EPOCH−HP

USER MANUAL

Version 1.1

Version 1.1 (Modified May 4, 2007)

Information in this document is subject to change without notice.
Advanced RF Technologies, Inc. 1996-2007. All rights reserved.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Please send comments to:

E-Mail: info@adrftech.com

Phone: (323) 254-8131

Fax: (323) 254-4928

Address: Advanced RF Technologies, Inc.
              Attention: Technical Publications Department
              2607 Colorado Blvd., 1st floor
              Los Angeles, CA 90041
              USA

TABLE OF CONTENTS

1. Introduction of Epoch-HP

   1.1 Overview

   Epoch-HP series repeaters enhances outdoor wireless coverage in the most effective and cost efficient way. For its intelligent design and versatility, Epoch-HP series repeaters are the ideal choice for wireless coverage problems outdoors.

   In many large scale in-building applications, Epoch-HP series repeaters can also be used (e.g. malls, campus, stadiums, etc.) with passive antennas instead of a DAS (distributed antenna system) and offer significant cost savings.

   1.1.1 Highlights

   - 37, 40 or 43 dBm Composite Output Power
   - 95 dB gain
   - 30 dB AGC Range @ 0.5 dB Step
   - Can Set AGC Output Power Level
   - Band Selectable via Software
   - Can Support Non-Contiguous Bands
   - Supports Embedded Wireless Modem
   - Supports Network Management Monitoring System via SNMP

   1.1.2 Available Models

   Epoch-HP is available in all 1900 MHz PCS band combinations. The following table illustrates the six models which are available in the Epoch-HP series:

Product ID	Description
Epoch-HP-05-SX	5 W composite output power with 95 dB of gain (30 dB dynamic AGC range). Band Option 1 (S1): Any 5 or 15 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 2 (S2): Any 5 or 10 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 3 (S3): Any 5 or 5 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime.
Epoch-HP-10-SX	10 W composite output power with 95 dB of gain

	(30 dB dynamic AGC range). Band Option 1 (S1): Any 5 or 15 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 2 (S2): Any 5 or 10 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 3 (S3): Any 5 or 5 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime.
Epoch-HP-20-SX	20 W composite output power with 95 dB of gain (30 dB dynamic AGC range). Band Option 1 (S1): Any 5 or 15 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 2 (S2): Any 5 or 10 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime. Band Option 3 (S3): Any 5 or 5 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime.

Table 1 – Epoch-HP Models

** **Special band combinations are also supported in all the models.**

2. Installation Guide for Epoch-HP

2.1 Environmental Requirements

2.1.1 Antenna Separation/Isolation

Separation between antennas is necessary to prevent oscillation. Oscillation occurs when the signal entering the system continually reenters, due to the lack of separation between the donor and server antennas. In other words, the signal is being fed back into the system. This creates a constant amplification of the same signal. As a result, the noise level rises above the signal level.
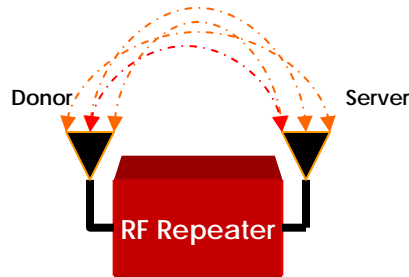
Figure 1 – RF Repeater Oscillation

To prevent feedback, the donor and server antennas must be separated by an appropriate distance to provide sufficient isolation. Isolation is attained by separating antennas a sufficient distance so that the output of one antenna does not reach the input of the other.   This distance is dependent on the gain of the repeater.

A sufficient isolation value is 13 ~ 15 dB greater than the maximum gain of the repeater. For example, if the gain of the repeater is 50 dB, then an isolation of 63 ~ 65 dB or greater is required.   In the same manner, because the Epoch-HP has a maximum gain of 95 dB, it requires an isolation of at least 108 ~ 110 dB.

2.1.2 Line of Sight

The donor antenna which points towards the base station typically has a narrow beam antenna pattern. As a result, a slight deviation away from the direction of the BTS can lead to less than optimum results.   In addition, obstacles between the repeater and the BTS may impair the repeater from obtaining any BTS signal. As a result, the repeater cannot transmit signal to the coverage area. Therefore, a direct line of sight to the BTS for the donor antenna is vital to the function of a repeater. For the same reason, placing the server antenna in direct line of sight of the coverage area is also necessary.
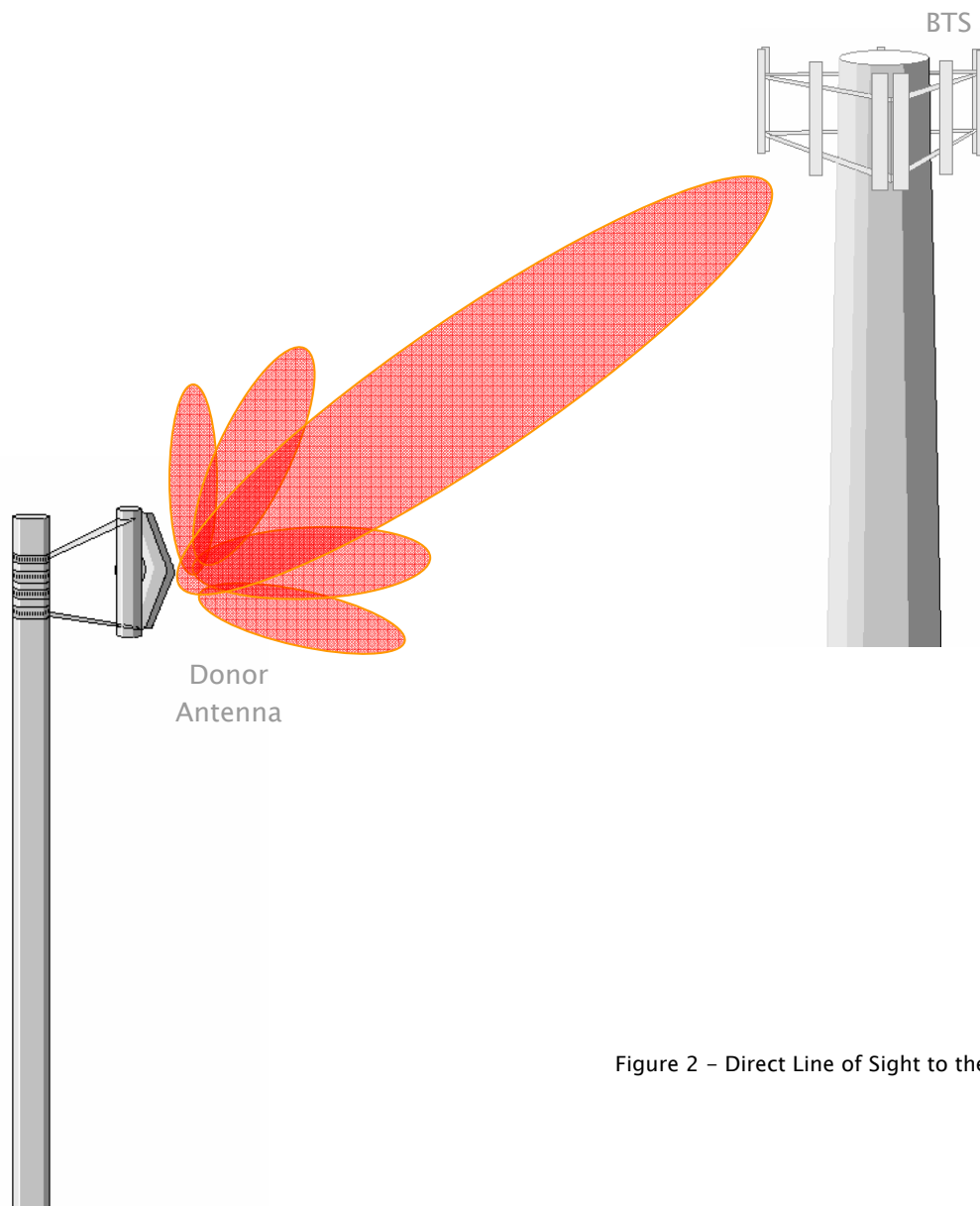
Figure 2 – Direct Line of Sight to the BTS

2.2 Warnings and Hazards

WARNING! ELECTRIC SHOCK

Tampering with the modules within the Epoch-HP repeater exposes the user to electric shock and the risk of damaging the unit. DO NOT TAMPER with modules within the unit. Opening or tampering with any modules inside the Epoch-HP will void all warranties.
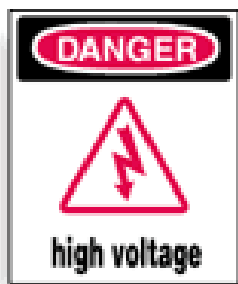
WARNING! HIGH VOLTAGE

In installing donor or server antennas, avoid close proximity to overhead power lines or high power components. Contact with high power components will severely damage the repeater and may cause serious injury and/or death to the user. Exercise extreme caution when installing antennas near high power lines.

WARNING! EXPOSURE TO RF

Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC rules for human exposure. Visit the FCC website at www.fcc.gov/oet/rfsafety to learn more about the effects of exposure to RF electromagnetic fields.
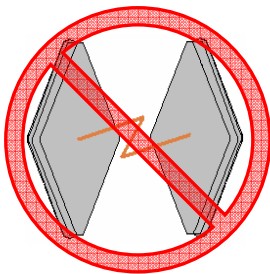
WARNING!

Operating the Epoch-HP with antennas in very close proximity facing each other could lead to severe damage to the repeater.

2.3 RF exposure warning
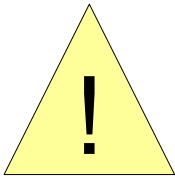
 Important Safety Information

In order to satisfy the FCC RF exposure requirements, you must ensure that the installation complies with following:

For **INDOOR** use, an omni-directional antenna with a maximum gain of 3 dBi can be used with this unit. Service antenna is connected to the Server port in the Epoch-HP via a cable with typical 1~10 dB loss in accordance with the length of the cable.
Service antennas must be positioned to observe minimum separation of 50 cm (~20 inch) from all users and bystanders. For the protection of personnel working in the vicinity of service antennas, the following guidelines for minimum distances between the human body and the antenna must be observed.

The installation of an service antenna must be such that, under normal conditions, all personnel cannot come within 50 cm(~20 inch) from any service antenna. Exceeding this minimum separation will ensure that the employee or bystander does not receive RF exposure beyond the maximum permissible exposure according to section 1.1310 (Limits for General Population/Uncontrolled Exposure)

For **OUTDOOR** use, an directional antenna with a typical gain of 12 dBi can be used with this unit. Donor antenna is connected to the donor port in the Epoch-HP via a cable with typical 1~10 dB loss in accordance with the length of the cable.
Donor antenna must be positioned to observe minimum separation of 152 cm (~ 5 ft) from all users and bystanders. For the protection of personnel working in the vicinity of service antennas, the following guidelines for minimum distances between the human body and the antenna must be observed.

The installation of an donor antenna must be such that, under normal conditions, all personnel cannot come within 152 cm(~5 ft) from donor antenna. Exceeding this minimum separation will ensure that the employee or bystander does not receive RF exposure beyond the maximum permissible exposure according to section 1.1310 (Limits for General Population/Uncontrolled Exposure)

2.4 Tools and Recommendations for Installation

The following may be necessary (not required) for installation of the repeater:
a. Crescent Wrench
b. Philips Screw Driver
c. Lift, Ladder, or Boom Truck
d. Spectrum Analyzer
e. Sweep Tester
f. Signal Generator
g. Pilot Scanner
h. RF Power Meter
i. Voltmeter
j. Coaxial Cables
k. Compass
l. PC with an USB port

The list above may vary depending on if brackets are used to install the repeater. Bring additional tools that may be useful during installation. It is recommended that two people install the Epoch-HP repeater system.

2.5 Epoch-HP Parts List

The Epoch-HP repeater system includes:

	PART ID	QUANTITY
a. Epoch-HP Repeater	EPOCHHP01	1
b. Nuts and Bolts	BLTS01	4
c. Epoch-H V1.X GUI	HPOMS01	1
d. Ground Cable	GNDSTD01	1
e. USB Cable	USB01	1
f. Keys	KEYS01	2

2.6 Epoch-H V1.X Installation and Requirements

2.5.1 Minimum Requirements
Hardware (PC Platform)
CPU: 200 MHz
Memory: 32 MB
Hard Disk: 10 MB (Free Space)
USB Port: 1 Port
CD-ROM Drive
Compatible Operating System:
Microsoft Windows XP (Preferred), 2000

2.5.2 Epoch-H V1.X Installation

Installing the Epoch-H V1.X

a. Insert the CD into the CD-ROM drive.
b. Click on "My Computer."
c. In the "My Computer" window, click on your CD-ROM drive (usually labeled D:).
d. Double-click the file labeled "Epoch-H V1.x.exe."
e. The installation wizard will guide you through the conclusion of the Epoch-H V1.X installation process.

2.5.3 Initial Startup of Epoch-H V1.X

a. Using the USB cable (USB01) that is provided, connect one end of the cable to the PC USB port and the other end to the repeater's USB port located on the bottom of the repeater.
b. Open the Epoch-H V1.X software

2.7 Pre-Installation using Epoch-H V1.X

Prior to the Epoch-HP installation, ensure that:

a. The USB driver is installed and the USB cable is connected at both ends.
b. The donor and server antennas are in place.
c. The TX and RX communication status LEDs are blinking.

*** The TX and RX LEDs should blink every 1 second only in the Status Window. In the Status Window, a blinking green RX LED indicates that the PC is retrieving data from the repeater (Epoch-HP). Similarly, a blinking green TX LED indicates that the PC is transmitting data to the Epoch-HP.*

*** If neither of the LEDs is blinking: (1) check if the USB deriver has been installed; (2) check the USB cable is connected properly between the PC and the repeater; or (3) check if the repeater power is on.*

2.8 Step by Step Instructions for Installation

2.8.1 Repeater Setup

1. Open the Epoch-HP

Open the front door of the repeater cabinet by using the key (KEYS01) provided. There are two locks integrated into the door latches. One key works for both locks.

*** Please keep the cabinet door open fully during the installation until you are instructed to close the cabinet.*

3 – Server Antenna Port

2 – Donor Antenna Port

5 – Back-Up Battery Cable Opening

4 – USB Port

1 – AC Power Supply

Figure 3 – Bottom Side of the Repeater

2. Connect the Power Source and Ground Wire

Make sure that the power switch inside the repeater is turned off before connecting the power cable. Connect the power cable to the power source as shown in Figure 3 (# 1).

*** Before connecting the power cable to the power source, make sure that the voltage source is 110 V.*

3. Connect the Donor Antenna

Connect one end of the RF coaxial cable to the donor antenna and the other end to the repeater donor port located on the bottom of the Epoch-HP as shown in Figure 3 (# 2).

4. Connect the Server Antenna

Connect one end of the RF coaxial cable to the server antenna and connect the other end to the repeater server port located on the bottom of the Epoch-HP as shown in Figure 3 (# 4).

5. Connect the USB Cable

Using the USB cable (included in the box), connect one end of the cable to the Epoch-HP's USB port located on the bottom of the repeater (# 4 – Figure 3) and the other end to the laptop's USB port.

6. Connect the Back-Up Battery (Optional)

If a back-up battery is needed, please connect it to the power supply located inside the repeater. You can pass the back-up battery power cable through the opening as shown in Figure 3 (# 5).

7. Turn On the Power for Epoch-HP

Make sure that the donor and server antennas and the power cable are securely connected to the correct ports. Turn the power switch on, located inside the repeater.

8. Launch the Epoch-H V1.X Program

Open the Epoch-H V1.X program. You will see the Status Window.

*** Please make sure that both communication status LEDs, the TX and the RX on the bottom of the window, are blinking periodically. A green blinking TX LED indicates that the data is being transmitted from the PC to the Epoch-HP. A green blinking RX LED indicates that the data is being retrieved from the Epoch-HP to the PC.*

*** For more detailed information on the Epoch-H V1.X, please refer to Section 3 on page 15.*

*** If either the TX or the RX status LED is not blinking, check if the USB driver has been installed. For more information, refer to Section 5, "Troubleshooting" on page 29.*

*** Before proceeding to the next step, please close the cabinet door (do not lock) at this time in order to avoid inadvertent RF feedback going inside the repeater."*

9. Go to the Install Window

Now with the blinking TX and RX status LEDs on the Status Window, go to the Install Window. You will see the following:
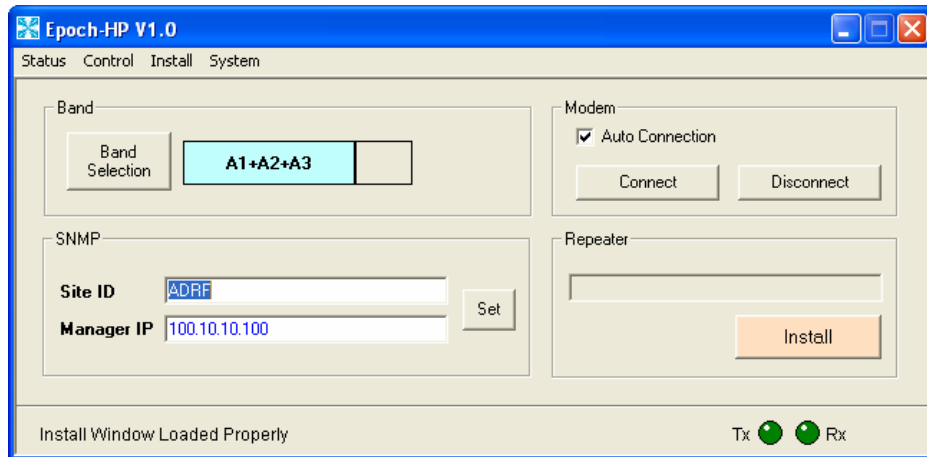
Figure 4 – Installation Window of the Epoch-H V1.X

10. Select the Desired Band or Bands

Select the desired band or bands by clicking on "Band Selection." Once you do so, the following window will come up:

Figure 5 – Band Selection Window of the Epoch-H V1.X

You can select any 5 or 15 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime.

*** The above band configuration strictly depends on which model you are using (e.g. S1, S2, or S3). Please refer to Table 1 on Page 5.**

*** If a wireless modem is not connected, skip steps 11 through 13 and proceed to step 16.**

11. Provide SNMP Information

Type in the Site ID and the Manager IP address as given to you by the Wireless Provider. Once both the parameters are typed in, you must click "Set" for it to be executed.

12. Check the Modem Connection

Verify that the *Auto Connection* box is checked and then click on "Connect."

13. Click on Install
After the first three steps, click on "Install." This installation process will normally take less than 5 minutes.

*** Please refer to the "Quick Installation Guide" for any questions or problems that you may encounter during this installation process.*

If a modem is not connected to the repeater and you click the "Install" button, the following pop-up window will appear:

Figure 6 – No Wireless Modem Connected

If you choose to continue with the RF portion only, simply click "Yes" and the installation process will resume again.

14. Check the Front LED Panel
Check that the Power LED is on (Green) and neither Soft Fail LED (Yellow) nor Hard Fail LED (Red) is lit.

*** If the Soft Fail or Hard Fail LED is on, refer to Section 3.3 on page 25.*

*** You can go to the Status Window of the Epoch-H V1.X program to view the basic parameters of the repeater once the repeater has installed successfully.*

17. Lock the Epoch-HP Door
Now you can lock the door using the key provided.

CONGRATULATIONS!!
The Epoch-HP Installation Process is Complete.

3 User Manual V1.0 using Epoch-H V1.X

    3.1 Menu Structure

        3.1.1 Window Overview

Status
The Status Window allows you to monitor the current settings and status of the Epoch-HP.

Control
The Control Window enables you to change or adjust the Epoch-HP's parameters and settings.

Install
The Install Window guides you through an automated installation of the Epoch-HP repeater.

System Information
For more detailed system information, click on the Info. Menu. Information such as model number, serial number, and firmware version of the repeater are included here. You can also upgrade the repeater firmware from this menu.
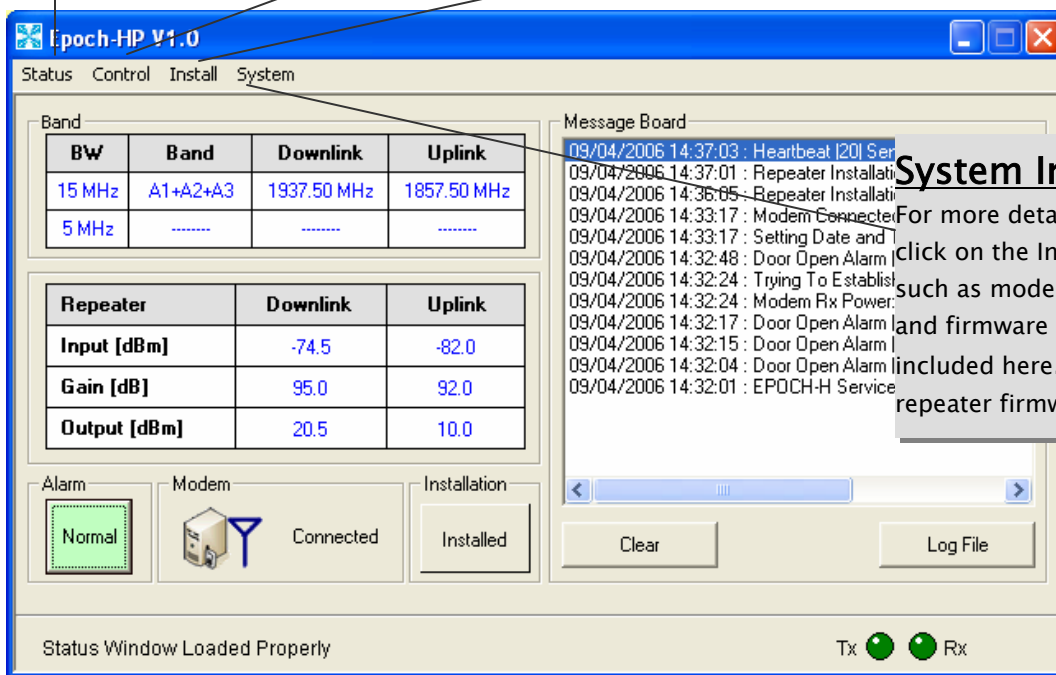

Figure 7 – Status Window of the Epoch-H V1.X

3.1.2 Status Window

The Status Window is the monitoring window of the Epoch-H V1.X. This window enables the user to monitor the status and settings of the Epoch-HP. In other words, no parameters can be changed in the Status Window. To change parameters, you will need to go to the Control Window.

Repeater Input
Indicates input signal strength of the repeater after being amplified by the donor antenna [in dBm].

Repeater Gain
Indicates the gain of the repeater [in dB].

Repeater Output
The output of the repeater [in dBm] before being radiated by the server antenna.

Band
Will display filter bandwidth, currently selected bands, center downlink & uplink operating frequencies.

Message Board
The user will be able to see heartbeat messages which are sent out recently. In addition, the user will also be able to see any alarms that are generated along with messages once the alarms are cleared as well.

Modem Connection
Will let you know if the wireless modem is connected to the repeater

Clear
Will clear the Message Board.

Log File
History for the heartbeats and alarms generated from the repeater and can be saved as a text file.
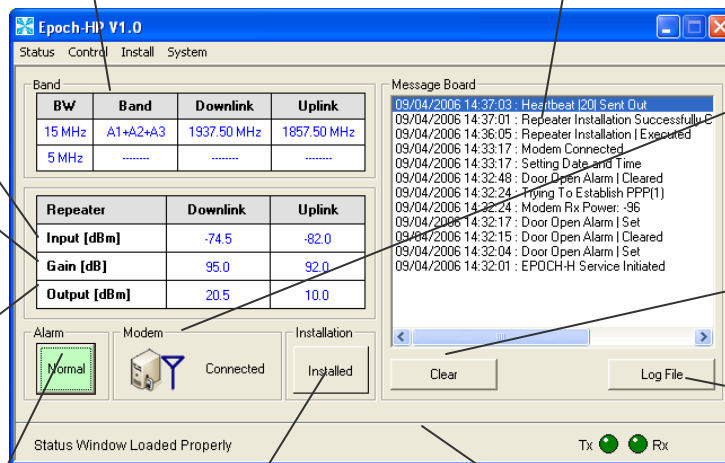
Figure 8 – Status Window of the Epoch-H V1.X

Alarm Button
The alarm button changes color to the corresponding status of the repeater: Green for normal operation; Yellow for soft fail alarm; and Red for hard fail alarm. Click on the alarm button for detailed information.

Installation
Will let you know if the repeater is properly installed.

Status Bar
Displays the status of the repeater (e.g. Status Window Loaded Properly, etc.) and transmit (TX) & receive (RX) communication LEDs.

3.1.3 Control Menu

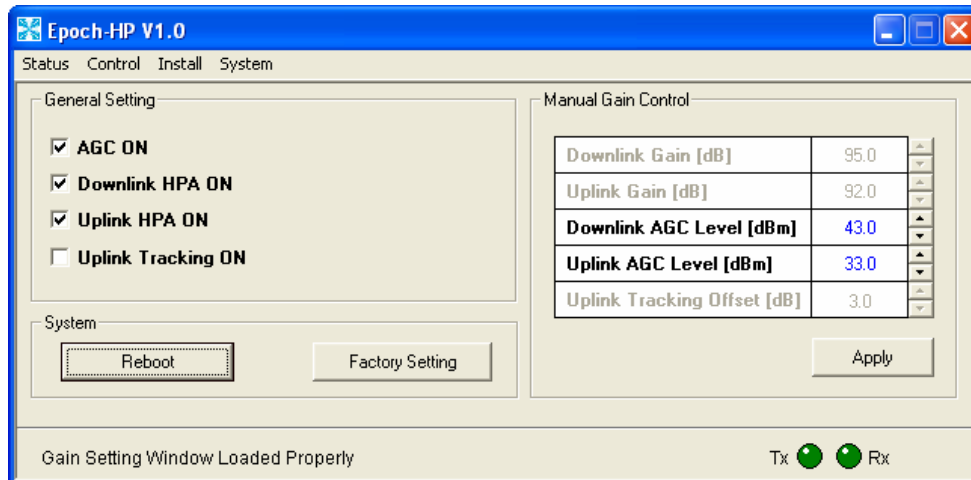#### 3.1.3.1 General Setting Window

Figure 9 – General Setting Window of the Epoch-H V1.X

AGC Mode

AGC (Auto Gain Control) adjusts the variable gain of the repeater to ensure a constant specified output power of 37, 40 or 43 dBm (depending on the Epoch-HP model). The functionality of the AGC feature is assured under the condition that the input BTS signal is within the specified AGC range and that sufficient isolation exists between antennas.   By default, the *AGC ON* box is checked. To manually change the gains in both the links, *AGC ON* must be unchecked.

If *AGC ON* is checked and *Uplink Tracking ON* is unchecked, the user can specify the AGC level in the downlink and in the uplink respectively @ 0.5 dB step. By default, the AGC Level is set to maximum output power in each link.

By default, *Uplink Tracking* is not checked. Once both AGC and Uplink Tacking are checked, this allows the user to set the AGC level in the downlink only. The default values that will be displayed on both Downlink and Uplink AGC Levels are the maximum output power as shown in the table below:

Output Power Level	Default Downlink AGC Level	Default Uplink AGC Level
5 W	43 dBm	33 dBm
10 W	40 dBm	30 dBm
20 W	37 dBm	27 dBm

Table 2 – Default AGC Power Level Values

If *Uplink Tracking ON* is unchecked, then the user can set the AGC level in both links.

Models	Gain Range	AGC Input Range
Epoch–HP–05/XX (37 dBm or 5 W Model)	65 to 95 dB	–58 to –28 dBm
Epoch–HP–10/XX (40 dBm or 10 W Model)	65 to 95 dB	–55 to –25 dBm
Epoch–HP–20/XX (43 dBm or 20 W Model)	65 to 95 dB	–52 to –22 dBm

Table 3 – AGC Input Range

Downlink/Uplink HPA Mode

The HPA mode enables the user to turn the HPA on or off. If the HPA is turned off on either link, the Epoch–HP will not operate properly. Both HPAs needs to be turned on for the RF portion of the repeater to work in both directions (downlink and uplink). By default, the *Downlink/Uplink HPA ON* box is checked.

Either or both HPAs can be turned off for troubleshooting purposes during an installation process.

Uplink Tracking/Offset Modes

Uplink tracking mode enables or disables the *Uplink Tracking ON* feature that sets the gain in the uplink equaling to the gain in the downlink.   The tracking gain offset is the difference in the uplink and downlink gains.   For example, if the downlink gain is 80 dB, the *Uplink Tracking ON* is checked, and the *Uplink Tracking Gain Offset* is set to 3 dB, the uplink gain would be 77 dB.

By default, the *Uplink Tracking ON* box is not checked. If it was checked, then the default *Uplink Tracking Offset* is set to 3 dB. This means that the uplink gain will track the down link gain and will be 3 dB less.

Control Item	Action	Setting Value
Uplink Tracking ON	Set Uplink Tracking Mode	ON or OFF
Uplink Tracking Offset	Set Tracking Gain Offset	0 ~ 25 dB @ 0.5 dB step

Table 4 – Uplink Tracking Mode and Tracking Gain Offset Range

Downlink/Uplink Gain
The gain of the Epoch-HP is the ratio of the input signal to the output signal. The gain may be set in both links.

*** The manual gain option is disabled when the AGC ON box is checked.*

Reboot
By clicking the "Reboot" button, similar to how the operation works in a PC, the control board of the repeater will restart itself.

Factory Setting
Clicking on the "Factory Setting" button resets the settings of the repeater to the original default factory settings as noted in the "Default Control Settings" in Section 3.4 on page 27.

*** You will lose your current saved settings once you click on "System Factory Setting"*
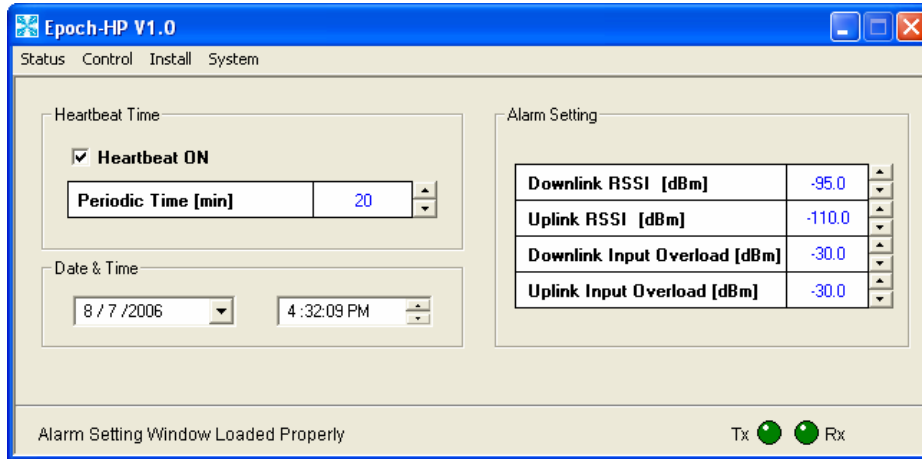
3.1.3.2 Alarm Setting Window

Figure 10 – Alarm Setting Window of the Epoch-H V1.X

Control Item	Action	Downlink	Uplink
Downlink/Uplink RSSI	Sets Low RSSI Alarm Level	-120 ~ -30 dBm	-120 ~ -30 dBm
Downlink/Uplink Input Overload	Sets Input Overload Level	-90 ~ -20 dBm	-90 ~ -20 dBm

Table 4 – Alarm Threshold Values

RSSI

The RSSI alarm is the minimum RSSI value that the Epoch-HP requires to ensure optimal coverage. The RSSI alarm will go off when the RSSI is lower than the threshold value (refer to the RSSI value in the Alarm Setting Window).

Input Overload

A *Downlink/Uplink Input Overload* alarm occurs when the input signal strength to the Epoch-HP exceeds the threshold value (refer to the *Uplink/Downlink Input Overload* values in the Alarm Setting window).

Heartbeat

Heartbeat is a periodic message sent out to Wireless Provider's NOC *only if the repeater has a wireless modem connected to it*.

Control Item	Action	Setting Value
Heartbeat ON/OFF	Set Heartbeat Mode	ON/OFF
Periodic Time	Set Heartbeat Time	1 ~ 60 min @ 1 min step

Table 6 – Heartbeat Mode and Time Range

Heartbeat Mode

The Heartbeat ON box is checked by default. The heartbeat feature is only available *if the repeater has a wireless modem connected to it*.

Periodic Time

The *Periodic Time* is the time interval between Heartbeats *only if the repeater has a wireless modem connected to it*. The default periodic time is 20 minutes. The periodic time can be adjusted manually between 1 to 60 minutes.

3.1.4   Install Window

At the time of installation, the installer needs to go to the Install Window of the Epoch-H V1.X. The Install Window will guide the installer through a step by step process to properly install the Epoch-HP repeater.

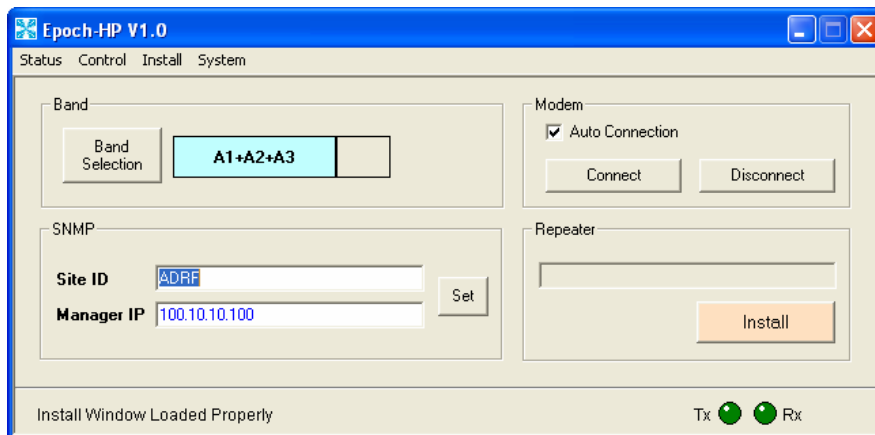For setup or installation of a repeater, go to the Install Window.

Figure 11 – Install Window of the Epoch-H V1.X

Band

Select the desired band or bands by clicking on "Band Selection." Once you do so, the following window will come up:

Figure 12 – Band Selection Window of the Epoch-H V1.X

You can select any 5 or 15 MHz block or any 5 MHz and 15 MHz contiguous blocks at anytime.

*** If a wireless modem is not connected to the repeater, simply select the desired operating band(s) and click on "Install."*

SNMP *(only applicable if a wireless modem is connected to the repeater)*

a. Site ID

The *Site ID* is a unique ID for each site and will be provided by the Wireless Provider.

b. Manager IP

The *Manager IP* address will be provided by the Wireless Provider. The repeater will send alarms to the Wireless Provider's NOC to the assigned Manager IP address.

Modem *(only applicable if a wireless modem is connected to the repeater)*

The *Auto Connection* box needs to be checked when the wireless modem is installed inside the repeater. A wireless modem is used in order to send the alarms and the heartbeat over the air to the Wireless Provider's NOC.

Repeater

Click the "Install" button and the repeater will setup automatically.

For information regarding the use of the Epoch-H V1.X during installation, refer to Section 2.7.1 on page 12, "Repeater Installation" (starting at number 8).

3.1.5 System Menu

3.1.5.1 Information

The Info. Window displays the following: (1) Model Number; (2) Serial Number; and (3) Firmware Version of the Epoch-HP repeater. Contact information is included along with a link to Advanced RF Technologies, Inc.'s URL.
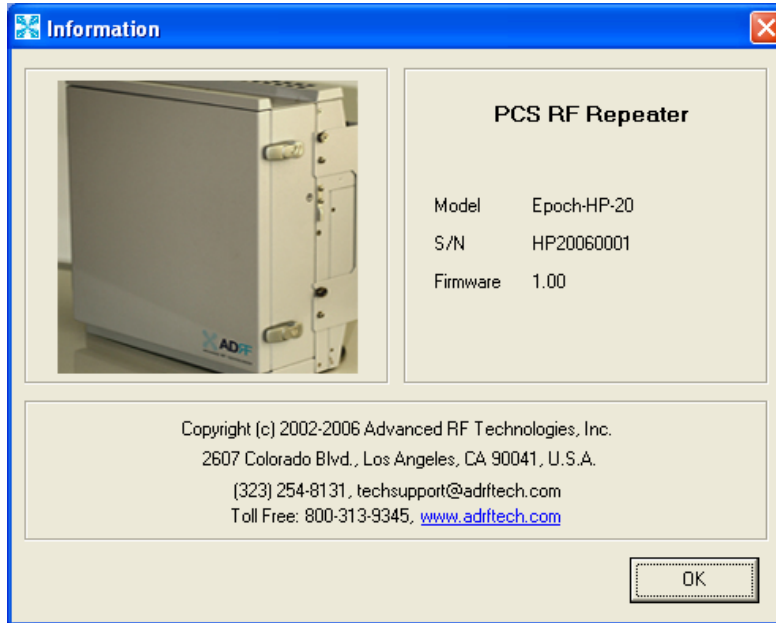

Figure13 – Info. Window of the Epoch-H V1.X

3.1.5.2 Firmware Upgrade

The Firmware Upgrade Window enables you to upgrade the firmware of the repeater. The latest version of the firmware will be provided to you by ADRF. Save the latest version of the firmware on your PC. Click on Open and locate the firmware from your PC. Click on Download and automatically the latest version of the firmware will be downloaded onto the repeater.
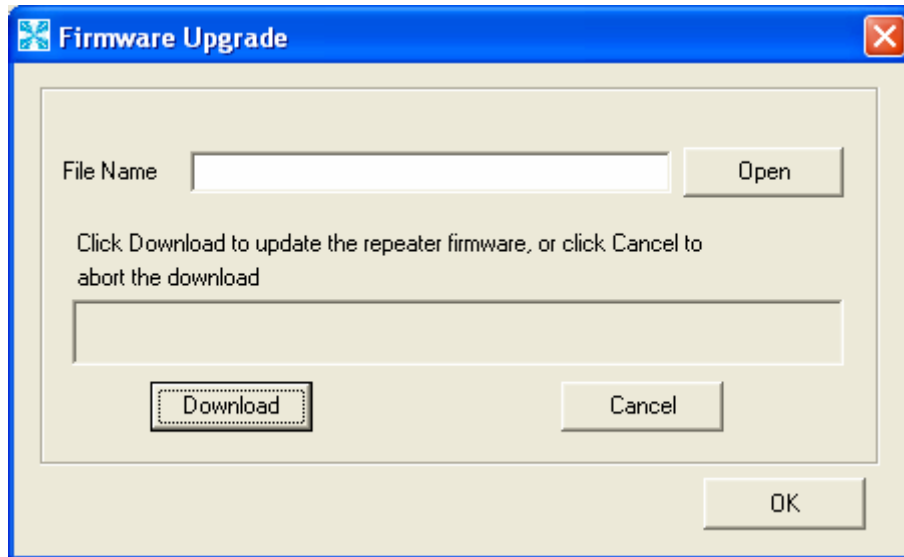
Figure 14 – Firmware Upgrade Window of the Epoch-H V1.X

3.2 Using the Epoch-H V1.X

3.2.1 Changing Parameters
In changing the parameters of the repeater via use of the Epoch-H V1.X, note that the values entered into the Epoch-H V1.X are limited to the ranges and modes specified in the Menu Structure section as explained in Section 3.1 on page 15.

The Organizational Chart below shows (alphabetically) the parameters that can be changed and the location of each parameter in the Menu Structure. The asterisk "*" denotes parameters that apply to both uplink and downlink.

Figure 15 – Variable Parameters in the Epoch–H V1.X
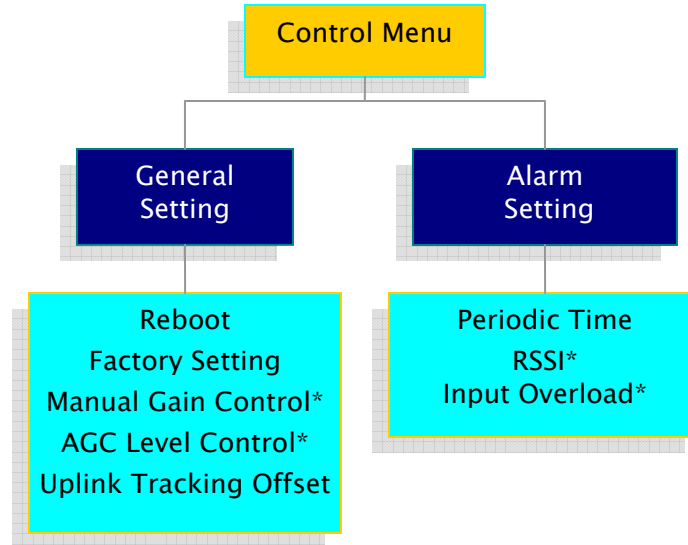
3.3 Alarms

All the various alarms that are supported by Epoch–HP can be viewed by clicking the "Alarm" button on the Status Window.   If a soft fail alarm should occur, the alarm of concern would be highlighted in yellow.   In the same manner, the corresponding hard fail alarm would be highlighted in red.   In order to find out what is causing the alarm(s), simply place the mouse cursor over the highlighted yellow or red alarm box *(Note: only applicable to some of the alarms)* and a tool tip message will appear, displaying the threshold value and the current measured value.   To update the window, click the "Refresh" button.
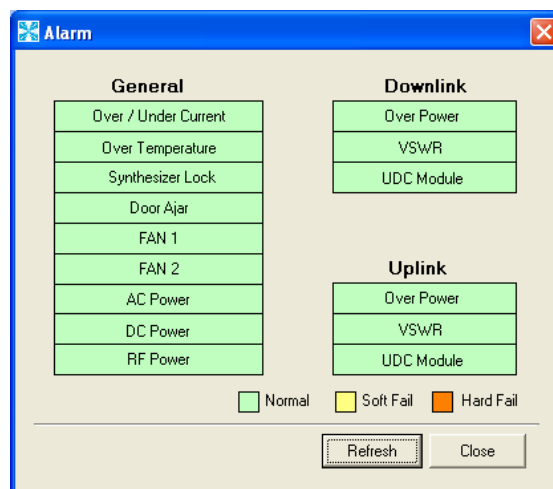

Figure 16 – All Alarm Parameters Supported by Epoch–H V1.X

In the event of a hard fail alarm, the control board will shutdown the HPA (both uplink & downlink) for 30 seconds and then turns on the HPA to check for a repeated hard fail occurrence. If the next two occurrences sense a hard fail, the control board will shutdown the HPA for 20 minutes (total of three consecutive hard fails). After 20 minutes, the HPA will automatically come back alive and the control board will check if the Hard Fail alarm has cleared. If it has not, the same process will continue as mentioned above.

3.3.1   General (Fixed Parameter) Alarms

Alarm List	Soft Fail	Hard Fail	Comments
Over/Under Current	O	O	Soft Fail: Less than 0.5 A @ under current Hard Fail: More than 7.5 A @ over current
Over Temperature	O	O	Soft Fail: 158 ~ 185 °F Hard Fail: > 185 °F
Synthesizer Lock	-	O	Band selection will not work properly
VSWR	-	O	> 1.5:1
Low Isolation/OSC.	-	O	Repeater will be in an oscillating state
RF Power	-	O	Will occur in the event of any Hard Fail alarm

Table 7 - General (Fixed Parameter) Alarms of the Epoch-H V1.X

3.3.2   Downlink/Uplink Alarms

	Alarm List	Soft Fail	Hard Fail	Remark
Downlink (Forward)	RSSI	O	-	Alarms will turn on if the value is not within operable limits specified in the Control Alarm Setting Window.
	Input Power Overload	O	-	
	Over Power*	O	O	
Uplink (Reverse)	RSSI	O	-	Note: The Over Power parameter is fixed and cannot be modified by the user.
	Input Power Overload	O	-	
	Over Power*	O	O	

Table 8 - List of Alarm Settings of the Epoch-H V1.X

The example below distinguishes the difference between an over power soft failure and an over power hard failure:

The threshold value for the downlink over power parameter is set to 45.0 dBm (factory set value for the 20 W model), a Hard Fail alarm would occur if the downlink over power value was greater than 45.0 dBm (43 dBm is the maximum composite power allowable). Similarly, a Soft Fail alarm would occur if the downlink over power value was greater than 44.0 dBm but less than 45.0 dBm. Vice versa, the same example is also applicable in the uplink side.

3.4 Default Control Settings
3.4.1   Default General Setting

Control Item	Setting Value
AGC Mode	ON
Downlink/Uplink HPA Mode	ON
Uplink Tracking Mode	ON
Downlink/Uplink Gain	80 dB
Downlink/Uplink AGC Level	DL: 37/40/43 dBm UL: 27/30/33 dBm (depending on model)
Tracking Gain Offset	3 dB

Table 9 – Adjustable Alarm Settings of the Epoch-H V1.X

a.   When *Uplink Tracking ON* mode is enabled by default, the *Tracking Gain Offset* is set to 3 dB.
b.   When *AGC ON* mode is enabled, by default, the *Downlink/Uplink AGC Level* is set to 37/40/43 dBm (depending on model).

3.4.2   Default Alarm Setting

Control Item	Setting Value	
	Downlink	Uplink
RSSI	-95 dBm	-110 dBm
Input Overload	-30 dBm	-30 dBm
Heartbeat On/Off	ON	
Heartbeat Time	20 minutes	

Table 10 – Default Alarm Parameter Values of the Epoch-H V1.X

4   Maintenance Guide for Epoch-HP

4.1 Periodic Inspection Checklist

☐ a.   Ensure that the door is closed and locked before inspection.

☐ b.   Check for loose connections to the repeater and antennas. If connections are loose, make sure that all connections are tightly fastened properly.

☐ c.   Cables and connectors are in good condition.

☐ d.   Open the repeater door to check that the repeater is turned on.

☐ e.   Check that all components inside are intact with no unusual wear (e.g., rust, dirt, etc.).

☐ f.   Ensure that the repeater brackets (if used) are in good condition and that the repeater is securely fastened.

4.2 Preventive Measures for Optimal Operation

4.2.1   Recommendations

- Perform the *Periodic Inspection Checklist* quarterly or semiannually.

- Always lock the door to the repeater to prevent unauthorized access.

4.2.2   Precautions

- Do not operate the repeater with the antennas in extremely close proximity as this may cause damage to the repeater.

- Do not shut down the repeater unless absolutely necessary (in the case where the repeater is a hazard to safety).

- Do not change parameters unless instructed to do so by an authorized supervisor.

- Do not move the repeater unless instructed to do so by an authorized supervisor.

- Do not detach any cables to the repeater unless repair of respective components are necessary.

5 Troubleshooting

5.1 Epoch-H V1.X Scenarios

Tx	Rx	Explanation
RED	RED	The USB port can not send or receive data. Check the USB port connection to the computer and the repeater. Ensure that the repeater is turned on and that the connection to the repeater is secure.
Blinking GREEN	RED	The repeater is not receiving any commands from the software. Ensure that the repeater is tuned on and check for proper USB port connection.
Blinking GREEN	Solid GREEN	The repeater is not receiving any commands from the software. In this state, the repeater is either processing or executing a command. Wait for a few seconds for the Rx LED to blink periodically.
Blinking GREEN	Blinking GREEN	Successful Connection. The Epoch-H V1.X and the repeater are communicating successfully.

Table 9 – Tx and Rx LEDs

Note: The Tx/Rx LEDs will blink periodically only on the Status Window.

5.2 Common Installation Problems

Problem	Possible Solution
The power green LED on the second panel is not lit.	Check if the power supply switch is turned on by opening the second door of the repeater.
Software & Laptop – No Communication	Please verify if the USB driver has been installed.
Status Window – Weak Signal or Donor RSS	Option 1: Check that the donor and server antennas are connected to the proper antenna ports on the repeater. Option 2: Reposition or rotate the donor antenna around until a stronger signal is received.
Low Isolation or Oscillation	Increase the separation between the donor and server antennas by moving the antennas around or by rotating them.
Downlink/Uplink VSWR Alarm	Check the cabling because RF signals maybe leaking and also verify that the connectors are tightly secured.
Downlink/Uplink Input Power Overload Alarm	Option 1: Add an attenuator after the donor/server antenna to reduce the strong donor/server signal coming into the repeater.

	Option 2: An oscillation in the system could cause this alarm. Check if there is sufficient separation between the donor and the server antennas.
Downlink/Uplink Over Power Alarm	Option 1: Add an attenuator after the donor/server antenna to reduce the strong donor/server signal coming into the repeater. Option 2: An oscillation in the system could cause this alarm. Check if there is sufficient separation between the donor and the server antennas.

Table 11 – Troubleshooting Tips

6   Warranty and Repair Policy
    6.1 General Warranty

The Epoch-HP carries a Standard Warranty period of two (2) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

6.2 Limitations of Warranty

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product. Advanced RF Technologies, Inc. may elect which remedy or combination of remedies to provide in its sole discretion. Advanced RF Technologies, Inc. shall have a reasonable time after determining that a defective product exists to repair or replace a defective product. Advanced RF Technologies, Inc. warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

5.3 Limitation of Damages

Advanced RF Technologies, Inc. entire liability for any defective product shall in no event exceed the purchase price for the defective product.

5.4 No Consequential Damages

Advanced RF Technologies, Inc. has no liability for general, consequential, incidental or special damages.

5.5 Additional Limitation on Warranty

Advanced RF Technologies, Inc. standard warranty does not cover products which have been received improperly packaged, altered, or physically damaged. For example, broken warranty seal, labels exhibiting tampering, physically abused enclosure, broken pins on connectors, any modifications made without Advanced RF Technologies, Inc. authorization, will void all warranty.

5.6 Return Material Authorization (RMA)

No product may be returned directly to Advanced RF Technologies, Inc. without first getting an approval from Advanced RF Technologies, Inc. If it is determined that the product may be defective, you will be given an RMA number and instructions in how to return the product. An unauthorized return, i.e., one for which an RMA

number has not been issued, will be returned to you at your expense. Authorized returns are to be shipped prepaid and insured to the address on the RMA in an approved shipping container. You will be given our courier information. It is suggested that the original box and packaging materials should be kept if an occasion arises where a defective product needs to be shipped back to Advanced RF Technologies, Inc. To request an RMA, please call (323) 254-8131 or send an email to techsupport@adrftech.com.

Appendix A: Specifications

A.1 Repeater Specifications

ELECTRICAL SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Frequency Range	DL	1930 to 1990 MHz	
	UL	1850 to 1910 MHz	
Sub Band Filtering		5 MHz, 15 MHz or 20 MHz	Any 5MHz @ 60MHz Any 15MHz @ 60MHz Any 5+ 15MHz @ 60MHz
Operating Frequency		Programmable	
Frequency Error		≤ +/- 0.05 ppm	
System Delay		≤ 5 usec	Each Band
Repeater Gain		65 to 95 dB	
Maximum DL / UL Output Power	20 W	+43 dBm / +33 dBm	Composite
	10 W	+40 dBm / +30 dBm	
	5 W	+37 dBm / +27 dBm	
DL AGC Range		30 dB	
UL AGC Range		30 dB	
AGC Step Size		0.5 dB	
Gain Linearity		≤ +/- 0.8 dB	
Gain Flatness		≤ 3.0 dB Peak to Peak	@ Each Band
		≤ 4.0 dB Peak to Peak	@ Full Band
Spectral Mask Emission		≤ -45 dBc	@ Fc +/- 885 KHz
		≤ -55 dBc	@ Fc +/- 1.98 MHz
		< -13 dBm	@ Fc +/- 2.25 MHz
Rho Factor		≥ 0.96	
Noise Figure		Maximum 5 dB	@ Maximum Gain
VSWR		≤ 1.5:1	

MECHANICAL SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Cabinet Size		18.11 x 20.08 x 9.55 inches	W x H x D (Including Bracket)
Cabinet Weight		73 lbs	Including Bracket
Cabinet Mount Type		Utility Pole Mount	
Connector Type	Antenna	N-Type (F)	
	Coupling	SMA (F)	30 dB
	Frame Ground	Lug Terminal (5.5SQ)	
	Control	USB	
Cooling		Forced Air Cooling	2 FAN
Weatherproofing		NEMA 4, IP65	

POWER SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Main AC Power		100 or 240 V AC	Select Switch Type
AC Frequency		50 to 65 Hz	
Power Consumption	20 W	500 Watts	
	10 W	360 Watts	
	5 W	250 Watts	
AC Supply Protection		Fuse	
Grounding		External Threaded Stud	

ENVIRONMENTAL SPECIFICATIONS

PARAMETERS	SPECIFICATIONS	COMMENTS
Operating Temperature	-22 ˚F to +122 ˚F	
Storage Temperature	-40 ˚F to +176 ˚F	
Humidity	5 to 95%, RH	