Maintenance Manual

ORION™
UHF (Dual Bandwidth)
SCAN AND SYSTEM
MOBILE RADIO

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ERICSSON

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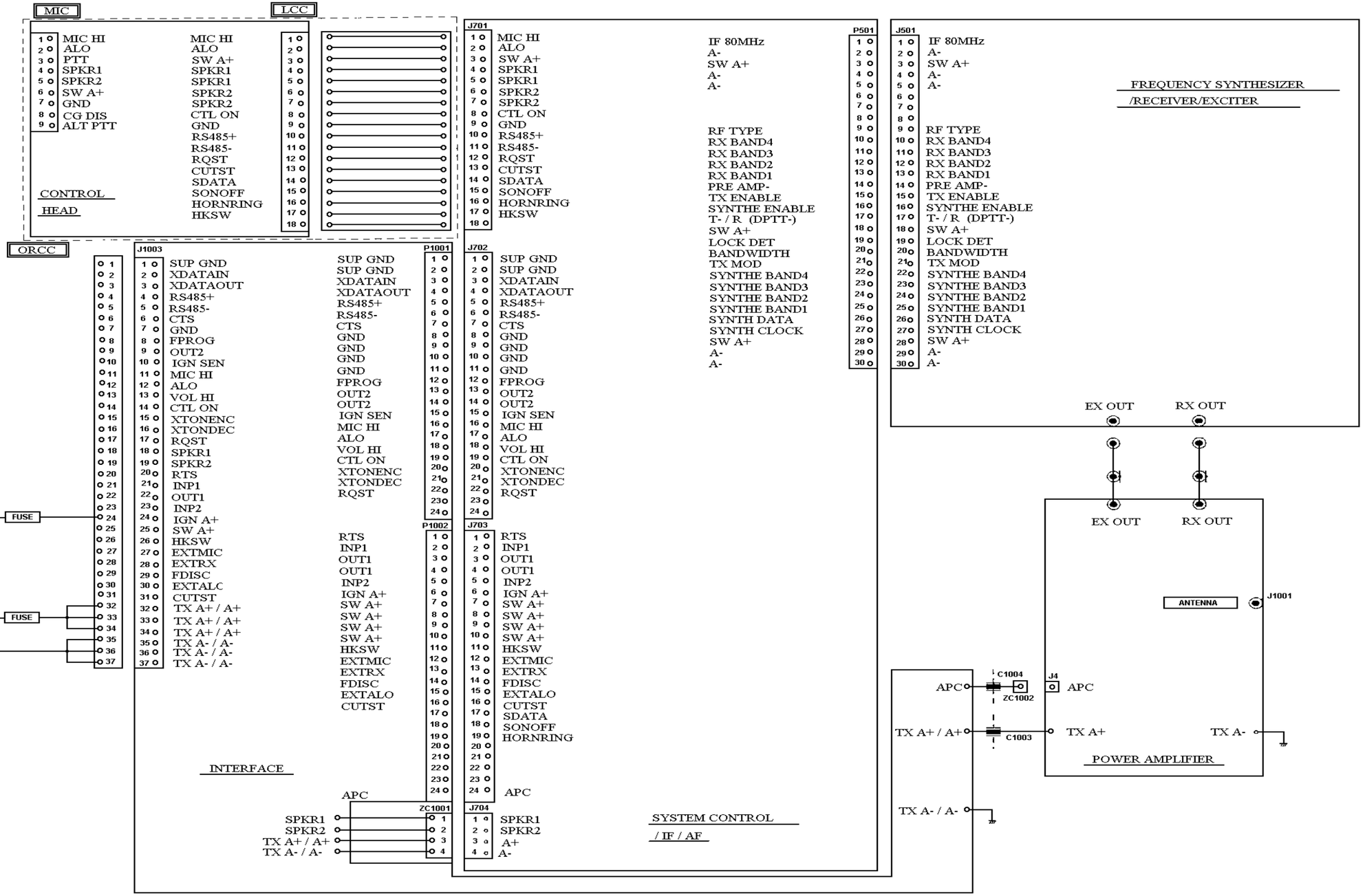
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LCC
1 MIC HI
2 ALO
3 PTT
4 SPKR1
5 SPKR2
6 SW A+
7 GND
8 CG DIS
9 ALT PTT
CONTROL HEAD
MIC HI
ALO
SW A+
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SPKR2
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RS485-
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RX BAND3
RX BAND2
RX BAND1
PRE AMP-
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SYNTHE ENABLE
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EX OUT
RX OUT
ANTENNA
J1001
J4
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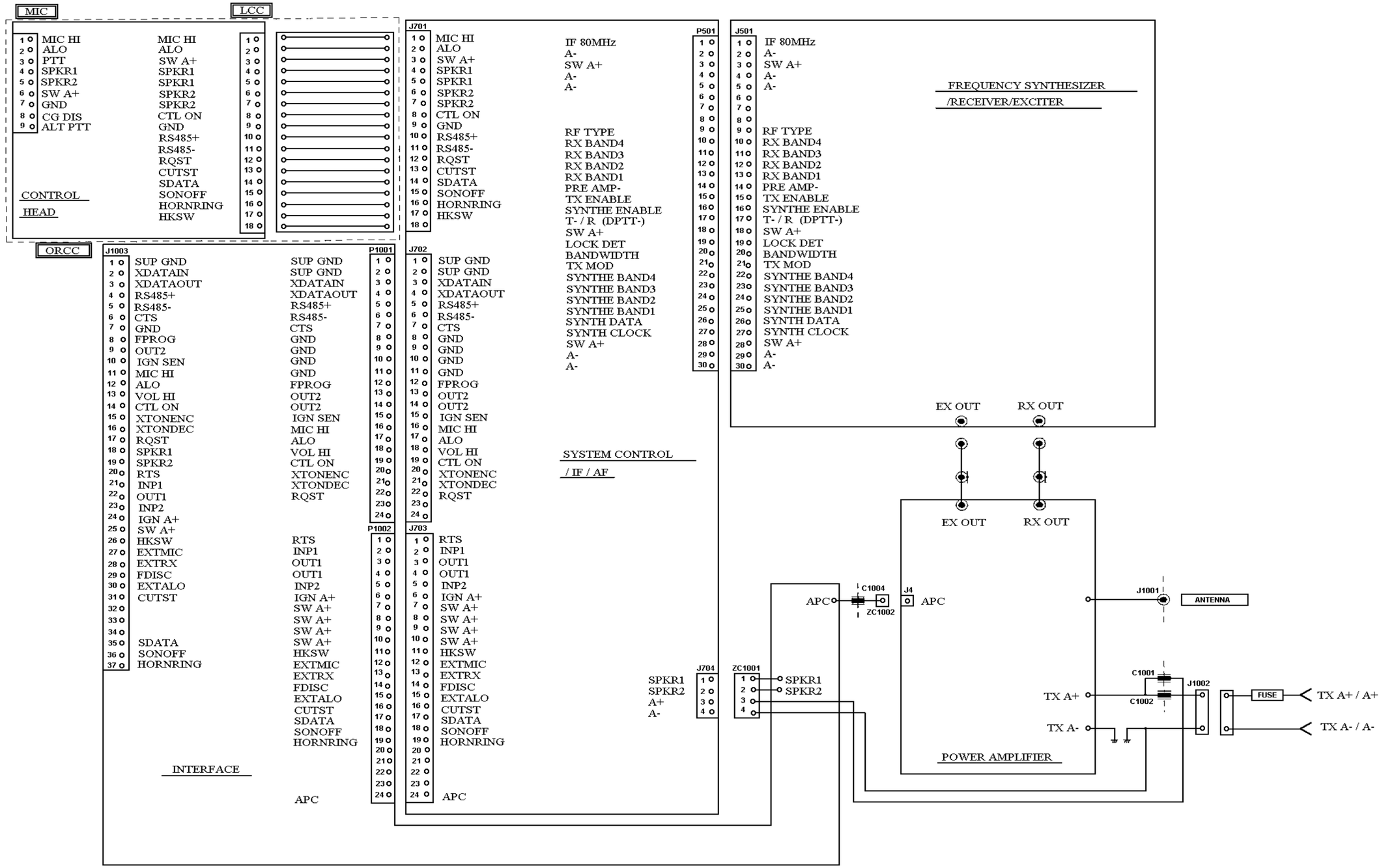
TX A+
TX A-
POWER AMPLIFIER



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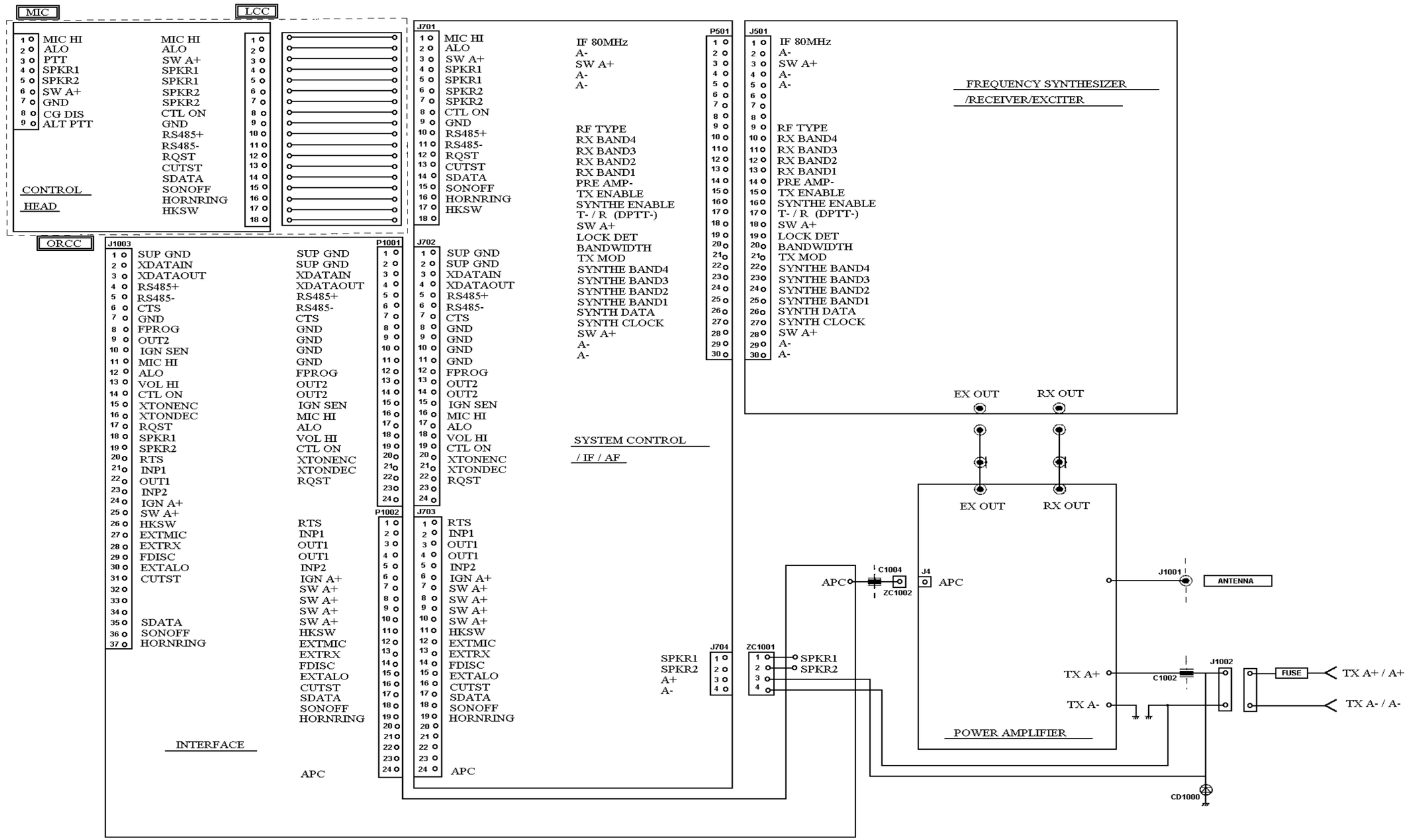
MIC
LCC
1 MIC HI
2 ALO
3 PTT
4 SPKR1
5 SPKR2
6 SW A+
7 GND
8 CG DIS
9 ALT PTT
CONTROL
HEAD
MIC HI
ALO
SW A+
SPKR1
SPKR1
SPKR2
SPKR2
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SW A+
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A-
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RX BAND3
RX BAND2
RX BAND1
PRE AMP-
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SYNTHE ENABLE
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SW A+
LOCK DET
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SYNTHE BAND3
SYNTHE BAND2
SYNTHE BAND1
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SYNTH CLOCK
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RX OUT
EX OUT
RX OUT
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3 XDATAOUT
4 RS485+
5 RS485-
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7 GND
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12 ALO
13 VOL HI
14 CTL ON
15 XTONENC
16 XTONDEC
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18 SPKR1
19 SPKR2
20 RTS
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22 OUT1
23 INP2
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25 SW A+
26 HKSW
27 EXTMIC
28 EXTRX
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SUP GND
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GND
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OUT2
OUT2
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ALO
VOL HI
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OUT1
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SW A+
SW A+
SW A+
SW A+
HKSW
EXTMIC
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EXTALO
CUTST
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1 SUP GND
2 SUP GND
3 XDATAIN
4 XDATAOUT
5 RS485+
6 RS485-
7 CTS
8 GND
9 GND
10 GND
11 GND
12 FPROG
13 OUT2
14 OUT2
15 IGN SEN
16 MIC HI
17 ALO
18 VOL HI
19 CTL ON
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4 OUT1
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8 SW A+
9 SW A+
10 SW A+
11 HKSW
12 EXTMIC
13 EXTRX
14 FDISC
15 EXTALO
16 CUTST
17 SDATA
18 SONOFF
19 HORNRING
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24 APC
SYSTEM CONTROL
/ IF / AF
SPKR1
SPKR2
A+
A-
J704
1
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3
4
ZC1001
1
2
3
4
SPKR1
SPKR2
APC
C1004
ZC1002
J4
APC
J1001
ANTENNA
TX A+
TX A-
C1002
J1002
FUSE
TX A+ / A+
TX A- / A-
POWER AMPLIFIER
CD1000

SPECIFICATIONS* - Cont.

Receiver

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)	-80 dB (STD)-75 dB (PRE)
(12.5 kHz Channels)	-70 dB (STD)-65 dB (PRE)
Spurious Response:	-90 dB (STD)/-90 (PRE)
Intermodulation 25 kHz:	-80 dB (STD)/-75 dB (PRE)
12.5 kHz:	-70 dB (STD)-65 dB (PRE)
Maximum Frequency Separation:	403-440 MHz .... 37 MHz 440-470 MHz .... 30 MHz 470-512 MHz .... 42 MHz
Frequency Response: (25 kHz)	Within +1, -3 dB of 6 dB/octave de-emphasis from 300 to 3000 kHz (1000 Hz reference)
(12.5 kHz):	Within +1, -3 dB of 6 dB/octave de-emphasis from 300 to 2500 kHz (1000 Hz reference)
RF Input Impedance:	50 Ohms
Hum/Noise ratio:	
Unsquelched	-50 dB
Squelched	-70 dB
Channel Spacing:	25/12.5 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
- 0.00015% 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 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 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-39166 contains the maintenance information to service this radio. The Service Section includes:

- Dissassembly 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

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ILLUSTRATION

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.

NOTICE!

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	9 Amperes at 13.2 Volts	
	35/40 Watts	14/15 Amperes at 13.6 Volts	
	80/100 Watts	25/28 Amperes at 13.4 Volts	
Frequency Stability:		0.00015%	
Temperature Range:		-30° C (-22° F) to +60° C (+140° F)	
Duty Cycle:		86% Receive, 14% Transmit	

Transmitter

Transmit Output Power:	20W/35W/40W/80W/100W
Conducted Spurious:	-85 dB
Modulation:	±5.0 kHz (WB-25 kHz spacing), ± 2.5 kHz (NB-12.5 kHz spacing)
Audio Sensitivity:	55 to 110 millivolts
Audio Frequency Characteristics:	Within +1 dB to -3 dB of a 6 dB/octave pre-emphasis 300 Hz -2500 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 (WB) / 0.15 maximum (NB)
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