OmniLink II
Press Automation Control

OPERATING MANUAL
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Section 1 Introduction

The OmniLink II Press Automation Control for part revolution clutch mechanical power presses is a flexible, intelligent, modular system that can be applied to presses with existing clutch brake and motor controls to provide a wide variety of control; press, die, and process monitoring; and management information functions. The system integrates setting and display of all functions through the OmniLink II Color LCD Operator Terminal, which includes a 9.2” diagonal color TFT liquid crystal display (LCD) with high brightness and large viewing angle, membrane keys for entry and navigation, and a Program/Run keyswitch.

Section 1.1 Base System

The base system hardware package consists of the OmniLink II Color Operator Terminal and R/D-Brake Monitor Module in an enclosure (panel mount versions are also available), and a resolver and its cable with connector. The Operator Terminal is the central operator interface for display and settings of all system functions and diagnostics. The easy to use large color TFT LCD display of the operator terminal provides the screens and menus. The operator terminal keypad is used to program settings or store or recall jobs. The resolver provides precise press crank or eccentric shaft angular position and speed to sequence and monitor press automation functions.

Section 1.1.1 Base System Standard Features

- Control reliable time base brake monitor with dual limits for top and midstroke stopping.
- Clutch engagement time monitor that can aid in determining when clutch adjustment or disc replacement should be done.
- Motion detection to detect resolver decoupling from the crankshaft.
- Powerful counting capability with 12 counters, 10 with flexible configuration.
- Six serial ports are provided, one of which is a high speed serial interface over which the operator terminal and optional modules communicate. Others are used to communicate with intelligent controllers that control automation related to the press production system. One can be used provide Link’s optional Serial Feed Interface that sets up a feed for a job when recalled from storage on the OmniLink II Operator Terminal and displays feed settings on the operator terminal screen. Another can be used for Link’s optional PLC Interface to send job settings to a PLC programmed to perform automation and display status and diagnostic messages from the PLC.
- Auto top stop compensation for variable speed presses in the Continuous mode.
- Operator screens in English or Spanish at the touch of a key, intelligent diagnostics of the base system and all system options in English and Spanish, “Help” in English and Spanish that automatically appears on the display screen for many data entry fields for settings.
- 500 job storage for all settings associated with standard and optional functions of the system.
Section 1.1.2 Base System Optional Features

- An optional analog input/output card allows stroking speed to be adjusted and displayed on the operator terminal even when not stroking for variable speed presses. It also allows motor load current to be displayed.

- Serial Feed Interface for most available electronic roll feeds.

- A flexible PLC interface that allows the OmniLink II Operator Terminal to send settings for jobs and receive status and diagnostic messages from the PLC for display on the operator terminal screen.

- LinkNet Shopfloor Information System - networks your presses to computer(s) to gather information and provide comprehensive management information database and reporting system.

Section 1.2 Optional Hardware Modules

The system is designed to allow additional hardware modules to be added to the base system package to perform a wide variety of control and monitoring functions. The system uses distributed intelligence -- each optional module has its own microprocessor to perform its logic functions. This provides increased computing power and superior performance, allowing more logic functions to be performed at greater speeds. All optional modules communicate to each other and to the OmniLink II Operator Terminal through a high speed serial bus cable with only four connections. This eliminates the need to individually wire all inputs and outputs back to the operator terminal. Adding modules is simple and quick, mount the module and wire the 3 wire and drain connection cable from the last module previously installed to the newly installed module.

Optional hardware modules that are currently available for the system are:

- The 5120 series Die Protection and Process Monitor modules available with 8 or 16 sensor inputs per module. Up to five 5120 series modules may be used with the system, giving a maximum of 80 total inputs for digital die protection and process monitoring.

- The 5105 series PLS/Logic Module available with 8 or 16 output relays (electromechanical, solid state ac, and solid state dc relays available) for programmable limit switch (PLS) or other output relay (OR) logic functions. Each module also has 16 inputs available for logic or sensing applications. Up to four 5105 series modules may be used with the system for a maximum of 32 PLS outputs, 32 OR outputs, and 64 sensing or logic inputs.

Optional hardware modules that are planned as additions to those currently available are:

- A 5108 series of Signature and Tonnage Monitor modules.

- A 5110 series of Auto Setup Modules that can automatically recall and set up shutheight, counterbalance pressure, cushion pressure, etc., when a job is recalled.

- A 5130 series of Analog Die Protection and Process Monitoring modules to measure production process variables and part features during stamping. Gives capability for 100% “in process” parts quality inspection when used with appropriate input sensors.
Section 1.3 System Overview
Figure 1.1 shows the base package hardware components for the OmniLink II Press Automation Control.

Figure 1.1 OmniLink II Press Automation Control Base System Package

Figure 1.2 (next page) shows the existing and planned components and features of the system with optional components.
Figure 1.2. Existing and Planned System Components and Functions
Section 2 Installation

Section 2.1 Preliminary Installation Considerations

1. Before you begin to install your OmniLink II Press Automation Control, you should read this entire manual carefully. This will help you to understand system functions and plan the installation to save time and the necessity to rework portions of the installation.

2. The high speed serial bus used to communicate between system modules begins with the OmniLink II LCD Operator Terminal and goes first to the R/D-Brake Monitor Module located in the back of the operator terminal enclosure, then on to each optional hardware module used with the system as shown in Figure 2.1. Every hardware module used with the system has a switch that can be closed to terminate the serial bus. The termination switch on the module installed at the far end of the serial bus should be thrown to the closed position. The switches on modules installed between the operator terminal and the last module should be in the open position. If only one optional module is used with the system, the termination switch on this module should be thrown to the closed position. If no optional modules are used with the system, the bus termination switch on the 802-5 R/D-Brake Monitor Module should be thrown to the closed position. The location of the termination switch for the 802-5 R/D-Brake Monitor Module is shown in Figure 2.1.

3. As shown in Figure 2.2, optional hardware modules may come with one module or multiple modules per enclosure, depending on the number and type of modules ordered. The modules do not have to be connected in any particular order on the serial bus, but the serial bus cable must connect to each module in the daisy chain fashion shown in Figure 2.2. It is desirable to run the cable for the serial bus to connect the optional hardware modules with the shortest total length of cable. The total length of serial bus cable used with the system must not exceed 300 feet.
It is also convenient to run the 115VAC power along with the high-speed serial bus cable to each module(s) enclosure in the same flexible liquid tight conduit with ground, as indicated in Figure 2.2.

Figure 2.2 Serial Bus Connections

3. **Dual connector plugs** are used for each optional module shown in Figure 2.2 for both the high-speed serial bus and 115VAC power connection to the module. This allows both the serial bus and power connections to be strung from module to module as shown in Figure 2.3.

![Diagram of Dual Connector Plugs for Modules for Serial Bus and Power](image_url)

**Figure 2.3 Dual Connector Plugs for Modules for Serial Bus and Power**
4. **NEVER** use any cable other than that supplied by Link Systems for the high-speed serial bus that interconnects the various components of the OmniLink II Press Automation Control. This cable has been chosen to optimize communication speed and distance for the serial bus. Use of other cables may result in communication faults that cause nuisance stops of your press production system. **DO NOT** splice sections of cable between OmniLink II modules. Use unbroken runs of cable between modules.

5. The wiring instructions for installation contained in this manual are necessarily generic since the OmniLink II Press Automation Control may be interfaced with a wide variety of control systems using multiple relay and electronic components. **If the installer has questions related to the proper installation of the system, contact the service personnel at Link Systems.** Always test each component of the system installation to see that proper function is obtained. **In particular,** make certain that all stop outputs from the OmniLink system to the press control are interfaced properly.

```
WARNING! Improper system installation or improper interface of stop outputs from the OmniLink system to the press control may result in damage to press, dies or other equipment and increase the possibility of injury to operators and others. Use qualified installers.
```

6. Installation of this system should be done in accordance with OSHA’s lockout/tagout regulations (see CFR 1910.147). You will be mounting OmniLink components on the press, and may be exposed to mechanical hazards if press movement should occur during mounting activities. You will also be wiring electrical circuits that will use 115VAC (nominal) voltages. Unless these circuits are de-energized during wiring activities, a serious or even fatal shock may occur. Depending on the options purchased with your OmniLink system, you may also be installing air valves or pressure sensors for air counterbalance or air cushion systems. These air systems could cause serious injury if not depressurized before installation is started. Remove hazardous energy during OmniLink system installation in accordance with CFR 1910.147.

```
WARNING! Failure to comply with CFR 1910.147 regulations and remove hazardous energy during installation of the OmniLink II Press Automation Control may result in serious injury or death! Use only qualified installers trained in lockout procedures for installation.
```
Section 2.2 Mounting System Components

Section 2.2.1 Mounting the Operator Terminal Enclosure

The OmniLink II LCD Operator Terminal must be mounted in a position that is easily seen and accessed by the operator. The liquid crystal display is designed for optimum viewing from the bottom of the display. If the operator terminal is mounted in a vertical plane, it should be mounted slightly above the operator's eye level for best visibility. If mounted in a sloped position, it should be mounted so that the operator's line of sight is from the bottom of the LCD. The desirable orientations are shown in Figure 2.4.

![Figure 2.4 LCD Mounting Orientations](image)

The OmniLink II Press Automation Control operator terminal is usually furnished mounted on the front of an enclosure, which also contains the R/D-Brake Monitor Module mounted in the back of the enclosure and pre-wired to the operator terminal. Figure 2.5 gives the dimensions of the operator terminal enclosure, including mounting dimensions.
Section 2.2.2 Mounting the Resolver

Mounting the resolver to be driven in a one to one ratio by the crank or eccentric shaft. The resolver may be direct driven by a coupling off the center of the shaft or driven by a chain and sprockets as shown in Figure 2.6.

NOTE! A CHAIN GUARD IS NECESSARY TO MEET OSHA 1910.219 STANDARDS
The standard resolver used with the OmniLink II press Automation Control is the 2500 Resolver. A 5000 Resolver can optionally be used with the system. In either case, a spring loaded mounting base, as shown in Figure 2.7, will be supplied with the resolver to maintain chain tension if the resolver is chain and sprocket driven. Mount the resolver on the spring base. Mount the spring base to accommodate alignment of chain and sprockets so that they may be driven by crank or eccentric shaft.

![Figure 2.7 Resolver Mounted on Spring Base to Maintain Chain Tension for Chain Drive](image)

Chain and sprockets may have been purchased from Link Systems. If so, the sprockets will be 35B28 (28 teeth) and chains will be size 35 roller chain. Link suggests that, if the customer provides chain and sprocket, the same type be used. This resolver electronic offset during calibration can only correct +/- 10° of mechanical misalignment, and 28 teeth make it easier to be within the offset that can be corrected. If you have a press that only provides access to an intermediate shaft or back shaft for connection of the resolver, you will have to determine how many turns this shaft makes for each turn of the crank or eccentric shaft. You must then use sprockets of different size, chosen to provide one turn of the resolver for one turn of the crank or eccentric shaft.

**Section 2.2.3 Mounting Optional Control and Monitoring Modules**

If you have purchased Die Protection & Process Monitoring, PLS/Logic, Auto Sets, Tonnage & Signature Monitoring, or other optional modules, these may be packaged in separate or combined enclosures, depending on how they were ordered. Figure 2.8 shows the mounting dimensions for the 8 or 16 channel Die Protection and Process Monitor Module enclosure and the enclosure for a single PLS/Logic Module. Mount the enclosures for these modules in locations where the enclosure doors can be easily opened for module access and wiring. Multiple module enclosures will be shipped with mounting dimensions inside the enclosure.
Figure 2.8 Mounting Dimensions for 8 or 16 Channel Die Protection or Single PLS/Logic Units
Section 2.3 Wiring System Modules and Components

Section 2.3.1 Conduit Runs

Wiring between the enclosures for OmniLink II Press Automation Control components should be run in conduit. The use of flexible liquid tight conduit with ground is suggested, but hard conduit can also be used. Figure 2.9 shows some of the typical conduit runs that may be required.

Figure 2.9. General View of Components and Wiring Runs for Installation.
The conduit runs that you will or may need, depending on the options you purchase and features that you wish to use on your OmniLink II, are:

- Conduit from resolver to R/D-Brake Monitor Module in OmniLink Operator Terminal enclosure.
- Conduit for 115VAC connections between OmniLink Operator Terminal and Press Control.
- Conduit for low voltage connections between OmniLink Operator Terminal and Press Control (only if options or press control circuits require low voltage as set forth in following sections).
- Conduit for 115VAC power and high speed serial bus cable from Operator Terminal to any remote enclosure containing optional module(s), such as Die Protection, PLS, etc., selected to be connected as the first module on the serial bus.
- Conduit runs from the enclosure containing the first optional module on the serial bus to successive enclosures containing optional module(s) to be connected on the serial bus.
- If optional Serial Feed Interface is purchased, conduit from the OmniLink II Operator Terminal enclosure to the feed control enclosure.
- If optional PLC Interface is purchased, conduit from the OmniLink II Operator Terminal enclosure to the enclosure housing the PLC.

NOTE! Do not run both 115VAC and lower voltage circuits in the same conduit from the OmniLink II Operator Terminal to the press control. If you have both 115VAC circuits and low voltage circuits, run them in separate conduits as shown in Figure 2.9. It is permissible to run 115VAC power wires and the high speed serial bus cable from the Operator Terminal to the first optional module and any successive modules used in the same conduit(s).

Section 2.3.2 Wiring the Resolver to the R/D-Brake Monitor Module

The standard resolver used with the OmniLink II Press Automation Control is Link’s 2500 Resolver. Link’s 5000 Resolver may be optionally provided. The resolver provides crankshaft angle to the OmniLink II and its cable must be wired to the 802-5 R/D-Brake Monitor Module, located on the inside back of the Operator Terminal enclosure (the module may be located elsewhere if the Operator Terminal is furnished without enclosure).

The 2500 Resolver comes with a cable with 3 pairs with a drain for each pair and a 6-pin MS connector to plug into the resolver. Run a ½” conduit from the 2500 Resolver to the knockout on the bottom left of the Operator Terminal enclosure. Pull the cable through the conduit and wire to the 802-5 R/D-Brake Monitor Module as shown in Figure 2.10.

The 5000 Resolver comes with a cable with 6 pairs with a drain for each pair and a 14-pin MS connector to plug into the resolver. Run a 3/4” conduit from the 5000 Resolver to the knockout on the bottom left of the Operator Terminal enclosure. Pull the cable through the conduit and wire as shown in Figure 2.11.
Figure 2.10. Wiring Connections from 2500 Resolver to 802-5 R/D-Brake Monitor Module
Figure 2.11. Wiring Connections from 5000 Resolver to 802-5 R/D-Brake Monitor Module
Section 2.3.3 Wiring 115VAC Power From Press Control to Operator Terminal

Pull red, white and green 16 gauge wires in the 115VAC conduit between the OmniLink II Operator Terminal enclosure and the press control (along with other wiring to be run in this conduit) and connect as shown in Figure 2.13. The control transformer in the press control will preferably be used to supply the 115VAC power for all the components of the OmniLink II Press Automation Control. As shown previously in Figure 2.3, all the modules for the system have a dual power connector plug so that, normally, power can be wired from module to module without having to put two (2) wires under a single terminal. The exception to this is the dual connector on the R/D-Brake Monitor Module when optional modules are used with the system. Three sets of wires must be wired to the dual terminal for Connector 5 of the R/D-Brake Monitor Module when optional modules are used: the incoming power from the press control, the outgoing power to the OmniLink II LCD Operator Terminal, and the outgoing power to the first optional module. This is shown in Figure 2.12 with two wires under each top terminal.

The power consumption of the OmniLink II Press Automation Control base system (Operator Terminal and Resolver) is 24VA (0.2Amp at 115VAC). The maximum power required for each 16 input Die Protection and Process Monitor is 56VA (.48Amp at 115VAC), although this power is dependent on the number and power requirements of sensors used and will rarely be required in most applications. The maximum power required for each PLS/Logic Unit Module is 30VA (.26A at 115VAC). The typical OmniLink II Press Automation Control will usually require less than 1Amp at 115VAC, but as options expand the system, 2 to 3 Amps may be required for very large systems. The control transformer in the existing press control should be adequate to supply the OmniLink II system power for most applications, but for larger systems, an additional control transformer or another source of 115VAC power may be required.
Contacts on R/D- Brake Monitor Module used to provide both immediate stop and top stop signals from OmniLink to press control. These contacts open immediately when an immediate stop is required and are delayed in opening as appropriate to stop the press on top when top stop is required.

CONNECTOR 5 TERMINALS
L1, L2, GND - 115VAC Power for OmniLink Press Automation Control from press control transformer.

CONNECTOR 4 TERMINALS
1, 2 --- Wire to Press Control Dual Valve solenoid. Tells OmniLink when press strokes or stops for Brake Monitor & Motion Detector.
3, 4 --- Wire into immediate clutch (stoking) stop circuit. Provides both immediate and top stop.

Note! If press control clutch stop circuit is low voltage instead of 115V, run these wires in conduit for low voltage connections.

1/2" CONDUIT CONTAINING ONLY 115VAC CONNECTION CIRCUITS

Figure 2.13 115VAC Wiring Between Press Control and Operator Terminal
Section 2.3.4 Wiring the Valve Voltage Circuit

The OmniLink II Press Automation Control brake monitor and motion detector functions require a signal from the press clutch/brake control that indicates when the press strokes and stops stroking. This signal is derived from the voltage across the dual air valve solenoid (in some cases a hydraulic valve may be used) that controls stroking. Two red wires must be pulled through the 115VAC conduit between press control and the OmniLink II Operator Terminal enclosure. On the press control end the wires must be connected to opposite sides of one solenoid of the dual air valve. On the Operator Terminal end, the wires must be connected to terminals 1 and 2 of the plug for Connector 4. This is shown in Figure 2.13. Some presses have a single dual air valve that operates both clutch and brake. Others have two dual air valves, one for the clutch and one for the brake. When two dual air valves are used, always wire to a solenoid for the valve that controls the clutch.

Section 2.3.5 Wiring the OmniLink Stop Circuit Output

Two cross checked, force guided contacts operated by two separate microprocessors on the 802-5 R/D-Brake Monitor Module are used to provide both immediate stop and top stop signals to the press clutch/brake control to stop press stroking when faults are detected by the OmniLink II Press and Automation Control. These contacts, located between terminals 3 and 4 of Connector 4 are normally open, energized closed. They open to give a stop command to the press control. They should be wired into an immediate stop circuit of the press control as indicated in Figure 2.13. An immediate stop circuit is one that can immediately stop stroking of the press and will require use of the operator controls to resume stroking after the stop is removed. On many press controls, placing the contacts in series with the red color stop buttons (often referred to as “Emergency Stop Buttons”) is the desirable wiring method. This circuit used must not drop out motor controls on the press. Link engineers will assist you in determining where to wire the contacts into the press control if you need help.

If the immediate stop circuit in the press clutch/brake control is a 115VAC circuit (such as in most relay controls), pull two red wires in the 115VAC conduit between the OmniLink II Operator Terminal enclosure and the press control. Wire to terminals 3 and 4 of Connector 4 on the 802-5 R/D-Brake Monitor Module located in the back of the operator terminal enclosure and into the 115VAC stop circuit in the press control.

If the immediate stop circuit in the press clutch/brake control is a low dc voltage circuit (such as in most solid state controls), pull two blue wires in the low voltage conduit between the OmniLink II Operator Terminal enclosure and the press control. Wire to terminals 3 and 4 of Connector 4 on the 802-5 R/D-Brake Monitor Module located in the back of the operator terminal enclosure and into the low voltage stop circuit in the press control.

Figure 2.14 illustrates the appropriate stop circuit connections for Link’s SS501 press controls. Since these are solid state controls with low voltage dc circuits, 2 blue wires should be pulled through the low voltage conduit between the OmniLink II Operator Terminal enclosure and the press control for this connection.
Figure 2.14 Stop Circuit Connections from OmniLink II Automation Control to Link Press Controls

R/D-Brake Monitor Module

CONN4
1 2 3 4

Slot 26
501-8A or
501-20 Card

Light Curtain
1RCSA
2RCSA

Jumpers inside this box if no light curtain is present

E.S. Buttons

Slot 26
501-8A or
501-20 Card

Light Curtain
1RCSA
2RCSA

Jumpers inside this box if no light curtain is present

E.S. Buttons

LINK SS 501 CONTROL- STANDARD CARDS

LINK SS 501 CONTROL WITH 501-16 CARD OPTION

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Section 2.3.6 Wiring the Optional Setup Mode Input

The OmniLink II Press Automation Control provides an optional setup mode input that is used to bypass certain die protection and process monitoring functions, counters, and tonnage monitor low limits during setup activities that require stroking the press. This avoids nuisance faults that have to be reset on the die protection and tonnage monitor and false part counts based on stroking during setup activities. Most presses will use the INCH mode as the setup mode. It also allows a fixed setup mode speed to be set for variable speed presses with the Analog Input/Output option. An isolated contact that closes in the INCH mode must be used as an input. If you don’t have a spare INCH mode contact on the mode selector switch, one solution is to remove an existing switch contact closed only in INCH from the circuit and add a relay with 2 normally open contacts to the control circuit. Use the contact closed in INCH mode to energize the relay coil, use one normally open contact of the relay to insert in the control circuit where the INCH contact was previously located, and use the second normally open contact as the Setup Mode input to the OmniLink. Figure 2.15 shows the wiring of this setup mode input. Run wiring in a conduit reserved for low voltage circuits between press control and OmniLink operator terminal.

Figure 2.15. Optional Setup Mode Input Wiring.
Section 2.3.7 Wiring Optional Analog Input/Output Board Circuits

Section 2.3.7.1 Wiring to Display Motor Load Current

If the optional Analog Input/Output board is specified with the OmniLink II Press Automation Control, and you wish to graphically and numerically display motor load current on the OmniLink II Operator Terminal, refer to Figure 2.16. For fixed speed presses and presses with eddy current variable speed drives, use a current transformer and an instrument transformer and wire as shown in the upper press control illustration in Figure 2.16. These transformers will normally be supplied by Link if your order indicated that motor load current display is desired.

DC Motor Drives and Adjustable Frequency AC Motor Drives will usually provide an analog motor load current output of 0-10V or 4-20ma. Wire as shown in the lower press control illustration in Figure 2.16. If a 4-20ma output is used, throw position 3 of the 4-Pole switch on the Analog Input/Output board to the closed position. If a 0-10V analog output is used, leave position 3 of the switch open.

In addition to the wiring described in this installation section, it will also be necessary to calibrate the % Motor Load current displayed on the OmniLink Operator Terminal. This calibration is described in Section 4.2.2.5 of this manual.

Section 2.3.7.2 Wiring the Analog Speed Input and Output

The optional Analog Input/Output board also allows you to display the drive SPM for electronic variable speed drives on the OmniLink Operator Terminal, and to set the desired SPM with an analog voltage output from the Operator Terminal rather than with a potentiometer or keypad on the drive itself. Displaying drive SPM allows you to know how fast the press will stroke even when the clutch is not engaged. Without this feature, you can only display the stroking speed while the press is actually stroking.

To wire the isolated analog speed input and output, refer to figure 2.17. If you have an eddy current variable speed drive, refer to the upper box labeled press control. If one side of the tach generator is referenced to ground in the eddy current drive circuit, make sure position 1 on the switch located on the right side of the Analog Input/Output board is closed. If the tach generator drives a bridge rectifier on the eddy current drive, switch position 1 on the switch to open. The SPM OUT terminal on the Analog Input/output board should be wired to the eddy current drive SPM input (the input that sets desired speed). If desired, you may wire analog speed input only, leaving the speed setting to an existing potentiometer or keypad, but it is generally better to integrate press speed setting into the OmniLink II Operator Terminal.

To wire a DC Drive or an Adjustable Frequency AC variable speed drive, refer to the lower box labeled press control in Figure 2.17. Position 1 of the switch on the right side of the Analog Input/Output board should always be closed for DC or AC variable speed drives.

In addition to the wiring described in this installation section, it will also be necessary to calibrate the drive SPM displayed on the OmniLink Operator Terminal and the output signal that sets the speed of the variable speed drive. These calibrations are described in Sections 4.2.2.2, 4.2.2.3, and 4.2.2.4 of this manual.
Figure 2.16 Wiring the Analog Motor Load Current Input
Figure 2.17 Wiring to Display and Set SPM Through OmniLink II Operator Terminal
Section 2.3.8 Optional Solid State Relay Outputs

The OmniLink II Press Automation Control provides an optional solid state relay module. It can be supplied with a combination of AC or DC solid state relays specified by the customer. If the module is provided, the relays provide the following functions:

- R1 and R2 – Module programmable limit switches 1 and 2. Simple on at an angle off at an angle PLS’s for limited applications.
- R3 – Provides an output to drive an external light that indicates die protection is bypassed.
- R4 – Provides an output to drive an external light to indicate that a downtime code has been entered when the optional LinkNet information system software is used.

Figure 2.18 shows the wiring of the relay drive inputs from R/D-Brake Monitor Module connector 2 to the solid state relay module. Wire PLS relay outputs (relay 1 and 2) as desired to sequence auxiliary equipment associated with the press. Wire relay outputs 3 and 4 to indicator lights placed in a highly visible location if you wish an external indication that die protection is bypassed or the press has a downtime condition or event.
Section 2.4 Additional Mounting and Wiring if the Operator Terminal, R/D-Brake Monitor Module, and (Optionally) Solid State Relay Module are Provided Without Enclosure for Customer Panel Mounting

The OmniLink II Press Automation Control base system package may be purchased without the operator terminal, R/D-Brake Monitor module, and (optionally) Solid State Relay Module already mounted and pre-wired inside an Operator Terminal enclosure. This allows the customer to install the basic components of the system into his own enclosure(s). When this is the case, the customer will need to perform the additional component mounting and wiring.

Section 2.4.1 Mounting the Base Components in the Customer Enclosure

Mount the OmniLink II LCD Operator Terminal in an enclosure with viewing angle considerations as shown in Figure 2.4 and with clearance to easily operate the membrane keys on the terminal. Figure 2.19 shows the mounting hole dimensions of the operator terminal. The R/D-Brake Monitor module should be mounted on the inside of the enclosure on which the operator terminal is mounted. When furnished for customer panel mount, it will be come mounted on an intermediate fixture that aids customer mounting. See mounting dimensions in Figure 2.20. Similarly, if the optional 4-channel Output Relay Module is provided, this should be mounted on the inside of the enclosure on which the operator terminal is mounted. Mounting Dimensions

![Figure 2.19 OmniLink II LCD Operator Terminal Mounting Dimensions](image-url)
Section 2.4.2 Wiring the Base Components in the Customer Enclosure

The only wiring not shown in previous figures where base system components were supplied in an enclosure is the wiring between R/D-Brake Monitor Module and Operator Terminal. You will be supplied a 5’ length of high speed serial bus cable that may be cut to the actual required length. Connect one end of the cable to the bottom row of terminals on the dual plug for Connector 5 on the R/D-Brake Monitor Module and the other end to the lower left connector on the back of the operator terminal. Connect as follows on both connectors.

<table>
<thead>
<tr>
<th>Cable Wire Color</th>
<th>Connector Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>CANL</td>
</tr>
<tr>
<td>Orange</td>
<td>CANH</td>
</tr>
<tr>
<td>Blue</td>
<td>GND</td>
</tr>
<tr>
<td>Bare</td>
<td>Shield</td>
</tr>
</tbody>
</table>

Run individual red, white, and green wires between the power connector (CONN 5) on the R/D-Brake Monitor and the power connector at the upper left of the back of the operator terminal. Connect red to L1 on both connectors, white to L2 on both connectors and green to GND on both connectors. If the 4-channel Output Relay Module is supplied, wire from R/D-Brake Monitor Module to Output relay module as shown in Figure 2.18.

Section 2.5 Wiring Serial Ports for Serial Feed Interface, PLC Interface, and LinkNet Information System Options

Wiring for serial feed interface, PLC Interface, and LinkNet Information System options will be outlined...
in separate documents sent in addition to this manual when these options are purchased with your system.

Section 2.6 Wiring the Parallel Port for Messages from Auxiliary Equipment (Optional)

The OmniLink II Press Automation Control makes provision to wire inputs to its parallel port on the back of the operator terminal from auxiliary equipment intelligent controllers so that diagnostic messages from auxiliary equipment can be displayed on the brake monitor screen of the operator terminal. Seven isolated signal inputs and an isolated ground constitute the parallel port, which can be wired to provide up to 128 message codes. The OmniLink operator terminal allows entry of an alpha-numeric message of up to 40 characters long for each message code input to the parallel port. This is a useful feature when the user wants a simpler solution to diagnostics than having to deal with programming serial port communications between two different intelligent systems. Wire as shown in Figure 2.21.

The seven outputs on the PLC output card can be programmed to output the binary numbers 0000000 – 1111111 (decimal numbers 0-127) as diagnostic message codes. Of course, many times far fewer message codes will be needed, and only the needed number of messages will be programmed.

![Figure 2.21 Seven PLC Outputs Used to Create Message Codes 0000000-1111111 (0-127)](image)

Once the parallel port inputs are wired to receive message codes as in Figure 2.21, the configuration screens for Names and Messages on the OmniLink II operator terminal allows entry of alpha-numeric auxiliary equipment messages on the operator terminal brake monitor screen. Auxiliary equipment message entry is described in Section 4.3.
Section 3 Operator Terminal Basics

Section 3.1 OmniLink II Press Automation Control LCD Operator Terminal

The OmniLink II Operator Terminal features a 9.2” diagonal color TFT liquid crystal display (LCD) with high brightness and large viewing angle, a keypad, and a Program/Run keyswitch. The large display allows far more information to be shown on one screen than smaller ¼ VGA LCD displays, allowing fewer screens to be used to program system settings and view information in a system that has a multiplicity of functions. Unlike monochrome LCD displays, the color display can be used to call operator attention to fault or other messages through color highlighting. This, in conjunction with its softkey driven menu system and help messages provides easy to use operation.

![OmniLink II LCD Operator Terminal Diagram](image)

Figure 3.1 OmniLink II Color LCD Operator Terminal

Figure 3.1 shows the operator terminal front panel with the Main Screen selected on the display. The color liquid crystal display (LCD) is divided into fixed areas. Crankshaft position and current stroking mode of the press are displayed in the upper left hand corner of the color LCD screen. This angular position of press crank or eccentric is displayed in both graphical and numeric format. For speeds less than sixty strokes per minute, the pointer, which is enclosed in a circle, will rotate to visually indicate the angular position of the crankshaft. For eccentric and crankshaft driven presses, the top dead center of the stroke is equal to 0 degrees. The bottom dead center of the stroke is always 180 degrees. In addition to the rotating pointer, there is a rectangular box enclosed in the circle. When the slide is stopped within +/- 5 degrees of top, this box will be green with the letters “TOP”. When the slide is...
stopped within +/- 5 degrees of bottom dead center, the box will be yellow with the letters “BOT”. For speeds greater than sixty strokes per minute, two rotating arrows will appear in the circle. These rotating arrows indicate crankshaft motion.

The remainder of the top portion of the screen displays four user selectable items. These four user selectable items can be chosen by the user from a list in the User Configuration menus. The currently available items are:

1. Drive Speed (speed at which a variable speed drive will cause the press to stroke when the clutch is engaged -- requires optional Analog Input/Output Card for the R/D-Brake Monitor Module)
2. Stroking Speed (actual crankshaft SPM -- available only when the press is actually stroking)
3. Auto Press Speed (drive speed when press is not stroking and crankshaft speed when the press is stroking -- requires optional Analog Input/Output Card for the R/D-Brake Monitor Module)
4. System Status (diagnostic messages that indicate anything that prevents the start of stroking)
5. Reason for the Last Stop (diagnostic message that gives the reason for the last stop)
6. Total Tonnage (If the system is equipped with optional Tonnage & Signature monitor)
7. Counterbalance Pressure (If the control is equipped with optional automatic counterbalance adjust)
8. Shut Height (If the system is equipped with optional automatic shut height adjust)
9. Current Order Count
10. Current Down Time Code (If the optional LinkNet shop floor information system is used)
11. Distance to Bottom

The four user items selected can be mode dependent if the user can provide an isolated input to the operator terminal derived from the press clutch/brake control to indicate when the setup mode (usually Inch) is selected. The user has the option to choose four items for setup mode and four different items for production modes.

The menu reference area of the display immediately above the right side softkey legends indicates which menu the screen is showing. The largest area of the display is used for displaying control, monitoring, and process information, and settings. It is dependent on the present task being performed and the display screen selected.

**Section 3.2 Operator Terminal Modes**

There are three modes of operator terminal use: **User Configuration Mode**, initially used to configure the system for a specific machine and user choices of operation; **Program Mode**, used to program settings and do certain actions; and **Run Mode**, where the system provides its programmed functions for a job and may allow certain limited actions and settings without entering Program Mode. The Operator Terminal Configuration Mode screens can only be accessed by the use of the Run/Program key switch and the configuration code for the system, the highest order user password. Use of the Configuration Screens is necessary at the initial installation of the system to configure the system to the particular press and to allow the user to make choices about how the system is used. After the initial configuration, this mode will only be used if it is decided to change configuration settings. See Section 4 of this manual for specific information on the User Configuration Mode.

Run Mode screens and Program Mode screens are very similar for the OmniLink II Press Automation Control. Basically the same information is presented on screens in both modes. However in Run Mode, you can primarily only **view** the information and settings on the display screens, although the user can
choose to configure the system to allow certain commonly used settings and actions to be done in Run Mode. Fine adjustment of some angle settings can also be done in Run Mode.

The current commonly used settings and actions that can be user configured to be done either in Run Mode or restricted to Program Mode only are Tonnage Monitor Reset, Die Protection Limited Bypass, Die Protection Reset, Auto Setup Reset, Counter Reset, Counter Settings, Counter Change, and Motor Speed Adjust (when the optional analog input/output card is used to adjust Motor Speed). Of course, if optional hardware that performs any function described in the foregoing list is not used with the system, configuration of the settings or actions will not be necessary. Also, hardware options to allow the system to perform additional control and monitoring functions may be added to the system at a later time. If so, actions associated with these functions may add to the list of actions that can be done in Run Mode or restricted to Program Mode.

The vast majority of settings and actions for the system must be performed in Program Mode. Once key/code access to Program Mode is achieved, as described in Section 3.9, certain softkeys that can be used to change numbers or other settings for a job will appear. Also, in Program Mode, a cursor in the form of a highlight will appear that allows you to use the arrow keys to select particular settings to change. This cursor will also appear on Run Mode screens if a setting is allowed on a Run Mode Screen. Many of the screens also have on screen help messages that change with the setting to explain the choices available for the setting.

**Section 3.3 Softkeys**

Areas along the right side of the display and the bottom of the display provide legends for the softkeys located to the right of the LCD and bottom of the LCD. Softkeys are generally used to perform an action in the selected menu (such as reset a fault or change a setting), or select another menu or submenu screen. The softkeys are so named because they perform different functions in different screens, or even in the same screen depending on whether the Operator Terminal is in Run or Program Mode and on previous softkey use. The legend on the display next to the softkey may change within the same screen or from screen to screen to indicate the function the softkey will perform next in that particular screen. When the word “key” is used in this manual it refers to the keys on the keypad that always provide the same function, such as Enter, or provide the same numeric entry (1,2, etc.).

When a screen has been reached through a succession of one or more screens, an EXIT legend will appear next to the bottom right softkey. Each time this key is pressed it will select the previous screen until the Main Screen (Menu) is reached.

**Section 3.4 ACC Key**

The ACC key is a quick access key. This key will supply direct access from any menu to the Quick Access menu, so that items frequently used by the operator (depending on options) can be accessed by a single keystroke. The quick access menu contains machine notes, die notes, access to Down Time codes, name of current logged in user, log out softkey, and access to auxiliary communications. See Section 5.5 for a detailed description of these functions.
Section 3.5 CHG Key

This changes the display language from English to Spanish. Depressing the CHG key again will return the display language to English.

Section 3.6 Arrow keys

The Up, Down, Left, and Right arrow keys are used to select settings that may be entered or changed on any display menu where settings are provided. They are also used to select one item from a list of items to enter as a setting. Generally, settings can only be made in Program Mode screens, which are accessed by use of the Program/Run key or the use of a password, as explained in Section 3.9. In some cases, certain settings may be available in Run Mode. When a screen is first entered that allows settings to be programmed, the LCD will highlight an area (called a cursor) in order to inform you which setting or which item in a list is selected. If the highlighted area is a setting, it may have help text on the screen to explain the purpose of the setting. If the highlighted area selected is in a list of items to choose as a setting, pressing the ENT(ER) key or the Select softkey will enter it as the desired setting.

In this manual, SELECT means using the arrow keys to highlight an item or setting.

Section 3.7 Numeric Data Entry

There are numerous settings (parameters) associated with the OmniLink II system that require numeric entry through use of the operator terminal. Some of the settings are contained in the Configuration Mode menus for the system, where the user enters numbers to configure the system for certain machine characteristics (such as stopping time, stroking speed, etc.). Other numeric settings in the Configuration Mode menus are used to allow the employer to make choices specific to his use of the system. These numeric settings are often done only once when the system is installed and don’t have to be repeated unless the user decides to make changes in the initial choices. They require a person in possession of the User Configuration Code (the highest order system password) to gain access to the configuration mode to make the settings.

Another class of numeric settings must be done on a more frequent basis to program the control and monitoring functions of the system for specific jobs. These settings include those for Counters, Die Protection and Process Monitoring channels, Programmable Limit Switch operation, job numbers (for storage and recall of the settings of the system related to a specific job) and other standard and optional functions of the system. Since these settings are critical to whether the process is controlled or monitored correctly, only persons with key/code access to Program Mode (see Section 3.9 of this manual) can make or change most settings. Of course, once a job has been programmed and stored, its settings can be recalled and only the desired parts count for a job run, new jobs, or refinements of old job settings, will necessitate changing settings.

When a screen that is used to program settings is key/code accessed, the arrow keys on the keypad to the right of the LCD display are used to select (highlight) a particular setting. You can either directly enter a number into a selected setting or a CHANGE NUMBER softkey can be pressed which blanks the current setting and underlines the area where newly entered numbers will appear. The highlighted setting can then have its numeric data changed. If the parameter contains a decimal point, it will be positioned automatically by the operator terminal. The new number is entered by use of the number
keys on the keypad and pressing the ENT (Enter) key after you have changed the number to the desired value. The CLR key will clear the present number being entered, and the entry process is aborted by pressing the EXIT softkey or one of the arrow keys. The numeric data will not change from the previous value if the entry process is aborted. This process is illustrated in Figure 3.2, which shows a portion of the Counter programming screen.

![Illustration of Numeric Entry](image)

**Figure 3.2 Illustration of Numeric Entry**

### Section 3.8 Alphanumeric Data Entry

Some settings for the OmniLink II relate to descriptions, names, type of function or notes that may be used to describe jobs, individual monitoring or control channel use, or notes for a particular machine or job. Once access to the Program Mode is gained by the key/code procedure (see Section 3.9), the text, or combination of text and numbers, for names or descriptions can be entered in two ways, depending on the setting to be programmed.

1. A CHANGE SETTING softkey will appear on the screen when a setting for a description of the type of logic function a channel is to perform (such as a die protection channel) is selected (highlighted) by use of the arrow keys on the keypad. When this key is pressed, a popup list of fixed function descriptions will appear. The user may select an item from the list and press the ENT key to make the setting. Only a description from the list can be entered. This type of setting is illustrated in the Die Protection Channel Settings screen shown in Program Mode in Figure 3.3 for the Channel Type setting.
When the **Channel Type** setting is selected, the upper right softkey legend is **CHANGE SETTING**. Pressing the **CHANGE SETTING** softkey will cause a list box to appear as on the screen as shown in Figure 3.4, and the upper right softkey legend will change to **SELECT**. The arrow keys are used to highlight the desired item on the list after which the **SELECT** softkey is pressed to enter the selected item and remove the list box.

![Figure 3.3 The Die Protection Channel Settings Screen in Program Mode](image)

2. A **CHANGE NAME** softkey will appear on the screen when a description or name setting is selected. In some cases, a screen showing a list of default names or descriptions commonly used for the setting will appear when this softkey is pressed, allowing selection of a name or description to enter by pressing a **SELECT** softkey that appears for this type of setting. In addition, you may edit (change) existing or unnamed items on the list by selecting the item and pressing an **EDIT NAME** softkey on the screen after your selection. In this case, another popup menu, the Text Entry menu, will appear that allows you to enter letters, numbers, and spaces for the name or description selected. This also can be illustrated by use of the Die Protection Channel Settings screen. If the setting for **Description** is selected, the upper right softkey legend will be **CHANGE NAME**. Pressing this key causes the Die Protection Names screen to appear as shown in figure 3.5.

![Figure 3.4 List Box for Die Protection Type and SELECT Softkey](image)
The first page of names for the Die Protection Names screen is shown in Figure 3.6. Pressing the NEXT PAGE softkey takes you to additional pages where names can be entered. You can enter an existing name from the list shown as the setting for Description by using the arrow keys to highlight a name and pressing the SELECT NAME softkey or the ENTER key on the keyboard. You can add names on this and other “pages” or change existing names by pressing the EDIT NAME softkey. This will cause the popup Text Entry menu that allows the manual entry of letters or a combination of letters and numbers shown in Figure 3.6.

Figure 3.5 The Die Protection Channel Names Screen

Figure 3.6 Alphanumeric Data Entry Screen for Die Protection Names
This illustration is for the Die Protection Channel Names Screen that will be present if one or more optional Die Protection and Process Monitoring Modules is used with the system. But, the same pop up text entry box will appear on any other screen that allows entry of alphanumeric names or text. Letters are entered by using the left and right arrow keys to position the letter pointer under the desired letter and then pressing the SELECT LETTER softkey. If the left or right arrow key is pressed and held, the pointer will automatically move to successive letters. Upper or lower case letters can be selected by the LOWER CASE/UPPER CASE softkey. If upper case letters are currently being displayed in the text box, pressing the LOWER CASE softkey will change the text box to lower case letters. To change a previously entered character, use the CURSOR LEFT and CURSOR RIGHT softkeys to position the data entry line cursor over the letter to be changed and then select the new character. A space is inserted each time the SPACE softkey is pressed, and the CLR key clears all characters that have been entered. Numbers are entered directly from the numeric keypad. The entry process is aborted if the ABORT EDIT softkey is pressed or if you don’t press the ENT(ER) key when finished, leaving the previous data intact. The new description is accepted when the ENT key is pressed. Do not press the ENT (Enter) key until completely done selecting letters and numbers.

Once you have changed a name or entered a new name, it becomes part of the list. You must still highlight and press either the SELECT softkey or the ENT(ER) key for this name to be selected as the Description setting.

3. A third way that an alphanumeric setting is entered occurs when there is a choice between only two fixed alphanumeric entries can also be illustrated by the settings for Input Type and Bypassed. Where there are only two fixed choices for a setting, one setting will always initially appear depending on past use. In the case of Input Type, the two choices are “Normally Off” and “Normally On”, meaning that the sensor for a channel is either off when no fault is detected and turns on to indicate a fault or vice versa. The upper right softkey legend is CHANGE SETTING when Input Type is highlighted. Pressing this softkey will toggle the setting between the two choices. The two choices for the Bypassed setting are “Yes” and “No”. Again when this setting is selected, the CHANGE SETTING softkey will toggle the setting between these two choices.

Section 3.9 Access Control Operation for Settings and Actions in Program Mode

Section 3.9.1 Program/Run Key Switch Operation

The Program/Run key switch is located on the lower right side of the operator terminal. This is a two position switch. The key is removable in the RUN position only. If the Program/Run key switch is being used as a means to access the restricted items, the switch must be turned to the PROG position. When the Program/Run key switch is switched to the PROG position, the press will Top Stop and stroking will be prohibited until the switch is returned to the RUN position.

If Key Only access mode is selected by the user in the configuration mode, the key switch is the only
means available to access Program Mode. **All** settings and actions for the system are accessible to **anyone** when the Program/Run key switch is switched to the PROG position.

If **Code Only** access mode is selected by the user in the configuration mode, the Program/Run key will only be used to provide access (in conjunction with the User Configuration Code) to the User Configuration Mode. The Program/Run key will not access Program Mode. Programming Mode is accessed by code (password) only. Up to 16 employees (or employee classifications) may be assigned numeric codes (passwords) and a list of assigned settings and actions that each code assignee may perform in the Program Mode. Each employee assigned a code can use code (password) access without the Program/Run key. Each code will only grant access to perform the settings and actions in Program Mode assigned by the employer for the person with that specific code. Program mode settings and actions not specifically assigned to a code cannot be performed by the code assignee.

If **Key or Code** access mode is selected by the user in the User Configuration Mode, the key switch is one of two means available to access Program Mode. **All** settings and actions for the system are accessible when the Program/Run key switch is switched to the PROG position. In addition, Program Mode can be accessed by code. Up to 16 employees (or employee classifications) may be assigned passwords (codes) and a list of assigned settings and actions (permissions) that each code may perform in the Program Mode just as in **Code Only** access mode.

If **Key and Code** access mode is selected by the user in the User Configuration Mode, both the key switch and code (password) must be used to access Program Mode. Up to 16 employees (or employee classifications) may be assigned passwords (codes) and a list of assigned settings and actions (permissions) that each code may perform in the Program Mode just as in **Code Only** access mode.

**Section 3.9.2 Using Key Only Access to Program Mode for Settings and Actions**

If Key Only Access Mode is chosen, the only way to enter the Program Mode for screens which require settings or actions (such as reset and bypass) to be made in Program Mode is by use of the Program/Run key to select Program. Generally, the softkeys that are associated with performing settings and actions will appear only when the Run/Program switch is in the Program position. The **only** softkeys associated with performing settings and actions that will appear in Run Mode are those associated with the limited number of settings or actions that are configured by the user to be allowed in Run Mode, as described in **Section 4.2.4.3.2**. The following example uses the optional Die Protection and Process Monitoring function of the OmniLink II Press Automation Control to illustrate the Key Only Access Mode.

Figure 3.7 illustrates the main die protection screen for module 1, channels 1-8 when Key Only Access Mode is selected. Note that channel 5 is highlighted in Figure 3.7. With the Program/Run switch in Run position, pressing the CHANNEL SETTINGS softkey will select the channel settings screen shown in Figure 3.8 to allow viewing the settings for channel 5. However, you won’t be able to make changes to the settings unless the Program/Run switch is turned to the Program position, enabling settings to be changed through use of the setting functions provided by the use of the upper right softkey available only in Program Mode in Figure 3.8. Also, note that the RESET FAULT softkey for a Die Protection fault appears **only** in Program Mode in Figure 3.7. This restricts the action of resetting a die protection fault to Program Mode (Run/Program switch in Program) since no softkey exists to reset the fault in Run Mode. **Note!** The condition that creates a die protection fault must be cleared before the RESET FAULT softkey will perform a reset.
Once Program Mode is entered, the upper right softkey on screens throughout the OmniLink II Press Automation Control is used in the editing (change) process of any setting selected by use of the arrow keys on the operator terminal. See Sections 3.7 and 3.8.
Section 3.9.3 Code (Password) System Operation

If any of the access modes to Program Mode that use a code is chosen in the User Configuration Mode, code access to the system to perform setting(s) or action(s) is a log on operation that requires a user to enter his name (or classification) and a code associated with the user name. The system will also ask for a name and code whenever softkeys that allow access to settings or actions restricted to Program Mode, such as reset or bypass, are pressed. Once the user has logged on with his user code through any screen, access to other settings and actions permitted by his code in other screens is available until manual or automatic log out.

The following example of code access to Program Mode shows the steps necessary to access settings by code for new entry or change through the Die Protection screen if the User Configuration is set to allow code access. It should be noted that log on may also be required to reset or bypass the die protection function in the example shown when a reset or bypass softkey is pressed. Although screens for programmable limit switch and other functions are somewhat different, a common feature will be that the code request sequence to settings will always be by means of the upper right softkey, whereas the code request sequence for actions is initiated by the softkey that performs the action. Further, a user with proper access code can always log on by pressing the SUPPLY ACCESS CODE softkey that appears at the top of the Brake Monitor and Diagnostic screen in Run Mode. The popup Select User Name table and user name Code Entry box that are shown later in this example will also appear on all other screens where access to settings or actions by code (password) is used.

![Figure 3.9 Main Die Protection Screen for Module 1, Channels 1-8](image-url)

Figure 3.9 shows the main Die Protection screen as it appears with one of the code access options to access Program Mode configured. To change settings for Die Protection with a code, select the screen with the module and channel number(s) for which you wish to enter or change settings. The NEXT PAGE and PREVIOUS PAGE softkeys are used to select a module (in many cases there will only be 1
module) and a group of eight channels for that module. One module may have up to 16 channels. The PREVIOUS PAGE softkey will appear above the NEXT PAGE softkey only after the NEXT PAGE softkey is used to select a group of eight other than those shown on the first page. Use the Up/Down arrow keys to move the cursor (highlight) to a channel whose settings are to be changed. In the figure above, channel 5 on die protection module 1 is selected. Press the upper right softkey (CHANNEL SETTINGS). This will take you to the Die Protection Settings screen for channel 1, module 5, shown in Figure 3.10.

![Figure 3.10 Die Protection Channel Settings Screen](image)

Note that the Die Protection Channel Settings screen is channel specific, i.e., since channel 5 of die protection module 1 was selected when the CHANNEL SETTINGS softkey was pressed in Figure 3.1, the Die Protection Configuration screen that appears will allow you to settings for this particular channel. The upper right softkey is now labeled SUPPLY ACCESS CODE. Pressing this softkey will cause a popup table to appear listing user names as shown in Figure 3.11.

When the user name is selected in the screen shown in figure 3.11, the user name code entry box will appear as shown in Figure 3.12. Use the number keys on the Operator Terminal keypad to input the code associated with the user name and press the ENTER key.
After entry of a valid access code, the popup table and code entry box will disappear and the Program Mode screen of Figure 3.13 will appear, allowing settings to be made. The user will have access to all restricted items, including settings and actions for functions other than die protection that have been designated for his access in the configuration mode.
To perform a reset action when a die protection fault occurs with a Code Access Mode, press the RESET FAULT softkey that appears in either Run or Program Mode on the main Die Protection Screen shown in Figure 3.9 when the Fault occurs. The popup User Name entry box will appear, allowing a name to be selected. When the name is selected, the popup User Code box will appear to allow entry of a code. Entry of a valid code will reset the fault. **Note! The condition that creates a die protection fault must be cleared before a reset can occur.**

This access will remain until the user performs a log out or until the user is automatically logged out by a timeout or limited number of strokes function set in the configuration menu and described in this section. The user can log out by using the ACC key. This key will directly switch the display to the Quick Access screen. The LOGOUT soft key legend will appear along the bottom of the screen. If the operator presses this key, he will log out. He will have to log on again for renewed access to the restricted items.

### Section 3.9.4 Automatic Log Out

**In addition to the manual log out, the system contains an automatic logout.** The intent of automatic log out is to reduce the possibility of users other than the intended user from having access to restricted items. If there were no provisions for automatic log out and a user forgot to manually log out, all restricted items to which the user had been designated for access would be available from the log in time until power was removed from the OmniLink II. This presents the possibility of users other than the intended user having access to restricted items. Automatic log out is based upon both time and press strokes. During system configuration automatic Access Timeout parameters are entered. Automatic access timeout time and automatic access timeout strokes can be entered. The time entered is the amount of time after the last keystroke that will be allowed before the system will automatically log out the user. For example, if the automatic access timeout is set to 60 seconds, the user will be logged out 60 seconds after the last keystroke. If the user depresses a key before the 60 seconds have elapsed, a
new 60 second cycle will be started. The number of strokes that are entered is the number of press strokes after the last keystroke that will be allowed before the system automatically logs out the user. For example, if the automatic timeout is set to 10 strokes, the user will be logged out when the press completes ten strokes after the last keystroke. If the user depresses a key before 10 strokes have been completed, a new 10 stroke cycle will be started.
Section 4 Device and Main Configuration Menus

After your OmniLink II Press Automation Control is first installed and **BEFORE you begin to use the system**, you must configure the OmniLink II for and its components for its use on the particular press. The system provides access to **two** sets of configuration menus that set up the base system for all press operations, the **Device Configuration Menu**, and the **Main Configuration Menu**. Configuration Menus for hardware options such as Die Protection & Process Monitoring, PLS/Logic Modules, Tonnage Monitor Modules, Automatic Setup Modules, and Analog Process Monitoring Modules are also provided when optional hardware modules are used with the base system. Configuration of these hardware options will be covered in the respective sections of this manual that cover these options. The foregoing Configuration Menus are normally only done when the system is initially installed, or if initial configuration choices are to be changed at a later time. **In addition**, the OmniLink II Counters are configurable on a job by job basis, as opposed to a machine basis. These counters can be configured for multiple parts out per stroke, multiple strokes per part out, and other factors that depend on the specific job. Counter configuration will be discussed in the section of this manual that discusses counter use.

**It is IMPORTANT TO NOTE** that the only settings for optional modules contained in the Main Configuration Menus are those that restrict or permit certain optional module operator actions if the modules are used. The Device Configuration Menu is used to tell the system which optional modules are being used with the system. Configuration menus for all other settings for optional modules will be accessed through screens associated with the optional modules. These screens will only appear if these modules are installed and their presence is set to “Yes” in the Device Configuration Menu. The same User Configuration Code is used to gain access to all user configuration menus for the system.

⚠️ **CAUTION.** Certain configuration settings affect safety considerations, such as Brake Monitor limits, and others could affect whether elements of your production process are properly controlled or monitored by the OmniLink II Press Automation System. User configuration should be limited to persons who have read this manual completely and who are authorized by the employer to configure the system. Incorrect Brake Monitor limit settings may indirectly expose an operator to danger at the point of operation if stopping time is allowed to increase beyond the value used to calculate safety distance for presence sensing or two hand control safeguarding devices. Incorrect sequencing or monitoring caused by incorrect settings may lead to damaged dies, press, or auxiliary equipment.

Section 4.1 Device Configuration Menu

The first step in configuring the OmniLink II Press Automation Control is to configure the system for the specific hardware devices used with your system. The OmniLink system uses distributed intelligence in a variety of logic modules so that it offers maximum flexibility for specific applications. The OmniLink II Operator Terminal is the central integrating intelligence that communicates over a high-speed network with each hardware module to allow seamless programming of monitoring and control functions and display of information for each module. The Device Configuration Menu is used to “tell” the OmniLink II Operator Terminal the specific hardware modules used with the particular system with which it needs to communicate. You will need to configure the system for the devices used with it initially, and at any time you add modules to the system. Each hardware module used with the system must be have power and its high speed serial cable connected during device configuration.
The Device Configuration menu is also used to update the software in the various modules used with the system when needed or desired, although this normally will not need to be done when you initially configure your system. The OmniLink II Operator Terminal provides for the insertion of a smart media card with updated software to download to the various modules used with the system.

The Device Configuration Menu is accessed from the Quick Access screen shown in Figure 4.1. Pressing the ACC key on the operator terminal keypad causes the Quick Access screen to be displayed.

![Figure 4.1 The Quick Access Screen with Program/Run Switch in Program]

The DEVICE CONFIG softkey in the lower left corner of the screen appears only with the Run/Program switch in the program position. Pressing the DEVICE CONFIG softkey causes a box to popup which requests that you enter the User Configuration Code, the highest order user password. After entry of the correct code, the first page of the Device Configuration screen, shown in Figure 4.2, is displayed.

![Figure 4.2 Device Configuration Screen, First Page.]

Hardware Detected:  
Hardware Version:  
Bootcode Version:  
Software Version:  
Avail. Version:  
NEXT PAGE
The left column of the Device Configuration screen lists hardware modules that can be used with the system. The center column indicates whether the device is used with this particular OmniLink system. The right column is used to indicate information pertaining to device status, such as “detected”, which means the Operator Terminal has established communication with the module. The TOGGLE USED softkey will toggle the “Used” column for the highlighted (selected) device from No to Yes or Yes to No. The UPDATE PROGRAM softkey is used only in rare instances where it is desired to update software for a selected device to a newer version. The NEXT PAGE softkey will take you to a similar screen with additional device listings and a PREVIOUS PAGE softkey will appear so that you can return to the first page of the menu. Some hardware options planned for the system are not yet available and are not listed in the Device Configuration menu at this time. These will be added to operator terminal software updates that will be sent out as optional modules are available and purchased.

The first page of the Device Configuration screen indicates the following devices that you must indicate whether or not are used with your system.

1. System 5000 Card Rack and System 5000 Comm Module. Link makes provision to retrofit optional modules used with the OmniLink II Press Automation Control to previously sold System 5000 Press Controls equipped with the OmniLink II LCD Operator Terminal. First, high-speed serial interface chips must be inserted in sockets in the in the operator terminal and new software must be installed. Then a System 5000 Comm(unication) Module must be inserted into the 5000 card rack. A communication cable must then be run between the System 5000 Comm Module and the OmniLink II LCD Operator Terminal, as described in the Installation section of this manual. When this is done, you must toggle the System 5000 Card Rack “Used” setting to Yes. This enables the new operator terminal software to communicate with the 5000 Card Rack through its RS 485 port. Also, the “Used” setting for System 5000 Comm Module must be toggled to Yes. This enables the System 5000 control to send information to the Operator terminal and other system modules via the high-speed serial network used by the OmniLink II Press Automation Control. Both of these “Used” settings should remain No if you are not retrofitting an existing System 5000 Control.

2. R/D – Brake Monitor Module. This module is used in all OmniLink II Press Automation Control operator terminals except those to be retrofit to existing Link System 5000 Press Controls. Since it will be included in the same package as the OmniLink II LCD Operator Terminal and will be pre-tested at the factory, this setting should already be Yes for the “Used” column. If it is not, toggle it to Yes for non-retrofit applications

3. Programmable Limit Switch Outputs. The system provides for up to 32 programmable limit switch outputs. These outputs are options that come in groups of 8. Each group of 8 channels is pre-numbered and will be recognized by the operator terminal to be the specific pre-numbered group. You must toggle the “Used” setting for each specific group of 8 channels used with the system to be Yes.
Pressing the NEXT PAGE softkey causes the second page of the Device Configuration menu to be displayed, as shown in Figure 4.3.

The OmniLink II Press Automation Control provides for up to 5 Die Protection and Process Monitoring Modules, each with either 8 or 16 inputs. **Before** toggling a Die Protection and Process Monitoring Module to a “Used” setting of **Yes**, you must assign each module a **module number**. This is done by opening the door of each module and setting a rotary switch in the module you wish to designate as module 1 to the number 1. For each module used, set a different successive number on the rotary switch that indicates module number. When you have finished, an LED number display in the front door of each module indicates module number when power is on. Once you have assigned a module number to each die protection module to be used with the system, toggle to **Yes** for the “Used” setting for each module number used.

**Section 4.2 The Main Configuration Menu**

The Main Configuration Menu is used to configure:

1. Settings based on the characteristics of the press upon which the OmniLink is installed. Brake Monitor Stop Time Limits, Clutch Engagement Time Limit, and stroke length are examples of settings that depend on the individual press.

2. Settings for Encoder Offset, Auto Top Stop Compensation, Top of Stroke Angle

3. Choices of what you wish to show on areas of the Operator Terminal Display in certain areas reserved for user customization.
4. Configuring the Operator Terminal serial ports for any software options, such as serial feed interface and PLC Interface used.

5. Choosing whether certain bypass or reset actions for both standard and optional features are unrestricted, or whether these actions can only be done by persons you have chosen to do so in the security settings of the system.

6. Setting up the key/code access security system of the OmniLink to restrict certain reset or bypass actions and settings in programming menus to specific personnel or by Program/Run key.

7. Entering any diagnostic Messages that may be sent to the Operator Terminal parallel port by outputs from an auxiliary equipment PLC controller.

You must be able to stroke the machine to do certain parts of configuring the OmniLink II Press Automation control in the Main Configuration Menu. The system has outputs that are connected to the stop circuits of your press control that will be activated if a fault occurs. At this time you need to make sure that any monitoring or control functions associated with optional Die Protection, PLS, and other modules that you are using with the system will not generate a fault that you will have to repeatedly reset each time you stroke. As shipped from the factory, any optional modules shipped with the system are generally not programmed to perform monitoring or control actions and will not generate faults. However, if anyone at your facility has experimented with programming various monitoring functions before the system is configured, you may have to reprogram them to prevent faults when you stroke as follows: make sure all counters are turned off; if Die Protection or Analog Process Monitor options are provided, set all channels to Unused; if Tonnage and Signature Monitor option is provided, press the BYPASS softkey to bypass both high and low limits.

The Main Configuration Menu is accessed from the Brake Monitor menu. The CONFIGURE softkey is available only in the Brake Monitor Menu when the Program/Run switch is in the PROG position. The Brake Monitor menu is shown in Figure 4.4 with Program/Run switch in PROG position.

![Figure 4.4 Brake Monitor Menu](image-url)
If the CONFIGURE softkey is pressed, the display will ask for the configuration code. This user configuration code is user programmable and is the highest order user password for the system. An original code is sent from the factory to a person designated when the control is ordered. The user has the option of keeping the original code or changing to another during the initial configuration or at a later time if desired. This user configuration code is used to access the Main Configuration menu, as well as all other configuration menus and must be provided to qualified personnel only. When the code is entered, the Main Configuration Menu shown in Figure 4.5 appears.

![Figure 4.5 Main Configuration Menu](image)

The Main Configuration menu presents a list of other submenus that may be selected by softkey to enter settings for parameters. Once access to the Main Configuration menus is obtained, the Program/Run switch may be switched back and forth between PROG and RUN. It will be necessary to switch back to the Run position and stroke the press for certain Main Configuration Menu calibrations that may be required, as discussed in later sections. Also, some of the Run Mode and Program Mode screens will be available from certain Configuration Mode menus to aid in calibration or settings. The configuration mode will remain in effect until manually exited by pressing the EXIT softkey repetitively until the display returns to the Brake Monitor menu.

Settings can only be made in the configuration mode with the Program/Run switch turned to PROG. The arrow keys are used to position the cursor onto the configuration setting to be changed.
Section 4.2.1 Machine Parameters Menu

Pressing the Machine Parameters softkey in the Main Configuration menu accesses the Machine Parameters menu, shown in Figure 4.6. This menu is where you will begin the configuration process.

Figure 4.6 Machine Parameters Configuration Menu

Note that some numeric settings may already be programmed when you receive the unit. These settings were made during the checkout of your unit at the factory and must be reprogrammed as you configure the system based on the specific characteristics of your press.

Section 4.2.1.1 Configuring the Encoder (Resolver) Type

The first step after you have initially installed the OmniLink II system will be to select the Encoder Type setting on the Machine Parameters menu. An encoder is provided with each OmniLink II Press Automation Control to be driven in a one-to-one ratio by the crankshaft of the press to supply crankshaft angular position information to the system. The angular position display in the upper left corner of the screen displays the angle provided by the encoder.

Link offers two different encoders with the OmniLink II Press Automation Control. The standard encoder is the 2500 Resolver. An optional 5000 Resolver is also offered that combines a resolver and an optical encoder in the same enclosure to allow cross checking of the angular position information. You must determine which resolver you ordered with your system and set either “2500” or “5000” as the Encoder Type setting, the first menu item in the Machine Parameters Menu. This setting will be selected (highlighted) when the screen first appears. When the Encoder Type setting is selected, pressing the Change Setting softkey will toggle the setting between “2500” and “5000”. If you have a 2500 resolver and the setting already appears as 2500 in the highlighted area, you don’t need to push the Change Setting softkey.

Section 4.2.1.2 Setting Top of Stroke Angle

After setting the Encoder Type, look at the Top of Stroke Angle setting, the third menu item from the
top on the Machine Parameters menu. This setting comes from the factory as 0° since it is most likely that your press will have simple eccentric motion instead of the more complex link drive motion. If your press slide is directly driven by a crankshaft, an eccentric shaft, or eccentric gear you do not need to change the 0° setting. Go to the setting discussed in the next section of this manual.

If the press has a **link drive system** you must refer to the manual for the press to find what crank or eccentric angle represents top of stroke. This angle will normally be somewhere between 315° and 335° depending on the specific press design. Use the arrow keys to select the Top of Stroke Angle setting, use the number keys to key in the correct angle, and press the ENT(ER) key when done.

### Section 4.2.1.3 Setting Minimum Press Speed and Loss Of Motion Time

The OmniLink II Press Automation Control uses a motion detection system to detect any coupling failure that results in the encoder (resolver) not being driven by the crankshaft. If the resolver decoupling occurred, the system would then be unable to perform its monitoring and control functions that depend on crankshaft angular position. The motion detector generates an immediate stop signal if it senses motion below the SPM (strokes per minute) configured in the Minimum Press Speed setting for a period of time greater than the setting for Loss of Motion Time. The Loss of Motion Time setting is used to compensate for erratic motion on some geared presses where the gears cog back and forth as the press strokes, resulting in temporary dips below the Minimum Press Speed SPM setting, i.e., the motion detector threshold as shown in Figure 4.7.

![Figure 4.7 Erratic Crankshaft Motion Typical of Some Geared Presses](image)

The **Minimum Press Speed** setting is limited to values between 2 and 100 SPM, and an entry of a number beyond these values is rejected. A value well below the actual minimum press stroking speed should be entered as this configuration setting, preferably in the range of 25% to 30% of actual minimum press stroking speed although lower and higher values may also be suitable.

The value to enter for the **Loss of Motion Time** setting depends on the characteristics of the individual press. Use the following formula to determine your initial configuration setting in milliseconds for this parameter.

\[
\text{Loss of Motion Time} = \frac{3000}{\text{maximum press strokes/min}} \text{ (milliseconds)}
\]

Example: A variable speed press provides stroking speeds from 20 SPM to 60 SPM. Since 60 SPM is the maximum strokes/min, \(3000/60 = 50\) milliseconds. Enter 50 as the initial Loss of Motion Time setting.
If the loss of motion time value calculated by the formula is not longer than the time that motion can dip below the Minimum Press Speed, loss of motion faults will result. If these occur, you may increase the time calculated by the formula but, in no case, should this time be increased more than 2.5 times the value calculated by the formula.

Section 4.2.1.4 Temporarily Setting Other Items on the Machine Parameter Screen So that the Press Can be Stroked Without Generating Brake Monitor or Motion Detector Faults

The previous configuration settings could be done without having to stroke the press to a particular position in the stroke. The next setting in the Machine Parameter configuration menu, Encoder Offset, will require you to Inch the press slide to either the top or the bottom of the stroke. The OmniLink II Press and Automation Control provides a Brake Monitor and a Motion Detector as a standard feature. If the clutch engagement time limits or either the top stop or mid stroke stop limits are set below the actual clutch engagement time or the actual stopping time of your press, they will generate faults that will have to be reset. To avoid these faults, temporarily make these settings:

1. Clutch Engagement Time Limit: 200 msecs (milliseconds)
2. Brake Monitor Top Stop Limit: 500 msecs
3. Brake Monitor Mid Stroke Stop Limit: 500 msecs

These settings will prevent faults for most presses. But, if you have a press with clutch engagement time greater than 200 milliseconds or stop time greater than 500 milliseconds, you may have to increase the settings listed above to prevent having to reset faults during the next configuration steps that require stroking of the press. Note! These are temporary settings only! You will need to refine these settings later in the configuration process as described in section 4.1.1.8.

Section 4.2.1.5 Setting Encoder Offset

Once the Encoder Type is set, use the down arrow key to select Encoder Offset. The Encoder Offset setting must be performed so that your system indicates the correct crank or eccentric shaft angle. The Encoder Offset is a setting that compensates for limited (+/-10°) mechanical angular misalignment between the resolver shaft angular position and the crank or eccentric shaft angular position, so that the resolver and crank do not have to be perfectly mechanically aligned during installation.

Two methods of setting the encoder offset are described in this section, one with the slide positioned at top dead center (TDC), and one with the slide positioned at bottom dead center (BDC). For simple eccentric motion mechanical presses (which constitute the vast majority of presses), with slide driven by crankshaft, eccentric shaft, or eccentric gear, the top of stroke position always occurs with the crank at the 0° (TDC) angular position and bottom of stroke at the 180° (BDC) position. You may use either method of encoder offset for simple eccentric motion presses.

For Link Drive presses, bottom of stroke still occurs at the 180° (BDC) position, but top of stroke will generally occur at a crank or eccentric angle between 315° and 335°, depending on the specific design. You must use the method that positions the slide at BDC for link drive presses.
**Method 1. Slide at Top of Stroke**

1. Inch the press to position the crankshaft within +/- 1 degrees of top dead center \( (0^0 \text{ -- slide at top of stroke}) \). This is **important** because the system uses the crank angle as its absolute reference and will assume that the crankshaft position is at zero degrees when it calculates the Encoder Offset. If the crankshaft is actually \( 5^0 \) from top dead center when you press the SET ZERO softkey or manually enter an offset, as described in the following steps, you will incorporate a \( 5^0 \) error into the crankshaft angle indication of the OmniLink II Operator Terminal. **Make sure the Encoder Offset setting shown on the screen is 0.** If other than zero, select Encoder Offset and manually enter a setting of zero before going to the next step by pressing the 0 number key and then the ENT(ER) key.

2. When you have positioned the crankshaft as closely as possible to top dead center, read the angle display on the OmniLink II Operator Terminal. The number displayed must between 351\(^0\) and 10\(^0\). This is because a maximum misalignment of resolver to crankshaft of +/-10\(^0\) can be corrected by the Encoder Offset function. If the displayed angle is more than 10\(^0\) from 0, you must manually decouple the resolver/encoder from the crankshaft and re-couple it within the required 351\(^0\) to 10\(^0\).

3. When steps 1 and 2 are complete, use the arrow keys to select the Encoder Offset item on the menu and press the SET ZERO softkey. The offset angle value will be automatically entered into the Encoder Offset setting. This is the number that must be added to the actual resolver reading to get 0. If the resolver/crank misalignment angle was within the allowable limit of 351\(^0\) to 10\(^0\) when SET ZERO was pressed, the angular display value will indicate 0\(^0\).

Alternatively, you may enter the encoder offset manually using the number keys on the operator terminal keyboard. To do this, refer to Figure 4.8.

![Figure 4.8 Determining Encoder Offset](image-url)

Figure 4.8 illustrates how to manually determine encoder offset. If the crankshaft is positioned at TDC \( (0^0) \) and the angular position indicated by the angle display at the upper left corner of the operator terminal screen reads 354\(^0\), as in Figure 4.8a, you need to add an encoder offset of 6\(^0\) to 354\(^0\) to get 360\(^0\). For a circle 0\(^0\) and 360\(^0\) are the same point, but the angle display will always display 0\(^0\) rather than 360\(^0\). If you manually use the number keys to set 6\(^0\) as the offset and press the enter (ENT) key, the angle display will then change to agree with the actual crankshaft angle of 0\(^0\).

If the crankshaft is positioned at TDC \( (0^0) \) and the angular position indicated by the angle display at the upper left corner of the operator terminal screen reads 5\(^0\), as in Figure 4.8b, you need to add 355\(^0\) to the 5\(^0\) to be at 0\(^0\) (360\(^0\)). The operator terminal does not make provision for negative offsets.
Thus, regardless of whether you have a negative or positive misalignment of encoder to crankshaft, the Encoder Offset to manually enter when you calibrate the resolver with the slide at the top of stroke position is determined by the relation:

Encoder Offset = $360^\circ - \text{Display Angle (with current Encoder Offset setting of 0)}$

4. Verify that the angle display changes to $0^\circ$ after you press the Set Zero softkey or manually enter an offset. Manual entry of numbers between $0^\circ$–$90^\circ$ and $350^\circ$–$359^\circ$ is allowed. **If you have manually entered the wrong offset and the angle display doesn’t change to $0^\circ$, press the CLEAR key while Offset Encoder is selected to return the offset to 0 and then manually enter the correct offset angle.**

**Method 2. Slide at Bottom of Stroke**

1. Inch the press to position the crankshaft within no more than a couple of degrees of bottom dead center $180^\circ$ (slide at bottom of stroke). This is **important** because the system uses the crank angle as its absolute reference and will assume that the crankshaft position is at $180^\circ$ degrees when you calculate and manually enter the Encoder Offset. If the crankshaft is actually $5^\circ$ from bottom dead center when you manually enter an offset, as described in the following steps, you will incorporate a $5^\circ$ error into the angle indication of the OmniLink II Operator Terminal. **Make sure the Encoder Offset setting shown on the screen is 0.** If it is a value other than zero, manually enter a setting of zero before going to the next step.

2. When you have positioned the crankshaft as closely as possible to bottom dead center (use of a dial indicator gage between bolster and slide may be a useful tool to accurately determine bottom of stroke), read the angle display on the OmniLink II Operator Terminal. The number displayed must be within +/-$10^\circ$ of $180^\circ$, i.e., it must be between$170^\circ$ and $190^\circ$. This is because a maximum misalignment of resolver to crankshaft of +/-$10^\circ$ can be corrected by the Encoder Offset function. If the displayed angle is less than $171^\circ$ or more than $190^\circ$, you must manually decouple the resolver/encoder from the crankshaft and recouple it within the required angle range.

3. You must determine the required Encoder Offset to **manually** enter. The Set Zero softkey **must not be used** when determining offset in the bottom of stroke position. Determine the Encoder Offset angle to use as follows. Read the value on the angle display of the operator terminal with the crankshaft at BDC.

   a) If the angle display indicates a value between $171^\circ$ and $179^\circ$, calculate the Encoder Offset as:

   \[
   \text{Encoder Offset} = 180^\circ - \text{Display Angle (with Encoder Offset setting of 0)}
   \]

   b) If the angle display indicates a value between $181^\circ$ and $190^\circ$, calculate the Encoder Offset as:

   \[
   \text{Encoder Offset} = 540^\circ - \text{Display Angle (with Encoder Offset setting of 0)}
   \]

4. Use the number keys to key in the Encoder Offset you have calculated and press the ENT (Enter) key when finished. The operator terminal angle display should now read $180^\circ$. If not, you may have calculated the wrong offset angle or tried to offset a misalignment of more than +/- $10^\circ$. Manually enter 0 as the Encoder Offset and repeat this procedure.
Section 4.2.1.6 Use Mode Input Setting

The OmniLink II Press Automation Control provides an input that allows the user to provide an isolated contact to the operator terminal, when this can be derived from the press clutch/brake control, to indicate when the setup mode (usually Inch) is selected. When this input is provided, it allows die protection functions and counters to be bypassed when a setup mode is selected, if desired. Manual bypass of die protection and counters is also always available even when the Use Mode Input setting is Yes.

If this contact is wired as an input as described in the installation section of this manual, The CHANGE SETTING softkey should be used while Use Mode Input is selected to toggle the setting to “Yes”. If the Mode Input is not used, select “No” as the setting.

Section 4.2.1.7 Setting Clutch Engagement Time Limit

When the press control sends an electrical signal to the clutch/brake valve(s) to start stroking the press, there is a time delay before the air (or hydraulic on a few presses) flow can push the clutch plates together and ramp up crank speed (the clutch plates slip till flywheel or gear RPM is reached) to the setting made for Minimum Press Speed (see section 4.2.1.3). This is illustrated in Figure 4.9.

![Figure 4.9 Illustration of Clutch Engagement Time](image)

The Clutch Engagement Time Limit is used two ways by the system. First, the motion detector will not issue a fault, which stops stroking when the press clutch/brake control sends a stroking signal to clutch/brake valve, as long as motion starts within the time limit set for clutch engagement. Secondly, the Clutch Engagement Time limit provides useful diagnostic information relating to clutch wear. As clutch plates wear, increasing the volume of air that must flow into and be stored in the clutch air operator, clutch engagement time gradually increases. The increased volume of air stored in the clutch also takes longer to flow out when the air valve dumps pressure to stop stroking, resulting in longer stopping time for the press. When clutch wear reaches the point where actual clutch engagement time exceeds the limit, a fault will result that stops stroking and will be displayed as the reason for the last stop. Most (though not all) presses provide for adjustment or shimming to compensate for clutch wear. Exceeding the clutch engagement time limit tells you that clutch adjustment or shimming should be performed. When possible, it is preferable to adjust the clutch clearance to the press manufacturers recommended setting to determine the clutch engagement time with optimum clearance.

To determine the value to enter as the Clutch Engagement Time Limit, put the press in Single Stroke Mode and stroke the press several times. Record the Clutch Actual Engagement Time indicated by the system on the Machine Parameters screen at the end of each stroke. Some margin for wear must
be accommodated so that adjustment on a frequent basis is not necessary. A typical wear margin of 20% is usually sufficient. To determine the number to enter for the Clutch Engagement Time Limit with a 20% wear margin, take the longest time recorded and multiply it by 1.2. For example, if the longest time recorded is 100 milliseconds, enter a value of 120 milliseconds for the Clutch Engagement Time Limit.

Section 4.2.1.8 Setting Brake Monitor Top Stop and Brake Monitor Mid Stroke Stop Limits

The Brake Monitor Top Stop Limit and the Brake Monitor Mid Stroke Limits are set on the Machine Parameters menu. **However, during your initial system configuration only, before performing the steps listed in this section of the manual to determine the settings for Brake Monitor limits:**

1. If you have a variable speed press and are planning to adjust stroking speed through use of the OmniLink II LCD Operator Terminal and the Analog Input/Output Board, you should first access the Speed Configuration menu by pressing the SPEED CONFIG softkey on the Machine Params menu and perform the steps described in Section 4.2.2 of this manual. If not, proceed directly to step 2.

2. You should then return to the Main Configuration menu. Push the Top Stop Calibration softkey to go to the Top Stop Calibration menu and perform the Top Stop Calibration for the press as described in section 4.2.3 of this manual.

Once you have finished the Top Stop Calibration, return to the Machine Parameters menu and determine the proper Brake Monitor Top Stop and Mid Stroke Stop Limits as described in the following paragraphs of this section of the manual.

To determine Brake Monitor Top Stop Limit and Brake Monitor Mid Stroke Limit settings:

1. It advisable to determine stopping time of the press with the heaviest upper die that you use in the press and, if the press is a variable speed press, to run at the highest stroking speed for which the die is run in the press. Adjust the press shutheight so that the upper and lower dies don’t close. If the press has a slide counterbalance, it should be set for the weight of the upper die. The stopping time of the press will increase with upper die weight and stroking speed, and will vary with counterbalance pressure. It is also recommended to make adjustments (when adjustment is provided) to set clutch and brake clearance to the minimum value specified by the press manufacturer. This should reduce stopping time.

The worst case stopping time is what you are trying to determine, so that it is not necessary for you to have to repeatedly change the brake monitor stop limit settings as different dies are used in the press. Of course, you may add production jobs at a later time where die weight or stroking speed produces stop times that exceed the initial worst case values, requiring limits to be increased.

2. Turn the Run/Program switch to Run and start the press stroking in Continuous Mode. After the press has made two or three strokes, press the Top Stop softkey on the Machine Parameter menu screen. The OmniLink II Press Automation Control will top stop the press and a stopping time will be displayed in milliseconds (thousandths of a second) for Brake Monitor Actual Stop Time. To the right of the stop time (TOP) should appear, indicating that this is a top stop time measurement. Record this stop time and repeat this step, recording top stop time each time you stop.
3. Take the longest stop time recorded in step 2 and add a 10% to 20% margin for wear and other factors that affect this time to determine the Brake Monitor Top Stop Limit setting. For example, if your longest recorded stopping time is 170 milliseconds, 20% of this value is 34, and a setting of 204 milliseconds for the Brake Monitor Top Stop Limit would allow top stopping time to increase by 34 milliseconds before a brake monitor fault would prevent a successive stroke. A 10% margin would allow less increase in stopping time before a fault occurred. Turn the Run/Program switch to Program and select the Brake Monitor Top Stop Limit setting. Enter the number you have determined in this step for the Brake Monitor Top Stop Limit.

4. Next, return the Run/Program switch to Run and again start the press stroking in Continuous Mode. After the press has made two or three strokes, press the Mid Stop softkey on the Machine Parameter menu screen. The OmniLink II Press Automation Control will initiate a stop signal near mid stroke and a stopping time will be displayed in milliseconds (thousandths of a second) for Brake Monitor Actual Stop Time. To the right of the stop time (MID) should appear, indicating that this is a mid-stroke stop time measurement. Record the mid stroke stop time and repeat this step, recording mid stroke stop time each time you stop.

5. Take the longest stop time recorded in step 4 and add a 10% to 20% margin for wear and other factors that affect this time to determine the Brake Monitor Mid Stroke Stop Limit setting. For example, if your longest recorded stopping time is 200 milliseconds, 20% of this value is 40, and a setting of 240 milliseconds for the Brake Monitor Mid Stroke Stop Limit would allow mid stroke stopping time to increase by 40 milliseconds before a brake monitor fault would prevent a successive stroke. A 10% margin would allow less increase in stopping time before a fault occurred. Note! Because of the characteristics of the reciprocating motion of a mechanical power press, mid stroke stopping time is normally greater than top stopping time. Turn the Run/Program switch to Program and select the Brake Monitor Mid Stroke Stop Limit setting. Enter the number you have determined in this step for the Brake Monitor Mid Stroke Stop Limit.

Section 4.2.2 Speed/Load Configuration Menu Settings

The Speed/Load Configuration menu shown in Figure 4.10 is used to make calibration settings related to press speed and percent motor load display. This menu is accessed with the SPEED/LOAD CONFIG softkey on the Machine Parameters Menu. If you don’t purchase the optional Analog Input/Output option with your system, there are no settings that need be made on this menu. The factory default setting for Speed Mode, located at the top of the screen, will be “Not Used” and should be left as “Not Used”. If you do have the Analog/Input Output option, the following sections discuss the choices and settings that can be made.
Section 4.2.2.1 Setting Speed Mode

If you have the optional Analog Input/Output board, the Speed Mode setting at the top of the menu is the first setting you will make. If your press is a fixed speed press, leave the Speed Mode setting at the top as “Not Used”. The only use of the Analog Input/Output board will be to allow Percent Motor Load to be displayed, and the only setting you will make on this menu is for “Percent Load Cal #”. If your press has a variable speed drive, three Speed Mode choices that make use of the Analog Input/Output board are possible. Pressing the CHANGE SETTING softkey with the Speed Mode setting highlighted will cause a selection box to appear as shown in Figure 4.11.
Use the arrow keys to select your choice of 3 Speed Mode settings; Input Only, Output Without Recall, or Output With Recall. The significance of these settings is:

- **Input Only.** If Input Only is selected, an analog speed input signal must be provided to the Analog Input/Output Board from the variable speed drive as shown in Section 2.3.7.2 of this manual. This will allow display of the selected drive stroking speed, and stroking speed of the press can be displayed even when the press is not stroking. You will also need to enter Calibration settings related to Input SPM near the top of the screen.

- **Output Without Recall.** If Output Without Recall is selected, in addition to the requirements of Input Only, the analog output SPM output on Link’s Analog Input/Output board must be wired to the press variable speed drive, This is generically shown in Section 2.3.7.2. This allows stroking speed to be set by the OmniLink II LCD Operator Terminal, **but not recalled on a job by job basis** for the press. Both Input SPM and Output SPM Calibration Parameters will need to be entered on the Speed/Load configuration menu in order to calibrate input and output SPM. When Output Without Recall is selected you can also set the Speed Parameters shown on the menu. Setup Mode Fixed SPM automatically set a fixed low speed for Setup Mode (usually INCH mode). Prod. Mode Min SPM sets a minimum SPM at which the press will stroke in production modes to avoid sticking the press on bottom due to insufficient flywheel energy.

- **Output With Recall.** Same as Output Without Recall **except that you may set and store a speed which will be recalled and set by the OmniLink system on a job by job basis.**

**Section 4.2.2.2 Calibrating Variable Speed Drive Input SPM When “Input Only” is Selected**

If “Input Only” is selected for Speed Mode, the Analog Speed Output by which speed is set by the OmniLink II Operator Terminal will not be used. Drive SPM will be set by the same method (a potentiometer or keypad associated with the drive) as before the OmniLink II Press Automation Control was installed. An analog speed input from the drive to the OmniLink Analog Output/Input board as shown in Section 2.3.7.2 is necessary. Calibrate the Drive Speed input to the OmniLink Analog Input/Output board as follows:

1. Go to Section 4.2.4.1 of this manual and configure Stroking Speed to be displayed in the top area of the operator terminal display “When in a Production Mode”. Stroke Speed is determined by the resolver attached to the crankshaft and is always accurate. However it will be zero unless the press clutch is engaged (turning the crankshaft) and the press is actually stroking.

2. Use the potentiometer or keypad that sets the speed of the variable speed drive to set the highest speed (SPM) for the press.

3. Make certain Input SPM Offset is set to zero.

4. Set Maximum Input SPM to about 10% more than the actual highest stroking speed of the press, ie., if highest stroking speed is 100SPM, set Maximum Input SPM to 110.

5. Turn the Program/Run switch on the Operator Terminal to the RUN position so the press can stroke.
6. Select the CONTINUOUS stroking mode on the press stroking selector and initiate press stroking.

7. The actual stroking speed will be shown at the top of the OmniLink Operator Terminal display beside Stroke Speed as long as the press is stroking. This Stroke Speed will be used to calibrate the Motor (Drive Speed). If the Input SPM Cal # parameter is set to 0, the Motor Speed (Drive Speed) at the bottom of the screen will be 0. Calibration numbers between 0 and 4095 can be entered for the Input SPM Cal #. Enter calibration numbers by trial and error until the Motor Speed agrees with Stroke Speed. To do this press the CHANGE SETTING softkey with Input SPM Cal # selected and enter the calibration #. Do not use the ENTER CAL. MODE softkey for the Input SPM Cal #. The ENTER CAL. MODE softkey is used only when calibrating Output SPM calibration numbers where the OmniLink is used to set press stroking speed.

8. Adjust the variable speed drive till the Stroke Speed display at the top of the screen indicates the minimum stroking speed at which you will operate. If the Motor Speed Reading at the bottom of the display is within 1 or 2 SPM of the Stroke Speed displayed at the top of the screen at the minimum SPM stop here, you are finished. If not, it will be necessary to enter small numbers (start with the number 5) for the SPM Input Offset parameter, gradually entering greater numbers until the Motor Speed Reading equals Stroke Speed at the minimum SPM.

9. Return the press to the highest stroking speed and refine the Input SPM Cal # to make Drive Speed again agree with Stroke Speed if necessary.

Section 4.2.2.3 Calibrating Variable Speed Drive Input SPM When Output Without Recall or Output With Recall is Selected for Speed Mode

When either Output Without Recall or Output With Recall is selected for Speed Mode, the analog Output SPM signal from the OmniLink to the variable speed drive that sets drive speed must be calibrated and drive adjustments must be made so that the Drive SPM will actually track the speed settings entered by use of the OmniLink II Operator Terminal. This calibration/adjustment procedure, described in Section 4.2.2.4 must be performed first, before calibrating Input SPM, so that the Operator Terminal can be used to set the drive speeds required in the Input SPM calibration procedure.

Once the analog Output SPM from OmniLink to variable speed drive is calibrated follow the procedure of Section 4.2.2.2 to calibrate the Input SPM. In step 2 of the procedure, adjust drive speed by pressing the MOTOR SPEED softkey on the Speed/Load Configuration menu to take you to the motor speed adjustment screen and enter the desired speed. You will return to the Speed/Load Configuration menu when the EXIT softkey is pressed once speed is set.

Section 4.2.2.4 Calibrating the Analog Output SPM Signal to Give Correct Drive Speed

If either Output Without Recall or Output With Recall is selected for Speed Mode, the analog Output SPM signal from the OmniLink to the variable speed drive (see Section 2.3.7.2) that sets drive speed must be calibrated and drive adjustments must be made so that the Drive SPM will actually track the speed settings entered by use of the OmniLink II Operator Terminal. The calibration adjustment procedure is as follows:

1. Go to Section 4.2.4.1 of this manual and configure Stroking Speed to be displayed in the top area of the operator terminal display “When in a Production Mode”.

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2. Return to the Speed/Load Configuration menu and set Speed Mode to Output Without Recall or Output With Recall as desired. Set all parameters on the Speed/Load Configuration menu to 0, except for Minimum Output SPM and Maximum Output SPM. Set these values to the press manufacturer’s specified lowest and highest speed.

3. Enable the Output SPM calibration mode by pressing the ENTER CAL. MODE softkey, which causes a legend that “Output Cal Mode Is Active” to appear at the bottom of the screen and a popup Output Cal # entry box that appears under the legend. The softkey that read ENTER CAL MODE will also now read EXIT CAL MODE. Calibration mode allows Cal #’s to be entered into the popup entry field. The calibration number that is entered is converted directly into an analog output voltage as described in the information below.

\[ \text{Analog output (Vdc)} = \text{Calibration \#} \times 10.00 \]

<table>
<thead>
<tr>
<th>Cal. #</th>
<th>Output Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>4095</td>
<td>10.00</td>
</tr>
<tr>
<td>3890</td>
<td>9.50</td>
</tr>
<tr>
<td>3687</td>
<td>9.00</td>
</tr>
<tr>
<td>3481</td>
<td>8.50</td>
</tr>
<tr>
<td>3276</td>
<td>8.00</td>
</tr>
<tr>
<td>3071</td>
<td>7.50</td>
</tr>
<tr>
<td>2867</td>
<td>7.00</td>
</tr>
<tr>
<td>2662</td>
<td>6.50</td>
</tr>
<tr>
<td>2457</td>
<td>6.00</td>
</tr>
<tr>
<td>2252</td>
<td>5.50</td>
</tr>
<tr>
<td>2048</td>
<td>5.00</td>
</tr>
<tr>
<td>1843</td>
<td>4.50</td>
</tr>
<tr>
<td>1638</td>
<td>4.00</td>
</tr>
<tr>
<td>1433</td>
<td>3.50</td>
</tr>
<tr>
<td>1229</td>
<td>3.00</td>
</tr>
<tr>
<td>1024</td>
<td>2.50</td>
</tr>
<tr>
<td>0819</td>
<td>2.00</td>
</tr>
<tr>
<td>0614</td>
<td>1.50</td>
</tr>
<tr>
<td>0410</td>
<td>1.00</td>
</tr>
<tr>
<td>0205</td>
<td>0.50</td>
</tr>
<tr>
<td>0000</td>
<td>0.00</td>
</tr>
</tbody>
</table>

This voltage is input to the variable speed drive to set speed. The first objective of Output SPM calibration is to cause the variable speed drive to cause the press to stroke at the maximum rated stroking speed when the analog voltage is set to its highest value – 10VDC (Cal # 4095).

4. Instead of entering the highest calibration number (4095) initially, enter a value of 1000. This should be done to ensure that the drive does not cause the flywheel RPM to exceed the value that produces the maximum intended stroking speed.

5. Turn the Program/Run switch to RUN so that the press can stroke, turn the press stroking selector to the CONTINUOUS mode, and initiate stroking.
6. Observe the Stroke Speed indicator at the top of the operator terminal display. This is the true stroking speed derived from RPM that the crankshaft turns in Continuous stroking. If the SPM indicated is less than the Maximum SPM for the press, successively enter larger Output SPM Cal numbers until either the highest Cal # of 4095 is reached without producing the Maximum SPM, or until a Cal # lower than 4095 produces the maximum stroking speed. If a Cal # of 4095 produces a stroking speed less than the specified maximum stroking speed of the press, follow the variable speed drive manufacturer’s instructions and adjust the drive speed until it reaches maximum stroking speed with the 10Vdc signal produced by the Cal # of 4095. If a Cal # lower than 4095 causes the stroking speed to reach the specified maximum SPM, do not continue to increase the Cal #. Rather, adjust the drive speed downward until well below the Maximum SPM and then begin to increase the Cal # till 4095 is reached without exceeding maximum SPM. If necessary, re-adjust the drive speed upward to the maximum SPM after the Cal # is set to 4095, its maximum value. Once this step is complete, a Cal # of 4095 (and an analog voltage of 10Vdc) represents the highest stroking speed of the press. Leave the press stroking, do not exit calibration mode, and proceed to step 7.

7. Next, the Cal # that will produce the minimum stroking speed of the press must be found. A first approximation of this Cal # may be derived by assuming (as is usually the case) that the drive speed input responds in a fairly linear fashion to the analog voltage that the Cal # determines. For example, if a variable speed press is intended to stroke from a low of 50 SPM to a high of 150 SPM and the drive is adjusted to produce 150 SPM at a Cal # of 4095 in step 6, a first approximation of the Cal # that would produce 50 SPM, which is 1/3 of 150 SPM, would be 1/3 of 4095, or 1365. Enter this number into the popup Output Cal # entry box at the bottom of the screen. The stroking speed should slow down. Observe the Stroke Speed indicator at the top of the operator terminal display until the speed has stabilized at the lower value determined by the Cal # entered. If the SPM is lower or higher than the minimum stroking speed of the press, increase or decrease the Cal # until the specified minimum stroking speed is reached. Once the correct Cal # is determined by entry into the popup Cal # box, use the arrow keys to highlight the Minimum Output Cal # setting on the menu and enter this number. Leave the press stroking, do not exit calibration mode, and proceed to step 8.

8. The Mid Range Output SPM and Mid Range Output Cal # settings are provided to linearize the press speed with respect to the analog input when needed. Typically dc and variable frequency drives exhibit linear characteristics and it is not necessary to set a mid range parameter. However, eddy current drives can exhibit nonlinear behavior. To test for linearity, add the setting for Minimum Output Cal # to 4095 and divide by 2. Enter this value into the popup Output Cal # entry box at the bottom of the screen. The Stroke Speed indicator at the top of the operator terminal display should display a stroking speed halfway between the minimum and the maximum stroking speed ([minimum stroking speed + maximum stroking speed/2]. If the Stroke Speed Indication is within 2 or 3 SPM of the expected value you do not need to enter Mid Range settings. If the display differs by more than 2 or 3 SPM from the expected value, enter the Mid Range Output SPM and increase or decrease the Cal # in the popup Output Cal # entry box until the Stroke Speed SPM is equal to the Mid Range Output SPM that you entered. Once the correct Cal # is found, enter the Cal # as the Mid Range Output Cal # setting.

9. Calibration of press drive speed is now complete. Pressing the EXIT CAL MODE softkey will take you out of the Output SPM calibration mode and automatically set the press stroking speed to the lowest value on the Motor Speed adjustment screen. It is now possible to set stroking speed by entering numbers or using the SPM UP and SPM DOWN softkeys on the Motor Speed screen. Now calibrate Input SPM as described in Section 4.2.2.3.
Section 4.2.2.5 Calibrating Percent Motor Load

If an input signal is provided to the OmniLink Analog Input/Output board as shown in Figure 2.16, this input must be calibrated to show correct Percent Motor Load. The calibration procedure is as follows.

1. Turn on the main press drive motor and place an ammeter on a motor lead. Do not stroke the press. This would cause variation in the motor current.

2. Read the current being drawn by the ammeter, divide the ammeter current by the full load current of the motor and multiple the result by 100. This is the Percent Load you are drawing while not stroking or stamping and should normally be less than 30%. The full load current of the motor should be on the motor legend plate or available from a table.

3. Enter numbers by trial and error into the Percent Load Cal # until the Percent Load Reading at the bottom of the screen agrees with the number you calculated in step 2. Start with a Cal # of 2000. Note! The Percent Load Reading displayed varies inversely with the Cal #. If the Cal # of 2000 produces a Percent Load Reading that is higher than you calculated in step 2, increase the Cal #. If lower than your calculation, decrease the Cal #. You are finished when a Cal # produces the same Percent Load Reading that you calculated in step 2.

Section 4.2.2.6 Setting Speed Parameters

Speed Parameters should only be set for variable speed presses equipped with the OmniLink Analog Input/Output option and with press speed set by the OmniLink analog speed input.

The purpose of the Prod. Mode Min SPM setting is to prevent operator entry of stroking speeds below the minimum stroking speed recommended by the press manufacturer when the press is used in a production mode. This could cause both motor overload and sticking on bottom because of insufficient flywheel energy when stamping. If you don’t want to use this feature, simply leave its setting at zero. If you do want to set a minimum speed entry when in a production mode, enter the minimum speed setting.

The purpose of the Setup Mode Fixed SPM parameter is to allow the user to enter a fixed speed that the OmniLink analog speed output will automatically set when a setup mode (usually INCH) is selected on a variable speed press. This feature requires a setup mode input as shown in Figure 2.16.

Section 4.2.3 Top Stop Calibration Menu Settings

Both stopping time and stopping distance (in degrees) vary greatly with press speed and depend on die weight and counterbalance pressure (if the press has a counterbalance) to a lesser degree. Before calibrating top stop for the OmniLink II press and Automation Control, it is advisable to set a die in the press and adjust the counterbalance (if the press has a counterbalance) to the proper pressure for the upper die weight used. It is preferable to use a die that has one of the heaviest upper die weights used in the press, since this can then be used to determine the Brake Monitor settings that you will make next as prescribed in Section 4.2.1.8. If you do place a die in the press for this calibration procedure, adjust the slide shutheight so that the dies don’t close as you perform the top stop calibration and the following Brake Monitor settings.

The Top Stop Calibration menu, shown in Figure 4.12, is reached by pressing the Top Stop Calibrate softkey in the Main Configuration Menu.
There are 7 items indicated on the Speed Adjusted Top Stop Calibration Screen, which is used to calibrate top stop for both variable speed presses and fixed speed presses. These items are:

1. **Low Speed SPM.** This is a **setting** that **must be entered** for the lowest strokes/min for a variable speed press. For a fixed speed press, both the Low Speed SPM and the High Speed SPM of item 3 will be entered as the nominal speed of the press in strokes/min.

2. **Low Speed Degrees Before Top Dead Center (0°).** This is an **angle setting** that **must be entered** to initiate a stop for a variable speed press stroking at the Low Speed SPM that will result in stopping within a couple of degrees of Top Dead Center. For a fixed speed press, the number entered here will be the same as for High Speed Degrees Before top Dead Center in item 4.

3. **High Speed SPM.** This is a **setting** that **must be entered** for the highest strokes/min for a variable speed press. For a fixed speed press, both the High Speed SPM and the Low Speed SPM of item 1 will be entered as the nominal speed of the press in strokes/min.

4. **High Speed Degrees Before Top Dead Center(0°).** This is an angle **setting** that **must be entered** to initiate a stop for a variable speed press stroking at the High Speed SPM that will result in stopping within a couple of degrees of Top Dead Center. For a fixed speed press, the number entered here will be the same as for Low Speed Degrees Before top Dead Center in item 4.

5. **Speed At Stop Initiation.** This is a **measured speed** of the crank or eccentric at the angle that a stop signal intended to stop the press at TDC is initiated. It automatically appears each time the press strokes and intended to aid in the automatic top stop calibration process for variable speed presses. **You cannot enter a setting for this item.**
6. Calculated Degrees Before Top Dead Center. For variable speed presses, the OmniLink II Press Automation Control uses a nonlinear equation whose coefficients are based on the settings made in items 1-4 for highest and lowest speed. This equation calculates the correct angle before TDC to apply a stop signal to stop the press at the top of the stroke based on the measured stroking speed, shown as the Speed At Stop Initiation in item 5. This angle appears on the screen each time the press stops as the number indicated as Calculated Degrees Before Top Dead Center, and will vary with actual stroking speed. This calculated number aids in refining settings in items 2 and 4 to stop near top as you perform the automatic top stop calibration for variable speed presses. You cannot enter a setting for this item.

7. Co A and Co B. These are the coefficients of the nonlinear equation that compensates the top stop signal for variable speed presses for different speeds. These numbers are based on the settings you make in items 1-4. They have no utility other than possibly being useful for troubleshooting with Link personnel over the phone. For fixed speed presses, these coefficients will both be 0 since both Low Speed SPM and High Speed SPM will be entered as the nominal speed of the press, and Low Speed and High Speed Degrees Before Top Dead Center will be set the same. You cannot enter settings for these coefficients.

Section 4.2.3.1 Top Stop Calibration for Fixed Speed Presses

To set up the stop initiation angle for fixed speed presses:

1. Go to the Speed Adjusted Top Stop Compensation screen. Turn the Run/Program Switch to Program. Enter settings for both the Low Speed SPM and the High Speed SPM that are equal to the nominal press strokes/min. If the press legend plate indicates that the press strokes at a fixed 60 strokes/min, this is the value that should be entered. Enter settings of 00 for both the Low Speed Degrees Before Top Dead Center and High Speed Degrees Before Top Dead Center.

2. Turn the Run/Program switch to Run, select the Continuous mode of operation on the press control and initiate Continuous Stroking. After a few strokes, press the TOP STOP softkey on the Speed Adjusted Top Stop screen (do not top stop the press using any top stop button that may be provided with the press control). Since both Low Speed and High Speed Degrees Before Top Dead Center were set to 0 in step 1, the OmniLink operator terminal will initiate a stop signal at Top Dead Center (00), and the press will travel into the downstroke before stopping. Look at the operator terminal angle display in the upper left corner of the display to read the angle at which the press slide comes to a stop. Since the stop angles (Low and High Speed Degrees before Top Dead Center) entered in step 1 were both 0, the reading on the angle display is the number of degrees the press took to stop.

3. Turn the Run/Program switch back to Program. Enter the number on the Operator Terminal angle display into both the Low Speed and High Speed Degrees Before Top Dead Center as an approximate setting.

4. Return the Run/Program switch back to Run and initiate Continuous stroking again. Press the Top Stop softkey on the Speed Adjusted Top Stop screen and read the operator terminal angle display to observe where the press stopped. Since the stopping time and distance (angle) for the press may be different depending on the angular region over which the press stops, the settings in step 5 may not stop the press as close to the top as desired. To refine the adjustment, turn the Run/Program key
to Program so that you can change the settings made in step 3. If the press has stopped $X$ degrees beyond Top Dead Center, **add** $X$ degrees to the settings made in step 3. If the press has stopped $X$ degrees before Top Dead Center, **subtract** $X$ degrees from the settings made in step 3.

5. Repeat step 4, if necessary, until the press is stopping within a few degrees of top each time you push the Top Stop softkey. It is normal for a small variation to occur in the stop angle of the press as the press is stopped multiple times.

**Section 4.2.3.2 Variable Speed Press Auto Top Stop Calibration**

**Section 4.2.3.2.1 General Considerations**

Variable speed presses take longer in time and further (in crankshaft degrees) to stop as stroke speed is increased. This is not a linear function because the energy stored in the rotating parts and the slide is a function of the square of the stroking speed. Signals that tell the press clutch/brake control when to start stopping so that the slide will top stop are generated from angular position indicating devices such as rotating cam limit switches or encoders, that are connected to the press crank or eccentric shaft. These can be adjusted by trial and error to give a stop signal at a crankshaft position in the upstroke that results in the press stopping at top. But on a variable speed press, as speed increases, the stopping distance will increase, causing the press to overrun its top of stroke position for a fixed setting of the angular position indicating device. Similarly, if the angular position indicating device is set to stop the slide at top at a high speed, the slide will stop short of top at lesser speeds. On presses with a wide speed range, a fixed stop signal may even result in the press stopping at or near bottom at some speeds instead of near top.

The OmniLink II Press Automation Control provides, as **standard**, an **Auto Top Stop Compensation** function for variable speed presses for top stop commands that **it initiates** to the press clutch/brake control in conjunction with faults detected by its production system monitoring functions that require top stop. This function is calibrated in the configuration mode of the OmniLink II so that, as speed increases or decreases, the top stop signal is sent at an earlier or later crankshaft angle as necessary to stop the press slide near top position.

In addition, **IF** the optional PLS/Logic Module is provided with the OmniLink II, it may be possible to use PLS relays **in conjunction with the existing hard cams** for some press controls on variable speed presses to auto compensate the anti-repeat function that stops the press near top in single stroke modes for changes in speed. It is often possible to use the existing cams associated with the clutch/brake control to set a default stop position at the lowest stroking speed and use the OmniLink II PLS outputs to give an earlier stop signal as speed increases. **This must not be done if**, when the existing hard cams are adjusted to stop the press at top at the lowest stroking speed, this adjustment would result in a stop past $80^\circ$ in the downstroke at the highest stroking speed. See the installation section of this manual.

⚠️ **WARNING!** Never use the OmniLink II Press Automation Control PLS outputs to simply **REPLACE** the cams or other devices that provide the anti-repeat function (which automatically stops the press at the end of each stroke) required by OSHA standards for **SINGLE STROKE MODE** of a press clutch/brake control. The PLS outputs are not control reliable and may not stop the press if a failure occurs. Serious injury to operators can result if the press fails to stop at the end of a stroke as required in single stroke mode.
It is IMPORTANT TO NOTE that the OmniLink II cannot provide Auto Top Stop Compensation for top stop signals that it does not initiate to the press clutch/brake control in automatic modes. Top stop signals from auxiliary equipment or top stop operator controls that are wired directly to the clutch/brake control cannot be compensated. **Exception!** If the anti-repeat cams used for single stroke are also the cams used to provide top stop in automatic modes, the PLS outputs used to auto top stop compensate the anti-repeat function in single stroke will also compensate top stop signals from auxiliary equipment and top stop operator controls in automatic modes. If approved by Link engineers, Link Systems SS501 controls with at least 4 mechanical cam switches available for use with the anti-repeat function may be augmented with PLS outputs from the OmniLink II Press Automation Control to provide auto top stop compensation from all top stop sources.

**Section 4.2.3.2.2 Calibration Procedure for Variable Speed Presses**

The suggested auto top stop calibration procedure for variable speed presses is as follows.

1. Go to the Speed Adjusted Top Stop Compensation screen. Turn the Run/Program Switch to Program. Enter a setting equal to the lowest strokes/min for the variable speed press for the Low Speed SPM. Enter a setting equal to the highest strokes/min for the variable speed press for the High Speed SPM. Enter settings of 0° for both the Low Speed Degrees Before Top Dead Center and High Speed Degrees Before Top Dead Center. With both Low Speed and High Speed Degrees Before Top Dead Center set to the same value, the press control will not calculate a stopping angle based on speed but will use the programmed setting (0°) to generate a stop signal at all speeds.

2. Turn the Run/Program switch to Run, select the Continuous mode of operation on the press control, and set the speed of the press to the value entered for Low Speed SPM. If your system has the optional analog input/output card and it is set up to control stroking speed, press the Motor Speed Softkey in the lower left corner of the operator terminal and enter a speed setting equal to Low Speed SPM. If not, use the speed pot or other speed setting device for your variable speed drive to adjust stroking speed to the value entered for Low Speed SPM. Initiate Continuous stroking. After a few strokes, press the TOP STOP softkey on the Speed Adjusted Top Stop screen (do not top stop the press using any top stop button that may be provided with the press control). Since both Low Speed and High Speed Degrees Before Top Dead Center were set to 0 in step 1, the OmniLink operator terminal will initiate a stop signal at Top Dead Center (0°), and the press will travel into the downstroke before stopping. Look at the operator terminal angle display in the upper left corner of the display to read the angle at which the press slide comes to a stop. Since the stop angles (Low and High Speed Degrees before Top Dead Center) entered in step 1 were both 0, the reading on the angle display is the number of degrees the press took to stop.

3. Turn the Run/Program switch back to Program. Enter the number shown on the Operator Terminal angle display into both the Low Speed and High Speed Degrees Before Top Dead Center as an approximate setting.

4. Return the Run/Program switch back to Run and initiate Continuous stroking again. Press the Top Stop softkey on the Speed Adjusted Top Stop screen after a few strokes, read the measured SPM displayed by the Speed At Stop Initiation on the Operator Terminal display and compare this number to the number you entered for Low Speed SPM. It is normal for speed to vary slightly throughout a stroke, and the measured SPM at the point the stop was initiated may be a few strokes/min different than the value set for Low Speed SPM. If so, change the number for Low Speed SPM to be the same as the measured Speed At Stop Initiation value.
5. The stopping time and distance (angle) for the press may be different depending on the angular region over which the press stops. Thus, the settings for Low Speed and High Speed Degrees Before Top Dead Center made in step 3 may not stop the press as close to the top as desired. To refine the adjustment, turn the Run/Program key to Program so that you can change the settings made in step 3. If the press has stopped X degrees beyond Top Dead Center, add X degrees to the settings made in step 3. If the press has stopped X degrees before Top Dead Center, subtract X degrees from the settings made in step 3 for both Low Speed and High Speed Degrees before Top Dead Center.

6. Repeat step 4, if necessary, until the press is stopping within a few degrees of top each time you push the Top Stop softkey at the Low Speed SPM. It is normal for a small variation to occur in the stop angle of the press as the press is stopped multiple times.

7. Now that the stop at Low Speed SPM has been calibrated, set the press stroking speed to the highest stroking speed, stroke the press in Continuous a few strokes and press the Top Stop softkey to stop the press. Compare the measured speed displayed as Speed At Stop Initiation on the Operator Terminal with the value you entered into the High Speed SPM. If different, change the setting for High Speed SPM to the measured value. Since the press was stroking at a higher speed, it will have gone well past Top Dead center before stopping. Also, verify that the calculated stop initiation angle displayed as Calculated Degrees Before Top Dead Center is the same as the value programmed for both Low Speed and High Speed Degrees Before Top Dead Center.

8. For high speed presses, the press may take more than one stroke or even multiple strokes to stop at the high speed, so the angle at which the press stops could be anywhere in the stroke. Regardless of whether the press stops in less than a stroke or more than one stroke, calculate an approximate angle setting to replace the current High Speed Degrees Before Top Dead Center by adding the angle displayed on the Operator Terminal angle display (which shows where the press actually stopped) to the angle displayed for Calculated Degrees Before Top Dead Center. Turn the Run/Program switch to Program and replace the existing High Speed Degrees Before Top Dead Center setting with the approximate angle setting calculated by the method in the previous sentence.

9. Return the Run/Program switch back to Run and initiate Continuous stroking again. Press the Top Stop softkey on the Speed Adjusted Top Stop screen after a few strokes and read the Operator Terminal angle display to see where the press stopped. Since the stopping time and distance (angle) for the press may be different depending on the angular region over which the press stops, the approximate setting made for High Speed Degrees Before Top Dead Center made in step 8 may not stop the press as close to top as desired. To refine the adjustment, turn the Run/Program key to Program so that you can change the setting made in step 8. If the press has stopped X degrees beyond Top Dead Center, add X degrees to the setting made in step 8. If the press has stopped X degrees before Top Dead Center, subtract X degrees from the settings made in step 8 for both Low Speed and High Speed Degrees before Top Dead Center.

10. Repeat step 9, if necessary, until the press is stopping within a few degrees of top each time you push the Top Stop softkey at the High Speed SPM. It is normal for a small variation to occur in the stop angle of the press as the press is stopped multiple times. How much variation occurs depends on the stopping characteristics of the press.

11. As a final step, stay in the Speed Adjusted Top Stop Calibration menu and stroke the press in
Continuous mode at various speeds between the low and high speeds. For each speed, press the Top Stop key and verify that the press stops within a few degrees of top for each speed.

**Section 4.2.4 Operator Terminal Configuration**

**Section 4.2.4.1 Top Area (Screen) Display Configuration**

Pressing the OPERATOR TERMINAL softkey on the Main Configuration menu causes the Top Display Area Configuration Screen shown in Figure 4.13 to be displayed.

![Top Display Area Configuration](image)

**Figure 4.13 Top Display (Screen) Area Configuration.**

The OmniLink II LCD Operator Terminal provides for some user customization of the information displayed in the top areas of the screen to the right of the angle display. When any of the items beside Area 1, Area 2, etc. at the top of the screen are highlighted pressing the change setting softkey will cause a box to appear listing all items **not already currently assigned to another area**. Select the desired item and press the ENT(ER) key. The currently available items are:

1. Drive Speed. Speed at which a variable speed drive will cause the press to stroke when the clutch is engaged **requires optional Analog Input/Output Card for the R/D-Brake Monitor Module**
2. Stroking Speed. Actual crankshaft SPM -- available only when the press is actually stroking
3. Auto Press Speed. Drive speed when press is not stroking and crankshaft speed when the press is stroking-- **requires optional Analog Input/Output Card for the R/D-Brake Monitor Module**
4. System Status. Diagnostic messages that indicate anything that prevents the start of stroking
5. Reason for the Last Stop. Diagnostic message that gives the reason for the last stop
6. Total Tonnage. If the system is equipped with optional Tonnage & Signature monitor
7. Counterbalance Pressure. **If** the control is equipped with optional automatic counterbalance adjust
8. Shut Height. **If** the system is equipped with optional automatic shut height adjust
9. Current Order Count
10. Current Down Time Code. **If** the optional LinkNet shop floor information system is used
11. Distance to Bottom. Available only if you enter settings for the Rod Length and Stroke Length of the press in this menu

The four items selected by the user for display can be mode dependent **if the user can provide an isolated input to the operator terminal derived from the press clutch/brake control to indicate when the setup mode (usually Inch) is selected**. The user has the option to choose four items for setup mode and four different items for production modes when this setup mode input is available **and** when the **Use Mode Input** setting is set to yes in the Machine Parameters Menu. Only one group of four items will be displayed for all modes if no setup mode input is provided.

You may also make settings for the real time clock of the operator terminal on this screen to correct discrepancies or change to daylight savings time.

The operator terminal can convert crankshaft angle into distance from bottom of stroke and display this distance if you enter the connection rod length from crank to slide and the stroke length of the press. Before entering Rod Length and Stroke Length, note that the default Rod/Stroke Units setting is in(inches). If a setting in mm(millimeters) is desired, select Rod/Stroke Units and press the CHANGE SETTING softkey to toggle the setting to mm. Enter settings for Rod Length and Stroke Length in the dimensional units chosen for Rod/Stroke Units.

The OmniLink II LCD Operator Terminal provides both Spanish and English screens as standard. The Default Language setting on the Top Display Area Configuration screen determines which language will automatically be presented on power up of the system. If Default Language is set to English, the screens will appear in English upon power up and the CHG key can be used to toggle the language between English and Spanish. Configure Spanish as the Default Language setting on this screen if you wish Spanish as the desired language each time the system is powered up.

**Section 4.2.4.2 Zeroing Stroke Count**

The Stroke Counter for the OmniLink II Operator Terminal cannot be reset or changed in either Run or Program screens since it is intended to count cumulative strokes the press makes from the time the OmniLink Press Automation Control is installed. However, if you wish to zero the stroke counter because you reinstall the OmniLink system on another press, or for other reason, press the ZERO STROKE COUNT key on the Top Display Area Configuration screen. This will result in a code entry box appearing on the screen as shown in Figure 4.14.
Figure 4.14 Code Entry Screen to Zero Stroke Count

Entering the two digit code sent for zero stroke count sent separately from your unit for security purposes and pressing the ENT(ER) key will set the stroke counter to zero.

Section 4.2.4.3 Key/Code Access Configuration

As described in Section 3, the OmniLink II Press Automation Control provides a user configurable security system to limit access to system settings and actions to those authorized by the employer. The configuration menu of the OmniLink II Press Automation Control is used to select how settings and other operations, such as reset of faults, job storage and job recall may be done and who may perform these actions. Settings, reset, bypass, and job storage actions fall into four access categories:

1. Those parameter settings that may be made only in the Configuration Menus, which can only be accessed by a person(s) using the Program/Run key and the highest user level password, the User Configuration Code. These settings include those settings that are based on machine characteristics such as stroke length, top stop angle, etc., and those settings that relate to safety issues, such as brake monitor limits.

2. Configuration settings made in the configuration menu at the user’s discretion to either allow certain reset/bypass actions to be made by anyone at any time, or to require a key/code permission to restrict access to reset/bypass functions to those persons specifically authorized by the user. Die protection reset or bypass is an example of actions that could be restricted or not.

3. Configuration settings made in the PLS Configuration Menu to choose whether settings for individual channels of a PLS (programmable limit switch) are restricted from being changed even by persons who have key/code access to make settings for PLS channels. Of course the person with key/code access could still make settings for those PLS channels that are not restricted in the configuration menu.
4. Those settings and operations that the system **always** requires Key/Code access to Program Mode to make.

**Section 4.2.4.3.1 Choosing Access Mode**

Access configuration begins with choosing **Access Mode** on the Access Configuration screen shown in Figure 4.15. This screen appears when the ACCESS CONFIG softkey on the Top Display Area Configuration screen of Figure 4.13 is pressed.

There are four access modes available for those settings and actions that are restricted to Key/Code access. These are Key and Code, Code Only, Key or Code, and Key Only. These modes are explained in Section 3.9. The access mode selected applies to all users. **Note! If Key Only access mode is chosen, you will not have to perform the calibration steps related to Access Timeout or user descriptions and codes that are described in the following sections. You will need to choose to restrict or unrestrict the certain actions as described in Section 4.2.3.4.1.**

To change the access mode position the cursor on the current access mode setting, press the CHANGE SETTING softkey, position the cursor to the desired access mode, and press the ENT key.

**Section 4.2.4.3.2 Settings and Actions That Can Be Restricted to Program Mode Only or are Available in Both Run and Program Modes**

Regardless of which access mode is chosen in the previous section, there are a few commonly performed actions and settings that the system allows the user to choose to be restricted to Program Mode only or to be done in Run Mode screens as well as Program mode. To configure whether these items are restricted to program mode or not, press the RESTRICT/UNRESTRICT ACTIONS softkey on...
the Access Configuration screen shown in Figure 4.15. The Restrict/Unrestrict configuration screen shown in Figure 4.16 will be displayed.

![Figure 4.16 Restrict/Unrestrict Actions Configuration Screen](image)

The actions listed on this screen are those current at the time this manual was written. Later versions of OmniLink II software may list additional actions to restrict or unrestrict. With the exception of actions related to Counters, which are standard, the actions listed need to be configured only if the optional hardware for these functions is used with the system. For example, if no Tonnage Monitor is used with the system, simply leave the TM Reset setting as “No”.

Select (highlight) the settings for all actions listed on the screen that you wish to be unrestricted and press the CHANGE SETTING softkey to toggle the setting to “Yes”. Use settings of “No” if you wish the action to be restricted to Program Mode.

### Section 4.2.4.3.3 Setting Access Timeout

If an access mode that uses a code is chosen, you should make Access Timeout settings. A user that gains access by using his code (password) will be logged in until he manually logs out or is automatically logged out. See Section 3.9.3. Automatic log out can be either time based or stroke based. The log out time and the log out number of strokes are programmed in the Access Configuration menu shown in Figure 4.15.

The timed log out is based upon the time between keyboard activity. If the user does not press any key on the operator terminal within the time programmed, the control will automatically log out the user. To program the Access Timeout time move the cursor to Access Timeout time, press the Change Number softkey, enter the desired time, and press the ENT key. This time can be programmed from 0 to 999 seconds. A timeout time of 0 seconds turns off the timed log out. If the Access Timeout time is set to 0 seconds, there is no time based automatic log out.
The stroke log out is based upon a number of press strokes between keyboard activity. If the user does not press any key on the operator terminal within the number of strokes programmed, the control will automatically log out the user. To program the Access Timeout number of strokes move the cursor to the Access Timeout strokes, press the Change Number softkey, enter the desired time, and press the ENT key. The number of strokes can be programmed from 0 to 999. An Access Timeout strokes setting of 0 strokes turns off the stroke based automatic log out, and there will be no stroke based automatic log out.

**Section 4.2.4.3.4 Editing Users**

**If an access mode that uses a code is chosen (any mode besides Key Only),** the system allows for up to sixteen users to have the ability to gain access to Program mode through individual codes. Each user can be assigned a name and a password. The Access Configuration menu is used to select a user and to enter the user edit menu. To edit a user, position the cursor on a user name to be edited (or a blank space if a user is to be added) under the User Description in the Access Configuration screen shown in Figure 4.15 is and press the EDIT USER softkey. The User Configuration menu, Figure 4.17, will be displayed.

![User Configuration Menu](image)

Figure 4.17 User Configuration Menu

When the “User” setting is selected, pressing the CHANGE TEXT softkey will cause the popup text entry box to appear, so that an alphanumeric name or description can be entered for “User”. Selecting the “Code” setting allows entry of up to a 4 digit number. The “Used” setting can be toggled between “Yes” and “No” by use of the CHANGE SETTING softkey to quickly turn the ability of a user to access the Program Mode off and on without having to reprogram all settings.

Once the user has been assigned a name, code, and a “Yes” setting has been entered for “Used”, a list of settings and actions that a particular user is allowed, or not allowed, to perform can be configured. Select each setting listed under PERMISSIONS and press the CHANGE SETTING softkey to assign a “Yes” or “No” for the setting or action.
Note! The list of permissions shown on the screen is shown as an example. New software versions and hardware modules developed to perform new functions may add to this list. Also, any action that was chosen to be unrestricted in the screen of Figure 4.15 will appear in red in the permissions list and such actions will not be restricted to Program Mode, regardless of whether you select “Yes” or “No” under the used column for this item.

Section 4.2.4.3.5 Changing the User Configuration Code

Pressing the SET CONFIG. CODE softkey in the Access Configuration Menu, Figure 4.15, will display the User Configuration Code screen, Figure 4.18. This screen allows the User Configuration Code to be changed. This is the configuration code that protects against access to configuration screens by untrained and/or unauthorized persons. It is imperative that this code be given only to authorized personnel who are familiar with the control and with the consequences of incorrect parameter settings.

![Figure 4.18 User Configuration Code Screen](image)

The original configuration code is set at the factory. It is suggested that this code not be changed unless the security of the configuration code has been jeopardized. If a configuration code has been obtained by persons you do not wish to access the configuration parameters, it must be changed. **When this code is changed, the previous code will no longer be valid.** The new code should be documented and stored in a secure place.

If the current User Configuration Code is lost, the factory must be consulted to restore access to configuration screens.

To change the configuration code, press the Change Number softkey, enter the new code, and press the ENT key.
Section 4.2.4.4 Auxiliary Communications Setup

The AUXILIARY COMM. SETUP softkey provides access to the configuration screens for the communication options. These options include serial communication ports for interfacing to electronic servo feeds, auxiliary equipment (such as PLCs), a laptop interface for downloading messages, and a network interface. See the manual pertaining to the particular device that is connected for communication for auxiliary communications setup for that device.

Section 4.2.5 Auxiliary Equipment Messages

The OmniLink II Press Automation Control makes provision to wire inputs to its parallel port on the back of the operator terminal from the intelligent controller (such as a PLC) of auxiliary equipment so that diagnostic messages from auxiliary equipment can be displayed on the brake monitor screen of the operator terminal. Wiring is shown in Figures 2.20 in Section 2.6 of this manual. The OmniLink II operator terminal interprets inputs 2 – 8 on the parallel input port as binary number bits with input 2 representing 2^0 (the least significant binary bit) and input 8 as 2^6. Input 1 on the parallel port must be connected to the ground of the controller sending the signals to inputs 2-8. The 128 binary numbers available for message codes and their decimal equivalents are:

<table>
<thead>
<tr>
<th>Binary</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000000</td>
<td>0</td>
</tr>
<tr>
<td>0000001</td>
<td>1</td>
</tr>
<tr>
<td>0000010</td>
<td>2</td>
</tr>
<tr>
<td>0000011</td>
<td>3</td>
</tr>
<tr>
<td>0000100</td>
<td>4</td>
</tr>
<tr>
<td>0000101</td>
<td>5</td>
</tr>
<tr>
<td>0000110</td>
<td>6</td>
</tr>
<tr>
<td>0000111</td>
<td>7</td>
</tr>
<tr>
<td>etc.</td>
<td>etc.</td>
</tr>
</tbody>
</table>

The message codes sent to the parallel port from auxiliary equipment may indicate conditions that prevent stroking the press, such as “Feed Fault”, or may simply give information about the status of auxiliary equipment, such as “Feed Automatic Mode” or “Feed Manual Mode”. In either case, the person that programs the PLC to send the desired message codes needs to prioritize the messages sent to the parallel port in case several conditions that are assigned a message code are present at the same time.

Generally, all message codes from auxiliary equipment that are associated with the assertion of a stop signal from auxiliary equipment to the press clutch/brake control should take priority over messages that provide status information. A simple way to prioritize is to always have the PLC assert the lowest binary number message code when more than one condition exists. Assign all message codes associated with the assertion of a stop signal from auxiliary equipment to the press clutch/brake control to a lower group of binary numbers. Also, within this group, the lower the binary number the higher the priority in the order that you want the message displayed. Assign all messages associated with status information (and no associated stop signal) to a higher group of numbers than those message codes associated with stop signals from auxiliary equipment to clutch/brake control. Again, within this group, the lower the binary number assigned, the higher the priority in the order that you want the message displayed.
To enter the alpha-numeric messages associated with each input message code (number) go to the Auxiliary Names configuration screen shown in Figure 4.19. This screen is accessed from the Main Configuration menu shown in Figure 4.5 by pressing the NAMES softkey. To turn the auxiliary equipment message option ON, press the OPTION ON/OFF key.

To enter or edit messages, select the desired message number to edit and press the CHANGE NAME softkey. The Text Entry screen in Figure 4.20 will appear to allow message entry (see Section 3.8). For messages indicate conditions where the auxiliary equipment asserts a stop to the clutch/brake control, it is useful to start the message with “STOP:” and then state the diagnostic message.

Figure 4.19 The Auxiliary Equipment Message (Names) Configuration Screen.

Figure 4.20 The Text Entry Screen for Auxiliary Equipment Messages (Names)
Section 5 Using the OmniLink II Press Automation Control Standard Functions and Optional Speed Adjust Function

Read Section 3 of this manual for a general understanding of the use of the operator terminal before reading this section. The Main Menu (screen) of the OmniLink II Press Automation Control (Figure 5.1) provides a view of the major functions available and brief status information for each function. The operator may select the system standard Brake Monitor, Module Limit Switch, Job Setups, and Counters screens available with the base system hardware (Operator Terminal, R/D-Brake Monitor Module, resolver and its cable) by pressing the softkey adjacent to the softkey legend area on the screen. The Speed Adjust softkey legend will also appear on the Main Menu if the press is a variable speed press and the optional Analog Input/Output board is provided and used with the system to adjust stroking speed.

Screens associated with PLS/Logic, Automatic Setups, Tonnage & Signature Monitor, Die Protection & Process Monitor, and Analog Monitor functions are also accessed from the Main Menu by pressing the softkey adjacent to their softkey legend area on the display if your system has the optional hardware modules associated with these functions. The optional Serial Feed Interface and PLC Interface functions are also performed with the base system hardware, but special software must be activated to perform these functions. These functions are accessed by pressing the ACC key, which brings up the Quick Access screen for frequently used functions.

NOTE! Only the Brake Monitor, Job Setups, Counters, Module Limit Switch, and optional Speed Adjust optional functions will be covered in this section of this manual. Functions enumerated in the second paragraph of this subsection such as PLS/Logic, Automatic Setups, etc will be individually covered in subsequent sections of this manual. The optional Serial Feed Interface and PLC Interface functions will be covered in separate manuals provided when your system has these options.

Section 5.1 Main Menu (Screen)

Figure 5.1 shows the Main Operating Menu for the OmniLink II Press Automation Control in Run mode. The central area of the LCD display provides the following information.

- The current job number and the job description.
- The Order and Batch Count and associated limits.
- The status of the functions described by the softkey legends along the right side of the display.
- A Strokes/Min bar graph and numeric value only if your system is on a variable speed press and you use the optional Analog Input/Output board to report SPM.
- A % Motor Load bar graph and numeric value only if your system uses the optional Analog Input/Output board to report motor load.

The softkeys on this screen are used only to navigate to other screens. There are no settings that can be made on this screen and no additional screens that can be accessed by softkeys from this menu when in Program mode. When you turn the Run/Program key to Program, this screen remains the same.
Section 5.2 Brake Monitor and Diagnostic Screen

Pressing the Brake Monitor softkey causes the Brake Monitor and Diagnostic screen to appear. This screen is shown in Figure 5.2.

![Figure 5.2](image-url)

Figure 5.2 The Brake Monitor and Diagnostic Screen
The central portion of the display provides the following information:

1. A brake monitor used when the press stops at the top of the stroke.
2. A brake monitor used when the press stops at any position other than top.
3. The actual last stopping time of the press, measured by the brake monitor, and stop time limits that can be independently set for top stops and stops at any position other than stop.
4. Clutch engagement time monitor with preset limit and actual measured clutch engagement time.
5. A Critical (Stop) Angle which may be set for each job for use with the intellistop function of die protection and process monitoring. **This is the only setting (made in Program Mode) on this screen.**
6. Stopping Degrees – the number of degrees traveled during the last stop of press stroking
7. Messages from auxiliary equipment **if this option is used.**
8. Reason for the Last Stop. A diagnostic message that indicates the last event that caused the press to stop stroking.
9. Present Running Status. Diagnostic messages that indicate any event or condition that is keeping the press from stroking.

**Section 5.2.1 Brake Monitor**

The OmniLink II Press Automation Control incorporates a control reliable brake monitor that measures stopping time and stopping angle **every** time the press stops, **regardless** of stopping position. Separate stop time limits are provided for top stops and stops at positions other than top (mid-stroke). This is because stopping time usually varies with stopping position, with worst case stopping time usually occurring at mid downstroke. The separate top stop and mid-stroke limits allow relatively tight limits to be set for top stop time without causing nuisance brake monitor alarms when longer mid-stroke stopping occurs. Since the system knows whether the slide top stops, or stops elsewhere in the stroke, it automatically displays the stopping time as a top stopping time or a mid-stroke stopping time and compares it to the top stop or mid-stroke limit as appropriate.

The stop time limits for both top stop and mid-stroke stopping are set in the Machine Parameters configuration menu as described in **Section 4.2.1.8** of this manual. The settings may be made with 2msec resolution.

If the actual stop time at either top stop or mid-stroke stop exceeds its preset limit, the Present Running Status diagnostic message will read “Brake Monitor Alarm” highlighted in red, and the actual stop time shown by the brake monitor display will also be highlighted in red. Further stroking will be prevented until the brake monitor is reset.
WARNING! When your press is equipped with two-hand control devices and/or presence sensing devices for point of operation protection, only qualified personnel with a knowledge of the latest ANSI (B11.1), OSHA (CFR 1910.217), and other regulations that govern the relationship between stopping time and the distance at which two-hand control and/or presence sensing devices are to be located should set or reset Stop Limits for the brake monitor. These limits must never be set for longer times than the time on which the safety distance is based.

Section 5.2.2 Clutch Engagement Time Monitor

The clutch engagement time is measured each time the clutch/brake valve is engaged as the time from valve activation until crankshaft rotation exceeds the "minimum strokes/min" threshold. If the actual time exceeds a maximum limit, the stroke is aborted and the Reason for the Last Stop diagnostic message will be “Motion Did Not Start”. Both the minimum speed threshold and the maximum engagement time can be set only in the configuration menu (See Section 5.2.4 and Section 5.2.7). If this message appears, you can reset the fault and try to stroke the press again, but generally the same fault will occur again.

The Clutch Engagement Time Limit is used two ways by the system. First, the Motion Detector which makes sure the resolver is turning when the press is stroking will not stop stroking at the beginning of a stroke as long as motion starts within the time limit set for clutch engagement. Secondly, the Clutch Engagement Time limit provides useful diagnostic information relating to clutch wear. As clutch plates wear, increasing the volume of air that must flow into and be stored in the clutch air operator, clutch engagement time gradually increases. The increased volume of air stored in the clutch also takes longer to flow out when the air valve dumps pressure to stop stroking, resulting in longer stopping time for the press and perhaps tripping out the brake monitor. Most (though not all) presses provide for adjustment or shimming to compensate for clutch wear. In some, you must replace the friction plates when worn by a certain amount. Exceeding the clutch engagement time limit tells you that clutch adjustment or shimming should be performed. When possible, it is preferable to adjust the clutch clearance to the press manufacturers recommended setting to determine the clutch engagement time with optimum clearance.

Section 5.2.3 Critical Angle and Intellistop

The critical angle setting on the Brake Monitor and Diagnostic screen is used, in conjunction with Link’s Intellistop stop function, to decide whether to apply an Cycle Stop (immediate stop) or a Top Stop to press stroking. When sensors associated with Die Protection, Analog Process Monitor, or PLS/Logic inputs detect a fault, each channel monitoring a sensor has a choice of Cycle Stop, Top Stop or Intellistop settings that the user may program for each job. Generally, when a sensor detects a fault, the ideal situation is to either Top Stop or Cycle Stop the press before the dies close again to prevent possible damage to the die or press. But whether this can be done depends on where in the press cycle the fault is detected and how many crankshaft degrees are traveled after the stop signal is applied. If press stroking cannot stop when a sensor detects a fault before the dies close, it is then usually best to apply a Top Stop to prevent the possibility of sticking the press on bottom (dies closed).

When the Intellistop setting is chosen for a sensor channel, the OmniLink II Press Automation Control automatically makes the decision to Cycle Stop or Top Stop stroking. It makes this decision based
on where in the stroking cycle the fault occurs and how many degrees the press crankshaft will travel after the stop is applied. Figure 5.3 illustrates the **Intellistop** function.

![Intellistop Diagram](image-url)

**Figure 5.3 Illustration of Speed Advanced Intellistop Function**

The terms used to describe various angles in Figure 5.3 and the way they may be determined are as follows.

1. **Critical Angle.** The critical angle for a given die in a given press is the greatest downstroke angle that can occur without upper die parts closing on material or lower die parts. The top of the press stroke occurs at the $0^\circ$ position of crank or eccentric shaft and the bottom at the $180^\circ$ position as shown in Figure 5.3. The downstroke angle at which the upper die closes on material depends on the die design. Draw Dies may close on material at a downstroke crank angle of as little as $100^\circ$, i.e., several inches above the bottom of the stroke. Blanking dies may not close on material till the downstroke crank angle is $170^\circ$ or more, i.e., only a fraction of an inch above bottom of stroke. Any stop signal that results in stopping beyond the critical angle increases risk of sticking the press on bottom. Any stop signal that causes the press to stop before the critical angle will keep the press from sticking on bottom and reduce the risk of damaged die or press.

Determine critical angle for a set of dies with the dies in the press and adjusted to their proper shutheight. Inch the press slide downward until just before dies close on material and then stop the inching process. Actually, it is preferable to determine where the dies would close on a double thickness or more of material, since a fault may result from a condition that could cause a double or greater thickness of material in the die. Once you have inched the slide to the position described in the preceding sentences, observe the angle display at the upper left of the operator terminal display. Enter a critical angle setting equal to the angle indicated on the display.

2. **Intellistop Angle.** The Intellistop angle is the last angle at which a **Cycle Stop** signal may be given to stop the press at or before the critical angle. The press crankshaft will turn through an angular arc that represents angular stopping distance in degrees. The angular stopping distance depends on upper die weight, counterbalance pressure (when the press has a counterbalance), brake and clutch wear, and stroking speed if the press is a variable speed press.
The Intellistop angle is automatically computed by the OmniLink based on the angle of travel during top stopping. The angle labeled Top Stop Angle in Figure 5.3, is the angle at which a stop signal must be given which will result in the press stopping on top \( (0^0) \). The angular distance traveled in top stopping is also used to compute the Intellistop angle. **For a variable speed press, both the top stop and the Intellistop angle are automatically advanced to compensate for the increased stopping distance at higher speeds as shown in Figure 3.5.** The mechanics of stopping in the downstroke are somewhat different than stopping at top of stroke. Also gradual clutch and brake wear will increase stopping distance. For this reason, it is advisable to subtract about 10\(^0\) from the critical angle as determined in the preceding item 1 of this discussion to allow for these factors. **Another aid to determine the angular stopping distance, is the Stopping Degrees display shown below Critical Angle on the operator terminal display.** This angular stopping distance is measured and displayed every time the press stops regardless of where in the press stroke the stop occurs. You can stop the press such that it stops in the downstroke and read the actual stopping distance from the display. Of course, this is also a great aid in determining whether a regular **Top Stop or Cycle Stop** setting should be chosen for cyclic sensor channels where the fault will occur within a known timing window.

Thus, as shown in Figure 5.3, if **Intellistop** is chosen for a sensor channel, the order of stopping will be as follows.

- If a sensor fault occurs after the **Intellistop Angle** but before the **Top Stop Angle**, a **Top Stop** will result.
- If a sensor fault occurs after the **Top Stop Angle** but before the **Intellistop Angle** a **Cycle Stop** will result.

**NOTE!** **Intellistop will revert to Top Stop if the angular stopping distance of the press exceeds 180\(^0\).**

It is not necessary to determine the Critical Angle each time the die is used in the press. Once the Intellistop angle is initially determined, it will be stored as part of the job by the OmniLink and recalled with the job. As stopping distance can gradually increase with brake wear and clutch wear, it may be necessary to adjust the clutch and brake periodically to maintain stopping at or before the critical angle.

**Section 5.2.4 Stopping Degrees**

Each time a stop signal is applied to press stroking, the press crank or eccentric shaft travels for period of time and through an angular distance before stopping. The Stopping Degrees displayed is the angular stopping distance traveled the last time the press stopped. The stopping degrees are measured and displayed each time the press stops regardless of where the press stops in the stroke as long as the clutch has been engaged long enough to cause a crankshaft speed above the minimum speed threshold configured for the system. The display may not change when inching the press so quickly that minimum speed is not attained. Stopping Degrees can be extremely useful in determining whether a Top Stop or Cycle Stop setting should be made for a sensor channel when a fault is detected.
Section 5.2.5 Auxiliary Equipment Messages

The OmniLink II Press Automation Control makes optional provision to wire inputs to its parallel port on the back of the operator terminal from the intelligent controller (such as a PLC) of auxiliary equipment so that diagnostic messages from auxiliary equipment can be displayed on the brake monitor screen of the operator terminal. The messages are entered in the configuration menu as detailed in Section 4.2.5. When this option is used the messages appear under the Auxiliary Equipment Messages legend on the Brake Monitor and Diagnostic screen.

Section 5.2.6 Reason for the Last Stop

Diagnostic information is provided to show the reason the press stops. Once a stroke is initiated, the first stopping action is latched and displayed. This is done to capture transient conditions that may return to their proper state after the press stops. This information remains latched until press stops again. The only reasons for the stop of press stroking that the OmniLink II Press Automation Control can display under Reason for the Last Stop are those for stops that it initiates. Because it monitors the voltage to the valve that controls the clutch and brake, the OmniLink knows each time the press stops stroking. If it initiated the stop, the reason that it initiated the stop will be displayed. Stops that are not the result of the OmniLink will result in a display of “Non-OmniLink II Stop” under Reason for the last stop.

Additional information concerning press stops is archived in the Event Log. See Section 5.2.8.

Section 5.2.7 Present Running Status

The Present Running Status message indicates in English (or Spanish) any current condition of the OmniLink II Press Automation Control that results in a stop output to the press control and prevents stroking. Any condition that prevents stroke initiation is displayed as long as it exists. If no stop condition exists, an “OK” message indicates that only the correct run buttons are required to initiate the stroke.

The OmniLink II Press Automation Control cannot show any reason why the stroke may not be initiated caused by the press control or other equipment.

Section 5.2.8 Diagnostics

Additional OmniLink diagnostics are available through the DIAGNOS softkey. Pressing the DIAGNOS softkey will result in the main Diagnostic screen appearing as shown in Figure 5.4. This screen shows:

- The states of the four outputs available on the R/D-Brake Monitor Module, including the two module PLS outputs.
- The state of the two inputs for the R/D-Brake Monitor Module, including the optional input to indicate whether the press control is in a setup or production mode is shown.
- The state of the output relays that provide stop signals to the press control.
- Raw analog input signal information from the R2D decoder and the optional speed input, analog speed output and % Motor Load input.
Figure 5.4 Diagnostics Screen

The softkeys along the bottom of the screen navigate to other screens where high speed serial communication, memory, and software version information diagnostics are shown. This raw information is only useful for user diagnostics in the field as an aid in diagnosing possible problems over the phone with Link technicians. The phone service technician will direct you to these screens if necessary.

The EVENT LOG softkey is used to access the Event Log screen, which stores the last 128 Reason for the Last Stop messages with a date and time (the OmniLink incorporates a battery operated clock) stamp.

Section 5.2.9 Module Limit Switch

The R/D-Brake Monitor provides the logic for two simple programmable limit switch outputs as standard. Since these outputs can only sink 8ma of dc current, enough to operate solid state ac or dc relays, optional solid state relays must be provided to make these two Module PLS channels practical for driving larger loads. Link provides an optional 802-5 Solid State Relay Module (shown in Figure 2.18) that can provide up to 4 solid state relays, 2 for Module PLS channels 1 and 2, and 2 for optional indicator functions that may be driven by the R/D-Brake Monitor Module.

The Module Limit Switch screen can always be accessed by pressing the MODULE LIMIT SWITCH softkey on the Brake Monitor screen. If no optional PLS/Logic Module is used with the system, the LIMIT SWITCH softkey on the Main Menu will also access the Module Limit Switch screen. If one or more PLS/Logic Modules is used with the system, the LIMIT SWITCH softkey on the Main Menu will access the PLS/Logic Module screens, and only the MODULE LIMIT SWITCH softkey on the Brake Monitor screen will access the Module Limit Switch screen.

The Module Limit Switch screen simply shows the two channel numbers and the ON and OFF angles for each. You can view the information in Run mode and make settings in Program mode.
Section 5.3 Counters

From the Main Menu, Figure 5.1, depressing the COUNTER softkey displays the menu shown in Figure 5.5 and provides the operator certain production information. The present quantities of the order counter, batch counter, quality counter, auxiliary counters, scrap counter, and stoke counter can be viewed. Depending on how you configure the system, changes may be made in Run Mode or Program Mode only. See Section 4.2.4.3 for configuration choices Key/Code Access to Program Mode and for items that may be chosen to be unrestricted (settings and actions made in Run Mode of the operator terminal). See Section 3.9 for how to use Key/Code Access modes to settings and actions restricted to Program Mode.

![Figure 5.5 Counter Menu](image)

The display provides the following information:

1. The current Job Number and Description
2. Present running status of the press control
3. Current Count, Limit, State, and Percent Complete of the Order, Batch, Quality, and all Auxiliary Counters. These are called Production Counters.
4. Current Stroke Count
5. Current Scrap Count and Scrap Rate

Section 5.3.1 Production Counters

The OmniLink control has up to ten production counters. The first three production counters have dedicated names. These are Order, Batch and Quality. These three counters will always appear on the screen. The other seven counters are auxiliary counters. Auxiliary counters can be enabled or disabled.
in the counter configuration. If an auxiliary counter is enabled in the counter configuration, it will appear on the screen. If an auxiliary counter is disabled in the counter configuration, it will not appear on the screen. Also during counter configuration, each of the auxiliary counters can be assigned a sixteen character name. This counter configuration is on a job basis. The configuration information will be stored with the job. The stored information includes the counter name. When a job is recalled, the configuration information will also be recalled. For example, if the first auxiliary counter is being used on job number one, it will be recalled when job number one is recalled. If it is not being used on job number two, it will not be recalled and not appear on the screen when job number two is recalled.

All production counters that are turned on will increment as the press strokes, when the press is operating in a production mode. If the optional Setup/Production mode input is supplied to the R/D-Brake Monitor input as shown in Figure 2.15, the counters will not count in a setup mode. Normally each counter will increment by one counter per press stroke. However, all of the counters have the option to configured to increase by multiple counts every press stroke or by multiple counts every programmed number of press strokes. The values of the increment and the number of press strokes before a count changes are programmed in the counter configuration menu. For example, an operation that runs a three out blanking die would have the counter increase by three every press stroke. Another example, an operation that runs a one part out lamination die that requires ten strokes per part would have the counter increase by one every ten press strokes. As a final example, an operation that runs a four part out lamination die that requires ten strokes per part would have the counter increase by four every ten press strokes.

When the current count reaches the programmed limit, a top stop will be issued. This stop will remain active until the counter is reset or is turned off.

All counters can be configured so that the current count value is loaded with the last count from the previous run of a job. For example, Job A was running on a machine and it was decided that Job B should be run on the machine before finishing Job A. The Order Counter for Job A was at 1020. When Job B was loaded from memory with a Job Recall, the current count for Job A’s Order Counter, 1020, was stored in memory. The next time that Job A is loaded with a Recall, the count for the Order Counter will be set to 1020. If this feature is being used, it is imperative that the current job be terminated by recalling another job. The current counts are stored only when a job recall is performed. All counters can also be configured so that the count is also zero when recalled.

The three dedicated counters are Order, Batch, and Quality. The Order counter usually records the total parts made for a given process setup. The Batch counter usually records a small group of a process run, such as the number of parts that can be put into one container. The Quality counter is used to record the number of parts that can be made between quality inspections.

The reset, settings, and manual change of count for all production counters can be configured to be either Restricted (changed in Program mode only), or Unrestricted (changed in either Run or Program Mode). See Section 4.2.4.3.2 of this manual. Counter configuration settings are done in Program mode only.

Section 5.3.1.1 Production Counters On/OFF

Production counters can be turned on or turned off. If “counter settings” are restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to
access Program Mode in order to turn the counters on or off. If the user accesses Program Mode by using the password system, the user must be configured to have permission to change counter settings. When a counter is turned off, it does not increase. In addition, a counter that is turned off cannot issue a stop to the press control.

A production counter is turned on or off by first selecting the counter and then depressing the COUNTER OFF/ON softkey. To select a counter, use the arrow keys to position the cursor on the counter that is to be changed. The cursor can be either in the COUNT column or in the LIMIT column. Once the cursor is positioned over the proper counter, depressing the COUNTER OFF/ON softkey will turn the counter off if it is currently on and will turn the counter on if it is currently off.

Section 5.3.1.2 Production Counters Change Limit

Each production counter has a limit setting. When this limit is reached, a top stop will be issued. The slide will stop at the top of the stroke and further stroking will be prevented until the counter is reset or until the counter is turned off. If “counter change limit” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to change limits. If the user accesses Program Mode by using the password system, the user must be configured to have permission to change counter settings.

A production counter limit is changed by first selecting the counter limit and then entering the new value. To change a counter limit, use the arrow keys to positioned the cursor over the counter limit that is to be changed, press the CHANGE LIMIT softkey, enter the new limit using the numeric keypad. After the correct limit is entered, press the ENT key.

Section 5.3.1.3 Production Counters Reset

A counter reset will set a production counter’s current count to zero. If “counter reset” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to reset counters. If the user accesses Program Mode by using the password system, the user must be configured to have permission to reset a counter.

A counter is reset by first selecting the counter and depressing the COUNTER RESET softkey. To reset a counter, use the arrow keys to position the cursor on the counter that is to be reset. The cursor can be either in the COUNT column or in the LIMIT column. Once the cursor is positioned on the counter to be reset, press the COUNTER RESET softkey.

The counters can be configured so that resetting the Order Counter will also reset other counters. Each of the production counters can be configured to be reset when the Order Count is reset. This option is programmed in the counter configuration screen. Any or all of the production counters can be configured to reset when the Order Count is reset.

Section 5.3.1.4 Production Counters Increment/Decrement

Production counters can be manually increased by one count or decreased by one count. If “counter change” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to increase or decrease the count. If the user accesses Program Mode by using the password system, the user must be configured to
have permission to change counter settings.

To increase or decrease the current count value by one, select the counter and depress either the INCREMENT or DECREMENT softkey. To select a counter, use the arrow keys to position the cursor on the counter that is to be changed. The cursor can be either in the COUNT column or in the LIMIT column. Once the cursor is positioned on the counter to be changed, depress the INCREMENT key to increase the count by one or the DECREMENT key to decrease the count by one.

Section 5.3.1.5 Production Counters Change Count

The current count value of a production counter may be changed. If “counter change” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to change the count. If the user uses a password, the user must be configured to have permission to change counter settings.

To change a current count value, select the counter, depress the CHANGE COUNT softkey, and enter the new value. To select a counter, use the arrow keys to position the cursor on the count value that is to be changed. Once the cursor is positioned on the count value to be changed, press the CHANGE COUNT softkey. Then enter the new count using the numeric keypad. After the correct limit is entered, press the ENT key.

Section 5.3.2 Stroke Counter

The stroke counter increments anytime the crankshaft travels from the top of the stroke to the bottom of the stroke. This counter increments in all press operating modes, unlike the production counters that increment in production modes; Single Stroke, Continuous, Automatic Single Stroke, Continuous on Demand or Maintained Continuous modes, only. The stroke counter can only be reset from the press control configuration menu.

Section 5.3.3 Scrap Counter

The scrap counter is used to keep track of the number of scrap parts that have been produced. This counter is automatically increased when the tonnage monitor registers an out of limit hit. It may be changed, added to, subtracted from, increased by one, or decreased by one manually. When the scrap counter is manually increased by a count, all production counters are automatically decreased by the same count. When the scrap counter is manually decreased by a count, all production counters are automatically increased by the same count.

Note: The total number of parts in the system is constant. If there are 1000 parts in the order count and 100 parts in the scrap count, there is a total of 1100 parts in the system. Changing the scrap count to 500, will result in the order count being changed to 600. Since there are only 1100 parts in the system, the scrap count cannot be changed to a value greater than 1100.

If “counter change” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to change the count by entering numbers. If the user obtains access control by using the password system, the user must be configured to have permission for counter change. Incrementing and decrementing the scrap counter by one count at a time is allowed in the Run Mode of the operator terminal.
To change the value of the scrap count, position the cursor on the scrap counter and select the CHANGE SCRAP softkey. Then enter the new count using the numeric keypad. After the correct value is entered, press the ENT key. If the scrap count is increased, the amount by which it is increased is subtracted from the production counters. If the scrap count is decreased, the amount by which it is decreased is added to the production counters.

To add a number of scrap parts to the scrap counter, position the cursor on the scrap counter and select the ADD TO SCRAP softkey. Then enter the number to be added using the numeric keypad and press the ENT key. The number entered is added to the scrap count and subtracted from the production counters.

To subtract a number of scrap parts from the scrap counter, position the cursor on the scrap counter and select the SUBTRACT FROM SCRAP softkey. Then enter the number to be subtracted using the numeric keypad and press the ENT key. The number entered is subtracted from the scrap count and added to the production counters.

To increase the scrap counter count, press the INCREMENT SCRAP softkey. The value of the scrap counter will increase by one. The current count value of all production counters with a current value greater than zero and which are turned on, will decrease by one.

To decrease the scrap counter press the DECREMENT SCRAP softkey. The value of the scrap count will decrease by one. The current count value of all production counters with a current value less that its limit will increase by one.

The scrap rate is also displayed on the counter screen. The scrap rate is the calculated by dividing the scrap count by the sum of the scrap count and the current order count. If the Order Counter is turned off, “N/A” will be displayed for the scrap rate. This indicates that the scrap rate is not applicable, since a true value of the order count is not available. It should be noted that if the user ignores the decimal point and the percent symbol, the number displayed is the scrap rate in parts per million, ppm. For example, a scrap rate of .3984% is equivalent to 3984 ppm.

Section 5.3.4 Configure Counters

As described in Section 5.3.1 production counters can be configured on a job basis. The user must use the Key/Code Access Mode configured for his system to access Program Mode in order to change counter configuration. If the user obtains access control by using the password system, the user must be configured to have permission for counter configuration. The counter configuration information is stored with other job related information.

Depressing the CONFIG COUNTER softkey from the Counters menu, Figure 5.6, will display the Counter Configuration menu, Figure 5.6. This screen can only be viewed unless Key/Code Access to Program mode is used. Once in Program Mode counters can be configured. If password access to Program mode is configured the upper right softkey will have the legend SUPPLY ACCESS CODE when in Run Mode to initiate the password sequence to Program Mode.

Section 5.3.4.1 Configure Auxiliary Counter Names

The names of the seven auxiliary counters can be programmed by the user. The names of the Order,
Batch, and Quality counters are fixed and cannot be programmed.

To change an auxiliary counter name, position the cursor on the counter name to be changed and press the CHANGE NAME softkey. The text edit box will appear and the name can be entered. Press the ENT key to save the name and exit the text editor.

Section 5.3.4.2 Configure Counter Count By Value

The Count By value of all counters can be programmed. Normally this value is one. However, on certain applications, such as multi part out dies, this value can be a number other than one. A counter will increase its value by the programmed Count By value. If a die produced two parts each stroke, the Count By value of the Order Counter should be two. The counter will increase its value by two every time it increases.

To change the increment value position the cursor on the Counts By value to be changed, press the CHANGE INCREMENT softkey, enter the new number, and press the ENT key.

<table>
<thead>
<tr>
<th>COUNTER NAME</th>
<th>COUNTS BY</th>
<th>EVERY HOW MANY STROKES</th>
<th>RESET WHEN ORDER COUNTER RESET</th>
<th>ENABLE COUNTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Counter</td>
<td>1</td>
<td>1</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Batch Counter</td>
<td>1</td>
<td>1</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Quality Counter</td>
<td>1</td>
<td>1</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Aux 1. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 2. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 3. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 4. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 5. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 6. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Aux 7. Counter</td>
<td>1</td>
<td>1</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Set Counts to Zero When Job Recalled: YES

Figure 5.6 Counter Configuration Menu

Section 5.3.4.3 Configure Counter Every How Many Stroke Value

The number of press strokes between counter increments can be programmed. Normally this value is one. However, on certain applications, such as lamination dies, this value can be a number other than one. If a die produces a part every ten strokes, the Counter Every How Many Stroke value should be set to ten. The counter will increase its count every ten press strokes.

To change the number of strokes value position the cursor on the Counts By value to be changed, press the CHANGE Strokes softkey, enter the new number, and press the ENT key.
Section 5.3.4.4 Configure Counter Reset When Order Counter Reset

All counters other than the Order counter can be reset in two ways. The counters can be individually reset or the counter can be reset when the Order counter is reset.

To change the Reset When Order Counter Reset setting of a counter position the cursor on the value to be changed, press the CHANGE SETTING softkey.

Section 5.3.4.5 Configure Counter Enable

Each of the seven auxiliary counters can be enabled or disabled. When a counter is enabled, it will appear on the counter screen. When a counter is disabled it will not appear on the counter screen. The Batch, Order, and Quality counters are always enabled.

To change the Enable Counter setting of a counter position the cursor on the value to be changed, and press the CHANGE SETTING softkey.

Section 5.3.4.6 Configure Reset Counters When Job Recalled

This configuration provides the user with the option to restore the counters’ previous count when a job is recalled. If set to “No”, all counters will be loaded with the previous counts that were registered when the last job run was terminated. A job is terminated when another job is recalled. For example, Job A was running on a machine and it was decided that Job B should be run on the machine. The Order Counter for Job A was at 1020. When Job B was loaded from memory with a Job Recall, the current count for Job A’s Order Counter, 1020, was stored in memory. The next time that Job A is loaded with a Recall, the count for the Order Counter will be set to 1020.

If a job is not terminated by a recall of another job, the current counter information will be lost. In the example above, if Job B was not loaded from memory with a Recall, but instead was set-up by changing some of the settings that were already loaded for Job A, the current counter information at the end of Job A would be lost.

A “Yes” configuration will set the current count for all counters to 0 when the job is recalled.

To change the “Reset Counter When Job Recalled” setting of a counter position the cursor on the value to be changed, and press the CHANGE SETTING softkey.

Section 5.4 Motor Speed Adjustment (Option)

If the OmniLink II Press and Automation control is equipped with the Analog Input/Output board option and the press is a variable speed press, the System 5000 allows the operator to enter stroking speed from the keyboard as shown in Figure 5.7, and automatically sends this command (as an analog signal) to the motor drive. The stroking speed can be set over the entire speed range of the press (determined by the configuration) in all production modes. The OmniLink II Press Automation Control can automatically limit the speed setting in the INCH mode if the optional setup mode input to the R/D-Brake Monitor Module as shown in Figure 2.15 is wired. For example, a press that has a maximum stroking speed of 400 SPM may be configured to provide an INCH mode speed setting of 80 SPM. In this situation, the operator can enter a speed setting up to 400 in any mode but the command signal to the drive will go no
higher than 80 SPM when INCH mode is selected. If the press control is configured for fixed setup (INCH) mode speed, a message on the speed screen informs the operator that “Setup speed is fixed at 80 SPM”.

As shown in Figure 5.7, both drive speed, (SPM), and motor current, (% Load), are displayed in numeric and bar graph formats. The SPM bar graph ranges from 0 SPM to the maximum strokes/minute of the press. The % Load bar graph ranges from 0 to 200 %.

If “motor speed adjust” is restricted to Program Mode in the configuration menu, the user must use the Key/Code Access Mode configured for his system to access Program Mode in order to adjust speed. Key/Code Access mode to Program Mode is described in Section 3. If the user accesses Program Mode by using the password system, the user must be configured to have permission to change motor speed.

Motor speed can be changed by either entering a new value or by using the SPM UP and SPM DOWN softkeys. To enter a new Motor speed value, depress the CHANGE NUMBER softkey and enter the new value from the numeric keypad. After the correct motor speed value is entered, press the ENT key.

**Section 5.5 Quick Access (ACC key)**

The upper right hand key, ACC, can be used from any screen view the Quick Access screen. This screen is shown in Figure 5.8.
Section 5.5.1 Machine Notes

The Machine Notes area allows information concerning the machine to be entered and displayed. This information will not change as the current job is changed. This area allows for eight lines of text with each line containing up to 59 characters.

Section 5.5.2 Job Notes

The Job Notes area allows information concerning the job to be entered and displayed. This information is stored and recalled with the other job related information. This area allows for eight lines of text with each line containing up to 59 characters.

Section 5.5.3 Editing Machine Notes and Job Notes

The machine notes and job notes can be changed by first selecting the EDIT NOTES softkey. The user must access Program Mode by use of the Key/Code Access Mode configured for the system to edit these notes. If the user accesses Program Mode control by using the password system, the user must be configured to have permission to store jobs. Position the cursor to the line that is to be changed. Select the CHANGE TEXT softkey. The text edit box will appear and the line can be edited. Press the ENT key to save the text on the line. If another line is to be edited, position the cursor to that line and repeat the steps above. The arrow keys will move the cursor for the Machine Notes box to the Job Notes box.
In order for the job notes to be saved after editing, the current job must be stored. Job storage is described in Section 4.5.1.

Section 5.5.4 Auxiliary Communications

The AUXILIARY COMM softkey will provide access to communication options. These options include communication with electronic servo feeds, auxiliary equipment (such as PLCs), a laptop interface for downloading messages, and a network interface. A separate manual will be provided when these options are supplied. See the manual pertaining to the particular device that is connected for communication.

Section 5.5.5 LOGOUT Softkey

Selecting the LOGOUT softkey will remove access control from the current user. If a user has logged in using the password system, this user will retain access control until the user is logged out. Log out can be either manual or automatic. A user can be manually logged out by using the LOGOUT Softkey. Automatic log out is described in Section 3.

Section 5.6 Job Setups (Storage and Recall)

From the Main Menu, Figure 5.1, pressing the JOB SETUPS softkey accesses the Jobs menu, Figure 5.9 and allows the user to access the internal file system of the operator terminal. The parameters for all job related settings for standard and optional functions for the OmniLink II Press and Automation Control can be stored once initially determined and recalled each time the job is run in the press. This allows paperless record keeping of PLS/ Logic Module settings, Serial Feed Interface settings, Tonnage and Signature Monitor settings, Die Protection settings, Analog Process Monitor settings, Automatic Setup Module settings, etc.. This feature can give consistent setups of the press, auxiliary equipment, and process monitoring items. It can also save a tremendous amount of time in setting up a complex production system.

Figure 5.9 Jobs Menu

These softkey Legends appear only with the Program/Run switch in Program position when Key Only access to Program mode is chosen in the configuration menu.
The display provides the following information:

1. A list of all jobs presently in the internal file storage. The jobs are identified by a 9 digit number, and a 20 character description. A total of 500 jobs can be stored, and are shown in groups of up to 15.

2. The current job being used by the press control.

Job store, erase, and recall can be done only by persons having Key/Code access to Program Mode. If code (password) access is used, the password user may be assigned permission to store, erase, and recall as individual functions. A person might be allowed to recall a job, but not store or erase a job.

Section 5.6.1 Store Setup

From the Jobs Menu, Figure 5.9, pressing the STORE SETUP softkey will either transfer the screen to the Store Jobs menu, or initiate the user password sequence which accesses the Store Jobs menu, depending on the Key/Code Access Mode configured. The Store Jobs menu allows the user to place all settings for the job currently in use into the internal file storage area. The menu shown in Figure 5.10 allows the user to enter a new number under which the job will be stored and a job description. Position the cursor in the Job Number position. Then press the CHANGE NUMBER softkey. A nine digit numeric number can be entered. This number must be unique to this job. Entering a number already in use allows the current settings to replace the previous ones for that number. After entering a job number, move the cursor to the Job Description position. Then press the CHANGE TEXT softkey. The text edit box will appear and the name can be entered. Press the ENT key to save the name and exit the text editor. Finally, press the STORE SETUP softkey. The current job information is placed in the internal file system under the job number and job name. The operator terminal automatically returns to the Jobs menu.

![Figure 5.10 Store Jobs Screen](image)

NOTE: Changes made to the current job are NOT automatically made to the internal file system. If a stored job is recalled, and changes are made to any settings, the user must intentionally Store the new settings over the old job number before recalling another job if the changed settings are to be saved permanently.
Section 5.6.2 Recall Setup

From the Jobs Menu, Figure 5.9, pressing the RECALL SETUP softkey will either transfer the screen to the Select Jobs menu, or initiate the user password sequence which accesses the Select Jobs menu, depending on the Key/Code Access Mode configured. If the user obtains access control by using the password system, the user must be configured to have permission to recall jobs from memory. The Select Job screen allows the user to select the job that is to be recalled. The Select Job menu is shown in Figure 5.11. There are two ways to select a job. The first way is to enter the job number, if it is known. The ENTER NUMBER softkey allows the user to enter the desired job number directly into the operator terminal, which automatically searches the file system and retrieves the job if located. The second way is to select the job from the screen. Select a job by using the NEXT GROUP key to locate the page that the job is on, and then using the arrow keys to position the cursor on the correct job. With the cursor on the correct job, depress the SELECT softkey.

![Figure 5.11 Select Jobs Screen](image_url)

Either method of locating the desired job results in a request for final verification as shown in Figure 5.12. After verifying that the job number and description are correct, the RECALL SETUP softkey replaces the information in the current job with that of the requested one. During the recall process, the message "Loading the Job" is displayed. When complete, the operator terminal returns to the job setups menu and the current job information reflects the change.

![Figure 5.12 Recall Jobs Screen](image_url)
Section 5.6.3 Erase Setup

From the Jobs Menu, Figure 5.9, pressing the RECALL SETUP softkey will either transfer the screen to the Select Jobs menu (Figure 5.11), or initiate the user password sequence which accesses the Select Jobs menu, depending on the Key/Code Access Mode configured. If the user obtains access control by using the password system, the user must be configured to have permission to erase jobs from memory. The Select Job menu allows the user to select the job that is to be erased. Once a job is selected the Erase Jobs screen (similar to the Recall Jobs screen of Figure 5.12 except the softkey legend is ERASE JOB) appears.

The method for locating a job is the same as those for recalling one. Once the job to be erased has been located, the ERASE SETUP softkey can be used to erase the job.
Section 6 Digital Die Protection and Process Monitor

The Digital Die Protection and Process Monitor Module is an optional addition to the OmniLink II Press Automation Control which is designed for use in monitoring various material and tool conditions that are important to the correct operation of the process. This is accomplished by installing appropriate sensors and probes in or near the die and connecting these sensors to channel inputs of the Die Protection and Process Monitor Module. The channels are then programmed through the OmniLink II Operator Terminal to perform the desired monitoring function for the connected input. In the event that improper conditions occur the machine can be stopped, avoiding excessive delay in the production process or damage to the tooling and/or press. The die protection and process monitor units come in both eight and sixteen channel versions. The Model 5121 is an eight channel die protection module. The Model 5120 is a sixteen channel die protection module.

The OmniLink II Press Automation Control can provide for up to five digital die protection modules. Any combination models 5120 or 5121 totaling up to five can be connected. If five Model 5120 sixteen channel die protection modules are added to the OmniLink II Press Automation Control, 80 digital inputs can be monitored.

Section 6.1 Features of the Digital Die Protection and Process Monitor

The module has either eight or sixteen channels available for use with die sensors and probes. These channels may be used to monitor parts ejection, stock in place, material in position, stock buckling, end of stock, or other functions of interest. Either solid state (NPN or PNP) or probes and mechanical sensors may be used as inputs to the Digital Die Protection and Process Monitor Module. No configuration is necessary to select the sensor type.

The sensors are electrically connected to the unit by wiring directly to the terminals which are located inside the unit, by connecting to the optional front panel receptacles, or by connecting to the optional quick die change receptacle. On some models up to eight sensors may be connected to the front panel of the Sensor Interface via widely available Micro-DC connector receptacles, or alternatively four sensors can be connected to the four panel binding posts which provide quick single wire connection of probes and other grounding mechanical devices. Many customers choose to connect sensors that are mounted in the tooling to the module via a multi-conductor cable that connects to a quick die change receptacle, which is located on the bottom of the unit. This quick die change receptacle can be the 19 pin circular receptacle that is supplied by Link Systems on the “QCR” models or it can be a receptacle that is specific to the customer. The “NC” models are supplied with a removable blank panel on the bottom of the unit. A customer specific receptacle can be installed in this blank panel. See Table 6-1 for a listing of available models.

The module can be programmed to monitor each individual input in the manner necessary to insure that the process is proceeding in the intended manner. Each channel can be programmed to function as one of the following types: Static, Cyclic, Transfer, In Position, One Part Detection, or Two Part Detection. In addition, a Custom channel type is available. This Custom type allows for a list of programmable rules to be applied to a channel. Since the rules are programmable, custom monitoring logic can be applied to an individual channel. All of the above listed monitoring types will be described in subsequent sections of this manual.
If the monitor detects a process fault, a stop signal will be sent to the press control. There are three types of stops than can be assigned to an individual channel. When an input malfunction is detected, a cycle stop, top stop, or intellistop signal can be asserted. If programmed for a cycle stop and a malfunction is detected, a stop signal will be immediately sent to the press control. If programmed for a top stop and a malfunction is detected, a stop signal will be sent to the press control at a slide position that will allow the slide to come to rest at the top of its stroke. If programmed as an intellistop and a malfunction is detected, an immediate stop signal will be sent to the press control if the slide can come to rest before a programmed critical angle. If the malfunction occurs at a slide position that will not allow the slide to come to rest before the programmed critical angle, a top stop will be executed.

The system has the capability of displaying extensive channel diagnostics. The current state of each of the channel inputs is displayed. In addition, a numerical and graphical representation of the channel input’s history is available. The last 64 transitions (a transition is either a change in sensor state from on to off or from off to on) of the channel input are stored. This information can be displayed numerically in a table format or graphically.

The Digital Die Protection and Process Monitors have a power supply that can be used to power sensors. This supply provides 24 volts DC @ 1 Amp.

Section 6.2 Specifications for the Digital Die Protection and Process Monitors

There are several different versions of the Digital Die Protection and Process Monitor. The Model 5120 is a 16 input unit. The Model 5121 is an 8 input unit. Each model is available with or without a 19 pin Quick Die Change Receptacle. When the Quick Die Change Receptacle is available, all of the unit’s inputs are accessible via this connector. A single cable can be used to attach the die sensors to the inputs of the Digital Die Protection and Process Monitor. The Model 5120 is available with or without the front panel micro connectors and binding posts. The various models and their part numbers are listed in Table 6.1.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>LINK PART NUMBER</th>
<th>NUMBER OF INPUTS</th>
<th>QUICK DIE CHANGE RECEPTACLE</th>
<th>FRONT PANEL MICRO RECEPTALCES AND BINDING POSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5120-QCR</td>
<td>108830</td>
<td>16</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5120-NC</td>
<td>108831</td>
<td>16</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5120-QCR-NP</td>
<td>109081</td>
<td>16</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5120-NC-NP</td>
<td>109082</td>
<td>16</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5121-QCR</td>
<td>108832</td>
<td>8</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5121-NC</td>
<td>108833</td>
<td>8</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 6.1 Model Numbers

The mechanical and electrical specifications for the Digital Die Protection and Process Monitor are listed in Table 6.2.
### Table 6.2 Specifications

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure Dimensions</td>
<td>11.9” (302 mm) High x 6.25” (159 mm) Wide x 4” (102 mm) Deep</td>
</tr>
<tr>
<td>Mounting Footprint</td>
<td>11.15” (283 mm) High x 4.25” (108 mm) Wide</td>
</tr>
<tr>
<td>Maximum Overall Clearance Dimensions</td>
<td>17” (432 mm) High x 6.25” (159 mm) Wide x 8” (203 mm) Deep</td>
</tr>
<tr>
<td>Input Power</td>
<td>100 to 135 VAC @ .5 Amps (Voltage Selector in 115 position) or 200 to 270 VAC @ .25 Amps (Voltage Selector in 230 position)</td>
</tr>
<tr>
<td>Input Fuse Type</td>
<td>95 to 140 VAC operation Littlefuse 313.500, Bussman MDL-1/2, Gould GLD-1/2 or equivalent 190 to 280 VAC operation Littlefuse 313.250, Bussman MDL-1/4, Gould GLD-1/4 or equivalent</td>
</tr>
<tr>
<td>Sensor Types</td>
<td>3 Wire DC, NPN or PNP with no LED in parallel with the load</td>
</tr>
<tr>
<td>Available Sensor Power</td>
<td>24 VDC @ 1 Amp maximum (total for all sensors)</td>
</tr>
<tr>
<td>Sensor Voltage Drop</td>
<td>4 VDC maximum across switch in ON (closed) state</td>
</tr>
<tr>
<td>Sensor Leakage Current</td>
<td>500 uA maximum in OFF (non-conducting) state</td>
</tr>
<tr>
<td>Front Panel Micro-Connector (optional)</td>
<td>Mating Connectors  Link Part # 108046 Connector Straight  Link Part # 108048 Connector Right Angle</td>
</tr>
<tr>
<td>Binding Post (optional)</td>
<td>Mating Connector Link Part # 100377 – White Banana Plug</td>
</tr>
<tr>
<td>Quick Die Change Receptacle (optional)</td>
<td>Mating Cordset  Link Part # 108776 – 2 Meter Length  Link Part # 108777 – 3 Meter Length  Link Part # 108778 – 5 Meter Length</td>
</tr>
</tbody>
</table>

### Section 6.3 Mounting

The Digital Die Protection and Process Monitor is designed to be mounted in close proximity to the tooling. The unit should be mounted in a location that allows the front panel indicators to be viewed and easy access to the front panel receptacles and to the quick die change receptacle. The enclosure dimensions and mounting footprint are shown on Figure 6.1. The unit shown in Figure 6.1 has both the door mounted binding posts and micro connectors, and the bottom mounted 19 pin connector. Some models of the Digital Die Protection and Process Monitor do not have the door mounted binding posts and micro connectors. Some models do not have the bottom mounted 19 pin connector. The absence of these items will decrease the mounting clearance requirements.

Normally the Digital Die Protection and Process Monitor module can be mounted directly to the press frame. However in high shock and vibration environments, shock mounts may be required. If it is determined that shock mounts are required, please consult Link Systems for recommendations.
Figure 6.1 Dimensions and Mounting Footprint
Section 6.4 Wiring

The wiring diagram for Model 5020 units is shown in Figure 6.2. The wiring diagram for Model 5121 units is shown in Figure 6.3. The following connections and operations must be done:

1. Input Power
2. High Speed Serial Bus Cable
3. Set High Speed Serial Bus Termination Switch
4. Module Number Selection
5. Sensor Connections

Section 6.4.1 Wiring Input Power

Connection of AC input power is made to the 3 pin terminal block on the bottom right of the circuit board in the bottom of the enclosure. The pinout is provided on Figure 6.2 for Model 5120 or Figure 6.3 for Model 5121. This unit contains an input voltage selector. This selector allows for operation at 115 VAC or 230 VAC. The factory default is 115 VAC. If 230 VAC operation is required, the selector must be switched to the 230 position. In addition, the input fuse must be changed from .5 amps to .25 amps. See specifications for fuse type.

The 3 pin plug supplied for connection of input power is a dual connector plug. As described in Section 2.1 and shown in Figure 2.3, this dual connector plug allows for input power to be strung from module to module.

Section 6.4.2 Wiring High Speed Serial Bus Cable

The high speed serial bus cable is wired to the 4 pin terminal block on the bottom center of the circuit board in the bottom of the enclosure. The pinout is provided on Figure 6.2 for Model 5120 and Figure 6.3 for Model 5121. The cable that is supplied by Link Systems for the high-speed serial bus that interconnects the various components of the OmniLink II Press Automation Control must be used. This cable must run from device to device without being spliced.

The 4 pin plug supplied for connection of the high speed serial bus is a dual connector plug. As described in Section 2.1 and shown in Figure 2.3, this dual connector plug allows for the high speed serial bus cable to be strung from module to module.

Section 6.4.3 Setting High Speed Serial Bus Terminal Switch

The high speed serial bus termination switch must be placed in the correct position. The high speed serial bus termination switch is located on the top circuit board mounted on the door of the enclosure. If this device is the last device in the serial bus string, the termination switch must be placed in the closed (up) position. The red LED indicator next to the switch will light when the switch is in the closed position. The last device in the serial bus string will have only one high speed serial bus connection to the 4 pin dual plug. The last device will have a connection from the previous device, but will not connect to any other devices. If this device is not the last device in the serial bus string, the termination switch must be placed in the open (down) position. The red LED will be off when the switch is in the open position.
Figure 6.2 Model 5120 Wiring Diagram
Figure 6.3 Model 5121 Wiring Diagram

Section 6.4.4 Module Number Selection
Since there can be up to five Digital Die Protection and Process Monitors connected to each OmniLink II Press Automation Control system, each of the Digital Die Protection and Process Monitor must be assigned an unique Module Number. The selection is made by use of the rotary switch that is located on the door mounted top circuit board. These numbers should be assigned sequentially starting at one. Two units cannot share the same Module Number. When powered, the unit will display its module number on the front door numeric display.

When the Die Protection screen is selected, the lowest numbered module will be displayed first. Subsequent number modules are selected by use of the NEXT PAGE softkey. If it is determined that one particular module will demand more operator attention that other modules, this module should be assigned number one.

Section 6.4.5 Sensor Connections

The Digital Die Protection and Process Monitor modules allow for input sensors to be connected to the unit through several different means. The sensors can connect to the internal input terminal block. Sensors can plug into the optional binding posts or micro connector receptacles on the front door of the enclosure. Sensors can connect via the optional quick die change receptacle. Sensors can connect to the optional die mounted sensor dock. These connections are shown in Figures 6.2 for Model 5120 and Figure 6.3 for Model 5121. It is important to note that some channels can have multiple means of input. Some channels can have their input connected via a terminal block, binding post, micro connector, or quick die change receptacle. Normally only one sensor will be connected to a channel. Normally only one of the input means will be used per channel.

Section 6.4.5.1 Sensor Connection via Internal Terminal Block

All channel inputs are available via the internal terminal block. This terminal block is located on the left side of the circuit board on the bottom of the enclosure. Also available on this terminal block are the connections for the unit’s 24 volt DC power supply. This supply can be used to power sensors.

Units that have the quick die change receptacle will already have one wire connected to each input terminal. Normally the quick die change wire is not removed when a sensor is wired to an internal terminal connection.

Section 6.4.5.2 Sensor Connection via Optional Binding Posts and Micro DC Connector Receptacle

If a unit is equipped with the optional binding posts and Micro-DC connector receptacles, sensors can be connected to channel inputs 1 through 4 via the binding posts and to channel inputs 1-8 via the Micro-DC connector receptacles. The binding posts are intended for sensors that have a single connecting wire. These are sensors that conduct to machine ground through the material or the tooling. The wiring for the Micro-DC connector receptacles is shown on Figure 6.2 for Model 5120 and Figure 6.3 for Model 5121. Connection of sensors to the Micro-DC connector receptacles can be made either with molded Micro-DC extension cables or by attaching field-wireable Micro-DC connectors to un-terminated sensor cables.

A low input impedance option is available for sensors wired to the binding posts or to Micro-DC connector receptacles 1-4. If the Micro-DC connector receptacle is used, the sensor must be wired to pin 2 of the Micro-DC connector. This low input impedance may be required for grounding type...
mechanical sensors. For these sensors, it may be necessary to source more current through the sensors than required with solid state sensors in order to maintain good contact. If the lower input impedance is required, the corresponding Pullup Resistance DIP switch should be switched to the ON position. The factory default setting for all switches is OFF. The DIP switch is shown on Figure 6.2 for Model 5120 and Figure 6.3 for Model 5121. The low impedance option is not available via the internal terminal block connection or via the quick die change receptacle.

Section 6.4.5.3 Sensor Connection via Optional Quick Die Change Receptacle

If a unit is purchased with the optional 19 pin quick die change receptacle, sensors can be connected to all channels via the quick die change receptacle. In addition, the unit’s 24 volt DC power supply is available via this connector. The pin connections for the quick die change receptacle are shown on Figure 6.2 for Model 5120 and Figure 6.3 for Model 5121.

Section 6.4.5.4 Sensor Connection via the Optional Sensor Dock

An optional sensor dock with 8 Micro-DC connector receptacles can be purchased. This sensor dock connects to the Digital Die Protection and Process Monitor via the quick die change receptacle. If a sensor dock is connected to a 16 channel unit, Model 5120, the receptacles on the sensor dock will connect to channels 9-16 of the Digital Die Protection and Process Monitor. If a sensor dock is connected to an 8 channel unit, Model 5121, the receptacles on the sensor dock will connect to channels 1-8 of the Digital Die Protection and Process Monitor. The connections for the sensor dock are shown on Figure 6.2 for Model 5120 and Figure 6.3 for Model 5121.

Section 6.4.5.5 Solid State Sensor Single, Series, and Parallel Connections

Normally only one sensor is wired to an individual input. Since the system can be expanded to as many as 80 inputs, only one sensor per input is suggested. Multiple sensors can be wired in series or parallel to expand monitoring capabilities. When solid state sensors are wired in series or parallel, they must be of the same type. Do not mix NPN and PNP sensors when wiring them in series or parallel. Figure 6.4 shows single, series, and parallel connections for both NPN and PNP solid state sensors. When wiring solid state sensors in series, ensure that the total voltage drop across all sensors does not exceed the value specified in Table 6.2. Also, the power up delay for each sensor must be considered since the last sensor in line is not powered until the upstream sensor is closed. When wiring solid state sensors in parallel, add the leakage current of each sensor to determine the total leakage current. This total current must not exceed the maximum leakage current listed in Table 6.2.
Section 6.5 Die Protection Input Types and Their Uses

Each die protection channel can be programmed for any one of nine different die protection types: Static, Cyclic, Transfer, In Position, 1 Part Detection Edge, 1 Part Pass, 2 Part Detection Edge, 2 Part Detection Pass, and Custom. In addition, any input can be set to Not Used if desired.

Sensor logic is assigned descriptive names such as Static, Cyclic, and 1 Part Pass. Although these names best describe the applications for which they are normally used, their use should not be limited by their assigned name. For example, if a channel requires the logic of a 1 Part Pass and the sensor is not actually detecting a part out, 1 Part Pass logic should still be used. Each channel can have its own description. Although the 1 Part Pass logic is employed, the assigned description can indicate the precise use of the channel.

Section 6.5.1 Static

Static inputs are used for sensors that monitor events that are independent of the production machine cycle. Examples are sensors monitoring end of stock and stock buckling. If the input is programmed as
Static Normally Off, the input should NOT be On under normal operation. In this case when the input switches On, a stop will be issued by the Digital Die Protection and Process Monitor. If the input is programmed as Static Normally On, the input should be On under normal operation. In this case when the input switches Off, a stop will be issued by the Digital Die Protection and Process Monitor.

An example of the use of a Static Normally Off input is stock buckling detection, as shown in Figure 6.5, part A. The stock to be fabricated is placed between a dual probe in the normal position. The probe remains Off (ungrounded) unless the stock buckles upward or downward far enough to touch the upper or lower portion of the probe, turning On (grounding) the normally open input, causing a fault.

An example of the use of a Normally On input is an end of stock sensor, as shown in Figure 6.6. A probe is mounted so that it is On (grounded) by the stock being fed into the production machine. When the end of stock is reached, the probe will no longer contact the stock, turning Off the input and causing a fault.

An additional feature of Static type inputs is the delay timer which is programmed by the operator. A programmed time of zero forces ordinary operation of the static input as described above, i.e., if the input is not in the 'normal' state, a fault will occur immediately. However, if a value other than zero is programmed the input is allowed to change from the normal state for the length of time programmed without a fault occurring. If the input does not return to the normal state before the time expires, a fault is generated. This allows the operator to avoid nuisance faults from sensors that 'bounce' open or closed momentarily. The delay time can range from 0 to 65535 milliseconds (65.535 seconds) in 1 millisecond increments.

Figure 6.5 Static Normally Off Inputs

Figure 6.6 Static Normally On Inputs
Section 6.5.2 Cyclic

Cyclic inputs are derived from monitored events that occur once each machine cycle when the production process is functioning normally. An example of a cyclic event is stripper plate monitoring as shown in Figure 6.7. In normal operation, when the die closes sensors on the right and left sides of the stripper plate will turn on; then, when the die opens again, the sensors will turn off. When a slug is caught between the stripper plate and the material a fault condition exists. Because of the slug, the right side of the stripper plate did not come close enough to the right sensor to turn it on. Since the sensor did not turn on, a fault was detected and a stop signal sent to the machine control.

When programming an input for cyclic mode, the operator must enter crankshaft angles to mark On and Off points for a timing 'window' for the cyclic event. The timing window On and Off setpoints should be programmed so that the window is On during the portion of the stroke that the cyclic event should occur.

When a channel is programmed to monitor a cyclic event, the event must occur sometime during the timing window. In addition, the event must turn off sometime during a press stroke. Acceptable and unacceptable conditions for cyclic events are shown in Figure 6.8. For all of the acceptable conditions the event occurred sometime during the timing window. In addition, the event was off sometime during the stroke. There are three unacceptable conditions shown in Figure 6.8. The left unacceptable figure shows that the event did not occur. This is a fault condition. The center unacceptable figure shows that event did occur, but did so outside the timing window. This is a fault condition. The right unacceptable figure shows that the event did not turn off during an entire press stroke. This is a fault condition.
Sensors that are used as inputs to cyclic channels can be either Normally On or Normally Off. The event is considered to occur when the sensor switches from its normal state. For example, if a cyclic channel is programmed to have a Normally Off sensor, the channel event will occur when the sensor is On. If a cyclic channel is programmed for a Normally On sensor, the channel event will occur when the sensor is Off. In the majority of applications, the input sensor to a cyclic channel is a Normally Off sensor.

An additional feature for use on cyclic type channels is the stroke delay counter which is programmable by the operator. The counter provides the flexibility to use the cyclic type to monitor events in the production process that may not occur every stroke, but must occur within some number of strokes. An example of such an application is slug detection, where under normal operation slugs are allowed to build up and fall out maybe two or three at a time after several strokes. In such a scenario a slug would not be detected by the sensor on every stroke, this would produce a fault were the stroke delay counter not used. The delay counter allows the operator to enter a number representing the maximum number of strokes that can be run consecutively without the slug being detected within the timing window. If the sensor does not become active within the window for a number of strokes exceeding the counter number, then a fault will be generated. By contrast, if the sensor does become active within the window on some stroke before the counter expires, then the counter is reset and the full count is again allowed. If the operator desires that the sensor be required to become active on every stroke, then a value of zero should be entered into the counter. (Note that although the sensor is allowed to remain inactive throughout a stroke when the stroke counter is used, the opposite is not true; e.g., the sensor is not allowed to remain active through an entire stroke or a fault is generated.)
Section 6.5.3 In Position

In Position type channels are used to monitor whether material is fully fed into the die on each cycle of the press. A sensor should be used to detect when the material to be fabricated is fully fed into the die. Figure 6.9 illustrates an example of the use of a sensor used as an input to a channel programmed for In Position type. In this example the material is fed forward contacting a spring loaded lever arm. A sensor monitors the position of the lever arm. When the material is in the correct position, the sensor turns on. If the feed is too short or too long, the sensor will be off.

![Figure 6.9 In Position Input](image)

When programming a channel for In Position type, the operator must enter crankshaft angles to mark On and Off points for a timing 'window' during which the material will move into place. The Window On angle must be set to a point before the material gets into position. The Window Off angle should be set to a point after the material has been fed into place. If the material is not in position by the end of the timing window, a fault will be generated. The Off angle must also be set so that the fault will stop the press before the die closes enough to cause damage. An illustration of the In Position timing sequence is shown in upper part of Figure 6.10. This figure shows that the material was fed into place during the timing window and that the material was in place at the end of the timing window.
Figure 6.10 also shows some unacceptable conditions for In Position events. There are three unacceptable conditions shown. The left unacceptable condition shows that the feed was not in place at the end of the timing window. This is a fault condition. The center unacceptable condition shows that the material did arrive in place during the timing window, but was not in place at the end of the window. As shown in Figure 6.9, this condition could occur in overfeed situations. This is a fault condition. The right unacceptable condition shows that the material was sensed as being in position before the beginning of the timing window. This is a fault condition.

The sensor being used to verify material position can be Normally Off or Normally On. The sensor will switch from its normal state when the material is in position. When a Normally Off sensor is being used to sense material position; the sensor will be Off when the material is not in place, and will be On when the material is in place. The example illustrated in Figure 6.9 is an example of a Normally Off sensor. When a Normally On sensor is being used to sense material position; the sensor will be On when the material is not in place, and will be Off when the material is in place. An example of a Normally On application is detecting proper material position by looking for a hole in the material. The sensor is On when there is material over the sensor. The sensor will switch to Off at the proper feed position when the hole is over the sensor.
Section 6.5.4 One Part Detection Edge

The One Part Detector Edge channel logic type is used to monitor ejection for parts that are completely out of the die area as soon as they are sensed by the channel input sensor. The channel logic looks for one part to be sensed during the timing window. An example of One Part Detector is shown in Figure 6.11. This example shows a small part being sensed by an optical parts detector. When this small part first interrupts the sensing field of the optical parts detector it is completely out of the die area. Detection of the leading edge of this part insures that the part is totally out of the die area.

The One Part Detector Edge input type functions much like the Cyclic type, the difference being that the timing window must turn on before, not while, the part is being ejected (activating the sensor). In other words, the Part Detector type requires that the sensor NOT be active when the window turns ON, and then become active at some point during the window. The sensor can still be active at the end of the window. With One Part Detector Edge, it is not required that the part completely passes the sensor by the end of the window. The timing for a One Part Detector Edge is shown in Figure 6.12.

The sensor being used to verify part detection can be Normally Off or Normally On. The sensor will switch from its normal state when the part is being detected. When a Normally Off sensor is being used to sense part out; the sensor will be Off when the part is not in the sensor, and will be On when the part is in the sensor. When a Normally On sensor is being used to sense part out; the sensor will be On when the part is not in the sensor, and will be Off when the part is in the sensor.

Section 6.5.5 One Part Detection Pass

The One Part Detector Pass channel logic type is used to monitor ejection for parts that are not completely out of the die area when they are first detected by the channel input sensor. The channel logic looks for one part to be sensed during the timing window, and also looks for the part to be past the sensor at the end of the timing window. By the end of the timing window, the part should be completely
past the sensor. An example of One Part Detector Pass is shown in Figure 6.13. This example shows an exiting part sliding down a chute. When the sensor first detects the leading edge of this part, the trailing edge of the part is still in the die area. Detection of the leading edge of this part does not insure that the part is totally out of the die area. The only way to insure that the part is completely out of the die is to require that it be completely past the sensor by the end of the timing window.

The One Part Detector Pass input type timing requires that the input sensor detect the part during the timing window only. The sensor cannot detect the presence of the part at the beginning or at the end of the timing window, but it must detect the presence of the part during the timing window. In other words, the Part Detector Pass type requires that the sensor NOT be active when the window turns ON, become active at some point during the window, and not be active at the end of the window. With One Part Detector Pass, it is required that the part completely passes the sensor by the end of the window. The timing for One Part Detector Edge is shown in Figure 6.14. **Note: If the input is programmed as ‘One Part Detector Pass’, the sensor is not allowed to become active outside the window or a fault will be generated.** This provides protection against a part ‘bouncing’ on a probe-type detector and satisfying the die protection input erroneously.

The sensor being used to verify part detection can be Normally Off or Normally On. The sensor will switch from its normal state when the part is being detected. When a Normally Off sensor is being used to sense part out; the sensor will be Off when the part is not in the sensor, and will be On when the part is in the sensor. When a Normally On sensor is being used to sense part out; the sensor will be On when the part is not in the sensor, and will be Off when the part is in the sensor.

**Section 6.5.6 Two Part Detection Edge**

The Two Part Detector Edge channel logic type is used to monitor ejection for two parts detected by a single sensor that are completely out of the die area as soon as they are sensed by the channel input sensor. The channel logic looks for two parts to be sensed during the timing window. These parts must not enter the sensor at the same time. There must be a separation time between the two parts. An example of Two Part Detector Edge is shown in Figure 6.15. This example shows two small parts being sensed by an optical parts detector. When the small part first interrupts the sensing field of the optical parts detector it is completely out of the die area. Detection of the leading edge of a part insures that the
The Two Part Detector Edge input type functions much like the One Part Detector Edge type, the difference being that two parts must be sensed. The first part must be sensed in the timing window. The leading edge of the second part must be sensed in the timing window. With Two Part Detector Edge, it is not required that the second part completely passes the sensor by the end of the window. There must be a separation time between the parts. The first part must completely exit the sensor before the second part enters the sensor. The timing for Two Part Detector Edge is shown in Figure 6.16.

The sensor being used to verify part detection can be Normally Off or Normally On. The sensor will switch from its normal state when the part is being detected. When a Normally Off sensor is being used to sense part out; the sensor will be Off when the part is not in the sensor, and will be On when the part is in the sensor. When a Normally On sensor is being used to sense part out; the sensor will be On when the part is not in the sensor, and will be Off when the part is in the sensor.

**Section 6.5.7 Two Part Detection Pass**

The Two Part Detector Pass channel logic type is used to monitor ejection for two parts detected by a single sensor. In addition, the second part must be completely past the sensor by the end of the timing window. The channel logic looks for two parts to be sensed during the timing window, and also looks for the second part to be past the sensor at the end of the timing window. An example of Two Part Detector Pass is shown in Figure 6.17. This example shows two exiting parts sliding down a chute. When the sensor first detects the leading edge of the second part, the trailing edge of the part is still in the die area. Detection of the leading edge of this part does not insure that the second part is totally out of the die area. The only way to insure that the second part is completely out of the die is to require that it be completely past the sensor by the end of the timing window.
The Two Part Detector Pass input type timing requires that the input sensor detect both parts during the timing window only. The sensor cannot detect the presence of a part at the beginning or at the end of the timing window, but it must detect the presence of the parts during the timing window. In other words, the Part Detector Pass type requires that the sensor NOT be active when the window turns ON, sense two parts during the window, and not be active at the end of the window. There must be a separation time between the parts. The first part must completely exit the sensor before the second part enters the sensor. The timing for Two Part Detector Edge is shown in Figure 6.18.

Note the input is programmed as ‘Two Part Detector Pass’, the sensor is not allowed to become active outside the window or a fault will be generated. This provides protection against a part ‘bouncing’ on a probe-type detector and satisfying the die protection input erroneously.

The sensor being used to verify part detection can be Normally Off or Normally On. The sensor will switch from its normal state when the part is being detected. When a Normally Off sensor is being used to sense part out; the sensor will be Off when the part is not in the sensor, and will be On when the part is in the sensor. When a Normally On sensor is being used to sense part out; the sensor will be On when the part is not in the sensor, and will be Off when the part is in the sensor.

Section 6.5.8 Transfer

Transfer type inputs are used to monitor automatic transfer mechanisms. Some progressive dies cut the part away from the stock at an early stage in the die. Automatic transfer mechanisms are then used to move the separate pieces to the next stage in the die. Each gripper on the transfer mechanism should have a sensor to detect that each part is in place in the transfer mechanism. These switches can be wired to channel inputs programmed as Transfer type to monitor the mechanism for dropped parts during the transfer.

When programming a channel for transfer type, the operator must enter crankshaft angles to mark On and Off points for a timing 'window' during which the transfer will occur. The Window On setpoint should be set to an angle just after the part is gripped. The window Off setpoint should be set to an
angle just before the part is released into the next stage of the die. The timing for Transfer is shown in Figure 6.20. The sensor must signal that the part is present for the entire timing window. In addition, the sensor must signal that the part is not present sometime during the press stroke. If the sensor does signal that a part is present for an entire press stroke, a sensor failure is assumed and a stop signal will be issued.

An additional feature of Transfer type inputs is the delay timer, which is programmed by the operator. A programmed time of zero forces ordinary operation of the transfer input as described above, i.e., if the sensor does not report the part present through the entire timing window, a fault will occur immediately. However, if a value other than zero is programmed the channel input is allowed to signal a missing part for the length of time programmed without a fault occurring. If the input does not signal a part present before the time expires and the timing window is still in effect, a fault is generated. This allows the operator to avoid nuisance faults from sensors that 'bounce' open or closed momentarily. The delay time can range from 0 to 65535 milliseconds (65.535 seconds) in 1 millisecond increments.

The sensor being used to verify part detection can be Normally Off or Normally On. The sensor will switch from its normal state when the part is being detected. When a Normally Off sensor is being used to sense part out; the sensor will be Off when the part is not on the sensor, and will be On when the part is on the sensor. When a Normally On sensor is being used to sense part out; the sensor will be On when the part is not on the sensor, and will be Off when the part is on the sensor.

Section 6.5.9 Custom

Custom type channels allow the user to define the channel logic. If there is a monitoring situation that does not fit the logic of the eight standard types, the custom type can be used. This type allows the user to define a set of logic rules for the channel. The channel’s input will be monitored based upon the defined rules.

The Custom Rules are:

- Detections in the timing window
- Enter the timing window On
- Enter the timing window Off
- Exit the timing window On
- Exit the timing window Off
- Always On in the timing window
- Always Off in the timing window
- Off somewhere in the stroke
- Off somewhere in the window
Section 6.6 Configuration

In order for the Digital Die Protection and Process Monitor to be recognized by the OmniLink II Press Automation Control, a Device Configuration must be performed. This process is described in Section 4.1. It is important that all Digital Die Protection and Process Monitors be assigned a \textbf{module number}. After all module numbers have been assigned, the Die Protection Module must be selected from the Device Configuration menu.

After configuring the system to recognize the Digital Die Protection and Process Monitor module(s), the Die Protection Screen can be accessed on the OmniLink II operator Terminal. The Die Protection Screen can be entered from the Main Menu by selecting the DIE PROTECTION softkey. The Die Protection Screen is shown in Figure 6.20.

![Die Protection Screen](image)

Figure 6.20 Die Protection Screen

The Digital Die Protection and Process Monitor system should be configured before being put into operation. This configuration allows the user to select the manner that the system can be reset and bypassed. The user is encouraged to look at all possible configuration options, and then choose the options that best fit his applications.

To enter the Configuration screen, place the Run/Program key switch in the Program position, then select the CONFIGURE softkey. A popup box which requests that the user enter the user configuration code, highest order user password. After entry of the correct code, the Die Protection System Configuration screen will appear. This screen is shown in Figure 6.21.
Section 6.6.1 Reset All Channels Configuration

There are two options to Reset Configuration. These options define the number of channels that are reset when the RESET ERROR softkey is pressed. The options are that only the channels that are visible on the screen are reset when the RESET ERROR softkey is selected or that all channels are reset when the RESET ERROR softkey is selected. The die protection screen shows eight channels at a time. If this option is set to No, only the eight channels visible on the screen will be reset when the RESET ERROR softkey is selected. If channels that are not visible on the screen are also in an error condition, they will not be reset. To reset the other faulted channels, the user will have to page through to the screen(s) that show the other faulted channels. Once the other faulted channels are visible, the RESET ERROR softkey will reset them. If this option is set to Yes, then the RESET ERROR softkey will reset all channels even if they are not currently displayed on the screen.

The suggested setting of this configuration parameter is No. When set to No, only the channels on the screen will be reset. The operator will have to page through to all screens that contain faulted channels to reset them. This will force the operator to at least view all pages that contain faulted channels.

Section 6.6.2 Stroke Limited Bypass Maximum Strokes and Maximum Time

Stroke limited bypass is an option that when selected allows a user to bypass the monitoring functions of the Digital Die Protection and Process Monitor for a limited number of strokes or for a limited time. The system will remove the bypass after either limit is reached. If stroke limited bypass is not required, the Stroke Limited Bypass Maximum Strokes parameter should be set to zero. If a stroke limited bypass is used but the timeout is not required, the Stroke Limited Bypass Maximum Time should be set to zero.

A user who has been granted access to stroke limited bypass could do so by selecting the Bypass “x” Strokes softkey. When this softkey is selected, the digital die protection and process monitoring system will be bypassed for the number of strokes (“x”) entered in the Stroke Limited Bypass Maximum Strokes parameter or for the number of minutes entered for the Stroke Limited Bypass Maximum Time.
When bypassed, the system will halt all monitoring functions. See Section 6.7 for more information concerning bypass. After the number of strokes has been completed or after the maximum bypass time has been exceeded, the bypass condition will be removed.

**Section 6.6.3 System Bypass Allowed**

If the System Bypass Allowed parameter is set to Yes, the BYPASS ON/OFF softkey will appear on the Die Protection screen. Any user who has been granted access to this system bypass, can do so by selecting this softkey. See Section 6.7 for more information concerning bypassing. By selecting this softkey again, the user can remove the system bypass. If this parameter is set to No, the BYPASS ON/OFF softkey will not appear on the Die Protection Screen. The only means of bypassing the Digital Die Protection and Process Monitor will be automatic bypass and stroke limited bypass.

**Section 6.6.4 Auto Un-bypass in Production Mode**

If the Auto Un-bypass in Production Mode parameter is set to Yes, the Digital Die Protection and Process Monitor will automatically remove any bypass when the press operating mode is changed from setup to production. The automatic removal of bypass will prevent the system from being inadvertently left in bypass when changing from setup mode to production mode. This automatic un-bypass feature will remove the bypass when the press mode is changed to production mode from setup mode. **This feature requires that the Use Mode Input Setting be set to yes and that the Setup Mode input be used. See Section 4.2.1.6.** If the Auto Un-bypass in Production Mode parameter is set to No, there will be no automatic un-bypass.

The automatic un-bypass feature only removes the bypass when the press mode changes from setup to production. Once in production mode, any user who has been granted access to do so can again select a bypass.

**Section 6.6.5 Restricted/Unrestricted Die Protection Channels**

The RESTRICTED UNRESTRICTED softkey on the Die Protection System Configuration screen can be used to display the Die Protection Restricted screen. This screen allows for selected channels of the digital die protection and process monitoring system to be restricted. When a channel is restricted, it can be viewed but not changed by the operator, and it will not be affected by job recalls. Once a channel is restricted, it will retain all settings that were programmed when the channel was set to restricted. The channel setting cannot be changed while restricted. If a job is recalled the restricted channel setting will not change, even if the restricted channel’s settings are different in the recalled job. The user has the option to restrict or unrestrict any channel. In order to make changes to a restricted channel; the restriction must be removed, the change entered, and then again set the channel to restricted.

**Section 6.7 Operation**

The Digital Die Protection and Process Monitor screen is shown in Figure 6.22. Various items on this screen are referenced to sections of this manual.
### a) Channel Settings
These are the parameters that define the logic type, window on and off angles, description, and type of stop to be issued on fault conditions. See Section 6.71.

### b) Channel Diagnostics
The diagnostic information aids the user in setup of the channels and in troubleshooting. See Section 6.72.

### c) Bypass
When monitoring of an individual channel or the entire system is not required, the individual channel or system must be bypassed. See Section 6.73.

### d) Reset
After a fault has been detected, a stop will be sent to the press control. Before production can resume, the system must be reset to clear the stop. See Section 6.74.

### e) Configure
Configuration allows the user to select the manner that the system can be reset and bypassed. See Section 6.6.

### f) Stop Types
When a channel fault has been detected, a stop will be sent to the press control. There are three different stop types: cycle stop, top stop, and intellistop. See Section 6.7.1.4.

### g) Status Information
The status of the view channel, individual module, and entire digital die protection and process monitoring system. See Section 6.76.
Section 6.7.1 Channel Settings

The channel settings define the monitoring type of the channel and the parameters associated with the channel type. The Die Protection screen is shown in Figure 6.22. The screen displays channel type, description, status, and sensor state for eight channels. Additional information specific for one channel, channel 5 in Figure 6.22, is displayed in the bottom section of the screen. The additional information includes the channel type, stop type, bypassed state, and other information specific to the channel type. The information on the Die Protection screen is view only information. Channel setting cannot be changed on this screen.

In order to change channel settings, the CHANNEL SETTINGS softkey must be selected. The Die Protection Settings screen will be displayed. This screen is shown in Figure 6.23.

![Die Protection Setting Screen](image)

The channel settings can by changed by a user who has gained access control. See Section 3.9 for information concerning access control. There are several items that can be programmed on this screen. The item list changes depending on the type of channel logic that is selected. In Figure 6.24 a Cyclic channel type is selected. The remaining items are all associated with Cyclic type inputs. In addition, the help screens are specific for logic type and for the highlighted parameter. The following sections contain a description of all possible items that may appear on the Die Protection Setting screen. Some of these items will not appear on all screens, because they do not apply to the selected channel type.

Section 6.7.1.1 Channel Types

The channel type can be selected from the following listing.
<table>
<thead>
<tr>
<th>Channel Type</th>
<th>Description</th>
<th>Section for Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static</td>
<td>Channel type used to monitor sensors that are independent of the machine production cycle. There is no timing associated with these inputs.</td>
<td>6.5.1</td>
</tr>
<tr>
<td>Cyclic</td>
<td>Channel type used to monitor events that occur once each machine cycle. These events must occur during the set timing window.</td>
<td>6.5.2</td>
</tr>
<tr>
<td>In Position</td>
<td>Channel type used to monitor material feed progression.</td>
<td>6.5.3</td>
</tr>
<tr>
<td>One Part Detector Edge</td>
<td>Channel type used to monitor part ejection for parts that are completely out of the die area as soon as they are sensed by the channel’s input sensor.</td>
<td>6.5.4</td>
</tr>
<tr>
<td>One Part Detector Pass</td>
<td>Channel type used to monitor part ejection for parts that are not completely out of the die area when they are first sensed by the channel’s input sensor. The part must be completely past the sensor by the end of the timing window.</td>
<td>6.5.5</td>
</tr>
<tr>
<td>Two Part Detector Edge</td>
<td>Channel type used to monitor two parts whose ejection is sensed by the same sensor. The parts must enter the sensor’s sensing field at different times. The last part does not have to exit the sensing field at the end of the timing window.</td>
<td>6.5.6</td>
</tr>
<tr>
<td>Two Part Detector Pass</td>
<td>Channel type used to monitor two parts whose ejection is sensed by the same sensor. The parts must enter the sensor’s sensing field at different times. The last part must exit the sensing field at the end of the timing window.</td>
<td>6.5.7</td>
</tr>
<tr>
<td>Transfer</td>
<td>Channel type used to monitor part transfer. The channel’s input sensor must report that the part is present through the entire timing window.</td>
<td>6.5.8</td>
</tr>
<tr>
<td>Custom</td>
<td>Channel type that allows the user to define the channel logic.</td>
<td>6.5.9</td>
</tr>
</tbody>
</table>

**Section 6.7.1.2 Description**

Input descriptions are helpful labels which aid the operator in identifying which sensor is tied to a particular input and what that input is monitoring. This is of particular value if many die protection inputs are used. Since the input "Type" labels are by necessity general in nature, an input description can be used to give more specific information to the operator. For example, suppose two separate sensors are being used to check for two different pilot holes in the part. The die protection inputs which these sensors are wired to would both be programmed as Cyclic type inputs to check proper operation of the sensor (pilot hole both present and absent at different points in the stroke). In this application it would be helpful to specify a description for each input such as "PILOT HOLE LEFT" and "PILOT HOLE RIGHT" so that if a failure occurred the operator would know immediately which hole was not seen. The system can have 80 names. Each name can be 20 alpha-numeric characters in length.

Moving the cursor to highlight the Description and then selecting the CHANGE NAME softkey can access the Die Protection Names screen. There are several names that were programmed by the factory. These are common names that may be helpful to the user. The user can edit or delete any of the factory
programmed names as required.

It must be noted that when a job is stored in memory, only the number assigned to the description is stored. When a job is recalled, the description that is currently assigned to the stored description number will be displayed. If a description has been changed since the job was last stored, the new description, not the description present when the job as stored, will be displayed. Since there are 80 description names available, the user is encouraged to enter descriptions in unused locations rather than edit existing names.

Section 6.7.1.3 Input Type

All channel logic types can have either Normally Off or Normally On input types. A sensor will switch from its normal state when the event that it is monitoring takes place. For example, if a Normally Off sensor is being used for stripper plate detection, the sensor will turn On when the stripper plate is detected. The majority of sensors used will be Normally Off input type.

Section 6.7.1.4 Stop Type

All channel logic types have three stop types available; cycle stop, top stop, and intellistop. When a channel fault is detected, a cycle stop, top stop, or intellistop signal can be asserted. If programmed for a cycle stop and a malfunction is detected, a stop signal will be immediately sent to the press control. If programmed for a top stop and a malfunction is detected, a stop signal will be sent to the press control at a slide position that will allow the slide to come to rest at the top of its stroke. If programmed as an intellistop and a malfunction is detected, an immediate stop signal will be sent to the press control if the slide can come to rest before a programmed critical angle. If the malfunction occurs at a slide position that will not allow the slide to come to rest before the programmed critical angle, a top stop will be executed.

The user must choose the type of stop that is appropriate for the application. See Section 5.2.3.

Section 6.7.1.5 Bypass

Each individual channel can be bypassed. When a channel is bypassed, it no longer monitors its input sensor. It will not send a stop signal to the press control if the input sensor fails to meet the requirements of the selected channel type. Bypass the channel by this means effectively turns the channel off, however, all of the programmed settings are retained. A channel could also be turned off by setting it to Not Used, but doing so will cause all other programmed settings to be lost.

When a channel is bypassed, its status on the Die Protection screen display “Bypass” highlighted in yellow. In addition the System Status and Module Status will display “One or More Channels Bypassed” highlighted in yellow.

Additional information on bypass is contained in Section 6.7.3.

Section 6.7.1.6 Delay Time

This parameter is used by Static, Transfer, and Custom channel logic types only. This is the time that the system will delay after the detection of a channel fault until a stop signal is issued. If the channel
remains in the fault condition for the length of the delay time, a fault will be issued. If the channel returns to a run condition before the full length of the delay time, a fault will not be issued. The maximum value of this delay time is 65535 milliseconds (65.535 seconds). If a delay time is not required, this parameter should be set to 0.

Section 6.7.1.7 Delay Strokes

This parameter is used by Cyclic and Customer channel logic types only. This is the number of strokes that can be made without satisfying the channel logic before a stop is asserted. This purpose of this delay is to accommodate events that may not occur every stroke, but will occur within some number of strokes. An example of such an application is slug detection, where under normal conditions slugs will build up and then fall out maybe two or three at a time. The delay counter allows the operator to enter a number representing the maximum number of strokes that can be run consecutively without the slug being detected within the timing window. If the sensor does not become active within the window for a number of strokes exceeding the counter number, then a fault will be generated. By contrast, if the sensor does become active within the window on some stroke before the counter expires, then the counter is reset and the full count is again allowed. If the operator desires that the sensor be required to become active on every stroke, then a value of zero should be entered into the counter. (Note that although the sensor is allowed to remain inactive throughout a stroke when the stroke counter is used, the opposite is not true; e.g., the sensor is not allowed to remain active through an entire stroke or a fault is generated.) The maximum Delay Strokes value is 255.

Section 6.7.1.8 Window On and Window Off

These are the angular settings in degrees for the timing window. These parameters are required for all channel types except Static. The permissible values are from 0º to 360º.

Once the timing window values are entered, they will be graphically displaced on the circular display in the lower right corner of the screen. The timing window duration will be highlighted in blue.

Section 6.7.1.9 Separation Time

This parameter is required for Two Part Detector Edge, Two Part Detector Pass, and Custom channel types. When an single sensor input is used to sense multiple parts, the operator must also program a Separation Time. This is due to the fact that some parts are irregularly shaped or have holes which may cause the detector to give multiple signals to the channel input for one part. To ensure that the detector counts only once for the first part, the module will wait through a programmed delay after seeing the first part before it begins to look for the next part. This programmed delay must be entered by the operator and is called Separation Time. The range of allowed values for the separation time is 0 milliseconds to 999 milliseconds in 1 millisecond increments. The proper value for a particular application will have to be determined by experimentation.

Section 6.7.2 Channel Diagnostics

The Die Protection screen shown in Figure 6.22 has a circular display in the lower right corner. This display gives a graphical representation of the timing window and the input sensor. Additional diagnostic information is available on the Die Protection Channel Diagnostics screen. Selecting the CHANNEL DIAGS softkey on the Die Protection screen will display the Die Protection Channel
Diagnostics screen. A sample of the Die Protection Channel Diagnostics screen is shown in Figure 6.24. This screen gives diagnostic information for the individual channel that was highlighted on the Die Protection screen. Other channels can be accessed by using the PREVIOUS CHANNEL or NEXT CHANNEL softkeys. Or the EXIT softkey will return to the Die Protection screen when another channel can be highlighted and then the CHANNEL DIAGS softkey selected.

The system records the last 64 transitions of the input sensor. A transition is a change of state from Off to On or from On to Off. Since the circular display can only display one press stroke at a time, the DECREMENT STROKE or INCREMENT STROKE softkeys can be used to view other press strokes. By using these keys, a history of the last 64 transitions will be displayed. Transition On and Off angles are displayed on the Capture Angles table.

The DECREMENT CURSOR and INCREMENT CURSOR can be used to move the cursor on the circular display. As this cursor is moved, its angular position is numerically displayed in the center of the circle.

The current Off/On status of the input sensor is displayed in the upper right corner.

Also displayed are the current values of the Time Delay Countdown, Separation Time Countdown, and Stroke Delay Countdown, and the Number of In Window Transitions.

**Section 6.7.3 Bypass**

When it is necessary to turn off any or all of the monitoring functions, the individual channel or all channels must be bypassed. Any channel that is bypassed is no longer being monitored. The system will not monitor the status of the channel’s input. A bypassed channel is essentially turned off.

There are several bypass options available with the Digital Die Protection and Process Monitor. These
options range from bypassing individual channels to bypassing the entire system.

Section 6.7.3.1 Channel Bypass

Individual channels can be bypassed by changing the Channel Setting bypass setting from No to Yes. Section 6.7.1.5 explains how to bypass an individual channel.

Individual channel bypass is not automatically removed when the press mode is switched to Production. If the system is configured for automatic un-bypass when the press mode changes from Setup to Production, individual channels bypassed in the Channel Setting screen, will not be un-bypassed.

The individual channel bypass is volatile. If an individual channel is bypassed in the Channel Settings screen and power is removed from the unit, the channel will be un-bypassed on power-up.

Section 6.7.3.2 System Bypass

If configured for System Bypass, the Die Protection screen will display the BYPASS ON/OFF softkey. Control access must be gained by the user before this key can be used. When the system bypass is switched to On, the entire Digital Die Protection and Process Monitor is switched off. To remove the bypass and return the system’s monitoring functions, the user can again select the BYPASS ON/OFF softkey.

In addition to the manual removal of bypass, the unit can be configured to automatically switch off bypass when the press mode is switched from Setup to Production. This Auto Un-bypass in Production Mode configuration option must be selected as described in Section 6.6.4.

The automatic un-bypass feature only removes the bypass when the press mode changes from setup to production. Once in production mode, any user who has been granted access to do so can again select a bypass.

Section 6.7.3.3 Stroke Limited Bypass

If configured for Stroke Limited Bypass, the Die Protection screen will display the BYPASS “X” STROKES softkey. Where “X” is the programmed number of strokes that the unit will be bypassed. When the stroke limited bypass is switched on, the units monitoring functions will be turned off for the number of press strokes displayed. As the press strokes, the System Status will display the remaining number of strokes. In addition to the number of strokes limit, a timer may also be programmed to limit the time that the stroke limited bypass remains in effect. Stroke limited bypass will be removed when the number of strokes is reached or when the time times out, whichever occurs first.

Stroke Limited Bypass can be removed by selecting the CANCEL BYPASS softkey. In addition, the unit can be configured for automatic removal of Stroke Limited Bypass when the press mode is switched from setup to production. This Auto Un-bypass in Production Mode configuration option must be selected as described in Section 6.6.4.

The automatic un-bypass feature only removes the Stroke Limited Bypass when the press mode changes from setup to production. Once in production mode, any user who has been granted access to do so can again select Stroke Limited Bypass.
Section 6.7.3.4 Bypass in Setup Mode and Bypass on Job Recall

Individual channels can be automatically bypassed when the press mode is switched to Setup mode. This will allow certain channels to be turned off when in press Setup mode.

Also, individual channels can be automatically bypassed for a programmed number of strokes after a job recall. The number of strokes that the channel will be bypassed is programmable per channel. This feature allows for sensors in progressive dies to be bypassed for the number of strokes that are required for the material progression to get to the sensor. For example, a sensor in the fifth stage of a five stage die will not see material until the fifth stroke. This sensor can be bypassed for four strokes after the job recall.

Individual channels must be programmed to bypass in Setup mode or to be bypassed for a number of strokes after a job recall. These items are programmed in the Die Protection Bypass Setup screen. To display the Die Protection Bypass Setup screen, select BYPASS SETUP softkey in the Die Protection Screen, Figure 6.22. The Die Protection Bypass Setup screen is shown in Figure 6.25.

Figure 6.25 Die Protection Bypass Screen

Section 6.7.4 Reset

Channel faults must be reset before the issued stop signal is removed. The RESET ERROR softkey on the Die Protection screen, Figure 6.22, must be used to reset faults.

There are several configurations for the Reset Error softkey availability. This softkey can be configured to be available at all times. When configured to be available at all times, the Reset will be available to all operators. Neither the Run/Program key or code access will be required to reset. The Reset Error softkey can be configured to be available to only personnel who can gain control access to the Die Protection Reset.

There are two configurations for the number of channels that the RESET ERROR softkey will reset at
one time. The Reset can be configured to only reset the channels that are displayed on one Die Protection screen. Eight channels are displayed on one Die Protection screen. The other configuration is for the RESET ERROR softkey to reset all channels, those displayed and those not displayed.

Section 6.7.5 Status Information

Status information is available for the individual channel, the individual module, and the entire Die Protection and Process Monitor system.

Individual channel status is listed next to the channel description on the Die Protection screen. Channel status can be OK, Error, or Bypass.

Additional status information for the highlight channel is displayed at the bottom of the screen. This will give specific information concerning the present status of the channel or the reason that an error condition exists on this channel.

At the bottom of the screen are Module Status and System Status. The Module Status will display the current status of the module that is selected for display. This System Status will display the current status of all Die Protection and Process Monitor modules connected to the system.
Section 7 Programmable Limit Switch (PLS)

The Programmable Limit Switch is an optional addition to the OmniLink II Press Automation Control. This unit provides electrical outputs that are related to machine position. The outputs can be used to control solenoid valves and to provide sequencing signals to feed and transfer systems.

Section 7.1 Features

The programmable limit switch system consists of PLS/Logic Modules (Model 5100-5B) and an output relay boards. The PLS/Logic Module contains the control logic and power supply necessary to control and power the output relay boards. The output relay boards provide the necessary electromechanical or solid state relays. Each PLS/Logic module can control and power two output relay boards. Each output relay board has eight relays. The OmniLink II Press Automation Control can have a maximum of four PLS output boards. Therefore 8, 16, 24 or 32 PLS channels can be provided.

The output relays can be electromechanical relays or solid state AC relays. The electromechanical relays are plug-in for individual replacement. The solid state board has provisions for eight plug-in solid state relays. The solid state relays can be either AC or DC. A solid state relay board can contain any combination of AC or DC relays totaling to eight.

There are five possible modes of operation for each of the thirty-two PLS channels. These modes are Always Off, Always On, Normal, Timed Off, and Toggle. See Section 7.5 for details of each mode.

Some modes can be programmed for Counted Outputs. A channel programmed for counted output will not have its PLS function occur every stroke. Instead it will cycle its output relay after the programmed number of strokes. For example a channel set to the Normal mode with a Counted Output set to five strokes, will turn its output relay on and off every fifth stoke. The output relay will remain off during the remaining four strokes of the five stroke cycle.

Turn on and/or turn off angular positions can also be independently speed advanced. The speed advance, if properly programmed, will cause the PLS outputs to turn on or turn off earlier in the stroke to compensate for the greater distance the machine crankshaft will turn at higher speeds in the given reaction time of the automation device. This is particularly useful for PLS sequenced feed roll release associated with the pilot function. If Normal Mode is used, both the on angle and the off angle can independently speed advanced.

Section 7.2 Specifications

The mechanical and electrical specifications of the Programmable Limit Switch are listed in Table 7.1.
PARAMETER SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>5100-5B Module Dimensions without Enclosure</td>
<td>10.4” (264 mm) High x 5.5” (138 mm) Wide x 4.8” (122 mm) Deep</td>
</tr>
<tr>
<td>5100-5B Module Mounting Footprint without Enclosure</td>
<td>9.77” (248 mm) High x 4.75” (121 mm) Wide</td>
</tr>
<tr>
<td>5100-5B Module Single Enclosure Dimensions</td>
<td>13.3” (338 mm) High x 7” (159 mm) Wide x 5” (203 mm) Deep</td>
</tr>
<tr>
<td>5100-5B Module Single Enclosure Mounting Footprint</td>
<td>13.75” (249 mm) High x 4.75” (121 mm) Wide</td>
</tr>
<tr>
<td>Input Power</td>
<td>100 to 135 VAC @ .5 Amps</td>
</tr>
<tr>
<td>Input Fuse Type</td>
<td>Littlefuse 217.500</td>
</tr>
<tr>
<td>Electromechanical Relay</td>
<td>240 VAC Max, 30 VDC Max, 5 Amp Max</td>
</tr>
<tr>
<td>Electromechanical Relay Fuse</td>
<td>Littlefuse M251007, Gould GSRV7</td>
</tr>
<tr>
<td>Solid State AC Relay</td>
<td>24 - 280 VAC, 3 Amp Max at 45º Ambient, 2 Amp Max @ 70º Ambient</td>
</tr>
<tr>
<td>Solid State DC Relay</td>
<td>60 VDC max, 3 Amp Max at 45º Ambient, 2 Amp Max @ 70º Ambient</td>
</tr>
<tr>
<td>Solid State AC or DC Relay Fuse</td>
<td>Littlefuse M251 007, Gould GSRV7</td>
</tr>
</tbody>
</table>

Table 7.1 Specifications

Section 7.3 Mounting

The PLS/Logic module can be mounted in any convenient location. It can be mounted in or near the OmniLink II Operator Terminal or it can be mounted near the devices that it is controlling. The module comes in an open frame unit as shown in Figure 7.1, or in an enclosure as shown in Figure 7.2. After wiring and initial set-up, there is normally no need to access the unit. However, it is suggested that the unit be mounted in a location that is free of excessive oil and lubricant spray, and that is not subject of severe shock or vibration.
Figure 7.1 PLS 5100-5B Open Frame Mounting
Figure 7.2 PLS Enclosure Mounting
Section 7.4 Wiring

The wiring diagram for Programmable Limit Switch units is shown in Figure 7.3. The following connections and operations must be done:

1. Input Power
2. High Speed Serial Bus Cable
3. Set High Speed Serial Bus Termination Switch
4. Wiring of PLS Outputs

Section 7.4.1 Wiring Input Power

Connection of AC input power is made to the 3 pin terminal block on the bottom right of the Model 5100-5 PLS/Logic Module. The pinout is provided on Figure 7.3.

The 3 pin plug supplied for connection of input power is a dual connector plug. As described in Section 2.1 and shown in Figure 2.3, this dual connector plug allows for input power to be strung from module to module.

Section 7.4.2 Wiring High Speed Serial Bus Cable

The high speed serial bus cable is wired to the 4 pin terminal block on the bottom left of the Model 5100-5 PLS/Logic Module. The pinout is provided on Figure 7.3. The cable that is supplied by Link Systems for the high-speed serial bus that interconnects the various components of the OmniLink II Press Automation Control must be used. This cable must run from device to device without being spliced.

The 4 pin plug supplied for connection of the high speed serial bus is a dual connector plug. As described in Section 2.1 and shown in Figure 2.3, this dual connector plug allows for the high speed serial bus cable to be strung from module to module.

Section 7.4.3 Setting High Speed Serial Bus Terminal Switch

The high speed serial bus termination switch must be placed in the correct position. The high speed serial bus termination switch is located just above the high-speed serial bus terminal block. If this device is the last device in the serial bus string, the termination switch must be placed in the closed (right) position. The red LED indicator next to the switch will light when the switch is in the closed position. The last device in the serial bus string will have only one high speed serial bus connection to the 4 pin dual plug. The last device will have a connection from the previous device, but will not connect to any other devices. If this device is not the last device in the serial bus string, the termination switch must be placed in the open (left) position. The red LED will be off when the switch is in the open position.

Section 7.4.4 Output Wiring

The wiring of the PLS output devices is shown in Figure 7.3.
Figure 7.3 PLS Wiring Diagram
Section 7.4.4.1 Electromechanical Relay Wiring

Each electromechanical relay has both normally open and normally closed contact sets available. These contact sets share the same common. The normally open contacts will close when the channel output is On, and will open when the channel output is Off. The normally closed contact will open when the channel output is On and will close when the channel output is Off. Each relay contact set is fused. See Specifications, Section 7.2, for fuse information.

Section 7.4.4.2 Solid State AC Relay Wiring

Each Solid State Relay Output board can accept eight solid state relays. These relays can be either AC (black) or DC (red). It is important that the required relay is in the correct channel position. Wiring AC solid relays in DC solid state relay applications or wiring DC solid state relays in AC solid state relay will result in incorrect operation and possible damage to equipment.

Two terminals are available for each solid state AC relay. These contacts will close when the channel output is on and will open when the channel output is off. The “-” and “+” designations on the terminal blocks do not apply to solid state AC wiring. These designations should be ignored.

Each solid state relay output is fused. See Specifications, Section 7.2, for fuse information.

Section 7.4.4.3 Solid State DC Relay Wiring

Each Solid State Relay Output board can accept eight solid state relays. These relays can be either AC (black) or DC (red). It is important that the required relay is in the correct channel position. Wiring AC solid relays in DC solid state relay applications or wiring DC solid state relays in AC solid state relay will result in incorrect operation and possible damage to equipment.

Two terminals are available for each solid state DC relay. These contacts will close when the channel output is on and will open when the channel output is off. The “-” and “+” terminal designations must be observed when wiring solid state DC wiring.

Each solid state relay output is fused. See Specifications, Section 7.2, for fuse information.

Section 7.5 PLS Modes and Special Features

Each PLS channel can be programmed for Always Off, Always On, Normal, Timed Off, or Toggle mode. Each mode is described in the following sections. It must be noted that all modes are available to all channels.

Certain modes can have special features available to them. These special features are counted outputs and speed advanced outputs.

Section 7.5.1 Always Off Mode

When programmed for Always Off mode, the PLS channel output is always turned off. If a channel is not be used, it should be set to Always Off.
In addition to being the desired setting for an unused channel, Always Off mode has another potential use. Some operations, such as gag tooling, may require solenoids to be on or off depending upon the part being produced. These operations may require that certain outputs be On or Off during the entire production run. In such operations, the Always Off mode can be used when the output is Off for the entire production run.

Section 7.5.2 Always On Mode

When programmed for Always On mode, the PLS channel output is always turned on. This mode should be used when a channel output is required to remain on during the entire production run.

The Always Off mode has a potential use in some gag tooling operations, may require solenoids to be on or off depending upon the part being produced. These operations may require that certain outputs be On or Off during the entire production run. In such operations, the Always On mode can be used when the output is On for the entire production run.

Section 7.5.3 Normal Mode

When programmed for Normal mode, the PLS channel output will turn on at an angle and turn off at an angle. This is the basic operation of a programmable limit switch. At the on angle the output will turn on. The output will turn on until the off angle is reached.

One application of Normal mode is an ejector control. The channel can be programmed to turn on the ejector solenoid and an angle and then turn off the ejector solenoid at another angle.

A Normal mode channel can have counted outputs and can have speed advanced on and/or off angles. If programmed for counted outputs with a count of four, the channel will not turn on every stroke, but only turn on every fourth stroke. See Section 7.5.6. If programmed for speed advance, the on and/or off angles can be advanced based upon machine speed. These angles can be independently adjusted to compensate for device reaction time, so that the end result always occurs at the desired point. See Section 7.5.7.

Section 7.5.4 Timed Off Mode

When programmed for Timed Off mode, the PLS channel output will turn on at an angle and turn off after a programmed time. The turn off of the channel output is not based upon press position, but instead is a programmed time after the turn on angle.

One application of Timed Off mode is a material lubrication control. The channel can be programmed to turn on the material lube at an angle and then turn off the lube after a fixed time. The advantage of the Timed Off mode in this example is that a fixed amount of lubrications will be put on the material. The amount of lubrication will not decrease or increase as the press slows down or speeds up. In addition, if a lubricator is controlled by a Normal mode channel that has on and off angles, and if the press stop between the on and off angles, the lubricator would remain off until the press re-starts and passes the off angle.

A Timed Off mode channel can have counted outputs and can have a speed advanced on angle. If
programmed for counted outputs with a count of four, the channel will not turn on every stroke, but only turn on every fourth stroke. See Section 7.5.6. The on angle can be independently adjusted to compensate for device reaction time, so that the end result always occurs at the desired point. See Section 7.5.7.

Section 7.5.5 Toggle Mode

When programmed for Toggle mode, the PLS channel will turn on at an angle, remain on for a programmed number of strokes. After the programmed number of stroke, the PLS channel will turn off at the angle, and remain off for the programmed number of strokes. The channel will repeat the On and Off cycle.

An application of Toggle mode, is a parts diverter. If it is required that a part bin be filled with a fixed number of parts, then a diverter shift to fill another bin with the same fixed number of parts, the Toggle mode can be used. While the second bin is being filled, the first bin can be removed and replaced with an empty bin.

The Toggle On and Off angles can be independently speed advanced. If programmed for speed advance, the on and/or off angles can be advanced based upon machine speed. These angles can be independently adjusted to compensate for device reaction time, so that the end result always occurs at the desired point. See Section 7.5.7.

Section 7.5.6 Counted Outputs

Some modes can be programmed for Counted Outputs. A channel programmed for counted output will not have its PLS function occur every stroke. Instead it will cycle its output relay after the programmed number of strokes. For example a channel set to the Normal mode with a Counted Output set to five strokes, will turn its output relay on and off every fifth stroke. The output relay will remain off during the remaining four strokes of the five stroke cycle.

An application of counted outputs is a scrap chopper. When strip material is fed into the die and when scrap or unused material exits, it is necessary to cut the scrap into small strips. A solenoid activated scrap chopper can cut the material into strips. These strips must be small enough to be conveniently handled, but it is unnecessary to chop the material every stroke. Chopping the material every stroke would put excessive ware on the scrap chopper. A counted output can be used to control the scrap chopper. The count can be set high enough so that the cut scrap can be easily handled, but the chopper will not have to chop on every stroke.

Section 7.5.7 Speed Advanced Leading and Trailing Edges

Turn on and/or turn off angular positions can also be independently speed advanced. The speed advance, if properly programmed, will cause the PLS outputs to turn on or turn off earlier in the stroke to compensate for the greater distance the machine crankshaft will turn at higher speeds in the given reaction time of the automation device. If Normal Mode is used, both the on angle and the off angle can independently speed advanced.

Speed advance is based upon the fact that all devices have a reaction time. A device’s reaction time is the time between the receipt of the go signal and the time that the device accomplishes its task. For
example, a feed roll pilot release is intended to release the feed rolls from the material, so that the die pilots can pick up the material and position it correctly. The pilot release cannot release too soon or the material may fall back out of the die. The pilot release cannot release too late or it will be holding on to the material as the die pilots try to position the material. The pilot release takes a certain amount of time to actually release the material. After the pilot release solenoid valve receives its electrical signal, the valve must shift to let air into the pilot release. The pilot release air pressure must built up to a level that overcomes the pilot springs before the material is released. The total time between the turn on of the release solenoid valve and the actual lifting of the pilots is the reaction time.

Without speed advanced outputs, it may not be possible to correctly set the turn on angle for the control of the pilot release for all press speeds. As the press speed increases, the die pilot pins approach the material faster. If the turn on of the pilot release solenoid valve is correct at slow press speed, it may not be correct at high press speed. The reaction time of the pilot release does not change with speed. The time between the turn on angle and the required material release angle gets smaller as press speed increases. The pilot release may not be able to release the material before the die pilots pick up the material as press speed increases.

Speed advance will compensate for the increase in press speed. The speed advance is programmed with the desired angle for the action to be accomplished. The speed advance is also programmed with the reaction time. The speed advance will increase the angle based upon the machine speed and the device reaction time. In the case of the pilot release, the turn on angle will be increased as the press speed increases. If programmed properly, the amount of increase will be such that the pilot roll release will release the material at the same press position, just as the die pilot pins pick up the material for all press speeds.

The availability of speed advance is configurable. If this feature is not required, it can be removed during the PLS configuration. See Section 7.6.2.

**Section 7.6 Configuration**

In order for the Programmable Limit Switch to be recognized by the OmniLink II Press Automation Control, a Device Configuration must be performed. This process is described in Section 4.1.

After configuring the system to recognize the Programmable Limit Switch module(s), the Limit Switch Screen can be accessed on the OmniLink II operator Terminal. The Limit Switch Screen can be entered from the Main Menu by selecting the LIMIT SWITCH softkey. The Limit Switch Screen is shown in Figure 7.4.
The Programmable Limit Switch system should be configured before being put into operation. This configuration allows the user to select the manner that the system can be reset and the use of speed advanced outputs. The user is encouraged to look at all possible configuration options, and then choose the options that best fit his applications.

To enter the Configuration screen, place the Run/Program key switch in the Program position, then select the CONFIGURE softkey. A popup box which requests that the user enter the user configuration code, highest order user password. After entry of the correct code, the Die Protection System Configuration screen will appear. This screen is shown in Figure 7.5.

Figure 7.4 Programmable Limit Screen

Figure 7.5 Programmable Limit Switch Configuration Screen
Section 7.6.1 Reset All Channels Configuration

There are two options to Reset Configuration. These options define the number of channels that are reset when the RESET ERROR softkey is pressed. The options are that only the channels that are visible on the screen are reset when the RESET ERROR softkey is selected or that all channels are reset when the RESET ERROR softkey is selected. The Limit Switch screen shows eight channels at a time. If this option is set to No, only the eight channels visible on the screen will be reset when the RESET ERROR softkey is selected. If channels that are not visible on the screen are also in an error condition, they will not be reset. To reset the other faulted channels, the user will have to page through to the screen(s) that show the other faulted channels. Once the other faulted channels are visible, the RESET ERROR softkey will reset them. If this option is set to Yes, then the RESET ERROR softkey will reset all channels even if they are not currently displayed on the screen.

The suggested setting of this configuration parameter is No. When set to No, only the channels on the screen will be reset. The operator will have to page through to all screens that contain faulted channels to reset them. This will force the operator to at least view all pages that contain faulted channels.

Section 7.6.2 Allow Speed advanced Outputs

This configuration parameter will allow or disallow the use of speed advance outputs. A speed advance output can have its leading or trailing edge advanced based upon machine speed. This feature allow for a PLS to change the turn on of turn off angle so that the event triggered by the PLS channel occurs at the desired angular position independent of machine speed.

If this feature is wanted, set the parameter to Yes. If this parameter is not wanted, set this parameter to No.

Section 7.6.3 Restricted/Unrestricted PLS Channels

The RESTRICTED UNRESTRICTED softkey on the PLS System Configuration screen can be used to display the PLS Restricted screen. This screen allows for selected channels of the programmable limit switch to be restricted. When a channel is restricted, it can be viewed but not changed by the operator, and it will not be affected by job recalls. Once a channel is restricted, it will retain all settings that were programmed when the channel was set to restricted. The channel setting cannot be changed while restricted. If a job is recalled the restricted channel setting will not change, even if the restricted channel’s settings are different in the recalled job. The user has the option to restrict or unrestrict any channel. In order to make changes to a restricted channel; the restriction must be removed, the change entered, and then again set the channel to restricted.

Section 7.7 Operation

The Programmable Limit Switch screen is shown in Figure 7.6. Various items of this screen are referenced to sections of this manual.
Figure 7.6 Referenced Die Protection Screen

a) Channel Settings These are the parameters that define the logic type, window on and off angles, description, and type of stop to be issued on fault conditions. See Section 7.7.1.

b) Selected Channel Information Specific information about the programmable limit switch channel that is currently selected. See Section 7.7.1

c) Reset After a fault has been detected, a stop will be sent to the press control. Before production can resume, the system must be reset to clear the stop. See Section 7.7.2

d) Configure Configuration allows the user to select the manner that the system can be reset and the use of Speed advance Outputs. See Section 7.6.

e) Status Information The status of the viewed channel, individual module, and the entire programmable limit switch system. See Section 7.7.3
Section 7.7.1 Channel Settings

The channel settings define the mode of the channel and the parameters associated with the mode. The Limit Switch screen is shown in Figure 7.6. The screen displays channel mode, description, status, and state for eight limit switch channels. Additional information specific for one channel, channel 1 in Figure 7.6, is displayed in the bottom section of the screen. The additional information includes the channel on and off setpoints and a graphical display of the settings. The information on the Limit Switch screen is view only information. Channel setting cannot be changed on this screen.

In order to change channel settings, the CHANNEL SETTINGS softkey must be selected. The PLS Change Settings screen will be displayed. This screen is shown in Figure 7.7.

The channel settings can by changed by a user who has gained access control. See Section 3.9 for information concerning access control. There are several items that can be programmed on this screen. The item list changes depending on the type of channel mode that is selected. In Figure 7.7 a Normal channel type is selected. The remaining items are all associated with Normal mode PLS. In addition, the help screens are specific for the highlighted parameter. The following sections contain a description of all possible items that may appear on the Limit Switch Setting screen. Some of these items will not appear on all screens, because they do not apply to the selected channel type.

Section 7.7.1.1 Channel Modes

The channel mode can be selected from the following listing.
<table>
<thead>
<tr>
<th>Channel Type</th>
<th>Description</th>
<th>Section for Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always Off</td>
<td>Channel output is always turned off.</td>
<td>7.5.1</td>
</tr>
<tr>
<td>Always On</td>
<td>Channel output is always turned on.</td>
<td>7.5.2</td>
</tr>
<tr>
<td>Normal</td>
<td>Channel output turns on at a programmed angle and turns off at a programmed angle.</td>
<td>7.5.3</td>
</tr>
<tr>
<td>Timed Off</td>
<td>Channel output turns on at a programmed angle and turns off after a programmed time.</td>
<td>7.5.4</td>
</tr>
<tr>
<td>Toggle</td>
<td>Channel outputs turns on at a programmed angle. The output remains on for the count limit selected. After the count limit has been reached, the output turns off at the programmed angle. The output remains off until the count limit is again reached. After the count limit has been reached, the output turns on. The sequence is repeated with the output turn off or the specified count and on for the specified count. The output is switch on and off at the programmed angle.</td>
<td>7.5.5</td>
</tr>
</tbody>
</table>

**Section 7.7.1.2 Description**

PLS descriptions are helpful labels, which aid the operator in identifying which device is tied to a particular PLS channel. This label can be up to 20 characters in length. Both alpha and numeric characters can be used.

Moving the cursor to highlight the Description and then selecting the CHANGE NAME softkey can access the PLS Names screen. There are several names that were programmed by the factory. These are common names that may be helpful to the user. The user can edit or delete any of the factory programmed names as required.

It must be noted that when a job is stored in memory, only the number assigned to the description is stored. The PLS Names screen has a number associated with each description. When a job is recalled, the description that is currently assigned to the stored description number will be displayed. If a description has been changed since the job was last stored, the new description, not the description present when the job as stored, will be displayed. Since there are 80 description names available, the user is encouraged to enter descriptions in unused locations rather than edit existing names.

**Section 7.7.1.3 Speed Advance**

This parameter will be displayed if the system has been configured for Speed Advance PLS outputs. There are four possible selections for this parameter. If the None option is selected, the channel’s turn on and turn off angles will not be speed advanced. If the Leading Edge option is selected, the channel’s turn on angle will be speed advanced, but its turn off angle will not be speed advanced. If the Trailing Edge option is selected, the channel’s turn off angle will be speed advanced, but its turn on angle will not be speed advanced. If the Both option is selected, the channel’s turn on and turn off angles will be speed advanced. See Section 7.5.7 for additional speed advance information.
Section 7.7.1.4 Counted Outputs

This parameter allows for the PLS channel to be programmed for counted outputs. If counted output for the channel is not required, select the No parameter. If counted output by press strokes is required, selected By Stroke. The By Input option is not functional at this time, and should not be selected. See Section 7.5.6 for additional counted output information.

Section 7.7.1.5 On Angle, Off Angle, Toggle Angle

These selections will appear as required by the mode selected. The On Angle will apply to Normal mode and Timed Off mode. This is the angle that the PLS channel output will turn on. The Off Angle will apply to Normal mode. This is the angle that the PLS channel output will turn off. Toggle Angle will apply to Toggle mode. This is the angle that the PLS channel output will Toggle from On to Off and from Off to On. The angle setting can be from 0º to 360º.

Section 7.7.1.6 Count Limit

The count limit is the valve that is assigned to a counted output. It is the number of strokes between that will occur between cycles of the PLS channel output for Normal and Timed Off modes. It is the number of strokes between the turn on and turn off of the PLS channel output for Toggle mode. The count limit can be set from 0 to 99,999,999.

Section 7.7.1.7 Speed Advance Lead Time

This parameter applies to Normal, Timed Off, and Toggle modes. It is the turn on reaction time of the device being controlled. The Speed advance Lead Time can be set from 0 to 999 milliseconds. See Section 7.5.7 for addition speed advance information and for information concerning reaction time.

Section 7.7.1.8 Speed Advance Trail Time

This parameter applies to Normal and Toggle modes. It is the turn off reaction time of the device being controlled. The Speed advance Trail Time can be set from 0 to 999 milliseconds. See Section 7.5.7 for addition speed advance information and for information concerning reaction time.

Section 7.7.2 Reset

PLS faults must be reset before the issued stop signal is removed. The RESET ERROR softkey on the Limit Switch screen, Figure 7.6, must be used to reset faults.

There are several configurations for the Reset Error softkey availability. This softkey can be configured to be available at all times. When configured to be available at all times, the Reset will be available to all operators. Neither the Run/Program key or code access will be required to reset. The Reset Error softkey can be configured to be available to only personnel who can gain control access to the Limit Switch Reset.

There are two configurations for the number of channels that the RESET ERROR softkey will reset at one time. The Reset can be configured to only reset the channels that are displayed on one Limit Switch screen. Eight channels are displayed on one Limit Switch screen. The other configuration is for the RESET ERROR softkey to reset all channels, those displayed and those not displayed.
Section 7.7.3 Status Information

Status information is available for the individual channel, the individual module, and the entire Programmable Limit Switch system.

Individual channel status is listed next to the channel description on the Limit Switch screen. Channel status can be OK or Error.

Additional status information for the highlight channel is displayed at the bottom of the screen. This will give specific information concerning the present status of the channel or the reason that an error condition exists on this channel.

At the bottom of the screen are Module Status and System Status. The Module Status will display the current status of the module that is selected for display. This System Status will display the current status of all Programmable Limit Switch modules connected to the system.