

Automated Weather Observing System AWOS



2090 CDP User's Manual



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Introduction

All Weather Inc's Automated Weather Observing System (AWOS) is a multifaceted, modular weather monitoring system that provides weather data indispensable to recognizing and monitoring airport weather patterns. The AWOS continuously measures an array of weather parameters and can output them to multiple display terminals for interpretation by airport personnel.

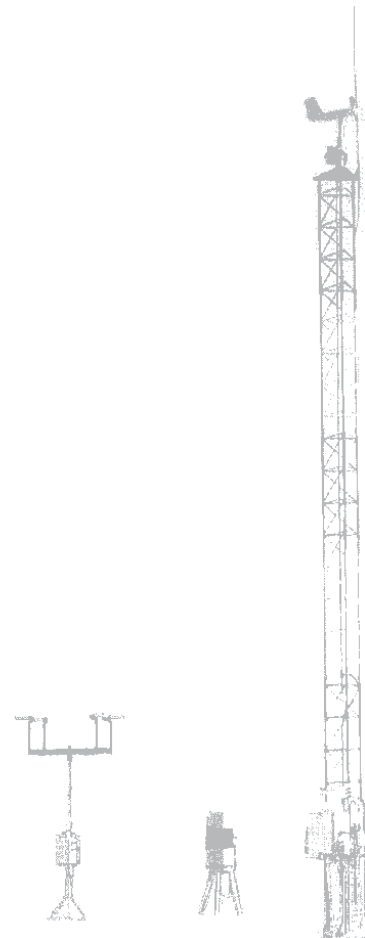
The sensor configuration of an AWOS is adaptable to the needs of the airport at which it is installed. A comprehensive selection of sensors is available, including:

- *Wind Speed and Gust*
- *Wind Direction and Variable Wind Direction*
- *Temperature*
- *Dew Point Temperature*
- *Relative Humidity*
- *Barometric Pressure*
- *Precipitation*
- *Visibility and Variable Visibility*
- *Sky Condition*
- *Altimeter Setting*
- *Density Altitude*
- *Present Weather*
- *Lightning and Thunderstorm Detection*
- *Freezing Rain*

The output signals of the AWOS sensors are collected and processed, then displayed on the Central Data Platform's (CDP) display. The CDP is equipped with All Weather Inc.'s user-friendly graphic interface, which consists of a hierarchical system of interactive menus, providing the user direct control over each station's operation.

The CDP also functions as an independent data logger, storing an ongoing record of weather data and system status. Kept as a permanent record of system operation, this archive data can be viewed or printed at any time using the system's straightforward Archive Menu functions.

A series of remote displays show the current readings computed by the CDP, and can be located up to one mile away from the main stations.



AWOS Basics

System Components

The AWOS consists of five major components:

- *Sensor Station*
- *Data Collection Platform (DCP)*
- *Central Data Platform (CDP)*
- *Remote Display System (RDS)*
- *Uninterruptible Power Source (UPS)*

I Sensor Station

The AWOS sensor station is located near the touch-down zone of the airport runway. The sensor station includes a combination of the following sensors, depending on the AWOS model: wind speed and direction, temperature, dew point, rainfall, dual barometric pressure sensors, cloud height, visibility, present weather, lightning detection, and freezing rain.

II Data Collection Platform (DCP)

Located on the sensor tower, the Data Collection Platform (DCP) collects data from the sensors, performs error detection on the received information, converts the sensors' data into engineering units, and transmits message packets containing sensor data and status information to the Central Data Platform (CDP) once every five seconds. The data packets contain a cyclic redundancy check (CRC) character that allows the CDP to determine if any transmission errors have occurred. The CDP ignores data that is not received correctly.

A keypad and display are built into the DCP for sensor maintenance and visibility sensor configuration (8364 series and above).

III Central Data Platform (CDP)

Meteorological data is transmitted by the Data Collection Platform to the Central Data Platform (CDP), which consists of a central processor, a high resolution display, a hard disk drive, floppy disk drive, a keyboard, and a mouse. The CDP receives data from the DCP and outputs current weather data to the Remote Display System (RDS).

Several key functions are initiated at the CDP, including:

- Set Date and Time
- Sensors On/Off
- Enter Voice Remark
- Enter Weather Remark

Up to two 90-second voice remarks can be entered by the operator at the CDP, and these will then be appended to the ongoing voice report. The voice remark is sometimes used in place of an Automatic Terminal Information System, or ATIS.

Weather remarks are entered at the CDP for transmission to the remote displays. This remark will be displayed on the top line of the Weather Remark display box.

A running record of measured weather conditions and overall system operation is maintained in the CDP's archive files for one year. An archive file is an automatic report written to nonvolatile memory once every five minutes. These files may be accessed at any time for viewing or printing using the *Archive Menu*, available to authorized users through the CDP's *Control Menu*.

IV Remote Display System

The Remote Display System (RDS) consists of a series of remote display units connected to the CDP. Each remote display station includes a central processor and a display. These remote displays present data in the same format as the CDP, and are controlled by the CDP. They are display stations only, with no available menus or configuration controls.

V Uninterruptible Power Source

The sensor station, CDP (including peripheral devices), and remote displays may all be protected by an uninterruptible power source (UPS), which supplies emergency power in the event of a power outage. Two UPS models are available: one will power the system components for a minimum of ten minutes, and the other will provide power for up to one hour. The systems sensors can be powered by optional backup batteries.

Lightning and Transient Surge Protection

The AWOS is protected by a comprehensive network of lightning and transient surge protection components. Tranzorbs, MOVs, and resistors protect all sensor lines, power lines, telephone lines, and communication lines against lightning-induced surges and power line transients and surges.

AWOS Configurations

AWOS systems are available in several configurations. The configurations differ primarily in the sensors included and the output method used (landline or radio). The *System Drawings* chapter of this manual provides block diagrams of the main configurations: AWOS I, AWOS II, AWOS III, AWOS III-P, AWOS III-T, AWOS III-PT, AWOS III-PZ, and AWOS III-PTZ.

AWOS I

AWOS I systems provide data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude

AWOS II

AWOS II systems add a visibility sensor, rain gauge and day/night detector to the AWOS I array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility

- Rainfall
- Day/Night Detection

AWOS III

AWOS III systems add a ceilometer to the AWOS II array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility
- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers

AWOS III-P

AWOS III-P systems add a present weather sensor to the AWOS III array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility
- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers
- Present Weather (rain, snow, drizzle, mist, fog, freezing fog, haze)

AWOS III-T

AWOS III-T systems add thunderstorm detection to the AWOS III array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction

- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility
- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers
- Thunderstorm/Lightning Detection

AWOS III-PT

AWOS III-PT systems add thunderstorm detection to the AWOS III-P array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility
- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers
- Present Weather (rain, snow, drizzle, mist, fog, freezing fog, haze)
- Thunderstorm/Lightning Detection

AWOS III-PZ

AWOS III-PZ systems add a freezing rain sensor to the AWOS III-P array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility

- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers
- Present Weather (rain, snow, drizzle, mist, fog, freezing fog, haze)
- Freezing Rain

AWOS III-PTZ

AWOS III-PTZ systems add a freezing rain sensor to the AWOS III-PT array. The system provides data for the following parameters:

- Wind Speed and Gust
- Wind Direction and Variable Wind Direction
- Temperature
- Relative Humidity
- Dew Point
- Barometric Pressure
- Altimeter Setting
- Density Altitude
- Visibility and Variable Visibility
- Rainfall
- Day/Night Detection
- Cloud Type and Height, up to 3 layers
- Present Weather (rain, snow, drizzle, mist, fog, freezing fog, haze)
- Thunderstorm/Lightning Detection
- Freezing Rain

AWOS Algorithms

Wind Speed and Direction

Wind speed and wind direction are two-minute running averages calculated from sensor readings taken at one-second intervals. When speed is less than or equal to two knots, the system indicates calm wind conditions.

Wind Gust

Wind gust is based upon the highest wind speed for the past 10 minutes.

Variable Wind Direction

Variable wind direction is a wind direction that varies around the two-minute average wind direction by 60 degrees or more.

Ambient Temperature

Ambient temperature is a five-minute average temperature calculated each minute from sensor readings taken at one-second intervals. Temperature will not be reported if the 8190 MARS fan fails.

Dew Point

Dew point temperature is a five-minute average dew point temperature calculated each minute from sensor readings taken at one-second intervals. If less than four valid one-minute values are available, dew point is reported as missing. Dew point temperature will not be reported if the 8190 MARS fan fails.

Pressure

For quality control purposes, the AWOS includes at least two pressure sensors. The definitions below apply to AWOS installations.

Altimeter Setting

The pressure value to which the altimeter of an aircraft on the ground is set so that it will indicate the field elevation (mean sea level) of the airport. The two pressure sensors must agree to within .04 inHg for altimeter setting to be reported. Also, the temperature read inside the 7190 sensor must be $>-40^{\circ}\text{C}$ and $<60^{\circ}\text{C}$.

Field Elevation (Ha)

The officially designated field elevation of an airport above mean sea level. It is the elevation of the highest point on any of the airport's runways.

Density Altitude (DA)

The altitude in the standard atmosphere where air density is equivalent to that of the airport. This is used by pilots to determine aircraft performance. Density altitude is not reported if it is less than 1000' above the field elevation.

Sensor Pressure (P)

The atmospheric pressure at the actual elevation of the sensor (Hz).

Station Elevation (Hp)

The officially designated height above mean sea level to which station pressure (Ps) pertains. Hp is the same as for Ha for AWOS airport installations.

Ceiling/Sky Condition

Ceiling and sky condition are determined from sensor outputs at least every 30 seconds integrated over a 30-minute sample period. A weighting scheme is employed for data collected during the last 10 minutes of the 30-minute sample period to make the algorithm more responsive to rapid changes in ceiling/sky conditions. Heights are reported in hundreds of feet (for example, 30 represents a height of 3000 feet).

Visibility

Visibility is a ten-minute average calculated each minute from sensor readings taken at ten-second intervals. The visibility sensor also performs self-checks of communications, window condition, and a number of operational functions, and reports any errors in its status word(s).

Variable Visibility

Variable visibility is based on visibility readings, and is only reported if visibility is >3 miles, and the difference between the maximum and minimum visibility values measured in the last ten minutes is greater than one-half mile.

Rainfall Accumulation

Rainfall accumulation shows the amount of rainfall (in 0.01" increments) measured during the past hour. This value is updated every five seconds, and is reset to zero at five seconds past the hour.

Present Weather (optional)

Present weather data is averaged over a one-minute period by the present weather sensor and is updated every one minute. The type of precipitation detected (Rain, Drizzle, Snow) is reported as explained in the **Sensor Displays** section of this manual. Rainfall rate is determined from the type and concentration of the detected precipitation, and is updated every one minute.

If a present weather sensor and a visibility sensor are installed and reporting properly, the following will be reported when the present weather sensor is reporting "NO PRECIPITATION":

HAZE	Visibility <7 sm and dew point depression $>4^{\circ}\text{F}$
MIST	Visibility $>1/2$ sm and <7 sm, and dew point depression $\leq 4^{\circ}\text{F}$

FOG Visibility $\leq 1/2$ sm, dew point depression $\leq 4^{\circ}\text{F}$, and temperature $> 32^{\circ}\text{F}$

FREEZING

FOG Visibility $\leq 1/2$ sm, dew point depression $\leq 4^{\circ}\text{F}$, and temperature $\leq 32^{\circ}\text{F}$

*(Note: In order for the Present Weather sensor's rainfall rate value to be displayed, the Rain Gauge option must be turned ON through the **Sensors ON/OFF** menu (found on **Maintenance Menu One**). This option must be ON whether or not a separate rain gauge is installed.)*

Freezing Rain Detection

With the addition of a Model 6495 Freezing Rain Sensor, the AWOS Present Weather field can incorporate freezing rain detection. The Freezing Rain Sensor is polled once per minute.

Thunderstorm Detection, Model 6500

Thunderstorm/lightning data is reported for any lightning activity detected within a 30 nm radius of the installation site as explained in the **Sensor Displays** section of this manual. The data is divided into three distance ranges: < 5 nm, 5-10 nm, and > 10 -30 nm. Activity detected in the > 10 -30 nm range also includes direction information, reported in octants (Northwest, Southeast, etc.). Lightning data is updated every 5 seconds, and uses a 15-minute sliding window (reported lightning activity includes all strikes detected within the past 15 minutes). The system displays may take up to one minute to reflect the new input.

Thunderstorm Detection, NADIN Interface

Using the optional NADIN interface link, thunderstorm/lightning data is updated every one minute. The system displays may take up to one minute to reflect the new input.

Averaging Table

(Table 1) Sensor averaging.

Sensor	Reporting Units	Averaging Times	Time to First Report after CDP Power Up
<i>Wind Speed</i>	Knots	2 minutes	90 seconds
<i>Wind Gust (last 10 minutes)</i>	Knots	5 seconds	90 seconds
<i>Wind Direction</i>	Nearest 10 degrees magnetic	2 minutes	90 seconds
<i>Variable Wind Direction</i>	Nearest 10 degrees magnetic	5 seconds	90 seconds
<i>Temperature</i>	Celsius	5 minutes	3 minutes
<i>Dew Point</i>	Celsius	5 minute	3 minutes
<i>Altimeter Setting</i>	Inches of mercury	5 seconds	1 minute
<i>Density Altitude</i>	Feet	5 seconds	3 minutes (not reported if <1000' above field elevation)
<i>Visibility</i>	Statute miles	10 minutes	8 minutes
<i>Variable Visibility</i>	Statute miles	1 minute	8 minutes
<i>Precipitation</i>	0.01 inches	5 second update	< 1 minute
<i>Sky Condition (Up to 3 Cloud Layers)</i>	100 feet	30 minutes	24 minutes
	Clear (CLR)	no clouds below 12,500 feet	
	Few	≥6% to 24% sky cover	
	Scattered (SCT)	≥25% to 49% sky cover	
	Broken (BKN)	≥50% to 87% sky cover	
	Overcast (OVC)	>87% sky cover	
	Obscured (VV)	Cloud bases at surface/fog	
<i>Thunderstorm</i>	Thunderstorm/Lightning and Direction	15-minute sliding window	1 minute
<i>Present Weather</i>	precipitation type and rate	1 minute	1 minute
<i>Freezing Rain</i>	freezing rain	1 minute	1 minute

Installation

The CDP installs indoors, and consists of:

- System Unit PC (Model 20901)
 - Voice/RMM Modem (Model 20905-A)
 - Sound Card (Model 20903)
 - Monitor (M482179-00)
 - Keyboard (M406059)
 - Mouse (M406060)
 - Printer (Model 20910-A/B)
 - Microphone (20906)
 - Speakers (Model 20904)
- Peripheral Interface (Model 20909)
 - UHF Radio (Model 20980-A—optional)
 - NADIN Interface (Model M404806—optional)
 - Landline to DCP (if no UHF radio)
- VHF Radio (Model 1791)
- Telephone Line (customer supplied)
- Optional Uninterruptible Power Source (Model 20913-D/F)
- Optional KVM extender kit (Model M488300-00)

All the CDP equipment will fit on a desktop that is at least 30" x 60". It must be located in a conditioned space where the temperature is maintained between 40° and 105° F, and between 5% and 90% relative humidity, and within three feet of an outlet with 120VAC or 220VAC, 50 or 60Hz. The CDP requires 500VA and should be on a dedicated 15Amp circuit. It must be located within three feet of a telephone line terminated with an RJ-11 connector. The phone line is dedicated to the AWOS and must not be shared with other telephones, FAX machines, or other equipment.

Installing the System Unit PC

The System Unit PC (20901) performs data processing on incoming AWOS data and controls I/O communications with the Peripheral Interface, NADIN Interface, DCP, and peripherals. If the optional KVM extender kit is used, follow the installation instructions in the section for the optional KVM Extender kit.

- 1 Install the System Unit PC in a location where convenient access to power and to the necessary communication links is available.
- 2 The monitor can be installed on its included desktop stand, or mounted to a wall using the M488297-00 wall mount kit. Follow the instructions included with the kit to install the wall bracket and monitor. A 35' monitor extension cable is included in the kit for installations where the monitor is located away from the CDP.
- 3 Connect the Monitor to the monitor port on the back of the System Unit PC.
- 4 Connect the keyboard and mouse to the two input connectors on the provided Y-cable, then connect the Y-cable to the DIN port on the back of the System Unit PC.
- 5 Connect the printer (if used) to the parallel port on the back of the System Unit PC.
- 6 Connect the microphone to the MIC IN connector on the sound card.
- 7 Set the Voltage Selector Switches to the proper settings, if not auto-switching.
- 8 Connect the System Unit PC power cord to a compatible power source.

Two speakers connect to the System Unit. One speaker is the main speaker, to which all speaker cables connect. This speaker also powers the second (left) speaker.

- 9 Connect the speaker power cord to the main speaker.
- 10 The speaker INPUT cable connects to the speakers from J8 on the Peripheral Interface PCB after installation of the Peripheral Interface in the next section.
- 11 Connect the interface cable to the 1791 radio (if used) as explained in the *Model 1791 User's Manual*.
- 12 Set up the printer according to the printer manual (ribbon, paper, etc.) and connect to the System Unit's printer port.
- 13 Power on the System Unit and set the system clock to the current GMT.

Installing the Model 20909 Peripheral Interface

The Peripheral Interface (20909) is housed within a separate enclosure with the UHF/VHF Data Link Radio (if used) and optional NADIN interface. The Peripheral Interface provides the circuitry and connections necessary for supporting a NADIN interface, UHF Radio, VHF radio, DCP landline connection, speakers, and telephone connection. It includes RS-232 to RS-485 modems with surge suppression, telephone line surge suppression, and audio filtering circuits. The Peripheral Interface installs near the System Unit, and communicates with it via several cable assemblies. These cables are first connected to the Peripheral Interface's PCB, as explained below, and then to the System Unit.

Peripheral Interface Connections

- 1 Remove the cover from the Peripheral Interface to expose the Peripheral Interface PCB.
- 2 Route the external cables from the System Unit, telephone line, RS-485 landline (if used), remote displays (if used), and VHF radio through the hole in the case's rear panel and connect to the Peripheral Interface PCB as shown in the *Peripheral Interface Connections* table below.
- 3 Install the NADIN interface cable, if used (see next section).

- 4 Bundle the cables on the inside of the Peripheral Interface chassis with the provided cable clamps and hardware.
- 5 Use cable ties every 12" to secure the cables on the outside of the Peripheral Interface. Install flex guard tubing between the System Unit and Peripheral Interface.
- 6 Set the Peripheral Interface line voltage selector switch for the proper voltage, and connect the power cable to the power input connector on the rear panel.
- 7 Connect the serial cable from the System Unit (M491552) to the DB9 COM 1 connector on the rear panel.

NADIN Interface (optional)

CLH NADIN Interface Board Installation

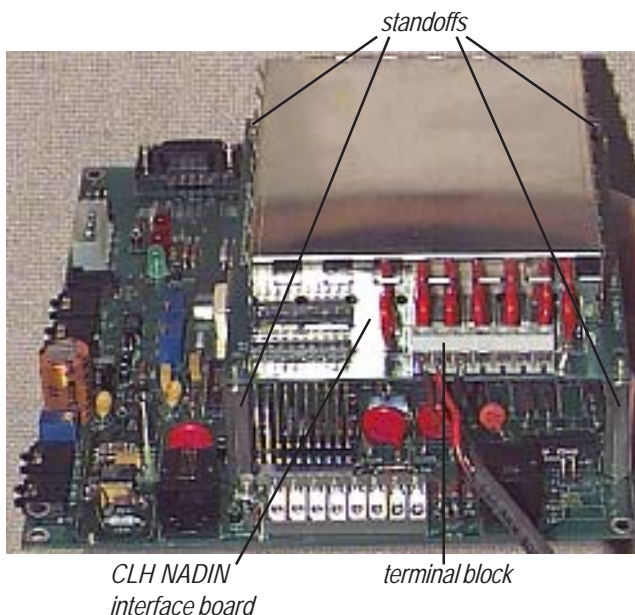
The optional NADIN interface board (M404806) used with the CLH NADIN system allows AWOS data to be submitted to the Weather Message Switching Center (WMSC) for dissemination to flight center stations, DUAT, etc. It can also be used to add thunderstorm and lightning detection capabilities to the AWOS. The NADIN interface connects to a plug-in connector on the Peripheral Interface board, with the incoming RS232 line from the Pan-Am satellite connecting to a terminal block on the upper side of the NADIN Interface.

- 1 Mount the included standoffs between the NADIN interface board and Peripheral Interface PCB as shown in drawing 20909-003.

Peripheral Interface Connections

Source	Cable Part Number	System Unit Connector	Peripheral Interface Connector
Voice/RMM modem card (System Unit)	part of 20905-A	MODEM	DB25 MODEM
Sound card (System Unit)	M491553	SPK OUT	J7 (VOICE IN)
Telephone line	n/a	n/a	J1 (PHONE IN)
RS-485 landline (if used)	n/a	n/a	RS-485 converter D+, D-, and gnd
Remote displays (if used)	n/a	n/a	RS-485 converter D+, D-, and gnd
VHF radio	M491686	n/a	J2: pin 1--WHITE; pin 2--GREEN; pin 3--RED; pin 4--BLACK
Speakers (INPUT)	part of 20904	n/a	J8 (SPK OUT)
Data link radio antenna	M491361	n/a	ANT on data link radio

- 2 Align the connector on the underside of the NADIN interface board with the mating connector on the Peripheral Interface board (J14).
- 3 Press down gently on the NADIN Interface board (being careful not to bend any pins) until it is fully seated, and secure with 4 screws.
- 4 Connect the three wires of the incoming RS232 cable from the CLH satellite connection to terminals 1, 2, and 3 of the terminal block as follows:
(Note: Connection designations refer to the function of the NADIN end of the connection (TX, RX); these designations connect to their opposite counterparts on the satellite end. For example, TX on the NADIN end connects to RX on the satellite end.)
 - Connect the wire from the satellite RX line to pin 1 (TX) on the terminal block.
 - Connect the wire from the satellite TX line to pin 2 (RX) on the terminal block.
 - Connect the ground wire to pin 3.



NADIN Interface Connection and Checkout

The 2090 Central Data Processor is capable of interfacing to two NADIN systems: CLH and ARINC. NADIN allows the local AWOS weather information to be sent to remote users at Flight Service Stations, DUAT terminals, and other weather information systems. Both

CLH and ARINC allow AWOS data to be sent to remote systems via telephone or satellite uplinks. CLH also allows lightning information to be processed via a satellite downlink.

The NADIN interface is transparent to the AWOS user. No periodic maintenance is required. Once the initial connection as described below has been established, no further action is required.

CLH Interface

If the CLH Z-Link satellite interface is used, the 20909 interface unit will contain an interface board (installed above) to connect to the RS232 serial data interface of the Z-Link system. This interface is 1200 baud, 8 data bits, no parity, and 1 stop bit. This interface also allows optional lightning detection data to be received by the AWOS CDP if this service has been requested. The 2090 CDP is then able to voice, display, print, and archive lightning/thunderstorm information.

Connect a cable from the Z-Link System to the 20909 CLH NADIN interface board as specified in **step 4** above, then follow the steps below to check operation of the interface.

- 1 Perform CDP checkout as explained on the next page.
- 2 Power on the AWOS and the Z-Link Systems.
- 3 Using diagnostics available on the Z-Link System, confirm that the AWOS transmits the binary ADAS message every minute. If data is not received, check the Tx and Rx communication lines. They may need to be swapped.
- 4 If a lightning interface is available, verify that the AWOS transmits "TMOK" in response to lightning input data messages. If data is not received, check the Tx and Rx communication lines. They may need to be swapped.
- 5 If no data is sent by the AWOS to the NADIN interface, confirm with the AWOS Configuration program, that the output to NADIN is enabled.
- 6 If no lightning data messages are displayed by the AWOS and lightning data is active on the Z-Link system, confirm with the AWOS Configuration program that NADIN Lightning Input is enabled.
- 7 Replace the Peripheral Interface cover.

ARINC Interface

If the ARINC NADIN interface is used, follow the steps below to connect the interface and check its operation.

- 1 Perform CDP checkout as explained below.
- 2 Connect a data cable with a DB-9 connector to the 20901's Serial 2 port.
- 3 Connect the other end of the data cable to the ARINC equipment.
- 4 The AWOS will output a METAR formatted text message, ASCII, 9600 baud, 8 data bits, no parity, 1 stop, every five minutes. Verify using ARINC diagnostics that the data is being received from the AWOS. If data is not received, check the Rx and Tx data communication lines. They may have to be swapped. If no communication is observed, check the 20901 BIOS settings for UART2 and verify that it is set according to the setup parameters in this manual.

The interface inside the 20909 chassis is not required for ARINC NADIN interfaces. All Weather Inc. also recommends that an RS232 surge suppressor be installed in-line with the RS232 data. This will help prevent damage to the AWOS CDP in the event of a surge on the RS232 data lines.

UPS Installation

Models 20913-D/F

If a Model 20913-D or F uninterruptible power source (UPS) is used at the CDP, install it and connect the CDP components as follows:

- 1 Connect a six-outlet power strip to an outlet on the UPS.
- 2 Connect the System Unit, Peripheral Interface, and monitor to the UPS.
- 3 Connect the 1791 VHF radio, speaker power supply, and printer to the outlet strip.
- 4 Connect the UPS to a properly grounded AC outlet.
- 5 Power on the outlet strip.
- 6 Power on the UPS.

KVM Extender Installation

The KVM Extender kit (M488300-00) contains the KVM extender module and all of the components required to have a second, or remote station attached to the CDP. The KVM extender module consists of two

units, a transmitter (located at the CDP computer) and the receiver (located at the desired use location).



Each of the two units have their own power supply and are connected to each other through a standard CAT5 (or better) patch cord up to 500 feet apart. Both units can have a keyboard, mouse, monitor, and microphone connected. Each set can access the CDP and both monitors will show the same display. The DIP switch on the back and the selector switch on the front of the transmitter module should be left in their default position. Refer to the manual provided with the KVM extender modules for more information on the switch settings.

- 1 Install the System Unit PC in a location where convenient access to power and to the necessary communication links is available.
- 2 Connect the DB25 end of the cable provided with the transmitter module of the KVM to the input connector on the back of the transmitter module.
- 3 The CDP monitor can be installed on its included desktop stand, or mounted to a wall using the M488297-00 wall mount kit. Follow the instructions included with the kit to install the

wall bracket and monitor. A 35' monitor extension cable is included in the kit for installations where the monitor is located away from the CDP.

- 4 Connect the Monitor to the monitor connector on the back of the transmitter unit. Connect the monitor connector on the DB25 cable to the monitor port on the back of the System Unit PC.
- 5 Connect the keyboard and mouse connectors on the DB25 cable to the two input connectors on the provided Y-cable, then connect the Y-cable to the DIN port on the back of the System Unit PC. Connect the CDP mouse to the mouse port on the front of the transmitter module. Connect the CDP keyboard to the keyboard port on the front of the transmitter module.
- 6 Connect the printer (if used) to the parallel port on the back of the System Unit PC.
- 7 Connect the CDP microphone to the microphone connector on the front of the transmitter module. Connect one of the 3.5mm stereo cables provided with the transmitter module to the MIC IN connector on the sound card and the microphone connector on the back of the transmitter module.
- 8 Set the Voltage Selector Switches to the proper settings, if not auto-switching.
- 9 Connect the System Unit PC power cord to a compatible power source.

Two speakers connect to the System Unit. One speaker is the main speaker, to which all speaker cables connect. This speaker also powers the second (left) speaker.

- 10 Connect the speaker power cord to the main speaker.
- 11 The speaker INPUT cable connects to the speaker jack on the front of the transmitter module. Connect the other 3.5mm stereo cable provided with the transmitter module to the speaker jack on the back of the transmitter module and J8 on the Peripheral Interface PCB after installation of the Peripheral Interface in the next section.
- 12 Connect the interface cable to the 1791 radio (if used) as explained in the *Model 1791 User's Manual*.

- 13 Set up the printer according to the printer manual (ribbon, paper, etc.) and connect to the System Unit's printer port.
- 14 Power on the System Unit and set the system clock to the current GMT.
- 15 Connect a CAT5 (or better) patch cord to the back of the transmitter module at the REMOTE I/O RJ-45 jack.
- 16 Connect the power supply provided with the transmitter module (the power supply for the transmitter and receiver modules are the same) to the power jack on the back of the transmitter module. Plug the power supply into AC power.
- 17 The remainder of the KVM extender kit is installed at the desired use location for the remote station. When routing the patch cord from the transmitter module to the location for the remote module, ensure that the patch cord is protected from damage and is not readily accessible. Plug the patch cord into the REMOTE I/O RJ-45 jack on the back of the receiver module.
- 18 The extender kit monitor can be installed on its included desktop stand, or mounted to a wall using the M488297-00 wall mount kit. Follow the instructions included with the kit to install the wall bracket and monitor. A 35' monitor extension cable is included in the kit for installations where the monitor is wall mounted.
- 19 Connect the monitor cable to the monitor connector on the back of the receiver module.
- 20 Connect the 3.5mm stereo cable provided with the monitor to the speaker jack on the monitor and the speaker jack on the front of the receiver module. The volume of the speakers built in to the monitor can be adjusted using the monitor's controls.
- 21 Connect the keyboard to the keyboard connector on the front of the receiver module. Connect the mouse to the mouse connector on the front of the receiver module.
- 22 Connect the microphone to the microphone connector on the front of the receiver module.
- 23 Connect the power supply provided with the receiver module (the power supply for the transmitter and receiver modules are the same) to the power jack on the back of the receiver module. Plug the power supply into AC power.

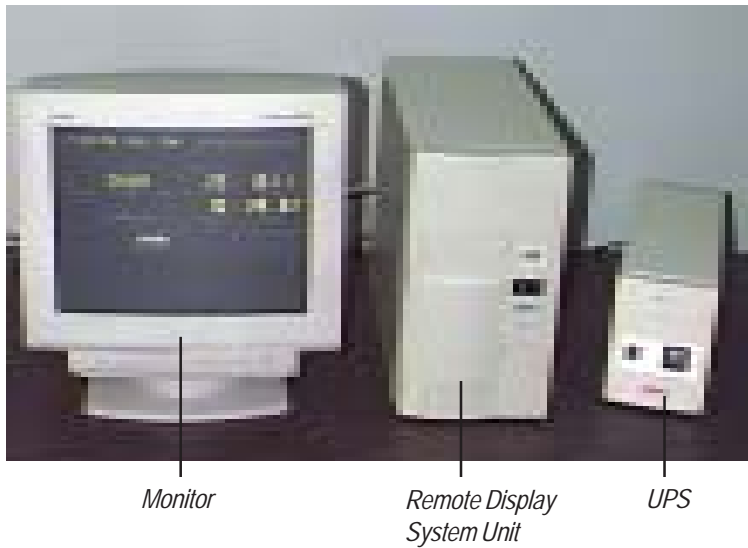
CDP Checkout

- 1 Power on the UPS, if used.
- 2 Power on the CDP system (System Unit, monitor, printer, speakers).
- 3 Power on the Peripheral Interface.
- 4 Power on the VHF radio.
- 5 Verify that the system boots and that the AWOS program starts.
- 6 Verify printer, display, keyboard, mouse, speaker, VHF radio, and telephone modem operation.
- 7 Replace the cover on the Peripheral Interface.
- 8 If the KVM Extender kit is installed, verify the operation of the remote display, keyboard, mouse, microphone, and speakers.

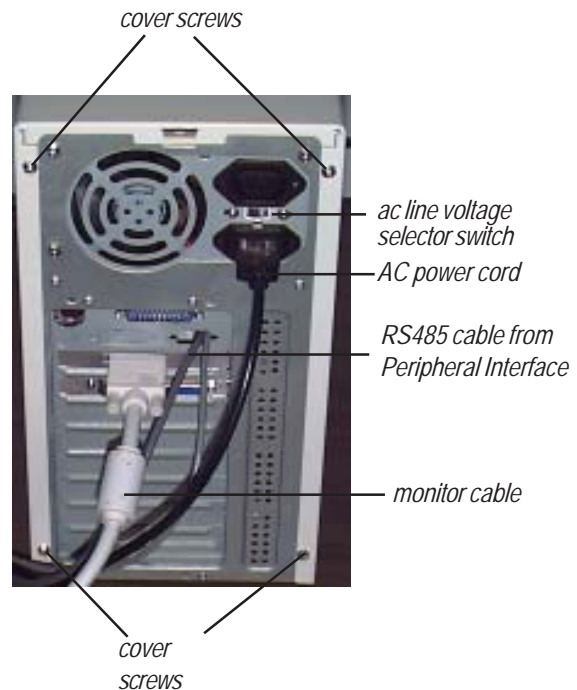
Remote Display Installation

This section describes how to install a new Model 2091 Remote Display for use in a 900 Series AWOS. Use caution in performing all of the following steps to prevent damage to the equipment due to electrostatic discharge. Work should only be performed by qualified service personnel in a suitable environment.

All the Remote Display equipment will fit on a desktop that is at least 30" x 60". The Remote Display must be located in a conditioned space where the temperature is maintained between 40° and 105° F, and between 5% and 90% relative humidity, and within three feet of an outlet with 120VAC or 220VAC, 50 or 60Hz. The Remote Display requires 200VA, and should be on a dedicated 15Amp circuit.



1) Remote Display System Unit, rear view, showing a typical final configuration. To remove the cover, remove the six Phillips head screws shown.





2) Remote Display System Unit cover removal.

After removing the screws from the rear panel, slide the Remote Display System Unit's cover back several inches, then lift the cover up and off.



RS485 cable from
Peripheral Interface



4) Remote Display internal PCB (M404813). Connect the incoming RS-485 cable from the Peripheral Interface to J2, pins 5 (-) and 6 (+). Connect the Wind Reporter's data cable to J2, pins 7 (-) and 8 (+).

(Note: Consult All Weather Inc. for RS-485 cable specifications. Special cable may be required for runs longer than 100'.)

3) Remote Display System Unit rear panel. Route the Peripheral Interface data cable and Wind Reporter data cable in through the Remote Display System Unit's back panel.



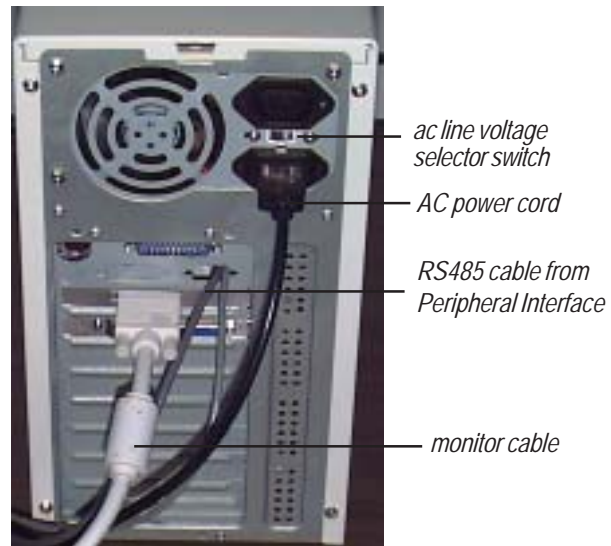
5) Removing the floppy drive cover from the Remote Display System Unit When installing software, it is first necessary to expose the floppy disk drive. To do this, gently pry the cover from the floppy drive bay with a small screwdriver as shown.

6) Remote Display System Unit with floppy drive cover removed. Insert the Remote Display software disk in the floppy drive and replace the drive cover.



Remote Display Connections

- 1 Set the line voltage selector switches on the Remote Display System Unit and Wind Reporter to the proper settings.
- 2 Connect the Wind Reporter data cable from the Remote Display System Unit to the DB9 connector on the Wind Reporter.
- 3 Connect the monitor and power cables to the Remote Display System Unit's rear panel connectors.
- 4 Connect the power cables from the System Unit, Monitor, and Wind Reporter to an AC source. If a UPS is used, connect the power cables to outlets on the UPS and connect the UPS to the AC source.

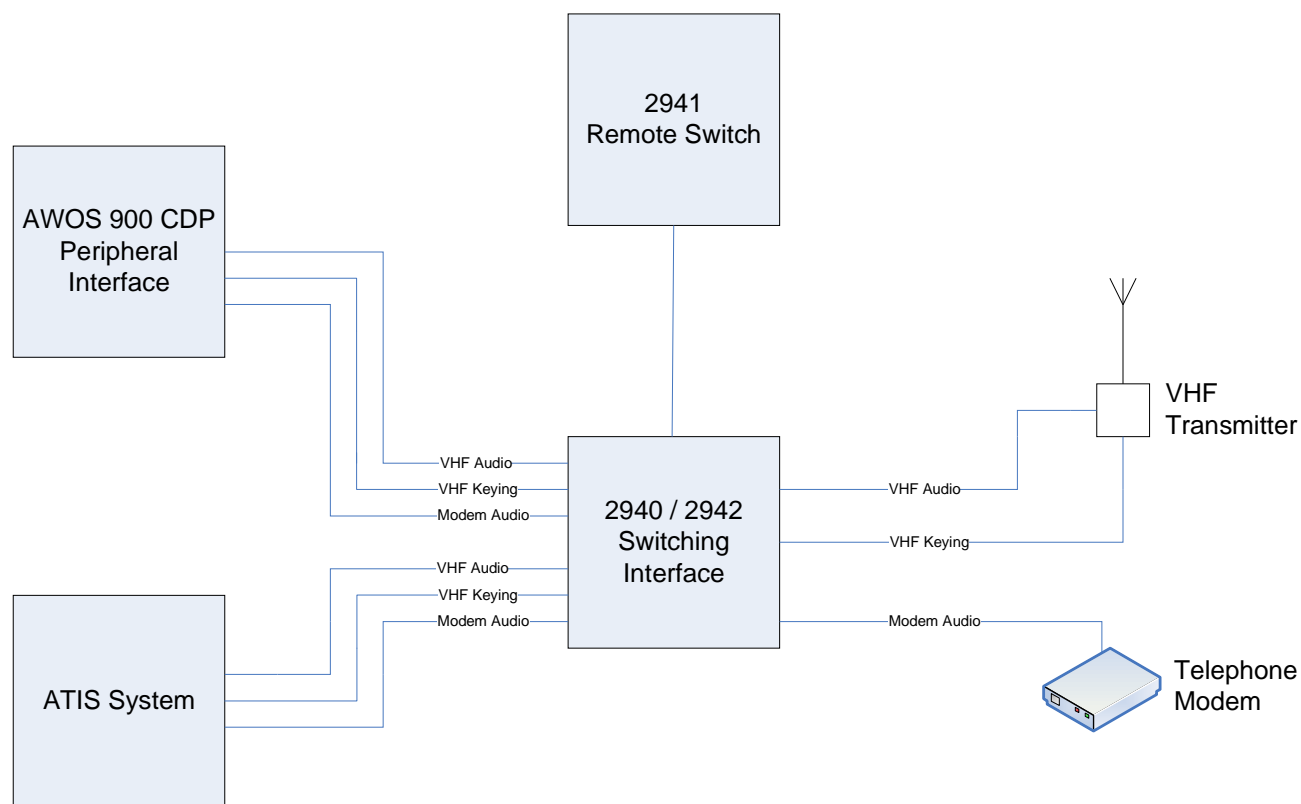


Remote Display Checkout

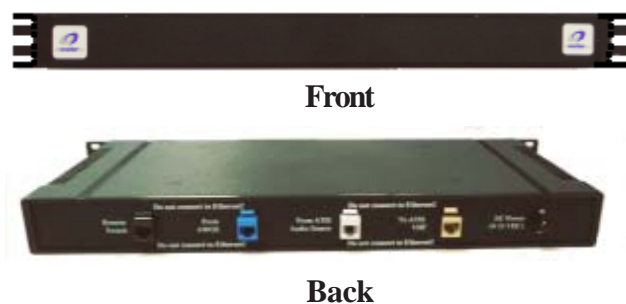
- 1 Power on the UPS, if used.
- 2 Power on the CDP System Unit and Peripheral Interface
- 3 Power on the Remote Display System Unit.
- 4 Power on the Remote Display monitor.
- 5 Power on the Wind Reporter.
- 6 Set the Wind Reporter to "INST" mode.
- 7 Verify that data is displayed on the Wind Reporter and on the Remote Display monitor.

AWOS/ATIS Interface

This section describes how to install an AWOS/ATIS Interface for use in a 900 Series AWOS. The FCC Title 47 (regulation 87.527c) only allows one VHF frequency for sites that have both ATIS and AWOS systems. The AWOS/ATIS Interface connect the VHF and telephone modem outputs of both of these systems to one VHF transmitter and one telephone modem. A switch controls the mode of the VHF transmitter and modem. Power (+12V_{DC}) is supplied by the CDP Peripheral Interface.



There are two different enclosures for the ATIS Interface. The Model 2940 is a 19" rack mountable enclosure. This model fits into the standard ATIS communication rack or any other standard 19" rack. The 2940 is a one rack unit (1RU) enclosure. There is no external mode switch on the 2940, therefore a Remote Switch (Model 2941) is required.



The desktop enclosure for the ATIS Interface is Model 2942. This model has a LED and mode switch on the front of the enclosure and does not require the remote switch. However, the remote switch can still be used with this model.



The Model 2941 Remote Switch can be up to 1000 feet away from the ATIS Interface and is connected to the interface with a CAT5 (or better) patch cord. The Remote Switch has a switch guard over the switch to prevent the accidental switching to ATIS mode for the ATIS Interface. The switch guard must be lifted before the switch can be changed to AWOS mode. When the switch guard is closed, the switch is automatically switched to ATIS mode. There is a LED that is lit when the switch is in AWOS mode.

The ATIS Peripheral Interface cable (Model M491838-00) is include with both enclosure models (2940 and 2942). This cable provides the CAT5 (or better) patch cord connection to all of the required connections to the inside of the Model 20909 Peripheral Interface assembly. This cable connects to the power supply inside the Peripheral Interface as well as the modem audio and VHF radio outputs.



Installation

ATIS Peripheral Interface cable

The ATIS peripheral interface cable must be installed to allow the AWOS/ATIS Interface assembly to connect to the AWOS

- 1 Turn off the power switch on the AWOS Peripheral Interface (Model 20909).
- 2 Remove the side cover on the Peripheral Interface and lay the interface on its side.
- 3 Disconnect any existing connections at J2 terminals 1 through 4 as well as the J4 Telephone Audio jack.
- 4 Remove the coupler from the ATIS Peripheral Interface cable (Model M491838-00), as necessary, to feed the cable (RJ-45 connector side) from the inside of the peripheral interface, through the cable access with the other cables exiting the peripheral interface. Reattach the coupler to the RJ-45 connector on the end of the interface cable.
- 5 Wire the Brown wire pair from the interface cable to terminals 1 and 2 of J2 on the Peripheral Interface PCB. The Brown wire should be on terminal 1 and the WHT/BRN wire on terminal 2.
- 6 Wire the Green wire pair of the interface cable to terminals 3 and 4 of J2 on the board. The Green wire should be on terminal 3 and the WHT/GRN wire on terminal 4.
- 7 Plug the 3.5mm stereo jack on the Blue wire pair of the interface cable into J4 on the Peripheral Interface board.
- 8 Connect the 4-pin Molex connector on the Orange wire pair of the interface cable to one of the unused power cables from the power supply in the Peripheral Interface.

AWOS/ATIS Remote Switch Assembly

The Remote Switch, Model 2941, should be mounted where the mode of the AWOS/ATIS switch is controlled. The switch assembly can be mounted a vertical or horizontal surface with the provided machine screws.

A CAT5 (or better) patch cord must be run between the Remote Switch assembly and the AWOS/ATIS Interface assembly. This cable is not part of the kits

provided. It is recommended that this be a black cable or be marked in some way as a black cable to keep the color scheme of the interface assembly.

AWOS/ATIS Interface Assembly

The 2940 Rack Mount Interface assembly is mounted into any 19" equipment rack with the four 10-32 SEMS screws provided with the assembly. The normal location for the installation of this assembly is in the communication rack for the ATIS equipment. This rack has the punch down blocks to connect the ATIS to the VHF radio and the telephone modem.

The Model 2942 Interface assembly can be located anywhere between the AWOS and ATIS equipment, however, it is usually located with the AWOS Peripheral Interface (Model 20909). Regardless of which model of ATIS Interface is used, the connections to the interfaces are the same.

The back of the interface assembly has four RJ-45 jacks for the connections to the AWOS and ATIS equipment as well as the Remote Switch assembly. Each of these jacks are color coded to aid in the installation of the Interface assembly. Each of these jacks will have a patch cord connected as part of the installation (except for the Black jack if the Remote Switch is not used). Each of these patch cords should be routed to prevent undue stress on the cable and should preferably be protected with some kind of conduit or cable ducting.

- 1 The patch cord from the Remote Switch assembly (if used) must be connected to the Black RJ-45 jack on the back of the Interface.
- 2 The Blue RJ-45 jack receives the cable from the AWOS Peripheral Interface. If the Model 2942 is used, it is expected that the assembly is close enough to the Peripheral Interface that the coupler is removed from the Peripheral Interface cable and connected directly to the Blue jack on the back of the AWOS/ATIS Interface assembly. If the Model 2940 is used, the supplied Blue patch cord is used to connect the Peripheral Interface cable assembly to the Blue jack on the back of the Interface assembly.



Since the expected wiring of the ATIS to VHF radio and telephone modem is through a punch down block, a pair of short solid-wire patch cords and couplers have been provided. The couplers are just attached to the end of the long patch cord and to one of the ends of the short patch cord. The other end of the short cord is cut off and the insulation stripped back. These wires can now be used on the punch block to make the connects to the ATIS.

- 3** Route the White patch cord provided between the Interface assembly (white jack) and to the outputs provided by the ATIS system. These outputs are the VHF PTT Keying output, VHF audio output, and Telco audio output. The Green wire pair connects to the PTT Keying output of the ATIS. The VHF audio output connects to the Brown wire pair. The Telco audio connects to the Blue wire pair. Polarity of these wires is not important.

- 4** Route the Gray patch cord provided between the Interface assembly (silver/chrome jack) and the VHF radio and telephone modem audio input. The Green wire pair connects to the PTT keying input of the VHF radio. The Brown wire pair connects to the audio input of the VHF radio. The Blue wire pair connects to the audio input of the telephone modem. Polarity of these wires is not important.

Checkout

- 1** Power on the AWOS with the AWOS/ATIS mode switch in the AWOS position. Verify the red LED is lit.
- 2** Verify the AWOS audio is heard over the VHF radio and adjust modulation as necessary.
- 3** Verify the AWOS audio is heard over the telephone modem and adjust audio levels as necessary.
- 4** Switch the mode switch to ATIS.
- 5** Verify the ATIS audio is heard over the VHF radio.
- 6** Verify the ATIS audio is heard over the telephone modem.

Assembly

This section explains how to assemble and configure a Model 20901 System Unit, Model 20909 Peripheral Interface, and Model 2091 Remote Display for use in a 900 Series AWOS. These procedures are normally performed at All Weather Inc. prior to system integration, but are included for use during servicing of the system. Use caution in performing all of the following procedures to prevent damage to the equipment due to electrostatic discharge. Work should only be performed by qualified service personnel in a suitable environment.

Model 20901 System Unit Assembly and Configuration

This section explains how to assemble and configure a Model 20901 System Unit for use in a 900 Series AWOS, and how to install new software or hardware in the system unit. This procedure is normally performed at All Weather Inc. prior to system integration, but is included for use during servicing of the system unit.

Unpack and identify the following components:

- 20901 central processor unit (Pentium 133 or higher, 16 Mb ram or more, 1.2 GB hard disk or greater, 3.5" floppy drive, 4 free ISA slots, 2 serial ports, 1 parallel printer port)
- M482179-00 monitor
- M406060 2-button PS2 mouse
- M406059 keyboard with PS2 connector
- M406061 mouse pad
- 20904 speakers
- 20906 microphone
- 20903 sound card (Creative Labs Soundblaster Model SB2961)
- 20905-A telephone modem

- 1 Connect the keyboard, monitor, and power cables to the 20901 unit
- 2 Power on the monitor and CPU
- 3 Verify operation of the monitor, system unit, and keyboard
- 4 Re-boot the system unit (press CTRL-ALT-DEL)
- 5 Power off the CPU
- 6 Remove the power cable, keyboard cable, and monitor cable from the system unit
- 7 Remove the cover from the system unit.
- 8 Install the sound card and serial card.
- 9 Use a Phillips screw driver to fasten the cards into place with the card panel mounting screws.
- 10 Set the CPU card jumpers to enable the timer, and set the timeout period to the maximum available.
- 11 Reinstall the chassis cover and secure the screws.

Software Installation

Install each of the following floppy disks from DOS:

- Mouse driver
- Sound card drivers
- Time standard drivers
- AWOS words
- AWOS system programs

For each disk:

- 1 Insert the disk in drive A:.
- 2 Select drive A: by typing "A:", then hitting Return.
- 3 Type the command "INSTALL", then hit Return.

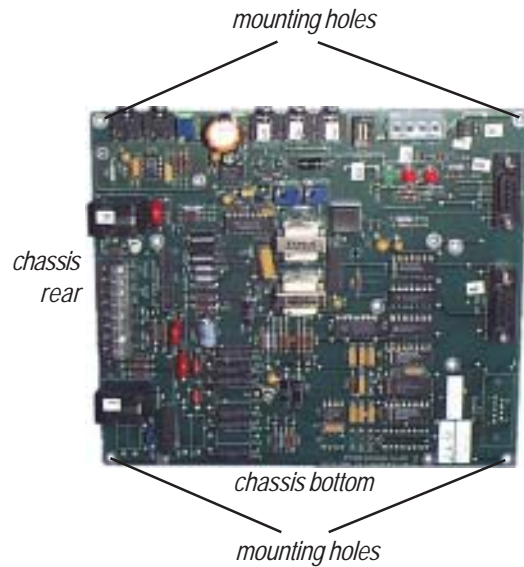
Peripheral Interface Assembly

The Peripheral Interface (20909) is housed within a separate enclosure with the UHF/VHF Data Link Radio (if used) and optional NADIN interface. The Peripheral Interface provides the circuitry and connections necessary for supporting a NADIN interface, UHF Radio, VHF radio, DCP landline connection, speakers, and telephone connection. It includes RS-232 to RS-485 modems with surge suppression, telephone line surge suppression, and audio filtering circuits. This section describes how to assemble a new Model 20909 Peripheral Interface for use in a 900 Series AWOS. This procedure is normally performed at All Weather Inc. prior to system integration, but is included for use during servicing of the system unit. Use caution in performing all of the following steps to prevent damage to the equipment due to electrostatic discharge. Work should only be performed by qualified service personnel in a suitable environment.

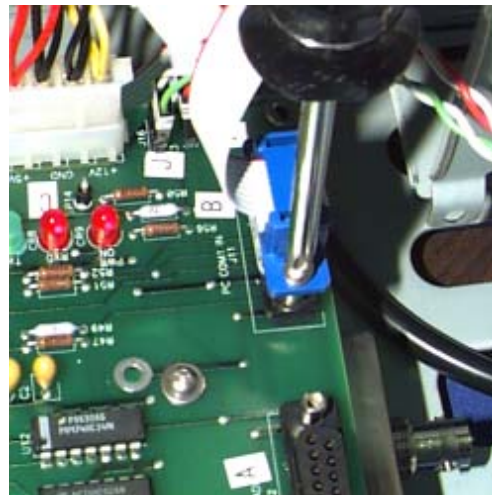
- 1 Remove the cover from the Peripheral Interface.
- 2 If a data link radio is to be used, mount the radio to the Peripheral Interface PCB (M404810) before installing the PCB in the case.
- 3 Mount the data link radio to the underside of the Peripheral Interface PCB through the mounting holes shown.
- 4 Connect the data link radio cable to the radio.



- 5 Mount the Peripheral Interface PCB (M404810) to the standoffs within the Peripheral Interface case with screws inserted through its corner holes, oriented as shown.
- 6 Set jumper JP1 for the type of data link used:
 - **Installed** for RS-485 landline
 - **Removed** for radio data link

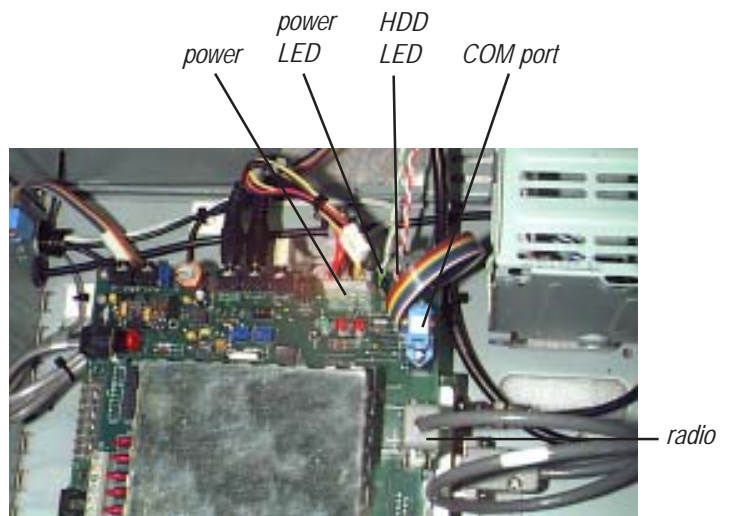


- 7 Connect the ribbon cable from the case's external COM port connector to J11 on the Peripheral Interface PCB, and screw down.



- 8 Connect the internal cables to the Peripheral Interface PCB:
 - data link radio cable to J12; screw down
 - power cable to J10
 - Power LED to J16
 - HDD LED to J17

Note: If the power LED does not come on after power is applied, reverse the PCB connector. If the HDD LED stays on steadily after applying power, reverse its PCB connector.



Source	Cable Part Number	System Unit Connector	Peripheral Interface Connector
Voice/RMM modem card (System Unit)	part of 20905-A	MODEM	DB25 MODEM
Sound card (System Unit)	M491553	SPK OUT	J7 (VOICE IN)
Telephone line	n/a	n/a	J1 (PHONE IN)
RS-485 landline (if used)	n/a	n/a	RS-485 converter D+, D-, and gnd
Remote displays (if used)	n/a	n/a	RS-485 converter D+, D-, and gnd
VHF radio	M491686	n/a	J2: pin 1--WHITE; pin 2--GREEN; pin 3--RED; pin 4--BLACK
Speakers (INPUT)	part of 20904	n/a	J8 (SPK OUT)
Data link radio antenna	M491361	n/a	ANT on data link radio

Peripheral Interface Connections

- 9 Route the external cables from the System Unit, telephone line, RS-485 landline (if used), remote displays (if used), and VHF radio through the hole in the case's rear panel and connect to the Peripheral Interface PCB as shown in the *Peripheral Interface Connections* table.
- 10 Install the NADIN interface cable, if used.
- 11 Bundle the cables on the inside of the Peripheral Interface chassis with the provided cable clamps and hardware.
- 12 Use cable ties every 12" to secure the cables on the outside of the Peripheral Interface. Install flex guard tubing between the System Unit and Peripheral Interface.
- 13 Set the Peripheral Interface line voltage selector switch for the proper voltage, and connect the power cable to the power input connector on the rear panel.
- 14 Connect the serial cable from the System Unit (M491552) to the DB9 COM 1 connector on the rear panel.

CDP Checkout

- 1 Power on the UPS, if used.
- 2 Power on the CDP system (System Unit, monitor, printer, speakers).
- 3 Power on the 20909 Peripheral Interface.
- 4 Power on the VHF radio.
- 5 Verify that the system boots and that the AWOS program starts.
- 6 Verify printer, display, keyboard, mouse, speaker, VHF radio, and telephone modem operation.
- 7 Replace the cover on the Peripheral Interface.

Replacing a 20905-A Internal Modem with the 20905-A External Modem Kit

If replacing an existing 20905-A internal modem with the 20905-A external modem, follow the instructions below. The external modem replaces the internal modem card, and mounts inside the peripheral interface.

- 1 Turn off the System Unit and Peripheral Interface.
- 2 Disconnect the phone cable and audio cable from the rear of the System Unit.
- 3 Open the System Unit.
- 4 Remove the 20905-A modem card.
- 5 Install the serial card (M406076) in place of the modem card.
- 6 Close the System Unit.
- 7 Open the Peripheral Interface.
- 8 Two cables that are routed to the outside of the Peripheral Interface will be connected to the external modem inside the Peripheral Interface. Pull these two cables into the Peripheral Interface: a) the phone cable connected to the Phone Out connector on the interface board; and b) the audio cable connected to J4 on the interface board.
- 9 Connect the audio cable to the MIC input on the external modem.
- 10 Connect the ribbon cable (M491592) to the DB25 connector on the external modem.
- 11 Connect the phone cable removed from the computer (and connected at the other end to the interface board's PHONE OUT connector) to the LINE connector on the modem.
- 12 Connect the modem power cable (M491815-00) to the back of the modem. Plug the other end of the cable into one of the power connectors on the power supply.
- 13 Remove the plastic film from the Velcro on the modem and attach it to the bottom of the Peripheral Interface as far toward the front of the chassis as possible.
- 14 Connect the female end of the ribbon cable to the back panel of the Peripheral Interface (the metal cover for the DB25 port may have to be removed) using the jack sockets (M408202-00) and flat washers (M009034-00).
- 15 Close the Peripheral Interface.
- 16 Connect the DB25-to-DB9 cable between the installed DB25 connector on the back of the Peripheral Interface and the bottom serial port on the System Unit's serial card.



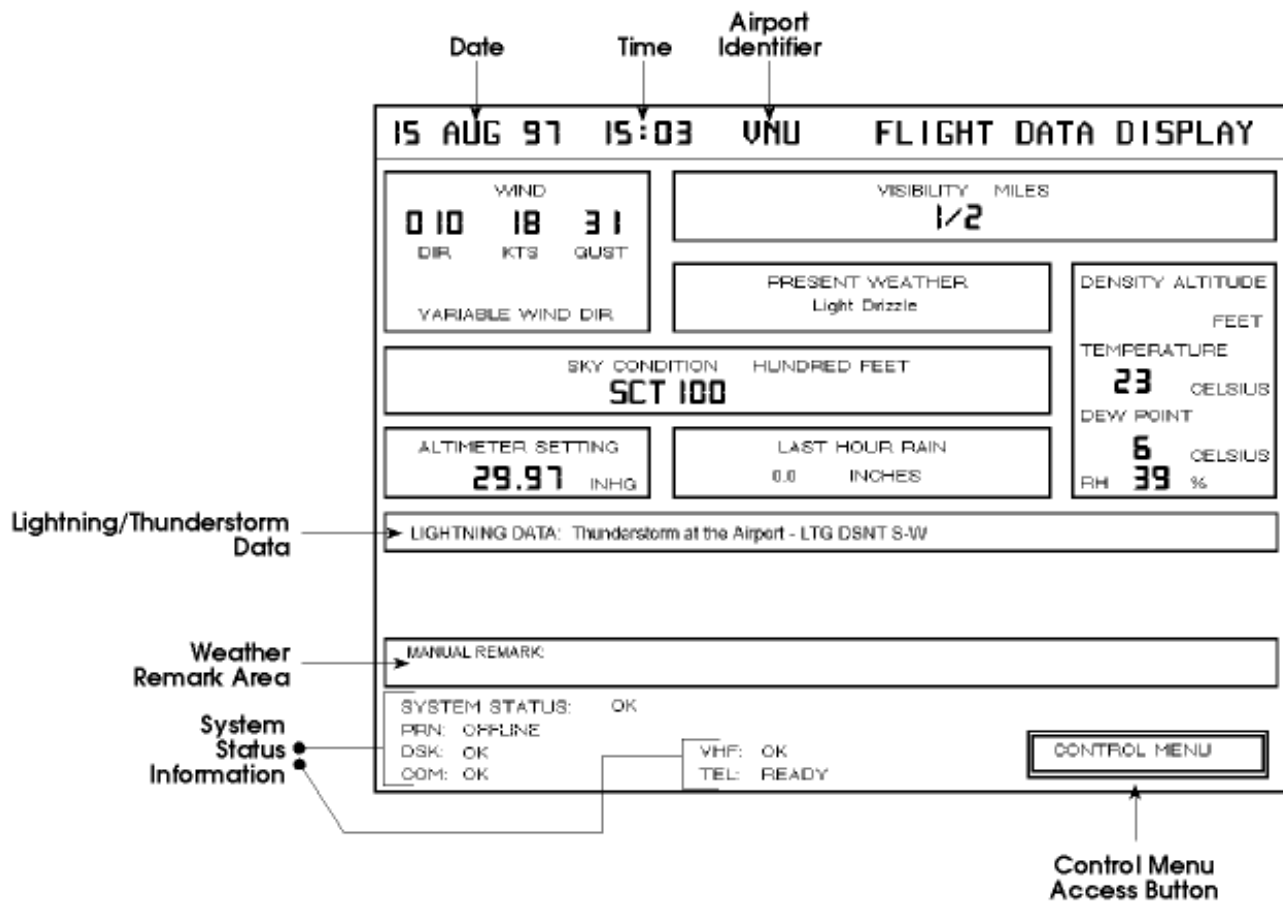
Main Display

The main display screen (**Figure 2**) shows the current reported weather conditions for all the sensors in an easy-to-read window format. The measured parameters are clearly marked, with current values shown in large, bold numbers. If data has not been received from a sensor, or if the sensor has been turned off (see *Turning Sensors On and Off*), the data display will be blank. If an error has been detected on the sensor, an error message will be shown in the specified error color (set through the *Color Setup Menu*).

In addition to sensor data, the main display also shows:

- date
- time
- airport identifier
- manually entered weather remarks
- system status

(Figure 2) Main screen



System Information

Date	Displays the current system date. This is set from the primary station's Maintenance Menu. The date should be set to the UTC date.
Time	Displays the current system time. This is also set from the primary station's Maintenance Menu, and should be set to UTC time.
Airport ID	Displays the three- or four-character airport identification code.

Sensor Displays

Immediately below the system information line (showing date, time, airport name, and active runway) are the sensor data windows. Each window contains the sensor data for a specific weather parameter or set of parameters. Wind speed and direction, for instance, are found within the Wind data window.

Wind

Values for wind speed, direction, gust, and variable direction are shown in the wind window. Wind direction and variable direction are shown in degrees magnetic; wind speed and gust are shown in knots.

Visibility

Visibility is measured by the forward scatter visibility sensor, and is reported in statute miles.

Present Weather

The present weather sensor discriminates between different types of precipitation and calculates the rate of precipitation. The possible precipitations types that may be shown in the display are:

Light Drizzle
Moderate Drizzle
Heavy Drizzle
Light Rain
Moderate Rain
Heavy Rain
Light Precipitation

Moderate Precipitation
Heavy Precipitation
Light Snow
Moderate Snow
Heavy Snow
Freezing Drizzle
Freezing Rain
Mist
Haze
Fog
Freezing Fog
No Precipitation

With the addition of optional hardware, several further weather types can be detected and displayed:

Light Ice Pellet
Moderate Ice Pellet
Heavy Ice Pellet
Light Hail
Moderate Hail
Heavy Hail

There are several error or maintenance messages that may also appear, indicating the type of maintenance to be performed or the nature of the error. The possible messages are:

INOPERATIVE
CLEAN LENSES
SENSOR RESET
COMM ERRORS
NOT REPORTING
DATA ERROR

ERROR XXXX where XXXX is a status code consisting of four hexadecimal characters (see *Table 2* in the ***Maintenance Menu*** chapter of this manual)

Rainfall rate is shown in a separate display window.

Density Altitude/Temperature/

Dew Point/RH

Values for density altitude, temperature, dew point temperature, and relative humidity are all displayed within the same window. Temperatures are reported in degrees Celsius, and relative humidity in percent. Density altitude is calculated and reported in feet.

Sky Condition

A laser ceilometer measures sky condition and cloud height, reporting both the type of cloud cover and the height of detected clouds. The type of cloud cover is represented by the following codes:

- FEW**—few ($\geq 6\%$ to 24% sky cover)
- SCT**—scattered ($\geq 25\%$ to 49% sky cover)
- BKN**—broken ($\geq 50\%$ to 87% sky cover)
- OVC**—overcast ($> 87\%$ sky cover)
- VV00n**—indefinite ceiling (haze or fog)

The definition of these codes is shown in the Averaging Table in the chapter titled **AWOS Basics**. Cloud height is shown in hundreds of feet (12,000 feet, for instance, is represented by “120”).

Altimeter Setting

Altimeter setting is displayed in inches of mercury. The direct readings of the two pressure sensors can be seen using the *Diagnostic Display On/Off* command on the Maintenance Menu. When the diagnostic display option is ON, the altimeter setting window will include values for BP#1 and BP#2.

Last Hour Rain

The rainfall over the last one-hour period is calculated by the rain gauge, or by the present weather sensor based on the type of precipitation detected and the calculated rate, and is reported in 0.01” increments. This value is updated every five seconds.

Thunderstorm/Lightning Data

Thunderstorm/lightning data is reported for any lightning activity detected within a 30 nm radius of the installation site. Lightning data is divided into three distance ranges:

- 0 to < 5 nm
- 5 nm to 10nm
- > 10 nm to (and including) 30nm

Lightning detected in the first range (within 5nm) is reported as “Thunderstorm at airport” in the body of the voice report with the present weather data. The screen display will show **Thunderstorm at the Airport** in the lightning data section.

Lightning detected in the second range (between 5nm and 10nm) is reported as “Thunderstorm in the vicinity” in the body of the voice report with the present weather data. The screen display will show **Thunderstorm in the Vicinity** in the lightning data section.

Lightning detected in the third range (greater than 10nm, up to 30nm) is reported in the remarks section of the voice report as follows:

- If lightning is detected in two octants, both will be reported with “and” separating them. (For example: “Lightning distant North and Southeast” if octants 1 and 4 are active).
- If lightning is detected in three octants, the data will be reported as a range if the octants are contiguous or if the strikes are spread between four contiguous octants. (For example: “Lightning distant North through East” if octants 1, 2, and 3 are active; or “Lightning distant North through Southeast” if octants 1, 2, and 4 are active). If more than one octant separates any of the three active octants, or if the three active octants are spread across more than four contiguous octants, the data is reported with “and” separating the octant descriptors. (For example: “Lightning distant North and Southeast and Northwest” if octants 1, 4, and 8 are active).
- If four contiguous octants are active, the data is reported as a range. (For example: “Lightning distant North through Southeast” if octants 1, 2, 3, and 4 are active).
- If four non-contiguous octants are active, or if five or more octants are active, the data is reported as “Lightning distant all quadrants”.
- Examples of the screen display are:

LTG DSNT N
LTG DSNT N AND E
LTG DSNT N – SE

Thunderstorm/lightning reporting is in accordance with the following documents:

1. FAA Advisory Circular 150/5220-16C
2. Surface Weather Observing 7900.5B

Weather Remark Area

This window shows any current weather remark. A weather remark is a one-line message entered by the operator from the *Operator Menu*.

System Status Information

SYSTEM

STATUS Displays general system-generated messages.

PRN Displays the status of the system printer. It may indicate: “OK” if operation is normal; “PAPER OUT”; “NOT READY”; or “OFFLINE”. The printer may be taken offline from the Operator Menu’s *Printer Control Menu*.

DSK Displays the status of the system disk drive used for data archiving. It should indicate “OK” for normal operation.

COM Indicates “OK” if data is being received from the sensor station. “ERROR” will be displayed if data is not being received properly from the DCP.

VHF Indicates the on (“OK”) or off (“OFF”) status of the VHF voice radio. This setting is controlled from the Operator Menu’s *Voice Control Menu*.

TEL Indicates the off (“READY”) or on (“ONLINE”) status of the telephone system used to answer incoming calls and output voice message reports. This setting is controlled from the Operator Menu’s *Voice Control Menu*.

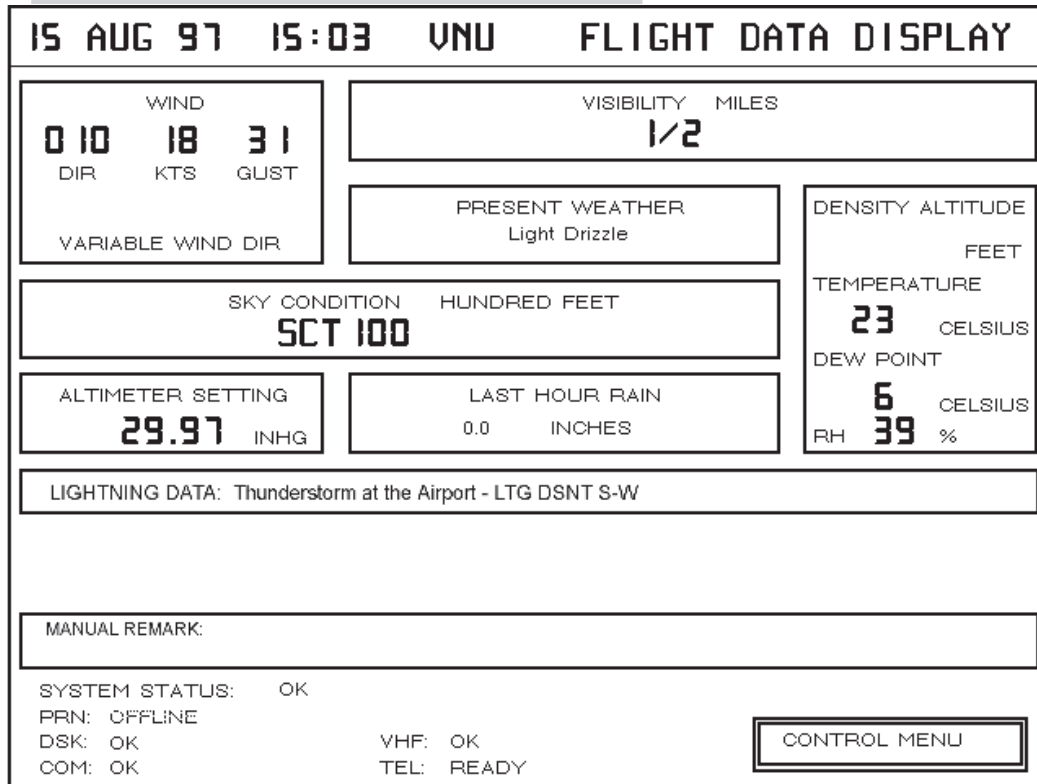
Control Menu

The *Control Menu* key calls up the Control Menu, which offers an array of configuration, maintenance, and archive options. These options are explained in detail in the following chapters.

Getting Help

Click the *Help* button on any menu to see an explanation of the functions available from that menu.

User's Menu



(Figure 2) To configure or change system settings, position the mouse's cursor over the "Control Menu" button, located in the lower right-hand corner of the display screen, and click. The Control Menu (Figure 4) will appear.

The AWOS user's software—available at the CDP—utilizes an interactive menu system to configure and operate the AWOS. **Figure 2** is an example of a typical main display screen, showing the range of reported meteorological conditions with full sensor operation. With the click of a mouse, the user can customize the system's operation or access nested menus containing data archive and system maintenance controls. At any menu, click the mouse on the *HELP* button to see a summary of the functions of all the keys on the menu.

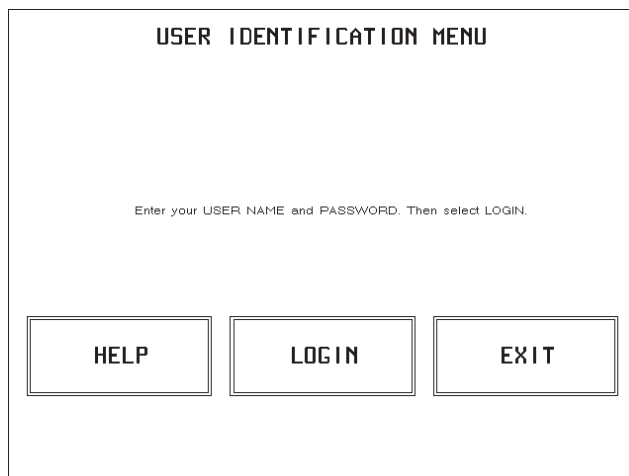
Logging In and Out

The AWOS is protected against unwanted access by a built-in password system. This system prevents unauthorized users from gaining access to any of the user's menus.

The first time the *Control Menu* button is clicked, the screen shown in **Figure 3** will appear, requesting the user to enter his or her user identification code. To log in, type your user identification code and password using the keyboard (if you do not have a user identification code and password, see your system administrator to obtain one), then click *Login*. (Note: The data entered on the keyboard will not be shown on the display.)

If you have entered a valid user identification code, the Control Menu will appear. If the Control Menu does not appear, reenter your user identification code and again click *Login*. If the Control Menu still does not appear, see your system administrator.

To return to the main screen, click *Exit*.



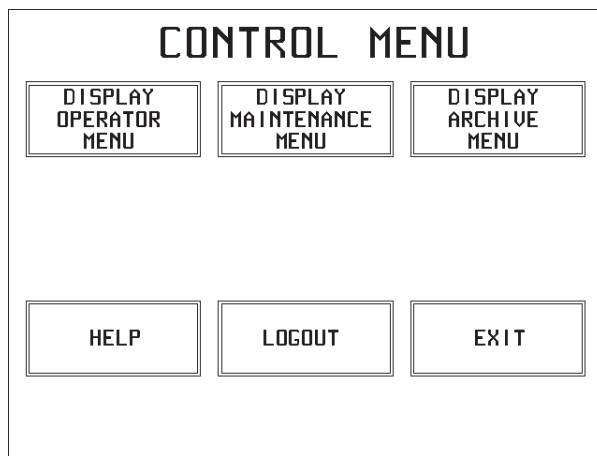
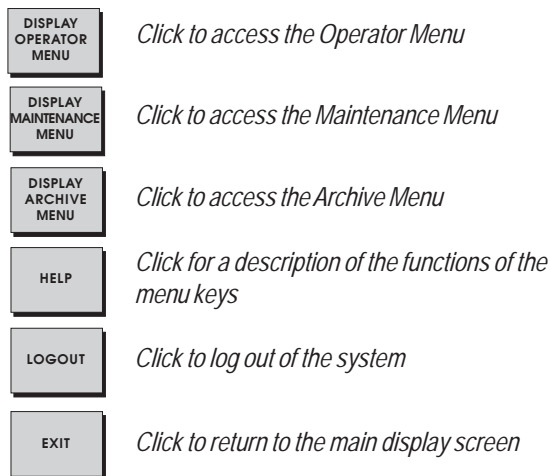
(Figure 3) User identification menu.

To log out of the system and return to the main screen, click *Logout* on the Control Menu. This will prevent access to the user's menus by unauthorized persons, since a user identification code will need to be entered again to regain access to the menus.

Control Menu

The Control Menu (**Figure 4**) gives the user access to the various operating menus. Each submenu of the Control Menu is restricted to use by those with access privileges to that menu. If you are not authorized to use a certain menu, the Control Menu will remain on the screen and you will hear a beep. The available submenus are:

- Operator Menu
- Maintenance Menu
- Archive Menu

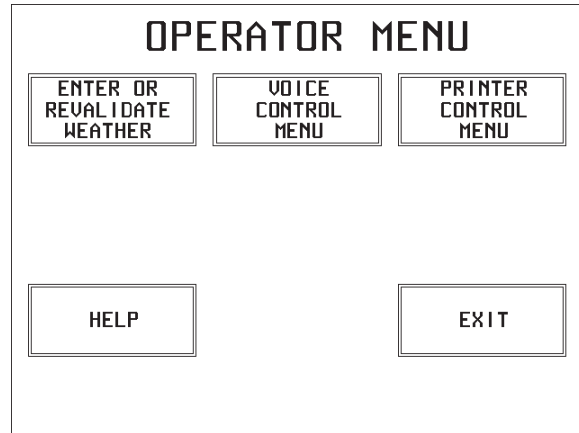


(Figure 4) Control menu.

Operator Menu

Through the Operator Menu (*Figure 5*), the user can:

- Enter or revalidate a weather remark
- Enter and control voice remarks
- Change printer settings

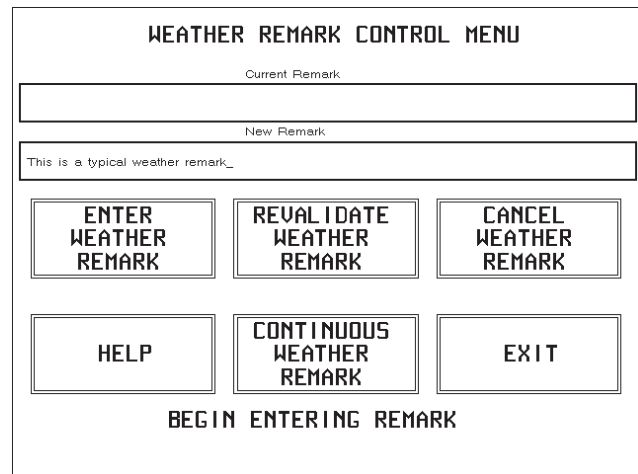


(Figure 5) Operator menu.

Weather Remark Control Menu

The Weather Remark Control Menu (*Figure 6*) allows the user to enter a weather remark to communicate with users at other stations. (Weather remarks are also sent to the optional NADIN interface, if one is used.) To access this menu, click on the *Enter or Revalidate Weather* button at the Operator Menu. The screen at right will appear.

- To begin entering a weather remark, click on the *Enter Weather Remark* button, and begin typing. When done, click *Exit* to activate the weather remark. Weather remarks can be up to 71 characters in length. Each remark remains valid until 55 minutes past the hour. Remarks entered between 45 and 59 minutes past the hour will remain valid until 55 minutes past the following hour. Remarks entered up to 44 minutes past the hour will remain valid until 55 minutes past the current hour.
- To revalidate the current weather remark, click on the *Revalidate Weather Remark* button. If not revalidated, the remark will be terminated.



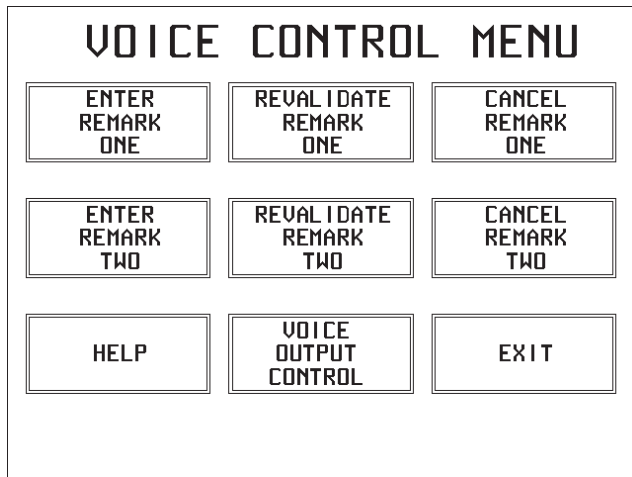
(Figure 6) Weather remark control menu.

- To cancel the current remark, click on the *Cancel Weather Remark* and the current remark will be terminated.
- To maintain perpetual display of the weather remark, click on the *Continuous Weather Remark* button. The remark will remain valid until changed or cancelled by the user. To return to the Operator Menu, click the *Exit* button.

Voice Control Menu

The Voice Control Menu (**Figure 7**) allows the user to enter, revalidate, or cancel voice remarks, and to control the output of the AWOS voice report.

- To access the Voice Control Menu, click on the *Voice Control Menu* button on the Operator Menu.



(Figure 7) Voice control menu.

Voice Remarks

Up to two voice remarks can be stored and output concurrently by the system. They are recorded using a microphone on site. Several time constraints apply to voice remarks:

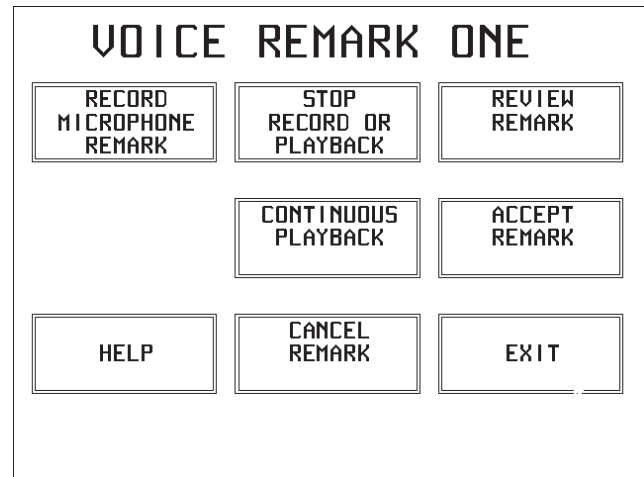
- Voice remarks must be revalidated hourly if they have not been set to continuous playback mode.
- If a voice remark is recorded between 5 minutes before the hour and 45 minutes after, it will be broadcast until 55 minutes after the hour.
- If a voice remark is recorded between 45 minutes and 55 minutes after the hour, it will be broadcast until 55 minutes after the following hour.

Entering Voice Remarks

- To enter a voice remark, click on either *Enter Remark One* or *Enter Remark Two* on the Voice Control Menu. The screen shown in **Figure 8** will appear.

Recording, accepting, and cancelling voice remarks

Up to two voice remarks can be stored and output concurrently by the system. The two Voice Remark Control Menus (**Figure 8**)—one for each of the two possible remarks—allow the user to enter on-site or remote remarks, review recorded remarks, and cancel outgoing remarks.



(Figure 8) Voice remark control menu.

Voice remarks are recorded for output from a microphone on-site.

To record a voice remark:

- Click on *Record Microphone Remark*. The microphone will be activated and you may begin recording immediately.
- Click on *Stop Record or Playback* to stop recording.

To review a recorded remark:

- Click on *Review Remark*. The recorded voice remark will be played back.
- To stop playback before the end of the remark, click on the *Stop Record or Playback* button.

To accept a recorded remark:

- When the recorded remark has been reviewed and found to be acceptable, click on *Accept Remark*. The recorded voice remark will be output according to the settings entered through the Voice Output Control Menu.

To cancel a recorded remark:

- Click on *Cancel Remark*. The recorded voice remark will be removed from the system’s memory.

To allow a recorded voice remark to be output continuously without revalidation:

- Click on *Continuous Playback*. The recorded voice remark will be output continuously until cancelled or replaced by a new remark.

Revalidating Voice Remarks

Voice remarks must be revalidated hourly if they have not been set to continuous playback mode through the Voice Remark Control Menu. Revalidation must be done between 45 and 55 minutes after the hour. To revalidate a current voice remark:

- Click on either *Revalidate Remark One* or *Revalidate Remark Two* on the Voice Control Menu. The voice remark will play until 55 minutes after the following hour.

Cancelling Voice Remarks

To cancel a current voice remark:

- Click on either *Cancel Remark One* or *Cancel Remark Two* on the Voice Control Menu. The remark will be erased from the system’s memory.

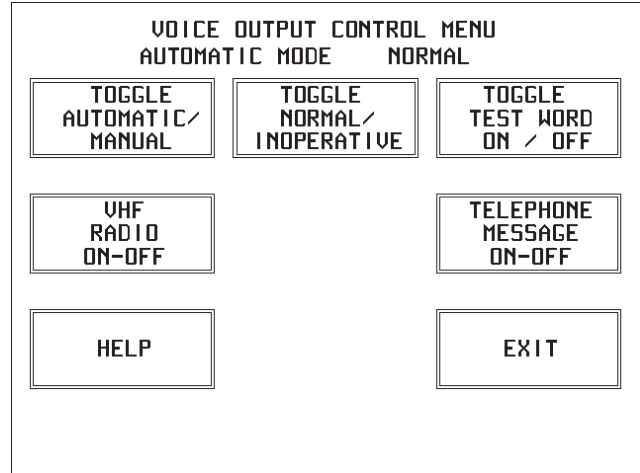
Voice Output Control Menu

The Voice Output Control Menu (**Figure 9**) allows the user to specify the mode of output of the AWOS voice report. The voice output mode can be set to Automatic, Manual, Inoperative, or Test. The current mode is shown at the top of the Voice Output Control Menu.

Normal and Inoperative Modes

The two operative modes controlled by the *Toggle Normal/Inoperative* button control overall voice output for the AWOS. Clicking this button toggles the active state between **Normal** and **Inoperative**.

- Setting this option to **Inoperative** prevents current weather data from being broadcast. The outgoing voice message will contain only the airport identity, followed by the message “AWOS temporarily inoperative”.



(Figure 9) Voice output control menu.

- Setting this option to **Normal** enables the other output modes available from this menu (Automatic, Manual, and Test). **Normal** operation must be selected for these modes to function.

Automatic and Manual Modes

When the AWOS voice output is set for **Normal** operation as described above, the *Toggle Automatic/Manual* button sets the outgoing message to include either all AWOS weather data (**Automatic**) or only manually recorded weather remarks (**Manual**). Clicking this button toggles the active state between **Automatic** and **Manual**.

- Selecting **Automatic** mode sets the outgoing voice message to include all available AWOS weather data, in addition to any manually recorded voice remarks.
- Selecting **Manual** removes all automatically gathered AWOS weather data from the voice output; only manually recorded voice remarks are broadcast in this mode.

Test Mode

The *Toggle Test Word On/Off* button causes the AWOS voice output message to include the word “Test”. Clicking this button will toggle the active state between **Test** mode and the previously active output mode. Voice output must be set for **Normal** operation to use this feature.

Setting Radio and Telephone Output

Voice output can be broadcast via radio, accessed by telephone, or both.

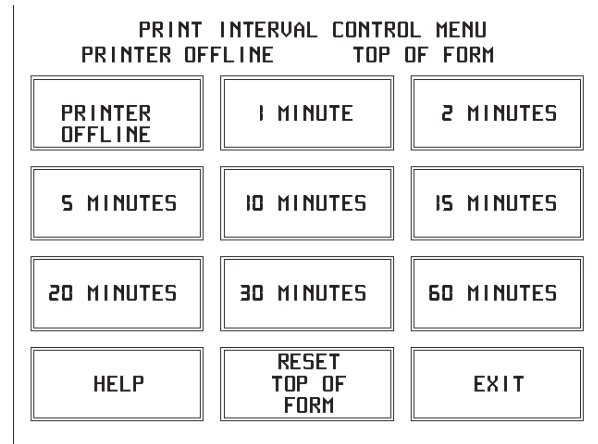
- To broadcast the AWOS voice report via VHF radio, click on *VHF Radio On-Off*. The button will be highlighted when VHF output is on.
- To allow the AWOS voice report to be accessed by telephone, click on *Telephone Message On-Off*. The button will be highlighted when telephone output is on.
- To turn on both radio output and telephone output, click on *VHF Radio On-Off* **and** *Telephone Message On-Off* so that both buttons are highlighted.
- To turn off either radio or telephone output, click on the associated menu button so that it is no longer highlighted.

Printer Control Menu

The Printer Control Menu (**Figure 10**) allows the user to control printing of AWOS data.

- To set the time interval at which AWOS data is printed, click on the desired interval button. The available intervals are: 1 minute, 2 minutes, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 30 minutes, and 60 minutes.
- To take the printer off line, click on the *Printer Online/Offline* button. To place the printer back online, click on the *Printer Online/Offline* button again. The current status will be shown at the top of the screen.
- To reset the top of the form, take the printer off line again and click on the *Reset Top of Form* button.
- Place the printer back online to enable printing.

To return to the Operator Menu, click once on the *Exit* button. Click again on the *Exit* button at the Operator Menu to return to the Control Menu.



(Figure 10) Printer control menu.

Line Printer Output Format

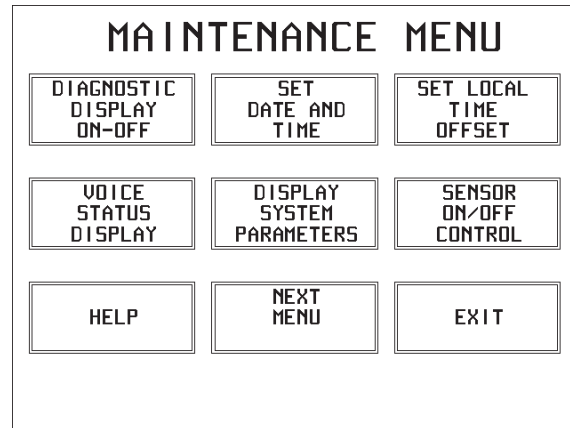
The output of the system line printer contains the following information. Some information will not be displayed if the sensor is not installed.

- Airport Identifier
- Julian Day
- Zulu Time (HHMM)
- Wind Direction/Speed and Gust (degrees magnetic and knots)
- Visibility (statute miles, if 8364 series sensor is installed)
- Lightning at airport or in vicinity (TS or VCTS, if lightning data available)
- Present Weather Code (blank if no precipitation, if 6490 present weather sensor is installed)
- Sky Condition (if ceilometer is installed)
- Temperature/Dew Point Temperature (Celsius)
- Relative Humidity (% RH)
- Altimeter Setting (inches of Mercury)
- Density Altitude (feet, only if \geq 1000 feet above airport elevation)
- Variable Visibility (statute miles, if 8364 series visibility sensor is installed)
- Variable Wind Direction (magnetic degrees)
- Precipitation Accumulation (tips since system startup, 1 tip = .01 inches, requires 8364 visibility sensor)
- Day/Night sensor output (D/N, requires 8364 visibility sensor)
- Lightning Remark (requires lightning information input from NADIN)

Maintenance Menu

The Maintenance Menu (*Figure 11*) controls were designed to provide system and equipment information to the user for troubleshooting purposes. System tests can be run and data enhancements made to provide added troubleshooting capabilities.

Note: Some screens display information for a short time and then exit. Do not click the mouse on these screens, unless a selection box is displayed that allows mouse input.



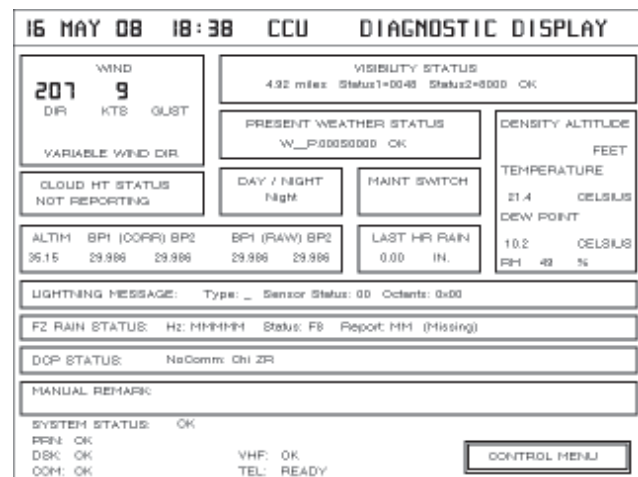
(Figure 11) Maintenance menu.

Diagnostic Display On-Off

- Clicking on the *Diagnostic Display On-Off* button changes the main data display, when enabled, to include instantaneous values for all the sensors connected to the system, along with status codes for the Present Weather Sensor, Visibility Sensor, Ceilometer, and the DCP. Both raw barometric pressure values and corrected values with offsets applied are displayed. The diagnostic display is shown in *Figure 12*. This feature is useful when performing system calibration and maintenance. **Tables 2, 3, 4, 5** and **6** show the status codes for the Present Weather Sensor, Visibility Sensor, 8329 Ceilometer, Thunderstorm Detector, and Freezing Rain Sensor. The Model 8339 Ceilometer will report status as OK, WARNING, or FAILURE. Consult the Model 8339 Ceilometer User's Manual for troubleshooting warnings or failures.

Set Date and Time

To ensure that the date and time settings at all the stations agree, the controlling main station serves as the master clock for the system. The time must be set to Zulu (Greenwich) time. The date and time are set from the controlling

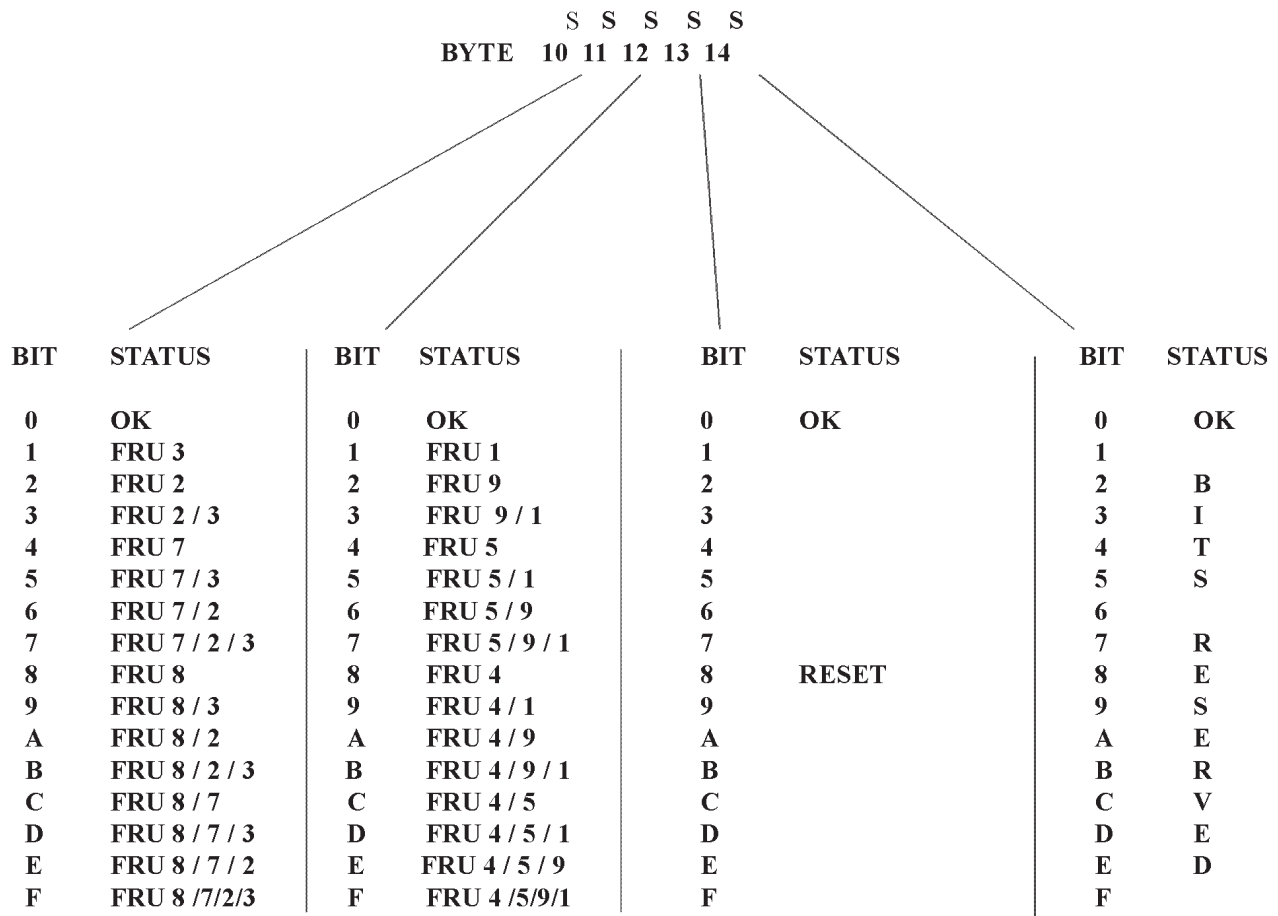


(Figure 12) Diagnostic data display.

main station's Maintenance Menu, which then updates the RDS stations.

- Click on the *Set Date and Time* button and the screen shown in *Figure 13* will appear.
- To change the date information, click on the appropriate buttons. Each click will change the information by one increment and will be reflected in the information shown on the top line of the screen.

The status field, denoted by s s s s (4 bytes) in the data output format, is a 4 byte field of sensor status bytes. The codes can be interpreted as shown in the table.



A status code of 0 in bytes 11, 12, 13, or 14 indicates “no problem” while a number or letter other than 0 indicates one more may be defective. For instance, if byte 11 read “9”, then both FRU 8 & FRU 3 should be checked. FR

(Table 2) Present weather sensor status codes.

Visibility Sensor Status Word 1			
BIT	FUNCTION	VALUE	MEANING
2-1-0	averaging interval	000	3 minutes*
		001	5 minutes
		010	10 minutes
5-4-3	output interval	001	10 seconds*
		010	1 minute
		011	5 minutes
		100	10 minutes
6	output type	0	visibility
		1	extinction coefficient*
7	units	0	miles*
		1	kilometers
8	configuration (NVRAM) error	0	OK
		1	error
9	visibility data incomplete status	0	data complete
		1	data incomplete (from at least 1 head)
10	visibility data missing status	0	OK
		1	data missing—data from more than 1 head is missing
11	visibility dirty window status	0	OK
		1	window dirty
12	three-headed operation indicator	0	Four-headed operation (normal)
		1	Three-headed operation
13-15	unused		

* standard settings, displayed as 48 in status word. Any other value indicates a configuration error.

(Table 3) Visibility sensor status codes.

Visibility Sensor Status Word 2			
BIT	FUNCTION	VALUE	MEANING
0	mode 0, direct	0 1	OK failed
1	mode 0, indirect	0 1	OK failed
2	mode 1, direct	0 1	OK failed
3	mode 1, indirect	0 1	OK failed
4	emitter 0 status	0 1	OK failed
5	emitter 1 status	0 1	OK failed
6	detector 0 status	0 1	OK failed
7	detector 1 status	0 1	OK failed
8	cross-check	0 1	OK failed
9	emitter 0 heater status	0 1	OK failed
10	emitter 1 heater status	0 1	OK failed
11	detector 0 heater status	0 1	OK failed
12	detector 1 heater status	0 1	OK failed
13	ALS or D/N heater status (note: this bit is ignored when neither an ALS nor Day/Night sensor is present)	0 1	OK failed
14	Vis. controller power supply status	0 1	OK failed
15	Visibility sensor model	0 1	8364-C 8364-E

(Table 3 cont.) Visibility sensor status codes.

XX = Functional codes — should be 25

Y = 0 Blower and heater OFF

Y = B Blower ON

Y = C Blower and heater ON

Priority	Code	Description
	XXY0	NO ERROR
30	XXY1	LOW TRANSMITTER POWER
31	XXY2	UNBALANCE DETECTOR
32	XXY3	OFFSET IN DETECTOR
34	XXY4	REFERENCE VOLTAGE ERROR
33	XXY5	ZERO POINT FAILURE
2	XX10	HIGH CURRENT CONSUMPTION IN S-BOARD
3	XX11	HIGH CURRENT CONSUMPTION IN M-BOARD
4	XX12	HIGH CURRENT CONSUMPTION IN H BOARD
10	XX13	VOLTAGE FAILURE +24V
6	XX14	VOLTAGE FAILURE +5V
7	XX15	VOLTAGE FAILURE +15V
8	XX16	VOLTAGE FAILURE -15V
9	XX17	VOLTAGE FAILURE +230V
11	XX18	VOLTAGE FAILURE +10V
12	XX19	VOLTAGE FAILURE -10V
5	XX20	A/D CONVERTER FAILURE IN H-BOARD
13	XX21	RHV FAILURE (RECEIVER HIGH VOLTAGE)
14	XX22	TEMPERATURE FAILURE
15	XX23	OVERHEAT
16	XX30	POWER FAILURE (NO OR LOW OUTPUT POWER)
17	XX31	CHARGE FAILURE (LASER CIRCUIT NOT CHARGED)
18	XX32	IPEAK CIRCUIT OUT OF FUNCTION
19	XX33	LASER HIGH VOLTAGE (LHV) REGULATION FAILURE
20	XX34	IPEAK CANNOT REACH MAX. ALLOWED CURRENT (55A)
21	XX35	LHV/20 NOT CORRESPONDING TO LHV REFERENCE
22	XX36	UNDEFINED FAILURE IN LHV CIRCUIT
23	XX40	RECEIVER FAILURE (VIDEO SIGNAL TOO LOW)
29	XX41	DETECTOR FAILURE
24	XX45	ADDRESS FAULT S-BOARD
25	XX46	ADDRESS FAULT H-BOARD
26	XX50	LPF MISSING
27	XX51	SYNC MISSING
28	XX52	LASER TRIGGER FAILURE
1	XX60	MASTER-SLAVE COMMUNICATIONS FAILURE
35	XX70	SOFTWARE REBOOT

(Table 4) 8329 Ceilometer status codes.

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 01. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 05. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 06. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 07. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 08. Processor Fault.	Main processor memory	Continued operation is not possible. Contact Field Service.
ERROR 09. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 10. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 11. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 12. Processor Fault.	DSP processor memory	Continued operation is not possible. Contact Field Service.
ERROR 14. Processor Fault.	DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 15. Processor Fault.	DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 16. Antenna Fault.	Antenna or antenna wiring	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Contact Field Service.
ERROR 17. Processor Fault.	No test strikes, antenna in noisy location, or faulty antenna	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Fault will clear automatically if interference subsides. c. Contact Field Service.
ERROR 18. Processor Fault.	Invalid test strikes, antenna in noisy location, or faulty antenna	Weather mapping is inhibited. a. Check antenna wiring for opens and shorts. b. Fault will clear automatically if interference subsides. c. Contact Field Service.
ERROR 19. Processor Fault.	Main Processor or Antenna in noisy location	Weather mapping is inhibited. a. Fault will clear automatically if interference subsides. b. Contact Field Service.
ERROR 20. Configuration Changed.	Antenna location (top/bottom, determined by processor wiring) changed since system was last powered up.	This may occur the first time the system is powered on in a new installation. Power the sensor off and back on again. If the error persists, contact Field Service.
ERROR 21. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 22. Invalid XYZ Input.	n/a	n/a

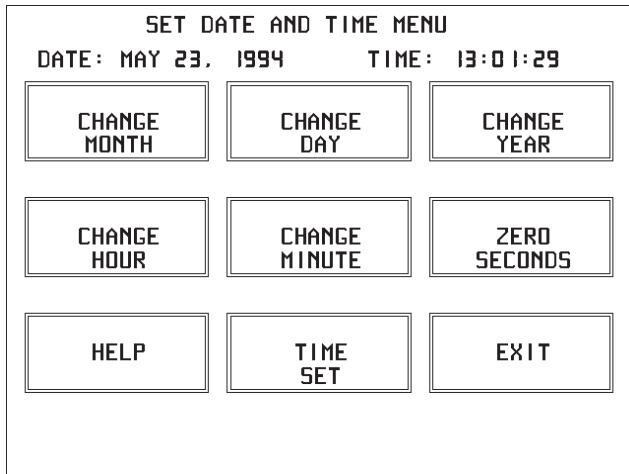
(Table 5) Thunderstorm/Lightning sensor status codes.

ERROR	PROBABLE CAUSE	CORRECTIVE ACTION
ERROR 23. Invalid Heading Ref.	n/a	n/a
ERROR 24. MIC KEY STUCK.	Mic key (inhibit line) has been asserted for at least 60 seconds	Weather mapping is inhibited. a. Contact Field Service.
ERROR 25 - 34. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 35. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 36. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 40. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 41. Processor Fault.	Main or DSP processor	Continued operation is not possible. Contact Field Service.
ERROR 42. Processor Fault.	Main processor	Continued operation is not possible. Contact Field Service.
ERROR 43. Invalid request.	DCP	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service
ERROR 44 - 49. Serial Communication.	DCP	Message error will clear once processed a. Improper baud rate from DCP. b. Excessive noise on communication lines, check wiring. c. If error occurs frequently, contact Field Service.
ERROR 50. Illegal Serial Heading Value.	DCP	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
ERROR 51. Invalid Message.	DCP	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.
ERROR 52. Invalid Antenna Change Request.	DCP	Message error will clear once processed a. A request was received to change the antenna mount to a location that does not match the configuration jumpers. Request is ignored. b. If error occurs frequently, contact Field Service.
ERROR 53 - 54. Communications Buffer Overload.	DCP	Message error will clear once processed a. Excessive noise on communication lines, check wiring. b. If error occurs frequently, contact Field Service.

(Table 5 cont.) Thunderstorm/Lightning sensor status codes.

Freezing Rain Sensor Commands and Responses		
Command Description	Command	Response
Send Routine Data	Z1	ZPS40000 Z – Sensor ID P – Status (P/F/D) P = Pass F = Fail D = Deice S – Status Descriptor " " = Okay (blank) 1 = Probe Failure 2 = Deicing Failure 3 = Electronics Failure 40000 – frequency in Hz
Perform Deice Cycle	Z3XX (XX = 01 – 60 secs)	ZDOK
Perform Extended Diagnostics	Z4	ZF2 Z – Sensor ID F – Status (P/F/D) P = Pass F = Fail D = Deice 2 – Status Descriptor " " = Okay (blank) 1 = Probe Failure 2 = Deicing Failure 3 = Electronics
Field Calibration	F5	ZPS40000 Z – Sensor ID P – Status (P/F/D) P = Pass F = Fail D = Deice S – Status Descriptor " " = Okay (blank) 1 = Probe Failure 2 = Deicing Failure 3 = Electronics Failure 40000 – Calibration frequency

(Table 6) Freezing Rain Sensor commands and responses with status codes.



(Figure 13) Set date and time menu.

- After the date information has been configured, set the time to the current Zulu time. After the date and time have been configured, click on the Time Set button to update the system. Click on Exit to return to the Maintenance Menu.

Set Local Time Offset

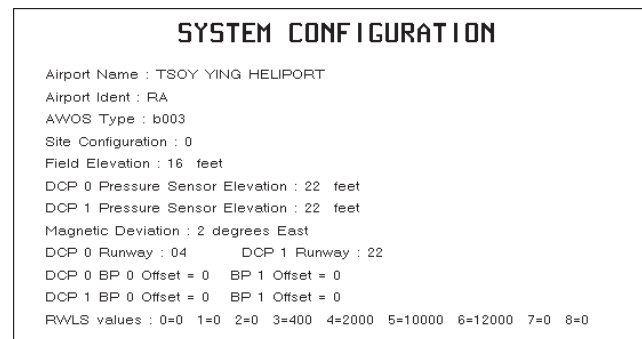
Through the *Set Date and Time* option explained earlier, the AWOS clock was set to Zulu time. Certain internal functions of the AWOS software are based on local time, however. This is set through the *Set Local Time Offset* option. When you click this button, a second screen will appear showing the current time set on the CDP clock (this should be Zulu time) and the local time offset. Each time you click the *Change Hours* button, the time offset is incremented by one hour. Continue clicking this button until the number of hours shown is the difference in hours between local time at the CDP location and Zulu time. When this is correct, the displayed time at the top of this screen should agree with the local time.

Voice Status Display

- Click on the *Voice Status Display* button to view voice processing status.

Display System Parameters

- Click on the *Display System Parameters* button to view how the system components are configured. A screen like the one shown in **Figure 14** will appear, showing the name and identification of the airport, the type of AWOS system, field elevation, sensor elevation, etc.

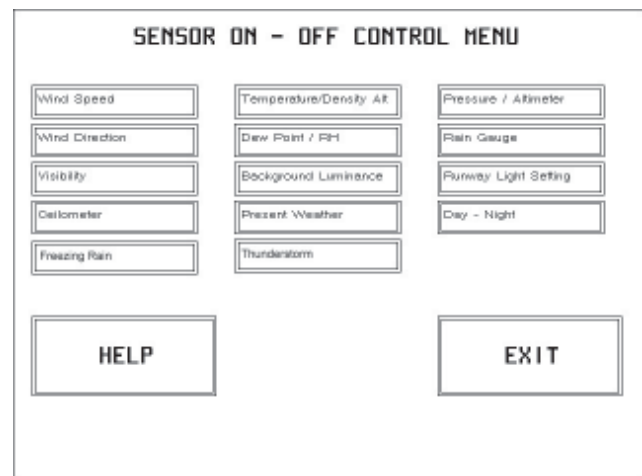


(Figure 14) System parameters display.

Turning Sensors On and Off

The *Sensor On/Off Control* button is used to set a sensor's active status to ON or OFF. When a sensor is OFF, information from that sensor is ignored by the CDP in its data processing operations, and it is noted in the voice output as "missing".

To configure the system sensors, click the *Sensor On/Off Control* button, and the screen in **Figure 15** will appear.

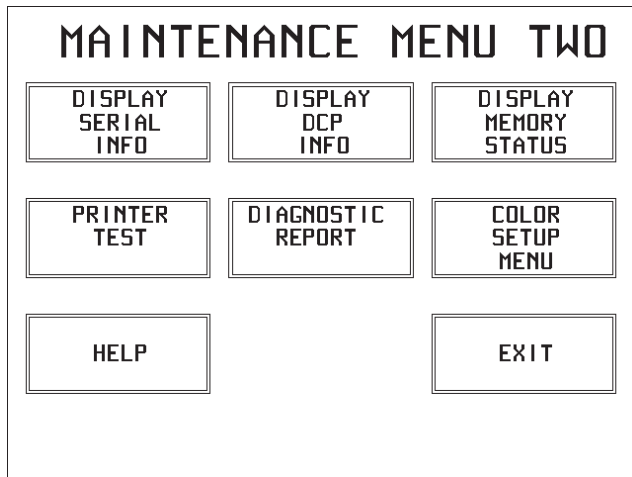


(Figure 15) Sensor on/off control menu.

- To enable a sensor (turn it ON), click once on that sensor's button. The button will become highlighted. To disable a sensor (turn it OFF), click on that sensor's highlighted button. It will be darkened, indicating that the sensor has been turned off. Click on the *Exit* button to return to the Maintenance Menu.

Maintenance Menu Two

- To access Maintenance Menu Two (**Figure 16**), click on the *Next Menu* button on the Maintenance Menu.



(Figure 18) Maintenance menu two.

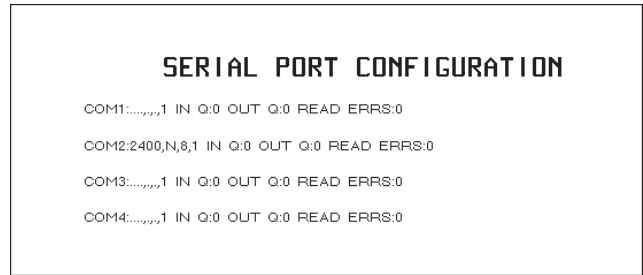
Maintenance Menu Two allows the user to:

- View serial port connection information
- View data collection platform (DCP) data
- Check current memory status
- View sensor status
- Change the colors used to display AWOS information
- View a list of equipment connected to the system

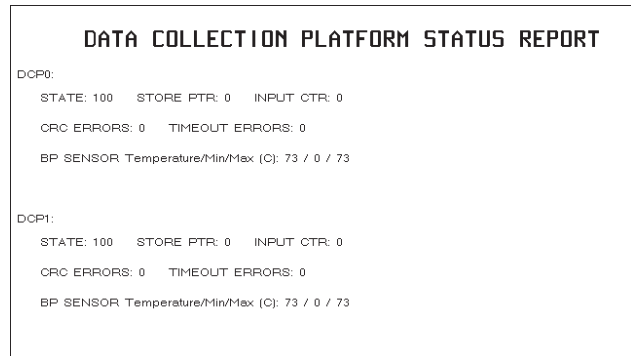
To exit any of the display screens, click on the *Exit* button to return to Maintenance Menu Two.

Display Serial Info

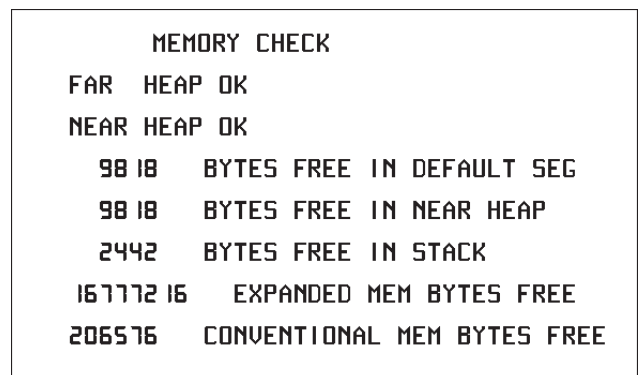
- To show current serial port connection information, click on the Display Serial Info button and the screen shown in **Figure 17** will appear.



(Figure 17) Serial port configuration display.



(Figure 18) DCP info display.



(Figure 19) Memory status display.

Display DCP Info

- To show DCP information, click on the Display DCP Info button and the screen shown in **Figure 18** will appear, displaying current DCP status

Display Memory Status

- To show current memory status, click on the Display Memory Status button and the screen shown in **Figure 19** will appear, displaying the available system memory.

Printer Test

Clicking the *Printer Test* button will cause a test page to be sent from the CDP to a connected printer. The progress of the test is followed through messages displayed on the **Printer Test** screen (“sending form feed to printer”, for example). When the test is complete, the test page will print (if everything is working properly) and the display will automatically return to Maintenance Menu Two. If an error occurs, check that the printer cable is connected properly and the printer is turned on.

Diagnostic Report

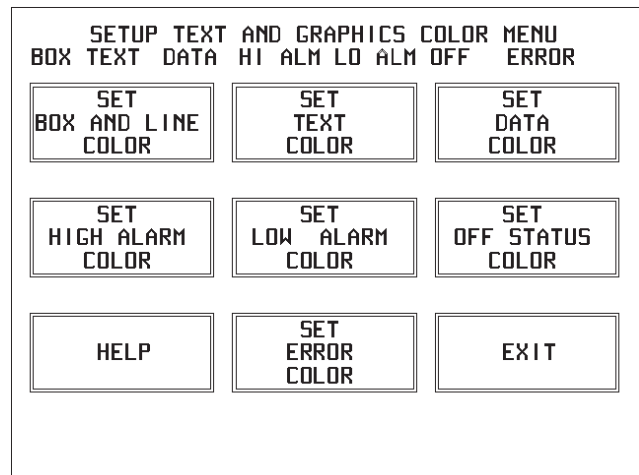
The Diagnostic Report screen shows the current status of connected sensors, including off-line, missing, and error conditions. This data is updated every hour.

Color Setup Menu

The Color Setup Menu (**Figure 20**) allows the user to customize the screen display colors. Click on the *Color Setup Menu* button to access this menu.

The elements whose colors can be changed through this menu (box line and color, text color, data color, low and high alarm, off status, and error) are listed at the top of the screen, and are shown in the currently selected color. Each time an element button is clicked (for example *Set Box and Line Color*), that element’s name in the list at the top of the screen will change color. For example, each time the *Set Box and Line Color* button is clicked, the word "BOX" at the top of the screen will change colors.

- When done, click the *Exit* button to return to Maintenance Menu Two. The screen displays will now show the newly selected element colors. To return to the Control Menu, click on the *Exit* button on the Maintenance menu.

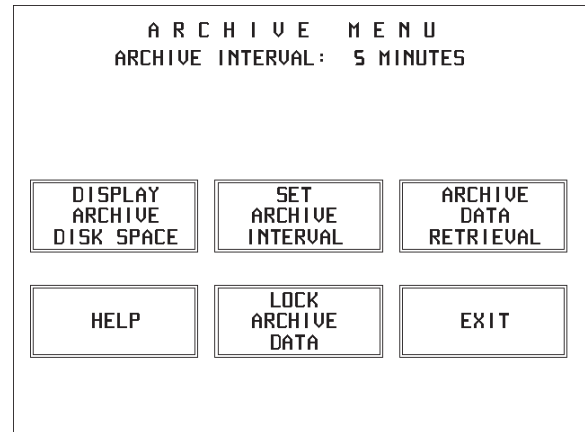


(Figure 20) Color setup menu.

Archive Menu

The Archive Menu (*Figure 21*) allows the user to view, display, print, and lock automatically stored archive information. The parameters included in each archive record are: airport identification, date, time, sky condition, temperature and dew point, wind direction and wind speed, altimeter setting, density altitude, precipitation, and status (a code showing any system errors detected by internal tests).

- To access archive data, click on the *Display Archive Menu* button in the Control Menu and the Archive Menu will appear.



(Figure 21) Archive menu.

Display Archive Disk Space

- To check current available disk space for archiving, click on the *Display Archive Disk Space* button. The information screen displayed will indicate the total amount of bytes on disk, the bytes available for use, and the percentage of free archive disk space

Set Archive Interval

- To set the rate at which the archive will store data, click on the *Set Archive Interval* button. All Weather Inc. recommends that data be stored in the archive every five minutes. Each time the *Set Archive Interval* button is clicked, the Archive Interval shown at the top of the screen will increase by five minutes. The archive interval can be set at five-minute increments up to 20 minutes.

Archive Data Retrieval

- To retrieve archive data, click on the *Archive Data Retrieval* button. This will bring up a menu of choices for identifying and outputting the desired data (*Figure 22*).

At the top of the screen are two lines: the top line reads *Output To:* and the second line reads, *Start Date:* and *Hour:*. The top line indicates the device to which the archive data will be output. The second line indicates the specific archive data to be retrieved (indexed by date and time).

- To choose an output device, click the mouse on the *Select Output Device* button. Continue to click on the button to cycle through the available output devices (printer, display unit, combination printer/display unit, or floppy drive A).
- To choose the year of retrieval, click on the *Select Retrieval Year* until the chosen year appears on the line at the top of the screen.
- In the same manner, choose the month, day and hour of retrieval by clicking on the *Select Retrieval Month*, *Select Retrieval Day* and *Select Retrieval Hour* buttons.
- When “23” is displayed for the hour selection, clicking the *Select Retrieval Hour* button again will change the selected hour to read “Entire File”. This selection will recall the entire day’s archive data.
- After the choices have been made, click on the *Begin Archive Retrieval* button to enable the archive retrieval functions. One hour of data will be displayed on the output device(s). If the entire file was selected (Select hour: entire file), then all of the day’s data will be displayed. All Weather Inc. recommends printing the entire file rather than viewing it on the display. To return to the Archive Menu screen, click the *Exit* button. To return to the Control Menu, click the *Exit* button on the Archive Menu. To return to the main screen, click the *Exit* button on the Control Menu.

ARCHIVE DATA RETRIEVAL		
OUTPUT TO: DISPLAY		
START DATE: JAN 1, 1993 HOUR: 0		
SELECT OUTPUT DEVICE	RETRIEVE LOCKED ARCHIVE DATA	SELECT RETRIEVAL YEAR
SELECT RETRIEVAL MONTH	SELECT RETRIEVAL DAY	SELECT RETRIEVAL HOUR
HELP	BEGIN ARCHIVE RETRIEVAL	EXIT

(Figure 22) Archive data retrieval menu.

Retrieving Locked Data

When an archive data file has been locked using the *Lock Archive Data* command (see below), the locked data will always consist of a single 24-hour period of data. It is not indexed by date or time, but is the most recently locked day’s worth of data. To retrieve this data to the selected output device, click on *Retrieve Locked Archive Data*. The locked data will be output to the selected device.

Locking Archive Data

The Archive Menu allows a single day’s worth of archive data to be locked. When data is locked, it is stored in a special memory location that prevents it from being overwritten, except by a newer locked record. Once a record is locked, it will remain in memory until another archive record is locked in its place. To lock a 24-hour span of data, click the *Lock Archive Data* button on the Archive Menu.

Archive data is locked using a screen similar to the Archive Retrieval screen. By clicking the *Select Lock Year*, *Select Lock Month*, and *Select Lock Day* buttons, you specify the 24-hour period of data to be locked. When the displayed date is correct, click *Lock Selected Archive Data* to lock the data. If locked data already exists, it will be overwritten by the new data.

To retrieve locked data, use the *Retrieve Locked Archive Data* command on the Archive Retrieval menu.

AWOS Output Modes

The output of the AWOS weather observation is controlled by one of four modes of operation. The mode in effect is dependent on a combination of settings and/or remarks entered through the Voice Output Control Menu, Voice Control Menu, and Weather Remark Control Menu, all of which are found on the Operator Menu.

The following sections describe each of the four modes and how to set the AWOS to each of them.

Mode 1—Full-Time Automated Operation

In this mode, the AWOS operates 24 hours a day without any manual input. The automated weather observations are updated on a minute-by-minute basis. There is no weather observer input to the AWOS. However, a manual observing capability may be maintained as backup, provided that an agreement with the National Weather Service (NWS) to maintain a manual observing capability exists.

To operate the AWOS in Mode 1, select NORMAL/AUTOMATIC mode on the Voice Output Control Menu.

Mode 2—Full-Time Automated Operation with Local Notice to Airmen (NOTAM)

Operation in this mode is the same as Mode 1, with the addition of the capability to append a manually recorded NOTAM to the automated voice reports. The airport manager is responsible for the NOTAM information. The NOTAM information is heard on the local voice broadcast; it is not transmitted longline. There is no weather observer input.

To operate the AWOS in Mode 2, select NORMAL/AUTOMATIC mode on the Voice Output Control Menu, and enter a voice remark using the Voice Control Menu.

Mode 3—Full-Time Automated Operation with Manual Weather Augmentation and Local NOTAM Option

Operation in this mode provides the capability for a weather observer to manually augment the automated observation by appending a weather entry to the observation during the published weather observer duty hours. The observer duty hours should be published in the Airport/Facility Directory. The addition of a local NOTAM is also permitted in this mode of operation, provided there is no interference with the observer augmentation. The weather observer is responsible for the accuracy and timeliness of the added weather information. The weather to be added is limited to thunderstorms, all types of precipitation, and obstructions to vision (Note: Tornadoes, waterspouts, and funnel clouds are reported as urgent specials (USP) using Mode 4.) The weather added by the observer is to be manually recorded and appended to the automated voice reports using the CDP microphone, and, as applicable, entered manually using the CDP keyboard into the system for transmission to NADIN. The procedures in Federal Meteorological Handbook No. 1 (FMH-1) or, as applicable, Federal Meteorological Handbook No. 9 (FMH-9), apply to the thunderstorm, precipitation, and obstruction to vision entries, except:

- (1) The manual entries are to be included in the “remarks” portion of the observation, prefaced with the phrase “OBSERVER WEA:”.
- (2) The precipitation entries are limited to type and intensity, e.g., “OBSERVER WEA: R-S-.”
- (3) The thunderstorm entries are limited to intensity (if appropriate), and direction (OVHD, NE, etc.), e.g., “OBSERVER WEA: TRW+T OVHD.”
- (4) Obstructions to vision (alone or in combination with precipitation) are to be included when the visibility is 3 miles or less, e.g., “OBSERVER WEA: F.”

To operate the AWOS in Mode 3, select NORMAL/AUTOMATIC mode on the Voice Output Control Menu, enter a voice remark using the Voice Control Menu, and enter a weather remark through the Weather Remark Control Menu.

Mode 4—Part-Time Manual Operation

Operation in this mode is normally used for backup and, as applicable, dissemination of USP over the Service A teletype network. Operation in this mode permits a weather observer to enter a complete manual observation into the system. The procedures in FMH-1 (or FMH-9) apply to the recording and formatting of these manual observations. As applicable, the manual observations are transmitted over the Service A teletype network. Voice dissemination of the observations must be done manually using the CDP microphone. The manual observations

include input from the automated AWOS outputs available to the weather observer on the CDP display, to be modified to FMH-1 (or FMH-9) requirements. For example, the manual observation includes manually derived ceiling/sky condition and visibility using FMH-1 (or FMH-9) definitions, which differ somewhat from the AWOS algorithms. Temperature, dew point, wind direction, wind speed, and altimeter setting are the same and should be used exactly as presented on the AWOS CDP display. Sea level pressure, if required to be included in the observation, must be computed manually since it is not an output included in the AWOS automated output.

To operate the AWOS in Mode 4, select NORMAL/MANUAL mode on the Voice Output Control Menu, enter a voice remark using the Voice Control Menu, and enter a weather remark through the Weather Remark Control Menu.

CDP Maintenance

Maintenance of the AWOS CDP is divided into monthly, quarterly, and annual maintenance tasks. The following procedures should be performed according to that schedule, and results recorded as required on the AWOS monthly, quarterly, and annual forms.

Monthly Maintenance

The following tasks should be performed on a monthly basis and the results recorded on the AWOS Monthly Technical Performance Record.

- 1 Check display operation.
- 2 Check keyboard operation.
- 3 Check printer operation.
- 4 Check the printer ribbon, and replace as necessary.
- 5 Check the printer paper, and replace as necessary.
- 6 Check microphone operation by recording a voice remark. Delete the remark when done.
- 7 Check dial-up telephone operation by dialing the CDP from an outside line.
- 8 Verify VHF radio operation by listening to the AWOS voice output over a remote receiver.
- 9 Check the system clock against a known standard; adjust the system clock if the difference is greater than 10 seconds.
- 10 Check speaker operation.
- 11 Check UPS operation, if installed.

Quarterly Maintenance

During quarterly maintenance, perform the procedures listed above for monthly maintenance and record the results on the AWOS Quarterly Technical Performance Record.

Annual Maintenance

During annual maintenance and revalidation, perform the procedures listed above for monthly maintenance and record the results on the AWOS Comprehensive Facility Performance and Adjustment Data Form.

Warranty

This equipment has been manufactured and will perform in accordance with requirements of FAA Advisory Circular 150/5220-16C. Any defect in design, materials, or workmanship which may occur during proper and normal use during a period of 1 year from date of installation or a maximum of 2 years from shipment will be corrected by repair or replacement by All Weather Inc.

Remote Maintenance Monitoring

Overview

The CDP can be accessed remotely from another computer to set system parameters or view system status and data. This feature is referred to as “RMM”. No special software is required to access the AWOS CDP. Any terminal emulator program such as ProComm or the Microsoft Windows Terminal Emulator program can be used to access the AWOS. The CDP is accessed for RMM purposed through the voice telephone line. The voice modem will switch to data mode if it detects a “*” tone during the first two seconds after the call is answered. Once communication is established, the user can enter commands to:

- end the RMM session
- enter a password to allow access to restricted functions
- get a current AWOS system status report
- get the current AWOS reported weather observation
- get the AWOS system configuration
- open a data file for downloading
- download a data file that has been opened
- get or set the AWOS system time
- get or set the AWOS system date
- get or set sensor online/offline state
- get or set the VHF voice radio online/offline state

Hardware Requirements

The following are minimum requirements to call the AWOS for RMM:

- 80486 PC running DOS 5.0 or Windows 3.1
- Terminal emulator program such as Procomm or the Windows Terminal Emulator (terminal emulator programs are included with most modems)

- US Robotics Sportster 28.8 data modem or equivalent (NOTE: not all modems may work properly with the AWOS. Contact your modem/PC vendor for help if the modem will not connect properly to the AWOS. All Weather Inc. assumes no responsibility for supporting the RMM computer system unless it was purchased from All Weather Inc.)
- Dial up telephone line capable of 28.8 or higher data transmission

Establishing Communication with the AWOS

The following steps are required to access the AWOS CDP via RMM:

- 1 Boot the computer to be used to access the AWOS
- 2 Start the computer’s terminal emulator program (Procomm, Kermit, MS Terminal Emulator, etc.)
- 3 Configure the terminal emulator to communicate with the modem (set the comm port, baud rate, etc.)
- 4 Type “AT” followed by return and verify that the modem returns “OK”
- 5 Set the duration of the “,” delay to 1 second by typing “ATS8=1” followed by return. The modem should respond with “OK”
- 6 Dial the phone number by entering the following command:

```
ATDT <number>,***** ,***** ,***** <cr>
```

In the above example, <number> is the AWOS voice telephone number with all required digits (to get an outside line, access long distance, dial the area code, dial the number). The command is followed by a carriage return. The AWOS must see a “*” within two seconds of answering the telephone. If it takes long to connect to the AWOS, insert more delays in the command string by adding commas.

- 7 Once the AWOS recognizes the “*”, it will wait approximately 15 seconds and then connect to the calling modem. Do not type on the keyboard while the connection processing is taking place or the connection may be lost. After the modems have connected, the commands in the next section may be used to obtain status and data.

AWOS RMM Commands

Table 6 describes the RMM commands available. Each command begins with a “\$” character and ends with a carriage return. The commands are entered through the keyboard. Some terminal emulator programs allow macro keys to be programmed. The commands may be programmed as macro keys if desired. Refer to your terminal emulator’s user manual for information on macro keys.

Entering Filenames

File names are of the format MMMDDYY where MMM is a three character month (JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC), a two digit day (01 through 31), and a two digit year (00 through 99). For example, to retrieve a file for December 31, 1998, the file name would be DEC3198.

The AWOS saves data using the above naming convention in two directories: \ERRLOG and \PRINTER.

The \ERRLOG directory contains status information updated every hour. The \PRINTER directory contains a copy of AWOS weather in the same format as the line printer output updated at one minute intervals. Data is maintained in these directories for one year.

In order to retrieve an AWOS data file, a complete file path must be entered.

Table 7 AWOS RMM Command Summary	
RMM Command	Description
\$HANGUP	end the RMM session
\$GETCUR	display the current AWOS weather report (formatted as the system printer output)
\$GETSTA	display the current AWOS system status report
\$CONFIG	display the AWOS system configuration
\$OPENFIL filename	open a file for transmission
\$GETFIL	retrieve the contents of an open data file
\$SETIME	retrieve the AWOS system time
\$SETIME hh:mm:ss	set the AWOS clock to hh:mm:ss
\$SETDAT	retrieve the AWOS system date
\$SETDAT mm/dd/yyyy	set the AWOS system date to mm/dd/yyyy
\$ONLINE	display sensor online status
\$ONLINE sensor	set sensor "sensor" to online
\$OFFLINE	display sensor offline status
\$OFFLINE sensor	set sensor "sensor" to offline
\$PASSWORD password	enter a password to enable restricted functions

Error log files are retrieved by entering the following with the \$OPENFIL command:

```
$OPENFIL C:\AWOS\ERRLOG\filename
```

Weather archive data files are retrieved by entering the following with the \$OPENFIL command:

```
$OPENFIL C:\AWOS\PRINTER\filename
```

Although other files can be retrieved, All Weather Inc. does not recommend this practice. The CDP does not allow data files to be uploaded to the AWOS. This protects against virus contamination, etc.

Retrieving Data Files

After the open command has been processed, the AWOS will respond with an acknowledgement of the file open command. An error message may be generated if the file was not opened properly. Once the file has been opened, the \$GETFIL command can be used to retrieve the data. If the terminal emulator program supports data logging, enable this feature to capture the screen data as it is downloaded. Status files may take a few seconds to download, printer archive files may take up to one minute to download (depending on the modem connection baud rate). After the files have been downloaded, they can be viewed with the terminal emulator program (if it supports file viewing) or with a text editor or word processor or printed to your system printer.

Specifying Sensor Names for Online/Offline Processing

The following abbreviations are valid for AWOS sensors/devices:

- WS for wind speed
- WD for wind direction
- TP for temperature
- DP for dew point
- BP for barometric pressure
- VI for visibility
- CH for cloud height
- PW for present weather
- VH for VHF radio voice
- ZR for freezing rain

Sensors that are set offline will not have their data reported in the voice message, on the display terminal, printer, or archive data. Turning off the VHF radio will cause the radio voice output to stop. The telephone voice will continue. If all sensors are offline, the AWOS will report temporarily inoperative to the voice output.

Password Processing

The \$PASSWD command is required to access the following functions:

```
$ONLINE, $OFFLINE, $OPENFIL, $GETFIL, $SETIME, and $SETDAT.
```

Unless \$PASSWD is entered, the AWOS will hang up within two minutes after the call is answered.

If \$PASSWD is entered, hangup will be ten minutes after the last command is entered unless a hang up command is received first.

Contact All Weather Inc. for the RMM password for your system.

RMM Command Processing and Command Responses

The input command is processed. If the command is valid, then a response will be generated. If the command is invalid, an error message will be sent. The system will hang up if three invalid commands in a row are received. If a password is required to access a function and a password has not been entered, the AWOS will not respond to the command even though it appears to have been typed correctly.

Responses to commands

\$HANGUP : "GOOD BYE" is sent to the RMM computer and the connection is terminated

\$GETCUR : Current one-minute data (same as line printer) is sent to the RMM computer

\$GETSTA : Current system status report is sent to the RMM computer

\$CONFIG : Returns the system configuration data on the RMM computer

\$OPENFIL: >>ERROR LOG FILE: Filename OPENED OK or an error message is displayed

\$GETFIL : Sends the contents of file “filename” to the RMM computer followed by >>END OF FILE

\$SETIME : Displays the current AWOS time on the RMM computer

\$SETIME hhmms: The AWOS sends, “The time will be set to HH:MM:SS” to the RMM computer. The user will be asked to confirm the change by typing “\$SETIME” followed by return. The AWOS will respond with “The current time is HH:MM:SS”

\$SETDAT : Displays the current AWOS date on the RMM computer

\$SETDAT mmddyyyy : The AWOS sends, “The date will be set to MMM DD, YYYY” to the RMM computer. The user will be asked to confirm the change by typing “\$SETDAT” followed by return. The AWOS will respond with “The current date is MMM DD, YYYY”

\$ONLINE : The AWOS responds with, “The following sensors are online: (list of sensors)”

\$ONLINE sensor: The AWOS reports sensors that are online.

\$OFFLINE: The AWOS responds with, “The following sensors are offline: (list of sensors)”

\$OFFLINE sensor: The AWOS reports sensors that are online (list of sensors)

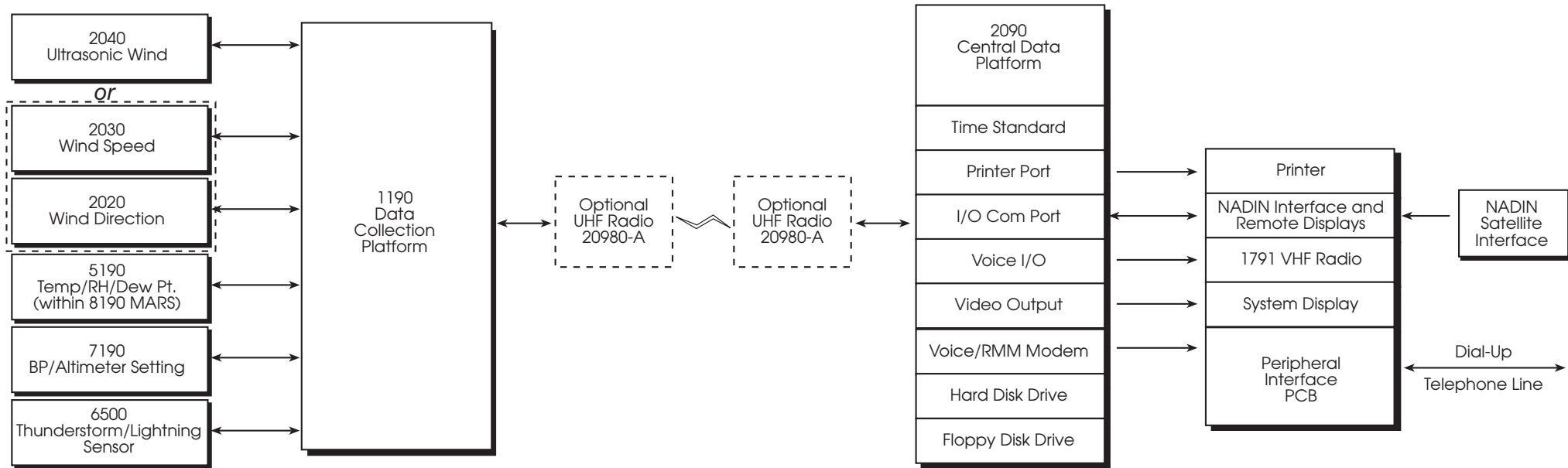
\$PASSWORD : The AWOS responds with, “Password accepted” or “Please re-enter”

Terminating the RMM Session

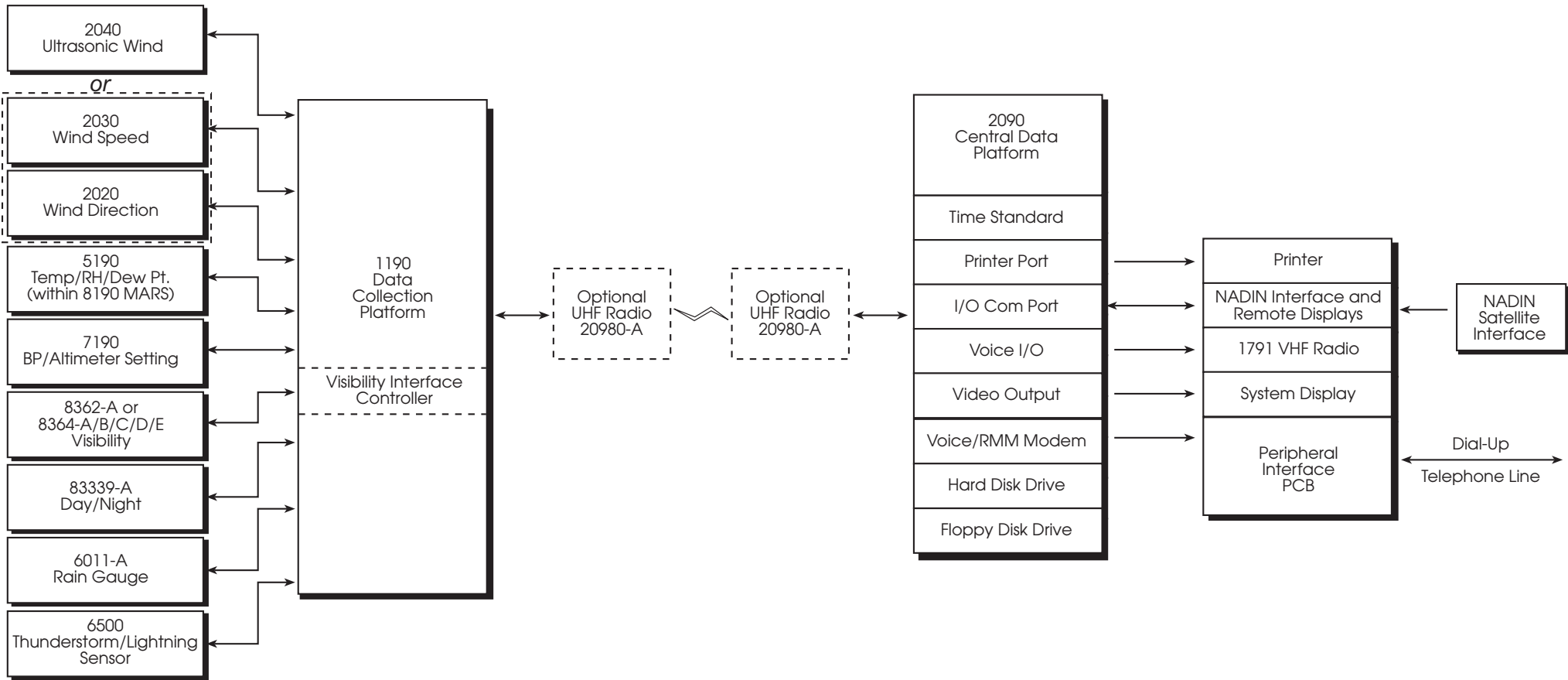
Use the command **\$HANGUP** to terminate the AWOS RMM session. If this command is not used, the telephone may be busy for up to ten minutes before the AWOS automatically terminates the call for inactivity.

System Drawings

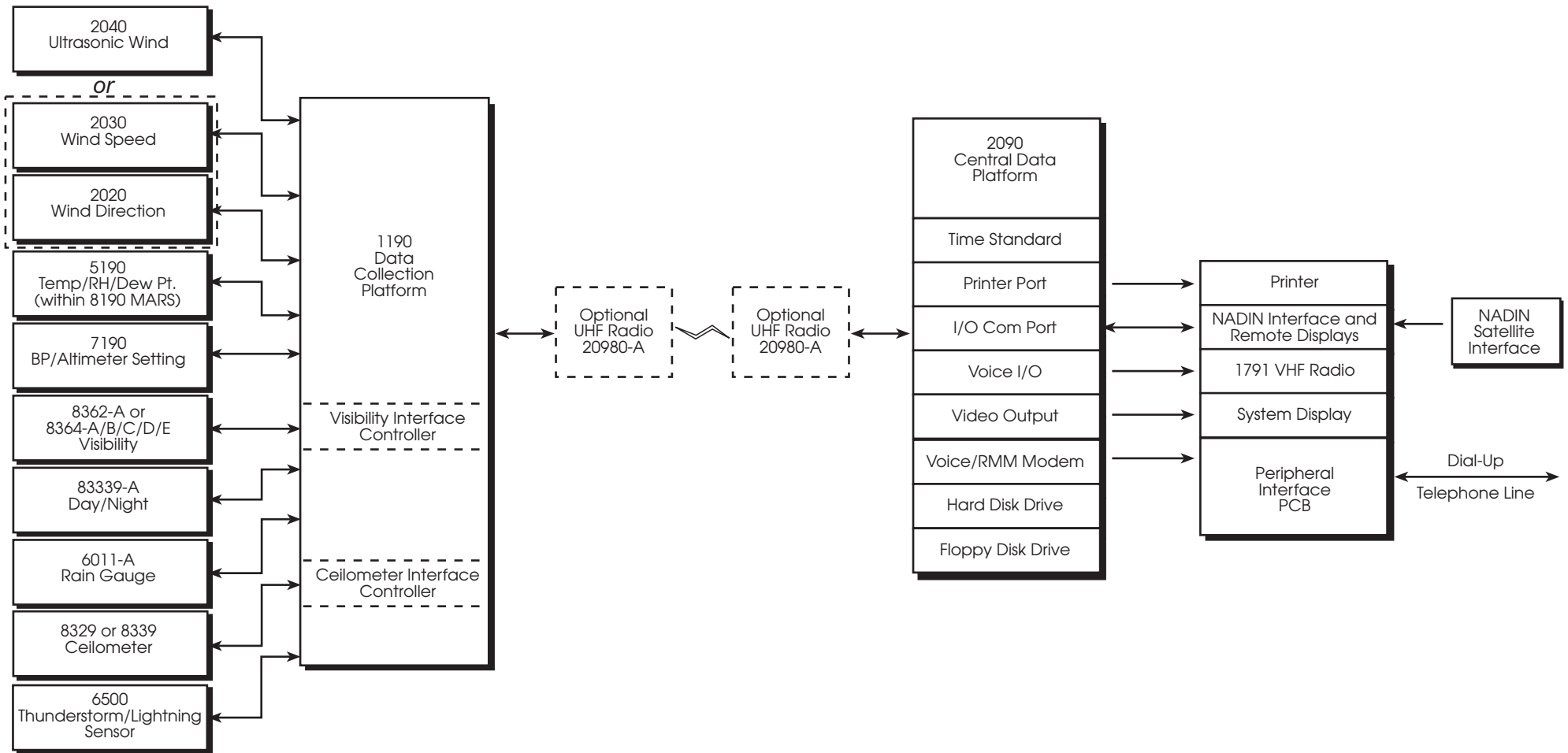
The system drawings on the following pages are included as references to assist in the installation, operation, and maintenance of this system.



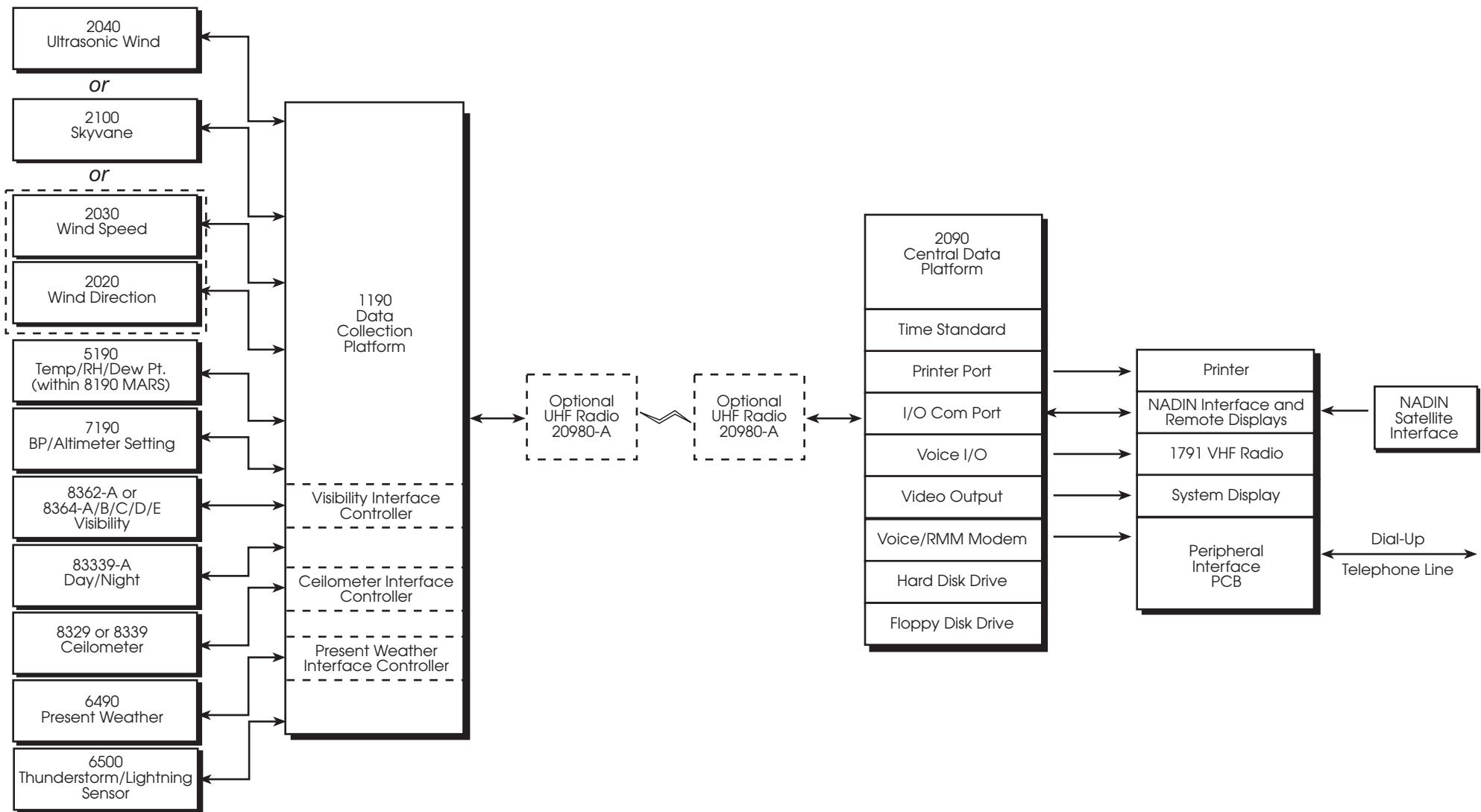
Model 901
AWOS I, AWOS I-T, AWOS I-U, and AWOS I-TU
 ("T" option uses Model 6500 or NADIN; "U" version uses Model 2040)



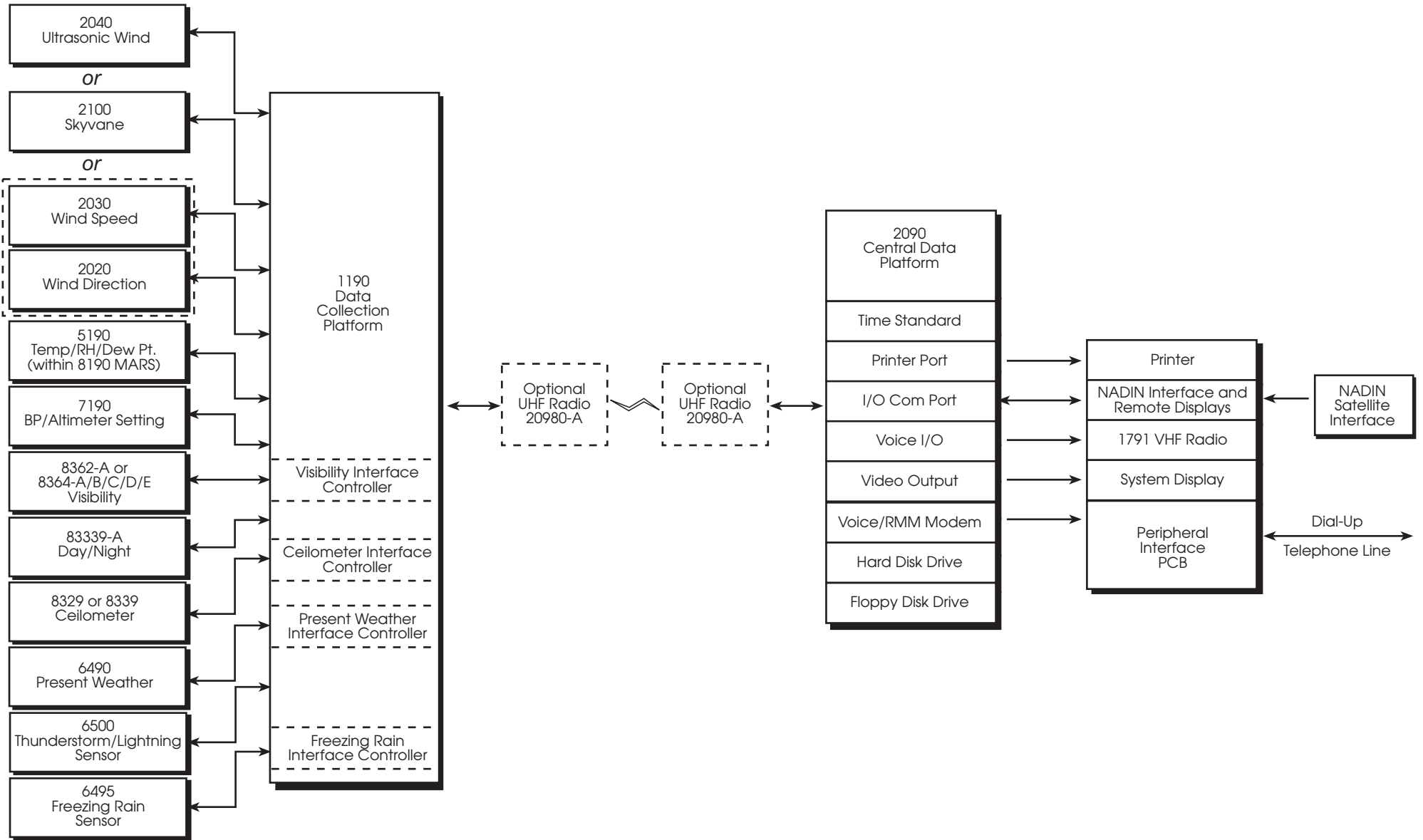
Model 902
AWOS II, AWOS II-T, AWOS II-U, and AWOS II-TU
 ("T" option uses Model 6500 or NADIN; "U" version uses Model 2040)



Model 903
AWOS III, AWOS III-T, AWOS III-U, and AWOS III-TU
 ("T" option uses Model 6500 or NADIN; "U" version uses Model 2040)



Model 903-P
AWOS III-P, AWOS III-PT, AWOS III-PU, and AWOS III-PTU
 ("T" option uses Model 6500 or NADIN; "U" version uses Model 2040)



Model 903-PZ
AWOS III-PZ, AWOS III-PTZ, AWOS III-PZU, and AWOS III-PTZU
 ("T" option uses Model 6500 and/or NADIN; "U" version uses Model 2040)



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