7

# INSTRUCTION MANUAL

FT-2FB

YAESU MUSEN CO., LTD.

TOKYO JAPAN

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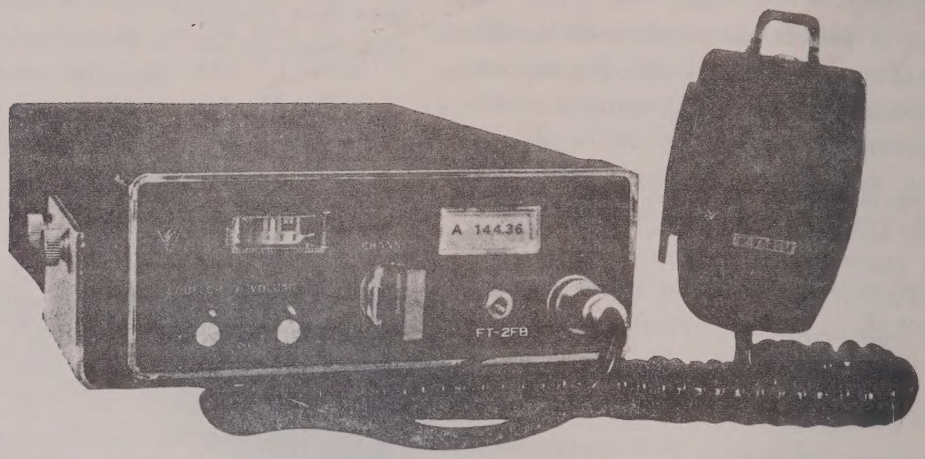
# FT-2FB VHF FM TRANSCEIVER




## GENERAL DESCRIPTION

The model FT-2FB VHF Transceiver is a precision built, compact, high performance FM transceiver designed to operate in the 2 meter FM amateur radio service. The FT-2FB is completely transistorized and operates from a 12 volt DC system, however, it can be used with a 115-or 230 volt AC power supply together with its AC/DC adaptor. The FT-2FB operates in the 144 to 148 MHz band on 12 crystal controlled channels, with selectable RF power output of 1 or 10 watts. The entire transceiver package is 6-5/8" wide, 2-1/2" high. 10" deep and weighs approximately 4 lbs. Heavy-gauge aluminium construction provides an extremely rugged package light in weight and virtually immune to the effect of vibration and shock.

## SPECIFICATIONS

### General

| | |
|---|---|
| Frequency Range | : 144-148 MHz |
| Number of Channels | : 12 channels, 3 supplied |
| Power Drain | : Receive 0.31 A<br>Transmit 1.7 A (High)<br>0.7 A (Low) |
| Power Source | : 13.5 volts ±15%<br>(negative ground) |
| Dimensions | : 6-5/8" W x 2-1/2" H<br>x 10" D |
| Weight | : 4 lbs. |
| Standard Accessories Supplied | : Dynamic microphone<br>connector plug<br>DC cord fuse<br>Mobile mount |

### Transmitter

| | |
|---|---|
| RF Output Power | : 10 watts high, 1 watt low (selectable) |
| Output Impedance | : 50 ohms unbalanced |
| Frequency Deviation | : 15 KHz max. |
| Frequency Stability | : ±0.001% or less |
| Spurious Radiation | : ±60 db |
| Tone Burst | : Nominal 1800 Hz (adjustable between 1300 and 3000 Hz) |

### Receiver

| | |
|---|---|
| Circuit | : Crystal controlled Double super heterodyne |
| IF Frequency | : 10.7 MHz & 455 KHz |
| Sensitivity | : 0.5μV for 20 db quieting |
| Selectivity | : ±15 KHz –6 db<br>±25 KHz –50db |
| Audio Output | : 2.5 watts |

For mobile operation, the DC power is supplied by the vehicle battery and charging system.

The transceiver will operate over a voltage range of 10.5 to 14 volts DC. It is necessary to carefully adjust the charging system so that the upper limit of 14 volts is never exceeded.

*UNDER NO CIRCUMSTANCES, SHOULD THE TRANSCEIVER BE OPERATED FROM A POWER SOURCE WHICH EXCEEDS 14 VOLTS. DAMAGE TO THE TRANSISTORS MAY OCCUR IF EXCESSIVE VOLTAGE IS APPLIED.*

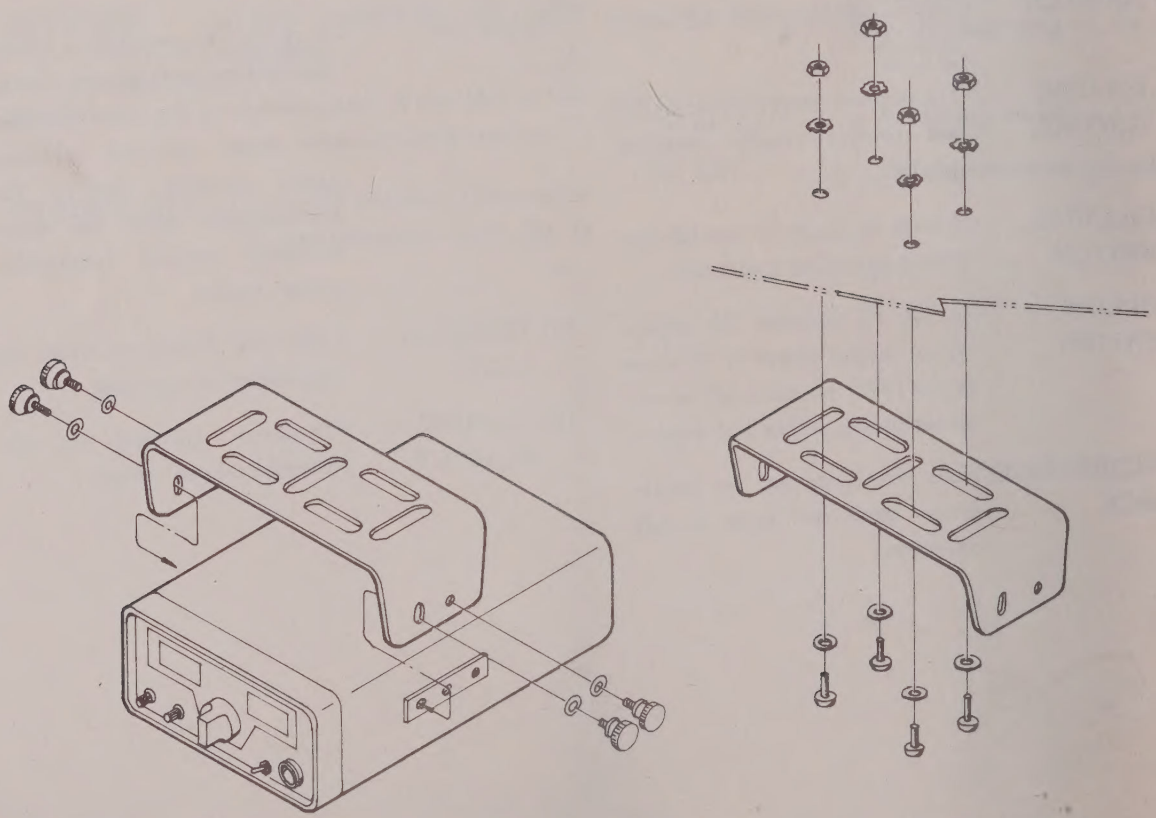
For vehicle installation, it is recommended that the power cord supplied should be used and run directly to the shortage battery for both positive (red cable) and negative (black cable) terminals.

## MOUNTING

The FT-2FB is supplied with a mounting bracket and DC power cord including a fuse holder.

The bracket should be fastened to the mounting surface with sheet metal screws. When the transceiver is mounted under the dashboard of a vehicle, keep the air path free from the vehicle's heater duct. Mount the transceiver away from the vehicle's heater system to prevent destruction of components. Once the unit is in place in the bracket, tighten the knurled screws on the sides to secure the transceiver in the desired position. Connect the microphone, power cable and antenna cable to the transceiver.

In some applications, vertical mounting may be more convenient. The FT-2FB transceiver may be mounted in any position without change in performance.

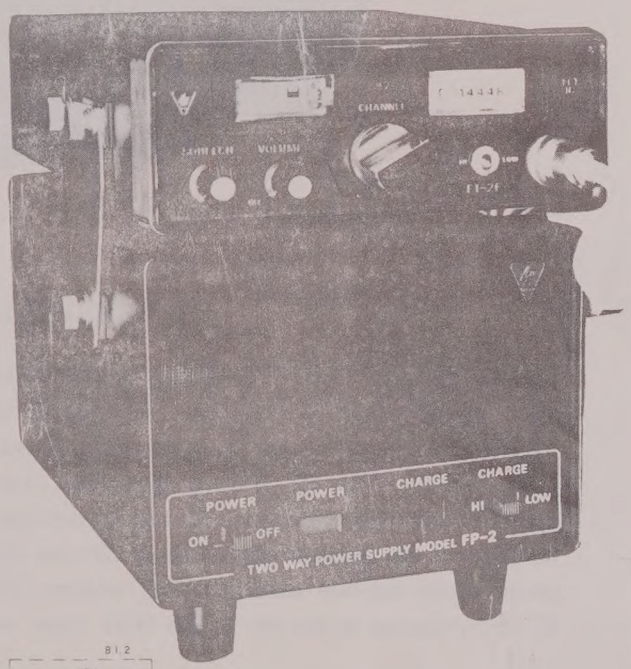


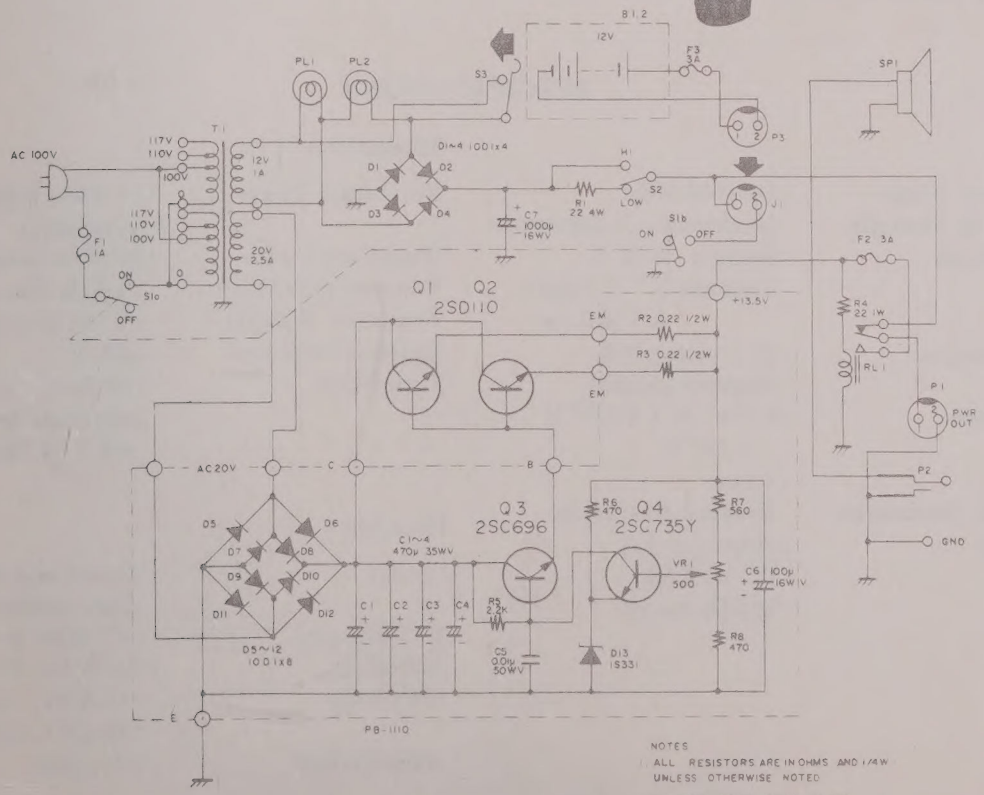
The FT-2FB FM Transceiver is a high quality VHF communication device which, with proper installation, will provide many years of dependable service. To prevent damage to the equipment during installation and use, care should be taken to observe the following precautions:

* Do not attempt to connect the power cord to a power source with the power switch ON.
* Do not connect the microphone with the power switch ON.
* Do not connect the antenna with the power switch ON.
* Do not connect the power cord to the primary power source until polarity and voltage are determined.
* Do not use a mis-matched antenna. Maximum efficiency will be obtained with an antenna system having a VSWR of less than 1.5 : 1.0. The antenna should be tuned to achieve a low VSWR.
* Do not key the transmitter unless an antenna or a dummy load is connected to the antenna coax connector.

## POWER REQUIREMENTS

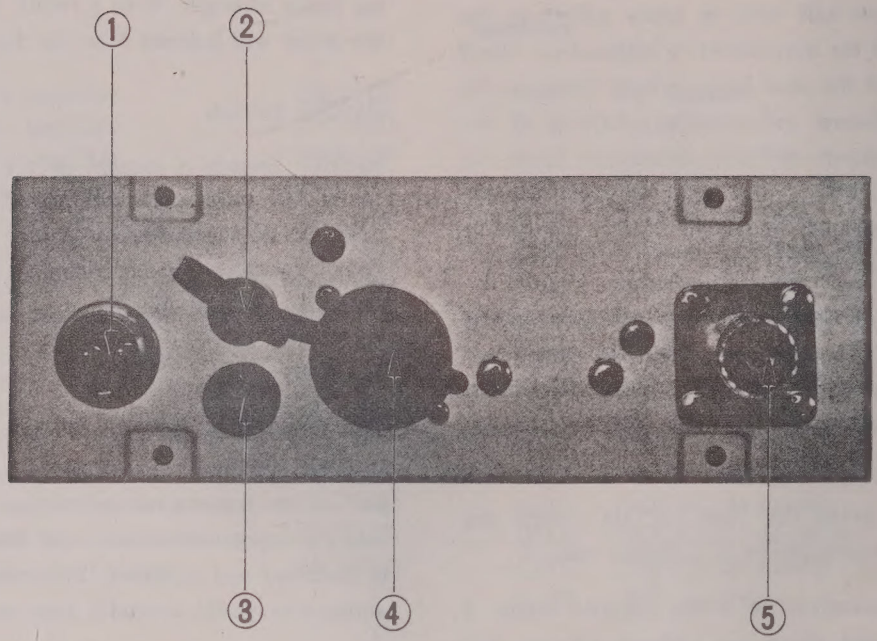
The FT-2FB is designed to operate nominally from a 12 volts DC power source. The transceiver requires 1.7 Amps on transmit and 0.31 Amp on receive. The fuse located in the power cord should be rated at 3 Amps. In fixed stations, the FP-2 AC power supply is used to provide 12 volts DC.




NOTES
1. ALL RESISTORS ARE IN OHMS AND 1/4W UNLESS OTHERWISE NOTED
2. ALL CAPACITORS ARE IN FLADS
3. B1,2, F3 AND P3 ARE OPTION PARTS

FP-2
CIRCUIT DIAGRAM



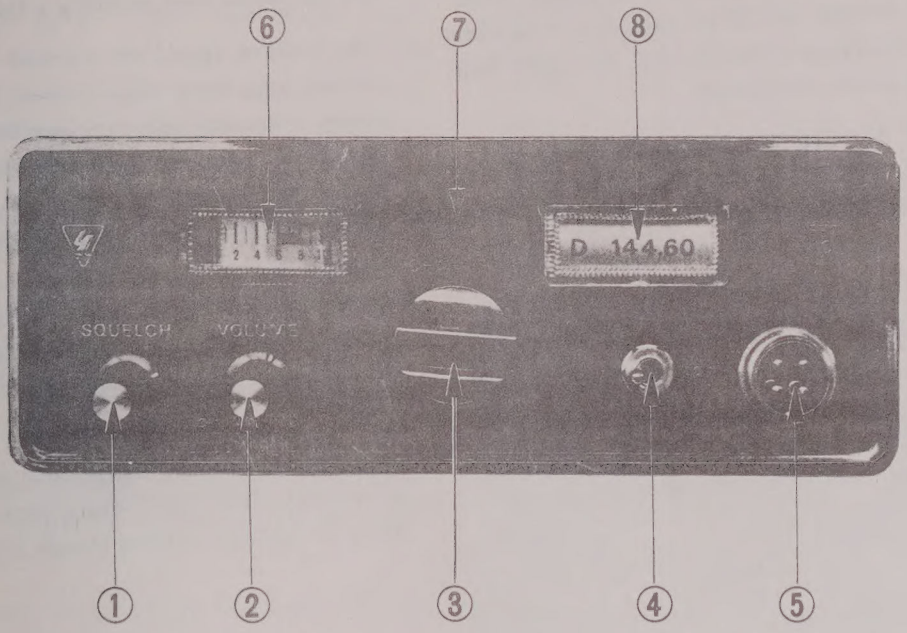

(1) POWER - Power receptacle, DC cable supplied.

(2) SP - Audio output is provided at this jack for an external speaker.

(3) BURST OFF - In the ON position, a tone signal of approximately 2800 Hz is transmitted for a very short time at the beginning of the transmission.

(4) ACC - Accessory socket.

(5) ANT - Coaxial connector for antenna.




(1) SQUELCH - SQUELCH threshold adjustment controls.

(2) VOLUME CONTROL - Transceiver power ON and OFF and receiver audio amplifier gain.

(3) CHANNEL SWITCH - Selects transceiver crystal controlled operating frequency.

(4) HI/LOW SWITCH - In the HI position the transmitter output power is 10 watts. In the LOW position, the transmitter power output is 1 watt.

(5) MICROPHONE JACK - Four pin connector for microphone input and push to talk operation.

(6) METER - A meter is provided to check transceiver performance. During operation in the receive mode, the meter indicates incoming signal strength. And in the transmission mode, the meter indicates relative transmitter power output.

(7) TRANSMIT LIGHT - Light will illuminate when the transmitter is operated.

(8) CHANNEL READOUT - Frequency selected by the channel selector switch.

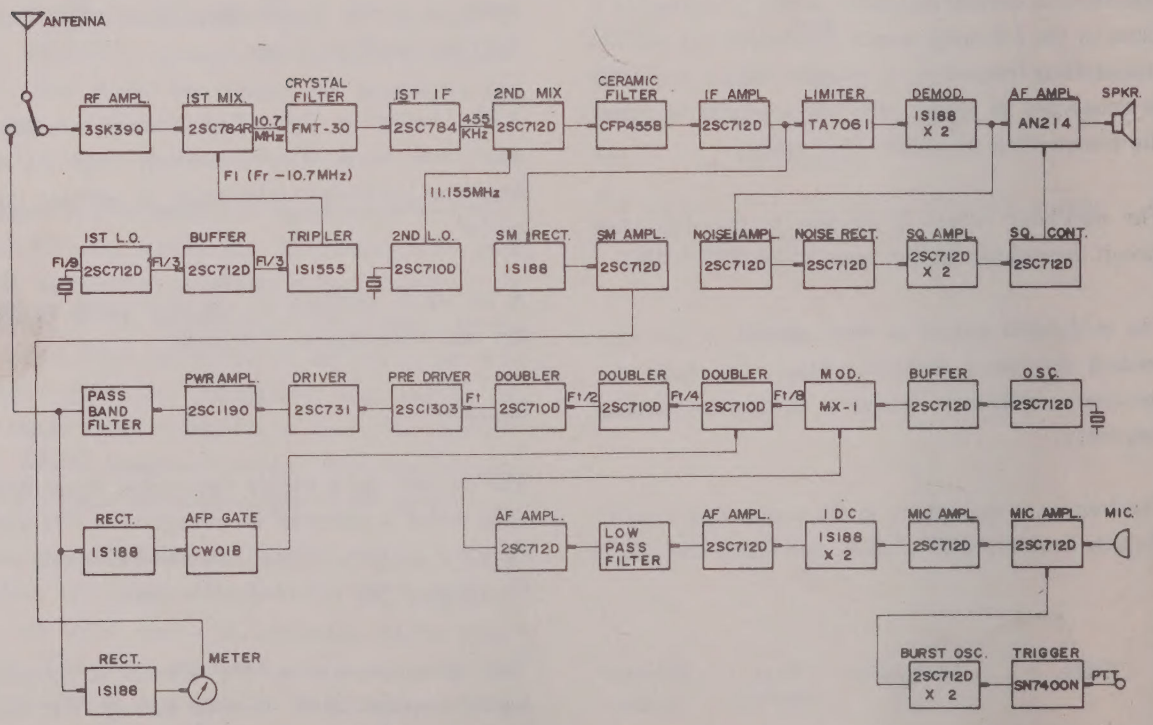
## SEMICONDUCTOR COMPLEMENT

### Transmitter

| | | |
|---|---|---|
| Q201 | Mic amplifier | 2SC712D |
| Q202 | Mic amplifier | 2SC712D |
| Q203 | Mic amplifier | 2SC712D |
| Q204 | Mic amplifier | 2SC712D |
| Q205 | Crystal oscillator | 2SC712D |
| Q206 | Buffer | 2SC712D |
| Q207 | Doubler | 2SC710D |
| Q208 | Doubler | 2SC710D |
| Q209 | Doubler | 2SC710D |
| Q210 | Pre-driver | 2SC1303 |
| Q211 | AFP gate | CW01B |
| Q401 | Driver | 2SC731 |
| Q402 | Power amplifier | 2SC1190 |
| Q117 | Tone burst generator | 2SC712D |
| Q118 | Tone burst generator | 2SC712D |
| Q122 | Tone burst trigger | SN7400N |

### Receiver

| | | |
|---|---|---|
| Q101 | RF amplifier | 3SK40 |
| Q102 | 1st Mixer | 2SC784R |
| Q103 | 1st IF amplifier | 2SC784R |
| Q104 | 2nd Mixer | 2SC712D |
| Q105 | 2nd IF amplifier | 2SC712D |
| Q106 | S-meter amplifier | 2SC712D |
| Q107 | Limiter amplifier | TA7061AP |
| Q108 | 1st Local oscillator | 2SC712D |
| Q109 | Buffer | 2SC712D |
| Q110 | 2nd Local oscillator | 2SC710D |
| Q111 | AF amplifier | AN214 |
| Q112 | Noise amplifier | 2SC712D |
| Q113 | Noise rectifier | 2SC712D |
| Q114 | SQUELCH amplifier | 2SC712D |
| Q115 | SQUELCH amplifier | 2SC712D |
| Q116 | SQUELCH control | 2SC712D |
| Q123 | AF amplifier | 2SC712D |




BLOCK DIAGRAM

## OPERATION

After all connections are made, rotate the SQUELCH knob fully counter-clockwise. Turn the VOLUME knob about one-half turn to apply power to the transceiver. If the transceiver is inoperative, check to determine if the pilot lamps which illuminate the meter and channel indicators are lighted. If not, recheck the power cord connections and fuse. Adjust the VOLUME control until the desired listening level is obtained. Select the desired channel by rotating the CHANNEL knob.

The SQUELCH control should be advanced slowly clockwise until background noise just disappears when a signal is not received. Excessive SQUELCH control insertion will mute the receiver even on strong signals.

To transmit, press the Push-To-Talk switch and speak into the microphone in a normal voice.

While the transceiver is in the transmit mode, a red lamp located above the channel selector will glow indicating RF output.

Release the Push-To-Talk switch to receive.

### HI/LOW Switch

The FT-2FB is provided with a HIGH/LOW switch on the front panel to provide output power of either 10 watts or 1 watt. For short range communication, the low power position should be used for minimum current drain from the power source.

### Meter Indicator

A meter is provided on the front panel to check the transceiver performance.

In the transmission mode, the meter indicates relative transmitter power output, and during operation in the receive mode, the meter indicates incoming signal strength. With a 100uV incoming signal, the meter will indicate 8 on the dial.

### BURST Switch

BURST Switch is located on the rear of chassis. In the ON position, a tone signal of approximately 1800 Hz is transmitted for a very short time at the beginning of the transmission. With the switch in the OFF position, this signal is disabled.

### Antenna

The FT-2FB is designed for use with a 50 ohm resonant antenna. The antenna is the most critical part of the transceiver installation. Communication range is dependent on how well the antenna system is installed and adjusted. A commercial 1/4 wave antenna is readily available from most local sources.

The length of coax cable between the transceiver and the antenna is not critical but the VSWR of the antenna (including cable) is important. If the VSWR is greater than 1.5 : 1.0, the antenna must be adjusted for a low VSWR to obtain maximum performance of the transceiver.

The output from the RF amplifier is then coupled to the first mixer Q102, 2SC784R.

The first mixer converts the RF signal into a 10.7 MHz intermediate frequency.

The output of the heterdyne oscillator Q108, 2SC-712D is amplified by the buffer stage Q109, 2SC-712D, and then coupled to a tripler D108, 1S1555 and multiplied. The frequency relationship is as follows :

$$\text{Xtal Frequency(MHz)} = \frac{\text{Signal Frequency} - 10.7}{9}$$

The local oscillator injection signal is 10.7 MHz lower than the signal received.

The first IF (10.7 MHz) signal is fed to a first IF amplifier Q103, 2SC784R, through a crystal filter, and amplified and then applied to a second mixer Q104, 2SC712D.

The second heterodyne signal of 11.155 MHz is generated by Q110, 2SC712D, and then fed to the second mixer to produce the 455 kHz second IF signal.

The 455 kHz second IF signal is amplified by Q105, 2SC712D, through the ceramic-mechanical filter. This filter determines the bandwidth and selectivity of the receiver.

The signal is then applied to limiter amplifier Q107, TA7061AP integrated circuit. The limiter is designed so that input signal variations in amplitude produce no change in the amplitude of the output signal. The output from the limiter is applied to the discriminator where the FM signal is converted to the audio signal which is then fed to the audio amplifier Q111, AN212 integrated circuit. The amplifier delivers 2.5 watts maximum output to the speaker.

The receiver SQUELCH circuit consists of a noise amplifier, Q112, a rectifier, Q113, DC amplifiers Q114 and Q115, and a DC controller, Q116, 2SC-712D's. The noise produced at the output of the discriminator is amplified by Q112, and rectified DC voltage controls Q116 to conduct when noise is present. In the absence of a incoming RF carrier, this DC control cuts off the audio amplifier Q111, AN214 and thus speaker noise is eliminated. The SQUELCH threshold is adjusted by rotating the potentiometer on the front panel.

## CRYSTAL CALCULATIONS

Transmit :

$$\text{Xtal Frequency(MHz)} = \frac{\text{Signal Frequency}}{8}\text{(MHz)}$$

Receive :

$$\text{Xtal Frequency} = \frac{\text{Signal Frequency} - 10.7}{9}\text{(MHz)}$$

### Accessory Socket Connection

| | |
|---|---|
| Pin 1 | Ground |
| Pin 2 | NC |
| Pin 3 | Discriminator output |
| Pin 4 | Ground |
| Pin 5 | Ground |
| Pin 6 | DC +12V |
| Pin 7 | DC +12V |
| Pin 8 | DC +12V through power switch |
| Pin 9 | PTT switch |

For remote PTT operation, connect a switch between Pin 1 and Pin 9.

# THEORY OF OPERATION

## Transmitter

The transmitter is phase modulated and has crystal controlled 12 channels within the 144 - 148 MHz.

The audio signal from the microphone is coupled to the audio amplifier stages Q201 and Q202, 2SC-712D's. The audio output from Q202 is coupled to the IDC (instantaneous Deviation Control) circuit where both positive and negative peaks are clipped by diodes D201 and D202, 1S188's when they exceed a predetermined clipping level. The IDC control VR202 adjusts the audio level applied to the modulator and is used to set the maximum transmitter deviation to the predetermined value. The output from IDC circuit is amplified by an audio amplifier Q203, 2SC712D and fed to the last audio amplifier stage Q204, 2SC712D through the low pass filter which passes the audio less than 2500 Hz. The output from Q204 is applied to the phase modulator.

An oscillator stage Q205, 2SC712D oscillates at the fundamental crystal frequency which is multiplied 8 times in the following stages to produce the desired transmitting frequency. A variable trimmer capacitor is connected in series with the crystals to adjust the transmitting frequency precisely.

The oscillator output is coupled to the modulator circuit through the buffer stage Q206, 2SC712D.

The modulated output is then applied to the succeeding frequency multiplier stages to obtain the necessary frequency deviation at the transmitting frequency.

The frequency multipliers in the transmitter consist of three doublers Q207, Q208, and Q209, 2SC710D's.

| Coils | Transistor | Frequency | Multiplication |
|---|---|---|---|
| L204, L205 | Q207, 2SC710D | 36 MHz | x 2 |
| L206, L207 | Q208, 2SC710D | 72 MHz | x 2 |
| L208, L209 | Q209, 2SC710D | 144 MHz | x 2 |

The RF signal is amplified by the buffer stage Q210, 2SC1303 and then coupled into class C amplifier stages which consist of driver Q401, 2SC731 and final amplifier Q402, 2SC1190. 10watts of RF power is delivered into a 50 ohm load through the pi-network passband filter.

AFP (Automatic Final Protection) circuit is provided to protect the final transistor against over load conditions, which may occur if the transmitter is keyed without an antenna or with a high VSWR antenna system. When the RF level at the collector of the final amplifier increase, diode D401, 1S188 detects this voltage and supplies a control voltage to the gate of Q211 (CW01B) which conducts. Thus the collector circuit of Q207, 2SC710D is grounded and RF energy is shunted to protect the following stages.

For low power operation, the power output is reduced to 1 watt by dropping the supply voltage to the final amplifier stages.

ATB (Automatic Tone Burst) circuit provides an audio tone burst of approximately 2800 Hz at the beginning of each transmission to activate the repeater.

A switch is provided on the rear panel to disable the tone burst signal, if desired.

## Receiver

The receiver is a double conversion super heterodyne which is designed for reception of FM signals on any of 12 fixed crystal controlled channels within the range of the 144 - 148 MHz band.

The signal received at the antenna is coupled to the RF amplifier Q101, 3SK40 through T-R change over relay. Q101 is a MOS FET transistor which provides high rejection to cross modulation and intermodulation effects caused by strong input signals.

Adjust L208 and L209 for maximum RF output at desired frequency. Adjust TC213, TC406, TC401, TC403 and TC404 for maximum output at the desired frequency.

A frequency counter should be used to determine the transmitting frequency. If a counter is not available adjust the trimmer capacitor connected in series with the transmitting crystal for the best audio quality on another receiver operating at the frequency.

Adjust L214 and VR203 for the above.

## AUTOMATIC FINAL PROTECTION CIRCUIT ADJUSTMENTS

Connect the VTVM between the gate of Q211 and ground.
Adjust VR3 for minimum VTVM reading.

Disconnect the antenna and adjust VR204 until the power output meter indicates Zero reading.

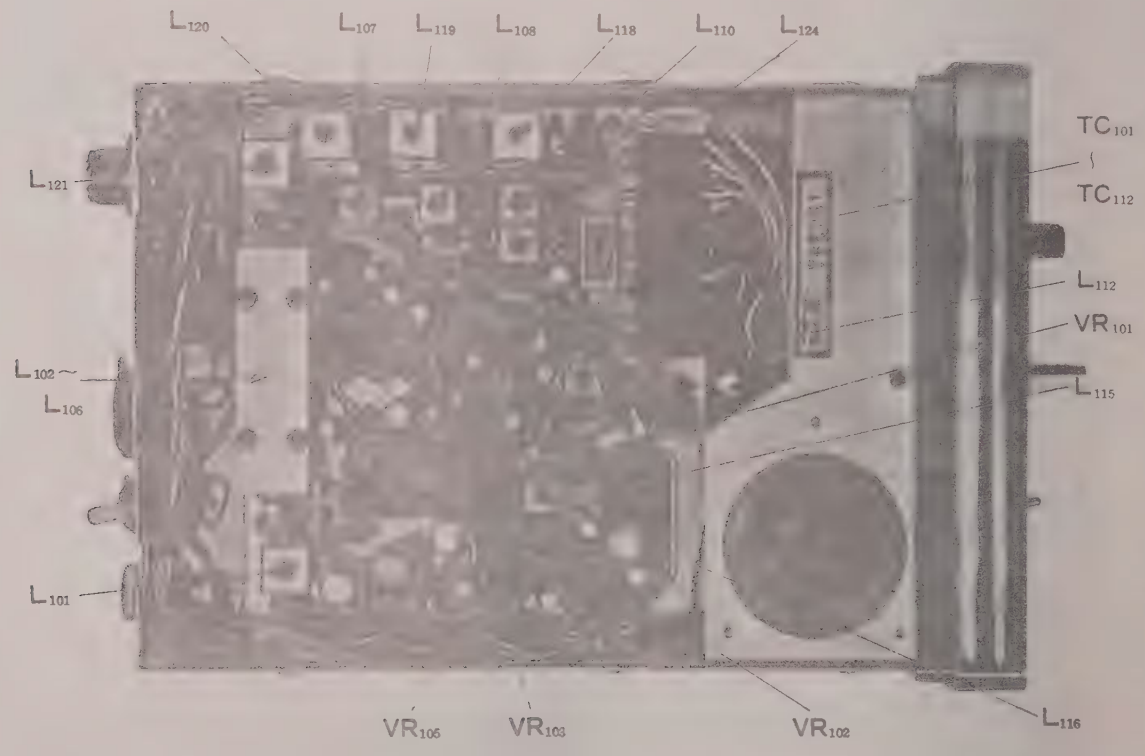
## RECEIVER ALIGNMENT

Connect VTVM RF probe to TP102 and peak L118 and L119 for maximum VTVM reading. Set the signal generator to the receiver frequency and connect to the antenna terminal.

Adjust L101 through L108, L110 and L112 for maximum reading on the S-meter.

Connect the VTVM to Pin 3 on the accessory socket and ground.
Detune L116 by rotating the tuning core fully clockwise, and adjust L115 for maximum VTVM reading. Then adjust L116 for zero VTVM reading.

This completes the transceiver alignment.




BOTTOM VIEW

The FT-2FB transceiver has been aligned and calibrated at the facfory with proper test instruments, and should not require realignment. Service or replacement of major components may necessitate subsequent realignment. Do not attempt alignment unless the operation of the transceiver is fully understood.

### Test Equipment Required

A signal generator, vacuum tube volt meter, and a RF wattmeter.

### Voltage and Resistance Measurements

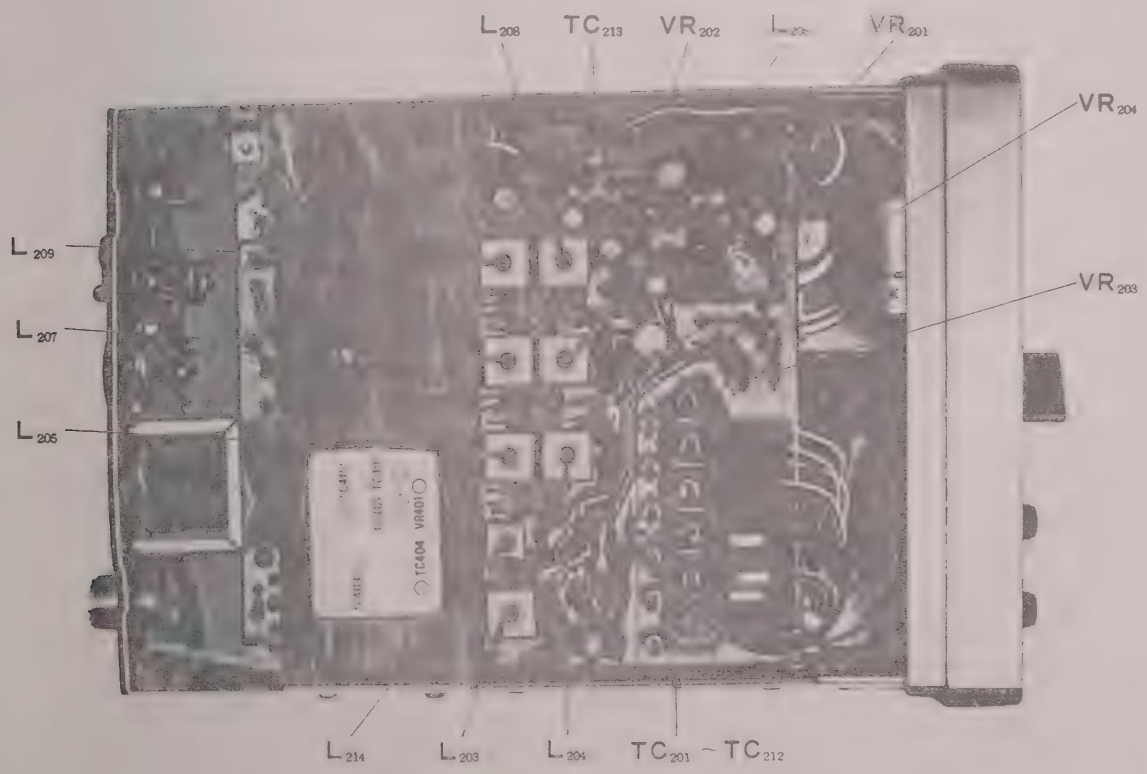
Charts are provided listing voltage and resistance values from transistor pins to ground. Measurements are to be made with a VTVM.

### TRANSMITTER ALIGNMENT

Test points are provided in the chart below to facilitate alignment. Extreme care is required to avoid tuning of coils to the improper harmonic. When adjusting coils always tune to the peak that provides maximum output at the desired transmitting frequency.

| TP201 | TP202 | TP203 |
|---|---|---|
| 1.3V DC | 0.7V DC | 1.2V DC |

Connect the RF wattmeter to the antenna terminal. Connect VTVM between TP201 and ground and tune L203 for maximum reading. Connect VTVM to TP202 and adjust L204 and L205 for maximum. L206 and L207 for TP203.




TOP VIEW

# VOLTAGE CHART

| No. | Emitter or Source | Base or Gate | Collector or Drain | No. | Emitter | Base | Collector |
|---|---|---|---|---|---|---|---|
| Q101 | 0.52 | (1) 0<br>(2) 3.5 | 8.5 | Q123 | 1.98 | 1.30 | 4.95 |
| Q102 | 0.16 | 0.76 | 8.5 | Q | | | |
| Q103 | 0.31 | 0.89 | 8.4 | Q201 | 0.17 | 0.73 | 5.1 |
| Q104 | 0.83 | 1.45 | 7.2 | Q202 | 2.45 | 3.10 | 3.1 |
| Q105 | 0.93 | 1.58 | 6.5 | Q203 | 3.75 | 4.35 | 8.4 |
| Q106 | 0.01 | 0.46 | 8.7 | Q204 | 0.31 | 0.93 | 8.7 |
| Q108 | 1.54 | 5.4 | 6.3 | Q205 | 4.75 | 4.70 | 3.45 |
| Q109 | 0.75 | 1.35 | 8.0 | Q206 | 1.35 | 0.88 | 9.2 |
| Q110 | 0.55 | 0.99 | 5.2 | Q207 | 1.16 | 1.42 | 9.8 |
| Q112 | 1.30 | 1.92 | 8.7 | Q208 | 0.86 | −0.73 | 9.2 |
| Q113 | 3.60 | 3.10 | 8.7 | Q209 | 1.34 | −1.30 | 12.4 |
| Q114 | 0.09 | 0.75 | 0.15 | Q210 | 0 | −0.12 | 12.2 |
| Q115 | 0.09 | 0.07 | 5.5 | Q401 | 0 | 0 | 12.9 |
| Q116 | 0 | 0.66 | 0.01 | Q402 | 0 | −0.05 | 12.5 |
| Q117 | 1.98 | 1.30 | 4.95 | No. | Cathode | Gate | Anode |
| Q118 | 1.98 | 1.15 | 5.1 | Q211 | 0 | 0.34 | 9.9 |

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q107 | 1.9 | 1.9 | 6.0 | 0 | 6.6 | 1.9 | 1.9 | | | | | | | |
| Q111 | 6.3 | 0 | 7.6 | 11.5 | 6.2 | 0 | 5.7 | 13.0 | 13.5 | | | | | |

* Voltage values are in volts DC, and measured by VTVM.
* Both VOL and SQUELCH controls fully counter clockwise.

# RESISTANCE CHART

| No. | Emitter or Source | Base or Gate | Collector or Drain | No. | Emitter | Base | Collector |
|---|---|---|---|---|---|---|---|
| Q101 | 200 | (1) 100K<br>(2) 13.5K | 280 | Q123 | 540 | 27K | 2.4K |
| Q102 | 940 | 3K | 460 | Q | | | |
| Q103 | 710 | 3K | 680 | Q201 | 650 | 23K | 13K |
| Q104 | 730 | 3.9K | 1.35 | Q202 | 1K | 13K | 1.7K |
| Q105 | 220 | 4.5K | 800 | Q203 | 700 | 12.5K | 190 |
| Q106 | 1K | 13K | 350 | Q204 | 150 | 220 | 780 |
| Q108 | 150 | 3.9K | 570 | Q205 | 1.5K | 15K | 90 |
| Q109 | 320 | 3.8K | 580 | Q206 | 330 | 4K | 90 |
| Q110 | 460 | 2.9K | 1.5K | Q207 | 100 | 4K | 250 |
| Q112 | 480 | 5.3K | 350 | Q208 | 56 | 1.4K | 260 |
| Q113 | 4K | 51K | 3.2K | Q209 | 56 | 1.4K | 70 |
| Q114 | 21 | 84K | 1.8K | Q210 | 0 | 100 | 70 |
| Q115 | 21 | 55K | 1.8K | Q401 | 0 | 0.7 | 70 |
| Q116 | 0 | 58K | 2.3K | Q402 | 0 | 0.7 | 70 |
| Q117 | 540 | 27K | 2.4K | No. | Cathode | Gate | Anode |
| Q118 | 540 | 27K | 2.4K | Q211 | 0 | 1.7K | 260 |

| No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Q107 | 1.4K | 1.2K | 1.2K | 0 | 0.8K | 1.4K | 1.4K | | | | | | | |
| Q111 | 1.2K | 0 | 1.2K | 2.4K | 1.2K | 0 | 1.8K | 45K | 0.05K | | | | | |

* Values are in ohms, and measured by VTVM.
* Both VOL and SQUELCH controls fully counter clockwise.

| | | | |
|---|---|---|---|
| 117, 136, 142, 152, 158 | ¼W | 4.7KΩ | ±10% |
| 160, 164, 168, 188, 197, | | | |
| 223, 230 | | | |
| 121 | ¼W | 5.6KΩ | ±10% |
| 218 | ¼W | 6.8KΩ | ±10% |
| 126, 132, 146, 154, 157, | ¼W | 10 KΩ | ±10% |
| 159, 161, 169, 172, 173, | | | |
| 192 | | | |
| 179, 208, 209 | ¼W | 15 KΩ | ±10% |
| 102, 116, 122, 135, | ¼W | 22 KΩ | ±10% |
| 143, 148, 163, 165, 180, | | | |
| 181, 190, 204, 210, 211, | | | |
| 220, 229, 403, 404 | | | |
| 110, 125, 212, 221 | ¼W | 27 KΩ | ±10% |
| 103, 107, 134, 202, 224 | ¼W | 33 KΩ | ±10% |
| 114, 115, 130, 131, 167 | ¼W | 47 KΩ | ±10% |
| 182 | | | |
| 101 | ¼W | 100 KΩ | ±10% |
| 153 | ¼W | 220 KΩ | ±10% |
| CARBON COMPOSITION | | | |
| 219 | ½W | 47 Ω | ±10% |
| 195 | ½W | 680 Ω | ±10% |
| 196 | 1 W | 39 Ω | ±10% |
| WIRE-WOUND | | | |
| 405 | 10W | 18 Ω | ±10% |

| VR-VARIABLE RESISTOR | | |
|---|---|---|
| 1 | EVHBOKK15A14 | 10KΩA |
| 2 | EVHBOAK15B24 | 20KΩB |
| 201 | EVLSOA00B52 | 500 ΩB |
| 105 | EVLSOA00B13 | 1KΩB |
| 202 | EVLSOA00B53 | 5KΩB |
| 102, 103, 203, 204 | EVLSOA00B14 | 10KΩB |
| 101 | EVLSOA00B54 | 50KΩB |
| 401 | SR19R001 | 47KΩB |

| L-INDUCTOR | | |
|---|---|---|
| 1 | AF CHOKE 2.4mH | 2.5A |
| 101 | ANT. TRANS. | |
| 102 | R. F. RESONATOR-A | |
| 103～105 | R. F. RESONATOR-B | |
| 106 | R. F. RESONATOR-C | |
| 107, 108 110, 124 | 10.7MHz IFT | |
| 110, 116, 112 | 455KHz IFT | |
| 115 | 455KHz IFT | |
| 118 | LOCAL OSCILLATOR | |
| 119 | L. O. BUFFER | |
| 120 | L. O. MULTIPLIER-A | |
| 121 | L. O. MULTIPLIER-B | |
| 203 | MODULATOR | |
| 204 | MULTIPLIER-A | 36MHz |
| 205 | MULTIPLIER-B | 36MHz |
| 206 | MULTIPLIER-A | 72MHz |
| 207 | MULTIPLIER-B | 72MHz |
| 208 | MULTIPLIER-A | 144MHz |
| 209 | MULTIPLIER-B | 144MHz |
| 213,403,407,408,409 | TUNING COIL | 144MHz |
| 214 | MODULATOR | |
| 109 | R. F. CHOKE COIL-A | |
| 402, 404, 406 | R. F. CHOKE COIL-B | |
| 212 | R. F. CHOKE COIL-C | |
| 117, 210, 401, 405 | 10μH | |
| 202, 211 | 250μH | |
| 113 | 510μH | |
| 112, 114, 122, 123 | 2mH | |
| 201 | 68mH | |

| F-FILTER | | |
|---|---|---|
| 101 | CRYSTAL FMT-30 | |
| 102 | CERAMIC CFM-455B | |

| J-RECEPTACLE & SOCKET | | |
|---|---|---|
| 1 | ACCESSORY | S-B7706 |
| 2 | POWER | FM-142 |
| 3 | MICROPHONE | FM-144 |
| 4 | ANTENNA | JSO-239 |
| 5 | EXT. SPEAKER | P-2240 |

| S-SWITCH | | |
|---|---|---|
| 1 | SRE-E22CF-30AE | |
| 2, 4 | MST-206N | |

| SP-SPEAKER | | |
|---|---|---|
| 1 | BELCOM B-22 | |

| M-METER | | |
|---|---|---|
| 1 | MK-23 | |

| PL-INDICATOR LAMP | | |
|---|---|---|
| 1～3 | 14V40mA | |

| PB-PRINTED CIRCUIT BOARD | | |
|---|---|---|
| PB-1133(A～Z) | TMTR. DRIVER | |
| PB-1143(A～Z) | TMTR. BOOSTER | |
| PB-1146(A～Z) | RECEIVER | |

| XS-CRYSTAL SOCKET | | |
|---|---|---|
| 101, 201 | S-20 12P | |

| X-CRYSTAL | | |
|---|---|---|
| 101～112 | RCVR. L. O. CRYSTAL | |
| 113 | HC-18/U 11.155MHz | |
| 201～212 | TMTR. OSC. CRYSTAL | |

| RL-RELAY | | |
|---|---|---|
| 401 | MT-2 12V 25mA | |

## Q-IC, FET, SCR & TRANSISTOR

### TRANSISTOR

| | |
|---|---|
| 110, 207～209 | 2SC710D |
| 103～106, 108, 109, 112～118, 122, 201～206 | 2SC712D |
| 401 | 2SC731 |
| 102 | 2SC784R |
| 402 | 2SC1190 |
| 210 | 2SC1303 |

### FIELD EFFECT TR.

| | |
|---|---|
| 101 | 3SK39Q |

### INTEGRATED CIRCUIT

| | |
|---|---|
| 111 | AN212 |
| 107 | HA1111 |
| 121 | SN7400N |

### S. C. R.

| | |
|---|---|
| 211 | CW01B |

## D-DIODE

### GERMANIUM

| | |
|---|---|
| 101～103, 105, 106, 109, 112, 201, 202, 401, 402 | 1S188FM1 |

### SILICON

| | | | |
|---|---|---|---|
| 108 | 1S1555 | | |
| 1 | DS130ND | | |
| 104 | V06B | | |

### ZENER

| | | | |
|---|---|---|---|
| 113 | AW0109 | 9V | 1W |
| 110, 203 | WZ090 | 9V | 500mW |
| 111 | 1S330 | 5V | 250mW |

### VARACTOR

| | |
|---|---|
| 204 | MX1 |

## C-CAPACITOR

### DIPPED MICA

| | | | |
|---|---|---|---|
| 153, 241, 410, 412 | 50WV | 1PF | ±0.5PF |
| 108, 157, 234 | 50WV | 2PF | ±0.5PF |
| 101, 228, 246, 416 | 50WV | 5PF | ±0.5PF |
| 6, 152 | 50WV | 8PF | ±0.5PF |
| 151, 240 | 50WV | 10PF | ±1PF |
| 148, 242, 406, 408 | 50WV | 15PF | ±10% |
| 140, 244, 247～258 | 50WV | 20PF | ±10% |
| 102, 115, 155, 233, 407 | 50WV | 30PF | ±10% |
| 109, 194～200, 1101～1105, 245 | 50WV | 40PF | ±10% |
| 107, 203, 227 | 50WV | 50PF | ±10% |
| 139, 154 | 50WV | 60PF | ±10% |
| 236, 237 | 50WV | 70PF | ±10% |
| 138, 403 | 50WV | 80PF | ±10% |
| 112, 217, 225, 230, 231 | 50WV | 100PF | ±10% |
| 132 | 50WV | 120PF | ±10% |
| 215 | 50WV | 180PF | ±10% |
| 133, 134 | 50WV | 300PF | ±10% |
| 124, 125 | 50WV | 400PF | ±10% |
| 170 | 50WV | 470PF | ±10% |

### CERAMIC DISC

| | | | |
|---|---|---|---|
| 135, 169, 172, 173, 202, 204, 212, 216 | 50WV | 0.001μF | $^{+80}_{0}$% |
| 3～5, 9, 103～106, 110, 111, 119, 121, 122, 141, 145, 146, 149, 150, 156, 158, 174, 187, 191, 192, 214, 218～223, 226, 229, 232, 235, 238, 239, 259, 261, 402, 409, 411, 413～415 | 50WV | 0.01μF | $^{+80}_{0}$% |
| 1, 7, 113, 114, 116～118, 120, 123, 126～128, 130, 131, 136 | 50WV | 0.047μF | $^{+80}_{0}$% |

### ELECTROLYTIC

| | | | |
|---|---|---|---|
| 188 | 6.3WV | 330μF | |
| 201, 206, 207, 211 | 16WV | 1μF | |
| 129, 159, 160, 162, 163, 168, 171, 175～177, 180, 182, 189, 205, 208 213, 243 | 16WV | 10μF | |
| 165 | 16WV | 33μF | |
| 224 | 16WV | 47μF | |
| 190, 260, 404, 405 | 16WV | 100μF | |
| 166, 193 | 16WV | 220μF | |
| 2 | 16WV | 470μF | |

### PLASTIC FILM

| | | | |
|---|---|---|---|
| 164, 178, 179 | 50WV | 0.01μF | ±20% |
| 161, 209, 210 | 50WV | 0.047μF | ±20% |
| 167, 181 | 50WV | 0.1μF | ±20% |

## TC-TRIMMER CAPACITOR

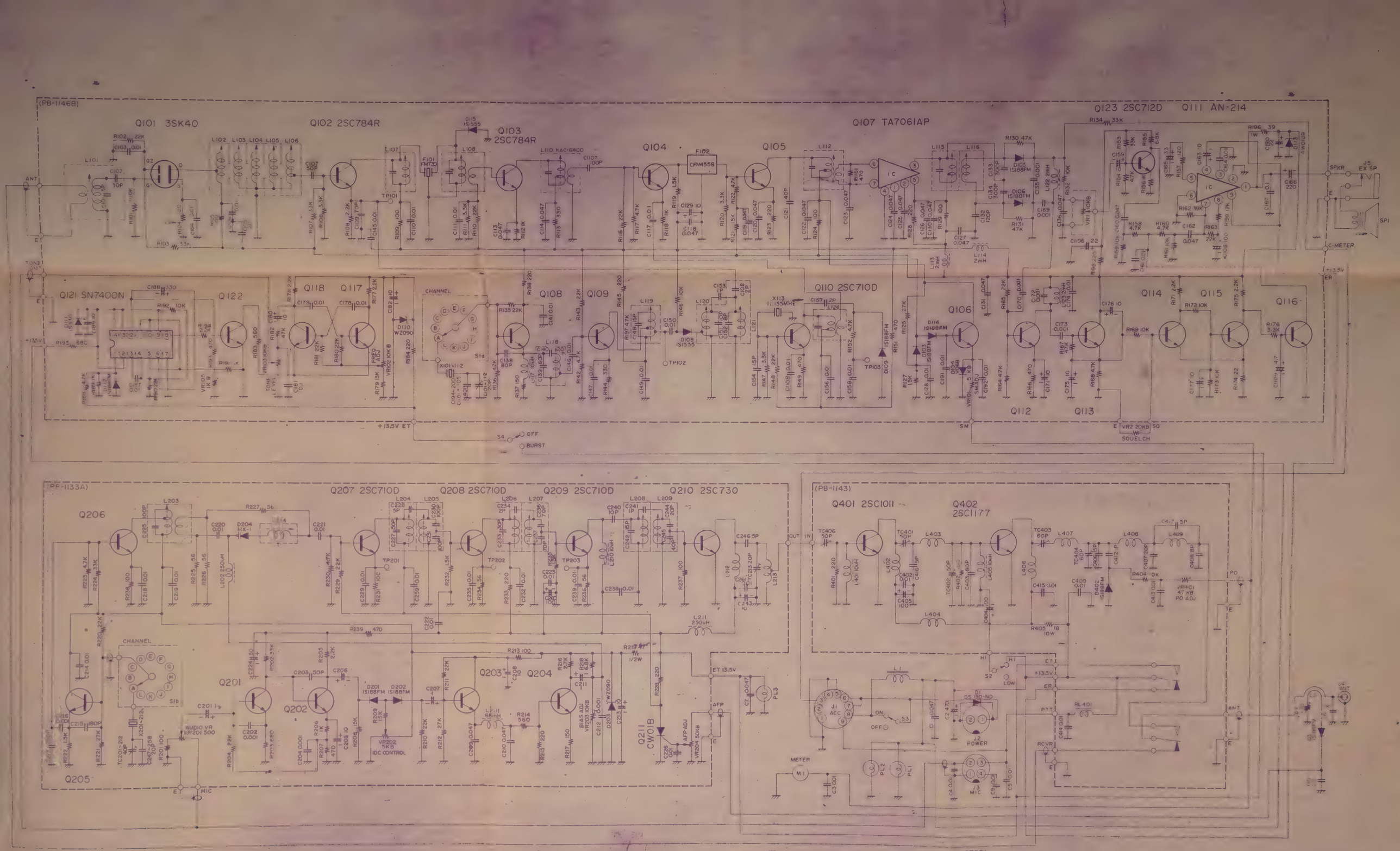
### CERAMIC

| | |
|---|---|
| 213 | ECV1ZW20P32 |
| 101～112 | ECV1ZW20P50 |
| 201～212 | ECV1ZW40P32 |
| 401, 402, 406 | ECV1ZW50P32 |
| 403, 404 | CV08S600 |

## R-RESISTOR

### CARBON FILM

| | | | | |
|---|---|---|---|---|
| 174 | ¼W | 22 | Ω | ±10% |
| 225～227, 234, 236 | ¼W | 56 | Ω | ±10 |
| 105, 109, 170, 201, 213, 231, 237, 238, 402 | ¼W | 100 | Ω | ±10% |
| 129, 137, 217 | ¼W | 150 | Ω | ±10% |
| 104, 123, 138, 145, 184, 215, 228, 233, 401 | ¼W | 220 | Ω | ±10 |
| 113, 144, | ¼W | 330 | Ω | ±10% |
| 124, 149, 151, 162, 166, 193, 207, 239 | ¼W | 470 | Ω | ±10% |
| 183, 214 | ¼W | 560 | Ω | ±10% |
| 203 | ¼W | 680 | Ω | ±10% |
| 112, 118, 156, 189, 191, 206 | ¼W | 1 | KΩ | ±10% |
| 119, 120, 127, 155, 222, 232, 235 | ¼W | 1.5 | KΩ | ±10% |
| 108, 150, 171, 175, 177, 178, 194, 205 | ¼W | 2.2 | KΩ | ±10% |
| 216 | ¼W | 2.7 | KΩ | ±10 |
| 106, 111, 128, 147, 176 | ¼W | 3.3 | KΩ | ±10 |

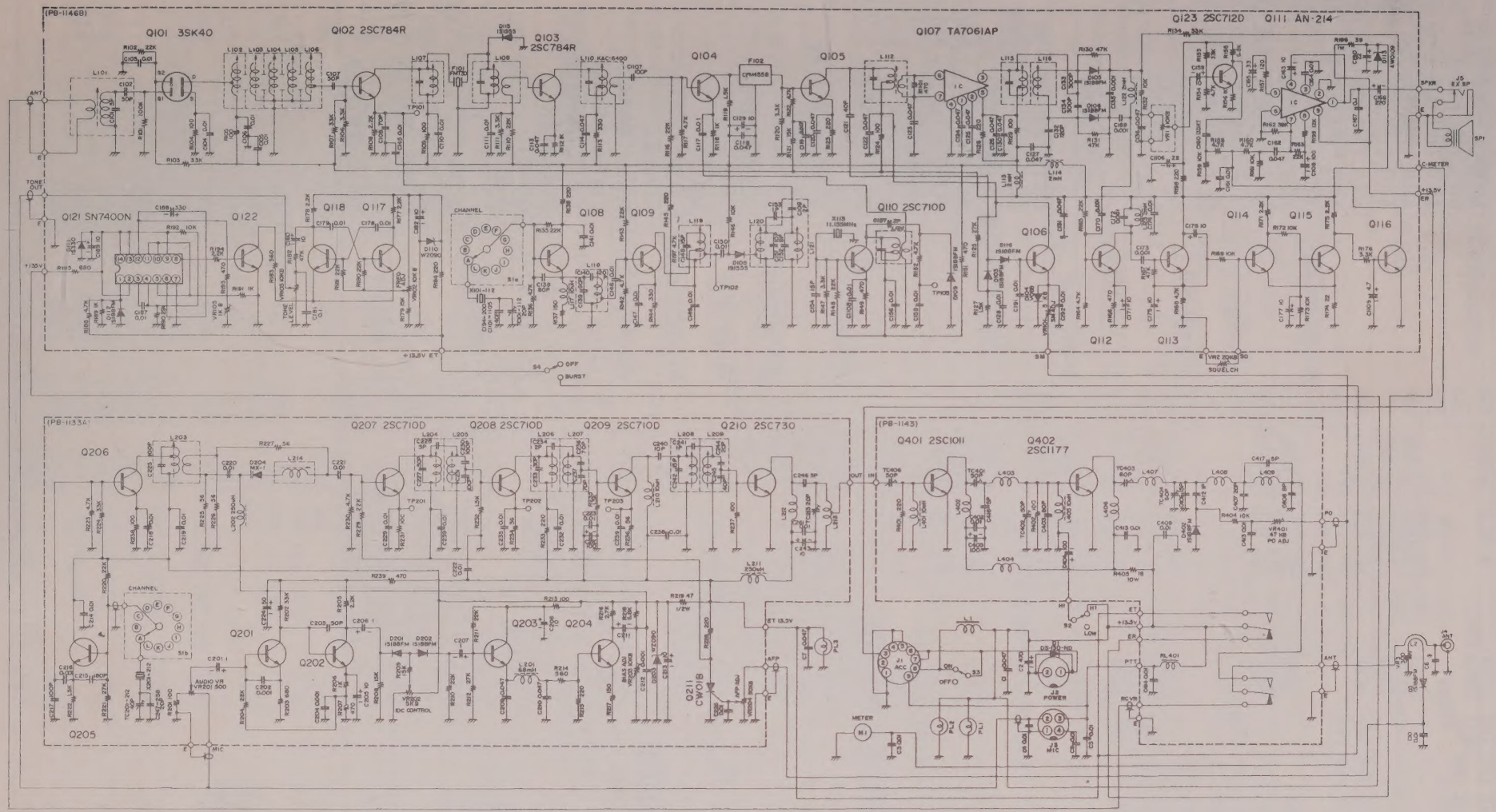



NOTES:

1. ALL TRANSISTORS ARE 2SC712D UNLESS OTHERWISE NOTED.
2. ALL RESISTORS IN Ω 1/4W 10% UNLESS OTHERWISE NOTED.
3. ALL CAPACITORS IN uF UNLESS OTHERWISE NOTED.
4. * VALUE IS NOMINAL.

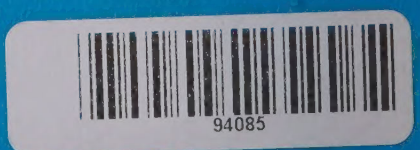
+ — 16WV

# FT-2F B
## CIRCUIT DIAGRAM




FT-2F B
CIRCUIT DIAGRAM


YAESU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