MAGNUM S-9

AM/FM/SSB 10 METER MOBILE AMATEUR TRANSCEIVER

OPERATING MANUAL

MAGNUM INTERNATIONAL
a division of RF Limited

INTRODUCTION

Congratulations on your purchase of a Magnum S-9 AM/FM/SSB 10 meter transceiver. Your Magnum S-9 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 S-9 is a combination microprocessor and phase-lock loop (PLL) controlled radio combining both high RF performance with a user-friendly front panel. The Magnum S-9 is built rugged to withstand years of use in harsh mobile environments. Although engineered with mobile use in mind the Magnum S-9, with the addition of a high quality 10 amp regulated power supply, may be easily adapted to fixed station operation.

IMPORTANT: The Magnum S-9 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

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:

Magnum International
PO Box 445
Issaquah WA 98027

Registering your Magnum S-9 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.

Copyright © 2004 by Magnum International. All rights reserved.

INSTALLATION

1. **Contents**
   Unpack and inspect your Magnum S-9 for missing or damaged components. Your Magnum S-9 includes the following items:

Quantity	Description
1	Magnum S-9 Transceiver
1	Dynamic Microphone
1	DC Power Cord with Inline Fuse
1	Mounting Bracket with Hardware
1	Microphone Hanger with Hardware Set
1	Operating Manual with Schematic
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 the 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 Magnum S-9 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 unit for the cables. Do not pinch, or bend sharply, the power or antenna cables. Do not install the Magnum S-9 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 Magnum S-9 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 Magnum S-9 is designed to work on any 12 - 14.1 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 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 Magnum S-9 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 50 watts PEP minimum. A standard SO-239 type antenna connector is located on the rear panel of the Magnum S-9. 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 Magnum S-9. 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 retuned before operating on those frequencies.

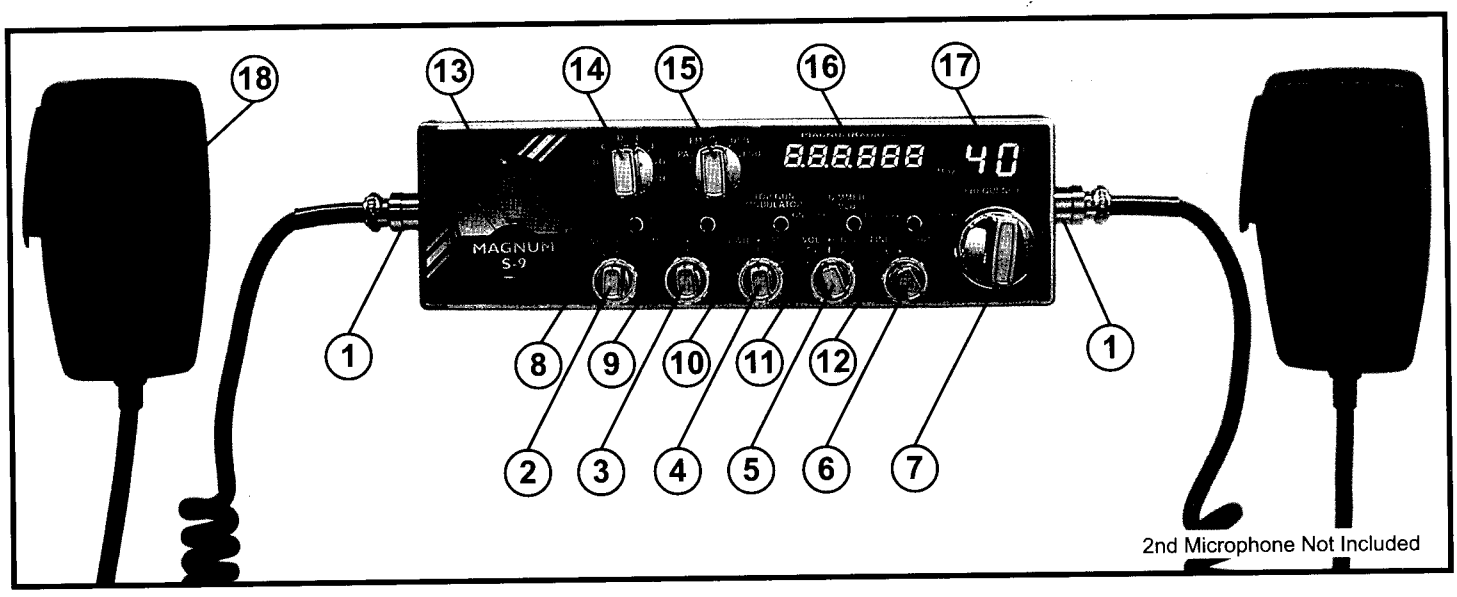
If you are experiencing unusual VSWR readings check for the following possible problems:

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 Magnum S-9 is equipped with a noise blanker circuit that is designed to reduce, and in many instances eliminate, this electrical noise.

In extreme cases, the noise blanker may not eliminate all the electrical noise. In such cases, an alternator/ ignition noise filter can be used. The PLF-10C FilterCord by Magnum International is designed for use with the Magnum S-9 and is an effective way to eliminate alternator and ignition noise problems.



FRONT PANEL CONTROLS

1. **DOUBLE-BARREL™ MICROPHONE INPUTS**
The S-9 is the only radio that features TWO 4-pin, lock ring type, microphone inputs - one on each side of the radio. The Double-Barrrel™ microphone jacks allow you to choose the side of the radio you want the microphone on, or install the stock microphone on one side and your favorite microphone on the other!

Microphone wiring is as follows:
Pin 1 : Ground
Pin 2 : Microphone Audio
Pin 3 : Transmit
Pin 4 : Receive

2. **(OFF)VOL SQ**
(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.

SQ: 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-G RF-G**
MIC-G: 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 meter needle reaches maximum deflection. Next, rotate the control counterclockwise approx. 1/16 inch. The transmitter will now be putting out its maximum rated power.

RF-G: 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.

4. **PWR AMT**
PWR: Variable RF Output Power. The transmitted power of the Magnum S-9 may be varied from 0 to 40 watts peak in all modes. Rotate clockwise to increase RF output power. Rotate counterclockwise to decrease RF output power.

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 Magnum S-9. 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.

5. **VOL DEL**
TURBO™ Digital Echo is a Magnum radio exclusive feature. The *TURBO*™ Digital Echo is louder, more adjustable, and better sounding than any other echo processor available.

VOL: Echo Volume. Varies the volume or number of echo repetitions. To increase the echo volume, rotate the control clockwise.

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. **FINE ⊰⊱ COR**
The clarifier shifts both the transmitted and received frequency in all modes. The primary use is for SSB operation. The COR (course) tuning shifts a total of +/ - 5 KHz. The FINE tuning shifts a total of +/- 1.5KHz. The built-in frequency counter will read both course and fine adjustments.

7. **FREQUENCY**: Rotate clockwise or counterclockwise to select the desired frequency.

8. **OFF-NB-NB+**: Noise Blanker and Automatic Noise Limiter. In the NB position, only the noise blanker is ON. In the NB+ position, both the noise blanker and automatic noise limiter are ON. The noise blanker circuit eliminates pulse type interference usually associated with automotive ignition systems.

   The NB+ position also turns off the frequency counter display.

9. **OFF-RB:** Roger Beep. The RB position activates the end of transmission, or roger beep, tone. When activated a 1kHz tone will automatically transmit upon the release of PTT switch. This notifies contacts that your transmission has ended and you are ready to receive their signal.

10. **TOP GUN™ MODULATOR ON-OFF:** The TOP GUN™ Modulator feature makes AM mode communications more effecient and effective. When turned on, the modulator circuit allows the AM carrier to be turned down to 1 to 1.5 watts, while still maintaining the peak output power of 45 watts of modulation (45 watts of swing). To turn the TOP GUN™ Modulator feature on, turn the switch to ON. Next, use the PWR control to set the level of AM carrier you want. Even when the PWR control is set to 1 to 1.5 watts, the radio (with the Modulator circuit turned on) will provide the maximum peak output power of 45 watts.

11. **DIMMER LO-MED-HI**: The 3 stage dimmer control allows you to select the proper illumination level for both the S/RF meter and blue LED displays.

12. **+10kHz-OFF**: In the +10kHz position, the frequency is shifted up 10 kHz.

13. **S/RF/SWR Warning Meter**: The meter indicates relative receive signal strength, RF output power, and high SWR (standing wave ratio). The meter features blue backlighting on receive and red backlighting on transmit.

    The meter features 2 scales, the lower scale indicates relative signal strength (S units) for received transmissions. The top scale indicates the RF output power of the Magnum S-9.

    If the antenna system's VSWR is too high, the meter will FLASH red on transmit. This indicates that the system's VSWR is too high and potentially damaging to the radio. See rear panel instructions (#3) on pg 7.

14. **BAND**
Use to select the following band segments (frequency groups).

Band	Frequency Range
A	28.065 - 28.505 MHz
B	28.145 - 28.585 MHz
C	28.165 - 28.605 MHz
D	28.085 - 28.525 MHz
E	28.065 - 28.505 MHz
F	28.145 - 28.585 MHz
G	28.165 - 28.605 MHz
H	28.085 - 28.525 MHz

15. **PA/FM/AM/USB/LSB**
(PA): Public Address Mode. To operate PA, insert a public address speaker or horn into the PA jack on the rear panel of the transceiver.

16. **6-DIGIT FREQUENCY COUNTER**

17. **2-DIGIT CHANNEL DISPLAY**

18. **DYNAMIC MICROPHONE**

REAR PANEL

1. **External Speaker Jack**
An external speaker jack is located on the rear panel of the transceiver. The Magnum S-9 is designed to accept any standard 8 ohm external speaker for use with two-way transceivers.

2. **Public Address (PA) Horn Jack**
A PA horn jack is located on the rear panel of the transceiver. The Magnum S-9 is designed to accept any standard PA horn for use with two-way transceivers. To operate in PA mode, please refer to the previous instructions.

3. **SWR LIGHT ON/OFF SWITCH**
The S-9 is equipped with an automatic HIGH VSWR warning circuit. In the event of an abnormally high VSWR condition the red transmitter light that illuminates the meter will start flashing. It is strongly recommended to correct the problem quickly as transmitting with a high VSWR will stress and shorten the life of the RF transistors.

   The on/off switch on the rear panel of the radio turns off the flashing red high VSWR indicator. Please note that this only turns off the indicator light and does not solve any problems that may exist with the radio and antenna system.

GENERAL SPECIFICATIONS

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	:	7 amps maximum
Dimensions	:	7.75 x 2.5 x 10.75 in (W x H x D)
Weight	:	4 lbs

TRANSMITTER SPECIFICATIONS

Power Output	:	SSB / FM ..... 40 Watts
	:	AM ..... 9 Watts Average / 45 Watts PEP
Final Transistors	:	2SC1969 (x2)
Spurious Emissions	:	More than 50 dB below peak output power
Carrier Suppression	:	More than 40 dB below peak output power
Unwanted Sideband	:	More than 50 dB below peak output (1 kHz tone)
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 ohms

RECEIVER SPECIFICATIONS

Circuit Type	:	Dual-Conversion Superheterodyne
Intermediate Frequencies	:	1st IF / SSB IF ..... 10.695 MHz
	:	2nd IF ..... 455 kHz
Sensitivity	:	SSB ..... 0.25 µV at 10 dB S + N/N
	:	AM ..... 1.0 µV at 10 dB S + N/N
	:	FM ..... 0.3 µV at 12 dB SINAD
Selectivity	:	SSB ..... 4.2 kHz (-6 dB) / 8.5 kHz (-60 dB)
	:	AM / FM ..... 6.0 kHz (-6 dB) / 18 kHz (-60 dB)
Clarifier Range	:	+/- 1.5 kHz (Fine), +/-5.0 kHz (Course)
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

MAGNUM S-3 S-6 S-9 Owner's Manual Addendum

Microphone gain amplifier circuit
The microphone amplifier circuit has been preset at the factory for an aftermarket noise canceling microphone. If the gain level requires further adjustment, remove the echo board (located directly in front of the toroidal DC input choke) and readjust VR-1 to desired setting.

AM transmitter audio level adjustment
The AM transmitter's audio level is adjusted by VR-14. Turning the VR clockwise increases the audio level.

Transmitter Specifications
Power Output AM: 1~9watts carrier/50 watts PEP
SSB: 45+ watts PEP
FM: 1~18 watts

RF Complement:
Driver stage: 1 x ERF 2030 MOSFET Final stage: 2 x ERF 2030 MOSFET

Test setup:
50amp regulated supply @ 14vdc. Bird 43 Thruline w/4300-400 Peak Power conversion kit. 25~60 MHz, 50 watt element.

S-3 Dimmer Control Board
The board is located between the DC input choke and the front panel assembly. The board is brown in color and is marked "DIMMER ADJ". VR-1 adjusts the brilliance of both the channel LED and the backlighting of the SRF meter. VR-2 adjusts the LED brilliance of the NITRO-XPRESS models only.

NX Model On Off Switch
To turn off the NITRO KNOBS, locate the 3 position slide switch on the rear panel and move the lever to the desired position.

MAGNUM S-3175, S-6175 and S-9175
OWNERS MANUAL ADDENDUM

INSTALLATION

Make sure the radiators/fins of the heatsink do not rest on a carpeted or soft surface. To effectively cool the transmitter, the fins must be kept in an open area with an unrestricted air flow.

The 10 foot DC power cable is fused with a 30 amp automotive type fuse. The cable is fused at the battery end to eliminate any possibility of damage to either vehicle or transceiver.

CAUTION The transmitter draws in excess of 20 amps during peak operating conditions. Both positive (red) and negative (black) cables must be connected directly to the battery posts.

DO NOT

- Route the DC cables thru the ignition switch.
- Connect the DC cables to the cigarette lighter
- Use any DC connectors that are located inside the cabin space of the vehicle

These connections do not provide enough DC current to operate the transmitter properly. Both vehicle and transceiver can be seriously damaged and this is will void any warranty.

ANTENNA

Selecting the proper antenna is very important; this is the most critical component in high powered RF communications systems. There are many choices and types. Talk with a professional installer to determine which model will best serve your requirements. Make sure the operating frequencies are discussed so a model with proper band pass is selected. Choose an antenna with an RF rating of at least 1KW PEP. Use either Mini 8 or RG 8 coaxial cable for all transmission feed lines. Make sure the UHF connectors have the "braid/shield" portion of the cable soldered to the UG 175 adapter. Crimped connections or improperly soldered connections will result in damage to the transmitter.

TRANSMITTER SPECIFICATIONS

RF COMPLEMENT DRIVE STAGES: 3 ERF2030 MOSFET
RF COMPLEMENT FINAL STAGE: 4 ERF2030 MOSFET operating push-pull parallel.
AM 1~30 watts carrier/175+ watts PEP
FM 1~80 watts
SSB 170~175 watts PEP

MAXIMUM CURRENT DRAIN 25 amps

AM TRANSMITTER AUDIO LEVEL ADJUSTMENT

Adjust VR-14 clockwise to increase audio level, adjust counterclockwise to reduce audio.