

Maintenance Manual

**ORION™
UHF
SCAN AND SYSTEM
MOBILE RADIO**

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NOTICE!

This manual covers Ericsson and General Electric products manufactured and sold by Ericsson Inc.

NOTICE!

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user’s authority to operate the equipment in addition to the manufacturer’s warranty.

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SPECIFICATIONS*

Frequency Range:		403-440 MHz	
		440-470 MHz	
		470-512 MHz	
Regulatory Approval			
FCC (United States)	AXATR-315-A2	403-440 MHz	20/40 Watts
	AXATR-315-B2	440-470 MHz	30/40 Watts
	AXATR-315-C2	470-512 MHz	35 Watts
	AXATR-316-A2	403-440 MHz	100 Watts
	AXATR-316-B2	440-470 MHz	100 Watts
	AXATR-316-C2	470-512 MHz	80 Watts
DOC (Canada)	TR-315	403-440 MHz	20/40 Watts
	TR-315	440-470 MHz	30/40 Watts
Battery Drain:			
Receive	Squelched	1.1 Amperes at 13.8 Volts	
	Unsquelched	3.0 Amperes at 13.8 Volts (15 Watts Output)	
Transmitter	20 Watts	12 Amperes at 13.2 Volts	
	35/40 Watts	14 Amperes at 13.6 Volts	
	80/100 Watts	25/28 Amperes at 13.4 Volts	
Frequency Stability:		0.0002% depending on model	
Temperature Range:		-30° C (-22° F) to +60° C (+140° F)	
Duty Cycle:		100% Receive, 14% Transmit	
Transmitter			
Transmit Output Power:		20W/35W/40W/80W/100W	
Conducted Spurious:		-85 dB	
Modulation:		±4.5 kHz	
Audio Sensitivity:		55 to 110 millivolts	
Audio Frequency Characteristics:		Within +1 dB to -3 dB of a 6 dB/octave pre-emphasis 300 Hz and within +1 dB to -4.5 dB of a 6 dB/octave pre-emphasis 3000 Hz per EIA standards. Post-limiter filter per FCC and EIA.	
Distortion:		Less than 2% (1000 Hz)	
		Less than 5% (3000 Hz)	
Deviation Symmetry:		0.3 kHz maximum	
Maximum Frequency Separation:		403-440 MHz 37 MHz	
		440-470 MHz 30 MHz	
		470-512 MHz 42 MHz	
Microphone Load Impedance:		600 Ohms	
Power Adjust Range:		100% to 50% of rated power (U.S.A. Models)	
		100% to 30% of rated power (Euro Models)	
RF Output Impedance:		50 Ohms	
FM Noise:		45 dB	

Continued

SPECIFICATIONS* - Cont.

<u>Receiver</u>	
Audio Output: (To 4.0 ohm speaker)	15 Watts with less than 3% distortion
Sensitivity: 12 dB SINAD (IEIA method)	0.35 µV (STD)/0.22 µV (PRE)
Selectivity: EIA Two-Signal Method (25 kHz Channels)	-85 dB (STD)-80 dB (PRE)
Spurious Response:	-100 dB (STD)/-90 (PRE)
Intermodulation 25 kHz:	-85 dB (STD)/-80 dB (PRE)
Maximum Frequency Separation:	403-440 MHz 37 MHz 440-470 MHz 30 MHz 470-512 MHz 42 MHz
Frequency Response:	Within +1, -3 dB of 6 dB/octave de-emphasis from 300 to 3000 MHz (1000 Hz reference)
RF Input Impedance:	50 Ohms
Hum/Noise ratio: Unsquelched Squelched	-50 dB -70 dB
Channel Spacing:	30 kHz

* These specifications are intended primarily for use of the service technician. Refer to the appropriate Specifications Sheet for the complete specifications.

DESCRIPTION

The synthesized **ORION** mobile radio combinations are completely solid-state, utilizing microcomputer technology and integrated circuits to provide high-quality, high-reliability radios. Standard combinations may be equipped with:

- Microcomputer Controlled Frequency Synthesizer
- Up to 16 Channels
- 0.0002% Frequency Stability
- Other Structured Options

The basic radio consists of three printed wiring boards mounted in a cast aluminum frame. The three boards are:

1. The Control Logic/IF board
2. The Frequency Synthesizer/Receiver/Exciter board
3. The Power Amplifier board

The radio is of double-layer construction with tuning adjustments easily accessible from the top of the radio.

The Control Logic/IF Board is located on the top of the radio, while the Power Amplifier and the Synthesizer/Receiver/Exciter boards are located on the bottom of the radio.

SYNTHESIZER/INTERCONNECT

The synthesizer consists of a microcomputer, **E**lectrically **E**rasable **P**rogrammable **R**ead **O**nly **M**emory (**EEPROM**), a frequency synthesizer IC, transmit and receive **V**oltage **C**ontrolled **O**scillator's (**VCO**) and associated circuitry. The frequency synthesizer under control of the microcomputer generates all transmit and receive Radio Frequencies (RF).

The EEPROM stores binary data for all radio frequencies, Channel Guard tones/digital codes and the timing function of the **C**arrier **C**ontrol **T**imer (**CCT**). The

microcomputer accesses the EEPROM and provides the correct **W**ALSH bits to the Channel Guard circuitry to generate the correct Channel Guard tone or digital code on a per-channel basis.

PROGRAMMING

The EEPROM allows the radio to be programmed or reprogrammed as needed to adapt to changing system requirements. Radio Frequencies, Channel Guard tone and digital codes and the CCT function can be reprogrammed.

The EEPROM can be reprogrammed through the radio front connector using a personal computer. This programmer allows all information to be loaded simultaneously.

Programming instructions are provided in the respective Programmer Maintenance Manuals.

TRANSMITTER

The transmitter consists of the exciter, frequency synthesizer, transmitter VCO and a Power Amplifier (PA) assembly. The PA assembly consists of a PA board mounted on a heat sink assembly. The PA board also contains an antenna switching diode and a low-pass filter.

Audio and Channel Guard circuitry for the transmitter is located on the Control Logic/IF Board.

RECEIVER

The receiver consists of the frequency synthesizer, RX VCO, injection amplifiers, front end, IF and limiter detector. Audio, squelch and Channel Guard circuitry for the receiver is located on the Control Logic/IF Board.

SYSTEM CONTROL FUNCTION

A microprocessor on the Control Logic/IF board controls the frequency synthesizer, the TX ON/OFF, the decoding of CTCSS tones, the generation of CTCSS tones,... etc. The audio processor circuitry of the transmitter and the receiver are located on the Control Logic/IF board. Squelch circuitry and a connection to the digital AEGIS circuit is also located on the Control Logic/IF board.

OPERATION

Complete operating instructions for the ORION Two-Way Radio are provided in Operator's Manual LBI-38888 for the control unit used.

MAINTENANCE

The Service Section in maintenance manual LBI-38908 contains the maintenance information to service this radio. The Service Section includes:

- Disassembly Procedures
- Replacement of IC's, chip capacitors and resistors
- Alignment procedures for the transmitter and receiver
- Troubleshooting Procedures and wave forms

A mechanical layout for the radio is found in **ORION** Assemblies Maintenance Manual **LBI-38909**.



Figure 1 - ORION Mobile Radio





