

Programmable Dual Channel Monitor

DCM Series User's Manual



*KAIF DIGITAL CORPORATION.,
7678 E. GREENWAY ROAD, #103
SCOTTSDALE, AZ 85260*

TEL. NO: 480-607-3100
FAX NO: 480-607-3101

DCM Series User's Manual

SPECIFICATIONS:	3
DESCRIPTION:	4
SAVING PROGRAMMED PARAMETER:	4
Table 1. How to Display Parameters	5
PEAKS:	5
DISPLAYING PEAKS	5
RESETTING PEAKS	6
RATE:	6
MODES OF OPERATION FOR PULSE CHANNEL:	6
RATE MONITOR:	6
RPM MONITOR	6
FREQUENCY MONITOR:	7
COUNTER	7
MODES OF OPERATION FOR COUNTER:	8
COUNT UP CONFIGURATION:	8
MODE 0: (Count up with manual reset to zero)	8
MODE 1: (Count up to Preset with auto reset to zero)	8
MODE 2: (Count up to Preset with auto Zero after delay)	8
COUNT DOWN CONFIGURATION	8
MODE 3: (Count down to zero with manual preset)	8
MODE 4: (Count down to zero with auto preset)	8
MODE 5: (Count down to zero with auto preset after delay)	8
RESETTING COUNT:	9
RELAY DELAY PERIOD:	9
TOTALIZER:	9
BATCH COUNT:	9
SCALING:	9
TIME:	9
SETUP:	10
EXITING SETUP:	10
CHANNEL CONFIGURATION:	10
'Input Type' Setup	10
'Channel ON/OFF' Setup	11
Setup for degrees Centigrade or Fahrenheit	11
'Decimal Point Position' Setup	11
'High Scale' Setup	11
'Low Scale' Setup	11
'Offset' Setup	11
'Tare' Setup	12
'Limits' Setup	12
'Deadband' Setup	12
'Relay Latched/Non-Latched Mode' Setup	12
'Relay Normally Open/Closed' Setup	12
'Engineering Units' Setup	13
'Rate Time Base' Setup	13
Input Signal type selection:	13
SYSTEM CONFIGURATION:	13
Display Options	14
'Display Time' Setup	14
Audio Alarm ON/OFF	14
Cold Junction Setting	14
Calibration Mode	14
Thermocouple Calibration Procedure	14
Input Range Setup (for current and voltage):	15
Voltage Range Setup (0-5vdc, 0-10vdc)	15
Voltage Range Setup (for millivolt inputs)	15
Current Range Setup	15
Correct Range Settings	15
Setup Examples	15
Example #1: Use of the OFFSET Parameter	15
Example #2: Use of the LOW SCALE Parameter	15
SETUP FOR A PULSE CHANNEL:	18

DCM Series User's Manual

Turning a Channel ON or OFF	18
MODES OF OPERATION FOR A PULSE INPUT CHANNEL:	18
SETUP FOR COUNTER:	18
SETUP FOR HIGH AND LOW FREQUENCY MONITOR:	19
SETUP FOR RATE MONITOR:	20
SETUP FOR RPM MONITOR:	20
ALARM OUTPUTS:	21
Status:	21
Resetting:	21
Open Collector (solid state) output Option:	22
Figure 1. Open Collector Hookup Example.....	22
Electro-Mechanical Relay Option:	22
Figure 2. Electro-mechanical Relays Hookup Example	22
POWER	22
FIG. 3: Power, Input/Output connections & rear view of the instrument.	23
INPUT/OUTPUT CONNECTOR PIN ASSIGNMENTS	23
MOUNTING	24
Figure 4. Panel Cutout Dimensions	24
WARRANTY	24
WARRANTY	25

SPECIFICATIONS:

(Typical @ 25C and rated supply voltage unless otherwise specified)

STANDARD INPUTS

- * 4-20ma 10-50ma 0-5Vdc 0-10Vdc
- Thermocouple inputs: J,K,T,E,R,S,B
- Cold junction compensation error: +/- 1C (10C to 40C)
- Open input indication: **HELP** displayed
- Temperature displayable in Degrees C or F
- Non standard inputs available --- consult factory.

ANALOG TO DIGITAL CONVERSION

- 4-1/2 Digit (20,000) Count) A/D Converter
- Dual slope integrating converter with 7 conversions /sec. (typical) rate.

SCAN RATE

- Fixed: two channels per second

DISPLAY

- Red seven segment displays--0.39" (10mm) digit height
- Over range indication: **HELP**
- Display test: Briefly displays **8.8.8.8.8.8** on power up.
- Seven digit display

SCALE/OFFSET

- Scale programmable from 1-30000 units
- Offset programmable from 0-99.99 MA (For MA Input)
- Offset programmable from 0-9.999 MV (For Voltage Input)

RELIABILITY/ACCURACY

- Calibration: NIST traceable (for thermocouples)
- Temperature resolution: 1C/1F, 0.1% of Full Scale
- Warranty: 1 Year
- Recalibration recommended at 12 month interval

POWER REQUIREMENT

- * 120Vac --- 60 HZ (Standard)
- * 240Vac --- 50 HZ (optional)
- * 8Vdc --- 12Vdc (optional)

OUTPUT (optional)

- Open collector outputs – 6 open collector outputs, maximum sink capability of 50ma per output
- Relays: Single pole single throw, 1 Amp @ 28Vdc or 0.5 Amp @ 120Vac resistive
- Output termination: Euro-style plugable connector

DECIMAL POINT:

- Programmable: None, 10th position, 100th position, 1000th position

COUNT/RATE/RPM/FREQUENCY:

- Count Range : 1 – 9999999 Rate Range: 0 – 9999999 Frequency Range: 2.00 to 1000000 RPM Range: 0 - 9999999
- Scaler 0.00000 to 99.99999
- Division factor: 0 to 65000
- Rate Time Base: Programmable 1.000 Seconds to 9999.999 Seconds

DESCRIPTION:

A highly versatile series, DCM offers a unique combination of two analog channels or two pulse input channels or a combination of pulse (square wave) on one channel and an analog signal on the other. This feature allows it to be used as counter, rate, RPM or a frequency monitor along with displaying an analog signal such as 4-20ma loop current, voltage or millivolts or a temperature signal from thermocouples, RTDS etc. For example, flow and temperature or flow and pressure can easily be monitored in a single unit.

On the analog channel, signals from thermocouples, RTDS or thermistors are linearized and displayed in degrees Centigrade or Fahrenheit. Voltage and milliamp signals (4-20ma etc.) are displayed in engineering units that correspond to the process being monitored. Scaling is accomplished through front keys and does not require any tedious formulas.

The Pulse (or square wave input) channel functions like four monitors in one. It can be programmed as an up/down counter, rate, rpm or frequency monitor. In counter mode, the channel can count up or down to a maximum count of 9,999,999 and also offers three presets along with built in delay timers. As a rate indicator, it offers a programmable time base from 1.000 to 9999.999 seconds.

In RPM mode, the channel counts incoming pulses and displays the data as revolutions per minute. In frequency mode, an internal crystal reference is used to indicate the frequency of incoming pulses (low frequency mode only). Measured frequency range is from 1Hz to 1 megahertz. Two modes of operation are supported:

1. High frequency mode (resolution = 1Hz)
2. Low frequency mode (resolution = 0.01 Hz)

NOTE: Check model number for the type of input and display units ---- thermocouples, 4-20ma, 0-5Vdc, or 0-10Vdc etc...

MODEL NO	DESCRIPTION
DCM-BM	J,K,T,E Thermocouple, 4-20ma, 0-10vdc & 0-5vdc pulse
DCM-TH	Thermistor (400 Series) , 4-20ma, 0-10vdc and 0-5vdc pulse
DCM-RTD	100 Ohm RTD , 4-20ma, 0-10vdc and 0-5vdc pulse
DCM-R	'R' Thermocouple, 4-20ma, 0-10vdc and 0-5vdc pulse
DCM-S	'S' Thermocouple , 4-20ma, 0-10vdc and 0-5vdc pulse
DCM-B	'B' Thermocouple , 4-20ma, 0-10vdc and 0-5vdc pulse
DCM-100MV	100Millivolt , 4-20ma, 0-10vdc and 0-5vdc pulse

OPTIONS (Add to Model No)	
SUFFIX	DESCRIPTION
/6	240vac Power
/7	15vdc Power
/R	4 Relay Outputs
/OC	4 Open collector outputs

SAVING PROGRAMMED PARAMETER:

DCM saves all the programmed parameters in an EEPROM (electrically erasable programmable read only memory). An EEPROM stores the programmed parameters even when the power is removed from the unit. However, it is important to note that if the parameters are being changed during setup, they must be saved in the EEPROM by pressing and holding the RESET key till the display reads 'SAVING' (also described under SETUP). If the parameters are **NOT** saved and the power is removed from the unit, any newly changed values will be lost (the unit will, however, maintain the old values).

Table 1. How to Display Parameters

TO DISPLAY	PERFORM FOLLOWING STEPS
1) Channel 1's Process value	a) Push CH SEL key once.
2) Channel 2's Process Value	a) Push CH SEL key twice. First push selects channel 1 and the second push will select and display channel 2's process reading.
3) Channel's high peak	a) Select channel whose high peak is desired (push CH SEL key) b) Push HI/LO key once
4) Channel's low peak	a) Select channel whose low peak is desired (push CH SEL key) b) Push HI/LO key twice --- 1st push displays high peak, 2nd push , low peak.
5) Rate	a) Select channel whose rate is desired (push CH SEL key) b) Push DATA key once.
6) Channel Differential	a) Select a channel by pushing CH SEL key ONCE b) Push DATA key twice -- 1st push displays rate, 2nd push: Channel Differential
7) TOTAL	a) Select a channel by pushing CH SEL key twice b) Push DATA key SIX times till TOTAL displays in the window The sequence is: Rate, Channel differential, Limit1, Limit2, Limit3, Total
8) BATCH	a) Select a channel by pushing CH SEL key twice b) Push DATA key SEVEN times till bATCH displays in the window, The sequence is: Rate, Channel differential, Limit1, Limit2, Limit3, Total, Batch
9) LIMITS	a) Push CH SEL key to select desired channel b) Push DATA key THREE times to display channel's limit number 1 c) Each additional push after that will display limit 2 & limit 3
10) Elapsed time	a) Push TIME key.
11) Scan	a) If the unit is holding, push the SCN/HLD key once.
12) Hold	a) If the unit is scanning, push the SCN/HLD key once.

PEAKS:

A very useful function on the system is tracking the highest (peak) and the lowest (valley) point attained by each channel. This is particularly helpful if an operation is not being constantly watched or is left unattended e.g. overnight.

DISPLAYING PEAKS

The first step in displaying peaks is to select the channel whose peaks are desired. This is done by pushing the '**CH. SEL**' key. Once the desired channel has been selected, push the '**HI/LO**' key. Pushing it once will show the high peak attained by the selected channel. Pushing it a second time will indicate the low process value (NOTE: The second push, to display valley, must be initiated before the display reverts to normal display mode). Before displaying high peak the display will read '**CHx HI**' (x=channel #). Similarly, for low peak the display will indicate '**CHx LO**' (x=channel #) before showing the value. If an attempt is made to display the high or low peak of a channel which has been turned off (in CH Setup), the display will read '**CHx OFF**' (x=channel #) to indicate the channel status.

RESETTING PEAKS

Peaks can be reset to current process value e.g. if channel 1 is reading 200 C, its peaks can be reset to 200. This will allow tracking from the current process reading. To reset high peak, first select the channel whose peak is desired to be reset (by pushing the 'CH. SEL' key). Once the channel has been selected, push the 'HI/LO' key and keep it pushed. The display will read 'CHx HI' (x=channel #) following which the value of high peak will be displayed. With the HI/LO key still pushed, go on to push the RESET key. The display will read 'RESEt' and the unit will then take the present value of process on that channel and enter it as the new high peak. To reset low peak, release HI/LO key (from high peak display mode) and push it again immediately -- and keep it pushed. The display will read 'CHx LO' and then the value of channel's low peak. With the HI/LO key still pushed, press the RESET key. The display will read 'RESEt' and the unit will enter the present process value as channel's new low peak.

RATE:

DCM tracks the rate of process change per programmed time base for each channel. This RATE is displayed by first pushing the CH. SEL key to select the channel whose rate is desired and then pushing DATA key once. The display will briefly read 'rAtE' and then show the monitored rate for that channel.

MODES OF OPERATION FOR PULSE CHANNEL:

RATE MONITOR:

As a rate indicator, DCM series features crystal controlled accuracy and provides the flexibility of a programmable time base for sampling. The time base can be set from 1.000 seconds through 9999.999 seconds in increment of 0.001 second and is done during SETUP (look under SET-UP). Additionally, a division or scaler factor can also be programmed that will divide or scale the incoming pulses. For a quicker update of rates, a scaler factor can be programmed (when a channel is programmed for a rate mode). For example, if rate /minute is desired, then setting the time base to 1.000 and scaler to sixty, will give you rate/minute. This rate, however, will be updated every one second. It may be noted that rate calculated this way may lose some accuracy.

Additionally, the unit shows the rate, based on the programmed time base in all the system modes i.e. frequency, counter and RPM. This can be displayed by first selecting the desired channel (by pushing CH SEL key) and then pushing the DATA key. **(NOTE: In the RPM mode, the rate time base must be smaller than the selected filter value. If not, the system will automatically consider the filter value as the time base for rate calculation. Also, a difference of 0.500 is recommended between the filter and time base).**

There are three rate based limits (two without outputs, 1 audio/visual) that can be set anywhere from 1-9,999,999. These limits can be configured to reset automatically when the rate falls below the set limit or alternately reset manually. This is done by going into the setup mode and selecting the proper configuration (look under SETUP).

RPM MONITOR

In RPM mode, the system will accept 0-5V square wave or pulse input from a sensor and show revolutions per minute. The input has a schmitt trigger so as to accept any kind of square wave or pulses, as long as the high and low specifications are met.

Also a filter function is provided in the RPM mode which allows to smooth out rapidly changing RPM. On the contrary, if it is desired to see the variation in the RPM, then this feature also comes in handy. Select a low filter value to see variations in RPM and a higher value for a more stable display. Selectable filter values are 1,2,4,6,10,15,20,30 and 60 and the selection is done in SETUP mode.

Three RPM based limits (two with outputs, 1 audio/visual) are provided for each channel that can be set to activate internal relays when a preset limit is exceeded. The ON/OFF status of these relays is indicated on the front panel by LEDs.

There are two modes of resetting the limits. First is automatic mode in which the limits reset automatically as soon as RPM falls

below the limit (minus the relay) deadband. The second mode is manual reset. Once the limits are energized, they will stay energized until manually reset.

(NOTE: In the RPM mode, the rate time base must be smaller than the selected filter value. If not, the system will automatically consider the filter value as the time base for rate calculation. Also, a difference of 0.500 is recommended between the filter and time base).

FREQUENCY MONITOR:

DCM monitor can also be programmed as a frequency monitor. In this mode the unit will display incoming frequency with a crystal based reference. Input signal is used for gating one time period. An internal counter counts the clocks from a crystal based oscillator and uses that to determine the frequency of incoming signal. Frequency range is from 5.00HZ to 1,000,000 HZ.

There are two frequency modes in which the system operates. Low frequency and high frequency. These modes are selected during SETUP. In low frequency mode, the unit will show frequency in 100th of a hertz and the range is from 2.00 HZ to 500.00 HZ. In high frequency mode, the system displays the frequency in unit steps. The range is from 1 HZ to 1,000,000HZ.

During frequency mode, indicated rate is same as the frequency. Total and batch count is not updated during this mode. High and low peaks are captured and can be displayed by pushing the **HI/LO** key.

Three Frequency based limits (two with outputs, 1 audio/visual) per channel are provided which activate when preset limit is exceeded. The status of these limits is indicated on the front panel by LEDs.

There are two modes of resetting the limits. First is the automatic mode in which the limits reset automatically as soon as the frequency falls below the limit minus the relay deadband. The second mode is manual reset. Once the relays are energized, they will stay energized until manually reset.

NOTE: Channel 2 can be programmed for low frequency mode, only if Channel 1 input is not configured for pulse. If Channel one is configured for pulse input, Channel 2 does not allow low frequency configuration during setup and the low frequency step is automatically skipped. Also, if Channel 2 is configured for low frequency (e.g. with Channel 1 being setup as Analog Channel) and Channel 1 is switched from Analog to Pulse input, channel 2 will be automatically switched from low frequency to high frequency mode. Under this condition, limits must be reconfigured for proper value with no decimal point on channel 2.

COUNTER

In counter mode, the system can be programmed to either count up or count down in six different modes. The limit relays can be programmed to reset manually or automatically. Also, the delay time on automatic reset of the relays is programmable.

For scaling, the unit provides the convenience of a scaler and a division factor. The scaler can be programmed from 0.00000 to 99.99999, in increments of 0.00001. Scaler is a number with which the input count is multiplied. For Example a flow meter that puts out one pulse for every 0.00024 gallons, would require a scaler of 0.00024. On a pulse count of 10000, the display will read 2.4 ($10000 \times 0.00024 = 2.4$). Scaler is disabled if its value is set to 0.00000. Similarly, the division factor works on incoming pulses and divides them with the programmed factor.

NOTE: Division factor is disabled if a scaler value greater than 0.00000 is programmed.

Various operating modes of the counter are explained below:

MODES OF OPERATION FOR COUNTER:

COUNT UP CONFIGURATION:

MODE 0: (Count up with manual reset to zero)

In this mode the system counts up from zero. Preset limits energize when the count reaches preset limit values. The unit will continue counting up until manually reset. To reset the count manually, first select a channel by pushing **CH SEL** key and while keeping CH SEL key pushed, simultaneously push the **RESET** key. The display will read '**RESET**' and then the reset value of zero will be displayed. On resetting to zero, the outputs will automatically de-energize and this will be indicated by the LED'S for the respective outputs turning off on the front panel.

MODE 1: (Count up to Preset with auto reset to zero)

In this mode the counter counts up to a preprogrammed preset value (look under SETUP). On reaching preset the counter automatically resets to zero and starts the up count again. The count can be reset manually before it reaches preset. To reset the count manually, first select a channel by pushing **CH SEL** key and while keeping the CH SEL key pushed, simultaneously push the **RESET** key. The display will read '**RESET**' and then the reset value of zero will be displayed. Preset limits energize when the count reaches limit values.

MODE 2: (Count up to Preset with auto Zero after delay)

In this mode the counter counts up from zero to a preset value. Preset limits energize when the count reaches limit values. On reaching PRESET, the delay period starts. After the delay period is over, the count is automatically zeroed, the limits, if energized (and in non-latch mode), are reset and the count up starts again. The delay period is programmed in SET - UP mode.

For example, if PRESET is set to 9000 counts and the delay period is programmed for 10 seconds, then when the counter reaches 9000, the delay period will start and after 10 seconds of reaching 9000 count, the count will be reset to zero.

COUNT DOWN CONFIGURATION

MODE 3: (Count down to zero with manual preset)

In this mode the counter counts down from a preset number (**preset number is programmed during SETUP**). On reaching zero the counter will not decrement further until manually preset. To preset the counter value manually, push **CH SEL** key to select a channel. While keeping **CH SEL** key pushed, go on to push the **RESET** key simultaneously. The display will read '**RESET**' and then the displayed value will be reset to zero. Count down will start immediately thereafter.

When count goes down to a limit value the respective output is energized. The output will stay energized until the count is preset as explained above.

MODE 4: (Count down to zero with auto preset)

In this mode the counter counts down from a pre-programmed preset value (look under SETUP). When count goes down to limit value, the respective output gets energized. The display in the meantime will keep counting down. When it reaches zero, it will automatically preset itself to the programmed preset value.

NOTE: i) Time delay in modes 2 and 5 must be less than the time required to count from zero to preset or preset to zero.

MODE 5: (Count down to zero with auto preset after delay)

In this mode the counter counts down from a Preset value. Preset limits energize when the count reaches limit values. On reaching zero, the delay period starts. After the delay period is over, the count is automatically preset, the limits, if energized (and in non-latch mode), are reset and the count down starts again. The delay period is programmed in SET - UP mode.

RESETTING COUNT:

The COUNT shown for each channel can be reset to zero or preset for a count down (depending on counter mode) at any time. To reset the count manually, first select a channel by pushing **CH SEL** key and while keeping the CH SEL key pushed, push the **RESET** key simultaneously. The display will read '**RESET**' and then the reset value of zero will be displayed. If the counter is set for count down mode, then the display will preset to the value that was programmed during SETUP.

RELAY DELAY PERIOD:

Relay delay period in counter modes 2 and 5 is programmable from 1 to 9999999 seconds (look under SETUP). Delay period is the time for which the output stays in its current state on reaching zero or preset. Following the end of delay period, the output is either reset or preset (depending on the counter type selected).

TOTALIZER:

DCM series keeps track of total in counter, RPM and rate mode and can be displayed by pushing the **DATA** key.

In rate mode, if the displayed rate is 500 units per minute, then over a period of half an hour the total would be 15000 ($500 \times 30 = 15000$). Similarly in RPM mode the TOTAL is the accumulated revolutions over the time period the unit has been working.

In counter mode, the unit indicates the total count. This is irrespective of preset value i.e. if the preset is 5000 and the counter is in count - up mode, then after the unit has gone through ten preset cycles, the display will indicate a total of 50,000 ($5000 \times 10 = 50,000$). If in count down mode, the total represents the accumulated down counts.

BATCH COUNT:

DCM series also offers batching capability in counter mode. One batch constitutes of counting up or down (to preset or zero, respectively) to or from the preprogrammed PRESET value e.g. if PRESET is set to 5000 (and the channel is in counter mode 3) then each time the count goes up to 5000, it will reset to zero and start counting up again. This will constitute one batch.

To view the number of batches processed, first select a channel (by pushing **CH SEL** key) and then successively push **DATA** key till BATCH shows on the display. To reset batch count, bring up the batch count on the display and while still holding in the **DATA** key, simultaneously push the **RESET** key. The display will show 'RESET' followed by resetting of batch count.

SCALING:

Scaling is used for multiplying or dividing incoming pulses by a number. It is achieved by programming Scaler value or division factor during SETUP. This feature is useful if each revolution of a shaft produces more than one pulse, e.g. if a shaft gives 100 pulses per revolution then programming the division factor equal to 100 will give the actual RPM of the shaft. This can also be used in cases where a count is required on boxes with each box containing a certain number of parts, e.g. if it is required to obtain the count on cartons containing soft-drink bottles with each carton containing 50 bottles, the scaler will be set to 50. Similarly scaling can be used to measure length or flow of liquids.

Scaler can be programmed from 0.00000 to 99.99999, in increments of 0.00001. Scaler is a number with which the input count is multiplied. For Example, a flow meter that puts out one pulse every 0.00024 gallons, would require a scaler of 0.00024. On a pulse count of 10000 (and decimal point programmed in 10th position), the display will read 2.4 ($10000 \times 0.00024 = 2.4$). Scaler is disabled if its value is set to 0.00000.

The difference between division factor and scaler is that division factor is in whole number where as scaler can be programmed in increments of 10,000th of a unit. Also, the maximum scaler value that can be entered is 99.99999. However, SCALER should be limited so that the display would not go into over range condition. For Example, if the SCALER is set to 65.12345 and the pulse count goes to 1000000, the overall number becomes 65,123,450. This number is beyond the display capability of the unit).

TIME:

The system keeps track of the process run time in Hours, minutes and seconds. To display the elapsed time since the system was turned on or the time was last reset, push the **TIME** key. The display will first read "ELPSD T" (for elapsed time) followed by

the indication of the elapsed time. Maximum time indicated is 999.59.59 hours.

To reset the timing and start it all over again, first push the **TIME** key and while keeping it pushed, press the **RESET** key. The time will reset and start over from 000.00.00 hours.

SETUP:

Setup mode provides a means to customize the monitor to suit a particular application. It allows programming such parameters as temperature units, limits, display mode, relay deadband, etc.

SETUP mode has 2 sections:

- a) the **SYS** setup section to set system parameters
- b) the **CH** setup section to set channel parameters for each channel.

To get into SETUP mode, push the **SETUP** key twice. The first push displays elapsed time and the second push brings the unit into the SETUP mode. SETUP mode is indicated by '**SETUP**' in the display window (the SETUP LED indicator will also be illuminated) followed by '**ENTR PC**' (for **ENteR Pass-Code**). The pass-code feature has been provided to keep unauthorized personnel from changing any parameters. Each of the five keys on the front panel are labeled with a number in the lower right corner. The pass-code is a four digit combination of these numbers. Enter the pass-code when the displays reads '**ENTR PC**'. For DCM units, the PASS-CODE # is **3254**.

Three attempts at entering the correct pass-code are allowed. '**HELP**' shows up in the display window if the attempted pass-code is wrong. If a person fails in three attempts the system will go back to normal display mode. To make another attempt at this point one has to get into SETUP mode again.

Three keys are used during setup --- **SETUP**, **<NEXT>**, and **^v**. If, at any point during SETUP, it is desired to get out of SETUP, push and hold the **RESET** key until the display reads '**SAVING**'. The **SETUP** key takes you from one parameter to the next. For Example, if you are setting up Channel ON/OFF, then after getting the desired value push **SETUP** key to setup for Degrees C/F. The **<NEXT>** and **^v** keys are used for programming the values of parameters such as limits, setpoints, etc.

EXITING SETUP:

To exit from any point during SETUP procedure or to save the newly made changes, simply press and hold the **RESET** key until the display shows '**SAVING**'. This indicates that the unchanged and the newly made changes are being saved in the EEPROM for permanent storage.

Once the correct pass-code has been entered, the display shows '**SYS CH**', with **CH** blinking. At this point the operator may choose between making channel settings (CH), or system settings (SYS). Use **^v** key to toggle between CH and SYS modes. When the desired mode is blinking, press the **SETUP** key to begin setup of the parameters for that mode.

CHANNEL CONFIGURATION

After entering the correct pass-code and selecting the blinking '**CH**' (ref. SETUP section), the display shows '**SLCt CH**' (for "Select Channel"). Use **^v** key to display the desired channel. The selected channel will be displayed in the format '**CHANNEL x**' (where x=channel#). Once the desired channel # is displayed, push **SETUP** key to go on to setup parameters for the displayed channel #.

'Input Type' Setup

The display will briefly show '**IP TYPE**' (for "Input type") after which current input type for the channel will be displayed. Various inputs are: J T/C, CR.AL T/C (Chromel Alumel, type K T/C), T T/C, E T/C, CURRENT, VOLTAGE or PULSE (Refer to model number on the unit to find input type). To change the displayed input, push **^v** key till appropriate type is displayed. Push **SETUP** key to move to the next step.

NOTE 1: Whenever input type is changed, the unit automatically clears the previously entered engineering display units. Therefore, do not forget to enter new engineering units (ref. Display Units section) or the respective channel will display '**. . .**' (three dots) when displaying a process value.

'Channel ON/OFF' Setup

After displaying input type, the next step turns a channel ON or OFF. This determines whether a channel is scanned and displayed or not. If for any reason a channel is not being used, it should be turned OFF. This will prevent the unit from spending any time scanning it and also from displaying a 'HELP' message if there is no signal connected to its input. If a channel is OFF, the display will show 'CHx OFF', and if it is ON the display will show 'CHx ON' (x=channel #).

Use ^v key to display the desired ON/OFF setting, and then push **SETUP** key Setup For Decimal Point Position.

NOTE: If input type is voltage or current, then the next step performed in setup is selection of Decimal Point position. For thermocouple, RTD or thermistor inputs, the following steps are performed:

Setup for degrees Centigrade or Fahrenheit

After turning a channel ON/OFF, the next step is to select temperature display units. At this point the display will read 'DEGRE C' or 'DEGRE F'. Push ^v key to make an alternate selection. After the selection, push **SETUP** key to go to the next step --- **THE NEXT STEP IS SETTING UP OF LIMITS.**

FOLLOWING STEPS (UP TO SETTING UP OF LIMITS) ARE PERFORMED ONLY FOR UNITS WITH VOLTAGE OR CURRENT INPUT:

'Decimal Point Position' Setup

After setting the channel ON or OFF, the next parameter for configuration is setting the decimal point position. This is indicated by the display showing 'dP 9999' (dP=decimal point). The ^v key moves the decimal point thru all the possible positions. After '9.999', the display goes to '9999' which indicates a display with no decimal point.

Use ^v key to move decimal point to the desired position, and then push **SETUP** key Setup High Scale.

'High Scale' Setup

After setting the channel's decimal point position, the next parameter to be set is the High Scale. This parameter determines what number will be displayed when the transducer puts out its maximum signal. For example, suppose a pressure transducer produces a 0Vdc to 10Vdc signal which corresponds to 0psi to 150psi. Then you would want the display to show 150 when 10Vdc is measured. To do this, set High Scale=150.

After pushing the **SETUP** key, the display will briefly read 'HI SCLE' (for "High Scale"), and then show the current High Scale setting. Active digit (the digit that can be changed) will be flashing. Pushing ^v key and keeping it pushed, will increment the digit. Releasing ^v key and then pushing it again will decrement the value (^v key works as a toggle -- alternating between increment and decrement). To change the next digit, push <NEXT> key. This will advance the flashing to the following digit. Use ^v key to change the value. After the desired High Scale setting is displayed, push **SETUP** key to go to the next step.

'Low Scale' Setup

After setting a channel's High Scale, the next parameter to be set is Low Scale. This parameter determines what number will be displayed when the transducer puts out its minimum signal. For example, suppose a pressure transducer produces a 0Vdc to 5Vdc signal which corresponds to 10psi to 75psi. In this case the display should read 10 when 0Vdc is measured. To do this, set the Low Scale=10.

After pushing **SETUP** key, the display will briefly read 'LO SCLE' (for "Low Scale"), and then show the present Low Scale setting. Active digit (the digit that can be changed) will be flashing. Use ^v key (as described in Setup For High Scale) to change the value. After the desired Low Scale setting is displayed, push **SETUP** key to go to the next step.

'Offset' Setup

After setting a channel's Low Scale, the next parameter to be set is channel offset. Offset is used for calibrating a channel to a specific transducer that puts out a signal other than zero at its low end. If a transducer happens to output a small signal at its low end excitation, then the OFFSET parameter is used to make the transducer's minimum signal appear to be zero. For instance,

suppose a flow transducer outputs a 0.130Vdc to 5.000Vdc signal which corresponds to a flow rate of 0 to 40 gal./min. Then to make the 0.130Vdc correspond to a display of 0, set OFFSET =0.130.

NOTE: If the input type is CURRENT, the Offset value is entered in milliamps.
If the input type is VOLTAGE, the Offset value is entered in millivolts.

After pushing **SETUP** key at the completion of Setup For Low Scale, the display will briefly read '**OFFSEt**', and then show the present Offset value. The active digit will be flashing. Use ^v key (as described in Setup For High Scale) to enter a desired OFFSET value. After the desired OFFSET value is displayed, push the **SETUP** key to go to the next step.

'Tare' Setup

After setting a channel's OFFSET value, the next parameter to be set is channel TARE. TARE is used if it is necessary to always subtract a value from a reading prior to displaying that reading. For example, suppose a pressure transducer always includes atmospheric pressure of 15 psi, and you only wish to display pressure differential from atmospheric (a gage reading of 19psi is to be displayed as 4psi). To do this, enter the number you want subtracted from the measurement prior to displaying it.

The display will first show '**tARE**' after which current TARE value will be displayed. Use ^v key (ref. Setup For High Scale) to set the desired TARE number. Once the desired TARE value is displayed, push the **SETUP** key to enter that value and go to the next step.

'Limits' Setup

DCM uses LIMIT parameter to determine when to activate output signal for a specific channel. When a reading exceeds LIMIT value, then the output for that limit is activated. When a channel reading drops below the LIMIT setting by an amount equal to the DEADBAND setting, then the channel's output is de-activated.

The display will first show '**CHx Lt1**' (where 'x' is the channel number) following which the LIMIT value will be displayed. Use ^v key (ref. Setup For High Scale) to set a desired value. Once the desired LIMIT value is displayed, push **SETUP** key to enter that value and go on to setting up limit 2. After limit 2 (which is setup just like limit1), limit 3 for the channel will be setup.

'Deadband' Setup

After setting a channel's limits, the next parameter to be set is the channel's output relay DEADBAND. This parameter is used to eliminate relay "chatter" as a signal hovers around its LIMIT value. When channel reading drops below the LIMIT setting by an amount equal to DEADBAND setting, then that particular limit output is de-activated. The minimum value of DEADBAND is 2.

The display will first show '**dEAd bd**' after which the present DEADBAND value will be displayed. Use ^v key (ref. Setup For High Scale) to set the desired DEADBAND value. Push **SETUP** key after programming DEADBAND value.

'Relay Latched/Non-Latched Mode' Setup

In Latched mode the relay is activated when its LIMIT value is exceeded and stays activated until the operator manually resets the relay. To manually reset a relay on channel 1 or 2, first select the channel by pushing the **CH. SEL**. Then push the **DATA** key until the desired limit number for the particular channel comes up on the display e.g. CH2 LT3 (Channel 2, limit number 3). While keeping the **DATA** key pressed, simultaneously press the **RESET** key. This will reset the respective limit relay (NOTE: Process reading should be below the limit value for the relay to reset. Otherwise, pushing of the keys will be ignored)

In Non-latched mode the relay is activated when its LIMIT value is exceeded. The relay is deactivated when the channel readings drop below the LIMIT value by the DEADBAND setting.

The display will show '**NON LCH**' for Non-Latch mode, or '**LAtCH**' for Latch mode. Use ^v key to toggle between settings. Once the desired setting is displayed, push **SETUP** key to enter that value and go to the next step.

'Relay Normally Open/Closed' Setup

After setting DEADBAND, the next parameter determines whether channel's output relays will operate as "Normally Open" or as "Normally Closed". The relay itself is a Single Pole Single Throw (SPST) relay.

When this parameter is set for "Normally Open", the relay contacts are open when reading is below LIMIT, and closes when the channel reading exceeds its LIMIT value.

When this parameter is set for "Normally Closed", the relay is closed when readings are below LIMIT, and opens when the channel reading exceeds its LIMIT value.

The display will show '**LTx N.O.**' (where 'x' is the channel number) for a Normally Open setting or '**LTx N.C.**' for a 'Normally Closed' setting. Use ^v key to toggle between two settings. Once the desired setting is displayed, push **SETUP** key to go on to setting up limits 2 and 3 for the channel. The display format is '**LT2 N.O.**' or '**LT2 N.C.**' and '**LT3 N.O.**' or '**LT3 N.C.**' respectively.

'Engineering Units' Setup

After setting a channel's relay for NORMALLY OPEN/CLOSED operation, the next step sets the 3 letters that follow the process value in the display. These 3 letters represent the measurement units for analog channels (only analog channels have this feature). Any desired combination of the following letters may be programmed:

A,B,C,D,E,F,G,H,I,J,L,N,O,P,Q,R,S,T,U,Y

The letter selection goes up to '**Y**' and down to '**A**' and from '**A**' down to '-' sign. The '-' sign indicates that that particular digit will be blanked e.g. if the desired engineering unit was feet, then the display can be programmed to show '**Ft**'. In this case one letter (the letter to the left of letter '**F**') will be blanked out by programming a '-' sign in its location.

If no engineering units have been programmed, then three dots will be displayed. Whenever the input type is changed from one type to another, the system automatically clears the engineering units. Therefore, it is necessary to enter new units after a change in the input type has been made. The only exception in this case is when a thermocouple selection is made. In that case, the unit automatically enters an '**F**' or '**C**' (Fahrenheit or Centigrade) depending upon the selected display units. However, just like the other inputs, any alternate units may be programmed for thermocouples.

The display will first show '**C1 UNIT**' after which the present UNITS setting will be displayed. Use ^v key (ref. Setup For High Scale) to setup the desired UNITS. Push **SETUP** key after the desired UNITS are displayed.

'Rate Time Base' Setup

Rate time base is used for calculating rate for the selected channel. The units for Time base are seconds and it can be entered in increments of 1000th of a second. Minimum Time base is one second.

The display will first show '**rAtE tb**' after which the current Time Base value will be displayed. Use ^v key (ref. Setup For High Scale) to enter desired value. Push **SETUP** key after programming Rate Time base.

Input Signal type selection:

The display will briefly show '**IP TYPE**' (for "Input type") after which the present input type for the selected channel will be displayed. Various inputs available are: J T/C, CR.AL T/C (Chromel Alumel, type K T/C), T T/C, E T/C, CURRENT, or VOLTAGE. If the unit has a noble metal thermocouple option, then only one T/C can be selected i.e. B T/C, R T/C, or S T/C. Use ^v key to display the desired input type. Once the desired input type is displayed, push **SETUP** key to enter that input type and go to the next step.

SYSTEM CONFIGURATION:

After entering correct pass-code and selecting the blinking '**SYS**' (ref. SETUP section), the DCM goes into the SYSTEM CONFIGURATION mode. This mode allows setting up parameters that affect all the channels or the instrument in general.

Display Options

On pushing **SETUP** key while the display is flashing **SYS**, the display briefly shows '**dSP OPt**' (for display option) and then the current Display Option setting. Following display options are selectable. Use **^v** key to step thru these options. Once the desired Display Option is shown, push **SETUP** key to enter the setting and go to set Display Time.

<u>Option</u>	<u>Display</u>	<u>Description</u>
SCAN	SCAN	Scan all channels that are turned on.
HIGH POINT	HIGH Pt	Display peak value of all channels that are turned on.
LOW POINT	LO Pt	Display low reading of all channels that are turned on.
CH1 – CH2	CH1 – CH2	Channel 1 differential with respect to channel 2
CH2 – CH1	CH1 – CH2	Channel 2 differential with respect to channel 1
ELAPSED TIME	ELPSEd t	Elapsed time

'Display Time' Setup

The first parameter in system setup mode is the DISPLAY TIME. This determines how many seconds a channel's reading is displayed before scanning to the next channel. The display will first show '**dSPLY t**' (for Display Time), and then the present setting in seconds. Use **^v** key (ref. Setup For High Scale) to set the desired DISPLAY TIME value. Once the desired DISPLAY TIME value is displayed, push **SETUP** key to enter that value and go to Setup For Relay Latch/Non-Latch

Audio Alarm ON/OFF

The next step lets you program the buzzer ON or OFF. The display will either read 'ALR ON' or 'ALR OFF'. To make an alternate selection, push **^v** key. After making any change or to retain current setting, push **SETUP** key. This will take you to the very beginning of setup mode.

Cold Junction Setting

The next parameter is the cold junction reference temperature. The display will first show '**COLD JN**', and then the cold junction temperature will be indicated. **IF NECESSARY**, use the **^v** key to adjust until the display reads proper temperature. Once the correct temperature is displayed, push **PROG** key to enter that setting and go to Controller Calibration.

NOTE 1: The unit should be powered up for at least fifteen to twenty minutes before any adjustments are made to the cold junction reading.

NOTE2: Cold Junction temperature is the temperature at the connector where thermocouple connects (and forms the junction) into the unit. IT IS NOT THE AMBIENT TEMPERATURE.

Calibration Mode

After setting the Cold Junction Reference temperature, the next step is calibration of channels. This allows easy calibration of each channel without the instrument scanning from channel to channel. The display will show channel input reading in the form '**x-nnnnn**' (where x=channel number and nnnnn is the process reading).

NOTE 1: ONLY channels that are turned ON will be displayed at this time!

NOTE 2: Only analog channels can be calibrated.

Thermocouple Calibration Procedure

*Note: Make sure the unit is reading correct cold junction temperature before calibration.
If incorrect, adjust as described in the "Program For Cold Junction" section.*

For calibrating a thermocouple Channel, the following steps should be performed. Note that calibrating one channel will automatically calibrate the other channel. Also, only one type of thermocouple input needs to be calibrated i.e. J,K,T or E. For example, if the calibration is done for a type K thermocouple, types J, T, and E are automatically calibrated.

1. Connect a thermocouple calibration source to the unit.
2. Dial in 1100 degrees centigrade on the calibrator (Note: unit must be programmed for displaying in centigrade).
3. Adjust the gain pot (see diagram of rear view of instrument) on the back of the instrument until the display reads '1100'.
4. Short Channel #1's input with a wire or shorting bar (make sure to disconnect the calibrator so as not to damage it).
5. Push DATA key. The display will read '0002' --- or some other value.
6. Adjust offset pot on back of instrument (ref. Fig. 3) until the display reads '0000'.
7. Push PROG key once -- the display will show Cold Junction temperature.
8. Remove the shorting bar from Channel one input and connect the thermocouple calibrator again.
9. Repeat steps 2 through 7 till the unit reads proper temperature. Press 'PROG' key to step the display to next Channel.

Input Range Setup (for current and voltage):

Voltage Range Setup (0-5vdc, 0-10vdc)

After calibration, the VOLTAGE range may be setup. The display will briefly show 'U rAnGE' (for "Voltage Range"). Then the display will show the present setting. Use ^v key (ref. Setup For High Scale) to set the desired VOLTAGE value. Once the desired VOLTAGE value is displayed, push SETUP key to enter that value and go to the next step.

Voltage Range Setup (for millivolt inputs)

For Millivolt input units (i.e. the units that have millivolt input option instead of thermocouples), the display will first show 'HV rnGE' (for "High Voltage Range"). After the High Voltage range is set, the display shows 'LV rnGE' (for "Low Voltage Range" i.e. for millivolt input). Enter values for respective inputs.

Current Range Setup

After the VOLTAGE range, the CURRENT range may be set. The display will briefly show 'C RANGE' (for "Current Range") followed by previous value. Use ^v key (ref. Setup For High Scale) to set the desired CURRENT value. Once the correct CURRENT range is displayed, push SETUP key to enter that value and return to 'SYS CH' display.

Correct Range Settings

Following RANGE values should be entered for various inputs:

<u>INPUT</u>	<u>RANGE Value</u>
0-5 Vdc	5.000
0-10 Vdc	10.000
0-100 Mv	100.0
4-20 Ma. (loop current)	20.00

Setup Examples

Example #1: Use of the OFFSET Parameter

Setup for a 4-20ma transducer signal corresponding to 0-500 gallons of fluid (reading in 10th of a gallon resolution):

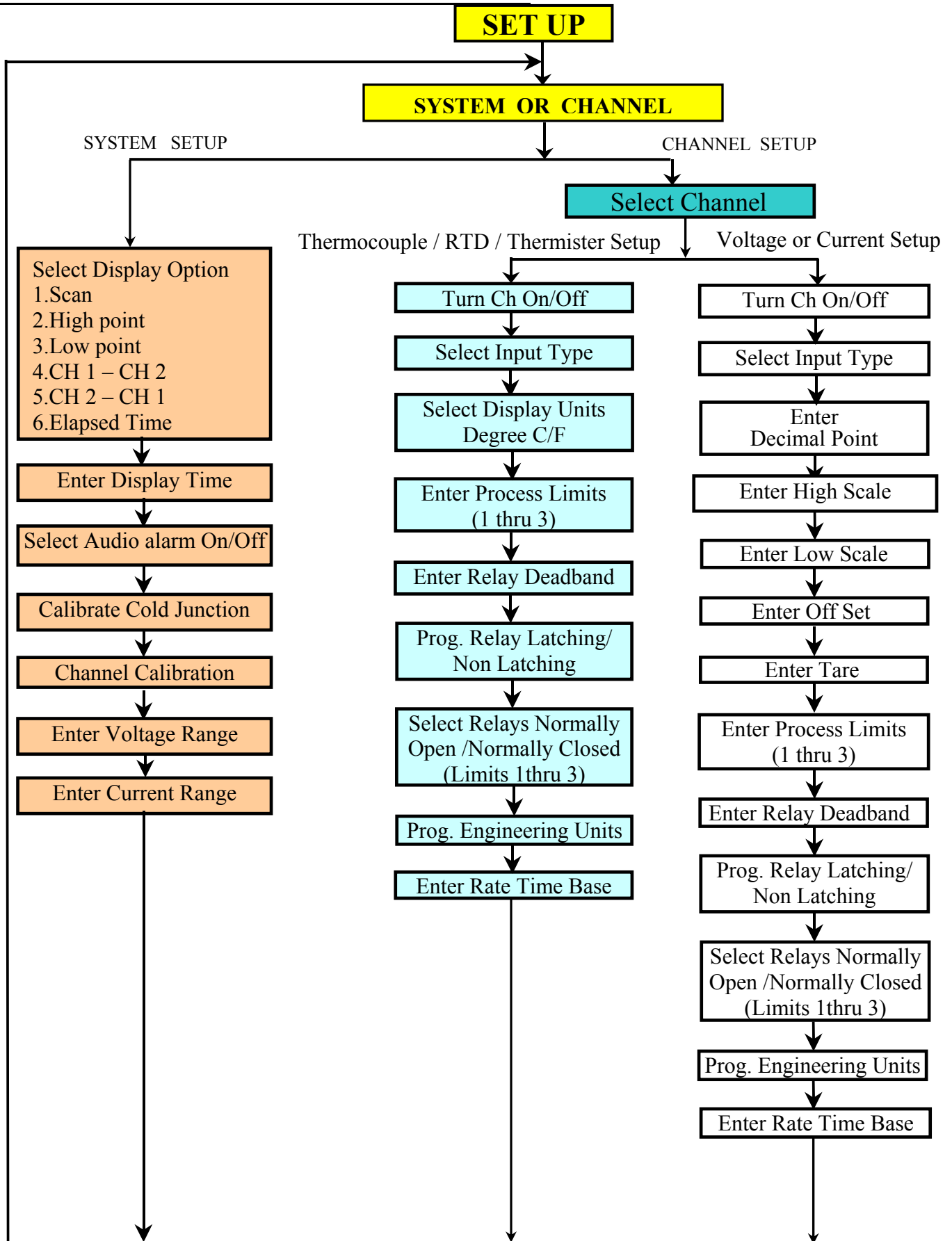
DECIMAL POINT	= 999.9	OFFSET	= 4.000
HIGH SCALE	= 500.0	TARE	= 0.000
LOW SCALE	= 000.0		

Example #2: Use of the LOW SCALE Parameter

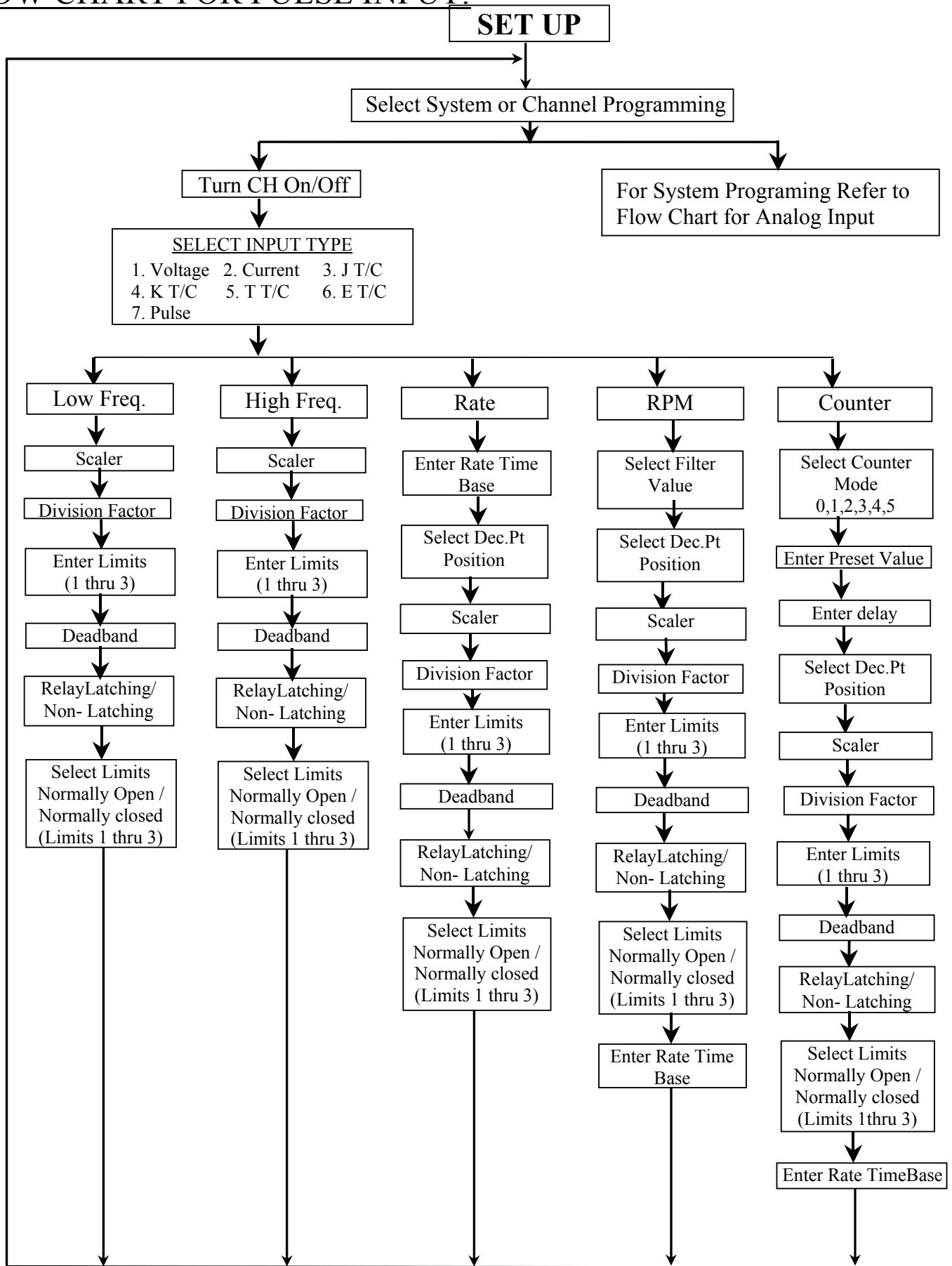
Setup for a 4-20ma transducer signal corresponding to 500-2000 degrees Fahrenheit temperature i.e. 500 degrees at 4ma and 2000 degrees at 20ma (one degree resolution):

DECIMAL POINT	= 9999	OFFSET	= 4.00
HIGH SCALE	= 2000	TARE	= 0.000
LOW SCALE	= 500		

FLOW CHART FOR ANALOG INPUT



FLOW CHART FOR PULSE INPUT:



SETUP FOR A PULSE CHANNEL:

Turning a Channel ON or OFF

The very first thing after selecting a channel is to turn it on or off. A channel should be turned off if it is not being used. Use ^v key to select the desired setting. If a channel is OFF, the display will show '**CHx OFF**' (where 'x' is the channel number) and if it is ON the display is '**CHx ON**'. Use ^v key to display the desired ON/OFF setting, and then push **SETUP** key to go to the next parameter.

MODES OF OPERATION FOR A PULSE INPUT CHANNEL:

A pulse Channel can operate in any one of the following modes:

<u>MODE</u>	<u>DISPLAY SHOWS</u>	<u>DESCRIPTION</u>
Counter Mode	COUnTEr	For a Channel being configured as a counter.
Rate Mode	rAtE	For a Channel being configured as a rate monitor.
RPM mode	SyS rP	For a Channel being configured as RPM monitor.
High Frequency Mode	HI FrEq	For a Channel being configured as high frequency meter.
Low Frequency Mode	LO FrEq	For a Channel being configured as low frequency meter.

To change operating mode of the system push ^v key. After obtaining the desired mode, push **SETUP** key.

The next function to be configured depends on the operating mode selected above. To configure for different modes, look under appropriate headings.

SETUP FOR COUNTER:

If a channel is setup as a counter, then the following steps have to be performed. To abort at any point during the setup, push **RESET** key once to get to the very beginning of SETUP, or push and hold (till SAVING is displayed) to get out of SETUP altogether.

<u>FUNCTION</u>	<u>DISPLAY SHOWS</u>	<u>TO CHANGE</u>
Counter mode 0	Cntr 0	Push ^v key till desired mode is selected .
Counter mode 1	Cntr 1	
Counter mode 2	Cntr 2	
Counter mode 3	Cntr 3	
Counter mode 4	Cntr 4	
Counter mode 5	Cntr 5	
Preset value entry	'PrESEt' followed by preset value e.g. 10.024 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Relay Delay entry	'dELAY' followed by preset value e.g. 24 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Decimal point placement	dP 9999 dP 999.9 dP 99.99 dP 9.999	Push ^v key to move decimal point to desired position.
Scaler	'SCALER' followed by preset Scaler value e.g. 0.00024 with	Push ^v key to increment or decrement active digit. Push <NXT> key to change

FUNCTION	DISPLAY SHOWS	TO CHANGE
	active digit flashing.	active digit.
Division Factor	'dIV FAC' followed by preset division factor e.g. 12 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Limit 1 Limit 2 Limit 3	'CH1 LT1' followed by preset Limit 1 value e.g. 123.4 with active digit flashing. For limits 2 & 3 CH1 LT2, CH1 LT3 followed by limit value.	Push ^v key to increment or decrement active digit. Push <NXT> key to active digit. NOTE: Limit3 is audio visual alarm only --- it has no relay output.
Relay deadband	'dEAbd' followed by deadband value e.g. 0002	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active.
Latching or non - latching relay setup.	'LATCH' for latching mode. 'NON LCH' for non- latching mode.	Push ^v key to obtain alternate mode.
Limit outputs programmed as normally open or closed	LT1 N.O. or LT1 N.C LT2 N.O. or LT2 N.C LT3 N.O. or LT2 N.C	Use ^V key to obtain alternate mode.
Time base for RATE calculation (In seconds)	'T BASE' followed by previously programmed value e.g. '1.999'	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active

SETUP FOR HIGH AND LOW FREQUENCY MONITOR:

If the unit is setup as a frequency meter, then following SETUP steps are performed.

FUNCTION	DISPLAY SHOWS	TO CHANGE
Scaler	'SCALER' followed by preset scaler value e.g. 10.00024 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Division Factor decrement	'DIV FAC' followed by preset division by preset division factor. (e.g. 12' with active digit flashing).	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Limit 1 Limit 2 Limit 3	'CH1 LT1' followed by preset Limit 1 value e.g. 123.4 with active digit flashing. For limits 2 & 3 CH1 LT2, CH1 LT3 followed by limit value.	Push ^v key to increment or decrement active digit. Push <NXT> key to active digit. NOTE: Limit3 is audio visual alarm only --- it has no relay output.
Relay deadband	'dEAbd' followed by deadband value e.g. 0002	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active.

FUNCTION	DISPLAY SHOWS	TO CHANGE
Latching or non - latching relay setup.	'LATCH' for latching mode. 'NON LCH' for non latching mode.	Push ^v key to obtain alternate mode.
Limit outputs prog- rammed as normally open or closed	LT1 N.O. or LT1 N.C LT2 N.O. or LT2 N.C LT3 N.O. or LT2 N.C	Use ^V key to obtain alternate mode.

SETUP FOR RATE MONITOR:

If channel 2 is programmed to operate in RATE mode, then the following steps are performed during SETUP procedure:

FUNCTION	DISPLAY SHOWS	TO CHANGE
Time base for RATE calculation (In seconds)	'rAtE tb' followed by previously programmed value e.g. '1.999'	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active
Decimal point placement	dP 9999 dP 999.9 dP 99.99 dP 9.999	Push ^v key to move decimal point to desired position.
Scaler	'SCALER' followed by preset scaler value e.g. 10.00024 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Division Factor	'DIV FAC' followed by preset division by preset division factor. (e.g. 12' with active digitflashing).	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Limit 1 Limit 2 Limit 3	'CH1 LT1' followed by preset Limit 1 value e.g. 123.4 with active digit flashing. For limits 2 &3 CH1 LT2, CH1 LT3 followed by limit value.	Push ^v key to increment or decrement active digit. Push <NXT> key to active digit. NOTE: Limit3 is audio visual alarm only --- it has no relay output.
Relay deadband	'dEAdbd' followed by deadband value e.g. 0002	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active.
Limit outputs prog- rammed as normally open or closed	LT1 N.O. or LT1 N.C LT2 N.O. or LT2 N.C LT3 N.O. or LT2 N.C	Use ^V key to obtain alternate mode.

SETUP FOR RPM MONITOR:

If the unit is setup as an RPM monitor then following steps are performed for setting up various parameters:

FUNCTION	DISPLAY SHOWS	TO CHANGE
Filter value	1,2,4,6,10,15,20,30,60	Push ^v key to obtain desired value
Decimal point placement	dP 9999 dP 999.9 dP 99.99 dP 9.999	Push ^v key to move decimal point to desired position.
Scaler	'SCALER' followed by preset scaler value e.g. 10.00024 with active digit flashing.	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Division Factor	'DIV FAC' followed by preset division by preset division factor(e.g. 12' with active digit flashing).	Push ^v key to increment or decrement active digit. Push <NXT> key to change active digit.
Limit 1 Limit 2 Limit 3	'CH1 LT1' followed by preset Limit 1 value e.g. 123.4 with active digit flashing. For limits 2 &3 CH1 LT2, CH1 LT3 followed by limit value.	Push ^v key to increment or decrement active digit. Push <NXT> key to active digit. NOTE: Limit3 is audio visual alarm only --- it has no relay output.
Relay deadband	'dEAdbd' followed by deadband value e.g. 0002	Push ^v key to increment or decrement active digit. Push <NXT> key to make next digit active.
Latching or non - latching relay setup.	'LATCH' for latching mode. 'NON LCH' for non latching mode.	Push ^v key to obtain alternate mode.
Limit outputs programmed as normally open or closed	LT1 N.O. or LT1 N.C LT2 N.O. or LT2 N.C LT3 N.O. or LT2 N.C	Use ^v key to obtain alternate mode.

ALARM OUTPUTS:

Status:

The system has optional process alarm outputs that are activated when limit is exceeded on any of the two channels. The alarms can be programmed as normally open or normally closed (see SETUP) and latching or non-latching. The status of these alarms is indicated on the front panel by LEDs. When ever an alarm is activated the respective LED is turned on. Each channel has two outputs (relay or open collector) and one audio visual alarm. Audio visual alarm provides a visual indication on the front panel (LED) and a buzzer output if a programmed limit value is exceeded. Buzzer can be turned off, if so desired (look under SETUP).

Resetting:

Once energized, alarms can be reset in two different ways --- automatically or manually (non latching or latching). In non-latching mode, the alarm outputs will de-energize on their own when process variable drops below the limit value. In latching mode, they stay energized even if the process variable drops below the limit. To reset the energized outputs in the latching mode, first make the display indicate the limit that needs to be reset (e.g. "CH1 LT2"), by pushing the **DATA** key. Next, keeping the **DATA** key pushed while limit value is displayed, go on to push the **RESET** key. The respective alarm output will de-energize and the system will indicate so by displaying RLY RST.

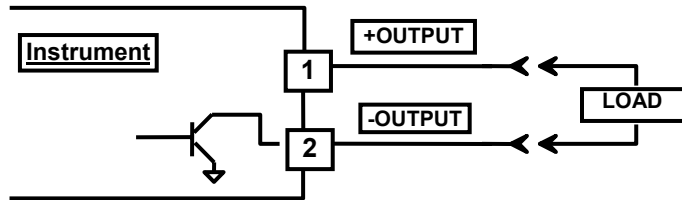
NOTE: Process value for respective relay must be below limit value for it to reset. Other wise the key sequence will be ignored.

Open Collector (solid state) output Option:

DCM units can be ordered with either open collector outputs or electro-mechanical relays. (Check model number printed on the unit for option). If ordered with open collector outputs, then these outputs are programmed during Setup to operate as either Normally Open (NO) or Normally Closed (NC). The default setting is Normally Open.

Whenever a limit is reached, an open collector output provides a 5 Vdc signal at 50milliamp on the output connector, eg.. Limit #1 provides its 5 volt output signal between pins 1 and 2.

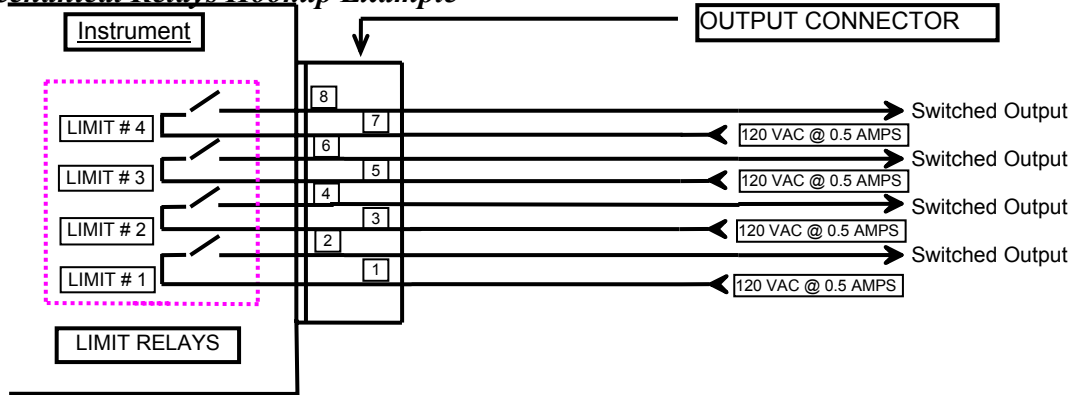
Figure 1. Open Collector Hookup Example



Electro-Mechanical Relay Option:

DCM units can be ordered with either open collector outputs or electro-mechanical relays. (Check model number printed on the unit for option). If ordered with relays, then these relays are programmed during Setup to operate as either Normally Open (NO) or Normally Closed (NC). The default setting is Normally Open. Each of these limit relays provides a switched output whenever a limit is reached. The maximum rating for a 120Vac unit is 120Vac @ 0.5 amp or 28 Vdc @ 1.0 amp. A 240Vac unit is rated at 240Vac @ 0.25 amp. or 28Vdc @ 1.0 amp.

Figure 2. Electro-mechanical Relays Hookup Example



NOTE: LOOK UNDER SPECIFICATIONS FOR RATING ON RELAYS & OPEN COLLECTOR OUTPUTS. UNDER NO CONDITION SHOULD THE RELAYS & OPEN COLLECTOR OUTPUTS BE OPERATED BEYOND THEIR RATED CAPACITY. DOING SO CAN DAMAGE THE UNIT PERMANENTLY.

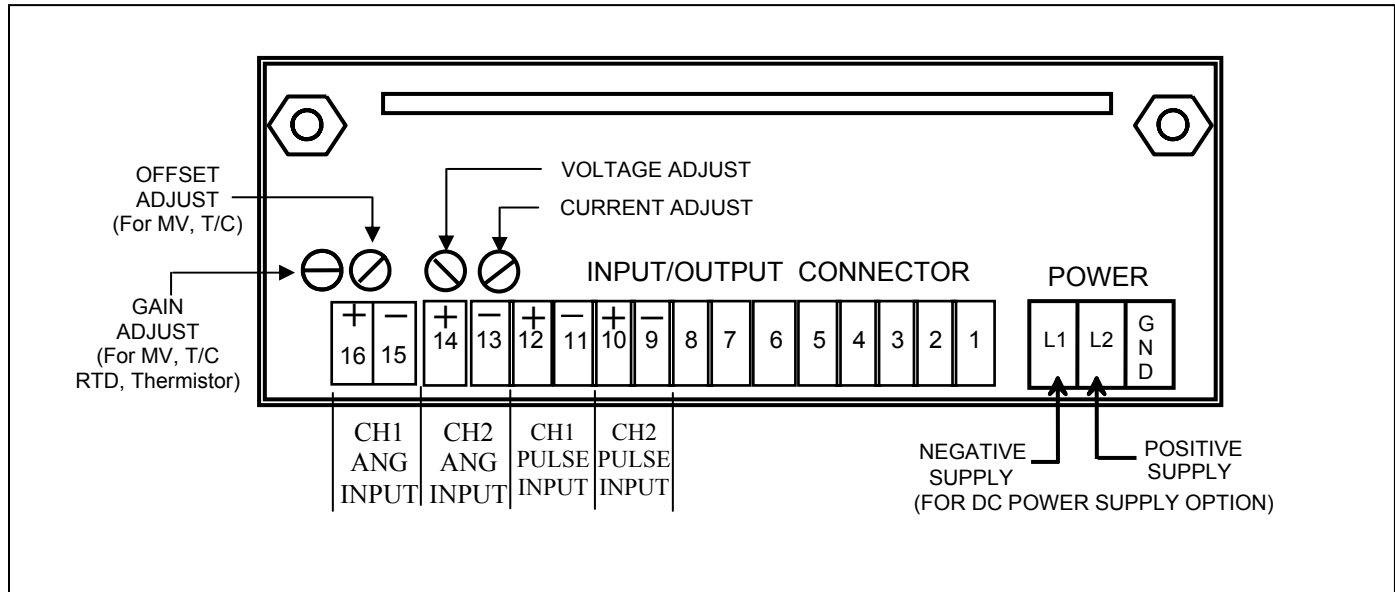
POWER

Power connection should be made to the three terminal connector as shown in figure 3. Also, make note that it is very important that the power line inputs and the power ground are not switched. Doing so will permanently damage the instrument. Refer to the schematic for proper connections. For convenience, the printed circuit board is labeled L1 L2 GND on the under side of three terminal power connector.

For instruments with the 12Vdc power option, refer to Figure 3.

NOTE: WHILE MAKING POWER CONNECTION TO THE UNIT, MAKE SURE THAT AC POWER LINE L1 OR L2 IS NOT ACCIDENTALLY CONNECTED INTO THE GROUND (GND) TERMINAL. THIS WILL RESULT IN PERMANENT DAMAGE TO THE INSTRUMENT. DOUBLE CHECK THE CONNECTIONS BEFORE APPLYING POWER!!

FIG. 3: Power, Input/Output connections & rear view of the instrument.



INPUT/OUTPUT CONNECTOR PIN ASSIGNMENTS

PIN NO

DESCRIPTION

1	CHANNEL1, LIMIT 1 NORMALLY OPEN/OPEN COLLECTOR NEGATIVE
2	CHANNEL1, LIMIT 1 COMMON/OPEN COLLECTOR POSITIVE
3	CHANNEL1, LIMIT 2 NORMALLY OPEN/OPEN COLLECTOR NEGATIVE
4	CHANNEL1, LIMIT 2 COMMON/OPEN COLLECTOR POSITIVE
5	CHANNEL2, LIMIT 1 NORMALLY OPEN/OPEN COLLECTOR NEGATIVE
6	CHANNEL2, LIMIT 1 COMMON/OPEN COLLECTOR POSITIVE
7	CHANNEL2, LIMIT 2 NORMALLY OPEN/OPEN COLLECTOR NEGATIVE
8	CHANNEL2, LIMIT 2 COMMON/OPEN COLLECTOR POSITIVE
9	CHANNEL 2 PULSE INPUT – POSITIVE (+)
10	CHANNEL2 PULSE INPUT – NEGATIVE (-)
11	CHANNEL 1 PULSE INPUT – NEGATIVE (-)
12	CHANNEL 1 PULSE INPUT – POSITIVE (+)
13	CHANNEL 2 ANALOG INPUT – POSITIVE (+)
14	CHANNEL 2 ANALOG INPUT – NEGATIVE (-)
15	CHANNEL 1 ANALOG INPUT – NEGATIVE (-)
16	CHANNEL 1 ANALOG INPUT – POSITIVE (+)

NOTE: PINS ON THE CONNECTOR OTHER THAN THE ONES DESIGNATED ABOVE MUST NOT BE CONNECTED TO ANY SIGNAL UNDER ANY CIRCUMSTANCES. ALSO PROPER CONNECTION AND CORRECT ORIENTATION OF THE CONNECTOR ARE NECESSARY TO AVOID MALFUNCTION OR PERMANENT DAMAGE TO THE INSTRUMENT.

MOUNTING

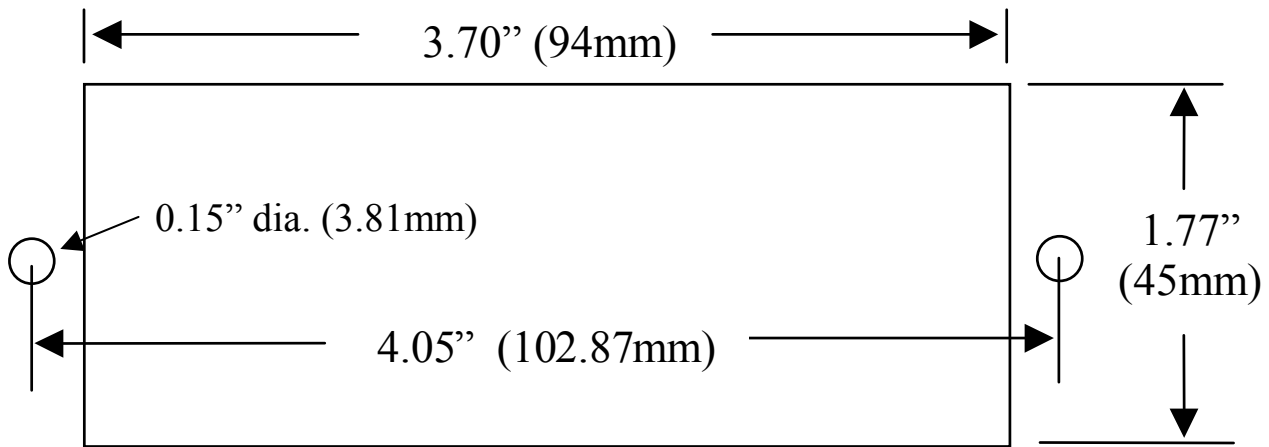
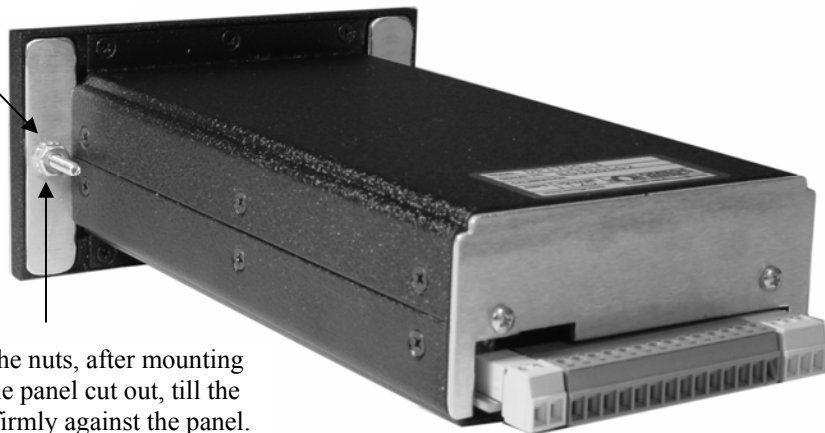


Figure 4. Panel Cutout Dimensions

1. Cut out Panel and mounting hole dimensions as shown in figure 8 above.
2. Remove the nuts from the mounting screws on the Panel Meter (see picture below).
3. Insert panel meter into the hole until it is flush with the panel.

Install the nuts and tighten them till the unit is held firmly against the panel.

1. Remove nuts and insert Panel Meter and screws in mounting holes in the panel cut out.



2. Tighten the nuts, after mounting the unit in the panel cut out, till the unit is held firmly against the panel.

WARRANTY

All products manufactured by Kaif Digital Corporation are warranted against defective material and workmanship for a period of one year from the date of shipment.

Any defective equipment returned to Kaif Digital Corporation (transportation charges prepaid) during the warranty period will be repaired or replaced free of charge provided there is no evidence of abuse or mishandling.

All products returned to Kaif Digital Corporation must be insured by sender and must be carefully packaged and adequately protected to prevent breakage from shock and rough handling that might occur during shipment. All applicable shipping charges, insurance, duties, and taxes must be prepaid by sender.

If, during the period of this warranty, the product appears to have a defect in material or workmanship, please call your local Kaif Digital representative or write:

Customer Service Department

Kaif Digital Corporation
7678 E. GREENWAY ROAD
SCOTTSDALE, AZ 85260.

Tel: (480) 607-3100
Fax: (480) 607-3101