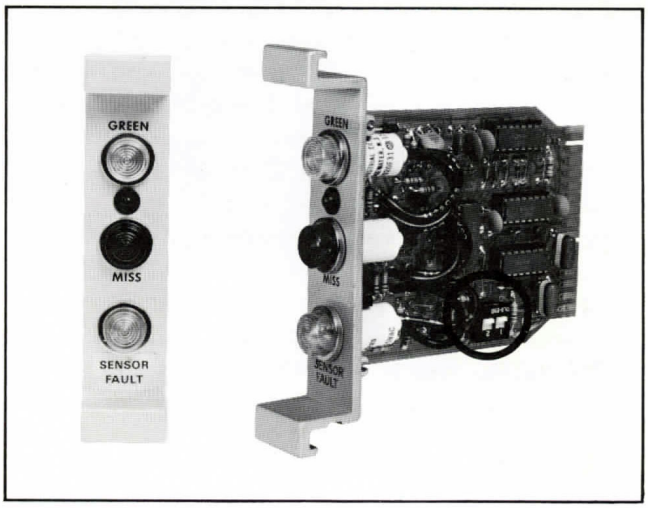

Figure 7. The IC-410 Green Module.

The IC-410 Module must be disabled (or removed) if its individually corresponding sensor is not being used. The disable feature is selected via the circuit-board switch labeled DIS/OPR (see Figure 7 and note "Switch #1"). When the switch is placed in the DIS position, the front panel LED illuminates, to indicate that the station has been disabled.

In the standard mode (as supplied) an IC-410 module checks sensor conditions on every two cycles of the press. This means that if any green signal is still present after two consecutive Ready periods have elapsed, the module will designate a Sensor Fault. Alternative sensor check modes may be selected via circuit board. These are the external sensor check mode and the internal sensor check mode, respectively.

The external sensor check mode: In this mode, the user selects the period of his sensor check via the addition of a cam switch, independent of the ready switch. This normally open (NO) switch is connected to ground and Pin 38 on the IC Controller's Input/Control Board. The switch should be actuated for a short period (approximately 60°), where no green inputs are expected. This method effectively determines the validity of sensor output on each cycle of the press.

The internal sensor check mode: In this mode, the user removes the existing jumper which runs from A to B on the modules' circuit board. He then installs a new jumper from A to C. This method assures that any green signal received outside of the Ready time period will cause the IC Controller to generate a Sensor Fault condition.

Any IC-410 module may be programmed to initiate either a Main or Auxiliary Stop, depending which of these are switch- selected. A circuit board switch labeled AUX/MAIN determines the nature of the stop (see Figure 7 and note "Switch #2").

In the AUX stop setting, any Sensor Fault condition causes the Sensor Fault light to illuminate on the IC-410 module, and the Auxiliary Stop light to illuminate on the IC-200 module, and relay shutdown to occur.

In the MAIN stop setting, any Sensor Fault condition causes the Sensor Fault and Miss lights to illuminate on the IC-410 module, a Main Stop light to illuminate on the IC-200 module, and relay shutdown to occur.

Special Modifications: The IC-410 module can be supplied in a Short Feed ("SF") version. The Short Feed Module is required only when both short feed and bottom- dead-center-occurring events (such as shut- height) are to be sensed by the Wintriss IC Controller. 'Mien supplied this way (IC 410 SF), the module has only to sense the leading edge of the green signal, in order to satisfy the Ready circuit. In the Short Feed configuration, Sensor Faults are indicated by a Miss light if the sensor is shorted for two consecutive Ready's. To obtain a Short Feed IC-410 module, specify with your order prior to IC Controller shipment.

The IC-410 module is normally supplied with an input impedance of less than 30,000 ohms with respect to ground. It can be alternatively supplied as a Low Impedance ("L") module with less than 1000 ohms-to-ground input impedance. This modification 0C- 410L) is useful in those applications where the conductive properties of lubricant might cause false signals to be generated from a sensor or probe. To obtain a Low Impedance IC-410 Module, specify prior to IC Controller shipment.

1.5 Optional Modules

The following optional modules are also available from the factory:

1.5.1 The IC-250 (Red/Yellow Selectable) Module

The standard IC-200 Module provides for both Auxiliary and Main Stops, but cannot distinguish whether the source of a fault is from a particular red or yellow circuit. The IC-250 Module can be used in those applications where individual red/yellow sensor fault identification information is required.

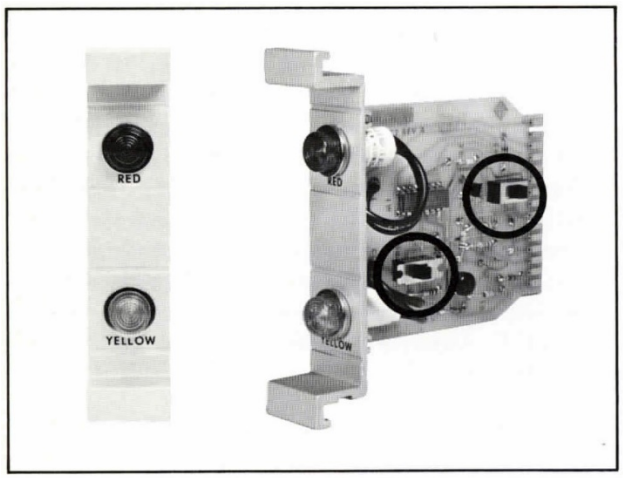

Figure 8. The IC-250 (Red/Yellow Selectable) Module.

Prior to its installation, the IC-250 is programmed, via switch-selection, to indicate either red or yellow faults (see Figure 8 and note bottom left switch). Depending on this selection, either a Red or Yellow front panel lamp is illuminated when any malfunction is detected.

In addition, another switch-selectable function of the IC-250 determines whether the module controls the Auxiliary or Main Stop circuits (see Figure 8 and note top right switch). Any combination of both switches allows Controller operation.

The IC-250 Module may be installed in any unused IC-410 station; sensor connections for this module are made to the same pins as those IC Modules they replace, e.g. pin 19 for station 1, pin 20 for station 2, etc. ••

1.5.2 The IC-400 and IC-400SF Modules

These modules substitute for the IC-410 and IC-410SF respectively, when timed, versus cyclic sensor checks are required. The IC-400SF must be used with the associated short feed station when shut-height or other events which occur at bottom-dead-center are to be checked in conjunction with short feed.

The IC-400 Modules are useful in those operations where a green signal will normally be present for two Ready's (--for example, in transfer applications where there is checking for the presence of a part at both the beginning and end of transfer). In such cases, two short Ready signals are generated over one long green one, which would normally result in an IC-410 Sensor Fault condition.

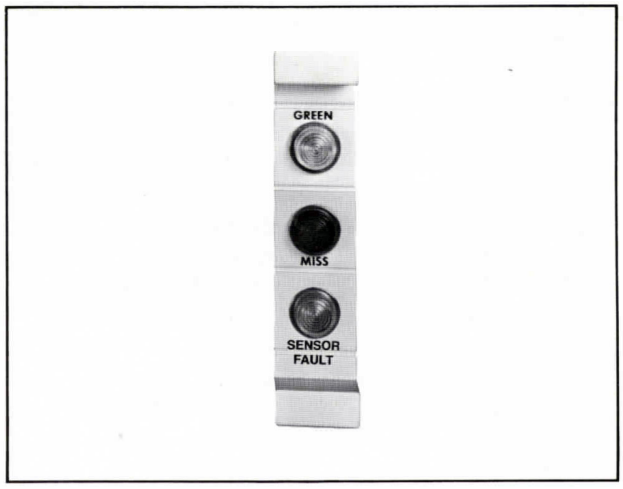

Figure 9. The IC-400 Module.

This phenomenon is successfully circumvented when the IC-410 is replaced by the IC-400 Module which is time-, rather than cycle-based. (If a green signal lasts for four to seven seconds, then an IC-400 Sensor Fault will be generated.)

1.5.3 The IC-350 Time Delay Module

This module is a dual-card module, which replaces the standard Ready (IC-300) Module. It therefore occupies the first green station in any Wintriss IC-3 Controller. Only one cyclic (green) event may be monitored when this module is used.

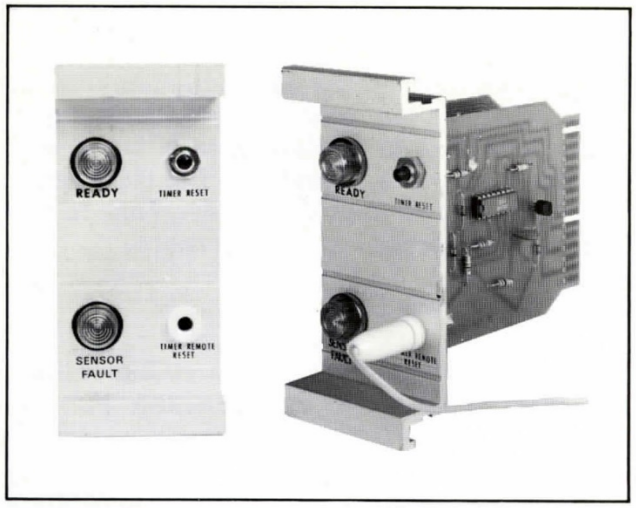

Figure 10. The IC-350 Time Delay Module.

In general, the IC-350 Module is used only with mechanical, full-revolution clutch presses. In such applications, each stroke of the press is inhibited until the IC Controller has determined that there has been no malfunction during the previous stroke.

Just prior to the bottom of each stroke of the press, the IC-350 sends a stop command to the Top-Stop circuits. If the cyclic event to be sensed has occurred, then a re-start command will be immediately issued, and the press allowed to continue operation. (The cyclic event should occur within approximately 1/2 second after the stop command, but this time is adjustable from 0-2 seconds.)

Any press using an IC-350 Module, then, runs "on the hop" -- start, stop…start,..stop… etc.. If the set-time on the IC-350 interval timer should elapse because of the absence of a green signal, the press will stop at top-dead-center, the IC-350 will activate the **Auxiliary** Stop circuit, and the **Auxiliary** Stop and Sensor Fault indicators will illuminate. To resume press operation, the Reset buttons on both the IC-200 and the IC-350 Modules must be pushed. The IC-350 will allow the operation to start automatically. Strict use, therefore, of point-of-operation guarding is imperative in conjunction with the IC-350 to avoid accidental operator in-

1.6 Special IC Controller Provisions

The following special IC Controller provisions are available from the factory:

1.6.1 Dual Ready

For some applications, namely those that complete the progression of material at a point well into the downstroke, it is desirable to monitor short feed independent of other, upstroke-occurring events, such as part ejection. A Dual Ready control option, which monitors feed length independently of other cyclic events, is available with the IC Controller. Using this feature, two Ready signals are generated and two separate decisions are made per stroke. This avoids the risk of the punch's making contact with the material, in the event of a part ejection failure. Normally, downstroke progression decisions invariably result in punch/material contact. While the damage is usually minimal, punch/material contact is unavoidable largely because of the lateness of the decision point (i.e. well into the downstroke), coupled with the stopping efficiency--or inefficiency--of the machine.

The Dual Ready method offers an advantage over the red circuit progression check method (refer to Section 2.2.1) in that Dual Ready offers Sensor Fault detection capabilities for both cyclic sensors. Such Sensor Fault detection is unavailable when using a reel circuit to monitor feed length. The Dual Ready control must be ordered with the original control prior to its shipment.

1.6.2 The IC-3-1-TD

The IC-3-1-TD is a special-configuration IC-Controller, which has limited application possibilities on full-revolution clutch machinery. For information on the IC-3-1-TD, refer to Sections 1.5.3 and to Sections 3.6.2 through Sections 3.6.4.

1.7 7 IC Controller Accessories

1.7.1 The Remote Connection Box ("RCB")

The RCB is designed to minimize the **set-up**time associated with frequent changes in sensing hardware. The unit is equipped with front panel jacks for quick connection to the Green, Yellow, and Red sensor inputs on an IC-3 Controller. On the front panel of the RCB are a Power 'On/Off" switch, a Key- lock Disable switch (this enables bypass of the IC Controller during set-up), a Remote Reset switch, and an Accessory Plug (for use with parts-ejection monitoring sensors).

Figure 11. The Remote Connection Box.

The RCB permits wiring and sensor changes to be made without entry into the IC Controller itself, and thus, without access to the IC-3 Input/Control board. Additionally, the RCB incorporates a noise-rejection network of its own.

CAUTION

With its key in the Disable position, the RCB effectively renders inoperable all IC Controller functions. The key itself is removable only in the Run position. When the key is in the Disable position, the press will run without any die protection.

1.7.2 Mounting the RCB

Mount the RCB in the same manner that the IC Controller has been mounted; i.e., away from lubricant or coolant splash, but readily accessible by the operator. The RCB should be positioned so that it is convenient to both the die- and press-mounted sensors.

1.7.3 Wiring the RCB

Cables are supplied with the RCB for making all connections between the IC Controller and the Remote Connection Box. It is suggested that these cables be run through separate flexible or rigid conduit, to both prevent damage and reduce electrical noise interference. See Figure 29 for a diagram on wiring the RCB. For further notes on the RCB, see the Wintriss Controls Application Manual {IM-607) as well•

1. 7.4 The Shorting Plug

The Shorting Plug mates with the Amphenol connector on the front panel of the IC-110 Power Module. It overrides all Ready/ Green/Sensor Fault operations of the IC Controller, and allows manual machine function, without necessitating complete disconnection of the IC Controller from press circuitry. Red and Yellow circuits remain fully operative even when the Shorting Plug is in place.

Figure 12. The Shorting Plug.

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2. PRINCIPLES OF IC CONTROLLER OPERATION

Three very simple circuits govern IC controller operation. These are the “Ready” (green or cyclic) circuits, the “Red” or "Yellow" circuits, and the “Sensor Fault” circuits.

2.1 Ready Circuits

The press itself (through a cam-operated or shaft-driven switch) generates an interrogate pulse (Figure 13) called Ready. This pulse is generated during the time green, cyclic event signals are expected to occur. Figure 13 shows a switch closure via cam or similar device mounted to the press. It provides the Ready signal from about the 5:30 position to the 7:00 o'clock position. Green sensor signals associated with cyclic events must be received during the assigned timing range. If, at the end of that time, the IC Controller has not received the appropriate green signals, the conditions for a Stop have been satisfied. When the Ready signal ends at 7:00 o'clock, as it does in the sample illustration, the IC Controller lights a front panel neon lamp, indicating which sensor did not provide the requisite green signal.

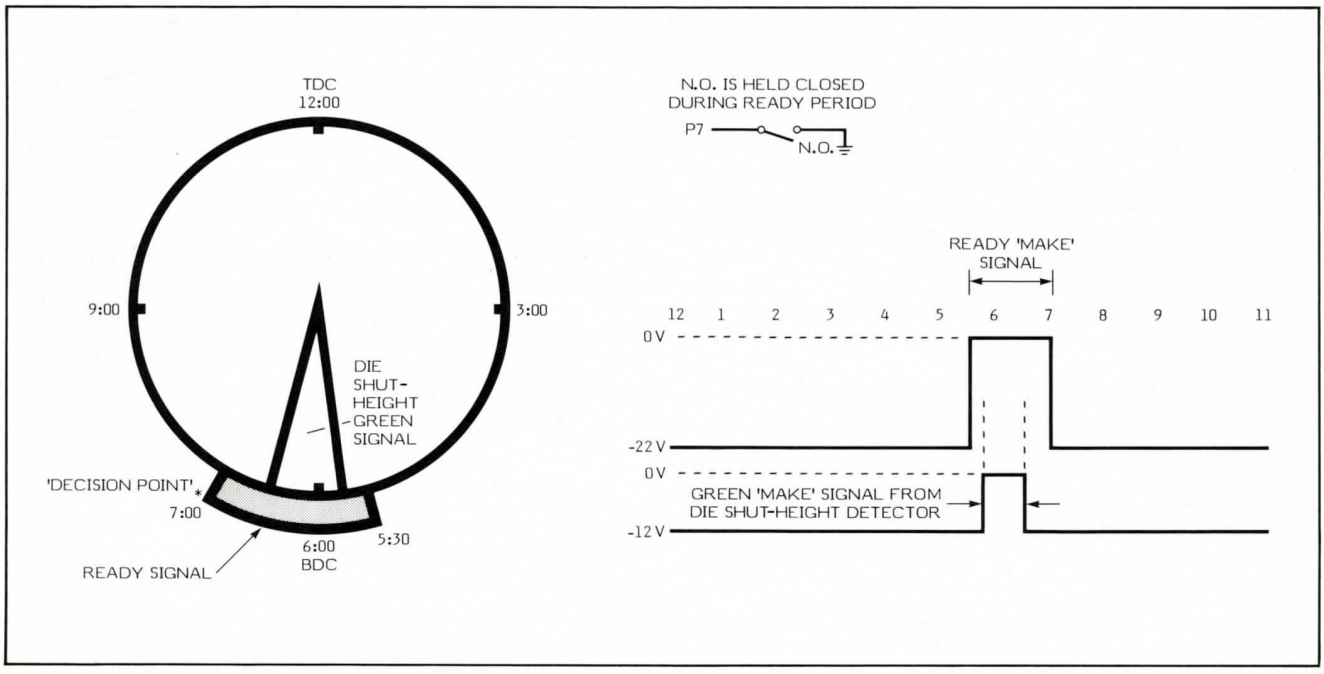


Figure 13. Single-Event Ready Cycle.

The red Miss indicator will show which of the green sensors failed to provide a green pulse. The red Main Stop lamp illuminates whenever any "miss" occurs, and the Wintriss IC Controller signals the press to stop (normally, via the Emergency Stop circuit). The Reset but ton on the front panel must subsequently be pushed to resume normal machine operation.

Figure 14 depicts dual monitoring; that of parts ejection, and of die shut-height monitoring. Here, two pieces of information are required for the press to operate continuously:

- A signal from the parts ejection sensor, and
- A signal from the die shut-height sensor.

Both must be received during the Ready signal, and both must be received on each and every stroke of the press.

In this type of application, it must be determined where, in relation to crankshaft rotation, the part can accurately be sensed. A longer Ready period is required here. Normally, parts ejection sensing takes place between the 7:00 o'clock and 10:00 o'clock positions. Parts ejection sensing may be done with a probe **(see** Figure 16), a proximity coil (see Figure 17), an impact plate (see Figure 18), or a miniature light curtain (see Figure 19).

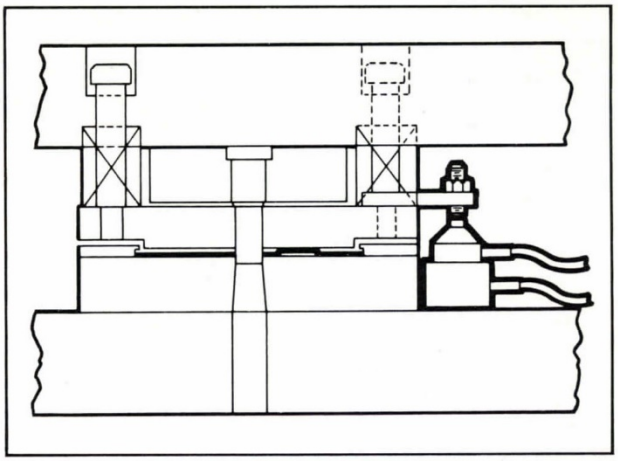


Figure 15. Die Shut-Height Sensors.

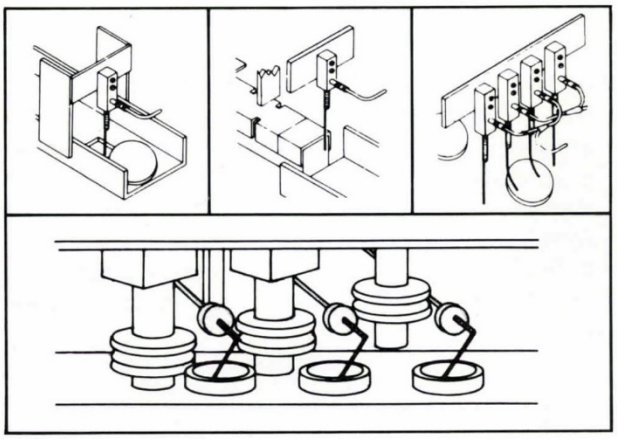


Figure 16. Probes.

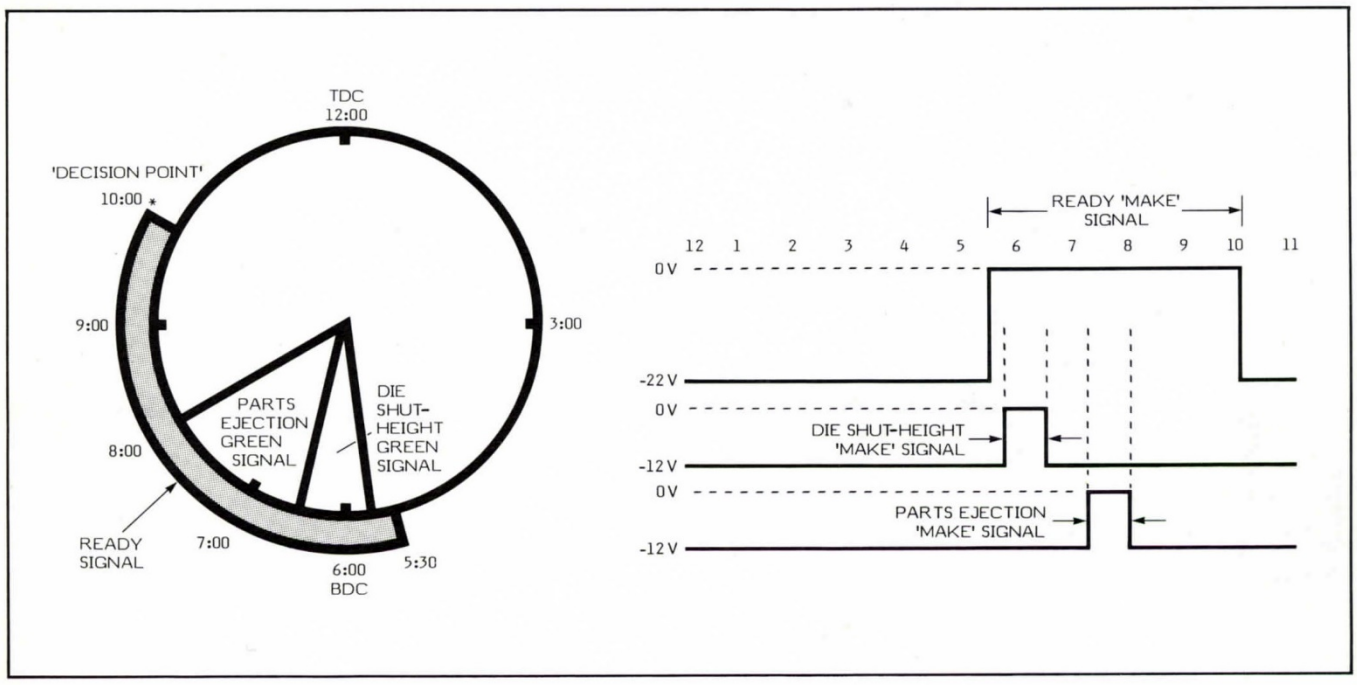


Figure 14. Two-Event Ready Cycle.

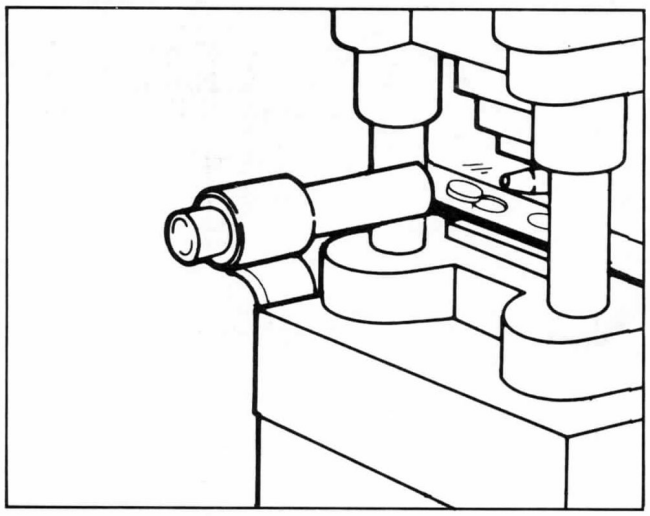


Figure 17. A Proximity Coil.

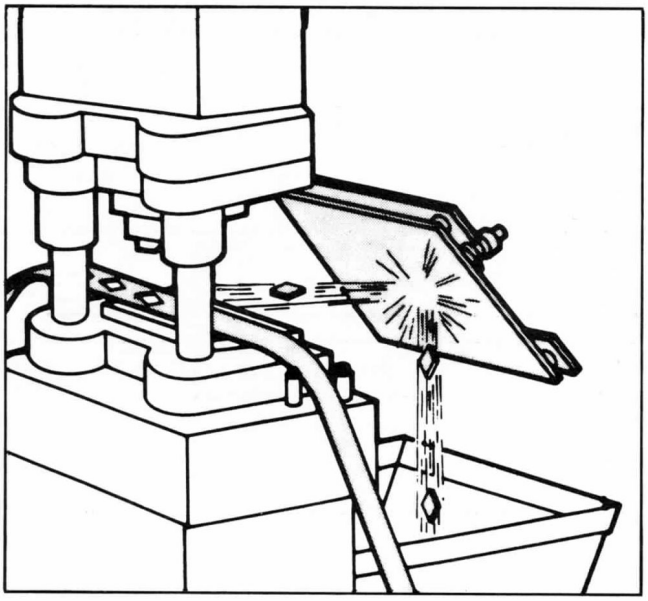


Figure 18. An Impact Plate.

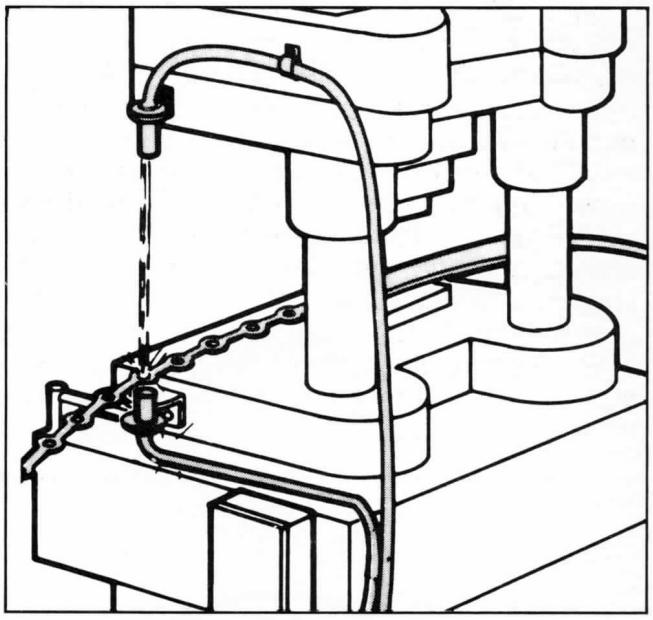


Figure 19. A Miniature Light Curtain with Standard Opposed Optics.

Figure 20 adds a third condition to the monitoring situation. The example can pertain to an instance where more than one part is being ejected (such as from a two-out die) or to the detection of a short feed situation, for example. In the latter case, a sensor has to be placed outside of the die so that when the feeding mechanism advances, the sensor will make sure the stock moves properly. When using a shut-height detector and a short feed sensor simultaneously, the green module associated with the short-feed sensor must be a Short Feed version, IC-410SF.

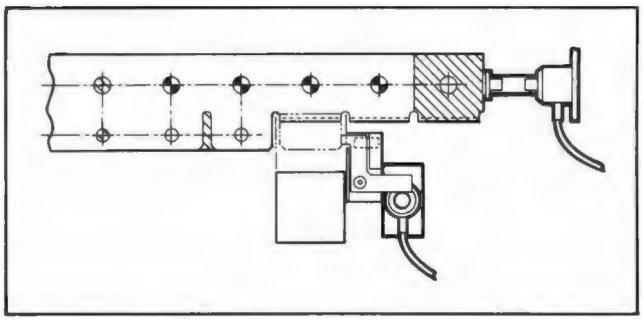


Figure 21. A Short Feed Sensor.

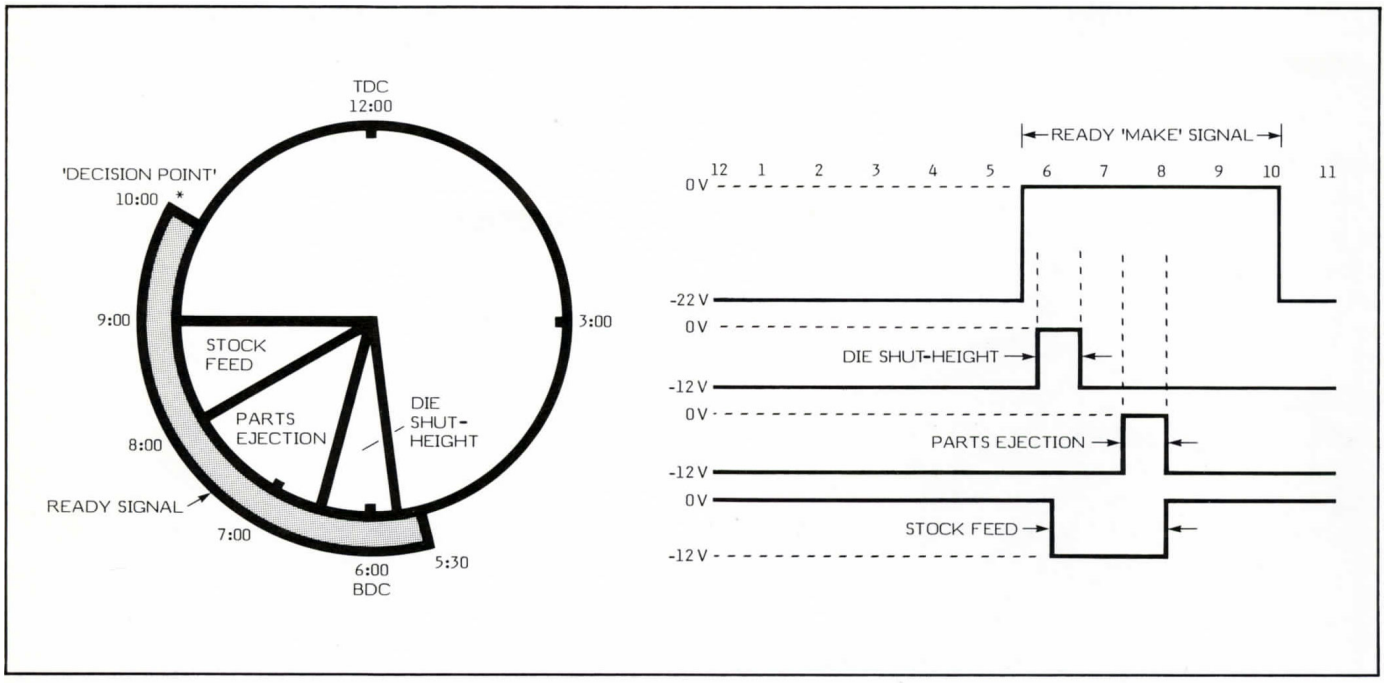


Figure 20. Three-Event Ready Cycle.

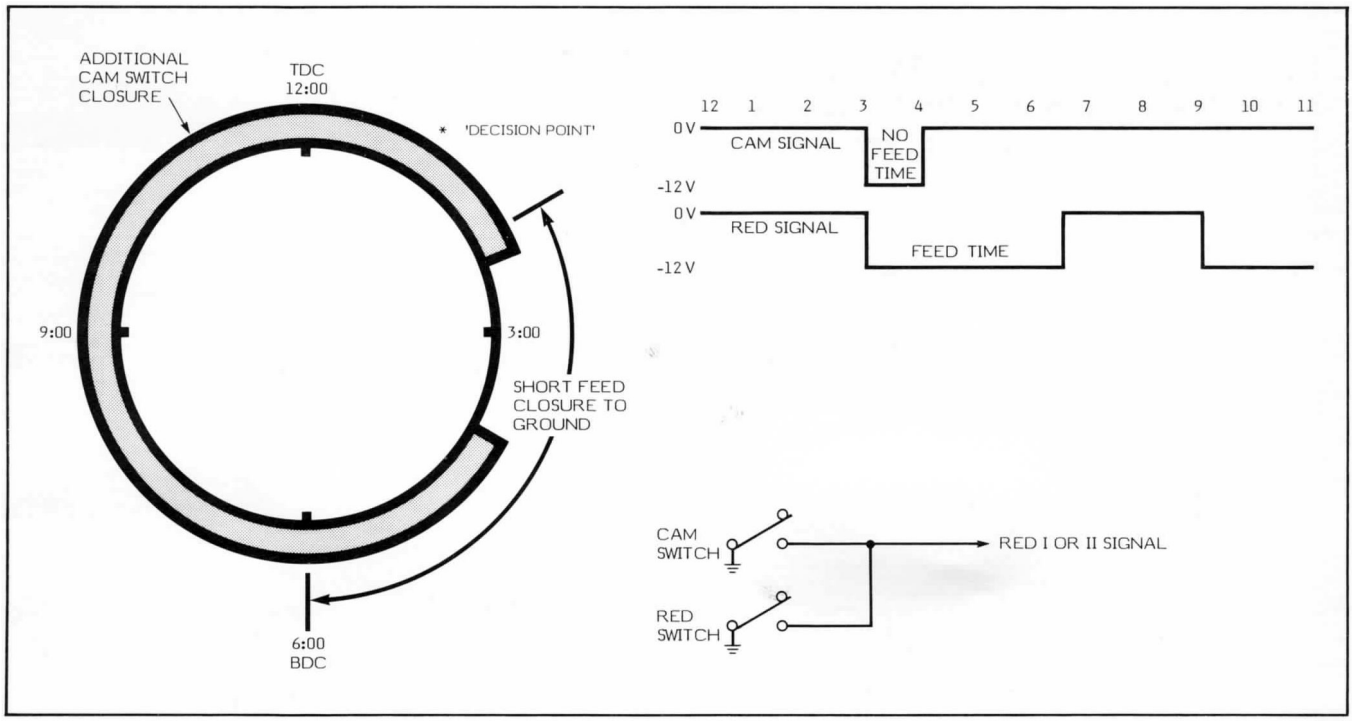
A Ready signal may be provided to the press in a variety of ways, but the ultimate goal is always the same: to generate a closure- to-ground during the time span required to sample all of the green stations wired to the Wintriss IC Controller. Timing is associated with the leading edge of the Ready signal. Dwell represents the length of time, cor-responding to the degree of crankshaft rotation, during which the Ready signal remains activated. It is advantageous to make the Ready signal, or pulse width, as short as possible, yet lengthy enough to accommodate all of the anticipated green signals. The longer a Ready signal is allowed to remain on (this is "dwell"), the later in the press' cycle decision-making will have to occur. Excessively short signals, conversely, can cause 'nuisance' stops.

2.2 Red/Yellow Circuitry

2.2.l Red

There are two independent "red" circuits, red **1** and red 2. The difference between "red" and "yellow" circuitry is that red circuits are normally grounded ones. When the path-to-ground is broken for any reason, the red circuit detects a malfunction, and generates an Auxiliary Stop.

Typically, a red circuit is used as an alternate for cyclic detection of short feed, via a die-mounted short feed sensor (see Figure 21). The red signal is wired, in parallel, with a second cam switch's signal. As shown in Figure 22, the cam switch provides a path-to-ground when the material does not advance. Conversely, the red signal provides a path-to-ground when the material does fully advance. If neither feed condition is satisfied, the absence of a ground signal generates an Auxiliary Stop. This method normally allows a decision to be made earlier in the stroke than the misfeed pilot detection method.



Usually, this method of checking short feed is used when all green stations have been designated for other cyclic functions, or when a roll-type of feed is being used. In that case, the red circuit allows a separate, downstroke decision based on material advance, and independent of other, upstroke cyclic decisions. Any decisions made after top-dead-center may result in the punch entering the material prior to the press's coming to a complete stop, thereby minimizing - but not preventing - damage. This approach does not provide Sensor Fault detect1on.

2.2.-:- Yellow Circuits

Yellow circuits are normally ungrounded circuits. Any time the yellow circuit detects ground, it generates an Auxiliary Stop condition. Typically, the yellow circuit is connected through a sensor with potential-to-ground. Yellow circuit applications make use of those sensors which can be mounted so that they will be grounded when a malfunction occurs. Such applications include stock-buckling, or end-of-coil sensing (see Figure 23).

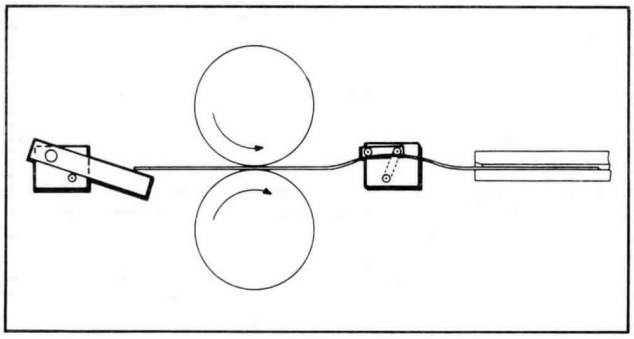


Figure 23. An End-of-Coil Sensor (left) and a Buckling Sensor (right).

Both Red and Yellow circuits are low-voltage circuits, and they eliminate any shock hazards for personnel during use and set-up. Under normal circumstances, neither Red nor Yellow circuitry has any relationship to crankshaft rotation; these circuits have no indication as to what part of stroke or cycle the machine is in (except when they are used for monitoring a feed condition, or when used in conjunction with an auxiliary cam switch). Therefore, when red or yellow signals are received, those circuits generate an Auxiliary Stop, regardless of stroke position. Normally, the Auxiliary Stop is wired into the press's Top-Stop, and so the press actually will "wait" until the end of cycle before stopping.

2.3 Sensor Fault Detection Circuitry

"Sensor Fault" circuits monitor the validity of information coming into the IC Controller from Ready or green sensors. If a Sensor Fault detection circuit determines that an incoming signal from a Ready or green sensor is invalid, the Auxiliary Stop circuit will be enabled. For example: if shut-height is being monitored, and its corresponding sensor has failed closed, resulting in a continuous green signal which is shorted-to-ground, the Sensor Fault circuit will generate an Auxiliary Stop.

A timed Sensor Fault detection circuit is provided for the Ready circuit. This timed circuit is internally adjustable for the time it takes to trigger, from three to fifty seconds. It checks to make sure that the Ready circuit is not permanently shorted, or open. This means that the Ready signal can only be present or absent for a preset length of time.

If that length of time exceeds the prescribed figure, an Auxiliary Stop is generated, and the press stopped. If the internally adjusted set-time is too short, Auxiliary Stop can occur prematurely; that is, before a stroke has been initiated. If the time is set so that it is too long, however, the press may be allowed to run with a Ready switch failure, which can mean several seconds of operation without die protection from the IC Controller.

All of the Sensor Fault circuits cause a neon Sensor Fault indicator lamp to illuminate on that module which is wired to the defective sensor. In the event of a Ready Sensor Fault, the Auxiliary Stop lamp also illuminates. IC-410 Modules may be programmed to cause an Auxiliary or Main Stop, as the application demands. When a Sensor Fault is detected, then, two indicators are always illuminated: the Auxiliary or Main Stop lamps, and Sensor Fault lamp on the module which corresponds with the malfunctioning sensor.

Normally, failure caused by a red or yellow sensor, or a Sensor Fault condition, generates an Auxiliary Stop. Since red, yellow and Sensor Fault circuits are independent of stroke position, it is possible that the press may stop with a part in the die at bottom- dead-center. This creates a circumstance in which it is difficult to troubleshoot the problem, and it can also cause the press to jam. Data Instruments recommends that the Auxiliary Stop circuit be wired into the Top-Stop circuit of the press. This way, the cycle will be allowed to continue through bottom-dead-center, but to stop at top- dead-center, thus avoiding the occurrence of such a jam.

The Main Stop circuit may then be wired in series with the Emergency Stop circuit of the press. Since a Main Stop can only occur after a Ready signal has ended, the press is usually on the upstroke, and any failure will therefore be easier to identify. Care must be taken to discriminate between single- stroke and continuous press operations when wiring the Auxiliary Stop circuitry. Check your press Operating Manual to verify that the Top-Stop circuit is operative in the single-stroke mode.

If desired, both Main and Auxiliary Stop circuits may be wired together in series, and subsequently connected to either Top or Emergency Stop. In this manner both the Main and Auxiliary Stops will have the same stopping effect.

Data Instruments has available an electro-mechanical device which measures Stop-Time and Safety Distance within +l%. This device is portable and will readily-interface with punch presses of all types. Please consult the factory for additional information on the SHAD-STMD.

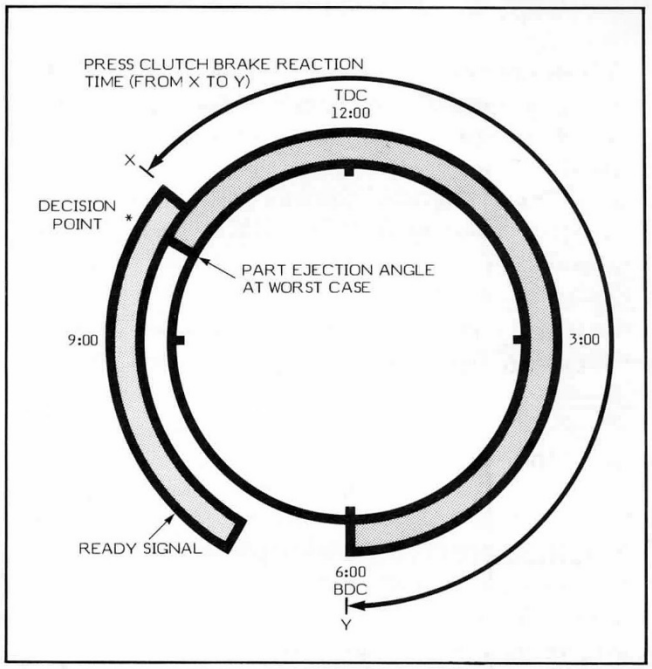


Figure 25. Effects of Stop Time, Sensor Location, and Part Speed on Ready Switch Adjustment.

Stop Angle Calculation

Total Stop Time = Part Travel Time + IC Control Control Response Time (i.e. 10ms) + Press Stop Time

$$\text{Stop Angle} = \text{Decision Point Angle} + \frac{\text{TST}}{\text{Time for 1 Stroke}} \times 360^{o}$$

Sample Equation, Where:

Press Speed is 175 strokes-per-minute
Stopping Time is 200 milliseconds
Decision Point Angle is 300 degrees
Part Velocity is 50 feet-per-second
Sensor Distance is 12 inches from part ejection

$$\text{TST} = \frac{1}{50} + 10\text{ms} + 200\text{ms} = 230\text{ms}$$

$$\frac{175}{60} = 2.91 \text{ strokes per second} = \frac{1}{2.91} \times 1000 = .342\text{ms per stroke}$$

$$\text{SA} = 300^{o} + \left(\frac{230}{342} \times 360^{o}\right) = 300^{o} + 242^{o} = 182^{o}$$

Figure 24. Stop Angle Calculation.

3. INSTALLATION

3.1 Unpacking

After unpacking your Wintriss IC Controller, visually check its exterior for any damage which might have occurred during its shipment. Check each individual module to be sure that it is securely seated in its correct location, and that it is held tightly by the screws on the bottom front end of each module. Notify the Common Carrier immediately if any damage is found. Refer to Figure 26 for correct module locations.

3.2 Mounting and Wiring the IC Controller

Below is a summary of the IC Controller installation procedures; detailed instructions on mounting and wiring follow it, respectively. A brief reading through this summary will help you to prepare for your IC Controller installation.

1. The IC Controller is press-mounted on a bracket or into the control console (see Figure 33).

2. The Main Stop and Auxiliary Stop circuits are wired to press Emergency and Top-Stop circuits. They should be wired in series if only one circuit is used.

3. 115VAC input is wired to the IC Controller.

4. The built-in test Signal Simulators are used to test all functions, to ensure that the IC Controller will stop the press in the event of a malfunction, and to ensure that the press will resume normal operation once the Wintriss IC Controller has been reset (see Figure 28).

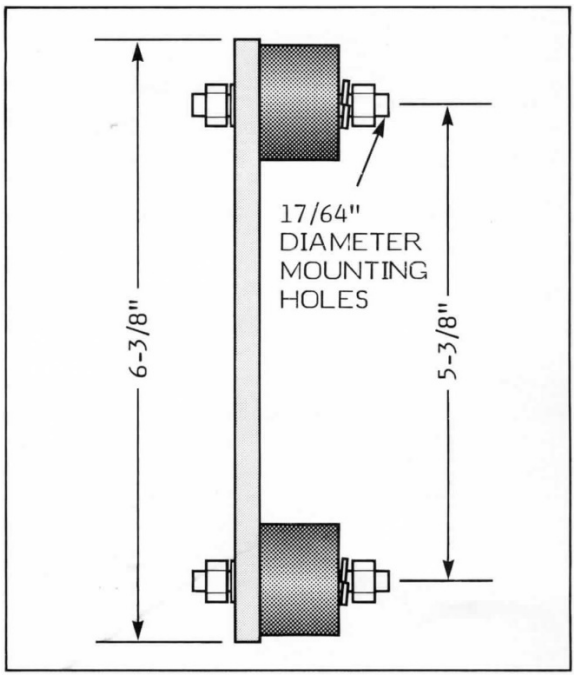


Figure 27. A Standard Mounting Bracket.

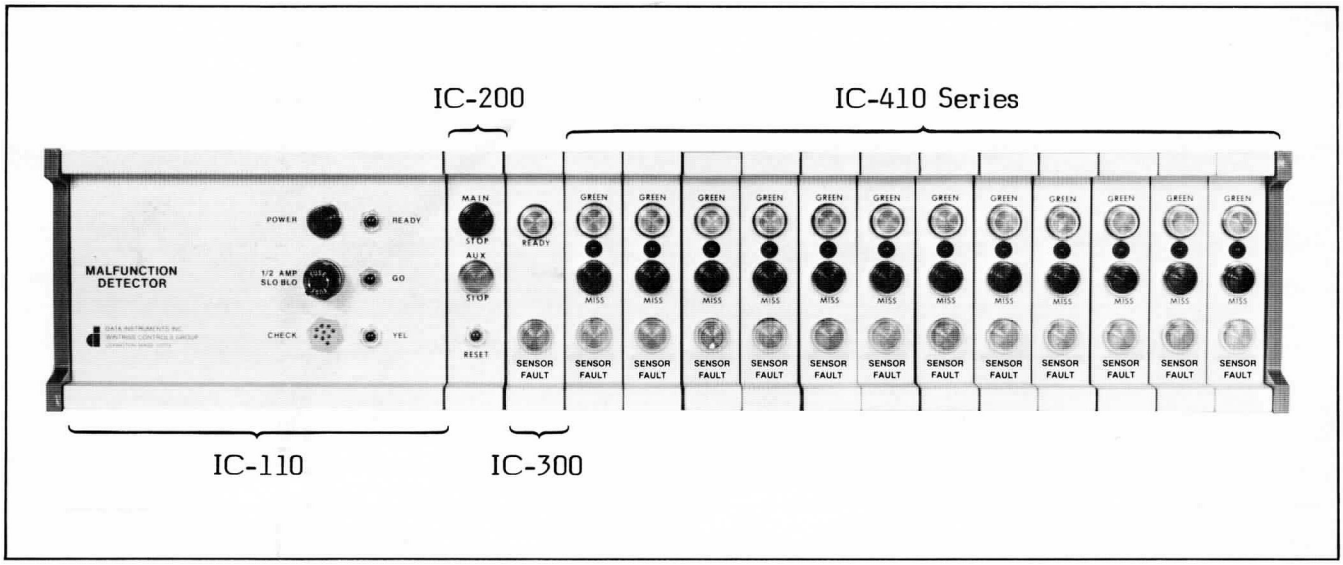


Figure 26. Typical IC-12 Controller Module Locations.

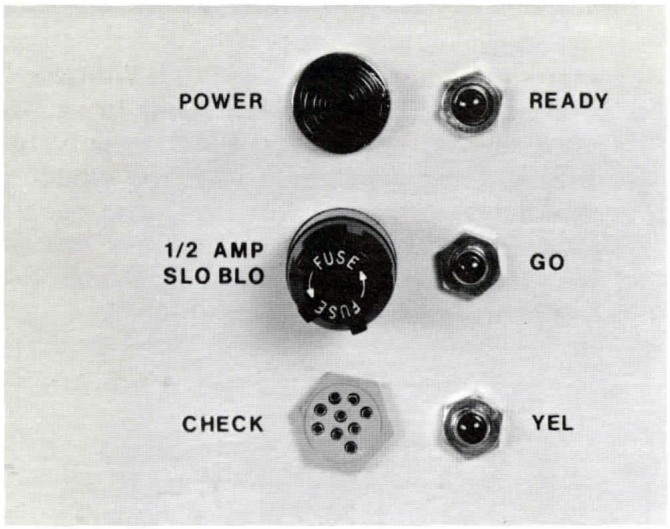


Figure 28. The Test Signal Simulators, labeled READY, GO, and YEL.

5. All sensors are connected to the Input/ Control board, using Molex 093 crimp-on pins, supplied with your IC Controller•

6. Each sensor is manually activated (with the press stopped) to verify that sensors' correct operation•

7. In the event that a problem exists, the Stop circuits will be disabled using a Shorting Plug, and the press will be inched through several cycles. During that time, you should observe the neon lamps on the IC Controller. These will help you to isolate the source of any malfunction.

3.2.l Mounting the IC Controller

The IC Controller should be conveniently located near the press it is to control; it must not, however, be placed so that it can be splashed by lubricants, water, coolants, etc.. Generally, the Wintriss. IC Controller is best when placed in as high a spot as possible, however the Res t button--and indicator lamps--should be positioned for easy access and visibility.

A secure ground connection is essential for proper IC Controller operation. When considering a location for your IC Controller, allow the individual modules to extend forward, to allow room for future access to the securing screws on the bottom front end of each. Such placement will facilitate their easy removal from the IC Controller (in the event of a defective module, for example). Be sure that the left and right end-plate screws are accessible for initial wiring, and for alterations after initial IC Controller installation.

Remember, when you re-locate a Wintriss IC Controller, be sure to leave room for access to the screws that secure the left and right end-plates, and to those that secure each of the modules.

Mount your IC Controller as follows:

l. Remove the four nuts and lock washers from the four shock mounts.

2. Attach the IC Controller to a suitable bracket; secure it with the four nuts and lock washers.

3. Make sure there is a good ground connection between the press frame and the IC Controller's mounting hardware.

3.2.2 Wiring the IC Controller

Two knock-out plugs are located on the bottom left end of the IC Controller. They provide access to the Stop Circuits' terminal board and the Input/Control board (see Figures 30, 31, and 32). To eliminate electrical noise and interference, it is necessary that all input power and stop circuit connections be brought to the IC Controller in a single electrical conduit and that all low-voltage signal connections to sensors use separate conduit.

Unless local wiring ordinances allow for the use of 'quick disconnect' connectors, all wiring to the IC Controller should be done in accordance with standard Shop Wiring Practices.

It is the customer's responsibility to perform the actual wiring to the Wintriss IC Controller. The Input/Control board pins accept Molex 093 crimp-on connectors; two dozen pins are supplied with each IC Controller unit.

For ease of installation, it is recommended that a Molex crimping tool be used for those signal lines which terminate at the Input/ Control board. (Molex crimping tools are readily available at most local electronics supply stores.) If a Molex tool is not used, each joint should be soldered to insure proper connection.

Make sure a good ground connection exists between the press frame, and the terminal labeled ground. Pull all wiring through conduit; dress away from the Input/Control board. Use 1/14 gauge wire for the AC wiring, and adhere to the following AC wiring color code:

Black ---------Hot
White-------- Neutral
Green --------Ground
Red ---------- Stop Circuits

3.2.3 Wiring the Stop Circuits

1. Remove the left end-plate by removing the four 1/6 cross-recessed screws.

2. Remove the bottom, rear knockout from the IC Controller.

3. Bring the 2- or 4 -wire Stop circuit leads through the same conduit that will be used to carry the AC power leads.

4. Refer to Figures 30 and 31, and wire the external Stop circuits for the press in one of the two configurations shown.

3.2.4 Wiring the AC Circuits

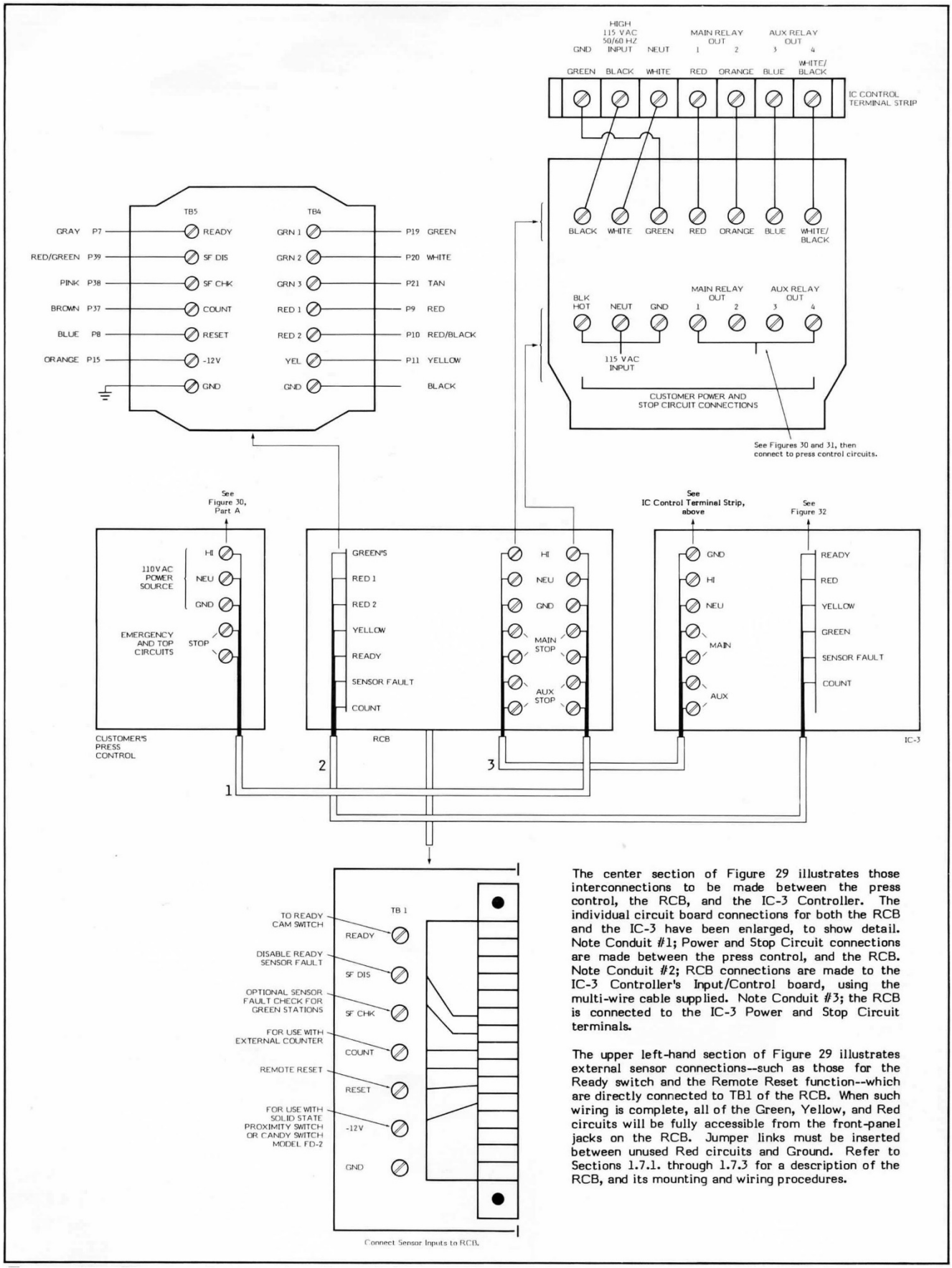
1. Remove the fuse from the IC-ll0 Power Module.

2. Connect the three input ll5 V AC wires to the terminal strip.

3.2.5 Preliminary Checkout Procedure

With your IC Controller both mounted and wired, you are now ready to perform a Preliminary Checkout procedure. At this time, please refer to Table 2 so that you can familiarize yourself with the Controls and Indicators on the Wintriss IC Controller before checkout begins.

Complete the following Preliminary Checkout Procedure in its entirety before wiring the sensor inputs.



The center section of Figure 29 illustrates those interconnections to be made between the press control, the RCB, and the IC-3 Controller. The individual circuit board connections for both the RCB and the IC-3 have been enlarged, to show detail. Note Conduit #1; Power and Stop Circuit connections are made between the press control, and the RCB. Note Conduit #2; RCB connections are made to the IC-3 Controller's Input/Control board, using the multi-wire cable supplied. Note Conduit #3; the RCB is connected to the IC-3 Power and Stop Circuit terminals.

The upper left-hand section of Figure 29 illustrates external sensor connections--such as those for the Ready switch and the Remote Reset function--which are directly connected to TB1 of the RCB. When such wiring is complete, all of the Green, Yellow, and Red circuits will be fully accessible from the front-panel jacks on the RCB. Jumper links must be inserted between unused Red circuits and Ground. Refer to Sections 1.7.1. through 1.7.3 for a description of the RCB, and its mounting and wiring procedures.

Figure 29. Remote Connection Box Wiring.

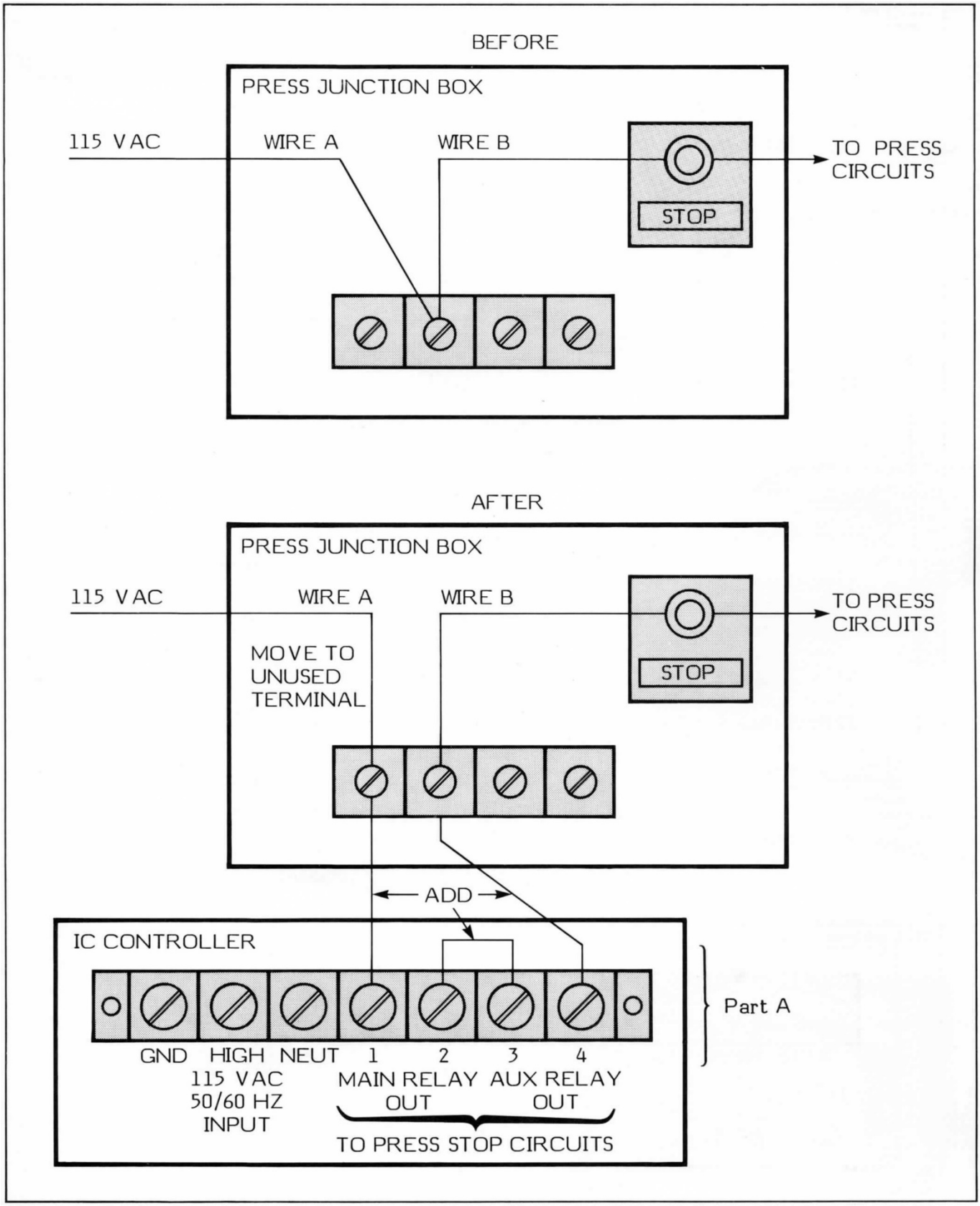


Figure 30. Single Stop Circuit Wiring.

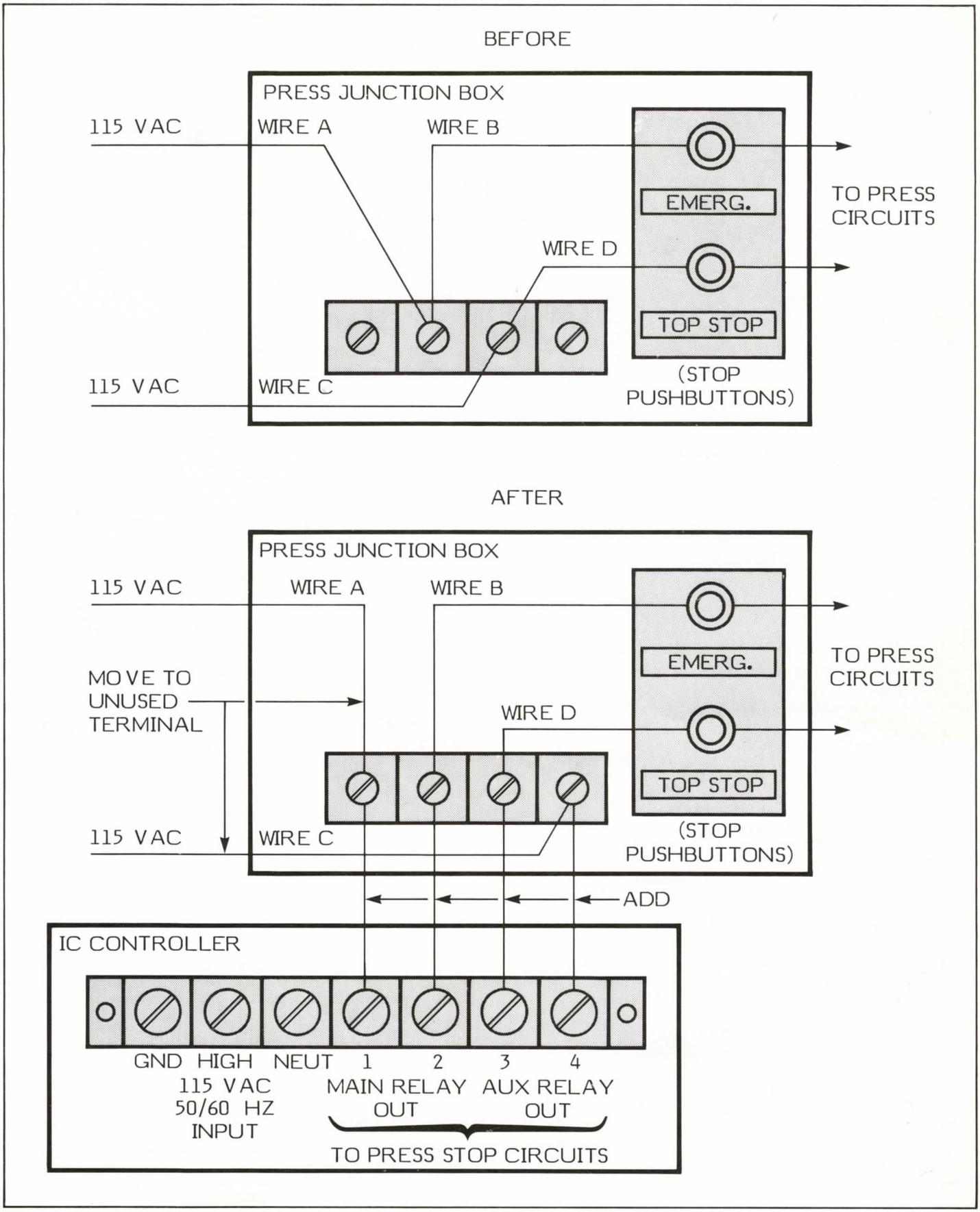
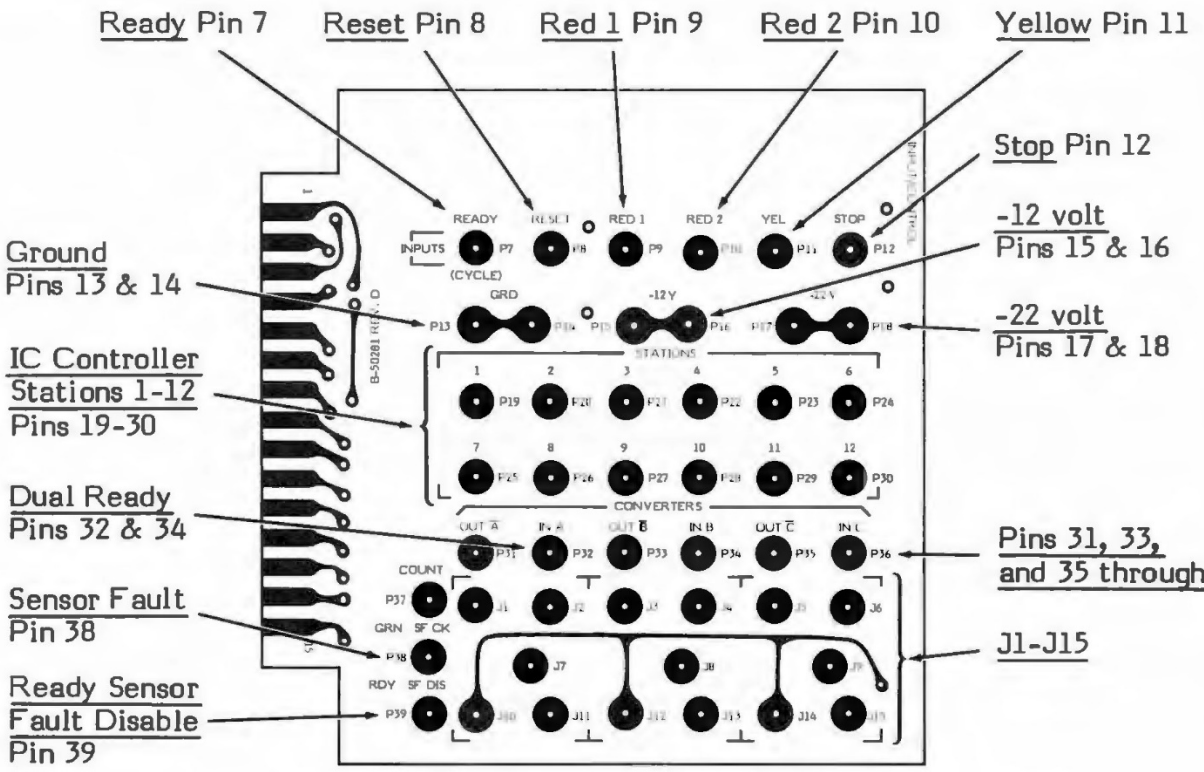


Figure 31. Dual Stop Circuit Wiring.



Ready Pin 7: Connect Pin 7 to a normally-open-to-ground cam-operated switch that is suitable for logic-level interface, such as the Wintriss SSPS or Candy Switch.

Reset Pin 8: The optional Remote Reset may be connected via Pin 8 to a normally-open-to-ground switch that provides a momentary closure-to-ground.

Red 1 Pin 9: Normally this is shipped with a jumper-to-ground (Pin 13). Wire to a normally-closed-to-ground sensor, such as the Wintriss Misfeed Pilot Detector, or leave the jumper in place.

Red 2 Pin 10: Like Pin 9, this is shipped with a jumper-to-ground (Pin 14). Pin 10 provides for a second normally-closed-to-ground sensor input.

Yellow Pin 11: Wire Pin 11 to a normally-open-to-ground sensor, like a buckle detector or an end-of-material sensor, or leave unterminated.

Stop Pin 12: The optional Remote Stop may be connected to pin 12 via a normally-open-to-ground switch that provides a momentary closure-to-ground.

Ground Pins 13 & 14: These two pins are used to ground any unused Red circuits.

-12 volt Pins 15 & 16: Use these two pins for those Wintriss sensors with inputs requiring -12 volt supplies, such as an SSPS.

-22 volt Pins 17 & 18: Use these two pins for those Wintriss sensors with inputs requiring -22 volt supplies.

IC Controller Stations 1-12 Pins 19-30: These pins provide one connection for each IC-410 station. Connect to sensors that are normally-open-to-ground. Pin 19 corresponds with the first IC-410 station (just to the right of the IC-300 Module). Pins 20-30 correspond sequentially, with the rest of the IC-410 stations, from left to right.

Dual Ready Pins 32 & 34: Use these pins in conjunction with the Dual Ready card. Connect the ready signal for station 1 (stations 1-6 for IC-12 Controllers) to Pin 34. Connect the ready signal for stations 2 & 3 (stations 7-12 for IC-12 Controllers) to Pin 32.

Pins 31, 33 and 35 through 37: These pins are not presently used.

Sensor Fault Pin 38: Use this pin to connect a normally-open-to-ground cam switch for external Sensor Fault check with IC-410 Modules.

Ready Sensor Fault Disable Pin 39: Ground this pin to inhibit Ready Sensor Fault operation (with no 'timeout'). If a Ready switch fails with this pin grounded, the IC Controller will not detect cyclic malfunctions.

J1-J15: This part of the Input/Control card is not presently in use; there are no pins located at these etch points.

Figure 32. The Input/Control Board and its Corresponding Functions.

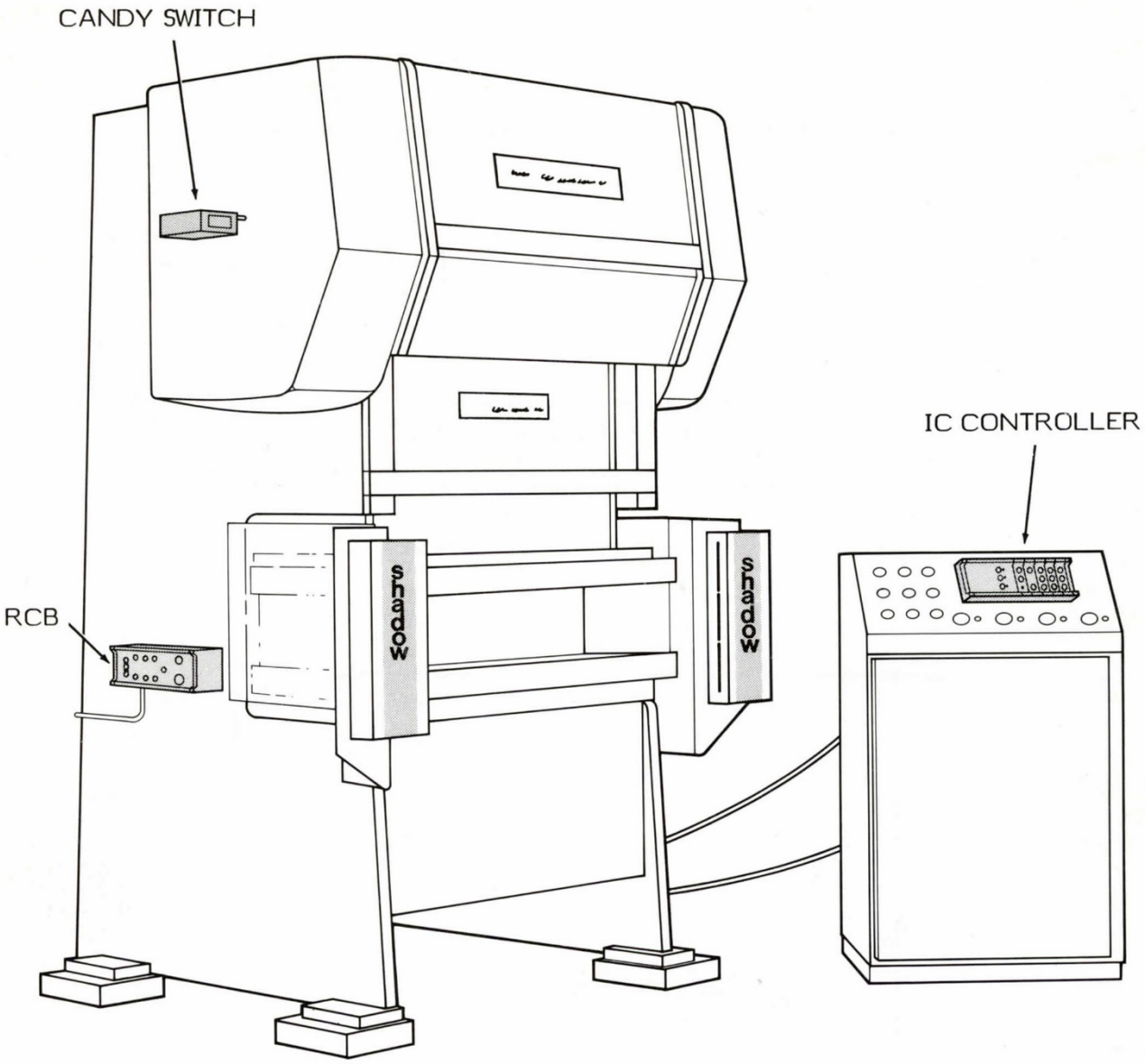


Figure 33. The Suggested Locations for the IC Controller, the RCB, and the Candy Switch.

Figure 34. The Wintriss Remote Connection Box.

Figure 34. The Wintriss Remote Connect ion Box.

Table 2. Controls and Indicators.

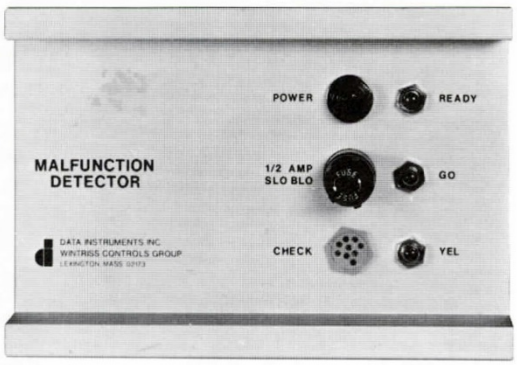
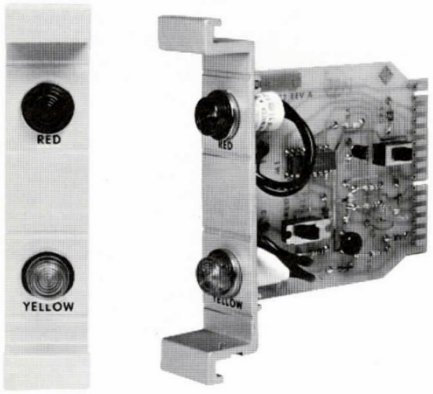
Reference Designation	Control/Indicator	Function
IC-110 POWER MODULE 	Power Lamp (red) 1/2 Amp Slo-Blo fuse Check Connector Pushbuttons 1,2,3	Lights when AC power is applied to the IC Controller. Provides overload protection and AC Power (on/off) control. Amphenol socket connector for Shorting Plug. These are Signal Simulators for IC Controller Testing.
IC-200 RED/YELLOW MODULE 	Main Stop Lamp (red) Aux Stop Lamp (amber) Reset Switch	Lights when a Miss is detected, indicating that main output relay is open or…lights when green Sensor Fault is selected to Main Stop. Lights when a Red or Yellow malfunction is detected or when Sensor Fault occurs, to indicate that auxiliary output relay is open. When pressed, this closes the open relay and shuts off all lamps except Power.
IC-250 RED/YELLOW SELECTABLE MODULE 	Red Lamp (red) Yellow Lamp (amber) RED/YEL ("Switch #1") MAIN/AUX ("Switch #2")	Lights when a malfunction occurs within a red circuit. Lights when a malfunction occurs within a yellow circuit. Internal switch, mounted on the circuit board, programs module to detect either red or yellow faults. Internal switch, mounted on the circuit board, programs module to control Auxiliary or Main Stop.

Table 2. Controls and Indicators (Continued).

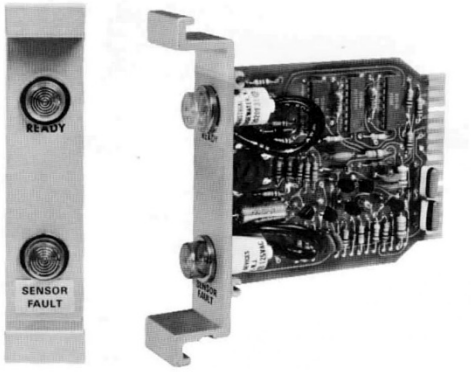
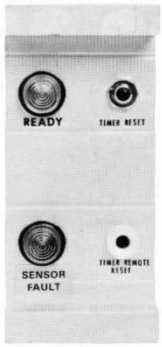
Reference Designation	Control/Indicator	Function
IC-300 READY MODULE 	Ready Lamp (clear)	Lights each time a Ready signal is received, once per press cycle.
	Sensor Fault Lamp (amber)	Lights if a Ready signal is present continuously or is missing for longer than a preset time between 3 and 50 seconds. Causes Auxiliary Stop lamp to light and auxiliary relay to open.
	Sensor Fault Timer (blue)	Internal timer provides output to the Auxiliary Stop circuit.
IC-350 TIME DELAY MODULE 	Ready Lamp (clear)	Lights each time a Ready signal is received, once per press cycle.
	Sensor Fault Lamp	Lights when no green signal is received within the time span required or•••lights if the Ready signal's length exceeds its preset time.
	Timer Reset Button	Resets interval timer after a Sensor Fault.
	Timer Remote Reset Jack	Provides a remote means for setting the interval timer.
IC-400 GREEN MODULE 	Green Lamp (green)	Lights when the station has received an incoming pulse from a corresponding sensor.
	Miss Lamp (red)	Lights if the expected green signal has not occurred by the time a Ready period ends.
	Sensor Fault Lamp (amber)	Lights when the green signal is shorted (and providing a constant signal from between 4-7 seconds)•

Table 2. Controls and Indicators (Continued).

Reference Designation	Control/Indicator	Function
IC-410 Ready MODULE 	Green Lamp (clear)	Lights each time a green signal is received during the Ready time. Blinks on and off during normal operation.
	Miss Lamp (red)	Lights when a green signal does not occur during a Ready time for that particular station. Causes Main Stop lamp to light and opens the main output relay.
	Sensor Fault Lamp (Amber)	Lights if a green signal is present for two consecutive Ready cycles. Indicates a shorted-to-ground sensor, causes the Auxiliary Stop lamp to light, and opens the auxiliary output relay. Note: Sensor Fault may be switch-selected to Main Stop.
	LED (red)	Lights when internal switch is in DIS (for "disabled") position, indicating that the module is inoperative.
	DIS/OPR ("Switch Ill")	Internal switch, mounted on the circuit board, allows this module to be disabled without permanently removing it from the IC Controller.
	MAIN/AUX ("Switch /12")	Internal switch, mounted on the circuit board, allows Sensor Fault to control either the Main Stop or the Auxiliary Stop.

Note: All indicators are neon lamps (except the LED) and normally pulsate slightly.

3.3 Preliminary Checkout Procedure

1. With AC power off, remove the left end-panel, and check to ensure that two jumper wires are installed between Pins 9 and 13, Pins 10 and 14. Temporarily disconnect the Ready switch from Pin 7 and any green inputs that are connected to Pins 19 - 30.

2. Remove the IC-300 Module, and temporarily adjust the blue, Ready Sensor Fault detection timer to the "50 second" position (rotate clockwise fully). Re- seat the module in the IC Controller (see Figure 35).

3.

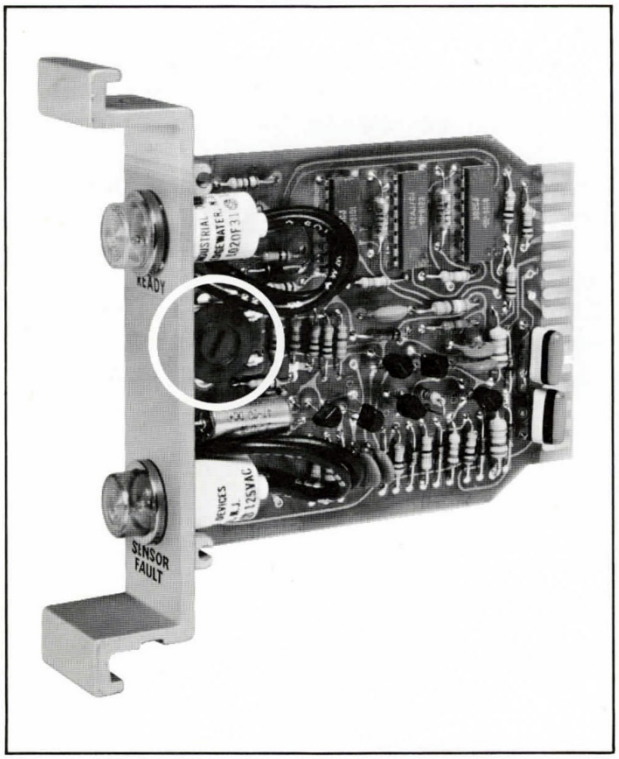


Figure 35. The Blue, Ready Sensor Fault Detection Timer.

Apply power to the IC Controller. Press the Reset button on the IC-200 Module, and note that all indicator lamps on the IC Controller - except Power lamps - should be off.

4. You will be running the press; be sure there is no material in it! Be sure to secure point of operation guards or de- vices at this time.
   a. Activate the press in the continuous mode. When the press starts running, all lamps on the Wintriss IC Controller - except Power lamps - should be off.
   b. In approximately fifty seconds, the press should stop, and the Auxiliary Stop and Ready Sensor Fault lamps on the IC-300 Module should illuminate.

> NOTE
> Auxiliary Stop may result in either Top-Stop or Emergency Stop; this depends on the interface selected (see Figures 30 and 31).

5. Press the Reset button on the IC-200 Module, and note that the Auxiliary and the Sensor Fault lamps go out.

6. Reinitiate a new stroke before the Ready timer's set-time elapses. Press and release the Ready pushbutton switch on the IC-ll0 Power Supply Module and the press should Emergency-Stop. The Main Stop indicator and all the Miss lamps should illuminate.

7. Press the Reset button, and the Main Stop and Miss Lamps should go out.

8. Restart the press, and press the Yellow pushbutton on the IC-110 Module. The press should stop and the Auxiliary Stop light should illuminate.

9. Press the Reset button, and note that the Auxiliary Stop indicator goes out.

For IC Controllers equipped with IC-400 Modules

10a. Start the press and push the Green pushbutton for approximately 4-7 seconds. All of the IC-400 Module's Green lamps should illuminate. Approximately 4-7 seconds later, the IC-400 module's Sensor Fault lamps and the Auxiliary Stop lamp should illuminate, and the press should stop.

For IC Controllers equipped with IC-410 Modules

10b. Start the press and push the Ready button twice, while depressing the Green push button. At the end of the second Ready signal, the IC-410 module's Sensor Fault lamps should light, and the press should stop. Additionally, the Main or Auxiliary Stop lamps should illuminate, depending upon the IC-410 Module's internal programming via switch position (see Figure 36 and note "Switch #2").

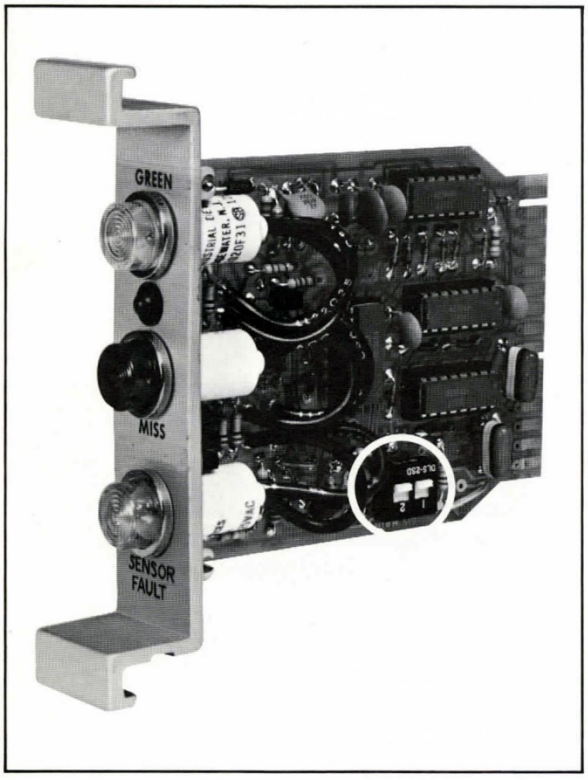


Figure 36. The IC-410 Switches.

11. Press the Reset button, and restart the press. Simultaneously press the Ready pushbutton and the Green pushbutton several times each. The Ready, and all Green lamps should illuminate each time the buttons are pressed; the press should continue to run during this step.

12. Stop the press. Reconnect Pin 7 and any green inputs to Pins 19-30. Re- adjust the Ready timer for the desired time delay.

3.4 Static Testing

Preliminary Checkout is now complete. For static testing of an IC-110 Module-equipped Controller, it is not necessary to disconnect the Ready and green inputs, provided the press can be inched to a point where no Ready or green inputs are anticipated. All Wintriss Test Box functions have been incor-porated into the IC-110 Module. If you already own a Test Box, it may be used for 'disable' purposes only on IC-110-equipped Controllers. (Those using IC Controllers equipped with the older, IC-100 series modules may use their Test Boxes as before).

3.5 Wiring the Sensor Inputs

When using the Remote Connection Box, all sensor inputs must be wired to the RCB itself (see Figure 29). The Remote Connection Box will then be wired to the IC Controller.

Use 18, 20, or 22 A.W.G. stranded insulated wire for all the connections to the Input/ Control board. All wires should be stripped approximately 1/4" at the IC Controller end. See Figure 32 for an overview of the IC Controller Input/Control Board.

With Molex 093 female pins, supplied with each unit, wire the Input/Control board for your application. A Molex crimping tool should be used for these connections. In the event that a Molex tool cannot be used, each joint must be soldered, to ensure a positive connection.

Route all sensor input **wires** through a separate conduit and into the IC Controller through the second knockout hole on the bottom panel. Each conductor should be tagged to indicate its source, for future troubleshooting. It is considered a good practice to keep track of all green sensors and all the green stations (Pins 19-30) to which they are individually connected.

If several sensors are to be used with one, common input, it is a good idea to make a separate interconnection for the input leads. Then, bring only one lead to the Input/Control board.

3.5.1 Wiring the Ready Signal Inputs

1. Crimp a Molex pin as described above to the wire coming from the Ready sensor. Connect the Ready signal input to Pin 7 as shown in Figure 32.

2. The Ready signal must originate from a normally open-to-ground cam switch, or any similar device that remains closed long enough for all Ready signals to be detected.

NOTE

¼tien using a "Gemco"-type switch for a Ready input, it is desirable to substitute for the standard switch one with gold-flashed contacts, and to provide shielded cable for signal wire. Carbon brush switches will not work properly with the IC-Controller's logic-level circuitry. Any operation involving speeds over 200 SPM should use a Wintriss Solid State Proximity Switch (see Figure 37) or Candy Switch model CSFD2 for the Ready function. (See the Wintriss Controls Group Application Manual for specifications.)

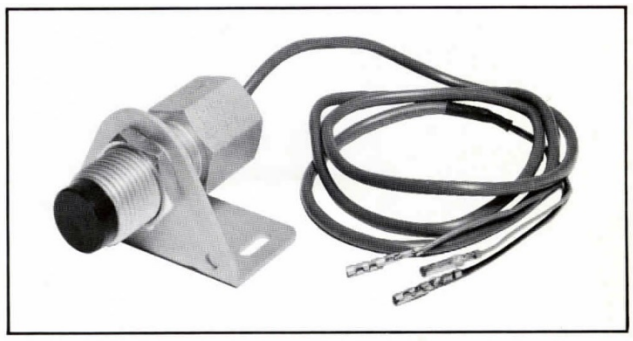


Figure 37. A Wintriss Solid State Proximity Switch (SSPS).

Figure 38. Candy Switches, shown ganged together, with Locking Cover.

3.5.2 Wiring the Green Signal Inputs

1. Crimp a Molex pin to each wire coming from each Green sensor.

2. Connect the Green signal to Pins 19-30 as shown in Figure 32. Up to 12 circuits may be used with the IC-1 Controller; up to 3 circuits may be used with the IC-3.

3. Ensure that when a Green module is plugged into a slot or station, it cor-rectly corresponds with the appropriate Pin number on the Input/Control board. The Green module stations begin with the third position to the right of the IC-110 Power Module. Stations 1-12 correspond with Pins 19-30, respectively.

4. All Green signals must originate from normally open-to-ground sensors that provide a momentary closure-to-ground.

3.5.3 Wiring the Red Signal Inputs

1. Connect a sensor wire to either one or both Red circuits, as is appropriate.

2. The IC Controller is shipped with Red jumper wires connected between Pins 9 and 13 (ground) and between Pins 10 and 14 (ground). If one, or if neither Red input will be used, leave the appropriate jumper wire in place. Otherwise, the unterminated Red circuit will cause permanent Auxiliary Stop, with the press shut off.

3. Connect the Circuit designated Red 1 to Pin 9; connect Red 2 to Pin 10.

4. Both Red signals must originate from normally closed-to-ground sensors that provide an open circuit when a malfunction occurs.

3.5.4 Wiring the Yellow Signal Inputs

1. Crimp a Molex pin to the wire coming from the Yellow sensor.

2. Connect the Yellow input pin to Pin 11; if the Yellow circuit is not used, make no connection to Pin 11.

3. The Yellow signal must originate from a normally open-to-ground sensor that provides a ground closure when a malfunction occurs.

4. Any number of Yellow sensors may be connected in parallel, brought to a common terminal block, and then wired to the Input/Control board.

3.5.5 Wiring the Remote Reset Inputs

l. Crimp a Molex Pin to the wire coming from the Remote Reset switch.

2. Connect the Reset input to Pin 8.

3. The Remote Reset must originate from a normally open-to-ground switch that provides a momentary connection to ground when it closes.

4. If Remote Reset function is not desired, make no connection to Pin 8.

3.5.6 Wiring the Remote Stop Inputs

1. Crimp a Molex pin to the wire coming from the Remote Stop switch.

2. Connect the Stop input to Pin 12.

3. The Remote Stop input must originate from a normally open-to-ground switch that provides a momentary connection to ground when closed.

4. Etched jumper E-2 or E-3 on the IC-300 Ready Module is provided to cause the Remote Stop input to control either the Auxiliary or the Main Stop circuit, as desired. IC Controller units are shipped so that the Remote Stop input controls the Auxiliary Stop circuit.

5. If no Remote Stop function is desired, make no connection to Pin 12.

3.5.7 Remote Stop Strapping

1. Remove Power.

2. Remove Ready Module.

3. Locate printed circuit etch jumper E-2 or E-3. E-2 connects to board-edge Pin N, and E-3 connects to Board-edge Pin C. Board is shipped with E-2 in place (Auxiliary Stop).

4. For remote control of Main Stop circuit, install E-3, and cut E-2.

5. For remote control of Auxiliary Stop circuit, install E-2, and cut E-3.

3.5.8 External Green Sensor Fault Detection Inputs (IC-410 Modules only)

1. Crimp a Molex pin to the wire coming from the auxiliary cam switch or other device which times that duration when Green signals are absent.

2. Connect the Sensor Fault timing input to Pin 38.

3. The Sensor Fault input must originate from a timing device that provides a closure-to-ground during the time that all Green signals should be absent. (Approximately 30° of dwell.)

4. If External Green Sensor Fault Detection is not desired, make no connection to Pin 38.

3.5.9 Ready Sensor Fault Disable

1. Remove power.

2. Remove the left end-plate.

3. Short Pin 39 to ground with jumper wire.

4. Replace the left end-plate.

5. Apply power.

6. Press the reset button; observe that neither Auxiliary Stop nor Sensor Fault lamps light within fifty seconds.

3.6 Final IC Controller Checkout

You are now ready to perform Final IC Controller Checkout. Again, briefly refer to Table 2 in order to familiarize yourself with the IC Controller, and its controls and indicators, for this test.

During the Final Checkout, you will be manually activating all sensors, each in turn, while observing the lamps on your IC Controller. In doing so, you will be simulating actual faults.

> NOTE
> Take extreme caution not to expose yourself or others to point -of- operation hazards while you are simulating faults during any phase of Final Checkout.

1. Inch the press to a point where neither Ready nor Green signals are present.

2. Press the Reset button on the IC Controller. Make certain that the press is not running.

Remember these points when performing Checkout:

- When either or both Red sensors are ungrounded, the Auxiliary Stop illuminates. It will stay on until ground is restored. Then, the IC Controller may be reset.
- Each time a Yellow sensor is grounded, the Auxiliary Stop lamp will illuminate. It will be necessary to un-ground the Yellow sensor, then to press the Reset button when this has occurred.
- When a Ready sensor is grounded, the Ready lamp will illuminate.

3.6.1 Final Checkout Procedure

1. Press the Reset button. Note that the Ready Sensor Fault lamp comes on at the end of its three-to-fifty second (preset) time period.

2. Inch the press to a point where the Ready signal is off and green signals are absent.

3. Press the Reset button. Press the Ready test pushbutton on the IC- 110 Module, and note that all modules indicate a Miss.

4. Reset the Controller. Press the Ready and Green test buttons simultaneously, and note that the indicator lamps are operational, and that none of the Mal-function indicators are illuminated.

5. Press the Green test button and hold it, simultaneously pressing the Ready test button twice. Note that the green Sensor Fault indicators illuminate.

6. Reset the Controller. Press the Yellow test button, and note that the Auxiliary Stop lamp illuminates.

7. Reset the Controller, and start the press producing parts. Allow it to cycle automatically while observing that lamps illuminate in the correct sequence on the IC Controller.

   a. During the time the Ready lamp is on, all Green lamps should blink. No other lamps, except the Power lamp, should be on.

   b. The press should continue to operate here unless a malfunction should occur.

8. With the press running, simulate a cyclic fault by blocking an ejected part, creating a short feed situation, or by placing a paper shim between the shut-height sensor and its actuator. Note that the appropriate indicator illuminates in re-action to the simulated fault, and make sure that the press stops.

9. Reset the Controller, restart the press, and simulate an Auxiliary fault by shorting a buckling sensor, or by creating an end-of-coil situation. Make sure the appropriate indicator illuminates in reaction to the simulated fault, and make sure that the press stops.

3.6.2 Special Instructions for Key-Clutch Presses using the IC-3-1 TD

The IC-3-1 TD consists of a single Green module and an IC-350 Time Delay Module. This is a special purpose dual-card module; it replaces the standard Ready (IC-300) Module, and it also occupies the first green station. Only one cyclic (green) event may be monitored with the IC-3-1-TD. Consult the factory if you need additional applications information for the IC-3-1 TD (see Section 1.5.3).

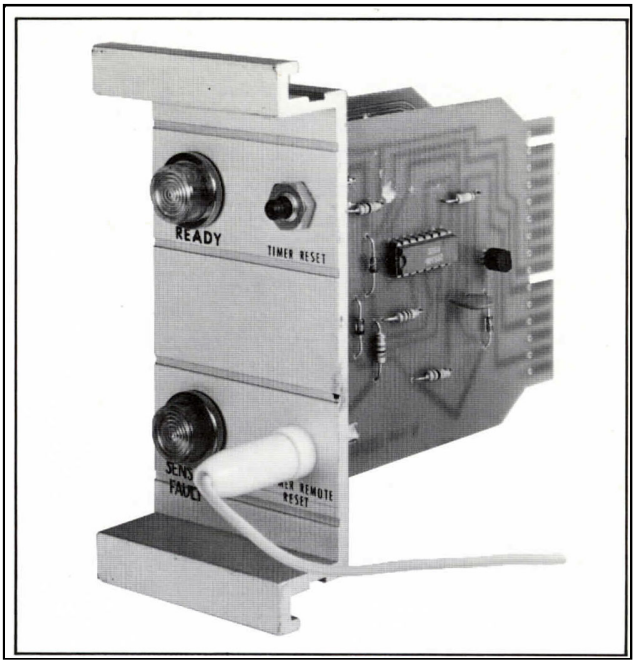


Figure 40. The IC-350 Time Delay Module.

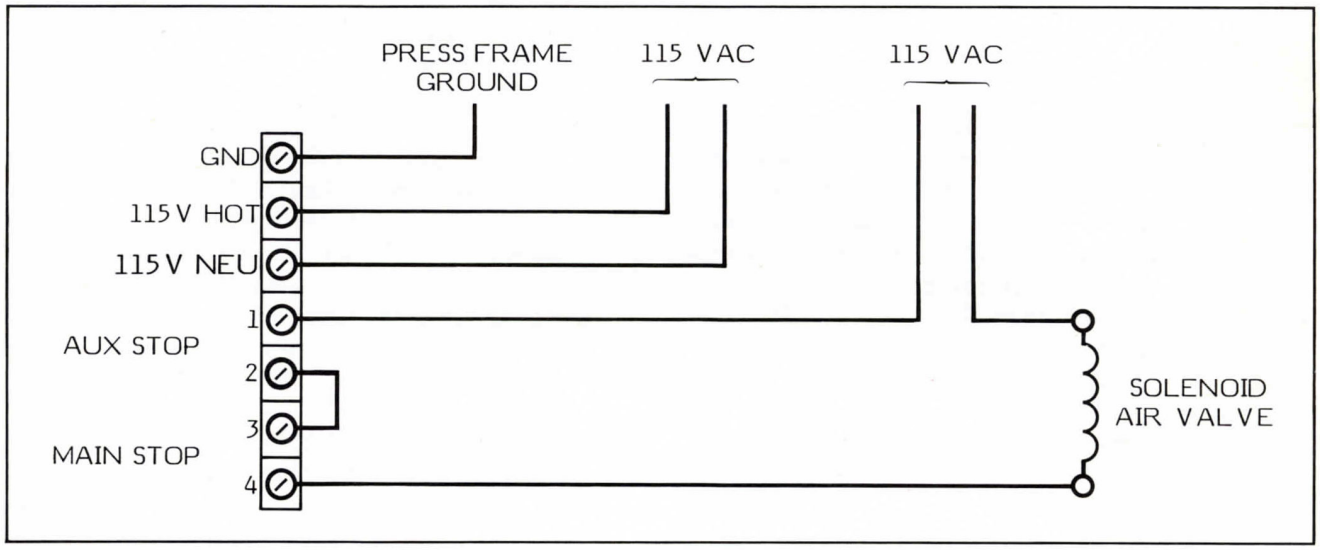


Figure 39. IC 3-1-TD Installation.

NOTE

Some special warnings pertain to this installation. They are as follows:

- The IC-3-1-TD is designed specifically for use with mechanical, full-revolution clutch machines. The use of the IC-3- 1-TD with part-revolution clutch ma- chines is not recommended
- It is imperative that separate reset switches be used for the IC-350 with the IC-3. Any interconnection between the reset terminals of the IC-3 and the IC-350 will result in a dangerous situation. If a common reset is desired, a two-pole switch must be used.
- This control is a tripping device. Appropriate machine guarding must be used in conjunction with it.
- As shown in Figure 39, this installation overrides all other electrical tripping or stopping means, such as foot switches, or palm buttons.

NOTE continues on following page•••

••• NOTE (continued)

- It is desirable to connect a Remote Stop control to the IC-3-1-TD unit. Otherwise, malfunctions must be simulated, in order to stop the press.

3.6.3 Wiring the IC-3-1 TD Sensor Inputs

1. Attach the Ready signal wire to pin 7 on the Input/Control board.

2. Adjust the Ready cam to produce a Ready pulse of approximately 30° duration just after top dead-center.

3. Install the Green signal wire from the part ejection sensor or short feed sensor to the Reset input on pin 8.

4. Remove the jumper wire connected between Red 2 on pin 10 and Ground on Pin 14. Connect the jumper between Red 2 (Pin 10) and Station 1 (Pin 19).

5. If desired, a Remote Reset capability may be added for the rundown interval circuit. (This circuit determines the time period, after the stop command, during which the cyclic event (or green signal) must be received to restart the press). To provide Remote Reset capability, add a normally open (NO) push-button switch from the front panel banana jack to ground. Warning! Do not connect the Timer Reset switch and the IC Controller Remote Reset Switch together.

6. Follow interconnection instructions as shown in Figure 39.

3.6.4 Performing Checkout of the IC-3-1 TD

1. Apply power to the IC Controller and to the press circuit.

CAUTION

The next step will cause the press to cycle.

2. Press the Timer Reset button on the IC-350 Module, and then press the reset button on the IC-200 Module. The press will cycle.

3. During the press cycle, a Ready pulse occurs, along with Miss and Main Stop indications. This sets up the electro-mechanical sequence required to Top-Stop the press.

4. If the part is ejected prior to the run-down time of the interval timer, a Reset pulse is generated. This resets the Controller, and starts the press.

5. If the part is not detected before the interval timer has run down, the IC Controller will be latched in an "off" condition. To restore its normal operation, repeat Step 2, above. Both the Sensor Fault and Auxiliary lights will illuminate if the timer runs down.

At this point, installation, including mounting, wiring and both checkouts, is complete. Your Wintriss IC Controller is ready for operation. Refer to the next section (Use of the IC Controller) before using your Wintriss IC Controller to protect a press.

4. USE OF THE IC CONTROLLER

This chapter provides the information needed to operate the IC-3 and IC-12 Controllers. See Table 2 for an illustration of the front panel controls and indicators.

Basically, operating instructions for the IC Controller consist of simply turning the IC Controller on, and observing the sequencing of the front panel lamp illuminations during normal operation of the IC Controller and the press. Operational Modes may be separated into Normal Override, and Checkout. Checkout has already been described (see Section 3.6.1); the Normal and Override procedures are covered in the next sections of the manual.

4.1 Normal Operational Mode

1. Install the fuse into the IC-110 Power Module. Observe that the Power lamp illuminates. Ignore any other neon lamps.

2. Press the front panel Reset button and note that only the Power Lamp comes on.

3. Start the press. While it is producing parts, observe the normal sequence of lamps; i.e., the Green lamps should illuminate during the time the Ready lamp is on, and no other lamps should illuminate unless a malfunction occurs.

4. If a Green signal is not received before the end of the Ready cycle, the corresponding Miss Lamp lights, and the Main Stop lamp lights, while the press stops.

5. When the malfunction has been corrected, press the Reset button, and resume press operation via normal means.

6. If a Ready signal is not received within the time delay period of the IC-300, the Ready Sensor Fault lamp will light, and the Auxiliary Stop lamp will light, stopping the press.

7. When the malfunction has been corrected, press the Reset button, and resume press operation via normal means.

8. If a sensor shorts for two consecutive Ready signals, the green module will indicate a Sensor Fault, and will stop the press.

9. When the malfunction has been corrected, press the Reset button, and resume press operation via normal means.

10. To disable both the Wintriss IC Controller and the press, remove the fuse from your IC-110 Module.

4.2 Override Procedure

With the shorting plug connected to the front panel Check connector, the Wintriss IC Controller can be made to override both the Ready and Green Sensor Fault circuits. To operate the IC Controller without its Ready or Green features, simply install the Shorting Plug. All front panel lamps will continue to function; however the Main and Auxiliary Stop circuits will be inhibited (except for Red and Yellow malfunctions, which will continue to shut off the press).

CAUTION

Whenever the IC Controller is in this 'disabled' mode, all of its cyclic features are rendered inoperable. During Override, only Red or Yellow malfunctions will shut off the press. In the event of any other malfunctions, the press continues to run.

5. MAINTENANCE AND ADJUSTMENT OF THE IC CONTROLLER

This section provides instructions for maintaining the Wintriss IC Controller at its optimum performance level.

Adjustment procedures follow, along with troubleshooting information to aid in diagnosing a malfunction in any of the replaceable modules.

Whenever you are observing press activity and IC Controller response, look for normal sequencing of lamps; i.e., during the time the Ready lamp is on, expect to see the associated Green lamps blink. (The time when the Ready lamp is on is one of short duration. However, with some practice, the general sequence of events may be readily verified.) If green signals are being received without a "Ready", or if Miss lights appear without the press' stopping, it should be obvious that a problem exists, and corrective action must be taken.

5.1 Troubleshooting

When troubleshooting or performing maintenance on the IC Controller, the following points are of importance:

- Exercise caution when working on the Input/Control Board; the adjacent ter-minal strip is hot - 115 V AC.
- Sensor inputs may be checked with the press off. By keeping the IC Controller on, and the press off, as in the Final Checkout phase, all sensors may be checked by manually grounding or opening the appropriate sensor leads, while observing the corresponding lamps on your IC Controller unit.
- Sometimes, problems may be identified by disabling the IC Controller and temporarily installing jumpers across the output circuits. Then, inch the press through several cycles of operation, while observing the lamps on the Controller for abnormal indications. Remember to dis-connect the jumpers when finished!
- Before removing any module from your IC Controller, or installing any new modules, always remove power to the Controller, or take the front panel fuse out first. The integrated circuits on these modules may be damaged by power surges.
- To facilitate troubleshooting, connect a Molex Pin jumper wire between ground and Pin 39 on the Input/Control board. This inhibits the Ready Sensor Fault Detection circuit. Remember to dis-connect the jumper when finished!
- One of the most foolproof troubleshooting methods involves replacing a suspected faulty module with a known working module of the same type. Remember to re-move power first, to determine if the problem is module-related.
- Modules can be interactive. Consequently, it may be necessary to change all modules in order to solve certain problems. Substitute one new module at a time, until a solution is found.
- Another expedient when troubleshooting is to remove power, and then to remove the two screws securing the IC-110 Module. Withdraw the IC-110 module from the Controller. If the press will start with the IC-110 removed, the problem is either in the press control wiring, or in the Mother Board of the Wintriss IC Controller.

5.2 Problem Solving

When isolating a problem, it is easiest to trace it to one of three places: the IC Controller, the press circuitry itself, or the external sensors. Most problems encountered are relatively easy to define; i.e. the press will not shut down when a Miss or Sensor Fault occurs, or the press will not run at all.

- Check to make sure the press circuits are correctly wired. Be especially careful to make sure that they are wired in series, if only one press circuit is used. If press circuits have inadvertently been wired in parallel, the press cannot shut down. Be sure all press control circuits have been connected appropriately.

- If the Controller generates random misses on all stations, Ready switch contact bounce may be the problem. This is especially prevalent when "Gemco" or "Allen Bradley" rotary limit switches or standard electro-mechanical cam-actuated limit switches are used. The correct solution requires switch replacement; however, the problem may be temporarily resolved by installing a .1 microfarad capacitor rated at 500 V DC, across the switch contacts.

Electrical 'noise' is a sharply rising pulse of electricity, typically, around 2000 volts, which is generated when an electrical closure is made. Motor start relays, solenoid switches, and stop-circuit relays are primary sources of electrical noise. When signal cables are improperly run (that is, not run in conduit that is separate from power leads, or switching leads), electrical noise can interfere with the sensor cables that run into the IC-Controller. The symptoms that usually exist here are false Green or Ready signals, and possibly, false Miss conditions. Noise may cause sensors (such as parts ejection, feed, or shut height sensors) to register an event, when in fact no such event has actually occurred. (This situation is a problem only if it exists during the Ready signal's time period.) If the IC Controller receives a false Green signal due to noise, it will be satisfied, and will not generate a Miss.

- Noise interference can be eliminated by properly installing cables during initial installation. Run all sources (Green, Yellow and Ready signals) in separate conduit from stop-circuits and AC power sources. The conduit acts as an electrical shield. Install metal oxide varistors across noisy coils, as an additional remedy.

- When noise causes a false Ready, a Miss is indicated, even though all events may actually have taken place correctly. This problem is usually indicated by all Green-station Miss lamps illuminating on what seems to be a random basis, with no concurrent malfunction apparent.

- Most noise-related problems can be identified by relating crankshaft position at time of false signal occurrence, to some event that is taking place at that point in the cycle. For example, assume that a false Green signal occurs at about 270° of crankshaft rotation on a press using air feed. The most likely source of noise here would be the solenoid switch on the air feed.

5.3 Checking DC Outputs

Two of the three DC outputs of the IC-110 Power Module may be conveniently checked via the Input/Control Board. The -12 volts are present at Pins 15 and 16 and the -22 volts are present at Pins 17 and 18, when- ever power is supplied. These voltages control the operation of all circuits except for the neon lamps, which operate from the +135 volt supply.

5.4 Troubleshooting Hints

5.4.1 Continuous Green Lamp

If any Green lamp remains on, continuously, disconnect the input Molex pin from the appropriate sensor and pins 19-30. If the lamp still remains on, the Green Module may be defective. Try swapping it with another Green Module, to determine if this is the problem.

5.4.2 Absence of Green Lamp

If the absence of a Green signal is a problem, before assuming that the Green Module is defective, disconnect the appropriate input sensor line from Pin 19 through Pin 30. Momentarily jump the appropriate pin to Ground and observe the appropriate indicator lamp. If the lamp illuminates, the module is fine; the sensor is bad.

5.4.3 Cyclic Sensor Shorts

Any Cyclic Sensor shorts have at least two indicators - the Auxiliary Stop or Main Stop lamps, and the Sensor Fault lamp.

5.4.4 Red or Yellow Malfunction

A Red or Yellow malfunction has only one indicator; the Auxiliary Stop lamp. Pin-pointing the failure to either a Red or Yellow circuit source must be done using conventional troubleshooting techniques.