



SpectraWave 1900™

Users Manual

LCC International, Inc.

SpectraWave 1900 Users Manual

LCC p/n 41-A00818-1

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Introduction

SpectraWave 1900 is a continuous wave transmitter that simulates cell sites during candidate site evaluation and RF design validation. The SpectraWave 1900 transmitter continuously monitors key performance metrics and frequency output to maintain tolerances of 0.5 Parts Per Million (PPM). This design tool uses an advanced thermal design that ensures the same level of output accuracy in virtually any climate within a temperature range of -4° to +140° F (-20° to +60° C).

The SpectraWave 1900 transmitter is designed to operate almost anywhere you can locate an antenna. Its casing and structure are strong enough to withstand harsh environments, including shock and vibration. With its small size and weight, you can move SpectraWave 1900 easily to a variety of locations for testing.

After selecting a potential site, use SpectraWave 1900 to transmit a signal over a single frequency. Use SpectraWave 1900 in conjunction with RSAT-2000 (or the EXP-2001 to measure the signal and collect data for later analysis) for safe, easy, and productive data measurement.

1.1 About This Manual

This SpectraWave 1900 User's Manual contains information intended for engineers and technicians of wireless systems who have a basic knowledge of wireless telephony. This manual includes only minimal information on industry standards related to the operation of SpectraWave 1900.

1.2 What is in this Manual

This manual includes the following sections:

- **Quick Start**, a step-by-step guide to basic SpectraWave 1900 operation.
- **Functional Screens** details all of the various displays that SpectraWave 1900 generates, and the data that they present, and information on configuring that data.
- **Appendixes** provide additional technical information and discuss optional software.

The typical SpectraWave 1900 user operates a unit that has already been installed in a test vehicle and will not need to install the system.

1.3 Document Conventions

This manual uses specific type fonts to indicate certain meanings. Computer file names and directories appear in **Courier New Bold**. Terms that appear in a graphical user interface (GUI) are in **Times New Roman Bold**. Keyboard entries appear in Courier New (plain).

Page numbering includes the chapter number and the page within the chapter. For example, 2-2 is Chapter Two, Page Two.

Figures and tables are numbered according to the chapter and the sequence in which they appear in the chapter. For example, Figure 2-1 is the first figure in Chapter Two.

Note:	Text in this format pertains to the topic being discussed in regular text and is set aside to emphasize a particular point.
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CAUTION:	Text found in this format is vitally important to proper operation of SpectraWave 1900. Please pay careful attention to these items.
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WARNING!: Text found in this format alert users to hazardous conditions that may result in bodily harm. Pay strict attention to these.

1.4 Technical Support

Direct questions regarding set up and use of SpectraWave 1900 to LCC Customer Support at (800) 522-9670. You also can contact LCC via e-mail at support@LCC.COM, or at our web site, www.lcc.com.

SpectraWave 1900 Basics

SpectraWave 1900 is a continuous wave transmitter that simulates cell sites during candidate site evaluation and RF design validation. Use SpectraWave 1900 to measure potential performance of an antenna at the sites you are considering as antenna locations.

The SpectraWave 1900 transmitter transmits a signal over a single frequency at a potential antenna site. SpectraWave 1900 also can be combined with RSAT-2000 (or with the EXP-2001/Benchmark) to measure the signal and collect data for later analysis for safe, easy, and productive data measurement. Use the SpectraWave 1900 transmitter to evaluate and compare the signal strength you can expect from locating the antenna at different sites within a cell. Use SpectraWave 1900 to evaluate the level of interference from a potential cell site to adjacent sites.

The SpectraWave 1900 transmitter continuously monitors key performance metrics and its frequency output to maintain a tolerance of 0.5 PPM. This design tool uses an advanced thermal design that ensures the same level of output accuracy in virtually any climate within a temperature range of -4° to +140° F (-20° to +60° C). The SpectraWave 1900 transmitter is designed to operate almost anywhere you can locate an antenna and can operate under a variety of conditions. With its small size and weight, you can move SpectraWave 1900 easily to a variety of locations for testing.

This chapter discusses the basic parts of the transmitter. Section 2.1, *Basic Transmitter Configuration*, provides a description of SpectraWave 1900's parts and screens. Section 2.3, *SpectraWave 1900 Convenience Features*, lists basic features that ensure easy use of the SpectraWave 1900 transmitter. Section 2.4, *Preparing SpectraWave 1900 for Operation*, includes information on setup requirements and component connections.

2.1 Basic Transmitter Configuration

The SpectraWave 1900 transmitter unit features:

- Transmitter Base unit (see Figure 2-1)
- Transmitter antenna Kit (see Figure 2-7).

You must supply an external AC power source with either 120 VAC at 60 Hz or 220 VAC at 50 Hz. SpectraWave 1900 parts are described in the sections that follow.

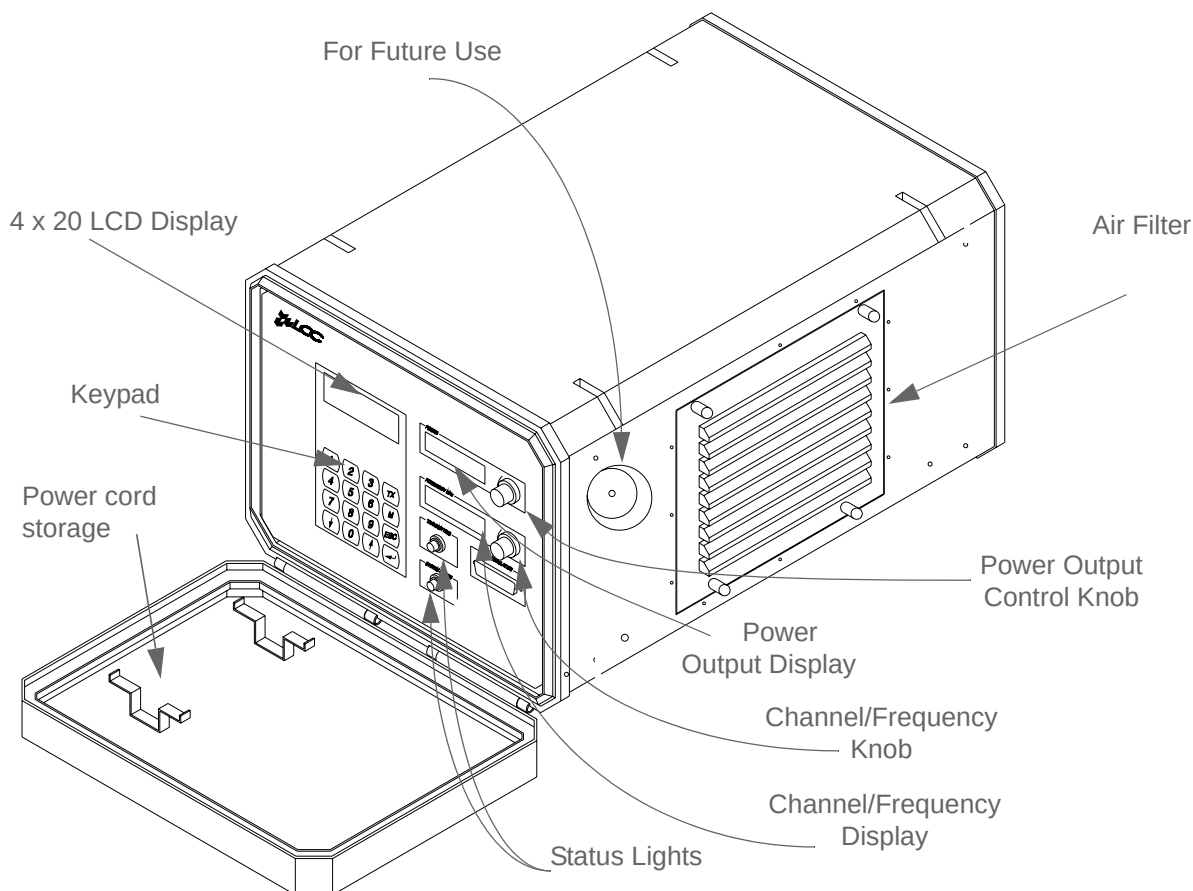


Figure 2-1 The SpectraWave 1900 Transmitter Base Unit

The SpectraWave 1900 transmitter base unit operates through screens, subscreens, and a keypad on the front panel of the transmitter. The front panel has two large 1 x 8 character liquid crystal displays (LCDs) that display frequency and power values, a TX Power LED, a System Power LED, and a 4 x 20 character LCD where the screens and subscreens are displayed.

Refer to Appendix A for information on part numbers for SpectraWave models, options, and accessories.

2.2 User Interface

SpectraWave 1900's Base Unit's front panel provides a control interface for transmitter operation (see Figure 2-2).

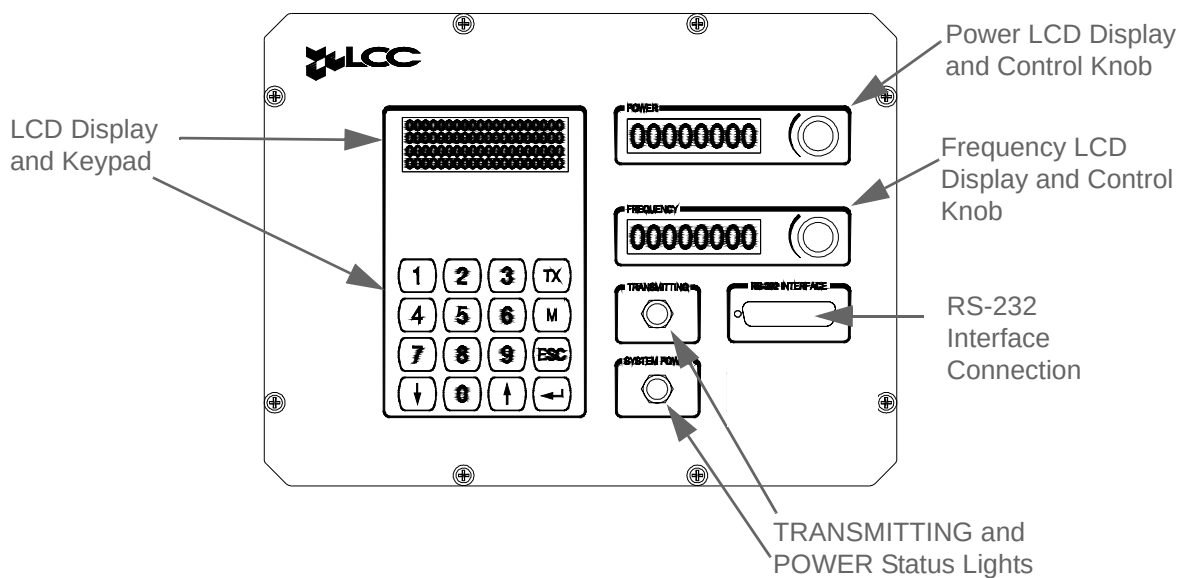


Figure 2-2 SpectraWave 1900 Front Panel

The front panel presents two LCD displays that enable the user to configure and control SpectraWave 1900's operation:

- **Menu-Driven Screens**, configured via an associated keypad; and
- **Numerical Screens**, configured via associated knobs, and providing an alternate method to configure power and frequency values.

Additionally, status lights provide operating information.

2.2.1 Menu-Driven Screens Display

Use the menu-driven screens display and associated 16-key keypad to configure SpectraWave 1900 operations.

Use the 10 numeric keys to select between available menu options and to enter transmitting and power values. (Transmitting and power values can also be entered via the numeric displays and associated control knobs.)

Use the up and down arrow keys to select available menu options.

Use the four remaining, non-numeric keys to perform these functions, available from most menu screens:

- Press **TX** to commence transmitting on a selected frequency or channel number.
- Press **M** to display the Main Menu screen.
- Press **ESC** to leave one screen and return to the previous screen, or to reenter a value or parameter already entered into SpectraWave 1900.
- Press **↵** to accept a value or parameter newly entered into SpectraWave 1900.

SpectraWave 1900's user control interface embodies menu-driven functional screens that are accessible from one another in a specific sequence. The functional screens are accessible via a Main Menu, displayed by pressing the **M** key. The Main Menu screen enables access to three associated menus (see Figure 2-3).

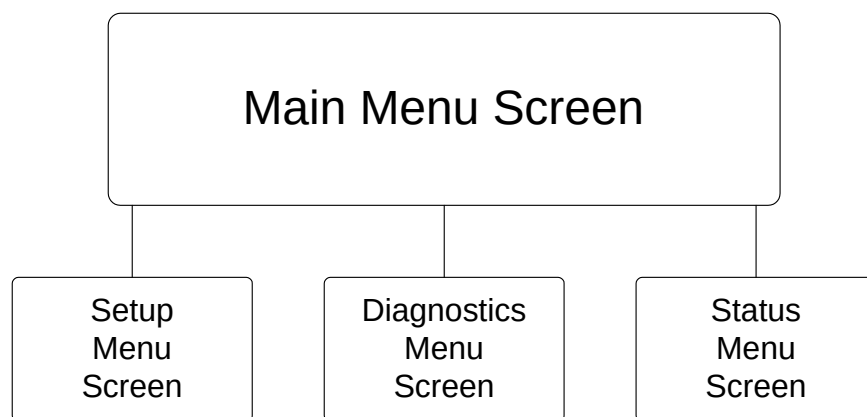


Figure 2-3 Main Menu Screen and Associated Menus

The Setup Menu provides access to seven functional screens (see Figure 2-4).

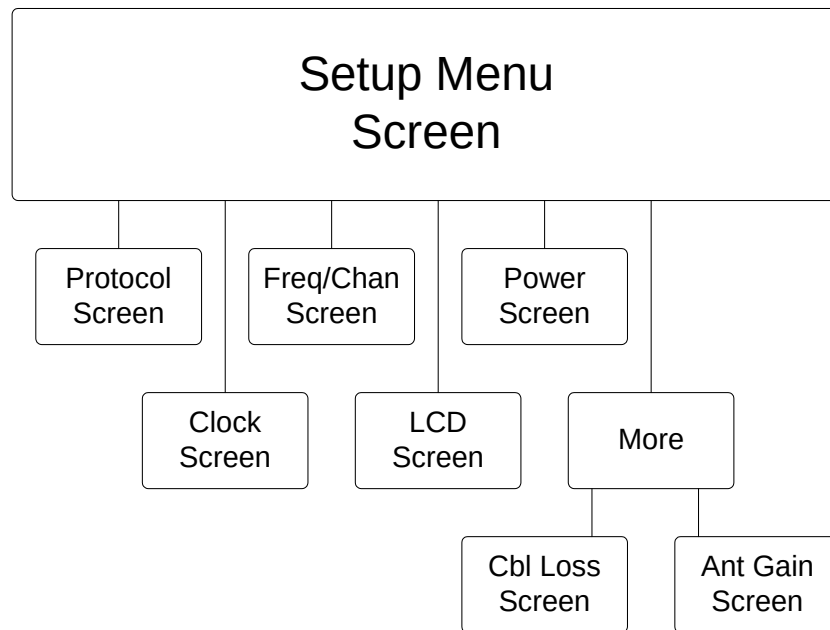


Figure 2-4 Setup Menu and Associated Functional Screens

The Diagnostics Menu provides access to seven functional screens (see Figure 2-5).

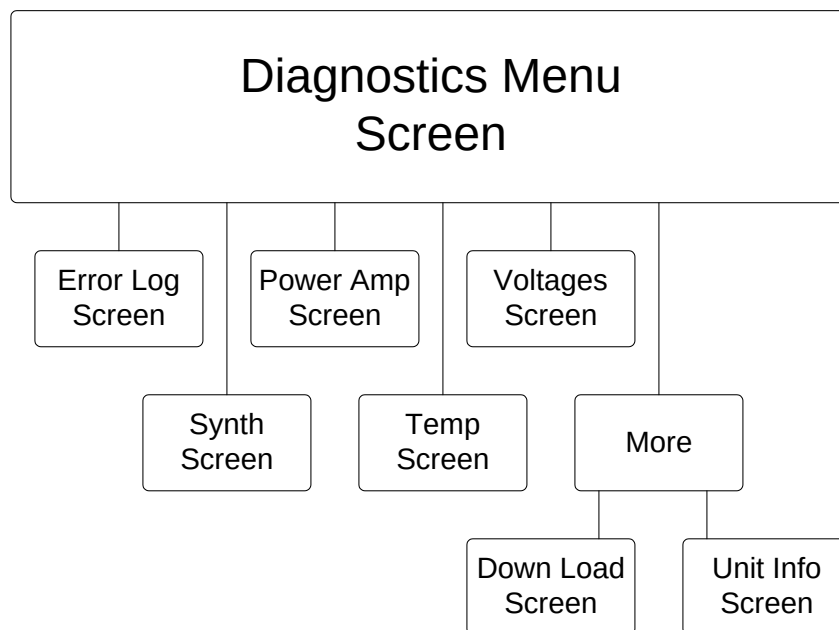


Figure 2-5 Diagnostics Menu and Associated Functional Screens

The Status Menu provides access to the Status Screen (see Figure 2-6).

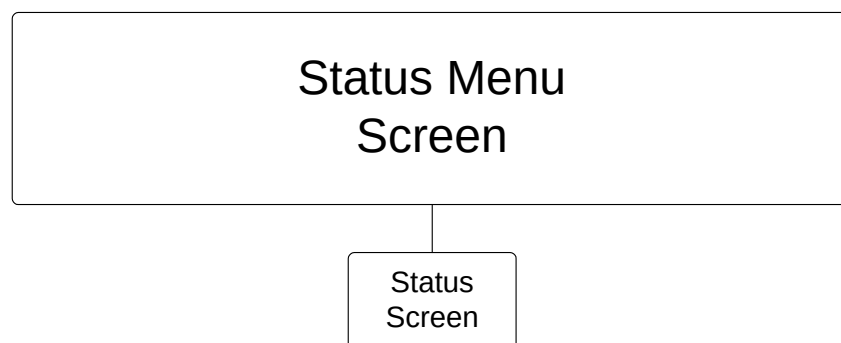


Figure 2-6 Status Menu and Associated Screen

See later sections of this manual for guidance on using and configuring SpectraWave 1900's functional screens.

2.2.2 Numerical Screens (Power and Frequency)

The two numerical screens and associated control knobs provide an alternate method of setting transmitter Power and Frequency values. Rotate the control knob(s) clockwise to increase or counterclockwise to decrease the displayed value(s).

2.2.3 Status Lights

SpectraWave 1900's front panel includes two status lights, green and red: green when the unit is transmitting, and red when the unit is powered on.

2.2.4 Antenna Accessory Kit

The antenna kit contains a 6 dB gain omni-directional antenna, three ten-foot cable sections, a tripod, and a dummy load. The dummy load terminates the output of an external power meter while performing system VSWR measurements. Different antenna accessory kits are available for PCS, DCS-1800, AMPS and N-AMPS, iDEN, ETACS, and GSM protocols.

Note: The PCS antenna kit is the only kit designed to operate with the SpectraWave 1900.

Figure 2-7 shows an example of a SpectraWave 1900 transmitter antenna kit.

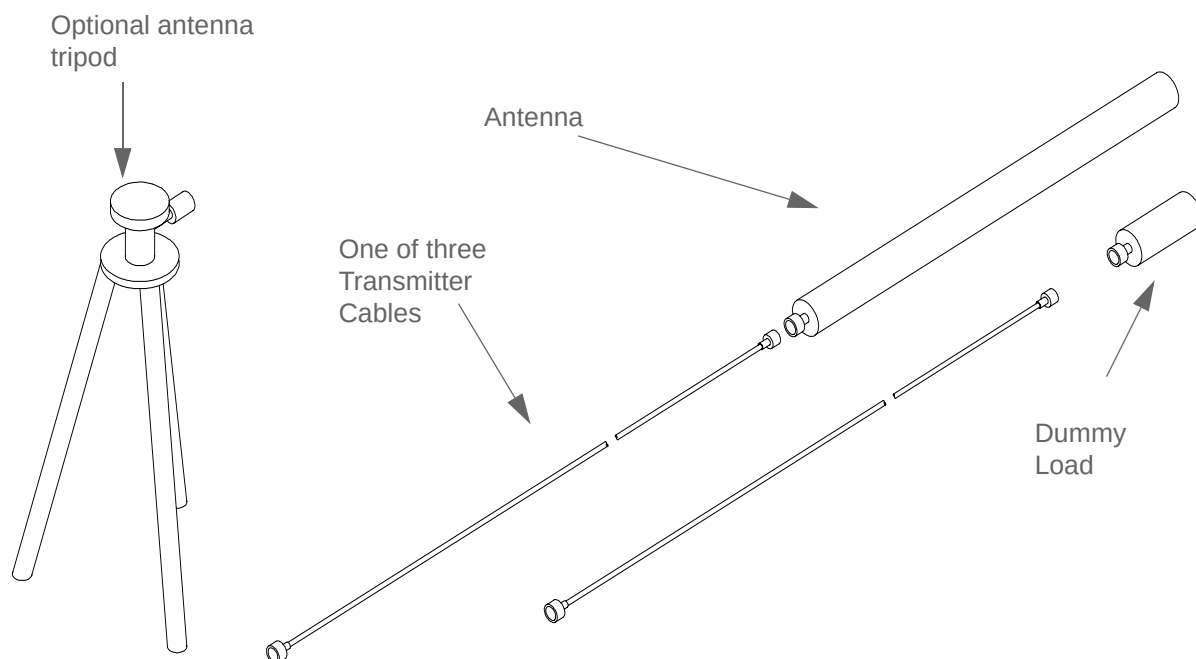


Figure 2-7 Transmitter Antenna Kit

The SpectraWave 1900 Transmitter comes with three cables and any adaptors required for attachment to the main RF antenna. An optional antenna tripod is also available.

2.2.5 Tripod

An optional light-weight tripod is available from LCC. This tripod is designed for mounting the antennas that come with the unit.

WARNING!: Use caution when using tripod in high winds.

2.2.6 Transmitter Power Supply

Three types of power cables are available:

- U.S. style,
- U.K. style, and
- Euro-style.

SpectraWave 1900 Basics

The power cable attaches to the rear panel of the transmitter. Plug the power cable into the power source. The power source can be either 110 VAC, 60Hz or 220 VAC, 50Hz nominal. The SpectraWave 1900 transmitter will automatically switch to support either power source.

2.3 SpectraWave 1900 Convenience Features

SpectraWave 1900 is designed to operate in almost any environment where an antenna can be located, and is ready to use less than three minutes after you turn it on. Other convenience features of SpectraWave 1900 include:

- Power output displayed in watts, milliwatts, or dBm
- Strong casing and structure to withstand harsh environments, including shock and vibration
- Small size and weight (approximately 12.5" x 18.5" x 10" and just over 35 pounds) for moving the unit around a variety of testing locations
- Carrying handle
- Lift rings for use with cranes or lifting ropes.

2.4 Preparing SpectraWave 1900 for Operation

Before you begin testing, you must properly prepare and set up the SpectraWave 1900. The following sections describe the steps and precautions you should perform to ensure proper setup and accurate operation.

2.4.1 Checking and Maintaining the Air Filter

WARNING!: Before operating the SpectraWave 1900 transmitter, verify that the air filter is clean. The air filter **must** be cleaned every 30 days to ensure safe operation of the transmitter.

To clean the air filter:

1. Loosen the four captive panel fasteners that hold the air filter in place (see Figure 2-1). Remove the cover.
2. Remove the filter and wash it with warm, soapy water. Let the filter air dry.
3. To reinstall the air filter, insert the filter into the transmitter with the wire diamond mesh over the filter media facing away from you (the filter cover screws are offset, making it impossible to install upside down).
4. Replace the filter cover over the filter and tighten the four captive panel fasteners by hand.

If the air filter is damaged or torn, you may need to replace it with a new air filter. Refer to Appendix A for information on ordering a new air filter.

WARNING!: Reattach the front cover to the SpectraWave unit before you begin drive testing to guard against harsh or inclement weather.

2.4.2 Setting Up the SpectraWave 1900

Once you have decided upon your test site, follow these steps to set up SpectraWave 1900:

1. Set up the main RF antenna in a position that provides an unobstructed view of the intended coverage area. The usual setup requires a tripod for temporary mounting and to raise the antenna over any roof parapets.

Note: Note that structures **behind** and to the **side** of the antenna will strongly affect the radiation pattern, a situation common to working with rooftop antennas.

2. Connect one or more RF antenna cables between the antenna and the RF output connector on the side of the SpectraWave1900 unit. If more than one RF cable is needed, use the supplied N-female to N-female adaptors to connect cables together.
3. Configure the SpectraWave setup so that the lowest point on the antenna cable(s) is lower than the connection to the SpectraWave.
4. Route the antenna cable to provide a drip loop. This **drip loop** will protect against accidental shock (see Figure 2-8).

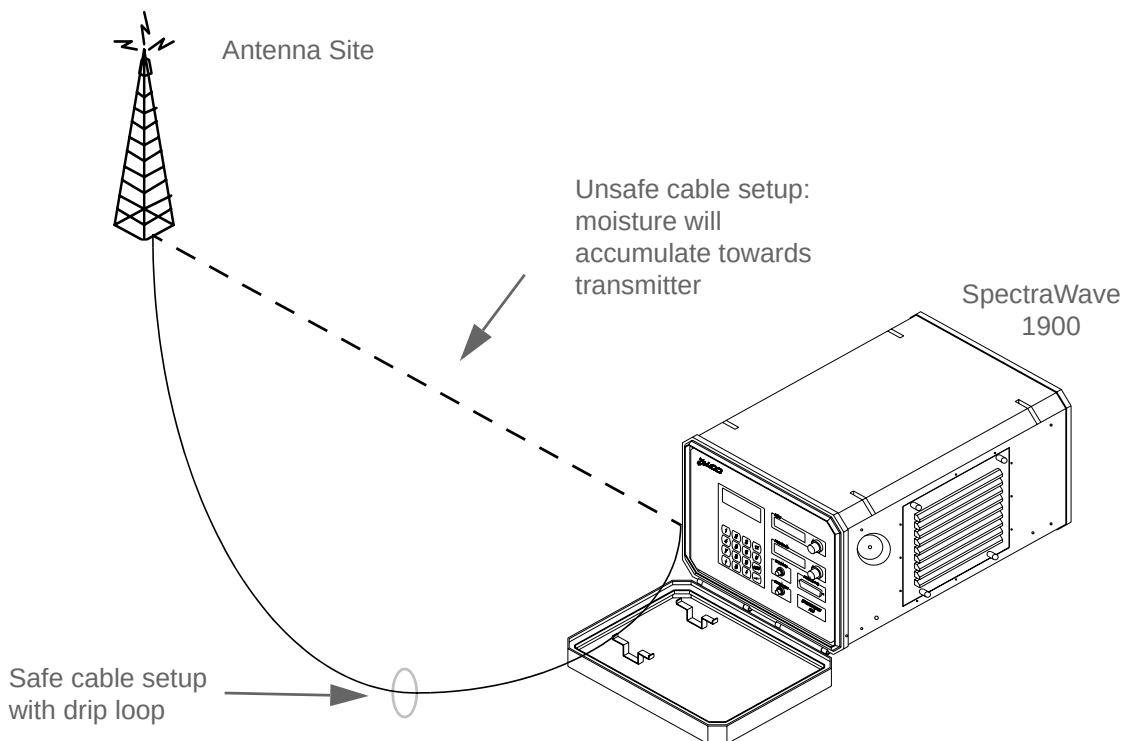


Figure 2-8 SpectraWave Setup (not to scale)

WARNING!: Water runoff along the antenna cable can create electrical hazard.

5. Check the air filter to make sure it is clean. If the filter is dirty, remove it and clean it before turning the power switch on. Refer to section 2.4.1, *Checking and Maintaining the Air Filter* for instructions on removing and cleaning the air filter.
6. Connect the power cable to the rear panel. Connect the power cable to your external AC power source, such as an existing power outlet. For locations lacking power outlets, use an AC power generator. Turn on the power switch. Whenever the power is turned on, make sure that the unit is properly ventilated. Allow clearance for air intake on the side. Also allow clearance for the exhaust vent on the rear panel.

WARNING!: Do not allow the AC Power Cord to lie in water. This can create danger of electrical shock.

7. Set the test parameters as shown in Chapter 3.
- You now are ready to begin testing.

2.4.3 Setting Test Parameters

To prepare for testing, read the instructions in Chapter 4, *Functional screens*. Follow these instructions to set up the test parameters and begin drive testing.

2.5 Preparing SpectraWave 1900 for Shipping

Should you need to ship SpectraWave 1900 for any reason, make sure that you pack the unit in its original packing carton. Failure to do so may cause damage to the unit that is not covered by the LCC warranty.

Quick Start

Follow the steps below to perform basic SpectraWave 1900 operations on an already placed system. Refer to later sections of this manual for details on more complex operations, technical data, and guidance in the use of optional peripherals.

This section provides basic guidance on:

- Powering up the SpectraWave 1900 transmitter
- Accessing and using the SpectraWave 1900 transmitter's functional screens.

This chapter assumes that the SpectraWave 1900 transmitter has been set up correctly and has power available to it.

This chapter is organized according to the SpectraWave 1900's menu structure. Functional screens are grouped with the menus associated with them. Start with section 3.1, *Powering Up SpectraWave 1900*.

Go to section 3.2, *Status Menu Screen*, and then to section 3.3, *Setup Menu Screen*.

In section 3.3, *Setup Menu Screen*, go to the desired screen sections:

- 3.3.1, Protocol Screen
- 3.3.2, Frequency/Channel Screen
- 3.3.3, Power Screen
- 3.3.4, Clock Setup Screen
- 3.3.5, LCD Contrast Setup Screen
- 3.3.6, Setup Menu-2 Screen.

Go to section 3.4, *Diagnostics Menu Screen*, and then to the desired screen sections:

- 3.4.1, Error Log View/Log Screen
- 3.4.2, Power Amp Status Screen
- 3.4.3, Voltage Status Screen
- 3.4.4, Synthesizer Status Screen
- 3.4.5, Ambient Temperature Screen.

Go to section 3.5, *Setting Up an PCS 1900 Protocol*, for a sample step-by-step procedure using SpectraWave 1900.

3.1 Powering Up SpectraWave 1900

To power up the SpectraWave 1900 transmitter:

1. Connect the antenna and press the power switch on the back of the SpectraWave 1900 transmitter. The SpectraWave 1900 transmitter will activate, and the fan will run.
2. The LCC Copyright screen (see Figure 3-1) displays on the SpectraWave's Main LCD Display while the transmitter warms up, followed by the Status Menu screen (see Figure 3-2).

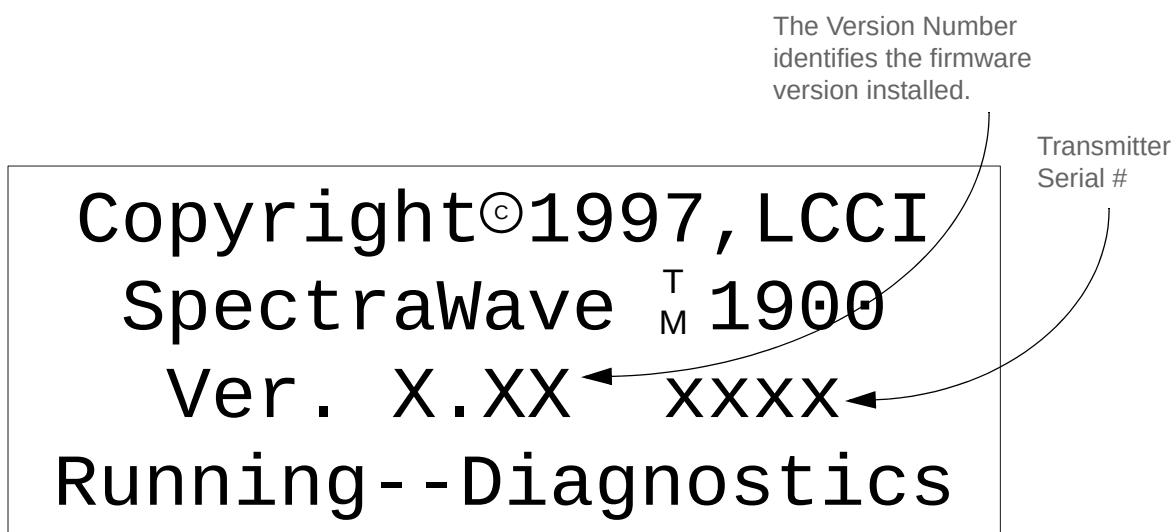


Figure 3-1 LCC Copyright Screen



Figure 3-2 Status Menu Screen

3.2 Status Menu Screen

The Status Menu screen (see Figure 3-2) displays when the transmitter is completely warmed up.

The Status Menu screen displays:

- Effective Isotropic Radiated Power (EIRP)
- Protocol selected (PCS-1900 in this example)
- Channel number (Chan #)
- Direction of the channel (F for forward, R for reverse)

Press **1** to display the Setup Menu screen (see Figure 3-3).

3.3 Setup Menu Screen

Access the Setup Menu screen (see Figure 3-3) as follows:

- Press **1** on the Status Menu screen, or
- Press **1** on the Main Menu screen.

S E T U P M E N U	
1 . PROTOCOL	4 . CLOCK
2 . FREQ/CHAN	5 . LCD
3 . POWER	↓ . More

Figure 3-3 Setup Menu Screen

To use the Setup Menu Screen, press the corresponding number to go to the following functional screens:

- Press **1** to display the Protocol screen (section 3.3.1).
- Press **2** to display the Frequency/ Channel screen (section 3.3.2).
- Press **3** to display the Power screen (section 3.3.3).
- Press **4** to display the Clock Setup screen (section 3.3.4).

3.3.1 Protocol Screen

- Press 5 to display the LCD Contrast Setup screen (section 3.3.6).
- Press ↓ to access the Setup Menu-2 screen (section 3.3.6).

3.3.1 Protocol Screen

To use the Protocol screen:

1. From the Setup Menu screen (see Figure 3-3), press **1** to access the Protocol screen (see Figure 3-4).

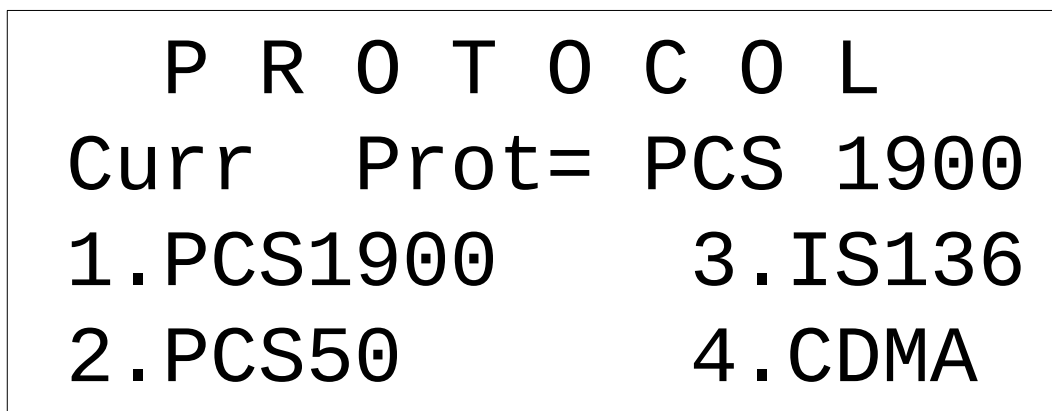


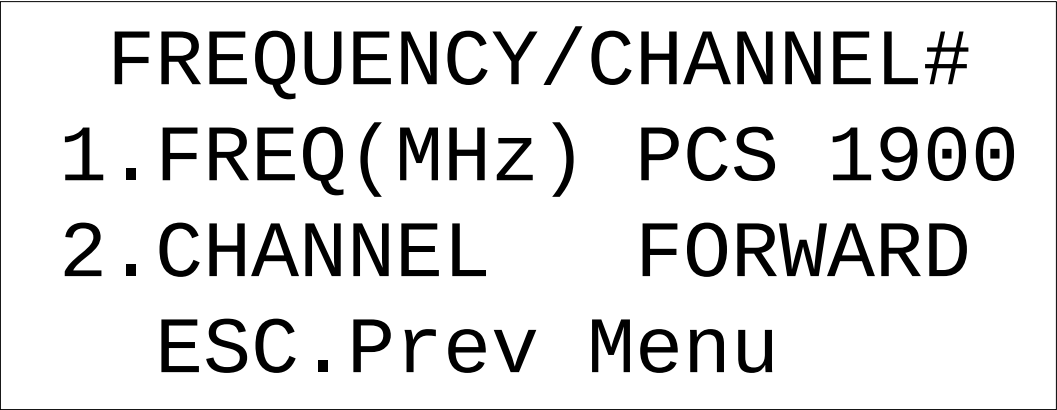
Figure 3-4 Protocol Page One Screen

2. Press the corresponding number to select one of the following from the Protocol Screen:
 - Press **1** to display the PCS 1900 screen (GSM Protocol of the PCS band).
 - Press **2** to display the PCS 50 screen (an LCC channel assignment scheme to match an EXP-2001 receiver, using the same channels in the PCS band).
 - Press **3** to display the IS 136 screen (the TIA/EIA IS-136 standard for the PCS band).
 - Press **4** to display CDMA screen (the TIA/EIA IS-95 standard for the PCS band).

3.3.2 Frequency/Channel Screen

To use the Frequency/Channel screen:

1. From the Setup Menu screen (see Figure 3-3), press **2** to access the Frequency/Channel screen (see Figure 3-5).



The screenshot shows a menu with the title 'FREQUENCY/CHANNEL#' at the top. Below the title are four options: '1.FREQ(MHz) PCS 1900', '2.CHANNEL FORWARD', 'ESC.Prev', and 'Menu'. The text is displayed in a large, bold, black font on a white background.

Figure 3-5 Frequency/Channel Screen

2. Press the corresponding number to select either the Frequency Range screen or Channel Range screen:
 - Press **1** to display the Frequency Range screen.
 - Press **2** to display the Channel Range screen.

3.3.3 Power Screen

To use the Power screen:

1. From the Setup Menu screen, press **3** to access the Power Level Range screen (see Figure 3-6).

POWER LEVEL	RANGE
1.milliWatts	30-999
2.Watts	0.1-20
3.dBm	15-43

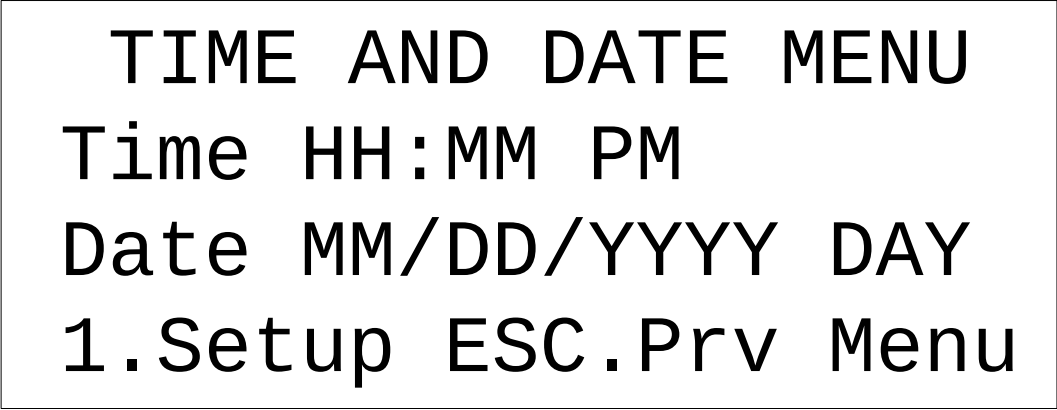
Figure 3-6 Power Level Range Screen

2. Press the corresponding number on the Power Level Range screen to select the desired output power level:
 - Press **1** for milliwatts.
 - Press **2** for watts.
 - Press **3** for dBm.
3. Press **ESC** to return to the Setup Menu screen.

3.3.4 Clock Setup Screen

To use the Clock Setup screen:

1. From the Setup Menu screen, press **4** to access the Time and Date Menu Screen (see Figure 3-7).



TIME AND DATE MENU
Time HH:MM PM
Date MM/DD/YYYY DAY
1.Setup ESC.Prv Menu

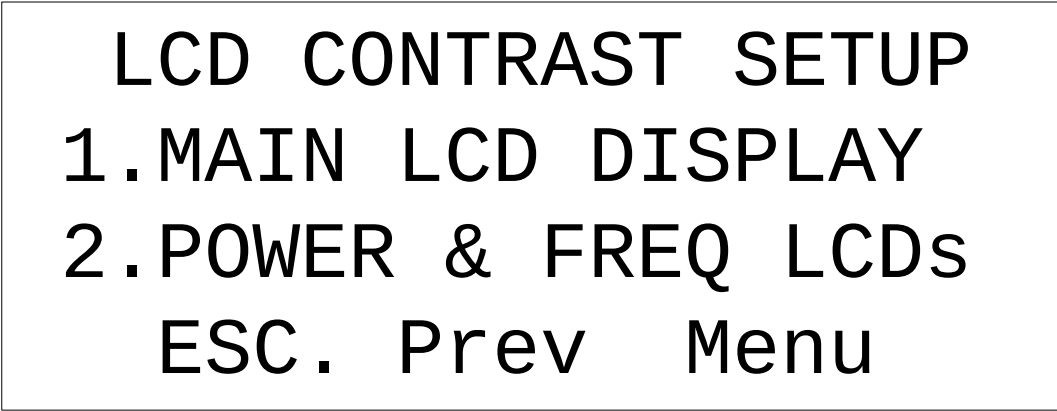
Figure 3-7 Time and Date Menu Screen

2. Press **1** to display the Clock Setup screen.
3. Press **ESC** to return to the Time and Date Menu screen. Press **ESC** again to return to the Setup Menu screen.

3.3.5 LCD Contrast Setup Screen

To use the LCD Contrast Setup screen:

1. From the Setup Menu screen, press 5 to access the LCD Contrast Setup screen (see Figure 3-8).



LCD CONTRAST SETUP
1.MAIN LCD DISPLAY
2.POWER & FREQ LCDs
ESC. Prev Menu

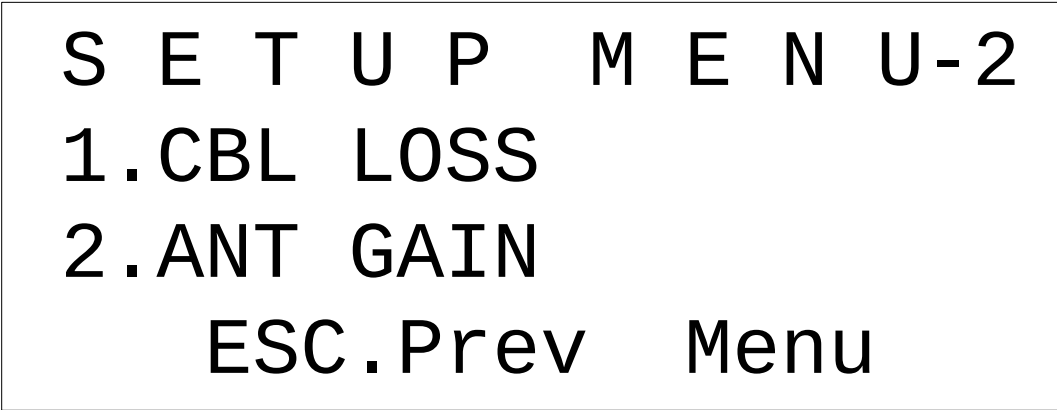
Figure 3-8 LCD Contrast Setup Screen

2. Press the corresponding number to setup the desired LCD Contrast screen:
 - Press **1** to view the Main LCD Display screen.
 - Press **2** to display the Power & Frequency LCD screen.
3. Press **ESC** to return to the LCD Contrast screen.
4. Press **ESC** again to return to the Setup Menu screen.

3.3.6 Setup Menu-2 Screen

To use the Setup Menu-2 screen:

1. From the Setup Menu Page One screen, press ↓ to access the Setup Menu-2 screen (see Figure 3-9).



S E T U P M E N U - 2
1 . C B L L O S S
2 . A N T G A I N
ESC . P r e v M e n u

Figure 3-9 Setup Menu-2 screen

2. Press the corresponding number to go to the following functional screens:
 - Press **1** to display the Cable Loss screen.
 - Press **2** to display the Antenna Gain screen.
3. Press **ESC** to return to the Setup Menu-2 screen.
4. Press **ESC** again to return to the Setup Menu screen.

3.3.6.1 Cable Loss Screen

To use the Cable Loss screen:

1. From the Setup Menu screen, press ↓ to access Setup Menu-2 screen (see Figure 3-9).
2. Press **1** on the Setup Menu-2 screen to access the Cable Loss screen (see Figure 3-10).

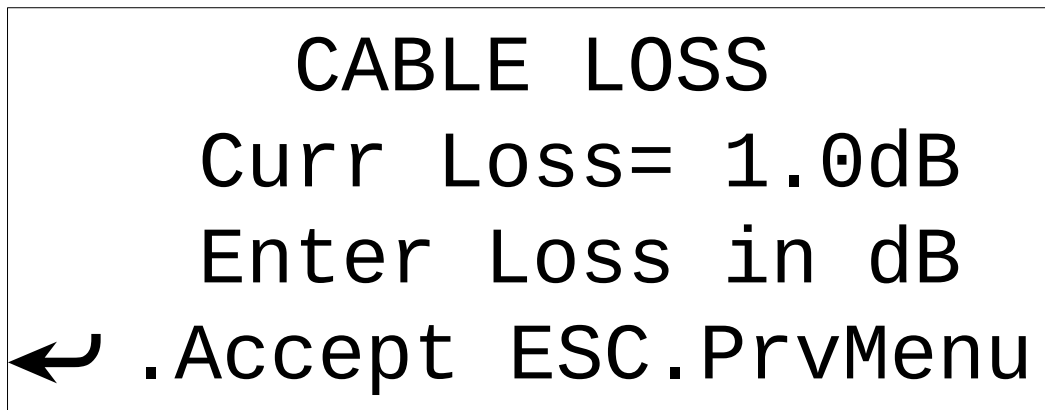


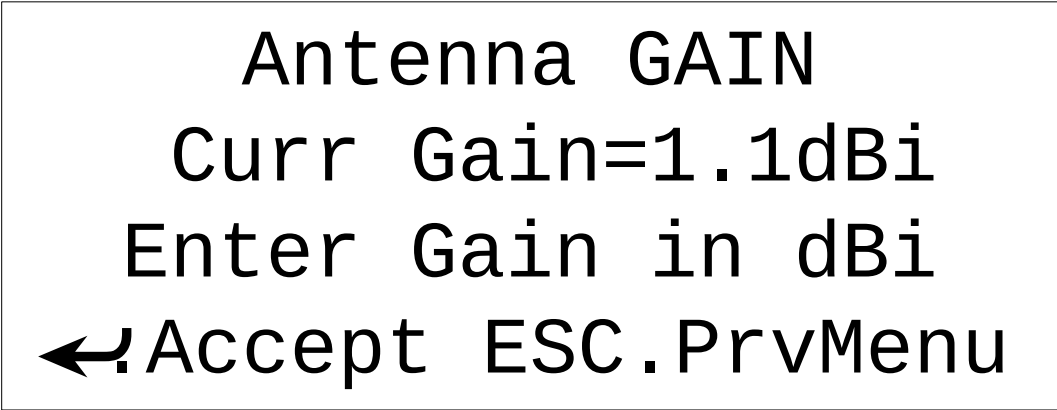
Figure 3-10 Cable Loss Screen

3. On the Cable Loss screen, enter the Cable Loss value (a positive number between 0 and 23 dB).
4. Press ↵ to enter the cable loss value.
5. Press **ESC** to return to the Setup Menu-2 screen, then press **ESC** again to return to the Setup Menu screen.

3.3.6.2 Antenna Gain Screen

To use the Antenna Gain screen:

1. From the Setup Menu screen, press ↓ to access Setup Menu-2 screen.
2. Press 2 on the Setup Menu-2 screen (see Figure 3-9) to access the Antenna Gain screen (see Figure 3-11).



Antenna GAIN
Curr Gain=1.1dBi
Enter Gain in dBi
← Accept ESC.PrvMenu

Figure 3-11 Antenna Gain Screen

3. Enter the Antenna Gain value on the Antenna Gain screen. This value will be a positive number.

Note: An Antenna Gain that is specified in dBi (gain relative to a half-wave dipole) will be 1.7dB lower than the equivalent dBi value.

4. Press ↵ to enter the antenna gain value.
5. Press **ESC** to return to the Setup Menu-2 screen, then press **ESC** again to return to the Setup screen.
6. Press ↓ on the front panel keypad to return to the Main Menu screen.

3.4 Diagnostics Menu Screen

To access the Diagnostics Menu screen (see Figure 3-12):

1. From the Main Menu screen, press **2** on the front panel keypad to display the Diagnostics Menu screen (see Figure 3-12).

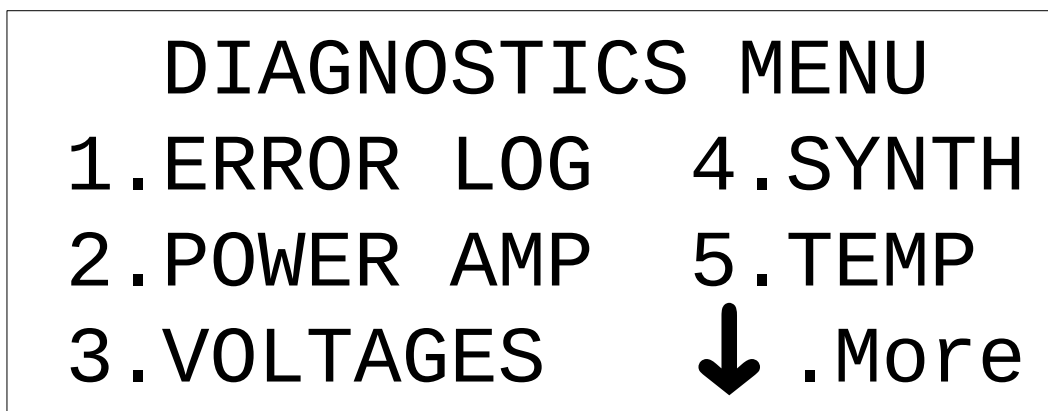


Figure 3-12 Diagnostics Menu Screen

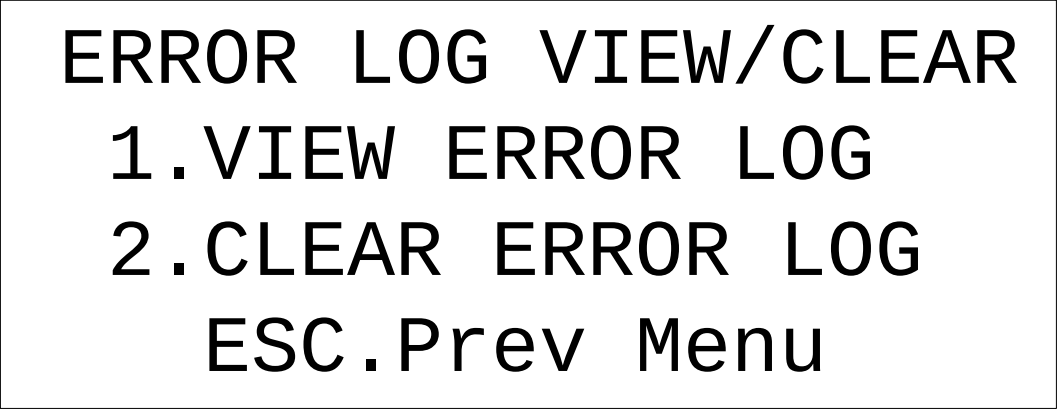
To use the Diagnostics Menu screen, press the corresponding number to go to the following functional screens:

- Press **1** to display the Error Log screen.
- Press **2** to display the Power Amp screen.
- Press **3** to display the Voltages screen.
- Press **4** to display the Synthesizer screen.
- Press **5** to display the Temperature screen.
- Press **↓** to display the Diags Menu-2 screen.

3.4.1 Error Log View/Log Screen

To use the Error Log View/Log screen:

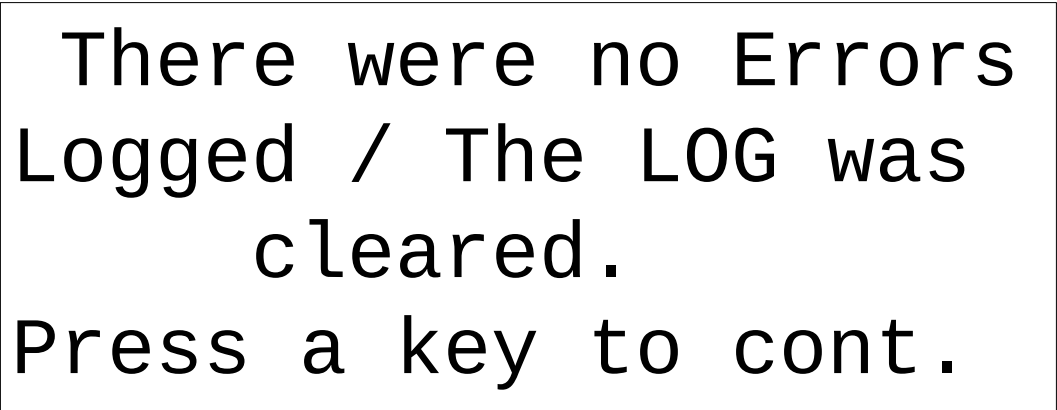
1. From the Diagnostics Menu screen (see Figure 3-12), press **1** to access the Error Log View/Clear screen. The Error Log View/Clear screen will appear (see Figure 3-13).



ERROR LOG VIEW/CLEAR
1.VIEW ERROR LOG
2.CLEAR ERROR LOG
ESC.Prev Menu

Figure 3-13 Error Log View/Clear Screen

2. Press **1** to display the View Error Log screen. One of two screens will display: Figure 3-15 if there were no errors logged, and Figure 3-16 if there were errors logged (see Appendix B for an explanation of error codes in the log).



There were no Errors
Logged / The LOG was
cleared.
Press a key to cont.

Figure 3-14 No Errors Logged screen

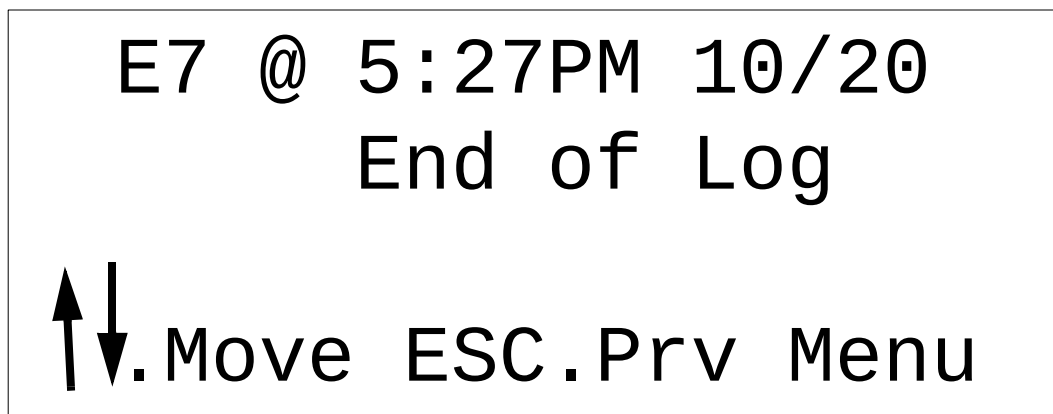


Figure 3-15 Error Log

3. Press 2 to display the Clear Error Log screen (see Figure 3-16).

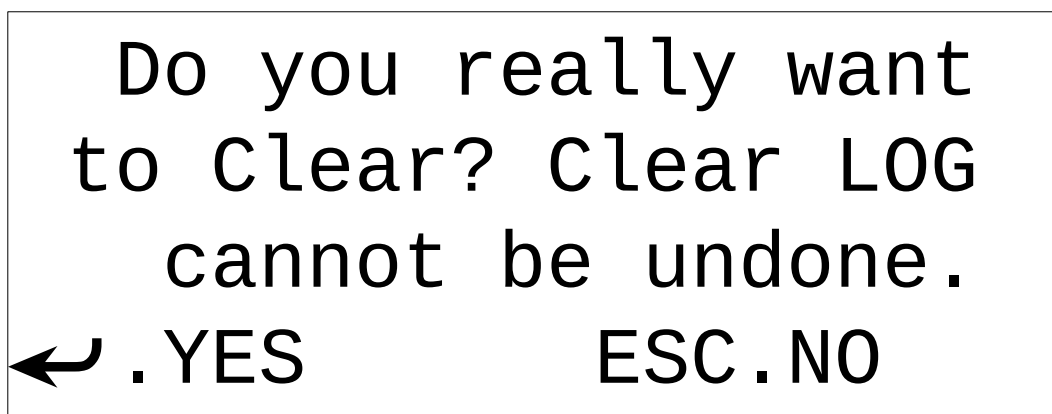


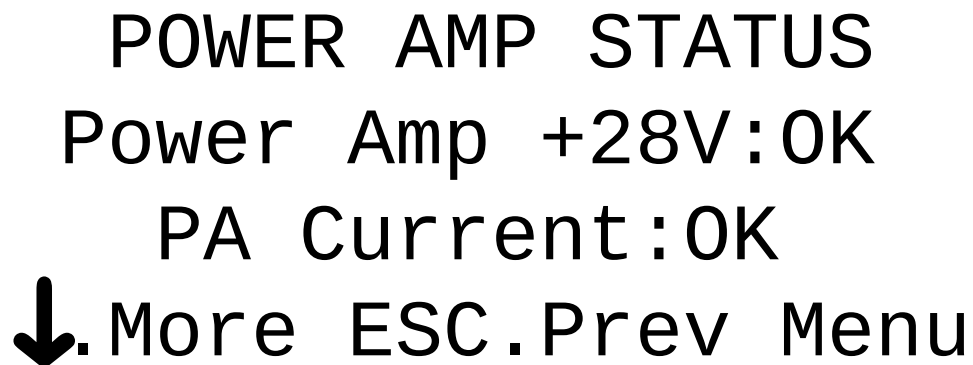
Figure 3-16 Clear Error Log Screen

4. Press ← to clear the error log. The Diagnostics Menu screen will appear (see Figure 3-12). Verify that the voltage supply is within
5. Press ESC to return to Error Log View/Clear screen.

3.4.2 Power Amp Status Screen

To use the Power Amp Status screen:

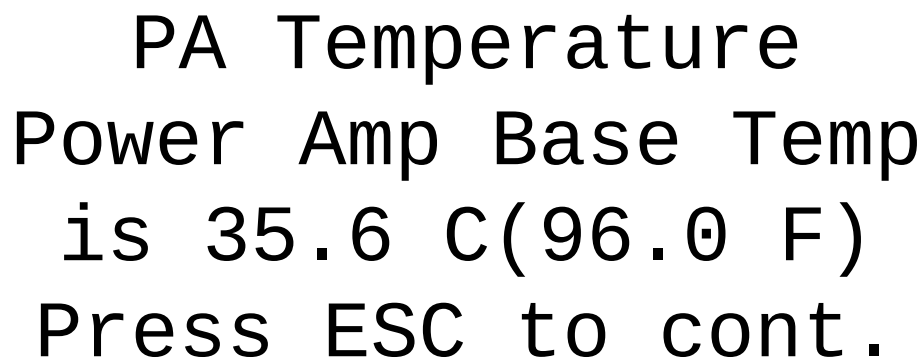
1. From the Diagnostics Menu screen, press 2 to verify that the Power Amp is operating correctly. The Power Amp Status screen displays (see Figure 3-17). Use this screen to verify that the voltage supply is within specifications, and the Power Amp is not drawing too much current.

A screenshot of the Power Amp Status screen. The text is displayed in a large, black, sans-serif font on a white background. The text reads: "POWER AMP STATUS", "Power Amp +28V:0K", "PA Current:0K", and "↓.More ESC.Prev Menu".

POWER AMP STATUS
Power Amp +28V:0K
PA Current:0K
↓.More ESC.Prev Menu

Figure 3-17 Power Amp Status Screen

2. Press ↓ on the front panel keypad to verify the power amplifier's base temperature. The PA Temperature screen displays (see Figure 3-18).

A screenshot of the PA Temperature screen. The text is displayed in a large, black, sans-serif font on a white background. The text reads: "PA Temperature", "Power Amp Base Temp", "is 35.6 C(96.0 F)", and "Press ESC to cont.". The "0" in "96.0" is a small circle.

PA Temperature
Power Amp Base Temp
is 35.6 C(96.0 F)
Press ESC to cont.

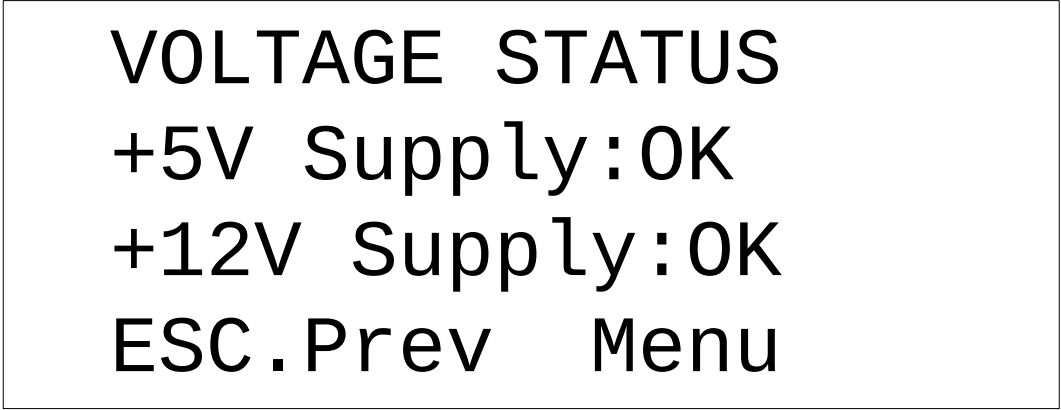
Figure 3-18 PA Temperature Screen

3. Press **ESC** to return to the Diagnostics Menu screen.

3.4.3 Voltage Status Screen

To use the Voltage Status screen:

1. From the Diagnostics menu, press **3** to access the Voltage Status screen (see Figure 3-19). Use this screen to verify that all the other voltages used within the SpectraWave 1900 are within specifications.



VOLTAGE STATUS
+5V Supply:OK
+12V Supply:OK
ESC.Prev Menu

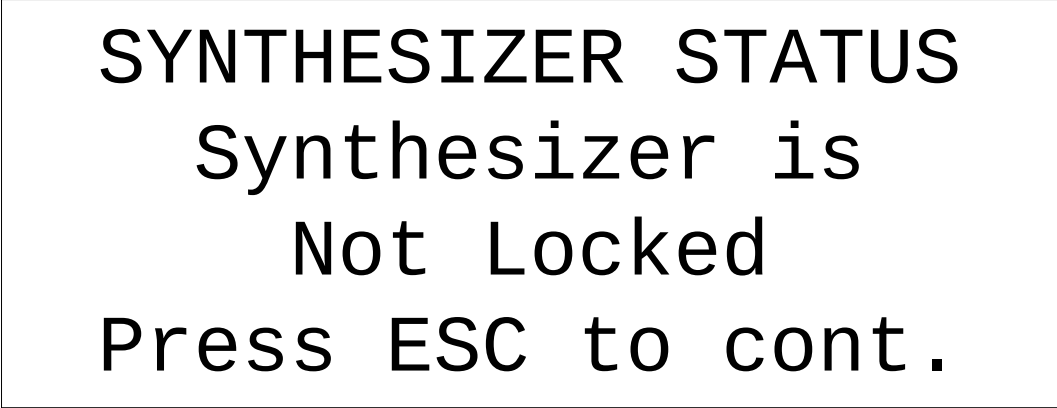
Figure 3-19 Voltage Status Screen

2. Press **ESC** to return to the Diagnostics Menu screen.

3.4.4 Synthesizer Status Screen

To use the Synthesizer Status screen:

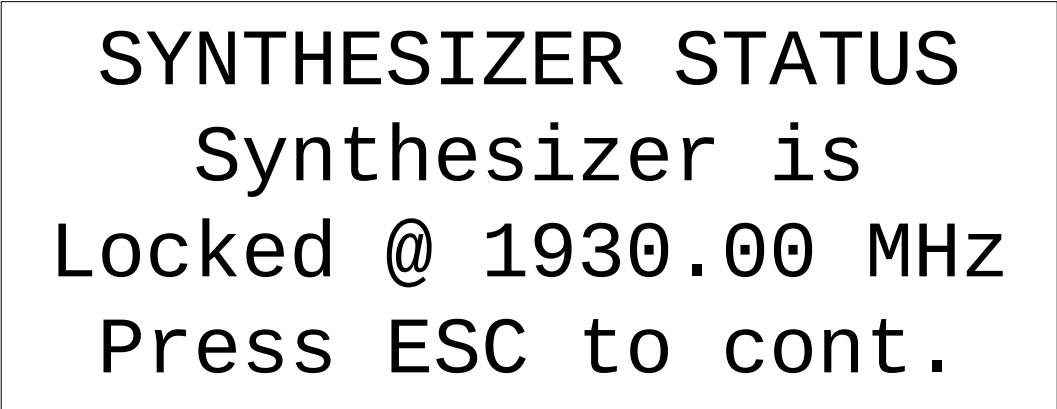
1. From the Diagnostics menu, press **4** to access the Synthesizer Status screen. When not transmitting, the screen looks like Figure 3-20.



SYNTHESIZER STATUS
Synthesizer is
Not Locked
Press ESC to cont.

Figure 3-20 Synthesizer Status screen (not transmitting)

When transmitting, the screen looks like Figure 3-21.



SYNTHESIZER STATUS
Synthesizer is
Locked @ 1930.00 MHz
Press ESC to cont.

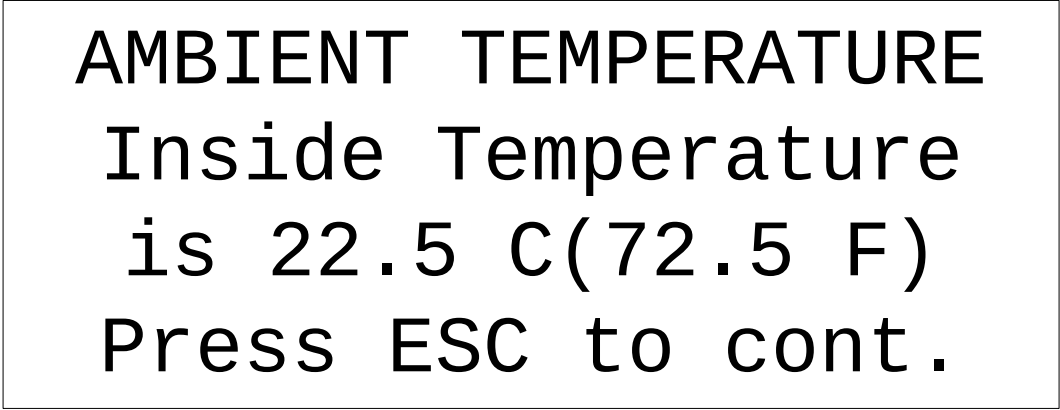
Figure 3-21 Synthesizer Status screen (transmitting)

2. Press **ESC** to return to the Diagnostics Menu screen.

3.4.5 Ambient Temperature Screen

To use the Ambient Temperature screen:

1. From the Diagnostics Menu screen, press **5** to access the Ambient Temperature screen (see Figure 3-22). Verify the temperature within the SpectraWave case.



AMBIENT TEMPERATURE
Inside Temperature
is 22.5 C(72.5 F)
Press ESC to cont.

Figure 3-22 Ambient Temperature Screen

2. Press **ESC** to return to the Diagnostics Menu screen.

3.4.6 Diagnostics Menu-2 Screen

To access the Diags Menu-2 screen:

1. From the Diagnostics Menu screen, press ↓ to access the Diags Menu-2 screen (see Figure 3-23).

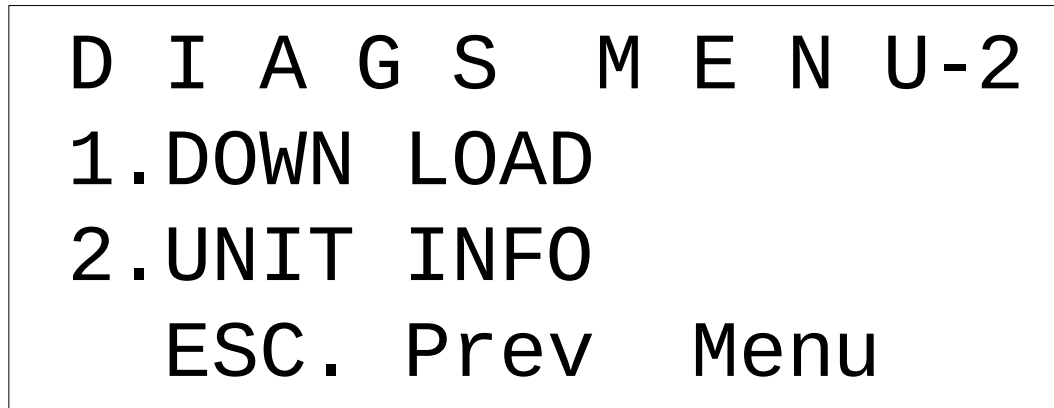


Figure 3-23 Diags Menu-2 Screen

2. From the Diags Menu-2 screen:
 - Press **1** to access the Download screen.
 - Press **2** to access the Unit Info screen.
3. Press **ESC** to return to the Diagnostics Menu screen.

3.5 Setting Up a PCS 1900 Protocol

The following PCS-1900 protocol uses steps and techniques common to other transmission protocols. Use it as an example of SpectraWave 1900 operation.

1. Place the SpectraWave 1900 in the desired testing location.
2. Turn the power switch to the **OFF** position, then attach the power cable to the back of the SpectraWave 1900.
3. Connect the antenna (or dummy load) to the left side of the SpectraWave 1900.
4. Press the power switch on the back of the SpectraWave 1900 to turn the transmitter on. The system power light on the front panel lights.
5. The LCC Copyright screen appears (see Figure 3-24) on the Spectra Wave 1900's Main LCD Display while the transmitter warms up.

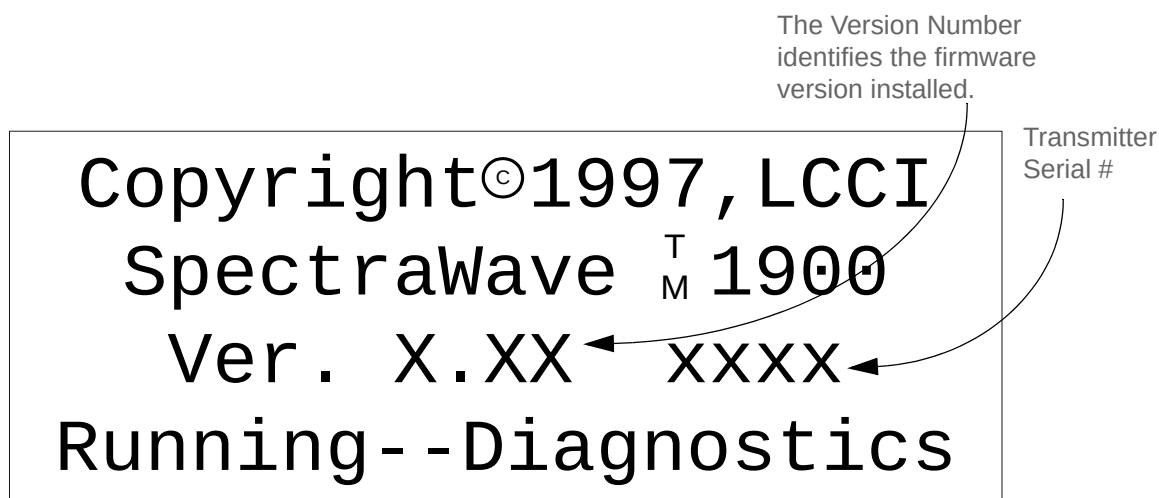
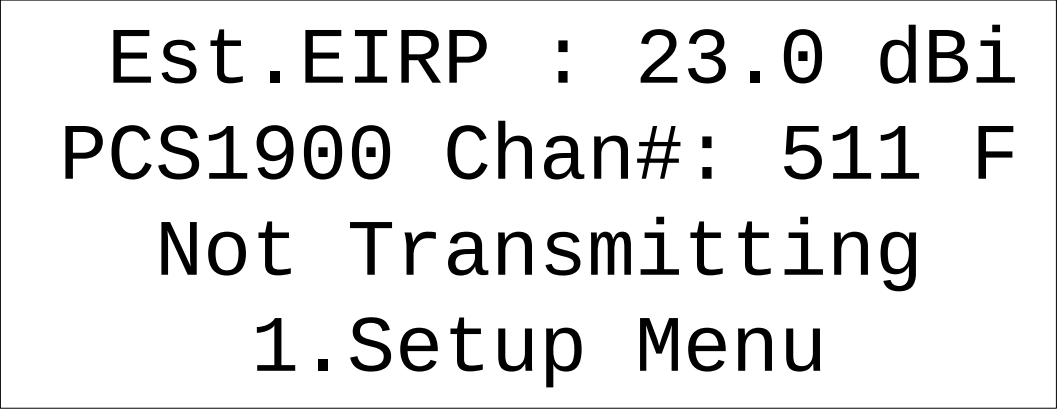


Figure 3-24 LCCI Copyright Screen

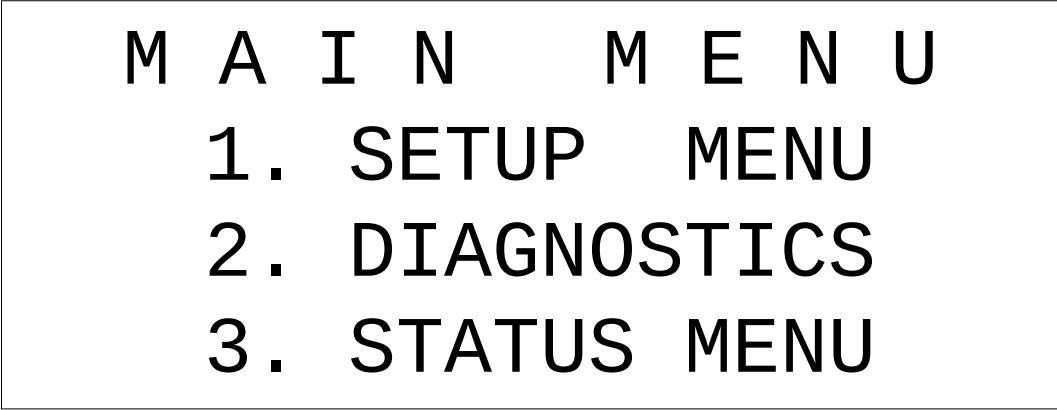
6. After the transmitter is warmed up and ready, the Status Menu screen displays (Figure 3-26).



Est.EIRP : 23.0 dBi
PCS1900 Chan#: 511 F
Not Transmitting
1.Setup Menu

Figure 3-25 Status Menu Screen

7. Press **M** on the front panel keypad to access the Main Menu screen (see Figure 3-26).



M A I N M E N U
1. SETUP MENU
2. DIAGNOSTICS
3. STATUS MENU

Figure 3-26 Main Menu Screen

8. Press **1** on the front panel keypad to access the Setup Menu screen (see Figure 3-27) to set up the clock and LCD displays.

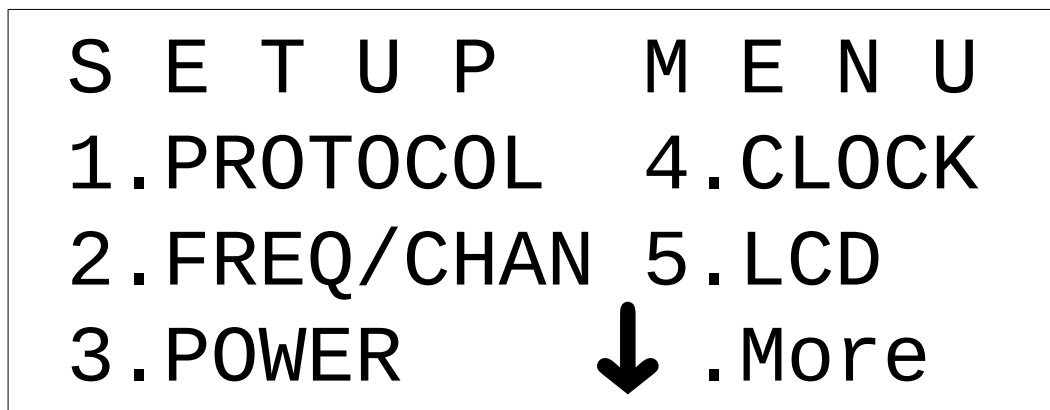


Figure 3-27 Setup Menu Screen

9. Press **4** on the front panel to access the Time and Date Menu screen (see Figure 3-28).

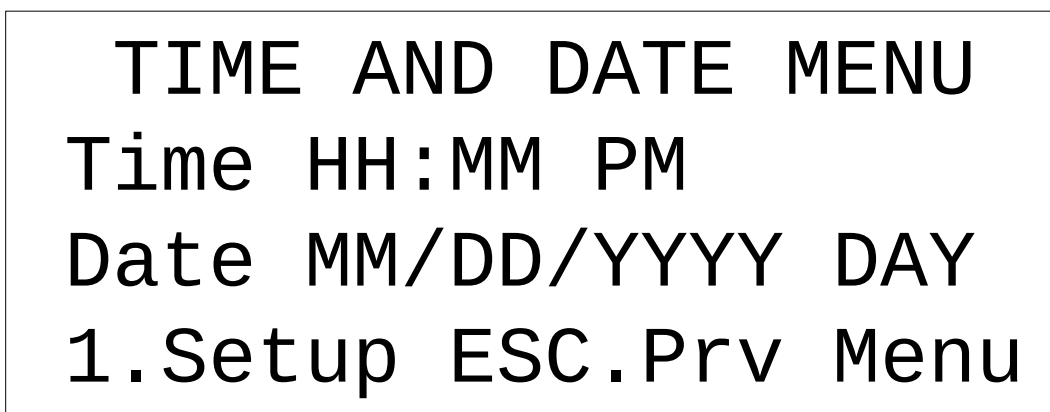


Figure 3-28 Time and Date Menu Screen

10. Verify that the time and date are correct. If so, press **ESC** to return to previous screen and proceed to step 19. If not, follow steps 11 through 18.
11. Press **1** on the front panel to set up the Time and Date. The Clock Setup screen (see Figure 3-29) displays.

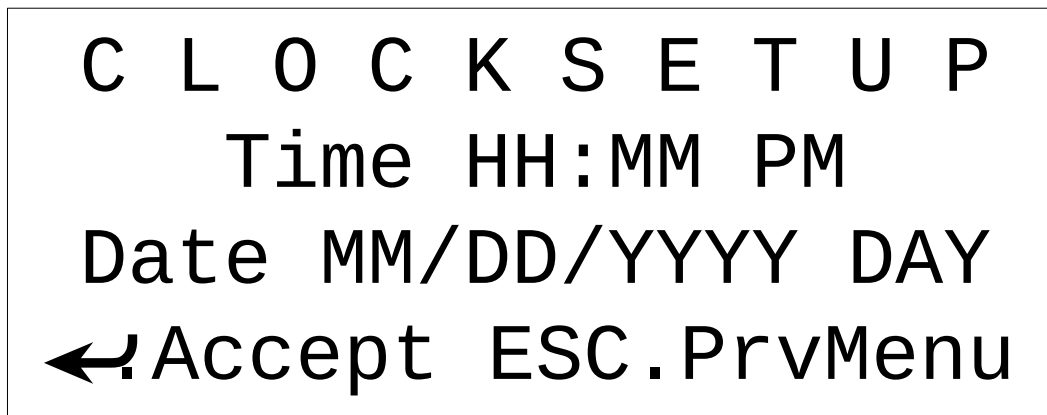
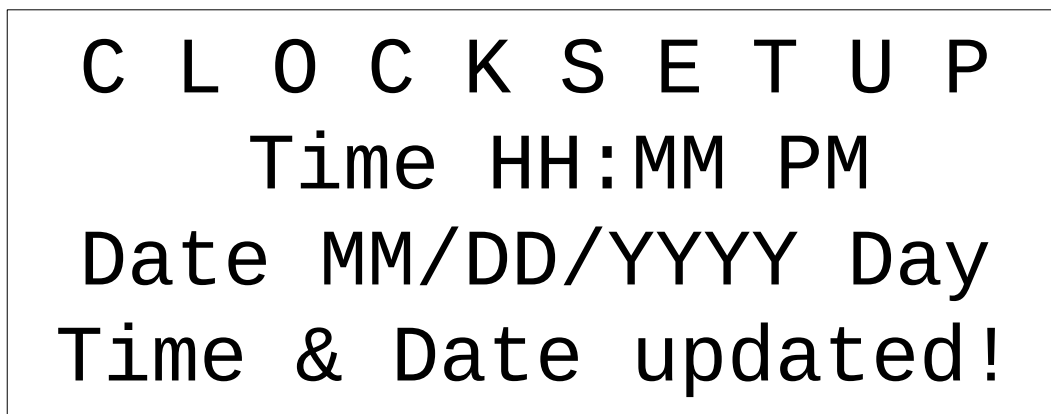


Figure 3-29 Clock Setup Screen

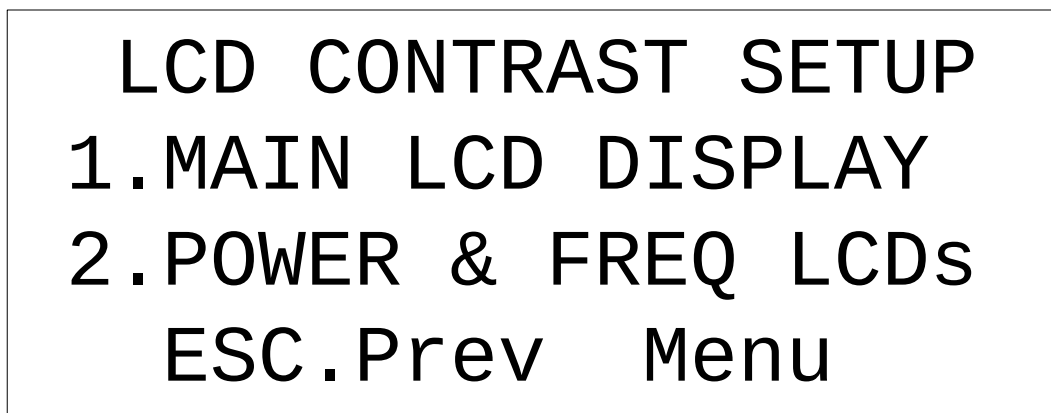
12. Use the front panel keypad to enter the hour and minutes into the SpectraWave 1900.
13. Use the up and down arrow on the front panel keypad to select **AM** or **PM**. Use the numerical key pad to enter the time. The new hour and minutes will appear on the Clock Setup screen time line.
14. After setting the time, press **1** to set the date. The cursor will move to the Date line on the Clock Setup screen.
15. Use the front panel keypad to enter the month, day, year (in numerals) and the day (in characters).
16. Use the up and down arrows on the front panel keypad to select the day of the week. The new month, day, and year will appear on the date line.
17. Press ← on the front panel keypad to enter the new time and date into the SpectraWave 1900. The Time Updated screen will momentarily appear (see Figure 3-31). The Setup Menu screen will then return.

A rectangular box containing the text 'C L O C K S E T U P' on the first line, 'Time HH:MM PM' on the second line, 'Date MM/DD/YYYY Day' on the third line, and 'Time & Date updated!' on the fourth line.

C L O C K S E T U P
Time HH:MM PM
Date MM/DD/YYYY Day
Time & Date updated!

Figure 3-30 Time Updated screen

18. Press **5** to setup the desired LCD display contrast. The LCD Contrast Setup screen (see Figure 3-31) appears.

A rectangular box containing the text 'LCD CONTRAST SETUP' on the first line, '1.MAIN LCD DISPLAY' on the second line, '2.POWER & FREQ LCDs' on the third line, and 'ESC.Prev Menu' on the fourth line.

LCD CONTRAST SETUP
1.MAIN LCD DISPLAY
2.POWER & FREQ LCDs
ESC.Prev Menu

Figure 3-31 LCD Contrast Setup Screen

19. Press **1** to set up the Main LCD Display. The Main LCD Display screen (see Figure 3-32) appears.

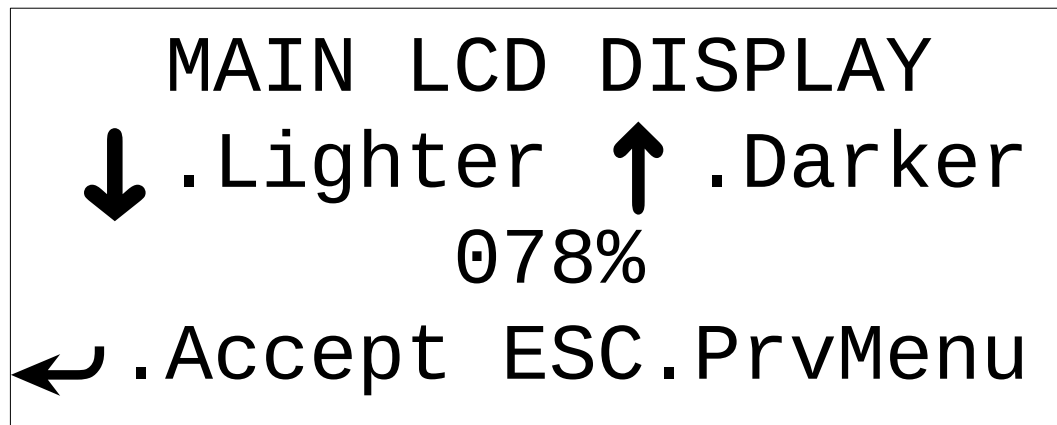


Figure 3-32 Main LCD Display screen

20. Use the up and down arrows on the front panel keypad to select the desired contrast.
21. Press $\leftarrow$ to accept the desired display contrast. The LCD Contrast Setup Screen (see Figure 3-31) appears.
22. Press 2 to set up the Power & Frequency LCD display. The Power and Frequency LCD screen appears (see Figure 3-33).

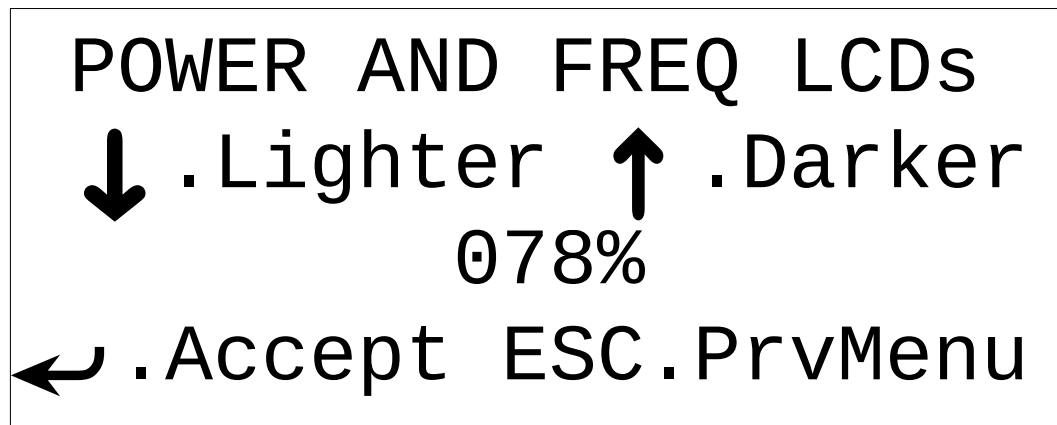


Figure 3-33 Power and Frequency LCD's Display Screen

23. Use the up and down arrows to select the desired display contrast.
24. Press $\leftarrow$ to accept the new display contrast. The LCD Contrast Setup screen appears.
25. Press **M** to display the Main Menu screen (see Figure 3-34).

M A I N M E N U
1. SETUP MENU
2. DIAGNOSTICS
3. STATUS MENU

Figure 3-34 Main Menu Screen

26. Press 2 to access the Diagnostics Menu screen (see Figure 3-35) to verify the operation of the SpectraWave 1900.

DIAGNOSTICS MENU
1. ERROR LOG 4. SYNTH
2. POWER AMP 5. TEMP
3. VOLTAGES ↓ More

Figure 3-35 Diagnostics Menu Screen

27. Press 1 to access the Error Log View/Clear screen (see Figure 3-36). View errors as required.

ERROR LOG VIEW/CLEAR
 1.VIEW ERROR LOG
 2.CLEAR ERROR LOG
 ESC.Prev Menu

Figure 3-36 Error Log View/Clear Screen

28. Press **1** to display the View Error Log screen. One of two screens will display: Figure 3-38 if no errors were logged, and Figure 3-39 if errors were logged.

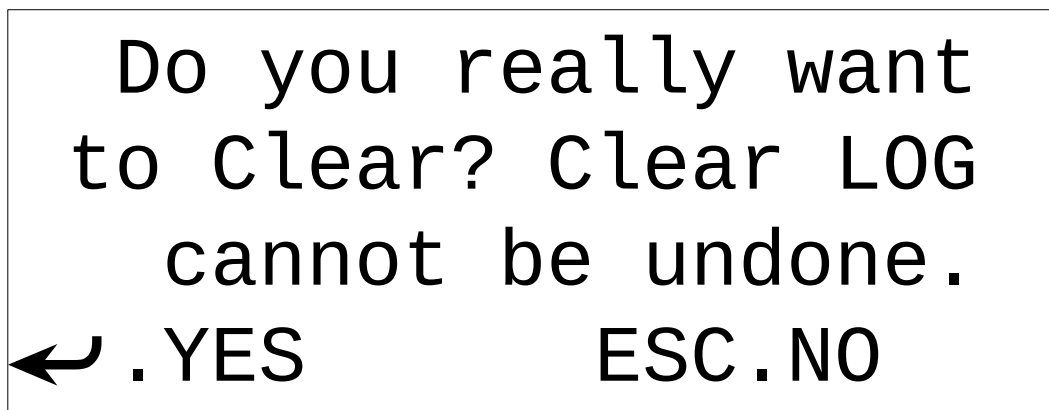
There were no Errors
 Logged / The LOG was
 cleared.
 Press a key to cont.

Figure 3-37 No Errors Logged screen

E7 @ 5:27PM 10/20
 End of Log
 ↓↑.Move ESC.Prv Menu

Figure 3-38 Error Log screen

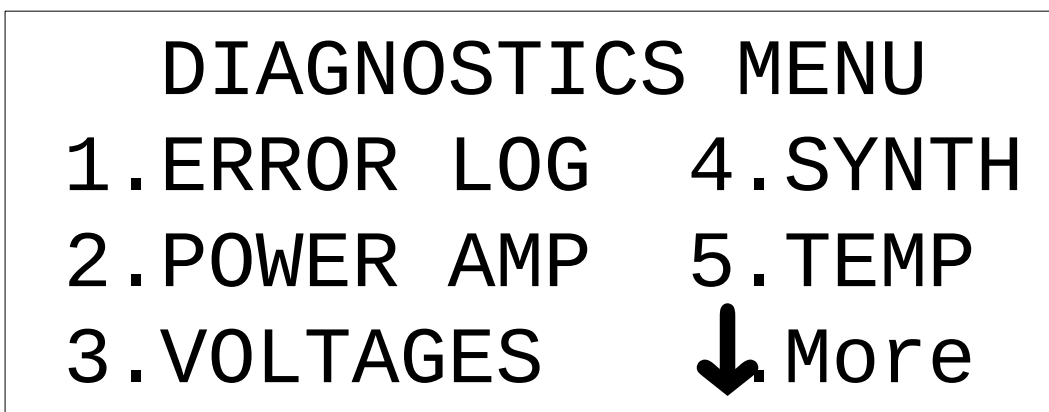
29. From the No Errors Logged screen press any key to continue. From the Error log screen press **ESC** to return to the previous screen.
30. Press **1** to access the Error Log View/ Clear screen.
31. Press **2** to access the Clear Error Log screen (see Figure 3-39).

A rectangular screen with a black border. The text is centered and reads: "Do you really want to Clear? Clear LOG cannot be undone." Below this, on the left, is a left-pointing arrow followed by ".YES". On the right is "ESC.NO".

Do you really want
to Clear? Clear LOG
cannot be undone.
← .YES ESC.NO

Figure 3-39 Clear Error Log Screen

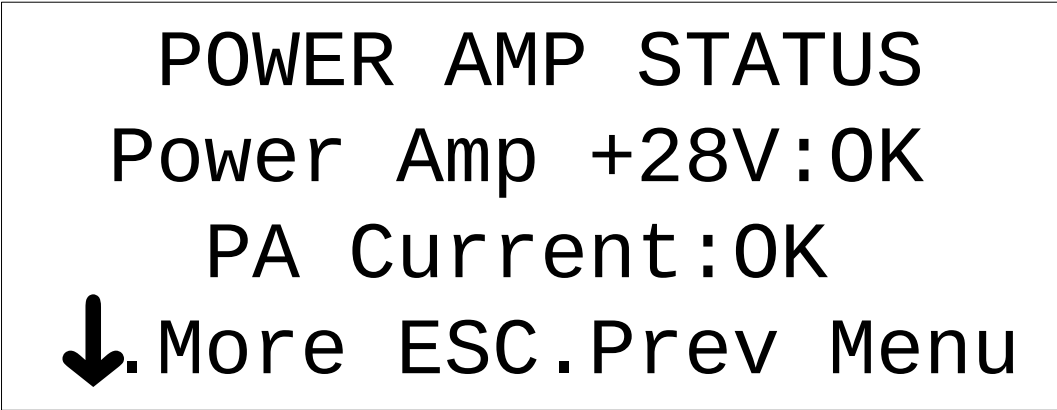
32. Press ← to clear the error log. The Diagnostics Menu screen redisplay.

A rectangular screen with a black border. The text is centered and reads: "DIAGNOSTICS MENU" at the top. Below it are two columns of options: "1.ERROR LOG", "2.POWER AMP", "3.VOLTAGES" on the left, and "4.SYNTH", "5.TEMP", "↓ More" on the right. The arrow points downwards.

DIAGNOSTICS MENU
1.ERROR LOG 4.SYNTH
2.POWER AMP 5.TEMP
3.VOLTAGES ↓ More

Figure 3-40 Diagnostics Menu Screen

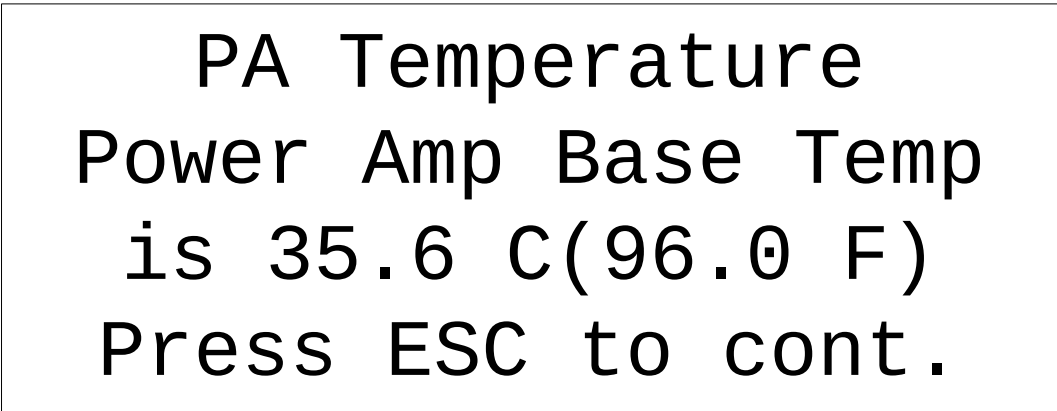
33. Press **2** to verify that the Power Amplifier is operating correctly. The Power Amp Status screen (see Figure 3-41) appears.



POWER AMP STATUS
Power Amp +28V:0K
PA Current:0K
↓.More ESC.Prev Menu

Figure 3-41 Power Amp Status Screen

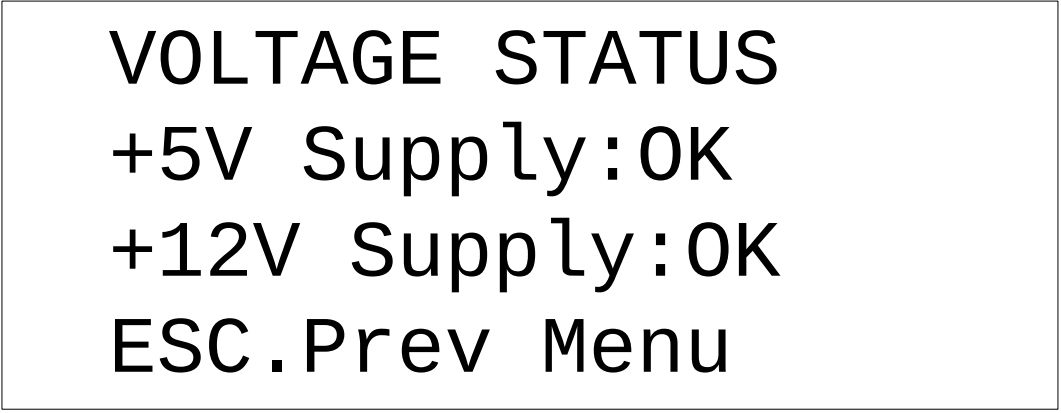
34. Verify that the Power Amp Status reads as illustrated.
35. Press ↓ to verify that the Power Amps Base Temp is operating within the unit's Operational Specifications (see Appendix A). The PA Temperature screen appears (see Figure 3-42).



PA Temperature
Power Amp Base Temp
is 35.6 C(96.0 F)
Press ESC to cont.

Figure 3-42 PA Temperature Screen

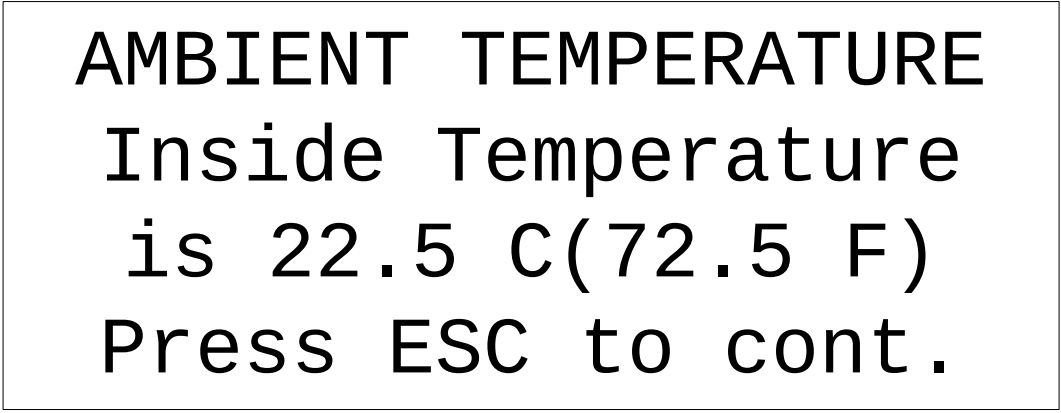
36. Press **ESC** to return to the Diagnostics Menu screen.
37. Press **3** to verify that the SpectraWave 1900's power supply is operating correctly. The Voltage Status screen (see Figure 3-43) appears.



VOLTAGE STATUS
+5V Supply:0K
+12V Supply:0K
ESC.Prev Menu

Figure 3-43 Voltage Status Screen

38. Verify that the +5V Supply and +12V Supply lines read **OK**.
39. Press **ESC** to return to the Diagnostics Menu screen.
40. From the Diagnostics Menu screen, press **5** to verify that the internal temperature of the SpectraWave 1900 is within the Unit's Operations Specifications (see Appendix A). The Ambient Temperature screen appears (see Figure 3-44).

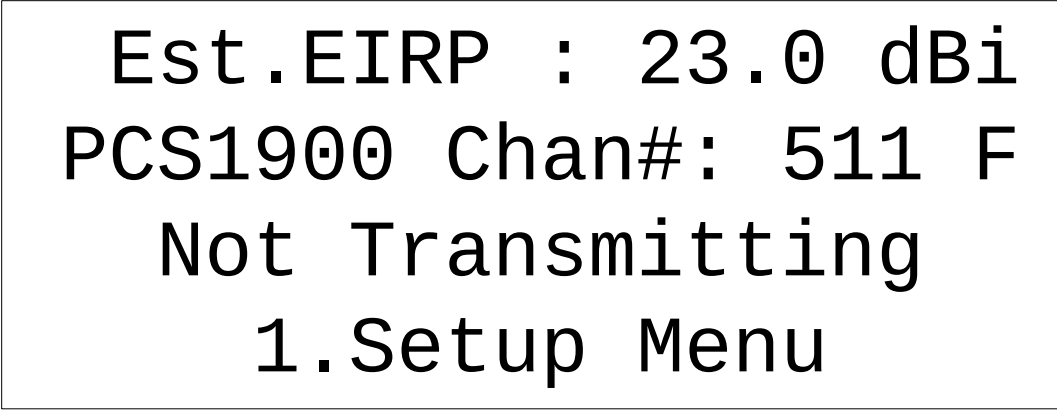


AMBIENT TEMPERATURE
Inside Temperature
is 22.5 C(72.5 F)
Press ESC to cont.

Figure 3-44 Ambient Temperature Screen

41. Press **ESC** to return to the Diagnostics Menu screen.

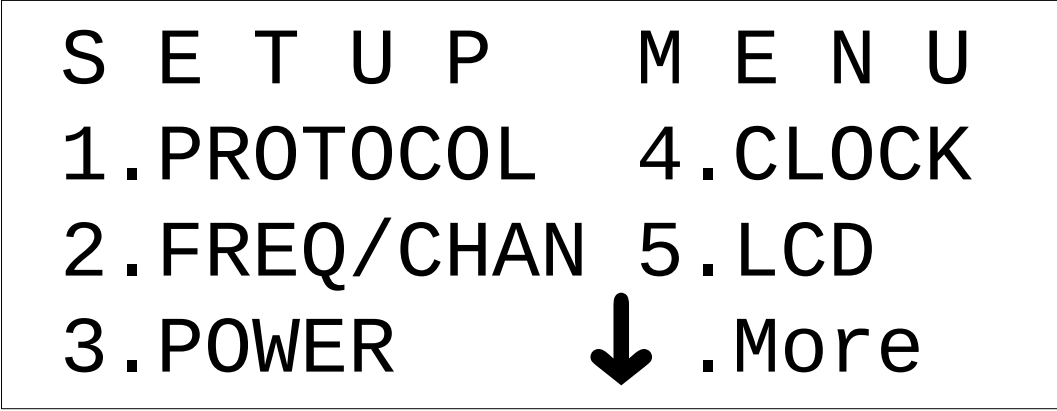
42. Press **ESC** to return to the Status Menu screen. The Status Menu screen appears (see Figure 3-45).



Est.EIRP : 23.0 dBi
PCS1900 Chan#: 511 F
Not Transmitting
1.Setup Menu

Figure 3-45 Status Menu Screen

43. Press **1** to access the Setup Menu screen (see Figure 3-46).

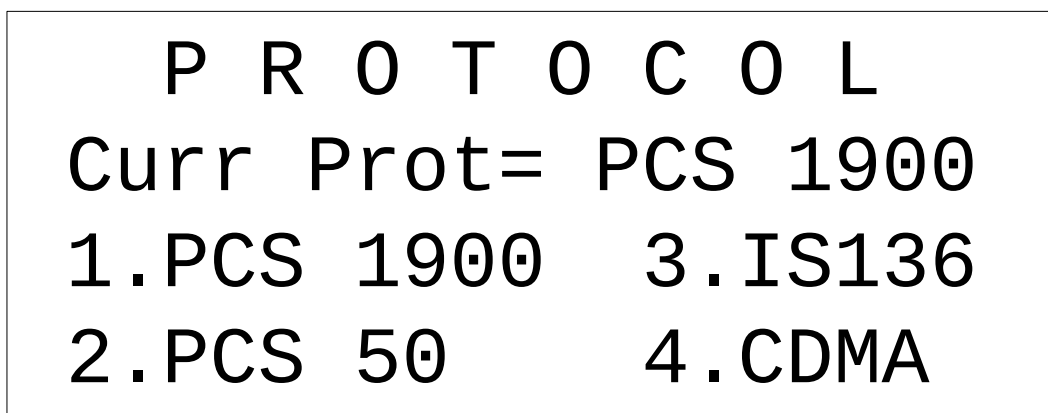


S E T U P M E N U
1.PROTOCOL 4.CLOCK
2.FREQ/CHAN 5.LCD
3.POWER ↓ .More

Figure 3-46 Setup Menu Screen

3.5 Setting Up a PCS 1900 Protocol

44. Press **1** to access the Protocol screen. The Protocol screen appears (see Figure 3-47).

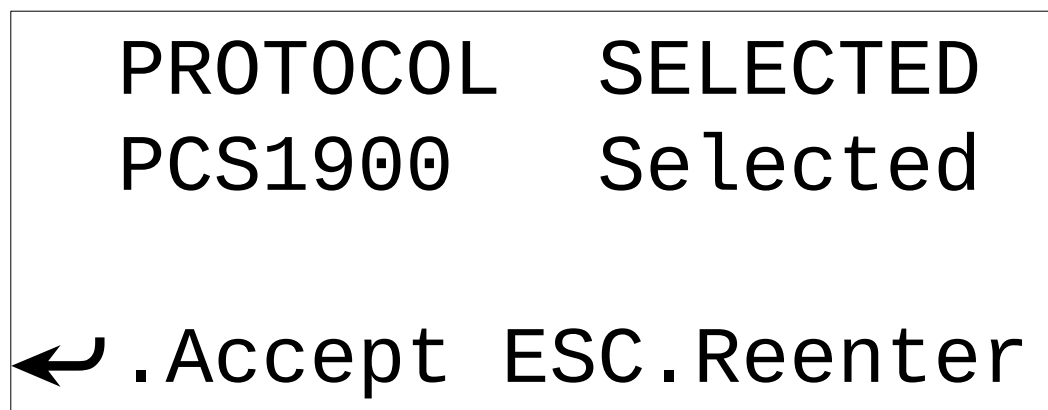


A screenshot of a terminal window showing the 'P R O T O C O L' screen. The text is as follows:

```
P R O T O C O L
Curr Prot= PCS 1900
1.PCS 1900    3.IS136
2.PCS 50      4.CDMA
```

Figure 3-47 Protocol Screen

45. Select a protocol. The Protocol Selected screen then displays (figure 3-48).



A screenshot of a terminal window showing the 'PROTOCOL SELECTED' screen. The text is as follows:

```
PROTOCOL    SELECTED
PCS1900     Selected
← .Accept  ESC.Reenter
```

Figure 3-48 Protocol Selected Screen

46. Press **↵** to accept the PCS 1900 protocol. The Frequency/Channel # screen appears (see Figure 3-49).

FREQUENCY/CHANNEL#
1.FREQ(MHz) PCS1900
2.CHANNEL FORWARD
ESC.Prev Menu

Figure 3-49 Frequency/Channel # Screen

47. To enter a desired channel number into the SpectraWave 1900, go to step 51. Steps 48 through 50 describe how to enter a frequency number.
48. Press **1** to enter a frequency number into the SpectraWave 1900. The Frequency Range screen appears (see Figure 3-50).

PCS 1900 FREQ RANGE
Forward 1930-1990
Reverse 1850-1910
← Accept ESC.PrvMenu

Figure 3-50 PCS 1900 Frequency Range Screen

49. Use the keypad or Frequency MHz knob to enter a desired frequency, which appears in the frequency channel display.
50. Press **←** to select the desired frequency entered into the SpectraWave 1900. The Setup Menu screen redisplay.
51. Press **2** to enter the desired channel number into the SpectraWave 1900. The Frequency/Channel # screen appears (see Figure 3-51).

PCS 1900	CHAN#	RANGE
1.Forward		511-811
2.Reverse		511-811
ESC.	Prev	Menu

Figure 3-51 PCS 1900 Chan # Range Screen

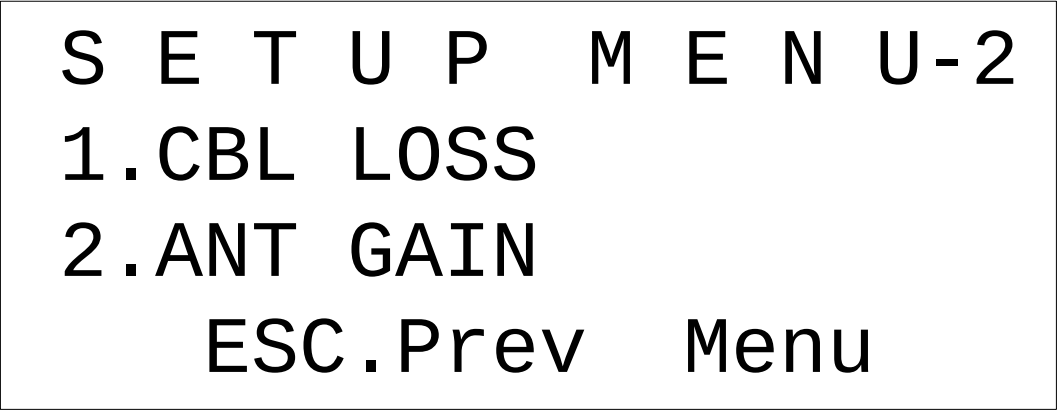
52. Select **1** for forward or **2** for reverse to enter the direction of the channel.
53. Use the keypad or Frequency MHz knob to enter a desired channel, which appears in the Frequency/Channel display.
54. Press **ESC** to accept the channel entered.
55. From the Setup Menu, press **3** on the front panel keypad to select the desired power output level. The Power Level Range screen appears (see Figure 3-52).

POWER	LEVEL	RANGE
1.milliWatts		30-999
2.Watts		0.1-20
3.dBm		15-43

Figure 3-52 Power Level Range screen

56. To enter the desired power unit: select **1** for milliWatts, **2** for Watts, and **3** for dBm.
57. Use the keypad or Power knob to enter a desired power output level, which appears in the power display.

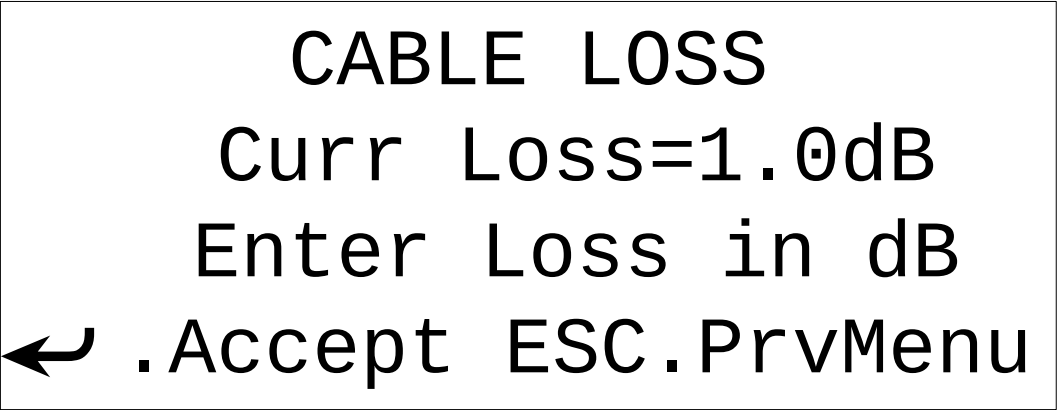
58. Press $\leftarrow$ to accept the power output level into the SpectraWave 1900. The Setup Menu screen appears.
59. Press $\downarrow$ to access the Setup Menu-2 screen (see Figure 3-53).



S E T U P M E N U - 2
 1.CBL LOSS
 2.ANT GAIN
 ESC.Prev Menu

Figure 3-53 Setup Menu-2 Screen

60. Press **1** on the front panel keypad to enter the value of the cable loss into the SpectraWave 1900. The Cable Loss screen appears (see Figure 3-54).



CABLE LOSS
 Curr Loss=1.0dB
 Enter Loss in dB
 ← .Accept ESC.PrvMenu

Figure 3-54 Cable Loss screen

61. Use the keypad or Power knob to enter a desired value of cable loss, a positive number between 0 and _db.
62. Press $\leftarrow$ to accept the value of the cable loss into the SpectraWave 1900. The Setup Menu-2 screen redisplay.
63. Press **2** to enter the value of Antenna Gain into the SpectraWave 1900. The Antenna Gain Menu screen appears (see Figure 3-55).

Antenna GAIN
Curr Gain=1.6dBi
Enter Gain in dBi
← .Accept ESC.PrvMenu

Figure 3-55 Antenna Gain Screen

64. Use the keypad to enter a desired value of antenna gain in dBi.
65. Press $\leftarrow$ to accept the value of antenna gain into the SpectraWave 1900. The Setup Menu-2 screen redisplay.

CAUTION:	An output power error will occur if the output power falls below $15 < \text{Power Level} + \text{Cable Loss} - \text{Antenna Gain} \leq 46$.
-----------------	--

66. Press **M** to access the Main Menu screen.
67. Press **3** to access the status screen to verify the output power level of the SpectraWave 1900.
68. Press **TX** to start the SpectraWave 1900 transmitting. The transmitting light (green) on the front panel turns on.
69. Close and lock the front panel cover of the SpectraWave 1900 and start collecting data.
70. To stop transmitting open the front panel cover of the SpectraWave 1900, press **TX** on the keypad and turn the power off.

Functional Screens

SpectraWave 1900 menus have three major areas of functionality:

- Setup,
- Diagnostic, and
- Status functions.

SpectraWave 1900 functions originate primarily from a Main Menu and other menu screens, including the Setup Menu, Setup-2, Diagnostics Menu, Diags-2, and Status Menu screens.

This chapter uses three sections to describe SpectraWave 1900's major areas of functionality. Section 3.1 describes the Setup functions and screens. Section 3.2 describes the Diagnostics functions and screens. Section 3.3 describes the Status functions and screens. Each section contains detailed steps for performing each function and using each screen.

Note: Follow the steps provided in this chapter only after you have properly positioned the transmitter, connected the components, and powered up SpectraWave 1900.

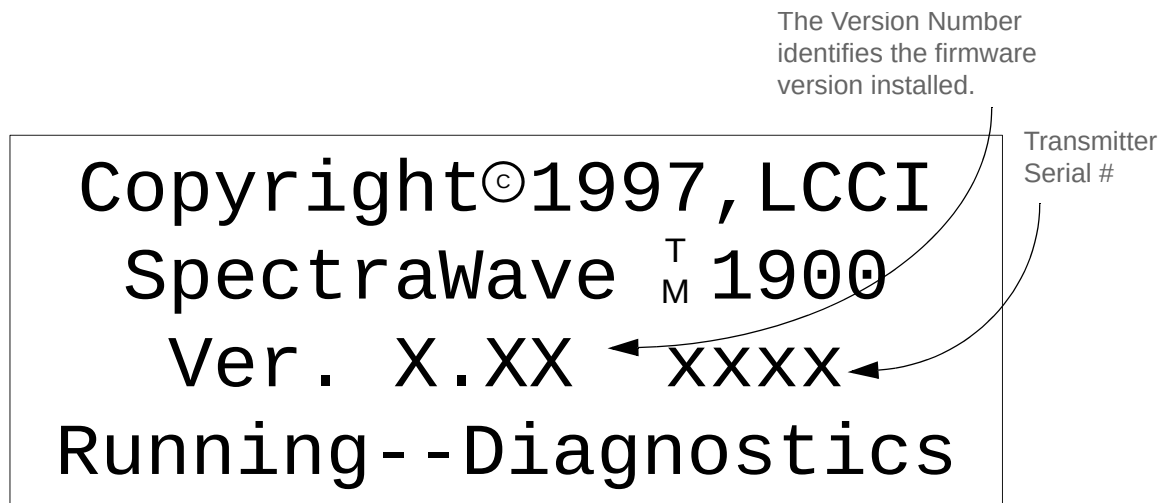
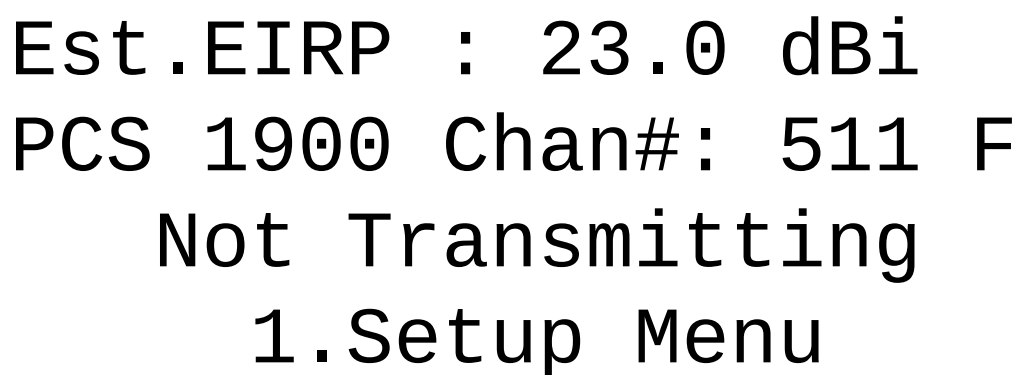


Figure 4-1 LCC Copyright Screen

When you first turn on SpectraWave 1900, the LCC copyright screen displays (see Figure 4-1), followed by the Status Menu screen (see Figure 4-2) after the transmitter finishes warming up. From the Status Menu screen, you can move to the Setup Menu screen, or you can move to the Main Menu screen by pressing **M** on the front keypad. From the Main Menu screen, you can access three menu screens by pressing the corresponding number on the keypad:

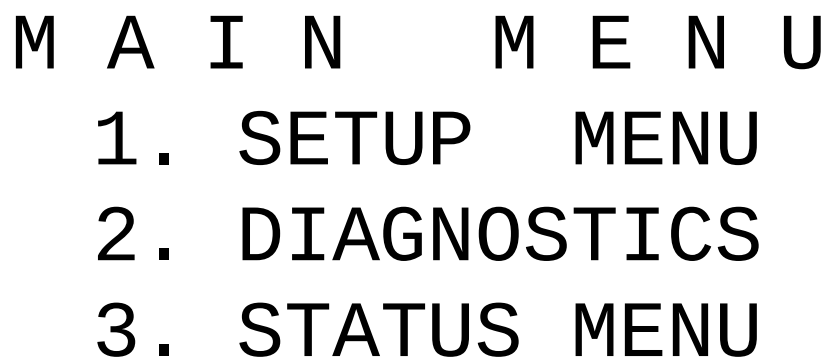
- 1. Setup Menu,
- 2. Diagnostics Menu, and
- 3. Status Menu.

Access the Setup-2 screen from the Setup Menu screen and the Diags-2 screen from the Diagnostics Menu screen.

A screenshot of the Status Menu screen. The text is displayed in a large, black, monospaced font on a white background. The text reads: "Est.EIRP : 23.0 dBi", "PCS 1900 Chan#: 511 F", "Not Transmitting", and "1.Setup Menu".

Est.EIRP : 23.0 dBi
PCS 1900 Chan#: 511 F
Not Transmitting
1.Setup Menu

Figure 4-2 Status Menu Screen

A screenshot of the Main Screen Menu. The text is displayed in a large, black, monospaced font on a white background. The text reads: "M A I N M E N U", "1. SETUP MENU", "2. DIAGNOSTICS", and "3. STATUS MENU".

M A I N M E N U
1. SETUP MENU
2. DIAGNOSTICS
3. STATUS MENU

Figure 4-3 Main Screen Menu

4.1 Using Setup Functions

This section offers instructions on performing SpectraWave 1900 setup functions. Before you begin performing these steps, make sure you have properly positioned the transmitter, connected the components, and powered up SpectraWave 1900. For information on how to do this, refer to section 2.1 *Basic Transmitter Configuration*.

When the transmitter is fully warmed up, the Status Menu screen displays. On the Status Menu screen, press **1** to access the Setup Menu screen (see Figure 4-4).

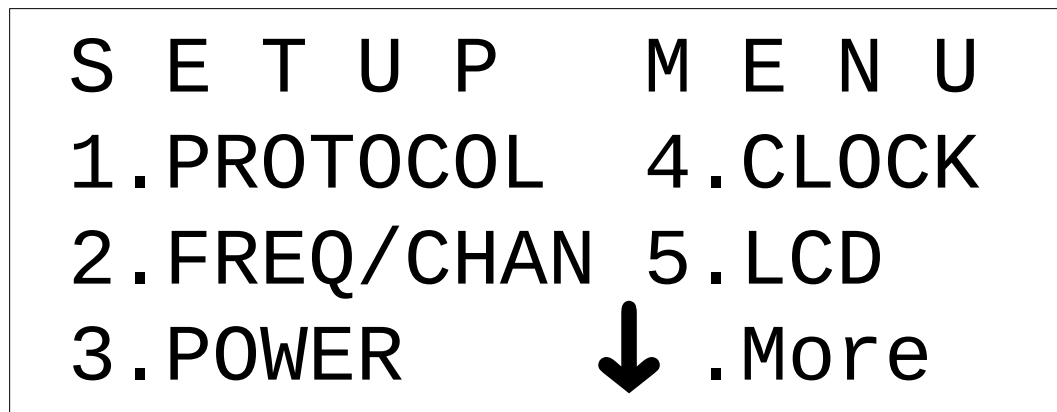


Figure 4-4 Setup Menu Screen

4.1.1 Selecting Protocol

To use the Protocol screen:

1. From the Setup Menu screen, press **1** to select **Protocol**. The Protocol screen appears (see Figure 4-5).
2. Protocols are listed on the Protocol screen. Select a protocol by pressing the corresponding number. If you do not see the protocol you want to select listed on the Protocol screen, press **↓** to display the Protocol-2 screen (see Figure 4-6), where other protocols are listed.

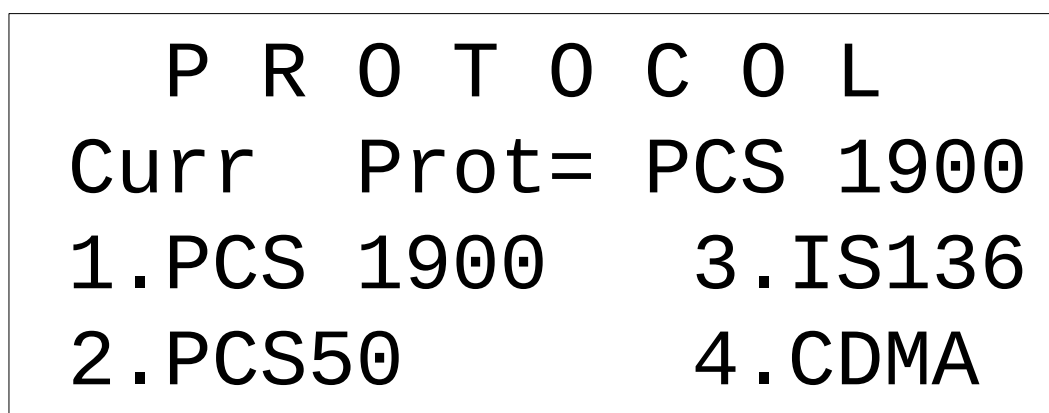


Figure 4-5 Protocol Screen

3. After you select a protocol, the Protocol Selected screen appears (see Figure 4-7) with the selected protocol shown. Press $\leftarrow$ to accept the protocol; the Frequency/Channel # screen appears (see Figure 4-8) displaying the selected protocol.

Note: The Frequency/Channel # screen also is accessible by pressing 2 on the Setup Menu screen.

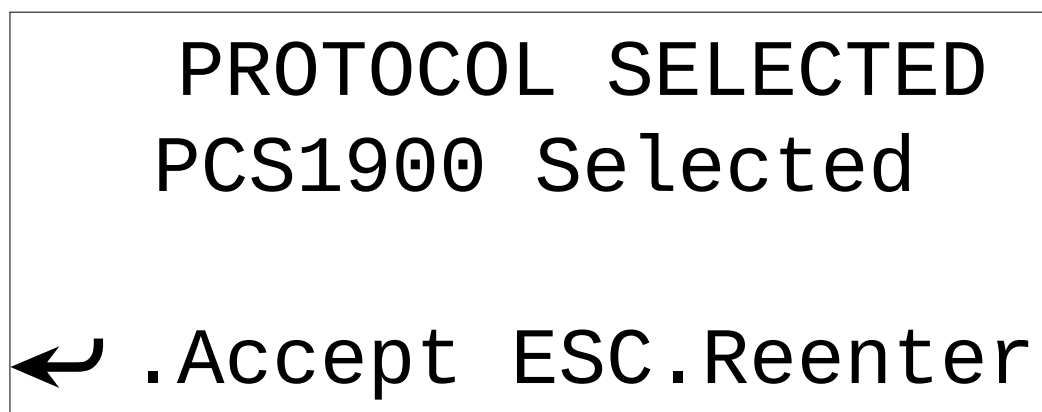
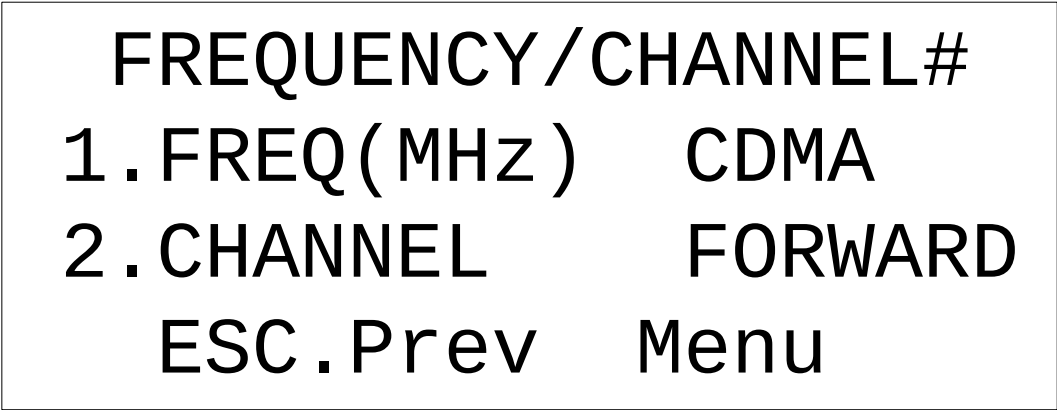


Figure 4-6 Protocol Selected Screen



```

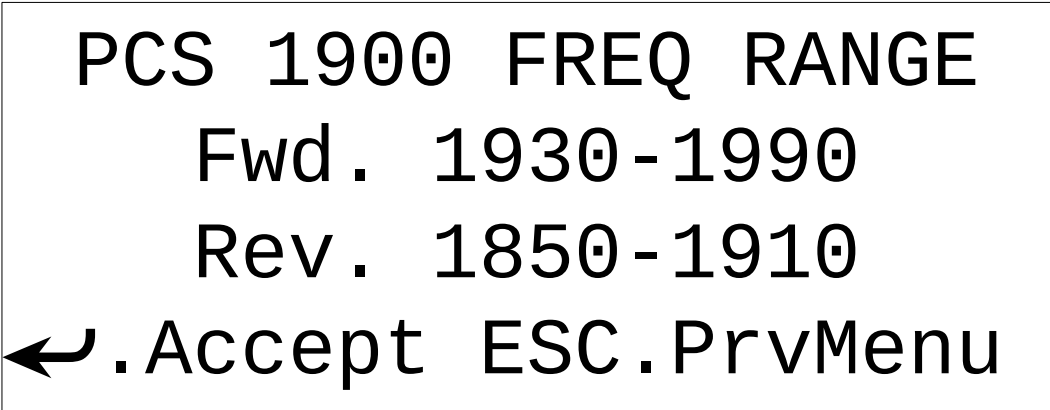
FREQUENCY/CHANNEL#
1.FREQ(MHz)    CDMA
2.CHANNEL      FORWARD
ESC.Prev      Menu
  
```

Figure 4-7 Frequency/Channel # Screen

4.1.2 Selecting Frequency and Channel Number

To use the Frequency/Channel # screen:

1. Press **1** on the Frequency/Channel # screen to change the frequency. The Freq Range screen appears (see Figure 4-9). On the Freq Range screen, select the frequency using the keypad or knob control. When you are finished, press **↵**. The Frequency/Channel # screen is displayed.



```

PCS 1900 FREQ RANGE
Fwd. 1930-1990
Rev. 1850-1910
←.Accept ESC.PrvMenu
  
```

Figure 4-8 Freq Range Screen

2. Press **2** on the Frequency/Channel # screen to display the Channel # Range screen (see Figure 4-10). On the Channel # Range screen, select **1** or **2** to select the channel direction (**Forward** and **Reverse**). Use the keypad or Power Control knob to select the desired channel number. The **↵** function now displays. Press **↵** to enter the data. The Setup Menu screen is redisplayed.

PCS1900	CHAN#	RANGE
1.Forward	511	811
2.Reverse	511	811
←.Accept	ESC	PrvMenu

Figure 4-9 Chan # Range Screen

4.1.3 Selecting Power

To adjust the power levels on the SpectraWave 1900:

1. From the Setup Menu screen, press **3** to select Power. The Power Level Range screen will appear (see Figure 4-11).
2. From the Power Level Range screen, press **1**, **2**, or **3** to select the desired power units, then use the keypad or Power Output Control knob to select the desired power level. The **↵** function is now available (see Figure 4-11). When you are finished, press **↵**. The Setup Menu screen is redisplayed.

POWER	LEVEL	RANGE
1.milliWatts	30	999
2.Watts	0.1	20
3.dBm	15	43

Figure 4-10 Power Level Range Screen



```

1.milliWatts 30-999
2.Watts      0.1-20
3.dBm       15-43
←Accept  ESC.PrvMenu

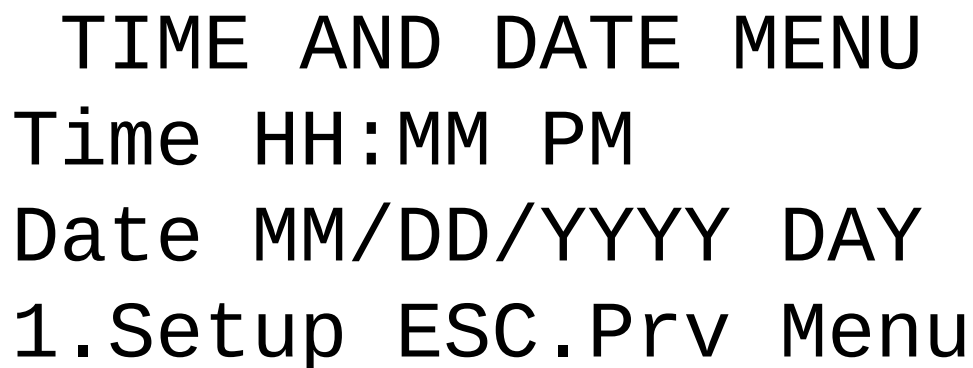
```

Figure 4-11 Power Level Range Screen

4.1.4 Setting the Clock and Date

To adjust the time and date:

1. From the Setup Menu screen, press **4** to select Clock. The Time and Date Menu screen will appear (see Figure 4-12).



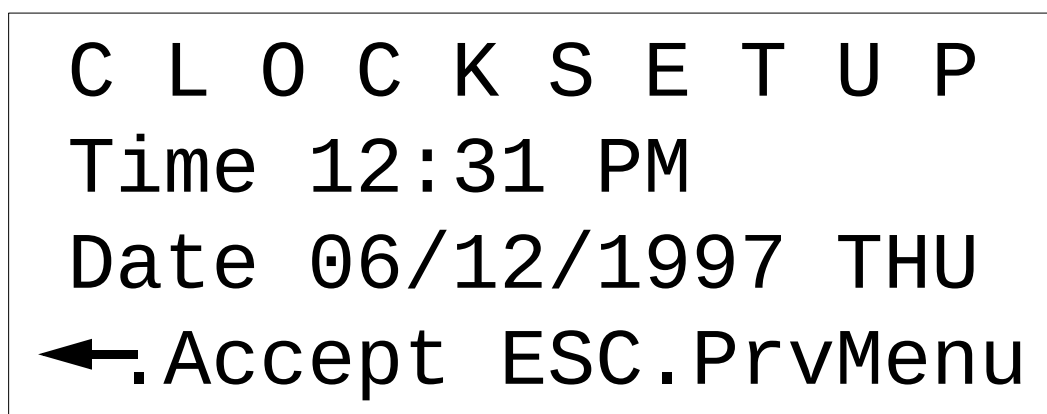
```

TIME AND DATE MENU
Time HH:MM PM
Date MM/DD/YYYY DAY
1.Setup ESC.Prv Menu

```

Figure 4-12 Time and Date Menu Screen

2. From the Time and Date Menu screen, press **1** for Setup. The Clock Setup screen will appear (see Figure 4-13). Set the time using the keypad. Use the up and down arrows to select AM or PM. When you finish changing the time, press **1** to change the date. Use the keypad to change the date. Use the up and down arrows to change the day of the week. When you are finished, press **↵** to accept the changes. The Time and Date updated screen will momentarily be displayed. The Setup Menu screen is then redisplayed.

A screenshot of a terminal window showing the 'CLOCK SETUP' screen. The text is as follows:

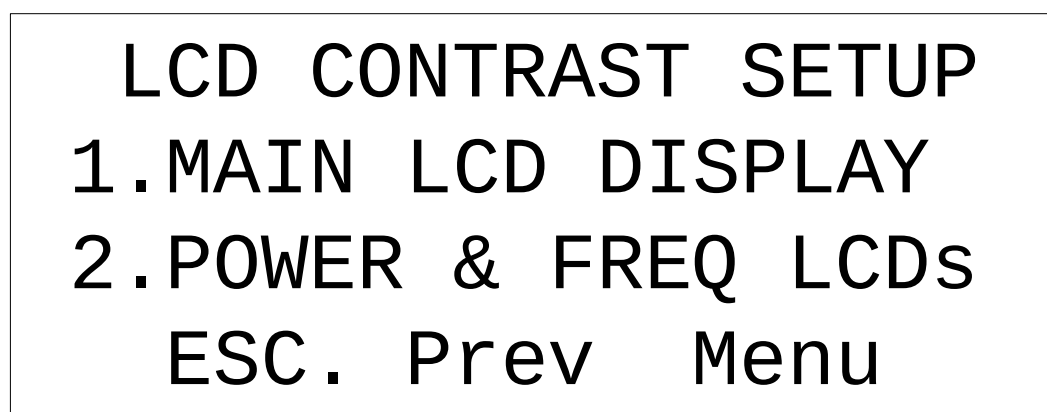
C L O C K S E T U P
Time 12:31 PM
Date 06/12/1997 THU
←.Accept ESC.PrvMenu

Figure 4-13 Clock Setup Screen

4.1.5 Setting the LCD Contrast

To adjust the LCD contrast setting:

1. From the Setup Menu screen, press **5** to select LCD. The LCD Contrast Setup screen appears (see Figure 4-14).
2. From the LCD Contrast Setup screen, press **1** or **2** to select the Main LCD Display (see Figure 4-15) or Power and Freq LCDs screen (see Figure 4-16). Use the up and down arrows to adjust the setting. When you are finished, press **↵**. Press **ESC** to return to the LCD Contrast Setup screen.

A screenshot of a terminal window showing the 'LCD CONTRAST SETUP' screen. The text is as follows:

LCD CONTRAST SETUP
1.MAIN LCD DISPLAY
2.POWER & FREQ LCDs
ESC. Prev Menu

Figure 4-14 LCD Contrast Setup Screen

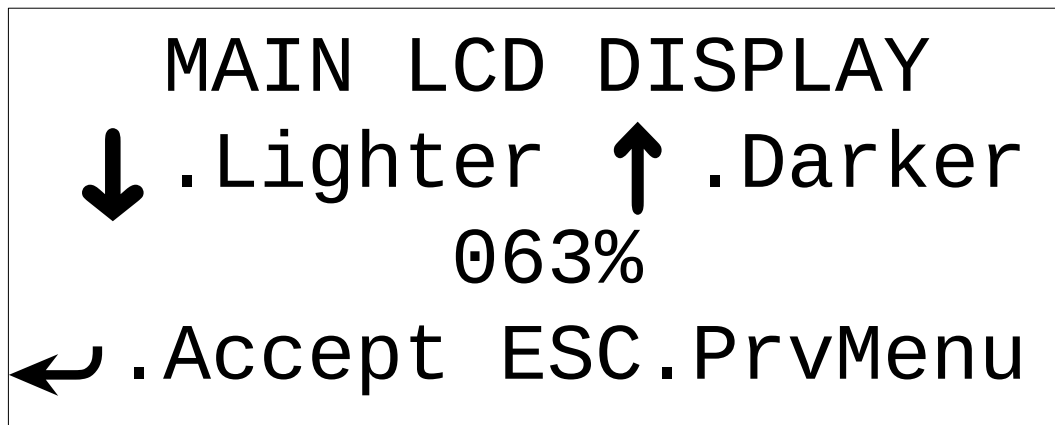


Figure 4-15 Main LCD Display screen

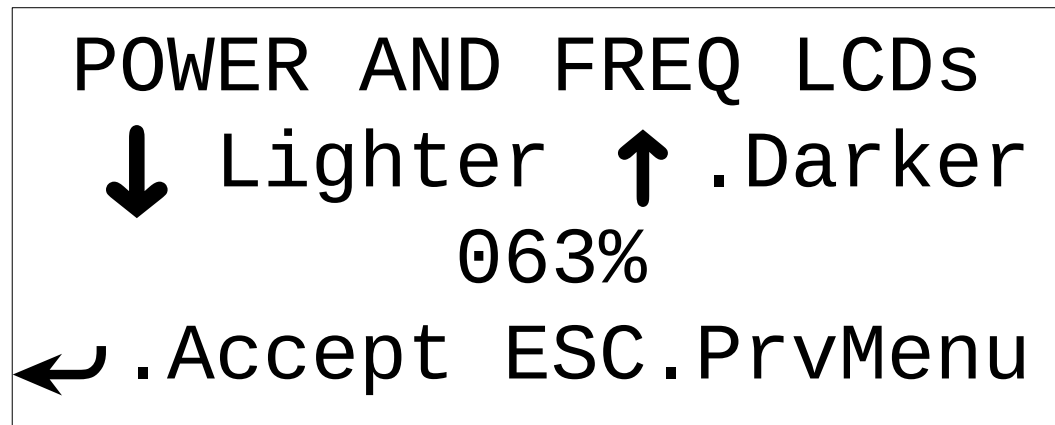


Figure 4-16 Power and Freq Screen

4.1.6 Setting Cable Loss Value

The cable loss and antenna gain values are used to set the desired output power, or effective radiated power (refer to section 4.1.3, *Selecting Power*). If the combination of cable loss, antenna gain, and desired output power is lower or higher than the range of the SpectraWave 1900, you will receive an error message.

1. Display the Setup Menu Page One screen and press ↓ to display the Setup Menu-2 screen (see Figure 4-17).

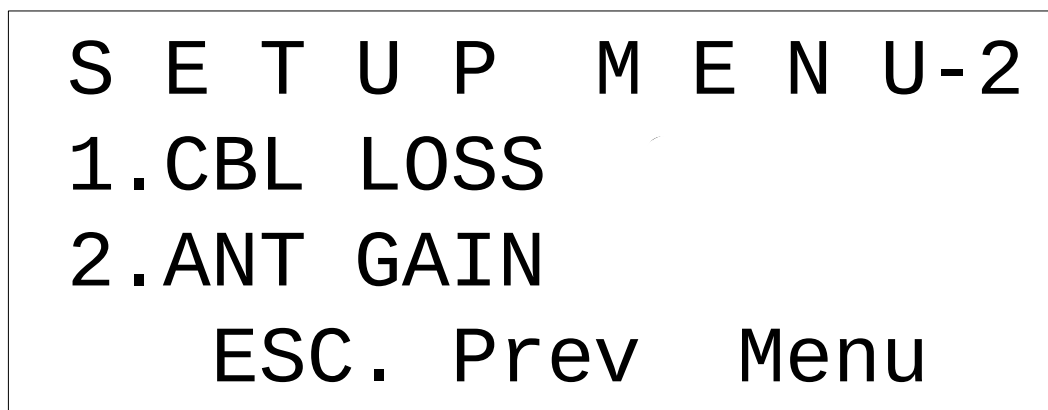


Figure 4-17 Setup Menu-2 Screen

2. On the Setup Menu-2 screen, press 1 to display the Cable Loss screen (see Figure 4-18).

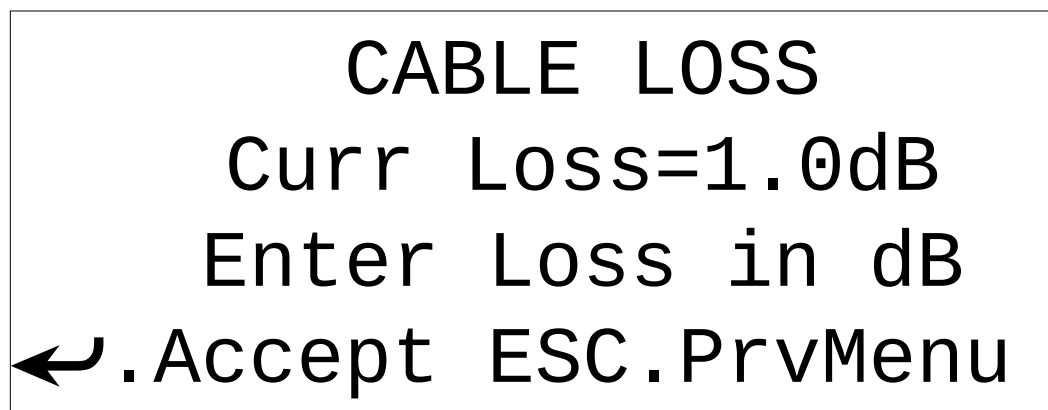


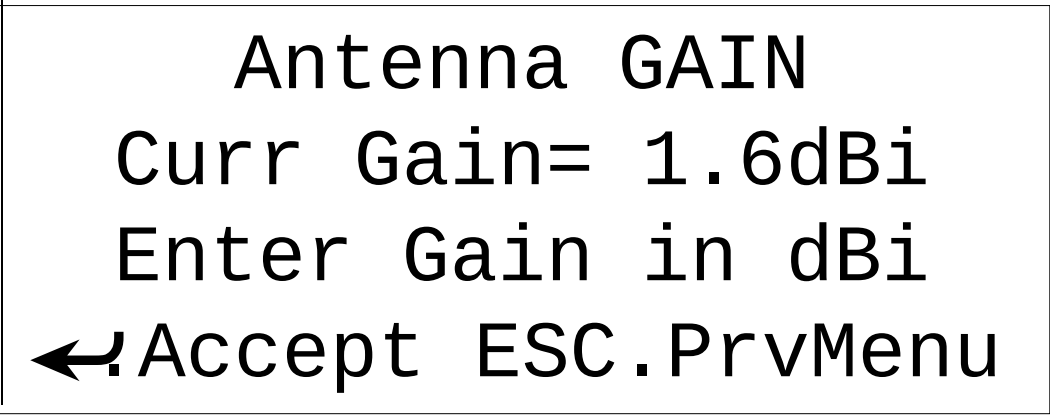
Figure 4-18 Cable Loss Screen

3. On the Cable Loss screen, use the keypad or Power Control knob to set the cable loss dB. When you are finished, press ←. The Setup Menu-2 screen displays.

4.1.7 Setting Antenna Gain Value

To set the antenna gain value:

1. On the Setup Menu-2 screen, press 2 to display the Antenna Gain screen (see Figure 4-19).

A screenshot of the Antenna Gain screen, which is a rectangular box with a black border. Inside the box, the text is centered and reads: "Antenna GAIN" on the first line, "Curr Gain= 1.6dBi" on the second line, "Enter Gain in dBi" on the third line, and "← Accept ESC.PrvMenu" on the fourth line. The text is in a large, black, sans-serif font.

Antenna GAIN
Curr Gain= 1.6dBi
Enter Gain in dBi
← Accept ESC.PrvMenu

Figure 4-19 Antenna Gain Screen

2. On the Antenna Gain screen, use the keypad or Power Control knob to set the antenna gain strength. When you are finished, press ←. The Setup Menu-2 screen is displayed.

4.2 Using the Diagnostic Functions

This section offers instructions on performing SpectraWave 1900 diagnostic functions. Before you begin performing these steps, make sure you have properly positioned the transmitter, connected the components, and powered up SpectraWave 1900. For information on how to do this, refer to section 2.3 *Preparing SpectraWave 1900 for Testing*.

Following are basic steps for using SpectraWave 1900's diagnostic capabilities.

1. Press **M** to display the Main Menu.
2. Press **2** to display the Diagnostics Menu screen (see Figure 4-20).

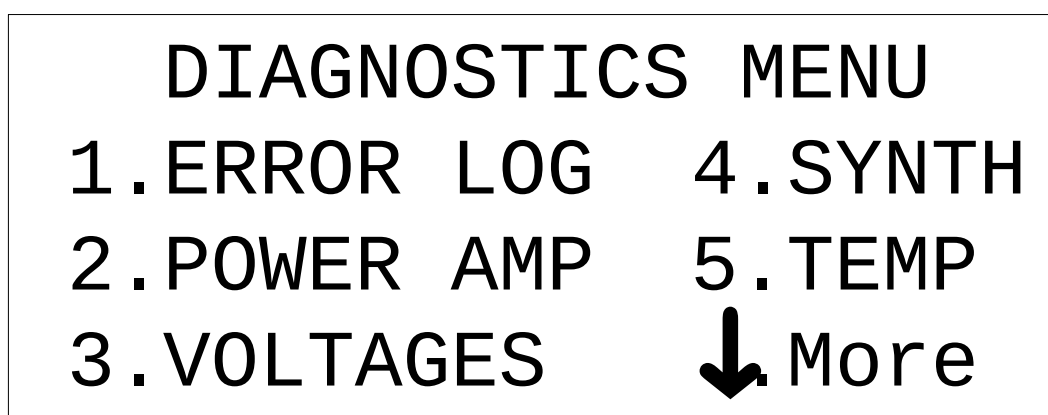
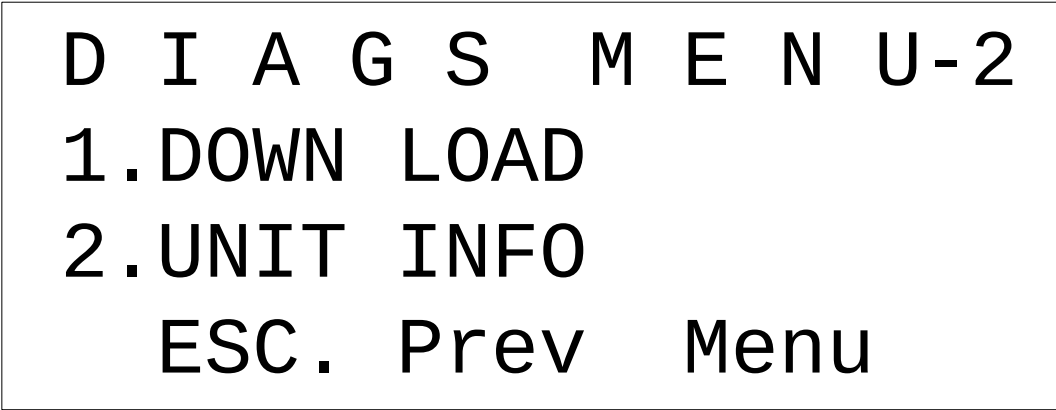


Figure 4-20 Diagnostics Menu screen

From the Diagnostics Menu screen, select the diagnostic characteristics you want to view (Error Log, Power Amp, Voltages, Synthesizer, or Temp) by pressing the corresponding number. Pressing ↓ displays Diags Menu-2 screen (see Figure 4-21). The options on the Diags Menu-2 are Down Load and Unit Info. Pressing **ESC** returns you to the previous menu.

A rectangular box representing a screen with the following text:

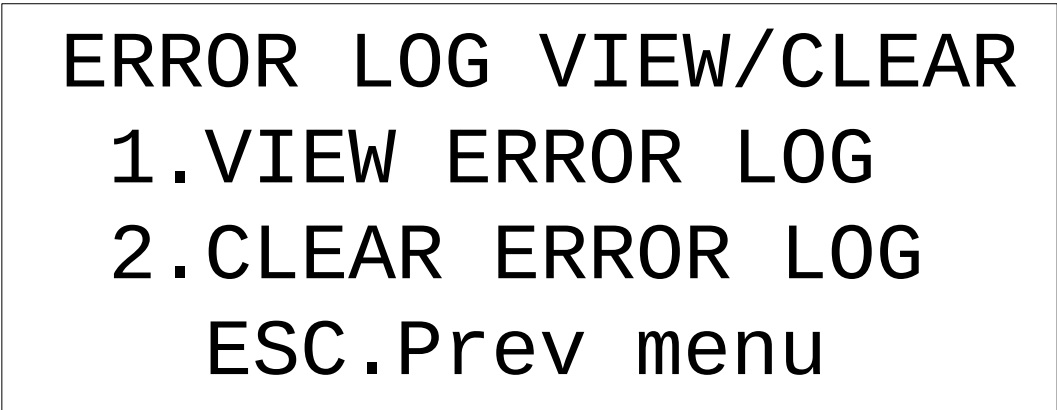
D I A G S M E N U - 2
1 . D O W N L O A D
2 . U N I T I N F O
E S C . P r e v M e n u

Figure 4-21 Diags Menu-2

4.2.1 Displaying the Error Log View/Clear

To display the error log:

1. Press **1**. The Error Log View/Clear screen appears (see Figure 4-22).

A rectangular box representing a screen with the following text:

E R R O R L O G V I E W / C L E A R
1 . V I E W E R R O R L O G
2 . C L E A R E R R O R L O G
E S C . P r e v m e n u

Figure 4-22 Error Log View/Clear Screen

2. Press **1** on the Error Log View/Clear screen to view the error log. One of two screens appear: the Error Log screen (see Figure 4-23) or the No Errors Logged screen (see Figure 4-24). Use the arrow keys to view the error log messages. Press **ESC** to return to the Error Log View/Clear screen.

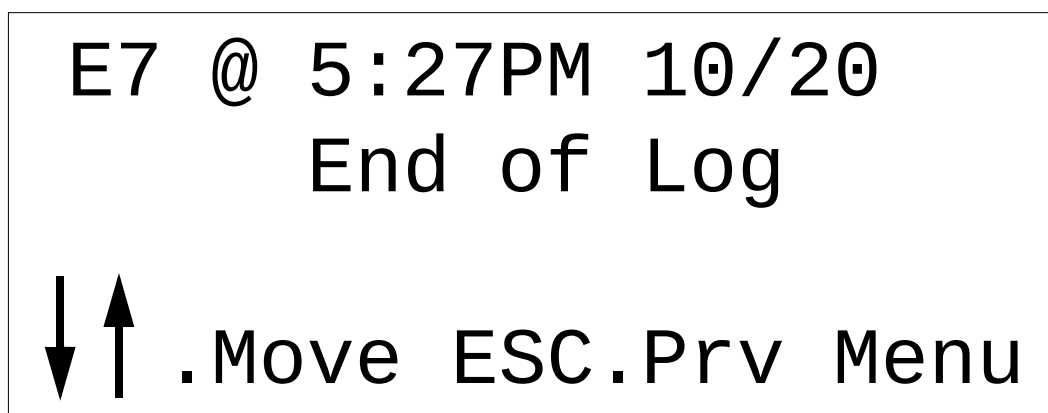


Figure 4-23 Error Log

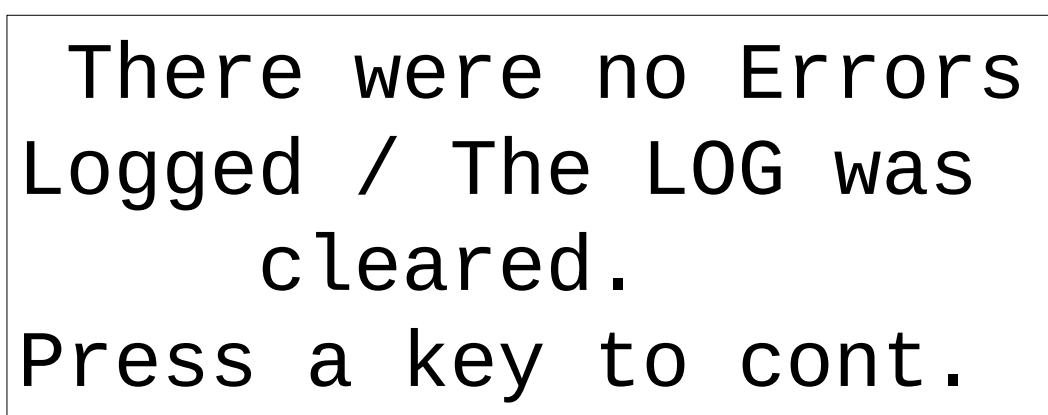


Figure 4-24 No Errors Logged screen

3. To clear the error log, press 2 on the Error Log View/Clear screen. The Clear Error Log screen will appear (see Figure 4-25). Press **↵** to clear the error log. Press **ESC** if you do not want to clear the error log and you will return to the Error Log View/Clear screen. Press **ESC** to return to the Diagnostic Menu screen.

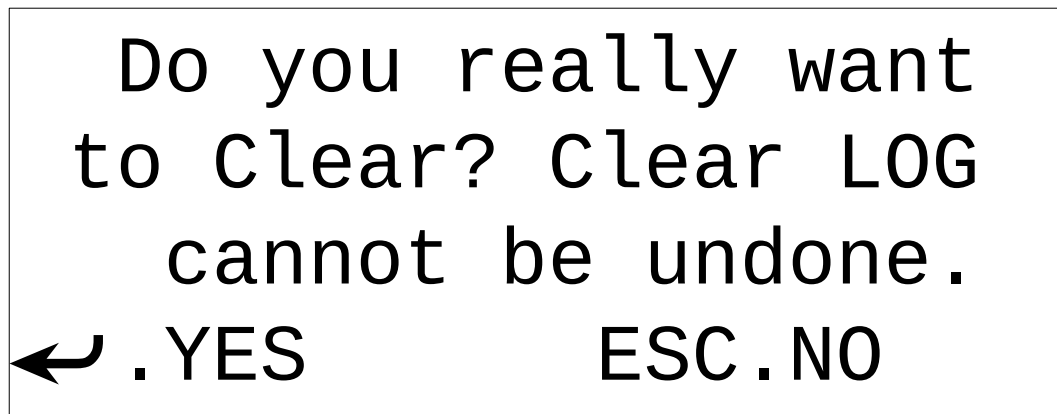


Figure 4-25 Clear Error Log Screen

4.2.2 Viewing the Power Amp Status

To view the power amp status:

1. Press 2 on the Diagnostics Menu screen to display the Power Amp Status screen (see Figure 4-26).

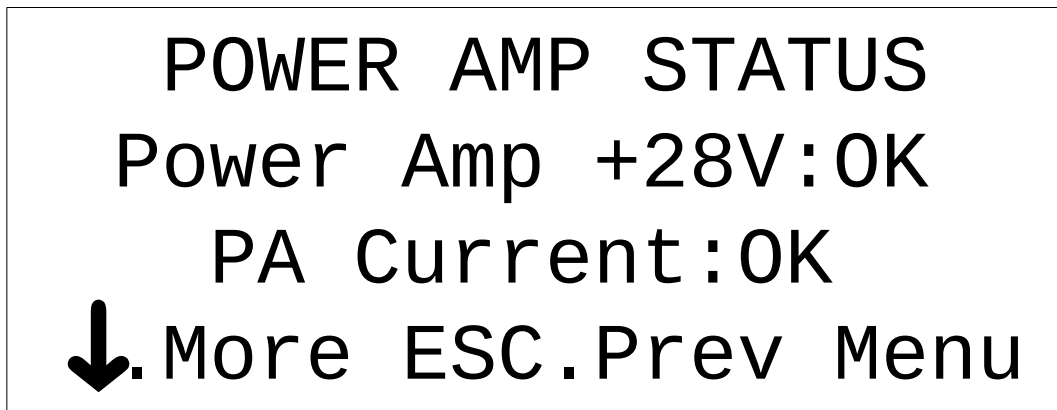
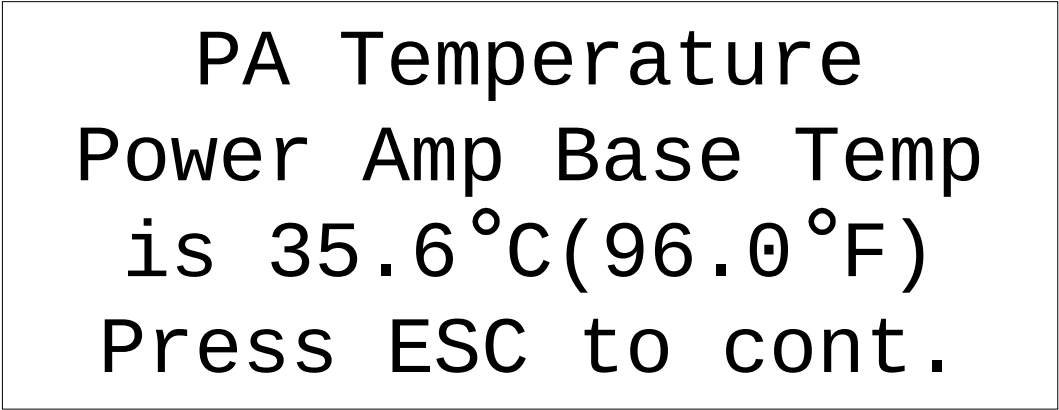


Figure 4-26 Power Amp Status Screen

2. On the Power Amp Status screen, press ↓ to display the PA Temperature screen (see Figure 4-27). Verify the PA temperature is within specifications (see Appendix A), press **ESC** to return to the Diagnostics Menu screen.

A screenshot of a diagnostic screen with a black border. The text is centered and reads: "PA Temperature", "Power Amp Base Temp", "is 35.6°C(96.0°F)", and "Press ESC to cont.".

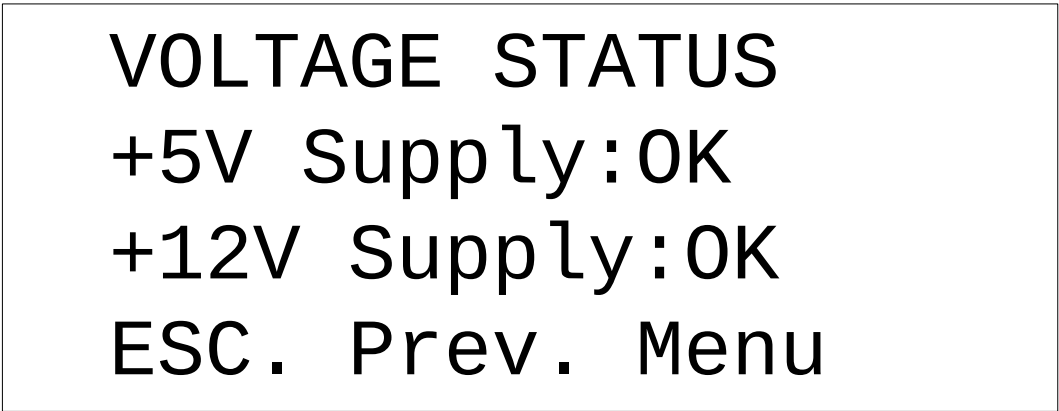
PA Temperature
Power Amp Base Temp
is 35.6°C(96.0°F)
Press ESC to cont.

Figure 4-27 PA Temperature Screen

4.2.3 Viewing Voltage Status

To view the voltage status:

1. Press **3** on the Diagnostics Menu screen to display the Voltage Status screen (see Figure 4-28). Verify the status of the +5 volt and +12 volt power supply, press **ESC** to return to the Diagnostics Menu screen.

A screenshot of a diagnostic screen with a black border. The text is centered and reads: "VOLTAGE STATUS", "+5V Supply:0K", "+12V Supply:0K", and "ESC. Prev. Menu".

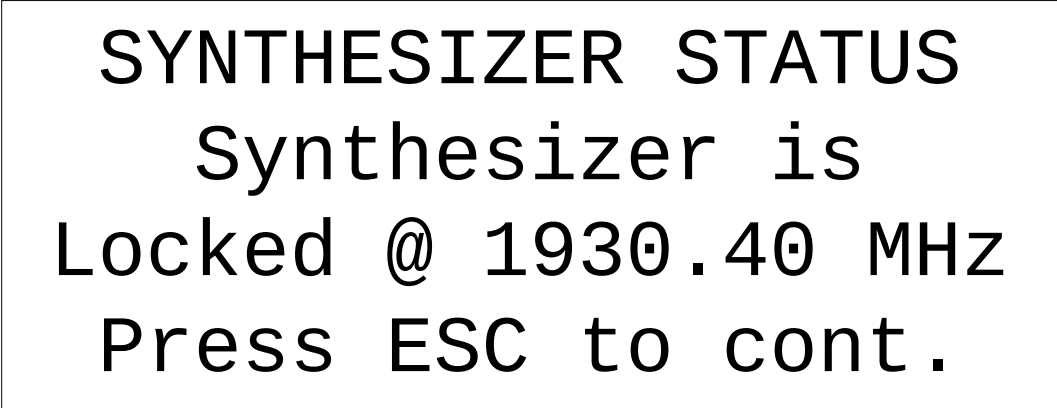
VOLTAGE STATUS
+5V Supply:0K
+12V Supply:0K
ESC. Prev. Menu

Figure 4-28 Voltage Status Screen

4.2.4 Viewing Synthesizer Status

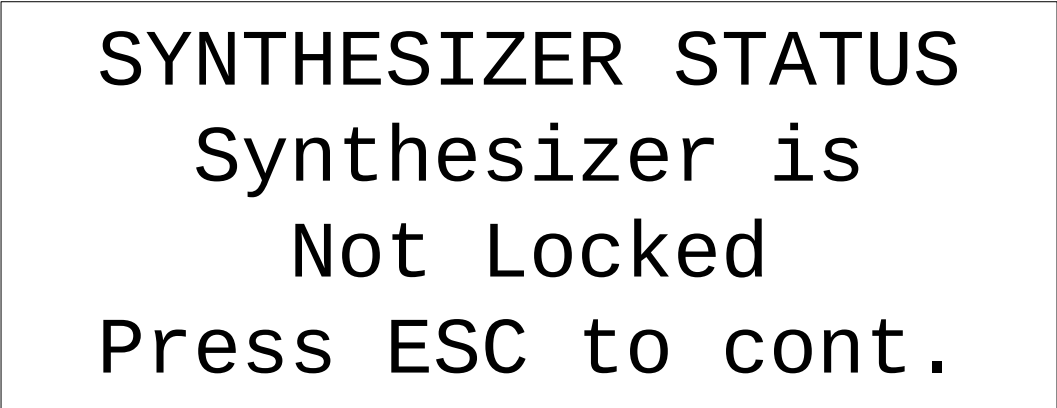
To view the synthesizer status:

1. Press **4** on the Diagnostics Menu screen to view the synthesizer status. When transmitting, the Synthesizer Status screen in Figure 4-29 appears; when not transmitting, the Synthesizer Screen in Figure 4-30 appears. After you have viewed the status of the synthesizer, press **ESC** to return to the Diagnostics Menu screen.

A rectangular box containing the text "SYNTHESIZER STATUS", "Synthesizer is", "Locked @ 1930.40 MHz", and "Press ESC to cont." in a large, black, sans-serif font.

SYNTHESIZER STATUS
Synthesizer is
Locked @ 1930.40 MHz
Press ESC to cont.

Figure 4-29 Synthesizer Status Screen (transmitting)

A rectangular box containing the text "SYNTHESIZER STATUS", "Synthesizer is", "Not Locked", and "Press ESC to cont." in a large, black, sans-serif font.

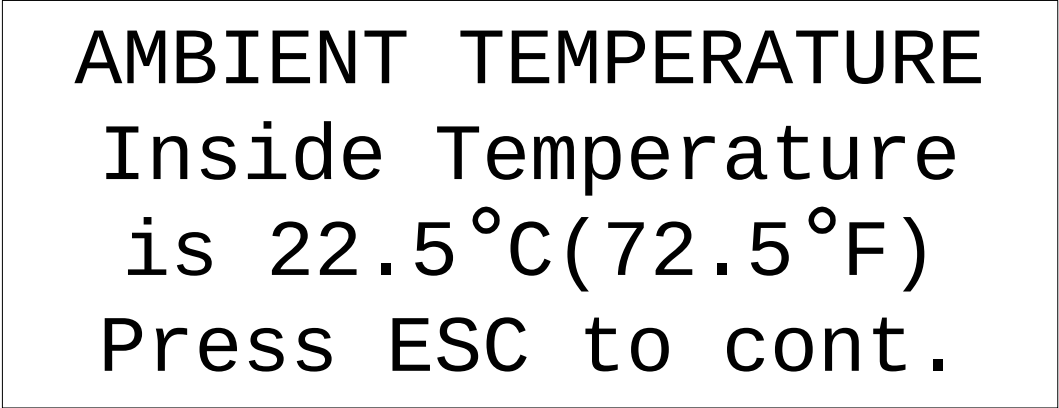
SYNTHESIZER STATUS
Synthesizer is
Not Locked
Press ESC to cont.

Figure 4-30 Synthesizer Status Screen (not transmitting)

4.2.5 Viewing Ambient Temperature Status

To view the ambient temperature status:

1. Press **5** on the Diagnostics Menu screen to view the ambient temperature status. The Ambient Temperature screen will appear (see Figure 4-30).



AMBIENT TEMPERATURE
Inside Temperature
is 22.5°C(72.5°F)
Press ESC to cont.

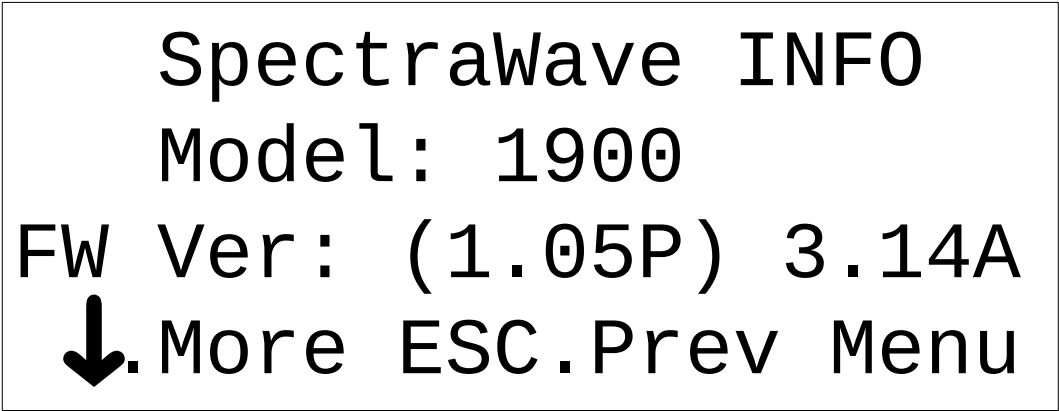
Figure 4-31 Ambient Temperature Screen

2. After you have viewed the temperature information, press **ESC** to return to the Diagnostics Menu screen.

4.2.6 Viewing Transmitter Information

To view transmitter information:

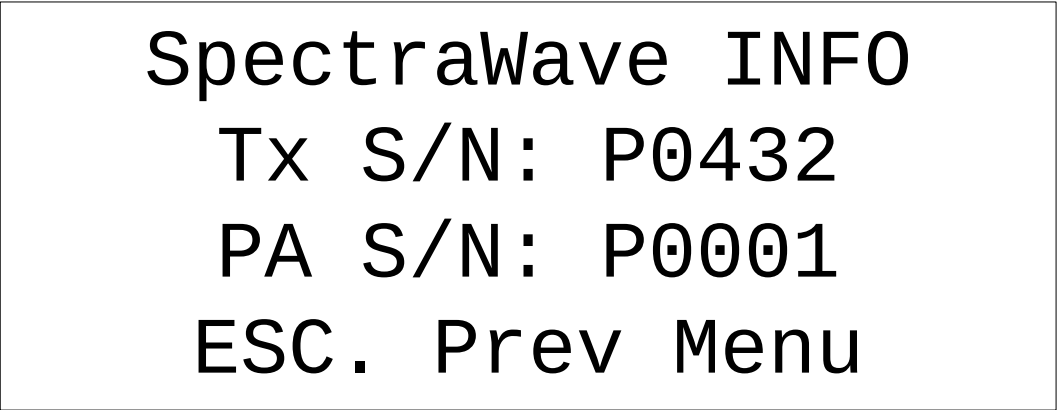
1. On the Diags Menu-2 screen, press **2** to display the first SpectraWave Info screen (see Figure 4-32).



SpectraWave INFO
Model: 1900
FW Ver: (1.05P) 3.14A
↓.More ESC.Prev Menu

Figure 4-32 SpectraWave Info Screen

2. View the transmitter information, then press ↓ to display the second SpectraWave Info screen (see Figure 4-33).



SpectraWave INFO
Tx S/N: P0432
PA S/N: P0001
ESC. Prev Menu

Figure 4-33 SpectraWave Info Screen

3. After you have viewed the serial number of the transmitter and the power amp, press **ESC** to return to the first SpectraWave Info screen. Press **ESC** again to return to the Diags Menu-2 screen.

4.3 Using Status Menu Options

This section contains information on SpectraWave 1900 status options.

The following are basic steps for using SpectraWave 1900's status capabilities.

1. Press **M** to display the Main Menu.
2. Press **3** to display the Status Menu screen (see Figure 4-39).

A screenshot of the Status Menu screen, enclosed in a rectangular border. The text is displayed in a large, black, monospaced font. It shows the estimated EIRP as 23.0 dBi, the protocol as PCS 1900, the channel number as 511, and the direction as F. It also indicates that the transmitter is not transmitting and provides an option to access the Setup Menu.

Est.EIRP : 23.0 dBi
PCS 1900 Chan#:511 F
Not Transmitting
1.Setup Menu

Figure 4-34 Status Menu Screen

3. View the estimated EIRP, the selected protocol, channel number, direction of the channel, and whether the transmitter is transmitting to not transmitting. Press **1** to access the Setup Menu screen. Refer to section 4.1, *Using Setup Functions* for information on how to use the Setup Menu.

Appendix A Specifications

SpectraWave Models Available

Model	Frequency Range	Part Number
SpectraWave 1900	1850 to 1990 MHz	41-A00818-1
SpectraWave 1800	1710 to 1880 MHz	41-A01059-1
SpectraWave 800	805 to 960 MHz	41-A01026-1

Performance Specifications

Output Power (Selectable in 0.1 dBm increments)	
SpectraWave 1900	30 mw to 20W (+15 to +43 dBm)
SpectraWave 1800	30 mw to 25W (+15 to +44 dBm)
SpectraWave 800	30 mw to 40W (+15 to +46 dBm)
Output Power Accuracy	+/-1 dBm over full temperature range
Frequency Accuracy	0.5 PPM
Harmonics	>-60 dBc
Warm Up Time	maximum of 3 minutes
Input Power	110 VAC 60 Hz or 220 VAC 50Hz
Output Connectors	RF output: N-type, female
	Modem output: SMA female with male center P/U (Reserved for future use)
	External inputs: DB25 female

Physical Specifications

Size	12.5"Wx18.5"Lx10"H (32cmX51cmX25cm)
Weight	<40 lbs (18 kg)
Operating Temperature	-4 to +140F (-20 to +60C)
Operating Humidity Range	10 to 95%, non-condensing

User Interface

- Two large 1 x 8 character LCDs display power and frequency settings
- 4 x 20 character LCD provides menu selectable operation
- Separate power and frequency control knobs
- Numeric key pad
- Transmit and power ON/OFF LEDs.

Key Features

- Continuous wave (analog) transmitter
- Wireless remote control option
- Protocol selection provides automatic channel number selection and spacing for each technology
- Power output selectable in watts, milliwatts, or dBm, in 0.1 dB increments
- Automatic power control and temperature compensation
- Advanced thermal design for use in all climates
- Heavy duty external case with an isolated internal chassis to protect against shock and vibration
- Air filter, sealed front panel, and rear cover for moisture and dirt resistance
- Built-in self-test to log, display, and shut down the unit when errors occur
- Downloadable firmware and modular construction for fast upgrades and easy service
- Retractable lift rings.

Accessories

Accessory	Part Number
Model 1900 Antenna Accessory Kit	41-A01104-1
Cable, Superflex, 1/4", 10 ft long, quantity: 3	70192
Omnidirectional antenna, 3 dB gain	17888
Dummy Load, 50 OHM (Alan Industries)	50LH50
Cable Connector, quantity: 2, (M/A COM)	3080-0000-00

Accessory	Part Number
Model 1800 Antenna Accessory Kit	43-A01103-1
Cable, Superflex, 1/4", 10 ft long, quantity: 3	70192
Omnidirectional antenna, 3 dB gain	17888
Dummy Load, 50 OHM (Alan Industries)	50LH50
Cable Connector, quantity: 2, (M/A COM)	3080-0000-00
 Model 800 Antenna Accessory Kit	 42-A01101-1
(AMPS, NAMPS, iDEN, ESMR)	
Cable, Superflex, 1/4", 10 ft long, quantity: 3	70192
Omnidirectional antenna, 3 dB gain, 806-869 Mhz	17888
Dummy Load, 50 OHM (Alan Industries)	50LH50
Cable Connector, quantity: 2, (M/A COM)	3080-0000-00
 Model 800 Antenna Accessory Kit	 42-A01101-1
(GSM, ETACS)	
Cable, Superflex, 1/4", 10 ft long, quantity: 3	70192
Omnidirectional antenna, 3 dB gain, 890-960 Mhz	17888
Dummy Load, 50 OHM (Alan Industries)	50LH50
Cable Connector, quantity: 2, (M/A COM)	3080-0000-00
 Antenna Tri-pod	 63835

Appendix B Error Codes

Error Codes

#	Description	Action Taken	Firmware Action for Recovery	Recommended Action for Recovery
E0	+12V Fault.	Shutdown PA.	Wait til Power Level is OK.	
E1	+28V Fault (PA Power Fault).	Shutdown PA.	Wait til Power Level is OK.	
E2	+5V Fault.	Save System Setup.		
E3	PA Current Fault.	Shutdown PA.	Wait til current draw is OK.	
E4	Ambient Temperature >60 C.	Shutdown PA.	Wait til cooled off to <55 C.	
E5	PA Base Plate Temperature >80 C.	Shutdown PA.	Wait til cooled off to <75 C.	
E6	Synthesizer not locking to (FREQ in MHz).	Shutdown PA.		
E7	VSWR > 5:1.	Shutdown PA.		Check Cable & Antenna.
E8	F/W Download checksum error.	Flash Message.		Reload Firmware to CPU.
E9	Setup Memory checksum error.	Load defaults.	Will assign default values.	

Warning Codes

#	Description	Action Taken	Firmware Action for Recovery	Recommended Action for Recovery
W0	Ambient Temperature Rise >10 C.	Flash Message.*	Wait til Power Level is OK.	Check for airflow blockage.
W1	Ambient Temperature >55 C.	Flash Message.	Wait til cooled off to <55 C.	
W2	Base Plate Temperature >75 C.	Flash Message.	Wait til cooled off to <75 C.	
W3	VSWR > 4:1.	Flash Message.		Check cable and antenna.

*. Only Warning or Error Number displayed on LCD screen on the transmitter.

Appendix C Error Codes

Error Codes

#	Description	Action Taken	Firmware Action for Recovery	Recommended Action for Recovery
E0	+12V Fault.	Shutdown PA.	Wait til Power Level is OK.	Cycle power or call LCC.
E1	+28V Fault (PA Power Fault).	Shutdown PA.	Wait til Power Level is OK.	Cycle power or call LCC.
E2	+5V Fault.	Save System Setup.		Cycle power or call LCC.
E3	PA Current Fault.	Shutdown PA.	Wait til current draw is OK.	Cycle power or call LCC.
E4	Ambient Temperature >60 C.	Shutdown PA.	Wait til cooled off to <55 C.	Check airflow, clean air filter.
E5	PA Base Plate Temperature >80 C.	Shutdown PA.	Wait til cooled off to <75 C.	Check airflow, clean air filter.
E6	Synthesizer not locking to (FREQ in MHz).	Shutdown PA.		Cycle power or call LCC.
E7	VSWR > 5:1.	Shutdown PA.		Check Cable & Antenna.
E8	F/W Download checksum error.	Flash Message.		Reload Firmware to CPU.
E9	Setup Memory checksum error.	Load defaults.	Will assign default values.	Cycle power or call LCC.

Warning Codes

#	Description	Action Taken	Firmware Action for Recovery	Recommended Action for Recovery
W0	Ambient Temperature Rise >10 C.	Flash Message.*	Wait til Power Level is OK.	Check for airflow blockage.
W1	Ambient Temperature >55 C.	Flash Message.	Wait til cooled off to <55 C.	Check for airflow blockage.
W2	Base Plate Temperature >75 C.	Flash Message.	Wait til cooled off to <75 C.	Check for airflow blockage.
W3	VSWR > 4:1.	Flash Message.		Check cable and antenna.

*, Only Warning or Error Number displayed on LCD screen on the transmitter.

