



OMEGA FORCE S45

AM/FM/SSB 10 METER MOBILE AMATEUR TRANSCEIVER

OPERATING MANUAL



MAGNUM INTERNATIONAL

a division of RF Limited

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INTRODUCTION

Congratulations on your purchase of an OmegaForce S45 AM/FM/SSB 10 meter transceiver. Your OmegaForce S45 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 OmegaForce S45 is a microprocessor controlled, user programmable radio combining both high RF performance with a user-friendly environment. The OmegaForce S45 is built rugged to withstand years of use in harsh mobile environments. Although engineered with mobile use in mind the OmegaForce S45, with the addition of a high quality 10 amp regulated power supply, may be easily adapted to fixed station operation.

Some of the features of the OmegaForce S45 are; an advanced design liquid crystal display that provides the operator with a full visual account of the transceivers operating status, automatic frequency scanning from either the front panel or microphone, memory storage of your favorite frequencies, programmable frequency resolution of either 1 kHz, 10 kHz or 100 kHz, and split (offset) frequency operation for repeater use. These are just a few of the features that make the OmegaForce S45 a pleasure to own and operate.

IMPORTANT: The OmegaForce S45 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 OmegaForce S45 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 OmegaForce S45 for missing or damaged components. Your OmegaForce S45 includes the following items:

Quantity	Description
1	OmegaForce S45 Transceiver
1	Power 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 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 OmegaForce S45 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 OmegaForce S45 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 OmegaForce S45 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 OmegaForce S45 is designed to work on any 12 - 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 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 OmegaForce S45 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 OmegaForce S45. 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 OmegaForce S45. 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.

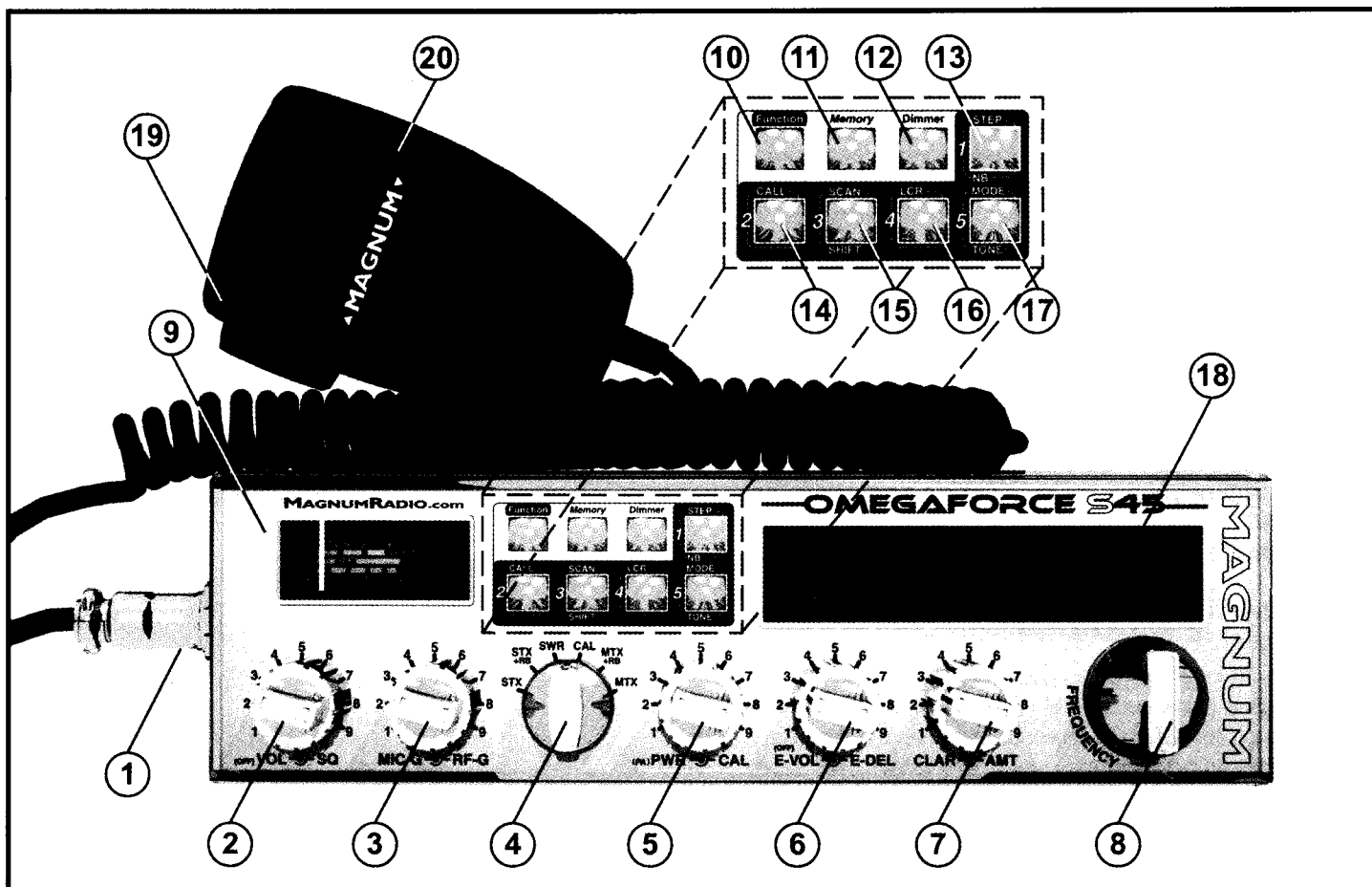
If you are experiencing unusual VSWR readings check for the following possible problems:

- 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 OmegaForce S45 is equipped with a noise blanker circuit that is designed to improve, 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 OmegaForce S45 and is an effective way to eliminate alternator and ignition noise problems.



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 : Up/Down Freq. (see schematic)
- Pin 5 : Ground
- Pin 6 : +13.8 VDC

2. (OFF)VOL \rightarrow 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 \rightarrow RF-G

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

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 signals are present. The S/RF display ("SIG" bar) indicates the received signal's strength.

4. STX • STX+RB • SWR • CAL • MTX+RB • MTX

STX: Standard Transmit. In the standard transmit position maximum AM mode output power is 10 watts carrier and 40 watts peak modulation. *NOTE: In the STX position, the meter measures receive signal strength and RF output power.*

STX+RB: Standard Transmit with Roger Beep. The STX+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. *NOTE: In the STX+RB position, the meter measures receive signal strength and RF output power.*

SWR: Standing Wave Ratio. The SWR position activates the meter to measure the standing wave ratio of the transceiver and antenna system. After the meter is calibrated, set the switch to the SWR position and press the PTT switch. The meter will measure the SWR. For optimum performance the SWR should be below 1.5 - the first green segment on the SWR portion of the meter indicates an acceptable standing wave ratio.

CAL: Calibrate. The CAL position activates the meter for SWR calibrating. To calibrate for SWR, set the switch to the CAL position, press the PTT switch and rotate the calibrate control until the meter's needle lines up with the CAL mark on the far right side of the meter. Once lined up, release the PTT. The transceiver is now ready to measure SWR (see below). *NOTE: When first attempting to calibrate make sure the transceiver is in the AM mode and the output power is at maximum. If it is not possible to calibrate in AM, then switch to FM mode.*

MTX: TOP GUN™ Modulator Transmit. The TOP GUN™ Modulator feature makes AM mode communications more efficient and effective. When turned on, the modulator circuit allows the AM carrier to be turned down to less than 1 watt, while still maintaining the peak output power of 40 watts of modulation (40 watts of swing). To turn the TOP GUN™ Modulator feature on, turn the switch to MTX or MTX+RB. Next, use the PWR control (see below) to set the level of AM carrier you want. Even when the PWR control is set to minimum, the radio (with the Modulator circuit turned on) will provide the maximum peak output power of 40 watts. *NOTE: In the MTX position, the meter measures receive signal strength and RF output power.*

MTX+RB: TOP GUN™ Modulator Transmit with Roger Beep. The MTX+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. *NOTE: In the MTX+RB position, the meter measures receive signal strength and RF output power.*

5. (PA)PWR → CAL

(PA): Public Address Mode. Rotate the PWR control full counterclockwise until it clicks to turn on the public address (PA) amplifier. To operate PA, insert a public address speaker or horn into the PA jack on the rear panel of the transceiver.

PWR: Variable RF Output Power. The transmitted power of the OmegaForce S45 may be varied from 1 to 40 watts peak in all modes. Rotate clockwise to increase RF output power. Rotate counterclockwise to decrease RF output power.

CAL: Calibrate. Rotate to calibrate the meter for SWR measurements. See instruction 4 for more information.

6. E-VOL → E-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.

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

E-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.

7. CLAR → AMT

CLAR: Clarifier. The clarifier shifts both the TX and RX frequency 1.0 kHz each side of the center frequency. This is necessary for tuning to an SSB signal. Rotate the clarifier control clockwise or counterclockwise to tune an SSB signal.

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 OmegaForce S45. 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.

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

9. **S/RF/SWR Meter:** The meter indicates relative receive signal strength, RF output power, SWR calibrate and SWR. The top horizontal bar graph indicates calibration and measuring of the standing wave ratio. The center bar graph indicates RF output power. The bottom bar graph indicates receive signal strength.

10. **FUNCTION:** This control is used to operate the three controls on the front panel that are printed in yellow, and the memory save function. To operate, press the FUNCTION button slightly and release, FUNC will be displayed on the LCD indicating that the function command is activated. After you have pressed one of the buttons the FUNC will disappear from the screen.

11. **MEMORY:** The OmegaForce S45 features 5 memory channels. These memory channels will save both the frequency and mode settings of your favorite channels.

Saving Memory Channels

1. Select a the frequency and operating mode to be saved.
2. Press the FUNC button.
3. While the FUNC indicator is displayed on the LCD, press the MEMORY button. The save (S) indicator will appear on the LCD next to the frequency.

4. While the S is displayed, immediately press any of the memory channel buttons (1 - 5).
5. The mode and frequency are now saved into memory.
6. If the S indicator disappears before you press the memory channel button, the information will not be saved and the process must be repeated.

Recalling (Loading) Saved Memory Channels

1. Press the MEMORY button. The load (L) indicator will appear on the LCD for several seconds.
2. While the L is displayed, press the desired saved memory channel (1 - 5) to be recalled.
3. The programmed mode and frequency will be displayed.

- 12. DIMMER:** Press the dimmer control to decrease the amount of backlighting on the front panel and LCD screen.

13. STEP • 1 • NB

STEP: Tuning Step. The STEP control 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 OmegaForce S45 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.

1: Memory Channel 1. After programming this button is memory channel 1. See MEMORY control for programming instructions.

NB: Noise Blanker and Automatic Noise Limiter. Turns the noise blanker and automatic noise limiter 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 NB and ANL, press the FUNC control and then press the NB button. NB and ANL will appear on the LCD indicating the noise blanker and ANL are turned on. To turn off the NB and ANL, repeat the same process.

14. CALL • 2

CALL: The call frequency is 29.300 MHz, FM. The radio's operating frequency and mode are automatically reset to this when the CALL button is pressed.

2: Memory Channel 2. After programming this button is memory channel 2. See MEMORY control for programming instructions.

15. SCAN • 3 • SHIFT

SCAN: Scans in increments of 10 kHz. There are two ways to scan using the front panel controls.

Receive Audio On Scanning

1. Turn squelch control full counterclockwise so that the background, or white, noise is heard.
2. Press the SCAN button.
3. The OmegaForce S45 will begin scanning at a rate of one 10 kHz step every 5 seconds.
4. To stop scanning press the SCAN button again, or momentarily press the PTT button on the microphone (scanning will stop without transmitting).

Receive Audio Mute Scanning

1. Carefully rotate the squelch control clockwise to a minimum excursion until the receive audio is off - refer to squelch control instructions.
2. Press the SCAN button.
3. The OmegaForce S45 will begin scanning at a rate of five 10 kHz steps every 1 second.
4. The scanning will automatically pause, and the squelch will disengage, when a strong signal is detected.
5. The squelch circuit will automatically re-engage and the receiver will continue to scan the moment the received signal is no longer detected.
6. To stop the scanning on a received signal, press the SCAN button again, or momentarily press the PTT button on the microphone (scanning will stop without transmitting).

3: Memory Channel 3. After programming this button is memory channel 3. See MEMORY control for programming instructions.

SHIFT: Used for programming offsets to operate repeater networks. The OmegaForce S45 can transmit and receive on different frequencies.

Programming the Offset Frequency

1. Press the FUNC button.
2. While the FUNC indicator is displayed on the LCD, press and hold down the SHIFT button for 3 or more seconds.
3. Three digits will appear on the LCD. This is the offset frequency in kHz.
4. Rotate the FREQUENCY control until the desired offset frequency is displayed.
5. To save the offset frequency setting and return to the main display repeat steps 2 and 3, or momentarily press the PTT button on the microphone (the transmitter will not be engaged).

Activating the Programmed Offset Frequency

1. Press the FUNC button.
2. While the FUNC indicator is displayed on the LCD, press the SHIFT button once (do not hold down the button).
3. +SHIFT is displayed on the LCD. The OmegaForce S45 will now transmit on the frequency that is XXX kHz greater than the displayed, or receive, frequency (XXX represents the programmed offset frequency in kHz).
4. The OmegaForce S45 is also capable of transmitting on the frequency that is XXX kHz lower than the displayed, or receive, frequency.
5. Repeat steps 1 and 2 until -SHIFT is displayed on the LCD. The transmit frequency will now be XXX kHz lower than the displayed, or receive frequency.
6. To turn off the offset frequency function, repeat steps 1 and 2 until the SHIFT indicator is no longer displayed on the LCD.

16. LCR • 4

LCR: Last Channel Recall. Press the LCR button to return to the last frequency that was transmitted on for more than 3 seconds.

4: Memory Channel 4. After programming this button is memory channel 4. See MEMORY control for programming instructions.

17. MODE • 5 • TONE

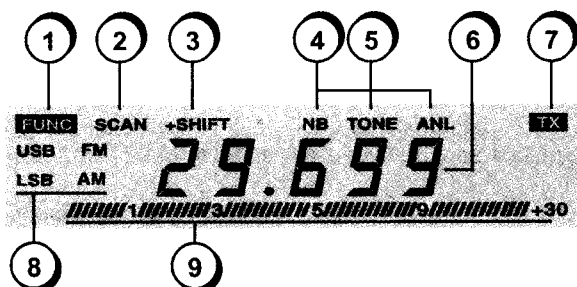
MODE: Press the MODE control to select the operating mode. The operating mode is indicated on the liquid crystal display, AM, FM, USB, or LSB.

5: Memory Channel 5. After programming this button is memory channel 5. See MEMORY control for programming instructions.

TONE: Press the FUNC button, and then press the tone button to turn on the receive audio tone control. TONE will appear on the LCD indicating the feature is activated. This feature will roll-off high frequency noise. Under many operating conditions this will improve the clarity and understanding of received signals.

18. LIQUID CRYSTAL DISPLAY

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



(1) FUNC

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

(2) SCAN

Indicates that the transceiver is in scan mode.

(3) +SHIFT / -SHIFT

Indicates that the split or offset frequency function is activated.

(4) NB and ANL

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

(5) TONE

Indicates that the receive audio tone low feature is active.

(6) 5 DIGIT FREQUENCY DISPLAY

Indicates transmit and receive operating frequencies.

(7) TX

Indicates that the transmitter is on.

(8) USB / LSB / FM / AM

Indicates the selected operating mode.

(9) PEAK READING RF POWER METER

Indicates relative peak RF output power.

19. PUSH-TO-TALK SWITCH

Press and hold the switch to transmit. TX will appear on the LCD screen when transmitting. Release the switch to receive.

20. UP and DOWN FREQUENCY CONTROLS

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

REAR PANEL

1. External Speaker Jack

An external speaker jack is located on the rear panel of the transceiver. The OmegaForce S45 is designed to accept any standard 8 ohm external speaker for use with two-way transceivers.

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 simply pressing the PTT switch on the microphone and turning on the ON/OFF POWER switch at the same time. To turn the tone back on, repeat the same process.

2. MEMORY BACK UP

The OmegaForce S45 features a super-capacitor back up for the 5 memory channels. The OmegaForce S45 can be disconnected from a power source for approximately 4 or 5 days before the memory is lost.

GENERAL SPECIFICATIONS

Frequency Coverage	: Transmit and Receive	28.000 to 29.699 MHz
Antenna Impedance	: 50 ohm, unbalanced	
Frequency Control	: Digital Phase-Lock Loop (PLL) Synthesizer	
Frequency Accuracy	: Better than +10 ppm from 0 - 40 °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 / 40 Watts PEP
Tuning Steps	: 1 kHz / 10 kHz / 100 kHz	
Final Transistors	: 2SC2312 (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 μ V at 10 dB S + N/N
	: AM	1.0 μ V at 10 dB S + N/N
	: FM	0.3 μ V 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	
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 INTERNATIONAL

A Division of RF Limited

PO Box 445 • Issaquah WA 98027
Telephone 425-558-9592 • Facsimile 425-558-9704
Technical Support Only 1-877-MAGNUM-9 (1-877-624-6869)

<http://www.magnumradio.com>
E-Mail info@magnumradio.com