INSTALLATION AND MAINTENANCE MANUAL

FOR

SMART TRANSMITTER

MODEL HST

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APPROVED BY   R. A. Lyon, Product Marketing Engineer   DATE   4/25/97

		REVISION RECORD		
Revision	Affected Paragraphs	Brief Description of Revision	Date	Approval Signature
Orig.	All	Original Release per E.O. QP-1456	4/27/97	P.Calabrese
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TABLE OF CONTENTS

1.0   SCOPE

This manual provides basic ordering information and specifications for Smart Transmitter, Model HST.

2.0   APPLICABLE DOCUMENTS

2.1   Conax Sales Order.

2.2   Customer purchase order (specified in Conax sales order).

3.0   GENERAL DESCRIPTION

The HST is a state-of-the-art µP based, smart 2 wire transmitter. It incorporates advanced electronics circuitry and software that enables it to provide a high degree of performance and system flexibility, yet at a reasonable cost and ease of use.

The HST can be supplied in these basic configurations:

HST as a blind (no display) instrument,

IHST as a displaying transmitter with built-in keyboard.

For the availability of other hardware and software options, consult the factory.

Before attempting to program the HST, make yourself acquainted with the HST keyboard and display (see Section 7.0).

The unique design features enables a single transmitter to be used for measuring RTDs, Thermocouples, Potentiometers, Resistance sensors, or DC mV signal levels.

Advanced signal processing technology provides features not commonly found among other smart transmitters such as: Square-root function, Loop-simulation, and optional capabilities for Dual Inputs and Mathematical manipulations.

The HST is fully software driven. All input parameters are programmable. An external hand-held programmer or an integral transmitter mounted programmer (both optional) enables on-site calibration and indication of process parameters.

Additional Optional Features:
- LCD Display.
- Programmers, hand-held or integrally mounted, both with LCD displays.
- Digital communication for interfacing with PC, PLC and remote programmers (HART Protocol).
  HART - Smart Communications Protocol Specification is a trademark of Rosemount, Inc.

4.0 **SPECIFICATIONS**

4.1 General.

INPUT: Thermocouple types:
E, J, K, T, R, S, N, B, or C.

RTDs (2, 3 or 4 wire configuration):
Pt-100 (DIN & NIST curves), Pt-200, Ni-100, Cu-10, and
other RTDs.

DC mV: ±120.00 mV input span.
Potentiometer: 100Ω, to 20KΩ.
Resistance sensors (2,3 and 4 wire configurations): 0 to 600Ω.
Optional: DCmA, DCV.
Optional: ACV, ACA, Frequency/Pulse.

MINIMUM RANGE: None, limited only by signal quality.

DIGITAL RESOLUTION: >17 bits.

OUTPUTS: 4-20 mA, isolated analog current loop, standard.
Optional: Digital communication, HART Protocol.

DISPLAY (optional): 8 x 1 Character LCD indicator for programming and display of input
and output parameters and status.

SUPPLY: 12-45 VDC (@no load). Reverse voltage protected.

OPERATION CONDITIONS: -20 to +70°C, 0-95% RH, non-condensing .

STORAGE TEMPERATURE: -55 to +125°C.

TURN ON TIME: Within 4 seconds to rated response.

RESPONSE TIME: 0.5 seconds to 99% of reading (2 updates per second).

DAMPING FACTOR: Programmable 0.0 to 32.0 seconds.

LONG TERM STABILITY: Better than ±0.1% of span for 6 months.

ISOLATION: 800 VDC or peak AC.

RFI/EMI IMMUNITY: Tested per SAMA PMC 33.1C from 20 to 1000 MHZ and field
strength up to 300 V/m.

C.M.R.R.: >120 db DC to 60 Hz.

ENCLOSURE: Extruded, anodized aluminum.

DIMENSIONS: 3.00" x 2.44" x 2.46"
3.00" x 2.44" x 3.00" (with programmer/display)
(Hockey-puck housing. Suitable for mounting inside 3.5"
diameter explosion-proof enclosures).

4.2   Performance Specifications.

ANALOG OUTPUT RESOLUTION: 0.025% of span (±4 µA).

ANALOG OUTPUT (D/A) LINEARITY: ±0.025% of span.

DIGITAL SENSOR LINEARIZATION: <±0.02°C for Pt-100 RTD.
<±0.1°C for thermocouple.

COLD JUNCTION COMPENSATION: Automatically corrected to within <±0.3°C for
all T/C types.

TEMPERATURE STABILITY: Zero: <±0.003%/°C of span.
Span: <±0.005%/°C of span.

SUPPLY VOLTAGE EFFECTS: <±0.001% per Volt.

5.0   **INSTALLATION**

The HST may be mounted using the two mounting holes .165" dia. and 1.30" apart.

Wiring instructions for the HST are:
     Connect the positive supply voltage to terminal 5.
     Connect the negative supply voltage to terminal 6.

     RTD: (2 wire)   Connect one lead to terminal 1.
                           Connect other lead to terminal 4.

           (3 wire)   Connect single lead to terminal 4.
                           Connect current lead to terminal 1.
                           Connect voltage lead to terminal 2.

           (4 wire)   Connect leg 1 current lead to terminal 4.
                           Connect leg 1 voltage lead to terminal 3.
                           Connect leg 2 voltage lead to terminal 2.
                           Connect leg 2 current lead to terminal 1.

     DC mV: Connect negative lead to terminal 1.
                           Connect positive lead to terminal 2.

POTENTIOMETER: One end to terminal 1.
Second end to terminal 4.
Wiper to terminal 2.

TC: Connect negative lead to terminal 1.
Connect positive lead to terminal 2.

6.0   CALIBRATION AND OPERATION

Calibration: Automatic.

Unit includes all of the calibration parameters. It performs periodic "zero", "span", self-test, and auto calibration. No field calibration is required.

7.0   SMART TRANSMITTER PROGRAMMING

The HST programmer consists of a 4 button keyboard and 8 character single row LCD indicator. The display is used to indicate the values of measured parameters during the "RUN" mode, and provide prompting and programming instructions during the "MENU" mode.

7.1   Keyboard Description.

↵   "ENTER" key. Choose current display parameter or value as the correct valid one. Also, used to enter into one of the programming modes.

≪   "SHIFT LEFT" key. Used to shift the display pointer to the left during entry of numerical values. Also, used to interrupt the programming sequence and switch to "RUN" mode.

≪   "SHIFT UP" key. Used to increase the numerical value of the digit at which the display pointer is located, scroll "upwards" through the program menu during the "MENU" mode, and shift the decimal point to the right during the decimal point programming.

≫   "SHIFT DOWN" key. Used to decrease the numerical value of the digit at which the display pointer is located, scroll "downwards" through the program menu during the "MENU" mode, and shift the decimal point to the left during the decimal point programming.

7.2   Configuring the HST.

The HST may be supplied as factory configured for the input and application program specified by the customer. Use this manual to alter the existing configuration parameters. On site program changes are performed using the built-in display/programmer or hand-held programmer. Functions in both units are identical.

In order to avoid accidental program changes, the menu is divided into three main categories: USER, SIMULATION/TRIMMING, and CALIBRATION modes. To enter any of the menu modes, an access code must be entered. The code for each is as follows:

MODE	CODE	DESCRIPTION
USER	3	Use this mode to observe and modify input and display parameters.
SIMULATION & TRIMMING	10	Use this mode to (simulate) force the output loop current to a specific value or to trim the output current value.
CALIBRATION	77	To be used only by knowledgeable personnel to modify reference parameters.

An example of how to access the USER mode follows:

PRESS KEY	DISPLAY INDICATES	NOTES
↵	PASS?	Do you want to enter a operating mode.
↵	0	Enter the proper access code.
⩘ (3 times)*	3	Enter the "USER" access code.
↵	Dec. pnt	You have entered the "USER" mode. You may use the scroll keys to access various parameters.

*   Use the ⩘, ⩗ and ⟪ keys to enter desired access code. Press ↵ to enter.

7.3   Entering Numerical Values.

During the programming operation, the user may be requested to enter numerical values. Use the ⟪ key to position the display pointer to the digit to be changed. Use the ⩘ and ⩗ keys to increase or decrease the value at that position. The ⟪ will come back to the first position when incremented all the way to the left.

7.4   <u>User Menu (Access Code 3).</u>

This menu enables the user to configure the HST to their requirements. This process allows the user to set the following parameters:

PARAMETER	DISPLAYED AS	NOTES
Decimal point	Dec. pnt	Determines the display decimal point location and resolution.
Input	INPUT	Choose the type of input for the transmitter.
Burnout	BURNOUT	Choose upscale or down scale as the indication if input is open circuited.
Damping	DAMPING?	Input the time damping applied to the output signal updating.
Run	RUN?	Starts the HST operating.
Version	Version	The instrument version and serial number.

7.4.1   <u>"RUN" Function.</u> In most of the menus encountered while programming the HST, the "RUN?" prompt may appear as an option. If the remaining parameters in the programming operation need not be changed, the operator may select "RUN?" to start normal HTS operations.

7.4.2   <u>Decimal Point Selection.</u> When the "Dec.pant" prompt appears in the display, the operator may choose to select the appropriate decimal point setting by pressing the ↵ key then using the ⋀ and ⋁ keys to shift the decimal point 1 position to the left or right respectively. When satisfied press the ↵ key.

7.4.3   <u>Input Type and Range Selection.</u> When the "INPUT" prompt appears in the display, the operator may choose the input source applied to the HST by pressing the ↵ key. To scroll through the menu options, use the ⋀ and ⋁ keys. The options to select from are as follows:

DISPLAY	FUNCTION
DcmV	DC millivolts
T/C	Thermocouple selection
RTD	RTD selection
OHMS	Resistance
POT.	Potentiometric
RUN?	Go to RUN mode

7.4.3.1 <u>DcmV.</u> To operate in the DC millivolt mode, press the ↵ key when the "DCmV" prompt appears in the display. Use the ⋀ and ⋁ keys to scroll through the following menu items, when a selection is made press the ↵ key.

<u>DISPLAY</u>	<u>FUNCTION</u>
Lin.fnct	LINEAR FUNCTION
Squ.root	SQUARE ROOT FUNCTION

A) <u>Linear Function.</u> If the "Lin.fnct" function is selected, the HST will linearly range the 4-20 mA output to correspond to the "Input Lo" and "Input Hi" values. In addition, the displayed value will also be ranged to correspond to the "Disp. Lo" and "Disp. Hi" values. If reverse output is desired (4 mA corresponds to the high input value and 20 mA corresponds to the low input value), simply enter the high value for the "Input Lo" prompt and the low value for the "Input Hi" prompt. The output will then be reversed.

B) <u>Square Root Function.</u> If the "Squ.root" function is selected, the HST will compute the output based upon the following:

$$Output\ (mA) = 4 + 16\ \sqrt{(Input\text{-}"\ Input\ Lo"\ )\ /\ ("\ Input\ Hi"\text{-}"\ Input\ Lo"\ )}$$

C)

> **See Para. 7.4.3.6 for additional instructions for completing programming operation.**

7.4.3.2 <u>Thermocouple Selection.</u> To operate in the Thermocouple mode, press the ↵ key when the "T/C" prompt appears in the display. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

<u>DISPLAY</u>	<u>FUNCTION</u>
Type E	Measure temperature with a Type E probe.
Type J	Measure temperature with a Type J probe.
Type K	Measure temperature with a Type K probe.
Type T	Measure temperature with a Type T probe.
Type R	Measure temperature with a Type R probe.
Type S	Measure temperature with a Type S probe.
Type N	Measure temperature with a Type N probe.
Type B	Measure temperature with a Type B probe.
Type C	Measure temperature with a Type C probe.

A) <u>TC Temperature Range Selection.</u> After selecting the TC Type, the HST will prompt for which temperature scale (C or F) to use. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

B) <u>TC Cold Junction Selection.</u> After selecting the temperature scale, the HST will prompt to determine whether or not to use the internal cold junction compensation feature or not. To select between "CJC" or "noCJC", use the ⌃ and ⌄ keys to scroll then press the ↵ key to select.

> **See Para. 7.4.3.6 for additional instructions for completing the programming operation.**

7.4.3.3   RTD Selection. To operate in the RTD mode, press the ↵ key when the "RTD" prompt appears in the display. Use the ⋀ and ⋁ keys to scroll through the following menu items, when a selection is made press the ↵ key.

DISPLAY   FUNCTION

Pt-100DI   Measure temp. with a 100 Ohm Pt. RTD using the DIN scale.

Pt-100NB   Measure temp. with a 100 Ohm Pt. RTD using the NIST scale.

Cu-10   Measure temp. with a 10 Ohm Copper RTD.

Pt-1000   Measure temp. with a 1000 Ohm Pt. RTD.

Ni-110   Measure temp. with a 110 Ohm Nickel RTD.

A) Wiring Configuration Selection. After selecting the RTD, the HST will prompt for the input sensor wiring configuration. Use the ⋀ and ⋁ keys to scroll through the following menu items, when a selection is made press the ↵ key.

DISPLAY   FUNCTION

4-wire   See Section 5.0 for wiring information

3-wire   "

2-wire   "

B) RTD Temperature Scale Selection. After selecting the wiring configuration, the HST will prompt for which temperature scale (C or F) to use. Use the ⋀ and ⋁ keys to scroll through the following menu items, when a selection is made press the ↵ key.

See Para. 7.4.3.6 for additional instructions for completing the programming operation.

7.4.3.4   Resistance Measurement Selection. To operate in the resistance measurement mode press the ↵ key when the "OHMS" prompt appears in the display. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

A) Wiring Configuration Selection. After selecting the resistance measurement mode the HST will prompt for the input sensor wiring configuration. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

DISPLAY   FUNCTION

4-wire   See Section 5.0 for wiring information

3-wire   "

2-wire   "

See Para. 7.4.3.6 for additional instructions for completing the programming operation.

7.4.3.5   Potentiometric Measurement Selection. To operate in the potentiometric measurement mode press the ↵ key when the "POT" prompt appears in the display. Express the "InputLo" and "InputHi" parameters as %.

See Para. 7.4.3.6 for additional instructions for completing the programming operation.

7.4.3.6   Inputting High and Low Boundary Values. After the operator has selected the desired function the display will prompt for high and low input values and there corresponding high and low display values.

When the display prompt is "Input Lo" press the ↵ key to enter the LOWEST VALUE of the INPUT PARAMETER (in °F or °C) accepted by the HST, press the ↵ key to accept that value and proceed to the next parameter. Use the ⋀, ⋁ and ⟪ keys to display set that number.

When the display prompt is "Disp. Lo" press the ↵ key to enter the number that will be DISPLAYED when the input reaches the "Input Lo" value, press the ↵ key to accept the number and proceed to the next parameter. Use the ⋀, ⋁ and ⟪ keys to set that number.

When the display prompt is "Input Hi" press the ↵ key to enter the HIGHEST VALUE of the INPUT PARAMETER accepted by the HST, press the ↵ key to accept that value and proceed to the next parameter. Use the ⋀, ⋁ and ⟪ keys to display set that number.

When the display prompt is "Disp. Hi" press the ↵ key to enter the number that will be DISPLAYED when the input reaches the "Input Hi" value, press the ↵ key to accept the number and proceed to the next parameter. Use the ⋀, ⋁ and ⟪ keys to set that number.

7.4.3.7   Setting Trim Function. At this point in the programming process you will be given the option to clear a previously set trim value ("Trim clr") or not ("no clear"). Use the ⋀ or ⋁ keys to select the appropriate option then press ↵. If you select "no clear" the HST will range the "Input Lo" and "Input Hi" for 4-20 mA output however, the displayed value and actual output current will be adjusted by the previously set trim data.

7.4.4   Burnout Indication. Burnout detection is the ability of the HST to detect an open circuit condition. The user must be made aware of this condition in order to insure proper system or process operation.

If the "BURNOUT" function is selected, the HST will prompt for "Upscale" or "Dn.scale" selection. Use the ⋀ or ⋁ keys to select the appropriate option then press ↵.

Selecting "Upscale" will force the output to go above 20 mA if a open circuit is detected. Whereas, selecting "Dn.scale" will force the output to less than 4.0 mA.

7.4.5   Damping Factor. For fast responding input sensors or in particularly noisy environments it may be desirable to filter out rapid changing signals, thereby providing a smooth output signal. The user may insert a damping factor to the measurement which is the equivalent of a low pass filter with a time constant measured in seconds. The greater the damping factor the slower the output response. The damping factor may have a value form 0.0 to 32.0 (seconds).

7.4.6   Version. The HST memory retains certain information which is embedded into it during initiation and calibration. This information includes the following:

Version   Software edition, date and time of last revision.

S/N   The instrument's serial number.

Nickname   The instrument's polling address (must be zero if the device is not used in a HART multidrop network).

Ln.Freq.   Line frequency of main power (50 or 60 Hz) for which the unit's A/D converter was optimized.

Write "WR prot"   Enables/disables Protectwrite protection mode/"no WR pr" (HART Code communication option only).

7.5   Simulation and Trimming Menu (Access Code 10).

This menu enables the user to set specific output or to trim the output compensate for a specific sensor characteristic. This process allows the user to set the following parameters:

PARAMETER	DISPLAYED AS	NOTES
Simulation	SIMULATE	Forces the output to a specific value.
Trimming	TRIM?	Compensate for a sensor characteristic.
Run	RUN?	Go to RUN mode

7.5.1 <u>Simulation.</u> The simulation mode is intended to give the operator the option to force the output to a specific value. This feature may be used to test the loop integrity. To operate in the simulation mode press the ↵ key when the "SIMULATION" prompt appears in the display.

7.5.1.2 <u>Simulation Parameters.</u> After selecting "SIMULATION" the HST will prompt for the additional information. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

<u>DISPLAY</u>	<u>FUNCTION</u>
Input?	Allows an input value to be used as the forcing parameter.
Output?	Allows an output value to be used as the forcing parameter.
%range	Allows an %(0-100) of range to be used as the forcing parameter.
RUN?	Go to RUN mode.

A) <u>Input? Parameter.</u> If the operator selects the "Input?" parameter, the HST will prompt for the desired input value based upon full scale output (See example below).

Example:
　Transmitter configuration:　　0 to 600°C for 4-20 mA
　Entered at prompt:　　　　　　300
　then Output =　　　　12.00 mA

B) <u>Output? Parameter.</u> If the operator selects the "Output?" parameter, the HST will prompt for the desired output value directly in mA.

C) <u>%range Parameter.</u> If the operator selects the "%range" parameter, the HST will prompt for the desired input value based upon % of full scale output (See example below).

EXAMPLE:
　Transmitter configuration:　　0 to 600°C for 4-20 mA
　Entered at prompt:　　　　　　50
　then Output =　　　　　　　　12.00 mA

7.5.2   <u>Trim.</u> The trim mode is intended to give the operator the option to trim the output to a specific value. This feature may be used when a sensors' characteristics deviate from their ideal. Trimming enables the operator to achieve higher accuracy and better system performance.

The trimming operation is performed by stimulating the actual input sensor with environmental conditions occurring at the low and high points of the operating range. Then adjusting the output at these points to give the correct results.

<div align="center">

<u>NOTE:</u>

A TRANSMITTER UNDERGOING TRIMMING MUST BE CONFIGURED FOR THE DESIRED OPERATION BEFORE TRIMMING SHOULD BE STARTED.

</div>

7.5.2.1   <u>Trim Parameters.</u> After selecting "TRIM?" the HST will prompt for the additional information. Use the ⌃ and ⌄ keys to scroll through the following menu items, when a selection is made press the ↵ key.

<u>DISPLAY</u>	<u>FUNCTION</u>
Set Low	Allows the low input value to be read by the transmitter.
Set High	Allows the high input value to be read by the transmitter.
Clear ?	Clears the last settings of trimmed values.
Restore?	Restores previously entered trim values.
RUN?	Go to RUN mode.

A) <u>Set Low Parameter.</u> If the operator selects the "Set Low" parameter, the HST will start reading the input signal. Allow 10-20 seconds for the signal to stabilize then press ↵. The display will then prompt "Dis Low", press ↵. Enter the correct value that the transmitter should display then press ↵. The high end calibration will not be effected by this operation. The HST will automatically range itself between the new low and high calibration points.

B) <u>Set High Parameter.</u> If the operator selects the "Set high" parameter, the HST will start reading the input signal. Allow 10-20 seconds for the signal to stabilize then press ↵. The display will then prompt "Dis high", press ↵. Enter the correct value that the transmitter should display then press ↵. The low end calibration will not be effected by this operation. The HST will automatically range itself between the low and new high calibration points.

C) <u>Clear ? Parameter.</u> If the operator selects the "Clear ?" parameter, the HST will clear any set high and low trim values.

D) <u>Set High Parameter.</u> If the operator selects the "Restore?" parameter, the HST will restore the last high and low trim values.

8.0   <u>TEMPERATURE DIFFERENCE MEASUREMENT</u>

It is possible to use the HST to measure the difference between two RTD sensors. This method works very well if the temperature difference is relatively small (the RTD sensor is linear over small ranges) and the median temperature over that range is known.

1)   Enter the "USER" mode and select "OHMS","3-wire" input.

2)   Set the low end of the differential temperature in ohms* for the "InputLo" parameter, in most cases this will be zero.

3)   Set the "Disp.Lo" parameter to the low value of the temperature difference.

4)   Set the high end of the differential temperature in ohms* for the "InputHi" parameter. This should be the difference (in ohms) between the "hot" sensor and the "cold" sensor at full scale measurement.

5)   Set the "Disp.Hi" parameter to the high value of the temperature difference.

* (From Temperature vs. Resistance tables)

EXAMPLE:
Problem:
Setup the HST for a temperature difference of 0-10°C in the ambient temperature of 100-150°C for Pt-100 sensors.

Solution:
The midpoint temperature is 125°C. A _T of 10°C at the   midpoint gives temperatures between 120 and 130°C. For Pt-100 sensors, the resistance is 149.824 - 146.061Ω = 3.763Ω,
therefore,
    set "InputLo" to 0.00
    set "Disp.Lo" to 0.00
    set "InputHi" to 3.763
    set "Disp.Hi" to 10.000
Result:
 The HST will transmit 4.00 mA for 0°C difference and 20 mA for 10°C difference between the two sensors.

EXAMPLE:
Problem:

Setup the HST for a temperature difference of -15 to +15°C at an ambient temperature of 200 to 300°C for Pt-100 sensors.

Solution:

The midpoint temperature is 250°C. A _T of 30°C at the midpoint gives temperatures between 235 and 265°C. For Pt-100 sensors the resistance is 188.637 - 199.491Ω = 10.854Ω for 15°C, the resistance difference is half or 5.427Ω. Therefore, at -15°C the input resistance is -5.427Ω and at +15°C the resistance is   +5.457Ω.

set "InputLo" to -5.427
set "Disp.Lo" to -15.000
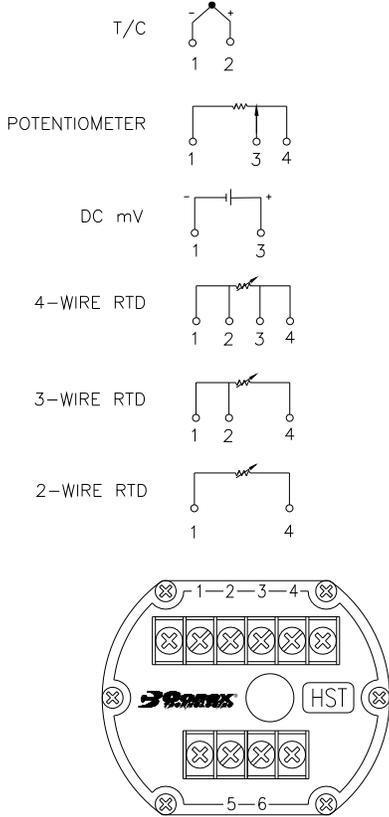set "InputHi" to 5.427
set "Disp.Hi" to 15.000

Result:

The HST will transmit 4.00 mA for -15°C difference and 20 mA for+15°C difference between the two sensors.

9.0   MAINTENANCE

The electronic components should not be exposed to water or excessive amounts of dust of dirt. Periodic inspection of all wire connections is recommended. Insure all electrical connections are tight, clean and free of corrosion.

<u>**APPENDIX A**</u>

ILLUSTRATIONS

T/C

POTENTIOMETER

DC mV

4—WIRE RTD

3—WIRE RTD

2—WIRE RTD

INPUT WIRING DIAGRAM

PROGRAMMING PORT

OPTIONAL MAGNETIC
SWITCHES FOR
PROGRAMMING
THRU XP ENCLOSURE'S
WINDOW

181.4°C
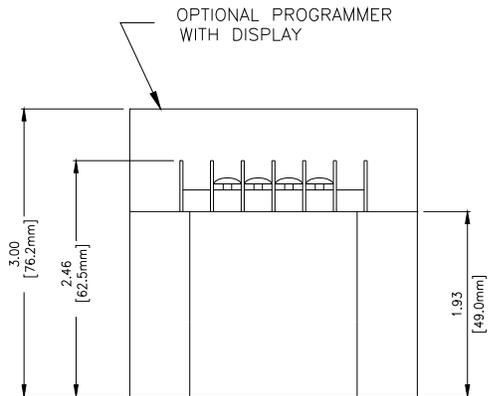
OPTIONAL PROGRAMMER
WITH DISPLAY

2.40
[60.9mm]

3.00
[76.2mm]

181.4°C

OPTIONAL DISPLAY

LOOP WIRING

OPTIONAL PROGRAMMER
WITH DISPLAY

3.00
[76.2mm]

2.46
[62.5mm]

1.93
[49.0mm]

35 mm DIN RAIL

DIN RAIL ADAPTER
MODEL MES-TKAD

2.75" SNAP TRACK
MODEL MES-2TK2D FOR
SURFACE OR DIN RAIL
MOUNTING.
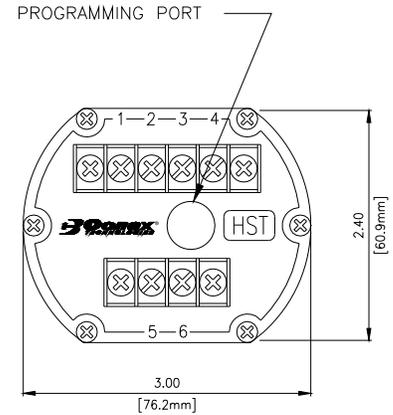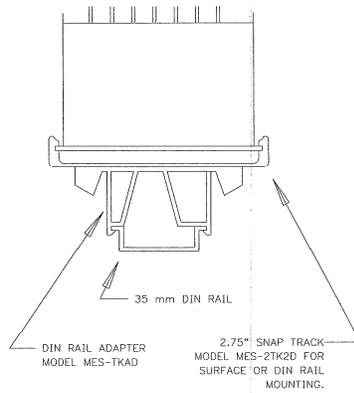
Sample loop showing the HST with both Analog and Digital devices.

Hand-Held
Programmer

HART
PROGRAMMER
(REMOTE)

(−)
POWER
SUPPLY
(+)

RL >= 250 Ohms

BELL 202
MODEM

PLC/PC

181.4°C

122,94
4.840

69,85
2.750
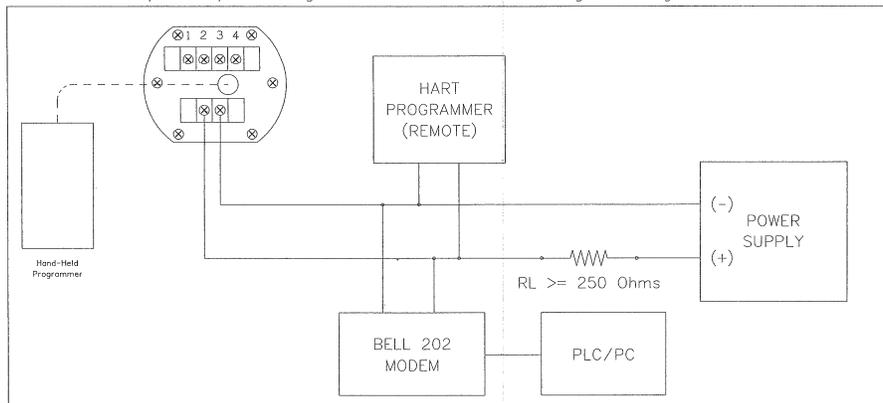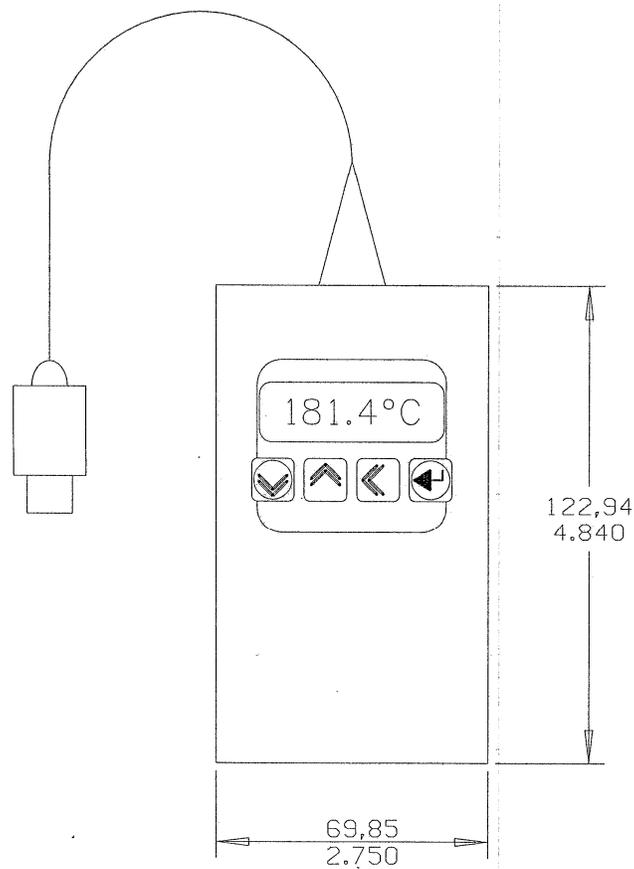
Hand-Held Programmer

APPENDIX B

PROGRAMMING WITH THE HST-H
WITH A HART 275 COMMUNICATOR

This Appendix contains information which is required to alter the functional operation of the HST-H HART smart transmitter.

The HST-H has two modes of operation. Only certain functions can be programmed from each. Therefore, a good understanding of each mode is essential in order to achieve the desired operation from the HST-H transmitter.

When first turned on, the HST-H will be active in the "Generic" mode. One of several displays will appear depending upon the state of the system.

If the HST-H is connected to the HART Communicator as shown in Fig. B1 and is operating properly then the display will appear as indicated in para. B1.1.1.

If the HART Communicator is turned on and the HST-H is not powered, the display will appear as indicated in para. B1.1.2. and will require the operator to press OK then 2, when the HST-H is connected properly. The menu in paragraph B1.1.1 should appear.

NOTE
If the HART Communicator should become disconnected from the system (as indicated by the prompt "Device Disconnected") the operator should do the following when the system is re-connected.

> Press RETRY
> Press NEXT
> Press YES

The menu in paragraph B1.1.1 should appear.

Table B1.1 indicates the most common parameters which are likely to need to be altered in the HST-H. The instructions assume the HST-H is operating in the "Generic mode" and the menu in paragraph B1.1.1 is displayed. If other parameter modifications are required consult the factory for additional information.

B1.1.1 Normal startup
> Generic:@@@@@@@@
> Online(Generic)
> > 1 Device setup
> > 2 PV   78.312 degF
> > 3 PV AO   10.266 mA
> > 4 PV LRV   0.000 degF
> > 5 URV   200.000 degF

B1.1.2 HST-H off startup
    HART Communicator
    Online
     Looking for a device
     (after approx. 20 sec) the display will change to

    No Device Found.
    Press OK...

    HART Communicator
                1 Offline
                2 Online
                3 Frequency Device
                4 Utility
    Press 2.

                        TABLE B1.1
    Parameter   Paragraph
    Process Variable, Low Range Value (PV LRV)   B1.1.3
    Process Variable, Upper Range Value (URV)   B1.1.4
    Tag   B1.1.5
    Process Variable, Sensor Units (PV Snsr unit)   B1.1.6
    Change the Snsr Damping (Snsr Damp)   B1.1.7
    Output Loop Test (Loop Test)   B1.1.8
    D/A trim   B1.1.9
    Change the Sensor Type   B1.1.11

B1.1.3 Change the Process Variable, Low Range Value (PV LRV)
 from the menu in B1.1.1:
    press 4 (PV LRV)
    press 1 (PV LRV)
    enter digits to set the Low Range Value

B1.1.3.1 Sending changes to the HST-H transmitter
    press F4 (ENTER)
    press F2 (SEND*)
    press F4 (OK) or F3 (ABORT)
    press F4 (OK)
    press F3 (HOME)

B1.1.4 Change the Process Variable, Upper Range Value (URV)
 from the menu in B1.1.1:
        press 5 (URV)
        press 2 (URV)
        enter digits to set the Upper Range Value
        follow instructions in para. B1.1.3.1

B1.1.5 Change the Tag Number (Tag)
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 3 (Basic Setup)
    press 1 (Tag)
        enter digits to set the Tag Number
        follow instructions in para. B1.1.3.1

B1.1.6 Change the Process Variable, Upper Range Value (URV)
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 3 (Basic Setup)
        press 2 (PV Unit)
        move up or down arrows to high light the desired units
        follow instructions in para. B1.1.3.1

B1.1.7 Change the Sensor Damping (Snsr Damp)
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 4 (Detail Setup)
        press 2 (Signal condition)
        press 1 (Snsr Damp)
        enter the damping value.
        follow instructions in para. B1.1.3.1

B1.1.8 Output Loop Test (Loop test)
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 4 (Detail Setup)
        press 3 (Output condition)
        press 1 (Analog output)
        press 3 (Test Loop)
        press F4 (OK)
    enter Output level
        press F4 (End)
        press F3 (HOME)

B1.1.9 D/A trim
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 4 (Detail Setup)
        press 3 (Output condition)
        press 1 (Analog output)
        press 4 (D/A trim)
        press F4 (OK)
        connect reference meter
        press F4 (OK)
        press F4 (OK)
    enter output level
        press 1 (Yes)
        press F4 (OK)
        enter output level
        press 1 (Yes)
        press F4 (OK)
        press F3 (HOME)
        follow instructions in para. B1.1.3.1

B1.1.10 Entering the 3044C Emulation Mode
 from the menu in B1.1.1:
        press 1 (Device Setup)
        press 4 (Detail Setup)
        press 4 (Device information)
        press 8 (Message)
        press . three times (...SET EMULATION OF)
        press F4 (ENTER)
        press F2 (SEND)
        press F4 (OK)
           the system should respond with
             L7: UNDEFINED RESPONSE CODE VALUE

           NOTE: If the communicator has a different response then turn both the
           Communicator and the HST-H off then back on and start over.
        press F4 (OK)
        press F4 (OK)
        press F3 (HOME)
        turn the Communicator off
        turn the Communicator on

        After the self test is complete, the top line of the display should read as follows:
        3044C Tem:(Tag Number)

B1.1.11 Change the Sensor Type
Place HST-H in 3044C emulation mode using the instructions in paragraph B1.1.10.

    press 1 (Device Setup)
    press 3 (Basic Setup)
    press 4 (Connections)
    press F4 (OK)
    select sensor type (see Table B2) using the up/down keys.
    press F4 (ENTER)
  select the connections (see Table B3) using the up/down keys.
    press F4 (ENTER)
    select the meter option (see Table Be) using the up/down keys.

    press F4 (OK)
    press 2 (PV Unit)
    select Unit (deg F)
    press F4 (ENTER)
    press F4 (OK)
    press F3 (HOME)
    press F2 (SEND)
    press F4 (OK)
    press F4 (OK)
    turn the communicator off
    turn the HST-H off
    turn the HST-H on
    turn the communicator on, the HST-H will be in the Generic mode and the new parameters
    should be in effect.

TABLE B2
Ohms
PT100 a=385
PT100, a=392
PT200, a=385
PT500, a=385
Ni120
Diff ohms
Diff PT100, a=385
Diff PT100, a=392
Diff PT200, a=385
Diff PT500, a=385
Diff Ni120
Millivolts
T/C typ B
T/C typ E
T/C typ J
T/C typ K
T/C typ N
T/C typ R
T/C typ S
T/C typ T
T/C typ DIN L
T/C typ K
T/C typ S
T/C typ DIN U
Non std

TABLE B3
2 Wire
3 Wire
4 Wire

TABLE B4
Meter Option
Eng unit
% rnge
Alt % rnge | Eng unit
Milliamp
None
Unknown

SIMPLE LOOP SHOWING THE HST—H WITH A HART 275 COMMUNICATOR

SENSOR

RL>= 250 ohms

HART Model 275
Communicator

(−) POWER
(+) SUPPLY