10 METER AM / FM MOBILE AMATEUR TRANSCEIVER

DUAL POWER - 80 & 25 WATTS PEP

OWNER'S MANUAL

MAGNUM

INTRODUCTION

Congratulations on your purchase of a Magnum Raptor FM/AM 10 meter transceiver. Your Magnum Raptor is designed to provide years of enjoyment and trouble-free service. There are many features and functions designed into this transceiver. To ensure that your investment is enjoyed to its fullest extent please take a few moments and thoroughly read this manual.

Your Magnum Raptor is a combination microprocessor and phase-lock loop (PLL) controlled radio combining both high RF performance with a user-friendly front panel. The Magnum Raptor is built rugged to withstand years of use in harsh mobile environments. Although engineered with mobile use in mind the Magnum Raptor, with the addition of a high quality 20 amp regulated power supply, may be easily adapted to fixed station operation.

IMPORTANT: The Magnum Raptor is designed for entry level amateur use. If the transmitter is operated in the United States or within it's territories a licensed amateur radio operator must be present at the station. The minimum license class to operate 10-meter phone is Novice/Technician. If you are studying for your license and want to familiarize yourself with the operation of the radio, the receiver may be operated with or without a licensed operator present. For more information regarding FCC licensing, contact your nearest amateur radio dealer, or for complete details contact the American Radio Relay League.

American Radio Relay League (ARRL)
225 Main Street
Newington, CT 06111

Telephone 860-594-0200
Facsimile 860-594-0259
http://www.arrl.org

LIMITED WARRANTY

RF Limited / Magnum warrants this product to be free of defects for a period of one (1) year from the original date of purchase. This warranty is non-transferable. This limited warranty is subject to repair or replacement of defective components only. This warranty is void if the radio has been tampered with or misused.

IMPORTANT: RETAIN YOUR SALES RECEIPT

The enclosed warranty registration form must be filled out and mailed along with a photocopy of your sales receipt within 15 days from the purchase date. If the warranty registration form and copy of your sales receipt are not received the radio is not covered under warranty. Please fill out the enclosed warranty registration form and send it along with a copy of your sales receipt to:

RF Limited / Magnum
PO Box 1124
Issaquah, WA 98027

Registering your Raptor with RFLimited / Magnum provides several benefits:

1) Validates your warranty.
2) Entitles you to free updates and information regarding your radio and new accessories for your radio.

INSTALLATION

1. Contents

Unpack and inspect your Raptor for missing or damaged components. Your Raptor includes the following items:

Quantity	Description
1	Raptor Transceiver
1	Microphone
1	DC Power Cord with Inline Fuse
1	Mounting Bracket with Hardware
1	Microphone Hanger with Hardware Set
1	Operating Manual with Schematic/PLO
1	Warranty Registration Form

2. Microphone Hanger

The microphone hanger may be attached to the side of the transceiver, or any other convenient location. Locate the mounting holes on either side of the transceiver. Use the provided screws to attach the microphone hanger either vertically or horizontally to the side of the transceiver.

3. Mounting

When attaching the Raptor mounting bracket to the vehicle, choose a location that will provide easy access to all front panel controls and air circulation to the rear panel. When selecting a mounting location, make sure that there is ample space behind the control deck for the cables. Do not pinch, or bend sharply, the power or antenna cables. Do not install the Raptor in any compartment that restricts airflow and do not install in a location that interferes with the safe operation of the vehicle.

Attach the mounting bracket to the vehicle first then mount the Raptor to the bracket. If the rear panel is not accessible you may want to attach the power and antenna cable prior to mounting.

4. Electrical Connections

The Raptor is designed to work on any 13.8 volt DC, negative ground, source. The condition of a vehicle's electrical system can affect operation. A low battery, worn generator/alternator, or poor voltage regulator will seriously impair the performance of the transceiver. Any of the above conditions could result in a high level of receiver noise generation or a substantial loss of the transmitter's RF output. Make sure that all of these components of your vehicle's electrical system are in good condition prior to installing the transceiver.

CAUTION!
VOLTAGE EXCEEDING 15 VDC WILL DAMAGE THE RADIO. MEASURE VOLTAGE AT BATTERY TERMINALS, WITH VEHICLE RUNNING, PRIOR TO INSTALLATION!

Before making any electrical connections make sure the volume (VOL) control is in the "OFF" position. Connect the positive (+) red wire of the DC power cord to a positive 13.8-volt source at the vehicle fuse block. If connecting to the fuse block, it is recommended that a switched power source be used so that the power to the transceiver is disconnected when the vehicle is off. This will eliminate the possibility of the transceiver draining the vehicle's battery.

Connect the negative (-) black wire to a metal part of the vehicle's frame, or chassis ground. Make sure that this is a good ground connection.

The Raptor power cord may also be connected directly to the battery. Connecting directly to the battery has several benefits, the first of which is to maximize RF output. Secondly, the battery is a very large capacitor and will help eliminate certain types of ambient and vehicle noise. If connecting directly to the vehicle's battery, additional power cable may be required. On runs of 8 feet or less use 12-gauge stranded wire. Use 10-gauge wire on longer runs.

5. Antenna Connection

The transceiver will operate using any standard 50-ohm ground-plane, vertical, mobile whip, long wire or similar antenna. The antenna should be rated at 200 watts PEP minimum. A standard SO-239 type antenna connector is located on the rear panel of the Raptor. Connection is made using a PL-259 and high-grade coaxial cable (RG213, RG58A/U or Mini RG-8 is recommended).

A ground-plane antenna provides greater coverage and is recommended for fixed station-to-mobile operation. For point-to-point fixed station operation, a directional beam antenna operates at greater distances even under adverse conditions. A non-directional antenna should be used in a mobile installation; a vertical whip is best suited for this purpose. The base loaded whip antenna normally provides effective communications. For greater range and more reliable operation, a full quarter wave whip may be used. Either of these antennas uses the metal vehicle body as a ground plane.

Once the antenna is mounted on the vehicle, route the coaxial cable so that it is not next to any power cables or vehicle cables. Connect the PL-259 to the antenna connector on the rear panel of the Raptor. Make sure that the cable does not interfere with the safe operation of the vehicle.

6. VSWR

Before use, it is important to determine the antenna system's VSWR (voltage standing wave ratio). You will need a high quality SWR bridge (meter) to accurately tune your antenna system. First, make sure the SWR bridge is in good working order and is calibrated. To ensure your radio is performing properly the VSWR should never exceed 1.5 to 1. Never transmit on any antenna system where the VSWR exceeds 1.8 to 1. This will stress the output stage and could destroy the RF transistors; this type of misuse and failure is not covered under warranty.

Measure the VSWR at the center of the operating band. Tune the antenna (according to the antenna manufacturer's tuning instructions) so that the VSWR is as close to 1 to 1 at the center of the operating band.

Next, measure the VSWR at the lowest and highest frequency of the transceiver. If the antenna has a wide enough frequency range and band-pass, the VSWR readings should be below 1.5 to 1 across the entire operating band. If at the lower or upper end of the transceiver operating frequency, the VSWR measures more than 1.5 to 1, it is recommended that the antenna be re-tuned before operating on those frequencies.

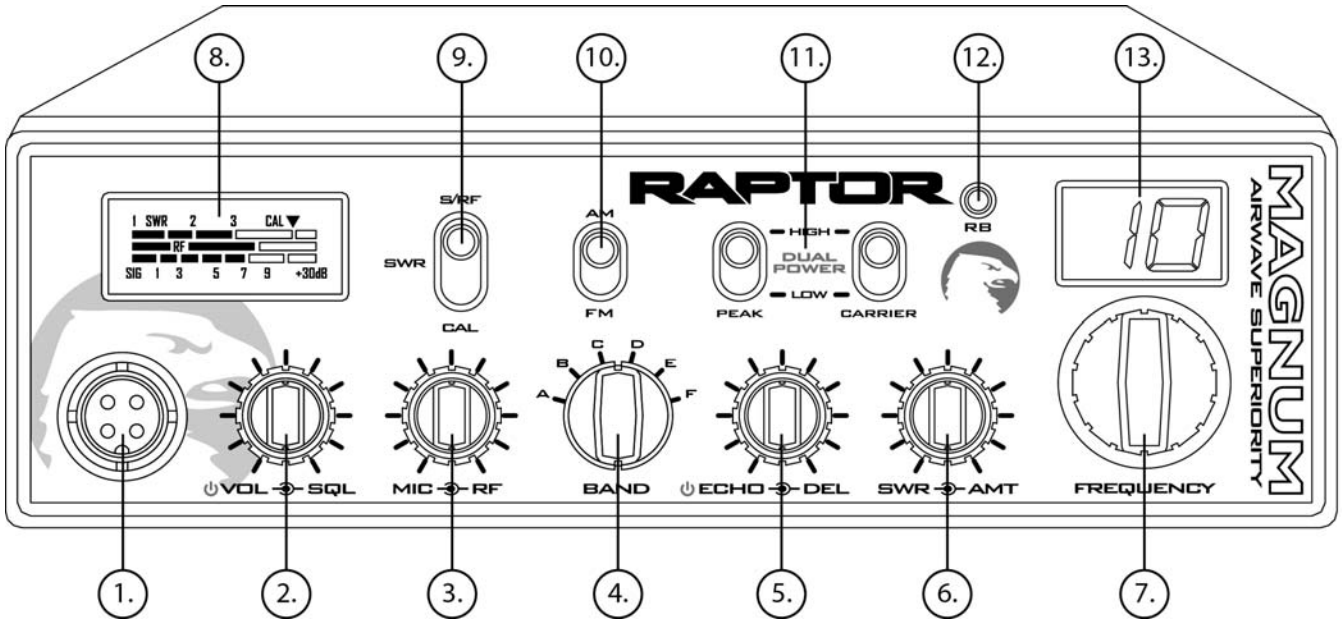
If you are experiencing unusual VSWR readings check for the following possible problems:

1) Make sure that the antenna is installed properly and grounded.
2) Check all coaxial cable and connectors for defects and poor routing.
3) If testing a vehicle installation, make sure that all vehicle doors are closed when testing.
4) Do not test near or around large metal objects or buildings.

7. Ignition Noise

In certain vehicle installations, electrical noise or interference may be present in the receive audio of the transceiver. Typically the vehicle's ignition system or more specifically the alternator generates this noise. The Raptor is equipped with both ANL and noise blanker circuits that are designed to improve, and in many instances eliminate, electrical noises.

In extreme cases, the noise blanker may not eliminate all electrical noises. In such cases, an inline DC noise filter can be used. The XLF-20 FilterCord by RF Limited is designed for use with the Raptor and is an effective way to eliminate all noise emanating from the 12VDC line. The filter will not have any effect on airborne noise entering the radio through the antenna system. This includes the 'popping' sound associated with ignition systems.



FRONT PANEL CONTROLS

1. MICROPHONE INPUT

A 4 pin, screw ring microphone connector is used. Microphone wiring is as follows:
Pin 1: Ground (Gnd)
Pin 2: Microphone Audio (AF)
Pin 3: Transmit (TX)
Pin 4: Receive (RX)

2. (OFF) VOL SQL

(OFF): Turns the radio on and off. Rotate the control counterclockwise until it clicks.

VOL: Volume. Adjusts the AF gain, or volume of the receive audio. Turn clockwise to increase and counterclockwise to decrease.

SQL: Squelch. Used to eliminate background or "white" noise when monitoring strong signals. To properly adjust the squelch circuit, start rotating the control slowly clockwise until the received white noise disappears.

3. MIC RF

MIC: Microphone Gain. Increases or decreases the microphone audio output, or "talk power". The gain increases as the control is rotated clockwise.

RF: RF Gain. Adjusts the receiver sensitivity to both signals and background noise. This affects the distance at which a signal can be detected. Turning the control counterclockwise reduces the receiver sensitivity. This is particularly useful in areas where large volumes of signals are present. The S/RF display ("SIG" bar) indicates the received signal's strength.

4. BAND

In the A position, the Raptor operates in the 10 meter band.

Positions B – F are memory channels for saving and fast recall of favorite frequencies. To program the 5 memory channels, complete the following steps:

1. Connect radio to power and turn on.
2. Remove bottom (speaker side) cabinet)
3. Locate memory tact switch inside the radio. The memory tact switch is located near the front panel of the radio by the frequency control switch. It is a small push button tact switch along the side chassis of the radio.
4. Put band switch into position A.
5. Rotate frequency control to desired frequency (see 12. for details on viewing MHz and kHz frequency positions).
6. Press and hold memory tact switch inside radio. Note that the frequency display will blink.
7. With display blinking, rotate the band switch to the desired memory channel (B – F).
8. Release memory tact switch. The frequency is now saved in the selected memory channel.
9. Repeat steps 4 through 8 for other memory channel positions.

5. ECHO DEL

TURBO™ Digital Echo is a Magnum radio exclusive feature. The *TURBO*™ Digital Echo is louder, has a wider range, and a more natural sound than any other echo processor available.

ECHO: Echo Volume. Varies the volume or number of echo repetitions. To increase the echo volume, rotate the control clockwise. To turn the echo feature off completely, rotate the echo volume control full counterclockwise until it clicks.

DEL: Echo Delay. Varies the amount of delay, or duration of the echo repetition. Rotate clockwise to increase the amount of delay and counterclockwise to decrease.

6. SWR AMT

SWR: Standing Wave Ratio Calibrate. The Raptor features an internal standing wave ratio (SWR) bridge for measuring and checking the antenna system's standing wave ratio. See 9. for more details.

AMT: All Mode Talk Back. AMT, a Magnum exclusive, is an independent talk back monitor. The AMT functions in all modes and allows the operator to monitor the transmitted audio of the Raptor. To increase the volume of the talk back rotate the control clockwise. To decrease rotate counterclockwise. To turn off the talk back rotate the control completely counterclockwise.

7. FREQUENCY: Rotate clockwise or counterclockwise to select the desired frequency. The Raptor continuously tunes from 28.00 to 29.69MHz in 10kHz steps. See 12. for details on viewing MHz and kHz frequency positions

8. S/RF/SWR METER: Indicates receive signal strength, RF output power, and SWR. The top bar on the meter indicates SWR (see 9. for more details). The middle bar indicates RF output power. The bottom bar indicates receive signal strength.

The meter features a two color LED backlight. In receive mode, the meter is illuminated blue. During transmitting, the meter is illuminated red.

9. S/RF – SWR – CAL: Selects the function of the S/RF/SWR meter (see 8.).

S/RF: In the S/RF position, the Raptor's front panel meter indicates receive signal strength (SIG) during receive mode, and RF output power (RF) when transmitting.

SWR - CAL: The SWR and CAL positions are used in conjunction with the SWR variable control (see 6.) to measure and check your antenna system's standing wave ratio (SWR).

To check your SWR follow these steps:

a. Put slide switch into the CAL (calibrate) position.
b. Use microphone PTT switch to put the Raptor into transmit mode.
c. While transmitting, use the SWR variable control (6.) to align the front panel meter needle with the CAL mark on the top bar.
d. Release PTT switch after calibrating.
e. Put slide switch into the SWR position.
f. Press the microphone's PTT switch to put the radio back into the transmit mode.
g. The front panel meter needle will indicate the standing wave ratio. The top bar of the meter indicates SWR.

   A perfect SWR is 1:1 (the needle will stay on the number 1).

   An acceptable SWR is 1.5:1 or lower (the needle is no more than half way between the 1 and the 2 on the meter).
   SWR measurements above 2:1 (the needle is on or past the number 2 on the meter) are poor and your antenna system should be checked by a trained technician.

10. AM - FM: Selects the mode of operation, AM or FM.

11. DUAL POWER: The Raptor features an exclusive dual power system that allows quick and easy adjustment of the radio's carrier and peak RF output power.

CARRIER LOW – HIGH: Adjusts the RF output power on FM and the carrier only on AM. In the LOW position the carrier level will be 2 watts. In the HIGH position the carrier level will be 15 watts.

PEAK LOW – HIGH: Adjusts the peak RF output power (modulated power) on AM only. In the LOW position the peak power will be 25 watts PEP. In the HIGH position the peak power will be 80 watts PEP.

12. RB: Roger Beep. A tone that is automatically transmitted when the microphone PTT switch is released (unkeyed). The roger beep tone is used to indicate the end of your transmission to the receiving party.

12. FREQUENCY DISPLAY: Displays the 100kHz and 10kHz position of the operating frequency. For example, when operating 28.750MHz, the display will show 75.

To see the MHz position, press the PTT switch on the microphone and the MHz position will briefly be displayed. For example, when operating 28.750MHz and the PTT switch is pressed the display will show 28.

NOT SHOWN

Microphone Push-To-Talk Switch: The push-to-talk (PTT) switch is located on the side of the microphone. Press and hold the switch to transmit. While transmitting, speak into the front grill of the microphone.

The front panel meter light will turn from blue to red, indicating that you are transmitting. Release the switch to receive.

REAR PANEL

EXT. SP.: External Speaker Jack

An external speaker jack is located on the rear panel of the transceiver. The Raptor is designed to accept any standard 8-ohm external speaker for use with two-way transceivers.

DC Power Connection

The Raptor features a power cord with the industry standard TP (trailer plug) style connector. For information on connecting to a power source, see the installation section of this manual.

FREQ: External Frequency Counter

An optional external frequency counter is available for your Magnum Raptor. This optional frequency counter is available separately and is used to indicate the exact frequency you are transmitting on.

Plug the frequency counter into the connector on the back panel and follow the installation instructions provided with the counter.

GENERAL SPECIFICATIONS

Emission Modes	:	FM (F3E) / AM (A3E)
Antenna Impedance	:	50 ohm, unbalanced
Frequency Control	:	Digital Phase-Lock Loop (PLL) Synthesizer
Frequency Accuracy	:	Better than +10 ppm from 0 - 40 ^{0}C after 15 min. warm up
Power Requirement	:	12 – 13.8 V DC, negative ground
Current Consumption	:	10 amps maximum
Dimensions	:	7.75 x 10.75 x 2.25inches
Weight	:	4.4 lbs.

TRANSMITTER SPECIFICATIONS

Power Output	:	FM .....15 Watts
	:	AM Carrier ..... 2 Watts Low / 15 Watts High
	:	AM Peak ..... 25 Watts Low / 80 Watts High
Tuning Steps	:	10 kHz
Final Transistor	:	ERF7530
Spurious Emissions	:	More than 50 dB below peak output power
Carrier Suppression	:	More than 40 dB below peak output power
FM Deviation	:	+/- 2 kHz maximum
Audio Response	:	More than 30dB below peak output
Frequency Response	:	400 to 2800 Hz
Microphone Impedance	:	ECM, 600 to 1K ohm

RECEIVER SPECIFICATIONS

Circuit Type	:	Dual-Conversion Superheterodyne
Sensitivity	:	AM ..... 0.5 µV at 10 dB S + N/N
	:	FM .....0.3 µV at 12 dB SINAD
Selectivity	:	AM / FM ..... 6.0 kHz (-6 dB) / 18 kHz (-60 dB)
Adjacent Channel Rejection	:	Better than 70 dB
IF Rejection	:	Better than 80 dB for all frequencies
Frequency Response	:	250 to 3000 Hz
Audio Output Power	:	2 watts minimum at 10% THD with an 8 ohm load
Audio Output Impedance	:	8 ohms

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