# **MAINTENANCE MANUAL** 851-870 MHz MASTR®II STATION EXCITER BOARD 19D438214G1

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#### **DESCRIPTION**

Refer to Figure 1 and the schematic diagrams for the following discussion. The synthesizer-exciter assembly contains a reference oscillator, audio processor, frequency synthesizer (for generating the transmit carrier frequency), exciter power-amplifier module, and associated modulation circuitry. The reference oscillator module plugs into the synthesizer-exciter board at XY101 and provides ±1 PPM frequency stability. An audio processor module plugs into the synthesizer-exciter board at XA101. The synthesizer-exciter is modulated by audio applied directly to the modulation port of the VCO (U104).

The use of an 800 MHz voltage controlled oscillator (VCO) allows direct synthesis of RF frequencies required for the transmit carrier. The output of the VCO is divided by 128/129 in the prescaler, and then further divided in the phase-locked-loop (PLL) IC for comparison with a 12.5 kHz signal. The 12.5 kHz signal is derived from the 10 MHz reference oscillator. A crystal-controlled oscillator, with a crystal mounted in a temperature-controlled oven, is used as the reference oscillator. The oscillator has a frequency stability of ±one-part-per-million (PPM) over a temperature range of -22 to  $+185^{\circ}F$  (-30 to  $+85^{\circ}C$ ).

On-frequency drive for the exciter power amplifier module is obtained from the VCO. The frequency output of the VCO is determined by the PLL circuit. The exciter PA module amplifies the RF signal to a +19 dBm level, measured at the output connector of the synthesizer-exciter board, which is sent to the main power amplifier board.

#### **CIRCUIT ANALYSIS**

#### **SYNTHESIZER**

The synthesizer circuit uses a phase-locked VCO (U104) operating over a frequency range of 851 MHz to 870 MHz. The output signal is generated directly by the sealed VCO (U104), and amplified by buffer transistor Q103. Output of this buffer goes to the prescaler (U2) and exciter power amplifier (PA) through buffer transistors Q104 and Q105.

Using the 800 MHz, divide-by 128/129, dual-modulus prescaler (U102), the VCO is phase-locked to a 12.5 kHz reference signal. The reference signal is obtained by division of the 10 MHz reference oscillator (Y101) signal within the PLL (U101). The 800 MHz VCO output is divided by the dual-modulus prescaler (U102), which becomes the frequency input to the PLL (U101-1-). Within the PLL (U101) this input frequency (FIN) is further divided to 12.5 kHz and compared to the reference signal. This permits 12.5 kHz channel spacing.



Printed in U.S.A.



Figure 1 - Synthesizer-Exciter Block Diagram

Phase-locked-loop U101 is programmed by three inputs from the GETC Board, which are buffered by transistors Q108, Q109, and Q110. The SW enable pulse (10 milliseconds) activates switch U103, allowing rapid channel acquisition during channel changes. A LOCK DET signal, from the PLL goes to the microprocessor on the GETC shelf for processing and error detection.

#### **AUDIO PROCESSOR MODULE (A101)**

The transmitter audio processor module (A101) contains audio circuitry consisting of two operational amplifiers, AR101-A and \_B, a pre-emphasis circuit with amplitude limiting, and a post-limiter filter. A gain of approximately 24 dB is realized through the audio processor.

A 10-volt regulator (U8 on synthesizer-exciter board) powers the audio processor module (A101) and applies regulated +10V thru P102-6 to a voltage divider consisting of R108 and R110 (on the audio module). The +5V output from the voltage divider establishes the operating reference point for both operation amplifiers (AR101 A and B). Capacitor C107 filters noise from the voltage supply to the operational amplifiers. Resistor R105, R106, and R107 and diodes CR101 and CR102 (on audio module) provide limiting for AR101-B. Diodes CR101 and CR102 are reverse biased by +5 VDC on AR101B-6 and voltage divider network R105, R106 and R107. The voltage divider network provides +7 VDC at the cathode of CR101 and +3 VDC at the anode of CR102. Capacitors C102 and C103 permit a dc level change between AR101B-7 and the voltage divider network, for diode biasing.

When the input signal to AR101B-6 is of a magnitude such that the amplifier output at AR101B-7 does not exceed 4 volts p-p, the amplifier provides a nominal 20 dB gain. When the audio output signal level at AR101B-7 exceeds 4 volts p-p, diodes CR101 and CR102 conduct on the positive and negative half cycles. This provides 100% negative feedback, reducing the amplifier gain to unity and limiting the audio amplitude at AR101B-7 to 5 volts p-p.

Resistors R102, R103, and R104 and capacitor C104 comprise the audio pre-emphasis network that enhances the overall system signal-to-noise ratio. Resistor R104 and capacitor C104 control the pre-emphasis curve below limiting. The cut-off point for high frequency pre-emphasis is set by R103 and C104. As high frequencies are attenuated, the gain of AR101 is increased. Audio from the microphone is applied to the audio processor at P102-1 and coupled to the input of operational amplifier AR101-B through R101 and C101. The amplifier output of AR101-B is coupled through P102-4, audio MOD ADJ control R152 (on the Exciter board), C106, R112, and R113 to the input of operational amplifier AR101-A. Audio MOD ADJ control is set for a deviation of 3.75 kHz.

The Channel Guard (CG) tone input is applied to the audio processor through P902-2, CG MOD ADJ R150 (on the Exciter Board) to P102-5. The CG tone is then coupled through C105 and R111 to AR101A-2, where it is combined with the microphone audio. Operational amplifier AR101-A provides a signal gain of approximately 4 dB.

An active, post-limiter filter consisting of AR101-A, R112-R114, C108, and C109, provides 12 dB-per-octave roll-off. An additional 6 dB-per-octave roll-off is provided by R109 and C111 for a total of 18 dB per octave.

# ONE PPM REFERENCE OSCILLATOR (Y101)

The quartz crystal used in the reference oscillator, exhibits the traditional "S" curve characteristics of output frequency versus operating temperature. The crystal is cut to perform at an ambient temperature of  $185^{\circ}F$  (85C), placed in an oven to hold it at that temperature over an outside temperature range of -31 to +185^{\circ}F (-35^{\circ}C to +85^{\circ}C). Compensation is added to the circuit to best linearize performance at the operating temperature of the oven. In this way, rated stability (1 PPM) is LBI-31800

maintained over the temperature range of -31 to +185°F (-35°C to +85°C).

The output of Audio Processor (A101, P102-9) connects to P902-1 of the synthesizer-exciter board), and sent through U106 for low-frequency compensation. After compensation, modulation is applied to the modulation input of the VCO (U104). Low-frequency-compensation circuit (U106) provides a flat response, over a frequency range of 10 Hz to 15 kHz, for modulation signals to the VCO.

#### **EXCITER STAGE**

The +5 dBm signal from buffer transistors Q103 and Q104 is applied to the exciter module U105-1 where it is amplified to a level of +21 dBm. This signal goes through a 2 dB pad (R129, R130, and R131) to output connector J101.

#### TRANSMIT SWITCH STAGE

During transmit the PTT line (TX EN) goes high (P902-12) which activates transmit switch Q106 and Q107. When TX EN goes high, transistor Q7 is biased on, which in turn causes Q6 to conduct. Regulated 7.6 volts from regulator U109, flows through Q6 to the dc power input of exciter amplifier U5. This is how the exciter is keyed on and off.

### LBI-31800

### OUTLINE DIAGRAM





SOLDER SIDE



(19D438214, Sh. 1, Rev. 3) (19D438215, Sh. 3, Rev. 2)

#### 851-870 MHz SYNTHESIZER EXCITER BOARD 19D438214G1



#4 - 40 PLAIN WASHER #4 - 40 LOCKWASHER

LEAD IDENTIFICATION FOR U7

FLA<sub>1</sub>

IN - LINE TOP VIEW NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION



#### SCHEMATIC DIAGRAM



LBI-31800

#### 851-870 MHz SYNTHESIZER-EXCITER BOARD 19D438214G1

(19D438264, Sh. 1, Rev. 4)

#### LBI-31800

#### SYNTHESIZER EXCITER BOARD 19D438214G1

			.	C156	1
SYMBOL	PART NO.	DESCRIPTION		0457	l
		CAPACITORS		C157	Ι.
C101	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.		C158	Ľ
C102	19A703314P2	Tantalum: 220 μF, -10+50%, 10 VDCW.		C159	1
C103	19A702236P54	Ceramic: 150 pF ±5%, 500 VDCW, temp coef 0 ±30 PPM/°C.		C160	1
C104	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.			
C105	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.		J101	
C106	19A702052P106	Ceramic: 1500 pF ±5%, 50 VDCW.		0.01	
C107	19A702236P54	Ceramic: 150 pF $\pm$ 5%, 500 VDCW, temp coef 0 $\pm$ 30 PPM/°C.		1 101	
C108	19A702236P44	Ceramic: 56 pF $\pm$ 5%, 50 VDCW, temp coef 0 $\pm$ 30 PPM/°C.		and L102	
C109	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.		L103	•
C110	19A702236P44	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.		Daga	
C111	19A702236P5	Ceramic: 0.9 pF ±1 pF, 50 VDCW, 0 ±30 PPM/°C.		P902	
C112	19A702236P44	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.		Q101 Q103	
C113	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.		thru	
C114	19A700004P8	Metallized polyester: 1 $\mu$ F ±10%, 63 VDCW.		Q105	
C115	19A700004P1	Metallized polyester: $0.068 \mu\text{F} \pm 10\%$ , 63		Q106	ľ
		VDCW.		Q107	
C116	19A701534P17	Tantalum: 47 μF ±20%, 10 VDCW.		Q108 thru	ľ
C117	19A702052P22	Ceramic: 0.047 μF ±10%, 50 VDCW.		Q110	
C118	19A702236P10	Ceramic: 2.2 pF $\pm$ 2.5 pF, 50 VDCW, temp coef 0 $\pm$ 30 PPM/°C.			
C119	19A702236P44	Ceramic: 56 pF ±5%, 50 VDCW, temp coef		R102	ľ
C127		±30 PPM/°C.		R103	
C128	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.		R104 and	ľ
C129	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.		R105	
C130	19A701534P7	Tantalum: 10 µF ±20%, 16 VDCW.		R106	ŀ
and				R107	ŀ
C131	104702226044	Coromics FC pF 15% F0 VDCW/ temp coof		R108	ŀ
0132	19A702236P44	$\pm$ 30 PPM/°C.		R109	ŀ
C133	19A702052P28	Ceramic: 0.022 µF ±10%, 50 VDCW.		R110	Ľ
C134	19A700004P8	Metallized polyester: $1 \mu\text{F} \pm 10\%$ , 63 VDCW.		R111	ľ
C136	19A700004P8	Metallized polyester: $1 \mu\text{F} \pm 10\%$ , 63 VDCW.		R112	1
C138	19A703314P7	Electrolytic: 2.2 $\mu$ F -10+50%, 50 VDCW; sim to		R113 R114	
C120	10470152409	Panasonic LS Series.		R115	
C139	194701554F0	Tantalum: $22 \mu\text{F} \pm 20\%$ , 16 VDCVV.		R116	
C140	19A702052F14	Ceramic: $1000 \text{ pE} \pm 5\% 50 \text{ VDCW}$ .		and	
C142	19A702052P1/	Coramic: $0.01 \pm 10\%$ , 50 VDCW.		R117	
C143	19A702052P26	Ceramic: $0.1 \mu\text{E} \pm 10\%$ , 50 VDCW.		R118	ľ
C144	19A703314P2	Tantalum: 220 µF -10+50% 10 VDCW		R119	ľ
C145	19A702052P14	Ceramic: 0.01 µF ±10%. 50 VDCW.		R120	
C148	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.		R121	ľ
C149	19A703314P2	Tantalum: 220 µF, -10+50%, 10 VDCW.		R122	
C150	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.		R123	
C151	19A702236P50	Ceramic: 100 pF $\pm$ 5%, 50 VDCW, temp coef 0 $\pm$ 30 PPM/°C.		R124	
C152	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.		R126	ľ
C153	19A702052P28	Ceramic: 0.022 µF ±10%, 50 VDCW.		R127	ľ
C154	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.		R128	ľ
C155	19A701534P8	Tantalum: 22 $\mu F$ ±20%, 16 VDCW.		R129	ľ
<b></b>	-		4 I		1

SYMBOL	PART NO.	DESCRIPTION
C156	19A702236P54	Ceramic: 150 pF ±5%, 500 VDCW, temp coef
		0 ±30 PPM/°C.
C157		
and	19A701534P8	Tantalum: 22 µF ±20%, 16 VDCW.
C158		
C159	19A702052P26	Ceramic: 0.1 $\mu$ F ±10%, 50 VDCW.
C160	19A703314P10	Electrolytic: $10 \mu\text{F}$ -10+50%, 50 VDCW; sim to
		Panasonic LS Series.
		JACKS
J101	19A700049P2	Connector, receptacle; 500 VDCW maximum;
		sim to NTTF-1058.
		INDUCTORS
L101	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res
and		max, 100 v.
L102	104700000040	
L103	19A700000P12	Coll, RF: 1.0 uH $\pm$ 10%; sim to Jeffers 4411-8K.
		PLUGS
P902		(Consists of miscellaneous items 3 & 4 below).
		TRANSISTORS
Q101	19A700022P2	Silicon, PNP: sim to 2N3906.
Q103	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
thru		
Q105	40470040700	
Q106	19A703197P2	Silicon, PNP; sim to MMB14403 low profile.
Q107	19A700076P2	Silicon, NPN: Sift to MIVIB I 3904, IOW profile.
thru	194/00023P2	Shigon, NFN. Shi lu 2193904.
Q110		
		RESISTORS
R102	19B800607P104	Metal film: 100K ohms +5%, 1/8 w.
R103	19B800607P150	Metal film: 15 ohms +5% 1/8 w
R104	19B800607P823	Metal film: 82K ohms +5%, 1/8 w.
and		······································
R105		
R106	19A702931P137	Metal film: 237 ohms $\pm$ 1%, 200 VDCW, 1/8 w.
R107	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R108	19B800607P221	Metal film: 220 ohms ±5%, 1/8 w.
R109	19B800607P150	Metal film: 15 ohms ±5%, 1/8 w.
R110	19B800607P332	Metal film: 3.3K ohms ±5%, 1/8 w.
R111	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R112	19B800607P105	Metal film: 1M ohms ±5%, 1/8 w.
R113	19B800607P333	Metal film: 33K ohms ±5%, 1/8 w.
R114	19B800607P104	Metal film: 100K ohms $\pm$ 5%, 1/8 w.
R115	19B800607P100	Metal film: 10 ohms ±5%, 1/8 w.
R116	19B800607P680	Metal film: 68 ohms ±5%, 1/8 w.
and R117		
R118	1988006070221	Metal film: 220 obms +5% 1/9 w
R110	19B800607F22T	Metal film: 3.3K obms ±5%, 1/9 w
R120	19880060720102	Metal film: 1K ohme $\pm 5\%$ , 1/0 W.
R121	1988006072150	Metal film: 15 ohms $\pm 5\%$ 1/9 w
R122	198800607 - 150	Notal film: 2.2K abma $\pm 5\%$ , 1/6 W.
D122	100000070332	Noted film: 1/ obmo $\pm 5\%$ , 1/8 W.
N123	10000070102	Noted film: 15 obmo $\pm 5\%$ , 1/8 W.
IX 124	190000078150	Netel film: 200 abms $15\%$ , $1/8$ W.
R125	19B800607P221	Netal film: 220 onms ±5%, 1/8 w.
D100	19A/02931P161	Ivietal film: 422 onms±1%, 200 VDCW, 1/8 w.
R126	10470000400	
R126 R127	19A702931P9	Metal film: 12.1 onms ±1%, 200 vDCw, 1/8 w.
R126 R127 R128	19A702931P9 19A702931P161	Metal film: 422 ohms ±1%, 200 VDCW, 1/8 w. Metal film: 422 ohms ±1%, 200 VDCW, 1/8 w.
R126 R127 R128 R129	19A702931P9 19A702931P161 19A702931P145	Metal film: 12.1 onns $\pm$ 1%, 200 VDCW, 1/8 w. Metal film: 422 ohms $\pm$ 1%, 200 VDCW, 1/8 w. Metal film: 287 ohms $\pm$ 1%, 200 VDCW, 1/8 w.

## PARTS LIST

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
R130	19A702931P25	Metal film: 17.8 ohms ±1%, 200 VDCW, 1/8 w.			SOCKETS
R131	19A702931P145	Metal film: 287 ohms ±1%, 200 VDCW, 1/8 w.	XA101		(Consists of miscellaneous item 5 below)
R134	19B800607P471	Metal film: 470 ohms ±5%, 1/8 w.	ALIOI		(Consists of miscellaheous item 5 below).
R135	19B800607P392	Metal film: 3.9K ohms ±5%, 1/8 w.			SOCKETS
R136	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.	XV101		(Consists of miscollangous itom 5 holow)
R137	19B800607P472	Metal film: 4.7K ohms ±5%, 1/8 w.	and		(Consists of miscellaneous item 5 below).
and			XY102		
R138	400000070404				CRYSTALS
R139	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.			
R 140	196000779210	Variable: 100K onms $\pm 25\%$ , 100 VDCW, .3 watt.	Y101	19A113699G5	Reference Oscillator: 10.000 MHz.
R141	198000007803	Metal film: 470K chma 15%, 1/8 w.	and V102		
R142	190000077474	Metal film: 220K ahma 15%, 1/8 w.	1102		
R143	19B800607P224	Motol film: $150$ obmo $\pm 5\%$ , $1/8$ w			MISCELLANEOUS
D145	19B000007F133	Metal film: $474$ ohmo $\pm 5\%$ , $1/8$ w.	3 and	19B219594P1	Contact, electrical: 7 pins.
R145	198000007F473	Motol film: 220K obmo $\pm 5\%$ , 1/8 w.	4		
D147	1980000077224	Motol film: $474$ obmo $\pm 5\%$ , $1/8$ w	5	19A701785P1	Contact, electrical; sim to Molex 08-50-0404.
R147	19B800607P473	Motol film: 10 obms $\pm 5\%$ , 1/8 w.	6	19A116023P1	Insulator, plate.
R140	190000071 100	Motol film: 1210 ohmo $\pm 1\%$ 200 $VDCW$ 1/8 w	7	19B801377G3	Heat Sink.
R150	19R7029511 209	Variable cormet: 5K ebms $\pm 10\%$ 1/2 w	8	19A700068P1	Insulator, bushing.
R150	19B20502317	Motol film: 10K obms $\pm 5\%$ 1/8 w	9	19A701312P2	Flatwasher, metric: steel.
R152	19B0000071 103	Variable correct: EK obms $\pm 10\%$ , 1/2 w	10	19A702364P106	Machine screw: TORX Drive, No. M2 - 0.4 x 6.
R152	19B233029F7	Valiable, certifier. SK offins $\pm 10\%$ , 1/2 w.	11	19B234907P1	Bracket.
P154	19D0000071 001	Motol film: 227 obmo $\pm 1\%$ , 7/0 W.	12	19B234906P1	Spring clip.
R154	19A702931P137	Motol film: 1210 obms $\pm 1\%$ , 200 VDCW, 1/8 w.	20	19A700134P10	Wire Jumper.
R155	1089006078222	Motol film: 2.2K ohmo $\pm 5\%$ 1/8 w	21	19A701278P4	Insulative sleeving.
R150 P157	1980000077222	Metal film: $47 \text{ chm}_2 \pm 5\%$ , 1/8 w.			
D150	19000007F470	Matal film: 40 ohma 150( 1/9 w	A101		
thru	19600007 F 103	Metal IIII. TOK ONITIS ±5%, 1/8 w.			AUDIO PROCESSOR BOARD
R162					19C3215452G2
R163	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.			INTEGRATED CIRCUITS
thru P165			AR101	19A116754P2	Linear, Dual 741C OP AMP; sim to MC1458SP1
R165	1088006078332	Motol film: 2.2K ohms +5% 1/8 w			High Slew Rate OP AMP.
R167	19B800607P472	Metal film: $4.7$ K ohms $\pm 5\%$ , $1/8$ w			CAPACITORS
R168	19B800607P100	Metal film: 10 obms $\pm 5\%$ , 1/8 w	C101	T644ACP333J	Polyester: .033 µF ±5%, 50 VDCW.
R169	1320000011 100	wetarinin. 10 0mm3 ±070, 170 w.	C102	5491674P36	Tantalum: 3.3 μF ±20%, 10 VDCW; sim to Spra-
thru			and		gue Type 162D.
R171			C103	TC444.0D0471	
R172	19B800607P823	Metal film: 82K ohms ±5%, 1/8 w.	0104	1644ACP347J	Polyester: $.047 \mu\text{F} \pm 5\%$ , 50 VDCW.
R173	19B800607P271	Metal film: 270 ohms ±5%, 1/8 w.	C107	5496267P9	Tantalum: 3.3 $\mu$ F ±20%, 15 VDCW; sim to Spra-
R174	19B800607P391	Metal film: 390 ohms 5%, 1/8 w.	C108	T644ACP268J	Polvester: 0068 µF +5% 50 VDCW
R175	19B800607P1	Metal film: Jumper.	C109	19A701602P20	Ceramic: 1000 pE $\pm 10\%$ 1000 VDCW
		INTEGRATED CIRCUITS	C111	T644ACP368.	Polyester: 068 µF +5% 50 VDCW
U101	19B800902P4	Digital: Synthesizer, CMOS Serial Input.	C112	19A143491P6.J0	Ceramic: $6 \text{ pE} \pm 5\%$ temp coef 0 PPM
U102	19A704740P1	Digital: Divider; sim to Mitsubishi M54475P.	C113	19A701534P9	Tantalum: $47 \text{ µE} \pm 20\%$ , temp coel of 1 m.
U103	19A700029P44	Digital: BILATERAL SWITCH.	C114	5491674P36	Tantalum: $3.3 \mu\text{F} \pm 20\%$ , $0.0 \text{VDCW}$ : sim to Spra-
U104	19A704902P1	VCO: DUAL BAND: 806-825 MHz, 851-870 MHz;	0111		gue Type 162D.
		sim to: ALPS URAA.	C115	19A701534P8	Tantalum: 22 μF ±20%, 16 VDCW.
U105	19A704695P1	Hybrid PF Amplifier: sim to NEC Type MIC-5809L.			DIODES
U106	19A701789P1	Linear: Quad Op Amp; sim to LM324.	CR101	10A115250P1	Silicon fast recovery 225 mA 50 PIV
U107	19J706031P1	Linear: POSITIVE VOLTAGE REGULATOR.	and	19411923011	Silicon, last recovery, 225 mA, 50 mV.
U108 and	19A701999P1	Linear: Voltage Regulator; sim to LM317T.	CR102		
U109					PLUGS
			P102	19A116659P76	Connector, printed wiring: 9 contacts rated at 5
					amps; sim to Molex 09-52-3091.

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

#### PARTS LIST

SYMBOL	PART NO.	DESCRIPTION
		RESISTORS
R101	19A134231P223J	Deposited carbon: 22K ohms ±5%, 1/8 w.
R102	19A700106P95	Composition: 22K ohms ±5%, 1/4 w.
R103	19A700106P55	Composition: 470 ohms $\pm$ 5%, 1/4 w.
R104	19A701250P369	Metal film: 51.1K ohms ±1%, 1/4 w.
R105	19A701250P303	Metal film: 10.5K ohms ±1%, 1/4 w.
R106	19A701250P311	Metal film: 12.7K ohms ±1%, 1/4 w.
R107	19A701250P303	Metal film: 10.5K ohms ±1%, 1/4 w.
R108	19A701250P269	Metal film: 5.11K ohms ±1%, 1/4 w.
R109	3R152P132J	Composition: 1.3K ohms ±5%, 1/4 w.
R110	19A701250P269	Metal film: 5.11K ohms ±1%, 1/4 w.
R111	19A700106P91	Composition: 15K ohms ±5%, 1/4 w.
R112	19A701250P339	Metal film: 24.9K ohms ±1%, 1/4 w.
R113	19A701250P307	Metal film: 11.5K ohms ±1%, 1/4 w.
R114	19A701250P347	Metal film: 30.1K ohms ±1%, 250 VDCW, 1/4 w.
R115	19A700106P73	Composition: 2.7K ohms ±5%, 1/4 w.
R116	H212CRP110C	Deposited carbon: 100 ohms $\pm$ 5%, 1/4 w.
		MISCELLANEOUS
	NP280059P3	Nameplate.
	19A142927P1	Insulator.

\*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

#### **PRODUCTION CHANGES**

Changes in the equipment performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for the descriptions of parts affected by these revisions.

- REV. A 851-870 MHz SYNTHESIZER-EXCITER BOARD 19D438214G1 To improve oscillator performance changed R150, R152, Y101 and Y102 and added R175. Old part numbers were:
  - R150 19B800779P8, Var., cer,: 4.7K ohms ±25%, .3 w. R152 - 19B800779P8, Var., cer.: 4.7K ohms ±25%, .3 w.
  - Y101 19B234897P1, Reference Oscillator: 10.000 MHz.
  - Y102 19B234897P1, Reference Oscillator: 10.000 MHz.
- REV. B 851-870 MHz SYNTHESIZER-EXCITER BOARD 19D438214G1 To center lock detect range changed R173 and R174. Old part numbers were: R173 - 19B800607P222, Mtl film: 2.2K ohms ±5%, 1/8 w.
  - R174 19B800607P562, Mtl film: 5.6K ohms ±5%, 1/8 w.
- REV. C 851-870 MHz SYNTHESIZER-EXCITER BOARD 19D438214G1 To minimize frequency excursion when exciter is keyed added wire jumper and insulating sleeve between points H1 and H2 (miscellaneous items 20 and 21 in parts list).
- REV. A AUDIO PROCESSOR BOARD 19321542G2 To improve low frequency response on Channel Guard input. C113 was 10μF (19A701534P7).
- REV. B AUDIO PROCESSOR BOARD 19C321542G2 To stabilize the amplifier, R116, 100 ohms (H212CRP110C) added.

19C321542G2







C.G. HI + 10 V	5)- 6)-	▲ C113 47UF )+ C105 .033UF R106 5.11K	
	- 3 > - 4 >	)  * • C106 OPERATIONAL AMPL 1 UF ▲ C114 AND LIMITER • 330F	
≟ MOD ADJUST MIC HI IN	ı >	R109 R109 R109   1.3K 10.   R101 C101   22K 0.033   C111 C101   22K 0.033   C112 C103   C112 C103   C112 C101   C111 C107   S11K C102   R104 C102   S11K C102   C102 S11K   C102 S1K   C104 3.3UF	07 5K 06 7K
A MIC LO	2≻ 7≻	□ 0.47UF \$ R1	05 5K
C.G. LO	8>	┝╺┝───┝	
AUDIO OUT	э≻		

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NOTES CONNECT GRD TO PIN 4 ON AR101, CONNECT VCC (+10V) TO PIN 8 ON AR101. ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K-1000 OHMS OR MEG - 1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQ CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWE BY UF = MICROFARADS, INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH = MILLIHENRYS OR H = HENRYS.

LBI-31800



#### G1 🔺 G2

#### **AUDIO PROCESSOR** 19C321542G2

(19C321854, Rev. 9)