Maintenance Manual

ORION™
136-174 MHz
SCAN AND SYSTEM
MOBILE RADIO

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ERICSSON

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NOTICE!

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

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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.

SPECIFICATIONS*

Frequency Range:		136-153 MHz 150-174 MHz
Battery Drain:		
Receiver	Squelched	1.1 Amperes at 13.8 Volts
	Unsquelched	3.0 Amperes at 13.8 Volts (15 Watts Output)
Transmitter	25 Watts	12 Amperes at 13.2 Volts
	50 Watts	14 Amperes at 13.6 Volts
	110 Watts	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:		25W/50W/110W
Conducted Spurious:		-85 dB
Modulation:		±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 (+1 to -3 dB for Euro) 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)
Deviation Symmetry:		0.3 kHz maximum
Maximum Frequency Separation:		136-153 MHz, 17 MHz 150-174 MHz 24 MHz
Microphone Load Impedance:		600 Ohms
Power Adjust Range:		100% to 50% of rated power (U.S.A. Models) 100% to 24% of rated power (Euro Models)
RF Output Impedance:		50 Ohms
FM Hum & Noise:		-50 dB
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)
Selectivity: EIA Two-Signal Method (25 kHz Channels)		-90 dB (STD)

Continued

SPECIFICATIONS* - Cont.

Receiver - Cont.

Spurious Rejection:	-90 dB (STD)
Intermodulation 30 kHz:	-80 dB (STD)
Maximum Frequency Separation:	136-153 MHz .... 17 MHz 150-174 MHz .... 24 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	-50 dB
Channel Spacing:	30 kHz

REGULATORY APPROVALS

The following equipment authorized numbers have been granted:

COUNTRY	REGULATORY APPROVAL
UNITED STATES	FCC AXATR - 312-A2/B2 (30/50W) AXATR - 313-A2/B2 (110W)
CANADA	DOC TR - 312-A2/B2 (30/50W) TR - 313-A2/B2 (110W)

* 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 192 Conventional Channels
- Up to 800 EDACS Systems/Groups
- 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 located on the top of the radio, while the Power Amplifier and the Synthesizer/Receiver/Exciter boards are located on the bottom.

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 **R**adio **F**requencies (**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 **P**ower **A**mplifier (**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 Logic 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 Logic Board.

LOGIC 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

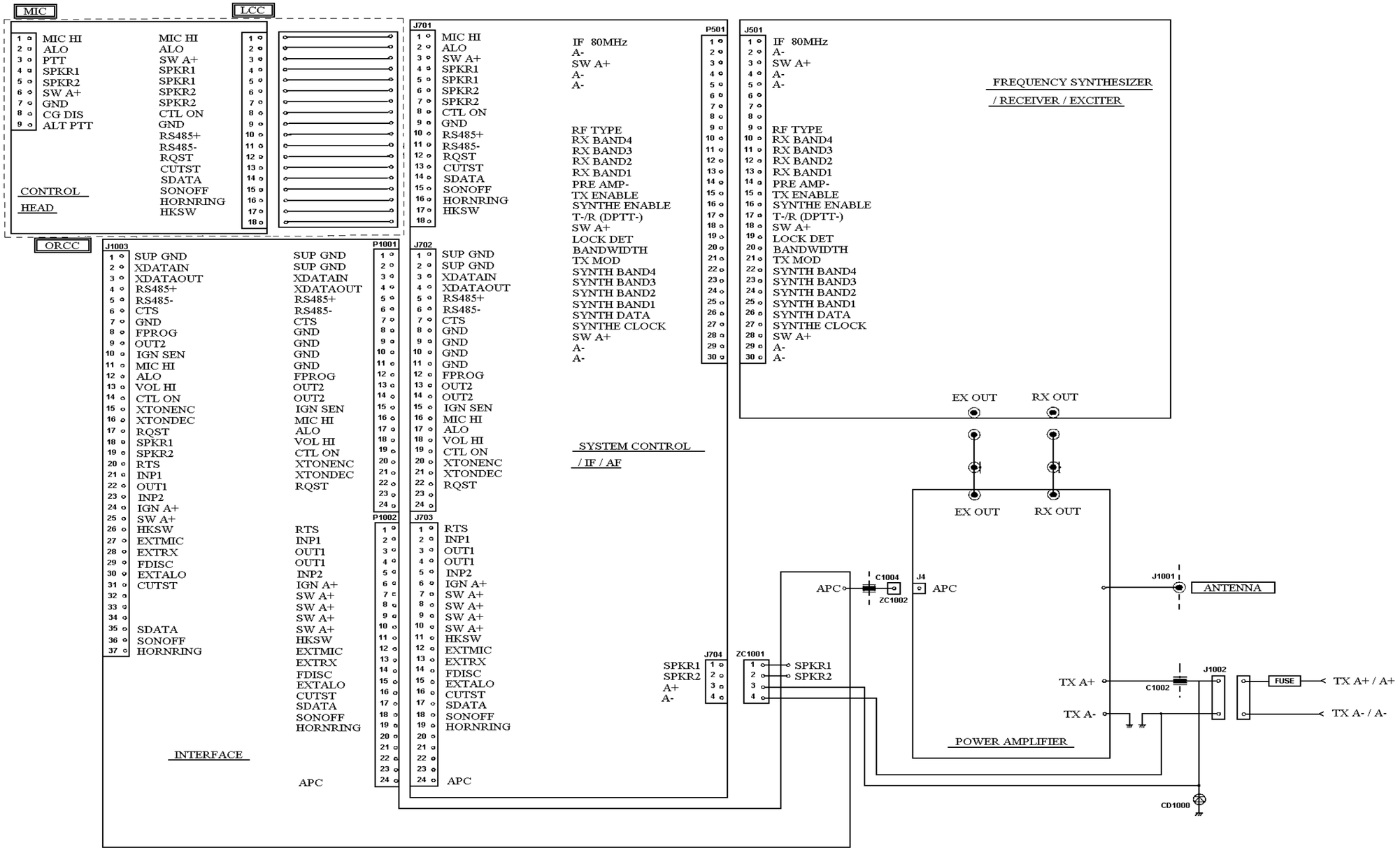
Complete operating instructions for the ORION Two-Way Radio are provided in Operator's Manual **LBI-38888** for the control unit used.

MAINTENANCE

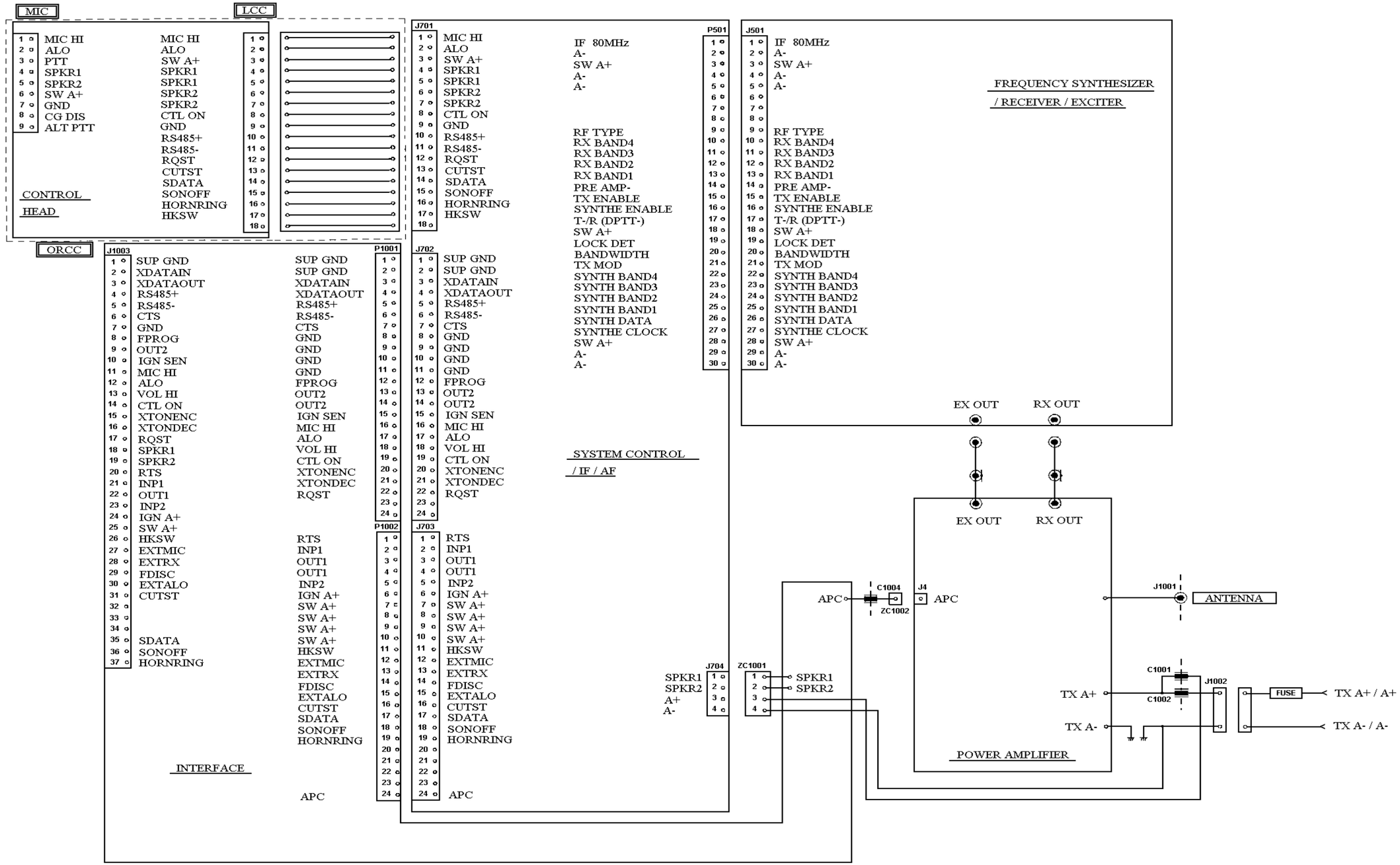
The Service Section in maintenance manual **LBI-38993** contains the maintenance information to service this radio. The Service Section includes:

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

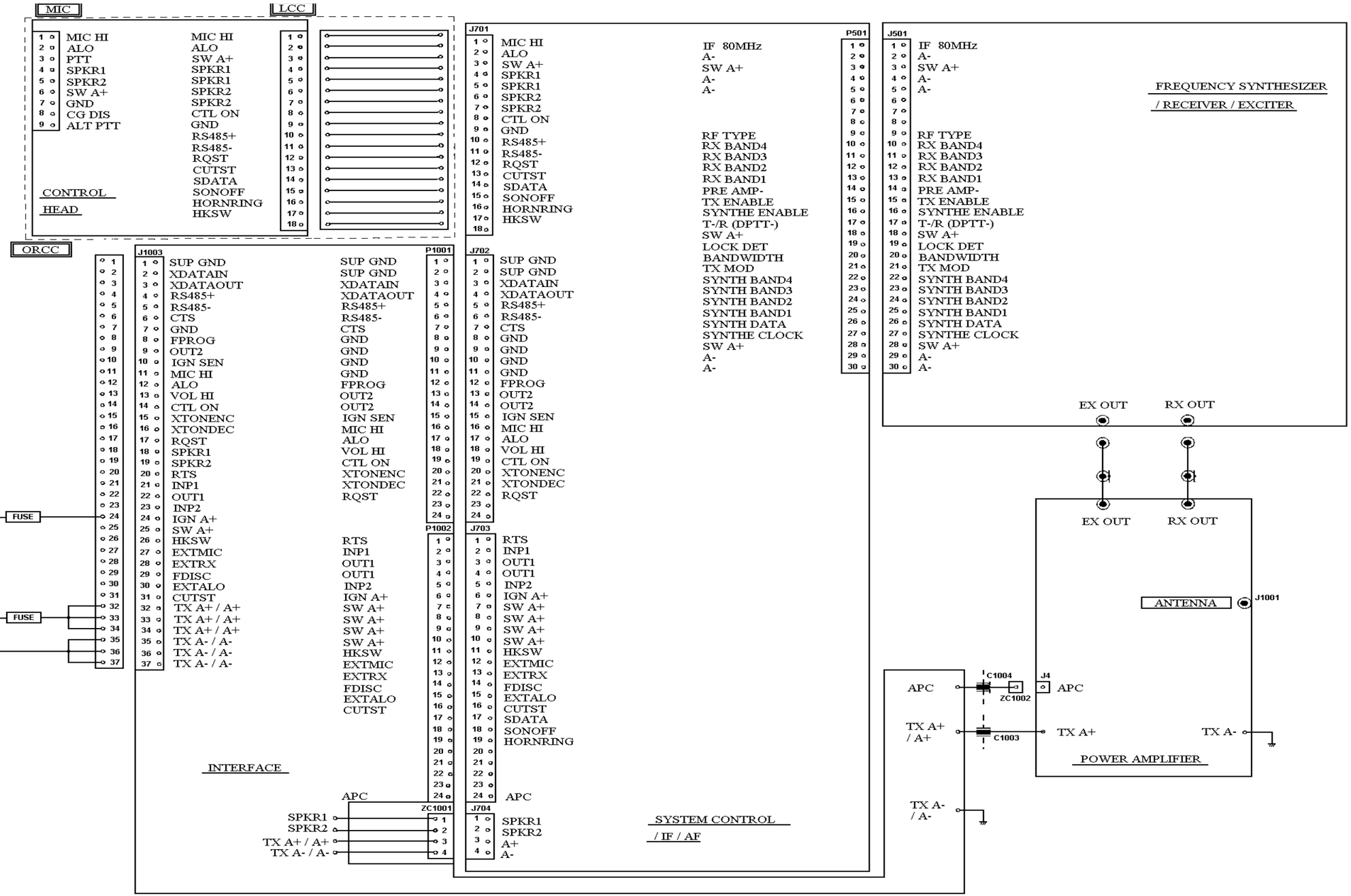
Figure 1 - ORION Mobile Radio



U.S.A. LOW POWER



U.S.A. HIGH POWER


MIC
LCC
1 MIC HI
2 ALO
3 PTT
4 SPKR1
5 SPKR2
6 SW A+
7 GND
8 CG DIS
9 ALT PTT
MIC HI
ALO
SW A+
SPKR1
SPKR1
SPKR2
SPKR2
CTL ON
GND
RS485+
RS485-
RQST
CUTST
SDATA
SONOFF
HORNRING
HKSW
CONTROL HEAD
ORCC
J1003
P1001
SUP GND
XDATAIN
XDATAOUT
RS485+
RS485-
CTS
GND
FPROG
OUT2
IGN SEN
MIC HI
ALO
VOL HI
CTL ON
XTONENC
XTONDEC
RQST
SPKR1
SPKR2
RTS
INP1
OUT1
INP2
IGN A+
SW A+
HKSW
EXTMIC
EXTRX
FDISC
EXTALO
CUTST
TX A+ / A+
TX A- / A-
IGN A+
FUSE
TX A+ / A+
FUSE
TX A- / A-
J701
J702
J703
J704
P1002
ZC1001
APC
SPKR1
SPKR2
TX A+ / A+
TX A- / A-
INTERFACE
SDATA
SONOFF
HORNRING
A+
A-
SYSTEM CONTROL / IF / AF
P501
IF 80MHz
A-
SW A+
RF TYPE
RX BAND4
RX BAND3
RX BAND2
RX BAND1
PRE AMP-
TX ENABLE
SYNTHE ENABLE
T-/R (DPTT-)
LOCK DET
BANDWIDTH
TX MOD
SYNTH BAND4
SYNTH BAND3
SYNTH BAND2
SYNTH BAND1
SYNTH DATA
SYNTHE CLOCK
J501
FREQUENCY SYNTHESIZER / RECEIVER / EXCITER
EX OUT
RX OUT
ANTENNA
J1001
C1004
J4
ZC1002
C1003
TX A+
TX A-
POWER AMPLIFIER

EUROPEAN