MAINTENANCE MANUAL

851-870 MHz EXCITER/SYNTHENSIZER BOARD 19D902262G1-G3

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DESCRIPTION

The Exciter/Synthesizer Board consists of a transmit exciter and a receiver local oscillator (L.O.) circuit.

The transmit exciter is a synthesized signal generator capable of providing a modulated carrier on any 12.5 kHz channel in the 851-870 MHz band. A digital programming command from the Loader Board determines the channel. The exciter is made up of an audio processor, synthesizer and power amplifier section. Frequency range is 851.0000 to 870.0000 MHz.

The receiver local oscillator circuit is an unmodulated synthesized signal generator. The L.O. is offset from the exciter frequency by 70 MHz in the Group 1 board, and by 45 MHz in the Group 2 and Group 3 boards. A digital programming command from the Loader Board determines the channel.

Refer to Figure 1 and the schematic diagrams in the following discussion.

CIRCUIT ANALYSIS

TRANSMIT EXCITER

The exciter is made up of an audio processor, synthesizer and power amplifier.

AUDIO PROCESSOR

Amplifier U1A, post limiter filter U1B,and amplifier U16 make up the audio processor. Audio applied to the exciter board at J1-6 is amplified by U1A. This amplifier has two networks affecting its gain. First, the audio is pre-emphasized by R105, R107, R108 and C105. Second, the audio is limited by diode duals D1-D3 to prevent over-modulation. Audio level is set by R109 (VOICE LEVEL ADJUST control) and coupled to U1B to provide an 18 dB per octave post limiter filter. Tone, channel guard and low frequency data enter the exciter on J1-2. The level is adjusted by R114 and coupled to the input of U1B along with the voice audio.

Filter output is connected to J1-1. From there it is connected to the input of amplifier U16A at J1-14 by an external cable. When signalling is transmitted, this cable is removed and 4800 baud data is put into J1-14.

Audio (or data) at J1-14 is amplified by three-stage amplifier U16A, U16B, U16C. Feedback around the first two stages (R242, C238) provides low frequency pre-distortion (bass boost) to compensate for losses in the modulation process. The correct amount of boost is adjusted by R240. Audio and the low frequency compensation are combined in U16C and applied to exciter Voltage Controlled Oscillator (VCO) U14.

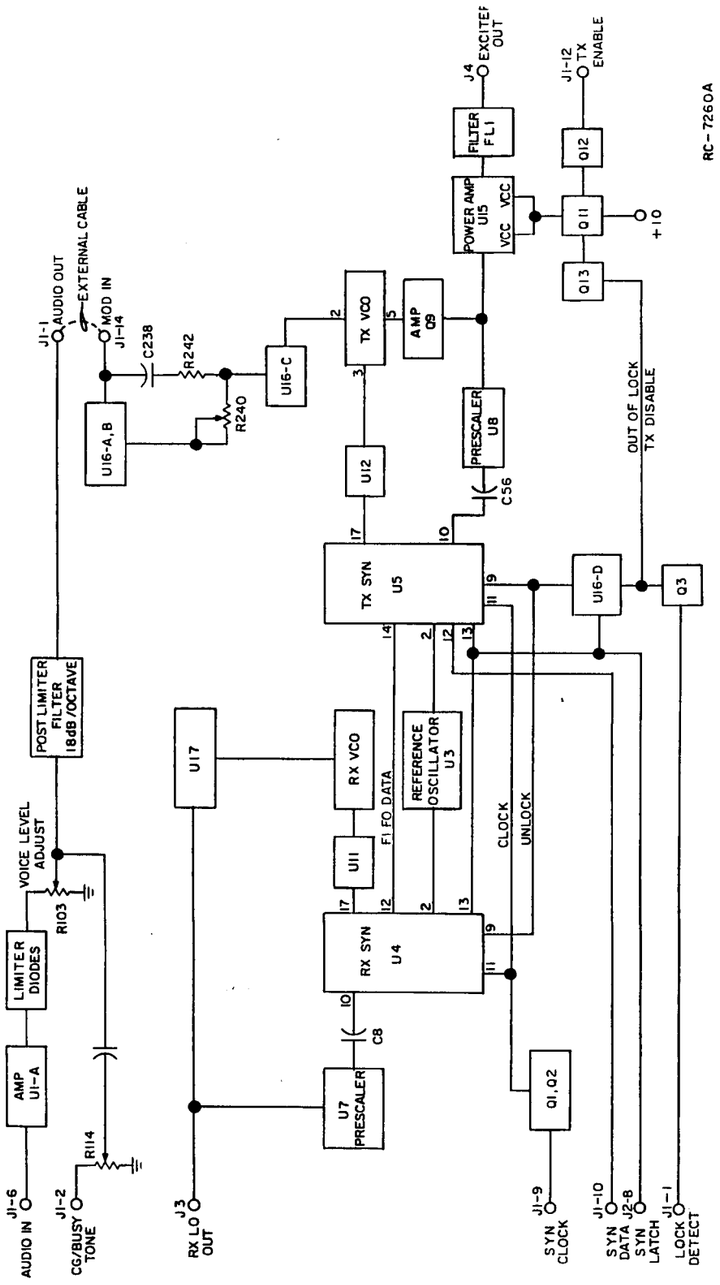

Figure 1 - Block Diagram Synthesizer/Exciter Board

SYNTHESIZER

The synthesizer consists of synthesizer chip U5, prescaler U8, loop bandwidth switch U12 and VCO U14.

RF output from the VCO, amplified by Q9, is applied to prescaler divide by 128/129 U8 through amplifier Q8. Prescaler output is fed into the synthesizer at U5-10. It is further divided within the synthesizer chip by a programmable divide-by-N-counter. A high stability system reference signal, supplied by 12.8 MHz reference oscillator U3, is connected to the synthesizer at U5-2. This signal is divided down to 12.5 kHz inside the synthesizer and compared to the VCO derived 12.5 kHz. DC feedback to the VCO through Q6 and loop switch U12 keeps the VCO locked to a subharmonic of the reference signal. The Loader Board designates the channel by digital command. This, in turn, controls the divide-by-N-counter inside the synthesizer.

POWER AMPLIFIER

RF output from the VCO, amplified by Q9, is applied to the input of power amplifier integrated circuit U15. The combination of Q9 and U15 amplifies the signal to 100 mW. Power amplifier output is applied to bandpass filter FL1 to remove harmonics of the 800 MHz carrier. The output on J4 is fed directly to a 45 or 100 watt power amplifier.

RECEIVER LOCAL OSCILLATOR CIRCUIT

The receiver local oscillator circuit consists of synthesizer chip U4, prescaler U7, loop switch U11 and VCO U13.

RF output from the VCO, amplified by U17, is applied to prescaler divide 128/129 U7. Prescaler output is fed into the synthesizer at U4-10. It is further divided within the synthesizer chip by a programmable divide-by-N-counter. A high stability system reference signal, supplied by 12.8 MHz reference oscillator Q3, is connected to the synthesizer at U4-2. This signal is divided down inside the synthesizer and compared to the VCO derived signal. DC feedback to the VCO through Q5 and loop switch U11 keeps the VCO locked to a subharmonic of the reference signal. Offset from the transmit frequency is determined by FIFO data from transmit synthesizer U5. This is applied to the receiver synthesizer at U4-12. It controls the divide-by-N-counter inside the synthesizer.

The output on J3 is fed into the LO input on the receiver. The frequency is 70 MHz below transmit exciter frequency in the Group 1 unit. It is 45 MHz below transmit exciter frequency in the Group 2 and Group 3 units.

CONTROLS

Three control lines from the Loader Board are required to program channel information into the synthesizers: Synthesizer latch on J1-11, synthesizer clock on J1-9 and synthesizer data on J1-10. Synthesizer clock is connected to amplifiers Q1 and Q2. The output, taken from Q2, is applied to the receive and transmit synthesizers on pins U4-11 and U5-11, respectively. Synthesizer data is the digital channel command. It is connected to the transmit synthesizer at U5-12, and it controls the divide-by-N-counter inside the synthesizer. Synthesizer latch is connected into the receive and transmit synthesizers at U4-13 and U5-13 respectively, and to amplifier U16D.

The lock detect line on J1-8 is a control input supplied to the Loader Board. This will cause the Loader Board to resend digital programming commands when an out-of-lock indication is sensed. Within the exciter, U16-D also supplies an out-of-latch signal to Q13. When an out-of-lock indication is sensed, this signal will disable power amplifier U15.

Power amplifier U15 is connected to the +10 volt regulated source through transistor switch Q11-Q12. Transmit enable on J1-12, applied to the base of Q12, will turn the transistor on. This will turn Q11 on and power is applied to U15 through Q11. Transistor Q13 is held off by the output of amplifier U16D.

An internal out-of-lock indication at J1-8, applied to transistor Q3, will turn Q13 on and Q11 off. Power amplifier U15 is disabled because it is disconnected from the 10 volt source.

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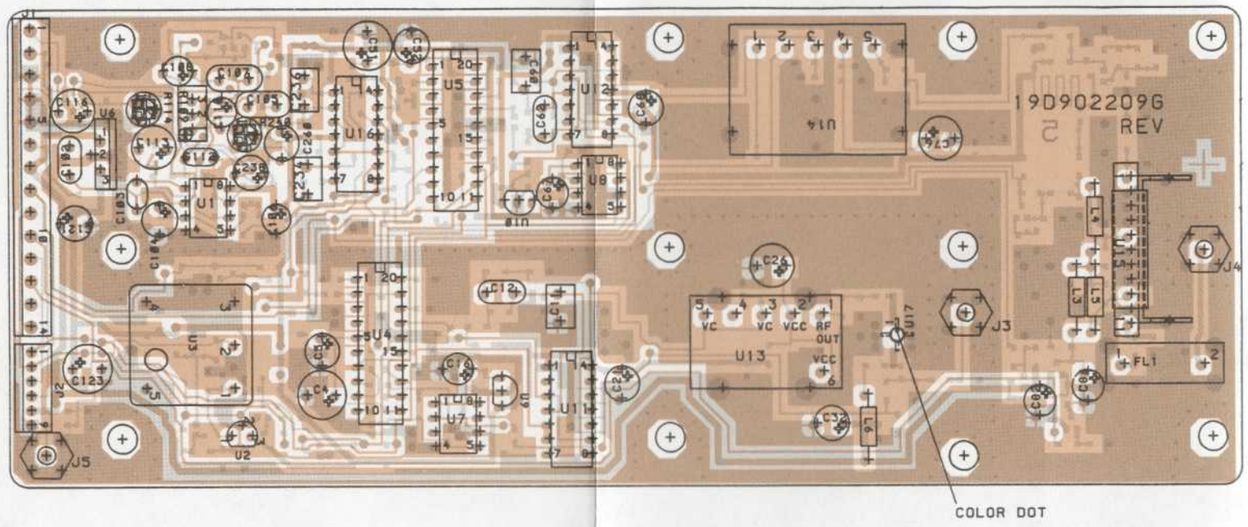
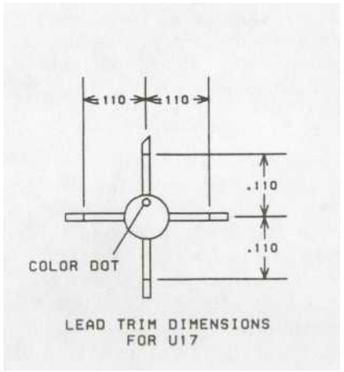
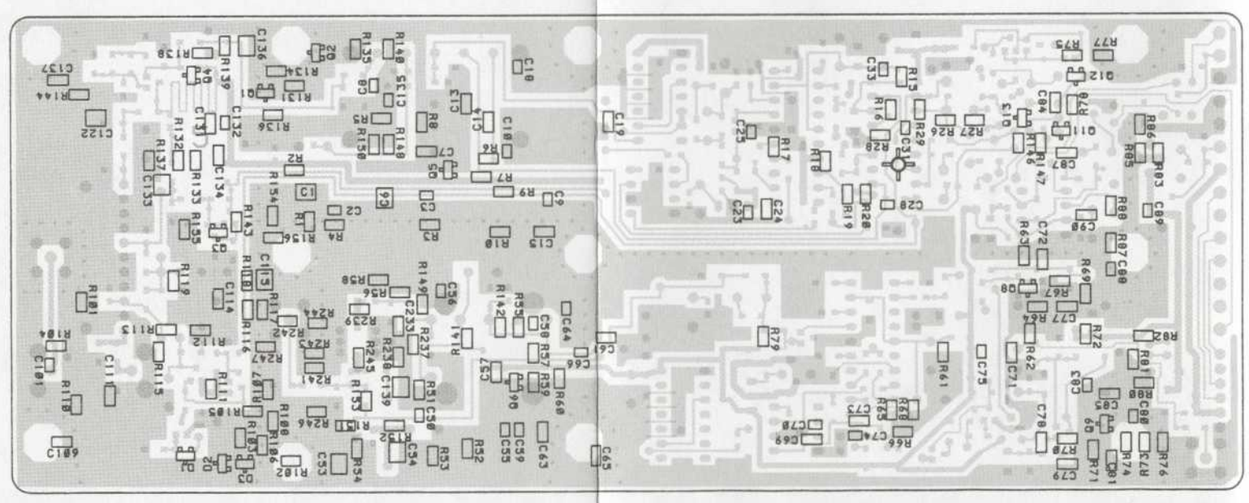


(19D902209, Sh. 1, Rev. 4)
(19D902208, Component Side, Rev. 4)
(19D902208, Solder Side, Rev. 5)

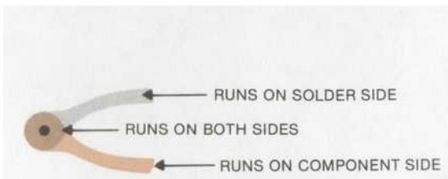


LEAD TRIM DIMENSIONS
FOR U17



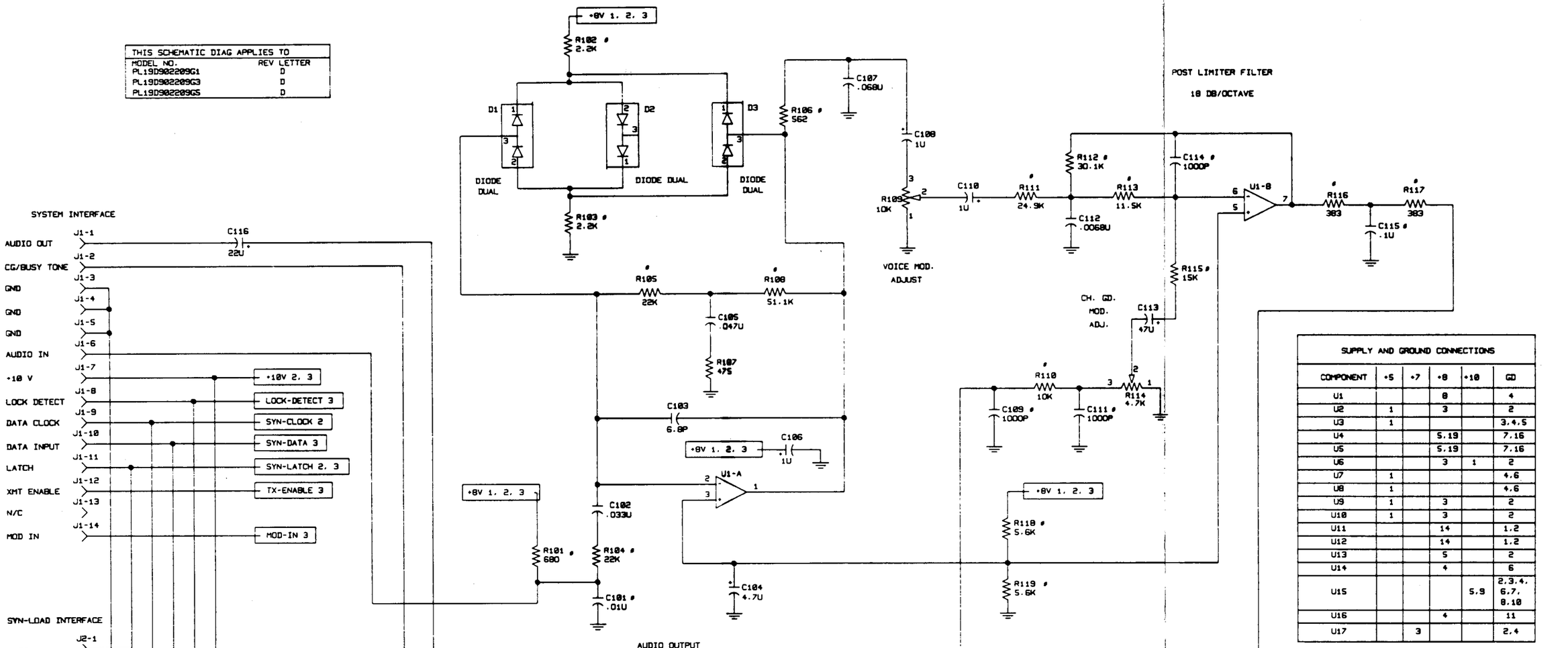
BACK VIEW OF BOARD

(19D902209, Sh. 1, Rev. 4)
(19D902208, Solder Side, Rev. 5)



SYNTHESIZER/EXCITER BOARD
19D902209

THIS SCHEMATIC DIAG APPLIES TO	
MODEL NO.	REV LETTER
PL19D902209G1	D
PL19D902209G3	D
PL19D902209G5	D



POST LIMITER FILTER

18 DB/OCTAVE

SUPPLY AND GROUND CONNECTIONS					
COMPONENT	+5	+7	+8	+10	GD
U1			8		4
U2	1		3		2
U3	1				3,4,5
U4			5,19		7,16
U5			5,19		7,16
U6			3	1	2
U7	1				4,6
U8	1				4,6
U9	1		3		2
U10	1		3		2
U11			14		1,2
U12			14		1,2
U13			5		2
U14			4		6
U15				5,9	2,3,4, 6,7, 8,10
U16			4		11
U17		3			2,4

COMPONENT	G1	G5
U13	736-755 MHZ	761-780 MHZ

NOTES:

1. USED FOR G5 ONLY.
2. USED FOR G1 AND G3 ONLY.
4. BUILT TO G3 SPECS. SEE CHART FOR G1 AND G5 VALUES.

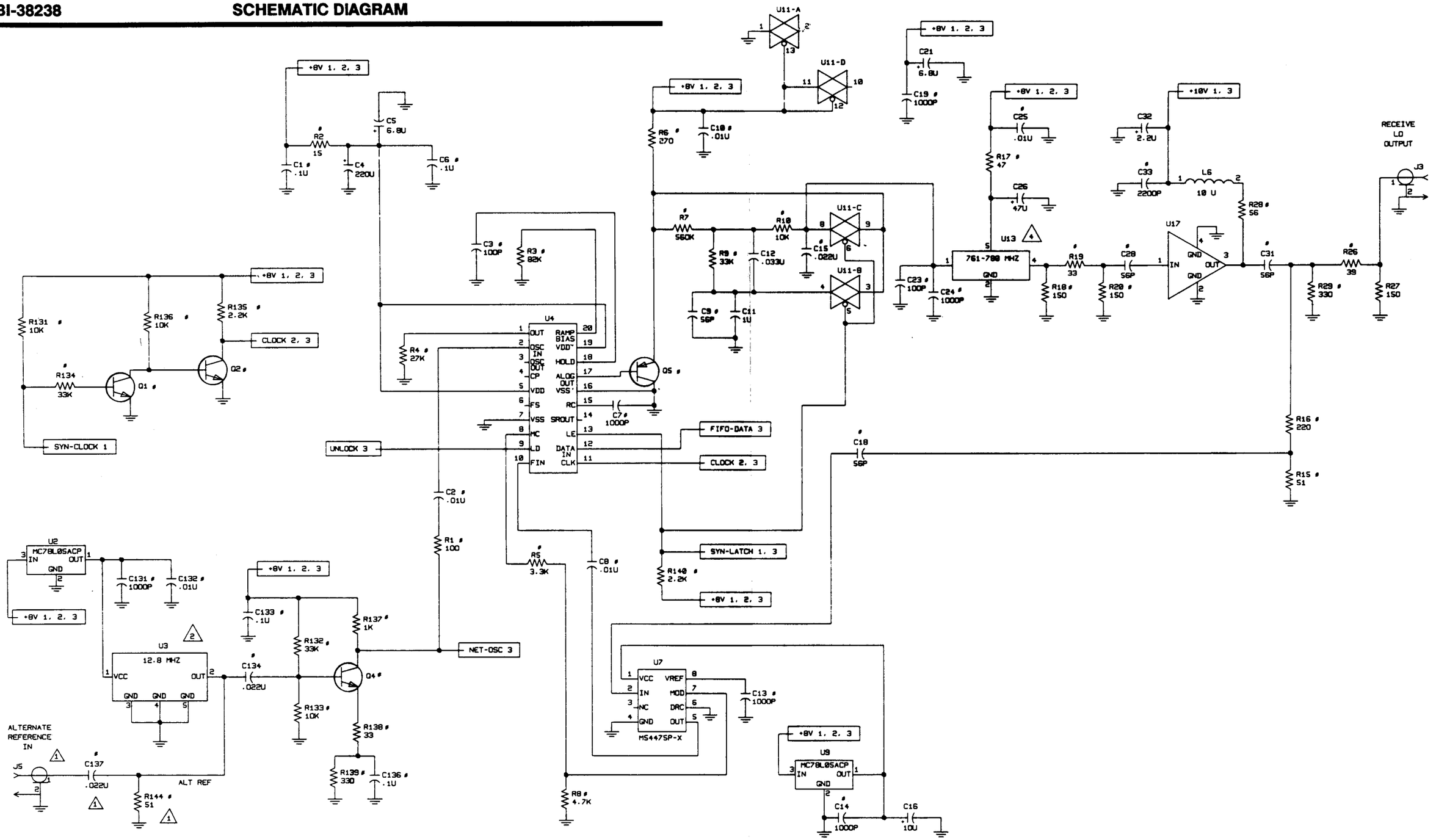
ALL RESISTORS ARE 1/8 5% WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY MULTIPLIER K OR M.
CAPACITOR VALUES IN F UNLESS FOLLOWED BY MULTIPLIER U, N OR P
INDUCTANCE VALUES IN H UNLESS FOLLOWED BY MULTIPLIER M OR U

- DESIGNATES CHIP COMPONENTS

REFERENCES 00-49 -> RECEIVE
REFERENCES 50-99 -> TRANSMIT
REFERENCES 100-119 -> AUDIO
REFERENCES 120-129 -> POWER
REFERENCES 130-250 -> MISCELLANEOUS

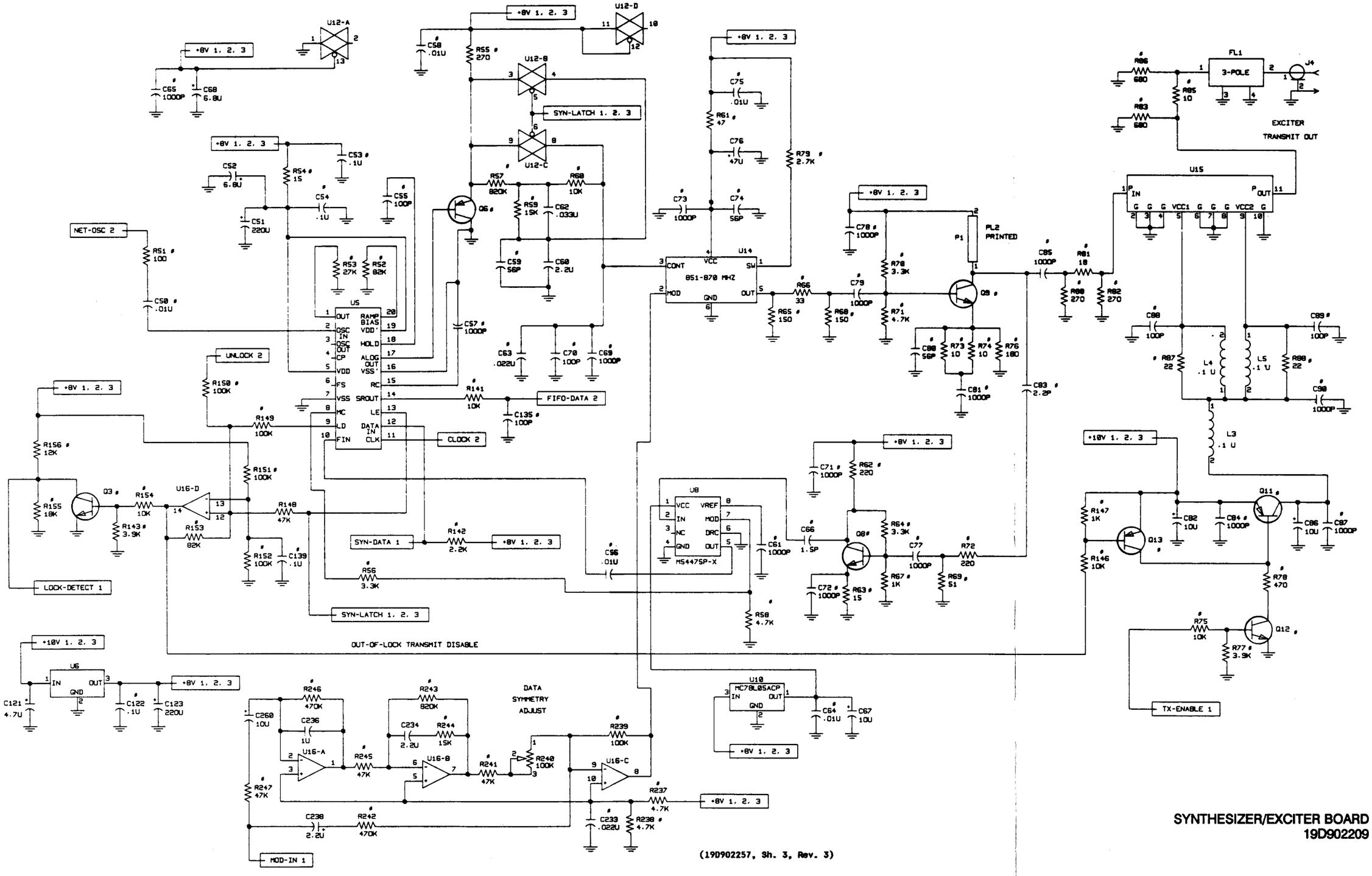
SYNTHESIZER/EXCITER BOARD 19D902209

(19D902257, Sh. 1, Rev. 5)



SYNTHESIZER/EXCITER BOARD
19D902209

(19D902257, Sh. 2, Rev. 1)



(19D902257, Sh. 3, Rev. 3)

SYNTHESIZER/EXCITER BOARD
19D902209

PARTS LIST

EXCITER/SYNTHESIZER BOARD
800 MHz EXC, 70 MHz LO 19D902262G1
800 MHz EXC, 45 MHz LO 19D902262G2
800 MHz EXC, 45 MHz LO, EXT REF 19D902262G3
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
A1		COMPONENT BOARD 19D902209G1 COMPONENT BOARD 19D902209G3 COMPONENT BOARD 19D902209G5
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C2	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C3	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C4	19A703314P2	Tantalum: 220 uF, -10+50%, 10 VDCW.
C5	19A701534P16	Tantalum: 6.8 uF ±20%, 35 VDCW.
C6	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C7	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C8	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C9	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C10	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C11	19A700004P10	Metallized Polyester: 1.0 uF ±10%, 63 VDCW.
C12	T644ACP333J	Polyester: .033 uF ±5%, 50 VDCW.
C13 and C14	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C15	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C16	19A703314P10	Electrolytic: 10 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C18	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C19	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C21	19A701534P16	Tantalum: 6.8 uF ±20%, 35 VDCW.
C23	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C24	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C25	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C26	19A701534P17	Tantalum: 47 uF ±20%, 10 VDCW.
C28	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C31	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C32	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C33	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C50	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C51	19A703314P2	Tantalum: 220 uF, -10+50%, 10 VDCW.
C52	19A701534P16	Tantalum: 6.8 uF ±20%, 35 VDCW.
C53 and C54	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C55	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C56	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C57	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C58	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C59	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C60	19A700004P12	Metallized Polyester: 2.2 uF ±10%, 50 VDCW.
C61	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C62	T644ACP333J	Polyester: .033 uF ±5%, 50 VDCW.
C63	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C64	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C65	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C66	19A702061P3	Ceramic: 1.5 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM.
C67	19A703314P10	Electrolytic: 10 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C68	19A701534P16	Tantalum: 6.8 uF ±20%, 35 VDCW.
C69	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C70	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C71 thru C73	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C74	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C75	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C76	19A701534P17	Tantalum: 47 uF ±20%, 10 VDCW.
C77 thru C79	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C80	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C81	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C82	19A703314P10	Electrolytic: 10 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C83	19A702061P5	Ceramic: 2.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C84 and C85	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C86	19A703314P10	Electrolytic: 10 uF -10+50% tol, 50 VDCW; sim to Panasonic LS Series.
C87	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C88 and C89	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C90	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C101	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C102	T644ACP333J	Polyester: .033 uF ±5%, 50 VDCW.
C103	19A700235P11	Ceramic: 6.8 pF ±0.25 pF, 50 VDCW, temp coef N150 PPM.
C104	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C105	T644ACP347J	Polyester: .047 uF ±5%, 50 VDCW.
C106	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C107	T644ACP368J	Polyester: .068 uF ±5%, 50 VDCW.
C108	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C109	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C110	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C111	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C112	T644ACP268J	Polyester: .0068 uF ±5%, 50 VDCW.
C113	19A701534P17	Tantalum: 47 uF ±20%, 10 VDCW.
C114	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C115	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C116	19A701534P8	Tantalum: 22 uF ±20%, 16 VDCW.
C121	19A701534P6	Tantalum: 4.7 uF ±20%, 35 VDCW.
C122	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C123	19A703314P2	Tantalum: 220 uF, -10+50%, 10 VDCW.
C131	19A702061P99	Ceramic: 1000 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C132	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C133	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C134	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C135	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C136	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C137	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW. (Used in G5).
C139	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C233	19A702052P28	Ceramic: 0.022 uF ±10%, 50 VDCW.
C234	19A700004P12	Metallized Polyester: 2.2 uF ±10%, 50 VDCW.
C236	19A700004P10	Metallized Polyester: 1.0 uF ±10%, 63 VDCW.
C238	19A701534P5	Tantalum: 2.2 uF, ±20%, 35 VDCW.
C260	19A701534P7	Tantalum: 10 uF ±20%, 16 VDCW.
		- - - - - - - - - - DIODES - - - - - - - - - -
D1 thru D3	19A700053P2	Silicon, fast recovery (2 diodes in series).
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19A704888P1	Bandpass Filter, 851-871 MHz; sim to: Murata DPC3R861P020BTD.
		- - - - - - - - - - JACKS - - - - - - - - - -
J1	19A116659P113	Printed wire, two part: 14 contacts, sim to Molex 09-60-1141.
J2	19A704852P32	Printed wire, two part: 6 contacts, sim to Molex 22-29-2061.
J3 and J4	19A705512P1	Connector, RF SMB Series: sim to AMP No. 221111-1.
J5	19A705512P1	Connector, RF SMB Series: sim to AMP No. 221111-1. (Used in G5).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3 thru L5	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L6	19A700024P25	Coil, RF: 10.0 uH ±10%, 3.70 ohms DC res max.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q4	19A700076P2	Silicon, NPN.
Q5 and Q6	19A703197P2	Silicon, PNP; sim to MMBT4403 Low Profile Pkg.
Q8 and Q9	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q11	19A703197P2	Silicon, PNP; sim to MMBT4403 Low Profile Pkg.
Q12	19A700076P2	Silicon, NPN.
Q13	19A703197P2	Silicon, PNP; sim to MMBT4403 Low Profile Pkg.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P150	Metal film: 15 ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R5	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R6	19B800607P271	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 w.
R7	19B800607P564	Metal film: 560K ohms ±5%, 200 VDCW, 1/8 w.
R8	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R9	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R10	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
R15	19B800607P510	Metal film: 51 ohms ±5%, 200 VDCW, 1/8 w.
R16	19B800607P181	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 w. (Used in G1).
R16	19B800607P221	Metal film: 220 ohms ±5%, 200 VDCW, 1/8 w. (Used in G3 and G5).
R17	19B800607P470	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 w.
R18	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R19	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R20	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R26	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Used in G1).
R26	19B800607P390	Metal film: 39 ohms ±5%, 200 VDCW, 1/8 w. (Used in G3 and G5).
R27	19B800607P680	Metal film: 68 ohms ±5%, 200 VDCW, 1/8 w. (Used in G1).
R27	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w. (Used in G3 and G5).
R28	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R29	19A702931P93	Metal film: 90.9 ohms ±1%, 200 VDCW, 1/8 w. (Used in G1).
R29	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w. (Used in G3 and G5).
R51	19B800607P101	Metal film: 100 ohms ±5%, 200 VDCW, 1/8 w.
R52	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R53	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R54	19B800607P150	Metal film: 15 ohms ±5%, 200 VDCW, 1/8 w.
R55	19B800607P271	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 w.
R56	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R57	19B800607P824	Metal film: 820K ohms ±5%, 200 VDCW, 1/8 w.
R58	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R59	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R60	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R61	19B800607P470	Metal film: 47 ohms ±5%, 200 VDCW, 1/8 w.
R62	19B800607P221	Metal film: 220 ohms ±5%, 200 VDCW, 1/8 w.
R63	19B800607P150	Metal film: 15 ohms ±5%, 200 VDCW, 1/8 w.
R64	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R65	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R66	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R67	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R68	19B800607P151	Metal film: 150 ohms ±5%, 200 VDCW, 1/8 w.
R69	19B800607P510	Metal film: 51 ohms ±5%, 200 VDCW, 1/8 w.
R70	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R71	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R72	19B800607P221	Metal film: 220 ohms ±5%, 200 VDCW, 1/8 w.
R73 and R74	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R75	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R76	19B800607P181	Metal film: 180 ohms ±5%, 200 VDCW, 1/8 w.
R77	19B800607P392	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 w.
R78	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R79	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R80	19B800607P271	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 w.
R81	19B800607P180	Metal film: 18 ohms ±5%, 200 VDCW, 1/8 w.
R82	19B800607P271	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 w.
R83	19B800607P681	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 w.
R85	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R86	19B800607P681	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 w.
R87 and R88	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R101	19B800607P681	Metal film: 680 ohms ±5%, 200 VDCW, 1/8 w.

SYMBOL	GE PART NO.	DESCRIPTION
R102 and R103	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R104 and R105	19B800607P221	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R106	19A702931P173	Metal film: 562 ohms ±1%, 200 VDCW, 1/8 w.
R107	19A702931P166	Metal film: 475 ohms ±1%, 200 VDCW, 1/8 w.
R108	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R109	19B235029P8	Variable: 10K ohms, ±10%, 1/2 w.
R110	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R111	19A702931P339	Metal film: 24.9K ohms ±1%, 200 VDCW, 1/8 w.
R112	19A702931P347	Metal film: 30.1K ohms ±1%, 200 VDCW, 1/8 w.
R113	19A702931P307	Metal film: 11.5K ohms ±1%, 200 VDCW, 1/8 w.
R114	19B800779P8	Variable, cermet: 4.7K ohms ±25%, .3 w.
R115	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R116 and R117	19A702931P157	Metal film: 383 ohms ±1%, 200 VDCW, 1/8 w.
R118 and R119	19B800607P562	Metal film: 5.6K ohms ±5%, 200 VDCW, 1/8 w.
R131	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R132	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R133	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R134	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R135	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R136	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R137	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R138	19B800607P330	Metal film: 33 ohms ±5%, 200 VDCW, 1/8 w.
R139	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R140	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R141	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R142	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R143	19B800607P392	Metal film: 3.9K ohms ±5%, 200 VDCW, 1/8 w.
R144	19B800607P510	Metal film: 51 ohms ±5%, 200 VDCW, 1/8 w. (Used in G5).
R146	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R147	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R148	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R149 thru R152	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R153	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R154	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R155	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R156	19B800607P123	Metal film: 12K ohms ±5%, 200 VDCW, 1/8 w.
R237 and R238	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R239	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R240	19B800779P16	Variable, 100K ohms, ±25%, 100 VDCW, 3 watt.
R241	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R242	19B800607P474	Metal film: 470K ohms ±5%, 200 VDCW, 1/8 w.
R243	19B800607P824	Metal film: 820K ohms ±5%, 200 VDCW, 1/8 w.
R244	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R245	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R246	19B800607P474	Metal film: 470K ohms ±5%, 200 VDCW, 1/8 w.
R247	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A705560P1	OP AMP, Dual; sim to Signetics NE5532A.
U2	19J706031P1	Linear: POSITIVE VOLTAGE REGULATOR.

SYMBOL	GE PART NO.	DESCRIPTION
U3	19B801351P12	CRYSTAL OSCILLATOR; 14.850 MHz, temperature compensated. (Used in G1).
U3	19B801351P14	CRYSTAL OSCILLATOR; 12.80 MHz, temperature compensated. (Used in G3).
U4 and U5	19B800902P4	Synthesizer: CMOS Serial Input.
U6	19A134717P3	Linear: POSITIVE VOLTAGE REGULATOR; sim to uA 7808U.
U7 and U8	19A704740P1	Divider; sim to Mitsubishi M54475P.
U9 and U10	19J706031P1	Linear: POSITIVE VOLTAGE REGULATOR.
U11 and U12	19A700029P44	Digital: BILATERAL SWITCH.
U13	19A705768P1	RCVR VOLTAGE CONTROLLED OSCILLATOR: sim to ALPHS Model URAA4X454A. (Used in G1).
U13	19A705026P4	Voltage Controlled Oscillator. (Used in G3).
U14	19A704902P1	VCO: DUAL BAND: 806-825 MHz, 851-870 MHz; sim to: ALPS URAA.
U15	19A704695P1	Hybrid RF Amplifier; sim to: NEC Type MIC-5809L.
U16	19A701789P1	Linear, Low Power OP AMP; sim to LM324N.
U17	19A705537P1	Integrated Circuit (MMIC), RF Power Amplifier: sim to Avantek MSA0885.
		- - - - - - - - - - CABLES - - - - - - - - - -
W1 and W2		Part of printed wire board.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B234907P1	Bracket.
	19B234906P1	Spring clip.

PRODUCTION CHANGES

Changes in the equipment to improve 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 - EXCITER/SYNTHESIZER BOARD 19D902209G1, G3 & G5
Incorporated in initial shipment.

REV. B - EXCITER/SYNTHESIZER BOARD 19D902209G1, G3 & G5
To improve synthesizer locking by reducing the Q of decoupling elements L4 & L5. Added R87 & R88. Deleted C91. Relocated C89 to the pad of C91.

C91 was 19A702052P7 - Ceramic: 2200 pF ±10%, 50 VDCW.

REV. C - EXCITER/SYNTHESIZER BOARD 19D902209G1, G3 & G5
To AC couple audio path to external circuitry. Added C116.

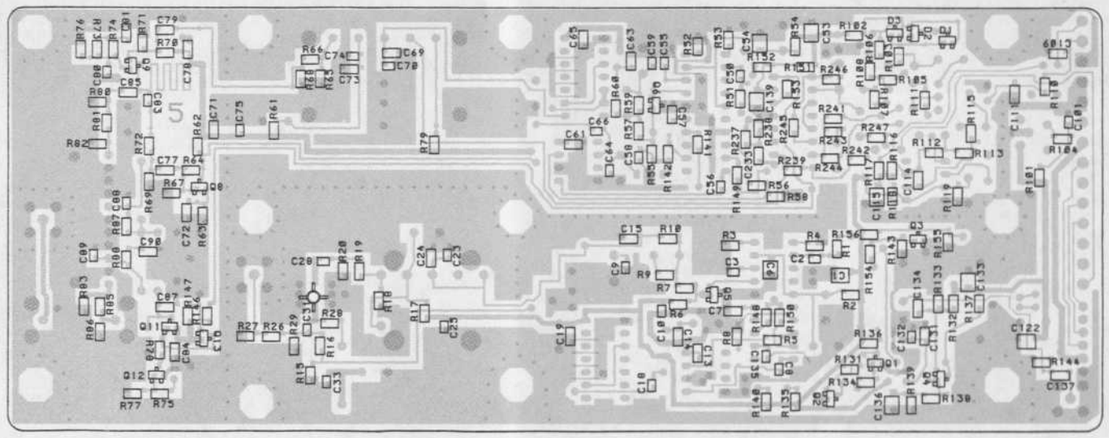
REV. D - EXCITER/SYNTHESIZER BOARD 19D902209G1, G3 & G5
To improve operation with addition of C116, deleted R248.

R248 was 1M ohms.

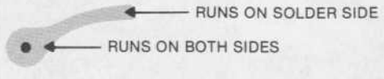
ADDENDUM NO 1 TO LBI-38238A
(PC17)

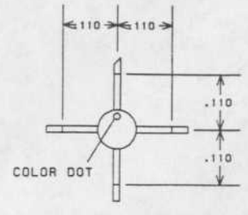
This addendum provides a correction to the outline diagram on page 4 of this manual. The back view of the board (on page 4) should be replaced by the view below.

BACK VIEW OF BOARD



(19D902209, Sh. 1, Rev. 4)
(19D902208, Solder Side, Rev. 5)





LEAD TRIM DIMENSIONS
FOR U17