ACE Technology

USR-1900

Installation and Operations Manual

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ACE TECHNOLOGY

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1. General Information

1.1 Introduction

This manual provides information pertaining to the installation and operation of ACE Technology's USR-1900A/B "Ultra Slim" repeaters. Both units are for CDMA modulation in the PCS frequencies as shown in Table 1-1.

<**Table 1-1:** USR-1900 Repeater Models>

Model Number	Down Link* Frequencies	Up Link** Frequencies	Modulation
USR-1900A	1930 ~ 1945 MHz	1850 ~ 1865 MHz	CDMA
USR-1900B	1950 ~ 1965 MHz	1870 ~1885 MHz	CDMA

*: Down Link is from base station to mobile
**: Up Link is from mobile to base station

1.2 Specifications

<**Table 1-2:** USR-1900 Specifications>

Frequency Band	Down Link	1930 ~ 1945 MHz (PCS A Band), 1950~1965 MHz (B Band)
	Up Link	1850 ~ 1865 MHz (PCS A Band), 1870~1885 MHz (B Band)
Bandwidth		15 MHz
Maximum Output Power		+ 25 mW (+ 14 dBm) CDMA (3FA Composite)
Noise Figure		Less Than 8 dB
Gain Range		55 dB to 85 dB
POWER O/P 1dB C.P.		21 dBm
Attenuation Control Range		30 dB
Attenuation Control Steps		2 dB
Gain Variation by Temperature (- 10 ºC ~ + 45 ºC)		± 2 dB
V.S.W.R		2 : 1 Max.
Signal Delay		Less than 5 µsec
Spurious		45 dBc @ fo ± 885 kHz (RBW 30kHz) 55 dBc @ fo ± 1.98MHz (RBW 30kHz)
Impedance		50 Ω
Alarm & Status LED		Power On: Green Down Link Overpower, Up Link Overpower Down Link PLL, Up Link PLL
Power Supply		110 VAC, 50 ~ 60Hz, 16W
Temperature	Operating	–10 °C to 45 °C
	Storage	–40 °C to 85 °C
Dimension (W x H x D , inch)		8.07" x 2.44" x 6.00"
Weight (Pound)		3.5 lb.
RF Connectors		Type N Female

1.3 Description

This product is designed for offices, hotel rooms, small parking lots, garages or small buildings, helping to improve PCS communications signal and coverage by extending the coverage of a base station.

Outdoor antenna receives from a PCS base station, then USR1900 repeater amplifies the signal. After amplification, the signal is passed through to the indoor antennas. Conversely, signals from handsets are amplified and retransmitted to the base station.

2. Installation

Professional Installation Only

Although the installation of the repeater unit is simple and straightforward, the transmission lines for both external and internal antennas require professional installation by a licensed communication technician. In addition, the installation must conform to all applicable federal, state and local government regulations.

2.1 Introduction

This section provides information for the installation and setup of the USR-1900 repeater. The information consists of procedures for unpacking, inspection and preparation for the installation, as well as the actual installation and the setup.

2.2 Unpacking and Inspection

Examine the shipping carton for damage before unpacking the unit. If the shipping carton is damaged, try to have the carrier's agent present when the equipment is unpacked. If visual inspection reveals physical damage(s) to the equipment, you should send it back for replacement.

Verify that the equipment is complete, as listed under packing slip. Contact ACE Technology with any missing component.

2.3 Preparation for Use

2.3.1 Power Requirements

The power supply of the USR-1900 accepts 110 VAC, at 50 ~ 60 Hz. Power consumption of the USR-1900 is approximately 16 Watts.

2.3.2 Operating Environment

The USR-1900 is intended for indoor use only. Do not install it where it might be exposed to the outside elements as this could result in destruction of the unit and other hazards.
For normal operations, the environmental conditions should be as follow:

Temperature range: –10 °C to 45 °C, Maximum Humidity: 95 %

2.4 Before Installation

You will need to determine the following before beginning the USR-1900 installation:

a. Base station location

b. Location where the outdoor antenna is to be installed

c. Location where the indoor antenna is to be installed

d. Location where the USR-1900 is to be installed

e. Length and type of coaxial cable needed to connect from the outdoor antenna to the repeater unit

f. Length and type of coaxial cable needed to connect from the repeater unit to the indoor antenna

2.5 Antenna Installation

CAUTION: In order to comply with FCC rules for RF exposure, the following must be observed:

The antenna must be installed such that a minimum separation distance of 20 cm is maintained between the antenna and any persons.

2.5.1 Outdoor Antenna

Select a site for your outdoor antenna, making sure you have enough signal strength at that location. Using coax cable, connect the antenna to the repeater. If you are using a directional antenna such as a Yagi type, the antenna should be installed so that it is in line of sight of the base station. Then, align the directional antenna toward that direction, and secure the antenna using provided mounting hardware.

Use of a lightning arrester is highly recommended. By installing a lightning arrester between the outside antenna and the repeater, you can protect the repeater unit from electrical surge from lightning.

2.5.2 Indoor Antenna

Install the indoor antenna at a convenient location. It should be free of metallic obstruction in order to have an effective coverage. Depending on the circumstance of the installation, either one or a combination of following antennas can be used: Ceiling mount patch antenna, Wall mount patch antenna, Corner reflector

2.6 Repeater Installation

USR-1900 is an indoor repeater. Accordingly, the environment of the intended installation site needs to be considered. The repeater must be shielded from moisture, such as rain, and excessive temperatures. The operating temperatures should be between -10 °C and 45 °C.

2.6.1 Turn-On Procedure

Verify all RF connectors are tightened and cables and antennas are secured. On the repeater, switch "ON/OFF" to ON position. The Power indicator LED should be green. Make sure that no other LED is illuminated. If any other LED is lit, consult the trouble shooting page of this manual, or "2.6.2 Antenna Isolation and Alignment" section.

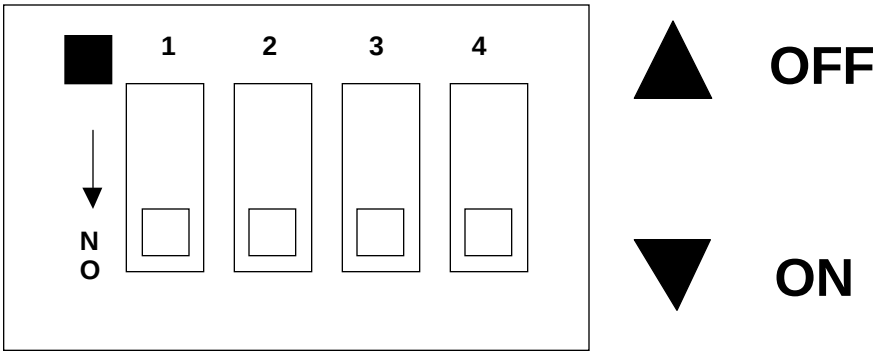
2.6.2 Antenna Isolation and Alignment

USR-1900 is equipped with an over drive protection circuit. If the circuit detects that the repeater is transmitting at a power level above that allowed by the FCC, it shuts down the repeater and the appropriate overdrive LED will start to blink. In the event that this condition persists for more than 3 minutes, the repeater will shut itself down and needs to be reset, by turning the AC power switch off and on, to resume operation.

A. Antenna Isolation

If the isolation between the outdoor and indoor antennas is not sufficient, the repeater will oscillate and turn itself off. It is recommended that when turning on the repeater for the first time, both the up link and down link attenuation, marked "UPLINK ATT." and "DOWNLINK ATT." respectively, should be fully engaged. The dipswitch setting and the levels of attenuation are shown in figure 2-6 and Table 2-6.

<**Figure 2-6:** Dipswitch setting>



<**Table 2-6:** Dipswitch Setting>

Dipswitch Number	**1**	**2**	**3**	**4**
Attenuation (dB), (Dipswitch ON)	2	4	8	16

As shown in table 2-6, each dipswitch has different attenuation associated with it, and may be used in combination of others. For example, to obtain an attenuation of 20 dB, dipswitches number 2 and 4 should be in "ON" position, and the dipswitches number 1 and 3 should be in "OFF" position. (0 + 4 + 0 + 16 = 20). Attenuation level can be set from 0 to 30 dB by 2 db increments.

Starting from the maximum attenuation, 30 dB, decrease the attenuation level in 2 dB steps by manipulating the dipswitches until all the switches are in "OFF" position, or stop and back off by 2 dB if you trigger either of the over-drive alarms, "OVRPWR ALM", for maximum gain.

B. Antenna Alignment

If you are triggering the overdrive alarms at any point, try to increase the isolation between the antennas by relocating them. The indoor antenna should be placed physically as far away from the outdoor antenna as practical. If the geometry of the intended coverage area allows it, you should also try the indoor antenna in such way that interference between the antennas is at the minimum. If you are using directional antennas, try to find a location for the indoor antenna where it can cover the needed area and oriented back to back with respect to the outdoor antenna.

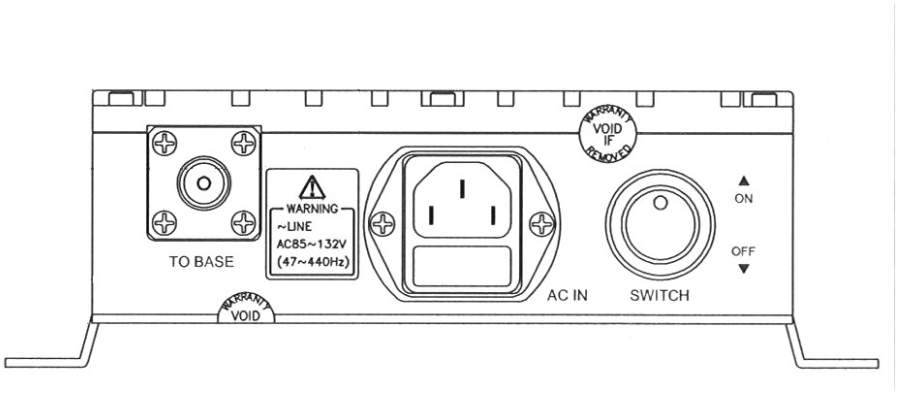
2.7 Connectors

Figure 2-7 shows the connectors and Table 2-7 provides a description of each connector on the USR-1900 unit

<**Table 2-7:** USR-1900 Connectors>

Label	Description
AC IN	Multipin AC Power connector with grounded plug supplying AC to the power supply in this unit
TO BASE	N-type female connector transmits base station RF, receives mobile RF, and connects to the outdoor antenna
TO MOBILE	N-type female connector transmits mobile RF, receives base station RF, and connects to the indoor antenna

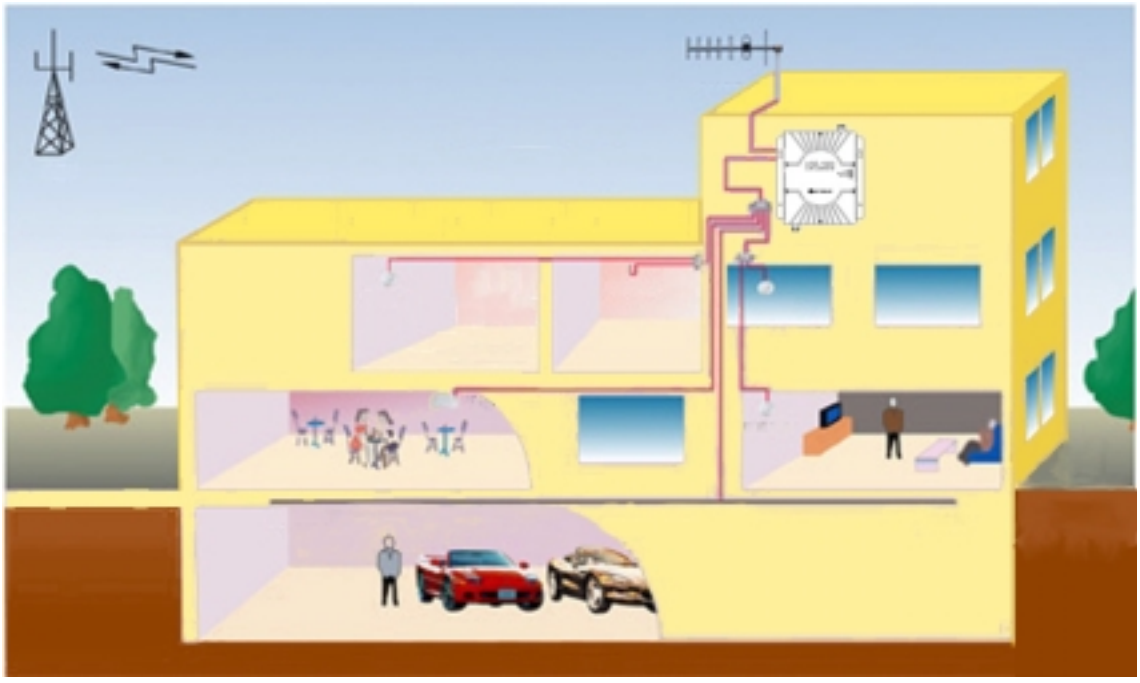
<**Figure 2-7:** USR-1900 Connectors>



2.8 Installation Example

USR-1900 can be installed with multiple indoor antennas as shown in Figure 2-8. In this example, a 6-way power splitter was used to split the signal to and from the indoor antennas.

<**Figure 2-8:** USR-1900 Installation Example>



3. Operation

3.1 Introduction

This section provides information for operating the USR-1900 repeater.

3.2 Operating Instruction

3.2.1 Power-up

Connect the repeater to AC power supply using the provided power cable. Push the "SWITCH" to "ON" position. The red LED on the switch should light up. All five LEDs will blink momentarily while the unit goes through initialization, which includes checking the alarm status. If no alarm condition is present, only the "POWER" LED will remain lit. The repeater is then operating properly.

3.2.2 Alarm Status

3.2.2.1 Overdrive Alarm

There are two overdrive alarms on the unit, one for the down link marked "DWNLNK OVRP ALM", and another for the up link marked "UPLNK OVRP ALM". Over driving occurs when the RF output power of the repeater exceeds a prescribed limit. This means that the input RF power level is too high, or the repeater is oscillating. The condition may be transient, caused by a passing emergency vehicle emitting a strong signal for example, or permanent, due to a nearby base station. It may also indicate low isolation between the antennas, which causes the unit to oscillate (please refer to the section 2.6.2 of this manual for antenna alignment and isolation.)

The overdrive alarms on the USR-1900 repeater are design to detect whether the over driving is transient or permanent. When overdriving is detected, power to the RF power is cut off and the LED flashes. After approximately 1 minute, the unit will test to see if the condition persists. If it does not detect overdrive the unit will power up and continue to operate. If it still detects overdrive, it will wait another minute. If it detects overdrive for the third time, it will shutdown the unit completely. Once the shutdown is triggered the system needs to be re-initialized by turning the AC power off and on in order for the repeater to function.

3.2.2.2 PLL Unlock Alarm

There are two PLL unlock alarms on the unit, one for the down link marked “DWN PLLALM” and another for the up link marked “UP PLLALM”. These alarms are triggered when the PLLs, critical components of the repeater, fail to function properly. The unit will not operate while either one of the alarms is on. Turn off the power and call for service. This malfunction is both critical and permanent. The unit needs to be replaced.

3.2.2.3 Power Alarm

The AC power indicator, marked “POWER” doubles as the power alarm. It monitors the function of the power supply. If the power supply malfunctions, or the AC input voltage is out of range (85 – 132 VAC), it will cut off the power to the RF part of the repeater. However, power to the controller is still available to keep the alarm on, which is indicated by flashing POWER LED. If the AC power supply is determined to be within the range and the power alarm is still on, then power down the unit and call for service.

4. Trouble Shooting

If the repeater does not operate properly after installation, first make sure that the installation procedures as described in section 2 of this manual were followed correctly. Inspect each connection, both RF and AC, and connectors for a secure fit, checking to see if all the connections are made to the proper ports of the unit and the antennas.

If the malfunction is due to an alarm condition, refer to the appropriate part of the section 3.2 of this manual. Corrective actions may be taken for the overdrive alarms. However, if the PLL unlock alarms or the Power alarm is (are) on, the unit needs to be repaired by a factory-authorized technician.

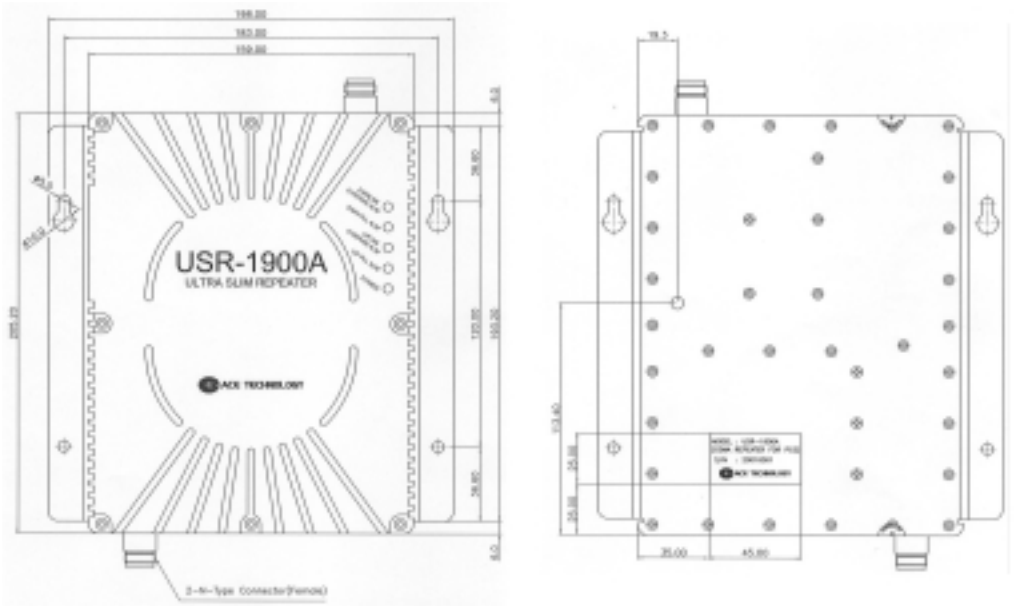
CAUTION!

There are no user serviceable parts in the USR-1900. DO NOT OPEN the unit. There is a danger of an electric shock. Opening the covers of the unit will void all warranties.

5. Drawings

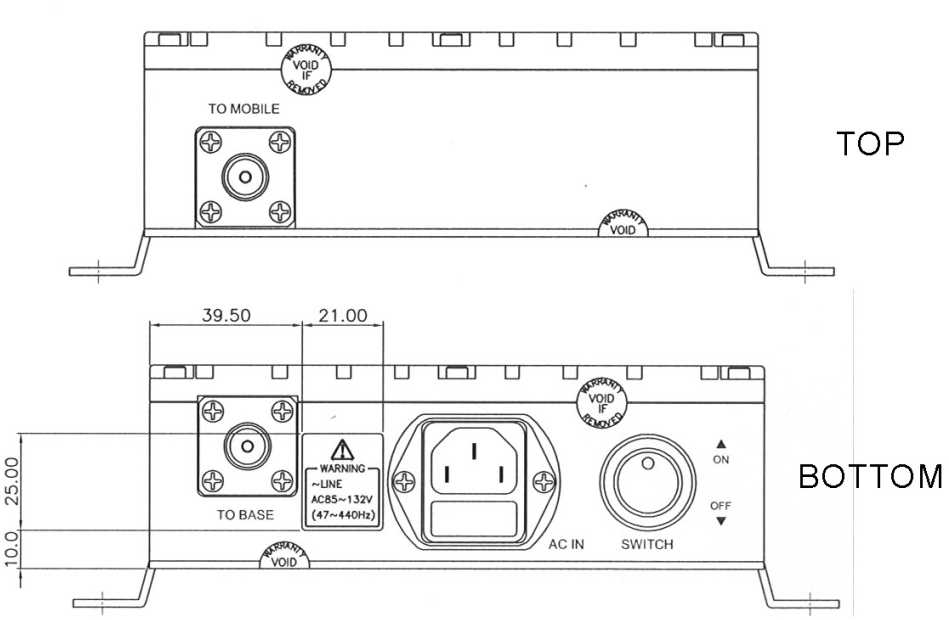
5.1 Front and Back views

<**Figure 5-1:** USR-1900 Front and Back views>



5.2 Top and Bottom views

<**Figure 5-2:** USR-1900 Top and Bottom views>



5.3 Side views

<**Figure 5-3:** USR-1900 Side views>