(Applies to Exec II and Custom MVP)

MOBILE RADIO

LBI31118
(Supersedes LBI30049)

MAINTENANCE MANUAL

IF-DETECTOR BOARD 19D432538G1-G6

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DESCRIPTION

The IF-Detector board (IF-DET) provides approximately 120 dB gain at the IF frequency, detects the audio frequencies and provides the volume squelch HI output to the System-Audio & Squelch board (SAS). The F1 keying lead, and RX OSC control from the SAS board, compensation voltage from the exciter and the regulated +10 Volt circuits are completed through P903/J903 and J602 on the IF-DET board.

IF-DET board 19D432538G2 and G5 contains a 4-pole and a 2-pole crystal filter and operates with an IF frequency of 9.4 MHz. It is used in radios with an operating frequency of 29.7-36 MHz, 42-50 MHz and 851-870 MHz.

IF-DET board 19D432538G1 and G4 also contains a 4-pole and a 2-pole crystal filter. It operates with an IF frequency of 11.2 MHz and is used in radios with an operating frequency between 36-42 MHz and 66-88 MHz.

IF-DET board 19D432538G3 and G6 contains two 2-pole crystal filters and operates with an IF frequency of 11.2 MHz. It is used in radios with an operating frequency of 138-174 MHz, and 406-512 MHz.

NOTE

In radios equipped with IF Detector Board 19C321662, refer to LBI30049.

CIRCUIT ANALYSIS

CRYSTAL FILTERS, IF AMP & LIMITER-DETECTOR

The IF input from the MIF or IF Filter board is applied to monolithic crystal filter FL601 and FL602. The crystal filter provides additional selectivity and is followed by a tuneable impedance matching network (T601) and IF amplifier U601. The IC amplifier provides approximately 60 dB gain.

Final IF selectivity is provided by two-pole crystal filter FL603. A tuneable impedance matching network T602 matches the output impedance of IF amplifier IC U601 to the input of crystal filter FL603. The IF amplifier output is metered at J601-1 through a metering network consisting of C612, C613, CR601 and CR602. Tuneable impedance matching network T603 matches the output impedance of FL603 to the input of Limiter-Detector IC U602.

In addition to providing 60 dB of gain at the IF frequency, Limiter/Detector IC U602, C620, C621 and L603 comprise a quadrature phase detector to recover the audio from the IF frequency. The quadrature phase detector utilizes a 90 degree phase shift in the IF frequency to detect the audio signal. It compares the phase of the IF input at U602-4 with the same IF input frequency shifted 90 degrees at U602-2. The resultant signal varies phase linearly as the carrier signal deviates about the center frequency.

The detector output is adjusted for maximum audio output by FM DET ADJUST T604, and is metered at J601-2 through R607.

AUDIO PREAMPLIFIER

The audio preamplifier consists of transistors Q601, Q602, and Q603. It provides approximately 26 dB of gain.

The output of the Limiter-Detector is coupled to the audio preamplifier through audio level adjust control R608. R608 sets the audio input level to the preamplifier circuit.

The output of the audio preamplifier is coupled through a low pass filter (L604 and C626) to volume and squelch control circuit on the SAS board. The filter removes any IF signal remaining in the audio output of the preamplifier.

GENERAL ELECTRIC COMPANY • MOBILE COMMUNICATIONS DIVISION
WORLD HEADQUARTERS • LYNCHBURG, VIRGINIA 24502 U.S.A.

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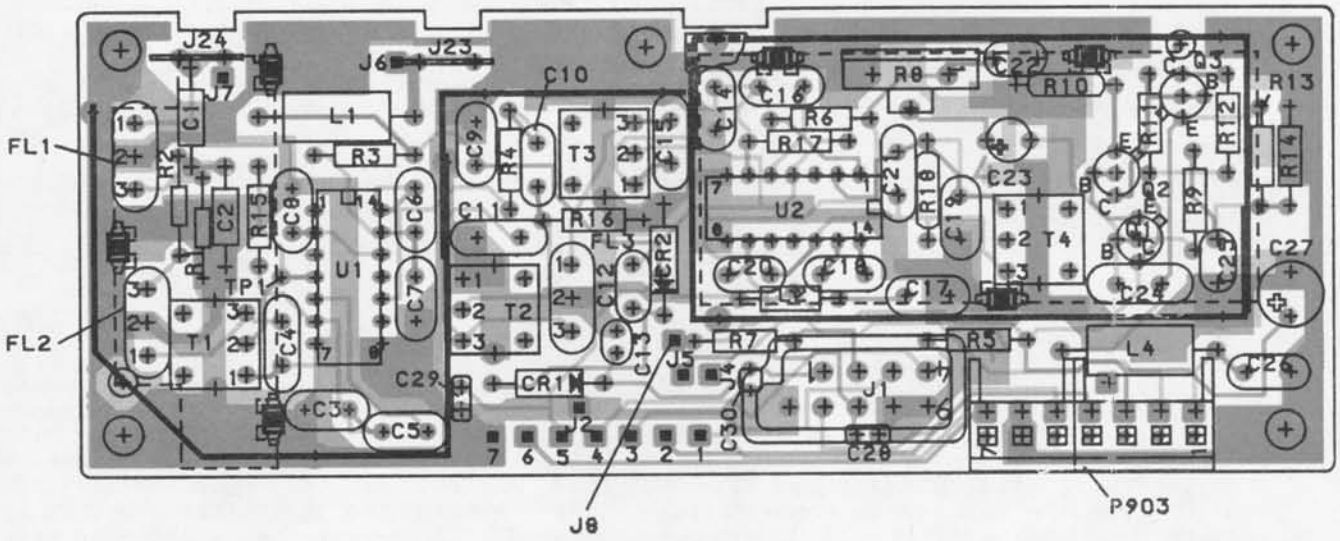
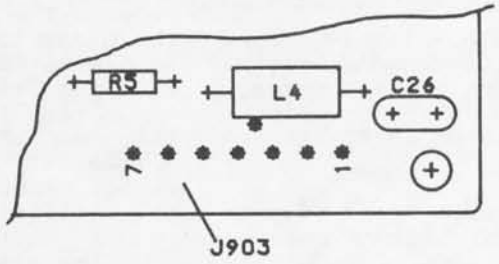
MASTR EXECUTIVE II

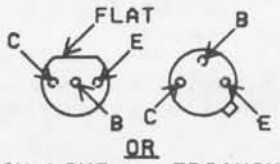


(19D432539, Rev. 5)
(19A143462, Sh. 1, Rev. 4)
(19A143462, Sh. 2, Rev. 4)

CUSTOM



LEAD IDENTIFICATION
FOR Q1, Q2 & Q3



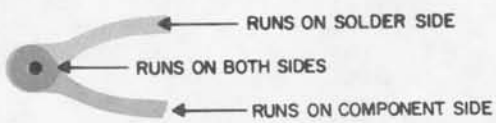
OR

IN-LINE TRIANGULAR

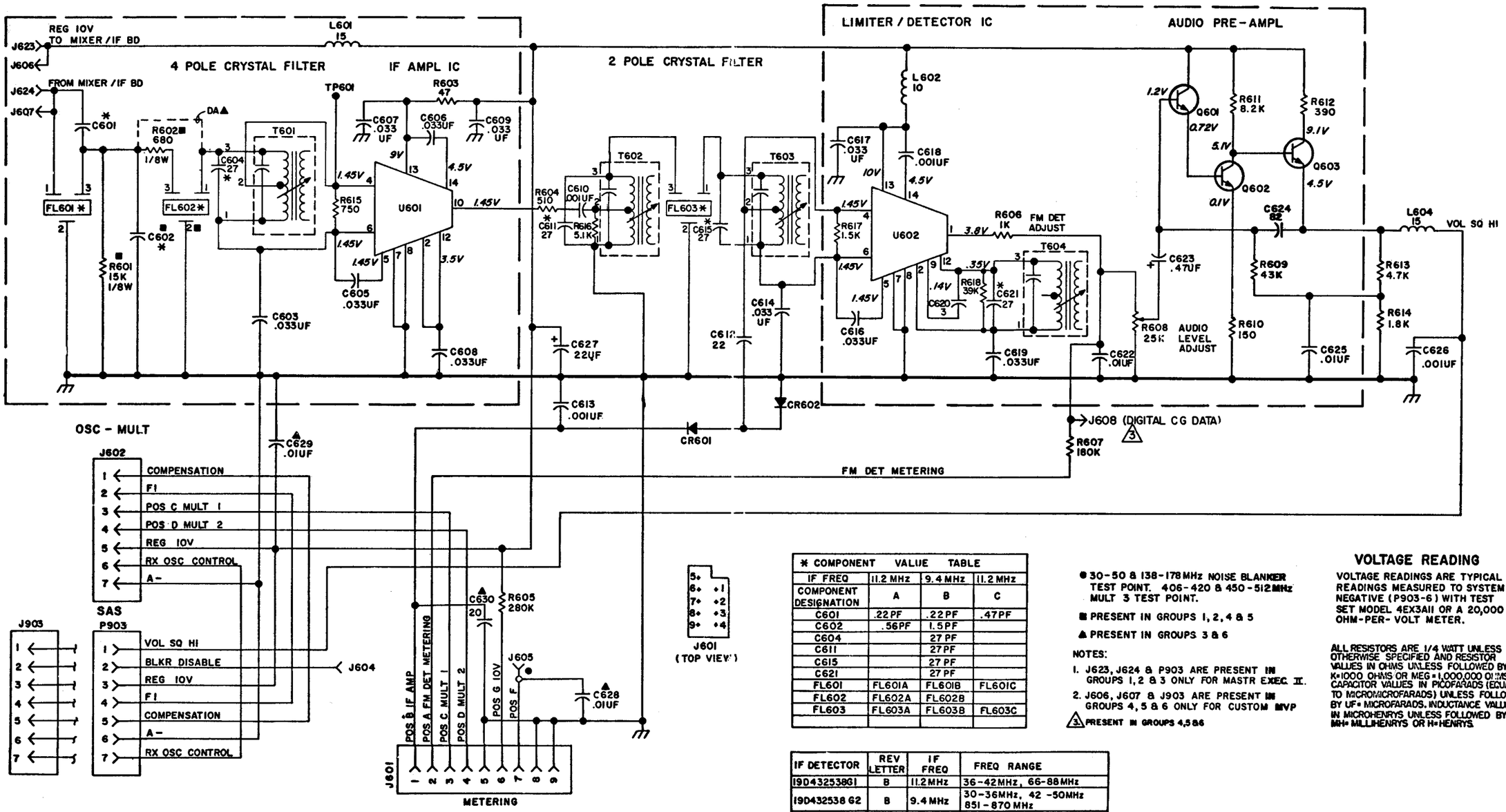
TOP VIEW

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

OUTLINE DIAGRAM



IF DETECTOR BOARD
19D432538G1-G6



* COMPONENT VALUE TABLE			
IF FREQ	11.2 MHz	9.4 MHz	11.2 MHz
COMPONENT DESIGNATION	A	B	C
C601	.22PF	.22PF	.47PF
C602	.56PF	1.5PF	
C604		27 PF	
C611		27PF	
C615		27 PF	
C621		27 PF	
FL601	FL601A	FL601B	FL601C
FL602	FL602A	FL602B	
FL603	FL603A	FL603B	FL603C

IF DETECTOR	REV LETTER	IF FREQ	FREQ RANGE
19D432538G1	B	11.2MHz	36-42MHz, 66-88MHz
19D432538 G2	B	9.4MHz	30-36MHz, 42-50MHz 851-870 MHz
19D432538 G3	B	11.2MHz	138-174MHz, 406-512MHz
19D432538G4	C	11.2MHz	36-42MHz, 66-88MHz
19D432538G5	C	9.4MHz	30-36MHz, 42-50MHz 851-870MHz
19D432538G6	C	11.2MHz	138-174MHz, 406-512MHz

● 30-50 & 138-178MHz NOISE BLANKER TEST POINT. 406-420 & 450-512MHz MULT 3 TEST POINT.

■ PRESENT IN GROUPS 1, 2, 4 & 5

▲ PRESENT IN GROUPS 3 & 6

NOTES:

1. J623, J624 & P903 ARE PRESENT IN GROUPS 1, 2 & 3 ONLY FOR MASTR EXEC II.
2. J606, J607 & J903 ARE PRESENT IN GROUPS 4, 5 & 6 ONLY FOR CUSTOM MVP

3 PRESENT IN GROUPS 4,5 & 6

VOLTAGE READING

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (P903-6) WITH TEST SET MODEL 4EX3A11 OR A 20,000 OHM-PER-VOLT METER.

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 (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

(19D432536, Rev. 5)

SCHEMATIC DIAGRAM

IF DETECTOR BOARD
19D432538G1-G6

PARTS LIST

IF DETECTOR BOARD
19D432538G1 11.2 MHz MASTR EXEC II - REV A
19D432538G2 9.2 MHz MASTR EXEC II - REV A
19D432538G3 11.2 MHz MASTR EXEC II - REV A
19D432538G4 11.2 MHz CUSTOM MVP - REV C
19D432538G5 9.2 MHz CUSTOM MVP - REV C
19D432538G6 11.2 MHz CUSTOM MVP - REV C
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C601A and C601B	19A700013P5	Phenolic: 0.22 pF ±5%, 500 VDCW.
C601C	19A700013P9	Phenolic: 0.47 pF ±5%, 500 VDCW.
C602A	19A700013P10	Phenolic: 0.56 pF ±5%, 500 VDCW.
C602B	19A700013P15	Phenolic: 1.50 pF ±5%, 500 VDCW.
C603	19A700234P10	Polyester: 0.033 uF ±10%, 50 VDCW.
C604	19A701624P118	Ceramic: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
C605 thru C609	19A700234P10	Polyester: 0.033 uF ±10%, 50 VDCW.
C610	19A701602P19	Ceramic: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C611	19A701624P118	Ceramic: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
C612	19A701624P516	Ceramic: 22 pF ±5%, 500 VDCW, temp coef -470 PPM.
C613	19A116192P13	Ceramic: 1000 pF ±10%, 50 VDCW; sim to Erie 8121-A050-W5R-102K.
C614	19A700234P10	Polyester: 0.033 uF ±10%, 50 VDCW.
C615	19A701624P118	Ceramic: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
C616 and C617	19A700234P10	Polyester: 0.033 uF ±10%, 50 VDCW.
C618	19A701602P19	Ceramic: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C619	19A700234P10	Polyester: 0.033 uF ±10%, 50 VDCW.
C620	19A701624P201	Ceramic: 3.0 pF ±0.5 pF, 500 VDCW, temp coef -150 PPM.
C621	19A701624P118	Ceramic: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
C622	19A700234P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C623	19A701534P3	Tantalum: 0.47 uF ±20%, 35 VDCW.
C624	19A700105P32	Mica: 82 pF ±5%, 500 VDCW.
C625	19A700234P7	Polyester: 0.01 uF ±10%, 50 VDCW.
C626	19A701602P19	Ceramic: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C627	19A701534P8	Tantalum: 22 uF ±20%, 16 VDCW.
C628 and C629	19A116192P1	Ceramic: 0.01 uF ±20%, 50 VDCW; sim to Erie 8121 Special.
C630	19A116114P39	Ceramic: 20 pF ±5%, 100 VDCW; temp coef 0 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR601 and CR602	4038056P1	Germanium.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL601A	19B219573G3	Crystal: Resonator A - 11,200.000 kHz; Resonator B - 11,196.024 kHz, Resonator A - 11,200.000 kHz; Resonator B - 11,196.024 kHz.
FL601B	19B219574G3	Crystal: Resonator A - 9400.300 kHz, Resonator B - 9396.324 kHz; Resonator A - 9400.300 kHz, Resonator B - 9396.324 kHz.
FL601C*	19B219573G6	Crystal: Resonator A - 11,200.000 kHz; Resonator B - 11,200.000 kHz. In G1 of REV B and earlier: In G3 of REV D and earlier:
	19B219573G1	Crystal: Resonator A - 11,200.000 kHz; Resonator B - 11,200.000 kHz.
FL602A		(Part of FL601A).
FL603A		(Part of FL601B).
FL603A	19B219573G6	Crystal: Resonator A - 11,200.000 kHz; Resonator B - 11,200.000 kHz.
FL603B	19B219574G1	Crystal: Resonator A - 9400.300 kHz, Resonator B - 9400.300 kHz.
FL603C	19B219573G6	Crystal: Resonator A - 11,200.000 kHz; Resonator B - 11,200.000 kHz.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J601	19B219374G1	Connector. Includes:
	19C317957P1	Shell.
	19A116651P1	Connector, Includes: Contact, electrical.
J602	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.
J604 thru J607	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.
J623 and J624	19A116975P1	Contact, electrical.
J903	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L601	19A700000P25	Choke, RF: 15.0 uH ±10%, 1.20 ohms DC res max; sim to Jeffers 4421-9K.
L602	19A700024P25	Coil, RF: 10.0 uH ±10%, 3.70 ohms DC res max.
L604	19A700000P25	Choke, RF: 15.0 uH ±10%, 1.20 ohms DC res max; sim to Jeffers 4421-9K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P903		Connector. Includes:
	19A116659P1	Connector, printed wiring: 3 contacts rated at 5 amps; sim to Molex 09-52-3032.
	19A116659P15	Connector, printed wiring: 4 contacts rated at 5 amps; sim to Molex 09-52-3042.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q601 thru Q603	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R601	3R151P153J	Composition: 15K ohms ±5%, 1/8 w.
R602	3R151P681J	Composition: 680 ohms ±5%, 1/8 w.
R603	19A700019P21	Deposited carbon: 47 ohms ±5%, 1/4 w.
R604	19A143400P33	Deposited carbon: 510 ohms ±5%, 1/4 w.
R605	19A701250P444	Metal film: 280K ohms ±1%, 1/4 w.
R606	19A700019P37	Deposited carbon: 1K ohms ±5%, 1/4 w.
R607	19A700019P64	Deposited carbon: 0.18 megohms ±5%, 1/4 w.
R608	19B209358P107	Variable, carbon film: approx 800 to 25K ohms ±10%, 1/4 w; sim to CTS Type X-201.
R609	19A143400P56	Deposited carbon: 43K ohms ±5%, 1/4 w.
R610	19A700019P27	Deposited carbon: 150 ohms ±5%, 1/4 w.
R611	19A700019P48	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R612	19A700019P32	Deposited carbon: 390 ohms ±5%, 1/4 w.
R613	19A700019P45	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R614	19A700019P40	Deposited carbon: 1.8K ohms ±5%, 1/4 w.
R615	19A143400P35	Deposited carbon: 750 ohms ±5%, 1/4 w.
R616	19A143400P45	Deposited carbon: 5.1K ohms ±5%, 1/4 w.
R617	19A700019P39	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R618	19A700019P56	Deposited carbon: 39K ohms ±5%, 1/4 w.
T601 thru T604	19A134747P2	- - - - - - - - - TRANSFORMERS - - - - - - - - - Transformer, IF: resonant freq. 10.7 MHz; sim to TOKO Inc. 154 PC-470073N3.
TP601	19A701622P1	- - - - - - - - - TEST POINTS - - - - - - - - - Cotter pin.
U601 and U602	19A116445P1	- - - - - - - - - INTEGRATED CIRCUITS - - - - - - - Integrated circuit, linear: sim to ULN2111.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B226648G1	Shield. (Located around FL601, FL602).
	19B219571G1	Shield. (Located under Z601, J624 on opposite side of component board).
	19B219554G1	Can. (Located around U602, Q603).
	19B219555P1	Cover. (Used with 19B219554G1 can).
	19B219727G1	Shield. (Located under 19B219554G1 can).
	19A116428P4	Ground tab: sim to AMP 86031-1 (Strip Form). (Used with shields on bottom of circuit board).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.