AVG Automation

AC AUTOTECH CONTROLS

UTICOR

M1030-E Programmable Load Monitor, Mini*PLM

Instruction & Operation Manual

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MAN-M1030-PEAK
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M1030-E Programmable Load Monitor

- **Up to 4 sensors in one small panel mount 7.25" x 5.5" x 5.9" package.**
- **Tonnage sensors with 4–20 mA output to simplify wiring.**
- **Built-in sensor integrity check detects broken sensor wires as well as unusual sensor drift.**
- **Total number of hits and % of good for SPC.**
- **Programmable Over & Under Limits for Press Protection, Die Protection & Process Trend.**
- **Die & Process Trend Limits programmable in tons or in percentage.**
- **Learn Mode to automatically compute reference tonnage for Die Protect Band.**
- **Process Trend Base is the running average of tonnage measured over programmed number of preceding cycles.**
- **Limit comparisons can selectively be disabled (except Press Overload Limit).**
- **4 Fail-safe alarm outputs.**
- **Separate outputs for Positive & Negative Press Tonnage Limits.**
- **Separate outputs for Over & Under Tonnage.**
- **Field replaceable electromechanical relays for alarm outputs.**
- **Multiple setup storage allows quick limit changeover.**

Introduction

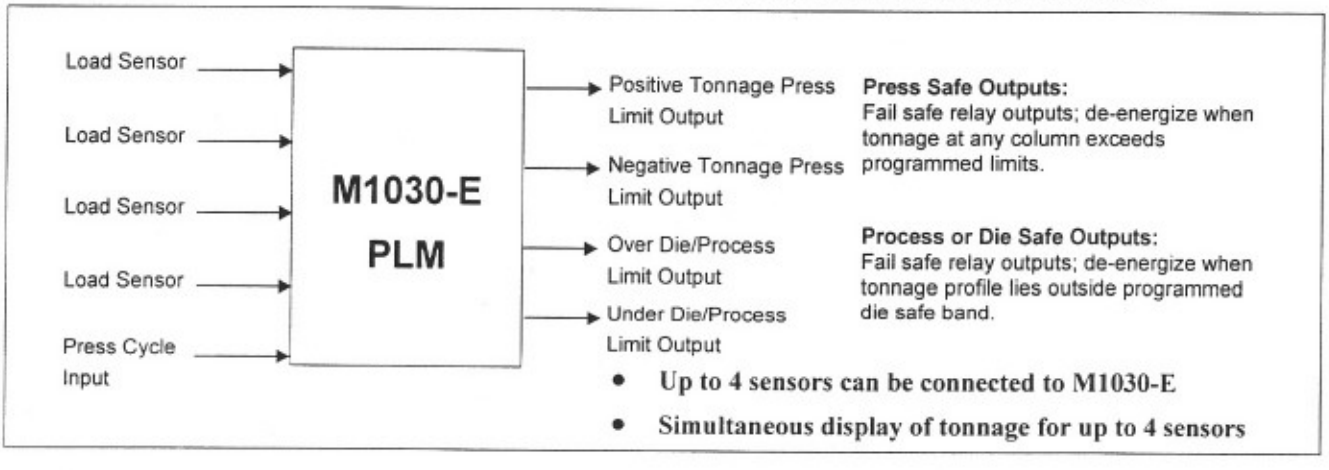
Programmable Load Monitor, Mini•PLM M1030-E from Autotech, is one of the best investments in tools for a press. It offers an economical entry into the Press Load Monitoring. While the M1030-E pays for itself very quickly by protecting the press & dies, your investment in M1030-E is protected. If in the future you require Full Load Signature Analysis capabilities, you can upgrade to our Signature Analysis model M1030, by paying only the difference in the cost (within 3 years of purchase).

The Low Cost Mini•PLM M1030-E measures Load or Tonnage on a press by using strain gages mounted on load bearing members, such as press columns. The M1030-E compares the measured load against user programmed limits for Press Protection, Die Protection and for Process Trend.

If the measured Load is outside the programmed limits, the Mini•PLM de-energizes the appropriate fail-safe relay, that can be used to stop the press, warn the operator, and/or signal a supervisory control.

The Mini•PLM uses strain gauge sensor with built-in amplifier for tonnage measurement. The sensors provide current signals proportional to tonnage. This makes wiring of sensors very easy. The user does not have to worry about length of wires, or splicing of wires.

The Mini•PLM has two counters for counting total number of hits, as well as the number of good parts made. A part is considered good if it did not cause any alarm or fault during stamping. A block diagram is shown below:



Specifications

Power Requirements:
105–135 VAC, 50/60 Hz, 25 W (For optimum use, a Constant Voltage Transformer should be used)

Operating Temperature: 0 to 130 °F

Tonnage Sensors:
Autotech's SAC-M1030-SEN strain gauge sensor providing 4–20 mA signal for tonnage. (Existing strain gauges may be used with Autotech's SAC-M1030-SENA amplifier.)

Number of Sensors: 4

Strain Gauge Element:
1 mV/V @ 400 micro-inch/inch

Sensor Mounting:
Weld pad mount or drill mount

Counters:
2, Total # of hits, and % of Good parts

Control Inputs

Electrical Characteristics:

TRUE:
Contact Closure to VO (term #15 on TB5) or 11–28 VDC input

FALSE:
Open or <0.8 VDC input

Program Enable:
Input must be TRUE to change any value

Supervisory 1 & Supervisory 2:
Supervisory inputs for access control

Fault Reset:
When TRUE, resets all faults

Press Cycle Input:
A FALSE to TRUE transition signifies end of a press cycle. Input should occur +/– 10 degrees of TDC

Programmable Limits

6 limits for each installed sensor. The Limit comparisons can be selectively disabled, except for Positive Tonnage Press Limit.

Positive Tonnage Press Limit:
Programmed in Tons for Press Overload Protection, can not be disabled

Negative Tonnage Press Limit:
For Snap through or Reverse tonnage protection, can be disabled

Die Protect Band:
Defined by Die Protect High & Low Limits; both limits programmed as deviation from Reference Tons, either in tons or in percent of reference ton value (choice is programmable); comparison can be disabled

Number of Reference Storage: 10

Process Trend Band:
Defined by Process High & Low Limits; both limits programmed as deviation from Process Base Tons, either in tons or in percent of the base tons; comparison can be disabled. (Process Base Tonnage is the running average of tonnage measured over last several cycles, number of cycles for averaging is programmable.)

Outputs

4 field replaceable electromechanical relay outputs; all outputs are fail safe. (The NO relay contact is closed under safe conditions, and opens under fault conditions.)

Relay Specifications:
120 VAC @ 10 Amp Resistive, SPST

Output Relay	Output relay de-energizes if...
Positive Tonnage Press Limit	measured tonnage exceeds positive tonnage press limit
Negative Tonnage Press Limit	measured tonnage exceeds negative tonnage press limit
Over Die/Process Limit	measured tonnage is greater than die and/or process high limit
Under Die/Process Limit	measured tonnage is less than die and/or process low limit

How to Order

M1030-E PLM

SAC-M1030-PLMx M1030-E Programmable Load Monitor unit for up to 4 sensors

Where x = Number of Inputs
2: Two channel
4: Four channel

Sensor, Amplifier, Cables

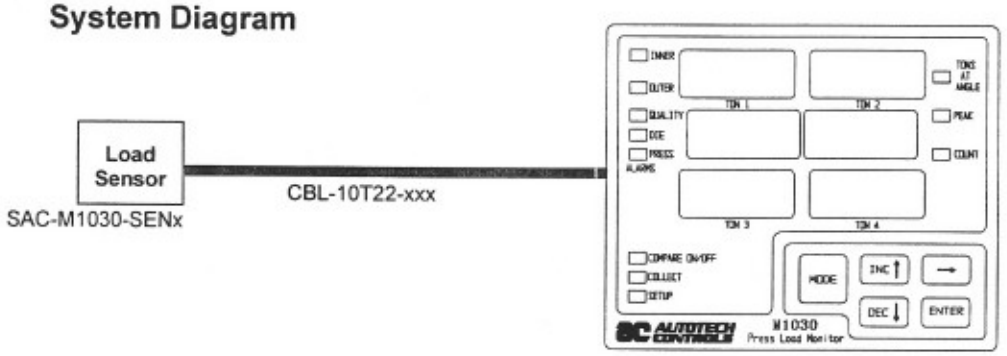
SAC-M1030-SEND Sensor, protective cover, amplifier (4–20mA sourcing output)

SAC-M1030-SENW Sensor, protective cover, amplifier (4–20mA sourcing output) with weld pad kit, for mounting sensor by welding the pads

SAC-M1030-SENA Sensor amplifier (4–20mA sourcing output) with protective cover (without sensor, for use with existing installed sensors)

CBL-10T22-xxx 22 AVG, 10 conductor (5 twisted pairs) overall foil shielded cable for wiring resolver and sensors to M1030-E PLM with drill kit for mounting sensor by drilling holes in the column

System Diagram



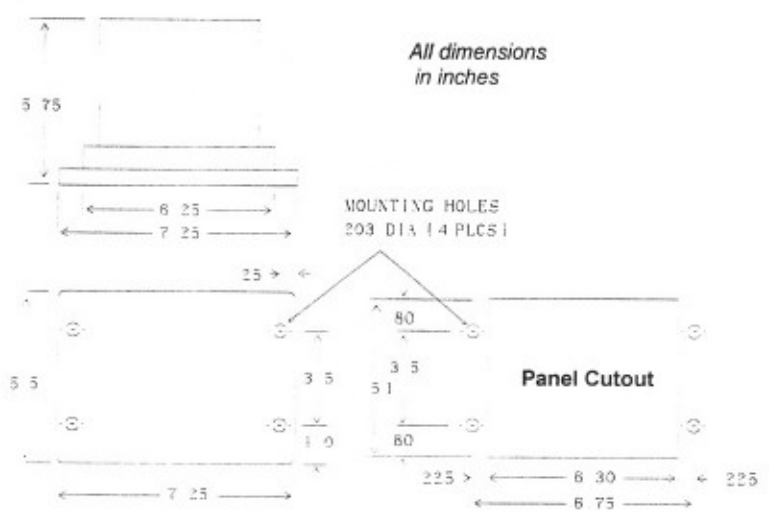
SAC-M1030-PLM

Installation and Wiring

Mounting

The M1030-E PLM mounts in a 6.3" x 5.1" panel cutout and requires four mounting holes as shown in the Panel Cutout drawing below. The M1030-E will fit in a 6-inch deep panel. Slide the M1030-E through the panel opening with gasket and tighten the four #8 mounting screws. Attach the pre-wired removable terminal blocks to complete the installation.

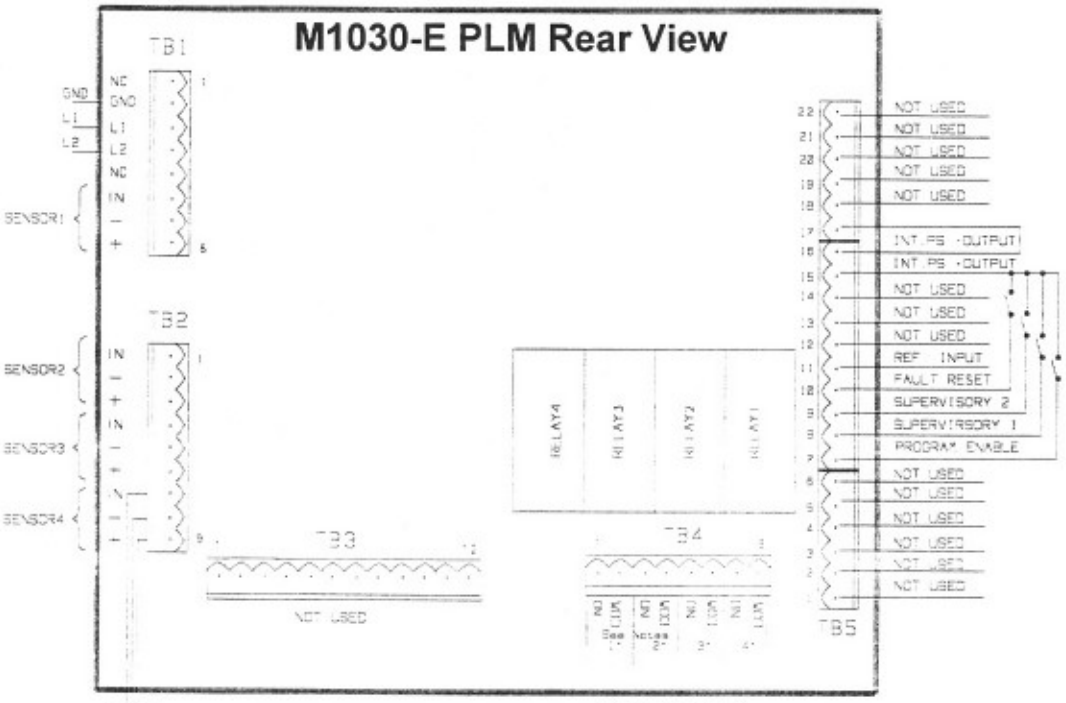
For sensor mounting, see respective instruction manual.



Installation and Wiring (Continued)

Wiring

On Terminal Blocks TB1 - TB2 (See Below)	
Designation	**Description**
IN	Signal from sensor
—	Signal common
++	+12 VDC for sensor

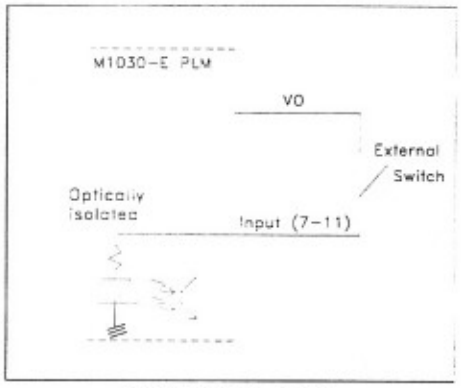


NO: *Normally Open*
COM: *Common*

Notes:

- Wiring to other electronic devices such as programmable controllers must use uninterrupted runs of shielded cable with the shield connected to earth ground at both ends.
- NO terminal needs to be a higher potential than COM terminal.

Tonnage Sensor Terminals
(SAC-M1030-E-SENX)



Typical Inputs on TB5

Terminal Block # (on TB4)	Output Function
1	Under Die/Process Limit Fault (Normally Open)
2	Under Die/Process Limit Fault (Common)
3	Over Die/Process Limit Fault (Normally Open)
4	Over Die/Process Limit Fault (Common)
5	Negative Tonnage Press Limit Fault (Normally Open)
6	Negative Tonnage Press Limit Fault (Common)
7	Positive Tonnage Press Limit Fault (Normally Open)
8	Positive Tonnage Press Limit Fault (Common)

Terminal Block # (on TB5)	Label	Description
1–6	Not used	Not used
7	Program Enable	Input must be TRUE to change any value
8	Supervisory 1	Supervisory inputs for access control
9	Supervisory 2	Supervisory inputs for access control
10	Fault Reset	When TRUE, resets all faults
11	Press Cycle Input	A FALSE to TRUE transition signifies end of a press cycle
12–14	Not used	Not used
15	Voltage Output	For use only as voltage supply for M1030-E inputs
16	None	Needs to be jumped to 17
17	None	Needs to be jumped to 16
18–22	Not used	Not used

M1030-E Programming

1. Introduction

The M1030-E Mini•PLM protects presses and dies by measuring tonnage in each press cycle, comparing the measured tonnage against programmed limits, and de-energizing fail safe fault relays if the tonnage is outside the limits. The relay outputs may be used to signal a supervisory control, stop the press, or activate a visual/audible alarm for the operator. The Mini•PLM M1030-E requires an input to indicate the "End" of a press cycle. The input may come from a Cam, PLS or Proximity switch.

Mini•PLM features the following user programmable limits for each sensor:

Positive Tonnage Press Limit:
This Limit is programmed by the user in Tons. The Mini•PLM de-energizes "Positive Tonnage Press Limit" relay when measured tonnage exceeds the limit. This limit is set around the rated tonnage of the press, and intended to protect the press from overload. This limit comparison **cannot be** disabled.

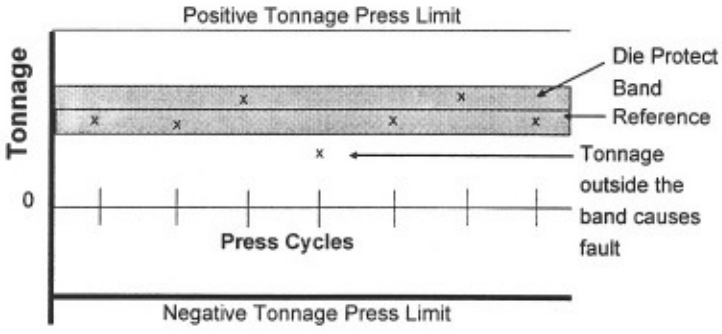
Negative Tonnage Press Limit:
This Limit is programmed by the user in Tons. The Mini•PLM de-energizes "Negative Tonnage Press Limit" relay when measured tonnage exceeds the limit. This limit is intended to protect press from reverse or snap-through tonnage. This limit comparison **can** be disabled.

Die Protection Band:
The Die Protection Band is created by programming limits around a "reference" tonnage. The reference tonnage is automatically learned by the Mini•PLM during unit setup. The Mini•PLM measures maximum tonnage in each press cycle and averages over a programmed number of hits. The average tonnage is considered as reference. The Mini•PLM maintains a reference for each installed sensor. User programs positive and negative deviation around this reference to create a die protection band. Thus:

*Die Protection **High** Limit =*
*Reference + Die Protect **Positive** Deviation*
*Die Protection **Low** Limit =*
*Reference + Die Protect **Negative** Deviation*

The two deviations can be programmed in tons, or in % of reference tons. The choice is programmable, and is common for both the Die as well as Process Trend Limits.

If during any press cycle the measured tonnage is outside these limits, Mini•PLM indicates a fault. If the tonnage is greater than the High Limit, the "Over Die/Process Limit" relay is de-energized. If the tonnage is less than the Low Limit, the "Under Die/Process Limit" relay is de-energized. The Die Protection band comparison **can** be disabled. Above Limits are illustrated in the following diagram.



Process Trend Band or Limits:
The Process Trend Band functions similar to Die Protect band, EXCEPT that the reference tonnage for process trend band, called Process Trend Base, is not fixed at the time of setup. The Process Trend Base varies in each cycle, and is the running average of measured tonnage over last several press cycles. The number of cycles over which the tonnage is averaged, is programmable. Like Die Protect Band, user programs deviation from the Base. The Process Trend Band may be used to monitor cycle to cycle tonnage variation.

*Process Trend **High** Limit =*
Process Trend Base + Process Positive Deviation
*Die Protection **Low** Limit =*
Process Trend Base + Process Negative Deviation

The two deviations can be programmed in tons, or in % of reference tons. The choice is programmable, and is common for both the Die as well as Process Trend Limits.

If in any press cycle the measured tonnage is outside these limits, Mini•PLM indicates fault. If the tonnage is greater than the High Limit, the "Over Die/Process Limit" relay is de-energized. If the tonnage is less than the Low Limit, the "Under Die/Process Limit" relay is de-energized. The Process Trend Band comparison can be disabled.

The Mini•PLM M1030-E can store parameters (limits and reference values) for up to 10 setups.

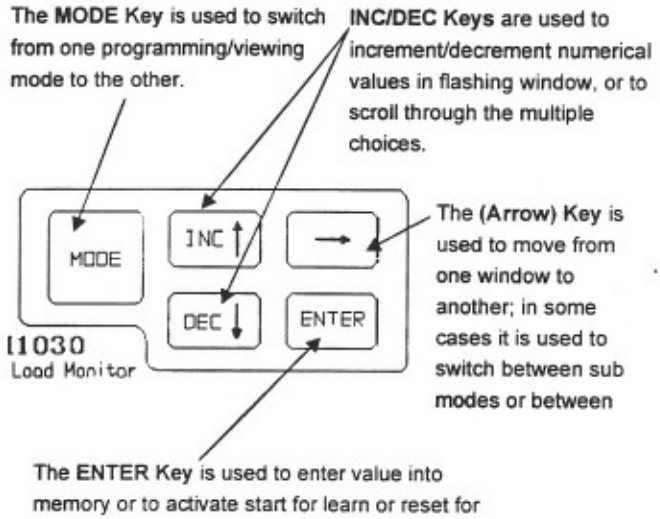
The Mini•PLM has two counters to keep track of total number of hits and % of Good parts made. A part is considered good if it did not cause *any* fault. The hits are counted ONLY if the tonnage comparison is "ON" (see Mode 4 — Run Modes).

1.1 Modes

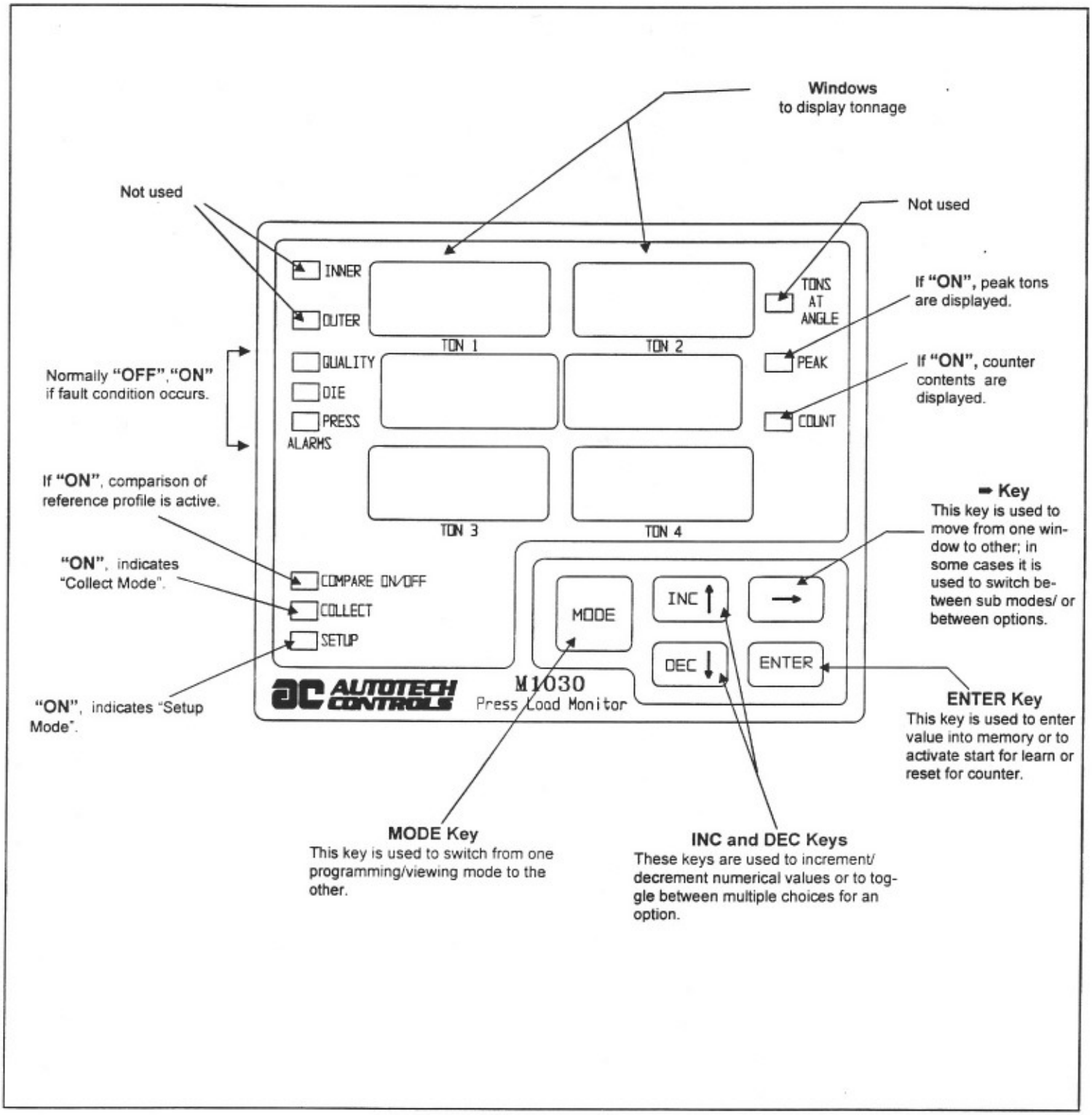
On the M1030-E, each display is considered to be a different mode. A flow chart on page 22 shows all modes and transitions between them. The detailed descriptions of the modes, displays and key responses are described in the Display Modes Reference. The list in the Overview section refers to modes described in the reference section.

1.2 Key Pad

The M1030-E front panel is shown on page 7. The unit has five simple keys for programming as well as operation of the unit. Response to key strokes in different modes is described in the Display Modes Reference. The general function of each key is described as follows:



M1030-E Front Panel



M1030-E Display Modes Reference

A programming flow chart is shown on pages 22–25. Follow the flow chart for programming/operating the M1030-E. The mode numbers used in the flow chart are the same as those used in this Display Mode Reference section.

Modes are selected by switching Supervisory 1 or 2 in combination with keystrokes as described in the following chart and sections. Program Enable must be TRUE to make programmable changes in any Mode.

Mode Selection	Supervisory 1	Supervisory 2
Run Modes	False	False
Learn and Run Modes	True	False
Setup Modes	False	True
Limits Modes	True	True

The following paragraphs describe the various modes and displays which may be programmed or viewed on the M1030-E Programmable Load Displays.

RUN MODES

Once the M1030-E has been setup (calibrated and programmed for limits), the operation of the unit is very straight forward. The unit is primarily used to monitor tonnage and activate outputs if required.

Mode 1. View Positive Tonnage from Last Press Cycle

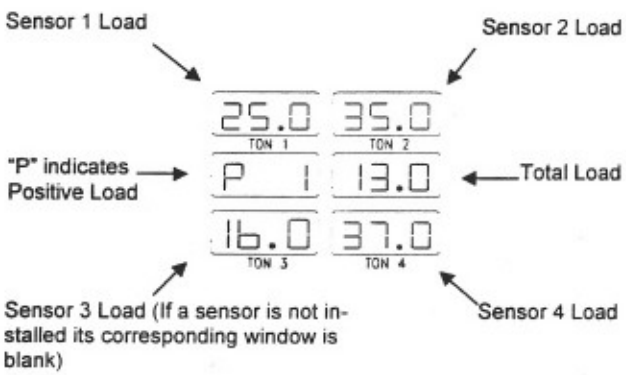
This mode enables the user to view Positive Load from the last cycle for all installed sensors.

Control Input Status: Supervisory 1 and 2 FALSE
Indicator LEDs On: Peak or Compare On/Off may be on if Comparison is On
Previous Mode: None

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switches to Mode 2 (View Negative Tonnage from Last Press Cycle)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Switch to Mode 5 (Fault Display)

The display on the unit is shown below:



Mode 2. View Negative Tonnage from Last Press Cycle

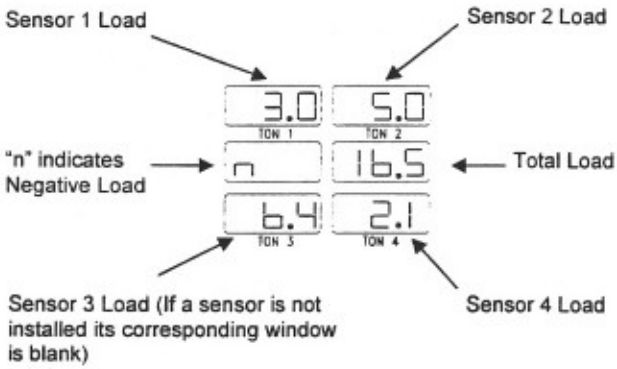
This mode enables the user to view Negative Load from the last stroke for all installed sensors.

Control Input Status: Supervisory 1 and 2 FALSE
Indicator LEDs On: Peak or Compare On/Off may be On if Comparison is On
Previous Mode: Mode 1 (View Positive Tonnage from Last Press Cycle)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switches to Mode 3 (View Counters)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Ignore

The display in this mode is shown below:



Mode 3. View Counters

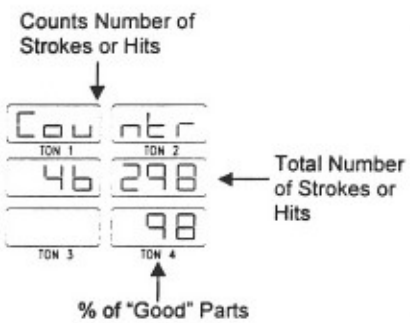
This mode allows the user to view the number of strokes or hits counted and edit the counter by reseting the display.

Control Input Status: Supervisory 1 and 2 FALSE
Indicator LEDs ON: Count or Compare On/Off may be On if Comparison On
Previous Mode: Mode 2 (View Negative Tonnage from Last Press Cycle)

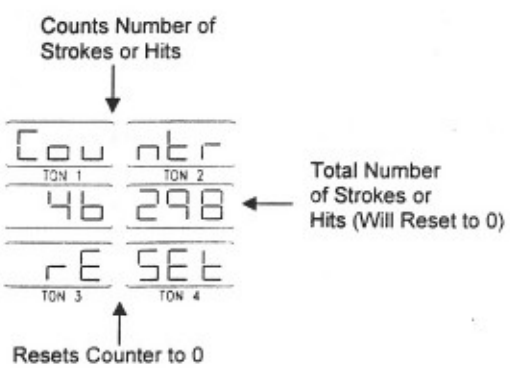
The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switches to Mode 4 (Select Die Number) from either the Counter Reset Display or Counter Display
ENTER	• Resets counter if in Counter Reset Display
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Switches to Counter Reset Display from the Counter Display • Switches to Counter Display from Counter Reset Display

The Counter Display in this mode is shown below:



The Counter Reset Display is shown below:
NOTE: *Press the RIGHT ARROW key & ENTER key to reset to zero.*



Mode 4. Select Die Number

This mode allows the user to select programmed die parameters and enable or disable them.

Control Input Status: Program enable TRUE, Supervisory 1 and 2 FALSE
Indicator LEDs ON: None OR Compare ON/OFF
Previous Mode: Mode 3 (View Counters)

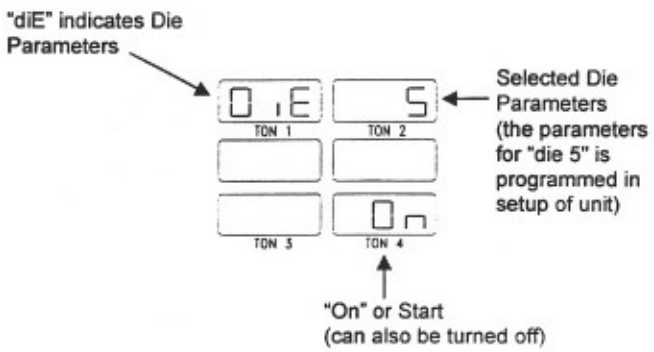
The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Mode 1 or Mode 6 are dependent on Sup1 and Sup2
ENTER	• Ignore
INC	• Increment die number or turn ON Comparison
DEC	• Decrement die number or OFF Comparison
RIGHT ARROW	• Moves between editable windows

CAUTION

"Comparison" matches the programmed limits with the current action of the press. Therefore, with comparison turned off, the M1030-E die protection is also turned off.

The key responses in this mode are as follows:



Mode 5. Fault Display

The following paragraphs describe various faults which occur while operating M1030-E.

Control Input Status: Supervisory 1 and 2 FALSE
Indicator LEDs ON: (Determined by Case, see examples below)
Previous Mode: Mode 4 (Select Die Number)

There can be several types of faults detected by the M1030-E. These are detected by most significant to least significant as listed below:

1. Press Protect Fault (Positive and Negative)
2. Die Protect Fault (Positive and Negative)
3. Process Control Fault (Positive and Negative)
4. Sensor Offset Fault

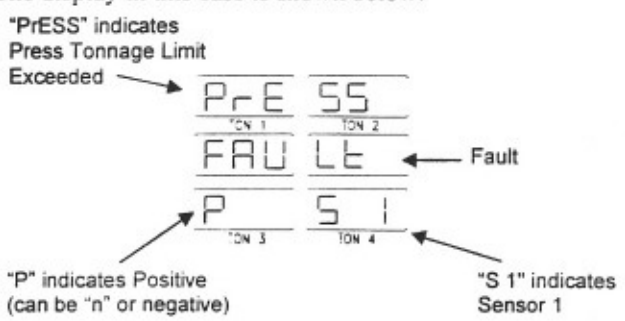
All faults, except Positive Press Protect, can be disabled from the front panel. The four different causes for a fault are shown in the following case examples:

Case 1. Press Tonnage Limit exceeded.
Case 2. Tonnage is out of programmed die limit while comparing against reference tonnage.
Case 3. Tonnage is out of process limit while comparing against reference tonnage.
Case 4. Sensor offset signal is out of programmed limits.

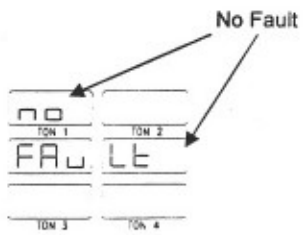
Case 1: Programmable Load Limit Exceeded

Indicator LEDs ON: Press Alarm

The display in this case is shown below:



After the "External Reset" switch is pressed the display will change to the "no FAuLt" display:

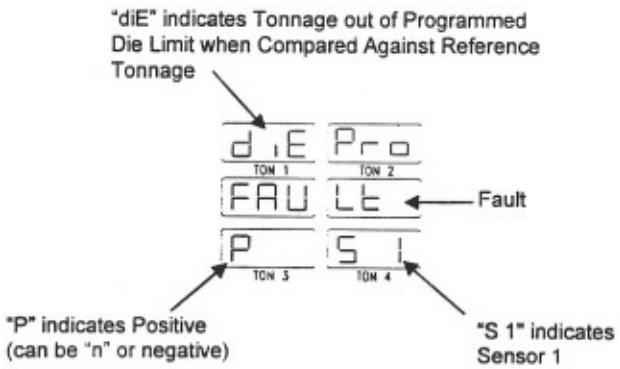


Pressing the RIGHT ARROW key in fault screen mode returns display to Mode 1.

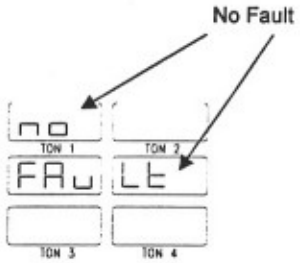
Case 2: Die Limit Exceeded

Indicator LEDs ON: Die Alarm

The display in this case is shown below:



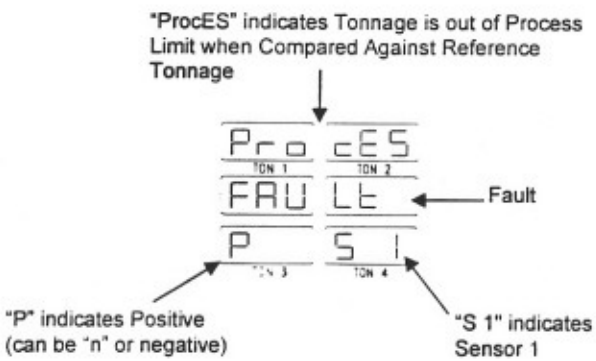
After the "External Reset" switch is pressed, the display will change to the "no FAuLt" display:



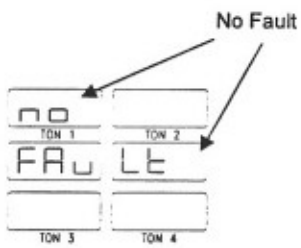
Case 3: Process Control Limit Exceeded

Indicator LEDs ON: Quality Alarm

The display in this case is shown below:



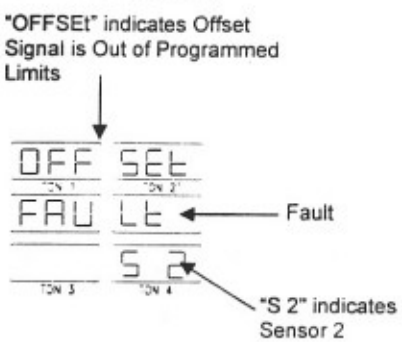
After the "External Reset" switch is pressed the display will changeto the "no FAuLt" display:



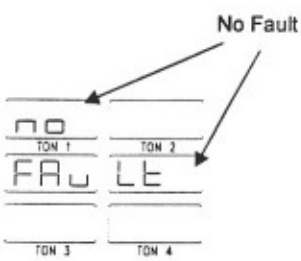
Case 4: Offset

Indicator LEDs ON: *All*

The display in this case is shown below:



After the "External Reset" switch is pressed, the display will change to the "no FAuLt" display:



LEARN MODES

Mode 6. Setup for Reference Collection for Die Protect Limit

To collect reference, program the number of strokes the unit will use to learn and enable/start.

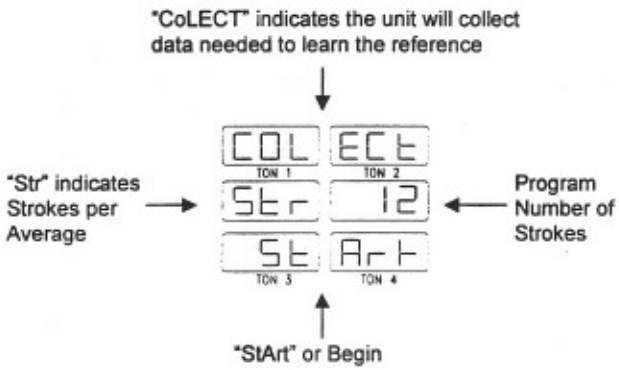
Control Input Status: Supverisory 1 TRUE, Supervisory 2 FALSE
Indicator LEDs ON: Collect
Previous Mode: Mode 4 (Select Die Number)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switches to Mode 1 (View Positive Tonnage from Last Press Cycle)
ENTER	• Pressing Enter key immediately after the Right Arrow key switches to Mode 7 (Learn the Reference)
INC	• Increment maximum strokes
DEC	• Decrement maximum strokes
RIGHT ARROW	• Moves between edit-able windows

To begin collection through Mode 7 Learn the Reference, the RIGHT ARROW key must be pressed.

The display in this mode is shown below:



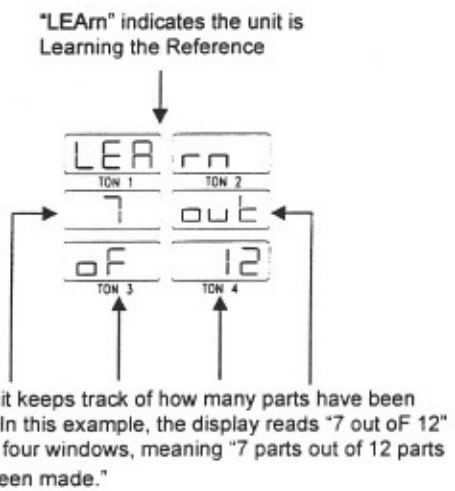
Mode 7. Learn the Reference

After setting up Mode 6, the unit will learn the reference for die protection.

Control Input Status: *Supverisory 1 TRUE, Supervisory 2 FALSE*
Indicator LEDs ON: Collect
Previous Mode: Mode 6 (Setup for Reference Collection for Die Protection)

Key Pressed	*Response*
MODE	• Abandon Learn (Go to Mode 6)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Ignore

The display in this mode is shown below:



When counting has been completed, the display will automatically change to Mode 8.

Mode 8. References Learning Done

When the cycles have been completed in Mode 7, the References Learning Done display will be viewed.

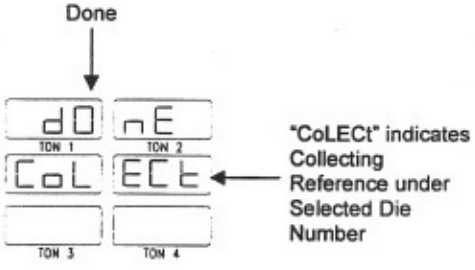
Control Input Status: Supverisory 1 TRUE, Supervisory 2 FALSE
Indicator LEDs ON: Collect
Previous Mode: Mode 7 (Learn the Reference)

The key responses in the mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 6 (Setup for Reference Collection for Die Protect Limit)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Ignore

Press the Mode key to return to Mode 6 (Setup for Reference Collection for Die Protect Limit) and Mode again to return to Mode 1 (View Positive Tonnage from Last Press Cycle).

The display in this mode is shown below:



SETUP MODES

Mode 9. Program Positive Tonnage Press Limit

Program the Positive Tonnage Press Limit by selecting the limit for each sensor.

Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 8 (References Learning Done)

The key responses in the mode are as follows:

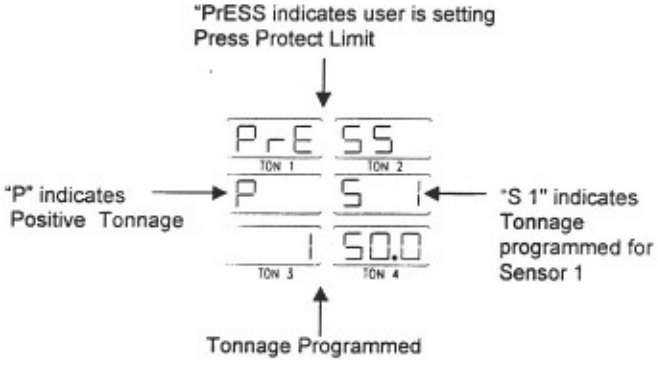
Key Pressed	*Response*
MODE	• Switch to Mode 10 (Program Negative Tonnage Press Limit)
ENTER	• Ignore
INC	• Increment maximum positive tonnage or sensor
DEC	• Decrement maximum positive tonnage or sensor
RIGHT ARROW	• Move between editable windows

NOTE:
This limit cannot be disabled.

There is a Positive Press Protect Limit assigned to each sensor:

- If there is a letter "H" next to the letter "P" on the display, then the assigned *Offset Limit* is too high and must be lowered.
- If the maximum *Positive Press Protect Limit* value is restricted by a high *Offset Limit*.
- If a higher *Offset Limit* makes the maximum *Positive Press Limit* lower.

The display in this mode is shown below:



Mode 10. Program Negative Tonnage Press Limit

Program the Negative Tonnage Press Limit by selecting the limit for each sensor. This limit can be enabled or disabled.

Control Input Status: Supervisory 1 FALSE
Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 9 (Program Positive Tonnage Press Limit)

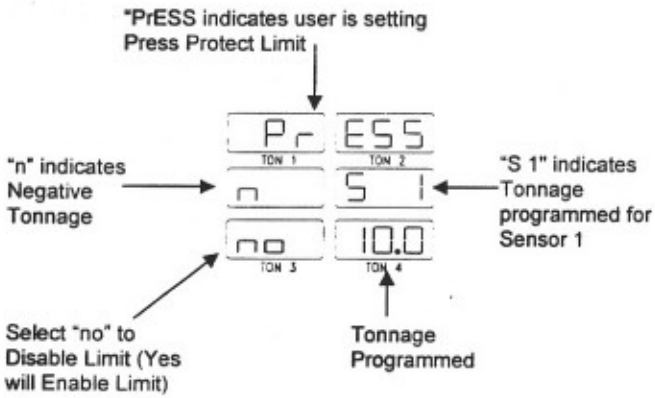
The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 11 (Install Sensors)
ENTER	• Ignored
INC	• Increments maximum negative tonnage or sensor or YES
DEC	• Decrements maximum negative tonnage or sensor or NO
RIGHT ARROW	• Move between editable windows

There is a Negative Press Protect Limit assigned to each sensor:

- If there is a letter "H" next to the letter "n" on the display, then the assigned *Offset Limit* is too low and must be increased.
- If the maximum *Negative Press Protect Limit* value is restricted by a low *Offset Limit.*
- If a lower *Offset Limit* makes the maximum *Negative Press Protect Limit* lower.
- If the *Negative Press Protect Limit* can be disabled.

The display in this mode is shown below:



Mode 11. Install Sensors

Each sensor can be installed or deinstalled.

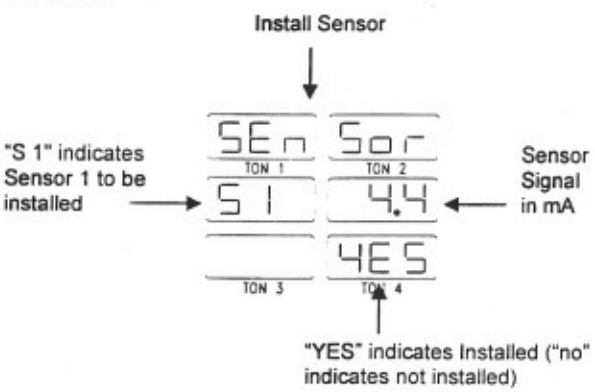
Control Input Status: Supervisory 1 FALSE,
Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 10 (Program Negative Tonnage Press Limit)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 12 (Offset Limits)
ENTER	• Ignore
INC	• Change sensor number
DEC	• Change sensor number
RIGHT ARROW	• Toggles between Yes and No

The display in this mode is shown below:

NOTE: *Press the RIGHT ARROW key to install or deinstall.*



Mode 12. Offset Limits

The sensor signal, in the idle state, should be around 4 mA. If the sensor signal "wonders" outside offset limits, an Offset Fault will be generated indicating that by some reason (broken cable, mechanical damage, etc.) the offset reading has been changed and needs to be corrected.

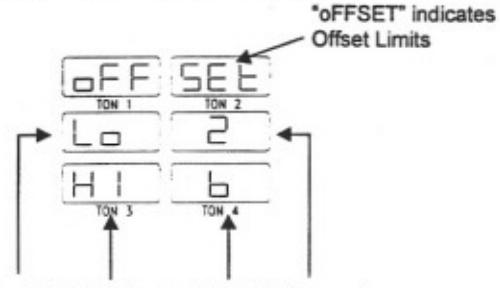
Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 11 (Install Sensors)

The key responses in this mode are as follows:

Key Pressed	***Response***
MODE	• Switch to Mode 13 (Calibrate Sensors)
ENTER	• Ignore
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Moves between editable windows

IMPORTANT NOTE:
— A high *Offset Limit* restricts the maximum *Positive Press Protect Limit.*
— A low *Offset Limit* restricts the maximum *Negative Press Protect Limit.*
— Each time the *Offset Limit* is changed, the *Positive and Negative Press Protect Limits* **MUST** be checked to make sure they are still valid.

The display in this mode is shown below:



Mode 13. Calibrate Sensors

Program Mode 13 to calibrate sensor signals to tonnage sensors.

Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 12 (Offset Limits)

Each sensor has its unique calibration number. In a case when a unit must be replaced, calibration numbers can be entered directly instead of going through the calibration procedure.

To calibrate sensors, press is cycled once (one stroke) while calibration mode is on the display. During the hit, the M1030-E captures peak values from all installed sensors. The raw captured value (in mA) is displayed in the right middle window. This value is between 0 and 20. The larger the number (but not exceeding 20), the higher the resolution of the tonnage read by the sensors. The equation that explains this relationship is :

Maximum Tons Detected =
(20 Raw Reading) x Peak Tons

Where:
Max Tons Detected:
Maximum tonnage that will be detected by sensor.
Raw Reading:
Raw reading from sensor displayed in middle right window.
Peak Ton:
Programmable Load in calibration procedure for the sensor. This value is entered in bottom right window.

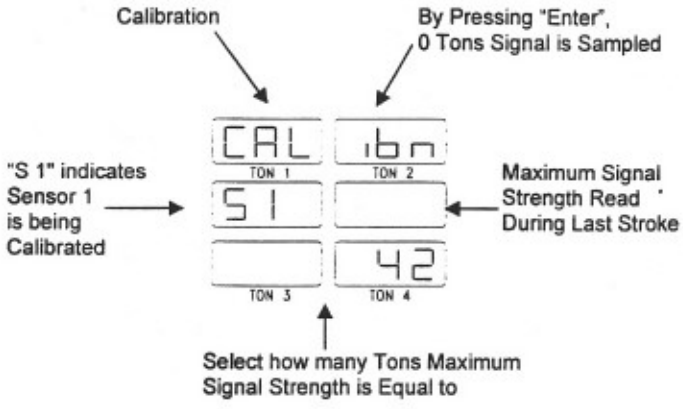
Sensivity of the sensor may be trimmed by changing location of the jumper on the sensor itself. See sensor manual for details. The middle left window indicates sensor number. During the stroke, you must note peak values from calibrated load cells. The noted values for each sensor (from corresponding calibrated load cell) is entered in the bottom windows.

If M1030-E can calibrate the sensors without any error, the word "donE" will be displayed in two bottom windows. The range of changes in maximum tonnage is limited by calibration procedure, so each time calibration is in progress or calibration numbers are changed, you must make sure that maximum tonnage limit is set at the proper level.

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 14 (View Calibration Numbers)
ENTER	• Completes calibration of the sensor, if pressed when peak ton value flashing
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Moves between editable windows

The display in this mode is shown below:



Mode 14. View Calibration Numbers

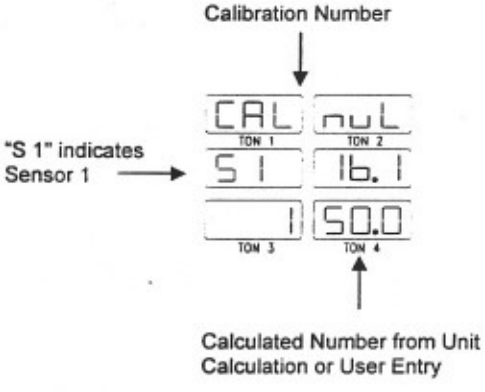
This mode is used to document calibration numbers for each sensor, after the sensor has been calibrated. The calibration number is unique for each installed sensor. If M1030-E unit is changed, user can enter calibration numbers for each sensor to calibrate, instead of going through the calibration procedure (Mode 13).

Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 13 (Calibrate Sensors)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 15 (Edit Number of Press Cycles for Process Trend Base)
ENTER	• Ignore
INC	• Increment editable windows
DEC	• Decrement editable windows
RIGHT ARROW	• Moves between editable windows

The display in this mode is shown below:



Mode 15. Edit Number of Press Cycles for Process Trend Base

Determines number of press cycles for Process Trend Base.

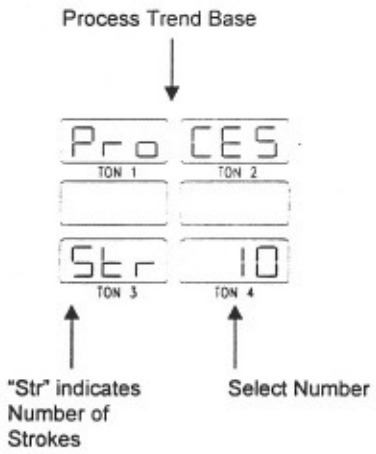
Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 14 (View Calibration Numbers)

The *Process Control Limit* is an extra parameter that determines how many strokes will be averaged to determine the base for *Process Control Limit* calculations.

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 16 (Select Units (Tons or %) for Die/Process Limits
ENTER	• Ignore
INC	• Increment stroke average
DEC	• Decrement stroke average
RIGHT ARROW	• Ignore

The display in this mode is shown below:



Mode 16. Select Units (Tons or %) for Die/Process Limits

Selects whether units will be displayed in tons or in percent.

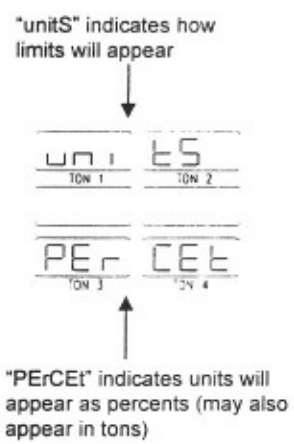
Control Input Status: Supervisory 1 FALSE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 15 (Edit Number of Press Cycles for Process Trend Base)

Unit selection MUST be made before limits are adjusted.

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 9 (Program Positive Tonnage Press Limit)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Change between percent and tonnage

The display in this mode is shown below:



LIMIT MODES

Mode 17. View Reference

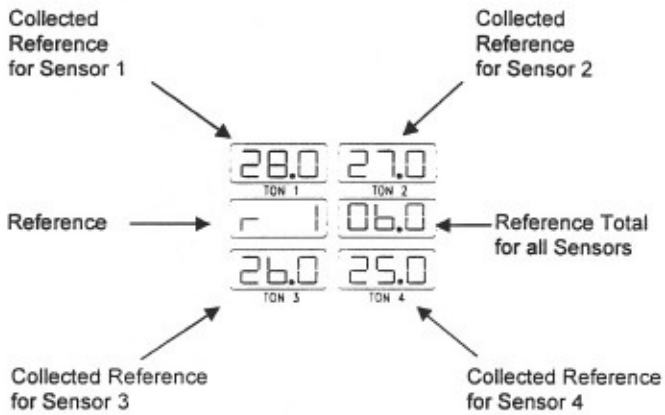
This display shows stored reference peak readings.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 16 (Select Units (Tons or %) for Die/Process Limits)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 18 (Enable/Disable Die/Process Limit)
ENTER	• Ignore
INC	• Ignore
DEC	• Ignore
RIGHT ARROW	• Ignore

The display in this mode is shown below:



Mode 18. Enable/Disable Die/Process Limit

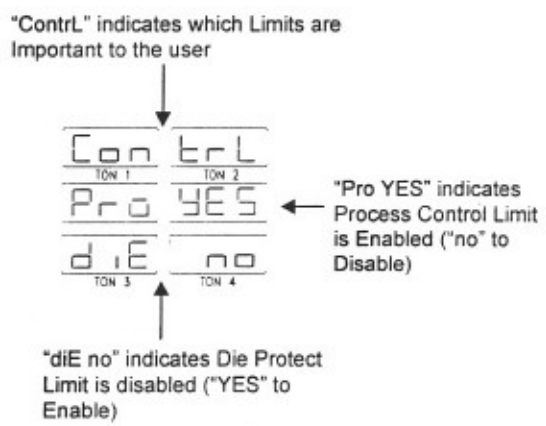
Both Die Protect Limit and Process Control Limit can be individually enabled or disabled.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 17 (View Reference)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 19 (Edit Die Positive Deviation)
ENTER	• Ignore
INC	• YES displayed in flashing window
DEC	• NO displayed in flashing window
RIGHT ARROW	• Moves between editable windows

The display in this mode is shown below:
NOTE: *The RIGHT ARROW key switches between the Die Protect Limit and Process Control Limit.*



Mode 19. Edit Die Positive Deviation

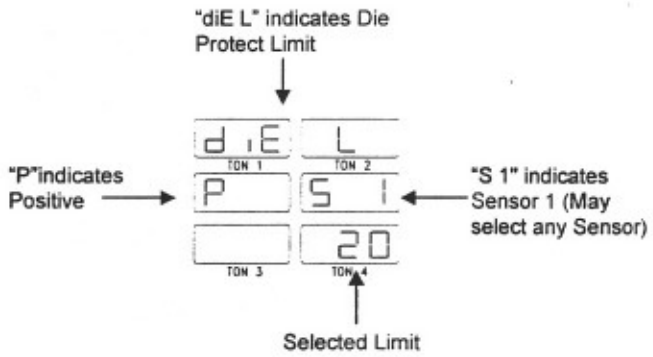
Each sensor has its own *Positive Die Protect Limit* . The limit is entered either as tons or percent depending on the selection made during setup.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 18 (Enable/Disable Die/ Process Limit)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 20 (Edit Die Negative Deviation)
ENTER	• Ignore
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Move between editable windows

The display in this mode is shown below:



Mode 20. Edit Die Negative Deviation

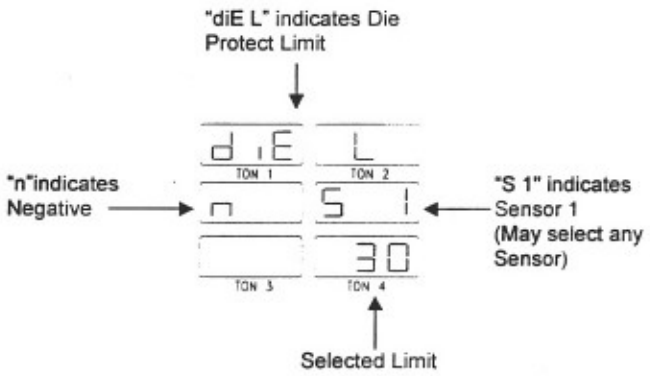
Each sensor has its own *Negative Die Protect Limit.* The limit is entered either as tons or percent depending on the selection made during setup.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 19 (Edit Positive Die Deviation)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 21 (Edit Process Positive Deviation)
ENTER	• Ignore
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Move between editable windows

The display in this mode is shown below:



Mode 21. Edit Process Positive Deviation

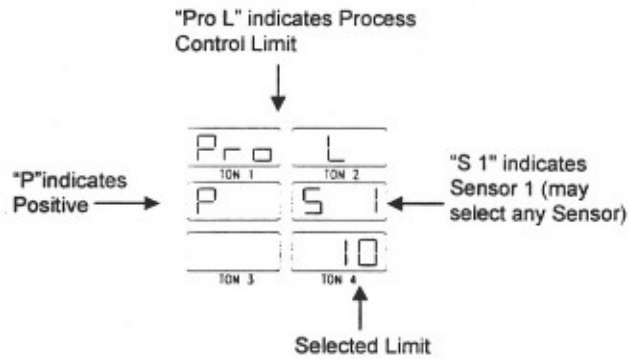
Each sensor has its own *Positive Process Control Limit*. The limit is entered either as tons or percent depending on the selection made during setup.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 20 (Edit Die Negative Deviation)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 22 (Edit Process Negative Deviation)
ENTER	• Ignore
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Move between editable windows

The display in this mode is shown below:



Mode 22. Edit Process Negative Deviation

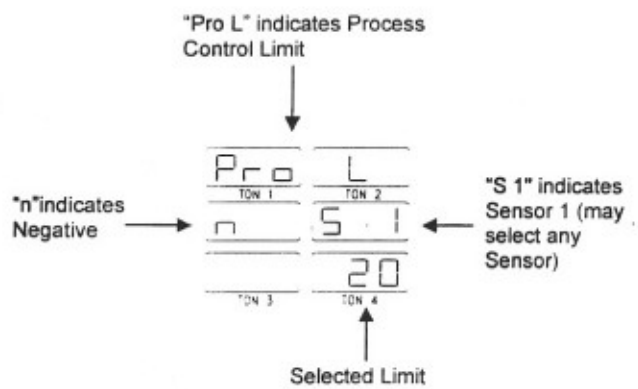
Each sensor has its own *Negative Process Control Limit.* The limit is entered either as tons or percent depending on the selection made during setup.

Control Input Status: Supervisory 1 TRUE, Supervisory 2 TRUE
Indicator LEDs ON: Setup
Previous Mode: Mode 21 (Edit Process Positive Deviation)

The key responses in this mode are as follows:

Key Pressed	*Response*
MODE	• Switch to Mode 17 (View Reference)
ENTER	• Ignore
INC	• Increment values in flashing window
DEC	• Decrement values in flashing window
RIGHT ARROW	• Move between edit-able windows

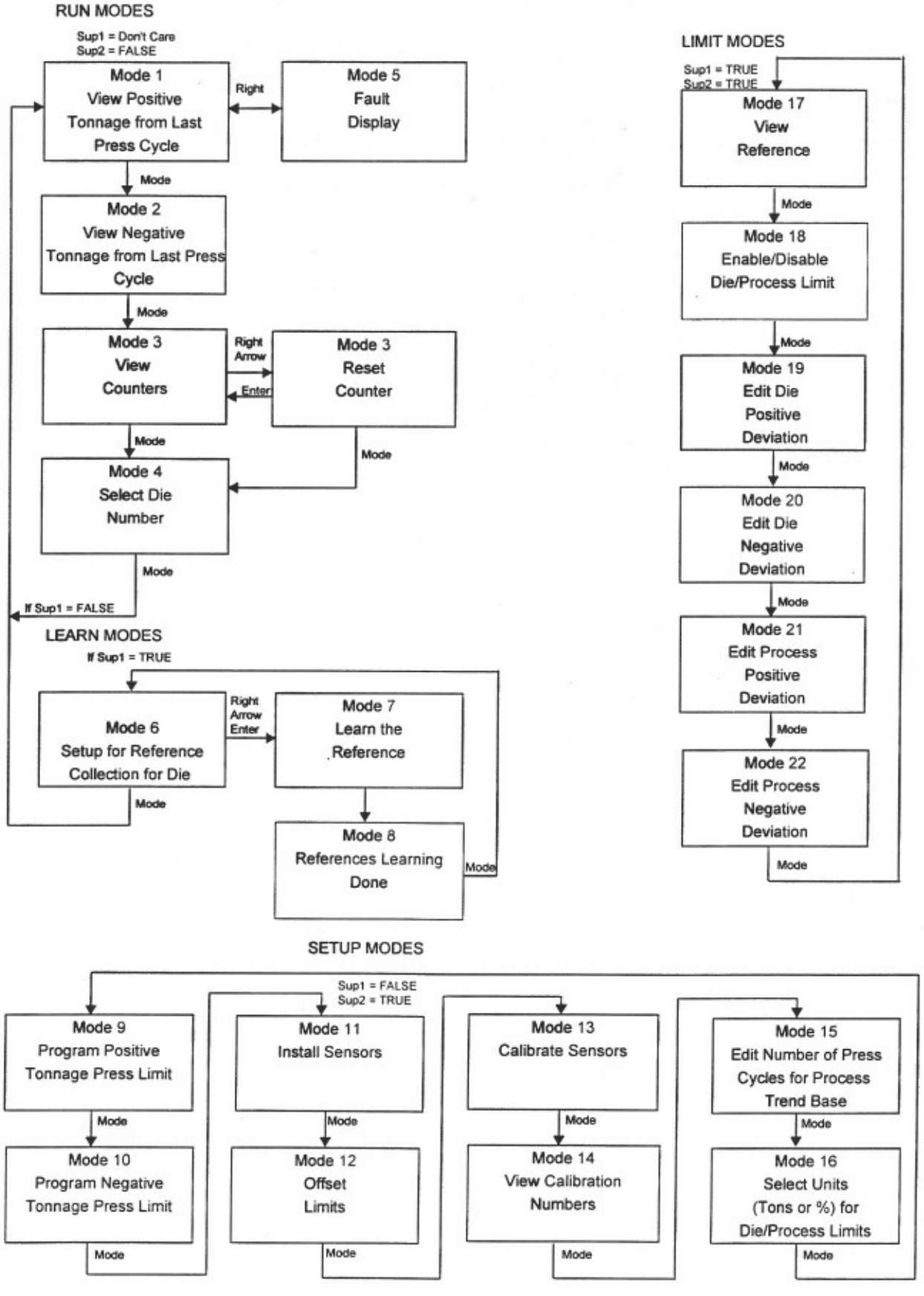
The display in this mode is shown below:

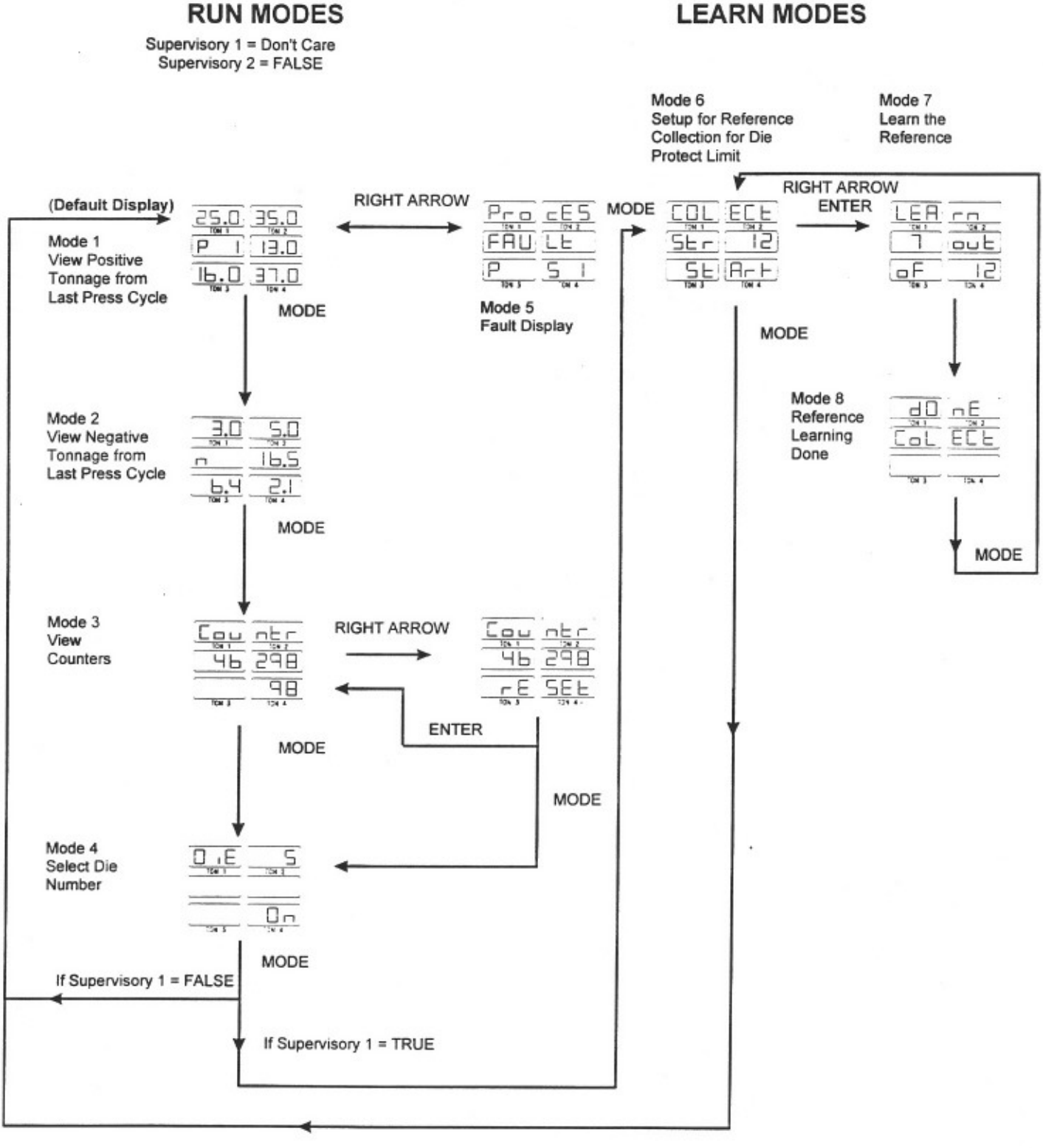


M1030-E SYMBOL TRANSLATION CHART

Symbol	Translation	Description	In Mode ...
CAL ibn	CALibn	Calibration Numbers	14
CAL nuL	CALnuL	Calibration Null	13
CoL ECt	CoLECt	Collect	6, 8
Con trL	ContrL	Control	18
Cou ntr	Countr	Counter	3
d iE	diE	Die	4, 5, 18, 19, 20
dO nE	dOnE	Done	8
FAu Lt	FAuLt	Fault	5
Hi	Hi	High	12
L	L	Limit	19, 20, 21, 22
LEA rn	LEArn	Learn	7
Lo	Lo	Low	12
n	n	Negative	2, 5, 10, 20, 22
no	no	No	5, 10, 18
oF	oF	Of	7
oFF SEt	oFFSEt	Offset	5, 12
On	On	On	4
out	out	Out	7
P	P	Positive	1, 5, 9, 19, 21
PEr CEt	PErCEt	Percent	16
PrE SS	PrESS	Press	5, 9, 10
Pro	Pro	Process Trend Limit	18, 21, 22
Pro cES	ProcES	Process	5, 15
r	r	Reference	17
rE SEt	rESEt	Reset	3
SEn Sor	SEnSor	Sensor	11
StA rt	StArt	Start	6
Str	Str	Stroke	6, 15
uni tS	unitS	Units	16
YES	YES	Yes	11, 18

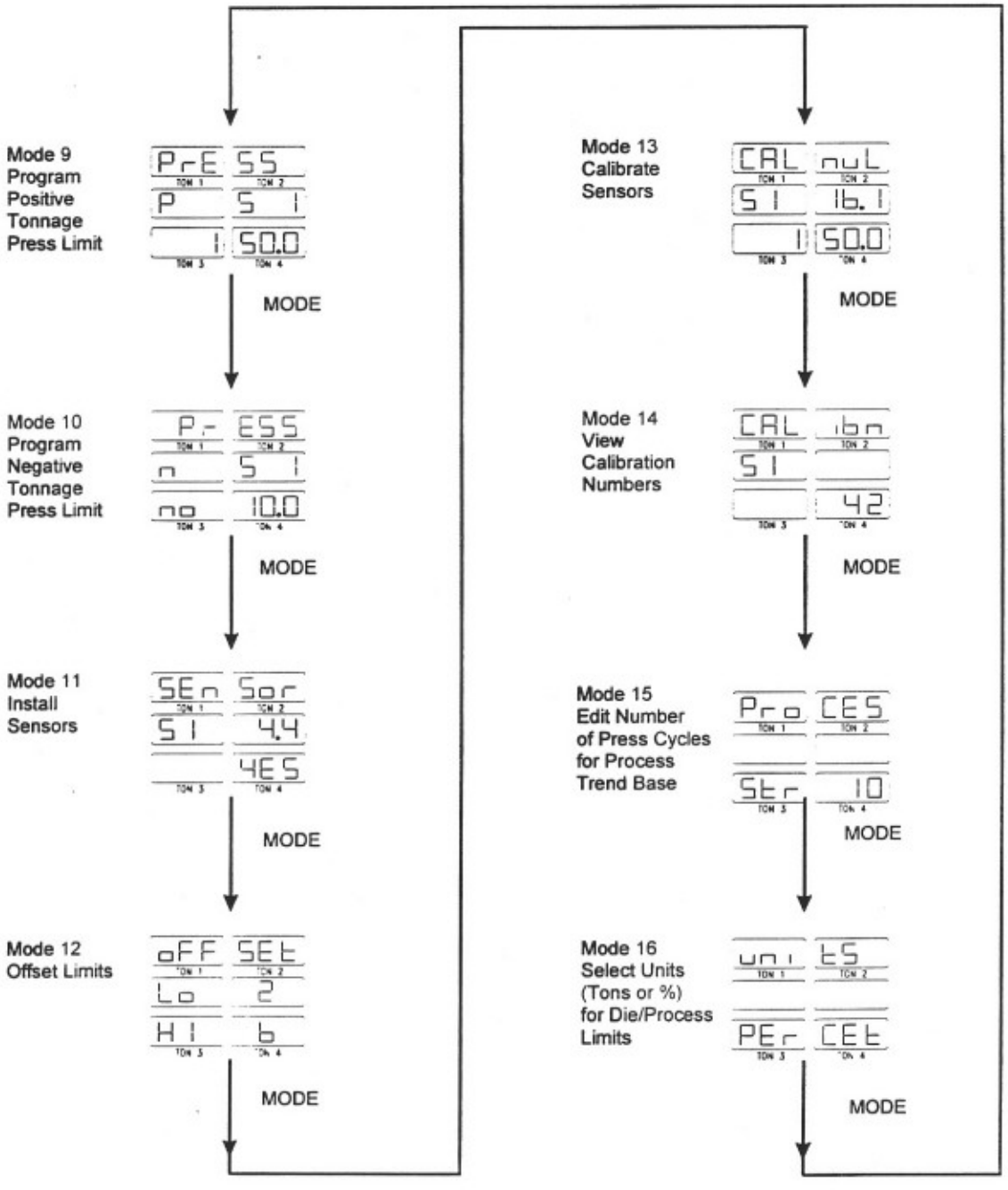
PROGRAMMING FLOW CHART




RUN MODES
Supervisory 1 = Don't Care
Supervisory 2 = FALSE
LEARN MODES
Mode 6
Setup for Reference
Collection for Die
Protect Limit
Mode 7
Learn the
Reference
(Default Display)
RIGHT ARROW
MODE
ENTER
Mode 1
View Positive
Tonnage from
Last Press Cycle
Mode 5
Fault Display
Mode 8
Reference
Learning
Done
Mode 2
View Negative
Tonnage from
Last Press Cycle
Mode 3
View
Counters
Mode 4
Select Die
Number
If Supervisory 1 = FALSE
If Supervisory 1 = TRUE

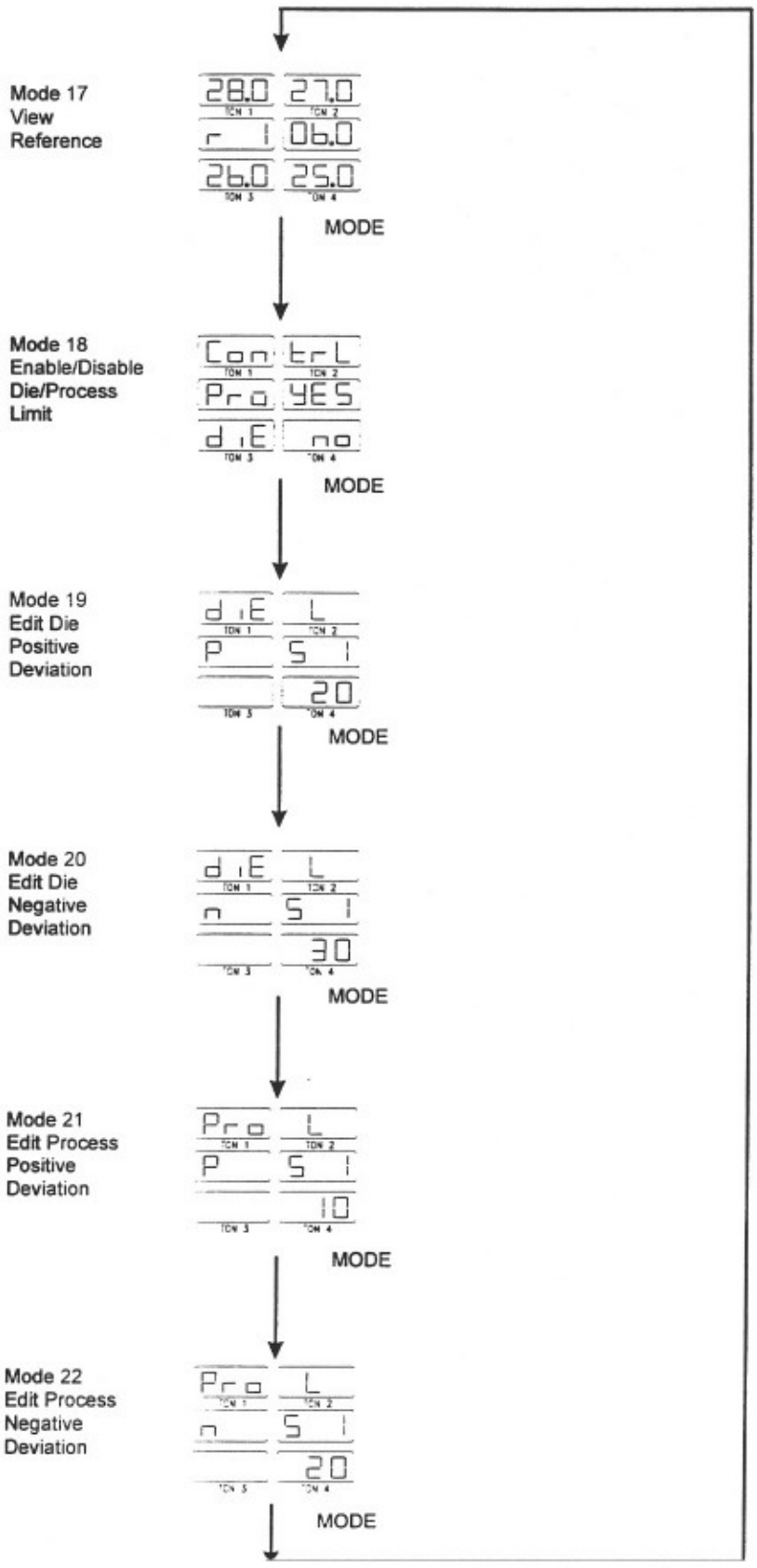
SETUP MODES

Supervisory 1 = FALSE
Supervisory 2 = TRUE



LIMIT MODES

Supervisory 1= TRUE
Supervisory 2 = TRUE



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