

5.1 TUNE PARAMETERS

The Controller parameters appear in the following sequence:

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
1	Input Correction Offset	Inp Cor	Modifies Actual PV Value: Offset PV + Actual PV = PV Value Used	For linear input, limited by Scale Range Max. and Scale Range Min. Default = 0
2	Output 1 Power	Po1	Indicates current Output1 Power Level	Not Adjustable "Read Only"
3	Output 2 Power	Po2	Indicates current Output2 Power Level	Not Adujstable "Read Only"
4	Recorder Output Scale Maximum(5)	P Out HI	The Value of the process variables or setpoints (as applicable) for which the recorder output is a maximum	-1999 to 9999 (decimal point as for the process variable input range). Default =Input Range Max
5	Recorder Output Scale Minimum(5)	P Out Lo	The value of the process variable or setpoint(as applicable) for which the recorder output is a minimum	-1999 to 9999 (decimal point as for the process variable input range). Default = Input Range Min.

6	Proportional Band 1 (PB1)	P. Band 1	Defines Portion of input span in which the Output 1 power level is proportional to the (offset) process variable value	0.0% (ON/OFF control) to 999.9% of input span Default 10.0%
7	Proportional Band 2 (PB2)(2)	P. Band 2	Defines Portion of input span in which the Output 2 power level is proportional to the (offset) process variable value	0.0% (ON/OFF control) to 999.9% of input span Default 10.0%
8	AutoReset (3)	AutoRset	Integral Time Constant	1 second to 99 minutes 59 seconds per repeat Default 5.00 minutes
9	Rate (3)	Rate	Derivative Time Constant	00 seconds to 99 minutes 59 seconds Default 1.15 minutes
10	Spread (4)	Spread	Defines the portion of the proportional band (PB1 + PB2) over which both outputs are active (overlap) or neither output is active (deadband)	-20% to +20% (negative value = deadband, positive value = overlap) Default = 0%

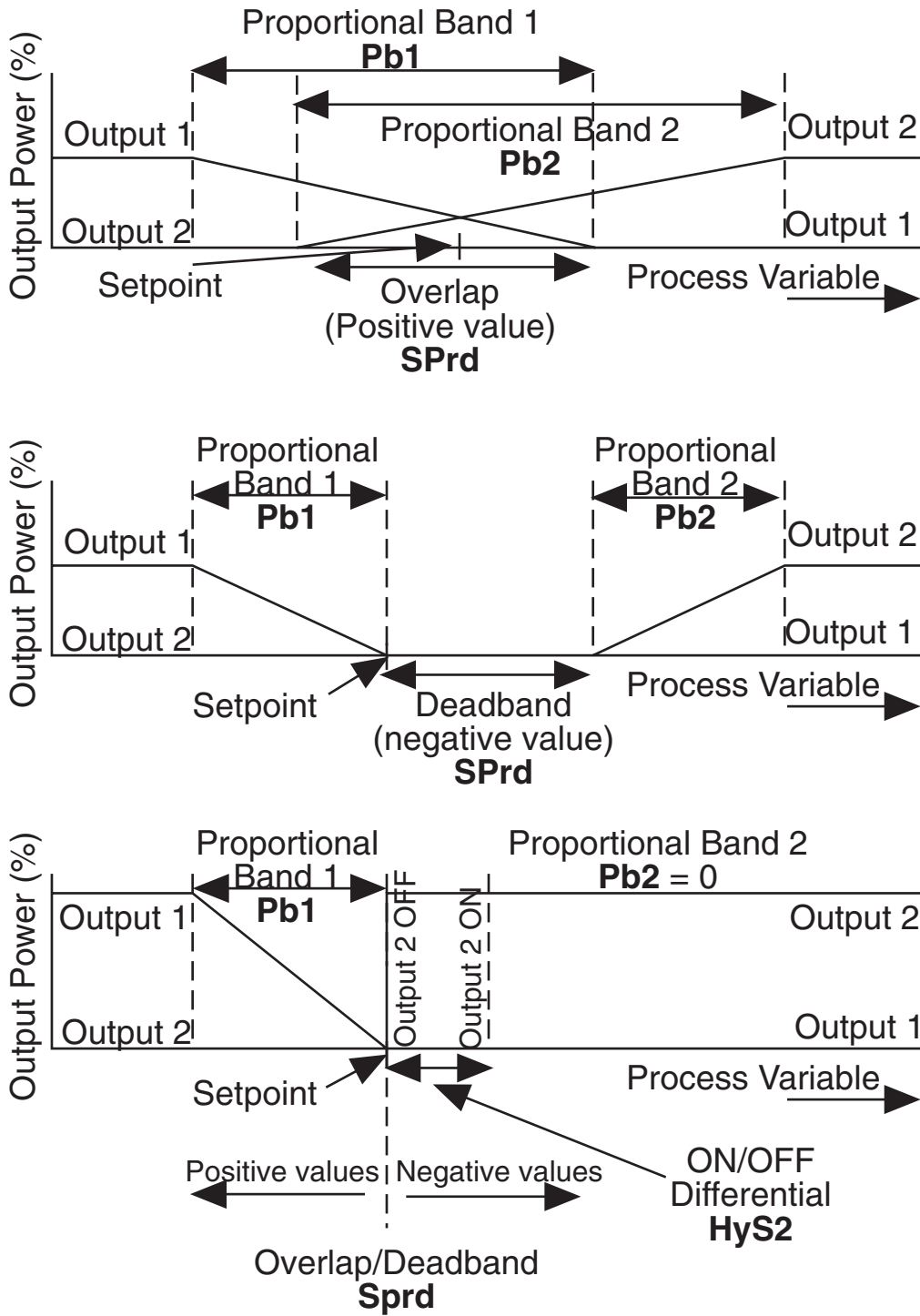
11	Manual Reset (3)	Man Rset	Bias applied to output power, expressed as a percentage of output power	0% to 100% (Output1 only) -100% to +100% (Output 1 & Output 2) Default 25%
12	Hysteresis (7)	Hyst 1	Defines band below setpoint where output 1 will not transition	0.1 to 10% of input span Default 0.5% (=7°F for input type 1420)
13	Hysteresis (7,2)	Hyst 2	Defines band above setpoint where output 2 will not transition	0.1 to 10% of input span Default 0.5% (=7°F for input type 1420)
14	Setpoint Rate	SP Rate	Determines maximum rate of change for setpoint in units per hour	1 to 9999, INF Default = INF (infinite)
15	Output 1 Cycle Time (6)	CycTime1	Limits frequency of operation of output relay to maximize relay life	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 seconds. Default = 1 second
16	Output 2 Cycle Time (6,2)	CycTime2	Limits frequency of operation of output relay to maximize relay life	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 seconds. Default = 1 second
17	Motor Travel Time (8)	MT Time	Time Taken for value to travel from one end stop to the other	5 seconds to 5 minutes Default = 1.00 Minute

18	Minimum Motor OnTime(8)	MinDrive	Minimum drive effort required to initiate movement in a stationary valve	0.0 seconds to Motor Travel Time divided by 10 Default=1.0 second
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NOTES ON TUNE PARAMETER MODE

1. The input Correction value should be chosen with care. Any adjustment to this parameter is, in effect, a calibration adjustment. Injudicious application of values to this parameter could lead to the displayed process variable value bearing no meaningful relationship to the actual process variable value. There is no front panel indication when this parameter is in effect (i.e. has been set to a non-zero value).
2. These parameters are applicable only if the secondary control (COOL) output is fitted.
3. These parameters are not applicable if Proportional Band 1 is set to 0 (i.e. ON/OFF control).
4. This parameter is not applicable if Proportional Band 1 is set to 0 or if Output 2 (COOL) is not fitted.
5. These parameters are not applicable if the Recorder Output option is not fitted.
6. Output 1 cycle Time is not applicable if Proportional Band 1 is set to 0 or if Output 1 is a DC linear output. Output 2 cycle Time is not applicable if Proportional Band 1 is set to 0, if Output 2 is not fitted or if Output 2 is a DC linear output.
7. These parameters only apply if the proportional band has been set to 0.
8. These parameters only apply if Control Action in configuration is Mdr or Mdd.

FIGURE 5-1



5.2 EXITING TUNE MODE

The operator may exit from Tune Mode by pressing the MODE key.

Section 6 - Alarm Mode

The Alarm Mode parameters control the type of alarms used and their settings.

To enter the Alarm Setting Mode from Base Mode:

1. Press the MODE key until **Alarm** appears in the message display
2. Press the SCROLL key to enter the alarm setting mode

To return to Base Mode:

1. Press the MODE key until, **Basemode** appears in the message display
2. Press the SCROLL key to return to Base Mode

6.1 ALARM PARAMETERS

Press the SCROLL key to step through the parameters. Press the UP and DOWN keys to change the parameter setting.

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
1	Alarm 1 Type	Alarm 1	Specifies Alarm 1 Operation	P_hi-Process High P_Lo-Process Low dE-Deviation bAnd-Band nonE-None
2	Alarm 2 Type	Alarm 2	Specifies Alarm 2 Operation	P_hi-Process High P_Lo-Process Low dE-Deviation bAnd-Band nonE-None

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
3	Alarm Inhibit	Inhibit	Specifies which alarms are inhibited	nonE-None ALA1-Alarm 1 ALA2-Alarm 2 both-Both Alarms
4a	Process High Alarm 1 value	HiAlarm 1	If Alarm 1 is a process high alarm, process variable at or above which Alarm 1 will be active	Input Range Max to input Range Min. Default=Input Range Max.
4b	Process Low Alarm 1 value	LoAlarm 1	If Alarm 1 is a process low alarm, process variable at or below which Alarm 1 will be active	Input Range Max to input Range Min. Default=Input Range Min.
4c	Band Alarm 1 Value	BaAlarm1	If Alarm 1 is a Band Alarm, the band of process variable values (centered on the setpoint) outside which the process variable will cause the alarm to be active	$\pm(\text{Input Span})$ From setpoint Default = five input units

4d	Deviation (High/Low) Alarm 1 Value	DeAlarm 1	If Alarm 1 is a Deviation High/Low alarm, gives a value above (positive value) or below (negative value) the setpoint. If the process variable deviates from the setpoint by a margin greater than this value, the alarm becomes active	\pm (input range) from setpoint. Default = five input range units
5	Alarm 1 Hysteresis value	Al1 Hyst	Value defines a hysteresis band on the "safe" side of the Alarm 1 value	1 unit to X units where X = 10% of input span.
6a	Process High Alarm 2 value	HiAlarm 2	If Alarm 2 is a process high alarm, process variable at or above which Alarm 2 will be active	Input Range Max to input Range Min. Default=Input Range Max.
6b	Process Low Alarm 2 value	LoAlarm 2	If Alarm 2 is a process low alarm, process variable at or below which Alarm 2 will be active	Input Range Max to input Range Min. Default=Input Range Min.

6c	Band Alarm 2 Value	BaAlarm2	If Alarm 2 is a Band Alarm, the band of process variable values outside which the process variable will cause the alarm to be active	$\pm(\text{Input Span})$ From setpoint Default = five input units (centered on the setpoint)
6d	Deviation (High/Low) Alarm 2 Value	DeAlarm 2	If Alarm 2 is a Deviation High/Low alarm, gives a value above (positive value) or below (negative value) the setpoint. If the process variable deviates from the setpoint by a margin greater than this value, the alarm becomes active	$\pm(\text{input range})$ from setpoint. Default = five input range units
7	Alarm 2 Hysteresis value	Al2 Hyst	A non-zero value defines a hysteresis band on the safe side of the Alarm 2 value	1 unit to X units where X = 10% of input span.
8	Loop Alarm Enable	Loop Alm	Enables/disables Loop Alarm	EnAb disA Default=disA

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
9	Loop Alarm Time	LpAtime	If ON/OFF control is selected, and loop alarm is enabled this defines the duration of the saturation condition after which the Loop Alarm is Activated.	1 second to 99 minutes 59 seconds. Default = 99 minutes 59 Seconds.

6.2 ALARM INHIBIT FACILITY

On Power-up, an "alarm" condition may occur, based on the alarm value, the process value and, if appropriate to the alarm type, the setpoint value. This would normally activate an alarm; however, if the pertinent alarm is inhibited, the alarm indication is suppressed and the alarm will remain inactive. This will prevail until the "alarm" condition returns to the "inactive" state, whereafter the alarm will operate normally.

6.3 LOOP ALARM AND LOOP ALARM TIME

The Loop Alarm is a special alarm which detects faults in the control feedback loop by continuously monitoring process response to the control output(s).

The Loop Alarm facility, when enabled, repeatedly checks the control output(s) for saturation i.e. either or both outputs being at the maximum or minimum limit. If an output is found to be in saturation, the Loop Alarm facility starts a timer; thereafter, if the saturated output has not caused the process variable to be corrected by a predetermined amount V after a time T has elapsed, the Loop Alarm goes active. Subsequently, the Loop Alarm facility repeatedly checks the process variable and the control output(s). When the process variable starts to change value in the correct sense or when the saturated output comes out of saturation, the Loop Alarm is deactivated.

For PID control, the Loop Alarm Time T is always set to twice the value of the Reset (Integral Time Constant) parameter. For On/Off control, the user defined value of the Loop Alarm Time parameter is used.

The value of V is dependent upon the input type:

°C ranges: 2°C or 2.0°C

°F ranges: 3° F or 3.0°F

Linear ranges: 10 least significant display units

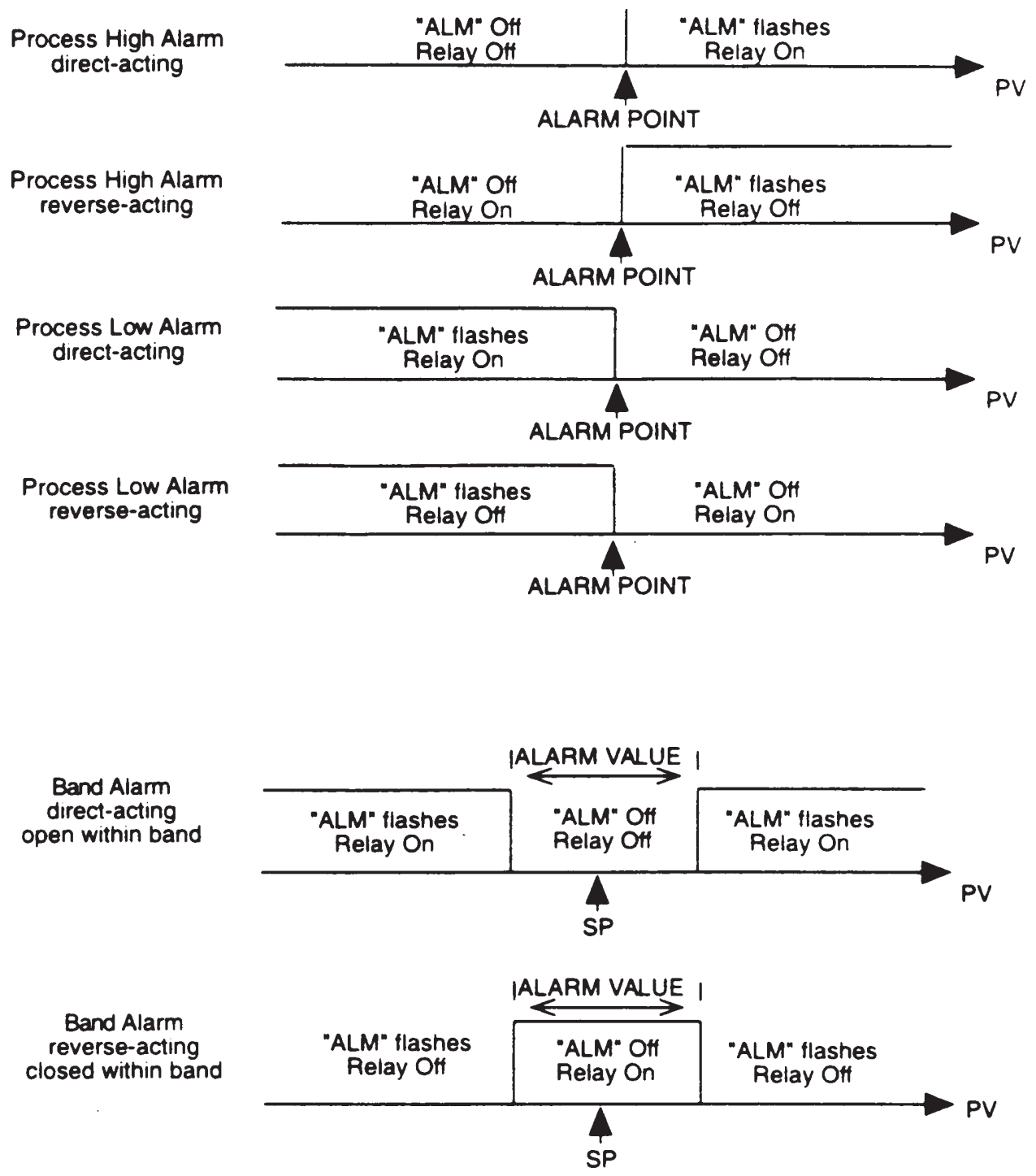
For single output controllers, the saturation limits are 0% and Output Power Limit. For dual output controllers, the saturation limits are - 100% and Output Power Limit.

Notes:

1. Correct operation of the Loop Alarm depends upon reasonably accurate PID tuning.
2. The Loop Alarm is automatically disabled during Manual Control Mode and during execution of the Pre-Tune facility. Upon exit from Manual Control Mode or after completion of the Pre-Tune routine, the Loop Alarm is automatically re-enabled.

When full ON/OFF control is selected (i.e. Proportional Band 1 is set to 0) and Loop Alarm is enabled, the Loop Alarm Time parameter determines the duration of the saturation condition after which the Loop alarm will be activated. It may be adjusted within the range 1 second to 99 minutes 59 seconds. This parameter is omitted from the display sequence if ON/Off control is not selected or Loop Alarm is disabled. The default setting is 99:59.

FIGURE 6-1



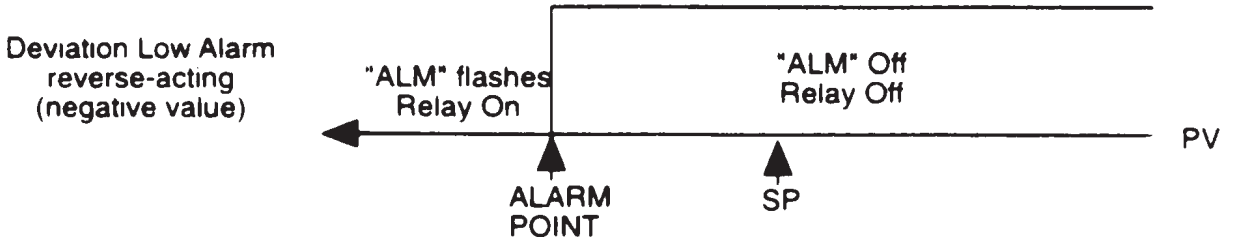
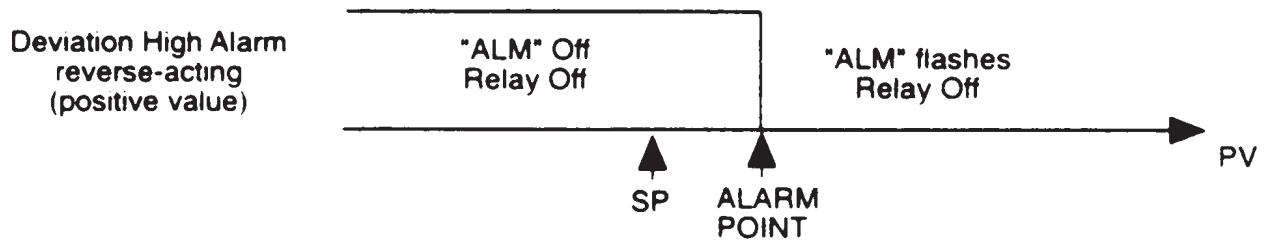
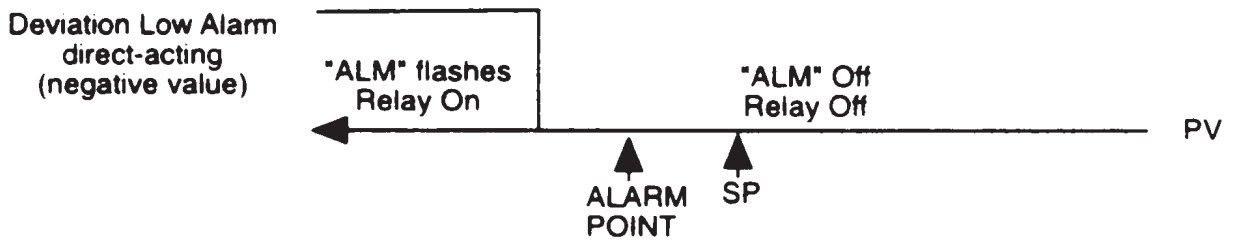
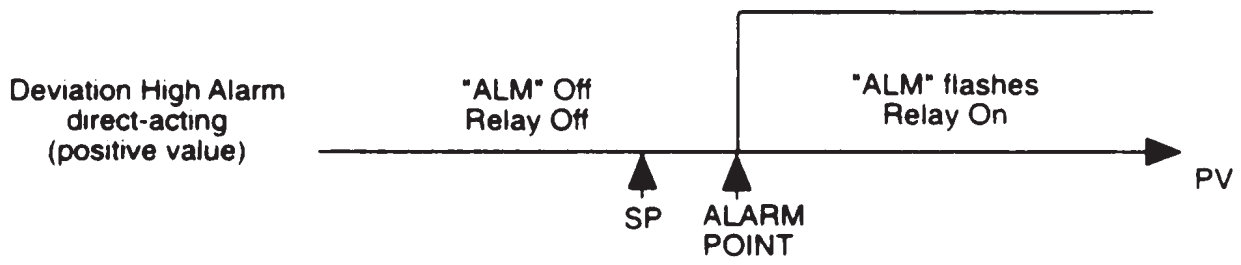
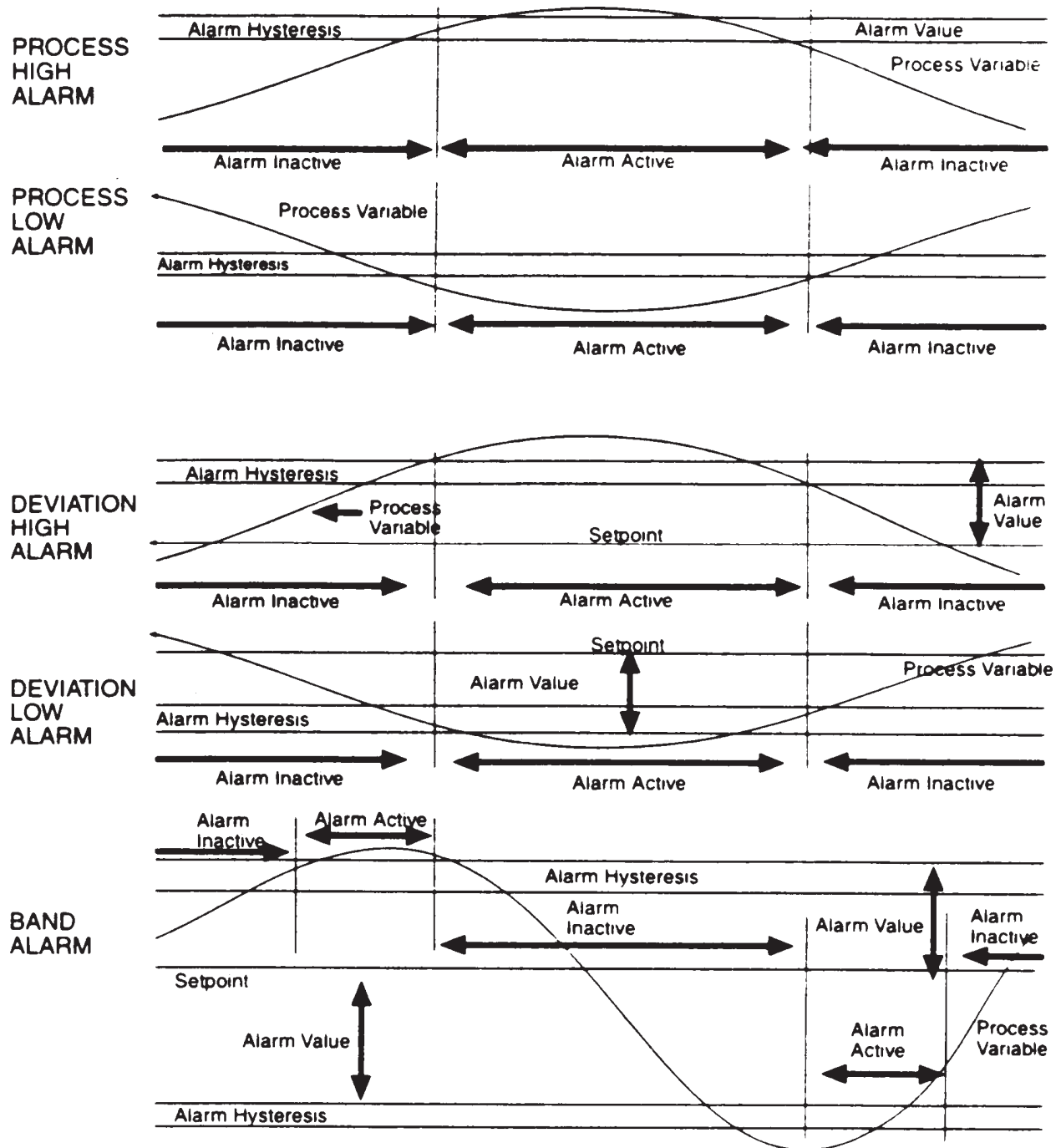


FIGURE 6.2

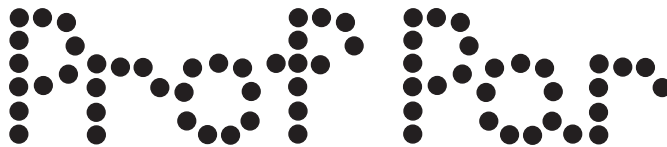


Section 7 - Defining and Viewing a Profile (Profile Set Mode)

The instrument may be put into Profile Set Mode from either Base Mode or Program Run Mode (i.e. with a program currently running).

7.1 ENTRY INTO PROFILE SET MODE

1. Press the MODE key until the Message Display shows:



2. Press the SCROLL key.

The instrument will enter Profile Set Mode, the **SET** and **PRG** indicators will go ON and the operator will be able to edit programs and segments.

To return to Base Mode, press the MODE key.

Program parameters are divided into three categories:

- (a) Those common to all programs - global parameters
- (b) Those which apply to a specific program as a whole
- (c) Those relevant to a specific segment in a specific program

In Profile Set mode, the operator will be presented with the first of a sequence of parameter displays. The operator may then step through the sequence, using the SCROLL key. The parameter setting (in the lower Main Display) may be changed using the UP/DOWN keys. The displayed Program Number may be changed using the PROF key and the displayed Segment Number may be changed using the RUN/HOLD key.

7.2 PARAMETERS COMMON TO ALL PROFILES

(Program Number = A, Segment Number = Blank)

The parameters common to all programs (global parameters) are presented for edit/viewing in the following sequence:

To view the parameters in the Global category, press the PROF key until the Program Number shown is "A". Press the RUN/HOLD key until the segment Number shown is blank. Press the SCROLL key.

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
1	Start On	Start on	Defines setpoint value at start of each program	SEtP-Current Controller setpoint value Proc-Current Process variable value
2	Go To	Go To	Defines Basemode Status at end of each program	ON= Outputs are active OFF=Outputs are inactive
3	End On	End on	Defines setpoint value at end of each program	F_SP-End on Final SP value value* SEtP-End on Controller SP value

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
4	Delay Time	Delay	Defines delay (in hours/min) between initiating the program and actually starting	Numerical value, with the decimal point separating the two units (hours/min)
5	Program Lock	LockProg	Defines whether the operator is permitted to change program definitions while a program is running/held	On - No changes permitted OFF- changes permitted
6	Power Fail Recovery Period	Recovery	Defines length of power loss before automatic return to Base Mode after restoration of power, regardless of recovery type	1:00 - 24:59 NOTE: If the real time clock option has not been provided changing this value to 0.01 will allow selection of recovery type. Setting this to 0.00 will force a return to Base Mode.
7	Power Fail Recovery Type	Rec Type	Defines response to restoration of power after a power loss. This parameter	cont-Continue with mode of operation at time of power failure. rEst-Restart

does not appear if recovery is set to 0.00. These settings can be overridden by the recovery parameter

program running at time of power failure. If one was not running, return to Base Mode. PFH-Setpoint and event outputs are held at values at time of power loss. P.F. Hold is displayed until a key other than RUN/HOLD is pressed. Pressing the RUN/HOLD key will continue the profile if one was running. Holding this key for more than five seconds will abort the profile.

8	Time of day	RTC Time**	Sets clock of real-time clock option	1:00 - 24:59
9	Day of the Week	RTC Day**	Sets day of real time clock option	Sun through Sat
10	External Selection	Ext.Sel***	Defines functions which may be	

controlled
externally

nonE=No
external
selection
SEL=Program
selection only
run=Only Run
Hold,Abort,
and x60
functions
both=All pro-
gram selec-
tion and run
control func-
tions

* The Final Setpoint value for the End Segment of each program.

** Only if real-time clock is fitted.

*** Only if external options are fitted.

7.3 PARAMETERS WHICH APPLY TO A SPECIFIC PROGRAM AS A WHOLE

Only the parameters relevant to the displayed program number (which can be changed using the PROG key) are presented. The parameter sequence is as follows:

To view parameters in the Program category, press the PROF key until the desired Program Number is displayed. Press the RUN/HOLD key until the Segment Number shown is blank.

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
1	Cycle Count	Cycles	Defines the number of times the program will be repeated	1 - 9999 Program will repeat the set number of of times

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
				inF = Program will repeat indefinitely
2	Deviation Hold	Dev. Hold	Selects operation of Deviation Hold facility (relative to setpoint)	<p>OFF = No Deviation Hold</p> <p>H_SP = Deviation Hold above setpoint only</p> <p>L_SP = Deviation Hold below setpoint only</p> <p>both = Deviation Hold above and below setpoint</p>
3*	Hold Band	HoldBand	Defines the width of the Hold Band	Numerical value (0.0 to span)
4*	Hold On	Hold on	Defines whether the Deviation Hold facility is used on ramps only, dwells only or both	<p>d_r = Deviation Hold on ramps and dwells</p> <p>___d = Deviation Hold on dwells only</p>

				____r = Deviation Hold on ramps only
5	Pre-x60	Pre-x60	Determines whether the timebase for the program is pre-selected to be hours/minutes or minutes/seconds	nonE = No pre-selection ON=minutes/seconds OFF=hours/minutes
6	Autostart time Enable	Timer	Selects Whether autostart is active for this profile	ON OFF
7	Start Time**	Strt-ti	Determines the automatic start time for the profile	1:00-24:59 OFF=manual start only
8	Start Day**	Strtday	Determines the day of the week when start time applies	ALL=7 days a week Mon=Monday tuE=Tuesday Wed=Wednesday thu=Thursday Fri=Friday SA=Saturday Sun=Sunday 5dy=Mon-Fri 6dy=Mon-Sat

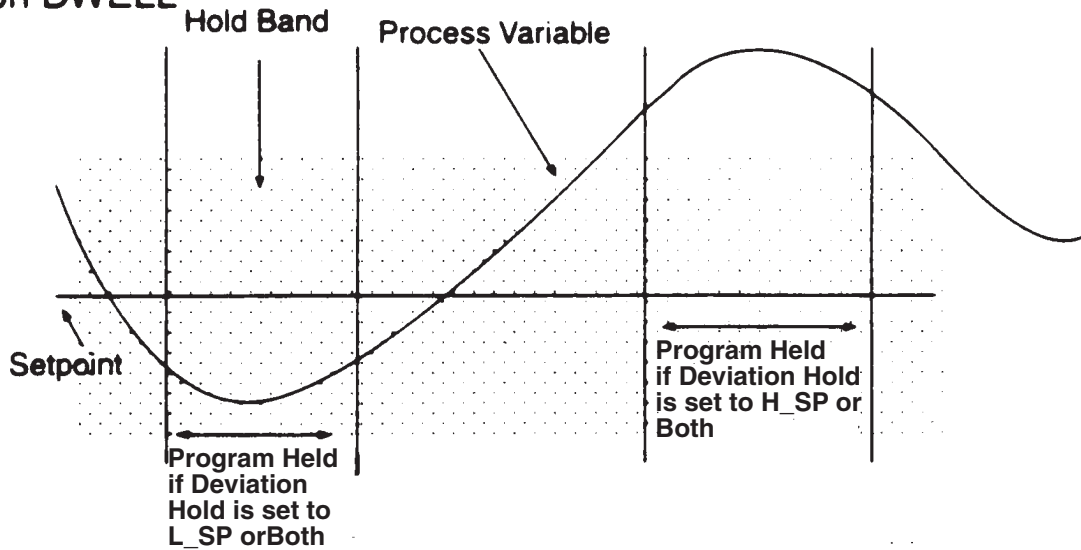
* Not displayed if deviation hold is off.

** Only displayed when real-time clock is fitted, or if timer is set to On.

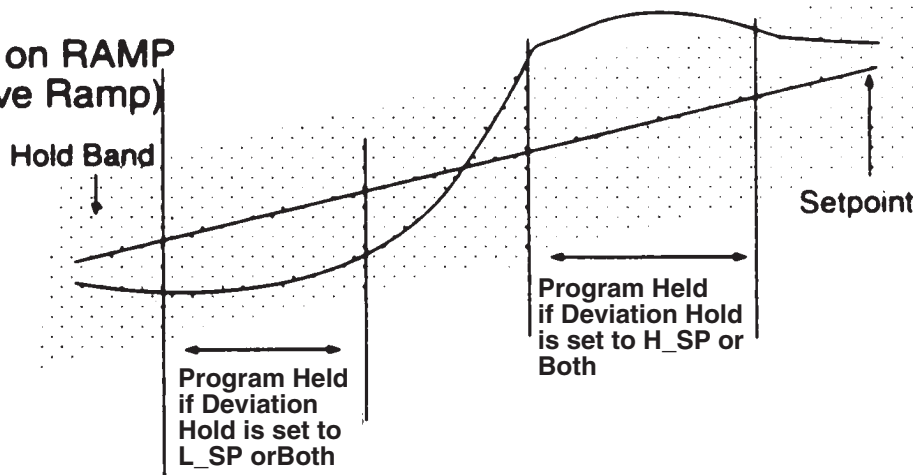
This parameter sequence may be viewed/edited for any program by simply changing the Program Number as required, using the PROF key, then stepping through the parameters with the SCROLL key.

FIGURE 7-1

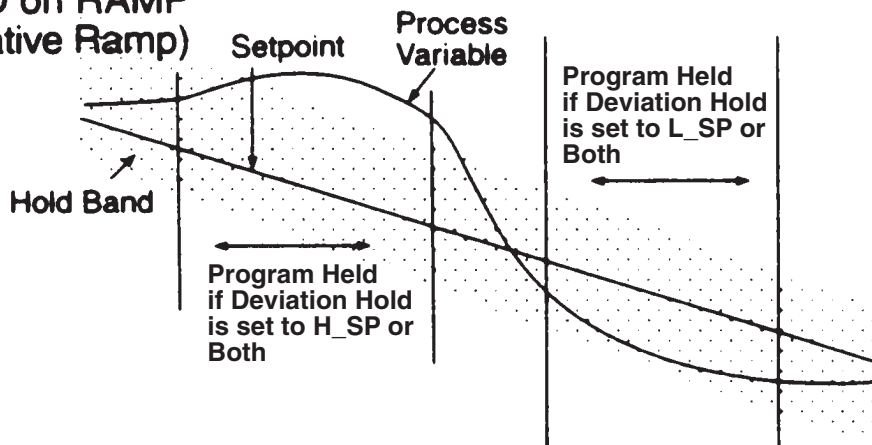
HOLD on DWELL



HOLD on RAMP (Positive Ramp)



HOLD on RAMP (Negative Ramp)



7.4 EDITING/VIEWING PARAMETERS IN ANY/EACH SEGMENT IN A SPECIFIC PROFILE

(Program Number = 1 to 8, Segment Number = 1-16)

Adjust the Program Number (using the PROF key) and the Segment Number (using the RUN/HOLD key) as required. The parameters presented will be those relevant to the program and segment whose numbers are displayed. The parameters sequence for each segment is as follows:

To view parameters in the Segment category, press the PROF key until the desired Program Number is displayed. Press the RUN/HOLD key until the desired Segment Number is displayed.

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
1	Final Setpoint Value	Final SP	Defines the final value of the setpoint for this segment, selects a dwell segment or indicates a Join, Repeat, or End Program segment	Numeric value (limited by SPHi and SPLo) or (by pressing the UP/DOWN keys simultaneously) indicates a dwell with: <p style="text-align: center;">- - - -</p> or, if the segment is already a Join, Repeat, or End Program segment, as shown below

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
2	Segment Time or Ramp Rate as selected in Configuration Mode	Time or RampRate	Defines the duration/ramp rate of the of the segment or whether this is a Join, Repeat or End Program segment*	<p>Four-digit number in the form nn.nn (hours. minutes or seconds) or negative values as follows:</p> <p>J01 - Join to Program 1 J02 - Join to Program 2 J03 - Join to Program 3 J04 - Join to Program 4 J05 - Join to Program 5 J06 - Join to Program 6 J07 - Join to Program 7 J08 - Join to Program 8 rEP - Repeat Segment End - End Program</p>

STEP	DESCRIPTION	MESSAGE DISPLAY	FUNCTION	AVAILABLE SETTING
3	Event †	Event	Defines the states of the four event outputs for this segment	Four-bit binary number (0=inactive, 1=active)

* If a segment is set to be a Join segment, a repeat segment or an End Program segment, the next depression of the SCROLL key will set the Segment Number to A and the parameter displayed will be the first in the sequence of parameters common to the whole program - Cycle Count. Otherwise, the next depression of the SCROLL key will display the next segment parameter - Event (for the current segment) if the Event Output hardware is fitted.

† This parameter appears in the sequence only if the Event Output hardware is fitted, in which case this parameter will be followed by the Final Setpoint Value parameter for the next segment. If this hardware is not fitted, this parameter will be omitted from the sequence and the segment number will be advanced, causing the Final Setpoint Value parameter for the next segment to appear immediately.

CANCELLING JOIN, REPEAT OR END PROGRAM SEGMENTS

This can be achieved:

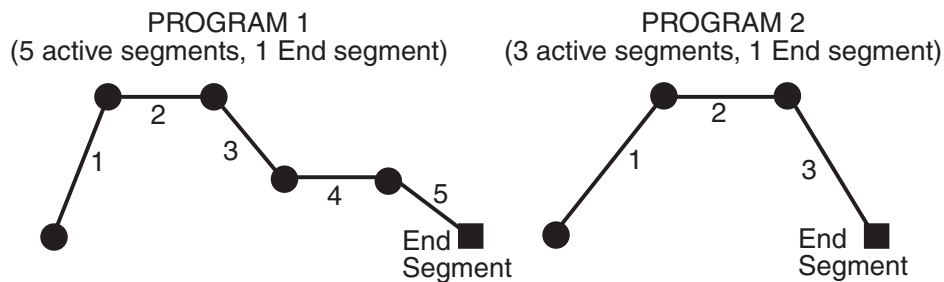
- (a) at the Final Setpoint Value parameter, by simultaneously pressing the UP/DOWN keys to produce a Dwell segment, or
- (b) at the Segment Time/Ramp Rate parameter, by incrementing the value to 0 or a positive value.

7.5 USING JOIN, REPEAT AND END SEGMENTS AND CYCLING PROGRAMS

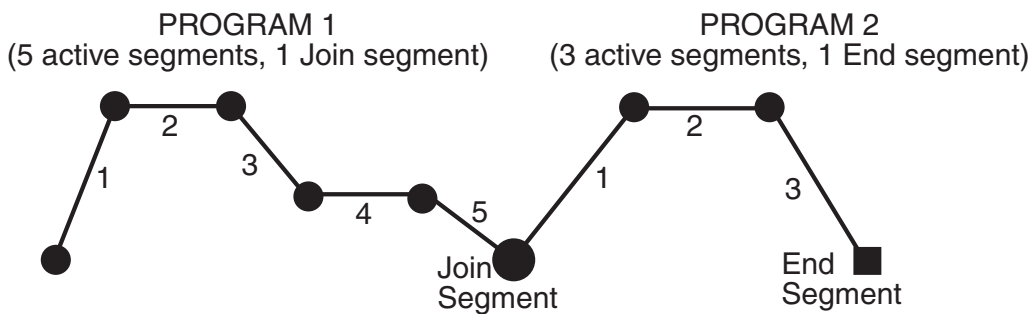
By default, the instrument has eight programs, each 16 segments long (all 16 segments are active and, at the end of Segment 16 is an implicit End Segment). These programs can be made shorter (using End segments) or longer (by creating program sequences with Join, Repeat and End segments). The only limit to the size of a program sequence is a maximum length of 121 active segments plus seven Join segments plus one End segment (i.e. all eight programs joined to make one program sequence).

Segments follow a free format in that ramp or dwell can be followed by dwell or ramp, completely as desired.

Consider two example programs:

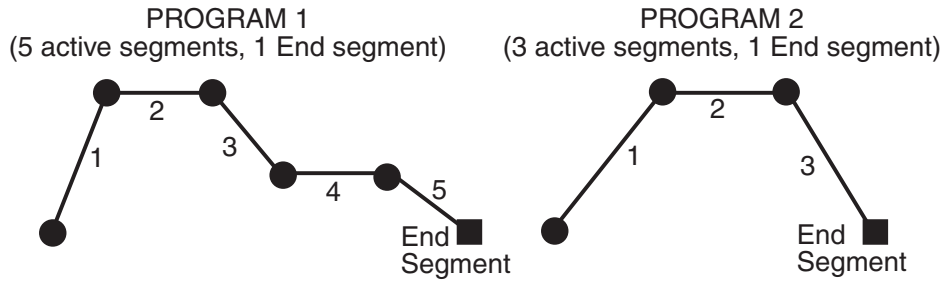


To join the two programs to form a program sequence, change the End segment of Program 1 to a Join segment (Segment Time or Ramp Rate set to J02 - Join Program 2):

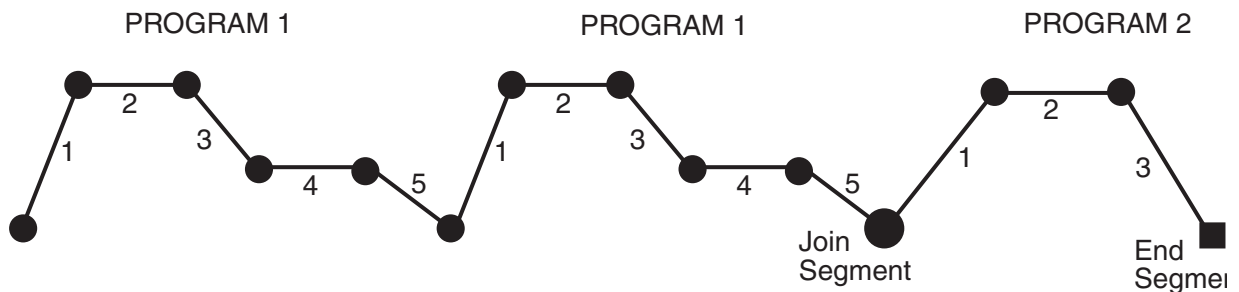


There are no restrictions on joining programs; several programs can be joined to one program (i.e. to provide user-selectable warm-up programs, depending upon which program is run first).

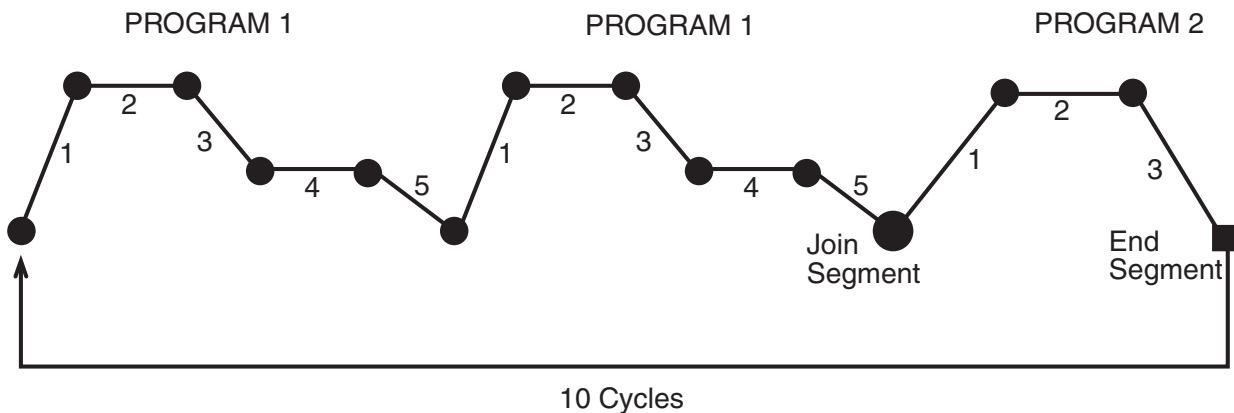
The Cycle feature can be used to make more complex program sequences. Consider the two simple example programs previously described:



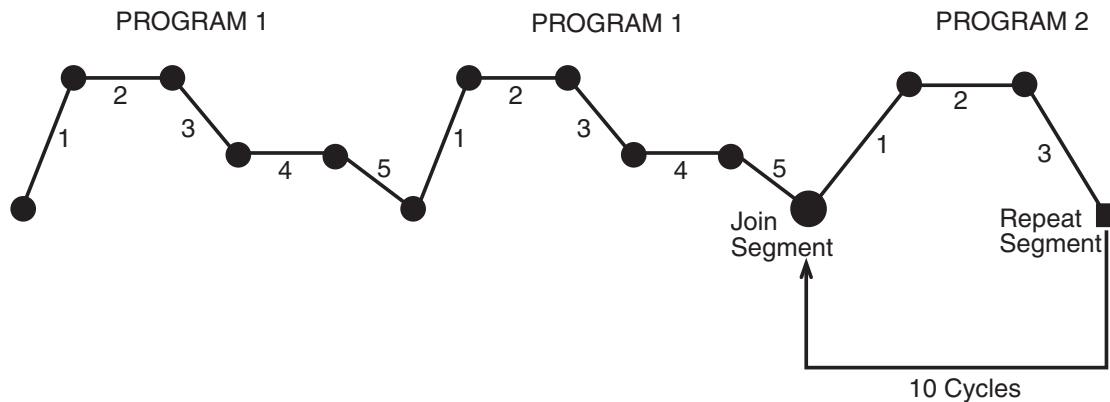
and consider the case where Program 1 is set to perform two cycles and Program 1 is joined to Program 2. When Program 1 is run, the result would be:



If Program 2 were now set to perform ten cycles, the result would be:



Now, with Program 2 set to perform 10 cycles, change its last segment to a Repeat segment (Segment Time or Ramp Rate set to REP); the result would be:



At the end of the tenth cycle of Program 2, the program sequence would end.

7.6 BASIC RULES TO REMEMBER

In any program sequence:

- A program ending in a Join segment will perform the required number of cycles of *itself* before joining the new program.
- A program ending in a Repeat segment (hence, by definition, the last program in the sequence) will perform the required number of cycles of *itself* before ending the sequence.
- A program ending in an End segment (hence, by definition, the last program in the sequence) will perform its cycle on the *entire program sequence* before ending that sequence.

7.7 EXITING PROFILE SET MODE

The operator may exit from Profile Set Mode by pressing the MODE key, then pressing the SCROLL key, which will cause a return to the Base Mode.

Section 8 - Programs

8.1 SELECTING AND RUNNING A PROGRAM

When no program is running, the instrument is in Base Mode and the RUN and HLD indicators are OFF. In this mode, select a program as follows:

1. Hold down the PROF key until the required program number is displayed.
2. Press the RUN/HOLD key once to start the program. The **RUN** indicator will then go ON or flash if a delayed start has been programmed. The instrument is now in Program Run Mode.

8.2 CHANGING THE PROGRAM TIMEBASE

While a program is running, the normal timebase is hours/minutes. To change to a timebase of minutes/seconds (i.e. select the x60 facility) press the UP key for more than five seconds, whereupon the **x60** indicator will go ON. To cancel operation on the **x60** timebase, press the DOWN key for more than five seconds, whereupon the **x60** indicator will go OFF.

8.3 HOLDING A PROGRAM MANUALLY

The operator may hold or freeze a program by momentarily pressing the RUN/HOLD key. The **HLD** indicator will then go ON (the **RUN** indicator staying ON) and the program will stop execution. The program may subsequently be restarted by momentarily pressing the RUN/HOLD key again.

HLD INDICATOR FLASHING: If before the operator holds the program manually, the **HLD** indicator start flashing, this indicates that the program is currently subject to an Auto-Hold. If the RUN/HOLD key is pressed (for a manual Hold), the **HLD** indicator will go ON continuously. When the operator removes the manual Hold (by pressing the RUN/HOLD key again), the **HLD** indicator will either flash (indicating that the Auto-Hold conditions still prevail) or go OFF (indicating that the Auto-Hold conditions no longer prevail).

RUN INDICATOR FLASHING: This indicates that the program is in a Delay state i.e. is timed to start after a user-defined delay has elapsed. When the delay period has elapsed, the program will run and the **RUN** indicator will come on continuously.

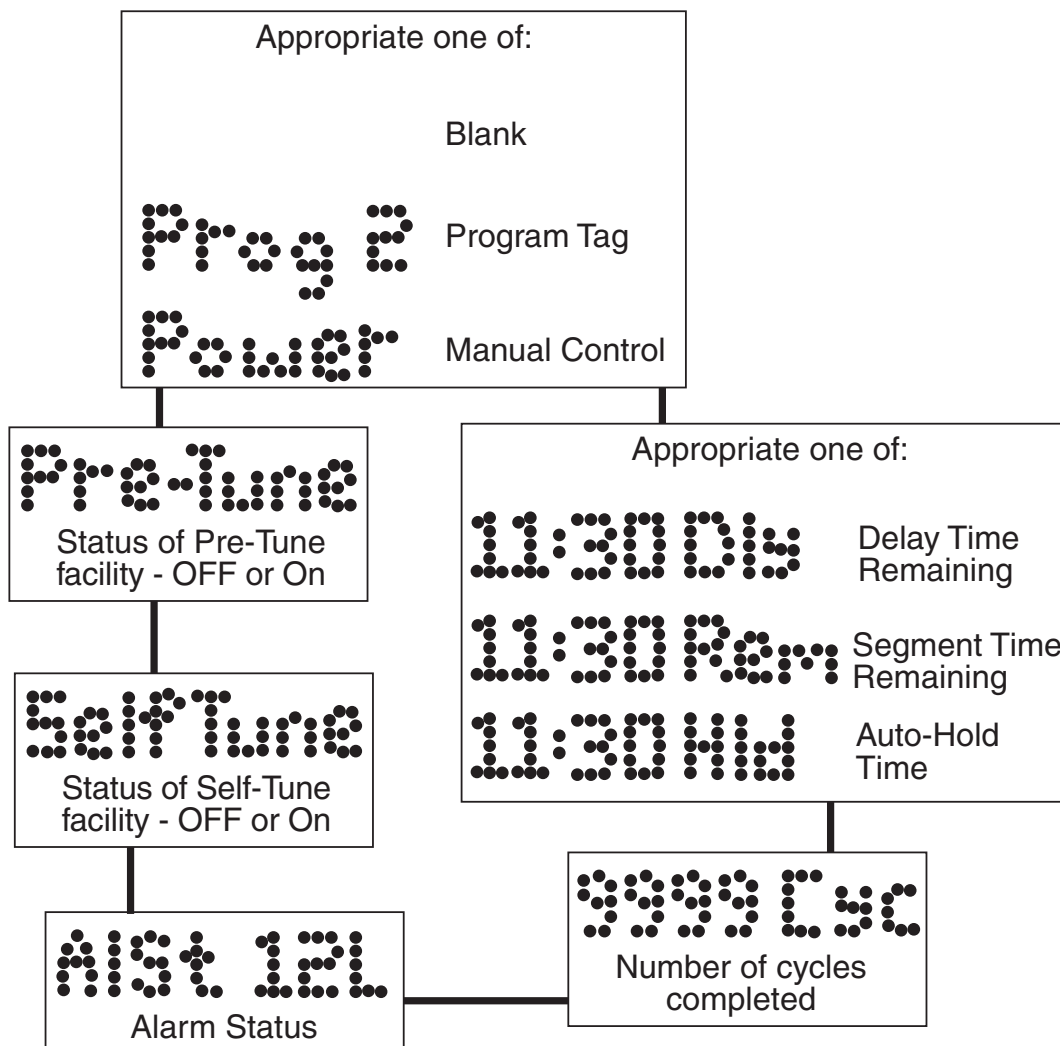
8.4 JUMPING TO THE NEXT SEGMENT

At any time during a program's execution, the operator may jump forward to the next segment by simultaneously pressing the PROF and UP keys.

Note that, since programs may be joined or set to cycle, jumping past the last segment in a program may result in changes in the Program Number and Cycle Count.

8.5 VIEWING PROGRAM PROGRESS/STATUS

In Program Run Mode, a number of displays are made available to the operator (in the Message Display area) which indicate program progress/status. While the current program is running, held or delayed, press the SCROLL key to cycle through a sequence of program status displays with the following legends in the Message Display:



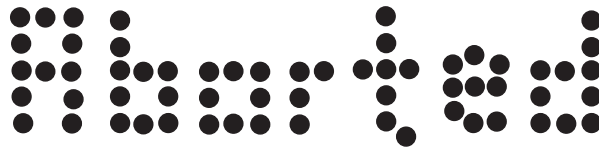
In the case of Segment Time Remaining or Auto-Hold Time display, the time is in hours/minutes (if the **x60** indicator is OFF) or minutes/seconds (if the **x60** indicator is ON). The Delay Time display is always in hours/minutes.

Note: *If the **SCROLL** key is held for two seconds or longer, the instrument will auto-scroll through the above display cycle (with the exception of the **Self-Tune** and **Pre-Tune** displays). The auto-scroll can be stopped by pressing any key other than the **SCROLL** key.*

The auto-scroll can be stopped by pressing any key other than the **SCROLL** key.

8.6 ABORTING A PROGRAM

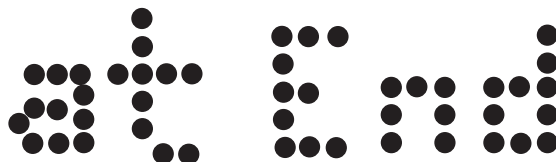
The operator may abort (i.e. terminate) the current program by holding down the **RUN/HOLD** key for more than five seconds. When the program is aborted, a return is made to the Base Mode and the Message area will show:



This message will be removed by the next key press.

8.7 "END OF PROGRAM" INDICATION

When the program has completed its End Segment (i.e. the last segment to be performed), the message display shows:



and a return is made to the Base Mode.

8.8 ACCESSING MODES OF THE CONTROLLER

The controller has various modes in which the control parameters can be viewed or changed. A list of available modes is shown along with a brief description of their purpose.

To access a mode, press the MODE key until the desired mode appears in the message display. Press the SCROLL key to enter the mode. Refer to other sections of this manual for detailed information on each mode. Any mode which has been disabled in the Enable Mode will not be displayed, and may not be accessed.

MODE	USAGE
PreTune	Preset the PID control parameters to provide a base for the SelfTune facility
AutoTune	Activate/Deactivate Auto Tune
ProfPar	Create or edit program profile
TunePar	Adjusts the instrument PID parameters
Alarm	Set up the instrument alarm parameters
Enable	Allow access to various modes of the control
ConfPar	Adjust the control input, output and communications parameters
Test	Test the instrument outputs
Calib	Calibrate the control instrument
BaseMode	Return to Base Mode

Section 9 - Test Mode

The Test Mode permits turning on and off the instrument outputs in order to determine proper operation.

To enter the Test Mode from Base Mode:

1. Press the MODE key until **Test** appears in the message display.
2. Press the SCROLL key to enter the Test Mode.

To return to Base Mode:

1. Press the MODE key until **Basemode** appears in the message display.
2. Press the SCROLL key to return to Base Mode

Exiting the Test Mode will turn all outputs off and terminate communications. Control of outputs and communications will return to the mode from which access to the Test Mode was gained. Press the SCROLL key to step through the parameters. Use the UP and DOWN keys to change the parameter setting

<u>STEP</u>	<u>DISPLAY</u>	<u>SETTING</u>
1	Output 1 ¹	On/OFF
2	Output 2 ^{1,2}	On/OFF
3	Output 3 ^{1,2}	On/OFF
4	EOPrelay	ON/OFF
5	Event1 ¹	ON/OFF
6	Event2 ¹	ON/OFF
7	Event3 ¹	ON/OFF
8	Event4 ¹	ON/OFF
9	Comms	Send/Stop

Notes:

1. Only appears if presence has been registered in Hardware Define (Configuration Mode)
2. Driven to 100% when turned on.

Section 10 - Calibration Mode

To enter the Calibration Mode from Base Mode:

1. Press the MODE key until **Calib** appears in the message display.
2. Press the SCROLL key to enter the Calibration Mode.

To return to Base Mode, cycle power to the control.

10.1 CALIBRATION PROCEDURE

NOTE: Calibration should be attempted only on controllers on which calibration errors have been encountered (see CALIBRATION CHECK).

CALIBRATING THE UNIVERSAL INPUT

Equipment Required:

1. Input source with an accuracy better than $\pm 0.05\%$ of reading:
 - a) Thermocouple inputs: Thermocouple simulator, "K" type with compensated leads.
 - b) DC Linear inputs: 0-50mV, 0-10V or 0-20mA
 - c) RTD inputs: decade resistance box with connections for three-wire input (or equivalent)
2. Case assembly, wired for appropriate input supply (90-264 VAC 50/60Hz, 20-50 VAC 50/60 Hz or 22-65 VDC)

Calibration Procedure:

1. Ensure that the controller is powered off and that the mains (line) lead is disconnected. On the CPU PCB, fit the appropriate jumpers (see Figure 10.1, Table 10.1). Connect the appropriate input lead (see Figure 10.2)
2. Connect the mains (line) lead to the controller. Power up the controller and leave switched on for five minutes (for RTD and DC Linear inputs) or 30 minutes (for thermocouple inputs).

3. Enter Calibration Mode. The lower main display will then show Input Type Number in the form:

iP_I

and the message display will show:

Calib

Using the UP/DOWN keys, change the input type number as required (see Table 10.1).

Note: If required, only one input type may be calibrated. Exception: If it is required to calibrate the thermocouple input (Input Type 5), it is necessary first to calibrate the DC 0-50mV input (Input Type 1).

4. Press the PROF key to change the lower main display to show: _ _ _ _

After a few seconds, the lower main display will either (a) return to the initial Input Type Number display if calibration was successful, or (b) display:

FAIL

In the latter case, the jumpers and wiring should be checked.

5. To calibrate inputs, repeat Steps 1 to 4 for each of the other input types (see Table 10.1) until all five input types have been successfully calibrated.

The universal input calibration procedure is now complete.

TABLE 10.1 Universal Input Type Selection

Input Type No.	Input Type	Calibration Input	Link Jumper 1	Link Jumper 2	Link Jumper 3
1	0-50mVDC	50mVDC	Parked	Parked	Parked
2	0-10VDC	10VDC	Fitted	Parked	Parked
3	0-20mADC	20mADC	Parked	Fitted	Parked
4	3-wire RTD	200 ohm	Parked	Parked	Parked
5	Thermocouple	0°C (K Type)	Parked	Parked	Fitted

FIGURE 10-1

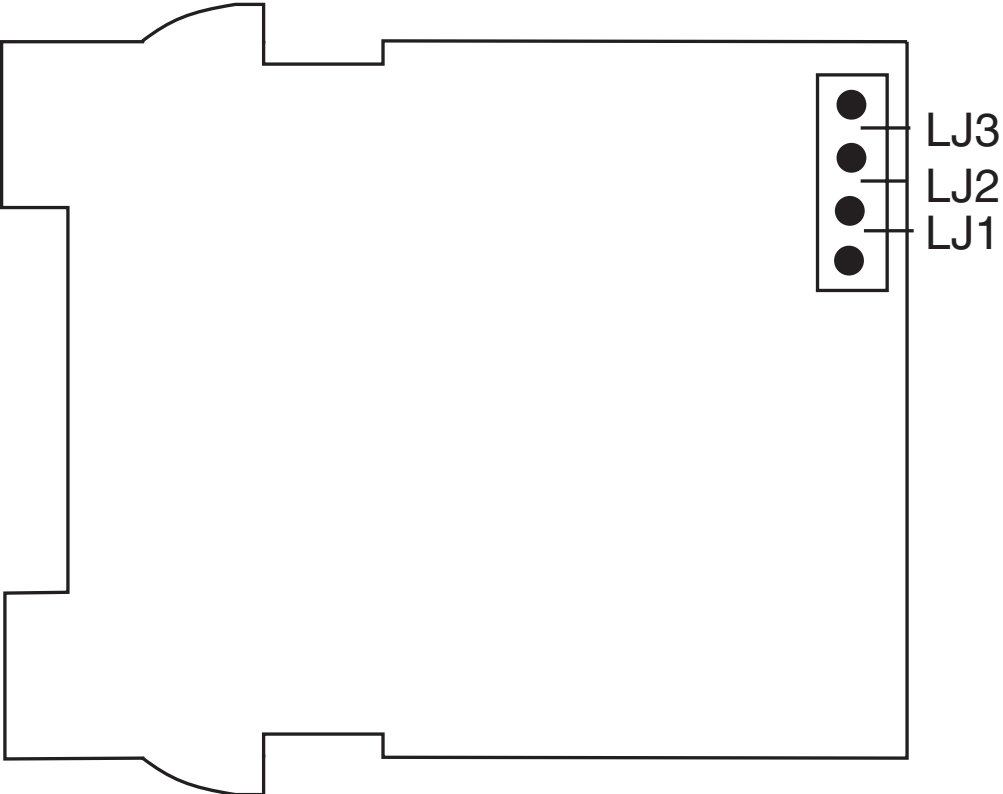
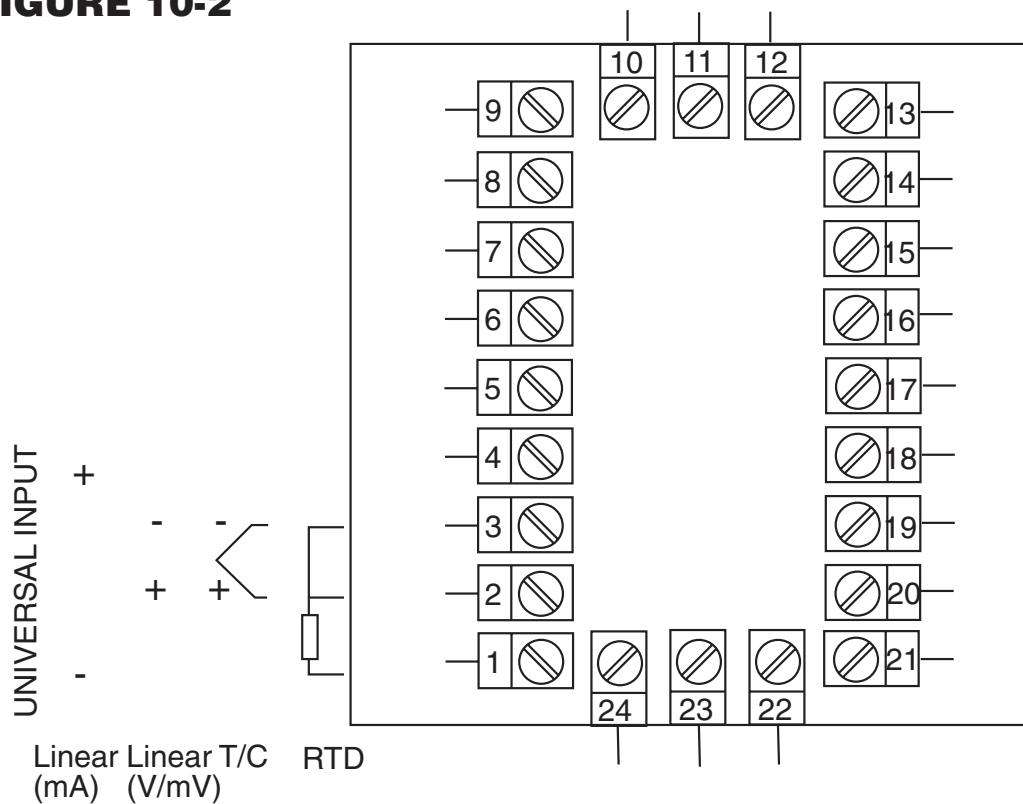


FIGURE 10-2



10.2 EXIT FROM CALIBRATION MODE

To exit from Calibration Mode, cycle power to the instrument.

NOTE: An automatic exit is made from Calibration Mode if there is no key activity for two minutes.

10.3 CALIBRATION CHECK

1. Set the Controller to the required configuration (using link jumpers and front panel entry) as described in the appropriate site manual.
2. Power up the controller and leave it powered up for at least five minutes (for RTD and DC linear inputs) or at least 30 minutes (for thermocouple inputs).
3. After the appropriate delay for stabilization has elapsed, check the calibration by connecting the appropriate input source and checking a number of cardinal points.

Appendix A - Range Codes

The input ranges available (selectable via the front panel) are:

For Thermocouple Inputs

TYPE	INPUT RANGE	DISPLAYED CODE	TYPE	INPUT RANGE	DISPLAYED CODE
R	0 - 1650°C	1127	K	-200 - 760°C	6726
R	32 - 3002°F	1128	K	-328 - 1399°F	6727
S	0 - 1649°C	1227	K	-200 - 1373°C	6709
S	32 - 3000°F	1228	K	-328 - 2503°F	6710
J	0.0 - 205.4°C	1415	L	0.0 - 205.7°C	1815
J	32.0 - 401.7°F	1416	L	32.0 - 402.2°F	1816
J	0 - 450°C	1417	L	0 - 450°C	1817
J	32 - 842°F	1418	L	32 - 841°F	1818
J	0 - 761°C	1419	L	0 - 762°C	1819
J	32 - 1401°F	1420	L	32 - 1403°F	1820
T	-200 - 262°C	1525	B	211 - 3315°F	1934
T	-328 - 503°F	1526	B	100 - 1824°C	1938
T	0.0 - 260.0°C	1541	N	0 - 1399°C	5371
T	32.0 - 501.0°F	1542	N	32 - 2550°F	5324

For RTD Inputs

Note: Input conditioning jumper LJ1, LJ2, or LJ3 needs to be changed, see Appendix B.

INPUT RANGE	DISPLAYED CODE	INPUT RANGE	DISPLAYED CODE
0 - 800°C	7220	0.0 - 100.9°C	2295
32 - 1471°F	7221	32.0 - 213.6°F	2296
32 - 571°F	2229	-200 - 206°C	2297
-100.9 - 100.0°C	2230	-328 - 402°F	2298
-149.7 - 211.9°F	2231	-100.9 - 537.3°C	7222
0 - 300°C	2251	-149.7 - 999.1°F	7223

For DC Inputs

Note: Input conditioning jumper LJ1, LJ2, or LJ3 needs to be changed, see Appendix B.

INPUT RANGE	DISPLAYED CODE	INPUT RANGE	DISPLAYED CODE
0-20mA	3413	0-5V	4445
4-20mA	3414	1-5V	4434
0-50mV	4443	0-10V	4446
10-50mV	4499	2-10V	4450

Appendix B - Board Layout, Jumper Positioning

FIGURE B-1 PCB POSITIONS

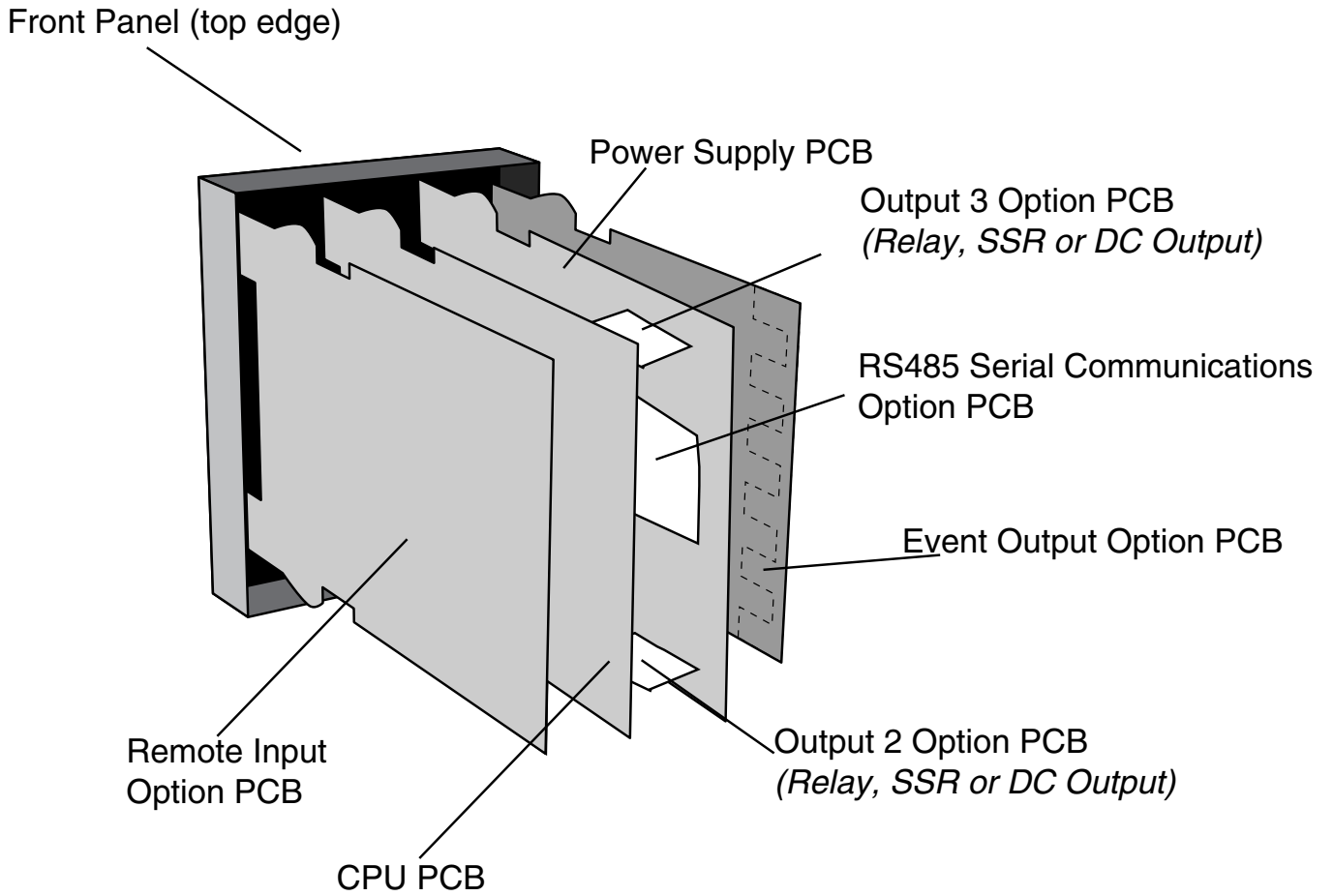


FIGURE B-2 OUTPUT 2, OUTPUT 3 REMOVAL

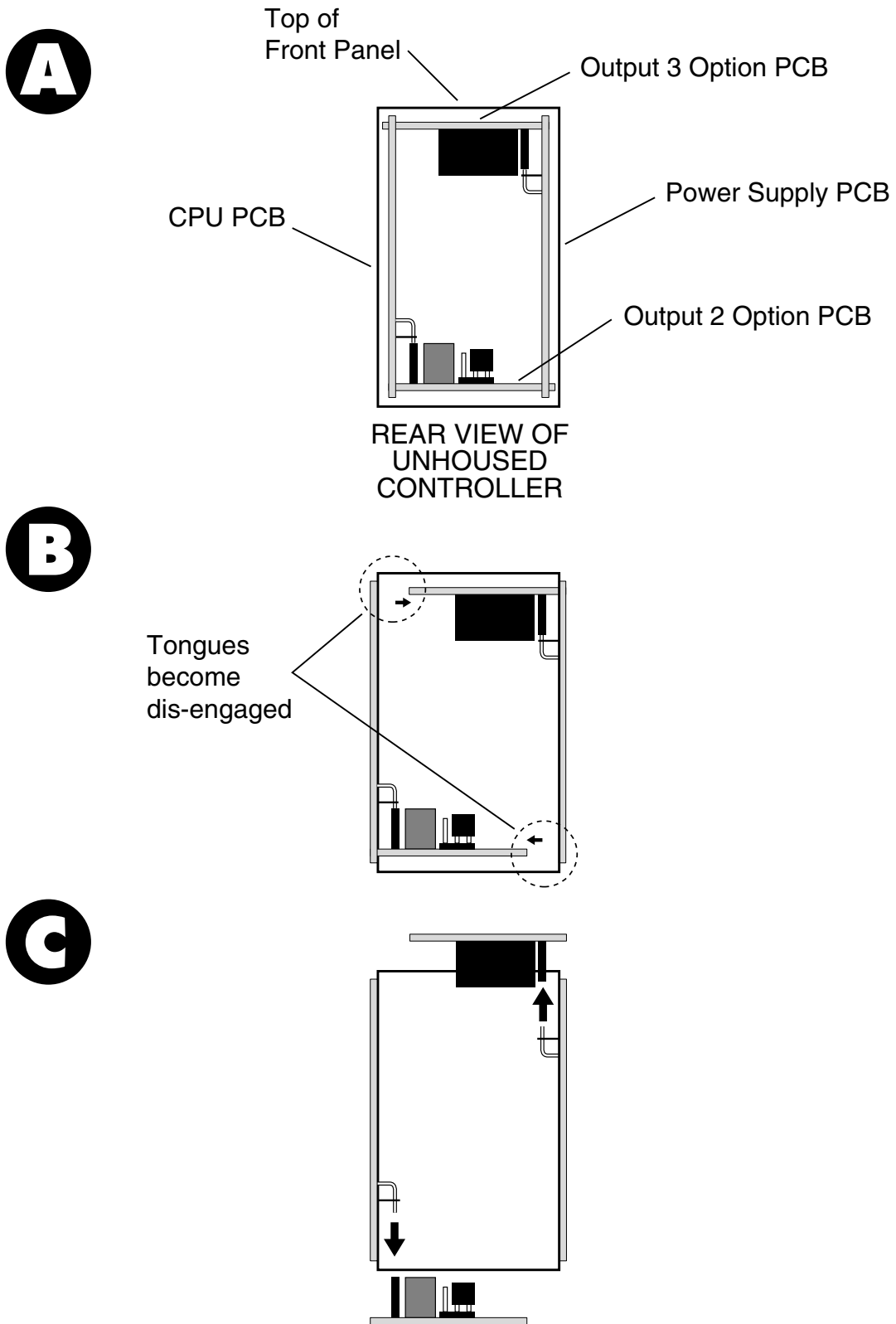
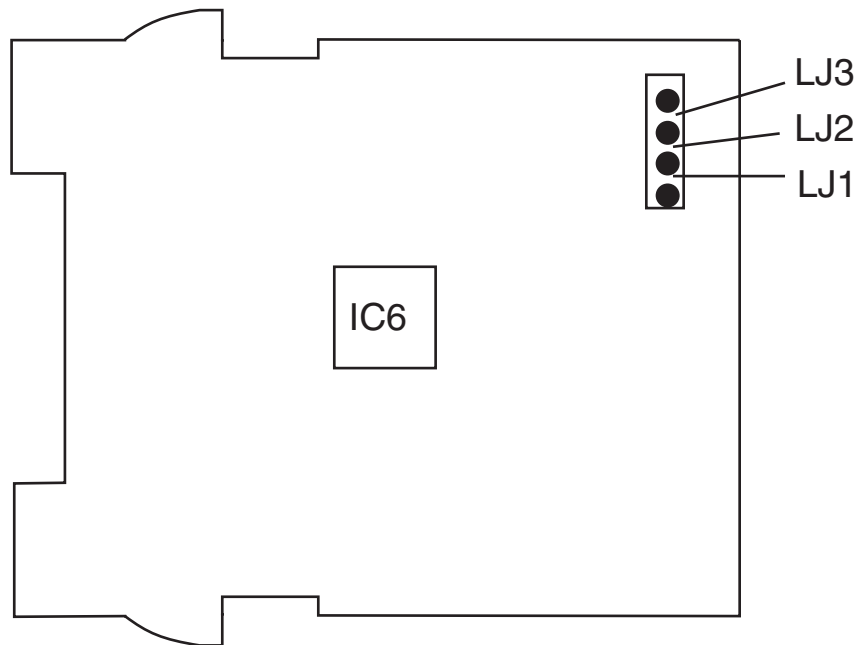
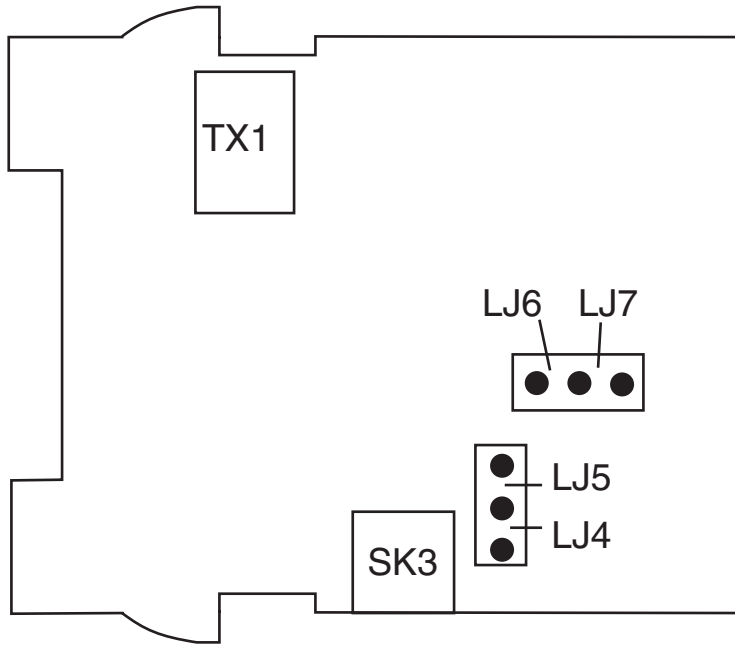


FIGURE B-3 CPU PWA



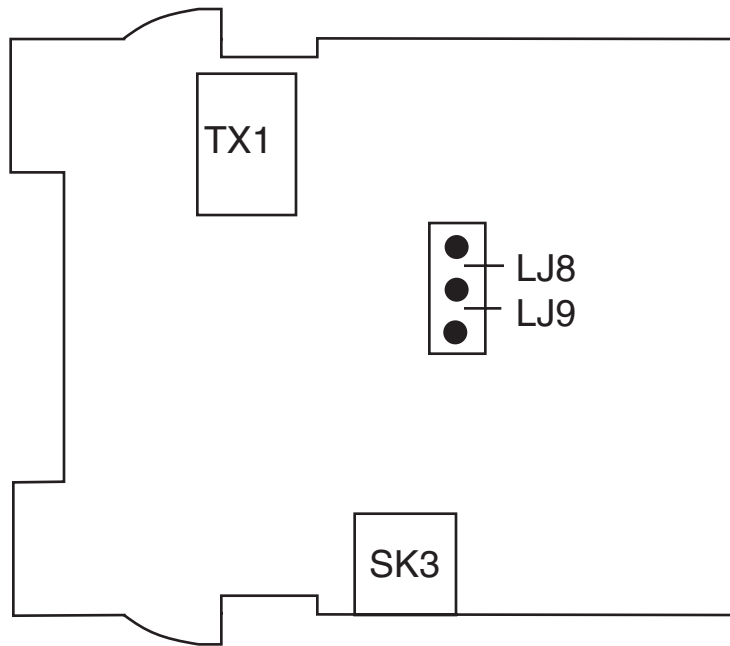
<u>Input Type</u>	<u>LJ1, LJ2, LJ3 Jumper Position</u>
RTD, DC (mV)	None (parked)
T/C	LJ3
DC (mA)	LJ2
DC (V)	LJ1

FIGURE B-4 PS PWA WITH RELAY OR SSR OUTPUT 1



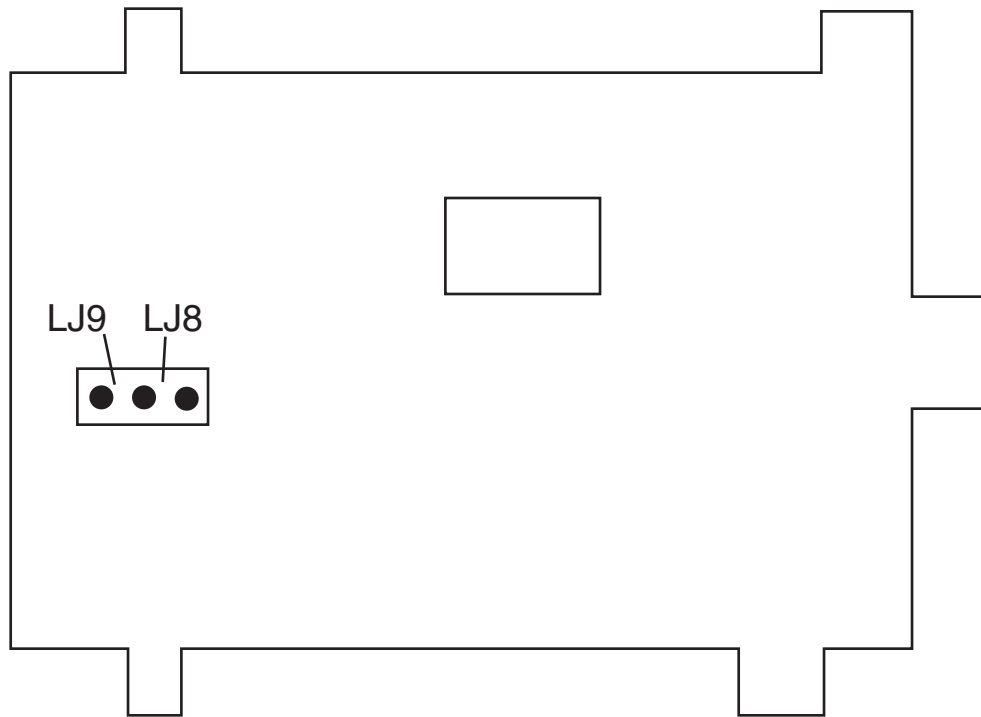
<u>Output Type</u>	<u>LJ4, LJ5 Jumper Position</u>	<u>LJ6, LJ7 Jumper Position</u>
Relay	LJ5	LJ6
SSR	LJ4	LJ7





FIGURE B-5 PWA WITH DC OUTPUT 1



<u>Output Type</u>	<u>LJ8, LJ9 Jumper Position</u>
DC (0-10V)	 LJ8
DC (0-20mA)	 LJ9
DC (0-5V)	 LJ8
DC (4-20mA)	 LJ9

FIGURE B-6 OPTION PWA DC OUTPUT 2/OUTPUT 3



<u>Output Type</u>	<u>LJ8, LJ9 Jumper Position</u>
DC (0-10V)	 LJ8
DC (0-20mA)	 LJ9
DC (0-5V)	 LJ8
DC (4-20mA)	 LJ9

Appendix C - Specifications

INPUT SPECIFICATIONS

General

Input Sample Rate:	Four per second
Input Resolution:	14 bits approximately
Input Impedance:	Greater than 100M ohm resistive (except for DC mA and V inputs)
Isolation:	Universal input isolated from all outputs except SSR at 240 VAC.

Thermocouple

Types:	R, S, J, T, K, L, B, and N
Calibration:	Complies with BS4937, NBS125 and IEC584.
Sensor Break Protection:	Break detected within 2 seconds. Control outputs set to OFF (0% power); alarms operate as if the process variable has gone over-range.

RTD and DC mV

Type and Connection:	Three-wire Pt100
Calibration:	Complies with BS1904 and DIN43760.
Lead Compensation:	Automatic
RTD Current:	150uA (approximately)
Sensor Break Protection:	Break detected within 2 seconds. Control outputs set to OFF (0% power); alarms operate as if the process variable has gone under-range.

DC mA and DC V

Scale Range Maximum:	-1999 to 9999
Scale Range Minimum:	-1999 to 9999
Minimum Span:	1 display LSD
Sensor Break Protection:	Applicable to 4-20mA, 1-5V, and 2-10V ranges only. Break detected within 2 seconds. Control outputs set to OFF (0% power); alarms operate as if the process variable has gone under-range.

OUTPUT SPECIFICATIONS

Output 1

General

Types Available: Relay (standard), SSR Driver and DC as options.

Relay

Contact Type:

SPDT

Rating:

2A resistive at 120/240V AC, 0.5A inductive
@230VAC

Lifetime:

> 500,000 operations at rated voltage/current

Isolation:

Inherent

SSR Driver/TTL

Drive Capability:

SSRD>4.2V DC into 1K ohm minimum

Isolation:

Not isolated from input or other SSR outputs.

DC

Resolution:

Eight bits in 250mS (10 bits in 1 second typical,
>10 bits in >1 second typical).

Update Rate:

Four times per second

Ranges:

* 0-20mA, 4-20mA, 0-10V, and 0-5V

Load Impedance:

0-20mA: 500 ohm maximum

4-20mA: 500 ohm maximum

0-10V: 500 ohm minimum

0-5V: 500 ohm minimum

Isolation:

Isolated from all other inputs and outputs.

*Changes between V and mA ranges also require jumper movement.

OUTPUT 2

General

Types Available:

Relay, SSR Driver, DC Linear, and Transmitter
Power Supply

Relay

Contact Type:

SPDT

Rating:

2A resistive at 120/240V AC; 0.5A inductive
@ 230VAC

Lifetime:

> 500,000 operations at rated voltage/current

Isolation: Inherent

SSR Driver/TTL

Drive Capability: SSRD>4.2V DC into 1K ohm minimum
Isolation: Not isolated from input or other SSR outputs

DC

Resolution: Eight bits in 250mS (10 bits in 1 second typical, >10 bits in >1 second typical)
Update Rate: Four times per second
Ranges: * 0-20mA, 4-20mA, 0-10V, and 0-5V
Load Impedance: 0-20mA: 500 ohm maximum
4-20mA: 500 ohm maximum
0-10V: 500 ohm minimum
0-5V: 500 ohm minimum
Isolation: Isolated from all other inputs and outputs

*Changes between V and mA ranges also require jumper movement.

TRANSMITTER POWER SUPPLY

Output: 20-28VDC (24VDC nominal)
Min. Load Impedance: 910 ohm (22mA @ 20VDC)

OUTPUT 3

General

Types Available: Relay, SSR Driver, DC linear (retransmit only), and Transmitter Power Supply

Relay

Contact Type: SPDT
Rating: 2A resistive at 120/240V AC; 0.5A inductive @ 230VAC
Lifetime: > 500,000 operations at rated voltage/current
Isolation: Inherent

SSR Driver/TTL

Drive Capability: SSRD>4.2V DC into 1K ohm minimum
Isolation: Not isolated from input or other SSR outputs

DC

Resolution:	Eight bits in 250mS (10 bits in 1 second typical, >10 bits in >1 second typical).
Update Rate:	Four times per second
Ranges:	* 0-20mA, 4-20mA, 0-10V, and 0-5V
Load Impedance:	0-20mA: 500 ohm maximum 4-20mA: 500 ohm maximum 0-10V: 500 ohm minimum 0-5V: 500 ohm minimum
Isolation:	Isolated from all other inputs and outputs.

* Changes between V and mA ranges also require jumper movement.

TRANSMITTER POWER SUPPLY

Output:	20-28VDC (24VDC nominal)
Min. Load Impedance:	910 ohm (22mA @ 20VDC)

CONTROL SPECIFICATIONS

Control Types:	PID, PID/ON-OFF2, ON-OFF
Automatic Tuning Types:	Pre-Tune and Auto-Tune
Proportional Bands:	0 (OFF), 0.5% - 999.9% of input span @ 0.1% increments
Auto Reset:	1s-99min 59sec/repeat and OFF
Rate:	0 (OFF) - 99min 59sec
Manual Reset (Bias):	Adjustable in the range 0-100% of output power (single output) or -100% to +100% of output power (dual output)
Deadband/Overlap:	-20% to +20% of proportional band 1 + proportional band 2
ON/OFF Hysteresis:	0.1% to 10.0% of input span
Auto/Manual Control:	User-selectable with "bumpless" transfer into and out of Manual control.
Cycle Times:	Selectable from 0.5sec to 512sec in binary steps
Setpoint Range:	Limited by Setpoint Maximum and Setpoint Minimum.
Setpoint Maximum:	Limited by Setpoint and Range Maximum.
Setpoint Minimum:	Limited by Range Minimum and Setpoint.

Alarms

Maximum Number:	Two "soft" alarms plus Loop Alarm
Maximum # Outputs:	Up to 2 outputs can be used for alarm purposes
Combination Alarms:	Logical OR or AND of alarms to an individual hardware output is available.
Hysteresis:	1 LSD to 10% of span.
Loop Alarm:	Detects faults in the control feedback loop by continuously monitoring process variable response to the control output(s).

PROGRAM SPECIFICATIONS

Programs:	Eight, each with free-form segments
Length of Programs:	Adjustable in the range 1 to 16 segments; programs cascadable - maximum length 121 segments.
Segment Types:	Ramp, Dwell, Join, Repeat, or End.
Program Cycling:	Range 1 to 9999, infinite.
Delayed Start:	May be set in the range 0 to 99:59 (hours:minutes). One setting applies to all programs.
Control:	Run, Hold, Abort, Time Base x60 (local or remote); Select Program (local or remote); Jump to next Segment.
Start From:	Either current process variable value or controller setpoint value.
Go To:	Base Mode or Off Mode
End On:	Final Value or controller setpoint.
Deviation/Hold:	Off, below setpoint only, above setpoint only or above and below setpoint. On ramps only, on dwells only, or on both ramps and dwells. Auto/ Hold band may be set from 0 to input span.
Time Base:	Either hours:minutes or minutes:secs (x60) pre-programmable or may be set during Program Run.
Segment Time:	May be set in the range 0 to 99:59 (hours:minutes or minutes:seconds).
Ramp Rate:	0 to 9999 least significant digits per hour or minute.

End of Program Output

Type: Relay
Contact Type: SPDT
Rating: 5A resistive @ 120/240V AC
Lifetime: >100,000 operations @ rated voltage/current
Isolation: Inherent

Event Outputs - Option

Type: Relay (4)
Contact Type: SPST
Rating: 5A resistive @ 120/240V AC
Lifetime: >100,000 operations @ rated voltage/current.
Isolation: Inherent
Programmability: Each event is programmable to either OFF or ON for each segment.

Digital (Remote Program Control) Inputs, Outputs

Type: Voltage-free contact and TTL compatible
Number available: Six: Run/Hold, Time Base x60, Abort Three (binary-coded) Program Select.
Active State: Max. Contact Resistance (closed) = 50 ohms
Max. Voltage (TTL) for "0" = 0.8V
Min. Voltage for "0" = -0.6V
Non-Active State: Min. Contact Resistance (open) = 5,000 ohms
Min. Voltage (TTL) for "1" = 2.0V
Max. Voltage for "1" = 24.0V
Max. Input Delay (OFF-ON): 0.25 seconds
Min. Input Delay (ON-OFF): 0.25 seconds

PERFORMANCE

Reference Conditions

Ambient Temperature: 20°C ± 2°C
Relative Humidity: 60-70%
Supply Voltage: 90-264V AC 50Hz ±1%
Source Resistance: <10 ohm for T/C input
Lead Resistance: <0.1 ohm/lead balanced (Pt100)

Performance Under Reference Conditions

Common Mode Rejection: >120dB at 50/60Hz giving negligible effect at up to 264V 50/60Hz

Series Mode Rejection: >500% of span (at 50/60Hz) causes negligible effect

DC Linear Inputs

Measurement Accuracy: $\pm 0.25\%$ of span ± 1 LSD

Thermocouple Inputs

Measurement Accuracy: $\pm 0.25\%$ of span ± 1 LSD
(Note: Reduced performance with Type B T/C between 100-600 °C (212 - 1112 °F))

Linearization Accuracy: Better than $\pm 0.2^\circ\text{C}$ any point, any 0.1°C range ($\pm 0.05^\circ\text{C}$ typical). Better than $\pm 0.5^\circ\text{C}$ any point, any 1°C range.

Cold Junction Comp: Better than $\pm 0.7^\circ\text{C}$

RTD Inputs

Measurement Accuracy: $\pm 0.25\%$ of span ± 1 LSD

Linearization Accuracy: Better than $\pm 0.2^\circ\text{C}$ any point, any 0.1°C range ($\pm 0.05^\circ\text{C}$ typical). Better than $\pm 0.5^\circ\text{C}$ any point, any 1°C range.

DC Outputs

Output 1 Accuracy: mA: 0-20mA $\pm 0.5\%$ of span (20mA) @ 250 ohm
4-20mA $\pm 0.5\%$ of span (16mA) @ 250 ohm
V: 0-10 $\pm 0.5\%$ of span (10V) @ 2K ohm
0-5V $\pm 0.5\%$ of span (5V) @ 2K ohm

Output 2 Accuracy: mA: 0-20mA $\pm 0.5\%$ of span (20mA) @ 250 ohm
4-20mA $\pm 0.5\%$ of span (16mA) @ 250 ohm
V: 0-10V $\pm 0.5\%$ of span (10V) @ 2K ohm
0-5V $\pm 0.5\%$ of span (5V) @ 2K ohm

Output 3 Accuracy: mA: 0-20mA $\pm 0.25\%$ of span (20mA) @ 250 ohm
(Recorder Accuracy) 4-20mA $\pm 0.25\%$ of span (16mA) @ 250 ohm
V: 0-10V $\pm 0.25\%$ of span (10V) @ 2K ohm
0-5V $\pm 0.25\%$ of span (5V) @ 2K ohm

OPERATING CONDITIONS

Ambient Operating Temperature:	0° C to 55°C
Ambient Storage Temperature:	-20°C to 80°C
Relative Humidity:	20% - 95% non condensing
Supply Voltage:	90 - 264VAC 50/60 Hz (standard) 20 - 50V AC 50/60Hz or 22-65V DC (optional)
Source Resistance:	1000 ohm maximum (thermocouple)
Lead Resistance:	50 ohm per lead maximum balanced (Pt100)

Performance Under Operating Conditions

Temperature Stability:	0.01% of span/°C change in ambient temperature
Cold Junction Compensation:	Better than $\pm 1^\circ\text{C}$ (thermocouple only)
Supply Voltage Influence:	Negligible
Relative Humidity Influence:	Negligible
Sensor Resistance Influence:	Thermocouple 100 ohm: < 0.1% of span error Thermocouple 1000 ohm: < 0.5% of span error RTD Pt100 50ohm/lead: < 0.5% of span error
Radiated RF Field Influence:	Degradation of Output 1 accuracy to 3% at spot frequencies in the range 80 - 350MHz at field strength of 10V/m.

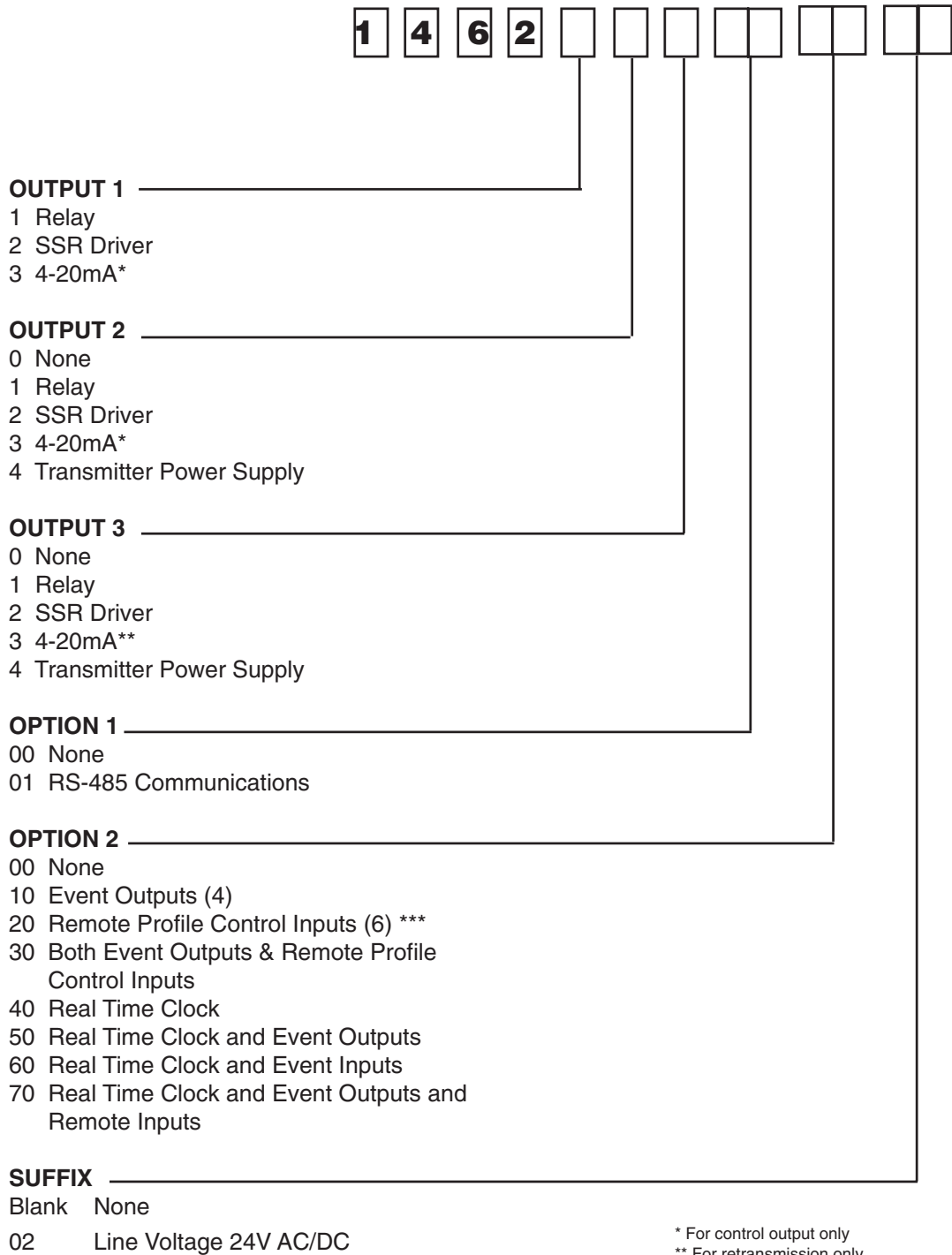
ENVIRONMENTAL

EMI Susceptibility:	Designed to meet EN50082-1:1992 and EN50082-2: 1995
EMI Emissions:	Designed to meet EN50081-1:1992 and EN50081-2:1994
Safety Considerations:	Designed to comply with EN61010-1:1993
Supply Voltage:	90-264 AC 50/60Hz (standard) 20-50V AC 50/60Hz or 22-65V DC (optional)
Power Consumption:	4 watts approximately
Front Panel Sealing:	NEMA4
Agency Approvals:	UL Listed pending cUL certified for use in Canada pending

PHYSICAL

Dimensions:	1/4 DIN front panel 96mm x 96mm (3.78" x 3.78") 100mm deep (3.94")
Mounting:	Plug-in with panel mounting fixing strap. Panel cutout 92mm x 92mm (3.62" x 3.62")
Terminals:	Screw type (combination head)
Weight:	16 ounces maximum
Display Character Height:	Top : .4" Bottom: .36" Message: .19" Profile/Segment No.: .25"

Appendix D - Model Number Hardware Matrix



* For control output only
 ** For retransmission only
 *** Remote Control available - Run/Hold, Abort, Time Base Change (x60), and three (binary coded) Program Select.

Appendix E - Software Reference Sheet

HDW DEF	
OPTION	

Configuration Parameters
Input
Control
Out2 Use
Out3 Use
Seg. Mode
Baud Rate
Protocol
Address
CJC
Events

Enable Mode				
Prof Par			EnAb	diSA
Setpoint		rEAd	EnAb	
Pretune	OFF	rEAd	EnAb	
Autotune	OFF	rEAd	EnAb	
Alarm			EnAb	diSA
Tune Par			EnAb	diSA
Conf Par			EnAb	diSA
Test			EnAb	diSA
Calib.			EnAb	diSA
Manual			EnAb	diSA
Sprate			EnAb	diSA
ComWrite			EnAb	diSA
Auto PT			EnAb	diSA
Units			EnAb	diSA
Passch				

Tune Mode	
Inp Cor	
Po1	Read Only
Po2	Read Only
P. Out HI	
P. Out LO	
P.Band 1	
P.Band 2	
AutoReset	
Rate	
Spread	
Man Reset	
Hyst 1	
Hyst 2	
SP Rate	
CycTime1	
CycTime2	

Alarm Mode
Alarm1
Alarm2
Inhibit
HiAlarm1
LoAlarm1
BaAlarm1
DeAlarm1
AI1 Hyst
HiAlarm2
LoAlarm2
BaAlarm2
DeAlarm2
AI2 Hyst
Loop Alm
LpAtime

Program Define Mode
(All Programs)
Start on
Go To
End on
Delay
ProgLock
Recovery
Rec Type
RTC Time
RTC Day
Ext. Sel

Specific Program as a
Whole
Cycles
DeviationHold
HoldBand
Hold on
Pre-x60
Timer
Strt-ti
Strt-day

Each Segment in a Specific Program

Final SP

Time

RampRate

Event

Warranty and Return Statement

These products are sold by The Partlow-West Company under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to a purchase of these products, as new merchandise, directly from The Partlow-West Company or from a Partlow-West Company distributor, representative or reseller, and are extended only to the first buyer thereof who purchases them other than for the purpose of resale.

Warranty

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the factory and to conform at that time to the specifications set forth in the relevant instruction manual or manuals, sheet or sheets, for such products for a period of two years.

THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN AND ABOVE SET FORTH. PARTLOW MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.

Limitations

The Partlow-West Company shall not be liable for any incidental damages, consequential damages, special damages, or any other damages, costs or expenses excepting only the cost or expense of repair or replacement as described above.

Products must be installed and maintained in accordance with the instructions. Users are responsible for the suitability of the products to their application. There is no warranty against damage resulting from corrosion, misapplication, improper specifications or other operating condition beyond our control. Claims against carriers for damage in transit must be filed by the buyer.

This warranty is void if the purchaser uses non-factory approved replacement parts and supplies or if the purchaser attempts to repair the product themselves or through a third party without ThePartlow-West Company authorization.

Returns

The Partlow-West Company sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing (at Partlow's option), free of charge, the products which are reported in writing to ThePartlow-West Company at its main office indicated below.

The Partlow-West Company is to be advised of return requests during normal business hours and such returns are to include a statement of the observed deficiency. The buyer shall pre-pay shipping charges for products returned and The Partlow-West Company or its representative shall pay for the return of the products to the buyer.

Approved returns should be sent to: THE PARTLOW-WEST COMPANY
 2 CAMPION ROAD
 NEW HARTFORD, NY 13413 USA



THE PARTLOW-WEST COMPANY
2 CAMPION ROAD • NEW HARTFORD, NY 13413 USA
1-800-866-6659 • 315-797-2222 • FAX 315-797-0403