DewTrak II - MO

Dew Point / Humidity and Pressure Transmitter
Motor Octane Testing
OPERATORS MANUAL

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Edgetech Instruments

DEWTRAK II

QUICK STARTUP GUIDE

STARTUP

1. Mount the DewTrak ll in position to measure the intake air to the CFR Engine as per the enclosed install detail (see installation procedure on page 9).

2. Connect wiring to the main terminal strip as shown below:

TERMINAL	ITEM
1,2	SERVOLOCK SIGNAL OR ALARM 2
3,4	CLEAN MIRROR SIGNAL OR ALARM 1
5	CHASSIS GROUND
6	ANALOG OUTPUT 2
7	ANALOG OUTPUT 1
8	ANALOG OUTPUT RET.
9	FOR FACTORY USE
10	FOR FACTORY USE
11	RS232 RETURN
12	RS232 TX
13	RS232 RX

3. Power unit up by plugging 24VDC transformer into a 115-120 VAC outlet.

4. After the self-test procedure, start recording valid data.

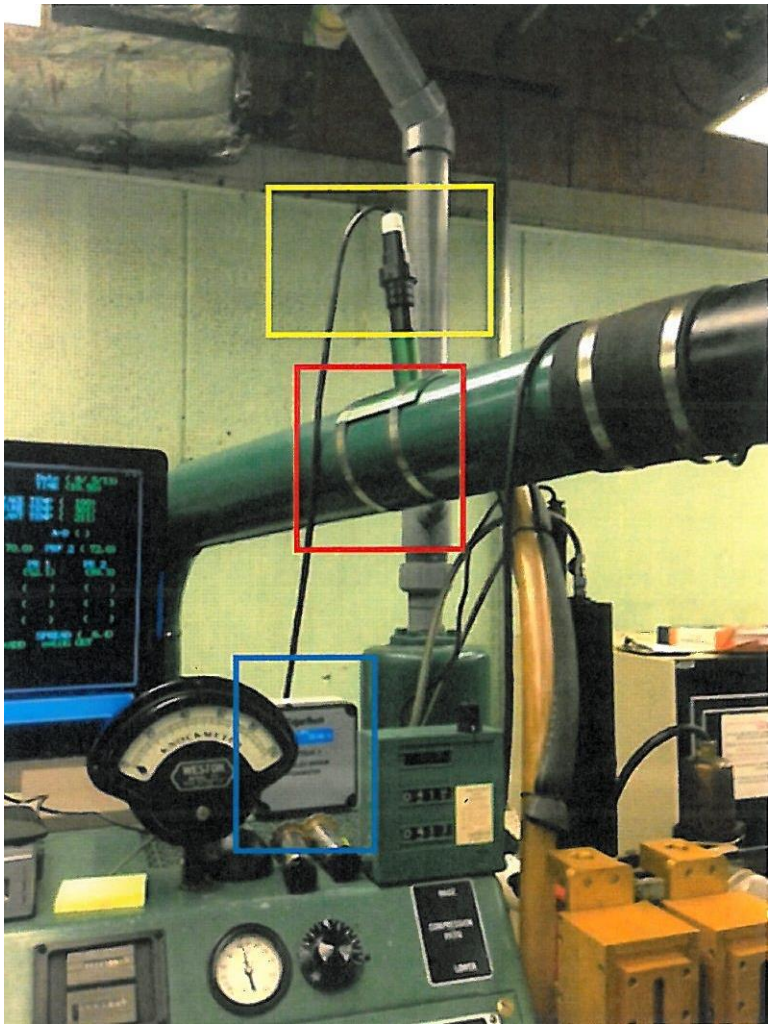

Figure 1a. Lab engine with humidity probe (outlined in yellow) midway in air intake duct. Probe is designed to not impede air flow to carburetor. Humidity reading is in gr/lb and is not effected by temperature in the air duct. A pressure transducer (outlined in blue) is mounted in the chassis of the transmitter in order to measure barometric pressure. For maximum utility, individual saddles (outlined in red) can be mounted on multiple engines and a single humidity probe can be shuttled from one engine to another as well as measuring the humidity of the lab air. Measurement and control of lab air can prevent water condensation in the test fuel bowl which could lead to errors in octane determination.

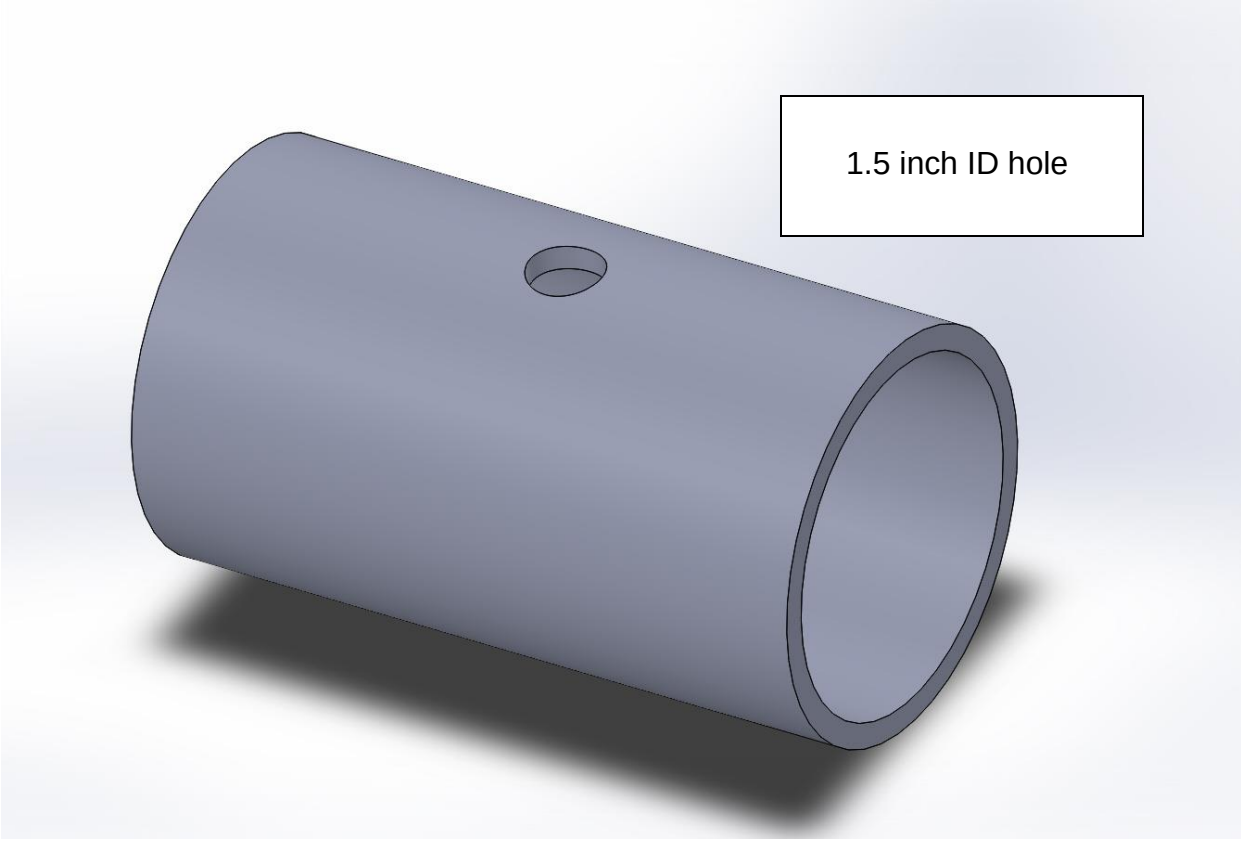

Figure 1b. Schematic diagram of 1.5” hole in air intake duct for DewTrak II – MO mounting with saddle.

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2.0 EDGETECH INSTRUMENT'S COMMITMENT TO QUALITY

To Our Customers:

Thank you for purchasing one of our products. At Edgetech Instruments Inc., it is our policy to provide cost-effective products and support services that meet or exceed you requirements, to deliver them on time, and to continuously look for ways to improve both. We all take great pride in the products we manufacture.

We want you to be entirely satisfied with your instrument. The information contained in this manual will get you started. It tells you what you need to get your equipment up and running, and introduces its many features.

We always enjoy hearing from the people who use our products. Your experience with our products is an invaluable source of information that we can use to continuously improve what we manufacture. We encourage you to contact or visit us to discuss any issues whatsoever that relate to our products or your application.

The Employees of Edgetech Instruments Inc.

3.0 INTRODUCTION

3.1 GENERAL DESCRIPTION

The Model DewTrak ll MO ™ Dew Point/Humidity Transmitter is an optical chilled mirror hygrometer, designed to continuously measure humidity of the intake air to CFR Knock Engines as per ASTM D2699, and ASTM D2700. Though not specified in ASTM D2885, the instrument will also prove useful in measuring the humidity entering Online Knock Engines. The Dew Trak II – MO is also equipped with an accurate and precise pressure transducer that measures barometric pressure in the test lab. Pressure measurement is specified in the above mentioned ASTM procedures. Humidity is measured in grains/pound, and barometric pressure in inches of mercury. Both humidity and pressure are displayed on the unit and outputted in either RS232 or analog signals. The instrument is powered by 24VDC. It uses the chilled mirror dew point temperature condensation principle to determine the water vapor concentration in gas mixtures, and a platinum resistance thermometer to accurately measure that temperature. The Dew Trak II MO therefore provides a fundamental measurement of humidity that is traceable to NIST, and is explained in the Appendix to this manual. Outputs include 4 to 20 mA (Factory default unless specified otherwise when ordering), 0 to 5VDC, or 0 to 10VDC, field-selectable. Two sets of analog outputs are supplied, unless Dew Point only is ordered. Additional outputs include an RS-232C serial port, as well as electrically isolated relay contacts.

The DewTrak ll MO is supplied in a plastic (IP65) dust-tight and water resistant package. Many options and accessories are available, and these are described below. Figure 1a shows the Dew Trak II MO installed in an actual CFR Engine. Figure 1b is a schematic drawing of the hole in the intake air duct upon which the probe saddle is secured (see installation section, 4.0).

3.2 STANDARD FACTORY CONFIGURATIONS

The DewTrak ll – MO is designed with two standard configurations for user convenience, as shown below. In addition, you can consult the Factory for special configurations if needed.

DT-MO-PL-W-R-RD-B REMOTE WITH CABLE A wall-mount configured humidity and pressure transmitter with a plastic enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, saddle kit, and alarm relays. A 10 foot cable is supplied between the humidity transmitter probe and the plastic enclosure. The pressure transmitter is contained within the plastic enclosure.

DT- MO-W-RD-B DIRECT WITHOUT CABLE A remote-mount configured Dew Point/Humidity and pressure transmitter with a plastic enclosure, a two-stage chilled mirror sensor, two programmable analog outputs, an RS-232 bi-directional serial port, saddle kit.

3.2.1 FACTORY DEFAULT OUTPUT RANGES

These standard output measurement ranges apply to all instruments unless specified otherwise when ordering. They correspond to 4 to 20 mA. See 3.1 above for other field-selectable electrical ranges.

- Grains/lb 0 – 100 grains/lb
- Barometric Pressure 28 – 32 inches of mercury

3.3 OPTIONS AND ACCESSORIES

The DewTrak ll-MO is designed to accept a number of options and accessories to expand its capabilities.

ATDT Add a platinum RTD Air Temperature probe to the package. (Used with a 10 ft. cable).

4.0 INSTALLATION

4.1 PLACEMENT OF INSTRUMENT

The DewTrak ll-MO was specifically designed to be inserted into the air duct of a CFR Engine. Many of our customers place the probe and saddle midway in the air duct as described in Figures 1a, b, pages 3, 4. The probe saddle is designed to allow adequate air flow to the sensor. The procedure to install the DewTrak II – MO system is outlined below.

1. Drill 1.5” ID hole at midpoint of the air duct at the 12 O’clock position
2. Place saddle coincident with the 1.5” hole
3. Apply two hose clamps supplied with the system on either side of the probe port
4. Insert probe into the saddle tube to the full stop position

Since the DewTrak II – MO is on a remote cable, the probe can be used to measure the humidity of the engine lab. Many of our customers do this to evaluate the workings of the HVAC system and air chillers. The remote probe also allows the measurement of humidity in grains/lb at multiple saddle locations thus enhancing the versatility of the system.

The pressure transducer of the DewTrak II–MO is positioned within the plastic chassis , which is opened to the lab environment and therefore measures the barometric pressure as required by ASTM-D2699, and D2700. Optimal performance of the instrument is experienced when air is gently moving over the chilled mirror sensor, providing a representative sample for measurement. If you have purchased an instrument with the optional digital display, choose a location where the display may be conveniently observed. Depending on the location selected, it may be convenient to wire the instrument prior to mounting.

4.2 MOUNTING

4.2.1 REMOTE MOUNT WITH SADDLE

A 10 foot (1.8 meter) remote sensor cable is provided between the sensor and the instrument housing. The pressure transmitter is contained within the plastic enclosure. Consult the factory for other lengths. A remote mount unit is available with either a plastic or metal housing. Mount the housing as described above.

4.2.2 DIRECT MOUNT ON SADDLE

In this configuration the humidity probe is integral with the plastic enclosure. The pressure transmitter is contained within the plastic enclosure. The enclosure has a perforated port on the side wall to allow for equilibration with the barometric pressure of the ambient.

4.3 Electrical Wiring

The table below indicates the various terminal positions for their respective functions.

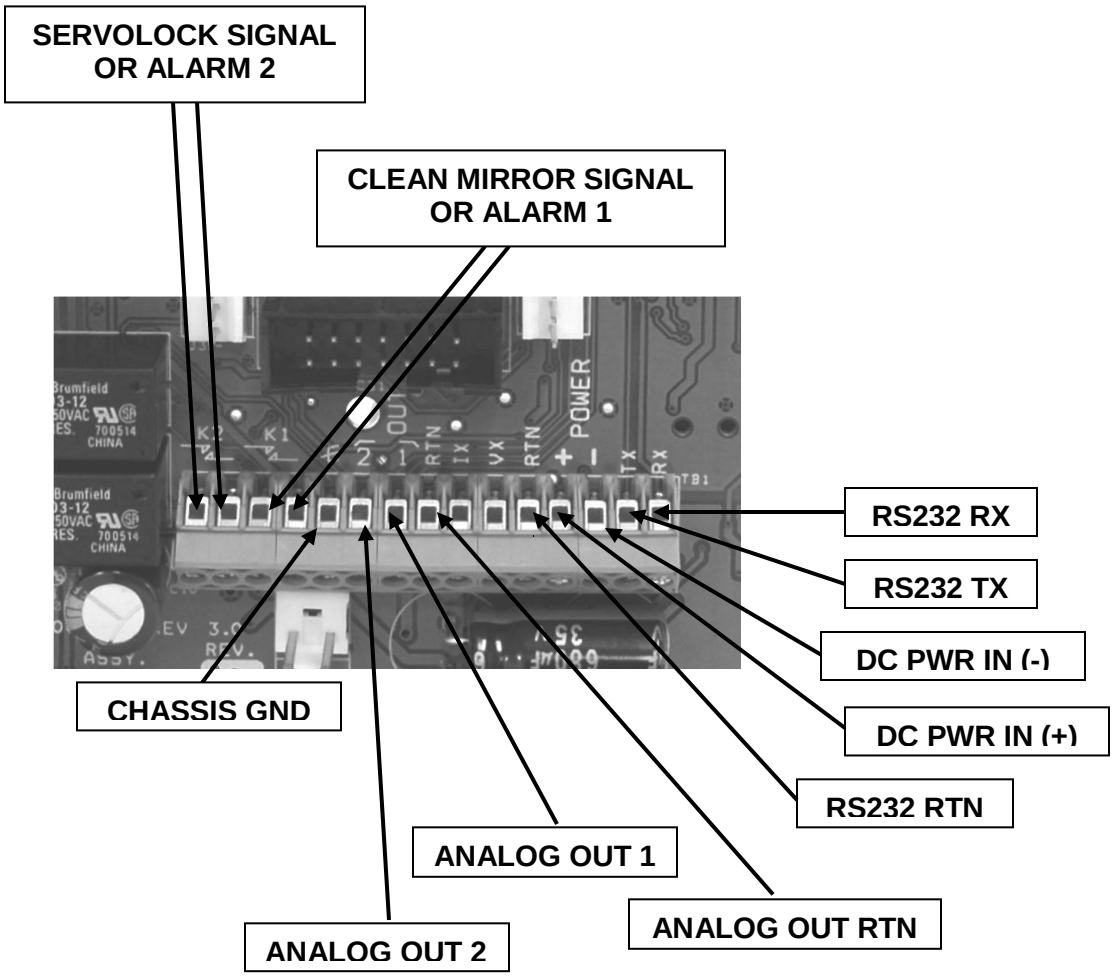
CAUTION: BE SURE TO OBSERVE CORRECT WIRING POLARITY.

DO NOT APPLY POWER TO THE UNIT UNTIL THE INSTALLATION HAS BEEN COMPLETED.

Table 4-1 Terminal Strip Wiring

TERMINAL	ITEM
1,2	SERVOLOCK SIGNAL OR ALARM 2
3,4	CLEAN MIRROR SIGNAL OR ALARM 1
5	CHASSIS GROUND
6	ANALOG OUTPUT 2
7	ANALOG OUTPUT 1
8	ANALOG OUTPUT RET.
9	*FOR FACTORY USE*
10	*FOR FACTORY USE*
11	RS232 RETURN
14	RS232 TX
15	RS232 RX

Figure 4-1 Terminal Strip Wiring



4.3.2 INPUT/OUTPUT WIRING

Wire the Analog Outputs as required. See 4.4 below for information on output selection.

Connect the RS-232 Serial Output if desired. Only 2 wires are required if the output is needed for transmitting information only. A third wire is added for bi-directional communications with the serial port.

Connect the relays as needed. Note that they may be programmed to provide either a Clean Mirror signal and a ServoLock signal, or they may be used as upper or lower setpoint Alarm Relays. See Section 5.4.4 for further information.

4.4 SELECTION OF ANALOG OUTPUTS

Two small electrical switches allow the selection of analog output scaling. These switches are located in the top left corner of the circuit board as shown in Figure 4-2 below. You can select the outputs to be either 4 to 20 mA, o to 5VDC, or 0 to 10VDC. To modify the output scaling, proceed as follows:

1. Be sure that DC Power is not applied to the unit.
2. Remove the outer cover.
3. Using a small screwdriver, set the switches as shown in Table 4-2.
4. Replace the cover.
5. Reapply DC power.

OUTPUTS	SWITCH 1	SWITCH 2
4 to 20 mA	DOWN	----
0 to 5VDC	UP	UP
0 to 10VDC	UP	DOWN

Table 4-2. Analog Output Switch Settings

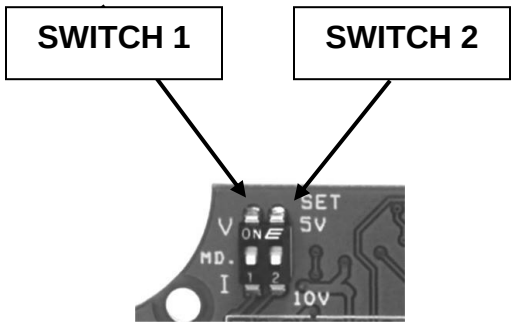


Figure 4-2 Output Selector Switches

5.0 OPERATION

5.1 PLACEMENT OF INSTRUMENT

Locate the DewTrak ll – MO Humidity Transmitter in the intake air duct of the CFR Engine as described on pages 3,4, 11. The probe and saddle assembly are designed to allow the free movement of air sample across the mirror of the sensor. Optimal performance of the instrument is experienced when air is gently moving over the chilled mirror sensor, providing a representative sample for measurement.

5.2 FLOW CONTROL

The sensor probe is designed so that the flow rate can be changed. This is achieved by means of rotating the sensor cover around the sensor probe base. By aligning and misaligning the holes on the sensor cover with those of the sensor base, the air flow can be controlled across the surface of the chilled mirror sensor. The proper alignment of the holes (and thus gas flow control) depends on the application. The DewTrak ll sensor is designed to accommodate various application conditions. Optimal performance of the sensor may require several trial and error adjustments. “Optimal” performance is defined by the response time of the sensor, (lower flow results in a slower response). Accuracy is unaffected by the flow.

Flow control can also be achieved by constructing a simple external sampling system. You can use an EdgeTech Sample Chamber, Model SC1, along with a flowmeter which can adjust the flow between 0 to 5 SCFH. Contact the factory for more details.

5.3 CLEAN MIRROR SIGNAL

The DewTrak ll Humidity Transmitter features an electro-optical technique to detect and maintain the dew layer on the mirror surface. By use of the Auto Validation Cycle, the system will indicate when the mirror needs attention. In the factory default configuration, the Clean Mirror alarm relay actuates when the mirror requires periodic cleaning. An indication also appears on the RS-232 serial output. When the Clean Mirror alarm actuates, the instrument is still operational and the accuracy of the measurement is not affected by the presence of contaminants on the mirror surface.

Note: This alarm requires that the mirror be cleaned within a reasonable period of time, or the specified accuracy can no longer be guaranteed.

There are many variables determining the frequency that your transmitters require maintenance. These include flow rate and the amount of particulate matter in the gas being measured. Once you determine the typical contamination rate in your unique application, it is recommended that you initiate a periodic maintenance schedule. This minimizes the chance of obtaining incorrect data due to mirror contamination.

5.4 USING THE RS-232C SERIAL PORT TO REPROGRAM YOUR SETTINGS

Note: If the Factory Default settings are satisfactory, there is no reason to perform any programming.

The DewTrak ll is very versatile. Through the Serial Port, the user has complete control over the display units, the electrical outputs, and other features as well. Here are some of the parameters you can select and change:

- Displayed Values (if the optional display has been supplied)
- Output Units
- Output Ranges
- Alarm Scaling (if alarms have been selected)
- RS-232 Settings (Elapsed Time Stamp, Update Rate)
- Auto Validation (On or Off)

5.4.1 SERIAL PORT SETUP

You will need a serial cable with a standard DB-9 connector on one end, which will plug into the standard serial port connector on the back of your computer. The other end will have three stripped wires, which will connect to Terminal Strip TB1 on the DewTrak ll circuit board as shown below:

Table 5-1 Serial Cable Wiring

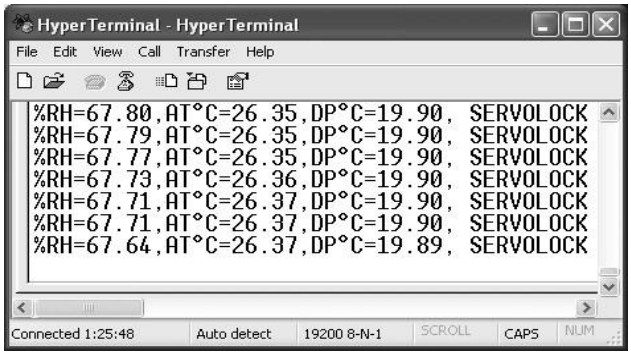
DB-9 SERIAL CONNECTOR	TB1 TERMINAL STRIP
Pin 2	TX – Term. 14
Pin 3	RX – Term 15
Pin 5	RTN – Term. 11

Using a terminal emulation program, such as HyperTerminal, set your PC Com Port to:

BAUD:	19200
BITS	8
STOP BITS	1
PARITY	NONE
FLOW CONTROL	NONE

HyperTerminal has a setting called Control for Terminal Emulation. Set it to AUTODETECT.

After connecting both ends of the serial cable, apply power to the DewTrak ll. A window should be seen, which will show some warm-up and self test data. After the self checking and warm-up period, the window will display information similar to the photo shown here. This is the default condition.

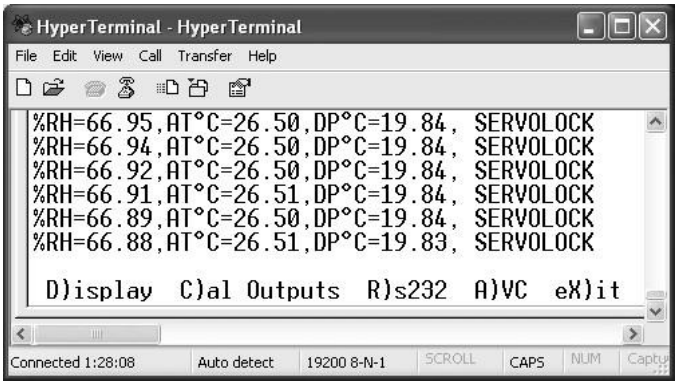


5.4.2 PROGRAMMING THE DEWTRAK II VIA THE SERIAL PORT

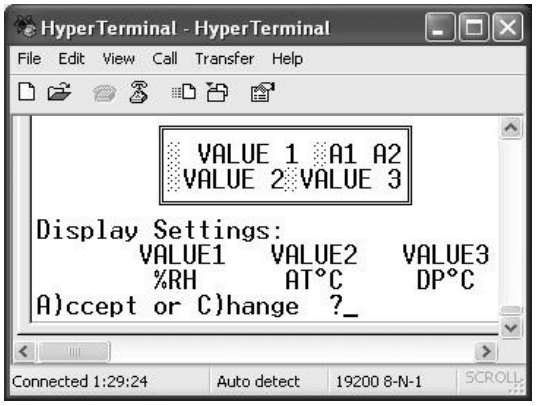
If you do not see a window similar to the one shown above, you will not be able to program this instrument. Check your terminal emulation program, the power supply, and check the interconnecting cable wiring as shown in Table 6 -1 above.

NOTE: WHEN PROGRAMMING ALPHABETIC CHARACTERS, USE UPPER CASE ONLY.

To begin reprogramming, press the ESCape key on your computer keyboard. The window will change to that shown here. To select the desired parameter, simply select the first letter as shown. You will find it quite intuitive once you try it. Several programming examples will be shown here.

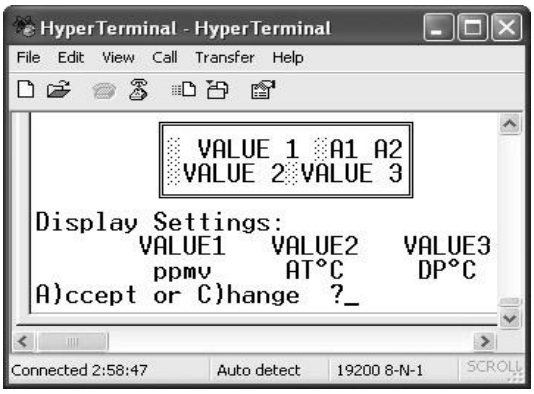


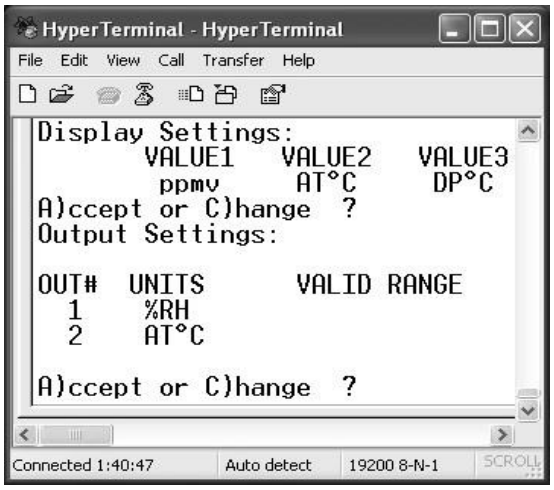
5.4.3 CHANGING THE DIGITAL DISPLAY (if you have the Display option)



Press the D key to change the displayed values. The window at the left will appear. Press the A key to keep the present values, or the C key to change them. In this case, you will change them. So, you will press C to change the values.

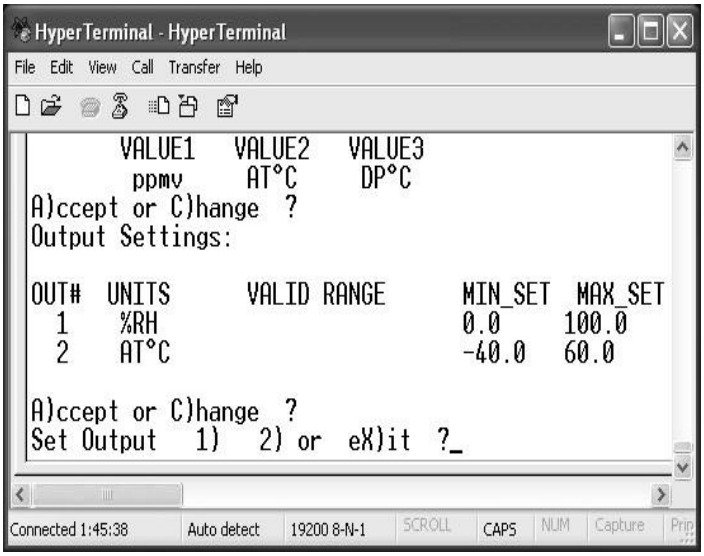
Using the Space Bar on the keyboard, you can toggle through all the available units to display. You will change the first displayed parameter from %RH to ppmv, as shown here. For VALUE1, cycle all the available parameters using the Space Bar until ppmv is shown. Press Enter. Press Enter again to keep VALUE2, and press Enter again to keep VALUE3. Press A for A)ccept. You have now selected your desired displayed parameters.

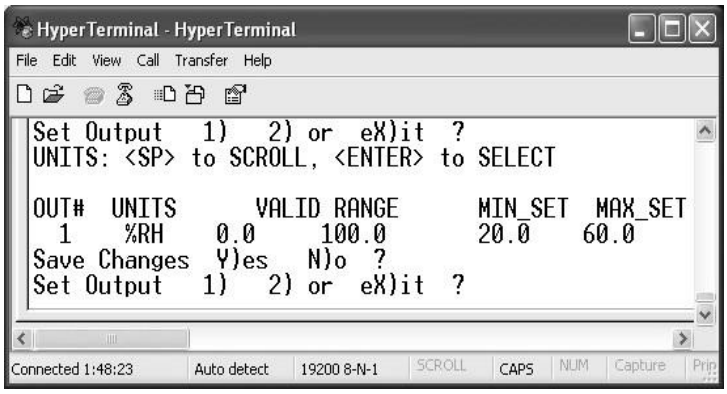




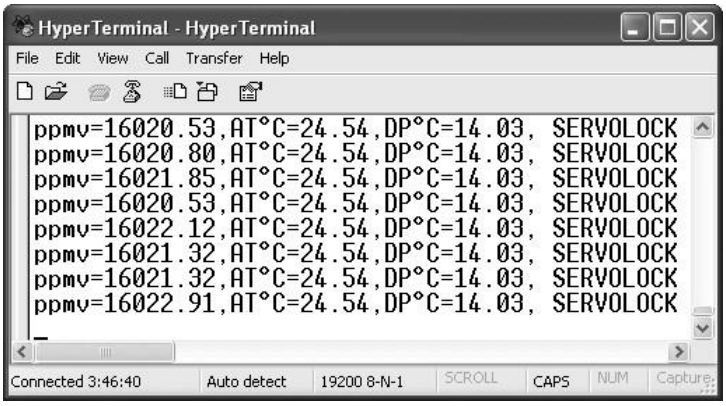
The screen at the left will now be seen, and you will have an opportunity to select the electrical outputs and make them represent any parameter you wish. To do so, press C for C)hange, and the screen shown below will appear.

The outputs shown are %RH with a range of 0 to 100%RH, and Air Temperature (AT) with a range of -40 to 60°C. These are the Factory defaults.





Perhaps you would like additional resolution on the Relative Humidity analog output. So, for this example, you will change the output scaling from 0 to 100 %RH to 20 to 60%RH. Press 1 on the keyboard in order to change Parameter 1. Set the MIN SET to 20. Press Enter. Set the MAX SET to 60. Press Enter. Press Y for Y)es to save the changes. You can then enter X for eX)it if desired.



You will see that the default window will reappear, and will be constantly updated. Comparing it with the window shown at the beginning of this chapter, the first parameter has been changed from %RH to ppmv. A meter on the analog output would show that the first output is on %RH, with scaling of 0 to 100% corresponding to 20 to 60%RH.

5.4.4 RELAY OUTPUTS

Two relays, K1 and K2, are built into the DewTrak ll. The relay contacts are brought out to the main terminal strip, TB1. The contacts are Normally Open (NO), or Form A. As supplied from the Factory, they are configured as follows:

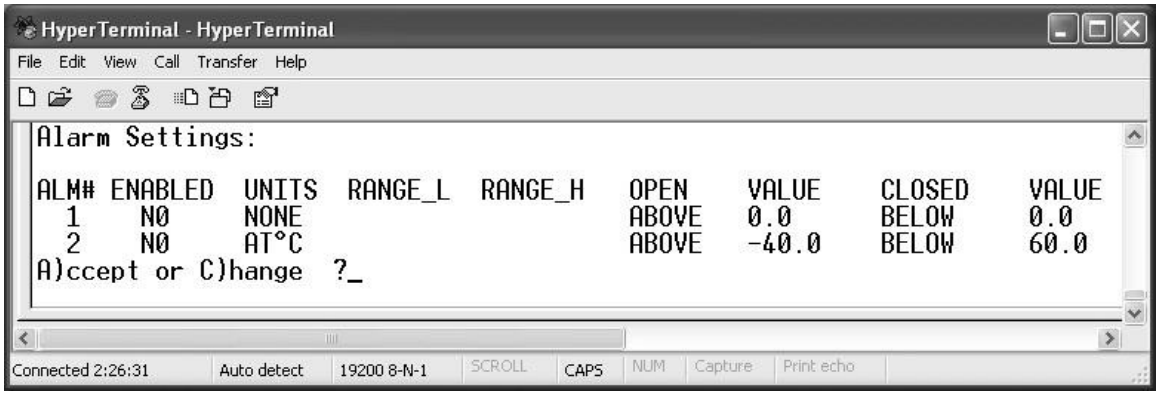
K1 is used as the Clean Mirror signal. When energized, it advises the user that contamination has accumulated on the dew point sensor mirror, and the system should be shut down for a routine cleaning. When this signal occurs, the system still provides dew point measurements that are in specification, but the closure indicates that readings may become unreliable if the mirror is not cleaned before long.

K2 is the ServoLock signal. ServoLock is an EdgeTech term indicating that the mirror servo loop is operating properly, and there is a correct dew layer on the mirror surface. You can use this relay signal as an indication that good dew point data is being supplied by the DewTrak ll. Or conversely, the lack of this signal may be used as a “busy” signal, telling the user to disregard the data being received at this time.

5.4.4.1 CONFIGURING THE RELAYS AS ALARMS

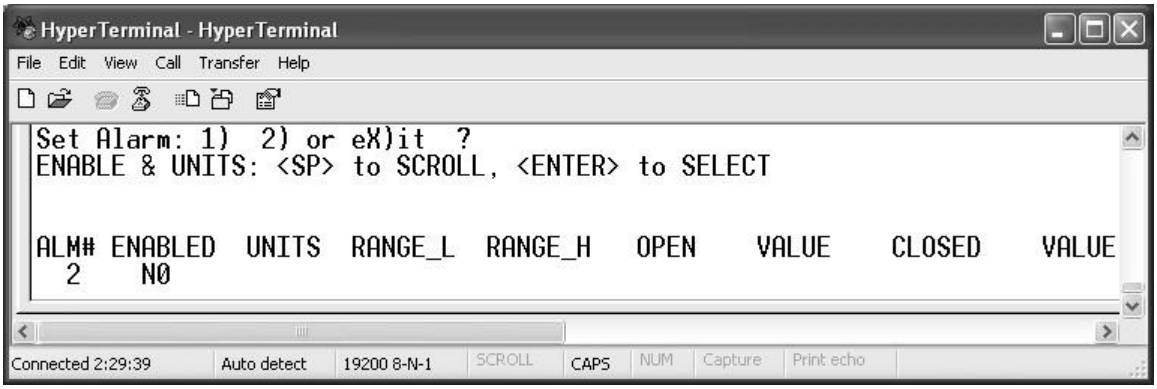
Using the RS-232 Port, relays K1 and K2 may be set as Alarm Relays. You can program them to actuate on any increasing or decreasing measured or calculated humidity parameter.

NOTE: IT IS ADVISABLE TO PROGRAM IN A SMALL OVERLAP OF THE "ON" VALUE AND THE "OFF" VALUE, SO THAT THE RELAY DOES NOT CHATTER WHEN THE MEASURED VALUE IS EXACTLY AT THE SETPOINT. THIS OVERLAP IS CALLED "HYSTERESIS."

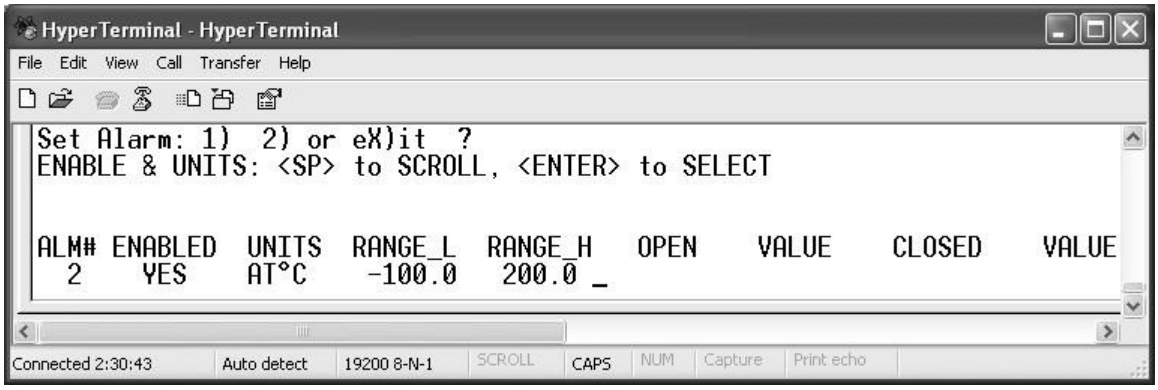


You can press D for D)isplay until the above picture appears. If you do not wish to use the Alarm Relays, A for A)ccept, then X to eX)it.

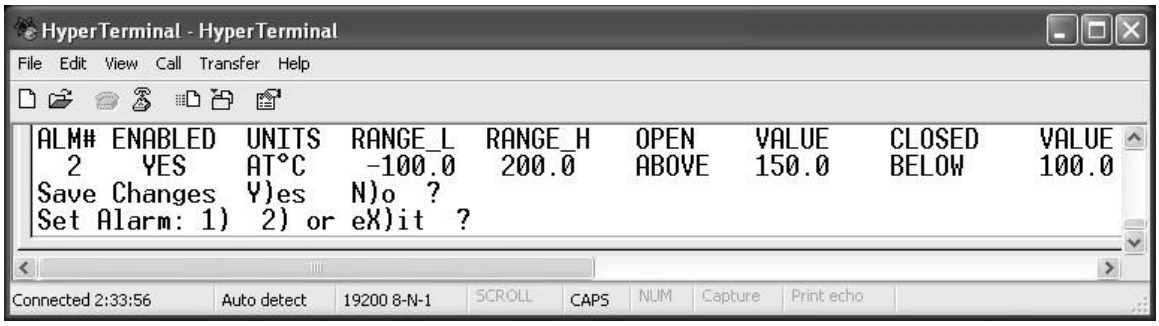
To program the relays as Alarms, proceed as follows: Press C for C)hange when the above picture appears. You will then be able to program Alarm1 and Alarm2 as shown in the picture below.



In this case, enable Alarm2 by scrolling with the space bar and selecting YES. See the picture shown below.



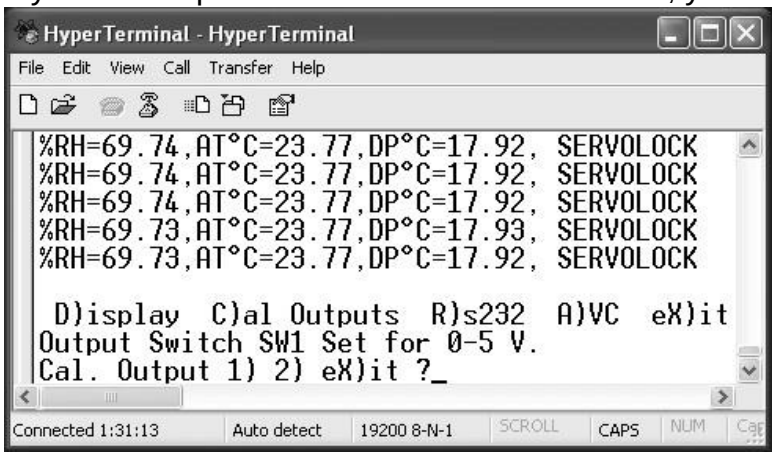
You will then be able to select the values for the OPEN and CLOSED conditions. In this case, you would like Alarm2 to OPEN at an Air Temperature reading of 150, and to remain open above that value. You would like the relay to CLOSE at a reading of 100, and to remain closed below that value. You can then save the



changes, and then proceed to program Alarm1 or press X for eX)it.

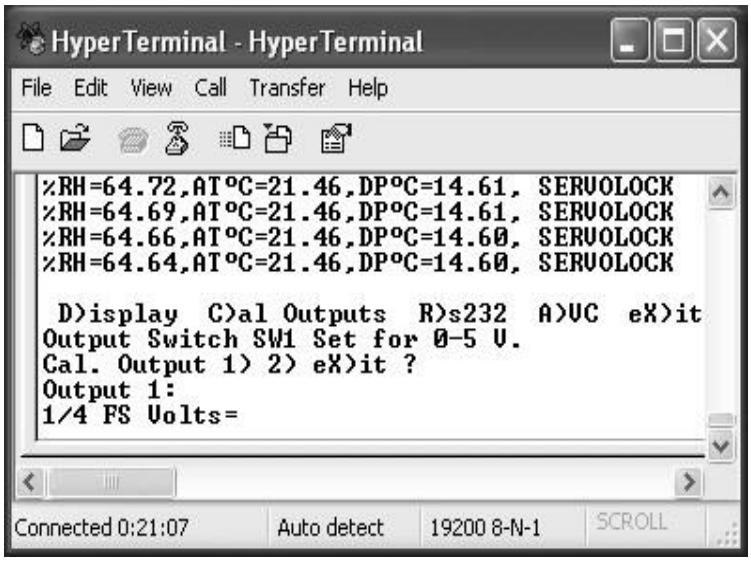
5.4.5 CALIBRATING THE ANALOG OUTPUTS

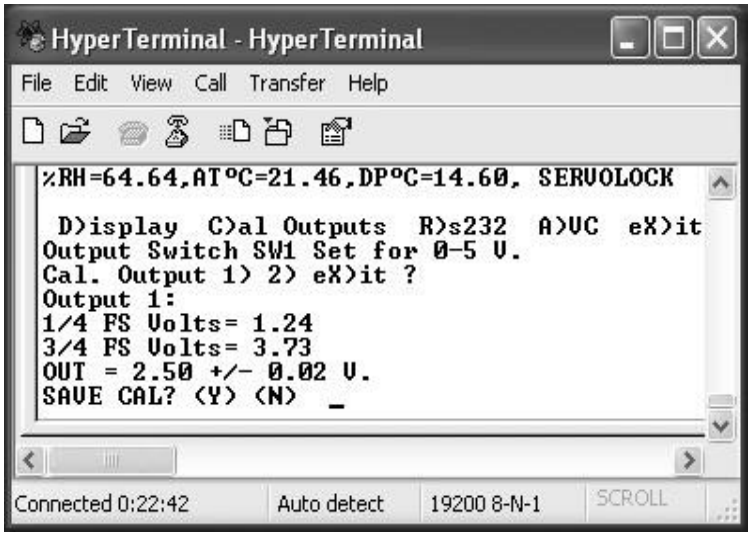
If you have a precise milliammeter or voltmeter, you can check the accuracy and scaling of the analog outputs. Connect your meter to terminal strip TB1 on the circuit board. If you have selected 4 to 20 mA current output, you can connect it in series with the load. If you have selected 5 or 10 VDC, connect it between the voltage output and RTN.



Press C for C)al Outputs. This window shows that the output switches on the circuit board are set for analog outputs of 0 to 5VDC, and you can now select Output 1 or 2 to test. Selecting Output 1, a new window will be seen, as shown below. A new output voltage will be measured on the terminal strip,

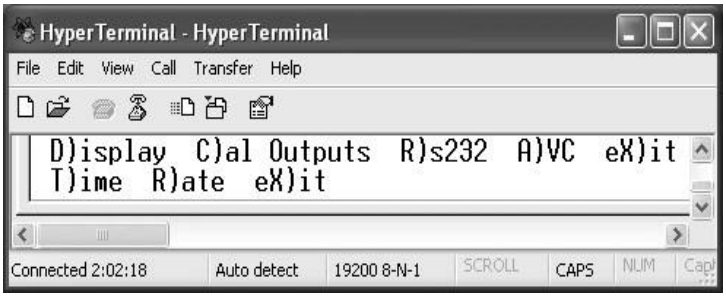
corresponding to ¼ of Full Scale. Type in this voltage reading as requested by the program. Press the Enter key. You will then see a second screen, giving you the value of ¾ of Full Scale. Also, type in this value as requested by the program. Press Enter. Now, the voltage corresponding *exactly to midscale* will be measured at the output. Your meter should read 2.50VDC +/- 0.02 volts, +/- the meter error. You can save the calibration, and then eX)it from the program.



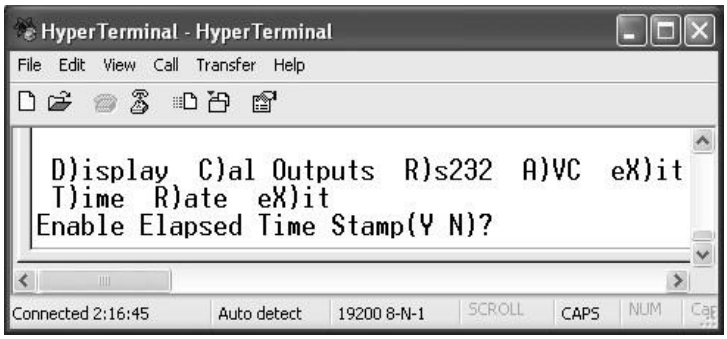


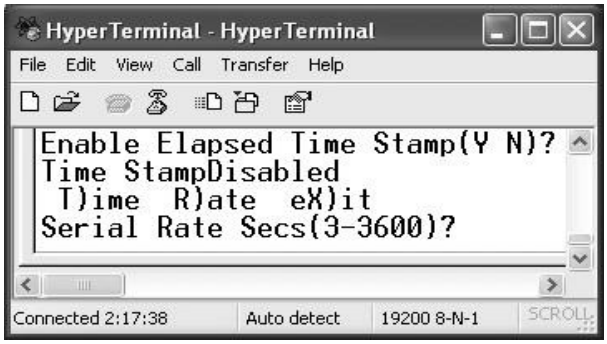
5.4.6 PROGRAMMING THE SERIAL OUTPUT

From the main (default) window, press the ESCape key. Then press R for R)s232. You will then have two options. You can add an Elapsed T)ime Stamp to the serial output, and you can select an Update Rate. If you select T for the output T)ime Stamp, you will see the window shown here.

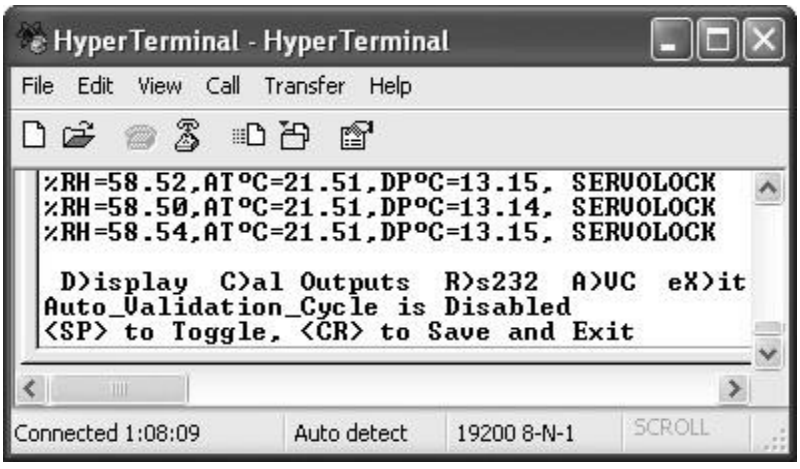


You can now select Y for YES, or N for NO. If you select R for Update R)ate, you will see the window shown here. It allows you to select the Serial Port update rate in seconds, from 3 to 3600 seconds, or 1 hour maximum.





5.4.7 AUTO VALIDATION CYCLE



If desired, you can also enable or disable the Auto Validation cycle. This automatic built-in cycle is a self-test feature. Every 6 hours, it heats the mirror, evaporating the dew layer, and checks for excessive contamination on the surface. If conditions are acceptable, it proceeds to grow a new dew layer and continues to take measurements. If contaminants are excessive, it initiates the Clean Mirror alarm. During the periodic cycle, the analog outputs are held for 30 seconds at the value that existed *just before* the cycle started. Press the Space Bar to Enable or Disable the Auto Validation cycle, and then Save and Exit.

6.0 MAINTENENACE

6.1 ROUTINE MAINTENANCE

The only maintenance required by the DewTrak ll is periodic mirror cleaning. The rate of contamination, and therefore the frequency of mirror cleaning, varies from user to user. It depends upon flow rate of the gas being measured, the quantity of contaminants in the gas, and how wide the sensor aperture is opened.

6.1.1 MIRROR CLEANING SCHEDULE

To maintain the optimum in accurate and reliable operation of any optical chilled mirror system, a periodic maintenance program should be established. Depending on the application, you may want to "schedule" mirror cleaning on a routine basis. It is recommended that the time internal between cleaning be determined by the performance experience of the system. In other words, operation experience with the instrument will dictate that mirror cleaning will be scheduled just prior to when it is necessary. Cleaning the mirror excessively is no more useful than not cleaning the mirror when it is needed.

The buildup of contamination on the mirror surface normally occurs very slowly. Over time, particulates and other matter present in the sample gas and not captured by filters, build up on the mirror. The result of the buildup of contaminants on the mirror surface is reduced dry mirror reflectivity and a change in the optical reference point. When the contamination becomes too severe to allow specified dew point accuracy to be maintained, a CLEAN MIRROR warning will be generated. Normally, intervals of at least 90 days between routine mirror cleanings can be achieved. However, if the sample contaminants are particularly high, more frequent mirror cleanings may be required. When cleaning is required, clean the mirror surface and optical parts, as follows:

6.1.2 CLEANING THE MIRROR

To gain access to the mirror, slide the black sensor cover up approximately an inch to allow access to the mirror surface.

1. Shut off the 24VDC power supply, allowing the mirror to equilibrate to room temperature, evaporating the dew layer.

2. Moisten a clean cotton swab with isopropyl alcohol. Cotton swabs and cleaning bottle are provided in the Cleaning Kit supplied.

3. Wipe the mirror surface and the optics surface in a circular motion.

4. Dry the surface with a clean cotton swab.

5. Next, moisten a clean swab with clean, preferably distilled water and lightly wipe the mirror and optics areas.

6. Dry these areas thoroughly with a clean, dry swab.

7. Slide the sensor cover back into position. Be sure you push it down all the way down, past the O-ring, as far as it can go.

8. Turn the power supply back on, and wait for the DewTrak ll to come back into control.

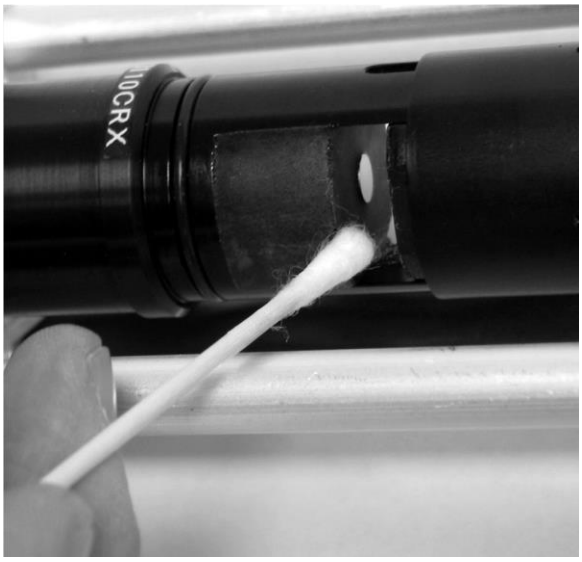


Figure 6-1 Cleaning the Mirror

7.0 SPECIFICATIONS

Measurement Range:

Dew Point:	-40°C to 60°C (-40°F to 140°F)
Ambient Temperature:	-40°C to 60°C (-40°F to 140°F)
Barometric Pressure:	0 to 30” Hg
Equivalent %RH:	1% to 95%

Depression Range: 60°C (108°F)

Repeatability: ±0.1gr/lb

Accuracy: ±0.5gr/lb Dew Point
± 0.044”Hg Barometric Pressure

Operating Temperature:

Sensor:	-40°C to 65°C (-40°F to 149°F)
Control Unit:	0°C to 50°C (32°F to 122°F)

Pressure: 100 psig maximum (Higher pressures available on special order)

Flow Rate: Static to 3,000 linear ft/min.

Analog Outputs: 4 to 20 mA/0 to 5VDC/0 to 10VDC (selectable)
Load: 4 to 20 mA : 400 ohms or lower
0 to 5/10VDC: 1K ohm or higher

Standard Output Ranges: Dew Point: -40°F to 140°F (-40°C to 60°C)
(Programmable) Temperature: -40°F to 140°F (-40°C to 60°C)
Percent RH: 0 to 100%

Serial Outputs: RS-232C, bidirectional

Relay Outputs:

K1:	Clean Mirror/Alarm 1
K2:	ServoLock/Alarm 2
Contact Rating:	Normally Open (Form A)
	3A at 250VAC, or 30VDC

Remote Cables:

Dew Point:	6 ft. standard**,** 50 ft. maximum
Air Temperature:	10 ft. standard, 50 ft. maximum

Power Supply: 24VDC ±20%, 1A maximum

8.0 APPENDIX

8.1 WARRANTY STATEMENT

All equipment manufactured by Edgetech Instruments Inc.is warranted against defective components and workmanship for repair at their plant in Massachusetts, free of charge, for a period of twelve months. Malfunction due to improper use is not covered in this warranty and Edgetech Instruments Inc. disclaims any liability for consequential damage resulting from defects in the performance of the equipment. No product is warranted as being fit for a particular purpose and there is no warranty of merchantability. This warranty applies only if (i) the items are used solely under the operating conditions and in the manner recommended in the instruction manual, specifications, or other literature; (ii) the items have not been misused or abused in any manner or repairs attempted thereon; (iii) written notice of the failure within the warranty period is forwarded to Edgetech Instruments Inc. and the directions received for properly identifying items returned under warranty are followed; and (iv) the return notice authorizes Edgetech Instruments Inc. to examine and disassemble returned products to the extent Edgetech Instruments Inc. deems necessary to ascertain the cause for failure. The warranties expressed herein are exclusive. There are no other warranties, either expressed or implied, beyond those set forth herein, and Edgetech Instruments Inc. does not assume any other obligation or liability in connection with the sale or use of said products.

Equipment not manufactured by Edgetech Instruments Inc. is supported only to the extent of the original manufacturer’s warranties

8.2 N.I.S.T. TRACEABILITY – WHAT DOES IT MEAN?

This precision measuring instrument is certified by Edgetech Instruments Inc. to be traceable to N.I.S.T., the National Institute of Standards and Technology (formerly known as the National Bureau of Standards, or NBS), in Gaithersburg, Maryland, U.S.A. You have received a Certificate of Calibration with this instrument. What does N.I.S.T. Traceability mean in terms of this instrument?

The instrument measures Dew Point using the Optical Chilled Mirror (OCM) technique, which provides a primary rather then a secondary measurement of Dew Point temperature. In addition, Dew Point is a fundamental measurement of humidity. It is not affected by temperature.

The Dew Point temperature is measured using a Platinum Resistance Thermometer (PRT). This device is a coil of nearly pure platinum, where the rate of change of resistance with temperature is precisely known. Resistance is accurately measured and is automatically converted to temperature information within the instrument.

TRACEABILITY:

- 1. The precise platinum resistance thermometer is N.I.S.T. traceable by the traceable resistance standards maintained by the PRT manufacturer.

- 2. A multi-point Dew Point calibration is performed on every chilled mirror sensor, using Edgetech Instruments' traceable secondary dew point standard. This instrument, a precise chilled mirror hygrometer, is periodically sent directly to N.I.S.T. for certification against the USA's Dew Point transfer standard, a Two-Pressure Generator.