

(BitRage logo)

# **CR45-A-53/58/58L**

## **Transceivers**

### **User Reference**

(Part numberxxx)  
Ver 0.01  
May 2001

BitRage™ is a trademark of BitRage, Inc.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant 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 in 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 equipment 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 expressly 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

*[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..

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## **CR45-A Overview**

*[add photograph of CR45-A]*

**Figure 1-1. The CR45-A**

## Troubleshooting

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.

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## Product Specifications

### Wireless Digital Transceiver

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

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**Digital Signal Process (included within radio housing)**

<b>Data Interface</b>	DS-3
<b>Line Rate</b>	44.736 Mbps ? 20 PPM
<b>Line Code</b>	B3ZS
<b>Clock Jitter</b>	30 pico second peak-to-peak RMS
<b>Load</b>	75Ohms ? 5%
<b>Power Level</b>	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
<b>Operating Power</b>	+4.5 VDC to +5.0 VDC (supplied from radio)
<b>Operating Temperature</b>	-40C to +85 C

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**General Information**

<b>Maximum Cable Use Length</b>	Data cables: Up to 900 feet. featuring auto gain and auto EQ Power cables: Up to 900 feet
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**Hazard Warnings**

**Warning:** *The CR45-A products should only be installed by professional installers.*

**RF Exposure Compliance**

Installation of the CR45A and its antenna must be performed by qualified personnel who are following the procedures and guidelines given in the *CR45A Installation and Setup Guide*.

To comply with FCC radio frequency exposure requirements, the antennas used for this device must be installed to provide a separation distance at least 1.5 meters (5 feet) from all persons. Under no circumstances should you or anyone get closer than 1.5 m to the antenna without first ensuring that the system is powered off.

## Troubleshooting

### User Requirements

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.

# Section 2 . Troubleshooting

## Connectors and Indicators

The cable connectors and status indicators on the CR45A are shown in Figure 2-1 and described as follows:

[insert illustration here]

**Figure 2-1. CR45-A Connectors and Indicators**

? <b>Antenna connector</b>	Type N female 50 Ohm Use up to 3.0 ft cable
? <b>Data In connector</b>	BNC female 75 Ohm Use RG 59 cable up to 900 feet <i>Note: Automatic Gain and Automatic EQ circuits are built-in</i>
? <b>Data Out connector</b>	BNC female 75 Ohm Use RG 59 cable up to 900 feet <i>Note: Automatic Gain and Automatic EQ circuits are built-in</i>
? <b>Power connector</b>	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
? <b>Numeric display</b>	Used during the alignment process. Maximum value is displayed when antenna is in the ideal position.
? <b>RX LED</b>	On when data is being received
? <b>TX LED</b>	On when data is being transmitted
? <b>Power display</b>	On when DC operating power is present in the radio

## Basic Safety Guidelines

- ?? 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.*

## Safety Notes About The Installation

*Note: This information has been supplied to the professional personnel who installed and set up the CR45A and antenna. It is presented here for your information only.*

The installer should have mounted 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 rooftops and towers designated for fixed wireless applications. Table 2-1 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	+6.5 dBm	31 dBi	1.5m (5 ft)
	5.8GHz	+6.5 dBm	28 dBi	
CR45-A-58L	5.8 GHz	+1.8dBm	37 dBi	1.5m (5 ft)



**Additional  
Information on the  
Web**

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](http://www.fcc.gov/oet/rfsafety).



# Glossary

