

EPOCH-S02-19001W

USER MANUAL

Version 1.0





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1. Installation Guide for Epoch-S02-19001W

1.1 Environmental Requirements

1.1.1 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.

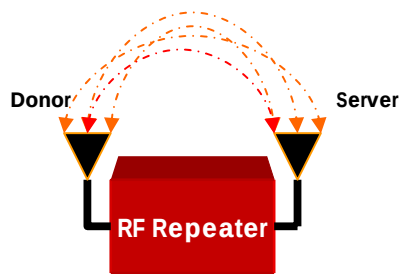


Figure 1 – RF Repeater Oscillation

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-S02-19001W has a maximum gain of 96 dB, it requires an isolation of at least 109 ~ 111 dB.

1.1.2 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.

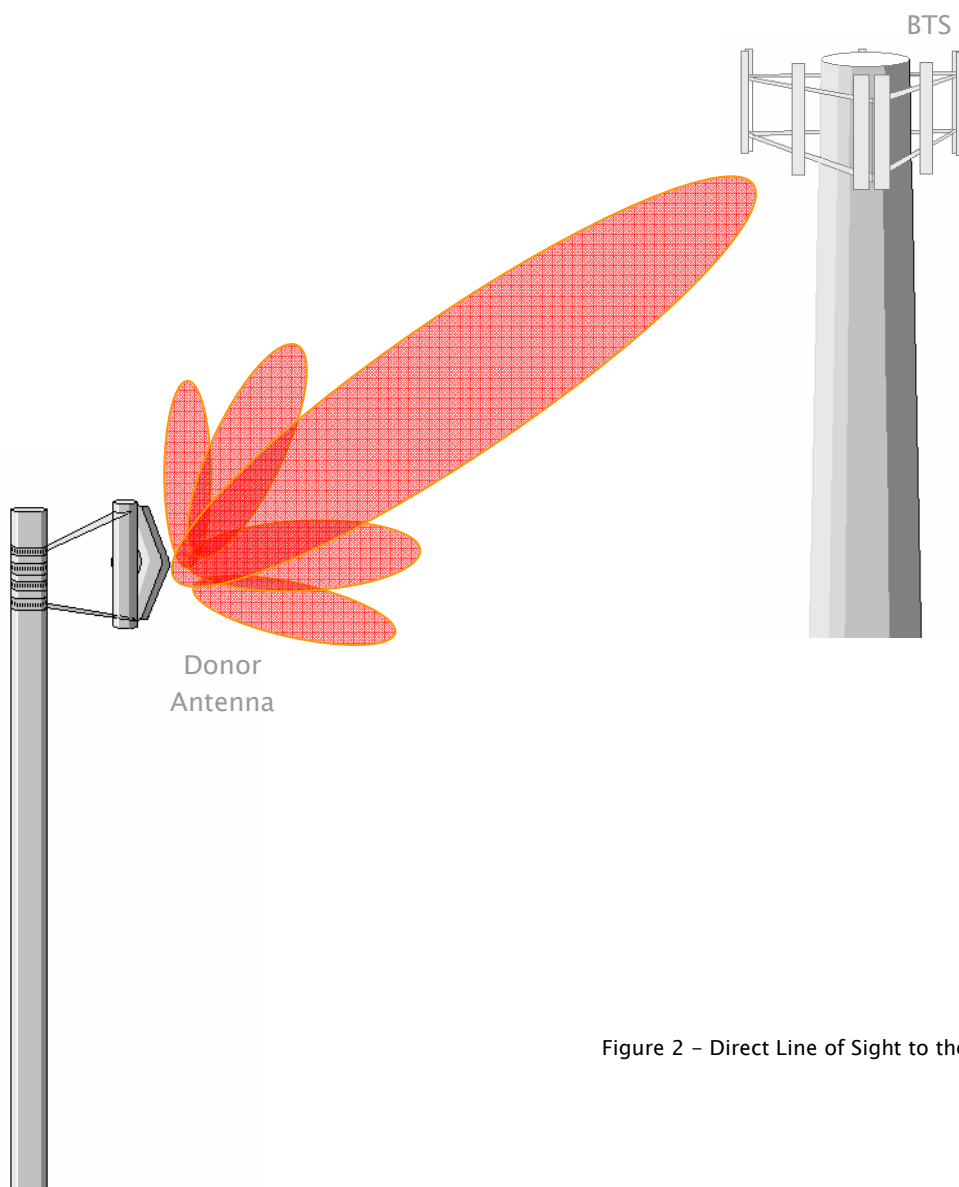


Figure 2 – Direct Line of Sight to the BTS

1.2 Warnings and Hazards



WARNING! ELECTRIC SHOCK

Tampering with the modules within the Epoch-S02-19001W 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-S02-19001W 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.

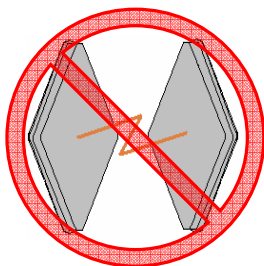


WARNING! EXPOSURE TO RF

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.

MPE WARNING!

Please maintain a safe distance of 50.16 cm while operating near the donor and the server antennas (assuming the maximum gain of either of the antennas do not exceed 15 dBi).



WARNING!

Operating the Epoch-S02-19001W with antennas in very close proximity facing each other could lead to severe damage to the repeater.

1.3 Tools and Recommendations for Installation

The following may be necessary (not required) for installation of the repeater:

- Crescent Wrench
- Philips Screw Driver
- Lift, Ladder, or Boom Truck
- Spectrum Analyzer
- Sweep Tester
- Signal Generator
- Pilot Scanner
- RF Power Meter
- Voltmeter
- Coaxial Cables
- Compass
- PC with an RS-232 serial port (with Epoch-S02 1W OMS V1.XX Software installed)

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-S02-19001W repeater system.

1.4 Epoch-S02-19001W Parts List

The Epoch-S02-19001W repeater system includes:

	<u>PART ID</u>	<u>QUANTITY</u>
a. Epoch-S02-19001W Repeater	EPOCHSO201	1
b. Repeater I-Bracket (Added Option)	ISRB01	1
c. Nuts and Bolts	BLTS01	4
d. Screws (Added Option)	SC01	8
e. Epoch-S02 1W OMS V1.XX	SO2OMS V1.XX01	1
f. Ground Cable	GNDSTD01	1

g. Straight-Through Serial Cable	SCST01	1
h. Keys	KEYS01	4

1.5 Epoch-S02 1W OMS V1.XX Installation and Requirements

1.5.1 Minimum Requirements

Hardware (PC Platform)

CPU:	200 MHz
Memory:	32 MB
Hard Disk:	10 MB (Free Space)
Serial Port:	1 Port (RS-232)
CD-ROM Drive	

Compatible Operating System:

Microsoft Windows 98SE, ME, 2000 (Preferred), XP

1.5.2 Epoch-S02 1W OMS V1.XX Installation

Installing the Epoch-S02 1W OMS V1.XX

- Insert the CD into the CD-ROM drive.
- Click on "My Computer."
- In the "My Computer" window, click on your CD-ROM drive (usually labeled D:).
- Double-click the file labeled "setup.exe."
- The installation wizard will guide you through the conclusion of the Epoch-S02 1W OMS V1.XX installation process.

1.5.3 Initial Startup of Epoch-S02 1W OMS V1.XX

- Using the straight-through serial cable (SCST01) that is provided, connect one end of the cable to the PC RS-232 serial port and the other end to the repeater's DB9 port (labeled as NMS) located on the bottom of the repeater.
- Open the Epoch-S02 1W OMS V1.XX software
- In the Status Window, choose the right communication port: COM1, COM2, COM3, or COM4 (the default setting is COM1). Refer to section 2.1.1 for additional information on page 15.

***** If your PC does not have a serial port and only supports USB connection, you will then need a USB-to-Serial adapter so that it can connect to the straight-through serial cable that is provided.***

- d. Click on the Status Window again to refresh the window.

1.6 Pre-Installation using Epoch-S02 1W OMS V1.XX

Prior to the Epoch-S02-19001W installation, ensure that:

- a. The correct COM port is selected.
- 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-S02-19001W). Similarly, a blinking green TX LED indicates that the PC is transmitting data to the Epoch-S02-19001W.***

***** If neither of the LEDs is blinking: (1) check the COM port setting of your PC by choosing the port to which the serial port is assigned; (2) check the straight-through serial cable is connected properly between the PC and the repeater; or (3) check if the repeater power is on.***

1.7 Step by Step Instructions for Installation

1.7.1 Repeater Setup

1. Mount the I-Bracket (Optional)

Position the I-Bracket (ISRB01) at the desired location. Using the 8 screws (SC01) provided, fasten the I-Bracket securely.

2. Attach Repeater to the I-Bracket (Optional)

Using the 4 bolts (BLTS01) provided, fasten the repeater (Epoch-S02-19001W) to the I-Bracket.

3. Open the Epoch-S02-19001W

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.**



Figure 3 - Bottom Side of the Repeater

4. 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 (# 3). Connect the ground wire (GNDSTD01) to the ground connector as shown in Figure 3 (# 5).

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

5. 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-S02-19001W as shown in Figure 3 (# 2).

6. 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-S02-19001W as shown in Figure 3 (# 4).

7. Connect the Serial Cable

Using the straight-through serial cable (included in the box), connect one end of the cable to the Epoch-S02-19001W's NMS port located on the bottom of the repeater (# 1 – Figure 3) and the other end to the laptop's serial port.

8. Turn On the Power for Epoch-S02-19001W

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.

9. Launch the Epoch-S02 1W OMS V1.XX Program

Open the Epoch-S02 1W OMS V1.XX program. You will see the Status Window.

***** For more detailed information on the Epoch-S02 1W OMS V1.XX, please refer to Section 2 on page 15.***

10. Select Proper COM Port

From the Status Window of the Epoch-S02 1W OMS V1.XX, select the correct COM port setting at the lower right hand side of the window (refer to Section 2.1.1 on page 15).

***** 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-S02-19001W. A green blinking RX LED indicates that the data is being retrieved from the Epoch-S02-19001W to the PC.***

***** If either the TX or the RX status LED is not blinking, check the COM port setting of your PC and choose the port to which serial port is assigned. For more information, refer to Section 4, "Troubleshooting" on page 27.***

***** 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."***

11. 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:

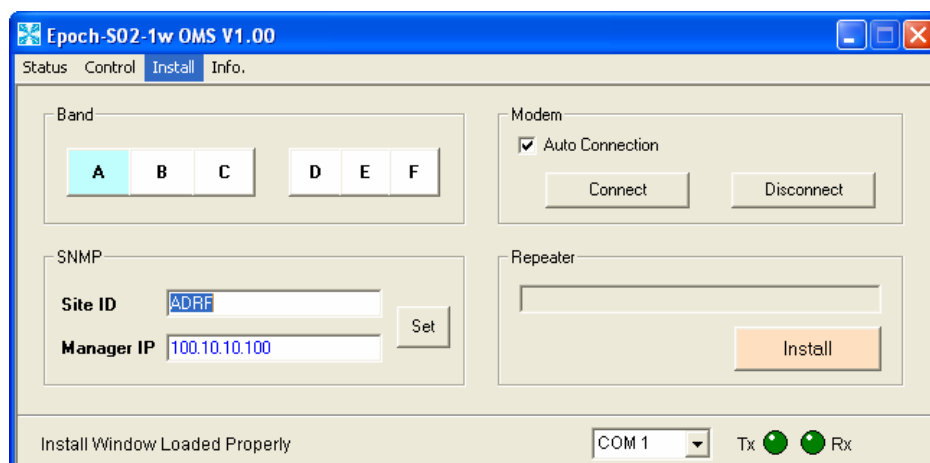


Figure 4 – Installation Window of the Epoch-S02 1W OMS V1.XX

12. Select the Desired Band or Bands

Select the desired band or bands by clicking the appropriate buttons. You can deselect the undesired band or bands by clicking the button again. You can select among 15 band combinations; A, B, C, D, E, F, AD, AE, AF, BD, BE, BF, CD, CE or EF. Neither two 5 MHz bands (e.g. DE, DF, etc.) nor two 15 MHz bands (e.g. AB, AC, etc.) are allowed. The default band is A.

Control Item	Action	Setting Value
15 MHz Band	Band Selection	A/B/C
5 MHz Band	Band Selection	D/E/F

Table 1 – 15 MHz and 5 MHz Band Options

**** Only one 15 MHz band and one 5 MHz band can be chosen simultaneously (i.e. A and D, B and E, etc.; not A and B, E and F, etc.).**

**** If a wireless modem is not connected, skip steps 13 through 15 and proceed to step 16.**

13. 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.

14. Check the Modem Connection

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

15. 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:



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

16. 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 2.3 on page 23.***

***** You can go to the Status Window of the OMS V1.XX program to view the basic parameters of the repeater once the repeater has installed successfully.***

17. Lock the Epoch-S02-19001W Door

Now you can lock the door using the key provided.

CONGRATULATIONS!!

The Epoch-S02-19001W Installation Process is Complete.

2 User Manual V1.0 using Epoch-S02 1W OMS V1.XX

2.1 Menu Structure

2.1.1 Window Overview

Status

The Status Window allows you to monitor the current settings and status of the Epoch-S02-19001W.

Control

The Control Window enables you to change or adjust the Epoch-S02-19001W's parameters and settings.

Install

The Install Window guides you through an automated installation of the Epoch-S02-19001W repeater.

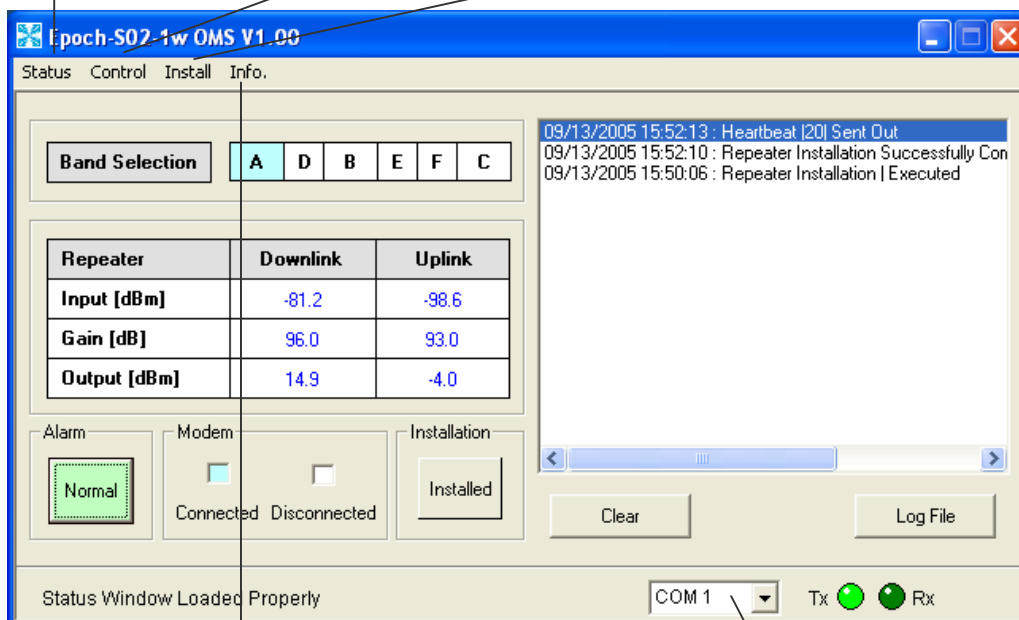


Figure 5 – Status Window of the Epoch-S02 1W OMS V1.XX

System Information

For more detailed system information, click on the Info. Menu. Information such as model number, serial number, firmware version and manufacturing date of the repeater are included here.

COM Port Selection

To select the appropriate COM port, click the small downward arrow. A pull-down list will appear with a number of COM port options.

2.1.2 Status Window

The Status Window is the monitoring window of the Epoch-S02 1W OMS V1.XX. This window enables the user to monitor the status and settings of the Epoch-S02-19001W. 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].

Band Selection

Currently selected band(s) are highlighted.

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.

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.

Modem Connection

If the modem has properly established a PPP session.

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.

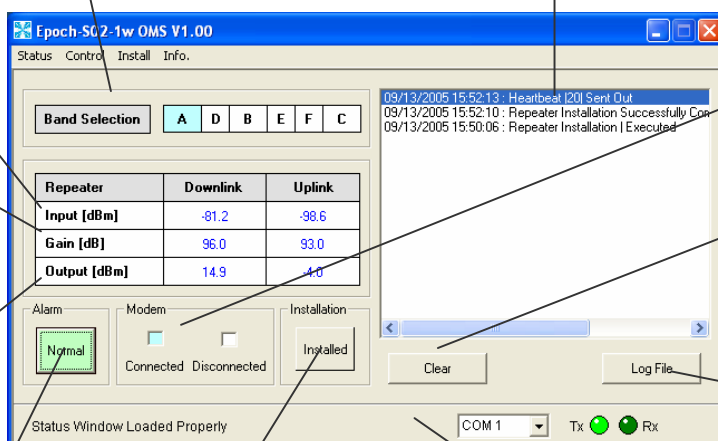


Figure 6 – Status Window of the Epoch-S02 1W OMS V1.XX

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.), transmit (TX) and receive (RX) communication LEDs, and COM ports (e.g. COM1, etc.).

2.1.3 Control Menu

2.1.3.1 General Setting Window

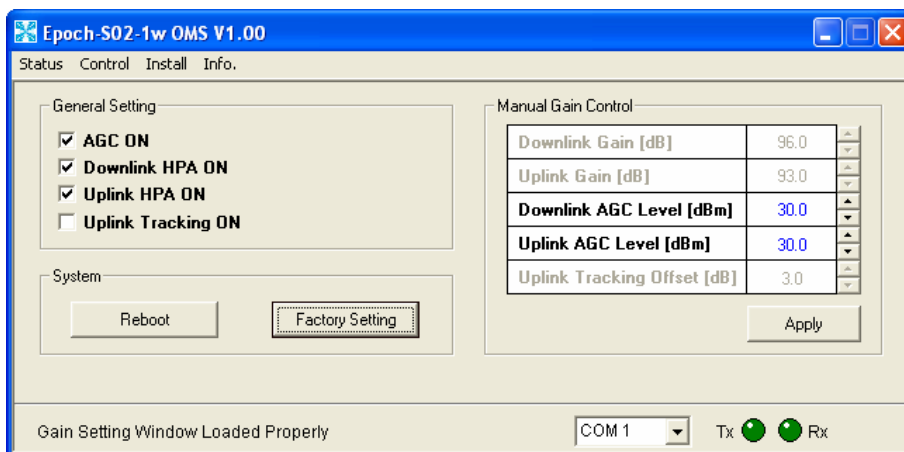


Figure 7 – General Setting Window of the Epoch-S02 1W OMS V1.XX

AGC Mode

AGC (Auto Gain Control) adjusts the variable gain of the repeater to ensure a constant specified output power of 30 dBm. The functionality of the AGC feature is assured under the condition that the input BTS signal is within the specified AGC range (–66 to –26 dBm) and that sufficient isolation exists between antennas (≥ 109 dB). 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 (0 to 30 dBm). By default, the AGC level is set to 30 dBm in each link.

By default, *AGC ON* and *Uplink Tracking ON* are both checked, this allows the user to set the AGC level in the downlink only. If *Uplink Tracking ON* is unchecked, then the user can set the AGC level in both links.

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-S02-19001W 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 checked and the *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 2 – Uplink Tracking Mode and Tracking Gain Offset Range

Downlink/Uplink Gain

The gain of the Epoch-S02-19001W 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.***

System Reboot

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

System 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 2.4 on page 26.

***** You will lose your current saved settings once you click on “System Factory Setting”***

2.1.3.2 Alarm Setting Window

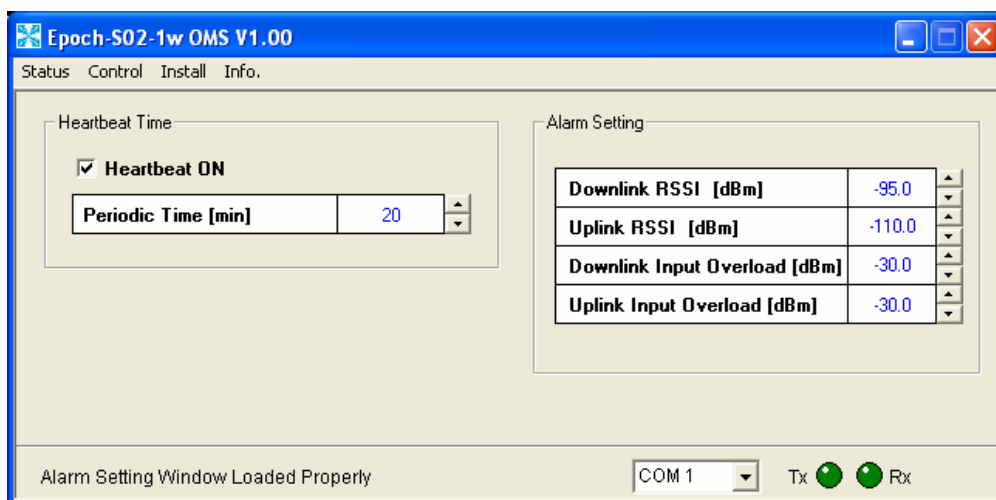


Figure 8 – Alarm Setting Window of the Epoch-S02 1W OMS V1.XX

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 3 – Alarm Threshold Values

RSSI

The RSSI alarm is the minimum RSSI value that the Epoch-S02-19001W 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). The threshold RSSI value can also be adjusted manually @ 0.5 dB step (range is shown in Table 3 on page 19).

Input Overload

A *Downlink/Uplink Input Overload* alarm occurs when the input signal strength to the Epoch-S02-19001W 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 4 – 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.

2.1.4 Install Window

At the time of installation, the installer needs to go to the Install Window of the Epoch-S02 1W OMS V1.XX. The Install Window will guide the installer through a step by step process to properly install the Epoch-S02-19001W repeater.

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

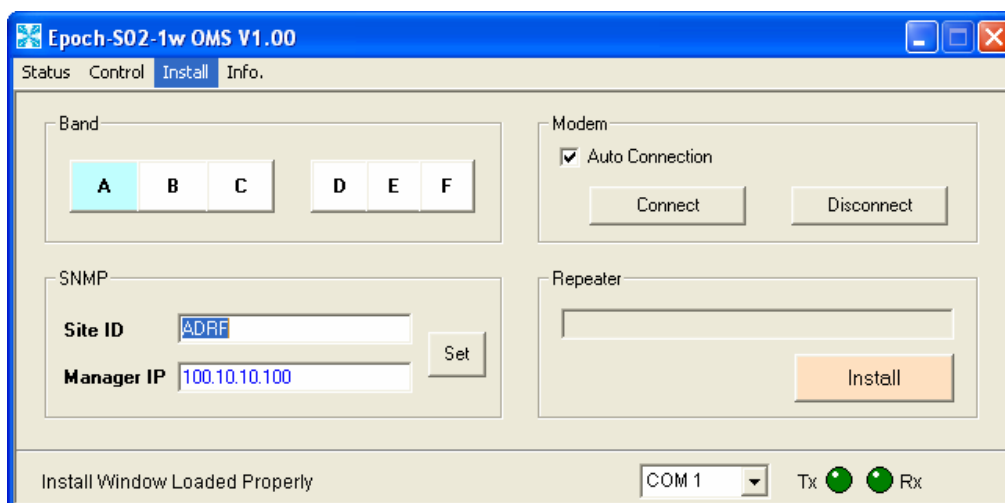


Figure 9 – Install Window of the Epoch-S02 1W OMS V1.XX

Band

Select the desired band or bands by clicking the appropriate buttons. You can deselect the undesired band or bands by clicking the button again. You can select among a total of 15 band combinations; A, B, C, D, E, F, AD, AE, AF, BD, BE, BF, CD, CE and EF. Neither two 5 MHz bands nor two 15 MHz bands can be selected at any given time.

***** 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-S02 1W OMS V1.XX during installation, refer to Section 1.7.1 on page 12, "Repeater Installation" (starting at number 9).

2.1.5 System Information

The Info. Window displays the Model Number, Serial Number, Firmware Version, and Manufacturing Date of the Epoch-S02-19001W repeater. Contact information is included along with a link to Advanced RF Technologies, Inc.'s URL.



Figure10 – Info. Window of the Epoch-S02-19001W OMS V4.XX

2.2 Using the Epoch-S02 1W OMS V1.XX

2.2.1 Changing Parameters

In changing the parameters of the repeater via use of the Epoch-S02 1W OMS V1.XX, note that the values entered into the Epoch-S02 1W OMS V1.XX are limited to the ranges and modes specified in the Menu Structure section as explained in Section 2.1 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.

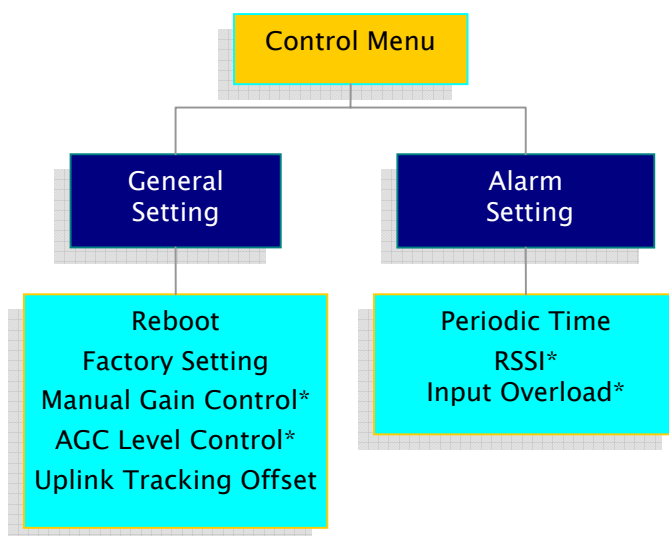


Figure 11 – Variable Parameters in the Epoch-S02 1W OMS V1.XX

2.3 Alarms

All the various alarms that are supported by Epoch-S02-19001W 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.

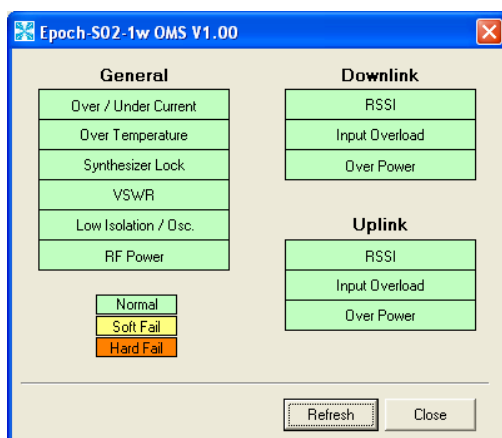


Figure 12 – All Alarm Parameters Supported by Epoch-S02-19001W

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.

2.3.1 General (Fixed Parameter) Alarms

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

Table 5 – General (Fixed Parameter) Alarms of the Epoch-S02 1W OMS V1.XX

2.3.2 Downlink/Uplink Alarms

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

Table 6 – List of Alarm Settings of the Epoch-S02 1W OMS V1.XX

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 32.0 dBm (factory set value), a Hard Fail alarm would occur if the downlink over power value was greater than 32.0 dBm (30 dBm is the maximum composite power allowable). Similarly, a Soft Fail alarm would occur if the downlink over power value was greater than 31.0 dBm but less than 32.0 dBm. Vice versa, the same example is also applicable in the uplink side.

2.4 Default Control Settings

2.4.1 Default General Setting

Control Item	Setting Value
AGC Mode	ON
Downlink/Uplink HPA Mode	ON
Uplink Tracking Mode	ON
Downlink/Uplink Gain	86 dB
Downlink/Uplink AGC Level	30 dBm
Tracking Gain Offset	3 dB

Table 7 – Adjustable Alarm Settings of the Epoch-S02 1W OMS

- When *Uplink Tracking ON* mode is enabled by default, the *Tracking Gain Offset* is set to 3 dB.
- When *AGC ON* mode is enabled, by default, the *Downlink/Uplink AGC Level* is set to 30 dBm.

2.4.2 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 8 – Default Alarm Parameter Values of the Epoch-S02 1W OMS V1.XX

3 Maintenance Guide for Epoch-S02-19001W

3.1 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.

3.2 Preventive Measures for Optimal Operation

3.2.1 Recommendations

- Perform the *Periodic Inspection Checklist* quarterly or semiannually.
- Always lock the door to the repeater to prevent unauthorized access.

3.2.2 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.

4 Troubleshooting

4.1 Epoch-S02 1W OMS V1.XX Scenarios

Tx	Rx	Explanation
RED	RED	The COM port can not send or receive data. Check the COM 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 OMS software. Ensure that the repeater is tuned on and check for proper COM port connection.
Blinking GREEN	Solid GREEN	The repeater is not receiving any commands from the OMS 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-S02 1 w OMS V1.XX 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.

4.2 Common Installation Problems

Problem	Possible Solution
A serial port is not available on the PC (only has a USB Port)	You would need a USB-to-Serial adapter so that it can connect to the straight-through serial cable that is included with the repeater.
The power green LED on the front panel is not lit.	Option 1: Check if the power supply switch is turned on by opening the second door of the repeater. Option 2: Check if the control board switch is turned on by opening the second door of the repeater.
OMS Software & Laptop – No Communication	Option 1: Please verify that the serial cable is a straight-through serial cable (use the one that came with the repeater). Option 2: Verify that proper COM port has been selected and the Tx and Rx LEDs are lit green and blinking periodically on the Status Window.
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: Check if the current OMS software loaded is the

	same version as the one provided with the repeater. If it is not, install the version of the OMS software from the CD provided. Option 3: 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: If the repeater is connected to a DAS, there's a good chance the DAS system could cause a strong signal to come in on the uplink side of the repeater, causing an <i>Uplink Input Power Overload</i> alarm. If this happens, add an attenuator on the uplink side of the repeater or control the signal coming in from the DAS. Option 3: 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 10 – Troubleshooting Tips

5 Warranty and Repair Policy

5.1 General Warranty

The Epoch-S02-19001W carries a Standard Warranty period of two (2) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

5.2 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	FL	1930 to 1990 MHz	Protocols: TDMA, CDMA & GSM
	RL	1850 to 1910 MHz	
Sub Band Filtering		5 MHz, 15 MHz, or 20 MHz	A, D, B, E, F, C, AD, AE, AF, DB, DC, BE, BF, EC or FC
Operating Frequency		Programmable	
Frequency Error		$\leq \pm 0.1$ ppm	
System Delay		≤ 5 usec	Each Link
Receiver Dynamic Range		-66 to -26 dBm	
Repeater Gain		56 to 96 dB	
Maximum FL and RL Output Power		+30 dBm	Composite
FL AGC Range		40 dB	
RL AGC Range		40 dB	
AGC Step Size		0.5 dB	
Gain Linearity		$\leq \pm 1.0$ dB	
Gain Flatness		≤ 2.5 dB	
Total PA Power Variance		$\leq \pm 0.5$ dB	
In-Band Noise		≤ -45 dBc	@ Fc $\pm$ 885 KHz
		≤ -52 dBc	@ Fc $\pm$ 1.98 MHz
Spurious Emission		< -13 dBm	@ Fc $\pm$ 2.25 MHz
Rho Factor		≥ 0.912	
Noise Figure		Typical 4 dB	@ Maximum Gain
VSWR		$\leq 1.5:1$	

MECHANICAL SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Cabinet Size		15.75 x 17.72 x 9.45 inches	W x H x D (Without I-Bracket)
Cabinet Weight		57 lbs	Without I-Bracket
Cabinet Mount Type		Utility Pole Mount	
Connector Type	Antenna	N-Type (F)	
	Coupling	SMA (F)	30 dB
	Frame Ground	Hex Nut (M6)	
	Control	DB9 (M)	
Cooling		Convection	
Weatherproofing		NEMA 4, IP65	

POWER SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Main AC Power		100 to 240 V AC	
AC Frequency		45 to 65 Hz	
Power Consumption		100 Watts	
AC Supply Protection		Fuse	
Grounding		External Threaded Stud	

ENVIRONMENTAL SPECIFICATIONS

PARAMETERS		SPECIFICATIONS	COMMENTS
Operating Temperature		-22 °F to +122 °F	
Storage Temperature		-22 °F to +176 °F	
Humidity		10 to 85%, RH	