DAVIS

SYSTEM INSTALLATION

FOR STANDARD GROWEATHER™ AND ENVIROMONITOR™ SYSTEMS

INTRODUCTION

This manual covers basic GroWeather/EnviroMonitor installation, including how to connect your sensors to the sensor interface module (SIM) and how to power your unit. Instructions on installing/mounting sensors and other system components (such as the Alarm Output Module) are contained in the manuals for those products. This manual does include several installation drawings which depict typical GroWeather/EnviroMonitor installations and should help you connect all of your components correctly.

SYSTEM COMPONENTS

The system includes the following components. Please make sure you have all listed components before continuing.

- ◆ Console with Mounting Base attached
- ◆ Sensor Interface Module
- ◆ 8-foot (2.4-m) 8-Conductor Cable
- ◆ AC-Power Adapter
- ◆ Two #8 X 3/4" Pan Head Self-Threading Screws
- ◆ 16.5-foot (5 m) Ground Wire (12 AWG)
- ◆ Three #6 x 1" (25 mm long) Self-Threading Screws

- ◆ **Two Cable Ties**
- ◆ **Four Adhesive Pads**
- ◆ **Two Cable Label Sheets**

TOOLS AND MATERIALS NEEDED

In addition to the components listed above, you may need some of the following tools and materials. Please be sure you have everything you need before beginning the installation.

- ◆ **Medium-sized Phillips Screwdriver**
- ◆ **9-volt Alkaline Battery**
- ◆ **Drill with #36 (.106" or 2.5 mm) and #29 (.136" or 3.5 mm) drill bits**
- ◆ **Standard Switch Box (if you wish to mount the console on a wall with the wires running inside the wall)**

USING THE LABEL SHEET

We have provided two sheets of labels which should aid you in your installation. The majority of the labels on the sheets are cable labels for marking the ends of each cable. These labels contain connector codes which will help you attach the correct cable to the correct connector. We have included two label sheets so you can label both ends of each cable with the same label.

Note: *Also included on the label sheet are circuit board labels which are for use only with industrial versions of the stations.*

Cable Connector Codes

To simplify installation, we have coded each connector and included the code on the cable label and on the circuit board or enclosure next to the appropriate connector. Most connector codes includes a letter and a number. The letter identifies the module or unit on which the connector is located while the number identifies the specific connector. The following letter codes identify the module/unit on which a connector is located.

- ◆ **S = Sensor Interface Module**
- ◆ **P = Power**
- ◆ **C = Console**
- ◆ **L = WeatherLink**
- ◆ **B = Battery and Solar Power**
- ◆ **A = Alarm Output Module**
- ◆ **PC = Computer**

Labeling Cables

Any installation is going to include a number of cables running from various sensors and components to other components. To alleviate confusion, we have included label sheets which you should use to mark your cables (see "Cable Connector Codes" on page 2).Before you begin installation, lay out all of your cables and attach the appropriate label to each end of each cable. ***Make sure you label every cable end, including extension cables.*** Doing this now will help prevent confusion during the installation and if you ever need to disconnect a sensor/component at a later date.

When labeling cables, orient the label so the connector code nearest the end of the cable matches the connector to which that end of the cable will be attached. For example, place one C2/SENSOR I'FACE/S7 label onto the 8-conductor cable (which will be running between the sensor interface module (SIM) and the console) so the C2 side of the label is nearest the end of the cable which will be connected to the console. Place the second C2/SENSOR I'FACE/S7 label onto the other end of the cable so the S7 side of the label is closest to the SIM end of the cable.

Console End   **SIM End**
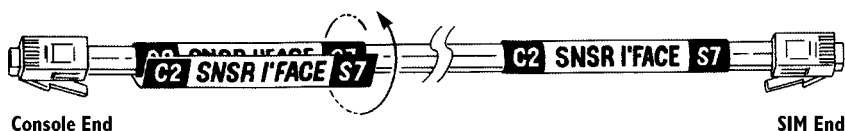
LABELING YOUR CABLES

Temperature Sensor/Probe Labels

There are two labels (TEMP/S2 and TEMP2/S3) for the external temperature sensor/stainless steel temperature probe because you may connect this sensor in one of two locations (connector S2 or S3). Consult the guidelines below to decide which label to use on your external temperature sensor/stainless steel temperature probe. Note that you should always use the T-HUM/S2 label on your external temperature/humidity sensor.

- ✦ If you have a temperature/humidity sensor connected to the system, and want to use the external temperature sensor/stainless steel temperature probe as the "soil" temperature sensor, use the TEMP 2/S3 label.

- ✦ If you do not have a temperature/humidity sensor and want to use the external temperature sensor/stainless steel temperature probe as your primary outside temperature sensor, use the TEMP/S2 label.

- ✦ If you have a UV sensor (which needs to be attached at connector S3) and either the external temperature sensor or the stainless steel temperature probe, use the TEMP/S2 label.

- ✦ If you have both an external temperature sensor and a stainless steel temperature probe (or two of either), place the TEMP/S2 label on the sensor you are going to use as the primary outside temperature sensor. Place the TEMP2/S3 label on the sensor you are going to use as the "soil" temperature sensor.

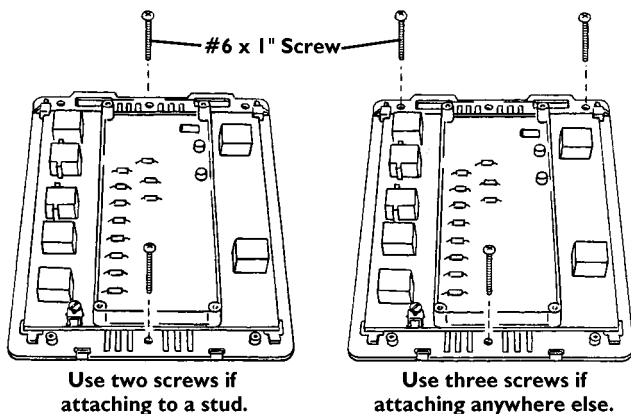## MOUNTING THE SENSOR INTERFACE MODULE

You may mount the SIM on a wall or other vertical surface or you may simply set it down on a horizontal surface. It should be sheltered from weather and located near a grounding point. You may use our Complete System Shelter (#7724) or Multi-Purpose Shelter (#7728) to provide protection from weather. Use our Grounding Kit (#7780) if suitable ground is not otherwise available.

1. Remove the cover by pushing down on the tabs at the top until you can remove the tabs from the slots.
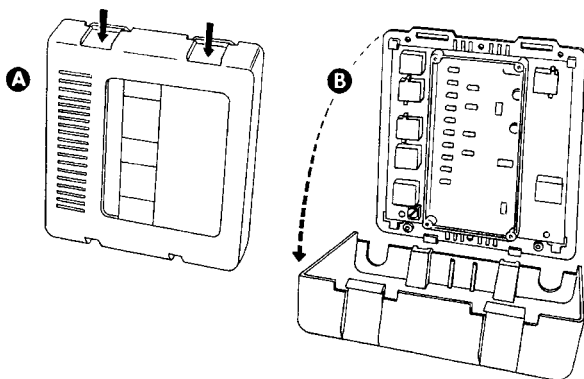
REMOVE COVER

2. If you plan to mount the SIM against a wall or other vertical surface, attach the base to the mounting surface using the #6 x 1" screws. Otherwise skip this step.

    Use two screws (as shown below) when attaching to a stud. Use three screws (as shown below) in any other case. Drill pilot holes using a #36 (.106" or 2.5 mm) drill bit.

ATTACHING TO A WALL OR VERTICAL SURFACE

3. **If you plan to place the SIM on a horizontal surface, attach one of the adhesive pads to each of the four raised circles on the underside of the base as shown below.**


Adhesive Pad

ATTACHING ADHESIVE PADS
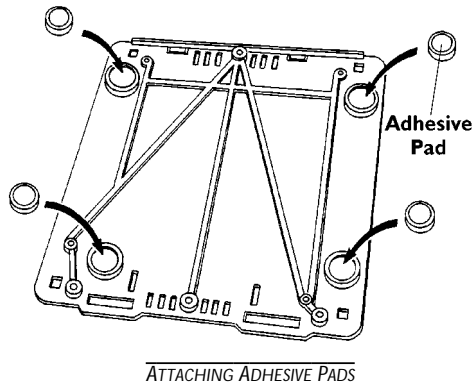
CONNECTING TO THE SENSOR INTERFACE MODULE

Make sure that you install your sensors and run all necessary cables to the SIM location before connecting cables to the SIM.

Connecting to the Sensor Interface Module

1. Attach one end of the 8-conductor cable (which runs from the SIM to the console) to connector S7.

2. Attach the sensor cables to the appropriate connector as shown below.
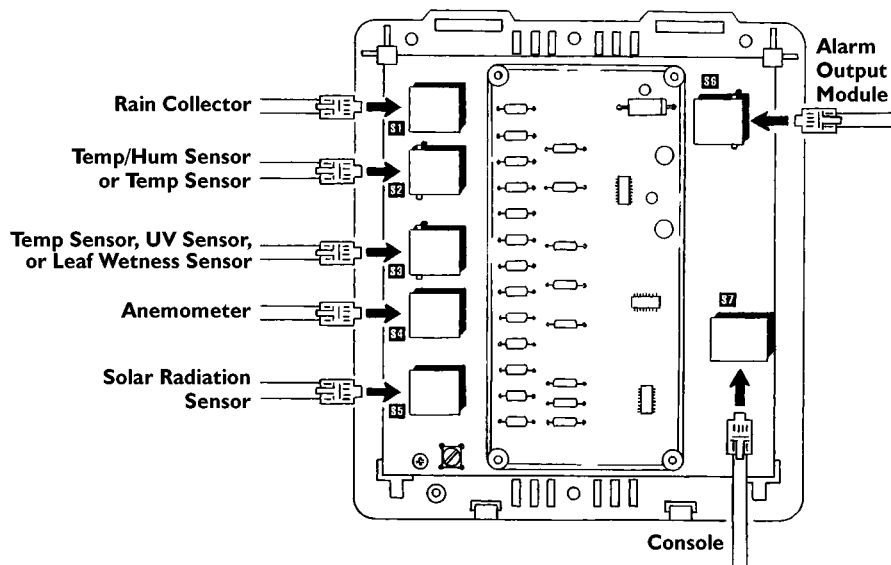
ATTACHING CABLES

You may attach either the external temperature sensor, external temperature/humidity sensor, or the stainless steel temperature probe to connector S2. The sensor connected at S2 will measure outside/air temperature (and humidity if applicable).

You may attach either the external temperature sensor, stainless steel temperature probe, leaf wetness sensor, or the UV sensor to connector S3. The sensor connected at S3 will measure soil temperature (GroWeather), Leaf Wetness (GroWeather), or UV (Energy EnviroMonitor).

3. **Connect the spade lug on the ground wire to the GND terminal at JP1.**

   You need to ground the SIM to take advantage of RFI and surge suppression capabilities.
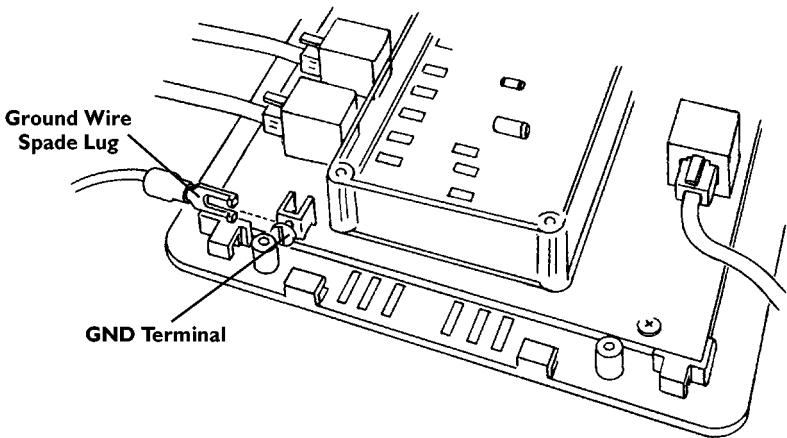
ATTACHING GROUND WIRE

Routing Cables out of Sensor Interface Module

1. **Gather the cables connected on the left of the SIM (including the ground wire) and secure them to the cable tie lug using a cable tie.**

   Even if you have only one cable, secure it to provide strain relief. When tightening the cable tie, make sure the cables are on top of the lug.
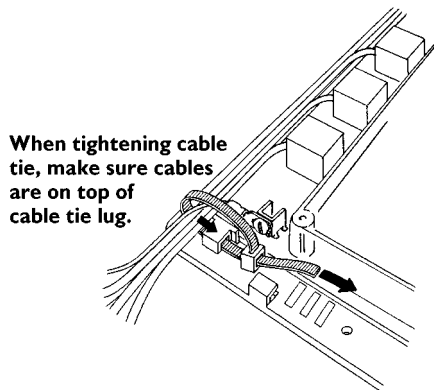
SECURE CABLES

2. **Gather the cables connected on the right of the SIM and secure them to the cable tie lug using a cable tie.**

   Even if you have only one cable, secure it to provide strain relief. When tightening the cable tie, make sure the cables are on top of the lug.
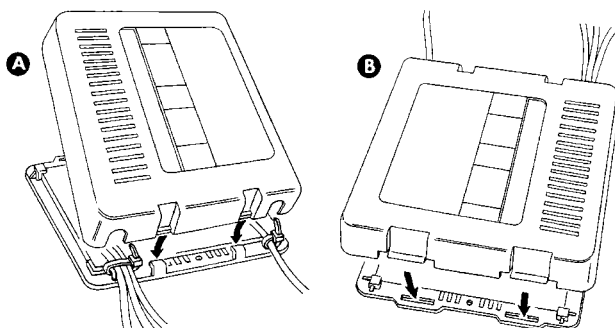
3. Finally, reattach the cover by putting the cover into place (as shown below) and pushing it onto the base until the tabs on top of the cover snap back into their slots. Make sure the cables run out the bottom of the SIM as shown below.

REPLACE COVER

CONNECTING THE CONSOLE

In order to connect cables to the console, you must remove the mounting base which comes attached to the console. To remove the mounting base, press down on the large tab until it is free from its slot and pull the base away from the console.

To connect the console to the SIM (or the ICAM), run the 8-conductor cable to the console and plug it into the jack marked C2 (To Sensor I'face) on the underside of the console.

Primary Power

The console is powered by 9- to 12-volt DC (direct current). In North America, the power adapter included with your unit converts 120-volt, 60-Hz AC (alternating current) to 9–volt DC, allowing you to run the unit on ordinary household current. If you are outside North America, in a location where the line voltage is not 120–volt, 60–Hz, check to see if your local dealer has supplied a power adapter that is appropriate for your electrical power before you connect the power adapter to the console. If not, you must use a power converter/transformer or the appropriate power adapter (9-12-volt, 2.5-mm female plug).

To power the console, simply connect the power adapter to the jack marked C1 (Power) on the underside of the console. Plug the other end of the power adapter into an appropriate power outlet. Once connected, the console should run through a brief self-test procedure. All of the display segments appear, and the console beeps twice (three times if you have the WeatherLink hardware module attached). When the self-test finishes, the time (reading 12:00 a.m.) appears on the display.

Battery Backup

We recommend that you also install a 9-volt alkaline battery as a backup power supply. In the event of a power outage, the battery will power the console. Not only will this prevent the loss of data stored by the console, but will also allow you to continue observing weather conditions during the power outage. New alkaline batteries will power the console for 24–48 hours. For maximum security, keep the battery backup fresh. You should replace batteries any time the unit has operated on battery power for more than 18 hours. To prevent loss of data when replacing batteries, make sure the unit is receiving power from the adapter before changing batteries.

Note: *The use of Ni-Cad batteries is not recommended. Ni-Cad batteries carry less power than alkaline batteries and they will not be recharged by the console. In the event of a power outage, Ni-Cad batteries will be able to power the console for a shorter period of time than alkaline batteries will.*

To install the backup battery, remove the battery cover underneath the console, snap the battery connector onto the battery, lower the battery into the compartment, and replace the battery cover.

INSTALLING BACKUP BATTERY
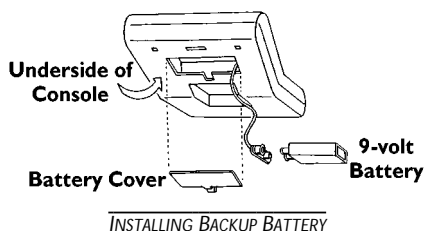
DISPLAYING THE CONSOLE

By changing the orientation of the mounting base, you may display the console on a tabletop, set it on a shelf, or mount it on a wall.

Selecting a Site for the Console

Unless you use Davis' Complete System Shelter or a similar weather-proof shelter, you should locate the console indoors. For more accurate readings, follow these suggestions.

- ✦ **Avoid placing the console in direct sunlight.**
  The black casing heats up in direct sunlight. This may cause erroneous readings and/or damage to the unit.

- ✦ **Avoid placing the console near radiant heaters or heating/air conditioning ducts.**

- ✦ **If you are mounting the console on a wall, choose an inner or interior wall.**
  Avoid walls which heat up or cool down depending on the weather.

- ✦ **To connect the console to an 8-conductor cable running inside the wall, attach the mounting base to an empty switch box, using the two screw holes on the mounting base.**

"Horizontal" Orientation

Use this mounting base orientation if the console's LCD will be below eye level once the console is positioned. Attach the mounting base as shown below and then place the console onto any flat surface.
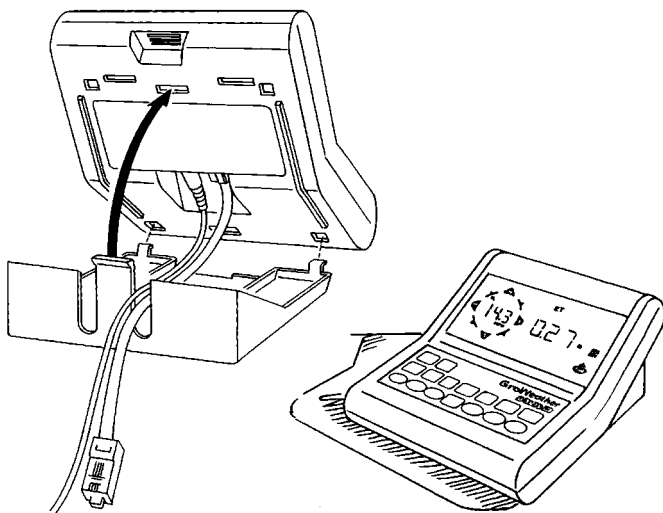
HORIZONTAL ORIENTATION

"Vertical" Orientation

Use this mounting base orientation if the console's LCD will be at or above eye level once the console is positioned. Attach the mounting base as shown below and then place the console onto any flat surface.
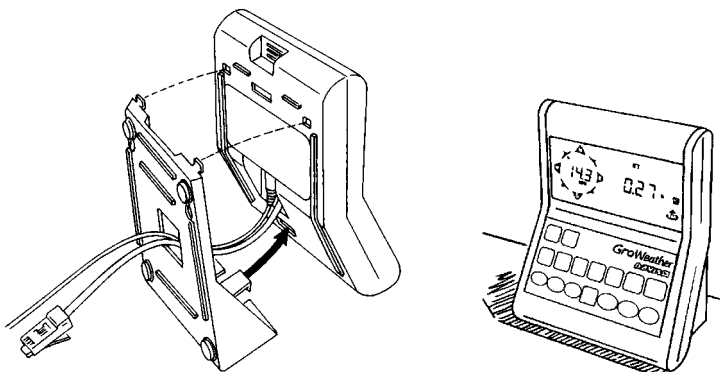

VERTICAL ORIENTATION

To Display the Console on a Wall

If you want to attach the console to a wall, follow the instructions below.

1. Mark the location of the two keyholes on the back of the mounting base.

2. Use a drill with a #29 (.136" or 3.5-mm) drill bit to make pilot holes in these locations.

3. Drive the two #8 x 3/4" pan head screws into the wall.
   Leave at least 1/8" (3 mm) between the wall and the heads of the screw.

4. Attach the mounting base to the console in the vertical orientation position.

5. Slide the keyholes on the back of the mounting base over the two screw heads. Lock the console into place by gently sliding it downward until it no longer moves.
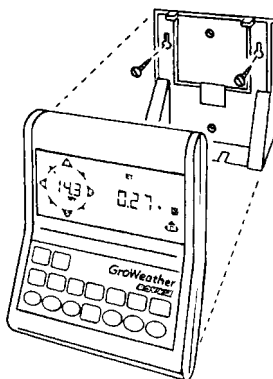

ATTACHING CONSOLE TO A WALL

TYPICAL INSTALLATIONS

The sections below show some typical installations to aid you in connecting your system. Specific instructions for mounting and connecting various sensors and components are contained in the manuals for those components.

WeatherLink with Short-Range Modem Pair

The illustration below shows a WeatherLink connection via our Short-Range Modem Pair (SRM Pair). The WeatherLink cable plugs into the Short-Range Modem Adapter in order to connect to one half of the SRM Pair. The other half of the SRM Pair is connected to a free serial port on your computer. The SRM Pair is connected using a 2-twisted pair cable (Davis Product #7884) which is not included. Using 22 AWG cable, you may run up to 4 miles of cable between the SRM Pair. Using 18 AWG cable, you may run up to 8 miles between the SRM Pair.
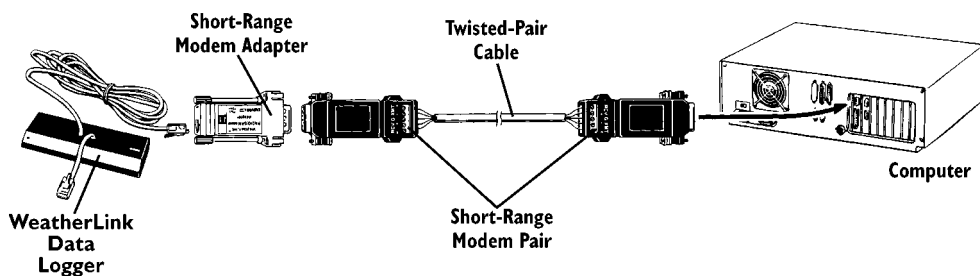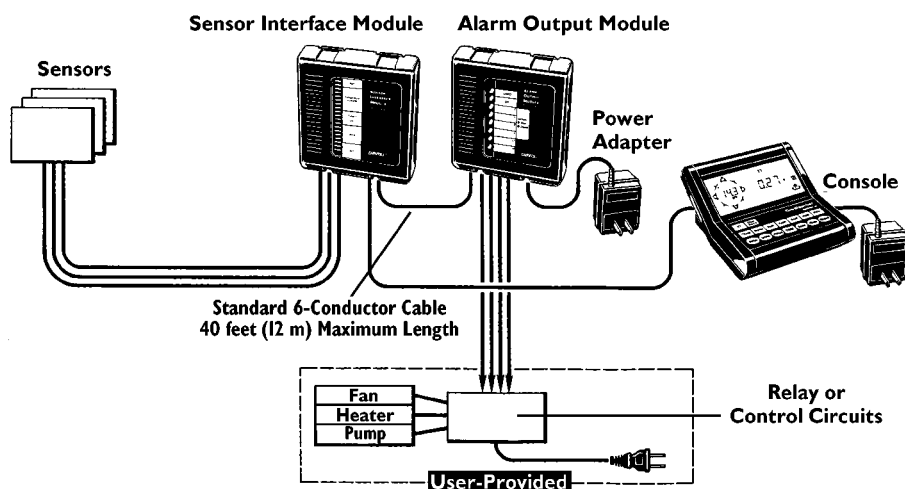

WEATHERLINK WITH SHORT-RANGE MODEM PAIR

Alarm Output Module Connected to Sensor Interface Module

The illustration below shows an Alarm Output Module (AOM) connection made at the Sensor Interface Module (SIM). The AOM connects to the SIM using the provided 2' AOM Cable or a 40' (12 m) Standard 6-Conductor Extension Cable. You may not extend this distance beyond 40' (12 m). If the AOM needs to be more than 40' (12 m) from the SIM, connect the AOM to the Interface Cable Adapter as shown on the next page.

The AOM can drive control circuits such as thermostats or sprinkler controllers. To control power equipment such as heaters, motors, etc., you will need to provide relays or control circuits.
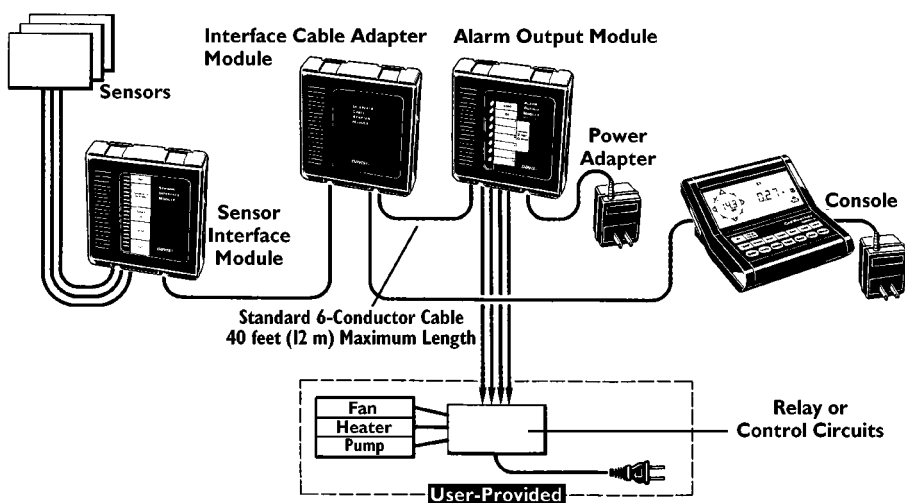

ALARM OUTPUT MODULE CONNECTED TO SENSOR INTERFACE MODULE

Alarm Output Module Connected to Interface Cable Adapter Module

The illustration below shows an Alarm Output Module (AOM) connection made at the Interface Cable Adapter Module (ICAM). The AOM connection must be made using either the 2' AOM Cable or a 40' (12 m) Standard 6-Conductor Extension Cable. You may not extend this distance beyond 40' (12 m). Therefore, if the AOM cannot be located within 40' (12 m) of the Sensor Interface Module (SIM), you will need to connect the AOM to the ICAM instead.

Connect the SIM to the ICAM using up to 100' of standard 8-Conductor cable. Connect the Console to the ICAM (instead of the SIM) using a standard 8-Conductor cable. Connect the AOM to the ICAM using either the 2' AOM Cable or a 40' (12 m) Standard 6-Conductor Extension Cable.

The AOM can drive control circuits such as thermostats or sprinkler controllers. To control power equipment such as heaters, motors, etc., you will need to provide relays or control circuits.

ALARM OUTPUT MODULE CONNECTED TO INTERFACE CABLE ADAPTER MODULE

Using Power Y-Cable to Power Console and AOM

It is possible to use a power Y-cable to provide power to both the console and the AOM using a single AC-power adapter, as shown below. The power Y-cable is provided with the AOM.
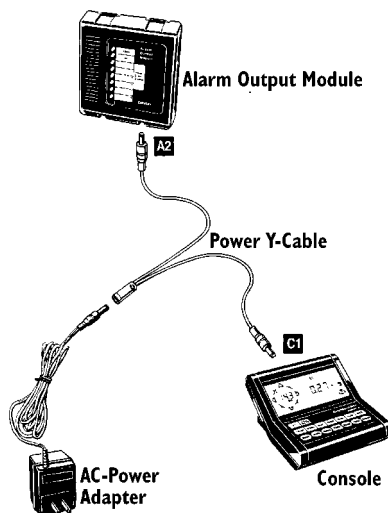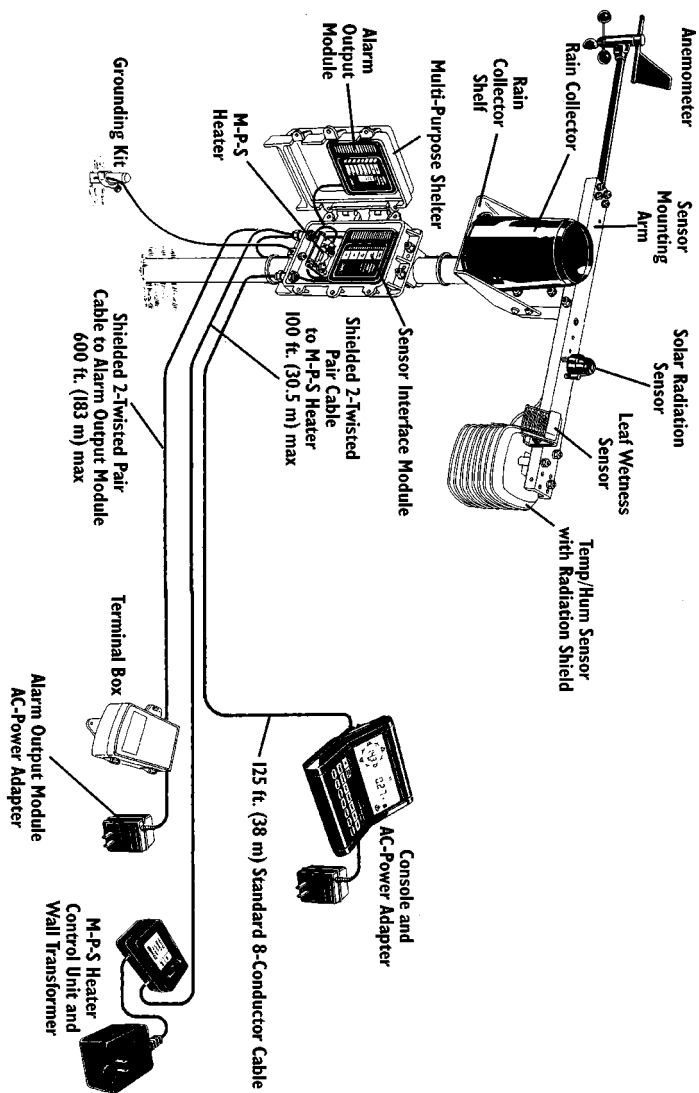

USING POWER Y-CABLE

Field System Installation

The illustration on the following page shows an example of an installation in which the sensor interface module is placed outside (using the Multi-Purpose Shelter for protection) and a single cable is run from the SIM to the console, which is located indoors. The sensor interface module (SIM) need not be mounted on the Sensor Mounting Arm support mast; it may be located at any intermediate point between the sensors and the console. If desired, you may run shielded cable from the SIM to the ICAM and then run standard 8-Conductor Cable from the ICAM to the console, which will allow you to place the SIM farther from the console.

Consult the table below to determine the maximum cable run for power cables to the AOM and the Multi-Purpose-Shelter Heater (MPS Heater). You will need to splice the power cable to the AOM's AC power adapter using a Terminal Box, Surge Protectors, or Waterproof Crimp-Type Splice Connectors (Terminal Box shown). The power cable for the MPS Heater connects into the heater's control unit, which allows you to turn power to the heater on and off.

MAXIMUM CABLE RUN FOR AOM POWER CABLE	MAXIMUM CABLE RUN FOR SHELTER HEATER POWER CABLE	TYPE OF CABLE
600 feet (180 m)	100 feet (30 m)	2-Twisted Pair Cable (#7884)
600 feet (180 m)	100 feet (30 m)	20 AWG Pair (0.75 mm^2)
800 feet (240 m)	160 feet (48 m)	18 AWG Pair (1.0 mm^2)
1200 feet (360 m)	250 feet (75 m)	16 AWG Pair (1.5 mm^2)

This advantage of this installation is that it keeps sensor cable runs relatively short; the longer portion of the cable run to the console is made with a single 8-conductor cable, which is easier to route and lower in cost than multiple sensor cables. However, the standard cables supplied with the sensors are 40' in length which may result in a surplus of up to 30' (9 m) of cable.

Anemometer

Alarm Output Module

Grounding Kit

Rain Collector Shelf

Multi-Purpose Shelter

M-P-S Heater

Rain Collector

Sensor Mounting Arm

Solar Radiation Sensor

Leaf Wetness Sensor

Temp/Hum Sensor with Radiation Shield

Shielded 2-Twisted Pair Cable to Alarm Output Module 600 ft. (183 m) max

Shielded 2-Twisted Pair Cable to M-P-S Heater 100 ft. (30.5 m) max

Sensor Interface Module

Terminal Box

Alarm Output Module AC-Power Adapter

125 ft. (38 m) Standard 8-Conductor Cable

Console and AC-Power Adapter

M-P-S Heater Control Unit and Wall Transformer

FIELD INTERFACE INSTALLATION
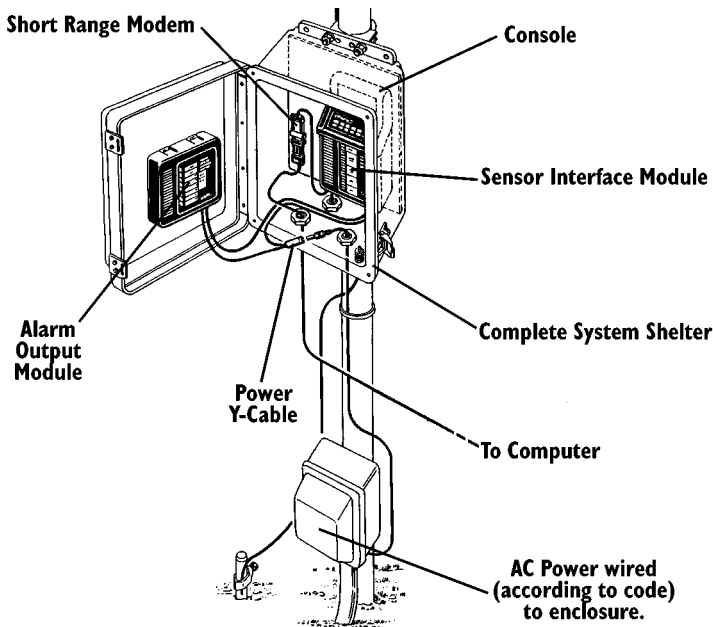
Field System with AC Power

The illustration below shows an installation in which the console is located with the SIM (and, optionally, the AOM) in the field near the sensors. The console and modules are housed in the Complete System Shelter (CSS). The Complete-System-Shelter Heater might also be included.

AC power is wired, according to code, to an enclosure or shelter containing a receptacle box and a power adapter. The power adapter cable is routed into the CSS, where a power Y-cable distributes power to the console and AOM.

The WeatherLink (optional) is connected via a Short-Range Modem Pair and two-twisted-pair cable to a computer in the office at a distance of up to 8 miles, depending on the wire gauge used. If a cable to the computer is not feasible, data may be uploaded to a laptop or other portable computer at the sensor site.

The advantages of this system:

✦ **The Console is located near the sensors.**
Data may be viewed at the sensor site. In addition to making weather data available in the field, this is useful for the alignment, adjustment, and monitoring of sensors.

✦ **The WeatherLink cable to the computer can be very long, and (comprising only four conductors) it is low in cost.**
The Link cable is also relatively immune to noise and voltage surges, and additional protection is low in cost.
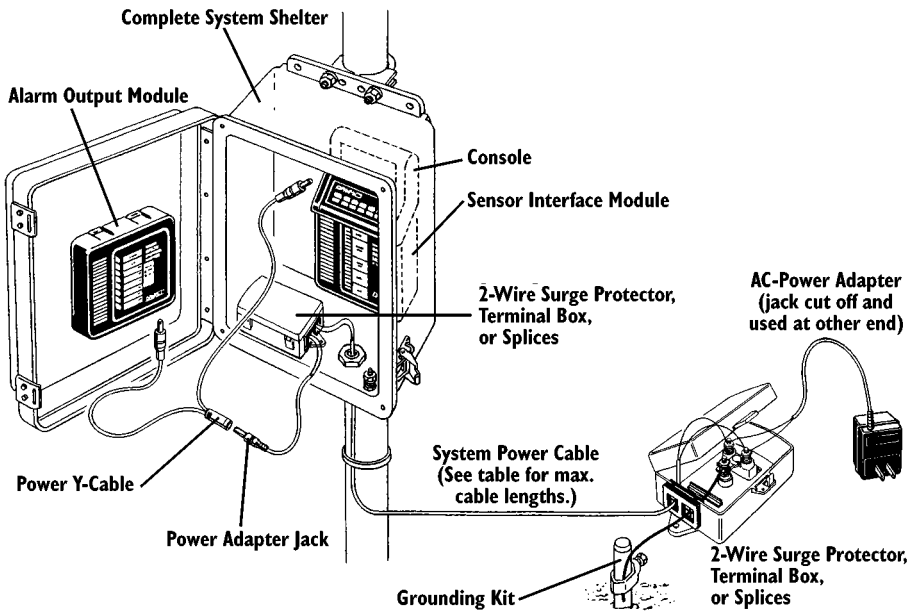

FIELD SYSTEM WITH AC POWER

Field System with Wired DC Power

This system configuration has the same characteristics and advantages as those of the AC-powered system described in "Field System with AC Power" on page 18. In this case AC power is not wired to the site. Rather, the power adapter is plugged into an available circuit in a sheltered location, and the (nominal) 12-Volt DC output is supplied to the station with a two-wire cable (twisted-pair is preferred, but not required). The two wire cable is connected to the power Y-Cable using a single Surge Protector, Terminal Box, or splice connectors. The Surge Protector may be housed in a Small Surge Protector Shelter as shown below, or it may be attached to the back panel of the shelter. The table below lists some recommended maximum distances, which are determined by the wire gauge used.

MAXIMUM CABLE RUN	TYPE OF CABLE
460 feet (140 m)	24 AWG Pair (.20 mm^2)
600 feet (180 m)	22 AWG Pair (.32 mm^2)
1000 feet (300 m)	18 AWG Pair (.82 mm^2)

*FIELD SYSTEM WITH WIRED DC POWER*

Solar-Powered Field System

The illustration below shows an installation in which the Complete System Shelter (CSS) houses the console, a battery, and the charging regulator. As shown in "Field System with AC Power" on page 18, data may transmitted via Link cable, read visually from the display, or uploaded to a computer brought to the site.
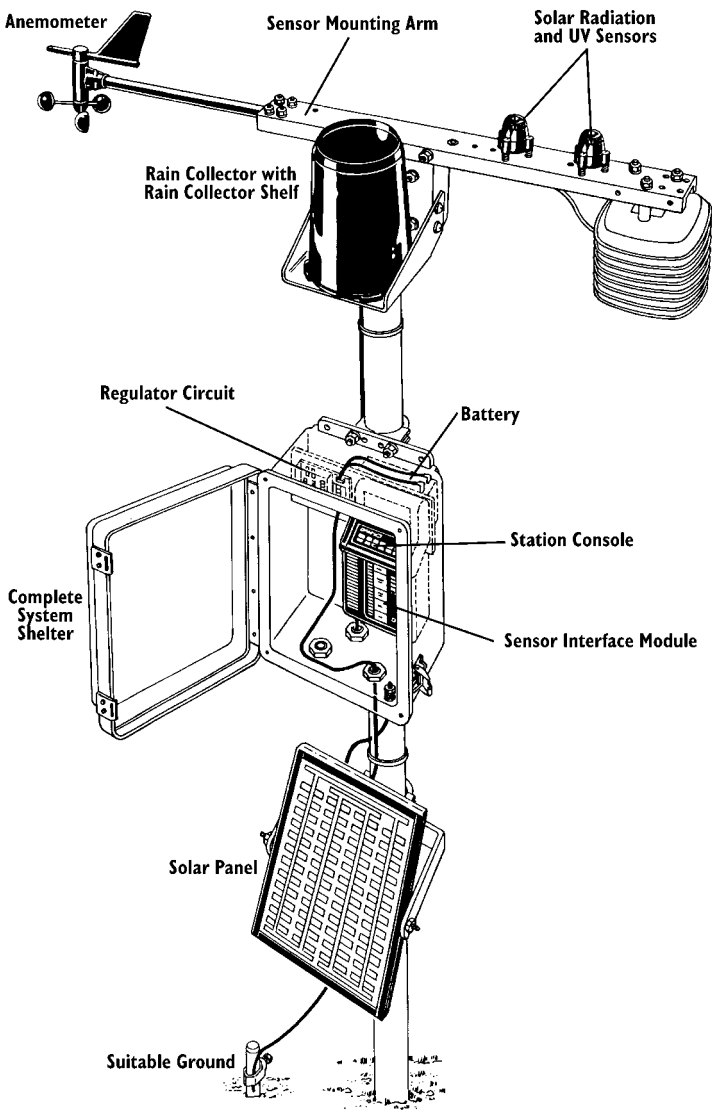
SOLAR POWERED FIELD SYSTEM

## Solar-Powered Field System with Radio

The illustration below shows a solar-powered system (see "Solar-Powered Field System" on page 20) in which the WeatherLink commands and data are communicated via a user-supplied radio. The 1200- or 2400-baud WeatherLink is compatible with any transparent communications channel. Because the solar panel and battery of the Solar Power Kit are not sufficient to supply the radio for continuous operation, the Alarm Output Module is used to switch on power to the transmitter for short scheduled periods.
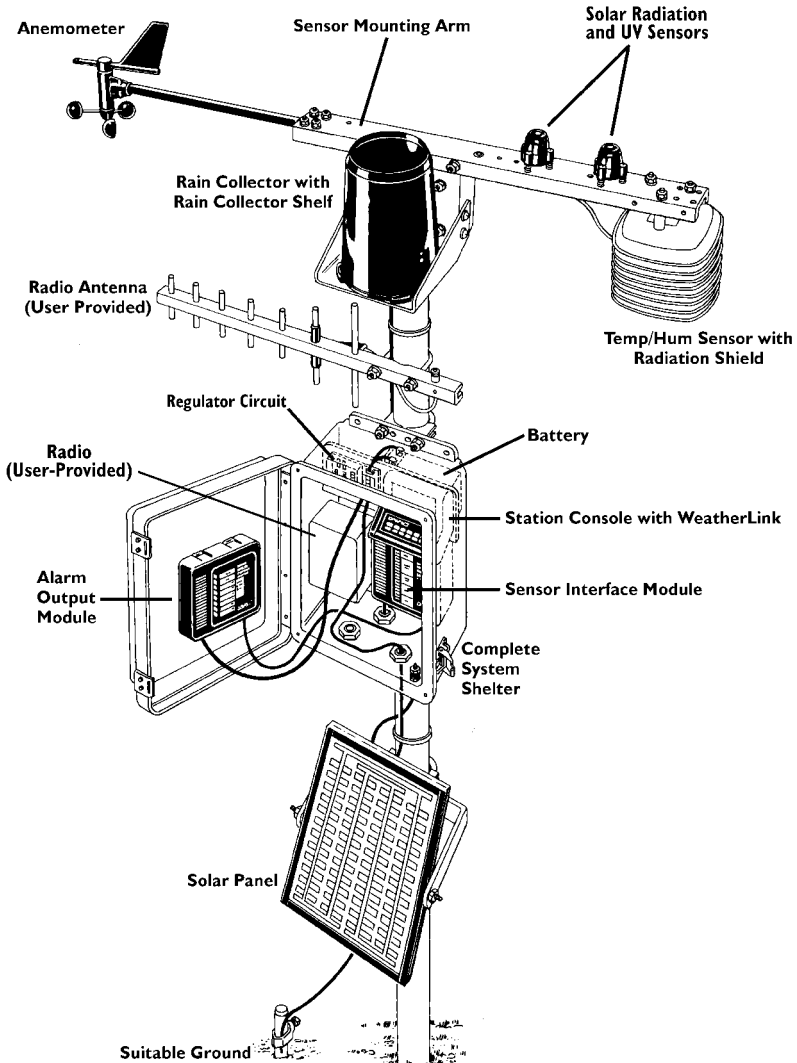
SOLAR-POWERED FIELD SYSTEM WITH RADIO
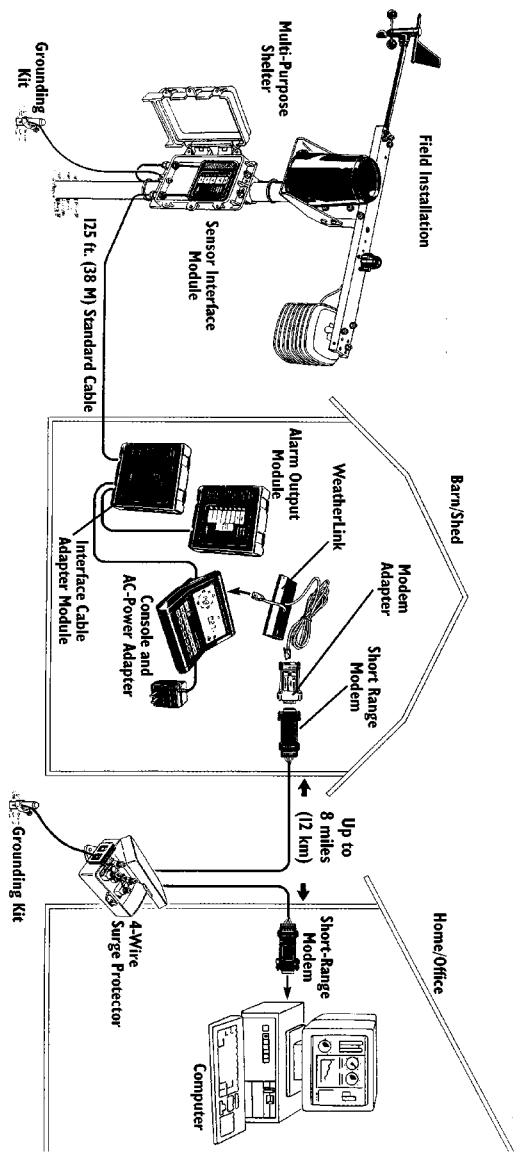
"Outbuilding" System Configuration

This variation of the "Field System Installation" (page 16) places the console and WeatherLink in a barn or other shelter and then uses a Short-Range Modem Pair (or radio) to communicate with the computer at the "central" site. The figure below shows the use of Surge Protectors (optional) on the SIM-to-console and WeatherLink cables.
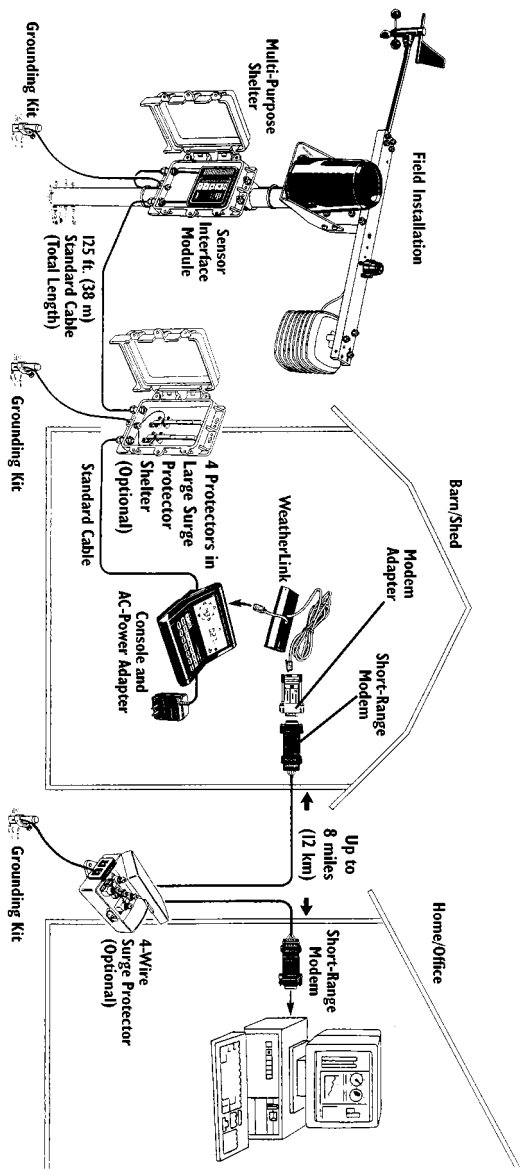
"OUTBUILDING" SYSTEM CONFIGURATION

"Outbuilding" System Configuration with ICAM and AOM

The figure below shows an "outbuilding" system configuration with the addition of an Interface Cable Adapter Module and Alarm Output Module, enabling the weather station, the user, or a computer program to provide inputs to controllers of heaters, fans, motors, or other equipment in the vicinity of the barn or shelter.

"OUTBUILDING" SYSTEM CONFIGURATION WITH ICAM AND AOM

For Product Numbers: 7450 (GroWeather), 7460 (Energy EM), and 7470 (Health EM)

Davis Instruments Part Number: 7395-073
Standard System Installation Manual
Rev. B Manual (7/13/99)

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WeatherLink is a registered trademark of Davis Instruments Corp.

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3465 Diablo Avenue, Hayward, CA 94545 U.S.A.