MAINTENANCE MANUAL FOR 25kHz RECEIVER IF MODULE 19D902783G1

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DESCRIPTION

The MASTR III Receiver IF Module provides amplification and demodulation of the 21.4 MHz Intermediate Frequency signal. The IF Module also includes the receiver squelch circuitry. However, it does not include deemphasis or squelch audio gating circuits. Figure 1 is a block diagram showing the functional operation of the IF Module.

The IF Module circuitry contains the following:

- A 50 ohm input impedance matching network and IF Amplifier
- A chain of two crystal filters and two integrated circuit IF amplifiers
- An integrated circuit containing a crystal oscillator, mixer, limiter, and quadrature detector
- A variable gain AF amplifier
- A squelch circuit
- A fault detector circuit
- An integrated circuit voltage regulator

ERICSSON

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CIRCUIT ANALYSIS

INPUT MATCHING NETWORK

The input impedance matching network provides a 50 ohm load for the receiver RF module. The network consists of C1 thru C3, L1 thru L3, and R1.

Capacitor C1 provides AC coupling and a DC block on the input line (J1). This DC block protects the module in the event of a failure in a preceding module. L2 and L3 are series resonant at 21.4 MHz and provide a signal path to the FET amplifier Q6. Parallel resonant circuit, L1 and C2, provide a path to the 50 ohm load, R1, for frequencies other than 21.4 MHz.

CRYSTAL FILTERS, IF AMPLIFIERS

Y1, Y2, U1, U2, and associated circuitry provide IF filtering and amplification at 21.4 MHz. Filters Y1 and Y2 are both 4 pole bandpass filters with a center frequency of 21.4 MHz and a bandwidth of ±6.5 kHz. Amplifiers U1 and U2 are integrated circuit amplifiers. U1 provides 30 dB of gain, U2 provides 18 dB of gain. The amplifiers and filters have terminal impedances of 50 ohms. In circuit gain measurements can be made using a high impedance probe.

Inductors L3, L4 and associated resistors and capacitors provide power supply decoupling. R3 and R7 provide paths to the input of the Fault Detector circuit. These inputs enable the Fault Detector circuit to monitor the DC voltages of U1 and U2.

The RF level detectors consist of transistors Q1 and Q2 along with associated resistors and capacitors. These detectors play no role in the normal operation of the IF Module, but they aid in unit testing and module troubleshooting.

OSCILLATOR/MIXER/DETECTOR

Integrated circuit U3 provides several functions including 2nd mixer, if amplifier and limiter, and quadrature detector.

The 20.945 MHz crystal oscillator provides local oscillator injection to the mixer in U3. This mixer converts the 21.4 MHz IF signal to 455 kHz. C20 and C21 are oscillator feedback capacitors and have been chosen to provide the proper capacitance for crystal Y3. The proper oscillator output level is difficult to measure directly without affecting the oscillation.

A preferable measurement is at TP3 which should read about 50 mV pk. (Measured using a 10 megohm, 11 pF oscilloscope probe.)

The mixer is internally connected to the crystal oscillator. Pins 16 and 3 of U3 are the mixer input and output respectively. Typical mixer conversion gain is about 20 dB. The output of the mixer drives the 4 pole ceramic bandpass filter FL1.

The limiter input is U3 pin 5, but the limiter output is internally connected to the detector and is not externally available.

A received signal strength indicator (RSSI) is provided at U3 Pin 13. This indicator signal is generated within the limiter circuitry and provides an output current proportional to the logarithm of the input signal strength. This current develops a voltage across R18. The voltage varies from about 0.7 Vdc for noise input, to about 1 Vdc for a 12 dB SINAD signal, to a maximum of about 2.7 Vdc for a high signal level (50 dB stronger than that required for 12 dB SINAD).

The quadrature detector provides a demodulated audio frequency output. The input to the detector is internally connected to the limiter and is not externally available. The output of the detector is U3 pin 9. R19 and C28 provide low-pass filtering to remove 455 kHz feedthrough. Ceramic resonator Y4 provides the frequency selective component needed for FM demodulation. Y4 replaces the typical LC resonant circuit found in most quadrature detectors. In contrast to the typical LC network, Y4 requires no adjustment.

The DC supply to U3 is provided through voltage dropping resistor R11 to U3 pin 4. R12 provides a path to the input of the Fault Detection circuit. This enables the Fault Detector to monitor the DC voltage on U3.

AUDIO AMPLIFIER

Operational amplifier U6.3 provides audio frequency amplification. Its gain is set by its associated resistors, including variable resistor VR1. VR1 allows for adjusting the AF output level to 1 Vrms with a standard input signal to the module (1 kHz AF, 3 kHz peak deviation). U6.2 is used as a voltage regulator to provide 4 Vdc for biasing the Operational amplifier.

SQUELCH

Buffer Amplifier

Integrated circuit U6.4 is configured as a unity gain buffer amplifier. It provides a high input impedance to minimize loading of the previous circuits.

TABLE 1 - GENERAL SPECIFICATIONS

ITEM	SPECIFICATION
I.F. frequency	21.4 MHz
Input Impedance	50 ohm
12 dB SINAD	-120.0 dBm
Adj. CH SEL (25 kHz)	-103 dB
Image (20.49 MHz)	-100 dB
3rd order Intercept Pt	23 dBm
Variation of Sensitivity with Signal Frequency	2 kHz
2nd I.F. frequency	455 kHz
2nd L.O. frequency	20.945 MHz
AF output (J2 pin 31C)	1 Vrms adjustable (with standard input signal)
AF output impedance	1k ohm
AF distortion	5%
AF response	
10 Hz	-3 dB
300 Hz	±1 dB
1000 Hz	0 dB reference
3 kHz	±1 dB
Hum & Noise	-55 dB
RSSI output (J2 pin 20C)	0.7 to 2.7 Vdc prop to log (sig level)
RSSI time constant	5 ms
SQ Threshold Sensitivity	-119 dBm
SQ Maximum Sensitivity	-102 dBm
SQ Clipping	3 kHz
SQ Attack	150 ms
SQ Close	250 ms
SQ output (J2 pin 26C)	5V logic (low = squelched)
Fault output (J2 pin 11C)	5V logic (low = fault)
DC Supply	1 Vrms (adjustable)

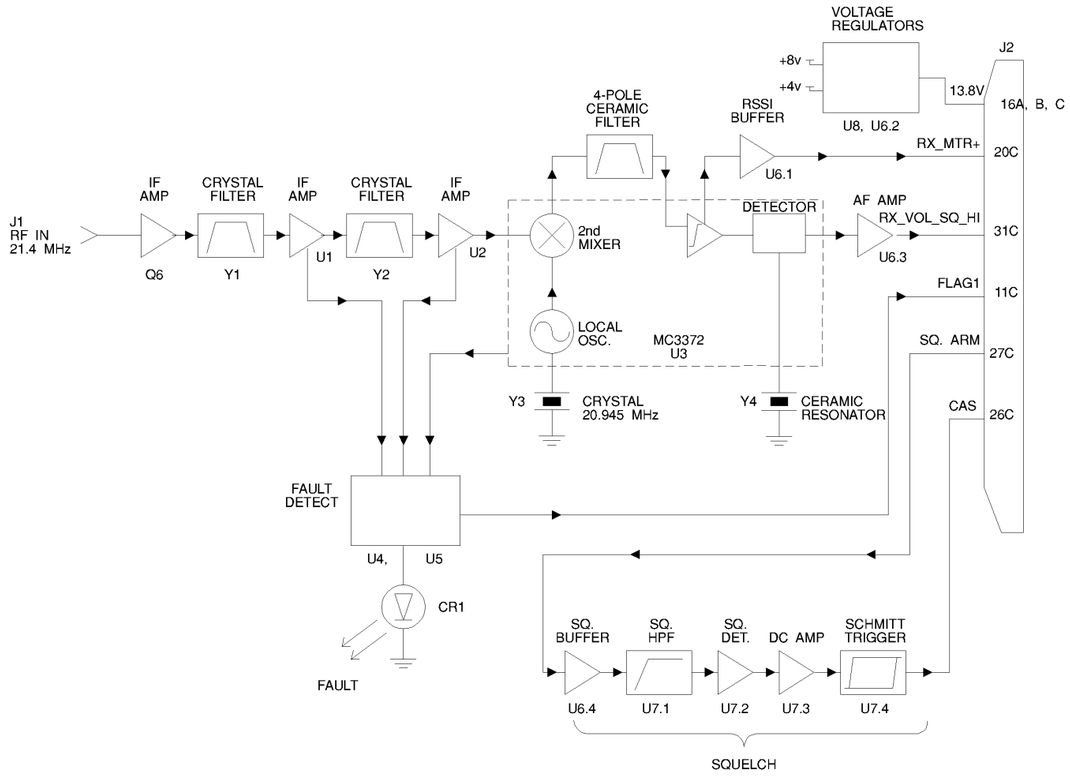


Figure 1 - 25 kHz Receiver IF Module

Highpass Filter

The audio frequency highpass filter consists of U7.1 and its associated circuitry. The purpose of this filter is to reject all voice frequencies and allow only demodulated noise to pass. The functioning of the squelch circuit depends upon the presence or absence of this noise. (When a signal is being received, i.e. the receiver is quiet, the squelch circuit senses the absence of noise and unsquelches the radio.)

Noise Detector

U7.2 along with associated components act as a noise detector. The rectified output of U7.2 charges C44 to a nearly constant DC voltage.

DC Amplifier

U7.3 is configured as a basic amplifier with a gain of 11.

Schmitt Trigger

U7.4 is configured as an amplifier with positive feedback. This arrangement provides hysteresis in the output verses input characteristic. This eliminates the possibility of the squelch circuit repeatedly cutting in and out when the input signal is near a threshold. R56 and R57 act as a voltage divider to provide a 5 volt logic level output. (Logic High = unsqelched)

FAULT DETECTOR

U4 and U5 are voltage comparators. These are configured into four "window detectors" which sense the presence of voltages within specified ranges (windows).

The four window detector circuits are U4.1 & U4.2, U4.4 & U4.3, U5.1 & U5.2, and U5.4 & U5.3. These monitor DC operating voltages on U6.2, U1, U2, and U3 respectively. R29 and R30 comprise a voltage divider to provide a 5 volt logic level output. A fault is indicated when the output drops to zero.

Diode D1 and transistor Q3 monitor the output of the 8V regulator. D1 is a 8.2 volt breakdown diode. If the regulator output voltage should rise above 8.9 V (8.2 + 0.7 base-emitter drop) Q1 will turn on and a fault will be indicated.

Transistors Q4 and Q5 are drivers for the front panel LED CR1. These are powered from the +13.8 Vdc line before the 8V regulator. Therefore, if the regulator opens, a fault will still be indicated.

VOLTAGE REGULATOR

U8 is a monolithic integrated circuit voltage regulator providing 8 Vdc. This powers all circuitry in the module with exception of the front panel LED and its drivers.

MAINTENANCE

RECOMMENDED TEST EQUIPMENT

The following test equipment is required to test the IF Module.

1. FM Signal Generator; HP 8640B, HP 8657A, or equivalent
2. AF Generator or Function Generator
3. Audio Analyzer; HP 8903B, HP 339A, or equivalent
4. Oscilloscope
5. DC Meter for troubleshooting
6. Power Supply; 13.8 Vdc @ 150 mA

ALIGNMENT PROCEDURE

1. Apply 13.8 Vdc supply to module.
2. Verify DC current consumption is between 90 and 150 mA.
3. Verify fault output is 0 to 0.5 Vdc and front panel LED is off.
4. Apply a standard input signal to the module input. (-60 dBm, 21.4 MHz signal modulated with 1kHz AF, 3 kHz peak deviation)
5. Set VR1 for 1 Vrms ±3% at module output (pin 31C on 96 pin connector J2).

TROUBLESHOOTING

Each IF amplifier has a nominal 18 dB gain. U2 has a nominal gain of 30 dB. The mixer has about 20 dB gain with proper LO injection. The proper crystal oscillator level is 50 mV pk measured at TP3.

The following four test points are provided on the PWB for additional test capability:

TP1: 100 mV pk @ 21.4 MHz with -30 dBm input signal

TP2: 100 mV PK @ 21.4 MHz with -50 dBm input signal

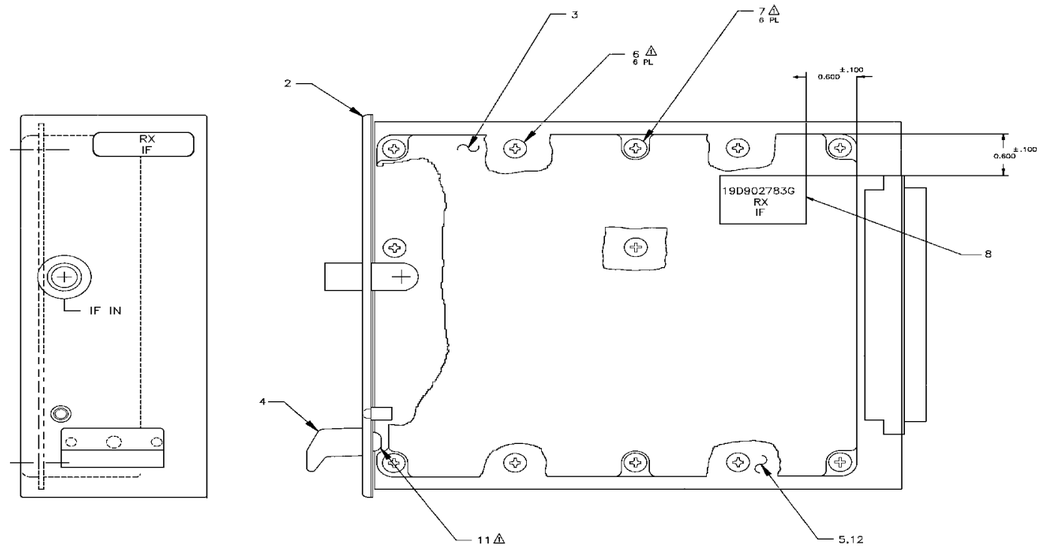
TP3: 50 mV pk @ 20.945 MHz independent of input signal

TP4: 100 mV pk @ 455 kHz with -60 dBm input signal

All RF voltages measured with 10 Megohm, 11 pF probe.

TROUBLE SHOOTING GUIDE

SYMPTOM	CHECK (CORRECT READING SHOWN)	INCORRECT READING INDICATES DEFECTIVE COMPONENT
Fault indicator on	Check DC voltages +8V at U8 Pin 1 +4v at U Pin 7 5.5V at U1 output pin 3.3V at 2 output pin 4.4V at U3 Pin 4	If DC voltages not correct U8 or associated components U6 or associated components U1 or associated components U2 or associated components U3 or associated components If DC voltages correct U4, U5, U6, D1, Q3, Q4, Q5
No audio - no noise	With no signal applied to module IF input Check for AF noise @ C29 ; 200mV Check for AF noise @ U6 Pin 8: 1 V	 U3 or associated components U6 or associated components
Noise only - no demodulated audio	Check crystal oscillator: TP3 50 mVpk 20.945 MHz Apply -30 dBm 21.4 MHz input, check TP1 100 mVpk Apply -50 dBm 21.4 MHz input, check TP2 100 mVpk Apply -60 dBm 21.4 MHz input, check TP4 100 mVpk	U3, Y3 or associated components Q6, Y1, U1 or associated components U2, Y2 or associated components U3, FL1 or associated components
Poor 12 dB SINAD	Check crystal oscillator: TP3 50 mVpk 20.945 MHz Apply -30 dBm 21.4 MHz input, check TP1 100 mVpk Apply -50 dBm 21.4 MHz input, check TP2 100 mVpk Apply -60 dBm 21.4 MHz input, check TP4 100 mVpk	U3, Y3 or associated components Q6, Y1, U1 or associated components U2, Y2 or associated components U3, FL1 or associated components
No squelch function	With squelch pot maximum, or with module AUDIO/ SQUELCH/HI connected to SQUELCH/ARM input and with no signal to module IF input: Check Presence of 1 Vpk noise at U6 Pin 14	U6 or associated components
	Check presence of 1 Vpk noise U7 at Pin 1 Check presence of 1 Vpk noise U7 Pin 1 Check DC voltage U7 at Pin 8: 7 V Check DC voltage U7 Pin 14: 0.5 V	U7 or associated components

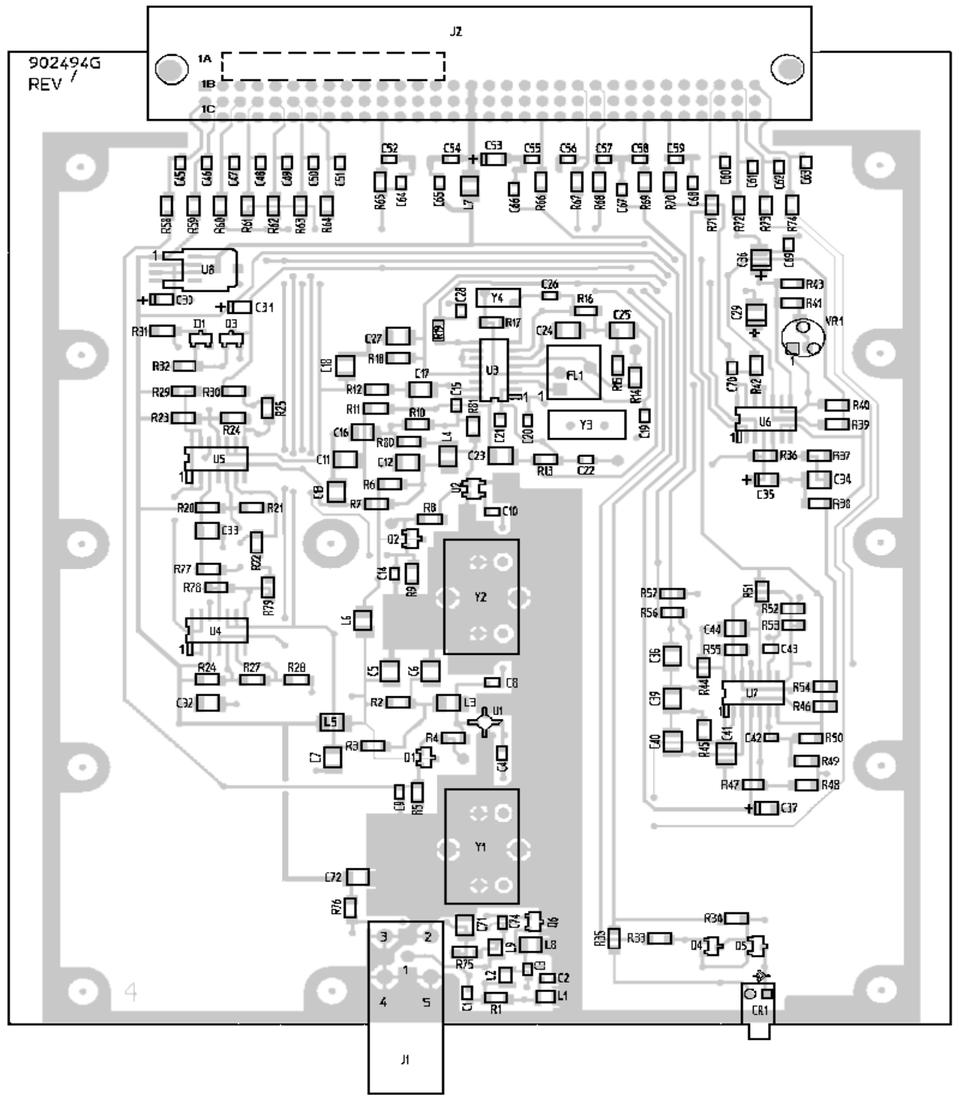


1 NOTES:

⚠1 TORQUE SCREWS, ITEMS 6 AND 7, TO 10.0 ± 1.3 INCH POUNDS.
TORQUE SCREW ITEM 11 TO 20 ± 1.3 INCH POUNDS.

RECEIVER IF MODULE
19D902783G1

(19D902783, Sh. 1, Rev. 3)



LEAD IDENTIFICATION FOR
D1
(SOT) DIODES

(TOP VIEW)

(A) (C)

LEAD IDENTIFICATION FOR
U1

(TOP VIEW)

GROUND (2)

(3) RF OUTPUT and DC BIAS

(1) RF INPUT

GROUND
(4)

LEAD IDENTIFICATION FOR
Q1-Q5
(SOT) TRANSISTORS

(TOP VIEW)

(B) (C)

(E)

LEAD IDENTIFICATION FOR
Q6
(SOT) TRANSISTORS

(TOP VIEW)

(D) (G)

(S)

LEAD IDENTIFICATION FOR
U2
(SOT) INT CKT

(TOP VIEW)

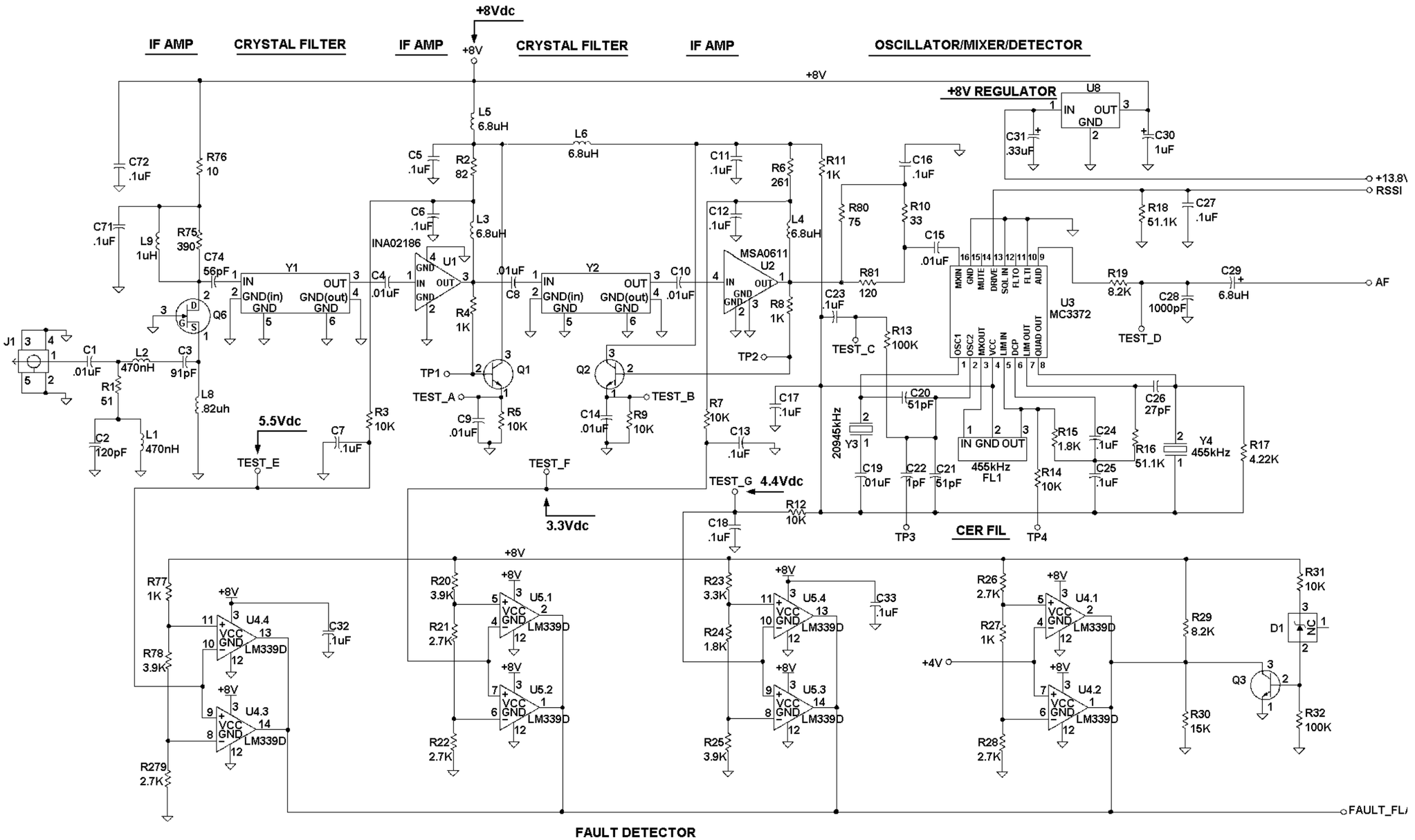
OUTPUT GND

GND INPUT

(19D902494, Sh. 1, Rev. 5B)
(19D902493, Comp. Side, Rev. 5)

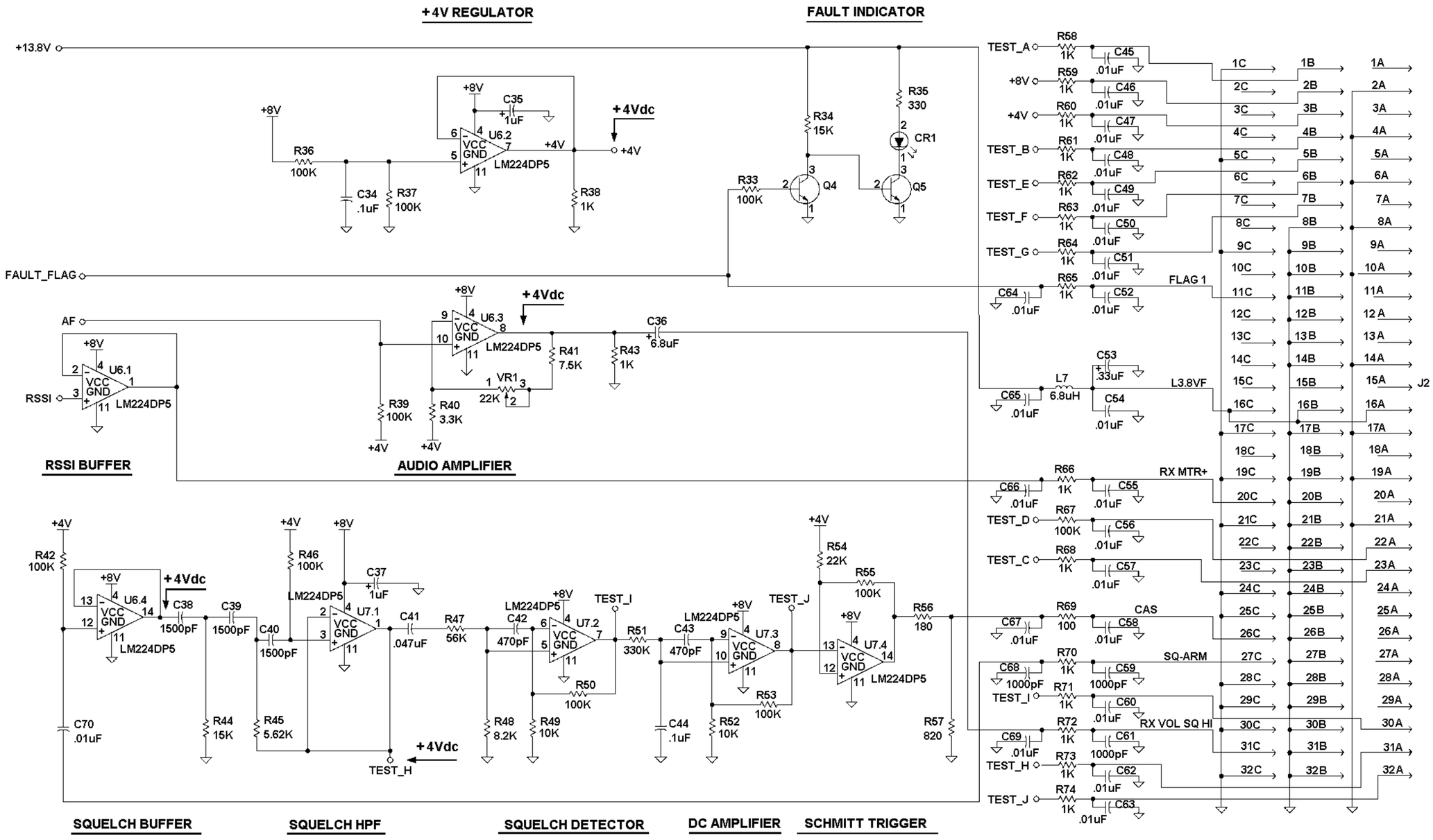
CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

RECEIVER IF MODULE
19D902494G1



RECEIVER IF MODULE
19D902494G1

(19D902504, Sh. 1, Rev. 6)



RECEIVER IF MODULE
19D902494G1

(19D902504, Sh. 2, Rev. 6)

VHF RECEIVER RF MODULE
19D902783G1
ISSUE 2

SYMBOL	PART NO.	DESCRIPTION
		- - - - - MISCELLANEOUS - - - -
2	19D902508P1	Chassis.
3	19D902509P1	Cover.
4	19D902555P1	Handle.
6	19A702381P506	Screw, thread forming: TORX, No. M3.5 - 0.6 X 6.
7	19A702381P513	Screw, thread forming: TORX, No. M3.5 - 0.6 X 13.
11	19A702381P508	Screw, thread forming: No. 3.5-0.6 x 8.
		Receiver IF Board 19D902494G1
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C2	19A702236P52	Ceramic: 120 pF, ±5%, 50 VDCW.
C3	19A702236P49	Ceramic: 91 pF, ±5%, 50 VDCW.
C4	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C5 thru C7	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C8 thru C10	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C11 thru C13	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C14 and C15	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C16 thru C18	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C19	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C20 and C21	19A702061P47	Ceramic: 51 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C22	19A702061P1	Ceramic: 1 pF ±0.5 pF, 50 VDCW.
C23 thru C25	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C26	19A702061P33	Ceramic: 27 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM/°C.
C27	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C28	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C29	19A705205P5	Tantalum: 6.8 µF, 10 VDCW; sim to Sprague 293D.
C30	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C31	19A705205P12	Tantalum: .33 µF, 16 VDCW; sim to Sprague 293D.
C32 thru C34	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW
C35	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C36	19A705205P5	Tantalum: 6.8 µF, 10 VDCW; sim to Sprague 293D.
C37	19A705205P2	Tantalum: 1 µF, 16 VDCW; sim to Sprague 293D.
C38 thru C40	19A702061P89	Ceramic: 1500 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C41	19A702052P22	Ceramic: 0.047 µF ±10%, 50 VDCW.
C42 and C43	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C44	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C45 thru C52	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C53	19A705205P12	Tantalum: .33 µF, 16 VDCW; sim to Sprague 293D.
C54 thru C58	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C59	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C60	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C61	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C62 thru C67	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C68	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C69 and C70	19A702052P14	Ceramic: 0.01 µF ±10%, 50 VDCW.
C71 and C72	19A702052P26	Ceramic: 0.1 µF ±10%, 50 VDCW.
C74	19A702061P49	Ceramic: 56 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - DIODES - - - - - - - - - - -
CR1	19A703595P10	Optoelectronic: Red LED in right angle housing; sim to HP HLMP-1301-010.
D1	19A700083P105	Zener: 8.2V; sim to BZX84-C8V2.
		- - - - - - - - - - - FILTERS - - - - - - - - - - -
FL1	19A702171P3	Bandpass Filter: Fc = 455 kHz, 6dB BW = ±7.5 kHz; sim to Murata CFU455E2.
J1	19A115938P24	Connector, receptacle.
		- - - - - - - - - - - JACKS - - - - - - - - - - - -
J2	19B801587P7	Connector, DIN: 96 male contacts, right angle mounting; sim to AMP 650887-1.
		- - - - - - - - - - -INDUCTORS - - - - - - - - - - -
L1 and L2	19A700021P13	Coil, fixed: 470 nH.
L3 thru L7	19A705470P35	Coil, fixed: 6.8 µH.
L8	19A705470P24	Coil, fixed: 820 nH.
L9	19A700021P17	Coil, fixed: 1 µH.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A704708P2	Silicon, NPN: sim to NEC 2SC3356.
Q3 thru Q5	19A700076P2	Silicon, NPN: sim to MMBT3904, low profile.
Q6	19A702524P2	N-Type, field effect.
		- - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P510	Metal film: 51 ohms ±5%, 1/8 w.
R2	19B800607P820	Metal film: 82 ohms ±5%, 1/8 w.
R3	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R4	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R5	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R6	19A702931P141	Metal film: 261 ohms ±1%, 200 VDCW, 1/8 w.
R7	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R8	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R9	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R10	19B800607P330	Metal film: 33 ohms ±5%, 1/8 w.
R11	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R12	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R13	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R14	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R15	19B800607P182	Metal film: 1.8K ohms ±5%, 1/8 w.
R16	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R17	19A702931P261	Metal film: 4220 ohms ±1%, 200 VDCW, 1/8 w.
R18	19A702931P369	Metal film: 51.1K ohms ±1%, 200 VDCW, 1/8 w.
R19	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 w.
R20	19B800607P392	Metal film: 3.9K ohms ±5%, 1/8 w.
R21 and R22	19B800607P272	Metal film: 2.7K ohms ±5%, 1/8 w.
R23	19B800607P332	Metal film: 3.3K ohms ±5%, 1/8 w.
R24	19B800607P182	Metal film: 1.8K ohms ±5%, 1/8 w.
R25	19B800607P392	Metal film: 3.9K ohms ±5%, 1/8 w.
R26	19B800607P272	Metal film: 2.7K ohms ±5%, 1/8 w.
R27	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R28	19B800607P272	Metal film: 2.7K ohms ±5%, 1/8 w.
R29	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 w.
R30	19B800607P153	Metal film: 15K ohms ±5%, 1/8 w.
R31	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R32 and R33	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R34	19B800607P153	Metal film: 15K ohms ±5%, 1/8 w.
R35	19B800607P331	Metal film: 330 ohms ±5%, 1/8 w.
R36 and R37	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R38	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R39	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R40	19B800607P332	Metal film: 3.3K ohms ±5%, 1/8 w.
R41	19A702931P285	Metal film: 7500 ohms ±1%, 200 VDCW, 1/8 w.
R42	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R43	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R44	19B800607P153	Metal film: 15K ohms ±5%, 1/8 w.
R45	19A702931P273	Metal film: 5620 ohms ±1%, 200 VDCW, 1/8 w.
R46	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R47	19B800607P563	Metal film: 68K ohms ±5%, 1/8 w.
R48	19B800607P822	Metal film: 8.2K ohms ±5%, 1/8 w.
R49	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R50	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R51	19B800607P334	Metal film: 330K ohms ±5%, 1/8 w.
R52	19B800607P103	Metal film: 10K ohms ±5%, 1/8 w.
R53	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R54	19B800607P223	Metal film: 22K ohms ±5%, 1/8 w.
R55	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w.
R56	19B800607P181	Metal film: 180 ohms ±5%, 1/8 w.
R57	19B800607P821	Metal film: 820 ohms ±5%, 1/8 w.
R58 thru R66	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R67	19B800607P104	Metal film: 100K ohms ±5%, 1/8 w
R68	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R69	19B800607P101	Metal film: 100 ohms ±5%, 1/8 w.
R70 thru R74	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R75	19B800607P391	Metal film: 390 ohms ±5%, 1/8 w.
R76	19B800607P100	Metal film: 10 ohms ±5%, 1/8 w.
R77	19B800607P102	Metal film: 1K ohms ±5%, 1/8 w.
R78	19B800607P392	Metal film: 3.9K ohms ±5%, 1/8 w.
R79	19B800607P272	Metal film: 2.7K ohms ±5%, 1/8 w.
R80	19B800607P750	Metal film: 75 ohms ±5%, 1/8 w.
R81	19B800607P121	Metal film: 120 ohms ±5%, 1/8 w.
		- - - - - -INTEGRATED CIRCUITS - - - - - -
U1	344A3740P1	Silicon, bipolar.
U2	19A705927P1	Silicon, bipolar.
U3	19A149980P2	Linear: Osc./Mixer/IF/Det./Amp.; sim to MC3372D.
U4 and U5	19A704125P1	Linear: Quad Comparator; sim to LM339D.
U6 and U7	19A701789P5	Linear:Quad Op Amp; sim to LM224D.
U8	19A704971P10	Voltage regulator: 8 Vdc; sim to MC78M08CDT.
		- - - - - - - - VARIABLE RESISTOR - - - - - -
VR1	19B800779P12	Variable resistor: 22k ohms, 0.1 w; sim to Murata RGV4E223.

*COMPONENTS, ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	PART NO.	DESCRIPTION
		- - - - - - - - - - CRYSTALS - - - - - - - - -
Y1	19A149974G7	Filter, crystal: Fc = 21.4 MHz, 3 dB BW = 15.0 kHz. Insertion loss = 2.0 dB max.
Y2	19A149974G8	Filter, crystal: Fc = 21.4 MHz, 3 dB BW = 15.0 kHz. Insertion loss = 3.0 dB max.
Y3	19A702284G5	Quartz crystal unit: 20.945000 MHz ±10 ppm @ 25°C.
Y4	19A149976P1	Fixed: 455 kHz.

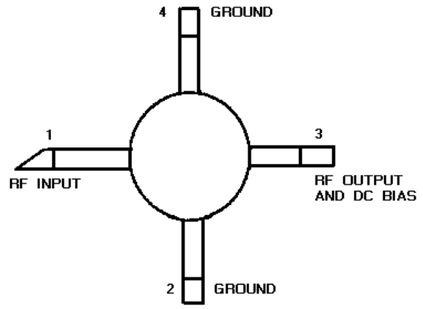
PRODUCTION CHANGES

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.

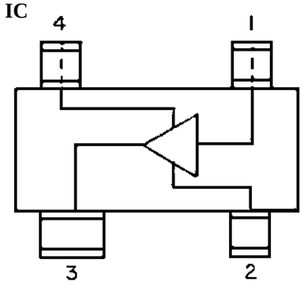
Rev. A - **19D902494G1, 25 kHz IF Module Board**
To improve performance in high temperature environments and to eliminate Audio Level drifting, changed voltage regulator U8 and variable resistor VR1.
U8 was: 19A704971P11, 8 Vdc; sim to MC78L08ACD.
VR1 was: 19A705496P5 20K ohms 0.1w; sim to Murata RGV4E203.

Rev. B - **19D902494G1, 25 kHz IF Module Board**
To change Squelch Driver operation to allow compatibility with GETC, changed resistors R56, R57, and R69.
R56 was: 19B800607P182 Metal film: 1.8K ohms ±5%, 1/8 w.
R57 was: 19B800607P822 Metal film: 8.2K ohms ±5%, 1/8 w.
R69 was: 19B800607P102 Metal film: 1K ohms ±5%, 1/8 w.

U1
344A3740P1
Silicon Bipolar IC

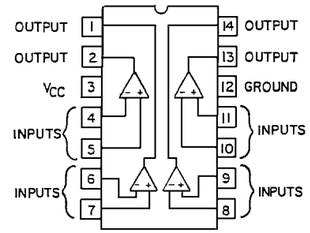


U2
19A705927P1
Silicon Bipolar IC

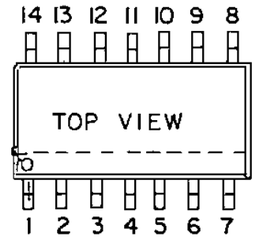


PIN 1. RF INPUT
2. GROUND
3. RF OUTPUT AND BIAS
4. GROUND

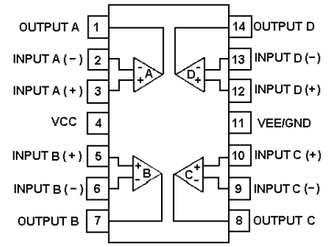
U4 & U5
19A704125P1
Quad Comparator



NOTE: OUTPUTS ARE OPEN COLLECTOR

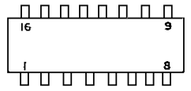


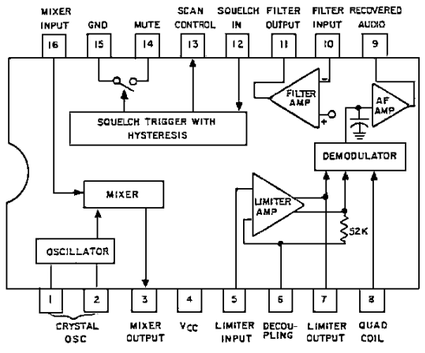
U6 & U7
19A701789P4
Quad Op-Amp



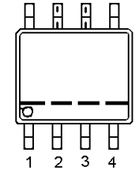
U3
19A149980P2
FM Receiver

PIN CONFIGURATION





U8
19A704971P10
Voltage Regulator



PIN	FUNCTION
1	Vout
2	GROUND
3	GROUND
4	N.C.
5	N.C.
6	GROUND
7	GROUND
8	Vin