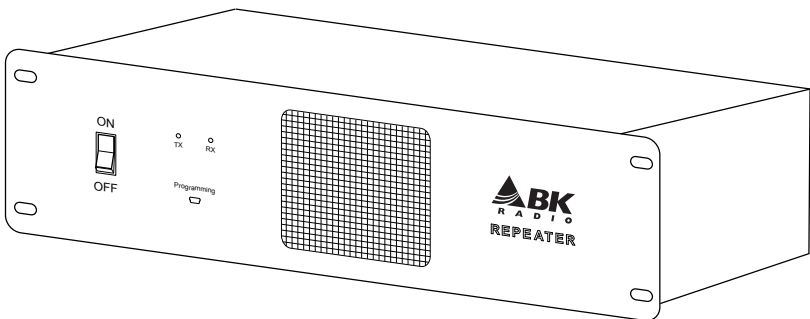




# DRH-01-100 Digital Repeater

## Operator's Manual



# Contents

FCC Requirements.....	1
Contact Information.....	2
Connections and Control .....	3
Basic Operation & Maintenance .....	4
Operation .....	4
Maintenance.....	4
Installation & Site Requirements .....	4
Installation Requirements.....	4
Antenna Separation Considerations .....	5
Programmed Frequency Considerations .....	6
Desktop or Rack Mounting Considerations.....	6
Programming.....	7
Required Equipment.....	7
Programming Channel Parameters.....	7
Programming Repeater Parameters .....	9
Optimizing Transmit Power .....	10
Contact Information.....	11

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## Introduction

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This manual contains information concerning the operation procedures for the BK Radio DRH-01-100 Repeater.

The DRH has been designed to meet the digital requirements of today's communications environment. Please take a moment to read the information in this manual so you can get optimum performance from your new radio.

When operating in digital mode the DRH passes crucial digital data including P25 radio identification numbers, AES and DES encrypted signals and P25 Emergency signals.

In addition the DRH is designed to pass the encryption key information used in conjunction with BK Radio's exclusive wireless tactical OTAR option.

Check with your RELM/BK Radio dealer or communications officer for information on the programmed functions of your repeater and subscriber radios prior to operation.

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## Safety Precautions

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- Do not operate the transmitter in close proximity to blasting caps.
- Do not operate the radio in an explosive atmosphere (petroleum fuels, solvents, dust, etc.).

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## FCC Requirements

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

Your radio must be properly licensed by the Federal Communications Commission prior to use. Your BK Radio dealer can assist you in meeting these requirements. Your dealer or communications officer will program each repeater with your authorized frequencies, signaling codes, etc..

## Industry Canada Compliance

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 Canada.

## RF Exposure Compliance and Control Guidelines

To control your exposure and ensure compliance with the occupational/controlled environment exposure limits adhere to the following procedures.

Warning: Maintain a separation distance from the antenna to a person(s) of at least 5 ft. You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational /Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

For more information concerning radio frequency radiation visit these websites:

<http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

<http://www.osha.gov/SLTC/radiofrequencyradiation>

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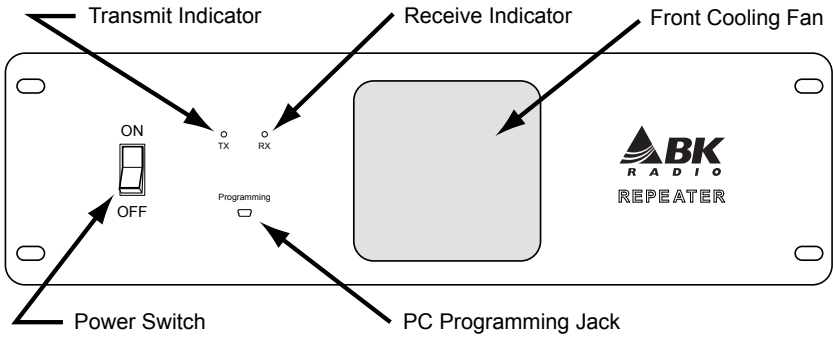
## CONTACT INFORMATION

For additional information on exposure requirements or other information, visit website <http://www.relm.com>.

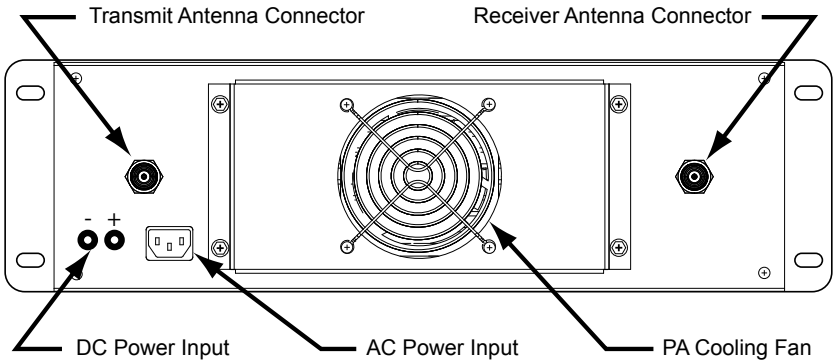
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# Connections and Control

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**Front Panel**



**Rear Panel**

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# Basic Operation & Maintenance

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## Operation

Prior to operation the DRH-01-100 must be loaded with authorized frequencies and parameters by a qualified technician. (See “Programming”)

Ensure that all antenna and power cables are connected to the unit.

**Operating the DRH-01-100 without the proper antenna could result in damage to the repeater.**

Turn the Power switch to the ON position.

The lighted switch indicates unit power. Transmit and receive LEDs indicate current operating status.

To power-down turn the Power switch to the OFF position.

NOTE: If external DC supply is connected, the DC supply must be turned off to power down the repeater.

## Maintenance

Allow adequate clearance at both the front and back of the repeater to provide air flow.

The front cooling fan filter should be kept clean and clear of debris and should be periodically cleaned. To access the filter remove the fan shield by pulling straight out.

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# Installation & Site Requirements

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## Installation Requirements

AC input - 110V, 60Hz

Rack Mount - Standard 19” rack mountable

Antenna Connections - N-Type

Use only manufacturer or dealer supplied antenna.

## Optional DC Power Input

When AC power is interrupted, or not available, the DRH-01-100 can be powered from a DC source.

DC Input requirements: 13.8V, 30 amp

## Antenna Installation and Safe Operating Distances

Before installing the DRH-01-100 at the operating site, the following details regarding desk or floor space, rack clearance and lightning protection should be considered.

**Antenna Minimum Safe Distance:** 5 ft.

**Antenna Gain:** Zero dBd referenced to a dipole.

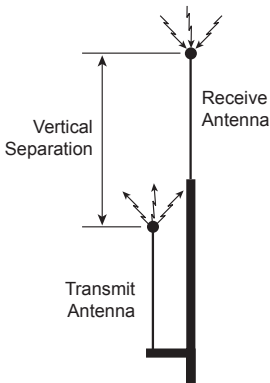
**Antenna Mounting:** The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the minimum safe distance to the antenna.

To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

**Warning:** You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF Exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational /Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

## Antenna Separation Considerations

**The physical separation between the receive and transmit antennas is critical to system operation.**



The required separation distance is dependant on the operating frequencies and RF power output. BK Radio recommends mounting both receive and transmit antennas on a single mast with the appropriate vertical separation.

The receive antenna should be mounted above the transmit antenna.

For required distance refer to the chart below.

RF Power	Minimum Separation
100 Watts	30 feet
50 Watts	25 feet

**WARNING: Failure to maintain minimum antenna separation may cause equipment damage.**

## **Programmed Frequency Considerations**

For optimum operation, it is recommended the transmit and receive frequency separation be at least 5 MHz (i.e. Rx:155.000 MHz/Tx:150.000 MHz). Failure to maintain adequate frequency and antenna separation may result in receiver degradation and/or equipment damage.

## **Desktop or Rack Mounting Considerations**

The DRH-01-100 is 19 inches (483 mm) wide (standard 19 inch rack mountable), 5.5 inches high, 14.5 inches deep, and weighs 14.75 lb.

When mounting the DRH-01-100 Cabinet:

- Ensure that the unit is securely mounted.
- Ensure that the air vents are clear of obstructions.
- Ensure that there is adequate space for entry of external cables (antenna and AC power cables) at the rear of the unit without the need for small radius bends.

## **Lightning Protection**

To minimize damage or injury, a complete system of lightning protection and grounding connections is recommended.



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# Programming

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## Required Equipment

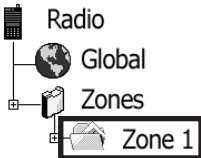
KAA0731 Programming Software  
USB Programming Cable

Open the program  
If prompted select P150 as the radio type.



Read the programmed information by clicking the Read icon or select “Read All Data” from the Read menu.

## Programming Channel Parameters



To access the DRH-01-100 channel parameters click the “Zone #” folder in the left panel.

NOTE: The DRH-01-100 is capable of storing several channels of information. Only one channel is used during normal operation. The desired operating channel must be selected prior to operation. (See Channel Selection in the Programming Repeater Parameters section of this manual.)

	Label	Receiver Freq	Mode	RX CG	RX NAC	Transmit Freq	TX CG	TX NAC	BW
▶ CH1	Set 1	157.650000	D	000.0	3967	173.950000	000.0	0659	N

### Label

A channel label of up to thirteen characters can be assigned.

### Receiver Freq

Valid receiver frequencies for the DRH-01-100 are from 136.000 MHz to 174.000 MHz in 1.25 kHz increments.

### Mode

The Mode selection is available on units capable of digital or analog operation. The DRH-01-100 operates in digital mode only. The Mode selection is disabled.

## **RX CG**

The CTCSS Code Guard selection applies to models capable of operating in analog mode. The DRH-01-100 operates in digital mode only. The receiver CTCSS Code Guard selection is disabled.

## **RX NAC**

The receiver network access code is programmable in Hexadecimal from \$000 to \$FFF or as decimal from 0000 to 4095.

### Special RX NACs:

If \$F7E (3966 decimal) is programmed as the RX NAC the repeater will accept any incoming NAC and transmit the programmed TX NAC.

If \$F7F (3967 decimal) is programmed as the RX NAC the repeater will accept any incoming NAC and transmit the same NAC regardless of the TX NAC programming.

## **TX CG**

The CTCSS Code Guard selection applies to models capable of operating in analog mode. The DRH-01-100 operates in digital mode only. The transmitter CTCSS Code Guard selection is disabled.

## **TX NAC**

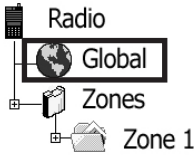
The transmitted network access code is programmable in Hexadecimal from \$000 to \$FFF or as decimal from 0000 to 4095.

NOTE: \$F7E (3966) and \$F7F (3967) are reserved for receiver programming only. (See above.)

## **BW**

The Bandwidth selection applies only to analog channels. The DRH-01-100 operates in digital mode only. The analog bandwidth selection is disabled.

## Programming Repeater Parameters



To access the DRH-01-100 repeater parameters click the “Global” folder in the left panel.

Tx Hang Time (sec)	<input type="text" value="3.5"/>
Rx Hang Time (sec)	<input type="text" value="3.5"/>
Data Preamble (msec)	<input type="text" value="100"/>
Zone	<input type="text" value="1"/>
Channel	<input type="text" value="1"/>

### Hang Times

Hang times hold the repeater in receive and/or transmit condition after an incoming signal has dropped. This allows radio users to respond without the repeater toggling to standby mode.

#### TX Hang Time (sec)

Select the desired time for the repeater to continue transmitting after the incoming signal has stopped. 0 to 7.5 seconds.

#### RX Hang Time (sec)

Select the desired time for the repeater to keep the receiver open after the incoming signal has stopped. 0 to 7.5 seconds.

### Data Preamble (msec)

The Preamble is a signal that is sent when the repeater transmitter transitions from idle to transmitting.

Programming a Data Preamble allows time for a receiving radio to establish reception prior to receiving incoming signals, decreasing the chance of missing information.

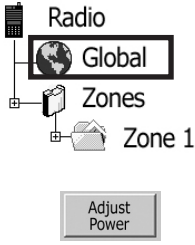
The Data Preamble can be programmed from 0 to 315 msec.

### Channel Selection

Use the Zone and Channel drop boxes to select the DRH-01-100 operating channel.

## Optimizing Transmit Power

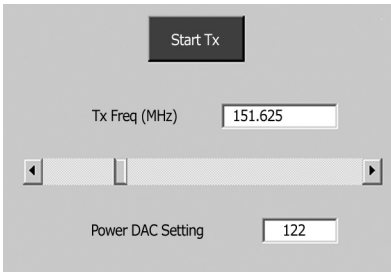
The DRH-01-100 is factory tuned to achieve a minimum of 100 Watts RF output across the full band of the repeater (136 - 174 MHz). RF power can be adjusted to a lower output on your operating frequency within the parameters of the power amplifier. The minimum power output of the DRH-01-100 is approximately 50 Watts.



To access the DRH-01-100 transmit power adjustment click the “Global” folder in the left panel then select “Adjust Power”.

## Adjusting the Power

Connect the Transmit Antenna Connector to an RF power meter capable of reading a minimum of 250 Watts.



Enter the programmed transmit frequency in the Tx Freq box.

1. Click the “Start Tx” button.
2. Record the Power DAC Setting.
3. Use the slider bar for course adjustment and the arrows for fine tuning to achieve the desired power output.
4. Click the “Stop Tx” button to set the power.

**NOTE: Changing the power settings at one frequency may cause degraded performance at other frequencies. If the operating frequency is changed the RF power must be readjusted for that frequency.**

**To meet the minimum 100 watts specification the power DAC should be reset to its original value prior to changing the operating frequency.**

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## Contact Information

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