

# **AUTO MET 580**

## **OPERATION MANUAL**



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### **AUTOMET PLUS® 580 OPERATION MANUAL**

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# Table of Contents

<b>1. General Information .....</b>	<b>7</b>
1.1. Introduction .....	7
1.2. Description .....	7
1.3. Specifications .....	8
1.4. Physical Specifications .....	8
1.5. Siting .....	9
1.6. Mounting .....	9
1.7. Wiring .....	10
1.8. Sensors .....	10
1.9. Power .....	10
1.10. RS232 Cable Connection .....	11
1.11. USB Cable Connection .....	11
1.12. Modem Option .....	11
1.13. Printer Port (COM2) .....	11
1.14. Digital Serial Sensor COM Port .....	11
<b>2. Operation .....</b>	<b>12</b>
2.1. Front Panel Operation .....	12
2.2. Display Power and Main Menu .....	13
2.2.1. Navigation and Editing Keys .....	13
2.2.2. Setup Menu Overview .....	15
2.2.3. Operate Menu Overview .....	15
2.2.4. Test Menu Overview .....	15
2.3. LCD Contrast Adjustment .....	16
<b>3. Setup Menu .....</b>	<b>16</b>
3.1. Setup Clock .....	16
3.2. Setup Sensor .....	17
3.2.1. Sensor Setup Introduction .....	17
3.2.2. Viewing the Sensor Setup .....	17
3.2.3. Editing the Sensor Setup .....	17
3.2.4. Viewing Channel Scaling .....	19
3.2.5. Set Analog Channel Scaling .....	20
3.2.6. Set Counter Wind Speed Scaling .....	20
3.2.7. Special Setup for RTD Platinum Temperature Sensors .....	21
3.2.8. Set Solar Scaling .....	21
3.2.9. Set Auto ID Sensor Scaling .....	22
3.2.10. Special Settings for Thermistor Temperature Channels 3 and 4 .....	23
3.2.11. Special Settings for Solar .....	23
3.2.12. Special Settings for Rain Gauge .....	25
3.3. Setup Average Period .....	25
3.4. Setup Station ID .....	26
3.5. Voltage Output .....	26

3.6.	Voltage Input.....	27
3.7.	Digital Sensor.....	27
3.7.1.	Digital Selection Screen .....	27
3.7.2.	Digital Change Detected .....	34
3.8.	Setup Alarms .....	35
3.8.1.	Alarm Options.....	35
3.9.	Setup Reports .....	37
3.10.	Setup Baud .....	37
3.11.	Setup Modbus.....	38
3.12.	Setup Password.....	38
3.13.	Setup Communications Screen .....	39
3.14.	Setup About Screen.....	39
<b>4.</b>	<b>Operate Menu.....</b>	<b>39</b>
4.1.	Memory Use.....	40
4.2.	Transfer Data .....	40
<b>5.</b>	<b>Test Menu.....</b>	<b>40</b>
5.1.	Test Alarm.....	41
5.2.	Test Voltage Output.....	41
5.3.	Test Calibrate.....	42
<b>6.</b>	<b>RS232 Communication .....</b>	<b>43</b>
6.1.	RS232 Port Description .....	43
6.2.	USB.....	43
6.3.	Ethernet Port Setup and Configuration.....	44
6.3.1.	Setting the Static IP Address of the AutoMet: .....	44
6.3.2.	Installing the Virtual Serial Port Drivers:.....	46
6.3.3.	Configuring the Virtual Com Port for Your Device: .....	48
6.4.	Modem Option .....	51
6.5.	Cloud Option .....	51
6.6.	RS232 Main Menu .....	52
6.7.	Extended Command Menu .....	53
<b>7.</b>	<b>Troubleshooting .....</b>	<b>54</b>
<b>8.</b>	<b>Technical Support .....</b>	<b>55</b>
<b>9.</b>	<b>Factory Repair and Calibration .....</b>	<b>55</b>
<b>10.</b>	<b>Appendices .....</b>	<b>56</b>
10.1.	Appendix A – RS232 Commands.....	56
10.2.	Appendix B – Extended Commands.....	62
10.3.	Appendix C – Updating Firmware.....	63

10.4. Appendix D – Wiring Panel Technical Data.....	64
10.5. Appendix E – Serial Output Record Formats .....	68
10.5.1. MetRecord Format .....	68
10.5.2. UIM Record Format.....	69
10.5.3. Status Field Format.....	70
10.5.4. Record Checksums .....	70
10.6. Appendix F – Wind Direction Sensor Orientation .....	71
10.7. Appendix G – AutoMet Data logger Multiplier & Offset Examples .....	77
10.8. Appendix H – Calculation of Max Engr and Min Engr for AT Measurements .....	78
10.9. Appendix I – USB Driver Installation Instructions .....	79

# **1. General Information**

## **1.1. Introduction**

The AutoMet is a complete display data logger designed to accept a variety of standard Met One Sensors, AutoMet Sensors or Met One Digital Serial sensors.

Measurements can include wind speed, wind direction, air temperature, relative humidity, rainfall, solar radiation, and barometric pressure. Math calculations can include gust, sigma, WSV, WDV, min, max, dew point, standard deviation, and delta t for any measurement channel.

Analog input channels can also be custom scaled to work with other environmental monitoring sensors.

The AutoMet includes 12 independent 16 bit voltage output channels, which allow the AutoMet to function as a powerful, user-configurable signal translator for connection to a variety of other recording systems and data loggers.

## **1.2. Description**

The operator can easily display instantaneous measurements, stored values, and other information. The data logger runs on 12 volts DC, supplied by the included AC adapter or optional battery or solar power systems.

Each AutoMet system is shipped with a custom wiring diagram that includes the sensors and special features that are used with your AutoMet Logger. Additional sensors may be easily added at a later date.

### 1.3. Specifications

PARAMETER	SPECIFICATION
<b>Analog Sensor Inputs</b>	8 channel single ended 0 – 2.5 or 0 – 5 VDC user selectable, with AutoMet Auto ID Sensor option 2 channel inputs for small signal solar radiation sensors 3 channel inputs for RTD platinum temperature sensors
<b>Special Input</b>	2 channel frequency counters (wind speed frequency selectable as low or high range or low AC millivolt) 1 channel rain gauge channel (de-bounced switch closure with excitation resistor to 5 volts)
<b>Digital Sensor Inputs</b>	Multiple Digital sensors, 8 channels max (Met One Instrument Sensors)
<b>Voltage Outputs</b>	12 voltage output channels 16 bits unipolar 5.000VDC full scale (selectable to 1.000 or 2.5 VDC full scale) +/- 4 millivolts accuracy
<b>Alarm Outputs</b>	2 alarm channels with N.O. relay contacts (max power 24 VDC @ 20 mA)
<b>Communication</b>	Ethernet serial port USB serial port shared with main port Main RS-232 serial port, 1200-115200 baud, ASCII, N, 8, 1 Digital Sensor, RS-232, 9600 baud fixed RS-485 Extra port, RS-232, 1200-115200 baud
<b>Communication Protocol</b>	7500 MetRecord Protocol for digital sensors and serial communications UIM serial report string Modbus
<b>Log Channels</b>	16 logging channels (combination of digital, analog measurements, and calculated values)
<b>Logging Data Capacity</b>	1 minute data – 7.2 days 5 minute data -36 days 10 minute data – 72 days 15 minute data – 108 days 30 minute data – 216 days 1 hour – 433 days (1.2 years)
<b>Power Requirements</b>	15 VDC $\pm$ 20% 50 mA or less (display off) 125 mA (display on)
<b>Power Source</b>	120-240 VAC, 50-60 HZ to 15 VDC power supply (included) Solar panel array and battery (optional) Battery and AC powered charger (optional)
<b>Display</b>	Backlit LCD with auto time-out 40 character width Eight lines
<b>Keypad</b>	Four operation selection keys Four motion selection keys Four function selection keys
<b>Environmental</b>	Operating temperature range: -20°C to +60°C (extended range available) Humidity: 0-100%, non-condensing

### 1.4. Physical Specifications

PARAMETER	SPECIFICATION
<b>Dimensions</b>	15.5 in (high) x 13.5 in (wide) x 7.0 in (depth)
<b>Weight</b>	7.8 lbs (3.5kg)

## INSTALLATION

### **1.5. Siting**

Choose a site that is convenient to the sensor array and mount the unit at a height that is convenient to all users.

### **1.6. Mounting**

Mount the data logger to the tripod or tower vertical using the mounting bracket kit (PN 2800). Do not over tighten the bracket. This could cause damage to the mast and make extension of it difficult.

## 1.7. Wiring

AutoMet data loggers are system tested at the factory with cables and sensors attached. The cables may or may not be attached during shipping. (Refer to custom wiring diagram for your system.)

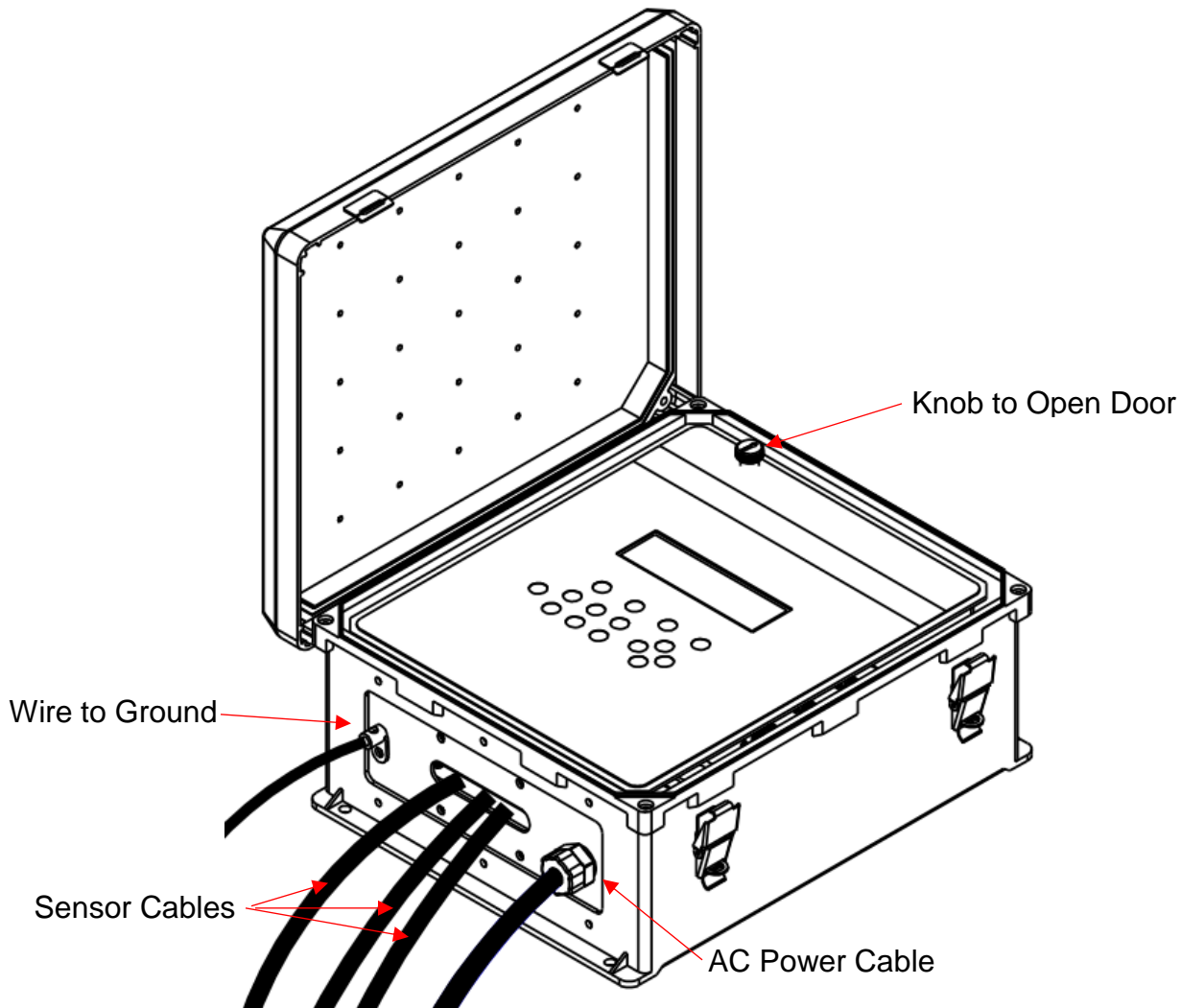
## 1.8. Sensors

Insert the sensor cables into the data logger as shown in the below picture. Connect the wires as shown in the System Interconnect Diagram.

Once wired, the seal clamp can be tightened around the cable bundle. Clamp the wires by first tightening the internal clamp screws and then by tightening the external clamp screws. Finally, tug lightly on the cables to be sure they are clamped and the seal is in place

## 1.9. Power

Plug the AC adapter cable into DC power jack on data logger and plug the appropriate AC adapter module into the AC power outlet. When used outdoors, a weatherproof cover such as the Carlin Model E9UDVG should be used on the AC outlet box.



### **1.10. RS232 Cable Connection**

Connect the RS-232 (P/N 550065) cable between the AutoMet and the host computer's 9 pin RS-232 port.

#### **WARNING!**

**Do not confuse the computer parallel printer port or VGA video adapter connectors as RS-232 COM ports. Connecting to these will cause damage to your computer, and/or the equipment being connected to it. Normally RS-232 connections on PC have male pins vs. female socket type connectors. If in doubt, consult the owner's manual or check with your computer dealer before making any connections. If the computer does not have an RS-232 port then a USB to RS-232 adapter must be used or connection made using the USB connection on the AutoMet logger wiring panel. See the USB section below.**

By default, the AutoMet RS-232 port is set up to communicate at 9600 Baud, No parity, 8 data bits, 1 stop (9600 N 8 1). Using the BAUD Rate Setup Menu, the port can be configured for other BAUD rates.

NOTE: See section 6 for additional information.

### **1.11. USB Cable Connection**

The AutoMet uses a male type A to Male type B cable for connection to the PC. Connect the USB cable (P/N 500768) between the AutoMet and the host computer USB port. The USB serial drivers, located on the CD (P/N 80328), will need to be installed on the host computer prior to trying to communicate with the AutoMet.

The USB serial drivers allow the host computer to communicate to the AutoMet using the Air Plus 5, Comet or any standard serial communications program.

### **1.12. Modem Option**

With the cell modem option, connect the RJ11 phone cable from the phone line to the AutoMet modem surge protection module. Be sure the AutoMet ground is connected to a GOOD earth ground.

### **1.13. Printer Port (COM2)**

A printer port is provided for Auto-Printing RS-232 data and can be connected to a serial printer, computer, or other RS-232 logging device. The AutoMet printer port has the option to print MetRecord or UIM records as OFF, 1 second, 10 second, 1 minute, 5 minute, or 10 minute intervals. This setting is independent of the main port record output and allows dual types of record output if needed.

The AutoMet printer port will communicate at 1200 thru 115,200 Baud, No parity, 8 data bits, and 1 stop bit.

### **1.14. Digital Serial Sensor COM Port**

The logger can be set up to use this port for retrieving measurements from a Met One Digital Serial meteorological sensor.

Refer to the Digital Sensor Setup section of the manual for installation instructions.

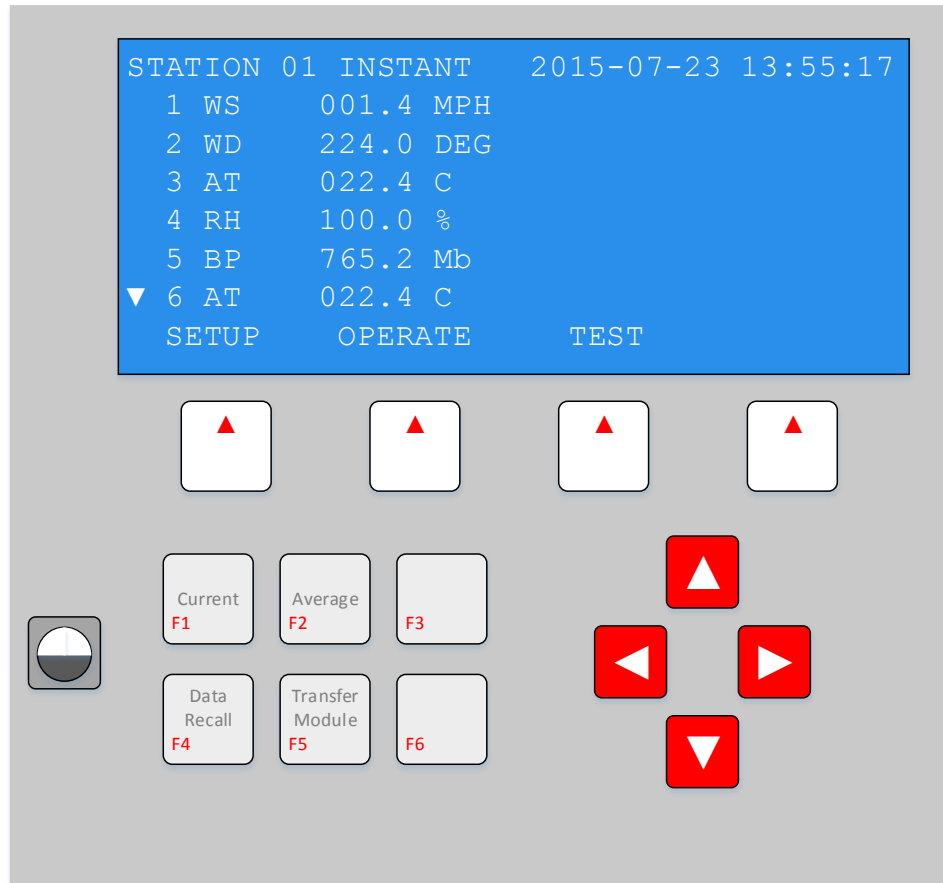
## 2. Operation

### 2.1. Front Panel Operation

The AutoMet uses a series of display prompts to set up the AutoMet and verify operation of the system.

If the display is blank then the AutoMet is in power saving mode. Press any key on the keyboard to activate the display.

The four keys under the display are "Hotkeys" that change function depending on the current operation. The text on the display above each key indicates the operation for that key.



Keys F1 thru F6 are shortcut keys for operations that are commonly used.

The key to the left of the shortcut keys is the display contrast adjustment. See section 2.3 LCD Contrast Adjustment for detailed explanation.

The arrow keys are used to navigate through the screens and edit fields when in edit mode.

Look at the description of the displays on the following pages to gain familiarity, and then perform the following steps to put the system in operation. The display is used to indicate the function of the key located below the displayed operation.

**Note:** The display will automatically shut off after a period of 1, 5, or 10 minutes as set by the operator (see section 3.1). To conserve power in battery-powered systems, the display period should be set for the shortest usable time.

See section 3 for instructions to set the date, time, station number, and averaging period.

**Note:** A password (using the function keys) is required to access these functions. The factory installed password as shipped is F1 F2 F3 F4.

After you have made changes, save the changes, exit, and then verify that the time and date you have set are correct. If you have problems, review the steps again and if necessary, contact Customer Service for assistance.

Continue to set the rest of the functions using the display.

Press the `OPERATE` then `INST` keys. Verify displayed data is representative of actual conditions.

Data will be recorded automatically; refer to the RS232 Communications section for instructions to retrieve data.

## 2.2. Display Power and Main Menu

The display will turn off automatically to conserve power after a selectable timeout period - 1, 5, or 10 minutes.

Pressing any key on the AutoMet keyboard activates the display. All AutoMet logging functions continue, whether or not the display is operating.

When the AutoMet is first powered up, it will display the top menu. The menu displays the date, time, current alarm conditions, and `Hotkeys` for selecting optional menus of the AutoMet data logger.

**Note:** When an alarm timeout occurs, the alarm display will be replaced with a timeout message. If the message prompts for `F2 TO RESET`, then press the F2 function key to reset the alarm.

### 2.2.1. Navigation and Editing Keys

The hotkeys allow the operator to select menus for setup, operation, and testing of the AutoMet. Each menu will have a keyword displayed above the hotkey, identifying its function. Each sub menu will have an `EXIT` hotkey which will return the AutoMet to the previous menu.

STATION 01	INSTANT	2015-07-23 13:52:28
1 WS	0.367 MPH	
2 WD	0.164 DEG	
3 AT	0.296 F	
4 RH	0.315 %	
5 BP	0.338 Mb	
▼ 6 AT	0.338 C	
SETUP	OPERATE	TEST

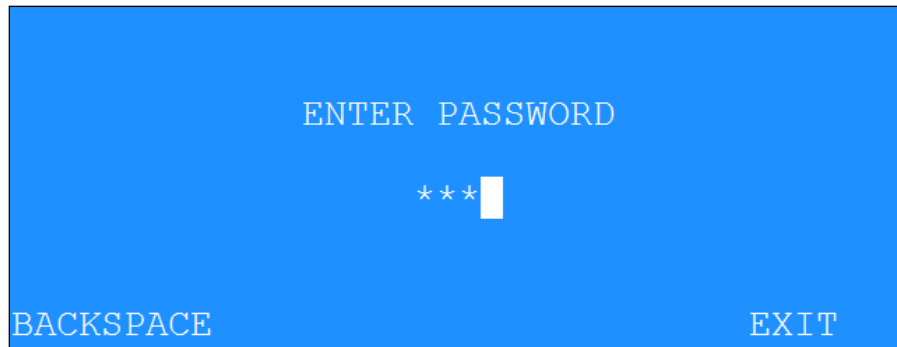
Typical Top Menu Screen

**Note:** Several scrolling menus are available for setup, operate, and test. Use the up and down arrows to place the cursor on the desired selection then press the `SELECT` hotkey to see the setup options.

Use the `EDIT` or `SCALE` hotkeys when available on the screen, to allow editing of the logger setup. When editing, the left and right arrow keys move the cursor through the various data

entry points in the specific field. The up and down arrow keys increment or decrement the numeric value or selections made within a field. Use the **SAVE** hotkey to save changes or **DONT SAVE** to leave the settings unchanged.

For the setup and test menus, the operator must first enter a four-keystroke password to enable access to these menus (AutoMet comes from the factory with the sequence F1 F2 F3 F4). When entering the password, the following screen will be shown:



The password characters will be shown on the screen as an asterisk (\*). Use the backspace key to retype a keystroke or the key sequence. If the password is incorrect, a message will be displayed prompting to retry the password. When the fourth keystroke is pressed and the password is valid, the LCD screen will automatically move on to the next menu.

**2.2.2. Setup Menu Overview**

The `SETUP` menu is used by the operator when installing the AutoMet at a new site, or when modifying existing settings (Password required). This is where all of the logger configuration settings are programmed. See the individual selection explanations in Section 3 of this manual for more details. There are more selections available than are shown on the screen. Use the up and down arrow keys to scroll through all the selections available.

CLOCK	SETUP MENU	
SENSOR		
AVG PERIOD	SET DATE AND TIME	
STATION ID		
VOLT OUTPUT		
VOLT INPUT		
DIGITAL		
▼ALARMS	SELECT	EXIT

**2.2.3. Operate Menu Overview**

The `OPERATE` menu gives access to the current conditions. Since the AutoMet setups cannot be altered within this menu, no password is required.

MEMORY USE	OPERATE MENU	
TRANSFER DATA		
	DISPLAY MEMORY USE	
	SELECT	EXIT

**Note:** Refer to the `OPERATE` section for details.

**2.2.4. Test Menu Overview**

The `TEST` menu gives access to the diagnostics and sensor calibration tests menu (Password required). Firmware revisions are also displayed here. The diagnostics include memory, display, signature, and alarm tests. The calibration test allows the operator to identify maintenance on the sensors connected to the AutoMet system.

ALARMS	TEST MENU	
VOLT OUTPUT		
CALIBRATE	TEST ALARM RELAYS	
	SELECT	EXIT

**Note:** Refer to the TEST section for details.

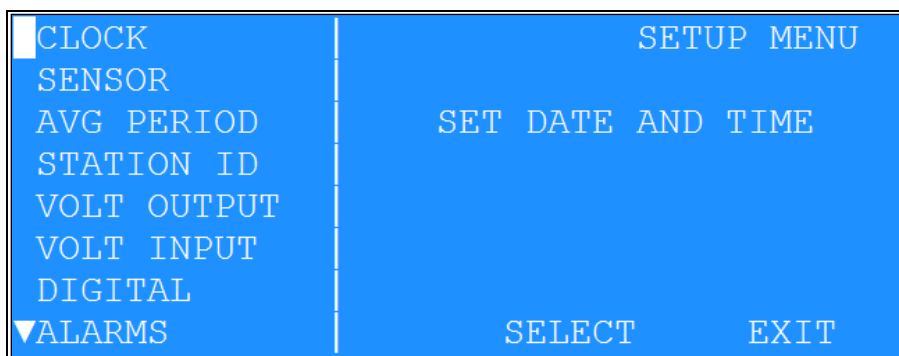
### 2.3. LCD Contrast Adjustment

The key with a circular symbol on it is for adjusting the light/dark contrast on the LCD display. Press and hold the key until the desired contrast is achieved. It is possible to over-adjust the contrast and make the entire display completely blank or completely dark, so be careful to set it to a visible level or it may appear that the unit is not operating.

### 3. Setup Menu

The **SETUP** menu is used by the operator when installing the AutoMet at a new site, or when modifying existing settings (Password required). All of the logger configuration settings are programmed within this sub menu.

Use the up and down arrow keys to navigate to the desired setup item and then press the **SELECT** key.



Individual selection explanations follow in more detail.

### 3.1. Setup Clock

The **SETUP CLOCK** sub-menu allows the operator to set the AutoMet's date, time, and UTC time zone offset.

Scroll up or down to choose a field and press the `EDIT` key to set the corresponding value.



Field	Descriptions
Date	Edits the AutoMet's current date.

Time	Edits the AutoMet's current time.
Time Zone Offset	Allows the operator to adjust the devices time zone for pushing data to the cloud. This setting only affects devices pushing data to the cloud.

Pressing **SAVE** will permanently update the clock settings.

**Note:** It is only necessary to enter the last two digits of the year; this does require that any customer developed software be aware of this two digit method of year indication, and automatically add the 20XX to the year field. The AutoMet recognizes correct year / leap year information until the year 2050.

## 3.2. Setup Sensor

### 3.2.1. Sensor Setup Introduction

The AutoMet Data logger provides eight analog inputs for logging Meteorological sensor data. These sensors can be connected to the logger as indicated in Appendix D. The AutoMet comes from the factory pre-configured for your ordered set of sensors.

New sensors connected to the logger must be configured in the logger setup before data can be acquired.

Each channel has a general setup screen for setting the name, units, and source. Within the setup screen is a **SCALE** hotkey that can select a scaling screen for setting measurement specifics.

### 3.2.2. Viewing the Sensor Setup

From the main menu select **SETUP** then select **SENSOR**. A split screen will be displayed allowing selection of a specific channel and its associated parameters.

Shown below is an example of a Wind Speed analog sensor on channel 1:

1	WS	READING: 0.063 MPH
2	WD	NAME: WS
3	AT	SOURCE: ANALOG
4	RH	UNITS: MPH
5	BP	
6	AT	
7	no	
▼ 8	no	EDIT SCALE EXIT

### 3.2.3. Editing the Sensor Setup

#### 3.2.3.1. Channel Name

The **NAME** field contains the name of the measurement. For example, WS is used for Wind Speed. Up to eight characters can be used in the **NAME** field.

### 3.2.3.2. Channel Source

The channel **SOURCE** determines the source of the measurement. The table below describes each source in detail.

Source Name	Description
Analog	Configure the channel for analog or auto id sensors.
Counter 1 & 2	Configure the channel for pulse input from Wind Speed sensors. <ul style="list-style-type: none"><li>• <b>LO FREQ</b> for sensors with low frequency outputs, I.E., 014A, 013, or 034B.</li><li>• <b>HI FREQ</b> for sensors with high frequency outputs, I.E., 010C, 1564, or WS-201.</li><li>• <b>LO AC</b> for sensors with low-millivolt AC outputs.</li></ul>
RTD 1-3	Configure the channel for a platinum resistance temperature sensor.
Solar 1 & 2	Configure the channel for a small signal Solar Radiation sensor.
Rain	Configure the channel for use of the rain gauge channel.
Battery Voltage	Configure the channel to display the AutoMet's current battery voltage.
Gust	Configure the channel to log the gust event for the channel specified in the <b>WS CHAN</b> field. <ul style="list-style-type: none"><li>• The instantaneous gust value is computed as the three-second rolling average of instantaneous (1-second) wind speed measurements.</li><li>• The gust computation is compatible with any standard wind speed sensor (pulse or analog). The instantaneous gust value is visible on the instantaneous screen.</li><li>• The maximum gust value during the average period is stored to data logger memory.</li></ul> Note: Setting the channel to Gust will disable any sensor inputs for this channel on the wiring panel.
Sigma	Sigma is a derived channel. By setting the source to sigma and then choosing a wind direction, this channel will log the sigma theta of the sensor it is derived from.  Sigma theta is a measure of horizontal wind direction fluctuations. Mathematically, it is the standard deviation of the horizontal wind direction.
WSV	WSV is a derived channel. By setting the source to WSV and choosing measured wind speed and wind direction channels, this channel will calculate a vector average as required by the EPA for use in air quality applications. See EPA Volume IV: Meteorological Measurements handbook for more information.

WDV	WDV is a derived channel. By setting the source to WDV and choosing measured wind speed and wind direction channels, this channel will calculate a weighted vector average as required by the EPA for use in air quality applications. See EPA Volume IV: Meteorological Measurements handbook for more information.
Min	Min is a derived channel. By setting the source to Min and selecting a channel, this channel will always log the minimum value of the derived channel.
Max	Max is a derived channel. By setting the source to Max and selecting a channel, this channel will always log the minimum value of the derived channel.
Dew Point	Dew Point is a derived channel. By setting the source to Dew Point and choosing a temperature and humidity channel, this channel will always log the dew point calculated between these two channels.
Standard Deviation	Standard Deviation is a derived channel. By setting the source to Std Dev and selecting a channel, this channel will always log the calculated standard deviation when the logger is in Data Average mode. Otherwise, for the instantaneous data, it will log the current channel reading.
Delta T	Delta T is a derived channel. By setting the source to Delta and selecting two temperature channels, this channel will always log the calculated difference of temperature 1 from temperature 2.
Unused	If you do not need 16 channels for your device, operators can set a channel to unused, in which the channel becomes ignored. When a channel is set to unused, it will not be logged.

### 3.2.3.3.Channel Units

The `UNITS` field contains the engineering units of the measurement (example: MPH for Miles Per Hour). Up to six characters are available in the `UNITS` field.

### 3.2.4. Viewing Channel Scaling

Pressing the `SCALE` key will bring up a screen showing the scaling detail for the current channel. The `READING` field displays the current instantaneous reading for the selected channel.

```

ANALOG SCALE
  READING: WD 0.068 DEG (ID 0 M)
    PREC: 3
    MATH: SCALAR
  MIN ENGR: 0000.0000
  MAX ENGR: 0001.0000  MAX VOLTS: 1.000

  EDIT      ENGLISH  AUTO ID  EXIT

```

### 3.2.5. Set Analog Channel Scaling

These fields are available for scaling the current channel measurement:

- **PREC:** Measurement precision; Number of digits to the right of the decimal point.
- **MATH:** Set the type of measurement as scalar or vector.
- **MIN ENGR:** Engineering units at zero sensor volts.
- **MAX ENGR:** Engineering units at full scale sensor volts.
- **MAX VOLTS:** Full scale output voltage of the sensor.

### 3.2.6. Set Counter Wind Speed Scaling

The **COUNTER SCALE** sub-menu allows the user to set the scaling of the counter wind speed. Enter the multiplier and offset for the specific sensor based on the frequency output of the sensor.

For Met One wind speed sensors, refer to Appendix G to determine multipliers and offsets. For other frequency inputs, calculate as follows:

$$Mult = \frac{Full\ Scale\ Hz}{Full\ Scale\ Engr\ Units}$$

$$Offset = Engr\ Units\ at\ Zero\ Hz$$

For direct frequency measurement in HZ: MULT = 1, OFFSET = 0;

```

COUNTER SCALE
  READING: WS 0.000 MPH
    PREC: 3
    MATH: SCALAR
    MULT: 0000.0000
  OFFSET: 0000.0000

  EDIT                                     EXIT

```

### 3.2.7. Special Setup for RTD Platinum Temperature Sensors

The `RTD SCALE` sub-menu allows the user to set the scaling of the RTD platinum temperature probe for extremely accurate temperature readings.

```
RTD SCALE
READING: AT 46.22 C
PREC: 2
MATH: SCALAR
  R0: 100.000    ALPHA: 0.0038500
  BETA: 0.10863  DELTA: 1.49990

EDIT                                EXIT
```

Example wiring to connect Met One T-200 RTD platinum temperature sensor to 580:

T-200 Wire Color:	1734 Cable Wire Color	580 Terminal
RED	RED	RTD N-1
RED	GRN	RTD N-2
BLK	BLK	RTD N-3
BLK	WHT	RTD N-4

### 3.2.8. Set Solar Scaling

The `SOLAR SCALE` sub-menu allows the user to set the scaling of the solar sensor based on the calibration constant of the solar sensor. The constant is in micro-volts per watts meters squared.

```
SOLAR SCALE
  READING: no 0 W/m2
  PREC: 0
  MATH: SCALAR
CAL CONSTANT: 07.000 uV/W m2

EDIT                                EXIT
```

### 3.2.9. Set Auto ID Sensor Scaling

Verify the connection of the Auto ID sensor then press the `AUTO ID` key. The display should update the screen automatically with the sensor setup parameters.

Press the `METRIC` hotkey to toggle between `ENGLISH` or `METRIC` engineering units. This key is available only with `AUTO ID` sensors.

```
ANALOG SCALE
  READING: BP  28.81 HG  (ID 25 E)
    PREC: 2
    MATH: SCALAR
MIN ENGR: 0024.0000
MAX ENGR: 0030.0000  MAX VOLTS: 1.000

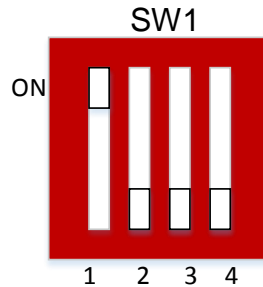
  EDIT      METRIC    AUTO ID    EXIT
```

### 3.2.10.Special Settings for Thermistor Temperature Channels 3 and 4

Channels 3 and 4 each have an option for Met One thermistor temperature sensors.

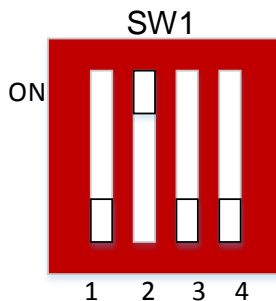
#### 3.2.10.1.Channel 3 Thermistor Temperature

A 23,100 $\Omega$  precision ( $\pm 0.1\%$ ) resistor can be connected to the logger input terminals for thermistor temperature. This is accomplished by flipping SW1 – Signal 1 to the ON position as shown in the diagram below.



#### 3.2.10.2.Channel 4 Thermistor Temperature

A 23,100 $\Omega$  precision ( $\pm 0.1\%$ ) resistor can be connected to the logger input terminals for thermistor temperature. This is accomplished by flipping SW1 – Signal 2 to the ON position as shown in the diagram below.



#### 3.2.10.3.Setup for Met One Instruments 060A-2 Temperature Sensor

Use the settings below for a 060A-2 sensor:

Measurement range of -50 to +50 Deg C

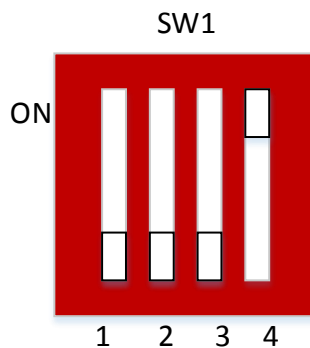
PREC:	1
MATH:	SCALAR
MIN ENGR:	106.0
MAX ENGR:	-72.8
MAX VOLTS:	2.000

### 3.2.11.Special Settings for Solar

This section covers the special settings for solar.

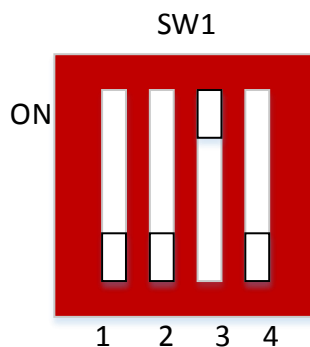
#### 3.2.11.1.Solar 1

Some sensors require a  $100\Omega$  precision ( $\pm 0.01\%$ ) load resistor across the logger input terminals. This is accomplished by flipping SW1 –Signal 4 to the ON position as shown in the diagram below.



#### 3.2.11.2.Solar 2

Some sensors require a  $100\Omega$  precision ( $\pm 0.01\%$ ) load resistor across the logger input terminals. This is accomplished by flipping SW1 – Signal 3 to the ON position as shown in the diagram below.



### 3.2.11.3. Setup Instructions for Met One Instruments Model 096 (Li-Cor LI-200) Solar Radiation sensor

This sensor has a current output and requires a load resistor to convert the signal to a voltage for the logger measurement.

The Calibration Constant on the calibration certificate is stated in units of  $\mu\text{A/KW/m}^2$  and must be converted to units of  $\mu\text{V/W/m}^2$  as follows. This calculation is based on the use of a  $100\Omega$  load resistor.

$$\mu\text{V/W/m}^2 = \mu\text{A/KW/m}^2 / 10 \quad (\text{or}) \quad \text{CalConst}_{\text{new}} = \text{CalConst}_{\text{cert}} / 10$$

Example: If the Li-Cor calibration certificate shows a calibration constant of **89.2  $\mu\text{A/KW/m}^2$** , then the conversion is:

$$\text{CalConst}_{\text{new}} = \text{CalConst}_{\text{cert}} / 10 = 89.2 / 10 = \mathbf{8.92 \mu\text{V/W/m}^2}$$

### 3.2.12. Special Settings for Rain Gauge

When setting up the rain gauge channel an option for RESET interval is provided. The selection choices are Average Interval or Midnight. If **Average Interval** is selected, the rain channel value is reset every average interval. If **Midnight** is selected the rain channel is update ever day at midnight. The value during each average interval is the accumulated value up to that time and will be reset at midnight.

```
? 4 TEMP2 | READING: 0.00 IN
5 no      | NAME: RN
6 no      | SOURCE: RAIN
7 SOLAR   | UNITS: IN
8 SOLAR   |
9 RN      | RESET: MIDNIGHT
10        |
?11       | EDIT      SCALE      EXIT
```

### 3.3. Setup Average Period

The AVERAGING PERIOD is selectable as 1, 5, 10, 15 or 60-minute intervals. The data storage memory will be formatted to save data at the selected interval.

```
                                SETUP AVERAGE PERIOD

AVERAGING PERIOD  10 MIN

EDIT                                     EXIT
```

3.4. Setup Station ID

The STATION ID is used in cases where there is more than one data logger and used for identification purposes. The number can be any number from 1 to 99.

SETUP STATION ID

STATION ID 01

EDIT

EXIT

3.5. Voltage Output

The assignments and settings for the voltage outputs are set in this screen.

Scroll on the left-hand side to select the desired output channel. These are the fields:

- LOG CHAN Selects the desired input channel to relate to this output.
- MIN ENGR UNITS Engineering Units at zero volts.
- MAX ENGR UNITS Engineering Units at full scale volts (1.0, 2.5 or 5.0 V).
- SPAN VOLTS Sets the span voltage. This value applies to all the analog output channels.

OUT 1	SETUP VOLTAGE OUTPUT
OUT 2	LOG CHAN: 1 WS
OUT 3	MIN ENGR UNITS: 00.000
OUT 4	MAX ENGR UNITS: 01.000
OUT 5	
OUT 6	SPAN VOLTS: 1.000 *
OUT 7	* ALL OUTPUTS
▼OUT 8	EDIT
	EXIT

### 3.6. Voltage Input

Enter the desired input voltage range for the analog inputs in this screen.

The setting applies to all channels. Selections are 2.500 and 5.000 VDC.



SETUP INPUT VOLTAGE

INPUT VOLT: 2.500

EDIT EXIT

### 3.7. Digital Sensor

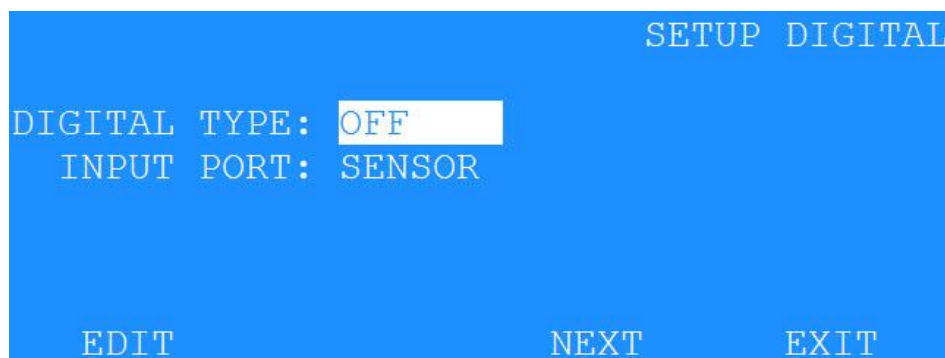
Met One Instruments provides a series of Digital sensors (TACMET, MSO, AIO 2, 597A, NPM, ES-642, etc...) which measure multiple parameters such as wind speed, wind direction, air temperature, relative humidity, and barometric pressure. This also includes some of the particulate sensors. These measurements are accessed through a RS-232 or RS-485 serial data stream. These type sensors are connected to the DIG SENSOR (RS-232), or RS-485 input ports.

Measurement data is sent from the sensor to the logger once per second. Maximum cable length for RS-232C connection is 50 feet; RS-485 communication is approved for cable lengths up to 4000 feet. Multiple sensors using RS-485 can be connected, but you are limited to a maximum of 8 individual channels.

The units for wind speed, air temperature, and barometric pressure can be set by the user through the Digital Setup screens.

#### 3.7.1. Digital Selection Screen

The Digital Selection screen is used to select which type of digital sensor is connected to the DIG SENSOR or RS-485 input. The selections are OFF, AIO, TACMET, or DIGITAL. Note: the AIO 2 is considered as a DIGITAL sensor vs. the original AIO which has a separate selection entry. If any sensor other than DIGITAL is selected continue to 3.7.1.1 SETUP AIO menu.



SETUP DIGITAL

DIGITAL TYPE: OFF

INPUT PORT: SENSOR

EDIT NEXT EXIT

Select the INPUT PORT to choose SENSOR or RS485. Once the INPUT PORT has been selected, move down to select if SINGLE or MULTI sensors connected to the AutoMet.

```

                                SETUP DIGITAL
DIGITAL TYPE: DIGITAL
  INPUT PORT: RS485
    SENSORS: SINGLE
EDIT                                NEXT                                EXIT

```

```

                                SETUP DIGITAL
DIGITAL TYPE: DIGITAL
  INPUT PORT: RS485
    SENSORS: MULTI
EDIT                                NEXT                                EXIT

```

If SINGLE is selected, the NEXT entry will continue to the Connect Digital Sensor Screen. If MULTI is selected an alternate menu will appear to allow for selecting up to 3 RS-485 sensors that may be connected to the AutoMet. Plug in the first sensor and make sure it powered up and connected to the sensor RS-485 Input.

```

                                FIND SENSORS
DIGITAL SENSORS
ADDR 01  NOT CONNECTED
ADDR 02  NOT CONNECTED
ADDR 03  NOT CONNECTED
SCAN      NEXT      CHANGE      EXIT

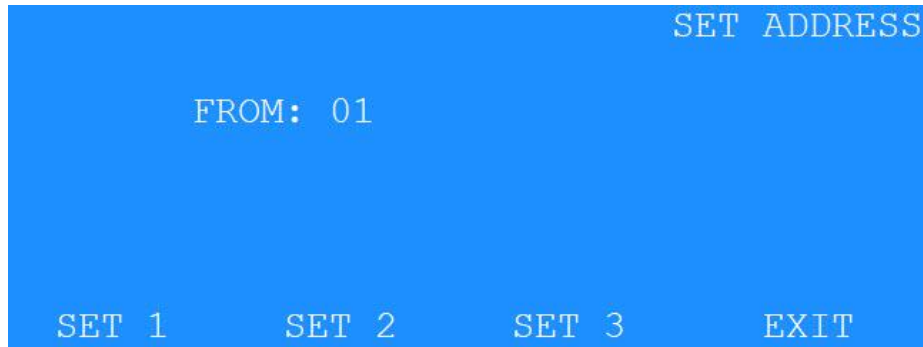
```

If the first Digital sensor address is already set to 1 or 2, it will show up under the appropriate location. Note: For most sensors the default address is set to 1. If this is sensor is address 1 than unplug it and install the second sensor.

Use the SCAN selection to scan for the sensor connected to the RS-485 input, if it is not address 1 or 2. If a sensor is detected save the configuration and then use the CHANGE selection to assign that sensor to SET 1, SET 2, or SET 3. Assign it to SET 1.

Unplug this assigned sensor and power it up and see if it appears on the digital sensors menu screen. If it is also address 1 than use the CHANGE to assign it to SET 2. If it does not show up run SCAN again, identify it and assign it to SET 2.

Remove the sensor and install and power up the third sensor if you have that many. As before, if it is address 1, than CHANGE it to SET 3. Otherwise run SCAN again to identify the sensor address. Use CHANGE to assign it to SET 3




SET ADDRESS

FROM: 01

SET 1      SET 2      SET 3      EXIT

Plug in all the sensors, and the FIND SENSORS screen will update to show the installed sensors.



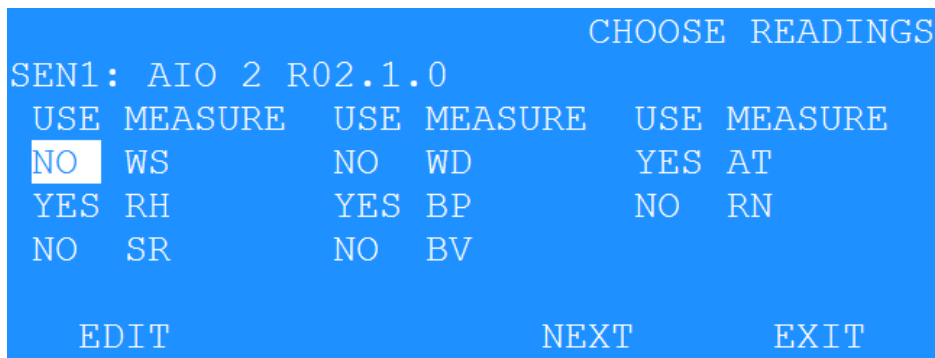
FIND SENSORS

DIGITAL SENSORS

<input type="checkbox"/>	ADDR 01	AIO 2 R02.1.0
<input type="checkbox"/>	ADDR 02	AIO 2 R02.1.0
<input type="checkbox"/>	ADDR 03	NOT CONNECTED

SCAN      NEXT      CHANGE      EXIT

Press NEXT to continue to CHOOSE READINGS



CHOOSE READINGS

SEN1: AIO 2 R02.1.0

USE	MEASURE	USE	MEASURE	USE	MEASURE
<input type="checkbox"/> NO	WS	<input type="checkbox"/> NO	WD	<input type="checkbox"/> YES	AT
<input type="checkbox"/> YES	RH	<input type="checkbox"/> YES	BP	<input type="checkbox"/> NO	RN
<input type="checkbox"/> NO	SR	<input type="checkbox"/> NO	BV		

EDIT      NEXT      EXIT

On this screen select which measurements are to be included in the data used by the 580 by selecting a USE value of YES. Setting the USE value to NO, will prevent that this measurement will not be mapped to a channel. Once all have been selected as YES or NO select the NEXT button to move to sensor 2.

```

                                CHOOSE READINGS
SEN2: AIO 2 R02.1.0
USE MEASURE   USE MEASURE   USE MEASURE
NO WS         NO WD         YES AT
YES RH        YES BP        NO RN
NO SR         NO BV

EDIT          NEXT          EXIT

```

Do the same thing with the SEN2 menu items that are to be assigned to a measurement channel by using the YES and NO under the USE category. Once complete select NEXT to move on to the ASSIGN TO DATA LOGGER CHANNEL.

```

ASSIGN TO DATA LOGGER CHANNEL

CH MEASURE    CH MEASURE    CH MEASURE
3 AT          4 RH          5 BP
6 AT2         7 RH2         8 BP2

EDIT          NEXT          EXIT

```

This menu allows the for the mapping of the sensor measurments to a channel. If a duplicate channel name exists, it will auto number them. Press NEXT once channels have been selected.

```

MEASUREMENT UNITS SETUP

AT:  C          BP:  mbar
AT2: C          BP2: mbar

EDIT          NEXT          EXIT

```

This menu allows for the selection of displayed units. Sensors that are 7500 compliant, the 580 knows the available units for each measurement (if applicable). For example above, the AT channels can be selected as either F or C degrees.

Press NEXT to continue the setup.

```
>>> WARNING <<<

SETTING THE ADA INPUT TO DIGITAL
WILL AUTOMATICALLY CONFIGURE
THE SENSOR CHANNELS.
PREVIOUS CONFIGURATIONS WILL BE LOST.

CANCEL                                CONTINUE
```

Select CONTINUE to move to the next screen.

The following is the next screen.

```
>>> WARNING <<<

MAKING CHANGES TO THE DIGITAL
SETTINGS REQUIRES THE DATA LOG
MEMORY TO BE CLEARED!

CANCEL                                CONTINUE
```

The following is the next screen.

```
>>> CONFIGURING DIGITAL SENSOR <<<

>>>          PLEASE WAIT...          <<<
```

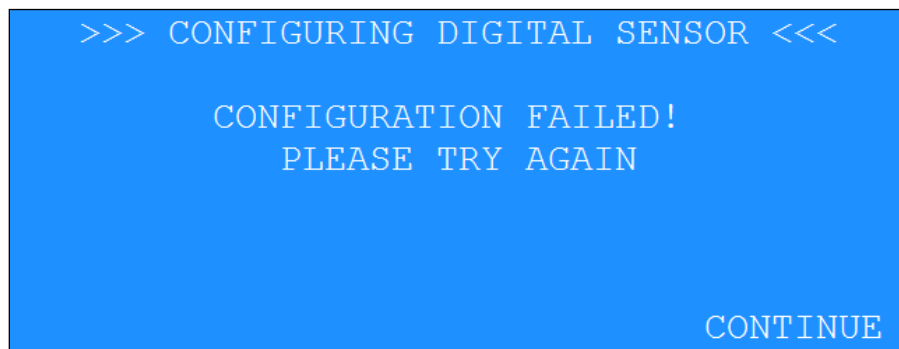
The following is the next screen.

```
>>> CONFIGURING DIGITAL SENSOR <<<

CONFIGURATION COMPLETE!

EXIT
```

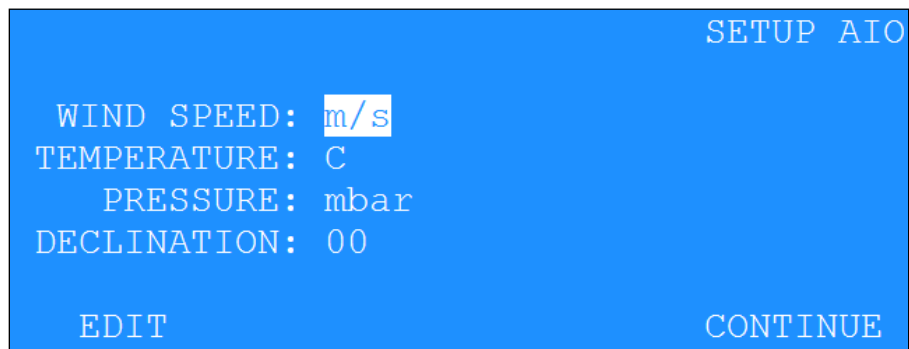
This screen is presented if the configuration fails.



Pressing `CONTINUE` will go to the beginning of the Digital Setup screen sequence.

#### 3.7.1.1.AIO / TACMET Digital Sensor Setup Screens

The following screens are used when the selection is `AIO` or `TACMET`.



When `AIO` or `TACMET` is selected then `COM2` baud rate is fixed at 9600. Protocol is set to match the `AIO` (9600 N 8 1).

When `AIO` is selected the channel descriptors for the first 5 channels will be automatically configured (See `AIO Channel Descriptor Table` below), and cannot be edited. The `Sigma` channel will automatically be set to channel 2, the `WD` measurement.

When `AIO` is selected, `REPORT TYPE` selection is limited to `OFF` and `1 SECOND` as the only choices. The `REPORT TYPE` parameter is automatically set to `OFF` if it is set to anything other than `1 SECOND`.

The `WIND SPEED` unit selections are `m/s` or `mph`.

The `TEMPERATURE` unit selections are `C` or `F`.

The `PRESSURE` unit selections are `mbar` or `inHg`.

This new parameters will be saved in non-volatile `EE` memory.

When the `AIO` is enabled but not connected, the measured `A/D` values will be set to 0.

AIO Channel Descriptor Table

TYPE	WS	WS	WD	AT	AT	RH	BP	BP
UNITS	m/s	MPH	Deg	C	F	%	mb	"Hg
PREC	1	1	0	1	1	0	1	2
MULT	65.0	145.0	360.0	100.0	180.0	100.0	500.0	14.76
OFFSET	0.0	0.0	0.0	-50.0	-58.0	0.0	600.0	17.72
FS VOLT	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
VECTOR	S	S	V	S	S	S	S	S
INV SLOPE	N	N	N	N	N	N	N	N

The following is the next screen.

```

>>> WARNING <<<

SETTING THE DIGITAL INPUT TO AIO WILL
AUTOMATICALLY CONFIGURE
SENSOR CHANNELS 1 - 5.
PREVIOUS CONFIGURATIONS WILL BE LOST.

CANCEL                                CONTINUE

```

Press the CANCEL hotkey to make no changes.

Press CONTINUE to go to the following screen.

```

>>> WARNING <<<

MAKING CHANGES TO THE AIO
SETTINGS REQUIRES THE DATA LOG
MEMORY TO BE CLEARED!

CANCEL                                CONTINUE

```

Press CANCEL to make no changes.

Press `CONTINUE` to reinitialize AIO and sensor configurations and clear the data logger memory.

This screen will appear while configuring the AIO. You may `EXIT` at any time.

```
>>> CONFIGURING AIO PLEASE WAIT <<<

WIND SPEED UNITS: WAITING
TEMPERATURE UNITS:
PRESSURE UNITS:
DECLINATION:

EXIT
```

### 3.7.2. Digital Change Detected

The AutoMet can detect when a digital sensor configuration has changed. This change usually happens when the original sensor is replaced with another sensor with a different configuration, or the configuration of the same sensor was changed outside of the AutoMet setup process.

For example, the sensor is initially connected, configured, and has been data logging for some time. The user disconnects the sensor and changes the units of one of the channels (C to F). Now the sensor configuration does not match the initial sensor configuration.

When this condition occurs this screen presented.

```
>>> WARNING <<<

A CHANGE WAS DETECTED IN YOUR DIGITAL
SENSOR THAT REQUIRES RECONFIGURATION
AND CLEARING OF THE DATA LOGGER.

CONTINUE
```

Pressing `CONTINUE` will go to the `DIGITAL` series of setup screens discussed previously.

If you exit out of this sequence of screens before the data logger is cleared, the `WARNING` screen will be presented again in ten seconds and the top screen `STATUS` line with report `SENSOR MISMATCH`.

**Note:** When the digital sensor is disconnected, or a sensor mismatch is detected the sensor `OFFSET` values are used to calculate the channel data averages.

### 3.8. Setup Alarms

Two alarms are available that display a visual indication on the main LCD screen as well as activating the alarm relay contacts accessible on the AutoMet wiring panel. The operator can configure ALARM 1 and ALARM 2 independently.

ALARM 1	SETUP ALARMS
ALARM 2	
	CHAN: 3 AT 0.00 C
	LOW: 000.00
	HIGH: 000.00
	TYPE: OFF
	EDIT OPTIONS EXIT

The monitor channel for alarm conditions is selected in the `CHAN` field using the up/down arrow keys.

Depending on the type of alarm, the `LOW` and/or `HIGH` fields set the alarm points.

The alarm `TYPE` can be set as:

Type	Alarm Condition
OFF	Alarm is OFF
LO	Alarm is ON below the LO set point
HI	Alarm is ON above the HI set point
WINDOW	Alarm is ON between the LO and HI set points
EXCLUS	Alarm is ON Outside of the LO and HI set points (exclusive)

#### 3.8.1. Alarm Options

Pressing the `OPTIONS` hotkey in the `SETUP ALARM OUTPUTS` screen will display a second screen showing the alarm options. Three fields provide optional time-out and start delay of the alarms. These apply only to the current alarm selected.

The `RESET ELAPSED TIME` field can be set for `MANUAL` or `AUTOMATIC` reset of the alarm time-out. With `MANUAL` reset, the operator must press the F2 key at the top screen to reset the alarm after time-out. With `AUTOMATIC` reset, the time-out is reset when the conditions causing the alarm change to a non-alarm condition.

The `ALARM TIMEOUT VALUE` determines the length of time in minutes before a time-out on an alarm condition occurs. The value can be any number from 1 to 999 minutes.

The `ALARM ACTIVE DELAY` determines the length of time delay in seconds before the alarm relay contact activates during an alarm condition. The value can be any number from 0 to 60 seconds.

SETUP ALARM OPTIONS	
TIMEOUT/DELAY MODE:	NO TIMEOUT/DELAY
ALARM TIMEOUT VALUE:	000 MINUTE(S)
ALARM ACTIVE DELAY:	00 SECOND(S)
EDIT	EXIT

The TIMEOUT/DELAY MODE settings are:

Settings

Alarm Condition

NO TIMEOUT/DELAY

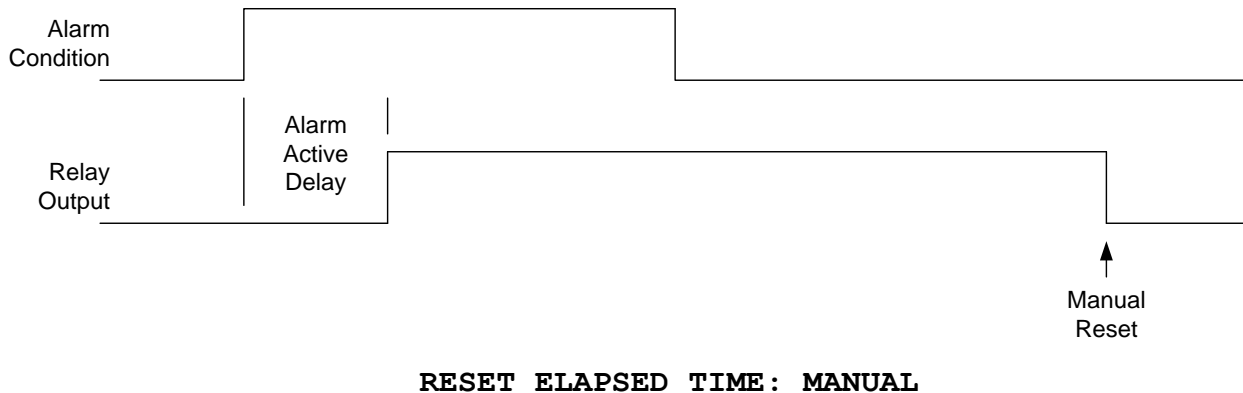
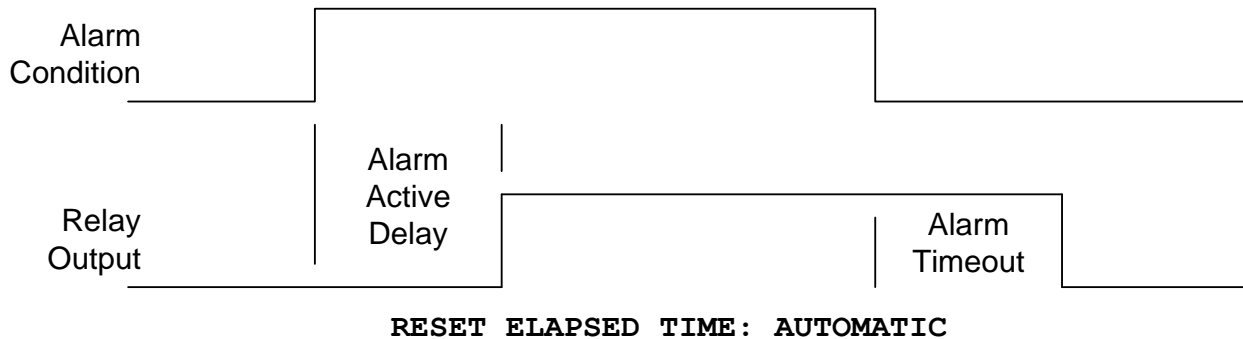
Both Alarms function normal

MANUAL RESET

Alarm will store total time of alarm conditions.  
When the MAX time (ALARM TIMEOUT VALUE) is reached alarm will time out and will have to be reset by pressing the F2 Key

AUTO RESET

Alarm will reset when the alarm condition stops.



### 3.9. Setup Reports

The report screen allows selection of the data output from the MAIN and PRINTER ports.

See Appendix E of the manual for the report format detail.

- OUTPUT FORMAT: Selects MetRecord or UIM output format
- OUTPUT TYPE: Instantaneous or Average.
- OUTPUT INTERVAL: Selectable as 1 sec, 10 sec, 1 min, 5 min, 10 min in instantaneous or average period for average report.

MAIN	SETUP REPORT OUT MAIN
PRINTER	
	OUTPUT FORMAT: METRECORD
	OUTPUT TYPE: OFF
	OUTPUT INTERVAL: 1 SEC
	EDIT EXIT

### 3.10. Setup Baud

The BAUD screen allows modifications to the data logger serial port baud rates.

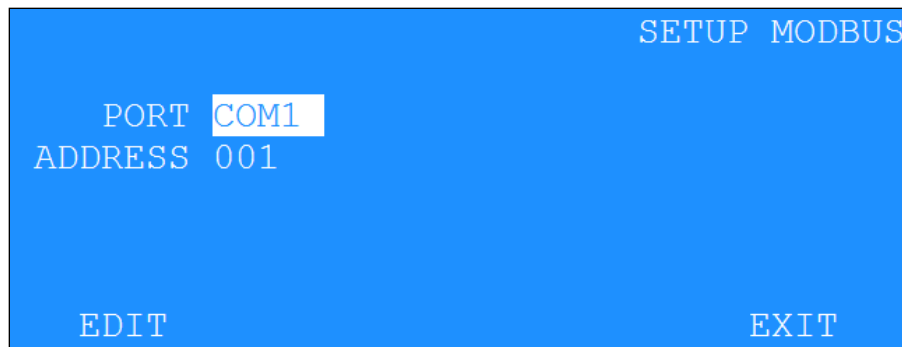
	SETUP BAUD
MAIN PORT BAUD:	9600
COM2 PORT BAUD:	9600
RS-485 BAUD:	9600
COM1 PORT BAUD:	9600
EDIT	EXIT

**Note:** Avoid using high baud rates for long RS232 serial cable connections. The recommended rate is 9600.

**Warning:** A change in baud rate takes effect immediately and remains at the new baud rate even when the logger power is cycled. The baud rate of the terminal program or software must also be changed to match the new baud rate.

### 3.11. Setup Modbus

The MODBUS screen allows modifications to the Modbus port and the Modbus starting address.



```

SETUP MODBUS

PORT COM1
ADDRESS 001

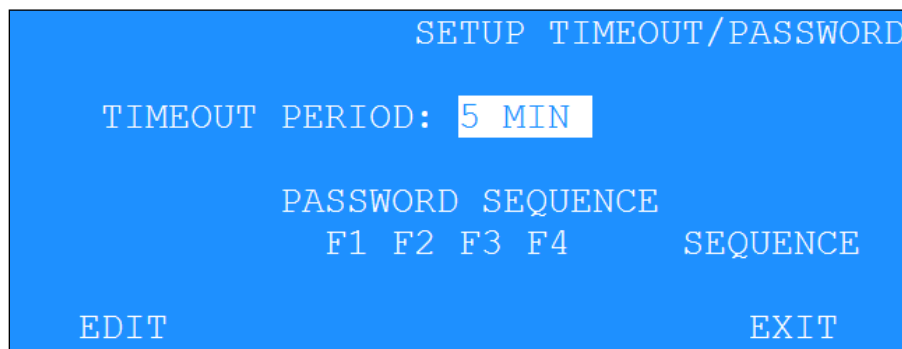
EDIT EXIT

```

### 3.12. Setup Password

The time-out period determines the auto-shutoff time for the LCD display. This is especially critical in battery-powered operations to conserve battery power. It can be set to time out (TIMEOUT PERIOD) after 1, 5, or 10 minutes.

The password sequence allows the operator to change the 4-keystroke password keys.



```

SETUP TIMEOUT/PASSWORD

TIMEOUT PERIOD: 5 MIN

PASSWORD SEQUENCE
F1 F2 F3 F4 SEQUENCE

EDIT EXIT

```

**Note:** The factory default password is: F1 F2 F3 F4. Use caution if changing the password to assure that the new password is memorized and/or recorded. Editing logger setups is not possible without the password. Contact Customer Service for assistance if the changed password is lost.

### 3.13. Setup Communications Screen

This screen allows the operator to make changes to the internet/communication settings of the AutoMet. The table below explains each settings.

Field	Description
Ethernet Serial	Allows the user to enable or disable the Ethernet serial on the wiring panel on the AutoMet.
Cloud Modem	If the AutoMet came with a cell modem, this option allows the user to pick the type of modem. Current options are NONE, GSM, and CDMA.
Modem Port	Allows the user to set which port the modem will use to talk with the AutoMet.

### 3.14. Setup About Screen

Information in this screen provides general information about the AutoMet data logger and any digital sensors that may be attached.

The screen also contains factory contact information.

```
AutoMet 580
(541) 471-7111
WWW.METONE.COM
SERIAL I10222
FIRMWARE:
MASTER AutoMet 580, 10580, R1.0.0
DIGITAL 1, 597, 10503-01, R00.1.7
EXIT
```

## 4. Operate Menu

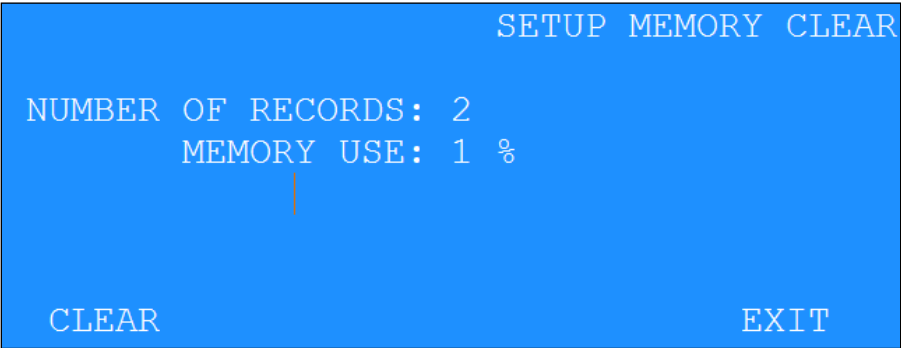
The `OPERATE` menu allows viewing the memory use. Since the AutoMet setups cannot be altered within this menu, no password is required.

```
MEMORY USE      OPERATE MENU
TRANSFER DATA  DISPLAY MEMORY USE

SELECT          EXIT
```

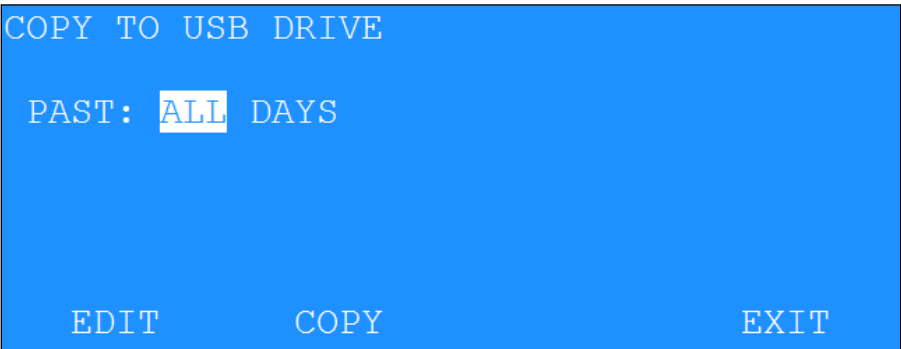
4.1. Memory Use

This screen displays the number of records stored as well as the total percentage of memory used.



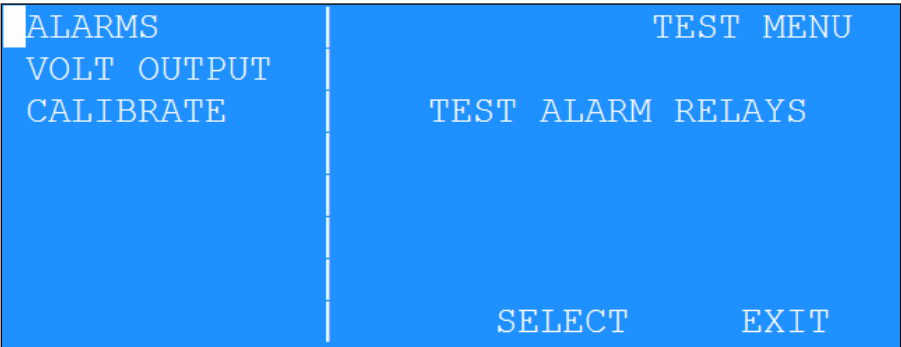
4.2. Transfer Data

The transfer data screen allows users to copy the data file from the AutoMet to a USB stick. Users must insert their USB stick into the wiring panel, select the past amount days to write to the USB stick and press the COPY button to begin the transfer.



5. Test Menu

The TEST menu gives access to the diagnostics and calibration tests (Password required). The diagnostics include memory, display, signature, and alarm tests. The calibration test allows the operator to perform maintenance on the sensors and inputs of AutoMet system.



## 5.1. Test Alarm

TEST ALARM allows the operator to manually force an alarm condition for testing hardware alarm devices external to the AutoMet data logger.

TEST ALARM					
ALARM 1:	03	AT	27.59	C	OFF
ALARM 2:	01	no	0.063	V	OFF
		TOGGLE	TOGGLE		
		ALARM 1	ALARM 2	EXIT	

Pressing TOGGLE ALARM 1 will highlight the ALARM 1 display. ALARM 2 will highlight when toggling ALARM 2.

**Note:** The toggle will force the alarm output from the AutoMet unit to an alarm condition.

## 5.2. Test Voltage Output

TEST VOLTAGE OUTPUT is used for system testing the zero and span voltage outputs.

TEST VOLTAGE OUT			
ALL OUTPUTS: SPAN			
VOLTAGE: 1.000V			
NORMAL	ZERO	SPAN	EXIT

- NORMAL: All voltage outputs follow the current conditions.
- ZERO: Places all the voltage outputs to zero volts.
- SPAN: Places all the voltage outputs to the span voltage.

### 5.3. Test Calibrate

The CALIBRATE menu is used whenever sensor maintenance or system calibration tests are performed. The display has the capability of displaying the engineering units or measured voltage from the sensor by using the VOLT/ENG toggle hotkey.

The hotkey options are:

- TOGGLE FLG: Mark the logged data as calibration test.
- VOLT/ENG: Toggle the display to show volts or engineering units

Menu in Engineering Units Mode

CAL	DATA	FLAG: OFF	TEST CALIBRATE
1	WS	0.063 MPH	
2	WD	0.066 DEG	
3	AT	27.60 C	
4	RH	32.3 %	
5	BP	972.68 mbar	
▼ 6	no	0.072 V	
		TOGGLE FLG VOLT/ENG	EXIT

Menu in Voltage Mode

CAL	DATA	FLAG: OFF	TEST CALIBRATE
1	WS	0.063 V	
2	WD	0.066 V	
3	AT	0.000 V	
4	RH	0.000 V	
5	BP	0.000 V	
▼ 6	no	0.073 V	
		TOGGLE FLG VOLT/ENG	EXIT

The Calibration screen displays current conditions of sensors in engineering or volt units. A Data flagging option is available by keystroke.

Pressing the TOGGLE FLG hotkey will toggle the CAL DATA FLG on and off. When turned on, the data record status will be flagged as a calibration record.

## 6. RS232 Communication

### 6.1. RS232 Port Description

An RS-232 port is provided for external communications to the AutoMet unit. Access to the AutoMet is menu driven; allowing any DOS, WINDOWS, or MAC based terminal communication software to communicate with the AutoMet unit.

Other features of the RS-232 port allow setting of the Date, Time, erasing the AutoMet memory, binary downloading of data, and the ability to view the current AutoMet setups.

To enable remote computers to communicate with the data logger series, an optional modem may be installed. This device requires a dedicated dial-up telephone line, cellular connection, or radio to properly communicate.

**Note:** It is assumed that the installer is familiar with the operation of and interfacing of the RS232 port of the computer.

Connect the appropriate voltage rated AC power adapter to the AutoMet unit and Local AC power. The LCD screen of the AutoMet unit should display a screen with date, time, and alarm conditions. Power the computer and start the terminal, Air Plus 5 or Comet software. The default settings for RS232 communications are:

- 9600 Baud
- 8 Bit data
- 1 Stop bit
- No parity

Consult the manual for the terminal, Air Plus 5 or Comet software to set and verify these settings.

### 6.2. USB

**WARNING:** The USB serial drivers, located on the CD (P/N 80328) will need to be installed on the host computer prior to trying to communicate with the AutoMet. See Appendix I for installation instructions.

**NOTE:** The Main RS-232 port and the USB port should not both have cables plugged in at the same time as they are the same Main communication port.

**If simultaneous RS-232 and USB connections are needed, use the RS-232 Printer or Extra ports along with the USB.**

The USB serial drivers allow the host computer to communicate to the AutoMet using the Air Plus 5, Comet, or any standard serial communications program. The USB connection is a virtual RS-232 connection and as such must be set to match the RS-232 settings of the AutoMet. Refer to section 7.1 for information about setting the communication port settings.

The AutoMet comes with a standard male type A to Male type B USB cable for connection to the PC. Connect this USB cable (P/N 500784) between the AutoMet and the host computer USB port.

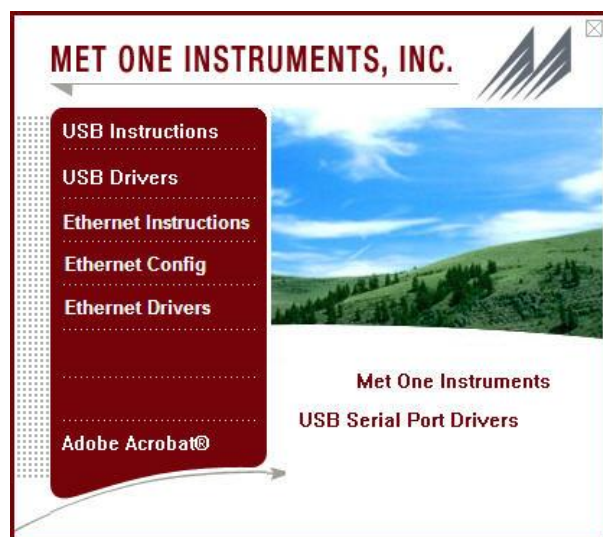
### 6.3. Ethernet Port Setup and Configuration

The Ethernet port must be configured with some drivers by the user:

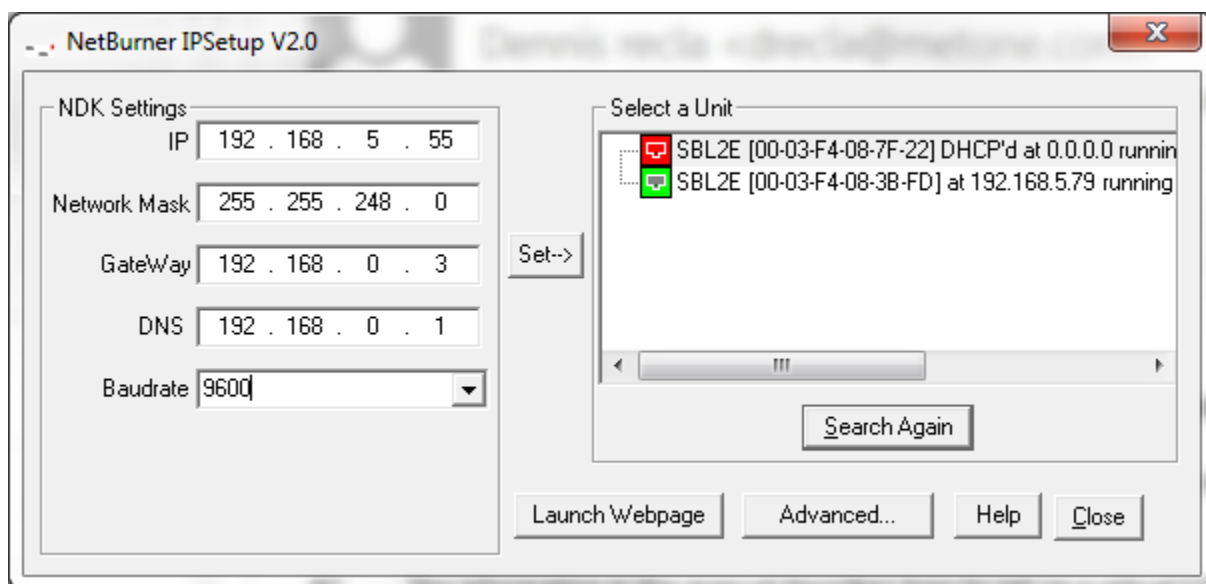
#### 6.3.1. Setting the Static IP Address of the AutoMet:

This section covers how to assign your static ip to the AutoMet 580. These steps assume that someone (an IT person) has setup a static ip address, a network mask, and gateway that you can use to assign to the device. Follow the steps below to assign this information to your device.

1. Connect CAT5 Ethernet cable between local network and Ethernet connector on the wiring panel of the AutoMet.
2. Insert the supplied USB/Ethernet Driver CD (part 80328) into your PC. The following menu window should appear:



3. Click on the Ethernet Config button. The following screen will appear:



4. The “Select a Unit” box displays a list of available static IP addresses on the network. Units with a “DHCP” mean they need to be configured and units without the “DHCP’d” means they have already been configured and you shouldn’t change them unless you know what you are doing.
  - a. Generally, when setting the device up for the first time, it will have an ip address of 0.0.0.0 and will be displayed in red as shown in the screen shot above.
  - b. If your device isn’t showing up in the list, confirm that you have enabled Ethernet in the device’s internet setup screen (Section 3.13).
5. Select from the unit list your AutoMet 580. It should be the ip address with a “DHCP’d” in it and an address of 0.0.0.0, because that unit is ready to be configured.
6. Type in your assigned static IP address in the IP window. Be sure to write this number down as you will need it later.
7. Type in a Network Mask in the Network Mask window, this may vary depending how your IT department has set up your network. Typical network mask is 255.255.255.0.
8. Set the gateway and DNS based on your company’s network settings.
9. Set the baud rate to the unit’s port baud rate.
10. Select your device from the unit list and press the Set→ button to change the IP address of your AutoMet.
11. If the device disappeared from your list, press the search again button until it appears again with your newly assigned ip address.
12. Select the unit from the list and press the launch webpage button. This will launch the AutoMet’s Ethernet configuration page.
13. At the top of the page, go to the Serial tab.

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### Serial

Data port settings (DEBUG defaults to port 0 if both are set to DEBUG):

	PORT 0	PORT 1
Data port settings (DEBUG defaults to port 0 if both are set to DEBUG):	RS-232	DEBUG
Data baud rate:	38400	38400
Custom baud rate:	0	0
Data bits:	8	8
Stop bits:	1	1
Data parity:	None	None
Flow control:	RTS/CTS	None
Allow AT commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AT attention command char:	43 (+)	43 (+)

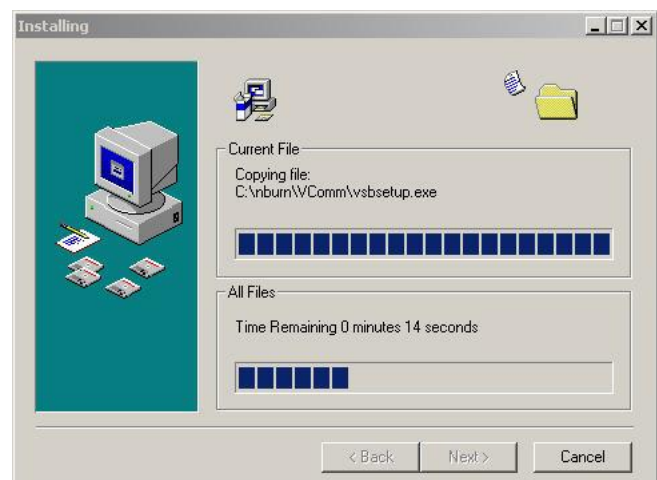
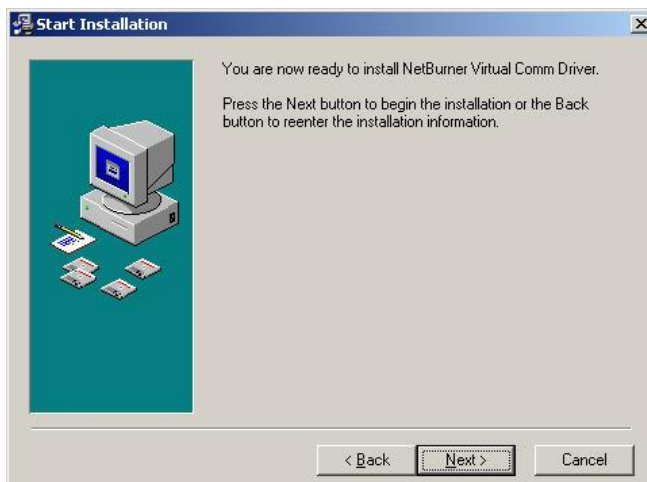
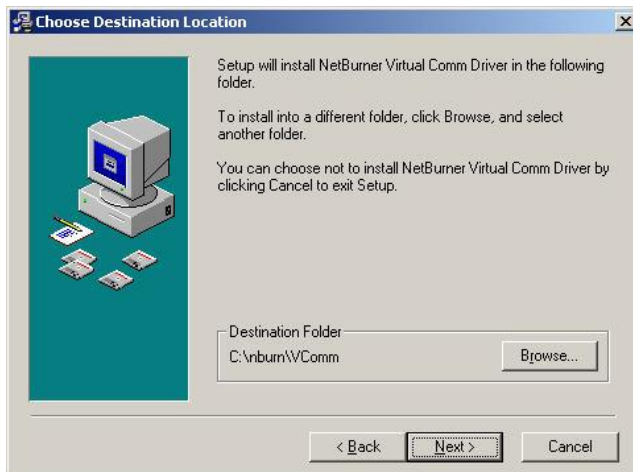
[Submit New Settings](#)

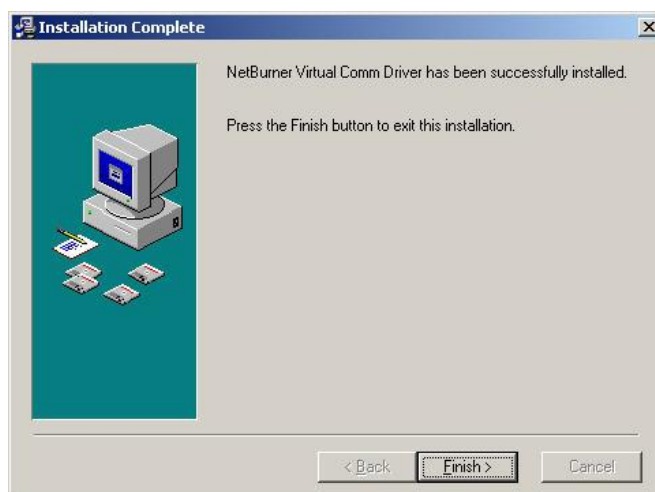
14. For Port 0, set the data port to RS-232, set the baud rate to match the AutoMet’s baud rate, and the flow control to RTS/CTS.
15. For Port 1 set the dataport to DEBUG and match port 0 settings for the rest.
16. Press the ‘submit new settings’ button to save your changes. You should now be able to communicate with your device via Ethernet.

### 6.3.2. Installing the Virtual Serial Port Drivers:



1. From the Drivers CD, click the Ethernet Drivers button. The Choose Destination screen will appear as shown below. Click on the Next button. Select your operating system and click Next. The Start Installation screen will appear. Click Next. The Installing screen will display that the software is installing the drivers.

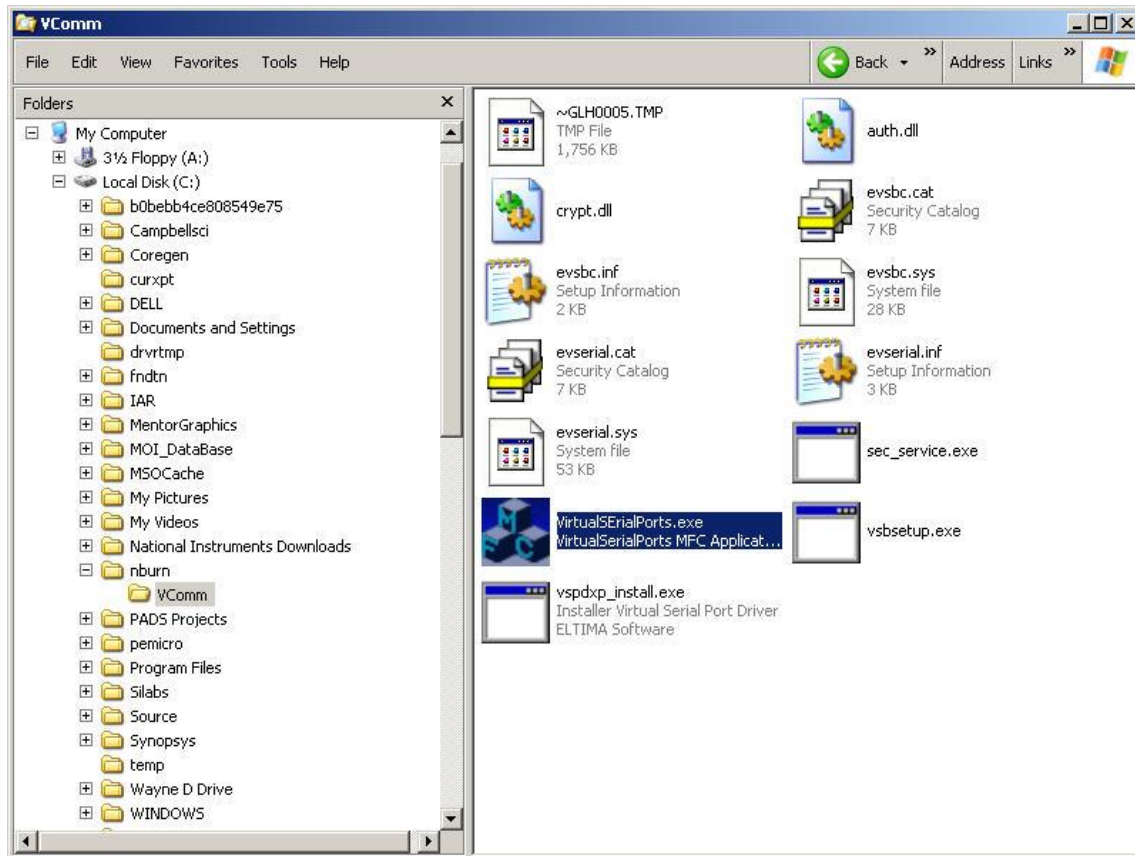




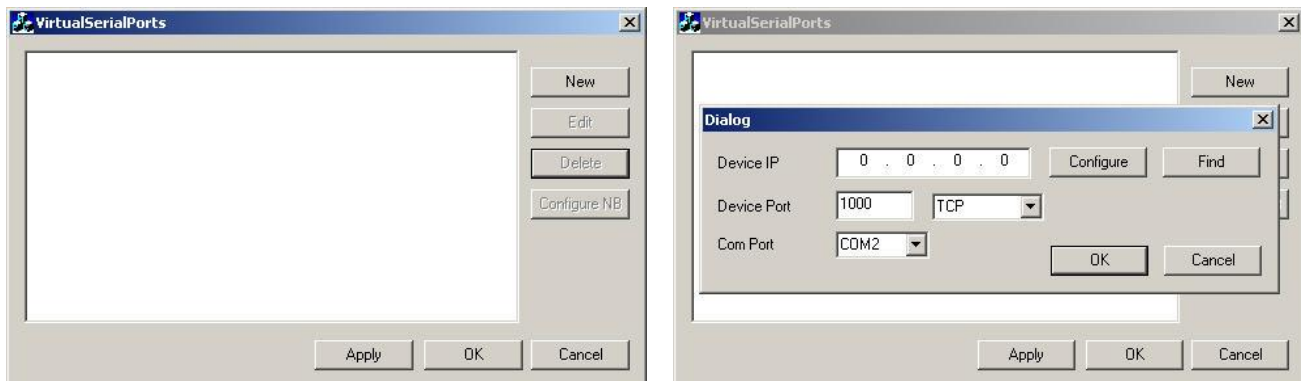
2. When the Installation Complete screen is displayed, click the Finish button. You will need to restart your computer before the drivers will be ready to use.

### 6.3.3. Configuring the Virtual Com Port for Your Device:

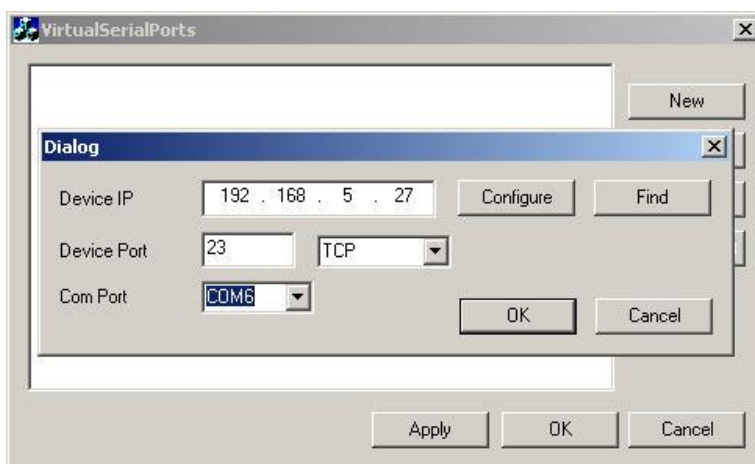
1. Open your My Computer folder and navigate to the **C:\nburn\VComm** folder. Double click the **VirtualSerialPorts.exe** file:



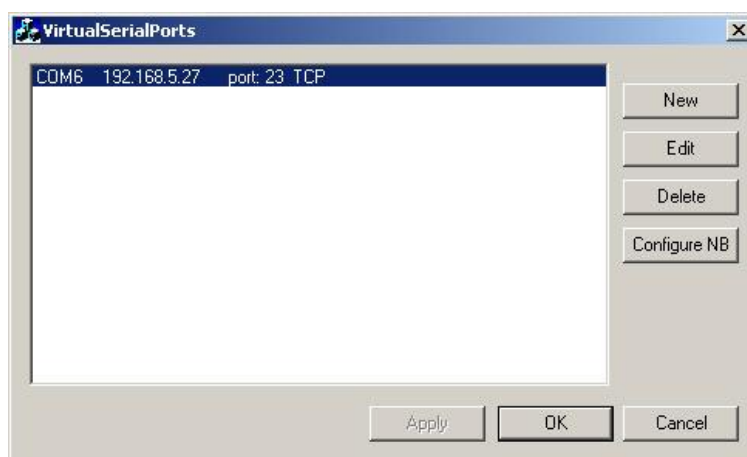
2. The configuration window will appear as shown below. Click the New button.



3. Type in the IP address you assigned earlier to the unit. Set the Device Port to 23 and choose a Com Port from the drop down window as shown below. Click the OK button, then the Apply button:



4. Click on the IP line (in this example the “COM6 192.168.5.27” line) and click the Configure NB button to test the connection.



5. Your internet browser will open and show you a similar screen to the one below. This completes the virtual com port drivers. Remember this instrument will always be accessed by the Com Port you chose in step 3. Click the close button on the browser and the VirtualSerialPort program window.


NetBurner SBL2e Network Setup(TCP) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://192.168.5.27/INDEX.HTM

Most Visited Getting Started Latest Headlines

NetBurner SBL2e Network Setup(TCP)

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### Network

Device Name (for DHCP)

Addressing Mode

#### IP SETTINGS:

	Static Settings	Current Values
Device IP Address	<input type="text" value="192.168.5.27"/>	192.168.5.27
Device Subnet Mask	<input type="text" value="255.255.248.0"/>	255.255.248.0
Device Gateway	<input type="text" value="0.0.0.0"/>	0.0.0.0
DNS Server	<input type="text" value="0.0.0.0"/>	0.0.0.0
Ethernet Link	<input type="text" value="Normal"/>	Physical power cycle required after change

#### INCOMING TCP SETTINGS:

	Port 0	Port 1
Listen for incoming network connections	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Listening network port:	<input type="text" value="23"/>	<input type="text" value="24"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="30"/>	<input type="text" value="30"/>
Allow new connection if the existing connection has been idle for this many seconds.	<input type="text" value="30"/>	<input type="text" value="30"/>

#### OUTGOING TCP SETTINGS:

	Port 0	Port 1
Make outgoing connections:	<input type="text" value="Never"/>	<input type="text" value="Never"/>
Connect on network port:	<input type="text" value="1000"/>	<input type="text" value="1000"/>
Connect/Send to this address:	<input type="text"/>	<input type="text"/>
Timeout and disconnect after this many seconds of inactivity.	<input type="text" value="60"/>	<input type="text" value="60"/>

Done

- Click on the Serial link at the top of the page. You should be taken to a page like shown below.

NetBurner SBL2E Dual Serial

192.168.5.24/serial\_conf.htm

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**Serial**

	PORT 0	PORT 1
Data port settings (DEBUG defaults to port 0 if both are set to DEBUG):	RS-232	RS-232
Data baud rate:	9600	9600
Custom baud rate:	0	0
Data bits:	8	8
Stop bits:	1	1
Data parity:	None	None
Flow control:	None	None
Allow AT commands:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AT attention command char:	43 (+)	43 (+)

Submit New Settings

7. Change the Baud Rate to match your device and the Flow Control to “RTS/CTS”. All other settings should remain the same. Press the Submit New Settings button to have these settings take effect.

#### 6.4. Modem Option

Operation of the modem option is performed by using a second internal or external modem at the computer or terminal. The AutoMet modem will automatically answer when called. Verify the operation as outlined in section 4.0. If the AutoMet modem does not answer or communicate, then verify the cabling.

To verify the RS232 connection to the AutoMet unit, press the <Enter> key a minimum of 3 times. An asterisk character (\*) should be seen on the screen (If not seen, verify the cabling and communications settings). To prevent modem line noise from activating the modem, it requires three <Enter> commands to recognize a connection.

#### 6.5. Cloud Option

The AutoMet has a cloud option in which a pre-configured modem will be sent with the unit. The AutoMet will send the data to the cloud and users may visit their webpage created by Met One to view their secure data. For more information please contact a sales person by e-mailing [sales@metone.com](mailto:sales@metone.com) or giving us a call at 541-471-7111.

See section 3 to see how to configure the communication settings in detail.

## 6.6. RS232 Main Menu

The AutoMet unit uses a menu system to communicate through RS232. Press the <CR> key until the \* character appears. This places the AutoMet in Terminal Mode.

Display the help menu by typing the “?” question mark, or "H" keys. A listing similar to the following should display:

\* h

AutoMet 580 Help Menu

```
# - 7500 Protocol
1 - Report Settings
2 - Report All Data
3 - Report New Data
4 - Report Last Data
C - Clear Data File
D - Set Date
H - Help Menu
Q - Quit Out of Terminal Mode
T - Set Time
Z - Start Remote Control
DS - Report Channel Descriptor
DT - Set Date/Time
ID - Set Location ID
MA - Set Modbus Address
MP - Set Modbus Port
NW - Set Network Mode
PR - Print Report
PW - Enter User Password
QH - Report Data Record Header
RQ - Request Current Data Record
RS - Report Settings
RV - Report Model/Part/Revision
SB - Set Baud Rate
SS - Get Serial Number
ST - Set Sample Time
UN - Get Channel Units
CHN - Set Channel Name
CHU - Set Channel Units
TZO - Time Zone Offset
MDMP - Modem Port Setting
MODEM - Modem Cloud Setting
```

By typing one of the number keys, the associated function will be performed. See Appendix A for RS232 command details.

## 6.7. Extended Command Menu

The AutoMet now supports a new higher resolution data format. The System Menu commands provide support for the Legacy data format for backward compatibility while the Extended Commands output the data in the new high resolution format.

These commands are all multi-character commands and are started by pressing the <Esc> key followed by the given command then terminated by the <Enter> key.

Typing <Esc>H<Enter> will display a listing of the Extended Command summary.

\* <Esc>H

Extended Command Menu

Each command is terminated with the <Enter> key.

High Resolution File Commands

<Esc>1 - Display Current Day Averages

<Esc>2 - Display All Averages

<Esc>3 - Display New Averages

<Esc>RF - Reset File Memory

<Esc>XP - Change Download Pointer

<Esc>XB - XMODEM Download of File Data

<Esc>XR - XMODEM Download of Real Time Readings

These commands are intended for computer controlled data access. Consult the factory for a detailed description of these commands.

## 7. Troubleshooting

<b>SYMPTOM</b>	<b>CHECKPOINT</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
AutoMet unit will not operate	BATT Connector	No +12 Volt Power	Repair/Replace Supply
	Visual	Blown Fuse	Replace fuse
	Visual	Loose Cables	Check
Blows Fuse	Check	Power polarity Incorrect	Reverse
	Check	Wiring Panel, D22 diode shorted	Replace
	Check	Lightning Damage	Return to Factory
LCD Backlight is lit but no display	Keypad	Contrast Adjust	Adjust Contrast
	BATT Connector	Low Power	Repair/Replace Supply
	Front Panel	Bad LCD Display	Replace Display Assembly
	Front Panel	Bad Keypad	Replace Keypad Assembly
	Front Panel	Bad CPU PC Board	Replace 33230-1 PC Board
ADA Not Working		ADA Cable Wiring	Check
Digital Sensor Not Working		Digital Sensor Cable Wiring	Check

## **8. Technical Support**

Should you require support, please consult your printed documentation to resolve your problem. If you are still experiencing difficulty, you may contact a Technical Service representative during normal business hours—7:30 a.m. to 4:00 p.m. Pacific Standard Time, Monday through Friday.

Voice: (541) 471-7111

Fax: (541) 471-7116

E-Mail: [service@metone.com](mailto:service@metone.com)

Mail: Technical Services Department  
Met One Instruments, Inc.  
1600 Washington Boulevard  
Grants Pass, OR 97526

## **9. Factory Repair and Calibration**

It is recommended that calibration of the AutoMet unit be performed at the factory. Please contact the service department for return authorization number prior to sending any equipment in for repairs.

## 10. Appendices

### 10.1. Appendix A – RS232 Commands

**Note:** To stop an operation in process from executing, press the <CR> key.

#### 1 – Report Settings

Display the AutoMet settings. Shown below is an example of the report:

\* 1

AutoMet 580 Settings Report  
2015-07-27 08:43:51

Firmware, 10580, R1.0.0  
Digital, 1, 597, 10503-01, R00.1.7  
Serial Number, I10222  
Location, 1  
Main Port Baud, 9600  
COM1 Baud, 9600  
COM2 Baud, 9600  
485 Port Baud, 9600  
Modbus Port, COM1  
Modbus Address, 1

LCD Timeout, 5 MIN  
Average Period, 10 MIN  
Input Voltage, 2.500  
Output Voltage, 1.000

ALARM 1 Chan, 03 AT  
LO, 0000.00  
HI, 0000.00  
Type, OFF  
Delay Mode, NO TIMEOUT/DELAY  
Timeout, 0  
Delay, 0

ALARM 2 Chan, 01 WS  
LO, 000.000  
HI, 000.000  
Type, OFF  
Delay Mode, NO TIMEOUT/DELAY  
Timeout, 0  
Delay, 0

Auto Reports  
Main Fmt, METRECORD  
Main Type, OFF  
Main Intvl, 1 SEC  
Print Fmt, METRECORD  
Print Type, OFF  
Print Intvl, 10 SEC  
UIM ID,

Ethernet Serial, ON

```

Cloud Modem, NONE
Cloud Port, MAIN
Time Zone, UTC -08:00

```

#### RTD Settings

```

Src,      R0,      Alpha,      Beta,      Delta
RTD1, 100.000, 0.0038500, 0.10863, 1.4999000
RTD2, 100.000, 0.0038500, 0.10863, 1.4999000
RTD3, 100.000, 0.0038500, 0.10863, 1.4999000

```

#### Solar Settings

```

Src, Cal Constant
Sol1, 7.000
Sol2, 0.000

```

Chan	Src	Name	Units	Prec	FS Volts	Min Engr	Max Engr	Math
1	Sen1	WS	MPH	3	1.0	0000.000	0001.000	Avg
2	Sen2	WD	DEG	3	1.0	0000.000	0001.000	Avg
3	Dig.	AT	C	2	2.5	-0050.00	00070.00	Avg
4	Dig.	RH	%	1	2.5	000000.0	000100.0	Avg
5	Dig.	BP	mbar	2	2.5	00500.00	01100.00	Avg
6	Sen6	no	V	3	1.0	0000.000	0001.000	Avg
7	Sen7	no	V	3	1.0	0000.000	0001.000	Avg
8	Sen8	no	V	3	1.0	0000.000	0001.000	Avg
9	None			0				
10	None			0				
11	None			0				
12	None			0				
13	None			0				
14	None			0				
15	None			0				
16	None			0				

Out	Src	Min Engr	Max Engr
1	Chan 1	0000.000	0001.000
2	Chan 2	0000.000	1200.000
3	Chan 3	000000.00	000001.00
4	Chan 4	000000.0	000001.0
5	Chan 5	000000.00	000001.00
6	Chan 6	0000.000	0001.000
7	Chan 7	0000.000	0001.000
8	Chan 8	0000.000	0001.000
9	Chan 9	000000000	000000001
10	Chan 10	000000000	000000001
11	Chan 11	000000000	00001200
12	Chan 12	000000000	00001200

## **2 – Report All Data**

Display all the averages stored in the AutoMet unit memory, including a comma separated header line that will have the measurement name and units including date, time, and logged channels.

If there were no new averages then only the header line will be output.

## **3 – Report New Data**

Reports the Display Averages that were not previously retrieved, including a comma separated header line that will have the measurement name and units including date, time, and logged channels.

If there were no new averages then only the header line will be output.

#### **4 – Report Last Data**

Display the last average stored in the AutoMet unit memory retrieved including a comma separated header line that will have the measurement name and units including date, time, and logged channels.

If there were no new averages then only the header line will be output.

#### **C – Clear Data File**

This command will clear all the logger data. Download any data that is important before clearing as it cannot be retrieved afterwards.

\*C

WARNING!!! Clearing Memory Destroys All Data!

Continue? (Y) or (N)? (Press Enter to Cancel):

### **D – Set The Date**

Set the datalogger date. If a date is not entered with the command the current logger date will be shown and prompt for a new date.

### **T – Set The Time**

Set the datalogger time. If the time is not entered with the command the current logger time will be shown and prompt for a new time.

### **Q – Quit Out of Terminal Mode**

Exits the terminal mode and returns to Computer Controlled mode.

### **DT – Set Date/Time**

Set the datalogger time. Sending the command without parameters will return the current datalogger date and time.

To change the date and time enter the command plus the new date and time setting.

Example:

```
* DT 2014-06-05 12:08:17
DT 2014-06-05 12:08:17
*
```

### **ID – Set Location ID**

Set the datalogger location ID. Sending the command without parameters will return the current ID. The ID can be a number from 01 to 99.

To change the ID enter the command plus the new ID.

Example:

```
* ID 02
ID 002
*
```

### **PR – Print Report**

This is the same function as the 1 – Report Settings command.

### **QH – Report Data Record Header**

Prints a comma separated header line that will have the measurement name and units including date, time, and logged channels.

### **RQ – Request Current Data Record**

This is the same function as the 3 – New Data command.

### **RV – Report Model/Part/Revision**

Reports the current Model, Firmware Part Number, and Firmware version of the datalogger in comma separated format.

### **SB – Set Baud Rate**

Set the main RS232 port baud rate. For a list of the selection send the command:

```
* SB?  
SB 2-1200,3-2400,4-4800,5-9600,6-19200,7-38400,8-57600,9-115200  
*
```

To set a new baud rate enter the SB command plus the number of the desired baud. For 38400 the command would be:

```
* SB 7  
SB 7-38400  
*
```

**Note:** Avoid using high baud rates for long RS232 serial cable connections. The recommended rate is 9600.

**Warning:** A change in baud rate takes effect immediately and remains at the new baud rate even when the logger power is cycled. The baud rate of the terminal program or software must also be changed to match the new baud rate.

If the setting is forgotten and communication cannot be established, the setting can be checked and set in the baud rate setup screen of the LCD.

### **SS – Get Serial Number**

Report the Serial Number of the logger.

### **ST – Set Sample Time**

Set the averaging sample time of the logger. The time selections can be viewed by using the command:

\* ST?

ST 0-1 MIN, 1-5 MIN, 2-10 MIN, 3-15 MIN, 4-30 MIN, 5-60 MIN

\*

The following example shows how to set the sample time to 60 minutes:

\* ST 5

ST 5-60 Min

\*

## **10.2. Appendix B – Extended Commands**

### **<Esc>1 - Display Current Day Averages**

Display today's averages only for the High Resolution file.

### **<Esc>2 - Display All Averages**

Display all the averages stored in the AutoMet unit memory for the High Resolution file.

### **<Esc>3 - Display New Averages**

Display Averages that were not previously retrieved for the High Resolution file.

### **<Esc>RF -Reset File Memory**

This is a destructive command. Activation will erase all data in the high resolution file. The Legacy file is left intact. Password is required.

### **<Esc>XP - Change Download Pointer**

This is the pointer for keeping track of the last entry of the high resolution data memory. If the memory is full, then the oldest data is written over first. This is the equivalent of the 'p' command for the High Resolution file.

### **<Esc>XB - XMODEM Download of Data**

This command is used by Air Plus 5 software for binary data downloading. This is a proprietary command that requires software handshaking and is not recommended for terminal software operation.

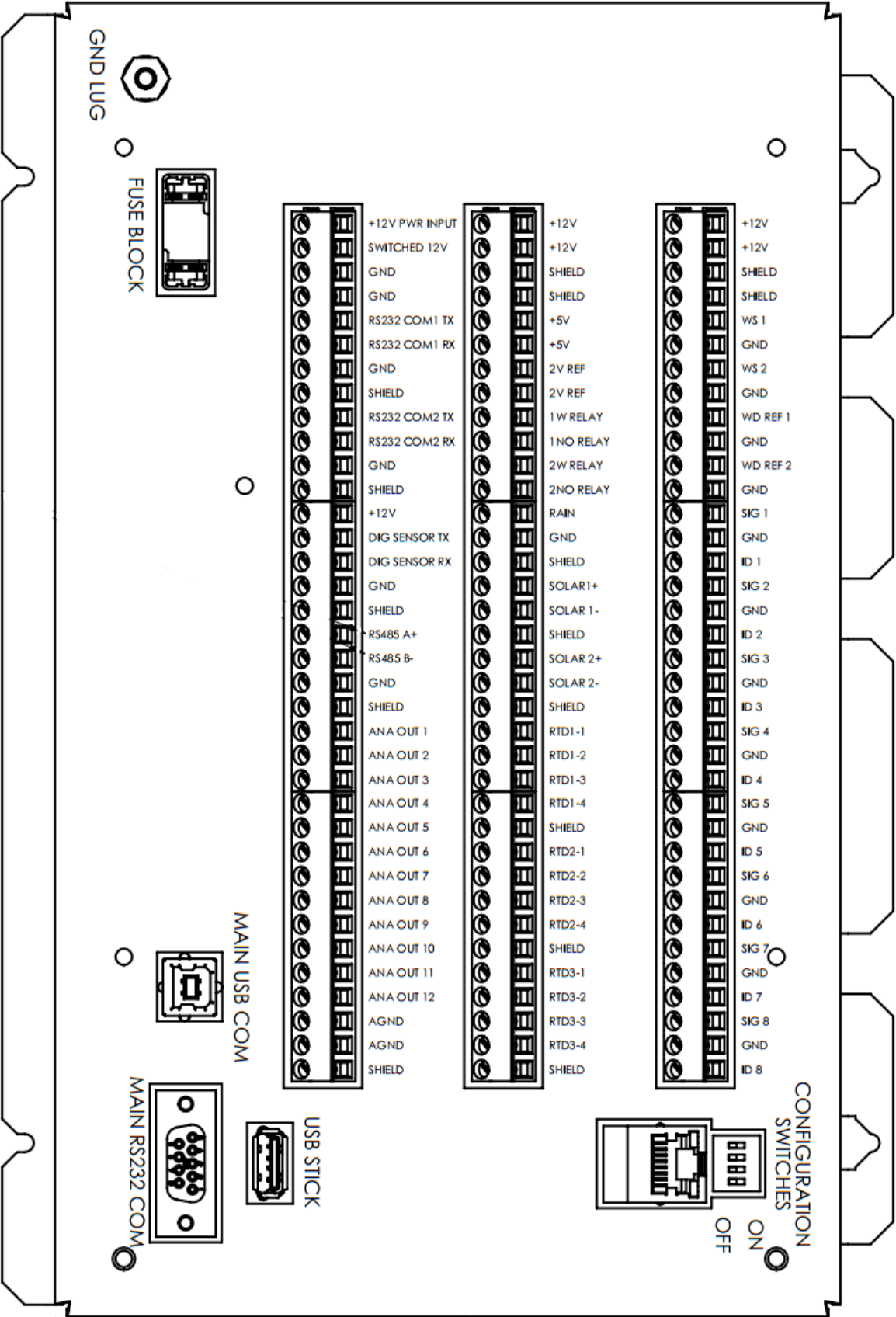
### **<Esc>XR - XMODEM Download of Real Time Values**

This command is used by Air Plus 5 software. This is a proprietary command that requires software handshaking and is not recommended for terminal software operation.

### **10.3. Appendix C – Updating Firmware**

Consult the factory for updating the AutoMet Firmware.

10.4. Appendix D – Wiring Panel Technical Data



## Wiring Panel Terminal Assignments

Terminal Block	Description
TB1	WS1 WS2 WD REF 1 WD REF 2
TB2	Analog input channels 1-4
TB3	Analog input channels 5-8
TB4	+5V sensor power 2V REF Alarm 1W Alarm 1NO Alarm 2W Alarm 2NO
TB5	Rain Input Solar 1-2 Input RTD 1 Input
TB6	RTD 2-3 Input
TB7	RS 232 COM 1 RS 232 COM 2
TB8	DIG SENSOR TX/RX (RS-232) RS485 Analog Out 1-3
TB9	Analog Out 4-12

Term Block	Pin #	Name
1	1	+12V
1	2	+12V
1	3	Shield
1	4	Shield
1	5	WS1
1	6	Common ground
1	7	WS2
1	8	Common ground
1	9	WD Ref 1
1	10	Common ground
1	11	WD Ref 2
1	12	Common ground

Term Block	Pin #	Name
2	1	Signal 1
2	2	Common ground
2	3	Auto ID 1
2	4	Signal 2
2	5	Common ground
2	6	Auto ID 2
2	7	Signal 3
2	8	Common ground
2	9	Auto ID 3
2	10	Signal 4
2	11	Common ground
2	12	Auto ID 4

Term Block	Pin #	Name
3	1	Signal 5
3	2	Common ground
3	3	Auto ID 5
3	4	Signal 6
3	5	Common ground
3	6	Auto ID 6
3	7	Signal 7
3	8	Common ground
3	9	Auto ID 7
3	10	Signal 8
3	11	Common ground
3	12	Auto ID 8

Term Block	Pin #	Name
6	1	RTD 1 – 4
6	2	Shield
6	3	RTD 2 – 1
6	4	RTD 2 – 2
6	5	RTD 2 – 3
6	6	RTD 2 – 4
6	7	Shield
6	8	RTD 3 – 1
6	9	RTD 3 – 2
6	10	RTD 3 – 3
6	11	RTD 3 – 4
6	12	Shield

Term Block	Pin #	Name
4	1	+12V
4	2	+12V
4	3	Shield
4	4	Shield
4	5	+5V
4	6	+5V
4	7	2VREF
4	8	2VREF
4	9	1W Relay
4	10	1NO Relay
4	11	2W Relay
4	12	2NO Relay

Term Block	Pin #	Name
7	1	+12V Power in
7	2	Switched 12V
7	3	Common ground
7	4	Common ground
7	5	RS232 COM 1 TX
7	6	RS232 COM 1 RX
7	7	Common ground
7	8	Shield
7	9	RS232 COM 2 TX
7	10	RS232 COM 2 RX
7	11	Common ground
7	12	Shield

Term Block	Pin #	Name
5	1	Rain
5	2	Common ground
5	3	Shield
5	4	Solar 1+
5	5	Solar 1-
5	6	Shield
5	7	Solar 2+
5	8	Solar 2-
5	9	Shield
5	10	RTD 1 – 1
5	11	RTD 1 – 2
5	12	RTD 1 – 3

Term Block	Pin #	Name
8	1	+12V
8	2	DIG SENSOR TX
8	3	DIG SENSOR RX
8	4	Common ground
8	5	Shield
8	6	RS485 +
8	7	RS485 -
8	8	Common ground
8	9	Shield
8	10	Analog out 1
8	11	Analog out 2
8	12	Analog out 3

<b>Term Block</b>	<b>Pin #</b>	<b>Name</b>
9	1	Analog out 4
9	2	Analog out 5
9	3	Analog out 6
9	4	Analog out 7
9	5	Analog out 8
9	6	Analog out 9
9	7	Analog out 10
9	8	Analog out 11
9	9	Analog out 12
9	10	Common ground A
9	11	Common ground A
9	12	Shield

## 10.5. Appendix E – Serial Output Record Formats

There are two record formats available from the AutoMet serial ports:

- MetRecord Format – Standard Met One Data Format
- UIM Format – Compatible with Climatronics UIM systems.

### 10.5.1. MetRecord Format

A header will contain column text containing Date/Time, Channel Names, and Status in comma separated format. This is useful when importing records into a spreadsheet.

Each record including the header contains a checksum. See the section below for an explanation of the `CHECKSUM` field.

In the MetRecord format there is one space following the date stamp; data fields following are comma separated with no spaces.

Example:

```
2014-06-05 13:21:00,00046.3,00079.7,+0450.0,00105.6,0025.30,  
+0123.2,00046.4,000.215,0000.00,00079.7,0015.10,00000,*05538
```

The field order is:

- |    |                 |
|----|-----------------|
| 1  | Date/Time       |
| 2  | Log Chan1       |
| 3  | Log Chan2       |
| 4  | Log Chan3       |
| 5  | Log Chan4       |
| 6  | Log Chan5       |
| 7  | Log Chan6       |
| 8  | Log Chan7       |
| 9  | Log Chan8       |
| 10 | Rain            |
| 11 | Sigma           |
| 12 | Battery Voltage |
| 13 | Status          |

The status field is a bitwise numeric indication of the logger status including alarms and system calibration flag. See the section below for an explanation of the `STATUS` field.

When serial records are requested by a serial command, a header line containing the field information is output first followed by records.

### 10.5.2. UIM Record Format

The data record format for an UIM record is space separated using fixed width fields. All fields have a polarity sign and a two digit field number (with leading zeros). Each field is 10 bytes wide.

Example:

```
01+B1234 02+0046.3 03+0079.6 04+0450.0 05+0105.6 06+025.30 07+0123.2  
08+0046.4 09+00.215 10+000.00 11+0079.6 12+015.10
```

The field order is:

- 01 Logger Serial Number and leading letter
- 02 Log Chan1
- 03 Log Chan2
- 04 Log Chan3
- 05 Log Chan4
- 06 Log Chan5
- 07 Log Chan6
- 08 Log Chan7
- 09 Log Chan8
- 10 Rain
- 11 Sigma
- 12 Battery Voltage

### 10.5.3. Status Field Format

The status field is a bitwise combination of values indicating the various types of alarms and calibrations status of the logger. The status field is a 5-digit value with a leading zero.

Normally, the value in the status is a value of zero. When any bit is set, the status value is non-zero.

These are the values assigned to the bits:

Bit	Value
1 = Alarm 1	1
2 = Alarm 2	2
3 = Digital Sensor Not Found	4
4 = Reserved	8
5 = Reserved	16
6 = Reserved	32
7 = Reserved	64
8 = Calibration Flag	128

If more than one status bit condition exists then the value for each condition is added to the total status value. For example, if Alarm 1 and Alarm 2 were set during a system calibration then the status would be computed as:

$$1 + 2 + 128 = 131$$

Reserved bits may be defined in future versions of the logger.

### 10.5.4. Record Checksums

Checksum is calculated as the 16 bit unsigned integer sum of all of the characters up to but not including the Checksum Delimiter Character \* (0x2A). It is printed out as an ASCII decimal number.

The result is always 5 characters in length with a leading zero.

## 10.6. Appendix F – Wind Direction Sensor Orientation


### Introduction

Determining True North or Magnetic Declination is very important to the proper setup and orientation of the wind direction portion of the sonic wind sensor. The declination value is used to determine the difference between True North and magnetic North. This value varies around the world depending upon your location. The following procedure can be used to align the wind sensor to True North.

### Determining Local Magnetic Declination

#### Recommended Method

The recommended method for determining local magnetic declination is to visit the following website and fill out the proper information. Please visit <http://www.ngdc.noaa.gov/geomag-web/> to help you determine the right magnetic declination for your device.

**NOAA** NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA > NESDIS > NCEI (formerly NGDC) > Geomagnetism

## Magnetic Field Calculators

DeclinationU.S. Historic DeclinationMagnetic FieldMagnetic Field Component Grid

### Magnetic Declination Estimated Value

Declination is calculated using the most recent [World Magnetic Model \(WMM\)](#) or the [International Geomagnetic Reference Field \(IGRF\)](#) model. For 1590 to 1900 the calculator is based on the [gufm1](#) model. A smooth transition from gufm1 to IGRF was imposed from 1890 to 1900. Declination results are typically accurate to 30 minutes of arc, but environmental factors can cause magnetic field disturbances.

#### Calculate Declination

Latitude:  ☐ S ☒ N

Longitude:  ☒ W ☐ E

Model: ☒ WMM (2014-2019) ☐ IGRF (1590-2019)

Date: Year  Month  Day

Result format: ☒ HTML ☐ XML ☐ CSV ☐ PDF

Calculate

#### Lookup Latitude / Longitude

Either enter a zip code, select a country/city, or [search for an address at USGS Earth Explorer](#).

U.S. Zip Code:

- OR -

Country:

City:

Get & Add Lat / Lon

NOAA > NESDIS > NCEI (formerly NGDC) > Geomagnetism

Questions: [geomag.models@noaa.gov](mailto:geomag.models@noaa.gov)

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580-9800 Manual Rev H

71

## Secondary Method

Several resources for determining the magnetic declination of any site in the world can be found on the internet or can be accessed by modem using any common terminal program.

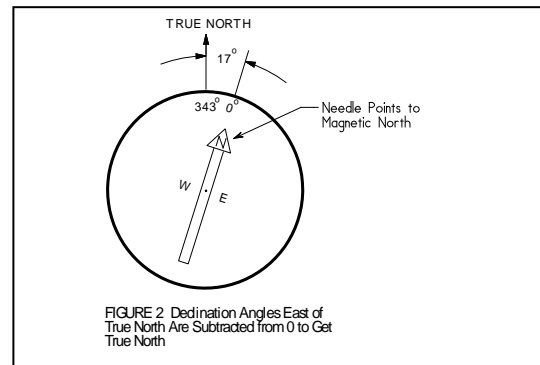
GEOMAG is a resource that can be accessed by telephone or the Internet (Telnet) connection. GEOMAG is accessed by calling 1-800-358-2663 with a computer and telephone modem, and communications program such as HyperTerminal. GEOMAG can also be accessed by the internet using the address: <telnet://neis.cr.usgs.gov>

GEOMAG prompts the caller for site latitude, longitude, and elevation, which it uses to determine the magnetic declination and annual change. The following Menu and prompts are from GEOMAG: Use the username: "QED".

### MAIN MENU

Type Q for Quick Epicenter Determinations (QED)  
L for Earthquake Lists (EQLIST)  
M for Geomagnetic Field Values (GEOMAG)  
X to log out

Enter program option: M



Would you like information on how to run GEOMAG (Y/N)? N

Options:

- 1 = Field Values (D, I, H,X,Z, F)
- 2 = Magnetic Pole Positions
- 3 = Dipole Axis and Magnitude
- 4 = Magnetic Center

Display values twice

[N]: press return

Name of field model[USCON95]: press return

Date

[Current date]: press return

Latitude

: 42/25 N

Longitude

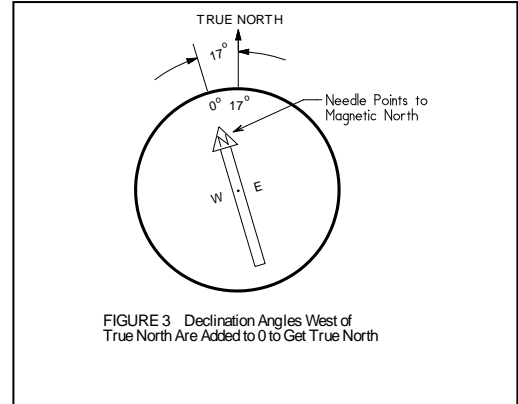
: 123/20 W

Elevation

: 1000

Units (m/km/ft)

: ft



**Example of report generated by GEOMAG:**

Model: USCON95            Latitude : 42/25 N  
Date : 2/13/99            Longitude: 123/20 W  
Elevation: 1000.000 ft

	D	I	H	X	Y	Z	F
	deg min	deg min	nT	nT	nT	nT	nT
	-----	-----	-----	-----	-----	-----	-----
	17 17.5	65 7.3	22056	21059	6555	47560	52425
Annual change:	0 -2.4	0 -1.7	-2.9	1.8	-15.6	-66.2	-61.3

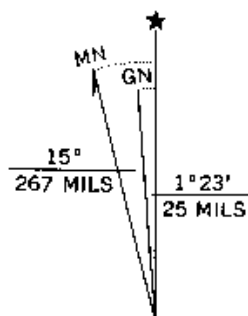
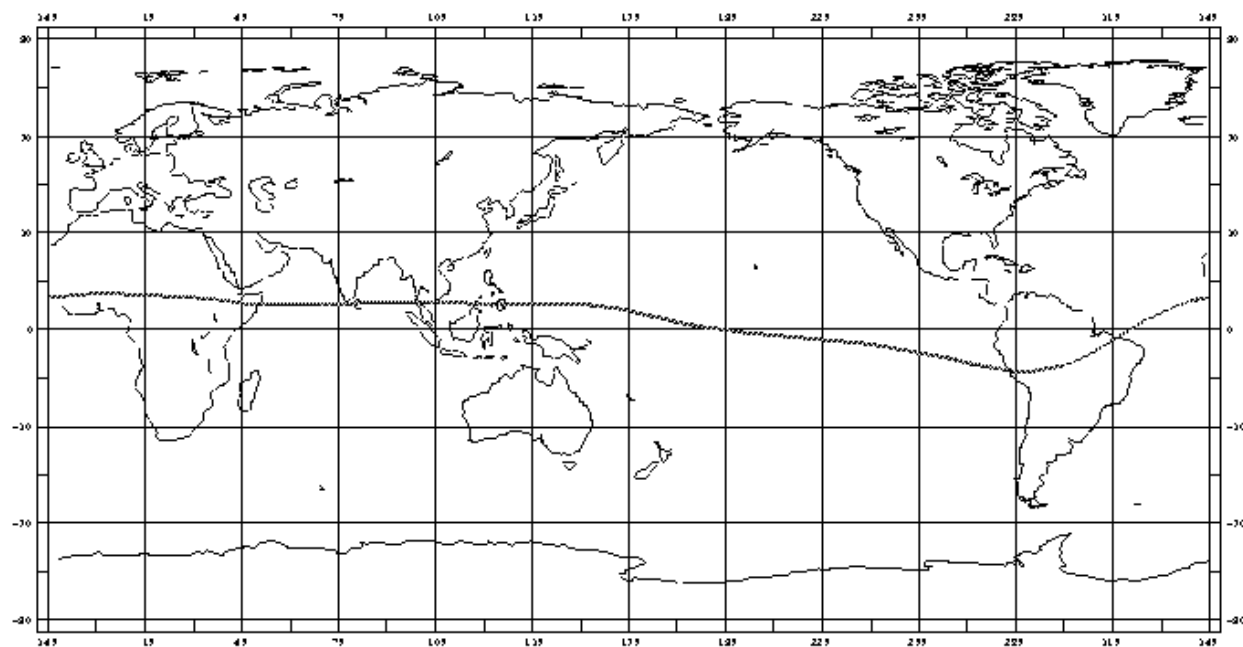
The calculated declination would be 17 degrees and 17.5 minutes for Grants Pass, Oregon.

The declination in the example above is listed as 17 degrees and 17.5 minutes. Expressed in degrees, this would be 17.3 degrees. As shown in Figure #1, the declination for Oregon is east, so True North for this site is  $360 - 17.3$ , or 342.7 degrees. The annual change is  $-2.4$  minutes. In this case, a value 343 degrees would probably be sufficient for most measurement accuracy.

An alternate internet site at URL address

<http://swdcwww.kugi.kyoto-u.ac.jp/iqrf/point/index.html>

provides a map of the world and you can move the mouse pointer to any position and select with the left mouse button. It will then calculate the magnetic declination for the selected point on the map (shown below)



UTM GRID AND 1971 MAGNETIC NORTH  
DECLINATION AT CENTER OF SHEET

An alternative method is to find a USGS map and examine the text at the bottom center of the map. At this point either a written indication is given, or a symbol similar to the one seen below will be found. This would indicate a declination of 15 degrees West-showing MN (magnetic North) to True North (Star). Other sources such as the local airport can be helpful in determining the correct declination.

## Adjustment

Orientation of the wind direction sensor is done after the location of True North has been determined. True North is usually found by reading a magnetic compass and applying the correction for magnetic declination, where magnetic declination is the number of degrees between True North and Magnetic North. Magnetic declination for a specific site can be obtained from a USGS topographic map, pilots maps, local airport, or through a computer service offered by the USGS called GEOMAG.

The following map showing magnetic declination for the contiguous United States can be used to determine the approximate declination of your site. Whether this is sufficient will depend upon the accuracy requirement of your installation. You may choose to use a more accurate method of determining your declination from magnetic North, such as one of the resources found later in this section.

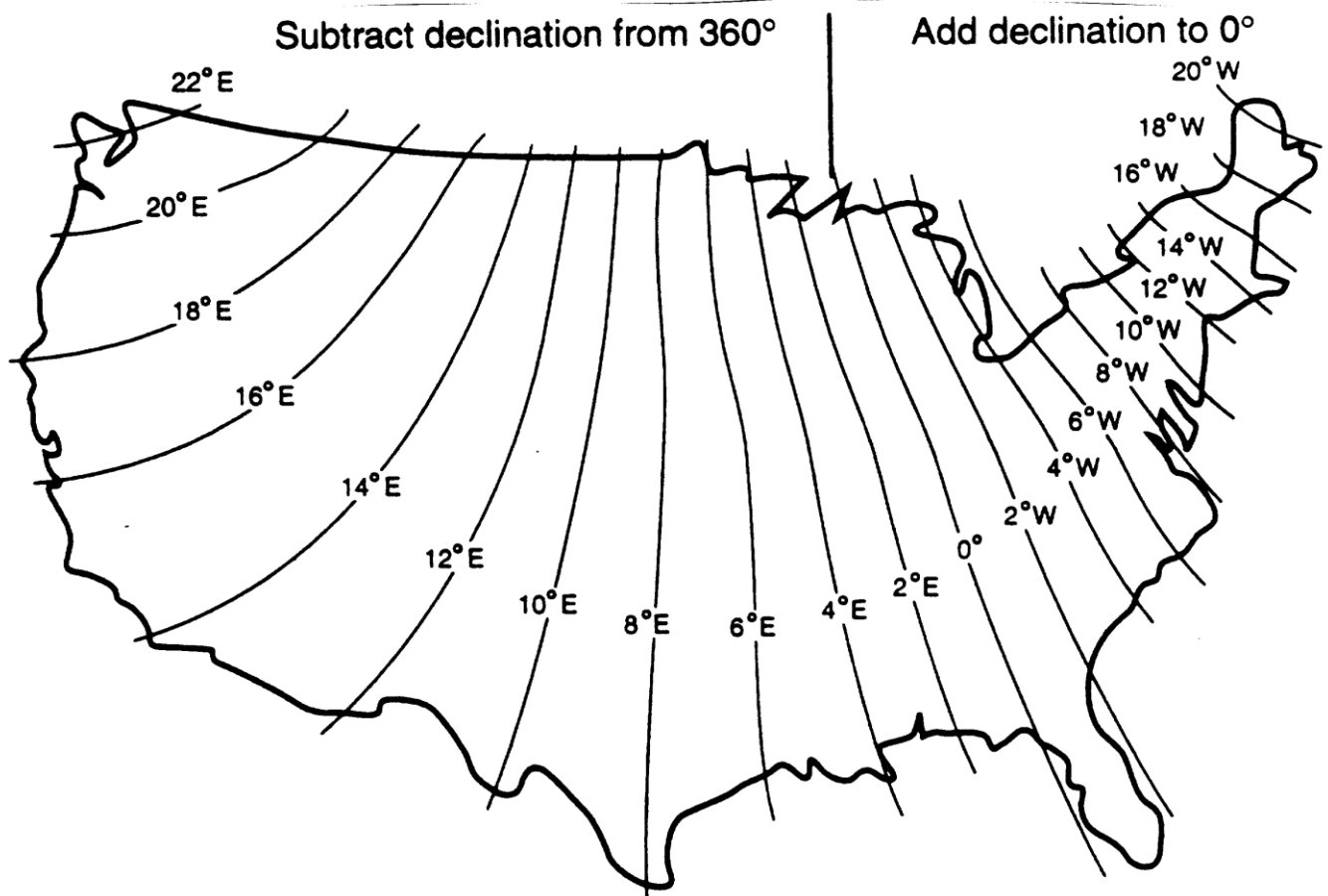


Figure #1 Typical declination values in the USA

Declination angles east of True North are considered negative, and are subtracted from 0 or (360) degrees to get True North as shown in figure #1. Declination angles west of True North are considered positive, and are added to 0 degrees to get True North as shown in figure #1. For example, the declination for Grants Pass, Oregon is 17° East. True North is  $360^{\circ} - 17^{\circ}$ , or  $343^{\circ}$  as read on a compass.

## **Alignment to North**

Orientation is most easily done with two people, one to aim and adjust the sensor, while the other observes the wind direction display. (Once True North is located, the South reference can be determined)

### **1. Establish a reference point on the horizon for True North.**

Sighting down the instrument centerline, aim the two arms of the North/South pair at True North with the locking set screw pointed south.

### **2. Align the sensor adapter or adapter mount.**

Loosen the setscrews that secure the base of the sensor to the cross arm. While viewing the position/rotation of the North/South sensor arms, slowly rotate the sensor base until the two arms point to True North that was determined by earlier measurement using compass.

Other methods employ observations using the North Star or the sun, and are discussed in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV Meteorological Measurements.

## 10.7. Appendix G – AutoMet Data logger Multiplier & Offset Examples

Measure	Sensor	Units	Range	Mult	Offset	FS Volt	S/V
WS *	010	mph	0 to 100	11.178	0.6	2.5	S
		m/s	0 to 44.704	25.015	0.27	2.5	S
WS *	014A	mph	0 to 100	0.5589	1.0	2.5	S
		m/s	0 to 44.704	1.26288	0.45	2.5	S
WS *	014mini	m/s	0 to 50	1.21065	.49	2.5	S
WS *	034B	mph	0 to 100	0.5596	0.63	2.5	S
		m/s	0 to 44.704	1.2517	0.28	2.5	S
WS *	F460 lexan	mph	0 to 125	9.511	0.3	2.5	S
	F460 HD (Al)	mph	0 to 125	9.511	0.5	2.5	S
WS *	WM-III lexan	mph	0 to 165	6.95	.3	2.5	S
	WM-III HD (Al)	mph	0 to 165	6.95	.5	2.5	S
Sigma	Any	Deg	0 to 120	120	0		S
				<b>Mult</b>		<b>Prec</b>	
RN**	0.01"	inHg	0.01 in/tip	0.01		2	
	0.01"	mm	.254 mm/tip	0.254		2	
	0.1mm	mm	0.1 mm/tip	0.10		1	
	0.5mm	mm	0.5 mm/tip	0.50		1	

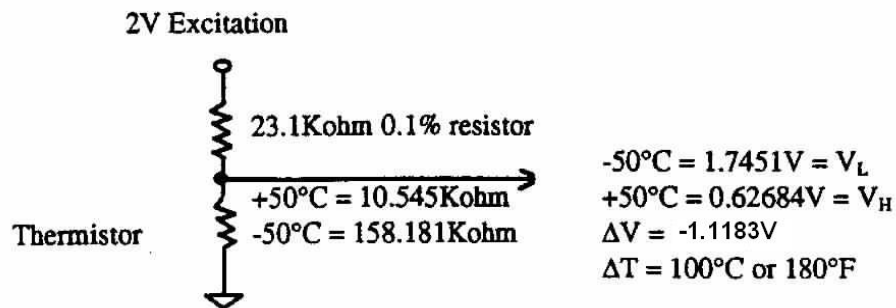
\* Use Counter inputs and Counter Mode for these sensors

\*\* Use Rain inputs and Rain mode for Rain sensors.

## AutoMet Data logger Max Engr & Min Engr Examples

Measure	Sensor	Units	Range	Max Engr	Min Engr	FS Volt	S/V
WS	591	mph	0 to 100	100	0	1.0	S
		m/s	0 to 44.704	44.70	0	1.0	S
WD	024/034B	Deg	0 to 360	360	0	2.5	V
WD	020C	Deg	0 to 360	360	0	2.5	V
WD	590	Deg	0 to 360	360	0	1.0	V
AT	592	F	-22 to +122	122	-22	1.0	S
		C	-30 to +50	50	-30	1.0	S
AT	083E	F	-58 to +122	-99	222.8	2.0	S
		C	-50 to +50	-72.8	106	2.0	S
RH	083E	%	0 to 100	100	0	1.0	S
RH	593	%	0 to 100	100	0	1.0	S
SR	595	Ly/min	0 to 2	2	0	1.0	S
		W/m2	0 to 2000	2000	0	1.0	S
BP	092/594	inHg	26 to 32	32	26	1.0	S
		mmHg	660.4 to 812.8	812.8	660.40	1.0	S
		mbar	880.5 to 1083.7	1083.65	880.46		S

### 10.8. Appendix H – Calculation of Max Engr and Min Engr for AT Measurements (For both AutoMet and Air Plus 5 Software)



$$V_L = 2 \text{ Volts} * (R_L / (R_L + 23.1K))$$

$$V_H = 2 \text{ Volts} * (R_H / (R_H + 23.1K))$$

$$\text{Min Engr} = T_H - V_H * \Delta T / \Delta V. \text{ Example: } 50^\circ C - 0.62684V * 100 / (-1.1183) = 106$$

$$\text{Max Engr} = 2 \text{ Volts} * \Delta T / \Delta V + \text{Min Eng. Example: } 2 * 100 / (-1.1183) + 106 = -72.8$$

## 10.9. Appendix I – USB Driver Installation Instructions

Products by Met One Instruments equipped with USB ports use hardware created by Silicon Laboratories. These USB ports emulate RS-232 serial ports only (Virtual COM port). They do not support FLASH memory drives of any type.

The CD-ROM labeled *Met One Instruments USB Serial Ports* contains the USB serial port drivers. Follow these instructions to install the USB serial port drivers.

The CD-ROM is configured to AutoPlay. If successful the following screen should appear. If it does not appear then right-click on the CD Drive device and select AutoPlay.



Click **USB Instructions** to view these instructions.

Click **USB Drivers** to run **CP210x\_VCP\_Win2K\_XP\_S2K3.exe** and then follow the instructions below.

**WARNING**—Do not connect the USB cable between the host computer and the Met One product until instructed to do so.