# FCC Part 22
# Transmitter Certification

# <u>Test Report</u>

## FCC ID: DNY0A1EKOMINI8

## FCC Rule Part: CFR 47 Part 22 Subpart H

## ACS Report Number: 05-0373-22H

Manufacturer: EMS Wireless
Equipment Type: Cellular Bi-Directional Amplifier
Model: EKOMINI-8

# Operator's Manual

# EkoMini™ BAND SELECTIVE INDOOR REPEATER

# OPERATOR'S MANUAL

**EMS**
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Disclaimer

**Every attempt has been made to make this material complete, accurate, and up-to-date.  Users are cautioned, however, that EMS *Wireless* reserves the right to make changes without notice and shall not be responsible for any damages, including consequential, caused by reliance on the material presented, including, but not limited to, typographical, arithmetical, or listing errors.**

Copyright Information

WARNINGS, CAUTIONS, AND GENERAL NOTES

**This product conforms to FCC Part 15. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

**RF Exposure**

**In accordance with FCC requirements of human exposure to radiofrequency fields, the server and donor radiating elements shall be installed such that a minimum separation distance of 20 cm and 30 cm, respectively, is maintained between the radiating element and the general population.**

Safety Considerations

**When installing or using this product, observe all safety precautions during handling and operation. Failure to comply with the following general safety precautions and with specific precautions described elsewhere in this manual violates the safety standards of the design, manufacture, and intended use of this product. EMS *Wireless* assumes no liability for the customer's failure to comply with these precautions.**

| WARNING |
|---|
| WARNING Calls attention to a procedure or practice, which if ignored, may result in damage to the system or system component. Do not perform any procedure preceded by a WARNING until described conditions are fully understood and met. |

If You Need Help

**If you need additional copies of this manual, or have questions about system options, or need help with installation and using of the system, please contact EMS *Wireless'* Customer Support Department.**

**EMS *Wireless* Customer Support Dept.**
**2850 Colonnades Court NW, Norcross, GA 30071**
**Tel: 770 582 0555**

Service

**Do not attempt to modify or service any part of this product other than in accordance with procedures outlined in this Operator's Manual. If the product does not meet its warranted specifications, or if a problem is encountered that requires service, notify EMS *Wireless'* customer support department. Service will be rendered according the EMS *Wireless'* warranty and repair policy. The product shall not be returned without contacting EMS *Wireless* and obtaining a return authorization number from the Customer Support department**

**When returning a product for service, include the following information: Owner, Model Number, Serial Number, Return Authorization Number (obtained in advance from EMS *Wireless* Customer Support Department), service required and/or a description of the problem encountered.**

Warranty and Repair Policy

**The EMS *Wireless* Quality Plan includes product test and inspection operations to verify the quality and reliability of our products.**

**EMS *Wireless* uses every reasonable precaution to ensure that every device meets published electrical, optical, and mechanical specifications prior to shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing ESD sensitive opto-electronic components. Physical damage to the external surfaces voids warranty.**

**These products are covered by the following warranties:**

**1.** General Warranty

**EMS *Wireless* warrants to the original purchaser all standard products sold by EMS *Wireless* to be free of defects in material and workmanship for the duration of the warranty period of one (1) year from date of shipment from EMS *Wireless*. During the warranty period, EMS *Wireless'* obligation, at our option, is limited to repair or replacement of any product that EMS *Wireless* proves to be defective. This warranty does not apply to any product, which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.**

**2.** Specific Product Warranty Instructions

**All EMS *Wireless* products are manufactured to high quality standards and are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of a device found to be defective on incoming inspection by a customer must be made within 30 days of receipt of the shipment, or within 30 days of discovery of a defect within the warranty period.**

**This warranty is the only warranty made by EMS *Wireless* and is in lieu of all other warranties, expressed or implied, except as to title, and can be amended only by a written instrument signed by an officer of EMS *Wireless*. EMS *Wireless* customer support representatives are not authorized to make commitments on warranty returns.**

**In the event that it is necessary to return any product against the above warranty, the following procedure shall be followed:**

**a.** **Return authorization shall be received from the EMS *Wireless* Customer Support prior to returning any device. Advise EMS *Wireless* Customer Support of the model, serial number, and the discrepancy. The device shall then be forwarded to EMS *Wireless*, transportation prepaid. Devices returned freight collect or without authorization may not be accepted.**

**b.** **Prior to repair, EMS *Wireless* Customer Support will advise the customer of EMS *Wireless* test results and will advise the customer of any charges for repair (usually for customer caused problems or out-of-warranty conditions).**

**If returned devices meet full specifications and do not require repair, or if non-warranty repairs are not authorized by the customer, the device may be subject to a standard evaluation charge. Customer approval for the repair and any associated costs will be the authority to begin the repair at EMS *Wireless*. Customer approval is also necessary for any removal of certain parts, such as connectors, which may be necessary for EMS *Wireless* testing or repair.**

**c.** **Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.**

**3.** Limitations of Liabilities

**EMS *Wireless'* liability on any claim of any kind, including negligence, for any loss or damage arising from, connected with, or resulting from the purchase order, contract, or quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contract, shall in no case exceed the purchase price of the device which gives rise to the claim.**

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**EMS *Wireless* test reports or data indicating mean-time-to-failure, mean-time-between-failure, or other reliability data are design guides and are not intended to imply that individual products or samples of products will achieve the same results. These numbers are to be used as management and engineering tools, and are not necessarily indicative of expected field operation. These numbers assume a mature design, good parts, and no degradation of reliability due to manufacturing procedures and processes.**

**EkoMini™  Manual**

**Description**

The EkoMini is a band selective, bi-directional amplifier unit and was designed to provide enhanced RF coverage for wireless systems in small facilities.  Usage includes providing coverage in retail stores, offices, warehouses, restaurants, homes, etc.

The EkoMini is housed in an indoor mountable enclosure, and is powered with a regulated wall mountable power supply.

The EkoMini supports most system protocols including CDMA, GSM/PCS1900 and TDMA and is available in models that cover all licensed 1.9 GHz PCS bands A through F, ESMR/SMR 806-866 MHz and Cellular 821 to 894 MHz.  Band selective filtering in both uplink and downlink signal paths is accomplished with down conversion to an intermediate frequency and SAW filtering to provide maximum selectivity from out of band carriers.

The EkoMini features auto set-up, lightweight compact enclosure, optional remote alarming, excellent electrical specifications, high reliability and cost-effective pricing.

**Functionality**

In order to function properly, during initial set-up the downlink signal must be presented to the EkoMini.  Without the downlink signal, the unit will not operate properly.

The EkoMini is capable of automatically adjusting its own signal gain levels up to the maximum output power levels. The EkoMini detects the downlink output power and adjusts the level for 20-dBm composite output power and continues to monitor and reset the gain as required for proper system performance.  For example, when a CDMA protocol system is being amplified, there could be an error in set-up initially resulting from only pilot sync, and paging Walsh codes being present on the RF carrier. The EkoMini will reduce the system gain until no signal is received that will exceed the output power setting.  This prevents the EkoMini from setting up to a higher power level than actually desired if all of the Walsh codes were present.  The gain does not continually change to maintain an output power of 20 dBm (AGC) since this would defeat and fight the benefits of power control in the system. The user may reduce or limit the power output level by adjusting the peak power limit as described below.  The user peak power switches will set the unit's output power up to 14 dB below the maximum power output of 20 dBm; the user interface to control this feature is the peak power switches.

The EkoMini has 30 dB of gain control in the uplink and downlink signal paths. This gain is controlled by two methods. Up to 14 dB can be controlled by adjusting the user peak limit switches located behind an access plate on the side of the unit to limit the maximum output power level. The uplink and downlink attenuators are controlled by the internal microprocessor to adjust the maximum gain of the unit for both paths. The uplink and downlink signal paths are adjusted to the same setting by the microprocessor unless the user offsets, reduces the gain in the uplink signal path. The user has control to reduce the uplink gain by 6 dB, this can be used to balance the uplink and downlink paths as well as reduce contribution of noise to the base station receivers. See Figure 1 below.
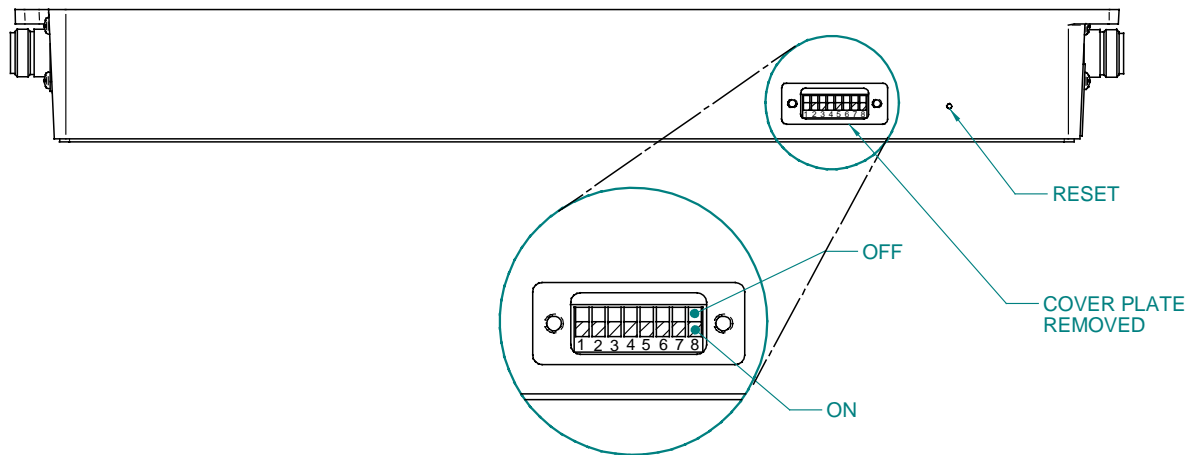


**Figure 1.**

**Switch Settings.** Orientation of the switches for on/off. The dip switches are located under the plate on the side of the unit.

**Downlink Peak Power Limit**

| | Switches | | |
|---|---|---|---|
| Power Limit (dBm) | Six | Seven | Eight |
| 20 | off | off | off |
| 18 | on | off | off |
| 16 | off | on | off |
| 14 | on | on | off |
| 12 | off | off | on |
| 10 | on | off | on |
| 8 | off | on | on |
| 6 | on | on | on |

**Uplink Gain Offset,** reduces uplink gain

| Gain Offset (dBm) | One | Two |
|---|---|---|
| 0 | off | off |
| -2 | on | off |
| -4 | off | on |
| -6 | on | on |

If a unit is initially set-up or moved from one location to another, pressing and holding the reset switch a minimum of 5 seconds until the LED's blink will restart the automatic set up feature.  If the peak limit and uplink gain offset switches are preset when the unit is installed the EkoMini will first attempt to set itself up to the full RF output power of 20 dBm and then reduce power as instructed by the peak limit and uplink gain offset switches.

The EkoMini has a total of 30 dB of gain control in the uplink and downlink signal paths, which is controlled by the microprocessor.  The microprocessor monitors the uplink and downlink detected signal levels and adjusts the gain to prevent overdriving the linear power amplifier circuits.

The EkoMini monitors the downlink-detected signal and adjusts the gain to achieve rated output power, +20 dBm.   The uplink attenuation is adjusted by the microprocessor to the same gain level.  Path loss is normally equal in both directions. The microprocessor continues to monitor the detected output power on both paths to prevent overdrive.  Should the downlink detected power increase above the desired level; the processor will reduce the gain in both uplink and downlink paths.  A subscriber unit getting very close to the rerad antenna, may cause uplink signal overdrive.  The processor will temporarily reduce the gain in the uplink (reverse) path when uplink signal overdrive is sensed, which will reduce the coverage during this condition. Proper placement of the rerad antenna will reduce the occurrence of this condition.

The output power level setting and the maximum detected level, along with date and time, are recorded in the history log file.

**Protocol Selection**

To insure proper RF power output the proper protocol must be selected this insures the software will properly distinguish the detected RF power level. CDMA is the only protocol that requires a different look up table/RF calibration.

Protocol Selection                                    Switch Five

    CDMA                                        On
    All Other*                                  Off

*All other protocols include; AMPS, GSM, PCS 1900, IDEN, ESMR, TDMA

**Band Selection**

***EkoMini 1.9 PCS Band***, is available in two models. Selection of the proper operating band A, B, or C with the model one and D, E, or F with model 2 is user selectable with two dip switches as follows:

| Band Selection | Band Width | Switch 3 | Switch 4 |
|---|---|---|---|
| A | 15 | on | on |
| B | 15 | on | off |
| C | 15 | off | on |

| Band Selection | Band Width | Switch 3 | Switch 4 |
|---|---|---|---|
| D | 5 | on | on |
| E | 5 | on | off |
| F | 5 | off | on |

If the switches are improperly set (Off/Off), the unit will not function. This fault will be indicated by the DC power on LED Indicator flashing green.

Note: If the band selection switches are changed after the unit is powered up, the unit will not change frequency until the (1) power is cycled or (2) the reset switch is pressed and held a EkoMinimum of 5 seconds, (Activating the reset switch will make the unit go through the set up cycle).

**_EkoMini Cellular Band_** switches 3 and 4 are used to EkoMinimize the gain of the adjacent bands control channels by increasing the frequency roll off in band.  It should be noted that the two switches shift the center frequency of the band; they do not change the bandwidth of the filter.  The operation band is preset by the factory and not customer changeable.

| Band Selection For "B" Band | 3 dB Roll Off Starts on Channel | Switch 3 | Switch 4 |
|---|---|---|---|
| $B_1$ | Channel 338 | on | on |
| $B_2$ | Channel 342 | on | off |
| $B_3$ | Channel 346 | off | on |
| $B_4$ | Channel 350 | off | off |

| Band Selection For "A" Band | 3 dB Roll Off Starts on Channel | Switch 3 | Switch 4 |
|---|---|---|---|
| $A_1$ | Channel 329 | on | on |
| $A_2$ | Channel 325 | on | off |
| $A_3$ | Channel 321 | off | on |
| $A_4$ | Channel 317 | off | off |

The units are factory set for filter centering at the middle of the bands, therefore channels at the beginning and end of the bands will be filtered out.  For example, in the "B" band, channels 334 to 337 will be filtered out.  Likewise in the "A" band, channels 330 to 333 will be filtered out.

If a customer needs to utilize channels near the band edges that might otherwise be filtered out, EMS can custom fit the filtering to meet the customer's needs.

**_EkoMini ESMR Band_** switches 3, 4 and 5 are unused; channel bandwidth is preset by the factory per customer request.

**Remote Alarming**
Remote alarming is accomplished with a factory installed modem and software option. The EkoMini microprocessor will detect the modem and initialize the required software. By dialing into the unit, it may now be programmed to the desired response numbers and alarm codes.  Access to programming mode requires entering a user selected 5-digit password.

A factory default password is preprogrammed into the unit as 11111.  The user may change this in the program mode of operation.  There is also a factory access password.

Up to three numbers and alarm codes or paging pin numbers can be sent.  The unit will send an alarm to the first number when an alarm occurs.  (The alarm is not sent during the red flashing alert period.  It is delayed 5 minutes to be certain the alarm will not clear itself).  Each additional number and alarm, which has a programmed sequence, will be sent after the programmed delay.  The delay, which is set, is a time measurement from initially sending the first telephone call and alarm.  The three telephone numbers are entered with the following information:

1.　　Telephone Number　　20 digits, maximum
　　　　　　　　　　　　　　　　Include required access codes such as 9 if required by a PBX.  A comma is used to insert a delay.
　　　　Pin　　　　　　　　　　10 digits
　　　　Alarm Code　　　　　　20 numeric digits

2.　　Telephone Number　　20 digits, maximum
　　　　　　　　　　　　　　　　Include required access codes such as 9 if required by a PBX.  A comma is used to insert a delay.
　　　　Pin　　　　　　　　　　10 digits
　　　　Alarm Code　　　　　　20 numeric digits
　　　　Delay　　　　　　　　　3 numeric digits, 0 to 999 minutes

3.　　Telephone Number　　20 digits, maximum
　　　　　　　　　　　　　　　　Include required access codes such as 9 if required by a PBX.  A comma is used to insert a delay.
　　　　Pin　　　　　　　　　　10 digits
　　　　Alarm Code　　　　　　20 numeric digits
　　　　Delay　　　　　　　　　3 numeric digits, 0 to 999 minutes

Telephone number 2 delay is the time between dialing out number 2 after number 1 has been dialed.  Accordingly telephone number 3 delay is the time between dialing out number 3 after number 2 has been dialed.

Should an alarm condition clear, the EkoMini will send an Alarm Clear alert to the same number or numbers that were alerted previously.  As an example the alarm condition could occur if the base station was turned off for maintenance.

The unit will record time, date and cause of the last 25 reportable (alarms present after 5 minute alert delay) alarms.  The user may download these via the modem connection

or factory personnel may also review them.  Retrieving log history requires entering the password.

Command, Clear Log File, is accessible only with the factory password.

**Alarms**

All alarms are considered major since there are no field replaceable modules in the unit.  All alarms are indicated locally and immediately by the Alarm LED indicator blinking red. Once the Alarm State has existed for 5 minutes, the Alarm LED will have a constant red indication.  Certain problems will result in the unit automatically shutting down after 5 minutes of sensed failure.  This is done by disabling the RF output stages in both the uplink and downlink signal paths.  Removing DC power from the unit for a period of 30 seconds or longer will reset the auto shut down.

| Failure | Action | Alarm Code |
|---|---|---|
| Alarm Cleared | | 0 |
| Synthesizer Lock, Uplink | Auto Shut Down | 1 |
| Synthesizer Lock, Downlink | Auto Shut Down | 2 |
| Downlink RF Overdrive | Auto Shut Down | 3 |
| Uplink RF Overdrive | Auto Shut Down | 4 |
| No Downlink RF Detected* | Alarm Only | 5 |
| Internal Voltage Failure | Alarm Only | 6 |
| Low Current Draw | Alarm Only | 7 |
| Keep Alive[1] | Auto Shut Down | 8 |
| External Alarm | Alarm Only | 9 |

*Minimum detectable RF level is approximately −10dBm.  Unit will alarm below this level.

[1]Not applicable unless equipped with remote alarms.  On units with remote alarms it must be activated when the remote messaging is set up.

**Keep Alive**

The EkoMini Keep Alive feature can only be activated once the modem has been installed.  Once activated by the user in the program mode, this feature requires the EkoMini, or a remote computer, to have contact at least once daily.  If no contact is completed, the EkoMini will shut down and activate an alarm.

The EkoMini can be programmed requiring a Keep Alive activation from as often as the user desires, but at least once daily.  The factory default requires one daily activation and is set to occur between 3:00 and 4:00 AM.

**Indicators**

The EkoMini is equipped with three LED indicators on the end of the unit which provide the following information:

| Indicator | State | Description |
|---|---|---|
| On | Off | No DC Input Power Applied |
|  | Green | DC Power on, normal function |
|  | Green Flashing | DC Power on, Set up fault-Band Selection |
| Alarm | Off | No Alarm |
|  | Red Flashing | 5 Minute Warning (See list of alarms) |
|  | Red  Alarm |  |
| Uplink RF |  | Power levels per picture below |
| Downlink RF |  | Power levels per picture below |
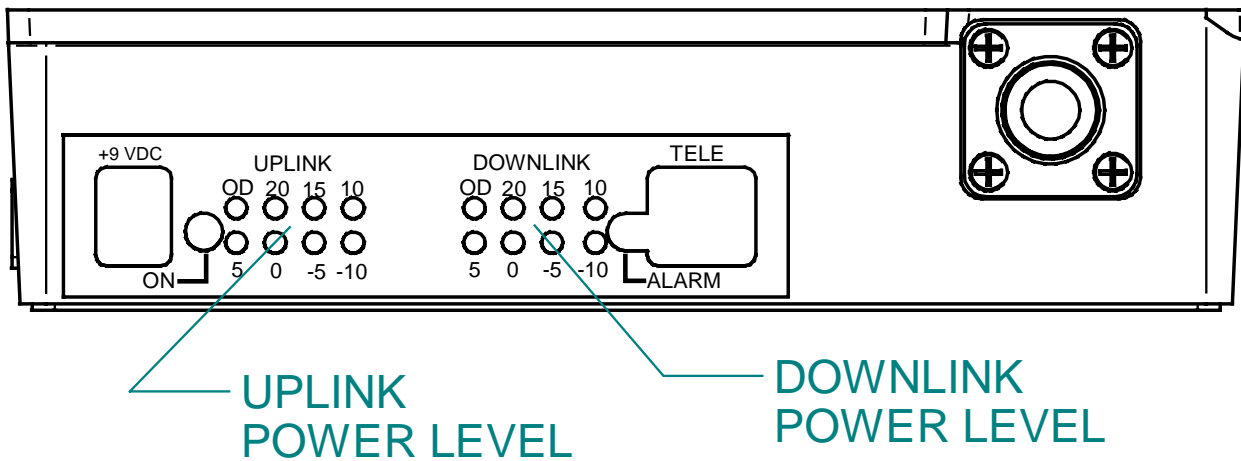


No RF Uplink Detected; this is a normal state for the uplink RF path.  The normal levels of  RF received and amplified from the subscriber unit may be below the −10 dBm

detectable level.  A quick check can be made by getting within a few feet of the Rerad Antenna, while watching the Uplink RF indicator.

**Primary Power**

The EkoMini Unit operates on 9 VDC input power @ 6 Amps.  This is supplied with a regulated wall mount supply, which is UL and CSA listed.  These are available to operate on AC input voltages of 90 to 260 VAC.

**Donor Antenna**

This input/output is connected to an antenna, which is directed at the desired cell site.

**Rerad Antenna**

This input/output is connected to an antenna, which is mounted in the desired area to be covered.  The antenna should be mounted at a location where adequate coverage is provided for the area desired while EkoMinimizing the potential of subscriber units normally operating close enough to overdrive the unit.

**Serial Number**

Each unit has a unique electronic serial number.  This number is displayed on the decal on the unit and is also displayed with the history log when using the modem interconnect.

**Installation:**

Note 1:  Only qualified technicians should perform Installation and system set up.  The user is cautioned that modification or changes to this device not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Note 2: Manufacturer's rated output power of this equipment is for single carrier operation.  For situations when multiple carrier signals are present, the rating would have to be reduced by 3.5 dBm, especially where the output signal is re-radiated and can cause interference to the adjacent band users.  This power reduction is to be determined by means of input power or gain reduction and not by an attenuator at the output device.

Note 3:  This device complies with Part 15 of the FCC Rules.  Operation is subject to the condition that this device does not cause harmful interference.

## Introduction

EkoMini is quick and easy to install, using a minimum set of common tools.   This section will provide the basic steps to performing the installation of EkoMini.  *Please read complete instructions before beginning assembly.*

## Getting Started*:*

Unpack all of the boxes and insure all of the material is included for your installation requirements and undamaged in shipment.

| QTY | Description |
|-----|-------------|
| 1 | EkoMini |
| 1 | +9 VDC Power Module |
| 1 | AC Power Cord |
| 1 | Manual |
| 1 | Test Data, Factory |
| 1 | *Optional, Telephone cable 6 ft. |

*Only needed with external alarm.

## Mounting:

**EkoMini is designed for optimum use as an in-door repeater.  The housing is not weather resistant and the automatic set up procedure assumes sufficient isolation between antennas is assured.  When the donor antenna is mounted outside and the rerad/server antenna is mounted inside of a building isolation is assured to be adequate.**

**Since the EkoMini has a minimum gain of 40 dB, isolation of at least 55 dB must be obtained between the donor and the rerad antenna.  Should adequate isolation not be obtained an oscillation could occur which could cause damage to the unit.**

-Connect coaxial cables to the Donor and Rerad ports.
-Connect primary power module to AC source and connect 9 VDC output to EkoMini DC Input.
-Optional connect telephone line to RJ11 jack.

Refer to attached drawing for any clarification.  (Page 16)
Select Mounting location of Donor directional antenna and orient toward the base station to maximize signal level.  For best performance this should be line of sight between the Donor antenna and the base station antenna.

Select mounting location of Rerad antenna to provide maximum coverage while maintaining at least a 20-foot spacing from closest cell phone usage if possible to reduce the possibility of overdrive.

**IMPORTANT:** Before performing channel or amplitude adjustments on any unit, make sure power is **OFF**.

**System Set Up Instructions:**

-During initial set-up, downlink signal must be presented to the unit.
-Apply Power after setting user switches and unit will automatically set up.
-Set Band Switches to desired Band for PCS or 3 dB roll off point for Cellular SW 3 & 4 (Preset at Factory to A or D depending on the Models BW 15 or 5 Mhz) (Cellular set to Channel 338 B Band and Channel 329 A Band)
 -Set UL gain offset as desired  (Preset to 4 dB offset)
 -Set DL RF Output Power to desired maximum Level (Factory Preset to full Power, 20 dBm Composite)
 -Set Protocol selection Switch (Factory Preset to All Other, SW 5-OFF)

-For set up of optional remote alarming refer to software set up instructions.

 <u>Setting Up Remote Alarming</u>

 **Alarm Code String Sent**
  The EkoMini will Page the Report Dial Out number and send the following format:

  Site location  00 Alarm code. Example: 9182736405005. The "9182736405" portion is the Site Location if defined as all Digits and set report name. "00" is the separator. 5 in this case is the alarm code. (**See section, Alarms,** 5 is No Downlink RF Detected)

  The unit is preprogrammed with the serial number and can be changed by the user to indicate the site location. There is always an alarm code at the end of the message after the separator designators 00. An alarm code of "0" indicates no alarms exist or alarms cleared.  The alarm message may contain several alarm codes indicating several types of alarms are present.

**Setting up your EkoMini:** For the EkoMini to Report Alarms, the unit must be first connected to a telephone line. To activate the unit to remotely report alarms, the unit must be contacted by modem via a computer, the setup procedure completed and the unit issued the Activate Report Alarms Command: (set rp actv = yes). **If any of these steps are skipped the unit will not function properly.**

### *STEP 1. Contacting the EkoMini.*

This can be achieved by using ANY Hyper Terminal Program.
A. Set to the following parameters.

BAUD : 2400
Word : 8
Stop : 1
Parity : None
Flow : None
Terminal Emulation: Auto Detect

**Note:** The EkoMini has a factory Default Auto Answer Set for 2 Rings. After The Unit answers, the prompt "Welcome to the Remote System" will appear.

B. Press the ENTER key. The Prompt : "Password?" Will appear.
C. Enter a valid password and press enter.

**Note:** If this is the first time the unit is contacted it should be done with a supervisors default password of: 11111 so that the Passwords can be changed.

D. Changing Passwords:

PW 1 = Password 1 change. 5 Characters or Numbers (supervisors PW)
PW 2 = Password 2 change. 5 Characters or Numbers
PW 3 = Password 3 change. 5 Characters or Numbers

E. Set Site Location Number

UN = (Unit Name change, 10 numeric characters, Default Serial Number)

### STEP 2. Setting up the EkoMini.

| | |
|---|---|
| A. Set the Report 1 Dial out Telephone Number. | RP 1 DIAL |
| (Dial out Number. 20 digits) | |
| B. Set The Pin Number (if Applicable). | RP 1 PINN |
| (Pin Number. 10 digits, maximum) | |
| C. Set Report 2 Dial out Telephone Number. | RP 2 DIAL |
| (Dial out Number. 20 digits) | |
| D. Set The Pin Number (if Applicable). | RP 2 PINN |
| (Pin Number. 10 digits, maximum) | |
| E. Set Delay for dialing out Telephone Number 2 after 1. | RP 2 DLAY |
| (Dial Delay in minutes from Telephone Number 1, 0-999) | |
| F. Set Report 3 Dial out Telephone Number. | RP 3 DIAL |
| (Dial out Number. 20 digits) | |
| G. Set The Pin Number (if Applicable). | RP 3 PINN |
| (Pin Number. 10 digits, maximum) | |
| H. Set delay for dialing out Telephone Number 3 after 2. | RP 3 DLAY |
| (Dial Delay in minutes from Telephone Number 2, 0-999) | |
| I.  Activate Report Alarms Command | RP ACTY |
| (Answer, Yes) | |
| J.  Set Answer Rings | AR |
| (Answer Rings. 0-999, Default = 2) | |
| K. Set Time | TM |
| (format: 01:31:29 for 1:31 am or 13:31:29 for 1:31 pm) | |
| L. Set Date | DT |
| (format: 01/10/99 for Jan 10, 99) | |

**Note:** Report 1 Dial, is the number that the EkoMini will dial should an ALARM condition occur. If desired the Report  2 Dial and Report 3 Dial can be set to different Telephone Numbers. The Report 2 and Report 3 have by default a cumulative delay set to 5 minutes each. So that: After 5 minutes of an alarm state, Report 1 will be contacted. After 5 more minutes Report 2 will be contacted and after 5 more minutes (or 15 minutes after the original alarm) Report 3 will be contacted. If Report 2,3 Dial out numbers are not changed the EkoMini will attempt to contact Report 1 when the delay time has expired. After setting up the Dial Out number and if necessary the Pin number (used for some paging systems) The Unit MUST be issued the Activate Report Alarms Command: ( set rp actv  Answer = yes ). If this step is skipped the unit WILL NOT report remote alarms. The unit then should have the Answer Rings set, if they are not set the EkoMini will DEFAULT to answer on 2 rings. The next step would be to set the time and date.

### STEP 3. *Testing the Reporting.*

A.  Testing the remote alarming.                                        test report 1

Note:  Before logging off the unit, it is advisable to test the configuration. By issuing a test report 1 command, the unit will log the user off and try to send an alarm code to the Report 1. If there are no alarms, it will send a 0.

## Keep Alive Functionality

**Theory of Operation:**
The EkoMini's Keep Alive can be set up to function in one of various formats. The unit can either be reactivated for an additional 24 hours by (1) either dialing out and send the site location and alarm string to a computer or (2) it can expect to receive a call and will report site location and alarm status. If there is a failure of communication with the remote computer the unit WILL SHUTDOWN and report alarm condition if possible. The unit will then need to have it's power cycled or reactivated by the remote computer if the unit can be contacted (should the deactivation be related to power failure, telephone line out, etc. at the remote computer location).

**Setting up Keep Alive:**

STEP 1. Connect to Unit.
STEP 2. SET KACTV YES.
STEP 3. Confirm Activation.
STEP 4. SET KTYPE --- Dial or answer
STEP 5. SET KMESSAGE --- What to send. If ASCII is selected the unit will attempt to connect and send a status screen.
STEP 6. SET KRING --- Modified ring amount used for line share purposes
STEP 7. SET KDIAL --- the Telephone Number to try to contact.
STEP 8. Set KRTRY --- Number of retries before alarming/shut down
STEP 9. TEST REPORT KADIAL --- Test the Keep Alive Telephone Number

**Important Notes:**
**IF Keep Alive is set to Active and IF UNIT IS NOT CONTACTED IN 24 Hour time period IT WILL SHUTDOWN.**

**Commands:**

MENU = Displays List of Commands
HELP = Displays List of Commands And Help Formatting
EVNT = Displays User Alarm Log
CONF = Displays Basic Configuration
RPRT = Displays Report Alarms Settings
KPAL = Displays KeepAlive settings
TEST REPORT #  = Will log off user and attempt to page report # with alarm cleared code.
Enter KADIAL to test the Keep Alive Number. Example (TEST REPORT KADIAL)

**SET:**

KTIME = Keep Alive time, Answer and Dial. xx:xx (24 hr.format)
KACTV = Keep Alive Active? Yes or No
KTYPE = Keep Alive Type? Dial or Answer
KMESS = Keep Alive Message? Tone or Ascii
KRING = Keep Alive Rings to Answer. 0-99
KCODE = Keep Alive Transmission String. "xxxx" must be Numeric if Message = tone.
KDIAL = Keep Alive Dial Out Number. xxxx (up to 20 digits)
KRTRY = Keep Alive Dial Retries Before Alarm. 0-99

RP # DIAL = Report (#=1,2,3) Dial out Number. 20 digits
RP # PINN = Report (#=1,2,3) Pin Number. 10 digits
RP # DLAY = Report (#=2,3) Dial Delay (minutes) from Previous Report. 0-999
RP ACTV = Report Active. Yes or No
RP TYPE = Reporting Unit Type? Name or Number(serial)

PW 1 = Password 1 change.  5 Characters or Numbers (supervisors PW)
PW 2 = Password 2 change.  5 Characters or Numbers
PW 3 = Password 3 change.  5 Characters or Numbers

UN = Unit Name Change. 10 Characters. Default is Serial Number
AR = Answer Rings. 0-999. Defaut = 0
TM = Time. format: 01:31:29 for 1:31 am or 13:31:29 for 1:31 pm
DT = Date. format: 01/10/99 for Jan 10, 99

**Important Notes:**

The EkoMini has a factory default auto answer set for 2 rings.

**Factory Default Settings:**

KTIME = 03:30 (24 hr.format)
KACTV = No
KTYPE =  Answer
KMESS = None
KRING = 5
KCODE = Serial Number
KDIAL = 000
KRTRY = 3


RP # DIAL = 000
RP # PINN = 000
RP # DLAY = 5
RP ACTV = No
RP TYPE = Number(serial)
PW 1 = 11111
PW 2 = 10000
PW 3 = 10001

UN = Serial Number
AR = 2

# INSTALLATION

**Mounting Holes (4 each)**

**Rerad Antenna (Inside)**

**Eko-Mini Unit**

**Donor Antenna (Outside)**

RJ 11 Jack
Telephone Modem→

Uplink @
Downlink
Indicators

**+9 VDC
Input**

**AC Supply**

**AC Power Cord**
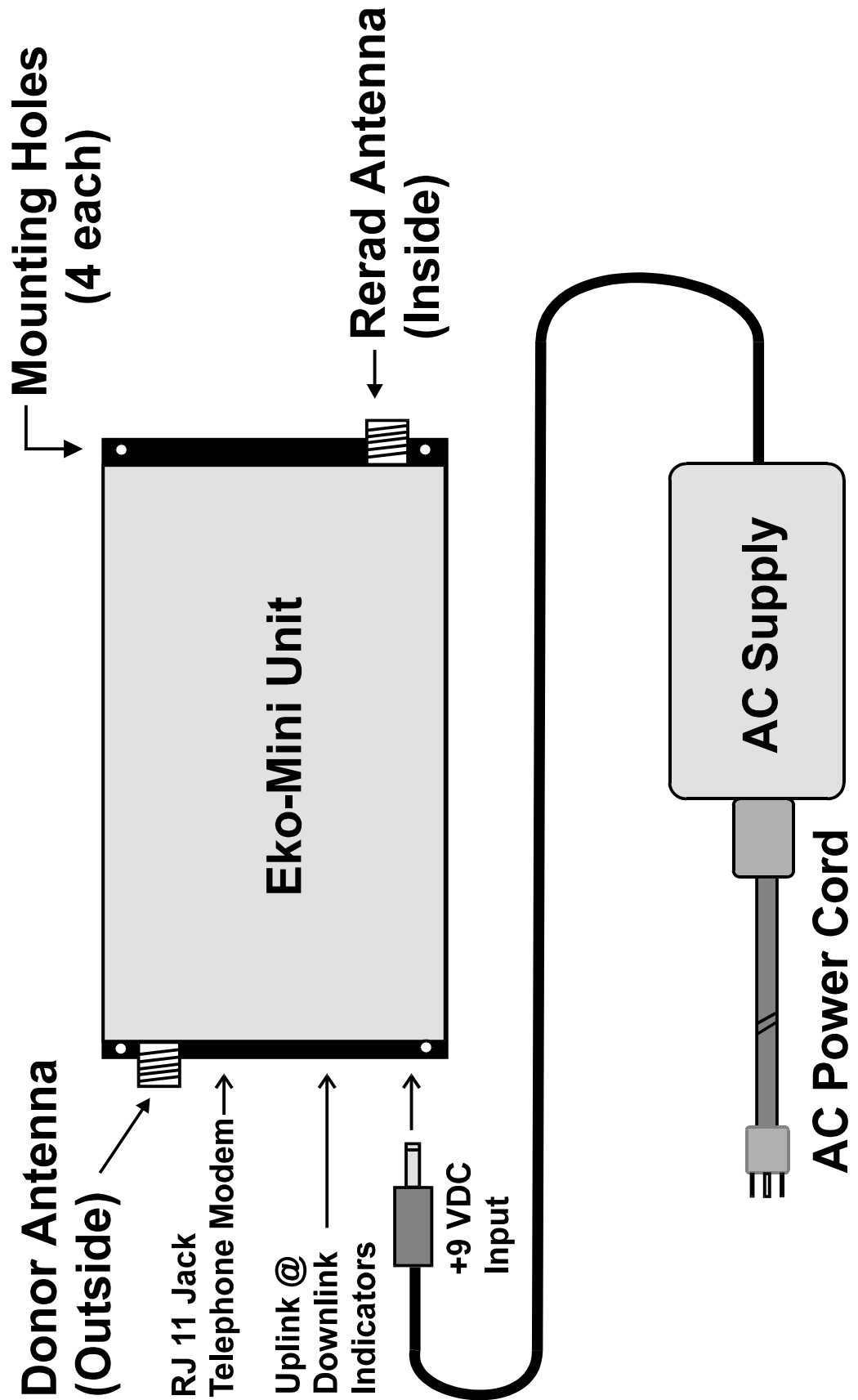
**Trouble Shooting:**

**The EkoMini has no field replaceable parts; repair limited to correcting improper set-up or customer software programming, installation issues or defective units.**

| Problem | Check | Corrective Action |
|---|---|---|
| No Power (no Green Light) | Power Source | Reconnect or Repair |
| | Power Source OK | Replace Unit |
| Alarm Indication | No RF Downlink Indication | Check RF Input Source |
| | No Uplink RF Indication | Check RF Antenna Input |
| | Recycle AC Power | No Change |
| | Reset Switch | No Change |
| | | Replace Unit |
| Remote Alarms inoperable | Generate Alarm, Remove RF input | Program Software |
| | Software OK, | Check Telephone line |
| | Telephone Line OK | Replace Unit |
| No RF DownLink Power | Check Band Switches | Set Switches & Recycle Power |
| | Switches Set Properly | Replace Unit |
| Low DownLink RF Power | Check Input Power Level | Relocate Donor Antenna, Improve Signal Strength Increase Donor Antenna Gain Shorten Coaxial Cable Length |
| | Signal Strength Good | Reset Switch, Start New System Set-up |
| | Low RF Output Power | Replace Unit |

| Specifications: | Reverse Link | Forward link |
|---|---|---|
| Frequency-Models | | |
|     EkoMini 1.9-15,    Band A | 1850 – 1885 MHz | 1930 – 1945 MHz |
|     EkoMini 1.9-15,    Band B | 1870 – 1885 MHz | 1950 – 1965 MHz |
|     EkoMini 1.9-15    Band C | 1895 – 1910 MHz | 1975 – 1990 MHz |
|     EkoMini 1.9-5,    Band D | 1865 – 1870 MHz | 1945 – 1950 MHz |
|     EkoMini 1.9-5    Band E | 1885 – 1890 MHz | 1965 – 1970 MHz |
|     EkoMini 1.9-5    Band F | 1890 – 1895 MHz | 1970 – 1975 MHz |
| Channel Bandwidth | 14.75 or 4.75 MHz | 14.75 or 4.75 MHz |
| Number of Channels | Multiple | Multiple |
| Output Power Composite, Adjustable | 6 to 20 dBm | 6 to 20 dBm |
| Return Loss | 15 dB | 15dB |
| Impedance | 50 Ohms | 50 Ohms |
| Noise Figure, Maximum | <8 dB | <8 dB |
| Gain, Maximum | 70 dB nominal | 70 dB nominal |
| Gain Range | 30 dB | 30 dB |
| Gain Steps | 2 dB | 2 dB |
| Peak Limiting adjustable | 14 dB | 14 dB |
| Reverse Path Gain Offset, below forward Path gain setting | 0 to 6 dB (2 dB Steps) | 0 to 6 dB (2 dB Steps) |
| Spurious | ≤ -13 dBm | ≤ -13 dBm |
| Signal Delay | <4 usec | <4 usec |
| Input RF Signal, Max Level | <-20 dBm | <-20 dBm |
| Gain Flatness | +1/-2 | +1/-2 |
| Connectors | N-Female | N/Female |
| Optional, Remote Alarms | | |

## Parameters

## EkoMini-19

| Mechanical | Specifications |
|---|---|
| Housing (WxHxD) | 7 "x 2.25" x 14.5" |
| Weight | 6.5 lbs. |
| Housing Material | Aluminum |
| Indoor Housing | |
| MTBF | 75,000 hours |
| Power Supply | 90 VAC, 50 – 60 Hz  to 260 VAC, 50-60 Hz     or 9.0 VDC @ 6 Amps |
| Current Draw | 500 mA |
| Operating Temperature | 5° to +45° C |
| Cooling | External Convection |

| Specifications: | Reverse Link | Forward link |
|---|---|---|
| Frequency-Models | | |
|     EkoMini 8-14CB,    Cellular B | 835 to 849 MHz | 880 to 890 MHz |
|     EkoMini 8-2.5CBE,  Cellular BE | 835 to 845 MHz & | 880 to 890 MHz & |
| | 846.5 to 849 MHz | 891.5 to 894 MHz |
|     EkoMini 8-11CA,    Cellular A | 824 to 835 MHz | 869 to 880 MHz |
|     EkoMini 8-1.5CAE,  Cellular AE | 824 to 835 MHz & | 869 to 880 MHz & |
| | 845 to 846.5 MHz | 890 to 891.5 MHz |
|     EkoMini 8-25C,      Cellular Full | 824 to 849 MHz | 869 to 894 MHz |
|     EkoMini 8-18S,       SMR | 806 to 824 MHz | 851 to 869 MHz |
| Channel Bandwidth | 1.5, 2.5, 10,11, 14, 18 or 25 MHz | 1.5, 2.5, 10,11, 14, 18 or 25 MHz |
| Number of Channels | Multiple | Multiple |
| Output Power Composite, Adjustable | 6 to 20 dBm | 6 to 20 dBm |
| Return Loss | 1.5:1 | 1.5:1 |
| Impedance | 50 Ohms | 50 Ohms |
| Noise Figure, Maximum | <8 dB | <8 dB |
| Gain, Maximum | 70 dB nominal | 70 dB nominal |
| Gain Range | 30 dB | 30 dB |
| Gain Steps | 2 dB | 2 dB |
| Reverse Path Gain Offset, below forward Path gain setting | 0 to 6 dB (2 dB Steps) | 0 to 6 dB (2 dB Steps) |
| Spurious | $\leq$ -13 dBm | $\leq$ -13 dBm |
| Signal Delay | <3 usec | <3 usec |
| Input RF Signal, Max Level | <-20 dBm | <-20 dBm |
| Gain Flatness | +2/-1 | +2/-1 |
| Connectors | N-Female | N/Female |
| Optional, Remote Alarms | | |

## EkoMini-8
## Protocols - CDMA, TDMA, GSM, AMPS, ESMR, IDEN

| Mechanical | Specifications |
|---|---|
| Housing (WxHxD) | 7 "x 1.5" x 14" |
| Weight | 6.5 lbs. |
| Housing Material | Aluminum |
| Indoor Housing | |
| MTBF | 75,000 hours |
| Power Supply | 115 VAC, 50 – 60 Hz  or 220 VAC, 50-60 Hz    or 9.0 VDC @ 6 Amps |
| Operating Temperature | 5° to +45° C |
| Cooling | External Convection |

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