



Service Manual

**PRO-39 = COM203
Programmable Scanner**

Catalog Number: 20-303/9303

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SPECIFICATIONS

Frequency Coverage	VHF Lo	*1 30-54 MHz	5 kHz steps
	Air	108-136.975 MHz	25 kHz steps
	VHF Hi	137-174 MHz	5 kHz steps
	UHF Lo	380-512 MHz	12.5 kHz steps
	UHF Hi	*2 806.0000-823.9375 MHz	12.5 kHz steps
		*2 851.0000-868.9375 MHz	12.5 kHz steps
		*2 896.0000-960.0000 MHz	12.5 kHz steps

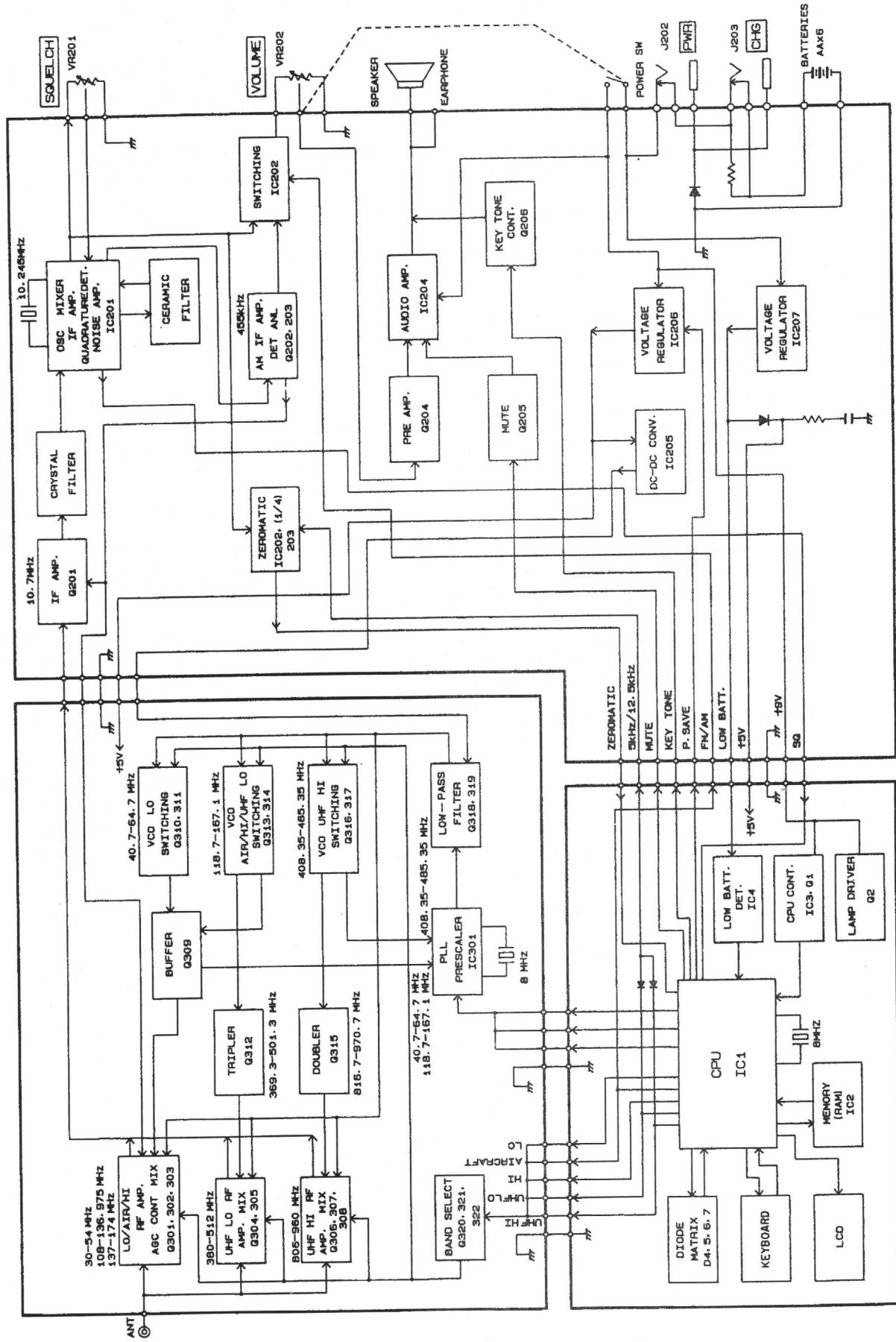
Notes: *1 68-88 MHz for 20-9303

*2 806-960 MHz for 20-9303

		UNIT	NOMINAL	LIMIT
Sensitivity	VHF Lo (FM)	uV	1.0	2.0
	Air (AM)	uV	2.0	5.0
	VHF Hi (FM)	uV	1.0	3.0
	UHF Lo FM	uV	1.0	4.0
	UHF Hi (FM)	uV	2.0	4.0
Squelch Sensitivity	at threshold	uV	1	4
	at tight (VHF Lo, Hi, UHF Lo, UHF Hi)	dB	25	15
	(Air)	dB	20	10
Selectivity	-6 dB	kHz	+/-10	+/-14
	-50 dB	kHz	+/-20	+/-25
Spurious Rejection	VHF Lo at 40 MHz	dB	50	40
	Air at 124 MHz	dB	50	40
	VHF Hi at 154 MHz	dB	50	40
	UHF Lo, UHF Hi			Not specified
IF Rejection	10.7 MHz at 154 MHz	dB	50	40
Modulation Acceptance	(EIA RS-204-A)	kHz	+/-8	+/-5
Signal to Noise Ratio	VHF Lo at 40 MHz	dB	45	30
	Air at 124 MHz	dB	35	25
	VHF Hi at 154 MHz	dB	45	30
	UHF Lo at 450 MHz	dB	35	25
	UHF Hi at 860 MHz	dB	35	25
Residual Noise	Vol. Min.	mV	3	5
Scanning Speed		channels/sec.	25	22-28
Scan Delay Time		sec.	2	1-3
Audio Output Power	T.H.D. 10%	mW	180	150
Channels of Operation	Any 200 channels in any band combination			
Channel, Frequency and Mode Display	Liquid crystal display			
Receiving System	Direct Key entry Digital-Controlled Synthesizer, Superheterodyne 1st IF: 10.7 MHz, 2nd IF: 455 kHz			
Power Source	9V DC negative ground only 6AA batteries or a suitable adapter			
Jacks	Antenna, Earphone, External Power, and Charge			

Note: Nominal specs represent the design specs. All units should be able to approximate these—some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet limit specs.

BLOCK DIAGRAM



PRINCIPLES OF OPERATION

The PRO-39 is a PLL(Phase Locked Loop) synthesized VHF/UHF FM/AM receiver, controlled by a CPU (Central Processing Unit) via a keyboard.

The VHF Lo band (30-54 MHz) or VHF Hi band (137-174 MHz) is received in 5 kHz increments and the UHF Lo band (380-512 MHz) or UHF Hi band 806-960 MHz) is set up to be 12.5 kHz increments. Similarly, the aircraft band (108-136.975 MHz) is in a 25 kHz step.

All functions such as receiving frequency range, frequency determination, scanning and delay time etc. are controlled by the CPU. The CPU is able to do only the assigned functions, and no modification of the CPU is feasible.

The following paragraphs explain the operation of the circuit in terms of the functional blocks:

A varactor (variable capacitance diode) tuning ("Automatic Tuning System") is employed on all bands except UHF Hi band.

Field-effect transistors (FET) are used in the RF/MIX circuits of low and high bands, to achieve optimum mix-modulation and mutual-modulation characteristics. Q201 amplifies the 10.7 MHz IF. A 10.7 MHz monolithic crystal filter is incorporated to obtain a good IF selectivity.

IC201 contains the local oscillator, mixer, IF amplifier, quadrature FM detector and noise amplifier. A crystal oscillator produces 10.245 MHz which is mixed with 10.7 MHz, resulting in 455 kHz IF. A 455 kHz ceramic filter is provided to increase the IF selectivity. The 455 kHz IF signal is amplified in the IF amp stage, and the quadrature FM detector detects it to an audio signal.

The detected output of the FM is applied to IC204. IC204 amplifies the audio signals and drives the speaker.

IC1 is the CPU. The CPU does data processing, calculation, etc. Any unstable supply voltage (VDD) to the CPU can cause the CPU to mal-function, such as wrong data processing, wrong data transfer, etc. To overcome this, C1 and R4 in the logic circuit "initialize" the CPU. (Refer to the Logic & AF section schematic on page 46.)

The initialization is done as soon as batteries or external power is connected. Figure A shows the initializing waveform. Memory backup function is automatically started whenever the initialization has been done and then functions in approximately 1 hour after the batteries or external power is disconnected.

The RESET switch is located in the hole on the front case (Figure E) and is used to correct an LCD or keyboard malfunction.

The unit has a battery-saving control circuit in manual mode. When the unit is in operation, the pin 74 of IC1 (CPU) is "H." If no signal input or no key input existed more than 5 seconds in manual mode with the SQUELCH on, the pin 74 becomes "L" (Fig. B). These signal controls IC206. When the pin 74 of IC1 is "L," the power supply for most of circuit is shut down (except CPU). In this battery-saving mode, 40% of the power can be saved during normal operation.

The initialization of the CPU, mentioned above can also be done by pushing RESET switch. Figure A shows the rise time duration when the initialization is done.

CX1 (8 MHz) is a ceramic oscillator clock which is used for CPU control. Figure C shows 1/8 divided waveform of Figure D.

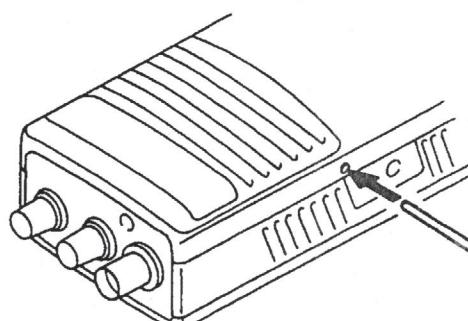


Figure E

IC1 Pin ①

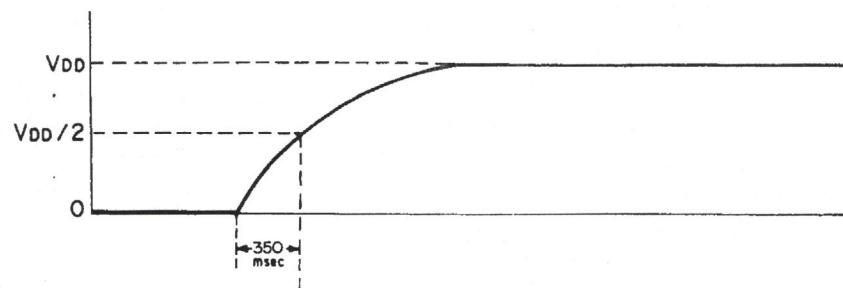


Figure A

IC1 Pin ⑦4

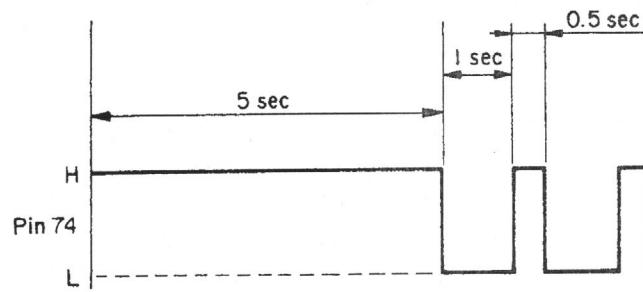


Figure B

IC1 Pin ⑧4

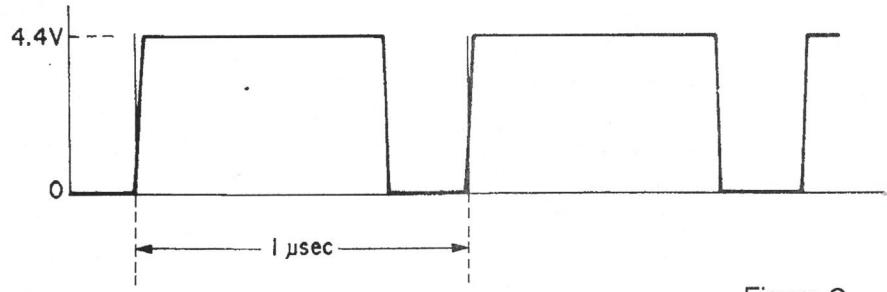


Figure C

IC1 Pin ⑤

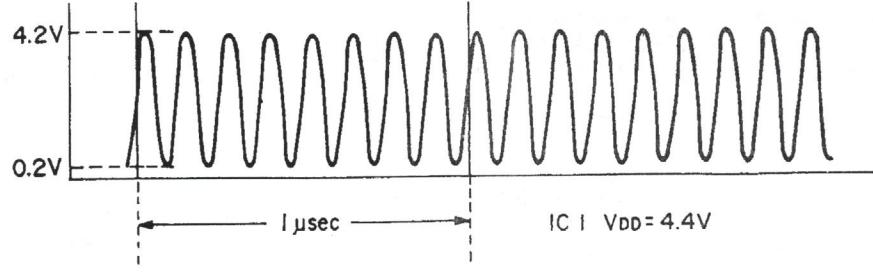
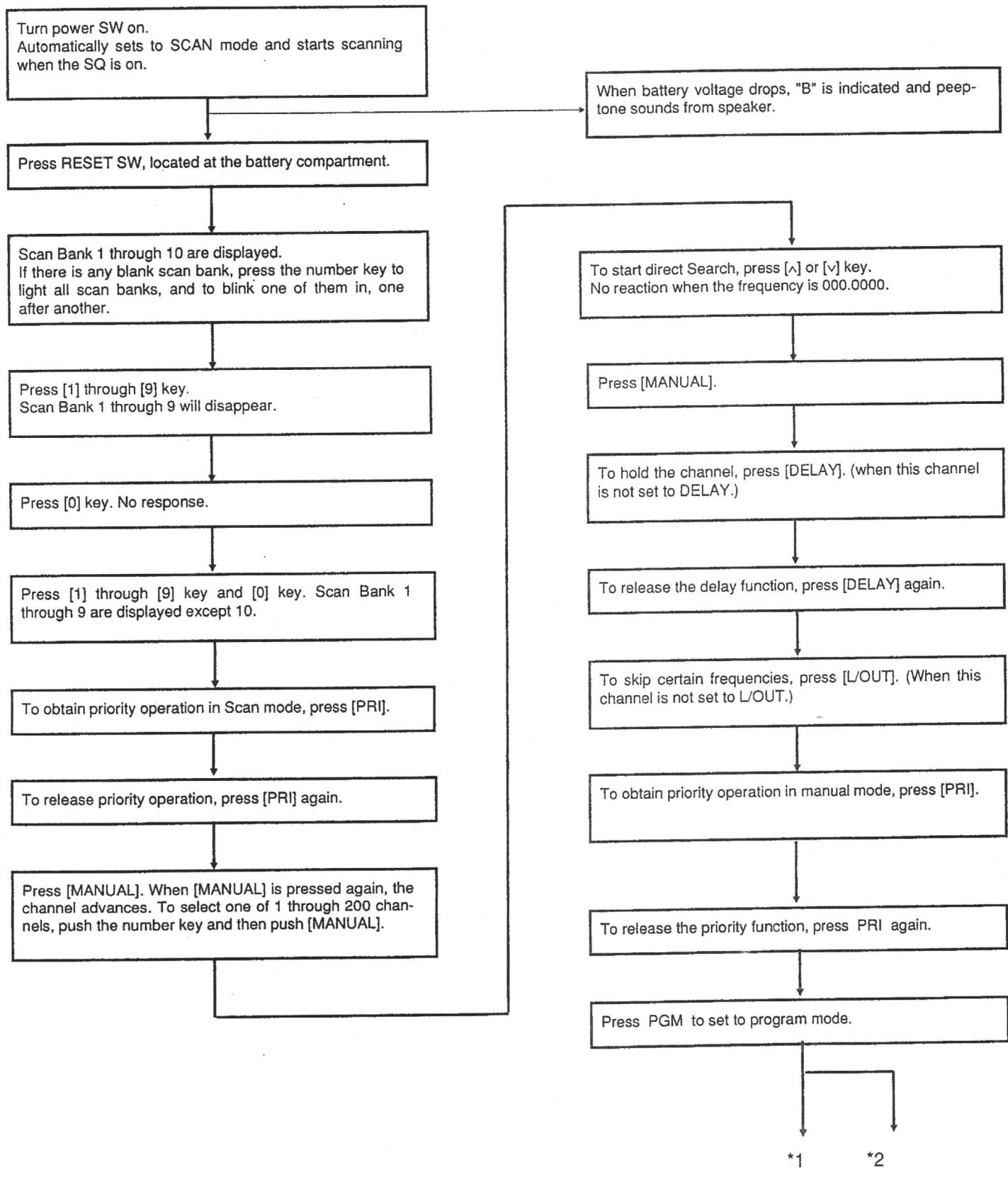
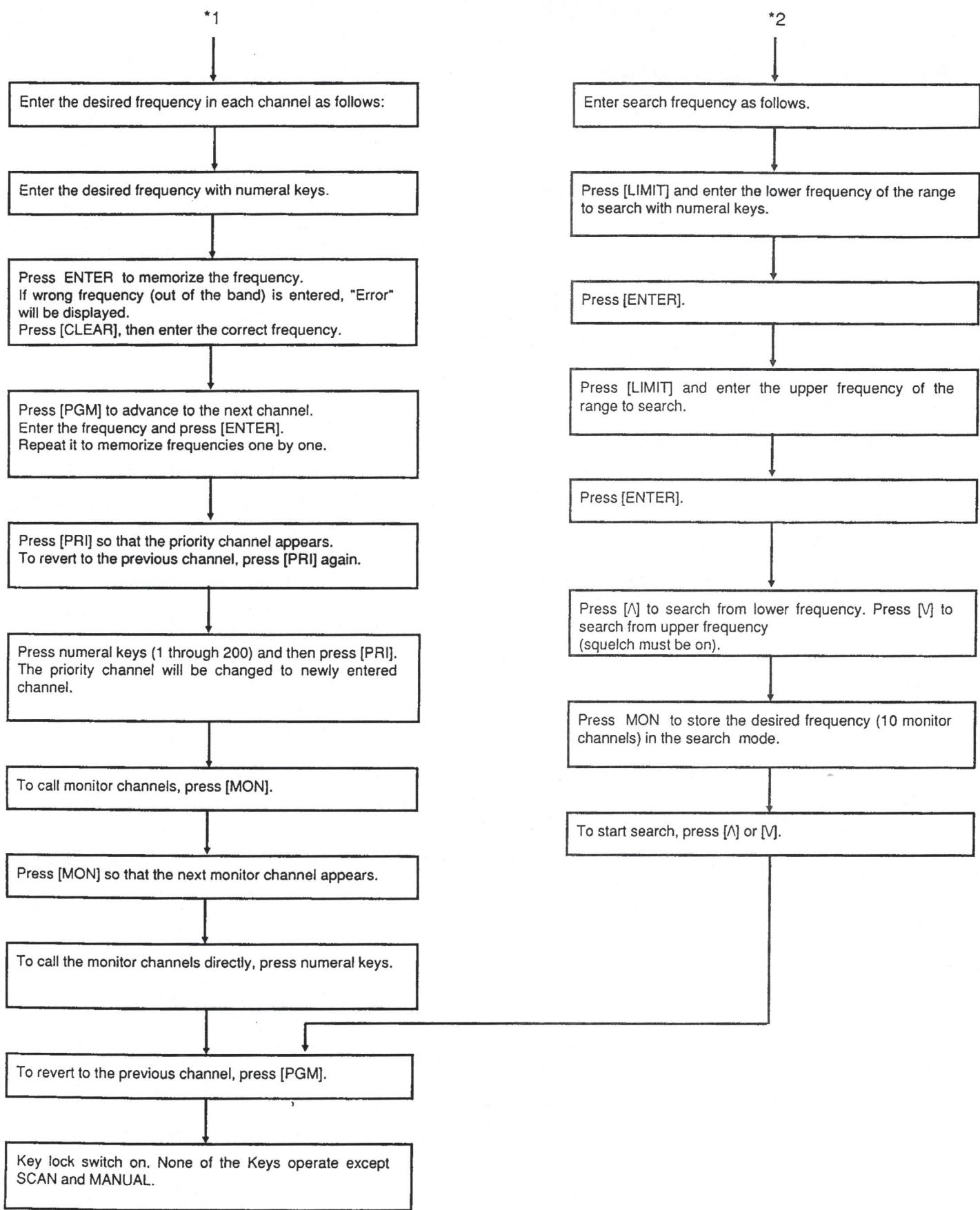


Figure D

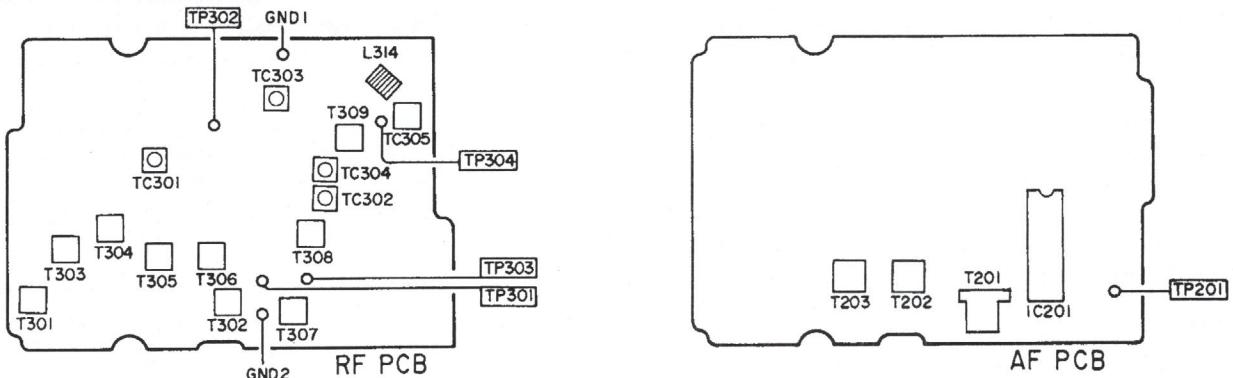
GENERAL OPERATION OUTLINE





ALIGNMENT/ADJUSTMENT

Alignment and Test Point Locations



Alignment Preparation

Test equipment required

- Oscilloscope (0~500 kHz, 0~50 MHz)
- AC SSVM
- DC SSVM
- Frequency Counter (200 MHz)
- Slow Sweep Generator with variable marker (10.7 MHz)
- 8-ohm dummy load
- VHF Sweep Generator with variable marker (30~54 MHz, 108~136.975 MHz, 137~174 MHz)
- UHF Sweep Generator with variable marker (380~512 MHz)
- FM Signal Generator (30~54 MHz, 137.000~174 MHz, 380~512 MHz, 806~960 MHz)
- AM Signal Generator (108~136.975 MHz)

Notes:

- Use non-metallic tuning tools.
- The test equipment and receiver should be warmed up at least 10 minutes before proceeding to alignment.
- The signal level from the generator should be kept as possible to obtain the usable output.
- 6AA batteries are required to hold the memory when the external power is disconnected. Always be sure the memories will be lost (and will have to be re-programmed).

The memory backup circuit can hold the programmed channel memories for about one hour even when neither the batteries nor the external power are provided.

Program channel 1 to channel 15 as follows:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	30.0000	9	174.0000
2	41.0050	10	380.0000
3	54.0000	11	451.0000
4	108.0000	12	512.0000
5	121.0000	13	806.0000
6	136.9750	14	860.0000
7	137.0000	15	960.0000
8	155.0000		

Table 1

ALIGNMENT PROCEDURES

Reference Frequency OSC Alignment

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
	OFF/VOLUME control: ON SQUELCH control: Fully counterclockwise (CCW). Select Channel 4.	Connect frequency counter to TP-303 and GND. See Figure 1.	TC305	Adjust TC305 so that the frequency is 118.700000 MHz +/-10 Hz.

IF Section Alignment

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
	OFF/VOLUME control: ON SQUELCH control: CCW	Connect test instruments as shown in Fig. 2.	T307 T201	Adjust T307 to symmetrize the upper and lower heights of the S curve to be equal and adjust T201 to symmetrize the left and the right of the S curve. (Figure 2)

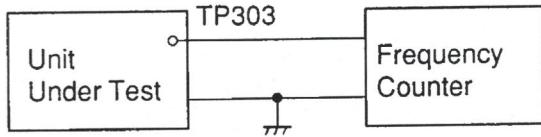


Figure 1

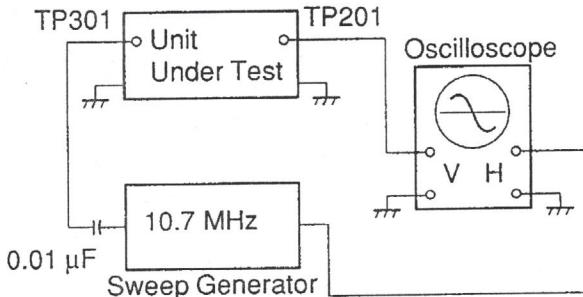


Figure 2

VCO Alignment

VHF Lo Band

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
1	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 1 through 3.	Connect DC SSVM to TP 304 and GND. See Figure 3.	TC302 T308	<ul style="list-style-type: none"> 1) Select channel 3 and adjust TC302 for 13 V on the DC SSVM. 2) Select channel 1 and adjust T308 for 1.0 V on the DC SSVM. 3) Repeat steps 1 and 2 until no further improvement is observed. See Table 2.

CH	Frequency	Voltage
CH1	30 MHz	Voltage at TP304 0.9-1.1V
CH2	41.005 MHz	Voltage at TP304 3.5-5.5V
CH3	54 MHz	Voltage at TP304 12.9-13.1V

Table 2

VHF AIR, Hi and UHF Lo Bands

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
2	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 4 through 12.	Connect DC SSVM to TP304 and GND. See Figure 3.	TC304 T309	<ul style="list-style-type: none"> 1) Select channel 12 and adjust TC304 for 12.5 V on the DC SSVM. 2) Select channel 4 and adjust T309 for 1.0 V on the DC SSVM. 3) Repeat steps 1 and 2 until no improvement is observed. See Table 3.

CH	Frequency	Voltage
CH4	108.000 MHz	Voltage at TP304 0.9-1.1 V
CH5	121.000 MHz	Voltage at TP304 2.3-3.3 V
CH6	136.975 MHz	Voltage at TP304 5.5-6.5 V
CH7	137.000 MHz	Voltage at TP304 1.4-2.4 V
CH8	155.000 MHz	Voltage at TP304 4.7-5.7 V
CH9	174.000 MHz	Voltage at TP304 10.5-11.5 V
CH10	380.000 MHz	Voltage at TP304 1.0-2.0 V
CH11	451.000 MHz	Voltage at TP304 5.5-6.5 V
CH12	512.000 MHz	Voltage at TP304 12.4-12.6 V

Table 3

UHF Hi Band

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
3	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 15.	Connect DC SSVM to TP304 and GND. See Figure 3.	L314	Adjust L314 for 13 V on the DC SSVM. See Table 4.

CH	Frequency	Voltage
CH13	806.000 MHz	Voltage at TP304 4.8-5.8 V
CH14	860.000 MHz	Voltage at TP304 6.3-7.3 V
CH15	960.000 MHz	Voltage at TP304 12.9-13.1 V

Table 4

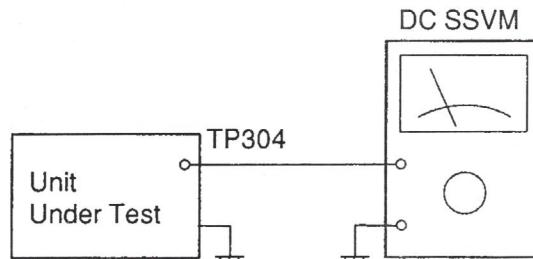


Figure 3

RF Amp. Alignment

VHF Lo Band

Step	Control Setting	Test Instruments Connection	Adjust	Remarks
1	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 1 through 3. See Table 1.	Connect Instruments shown as Figure 4. Sweep Generator 30-54 MHz.	T301 T302	1) Select channel 2 and adjust T301 and T302 for maximum RF waveform. 2) Check channel 1 through 3 for maximum output. A slight deviation as Figure 5 is acceptable.

VHF AIR Band

Step	Control Setting	Test Instruments Connection	Adjust	Remarks
2	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 4 through 6. See Table 1.	Same as Step 1. Sweep Generator 108-136.975 MHz.	T303 T305	1) Select channel 5 and adjust T303 and T305 for maximum RF waveform. 2) Check channel 4 through 6 for maximum RF output. A slight deviation as Figure 6 is acceptable.

VHF Hi Band

Step	Control Setting	Test Instrument	Adjust	Remarks
3	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 7 through 9. See Table 1.	Connection Same as Step 1. Sweep Generator 137-174 MHz.	T304 T306	1) Select channel 7 and adjust T304 and T306 for maximum RF waveform. 2) Check channel 7 through 9 for maximum RF output. A slight deviation as Figure 7 is acceptable.

UHF Lo Band

Step	Control Setting	Test Instrument	Adjust	Remarks
4	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 10 through 12. See table 1.	Connection Same as Step 1. Sweep Generator 380-512 MHz.	TC301 TC303	1) Select channel 10 and adjust TC301 and TC303 for maximum RF output. 2) Check channel 10 through 12 for maximum RF output. A slight deviation as Figure 8 is acceptable.

UHF Hi Band: no adjustment required.

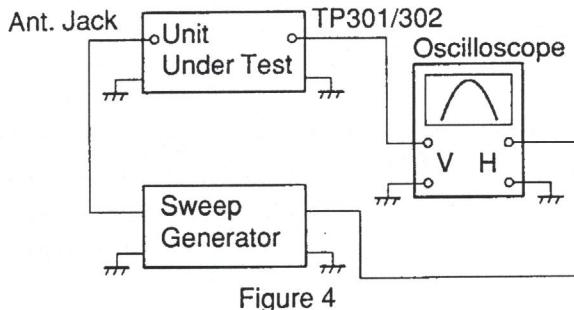


Figure 4

Note:

- Use TP301 for VHF Lo, Air and VHF Hi bands adjustment.
- Use TP302 for UHF Lo band adjustment.

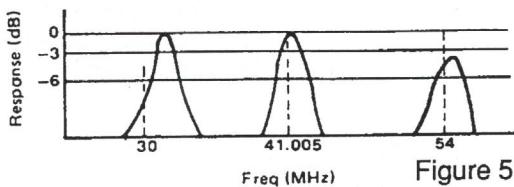


Figure 5

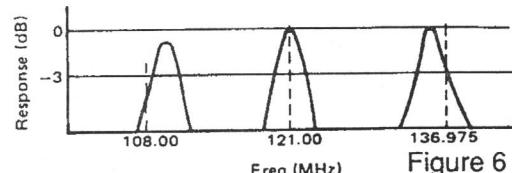


Figure 6

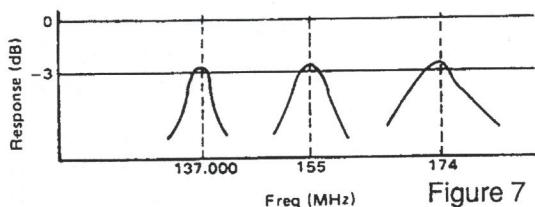


Figure 7

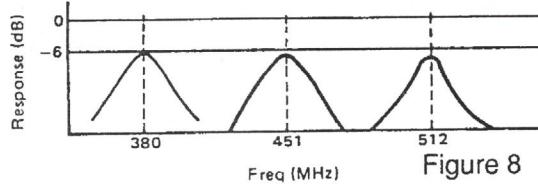


Figure 8

Overall Alignment and Sensitivity Measurement

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
1	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 10.	Connect FM signal generator to the ANT. jack and AC SSVM to EAR. jack across 8 ohm dummy load. Connect DC SSVM to TP201. See Figure 9.	TC303 T201	1) Readjust TC303 for maximum sensitivity. 2) Adjust T201 for 2 V on the DC SSVM.
2	OFF/VOLUME control: ON SQUELCH control: CCW Select channel 5.	Connect AM signal generator to the ANT. jack and AC SSVM to EAR. jack across 8 ohm dummy load. See Figure 10.	T307 T202 T203	1) Adjust T202 for maximum sensitivity. 2) Adjust T203 for minimum THD. 3) Readjust T307 for maximum sensitivity.

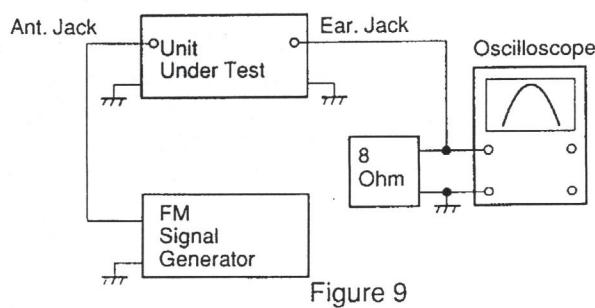


Figure 9

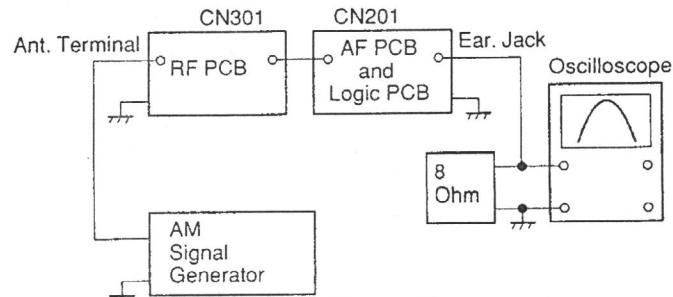


Figure 10

Note:

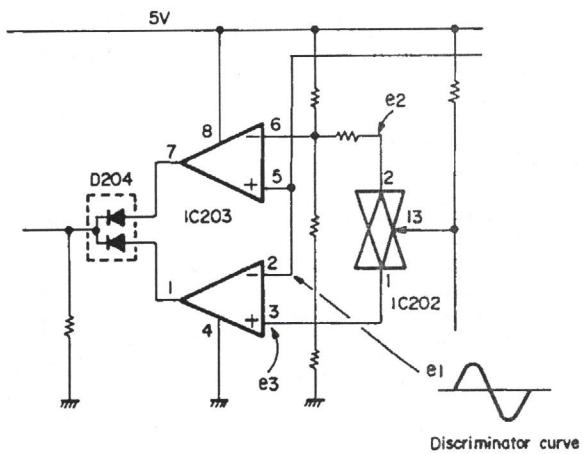
To adjust T202 and T203, remove RF PCB and connect CN201 and CN301.
To adjust T207, connect RF PCB and AF PCB.

Step	Control Setting	Test Instrument Connection	Remarks
3	OFF/VOLUME control: ON SQUELCH control: CCW Channel as Table 1.	Connect FM signal generator to the ANT. jack and AC SSVM to EAR. jack across 8 ohm dummy load. Set the signal generator to each frequency as Table 1. Set the Volume control for 0 dB (0.775 V) reading on the SSVM.	Turn off the modulation and measure the (S+N)/N ratio.

Note:

TP202 is used to observe the AM band detection output.

Zeromatic Function Test Procedure



(Zeromatic functions when OUTPUT is in "L" level.)

	$0 < e_1 < e_3$	$e_3 < e_1 < e_2$	$e_2 < e_1 < V_{cc}$
OUTPUT (D204 Cathode)	H	L	H

To adjust the e_1 voltage, receive a signal in the manual mode, and set T201 to obtain 2.0 V at TP-201. It is convenient to use National Weather Service Signal for the adjustment.

In the event of Zeromatic not functioning correctly, refer to Reference Frequency OSC Alignment (Page 9), and check 118.700000 MHz \pm 10 Hz, and adjust T201 again to 2.0 VDC while a signal is being received.

VHF-MID Band Alignment for 20-9303

Circuit Revision

The following parts should be changed as shown below.

Ref. No.	Lo Band	Mid band	Ref. No.	Lo Band	Mid band
C302	0.001 μ F	27 pF	D315	HVU306A	Not Used
C305	0.001 μ F	27 pF	T301	5SSR-328	5SSR-334
C356	56 pF	3 pF	T302	5SSR-328	5SSR-335
C357	68 pF	27 pF			
C358	33 pF	15 pF			
C359	0.001 μ F	39 pF			

VCO Alignment

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
	Same as VHF Lo Step 1. Program channel 1 through 3 as follows: CH1: 68 MHz CH2: 78 MHz CH3: 88 MHz	Same as Figure 3.	TC302 T308	1) Select channel 3 and adjust TC302 for 11 V on the DC SSVM. 2) Select channel 1 and adjust T308 for 1.0 V on the DC SSVM. 3) Repeat step 1) and 2) until no improvement is observed. See Table 5.

CH	Frequency	Voltage
CH1	68.000 MHz	Voltage at TP304 0.9-1.2 V
CH2	78.000 MHz	Voltage at TP304 3.5-5.5 V
CH3	88.000 MHz	Voltage at TP304 10.9-11.1 V

Table 5

RF AMP. Alignment

Step	Control Setting	Test Instrument Connection	Adjust	Remarks
	Same as VHF Lo Band Step 1. Program channel 1 through 3 as Step 12.	Same as Figure 4. Sweep Generator 68-88 MHz.	T301 T302	1) Select channel 2 and adjust T301 and T302 for maximum RF output. 2) Check channel 1 through 3 for maximum RF output. A slight deviation as Figure 11 is acceptable.

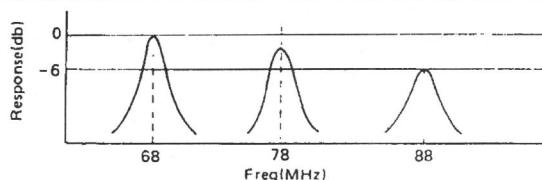
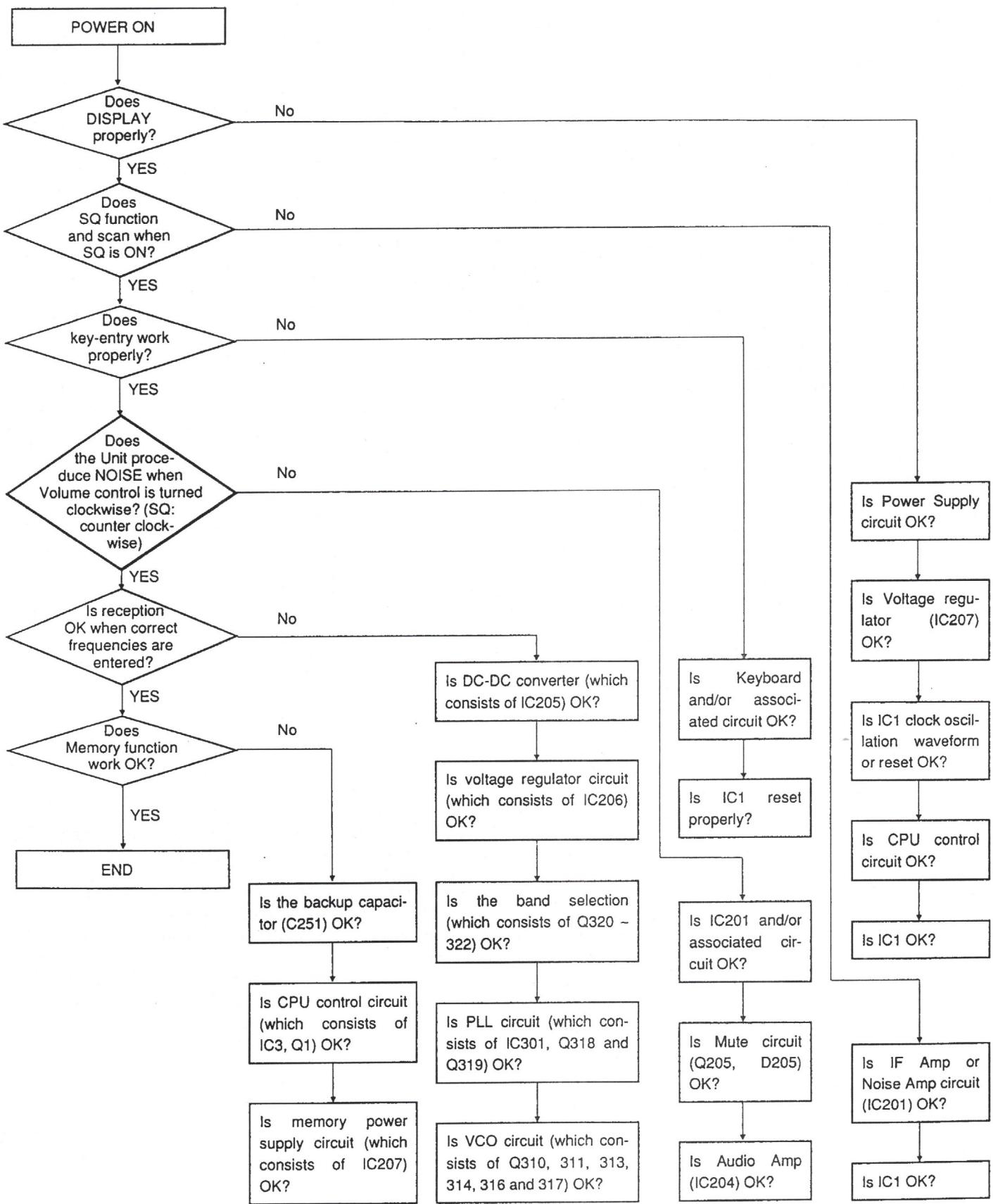
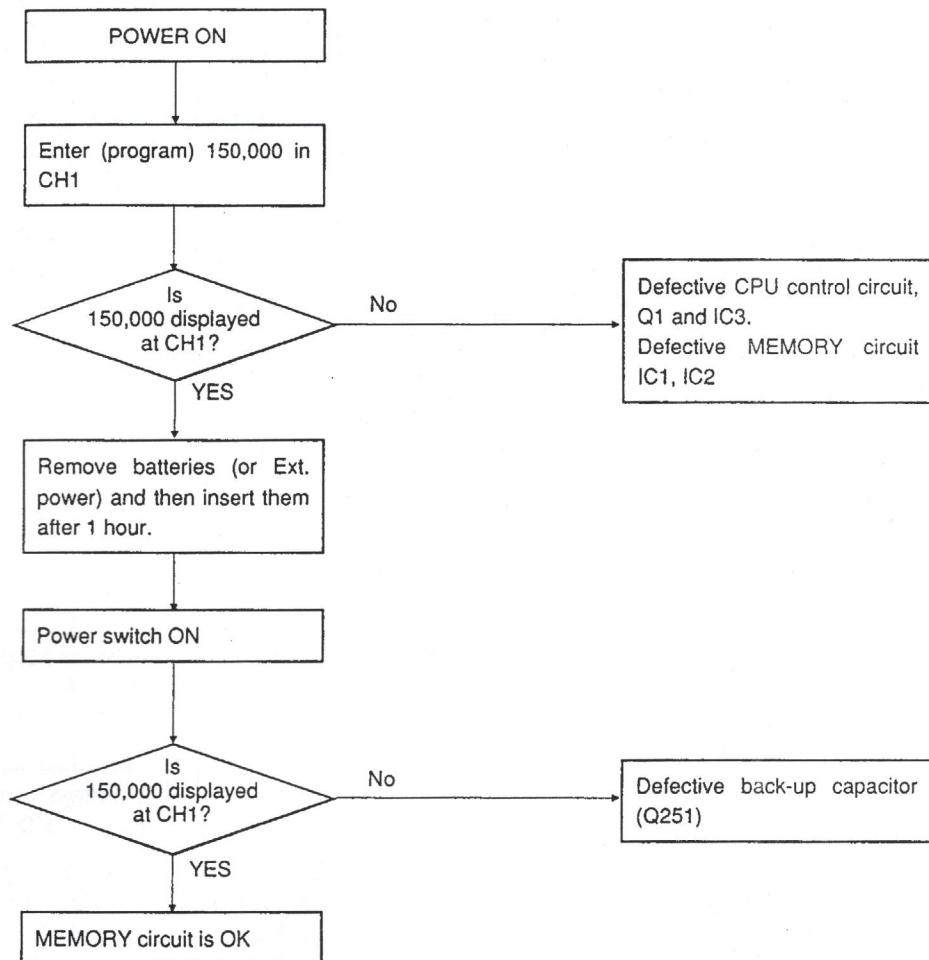


Figure 11

RECEPTION CHECK



MEMORY CHECK



Notes:

- Prior to checking the CPU System, measure supply voltage to ICs. (See schematic diagram.)
- While checking the following items, the ICs can "latch up." If so, push RESET switch for about either the built-in AA batteries or the external power is present on this check.

TROUBLESHOOTING

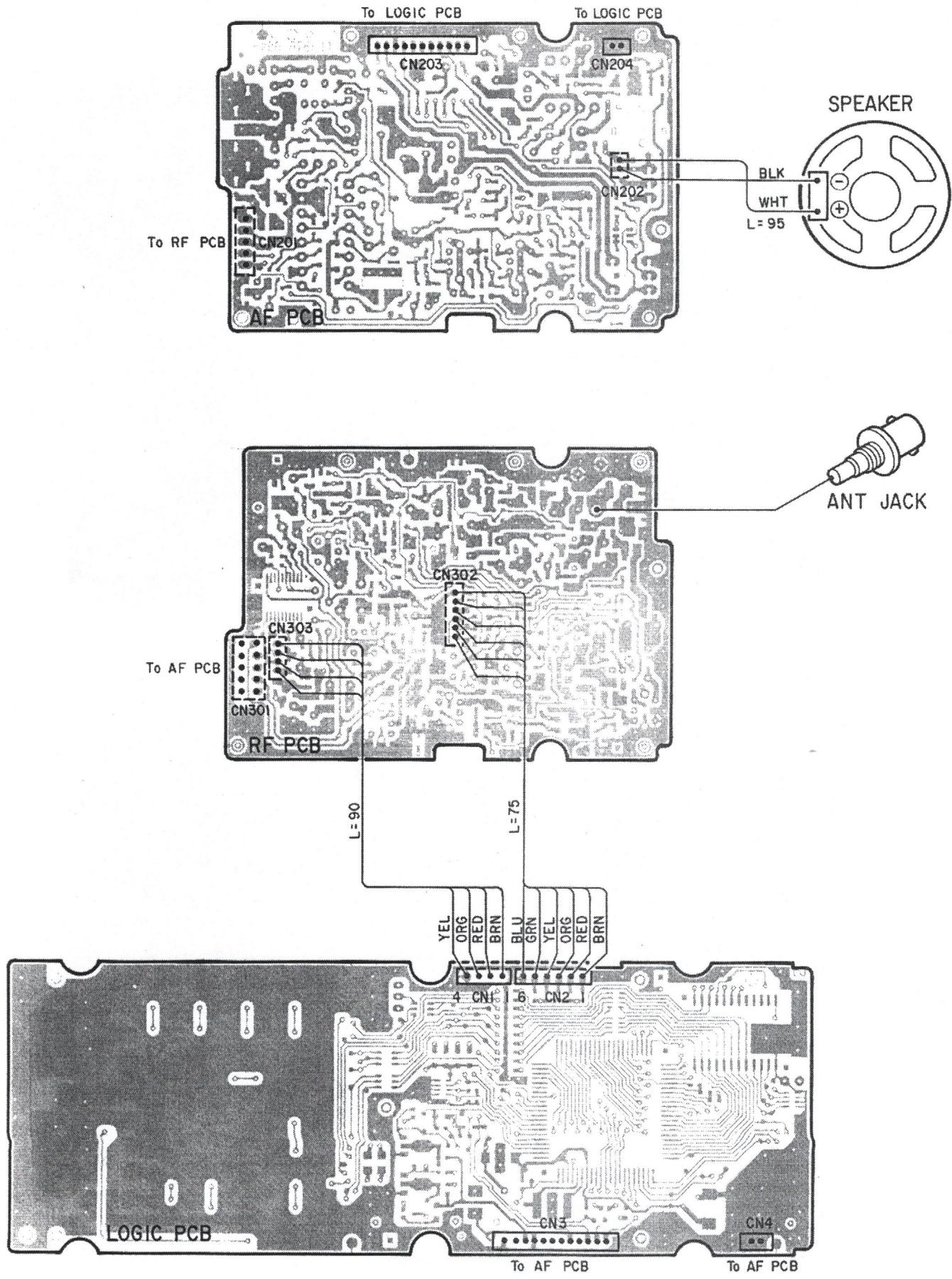
Symptom	Cause/Remedy
Display does not light and no sound when POWER is on. Volume control: MAX. Squelch control Counterclockwise (CCW)	Defective batteries: Change batteries. Wrong polarity of batteries: Correct the polarity of batteries. Defective external power jack or charge jack: Replace. Defective ON-OFF switch on volume control: Replace.
Display lights but no sound. Volume control: MAX Squelch control: CCW	Defective speaker or EXT. SPEAKER jack: Replace the defective parts. Defective audio amplifier IC204 and/or associated circuit components: Replace the defective components. Defective IF amplifier IC201 and/or associated circuit components: Replace the defective components. Defective functional squelch control and/or associated circuit components: Replace the defective components. Defective Q205, IC1 and/or associated circuit: Replace the defective components.
Sound comes out but display does not light. Volume control: MAX Squelch control: CCW	Defective LCD or rubber connector: Replace the defective components. Defective IC1 and/or associated circuit: Replace the defective components.
Does not scan and squelch does not operates.	Defective IC201 and/or associated circuit components: Replace the defective components. Defective IC1 and/or associated circuit components: Replace the defective components.
Does not scan but squelch operates.	Defective IC1 and/or associated circuit components: Replace the defective components.
Displays incorrectly and/or unable to enter correctly when RESET switch is pushed.	Defective keyboard and/or associated circuit: Replace the defective components. Defective CPU(IC1) and/or associated circuit: Replace the defective components.
Displays correctly at the time of programming. But after scanning, it becomes faulty.	Defective CPU(IC1) and/or associated circuit: Replace the defective components.
MANUAL select operates but SCAN does not operates.	Squelch control is not adjusted right: Turn squelch control clockwise.
All bands do not operate but display is OK.	Faulty connection among AF, LOGIC and RF PCBs: Replace the correct connection. Defective Q318 and Q319 in low-pass filter: Replace the defective components. Defective IC301 and/or associated circuit: Replace the defective components. Defective IC206 voltage regulator and/or IC205 DC-DC converter circuit: Replace the defective components.

Symptom	Cause/Remedy
VHF Lo (Mid) band does not operates but Aircraft, VHF Hi, UHF Lo and UHF Hi band operates.	Defective D301, D303, T301, T302, D302, D304 tuning circuit and/or Q310, Q311 VCO circuit: Replace the defective components. Defective Q322 and/or associated circuit: Replace the defective components.
Aircraft band does not operates but VHF Lo, VHF Hi, UHF Lo and UHF Hi band operates.	Defective D309 ,T303, T305 and/or associated circuit: Replace the defective components. Defective AM IF Amp. including Q202 and Q203: Replace the defective components. Defective Q321 in band switch circuit: Replace the defective components.
VHF Hi band does not operates but VHF Lo, Aircraft, UHF Lo and UHF Hi band operates.	Defective D305, D307, T304, T306 and/or associated circuit: Replace the defective components. Defective Q321 in band switch circuit: Replace the defective components.
UHF Lo band does not operates but VHF Lo, Aircraft, VHF Hi and UHF Hi band operates.	Defective Q304, Q305, Q312 and/or associated circuit: Replace the defective components. Defective Q320 in band switch circuit: Replace the defective components.
UHF Hi band does not operates but VHF Lo, Aircraft, VHF Hi and UHF Lo band operates.	Defective Q306-308, Q315 and/or associated circuit: Replace the defective components. Defective Q316 VCO circuit: Replace the defective components. Defective Q320 and/or associated circuit: Replace the defective components.
Does not make beep tone.	Defective Q205 and/or associated circuit: Replace the defective components. Defective IC1 and/or associated circuit: Replace the defective components.
LOW BATT does not indicate when battery voltage went down.	Defective IC4 and/or associated circuit: Replace the defective components.
"Zeromatic" does not operate or holds on a drifted frequency at search operation.	Defective IC202, IC203 and D204 in Zeromatic circuit: Replace the defective components. Discriminator coil is out of adjustment: TP201 shall have approx. 2.0 V in normal receiving mode. Refer to "Reference Frequency OSC Alignment" on page 9.

Important Note:

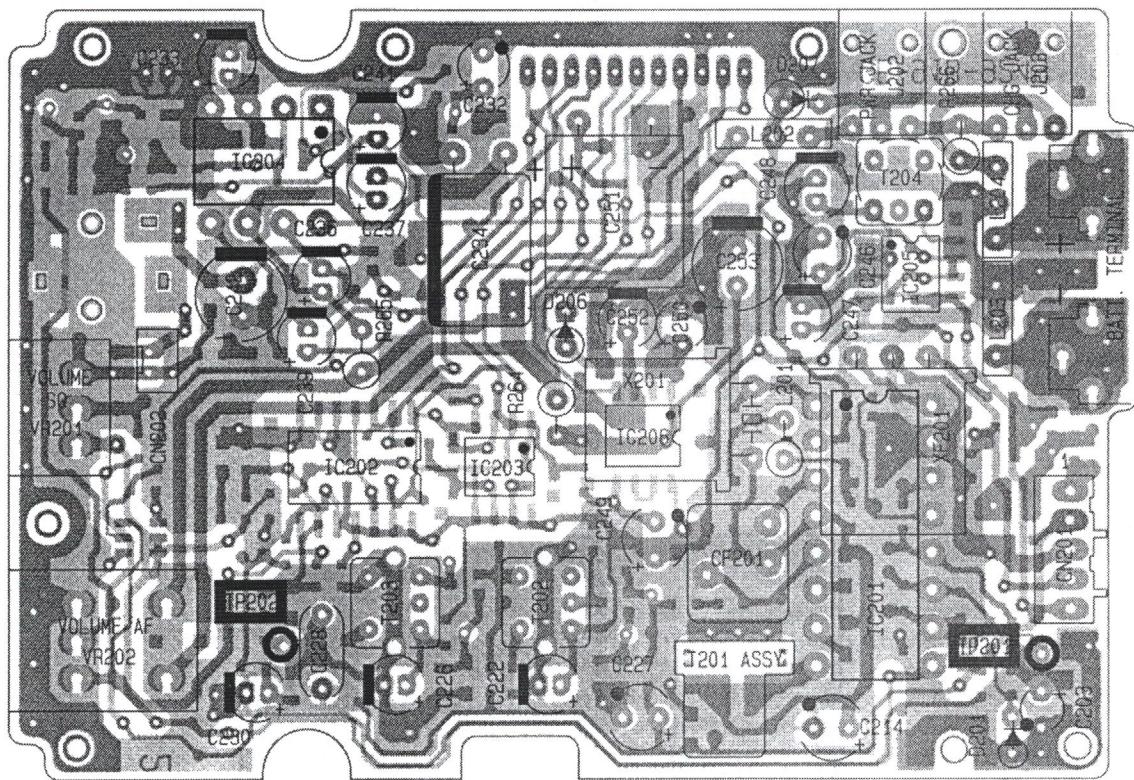
Pulse generated while checking circuits and/or certain combinations of key operation may cause improper operation. To clear the malfunction, re-initialization of CPU is necessary: Push RESET switch while pressing CLEAR, and then release the RESET switch. All channels (200 ch) will be cleared and frequency indicator displays 000.0000. (Be sure the power is on when doing the above.)

WIRING DIAGRAM

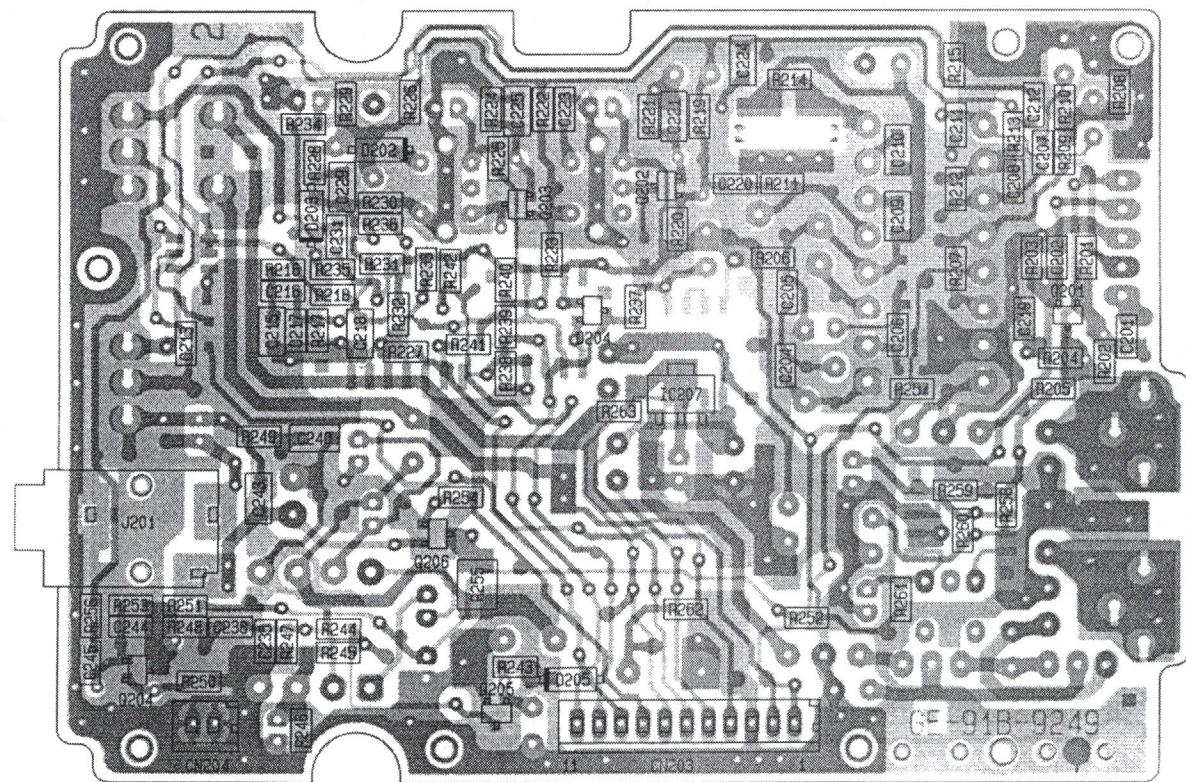


PRINTED CIRCUIT BOARDS

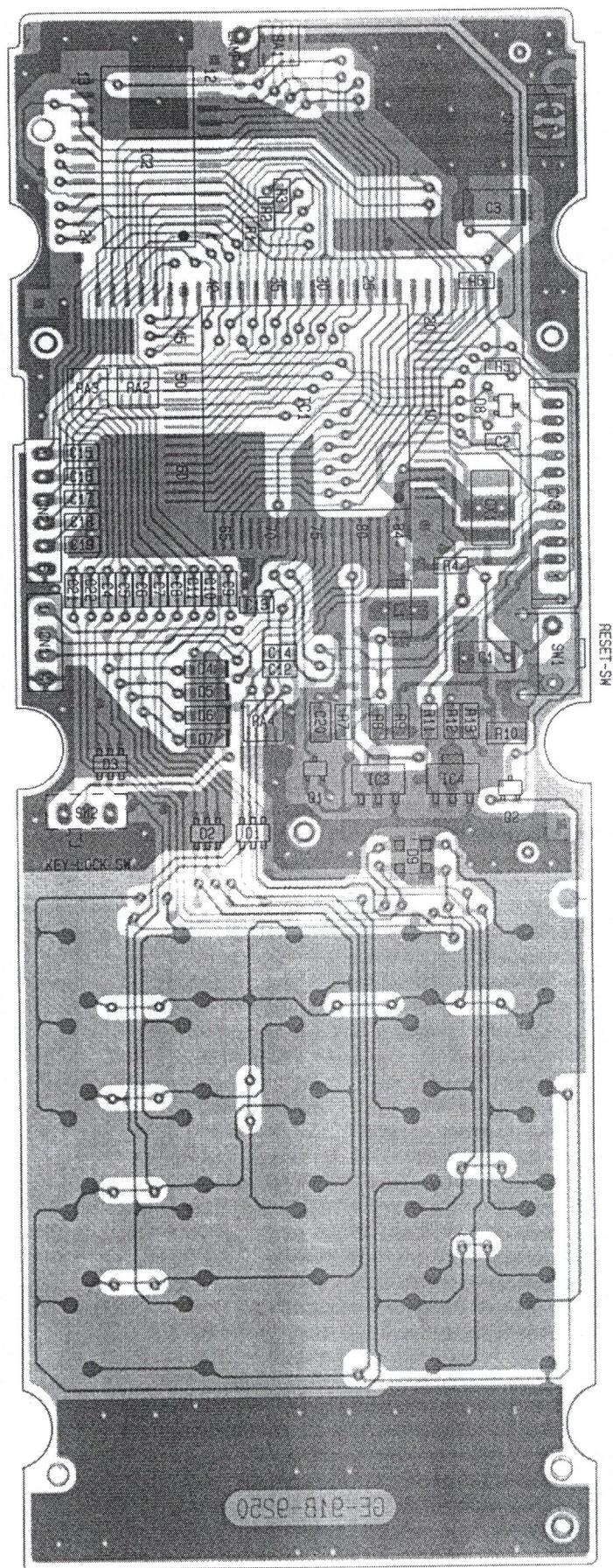
AF PCB (Top View)



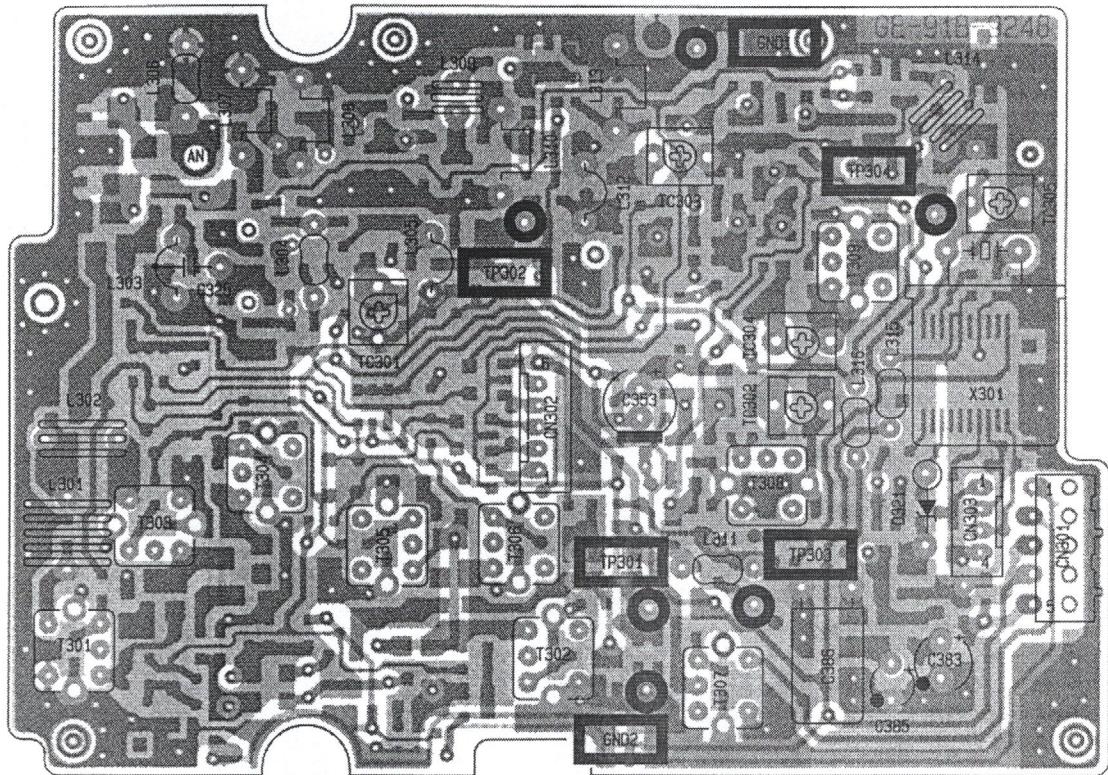
AF PCB (Bottom View)



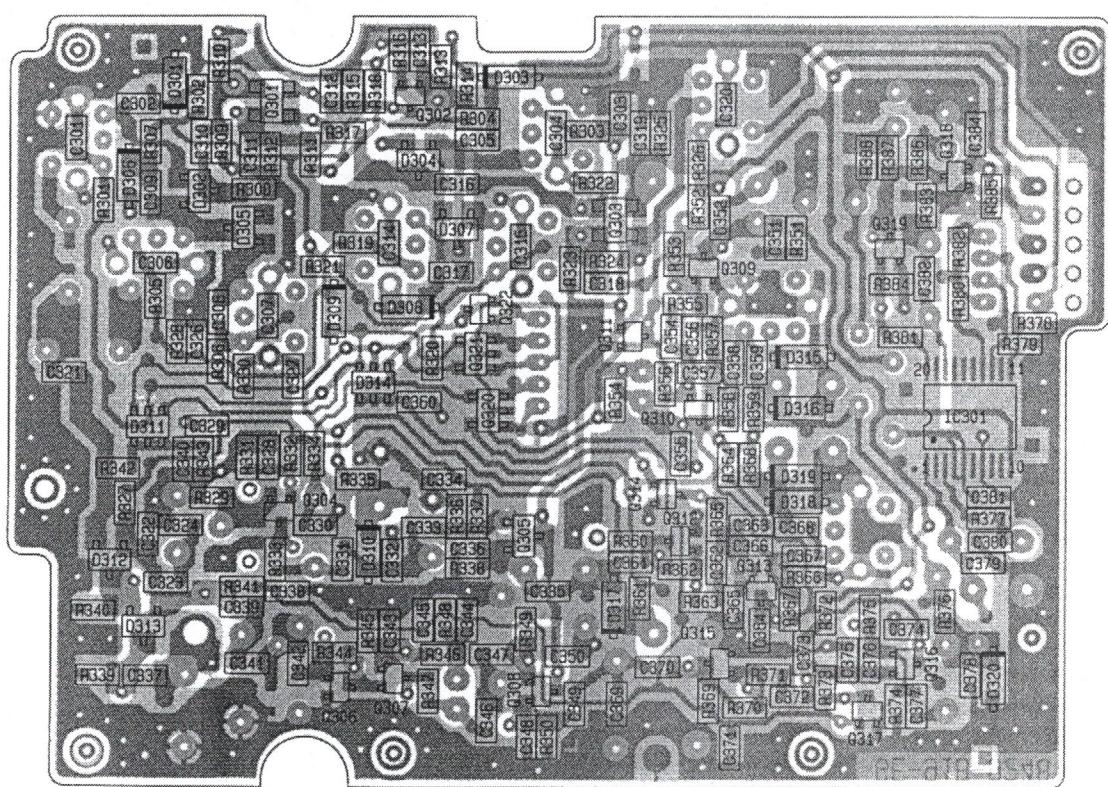
LOGIC PCB (Top View)



RF PCB (Top View)



RF PCB (Bottom View)



ELECTRICAL PARTS LIST

AF PCB ASSEMBLY

Ref. No.	Description					RS Part No.	Mfr's Part No.
(21)	PCB Assembly, AF Consists of the following:						GA-92C-9576
CAPACITORS							
C201	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C202	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C203	Tantalum	0.1 μ F	35 V	+/-20%			DN1V0R1M1S
C204	Ceramic	39 pF	50 V	+/-10%	0603		CC10SL1H390K
C205	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C206	Ceramic	22 pF	50 V	+/-10%	0603		CC10SL1H220K
C207	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C208	Ceramic	8 pF	50 V	+/-0.5 pF	0603		CC10SL1H080D
C209	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C210	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C211	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C212	Ceramic	470 pF	25 V	+/-10%	0603		CC10SL1E471K
C213	Ceramic	470 pF	25 V	+/-10%	0603		CC10SL1E471K
C214	Tantalum	33 μ F	10 V	+/-20%			DN1A330M1S
C215	Ceramic	0.033 μ F	50 V	+/-10%	0805		CC20B1H333K
C216	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C217	Ceramic	0.0015 μ F	50 V	+/-10%	0603		CC10B1H152K
C218	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C219	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C220	Ceramic	470 pF	25 V	+/-10%	0603		CC10SL1E471K
C221	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C222	Electrolytic	10 μ F	16 V	+/-20%			ECEA1CKA100
C223	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C224	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C225	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C226	Electrolytic	10 μ F	16 V	+/-20%			ECEA1CKA100
C227	Tantalum	33 μ F	10 V	+/-20%			DN1A330M1S
C228	*Mylar	0.056 μ F	50 V	+/-10%			NNM-563K
C229	Ceramic	0.082 μ F	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C230	Electrolytic	1 μ F	50 V	+/-20%			ECEA1HKA010
C231	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C232	Tantalum	0.1 μ F	35 V	+/-20%			DN1V0R1M1S
C233	Electrolytic	1 μ F	50 V	+/-20%			ECEA1HKA010
C234	Electrolytic	470 μ F	16 V	+/-20%			ECA1CM471
C235	Ceramic	0.015 μ F	25 V	+/-10%	0603		CC10B1E153K
C236	Electrolytic	4.7 μ F	35 V	+/-20%			ECEA1VKA4R7
C237	Electrolytic	2.2 μ F	50 V	+/-20%			ECEA1HKA2R2
C238	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C239	Electrolytic	10 μ F	16 V	+/-20%			ECEA1CKA100

*Mylar is registered trademark of E.I. Du Pont de Nemours and Company

Ref. No.	Description					RS Part No.	Mfr's Part No.
C240	Ceramic	0.082 µF	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C241	Electrolytic	10 µF	16 V	+/-20%			ECEA1CKA100
C242	Electrolytic	100 µF	16 V	+/-20%			ECEA1CKA101
C243	Ceramic	0.082 µF	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C244	Ceramic	680 pF	50 V	+/-10%	0603		CC10B1H681K
C245	Ceramic	0.015 µF	25 V	+/-10%	0603		CC10B1E153K
C246	Tantalum	0.22 µF	35 V	+/-20%			DN1VR22M1S
C247	Electrolytic	4.7 µF	35 V	+/-20%			ECEA1VKA4R7
C248	Electrolytic	33 µF	10 V	+/-20%			ECEA1AKA330
C249	Tantalum	10 µF	16 V	+/-20%			DN1C100M1S
C250	Tantalum	0.1 µF	35 V	+/-20%			DN1V0R1M1S
C251	Electrolytic	0.047 F	5.5 V	+80%--20%			AC310-G473Z5R5
C252	Electrolytic	10 µF	16 V	+/-20%			ECEA1CKA100
C253	Electrolytic	100 µF	16 V	+/-20%			ECEA1CKA101
CERAMIC FILTER							
CF201	Ceramic	455 kHz					CFU455D2
DIODES							
D201	SD-103	Schottky Barrier	Silicon				SD-103
D202	MA728	(Marked 2A)	Silicon				MA728
D203	MA728	(Marked 2A)	Silicon				MA728
D204	MA141WK	(Marked MT)	Silicon				MA141WK
D205	MA110	(Marked 1A)	Silicon				MA110
	or 1SS352	(Marked C1)	Silicon				or 1SS352
D206	SD-103	Schottky Barrier	Silicon				SD-103
D207	1N4002		Silicon				1N4002
	or S5566B		Silicon				or S5566B
ICs							
IC201	MC3361N	Osc./Mixer/Quad./Nopise Amp./ IF Amp.	MOS				MC3361N
IC202	TC4066BF	Zeromatic/Switching	MOS	SMT			TC4066BF
IC203	BA10358F or uPC358G	Zeromatic	Bipolar	SMT			BA10358F or uPC358G
IC204	LM386N-1	Audio Amp.	Bipolar				LM386N-1
IC205	TK11806M	DC-DC Conv.		Bipolar			SMTTK11806M
IC206	TK10682M	Voltage Regulator	Bipolar	SMT			TK10682M
IC207	S-81250HG-RD	Voltage Regulator	MOS	SMT			S-81250HG-RD
COILS & INDUCTORS							
L201	Choke	10 µH					LAL02NA100K
L202	Filter, EMI						LC103N-1RO
L203	Filter, EMI						LC103N-1RO
L204	Filter, EMI						LC103N-1RO

Ref. No.	Description			RS Part No.	Mfr's Part No.
TRANSISTORS					
Q201	2SC4215(O)	(Marked QO)		NPN	
Q202	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
Q203	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
Q204	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
Q205	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
Q206	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
RESISTORS					
R201	Metal Glaze	3.9 kohm	1/16 W	+/-5%	0603
R202	Metal Glaze	220 kohm	1/16 W	+/-5%	0603
R203	Metal Glaze	1 kohm	1/16 W	+/-5%	0603
R204	Metal Glaze	2.2 kohm	1/16 W	+/-5%	0603
R205	Metal Glaze	2.2 kohm	1/16 W	+/-5%	0603
R206	Metal Glaze	47 ohm	1/16 W	+/-5%	0603
R207	Metal Glaze	56 kohm	1/16 W	+/-5%	0603
R208	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R209	Metal Glaze	15 kohm	1/16 W	+/-5%	0603
R210	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R211	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603
R212	Metal Glaze	1 Mohm	1/16 W	+/-5%	0603
R213	Metal Glaze	2.2 kohm	1/16 W	+/-5%	0603
R214	Metal Glaze	47 kohm	1/16 W	+/-5%	0603
R215	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R216	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603
R217	Metal Glaze	470 kohm	1/16 W	+/-5%	0603
R218	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R219	Metal Glaze	2.7 kohm	1/16 W	+/-5%	0603
R220	Metal Glaze	270 kohm	1/16 W	+/-5%	0603
R221	Metal Glaze	470 ohm	1/16 W	+/-5%	0603
R222	Metal Glaze	5.6 kohm	1/16 W	+/-5%	0603
R223	Metal Glaze	270 kohm	1/16 W	+/-5%	0603
R224	Metal Glaze	47 ohm	1/16 W	+/-5%	0603
R225	Metal Glaze	100 ohm	1/16 W	+/-5%	0603
R226	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R227	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603
R228	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603
R229	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R230	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R231	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R232	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R233	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R234	Metal Glaze	10 kohm	1/16 W	+/-5%	0603
R235	Metal Glaze	470 kohm	1/16 W	+/-5%	0603
R236	Metal Glaze	22 kohm	1/16 W	+/-5%	0603
R237	Metal Glaze	100 kohm	1/16 W	+/-5%	0603
R238	Metal Glaze	1.8 kohm	1/16 W	+/-5%	0603
R239	Metal Glaze	2.7 kohm	1/16 W	+/-5%	0603
R240	Metal Glaze	3.3 kohm	1/16 W	+/-5%	0603
R241	Metal Glaze	1.2 kohm	1/16 W	+/-5%	0603
R242	Metal Glaze	100 kohm	1/16 W	+/-5%	0603

Ref. No.	Description					RS Part No.	Mfr's Part No.
R243	Metal Glaze	22 kohm	1/16 W	+/-5%	0603		RCN223J50
R244	Metal Glaze	56 kohm	1/16 W	+/-5%	0603		RCN563J50
R245	Metal Glaze	56 kohm	1/16 W	+/-5%	0603		RCN563J50
R246	Metal Glaze	27 kohm	1/16 W	+/-5%	0603		RCN273J50
R247	Metal Glaze	33 kohm	1/16 W	+/-5%	0603		RCN333J50
R248	Metal Glaze	33 kohm	1/16 W	+/-5%	0603		RCN333J50
R249	Metal Glaze	10 ohm	1/16 W	+/-5%	0603		RCN100J50
R250	Metal Glaze	270 ohm	1/16 W	+/-5%	0603		RCN271J50
R251	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603		RCN472J50
R252	Metal Glaze	2.7 kohm	1/16 W	+/-5%	0603		RCN272J50
R253	Metal Glaze	1 Mohm	1/16 W	+/-5%	0603		RCN105J50
R254	Metal Glaze	10 kohm	1/16 W	+/-5%	0603		RCN103J50
R255	Metal Glaze	470 ohm	1/4 W	+/-5%	1210		RCP471J50
R256	Metal Glaze	33 kohm	1/16 W	+/-5%	0603		RCN333J50
R257	Metal Glaze	10 kohm	1/16 W	+/-5%	0603		RCN103J50
R258	Metal Glaze	470 kohm	1/16 W	+/-5%	0603		RCN474J50
R259	Metal Glaze	220 ohm	1/16 W	+/-5%	0603		RCN221J50
R260	Metal Glaze	820 ohm	1/16 W	+/-5%	0603		RCN821J50
R261	Metal Glaze	47 ohm	1/16 W	+/-5%	0603		RCN470J50
R262	Metal Glaze	470 ohm	1/16 W	+/-5%	0603		RCN471J50
R263	Metal Glaze	47 ohm	1/16 W	+/-5%	0603		RCN470J50
R264	Carbon Film	4.7 ohm	1/4 W	+/-5%			ERD25TJ4R7
R265	Carbon Film	33 ohm	1/4 W	+/-5%			ERD25TJ330
R266	Carbon Film	22 ohm	1/2 W	+/-5%			ERDS1TJ220

TRANSFORMERS

T201	Assembly, coil Det. with PCB (Non Repairable) Coil, Det. (455 kHz) PCB		GR-E823PCB GR-E823 PCB
T202	IF (455 kHz)		5SSI-326
T203	Det. (455 kHz)		5SSI-327
T204	Choke		GR-D835

CRYSTAL

X201	10.245 MHz		H5717
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CRYSTAL FILTER

XF201	Crystal	10.7 MHz		H5718
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Ref. No.	Description			RS Part No.	Mfr's Part No.
MISCELLANEOUS					
CN201	Connector	5 Pin	Male		174075-5
CN202	Connector	2 Pin	Male		IL-Y-2P-S15T2-EF
CN203	Connector	11 Pin	Female		52024-1110
CN204	Connector	2 Pin	Female		52024-0210
J201	Jack, Earphone				HSJ0836-01-500
J202	Jack, Power				HEC2711-01-620
J203	Jack, Charge				HEC2711-01-620
	Terminal, Battery				GE-91D-9218
TP201	Pin, Test				GE-87D-7290
TP202	Pin, Test				GE-87D-7290
	Assembly, Squelch				GA-92D-9487
VR201	Potentiometer, Squelch	10 kohm(C)			RK0971110-10KC-10
	Nut	7 m/m			GE-89D-8343-1
	Assembly, Volume				GA-92D-9486
VR202	Potentiometer, Volume W/Switch	50 kohm(A)			RK0971111-50KA-10
	Nut	7 m/m			GE-89D-8343-1
(24)	Pad, PCB				GE-920-9623

LOGIC PCB ASSEMBLY

Ref. No.	Description					RS Part No.	Mfr's Part No.
(22)	PCB Assembly, LOGIC Consists of the following:						GA-92C-9577
CAPACITORS							
C1	Tantalum	4.7 µF	6.3 V	+/-20%	1206		ECST0JY475R
C2	Ceramic	0.1 µF	16 V	+80%-20%	0603		CC10F1C104Z
C3	Tantalum	10 µF	6.3 V	+/-20%			ECST0JB106R
C4	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C5	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C6	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C7	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C8	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C9	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C10	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C11	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C12	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C13	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C14	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C15	Ceramic	0.001 µF	50 V	+/-10%	0603		CC10B1H102K
C16	Ceramic	0.001 µF	50 V	+/-10%	0603		CC10B1H102K
C17	Ceramic	0.001 µF	50 V	+/-10%	0603		CC10B1H102K
C18	Ceramic	0.001 µF	50 V	+/-10%	0603		CC10B1H102K
C19	Ceramic	0.001 µF	50 V	+/-10%	0603		CC10B1H102K
C20	Ceramic	0.082 µF	25 V	+/-10%	0805		CC20B1E823K or GRM40B823K25
C21	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
C22	Ceramic	47 pF	50 V	+/-10%	0603		CC10SL1H470K
CERAMIC RESONATOR							
CX1	8 MHz					EFO-V8004B5 or KBR-8.0MWSTR	
DIODES							
D1	MA121	(Marked M2D)	Silicon			MA121	
D2	MA121	(Marked M2D)	Silicon			MA121	
D3	MA121	(Marked M2D)	Silicon			MA121	
D4	Not Used						
D5	MA110 or 1SS352	(Marked 1A) (Marked C1)	Silicon			MA110 or 1SS352	
D6	MA110 or 1SS352	(Marked 1A) (Marked C1)	Silicon			MA110 or 1SS352	
D7	Not Used						
D8	MA141WA	(Marked MN)	Silicon			MA141WA	
D9	1SS306 or 1SS272	(Marked A3) (Marked A1)	Silicon			1SS306 or 1SS272	
ICs							
IC1	GRE-9108A	CPU	MOS	SMT		GRE-9108A	
IC2	LC3517BM-10 or LC3517BM-12 or LC3517BM-15	Memory (16 kbit SRAM)	MOS	SMT		LC3517BM-10 or LC3517BM-12 or LC3517BM-15	
IC3	S-8054HN-CB	CPU Cont.	MOS	SMT		S-8054HN-CB	

Ref. No.	Description			RS Part No.	Mfr's Part No.	
IC4	S-8054HN-CB Low Battery Det. MOS SMT				S-8054HN-CB	
COIL						
L1	Filter, EMI				NFM41R10C223	
TRANSISTORS						
Q1 Q2	UN5214 (Marked 8D) UN5111 (Marked 6A)			NPN PNP	UN5214 UN5111	
RESISTORS						
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13	Metal Glaze Metal Glaze	10 kohm 10 kohm 10 kohm 100 kohm 100 kohm 47 kohm 100 kohm 150 kohm 10 kohm 82 ohm 100 kohm 82 kohm 22 kohm	1/16 W 1/16 W 1/16 W 1/16 W 1/16 W 1/16 W 1/16 W 1/16 W 1/16 W 1/10 W 1/16 W 1/16 W 1/16 W	+/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5% +/-5%	0603 0603 0603 0603 0603 0603 0603 0603 0603 0805 0603 0603 0603	RCN103J50 RCN103J50 RCN103J50 RCN104J50 RCN104J50 RCN473J50 RCN104J50 RCN154J50 RCN103J50 RCM820J50 RCN104J50 RCN823J50 RCN223J50
RESISTOR ARRAYS						
RA1 RA2 RA3 RA4	Metal Glaze Metal Glaze Metal Glaze Metal Glaze	47 kohm x 4 1 kohm x 4 1 kohm x 4 47 kohm x 4	1/16 W 1/16 W 1/16 W 1/16 W	+/-5% +/-5% +/-5% +/-5%		RCB8C473J0 RCB8C102J0 RCB8C102J0 RCB8C473J0
MISCELLANEOUS						
CN1 CN2 CN3 CN4 SW1 SW2 25 26 27	Not Used Not Used Connector, Connector, Switch, Push Switch, Slide Lamp, Plate, Logic Shield Fiber, Logic Shield Fiber, Logic PCB		11 Pin 2 Pin (Reset) (Key Lock) 6 V 35 mA	Male Male Male GE-91D-9220 GE-91D-9338 GE-92D-9616		53022-1110 53022-0210 SKHLLD SSSS7-12-ZA T1-6V35MA-WT GE-91D-9220 GE-91D-9338 GE-92D-9616

RF PCB ASSEMBLY

Ref. No.	Description					RS Part No.	Mfr's Part No.
(23)	PCB Assembly, RF Consists of the following:						GA-92C-9575
CAPACITORS							
C301	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C302	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C303	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C304	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C305	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C306	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C307	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C308	Ceramic	3 pF	50 V	+/-0.25 pF	0603		CC10SL1H030C
C309	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C310	Ceramic	22 pF	50 V	+/-10%	0603		CC10SL1H220K
C311	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C312	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C313	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C314	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C315	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C316	Ceramic	10 pF	50 V	+/-0.5 pF	0603		CC10SL1H100D
C317	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C318	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C319	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C320	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C321	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C322	Ceramic	2 pF	50 V	+/-0.25 pF	0603		CC10SL1H020C
C323	Ceramic	6 pF	50 V	+/-0.5 pF	0603		CC10SL1H060D
C324	Ceramic	8 pF	50 V	+/-0.5 pF	0603		CC10SL1H080D
C325	Ceramic	10 pF	50 V	+/-0.5 pF			HE40SJS100D
C326	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C327	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C328	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C329	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C330	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C331	Ceramic	27 pF	50 V	+/-10%	0603		CC10SL1H270K
C332	Ceramic	1 pF	50 V	+/-0.25 pF	0603		CC10SL1H010C
C333	Ceramic	27 pF	50 V	+/-10%	0603		CC10SL1H270K
C334	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C335	Ceramic	2 pF	50 V	+/-0.25 pF	0603		CC10SL1H020C
C336	Ceramic	3 pF	50 V	+/-0.25 pF	0603		CC10SL1H030C
C337	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C338	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C339	Ceramic	3 pF	50 V	+/-0.25 pF	0603		CC10SL1H030C
C340	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C341	Ceramic	1.5 pF	50 V	+/-0.25 pF	0603		CC10SL1H1R5C
C342	Ceramic	2 pF	50 V	+/-0.25 pF	0603		CC10SL1H020C
C343	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C344	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C345	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C346	Ceramic	1.5 pF	50 V	+/-0.25 pF	0603		CC10SL1H1R5C
C347	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C348	Ceramic	1 pF	50 V	+/-0.25 pF	0603		CC10SL1H010C

Ref. No.	Description					RS Part No.	Mfr's Part No.
C349	Ceramic	3 pF	50 V	+/-0.25 pF	0603		CC10SL1H030C
C350	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C351	Ceramic	470 pF	25 V	+/-10%	0603		CC10SL1E471K
C352	Ceramic	10 pF	50 V	+/-0.5 pF	0603		CC10SL1H100D
C353	Electrolytic	47 μ F	6.3 V	+/-20%			ECEA0JKS470
C354	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C355	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C356	Ceramic	56 pF	50 V	+/-10%	0603		CC10SL1H560K
C357	Ceramic	68 pF	50 V	+/-10%	0603		CC10SL1H680K
C358	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C359	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C360	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C361	Ceramic	10 pF	50 V	+/-0.5 pF	0603		CC10SL1H100D
C362	Ceramic	10 pF	50 V	+/-0.5 pF	0603		CC10SL1H100D
C363	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C364	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C365	Ceramic	22 pF	50 V	+/-10%	0603		CC10SL1H220K
C366	Ceramic	33 pF	50 V	+/-10%	0603		CC10SL1H330K
C367	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C368	Ceramic	820 pF	50 V	+/-10%	0603		CC10B1H821K
C369	Ceramic	2 pF	50 V	+/-0.25 pF	0603		CC10SL1H020C
C370	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C371	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C372	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C373	Ceramic	5 pF	50 V	+/-0.25 pF	0603		CC10SL1H050C
C374	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C375	Ceramic	10 pF	50 V	+/-0.5pF	0603		CC10SL1H100D
C376	Ceramic	12 pF	50 V	+/-10%	0603		CC10SL1H120K
C377	Ceramic	100 pF	50 V	+/-10%	0603		CC10SL1H101K
C378	Ceramic	2 pF	50 V	+/-0.25 pF	0603		CC10SL1H020C
C379	Ceramic	39 pF	50 V	+/-10%	0603		CC10UJ1H390K
C380	Ceramic	56 pF	50 V	+/-10%	0603		CC10UJ1H560K
C381	Ceramic	0.01 μ F	25 V	+/-10%	0603		CC10B1E103K
C382	Ceramic	0.0047 μ F	50 V	+/-10%	0603		CC10B1H472K
C383	Tantalum	2.2 μ F	25 V	+/-20%			TSD-A1E2R2M
C384	Ceramic	0.001 μ F	50 V	+/-10%	0603		CC10B1H102K
C385	Tantalum	0.1 μ F	35 V	+/-20%			DN1V0R1M1S
C386	Mylar	0.022 μ F	50 V	+/-10%			NNM-223K

DIODES

D301	HVU306A	Varactor	(Marked 3)	Silicon		HVU306A
D302	HSM2693A		(Marked B4)	Silicon		HSM2693A
D303	HVU306A	Varactor	(Marked 3)	Silicon		HVU306A
D304	HSM2693A		(Marked B4)	Silicon		HSM2693A
D305	HSM2692		(Marked B1)	Silicon		HSM2692
D306	HVU308	Varactor	(Marked 8)	Silicon		HVU308
D307	HSM2692		(Marked B1)	Silicon		HSM2692
D308	HVU308	Varactor	(Marked 8)	Silicon		HVU308
D309	MA110 or 1SS352		(Marked 1A or C1)	Silicon		MA110 or 1SS352
D310	HVU308	Varactor	(Marked 8)	Silicon		HVU308
D311	MA121		(Marked M2D)	Silicon		MA121
D312	HSM2693A		(Marked B4)	Silicon		HSM2693A

Ref. No.	Description			RS Part No.	Mfr's Part No.
D313	HSM2693A	(Marked B4)	Silicon		HSM2693A
D314	MA121	(Marked M2D)	Silicon		MA121
D315	HVU306A	Varactor	(Marked 3)	Silicon	HVU306A
D316	HVU306A	Varactor	(Marked 3)	Silicon	HVU306A
D317	HVU308	Varactor	(Marked 8)	Silicon	HVU308
D318	HVU308	Varactor	(Marked 8)	Silicon	HVU308
D319	HVU308	Varactor	(Marked 8)	Silicon	HVU308
D320	HVU308	Varactor	(Marked 8)	Silicon	HVU308
D321	HZ18-2L	Zener		Silicon	HZ18-2L
ICs					
IC301	MB1512PFV-G-BND-EF	PLL/Prescaler	MOS	SMT	MB1512PFV-G-BND-EF
COILS & INDUCTORS					
L301	Choke				4LNC-092
L302	Choke				4LNC-122
L303	RF (UFH Lo)				GE-88D-7616
L304	Choke	0.22 μH			LAL02NAR22M
L305	RF (UHF Lo)				GE-88D-7616
L306	Choke	0.22 μH			LAL02NAR22M
L307	RF (UHF Hi)				GE-87D-7120
L308	RF (UHF Hi)				GE-87D-7120
L309	Choke				2LNB-253
L310	RF (UHF Hi)				GE-87D-7120
L311	Choke	0.22 μH			LAL02NAR22M
L312	Tripler				GE-88D-7616
L313	Doubler				GE-87D-7120
L314	VCO (UHF Hi)				2LNE-314
L315	Choke	100 μH			LAL02NA101K
L316	Choke	10 μH			LAL02NA100K
TRANSISTORS					
Q301	3SK131	(Marked V11)	FET	MOS	3SK131
Q302	2SC4116(Y)	(Marked LY)		NPN	2SC4116(Y)
Q303	3SK131	(Marked V11)	FET	MOS	3SK131
Q304	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q305	2SC2732(EC)	(Marked EC)		NPN	2SC2732(EC)
Q306	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q307	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q308	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q309	2SC4215(O)	(Marked QO)		NPN	2SC4215(O)
Q310	2SC4215(O)	(Marked QO)		NPN	2SC4215(O)
Q311	UN5211	(Marked 8A)		NPN	UN5211
Q312	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q313	2SC4215(O)	(Marked QO)		NPN	2SC4215(O)
Q314	UN5214	(Marked 8D)		NPN	UN5214
Q315	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q316	2SC4226(R25)	(Marked R25)		NPN	2SC4226(R25)
Q317	UN5214	(Marked 8D)		NPN	UN5214

Ref. No.	Description				RS Part No.	Mfr's Part No.
Q318	2SA1586(Y)	(Marked SY)		PNP		2SA1586(Y)
Q319	2SC4116(Y)	(Marked LY)		NPN		2SC4116(Y)
Q320	XN1111	(Marked 9S)		PNP		XN1111
Q321	XN1111	(Marked 9S)		PNP		XN1111
Q322	UN5111	(Marked 6A)		PNP		UN5111
RESISTORS						
R301	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R302	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R303	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R304	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R305	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R306	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R307	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R308	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603	RCN472J50
R309	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R310	Metal Glaze	470 kohm	1/16 W	+/-5%	0603	RCN474J50
R311	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R312	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R313	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R314	Metal Glaze	220 ohm	1/16 W	+/-5%	0603	RCN221J50
R315	Metal Glaze	33 kohm	1/16 W	+/-5%	0603	RCN333J50
R316	Metal Glaze	10 ohm	1/16 W	+/-5%	0603	RCN100J50
R317	Metal Glaze	47 ohm	1/16 W	+/-5%	0603	RCN470J50
R318	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R319	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R320	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R321	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R322	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R323	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R324	Metal Glaze	1 Mohm	1/16 W	+/-5%	0603	RCN105J50
R325	Metal Glaze	2.2 kohm	1/16 W	+/-5%	0603	RCN222J50
R326	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R327	Metal Glaze	1 kohm	1/16 W	+/-5%	0603	RCN102J50
R328	Metal Glaze	22 kohm	1/16 W	+/-5%	0603	RCN223J50
R329	Metal Glaze	470 ohm	1/16 W	+/-5%	0603	RCN471J50
R330	Metal Glaze	10 kohm	1/16 W	+/-5%	0603	RCN103J50
R331	Metal Glaze	10 kohm	1/16 W	+/-5%	0603	RCN103J50
R332	Metal Glaze	10 kohm	1/16 W	+/-5%	0603	RCN101J50
R333	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R334	Metal Glaze	100 ohm	1/16 W	+/-5%	0603	RCN101J50
R335	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R336	Metal Glaze	560 kohm	1/16 W	+/-5%	0603	RCN564J50
R337	Metal Glaze	1 Mohm	1/16 W	+/-5%	0603	RCN105J50
R338	Metal Glaze	330 ohm	1/16 W	+/-5%	0603	RCN331J50
R339	Metal Glaze	3.3 kohm	1/16 W	+/-5%	0603	RCN332J50
R340	Metal Glaze	100 kohm	1/16 W	+/-5%	0603	RCN104J50
R341	Metal Glaze	1 kohm	1/16 W	+/-5%	0603	RCN102J50
R342	Metal Glaze	1 kohm	1/16 W	+/-5%	0603	RCN102J50
R343	Metal Glaze	47 kohm	1/16 W	+/-5%	0603	RCN473J50
R344	Metal Glaze	22 kohm	1/16 W	+/-5%	0603	RCN223J50
R345	Metal Glaze	10 kohm	1/16 W	+/-5%	0603	RCN103J50

Ref. No.	Description					RS Part No.	Mfr's Part No.
R346	Metal Glaze	10 kohm	1/16 W	+/-5%	0603		RCN103J50
R347	Metal Glaze	47 ohm	1/16 W	+/-5%	0603		RCN470J50
R348	Metal Glaze	100 ohm	1/16 W	+/-5%	0603		RCN101J50
R349	Metal Glaze	1 Mohm	1/16 W	+/-5%	0603		RCN105J50
R350	Metal Glaze	100 ohm	1/16 W	+/-5%	0603		RCN101J50
R351	Metal Glaze	470 ohm	1/16 W	+/-5%	0603		RCN471J50
R352	Metal Glaze	100 ohm	1/16 W	+/-5%	0603		RCN101J50
R353	Metal Glaze	100 kohm	1/16 W	+/-5%	0603		RCN104J50
R354	Metal Glaze	100 ohm	1/16 W	+/-5%	0603		RCN101J50
R355	Metal Glaze	470 ohm	1/16 W	+/-5%	0603		RCN471J50
R356	Metal Glaze	1 kohm	1/16 W	+/-5%	0603		RCN102J50
R357	Metal Glaze	22 kohm	1/16 W	+/-5%	0603		RCN223J50
R358	Metal Glaze	15 kohm	1/16 W	+/-5%	0603		RCN153J50
R359	Metal Glaze	10 kohm	1/16 W	+/-5%	0603		RCN103J50
R360	Metal Glaze	1 kohm	1/16 W	+/-5%	0603		RCN102J50
R361	Metal Glaze	47 kohm	1/16 W	+/-5%	0603		RCN473J50
R362	Metal Glaze	470 kohm	1/16 W	+/-5%	0603		RCN474J50
R363	Metal Glaze	680 ohm	1/16 W	+/-5%	0603		RCN681J50
R364	Metal Glaze	470 ohm	1/16 W	+/-5%	0603		RCN471J50
R365	Metal Glaze	1.5 kohm	1/16 W	+/-5%	0603		RCN152J50
R366	Metal Glaze	22 kohm	1/16 W	+/-5%	0603		RCN223J50
R367	Metal Glaze	15 kohm	1/16 W	+/-5%	0603		RCN153J50
R368	Metal Glaze	33 kohm	1/16 W	+/-5%	0603		RCN333J50
R369	Metal Glaze	1 kohm	1/16 W	+/-5%	0603		RCN102J50
R370	Metal Glaze	100 kohm	1/16 W	+/-5%	0603		RCN104J50
R371	Metal Glaze	47 ohm	1/16 W	+/-5%	0603		RCN470J50
R372	Metal Glaze	100 ohm	1/16 W	+/-5%	0603		RCN101J50
R373	Metal Glaze	470 ohm	1/16 W	+/-5%	0603		RCN471J50
R374	Metal Glaze	22 kohm	1/16 W	+/-5%	0603		RCN223J50
R375	Metal Glaze	15 kohm	1/16 W	+/-5%	0603		RCN153J50
R376	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603		RCN472J50
R377	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603		RCN472J50
R378	Metal Glaze	47 kohm	1/16 W	+/-5%	0603		RCN473J50
R379	Metal Glaze	47 kohm	1/16 W	+/-5%	0603		RCN473J50
R380	Metal Glaze	10 kohm	1/16 W	+/-5%	0603		RCN103J50
R381	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603		RCN472J50
R382	Metal Glaze	47 kohm	1/16 W	+/-5%	0603		RCN473J50
R383	Metal Glaze	15 kohm	1/16 W	+/-5%	0603		RCN153J50
R384	Metal Glaze	4.7 kohm	1/16 W	+/-5%	0603		RCN472J50
R385	Metal Glaze	3.3 kohm	1/16 W	+/-5%	0603		RCN332J50
R386	Metal Glaze	1 kohm	1/16 W	+/-5%	0603		RCN102J50
R387	Metal Glaze	1 kohm	1/16 W	+/-5%	0603		RCN102J50
R388	Metal Glaze	8.2 kohm	1/16 W	+/-5%	0603		RCN822J50

TRANSFORMERS

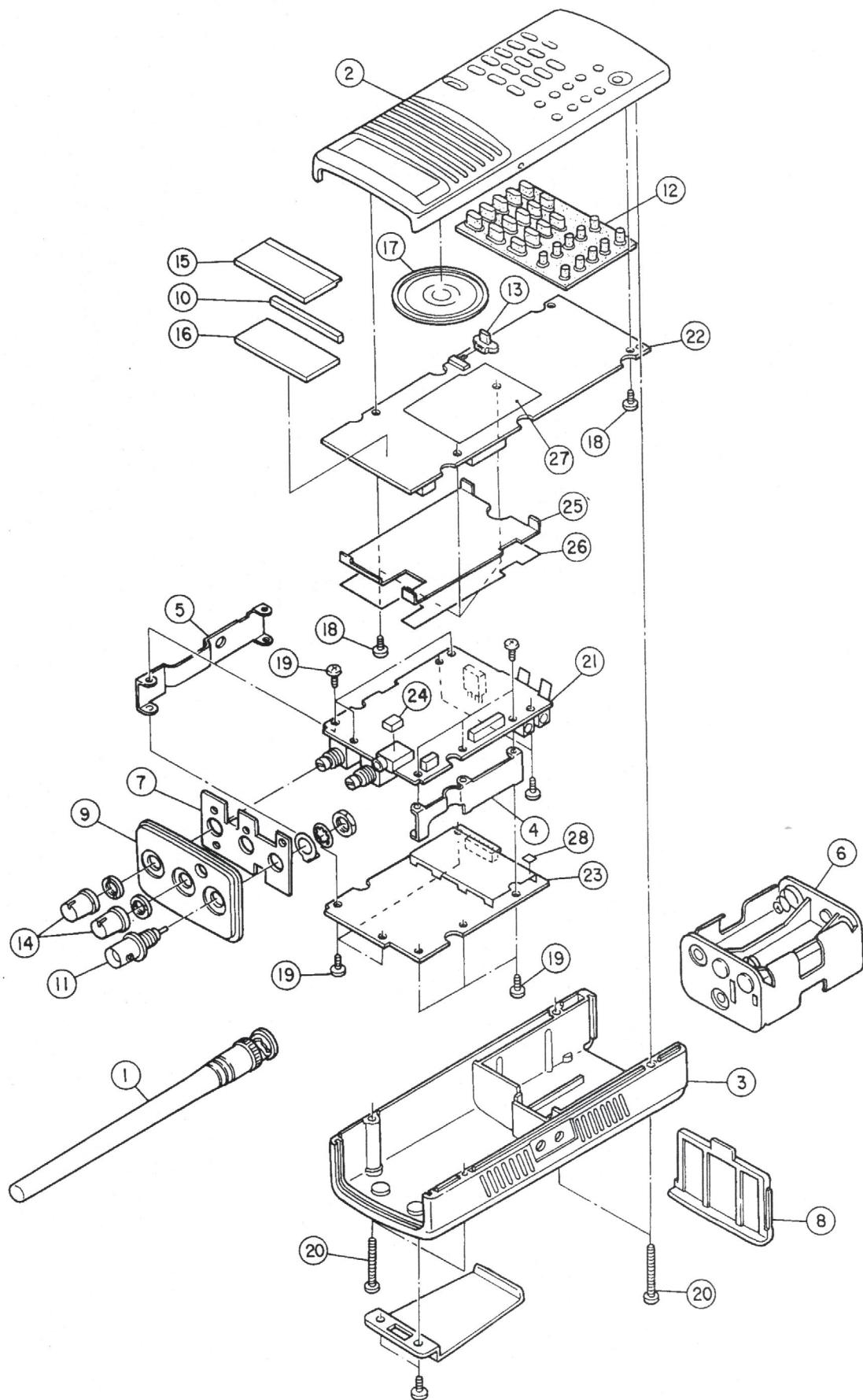
T301	RF (VHF Lo)		5SSR-328
T302	RF (VHF Lo)		5SSR-328
T303	RF (Air)		5SSR-329
T304	RF (VHF Hi)		5SSR-331
T305	RF (Air)		5SSR-330
T306	RF (VHF Hi)		5SSR-331
T307	IF (10.7 MHz)		5SSI-325

Ref. No.	Description	RS Part No.	Mfr's Part No.	
T308	VCO (VHF Lo)		5SSO-332	
T309	VCO (Air, VHF Hi, UHF Lo)		5SSO-333	
TRIMMERS				
TC301	20 pF		ECR-LA020E12	
TC302	20 pF		ECR-LA020E12	
TC303	20 pF		ECR-LA020E12	
TC304	10 pF		ECR-LA010A12	
TC305	30 pF		ECR-LA030E12	
CRYSTAL				
X301	6.4 MHz		GE-87D-7232	
MISCELLANEOUS				
CN301	Connector,	5 Pin	Female	174074-5
CN302	Connector,	6 Pin	Male	IL-Y-6P-S15T2-EF
CN303	Connector,	4 Pin	Male	IL-Y-4P-S15T2-EF
GND1	Pin, Test			GE-87D-7290
GND2	Pin, Test			GE-87D-7290
TP301	Pin, Test			GE-87D-7290
TP302	Pin, Test			GE-87D-7290
TP303	Pin, Test			GE-87D-7290
TP304	Pin, Test			GE-87D-7290
(28)	Shield, VCO			GE-92D-9532
	Fiber, VCO			GE-92D-9600

MECHANICAL PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
①	Antenna, Rubber		GE-91D-9447
②	Assembly, Case Front (Non Repairable)		GA-92D-9544
	Case, Front		GE-91A-9395
	Window, LCD		GE-91C-9208
③	Assembly, Case Rear for USA (Non Repairable)		GA-92D-9572
	Case, Rear		GE-91A-9216
	Clip, Belt		GE-90D-8957
	Screw, 3x5 Bindinghead Machine BLK	(Zn)	BLK BM 3x5 (Zn)
	Label, Model for USA		GE-92D-9537
	Holie, Shield		GE-92D-9621
④	Bracket, PCB (ANT Side)		GE-91D-9214
⑤	Bracket, PCB (VOL Side)		GE-91D-9215
⑥	Case, Battery		GE-91D-9339
⑦	Chassis, Top		GE-91D-9213
⑧	Cover, Battery		GE-91C-9217
⑨	Escutcheon, Top		GE-91C-9205
⑩	Interconnector, LCD		GE-91D-9210
⑪	Jack, Antenna		GE-85D-5383
⑫	Key, Top		GE-91C-9396
⑬	Knob, Key Lock		GE-91D-9211
⑭	Knob, VOL/SQ		GE-91D-9206
⑮	LCD		EDD042ZY7A4
⑯	Reflector, LCD		GE-91D-9209
⑰	Speaker 8 ohm 200 mV		EAS-3P123A
	Wire Kit		#9018(A)
	Hardware Kit		#9108(B)
⑱	Screw, 2x3 Panhead Machine BLK	(Zn)	BLK PM 2x3 (Zn)
⑲	Screw, 2x4 Panhead Machine	(Ni)	PM 2x4 (Ni)
⑳	Screw, 2.6x25 Panhead Machine BLK	(Zn)	BLK PM 2.6x25 (Zn)

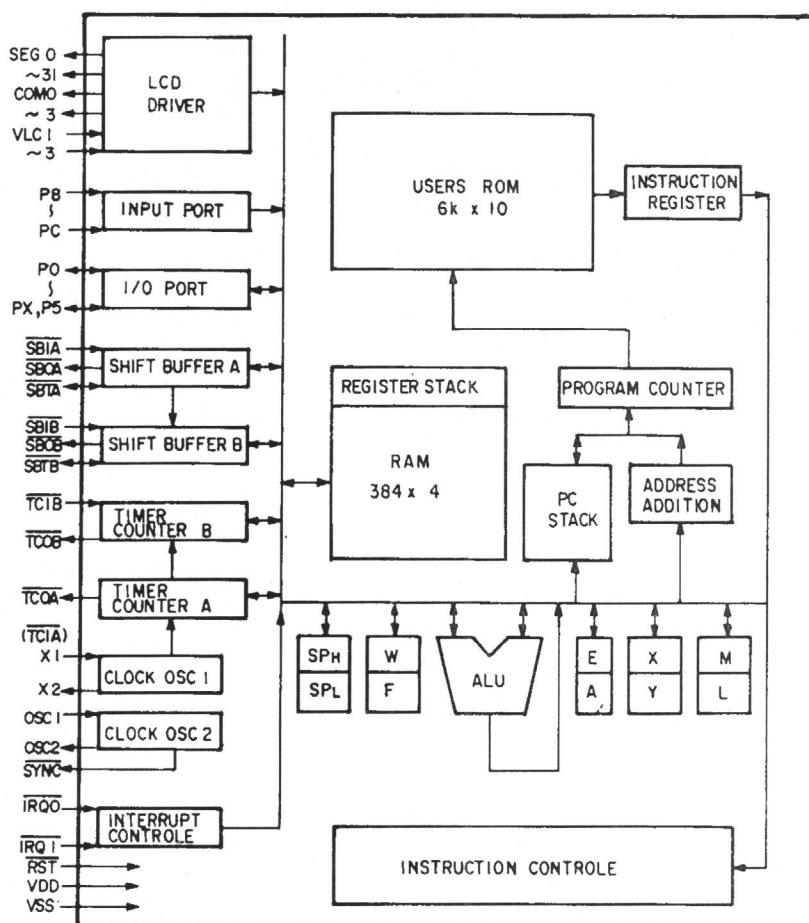
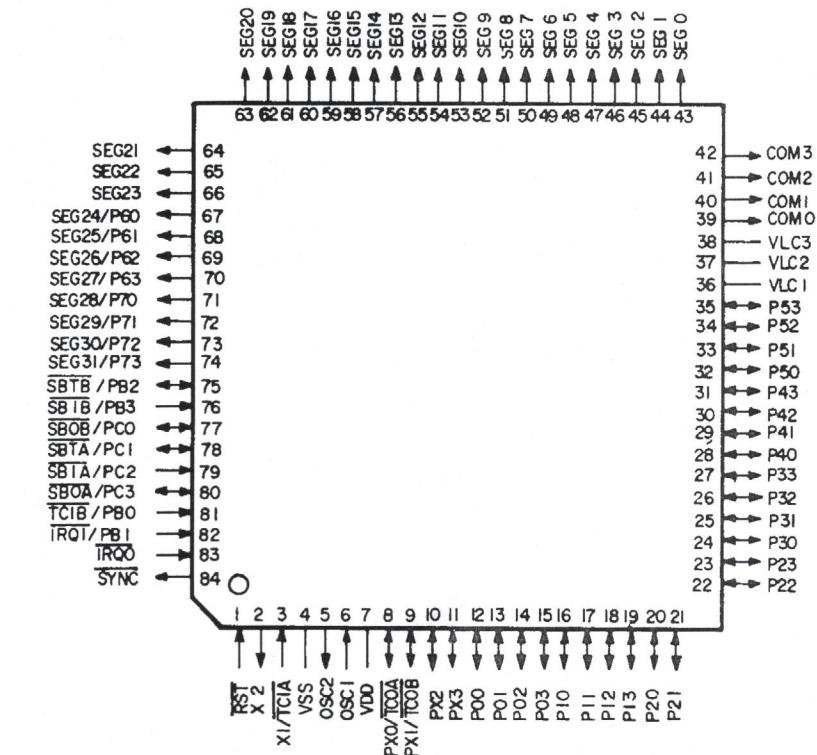
DISASSEMBLY DIAGRAM/EXPLODED VIEW



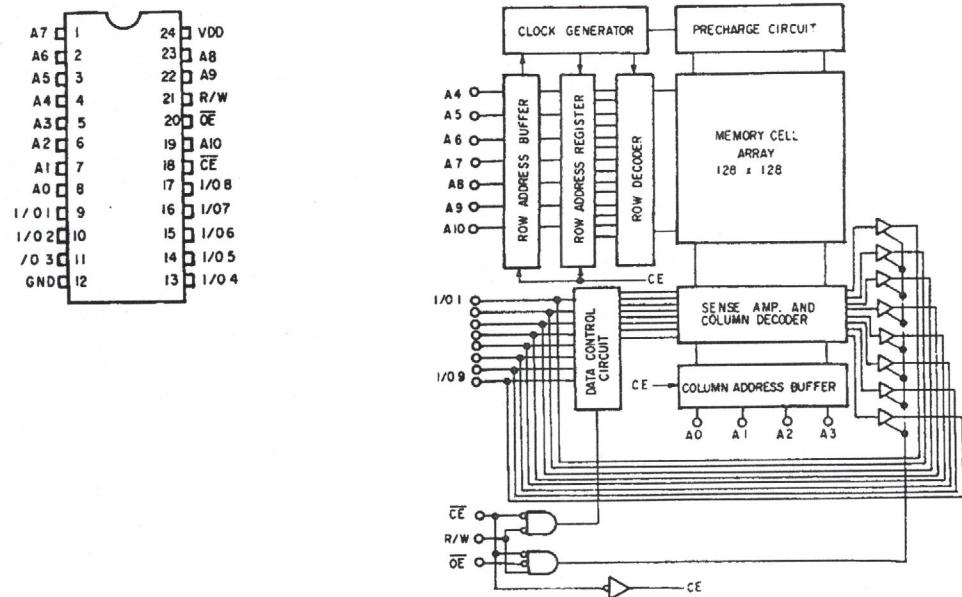
SEMICONDUCTOR LEAD IDENTIFICATION AND IC CIRCUIT DIAGRAM

INTEGRATED CIRCUIT IDENTIFICATION

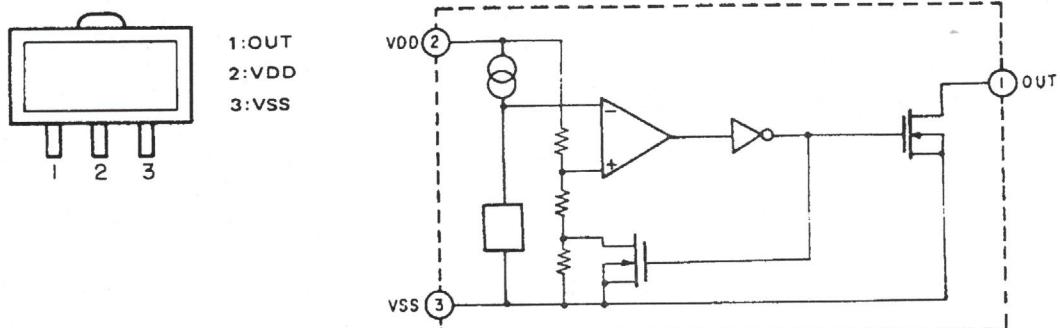
IC1 GRE-9108A



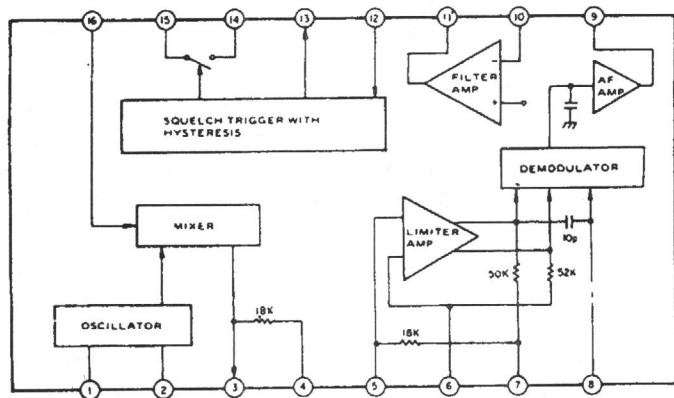
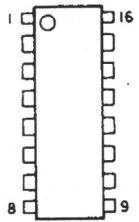
IC2 LC3517BM-10, 12, 15



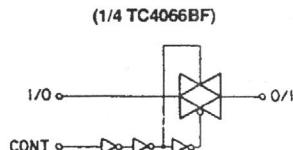
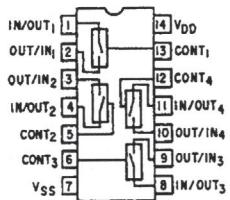
IC3 , IC4 S-8054HN-CB (Marked CB)



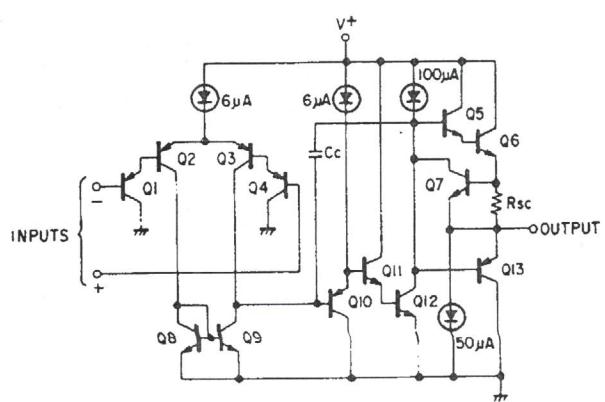
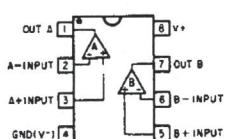
IC201 MC3361N



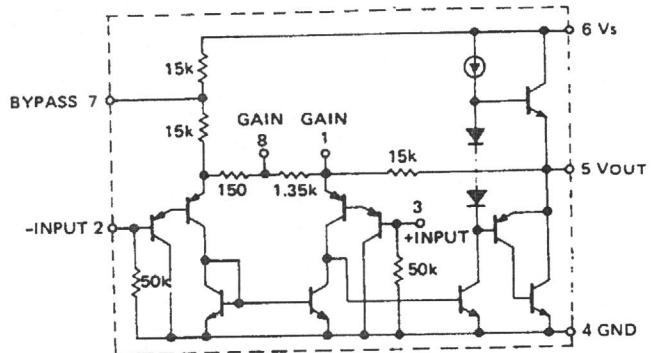
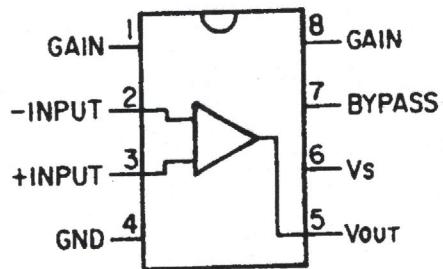
IC202 TC4066BF



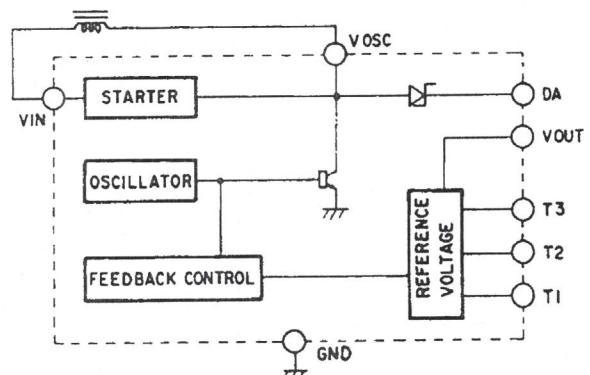
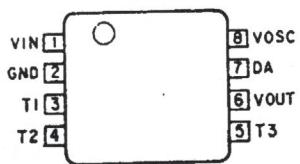
IC203 BA10358F or μ PC358G



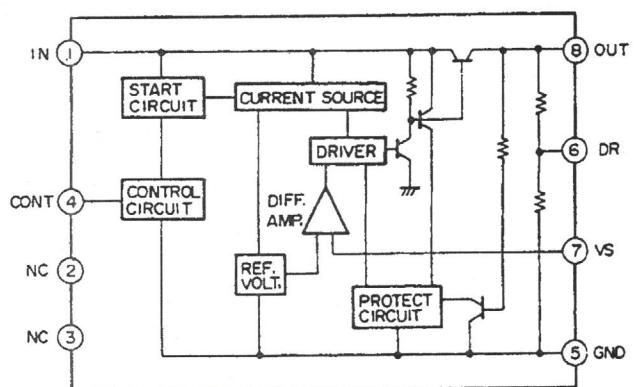
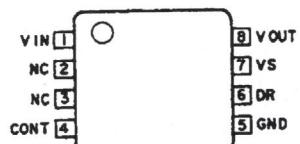
IC204 LM386N-1



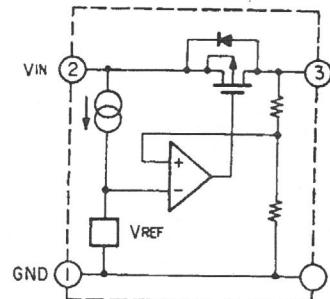
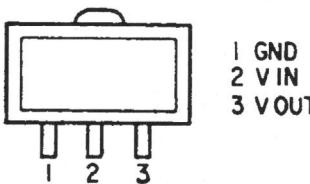
IC205 TK11806M



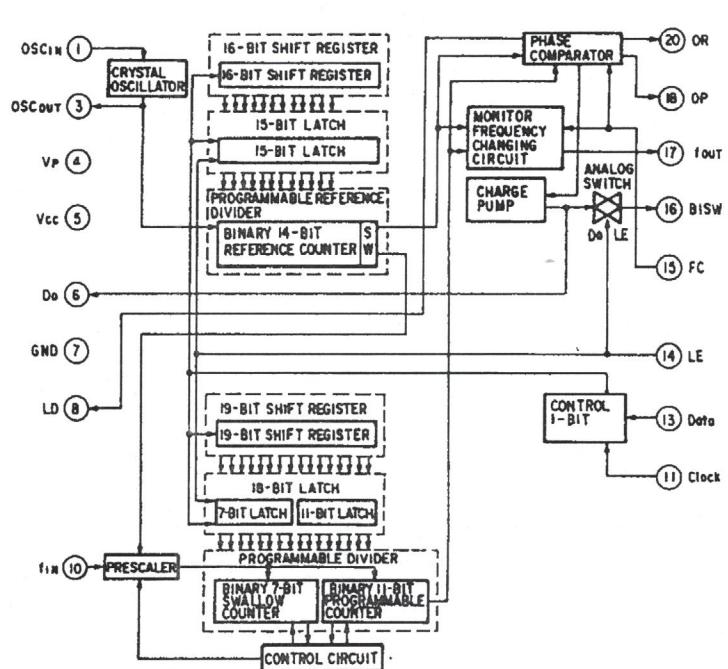
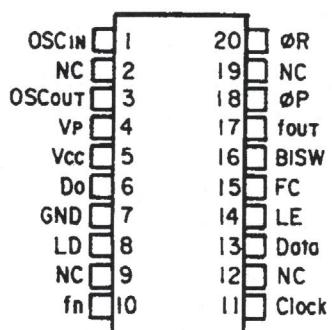
IC206 TK10682M



IC207 S-81250HG-RD



IC301 MB1512PFV-G-BND-EF



TRANSISTOR LEAD IDENTIFICATION

(A) 2SA1586(Y) (Marked SY)

2SC4116(Y) (Marked LY)

2SC4215(O) (Marked QO)

2SC4226(R25) (Marked R25)

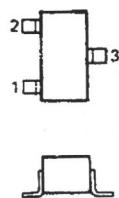
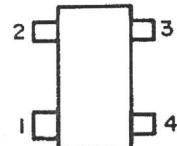
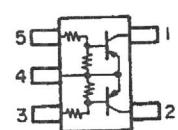
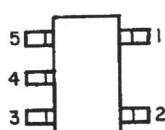
UN5111 (Marked 6A)

UN5211 (Marked 8A)

UN5214 (Marked 8D)

(B) XN1111 (Marked 9S)

(C) 3SK131 (Marked V11)



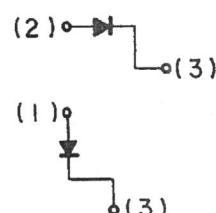
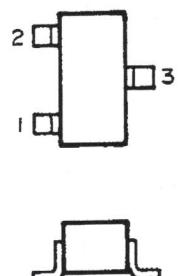
1. Emitter
2. Base
3. Collector

DIODE LEAD IDENTIFICATION

(A) 1SS352 (Marked C1)

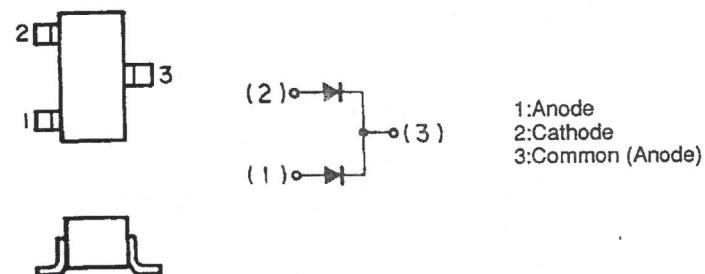


(B) HSM2692 (Marked B1)

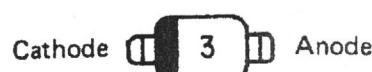


- 1:N.C.
- 2:Anode
- 3:Common(Cathode)

(C) HSM2693A(Marked B4)



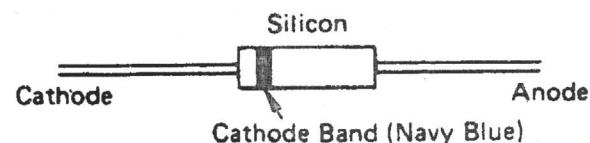
(D) HVU306A (Marked 3)



(E) HVU308 (Marked 8)



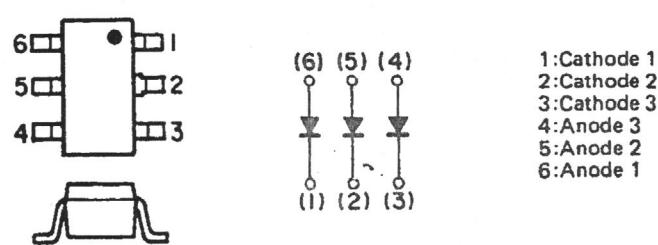
(F) HZ18-2L



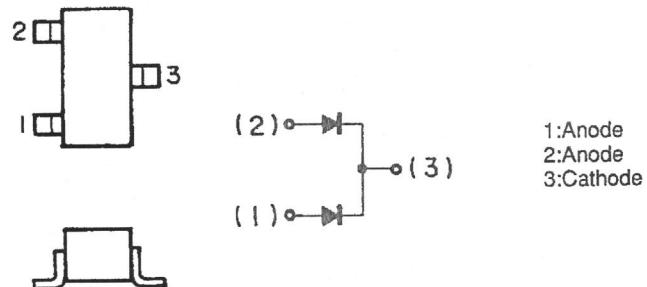
(G) MA110 (Marked 1A)



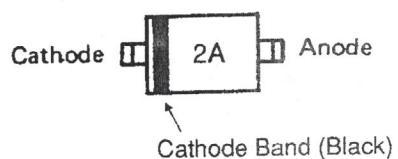
(H) MA121 (Marked M2D)



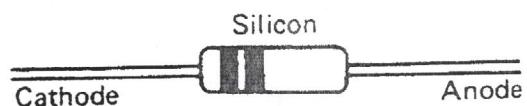
(I) MA141WK (Marked MT)



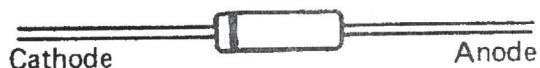
(J) MA728 (Marked 2A)



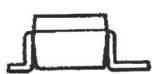
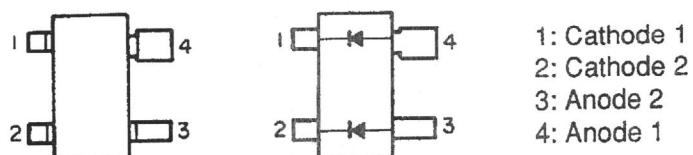
(K) S5566B



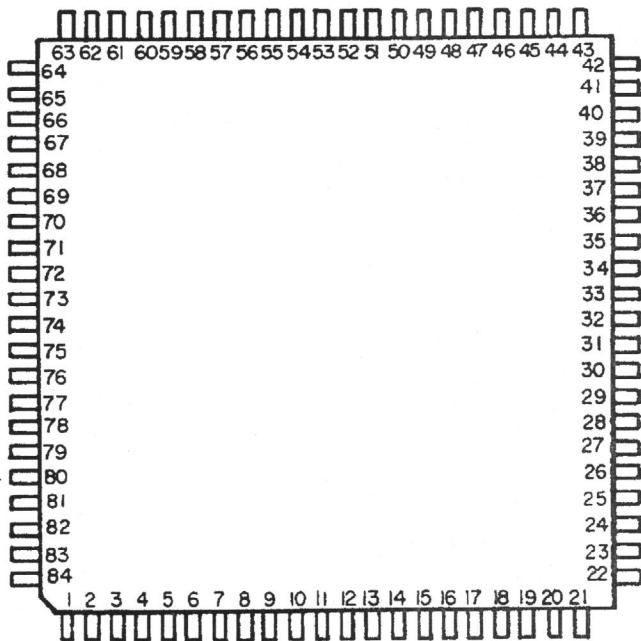
(L) SD103



(M) 1SS306 (Marked A3)
or 1SS272 (Marked A1)

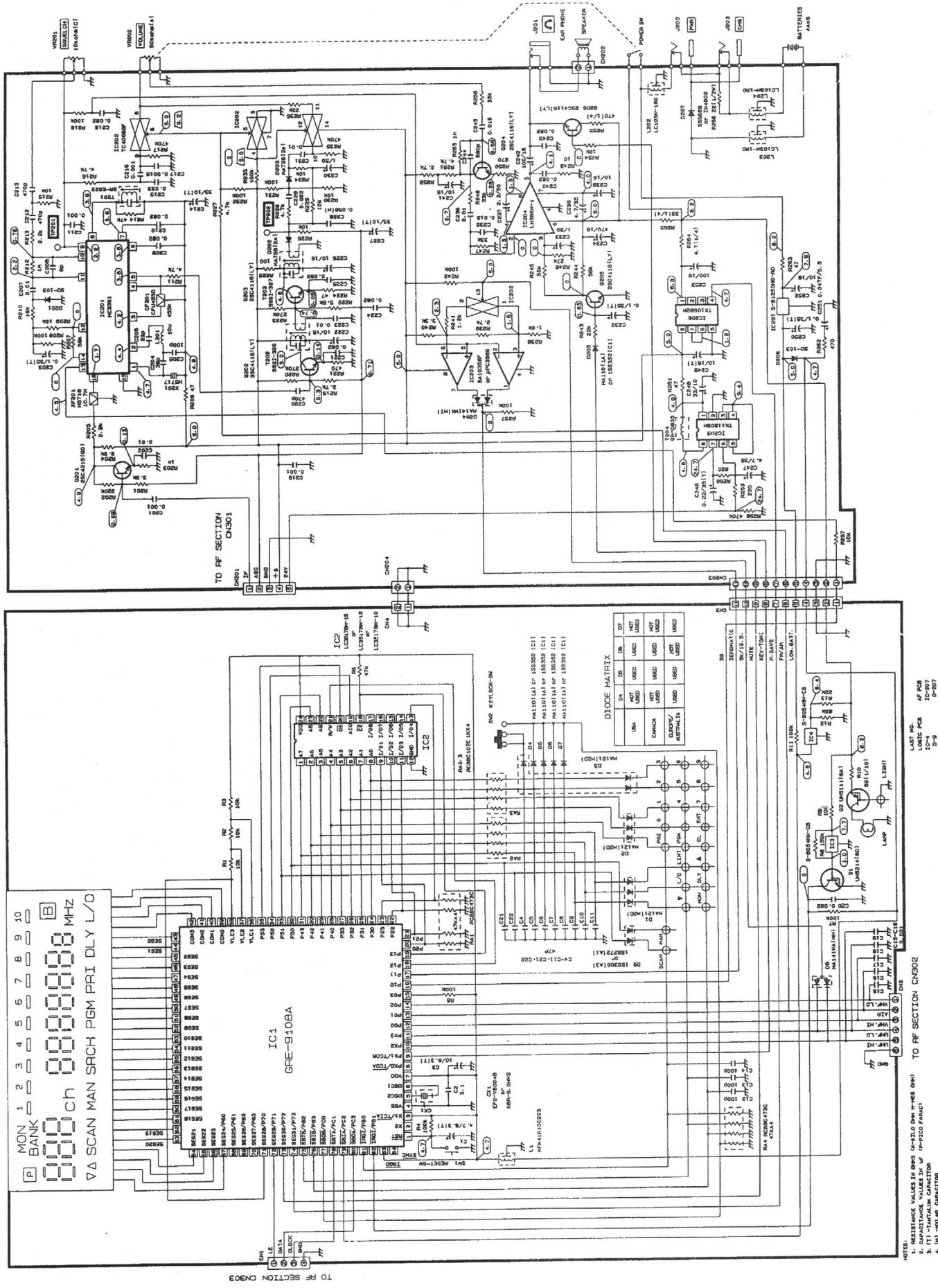


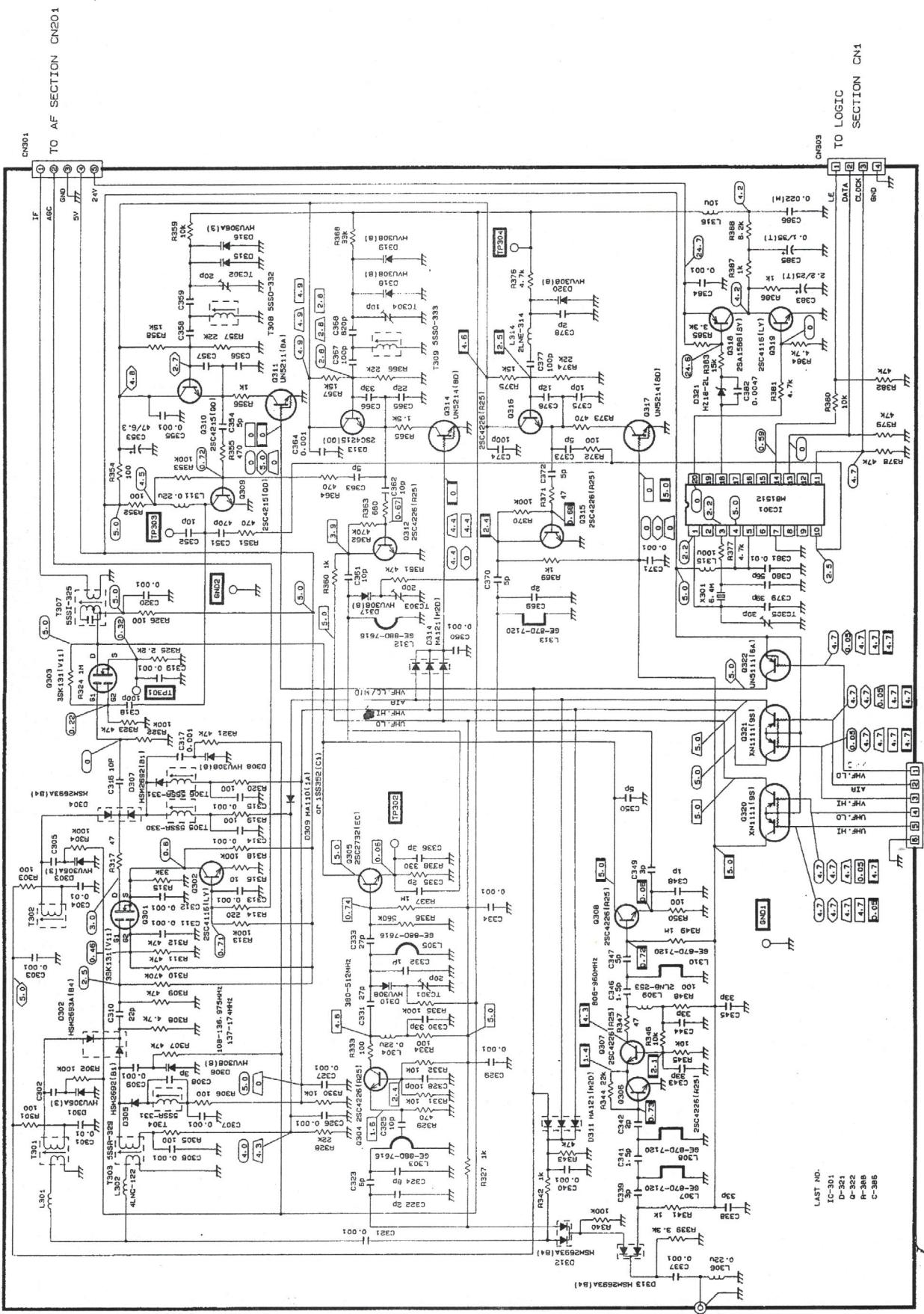
MICROPROCESSOR (IC1) PORT FORMAT



Pin No.		Pin No.	
1	Initialize signal input	43	LCD segment driver output
2	Not used	44	LCD segment driver output
3	+B	45	LCD segment driver output
4	Vss	46	LCD segment driver output
5	Resonator connection terminal	47	LCD segment driver output
6	Resonator connection terminal	48	LCD segment driver output
7	Vpp	49	LCD segment driver output
8	Not used	50	LCD segment driver output
9	Peep output	51	LCD segment driver output
10	BAND UHF HI	52	LCD segment driver output
11	BAND UHF LO	53	LCD segment driver output
12	BAND VHF HI	54	LCD segment driver output
13	BAND Air	55	LCD segment driver output
14	BAND VHF LO OR MID	56	LCD segment driver output
15	Switch	57	LCD segment driver output
16	Squelch input	58	LCD segment driver output
17	Zeromatic input	59	LCD segment driver output
18	Memory R/W output	60	LCD segment driver output
19	Memory CE output	61	LCD segment driver output
20	Memory I/O 1	62	LCD segment driver output
21	Memory I/O 2	63	LCD segment driver output
22	Memory I/O 3	64	LCD segment driver output
23	Memory I/O 4	65	LCD segment driver output
24	Memory adres A0	66	LCD segment driver output
25	Memory adres A1	67	LCD segment driver output
26	Memory adres A2	68	Not used
27	Memory adres A3	69	Not used
28	Memory adres A4	70	Not used
29	Memory adres A5	71	LCD bias control
30	Memory adres A6	72	PLL latch output
31	Memory adres A7	73	Mute output
32	Memory adres A8	74	Power control
33	Memory adres A9	75	Key input
34	Memory adres A10	76	Key input
35	Memory OE output	77	Band select
36	LCD drive power supply	78	Serial clock output
37	LCD drive power supply	79	Low battery input
38	LCD drive power supply	80	Serial data output
39	LCD common driver output	81	Key input
40	LCD common driver output	82	HOLD' input
41	LCD common driver output	83	+B
42	LCD common driver output	84	Timing output (Not used)

SCHEMATIC DIAGRAM





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