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# SERVICE MANUAL FTC-703A

SMC 307L1



FT 307 CBM

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C.P.O. BOX 1500  
TOKYO, JAPAN

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# INDEX

	(page)
FOREWORD	i
SECTION 1 – GENERAL	
GENERAL DESCRIPTION	1-1
SPECIFICATIONS	1-2
ACCESSORIES AND OPTIONS	1-3
INSTALLATION	1-4
BATTERY PACK INFORMATION	1-5
BATTERY CHARGER INFORMATION	1-6
CONTROLS, SWITCHES, AND CONNECTORS	1-8
OPERATION	1-10
SECTION 2 – TECHNICAL NOTES	
THEORY OF OPERATION	2-1
CRYSTAL DATA	2-3
TONE SQUELCH INSTALLATION	2-4
TONE SQUELCH TUNING RESISTOR CHART	2-5
TWO-TONE SEQUENTIAL DECODER INSTALLATION	2-6
TWO-TONE DECODER TUNING RESISTOR CHART	2-7
Y2T TWO-TONE DECODER PROGRAMMING KITS	2-8
NC-3A/NC-1A BATTERY CHARGER DIAGRAMS	2-12
SECTION 3 – SERVICING	
FTC-703A EXPLODED VIEW	3-1
SOLDERING INFORMATION	3-2
LEVEL DIAGRAM: RECEIVER SECTION	3-4
LEVEL DIAGRAM: TRANSMITTER SECTION	3-5
VOLTAGE CHART	3-6
MAINTENANCE AND SERVICING	3-7
RECEIVER ALIGNMENT	3-8
TRANSMITTER ALIGNMENT	3-10
CHANNEL CHANGES	3-12
PARTS LAYOUTS	3-14
TYPICAL PART FAILURES	3-18
TROUBLESHOOTING	3-19
TRANSISTOR & IC CONNECTIONS	3-23
SECTION 4 – REPAIR PARTS	
PARTS LIST AND ORDERING DATA	4-1
PARTS LIST	4-5

# YAESU FTC-703A VHF FM HAND-HELD TRANSCEIVER



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## GENERAL DESCRIPTION

The Yaesu model FTC-703A is a high performance, compact VHF FM transceiver for portable applications. Designed for operation within any 1 MHz range of the 68 – 88 MHz land mobile band, the FTC-703A features 3 watts of RF output and a flexible, quick-connect rubber flex antenna. The FTC-703A weighs less than a pound, less batteries, and a full line of accessories is available for special applications.

The FTC-703A is available with capacity for up to three channels. Audio quality, on both transmit and receive, is exceptionally clean and crisp, and the straightforward internal design reduces service time tremendously. With proper care and maintenance, the FTC-703A will provide many years of reliable operation.

GENERAL

**SPECIFICATIONS**

**GENERAL**

Frequency Coverage:  
68.00 MHz – 88.00 MHz  
(All channels within 1 MHz range)

Number of Channels:  
3

Operating Mode:  
F3

Power Source:  
NiCd Battery Pack @ 10.8V ±10%

Power Consumption:  
Receive 200 mA  
Receive (SQL) 25 mA  
Transmit 800 mA

Case Size:  
69 (H) x 49 (W) x 171 (D) mm

Weight:  
650 g (w/battery pack)

**TRANSMITTER**

Power Output:  
3.0 Watts

Modulation:  
Vector Phase Modulation

Frequency Multiplication: FOR SERVICE MANUALS  
x 12 CONTACT:

Deviation:  
±5 kHz

Maximum Bandwidth:  
16 kHz

Spurious Emission:  
–50 dB or Better

Output Impedance:  
50 Ohms

Microphone:  
Electro-Condenser

Transmitter Stability:  
Within 5 ppm.

**RECEIVER**

Type:  
Double Conversion Superheterodyne

First IF:  
10.7 MHz

Second IF:  
455 kHz

Sensitivity:  
0.32 µV for 20 dB QS

Selectivity:  
±20 kHz (–60 dB)

**SEMICONDUCTOR COMPLEMENT**

FET  
3SK51 1 JF1033B 2

Transistors  
2SA695D 4 2SC1311E 14  
2SC710D 2 2SC19230 4  
MRF237 1 2SC741 1  
2SC1209D 2 2SC1815Y 2

Silicon Diodes  
1S1555 5 MI301 1

Germanium Diodes  
1S188FM 2

Zener Diodes  
WZ050 1 WZ061 1

LED  
LN28RP 2

Design and specifications subject to change without notice.

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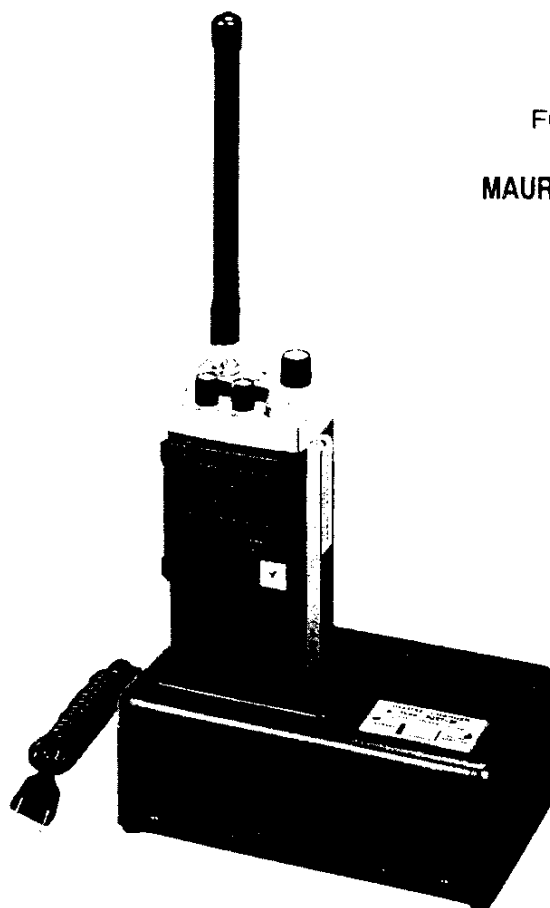
**ACCESSORIES AND OPTIONS**

YM-24	Remote Speaker/Microphone
NC-1A	Standard Battery Charger
NC-3A	Quick Charger/AC Adapter
FNB-2	NiCd Battery Pack

## Rubber Flex Antennas:

FHA-2A	68–70 MHz
FHA-2B	70–73 MHz
FHA-2C	73–76 MHz
FHA-2D	76–79 MHz
FHA-2E	79–82 MHz
FHA-2F	82–85 MHz
FHA-2G	85–88 MHz

FTS-1	Tone Squelch Unit (CTCSS Encoder/Decoder)
F2D-1	Two-Tone Sequential Decoder
FBA-1	Battery Pack Charger Adapter
FLC-1	Leather Case



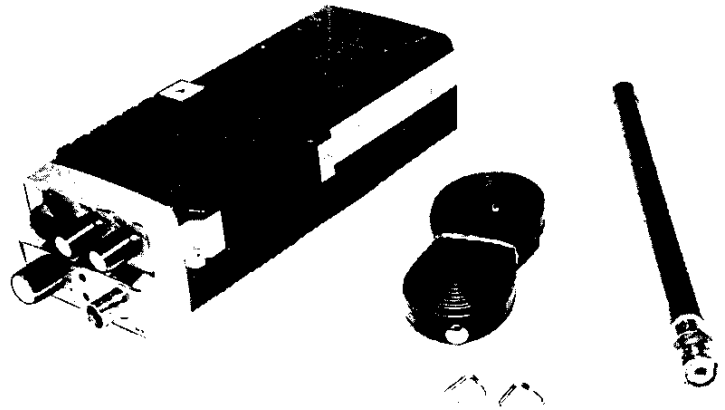
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FTC-703A + NC-3A Quick Charger/AC Adapter

## INSTALLATION

### UNPACKING AND INSPECTION

When you first open the FTC-703A packing carton, check the radio for any visible signs of damage. Before installing the battery pack, check the volume, squelch, and channel selector switches for smooth, positive rotation. If any damage is present, document the problem completely, and notify the shipping company immediately. Save the foam packing material for possible use at a later date.



### ANTENNA INSTALLATION

The rubber flex antenna is easy to install or remove. Just align the BNC connectors correctly at the ANT jack, and twist the BNC plug of the antenna to secure it to the jack on the radio.

A different type of antenna may be used with this transceiver. This antenna must display a feedpoint impedance of 50 ohms for proper operation.

#### CAUTION

NEVER SQUEEZE THE PUSH TO TALK SWITCH WITHOUT HAVING AN ANTENNA CONNECTED TO THE TOP PANEL ANTENNA JACK.



## BATTERY PACK INFORMATION

The NiCd battery pack is a 10.8 volt 450 mAh pack designed expressly for the FTC-703A. We do not recommend the use of other packs. Moreover, the FTC-703A must never be connected directly to AC power of any kind, nor DC voltages above exactly 12 volts. These abuses will void any and all factory warranties, and these simple precautions should be made clear to the customer. Appropriate warnings are contained in the Operation Manual.

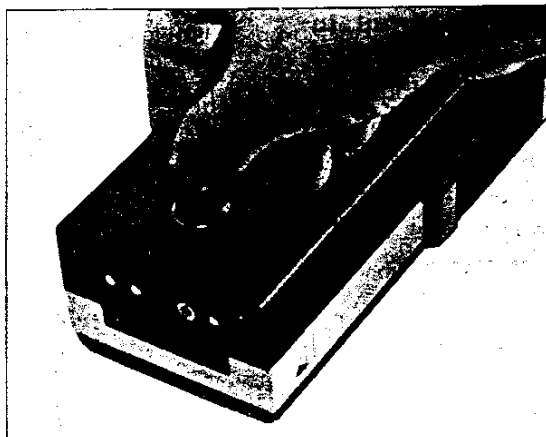
The following procedure will allow quick changing of battery packs:

- (1) Use a coin or screwdriver to turn the restraining screw on the rear of the radio counter-clockwise (CCW) by 90° ONLY.

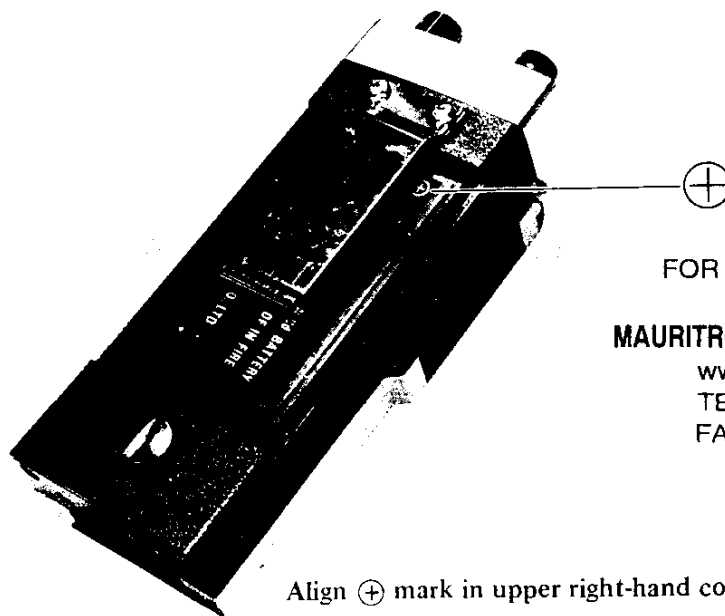
- (2) Remove the battery compartment cover.
- (3) Install the battery pack in the compartment. Be careful to align the pack with the ⊕ in the top right-hand corner, as shown in the photo.
- (4) Replace the battery compartment cover, and make fast the restraining screw with a 90° clockwise (CW) twist.

Note that it is not possible to damage the radio by installing a battery pack incorrectly, as the contacts will not touch any transceiver circuitry.

We recommend that customers carry at least one extra battery pack when operating in a remote area, so as not to be without communications in the event of an emergency.



Use a coin to open battery compartment.



Align ⊕ mark in upper right-hand corner.

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## GENERAL

### BATTERY CHARGER INFORMATION

Several chargers are available for the FTC-703A battery packs.

The NC-9B is a compact wall charger, similar to the type used with electronic calculators. The miniature phone plug is connected to the EXT jack on the bottom panel of the radio. Charging time is approximately 15 hours to full charge.

The NC-1A is a standard drop-in battery charger. When the FTC-703A is properly inserted into the charging slot, an LED will become illuminated, indicating proper operation. Charging time is approximately 15 hours for the NC-1A, as well.

The NC-3A is a quick charger and AC adapter. It will charge a NiCd battery pack in as little as four hours. The NC-3A includes a timer circuit to prevent overcharging. A full charge is automatically timed by your NC-3A and the charger indicator LED goes off when fully charged. However, if the CHARGER-ADAPTOR switch is changed or, the transceiver is removed from the socket or the AC power cord is disconnected during the charge, the timer resets and the battery will be overcharged.

The NC-3A also provides a normal charger function. A full charge requires approximately 15 hours in this mode.

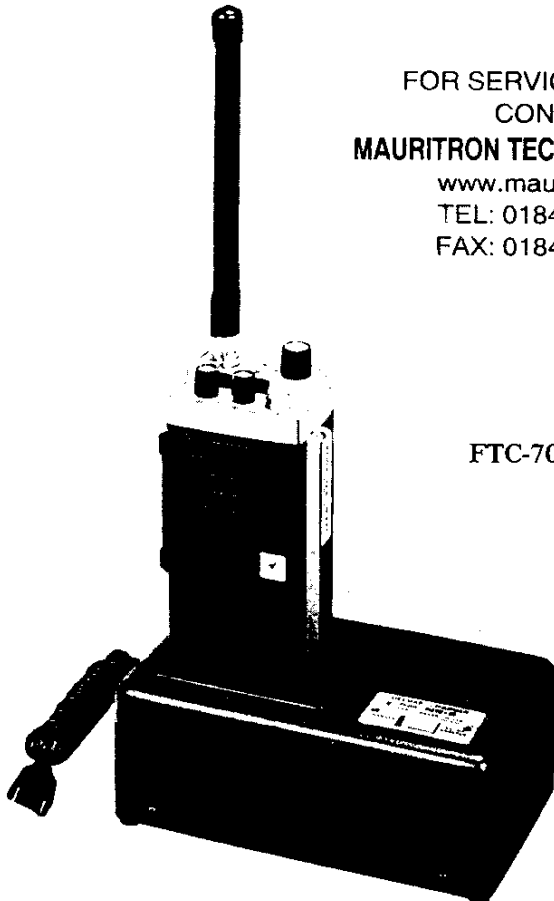
When you want to charge only the battery pack, without tying up the radio in the charger, use the optional FBA-1 Battery Sleeve. This adapter will allow charging of the pack alone.

When using the FBA-1 with NC-3A, the timer must be reset by the CHARGER-ADAPTER switch or pulling the FBA-1 out.

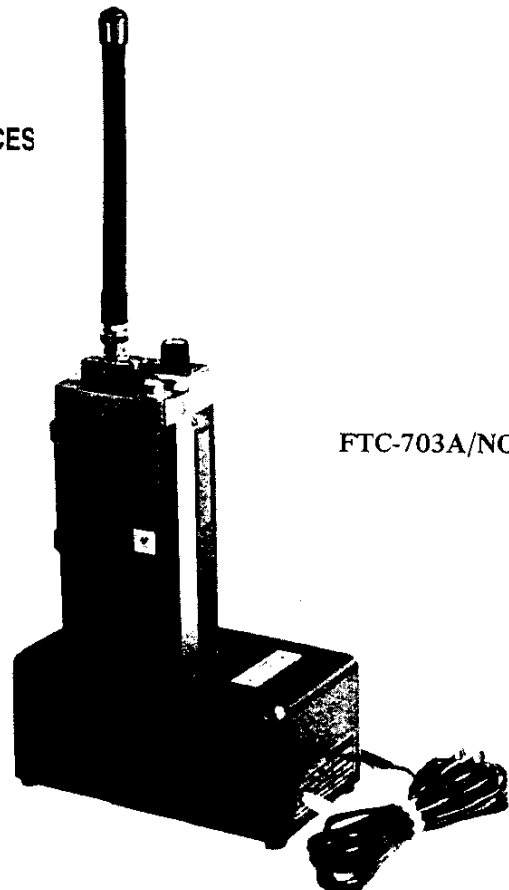
The NC-24 Multi-Charger is designed to charge as many as 24 batteries simultaneously.

Most Yaesu Battery Chargers may be used from a variety of supply voltages. The transformer primary wiring diagram for various voltages is shown in Figure 1. The NC-9B cannot be adapted to 220 volts, however. For those voltages, the type NC-9C charger is available from Yaesu agents in those countries using the higher voltages.

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FTC-703A/NC-3A



FTC-703A/NC-1A

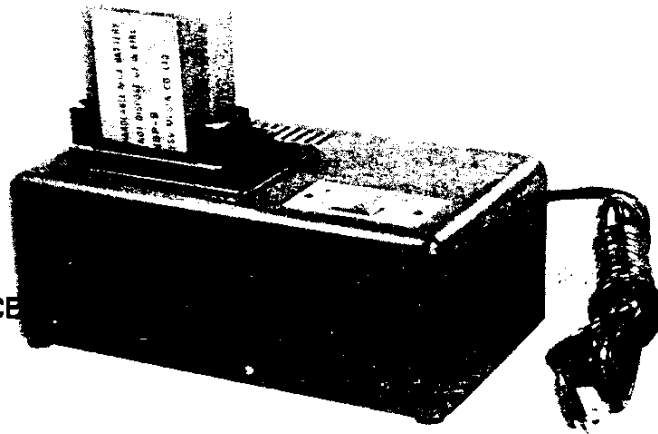




NC-9B Compact Charger (117V)

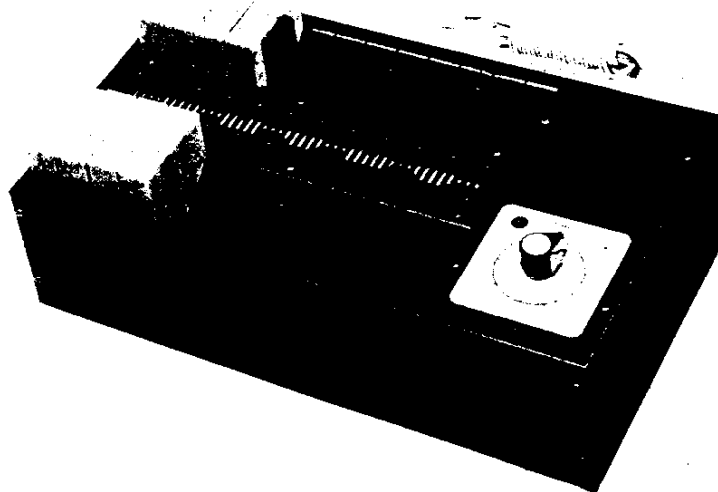


NC-9C Compact Charger (220/234V)



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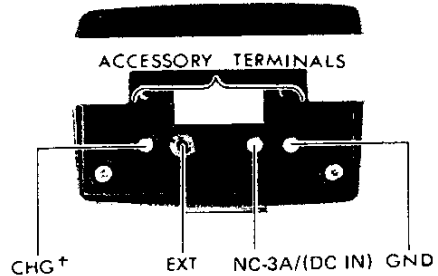
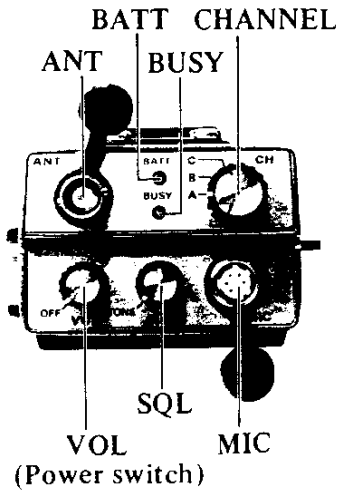
NC-3A Quick Charger + FNB-2 Battery in FBA-1 Adapter Sleeve



NC-24 Multi-Charger



## CONTROLS, SWITCHES, AND CONNECTORS



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**(1) ANT**

The antenna connector allows quick connection or removal of the flexible antenna.

**(2) BATT**

The battery indicator will light up when you transmit, if the battery charge is sufficient. If the indicator does not light up, the battery pack should be recharged as soon as possible.

**(3) BUSY**

The BUSY lamp lights up when a signal is being received.

**(4) CHANNEL**

Up to three channels may be selected.

**(5) VOL (Power Switch)**

This is the main volume and on/off switch for the radio. When operation is completed, or when charging batteries, be certain that the radio is turned OFF, to avoid battery depletion.

**(6) SQL**

The receiver squelch control will silence the receiver when no signal is being received. This prolongs battery life between charges. For correct adjustment, see the "Operation" section.

**(7) MIC**

The optional Yaesu YM-24 Speaker/Microphone accessory may be connected here.

**(8) PTT switch**

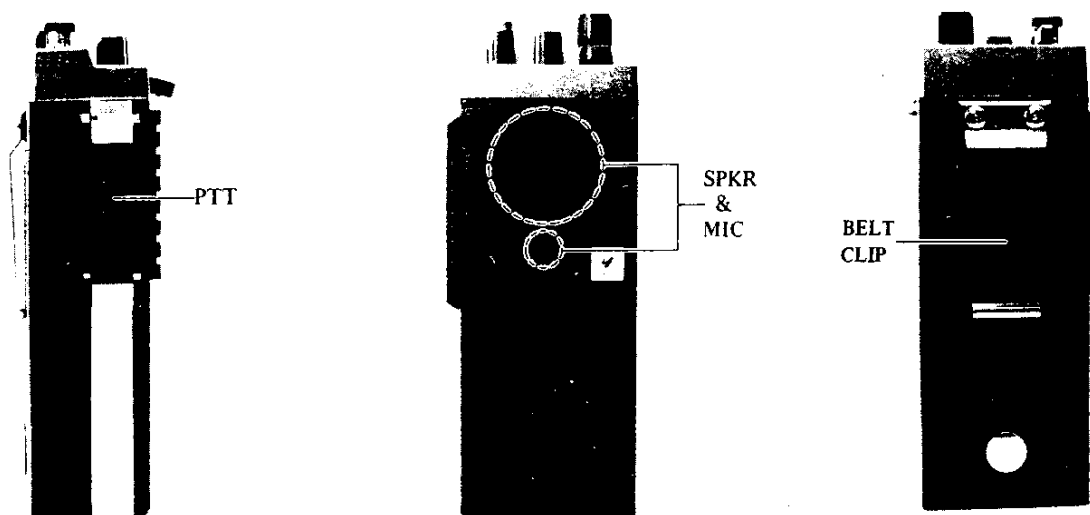
The Push To Talk (PTT) switch will activate the transmitter when you squeeze it. Release the switch to listen.

**(9) SPEAKER & MICROPHONE**

Behind the slits in the front panel are the built-in speaker and condenser microphone.

**(10) ACCESSORY TERMINALS**

These terminals are for connection to the NC-1A NiCd Charger and the NC-3A Quick Charger/AC Adapter. The EXT terminal is for connection to an external charger unit (10.8 VDC @ 45 mA max.).



**CAUTION**

WHEN OPERATING THE FTC-703A FROM OTHER THAN THE NiCd BATTERY PACK, DO NOT EXCEED THE 10.8 VOLT DC LIMITATION. OPERATION OF THIS UNIT DIRECTLY FROM 13.8 VOLT POWER WILL CAUSE PERMANENT DAMAGE TO THE TRANSCEIVER.

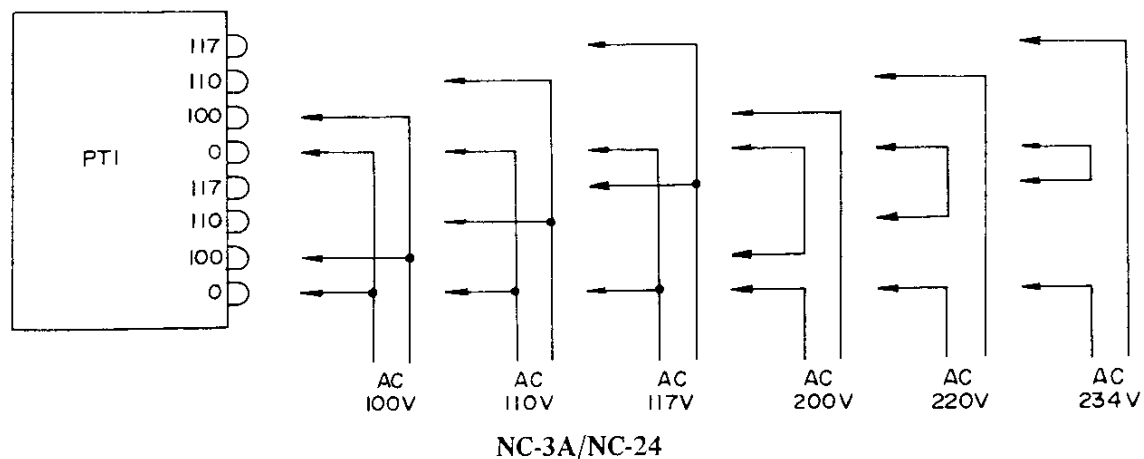
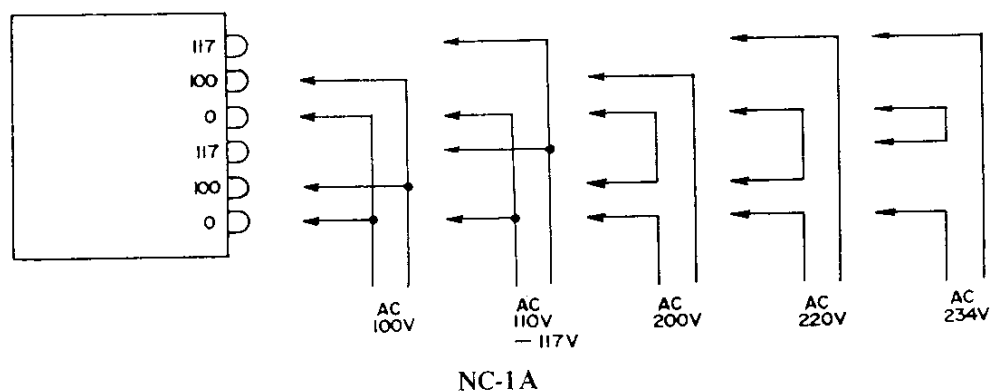


Fig. 1 Power Transformer Primary Connections

## OPERATION

### INSTALLATION AND OWNER TRAINING

The installation procedure for the FTC-703A is limited to the checking of all switches for proper action, installation of the antenna and battery pack, and confirmation that the transceiver is performing properly. If new channels are to be installed, this manual contains full installation information.

Included with each transceiver is an "Operation Manual" which presents basic operating instructions in an easy-to-understand format. Included are such items as tone squelch operation, speaker-microphone instructions, installation of the battery pack and antenna, and standard operating procedure. Rudimentary information on wave propagation is included, as well, enabling the owner to understand the effects of surrounding buildings and other obstacles. The service technician should become familiar with the operating manual, in order to be able to answer questions that may arise.

The sections to follow are exact reproductions of the corresponding sections of the Owner's Manual. They are presented in this format so as to acquaint you with the terminology familiar to the owner.

### OPERATION

Your FTC-703A transceiver is extremely easy to use. The operation procedure is summarized below.

1. Install the battery pack and the antenna, as described previously. Make certain that your battery pack is fully charged.
2. Turn the VOL switch ON, and rotate the SQL (squelch) control until receiver noise or voices can be heard. Set the VOL control for a comfortable listening level.
3. Rotate the CHANNEL selector to an UNUSED channel, one which has only noise on it. Now rotate the SQL control until the noise just disappears. Do not go past this threshold point; if you do, you will not be able to hear weak signals.
4. Now rotate the CHANNEL selector to the channel you want to use. To call another station, squeeze the PTT switch on the side of the radio, and speak into the grill on the front panel of the radio. A firm, but normal, voice will provide the best quality transmission.
5. When you have finished calling, release the PTT switch. The FTC-703A will now be in the "receive" mode, and the other station, if returning your call, will be heard in the speaker. Adjust the volume control as necessary for good reception.
6. When all operation is completed, be certain to turn the VOL switch OFF, to avoid battery depletion.

### TONE SQUELCH OPERATION

When the optional Tone Squelch unit is installed, rotation of the SQL control to the TONE position will activate the tone squelch circuit.

In this mode, when you transmit, a very low frequency tone (too low for the human ear to perceive) will be sent along with your voice signal. This will activate a similar tone squelch unit at the other station, and he or she will hear you calling normally.

On receive, your radio's receiver will remain silent until a similar subaudible tone is detected on an incoming signal. The receiver will then respond in the normal manner.

When a signal is present on your channel, but that station is not using tone squelch, the BUSY lamp will light up, to tell you that the channel is occupied. Your receiver will stay silent, though. If the BUSY lamp lights up, you should wait until the channel is clear before calling.

The net result is that an otherwise busy channel can be turned into a quiet one, with only desired calls coming through. See your dealer for installation of the optional tone squelch unit.

## HOW TO USE THE TWO-TONE ALERTING SYSTEM (OPTION)

If your FTC-703A is equipped with the optional Two-Tone Sequential alerting unit, the following section will explain how to use it for maximum effectiveness.

In your communications network, each transceiver will have a code number assigned to it. When the dispatcher puts out a special coded call for your unit, an alert tone will be heard in your radio's speaker. You then return the call in the usual fashion. Calls not intended for your unit will not activate your radio at all.

To set up your radio in the paging mode, rotate the SQL control fully clockwise into the click-stop. This is the TONE position, the same one used for Tone Squelch operation. Now, when your code is sent by the dispatcher, an alert tone of about three seconds duration will be heard emanating from your speaker. When the alert tone is finished, you should immediately return the call to the dispatcher.

When your communication is finished, reset the Two-Tone system by rotating the SQL knob out of the click-stop, then rotating it back into the click-stop. You will then be ready for the next time the dispatcher calls you.

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## GENERAL

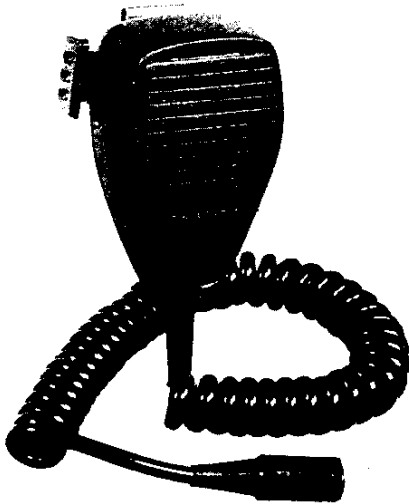
### USING THE OPTIONAL YM-24 SPEAKER/ MICROPHONE

The basic rules for effective communications presented earlier can be enhanced by use of the YM-24 Speaker/Microphone option, available from your Yaesu dealer.

The YM-24 is a remote hand-held microphone that also contains a speaker. The YM-24 plugs into the MIC jack on the top of your FTC-703A, and no further adjustment is required.

By holding the microphone close to your mouth, and speaking in a firm, normal voice, considerable noise reduction will occur on your transmitted signal. On receive, hold the YM-24 close to your ear, in order to shield your ear from background noise.

If you are in a difficult communications area, use of the YM-24 will allow you to hold the FTC-703A high in the air, and to move it around for best reception. The radio may also be mounted on the frame of your backpack, if you are in a remote area, and the YM-24 will then permit sending/receiving control.



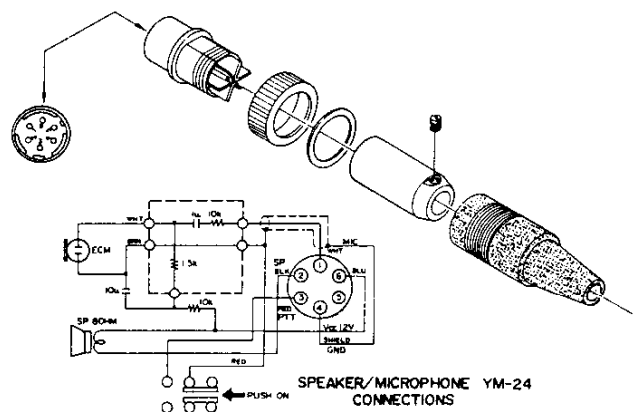
The YM-24 Speaker/Microphone option adds versatility to your Yaesu transceiver.

Squeeze the switch on the YM-24 to talk, and release the switch to listen.

Don't forget to turn the FTC-703A OFF when not using it. It's easy to forget this important step when using the remote speaker/microphone.



When using the YM-24 Speaker/Microphone, you can raise your FTC-703A above obstacles that might ruin reception.



YM-24 Speaker/Microphone Connections

## THEORY OF OPERATION

Reference to the block diagram will be of considerable help in understanding the operation of the transceiver circuitry. Please refer to the schematic diagram for specific component details.

The FTC-703A utilizes a transmitter strip, as well as a double conversion receiver strip. The FTC-703A is designed for operation from an internal NiCd battery pack.

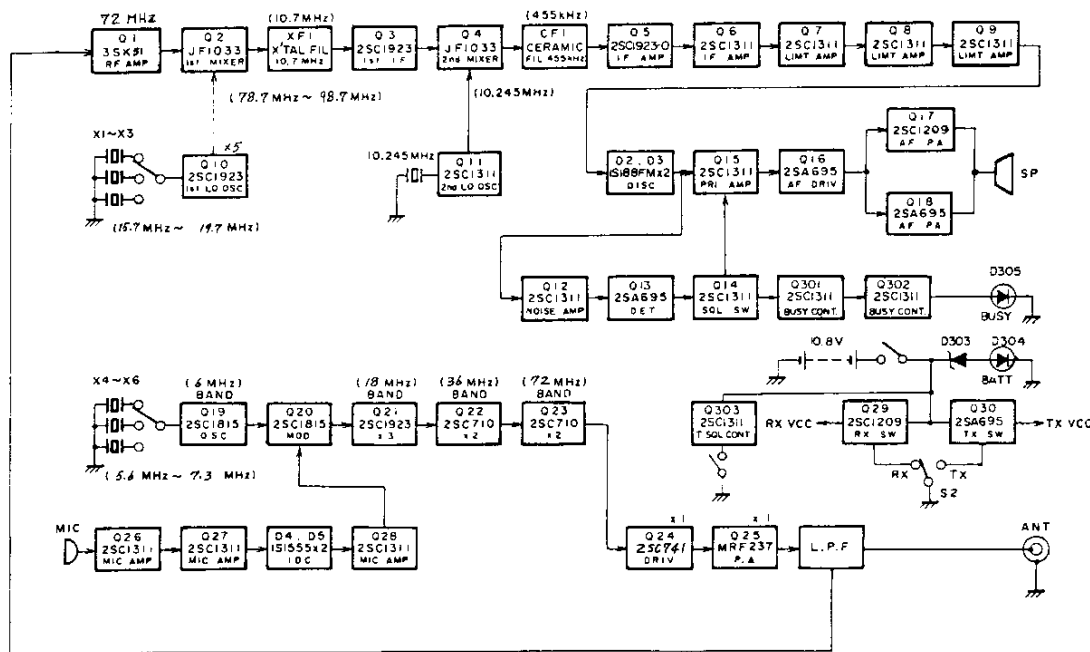
### RECEIVER

The signal from the antenna is fed through a low-pass filter consisting of  $C_{401}$ ,  $C_{402}$ ,  $L_{401}$ ,  $C_{110}$ , and  $L_{11}$ , as well as diode switch  $D_1$ , to the MOS FET RF amplifier,  $Q_1$  (3SK51). The amplified VHF signal is then heterodyned with the local oscillator signal supplied from  $Q_{10}$  (2SC1923) in first mixer  $Q_2$  (JF1033), producing a 10.7 MHz first IF. The IF signal is then passed through crystal filter  $XF_1$ , which has a 6 dB bandwidth of  $\pm 7.5$  kHz, and fed to IF amplifier  $Q_3$  (2SC1923).

The filtered IF signal appears at the gate of second mixer  $Q_4$  (JF1033), where the 10.7 MHz signal is heterodyned with a 10.245 MHz local signal delivered from  $Q_{11}$  (2SC1311), producing a 455 kHz second IF. The 455 kHz signal is passed through ceramic filter  $CF_1$ , which has a 6 dB bandwidth of  $\pm 5.5$  kHz, and fed to second IF amplifiers  $Q_5$  (2SC1923-0) and  $Q_6$  (2SC1311). The ceramic filter minimizes degradation of receiver performance caused by spurious responses, and it sets the working bandwidth for following stages. The amplified IF signal is delivered to the three-stage limiter amplifier,  $Q_7$ - $Q_9$  (2SC1311), in which any traces of amplitude modulation are removed. The IF signal is then delivered to the discriminator,  $D_2/D_3$  (1S188FM), produces an audio output in response to a corresponding change in the frequency of the 455 kHz IF signal. The audio signal is then amplified by  $Q_{15}$  (2SC1311),  $Q_{16}$  (2SA695),  $Q_{17}$  (2SC1209), and  $Q_{18}$  (2SA695), providing 500 mW of audio to the speaker.

The discriminator,  $D_2/D_3$  (1S188FM), produces an audio output in response to a corresponding change in the frequency of the 455 kHz IF signal. The audio signal is then amplified by  $Q_{15}$  (2SC1311),  $Q_{16}$  (2SA695),  $Q_{17}$  (2SC1209), and  $Q_{18}$  (2SA695), providing 500 mW of audio to the speaker.

FTC-703A BLOCK DIAGRAM



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When no carrier is present in the 455 kHz IF, the high frequency noise at the discriminator output is amplified by noise amplifier  $Q_{12}$  (2SC1311) and detected by  $Q_{13}$  (2SA695), producing a DC voltage. This voltage activates a switch,  $Q_{14}$  (2SC1311), which grounds the base of  $Q_{15}$ , silencing the receiver. When a carrier is present in the 455 kHz IF, the noise is removed from the discriminator, and the audio amplifier stages return to normal operation.

### TRANSMITTER

The transmitter section produces a frequency modulated signal. The audio signal from the microphone is amplified by  $Q_{26}$  and  $Q_{27}$  (2SC1311), then passed to the instantaneous deviation control (IDC), where both positive and negative peaks are clipped by  $D_4$  and  $D_5$  (1S1555). The output from the IDC is fed to  $VR_1$ , which sets the input level for microphone amplifier  $Q_{28}$  (2SC1311). The amplified signal is then passed to the modulator.

A 6 MHz fundamental signal is generated by  $Q_{19}$  (2SC1815). The fundamental signal is fed to the base of  $Q_{20}$  (2SC1815); the signal appearing at the emitter of  $Q_{20}$  is a vector phase modulated signal, because of the reactance variation produced in accordance with the speech input from  $Q_{28}$ .

The low-level signal is then multiplied by a total factor of 12 in the frequency multiplier stages:  $Q_{21}$  (2SC1923),  $Q_{22}$  (2SC710), and  $Q_{23}$  (2SC710). The VHF signal is then delivered to driver transistor  $Q_{24}$  (2SC741), and amplified by power amplifier  $Q_{25}$  (MRF237), the output of which is fed through a low-pass filter to the antenna. Power output is approximately three watts.

### CONTROL CIRCUITRY

In the receive mode, the PTT switch connection causes  $Q_{29}$  (2SC1209) to conduct, providing  $V_{cc}$  to be applied to the receiver section. In the transmit mode, the conduction of  $Q_{30}$  (2SA695) causes  $V_{cc}$  to be applied to the transmitter circuit, while  $D_7$  causes the base of  $Q_{29}$  to be grounded, thus disabling the receiver.

The microphone is grounded when the PTT switch is released. When the optional external speaker/microphone is used, the internal microphone is disabled.

When a signal is received by the main squelch system, a portion of the DC voltage appearing at  $Q_{14}$  is used to switch  $Q_{301}$  and  $Q_{302}$  (2SC1311) on, causing the BUSY LED to become illuminated.

In the transmit mode, the DC voltage from the battery is sampled by zener diode  $D_{303}$  (WZ061). When the battery level is above 8 volts,  $D_{303}$  will conduct, causing the BATT indicator LED to become illuminated, providing an indication of satisfactory battery charge.



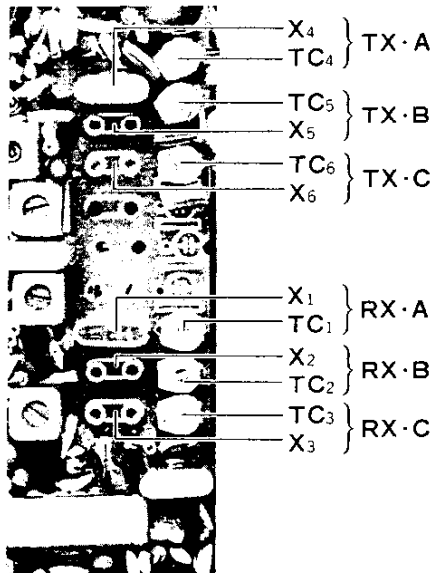


**CRYSTAL DATA**

1. Type of Holder:	HC-25/U
2. Channel Frequency:	68MHz – 88MHz
3. Oscillation Frequency:	TX: CH/12 RX: (CH+10.7)/5
4. Load Capacity:	TX: 50pF+60Hz=0 RX: 34.3pF-90Hz=0
5. Drive Level:	TS-683/TSM 2mW
6. Shunt Capacity:	TX: 5MHz – 4.6pF±0.5 6MHz – 4.2pF±0.5 7MHz – 4.6pF±0.5 RX: 15MHz – 4.7pF±0.5 16MHz – 5.0pF±0.5 17MHz – 4.5pF±0.5 19MHz – 4.4pF±0.5
7. Frequency Tolerance:	±10ppm at 25°C
8. Frequency Stability:	±10ppm –10°C to +50°C
9. Equivalent Resistance:	13 ohm max (series)
10. Operation Mode:	Fundamental

Table 1

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**CRYSTAL LOCATION DATA**



## OPTIONAL TONE SQUELCH (CTCSS) INSTALLATION

The optional FTS-1 Tone Squelch board can be supplied complete with the IC and all components, or minus the IC and frequency determining parts.

To install the Tone Squelch board, first remove the rear panel of the transceiver, as shown in Figure 12, page 3-6. Now remove the bottom panel of the transceiver, as shown in Figure 4.

Ascertain the customer's required tone frequency, and select the proper value for  $R_{502}$ , as determined from inspection of Table 2. In countries outside the United States, trimpot  $VR_{502}$  is in series with  $R_{502}$ ; the proper values for the combination of these two components can be found in Table 3.

Once the proper resistor is installed, mount the circuit board on the bottom side of the transceiver, as shown in Figure 4. Secure the board using the mounting hardware supplied. Now connect the wires extending from the circuit board to points (a), (b), (c), (d), (e), (f), and GND, as shown in Figure 3.

For alignment purposes,  $VR_{501}$  sets the input audio level to the CTCSS decoder. It should be set to the 12 o'clock position (minimum) for normal use.  $VR_{503}$  sets the subaudible output level, and this should be set for  $\pm 0.5$  kHz deviation on transmit.

Close up the transceiver. Installation is now complete. When the SQL control is set to TONE, a subaudible tone will be transmitted along with the speech signal. On receive, an identical subaudible tone will be required to open up the transceiver squelch. Rotate the SQL control out of the TONE position for normal squelch operation.

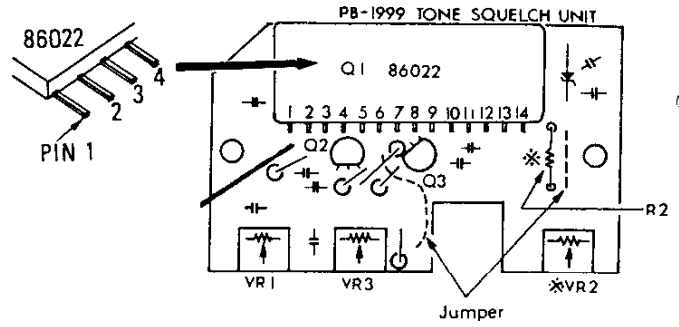


Fig. 2

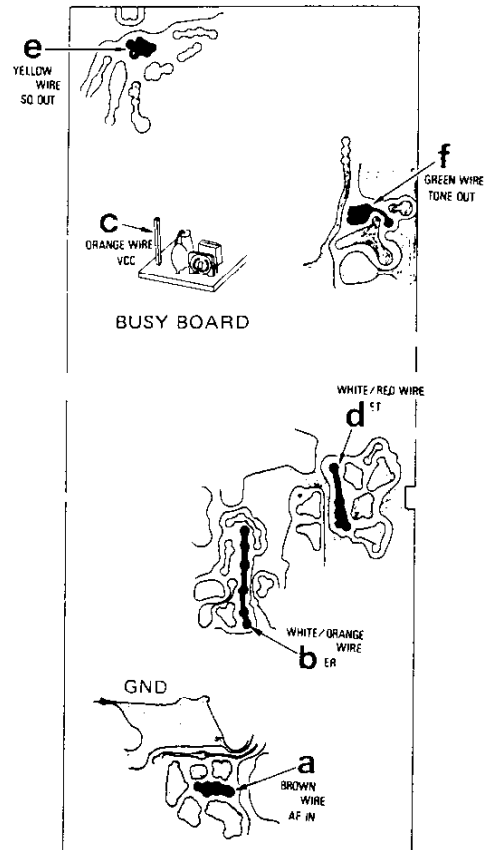


Fig. 3

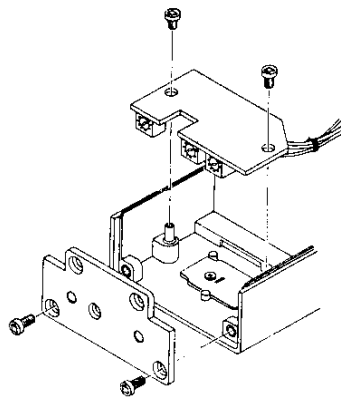


Fig. 4

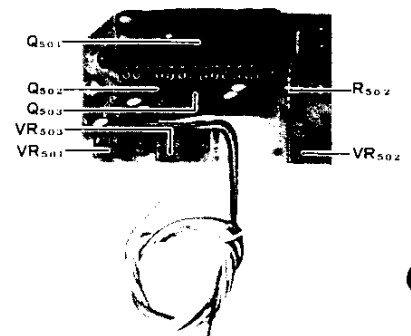


Fig. 5

TONE SQUELCH TUNING RESISTOR CHART

TUNING RESISTORS

CTCSS Frequency (Hz)	R <sub>502</sub> (kOhms)
67.0	180.441
71.9	156.684
74.4	146.331
77.0	136.616
79.7	127.517
81.0	123.456
82.5	119.008
85.4	111.062
88.5	103.418
90.0	100.000
91.5	96.748
94.8	90.129
100.0	81.000
103.5	75.614
107.2	70.484
110.9	65.860
114.8	61.461
118.8	57.392
123.0	53.539
127.3	49.934
131.8	46.515
136.5	43.292
141.3	40.248
146.2	37.362
151.4	34.614
156.7	32.084
162.2	29.752
167.9	27.600
173.8	25.611
179.9	23.774
186.2	22.080
188.0	21.520
192.8	20.064
203.5	18.720
209.0	17.472
210.7	17.168
218.1	16.032
225.7	15.000
233.6	14.064
241.8	13.232
250.3	12.500

R<sub>502</sub> VALUE (WHEN USING TRIMPOT)

Table A		Table B	
Tone frequency	R <sub>502</sub>	Tone frequency	R <sub>502</sub>
(Hz)	(kΩ)	(Hz)	(kΩ)
67.0	165	91.5	88.7
71.9	143	94.8	84.5
74.4	133	100	75.0
77.0	124	103.5	71.5
79.7	118	107.2	64.9
81.0	113	110.9	60.4
82.5	110	114.8	56.2
85.4	102	118.8	52.3
88.5	95.3	123.0	49.9
90.0	93.1	127.3	47.5
91.5	91.5	131.8	45.1
94.8	86.2	136.5	42.7
100.0	78.8	141.3	40.3
103.5	75.6	146.2	38.0
107.2	72.5	151.4	35.7
110.9	69.7	156.7	33.4
114.8	67.1	162.2	31.1
118.8	64.9	167.9	28.8
123.0	62.9	173.8	26.6
127.3	61.1	179.9	24.4
131.8	59.5	186.2	22.3
136.5	58.1	192.8	20.2
141.3	56.8	199.0	18.2
146.2	55.6	203.5	17.2
151.4	54.5	209.0	16.2
156.7	53.5	210.7	15.2
162.2	52.6	218.1	14.2
167.9	51.8	225.7	13.2
173.8	51.1	233.6	12.2
179.9	50.5	241.8	11.2
		250.3	10.2

- Note: 1. Please use 1% tolerance metallic film resistors.  
 2. VR<sub>502</sub> value: when using table A, 20 kΩ; table B, 10 kΩ

Table 3

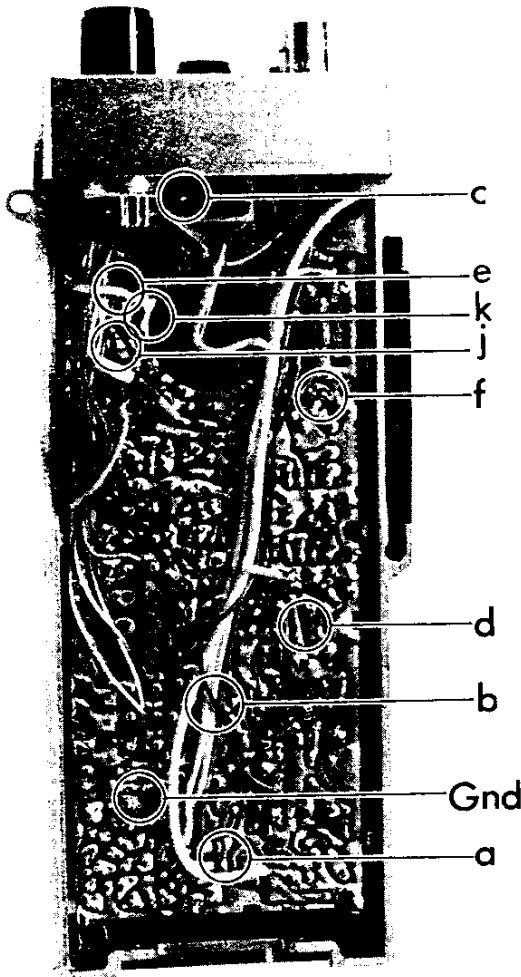
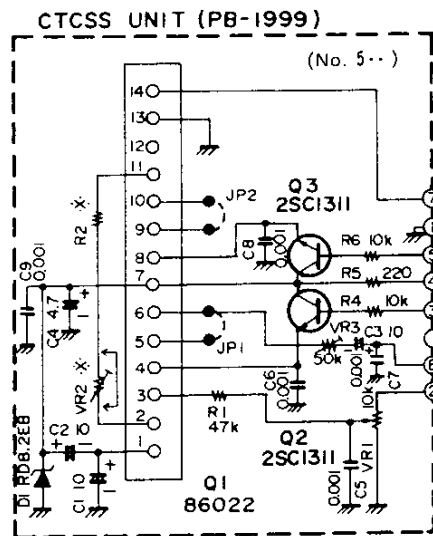


Fig. 6

Table 2

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 FAX: 01844 - 352554



- SQ OUT
- GND
- ET
- VCC I
- ER
- (AF OUT)
- TONE OUT
- AF (IN)

## OPTIONAL TWO-TONE SEQUENTIAL DECODER INSTALLATION

The optional F2D-1 Two-Tone Sequential Decoder board can be supplied complete with the IC and all components, or minus the IC and frequency determining parts. The board is installed in the same position as the Tone Squelch board, but the mounting procedure and interconnections to the transceiver are slightly different.

First, select the two tones for the set as determined by the requirements of the customer's system. Refer to Table 4, and select the values of  $R_{601}$  –  $R_{604}$  required to provide the proper programming of the tone board.

Mount the circuit board on the bottom side of the transceiver, as shown in Figure 9. Use the spacers provided, and note that the mounting procedure is slightly different from that of the tone squelch board. Secure the board to the mounting posts using the nuts and bolts supplied.

Connect the six wires extending from the circuit board to points (a), (c), (e), (j), (k), and GND, as shown in Figure 8. The above letters are also shown on the schematic diagram for the transceiver.

For alignment purposes,  $VR_{601}$  sets the input audio level to the decoder. It should be set to the 12 o'clock position or more for normal operation.  $VR_{602}$  sets the alert tone output level, and this control should be set to the level desired by the customer.

Close up the transceiver. Installation is now complete. In service, the SQL control is set to TONE, and an alert tone is sent when the proper sequential code for the transceiver is received. Rotate the SQL control out of the TONE position click-stop to stop the tone. Reset the decoder by setting the SQL control again to TONE.

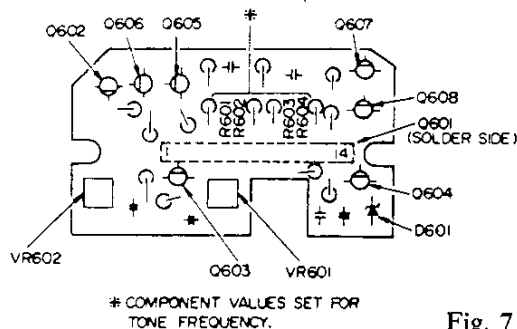


Fig. 7

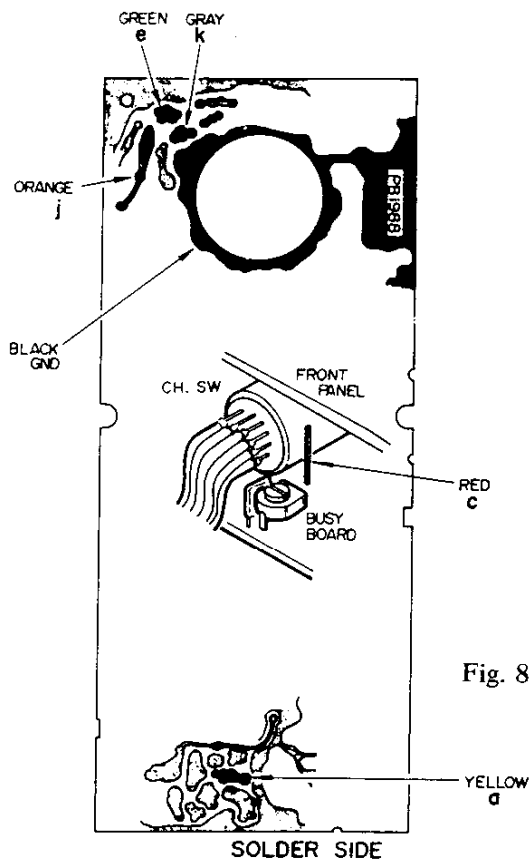


Fig. 8

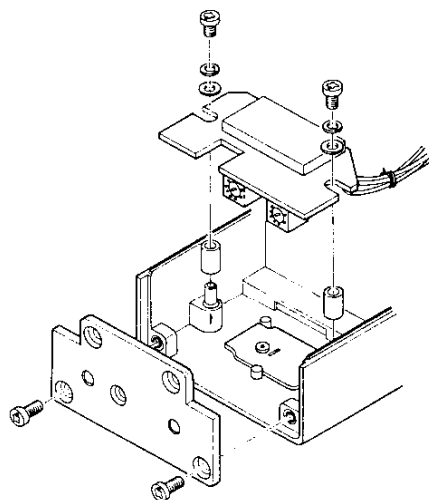


Fig. 9

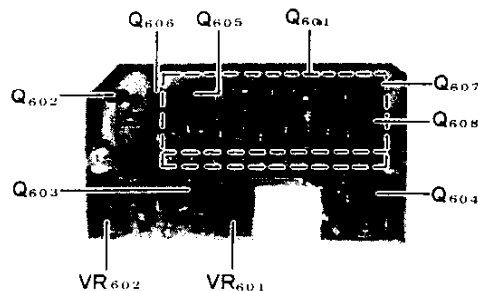


Fig. 10

TWO TONE DECODER TUNING RESISTORS

TONE FRE- QUENCY (Hz)	TUNING R $R_{601} = R_{603}$ $R_{602} = R_{604}$ (K ohms)	TONE FRE- QUENCY (Hz)	TUNING R $R_{601} = R_{603}$ $R_{602} = R_{604}$ (K ohms)	TONE FRE- QUENCY (Hz)	TUNING R $R_{601} = R_{603}$ $R_{602} = R_{604}$ (K ohms)
238.6Hz	300.60k $\Omega$	524.8Hz	135.58k $\Omega$	1153.4Hz	60.598k $\Omega$
241.8	296.59	539.0	131.95	1185.2	58.918
245.1	292.57	553.9	128.35	1190.0	58.672
250.3	286.45	569.1	124.87	1217.8	57.287
251.9	284.62	582.1	122.03	1220.0	57.180
254.1	282.14	584.8	121.46	1240.0	56.226
258.8	276.98	600.9	118.15	1251.4	55.695
266.0	269.43	617.4	114.94	1265.0	55.075
273.3	262.18	634.5	111.79	1281.0	54.362
280.8	255.12	645.7	109.82	1285.8	54.152
281.1	254.85	651.9	108.75	1291.4	53.908
288.5	248.26	669.9	105.78	1320.0	52.697
296.5	241.51	688.3	102.90	1321.2	52.647
304.7	234.95	707.3	100.08	1330.0	52.286
312.6	228.97	716.1	98.824	1341.2	51.832
313.0	228.67	726.8	97.340	1355.0	51.284
321.7	222.43	746.8	94.679	1357.6	51.182
330.5	216.46	767.4	92.084	1395.0	49.756
339.6	210.60	788.5	89.566	1397.4	49.667
346.7	206.25	794.3	88.898	1400.0	49.571
349.0	204.88	810.2	87.114	1430.5	48.472
358.6	199.34	832.5	84.727	1433.4	48.370
368.5	193.93	855.5	82.395		
378.6	188.70	879.0	80.139		
384.6	185.73	881.0	79.952		
389.0	183.60	903.2	77.938		
399.8	178.59	928.1	75.793		
410.8	173.75	953.7	73.705		
422.1	169.05	977.2	71.885		
426.6	167.25	979.9	71.681		
433.7	164.47	1000.0	70.200		
445.7	159.99	1006.9	69.705		
457.9	155.68	1034.0	67.826		
470.5	151.45	1049.6	66.788		
473.2	150.58	1063.2	65.908		
483.5	147.33	1084.0	64.605		
484.4	146.93	1092.4	64.093		
496.8	143.33	1120.0	62.464		
510.5	139.43	1122.5	62.321		
524.6	135.63	1151.0	60.728		

Table 4

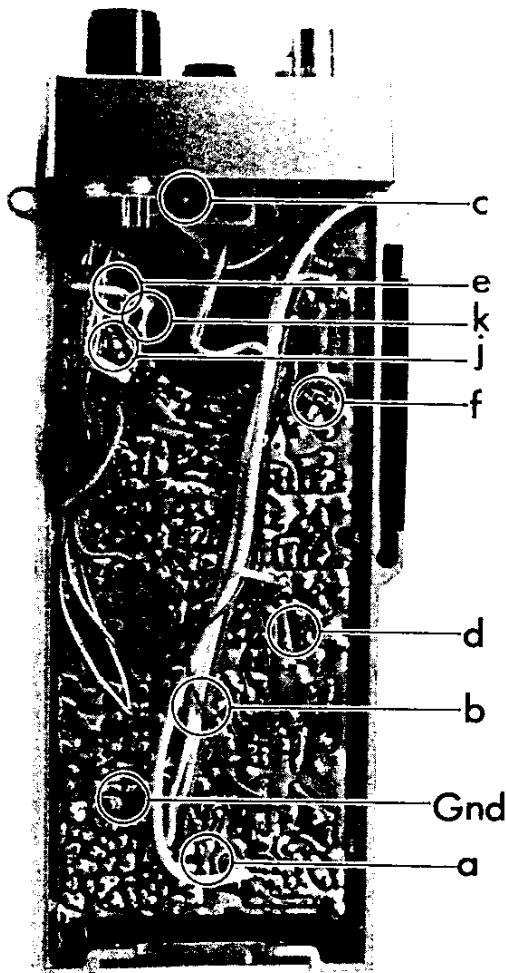
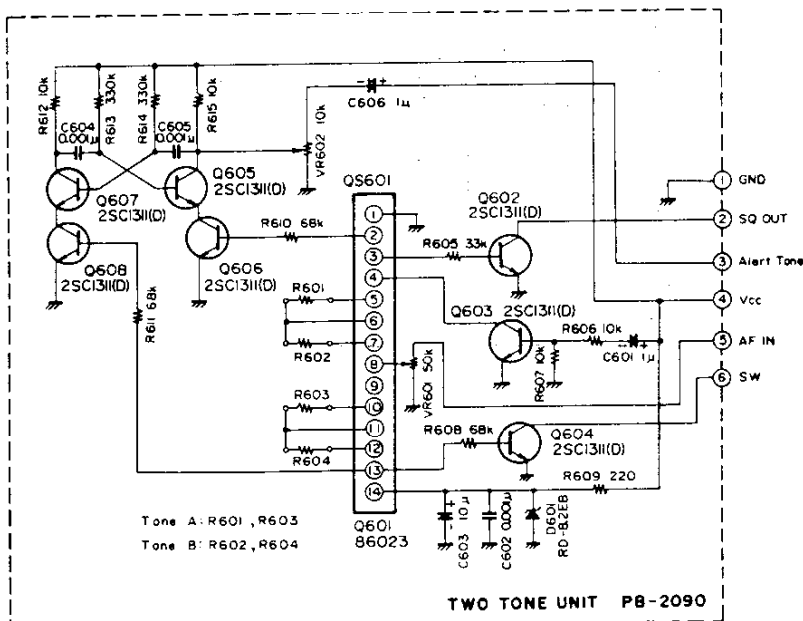


Fig. 11

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## Y2T TWO-TONE PROGRAMMING KITS TWO-TONE CODE TABLE

Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):		Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):	
	Tone A(Hz)	Tone B(Hz)	R 601 (KΩ) R 603 (KΩ)	R 602 (KΩ) R 604 (KΩ)		Tone A(Hz)	Tone B(Hz)	R 601 (KΩ) R 603 (KΩ)	R 602 (KΩ) R 604 (KΩ)
Y2T-101	330.5	349.0	216.46	204.88	Y2T-150	433.7	330.5	164.47	216.46
-102	"	368.5	"	193.93	-151	"	349.0	"	204.88
-103	"	389.0	"	183.60	-152	"	368.5	"	193.93
-104	"	410.8	"	173.75	-153	"	389.0	"	183.60
-105	"	433.7	"	164.47	-154	"	410.8	"	173.75
-106	"	457.9	"	155.68	-156	"	457.9	"	155.68
-107	"	483.5	"	147.33	-157	"	483.5	"	147.33
-108	"	510.5	"	139.43	-158	"	510.5	"	139.43
-109	"	539.0	"	131.95	-159	"	539.0	"	131.95
Y2T-110	349.0	330.5	204.88	216.46	Y2T-160	457.9	330.5	155.68	216.46
-112	"	368.5	"	193.93	-161	"	349.0	"	204.88
-113	"	389.0	"	183.60	-162	"	368.5	"	193.93
-114	"	410.8	"	173.75	-163	"	389.0	"	183.60
-115	"	433.7	"	164.47	-164	"	410.8	"	173.75
-116	"	457.9	"	155.68	-165	"	433.7	"	164.47
-117	"	483.5	"	147.33	-167	"	483.5	"	147.33
-118	"	510.5	"	139.43	-168	"	510.5	"	139.43
-119	"	539.0	"	131.95	-169	"	539.0	"	131.95
Y2T-120	368.5	330.5	193.93	216.46	Y2T-170	483.5	330.5	147.33	216.46
-121	"	349.0	"	204.88	-171	"	349.0	"	204.88
-123	"	389.0	"	183.60	-172	"	368.5	"	193.93
-124	"	410.8	"	173.75	-173	"	389.0	"	183.60
-125	"	433.7	"	164.47	-174	"	410.8	"	173.75
-126	"	457.9	"	155.68	-175	"	433.7	"	164.47
-127	"	483.5	"	147.33	-176	"	457.9	"	155.68
-128	"	510.5	"	139.43	-178	"	510.5	"	139.43
-129	"	539.0	"	131.95	-179	"	539.0	"	131.95
Y2T-130	389.0	330.5	183.60	216.46	Y2T-180	510.5	330.5	139.43	216.46
-131	"	349.0	"	204.88	-181	"	349.0	"	204.88
-132	"	368.5	"	193.93	-182	"	368.5	"	193.93
-134	"	410.8	"	173.75	-183	"	389.0	"	183.60
-135	"	433.7	"	164.47	-184	"	410.8	"	173.75
-136	"	457.9	"	155.68	-185	"	433.7	"	164.47
-137	"	483.5	"	147.33	-186	"	457.9	"	155.68
-138	"	510.5	"	139.43	-187	"	483.5	"	147.33
-139	"	539.0	"	131.95	-189	"	539.0	"	131.95
Y2T-140	410.8	330.5	173.75	216.46	Y2T-190	539.0	330.5	131.95	216.46
-141	"	349.0	"	204.88	-191	"	349.0	"	204.88
-142	"	368.5	"	193.93	-192	"	368.5	"	193.93
-143	"	389.0	"	183.60	-193	"	389.0	"	183.60
-145	"	433.7	"	164.47	-184	"	410.8	"	173.75
-146	"	457.9	"	155.68	-195	"	433.7	"	164.47
-147	"	483.5	"	147.33	-196	"	457.9	"	155.68
-148	"	510.5	"	139.43	-197	"	483.5	"	147.33
-149	"	539.0	"	131.95	-198	"	510.5	"	139.43

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NOTE 1: This chart applies to the Two-Tone Sequential Decoder modules for the FTC-703A as well as the FTC-2025/2040. For the FTC-703A, the Tone A resistors of interest are R601 and R603, and the Tone B resistors are R602 and R604. For the FTC-2025/2040 the Tone A resistors are R1101 and R1103, while the Tone B resistors are R1102 and R1104.

## Y2T TWO-TONE PROGRAMMING KITS TWO-TONE CODE TABLE

Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):		Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):	
	Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)		Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)
Y2T-201	569.1	600.9	124.87	118.15	Y2T-250	746.8	569.1	94.679	124.87
-202	"	634.5	"	111.79	-251	"	600.9	"	118.15
-203	"	669.9	"	105.78	-252	"	634.5	"	111.79
-204	"	707.3	"	100.08	-253	"	669.9	"	105.78
-205	"	746.8	"	94.679	-254	"	707.3	"	100.08
-206	"	788.5	"	89.566	-256	"	788.5	"	89.566
-207	"	832.5	"	84.727	-257	"	832.5	"	84.727
-208	"	879.0	"	80.136	-258	"	879.0	"	80.136
-209	"	928.1	"	75.793	-259	"	928.1	"	75.793
Y2T-210	600.9	569.1	118.15	124.87	Y2T-260	788.5	569.1	89.566	124.87
-212	"	634.5	"	111.79	-261	"	600.9	"	118.15
-213	"	669.9	"	105.78	-262	"	634.5	"	111.79
-214	"	707.3	"	100.08	-263	"	669.9	"	105.78
-215	"	746.8	"	94.679	-264	"	707.3	"	100.08
-216	"	788.5	"	89.566	-265	"	746.8	"	94.679
-217	"	832.5	"	84.727	-267	"	832.5	"	84.727
-218	"	879.0	"	80.136	-268	"	879.0	"	80.136
-219	"	928.1	"	75.793	-269	"	928.1	"	75.793
Y2T-220	634.5	569.1	111.79	124.87	Y2T-270	832.5	569.1	84.727	124.87
-221	"	600.9	"	118.15	-271	"	600.9	"	118.15
-223	"	669.9	"	105.78	-272	"	634.5	"	111.79
-224	"	707.3	"	100.08	-273	"	669.9	"	105.78
-225	"	746.8	"	94.679	-274	"	707.3	"	100.08
-226	"	788.5	"	89.566	-275	"	746.8	"	94.679
-227	"	832.5	"	84.727	-276	"	788.5	"	89.566
-228	"	879.0	"	80.136	-278	"	879.0	"	80.136
-229	"	928.1	"	75.793	-279	"	928.1	"	75.793
Y2T-230	669.9	569.1	105.78	124.87	Y2T-280	879.0	569.1	80.139	124.87
-231	"	600.9	"	118.15	-281	"	600.9	"	118.15
-232	"	634.5	"	111.79	-282	"	634.5	"	111.79
-234	"	707.3	"	100.08	-283	"	669.9	"	105.78
-235	"	746.8	"	94.679	-284	"	707.3	"	100.08
-236	"	788.5	"	89.566	-285	"	746.8	"	94.679
-237	"	832.5	"	84.727	-286	"	788.5	"	89.566
-238	"	879.0	"	80.136	-287	"	832.5	"	84.727
-239	"	928.1	"	75.793	-289	"	928.1	"	75.793
Y2T-240	707.3	569.1	100.08	124.87	Y2T-290	928.1	569.1	75.793	124.87
-241	"	600.9	"	118.15	-291	"	600.9	"	118.15
-242	"	634.5	"	111.79	-292	"	634.5	"	111.79
-243	"	669.9	"	105.78	-293	"	669.9	"	105.78
-245	"	746.8	"	94.679	-294	"	707.3	"	100.08
-246	"	788.5	"	89.566	-295	"	746.8	"	94.679
-247	"	832.5	"	84.727	-296	"	788.5	"	89.566
-248	"	879.0	"	80.136	-297	"	832.5	"	84.727
-249	"	928.1	"	75.793	-298	"	879.0	"	80.136

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Y2T TWO-TONE PROGRAMMING KITS  
TWO-TONE CODE TABLE

Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):		Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):	
	Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)		Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)
Y2T-401	321.7	339.6	222.43	210.60	Y2T-450	422.1	321.7	169.05	222.43
-402	"	358.6	"	199.34	-451	"	339.6	"	210.60
-403	"	378.6	"	188.70	-452	"	358.6	"	199.34
-404	"	399.8	"	178.59	-453	"	378.6	"	188.70
-405	"	422.1	"	169.05	-454	"	399.8	"	178.59
-406	"	445.7	"	159.99	-455	"	445.7	"	159.99
-407	"	470.5	"	151.45	-456	"	470.5	"	151.45
-408	"	496.8	"	143.33	-457	"	496.8	"	143.33
-409	"	524.6	"	135.63	-458	"	496.8	"	143.33
Y2T-410	339.6	321.7	210.60	222.43	-459	"	524.6	"	135.63
-412	"	358.6	"	199.34	Y2T-460	445.7	321.7	159.99	222.43
-413	"	378.6	"	188.70	-461	"	339.6	"	210.60
-414	"	399.8	"	178.59	-462	"	358.6	"	199.34
-415	"	422.1	"	169.05	-463	"	378.6	"	188.70
-416	"	445.7	"	159.99	-464	"	399.8	"	178.59
-417	"	470.5	"	151.45	-465	"	422.1	"	169.05
-418	"	496.8	"	143.33	-466	"	470.5	"	151.45
-419	"	524.6	"	135.63	-467	"	470.5	"	151.45
Y2T-420	358.6	321.7	199.34	222.43	-468	"	496.8	"	143.33
-421	"	339.6	"	210.60	-469	"	524.6	"	135.63
-423	"	378.6	"	188.70	Y2T-470	470.5	321.7	151.45	222.43
-424	"	399.8	"	178.59	-471	"	339.6	"	210.60
-425	"	422.1	"	169.05	-472	"	358.6	"	199.34
-426	"	445.7	"	159.99	-473	"	378.6	"	188.70
-427	"	470.5	"	151.45	-474	"	399.8	"	178.59
-428	"	496.8	"	144.33	-475	"	422.1	"	169.05
-429	"	524.6	"	135.63	-476	"	445.7	"	159.99
Y2T-430	378.6	321.7	188.70	222.43	-477	"	496.8	"	143.33
-431	"	339.6	"	210.60	-478	"	496.8	"	143.33
-432	"	358.6	"	199.34	-479	"	524.6	"	135.63
-434	"	399.8	"	178.59	Y2T-480	496.8	321.7	143.33	222.43
-435	"	422.1	"	169.05	-481	"	339.6	"	210.60
-436	"	445.7	"	159.99	-482	"	358.6	"	199.34
-437	"	470.5	"	151.45	-483	"	378.6	"	188.70
-438	"	496.8	"	143.33	-484	"	399.8	"	178.59
-439	"	524.6	"	135.63	-485	"	422.1	"	169.05
Y2T-440	399.8	321.7	178.59	222.43	-486	"	445.7	"	159.99
-441	"	339.6	"	210.60	-487	"	470.5	"	151.45
-442	"	358.6	"	199.34	-488	"	470.5	"	151.45
-443	"	378.6	"	188.70	-489	"	524.6	"	135.63
-445	"	422.1	"	169.05	Y2T-490	524.6	321.7	135.63	222.43
-446	"	445.7	"	159.99	-491	"	339.6	"	210.60
-447	"	470.5	"	151.45	-492	"	358.6	"	199.34
-448	"	496.8	"	143.33	-493	"	378.6	"	188.70
-449	"	524.6	"	135.63	-494	"	399.8	"	178.59
					-495	"	422.1	"	169.05
					-496	"	445.7	"	159.99
					-497	"	470.5	"	151.45
					-498	"	496.8	"	143.33

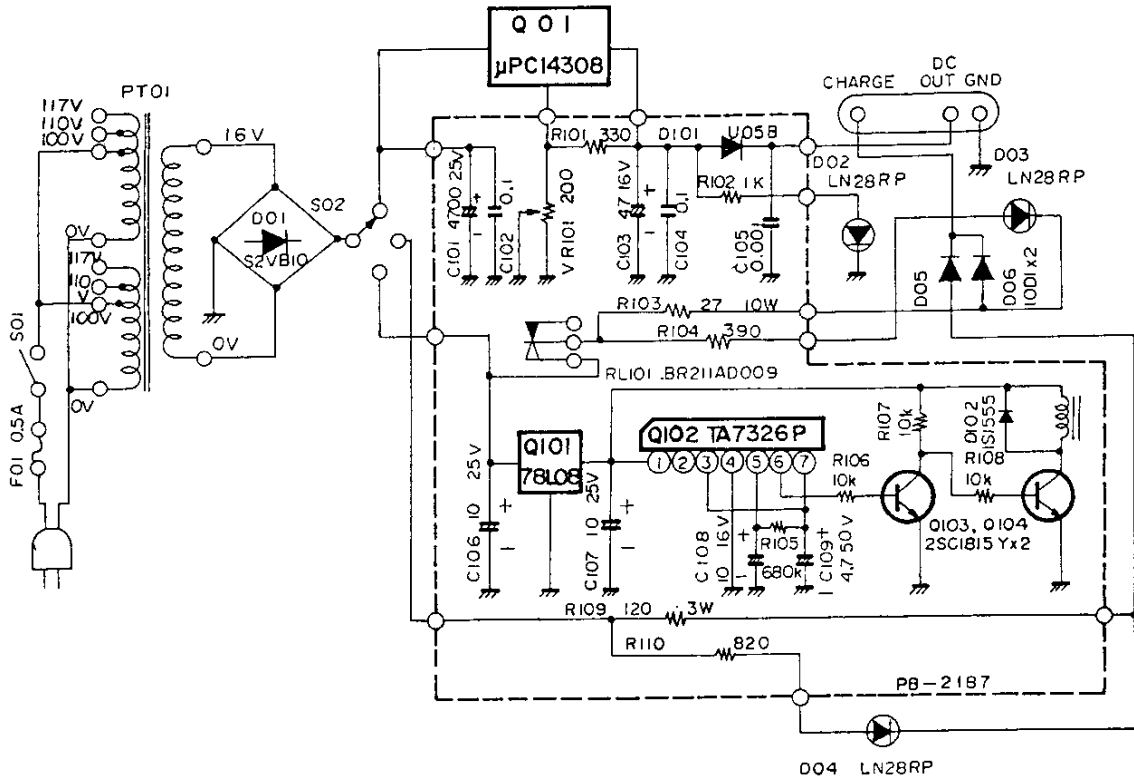


**Y2T TWO-TONE PROGRAMMING KITS  
TWO-TONE CODE TABLE**

Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):		Y2T Kit Number:	Tone Pair:		Resistor Values (Note 1):	
	Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)		Tone A(Hz)	Tone B(Hz)	R 601 R 603 (KΩ)	R 602 R 604 (KΩ)
Y2T-501	553.9	584.8	128.35	121.46	Y2T-550	726.8	553.9	97.340	128.35
-502	"	617.4	"	114.94	-551	"	584.8	"	121.46
-503	"	651.9	"	108.75	-552	"	617.4	"	114.94
-504	"	688.3	"	102.90	-553	"	651.9	"	108.75
-505	"	726.8	"	97.340	-554	"	688.3	"	102.90
-506	"	767.4	"	92.084	-556	"	767.4	"	92.084
-507	"	810.2	"	87.114	-557	"	810.2	"	87.114
-508	"	855.5	"	82.395	-558	"	855.5	"	82.395
-509	"	903.2	"	77.938	-559	"	903.2	"	77.938
Y2T-510	584.8	553.9	121.46	128.35	Y2T-560	767.4	553.9	92.084	128.35
-512	"	617.4	"	114.94	-561	"	584.8	"	121.46
-513	"	651.9	"	108.75	-562	"	617.4	"	114.94
-514	"	688.3	"	102.90	-563	"	651.9	"	108.75
-515	"	726.8	"	97.340	-564	"	688.3	"	102.90
-516	"	767.4	"	92.084	-565	"	726.8	"	97.340
-517	"	810.2	"	87.114	-567	"	810.2	"	87.114
-518	"	855.5	"	82.395	-568	"	855.5	"	82.395
-519	"	903.2	"	77.938	-569	"	903.2	"	77.938
Y2T-520	617.4	553.9	114.94	128.35	Y2T-570	810.2	553.9	87.114	128.35
-521	"	584.8	"	121.46	-571	"	584.8	"	121.46
-523	"	651.9	"	108.75	-572	"	617.4	"	114.94
-524	"	688.3	"	102.90	-573	"	651.9	"	108.75
-525	"	726.8	"	97.340	-574	"	688.3	"	102.90
-526	"	767.4	"	92.084	-575	"	726.8	"	97.340
-527	"	810.2	"	87.114	-576	"	767.4	"	92.084
-528	"	855.5	"	82.395	-578	"	855.5	"	82.395
-529	"	903.2	"	77.938	-579	"	903.2	"	77.938
Y2T-530	651.9	553.9	108.75	128.35	Y2T-580	855.5	553.9	82.395	128.35
-531	"	584.8	"	121.46	-581	"	584.8	"	121.46
-532	"	617.4	"	114.94	-582	"	617.4	"	114.94
-534	"	688.3	"	102.90	-583	"	651.9	"	108.75
-535	"	726.8	"	97.340	-584	"	688.3	"	102.90
-536	"	767.4	"	92.084	-585	"	726.8	"	97.340
-537	"	810.2	"	87.114	-586	"	767.4	"	92.084
-538	"	855.5	"	82.395	-587	"	810.2	"	87.114
-539	"	903.2	"	77.938	-589	"	903.2	"	77.938
Y2T-540	688.3	553.9	102.90	128.35	Y2T-590	903.2	553.9	77.938	128.35
-541	"	584.8	"	121.46	-591	"	584.8	"	121.46
-542	"	617.4	"	114.94	-592	"	617.4	"	114.94
-543	"	651.9	"	108.75	-593	"	651.9	"	108.75
-545	"	726.8	"	97.340	-594	"	688.3	"	102.90
-546	"	767.4	"	92.084	-595	"	726.8	"	97.340
-547	"	810.2	"	87.114	-596	"	767.4	"	92.084
-548	"	855.5	"	82.395	-597	"	810.2	"	87.114
-549	"	903.2	"	77.938	-598	"	855.5	"	82.395

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TECHNICAL NOTES

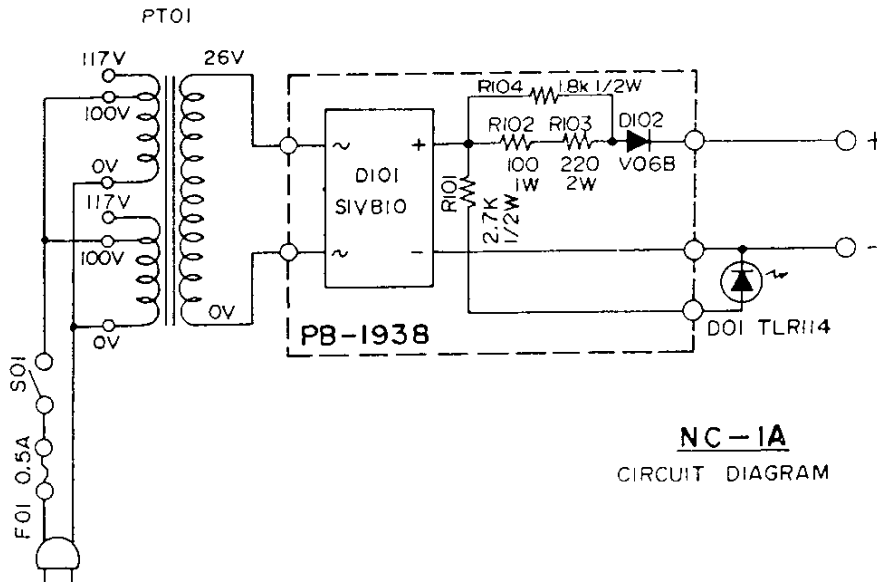


NOTE

1. ALL RESISTORS ARE IN 1/4W UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN µF.

Quick Charger/AC Adapter NC-3A

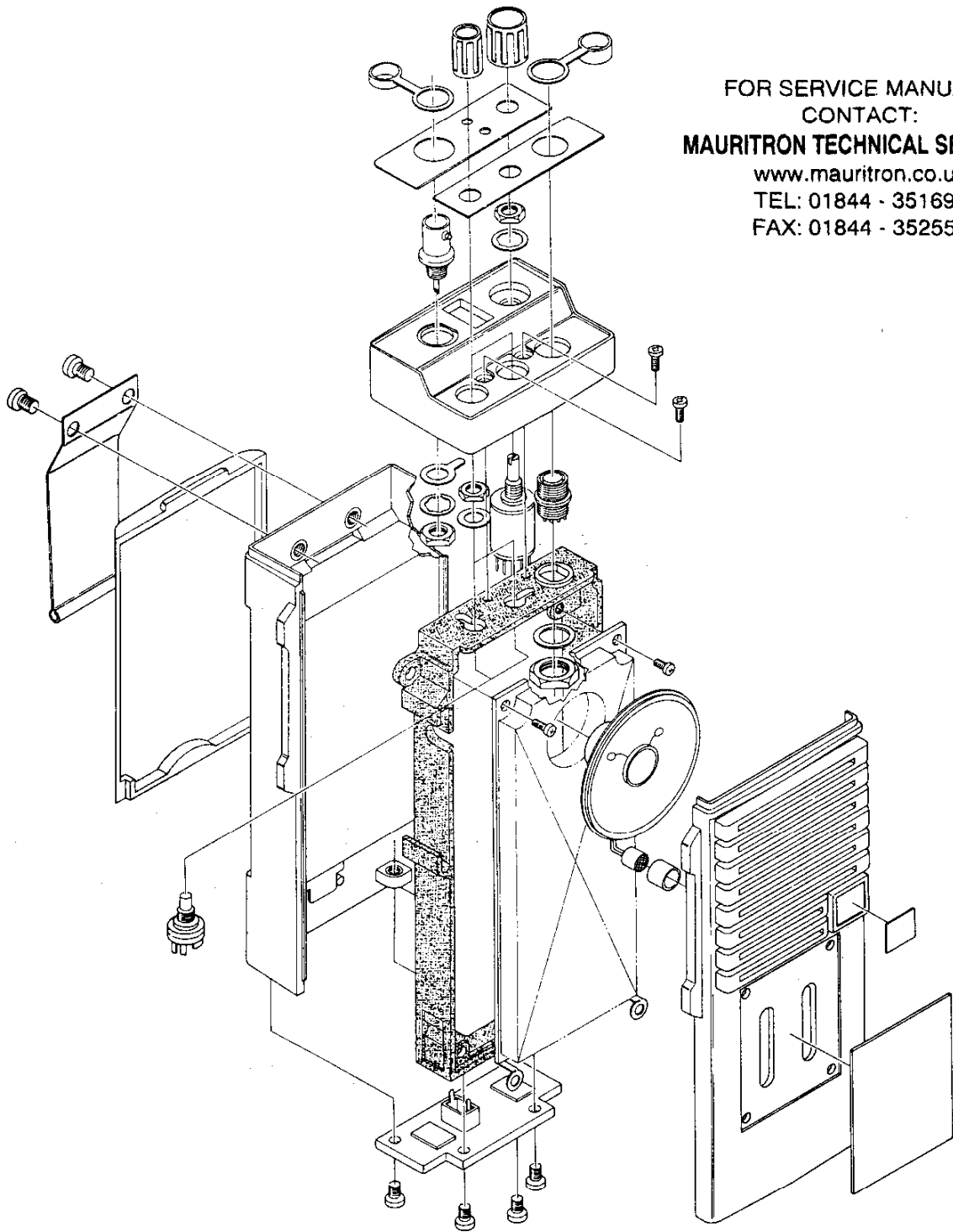
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**NC-1A**  
CIRCUIT DIAGRAM

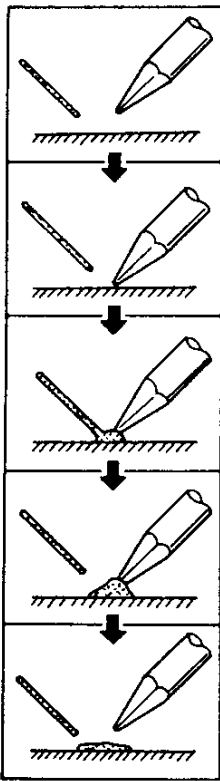
Battery Charger NC-1A

# FTC-703A EXPLODED VIEW



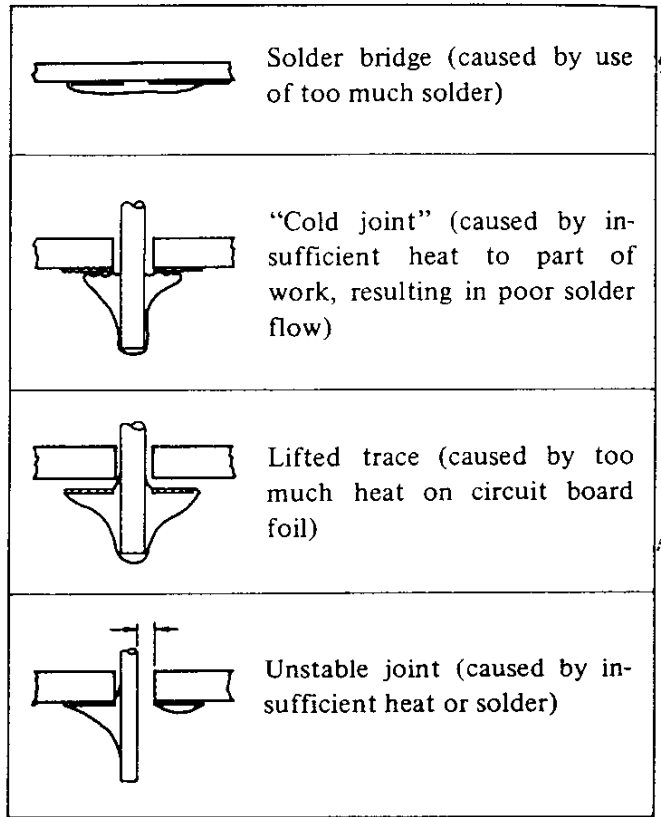
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BASIC SOLDERING PRACTICE



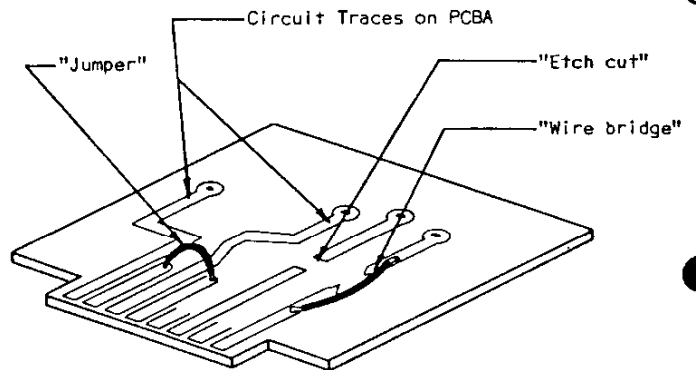
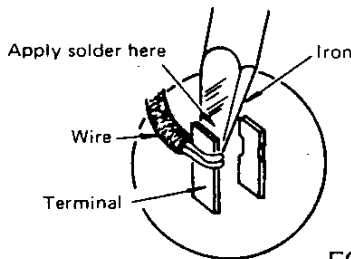
- (1) Prepare soldering iron and solder.
- (2) Apply soldering iron to surface to be soldered.
- (3) Apply solder to heated surface.
- (4) When enough solder is applied, remove solder. Continue to apply heat until solder flows cleanly.
- (5) Remove iron from work. Do not apply more heat than necessary for good solder flow.

EXAMPLES OF POOR SOLDERING PRACTICE



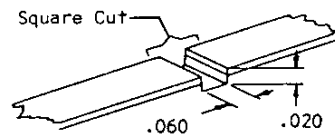
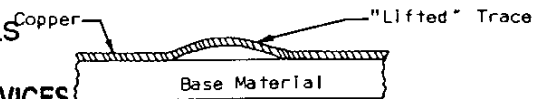
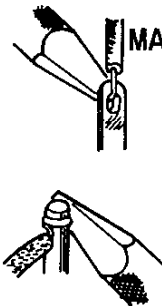
Soldering to terminal posts:

(Be certain to apply heat to both post and wire.)



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Coat Cut Area With Eastman 910

### CIRCUIT TRACE REPAIR

The printed circuit boards used in the FTC-703A are tough, but care should be exercised when performing repairs. The circuit traces frequently run close together, and solder bridges are easily formed if a dirty soldering iron is used.

A few simple precautions will keep the FTC-703A circuit boards in A-1 condition:

1. Use only a 12 to 30 watt chisel-tip soldering iron, with the smaller sizes preferred.
2. Use only a soldering iron equipped with a three-wire cord, with the tip grounded. Also acceptable is a soldering iron isolated through a transformer. An old soldering iron or gun may have 117 volts on the tip, and will certainly cause more damage than it repairs!

3. Use only 60/40 rosin core solder. Acid core solder has no place in a radio shop.
4. Use a solder sucker and solder tape to ensure a professional repair job.

Occasionally, etch cuts and jumper wires may be noted on a circuit board. This sort of modification, while uncommon, typically reflects a factory fine tuning of a design that was too insignificant to warrant a redo of the circuit board. If you encounter such mods, please leave them in place.

If you have previously lifted a copper trace, don't worry! Refer to the drawing, and make an etch cut on either side of the lifted trace. Now install a wire bridge to replace the excoriated trace. The circuit will now be "good as new," and servicing can continue with minimal interruption.

### INSERTION OF PARTS ON CIRCUIT BOARDS

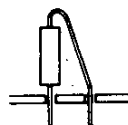
All of the below are acceptable ways of inserting components into circuit board mounting holes.



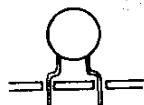
(a) Bend leads slightly



(b) Straight-in mounting



(c) Vertical mounting



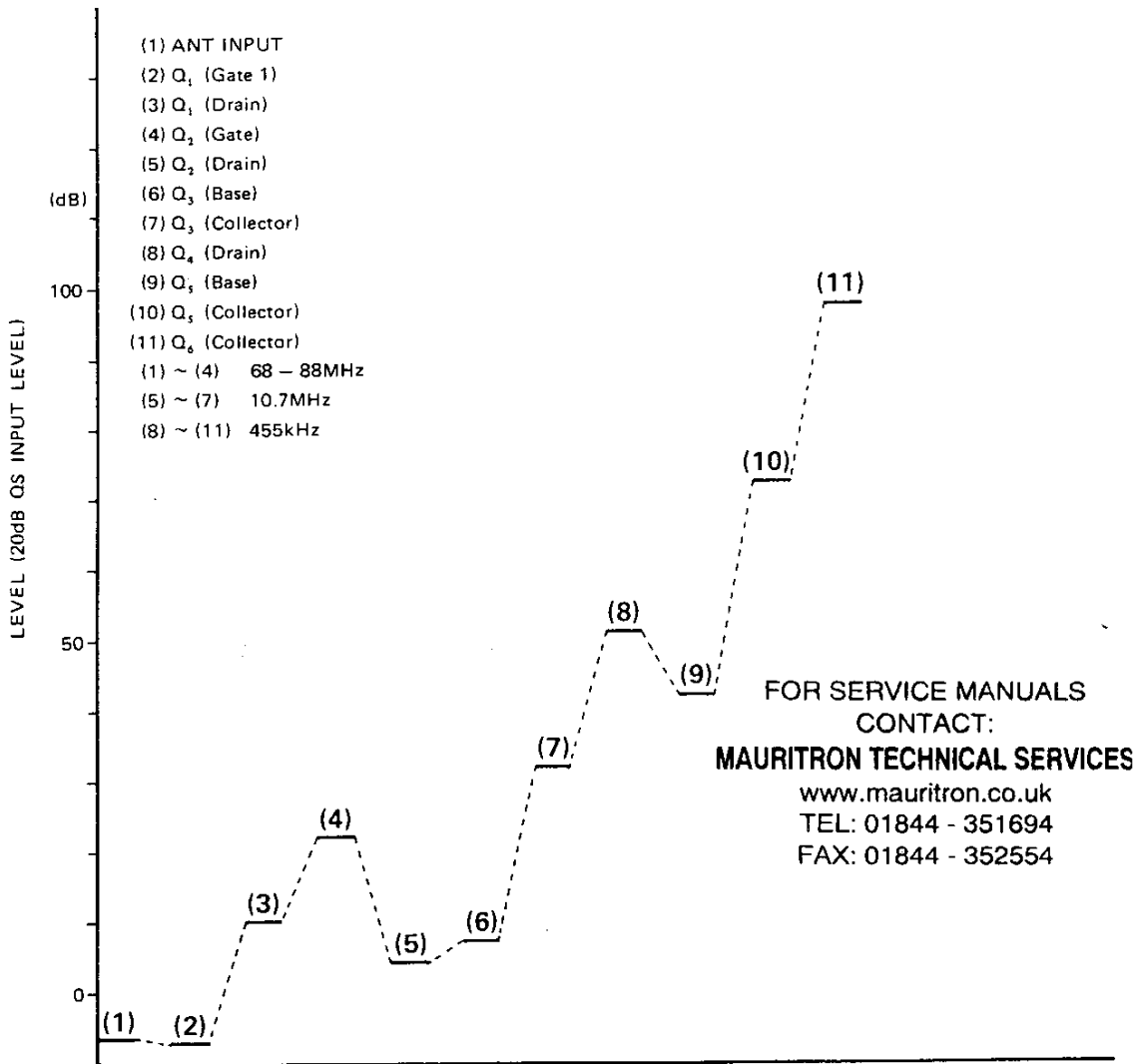
(d) Preformed disc ceramic capacitor



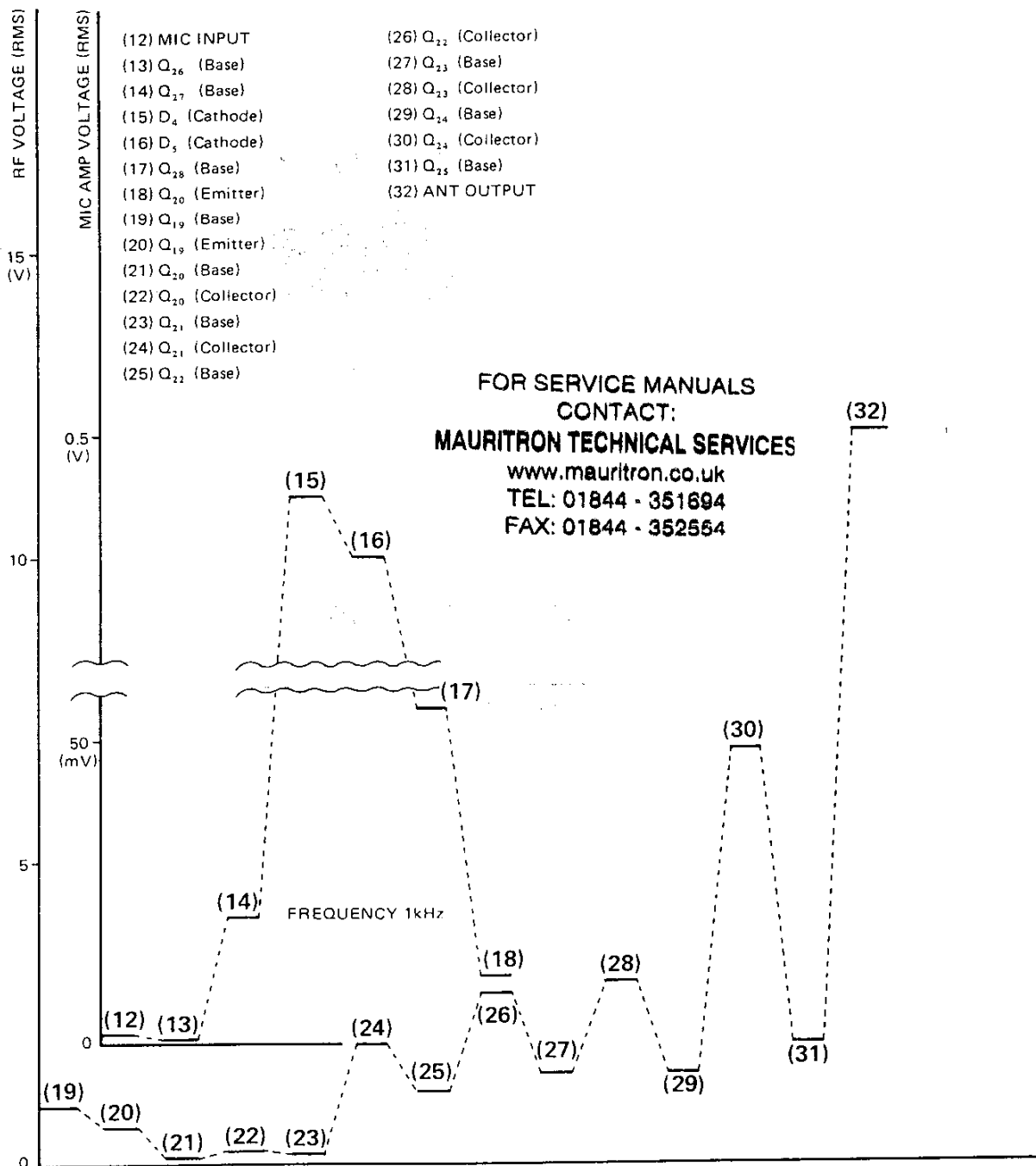
(e) Preformed resistor, diode, etc.

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# LEVEL DIAGRAM : RECEIVER SECTION



# LEVEL DIAGRAM : TRANSMITTER SECTION



SERVICING

REMOVAL OF TRANSCEIVER CASE

- (1) Remove screws A and B in Fig. 12, using a Phillips screwdriver of the proper size. Carefully remove the back panel of the transceiver.
- (2) Remove screws C and D in Fig. 13. The front panel may now be carefully removed. Be certain not to put undue strain on the inter-connection wires.

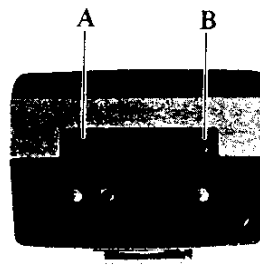


Fig. 12



Fig. 13

FTC-703A VOLTAGE CHART

COMPONENT	B (G)	E (S)	C (D)	COMMENTS	COMPONENT	B (G)	E (S)	C (D)	COMMENTS
Q <sub>1</sub>	G <sub>1</sub> 0 G <sub>2</sub> 4.8 V	0.5V	10.3V	RX SQ OFF	Q <sub>18</sub>	5.2	5.8	0	RX SQ OFF
Q <sub>2</sub>	0	2.0	9.7	"	Q <sub>19</sub>	2.0	1.8	4.3	TX PTT ON
Q <sub>3</sub>	2.3	1.8	9.8	"	Q <sub>20</sub>	1.6	1.1	3.7	"
Q <sub>4</sub>	0	2.0	9.0	"	Q <sub>21</sub>	0.9	0.4	4.9	"
Q <sub>5</sub>	1.0	0	1.2	"	Q <sub>22</sub>	0	1.1	9.5	"
Q <sub>6</sub>	4.9	4.8	5.8	"	Q <sub>23</sub>	0	1.5	9.6	"
Q <sub>7</sub>	0.7	0	1.1	"	Q <sub>24</sub>	-0.2	0	10.6	"
Q <sub>8</sub>	4.3	5.8	5.8	"	Q <sub>25</sub>	-0.22	0	10.6	"
Q <sub>9</sub>	-0.1	0	2.8	"	Q <sub>26</sub>	0.6	0	0.8	"
Q <sub>10</sub>	2.2	2.0	9.0	"	Q <sub>27</sub>	2.6	2.0	2.9	"
Q <sub>11</sub>	1.8	1.7	3.0	"	Q <sub>28</sub>	0.8	0.17	1.65	"
Q <sub>12</sub>	0.8	0	2.0	"	Q <sub>29</sub>	10.7/0.75	10.0/0.2	10.8/10.7	PTT OFF/ON
Q <sub>13</sub>	10.7/10.7	0/9.0	10.7/10.4	SQ OFF/ON	Q <sub>30</sub>	10.8/10.0	10.8/10.7	0/10.6	"
Q <sub>14</sub>	0	0	9.0	RX SQ OFF	Q <sub>301</sub>	0/0.65	0/0	2.65/0.03	SQ OFF/ON
Q <sub>15</sub>	6.0/0	7.0/0.5	10.0/0	SQ OFF/ON	Q <sub>302</sub>	2.6/0.03	1.92/0	1.97/10.2	"
Q <sub>16</sub>	9.5/10	10.0/10.8	6.0/0	"	Q <sub>303</sub>	0.57/10.8	0.26/10.5	10.8/10.8	TONE OFF/ON
Q <sub>17</sub>	6.0/0	5.8/0	10.8/10.8	"					SW ON/ SW OFF

Measured with VTVM



## MAINTENANCE AND SERVICING

### REGULAR MAINTENANCE PLAN

Because of the rugged design and construction of the FTC-703A, little maintenance should be required if the radio is not abused. As a Yaesu dealer, though, you are best in a position to determine the individual needs of your customers. Operation in extremely harsh environments may warrant more frequent checks of transceiver performance.

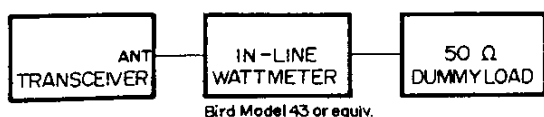
We recommend that customers return their sets to your service facility once every two years for routine checks of the transmitter power output and the receiver sensitivity. In the meantime, keep in frequent touch with your customers regarding their expanding communications requirements. Not only will this give you the opportunity to introduce new Yaesu products, but your customers' particular service requirements will become evident.

### PERFORMANCE CHECKS

Set up the FTC-703A and test equipment as follows:

#### I. Transmitter Power Output

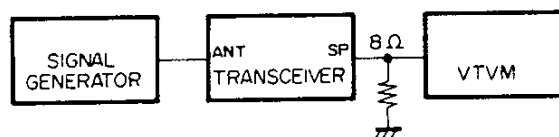
- a) Connect a suitable low power VHF dummy load/wattmeter to the antenna jack.
- b) Connect a 10.8 volt DC power source to the bottom panel EXT jack. Alternatively, use a freshly-charged battery pack or insert the FTC-703A into the NC-3A Quick Charger/AC Adapter (AC Adapter mode).
- c) Set the channel selector to any channel. Close the push-to-talk switch, and observe the power output. The output should be at least three watts, assuming a 50 ohm resistive load is used.



PO Test Setup

#### II. Receiver Sensitivity

- a) Connect an audio voltmeter to pin 2 of the top panel MIC jack. Pin 2 is the external speaker connection. Set the squelch control fully counterclockwise.
- b) Connect the RF output of a precision VHF signal generator to the antenna jack, and note the audio voltmeter reading with no signal input from the signal generator. Adjust the volume control and voltmeter range, as necessary, to obtain roughly a full-scale reading.
- c) Set the signal generator to the receiving channel frequency, and adjust the output amplitude of the signal generator until the voltmeter indicates a 20 dB (1/10th voltage) decrease of the reading in step b). The signal generator output voltage at this point is the 20 dB quieting sensitivity, and it should be approximately 0.3  $\mu$ V.



RX Sensitivity Test Setup

If the above checks are both OK, then clean out the transceiver by applying moderate-force compressed air throughout the chassis area. This will remove any dust that is present. If there is accumulated dirt inside the cabinet, a soft brush may be used to loosen it. Wipe the outer cabinet of the transceiver with a damp cloth, and use compressed air to dislodge accumulated dust present in the corners of the radio.

Do not use cleaning fluid on the cabinet of the FTC-703A. The ABS plastic may be partially dissolved by the chemicals present in the cleaning fluid.

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RECEIVER ALIGNMENT

(1) Local Oscillator

Connect the RF probe of a VTVM to the source of  $Q_2$ . Adjust the cores of  $T_8$  and  $T_9$  for maximum indication on the VTVM.

(2) Receive Channel Alignment

Connect a precision frequency counter to the emitter of  $Q_{10}$ , through a 10 pF capacitor. Adjust  $TC_1$  for channel A,  $TC_2$  for channel B,  $TC_3$  for channel C, for the precise channel frequency as determined by the following formula:

$$\text{Crystal freq.} = \frac{\text{Operating freq.} + 10.7}{5} \text{ MHz.}$$

(3) 10.7 MHz IF Transformer Alignment (I)

Connect a sweep generator with a center frequency of 10.7 MHz to the source of  $Q_2$ , and connect the diode detector of an oscilloscope to the emitter of  $Q_3$ . Adjust  $T_5$  and  $T_6$  until the pattern shown in Figure 14 is obtained.

(4) RF Amplifier Resonator

Connect a VHF signal generator to the antenna jack, and set its output to a channel near the center of the transceiver operating range. Connect an audio millivoltmeter to pin 2 of the MIC jack (speaker output). Use an attenuator in the line from the signal generator, if required.

Inject a 70 dB signal from the generator, and adjust the attenuator and voltmeter range, in order to make it possible to note changes in the quieting level of the receiver. Now adjust  $T_1$  through  $T_4$  for maximum quieting on the input signal.

If you have no audio voltmeter, inject a 1 kHz 60% modulated RF signal from the signal generator. Adjust  $T_1$  through  $T_4$  by ear for minimum background noise and best clarity on the input tone from the generator. Adjust the attenuation level as necessary to provide meaningful observation of changes in transformer tuning.

(5) 10.7 MHz IF Transformer Alignment (II)

Leave the audio voltmeter and signal generator connected as in step (4). Inject a signal near the noise floor from the signal generator, and adjust  $T_7$  for maximum quieting on the input signal. This adjustment may also be done by ear, if no audio voltmeter is available.

(6) Tone Squelch (Option) Setting

Set the SQL control to the TONE position. Connect a precision VHF signal generator to the antenna jack, and set its output to any channel. Inject a 0.25  $\mu$ V signal, and adjust  $VR_{301}$  until the squelch just opens (BUSY LED becomes illuminated).

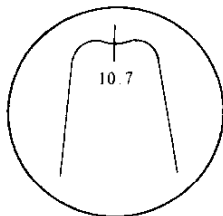
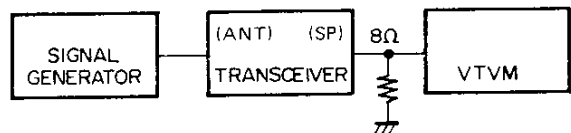
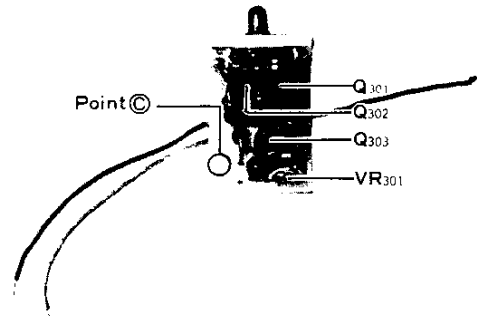
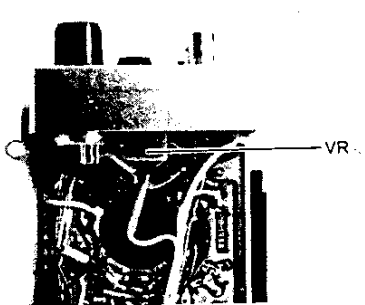
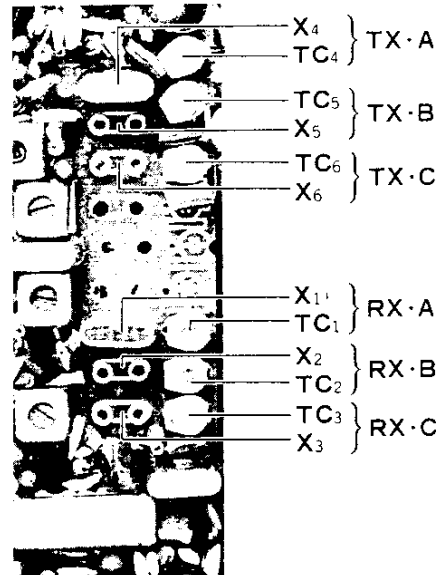
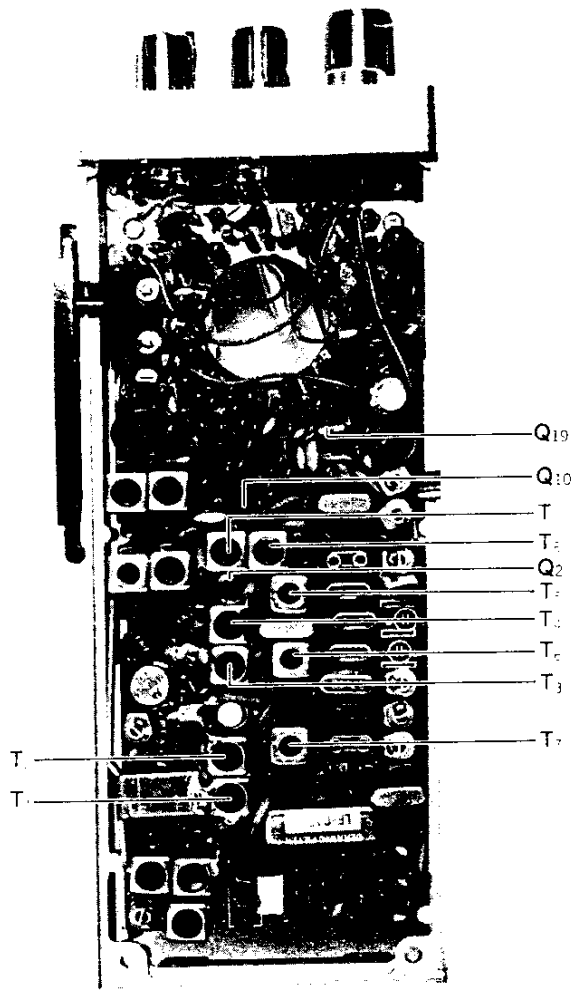


Fig. 14

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FAX: 01844 - 352554





Alignment Points

TRANSMITTER ALIGNMENT

Make all transmitter adjustments with a 50 ohm dummy load/wattmeter connected to the antenna jack.

(1) Multiplier Stage Adjustment

- a) Connect a DC voltmeter to the emitter of Q<sub>22</sub>. While transmitting, adjust T<sub>10</sub> and T<sub>11</sub> for a maximum reading on the voltmeter. A nominal reading is 1 VDC.
- b) Connect the DC voltmeter to the emitter of Q<sub>23</sub>. Adjust T<sub>12</sub> and T<sub>13</sub> for a maximum reading on the voltmeter. A nominal reading is 1.5 VDC.
- c) Connect the RF probe of a VTVM to the base of Q<sub>24</sub>. Compress or spread open slightly the turns of L<sub>2</sub> and L<sub>3</sub> to secure a maximum reading on the VTVM. This adjustment is fairly critical, so do not make any major adjustment unless the coils are being replaced for some reason.

(2) RF Output Peaking

Adjust TC<sub>7</sub> and TC<sub>8</sub> while transmitting for a maximum indication on the dummy load/wattmeter. With a full battery charge, power output should be approximately 3 watts.

(3) Deviation Adjustment

Connect a deviation meter to the antenna jack, and connect an audio signal generator to the microphone input terminal, as shown in Figure 15. Apply a 1 kHz modulated 15 mV signal, and adjust VR<sub>1</sub> for a deviation of ±4.7 kHz as shown on the deviation meter.

(4) TX Frequency Adjustment

Connect a precision frequency counter, through a 10 pF capacitor, to the emitter of Q<sub>19</sub>. Adjust TC<sub>4</sub> for channel A, TC<sub>5</sub> for channel B, TC<sub>6</sub> for channel C, to provide a correct frequency indication on the counter. The crystal frequencies should be determined by the formula

$$\text{Crystal frequency} = \frac{\text{Operating frequency}}{12} \text{ MHz}$$

If a precision VHF frequency counter is available, the frequency may be read directly by coupling loosely to the antenna or dummy load.

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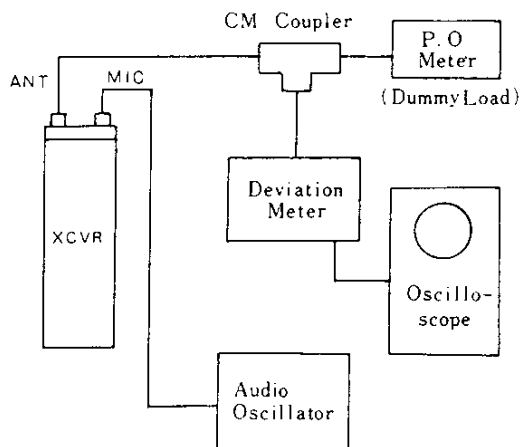
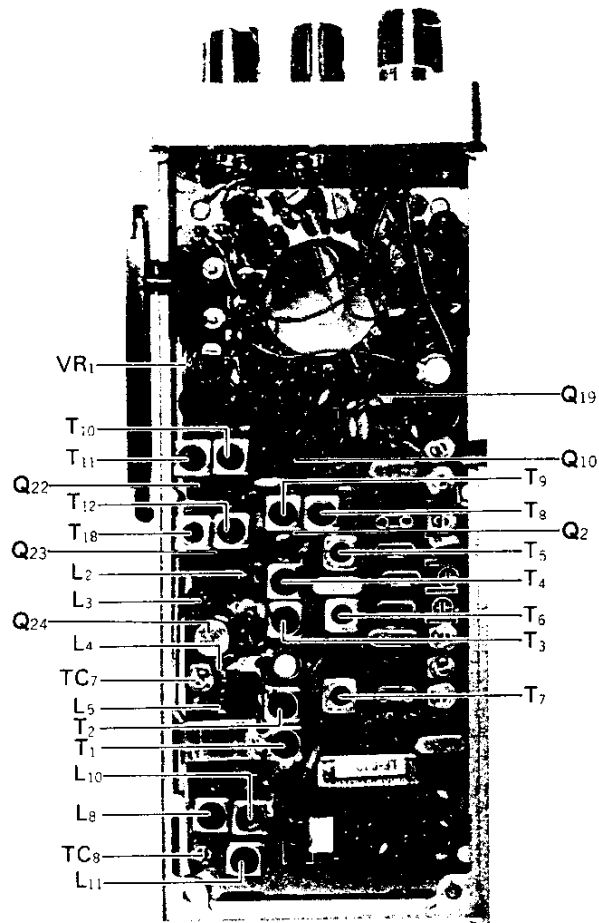


Fig. 15



Alignment Points

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CHANNEL CHANGES

I. Channel Changes within Present 1 MHz Operating Range

Channel changes within the existing 1 MHz range of the transceiver are easy to perform.

- a) Insert the desired crystals (See Table 1, page 2-3 for crystal specifications) into the correct sockets, as detailed in Figure 16.
- b) To set the receive channels, connect a precision frequency counter to the emitter of Q<sub>10</sub>, through a 10 pF capacitor. Adjust TC<sub>1-3</sub> for channels A-C, respectively, to set the crystals to the frequency determined by the following formula:

$$\text{Crystal freq.} = \frac{\text{Operating freq.} + 10.7}{5} \text{ MHz.}$$

- c) To set the transmit channels, connect the frequency counter to the emitter of Q<sub>19</sub>, through a 10 pF capacitor. Adjust TC<sub>4-6</sub> for channels A-C, respectively, to set the crystals to the frequency determined by the following formula:

$$\text{Crystal freq.} = \frac{\text{Operating freq.}}{12} \text{ MHz.}$$

Alternatively, use a 1 turn loop on the counter probe, and couple it lightly to the coaxial cable to the dummy load. The frequency may then be read directly, so long as the counter is capable of sufficient accuracy.

II. Channel Modifications to a New 1 MHz Range

If a new 1 MHz range is required (within the existing 68-73 MHz, 73-80 MHz, or 80-88 MHz range), proceed as follows:

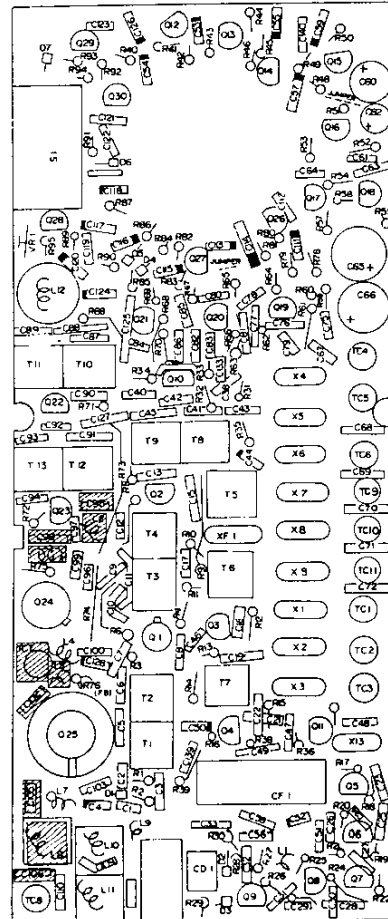
- a) Insert the new crystals into the appropriate sockets.
- b) Set the receive crystals precisely to the correct frequency, as shown in section I-b, above.
- c) Perform an alignment of the receiver strip, as detailed on page 3-8.

- d) Set the transmit crystals precisely to the correct frequency, as shown in step I-c, above.
- e) Perform an alignment of the transmitter strip, as detailed on page 3-10.

III. Channel Modifications Involving Major Frequency Change

The FTC-703A comes equipped for operation on one of the following three bands: 68-73 MHz; 73-80 MHz; 80-88 MHz. To make a channel change involving an entirely new frequency range,

- a) Refer to Table 5, and change the 14 capacitors shown therein. Frequency range modification kits are available from Yaesu.
- b) Now insert the desired crystals into the appropriate sockets, as shown in Figure 16.
- c) Align the receiver and transmitter strips, setting the receive and transmit channel crystals on frequency as you go.
- d) Remember that all channels must fall within a 1 MHz range.



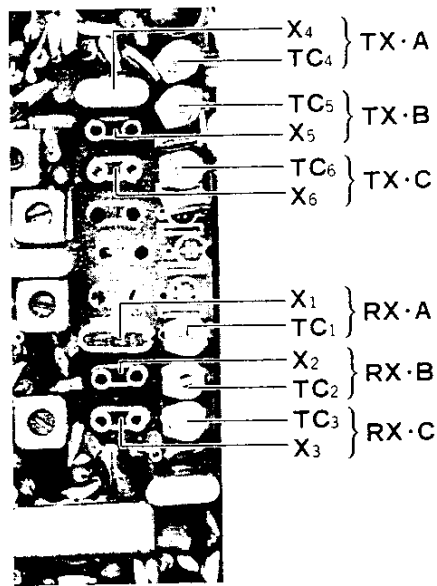


Fig. 16

### FREQUENCY RANGE CONVERSION TABLE

FREQ. RANGE		C2	C6	C10	C12	C41	C45	C95	C98	C102	C105	C106	C110	C145	C148
A.	68 MHz ~ 73 MHz	22PF	15PF	18PF	12PF	27PF	27PF	39PF	39PF	100PF	68PF	39PF	33PF	56PF	33PF
B.	73 MHz ~ 80 MHz	18PF	12PF	15PF	10PF	22PF	22PF	22PF	22PF	120PF	56PF	47PF	27PF	68PF	10PF
C.	80 MHz ~ 88 MHz	15PF	10PF	12PF	8PF	15PF	18PF	18PF	15PF	100PF	47PF	39PF	22PF	47PF	10PF

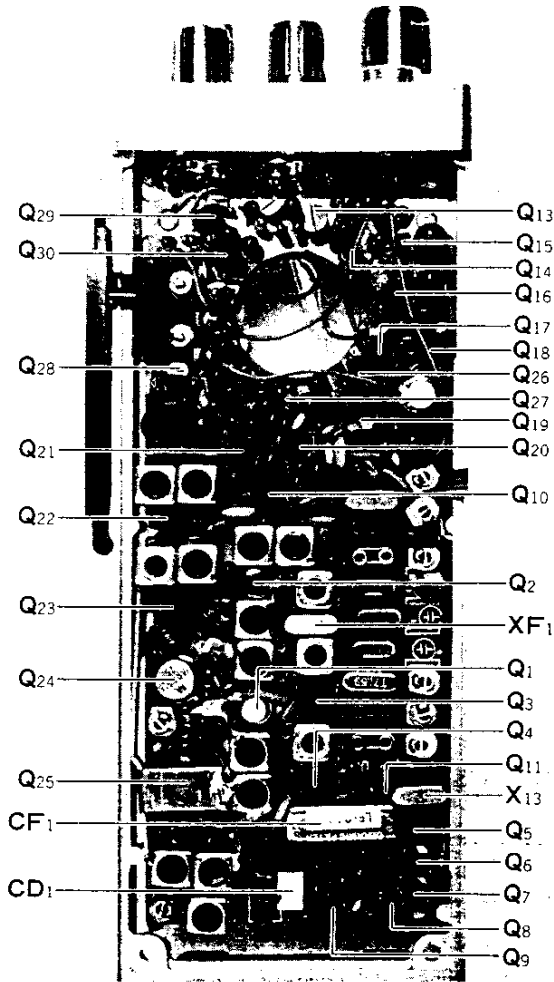
Table 5

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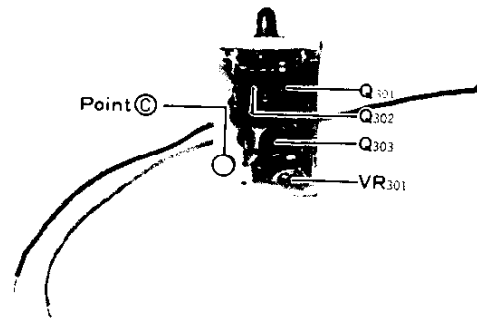
# PARTS LAYOUT

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COMPONENT SIDE VIEW



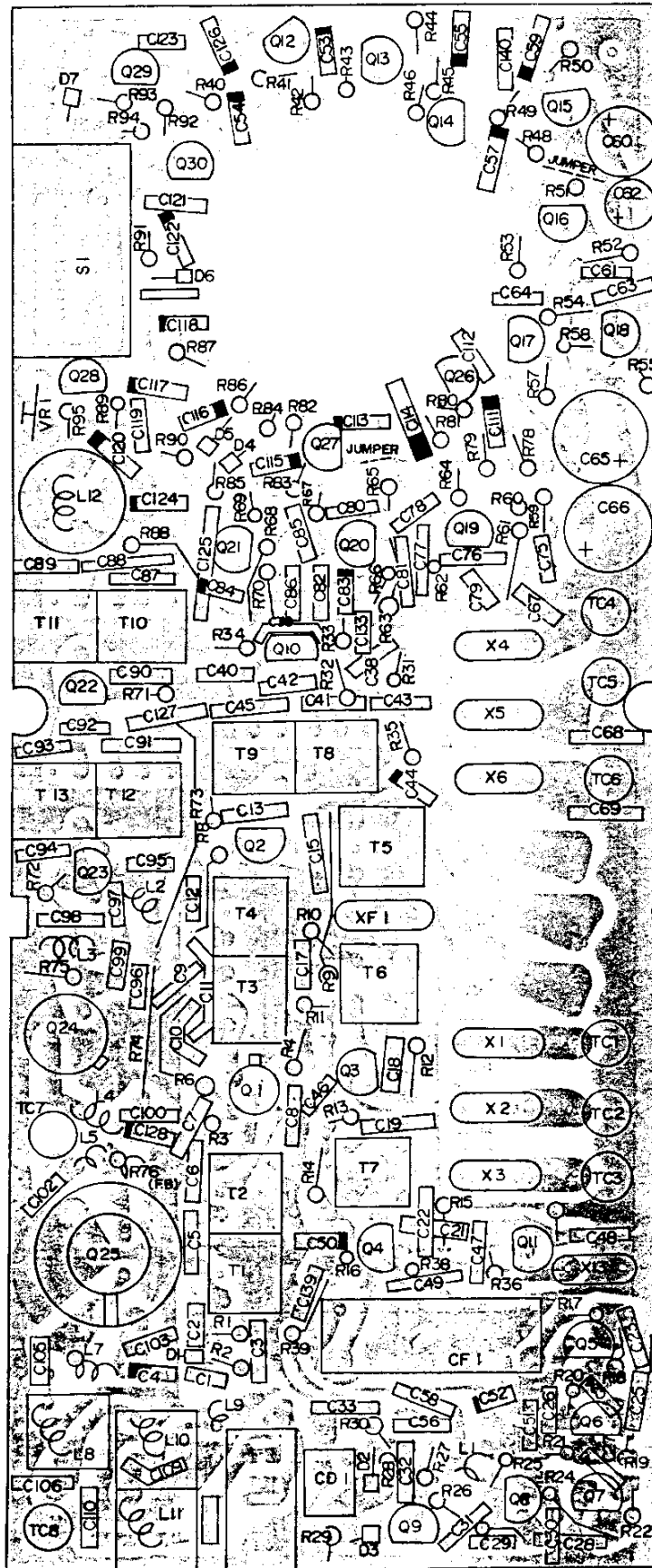
SOLDER SIDE VIEW



LED/BUSY BOARD



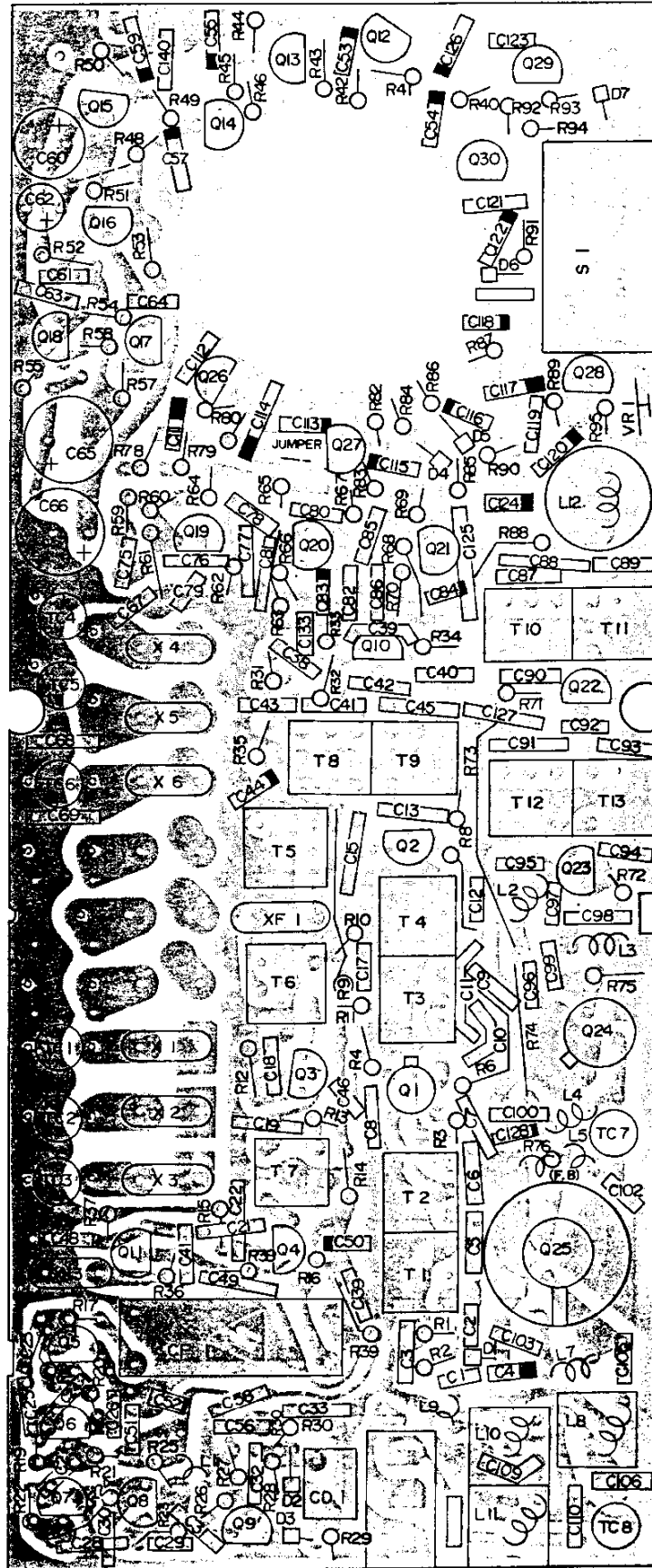
# MAIN BOARD PARTS LAYOUT



Viewed from Component Side

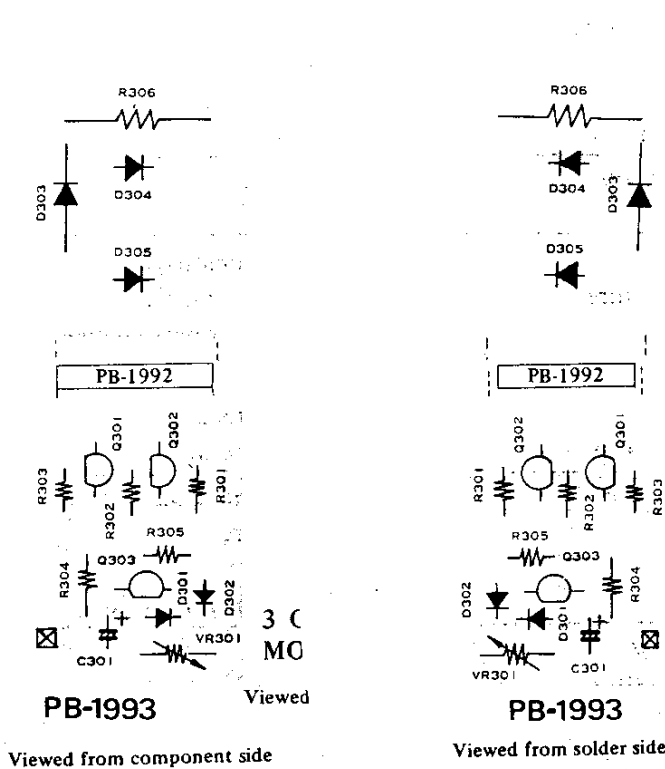
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# MAIN BOARD PARTS LAYOUT



Viewed from Solder Side

# LED/BUSY UNIT PARTS LAYOUT

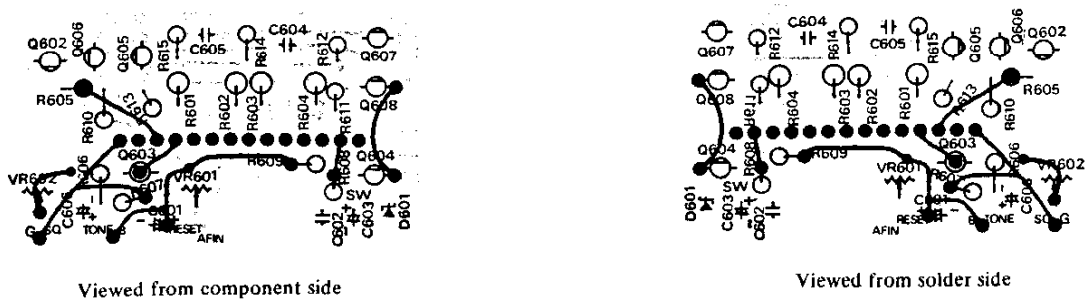


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# STONE SQUELCH UNIT PARTS LAYOUT



# TWO TONE DECODER UNIT PARTS LAYOUT



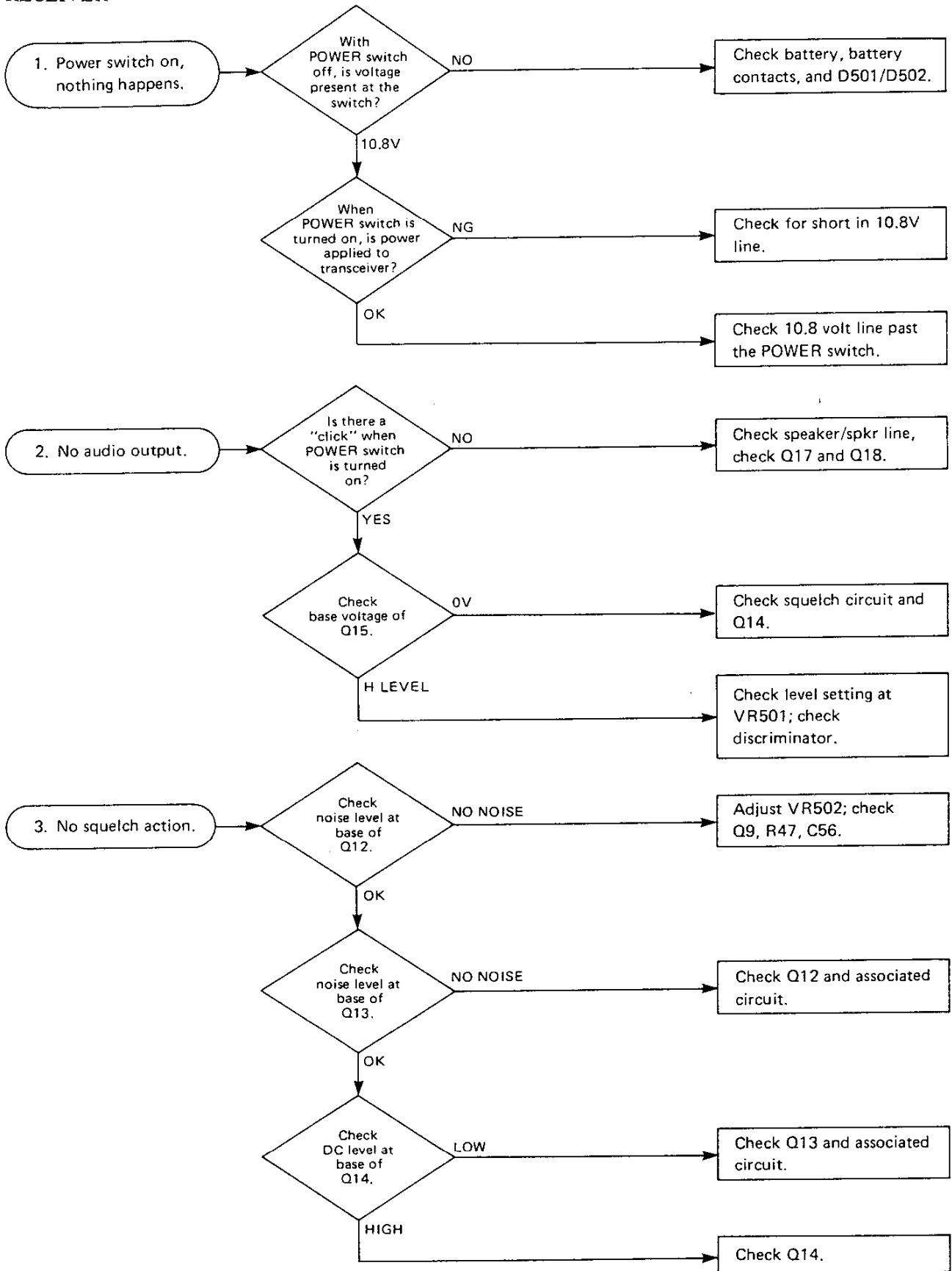
## TYPICAL PART FAILURES, CAUSES, AND SYMPTOMS

PARTS	CAUSE OF TROUBLE	SYMPTOMS
Semiconductors (IC, FET, TR)	High supply voltage Open circuit Excessive drive High temperature	Short or open circuit Output decreases to 1/2 at 80°C Internal noise Instability
MOS FET MOS IC	Static electricity	Total failure
Crystal Crystal filter	Shock High temperature	Crystal destroyed Frequency drift Filter bandpass change
Resistor	Excessive power Aging High temperature	Component burned Value changed Open circuit
Potentiometer	Excessive power Shock	Component burned Open circuit Noise Unsmooth rotation
Capacitor	Excess voltage High temperature Excess power	Shorted Leakage Open/decreased capacitance
Variable capacitor Trimmer capacitor	Ratings exceeded Dust between plates Shock, forced rotation	Shorted Leakage Unsmooth rotation
Coils	Ratings exceeded Variation	Open or short circuit Leakage or shorted turns Detuned
Switch	Ratings exceeded Aging	Poor contact Unsmooth operation Open circuit
Relay	Ratings exceeded Humidity	Poor contact Noise Coil open

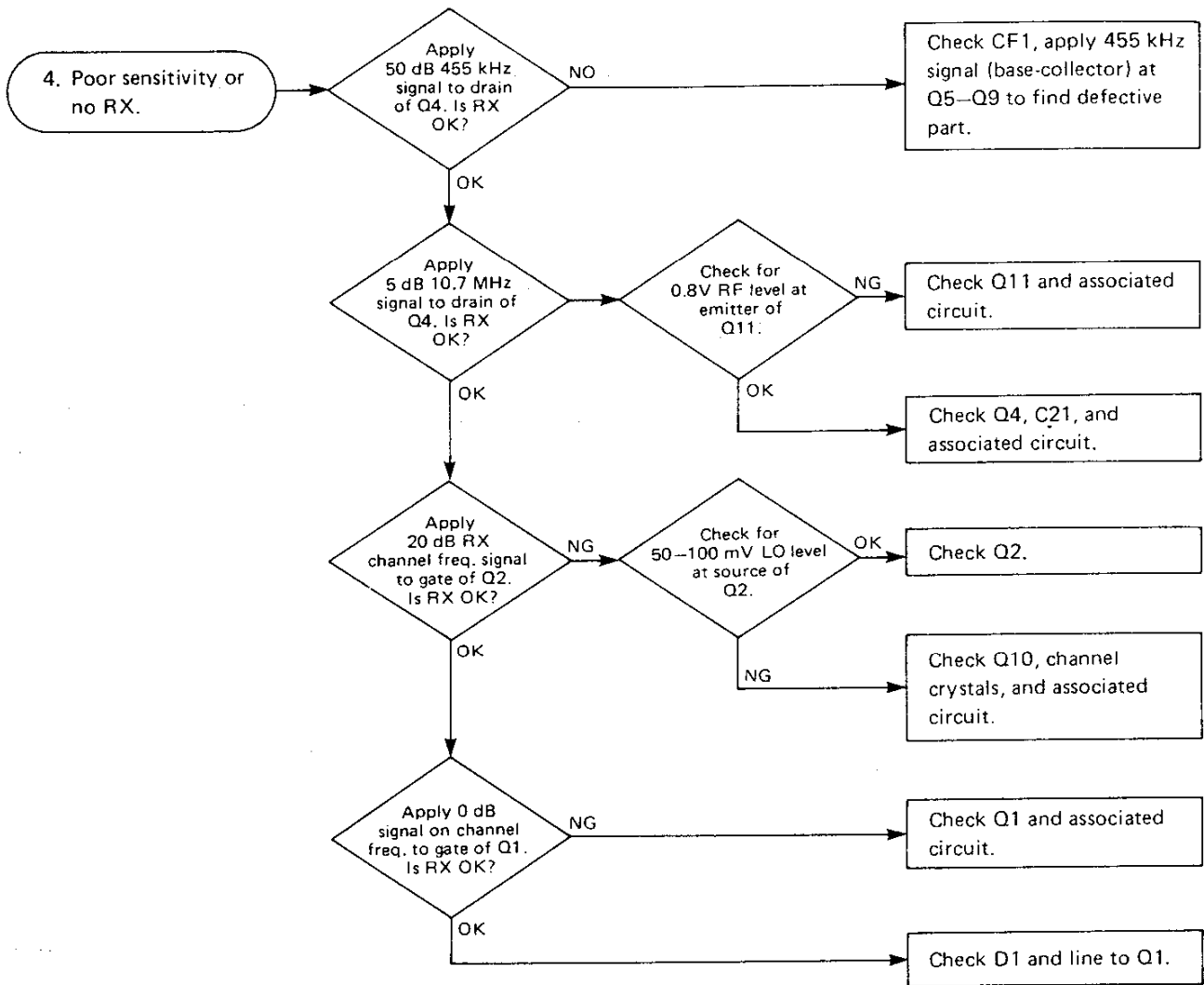
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**TROUBLESHOOTING**

**RECEIVER**

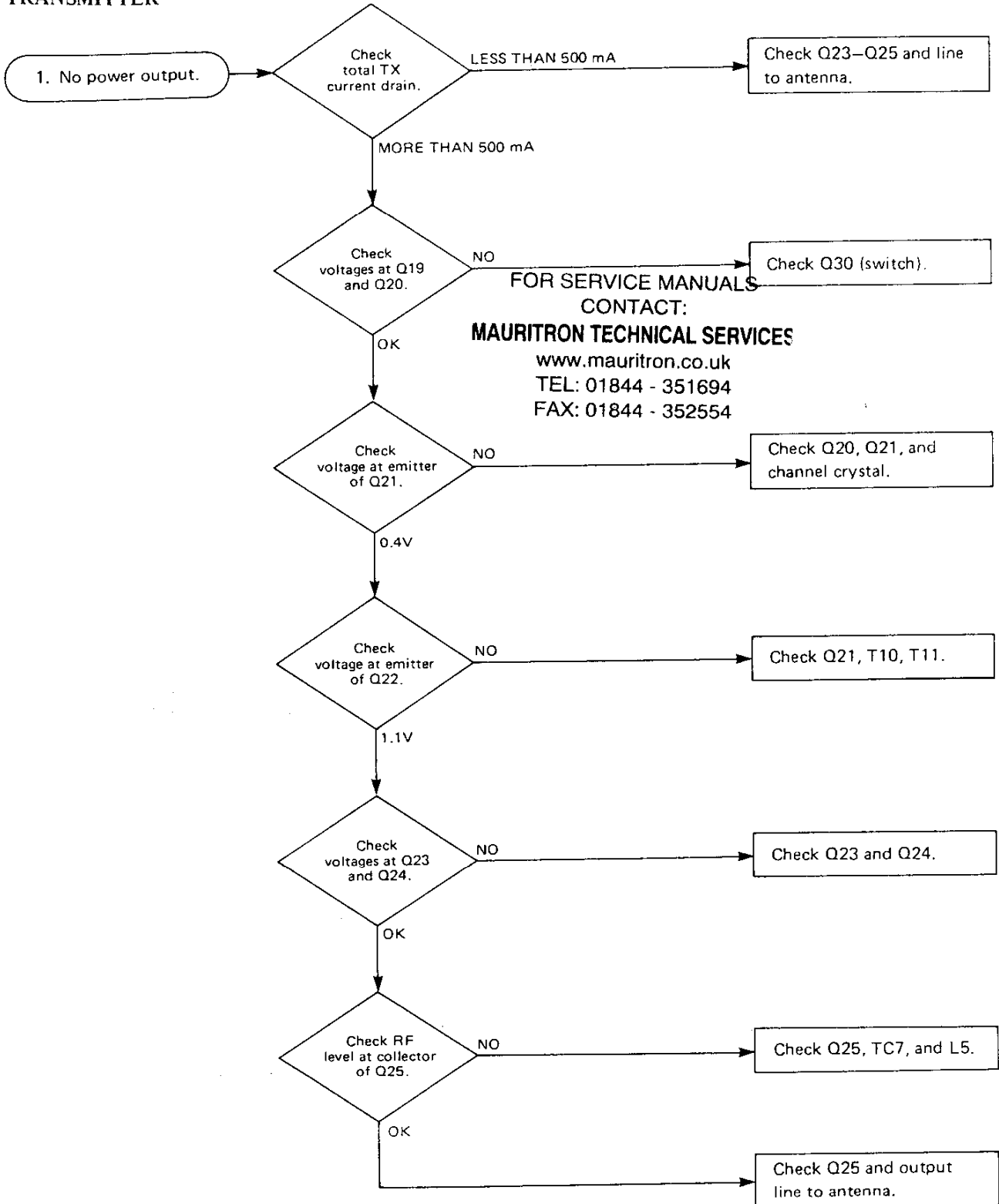


SERVICING

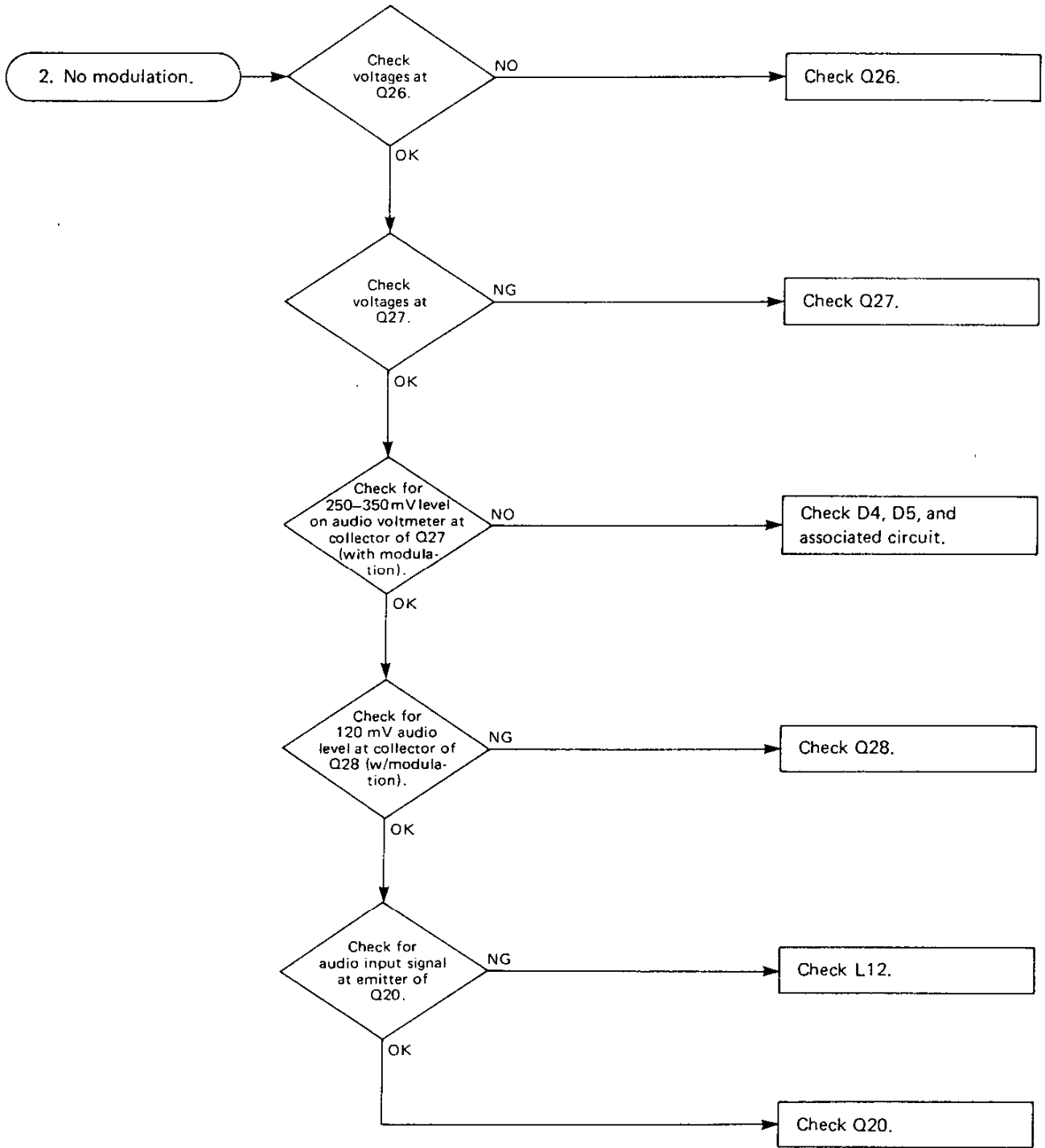


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TRANSMITTER

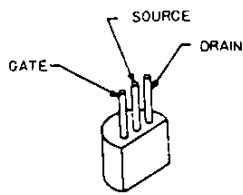


SERVICING

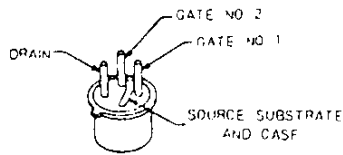




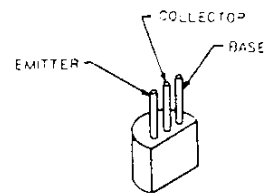
# TRANSISTOR & IC CONNECTIONS



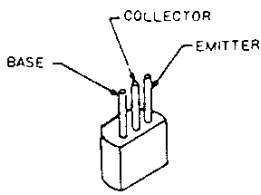
JF1033



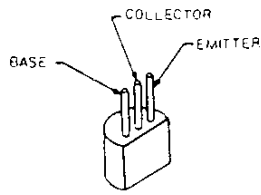
3SK51



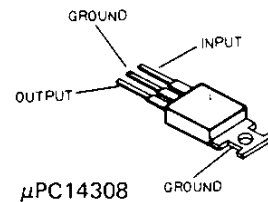
2SA695D  
2SC710D  
2SC1209D



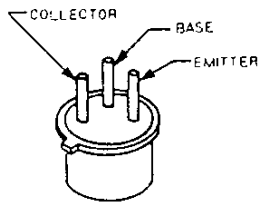
2SC1311



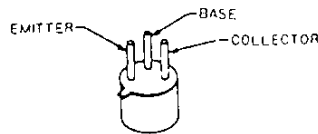
2SC1815Y  
2SC1923(O)



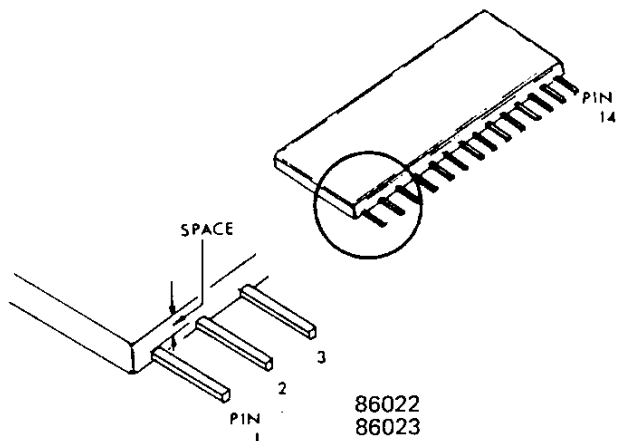
μPC14308



MRF237



2SC741



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# PARTS LIST AND ORDERING DATE

If you live in the United States, you may order parts from Yaesu Electronics Corporation. In other countries, you should order parts from the Yaesu agent for your country. In countries where Yaesu is not currently represented, you may order spare parts directly from Yaesu Musen Company, Ltd. in Tokyo.

When ordering, please specify the exact model number of the transceiver that the part is for. Many parts are standard, such as resistors and disc ceramic capacitors, but you should use particular care when ordering such items as electrolytics, tantalum capacitors, and the like.

The parts list to follow identifies the board that the parts belong to, as well as the circuit designation and part description. A "Part Number" is also specified, and this number will allow immediate identification by our parts department of the item you require. (\*\*See note below.)

Shipment of parts from Yaesu USA is usually made by UPS, COD. Allow at least a week for the parts department to process your order. You will receive prompt notification that your order has been received, and if parts are back ordered, or if additional information is required, you will be so informed.

### PARTS ORDER EXAMPLE

QUANTITY	TRANSCEIVER IDENTIFICATION	LOCATION	**PART NUMBER	CIRCUIT DESIGNATION
1	FTC-703A	PB-1988	G4800510C	Q1 (3SK51-03)

(cut here)

YAESU MUSEN COMPANY, LTD. – C.P.O. BOX 1500, TOKYO, JAPAN  
 YAESU ELECTRONICS CORPORATION – 6851 Walthall, Paramount, CA 90723  
 YAESU ELECTRONICS CORPORATION – 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

### ORDER BLANK

QUANTITY	TRANSCEIVER IDENTIFICATION	LOCATION	PART NUMBER	CIRCUIT DESIGNATION

I authorize shipment via:     Best Way             Parcel Post  
     UPS                             Other

Ship To:                            Name: \_\_\_\_\_  
 (Print or Type)                    Address: \_\_\_\_\_  
 City: \_\_\_\_\_                    State: \_\_\_\_\_                    Zip: \_\_\_\_\_  
 Country: \_\_\_\_\_



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 UPS  Other

Ship To: Name: \_\_\_\_\_  
 (Print or Type) Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Country: \_\_\_\_\_



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# PARTS LIST

## REPAIR PARTS

MAIN CHASSIS					THERMISTOR
Symbol No.	Part No.	Description	Th1	G9090002	D-22A
		<b>DIODE</b>			
D401,502	G2090032	Silicon Diode 1N4002			
					<b>CRYSTAL</b>
			X1,2,3	H0102220	HC-25/U #210222
			X4,5,6	H0102230	" #210223
VR501	J60800028	V12M4-1(6x5)S15SB5kΩ 5kΩB	X13	H0100720	HC-18/U 10.245MHz
VR502	J60800032	V12M4-1(6x5)S15SA20kΩ 20kΩA			
					<b>MONOLITHIC FILTER</b>
		<b>CAPACITOR</b>	XF1	H1101970	FMT-15A
C501,502	K00179033	Ceramic 50WV SL 22pF			
					<b>CERAMIC FILTER</b>
		<b>INDUCTOR</b>	CF1	H3900070	LF-C12
L501	L0020731				
					<b>CERAMIC DISCRIMINATOR</b>
		<b>SPEAKER</b>	CD1	H7900010	455D
SP	M4090026	VS-50-P 8Ω, 0.5W D=50mm			
					<b>RESISTOR</b>
		<b>SWITCH</b>	R98	J10216331	Carbon Composition
SS01	N0190027	MR-3-3			1/8W GK 330Ω
			R57,58	J10246229	" " 1/4W GK 2.2Ω
			R59	J10246100	" " " 10Ω
		<b>MICROPHONE</b>	R6,31,73	J10246220	
MIC	M3290001	EM-76	R14,74	J10246390	" " " 39Ω
			R76	J10246560	" " " 56Ω
			R9,13,35,39,	J10246101	" " " 100Ω
			53,64,70~72,		
		<b>CONNECTOR</b>	75		
J501	P1090050	UG-625B/U	R4,54	J10246121	" " " 120Ω
J502	P1090051	SG8512	R40,91,98	J10246221	" " " 220Ω
J503	P1090052	SR30-10R-6S	R62	J10246331	" " " 330Ω
			R12,88,94	J10246471	" " " 470Ω
			R34	J10246561	" " " 560Ω
			R55	J10246681	" " " 680Ω
			R2,66,67,92,	J10246102	" " " 1kΩ
			93		
<b>MAIN UNIT</b>					
Symbol No.	Part No.	Description			
PB-1988	F0001988	Printed Circuit Board	R16,17,79,81	J10246152	" " " 1.5kΩ
			R83	J10246182	" " " 1.8kΩ
			R1,37,47,51,	J10246222	" " " 2.2kΩ
			90,97		
		<b>IC, FET &amp; TRANSISTOR</b>			
Q2,4	G3090020	FET JF1033-B	R8,15,52,78	J10246332	" " " 3.3kΩ
Q1	G4800510C	" 3SK51-03	R27	J10246392	" " " 3.9kΩ
Q13,16,18,30	G3106950D	Tr 2SA695D	R20,21,24,25,	J10246472	" " " 4.7kΩ
Q22,23	G3307100D	" 2SC710D	63,87,99		
Q24	G3307410	" 2SC741	R84	J10246562	" " " 5.6kΩ
Q17,29	G3312090D	" 2SC1209D	R10,86	J10246682	" " " 6.8kΩ
Q6~9,11,12,	G3313110E	" 2SC1311-E	R28~30,33,38,	J10246103	" " " 10kΩ
14,15,26~28			42~45,60,61,		
Q19,20	G3318150Y	" 2SC1815-Y	65,68,89,95		
Q3,5,10,21	G3319230O	" 2SC1923-O	R85	J10246123	" " " 12kΩ
Q25	G3090001	" MRF-237	R48	J10246183	" " " 18kΩ
	G3090013	" MRF-515		J10246223	" " " 22kΩ
			R3,5,32	J10246273	" " " 27kΩ
		<b>DIODE</b>	R69	J10246333	" " " 33kΩ
D2,3	G2001880F	Germanium 1S188FM	R11,46,80,82	J10246473	" " " 47kΩ
D4,5,7	G2015550	Silicon Diode 1S1555	R18,19,22,23,	J10246563	" " " 56kΩ
D1	G2090033	" " MI301	49		
D6	G2090025	Zener Diode WZ050	R77	J10246104	" " " 100kΩ
			R26	J10246154	" " " 150kΩ
			R36,41,50	J10246224	" " " 220kΩ

REPAIR PARTS

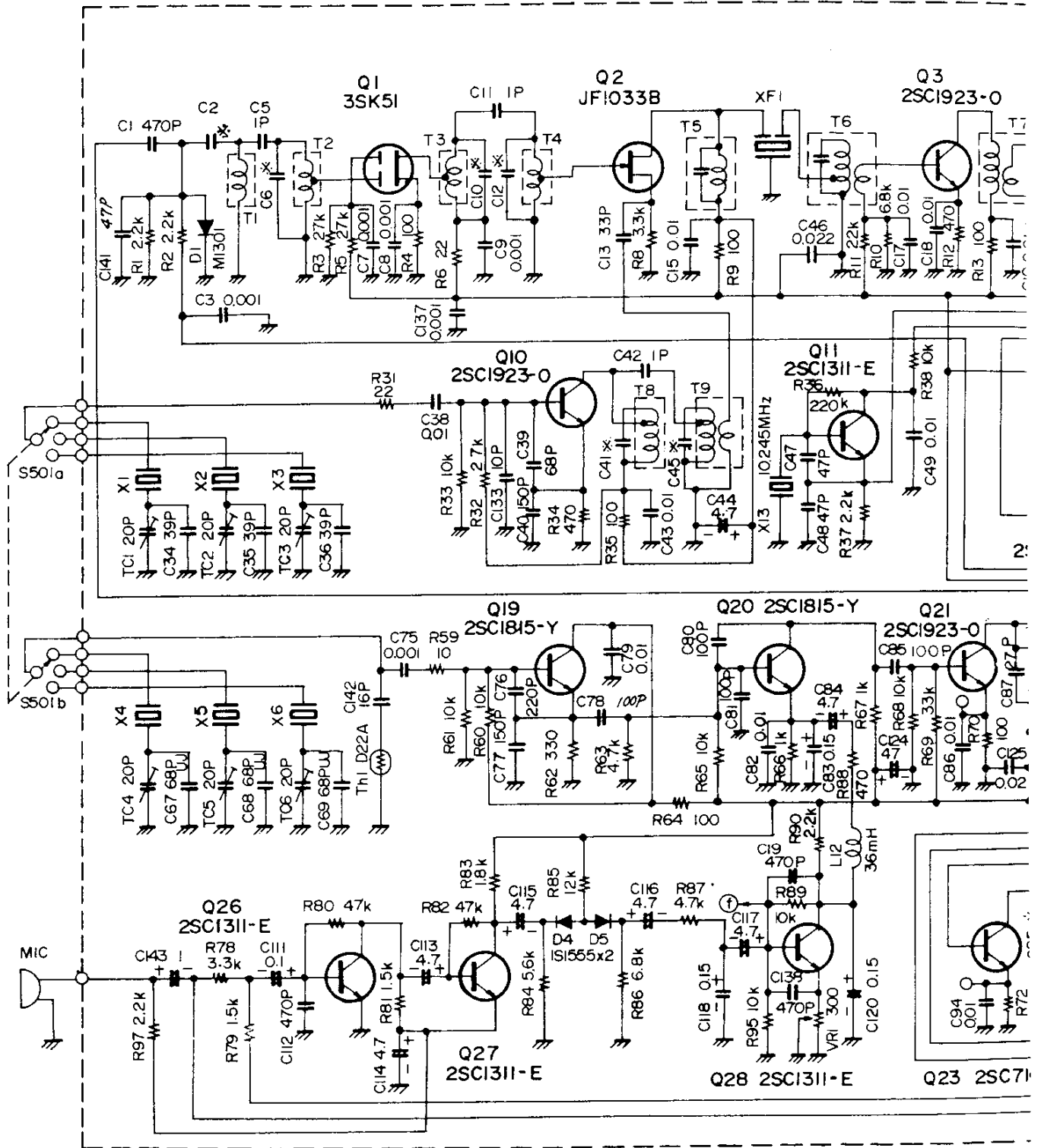
		CAPACITOR			INDUCTOR		
C97	K00179049	Ceramic	50WV SL	0.5pF	L1	L1190028	FL-5H-391K 390 $\mu$ H
C5,11,42,92	K00179024	"	"	1pF	L2,3	L0020716	
	K00179025	"	"	2pF	L4	L0020084	(R98)
	K00179039	"	"	2pF	L5	L0020736	
C88	K00179039	"	"	2pF	L5	L0020736	
C21	K00179027	"	"	5pF	L6	L0020085	(R76)
	K00179028	"	"	7pF	L7	L0020339	(R77)
	K00179029	"	"	8pF	L8	L002726	
C99,146,147	K00179031	"	"	10pF	L9	L0020727	
C29	K00179032	"	"	15pF	L10,11	L0020728	
	K00179033	"	"	22pF	L12	L1190074	8RB 36mH
C13,109	K00179034	"	"	33pF		L9190016	Coil case
C141	K00179038	"	"	47pF			
C80,81,78,85	K00179036	"	"	100pF			
C23,25	K00179037	"	"	220pF			
	K02179038	"	"	CH 7pF	T1~4	L0020600	<b>TRANSFORMER</b>
	K02179039	"	"	8pF	T5~7	L0190001	85PC-2874A
C142	K02179040	"	"	15pF	T8	L0020344	
C93	K02179034	"	"	22pF	T9	L0020345	
C87,89	K02179029	"	"	27pF	T10	L0020601	
C91	K02179035	"	"	33pF	T11	L0020602	
	K02179041	"	"	39pF	T12	L0020603	
C47,48	K02179036	"	"	47pF	T13	L0020604	
C34~36	K02179042	"	"	56pF			
C39	K02179037	"	"	68pF	FB1	L9190001	Ferrite beads Ri3x3-1
C40,77	K02179001	"	"	PG 150pF			
C133	K03179001	"	"	TH 10pF			<b>SWITCH</b>
C67~69	K06179024	"	"	UJ 68pF	S1	N7090003	Micro Switch AH2504
C76	K06179022	"	"	220pF			
	K10179003	"	"	B 470pF		B4047910A	Heat Sink
C1,27,28,31,32,112,119,138	K10179003	"	"	B 470pF		B4052990	X-tal Socket
C24	K10179005	"	"	470pF	<b>BUSY, LED UNIT</b>		
C3,8,9,63,64,75,100,103,121,137,140	K10179001	"	"	0.001 $\mu$ F	Symbol No.	Part No.	Description
					PB-1992	F0001992	Printed Circuit Board
					PB-1993	F0001993	" " "
C7	K10179004	"	"	0.001 $\mu$ F			
C17,30,38,43,56,79,82,86,90,94,96,123,127	K13179001	"	"	F 0.01 $\mu$ F	Q301~303	G3313110E	<b>TRANSISTOR</b> Silicon Transistor 2SC1311E
C15,18,19,22,26,49	K13179004	"	"	0.01 $\mu$ F	D301,302	G2015550	Silicon Diode 1S1555
					D303	G2090007	Zener Diode WZ061
C46,58,139	K13179002	"	"	0.022 $\mu$ F	D304,305	G2090080	LED LN28RP
C51,125	K13179005	"	"	0.022 $\mu$ F			
C2,6,10,12,41,45,95,98,102,105,106,110,145,148	-	See Frequency Range conversion table			R306	J10246561	<b>RESISTOR</b> Carbon Composition 1/4W GK 560 $\Omega$
					R303	J10246152	" " " 1.5k $\Omega$
C61	K50177332	Mylar Film	50WV	0.0033 $\mu$ F	R302,304	J10246103	" " " 10k $\Omega$
C33	K50177333	"	"	0.033 $\mu$ F	R305	J10246223	" " " 22k $\Omega$
C65	K70107107	Tantalum	10WV	100 $\mu$ F	R301	J10246473	" " " 47k $\Omega$
C44,54,59,84,104,113~117,122,128	K70127475	"	"	16WV 4.7 $\mu$ F			
C50,52,55	K70127106	"	"	10 $\mu$ F	VR301	J51713102	<b>POTENTIOMETER</b> EVN-A1A-A00B13 1k $\Omega$ B
						J50705102	
C62	K70127226	"	"	22 $\mu$ F			<b>CAPACITOR</b>
C60,66,124	K70127476	"	"	47 $\mu$ F	C301	K70167104	Tantalum 35WV 0.1 $\mu$ F
C57,143	K70147105	"	25WV	1.0 $\mu$ F			
C53,111,126	K70167104	"	35WV	0.1 $\mu$ F	<b>ACCESSORIES</b>		
C83,118,120	K70167154	"	"	0.15 $\mu$ F	Symbol No.	Parts No.	Description
					ANT		Antenna FHA-2 A,B,C,D,E,F,G (See Antenna information)
							Battery pack FNB-1
		<b>TRIMMER CAPACITOR</b>					
TC1~8	K91000029	ECV-1ZW	20x53N	20pF			Shoulder strap



TONE SQUELCH UNIT (OPTION)			VR502		
Symbol No.	Part No.	Description			
PB-1999	F0001999	Printed Circuit Board	*A (67.0Hz ~ 90.0Hz)	J50724203	PN822H 203V 20kΩB
	C0019990	PCB with components (without Q501,R502)	*B (91.5Hz ~ 123.0Hz)	J50724103	PN822H 103V 10kΩB
		<b>IC &amp; TRANSISTOR</b>	*C (127.3Hz ~ 179.9Hz)	J50724203	PN822H 203V 20kΩB
Q501	G1090178	IC 86022			
Q502,503	G3313110E	Tr 2SC1311E			
		<b>DIODE</b>			<b>CAPACITOR</b>
D501	G2090042	Zener RD-8.2EB	C505~509	K10179001	Ceramic disk 50WV 0.001μF B
		<b>RESISTOR</b>	C504	K70127475	Tantalum 16WV 4.7μF
R505	J10246221	Carbon Composition 1/4W GK 220Ω	C501~503	K70127106	" " 10μF
R504,506	J10246103	" " " 10kΩ		P1090093	MINIATURE SOCKET 2-331272-5 (for R502)
R501	J10246473	" " " 47kΩ		R7053250	Cushion
		<b>TUNING RESISTOR</b>			
R502					
*1 (67.0Hz)	J20249035	Metallic film 1/4W 165kΩ ±1%			
			TWO TONE DECODER UNIT (OPTION)		
			Symbol No.	Part No.	Description
*2 (71.9Hz)	J20249032	" " " 143kΩ "	PB-2090	F0002090	Printed circuit board
*3 (74.4Hz)	J20249030	" " " 133kΩ "		C0020900	PCB with components (without Q601, R601~R604)
*4 (77.0Hz)	J20249028	" " " 124kΩ "			<b>IC &amp; TRANSISTOR</b>
*5 (79.7Hz)	J20249026	" " " 118kΩ "			
*6 (81.0Hz)	J20249025	" " " 113kΩ "	Q601	G1090250	IC 86023
*7 (82.5Hz)	J20249024	" " " 110kΩ "	Q602~608	G3313110D	Tr 2SC1311D
*8 (85.4Hz)	J20249022	" " " 102kΩ "			<b>DIODE</b>
*9 (88.5Hz)	J20249020	" " " 95.3kΩ "	D601	G2090042	Zener RD8.2EB
*10 (90.0Hz)	J20249019	" " " 93.1kΩ "			<b>RESISTOR</b>
*11 (91.5Hz)	J20249018	" " " 88.7kΩ "	R609	J10246221	Carbon Composition 1/4W GK 220Ω
*12 (94.8Hz)	J20249016	" " " 84.5kΩ "	R606,607	J10246103	" " " 10kΩ
*13 (100.0Hz)	J20249014	" " " 75.0kΩ "	R612,615	J10216103	" " 1/8W " 10kΩ
*14 (103.5Hz)	J20249013	" " " 71.5kΩ "	R605	J10246333	" " 1/4W " 33kΩ
*15 (107.2Hz)	J20249010	" " " 64.9kΩ "	R608,610,611	J10246683	Carbon Composition 1/4W GK 68kΩ
*16 (110.9Hz)	J20249008	" " " 60.4kΩ "	R613,614	J10216334	" " 1/8W " 330kΩ
*17 (114.8Hz)	J20249006	" " " 56.2kΩ "			<b>TUNING RESISTOR</b>
*18 (118.8Hz)	J20249004	" " " 52.3kΩ "			See page 2-7
*19 (123.0Hz)	J20249002	" " " 49.9kΩ "			<b>POTENTIOMETER</b>
*20 (127.3Hz)	J20249037	" " " 182kΩ "	VR602	J50707103	PN822H 103V 10kΩB
*21 (131.8Hz)	J20249036	" " " 169kΩ "	VR601	J50707503	PN822H 503V 50kΩB
*22 (136.5Hz)	J20249034	" " " 158kΩ ±1%			<b>CAPACITOR</b>
*23 (141.3Hz)	J20249033	" " " 150kΩ "	C602	K12171102	Ceramic 50WV 0.001μF
*24 (146.2Hz)	J20249031	" " " 137kΩ "	C604,605	K50177102	Mylar " 0.001μF
*25 (151.4Hz)	J20249029	" " " 130kΩ "	C601,606	K70167105	Tantalum 16WV 1μF
*26 (156.7Hz)	J20249027	" " " 121kΩ "	C603	K70127106	" " 10μF
*27 (162.2Hz)	J20249025	" " " 113kΩ "			<b>IC SOCKET</b>
*28 (167.9Hz)	J20249023	" " " 105kΩ "	QS601	P3090035	116-28-30-114 (1/2)
*29 (169.0Hz)	J20249023	" " " " "			<b>MINIATURE SOCKET</b>
*30 (173.8Hz)	J20249021	" " " 97.6kΩ "			
*31 (179.9Hz)	J20249019	" " " 93.1kΩ "			
*40 (186.2Hz)	J20249017	" " " 86.6kΩ "			
*41 (188.0Hz)	J20249016	" " " 84.5kΩ "			
*42 (192.8Hz)	J20249015	" " " 80.6kΩ "			
*43 (203.5Hz)	J20249013	" " " 71.5kΩ "			
*44 (209.0Hz)	J20249012	" " " 68.1kΩ "			
*45 (210.7Hz)	J20249011	" " " 66.5kΩ "			
*46 (218.1Hz)	J20249009	" " " 63.4kΩ "			
*47 (225.7Hz)	J20249007	" " " 59.0kΩ "			
*48 (233.6Hz)	J20249005	" " " 54.6kΩ "			
*49 (241.8Hz)	J20249003	" " " 51.1kΩ "			
*50 (250.3Hz)	J20249001	" " " 47.5kΩ "			
		See page 2-5		P1090093	2-331272-5 (for R601-604)
		<b>POTENTIOMETER</b>			
VR501	J50724103	PN822H 103V 10kΩB			
VR503	J50724503	PN822H 503V 50kΩB			

FOR SERVICE MANUALS  
CONTACT:  
**MAURITRON TECHNICAL SERVICES**  
[www.mauritron.co.uk](http://www.mauritron.co.uk)  
TEL: 01844 - 351694  
FAX: 01844 - 352554



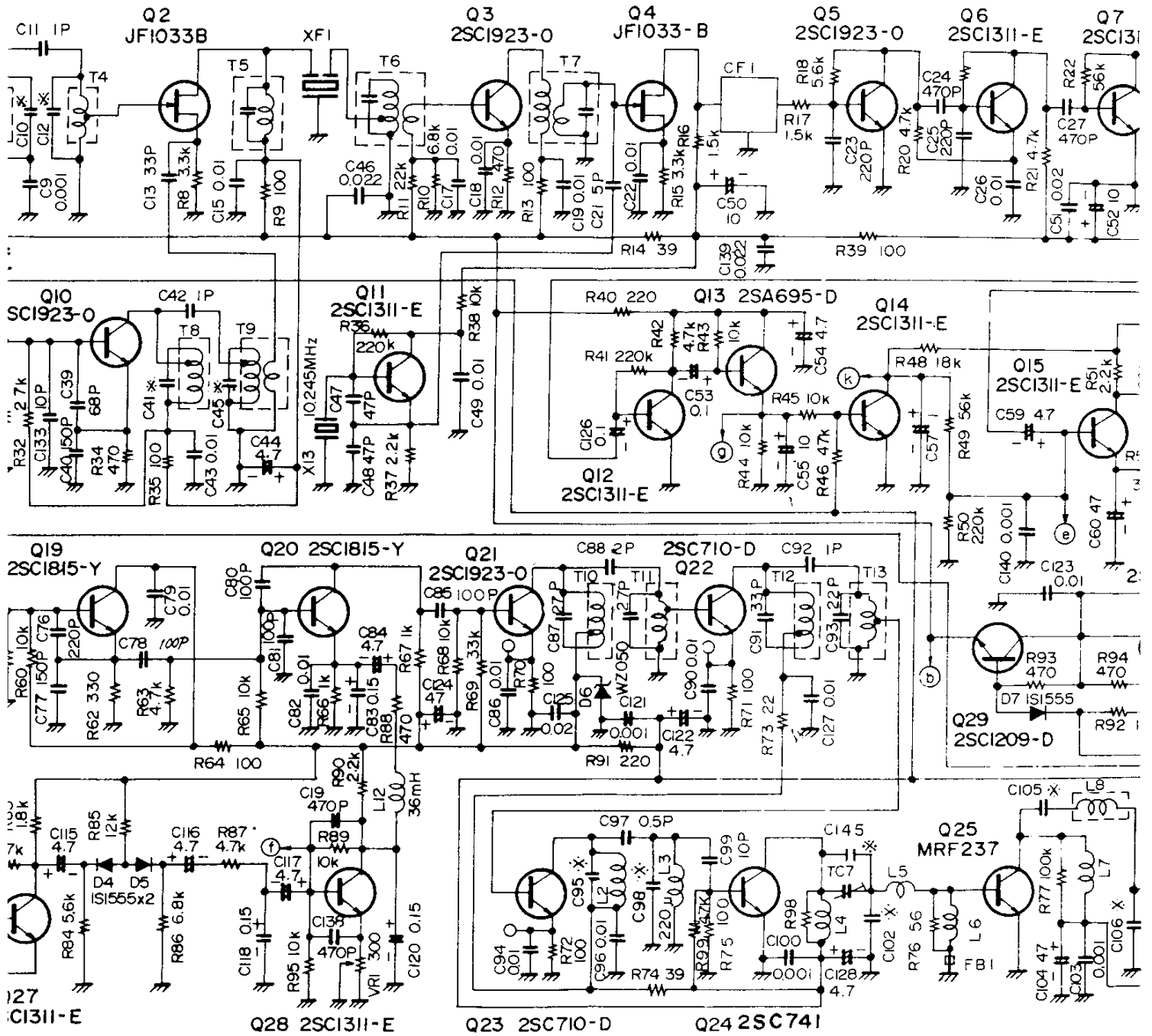


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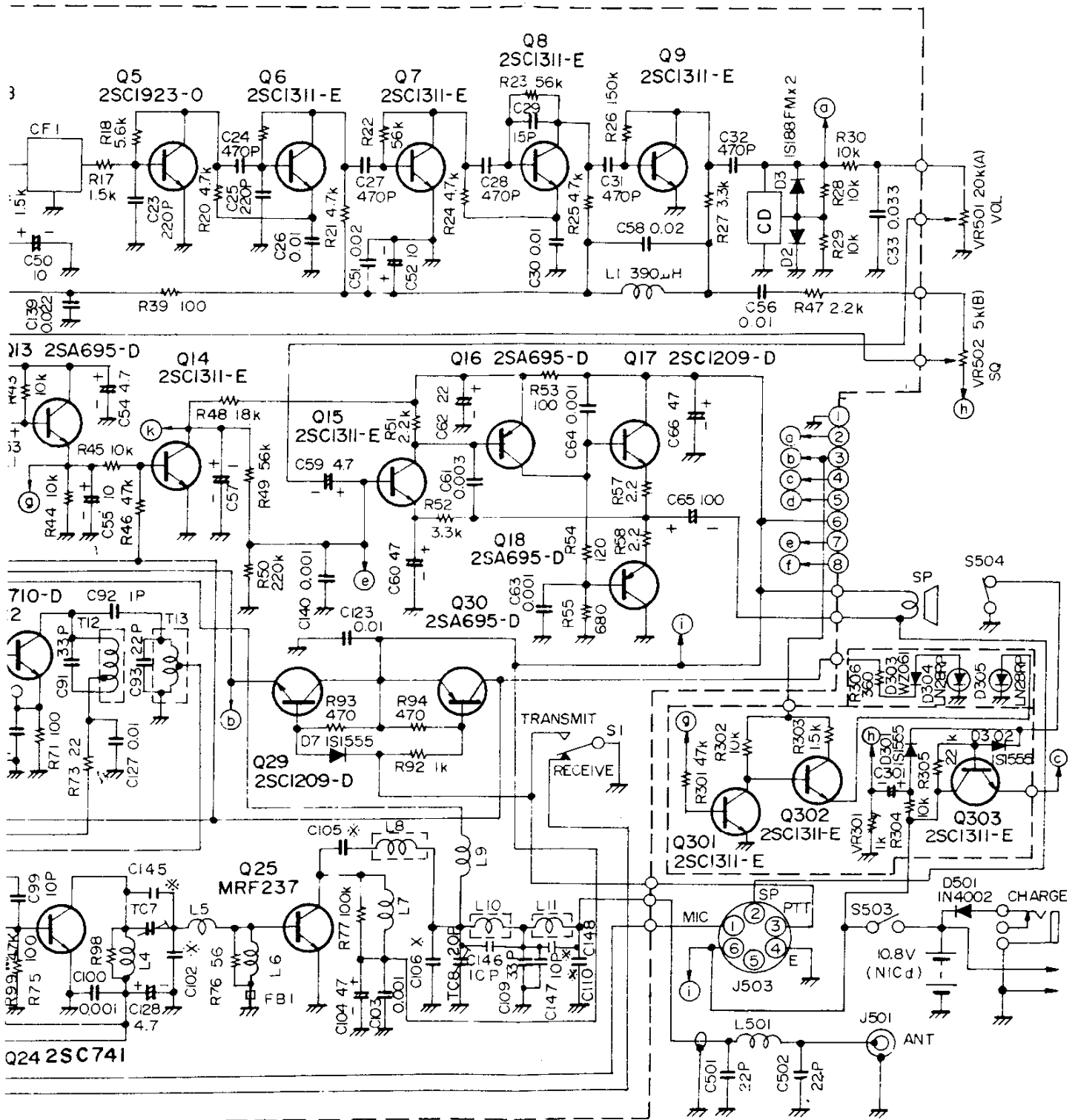
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	C2	C6	C10	C12	C41	C45	C95	C98	C102	C105	C108
1.68~73MHZ	22 P	15 P	18 P	12 P	27P	27 P	39 P	39 P	100 P	56 P	3
2.73~80MHZ	18P	12 P	15 P	10P	22 P	22P	22 P	22 P	120 P	56 P	4
3.80~88MHZ	15P	10 P	12 P	8 P	15P	18P	18 P	15 P	100P	47 P	3



C2	C6	C10	C12	C41	C45	C95	C98	C102	C105	C106	C110	C145	C148
2P	15P	18P	12P	27P	27P	39P	39P	100P	56P	39P	33P	56P	33P
8P	12P	15P	10P	22P	22P	22P	22P	120P	56P	47P	27P	68P	10P
5P	10P	12P	8P	15P	18P	18P	15P	100P	47P	39P	22P	47P	10P

- NOTES
1. ALL FIXED RESISTORS IN  $\frac{1}{4}$ W UNLESS OTHERWISE NOTED.
  2. ALL CAPACITORS IN  $\mu$ F UNLESS OTHERWISE NOTED.



5	C148
P	33P
P	10P
P	10P

- NOTES
1. ALL FIXED RESISTORS IN  $\Omega$  1/4W UNLESS OTHERWISE NOTED.
  2. ALL CAPACITORS IN  $\mu$ F UNLESS OTHERWISE NOTED.

**FTC-703A**  
**CIRCUIT DIAGRAM**

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