

Mobile Radio Communications

ORION<sup>TM</sup> 800 MHz SCAN AND SYSTEM MOBILE RADIO

#### TABLE OF CONTENTS

 						•		 . LBI-39070
 								 . LBI-39071
 							•	 . LBI-38994
 								 . LBI-39072
 							•	 . LBI-38992
 								 . LBI-38909
 								 . LBI-39073
· · · · · · · · · · · · · · · · · · ·	· · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·



Ericsson GE Mobile Communications Inc. Mountain View Road • Lynchburg, Virginia 24502

# **Maintenance Manual**



Printed in U.S.A.

# **SPECIFICATIONS\***

#### <u>Page</u> SPECIFICATIONS ..... 1 REGULATORY APPROVALS 2 2 SYNTHESIZER/INTERCONNECT 2 PROGRAMMING 2 TRANSMITTER 2 2 SYSTEM CONTROL LOGIC FUNCTION ..... 2 OPERATION ..... 3 MAINTENANCE 3 3 4 **ILLUSTRATIONS** 3

**TABLE OF CONTENTS** 

# Figure 1 - ORION Mobile Radio

- NOTE

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.

#### ——— NOTICE! ——

The software contained in this device is copyrighted by Ericsson GE Mobile Communications Inc. Unpublished rights are reserved under the copyright laws of the United States.

This manual is published by Ericsson GE Mobile Communications Inc., without any warranty. Improvements and changes to this manual necessitated by typographical errors, inaccuracies of current information, or improvements to programs and/or equipment, may be made by Ericsson GE Mobile Communications Inc., at any time and without notice. Such changes will be incorporated into new editions of this manual. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, for any purpose, without the express written permission of Ericsson GE Mobile Communications Inc.

Frequency Range	:	806-825 N 851-870 N
Battery Drain: <u>Receiver</u>	Squelched Unsquelched	1.1 Amper 3.0 Amper
<u>Transmitter</u>	12 Watts 30 Watts	7 Amperes 14 Ampere
Frequency Stabili	ty:	0.00015%
Temperature Ran	ge:	-30°C (-22
Duty Cycle:		80% Rece
<u>Transmitter</u>		
Transmit Output	Power:	12/35 Wat
		12/30 Wat
Conducted Spuri	ous:	-70 dB
Modulation:		±5 kHz, ±4
Audio Sensitivity		55 to 110
Audio Frequency Characteristics:		Within +1 Hz to 3000
Distortion:		Less than 2 Less than 2
Deviation Symme	try:	0.3 kHz m
Maximum Freque	ency Separation:	19 MHz (8 19 MHz (8
Microphone Load	I Impedance:	600 Ohms
Power Adjust Rai	nge:	100% to 5
RF Output Imped	lance:	50 Ohms
FM Noise:		45 dB
Carrier Attack Ti	me:	50 millised
Audio Attack Tim	e:	50 millised
Channel Guard T	'X Tone Distortion:	5%

## LBI-38902

MHz (TX) MHz (TX and RX)

res at 13.8 Volts eres at 13.8 Volts (15 Watts Output)

es at 13.6 Volts res at 13.6 Volts

 $2^{\circ}$ F) to +60°C (+140°F)

eive, 20% Transmit

tts (806-825 MHz)

tts (851-870 MHz)

4 kHz on NPSPAC Channels

millivolts

dB to -4.5 dB of a 6 dB/octave pre-emphasis from 300 00 Hz per EIA. Post-limiter filter per FCC and EIA.

2% (1000 Hz) 5% (3000 Hz)

naximum

806-825 MHz) TX (851-870 MHz) TX

50% of rated power

conds

conds

Continued

# **SPECIFICATIONS**

#### **Receiver**

Audio Output: (To 4.0 ohm speaker)	15 Watts with less than 3% distortion	radio combinations are completely solid-state, utilizing micro- computer technology and integrated circuits to provide high- quality, high-reliability radios. Standard combinations may be equipped with:
Sensitivity: 12 dB SINAD (EIA method)	0.35 μV	Microcomputer Controlled Frequency Synthesizer
		• Up to 192 Conventional Channels
Selectivity: EIA Two-Signal Method	-80 dB (Also -20 dB @ $\pm$ 12.5 kHz NPSPAC) channels)	• Up to 800 MHz EDACS Systems/Groups
(25 kHz Channels)		• 0.00015% Frequency Stability
Spurious Response:	-90 dB	Other Structured Options
Intermodulation 25 kHz:	-80 dB	The basic radio consists of three printed wiring boards mounted in a cast aluminum frame. The three boards are:
Maximum Frequency Separation:	857-870 MHz 19 MHz	1. The System Control Logic/IF Board,
Frequency Response:	Within +2, -8 dB of 6 dB/octave de-emphasis from 300 to 3000 MHz (1000 Hz reference)	2. The Frequency Synthesizer/Receiver/ Exciter Board
RF Input Impedance:	50 Ohms	3. The Power Amplifier Board.
Hum/Noise ratio: Unsquelched Squelched	-45 dB -70 dB	The radio is of double-layer construction with minimal tun- ing adjustments.
Receiver Recovery Time:	200 milliseconds	while the Power Amplifier and the Synthesizer/Receiver/Exciter Boards are located on the bottom.
Receiver Attack Time:	150 milliseconds	
Channel Spacing:	25 kHz	SYNTHESIZER/INTERCONNECT
		$\mathbf{r}_{\mathbf{P}} = \mathbf{r}_{\mathbf{P}} + $

# **REGULATORY APPROVALS**

The following equipment authorized numbers have been granted:

COUNTRY	REGULATORY APPROVAL
UNITED STATES	FCC AXATR - 317 - A2 (12W) AXATR - 318 - A2 (35W)
CANADA	DOC TR - 317 (12W) TR - 318 (35W)

### **DESCRIPTION**

ERICSSON GE synthesized ORION<sup>™</sup> 800 MHz mobile

The synthesizer consists of a microcomputer, Electrically Erasable Read Only Memory (EEPROM), a frequency synthesizer IC, transmit and receive Voltage Controlled Oscillator'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 Carrier Control Timer (CCT). The microcomputer accesses the EEPROM and provides the correct WALSH 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 rear connector using a personal computer and personal computer programmer software. This programmer allows all information to be entered from the personal computer screen.

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 antenna switching diodes and a low-pass filter.

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

# SYSTEM CONTROL LOGIC FUNCTION

A microprocessor on the System 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 System Control Logic/IF Board.

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

# PARTS LIST

#### ORION 800 MHz MOBILE RADIO



Figure 1 - ORION Mobile Radio

# **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-39073 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

SYMBOL	PART NUMBER	DESCRIPTION
		TXRX UNIT 34464570P1/1HM871PN
Δ1	B19/CME-138P	SYSTEM CONTROL LOGIC SECTION
A1	B19/CMC-682	IF SECTION
A2	B19/CMN-358	SYNTHESIZER/RECEIVER FRONT END/EXCITER BOARD (RECEIVER FRONT END/EXCITER SECTION)
A2	B19/CMN-358K	SYNTHESIZER/RECEIVER FRONT END/EXCITER BOARD (SYNTHESIZER SECTION)
		PA UNIT
		344A45741/JHM-871PI (12 WATT)
A1001	B19/CAH-5851	PA CIRCLIIT (LISED IN P1)
A1001	B19/CAH-585H	PA CIRCUIT (USED IN P2)
A1007	B19/CMH-123111	
A1002	510/0101-12310L	
		CONTROL UNIT 344A4581P1/CMD-556BL (SCAN MODEL LOCAL TYPE) 344A4581P2/CMD-556BR (SCAN MODEL REMOTE TYPE) 344A4581P3/CMD-556ML (SYSTEM MODEL LOCAL TYPE) 344A4581P4/CMD-556MR (SYSTEM MODEL REMOTE TYPE)
A1	B19/CDF-368B	SWITCH CIRCUIT (SCAN MODEL)
A1	B19/CDF-368M	SWITCH CIRCUIT (SYSTEM MODEL)
A2	B19/CMC-638	PANEL CONTROL
A3	B19/NQZ-4882	REMOTE INTERFACE ADAPTER (RIA)

# LBI-38902





This page intentionally left blank

# LBI-38902