ERICSSON

Mobile Communications

MASTR® II

RECEIVER VOTING TONE BOARD

19C336900G1

Maintenance Manual

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SPECIFICATIONS *

USED WITH	Receiver Voting for MASTR II Stations and MASTR II Auxiliary Receivers
TONE FREQUENCY	1950 Hz ± 1 Hz
TONE OUTPUT:	
Receiver Squelched	From -20 dBm to + 11 dBm on a 600 ohm line
Receiver Unsquelched	Greater than 50 dB isolation
INPUT POWER	+10 Volts DC @ 10 milliamperes
DISTORTION	Less than 5%
DIMENSIONS	3 1/4" X 2 1/8"
TEMPERATURE RANGE	-30°C to +60°C (-22°F to + 140°F)

* These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

WARNING

Be careful when working near energized circuits! High-level RF energy in the transmitter Power Amplifier assembly can cause RF burns upon contact. Keep away from these circuits when the transmitter is energized!

DESCRIPTION

Receiver Voting Tone Board 19C336900G1 plugs in the system board of MASTR® II Stations and MASTR® II Station Auxiliary Receivers to provide tone signaling. It is also used in the GETC shelf type 19D901868 and the earlier VG shelf type 19D438054 when used in Remote and Remote/Repeat Stations. Whenever the Satellite Receiver is squelched, a 1950 Hz tone from the tone board is applied to the Voting Selector through the audio pair. When the receiver is unsquelched, the 1950 Hz tone is removed.

CIRCUIT ANALYSIS

The Receiver Voting Tone Board consists of Tone Generator U1, Level Compensator circuit AR1-A and AR1-B, amplifier circuit AR1-C, tone switch circuit field effect transistor Q4 and control switch transistor Q1. The + 10 Volts required for operating the Tone Board is taken from the 10 volt Regulator on the station control shelf or the 10 Volt regulator board in Auxiliary Receivers.

Applying power to the Tone Board starts Tone Generator U1. Feedback for the generator is supplied through capacitor C2. The frequency and output level of Tone generator U1 is adjusted using potentiometers R5 and R9 respectively. The generator output (1950 Hz) is coupled directly to the input of amplifier circuit AR1-C, Pin 9 and through capacitor C4 to the input of the level compensator circuit at AR1-A, Pin 2. Potentiometer R19, on the output of AR1-C, is used to set the tone output level applied to the Line Amplifier on the Audio Board in stations and on the system board in Auxiliary Receivers.

The output of U1, applied to the input of the level compensator circuit, is amplified by amplifier AR I-A; a gain of approximately 8 (309K/39.2K = 7.88). The output of AR1-A, Pin 1 is applied to the input of a halfwave rectifier circuit consisting of diode CR1 and filter capacitor C5. The negative dc output level of the rectifier circuit is applied to the input of inverting amplifier AR1-B, Pin 9. AR1-B has a gain of approximately 17 (309K/17.8K = 17.34). The inverted positive dc level is then applied back to tone generator U1 through voltage divider R16/R17 to regulate the Tone Generator to the output level set by potentiometer R9.

The output of the Receiver Voting Tone Board is approximate 13 dB below the level set on the line. The output is fed into the station Audio Board or the Line Amplifier on the Auxiliary receiver system board where it is amplified 13 dB before being fed to the telephone pair.

When the receiver is squelched (no RUS voltage) control transistor Q1 is turned off. With Q1 off, the Gate of Tone Switch transistor Q4 is held high and Q4 is turned on to pass the tone through capacitor C7 to the Audio Line. The low input to J935-4 required for Voting Tone Disable is used during the transmit mode. In tone remote control systems, the 1950 Hz tone is disabled after detection of the Secur-it Tone to permit the function tone to be properly decoded. Refer to Installation Diagram for connections to perform these functions. The grounding of J935-4 pulls the Gate of Q4 low. With the Gate of Q4 low, Q4 is turned off with no tone is passing to the Audio Line.

ADJUSTMENTS

NOTE

The Intercom board plugs into the same plug (P935) on the system board as the Receiver Voting Tone Board plugs into. Therefore, the Receiver Voting Tone Board and the Intercom Board cannot be used at the same time.

Adjust R9

With a digital voltmeter connected between U1, Pin I and ground, adjust R9 for a reading of 3.00 VDC.

Adjust R5

With a frequency counter connected between J935, Pin 2 and ground, adjust R5 for 1950 Hz 1 Hz.

Adjust R19

Adjust R19 (AUDIO OUTPUT LEVEL SET) on the Receiver Voting Tone Board for a reading of -20 dBm at J1 on the Voting Selector. Do Not adjust R1 at the Receiver Module.

MAINTENANCE

The Receiver Voting Tone Board should require a minimum of maintenance. If service is required, refer to the Outline and Schematic Diagrams.

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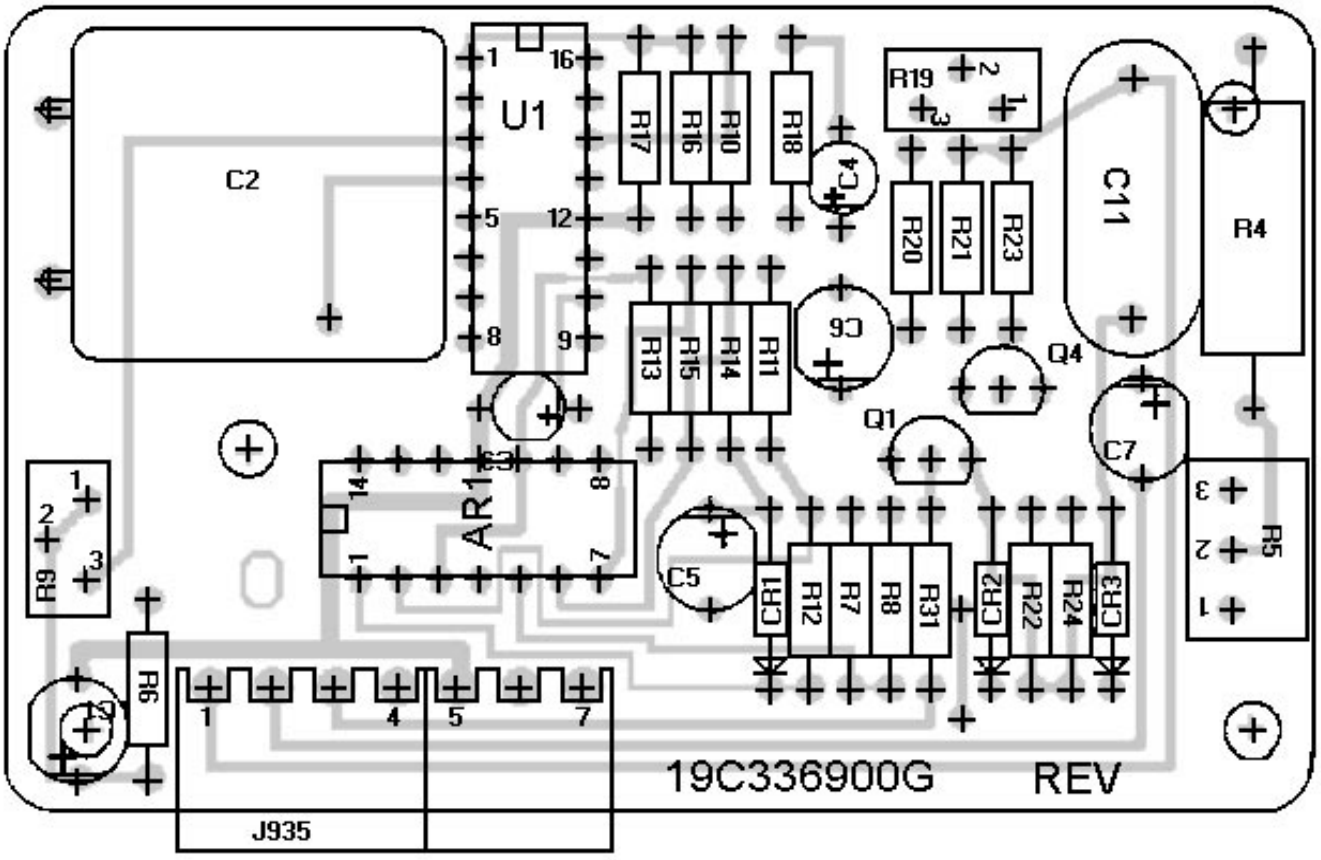
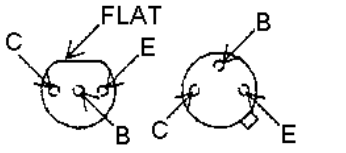


(19C336902, Sh. 1, Rev. 0)
(19A149395, Sh. 1, Rev. 0)

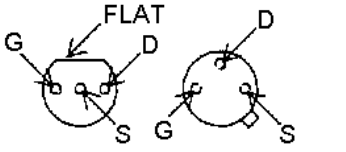
LEAD IDENTIFICATION FOR Q1



TOP VIEW

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

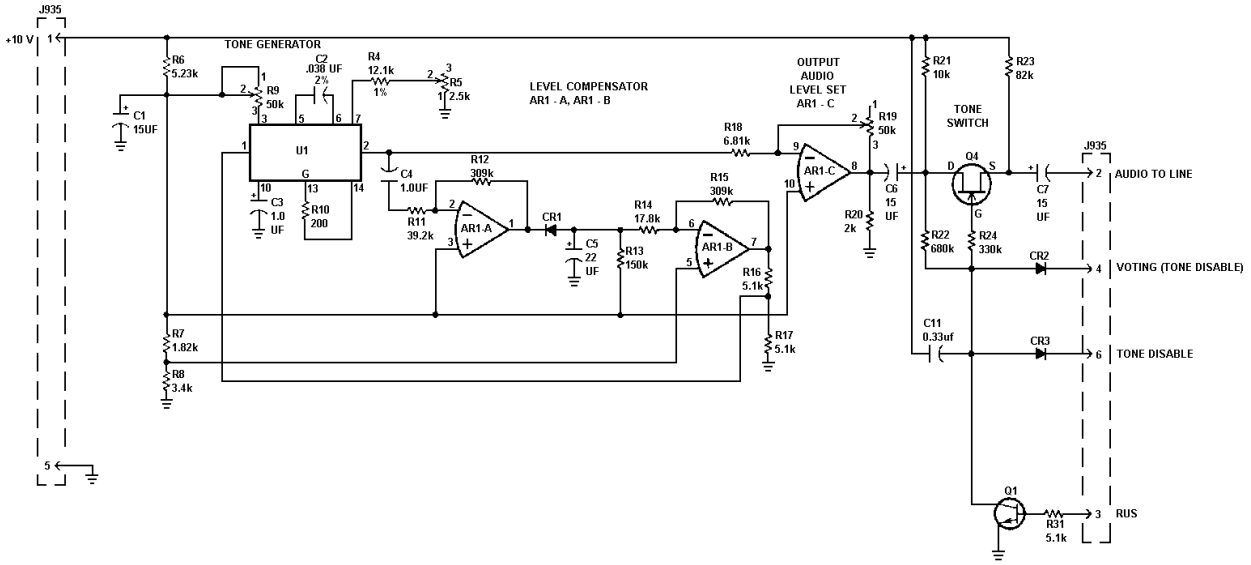
LEAD IDENTIFICATION FOR Q4



TOP VIEW

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

RECEIVER VOTING TONE BOARD



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

MODEL NO.	REV LETTER
19C336900	

NOTES:

1.

IC	V+	GND
AR1	PIN 4	PIN 11
U1	PIN 4	PIN 12

2. C11 AND CR3 USED FOR VG VOTER SELECTOR

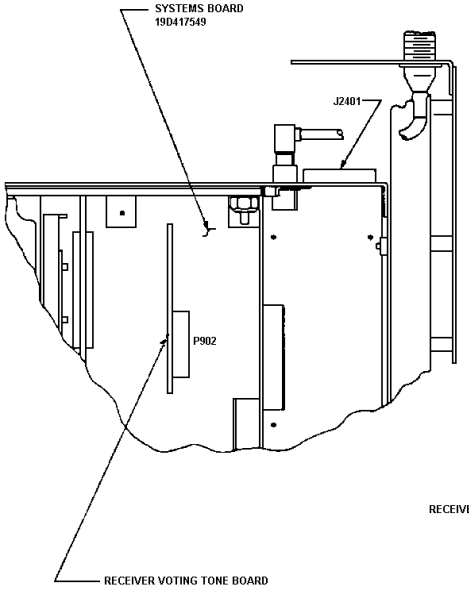
RECEIVER VOTING TONE BOARD

(19D438344, Sh. 1, Rev. 0)

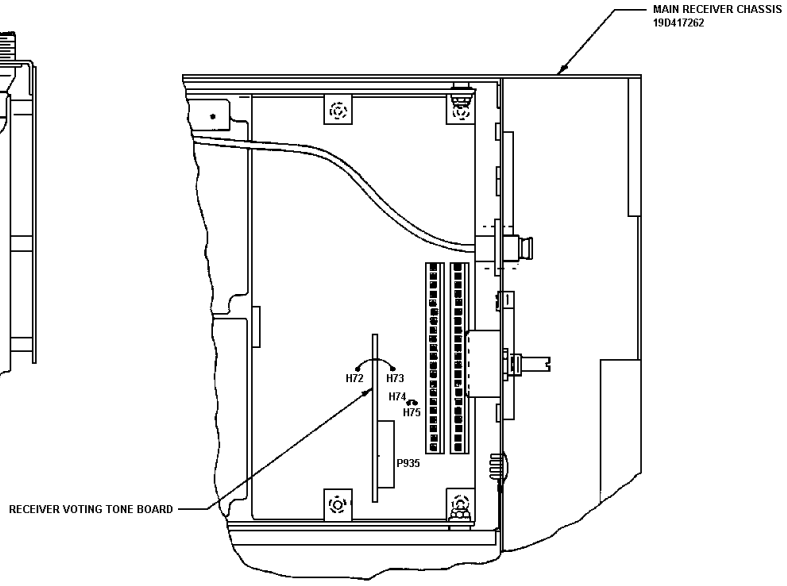
1950 HZ TONE DECODER
19C336900G1
ISSUE 1

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
AR1	19A134511P1	Linear: QUAD OP AMP; sim to LM224J.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A134202P8	Tantalum: 15 uF + or -20%, 20 VDCW.
C2	5493551P38000G	Silver mica: 38000 pF + or - 2%, 100 VDCW; sim. to Electro Motive Type DM-30.
C3 and C4	19A134202P14	Tantalum: 1 uF + or -20%, 35 VDCW.
C5	19A134202P6	Tantalum: 22 uF + or -20%, 15 VDCW.
C6 and C7	19A134202P8	Tantalum: 15 uF + or -20%, 20 VDCW.
		- - - - - - - - - - RECTIFIERS - - - - - - - - -
CR1 thru CR3	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - CONNECTORS - - - - - - - - -
J935		Connector. Includes:
	19A700102P1	Printed wire: 3 contacts rated at 5 amps; sim to Molex 09-52-3031.
	19A116659P7	Connector, printed wire: 4 contacts rated at 5 amps; sim to Molex 09-51-3041.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A700023P1	Silicon, NPN; sim to Type 2N3904.
Q4	19A134137P5	N Type, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R4	19A116793P1212	Metal film: 12.1K ohms + or -1%, 350 VDCW, 1/4 w.
R5	19A116559P204	Variable cermet: 2500 ohms + or - 20%, 1/2 w; sim to CTS Series 360.
R6	19A701250P270	Metal film: 5.23K ohms + or -1%, 1/4 w.
R7	19A701250P226	Metal film: 1.82K ohms + or -1%, 1/4 w.
R8	19A701250P252	Metal film: 3.4K ohms + or -1%, 1/4 w.
R9	19A134594P8	Variable: 50K ohms max + or -10%, 1/2 w.
R10	19A700106P46	Composition: 200 ohms + or - 5%, 1/4 w.
R11	19A701250P358	Metal film: 2.7 ohms + or -5%, 1/4 w.
R12	19A701250P448	Metal film: 309K ohms + or -1%, 1/4 w.
R13	3R152P154J	Composition: 150K ohms + or -5%, 1/4 w.
R14	19A701250P325	Metal film: 17.8K ohms + or -1%, 1/4 w.
R15	19A701250P448	Metal film: 309K ohms + or -1%, 1/4 w.
R16 and R17	3R152P512J	Composition: 5.1K ohms + or -5%, 1/4 w.
R18	19A701250P281	Metal film: 6.81K ohms + or -1%, 1/4 w.
R19	19A134594P8	Variable: 50K ohms max + or -10%, 1/2 w.
R20	3R152P202J	Composition: 2K ohms + or - 5%, 1/4 w.
R21	19A700106P87	Composition: 10K ohms + or - 5%, 1/4 w.
R22	3R152P684J	Composition: 680K ohms + or -5%, 1/4 w.
R23	19A700106P109	Composition: 82K ohms + or - 5%, 1/4 w.
R24	3R152P334J	Composition: 0.33 megohms + or - 5%, 1/4 w.
R31	3R152P512J	Composition: 5.1K ohms + or -5%, 1/4 w.
		- - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A134607P1	Linear: FUNCTION GENERATOR.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



(1) FIG. 1
(AUX RECEIVER)



(2) FIG. 2
(MAIN RECEIVER)

NOTES:

1) INTERCOM AND RCVR VOTING TONE BOARD ARE NOT COMPATIBLE.

2) EACH VOTED RECEIVER REQUIRES A SEPARATE LINE. WHEN AN AUXILIARY RECEIVER IS PRESENT IN A STATION COMBINATION WITH VOTING, THE AUDIO MAY NOT BE COMBINED EITHER THROUGH 2ND RCVR 600 OHMS HI OR BY PARALLELING THE OUTPUT LINES.

(1) INSTRUCTIONS FOR INSTALLING RECEIVER VOTING TONE BOARD 19C336900

1) REMOVE THE COVER (IF PRESENT).

2) AUX RECEIVER
PLUG RECEIVER VOTING TONE BOARD ON SYSTEMS BOARD (19D417549) AT P902 AS SHOWN IN FIG. 1.

3) MAIN RECEIVER (FIRST DIGIT NOT S)
MODIFY 19D417213 SYSTEM BOARD AS FOLLOWS:

A) IN 2-WIRE DC CONTROL (STATIONS WITH FIFTH DIGIT R, U AND SEVENTH DIGIT G, N, P, S, U, W). REMOVE JUMPER A901 H74 TO A901-H75. INSTALL JUMPER A901-H72 TO A901-H73.

B) IN 4-WIRE DC OR TONE CONTROL WITH SEVENTH DIGIT D, L OR WHEN OPTION 9507 OR OPTION 9601 IS PRESENT, REMOVE JUMPER A901-H74 TO A901-H75.

C) PLUG IN RECEIVER VOTING TONE BOARD AT P935 AS SHOWN IN FIG. 2.

4. MAIN RECEIVER (FIRST DIGIT OF S)
MODIFY 19D317213 SYSTEM BOARD AS FOLLOWS:

A) IN 2-WIRE DC CONTROL (STATIONS WITH FIFTH DIGIT R, U AND NINTH DIGIT G, N, P, S, U, W). REMOVE JUMPER A901 H74 TO A901-H75. INSTALL JUMPER A901-H72 TO A901-H73.

B) IN 4-WIRE DC OR TONE CONTROL WITH NINTH DIGIT D, L OR WHEN OPTION 9507 OR OPTION 9601 IS PRESENT, REMOVE JUMPER A901-H74 TO A901-H75.

C) PLUG IN RECEIVER VOTING TONE BOARD AT P935 AS SHOWN IN FIG. 2.

5) REPLACE THE COVER.

CONNECTIONS:

1. IN 2-WIRE DC CONTROL SYSTEMS WITH VOTING TONE BOARD, JUMPER FROM A901-H74 TO A901-H75 IS NOT PRESENT. JUMPER FROM A901-H72 TO A901-H73 IS PRESENT.

IN 4-WIRE STATIONS WITH VOTING TONE BOARD, JUMPER H74-H75; H72-H73 ARE NOT PRESENT.

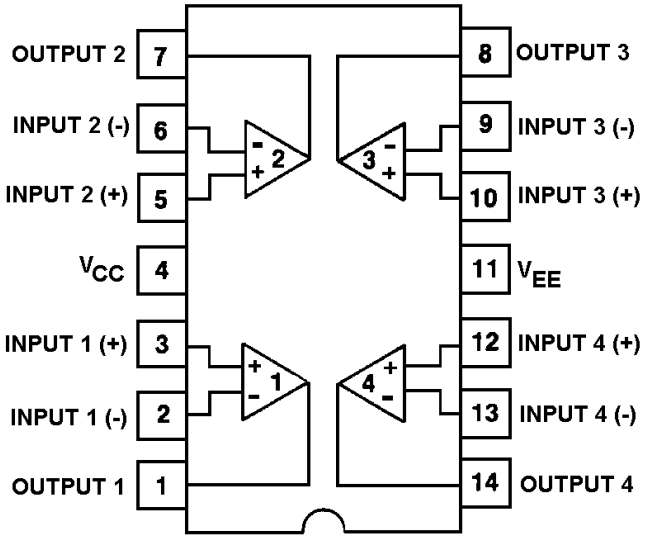
RECEIVER VOTING TONE BOARD

(19D417633, Rev. 9)

OPERATIONAL AMPLIFIER AR1

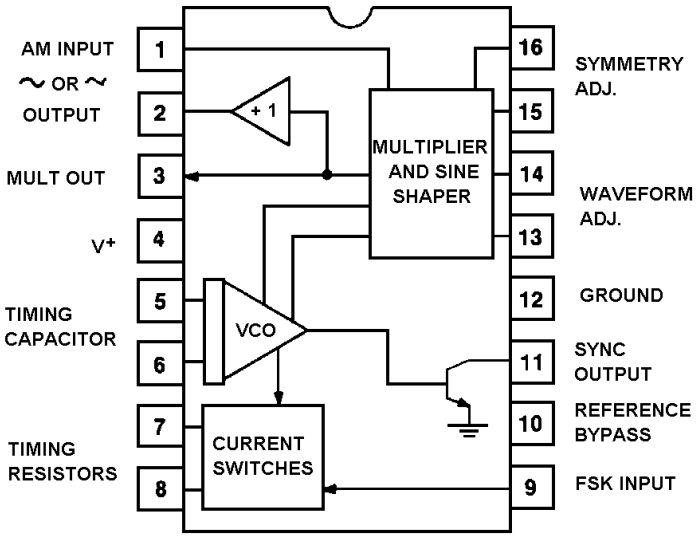
(19A134511P1)

BOTTOM VIEW



TONE GENERATOR U1

(19A134607P1)



TOP VIEW