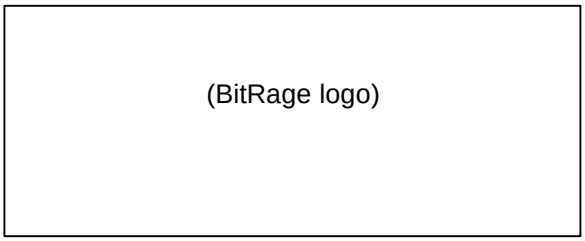

CR45-A-53/58/58L Transceivers

Installation and Set-up Guide

(Part numberxxxx)
Ver 0.01
May 2001

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NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursu ant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used i n accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

?? Reorient or locate the receiving antenna
?? Increase the separation between the equ ipment and receiver
?? Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
?? Consult the dealer or experienced radio/TV technician for help

The user must not make any modifications to the unit, unless expres sly approved by the party responsible for compliance. Failure to comply with this rule could void the user's authority to operate the equipment.

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Section 1. Product Description

Introduction

[BitRage company, introductory info]

Symbols Used In This Guide

A *note* (*icon1:)* within this guide provides supplemental information that may be useful in procedures or may indicate an exception or anomaly.

A *caution (icon2:)* indicates a condition or a risk factor that could disrupt normal operations or create difficulty with data reception or output.

A *warning (icon3)* indicates danger a situation that could cause bodily injury or death.

Note: This guide is intended for use by professional installation personnel Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents..

CR45-A Overview

[add photograph of CR45-A]

Figure 1-1. The CR45-A

The CR45-A radio system provides full duplex data communication at full-time 45 Mbps rate, operating in the UNII bands *[range needed?]*. Under FCC rules, users are not required to be licensed to operate a system, as long as the radio meets the maximum allowable EIRP limits.

CR45-A radio has been designed uniquely without a special modulation scheme to provide clear channel. While this radio can manage the transmission of the packet based DS-3 signal, its ability to manage the constant stream of DS-3 signal allows the transportation of most complex signals. Because the radio was designed without complex modulation technology to meet the unlicensed spectrum, data is transported accurately and efficiently.

To provide installation ease and minimal maintenance, antenna alignment is the only required procedure. All other adjustments are done automatically.

Product Specifications

Wireless Digital Transceiver

RF system	5.8 GHz
Operation	Full-duplex
Operating Frequency	5.775 GHz TX and 5.301 GHz RX 5.301 GHz TX and 5.775 GHz RX
Data Interface	Baseband DS-3
Data Modulation Scheme	none
Connectors	75 ohm female BNC (Data In, Data Out) Type N female (antenna) 4-pin twist lock (DC power)
Regulatory Compliance	FCC Part 15, Subpart E
Operating Temperature Range	-40C to +80C
Power Requirement	15 VDC to 27 VDC @ 0.85 Amps
Operating Range	11 miles
Physical Dimensions	7.50 in. wide, 8.5 in. high, 2 in. deep (width includes mounting ears)

Antenna Requirements	Use 2.0 ft. dish for distance up to 4.0 miles Use 3.0 ft. dish for distance up to 7.0 miles Use 6.0 ft. dish for distance up to 11.0 miles *Note: Line of sight required.*

Digital Signal Process (included within radio housing)

Data Interface	DS-3
Line Rate	44.736 Mbps ? 20 PPM
Line Code	B3ZS
Clock Jitter	30 pico second peak-to-peak RMS
Load	75Ohms ? 5%
Power Level	When all "1" pattern is transmitted, power level @22.368 MHz ?0.002MHz must be -1.8dbM to +5.8dbM and the power level at 44.736 MHz ?0.002 MHz must be -21.8dbM to -14.3dbM 2,3
Operating Power	+4.5 VDC to +5.0 VDC (supplied from radio)
Operating Temperature	-40C to +85 C

General Information

Maximum Cable Use Length	Data cables: Up to 900 feet. featuring auto gain and auto EQ Power cables: Up to 900 feet

Connectors and Indicators

The cable connectors and status indicators on the CR45-A are shown in Figure 1-2 and described as follows:

[insert illustration here]

Figure 1-2. CR45-A Connectors and Indicators

? **Antenna connector** — Type N female 50 Ohm

Use up to 3.0 ft cable

? **Data In connector** — BNC female 75 Ohm

Use RG 59 cable up to 900 feet
Note: Automatic Gain and Automatic EQ circuits are built-in

? **Data Out connector** — BNC female 75 Ohm

Use RG 59 cable up to 900 feet
Note: Automatic Gain and Automatic EQ circuits are built-in

? **Power connector** — 4-pin female twist lock

2 pins are assigned to receive the DC operating voltage
2 pins are assigned to send the status data signal to the remote monitoring unit

? **Numeric display** — Used during the alignment process. Maximum value is displayed when antenna is in the ideal position.

? **RX LED** — On when data is being received

? **TX LED** — On when data is being transmitted

? **Power display** — On when DC operating power is present in the radio

Section 2 . Installing the Equipment

[Overview info]

Basic Safety Guidelines

The following general guidelines should always be followed when installing or doing maintenance work on any electrical or radio equipment

?? Do not locate the transceiver near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits.

?? Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that a suitable grounding is available.

?? Do not work on the system or connect or disconnect cables during periods of lightning activity.

?? Disconnect all power and external cables before moving a chassis.

?? Do not work alone if potentially hazardous conditions exist.

?? Always verify that power has been disconnected from a circuit; never assume it has been.

?? Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

?? Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety fuses.

Warning: *This equipment contains an energy hazard. Disconnect the system before servicing.*

RF Exposure Limits

The CR45-A-53, CR45-A-58, and CR45-A-58L transceivers, used in conjunction with 28, 31 and 37 dBi gain antennas, are to be used in point-to-point applications only. The transceivers can be provided with or without an integral antenna. If the transceiver is provided without an integral antenna, then antennas used for these transmitters shall be professionally installed on permanent structures for outdoor operations. The installer is responsible for ensuring that the systems using high-gain, directional antennas are used exclusively for fixed, point-to-point operations.

The installer shall mount all transmit antennas so as to comply with the limits for human exposure to radio frequency (RF) fields per paragraph 1.1307 of the Federal Communications Commission (FCC) Regulations. The FCC requirements incorporate limits for Maximum Permissible Exposure (MPE) in terms of electric field strength, magnetic field strength, and power density.

The CR45A transceivers are to be installed on customers' rooftops and towers designated for fixed wireless applications. Table 1 specifies the *minimum* distance that must be maintained between the antenna and any areas where persons may have access, such as rooftop walkways and sidewalks, as well as through windows and other RF-transparent areas behind which persons may be located.

Table 2-1 Antenna Radiation Hazard

Radio	Frequency	Power Output, dBm	Antenna Gain, DBi	MPE Distance
CR45-A-53	5.3 GHz	+2.5 dBm	28 dBi	1.5m (5 ft)
CR45-A-58	5.8 GHz 5.8GHz	+6.5 dBm +6.5 dBm	31 dBi 28 dBi	1.5m (5 ft)
CR45-A-58L	5.8 GHz	+1.8dBm	37 dBi	1.5m (5 ft)

Antenna Warning Label

The following label wording must be placed on the antenna and visible from at least 1.5 meters (5 feet) away:

CAUTION: To comply with FCC RF exposure requirements, antennas used for this device must be installed to provide a separation distance of at least 15m(5 feet) from all persons to satisfy RF exposure compliance.

Additional Responsibilities

In addition to meeting these requirements, the antenna system installer is responsible for installing antennas so that they comply with FCC RF exposure requirements. The FCC RF exposure requirements at a given location are based on the sum total of contributions from all radio sources.

For BitRage antennas placed in close proximity to other transmitters, installers must ensure that MPE guidelines in 1.1307 of the FCC Rules can still be met, after including the contribution from the new antenna. Further information and guidance is available in FCC Bulletin OET 65, www.fcc.gov/oet/rfsafety.

Persons operating the equipment must ensure that it does not cause interference. Specifications must be followed for any special cables (for example, shielded cables) that are required for the unit to meet the EMC standards to which compliance is declared.

The user must not make any modifications to the unit, unless expressly approved by the party responsible for compliance. Failure to comply with this rule could void the user's authority to operate the equipment.

Installation Checklist

[to be added]

Installation and Verification Procedures

After the antenna dish has been installed, follow these procedures to connect radio:

1. Attach the radio on a permanent position within the reach of the R.F. cable that connects between the radio and antenna.
2. Connect the R.F. cable between the radio and antenna.
3. Route the RX, TX, and POWER cables from the radio to the termination point.
4. Connect the RX, TX, and POWER cables to the radio.
5. Secure the POWER SUPPLY unit at a desired location***. Do not connect the AC cable at this time.***
6. Connect the RX, TX, and POWER cables to the POWER SUPPLY unit.
7. Connect the I/O data cables between the application device and POWER SUPPLY unit. Application devices must generate and accept the DS-3 specified signals.

Verify Signal and Adjust Antenna

After the CR45-A is positioned and cables connected, verify its ability to receive and transmit signals. Use those signals to adjust antenna position.

1. Verify the presence of DS-3 signal at the POWER SUPPLY's DATA IN connector.
2. Connect the AC power cord to the source.
3. POWER indicator LED on the radio is lit.
4. TX LED on the radio is lit.

When nearside and far side equipment are prepared with power applied, start the antenna alignment procedure as follows:

1. Point the far side and near side antennas toward each other.
2. Disconnect DATA IN & DATA OUT cables on the far end POWER SUPPY unit.
3. Connect a 3.0 ft. coax cable between the DATA IN and DATA OUT connectors on the far end POWER SUPPLY unit. This creates the loop-back condition to the near end unit.
4. Adjust the near side antenna vertically, as well as horizontally while observing the numeric display on the radio. Largest numeric value is obtained when the antenna is properly adjusted. RX LED on the nearside radio is now lit.
5. Remove the 3.0 ft. coax cable at the far-end POWER
6. RX LED on the radio is lit (far side radio must be in the transmit mode with DS-3 signal input)

Section 3 . Troubleshooting