

**MILLENNIUM 2002
OPERATING MANUAL**

INTRODUCTION

Congratulations on your purchase of the Millennium 2002 10 meter amateur transceiver. The 2002 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.

The Millennium 2002 is a microprocessor controlled radio with a rugged design that makes it ideal for all mobile applications. A few of the design features incorporated into the 2002 are; user-friendly front panel controls, a back-lit liquid crystal display that provides the operator with a full visual account of the transceiver's operating status, frequency control from either the front panel or microphone, and programmable frequency resolution of either 1 kHz, 10 kHz or 100 kHz. These are just a few of the features that make the 2002 a pleasure to own and operate.

IMPORTANT: The Millennium 2002 is designed for amateur radio use. If the transmitter is operated in the United States or within its 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

Magnum International 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:

Millennium Warranty Registration
c/o Magnum International
PO Box 445
Issaquah, WA 98027

Registering your Millennium 2002 with 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
- 3) Provides possible recovery of lost or stolen radios through our serial number tracking database

INSTALLATION

1. Contents

Unpack and inspect your Millennium 2002 for missing or damaged components. Your 2002 includes the following items:

Quantity	Description
1	Millennium 2002 Transceiver
1	Microphone with Up/Down Controls
1	Mounting Bracket with Hardware Set
1	Microphone Hanger with Hardware Set
1	DC Power Cord
1	Operating Manual with Schematic

2. Microphone Hanger

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

3. Mounting Bracket

When attaching the 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. Do not install the 2002 in any compartment that restricts airflow and do not install the 2002 in a location that interferes with the safe operation of the vehicle.

Attach the mounting bracket to the vehicle first then mount the transceiver to the bracket. If the rear panel is not easily accessible when mounted, you may want to attach the coaxial and power cables first.

4. Electrical Connections

The 2002 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 on/off volume control on the transceiver 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 is 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 2002 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 14-gauge stranded wire. Use 12-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 30 watts PEP minimum. A standard SO-239 type connector is provided on the rear panel of the 2002. Connection is made using a PL-259 and high grade coaxial cable (RG213, RG58A/U or Mini RG-8 is recommended).

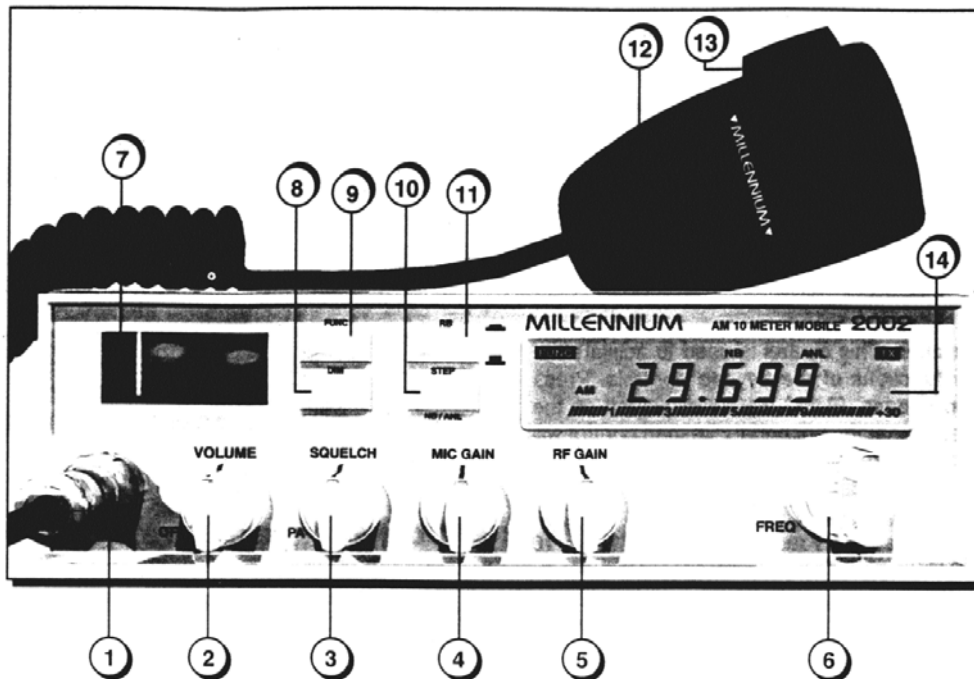
A ground-plane antenna provides greater coverage and is recommended for fixed station-to-mobile operation. For point-to-point fixed station operation, a directional beam antenna operates at greater distances even under adverse conditions. A non-directional antenna should be used in a mobile installation; 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 2002. Make sure that the coaxial cable does not interfere with the safe operation of the vehicle.

6. VSWR

After you have determined that the installation is correct and the radio is operational, it is important to determine the antenna system's VSWR (voltage standing wave ratio). Prior to taking any measurements make sure the SWR bridge (meter) 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 transistor; this type of misuse and failure is not covered under warranty.



FRONT PANEL CONTROLS

1. MICROPHONE INPUT

A 6-pin, lock ring type, microphone connector is used.

Microphone wiring is as follows:

Pin 1 : Microphone Audio

Pin 2 : Receive

Pin 3 : Transmit

Pin 4 : Down (Up w/ 22K Ohm Resistor)

Pin 5 : Ground

Pin 6 : +13.8 VDC

2. OFF / VOLUME

OFF: Turns the power to the radio on and off.

VOLUME: Adjusts the AF (audio frequency) gain, or speaker volume.

3. PA / SQUELCH

PA: Public Address. Turn the control fully counterclockwise to activate the public address feature. To speak over the PA system, press the PTT switch and speak into the microphone. In the PA mode, the transmitter is off and audio is sent to the PA system. The public address horn (not included) is plugged into the PA jack located on the back panel.

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

4. MIC GAIN: Microphone Gain. Increases or decreases the energy developed in the microphone amplifier circuit. The gain increases as the control is rotated clockwise.

For optimum setting, press the push-to-talk switch on the microphone and speak in a constant tone into the microphone. A good test tone is to say the word four in a long, drawn out tone. While speaking, rotate the mic gain control clockwise until the peak reading RF power meter on the LCD display reads +30 (this is the bar graph located along the bottom edge of the LCD). Next, rotate the control counterclockwise until the +30 segment of the display starts to flicker.

5. 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 traffic (signals) are present.

6. FREQ: Frequency. Rotate clockwise or counterclockwise to select the desired frequency.

7. S/Rf METER: Indicates receive signal strength and RF output power. The center bar on the meter indicates RF output power. The bottom bar indicates receive signal strength.

IMPORTANT!

Operating some of the features in 8 through 11 require the use of the function control. To activate the function control, momentarily push the FUNC button, the FUNC prompt will be displayed in upper left-hand corner of LCD. Push the control again to deactivate the function control.

- 8. DIM:** Dimmer. Press to increase or decrease the amount of back-lighting on the front panel and LCD screen.
- 9. FUNC:** Function. This control is used to activate the secondary functions of the keypad controls. Press slightly and release, FUNC will be displayed on the LCD indicating that the secondary keypad control will be selected when pressed.

10. STEP and NB/ANL

STEP: Selects frequency resolution in either 1 kHz, 10 kHz or 100 kHz steps. Press the STEP button, one of the digits will flash on and off. Press the STEP button again to change stepping resolution.

To tune frequencies in either 10 kHz or 100 kHz increments, press the STEP button until the desired digit is flashing. Rotate the FREQUENCY control in either direction. The entire frequency range of the Millennium 2002 can be stepped through in 10 or 100 kHz increments.

To tune in 1 kHz increments, press the STEP button until the 1 kHz digit flashes on and off. Rotate the FREQUENCY control. NOTE: When stepping in 1 kHz increments, you are limited to tuning within a 10 kHz frequency range.

NB/ANL: Noise Blanker / Automatic Noise Limiter. Turns the NB/ANL on and off. The noise blanker circuit eliminates pulse type interference usually associated with automotive ignition systems. The automatic noise limiter reduces atmospheric related noise. To activate the noise blanker and ANL, press the FUNC control and then press the NB/ANL button. NB and ANL will appear on the LCD indicating the noise blanker and ANL are turned on. To turn off the NB/ANL, repeat the same process.

- 11. RB:** Roger Beep. Push in the control to activate the end of transmission, or roger beep, tone. When activated a 1 kHz tone will automatically transmit upon release of PTT switch. This notifies contacts that your transmission has ended and you are ready to receive their signal. To turn off the roger beep, put the switch in the up, or released, position.

12. UP and DOWN FREQUENCY CONTROLS

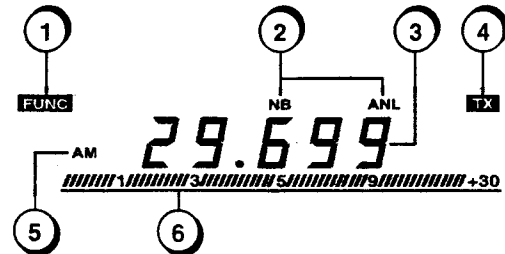
Allows remote control of frequency control. Press the up arrow to increase in frequency and press the down arrow to decrease in frequency.

13. PUSH-TO-TALK (PTT) CONTROL

Activates the transmitter and/or receiver. Push and hold the PTT control to transmit. Release the PTT control to receive.

14. LIQUID CRYSTAL DISPLAY

The LCD screen is the status display for the majority of the transceiver's functions.



(1) FUNCTION

Indicates the function button has been activated and that the function dependent controls may be accessed.

(2) NB and ANL

Indicates that both the noise blanker and the automatic noise limiter are active.

(3) 5 DIGIT FREQUENCY DISPLAY

Indicates transmit and receive operating frequencies.

(4) TX

Indicates that the transmitter is on.

(5) AM

Indicates the operating mode.

(6) PEAK READING RF POWER METER

Indicates relative peak RF output power.

OTHER FEATURES

1. PROGRAMMING TONE

This tone sounds each time the CPU is being programmed. It is helpful, in the beginning so you can be sure the command has been entered. You may turn off the tone by depressing the PTT switch on the microphone and turning on the transceiver's on/off power switch at the same time.

2. MEMORY BACK-UP

The Millennium 2002 will automatically return to the last operated mode and frequency prior to shut down. The 2002 can be disconnected from a power source for up to 5 days and still retain its memory.

General Specifications

Frequency Coverage	: 28.000 to 29.699 MHz
Tuning Steps (selectable)	: 1 kHz
	: 10 kHz
	: 100 kHz
Mode	: AM
Antenna Impedance	: 50 ohm, unbalanced
Operating Temperature	: -10°C to +60°C
Frequency Control	: Digital Phase-Lock Loop (PLL) Synthesizer
Frequency Accuracy	: +10 ppm or better from 0 - 40 °C after 15 min. warm up
Power Requirement	: 12 - 13.8 V DC, negative ground
Current Consumption	: 3.5 amps maximum
Dimensions (W x H x D)	: 200 x 60 x 270 mm
	: 7.75 x 2.375 x 10.5 in
Weight	: 1.9 kg
	: 4.1 lbs

Transmitter Specifications

Power Output	: 5 Watts Average / 12 Watts PEP
Final Transistor	: 2SC1969
Spurious Emissions	: More than 50 dB below peak output power
Frequency Response	: 400 to 2800 Hz
Frequency Tolerance	: 0.0005%
Microphone Impedance	: Condenser, 600 to 1K ohms

Receiver Specifications

Circuit Type	: Dual-Conversion Superheterodyne
Intermediate Frequencies	: 1st IF 10.695 MHz
	: 2nd IF 455 kHz
Sensitivity	: 0.5 uV at 10 dB S + N/N
S-Meter @ S-9	: 100 uV
Selectivity	: 6.0 kHz (-6 dB)
	: 18 kHz (-60 dB)
Adjacent Channel Rejection	: Better than 60 dB
IF Rejection	: Better than 70 dB for all frequencies
Frequency Response	: 250 to 3000 Hz
Audio Output Power	: 3 watts into 8 ohm load
THD	: 5% or better at 500mW output
Speaker Impedance	: 8 ohms