

IPM520 OPERATOR'S MANUAL

10 THOMAS IRVINE , CA 92618
Tel- (949) 465-0900 Fax - (949) 465-0905
Internet: www.futek.com

Revised July 2006

Our recommendations, if any, for those of these products are based on tests believed to be reliable. The greatest care is exercised in the selection of our raw materials and in our manufacturing operations. However, since the use of this product is beyond the control of the manufacturer, no guarantee or warranty, expressed or implied is made as to such use or effects incidental to such user handling or possession or the results to be obtained, whether in accordance with the direction or claimed so to be. The manufacturer expressly disclaims responsibility therefore. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing laws and/or patents covering any material or use.

Warranties or sale, disclaimer thereof and limitations of liability are covered exclusively by DigiTec's printed warranty statement, for the Enclosed Products. These instructions do not expand, reduce, modify or alter Futek's warranty statement and no warranty or remedy in favor of a customer or any other person arises out of these instructions.

Call Futek for all your instrumentation and process and control applications. Application Engineers are available to answer any questions.

10 Thomas • Irvine, CA 92618
Phone: (949) 465-0900
Fax: (949) 465-0905

Internet: www.futek.com

Table of Contents

<u>Section</u>	<u>Topic</u>	<u>Page</u>
Section 1	Introduction and Description	
Section 1.1	Product Description	3
Section 1.2	Dimensional Drawings	4
Section 1.3	Exploded View	4
Section 2	Pin Outs and Wiring Diagram	
Section 2.1	Main Board and Option Board Connections	5
Section 2.2	Option Board Connections	6
Section 2.2	RS232 connection drawings	8
Section 2.4	Channel 1 Input Connections	10
Section 2.5	Channel 2 Input Connections (3722A Only)	11
Section 3	Operation and Programming	
Section 3.1	Front Panel Keys	12
Section 3.2	Setup Mode Key Functions	12
Section 3.3	Run Mode Key Functions	13
Section 3.4	Programming Tips	18
Section 3.5	Enter Setup	19
Section 3.6	Main Programming Branch	21
Section 3.7	Channel Setup Programming Branch	22
Section 3.8	Output Setup Programming Branch	26
Section 3.9	Display Programming Branch	29
Section 3.10	Special Features Programming Branch	29
Section 4	Options	36
Section 5	Specifications	38
Inside Back Cover	3700 Flow Chart	

SECTION 1

INTRODUCTION AND DESCRIPTION

SECTION 1.1: UNIT DESCRIPTION:

The single input and the dual input intelligent process meters features 5 ½ digit resolution, 6 digit display, high speed, 5 front key operation and a NEMA 4X, industrialized aluminum case. One Form A relay is provided standard for use as an Alarm output or shunt cal relay. The IPM500 emphasizes the features required in today's applications, especially scaling of the meter to display in engineering units. Three methods are provided to scale the meter: No calculation scale and offset, load calibration and shunt calibration only.

Stock #'s:

FSH00248- one input channel

FSH00947- two input channels; Options C, H, P, T installed

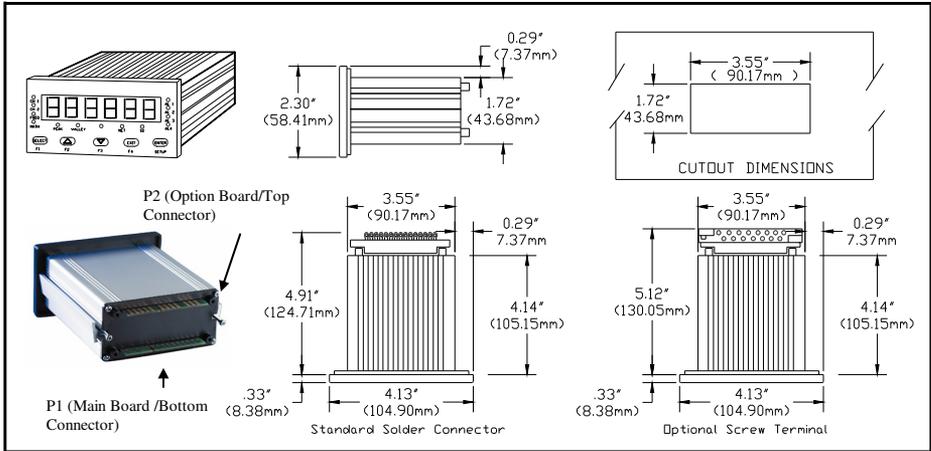
Options:

- "C" 3 Form C Relays
- "H" Analog & Excitation Output
- "P" Excitation Supplies 10/24 VDC
- "T" Serial RS-232C Communication

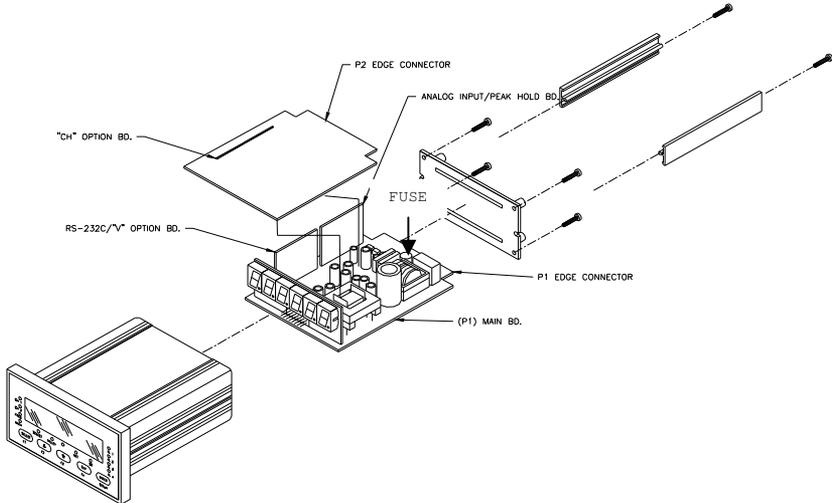
Ordering Example:

3720A-01CH Single Input with 3 Relays, Analog output,
and Screw Terminals.

SECTION 1.2: DIMENSIONAL DRAWINGS



SECTION 1.3



SECTION 2

SECTION 2.0 SAFETY SUMMARY

All safety related regulations; local codes and instructions that appear in this literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacture, the protection provided by the equipment may be impaired.

Do not use this unit directly command motors, valves, or other actuators not equipped with safeguards. To do so can be potentially harmful to persons or equipment in the event of a fault to the unit.



CAUTION: Read complete
Instructions prior to installation
And operation of the unit.

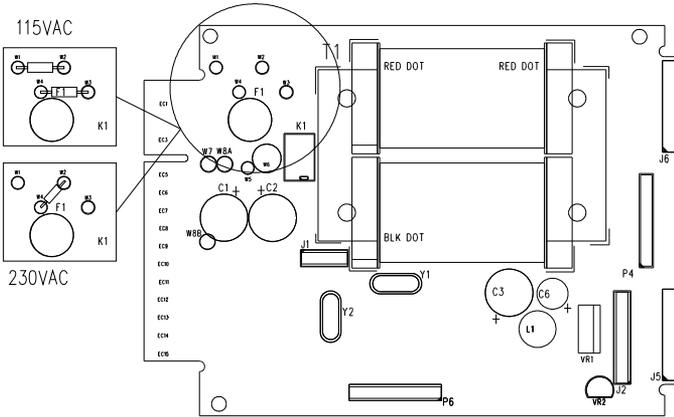


CAUTION: Risk of Electric shock

The unit must be properly grounded. Ground connection is tied to the Main Board “P1” connector pin C.

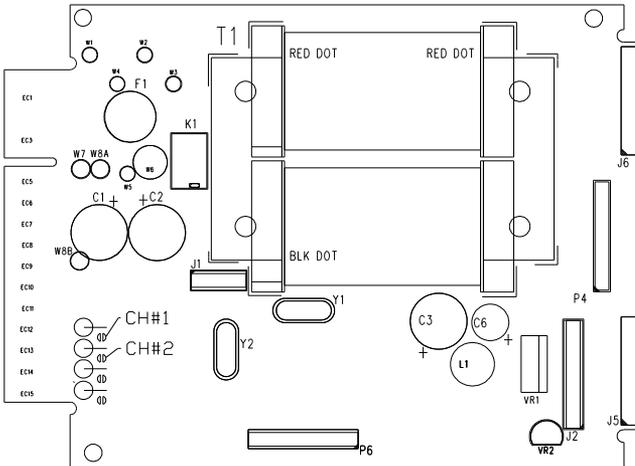
Fuse replacement must be performed with power disconnected. Use only the same type fuse. The fuse must be a TR5 microfuse, Time Lag (T), 1 amp, 250VAC. Fuse location shown in section 1.3

POWER 115 OR 230VAC SELECTION:



The IPM500 can be configured to operate on 115VAC or 230VAC by configuring the jumpers in the above drawing.

20MA SOLDER JUMPER LOCATION



To select 4-20ma input range solder across solder pads shown above.

PIN OUTS AND WIRING DIAGRAMS

SECTION 2.1: MAIN BOARD/BOTTOM (P1) AND

OPTION BOARD/TOP (P2) PIN OUTS

Connector Drawing

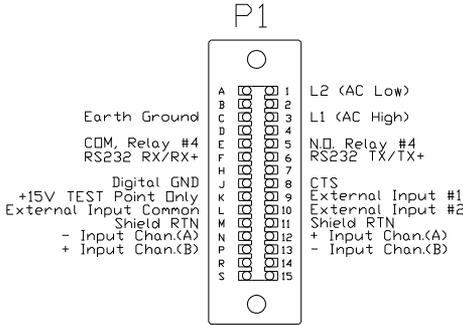


Figure 2.5 (P1) MAIN/BOTTOM BOARD Connector.

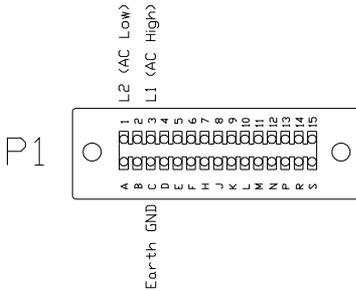


Figure 2.6 115 / 220 VAC Power Connections.

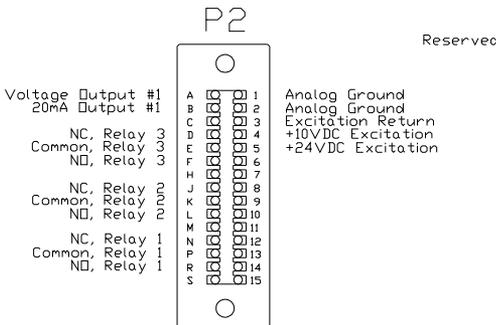
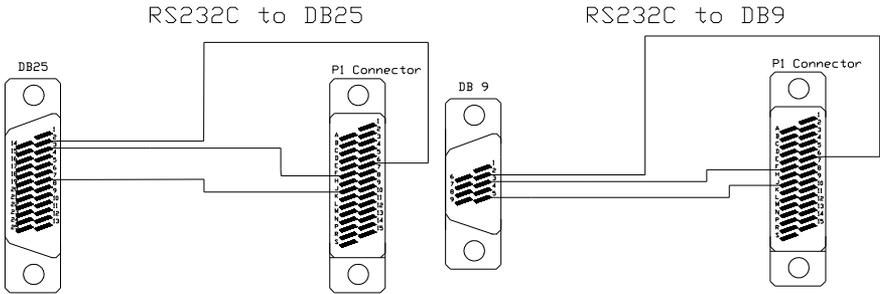
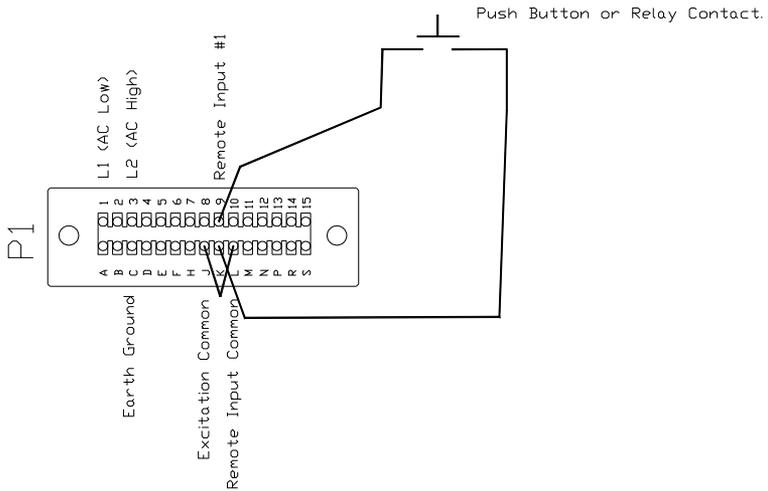


Figure 2.7 (P2) OPTION/TOP BOARD Connector.

SERIAL RS-232C CONNECTIONS ON P1(MAIN BD) CONNECTOR



EXAMPLE REMOTE INPUT WIRING



SECTION 2.4: CHANNEL #1 INPUT CONNECTIONS

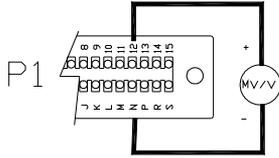


Figure 2.8: (CHAN #1 Voltage Input)

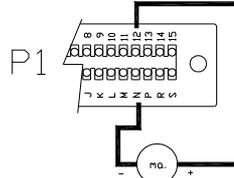


Figure 2.9: (CHAN #1 Current Input)

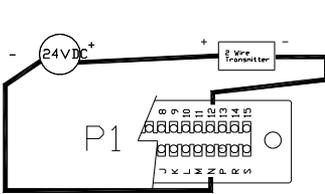


Figure 2.10: (2 Wire transmitter)

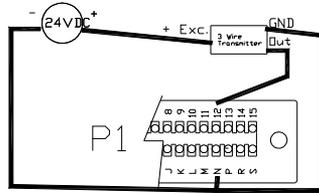


Figure 2.11: (3 Wire transmitter)

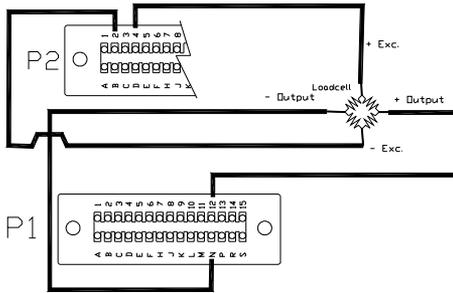
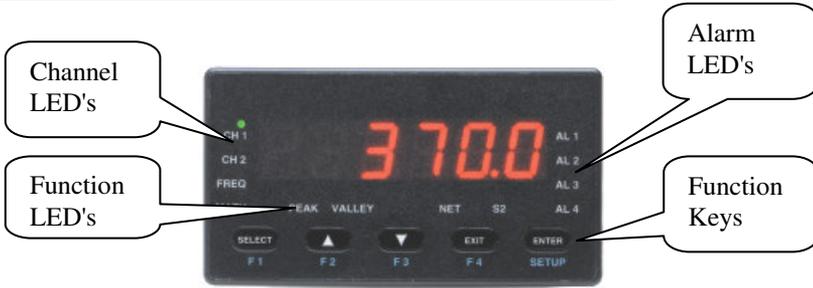


Figure 2.12: Loadcell

SECTION 3

OPERATION AND PROGRAMMING

SECTION 3.1: FRONT PANEL KEYS



The front panel keyboard has two modes of operation - SETUP and RUN
SETUP MODE KEYS

SELECT ▲ ▼ **EXIT** **ENTER**

RUN MODE KEYS

F1 **F2** **F3** **F4** **SETUP**

SECTION 3.2: SETUP MODE KEY FUNCTIONS

- 1. SELECT KEY** (→ on flow chart indicates to use this key)
 - Selects choice of functions within the menu you are setting up.
 - > Moves you left/right in the program menu.
 - When entering numeric data, it allows the selection of digit to be changed.
 - > Indicated by digit flashing.
 - When selecting decimal point, it moves the decimal point location.
- 2. UP ARROW KEY**
 - When entering numeric data, it increments the current value of the flashing digit by one with each push.
- 3. DOWN ARROW KEY**

- When entering numeric data, it decrements the numeric value of the flashing digit by one with each push.

4. **EXIT KEY**

- If at a Main branch prompt (CODE, CHAN, OUTPUT, DISPLY or SPEC), it exits to you back to RUN mode.
- If in a programming branch, it returns you to Main branch prompt.

NOTE: It does not store data to memory on its return.

ENTER key should be pushed first to store selected entry, then **EXIT** key.

5. **ENTER KEY** (↓ on flow chart indicates to use this key)

- Enters selected Main program branch.
 - > Moves you down in the program branch menu.
 - > Menu steps can be skipped by repeatedly pushing **ENTER** key till desired menu step is reached.
- Enters selected choices, numeric data or decimal point, it stores the value and advances to next step in the program menu.

SECTION 3.3: RUN MODE KEY FUNCTIONS

A. Entering SETUP

Push and hold **SETUP** key for 4 seconds. Meter will first display “SET CH” then display “CODE” or flash “SETUP then display “CHAN”.

- “CODE” is flashed with 00 if a lockout code has been under the Main program branch heading SPEC, CODE menu.
 - > The preset lockout must be entered at this time. If wrong code is entered or if no code is entered within 20 seconds, meter will return to RUN mode.
 - > Upon correct lockout code entry, meter enters the SETUP mode.
 - > The unmarked yellow LED just above the Down/F4 key will light, indicating you are in the SETUP mode.
- If no lockout code, “SETUP” flashed then “CHAN” displayed, indicating you have entered the SETUP mode.

If no key is pressed within 20 seconds, meter will return to RUN mode.

B. If SETUP key pushed and released meter will enter select channel program.

- “SET CH” (SET CHANNEL) will be display.
 - > Push **F1** to select Channel 1 for display
 - > Push **F2** to select Channel 2 for display (3722A only)
 - > Push **F3** to select Channel 3 for display (3722A only)

C. USER PROGRAMMABLE MENU LOCKOUT.

To enter, push and hold **SETUP** key, then enter lockout code “55”. This program allows user to disable/lockout the following menus from the SETUP program. When the menus are programmed to be locked, the unit will display “DISABL” when you try to enter the menu.

NOTE: A code # must be preprogrammed under SPEC, CODE to get the prompt for the code value.

To disable one or more of the selections add the values from the table and enter that number. If 0 is entered, all programs under that heading are enabled.

- “LEVEL1” is flashed with current selected number, valid values 0-15
 - 0 Don't Skip any branches
 - 1 Skip all channel programs "CHAN"
 - 2 Skip all output programs "OUTPUT"
 - 4 Skip all display program "DISPLY"
 - 8 Skip all special programs "SPEC"

Example: Enter number 12 to skip DISPLY and SPEC branches from normal setup selections.

- “CHAN1”, (Only if CHAN is not disabled from above), is flashed with current selected number. Valid values 0-15.
 - 0 Don't disable any channel 1
 - 1 Skip input range selection "INPUT"
 - 2 Skip user calibration branch "USER"
 - 4 Skip input calibration branch "INPUT"
 - 8 Skip shunt calibration branch "SHUNT"

- “CH” (Only if CHAN is not disabled from above) is flashed with current selected number. Valid values 0-7.
 - 0 Don't skip Channel 2
 - 1 Skip input range selection "INPUT"
 - 2 Skip user calibration branch "USER"
 - 4 Skip input calibration branch "INPUT"

- “CH3” (Only if CHAN is not disabled from above) is flashed with current selected number. Valid values 0-1.
 - 0 Don't skip Channel 3
 - 1 Skip Channel 3 "CHAN 3"

- “OUTPUT” (Only if OUTPUT is not disabled from above) is flashed with current selected number. Valid values 0-31.
 - 0 Don't disable any output menus
 - 1 Disable Alarm 1 menu
 - 2 Disable Alarm 2 menu
 - 4 Disable Alarm 3 menu
 - 8 Disable Alarm 4 menu
 - 16 Disable the Source menu

- “SPEC” (Only if SPEC is not disabled from above) is flashed with current selected number. Valid values 0-65535 (default 32768)
 - 0 Don't disable any menus
 - 1 Disable 'F1 SET'
 - 2 Disable 'F2 SET'
 - 4 Disable 'F3 SET'
 - 8 Disable 'F4 SET'
 - 16 Disable 'r In 1'
 - 32 Disable 'r In 2'
 - 256 Disable '20 Pt'
 - 512 Disable 'PEAK 1'
 - 1024 Disable 'PEAK 2'
 - 2048 Disable 'SCALE2'
 - 4096 Disable 'CODE'
 - 8192 Disable 'DEFAULT'
- If EXIT key is push at any of the 6 main heading, exit back to run mode.
- If EXIT key is push while in a main branch, exit back to that main branches heading.
- If SELECT key is push while at main branch heading, advance to next main branch.
- When “skip code number” is entered by ENTER key, advance to next branch heading.

D. F1, F2, F3 and F4 keys

The RUN mode keys (F1-F4) functions are selected in the SETUP mode under the Main program branch heading SPEC. The functions are described under the SPECIALS FEATURES PROGRAMMING BRANCH section of the manual (See pg. 26). The following are the available selections.

- "ALARM 1" through "ALARM 4"
- "TARE1", "TARE 2" and "TARE 3"
- "RESET"
- "CHAN 1, 2 or 3"
- "PEAK 1"
- "PEAK 2"
- "SCALE 2"
- "NET"
- "SHUNT" (display/calibration)

SECTION 3.4: PROGRAMMING TIPS

→ **SELECT Key** This represents **SELECT** key on flow charts

↓ **ENTER Key** This represents **ENTER** key on flow charts

Numeric values are entered by;

- Entering a number in flashing digit with the "UP" and "DOWN" keys.
- Advance to the next digit using **SELECT** key. Enter value and advance using **ENTER** key.

ENTER key sets number into memory and advances to next program.

EXIT key :

1. From MAIN BRANCH heading, takes you back to run mode
2. From PROGRAM BRANCH, takes you back to MAIN BRANCH heading you are in.

TIMED OUT EXITS:

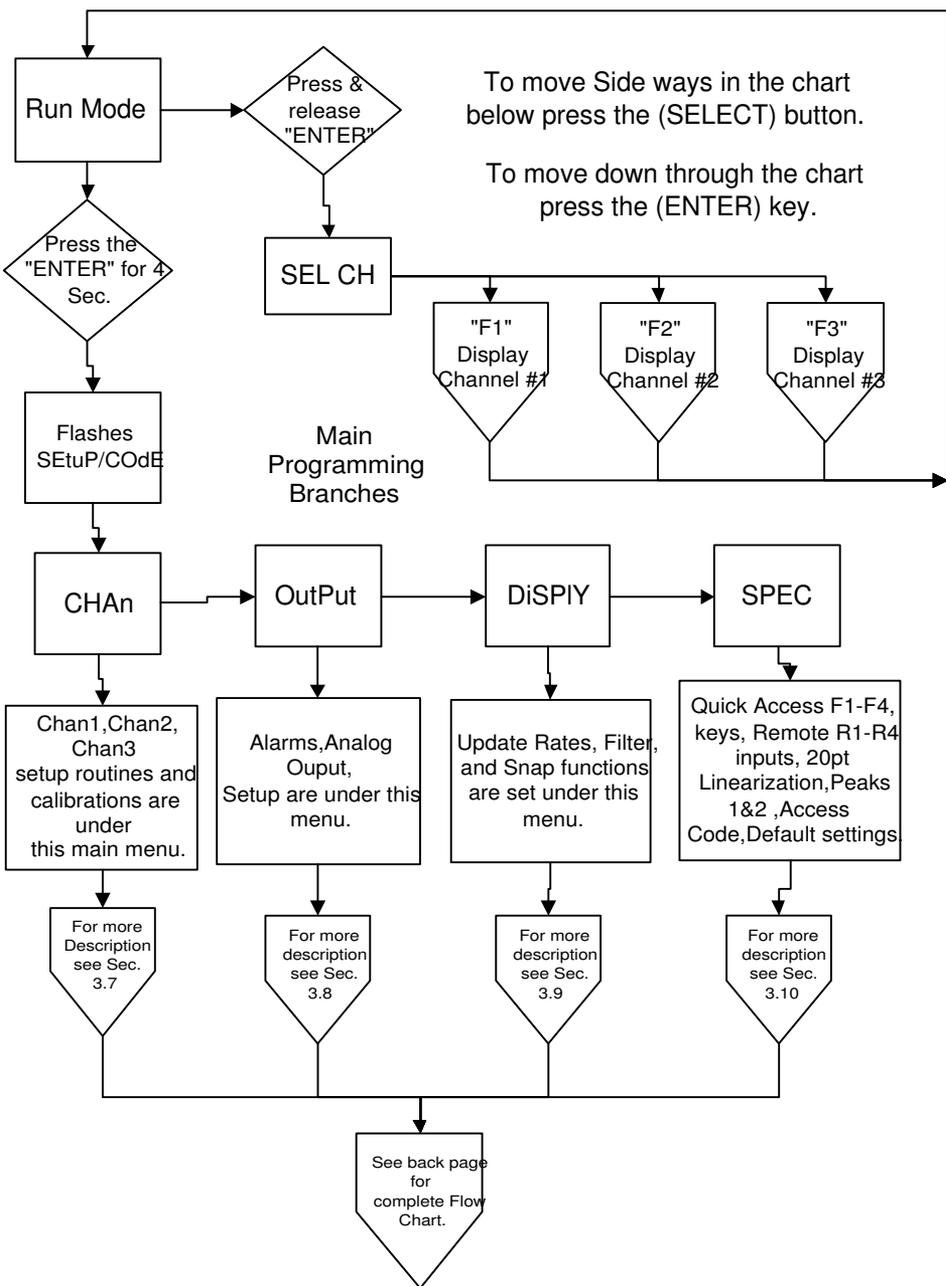
1. If no key is pushed within 20 seconds while at CODE or main branch heading, meter will automatically exit back to run mode.

2. If no key is pushed within 2 minutes while in any other program branch, meter will automatically exit back to run mode.

SECTION 3.5: ENTER SETUP

- Press and hold **SETUP** key for 4 seconds. Meter will display “SEL CH” at first then will enter into the Setup mode. The meter will display “CODE” or “CHAN”.
 - “CODE” is flashed with 00 if a lockout code has been set under the Main program branch heading SPEC, CODE menu.
 - The preset code (1-50) must be entered at this time. If wrong code is entered or if NO code is entered within 20 seconds, meter will return to RUN mode.
 - Upon correct lockout code entry, meter enters the SETUP mode. The status LED between Valley and NET will light indicating the meter is in the Programming/Setup mode.
 - The unmarked yellow LED just above the Down/F3 key will light, indicating you are in the SETUP mode.
 - If NO lockout code, “SETUP” flashed, then “CHAN” displayed, indicating you have entered the SETUP mode. If NO key is pressed within 20 seconds, meter will return to RUN mode.

SECTION 3.6: MAIN PROGRAMMING BRANCHES



SECTION 3.6 (cont.)

"CODE" is displayed if a lock out code has been programmed.

- If "CODE", then enter your Lockout Code number (1-50)
- If NO "CODE" then "CHAN" is displayed

Use **SELECT** key to choose which branch you wish to enter. Then press **ENTER** key to select that branch to program. Selections are: "CHAN", "OUTPUT", "DISPLY", and "SPEC".

SECTION 3.7: CHANNEL SETUP PROGRAMMING **BRANCH**

Press **SELECT** key to choose which channel you wish to program. Then press **ENTER** key.

CHAN 1 is input Channel 1

CHAN 2 is input Channel 2

CHAN 3 is the math Channel

There are 3 separate channel setups. Two for the analog input channel (Channel 1 and Channel 2) and one for the math channel (Channel 3)

1. Channel 1 and Channel 2 Scaling and Offsetting methods, to display in engineering units
 - There are 3 methods to perform the setup of Channel 1.
 - There are 2 methods to perform the setup of Channel 2.

At the beginning of each of the calibration methods there is a display that shows the raw unscaled input signal. This allows the user to verify the incoming signal is present and what value it is.
- a. Method 1 (U CAL)
 1. Raw input is displayed. For exact calibration purposes you can input the low and high inputs and record their value for entry in the low and high input values below. Push **ENTER** key to advance.
 2. "DEC PT" selects decimal point. Push **SELECT** key for displaying decimal point selections and **ENTER** key to confirm choice.
 3. "IN LO" enter in low input value
 4. "DSP LO" (display low) enter in display value corresponding to low input value.
 5. "IN HI" enter in high input value.

6. "DSP HI" (display high) enter in display value corresponding to high input value.

b. Method 2 (LD CAL)

NOTE: Input Signal must be applied to the unit for low and high display values. The meter compares the input signal to the display value entered and scales the meter based on the two inputs.

1. Raw input is displayed. This can be used to make sure the correct input is being applied and/or that the meter is properly measuring it. Push enter to advance.
2. "DEC PT" selects decimal point. Push **SELECT** key for displaying decimal point selections and **ENTER** key to confirm choice.
3. "DSP LO" (display low).

Either select "YES" or "NO" here.

"YES" allows you to apply corresponding low input signal to input and enter in corresponding low display value. Push **ENTER** key to make displayed value equal input. If "NO" is selected it skips over this program and leaves values to what they were.

4. "DSP HI" (display high).

Either select "YES" or "NO"

If "YES" is selected, this allows you to apply corresponding high input signal to input and enter in corresponding high display value. Push **ENTER** key to make displayed value equal input. If "NO" is selected it skips over this program and leaves values to what they were.

5. "ENABLE" (Enable). This enables the above calibration setup by the inputs. This allows for the low value and high values to be set at different times and then enabled when both are complete.

- "NO" leaves calibration unchanged
- "YES" enables this calibration and overrides any previous calibration by the USER or SHUNT type calibration

- c. Channel 1 only has a third method of setup
 "SHUNT" cal method (Also known as R-CAL):
1. Raw input is displayed. This can be used to make sure the correct input is being applied and/or that the meter is properly measuring it. Push **ENTER** to advance.
 2. "DEC PT" selects decimal point. Push **SELECT** key for displaying decimal point selections and **ENTER** key to confirm choice.
 3. "DSP LO" (display low). Enter in display value corresponding to low input value.
 4. "DSP Hi" (display high). enter in display value corresponding to shunt calibration resistor.
 5. At this time the unit stores the values and waits for a Function key (F1-F4) programmed for shunt calibration to start the following calibration.
 - a. DPM measures input & sets display low equal to input.
 - b. Shunt cal relay is closed automatically.
 - c. 5 sec later DPM measures input & sets display high equal to shunt cal input.
 - d. Shunt relay opened.
 - e. Return to the RUN MODE.

2. Channel 3 (Math channel)

- a. "TYPE" Select for Channel 3 to be one of following:
- | | |
|------------|-----------------------------|
| • "CHAN 1" | Channel 1's raw input count |
| • "CHAN 2" | Channel 2's raw input count |
| • "Add" | Sum of Channel 1 + 2 |
| • "Sub" | Difference of Channel 1 – 2 |
| • "Div" | Result of Channel 1 ÷ 2 |
| • "Mul" | Multiply of CH1 x CH2 |
| • "P1-P2" | Peak1 – Peak2 |
- b. Raw input is displayed. For exact calibration purposes you can input the low and high inputs and record their value for entry in the low and high input values below. **NOTE:** The low and high

values are the result of the above selected math formulas. Push **ENTER** key to advance.

- c. "DEC PT" selects decimal point. Push **SELECT** key for displaying decimal point selections and **ENTER** key to enter choice.
- d. "In LO", enter in low input value
- e. "DSP LO", (display low) enter in display value corresponding to low input value.
- f. "In HI", enter in high input value.
- g. "DSP HI", (display high) enter in display value corresponding to high input value.
- h. "OFFSE" Enter an offsetting factor from -9999 to 9999, which is applied after the above scaling.

SECTION 3.8: OUTPUT SETUP PROGRAMMING

BRANCH

Push **SELECT** key to choose which output you wish to program. Then press **ENTER** key.

"AL AR" is the 4 alarm output setups; "ANALOG" is analog output setup

1. ALARMS

This setup menu programs the 4 alarms.

NOTE: Relays 1 through 3 are optional FORM "C" relays and located on the option/top board.

Relay 4 is standard FORM "A" relay and located on the main/bottom board.

- a. "AL AR" selects which alarm is to be programmed. Use **SELECT** key to view choices of alarms 1 through 4. Use the **ENTER** key to enter choice.

Note: 1. Each alarm is treated completely independent thus allowing all 4 to be programmed with same channel or different channels controlling one alarm.

2. Alarm one is different from one standpoint. It has the additional selection of "SAFE"(fail safe) selection. The selection "SAFE" here controls relays 1 through 3 for the fail-safe operation.
- b. "CHANEL" selects which channel alarm is being assigned to. Use **SELECT** key to view choice of channels. Use **ENTER** key to enter choice.
 - c. "RELAY" selects which relay (1 through 4) is being programmed. Use **SELECT** key to view choices of outputs. Use the **ENTER** key to enter choice.

NOTE: Relays 1 through 3 are optional and located on the option/top board. Relay 4 is standard and located on the main/bottom board.
 - d. "TYPE" selects what type of alarm. Use **SELECT** key to view following choices. Use the **ENTER** key to enter choice.
 1. "ALAR HI" (alarm high) selects alarm to trigger when input goes over programmed set point.
 2. "ALAR LO" (alarm low) selects alarm to trigger when input goes under programmed set point.
 - e. "SET PT" (set point) enter number at which alarm will occur.
 - Set point can also be programmed from the RUN mode when an **F** key is assigned to display alarm. If **F** key is held for 4 seconds, the display will start flashing the right hand digit signifying the new set point can be entered.

Note: The corresponding front panel alarm LED is on when in alarm.

Note: Alarm set point can only be changed enabled on the alarm setup menu, otherwise you can only view the set point.
 - f. "HYST" (hysteresis / deadband) enter number. This number is added to a low limit or subtracted from a high limit before an alarm condition is cancel. It is typically used to prevent alarm chatter.
 - g. "LATCH" selects alarm to latching or non-latching (follows input). If LATCHING is selected, alarm will remain on till manually reset. Use **SELECT** key to view "YES" for latching

and "NO" for non-latching. Use the **ENTER** key to enter choice. Note: "**RESET**" function programmable for front panel key or remote input, is used to reset the latched alarm.

- h. "SAFE" ("ALARM 1" ONLY) selects alarms 1 through 3 to be in a safe mode (de-energizes on alarm) or standard (energizes on alarm). Use **SELECT** key to view "YES" for safe and "NO" for standard. Use the **ENTER** key to enter choice. Note: This is used to determine what the alarms do when loss of power occurs to meter. With "SAFE" selected alarm will turn on when power fails.
- i. "FLASH" selects alarm to flash display when in alarm. Use **SELECT** key to view "YES" for flash display and "NO" don't flash display. Use the **ENTER** key to enter choice.
- j. "ENABLE" selects if set point is changeable in the run mode, or just viewing a load.

2. ANALOG OUTPUT

This setup menu programs the analog output/retransmission.

- a. "SOURCE" selects what the analog output will be based upon. Use **SELECT** key to view choices. Use **ENTER** key to enter choice. After choice is entered then addition choices are entered.

1. Selections are:

- "CHAN 1" Channel 1
 - a) "GROSS" gross value (default)
 - b) "NET" net value
 - c) "PEAK 1" peak 1 value
- "CHAN 2" Channel 2
 - a) "GROSS" gross value
 - b) "NET" net value
 - c) "PEAK 1" peak 1 value
- "CHAN 3" Channel 3
 - a) "GROSS" gross value
 - b) "NET" net value
 - c) "PEAK 1" peak 1 value
- "DISPLY" What ever is currently selected

- b. "OUT" selects what the analog output will be
- "4-20" 4-20mA
 - "0-10" 0-10VDC
 - "0-20" 0-20mA
 - "0-5" 0-5VDC
 - "-5 +5" -5 to +5VDC
- c. "DSP Lo" enter what the low display value that will represent the low analog output value
- d. "DSP HI" enter what the high display value that will represent the high analog output value

SECTION 3.9: DISPLAY SETUP PROGRAMMING

BRANCH

"FILTER"/"SNAP" - "FILTER" AND "SNAP" work together to provide a digital filter. The filter is applied to both Channel 1 and Channel 2 inputs. The NO filter setup is

"FILTER"= 1.000, "SNAP"=0.000

The Filter formula is active only when New Reading < Old Reading +/- Snap Value.

New Display Reading = (Old Reading + (Filter (New Reading- Old)))

SECTION 3.10: SPECIAL FEATURES PROGRAMMING

BRANCH

Use **SELECT** key to choose which function you wish to program. Then press **ENTER** key.

- "F1 SET" thru "F4 SET" programs the RUN mode function of the 4 **F** keys
- "r in 1" thru "r in 2" programs the function of the 2 remote inputs
- "20 Pt" programs the 20 point linearization table and assigns it to one channel
- "PEAK 1" programs the peak or valley function of each channel
- "PEAK 2" programs second the peak or valley function of each channel
- "SCALE2" programs the second scaling parameters of each channel
- "CODE" programs the lockout code for authorized entry into SETUP
- "DEFAULT" sets meter setup back to default setup

1. "F1 SET", "F2 SET", "F3 SET" and "F4 SET" - RUN MODE function key setup

This programs the function of the 4 front panel **F** keys.

- A. "ALAR 1" thru "ALAR 4" assigns alarm function to F keys
- Pushing F key displays current alarm set point
 - Pushing F key for 4 seconds allows point value to be changed.
Current set point is displayed with the right most digit flashing. The set point can now be changed with the **UP** and **DOWN** keys. Select digit to be changed with **SELECT** key. Press **ENTER** key to enter new value into memory and return to RUN mode
- B. "TARE 1", "TARE 2" and "TARE 3" assigns **F** key for tare function. 1 for channel 1, 2 is for channel 2 and 3 for math channel 3.
- Pushing **F** key will zero the Channel for the input present.
 - Pushing **F** key for 4 seconds will reset the tare value to zero.
- "CHAN 1" assigns F key to display Channel 1
 "CHAN 2" assigns F key to display Channel 2
 "CHAN 3" assigns F key to display Channel 3

- C. "RESET" assigns **F** key for resetting latched outputs
- Pushing **F** key will reset all relays in an alarm condition.
- D. "SCALE2" assigns **F** key to initiate 2nd scaling to be applied.
- Pushing **F** key will switch displayed channel to 2nd scaling.
 - Front panel S2 LED will light to indicate 2nd scaling is applied.
 - Push **F** key while S2 is selected will change scaling back to initial scaling
 - If different channel is selected while 2nd scaling is selected, it will also use the 2nd scale factor applied to it.
- E. "SHUNT" assigns **F** key to "SHUNT" Cal function.
- If assigned to display calibration, pressing **F** key for 3 seconds will initiate shunt cal relay to close. This displays calibration value.
- Note: input should be unloaded.
- F. "NET" assigns **F** key to switch displayed channel between gross and net
- Pushing **F** key will switch displayed channel to display net.
 - Front panel NET LED will light to indicate NET is being displayed.
 - Push **F** key while net is selected will change display back to gross.
If different channel is selected while net is selected, it will also display net.
 - If assigned to do a "SHUNT" calibration, pressing **F** key triggers display of CAL with selection of "YES or NO".
"NO" aborts and returns to Run mode.
"YES" initiates the shunt calibration procedure.
- G. "PEAK 1" and "PEAK 2" assigns programmed peak function to **F** key

- Pushing **F** key will display the assigned peak function. If peak was assigned peak LED on front panel will also light. If Valley then valley LED will light.
- Pushing **F** key for 4 seconds will reset the peak/valley.

2. "r in 1", and "r in 2" remote inputs. RUN mode remote/external input setup

The 2 Remote input functions are selected under the Main program branch heading "SPEC". A TTL level applied to the input enables the following.

- ! "RESET" - Resets latched relays
- ! "TARE" - Zeros display for channel being displayed.
- ! "HOLD" - Freezes display and suspends measurements
- ! "SCALE2" - Selects second scaling to be applied to channel being displayed. S2 light on front panel is lit.
- ! "LOCK" - Locks out access to the SETUP programs
- ! "PEAK 1" - Display PEAK 1
- ! "PEAK 2" - Display PEAK 2
- ! "ALARM" - Disables alarms. Meter functions normally but no alarms are activated when they go beyond their preset limits.
- ! "DEC PT" - Selects the decimal point programmed
- ! "CHAN" - Selects the channel programmed
- ! "PRESET" - Resets both peak and valleys.
- ! "NET/GROSS" - Displays Gross value of channel
- ! "PRINT" - Initiates a print of the current display through the RS-232C serial port. (T option required for this function.)

3. 20 point linearization

Allows the user to program and assign a 19-segment linearization program to one channel.

"On"/"OFF" - On enables the linearization table, off disable the linearization table

"CHAN 1"
"CHAN 2"
"CHAN 3" } Assigns the linearization to a channel

"SEGS" - Total number of segments (1-19)

"In 1" through "In 19" - Enter the 19 input values

"OUT 1" through "OUT 19" - Enter the 19 output values

4. "PEAK 1" and "PEAK 2" setup

Programs the functions of the 2 peak capture inputs. Each peak can be individually programmed.

"TYPE" Select if peak to be highest or lowest valley

 "HI" High/Peak selection

 "Lo" Low/Valley selection

"CHAN 1", "CHAN 2,"CHAN 3" Select channel to do peak on

5. "SCALE 2" setup

Programs the setup and assignment of the second scale factor. This would typically be used to switch the display between English and Metric engineering units. The selection of scale 2 can be activated from a Front Panel Key (F1 - F4) or a remote input. They must be programmed to perform the switch to scale 2 under the "SPEC" branch programming.

"CHAN 1", "CHAN 2" Select which channel the second scale factor is being setup for. Both Channel 1 and Channel 2 can be setup for an individual second scale factor.

"DEC PT" selects decimal point. Push **SELECT** key for displaying decimal point selections and **ENTER** key to confirm choice.

"IN Lo" enter in low input value

"DSP Lo" (display low) enter in display value corresponding to low input value.

"IN HI" enter in high input value.

"DSP HI" (display high) enter in display value corresponding to high input value.

6. LOCK OUT CODE SETUP

This enables the program of a lockout code (0 to 50) to limit the entry into the setup mode. Once a code is entered here, it must be enter upon trying to enter the setup mode when the meter prompts for "CODE". Setting the code to 00 disable the lockout code function.

"CODE" is flashed with the lock out code currently programmed. Enter in a new code or exit the program (**EXIT** key).

7. DEFAULT program

This program is used for any of the following:

- Reset the meter back to the factory defaults.
- Set the user defined defaults into memory
- Reset the meter to the user defined defaults

"DEFAULT" default program prompt

"YES"/"NO" "NO" to exit this menu

"YES" if one of the 3 defaults is to be done.

Continue to next step

"USER"/"FAC"

- "FAC" (factory) allows the reset of the meter back to factory defaults. When the prompt
 - a) "FACTORY" is displayed, the **SELECT** key must be pushed and held (**10 seconds**) until the prompt "DONE" and returns to "SPEC" branch. If any other key is push it will abort the default operation and return to "SPEC" branch.
- "USR" (User) allows the setup of custom defaults or default to the custom defaults
 - b) "STORE" allows the custom defaults to be set. This will set the defaults to the setup of the meter it is currently programmed.
 - "SET DF" When this is displayed the **SELECT** key must be pushed and held until the "DONE" prompt. Meter then returns to "SPEC" branch heading.
 - "GET DF" When this is displayed the **SELECT** key must be pushed and held until the "DONE" prompt. This takes approximately

10 seconds. Meter then returns to "SPEC" branch heading.

SECTION 4 OPTIONS

OPTION C:

- 3 form C (single pole double throw) relays rated at 5 amp @ 240VAC, 5amps @ 30VDC.
- Located on the option/top printed circuit board

OPTION H:

- Analog output with menu selection of 0-20mA, 4-20mA, 0-5VDC, 0-10VDC and +5/-5VDC
- Update rate of 25/second (3720A)
- Resolution - 16 bit D/A
- Located on the option/top printed circuit board

OPTION P:

- 24VDC @ 150mA
Accuracy: .5%
- 10VDC @ 250mA supply
Accuracy: .5% (adjustable)

OPTION T:

- Serial RS-232C Communication.

- Configuration of 9600 baud, NO Parity Check, 8 DATA Bits, with CTS handshaking available.

SECTION 5 SPECIFICATIONS:

	±20 mA	+/- 30 mV	+/- 100 mV	+/- 200 mV	+/- 2V	±10V
Accuracy	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Zero Drift	Autozero	Autozero	Autozero	Autozero	Autozero	Autozero
Span Drift	10 ppm/°C	10 ppm/°C	10 ppm/°C	10 ppm/°C	10 ppm/°C	10 ppm/°C
Input Impedance	50 Ohms	10 Mohm	10 Mohm	10 Mohm	10 Mohm	10 Mohm
Resolution	1 uA	1 uV	10 uV	10 uV	100 uV	1 mV
Over-range Capability, minimum	10%	10%	10%	10%	10%	10%

Normal Mode Rejection Ratio	63 dB, 50/60 Hz
Common Mode Rejection Ratio	130 dB, 50/60 Hz
Response Time	100 msec max to display (10 updates / sec)
Internal Resolution	22 bits
Conversion Time	100 mS
Digital filter	10 Hz

Warm Up Time	15 minutes
Operating Temp range	-20°C to 60°C
Storage Temp range	-20°C to 85°C
Humidity	To 95%, non-condensing

AC supply voltage	115 or 230 VAC
Power Consumption	15 Watts maximum (all options installed)

Isolation

Signal Input to Earth Ground:	Safety rated to 450 Vrms, 2200Vp high voltage test
Option board to Earth Ground:	Safety rated to 450 Vrms, 2200Vp high voltage test
Option board to Signal Input:	400 Vp
Power to Earth Ground:	Safety rated to 500 Vrms, 4000 Vp high voltage test
Shunt Cal. Relay	Contact Rating : 30VDC @ 1 A