MAINTENANCE MANUAL
IF-DETECTOR BOARD 19C321662G1-G3

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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 Fl 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 and J602 on the IF-DET board.

IF-DET board 19C321662G2 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 30-36 MHz and 42-50 MHz.

IF-DET board 19C321662G1 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 of 36-42 MHz.

IF-DET board 19C321662G3 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
- 406-420 MHz
- 450-512 MHz

CIRCUIT ANALYSIS

CRYSTAL FILTERS, IF AMP & LIMITER-DETECTOR

The IF input from the MIF or IF Filter board is applied to a four-pole monolithic crystal filter (FL601 and FL602) in radios with an operating frequency of 30-50 MHz and a two-pole monolithic crystal filter (FL601) in radios with an operating frequency of 138-174 MHz, 406-420 MHz or 450-512 MHz. The crystal filter provides additional selectivity and is followed by an impedance matching network Z601 and IF amplifier U601. The IC amplifier provides approximately 60 dB gain.

Final IF selectivity is provided by two-pole crystal filter FL603. Impedance matching network Z602 matches the output impedance of IF amplifier IC U601 to the input of two-pole crystal filter FL603. The IF amplifier output is metered at J601-1 through a metering network consisting of C612, C613, CR601 and CR602. Impedance matching network Z603 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.

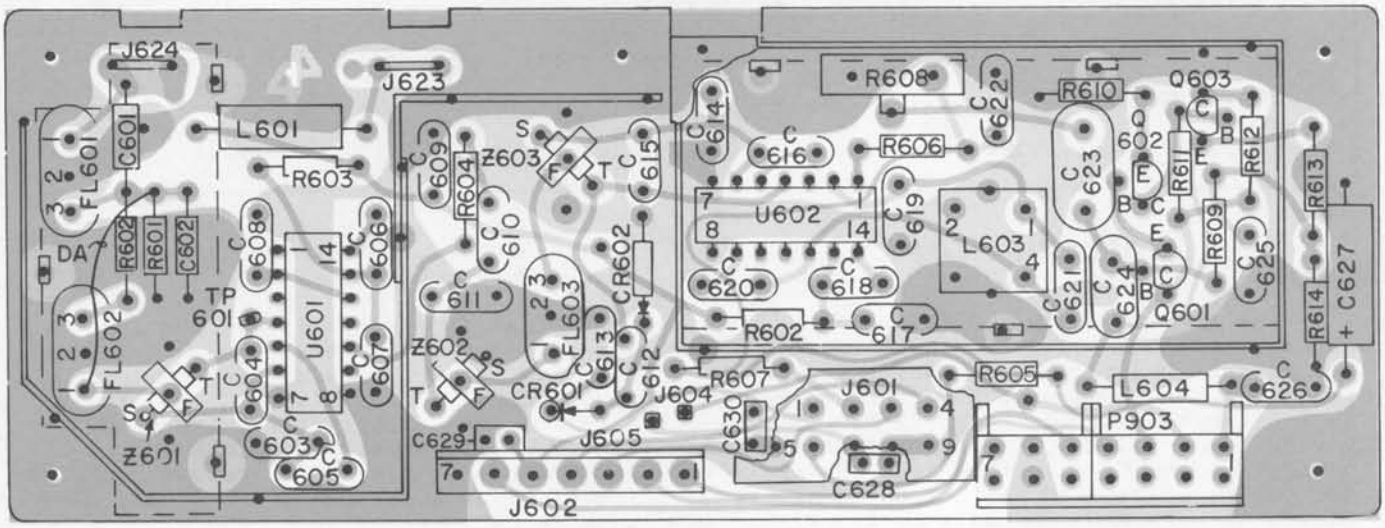
The detector output is adjusted for maximum audio output by L603 and is metered at J601-2 through R607.

AUDIO PREAMPLIFIER

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

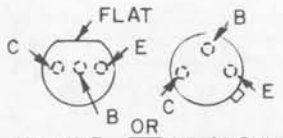
The output of the Limiter-Detector is coupled to the audio preamplifier through audio level adjust control R608. R608 sets the audio input level to the preamplifier circuit.

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.



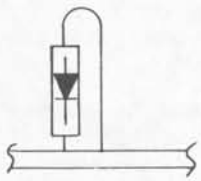
(19C321673, Sh. 2, Rev. 4)
(19C321673, Sh. 3, Rev. 4)

LEAD IDENTIFICATION
FOR Q601, Q602, & Q603



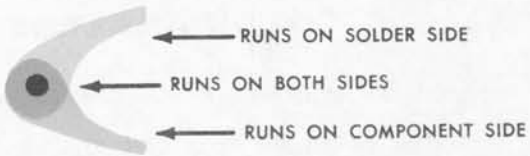
TOP VIEW

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



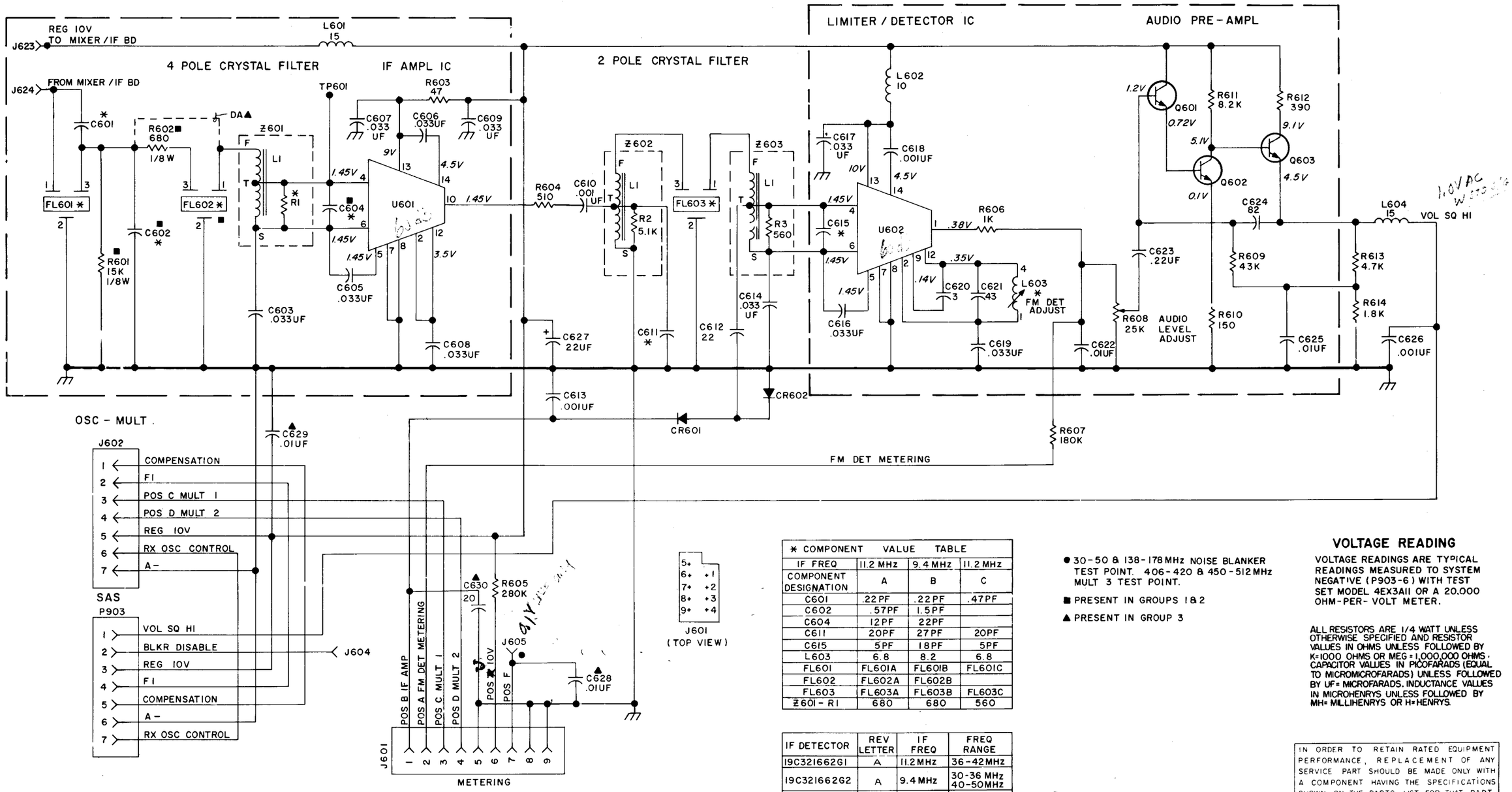
POLARITY FOR CR601

(19C327110, Rev. 3)



OUTLINE DIAGRAM

IF DETECTOR BOARD 19C321662G1-G3



* COMPONENT VALUE TABLE			
IF FREQ	11.2 MHz	9.4 MHz	11.2 MHz
COMPONENT DESIGNATION	A	B	C
C601	.22 PF	.22 PF	.47 PF
C602	.57 PF	1.5 PF	
C604	12 PF	22 PF	
C611	20 PF	27 PF	20 PF
C615	5 PF	18 PF	5 PF
L603	6.8	8.2	6.8
FL601	FL601A	FL601B	FL601C
FL602	FL602A	FL602B	
FL603	FL603A	FL603B	FL603C
Z601 - R1	680	680	560

IF DETECTOR	REV LETTER	IF FREQ	FREQ RANGE
19C321662G1	A	11.2 MHz	36-42 MHz
19C32166 2G2	A	9.4 MHz	30-36 MHz 40-50 MHz
19C32166 2G3	C	11.2 MHz	138-174 MHz 406-512 MHz

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

■ PRESENT IN GROUPS 1 & 2

▲ PRESENT IN GROUP 3

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.

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

(19D423320, Rev. 4)

SCHEMATIC DIAGRAM

IF DETECTOR BOARD 19C321662G1-G3

Issue 2

PARTS LIST

LBI-30081A

IF DETECTOR BOARD
19C321662G1 36-42 MHz (IF 11.2 MHz)
19C321662G2 30-36, 42-50 MHz (IF 9.2 MHz)
19C321662G3 138-174, 406-512 MHz (IF 11.2 MHz)

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C601A and C601B	5491601P105	Phenolic: 0.22 pf ±5%, 500 VDCW.
C601C	5491601P113	Phenolic: 0.47 pf ±5%, 500 VDCW.
C602A	5491601P115	Phenolic: 0.56 pf ±5%, 500 VDCW.
C602B	5491601P123	Phenolic: 1.5 pf ±5%, 500 VDCW.
C603	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C604A	5496219P642	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -470 PPM.
C604B	5496219P647	Ceramic disc: 22 pf ±10%, 500 VDCW, temp coef -470 PPM.
C605 thru C609	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C610	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C611A	5496219P646	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -470 PPM.
C611B	5496219P649	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -470 PPM.
C611C	5496219P646	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -470 PPM.
C612	5496219P647	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -470 PPM.
C613*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		Earlier than REV A:
	5494481P101	Ceramic disc: 150 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C614	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C615A	5496219P636	Ceramic disc: 5.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM.
C615B	5496219P645	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -470 PPM.
C615C	5496219P636	Ceramic disc: 5.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM.
C616 and C617	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C618	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C619	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C620	5496219P334	Ceramic disc: 3.0 pf ±0.25 pf, 500 VDCW, temp coef -150 PPM.
C621	5496219P354	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -150 PPM.
C622	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C623	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C624	7489162P25	Silver mica: 82 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C625	19A116080P101	Polyester: 0.01 µf ±10%, 50 VDCW.
C626	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C627	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C628* and C629*	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL. Added to G3 by REV C.
C630*	19A116114P39	Ceramic: 20 pf ±5%, 100 VDCW; temp coef 0 PPM. Added to G3 by REV C.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR601 and CR602	4038056P1	Germanium.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL601A	19B219573G3	Crystal, freq: PAD A: 11,200000 KHz, PAD B: 11,196024 KHz.
FL601B	19B219574G3	Crystal freq: PAD A: 9400.300 KHz, PAD B: 9396.324 KHz.
FL601C	19B219573G1	Crystal freq: PAD A: 11,200000 KHz, PAD B: 11,200000 KHz.
FL602A		(Part of FL601A).
FL602B		(Part of FL601B).
FL603A	19B219573G1	Crystal freq: PAD A: 11,200000 KHz, PAD B: 11,200000 KHz.
FL603B	19B219574G1	Crystal freq: PAD A: 9400.300 KHz, PAD B: 9400.300 KHz.
FL603C	19B219573G1	Crystal freq: PAD A: 11,200000 KHz, PAD B: 11,200000 KHz.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J601	19B219374G1	Connector. Includes:
	19C317957P1	Shell.
	19A116651P1	Contact, electrical; sim to Malco XO-2864.
J602	19A116659P106	Connector, printed wiring: 7 contacts; sim to Molex 09-60-1071.
J604 and J605	19A116779P1	Contact, electrical; sim to Molex 08-50-0404.
J623 and J624	19A116975P1	Contact, electrical.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L601	7488079P18	Choke, RF: 15.0 µh ±10%, 1.20 ohms DC res max; sim to Jeffers 4421-9K.
L602	19B209420P125	Coil, RF: 10.0 µh ±10%, 3.10 ohms DC res max; sim to Jeffers 4446-4.
L603A	19C311181G13	Coil.
L603B	19C311181G14	Coil.
L603C	19C311181G13	Coil.
L604	7488079P18	Choke, RF: 15.0 µh ±10%, 1.20 ohms DC res max; sim to Jeffers 4421-9K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P903		Connector. Includes:
	19A116659P1	Connector, printd wiring: 3 contacts; sim to Molex 09-52-3102.
	19A116659P15	Connector, printed wiring: 4 contacts; sim to Molex 09-52-3042.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q601 thru Q603	19A115910P1	Silicon, NPN; sim to Type 2N3904.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R601	3R151P153J	Composition: 15,000 ohms ±5%, 1/8 w.
R602	3R151P681J	Composition: 680 ohms ±5%, 1/8 w.
R603	3R152P470K	Composition: 47 ohms ±10%, 1/4 w.
R604	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R605	19C314256P22803	Metal film: 280,000 ohms ±1%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
R606	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R607	3R152P184J	Composition: 0.18 megohm ±5%, 1/4 w.
R608	19B209358P107	Variable, carbon film: approx 800 to 25,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R609	3R152P433J	Composition: 43,000 ohms ±5%, 1/4 w.
R610	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R611	3R152P822K	Composition: 8200 ohms ±10%, 1/4 w.
R612	3R152P391J	Composition: 390 ohms ±5%, 1/4 w.
R613	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
R614	3R152P182J	Composition: 1800 ohms ±5%, 1/4 w.
		- - - - - - - - - TEST POINTS - - - - - - - - -
TP601	N503P304C6	Cotter pin.
		- - - - - - - INTEGRATED CIRCUITS - - - - - - -
U601 and U602	19A116445P1	Integrated circuit, linear: sim to ULN 2111.
		- - - - - - - - - - NETWORKS - - - - - - - - - -
Z601A and Z601B	19B226649G1	Coil assembly. Includes:
R1	3R152P681J	Composition: 680 ohms ±5%, 1/4 w.
Z601C	19B226649G3	Coil assembly. Includes:
R3	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
Z602	19B226649G2	Coil assembly. Includes:
R2	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
Z603	19B226649G3	Coil assembly. Includes:
R3	3R152P561J	Composition: 560 ohms ±5%, 1/4 w.
		- - - - - - - - - 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).

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 descriptions of parts affected by these revisions.

REV. A - IF Detector Board 19C321662G1-3
To improve IF stability.
Changed C613.

REV. B - Not used.

REV. C - IF-Detector Board 19C321662G3
To improve IF tuning.
Added C628, C629 and C630.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES