

USER MANUAL

improve
productivity
and down time
at a minimal cost

PRESS-MASTER 1.5

Revision 6a
Sept. 7, 2005

Metal Form Products Co. Ltd.

8-1734 Orangebrook Court
Pickering ON L1W 3G8

P: (905) 831-1111
F: (905) 831-4064
Toll Free: 888-285-8885

Page left blank

Table of Contents

Introduction to the PRESS-MASTER	5
<i>Features</i>	5
<i>Specifications</i>	5
INSTALLATION	6
<i>Retrofit for existing panels</i>	6
<i>Display and circuit board mounting</i>	6
<i>New control panel</i>	6
<i>Resolver mounting</i>	7
<i>Final inspection of connections</i>	7
<i>Schematics instruction</i>	7
CLUTCH/BRAKE SYSTEM FUNCTIONS.....	8
<i>Operator panel label</i>	8
<i>Master stop</i>	9
<i>Power on selector</i>	9
<i>Power on indicator</i>	9
<i>Lube motor start</i>	10
<i>Lube pressure indicator</i>	10
<i>Main motor start</i>	10
<i>Main motor FWD/REV</i>	11
<i>Warning</i>	11
<i>Press mode select</i>	11
<i>Run station select</i>	12
<i>Warning</i>	12
<i>Safety valve RESET</i>	12
<i>Ram/slide adjust ON/OFF (UP/DOWN)</i>	13
PRESS-MASTER.....	14
<i>Front panel view</i>	14

Table of Contents

TDC / BRAKE MONITOR	15
<i>Entering program mode</i>	15
<i>Entering the password</i>	16
<i>Press setup selections</i>	16
<i>Press setup selections</i>	17
<i>TDC * CAM Programming FIXED speed press</i>	18
<i>TDC * CAM Programming VARI speed press</i>	19
<i>TDC/Brake speed compensation</i>	20
<i>Brake monitor</i>	21
<i>VARI drive</i>	22
<i>Zero encoder</i>	23
<i>Leaving program mode</i>	23
AUXILIARY OUTPUT #5.....	24
<i>Stroke based lubrication control & monitor</i>	24
<i>Protected normal Press Cam</i>	25
<i>Hydraulic Overload control & monitor</i>	26
AUXILIARY OUTPUT #6.....	27
<i>Time based lubrication control & monitor</i>	27
<i>Protected normal Press Cam</i>	28
<i>Hydraulic Overload control & monitor</i>	29
TONNAGE.....	30
<i>Programming tonnage limits</i>	30
<i>Zeroing tonnage sensors</i>	31
<i>Tonnage sensor multiplier</i>	32
RAM ADJUST SETTINGS	33
CREATING DIES	34
<i>Entering program mode</i>	34
<i>Die change</i>	35-36
EDITING DIES.....	37
<i>Entering program mode</i>	37
<i>Die modify</i>	38
<i>Cam outputs</i>	38
<i>Die protection</i>	39-40
<i>Counter Balance monitor</i>	41
<i>Counters</i>	42

MONITORING OPERATING PARAMETERS.....	43
<i>Last stop</i>	43
<i>Batch counter monitoring</i>	43
<i>Brake monitoring</i>	44
<i>Die protection</i>	44
<i>Tonnage monitoring</i>	44
<i>Counter balance monitoring</i>	45
<i>Current monitoring</i>	45
<i>Ram adjust</i>	45
DISPLAY MESSAGES	46
<i>Master – internal LED display</i>	46
<i>Fault messages</i>	46-48
<i>Master – External main LCD display</i>	49
<i>Status messages</i>	49-60
<i>Slave – internal LED display</i>	61
<i>Fault codes</i>	61
<i>Slave – internal LED display</i>	62-64
<i>Error codes</i>	65-70
RUN CODES.....	71
APPENDIX A.....	72
<i>Press safety codes</i>	72-77
APPENDIX B.....	78
<i>Die protection modes of operation</i>	78-81
DIMENSIONS	82
<i>Resolver Dimensions</i>	82
<i>Controller Dimensions</i>	83
<i>Display Dimensions</i>	84

INTRODUCTION TO THE PRESS-MASTER

The Press-Master Clutch Brake Automation Controller is designed to replace existing punch press controls at minimal cost, while including features normally found in more expensive units.

Features

The Press-Master controller circuitry is based upon dual microprocessors with diverse redundancy, self-checking and cross checking. Standard features include built in job memory, Vari Drive speed compensation, programmable cams, die protection, tonnage monitor inputs (see separate manual for sensor mounting), absolute resolver, absolute encoder, secondary incremental encoder input (optional) for shut-height indication, brake monitor, counters, troubleshooting with built-in error messages for easy diagnostics on three displays, lube control.

Specifications

Input Power: 120 VAC

Fuses: Main Fuse: 1 Amp. fast blow
Outputs: 5 Amp. slow blow

Indicators:

AC input: Amber LED
DC input: Green LED
Display: Master and slave, 4 Character Alpha-Numeric
Display main screen: 2" x 3.5" Plasma

Inputs:

8 AC 120 Volt Control System
16 DC 24 Volt Control System
4 DC 24 Volt Die Protection
8 Analog Tonnage

Set Points:

Job Count: 0 to 9999999
Batch Count: 0 to 99999
Completed part: 0 to 99999

Speed Comp: 0 to 359 ms.

SPM: 12 to 500

Brake Warning: 1 to 999 ms.
Brake Fail: 1 to 999 ms.
Brake Actual: 1 to 999 ms.
Motion: .5 sec.
Drift: 30 deg.
Cams: 0 – 359 deg.
Die Inputs: 0 – 359 deg.

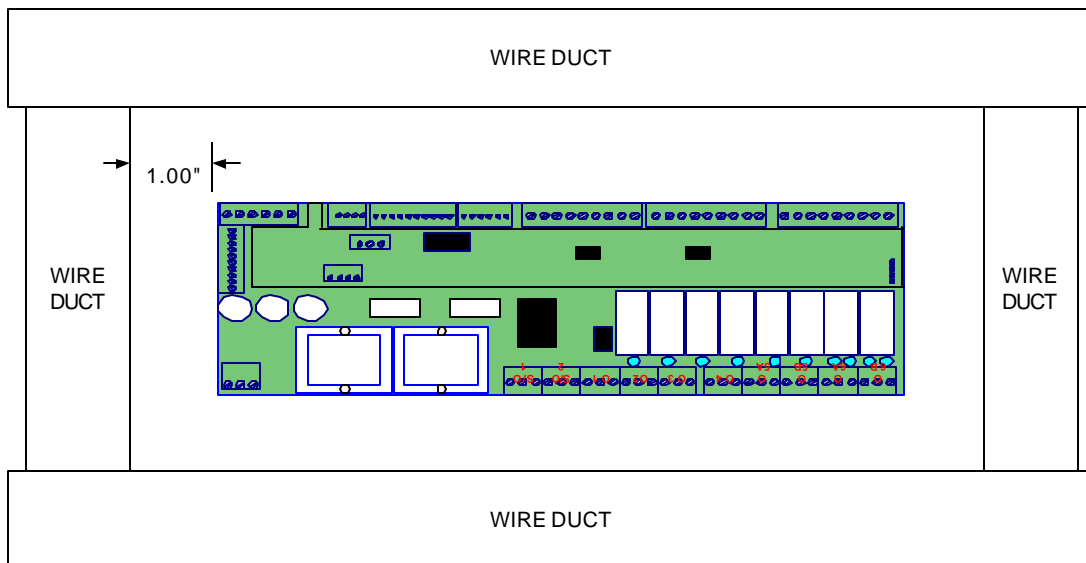
Crank Angle: 0 – 359 deg.

INSTALLATION

Retrofit for existing panels

If you have purchased a PRESS-MASTER to install in an existing control system and wish to utilize the existing motor controls, you must perform the following:

- Remove all existing relays, timers, track, wire duct, etc.
- Relocate all contactors, if needed, to a better-suited location in panel taking into consideration the size, shape and wiring needs of the PRESS-MASTER and your contactors.
- Mount the main control circuit board as far away as possible from contactors to reduce the possibility of inducing electrical noise in the PRESS-MASTER controller.
- Avoid running 600 Volt wires in the same wire duct as low voltage wires.
- Mount new wiring duct in control panel that is suited for the new layout.
- Allow at least 1" around all sides of the circuit board. See illustration below.



- Add vibration mounts to your control panel if mounting directly on punch press (if they do not already exist).
- Add or replace wires needed to connect all external points to controller as per schematics supplied.
- Wire colors and gauge used must be in accordance with the local electrical authority of your region.

Display and circuit board mounting

- Use the existing templates supplied to cut out and mount the display and circuit board.
- A label is supplied for your convenience for all key selectors and pilots.
- **For installation dimensions see pages 82, 83, and 84.**

New control panel

- Find and mark a suitable location for the panel.
- Allow for accessibility to the panel controls for the operator.
- Use vibration mounts when mounting directly on press.
- When using rigid pipe on the press, a minimum of 2 feet of flexible conduit shall be used.
- **DO NOT DRILL HOLES IN THE TOP OF THE PANEL.** This will void all warranties of the panel.
- Replace existing wiring with TFFN oil and gasoline resistant type wire.
- Wire the press according to drawings supplied.

Resolver mounting

The resolver requires a 1:1 turn ratio to function.

- Mount the resolver supplied with a 1:1 turn ratio on the press using chain and sprocket, or direct mount to shaft using a Love-Joy connector.
- Use vibration mounts to mount the resolver.
- The keyway in the shaft of the resolver indicates the 0 degree point of the crankshaft when at 12:00 o'clock (TDC) although it is not necessary to align keyway at TDC.
- Connect the resolver according to schematics supplied.
- Mount the Proximity switch supplied at 0 degrees to check for crankshaft slippage.
- **DO NOT SPLICE THE RESOLVER WIRE.** If the length of wire is not sufficient, contact us to obtain a longer cable.
- **DO NOT USE RESOLVER CABLE LESS THEN 25 FEET LONG.**
- **For dimensions and terminations refer to page 84.**

Final Inspection

1. Confirm all wiring by double-checking all connections as per schematics supplied.
2. Check incoming voltages and set overloads and fuses to correct ratings.
3. You are ready to turn the power on.

Schematics

The drawings supplied are showing features and/or items your press may not require. Simply jumper out or omit those items not needed for your machine.

See attached drawings.

Clutch Brake System Functions

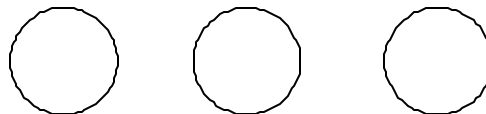
Operator panel label



PM1.5



GROUND INDICATOR



Master stop

This is an illuminated push-pull switch that interrupts all circuits in the system.



Power on selector

This is a key switch that turns on control system power.



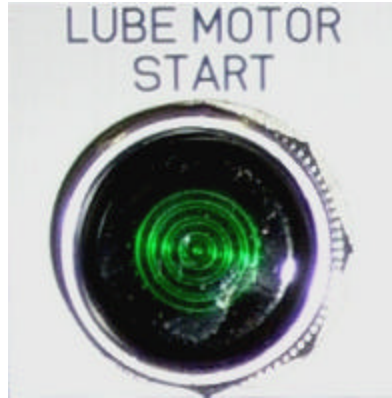
Power on indicator

This indicates that system power is on.



Lube motor start

This is an illuminated push button that starts the external lube motor pump. If the press does not have a lube motor there will be no button in this space.



Lube pressure indicator

Once lube pressure is present and the lube pressure switch closes, the lube motor contactor will latch and hold, then illuminate this indicator.



Main motor start

This is an illuminated push button. Once the lube motor is latched you can start the main motor. The indicator will turn on at this point.



Main motor FWD/REV

This is a key switch that reverses the direction of the main motor.



WARNING:

If no methods are being used to detect the direction of the motor and the motor is reversed while it is rotating, you may damage the main motor and cause serious harm to the machine and/or personnel.

We recommend that a ZERO SPEED switch be used on the main motor to detect the motion and direction of the motor.

Press mode select

This is a spring return key switch from SELECT to the RUN position. When the mode of operation of the press must be changed, rotate the key switch in the SELECT position and hold. With other hand, press the F key corresponding to mode of operation of the press required. See illustration below.

A diagram showing a key switch on the left with "PRESS MODE" at the top, "RUN" on the left, and "SELECT" on the right. To its right is a control screen with a yellow "F1" button above it, a white "F2" button below it, and a white "F3" button above a white "F4" button to the right. The screen itself has a blue header "RUN SCR N A" and a green body with a table:

F1	INCH	CONT	F3
F2	SINGLE	M: INCH	

Below the screen is a text box:

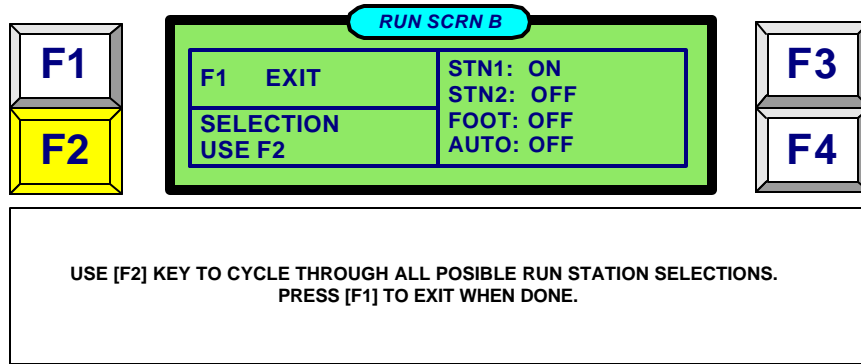
WHILE HOLDING THE PRESS MODE RUN SELECT KEY SWITCH IN THE SELECT POSITION THE FOLLOWING SCREEN WILL APPEAR

PRESS F1 TO SELECT INCH MODE
PRESS F2 TO SELECT SINGLE MODE
PRESS F3 TO SELECT CONTINUOUS MODE

NOTE: IF INCH MODE IS SELECTED SEE SAFETY GUARD BYPASS ON PAGE 12.

Run station select (See supplementary manual for 4 stations)

When the PRESS MODE RUN selector key is released the RUN STATION SELECT screen will appear. Use F2 to change selection. Press F1 to exit when the proper run station selection is displayed on the right side of the screen.



WARNING:

When using AUTO or FOOT selection you must ensure that a secondary method of guarding your press is in place. Examples are safety lights or mechanical guards

Safety guard bypass

When INCH mode is selected it is possible to bypass the safety guards for setup purposes.



NOTE: TO ACTIVATE THE BYPASS, PRESS AND RELEASE THE STATION STOP BUTTON. THE SAFETY GUARD BYPASS WILL BE ACTIVE FOR 10 SECONDS. REPEAT STATION STOP BUTTON FOR MORE TIME ON BYPASS.

Safety valve reset

This is a spring return key switch from RESET to RUN. When in the reset position the stop circuit is interrupted and power is applied to the reset solenoid of the valve.



Ram slide adjust ON/OFF (UP/DOWN)

This is a two position key switch that works in conjunction with the UP and DOWN push buttons. This enables you to adjust your ram height.



Front panel view

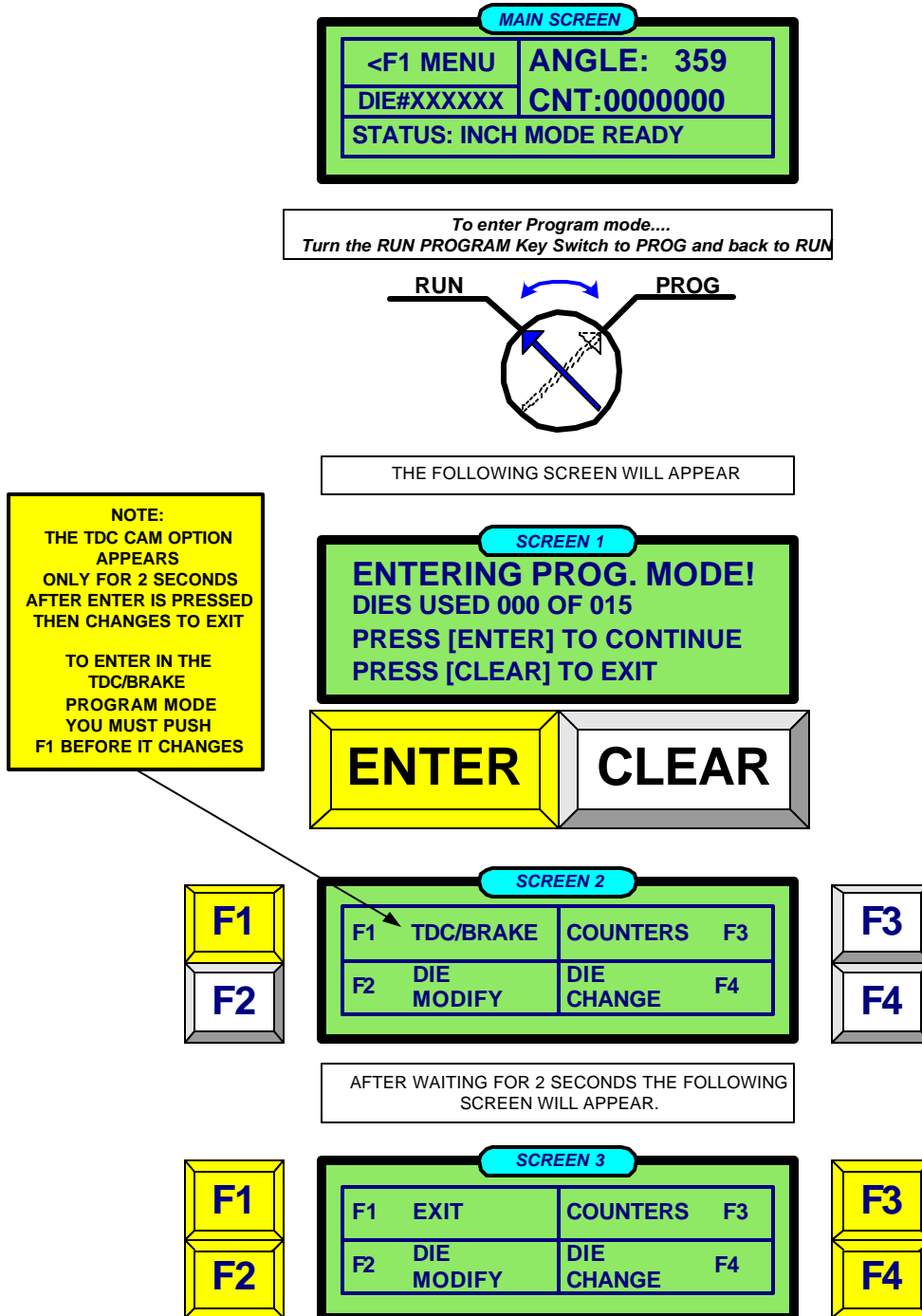


TDC / BRAKE MONITOR

Entering program mode

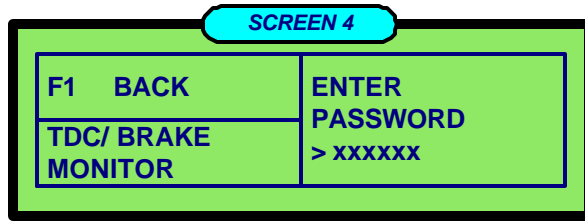
To enter the program mode use the RUN/PROGRAM switch shown on the previous page, Panel View. Rotate the Run/Program key switch to Program and then back to run. This will open screen 1 below and it will give you two choices [ENTER] or [CLEAR].

Pressing [CLEAR] will exit back to main screen. Pressing [ENTER] will take you to screen 2. For a period of 2 seconds the option of entering the [TDC/BRAKE] setup will appear. If [F1] is not pressed within 2 seconds after pressing [ENTER] the next option displayed will be exit.



Entering the password

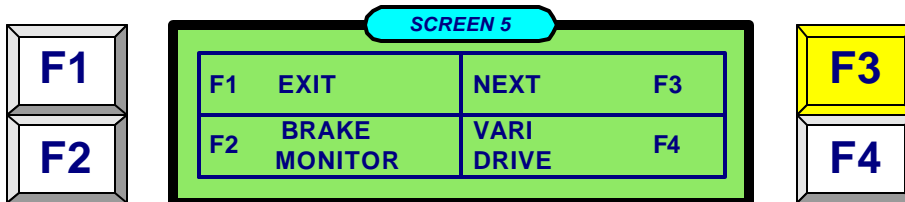
If [F1] was pressed within 2 seconds (as mentioned on previous page), screen 4 will appear.



You must enter the password to make changes to critical parameters of the program on this screen.

Note: Please call your Press-Master supplier for password.

Once the password is entered successfully the system will move to screen 5.

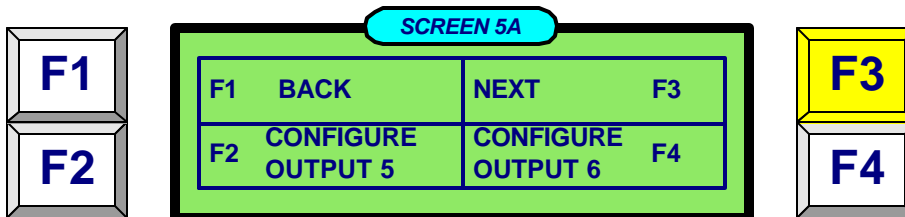


In screen 5 you have 2 program choices.

- 1 BRAKE MONITOR set up
- 2 VARI DRIVE set up.

Press [F1] to select EXIT
Press [F2] to program the BRAKE MONITOR
Press [F3] to go to NEXT screen
Press [F4] to program the VARI DRIVE

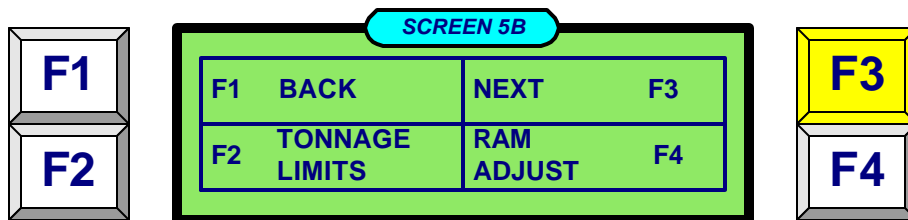
After pressing [F3] on screen 5 the system will move to screen 5A.



In screen 5A you have 2 program choices.

- 3 CONFIGURE AUX. OUTPUT #5
- 4 CONFIGURE AUX. OUTPUT #6

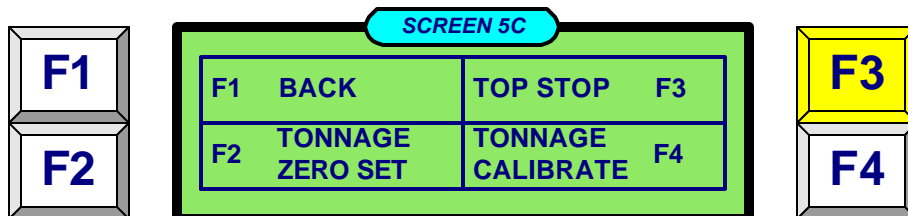
After Pressing [F3] on screen 5A the system will move to screen 5B.
See Next Page.



In screen 5B you have 2 program choices.

- 5 TONNAGE MONITOR LIMITS
- 6 RAM ADJUST DISPLAY LIMITS AND CALIBRATION

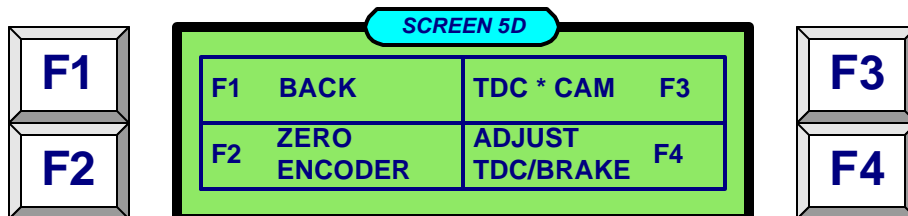
After pressing [F3] on screen 5B the system will move to screen 5C.



In screen 5C you have 2 program choices.

- 7 ZERO OFFSET FOR THE TONNAGE MONITOR SENSORS
- 8 CALIBRATION OF THE TONNAGE SENSORS

After pressing [F3] on screen 5C the system will move to screen 5D.



In screen 5D you have 3 program choices.

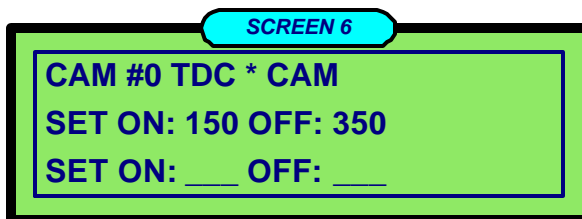
- 9 ZERO THE ENCODER AT TOP DEAD CENTER (TDC)
- 10 ADJUST THE OFFSETS FOR TDC AND BRAKE MONITORS
- 11 TOP DEAD CENTER (TDC) CAM PROGRAMMING

See Next Page.

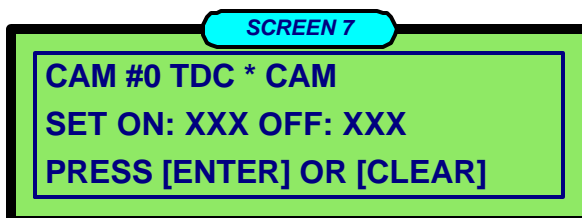
TDC * CAM Programming for fixed speed presses

Press [F3] on screen 5D to input new settings.

Use the keypad to enter the new setting in degrees. Press [CLEAR] to erase entries made. **SET ON is when the cam turns on. This is also the carry up signal when in single stroke. OFF is when the cam turns off and this is the setting that initiates the top stop point of the press.**



After the new settings have been entered the following screen will be displayed.



Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to cancel and move back to previous screen to re-enter settings.

CAUTION:

Be sure that the VARI SAMPLE TIME settings TS: and ADV: are set to all zeros

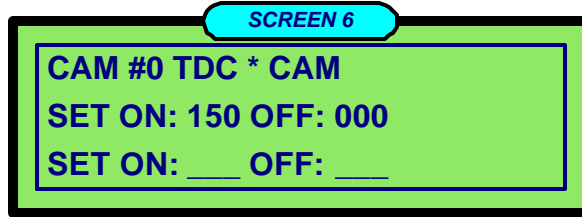
See page 22.

TDC * CAM Programming for variable speed presses

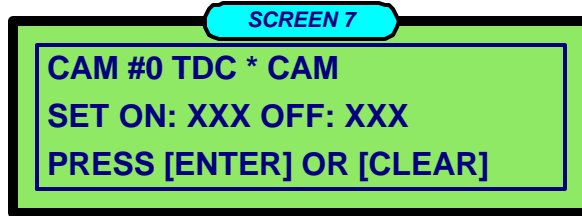
Press [F3] on screen 5D to input new settings.

Use the keypad to enter the new setting in degrees. Press [CLEAR] to go back and corrections on entries made.

Note: **ON is when the cam turns and is the carry up signal when in single stroke.**
OFF is the target in degrees that you want the press to stop at. Example: If you set it at 355 the press will calculate the speed and other factors to determine the stop point of the press so that it stops at approximately 355 degrees. The ideal setting is 000 since this is our target.



After the new settings have been entered the following screen will be displayed.



Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to cancel and move back to previous screen to re-enter settings.

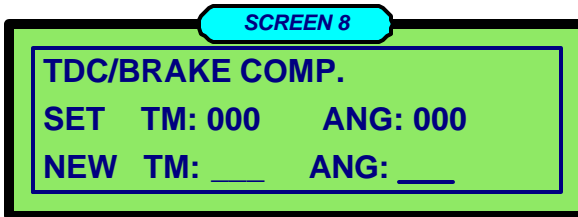
CAUTION:

Be sure that the VARI SAMPLE TIME settings TS: and ADV: are set accordingly

See page 22.

TDC / Brake speed compensation

Press [F4] on screen 5D to input new settings.



SCREEN 8

TDC/BRAKE COMP.
SET TM: 000 ANG: 000
NEW TM: ___ ANG: ___

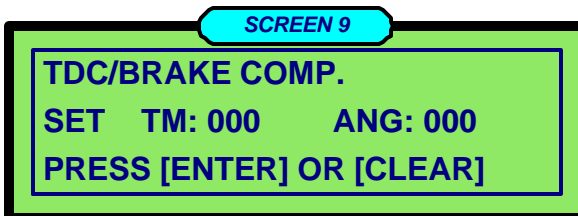
The brake compensation feature [TM] is used to compensate for the difference between the brake monitor reading and the actual reading obtained when using a safety meter such as a SEMILEX II. The maximum entry is 99 milliseconds.

The angle [ANG] is used to correct the top stop of the press when continuous mode is used. The maximum entry allowed is 19 degrees.

Change [TDC * CAM] settings in single mode first so that ram is stopping at the top of stroke.

Then run the press in continuous mode for 10 strokes and hit TOP STOP button. Then enter the number by which the press overshot the top in degrees in the [ANG] setting.

After all new settings have been entered the system will move to the following screen.



SCREEN 9

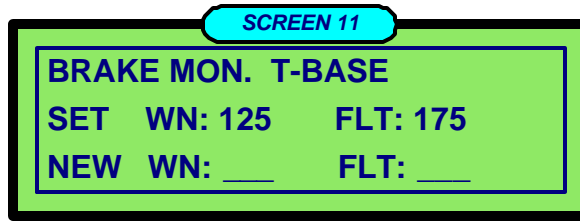
TDC/BRAKE COMP.
SET TM: 000 ANG: 000
PRESS [ENTER] OR [CLEAR]

Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to cancel and move back to previous screen to re-enter settings.

Brake monitor

Press [F2] on screen 5 to input new settings.



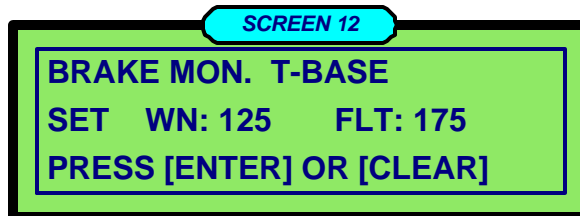
Use the keypad to enter the new settings in milliseconds.

[WN] = Warning Limit in milliseconds.

Exceeding this limit will cause a fault in the system that can be reset by pressing [F1].

[FLT]= Fail Limit in milliseconds. Exceeding this limit will cause a system fault.

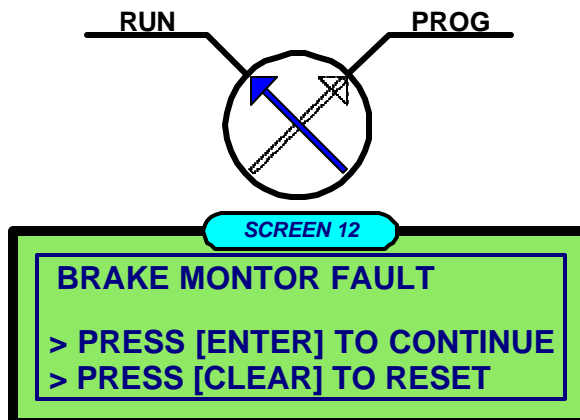
After all new numbers have been entered, the system will move to screen 12.



Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to go back and make corrections on entries.

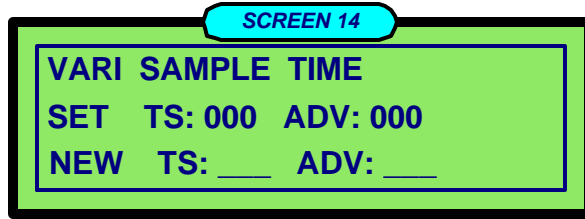
WHEN A FAULT TAKES PLACE, YOU MUST USE THE RUN/PROG KEY SWITCH TO SWITCH TO PROGRAM MODE AND RESET THE FAULT.



To change or adjust settings you must enter the TDC/BRAKE MONITOR setup mode.

Vari drive

Press [F4] on screen 5 to input new settings.



The Vari Speed feature is needed to compensate for speed changes in a press.

There are two settings that have to be set in this mode.

- 1 [TS] Sample Time in ms for TDC Cam.
- 2 [ADV] Sample time in ms for Output Cams

Descriptions:

[TS]: The number entered here will create a window in milliseconds the system looks at and determines the speed it is moving at.

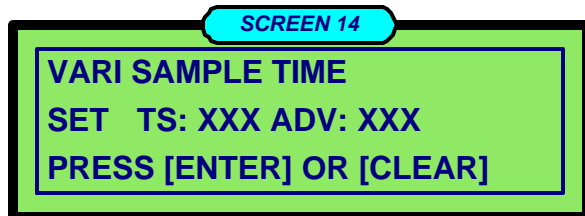
Setup procedure: [TS]

Start at TS=100 and test run the press in single stroke mode. If top stop is overshooting then increase TS. If the press is stopping before the top, decrease TS.

Setup procedure: [ADV]

Start at 100 ms and test run the press and adjust accordingly.
The larger the number the greater the advance.

After entering the new settings the system will move to the following screen.

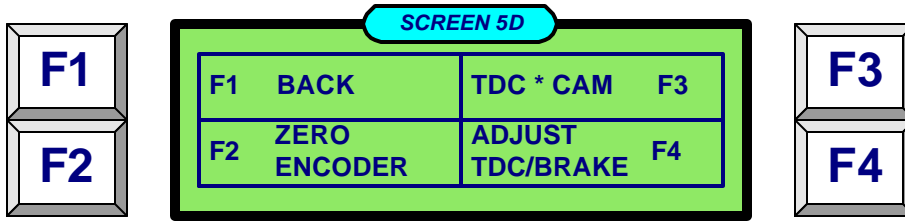


Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to go back and make corrections on entries.

Zero encoder

After Pressing [F2] on screen 5D the system will REWRITE screen 5D.



This feature is used to match the encoder angle with the mechanical zero (TDC) of the press crankshaft.

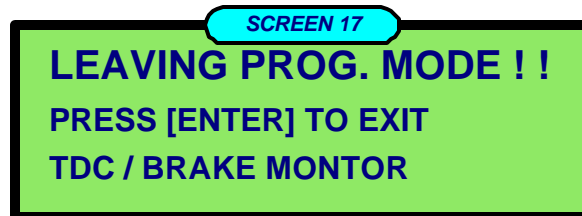
Press [F2] to reset the encoder angle to zero degrees.

Note: Zero degrees must match the location at which the proximity switch is "ON" (TDC), for checking crankshaft slippage.

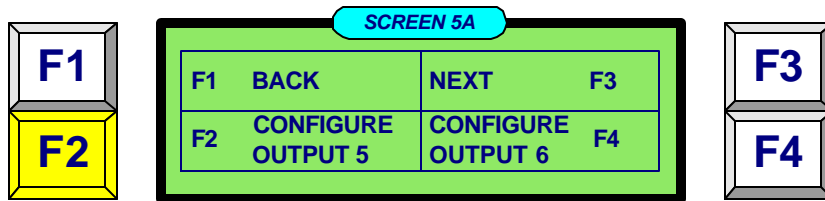
Leaving program mode

Any time that you want to exit the TDC / BRAKE program mode press [CLEAR] to exit.

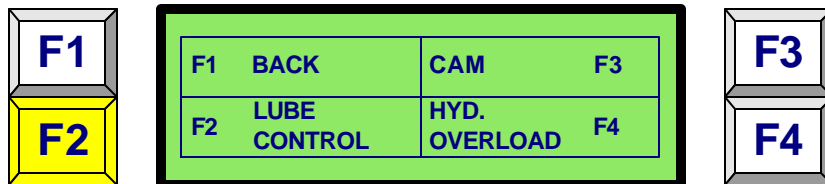
The following screen will appear.



AUXILIARY OUTPUT #5 Lube Control and Monitoring

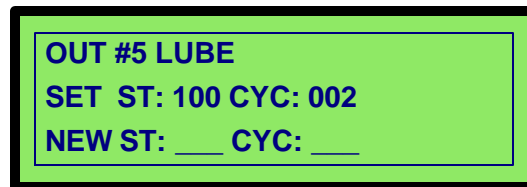


Press **[F2]** to configure auxiliary output #5



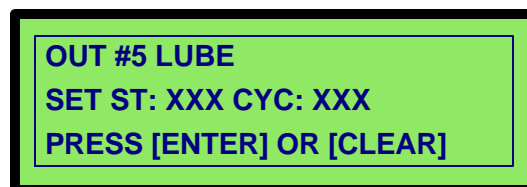
Press **[F2]** to configure output #5 as stroke based lube control and monitor

Output #5 is stroke based lubrication, for time based lubrication go to CONFIGURE OUTPUT 6



ENTER A 3 DIGIT NUMBER FOR **ST:**____
NUMBER OF STROKES TIMES 10 TO TRIGGER A LUBE CYCLE

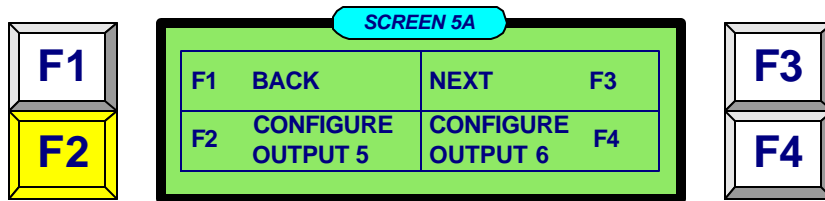
ENTER A 3 DIGIT NUMBER WITH LEADING 0's FOR **CYC:**____
NUMBER OF LUBE MONITOR SWITCH CYCLES TO COMPLETE THE LUBRICATION CYCLE. SETTINGS (001-009)



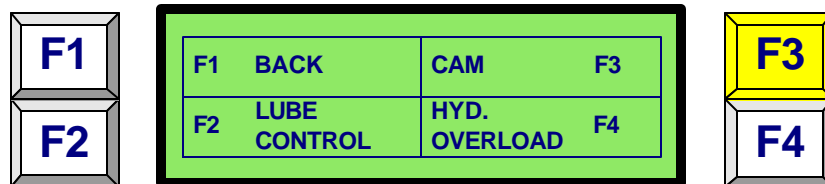
Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

After the Lubrication cycles starts output #5 will cycle "ON" for 6 seconds then "OFF" for 6 seconds then repeat. This will continue until the programmed number of switch input cycles have been received or the lube monitor TIMER times out causing a FAULT. The TIMER is automatically set for 5 minutes in the stroke based lube control (output #5).

AUXILIARY OUTPUT #5 Protected Normal Press Cam

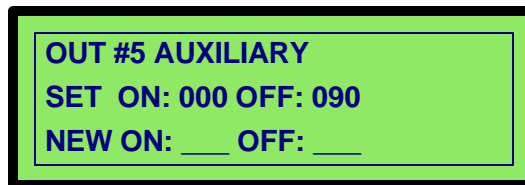


Press **[F2]** to configure auxiliary output #5



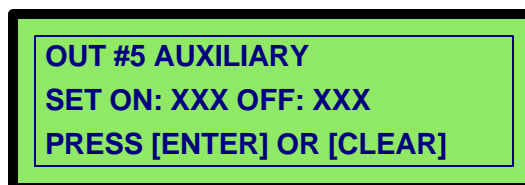
Press **[F3]** to configure output #5 as Normal Press Cam

Output #5 configured as a PRESS CAM.



ENTER A 3 DIGIT NUMBER FOR **ON:**____
STARTING ANGLE FOR CAM OUTPUT #5

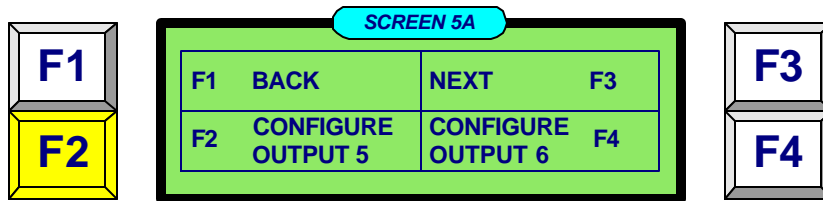
ENTER A 3 DIGIT NUMBER FOR **OFF:**____
FINISH ANGLE FOR CAM OUTPUT #5



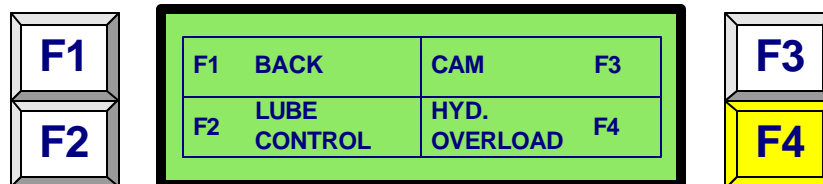
Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

Output #5, configured as a press cam, is not saved in the die memory and is not accessible in die memory. This cam will operate every Press Stroke independent of the die number loaded.

AUXILIARY OUTPUT #5 Hydraulic Overload



Press **[F2]** to configure auxiliary output #5



Press **[F4]** to configure output #5 as Hydraulic Overload

Output #5 configured as HYDRAULIC OVERLOAD



ENTER A 3 DIGIT NUMBER FOR **ON:**____
STARTING ANGLE FOR RESET CAM

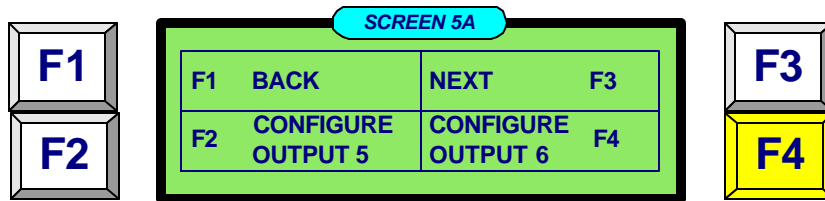
ENTER A 3 DIGIT NUMBER FOR **OFF:**____
FINISH ANGLE FOR RESET CAM



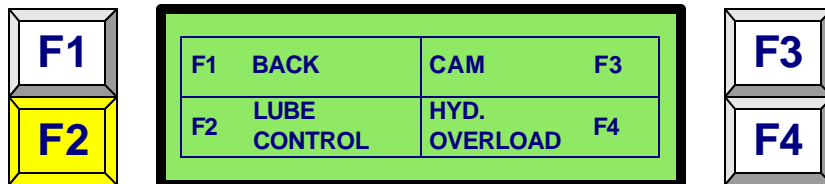
Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

Output #5 configured as Hydraulic Overload, Output #5 will turn "OFF" when the Hydraulic Input signal is lost. The Press Mode will change to INCH and the operator must press [F1] to reset the control to Inch to within the Reset Cam settings to RESET the Hydraulic Overload Output #5.

AUXILIARY OUTPUT #6 Lube Control and Monitoring

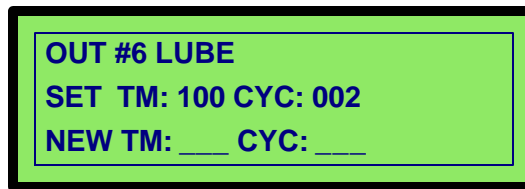


Press **[F4]** to configure auxiliary output #6



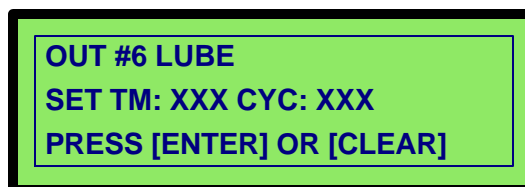
Press **[F2]** to configure output #6 as stroke based lube control and monitor

Output #6 is timed based lubrication, for stroke based lubrication go to CONFIGURE OUTPUT 5



ENTER A 3 DIGIT NUMBER FOR **TM**: ___
DELAY TIME IN MINUTES TO TRIGGER A LUBE CYCLE

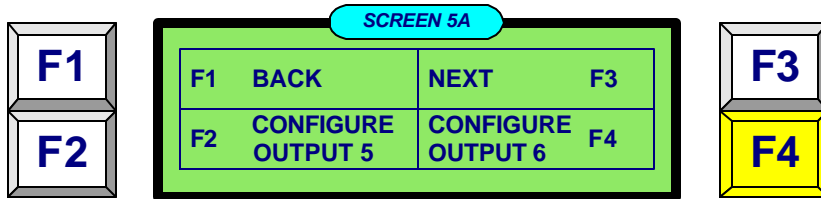
ENTER A 3 DIGIT NUMBER WITH LEADING 0's FOR **CYC**: ___
NUMBER OF LUBE MONITOR SWITCH CYCLES TO COMPLETE THE LUBRICATION CYCLE. SETTINGS (001-009)



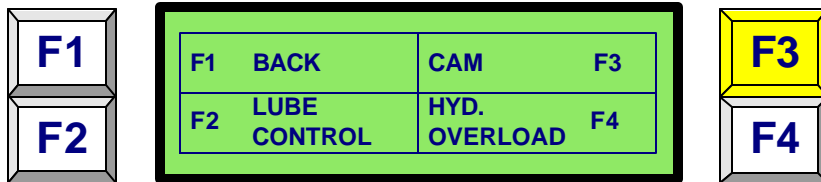
Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

After the Lubrication cycles starts output #6 will cycle "ON" for 6 seconds then "OFF" for 6 seconds then repeat. This will continue until the programmed number of switch input cycles have been received or the lube monitor TIMER times out causing a FAULT. The TIMER is automatically set for 10 minutes in the time based lube control (output #6).

AUXILIARY OUTPUT #6 Protected Normal Press Cam



Press **[F4]** to configure auxiliary output #6



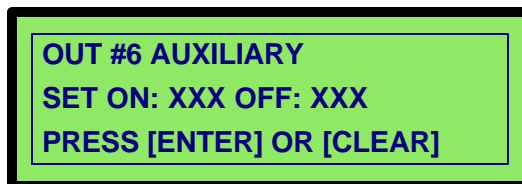
Press **[F3]** to configure output #6 as Normal Press Cam

Output #6 configured as a PRESS CAM.



ENTER A 3 DIGIT NUMBER FOR **ON:**____
STARTING ANGLE FOR CAM OUTPUT #6

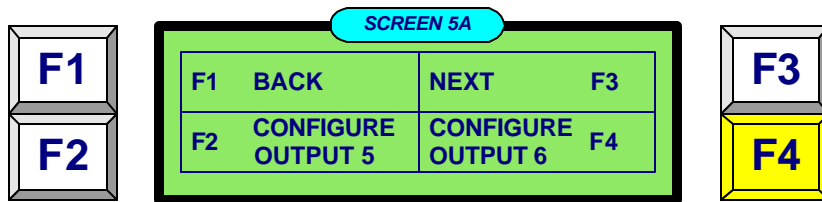
ENTER A 3 DIGIT NUMBER FOR **OFF:**____
FINISH ANGLE FOR CAM OUTPUT #6



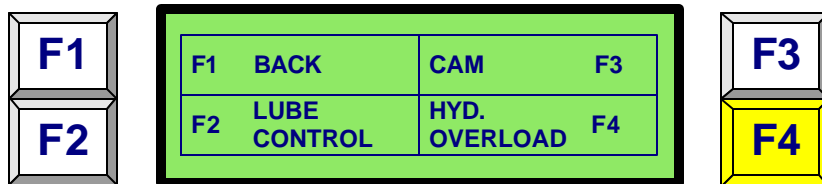
Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

Output #6 configured as a press cam, is not saved in the die memory and is not accessible in die memory. This cam will operate every Press Stroke independent of the die number loaded.

AUXILIARY OUTPUT #6 Hydraulic Overload



Press **[F4]** to configure auxiliary output #6



Press **[F4]** to configure output #6 as Hydraulic Overload

Output #6 configured as HYDRAULIC OVERLOAD



ENTER A 3 DIGIT NUMBER FOR **ON:** ___
STARTING ANGLE FOR RESET CAM

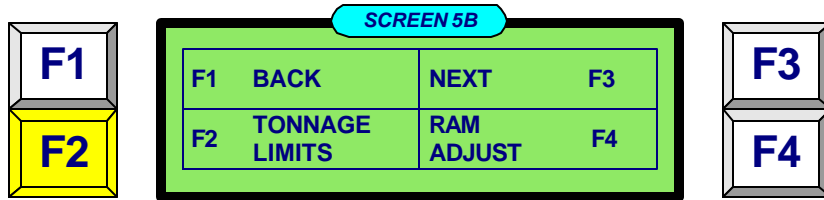
ENTER A 3 DIGIT NUMBER FOR **OFF:** ___
FINISH ANGLE FOR RESET CAM



Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

Output #6 configured as Hydraulic Overload, Output #6 will turn "OFF" when the Hydraulic Input signal is lost. The Press Mode will change to INCH and the operator must press [F1] to reset the control to Inch to within the Reset Cam settings to RESET the Hydraulic Overload Output #6.

Programming TONNAGE LIMITS



Press [F2] to set tonnage limits



Press [F1] to Exit this screen

There is no visible cursor in this screen. When the screen appears the cursor is on the:

100's digit of LB: _99.

Enter a 3 digit number for this setting, the cursor moves to the:

100's digit of LF: _99.

Enter a 3 digit number for this setting, the cursor moves to the:

100's digit of RB: _99.

Enter a 3 digit number for this setting, the cursor moves to the:

100's digit of RF: _99.

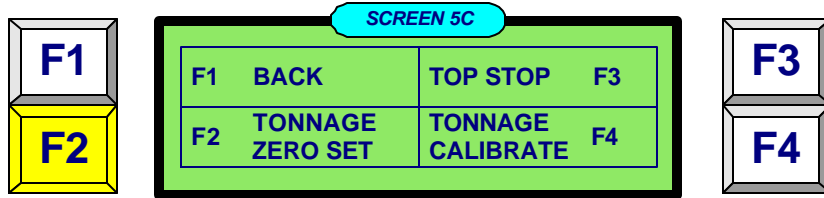
Enter a 3 digit number for this setting, the cursor now moves back to the:

100's digit of LB: _99.

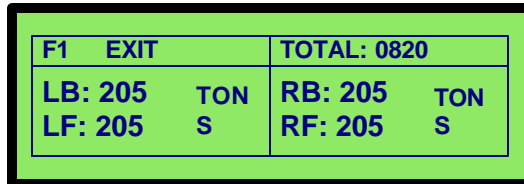
Note 1: See separate optional manual for tonnage sensor mounting locations.

Note 2: If you are not using tonnage monitoring you must enter 999 for LB, RB, LF, and RF or a tonnage fault will be generated.

ZEROING THE TONNAGE SENSORS



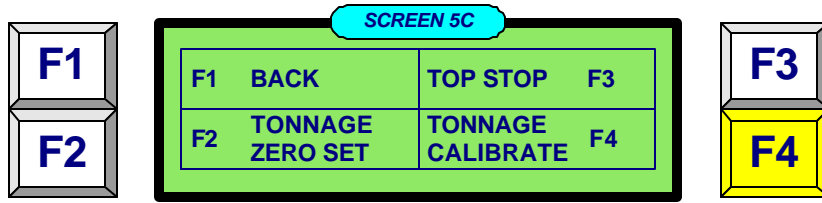
Press **[F2]** to set tonnage limits



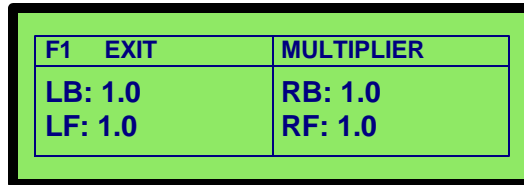
Press **[F1]** to Exit this screen

This screen shows the readings from all connected tonnage sensors. The purpose of this screen is to allow the installer and/or calibrator to manual zero out (as much as possible) each sensor. Adjust the potentiometer on each sensor so that the reading from the corresponding sensor is as low as possible.

TONNAGE SENSOR MULTIPLIER



Press **[F4]** to calibrate the tonnage sensors



Press **[F1]** to Exit this screen

There is no visible cursor in this screen. When the screen appears the cursor is on the:

first digit of **LB: _.0**.

Enter a 2 digit number for this setting, the cursor moves to the:

first digit of **LF: _.0**.

Enter a 2 digit number for this setting, the cursor moves to the:

first digit of **RB: _.0**.

Enter a 2 digit number for this setting, the cursor moves to the:

first digit of **RF: _.0**.

Enter a 2 digit number for this setting, the cursor now moves back to the:

first digit of **LB: _.0**.

RAM ADJUST DISPLAY Settings

SCREEN 5B

F1	F1 BACK	NEXT	F3
F2	F2 TONNAGE LIMITS	RAM ADJUST	F4

F3
F4

Press **[F4]** to select ram adjust settings

RAM ADJUST UPPER
MAX LIMIT: 12000
NEW LIMIT: _____

Enter the maximum shut height in thous. EX. 12000 = 12 inches

RAM ADJUST UPPER
MAX LIMIT: XXXXX
PRESS **[ENTER]** OR **[CLEAR]**

Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

RAM ADJUST LOWER
MIN LIMIT: 06000
NEW LIMIT: _____

Enter the minimum shut height in thous. EX. 06000 = 6 inches

RAM ADJUST LOWER
MIN LIMIT: XXXXX
PRESS **[ENTER]** OR **[CLEAR]**

Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

RAM ADJ. CALIBRATE
CAL SETUP: 00256
NEW SETUP: _____

Enter ram adjust display calibration number

RAM ADJ. CALIBRATE
CAL SETUP: XXXXX
PRESS **[ENTER]** OR **[CLEAR]**

Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

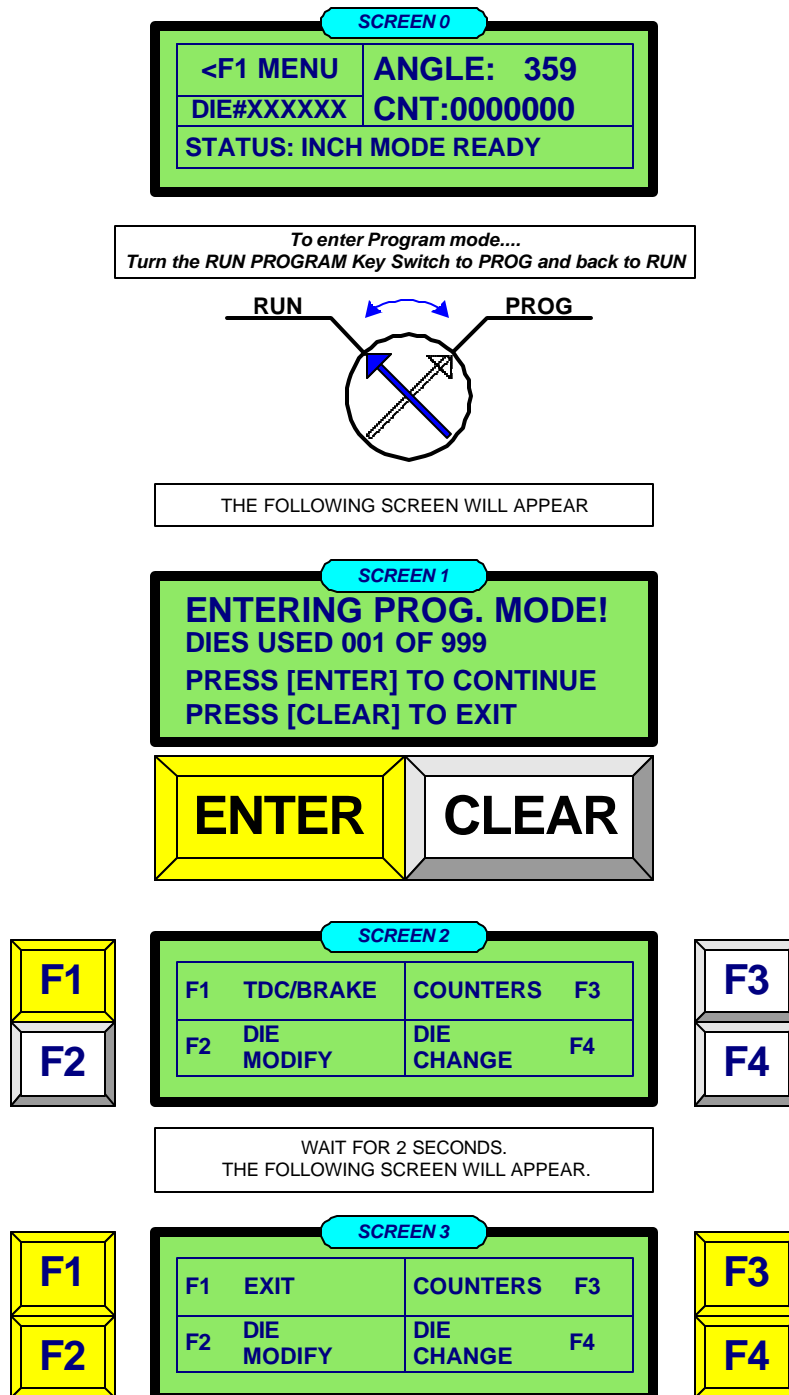
CREATING DIES

Entering program mode

To enter the program mode use the RUN / PROGRAM switch.

Rotate the Run / Program key switch to Program and then back to run. This will open screen 1 below and it will give you two choices to pick from [ENTER] or [CLEAR].

Pressing [CLEAR] will exit back to main screen. Pressing [ENTER] will take you to screen 2. For a period of 2 seconds on this screen, the option of entering the [TDC/BRAKE] setup will appear. If [F1] is not pressed within 2 seconds after pressing [ENTER], the next option displayed will be exit. See illustration below.



Die change

Here you can create new dies.

Dies represent settings pertaining to specific dies. It is recommended the die number be entered when possible.

Press [F2] to enter in the die change screen.

See illustration below.

SCREEN 29	
F1 BACK	ENTER NEW DIE... # _____
DIE CHANGE	

Once the number is entered, the system will look up the internal library to verify if it exists. If the die was not found and if it is a new number, the system will display the following screen.

SCREEN 31	
F1 BACK	DIE NOT FOUND # XXXXXX
F2 CREATE	

Press [F2] to create. The system will return to the main screen.

SCREEN 0	
<F1 MENU	ANGLE: 359
DIE#XXXXXX	CNT:000000
STATUS: INCH MODE READY	

Now the die number entered will be displayed.
Enter program mode then die modify to change setting of die.

OR

If the die was an existing number the system will display the following screen.

SCREEN 30	
F1 LOAD	DIE FOUND # XXXXXX
F2 ERASE	

Press [F2] to erase the die number and all settings.

THIS IS IRREVERSIBLE AND WE RECOMMEND THAT YOU RECORD ALL SETTINGS ON PAPER FOR SAFE STORAGE.

Press [F1] to load the die.

SCREEN 30	
F1 LOAD	DIE FOUND
F2 ERASE	# XXXXXX

Once the die is loaded in the system the following screen will be displayed.

SCREEN 0	
<F1 MENU	ANGLE: 359
DIE#XXXXXX	CNT:000000
STATUS: INCH MODE READY	

EDITING DIES

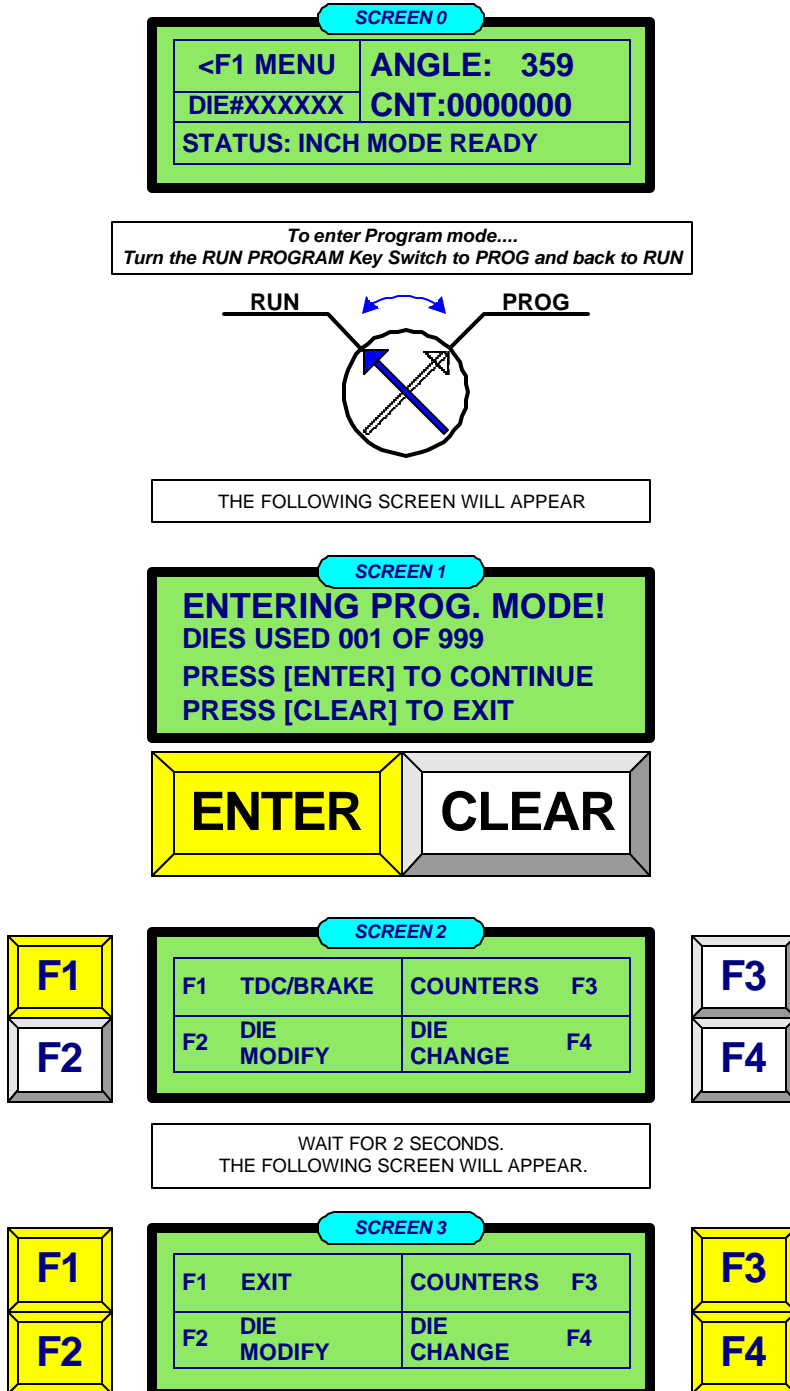
A die can be modified under DIE MODIFY.

Entering program mode

To enter the program mode use the RUN / PROGRAM shown on page 15.

Rotate the Run / Program key switch to Program and then back to Run. This will open screen 1 below and it will give you two choices to pick from [ENTER] or [CLEAR].

Pressing [CLEAR] will exit back to main screen. Pressing [ENTER] will take you to screen 2. For a period of 2 seconds on this screen the option of entering the [TDC/BRAKE] setup will appear. If [F1] is not pressed within 2 seconds of pressing [ENTER] the next option displayed will be exit. See illustration below.



Die modify

Press [F2] to enter DIE MODIFY.

The following screen will appear.

SCREEN 18			
F1	BACK	DIE PRO	F3
F2	CAMS	COUNTER BALANCE	F4

Press [F1] to go back to the following screen.

Press [F2] to program the CAMS.

Press [F3] to program the DIE PROTECTION.

Press [F4] to program the COUNTER BALANCE.

Cam outputs

Press [F2] on screen # 18 above for cam programming.

The following screen will appear.

See illustration below.

SCREEN 19			
F1	FEEDER #1	AIR JET #3	F3
F2	PILOT #2	DIE LUBE #4	F4

Repeat the following steps for all four cams to program.

Leaving the settings to zero will turn off the cam.

Press [F1] or [F2] or [F3] or [F4] to program the prospective cam.

See illustration below.

SCREEN 20	
CAM #1 FEEDER	
SET ON: 000 OFF: 000	
NEW ON: ___ OFF: ___	

Use the keypad to enter the new settings in degrees.

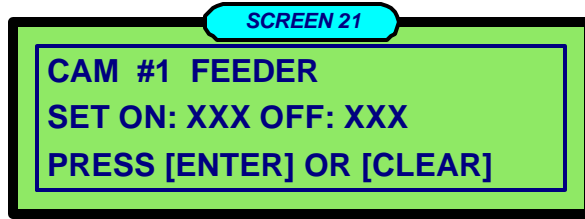
ON is when the cam will turn on.

OFF is when the cam will turn off.

See Next Page.

Once all numbers are entered, the system will move to the following screen.

See illustration below.



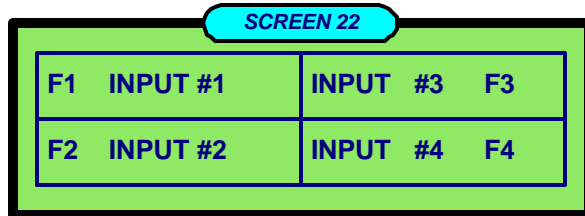
Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to cancel and move back to previous screen to re-enter all settings.

Die protection

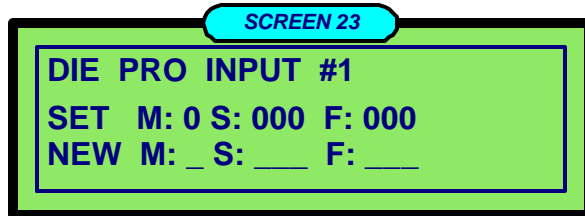
Press [F3] on screen # 18, page 38 for die protection programming.
The following screen will appear.

See illustration below.



Repeat the following steps for all four inputs to be program.
Leaving the settings to zero will turn off the die protection input.
Press [F1] or [F2] or [F3] or [F4] to program the respective input.

See illustration below.



Use the keypad to enter the new settings in degrees.

[M] Mode: is the mode that the input is to function as. See input mode descriptions below.

[S] Start: is when the cam will turn on and start looking for the input.

[F] Finish: is when the cam will turn off and stop looking for the input.

Note: If you need to bypass die protection, all die pro. settings must be zero, and all die pro. inputs unplugged.

Once all numbers are entered the system will move to the following screen.

DIE PRO INPUT #1
SET M: X S: XXX F: XXX
PRESS [ENTER] OR [CLEAR]

Press [ENTER] to accept changes and move to the next screen.

Press [CLEAR] to cancel and move back to previous screen to re-enter all settings.

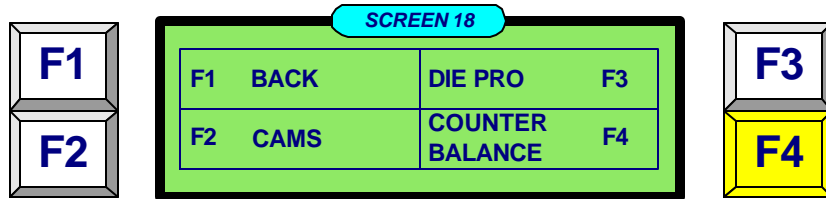
INPUT MODE DESCRIPTIONS

Mode:

0	Input has no function. BY-PASSED	
1	Static	- Normally Open. Signal must remain off at all times.
2	Static	- Normally Open with cam on signal.
3	Cyclic	- With cam on signal.
4	Cyclic	- With cam on.
4	Static	- With cam off.
5	Static	- Normally Closed.
6	Static	- Normally Closed with cam on signal.
7	Cyclic	- With cam on signal.
8	Cyclic	- With cam on.
8	Static	- With cam off.
9	Cyclic	- With cam on.
9	Static	- When signal on.

Note: Use the top stop button or [F1] on main display to clear a "DIE INPUT" fault.

***** SEE APPENDIX B FOR MORE INFORMATION ON DIE PROTECTION MODES OF OPERATION**

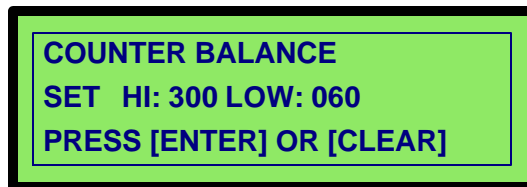


Press **[F4]** to program COUNTER BALANCE SETTINGS



ENTER A 3 DIGIT NUMBER FOR **HI**: ___
HIGHEST PRESSURE ALLOWED IN **PSI** FOR THE CURRENT DIE

ENTER A 3 DIGIT NUMBER FOR **LOW**: ___
LOWEST PRESSURE ALLOWED IN **PSI** FOR THE CURRENT DIE



Press **[ENTER]** to accept new setting or **[CLEAR]** to go back

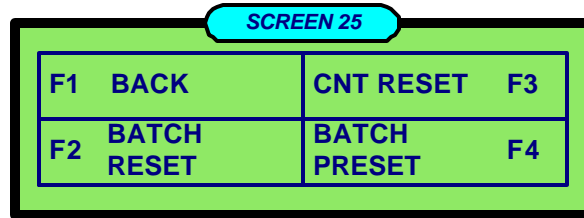
Counter Balance pressure is monitored by a pressure transducer. The pressure reading from this sensor must be between the HI and LOW settings entered or a counter balance fault will be generated.

Note: If you are not using Counter Balance monitoring you must enter 199 for HI and LOW values or a counter balance fault will be generated.

Counters

Press [F3] on screen # 2, page 37 for counters.
The following screen will appear.

See illustration below.



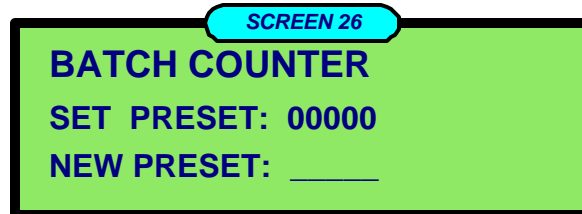
Press [F1] to go back to screen # 18.

Press [F2] to reset the batch counter.

Press [F3] to reset total count.

Press [F4] to set the batch size. The following screen will appear.

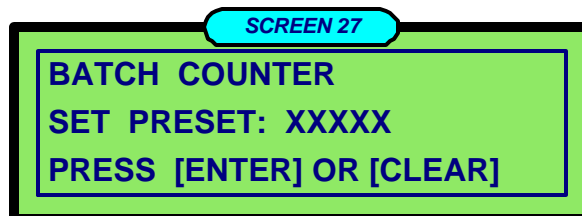
See illustration below.



Use the keypad to enter the new settings.

Once all numbers are entered, the system will move to the following screen.

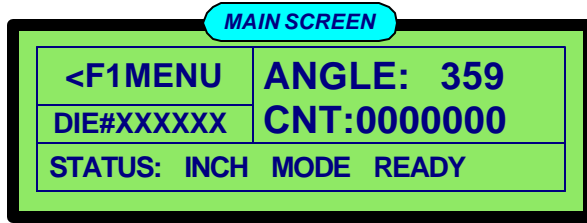
See illustration below.



Press [ENTER] to accept changes and to move to screen # 25.

Press [CLEAR] to cancel and move back to previous screen to re-enter all settings.

Monitoring Operating Parameters



Last Stop

On main screen select [F1] and this screen will appear:



Select [F2] for Last Stop. The screen that appears will display REASON FOR LAST STOP.

Select [F1] to return to main screen.

Batch counters

After selecting [F1] on main screen select [F4] on next screen and this screen will appear:



PRE: This indicates the preset batch setting.

CMP: This indicates completed batch count.

RMN: This indicates remaining batch count.

Select [F1] to return to main screen.

Brake monitoring

On main screen select [F1], select [F3], then select [F2] and this screen will appear:

F1 EXIT	ANGLE:XXX
BRAKE MONITOR	STIME:XXX DEGRS:XXX

ANGLE: This indicates the crankshaft angle with respect to TDC (000).

STIME: This indicates stopping time (in mSEC.) of the press.

DEGRS: This indicates how far (in degrees) the ram traveled after a stop command was initiated.

Select [F1] to exit to main screen.

Die protection

This screen is for monitoring die protection during set-up.

On main screen select [F1], select [F3], then select [F3] again and this screen will appear:

F1 EXIT	DP#: 1234
DIE PROTECTION	CAM: <input type="text"/> INP : <input type="text"/>

DP#: This indicates the die protection number.

CAM: This indicates when cam window is open and should see a die input signal. A star will appear in the box below the corresponding die protection number (DP#).

INP: This indicates that the die input has received a die protection signal. A star will appear in the box below the corresponding die protection number (DP#).

Select [F1] to exit to main screen.

Tonnage monitoring

On main screen select [F1], select [F3], select [F4], then select [F1] and this screen will appear:

F1 EXIT	TOTAL: 0000
LB: 000 LF: 000 TONS	RB: 000 RF: 000 TONS

LB: This indicates tonnage measured by the left rear tonnage sensor.

LF: This indicates tonnage measured by the left front tonnage sensor.

RB: This indicates tonnage measured by the right rear tonnage sensor.

RF: This indicates tonnage measured by the right front sensor.

TOTAL: This is the sum total tonnage as measured by the four sensors (LB+LF+RB+RF).

Select [F1] to exit to main screen.

Counter balance

On main screen select [F1], select [F3], select [F4], then select [F2] and this screen will appear:

F1 EXIT	PSI : XXX
COUNTER BALANCE	HIGH : XXX LOW : XXX

PSI: This indicates current counterbalance pressure.

HIGH: This indicates programmed maximum pressure allowed before a fault will occur (COUNTER BALANCE HI).

LOW: This indicates programmed minimum pressure allowed before a fault will occur (COUNTER BALANCE LO).

Select [F1] to return to main screen.

Current

On main screen select [F1], select [F3], select [F4], then select [F3] and this screen will appear:

F1 EXIT	AMPS : XXX
MOTOR CURRENT	PEAK : XXX MEAN : XXX

AMPS: This indicates present motor current (in amps.).

PEAK: This indicates peak motor current detected since control power was turned on (in amps.).

MEAN: This indicates mean motor current (in amps.).

Select [F1] to return to main screen.

Ram adjustment

On main screen select [F1], select [F3], select [F4], then select [F4] again and this screen will appear:

F1 EXIT	MAX : 00.000
RAM ADJUST	POS : 00.000 MIN : 00.000

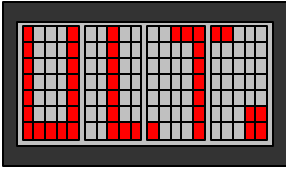
MAX: This indicates ram height upper limit (in thous.).

POS: This indicates current ram height (in thous.).

MIN: This indicates ram height lower limit (in thous.).

Select [F1] to return to main screen.

MASTER - INTERNAL LED DISPLAY



FAULT MESSAGES:

1) **FAULT...SYSTEM MEMORY BAD**

Description: The Press setup parameters have changed or become corrupted due to a memory failure.

Solution: 1) Cycle power OFF/ON to reset control.
2) Re-input all press parameters in Press-Master programming.
3) Contact Metal Form.

2) **MESSAGE...SLAVE FOUND FAULT**

Description: Slave has found a control board system fault.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

3) **FAULT...SERIAL DATA FAULTY**

Description: Corrupted RS232 data received from the slave processor.

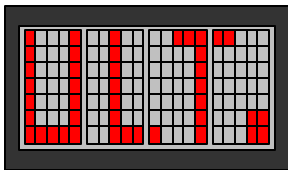
Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

4) **FAULT...RELAY TEST FAILED**

Description: Safety output relay K2 has failed to operate properly.

Solution: 1) Cycle power OFF/ON to reset control.
2) Replace safety output relay K2.
3) Contact Metal Form.

MASTER - INTERNAL LED DISPLAY



FAULT MESSAGES continued...

5) **FAULT...INPUT TEST FAILED**

Description: Master processor disagrees with the slave processor as to the state of the System inputs.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

6) **FAULT...SLAVE NOT RESPONDING**

Description: Master processor cannot communicate with slave processor.

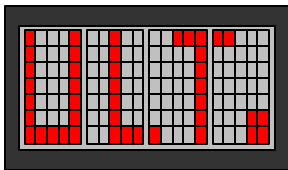
Solution: 1) Check slave processor display for fault codes.
2) Cycle power OFF/ON to reset control.
3) Contact Metal Form.

7) **FAULT...DUAL CHANNEL STOP INPUT**

Description: One channel of the dual channel stop circuits has failed to operate.

Solution: 1) Check all contacts in the safety guard circuit.
2) Check all contacts in the Master Stop circuit.
3) Check all contacts in the Station Stop circuit.
4) Check stop circuit wiring.
4) Cycle power OFF/ON to reset control.

MASTER - INTERNAL LED DISPLAY



FAULT MESSAGES *continued...*

8) **ERROR...SYSTEM DISPLAY NOT RESPONDING, CHECK MAIN DISPLAY CONNECTIONS**

Description: Master processor cannot communicate with main LCD display & Keypad.

Solution: 1) Cycle power OFF/ON to reset control.
2) Check main display connections.
3) Contact Metal Form.

END.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES:

1) **INCH MODE READY**

Description: Press run mode is INCH and press is ready to run.

1) **INCH MODE & BYPASS**

Description: Press run mode is INCH with the safety guard inputs bypassed.

2) **SINGLE MODE READY**

Description: Press run mode is SINGLE STROKE and press is ready to run.

3) **CONTINUOUS MODE**

Description: Press run mode is CONTINUOUS and press is not ready to run.

4) **CONTINUOUS READY**

Description: After depressing the CONTINUOUS SET button the press is ready to Run.

5) **FORCED INCH READY**

Description: Press is in CONTINUOUS MODE and has stopped outside the TOP STOP window (300 – 60 degrees).

Solution: Inch press to top of stroke.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

6) **STN1 TIME OUT** or **STN2 TIME OUT**

Description: Run station (palm buttons or foot switch), anti tie-down, or normally open contact wiring is shorted.

Solution: 1) Check palm and foot switch operation.
2) Check contact blocks and connections.
3) Check palm station cables.
4) Check foot switch cables.
5) Check control wiring.

7) **NO CONTINUOUS SET**

Description: Operator is attempting to initiate the press cycle in continuous run mode without activating the continuous-set button.

Solution: 1) Depress the Continuous-Set Button before press cycle initiation.
2) Change press run mode.

8) **STATIONS TIME OUT**

Description: Run station (two run stations active) overall timer has timed out.

Solution: 1) Check palm and foot switch operation.
2) Check contact blocks and connections.
3) Check palm station cables.
4) Check foot switch cables.
5) Check control wiring.

9) **RELEASE STN1** or **RELEASE STN2**

Description: Run station buttons being held in depressed position.

Solution: 1) Release buttons or foot switch.
2) Check palm and foot switch operation.
3) Check contact blocks and connections.
4) Check palm station cables.
5) Check foot switch cables.
6) Check control wiring.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

10) BRAKE WARNING

Description: The actual stopping time of the press has exceeded the Brake Warning Setting.

Solution: 1) Press F1 on main display to reset fault.
2) Check for proper operation of clutch and brake.

11) ENCODER FAULT

Description: The master processor has detected a problem with the encoder.

Solution: 1) Press F1 on main display to reset fault.
2) Check encoder electrical connections and wiring.
3) Replace encoder.

12) MOTION FAULT

Description: The master processor has not detected encoder motion within .5 seconds after activation of the clutch/brake valve, and then every .1 seconds while the valve is on.

Solution: 1) Press F1 on main display to reset fault.
2) Check for mechanical problems.
3) Check encoder electrical connections and wiring.
4) Replace encoder.

13) FAULT LED DISPLAY

Description: The master processor has detected a problem with the internal LED Display.

Solution: 1) Turn power off and then on to reset control (wait at least 15 seconds after turning power off before turning back on).
2) Replace LED display.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

14) **AC INPUT INTEGRITY**

Description: DC voltage has been detected in the AC inputs.

Solution: 1) Press F1 on main display to reset fault.
2) Check press control for incorrect wiring or shorts.
3) Contact Metal Form.

15) **DC INPUT INTEGRITY**

Description: AC voltage or input signal noise (bounce) has been detected in the DC inputs.

Solution: 1) Press F1 on main display to reset fault.
2) Check press control for incorrect wiring or shorts.
3) Check for vibration related electrical contact bounce.
4) Contact Metal Form.

16) **DIE PRO INPUT #1**

Description: A die process or cycle fault has occurred on Die Pro Input #1.

Solution: 1) Press F1 on main display to reset fault.
2) Check for die or material problems.
3) Check input #1 sensor or programmed settings.

17) **DIE PRO INPUT #2**

Description: A die process or cycle fault has occurred on Die Pro Input #2.

Solution: 1) Press F1 on main display to reset fault.
2) Check for die or material problems.
3) Check input #2 sensor or programmed settings.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

18) **DIE PRO INPUT #3**

Description: A die process or cycle fault has occurred on Die Pro Input #3.

Solution: 1) Press F1 on main display to reset fault.
2) Check for die or material problems.
3) Check input #3 sensor or programmed settings.

19) **DIE PRO INPUT #4**

Description: A die process or cycle fault has occurred on Die Pro Input #4.

Solution: 1) Press F1 on main display to reset fault.
2) Check for die or material problems.
3) Check input #4 sensor or programmed settings.

20) **LOW AIR PRESSURE**

Description: Signal voltage missing on DC input #2B.

Solution: 1) Check clutch and counter balance air pressure.
2) Check air pressure switches for proper settings.
3) Check air pressure switch electrical contacts and wiring.
4) Contact Metal Form.

21) **CUSTOMER STOP INPUT**

Description: Signal voltage missing on DC input #4B.

Solution: 1) Check auxiliary devices interlocked to stop the press cycle.
2) Check electrical contacts and wiring.
3) Contact Metal Form.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

22) **SINGLE ONLY – FOOT**

Description: Signal voltage missing on DC input #3. HAND/FOOT selector set to FOOT and press run mode is not set to SINGLE stroke.

Solution: 1) Select SINGLE stroke for FOOT operation.
2) Deselect FOOT to run in modes other than SINGLE.
3) Check for proper operation of selector switches.
4) Check selector switch electrical contacts and wiring.
5) Contact Metal Form.

23) **STATION STOP BUTTON**

Description: Signal voltage missing on DC input #5A and AC input #5. STATION STOP Button has been depressed.

Solution: 1) Release Station Stop Button.
2) Check for proper operation of button.
3) Check button electrical contacts and wiring.
4) Contact Metal Form.

24) **RUN MODE SELECT**

Description: Signal voltage present on DC input #3A.

Solution: 1) Check for proper operation of switch.
2) Contact Metal Form.

25) **STATION NOT ACTIVE**

Description: Controller received a run command from a non-active station.

Solution: 1) Press [F1] to reset controller.
2) Make sure all operators have an active run station.
3) Check run station electrical contacts and control wiring.
4) Contact Metal Form.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

26) SAFETY VALVE SWITCH

Description: Signal voltage missing on DC input #3B. Safety Valve static monitor switch open.

Solution:

- 1) Reset Safety Valve with SAFETY VALVE RESET selector switch.
- 2) Check for proper operation of Safety Valve.
- 3) Check Safety Valve electrical connections and wiring.
- 4) Check for vibration related electrical problems.
- 5) Contact Metal Form.

27) SYSTEM STOP INPUT

Description: Signal voltage missing on AC input #5. SYSTEM STOP.

Solution:

- 1) Check electrical connections and wiring.
- 2) Check for vibration related electrical problems.
- 3) Contact Metal Form.

28) RAM ADJUST ON

Description: Signal voltage on AC input #6. RAM/SLIDE ADJUST Selector is on.

Solution:

- 1) Select RAM/SLIDE ADJUST OFF.
- 2) Check for proper operation of selector switch.
- 3) Check selector switch electrical contacts and wiring.
- 4) Contact Metal Form.

29) RUN STATIONS OFF...

Description: This message will be displayed when power is applied to the Press-Master.

Solution:

- 1) Select PRESS RUN MODE set desired mode.
- 2) Activate desired run station(s).

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

30) **TOP STOP BUTTON**

Description: Signal voltage missing on DC input #6A. TOP STOP button has been depressed.

Solution: 1) Release Top Stop button.
2) Check for proper operation of button.
3) Check button electrical contacts and wiring.
4) Contact Metal Form.

31) **LUBE SYSTEM FAULT**

Description: Signal voltage missing on AC input #2.

Solution: 1) Check lubrication system on press.
2) Check lube monitor switches for proper settings.
3) Check lube monitor switch electrical contacts and wiring.
4) Contact Metal Form.

32) **MAIN MOTOR OFF...**

Description: Signal voltage missing on AC input #3.

Solution: 1) Confirm that main motor has started.
2) Check start switch electrical contacts and wiring.
3) Check starter electrical contacts and wiring.
4) Contact Metal Form.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES continued...

33) **RELEASE CONTINUOUS SET (PM 1 only)**

Description: Signal voltage missing on DC input #6. CONTINUOUS SET button has been depressed while not in continuous run mode.

Solution: 1) Release Continuous Set button.
2) Check for proper operation of button.
3) Check button electrical contacts and wiring.
4) Press may be in FORCED INCH mode or CONTINUOUS not selected.
5) Contact Metal Form.

34) **BRAKE MONITOR**

Description: The actual stopping time of the press has exceeded the Brake Fault Setting.

Solution: 1) Check for proper operation of clutch and brake.
2) Enter PROGRAM mode and follow instructions to reset fault.

35) **PRIOR SECONDARY RUN**

Description: Slave processor did not release “RUN” signal to master processor while press stopped.

Solution: 1) Check internal SLAVE LED DISPLAY.
2) Cycle power off and on to reset control.
3) Contact Metal Form.

36) **NO SECONDARY RUN**

Description: Slave processor did not send “RUN” signal to master processor to allow the press to cycle.

Solution: 1) Check internal SLAVE LED DISPLAY
2) Cycle power off and on to reset control.
3) Contact Metal Form.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

37) **ENCODER MOVE FAULT**

Description: Encoder position has change by more than 15 degrees while press stopped (SINGLE or CONTINUOUS mode).

Solution: 1) Press F1 on main display to reset fault.
2) Check for mechanical problems such as backlash in encoder drive shaft or chain.
3) Check encoder electrical connections and wiring.
4) Replace encoder.

38) **KEYPAD ERROR**

Description: Master processor cannot communicate with main LCD display & keypad.

Solution: 1) Cycle power OFF/ON to reset control.
2) Check main display connections.
3) Replace main display.
4) Contact Metal Form.

39) **SAFETY LIGHT FRONT, SAFETY LIGHT REAR**

Description: Signal voltage missing on AC input 4 (FRONT) and/or signal voltage missing on DC input 4A and AC input 5 (REAR). Safety guard or safety light circuit open.

Solution: 1) Check for guards in place.
2) Check safety lights are unobstructed.
3) Check fuses, electrical connections and wiring.
4) Contact Metal Form.

40) **BATCH COMPLETE**

Description: Parts complete count has reached the BATCH PRESET setting.

Solution: 1) Press F1 on main display to reset the BATCH counter.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

41) **DIE MEMORY FULL!!!**

Description: There is no more room in the die memory for new dies.

Solution: 1) Erase unused dies from memory.

42) **PROX SWITCH FAULT**

Description: The proximity switch that monitors the press for zero degrees (TDC) has failed or is not positioned to turn on at zero degrees.

Solution:

- 1) Depress F1 on main display to reset fault.
- 2) Check for proper proximity switch position.
- 3) Check for proper encoder position.
- 4) Check for mechanical problems.
- 5) Check for proper proximity switch operation.
- 6) Check proximity switch connections and wiring.
- 7) Replace proximity switch.
- 8) Check encoder electrical connections and wiring.
- 9) Replace encoder.
- 10) Contact Metal Form.

43) **PRIMARY RELAY FAIL**

Description: Master safety output relay K2 has failed to operate properly.

Solution:

- 1) Cycle power OFF/ON to reset control.
- 2) Replace safety output relay K2.
- 3) Contact Metal Form.

44) **DIE MEMORY BAD**

Description: The Press setup parameters stored in memory have become corrupted.

Solution:

- 1) Cycle power ON/OFF to reset fault.
- 2) Re-input all press parameters in Press-Master programming.
- 3) Make sure there is sufficient noise suppression in control system.
- 4) Make a note of all Dies and parameters. Enter program mode and enter 771456 for the password. Select CLEAR TO EXIT. **All Dies will be erased.** You will have to create new Dies and re-enter all Die parameters.

MASTER – EXTERNAL MAIN LCD DISPLAY

ERROR	ANGLE: 359
DIE# 123456	CNT: 0000000
STATUS:	MAIN MOTOR OFF...

STATUS MESSAGES *continued...*

45) **ENCODER REVERSE**

Description: The master processor has detected a problem with the encoder direction. If the encoder reverses for more than 5 degrees a fault is generated.

Solution:

- 1) Depress F1 on main display to reset fault.
- 2) Check encoder for proper rotation.
- 3) Check for backlash in encoder drive shaft or chain.
- 4) Check for vibration related problems.
- 5) Check encoder electrical connections and wiring.
- 6) Replace encoder.
- 7) Contact Metal Form.

46) **DIE PRO PROGRAM**

Description: Signal received on a bypassed DIE PRO input.

Solution:

- 1) Depress F1 on main display to reset fault.
- 2) Check DIE PRO program settings.
- 3) Check for die sensors connected that are not needed.

47) **MASTER STOP OPEN**

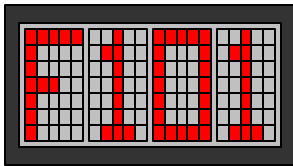
Description: Signal voltage missing on all inputs except DC input #2A and AC input #1. MASTER STOP button has been depressed.

Solution:

- 1) Release Master Stop button.
- 2) Check for proper operation of button.
- 3) Check button electrical contacts and wiring.
- 4) Contact Metal Form.

END

SLAVE - INTERNAL LED DISPLAY



FAULT CODES:

1) **F101**

Description: SERIAL DATA FAULTY. Corrupted RS232 data received from master Processor. Die memory defective/missing.

Solution: 1) Cycle power OFF/ON to reset control.
2) Replace Die memory.
3) Contact Metal Form.

2) **F102**

Description: Slave processor cannot communicate with master processor.

Solution: 1) Check slave processor display for fault codes.
2) Cycle power OFF/ON to reset control.
3) Contact Metal Form.

3) **F103**

Description: Slave safety output relay K3 has failed to operate properly.

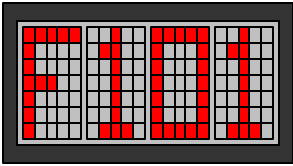
Solution: 1) Cycle power OFF/ON to reset control.
2) Replace safety output relay K3.
3) Contact Metal Form.

4) **F104**

Description: Dual channel fault, or internal watchdog relay OFF should be ON, or slave not responding.

Solution: 1) Cycle power OFF/ON to reset control.
2) Check stop circuit wiring and electrical contacts.
3) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



FAULT CODES continued:

5) **F105**

Description: External watchdog relay ON should be OFF.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

6) **F106**

Description: Internal slave watchdog timed out.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

7) **F107**

Description: Master processor did not release “RUN” signal to slave processor while press stopped.

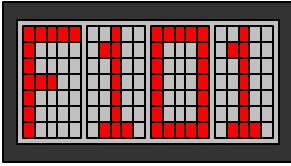
Solution: 1) Check internal MASTER LED DISPLAY.
2) Check external MASTER LCD DISPLAY.
3) Cycle power OFF/ON to reset control.
4) Contact Metal Form.

8) **F108**

Description: Erroneous Carry Up code received from master processor.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



FAULT CODES *continued:*

9) **F109**

Description: Master processor did not send “RUN” signal to slave processor to allow the press to cycle.

Solution: 1) Check internal MASTER LED DISPLAY.
2) Check external MASTER LCD DISPLAY.
3) Cycle power OFF/ON to reset control.
4) Contact Metal Form.

10) **F110**

Description: The proximity switch that monitors the press for (TDC) zero degrees has failed or is not positioned to turn on at zero degrees.

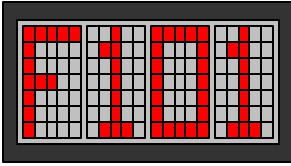
Solution: 1) Cycle power OFF/ON to reset control.
2) Check for proper proximity switch position.
3) Check for proper encoder position.
4) Check for mechanical problems.
5) Check for proper proximity switch operation.
6) Check proximity switch connections and wiring.
7) Replace proximity switch.
8) Check encoder electrical connections and wiring.
9) Replace encoder.
10) Contact Metal Form.

11) **F201**

Description: Master processor has detected an internal fault.

Solution: 1) Cycle power OFF/ON to reset control.
2) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



FAULT CODES continued:

12) **F202**

Description: Safety output relay K1 test failed, or master processor has detected a circuit board fault, such as “input test fault”.

Solution: 1) Cycle power OFF/ON to reset control.
2) Check safety output relay K1.
3) Check the input.
4) Contact Metal Form.

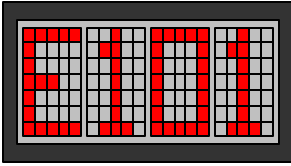
12) **F299**

Description: Master processor has detected a Press System fault.

Solution: 1) Clear Press System Fault.
2) Cycle power OFF/ON to reset control.
3) Contact Metal Form.

END.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES:

1) **E101 - RAM BLOCK REMOVED.**

Description: Signal voltage missing on AC input #1.

Solution: 1) Check ram block interlock plugs.
2) Check interlock plug electrical contacts and wiring.
3) Contact Metal Form.

2) **E102 - SINGLE ONLY – FOOT.**

Description: Signal voltage missing on DC input #3. HAND/FOOT selector set to FOOT and press run mode is not set to SINGLE stroke.

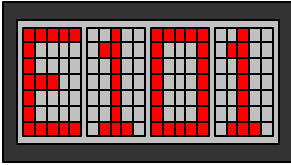
Solution: 1) Select SINGLE stroke for FOOT operation.
2) Deselect FOOT to run in modes other than SINGLE.
3) Check for proper operation of selector switches.
4) Check selector switch electrical contacts and wiring.
5) Contact Metal Form.

3) **E103 - SAFETY LIGHT FRONT, SAFETY LIGHT REAR**

Description: Signal voltage missing on AC input 4 (Front) and/or DC input 4A and AC input 5 (Rear). Safety guard or safety light circuit open.

Solution: 1) Check for guards in place.
2) Make sure safety lights are unobstructed.
3) Check fuses, electrical connections and wiring.
4) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES continued:

4) E104 – STATION STOP BUTTON

Description: Signal voltage missing on DC input #5A and AC input #5. STATION STOP button has been depressed.

Solution: 1) Release Station Stop button.
2) Check for proper operation of button.
3) Check button electrical contacts and wiring.
4) Contact Metal Form.

5) E105 – TOP STOP BUTTON

Description: Signal voltage missing on DC input #6A. TOP STOP button has been depressed.

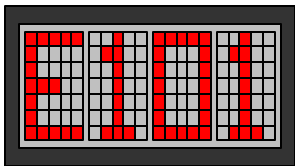
Solution: 1) Release Top Stop button.
2) Check for proper operation of button.
3) Check button electrical contacts and wiring.
4) Contact Metal Form.

6) E106 - RUN MODE SELECT

Description: Signal voltage present on DC input #3A.

Solution: 1) Deselect run mode.
2) Check for proper operation of switch.
3) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES continued:

7) **E107** - LOW AIR PRESSURE

Description: Signal voltage missing on DC input #2B.

Solution: 1) Check clutch and counter balance air pressure.
2) Check air pressure switches for proper settings.
3) Check air pressure switch electrical contacts and wiring.
4) Contact Metal Form.

8) **E108** - LUBE SYSTEM FAULT

Description: Signal voltage missing on AC input #2.

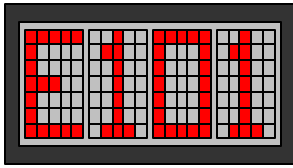
Solution: 1) Check lubrication system on press.
2) Check lube monitor switches for proper settings.
3) Check lube monitor switch electrical contacts and wiring.
4) Contact Metal Form.

9) **E109** - MAIN MOTOR OFF...

Description: Signal voltage missing on AC input #3.

Solution: 1) Check main motor is started.
2) Check start switch electrical contacts and wiring.
3) Check starter electrical contacts and wiring.
4) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES continued:

10) **E110 - SAFETY VALVE SWITCH**

Description: Signal voltage missing on DC input #3B. Safety valve static monitor switch open.

Solution:

- 1) Reset safety valve with SAFETY VALVE RESET selector switch.
- 2) Check for proper operation of Safety Valve.
- 3) Check safety valve electrical connections and wiring.
- 4) Check for vibration related electrical problems.
- 5) Contact Metal Form.

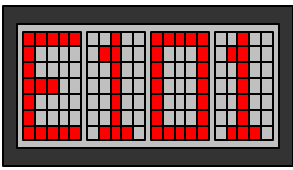
11) **E111 - SYSTEM STOP INPUT**

Description: Signal voltage missing on AC input #5. SYSTEM STOP.

Solution:

- 1) Check electrical connections and wiring.
- 2) Check for vibration related electrical problems.
- 3) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES continued:

13) **E113 - RAM ADJUST ON**

Description: Signal voltage on AC input #6. RAM/SLIDE ADJUST selector is on.

Solution: 1) Select RAM/SLIDE ADJUST OFF.
2) Check for proper operation of selector switch.
3) Check selector switch electrical contacts and wiring.
4) Contact Metal Form.

14) **E114 - MOTOR OVERLOAD**

Description: Signal voltage present on DC input #1B. OVERLOAD TRIPPED

Solution: 1) Check main motor overload.
2) Check ram motor overload.
3) Check lubrication motor overload, etc.
4) Check electrical contacts and control wiring.
5) Contact Metal Form.

15) **E115 - CUSTOMER TOP STOP**

Description: Signal voltage missing on DC input #5B. CUSTOMER TOP STOP

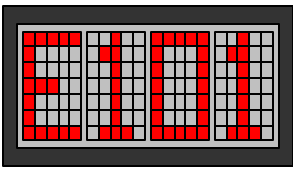
Solution: 1) Check for device wired to input.
2) Check operation of device wired to input.
3) Check electrical contacts and control wiring.
4) Contact Metal Form.

16) **E116 – LUBE LEVEL LOW**

Description: Signal voltage missing on DC input #6B. LUBE LEVEL LIMIT

Solution: 1) Check lubrication oil/grease levels.
2) Check for proper operation of level switch.
3) Check electrical contacts and control wiring.
4) Contact Metal Form.

SLAVE - INTERNAL LED DISPLAY



ERROR CODES continued:

17) **E118 – CUSTOMER STOP INPUT**

Description: Signal voltage missing on DC input #4B. CUSTOMER STOP

Solution: 1) Check for device wired to input.
2) Check operation of device wired to input.
3) Check electrical contacts and control wiring.
4) Contact Metal Form.

18) **E299 – HYDRAULIC OVERLOAD**

Description: Signal voltage missing on DC input #8B. HYDRAULIC OVERLOAD

Solution: 1) Check hydraulic overload system.
2) Check hydraulic overload system turned ON should be OFF.
3) Check electrical contacts and control wiring.
4) Contact Metal Form.

20) **E299**

Description: Master processor has detected a Press System fault.

Solution: 1) Clear Press System Fault.
2) Cycle power OFF/ON to reset control.
3) Contact Metal Form.

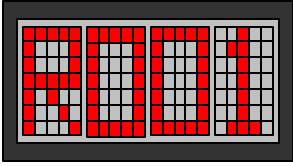
20) **E299**

Description: Controller has received a run command from a non-active station.

Solution: 1) Press [F1] to reset controller.
2) Check run station electrical contacts and control wiring.
3) Contact Metal Form.

END.

SLAVE - INTERNAL LED DISPLAY



RUN CODES:

1) **R000**

Description: No RUN mode selected.

Solution: None.

2) **R001**

Description: Press run mode is INCH and press is ready to run.

Solution: None.

3) **R002**

Description: Press run mode is SINGLE STROKE and press is ready to run.

Solution: None.

4) **R003**

Description: Press run mode is CONTINUOUS and press is ready to run.

Solution: None.

END.

ANSI B11.1-1988

6.3.2 The American National Standards Institute (ANSI) Standards for Presence-sensing Point of Operation Devices

A presence-sensing point-of-operation device, if used, shall protect the operator and others, and shall be interfaced with the control circuit to prevent or stop slide motion if the operator's hand or other body part is within the sensing field of the device during the closing portion of the stroke. In addition:

- (1) Presence-sensing devices shall not be used for safeguarding the point of operation on presses using full-revolution clutches.
- (2) When the sensing field has been interrupted, use of the normal press stroke initiating means shall be required after clearing the sensing field to resume press operation.
- (3) Muting (bypassing of the protective function) of the device shall be permitted after the hazardous portion of the press stroke has been completed. Muting of the device shall be accomplished in such a manner that no single component failure shall prevent the normal stop command, but shall prevent subsequent press strokes until the failure is corrected.
- (4) The device shall have an identifiable minimum object sensitivity so that an obstruction of an equal or greater size will be detected anywhere within the sensing field regardless of the plane of intrusion.
- (5) The device shall have a maximum response time which shall not be affected by object sensitivity adjustments or environmental changes.
- (6) The devices which require adjustments to accommodate variations in ambient or operating conditions or which incorporate channel blanking or floating window features shall be designed so that the adjustments or features are capable of being supervised by the employer.
- (7) The presence-sensing device shall be provided with a means that visibly indicates when it is and is not in use and functioning properly. The device shall also indicate which sections, if any, have been blanked out.
- (8) The device shall not fail to respond to the presence of the operator's or other's hand or body part due to the presence of a reflective object or work piece.
- (9) The device shall be designed and constructed so that any single component failure, including output devices, shall not prevent the normal STOP command from being sent to the press, but shall prevent operation of the press stroke until the failure has been corrected. In the event of a power failure to the device, it shall initiate a STOP command to the press-control system.
- (10) The device and the press-control system shall be interfaced so that the device's STOP command shall initiate stopping action during the closing portion of the press stroke. The interface shall be designed to ensure that a single component failure within the interface of the control system shall not prevent the normal STOP command from being sent to the press, but shall prevent operation of the press stroke until the failure has been corrected.
- (11) The device's sensitivity to intrusion shall not be adversely affected by changing conditions around the press.

(12) The effective sensing field of the device shall be located at a distance from the nearest point-of-operation hazard so that the operator or others cannot reach into the point of operation with a hand or other body part before cessation of motion during the closing portion of the stroke.

(13) The device shall not be affected by ambient light or by light-source decay so that the increase in response time or object sensitivity is greater than the value used to calculate the safety distance.

All areas of entry to the point of operation not protected by the presence-sensing device shall be otherwise safeguarded.

When a device is used on a press in a single-stroke mode and when the protection of the operator is dependent upon the stopping action of the press, a stopping performance monitor shall be required.

6.3.5 Two-Hand Control Device

3. Each operator hand control shall be located at a distance from the point of operation so that the operator cannot release either hand control and reach into the point of operation prior to die closure or prior to cessation of slide motion during the closing portion of the stroke.

ANSI B11.1-1988 (Safety Distance Formula)

Below is the Formula for calculating the safety distance of a Light Curtain, or Palm button:

The machine stop time should be measured with the machine running at its fastest speed with its heaviest die or tooling and the stop time being measured at the 90° position in the downstroke. The following formula should be used when calculating the safety distance:

$$Ds = K \times (TS + TC = Tr + Tbm)$$

DS = Minimum safety distance between the device and the nearest point of operation hazard (in inches)

K = Hand speed constant. This value has been determined by various studies and although these studies indicate speeds of 63 in/sec to over 100 in/sec, they are not conclusive determinations. The employer should determine this value by considering all factors, including physical ability of the operator.

TS = Stop time of the machine tool measured at the final control element.

TC = Response time of the control system.

NOTE: TS and TC are usually measured by a stop time measurement device.

Tr = Response time of the presence-sensing device and its interface, if any, as stated by the manufacturer or measured by the employer.

Tbm = Additional time allowed for the brake monitor to compensate for variations in normal stopping time.

OSHA REGULATIONS

1910.217 (C) (3) (iii)

SAFEGUARDING THE POINT OF OPERATION

(iii) A presence sensing point of operation device shall protect the operator as provided in paragraph (c) (3) (I) (a) of this section, and shall be interlocked into the control circuit to prevent or stop slide motion if the operator's hand or other part of his body is within the sensing field of the device during the down stroke of the press slide.

- (a) The device may not be used on machines using full revolution clutches.
- (b) The device may not be used as a tripping means to initiate slide motion.
- (c) The device shall not be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system.
- (d) Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding.
- (e) Refer to page *ANSI B11.19-1990* page for calculating safety light curtain distance from the point of operation.
- (f) Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device.

1910.217 (C) (3) (iii)

Additional requirements for safeguarding.

Where the operator feeds or removes parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device or Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding:

- (i) The employer shall use a control system and a brake monitor which comply with paragraphs (b) (13) and (14) of this section.
- (e) Inspection, maintenance, and modification of presses –
 - (i) It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and maintenance work performed.

1910.212

General requirements for all machines (covers press brakes, hydraulic and pneumatic machines not covered by mechanical power press standards.)

- (a) Machine guarding – (1) Types of guarding. One or more methods or machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation ingoing nip points, rotation parts, flying chips and sparks. Examples of guarding methods are: barrier guards, two-handed tripping devices, electronic safety devices, etc.

NOTE: These are only partial reprints; refer to your Federal Register for total construction, control reliability, and machine guarding requirements for the subject machine being guarded for all applicable OSHA Standards.

MACHINE CONTROL RELIABILITY REQUIREMENTS

CONTROL RELIABILITY:

Appendix A

“...control circuits shall be designed and constructed so that a single failure or fault, within the system does not prevent the normal stopping action from being applied to the press when required, or does not create an unintended stroking action, but does prevent initiation of a successive stroke until the failure is corrected.”

(ANSI B11.1-1988)

“...control shall be designed to prevent initiation of a stroke signal in the event that a failure occurs within the press control.”

(ANSI B11.2-1982)

“Robots shall be designed and constructed so that any single, reasonably foreseeable failure will not cause hazardous motion of the robot.”

(ANSI/RIA R15.06-1991)

“...control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of the control component to function properly, including relays, limit switches, and static output circuits.”

(ANSI B11.1-1982)

“...control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected.”

(ANSI B11.1-1982)

“...the control system shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent initiation of a successive stroke until the failure is corrected.”

(OSHA CFR 1910.217, 1988)

SAFETY GUIDELINES FOR MANAGEMENT

OPERATIONAL SAFETY

- 1. Appoint a Safety Coordinator to be responsible for safety regulations, requirements and suggestions. They must review and investigate all accidents and “close calls”.**
- 2. Establish and issue safety rules. Inform employees of their responsibilities. Make sure they understand them and know what is expected of them.**
- 3. A thorough review and an early inspection must be made of existing presses, dies, and point of operation guarding to attain the degree of responsibility required by ANSI B11.1-1988 Safety Standards and Federal State laws. Review what mandatory modifications are necessary.**
- 4. Equipment that is no longer safe and that cannot be economically upgraded should be destroyed.**
- 5. Never allow persons legally under age to operate or assist in the operation of machinery.**
- 6. All personnel must be properly trained to eliminate accidents and injuries.**
- 7. Regardless of the operator’s experience, education or language barrier, it is the responsibility of the supervisor to give them a thorough explanation with each new job assignment.**

8. No employee should be given a work assignment that he or she does not fully understand. Only properly instructed and thoroughly trained personnel should be assigned to work on or with any machine.
9. It shall be the responsibility of the employer to provide an adequate, clean, safe and uncluttered work area around each machine.
10. If a malfunction is reported, stop the machine immediately; correct the problem, then resume production.
11. Investigate all accidents and "close calls". Analyze the reason for the occurrence. Take action to prevent recurrence. Keep records of the investigation and preventative steps that were taken.
12. Only employees who understand the machines, operation and safety requirements and who are able to communicate this knowledge should be given the responsibility of instructing and training others to perform as operators.
13. Management must decide that personnel protective safety equipment is required to perform each job safely. Items such as safety glasses, shoes, gloves, helmets, hand pads, spats, protective sleeves and material handling equipment are common in the metal working industry. If noise levels are excessive, protective head sets and ear muffs are recommended.
14. When designing point of operation guarding, the manufacturing process should be weighed heavily in favour of operational safety.
15. Establish safe and convenient material handling methods and procedures.
16. Post in convenient areas the names, addresses, and phone numbers of physicians and hospitals, and members of the organization who are to be called in case of emergency.
17. All equipment must be electrically connected according to the National Electric Code and be consistent with other accepted practices.
18. Provide adequate and proper fire protection equipment.

POWER PRESS GUARDING

1. Press manufacturers do not know and cannot foresee the magnitude of potential applications of power presses. Therefore, only the press user can determine the type of guards that have to be used in order to perform the job safely. It is the responsibility of the user management to make certain that point of operation guarding and other necessary safety devices are installed. The press should be guarded in such a manner that it is impossible for the operators to place their hands or any other part of the body in the die area.
2. The press user should become thoroughly acquainted with the safety devices commonly employed in power press operations.
3. Feeding devices are strongly recommended, since they remove the operator from the die area, and therefore allow more effective utilization of guards and safety devices.
4. Do not release a press for production before installing and testing all guards and covers.
5. Make frequent evaluation checks of all guarding and devices while the press is running. Correct all unsafe findings immediately.

POWER PRESS CARE THROUGH INSPECTION AND MAINTENANCE

1. All maintenance and inspection personnel should be specifically instructed, and must understand proper maintenance and inspection procedures contained in this manual.
2. Set up a daily, weekly, and monthly press inspection program. Use a checklist and verify that the job is done correctly.
3. Establish a preventative maintenance program. Records of all maintenance work performed must be kept.
4. Since all equipment has a limited life, quality maintenance personnel are required to obtain maximum usage of your equipment.
5. Releasing a power press for production following maintenance should be the responsibility of a qualified individual assigned by management.
6. To maintain the original level of press reliability, careful inspection of mechanical, electrical, and pneumatic areas must be made. This may give an advance warning of a hazard which then can be corrected to prevent possible injuries and damage.

SAFETY ENFORCEMENT

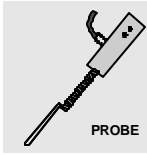
In order to have an effective safety program, management at all levels must enforce every safety rule and regulation. Strong disciplinary measures are sometimes required. They should consist of a warning, written reprimand, work suspension, transfer, demotion, or possibly a dismissal. All infractions must be reported and recorded. Once an infraction is noted, it shows that an unsafe practice or condition has existed. This may be the result of poor planning or improper training and instructing. The reason for the infraction should be analyzed in order to take corrective action.

SUPERVISOR TRAINING

It should be the responsibility of management to instruct their supervisors on safety, giving job instructions, supervising operators, determining accident causes, and building safety attitudes among the machine operators. Accidents can occur due to inadequate training of supervisors.

OPERATOR TRAINING

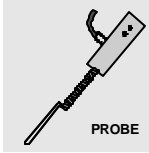
It shall be the responsibility of management to insure proper training of operators. A specific training program should be instituted to instruct the operator in safety, proper usage of the equipment, and correct operational procedure in performing each and every job. In addition to the supervisor, the operator should be familiar with the proper guarding of the point of operation. Never permit an operator to start a job without complete instructions from his immediate supervisor.



DIE PROTECTION MODES OF OPERATION

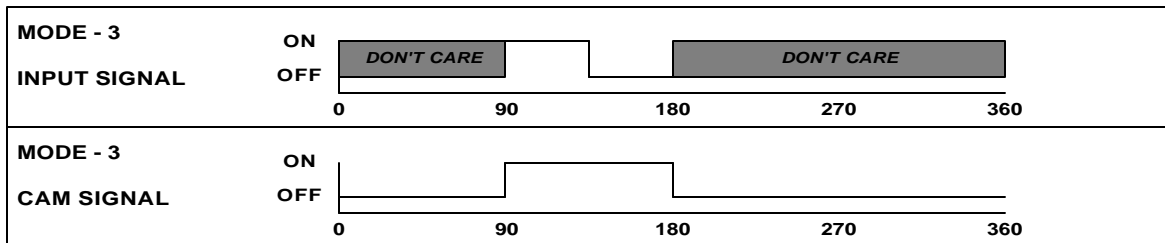
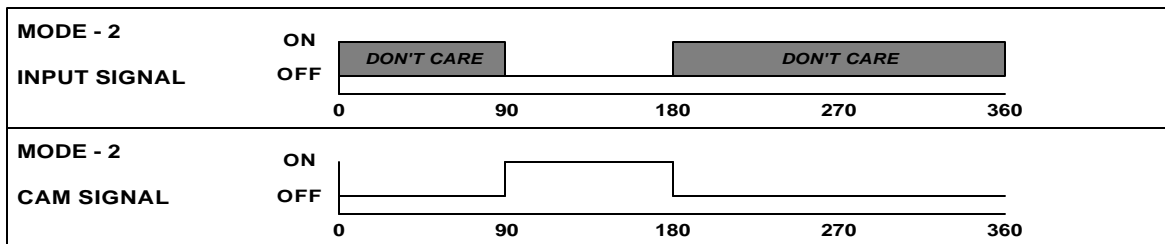
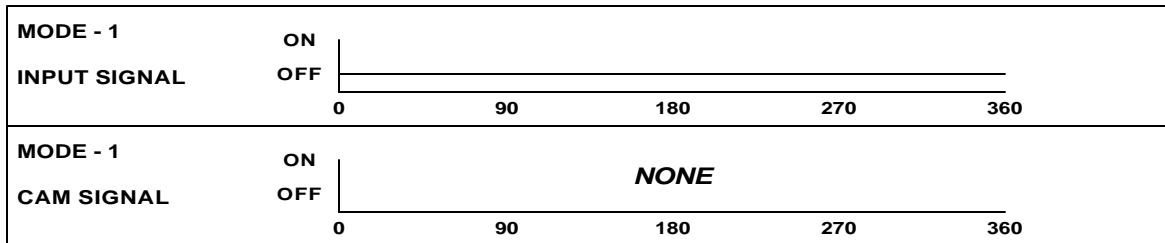
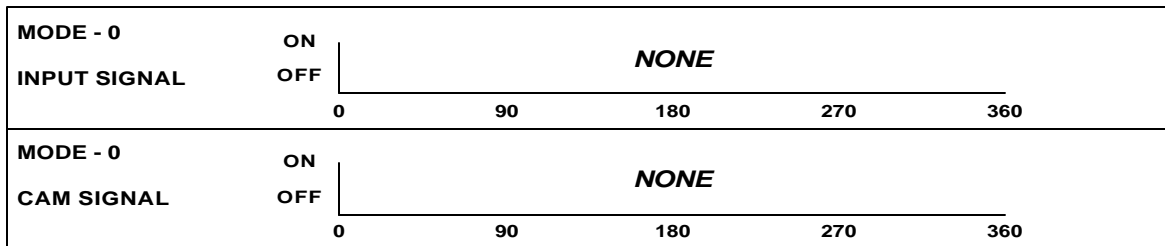
DIE PROTECTION MODES OF OPERATION
<p>MODE - 0 INPUT HAS NO FUNCTION (BYPASSED)</p>
<p>MODE - 1 INPUT MUST HAVE SIGNAL OFF AT ALL TIMES (STATIC - NORMALLY OPEN)</p>
<p>MODE - 2 INPUT MUST HAVE SIGNAL OFF DURING CAM "ON" (STATIC - NORMALLY OPEN WITH CAM ON SIGNAL)</p>
<p>MODE - 3 INPUT MUST SWITCH FROM SIGNAL ON TO SIGNAL OFF DURING CAM "ON" (CYCLIC - WITH CAM ON SIGNAL)</p>
<p>MODE - 4 INPUT MUST SWITCH FROM SIGNAL ON TO SIGNAL OFF DURING THE CAM "ON" INPUT MUST HAVE SIGNAL OFF DURING CAM "OFF" (CYCLIC - WITH CAM ON, STATIC WITH CAM OFF)</p>
<p>MODE - 5 INPUT MUST HAVE SIGNAL ON AT ALL TIMES (STATIC - NORMALLY CLOSED)</p>
<p>MODE - 6 INPUT MUST HAVE SIGNAL ON DURING CAM "ON" (STATIC - NORMALLY CLOSED WITH CAM ON SIGNAL)</p>
<p>MODE - 7 INPUT MUST SWITCH FROM SIGNAL OFF TO SIGNAL ON DURING CAM "ON" (CYCLIC - WITH CAM ON SIGNAL)</p>
<p>MODE - 8 INPUT MUST SWITCH FROM SIGNAL OFF TO SIGNAL ON DURING THE CAM "ON" INPUT MUST HAVE SIGNAL ON DURING CAM "OFF" (CYCLIC - WITH CAM ON, STATIC WITH CAM OFF)</p>
<p>MODE - 9 INPUT MUST SWITCH FROM SIGNAL OFF TO SIGNAL ON DURING THE CAM "ON" ONCE THE SIGNAL IS ON IT MUST STAY ON FOR THE DURATION OF THE CAM "ON" SIGNAL (CYCLIC - WITH CAM ON, STATIC WHEN SIGNAL ON)</p>

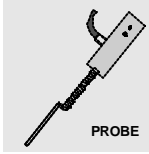
Note: If you need to bypass die protection, all die pro. settings must be zero and all die pro. inputs unplugged, or a "DIE PRO PROGRAM" error will occur.



DIE PROTECTION MODES OF OPERATION

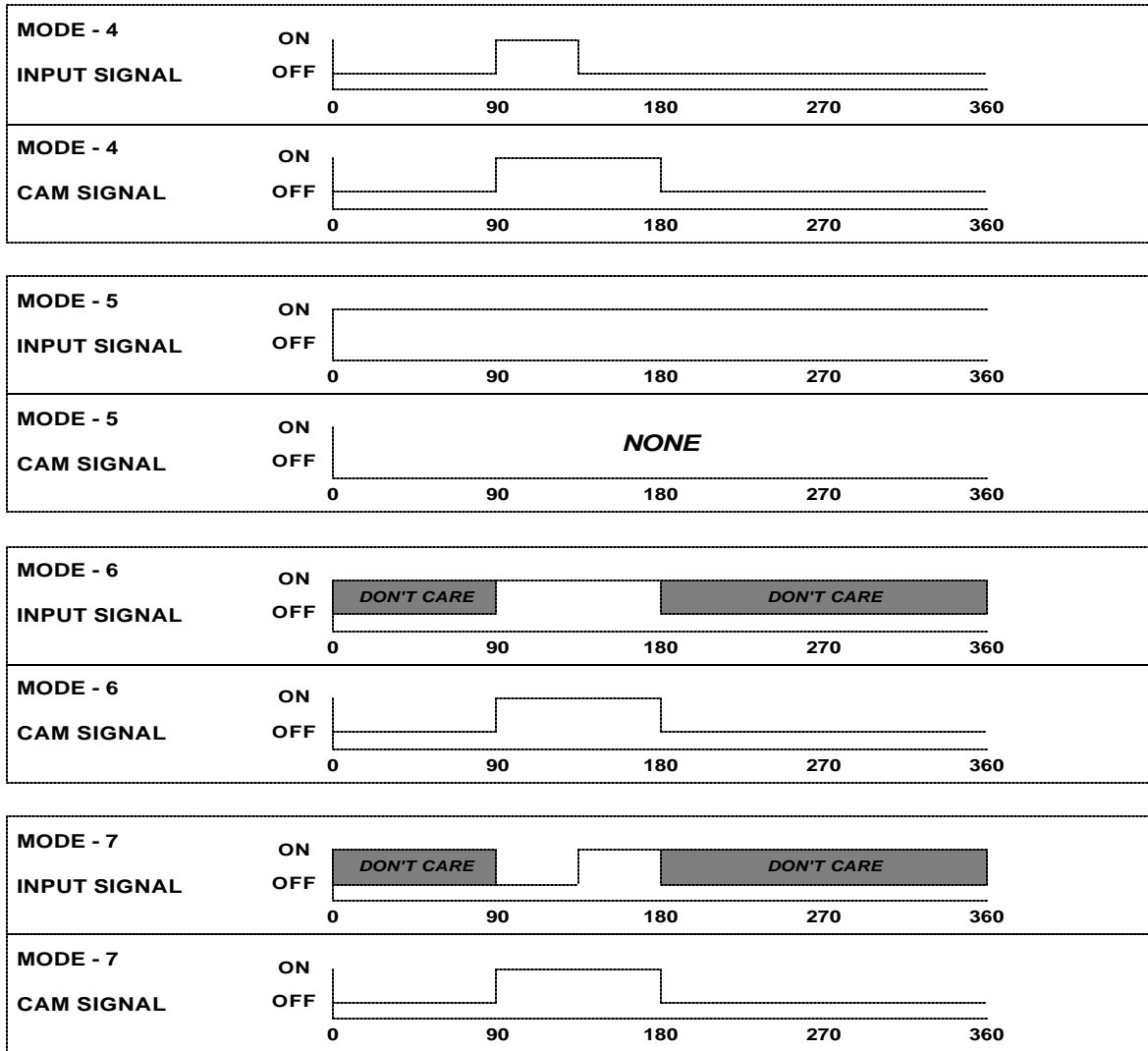
EXAMPLES OF DIE PROTECTION OPERATION BY MODES
SIGNALS AND CAM SETTINGS ARE FOR EXPLANATION ONLY

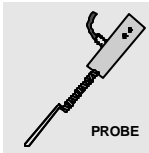




DIE PROTECTION MODES OF OPERATION

EXAMPLES OF DIE PROTECTION OPERATION BY MODES
SIGNALS AND CAM SETTINGS ARE FOR EXPLANATION ONLY

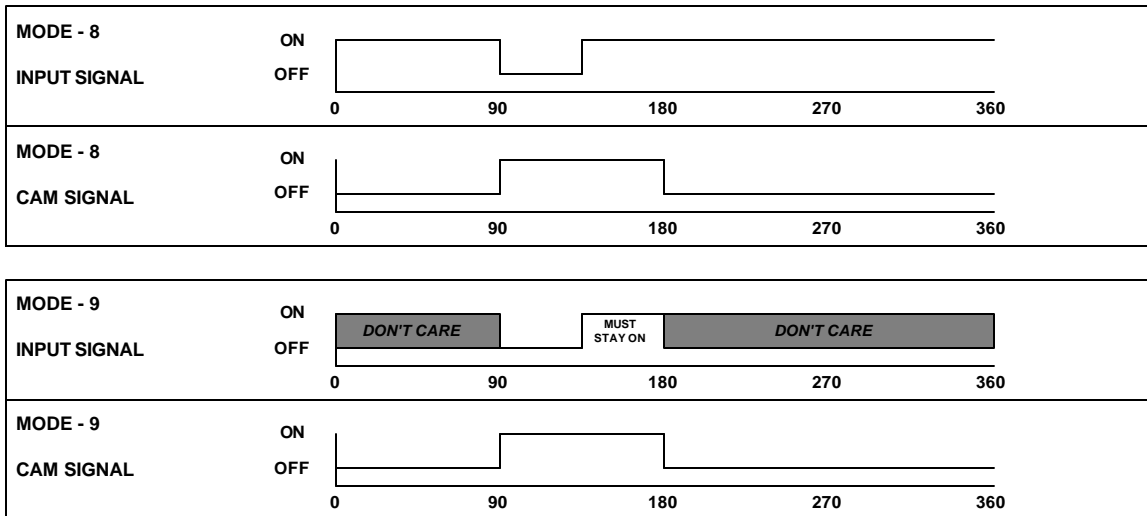




DIE PROTECTION MODES OF OPERATION

EXAMPLES OF DIE PROTECTION OPERATION BY MODES

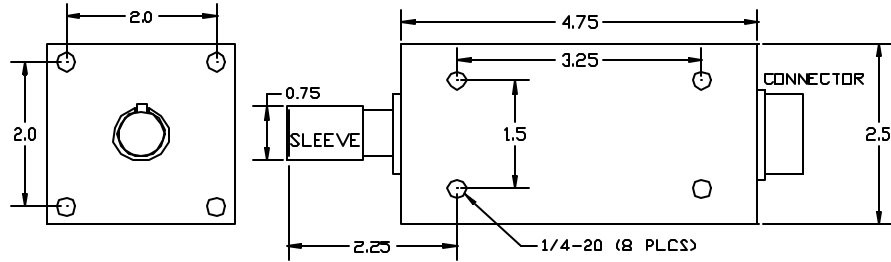
SIGNALS AND CAM SETTINGS ARE FOR EXPLANATION ONLY



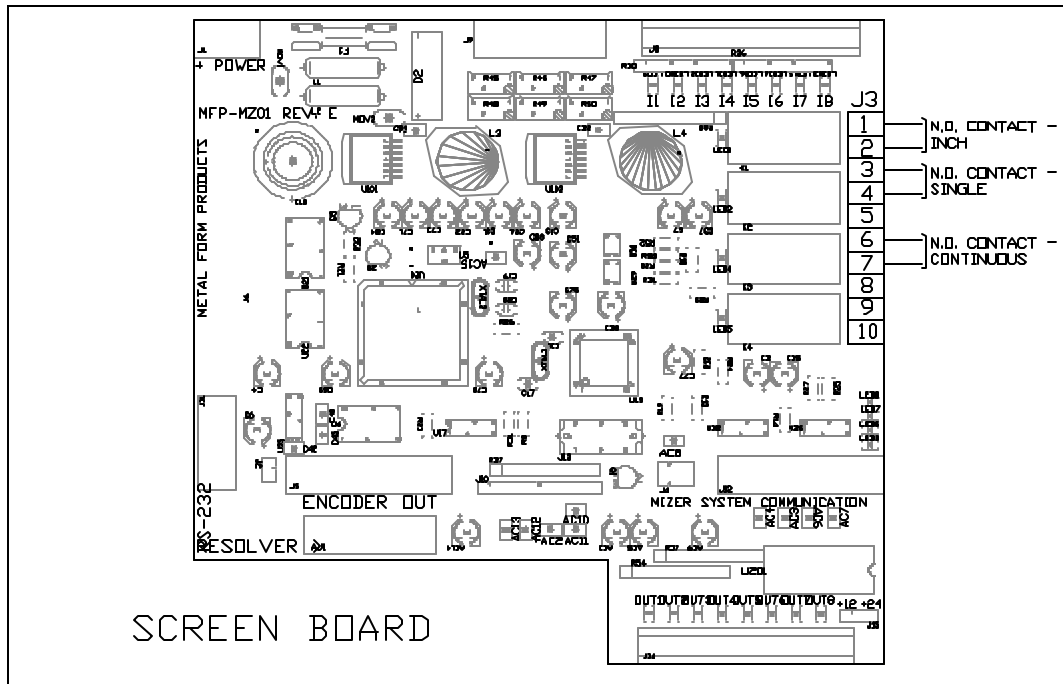
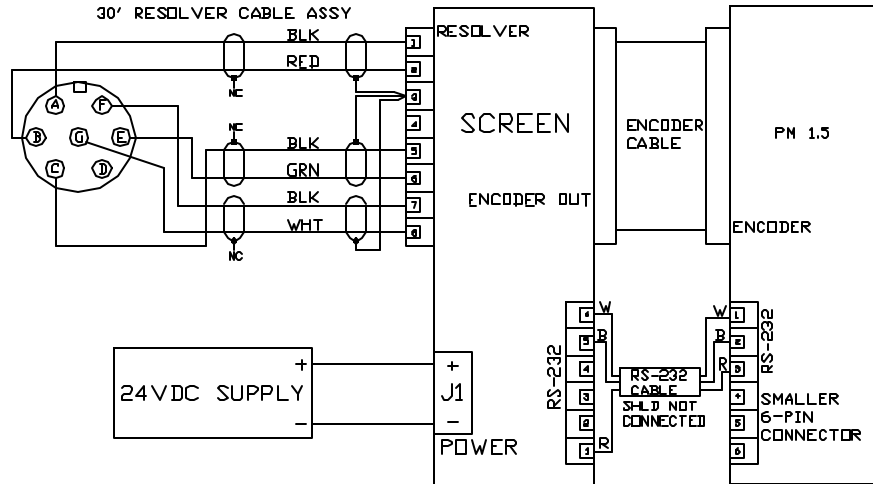
NOTES:

- 1) IN MODES 3, 7 ONCE THE INPUT SIGNAL IS RECEIVED DURING CAM "ON" IT BECOMES A DON'T CARE SIGNAL UNTIL THE NEXT CAM "ON".
- 2) IN MODES 4, 8 ONCE THE INPUT SIGNAL IS RECEIVED DURING CAM "ON" IT BECOMES A DON'T CARE SIGNAL UNTIL THE CAM "OFF".
- 3) IN MODE 9 ONCE THE INPUT SIGNAL IS RECEIVED DURING THE CAM "ON" IT MUST REMAIN UNTIL THE CAM "OFF".
- 4) **THE TOP STOP BUTTON OR [F1] ON MAIN DISPLAY IS USED TO RESET DIE PROTECTION FAULTS.**

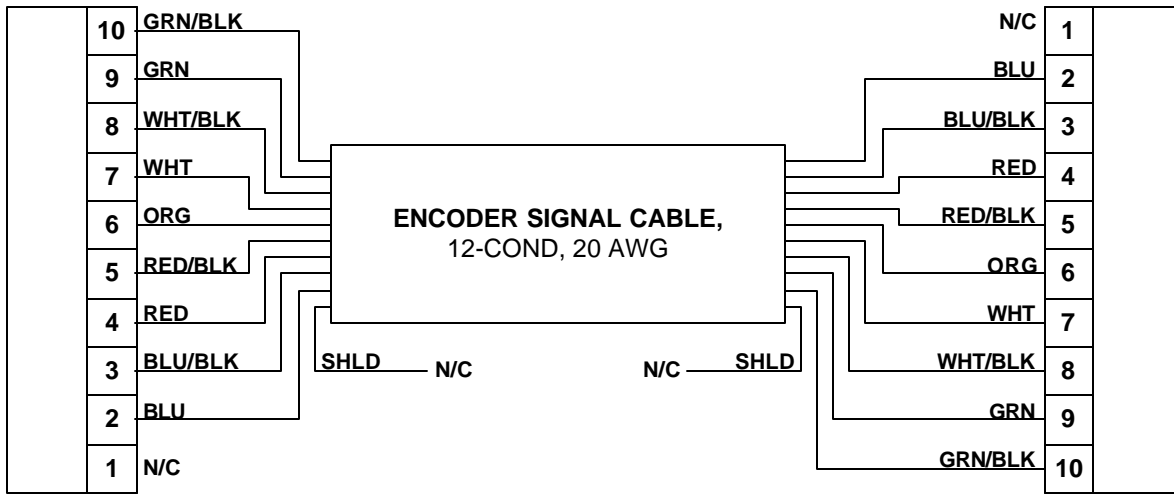
Resolver dimensions and screen board wiring



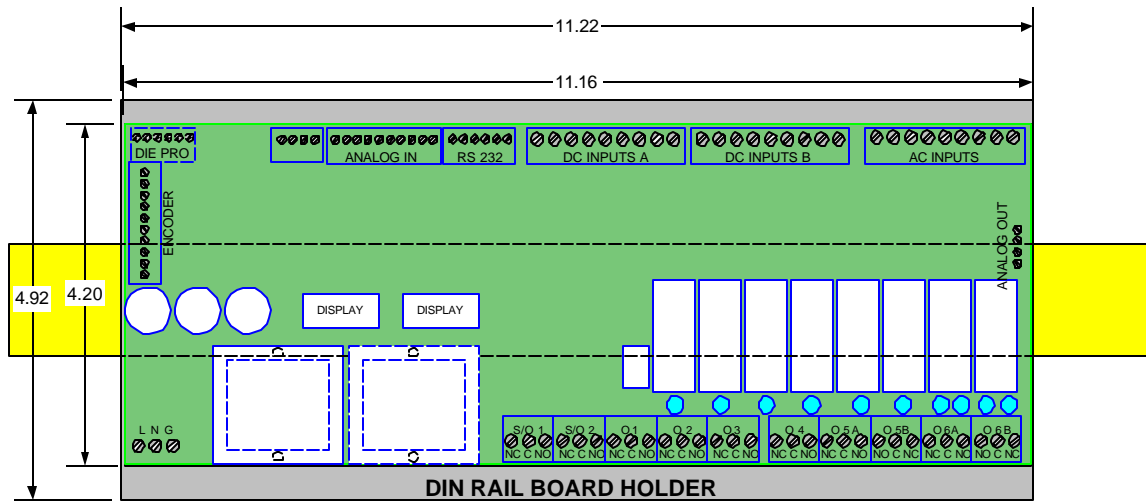
ALL DIMENSIONS IN INCHES



Note: If angle display goes backwards, swap Black & White wires on resolver connector pins 7 & 8.

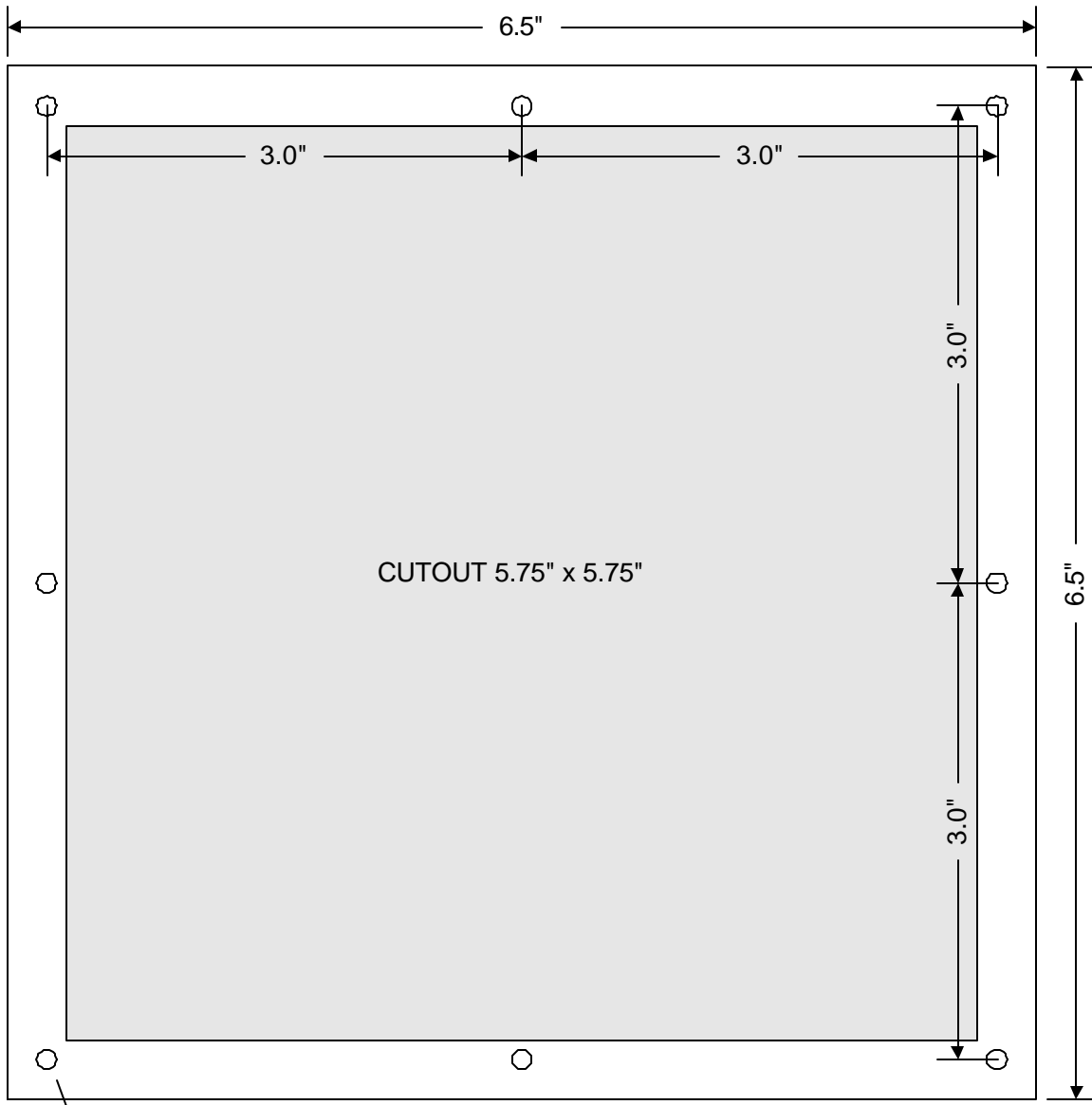


Encoder Signal Cable from Screen Board to PM1.5 Board



Controller dimensions

Display dimensions



THRU HOLE FOR 6-32 STUD, 8 PLCS

WARRANTY

Manufacturer warrants that this product will be free from defects in material and workmanship for a period of two years from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned to it with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction, and use not in accordance with manufacturer's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

DISCLAIMER

The provisions of the paragraph "Warranty" are the sole obligations of the manufacturer and exclude all other warranties of merchantability, expressed or implied.

Further, there are no warranties which extend beyond the above warranty.

LIMITATION OF LIABILITY

In the event of any claim or breach of any obligations of manufacturer under any order, whether expressed or implied, and particularly in the event of any claim or a breach of the warranty or warranties contained in the paragraph "Warranty" or of any other warranties, expressed or implied which might, despite the paragraph entitled "Disclaimer", be determined to be incorporated in any order, the company shall under no circumstances be liable for any consequential or special damages, either in law or in equity, or for losses or expenses or claims for the same arising from the use of, or inability to use, the products of the manufacturer for any purpose whatsoever.

WARNING: The entire machine safety system must be tested at the start of every shift. Machine testing should include:

- (1) Proper machine operation and stopping capability; and
- (2) Verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.