

5.2.1 RADIO LINK GENERAL PROPERTIES

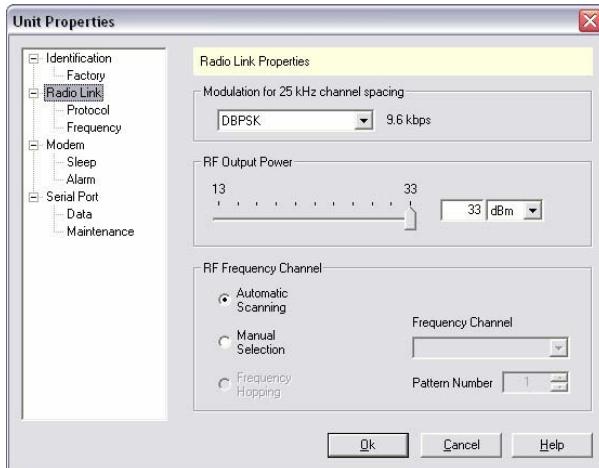


Figure 5-3: Radio Link General Properties Tab

The following controls reside in the Link General Properties tag:

- Modulation:

Chapter 5

	CS = 6.25 kHz	CS = 12.5 kHz	CS = 25 kHz
DBPSK	2.4 kbps	4.8 kbps	9.6 kbps
DQPSK (default)	4.8 kbps	9.6 kbps	19.2 kbps
D8PSK	7.2 kbps	14.4 kbps	28.8 kbps
D16QAM	9.6 kbps	19.2 kbps	38.4 kbps
GMSK	Not applicable	4.8 kbps	9.6 kbps

This control should show the modulation type along with the wireless link data rate that is provided by a specific radio modem. This option is available only for Base/Primary unit.

- **RF Output Power Level** (selectable from 13dBm/20mW (, or 25dBm/320mW for High Power ArWest radio modems) to Maximum Value defined by Dealer in the "Dealer Configuration").

- **RF Frequency Channel**—Automatic Scanning – it is a default option that grays out the Frequency Channel edit box. The List of frequencies scanned by the unit can be assigned through the Link Frequency Properties tab.
- **Manual Selection** – with this option, the operator can select one of the fixed channels (the actual range is based on the factory configuration). The Frequency Channel can be selected using the Frequency Channel combo box
- **Frequency Hopping** – selection of Frequency Hopping grays out the Frequency Channel edit box. The List of hopping frequencies can be assigned through the Link Frequency Properties tab.
- **Hopping Pattern:**
This control is applicable only if the Frequency Hopping mode is selected. The network operator selects one of the 32 available Hopping Patterns.

Note:

- RF Frequency Channel option is available only for Base/Primary unit. It is same for all units in the network.

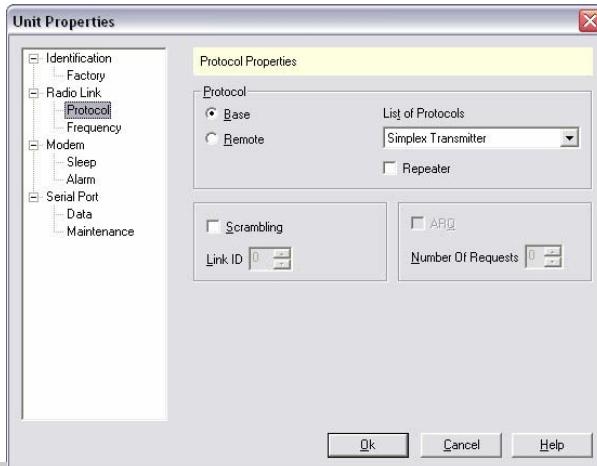
5.2.2 RADIO LINK PROTOCOL PROPERTIES

The following controls reside in the Link Protocol Properties tab:

The Protocol sub-group contains radio-button to choose between two types of units: Base and Remote each type has specific list of protocols that listed in the List of Protocols combo-box.

- **Base**
 - Simplex Transmitter
 - Half Duplex (specific for base unit)
- **Remote**
 - Simplex Receiver
 - Half Duplex (specific for remote units)
 - RTK Repeater
 - Repeater
- **Repeater Check Box** (available only for base unit)
 - Informs base unit about the Repeater(s) in the network

- **Scrambling Check Box**
The Scrambling check box enables/disables the data link protection by scrambling the transmitted data.
- **Link ID** (this variable is valid only if Scrambling is "On")
Seed for Pseudo-Random Sequence Generator (1 - 255)



Chapter 5

Figure 5-4: Radio Link Protocol Properties Tab**Note:**

- The link with Receive-Only radios does not support ARQ option.
- Scrambling options are available only for Base/Primary

5.2.3 RADIO LINK FREQUENCY PROPERTIES

This tab displays the list of up to 32 available frequencies mapped to corresponding channels. AWare displays the list of available carrier frequencies based on information from the specific unit profile file.

Two buttons under Update Form group helps to update the list of frequencies from saved dealer configuration or directly upload from the unit.

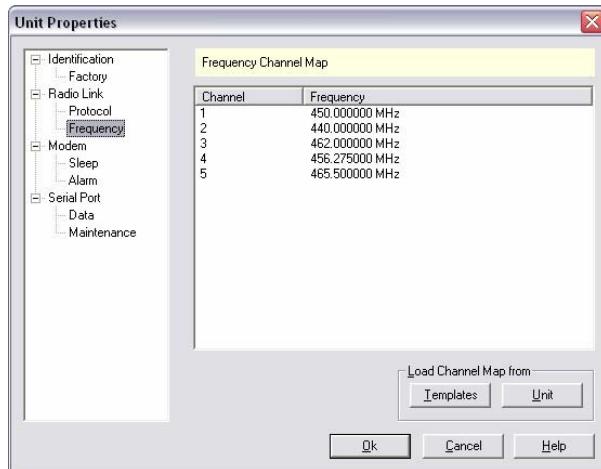


Figure 5-5: Radio Link Frequency Properties Tab

5.3 MODEM FEATURES PROPERTIES

This menu item helps to configure radios' service features such as the alarm indication mode and alarm control lines' behavior, and the sleep mode.

5.3.1 MODEM SLEEP PROPERTIES

The Sleep check box enables the sleep mode. The unit with the enabled sleep mode goes to sleep if there is no activity on the wireless link during waiting time defined by Wait edit box (range 100 – 2550 ms).

The sleeping AlphaWave unit can be activated again by the real-time CLK, DTR/RTS lines, and command received through TTL inputs. The operator can select one, two, or all three conditions:

- Activate by Real-time clock:
 - After 100 to 2550 ms of sleeping time
- Activate by Control Lines:
 - DTR
 - RTS (default)
 - DTR & RTS

- Activate by Sense Input Line:
 - Sensor 1
 - Sensor 2
 - Sensor 1 and Sensor 2

To activate the sleeping unit, the operator can select either Sense TTL inputs or/and RTS and DTR inputs.

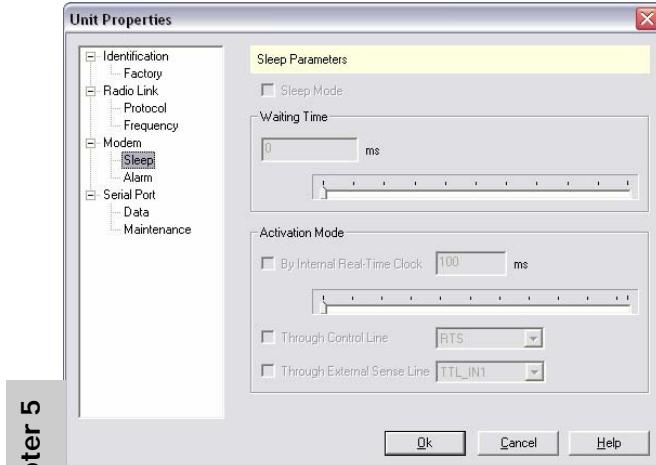


Figure 5-6: Sleep Properties Tab

5.3.2 MODEM ALARM PROPERTIES

The AlphaWave radio modem has the ability to indicate alarms using Alarm LED indicator and two TTL outputs.

The First Event Output (TTL1) control allows the operator to route the alarms and the inputs from remote sensors to the first event (TTL) output:

- Sensor 1 (the sensor's input on remote unit, default value)
- Sensor 1 and Sensor 2 (logic "and" of the sensors' inputs on remote unit)
- Sensor 1 or Sensor 2 (logic "or" of the sensors' inputs on remote unit)

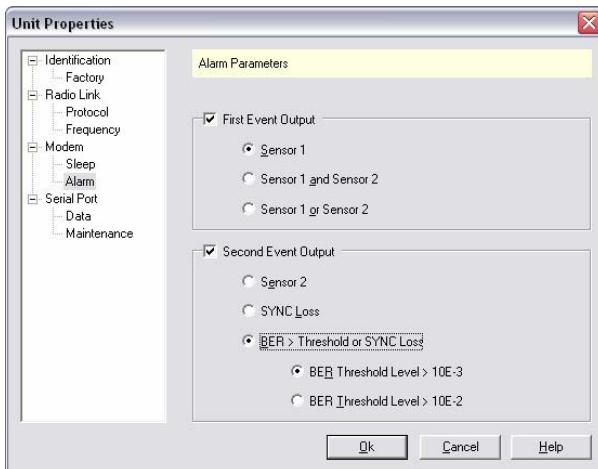
The Second Event Output (TTL2) control allows the operator to route the alarms and the inputs from remote sensors to the second event (TTL) output:

- Sensor 2 (the sensor's input on remote unit, default value)
- SYNC Loss
- BER > Threshold or SYNC Loss

The BER control allows the operator to select the BER threshold level for second event output in case of selected "BER > Threshold or SYNC Loss":

- BER Threshold Level $>10^{-3}$ (default value)
- BER Threshold Level $>10^{-2}$

Note: The Alarm Properties are not available for Simplex Transmitter configuration.



Chapter 5

Figure 5-7: Alarm Properties Tab

5.4 SERIAL PORT FEATURES PROPERTIES

This menu item helps to configure radios' service features such as the user data port and maintenance port settings.

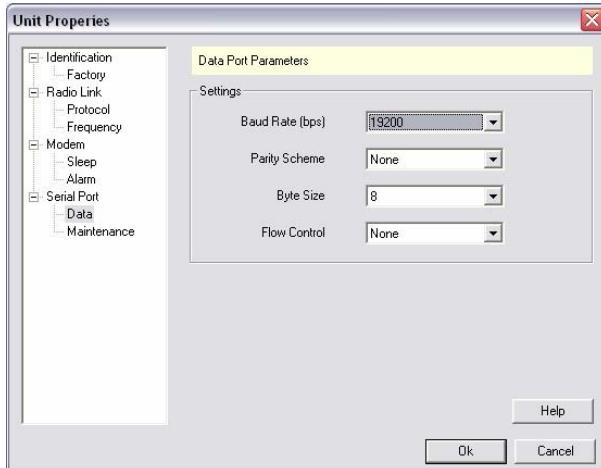


Figure 5-8: Data Port Properties Tab

5.4.1 DATA PORT PROPERTIES

From the Port tab of Unit Configuration dialog box the operator can configure the following data port parameters:

- **Baud Rate** – indicates the operating rate for the data port (300 bps to 115 kbps). The “MP Baud Rate” operating option does not define the data rate specifically. In this mode on, the same data rate is used for both maintenance commands and user data. The baud rate is defined by Maintenance Port settings or automatically detected when the serial port operates as a Maintenance Port.
- **Parity Scheme** – for enable/disable parity checking, can be one of the following settings: none, odd, even.
- **Byte Size** – number of bits in the bytes transmitted and received

- **Flow Control** – This field indicates the Data Port flow control option:
Hardware - (RTS/CTS) flow control;
Xon/Xoff – flow control is performed by software;
None – flow control is not used.

5.4.2 MAINTENANCE PORT PROPERTIES

From the Port tab of Unit Configuration dialog box the operator can configure the maintenance port parameters:

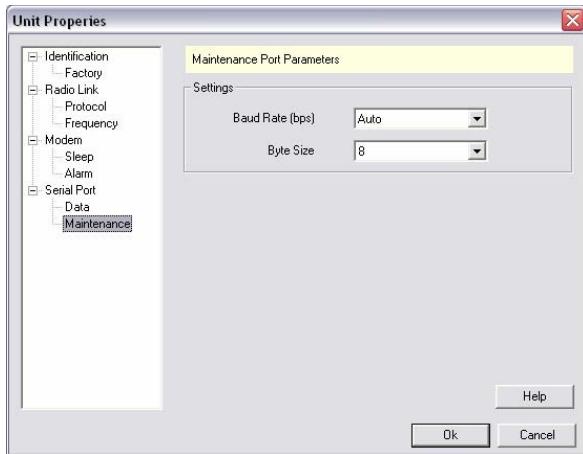


Figure 5-8: Maintenance Port Properties Tab

- **Baud Rate** – indicates the operating rate for the maintenance port (300 bps to 115 kbps). The “Auto” operating option does not define the data rate specifically. In this mode on, the baud rate is automatically detected using the maintenance commands as the key words.
- **Byte Size** – number of bits in the bytes transmitted and received.

6. TOOLS

AWare built-in installation and system monitoring tools are using special CLI commands, which are typically not used by the operator working with the unit through the Hyper Terminal. This list includes the following commands:

6.1 TEST KIT

The Test Kit is a set of four utilities that facilitate unit installation and maintenance. AWare tools allow the operator to investigate the frequency spectrum, to align the antennas precisely, to set a reasonable output power level, and eventually check the link using the BER test.

6.1.1 SPECTRUM ANALYZER

The Spectrum Analyzer test run on an AlphaWave unit is activated by the SPECTRUM command sent from AWare. By this command the unit scans the full frequency spectrum defined by the Factory Defined Configuration file and stores the measured values of the receive signal levels (RSL) in the RAM memory. To upload the measured RSL values from the unit the X-Modem protocol is used.

The Spectrum Analyzer test provides a graphical representation of the measured RSL values using two-dimensional graphs with the frequencies scaled on the abscissa (y axis) and RSL scaled in dBm on the ordinate (x axis). The Start and Stop Frequency controls define the Frequency Span, which determines the scale on the abscissa. Meanwhile the range of the RSL on the ordinate is fixed and equal to 10 dB, in range of -120 dBm to -20 dBm (Reference Level).

Chapter 6

The following controls are available:

- Start Frequency – defines the sweep starting frequency in MHz;
- Stop Frequency – defines the sweep stopping frequency in MHz;

- Refresh – starts the Spectrum Analyzer test procedure on the unit.

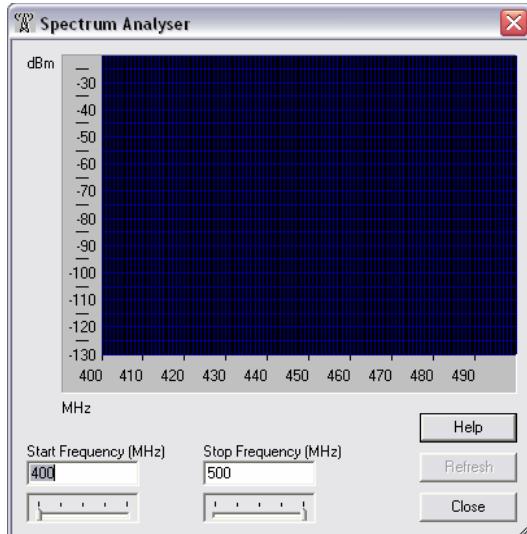


Figure 6-1: Spectrum Analyzer Dialog Box

To activate Spectrum Analyzer dialog box:

1. Select a unit name (icon) from the Site View pane.
2. Select the **Tools > Test Kit > Spectrum Analyzer** item of Aware main menu bar.

6.1.2. BERT

The BERT test is developed to test the wireless link quality in the network. It provides the BER statistics measured by a built-in test sequence generator.

The transmit output power level of the AlphaWave units is user selectable. The power level must provide the intact data transmission with minimal influence on other radio systems. The BERT test is also intended to estimate the quality of received radio signal depending on Transmit Power.

There are two states for this test: Transmit or Receive. By selecting

the Transmit option, the network operator will be able to select these values for BERT test:

- The Output Power Level for transmitter: defined through the dedicated control in the range from 13 to 45 dBm (to set the required values, the LINK PWRB command must be used)
- Interval – defines in ms the interval in which the frames will be transmitted. The Interval range is 0 to 999 ms.
- The modulation type of transmitter – DBPSK, DQPSK, D8PSK, D16QAM and GMSK

In Transmit state, Aware first sets the output power level and then periodically sends the test sequences in predefined intervals. By receiving that sequence, the unit starts transmitting the received frames to the receiver.

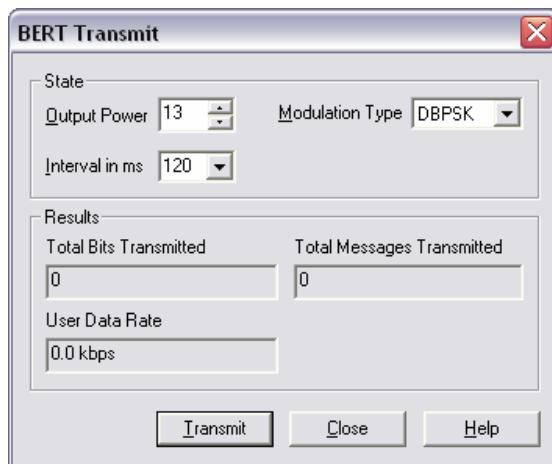
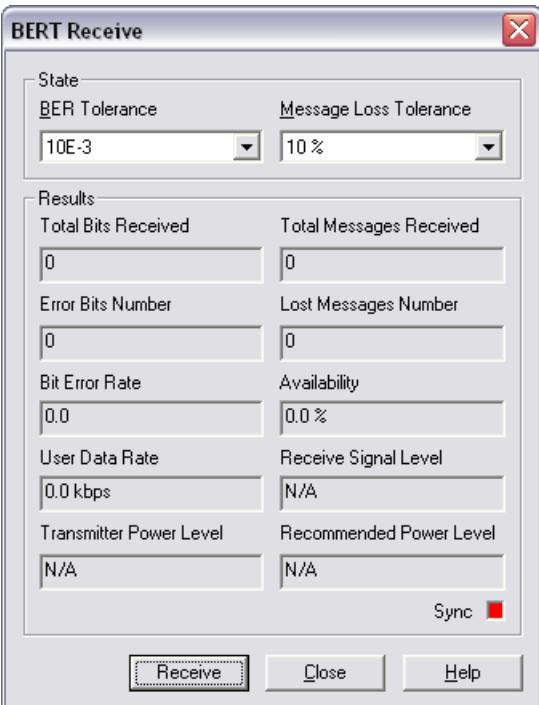


Figure 6-2: BERT Transmit Dialog Box

In Receive state, Aware BERT dialog box shows the received and lost frames counters, total received bits, user data, rate of BER and FLR (Frame Loss Rate). The BERT dialog also indicates the power level of transmitter (TSTUFR REMOTEPWR command will be used), the RSSI/RSL on receiver (it will be obtained through Statistics Interface), and Recommended Output Power Level for transmitter which is calculated based on the transmitter's power level, receiver's RSSI/RSL level, BER and frame loss rate tolerance on receive site.

The allowed values for BER tolerance is $<10^{-3}$, $<10^{-4}$, and $<10^{-5}$. The range of tolerance for frame loss rate is in the range from 10%, 1%, and 0.1%.



Chapter 6

Figure 6-3: BERT Receive Dialog Box

To calculate the Recommended Output Power Level, the following formula must be used:

1. **RPWR = Fade + PWR – RSL + RXS** (recommended value range is from 13 to 33dBm)
2. **Fade** is the Fade Margin in dB as a function of the error tolerance:

	BER	FLR
45 dB	$<10^{-5}$	0.1%
40 dB	$<10^{-4}$	1%
35 dB	$<10^{-2}$	10%

RXS is the receiver sensitivity as a function of the selected modulation type and channel spacing:

	CS	Modulation
-113 dBm	25 kHz	DBPSK
-114 dBm	12.5 kHz	DBPSK
-114 dBm	6.25 kHz	DBPSK
-110 dBm	25 kHz	DQPSK
-111 dBm	12.5 kHz	DQPSK
-111 dBm	6.25 kHz	DQPSK
-106 dBm	25 kHz	D8PSK
-107 dBm	12.5 kHz	D8PSK
-107 dBm	6.25 kHz	D8PSK
-100 dBm	25 kHz	D16QAM
-101 dBm	12.5 kHz	D16QAM
-101 dBm	6.25 kHz	D16QAM
-113 dBm	25 kHz	GMSK
-114 dBm	12.5 kHz	GMSK

PWR is the transmitter's output power level and **RSL** is the measured receive signal strength.

To activate BERT Test dialog box:

1. Select a unit name (icon) from the Site View pane.
2. Select the **Tools > Test Kit > BERT Test > Transmit or Receive** option of AWare main menu bar.

Note: The Transmit mode of BER test is not applicable for the receive-only systems.

The BER does not include the bits in the lost frames.

6.2 DEALER CONFIGURATION TOOLS

Dealer Configuration Tools is the group of software utilities intended to load Dealer Configuration Parameters. Dealer Configuration parameters can be stored in the file on the disk and used from the New Profile dialog box. To activate "Dealer Configuration" dialog box the dealer has to select Tools > Dealer Configuration > Edit Dealer Configuration Menu item. "Dealer Configuration" dialog box consists of two sections in the tab tree:

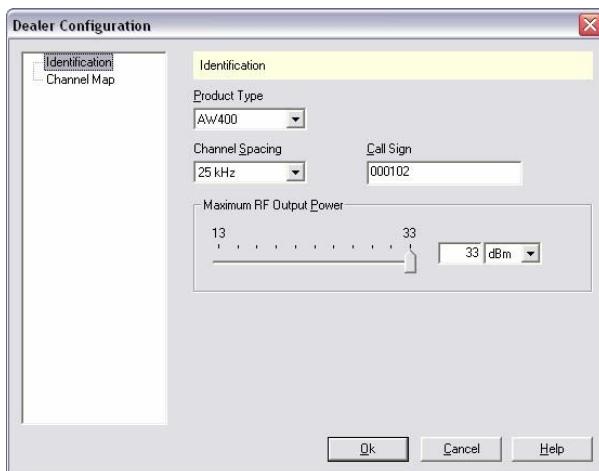


Figure 6-4: Identification for Dealer Configuration

Chapter 6

6.2.1 CONFIGURING CHANNEL MAPPING

The Identification tab intended to configure main features of the Dealer Configuration. The Identification tab contains following fields:

- **Product Type** – specifies the Unit product type
- **Channel Spacing** – specifies the channel spacing for current configuration. The channel spacing can be one of three different values (6.25 kHz, 12.5 kHz, and 25 kHz) all these values may be specified by the dealer for different users
- **Call Sign** – Indicates the unique ID assigned by FCC
- **Maximum Output Power Level** – specifies max allowable output power level that the operator can set. The max power level range for AW400 is 13dBm/20mW to 33dBm/2000mW and for AW435 is 25dBm/320mW to 45dBm/3200mW.

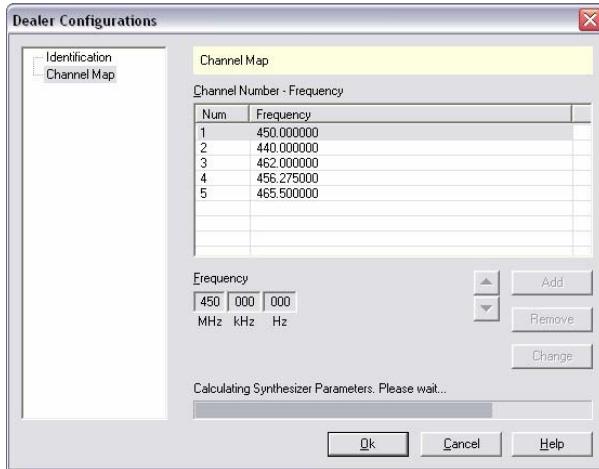


Figure 6-5: Channel Map for Dealer Configuration

The Dealer uses Channel Map tab to program frequencies and map them to corresponding channels. The maximum number of available channel for all ArWest radios is 32. The Channels List field shows all programmed frequencies in the current dealer configuration. The central frequencies are in MHz format and they have to be divisible to minimum channel spacing – 6.25 kHz. The dealer can add and remove channels from dealer configuration, also he can change central frequency and channel mapping.

The Dealer Configuration tool provides an automatic conversion from/to channel map generated for AW400Rx/200Rx/100Rx to/from channel map for AW4xx/2xx/1xx and GFU2x-x.

Chapter 6

6.3 FACTORY CONFIGURATION TOOLS

The Factory Configuration tools is a set of software utilities intended to create, export/import to/from external storage, and download to unit factory configuration parameters (including calibration parameters). The calibration parameters include TCXO tuning value (from 1 to 32), and ALC and RSSI/RSL calibration tables.

Note: The Calibration option is available only in the "Workshop" version of AWare.

6.3.1 TCXO CALIBRATION TOOL

This option allows operator/technician to adjust the output frequency value if it varies during the operation from the predefined value. By opening the TCXO Calibration Tool dialog box the operator/technician first orders the AlphaWave unit to generate continuous bit stream of all 0-s. The following frequencies are used to measure the TCXO accuracy:

	AW400	AW200	AW100
Testing Frequency	470 MHz	230 MHz	170 MHz
Required Accuracy	400 Hz	200 Hz	150 Hz

The Up/Down controls allow operator/technician to tune the TCXO generated frequency. If the difference between the nominal and measured value is less than Required Accuracy then the test can be completed. To save the TCXO Control value in the Configuration Image, the operator/technician must click the "Apply" button.

Aware automatically switches off the testing mode of unit, if the TCXO Calibration dialog box is closed.

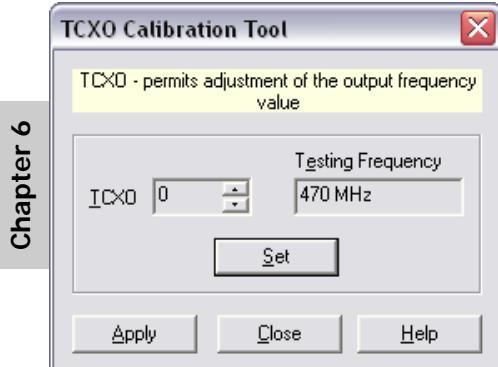


Figure 6-6: TCXO Calibration Box

To activate the TCXO Calibration Tool dialog box:

1. Select a unit name (icon) from the Site View pane.

2 Select the **Tools > Factory Configuration > Calibration Kit > TCXO** of AWare main menu bar.

6.3.2 ALC CALIBRATION TOOL

This option allows operator/technician to build the *ALC Table* used by unit's Automatic Level Control (ALC) module to set the precise value of required output power level. The *ALC Table* lists the measurements provided by unit's built-in Power Detector for the output power levels from 13 dBm to 33 dBm. The *ALC Table* also contains the DAC gain and attenuation level for each output power level in the list.

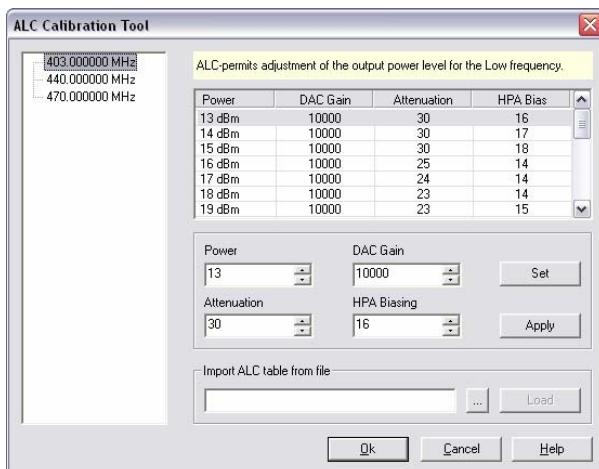


Figure 6-7: ALC Calibration Box

By opening the ALC Calibration Tool dialog box the operator/technician first orders the AlphaWave unit to generate 511-bit length pseudo-random sequence.

The measurement procedure shall be as follows:

1. Set the Desired Output power level to 13 dBm (Power);

Note: The HPA biasing level is explicitly defined by Desired Output Power level.

2. Change the Attenuation value from 31 to 0 (by step 1); the DAC gain is automatically set to 5000 central value (to set Attenuation, DAC, and HPA biasing, the ALC command must be used, see IS-00003-104);
3. Measure the output power level and go to step 4 if the difference between nominal desired and measured values is less than Required Rough Accuracy (± 2 dBm), if not repeat step 2;
4. Change the DAC Gain value from 2000 – 9000;
5. Measure the output power level, if the difference between the nominal desired and measured values is less than Required Accuracy (± 0.3 dBm) then store the Measured Detector value in the ALC Table using “Apply” button and go to step 6, if not repeat step 4.
6. Increase the output power level by 1 dB and go back to step 2.

The test is completed if the *ALC Table* is filled for all output power levels from 13 to 33 dBm. The Measured Power Detector values are stored in the unit’s configuration files image to be loaded into the unit (see section 6.4.2).

To activate the ALC Calibration Tool dialog box:

1. Select a unit name (icon) from the Site View pane.
2. Select the **Tools > Factory Configuration > Calibration Kit > ALC** of AWare main menu bar.

6.4 DOWNLOADING TOOLS

6.4.1 DOWNLOADING A NEW IMAGE

The Downloading procedure includes three steps to install upgraded versions of the embedded software images from the PC, on which AWare runs. AWare setup program provides the means to upgrade the embedded software images.

- Select the **Tools > Download Image** command from main menu bar. The Download dialog box for the selected unit is activated (see Figure 6-9).

- Select the downloadable image file in the computer by clicking Browse button – the **File Info** box shows complete information about image file if selected file is the right image.
- Select the downloadable image file in the computer by clicking Browse button – the **File Info** box shows complete information about image file if selected file is the right image.
- After selecting the image file, click the Download button to start downloading. The downloading progress is indicated in a separate dialog box.

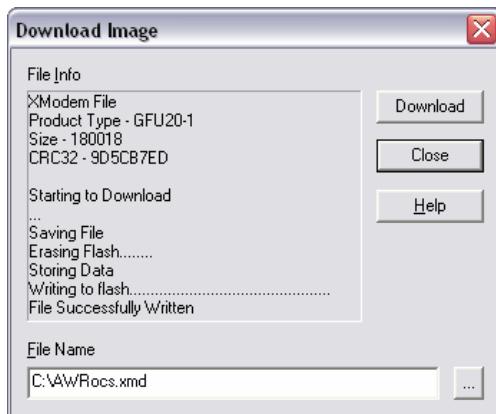


Figure 6-8: Download Dialog Box

Note: Downloading over the air is not possible for a receive-only system.

6.4.2 DOWNLOADING A DEALER CONFIGURATION FILE

To activate Downloading Dealer Configuration dialog box:

- 1 Select a unit name (icon) from the Site View pane.
- 2 Select the **Tools > Dealer Configuration > Download Dealer Configuration**

To create the dealer configuration file, the "Dealer Configuration" dialog box is used (see section 6.2).

For the end users the dealer configuration file is a read-only struc-

ture. It is prepared and loaded into the unit in production through the serial port using X-Modem protocol.

Note: Downloading of the dealer configuration file is available only in the "Dealer" version of AWARE.

6.4.3 DOWNLOADING A FACTORY CONFIGURATION FILE

To activate Downloading Factory Configuration dialog box:

- 1 Select a unit name (icon) from the Site View pane.
- 2 Select the **Tools > Factory Configuration > Download Factory Configuration**

To create the dealer configuration file, the "Dealer Configuration" dialog box is used (see section 6.2)

For the end users the factory configuration file is a read-only structure. It is prepared and loaded into the unit in production through the serial port using X-Modem protocol.

Note: Downloading of the Factory configuration file is available only in the "Workshop" version of AWARE.

7. STATUS AND STATISTICS

7.1 STATUS

7.1.1 TERMINAL TAB

This window is designed for the advanced operator, who is familiar with the system and CLI commands. It allows the operator to work with unit directly without GUI. The Terminal shows all information coming from the unit or transmitting towards it. It can be activated by selecting the appropriate item from menu bar or by right clicking on the unit in the Site View pane.

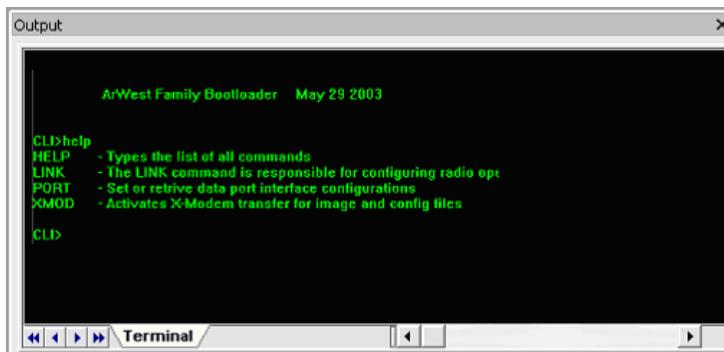


Figure 7-1: Terminal Tab

The Terminal window is located in the Display Pane as its tab.

7.1.2 LOG TAB

The purpose of the Log window is to display events taken from the unit. It is located in the Display Pane as its tab. It indicates the event type (Information, Warning or Error), date and time of occurrence, category (System or Communication), code and description of the event. Each unit in the network has its own Event Log Tab in the Display Pane with the unit name labeled.

Type	Date	Time	Category	Code	Description
Information	03.19.2005	11:32:09	Communication	1	Link Synchronization, link with Base/Remote unit is established
Information	03.19.2005	11:44:39	System	8	New user configuration is received from Base unit
Warning	03.19.2005	12:05:29	System	12	Unit went to sleep mode by time
Information	03.19.2005	13:05:29	System	14	Unit woke up by timer
Warning	03.19.2005	15:18:49	System	11	Unit went to sleep mode by the triggering of the external SLEEP Input line
Information	03.19.2005	15:46:44	System	15	Unit woke up by the triggering of the external SLEEP Input line
Information	03.19.2005	15:48:15	System	10	User configuration is changed by the CLI command
Information	03.19.2005	15:49:21	System	9	User configuration is saved in the Flash memory
Error	03.19.2005	16:05:01	System	6	Synthesizer Initialization error
Warning	03.19.2005	16:38:21	Communication	3	BER exceeded the maximum allowed threshold
Error	03.19.2005	18:18:21	System	16	The temperature inside of unit exceeded the maximum allowed level
Warning	03.19.2005	20:57:41	Communication	5	Receive Signal Level exceeds -70 dBm
Information	03.20.2005	02:31:01	Communication	4	BER level came back to the level required by threshold
Error	03.20.2005	07:39:33	Communication	7	Frequency Offset between local Rx and remote Tx is higher than 3 kHz
Error	03.20.2005	07:56:13	Communication	2	Synchronization Loss, link with Base/Remote unit is lost
Information	03.20.2005	09:36:13	Communication	1	Link Synchronization, link with Base/Remote unit is established
Warning	03.20.2005	09:37:25	System	13	Unit went to sleep mode by a command from Base unit

Figure 7-2: Log Tab

The menu item **Edit > Refresh Event Log** downloads the event log for the specified unit, adds it to the previously downloaded event logs and displays an updated event log.

The menu item **Edit > Clear Event Log** clears all units' event logs.

7.2 PERFORMANCE

7.2.1 VIEWING G.821 STATISTICS

Aware displays the Error Performance reports defined by the G.821 Standard. Each statistical measurement graph displays up to 96 data points along the horizontal axis, and up to 900 seconds on the vertical axis. Each data point along the horizontal axis represents 15 minutes of performance data collection. The G.821 Statistics tabs include ES, SES, ESR, SESR, Unavailable Time, and Available Time (see Figure 7-3):

- **Errored Second (ES)** - is a one-second period in which one or more bits are in error.
- **Severely Errored Second (SES)** - is a one-second period which has a bit error ratio more than 0.001
- **Errored Second Ratio (ESR)** - shows the ratio of ES to total seconds in available time during a fixed measurement interval.
- **Severely Errored Second Ratio (SESR)** - shows the ratio of SES to total seconds in available time during a fixed measure-

ment interval.

- **Unavailable Time** - begins when the Bit Error Rate (BER) in each second is worse than 0.001 for a period of ten consecutive second (shows period of ten consecutive seconds when the BER in each second is worse than 0.001.)
- **Available Time** - begins when the first second of a period of ten consecutive seconds each of which has a BER better than 0.001.

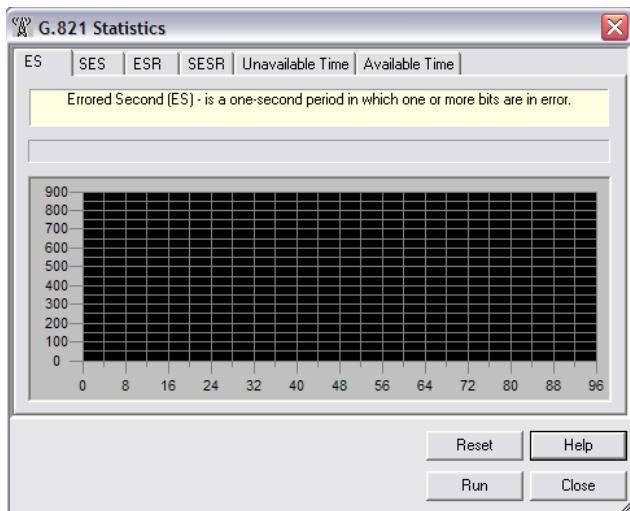


Figure 7-3: G.821 Statistics

The G.821 Statistics tab contains the following controls:

- Reset – Resets the statistic information;
- Run – gets the statistic information;
- Close - Close statistic window;
- Help - Help options for statistic window.

7.2.2 VIEWING Rx/Tx STATISTICS

The Rx/Tx Statistics dialog window provides the AlphaWave specific statistic information not covered by G.821 standard. This dialog contains nine tabs where the first tab exposes the numerical values for the monitoring parameters:

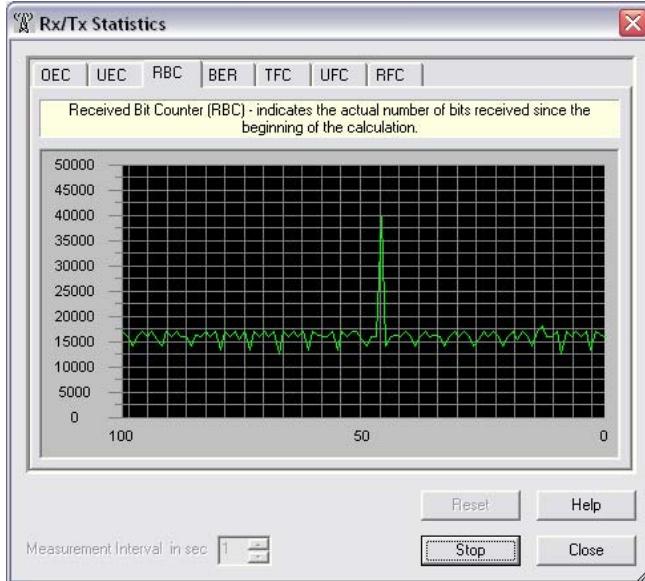


Figure 7-4: RX/TX Statistics

- **Observed Error Counter (OEC)** – shows the number of erroneous bits that have been detected by FEC decoder since the beginning of the calculation.
- **Uncorrected Error Counter (UEC)** – shows the number of erroneous bits that have not been corrected by FEC decoder since the beginning of the calculation.
- **Received Bit Counter (RBC)** – indicates the actual number of bits received since the beginning of the calculation.
- **Bit Error Rate (BER)** – shows the ratio of the number of corrected errors to the number of bits received since the beginning of the calculation.
- **Transmitted Frame Counter (TFC)** – displays the number of transmitted frames since the beginning of the calculation.
- **Unrecoverable Frame Counter (UFC)** – displays the number of received frames that have not been recovered by FEC decoder since the beginning of the calculation.
- **Received Frame (RFC)** – displays the number of received frames since the beginning of the calculation.

The tabs (OEC, UEC, RBC, TFC, UFC, LFC, RFC, and FLR) are the graphical representation of the monitoring parameters presented in time domain.

7.2.3 VIEWING RSL STATISTICS

The **Receive Signal Level (RSL)** Statistics dialog shows the current level of received signal in dBm. The statistical measurement graph displays up to 96 data points along the horizontal axis. The vertical axis shows the signal level in dBm. This tab contains a control to specify the measurement interval in seconds (the minimum interval equals to 5 seconds). During the measurement process AWare alters the diagram whenever the received signal's diapason changes.

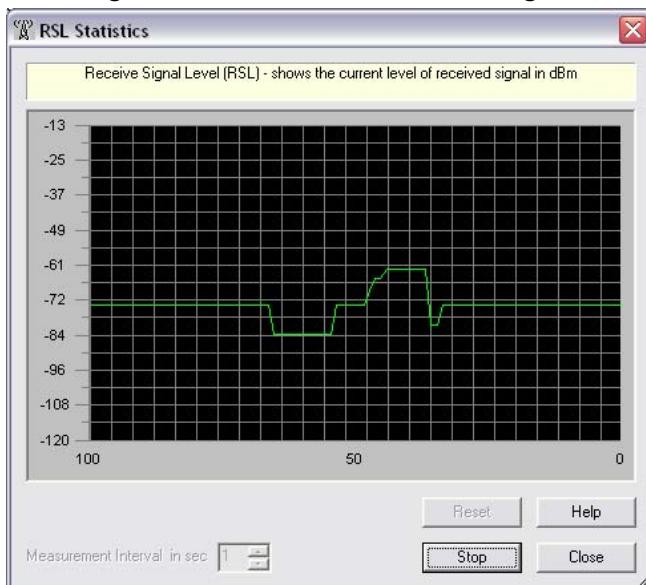


Figure 7-5: RSL Statistics

8. FIRMWARE COMPONENTS

8.1 EMBEDDED SOFTWARE / FIRMWARE

The Embedded Software/Firmware runs on the AlphaWave unit. The firmware consists of the following components:

- Link Control Level (LCL) module, which includes MAC controller and Framer;
- Kernel is a multitask operating system specifically developed for AlphaWave,
- Signal Processing module, responsible for modulation/demodulation and FEC coding/decoding;
- Configuration and Timing Control module;
- Serial Line Control module.

8.2 COMMAND LINE INTERFACE

The built-in user-friendly Command Line Interface (CLI) allows a user to perform a full configuration of the unit and read the statistics and alarm status. It is the most powerful tool to configure the unit. It makes changes to all possible settings that system will not be able to determine automatically.

The CLI commands allow user to configure and reconfigure the unit's settings. The user configuration parameters that could be changed through the CLI are:

- Data Port Settings
 - Baud Rate
 - Data Bits (8, 7)
 - Parity (Odd, Even, None)
 - Flow control (None, RTS/CTS, XON/XOFF)
- Alarm Settings
 - See Section 1.2.3 for details.
- Radio Operation Modes
 - See Section 1.1.3 for details
- Sleep modes
 - On/Off

- Activate by internal real-time clock
- Activate through RTS/CTS lines
- Activate by external sense lines
- Activate by any combination of the parameters mentioned before

Note: The unit's configuration that is set or modified through the CLI will be lost after unit's reboot, unless the saving operation is used to store a new setting in the unit's configura-

The CLI commands also provide filing operations, which include:

- Downloading
 - Unit's Configuration files
 - Software Images
- Uploading Unit's Configuration files
- Saving into the configuration files the configuration parameters modified through the CLI.

There are a few commands hidden from the end-user to support the test utilities offered by AWare. Another set of hidden CLI commands is intended to facilitate the unit's troubleshooting in production and repair centers.

8.2.1 COMMAND LINE INTERFACE CONVENTION

The convention in AlphaWave Command Line Interface (CLI), and CLI Commands are explained in greater detail in **Appendix B**.

8.3 “AWARE” CONFIGURATION SOFTWARE

“AWare” is a software application running on an external PC in Windows 98/ME/2000/NT/XP environment that provides sophisticated and complete solution for remote and local configuration, performance monitoring and diagnostics. It allows the Network Administrator to organize, manage, and control wireless connections built on AW.

Refer to Chapter 3 for a detailed description of the “AWare” GUI.

APPENDIX A

RADIO MODEM SPECIFICATIONS

Appendix A**AlphaWave Users Manual****4/26/2006**

Parameter	Specification
Temperature	Operating -30°C to +60°C (ETSI 300-019-1-3 Class 3.1(E)) Storage -40°C to +80°C
Environmental	IPC66
Dimensions	AW400: 6"x2.9"x1.5" (152mmx74mmx38mm) AW435: 6"x2.9"x2.5" (152mmx74mmx64mm)
Weight	AW400: 12 oz (340g) AW435: 27 oz (765g)
Power Supply Voltage	AW400: +9 to +24 VDC Nominal AW435: +9 to +16 VDC Nominal
Power Consumption (average)	AW400: 6W Tx Tx 2W Rx Rx 0.5W sleep Sleep AW435: 120W continuous Tx 38W 30% duty cycle 900mW Rx
Housing Color	Aluminum/two tone/silver and black
Antenna Connector	TNC, 50Ω, female
User Interface Connector Power Connector	AW400: D15 Waterproof female interface/power connector AW435: D15 Waterproof female interface connector, ALDEN Power Connector 300500
Altitude	-1,000 m below sea level to +8,500m above
Electronic Compliance	ETSI 300-113 (AW400 only)
	FCC Part 90
	RSS-210

A-1: AlphaWave Environmental Specifications

Parameter	Specification	
	AW400	AW435
Output Power	13 dBm to 33 dBm in 1 dB steps	DBPSK : 33 dBm to 45dBm DQPSK : 33 dBm to 45 dBm D8PSK : 28 dBm to 40 dBm D16QAM : 25 dBm to 37dBm
Output Power Control Accuracy		±1.5 dB (at normal test conditions) +2.0 dB and -3.0 dB (under extreme test conditions)
Nominal Output Impedance		50 Ohms
Carrier Frequency Stability		±1.5 ppm initial stability over temp with ±3 ppm aging/ year
Max. Frequency Error		±1.0 kHz (at normal test conditions) ±1.5 kHz (under extreme test conditions)
Adjacent Channel Power (Conducted)		65 dB, Part§90 210 (C, D, E)
Spurious Emission (Conducted)		-36 dBm @ (9 kHz – 1 GHz) -30 dBm @ (1 GHz – 4 GHz)
Spurious Emission (Radiated)		-36 dBm @ (9 kHz – 1 GHz) -30 dBm @ (1 GHz – 4 GHz)

A-2: Transmitter Specifications

Parameter	Specification		
Noise Figure	5 dB		
Nominal Input Impedance	50 Ohms		
Dynamic Range	-119 to -52 dBm		
Max. Input Signal Level	-10 dBm		
	25 kHz CS	12.5 kHz CS	6.25 kHz CS
Receiver Sensitivity for DBPSK (@ BER 1×10^{-4} , over temperature – 30°C to +60°C)	-113 dBm	-114 dBm	-114 dBm
Co-channel Rejection	-8 dB	-12 dB	-16 dB
Adjacent Channel Selectivity	70 dBc	60 dBc	50 dBc

NB AW435 not available with 6.25 kHz CS

A-3: Receiver Specifications

APPENDIX B

COMMAND LINE INTERFACE

COMMANDS

B.1 CONVENTION

The following convention is implemented in AlphaWave Command Line Interface (CLI):

- The Carriage Return/Line Feed (CR/LF, 0x0D/0x0A) is a command delimiter.
- The Carriage Return/Line Feed (CR/LF, 0x0D/0x0A) is a reply delimiter followed by the "CLI>" prompt if Echo option is On.
- The Carriage Return/Line Feed (CR/LF, 0x0D/0x0A) is a reply delimiter if Echo option is Off (default option).
- The 2-digit number followed by "@" in the unit's reply indicates the error code (refer to Table 1 for description), if Echo Off is selected, otherwise the error message is displayed.
- A successfully performed command is replied by @00 code, if Echo Off is selected, otherwise the set value is replied.
- A command with the certain [Parameter Name] and blank [Parameter List] displays the current settings for a given parameter.
- A command followed by "/F" option displays the Parameters in the predefined frame format. The display frame format is unique for each command supporting "/F" option.
- To set the mode ordered by CLI commands as permanent User Setting (the setting automatically selected for the boot-up unit) the SAVE command must be asserted.

Error Code	Short Description
0x01	Command Syntax Error. A command followed by "/" displays a command usage.
0x02	The parameter has a format error. A command with the certain [Parameter Name] followed by "/" displays the format and range of the variable.
0x03	The parameter is out of allowed range. A command with the certain [Parameter Name] followed by "/" displays the format and range of the variable.
0x04	The command is not valid for specific radio model. To display the list of available commands, the HELP command must be used (see section 5.2.2).
0x05	Unspecified Error

Figure B-1: Command Line Interface Error Codes

B.2 SOFTWARE SWITCHING TO COMMAND MODE

On power-up the radio modem is in data-mode. To switch to command mode the special byte-sequences with special meanings are used:

- Escape-Sequence: “+++” with 20 ms guard time before and after the command characters
- Escape-Acknowledge: “@00<CR><LF>”

In Command Mode, the unit's serial port must keep CTS line always active (see also section B.5.4).

B.2.1 HAPPY FLOW

1. In data-mode the unit starts looking for the Escape-sequence if there is no data from DTE for more than 20 ms (Start Guard Time).
2. If the unit detects the Escape-Sequence:
 - The transmitter continues sending over the air the data received from DTE before Escape-Sequence and buffers the data from DTE; T
 - The Receiver immediately stops forwarding to DTE the data received over the air and buffers it instead.
3. The radio unit waits for 20 ms and then sends Escape-Acknowledge to DTE if there is no data from DTE during 20 ms of Stop Guard Time.
4. The unit goes to command mode and discards Escape-Sequence from input buffer. The modem is immediately ready to receive commands. At the same time it continues buffering the data received over the air since step 2.

B.2.2 ESCAPE-SEQUENCE IN DATA

During the wait in step 3 above, the unit receives data from DTE:

- The unit sends buffered Escape-Sequence from DTE to the air;
- The unit sends all buffered data received from the air since step 2 to DTE and stays in data-mode (i.e. transmits data received from DTE over the air – including the just received, unexpected, data and forwards data received over the air to DTE.)

B.3 HARDWARE SWITCHING TO COMMAND MODE

As alternative to Software Switching, the switching through the MP/DP (Data Terminal Ready, DTR) control line can be used. To set Command Mode, the DTE must assert DTR signal active and then passive. By falling edge of DTR signal the unit goes to command mode and then sends Escape-Acknowledge to DTE („@00<CR><LF>“).

In Command Mode, the unit's serial port must keep Clear to Send (CTS) line always active (see also section 0).

Note: The powered up radio modem by default goes to Data Mode regardless of DTR control line polarity.

B.4 SWITCHING TO DATA MODE

- DTE sends the CLI command „DATAMODE<CR><LF>“ to the unit.
- Unit answers with Escape-Acknowledge („@00<CR><LF>“) and immediately goes to data-mode, so that the DTE can start sending data as soon as the Escape-Acknowledge has been received.
- If no valid CLI commands received from DTE within 1 minute, the unit will automatically switch back to data-mode.

Note: The data received over the air could be lost due to Rx buffer overflow if the unit stays in Command mode longer

B.5 COMMAND DESCRIPTIONS

B.5.1 HELP

The HELP command types the list of all available commands:

HELP	– Display this usage
BOOT	– Reboot the unit
LINK	– RF Link Operation Mode
DPORT	– Data Port Configuration
MPORT	– Maintenance Port Configuration
ALARM	– Alarm Indication and Alarm Control Configuration
SLEEP	– Sleep Mode Configuration
CONNECT	– Connect to Specified Unit

STATE	– Display Status and Statistics
SAVE	– Save Current Configuration into Configuration File
INFO	– Display Product ID along with Hardware/Software Versions
DATAMODE	– Exit Command Mode
[COMMAND] /?	– Display Command Usage

B.5.2 LINK

The LINK command is responsible for configuring radio's operation mode. It has six parameters listed below.

LINK [Parameter Name] [Parameters List] [/?]

Parameter Name	Parameter List
PROT	1 – "Simplex Receiver" 2 – "Simplex Transmitter" 3 – "Half Duplex" specific for remote units (a default protocol) 4 – "Half Duplex" specific for base unit 5 – "Full Duplex" specific for remote units 6 – "Full Duplex" specific for base unit 7 – "RTK Receiver" 8 – "RTK Transmitter" 9 – Reserved for future use 10 – "Repeater" (ArWest Proprietary protocol) 11 – "RTK Repeater"
MOD	1 – DBPSK 2 – DQPSK (default for AlphaWave) 3 – D8PSK 4 – 16QAM 5 – GMSK
PWRB / PWRW	(13 – 33) / (20 – 2000) – RF output Power in dBm / mW
CHAN	Selects the frequency channel, CN = (1 – 32). The maximal value is defined by number of frequencies in the channel list. The CN = 0 is reserved to set the Frequency Automatic scanning mode. The LINK CHAN 0 command also forces the radio modem to continue scanning starting from the channel currently selected by automatic scanning algorithm. In Automatic scanning mode, to check the frequency channel currently used or scanned, the STATE command must be used (see section 0).
FHOP	(1 – 128) – Frequency Hoping Pattern number
SCRAM	0 – No Scrambling (a default setting) (1 – 255) – Seed for Pseudo-Random Sequence Generator
ENROL	Enrolls the secondary units into the wireless cluster. The enrolled unit's 6-digit serial numbers are delimited by commas SN ₁ , SN ₂ , SN ₃ ... SN ₃₁ , SN ₃₂ . The number of units in the cluster does not exceed 32. The SN = 0 is reserved to clear the list of enrolled remote units.

AlphaWave Users Manual		4/26/2006
Parameter Name	Parameter List	
FEC	0 – Disable Forward Error Correction (FEC) 1 – Enable Reed-Solomon encoding, a default setting	

Figure B-2: Link Commands

Appendix B

Note:

LINK FHOP XX and LINK CHAN 0 commands can be processed only if Frequency Map is defined.

The boot-up radio modem operating in automatic scanning mode must start frequency scanning from first channel in the frequency map.

The Remote unit will restart the frequency scanning process if there is no receive signal on the automatically selected channel.

The frequency defined by CHAN parameter is not valid if Frequency Hoping mode is selected.

In the Frequency Hoping mode, the Frequency Pattern generator must generate the random numbers smaller than the number of frequencies listed in the unit's frequency list.

By default, there are no enrolled remote units in the network list. The ENROL parameter is not valid for Remote units.

B.5.3 DPORT

The DPORT is an object that responsible for data port interface configurations like Bit Rate, Flow Control, etc.

Parameter Name	Parameter List
RATE	0 – Maintenance Port's baud rate, a default setting 1 – 1200 baud 2 – 2400 baud 3 – 4800 baud 4 – 9600 baud 5 – 14400 baud 6 – 19200 baud 7 – 38400 baud 8 – 57600 baud 9 – 115200 baud

Parameter Name	Parameter List
BITS	Set number of bits in one byte (8 or 7) 8 is a default setting
PARITY	0 – None, a default setting 1 – Odd 2 – Even
FLOW	0 – None, a default setting 1 – SW (XON/XOFF) 2 – HW (RTS/CTS)

Figure B-3: DPORT Commands**Appendix B****B.5.4 MPORT**

The MPORT is an object that responsible for maintenance serial port interface configurations such as data rate and number of bits in a byte.

Parameter Name	Parameter List
RATE	0 – Auto. 1 – 1200 baud 2 – 2400 baud 3 – 4800 baud 4 – 9600 baud 5 – 14400 baud 6 – 19200 baud 7 – 38400 baud 8 – 57600 baud 9 – 115200 baud, a default setting
BITS	Set number of bits in one byte (8 or 7) 8 is a default setting

Figure B-4: MPORT CommandsNote:

ArWest radio modem's does not support data flow and parity on the maintenance serial port.

B.5.5 ALARM

The ALARM command is intended to set up the alarm indication mode and alarm control lines' behavior.

ALARM [Parameter Name] [Parameters List] [/?]

Parameter Name	Parameter List
TTL1	0 – TTL_OUT1 = logic "1" 1 – TTL_OUT1 = TTL_IN1, received from remote unit (default settings) 2 – TTL_OUT1 = TTL_IN1 and TTL_IN2, received from remote unit 3 – TTL_OUT1 = TTL_IN1 or TTL_IN2, received from remote unit
TTL2	0 – TTL_OUT2 = logic "1" 1 – TTL_OUT2 = TTL_IN2, received from remote unit (default settings) 2 – TTL_OUT2 = SYNC Loss 3 – TTL_OUT2 = BER > BERTH or SYNC Loss
BERTH	1 – BER Threshold $>10^{-3}$ (default threshold level for BER) 2 – BER Threshold BER $>10^{-2}$

Figure B-5: ALARM Commands

B.5.6 SLEEP

The SLEEP command determines the sleep mode parameters. The sleeping AlphaWave can be activated by real-time CLK, DTR/RTS lines, and command received through TTL inputs. The user can select one, two, or all three conditions.

SLEEP [Parameter Name] [Parameters List] [/?]

Parameter Name	Parameters List
CLK	0 – Do not activate by internal real-time clock (1 – 255) – Activate by internal real-time clock after 100 to 25500 msec of sleeping
HW	0 – Do not activate through DTR/RTS lines 1 – Activate through DTR/RTS lines
TTL	0 – Do not activate by external sense lines 1 – Activate by external sense lines
GTS	0 – Disable Sleep mode (default) (1 – 255) – Go to sleep mode if there is no activity in 10 to 2550 msec

Figure B-6: SLEEP Commands

B.5.7 CONNECT

To connect the radio unit through the local maintenance serial port or to establish the link with the remote unit in the Point-to-Multipoint network, the CONNECT command must be used.

CONNECT [*Unit_Numb*] [/?]

Where the *Unit_Numb* is an assigned decimal number for the unit to be connected. To get the complete unit list, the CONNECT command must be used with no parameter. The list of units in the Point-to-Point link with the connection established with remote unit is shown in Figure B-7:

Unit	Serial Number	Connect
BS	003578659922	
1	003574459923	C

Figure B-7: Connection List

The CONNECT command followed by "/F" is replied by the frame, which has the following format:

Bytes	Description
1 Byte	Number of Remote Terminals in the network (Base Station is not included)
6 Bytes	Serial Number of Base Station, network ID = 0
6 Bytes	Serial Number of 1 st Remote Terminal, network ID = 1
6 Bytes	Serial Number of 2 nd Remote Terminal, network ID = 2
...	...
1 Byte	Virtual Network ID of the unit connected to CLI
1 Byte	CR, 0x0D
1 Byte	LF, 0x0A

Figure B-8: Connection List Frame Format

To connect to the Base unit, through the remote unit, the parameter (*Unit_Numb*) must be equal to 0. To connect the local unit (Base or Remote), the parameter (*Unit_Numb*) must be equal to 0xFF.

B.5.8 STATE

The STATE command is used to check the state of the wireless link, the unit in the link, and the alarm control lines. To specify a radio unit (local or remote), the CONNECT command must be used in prior of STATE command using.

STATE [*Parameter Name*] [*Parameters List*] [/?]

Parameter Name	Parameters List
TTL1	0/1 – State of TTL_IN1 line
TTL2	0/1 – State of TTL_IN2 line
RSSI	-52 to -116 dBm – Indicates the Receive Signal Strength in dBm
BER	1.0E-6 to 9.9E-3 – Indicates the BER level
FREQ	403.000000 to 470.000000 MHz – Displays the central frequency of the operating channel.
CHAN	1 to 32 – Displays the selected or currently scanned frequency channel.
TEMP	-30°C to 100°C – Displays the temperate inside of enclosure.

Figure B-9: STATE Commands

The STATE command without *Parameter Name* indicates all values as shown in Figure B-10:

```
TTL_IN1 = 0
TTL_IN2 = 1
RSSI = -110dBm
BER <= 2.3E-5
FREQ = 440,012500 MHz
CHAN = 10
TEMP = 70C
```

Figure B-10: STATE Command Display

The STATE command followed by "/F" is replied by the frame, which has the following format:

Bytes	Description
1 Byte	State of TTL_IN1 (0 or 1)
1 Byte	State of TTL_IN2 (0 or 1)
1 Byte	RSSI value as a signed integer
2 Bytes	The BER is calculated by MSB * 10 ^(LSB) , MSB value range is 0 to 99 and LSB value range is negative -1 to -8.
4 Bytes	The Frequency channel in Hz presented in binary format.
1 Byte	Channel Number as an unsigned integer
1 Byte	Temperature inside of enclosure as an signed integer
1 Byte	CR, 0x0D
1 Byte	LF, 0x0A

Appendix B

Figure B-11: Unit State Frame Format

Note: The indicated receive signal strength (RSSI) is equal to -147 dBm if there is no signal received from transmitter.

B.5.9 BOOT

The BOOT command is intended to reboot the unit using selected user settings. Two options are available, to use the default user settings defined by dealer or to use the settings defined by end-user

BOOT [Parameter Name] [Parameters List] [/?]

Parameter Name	Parameter List
CFG	0 – selects the default user settings 1 – selects user modified settings

Figure B-12: Boot Commands

The BOOT command with no parameters selects the user settings defined by the prior "parameterized" BOOT commands.

B.5.10 SAVE

The SAVE command is intended to store the unit's currently used configuration into the User Configuration file. The configuration stored in the User Configuration file will be activated by automatically after unit's reboot.

B.5.11 INFO

The INFO command is used to retrieve the Radio ID along with its Hardware version, the loaded real-time software (AWrocs) version/revision and BootLoader's version/revision.

INFO [Parameter Name] [Parameters List] [/?]

<i>Parameter Name</i>	<i>Parameters List</i>
ID	Product ID: 2 – AW400Rx (UHF Receive-Only, Radar2) 3 – AW435 (35W UHF Transceiver, RadarPlus/AlphaWave+) 4 – AW400 (2W UHF Transceiver, AlphaWave) 6 – Reserved 11 – AW200 (2W VHF Transceiver for China, AlphaWave) 12 – AW100 (2W VHF Transceiver, AlphaWave) 13 – AW200Rx (VHF Receive-Only for China, Radar2) 14 – AW100Rx (VHF Receive-Only, Radar2) 15 – AW225 (25W VHF Transceiver for China, RadarPlus/AlphaWave+) 16 – AW135 (35W VHF Transceiver, RadarPlus/AlphaWave+)
SN	Six bytes Serial Number (SN)
HW	1.0 – hardware version in numeric "Major.Minor" format
SW	Ver. 1.0 Rev. A – displays software's version in numeric "Major.Minor" format and revision in numeric format (range from 01 to 99) for engineering releases and alphabetic format (A to Z) for manufacturing releases
BL	Ver. 1.0 Rev. A – displays BootLoader's version in numeric "Major.Minor" format and revision in numeric format (range from 01 to 99) for engineering releases and alphabetic format (A to Z) for manufacturing releases

Figure B-13: INFO Commands

The INFO command without *Parameter Name* indicates all values as shown in Figure B-14:

Product ID = 1
S/N = 000000 020303
Hardware = Ver. 1.0
Software = Ver. 1.0 Rev. B
BootLoader = Ver. 1.0 Rev. A

Figure B-14: INFO Command Display

Appendix B

The INFO command followed by "/F" is replied by the frame, which has the following format:

Bytes	Description
1 Byte	Product ID in ASCII format
6 Bytes	Unit's Serial Number in binary format
2 Bytes	Hardware version in ASCII format with Major number in MSB
2 Bytes	Software version in ASCII format with Major number in MSB
2 Bytes	Software revision in ASCII format; numbers from 01 to 99 are used to indicate engineering releases and letters from A to Z ("space" in MSB) are used to indicate manufacturing releases
2 Bytes	BootLoader version in ASCII format with Major number in MSB
2 Bytes	BootLoder revision in ASCII format; numbers from 01 to 99 are used to indicate engineering releases and letters from A to Z ("space" in MSB) are used to indicate manufacturing releases
1 Byte	CR, 0x0D
1 Byte	LF, 0x0A

Figure B-15: Unit Information Frame Format

B.5.12

DATAMODE

The DATAMODE command is used to explicitly exit Command mode.

Note: By DATAMODE command the radio modem goes to Data Mode regardless of DTR control line polarity.

APPENDIX C
CONFIGURATION & SETTINGS PRINT
FORMS

Factory Configuration

Identification

SerialNumber	00-00-00-00-10-60
Product Type	AW400
Description	AlphaWave 400MHz Radio Modem
Software Version	N/A

TCXO

TCXO	22
------	----

ALC Table

Output Power Value	Low (403.000000MHz)			Middle (440.000000MHz)			High (470.000000MHz)		
	Attenuation Value	HPA Bias Value	Gain Value	Attenuation Value	HPA Bias Value	Gain Value	Attenuation Value	HPA Bias Value	Gain Value
13 dBm	29	15	10000	30	15	10000	30	12	10000
14 dBm	27	14	10000	30	16	10000	29	12	10300
15 dBm	26	14	10000	30	17	10000	29	13	10000
16 dBm	25	14	10000	30	18	10000	30	14	10000
17 dBm	24	14	10000	26	15	10000	29	14	10000
18 dBm	23	14	10000	25	15	10000	28	14	10000
19 dBm	23	15	10000	24	15	10000	27	14	10000
20 dBm	22	15	10000	23	15	10000	26	14	10000
21 dBm	21	15	10000	22	16	10000	25	14	10000
22 dBm	20	15	10000	21	15	10000	24	14	10000
23 dBm	19	15	10000	20	15	10000	23	14	10000
24 dBm	17	14	10000	19	15	10000	22	14	10000
25 dBm	17	15	10000	16	13	10000	21	14	10000
26 dBm	17	16	10000	16	14	10000	20	14	10000
27 dBm	17	17	10000	16	16	10000	20	15	10000
28 dBm	17	18	10000	16	17	10000	20	16	10000
29 dBm	17	20	10000	16	19	10000	20	17	10000
30 dBm	17	21	10000	16	20	10000	20	18	10000
31 dBm	17	23	10000	16	22	10000	20	19	10000
32 dBm	17	25	10000	16	25	10000	20	21	10000
33 dBm	17	28	10000	16	28	10000	20	23	10000

Test Frequencies

Channel	Channel Frequency
Low	403.000000MHz
Middle	440.000000MHz
High	470.000000MHz

C.1

FACTORY CONFIGURATION PRINT FORM

C.2 DEALER CONFIGURATION PRINT FORM

Dealer Configuration

Product Type	AW400
Call Sign	
Channel Spacing	25 kHz
Maximum Allowed Output Power	33 dBm

Channel Map

Channel №	Channel Frequency
1.	430.000000MHz
2.	435.000000MHz
3.	440.000000MHz
4.	445.000000MHz
5.	450.000000MHz
6.	455.000000MHz
7.	460.000000MHz
8.	464.500000MHz
9.	464.550000MHz
10.	469.500000MHz
11.	469.550000MHz

Appendix C

C.3 USER SETTINGS PRINT FORM

User Settings

Software Version Version 1.3 Rev13

Link Settings

Link Channel	Ch.01 (430.000000MHz)
Frequency Hopping Pattern Number	-
ARQ	Off
Seed for Scrambling	Off
Modulation Type	DBPSK (9.6 kbps)
Plug-and-Play	0

Appendix C

Unit 1 Properties Table

SerialNumber		00-00-00-00-10-60
Product Type		AW400
RF Output Power Value		13 dBm
Protocol		Simplex "Transmitter"
Alarm	TTL1	-
	TTL2	-
	BERTH	-
DPORT	Baud Rate	MaintenancePort BaudRate
	Bits	8
	Parity	None
	Flow Control	None
MPORT	Baud Rate	115200 bps
	Bits	8
Sleep	CLK	Off
	HW	Off
	TTL	Off
	GTS	Off
Identification	Name	Unit0
	Owner	

Unit 2 Properties Table

SerialNumber		00-00-00-00-00-00
Product Type		AW400
RF Output Power Value		-
Protocol		Simplex "Receiver"
Alarm	TTL1	1
	TTL2	1
	BERTH	1
DPORT	Baud Rate	MaintenancePort BaudRate
	Bits	8
	Parity	None
	Flow Control	None
MPORT	Baud Rate	115200 bps
	Bits	8
Sleep	CLK	Off
	HW	Off
	TTL	Off
	GTS	Off
Identification	Name	Unit1
	Owner	