AutoMet^â 466A
Data Logger

Operation Manual

Document No. 466A-9800

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AUTOMET DATA LOGGER

<div align="center">

OPERATION MANUAL
</div>

1.0   GENERAL INFORMATION

1.1   INTRODUCTION

The Model 466A AutoMet is a complete display data logger designed to accept a variety of standard Met One Sensors or AutoMet Sensors. Measurements can include wind speed, wind direction, air temperature, relative humidity, rainfall, solar radiation, and barometric pressure.

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 an AC adapter or optional battery.

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 added at a later date without any special wiring using select standard of the AutoMet sensors.

1.3   SPECIFICATIONS

Inputs	2 counter inputs \ max of 8 channels
	8 analog channels / 1 count & 7 analog
	1 rain gauge channel
	1 ADA Automatic Direction Alignment (RS-232)
	1 Sigma calculation
Data Storage	200+ days when recording hourly averages
Power Requirement	12VDC ± 10%
	50 mA or less (display off): 125mA (display on)
Power Source	120VAC or 220VAC to 12VDC power module (std)
	Solar panel array and battery (opt)
	Battery and AC powered charger (opt)
Outputs	RS-232 for computer or modem
	RS-232 for printer or computer
	2 Alarm channels with N.O. relay contacts
	(Max. power 24 VDC at 20 mA)

2.0 INSTALLATION

2.1   SITING

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

2.2   MOUNTING

Mount the data logger to the tripod using the mounting "V" clamps as shown in the figure 2-1 below. Do not over tighten the clamp. This could cause damage to the tripod mast and make extension of it difficult. Optional mounting for larger towers or masts is shown in lower section of the figure.
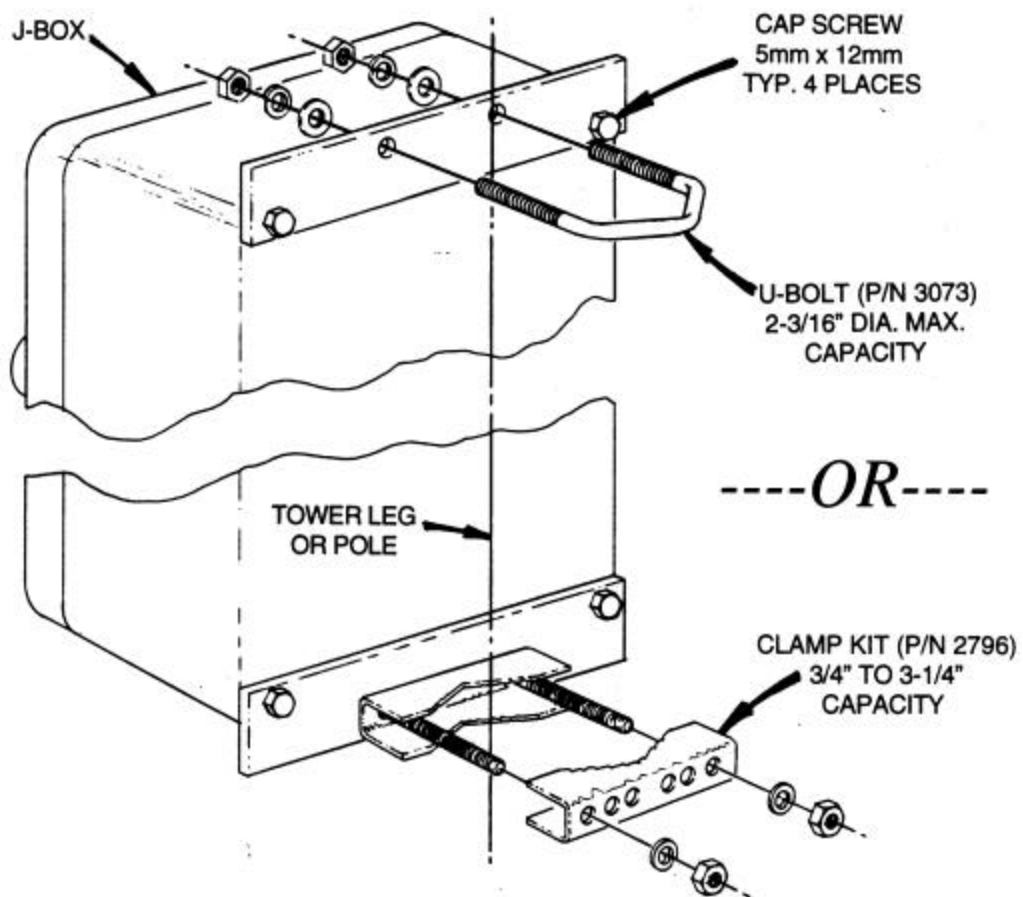
J-BOX MOUNTING OPTIONS
FIGURE 2-1

2.3   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.)

2.4   SENSORS
        Once wired, the seal clamp can be tightened around the cable bundle. Insert the sensor cables into
        the data logger as shown in figure 2-2. Connect the wires as shown in the System Interconnect
        Diagram. Finally tug lightly on cable to be sure they are clamped and the seal is in place.

        Clamp the wires by first tightening the internal clamp screws and then by tightening the external
        clamp screws.

2.5   POWER
        Plug 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 Carlon
        Model E9UDVG should be used, on the AC outlet box.
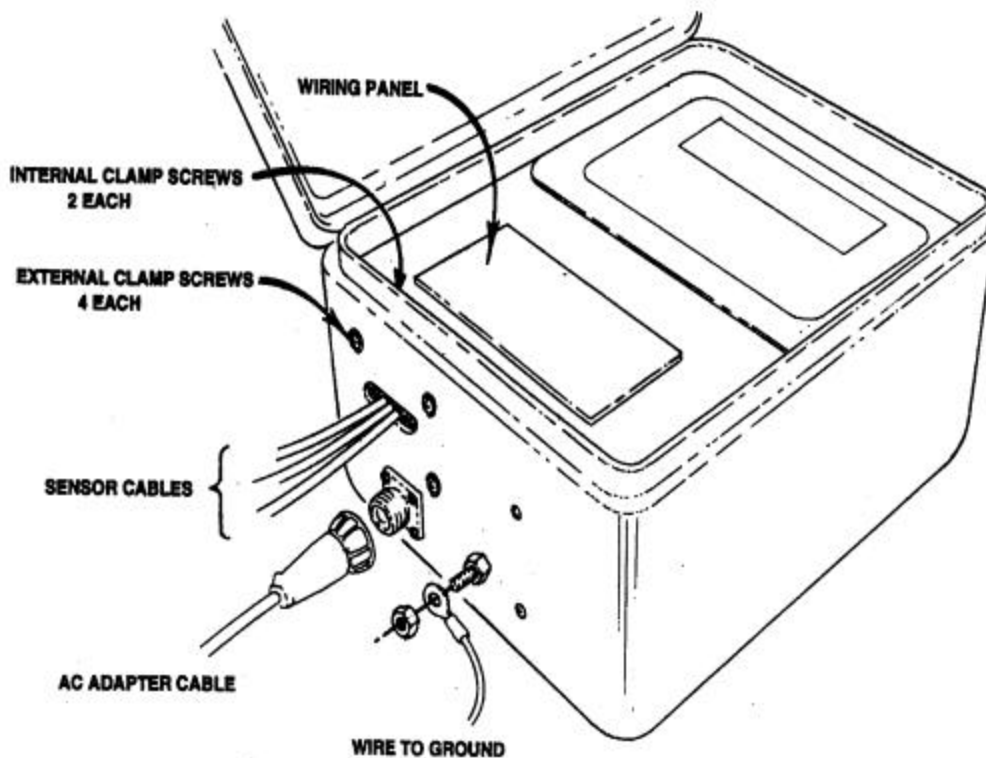
CABLE ROUTING
FIGURE 2-2

2.6   RS232

Connect the RS-232 (P/N 2443) cable between the AutoMet and the host computer 9 pin RS-232 port. One connector is marked "logger" and the other end is marked "PC", be sure they are connected to the correct ends. If the computer has a 25-pin connector, then use the 9 to 25 pin Port Adapter supplied.

Note: The AutoMet RS-232 port is set up to communicate at 9600 Baud, no parity, 8 bit, one stop (9600 N 8 1). Using the BAUD Rate Selection Menu (see section 4.10) the port can be configured for, 300, 600, 1200, 2400, 4800 or 9600 BAUD.

NOTE: See section 7 for additional information.

WARNING!

Do not confuse the computer parallel printer port or 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 owners' manual, or check with your computer dealer before making any connections.

2.7   MODEM OPTION

With the dial-up modem option, connect the RJ11 phone cable from the phone line to the   AutoMet modem surge protection module. Be sure the modem protector and AutoMet ground are connected to a GOOD earth ground.

2.8   PRINTER OPTION

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 data logger can be set to either print 24-hour summaries or print all averages and totals.

Note: The AutoMet printer port will only communicate at 1200 Baud, no parity, 8 bit, one stop (1200 N 8 1).

Connect Printer Cable (P/N 2979) to serial printer, or use optional AX-902 parallel printer adapter cable for use on parallel port printers.

3.0 OPERATION

3.1   FRONT PANEL OPERATION

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

To activate the display, press any key on the keyboard.

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

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 then contact Customer Service for assistance.

Continue to set the rest of the functions using the display. Verify that you are collecting data using the "OPERATE" hot key.

A.   Press "OPERATE"
B.   Press "INST"
C.   Verify displayed data is representative of actual conditions.
D.   Press "EXIT"
E.   Data will be recorded automatically, refer to section 7.0 RS232 COMMUNICATIONS to retrieve data.

3.2   DISPLAY POWER AND MAIN MENU

Pressing any key on the AutoMet keyboard activates the display. All AutoMet functions continue, whether or not the display is operating. Turning off the power to the display also puts the AutoMet into "sleep" mode, conserving power. (The display will turn off automatically after the timeout period - selectable as 1, 5, or 10 minutes).

When the AutoMet is first powered up, it will display the top menu. This is your indication that the system is ready for you to act further. The menu displays the date, time, firmware version, amount of memory left in days, the current alarm conditions, the F1 shortcut key, and four "Hot-Keys" 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.

The hot-keys allow the operator to select menus for setup, operation, and testing of the AutoMet. Each menu will have a keyword displayed above the hot key, identifying its function. Each menu will have an "EXIT" hot key, which will return the AutoMet to the main menu.

```
┌──────────────────────────────────────────────────┐
│                                                    │
│  10/25/98            > AUTOMET <            10:05  │
│      Ver 4.00                  UNIT ID: 01         │
│          Memory Left:   210 Day(s)                 │
│          ALARM1: 01 WS  1.3  MPH  OFF              │
│          ALARM2: 02 WD  179  DEG  OFF              │
│              F1 = Current Conditions               │
│      SETUP          OPERATE     TEST     LCD OFF   │
│                                                    │
└──────────────────────────────────────────────────┘
```
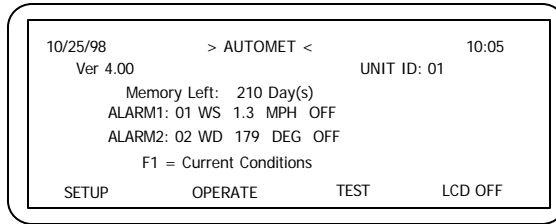
Typical Top Menu Screen

NOTE: The left and right arrow keys move the cursor through the various data entry points in the sub-menus. Use the up and down arrows to increment or decrement the numeric value or selections made within a field. Modifications made within a menu are not saved unless the SAVE hot-key is pressed. A screen indicator is displayed when the modifications are saved.

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:

```
┌──────────────────────────────────────────────────┐
│                                                    │
│                                                    │
│                  ENTER PASSWORD:                   │
│                       * * * *                      │
│                                                    │
│      BACKSPACE                          EXIT       │
│                                                    │
└──────────────────────────────────────────────────┘
```

 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.

3.3   SETUP MENU

The SETUP menu is used by the operator to install the AutoMet at a new site or modify existing settings (Password required). Options include setting the date, time, average period, station identification, alarms, counter, ADA, sigma, reports, and password. Provisions for erasing the data logger memory is also provided.

The hot-key options are:

```
┌──────────────────────────────────────────────────┐
│                                          SETUP    │
│  BASIC        SENSOR      ALARMS        REPORTS   │
│  ADA          SIGMA       PASSWORD      COUNTER   │
│  RESET        BAUD                                │
│                                                    │
│                                                    │
│  SELECT                                 EXIT       │
│                                                    │
└──────────────────────────────────────────────────┘
```
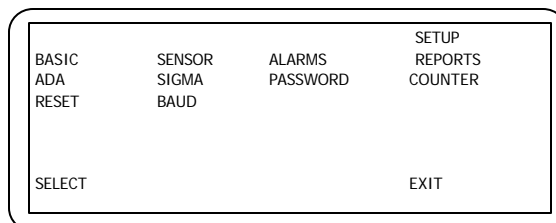
*Note: Refer to Section 4.0 (set up menu)

3.4   OPERATE MENU

The OPERATE menu gives access to the current conditions, as well as providing a means of selecting data for printing reports. Since the AUTOMET setups cannot be altered within this menu, no password is required.

The hot-key options are:

```
                                        OPERATE




  XFER MOD
  PRINTER        INST        AVERAGE          EXIT
```
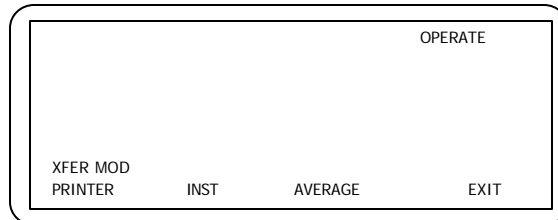
   Note: Refer to section 5.0 (operate menu) of this manual

3.5   TEST MENU

The TEST menu gives access to the diagnostics and sensor calibration tests menu. (Password required). 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.

   Note: Refer to section 6.0 (test menu) of this manual

3.6   OTHER CONTROLS

   A.   DISPLAY CONTRAST

           To enhance viewing of the LCD display, the contrast may be adjusted. The Contrast Control is located on the sensor wiring panel inside door of the unit. A small (#0) slotted screwdriver is required to change the contrast adjustment.

4.0   SETUP MENU

The SETUP menu is used by the operator to install the AutoMet at a new site or modify existing settings (Password required). Options include setting the date, time, average period, station identification, and alarms. Provisions for erasing the data logger memory is also provided.

The hot-key options are:

```
┌─────────────────────────────────────────────┐
│                              SETUP            │
│   BASIC      SENSOR      ALARMS     REPORTS   │
│   ADA        SIGMA       PASSWORD   COUNTER   │
│   RESET      BAUD                             │
│                                               │
│                                               │
│   SELECT                            EXIT      │
└─────────────────────────────────────────────┘
```

4.1   BASIC

The BASIC sub-menu allows the operator to select the AutoMet date, time, average period, station identification number.

Set the date and time to today's date and time. The station number 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. The average period is selectable as 1,5,15 or 60-minute intervals.

```
┌─────────────────────────────────────────────┐
│              SETUP DATE/TIME/ID/AVG           │
│                                               │
│      DATE        TIME      STATION NUMBER     │
│    01/01/90      01:00          01            │
│       AVERAGING PERIOD - 10 MINUTE(S)         │
│                                               │
│   SAVE                            EXIT        │
└─────────────────────────────────────────────┘
```

Pressing SAVE will permanently update the AutoMet setups:

```
┌─────────────────────────────────────────────┐
│  ┌────────────┐  SETUP DATE/TIME/ID/AVG       │
│  │CHANGES SAVED│                              │
│  └────────────┘                               │
│      DATE        TIME      STATION NUMBER     │
│    01/01/90      01:00          01            │
│       AVERAGING PERIOD - 10 MINUTE(S)         │
│                                               │
│   SAVE                            EXIT        │
└─────────────────────────────────────────────┘
```

Note: While it is only necessary to enter the last two digits of the year, the AutoMet is Year 2000 compliant, and recognizes correct year / leap year information until the year 2050. 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.

4.2   SENSOR

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

New sensors added on must be set up before data can be acquired. To set up a sensor, select the SETUP hot key on the top menu of the LCD. A second screen will be displayed, allowing selection of the setup mode. Press the SENSOR hot key.

The sensor setup screen will be displayed, allowing setup of the MET sensors:

```
┌─────────────────────────────────────────────────┐
│  ┌──────────────────┐                             │
│  │ CHANGES SAVED    │        SETUP CHAN PARAMS     │
│  └──────────────────┘                             │
│  CH ID   TYPE  UNIT PREC MULT  OFFSET              │
│  03 002  WS    MPH   1  +100.0 +000.0              │
│                    SENSOR FS VOLT: +1.000          │
│  INV SLOPE:N VECT/SCALAR:S MODE:AUTO ID            │
│                                                    │
│  SAVE                     ID MODE        EXIT      │
└─────────────────────────────────────────────────┘
```

NOTE: Factory setups for Met Sensors will be lost by changing from manual to exit Auto ID.

Channels are selected by using the up and down cursor keys in the CH. The keys function as follows:

ID Modes:
MANUAL: Manual Entry - Operator can define the sensors manually.
Auto ID: Use A10 auto ID method - Met One auto ID sensors (500 series) can be used.
Count 1: Counter inputs - For use with pulse input instruments such as 014A.
Count 2: Counter inputs - same as count 1.

Prec Field:
Sets the decimal place for Multiplier, Offset, and parameter displays.

VECT/SCALAR
Use vector for wind direction sensors, scalar for others

INV/SLOPE
Use inverse slope for thermistor temperature sensors with resistance outputs only.

METRIC/ENGLISH
Toggles the engineering units from English to Metric Units. This key only functions in the Auto ID mode, and the 500 series sensors are used.
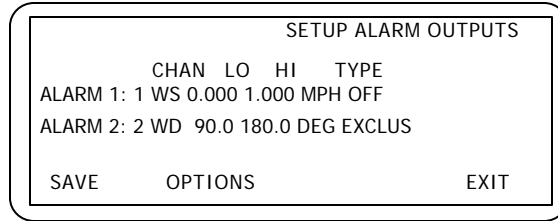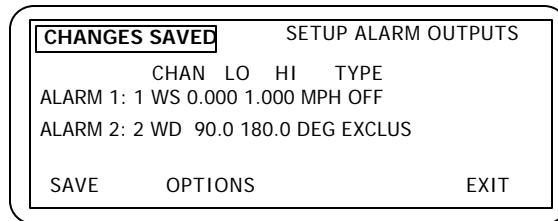
F1 thru F6
Field index shortcut keys

4.3   ALARMS

Alarms can be set to monitor any of the analog input channels. The alarm screen enables the operator to select the analog input to alarm on, LO and HI alarm points, and the type of alarm. The analog input is selected by moving the cursor to the 1:XX or 2:XX position and using the up/down arrow keys to select the analog input channel number.

```
 _____
|                                        |
|             SETUP ALARM OUTPUTS         |
|                                         |
|          CHAN  LO   HI    TYPE          |
|  ALARM 1: 1 WS 0.000 1.000 MPH OFF      |
|                                         |
|  ALARM 2: 2 WD  90.0 180.0 DEG EXCLUS   |
|                                         |
|                                         |
|    SAVE       OPTIONS            EXIT    |
|_____ |
```

The alarm types are:

Type		Alarm Condition
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)

Pressing SAVE will permanently update the AutoMet alarm setups:

```
 _____
|                                        |
| [CHANGES SAVED]    SETUP ALARM OUTPUTS  |
|                                         |
|           CHAN  LO   HI    TYPE         |
|  ALARM 1: 1 WS 0.000 1.000 MPH OFF      |
|                                         |
|  ALARM 2: 2 WD  90.0 180.0 DEG EXCLUS   |
|                                         |
|                                         |
|    SAVE       OPTIONS            EXIT    |
|_____ |
```

4.3.1   OPTIONS

Pressing the "OPTIONS" hot key in the "SETUP ALARM OUTPUTS" screen will display a second screen showing the alarm options. Four fields provide optional time-out and start delay of the alarms. These can be applied to either or both of the alarms.

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 time-out 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:  ALARM 1 ACTIVE
 RESET ELAPSED TIME:  MANUAL
 ALARM TIMEOUT VALUE: 001 MINUTE(S)
 ALARM ACTIVE DELAY:  05 SECOND(S)

 SAVE                           EXIT
```
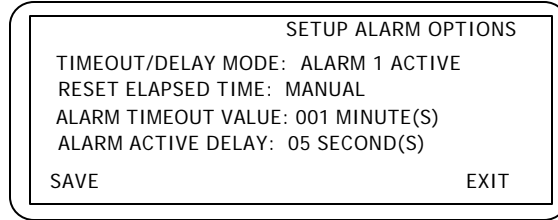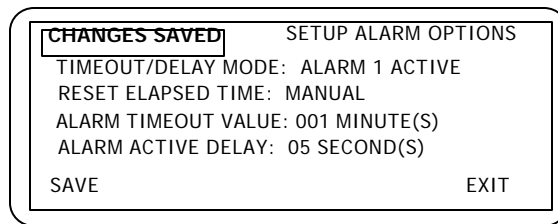
The "Timeout/Delay" modes are:

Type	Alarm Condition
NO TIMEOUT/DELAY	Both Alarms function normal
ALARM 1 ACTIVE	Alarm 1 will have time-out and delay, Alarm 2 functions normally
ALARM 2 ACTIVE	Alarm 2 will have time-out and delay, Alarm 1 functions normally
ALARM 1 & 2 ACTIVE	Alarm 1 and 2 will have time-out and delay

The "Reset Elapsed Time" modes are:

Type	Alarm Condition
MANUAL	Alarm will store total time of alarm conditions. When the MAX time (Alarm Time Out Value) is reached alarm will time out and will have to be Reset by pressing the F2 Key
AUTOMATIC	Alarm will reset when the alarm condition stops.

Pressing SAVE will permanently update the AutoMet option setups:

```
 CHANGES SAVED     SETUP ALARM OPTIONS
 TIMEOUT/DELAY MODE:  ALARM 1 ACTIVE
 RESET ELAPSED TIME:  MANUAL
 ALARM TIMEOUT VALUE: 001 MINUTE(S)
 ALARM ACTIVE DELAY:  05 SECOND(S)

 SAVE                           EXIT
```
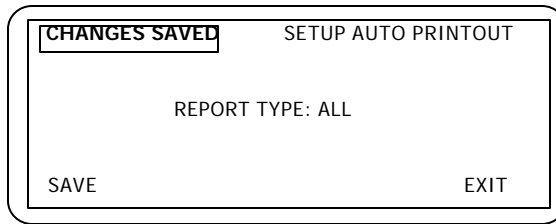
4.4   REPORTS

The REPORT sub-menu sets the type of Automatic-Printouts. The selections are:

OFF	No Auto-Prints are done
TOTALS	Only the 24 hour average and total are Auto Printed.
ALL	All averages and 24-hour totals are Auto-Printed

```
                              SETUP AUTO PRINTOUT


                          REPORT TYPE: ALL


          SAVE                                    EXIT
```
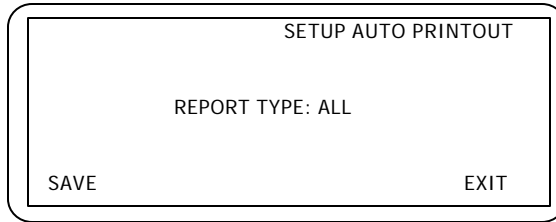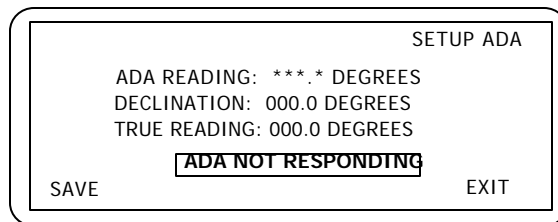
Pressing SAVE will store the new AutoMet setups in non-volatile memory:

```
  CHANGES SAVED        SETUP AUTO PRINTOUT


                          REPORT TYPE: ALL


          SAVE                                    EXIT
```

4.5   ADA (AUTOMATIC DIRECTION ALIGNMENT)

This menu selection lets the operator adjust the magnetic deviation of the wind direction readings. Adjustment can be entered manually, or read automatically with an optional Automatic Direction Alignment (ADA) unit attaches to the wind direction sensor.   If the ADA unit is not present, then the screen will display "ADA NOT RESPONDING".

```
                                      SETUP ADA
            ADA READING:  ***.* DEGREES
            DECLINATION:  000.0 DEGREES
            TRUE READING: 000.0 DEGREES
                   ADA NOT RESPONDING
          SAVE                            EXIT
```

Enter the manual declination, then press SAVE to activate the change.

```
  CHANGES SAVED              SETUP ADA
            ADA READING:  ***.* DEGREES
            DECLINATION:  000.0 DEGREES
            TRUE READING: 000.0 DEGREES
                   ADA NOT RESPONDING
          SAVE                            EXIT
```
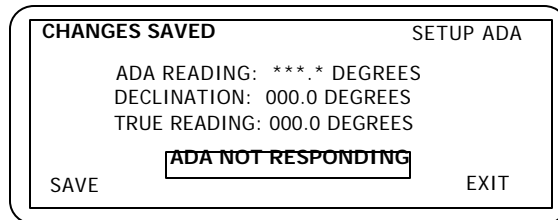
See appendix E for more information on determining the correct declination settings that should be used with the ADA unit. Once determined, enter the declination value, using − values for East values and + values for West values using the declination value as follows:
            If, for example, declination is 19 degrees East, enter -19.
      If declination is 8 degrees West, enter +8.

4.6   SIGMA

The Sigma setup screen allows the operator to select the channel to be used for Sigma calculations.

```
┌─────────────────────────────────────────────┐
│ ┌──────────────┐                             │
│ │ CHANGES SAVED │              SETUP SIGMA    │
│ └──────────────┘                             │
│                                              │
│  CHAN  UNITS  SIGMA MULT  SIGMA OFFSET        │
│                                              │
│  02 WD DEG    120.0 DEG    0.0 DEG            │
│                                              │
│                                              │
│   SAVE                              EXIT     │
└─────────────────────────────────────────────┘
```

Use the Up/Down arrows to select the correct channel, then press the SAVE hot-key to save the selection.

Note: The scaling of the Sigma calculation is fixed within the AutoMet

4.7   PASSWORD/TIME OUT

The timeout 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 after 1, 5, or 10 minutes.

.

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

```
┌─────────────────────────────────────────────┐
│                  SETUP TIMEOUT PASSWORD       │
│                                              │
│       TIMEOUT PERIOD: 60 MINUTES(S)           │
│            PASSWORD SEQUENCE                  │
│               F1 F2 F3 F4                     │
│   SAVE                              EXIT     │
└─────────────────────────────────────────────┘
```
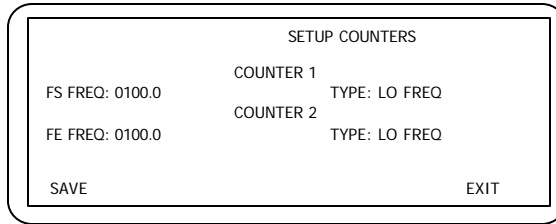
Pressing SAVE will permanently update the AutoMet setups:

4.8   COUNTER

The Counter sub-menu allows the user to set the Full Scale Frequency value and the Frequency type.

```
                          SETUP COUNTERS

                        COUNTER 1
  FS FREQ: 0100.0                          TYPE: LO FREQ
                        COUNTER 2
  FE FREQ: 0100.0                          TYPE: LO FREQ


  SAVE                                     EXIT
```
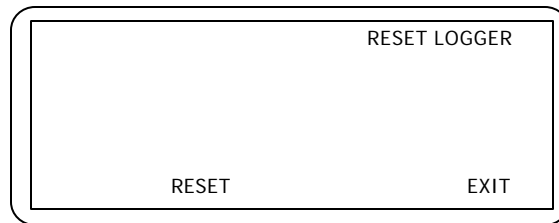
A.   F.S. FREQ

Change FS FREQ to match the sensor input Full Scale Frequency.
(See Appendix F)
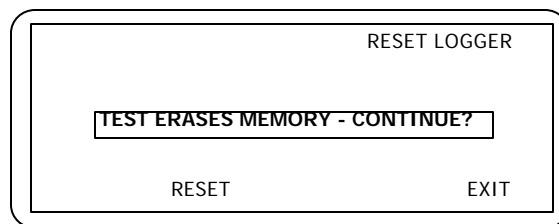
B.   TYPE

Set type to Low FREQ for sensors with low frequency inputs, I.E., 014A, 013, or
034A. Set TYPE to HI FREQ for sensors with high frequency inputs, I.E.,
010C,   1564, or WS-201.

4.9   RESET

```
                                    RESET LOGGER




  RESET                              EXIT
```

Reset logger is a destructive menu selection. **(All data in the AutoMet data logger will
be erased.)** Then selected, the operator will be prompted with a second screen:

```
                                    RESET LOGGER

  TEST ERASES MEMORY - CONTINUE?

  RESET                              EXIT
```

Pushing reset will begin a memory test of the data storage memory:
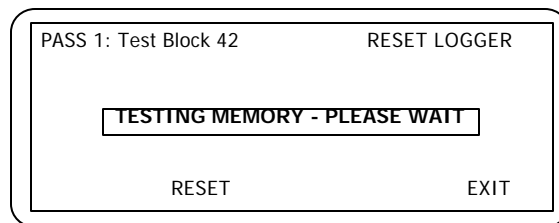
```
  PASS 1: Test Block 42              RESET LOGGER

       TESTING MEMORY - PLEASE WAIT

       RESET                          EXIT
```

All 64 blocks of data memory will be tested. The test requires about 3 minutes to run. An indicator at the top of the LCD screen displays the current memory block being tested. If a failed memory location is located, an error message will display on the LCD screen. At completion of the memory test, the display will show:

```
                                          RESET LOGGER


              RESET COMPLETE



              RESET                            EXIT
```
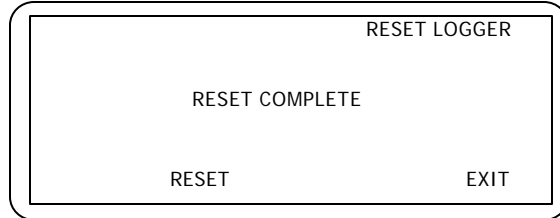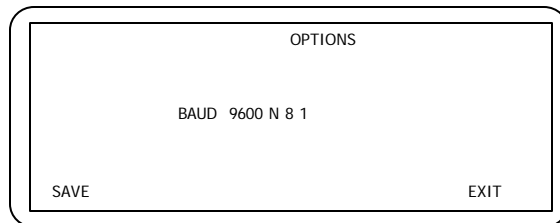
At this point the logger memory is cleared and the AutoMet unit will begin to acquire data.

4.10   BAUD

The baud screen allows modifications to the data logger RS232 transfer rate. Selections are 300, 600, 1200, 2400, 4800, 9600 bps.

```
                                   OPTIONS



                      BAUD  9600 N 8 1



          SAVE                               EXIT
```


5.0   OPERATE MENU

The OPERATE menu gives access to the current conditions, as well as providing a means of selecting data for printing reports. Since the AUTOMET setups cannot be altered within this menu, no password is required.

The hot-key options are:

```
                                              OPERATE





          XFER MOD
          PRINTER       INST       AVERAGE       EXIT
```
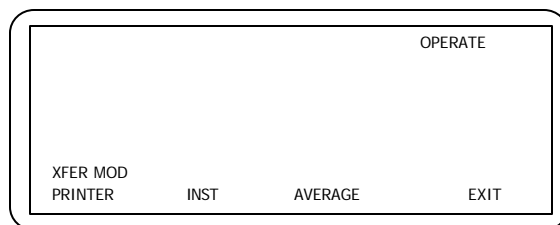

A.   PRINTER

The PRINTER sub-menu allows the operator to select the type of printout desired. The STATION CONFIGURATION is a listing of all the AutoMet settings, checksums, and diagnostic information. PRINT DAILY AVERAGE allows printing of the previous or current

day averages. PRINT SPECIFIC allows the operator to specify a start and end date for the printout.

The hot-key options are:
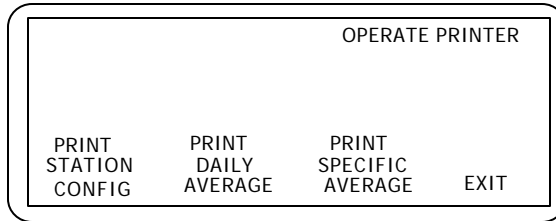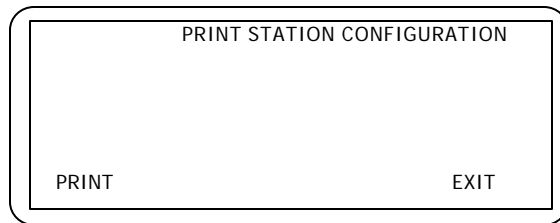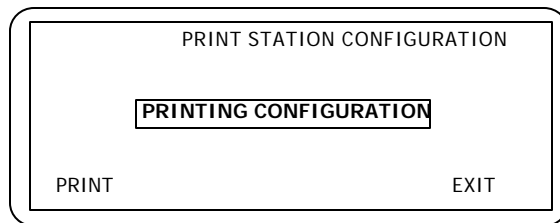
```
┌────────────────────────────────────────────┐
│                             OPERATE PRINTER  │
│                                              │
│                                              │
│     PRINT        PRINT        PRINT          │
│     STATION      DAILY        SPECIFIC       │
│     CONFIG       AVERAGE      AVERAGE    EXIT │
└────────────────────────────────────────────┘
```

B.   PRINT STATION CONFIGS

The station configuration is a listing of all the AutoMet settings, checksums, and diagnostic information.

```
┌────────────────────────────────────────────┐
│            PRINT STATION CONFIGURATION       │
│                                              │
│                                              │
│                                              │
│  PRINT                              EXIT     │
└────────────────────────────────────────────┘
```

During the printout, the LCD screen will display:

```
┌────────────────────────────────────────────┐
│            PRINT STATION CONFIGURATION       │
│                                              │
│         ┌──────────────────────────┐         │
│         │ PRINTING CONFIGURATION   │         │
│         └──────────────────────────┘         │
│  PRINT                              EXIT     │
└────────────────────────────────────────────┘
```

Upon completion, the screen will display:

```
┌────────────────────────────────────────────┐
│            PRINT STATION CONFIGURATION       │
│                                              │
│              PRINTOUT COMPLETE               │
│                                              │
│  PRINT                              EXIT     │
└────────────────────────────────────────────┘
```
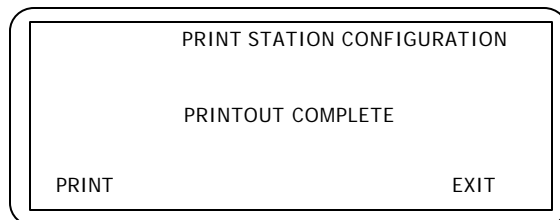
C.   PRINT DAILY AVERAGE
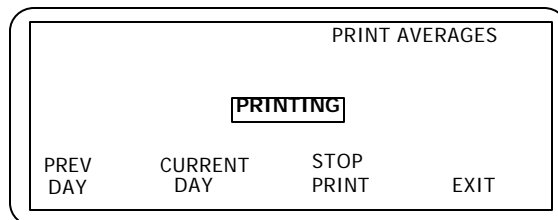
The PRINT DAILY AVERAGE sub-menu allows the operator to print the previous or current day averages.

The hot-key options are:
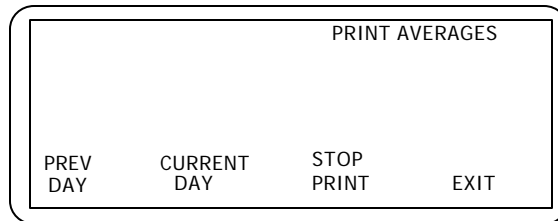
```
┌─────────────────────────────────────┐
│                      PRINT AVERAGES  │
│                                      │
│                                      │
│                                      │
│  PREV        CURRENT     STOP        │
│  DAY         DAY         PRINT    EXIT│
└─────────────────────────────────────┘
```

During the printout, the LCD screen will display:

```
┌─────────────────────────────────────┐
│                      PRINT AVERAGES  │
│                                      │
│              ┌──────────┐            │
│              │ PRINTING │            │
│              └──────────┘            │
│  PREV        CURRENT     STOP        │
│  DAY         DAY         PRINT    EXIT│
└─────────────────────────────────────┘
```
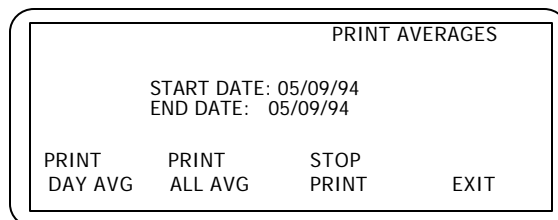
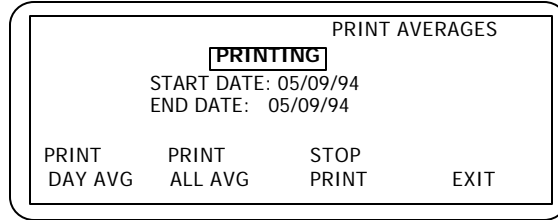Pressing the stop print hot-key will cause the printout operation to stop.

D.   PRINT SPECIFIC AVERAGE

The PRINT SPECIFIC menu allows the operator to print a report of averages on specific dates. Hot-keys provide a selection of printing just the 24 hour average and total, or all averages and totals.

The hot-key options are:

```
┌─────────────────────────────────────┐
│                      PRINT AVERAGES  │
│                                      │
│         START DATE: 05/09/94         │
│         END DATE:   05/09/94         │
│                                      │
│  PRINT       PRINT       STOP        │
│  DAY AVG     ALL AVG     PRINT    EXIT│
└─────────────────────────────────────┘
```

During the printout, the screen will display a printing message:

```
                                    PRINT AVERAGES
                              ┌──────────┐
                              │ PRINTING │
                              └──────────┘
                           START DATE: 05/09/94
                           END DATE:   05/09/94

                    PRINT        PRINT        STOP
                    DAY AVG      ALL AVG      PRINT        EXIT
```

Pressing the stop print hot-key will cause the printout operation to stop.
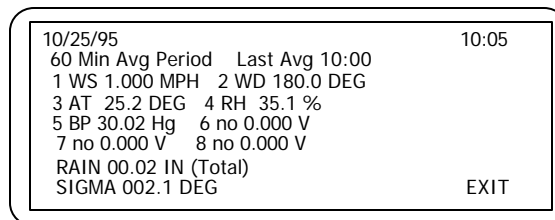
E.   INSTANTANEOUS

The INSTANTANEOUS screen provides a real time display of the 8 analog and rain inputs. The sensor scaling, engineering units, and decimal places is automatically determined by the AutoMet data logger.

```
10/25/95                                        10:05
                     CURRENT CONDITIONS
             1 WS 1.000 MPH   2 WD 180.0 DEG
             3 AT  25.2 DEG   4 RH  35.1 %
             5 BP 30.02 Hg    6 no 0.000 V
             7 no 0.000 V     8 no 0.000 V
             RAIN 00.02 IN (Total)
                                               EXIT
```
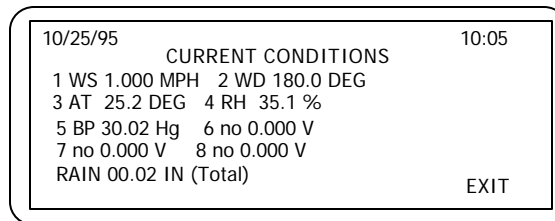
NOTE: This screen can be accessed from the main menu by pressing the F1 key.

F.   AVERAGE

The AVERAGE screen provides the last averages display of the 8 analog and rain inputs. The sensor scaling, engineering units, and decimal places is automatically determined by the AutoMet data logger. (NOTE: The rain total is for the last average period. Rain total will not update during the current average period. This must be viewed in the instantaneous menu)

```
10/25/95                                        10:05
             60 Min Avg Period    Last Avg 10:00
             1 WS 1.000 MPH   2 WD 180.0 DEG
             3 AT  25.2 DEG   4 RH  35.1 %
             5 BP 30.02 Hg    6 no 0.000 V
             7 no 0.000 V     8 no 0.000 V
             RAIN 00.02 IN (Total)
             SIGMA 002.1 DEG                    EXIT
```

NOTE: When power is first applied to the AutoMet, the averages shown will not be valid until the end of the averaging period. If an LCD timeout occurs however, the averages will remain when viewed again.

6.0   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.
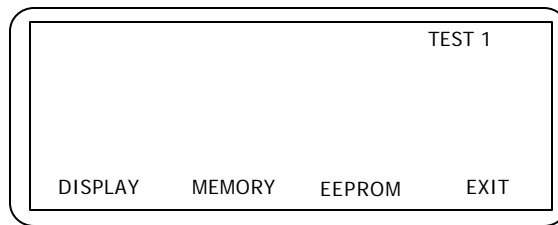
The hot-key options are:

```
                                              TEST




      DIAG       ALARMS      CALIBRATE       EXIT
```
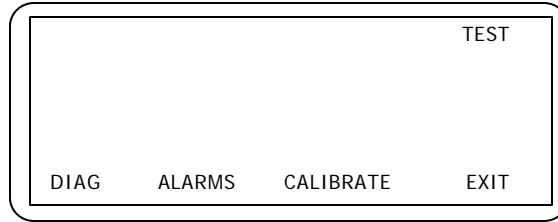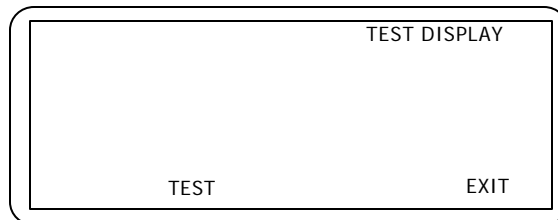
A.   DIAGNOSTIC

The DIAGNOSTIC sub-menu provides a selection of testing the display operation, the data
memory, or testing the checksums of the EEPROM setup memory.
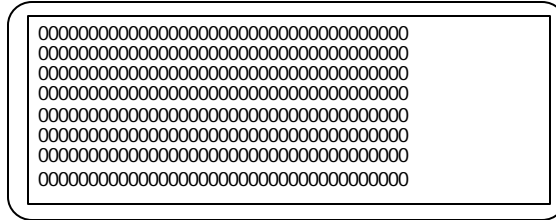
The hot-key options are:

```
                                              TEST 1




      DISPLAY      MEMORY      EEPROM        EXIT
```

B.   DISPLAY

The DISPLAY test will fill the screen with the numbers 0 through 9 in sequence.

```
                                         TEST DISPLAY




         TEST                             EXIT
```
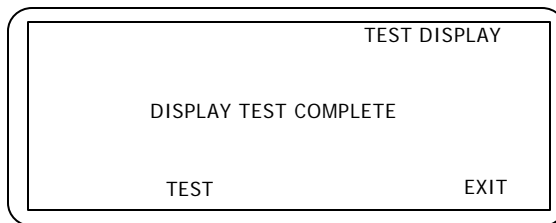
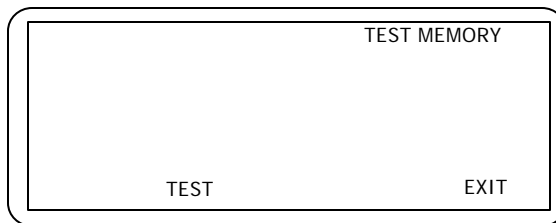The screen should be checked for missing characters, missing lines, or other defects:

```
┌─────────────────────────────────────────────┐
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
│ OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO     │
└─────────────────────────────────────────────┘
```

Sample of first screen

After the display sequences through the numbers and characters, the LCD should display:

```
┌─────────────────────────────────────────────┐
│                                 TEST DISPLAY  │
│                                               │
│         DISPLAY TEST COMPLETE                 │
│                                               │
│         TEST                        EXIT      │
└─────────────────────────────────────────────┘
```

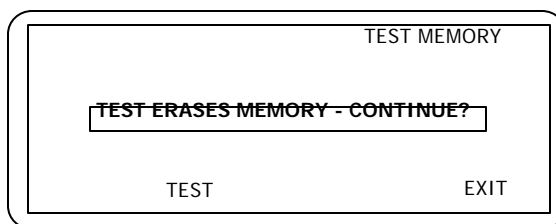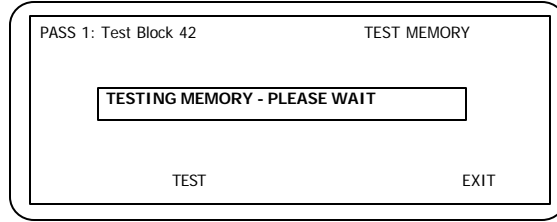C.   MEMORY

TEST MEMORY is a destructive menu selection. All data in the AutoMet data logger will be erased. WARNING: THIS TEST IS DESTRUCTIVE!
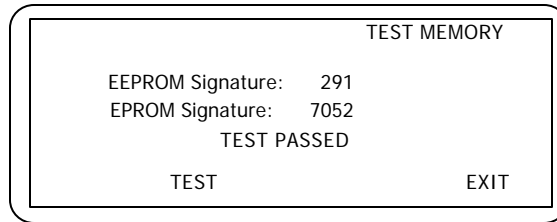
```
┌─────────────────────────────────────────────┐
│                                 TEST MEMORY   │
│                                               │
│                                               │
│                                               │
│         TEST                        EXIT      │
└─────────────────────────────────────────────┘
```

When selected, the operator will be prompted with a second screen:

```
┌─────────────────────────────────────────────┐
│                                 TEST MEMORY   │
│                                               │
│      ┌──────────────────────────────────┐    │
│      │ TEST ERASES MEMORY - CONTINUE?   │    │
│      └──────────────────────────────────┘    │
│         TEST                        EXIT      │
└─────────────────────────────────────────────┘
```

Pushing TEST will begin a memory test of the data storage memory. All 64 blocks of data memory will be tested. The test requires about 3 minutes to run. An indicator at the top of the LCD screen displays the current block of memory being tested. If a failed memory location is located, an error message will be displayed on the LCD screen. At the completion of the memory test, the display will show:
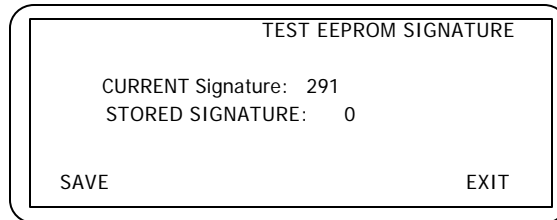
```
┌─────────────────────────────────────────────┐
│  PASS 1: Test Block 42            TEST MEMORY │
│                                               │
│   ┌─────────────────────────────────────┐    │
│   │ TESTING MEMORY - PLEASE WAIT        │    │
│   └─────────────────────────────────────┘    │
│                                               │
│              TEST                    EXIT     │
└─────────────────────────────────────────────┘
```

Upon completion, the signatures of the EPROM firmware and the EEPROM setup memory
is computed and shown:

```
┌─────────────────────────────────────────────┐
│                               TEST MEMORY     │
│                                               │
│      EEPROM Signature:    291                 │
│      EPROM Signature:    7052                 │
│               TEST PASSED                     │
│              TEST                    EXIT     │
└─────────────────────────────────────────────┘
```
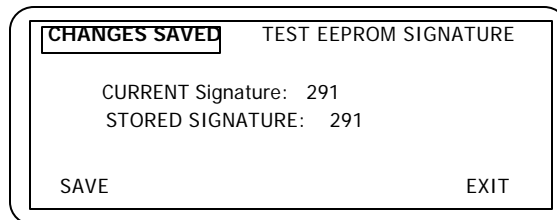
At this point the logger memory is cleared and the AutoMet unit will begin to acquire data.

D.   EEPROM

TEST EEPROM allows the operator to see if the AutoMet setups have been modified or
changed. If no changes were made, then the two numbers shown will be the same.

```
┌─────────────────────────────────────────────┐
│                        TEST EEPROM SIGNATURE  │
│                                               │
│    CURRENT Signature:  291                    │
│     STORED SIGNATURE:    0                    │
│                                               │
│   SAVE                               EXIT     │
└─────────────────────────────────────────────┘
```

If changes were made, the current signature number will be different. To update the stored
number, press SAVE.

```
┌─────────────────────────────────────────────┐
│  ┌──────────────┐                             │
│  │ CHANGES SAVED │   TEST EEPROM SIGNATURE    │
│  └──────────────┘                             │
│      CURRENT Signature:  291                  │
│       STORED SIGNATURE:   291                 │
│                                               │
│   SAVE                               EXIT     │
└─────────────────────────────────────────────┘
```
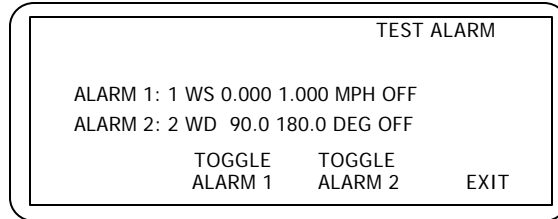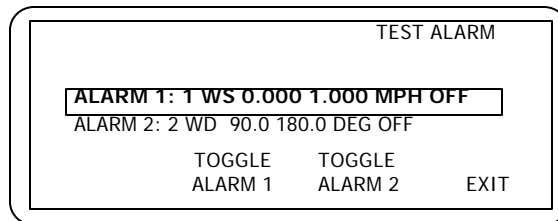
E.   ALARM

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

The hot-key options are:

```
                                      TEST ALARM

     ALARM 1: 1 WS 0.000 1.000 MPH OFF
     ALARM 2: 2 WD  90.0 180.0 DEG 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.

```
                                      TEST ALARM

     ALARM 1: 1 WS 0.000 1.000 MPH OFF
     ALARM 2: 2 WD  90.0 180.0 DEG OFF
                      TOGGLE     TOGGLE
                      ALARM 1    ALARM 2      EXIT
```

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 hot-key.

The hot-key options are:

```
10/25/95   CAL DATA FLAG: OFF 10:05
     Eng Units      Eng Units

  1 WS  24.3 MPH    2 WD 180.0 DEG
  3 AT  25.0 DEG    4 RH  35.1 %
  5 BP 29.99 Hg     6 no 0.000 V
  7 no 0.000 V      8 no 0.000 V
  RAIN 00.02 IN (Total)
          TOGGLE FLG VOLT/ENG   EXIT
```

Menu in Voltage Mode

```
10/25/95      CAL DATA FLAG: OFF      10:05
    VOLTS              VOLTS
 1 WS 0.243 V    2 WD 0.500 V
 3 AT 0.750 V    4 RH 0.351 V
 5 BP 0.499 V    6 no 0.000 V
 7 no 0.000 v    8 no 0.000 V
 RAIN 00.02 IN (Total)
          TOGGLE FLG     VOLT/ENG     EXIT
```

Menu in Engineering Units Mode

Calibration screen displaying current conditions of sensors in engineering or volt units. A Data   flagging option is available by keystroke (Reports generated from the AutoMet unit, or data collected by the AutoMet Report software will indicate a calibration test was performed).

Data reports arrays will be marked with a capital "C" whenever the cal data flag is toggled (Reference Appendix D for a sample report printout).

```
10/25/95       CAL DATA FLAG: OFF       10:05
    Eng Units          Eng Units
 1 WS 1.000 MPH   2 WD 180.0 DEG
 3 AT  25.2 DEG   4 RH  35.1 %
 5 BP 30.02 Hg    6 no 0.000 V
 7 no 0.000 V     8 no 0.000 V
 RAIN 00.02 IN (Total)
          TOGGLE FLG     VOLT/ENG     EXIT
```

7.0   RS232 COMMUNICATIONS

7.1   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 DOSS, WINDOWS, or MAC based terminal communication software to communicate with the AutoMet unit. The menus allow reports to be viewed directly in ASCII form. 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.

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 program (For AutoMet Report Software, use the Logger/Terminal menu). The settings for RS232 communications are:

9600 Baud
8 Bit data
1 Stop bit
No parity

Consult the manual for the terminal software, MICROMET PLUS (or AutoMet Report software) to set and verify these settings.

7.2   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, type 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.

NOTE: When the AutoMet display is "on" and in one of the sub-menus, the front panel RS-232 data port is disabled. Therefore, before attempting to access the data logger from a computer, first power-down the display from the main menu.

7.3   MAIN MENU SYSTEM

The AutoMet unit uses a menu system to communicate through RS232. Display the main menu by typing the "?" question mark, or "H" keys. The following menu should display:

* ?

| |
| > AutoMet <   System Menu |
| |

Select One of the Following:

0 - Auto-print 10 Second Current Conditions
1 - Display Current Day Averages
2 - Display All Averages
3 - Display New Averages
4 - Display System Configuration
5 - Display Date / Time
6 - Display Current Alarm Status
7 - Reserved
8 - Display > AutoMet < Utility Commands
9 - Display Pointers

    Press <Enter> to Exit a Selection

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

7.4   UTILITY MENU

AutoMet also has utility commands for binary data transfers and maintenance. Typing the number 8 key will display a listing of the AutoMet RS232 Utility SUB- command summary:

* 8

 > AutoMet < Utility Commands:

ASCII Commands:

c   - Clear Logger Data Memory (Password required)
d   - Set Date (Password required)
e   - Display Hex EEPROM Setup Values
h,H,? - Display > AutoMet < System Menu
i   - Display ID Values
m   - Display Hex Data Memory Values
p   - Modify Download Pointer
q   - Display Station ID
t   - Set Time (Password required)

BINARY Commands:

b   - XMODEM Download of Data
r   - XMODEM Download of Real Time Values
x   - XMODEM Download of EEprom Values

        See Appendix B for RS232 utility sub- command summary details.

8.0   MAINTENANCE

8.1   DATA BACKUP BATTERY

Replacement of the on board backup battery should be performed once a year. The battery is a coin cell and is equivalent to the following manufacturers part numbers:

Panasonic BR2016
Maxell CR2016
Duracell DL2016

WARNING: Removing the backup battery will erase the data stored in the AutoMet. The date and time will also be lost.

To replace the battery, remove the front panel of the AutoMet unit and locate the battery holder on the PC board. A spring clip holds the battery in. Lift the clip, remove the battery, and replace it with the new battery.

8.2   TROUBLESHOOTING

SYMPTOM	CHECKPOINT	PROBABLE CAUSE	REMEDY
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 D1 – diode shorted	Replace
	Check	Lightning Damage	Return to Factory
LCD Backlight is lit but no display	Wiring Panel	Contrast Adjust	Adjust Contrast
	BATT Connector	Low Power	Repair/Replace Supply
	Front Panel	Bad LCD Display	Replace LCD Assy 2823
		Bad Keyboard	Replace 2960 PC Board
		Bad CPU PC Board	Replace 3230-1 PC Board
ADA Not Working		ADA Cable Wiring	Check

8.3   TECHNICAL SUPPORT

For technical support contact:

> **Customer Service:**
> MET ONE INSTRUMENTS, INC.
> 1600 NW WASHINGTON BLVD
> GRANTS PASS, OR. 97526
>
> TEL: (541)-471-7111
> FAX: (541)-471-7116
>
> e-mail: metone@metone.com
>
> **Regional Sales and Service:**
> MET ONE INSTRUMENTS, INC.
> 3206 Main St., Suite 106
> Rowlett, Texas. 75088
>
> TEL: (972)-412-4715
> FAX: (214)-412-4716

For equipment repairs or calibrations, please contact Met One for a Return
Authorization Number before returning any equipment.

8.4   FACTORY REPAIR AND CALIBRATION

It is recommended that calibration of the AutoMet unit be performed at the factory.

APPENDIX A

RS232 COMMAND SUMMARY

0 - Auto-print 10 Second Current Conditions

This command will automatically display the instantaneous values from all of the sensors.

1 - Display Current Day Averages

Display today's averages only

2 - Display All Averages

Display all the averages stored in the AutoMet unit memory

3 - Display New Averages

Display Averages that were not previously retrieved

4 - Display System Configuration

General information screen providing the AutoMet Unit setup values

5 - Display Date / Time

Current date and time of the AutoMet unit.

6 - Display Current Alarm Status

Displays the current alarm values and status

7 - Reserved

Reserved future command - does nothing

8 - Display > AutoMet < Utility Commands

Sub-Menu for down-loading data and setup of the AutoMet unit

9 - Display Pointers

This is a display of the current status of the data storage memory. The current position, and amount of full memory locations is shown.

APPENDIX B

RS232 UTILITY SUB-COMMANDS SUMMARY

NOTE: The password used in the utility commands is equivalent to the numeric sequence of the function keys used for the password used on the AutoMet unit keyboard (i.e. sequence F1 F2 F3 F4 would be 1234).

c   - Clear Logger Data Memory (Password required)

This is a destructive command. Activation will erase all data stored in the memory. Password is required.

d   - Set Date (Password required)

Set the Date of the AutoMet Unit. The password is required

e   - Display Hex EEPROM Setup Values

Used for diagnostic purposes. Displays the special memory locations where the setups are stored.

h,H,? - Display > AutoMet < System Menu

Displays the main AutoMet menu.

i   - Display ID Values

Used for diagnostic purposes. Displays the identification codes of the sensors.

m   - Display Hex Data Memory Values

Used for diagnostic purposes. Displays the data memory locations.

p   - Modify Download Pointer

This is the pointer for keeping track of the last entry of the data memory. If the memory is full, then the oldest data is written over first.

q   - Display Station ID

Display the Station ID of the AutoMet Data logger.

t   - Set Time (Password required)

Set the Time of the AutoMet Unit. The password is required.

b   - XMODEM Download of Data

XMODEM is a standard binary data transfer protocol. The command allows binary transfer of the data stored in the AutoMet unit memory. This command is used by AutoMet Report for data down-loading. (Note: This command requires software handshaking and is a not recommended for terminal software operation).

r   - XMODEM Download of Real Time Values

Download Real Time allows quick scanning of the instantaneous values of the sensors, alarms, and other settings.   This command is used by AutoMet Report for the Logger Monitor screen. (Note: This command requires software handshaking and is not recommended for terminal software operation).

x   - XMODEM Download of EEprom Values

Download EE prom allows quick scanning of the non-volatile EEPROM memory (For diagnostic purposes).

APPENDIX C.

WIRING PANEL TECHNICAL DATA
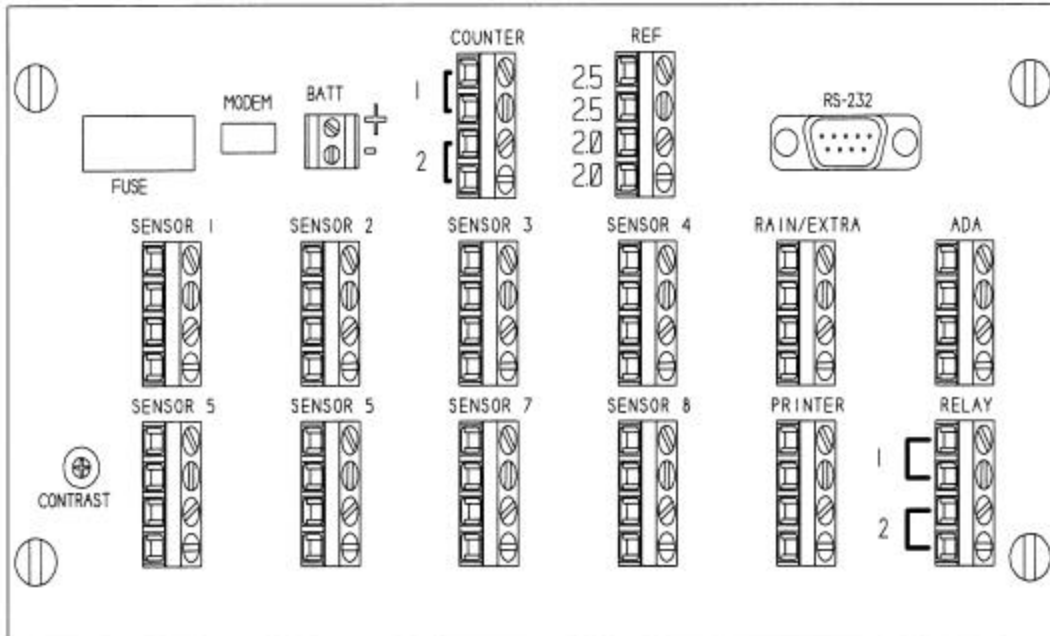
Connector Pinouts

Analog Inputs 1 to 8

Pin	Signal
1	Signal In
2	Common
3	+12V Power
4	ID Voltage

Counter

Pin	Signal
1	Counter #1
2	Common
3	Counter #2
4	Common

RS-232, Printer, ADA

Pin	Signal
1	Rec Data
2	Common
3	+12V Power
4	Xmit Data

Power

Pin	Signal
1	None
2	Common
3	+12V Power
4	None

Reference

Pin	Signal
1	2.5 Volts
2	2.5 Volts
3	2.0 Volts
4	2.0 Volts

Rain

Pin	Signal
1	Signal
2	Common
3	None
4	None

APPENDIX D - SAMPLE REPORT PRINTOUT

Report for 12/09/95 - Day 343   > AutoMet <   Station ID: 1

Channel	01	02	03	04	05	06	07	08	Rain	Sigma	
Sensor	WS	WD	AT	RH	BP	no	no	no	RA		
Units	MPS		DEG	DEG	%	HG	V	V	V	mm	Deg
==											
00:00	005.6	198.6	021.4	045.3	29.02	0.165	0.165	0.156	00.00	001.0	
01:00	005.6	198.6	021.2	045.4	29.02	0.166	0.165	0.158	00.00	001.1	
02:00	005.7	198.4	021.0	045.4	29.02	0.167	0.167	0.158	00.00	001.0	
03:00	005.6	198.5	020.8	045.4	29.01	0.168	0.167	0.159	00.00	001.0	
04:00	005.7	198.4	020.7	045.4	29.01	0.168	0.168	0.161	00.00	001.1	
05:00	005.7	198.2	020.6	045.4	29.00	0.169	0.168	0.161	00.00	001.0	
06:00	005.7	198.1	020.5	045.4	29.00	0.170	0.170	0.162	00.00	001.0	
07:00	005.7	197.4	020.3	045.5	29.00	0.170	0.170	0.163	00.00	001.1	
08:00	005.7	197.1	020.2	045.5	29.00	0.171	0.170	0.164	00.50	001.1	
09:00	005.3	198.5	020.2	045.8	29.00	0.168	0.168	0.161	00.50	001.1	
10:00	005.2	199.2	020.4	046.0	29.01	0.165	0.165	0.158	00.00	001.2	
11:00	005.1	199.5	020.6	046.3	29.01	0.165	0.164	0.156	00.00	001.2	
12:00	005.3	200.2	020.9	046.8	29.00	0.165	0.164	0.156	00.00	001.1	
13:00	005.4	200.0	021.3	047.1	28.98	0.164	0.163	0.154	00.00	001.0	
14:00	005.5	199.5	021.6	047.3	28.96	0.163	0.162	0.153	00.00	000.8	
15:00	005.3	200.0	021.8	047.4	28.93	0.161	0.160	0.150	00.00	000.8	
16:00	005.3	199.8	021.9	047.7	28.92	0.159	0.158	0.148	00.50	000.8	
17:00	005.4	198.8	021.8	047.9	28.91	0.161	0.161	0.151	00.00	000.8	
18:00	005.6	198.2	021.5	048.0	28.91	0.164	0.163	0.154	00.00	001.0	
19:00	005.6	198.4	021.3	048.0	28.91	0.165	0.165	0.156	00.00	000.9	
20:00	005.6	198.1	021.1	047.9	28.92	0.167	0.166	0.158	00.00	001.0	
21:00	005.7	197.9	020.8	047.6	28.90	0.168	0.168	0.160	00.00	001.0	
22:00	005.7	197.9	020.7	047.4	28.88	0.169	0.168	0.161	00.00	001.0	
23:00	005.6	197.9	020.5	047.2	28.84	0.170	0.168	0.161	00.00	001.0	
Totals	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	01.50	n/a	
Savg	005.5	198.6	021.0	046.5	28.96	0.166	0.166	0.157	n/a	001.0	
Vavg	000.0	198.6	000.0	000.0	00.00	0.000	0.000	0.000	n/a	n/a	

Data Recovery 100.0 %

APPENDIX E.

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 either point the sonic wind sensor to True North.

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 is shown in the figure #1, can be used for determination of declination. This will depend upon the accuracy requirement required. Alternately use a more accurate method of determining declination from magnetic North.
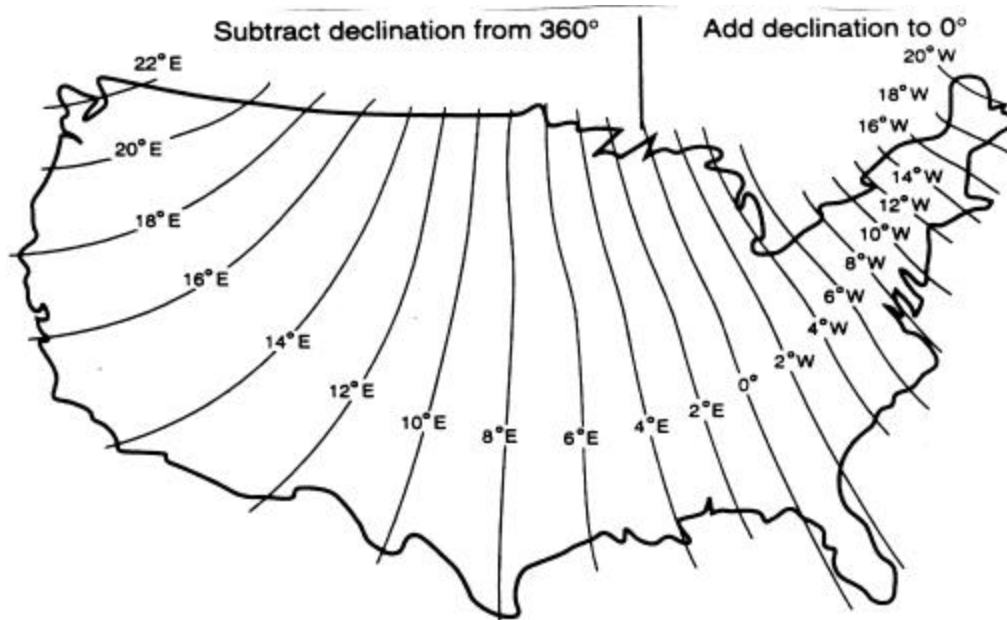
Figure #1 Typical declination values in the USA

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 #2. Declination angles west of True North are considered positive, and are added to 0 degrees to get True North as shown in figure #3. For example, the declination for Grants Pass, Oregon is 17° East. True North is 360° -17°, or 343° 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.

Determining Local Magnetic Declination

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
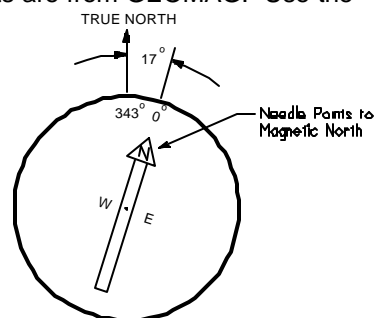
Options:
1 = Field Values(D, I, H,X,Z, F)

FIGURE 2 Declination Angles East of True North Are Subtracted from 0 to Get True North

2 = Magnetic Pole Positions
3 = Dipole Axis and Magnitude
4 = Magnetic Center

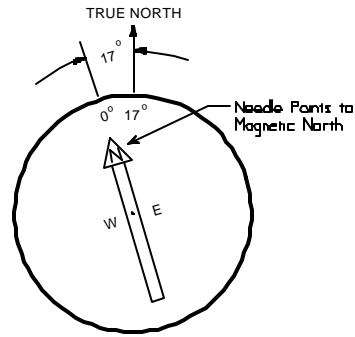|	
Display values twice	[N]: press return
Name of field model	[USCON95]: press return
Date	[Current date]: press return
Latitude	: 42/25 N
Longitude	: 123/20 W
Elevation	: 1000
Units (m/km/ft)	: ft

FIGURE 3   Declination Angles West of True North Are Added to 0 to Get True North

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://swdcdb.kugi.kyoto-u.ac.jp/igrf/point/**   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)
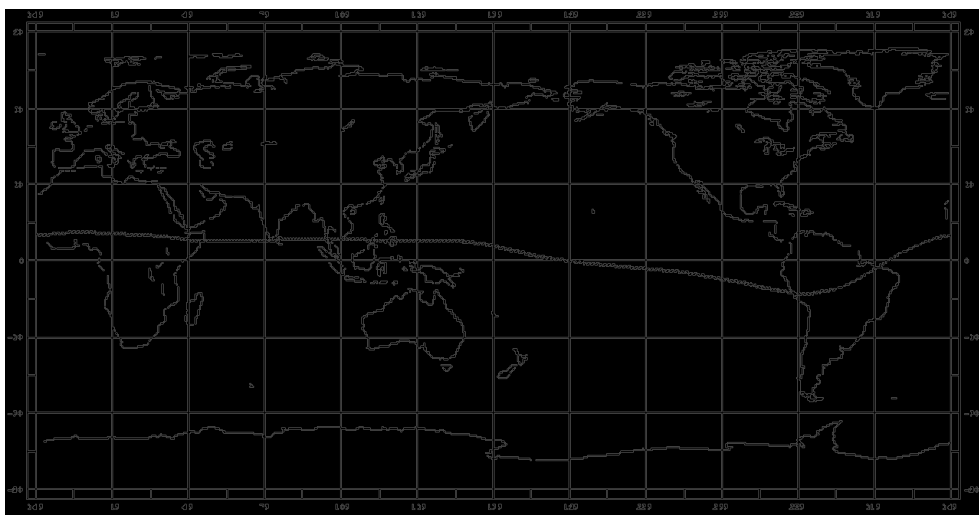
An alternative method is to find a USGS map and examine the text at the bottom center of the map. At this point either a written indication is given, or a symbol similar to the one seen below will be found. This would indicate a declination of 15 degrees West-showing MN (magnetic North) to True North (Star). Other sources such as the local airport can be helpful in determining the correct declination.
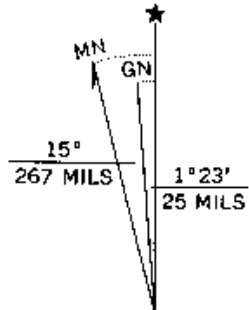
UTM GRID AND 1971 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Appendix F - AutoMet Data logger Multiplier & Offset Examples

1. AutoMet 460A/465A/466A Scaling and Setups **

				Datalogger						MMP Software	
					FS		INV				
Meas	Sensor	Units	Range	Mult	Offset	VOLT	S/V	Slope ?	FREQ	Mult	Offset
WS	010	mph	0 to 10	100	0	2.5	S	N	1117.8	125	0
		m/s	0 to 44.704	44.70	0	2.5	S	N	1117.8	55.88	0
WS	014	mph	0 to 100	100	0	2.5	S	N	55.9	125	0
		m/s	0 to 44.704	44.70	0	2.5	S	N	55.8	55.88	0
WS	034A	mph	0 to 100	99.9	-0.4	2.5	S	N	56.0	124.84	-.37
		m/s	0 to 44.704	44.70	-0.18	2.5	S	N	56.0	55.81	-0.18
WS	591	mph	0 to 100	100	0		S	N	--------	250	0
		m/s	0 to 44.704	44.70	0			N	--------	111.76	0
WD	024/034A	Deg	0 to 360	360	0	2.5	V	N	--------	450	0
WD	020C	Deg	0 to 360	360	0	2.5	V	N	--------	360	0
WD	590	Deg	0 to 360	360	0		V	N	--------	900	0
Sigma	Any	Deg	0 to 120	120	0		S	N	--------	120	0
AT	060A-2	° F	-58 to +122	32		0.92*	-99.03* S	Y	--------	402.40*	-9.03*
		° C	-50 to + 50	178.84*	-72.79*		S	Y	--------	223.55*	-72.79*
AT	592	° F	-22 to+122	144	-22		S	N	--------	360	-22
		° C	-30 to+50	80	-30		S	N	--------	200	-30
RH	083C	%	0 to 100	100	0		S	N	--------	250	0
RH	593	%	0 to 100	100	0		S	N	--------	250	0
SR	595	Ly/min	0 to 2	2	0		S	N	--------	5	0
		W/m2	0 to 2000	2000	0		S	N	--------	5000	0
BP	090D/594	in Hg	26 to 32	6	26		S	N	--------	15	26
		mmHg	600.4 to 812.8	152.40	660.40		S	N	-------- 381.00	660.40	
		mbar	880.5 to 1083.7	203.19	880.46		S	N	--------	507.98	880.36
RN	0.01”	in	0.01 in/tip	0.010			T	N	--------	0.01	0
	0.01”	mm	.254 mm/tip	0.2540			T	N	--------	0.254	0
	0.1mm	mm	0.1 mm/tip	0.100			T	N	--------	0.25	0
	0.5mm	mm	0.5 mm/tip	0.500			T	N	--------	0.50	0

* Nominal values - may vary slightly from one logger to another.
Refer to Appendix F. sections 2 and 3 for precise calculations of these values.

** For AutoMet Data loggers built after Serial #W4644

2. Calculation of Multiplier & Offset for AT Measurement
       (For both AutoMet and MicroMet Plus Software)

                        2V Excitation

                    23.1 K ohm 0.1% resistor
                                                        -50° C = 1.7451V = VL
                          +50°C = 10.545Kohm   +50° C = 0.62684 = VH
         Thermistor   - 50°C = 158.181Kohm ΔV = 1.1183V
                                                        ΔT = 100°C or 180°F

    Calculator program:

    In = (((Vo-VL)/(VH-VL)(IH-IL))+IL

    For Multiplier, enter these values:
    Vo = 2.5V
    VL = 0
    VH = _V (1.1183V in this example)
     IH = _T (100°C or 180°F in this example)
     IL = 0
     Result: In = 223.55 Multiplier for °C in this example.

     For Offset, enter these values:
     Vo = 2V
     VL = 1.7451V in this example.
     VH = 0.62684V in this example.
      IH = 50°C or 122°F
     IL = 50°C or -58°F
     Result: In = 72.794 = Offset for °C in this example

 3. AutoMet 466A Calculations

To get VL and VH values from AutoMet 466A Logger (to compute MMP Offset and Multiplier for Temperature measurements),
perform the following procedure:

             1. LCD On (Press any key)
            2. TEST
            3. Enter password (F1, F2, F3, F4 = default)
            4. CALIBRATE
            5. VOLT/ENG to get value in volts
            6. Substitute 158.181Kohms for 060A-2 (or equivalent) sensor for -50(C.
            7. Note voltage on Temperature channel ($\approx$ 0.253V) as V1.
            8. Substitute 10.545Kohms for 060A-2 (or equivalent) sensor for +50(C.
            9. Note voltage on Temperature channel ($\approx$ 1.374V) as V2.
            10. Subtract V1 from 2V - Note result as VL ($\approx$1.747V).
            11. Subtract V2 from 2V - Note result as VH ($\approx$0.626V).

Appendix G - Output Array Definition Example:

1. AutoMet Loggers

   AutoMet loggers have ten channels or output variables defined. The data from all these channels form an output array which is logged every averaging period (typically 60 minutes). The first eight channels correspond to the eight data logger analog channels. Channel 9 is Rainfall, and channel 10 is Sigma Theta (the standard deviation Wind Direction). If, for example, the measurements being made are Wind Speed, Wind Direction, Air Temperature, and Relative Humidity, on logger input channels 1 through 4, plus Rainfall, the channels would be defined as follows:

Item #	Chnl	Name	Unit	Dec	Type	Offset	Multiplier
1	1	WS	mph	1	S	0	125
2	2	WD	Deg	1	V	0	450
3	3	AT	Deg C	1	S	-72.79	223.55
4	4	RH	%	1	S	0	250
5	5	CH5	none	0	S	0	0
6	6	CH6	none	0	S	0	0
7	7	CH7	none	0	S	0	0
8	8	CH8	none	0	S	0	0
9	9	RN	inch	2	T	0	.01
10	10	SG	Deg	1	S	0	120

   Note: Entries for Unit, Offset and Mult in the table are examples only. Refer to **Appendix F** for the correct values for specific sensors and data loggers.