

# handic<sup>®</sup>



SERVICE MANUAL  
FOR  
**handic 007**  
SCANNER RECEIVER  
AND  
FM BROADCAST RADIO  
IN COMBINATION



**handic**  
bolagen



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## SPECIFICATIONS

Description	Nominal spec.	Limit spec.
<b>AUTO SCANNING SECTION</b>		
Frequency coverage VHF Hi VHF Mid	166 ± 4 MHz 79 ± 3 MHz	148 – 174 MHz 75 – 85 MHz
Scanning rate	20 channels/sec.	15 – 25 channels/sec.
Squelch delay time	2 sec.	1.5 – 3 sec.
Sensitivity (N.Q. = 20 dB) VHF Hi VHF Mid	0.5 μV at 166 ± 2 MHz 1 μV at 166 ± 4 MHz 0.5 μV at 79 ± 1.5 MHz 1 μV at 79 ± 3 MHz	1 μV at 166 ± 2 MHz 2 μV at 164 ± 4 MHz 1 μV at 79 ± 1.5 MHz 2 μV at 79 ± 3 MHz
Selectivity -6dB -50dB	±13.5 kHz ±20 kHz	≥ ±12.5 kHz ≤ ± 25 kHz
Spurious rejection	50 dB	40 dB
IF rejection	70 dB	50 dB
Image rejection ratio	35 dB at 166 MHz 45 dB at 79 MHz	30 dB at 166 MHz 40 dB at 79 MHz
Modulation acceptance	±7 kHz	± 5 kHz
Intermediate frequency 1st 2nd	10.7 MHz 455 kHz	
Filter	Ceramic filter (10.7 MHz and 455 kHz)	
Squelch sensitivity Threshold Tight	0.25 μV 35 dB noise quieting	1 μV at 79 and 166 MHz ≥ 25 dB noise quieting
Squelch quieting	50 dB	40 dB
Squelch to noise ratio (100 μV 5 kHz Div. at 1 kHz)	50 dB	40 dB
Residual noise (Vol. Min.)	3 mV	5 mV at 3.2 ohm
Crystal frequency VHF Hi VHF Mid	$F_{xtal} = \frac{F_{rec} - 10.7}{3}(\text{MHz})$ $F_{xtal} = \frac{F_{rec} + 10.7}{2}(\text{MHz})$	
Type of crystal	HC-25/u	
Type of resonance	Series resonance	
Capacitive load	20 pF + 20 × 10 <sup>-6</sup> = F <sub>0</sub>	
Equiv. resistance	Max. 35 Ω	
Freq. tolerance	±15 × 10 <sup>-6</sup>	

Description	Nominal spec.	Limit spec.
<b>FM ENTERTAINMENT SECTION</b>		
Tuning range	87.5 – 108.5 MHz	88 – 108 MHz
Sensitivity (S+N)/N=30 dB Dev.=22.5 kHz at 1 kHz Output=1 watt	2 $\mu$ V	5 $\mu$ V
Intermediate frequency	10.85 MHz	
IF rejection ratio	90 dB	60 dB
Image rejection ratio	45 dB	30 dB
AM suppression (Input=10 $\mu$ V over 50 $\Omega$ )	40 dB	20 dB
AFC holding range (-3dB point) 500 $\mu$ V Input 10 $\mu$ V Input	700 kHz 700 kHz	500 kHz 150 kHz
Semiconductors	6 integrated circuits, 1 FET, 38 transistors, 1 zener diode and 43 diodes	
Channels	8 channels	
Operating voltage	13.8 V DC (12 to 15 Volts)	
Polarity	Negative ground only	
DC power cable	3 feet with in-line fuse	
Power consumption	10 watts	
Audio Output	More than 2.8 watt at 10% T.H.D. (3.2 $\Omega$ Load)	
Antenna matching impedance	50 ohms	
Speaker matching impedance	3.2 – 16 ohms	
Speaker	Built-in 100 mm, dynamic type (8 ohm)	
Controls	Volume with power switch Squelch 8 channel by-pass switches FM entertainment tuning Priority switch for channel 1 Auto-Manual switch Manual channel selector switch FM-SCAN switch MIX-OFF switch PARA-SEPA antenna switch	
Jacks	Antenna (Motorola type) External speaker	
Channel indication	8 lamps	
FM dial scale	Illuminated slide rule type	
Size	210(W) x 65(H) x 200(D) mm.	

# DISASSEMBLY INSTRUCTION

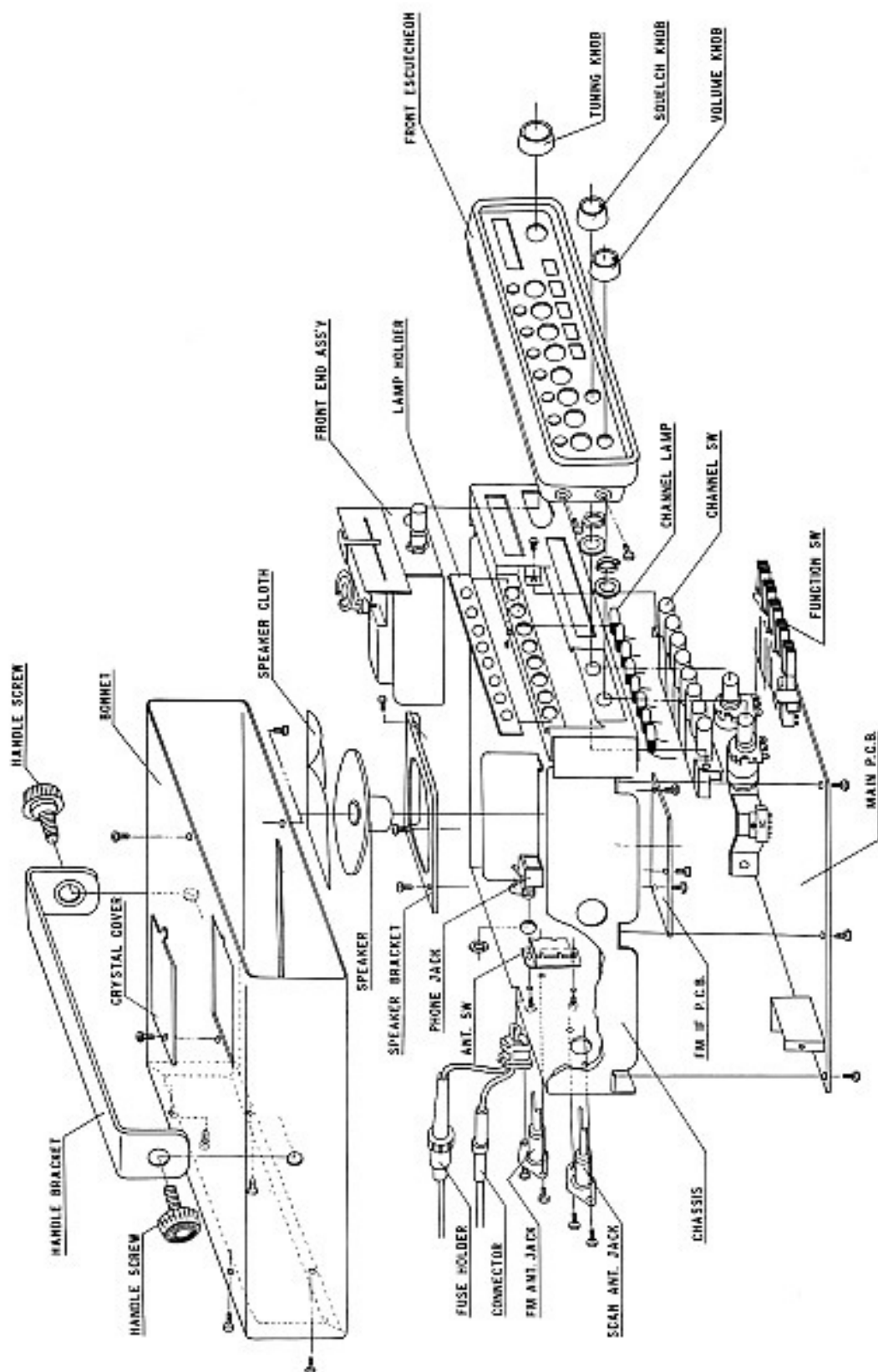


FIGURE 1

## REMOVAL OF THE BONNET

- Step 1: Remove both handle screws(A) and remove the handle bracket as shown.
- Step 2: Remove crystal cover screw(B) and remove the crystal cover as shown.
- Step 3: Remove screws(C) as shown (one each from top and bottom of unit).
- Step 4: Remove chassis mounting screws(D) from the rear as shown.
- Step 5: Push out the chassis from the rear.

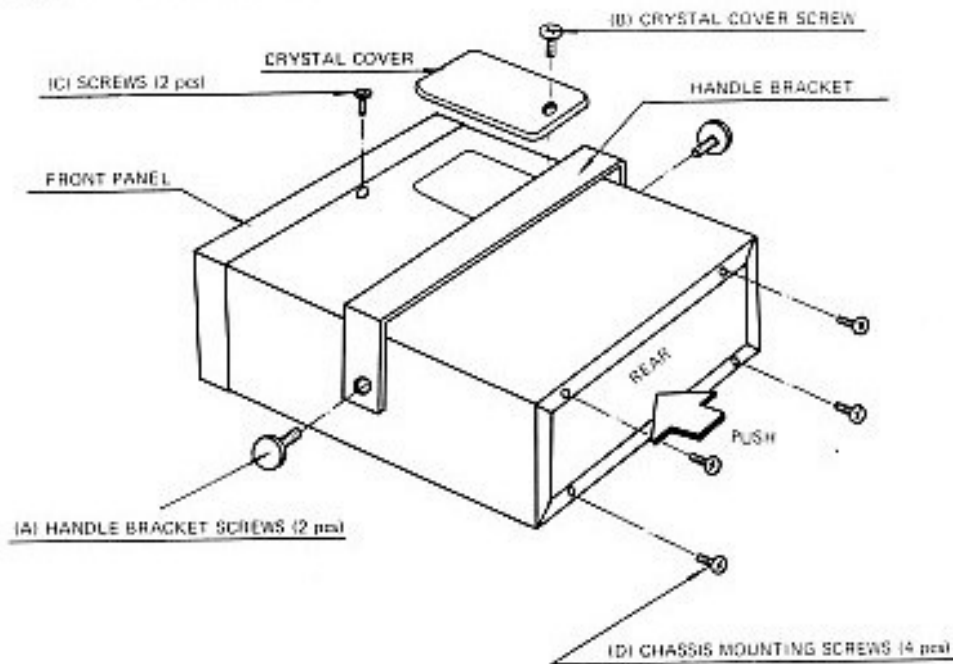


FIGURE 2

## DIAL STRING DIAGRAM

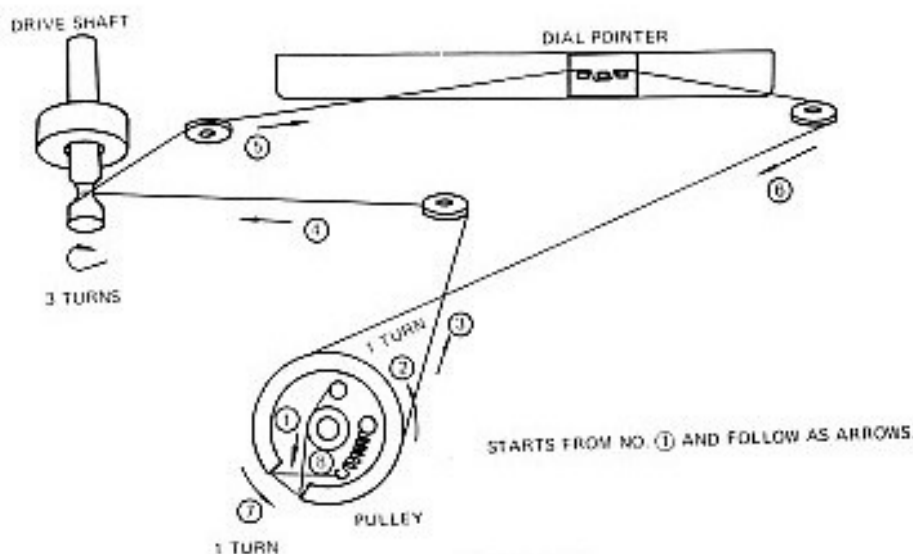


FIGURE 3

## GENERAL ALIGNMENT INSTRUCTIONS

Test equipment required:

1. Oscilloscope
2. Slow sweep generator with variable marker (10.7 – 10.85 MHz)
3. RF standard signal generator (75 – 174 MHz) (S.S.G.)
4. RF sweep generator with variable marker (75 – 174 MHz)
5. AC V.T.V.M.
6. DC V.T.V.M.
7. Frequency counter (0 – 50 MHz)

**Note:** A non-metallic alignment tool is required for complete alignment.  
 The test equipment and receiver should be warmed up at least 10 minutes before proceeding to the complete alignment.  
 Input signal from generator should be kept as low as possible.

## ALIGNMENT POSITIONS

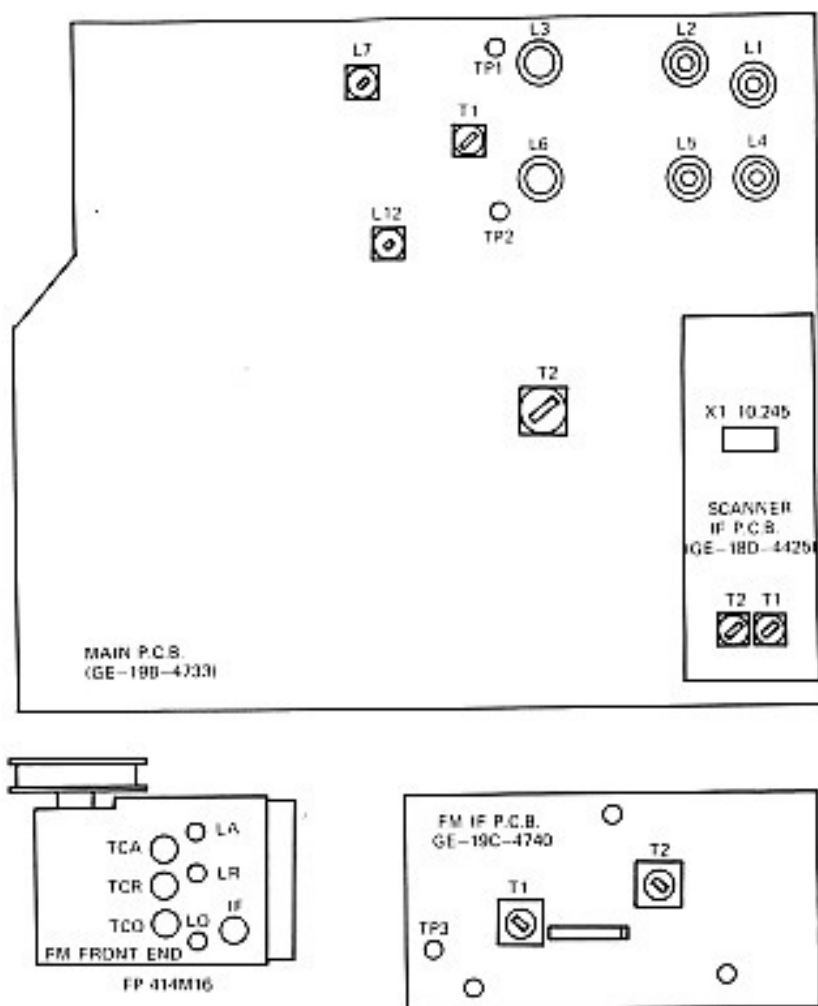


FIGURE 4

## SCANNER LOCAL OSCILLATOR CHECK

- Step 1: Connect Frequency Counter to L12(Mid) and L7(Hi) with a pick-up coil.  
 Step 2: Check the crystal frequency on the Frequency Counter.  
 Step 3: The crystal frequencies required are found by the following formulas:

Receiving Range	Required Frequency	Alignment coil
VHF Mid 74 – 85 MHz	$\frac{Fr + 10.7 \text{ MHz}}{2}$	L7
VHF Hi 148 – 174 MHz	$\frac{Fr - 10.7 \text{ MHz}}{3}$	L12

## LOCAL OSCILLATOR FREQUENCY CHECK (Q2)

- Step 1: Connect Frequency Counter through a 10pF capacitor to Q2 emitter circuit.  
 Step 2: Read frequency on the Frequency Counter.  
 Normal: 10.245 MHz  $\pm$  1 kHz.

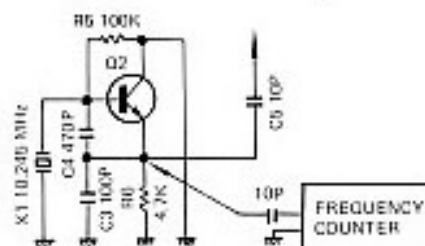


FIGURE 5

## SCANNER IF ALIGNMENT

- Step 1: Connect instruments as shown in Fig. 6.  
 Step 2: Adjust T1 and T2 of IF amplifier so that 455 kHz marker is in the center of the discriminator curve as shown in Fig. 7.

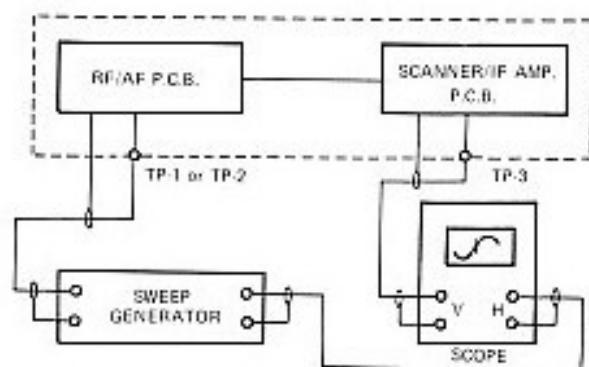


FIGURE 6

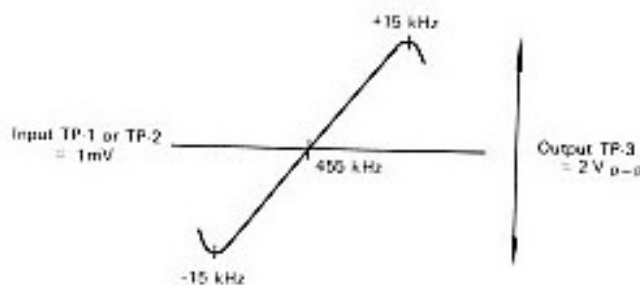


FIGURE 7



## SCANNER RF ALIGNMENT

Step 1: Connect instruments as shown in Figure 8.

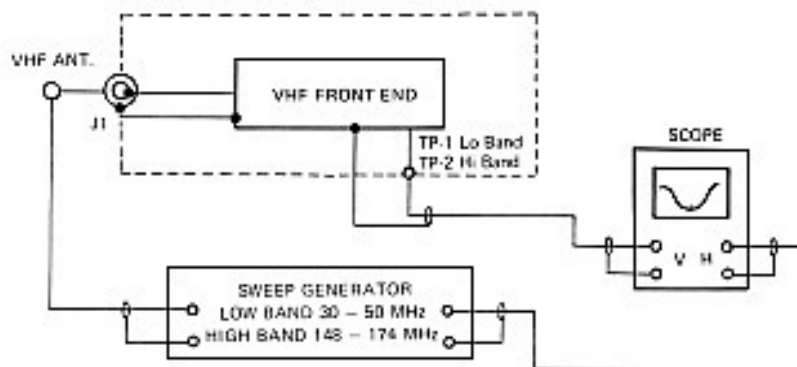


FIGURE 8

## SCANNER VHF MID ALIGNMENT

- Step 1: Put crystal in socket.
- Step 2: Tune sweep generator point on sweep center frequency at 70 MHz.
- Step 3: Adjust L4, L5 and L6 results at maximum output and best symmetry curve as shown in Figure 9.

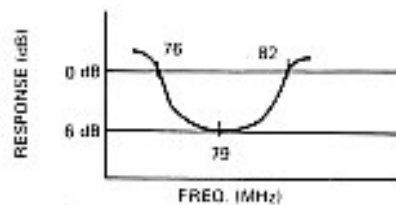


FIGURE 9

## SCANNER VHF HIGH ALIGNMENT

- Step 1: Tune sweep generator point on sweep center frequency at 166 MHz (not necessary put in crystal).
- Step 2: Adjust L1, L2 and L3 results at maximum output and best symmetry curve as shown in Figure 10.

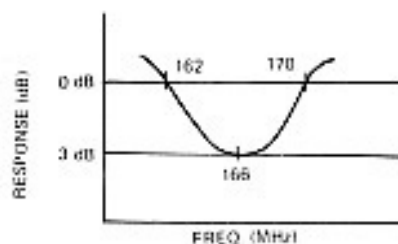


FIGURE 10

## FM SECTION ALIGNMENT

Step 1: FM IF SECTION (10.85 MHz)

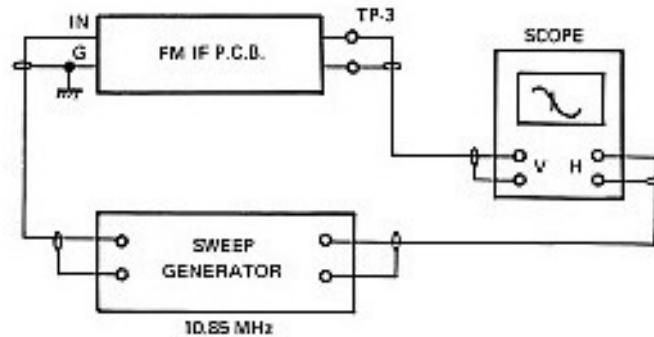


FIGURE 11

Step 1: Connect instruments as shown in Figure 11.

Step 2: Adjust T1 and T2 so that 10.85 MHz marker is in the center of the discriminator curve as shown in Figure 12.

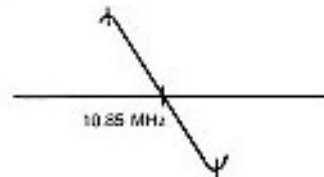


FIGURE 12

## FM TRACKING ALIGNMENT

Step 1: Connect instruments as shown in Figure 13.

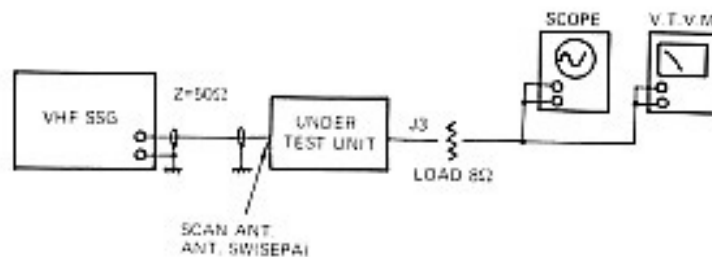


FIGURE 13

- Step 2: Set receiver pointer at 88 MHz and SSG also set on 88 MHz.
- Step 3: Adjust LO, LR and LA results at maximum output wave form when SSG input at minimum as possible.  
Next set on 108 MHz and adjust trimmer condensers TCO, TCR and TCA at maximum sensitivity.
- Step 4: Check the output level of SSG at 98 MHz and receiver pointer at 98 MHz.
- Step 5: Repeat step 2 to 4 if necessary.

## SCANNER SECTION ALIGNMENT

- Step 1: Connect instruments shown in Figure 13. Install crystals in sockets of VHF Hi (166 MHz) and VHF Mid (79 MHz).
- Step 2: Tune SSG for best output signal with the installed crystals. Keep SSG output signal at low as possible with modulation at 1 kHz and deviation at 5 kHz.
- Step 3: Adjust T1 (Main P.C. Board) and oscillator coil L7(Hi) or L12(Mid) for maximum output.
- Step 4: Adjust Volume control clockwise to set the output noise level to 0dB. (0dB=0.775 volts) with SSG output at minimum.  
Increase input level of SSG (no modulation) so that output level of receiver goes 20dB down from 0dB.  
Sensitivity means the value of SSG attenuator.  
This value level is noise quieting=20dB.

## SQUELCH ALIGNMENT

- Step 1: Adjust T2 to maximum inductance. (Inductance of coil will be at the maximum when the core is fully inserted).
- Step 2: Farther alignment is not required.

# BLOCK DIAGRAM

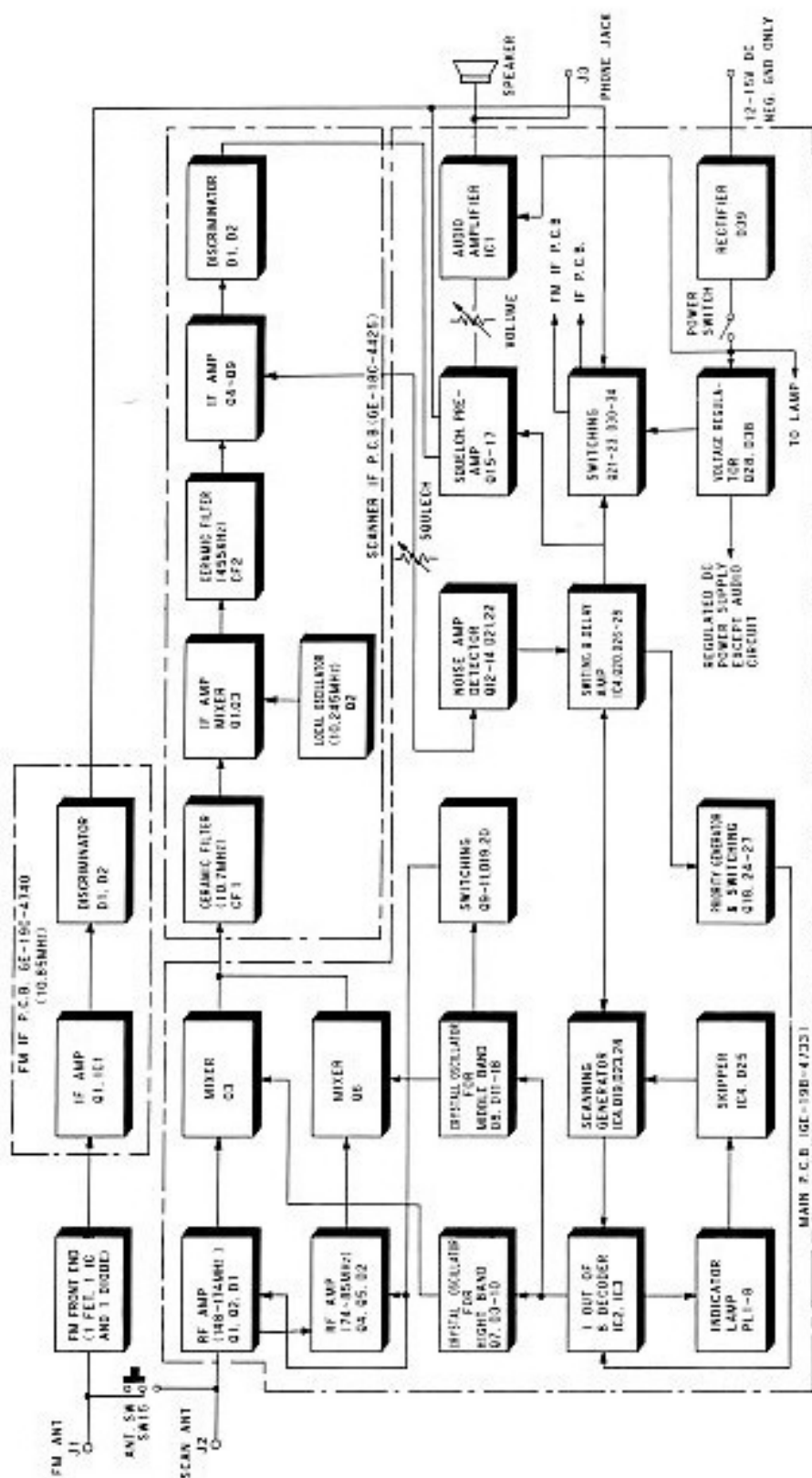
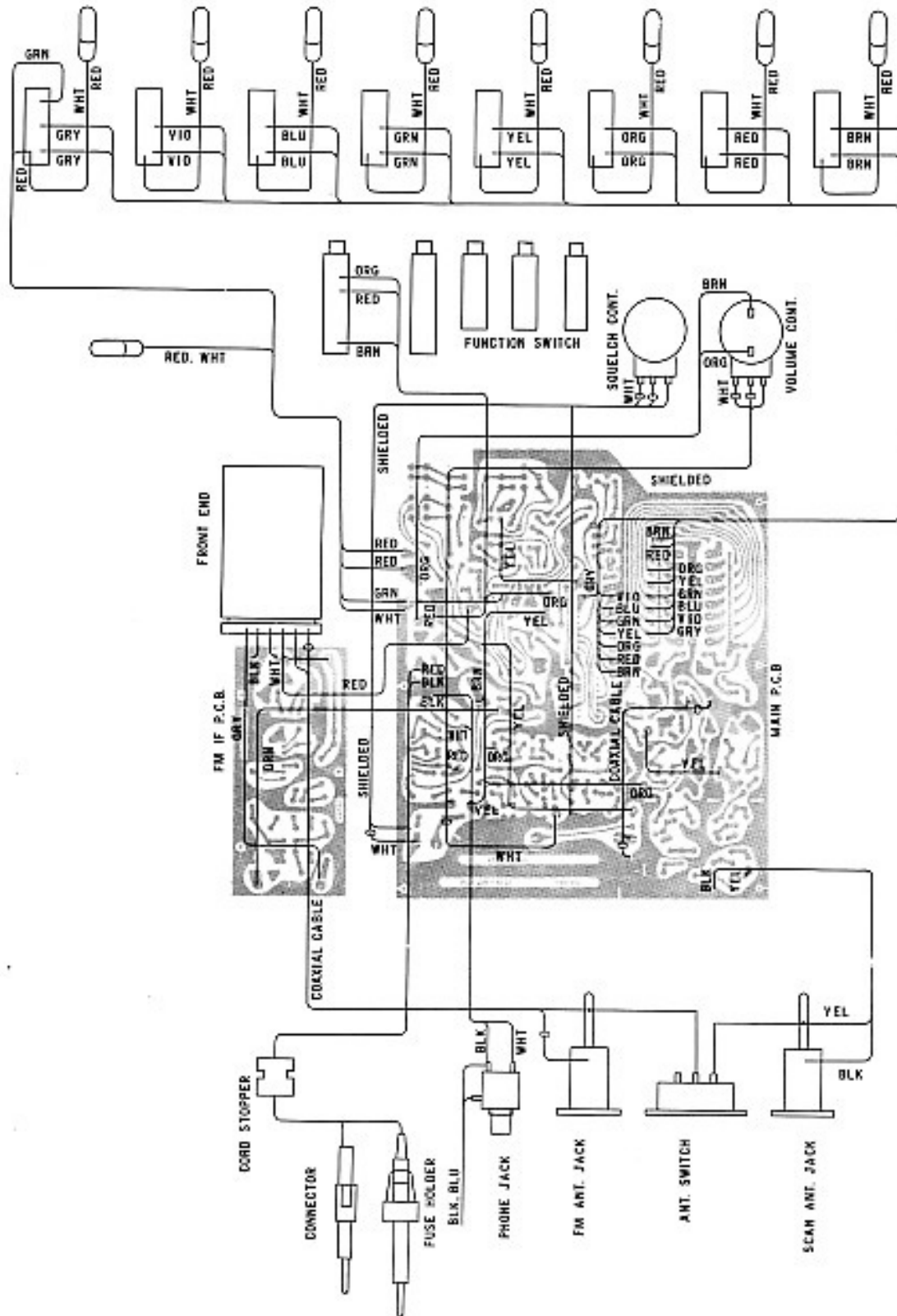


FIGURE 14

# WIRING DIAGRAM



CHANNEL LAMP. CHANNEL SWITCH

FIGURE 15

# MAIN PRINTED CIRCUIT BOARD TOP VIEW

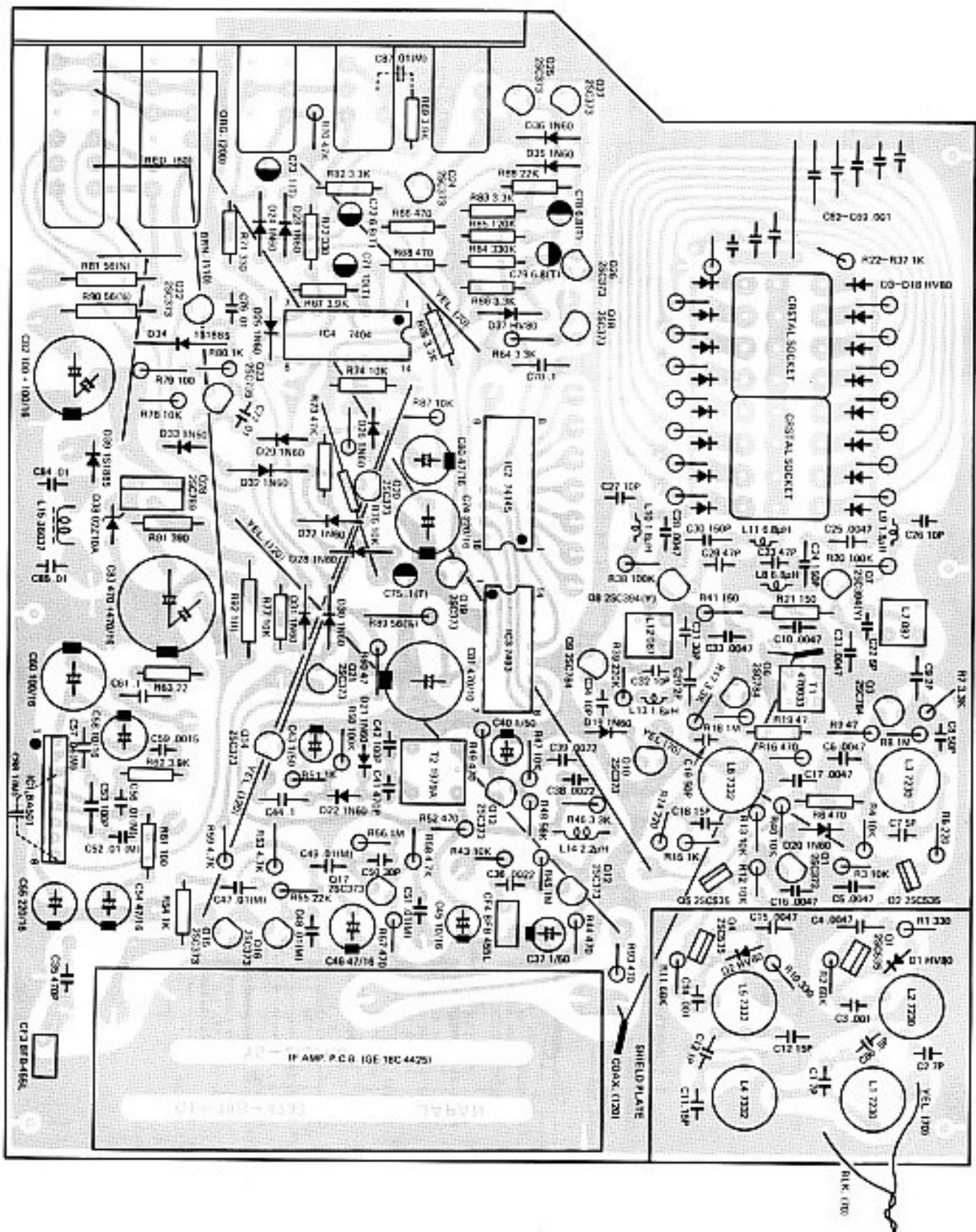


FIGURE 16

# MAIN PRINTED CIRCUIT BOARD BOTTOM VIEW

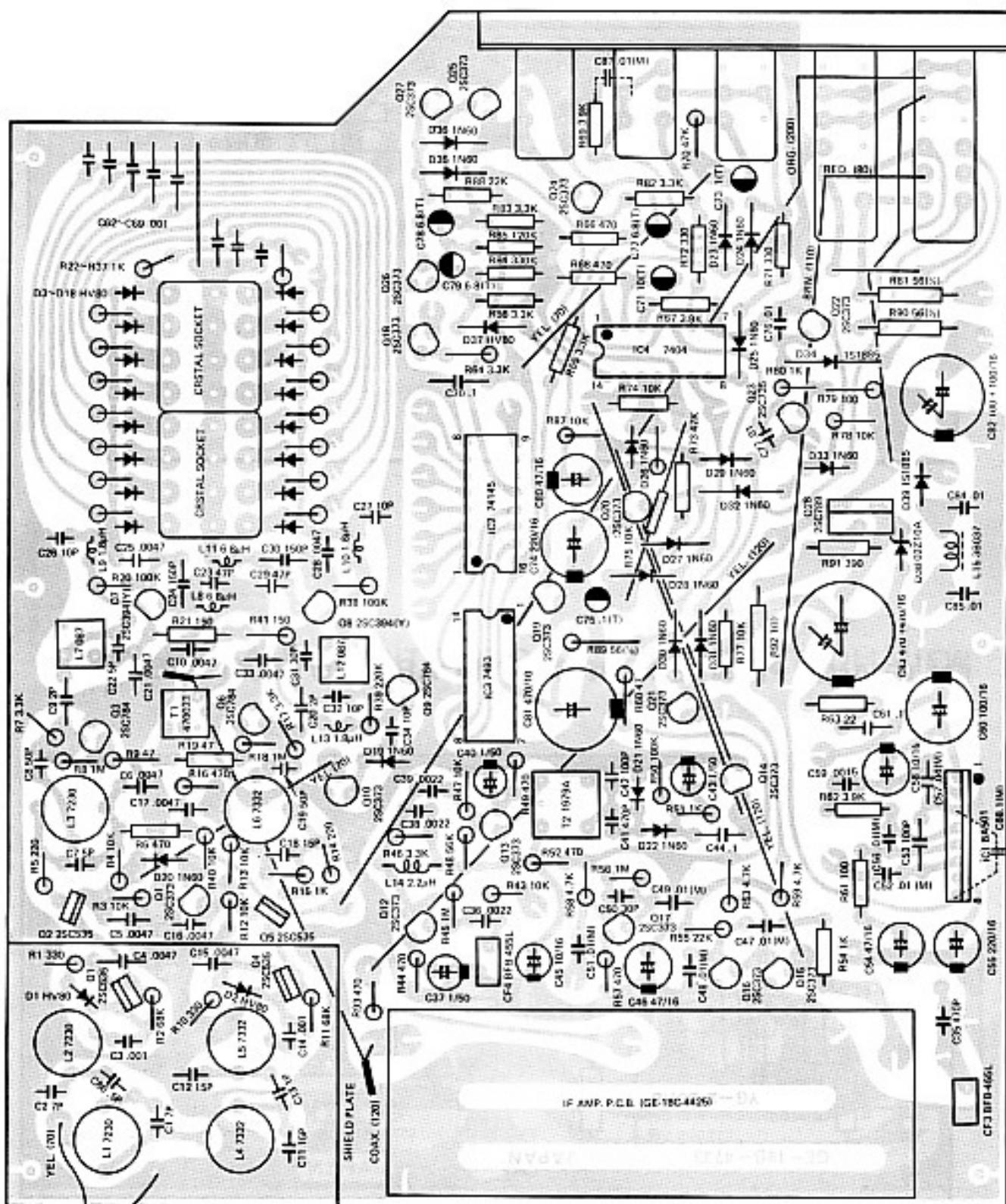


FIGURE 17

# FM IF AMP. PRINTED CIRCUIT BOARD TOP VIEW

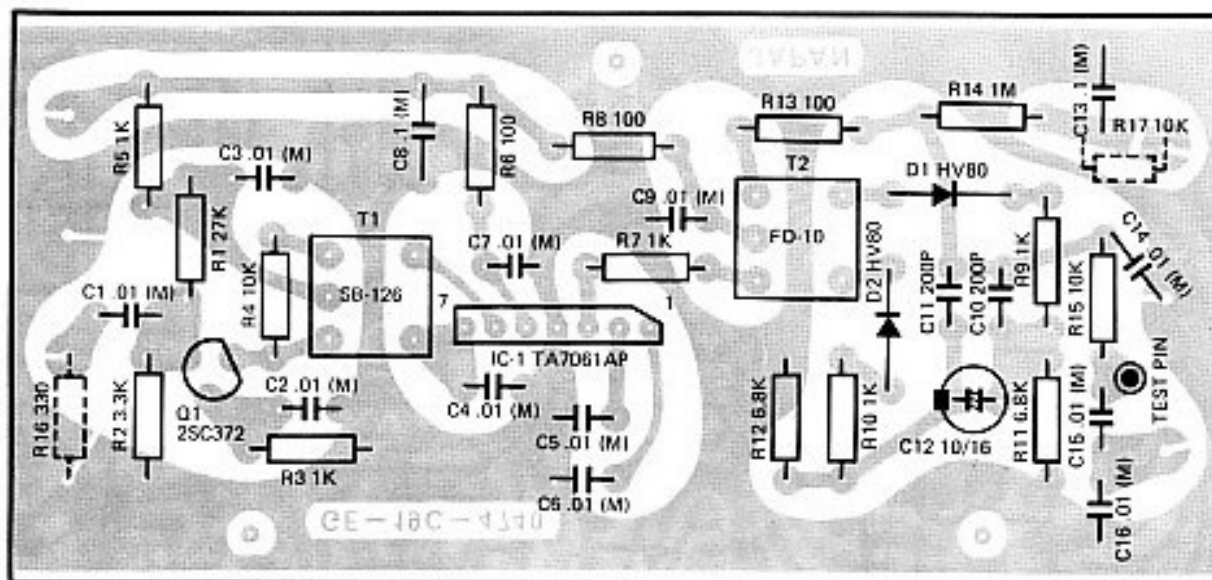


FIGURE 18

# FM IF AMP. PRINTED CIRCUIT BOARD BOTTOM VIEW

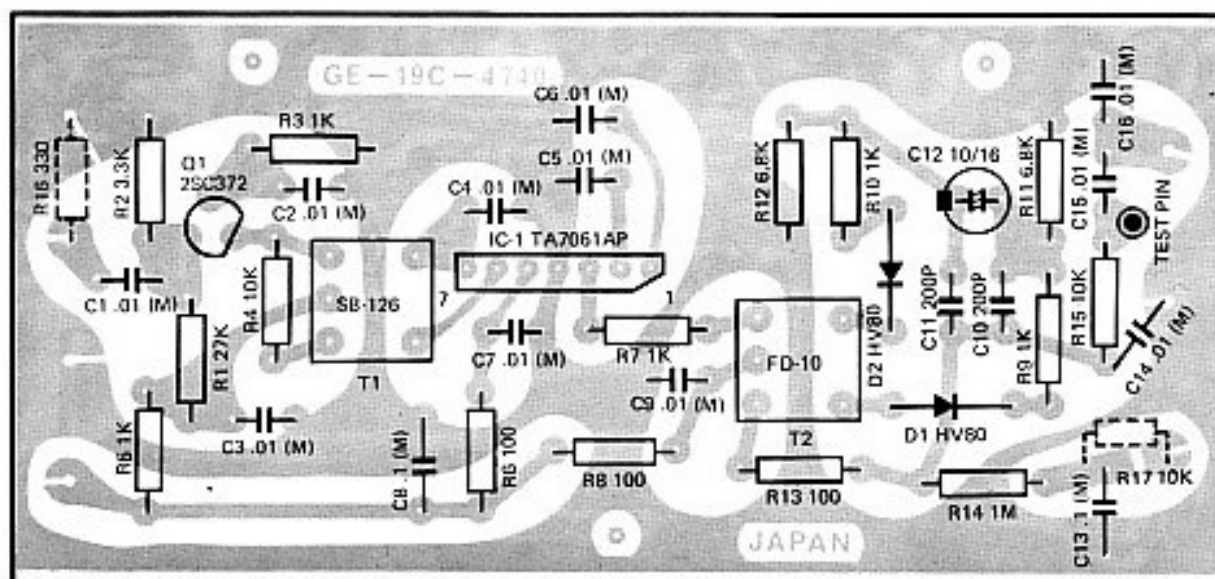


FIGURE 19



# SCANNER IF AMP. PRINTED CIRCUIT BOARD TOP VIEW

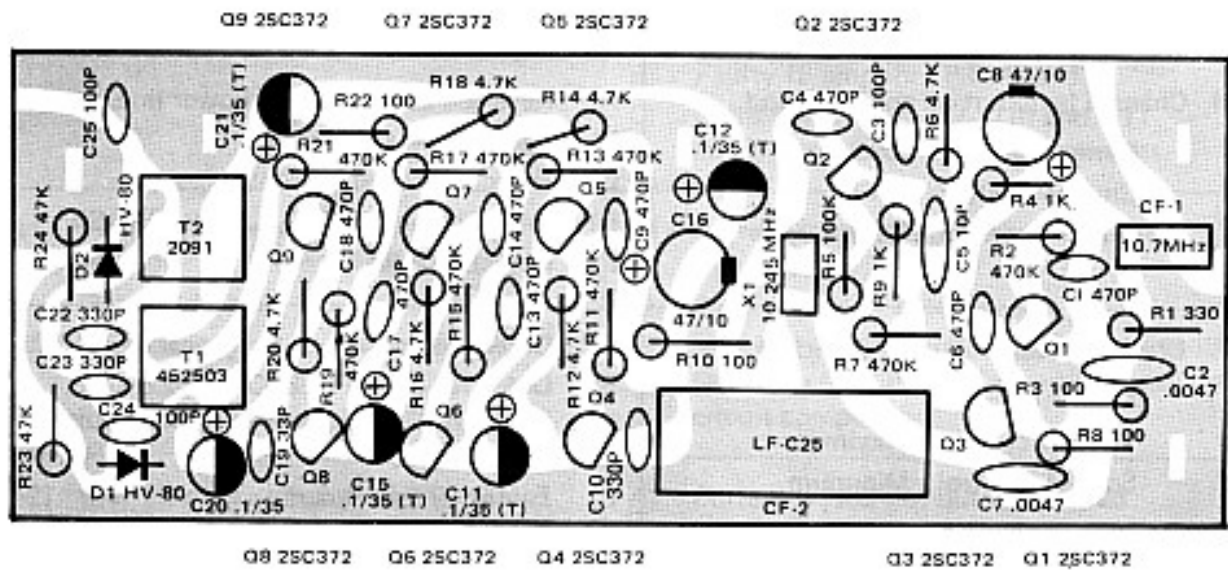


FIGURE 20

# SCANNER IF AMP. PRINTED CIRCUIT BOARD BOTTOM VIEW

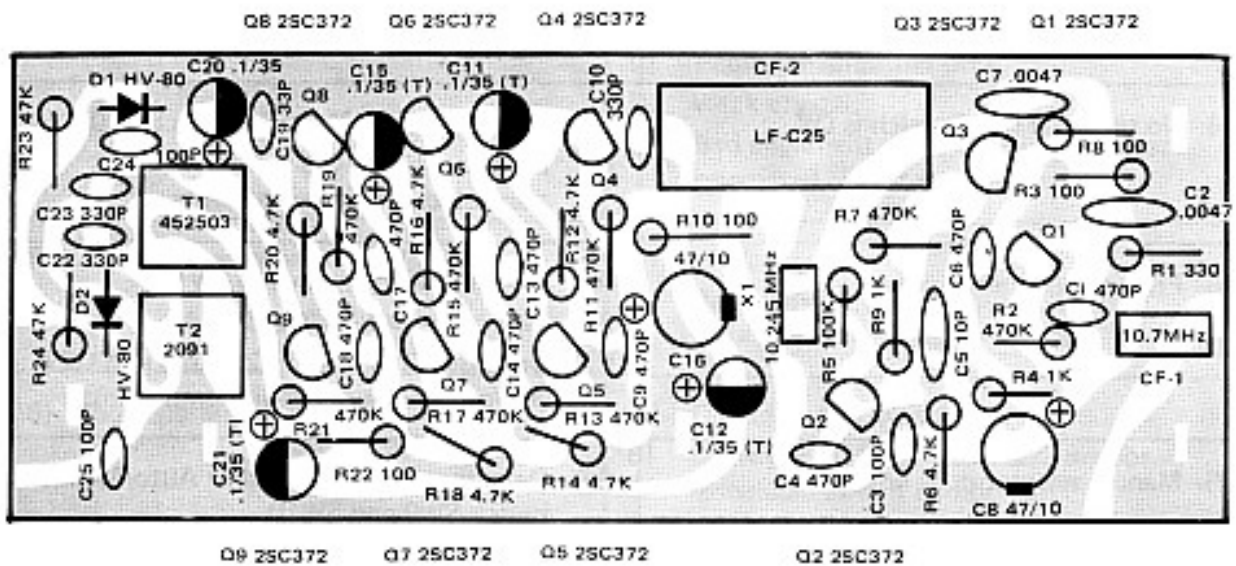


FIGURE 21

## TROUBLE SHOOTING

Symptom	Possible cause
1) Channel lamp not on and no sound. Power switch: ON Channel switch: ON Volume control: Maximum	A) Reversed connection of Power line. B) Faulty Power line cord. C) Defective Power switch. D) Defective one of D39, L15 or C84, C85. E) Defective Fuse.
2) Channel lamp on but no sound. Channel switch: ON Volume control: Maximum Squelch control: Minimum	A) Defective Speaker or Ext. speaker jack J3. B) Defective one of Q28, Q21, Q22, Q23, Q17 and IC-1 and/or associated circuit components. C) Faulty IF P.C. Board. D) Defective FM Mix switch.
3) Channel lamps not on but sound is OK. Channel switch: ON Volume control: Maximum Squelch control: Minimum	A) Defective channel switch or lamp. B) Defective R89 or R90. C) Defective IC-2, IC-3 and IC-4. D) Defective Q24, Q25 and Q18, (Priority channel only).
4) No scanning and Squelch control does not work.	A) Faulty IF amplifier. B) Faulty Noise amplifier detector. C) Defective IC-4, Q15, Q16 and/or associated circuit components. D) Defective VR1.
5) No scanning but Squelch is OK.	A) Defective Auto Manual switch SW10. B) Defective IC-2, IC-3 and IC-4 and/or associated circuit components.
6) Priority channel does not work.	A) Defective Priority switch SW11. B) Defective IC-2, IC-3 and IC-4. C) Defective Q18, Q24, Q25, Q26 and Q27 and/or associated circuit components.
7) Manual selector does not work.	A) Defective Manual switch or Auto/Manual switch SW9 and SW10. B) Defective C73 or R70.
8) Skipper circuit does not work.	A) Defective IC-4, D25 and/or associated circuit components.
9) Delay circuit does not work.	A) Defective D26, C74 and R73.

Symptom	Possible cause
10) VHF Hi and VHF Mid does not work.	A) Defective Mix/FM switch. B) Faulty IF amplifier P.C. Board. C) Defective Q7, Q8, Q9, Q10 and Q11 and/or associated circuit components.
11) VHF Mid does not work and VHF Hi is OK. (Noise is heard.)	A) Correct crystal not put in the required channel. B) Weak crystal or defective Q8, Q9, Q10 and Q11 and/or associated circuit components. C) Defective Q4, Q5 and Q6 and/or associated circuit components.
12) VHF Hi does not work and VHF Mid is OK. (Noise is heard.)	A) Correct crystal not put in required channel. B) Weak crystal or defective Q1, Q2, Q3 and Q7 and/or associated circuit components.
13) Distortion on VHF voice	A) Correct crystal not put in required channel. B) Faulty IF P.C. Board. C) Defective IC-1 and/or associated circuit components.
14) Low sensitivity VHF Mid.	A) Poor Antenna. B) Does not receive signal on the covered Receiving range. C) Faulty IF amplifier unit. D) Weak crystal. E) Bad alignment of RF amplifier and/or associated circuit components.
15) Low sensitivity on VHF Hi.	A) Weak crystal. B) Bad alignment RF amplifier and/or associated circuit components.
16) Poor operation on Mix.	A) Defective Mix switch. B) Defective Q21, Q22, and Q23 and/or associated circuit components.
17) FM does not work.	A) Faulty FM Front end. B) Faulty FM IF P.C. Board. C) Defective FM switch SW14. D) Defective Q21, Q22 and Q23 and/or associated circuit components.

# PARTS LIST

## SCANNER IF P.C. BOARD

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
<b>CAPACITORS</b>						
C1	Ceramic	470 pF		±10 %	990512	SCP-50
C2	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C3	Ceramic	100 pF		±10 %	990295	FC-70
C4	Ceramic	470 pF		±10 %	990512	SCP-50
C5	Ceramic	10 pF		±10 %	990377	FCC-50
C6	Ceramic	470 pF		±10%	990512	SCP-50
C7	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C8	Electrolytic	10 μF	16WV	-10 ~ +50 %	990036	CE04W1C100
C9	Ceramic	470 pF		±10 %	990512	SCP-50
C10	Ceramic	330 pF		±10 %	990505	SCP-50
C11,12	Tantalum	1 μF		±20 %	990141	CS15E1VOR1M
C13,14	Ceramic	470 pF		±10%	990512	SCP-50
C15	Tantalum	0.1 μF		±20 %	990582	CS15E1VOR1M
C16	Electrolytic	10 μF	16WV	-10 ~ + 50 %	990036	CE04W1C100
C17,18	Ceramic	470 pF		±10 %	990512	SCP-50
C19	Ceramic	33 pF		±5 %	990267	FC-50
C20,21	Tantalum	0.1 μF		±20 %	990582	CS15E1VOR1M
C22,23	Polystyrene	330 pF		±20 %	990183	SQC1H331J
C24,25	Ceramic	100 pF		±10 %	990295	FC-70
<b>RESISTORS</b>						
R1	Carbon film	330	1/8 W	±5 %	952471	ERD-18VJ-331
R2	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R3	Carbon film	100	1/8 W	±5 %	952387	ERD-18VJ-101
R4	Carbon film	1 K	1/8 W	±5 %	952555	ERD-18VJ-102
R5	Carbon film	100 K	1/8 W	±5 %	952891	ERD-18VJ-104
R6	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R7	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R8	Carbon film	100	1/8 W	±5 %	952387	ERD-18VJ-101
R9	Carbon film	1 K	1/8 W	±5 %	952555	ERD-18VJ-102
R10	Carbon film	100	1/8 W	±5 %	952387	ERD-18VJ-101
R11	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R12	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R13	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R14	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R15	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R16	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R17	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R18	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R19	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R20	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R21	Carbon film	470 K	1/8 W	±5 %	953003	ERD-18VJ-474
R22	Carbon film	100	1/8 W	±5 %	952387	ERD-18VJ-101
R23,24	Carbon film	47 K	1/8 W	±5 %	952835	ERD-18VJ-473
<b>SEMICONDUCTORS</b>						
Q1-Q9	Transistor	silicon			992052	2SC372(0)
D1,2	Diode	silicon			992164	HV-80

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
<b>COILS/TRANSFORMERS/FILTERS/CRYSTAL</b>			
T1	1FT	995234	7MC-452503N
T2	1FT	995241	7MC-2091N
CF1	Filter	10.7 MHz	995325
CF2	Filter	455 kHz	995332
			10.7MF-B
			LF-C25
X1	Crystal	10.235 MHz	452403
<b>MISCELLANEOUS</b>			
	P.C. Board	599929	GE-18C-4425

**FM IF P.C. Board**

<b>CAPACITORS</b>						
C1-C7	Mylar	0.01 $\mu$ F	50 WV	$\pm 20$ %	990099	
C8	Mylar	0.1 $\mu$ F	50 WV	$\pm 20$ %	990134	
C9	Mylar	0.01 $\mu$ F	50 WV	$\pm 20$ %	990099	
C10,11	Ceramic	200 pF		$\pm 20$ %	990589	FC-80
C12	Electrolytic	10 $\mu$ F	16 WV	-10 ~ +50 %	990036	CE04W1C100
C13	Mylar	0.1 $\mu$ F	50 WV	$\pm 20$ %	990134	
C14-C16	Mylar	0.01 $\mu$ F	50 WV	$\pm 20$ %	990099	
<b>RESISTORS</b>						
R1	Carbon film	27 K	1/8 W	$\pm 5$ %	953815	ERD-18TJ-273
R2	Carbon film	3.3 K	1/8 W	$\pm 5$ %	953661	ERD-18TJ-332
R3	Carbon film	1 K	1/8 W	$\pm 5$ %	953577	ERD-18TJ-102
R4	Carbon film	10 K	1/8 W	$\pm 5$ %	953745	ERD-18TJ-103
R5	Carbon film	1 K	1/8 W	$\pm 5$ %	953577	ERD-18TJ-102
R6	Carbon film	100	1/8 W	$\pm 5$ %	953409	ERD-18TJ-101
R7	Carbon film	1 K	1/8 W	$\pm 5$ %	953577	ERD-18TJ-102
R8	Carbon film	100	1/8 W	$\pm 5$ %	953409	ERD-18TJ-101
R9,10	Carbon film	1 K	1/8 W	$\pm 5$ %	953577	ERD-18TJ-102
R11,12	Carbon film	6.8 K	1/8 W	$\pm 5$ %	953717	ERD-18TJ-682
R13	Carbon film	100	1/8 W	$\pm 5$ %	593409	ERD-18TJ-101
R14	Carbon film	1 M	1/8 W	$\pm 5$ %	954081	ERD-18TJ-105
R15	Carbon film	10 K	1/8 W	$\pm 5$ %	954745	ERD-18TJ-103
<b>SEMICONDUCTORS</b>						
Q1	Transistor	silicon			992052	2SC372(0)
D1,2	Diode	silicon			992164	HV-80
IC1	Integrated circuit				992248	TA 7061AP
<b>COILS</b>						
T1	1FT				995248	SB-126
T2	1FT				995255	FD-10

Ref. No.	Description	handic Stock Number	MFR'S Parts Number
<b>MISCELLANEOUS</b>			
	P.C. Board Test Pin	599936 599449	GE-19C-4740

### MAIN P.C. BOARD

<b>CAPACITORS</b>						
C1,2	Ceramic	7 pF		±0.5 pF	990336	PC-50
C3	Ceramic	0.001 μF		±10 %	990519	SCP-60
C4-C6	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C7	Ceramic	5 pF		±0.25 pF	990218	PC-50
C8	Ceramic	50 pF		±10 %	990281	PC-60
C9	Ceramic	2 pF		±0.15 pF	990211	FC-50
C10	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C11,12	Ceramic	15 pF		±5 %	990246	FC-50
C13	Ceramic	1 pF		±0.1 pF	990204	RC-50
C14	Ceramic	0.001 μF		±10 %	990519	SCP-60
C15-17	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C18	Ceramic	15 pF		±5 %	990246	FC-50
C19	Ceramic	50 pF		±10 %	990281	FC-60
C20	Ceramic	2 pF		±0.15 pF	990211	FC-50
C21	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C22	Ceramic	5 pF		±0.25 pF	990218	FC-50
C23	Ceramic	47 pF		±10 %	990407	FCC-80
C24	Ceramic	150 pF		±10 %	990442	FCC-150
C25	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C26,27	Ceramic	10 pF		±0.5 pF	990239	FC-50
C28	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C29	Ceramic	47 pF		±10 %	990407	FCC-80
C30	Ceramic	150 pF		±10 %	990442	FCC-150
C31	Ceramic	30 pF		±5 %	990260	FC-50
C32	Ceramic	10 pF		±0.5 pF	990239	FC-50
C33	Ceramic	0.0047 μF		±10 %	990540	SCP-100
C34	Ceramic	10 pF		±0.5 pF	990239	FC-50
C35	Ceramic	470 pF		±10 %	990512	SCP-50
C36	Ceramic	0.0022 μF		±10 %	990533	SCP-80
C37	Electrolytic	1 μF	50 WV	-10 ~ +75 %	990008	CE04W1H010
C38,39	Ceramic	0.0022 μF		±10 %	990533	SCP-80
C40	Electrolytic	1 μF	50 WV	-10 ~ +75 %	990008	CE04W1H010
C41	Ceramic	470 μF		±10 %	990512	SCP-50
C42	Ceramic	100 pF		±10 %	990295	FC-70
C43	Electrolytic	1 μF	50 WV	-10 ~ +75 %	990008	CE04W1H010
C44	Ceramic	0.1 μF		-20 ~ +80 %	990498	MMC-135
C45	Electrolytic	10 μF	16 WV	-10 ~ +50 %	990036	CE04W1C100
C46	Electrolytic	47 μF	16 WV	-10 ~ +50 %	990043	CE04W1C470
C47-C49	Mylar	0.01 μF		±20 %	990099	
C50	Ceramic	30 pF		±5 %	990260	FC-50
C51,52	Mylar	0.01 μF		±20 %	990099	FC-50
C53	Ceramic	100 pF		±10 %	990295	FC-70
C54	Electrolytic	47 μF	16 WV	-10 ~ +50 %	990043	CE04W1C470
C55	Electrolytic	220 μF	16 WV	±20 %	990057	
C56,57	Mylar	0.01 μF		±20 %	990099	
C58	Electrolytic	10 μF	16 WV	-10 ~ +50 %	990036	CE04W1C100

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
C59	Mylar	0.0015 $\mu$ F			990596	
C60	Electrolytic	100 $\mu$ F	16 WV	-10 ~ +50 %	990050	CE04W1C101
C61	Ceramic	0.1 $\mu$ F		-20 ~ +80 %	990498	MMC-135
C62-C69	Ceramic	0.001 $\mu$ F		$\pm$ 10 %	990519	SCP-60
C70	Ceramic	0.1 $\mu$ F		-20 ~ +80 %	990498	MMC-135
C71	Tantalum	10 $\mu$ F	6.3 WV	$\pm$ 20 %	990162	CS15E0J100M
C72	Tantalum	6.8 $\mu$ F	6.3 WV	$\pm$ 20 %	990155	CS15E0J6R8M
C73	Tantalum	1 $\mu$ F	35 WV	$\pm$ 20 %	990141	CS15E1V0R1M
C74	Electrolytic	220 $\mu$ F	16 WV	-10 ~ +50 %	990057	CE04W1C221
C75	Tantalum	1 $\mu$ F	35 WV	$\pm$ 20 %	990141	CS15E1V0R1M
C76,77	Ceramic	0.01 $\mu$ F		-20 ~ +80 %	990477	MC-70
C78	Tantalum	6.8 $\mu$ F	6.3 WV	$\pm$ 20 %	990155	CS15E0J6R8M
C79	Tantalum	2.2 $\mu$ F	16 WV	$\pm$ 20 %	990148	CS15E1C2R2M
C80	Electrolytic	47 $\mu$ F	16 WV	-10 ~ +50 %	990043	CE04W1C470
C81	Electrolytic	470 $\mu$ F	10 WV	-10 ~ +50 %	990064	CE04W1A471
C82	Electrolytic	100 $\mu$ F + 100 $\mu$ F	16 WV	-10 ~ +50 %	990071	CE042W1C101
C83	Electrolytic	470 $\mu$ F + 470 $\mu$ F	16 WV	-10 ~ +50 %	990078	CE042W1C471
C84,85	Ceramic	0.01 $\mu$ F		-20 ~ +80 %	990477	MC-70
C86	Ceramic	0.5 pF			990547	AK-50
C87	Mylar	0.01 $\mu$ F		$\pm$ 20 %	990099	
C88	Mylar	0.1 $\mu$ F		$\pm$ 20 %	990134	

#### RESISTORS

R1	Carbon film	330	1/8 W	$\pm$ 5 %	952471	ERD-18VJ-331
R2	Carbon film	68 K	1/8 W	$\pm$ 5 %	952863	ERD-18VJ-683
R3,4	Carbon film	10 K	1/8 W	$\pm$ 5 %	952723	ERD-18VJ-103
R5	Carbon film	220	1/8 W	$\pm$ 5 %	952443	ERD-18VJ-221
R6	Carbon film	470	1/8 W	$\pm$ 5 %	953521	ERD-18TJ-471
R7	Carbon film	3.3 K	1/8 W	$\pm$ 5 %	953661	ERD-18TJ-332
R8	Solid	1 M	1/4 W	$\pm$ 5 %	954144	ERC-14J-105
R9	Carbon film	47	1/8 W	$\pm$ 5 %	952331	ERD-18VJ-470
R10	Carbon film	330	1/8 W	$\pm$ 5 %	952471	ERD-18VJ-331
R11	Carbon film	68 K	1/8 W	$\pm$ 5 %	952863	ERD-18VJ-683
R12,13	Carbon film	10 K	1/8 W	$\pm$ 5 %	952723	ERD-18VJ-103
R14	Carbon film	220	1/8 W	$\pm$ 5 %	952443	ERD-18VJ-221
R15	Carbon film	1 K	1/8 W	$\pm$ 5 %	952555	ERD-18VJ-102
R16	Carbon film	470	1/8 W	$\pm$ 5 %	952499	ERD-18VJ-471
R17	Carbon film	3.3 K	1/8 W	$\pm$ 5 %	953661	ERD-18TJ-332
R18	Solid	1 M	1/4 W	$\pm$ 5 %	954144	ERC-14J-105
R19	Carbon film	47	1/8 W	$\pm$ 5 %	953521	ERD-18TJ-470
R20	Carbon film	100 K	1/8 W	$\pm$ 5 %	953891	ERD-18VJ-104
R21	Carbon film	150	1/8 W	$\pm$ 5 %	953437	ERD-18TJ-151
R22-R37	Carbon film	1 K	1/8 W	$\pm$ 5 %	952555	ERD-18VJ-102
R38	Carbon film	100 K	1/8 W	$\pm$ 5 %	952891	ERD-18VJ-104
R39	Carbon film	220 K	1/8 W	$\pm$ 5 %	952947	ERD-18VJ-224
R40	Carbon film	10 K	1/8 W	$\pm$ 5 %	952723	ERD-18VJ-103
R41	Carbon film	150	1/8 W	$\pm$ 5 %	952415	ERD-18VJ-151
R42	Carbon film	10 K	1/8 W	$\pm$ 5 %	953745	ERD-18VJ-103
R43	Carbon film	10 K	1/8 W	$\pm$ 5 %	952723	ERD-18VJ-103
R44	Carbon film	470	1/8 W	$\pm$ 5 %	952499	ERD-18VJ-471
R45	Solid	1 M	1/4 W	$\pm$ 5 %	954144	ERC-14J-105
R46	Carbon film	3.3 K	1/8 W	$\pm$ 5 %	952639	ERD-18VJ-332
R47	Carbon film	10 K	1/8 W	$\pm$ 5 %	952723	ERD-18VJ-103
R48	Carbon film	56 K	1/8 W	$\pm$ 5 %	952849	ERD-18VJ-563

Ref. No.	Description				handic Stock Number	MFR'S Parts Number
R49	Carbon film	470	1/8 W	±5 %	952499	ERD-18VJ-471
R50	Carbon film	100 K	1/8 W	±5 %	952891	ERD-18VJ-104
R51	Carbon film	1 K	1/8 W	±5 %	952555	ERD-18VJ-102
R52	Carbon film	470	1/8 W	±5 %	952499	ERD-18VJ-471
R53	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R54	Carbon film	1 K	1/8 W	±5 %	952555	ERD-18TJ-102
R55	Carbon film	22 K	1/8 W	±5 %	952779	ERD-18VJ-223
R56	Solid	1 M	1/4 W	±5 %	954144	ERC-14J-105
R57	Carbon film	470	1/8 W	±5 %	952499	ERD-18VJ-471
R58,59	Carbon film	4.7 K	1/8 W	±5 %	952667	ERD-18VJ-472
R60	Carbon film	47	1/8 W	±5 %	952331	ERD-18VJ-470
R61	Carbon film	100	1/8 W	±5 %	953409	ERD-18TJ-101
R62	Carbon film	3.9 K	1/8 W	±5 %	953675	ERD-18TJ-392
R63	Carbon film	22	1/8 W	±5 %	953297	ERD-18TJ-220
R64	Carbon film	3.3 K	1/8 W	±5 %	952639	ERD-18VJ-332
R65	Carbon film	3.3 K	1/8 W	±5 %	953661	ERD-18TJ-332
R66	Carbon film	470	1/8 W	±5 %	953521	ERD-18TJ-471
R67	Carbon film	3.9 K	1/8 W	±5 %	953675	ERD-18TJ-392
R68	Carbon film	470	1/8 W	±5 %	953521	ERD-18TJ-471
R69	Carbon film	3.9 K	1/8 W	±5 %	953675	ERD-18TJ-392
R70	Carbon film	47 K	1/8 W	±5 %	953857	ERD-18VJ-473
R71,72	Carbon film	330	1/8 W	±5 %	953493	ERD-18TJ-331
R73	Carbon film	47 K	1/8 W	±5 %	952835	ERD-18VJ-473
R74-R77	Carbon film	10 K	1/8 W	±5 %	953745	ERD-18TJ-103
R78	Carbon film	10 K	1/8 W	±5 %	952723	ERD-18VJ-103
R79	Carbon film	10	1/8 W	±5 %	952219	ERD-18VJ-100
R80	Carbon film	1 K	1/8 W	±5 %	952555	ERD-18VJ-102
R81	Solid	56	1/8 W	±5 %	954137	ERC-12K-560
R82,83	Carbon film	3.3 K	1/8 W	±5 %	953661	ERD-18TJ-332
R84	Carbon film	330 K	1/8 W	±5 %	953997	ERD-18TJ-334
R85	Carbon film	120 K	1/8 W	±5 %	953927	ERD-18TJ-124
R86	Carbon film	3.3 K	1/8 W	±5 %	953661	ERD-18TJ-332
R87	Carbon film	10 K	1/8 W	±5 %	953745	ERD-18TJ-103
R88	Carbon film	22 K	1/8 W	±5 %	953801	ERD-18TJ-223
R89,90	Solid	56	1/2 W	±10 %	954137	ERC-12K-560
R91	Carbon film	390	1/8 W	±5 %	953507	ERD-18TJ-391
R92	Metal film	1	1 W	±10 %	954151	RN-1B
R93	Carbon film	470	1/8 W	±5 %	952499	ERD-18VJ-471

### SEMICONDUCTORS

Q1,2	Transistor	silicon			992080	2SC535(B)
Q3	Transistor	silicon			992101	2SC784(O)
Q4,5	Transistor	silicon			992080	2SC535(B)
Q6	Transistor	silicon			992101	2SC784(O)
Q7,8	Transistor	silicon			992073	2SC394(Y)
Q9	Transistor	silicon			992101	2SC784(O)
Q10-Q22	Transistor	silicon			992066	2SC373
Q23	Transistor	silicon			992087	2SC735(Y)
Q24-Q27	Transistor	silicon			992066	2SC373
Q28	Transistor	silicon			992115	2SC789(O)
D1-D18	Diode	silicon			992164	HV-80
D19-33	Diode	germanium			992143	1N60
D34	Diode	silicon			992157	1S1885



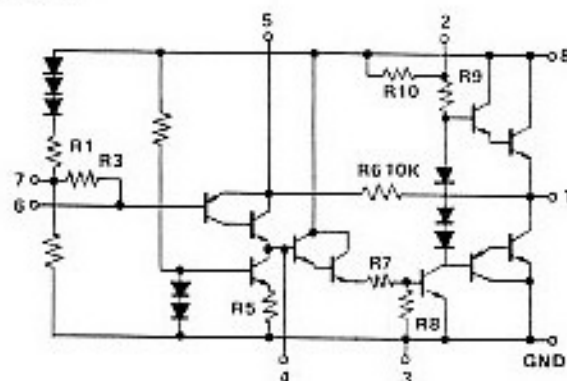
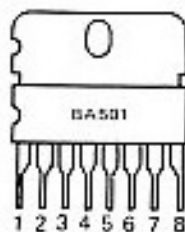
Ref. No.	Description	handic Stock Number	MFR'S Parts Number
D35,36	Diode      germanium	992143	1N60
D37	Diode      silicon	992164	HV-80
D38	Diode      Zener	992178	02Z10A
D39	Diode      silicon	992157	1S1885
IC1	Intergrated circuit	992255	BA-501
IC2	Intergrated circuit	992269	N74145N
IC3	Intergrated circuit	992234	N7404N
<b>COILS/TRANSFORMERS/FILTERS</b>			
L1-3	RF coil	995262	M-7230
L4-6	RF coil	995269	M-7332
L7	OSC. coil	995276	6.55NO-087
L8	Microinductor    0.68 $\mu$ H	995283	EL0606-R68M
L9,10	Microinductor    1.8 $\mu$ H	995290	LF4-1R8K
L11	Microinductor    0.68 $\mu$ H	995276	EL0606-R68M
L12	OSC. coil	995276	6.55NO-087
L13	Microinductor    1.8 $\mu$ H	995290	LF4-1R8K
L14	Microinductor	995297	EL061-202K
L15	Choke coil	995409	3B-037
T1	IFT	995304	119LC470033N3
T2	Noise Amp. coil	995311	CAN-1979A
CF3,4	Ceramic filter    455 kHz	598196	

#### CHASSIS ASSEMBLY PARTS LIST

<b>VOLUMES</b>				
VR1	Squelch	50 K	994060	50K $\Omega$ B-15A
VR2	Volume	50 K	984032	50K $\Omega$ A-15A
<b>SWITCHES</b>				
SW1-8	Push switch		994060	SFS-00002DF2010
SW9-15	Push switch		994067	SF-0026DF2010
<b>MISCELLANEOUS</b>				
	Main P.C. Board		599943	GE-19B-4733
	Crystal socket		599950	GE-17D-3391
	Pilot lamp	14 V/50 mA    L=120 m/m	599957	
	RF shield		599964	GE-19D-4800
	Vinyle tube	3 $\phi$ L=100 m/m		
<b>MISCELLANEOUS</b>				
	FM front end		599971	FP414016
	Motorola jack		599978	JA-C-020
	Phone jack		599985	JA-C-011
	Push switch button		599992	ER10-01-00
	Push switch button		599999	10105
	Slide switch		598006	S222081

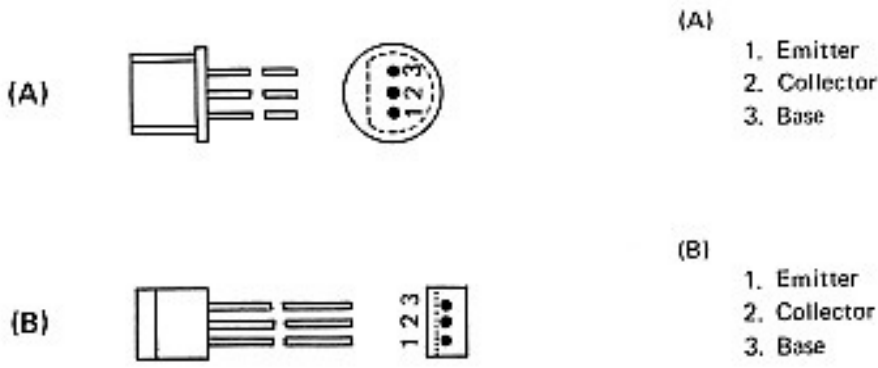
Ref. No.	Description	handic Stock Number	MFR'S Parts Number
	Pilot lamp 14 V 50 mA L=60 mm	599957	
	Volume knob	599554	GE-19D-4652
	Tuning knob	598013	GE-19D-4750
	Speaker	598020	PD-945ST
	Speaker cloth	598027	HN-6-7
	DC cable	598034	DX-106
	Fuse 1 A	598041	
	Cord stopper	599659	3P-4
	Lamp holder	598048	GE-16D-2794
	Lamp jewel	598055	GE-17D-3438
	Escutcheon	598062	GE-19B-4802
	Front panel	598069	GE-19C-4803
	Chassis	598076	GE-19A-4796
	Sub chassis	598083	GE-19C-4797
	Crystal cover	598090	GE-16D-2766
	Handle bracket	598097	GE-19C-4799
	Heat sink	598104	GE-19D-4801
	Speaker bracket	598111	GE-17C-3851
	Bonnet	598118	GE-19B-4798
	Dial pointer	598125	GE-19D-4810
	Dial window	598132	GE-19D-4804
	Dial plate	598139	GE-19D-4805
	Handle fiber	598146	
	Dial dram	598154	
	Dial pulley	598161	7002
	Pulley shaft	598168	$2\phi \times 10^1 \times 5$
	Lamp grommet	598175	BU-687
	Handle screw	598182	
	Screw	598189	

## LINEAR INTEGRATED CIRCUITS



# SEMICONDUCTORS LEAD IDENTIFICATION

- A: 2SC372(O), 2SC373, 2SC394(Y), 2SC735(Y), 2SC784(O)  
 B: 2SC535(B), 2SC789(O)



## SCHEMATIC DIAGRAM FOR FM FRONT END

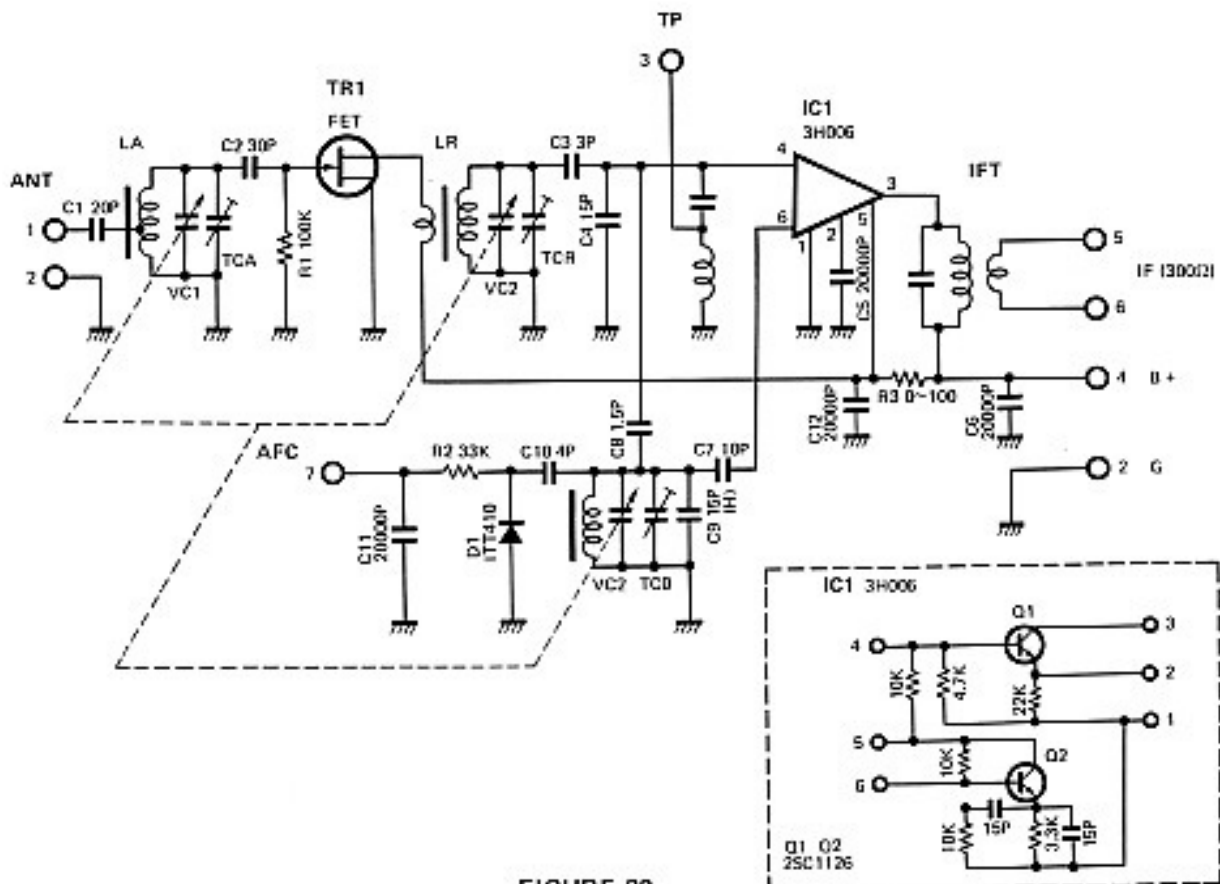
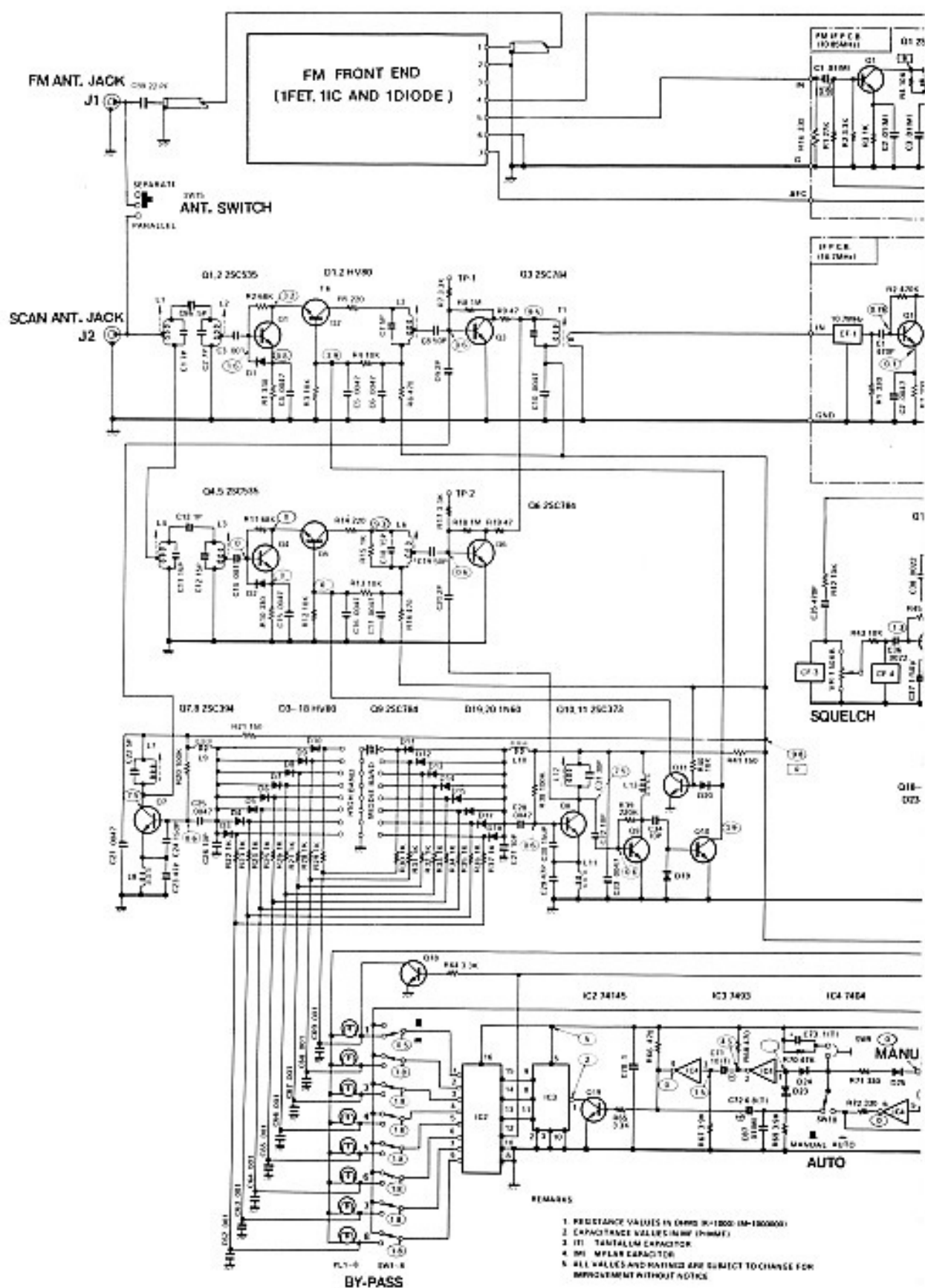
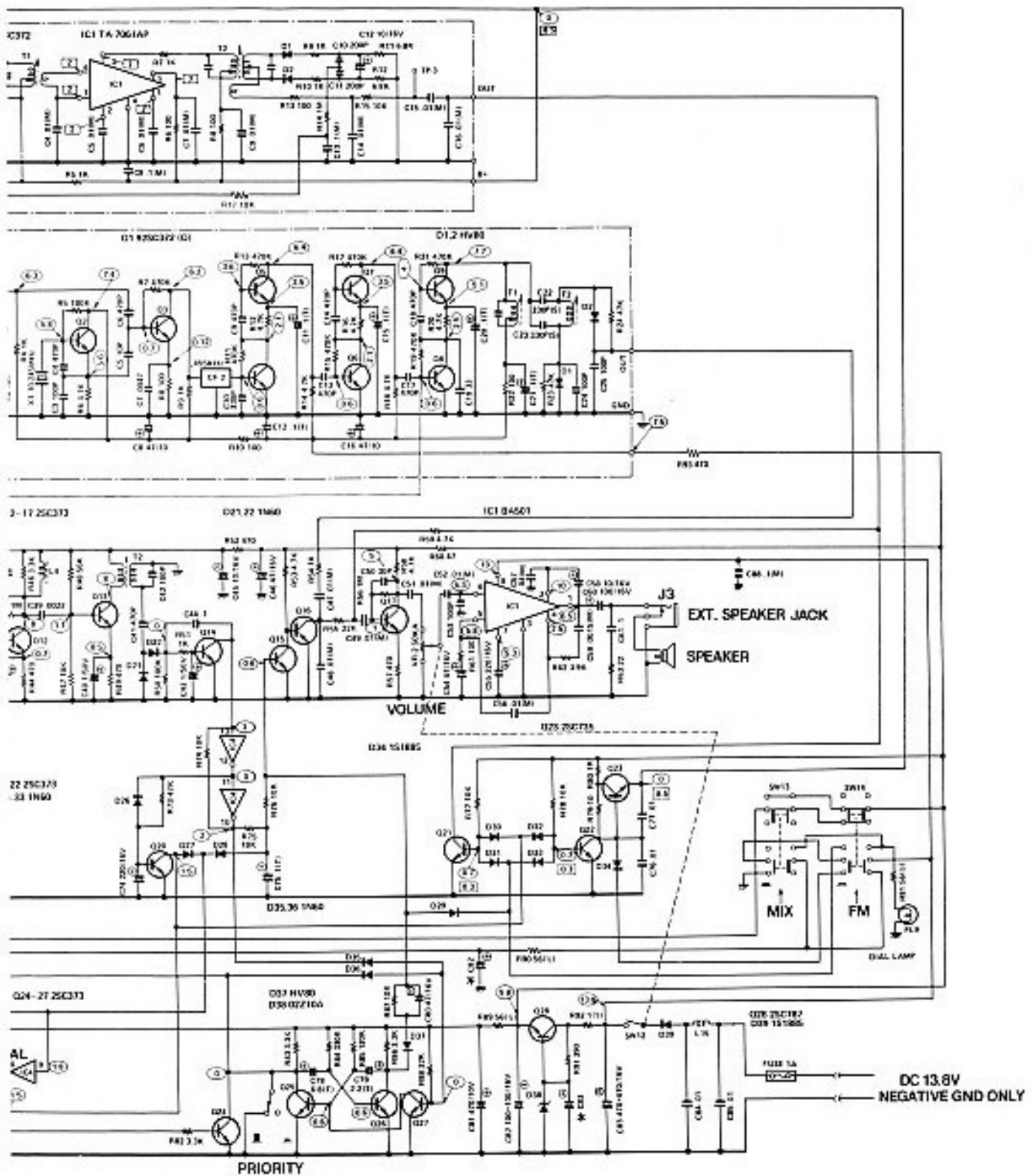


FIGURE 22

# SCHEMA



# TIC DIAGRAM



○ THIS SYMBOL INDICATES DC VOLTAGE MEASURED BY V.T.V.M. AT THE CONDITION OF HIGH BAND CH1 MANUAL OPERATED, VOLUME MINIMUM POSITION AND EQUALIZER OUT POSITION

□ THIS SYMBOL INDICATES FM RADIO OPERATED