

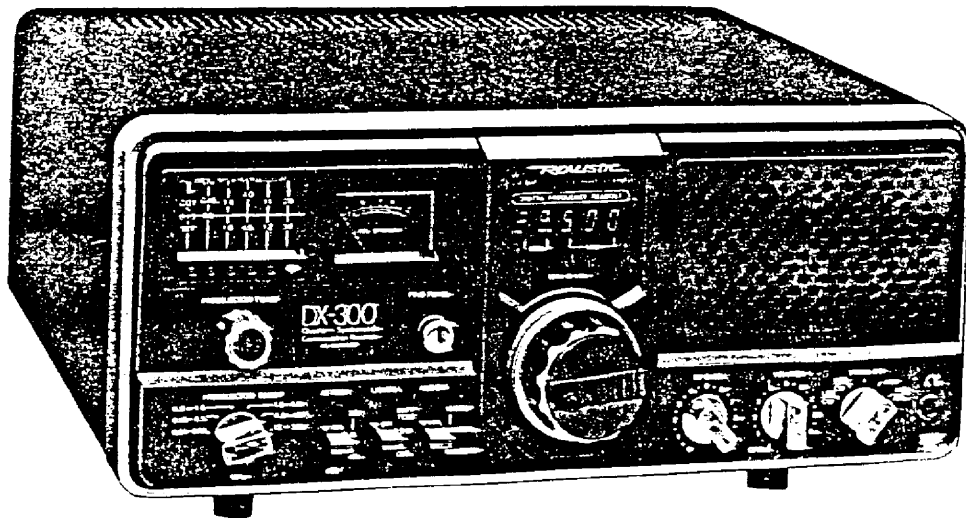
*REALISTIC*<sup>®</sup>

# Service Manual

DX-300

## QUARTZ-SYNTHESIZED DIGITAL LED-READOUT COMMUNICATIONS RECEIVER

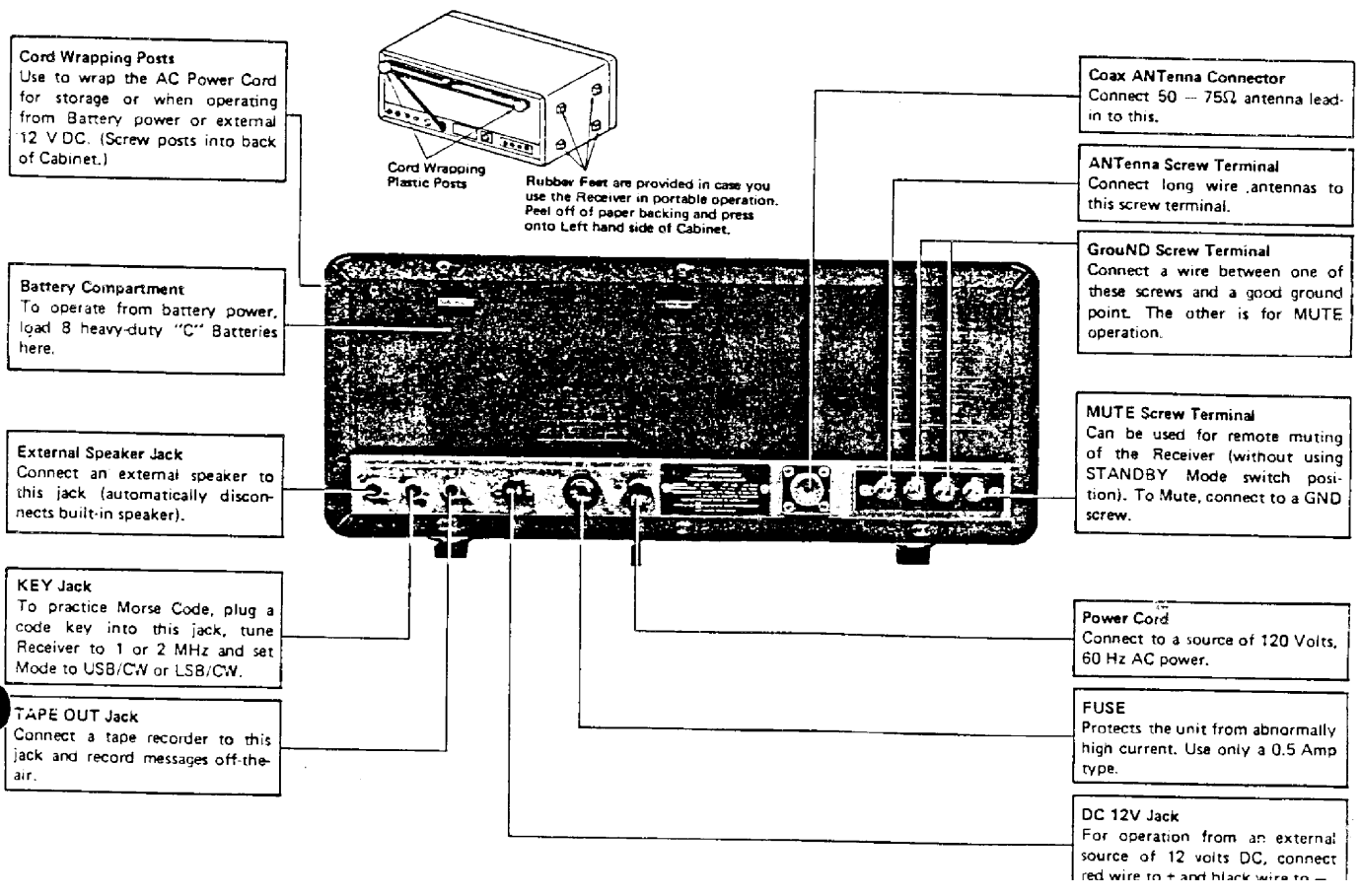
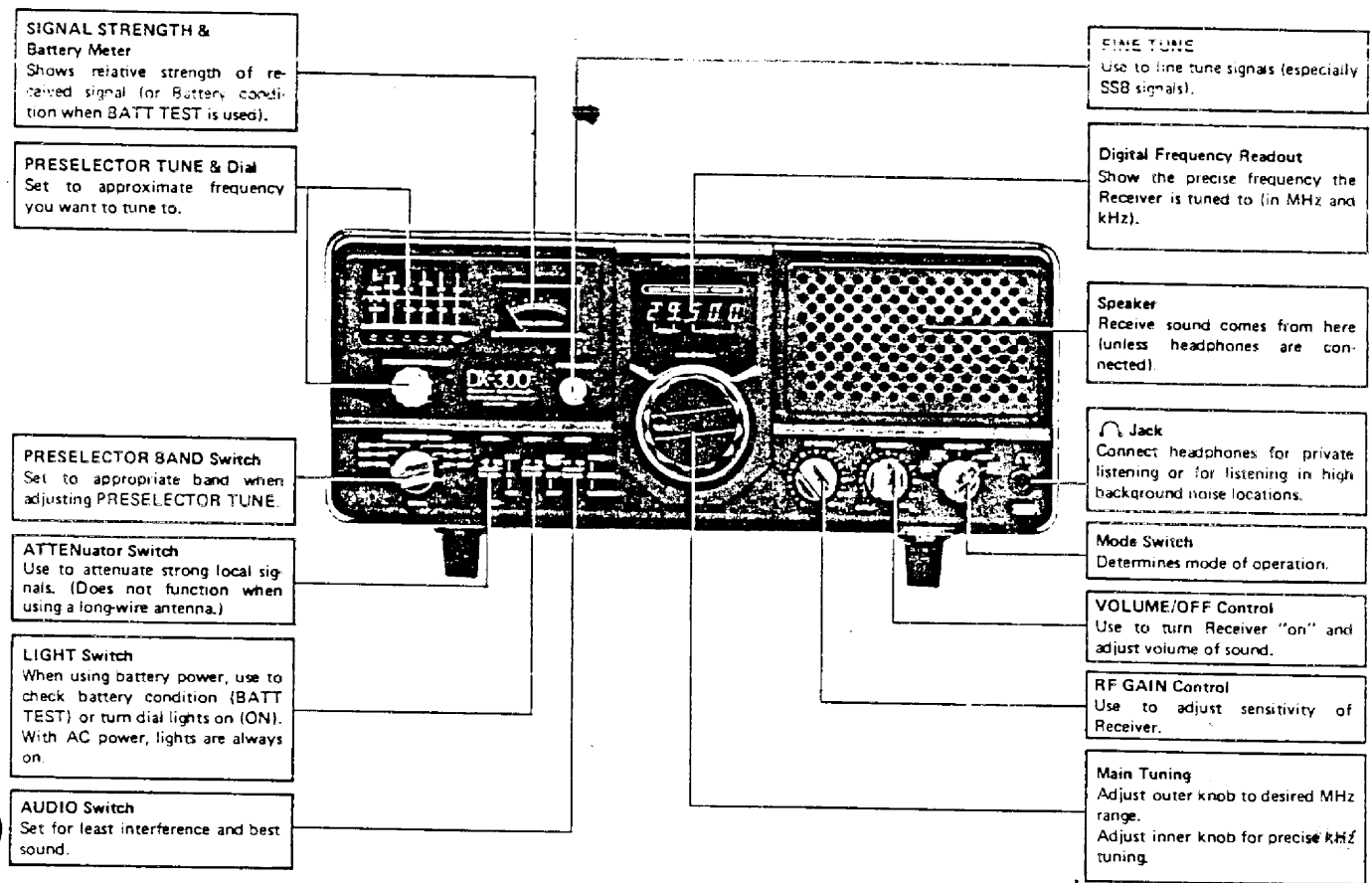
Catalog Number: 20-204



CUSTOM MANUFACTURED FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

# CONTROLS AND THEIR FUNCTIONS

(For complete details on operation, refer to the Owner's Manual.)



# SPECIFICATIONS

Description	Condition	Nominal Spec.	Limit Spec.
Frequency Coverage	Band A	10 – 150 kHz	10 – 150 kHz
	Band B	150 – 500 kHz	150 – 500 kHz
	Band C	500 – 1600 kHz	500 – 1600 kHz
	Band D	1.6 – 4.5 MHz	1.6 – 4.5 MHz
	Band E	4.5 – 12 MHz	4.5 – 12 MHz
	Band F	12 – 30 MHz	12 – 30 MHz
Sensitivity (S+N)/N = 10 dB AF Output = 50 mW	50 kHz	AM 30 $\mu$ V SSB 30 $\mu$ V	Not specified
	150 kHz	5 $\mu$ V 5 $\mu$ V	AM 50 $\mu$ V SSB 50 $\mu$ V
	300 kHz	1 $\mu$ V 0.5 $\mu$ V	10 $\mu$ V 5 $\mu$ V
	900 kHz	0.5 $\mu$ V 0.3 $\mu$ V	10 $\mu$ V 5 $\mu$ V
	3.1 MHz	0.5 $\mu$ V 0.3 $\mu$ V	2 $\mu$ V 1 $\mu$ V
	7.1 MHz	0.5 $\mu$ V 0.3 $\mu$ V	2 $\mu$ V 1 $\mu$ V
	15.1 MHz	0.5 $\mu$ V 0.3 $\mu$ V	2 $\mu$ V 1 $\mu$ V
28.1 MHz	0.5 $\mu$ V 0.3 $\mu$ V	2 $\mu$ V 1 $\mu$ V	
Loop Antenna Sensitivity (S+N)/N = 20 dB	180 kHz	11 mV	50 mV
	300 kHz	4 mV	15 mV
	470 kHz	2 mV	8 mV
	600 kHz	1 mV	2 mV
	900 kHz	550 $\mu$ V	1.5 mV
	1.4 MHz	450 $\mu$ V	1 mV
Image Ratio	10 – 50 kHz	Not specified	Not specified
	100 kHz	70 dB	50 dB
	300 kHz	70 dB	50 dB
	900 kHz	70 dB	50 dB
	3.1 MHz	60 dB	50 dB
	7.1 MHz	60 dB	50 dB
	15.1 MHz	60 dB	50 dB
28.1 MHz	60 dB	50 dB	
Intermediate Frequency	1st	54.5 – 55.5 MHz	
	2nd	3 – 2 MHz	
	3rd	455 kHz	
Spurious Rejection at 7.1 MHz	between 2 MHz and 150 MHz	60 dB	30 dB
Birdies at 7.0 MHz	(S+N)/N = 10 dB	2.0 $\mu$ V	10 $\mu$ V
Input Attenuator	0 dB		
	20 dB	22 dB	16 – 28 dB
	40 dB	40 dB	34 – 46 dB
Selectivity	$\pm$ 10 kHz	94 dB	60 dB
	-6 dB	5.5 kHz	3.5 – 7.5 kHz
Audio Output	8 $\Omega$ , 10% T.H.D.	1.5 W	1.2 W
Phone Jack Output	8 $\Omega$ , 0.5 W AF Output	100 mV	50 – 200 mV
Tape Output	7.1 MHz 1 mV (1 kHz 30% MOD), 0.5 W AF Output	300 mV	150 – 600 mV
Signal-to-Noise Ratio	7.1 MHz 1 mV (1 kHz 30% MOD), 0.5 W AF Output	40 dB	35 dB
Hum & Noise (VOLUME : Minimum)	at 8 $\Omega$ Speaker Output	AM/SSB 2 mV	AM/SSB 5 mV
	at 8 $\Omega$ Phone Jack Output	AM/SSB 0.25 mV	AM/SSB 0.5 mV

Description	Condition	Nominal Spec.	Limit Spec.
Meter Sensitivity	S-9 at 7.1 MHz	30 $\mu$ V	15 – 100 $\mu$ V
Audio Response 0 dB NORMAL 1 kHz	NORMAL 300 Hz	-5 dB	-5 $\pm$ 6 dB
	3 kHz	-14 dB	Not specified
	WIDE 1 kHz	+3 dB	+3 $\pm$ 3 dB
	300 Hz	+0.5 dB	+0.5 $\pm$ 6 dB
	3 kHz	-7 dB	Not specified
	NARROW 1 kHz	-1 dB	-1 $\pm$ 3 dB
	300 Hz	0 dB	0 $\pm$ 6 dB
	3 kHz	-18 dB	Not specified
Frequency Display	5-digit LED display (MHz/kHz)		
Frequency Stability	Within $\pm$ 1 kHz after one hour warm up		
Antenna Impedance	50 $\Omega$ unbalanced type (SO239 type connector)		
	High impedance type (screw type terminal)		
Operation Temperature	0 $^{\circ}$ C to 43.3 $^{\circ}$ C		
Power source	AC 120 V, 60 Hz for USA & CANADIAN models or AC 230 V, 50 Hz for EUROPEAN & AUSTRALIAN models.		
	DC 12 V (negative ground only) or internal 8 PCS "C" cells		

**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 which still might be considered acceptable; in no case should a unit perform to less than within any Limit Spec.*

# PRINCIPLES OF OPERATION

This Receiver is a triple-conversion type and employs a "double tuning" system. MHz Tuning tunes to the MHz "unit" of the receiving frequency (i.e. selects the desired 1 MHz portion to be tuned) and kHz Tuning tunes to the kHz "unit(s)".

Refer to the Block Diagram as you read through the following description:

An RF signal picked up by the Antenna goes to RF section via ATTenuator and Preselector. The RF signal is amplified by Q201, and up-mixed in 1st Mixer Q202 and Q203 with 1st Local Oscillator Q401 (MHz Tuning). Q401 produces 55.5 MHz to 84.5 MHz signals in 1 MHz spreads as required for the MHz portion of the receiving frequency (i.e. 55.5 MHz for "0" MHz spread ... from 10 kHz to 999 kHz, 56.5 MHz for 1 MHz to 1.999 MHz... etc. ...). The resulting frequency will always be from 55.5 MHz to 54.5 MHz. Note the frequency inversion as well as the up-conversion. This signal is amplified by 1st IF Amp Q205 and Q214.

The Reference Oscillator generates a 4 MHz crystal-controlled frequency using Q507. This is divided down to 1 MHz by IC502. D501 and D502 are used for the harmonics generator and produce integer harmonics of 1 MHz, which then are mixed in IC201 with 1st Local Oscillator frequency (55.5 MHz to 84.5 MHz). Of the harmonics mixed with the 1st Local Oscillator signal, only the 52.5 MHz signal is amplified by Q207 - Q209, and fed into Q206. In other words, only those harmonics that will produce 52.5 MHz when mixed with 1st Local Oscillator are applied to the 2nd Mixer. For example, to receive a 4 MHz signal, the 1st Local Oscillator frequency must be 59.5 MHz, so the 7th harmonic from the Harmonics Generator (i.e. 7 MHz) is used to produce required 52.5 MHz.

This 52.5 MHz frequency is down-mixed with 1st IF (55.5 - 54.5 MHz) and produces a 3 - 2 MHz 2nd IF (again note that the signal is "reversed" - i.e. 3 to 2, not 2 to 3 MHz). The 3rd Local Oscillator produces a signal 455 kHz higher than the 2nd IF, and is down-mixed with the 2nd IF at Q302, and a 3rd IF of 455 kHz is produced.

Note that the 55.5 - 84.5 MHz Local Oscillator is used both for 1st and 2nd mixing. This cancels frequency drift. For example, if the 1st heterodyning frequency drifts 1 kHz. The 2nd heterodyning frequency also drifts 1 kHz, thus the drift is cancelled.

For instance:

When tuned to CB Channel 1, 26.965 MHz, and if the Local Oscillator is running at 81.6 MHz (but it should be 81.5 MHz) this is what happens.

	Actual	Should be
1st Mix.	$81.6 - 26.965 = 54.635$ MHz	$81.5 - 26.965 = 54.535$ MHz
2nd Osc.	29 MHz	29 MHz
3rd Mix.	$81.6 - 29 = 52.6$ MHz	$81.5 - 29 = 52.5$ MHz
2nd Mix.	$54.635 - 52.6 = 2.035$ MHz	$54.535 - 52.5 = 2.035$ MHz

Thus, drift is cancelled.

Frequency Readout:

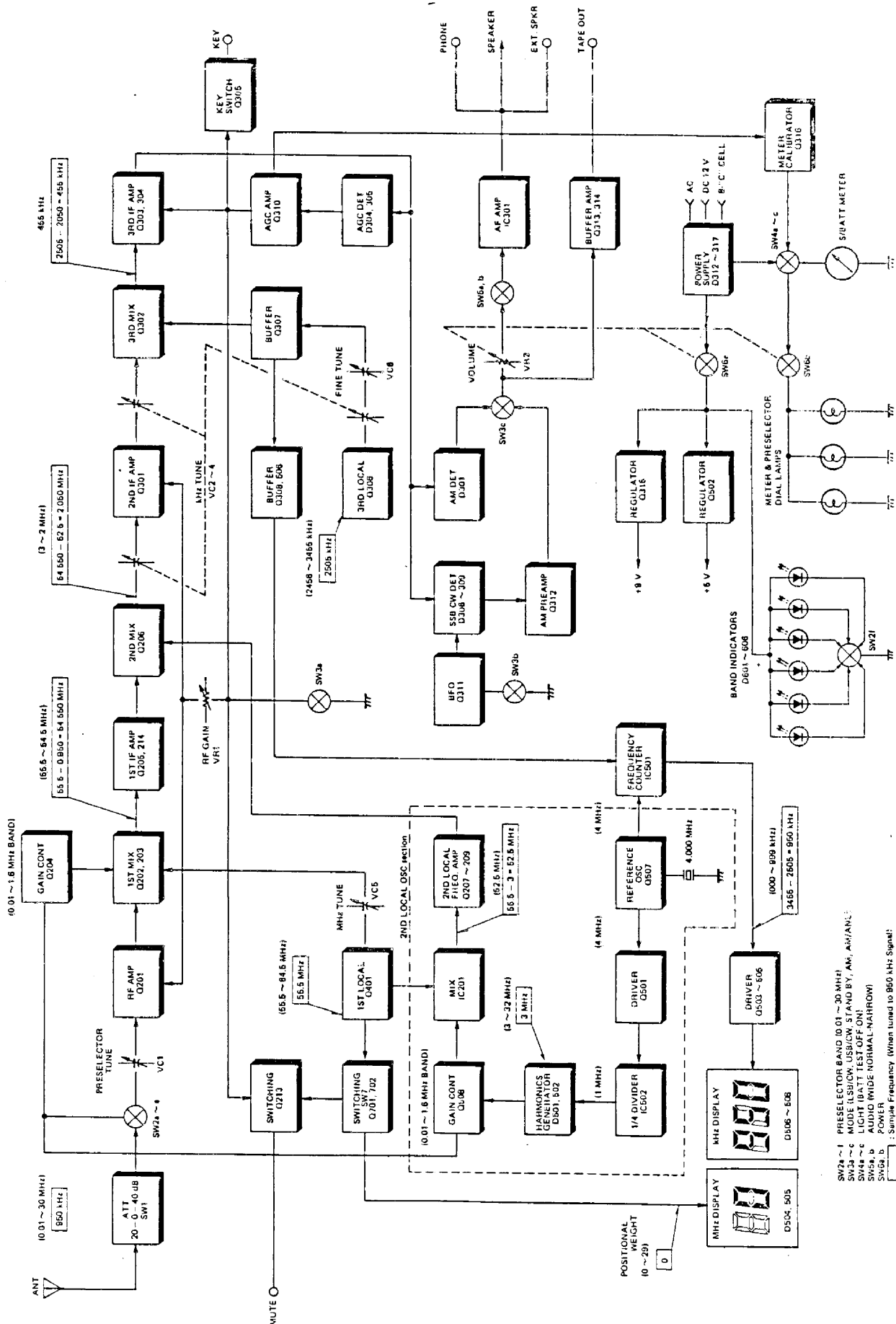
Just as with Tuning, frequency readout is done in two stages: MHz and kHz.

The MHz indicator is mechanical: MHz tuning capacitor VC5 is mechanically ganged with SW7.

SW7 makes the switch wafer to readout 0 - 29: it will indicate "0" when 1st Osc. is set to 55.5 MHz, "1" for 56.5 MHz, etc. ...

For kHz readout, IC501 counts the 3rd Local Oscillator frequency, which is, as described above, the kHz Tuning. The 3rd Osc. signal is buffered and amplified by Q307, Q308 and Q506, and applied to IC501. IC501 then converts this signal and drives the kHz display.

# BLOCK DIAGRAM



SW2a ~ i PRESELECTOR BAND (0.01 ~ 1.6 MHz)  
 SW2b ~ c MODE (LSB/CW, USB/CW, STAND BY, AM, AUCANCE)  
 SW2c ~ c LIGHT (BATT TEST OFF/ON)  
 SW2d ~ b ADD'D (WIDE/NORMAL/NARROW)  
 SW2e ~ b POWER (ON/OFF)  
 SW2f ~ b Sample Frequency (When tuned to 860 kHz Signal)

# OPERATION CHECK/ALIGNMENT PREPARATION

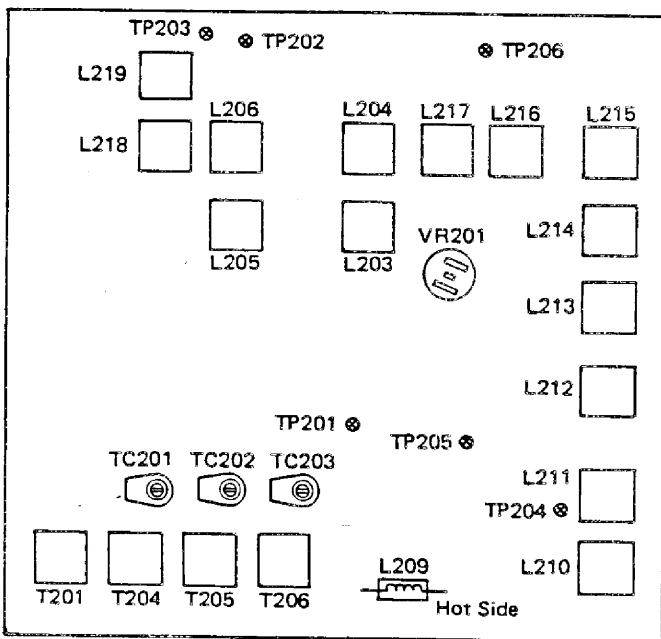
Test instruments required.

1. Oscilloscope
2. AC VTVM (RF)
3. DC VTVM
4. Spectrum Analyzer (if available) or Monitor Scope (40 MHz – 60 MHz)
5. Frequency Counter
6. 8Ω Dummy Load
7. RF Signal Generator (10 kHz – 30 MHz)
8. Audio Signal Generator
9. Distortion Meter
10. Sweep Signal Generator (40 MHz – 60 MHz)
11. Detector

**NOTE:** Prior to alignment allow instruments and unit to warm up for 15 minutes. Maintain Generator output level at minimum necessary (to avoid saturation and clipping).

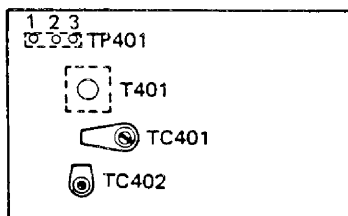
## ALIGNMENT LOCATIONS AND POINTS

### RF P.C.B.

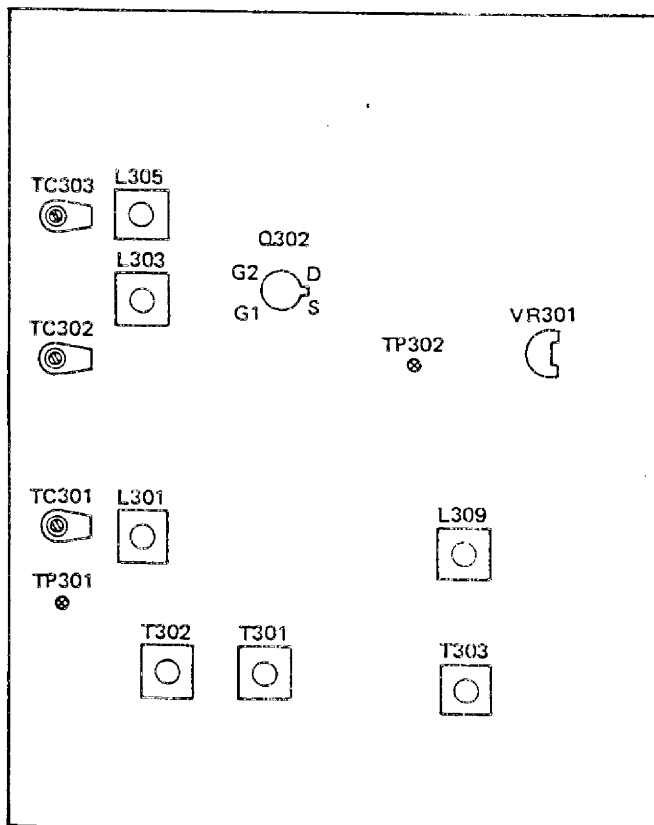


T202/T203 are bar antenna coil.

### MHz P.C.B. (Soldering Side View)



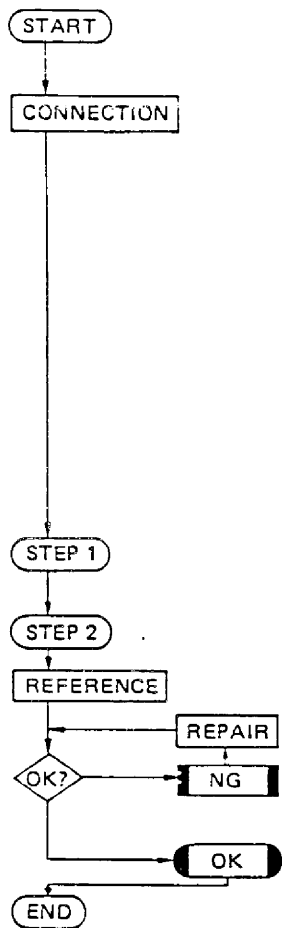
### IF/AF P.C.B.



**NOTE:** T201 and T303 happen to be adjustable due to parts procurement ease. No need to adjust them.

VR302 is attached to lug terminal on bottom side of IF/AF PCB.

# AF OPERATION CHECK



Connect AF Generator to "hot" end of VOLUME Control.  
 Connect AC VTVM, Oscilloscope and Distortion Meter to EXT SPKR Jack J3 across 8Ω Dummy Load.  
 See Figure 1.

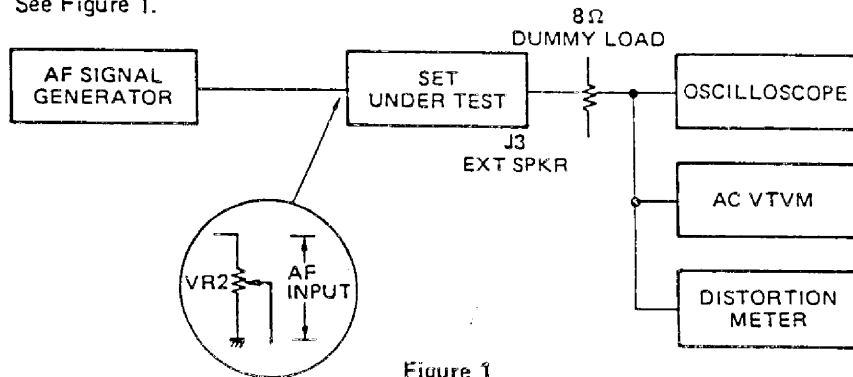


Figure 1

Control setting : VOLUME (max), AUDIO (NORMAL), Mode (AM)  
 AF Generator setting : 1 kHz

Check AF Output with 10 – 20 mV input.

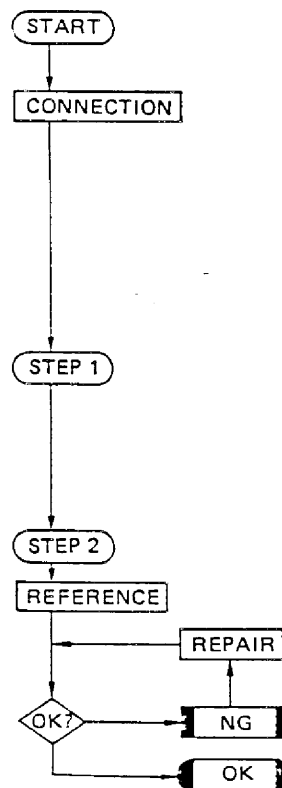
AF Output Power should be 0.5 W with 10 – 20 mV input.

Check AF circuit. See Troubleshooting 3).

AF Output Power is not 0.5 W with 10 – 20 mV input and/or Distortion is over 10%.

AF Output Power is 0.5 W with 10 – 20 mV input and Distortion is less than 10%.

# 2ND/3RD IF OPERATION CHECK



Connect SG to TP 202 through a 2pF capacitor. ✓  
 Connect AC VTVM and Oscillator to EXT SPKR Jack J3 across 8Ω Dummy Load. See Figure 2.

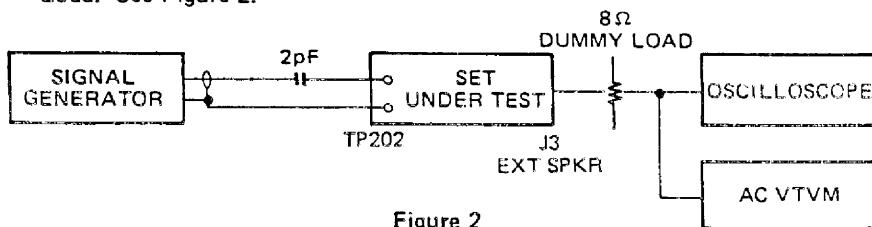


Figure 2

Control setting : Mode (AM), VOLUME (max), RF GAIN (max)  
 AUDIO (NORMAL)

Signal Generator : 2.5 MHz (1 kHz, 30% Mod.) ✓

MHz/kHz Tuning : 10.500 MHz

Check AF Output level with 700 – 1400 μV input. ✓

AF Output level should be 3 V with 700 – 1400 μV input. ✓

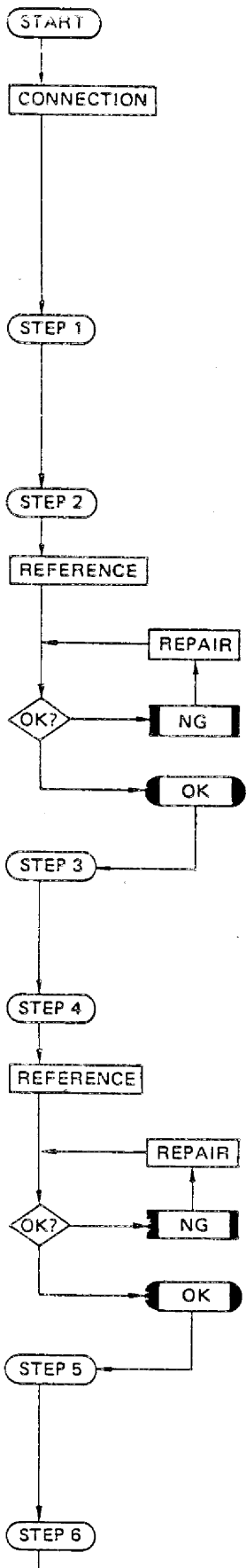
Check 2nd IF Stage, 3rd IF Stage, DET circuit and/or associated circuit components.

AF Output level is not 3 V with 700 – 1400 μV input. ✓

AF Output level is 3 V with 700 – 1400 μV input. ✓



# TOTAL GAIN CHECK



Connect SG to ANT Jack A - 1 and DC VTVM to TP 301.  
See Figure 3.



Figure 3

Control Setting : RF GAIN (max.)  
PRESELECTOR BAND (0.01 - 0.15)  
MHz/kHz Tuning (100 kHz)

SG Setting : 100 kHz

Increase SG output until 1.5 V reading is obtained on DC VTVM.

SG output is 7.5 - 30  $\mu$ V

Check RF and/or IF Stage and/or associated components.

SG output is more than 30  $\mu$ V

SG output is 7.5 - 30  $\mu$ V

Control Setting : PRESELECTOR BAND (0.15 - 0.5)  
MHz/kHz Tuning (300 kHz)

SG Setting : 300 kHz

Increase SG output until 1.5 V reading is obtained on DC VTVM.

SG output is 0.75 - 3  $\mu$ V

Check RF Stage and/or associated circuit components.

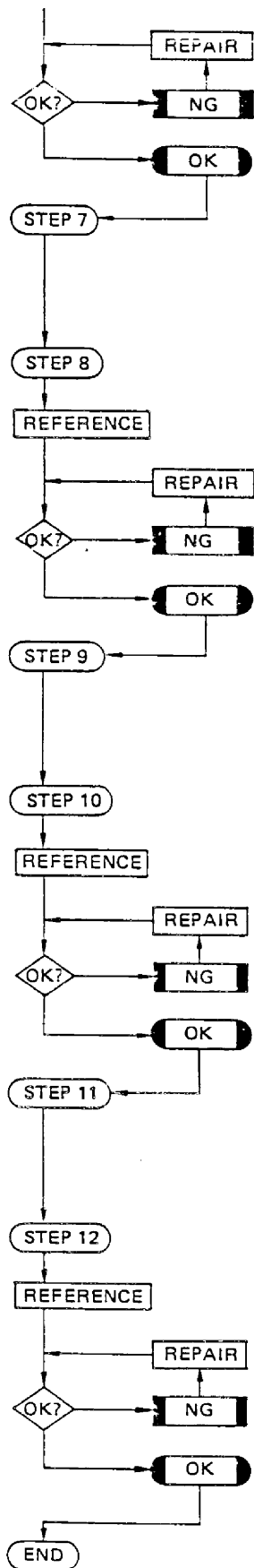
SG output is more than 3  $\mu$ V

SG output is 0.75 - 3  $\mu$ V

Control Setting : PRESELECTOR BAND (0.5 - 1.6)  
MHz/kHz Tuning (900 kHz)

SG output : 900 kHz

Increase SG output until 1.5 V reading is obtained on DC VTVM.



Check RF Stage and/or associated circuit component.

SG output is more than  $2 \mu\text{V}$

SG output is  $0.5 - 2 \mu\text{V}$

Control Setting : PRESELECTOR BAND (1.6 -- 4.5)  
MHz/kHz Tuning (3.1 MHz)

SG Setting : 3.1 MHz

Increase SG output until 1.5 V reading is obtained on DC VTVM.

SG output is  $1.5 - 6 \mu\text{V}$

Check RF Stage and/or associated circuit components.

SG output is more than  $6 \mu\text{V}$

SG output is  $1.5 - 6 \mu\text{V}$

Control Setting : PRESELECTOR BAND (4.5 -- 12)  
MHz/kHz Tuning (7.1 MHz)

SG Setting : 7.1 MHz

Increase SG output until 1 V reading is obtained on DC VTVM.

SG output is  $0.75 - 3 \mu\text{V}$

Check RF Stage and/or associated circuit component.

SG output is more than  $3 \mu\text{V}$

SG output is  $0.75 - 3 \mu\text{V}$

Control Setting : PRESELECTOR BAND (12 -- 30)  
MHz/kHz Tuning (21.1 MHz)

SG Setting : 21.1 MHz

Increase SG output until 1 V reading is obtained on DC VTVM.

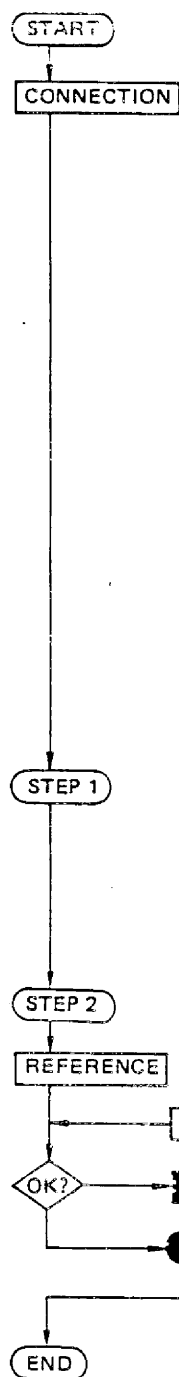
SG output is  $1.5 - 6 \mu\text{V}$

Check RF Stage and/or associated circuit component.

SG output is less than  $6 \mu\text{V}$

SG output is  $1.5 - 6 \mu\text{V}$

# 1ST IF OPERATION CHECK



Connect SG to TP201 and DC VTVM to TP202. See Figure 4.

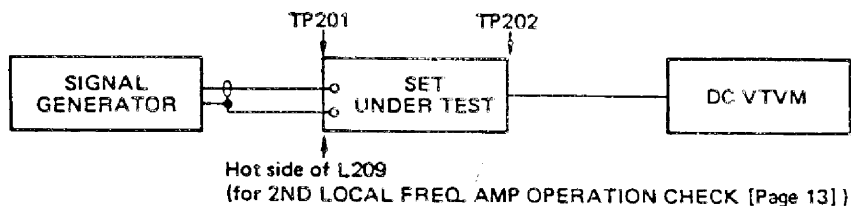


Figure 4

## NOTE

1. Connect Pin-2 of TP401 to Pin-3 of TP401 in order to inhibit the 1st Local Oscillator.
2. Supply GND level to the point where C240 and a coaxial cable is joined in order to inhibit the output of Harmonics Generator (D501, D502).

Control Setting : Mode (AM)  
 PRESELECTOR BAND (4.5 – 12 MHz)  
 PRESELECTOR TUNE (10 MHz)  
 MHz/kHz Tuning (10.5 MHz)

Signal Generator  
 Setting : 55 MHz (No Mod.)

Increase SG output until 100 mV (250 mV) reading is obtained on DC VTVM.

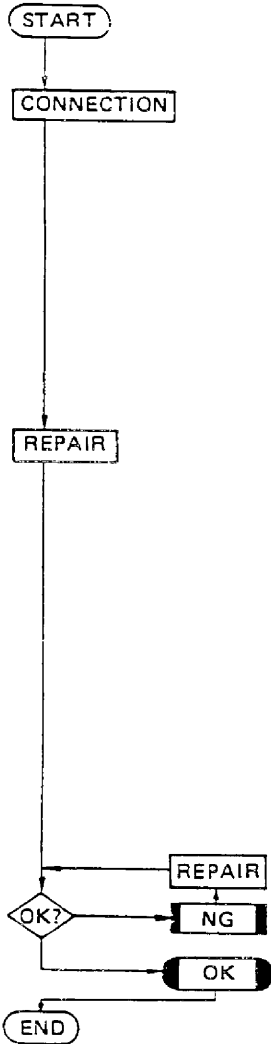
SG output is 2.14 – 4.22 mV (21.4 – 42.2 mV).

Check 1st IF stage and/or associated circuit components.

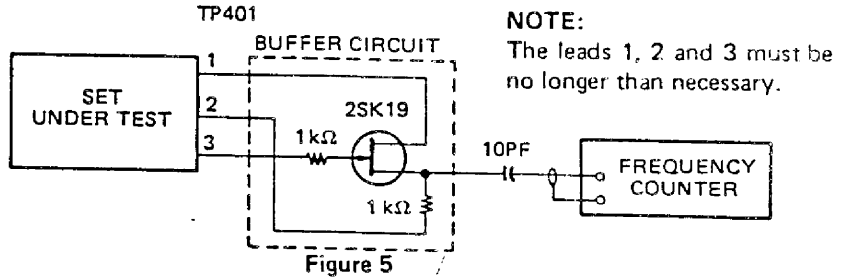
SG output is not 2.14 – 4.22 mV (21.4 – 42.2 mV).

SG output is 2.14 – 4.22 mV (21.4 – 42.2 mV).

# 1ST LOCAL OSC OPERATION CHECK



Connect Frequency Counter to TP401 through a Buffer circuit; See Figure 5.



The following readings should be obtained on Frequency Counter in accordance with MHz Tuning.

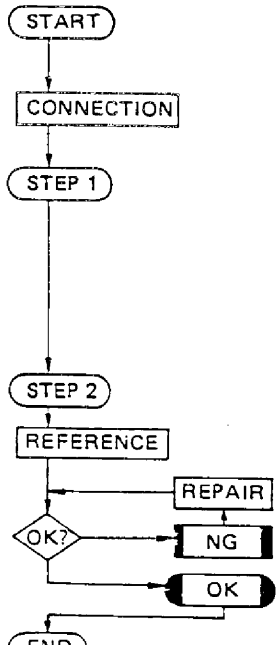
MHz Readout (MHz)	Frequency Counter Readings (MHz)
0	55.5 ± 0.1
1	56.5 ± 0.1
2	57.6 ± 0.1
.	.
.	.
28	83.5 ± 0.1
29	84.5 ± 0.1

See 1ST LOCAL OSC ALIGNMENT on page 19.

The reading does not meet the chart.

The reading meet the chart.

# 2ND LOCAL FREQ. AMP OPERATION CHECK



Connect SG to "hot" side of L209 and DC VTVM to TP202. See Figure 4.

Control Setting : Mode (AM)  
 PRESELECTOR BAND (4.5 -- 12 MHz)  
 PRESELECTOR TUNE (10 MHz)  
 MHz/kHz Tuning (10.5 MHz)

Signal Generator Setting : 52.5 MHz (No Mod.)

Increase SG output until 100 mV (350 mV) reading is obtained on DC VTVM.

SG output is 2.14 -- 4.22 mV (21.4 -- 42.2 mV).

Check Q207 -- Q209 and/or associated circuit components.

SG output is not 2.14 -- 4.22 mV (21.4 -- 42.2 mV).

SG output is 2.14 -- 4.22 mV (21.4 -- 42.2 mV).

# PRESELECTOR DIAL CALIBRATION

CONTROL SETTING	Set PRESELECTOR TUNE fully counter-clockwise.
CALIBRATION	Hold PRESELECTOR TUNE knob with your hand, and set the gear ①, shown in Figure 6, so that the Preselector Dial is as shown in Figure 7.

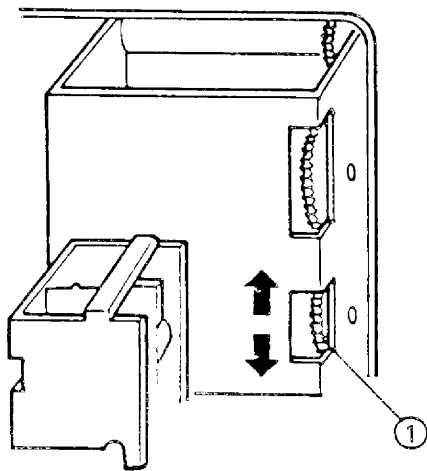


Figure 6

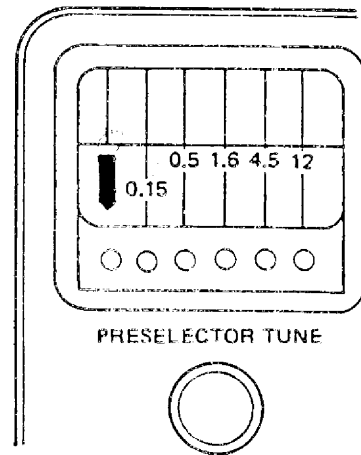
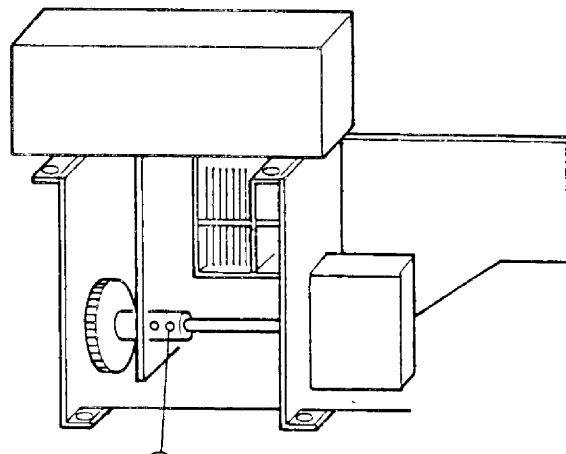


Figure 7

# LINKAGE ADJUSTMENT OF MHz SWITCH

**PRECAUTION:** Do the mechanical adjustment only if it is actually necessary after CHECK or you replaced some parts.

CONTROL SETTING	OFF/VOLUME : ON MHz Tune : fully clockwise
CHECK	Check the MHz Tuning indication; rotating the MHz Tuning in the counter-clockwise direction causes the MHz Tuning display to vary in 29, 28, ..... 1, 0, sequence and eventually disappear.
ADJUSTMENT	Loosen screw ① on MHz Switch shaft. Turn the shaft of MHz Switch in the direction that results in a MHz sequence indication of 0, 1, ..... 28, 29; tighten screw ① at the precise point where the 29 MHz indication disappears. To avoid miss tracking be sure to make this shaft setting very precisely.



### 3RD IF ALIGNMENT

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 9	OFF/VOLUME: ON Mode: AM RF GAIN: Max. MHz Tuning: 1 MHz kHz Tuning: 500 kHz	455 kHz 1 mV ± 3 dB (NO MOD.)	T301, T302	Adjust T301 and T302 for max. reading (approx. -2.3 V) on DC VTVM.
2	Same as Step 1	Same as Step 1	455 kHz 10 mV ± 3 dB (NO MOD.)	Same as Step 1	Adjust T301 and T302 for max. reading (approx. -2.5 V) on DC VTVM.

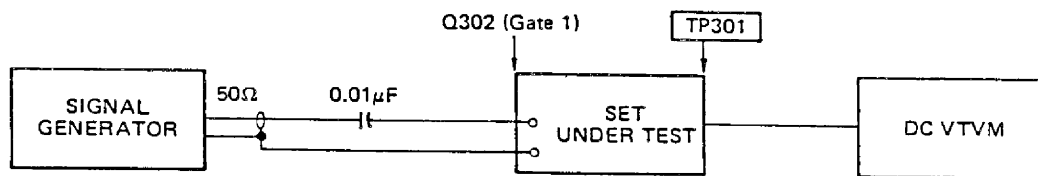


Figure 9

### ALIGNMENT OF kHz TRACKING

STEP	CONTROL SETTING	ADJUSTMENT	REMARKS
1	OFF/VOLUME: ON Mode: AM MHz Tuning: 1 MHz Set FINE TUNE to minimum receiving frequency with FINE TUNE knob set to 9 o'clock position. Preset kHz Tuning to fully counterclockwise and return it approximately 1-1/4 turns from the point when slipping starts.	TC303	Adjust TC303 for kHz Read-out of "000".
2	OFF/VOLUME: ON Mode: AM MHz Tuning: 1 MHz Set FINE TUNE to 3 o'clock position, and set kHz Tuning fully clockwise and return it approximately 1-1/4 turns from the point when slipping starts.	L305	Adjust L305 for kHz Read-out of "999".
3	Repeat Steps 1 and 2 a couple of times.		

## 2ND IF ALIGNMENT

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTINGS	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 10	OFF/VOLUME: ON Mode: AM RF GAIN: Max. VOLUME: Max. MHz Tuning: 2 MHz kHz Tuning: 900 kHz	2.1 MHz 1 mV (10 mV) $\pm 3$ dB 1 kHz 30% Mod.	L301, L303	Adjust L301 and L303 for max. reading [approx. 3 V (3.5 V)] on AC VTVM.
2	Same as Step 1	OFF/VOLUME: ON Mode: AM RF GAIN: Max. VOLUME: Max. MHz Tuning: 2 MHz kHz Tuning: 100 kHz	2.9 MHz 1 mV (10 mV) $\pm 3$ dB 1 kHz 30% Mod.	TC301, TC302	Adjust TC301 and TC302 for max. reading [approx. 3 V (3.5 V)] on AC VTVM.
3	Repeat Steps 1 and 2 until no further improvement can be obtained.				

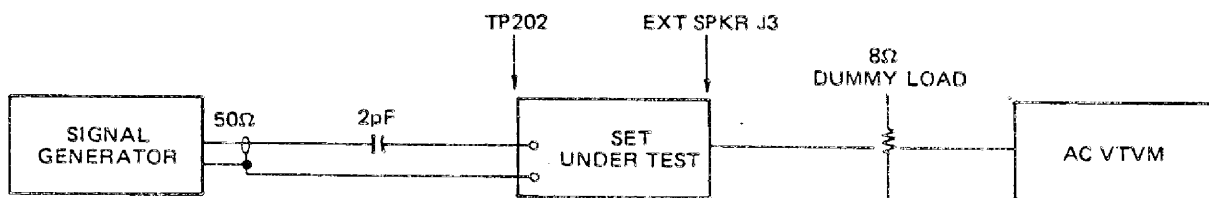
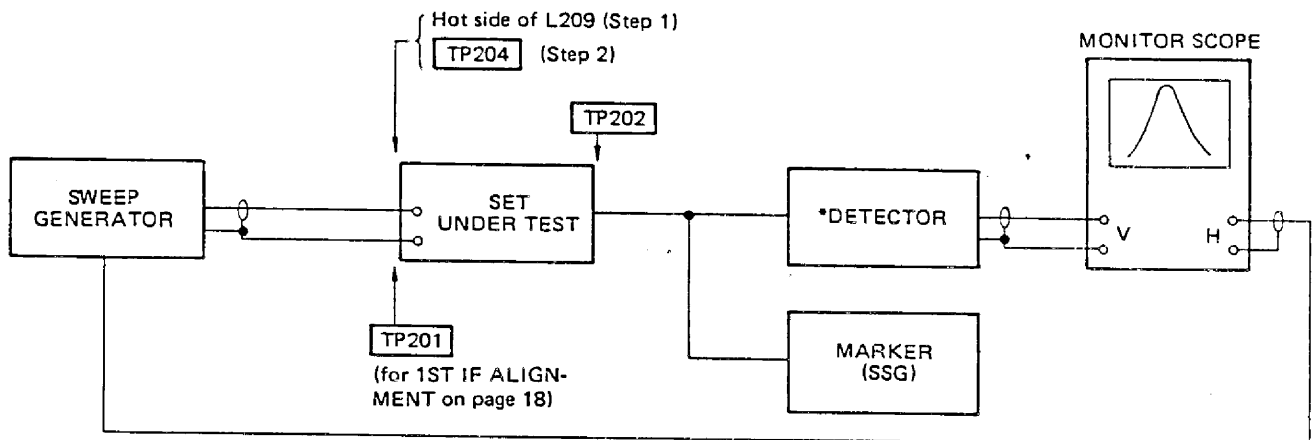


Figure 10

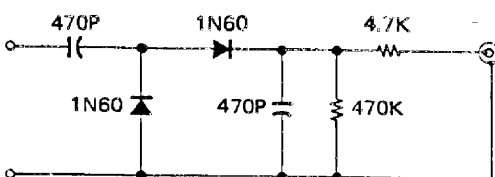
NOTE: Remember, 2nd IF is "reversed"; 3 to 2 MHz, not 2 to 3 MHz. Thus SG frequency should be 2.1 MHz for 2.9 MHz reception and 2.9 MHz for 2.1 MHz reception.

# ALIGNMENT OF 2ND LOCAL FREQ. AMP

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 11	OFF/VOLUME : ON Mode : AM PRESELECTOR BAND : 4.5 - 12 MHz PRESELECTOR TUNE : 10 MHz MHz Tuning : 10 MHz kHz Tuning : 500kHz	Center Freq. 52.5 MHz  Sweep Width 52.5 ± 2 MHz	L212 ~ L217	Set marker frequency to 52.5 MHz. Adjust L212 ~ L217 to peak on monitor scope.
2	Refer to Figure 11	Same as Step 1	Same as Step 1	L210 ~ L217	Set marker frequency to 52.5 MHz. Adjust L210 ~ L217 to obtain the characteristic curve as shown in Figure 12. The core position of each coil should be approximately as illustrated in Figure 13.



## \* DETECTOR CIRCUIT



## NOTE

1. Connect Pin-2 of TP401 to Pin-3 of TP401.
2. Keep leads between DET. and TP202 as short as possible.

Figure 11

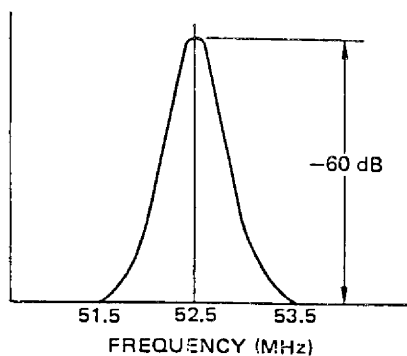


Figure 12

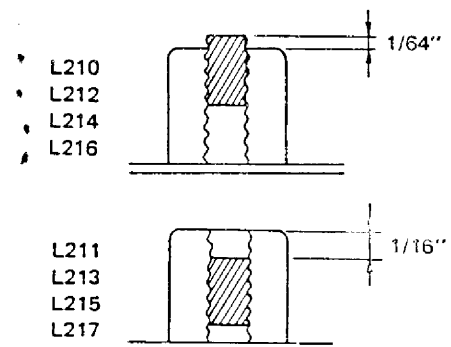


Figure 13



# 1ST IF ALIGNMENT

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 11	OFF/VOLUME : ON Mode : AM PRESELECTOR BAND : 4.5 - 12 MHz PRESELECTOR TUNE : 10 MHz MHz Tuning : 10 MHz kHz Tuning : 500 kHz	Center Freq. 55 MHz  Sweep Width 55 ± 2 MHz	L203 ~ L206 L218, L219	Set marker frequency to 54.5 MHz, 55.0 MHz and 55.5 MHz. Adjust L203 ~ 206, L218 and L219 to obtain the characteristic curve as shown in Figure 14. The core positions of each coil should be approximately as illustrated in Figure 15.

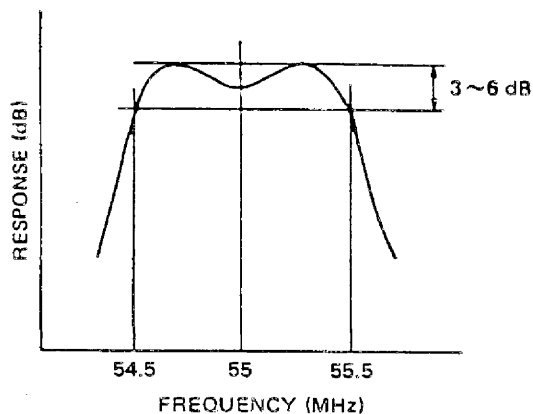


Figure 14

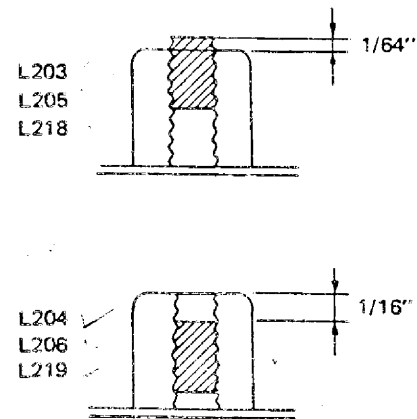


Figure 15

## PRECAUTION FOR VR201 AND 1ST LOCAL OSC ALIGNMENT

Any adjustment of VR201, TC401, TC402 and T401 must be made with great precision. Do not attempt any adjustment unless absolutely necessary.

### VR201 ALIGNMENT

NOTE: VR201 affects the MHz tracking. Thus, if you find it mandatory to adjust VR201, do so before finalizing MHz tracking. If VR201 adjustment has little effect, return it to the original setting.

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 16	OFF/VOLUME : ON Mode : AM RF GAIN : Max. PRESELECTOR BAND : 0.15 - 0.5 MHz PRESELECTOR TUNE : 0.5 MHz MHz Tuning : 0 MHz kHz Tuning : 500 kHz	500 kHz output : For approx. "3" ~ "5" reading on S-Meter	VR201	Adjust VR201 for max. reading on S-Meter.

# 1ST LOCAL OSC ALIGNMENT

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 16	OFF/VOLUME : ON VOLUME : For the desired audio output. Mode : AM RF GAIN : Max. ATTEN : 0 dB PRESELECTOR BAND : 1.6 – 4.5 MHz PRESELECTOR TUNE : 3.5 MHz MHz Tuning : 3 MHz kHz Tuning : 500 kHz	3.5 MHz	T401	Set trimmers TC401 and TC402 to mid-capacity point. Adjust T401 to receive SG signal.
2	Same as Step 1	OFF/VOLUME : ON VOLUME : For the desired audio output. Mode : AM RF GAIN : Max. ATTEN : 0 dB PRESELECTOR BAND : 12 – 30 MHz PRESELECTOR TUNE : 28 MHz MHz Tuning : 28 MHz kHz Tuning : 000 kHz	3.5 MHz	TC402	Adjust TC402 to receive the 8th harmonic of SG signal (28 MHz).
3	Repeat Step 1 and Step 2. Check tracking at 10.5 MHz, 17.5 MHz and 24.5 MHz. Adjust TC401 as required for optimum tracking.				
4	As a final check, make sure 1 MHz step tracking is correct all the way from 500 kHz to 29 MHz.				

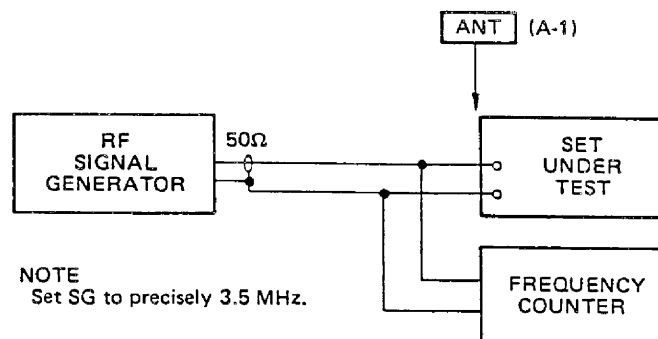


Figure 16

# RF STAGE ALIGNMENT

- NOTE 1. Maintain SG output level at minimum necessary to obtain usable output (3-4 readings on S-Meter).  
 2. T202, 203 (Bar. Antenna) : Refer to Wiring Diagram.

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 16	OFF/VOLUME : ON VOLUME : For the desired audio output. Mode : AM RF GAIN : Max. ATTEN : 0 dB PRESELECTOR BAND : 0.15 – 0.5 MHz MHz Tuning : To the point where the max. noise appears with MHz readout at "0". kHz Tuning : 300 kHz PRESELECTOR TUNE : 300 kHz	300 kHz 1 kHz 30% Mod.	T202	Adjust T202 for max. reading on S-Meter.
2	Same as Step 1	PRESELECTOR BAND : 0.5 – 1.6 MHz PRESELECTOR TUNE : 900 kHz kHz Tuning : 900 kHz Other Controls Setting : Same as Step 1	900 kHz 1 kHz 30% Mod.	T203	Adjust T203 for max. reading on S-Meter.
3	Same as Step 1	PRESELECTOR BAND : 1.6 – 4.5 MHz PRESELECTOR TUNE : 1.8 MHz MHz/kHz Tuning : 1.8 MHz Other Controls Setting : Same as Step 1	1.8 MHz 1 kHz 30% Mod.	T204	Adjust T204 for max. reading on S-Meter.
4	Same as Step 1	PRESELECTOR BAND : 1.6 – 4.5 MHz PRESELECTOR TUNE : 4.5 MHz MHz/kHz Tuning : 4.5 MHz Other Controls Setting : Same as Step 1	4.5 MHz 1 kHz 30% Mod.	TC201	Adjust TC201 for max. reading on S-Meter.
5	Repeat Steps 3 and 4 until no further improvement can be obtained.				
6	Same as Step 1	PRESELECTOR BAND : 4.5 – 12 MHz PRESELECTOR TUNE : 5.010 MHz MHz/kHz Tuning : 5.010 MHz Other Controls Setting : Same as Step 1	5.010 MHz 1 kHz 30% Mod.	T205	Adjust T205 for max. reading on S-Meter.
7	Same as Step 1	PRESELECTOR BAND : 4.5 – 12 MHz PRESELECTOR TUNE : 11.010 MHz MHz/kHz Tuning : 11.010 MHz Other Controls Setting : Same as Step 1	11.010 MHz 1 kHz 30% Mod.	TC202	Adjust TC202 for max. reading on S-Meter.
8	Repeat Steps 6 and 7 until no further improvement can be obtained.				
9	Same as Step 1	PRESELECTOR BAND : 12 – 30 MHz PRESELECTOR GUNE : 13.010 MHz MHz/kHz Tuning : 13.010 MHz Other Controls Setting : Same as Step 1	13.010 MHz 1 kHz 30% Mod.	T206	Adjust T206 for max. reading on S-Meter.
10	Same as Step 1	PRESELECTOR BAND : 12 – 30 MHz PRESELECTOR TUNE : 28.010 MHz MHz/kHz Tuning : 28.010 MHz Other Controls Setting : Same as Step 1	28.010 MHz 1 kHz 30% Mod.	TC203	Adjust TC203 for max. reading on S-Meter.
11	Repeat Steps 9 and 10 until no further improvement can be obtained.				

## BFO ALIGNMENT

NOTE : Set each control for max. reading on S-Meter.

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 16	OFF/VOLUME : ON VOLUME : For the desired audio Mode : LSB/CW PRESELECTOR BAND : 4.5 – 12 MHz PRESELECTOR TUNE : 7.1 MHz RF GAIN : Max. ATTEN : 0 dB MHz/kHz : 7.1 MHz	7.1 MHz 100 $\mu$ V (No Mod.)	L309	Adjust L309 for zero-beat. Set Mode to USB/CW and adjust kHz Tuning to obtain zero-beat. At this time kHz Readout must be "108" – "109".
2	Same as Step 1	Set MHz/kHz Tuning for max. reading on S-Meter. (7.1 MHz) Other Controls Setting : Same as Step 1	Same as Step 1	Same as Step 1	Alternate between LSB and USB and adjust L309 so the zero-beat is obtained at the same level on S-Meter.

## S-METER ALIGNMENT

### NOTE

1. After checking the specified sensitivities in all bands, adjust S-Meter sensitivity.
2. Set each control for max. reading on S-Meter.
3. VR302 : Refer to Wiring Diagram.

STEP	TEST INSTRUMENT CONNECTION	CONTROL SETTING	SIGNAL GENERATOR SETTING	ADJUSTMENT	REMARKS
1	Refer to Figure 16	OFF/VOLUME : ON Mode : LSB/CW PRESELECTOR BAND : 4.5 – 12 MHz PRESELECTOR TUNE : 7.1 MHz RF GAIN : Max. ATTEN : 0 dB MHz/kHz Tuning : 7.1 MHz	7.1 MHz 1 mV 1 kHz 30% Mod.	VR301	Adjust VR301 for full-scale reading on S-Meter.
2	Same as Step 1	Same as Step 1	7.1 MHz 30 $\mu$ V 1 kHz 30% Mod.	VR302	Adjust VR302 for a reading of 9 on S-Meter.

# TROUBLESHOOTING GUIDE

Symptom	Possible Cause
1) Pilot Lamp does not light and/or set fails to operate when power is ON.	A) Faulty power cord. B) Defective Q315 and/or associated circuit components. C) Defective lamp.
2) Fuse blows.	A) Short-circuit in the DC regulator circuit. B) Short-circuit in the power amplifier circuit.
3) Pilot Lamp lights but no sound on any band.	A) Defective Speaker. B) Defective PHONE and/or EXT SPKR Jack. C) Defective IC301 and/or associated circuit components. Proceed to A.F. OPERATION CHECK on page 9. D) Defective Mode switch SW-3.
4) No audio on any band.	A) Faulty Local Oscillator and/or associated circuit components. Proceed to 1ST/2ND LOCAL OSC CHECK on page 13. B) Faulty RF and/or IF Stage and/or associated circuit components. Proceed to TOTAL GAIN CHECK on page 10 – 11.
5) LSB/CW, USB/CW Mode does not function, AM Mode is OK.	A) Defective SSB/CW Detector D306 – D309 and/or associated circuit components. B) Defective BFO Q311 and/or associated circuit components.
6) Noisy	A) Faulty RF Stage amplifier and/or associated circuit components. Proceed to TOTAL GAIN CHECK on page 10 – 11. B) Faulty IF Stage amplifier and/or associated circuit components. Proceed to TOTAL GAIN CHECK on page 10 – 11. C) Defective AF amplifier IC301. Proceed to A.F. OPERATION CHECK on page 9.
7) Incorrect MHz reading.	A) The 1st Local OSC is out of order. See 1ST LOCAL OSC ALIGNMENT on page 18. B) MHz switch and linkage. See LINKAGE ADJUSTMENT OF MHz SWITCH on page 14.
8) Incorrect kHz reading.	A) Mistracking of kHz Tuning. See ALIGNMENT OF kHz TRACKING on page 15. B) IF Stage is out of order. See 1ST/2ND/3RD IF ALIGNMENT.
9) kHz Display is blanked.	A) 3rd Local Osc and/or associated circuit is defective. B) The Reference OSC (4 MHz) is defective. C) Frequency Counter (IC501) is defective.

- SPECIAL NOTE:** (1) If a user is annoyed by excessive birdies, which can not be eliminated by proper adjustment of the MHz tuning dial and/or the preselector and band switch, the problem may be caused by 1 MHz harmonics being passed through the 2nd I.F.

The best solution is to be sure that the shield case for the counter PCB is properly grounded (through the two wires from the RF PCB and the 4 screws). Be sure all shielding is secure. Also, try moving wires to see if you can obtain lower level birdies. Birdies with a level of more than 10  $\mu$ V (S + N/N equals 10 dB) are out of spec; nominal spec is no more than 2  $\mu$ V at 7.1 MHz.

- (2) Typically you can rule out any possibility of image response being responsible for birdies. Consider the following example for the image of 7.1 MHz....

$$F_i = F_r + 2IF$$

$F_i$  : Image Frequency

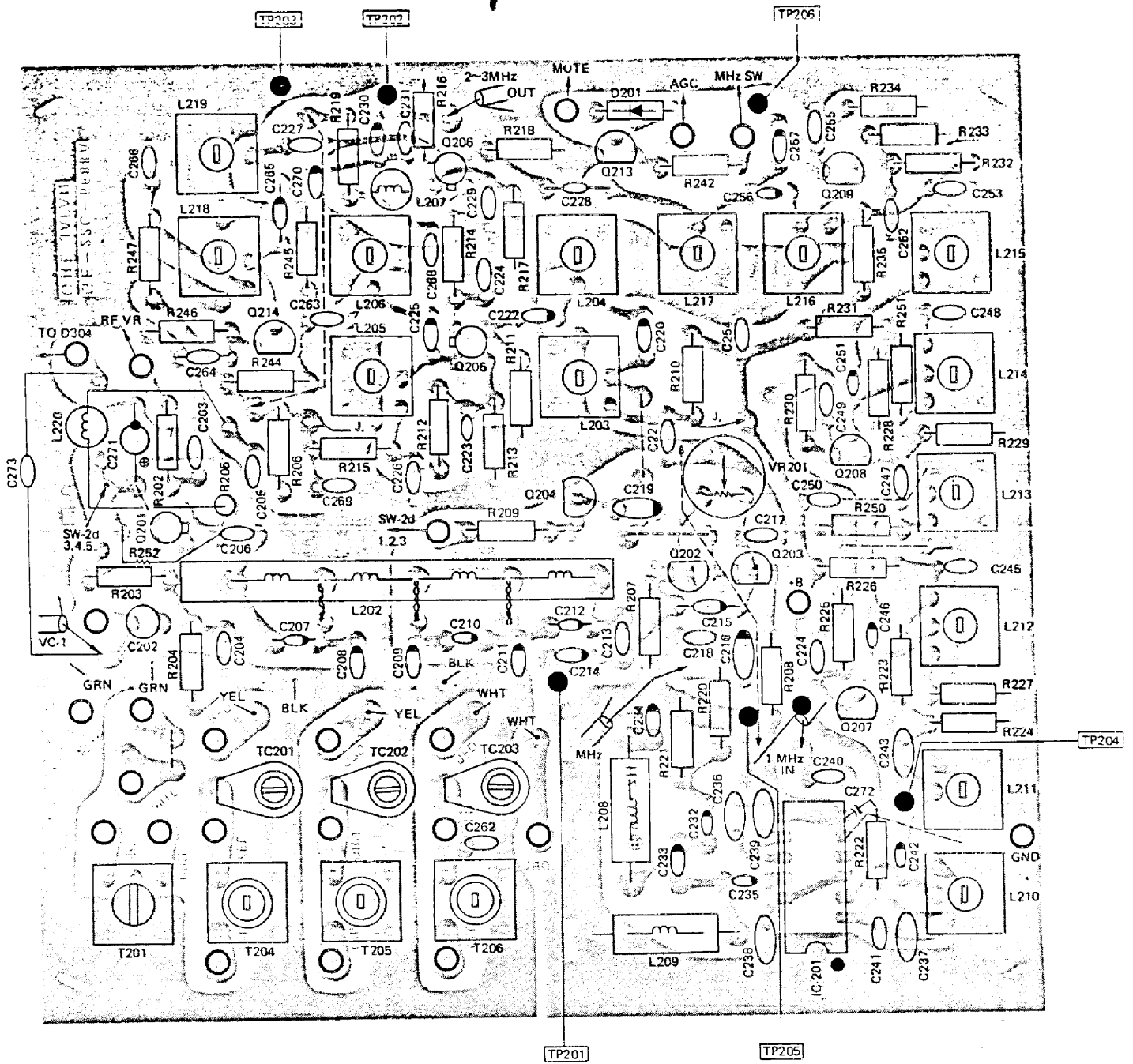
$F_r$  : Receiving Frequency

For instance :

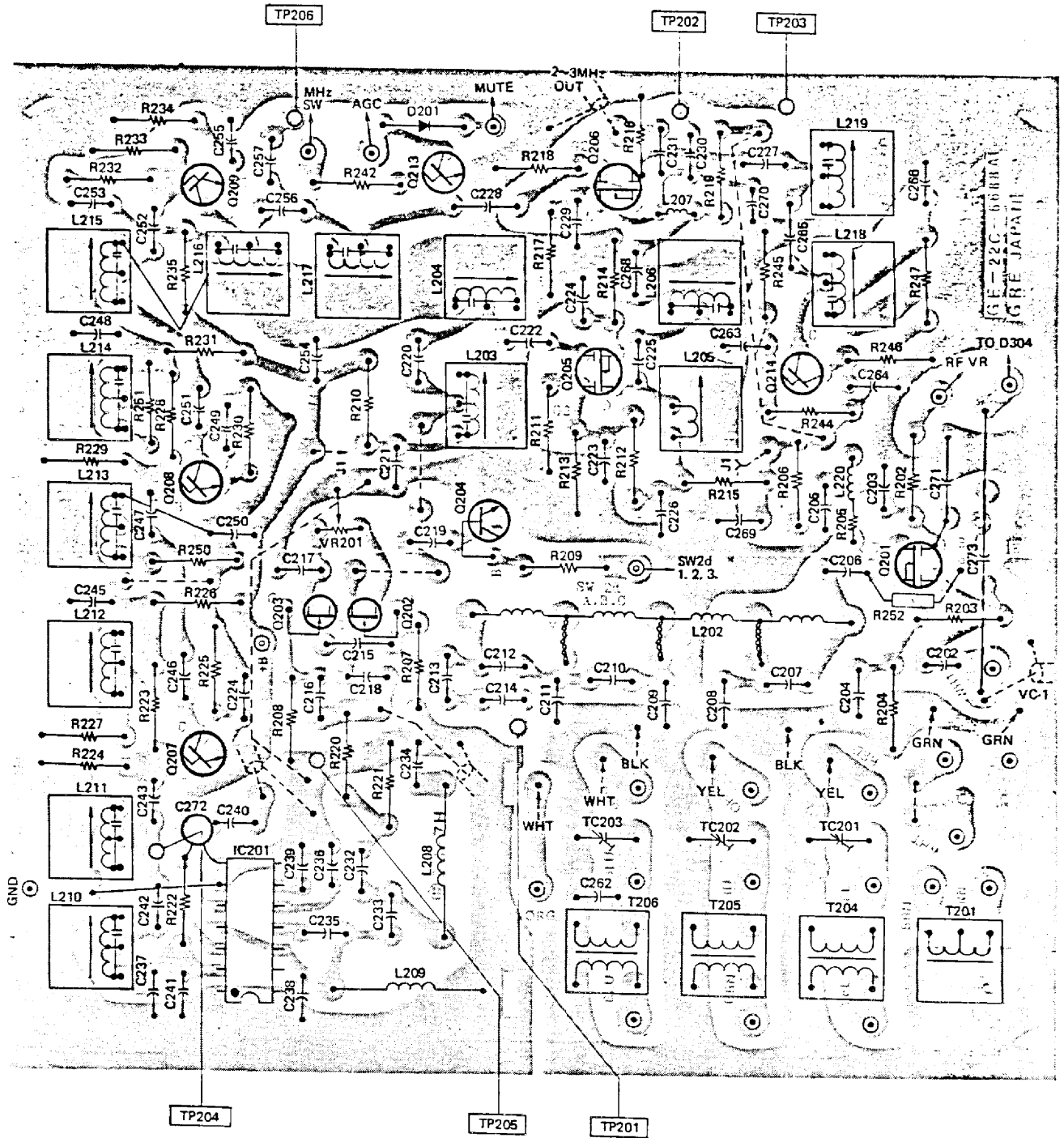
$$F_r = 7.1 \text{ MHz}$$

$$F_i = 7.1 + (2 \times 55.4) = 117.9 \text{ MHz}$$

# RF P.C. BOARD, TOP VIEW

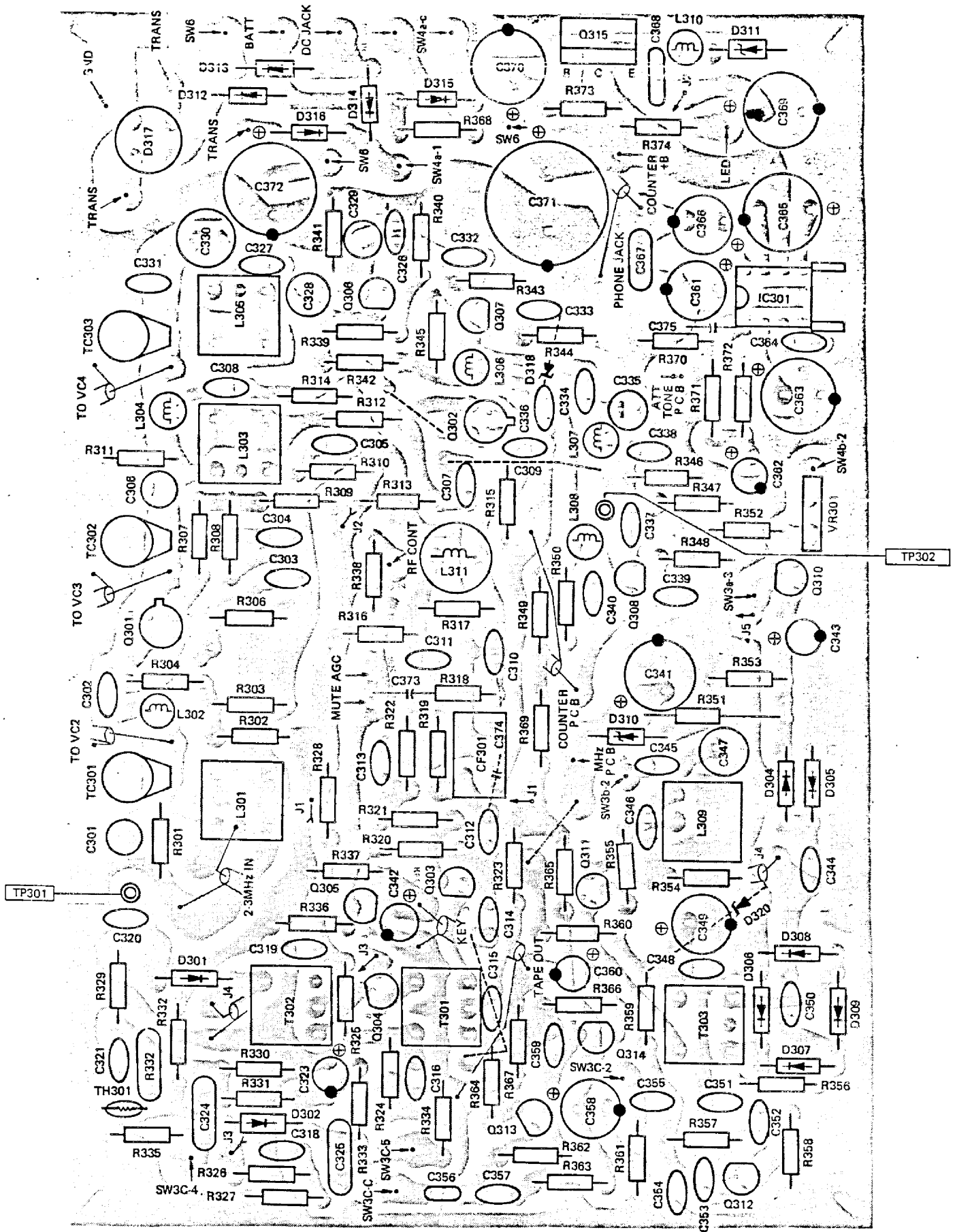


# RF P.C. BOARD, BOTTOM VIEW

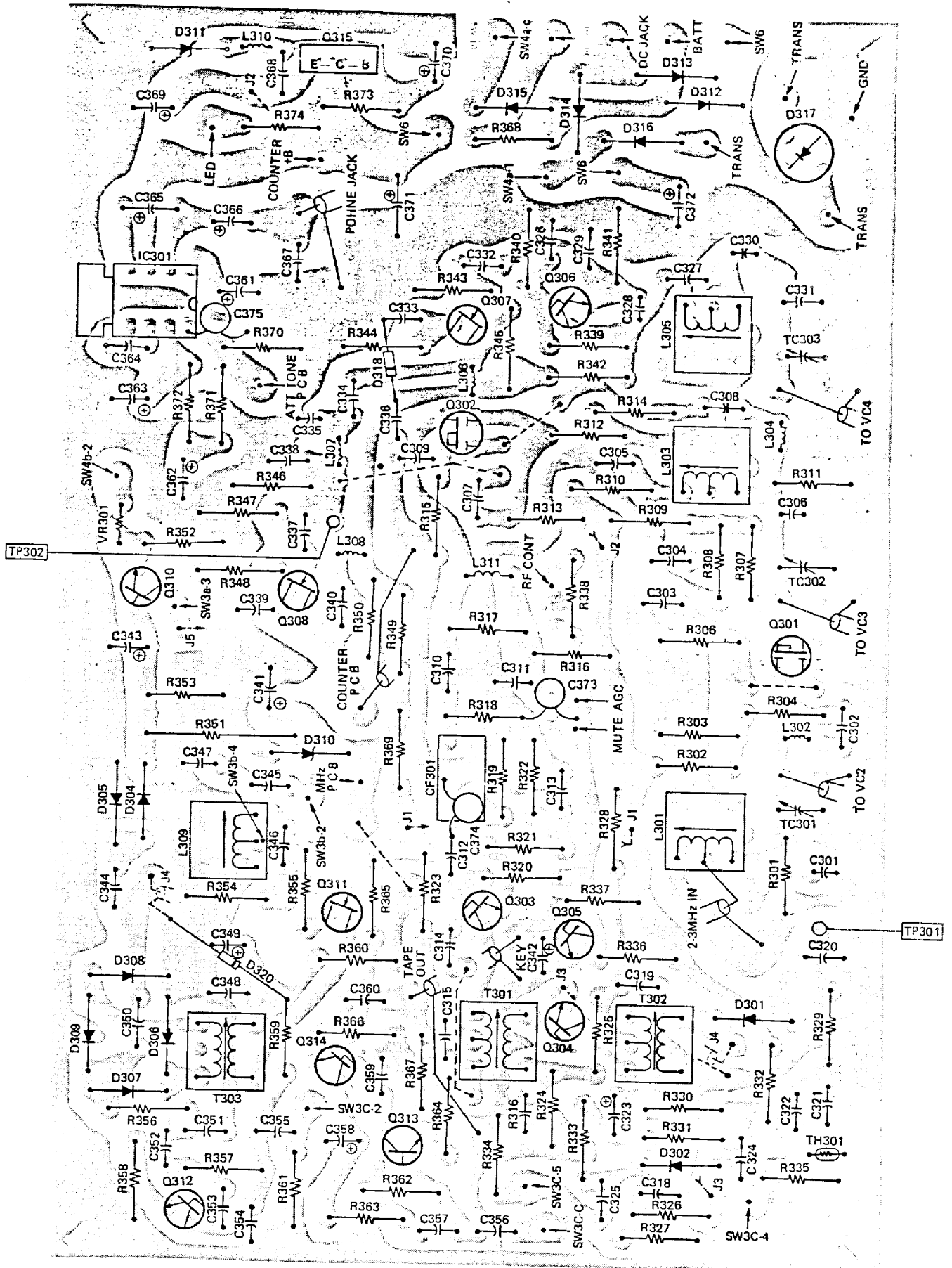




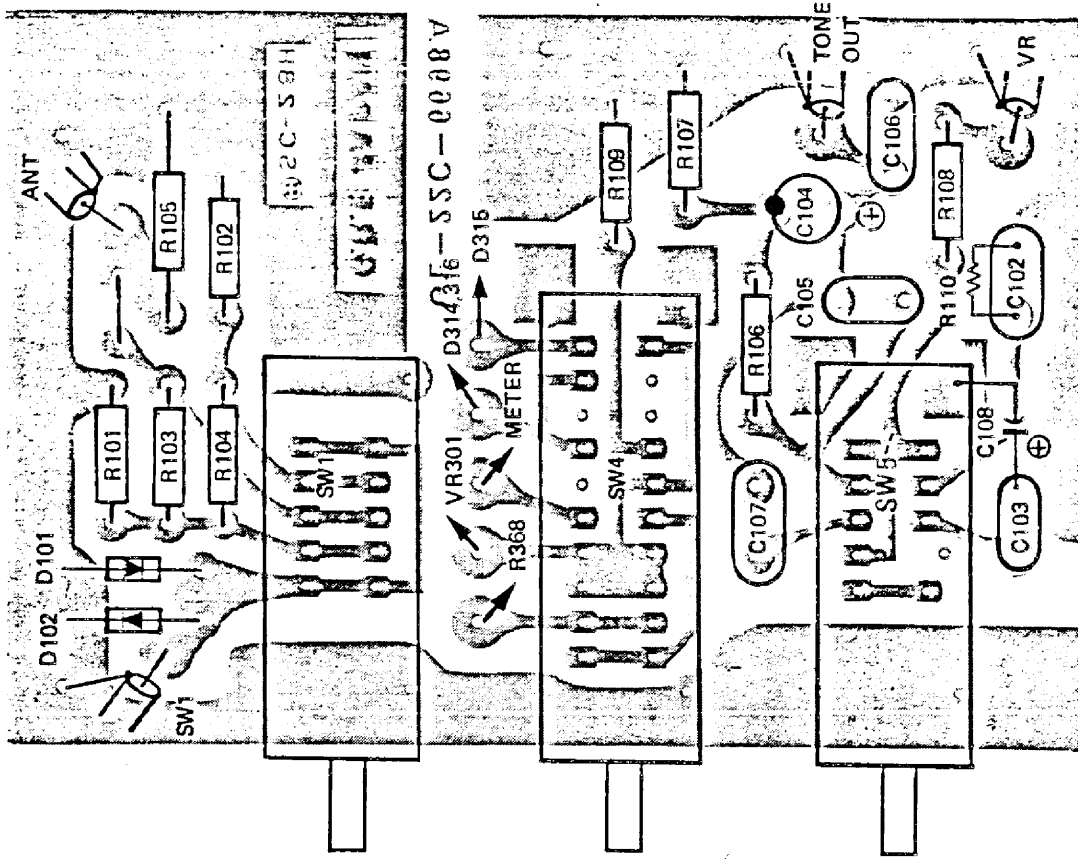
# IF/AF P.C. BOARD, TOP VIEW



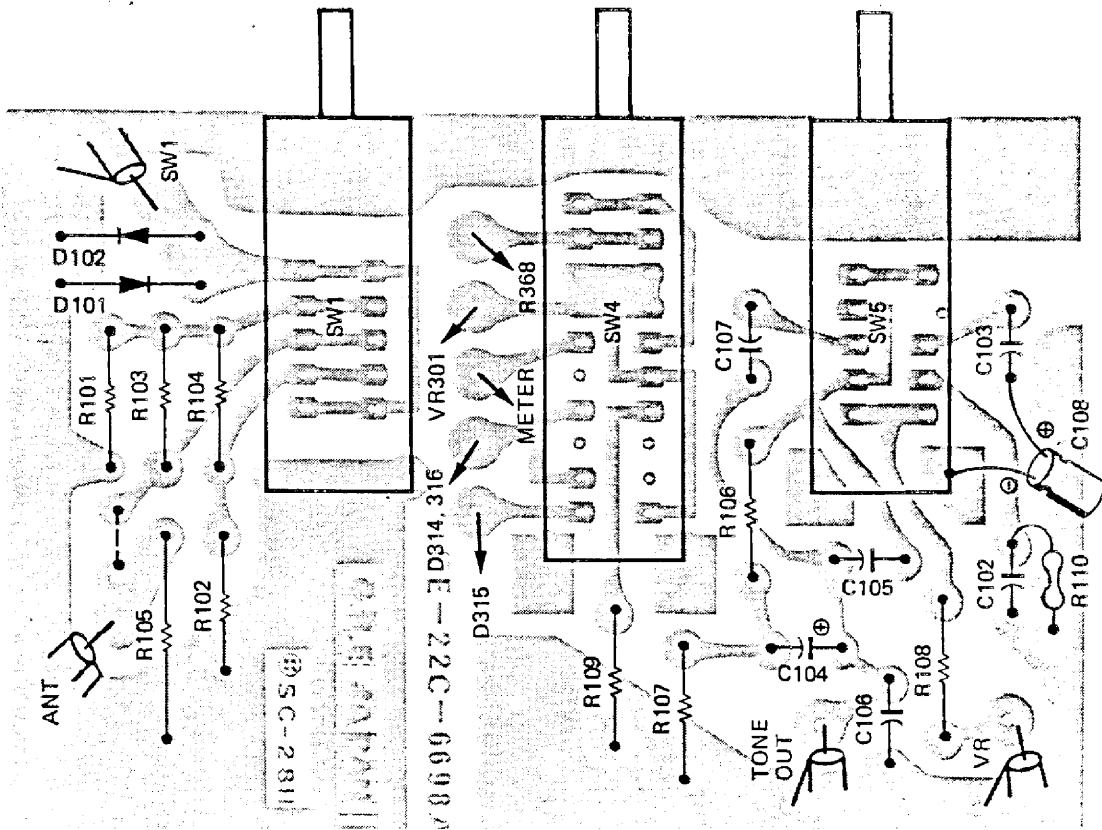
# IF/AF P.C. BOARD, BOTTOM VIEW



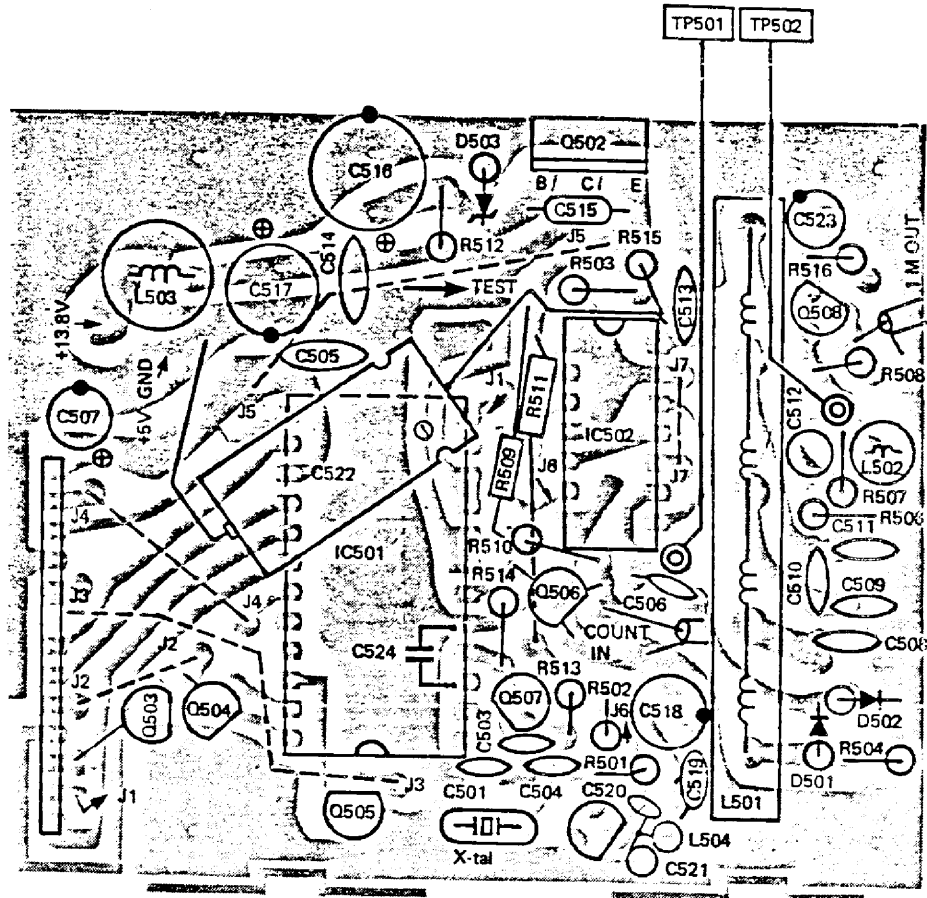
# AUDIO/ATT. P.C. BOARD, TOP VIEW



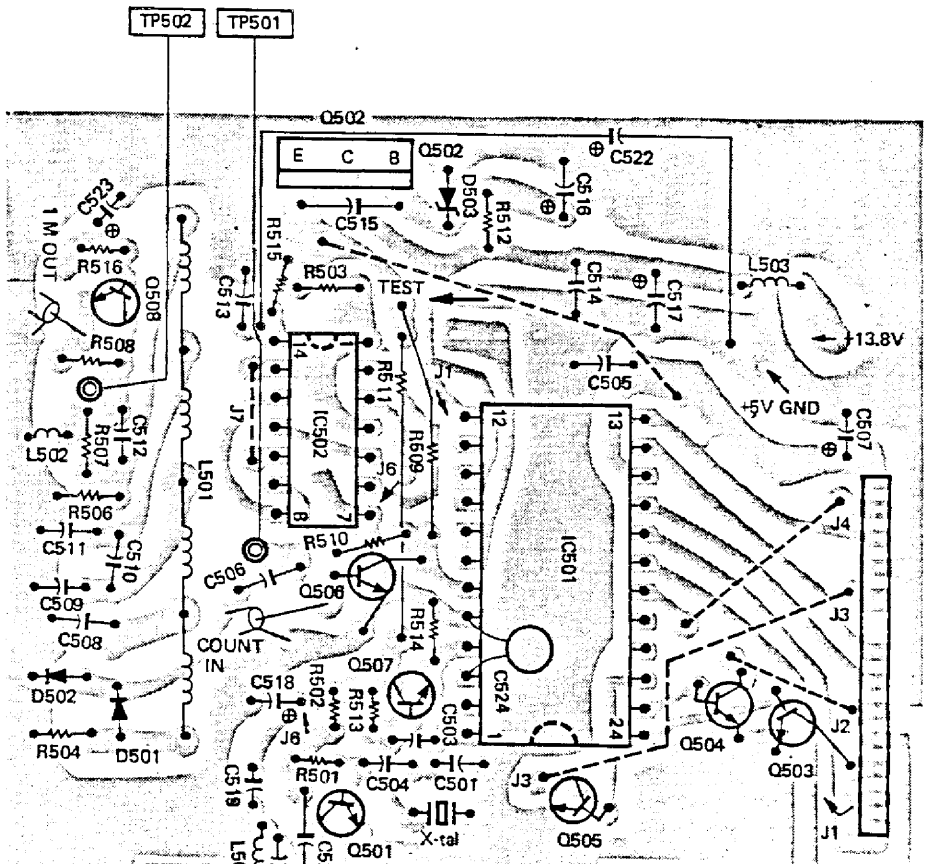
# AUDIO/ATT. P.C. BOARD, BOTTOM VIEW



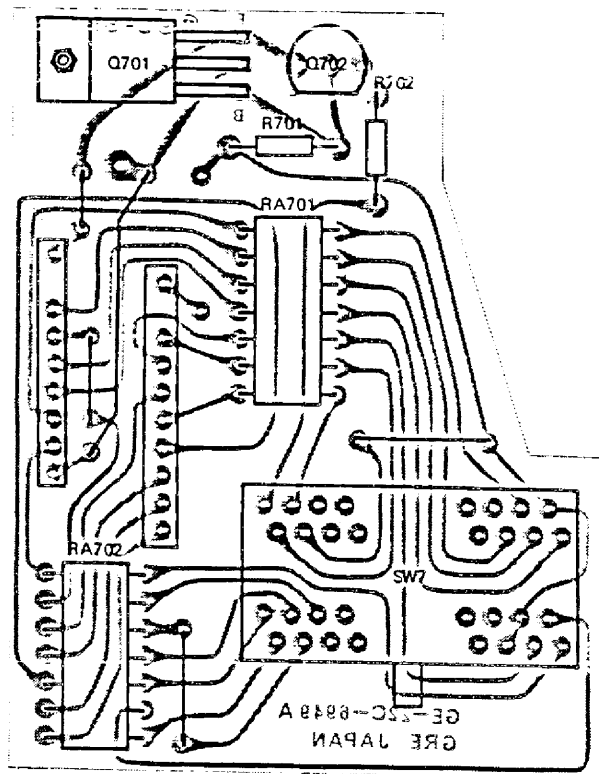
# COUNTER P.C. BOARD, TOP VIEW



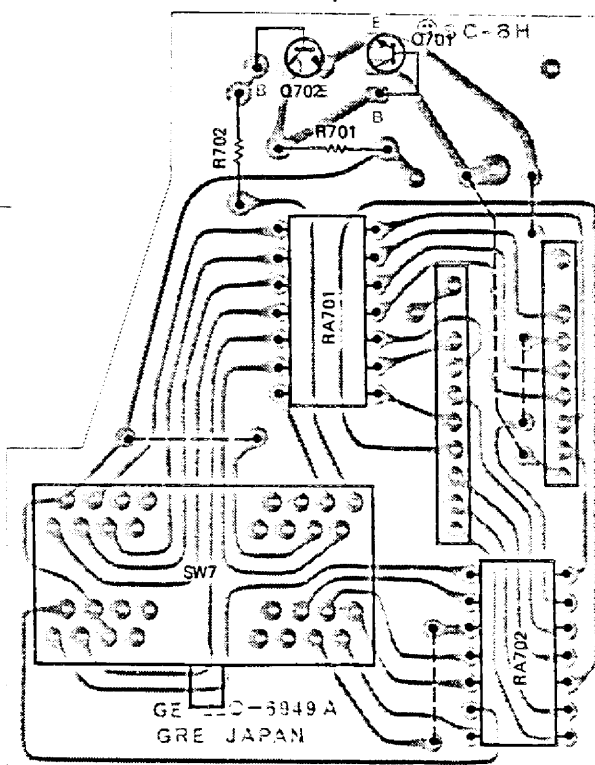
# COUNTER P.C. BOARD, BOTTOM VIEW



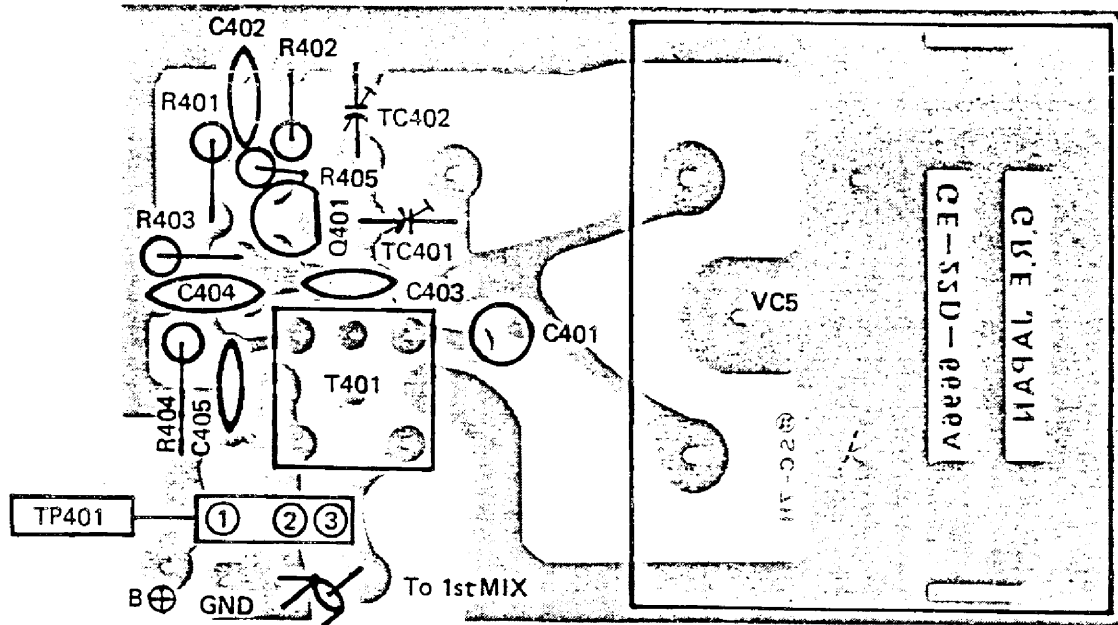
# MHz SWITCH P.C. BOARD, TOP VIEW



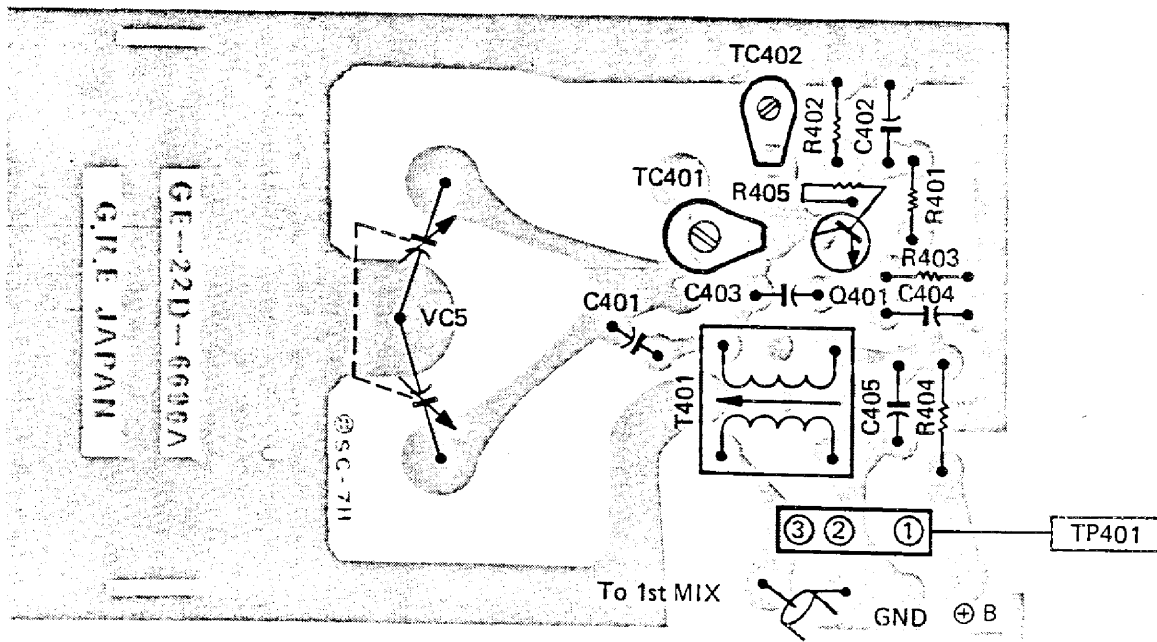
# MHz SWITCH P.C. BOARD, BOTTOM VIEW



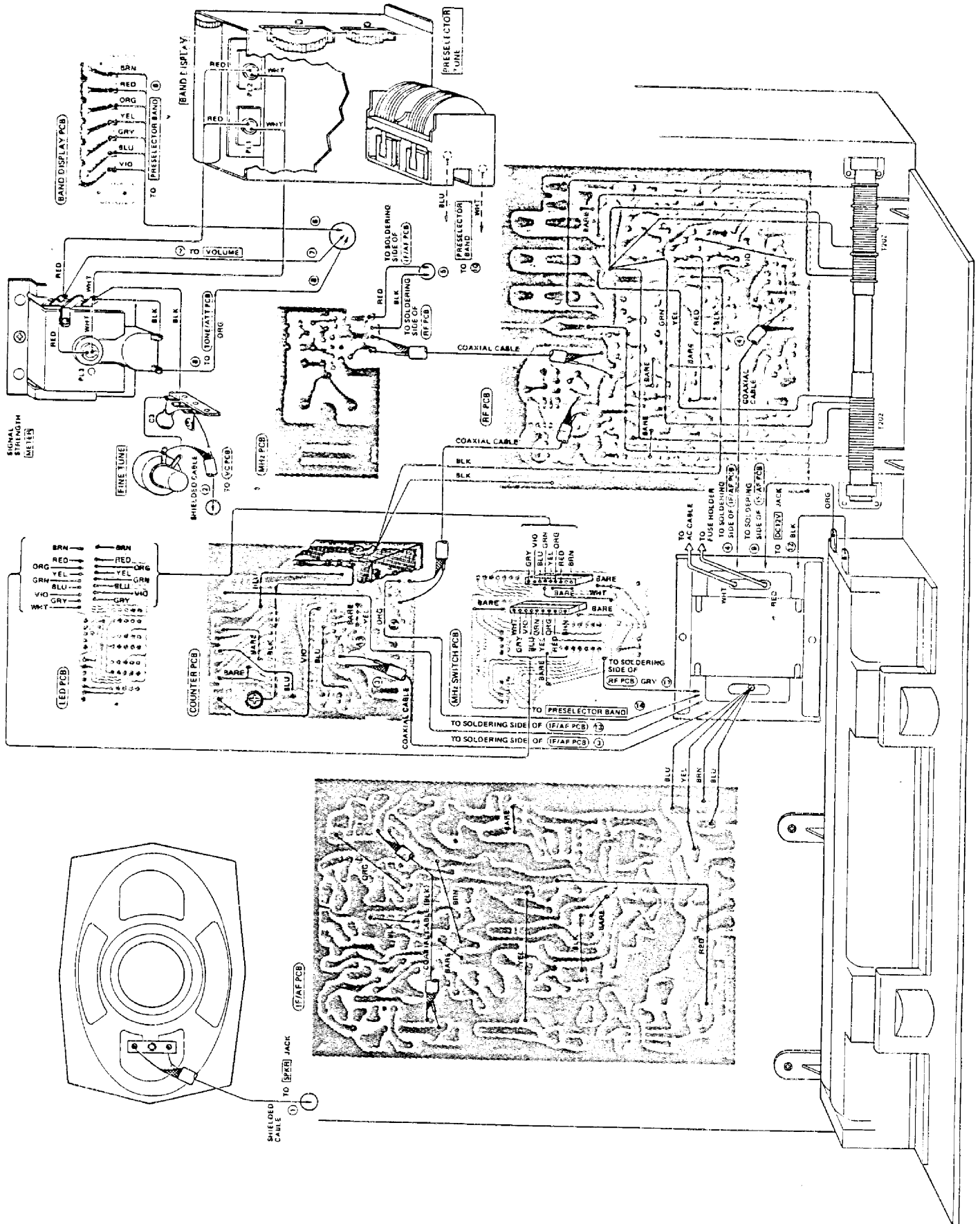
# MHz P.C. BOARD, TOP VIEW



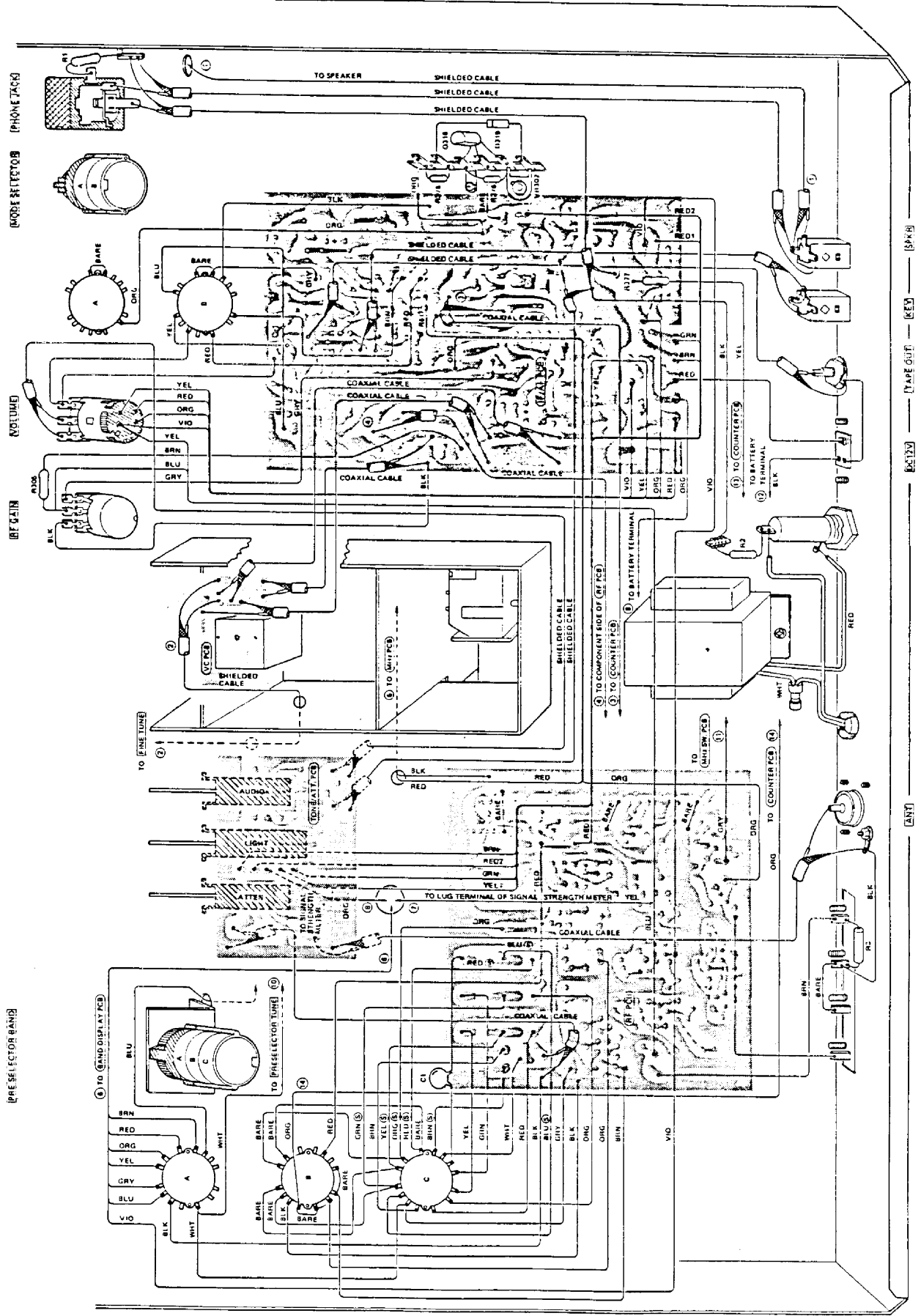
# MHz P.C. BOARD, BOTTOM VIEW



# WIRING DIAGRAM (TOP)



# WIRING DIAGRAM (BOTTOM)





# ELECTRICAL PARTS LIST

NOTE: Temperature characteristics

(C) . . . . . NPO

(U) . . . . . N750

(X) . . . . . N2200

CAPACITORS				
Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C1	220pF	50	±10	Ceramic
C2	Not used			
C3	2pF	50	±0.25pF	Ceramic (C)
C101	Not used			
C102	0.056μF	50	±10	Mylar
C103	0.022μF	50	±10	Mylar
C104	1μF	50	-10, +75	Electrolytic
C105	0.033μF	50	±10	Mylar
C106	0.033μF	50	±10	Mylar
C107	0.027μF	50	±10	Mylar
C108	47μF	10	-10, +50	Electrolytic
C201	Not used			
C202	270pF	50	±5	Polystyrene
C203	0.047μF	25	-20, +80	Ceramic
C204	0.01μF	25	-20, +80	Ceramic
C205	0.01μF	25	-20, +80	Ceramic
C206	0.01μF	25	-20, +80	Ceramic
C207	3pF	50	±0.25pF	Ceramic (C)
C208	33pF	50	±10	Ceramic (C)
C209	33pF	50	±10	Ceramic (C)
C210	3pF	50	±0.25pF	Ceramic (C)
C211	27pF	50	±10	Ceramic (C)
C212	5pF	50	±0.25pF	Ceramic (C)
C213	0.01μF	25	-20, +80	Ceramic
C214	22pF	50	±10	Ceramic (C)
C215	22pF	50	±10	Ceramic (C)
C216	100pF	50	±10	Ceramic
C217	47pF	50	±10	Ceramic
C218	0.01μF	25	-20, +80	Ceramic
C219	33pF	50	±10	Ceramic (C)
C220	5pF	50	±0.25pF	Ceramic (C)
C221	0.01μF	25	-20, +80	Ceramic
C222	15pF	50	±10	Ceramic (C)
C223	0.01μF	25	-20, +80	Ceramic
C224	0.01μF	25	-20, +80	Ceramic
C225	3pF	50	±0.25pF	Ceramic (C)
C226	0.01μF	25	-20, +80	Ceramic
C227	82pF	50	±10	Ceramic
C228	0.01μF	25	-20, +80	Ceramic
C229	0.01μF	25	-20, +80	Ceramic
C230	22pF	50	±10	Ceramic (C)
C231	0.01μF	25	-20, +80	Ceramic
C232	10pF	50	±0.5pF	Ceramic (C)
C233	5pF	50	±0.25pF	Ceramic (C)
C234	22pF	50	±10	Ceramic (C)
C235	10pF	50	±0.5pF	Ceramic (C)
C236	0.047μF	25	-20, +80	Ceramic
C237	0.047μF	25	-20, +80	Ceramic
C238	0.047μF	25	-20, +80	Ceramic
C239	0.047μF	25	-20, +80	Ceramic
C240	0.01μF	25	-20, +80	Ceramic
C241	0.001μF	50	±10	Ceramic
C242	2pF	50	±0.25pF	Ceramic (C)

Ref. No.	Value	Voltage (V)	Tolerance (%)	Material
C243	47pF	50	±10	Ceramic
C244	0.01μF	25	-20, +80	Ceramic
C245	0.01μF	25	-20, +80	Ceramic
C246	1pF	50	±0.25pF	Ceramic (C)
C247	47pF	50	±10	Ceramic
C248	0.01μF	25	-20, +80	Ceramic
C249	0.01μF	25	-20, +80	Ceramic
C250	0.01μF	25	-20, +80	Ceramic
C251	1pF	50	±0.25pF	Ceramic (C)
C252	0.001μF	50	±10	Ceramic
C253	0.01μF	25	-20, +80	Ceramic
C254	0.01μF	25	-20, +80	Ceramic
C255	0.01μF	25	-20, +80	Ceramic
C256	5pF	50	±0.25pF	Ceramic (C)
C257	3pF	50	±0.25pF	Ceramic (C)
C258	Not used			
C259	Not used			
C260	Not used			
C261	Not used			
C262	27pF	50	±10	Ceramic (C)
C263	47pF	50	±10	Ceramic
C264	0.01μF	25	-20, +80	Ceramic
C265	3pF	50	±0.25pF	Ceramic (C)
C266	0.01μF	25	-20, +80	Ceramic
C267	Not used			
C268	0.047μF	25	-20, +80	Ceramic
C269	0.01μF	25	-20, +80	Ceramic
C270	Not used			
C271	1μF	50	-10, +75	Electrolytic
C272	0.01μF	25	-20, +80	Ceramic
C273	10pF	50	±0.5pF	Ceramic
C301	150pF	50	±5	Polystyrene
C302	0.01μF	25	-20, +80	Ceramic
C303	0.047μF	25	-20, +80	Ceramic
C304	0.047μF	25	-20, +80	Ceramic
C305	0.047μF	25	-20, +80	Ceramic
C306	150pF	50	±5	Polystyrene
C307	0.01μF	25	-20, +80	Ceramic
C308	0.01μF	25	-20, +80	Ceramic
C309	0.01μF	25	-20, +80	Ceramic
C310	0.01μF	25	-20, +80	Ceramic
C311	0.047μF	25	-20, +80	Ceramic
C312	0.01μF	25	-20, +80	Ceramic
C313	0.047μF	25	-20, +80	Ceramic
C314	2pF	50	±0.25pF	Ceramic (C)
C315	0.047μF	25	-20, +80	Ceramic
C316	0.047μF	25	-20, +80	Ceramic
C317	Not used			
C318	0.047μF	25	-20, +80	Ceramic
C319	0.047μF	25	-20, +80	Ceramic
C320	0.01μF	25	-20, +80	Ceramic
C321	0.01μF	25	-20, +80	Ceramic
C322	0.1μF	50	±10	Mylar
C323	10μF	16	-10, +50	Electrolytic
C324	0.01μF	50	±10	Mylar
C325	0.1μF	50	±10	Mylar
C326	0.01μF	25	-20, +80	Ceramic
C327	120pF	50	±10	Ceramic (C)
C328	680pF	50	±5	Polystyrene
C329	1000pF	50	±5	Polystyrene
C330	3300pF	50	±5	Polystyrene

**COILS & TRANSFORMERS**

Ref. No.	Description	RS Part No.	MFR's Part No.
L201	Not used		
L202	BPF Coil	CA-5014	6NNB-134
L203	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L204	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L205	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L206	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L207	Inductor (330 $\mu$ H)		LF1-331K
L208	Choke Coil (1.2 $\mu$ H)	CB-2437	4LNC-135
L209	Choke Coil (0.84 $\mu$ H)	CB-2195	4LNC-027
L210	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L211	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L212	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L213	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L214	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L215	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L216	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L217	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L218	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L219	RF Coil (52.5 – 55 MHz)	CA-5022	10SSB-127
L220	Inductor (1 mH)	CB-2434	LF5-102K
L301	IF Coil (3 – 2 MHz)	CA-7955	10SSA-128
L302	Inductor (4.7 $\mu$ H)	CA-3891	LF4-4R7K
L303	IF Coil (3 – 2 MHz)	CA-7955	10SSA-128
L304	Inductor (4.7 $\mu$ H)	CA-3891	LF4-4R7K
L305	OSC Coil (3 – 2 MHz)	CA-5012	10SSO-129
L306	Inductor (100 $\mu$ H)	CB-2427	LF1-101K
L307	Inductor (27 $\mu$ H)	CA-3730	LF1-270K
L308	Inductor (270 $\mu$ H)	CB-2429	LF1-271K
L309	BFO Coil (455 kHz)	CA-5016	10SSO-131
L310	Inductor (470 $\mu$ H)	C-0835	LF1-471K
L311	Inductor (1 mH)	CB-2434	LF5-102K
L501	BPF Coil	CA-5014	6NNB-134
L502	Inductor (8.2 $\mu$ H)	CB-2438	LF4-8R2K
L503	Inductor (1 mH)	CB-2434	LF5-102K
L504	Inductor (8.2 $\mu$ H)	CB-2438	LF4-8R2K
T1	Power Transformer (See APPENDIX for Australian, EC, UK and Canadian Models)	TA-0708	TK-1284
T201	Antenna Coil (0.01 – 0.15 MHz)	CA-5017	10SSA-123
T202	Bar Antenna Coil (0.15 – 0.5 MHz)	CA-0676	12BNA-143
T203	Bar Antenna Coil (0.5 – 1.6 MHz)	CA-0676	12BNA-143
T204	Antenna Coil (1.6 – 4.5 MHz)	CA-5018	6PNA-124
T205	Antenna Coil (4.5 – 12 MHz)	CA-5019	6PNA-125
T206	Antenna Coil (12 – 30 MHz)	CA-5020	6PNA-126
T301	IF Transformer (455 kHz)	CA-7953	10SSI-132
T302	IF Transformer (455 kHz)	CA-7954	10SSI-133
T303	IF Transformer (455 kHz)	CA-7954	10SSI-133
T401	MHz OSC Coil	CA-5013	10SSO-130

CERAMIC FILTERS & CRYSTALS			
Ref. No.	Description	RS Part No.	MFR's Part No.
CF301 X1	Filter (455 kHz) X'tal (4.000 MHz)	C-0978 MX-2378	KBF-455R-4A

DIODE			
Ref. No.	Description	RS Part No.	MFR's Part No.
D101, 102	Silicon	DX-0270	1S1555
D201	Germanium	DX-0161	1N60
D301, 302	Germanium	CS-0161	1N60
D303	Not used		
D304 - 309	Germanium	DX-0161	1N60
D310	Zener (9 V)	DX-0110	EQA01-09 (R)
D311	Zener (10 V)	DX-1213	EQA01-10 (S)
D312 - 316	Silicon	DX-1108	ERB12-01
D317	Rectifier	DX-1212	1B4B or 1B4B1
D318	Zener (4.7 V)	DX-1214	02BZ4.7V
D319	Zener (4 V)	DX-1216	HZ4B3
D320	Zener (4.7 V)	DX-1214	02BZ4.7V
D501, 502	Germanium	DX-0161	1N60
D503	Zener (6 V)	DX-1217	EQA01-06 (R)
D504 - 508	LED		TLR312
D601 - 606	LED	DX-0496	TLR102

INTEGRATED CIRCUITS			
Ref. No.	Description	RS Part No.	MFR's Part No.
IC201	Mixer	MX-3809	SN76514N
IC301	AF Amp	MX-3383	μPC575C2
IC501	Freq. Counter	MX-3807	M54826P
IC502	Divider	MX-3808	SN74LS74N

LAMPS			
Ref. No.	Description	RS Part No.	MFR's Part No.
PL1, 2	Preselector Dial (12 V, 50 mA)	L-0990	L50-F12V50
PL3	Meter (12 V, 50 mA)	L-0990	L50-F12V50

NOTE 1: Unless otherwise specified all resistors are carbon film, wattage 1/4W, tolerance ±5%.

NOTE 2: R2 is not used for Australian/European Models.

RESISTORS					
Ref. No.	Value	RS Part No.	Watt- age (W)	Toler- ance (%)	Material
R1	180Ω	NEG-0144	1	±5	Metal
•R2	1.8MΩ	NEF-0521	1/2	±5	Carbon
R3	1.8MΩ	NEF-0521	1/2	±5	Carbon
R101	82Ω	NEE-0122			
R102	82Ω	NEE-0122			
R103	1kΩ	NEE-0196			
R104	1kΩ	NEE-0196			
R105	1.8MΩ	NEF-0521	1/2	±5	Carbon
R106	3.3kΩ	NEE-0230			
R107	10k Ω	NEE-0281			
R108	2.2kΩ	NEE-0216			
R109	390Ω	NEE-0162			
R110	3.3kΩ	NEE-0230			
R201	Not used				
R202	33kΩ	NEE-0324			
R203	100kΩ	NEE-0371			
R204	220Ω	NEE-0149			
R205	560 Ω	NEE-0176			
R206	220Ω	NEE-0149			
R207	560Ω	NEE-0176			
R208	100kΩ	NEE-0371			
R209	22kΩ	NEE-0311			
R210	220Ω	NEE-0149			
R211	100kΩ	NEE-0371			
R212	33kΩ	NEE-0324			
R213	33kΩ	NEE-0324			
R214	220Ω	NEE-0149			
R215	220Ω	NEE-0149			
R216	100kΩ	NEE-0371			
R217	220Ω	NEE-0149			
R218	100kΩ	NEE-0371			
R219	220Ω	NEE-0149			
R220	1kΩ	NEE-0196			
R221	470Ω	NEE-0169			
R222	220Ω	NEE-0149			
R223	27kΩ	NEE-0316			
R224	6.8kΩ	NEE-0262			
R225	1kΩ	NEE-0196			
R226	220Ω	NEE-0149			
R227	56kΩ	NEE-0345			
R228	22kΩ	NEE-0311			
R229	6.8kΩ	NEE-0262			
R230	1k Ω	NEE-0196			
R231	220Ω	NEE-0149			
R232	15kΩ	NEE-0297			
R233	4.7kΩ	NEE-0247			
R234	1kΩ	NEE-0196			
R235	22Ω	NEE-0078			
R236	Not used				
R237	Not used				
R238	Not used				
R239	Not used				
R240	Not used				

Ref. No.	Value	RS Part No.	Watt- age (W)	Toler- ance (%)	Material
R241	Not used				
R242	33kΩ	NEE-0324			
R243	Not used				
R244	22kΩ	NEE-0311			
R245	6.8kΩ	NEE-0262			
R246	1kΩ	NEE-0196			
R247	220Ω	NEE-0149			
R248	Not used				
R249	Not used				
R250	47kΩ	NEE-0340			
R251	47kΩ	NEE-0340			
R252	220Ω	NEE-0149			
R301	56kΩ	NEE-0345			
R302	47kΩ	NEE-0340			
R303	10kΩ	NEE-0281			
R304	100kΩ	NEE-0371			
R305	47kΩ	NEE-0340			
R306	68kΩ	NEE-0354			
R307	100Ω	NEE-0132			
R308	470Ω	NEE-0169			
R309	2.2kΩ	NEE-0216			
R310	220Ω	NEE-0149			
R311	56kΩ	NEE-0345			
R312	100kΩ	NEE-0371			
R313	1MΩ	NEE-0445			
R314	100kΩ	NEE-0371			
R315	220Ω	NEE-0149			
R316	220Ω	NEE-0149			
R317	1.5kΩ	NEE-0206			
R318	1.5kΩ	NEE-0206			
R319	3.3kΩ	NEE-0230			
R320	220kΩ	NEE-0396			
R321	100Ω	NEE-0132			
R322	1kΩ	NEE-0196			
R323	220 Ω	NEE-0149			
R324	3.3kΩ	NEE-0230			
R325	10kΩ	NEE-0281			
R326	15Ω	NEE-0074			
R327	470 Ω	NEE-0169			
R328	220Ω	NEE-0149			
R329	470Ω	NEE-0169			
R330	10kΩ	NEE-0281			
R331	33kΩ	NEE-0324			
R332	470kΩ	NEE-0423			
R333	10kΩ	NEE-0281			
R334	470kΩ	NEE-0423			
R335	470kΩ	NEE-0423			
R336	3.9kΩ	NEE-0237			
R337	22kΩ	NEE-0311			
R338	33kΩ	NEE-0324			
R339	18kΩ	NEE-0303			
R340	33kΩ	NEE-0324			
R341	1kΩ	NEE-0196			
R342	1kΩ	NEE-0196			
R343	100kΩ	NEE-0371			
R344	100Ω	NEE-0132			
R345	2.2kΩ	NEE-0216			
R346	1kΩ	NEE-0196			
R347	100kΩ	NEE-0371			
R348	220Ω	NEE-0149			

Ref. No.	Value	RS Part No.	Watt- age (W)	Toler- ance (%)	Material
R349	100Ω	NEE-0132			
R350	2.2kΩ	NEE-0216			
R351	220kΩ	NEE-0396			
R352	220Ω	NEE-0149			
R353	4.7kΩ	NEE-0247			
R354	47kΩ	NEE-0340			
R355	100Ω	NEE-0132			
R356	3.3kΩ	NEE-0230			
R357	1.5MΩ	NEE-0450			
R358	1kΩ	NEE-0196			
R359	4.7kΩ	NEE-0247			
R360	220Ω	NEE-0149			
R361	470k	NEE-0423			
R362	1.5M	NEE-0450			
R363	10kΩ	NEE-0281			
R364	5.6kΩ	NEE-0257			
R365	470Ω	NEE-0169			
R366	3.9kΩ	NEE-0237			
R367	22kΩ	NEE-0311			
R368	33kΩ	NEE-0324			
R369	33Ω	NEE-0087			
R370	43kΩ	NEE-0337			
R371	150kΩ	NEE-0384			
R372	100kΩ	NEE-0371			
R373	390Ω	NEE-0162			
R374	2.2kΩ	NEE-0216			
R375	15k Ω	NEE-0297			
R376	10kΩ	NEE-0281			
R377	10Ω	NEE-0063			
R401	22kΩ	NEE-0311			
R402	4.7kΩ	NEE-0247			
R403	680 Ω	NEE-0183			
R404	100Ω	NEE-0132			
R405	100Ω	NEE-0132			
R501	100kΩ	NEE-0371			
R502	4.7kΩ	NEE-0247			
R503	4.7kΩ	NEE-0247			
R504	100Ω	NEE-0132			
R505	Not used				
R506	100Ω	NEE-0132			
R507	100Ω	NEE-0132			
R508	3.3kΩ	NEE-0230			
R509	2.2kΩ	NEE-0216			
R510	150kΩ	NEE-0384			
R511	330Ω	NEE-0159			
R512	470Ω	NEE-0169			
R513	270kΩ	NEE-0402			
R514	1kΩ	NEE-0281			
R515	100Ω	NEE-0132			
R516	22kΩ	NEE-0311			
R701	15kΩ	NEE-0297			
R702	2.2kΩ	NEE-0216			

RESISTOR ARRAYS			
Ref. No.	Description	RS Part No.	MFR's Part No.
RA701	1.5 k $\Omega$ x 7	RX-0090	EXB-R7152M
RA702	1.5 k $\Omega$ x 7	RX-0090	EXB-R7152M

SWITCHES			
Ref. No.	Description	RS Part No.	MFR's Part No.
SW1	Lever Switch (ATTEN)	S-0919	SLR-523
SW2a - f	Rotary Switch (PRESELECTOR BAND)	S-1326	SRN3066N
SW3a - c	Rotary Switch (Mode)	S-1327	SRN2045N
SW4a - c	Lever Switch (LIGHT/BATT)	S-0920	SLR-643-02
SW5a, b	Lever Switch (AUDIO)	S-0919	SLR-523
SW6a, b	Power Switch included in VOLUME Control VR2		
SW7	Rotary Switch (included in MHz/kHz Tune Ass'y)	S-1325	CB-2-29

THERMISTOR			
Ref. No.	Description	RS Part No.	MFR's Part No.
TH301	10 k $\Omega$	T-1012	M-10K

TRANSISTORS			
Ref. No.	Description	RS Part No.	MFR's Part No.
Q201	RF Amp.		3SK45(B)-9
Q202	1st Mixer		2SK19(Y) or 2SK19(GR)
Q203	1st Mixer		2SK19(Y) or 2SK19(GR)
Q204	Gain Control		2SC1815(GR)
Q205	1st IF Amp.		3SK45(B)-9
Q206	2nd Mixer		3SK45(B)-9
Q207	52.5 MHz Local Freq. Amp		2SC1923(R)
Q208	52.5 MHz Local Freq. Amp		2SC1923(O)
Q209	52.5 MHz Local Freq. Amp		2SC1923(O)
Q210	Not used		
Q211	Not used		
Q212	Not used		
Q213	Switching		2SC1815(GR)
Q214	1st IF Amp.		2SC1923(O)
Q301	2nd IF Amp.		3SK45(B)-9
Q302	3rd Mixer		3SK45(B)-9
Q303	3rd IF Amp.		2SC1815(Y)
Q304	3rd IF Amp.		2SC1815(Y)
Q305	AGC Switch		2SC1815(GR)
Q306	3rd Local OSC		2SC1815(Y)
Q307	Buffer Amp.		2SK19(GR)
Q308	Buffer Amp.		2SK19(GR)
Q309	Not used		
Q310	AGC Amp.		2SC1815(GR)
Q311	BFO		2SK19(GR)
Q312	AF Preamp.		2SC1815(GR)
Q313	Buffer Amp.		2SC1815(GR)
Q314	Buffer Amp.		2SC1815(GR)
Q315	Regulator		2SD526(O)
Q316	Meter Calibrator		2SC1815(GR)
Q401	1st Local OSC		2SC1923(O)
Q501	Driver Amp.		2SC1815(GR)
Q502	Regulator		2SD526(O)
Q503	kHz Display Driver		2SC1815(GR)
Q504	kHz Display Driver		2SC1815(GR)
Q505	kHz Display Driver		2SC1815(GR)
Q506	Buffer		2SC1815(GR)
Q507	2nd Local OSC		2SC1815(GR)
Q508	Gain Control		2SC1815(GR)
Q701	MHz Display SW		2SD526(O)
Q702	MHz Display SW		2SC1815(GR)

VARIABLE CAPACITORS			
Ref. No.	Description	RS Part No.	MFR's Part No.
TC201 - 203	Trimmer (50pF)	C-0979	ECV-1ZW50X32
TC301 - 303	Trimmer (50pF)	C-0561	ECV-1ZW50X32
TC401	Trimmer (50pF)	C-0561	ECV-1ZW50X32
TC402	Trimmer (10pF)	C-0870	ECV-1ZW50X53
VC1	PRESELECTOR TUNE included in Preselector Dial Ass'y (29)	C-4671	C123A214
VC2 - 4	kHz Tune included in MHz/kHz Tune Ass'y (30)	C-4673	PVC-20G3J1-10H
VC5	MHz Tune included in MHz/kHz Tune Ass'y (30)	C-4764	C521C133
VC6	FINE TUNE	C-4675	FT7-25-NE

VARIABLE RESISTORS			
Ref. No.	Description	RS Part No.	MFR's Part No.
VR201	Semi-fixed (4.7 k $\Omega$ B)	P-1936	SR 19R3 4.7kB
VR301	Semi-fixed (500 $\Omega$ B)		EVN-J0AA00B52
VR302	Semi-fixed (20 k $\Omega$ B)		EVL-T0AA00B24
VR1	RF GAIN Control (50 k $\Omega$ B)	P-1937	VM10A620C-50kB
VR2/(SW6)	VOLUME Control (50 k $\Omega$ A) w/Power Switch	P-1938	VM11AA90C-5M1222-50kA

MISCELLANEOUS			
Ref. No.	Description	RS Part No.	MFR's Part No.
	RF P.C. Board		GE-22C-6688A
	IF/AF P.C. Board		GE-22C-6695C
	AUDIO/ATT P.C. Board		GE-22C-6698A
	MHz P.C. Board		GE-22D-6696A
	MHz Switch P.C. Board		GE-22C-6949A
	Counter P.C. Board		GE 22D-6948
	LED P.C. Board		GE-22D-6947
	Band Display P.C. Board		GE-22D-6946
A-1	ANT Jack	J-1009	NC-552-D
J1	KEY Jack	J-0840	S-G8022
J2	Phone Jack	J-1013	S-G7625
J3	External SPKR Jack	J-0840	S-G8022
J4	DC 12 V Jack	J-1010	ND-409
J5	TAPE OUT Jack	J-1011	NR-205-2
	8P Wire Connector Ass'y		GE-23D-7082
	9P Wire Connector Ass'y		GE-23D-7083
	Connector (8P : male)		5048-08A
	Connector (9P : male)		5048-09A
TP401	Connector (3P : male) for Test Point		5048-03A
TP201 - 206	Test Point		CHP-01
TP301, 302	Test Point		CHP-01
TP501, 502	Test Point		CHP-01

# MECHANICAL PARTS LIST

NOTE: \* Australian, EC, UK and Canadian Models employ different part. Refer to the APPENDIX for these models.

Ref. No.	Description	RS Part No.	MFR's Part No.
(1)	RF GAIN Control	P-1937	VM10A620C-50kB
(2)	VOLUME Control with Power Switch	P-1938	VM11AA90C-5M1222-50kA
(3)	Rotary Switch (Mode)	S-1327	SRN2045N
(4)	Rotary Switch (PRESELECTOR BAND)	S-1326	SRN3066N
(5)	Variable Capacitor (FINE TUNE)	C-4675	FT7-25-NE
(6)	Knob (PRESELECTOR TUNE)	K-3326	GE-23D-7069
(7)	Knob (FINE TUNE)	K-3327	GE-23D-7036
(8)	Knob (VOLUME/RF GAIN/PRESELECTOR BAND/Mode)	K-3330	GE-23D-7070
(9)	Knob (ATTEN/LIGHT/AUDIO)	K-3331	GE-23D-7071
(10)	Knob (kHz Tune)	K-3328	GE-23B-7068
(11)	Knob (MHz Tune)	K-3329	GE-23B-7067
(12)	IF/AF P.C. Board Ass'y	X-8002	GE-23E-7389
(13)	RF P.C. Board Ass'y	X-8003	GE-23E-7390
(14)	MHz P.C. Board Ass'y	X-8004	GE-23E-7391
(15)	MHz Switch P.C. Board Ass'y	X-8005	GE-23E-7392
(16)	Audio/Att P.C. Board Ass'y	X-8006	GE-23E-7393
(17)	Counter P.C. Board Ass'y	X-8007	GE-23E-7394
(18)	LED P.C. Board Ass'y	X-8008	GE-23E-7395
(19)	Band Display P.C. Board Ass'y	X-8009	GE-23E-7396
(20)	Speaker	S-4793	SR-305-10B
(21)	Meter (S/BATT)	M-0412	49C334
A-2 (22)	4P Screw Terminal Strips (ANT/GND/MUTE)	J-4584	UB-1004
(23)	ANT Jack	J-1009	NC-552-D
(24)	FUSE Holder (0.5 A)	F-1069	S-N1301
(25)	DC 12 V Jack	J-1010	ND-409
(26)	TAPE OUT Jack	J-1011	NR-205-2
(27)	KEY Jack/SPKR Jack	J-0840	S-G8022
(28)	PHONE Jack	J-1013	S-G7625
(29)	Preselector Dial Ass'y	D-3264	GE-23E-7398
	Preselector Gear Ass'y	RA-2664	GE-23-E-7197
	Dial	D-0407	GE-23C-7196
	Variable Capacitor	C-4671	C123A214
(30)	MHz/kHz Tune Ass'y	C-4672	GE-23E-7399
	MHz/kHz Gear Ass'y		GE-23E-7198
	Rotary Switch	S-1325	CB-2-29
	Variable Capacitor	C-4673	PVC-20G3J1-10H
	VC P.C. Board	X-8010	GE-22D-6990
	Variable Capacitor	C-4674	C521C133
(31)	Bar Antenna	CA-0676	12BNA-143
(32)	Holder for Bar Antenna		No. 152
* (33)	Power Transformer	TA-0708	TK-1284
(34)	Front Panel Ass'y	Z-4522	GE-23A-7064
	Front Panel		
	Preselector Window		
	Frequency Window		
(35)	Chassis		GE-23A-7058
(36)	Cabinet		GE-23A-7059
(37)	Rear Panel Ass'y	Z-4523	GE-23E-7401
	Rear Panel		GE-23A-7065
	Battery Terminal (A), +	HB-8335	GE-23D-7117
	Battery Terminal (B), -	HB-8336	GE-23D-7118
	Battery Terminal (C), ±	HB-8337	GE-23D-7119
	Battery Tube	B-0384	GE-23D-7384
(38)	Battery Cover	DB-0265	GE-23B-7066

Ref. No.	Description	RS Part No.	MFR's Part No.
(39)	Bracket for RF GAIN/VOLUME Controls and Mode SW	HB-8339	GE-23D-7241
(40)	Bracket for PRESELECTOR BAND SW	HB-8340	GE-23D-7062
(41)	Bracket for Meter	HB-8341	GE-23D-7061
(42)	Bracket for Preselector Dial Lamp	HB-8342	GE-23D-7063
(43)	Lug Terminal (2P)		1L2P
(44)	Lug Terminal (5P)		1L5P
(45)	Shaft, PRESELECTOR BAND SW	RT-1953	GE-23D-7120
(46)	Coupler, Shaft and PRESELECTOR BAND SW	HB-8344	GE-23D-7194
(47)	Bracket for Front Panel (A)		GE-23D-7060
(48)	Bracket for Front Panel (B)		GE-23D-7060
(49)	Foot (L)		NO. 7112
(50)	Foot (S)	F-0249	NO. 7105
(51)	Hand Strap	F-0250	GE-23D-7121
(52)	Shield Case (Top) for Counter P.C. Board	H-6250	GE-23C-7115
(53)	Shield Case (Bottom) for Counter P.C. Board		GE-23C-7116
(54)	Pressure Terminal		1-SD
	Solder Lug Terminals		3φ
	Wrapping Posts		1.2 x 12.5 mm
	Insulator for Band Display P.C. Board		GE-23D-7313
	Protection Cloth for Lever SW (ATTEN/LIGHT/AUDIO)		GE-23D-7374
	Protection Cloth for FINE TUNE Control		GE-23D-7375
	Protection Cloth for Rear Panel		GE-23D-7472
	Protection Cloth for Counter Case and Cabinet		GE-20D-5297
	Protector for Hand Strap		GE-23D-7404
	Lamp, Meter and Preselector Dial	H-6251	L50-F12V50
	Lamp Grommet for Meter	L-0990	BU687
	Lamp Grommet for Preselector Dial	HB-1182	GE-23D-7243
	Wire Clip	HB-8338	220-JD485210-01
	Wire Clip (A1)		GE-23D-7319
	Wire Binder		BK-1
	Wire Grommet		OCB-500
	* AC Power Cord (6 Feet, UL, Black)		KP-10, AWG-18
	* Cord Strain Relief		SR-3P4
	Wrapping Post for AC Power Cord		GE-18D-4215
	Fuse		0.5A, UL
	Fuse Caution Label (0.5 A)	HF-0025	GE-23D-7537
	Caution Label		GE-19D-4860
	* Model Label		GE-22D-6998
(55)	Screws		3 x 10 mm
(56)	Pan-Head Taptite Screws		4 x 8 mm
(57)	Pan-Head Taptite Screws		2.6 x 7 mm
(58)	Binding-Head Self Tapping Screws	HD-3020	3 x 6 mm
(59)	Pan-Head Self Tapping Screws	HD-3026	3 x 8 mm
(60)	Pan-Head Self Tapping Screws	HD-2057	3 x 6 mm
(61)	Round-Head Self Tapping Screws	HD-3108	2 x 6 mm
(62)	Binding-Head Screws		3 x 12 mm
(63)	Binding-Head Screws	HD-3030	4 x 8 mm
(64)	Binding-Head Screws		4 x 10 mm
(65)	Binding-Head Screws	HD-3047	4 x 15 mm
(66)	Pan-Head Screws	HD-3049	2.6 x 6 mm
(67)	Pan-Head Screws	HD-2044	3 x 5 mm
(68)	Pan-Head Screws	HD-2054	3 x 6 mm
(69)	Pan-Head Screws	HD-2055	3 x 8 mm
(70)	Pan-Head Screws	HD-2057	3 x 6 mm
(71)	Flat-Head Screws	HD-4019	3 x 6 mm (Nylon)
(72)	Pan-Head Screws	HD-1181	3 x 6 mm (Black)



Ref. No.	Description	RS Part No.	MFR's Part No.
(73)	Internal Star Lock Washers	HD-8045	2.6 φ
(74)	Internal Star Lock Washers	HD-8041	3 φ
(75)	Flat Washers		3 φ
(76)	Hex Nuts	HD-7003	3 φ
(77)	Hex Nuts	HD-7088	9 φ (Black)
(78)	Speed Nuts	HC-7013	PSN-3

## ACCESSORY LIST

Ref. No.	Description	RS Part No.	MFR's Part No.
	DC Power Cord Ass'y		DC-1021
	Fuse Caution Label		GE-23D-7491
	Antenna Ass'y	A-0323	GE-23E-7402
	Antenna		
	Connector (Plug)		
	Rubber Feet		SJ-5112

## APPENDIX TO PARTS LIST

For Australian, EC, UK and Canadian Models, some parts are changed. Following parts list information applies to these models.

### Australian model

Ref. No.	Description	RS Part No.	MFR's Part No.
(33)	Power Transformer		K6218
	AC Power Cord		SAA 3p 2 m
	Strain Relief		SR-5N-4
	Model Label		GE-23D-7332
	Terminal Block 12 pins		3012PT-12
	Fiber for Terminal Block		GE-23D-7435
R2	Not used		

### EC model

Ref. No.	Description	RS Part No.	MFR's Part No.
(33)	Power Transformer		K6218
	AC Power Cord		KP-419C, LTCE-2F
	Strain Relief		SR-4N-4
	Model Label		GE-23D-7184
	Cord Label		
R2	Not used		

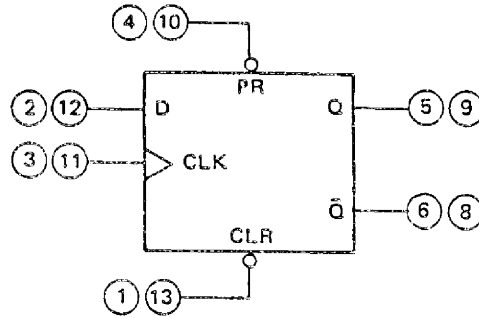
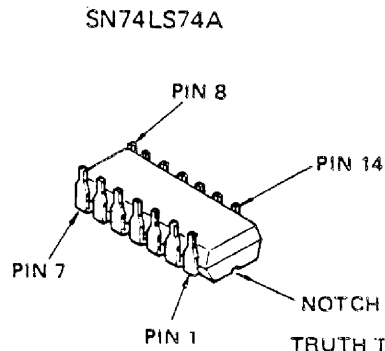
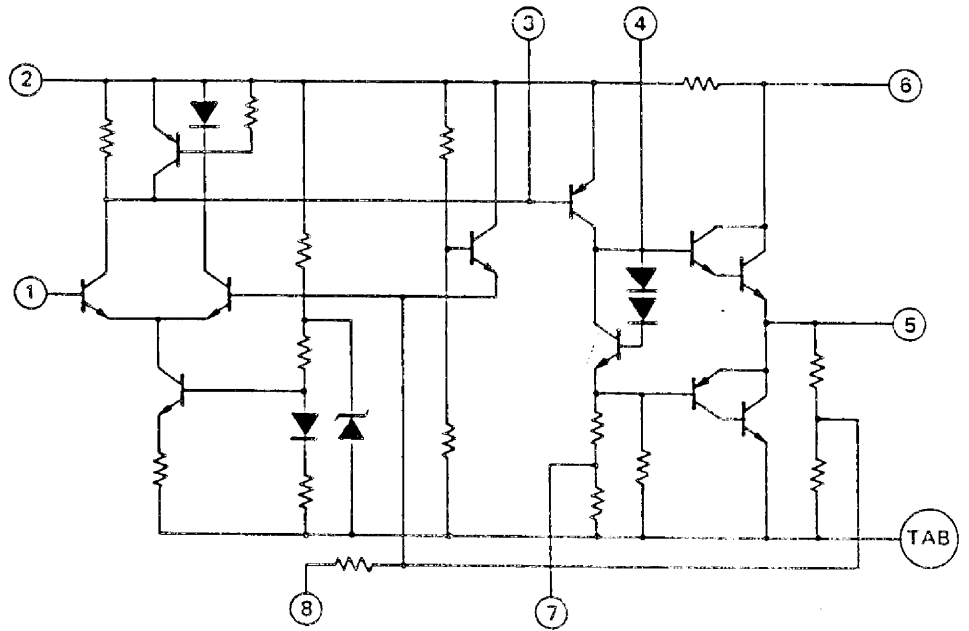
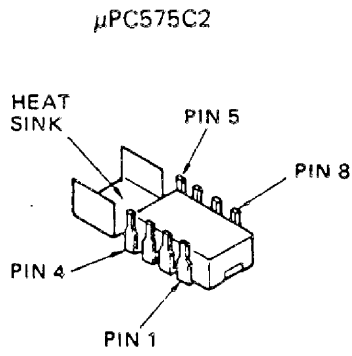
### UK model

Ref. No.	Description	RS Part No.	MFR's Part No.
(33)	Power Transformer		K6218
	AC Power Cord		BS 2p 2m
	Strain Relief		SR-4N-4
	Model Label		GE-23D-7184
	Cord Label		
R2	Not used		

### Canadian model

Ref. No.	Description	RS Part No.	MFR's Part No.
(33)	Power Transformer		TK1284B
	AC Power Cord		CSA 6 feet 3p
	Strain Relief		SR-5N-4
	Model Label		GE-23D-7183

# INTEGRATED CIRCUIT IDENTIFICATION

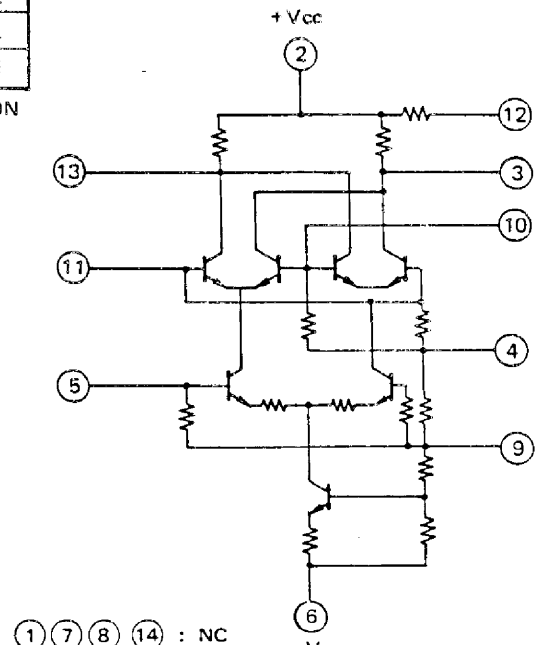
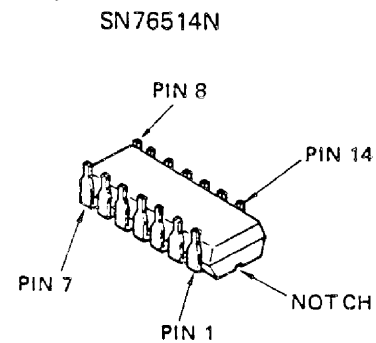


TWO F.F.S  
IN ONE PACKAGE

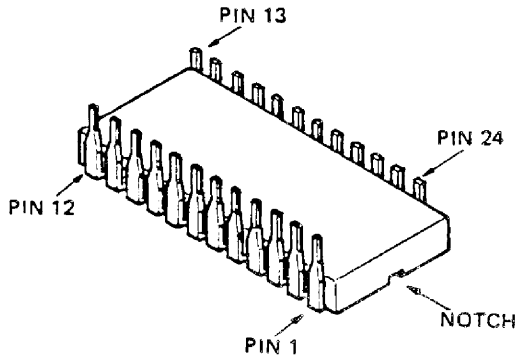
TRUTH TABLE

INPUTS				OUTPUTS	
D	CLOCK	PRESET	CLEAR	Q	$\bar{Q}$
H	↑	H	H	H	L
L	↑	H	H	L	H

↑: POSITIVE TRANSITION



M54826P

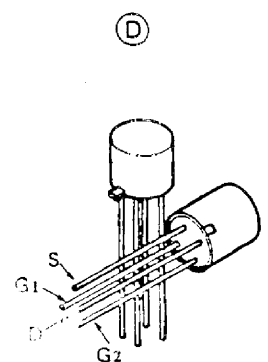
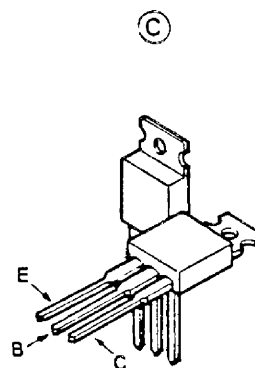
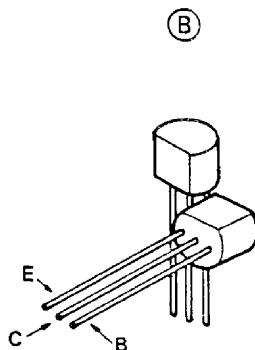
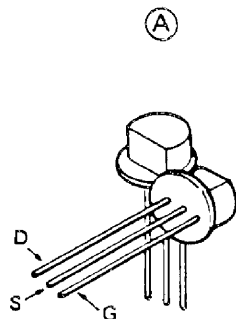


NOTE

- 1 Not used
- 2 Not used
- 3 } 4 MHz Crystal Oscillator
- 4 }
- 5 Ground
- 6 INPUT (2456 ~ 3455 kHz)
- 7 Count Mode/Preset Selection Input S1; Low
- 8 Count Mode/Preset Selection Input S2; Low
- 9 Count Mode/Preset Selection Input S3; Low
- 10 Count Mode/Preset Selection Input S4; Low
- 11 Not used
- 12 Segment Output; g
- 13 Segment Output; f
- 14 Segment Output; e
- 15 Vcc (+5 V)
- 16 Segment Output; d
- 17 Segment Output; c
- 18 Segment Output; b
- 19 Segment Output; a
- 20 Not used
- 21 Not used
- 22 Digital Output; D506
- 23 Digital Output; D507
- 24 Digital Output; D508

## TRANSISTOR LEAD IDENTIFICATION

- (A); 2SK19(Y)
- (B); 2SC1815, 2SC1923
- (C); 2SD526
- (D); 3SK45(B)-9



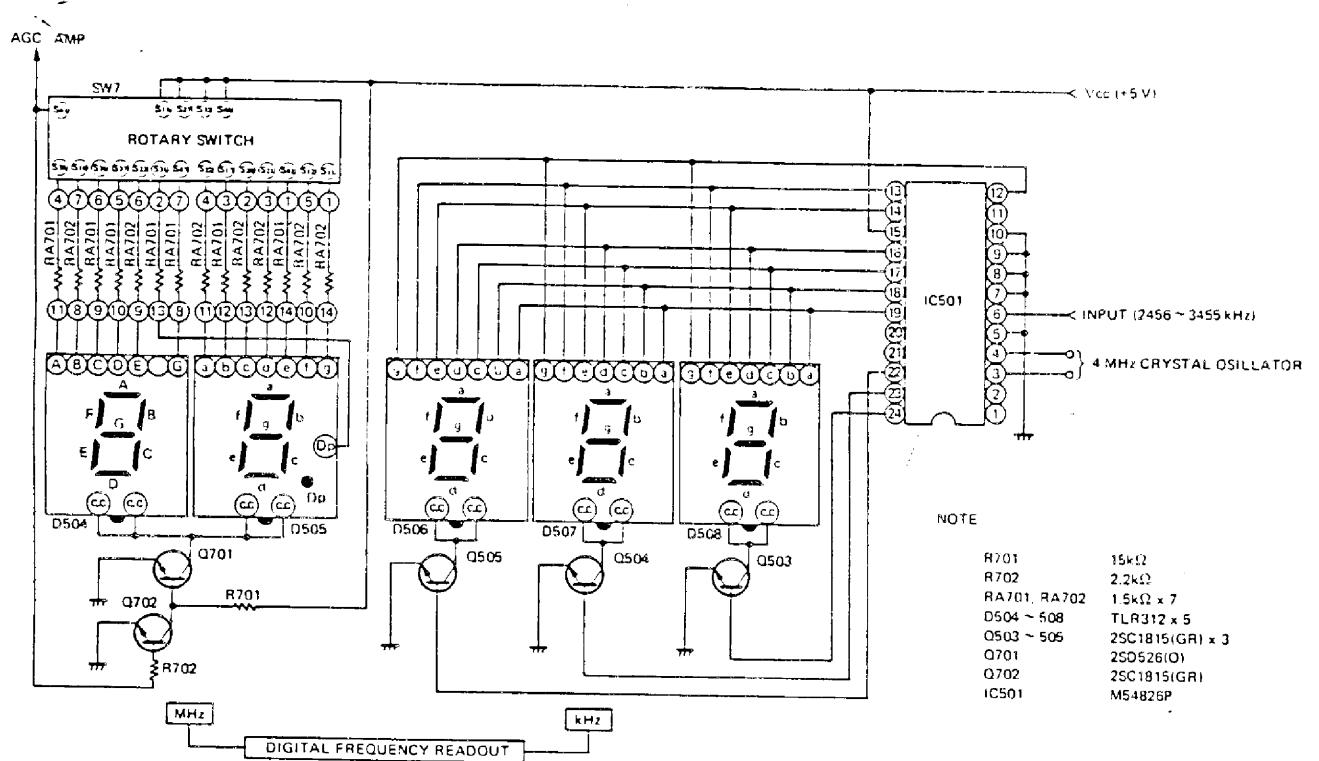
# SEMICONDUCTOR VOLTAGE READINGS

Ref No		Value (V DC)	Ref. No.		Value (V DC)	Ref. No.		Value (V DC)	
Q201	G <sub>1</sub>	1.8	Q303	B	4.6	Q504	B	2.3	
	G <sub>2</sub>	5.3		C	8.0		C	0.3	
	D	3.2		E	3.9		E	0	
	S	1.85	Q304	B	2.2	Q505	B	0.15	
Q202	G	0		C	8.4		C	0.3	
	D	9.2		E	1.5		E	0	
	S	1.8	Q305	B	0.65	Q506	B	0.4	
Q203	G	0		C	0		C	1.65	
	D	9.2		E	0		E	0	
	S	1.8	Q306	B	2.3	Q507	B	1.0	
Q204	B	0.65		C	3.8		C	3.8	
	C	0		E	1.8		E	0.65	
	E	0	Q307	G	0	Q508	B	0.75	
Q205	G <sub>1</sub>	0		D	5.6		C	0	
	G <sub>2</sub>	4.4		S	0.6		E	0	
	D	8.9	Q308	G	0	IC501	1	1.4	
S	0.6	D		5.6	2		1.8		
Q206	G <sub>1</sub>	0		S	0.75		3	0.2	
	G <sub>2</sub>	0	Q309	Not used			4	0.65	
	D	9.3		Q310	B		0.2	5	0
S	0.23	C			8.5		6	1.65	
Q207	B	1.8	E		0		7	0	
	C	9.2	Q311	G	0		8	0	
	E	1.05		D	4.5		9	0	
Q208	B	2.1		S	1.2		10	0	
	C	9.1	Q312	B	1.6		11	0.15	
	E	1.35		C	2.6		12	** 0.9	
Q209	B	2.2		E	0.95		13	0.9	
	C	9.5	Q313	B	2.3		14	0.9	
	E	1.5		C	4.5		15	5.0	
Q210		Not used		Q314	B		4.5	16	0.9
Q211		Not used	C		8.9		17	0.9	
Q212		Not used	E		3.9		18	0.9	
Q213	B	*** $\begin{bmatrix} 0.65 & 0 \\ 0 & 8.5 \\ 0 & 0 \end{bmatrix}$	Q315	B	10.3		19	0.9	
	C			13.8	20		0.5		
	E			9.6	21		0.5		
Q214	B	2.2	Q316	B	0.6		22	0.15	
	C	9.2		C	0		23	0.15	
	E	1.6		E	0		24	0.15	
IC201	1	—	IC301	1	1.75	IC502	1	1.65	
	2	8.75		2	13.5		2	1.65	
	3	8.75		3	13.0		3	5.0	
	4	4.35		4	7.9		4	1.5	
	5	2.8		5	6.6		5	1.65	
	6	0		6	13.8		6	5.0	
	7	—		7	0.24		7	4.5	
	8	—		8	1.9		8	5.0	
	9	2.8	Q401	B	1.5		9	1.6	
	10	4.3		C	8.4		10	0.75	
	11	4.3		E	1.3		11	5.0	
	Q301	G <sub>1</sub>	1.7	Q501	B		1.0	12	1.6
		G <sub>2</sub>	2.7		C		0.5	13	1.6
		D	9.3		E		0	14	0
Q302	G <sub>1</sub>	0	Q502	B	5.6	Q701	B	*** $\begin{bmatrix} 0 & 0.65 \\ 3.5 & 0 \\ 0 & 0 \end{bmatrix}$	
	G <sub>2</sub>	0.86		C	13.8		C		*** $\begin{bmatrix} 0.65 & 0 \\ 0 & 0.65 \\ 0 & 0 \end{bmatrix}$
	D	8.5		E	5.0		E		
S	0.5	Q503	B	0.15	Q702	B	*** $\begin{bmatrix} 0.65 & 0 \\ 0 & 0.65 \\ 0 & 0 \end{bmatrix}$		
Q303	B		4.6	C		0.3		C	
	C		8.0	E		0		E	
	E	3.9							

**NOTE**

- DC voltage measured with DC VTVM (input impedance = more than 100 kΩ) under the following conditions ;  
RF GAIN : Maximum  
No input signal
- (\*) The voltage readings are under the condition that PRESELECTOR BAND switch is set to ranges of 0.01 ~ 1.6 MHz.
- (\*\*) The voltage readings of IC501 are under the condition of kHz readout "000".
- (\*\*\*) The voltage readings are under the condition that MHz readout is blanked.

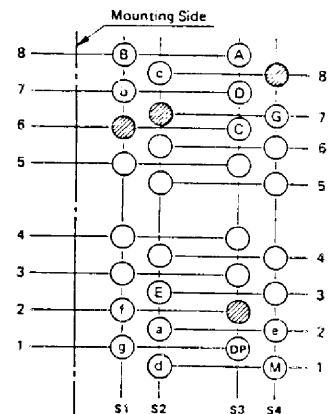
# SCHEMATIC DIAGRAM OF DIGITAL FREQUENCY READOUT SECTION



- NOTE
- R701 15kΩ
  - R702 2.2kΩ
  - RA701, RA702 1.5kΩ x 7
  - D504 ~ 508 TLR312 x 5
  - Q503 ~ 505 2SC1815(GR) x 3
  - Q701 2SD526(O)
  - Q702 2SC1815(GR)
  - IC501 M54826P

## ROTARY SWITCH SW7 (FOR MHz READ OUT)

### 1. TERMINAL DESIGNATIONS (Soldering Side View)



### 2. CONTACT FOR LED SEGMENTS

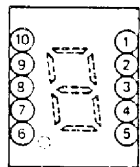
LED Segments	Contact
A	S <sub>18</sub>
B	S <sub>18</sub>
C	S <sub>16</sub>
D	S <sub>17</sub>
E	S <sub>13</sub>
G	S <sub>47</sub>
a	S <sub>22</sub>
b	S <sub>17</sub>
c	S <sub>28</sub>
d	S <sub>11</sub>
e	S <sub>22</sub>
f	S <sub>12</sub>
g	S <sub>11</sub>
Dp (Decimal Point)	S <sub>11</sub>

M — While the rotary switch steps UP/DOWN to next contact. S<sub>41</sub> contacts and it not only disables LEDs (D504, 505) but mute the unit.  
 ● — Common (+5 V)  
 ○ — Not used

## LEDs (D504~508)

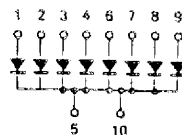
### 1. LEAD IDENTIFICATION

#### Soldering Side View



- 1 Segment A, a
- 2 Segment F, f
- 3 Segment E, e
- 4 Segment D, d
- 5 Common Cathode
- 6 Segment C, c
- 7 Dp Anode
- 8 Segment G, g
- 9 Segment B, b
- 10 Common Cathode

### 2. EQUIVALENT CIRCUIT



### 3. FREQUENCY READOUT POSITIONAL WEIGHT

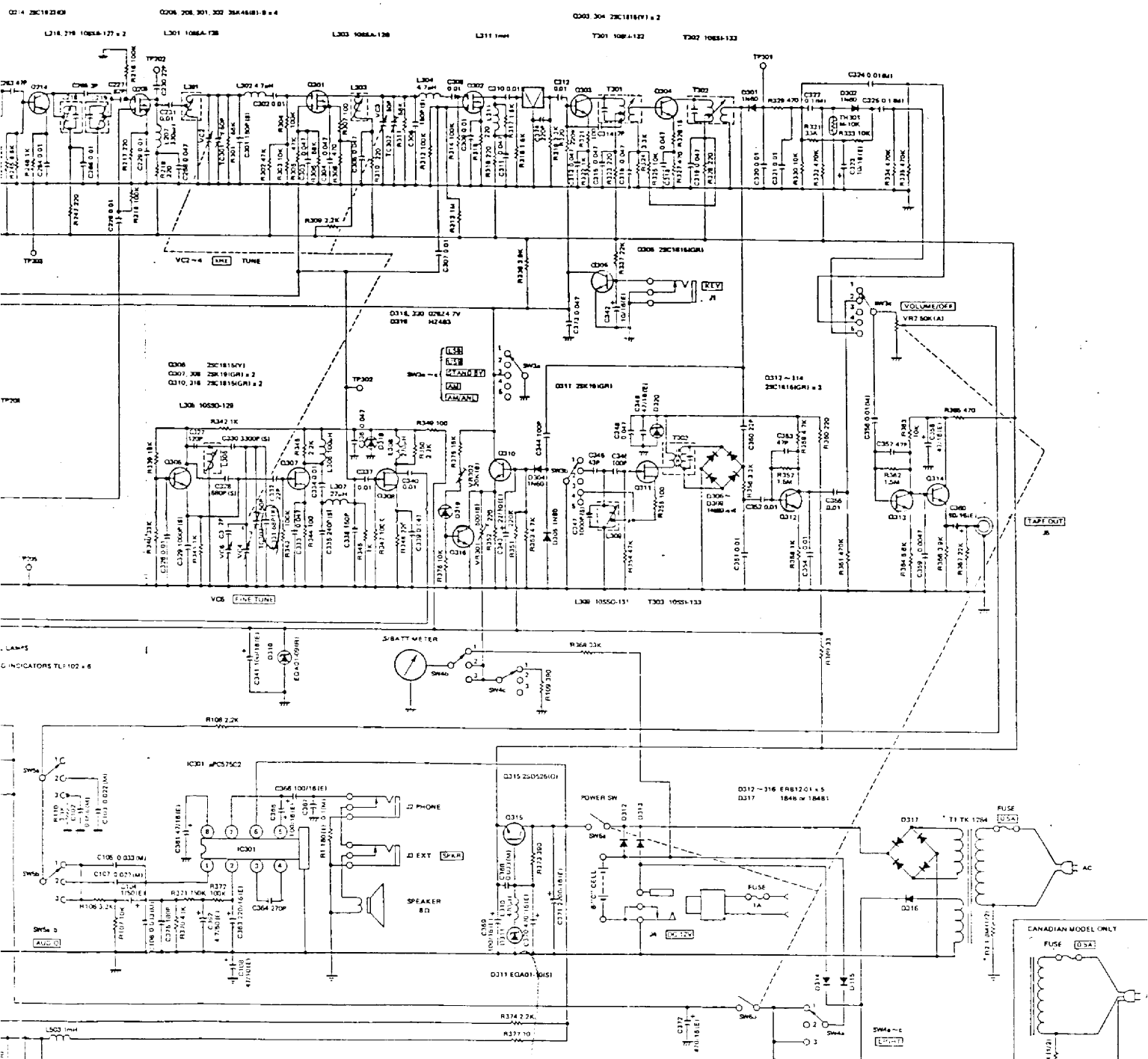
- 10 MHz ---- D504
- 1 MHz ---- D505
- 100 kHz ---- D506
- 10 kHz ---- D507
- 1 kHz ---- D508

## FREQUENCY COUNTER IC501 LEAD IDENTIFICATION

### UP/DOWN COUNT MODE . DOWN COUNT

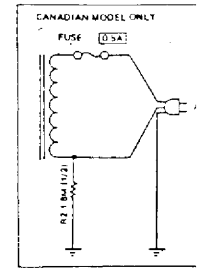
- 1 Not used
- 2 Not used
- 3 4 MHz Crystal Oscillator
- 4 Ground
- 5 Ground
- 6 INPUT (2456 ~ 3455 kHz)
- 7 Count Mode/Presel Selection Input S1; Low
- 8 Count Mode/Presel Selection Input S2; Low
- 9 Count Mode/Presel Selection Input S3; Low
- 10 Count Mode/Presel Selection Input S4; Low
- 11 Not used
- 12 Segment Output; g
- 13 Segment Output; f
- 14 Segment Output; e
- 15 Vcc (+5 V)
- 16 Segment Output; d
- 17 Segment Output; c
- 18 Segment Output; b
- 19 Segment Output; a
- 20 Not used
- 21 Not used
- 22 Digital Output; D506
- 23 Digital Output; D507
- 24 Digital Output; D508



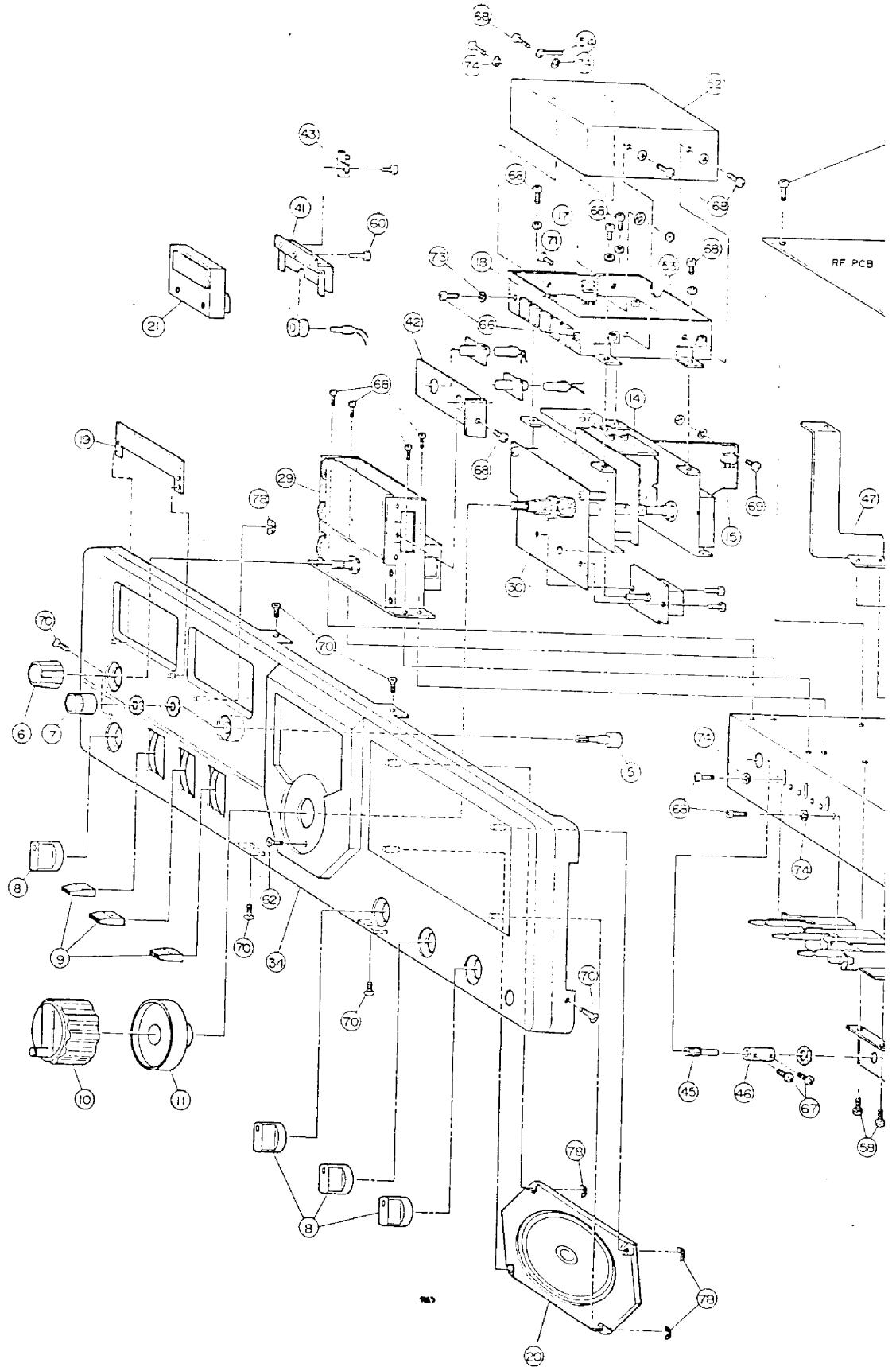


- NOTE
1. ALL RESISTANCE VALUES IN OHMS,  $1K = 10^3$  OHMS,  $M = 10^6$  OHMS
  2. ALL RESISTOR WATTAGES IN  $\mu W$  UNLESS OTHERWISE SPECIFIED
  3. ALL CAPACITANCE VALUES IN MICROFARADS, (P - MICROMICROFARADS)
  4. (E) - ELECTROLYTIC CAPACITORS
  5. (M) - MYLAR CAPACITORS
  6. (S) - POLYSTYRENE CAPACITORS
  7. (C) - CERAMIC CAPACITORS IN PPM
  8. (K) - CERAMIC CAPACITORS IN 2000
  9. (N) - CERAMIC CAPACITORS
  10. RATING OR TYPE NUMBER OF COMPONENT PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT WITHOUT NOTICE
  11. (1) DENOTES THAT FOR EUROPEAN/AUSTRALIAN MODELS PARTS NO. OF T1 IS K6218 AND R2 IS NOT USED.

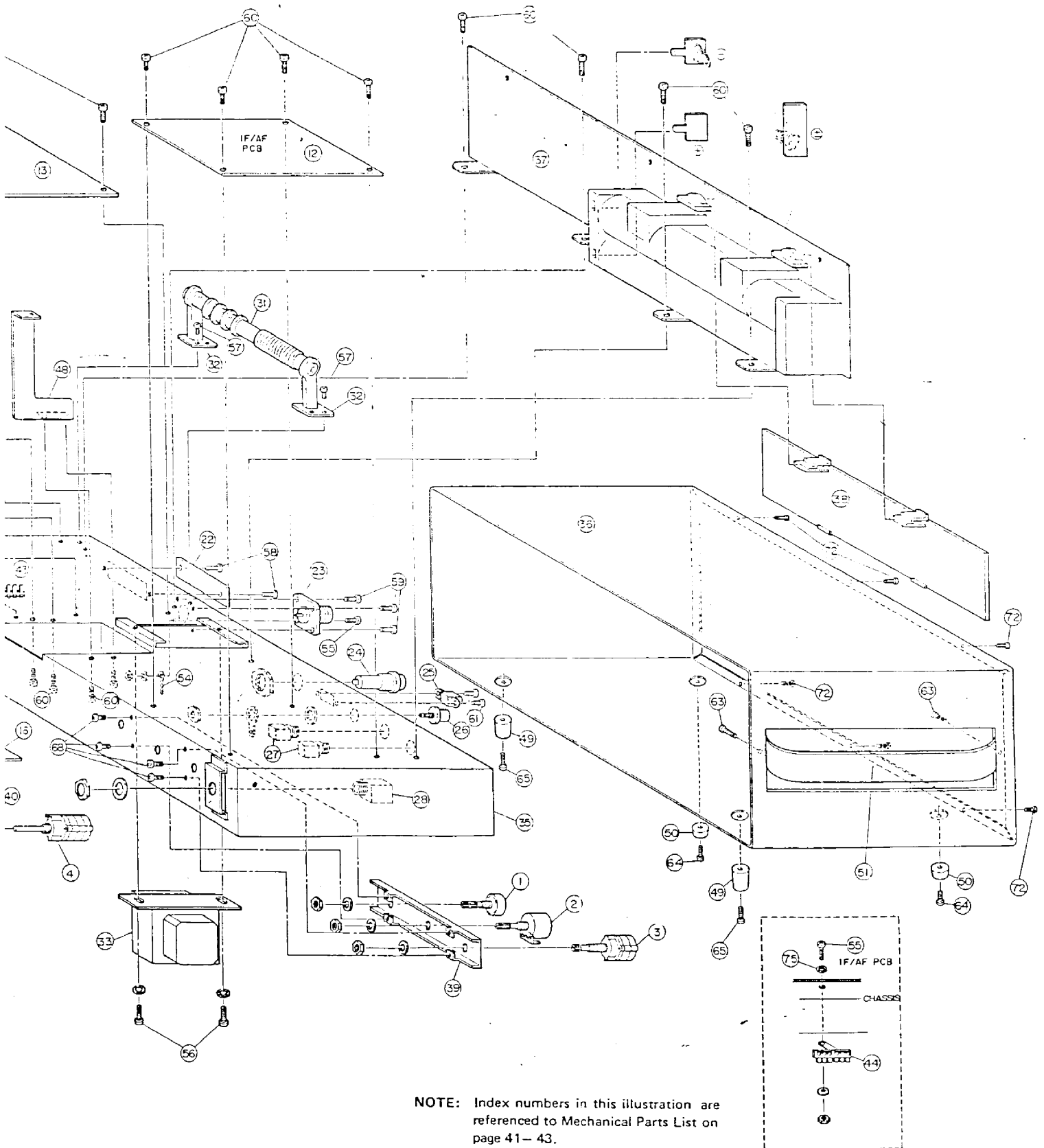
2001  
L307810



# DISASSEMBLY/EXPLODED VIEW







NOTE: Index numbers in this illustration are referenced to Mechanical Parts List on page 41-43.

**Radio Shack®**

NO. 1136

# **Service Information Bulletin**

**Catalog No.:** 20-204

**Description:** DX-300 Communications Receiver

NOTE: First shipments of the DX-300 showed various problems with spurious responses on the bands and improper centering of BFO (for SSB reception). The manufacturer has instituted a number of changes which help to reduce or eliminate such "birdies" and "spurs", plus the BFO setting. This addendum covers those and other changes.

# Modification for improvement of 2nd Local Oscillator Circuit (From Date Code 3A9)

See Figure 1.

1. Resistor R227 location has been changed and PC pattern is cut as marked.
2. Resistor R251 location has been changed and PC pattern is cut as marked.

You may want to make both of these changes on all units brought in for service/repair which have a date code prior to 3A9. Be sure to realign the 2nd Local Oscillator as stated on page 17 of Service Manual since above changes affect frequencies of L212 and L214.

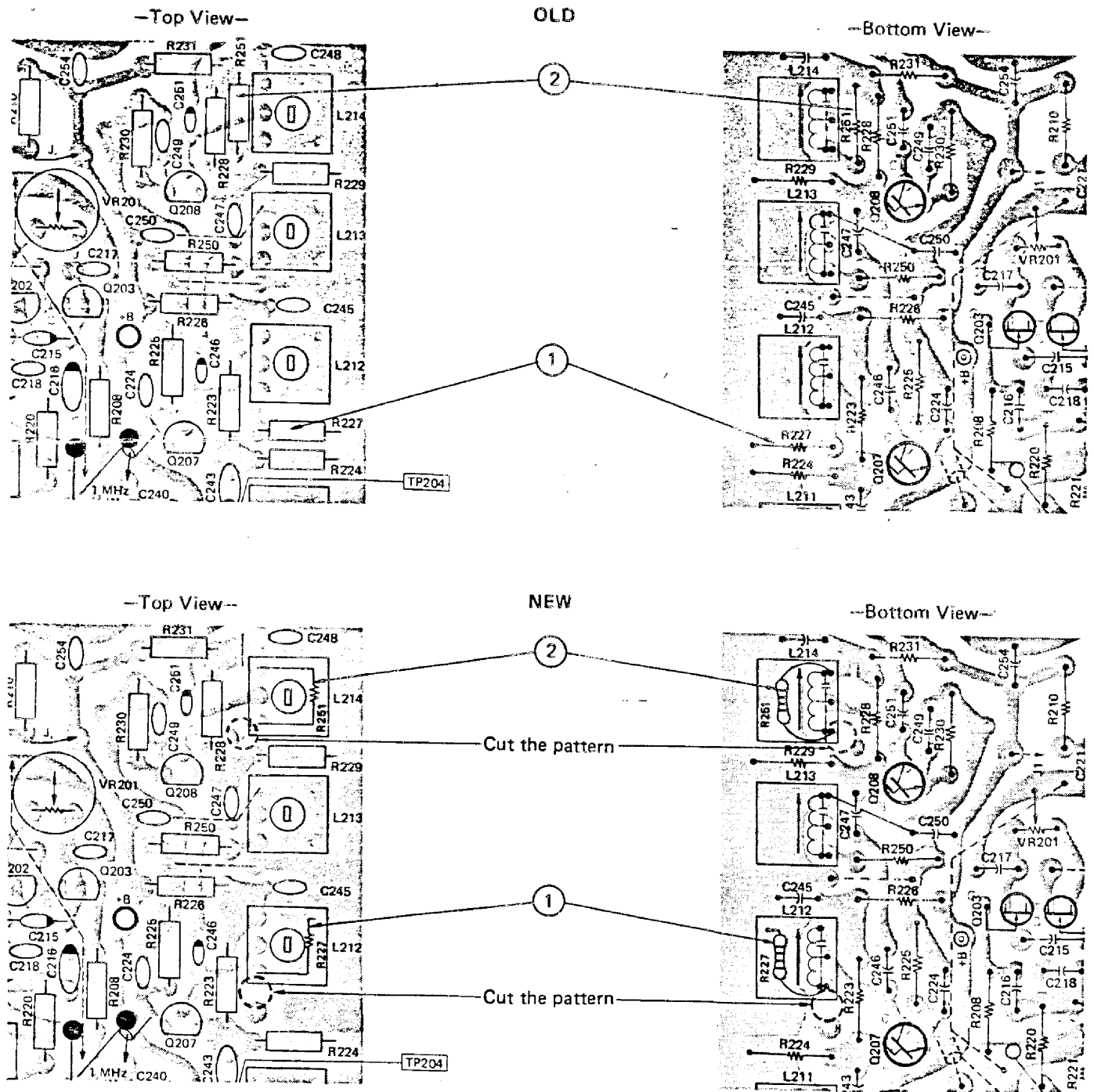


Figure 1 : RF P.C.BOARD PARTS LOCATION

- At an early stage of production, coaxial lead for 2nd IF input to L301 was soldered as shown in "old" of Figure 2. If a unit with such wiring is brought in for repair/service, change the wiring as shown in "new" figure.

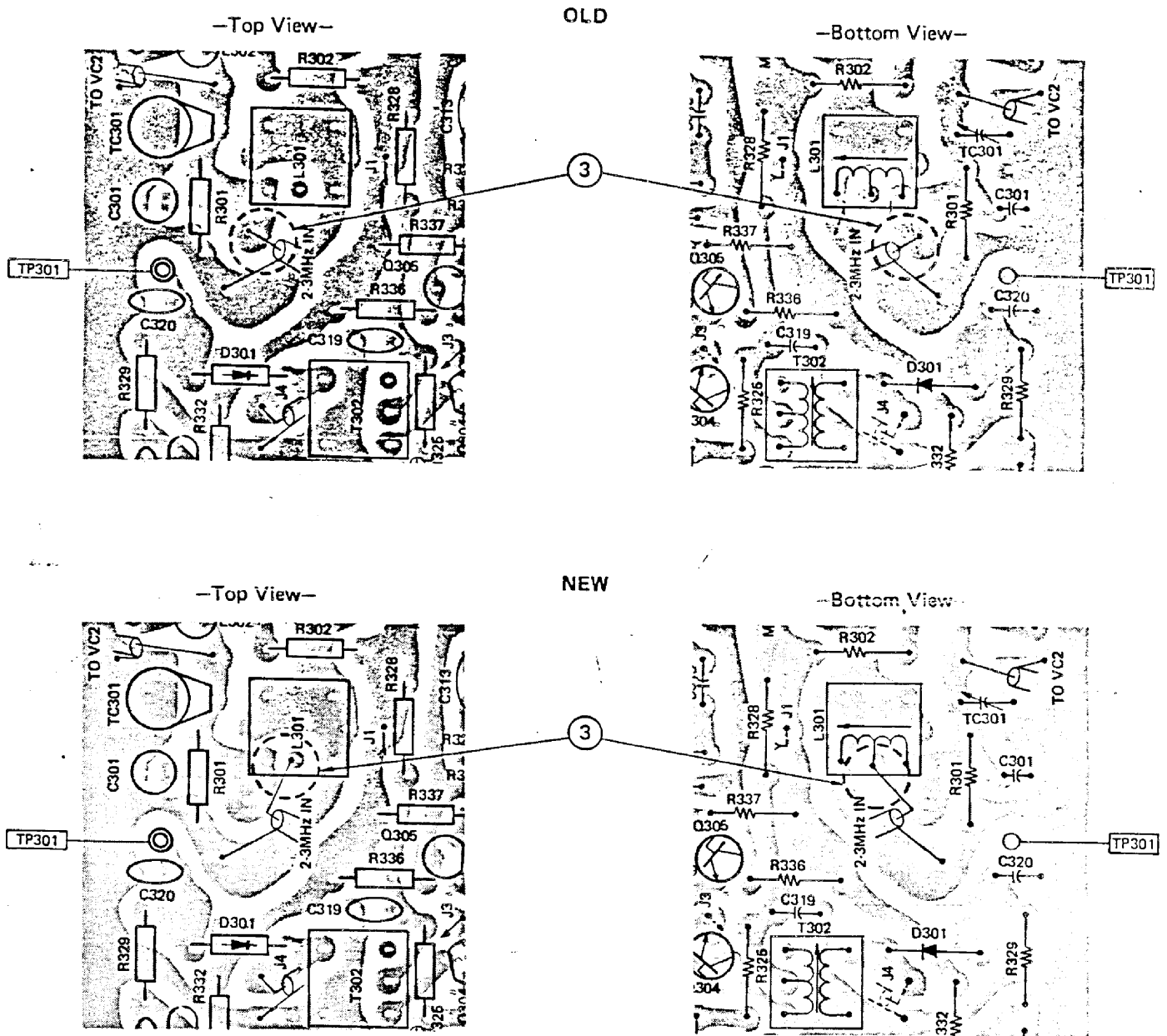


Figure 2 : IF/AF P.C.BOARD PARTS LOCATION

#### Modification of BFO (From Date Code 3A9)

C345 was changed from 43pF (NP0) to 27pF (NP0). Units which have a date code prior to 3A9 should have this change made. After the change, realign BFO as stated on page 21 of Service Manual.

#### Modification for improvement of 2nd IF circuit (From date code 4A9)

To avoid oscillation when the kHz readout is indicating below "050".

R301 was changed from 56 K ohms to 33 K ohms. Units which have a date code prior to 4A9 should have this change made.

## Modification of AGC time constant for improvement for SSB reception (From Date Code 3A9)

To lengthen the release time of AGC when receiving strong SSB signals, make the following changes. See Figures 3 and 4.

1. Delete C343 22 $\mu$ F electrolytic capacitor.
2. Change R353 from 4.7k $\Omega$  to 10k $\Omega$ .
3. Add following parts.

Q317	Transistor	2SC1815(GR)	
C376	Electrolytic Capacitor	100 $\mu$ F/16WV	CE02W1C101C
C377	Electrolytic Capacitor	1 $\mu$ F/50WV	CE04W1H010
C378	Electrolytic Capacitor	1 $\mu$ F/50WV	CE04W1H010
R378	Carbon Film Resistor	10k $\Omega$ 1/4W $\pm$ 5%	R25-103J
R379	Carbon Film Resistor	6.8k $\Omega$ 1/4W $\pm$ 5%	R25-682J
R380	Carbon Film Resistor	100k $\Omega$ 1/4W $\pm$ 5%	R25-104J
	Lug Terminal		1L3P

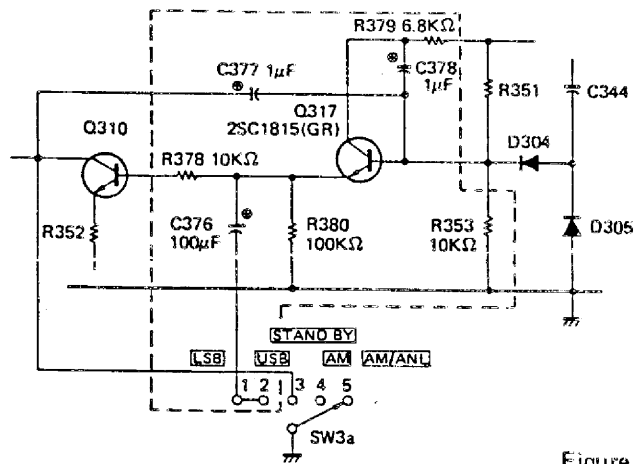


Figure 3

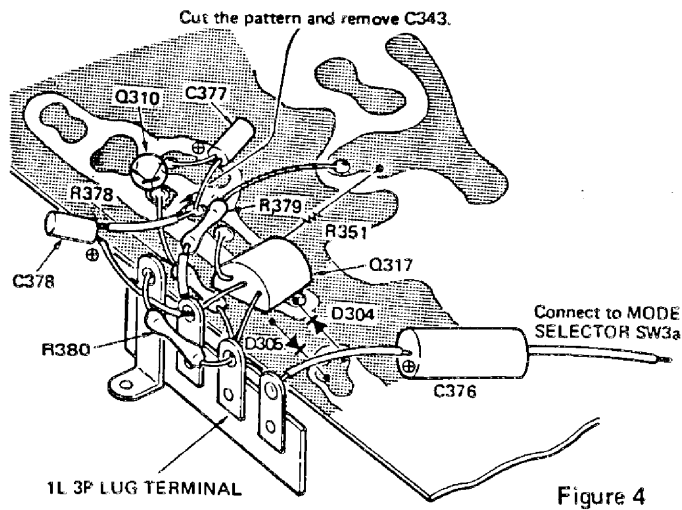


Figure 4

RADIO SHACK  A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102  
CANADA: BARRIE, ONTARIO L4M 4W5

TANDY CORPORATION

AUSTRALIA

BELGIUM

U. K.