



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.

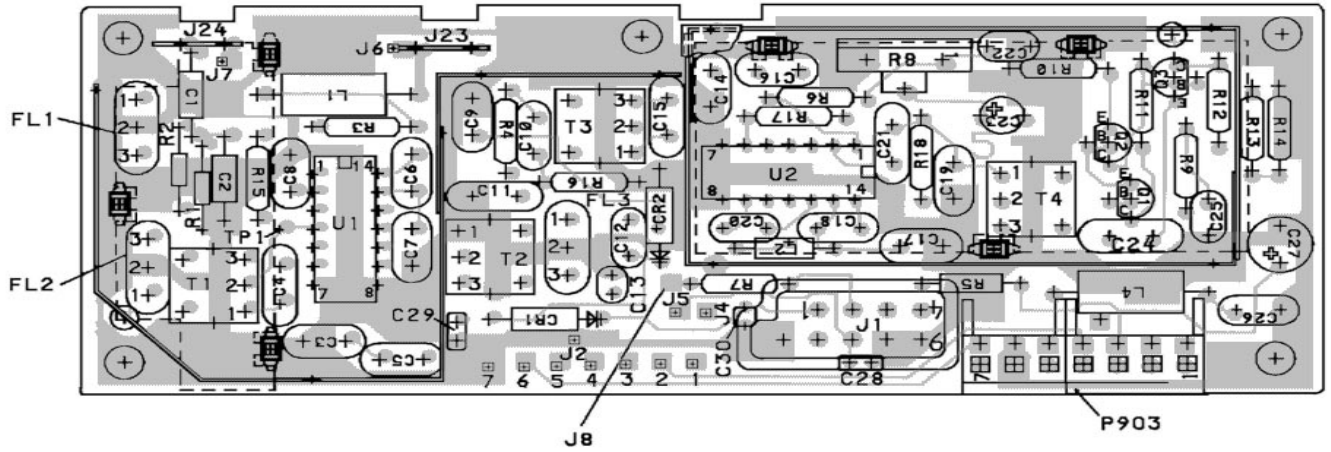
The output of the audio preamplifier is coupled through a low pass filter (L604 and C626) to volume and squelch control circuit on the SAS board. The filter removes any IF signal remaining in the audio output of the preamplifier.



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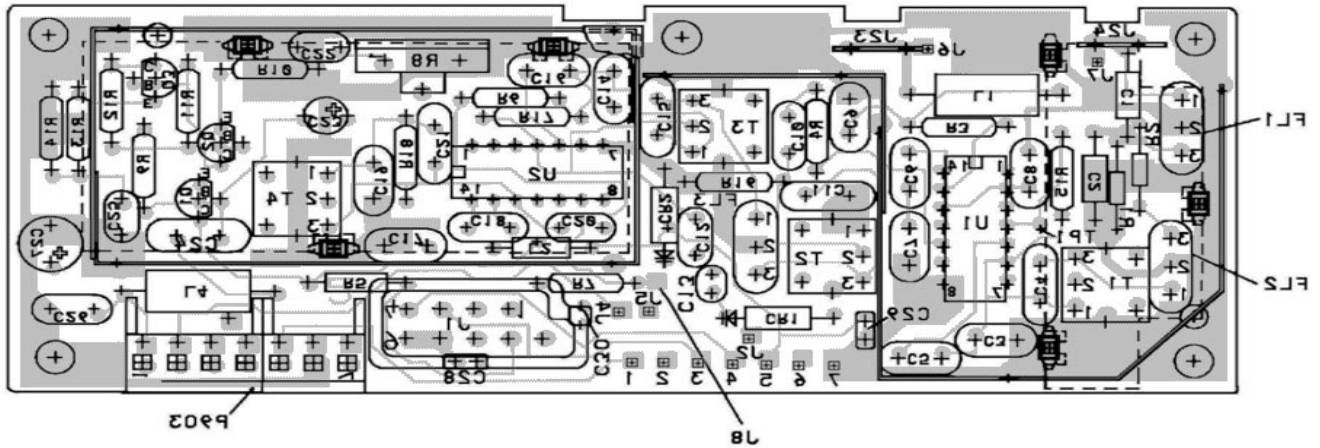
MASTR EXECUTIVE II

COMPONENT SIDE



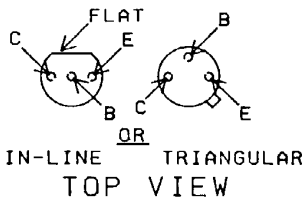
(19D432539, Rev. 6)
(19A143462, Sh.1, Rev 5)

SOLDER SIDE



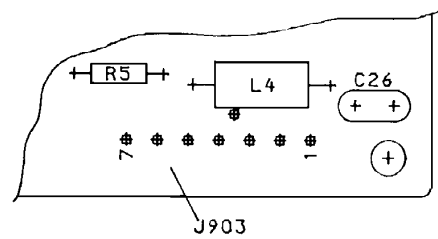
(19D432539, Rev. 6)
(19A143462, Sh.2, Rev 5)

LEAD IDENTIFICATION
FOR Q1, Q2 & Q3



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

CUSTOM



IF DETECTOR BOARD

19D432538G1-G6

PARTS LIST

IF DETECTOR BOARD
 19D432538G1 11.2 MHz MASTR EXEC II
 19D432538G2 9.4 MHz MASTR EXEC II
 19D432538G3 11.2 MHz MASTR EXEC II
 19D432538G4 11.2 MHz CUSTOM MVP
 19D432538G5 9.4 MHz CUSTOM MVP
 19D432538G6 11.2 MHz CUSTOM MVP

ISSUE 6

SYMBOL	GE PART NO.	DESCRIPTION
----- CAPACITORS -----		
C601A	19A700013P5	Phenolic: 0.22 pF ± 5%, 500 VDCW. (Used in G1 and G4).
C601B	19A700013P5	Phenolic: 0.22 pF ± 5%, 500 VDCW. (Used in G2 and G5).
C601C	19A700013P9	Phenolic: 0.47 pF ± 5%, 500 VDCW. (Used in G3 and G6).
C602A	19A700013P10	Phenolic: 0.56 pF ± 5%, 500 VDCW. (Used in G1 and G4).
C602B	19A700013P15	Phenolic: 1.50 pF ± 5%, 500 VDCW. (Used in G2 and G5).
C603	T644ACP333K	Polyester: .033 uF ±10%, 50 VDCW.
C604	19A701624P118	Ceramic: Disc, 27 pF ±5%, 500 VDCW, temp coef N80 ±30 PPM/°C. (Used in G2 and G5).
C605 thru C609	T644ACP333K	Polyester: .033 uF ±10%, 50 VDCW.
C610	19A701602P19	Ceramic: 1000 pF ± 20%, 1000 VDCW; sim to RMC Type JF Discap.
C611	19A701624P118	Ceramic: Disc, 27 pF ±5%, 500 VDCW, temp coef N80 ±30 PPM/°C. (Used in G2 and G5).
C612	19A701624P516	Ceramic: Disc, 22 pF ±5%, 500 VDCW, temp coef N470 ±60 PPM/°C.
C613	19A116192P13	Ceramic: 1000 pF ±10%, 50 VDCW; sim to Erie 8121-A050-W5R-102K.
C614	T644ACP333K	Polyester: .033 uF ±10%, 50 VDCW.
C615	19A701624P118	Ceramic: Disc, 27 pF ±5%, 500 VDCW, temp coef N80 ±30 PPM/°C. (Used in G2 and G5).
C616 and C617	T644ACP333K	Polyester: .033 uF ±10%, 50 VDCW.
C618	19A701602P19	Ceramic: 1000 pF ± 20%, 1000 VDCW; sim to RMC Type JF Discap.
C619	T644ACP333K	Polyester: .033 uF ±10%, 50 VDCW.
C620	19A701624P201	Ceramic: Disc, 3.0 pF ±0.5 pF, 500 VDCW, temp coef N150 ±120 PPM/°C.
C621	19A701624P118	Ceramic: Disc, 27 pF ±5%, 500 VDCW, temp coef N80 ±30 PPM/°C. (Used in G2 and G5).
C622	T644ACP310K	Polyester: .010 uF ±10%, 50 VDCW.
C623 *	19A701534P3	Tantalum: 0.47 uF ± 20%, 35 VDCW.
C624	19A700105P32	Mica: 82 pF ±5%, 500 VDCW.
C625	T644ACP310K	Polyester: .010 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. (Used in G3 and G6).
C630	19A700219P39	Ceramic: 20 pF ±5%, 100 VDCW, temp coef 0 PPM/°C. (Used in G3 and G6).
----- RECTIFIERS -----		
CR601 and CR602	4038056P1	Germanium: Fast recovery, 20 PIV, 40 mA.
----- FILTERS -----		
FL601A	19B219573G3	Crystal: Resonator A - 11,200.000 kHz. Resonator B - 11,196.024 kHz (Qty of 2) (Used in G1 and G4).
FL601B	19B219574G3	Crystal: Resonator A - 9400.000 kHz. Resonator B - 9396.024 kHz (Qty of 2). (Used in G2 and G5).
FL601C	19B219573G6	Crystal: Resonator A - 11,200.000 kHz. Resonator B - 11,200.000 kHz. (Used in G3 and G6).

SYMBOL	GE PART NO.	DESCRIPTION
FL602A		Part of FL601A.
FL602B		Part of FL601B.
FL603A	19B219573G6	Crystal: Resonator A - 11,200.000 kHz. Resonator B - 11,200.000 kHz. (Used in G1 and G4).
FL603B	19B219574G1	Crystal: Resonator A - 9400.000 kHz. Resonator B - 9400.000 kHz. (Used in G2 and G5).
FL603C	19B219573G6	Crystal: Resonator A - 11,200.000 kHz. Resonator B - 11,200.000 kHz. (Used in G3 and G6).
----- JACKS -----		
J601	19B219374G1	Connector: Includes: Shell.
	19C317957P1	Contact. (Qty of 9).
	19A700237P1	Contact, electrical; sim to Molex -08-50-0404.
J602	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.
J604 thru J607	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.
J608 *	19A701785P2	Contact, electrical; sim to Molex -08-50-0404. (Used in G4 - G6).
J623 and J624	19A116975P1	Contact, electrical. (Used in G1 - G3).
----- INDUCTORS -----		
L601	19A700000P25	Coil, RF: 15 uH ±10%; sim to Jeffers 4421-9K.
L602	19A700024P25	Coil, RF: 10.0 uH ± 10%, 3.70 ohms max. DC res.
L604	19A700000P25	Coil, RF: 15 uH ±10%; sim to Jeffers 4421-9K.
----- PLUGS -----		
P903		Connector. Includes: (Used in G1 - G3).
	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	19A700023P2	Silicon, NPN: sim to 2N3904.
----- RESISTORS -----		
R601	3R151P153J	Composition: 15K ohms ± 5%, 1/8 w. (Used in G1, G2, G4 and G5).
R602	3R151P681J	Composition: 680 ohms ± 5%, 1/8 w. (Used in G1, G2, G4 and G5).
R603	H212CRP047C	Deposited carbon: 47 ohms ±5%, 1/4 w.
R604	19A143400P33	Deposited carbon: 510 ohms ± 5%, 250 VDCW, 1/4 w.
R605	19A701250P444	Metal film: 280K ohms ± 1%, 1/4 w.
R606	H212CRP210C	Deposited carbon: -1K ohms ±5%, 1/4 w.
R607	H212CRP418C	Deposited carbon: 0.18M ohms ±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%, 250 VDCW, 1/4 w.
R610	H212CRP115C	Deposited carbon: 150 ohms ±5%, 1/4 w.
R611	H212CRP282C	Deposited carbon: 8.2K ohms ±5%, 1/4 w.
R612	H212CRP139C	Deposited carbon: 390 ohms ±5%, 1/4 w.
R613	H212CRP247C	Deposited carbon: 4.7K ohms ±5%, 1/4 w.
R614	H212CRP210C	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%, 250 VDCW, 1/4 w.
R617	H212CRP215C	Deposited carbon: 1.5K ohms ±5%, 1/4 w.
R618 *	H212CRP339C	Deposited carbon: 39K ohms ±5%, 1/4 w.
----- TRANSFORMERS -----		
T601 thru T604	19A134747P2	IF: Resonant freq. 10.7 MHz; sim to Toko Inc. 154 PC-470073R3.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

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 - IF-DETECTOR BOARD 19D432538G1-G6
To improve stability of the the detector circuit at temperature extremes, added R61B.

REV. B - IF-DETECTOR BOARD 19D432538G1-G6
To improve frequency response at 100 Hz, changed C623. C623 was: 19A116080P109 Polyester: .22 uF +10%, 50 WVDC.

REV. C - IF-DETECTOR BOARD 19D432538G4-G6
Added electrical connection, J608, for use with digital channel guard circuitry at junction of C622 and R607 (near FM detector output).

SYMBOL	GE PART NO.	DESCRIPTION
U601 and U602	19A116445P1	----- INTEGRATED CIRCUITS ----- Linear: sim to ULN2111.
	19B226648G1	----- MISCELLANEOUS ----- Shield. (Located around FL601 and FL602).
	19B219571G1	Shield. (Located near J624 on solder side of board).
	19B219554G1	Can. (Located around U602 and Q603).
	19B219555P1	Cover. (Used with can).
	19B219727G1	Shield. (Used with can).
	19A701883P4	Contact, electrical; sim to AMP 86444-1. (Used with can).
	19A701622P1	Cotter pin.
	19A130575P1	Label.
	19A701785P2	Contact, electrical; sim to Molex -08-50-0404.