



# **AlphaWave Users Manual**



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**EMISSIONS**

FCC	FCC Part 90
ETSI	300-113
Industry Canada	RSS-119

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**NOTICE**

Changes or modifications not expressly approved by ArWest Communications Corporation could void the user's authority to operate this equipment.

Shielded cable must be used with this equipment in order to ensure that it meets the emissions limits for which it was designed. It is the responsibility of the user to obtain and use good quality shielded cables with this device. Shielded cables are available from most retail and commercial suppliers of cables designed to work with radio equipment and personal computer peripherals.

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**406.0 TO 406.1 MHz OPERATION**

The frequency band from 406.0 to 406.1 MHz is reserved for use by distress beacons. As such AW400 should not be programmed to transmit on any frequency within this band. Caution should be used when programming frequencies into the AW400 to eliminate the possibility of AW400 users interfering with rescue operations in this band (US only).

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**SAFETY WARNING**

In order to ensure the safe operation of this radio equipment, the following practices should be observed.

**DO NOT** operate radio equipment near electrical blasting caps or in an explosive atmosphere

**DO NOT** operate any radio transmitter unless all RF connectors are secure and any open connectors are properly terminated.

**DO NOT** allow the antenna to come close to, or touch, the eyes, face, or any exposed body parts while the radio is transmitting.

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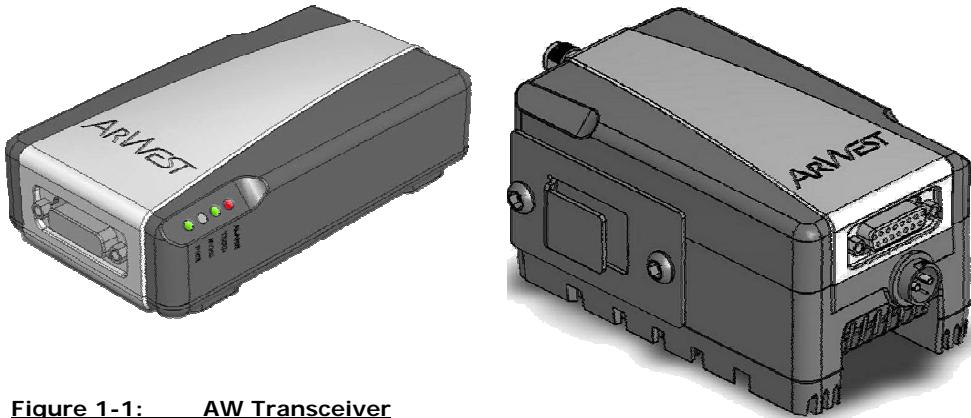
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## 1. INTRODUCTION

### 1.1 WHAT IS THE ALPHAWAVE (AW) SYSTEM

AlphaWave (AW) is a wireless system operating in the frequency band (50 to 800 MHz) that provides advanced features without complicated system set up, it includes:

- AW Radio Modem;
- "AWare" - Windows based Unit Configuration and Maintenance Software Application running on a IBM PC compatible computer (Distributor and User version).



**Figure 1-1: AW Transceiver**

The AW programmable, transparent radio modems provide real-time data transmission using spectrum efficient PSK/QAM modulation. It delivers error-free data at up to 38.4 kbps over the air for the 25 kHz channel spacing, 19.2 kbps for 12.5 kHz, and 9.6 kbps for 6.25 kHz. The AW Transceiver can be provided in two versions with different RF Output Power.

The two ports on the AW provide access to set up and test without unplugging the application terminal device. The setting can be done through the built-in Command Line interface (CLI), or through the configuration and maintenance application software running on a PC – "AWare". The diagnostic feature of the AW system provides information to monitor and maintain the user's communications link. The

output transmit power, receive signal strength (RSSI), antenna/feedline condition, and data decode performance will be transmitted online without application interruption.

The product is designed for maximum performance and reliability even in the harshest environments. Plug and play at its best, robust, withstanding the most adverse of conditions. With up to 2 watts RF output the AW system offers the most popular features required for telemetry and SCADA systems.

### 1.1.1 MODEL NUMBERS

The AlphaWave naming protocol utilizes a two (2) letter prefix **AW** and a three (3) character suffix to identify which part of the frequency range (1st character) and the RF Output Power, the particular transceiver operates on (2nd and 3rd character)

<b>AW100</b>	138 to 170 MHz	20mW to 2W
<b>AW200</b>	220 to 235 MHz	20mW to 2W
<b>AW400</b>	403 to 470 MHz	20mW to 2W
<b>AW125</b>	128 to 170 MHz	2W to 35W
<b>AW225</b>	220 to 235 MHz	2W to 25W
<b>AW435</b>	403 to 470 MHz	2W to 35W

For the rest of this manual reference will be made to AW400 and AW435 for convenience

### 1.1.2 NETWORK TOPOLOGIES

The AW Radio Modem supports Point-to-Point link (PTP) using Time Division Duplex (TDD) protocol and Point-to-Multipoint (PMP) network topology using Time Division Multiple Access (TDMA) protocol. The wireless media access contention for the PMP network can be resolved by an external controller through the data interface control lines (RTS, CTS, DTR, DSR, and DCD). In addition, the following versions of the AW software/firmware offer built-in Media Access Control (MAC) protocols to service PMP network.

Parameter	Specification	
	AW400	AW435
Operating Voltage	+9 to +24 VDC nominal	+9 to +16 VDC range 12VDC nominal ( $\pm 10\%$ )
Power Consumption (average)	6W, 2W, 0.05W Tx, Rx, Sleep	120W, 38W, 900mW Tx, Tx@30% duty cycle Rx
Operating Temp Range	-30°C to +60°C	
Dimensions (D x W x H)	149mm x 74mm x 34mm	154mm x 74mm x 72mm
Weight	12 oz / 340 g	27 oz / 765 g
Color/Housing	Two-tone Silver/Graphite, Aluminum	
Antenna Connector	TNC, 50Ω, female	
RS232 Connector	D15 waterproof, female	
Power Connector	Through DB15	Alden Connector (300500)

**Table 1-1: AlphaWave Physical Specifications**

Parameter	Specification		
	AW400	AW435	
Operating Frequency Range	138-170, 220-235, 403-470 MHz		
Modulation Techniques	GMSK/DBPSK, DQPSK, D8PSK, and D16QAM		
Radio Protocol	Time Division Duplex (TDD) Time Division Multiple Access (TDMA)		
Max. Distance Range	50 miles (80 km)	65 miles (105 km)	
Occupied Bandwidth (Channel Spacing, CS)	25 kHz, 12.5 kHz or 6.25 kHz		
Data Rate (BPS)	25 kHz CS	12.5 kHz CS	6.25 kHz CS
GMSK/DBPSK	9600	4800	2400
DQPSK	19200	9600	4800
D8PSK	28800	14400	7200
D16QAM	38400	19200	9600
System Gain (Ant gain not included)	146dBm	147dBm	147dBm
	158dBm	158dBm	159dBm
End to End delay	50 ms		

**Table 1-2: AlphaWave General Radio Specifications**

### 1.1.3 OPERATING MODES

The AlphaWave operating modes can be set through the CLI or through the external management application software. The following operating modes are available for AlphaWave radio modem:

- Time Division Duplex with dynamic bandwidth allocation provides up to 9.6/19.2/38.4 kbps user data throughput. "Half Duplex" Base or Remote and "Repeater" are the alternative protocols for the time division duplex operation.
- Simplex operating modes are developed primarily for GPS RTK applications.
- Sleep mode has automatic transmitter activation by an internal real-time clock, or by an external controller through the data interface control lines (RTS and DTR), or by the triggering of the external Sense Inputs.
- Programmable automatic channel scanning of the Preferred Channels is an alternative mode to the operation on the fixed Frequency Channel. In this mode the Base Unit is looking for free of use frequency channel while the Remote Unit is looking for the Base Unit to interact with.
- "Test" mode supports the radio installation using Built-in test tools.

### 1.1.4 MANAGEMENT TOOLS

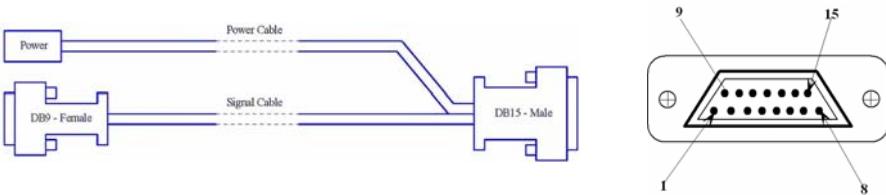
Built-in management tools along with "AWare" provide the following benefits:

- Easy user's interface for system configuration and monitoring using well developed CLI or intuitive GUI.
- An ability to test the link using built-in test utilities without expensive external test equipment such as spectrum analyzer and BER test analyzer.
- An ability to monitor status, alarms and radio performance through the intuitive GUI.
- Software upgrades and improvements can be downloaded from "AWare", to the units connected with a PC locally or remotely, through the wireless link.

## 1.2 ITEMS SUPPLIED WITH AW

Provided with each system is a transceiver (AW00 or AW435), programming cable and a CD. The CD includes Windows PC Interface Software – **AWare** and some training notes.

This provides DB15 connectivity for the AW400/AW435 with a DB9 for connection to a PC/CE Device for configuration. For the AW400, two tinned cables are available for connection to an external power supply. For the AW435 the same cable can be used but power is not available through the DB15, power to it must be supplied through the Power Cable with the Alden Connector.



**Figure 1-2: AW400 DB15 Connector**

Conn Pin #	Signal Name	Signal Description	Signal Type
1	DCD	Data Carrier Detect	O
2	DSR	Data Set Ready	O
3	RTS	Request To Send	I
4	DATAIN	Data from PC Serial Port to Modem	I
5	MP_DATAIN	Maintenance Port Serial Data In	I
6	TTLIN2	TTL In 2	I
7	TTLIN1	TTL In 1	I
8	PWRIN (AW400)	DC Power between 9 and 24 VDC	DC
9	DTR	Data Terminal Ready	I
10	CTS	Clear To Send	O
11	DATAOUT	Data from Modem to PC Serial Port	O
12	MP_DATAOUT	Maintenance Port Serial Data Out	O
13	TTLOUT2	TTL Out 2	O
14	TTLOUT1	TTL Out 1	O
15	GND	DC Power and Signal to Ground	I

**Table 1-3: Standard External Connector Pin Layout**

NB: Power in on Pin 8 only functional for AW400, this pin is not connected in AW435

### 1.2.1 AW TRANSCEIVER

Included with each AW400/AW435 (CM-10001) is a 2 meter interface cable for programming purposes only—**THIS IS NOT A FIELD DATA CABLE.**

Figure 1-3: AW400 Top View

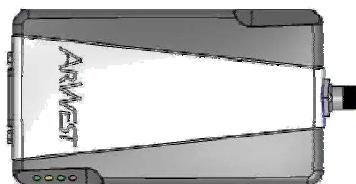


Figure 1-4: AW400 Side View LEDs



Figure 1-5: AW400 Front View RS232



Figure 1-6 AW435 Top View

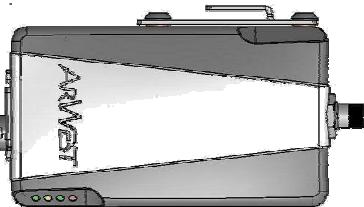


Figure 1-7: AW 435 Side View Bracket

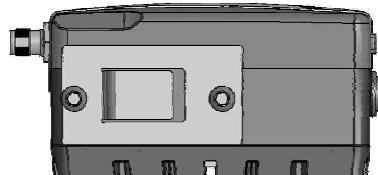
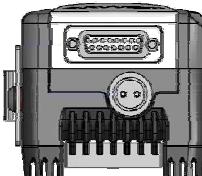


Figure 1-8: AW435 Front View RS232



### 1.2.2 AW400/AW435 INTERFACE CABLE

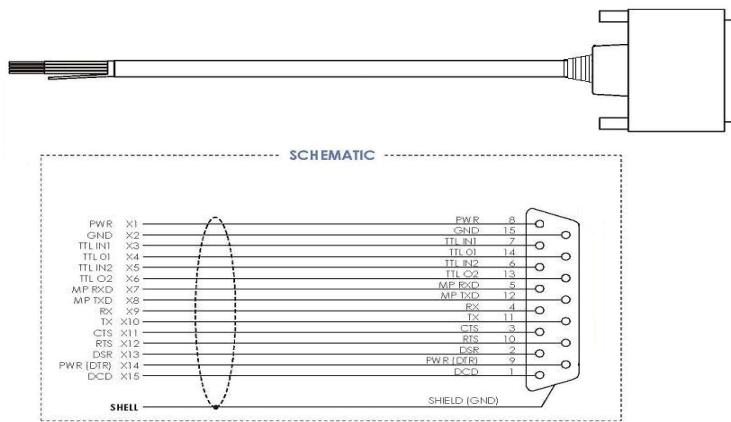
The serial Data Interface can be configured through the software to operate in half and full duplex operating modes. The serial line Data Rate should also be under the software control, which provides the automatic data rate detection.

RTS, CTS, DSR, DTR and CD signals should be reserved on-board for future support of full RS-232 hardware handshake operation. This will provide the support of the wide range of different standard and none-standard, user specific, Data Link interfaces.

The serial interface is protected against static discharge (15 kV) and shorts with power and signal circuits.

### 1.2.3. DATA CABLE

In order to interface an AW400 or AW435 to a third party system ArWest have developed an 'open-ended' transparent cable (see Fig 1-9). The user can connect whatever connector is required to the 'open-end' of the cable following the correct pin protocol for this cable (CM-10005). When using this cable with an AW400 power can be provided by a third party system, however the Power requirement for the AW435 requires that this capability be disabled on the AW435.



**Figure 1-9: AW400/AW435 Data Cable**

#### 1.2.4 ALARM/SENSE INTERFACE

The Alarm/Sense Interface provides two external sense CMOS/TTL input lines and two TTL output lines for connection to external Alarm and Security systems. The TTL output lines can be configured to indicate the following alarms:

TTL_OUT1:	TTL_IN1 (received from remote unit) TTL_IN1 and TTL_IN2 (received from remote unit) TTL_IN1 or TTL_IN2 (received from remote unit)
TTL_OUT2:	TTL_IN2 (received from remote unit) BER $>10^{-3}$ or SYNC Loss BER $>10^{-4}$ or SYNC Loss SYNC Loss

**Table 1-4: TTL Output Lines**

#### 1.2.5 SERIAL MAINTENANCE INTERFACE

The serial asynchronous interface allows connection to external serial devices. All commonly supported baud rates, parity and bit configurations are available up to 115.2 kbps. This interface is a simple 3-wire with RS-232C signal levels. The serial interface is protected against static discharge (15 kV) and shorts with power and signal circuits.

#### 1.2.6 LINK ALARM/STATUS INDICATORS

External LED's are used for Link and Line status indication:

Pos'n	Led Name	Color	Description
1	Power	Green	Active if Power connected to modem
2	Link	Red	Active whenever a signal with a level exceeding the level required for reception exists on the radio channel (min. light on 200ms).
3	Rx/Tx	Green	Active if modem receives or transmits Data over serial interface (min. light on 200ms)
4	Alarm	Red	Alarm indicator

**Table 1-5: External LEDs**

### 1.2.7 POWER INTERFACE

The power interface allows connection to an unregulated DC power source. The DC power source (third-party or user supplied) must provide a minimum of 11.0 Watts of DC power between 9 and 24VDC for the AW400 and a minimum of 38.0 Watts of power between 9 and 16VDC for the AW435. The power interface is protected against reverse polarity connection, as well as protected against high-voltage transients.

### 1.2.8 RF INTERFACE

The stand-alone unit's RF interface is a 50-ohm impedance matched standard BNC/TNC connector as required by regulations. It can operate without damage to the unit under DC short and open conditions.

### 1.2.9 ANTENNAS

Antenna type depends on the site requirements, and may be directional or omni-directional. The AW Base antenna is typically mounted on a mast that elevates the antenna a minimum of 40 feet above the average level of the terrain to support 50 miles distance range.

The total system gain allowable includes both the Radio-Modem and the antenna. The table listed below is for ArWest antennas, however the Gain values can be used with other antennas to determine AlphaWave Power Setting. Also note Table 1-7, AlphaWave Antenna Cuts, in order to achieve optimum performance whip antennas **MUST** be cut to suit the actual frequency to be used.

Antenna Part#	Gain dBi	Conn	AlphaWave Power Setting	
			AW400	AW435
AT-30000 to AT-30005	0	TNC	33 dBm (2W)	45 dBm (31.62W)
AT-30006 to AT-30007	3	NMO	30 dBm (1W)	42 dBm (15.85W)
AT-30008 to AT-30010	5	NMO	28 dBm (0.63W)	40 dBm (10W)
AT-30011 to AT-30015	9	TNC	24 dBm (0.25W)	36 dBm (3.98W)
AT-30016	8.8	N	24 dBm (0.25W)	36.2 dBm (3.98W)
AT-30017 to AT-30018	9	N	24 dBm (0.25W)	36 dBm (3.98W)
AT-30019 to AT-30021	2.5	TNC	30.5 dBm (1.155W)	42.5 dBm (15.85W)
AT-30019 to AT-30021	2.4	NMO	30.6 dBm (1.155W)	42.6 dBm (15.85W)

**Table 1-6: AlphaWave Power Settings v Antenna**

**Warning:**

1. The values defined in the table must not be exceeded in order to ensure compliance with RF exposure regulations.
2. The antenna of the device may not be co-located or operating In conjunction with any other antenna or transmitter.

All cuts made on antennas marked \* should be made on the bottom rod only. Measure the length of the rod cut from the lower edge of the phasing coil to the end of the whip.

All cuts made on antennas marked \*\* on the bottom of the rod only

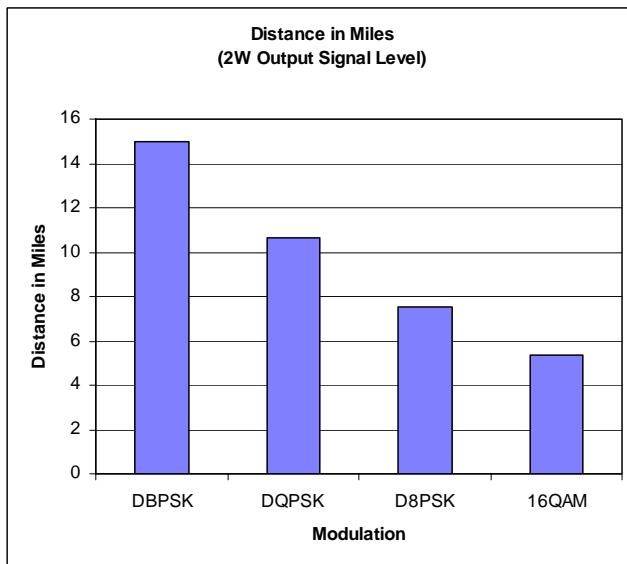


Antenna Part#	Freq MHz	Cut	Antenna Part#	Freq MHz	Cut
AT-30006**	150	48"	AT-30008*	405	14"
	152	47"		410	13"
	154	46"		415	12"
	156	45"		420	11½"
	158	44"		425	11"
	160	43½"		430	10½"
	162	43"	AT-30009*	430	12½"
	164	42"		435	12"
	166	41½"		440	11½"
	168	41"		445	11"
	170	40½"		450	10½"
AT-30007**	200	33"	AT-30010*	450	12"
	205	32"		455	11½"
	210	31"		460	11"
	215	30"		465	10½"
	220	29"		470	10"
	225	28"	AT-30022**	406-425	11"
	230	27"		425-440	10"
	235	26"	AT-30023**	425-440	10"
				435-450	9¾"
			AT-30024**	450-470	9"

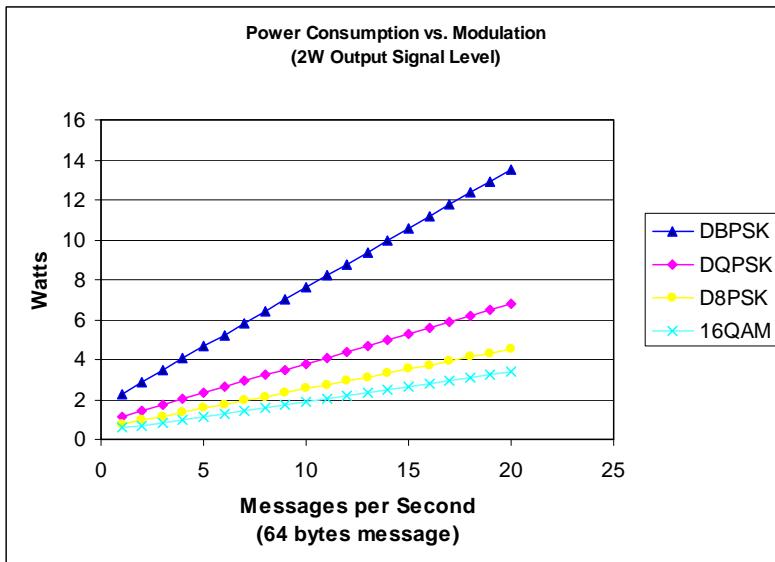
Table 1-7: AlphaWave Antenna Cuts

**1.2.10 MAXIMUM PERMISSIBLE EXPOSURE LEVELS**

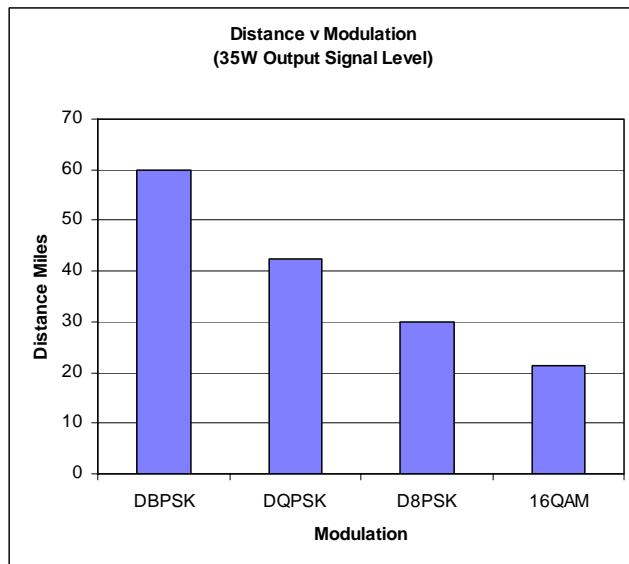
The AW435 is a High Power unit and FCC regulations now stipulate that Maximum Permissible Exposure Levels (**MPE**) be clearly indicated. The calculated safe distance for the AW435 is 93.6cm, Ar-West recommends that operators **do not** get closer than one (1) meter during operation of the Radio, except for initial setup and final shut down.



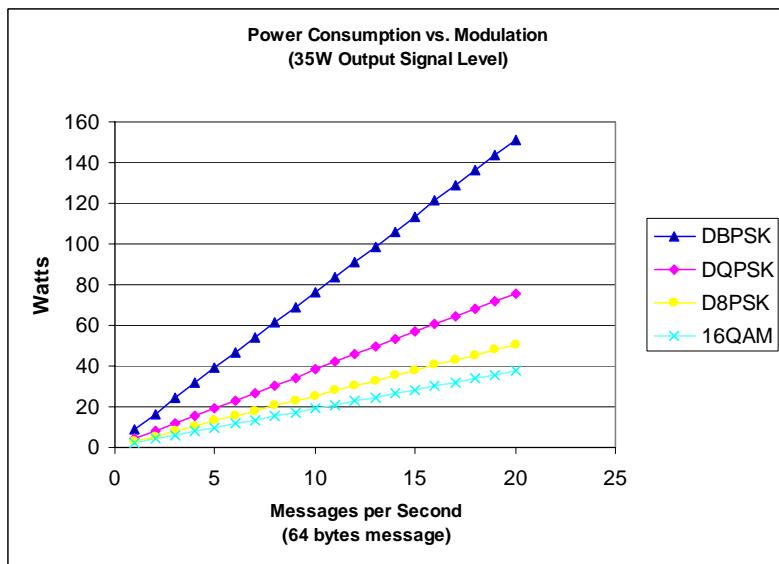
**Figure 1-10:** Distance v Modulation AW400



**Figure 1-11:** Power Consumption v Modulation AW400



**Figure 1-12:** Distance v Modulation AW435



**Figure 1-13:** Power Consumption v Modulation AW435

## **2. CONFIGURE YOUR ALPHAWAVE**

All AW products are shipped as **Remote** units with SmartScan<sup>®</sup> and Plug-and-Play enabled.

### **2.1 PLUG AND PLAY (DEFAULT SETTING)**

Simply connect the antenna and apply power to an AW unit that has the same Channel Mapping as the Base unit and SmartScan<sup>®</sup> technology will immediately detect the Base Station frequency and protocol and start receiving data.

### **2.2 BASE SETUP**

Use AWare "Link Protocol Properties Tab" (Figure 5-4) to convert the default "Remote" settings to the Base settings. On completion of setting Base in the Protocol Properties ensure that the correct Protocol Option is then selected (Simplex Transmitter/Half Duplex).

### **2.3 REMOTE SETUP**

All AW Products are shipped as Remote units, to return a unit reconfigured as a Base or Repeater to the Remote Mode, use AWare "Link Protocol Properties Tab" (Figure 5-4) to convert the default "Remote" settings to the Base settings. On completion of setting Base in the Protocol Properties ensure that the correct Protocol Option is then selected (Simplex Receiver/Half Duplex/RTK Repeater/Repeater).

### **2.4 REPEATER SETUP**

To extend the wireless link, AlphaWave radio modems use frame repeating technology.

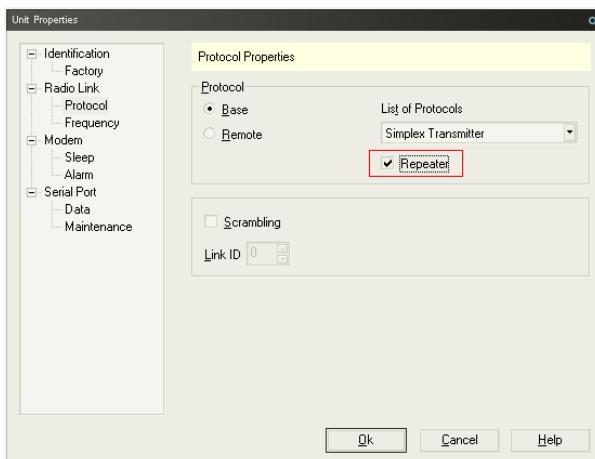
A remote unit can be assigned to the "Repeater" protocol. In this state the unit acts as a bridge between the base unit and remote unit(s). A repeater unit switches between intervals of receive and transmit operation. It first receives one frame of data from a base unit, then transmits the same frame of data to unit(s) in receive mode, and so on with each subsequent frame of data.

A repeater or bridge, when strategically located in such a location to avoid terrain screening (on top of a high building or, a hill for example) can greatly enhance the performance of a wireless network by allowing communications over distances much greater than would be possible without it.

If a Remote Unit can receive data from a Base Unit and a Repeater then the remote unit will select data from the strongest signal.

In order for the "Repeater" to function correctly the base unit must be configured correctly so it is aware that there is a repeater in the Network..

When a base unit is part of a wireless network using a remote *Repeater*, the repeater box underneath it must be checked for a working link to be established see figure 2-1 below.



**Figure 2-1: Base Station Setup with Repeater in the Network**

## 2.5 INSTALL NEW FIRMWARE

To install new firmware in an AW unit section 6.4 covers the downloading of the "embedded software images" using AWare.

### **3. AWARE - GENERAL DESCRIPTION**

AWare is a MS Windows® based software program designed for configuring and maintaining ArWest UHF radio systems. AWare is a user-friendly software application that provides complete and powerful tools for radio monitoring and diagnostics. It also provides software image and configuration downloading. The statistics from the monitoring can be viewed in text or graphical format. With the support of ArWest radios' real-time software, AWare architecture makes it possible to maintain all wireless network radio configuration by connecting to only one unit.

The program consists of three panes. The left pane shows the list of units in the wireless link/cluster. In the root node of the tree there is a local unit that is directly connected, through a serial cable, to the management computer running AWare. The right pane is the main window, which displays the selected unit's main configuration parameters and operating status. The bottom pane is a terminal window. It gives the ability to work directly with a Command Line Interface (CLI), without a GUI, by entering CLI commands. The bottom pane also contains a log window that shows the log records coming from selected unit.

To work with the program, the operator needs only to connect PC's COM port to local unit's maintenance port. AWare automatically generates the network tree displaying the locally connected unit in the root of the tree. AWare uses CLI commands for interaction with the radio modem.

The "Dealer" version of AWare provides the tools to preprogram the maximum output power level, channel spacing, and channel planning for specific countries and users. The "End-User" version allows an operator to select the settings preprogrammed by the dealer. The "Workshop" version of AWare provides the calibration tools used by repair centers to recalibrate the units.

Located on the ArWest Website ([www.arwestcom.com](http://www.arwestcom.com)), in the products section is a Flash Version of **AWare Software Tutorial**.

### 3.1 PRODUCT FEATURES

#### 3.1.1 MANAGEMENT

AWare is intended to manage the ArWest radio modems, it provides dialog boxes to change and configure all radio options. The following unit's settings are configurable through AWare:

1. Data port parameters (Line parameters);
2. Wireless transfer parameters;
3. Radio parameters (TX/RX etc.)

In addition to the individual option-tuning feature, AWare provides compound options for downloading feature. The downloading process uses X-Modem protocol that both the unit and the PC program are supporting. The manufacturing will provide configuration in shipping packages so every user can configure each unit with default parameters provided by vendor.

#### 3.1.2. ALARMS

There is a callback feature for reading the radio alarms. It is possible to activate and deactivate this feature in any device after each device sends its alarm status to the PC where AWare is running. The well-designed graphical user interface on AWare shows each particular alarm on the corresponding unit and with an operator's request shows detailed description of that alarm.

#### 3.1.3 STATISTICS

With a right-click of the mouse on a specific option on the menu bar, it is possible to view the statistics information on each unit. In the Statistic window an operator can see link status: number of error packets or bits arrived during unity of time (Bit Error Rate - BER), number of packets sent/received etc.). Such information can be shown in textual or graphical form. It is also possible to change the unit of time (scaling).

### 3.2 PRODUCT OVERVIEW

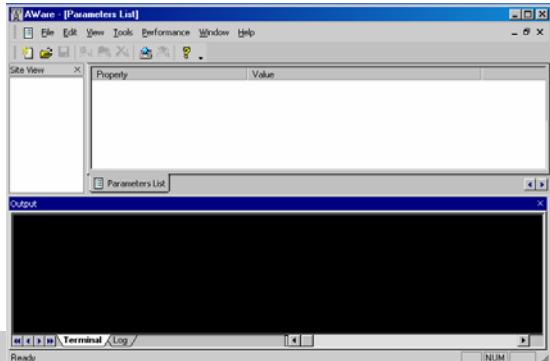
#### 3.2.1 USER INTERFACE CONVENTIONS

AWare uses the following user interface conventions:

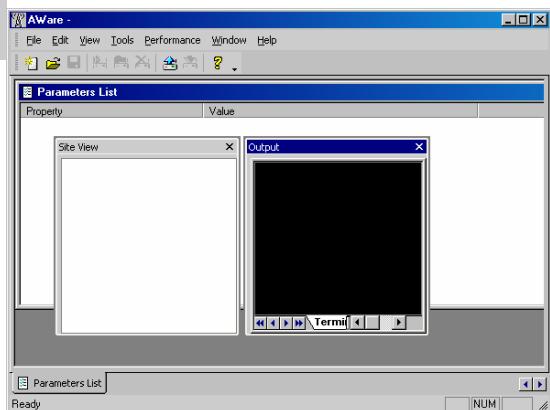
- Menu options and buttons that end with three dots (...) display a dialog window when selected. .
- Menu options that are followed by a shaded arrow display a submenu when selected.
- Buttons not followed by three dots or shaded arrow performs a function (command) when selected.
- Underlined letters in menu options identify keyboard shortcuts.
- If you are using a PC keyboard, hold down the [Alt] key and press the key underlined in the menu option to select that option.
- The arrow keys on the keyboard allow an operator to scroll up, down, right, or left within a menu.
- Menu options are dimmed when they are not active for a particular window.
- All windows and dialog boxes in AWare indicate object or property name in the title bar for which they are activated.

#### 3.2.2 MAINFRAME

The AWare Mainframe has three child windows: Site View (left pane), Main (right pane), and Display (bottom of the Mainframe). The double-clicking magnifies the child windows. The magnified child window can be docked back to the original position by the double-clicking on its title bar.



**Figure 3-1: Mainframe Default View**



**Figure 3-2: Mainframe with Undocked Child Windows**

### 3.2.3 SITE VIEW PANE

This window shows the list of all units in the wireless network. The wireless cluster is pictured as a tree with the Base/Primary unit as the root.

Operators are able to refresh the content of window through the main menu or popup menu by clicking mouse's right button. The refresh command can be activated manually or by setting polling option in the Preference dialog box. The system reacts on this command inactively because of slow wireless connection of the service channel.

In the "Dealer" version of AWARE, the Site View Pane is also used to display the tree of available unit profiles. The "Unit Profile" tree provides an operator with the tools to select, add, or delete a unit profile, or a folder of units' profiles.

The default position for Site View Pane is in the left side of main window.

### 3.2.4 MAIN PANE

AWARE Main pane contains the Quick View tab that displays the selected unit's main configuration parameters and operating status. The Main tab is used also for the Statistics tabs, which can be activated through the Performance menu items (see section 3.2.11)

Any of Statistics tabs can be opened and hidden by the operator. Meanwhile the Quick View tab is always in the Main pane and can be hidden only if the pane itself is hidden.

### 3.2.5 DISPLAY PANE

This window shows the log records coming from selected unit. The log records include all "Informative Events" with the time stamps along with the "System Errors/Major Alarms" and "Warnings/Minor Alarms". The log information can be accumulated, even if the unit is not selected (in the background). This window gives the operator the ability to sort and filter log information by user-preferred criteria (by date, by type and so on). In this window, it is also possible to accumulate all logs coming from AWARE itself.

The Terminal tab of the Display pane is designed for advanced operators to give them an ability to work with unit directly without GUI using the CLI commands.

### 3.2.6 MENU BAR

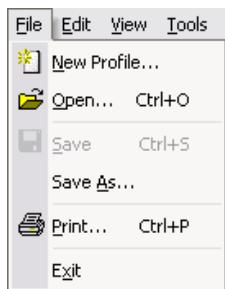
The menu is a major entry point for all program features. The operator through this interface can access and change the properties of the AlphaWave radio. The Menu Bar consists of following items:

**Figure 3-3: Menu Bar**

### 3.2.7 FILE MENU

The configuration information is stored in the Configuration Profiles. The Configuration Profiles can be saved or loaded under the File option of the menu bar. If necessary, this option allows the operator to set the same configuration of one unit on a different unit simply by loading it. The operator may save as many Configuration Profiles as he needs.

The File Menu contains the following commands (Figure 3-4):

**Figure 3-4: File Menu**

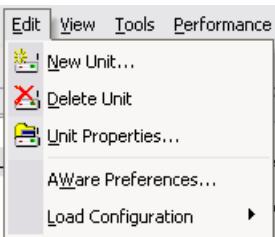
Where:

- New Profile** – to create a New Profile;
- Open** – to open a Profile from the hard or floppy disk;
- Save** – to save the modified Profile to the same device from where it was loaded;
- Save As** – to save a newly created or modified Profile on the specified devices with the specified name and “\*.awn” extension;
- Exit** – to exit Aware.

### 3.2.8 EDIT MENU

This menu item (Figure 3-5) helps to configure the radio's external and internal parameters. Those parameters are, input/output line properties, link configuration, radio modems configuration and so on (see section 5).

The AWare Preferences item in the Edit Menu helps to setup the user's Preferences for AWare.



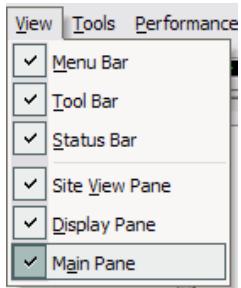
**Figure 3-5: Edit Menu**

Where:

- New Unit** – to add a new unit into the wireless network/link;
- Delete Unit** – to delete the selected unit from the wireless network/link;
- Unit Properties** – to open a configuration dialog box for the selected unit;
- AWare Preferences** – to open AWare preferences dialog box;
- Load Configuration** – to load a configuration to/from the selected unit from/to the open Configuration Profile.

### 3.2.9 VIEW MENU

The View menu intended to show/hide all toolbars, menus and windows to construct working layout.



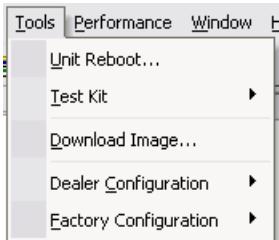
**Figure 3-6: View Menu**

Where:

- Menu Bar** – Show/Hide menu bar;
- Tool Bar** – for hide/show the tool bar;
- Status Bar** – for hide/show the status bar;
- Site View Pane** – for hide/show the site view pane;
- Display Pane** – for hide/show the terminal and log tabs in the display pane;
- Main Pane** – for hide/show the main pane

### 3.2.10 TOOLS MENU

The Tools menu consists of following items:



**Figure 3-7: Tools Menu**

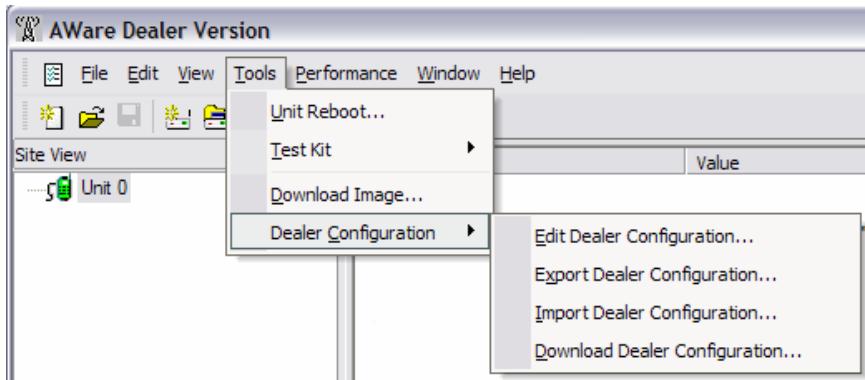
Where:

- Unit Reboot** – used to access “Reboot” dialog box;
- Test Kit** – provides a set of installation support and diagnostic utilities (see section 6.1);
- Download Image** – used to access the Firmware Image Downloading Manager;

**Dealer Configuration** – provides a set of tools to edit and load Dealer Configuration Parameters (available for Dealer and Workshop Version);

**Factory Configuration** – provides a set of tools to calibrate the unit and download Calibration Parameters to the unit (available only for Workshop Version);

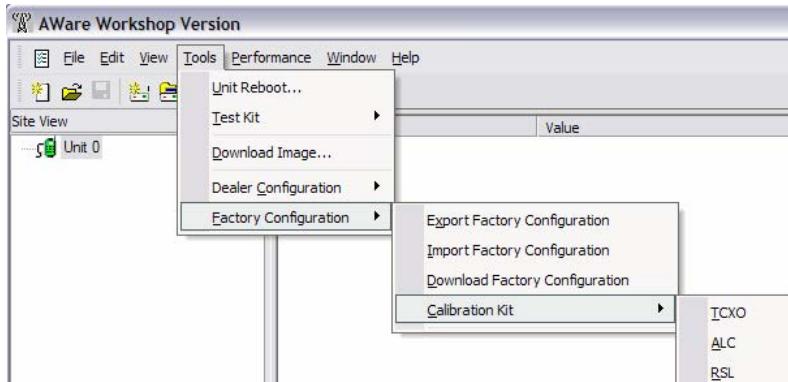
The “Dealers Configuration” sub-menu of “Tools” menu is intended to manipulate the dealer’s configuration File. “Dealer Configuration” sub-menu contains the following items (Figure 3-8):



**Figure 3-8: Dealer Configuration Sub-menu**

- **Edit Dealer Configuration** – opens dealer configuration dialog box to edit dealer configuration parameters
- **Export Dealer Configuration** – save dealer configuration into the file on the disk. The New Profile dialog box uses this file to choose the dealer configuration as basis for network profile.
- **Import Dealer Configuration** – load Dealer Configuration file into the system for editing it. The “Import Dealer Configuration” menu item also substitute dealer configuration file in the profile that currently active in AWARE.
- **Download Dealer Configuration** – download Dealer Configuration parameters into the unit through the serial interface.

The “Factory Configuration” sub-menu of “Tools” menu provides an access to the tools intended for the unit calibration. “Factory Configuration” sub-menu contains the following items (Figure 3-9):

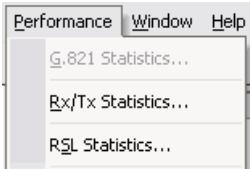


**Figure 3-9: Factory Configuration Sub-menu**

- **Export Factory Configuration** – save dealer configuration into the file on the disk. The New Profile dialog box uses this file to choose the dealer configuration as basis for network profile.
- **Import Factory Configuration** – load Factory Configuration file into the system for editing it. The “Import Dealer Configuration” menu item also substitute dealer configuration file in the profile that currently active in AWARE.
- **Download Factory Configuration** – download Factory Configuration parameters into the unit through the serial interface.
- **Calibration Kit** – provides access to the unit calibration tools (see section 6.3).

### 3.2.11 PERFORMANCE MENU

The Performance Menu is intended to retrieve the statistics from the unit and present the retrieved information in graphical formats:

**Figure 3-10: Performance Menu**

Where:

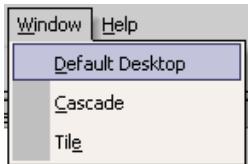
**Rx/Tx Statistics** – opens the tables and graphs of performance information unique for ArWest radio modems not covered by G.821 standard of ITU.

**G.821 Statistics** – opens the graphs of the Error Performance Parameters and Objectives defined by G.821 standard of ITU.

**RSL** - opens the graphs of received signal level for ArWest radio

### 3.2.12 WINDOW MENU

The “Window” menu (Figure 3-11) contains the following commands:

**Figure 3-11: Window Menu**

Where:

**Default Desktop** – to open and arrange the windows as it was designed for Default Desktop;

**Cascade** – to arrange windows so they are all partially visible;

**Tile** – to arrange windows horizontally or vertically so they are all very visible.

### 3.2.13 HELP

This menu item helps with the questions that arise about the available commands, information about commands usage and general information about AWare.

Help contains the following items:

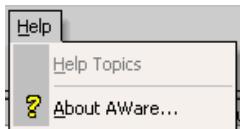


Figure 3-12: Help Menu

Where:

- Help Topics** – opens application help topics in the separate dialog with contents, index and find tabs;
- About Aware** – opens about dialog box.

### 3.2.14 TOOL BAR ICONS

The AWare Tool Bar contains the buttons with images so the operator can quickly associate the command with the image (see Figure 3-13).



Figure 3-13: AWare Tool Bar

Where:

- Create a New Profile
- Open Profile
- Save Profile
- Print Configuration(s) and User Settings
- Add a Unit into Profile
- Activate the selected unit's Configuration Properties
- Delete the selected unit from the Profile
- Update unit's configuration from local unit into the Profile
- Download unit's configuration from the Profile into the unit
- Select Help Topic or Show About dialog

## 4. CONFIGURATION FILES

The configuration information used by AWare is stored in four types of files:

- AWare Preferences
- Factory Configuration files
- Dealer Configuration files
- User Setting Profile

Factory Configuration files can be modified only by "Workshop" version of AWare. While Dealer Configuration file can be modified and loaded into the unit by "Dealer" version of AWare.

### 4.1 AWARE PREFERENCES

The "AWare Preferences" file is where AWare settings are stored. It includes two groups of setting parameters:

- Startup Preferences
- Communication Preferences

To open the "AWare Preferences" dialog box, the operator must click "AWare Preferences" menu item on "Edit" menu.

#### 4.1.1 STARTUP PREFERENCES

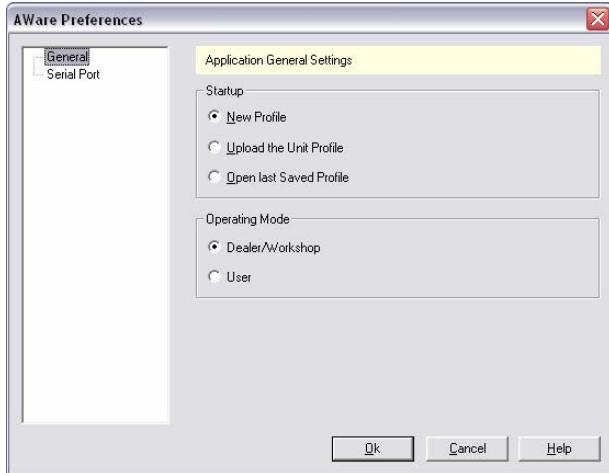
AWare allows three different startup procedures, which could be selected from the "General" preferences of the preferences dialog box:

- New Profile
- Upload the Unit Profile
- Open last Saved Profile

and two operating modes:

- Dealer/Workshop
- User

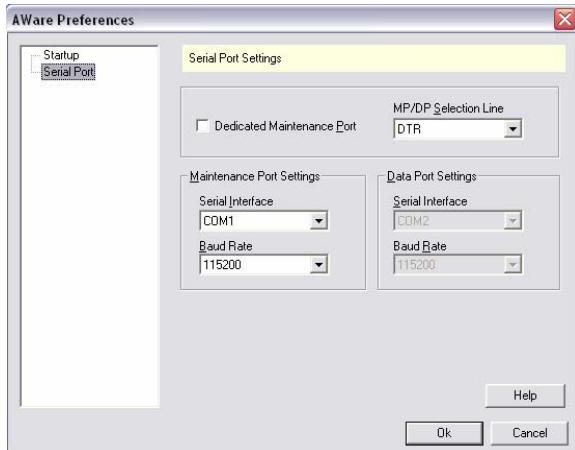
Dealer and Workshop versions of AWare provide for User and Dealer/Workshop operating modes. Only Dealer/Workshop operating provides access to Dealer and Factory Configuration Tools.



Chapter 4

**Figure 4-1: AWARE General Preferences**

The Dealer and Workshop versions of AWARE provide the identical set of tools as the User version. However, note that the wireless network profile generation and modification is available only in User AWARE is used or if User operating mode of Dealer and Workshop versions of AWARE is selected.

**Figure 4-2: Communication Preferences**

#### 4.1.2 COMMUNICATION PREFERENCES

The Communication preferences tab allows a variety of options for PC's COM port selection (COM1 to COM8) and interface cables used between the unit and PC. For Dedicated Maintenance Port, the COM ports for both Maintenance and Data must be defined. For Non-dedicated Maintenance Port, the shared COM port must be selected.

By default, the Dedicated Maintenance Port is unchecked and Settings for Maintenance serial port are grayed out.

If the Dedicated Maintenance Port is checked then the MP/DP Selection Line option must be grayed out and controls for Maintenance serial port settings become active.

To switch radio modem from/to Data/Command mode the Data Terminal Ready (DTR) control line or three-character command sequence can be used. The Data/Command Switching option is provided through the "DTR / Software" list box.

#### 4.2 CONFIGURATION FILES

The configuration files' structure has a binary format to protect configuration file from any type of external intervention from the user. The file has a tree type structure to keep information of the whole cluster in the root of the tree and each unit's configuration in the nodes. Further changes of any parameter will be saved in the configuration file in its corresponding place.

"Dealer" and "Workshop" versions of Aware are used to create, modify, save on disk, and load into the units the "Dealer Configuration" and "Factory Configuration" files. The "Dealer Configuration" and "Factory Configuration" tools are developed for this purpose (see sections 6-2, and 6-3).

#### 4.3 USER SETTINGS PROFILE

User Setting Profile defines the settings of the wireless cluster/link and the units in that cluster/link. At the same time, an operator is able to open only one profile in Aware and work with units in that cluster. The User Setting profile contains two groups of information:

- Cluster/Link Properties – common for all units in the cluster
- Unit Specific Properties – setting unique for each unit in the wireless cluster

The group of Cluster/Link Properties includes:

- Frequency
- Link Data Rate
- Topology
- Scrambling Seed

The group of unit specific properties includes:

- Data Port Rate
- Output Power Level
- Protocol
- Sleep mode
- Alarm Settings

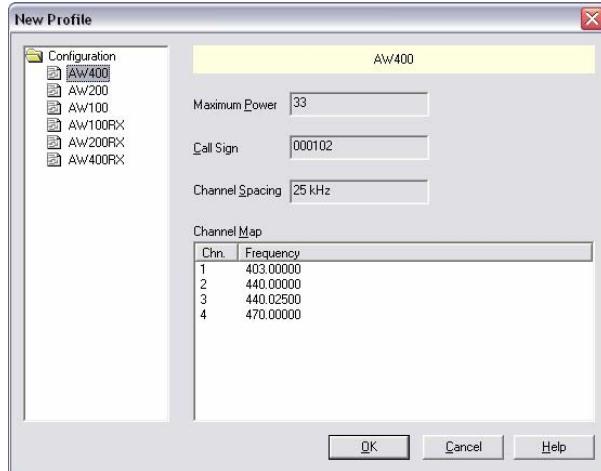
#### 4.3.1 CREATE A USER SETTING PROFILE

The menu item **File > New Profile** creates a new User Setting Profile (see Figure 4-3). By default, it creates one Base Station unit in the profile with factory default User Settings for that unit and opens unit properties dialog box to modify user settings for newly created unit.

The tree on the left shows all available configurations provided by dealer or automatically generated from existing units. By clicking on each configuration, the corresponding fields on the right will show all settings filled up by dealer for selected item.

The beige title on the dialog box shows the Product Name for current configuration.

- **Maximum Power** – determines maximum output power settable by the operator through the Unit Settings tools.
- **Call Sign** – indicates the unique ID assigned by FCC (filled by dealer).
- **Channel Spacing** – defines channel spacing 25 kHz, 12.5 kHz, or 6.25 kHz.
- **Channel Mapping** – defines the list of central frequencies mapped to channel numbers.



**Figure 4-3: New Profile Dialog Box**

The New Profile dialog box indicates the list of available units' configurations. The indicated unit configurations include Factory and Dealer configurations (refer to section 6.2 for Dealer Configuration). The full list of AW products currently supported by AWare includes:

AW400	AlphaWave UHF transceiver
AW200	AlphaWave Chinese version VHF transceiver
AW100	AlphaWave VHF transceiver
AW400Rx	Receive-Only UHF radio
AW200Rx	Receive-Only Chinese version VHF radio
AW100Rx	Receive-Only VHF radio
AW435	High Power UHF transceiver
AW225	High Power Chinese version VHF transceiver
AW135	High Power VHF transceiver

**Table 4-1: Products supported by AWare**

First two characters of name indicate the model family (AW). The following three digits after the dash is an operating frequency band:

400	403 to 470 MHz UHF band radio
200	220 to 235 MHz Chinese version VHF band radio
100	150 to 170 MHz VHF band radio

#### 4.3.2 OPEN A USER SETTING PROFILE

The full path of the User Setting Profile last used is stored in the system registry. The program automatically opens that profile after starting up when corresponding option is selected in the AWare preferences dialog box.

Choosing the "Open" menu item in "File" menu opens the File Open dialog box. This is where the chosen profile is loaded. Then the program automatically loads the newly chosen profile.

#### 4.3.3 SAVE A USER SETTING PROFILE

To store the current user settings, the "Save" and "Save As" are being used. "Save As" menu item opens "Save File" dialog box, which allows an operator to store the current user settings into the different file.

#### 4.3.4 ADD A UNIT INTO PROFILE

By selecting this menu item, the program adds Remote/Secondary units into the Profile. A unique name and serial number of all zeros specified for newly added unit. From this point the operator is able to set the unit specific parameters or change the cluster parameters for all units. The newly added into profile unit has the factory default user settings.

#### 4.3.5 DELETE A UNIT FROM PROFILE

The Delete Unit Menu item deletes the unit from the User Setting Profile. The delete operation can not be performed on the root item in the Site View configuration tree, as long as the configuration of the rest of all units is based on the root item's unit.

#### 4.3.6 SELECT A LOCAL UNIT

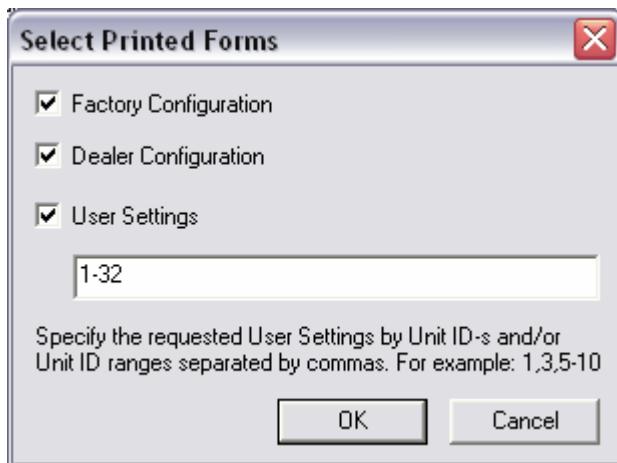
The "Local Unit" menu item specifies the unit that locally connected to the PC through the Serial Interface. This option used by AWare to substitute the Serial Number automatically (if last one is all zeros) with the serial number of locally connected unit during download process. The green icon will indicate local unit in the Profile Tree.

There should always be one unit in the profile and this one unit will be local.

#### 4.4 PRINTING CONFIGURATION AND USER SETTINGS FILES

The Configuration(s)/User Settings print Forms are developed to fit in the portrait oriented A4 paper size. The Factory and Dealer Configurations each fits in one page (see Appendixes C-1 and C-2.) For the User Settings each page may contain two Unit Properties tables (see Appendix C-3).

Print menu item in the File menu opens a “Select Printed Forms” dialog:



**Figure 4-4: Select Printed Forms**

By default, all three printed forms are selected and User Settings form includes all units in the wireless cluster (for example 1-32). The Operator can request the User Settings print out for different units in the cluster by entering the Unit ID or Unit ID range, as written on the dialog sample.



## 5. PLANNING OF WIRELESS CLUSTER

To open “Unit Properties” dialog box for the unit selected in the Site View pane, the operator can select the “Unit Properties” item from “Edit” menu (“Edit > Unit Properties... ”.) Double-clicking on the unit icon in the Site View pane also opens the “Unit Properties” dialog.

The left pane of the “Unit Properties” dialog is a unit’s User Setting Tree intended to facilitate and visualize the setup process. Each node in the tree pane corresponds to a specific tab on the dialog’s right side. The tab can be selected by clicking on the node in the tree.

AlphaWave radio modems have four main groups of settings: Identification, Link, Modem and Serial Port Properties. Some of the units’ parameters are common for all units in the wireless link/cluster. A warning message appears if the operator attempts to set a parameter mismatched with the rest of the units in the wireless link/cluster. The warning message should have an option control to automatically set the common parameter for all units in the wireless link/cluster or cancel the new setting.

To configure the units, AWare uses CLI commands described in Appendix B

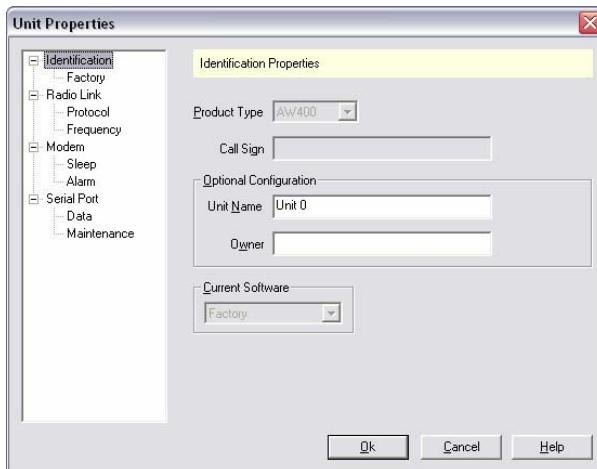
Chapter 5

### 5.1 IDENTIFICATION PROPERTIES

On the Identification Properties tab (see Figure 5-1), there is unit’s identification information such as:

- Product Name – With this option, the operator can select one of the ArWest radio models (see Section 4.3.1).
- Call Sign – Indicates the unique ID assigned by the FCC (filled by dealer).
- Current Software – Shows/Actives embedded software version that is running on the unit.
- Unit Name – Indicates the logical name of the unit given by the operator.
- Owner – Indicates the network ownership (filled by the operator).

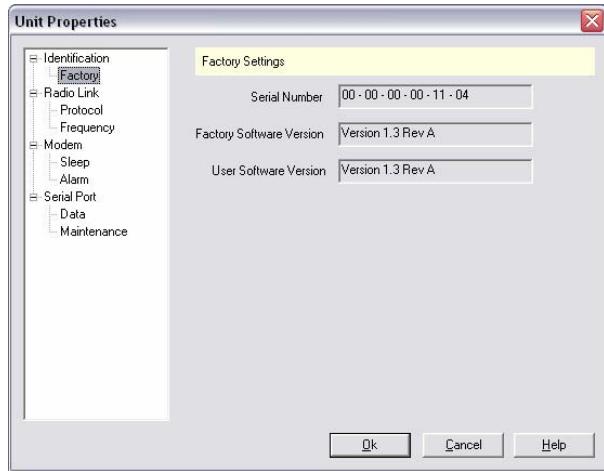
The last three identification parameters (Unit Name, Owner and Call Sign) are user assigned settings. The Embedded Software version should be retrieved from the unit through its maintenance serial port. For AlphaWave operating in Half or Full Duplex modes it can be read also over the air.



**Figure 5-1: Identification Properties**

### 5.1.1 FACTORY PROPERTIES

The Factory Properties is a sub-tab of the Identification Properties tab (see Figure 5-2). It contains the information that the vendor sets during manufacturing process.



**Figure 5-2: Factory Properties**

The unit's factory identification includes:

- **Serial Number** – Indicates the serial number (six/6 bytes) of the unit given by the manufacturer;
- **Factory Software Version** – The version of software image loaded in factory. The factory software becomes active if operator updated image is corrupted or failed. The factory software cannot be upgraded on the field.
- **User Software Version** - The version of software image loaded or upgraded by operator.

## 5.2 LINK PROPERTIES

The Link settings are split between three tabs: Link General Properties, Link Protocol Properties, and Link Frequency Properties.

Changing Link Properties of unit's configuration may cause link interruption. That is why after choosing Base/Primary unit's configuration the operator has limited choices for secondary unit.