OTHER CIRCUITS

Some circuits work for both transmitting and receiving and are described as follows:

PLL CIRCUIT: VFO unit PB-1465
FIX unit PB-1453
LOCAL unit PB-1454
PLL unit PB-1455

The FT-221R utilizes a phase lock loop system for the heterodyne oscillator providing a stable signal varying from 133.3 through 137.3 MHz to cover the entire 2 meter band.

VFO UNIT (PB-1465)

The VFO module board is installed in the VFO chassis. The VFO (variable frequency oscillator) Q_{1301}, **2SC372Y**, generates an 8,000 to 8,500 kHz signal and produces a 500 kHz main tuning dial range. Frequency drift is minimized through the use of a temperature compensation circuit utilizing a differential trimmer capacitor. The signal is fed through the amplifier buffer stage Q_{1302}, **2SK19GR**, and Q_{1303}, **2SC372Y**, to pin 11 of the FIX oscillator board. The buffer amplifier provides isolation and amplification of the VFO signal.

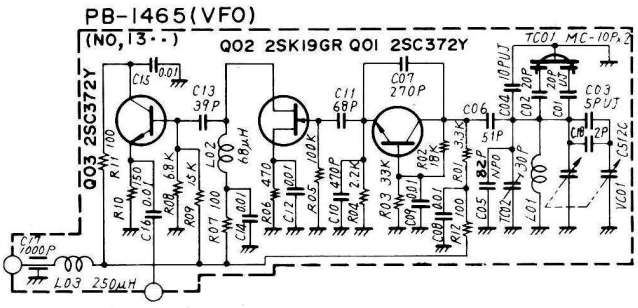


Figure 18

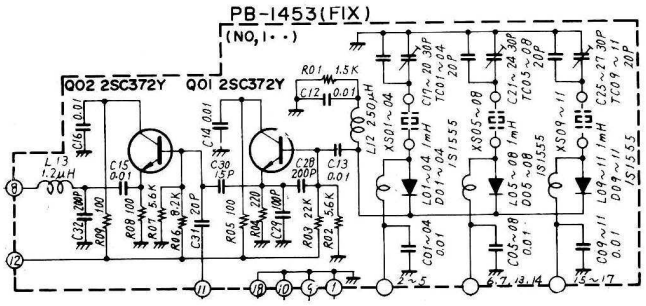


Figure 19

FIX UNIT (PB-1453)

In addition to normal VFO operation, 11 crystals may be selected for crystal controlled operation with the selector switch located on the front panel of the transceiver.

The FIX channel crystal oscillator Q_{101}, **2SC372Y**, oscillates at the frequency of the crystal selected by the diode switch D_{101} through D_{111}, **1S1555**. The output is fed from pin 8 through the buffer amplifier Q_{102}, **2SC372Y**, to the PLL unit.

The signal from the VFO also passes through this buffer stage to the PLL unit.

The crystal frequency falls between 8,000 and 8,500 kHz and is determined as follows.

$$fx = f_0 - f_1$$

where f_1 is given in Table 1 on page 12 and f_0 is the operating frequency.

LOCAL UNIT (PB-1454)

This oscillator generates a heterodyne signal which is used to convert the VCO (voltage controlled oscillator) signal to an 8,000 to 8,500 kHz signal, which is used for the comparison of the phase with that of the reference (VFO) signal.

The crystal controlled oscillator Q_{201}, **2SC372Y**, oscillates at the fundamental frequency of the crystal. A varactor diode D_{226}, **1SV50**, connected to the base of Q_{201}, is used as a clarifier to shift the oscillator frequency for receiver off-set tuning.

The output from the oscillator is fed to the frequency multiplier stage, Q_{202} and Q_{203}, **2SC784R**, producing the ninth harmonic at its output. The crystal is selected by the diode switch connected to the band switch. The relation between the frequency and band is shown on Table 2. The multiplied signal is then fed from pin 3 to the PLL unit.

For repeater operation, a fundamental crystal at 14.1333 MHz, X210, is used to generate a heterodyne signal of 127.2 MHz which is 600 kHz higher than the normal heterodyne signal when the band switch is set to the 146.5 MHz segment and X211 (fundamental frequency 14.3222 MHz) is used to generate 128.3 MHz signal which is 600

kHz higher than the normal heterodyne signal when the band switch is set to the 147.0 segment.

A relay, RL_{1001} in the tone burst unit is used to select the above crystals with the Repeater switch, S_8, in the ON position. When the Normal-Reverse switch, S_9, is set to the NOR position, the relay selects the repeater crystal on transmit that shifts the transmitting frequency down 600 kHz in the 146.5 MHz segment and shifts up 600 kHz in the 147.0 MHz band. The main VFO tuning dial indicates the received frequency.

With S_9 in the REV position, the relay selects the repeater crystal on receive that shifts the receiver frequency down 600 kHz in the 146.5 MHz segment and shifts up 600 kHz in the 147.0 MHz segment. The main tuning dial now indicates the transmitted frequency.

BAND	Crystal No.	Crystal Frequency	Local Frequency
		MHz	MHz
144.0	X_{201}	13.9222	125.3
144.5	X_{202}	13.9777	125.8
145.0	X_{203}	14.0333	126.3
145.5	X_{204}	14.0888	126.8
146.0	X_{205}	14.1444	127.3
146.5	X_{206}	14.2000	127.8
	X_{210}	*14.1333	127.2
147.0	X_{207}	14.2555	128.3
	X_{211}	*14.3222	128.9
147.5	X_{208}	14.3111	128.8

*Repeater for US Model.

Table 2

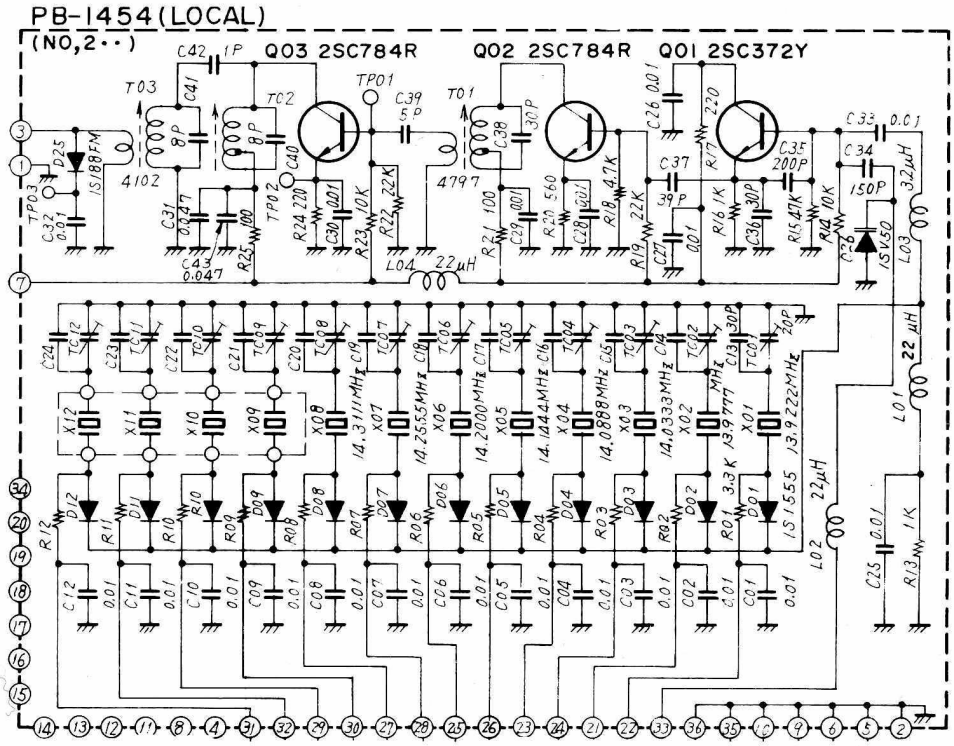


Figure 20

PLL UNIT (PB-1455)

This unit generates a heterodyne signal for the transmitter and receiver mixer in conjunction with the Phase Lock oscillator.

A voltage controlled oscillator Q_{305}, **2SK19GR**, generates a signal between 133.3 MHz and 137.3 MHz which is determined by L_{301}, TC_{301}, C_{324}, D_{305} and D_{306}. The varactor diode, D_{305}, changes the frequency by the DC voltage which is delivered from the phase detector amplifier Q_{301}, **2SK19GR**. The varactor diode, D_{306}, is used to shift the oscillating frequency in accordance with the band switch setting for a stable lock of the VCO. The output from the VCO, Q_{305}, is fed through a two stage buffer amplifier Q_{306}, **2SK19GR**, Q_{307}, **2SC784R**, to the mixers, Q_{405} in receive, Q_{501} and Q_{502} in transmit.

A portion of the output from Q_{306} is amplified through the buffer amplifier Q_{304}, **2SC372Y**, and is fed to the mixer Q_{303}, **2SC372Y**, where the signal from local oscillator unit is converted into a 8,000 to 8,500 kHz comparison signal.

This comparison signal is amplified by the amplifier Q_{302}, **μA703HC** and fed to the phase detector circuit consisting of diodes, D_{303} and D_{304}, **1S-1007**.

The phase detector compares the phase of the comparison signal with that of the reference signal which is fed through pin 17 from the FIX unit (VFO or FIX crystal signal), and any phase difference is converted into an error correcting voltage. This error voltage is amplified by Q_{301}, **2SK19GR**, and fed to the varactor diode D_{305}, **1SV50**, which changes the output signal phase to track the input.

The programmable unijunction transistor D_{301}, **N13T1**, generates a sawtooth wave when the VCO is unlocked. The sawtooth wave is used to lock the VCO. A portion of it is fed to the inverter Q_{308}, and rectified by Q_{310} **1S1555**.

The rectified voltage causes Q_{309}, **2SC372Y**, to conduct and its emitter voltage is used to conduct Q_{607} in the AF unit thus shorting the audio input to quiet the receiver when the PLL is unlocked.

In transmit, this voltage controls Q_{507} in the EXCITER unit causing Q_{506} cut off to disable the exciter stages. Thus, the transmitter and receiver stop functioning when the VCO is unlocked. With this voltage, a multivibrator Q_{308}, **TP4011AN**, produces a blanking pulse which controls the pilot lamp driver Q_{310}, **MPSA13**, causing the pilot lamp to flicker indicating VCO unlock.

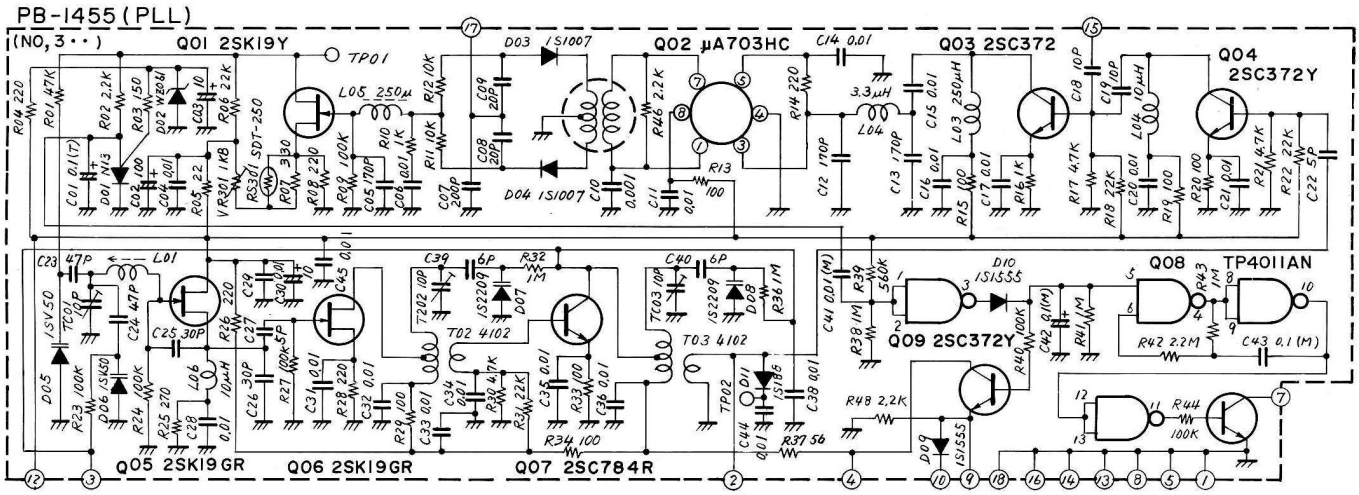


Figure 21

MARKER UNIT (PB-1459)

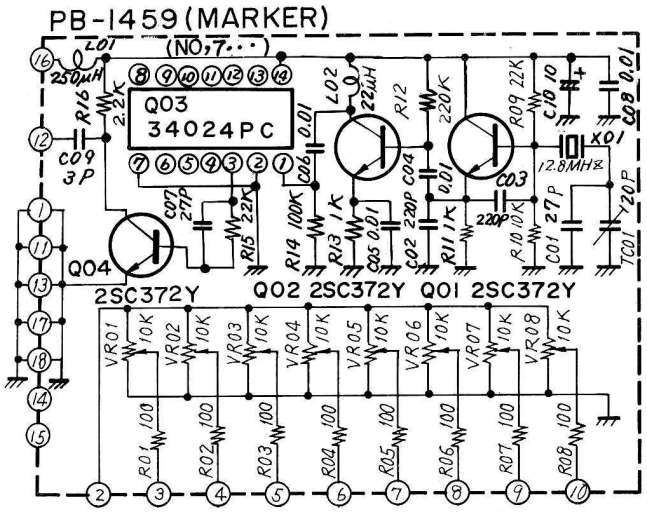


Figure 22

The crystal marker generator Q_{701}, **2SC372Y**, generates a 12.8 MHz signal, and its output is fed through the buffer amplifier Q_{702}, **2SC372Y**, to the frequency divider Q_{703}, **34024PC**, where the 12.8 MHz signal generates a 100 kHz marker signal. The marker signal is fed through a buffer amplifier Q_{704}, **2SC372Y** to the RX RF unit. When the marker switch is ON, the antenna relay is activated to disconnect the antenna.

Potentiometers VR_1 through VR_8 are installed in this board. These potentiometers are set to change the tuning frequency of the VCO and the exciter tuning circuits.

TONE BURST UNIT (PB-1461)

The tone burst signal is automatically transmitted in the following manner. When the PTT switch of the microphone is pressed momentarily before a normal transmission, the rapid voltage change in the PTT circuit causes a pulse to be fed to the tone burst control circuit consisting of Q_{1001}, Q_{1002}, Q_{1003}, **TP4011AN**, and Q_{1004}, **TP4049AN**, thus activating the tone burst oscillator Q_{1003}, **TP4011AN**.

Normal push-to-talk operation does not produce a pulse to activate the tone burst oscillator.

The tone frequency may be adjusted to any frequency between 1000 to 2000 Hz with VR_{1002} and the tone burst duration may be adjusted with VR_{1001}. The tone signal output level may be adjusted with VR_{1003}. The output from the tone burst oscillator is fed through the buffer Q_{1006}, **2SK19GR**, to pin 29 in the MIC AMP unit.

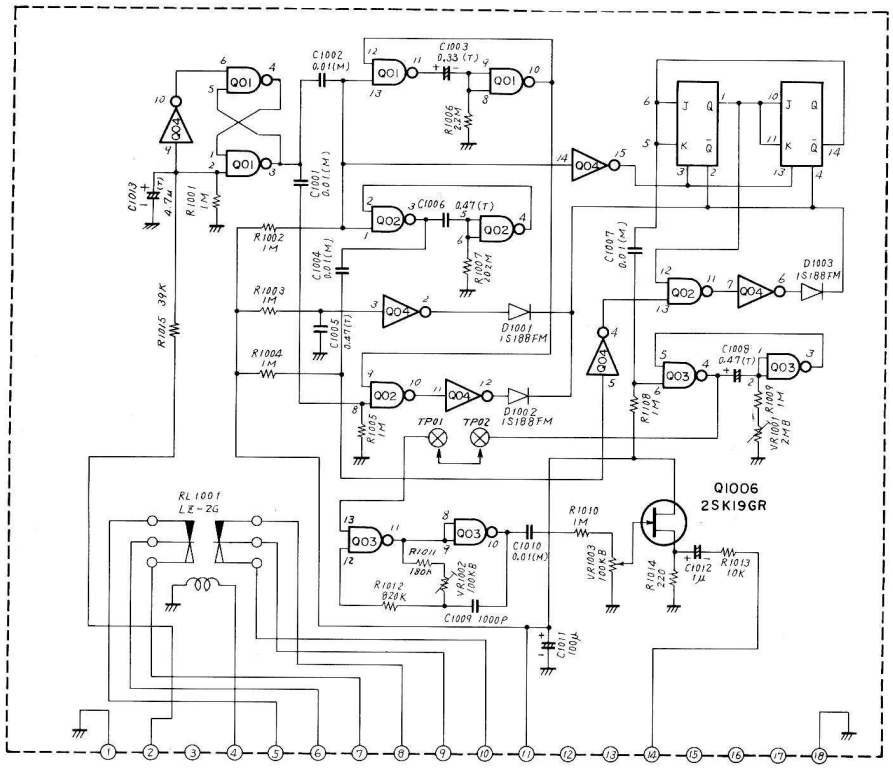


Figure 23 TONE BURST UNIT PB-1461

POWER SUPPLY & REGULATOR UNIT (PB-1469)

The power supply has been designed to operate from 100/110/117/200/220 or 234 volts AC 50/60 Hz, or 12 volts DC, negative ground. Inserting the appropriate power plug into the rear panel receptacle makes the necessary connections to operate the supply in either mode, AC or DC.

For AC operation, the DC voltage is supplied from the bridge connected rectifier unit D_{150}, **M4B-5**, which is connected to a 20 volt, 3.5 amps secondary winding of the power transformer. The DC voltage is regulated at 13.5 volts by the voltage regulator circuit consisting of Q_{1501}, **2SD313D**, and Q_1, **2SD114**.

Since such circuits as the VFO, local oscillator PLL circuit, require an extremely stabilized voltage, the 13.5 volts DC voltage is further stabilized at 8 volts by the voltage regulator Q_{1503}, **2SC735Y**, Q_{1504}, **2SD313D**, and Q_{1505}, **2SC372Y**.

For DC operation, the positive voltage is connected to pin 3 and the negative voltage to pin 4, of the power receptacle, J_1. To protect the circuits from any reverse connection of the DC voltage, D_1, **DS130YD**, conducts heavily in the reverse polarity connection to blow the line fuse in the DC cord. It is placed between pin 3 and ground on J_1.

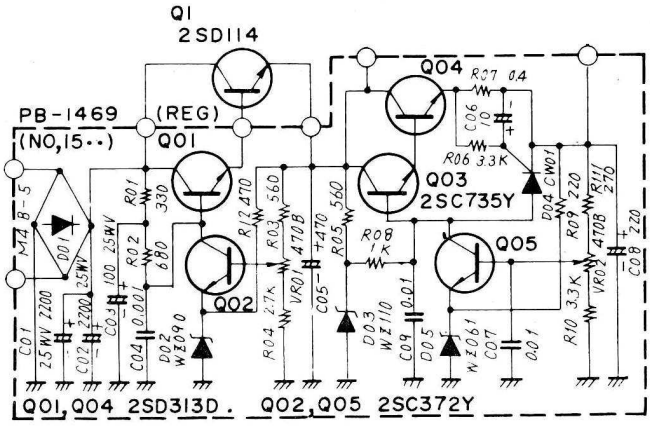
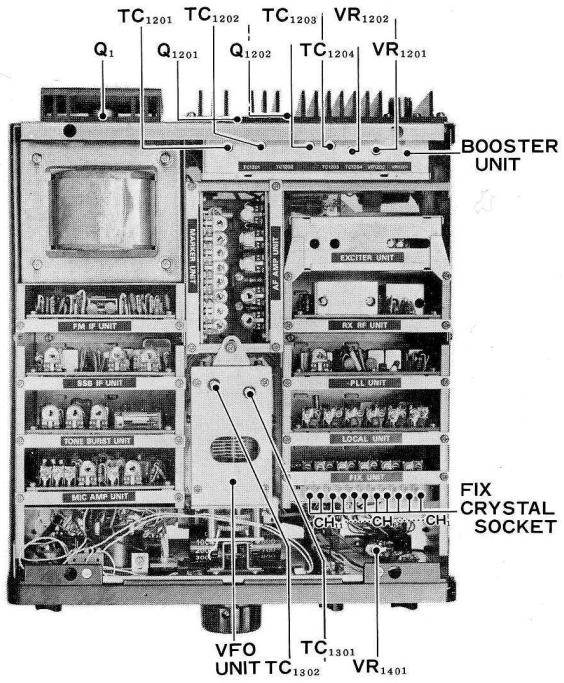
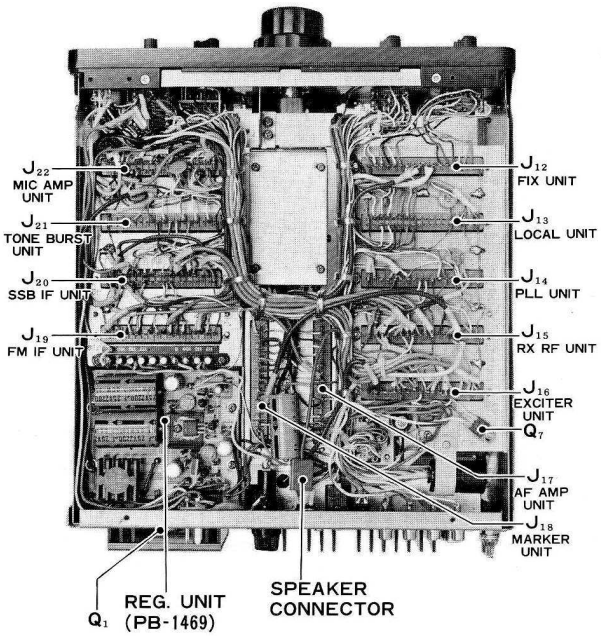


Figure 24



TOP VIEW

Figure 25



BOTTOM VIEW

Figure 26

MAINTENANCE & ALIGNMENT

GENERAL

Your model FT-221R transceiver has been carefully aligned and tested at factory prior to shipment. The reliability of the solid-state devices used in the FT-221R should provide years of trouble free service if the transceiver is not abused and normal, routine maintenance is carried out.

The following precautions should be observed to prevent damage to the transceiver:

(1) Do not interchange the AC and DC power cords.
(2) Do not apply any AC voltage other than the voltage determined by the transformer wiring.
(3) Do not exceed 14 volts DC, at the POWER receptacle, on DC operation. When operating mobile, check the battery voltage under the load (transmitter "keyed" in FM mode) with the engine running fast enough so the ammeter shows a "charge". In addition, do not operate the FT-221R if the supply voltage is below 12 volts DC.
(4) Avoid direct exposure to sunshine or water.

ROUTINE MAINTENANCE

Routine maintenance should be limited to keeping the transceiver clean, and periodic performance checks of the transmitter RF power output and the receiver sensitivity.

Cleaning:

When the transceiver has been used in dusty or sandy areas, the interior should be periodically cleaned. A vacuum-cleaner, or low pressure air source should be used, while any accumulated dirt may be removed with a soft brush. Check that the interior is thoroughly dry before replacing the case and/or operating the equipment. Wipe the exterior with a damp cloth whenever required.

PERFORMANCE CHECKS

Make all performance checks at 13.5 volts DC (under load) or AC with the appropriate voltage as determined by the transformer wiring.

Check the transmitter output as follows:

(a) Connect a suitable 50 ohm dummy load/RF wattmeter to the ANT receptacle.
(b) Set the MODE switch to FM and key the transmitter while observing the power output. The power should be approximately 10 watts, and the S-meter should read between 6 and 8.
(c) Set the MODE switch to SSB and key the transmitter. Speak normally into the microphone. The output meter should show 3 to 5 watts mean value.

Check the receiver sensitivity as follows:

(a) Connect an AC VTVM to the SP receptacle, set the MODE switch to FM and set the SQUELCH control fully counter-clockwise.
(b) Connect the RF output of a precision, VHF signal generator to the ANT receptacle and with no signal input note the VTVM reading. Adjust the VOLUME control and VTVM range, as required, to obtain an approximate full scale reading. (DO NOT change the VOLUME control setting after this adjustment is made.)
(c) Set the signal generator to the receiving frequency of the transceiver and adjust the output amplitude of the signal generator until the VTVM reads 1/10th (20 dB decrease) of the reading in step (b). The signal generator output voltage at this point is the 20 dB quieting sensitivity, and should be approximately 0.3μV.
(d) Set the MODE switch to SSB position and connect the AC VTVM to the speaker output. Apply an unmodulated, 0.5μV signal, from the standard signal generator and tune the transceiver for a maximum VTVM reading.
(e) Set the RF GAIN control to the fully clockwise position and adjust the AF GAIN control for a 450 mV VTVM reading.
(f) Reduce the signal generator output and read the VTVM reading. The VTVM reading should be less than 45 mV for a 10 dB S/N ratio.

If the above performance checks indicate a need for realignment it is recommended that the transceiver be returned to the dealer for alignment. The alignment procedures require special test equipment and techniques not normally available to the average owner. Attempts to realign the tuned

circuits without proper test equipment will result in degraded performance of the transceiver.

ALIGNMENT

SOME OF THE FOLLOWING ALIGNMENT PROCEDURES REQUIRE SPECIAL TEST EQUIPMENT AND TECHNIQUES AND SHOULD ONLY BE DONE BY AN EXPERT TECHNICIAN.

AF AMP UNIT

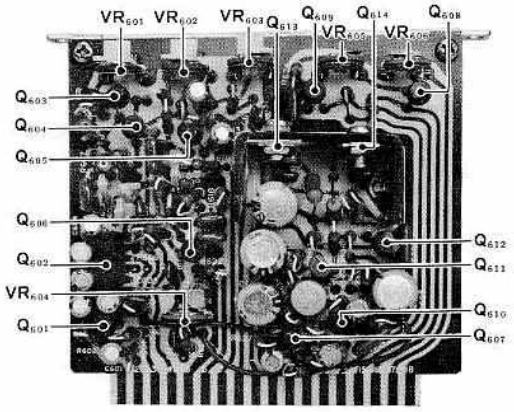


Figure 27

(1) CW Break-In

Adjust VR_{601}, DELAY control, for a suitable release time.

(2) CW Sidetone Level

Adjust VR_{604} for a suitable side tone level.

(3) Relay Sensitivity & Antitrip

Set the controls as follows:

VR_{602} RELAY · · · · · Fully CCW
MIC GAIN · · · · · · · · · Fully CCW
VOX GAIN · · · · · · · · PTT
MODE · · · · · · · · · · · · LSB or USB

Slowly rotate the RELAY control, VR_{602}, until the relay activates, then return the control carefully counter clockwise until the relay releases. This release point is the proper setting for the RELAY sensitivity control. Set the MIC GAIN control to the 2 o'clock position and the VOX control on the front panel to the 12 o'clock position. Speaking normally into the microphone, make sure that your voice activates the relay. Tune in a signal and adjust the AF GAIN on the front panel to a comfortable listening level. Set the ANTITRIP control, VR_{603}, to the minimum point that will prevent the speaker output from tripping the VOX. Adjust the DELAY control, VR_{601}, for a suitable relay release time.

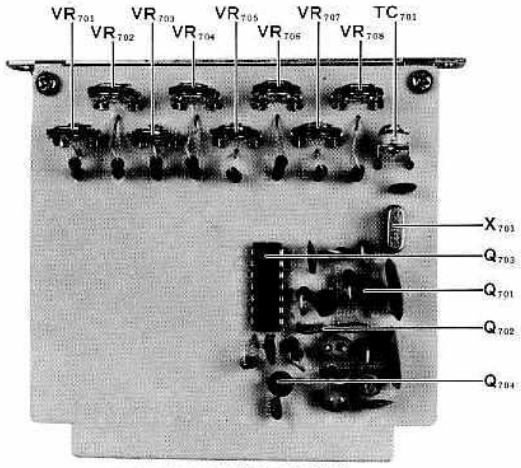
(4) Discriminator Meter Center

Set the controls as follows:

CHANNEL · · · VFO
MODE · · · · · · FM
DISC · · · · · · · OFF (down position)
RF GAIN · · · · Fully CW
MARKER · · · · ON (up position)

Tune the transceiver for maximum S-meter reading at a marker signal. This maximum reading has a 3 kHz width and the VFO should be set to the center of the signal. Turn the DISC switch on and adjust the center potentiometer, VR_{605}, until the meter indicates mid point on the scale. Check that the meter moves equally toward both ends when the VFO frequency is shifted equally up or down. Shift the VFO frequency 10 kHz lower than the zero center meter indication, and adjust the DISC potentiometer, VR_{606}, until the meter indicates 2.

MARKER UNIT



MARKER UNIT (PB-1459)

Figure 28

(1) Frequency Adjustment

Connect a frequency counter, through a 100 PF capacitor, to the collector of Q_{702}, 2SC372Y. Adjust TC_{701} to set the crystal frequency to 12.8MHz.

When the counter is not available, use another H.F. receiver and calibrate the 100kHz signal against WWV or JJY.

(2) Voltage Adjustment for the Varicap Tuning Circuit

Measure the voltage at pins 3, 4, 5, 6, 7, 8, 9 and 10 with a VTVM connected between the pins and ground.

Adjust the appropriate potentiometer, VR_{701} to VR_{708}, for following pin voltages:

Pin No.	3	4	5	6	7	8	9	10
Adjust. VR No.	701	702	703	704	705	706	707	708
Volt. DC. V.	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5

Table 3

SSB IF UNIT

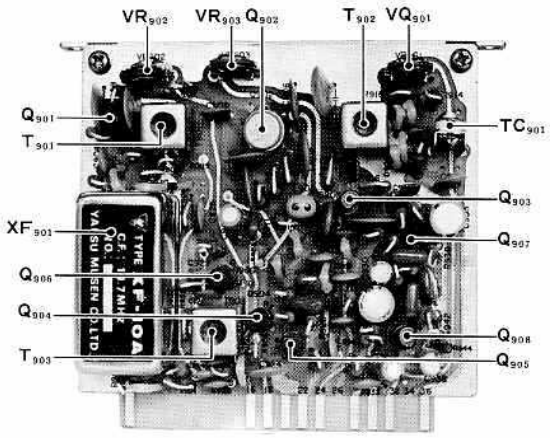


Figure 29

(1) S Meter Setting

Disconnect the antenna from the coax receptacle. Set the MODE switch to the AM mode. Set the RF GAIN control on the front panel to the fully clockwise position. Adjust VR_{913} (ZERO) until the meter indicates zero. Then set the RF GAIN control to the fully counter clockwise position. Adjust VR_{902} (FULL SCALE) until the meter indicates full scale. Repeat above procedures until the meter indicates zero and full scale with above mentioned RF GAIN settings.

(2) Carrier Balance (SSB Receive)

Disconnect the antenna.

Set the MODE switch to either the LSB or USB modes, and the RF GAIN control fully counter clockwise. Adjust VR_{901} and TC_{901} (CARRIER BALANCE) alternately until the S-meter indicates full scale. Change the MODE switch to CW position and check if the S-meter indicates exactly full scale.

MIC AMP UNIT

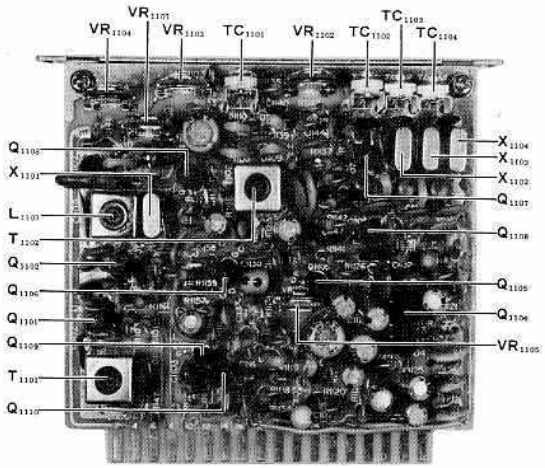


Figure 30

(1) SSB Carrier Frequency

Connect a dummy load, such as the YAESU YP-150, to the antenna receptacle and the output of an audio oscillator to the microphone input. Set the MODE switch to an SSB mode. Apply 1 kHz audio signal to the microphone input and adjust the MIC GAIN control or the output level from the audio oscillator for 10 watts RF output on the dummy load. Change the audio frequency to 350 Hz, and adjust TC_{1102} for LSB and TC_{1103} for USB to obtain 2.5 watts output. Check if the power output decreases to 2.5 watts when the audio frequency is moved to approximately 2600 Hz.

(2) AM and CW Carrier Frequency

Tune the transceiver in the USB mode and monitor the transmitted USB signal for the most natural voice quality while using another receiver. Change the mode of the transceiver to AM (with the monitor receiver in the USB mode), and adjust TC_{1104} for a zero beat against a carrier signal.

(3) Carrier Balance (SSB Transmit)

Connect a dummy load to the antenna receptacle and the RF probe of a VTVM to the inner conductor of coax cable at the antenna receptacle. Set the MODE switch to the LSB mode. Set the MIC GAIN control to the fully CCW position. Set the VOX switch to MOX position. Adjust VR_{1102} and TC_{1101} (CARRIER BALANCE) alternately to minimize the VTVM reading.

Repeat this procedure until a minimum reading is obtained equally for both side bands.

(4) CW Carrier Level

Set the CW level control, VR_{1105}, to the point where the output power starts to saturate.

FIX UNIT

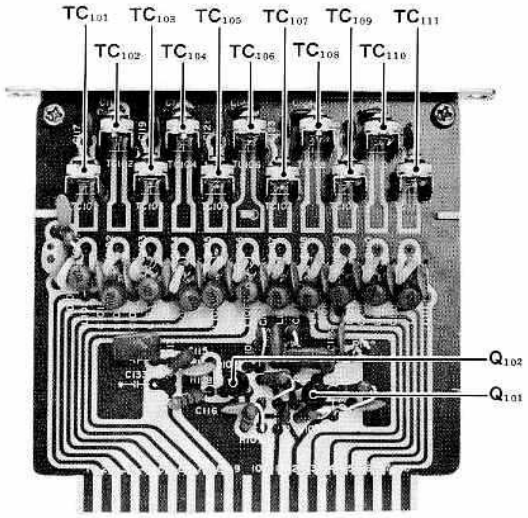


Figure 31

The crystal frequency may be precisely adjusted with TC_{101} to TC_{111} for on-frequency crystal controlled operation.

LOCAL UNIT

Set the MODE switch to USB, the BAND switch to 144.0, the CHANNEL switch to VFO, the MARK switch to OFF and the RPT switch to the OFF position. Connect a frequency counter to TP_{201} and adjust the oscillator frequency to 41.7666 MHz with TC_{201}. Set the MARK switch to the ON position and zero beat against the marker signal at 144.0 MHz on the VFO tuning dial. Set the BAND switch to 144.5 MHz and adjust TC_{202} to zero beat, then adjust TC_{203} for 145.0 MHz, TC_{204} for 145.5 MHz, TC_{205} for 146.0 MHz, TC_{206} for 146.5 MHz, TC_{207} for 147.0 MHz and TC_{208} for 147.5 MHz for a zero beat against the marker signal.

For the U.S. model, set the RPT switch to REV, the AUX/600 kHz switch to 600 kHz and the BAND switch to 146.5. Adjust TC_{210} for zero beat. Change the BAND switch to 147.0 and adjust TC_{211} for zero beat. For the European model, set the BAND switch to 145.0 and adjust TC_{210} for zero beat. During the above repeater frequency adjustment, the VFO dial is set to the zero beat obtained in the preceding adjustment.

For the frequency split other than 600 kHz, the crystal calculated by the formular in page 12 is installed in X_{209} socket for 146.5 MHz band and in X_{212} socket for 147.0 MHz band. Set the AUX/600 kHz switch to AUX position.

For the split frequency in 100 kHz order, such as 800, 900 or 1000 kHz, use the internal marker signal to calibrate as described in 600 kHz procedures. Adjust TC_{209} for zero beat on 146.5 MHz band and TC_{212} on 147.0 MHz band.

When the split frequency is not in 100 kHz order, such as 850 kHz or 940 kHz, the internal marker signal can not be used. In such a case, connect a precise frequency counter between TP_{201} and ground and adjust TC_{209} or TC_{212} for exact frequency which is 3rd harmonics of the crystal frequency given from the formular. For example, the counter frequency should be 42.31666 MHz for 850 kHz split on 146.5 MHz band, as the crystal frequency is $(127.8 - 0.85) \div 9 = 14.1055$ MHz.

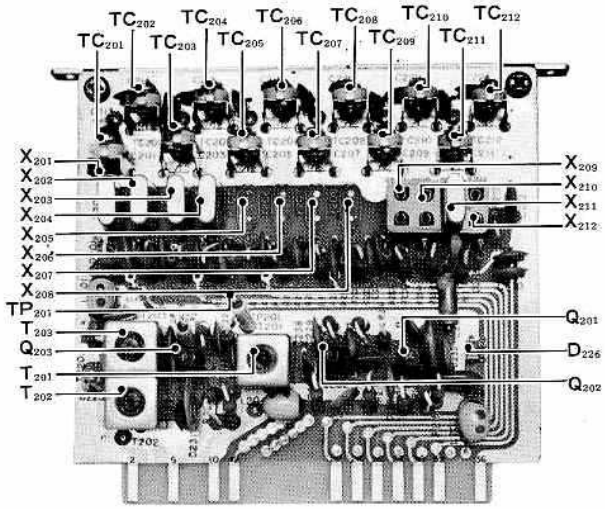


Figure 32

PLL UNIT

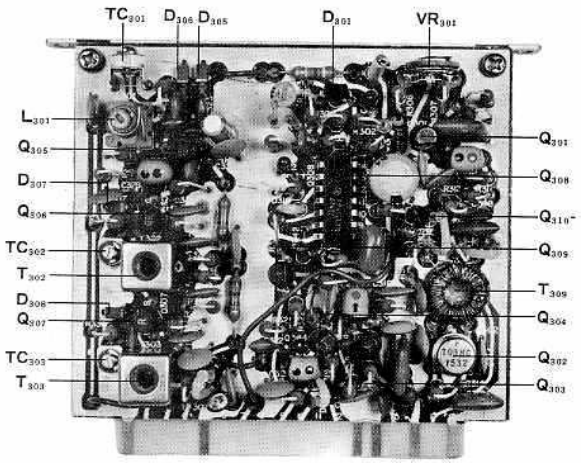


Figure 33

This unit does not require any adjustment unless major components are changed, and, as such, requires precise measuring equipment for alignment. When the PLL circuit is unlocked, the pilot lamps start flikering. Adjust VR_{301} until the circuit locks and the pilot lamps stop flikering. Check that the circuit locks at all segments and entire VFO range.

RX RF UNIT

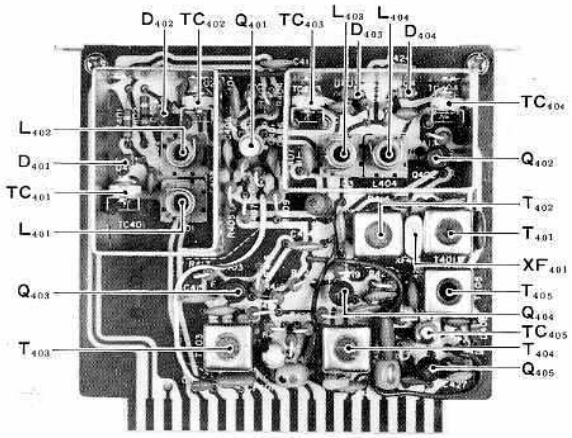


Figure 34

Set the BAND switch to 144.0, the CHANNEL switch to VFO, the RF GAIN control fully clockwise and the MODE switch to the USB mode. Tune the VFO to a signal (144.20 MHz, 10dB) from a signal generator connected to the antenna receptacle. Peak TC_{401}, TC_{402}, TC_{403} and TC_{404} for a maximum S-meter reading. In areas that use the high side of the band, 146 to 148 MHz, it is recommended to perform above procedures on 146.20 MHz.

EXCITER UNIT/BOOSTER UNIT

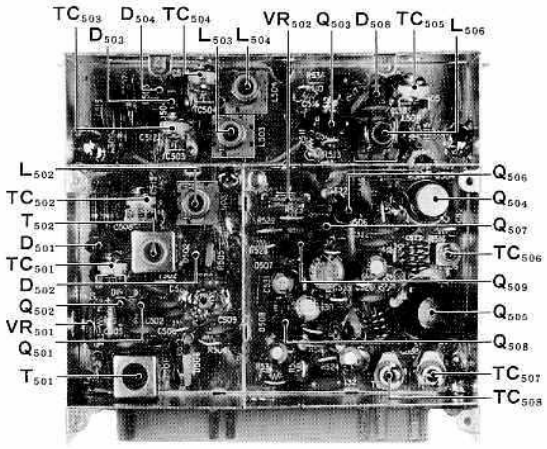


Figure 35

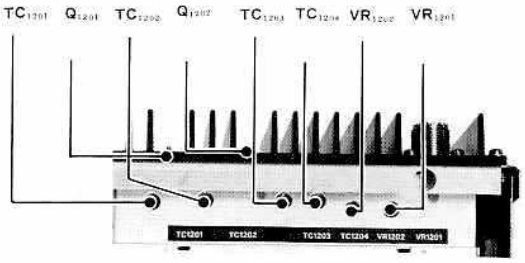


Figure 36

(1) Power Output

It is recommended that an insulated wand be used for the alignment of the booster unit. Connect a dummy load to the antenna receptacle. Set the BAND switch to 145.0, the CHANNEL switch to VFO and the MODE switch to FM. Set the VFO to 145.0 MHz. Set the VOX control to the MOX position. Peak TC_{501} through TC_{508} and TC_{1201} through TC_{1204} for maximum power output.

Change the frequency to 144.1 MHz and repeat above procedures for maximum power output. Change the frequency to 147.9 MHz and repeat above procedures for maximum power output.

Repeat the procedures alternately on 144.1 MHz, 145.0 MHz and 147.9 MHz until unity power output is obtained over 144 to 148 MHz.

(2) PO Meter Set

The PO (Power Output) meter indicates relative power output. After the completion of the above power output alignment, set the meter control, VR_{1202}, to the point where the meter indicates 80% of full scale.

(3) AM Carrier Level

Set the MODE switch to the AM position. Adjust VR_{502}, in the EXCITER UNIT, for 2.5 watts unmodulated carrier output on the dummy load.

(4) ALC Threshold

Connect the output from a two-tone signal generator to the microphone input and dummy load to the antenna receptacle. Set the BAND switch to 145.0, the CHANNEL switch to VFO, the MODE to USB and the MIC GAIN to the 12 o'clock position. Set the VOX GAIN control to the MOX positoin. Apply a 1 kHz single tone signal at first and adjust the signal generator output until the power meter shows 2.5 watts. Then apply a 1.5 kHz single tone signal and adjust its output for 2.5 watts output. Then leave the output levels of both tones at the set level and apply a 1 kHz/1500 kHz, two tone signal, of the above set level. Adjust VR_{1201} until the power meter indicates 3 watts.

SQUELCH THRESHOLD

Disconnect the antenna. Set the BAND switch to 144.0, the CHANNEL switch to VFO, the RF GAIN to the fully CW position, the MODE switch to FM and SQUELCH control to the 9 o'clock position. Adjust VR_{1401} to the point where the receiver is just silenced. Do not go beyond this threshold point or the SQUELCH control on the front panel will not function properly.

FM DEVIATION ADJUSTMENT

Connect a dummy load and an FM deviation meter to the antenna receptacle and audio signal from an audio oscillator to the microphone input. Set the MODE switch to FM mode, MIC GAIN control to an 11 o'clock position, and a VOX control to MOX position. Set VR_{1101} to a fully clockwise position and VR_{1104} to the centre of its range.

Apply a 1 kHz 3mV audio signal to the microphone input. Observe wave form in the oscilloscope pattern which is connected to the frequency deviation meter. Adjust VR_{1104} until sine wave is obtained in the scope pattern.

Connect a frequency counter to Pin 3 of MIC AMP UNIT (J22) and disconnect audio signal input to the microphone. Adjust L_{1101} until oscillating frequency becomes exactly 10.7 MHz. Connect again the audio signal to the microphone input. Adjust MIC GAIN control for ±5 kHz deviation with sine wave pattern in the scope. If sine wave pattern is not obtained, repeat above procedures. Increase audio signal input level to 8mV and adjust VR_{1101} for ±5 kHz deviation.

TONE BURST UNIT

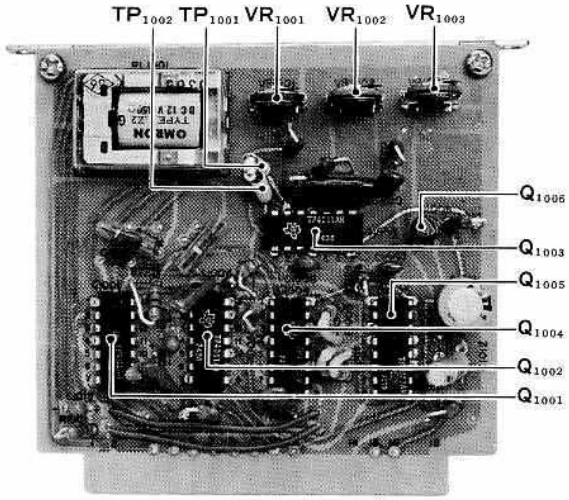


Figure 37

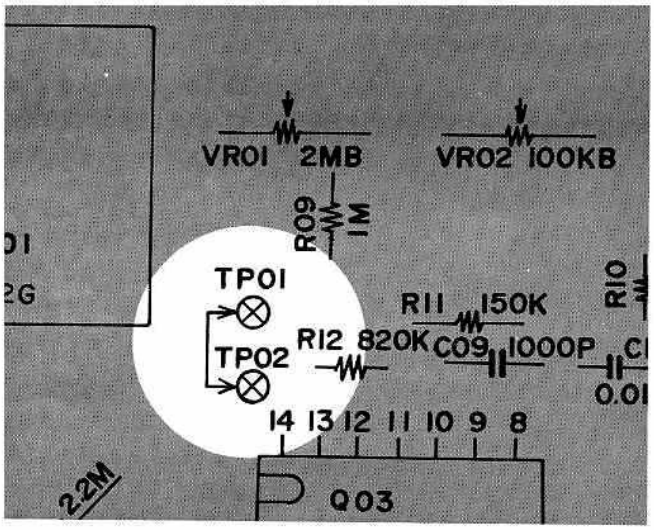


Figure 38

The adjustment of this unit should be done after the above FM deviation alignment has been completed. Set the controls, switches and the deviation meter as described in the deviation adjustment. Remove the tone burst unit from the chassis and disconnect the connection of the two test points as illustrated in order to obtain a continuous tone signal during the alignment. Insert the unit into its socket.

Set the MIC GAIN control to the 2 o'clock position and the VOX GAIN control to the MOX position. Measure the burst tone signal frequency at the deviation meter output. Adjust VR_{1002} to the desired frequency. Adjust VR_{1003} for ±3.5 kHz deviation.

Set the VOX GAIN control to the PTT position and remove the unit from its socket. Reconnect the disconnected test points and reinstall it into its socket.

The burst signal is automatically transmitted when the PTT switch on the microphone is keyed twice as, i.e., key 0.5 second, receive 0.5 second and then transmit. The deviation of the burst signal is preset at the factory to approximately 0.5 second. It may be adjusted with VR_{1001}. A clockwise rotation produces a longer deviation.

REGULATOR UNIT

Use an AC supply for this alignment. Connect a VTVM DC probe to the 13.5 volt line of the power supply unit. Adjust VR_{150} for a 13.5 volt VTVM reading. Connect the VTVM to the 8 volt line and adjust VR_{1502} for a 8 volt VTVM reading.

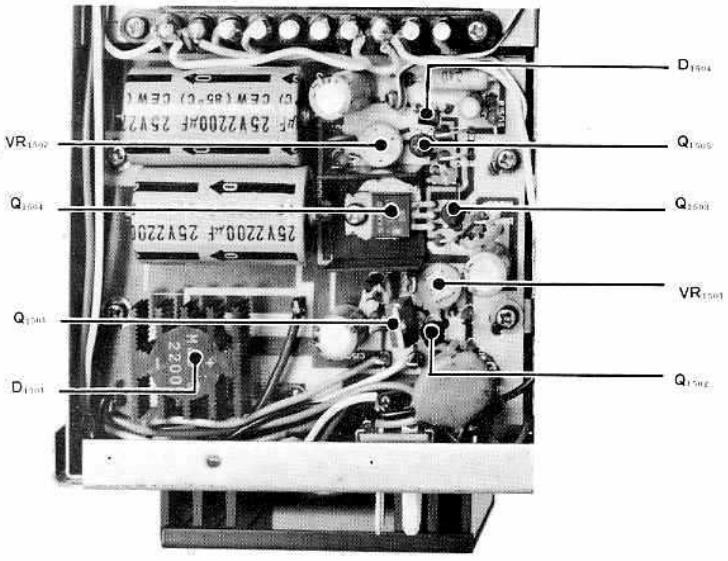


Figure 39

FM IF UNIT

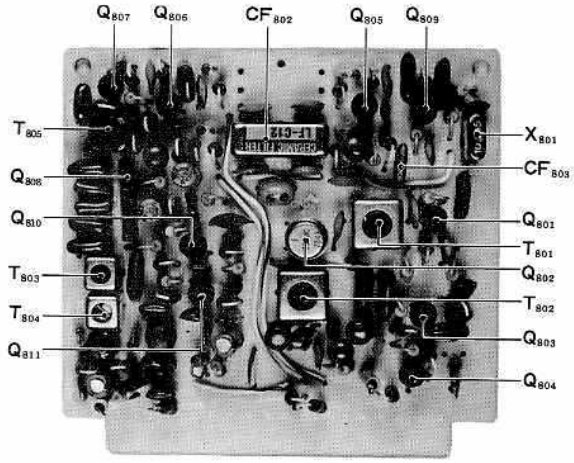
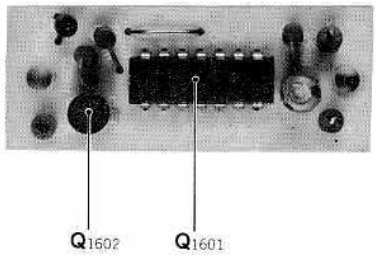


Figure 40



KEYING UNIT (PB-1568)

Figure 41

CONNECTOR RESISTANCE CHART

UNIT / PIN	FIX	LOCAL	PLL	RX RF	EXCITER	AF AMP	MARKER	FM IF	SSB IF	TONE BURST	MIC AMP
	J_{12}	J_{13}	J_{14}	J_{15}	J_{16}	J_{17}	J_{18}	J_{19}	J_{20}	J_{21}	J_{22}
1	E	E	E	E	E	E	E	E	E	E	E
2	∞	E	O	2.6K	250	0	53※	5.5K	E	1.7K	E
3	∞	O	2.3K	—	250	53※	2.4K	E	3.5K	—	6K
4	∞	—	53※	E	O	74※	2.5K	500	—	450	3.2K
5	∞	E	E	O	6K	—	2.5K	10	700	53	300
6	∞	E	45※	∞	E	∞	3K	1K	—	53	E
7	∞	53	160※	O	E	0	3K	300	250	∞	E
8	∞	—	E	E	2.4K	0	3K	1.6K	—	2.4K	O
9	E	E	2K	0	2K	40※	2.7K	E	53※	2.4K	12K
10	E	E	160※	E	2.6K	E	2.3K	2.5K	—	∞	700
11	∞	—	—	53※	2.6K	—	E	E	E	350	E
12	53※	—	53※	E	100K	1.6K	∞	—	—	—	E
13	∞	—	E	2.4K	1.1K	850	E	53※	700K	—	E
14	∞	—	E	3.5K	E	1K	—	3.3K	—	850	700K
15	∞	—	O	3.3K	E	2.1K	—	100K	250	—	250
16	∞	—	—	E	E	1.5K	2.4K	E	500	—	250
17	∞	—	∞	0	∞	5.5K	E	0	2.6K	—	E
18	E	—	E	E	E	E	E	E	46※	E	E
19		—							—		E
20		—							—		650
21		∞							300		53※
22		54※							—		500
23		—							400		E
24		—							400		E
25		—							∞		9K
26		—							—		O
27		—							53※		9K
28		—							500		∞
29		—							4.5K		850
30		—							E		2.2K
31		—							E		∞
32		—							500		5K
33		17K							1.9K		∞
34		—							E		1K
35		E							E		E
36		E							E		E

Switch, Knob Position

POWER···OFF MODE···FM BAND···144.0 CHANNEL···VFO RF GAIN···MAX VOX GAIN···PTT

AF GAIN
MIC GAIN
SQUELCH
···CENTER

FUNCTION SW···OFF

Measured with 20KΩ/V

Values are in OHMS

CONNECTOR VOLTAGE CHART

UNIT	J_{12}		J_{13}		J_{14}		J_{15}		J_{16}								J_{17}				J_{18}		J_{19}				J_{20}		J_{21}		J_{22}									
	FIX		LOCAL		PLL		RX RF		EXCITER								AF AMP				MARKER		FM IF				SSB IF		TONE BURST		MIC AMP									
									USB. LSB		CW		AM		FM		USB. LSB CW. FM		CW				USB. LSB CW. AM		FM						LSB		USB		CW		AM		FM	
	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T
1	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
2	0	0	E	E	0	0	7.2	0	0	8.0	0	0	0	0	0	0	0	0	0	0	8.0	8.0	0	0	0	0	E	E	E	E	E	E	E	E	E	E	E	E	E	E
3	0	0	0	0	2.0	2.0	0	0	0	8.0	0	0	0	0	0	0	8.0	8.0	8.0	8.0	2.0	2.0	E	E	E	E	0	2.8	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	8.0	8.0	E	E	0	0	0	0	0	0	0	0	13.5	0	13.5	0.5	2.5	2.5	0	0	0.05	0	0	0	0	0	0	0	0	0	0	7.3	0	7.3	0	0
5	0	0	E	E	E	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.0	3.0	0	0	0	0	1.8	2.2	8.0	8.0	0	0	0	0	0	8.0	0	8.0	0	8.0
6	0	0	E	E	0	0	0	0	E	E	E	E	E	E	E	E	0.6	0.6	0.6	0	3.5	3.5	0	0	7.2	0	0	0	8.0	8.0	E	E	E	E	E	E	E	E	E	E
7	0	0	8.0	8.0	0.7	0.7	0	0	E	E	E	E	E	E	E	E	0	0	0	0	4.0	4.0	0	8.0	0	8.0	0	8.0	0	0	E	E	E	E	E	E	E	E	E	E
8	0	0	0	0	E	E	E	E	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0	0	0	0	4.5	4.5	0	0.65	0.65	0.59	0	0	2.0	2.0	0	0	0	0	0	0	0	0	0	0
9	E	E	E	E	0	0	0	0	0	0	0	0	0	0	0	0	13.5	13.5	13.5	13.5	5.0	5.0	E	E	E	E	8.0	0	2.0	2.0	0	0	0	0	0	0	0	0	0	7.2
10	E	E	E	E	0	0.7	E	E	0	13.0	0	12.4	0	4.3	0	12.4	0	0	0	0	5.5	5.5	0	0	0	0	0	0	0	0	1.8	2.2	1.8	2.2	1.8	1.6	1.8	1.6	1.8	1.6
11	0	0	0	0	0	0	8.0	0	0	13.0	0	12.6	0	4.3	0	12.6	—	—	—	—	E	E	0	0	0	0	E	E	0	0	E	E	E	E	E	E	E	E	E	E
12	8.0	8.0	0	0	8.0	8.0	E	E	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0	0.65	0	0.55	0	0	0	0	7.3	0	0	0	0	0	E	E	E	E	E	E	E	E	E	E
13	0	0	0	0	E	E	2.0	2.0	0	13.5	0	13.5	0	13.5	0	13.5	0	0	0	0	E	E	8.0	8.0	8.0	8.0	0	0	0	0	E	E	E	E	E	E	E	E	E	E
14	0	0	0	0	E	E	0	2.8	E	E	E	E	E	E	E	E	0	0	0	0	0	0	5.2	4.2	5.2	4.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	5.2	4.2	E	E	E	E	E	E	E	E	0	0	0	0	0	0	5.8	4.7	0	0	0	8.0	0	0	0	8.0	0	8.0	0	0	0	0	0	0
16	0	0	0	0	0	0	E	E	E	E	E	E	E	E	E	E	0	0	0	0	0	0	E	E	E	E	1.6	0	0	0	0	8.0	0	8.0	0	8.0	0	8.0	0	8.0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	E	E	0	0	0	0	7.0	0	0	0	E	E	E	E	E	E	E	E	E	E
18	E	E	0	0	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	13.5	0	E	E	E	E	E	E	E	E	E	E	E	E
19			0	0																							0	0			E	E	E	E	E	E	E	E	E	E
20			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
21			0	0																							0	0			8.0	8.0	8.0	8.0	8.0	8.0	8.0	0	8.0	8.0
22			8.0	8.0																							0	0			0	0	0	0	0	0	0	0	0	0
23			0	0																							0.85	0			E	E	E	E	E	E	E	E	E	E
24			0	0																							0.85	0			E	E	E	E	E	E	E	E	E	E
25			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
26			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
27			0	0																							8.0	8.0			0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
28			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
29			0	0																							0	0			7.3	7.3	0.1	0.1	0	0	0	0	0	0
30			0	0																							E	E			0.1	0.1	7.3	7.3	7.3	0	0	0	0	0
31			0	0																							E	E			0	0	0	0	0	0	0	0	0	0
32			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
33			0	0																							0	0			0	0	0	0	0	0	0	0	0	0
34			0	0																							E	E			0	0	0	0	0	7.3	0	7.3	0	0
35			3.8	3.8																							E	E			E	E	E	E	E	E	E	E	E	E
36			E	E																							E	E			E	E	E	E	E	E	E	E	E	E

Measured with VTVM.
Values are in VOLTS DC.

VOLTAGE CHART

FIX Unit

	E	B	C		E	B	C
Q101	0.9	1.4	7.7	Q102	2.2	2.9	5.8

LOCAL Unit

	E	B	C		E	B	C		E	B	C
Q201	2.4	2.5	7.6	Q202	1.1	1.3	7.9	Q203	0.9	1.4	7.6

PLL Unit

	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)		E(S)	B(G)	C(D)
Q301	1.6	0	4.5	Q305	0.9	0	5.4	Q309	0	0	8.0
Q303	0.9	1.4	8.0	Q306	1.0	0	5.9	Q310	0	0.7	1.3
Q304	0.5	1.1	7.5	Q307	0.5	0.8	7.2				

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Q302	7.2	—	1.5	E	1.5	—	7.2	7.5						
Q308	4.9	4.9	0.2	8.0	0	1.9	E	8.0	8.0	0	8.0	0	0	8.0

RX RF Unit

	E (S)		B (G)		C (D)		G_2			E (S)		B (G)		C (D)	
	R	T	R	T	R	T	R	T		R	T	R	T	R	T
Q401	1.5	0	1.6	0	8.0	0.1	3.9	0	Q404	0.7	0	1.4	0	7.9	0.1
Q402	1.6	1.1	0	0	7.9	0.1			Q405	1.0	0	0	0	7.7	0
Q403	1.2	0	1.8	0	7.8	0.1									

EXCITER Unit (on Transmit)

	LSB.USB.CW			AM.FM				LSB.USB.CW			AM.FM				LSB.USB.CW			AM.FM		
	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)
Q501	1.3	0	12.1	1.4	0	11.8	Q504	0.4	1.2	10.1	0.4	1.2	10.0	Q507	0	0	13.3	0	0	13.3
Q502	1.3	0	12.1	1.4	0	11.7	Q505	0	0.7	13.4	0	0.7	13.4	Q508	1.1	1.8	5.4	1.1	1.8	5.4
Q503	1.2	1.9	12.0	1.2	1.9	11.9	Q506	12.5	13.3	13.5	12.5	13.3	13.5	Q509	4.9	5.5	13.5	4.9	5.5	13.5

Receive……0V

AF AMP Unit

	LSB.USB.CW AM			FM				LSB.USB.CW AM			FM				LSB.USB.CW AM			FM		
	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)
Q601	0.4	1.0	7.0	0.4	1.0	7.0	Q607	0	0	0.6	0	0	0.6	Q612	13.5	12.9	7.5	13.5	12.9	7.5
Q603	0.4	0	0.6	0.4	0	0.6	Q608	0	0	0	★1.9	0	★5.7	Q613	6.8	7.4	13.5	6.8	7.4	13.5
Q604	0	0.6	12.9	0	0.6	12.9	Q609	0	0	0	★2.6	0	★6.3	Q614	6.8	6.2	0	6.8	6.2	0
Q605	0.4	1.0	5.8	0.4	1.0	5.8	Q610	0	0.6	3.8	0	0.6	3.8							
Q606	2.9	1.0	8.0	2.9	1.0	8.0	Q611	8.5	9.1	12.9	8.5	9.1	12.9							

★FM Transmit……0V

	1	2	3	4	5	6	7	8	9
Q602	4.7	2.8	2.2	2.1	0	0.5	0.7	1.1	8.0

MARKER Unit (Marker Switch……ON)

	E	B	C		E	B	C		E	B	C
Q701	1.8	2.4	8.0	Q702	2.1	3.7	7.7	Q704	E	0.6	0.9

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Q703	1.8	E	3.8	4.0	4.0	4.0	E	0	4.0	0	3.7	3.0	0	0.8

FM Unit

	LSB.USB.CW AM			FM				LSB.USB.CW AM			FM				LSB.USB.CW AM			FM		
	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)		E(S)	B(G)	C(D)	E(S)	B(G)	C(D)
Q801	1.8	2.5	7.7	1.8	2.5	7.7	Q805	0	0	0	★1.3	★0.7	★7.2	Q809	0	0	0	★0.6	★1.3	★7.0
Q803	0	1.9	5.1	0	1.9	5.1	Q806	0	0	0	★1.4	★2.1	★2.5							
Q804	5.8	5.8	5.3	5.8	5.8	5.3	Q807	0	0	0	★0.7	★1.4	★7.0							

★FM Transmit……0V

		1	2	3	4	5	6	7	8
Q802	T・R	7.0	—	1.5	0	1.5	—	7.0	7.5
Q808	FM・R	1.8	1.8	6.8	0	5.5	1.8	1.8	
	T・R	0	0	0	0	0	0	0	

SSB IF Unit

	E(S)		B(G)		C(D)	
	R	T	R	T	R	T
Q901	0.7	0	0.7	0	7.3	0
Q903	1.1	0	0	0	7.8	0
Q904	0.7	0	0.7	0	7.3	0

	E(S)		B(G)		C(D)	
	R	T	R	T	R	T
Q905	0	0	0.7	0	7.2	0
Q906	0	0.6	0	0	0	7.0
Q907	5.3	5.3	5. 9	5.9	6.8	6.8

	E(S)		B(G)		C(D)	
	R	T	R	T	R	T
Q908	0.3	0.3	1.0	1.0	5.8	5.8

		1	2	3	4	5	6	7	8
Q902	R	0	1.2	0	1.8	5.5	7.6	7.3	0
	T	0	0	0	0	0	0	0	0

TONE BURST Unit

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Q1001	R	0	0	8.0	0	8.0	8.0	0	0	0	8.0	0	8.0	7.2	8.0		
	T	8.0	8.0	0	8.0	0	0	0	0	0	8.0	0	8.0	7.2	8.0		
Q1002	R・T	7.2	8.0	0	8.0	0	0	0	0	8.0	8.0	8.0	0	0	8.0		
Q1003	R・T	0	0	8.0	0	8.0	7.3	0	8.0	8.0	0	8.0	7.2	0	8.0		
Q1004	R	8.0	0	7.2	0	7.3	0	8.0	0	0	8.0	8.0	0	0	7.2	0	8.0
	T	8.0	0	7.2	0	7.3	0	8.0	0	8.0	0	8.0	0	0	7.3	0	8.0
Q1005	R・T	0	8.0	0	0	8.0	8.0	0	0	0	0	0	0	0	8.0	0	8.0

	S	G	D
Q1006	0.9	0	8.0

BOOSTER Unit (on Transmit)

	LSB.USB.CW			AM			FM		
	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)
Q1201	0	0.7	12.3	0	0.6	3.6	0	0.6	11.7

	LSB.USB.CW			AM			FM		
	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)	E(S)	B(G)	C(D)
Q1202	0	0.7	13.5	0	0.4	13.3	0	0.2	13.1

Receive……0V

VFO Unit

	E(S)	B(G)	C(D)
Q1301	2.1	2.7	4.4

	E(S)	B(G)	C(D)
Q1302	1.6	0	7.6

	E(S)	B(G)	C(D)
Q1303	1.6	2.1	6.9

MIC AMP Unit

	LSB. USB						CW						AM						FM					
	E(S)		B(G)		C(D)		E(S)		B(G)		C(D)		E(S)		B(G)		C(D)		E(S)		B(G)		C(D)	
	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T	R	T
Q1101	0	0	0	0	0	0	0	4.9	0	2.6	0	8.0	0	1.9	0	2.6	0	7.8	0	2.2	0	2.6	0	7.8
Q1102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	0	2.2	0	7.2
Q1103	1.5	1.5	2.1	2.1	3.9	3.9	1.5	1.5	2.1	2.1	3.9	3.9	1.5	1.5	2.1	2.1	3.9	3.9	1.5	1.5	2.1	2.1	3.9	3.9
Q1105	0	2.2	0	0	0	7.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q1106	0	0.7	0	0	0	7.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Q1107	3.0	3.0	3.4	3.4	6.8	6.8	3.0	4.9	3.4	3.4	6.8	8.0	2.7	3.0	3.4	3.4	6.8	6.7	2.7	2.7	3.4	3.4	6.8	6.8
Q1108	2.5	2.5	1.9	1.9	6.8	6.8	2.5	2.5	2.1	2.3	6.8	6.8	2.3	2.5	1.4	1.8	6.9	6.8	2.3	2.3	1.3	1.4	6.9	6.9
Q1109	1.3	1.3	0	0	6.9	6.9	1.3	1.3	0	0	6.9	6.9	1.3	1.3	0	0	6.9	6.9	1.3	1.3	0	0	6.9	6.9
Q1110	4.7	4.7	5.4	5.4	6.9	6.9	4.7	4.7	5.4	5.4	6.9	6.9	4.7	4.7	5.4	5.4	6.9	6.9	4.7	4.7	5.4	5.4	6.9	6.9

		1	2	3	4	5	6	7	8	9
Q1104	R	4.1	2.4	1.8	1.7	0	0	0	0.7	6.2
	T	4.1	2.4	1.8	1.7	0	0.5	3.3	1.2	6.9

REG Unit

	E	B	C		E	B	C		E	B	C
Q1501	14.1	14.6	22.6	Q1503	8.7	9.3	13.5	Q1505	6.1	6.7	9.3
Q1502	9.0	9.7	14.6	Q1504	8.0	13.5	8.7	Q_1	13.5	14.1	22.5

AM Mod(Q7)

	E		B		C	
	R	T	R	T	R	T
USB USB CW	0	12.3	0	12.9	0	13.5
AM	0	3.6	0	4.2	0	13.4
FM	0	11.7	0	12.3	0	13.2

PARTS LIST

MAIN CHASSIS			
PB	PRINTED CIRCUIT BOARD		
1471 (A～Z)	LED	BOARD	
1552 (A～Z)	SWITCH	BOARD	
Q	TRANSISTOR		
1		2SD114	
7		2SD313D	
D	DIODE		
1	Si	DS-130-YD	
6～10	Si	10D-1	
11	LED	GD-4	
12	〃	RD-4	
13	〃	TLR-108	
R	RESISTOR		
	CARBON COMPOSITION		
16	¼W		10KΩ
15	¼W		100KΩ
19	½W		10Ω
17	½W		56Ω
18	½W		100Ω
14,	½W		220Ω
13, 21	½W		470Ω
23	½W		5.6KΩ
11	½W		22KΩ
12	½W		27KΩ
VR	POTENTIOMETER		
4	EWK-DOAS 15023	500ΩB/500ΩC	
5	VM13A-5M3121	5KA	
8	EVH-BOAS-15A53	5KA	
6	VM20A	5KB	
7	VM11A5M	10KA	
3	EVH-BOAS-15B54	50KB	
10	EVH-BOAS-15B53	5KB	
9	EVL-SOAA-00B54	50KB	
C	CAPACITOR		
	DIPPED MICA		
16, 17, 18	50WV		100PF
22	50WV		300PF
	CERAMIC DISC		
14, 28～32	50WV		0.001μF
13, 33～35	50WV		0.01μF
11, 12, 15, 19～21, 23, 27	50WV		0.047μF
24～26	500WV		0.01μF
1, 2	1.4KV		0.0047μF
	ELECTROLYTIC		
10	16WV		2200μF
PT	POWER TRANSFORMER		
1	52-36		
CH	CHOKE COIL		
1	SN-8S-500		
L	INDUCTOR		
1	RFC		250μH
M	METER		
1	SP-38A		
SP	SPEAKER		
1	SA-70H		
RL	RELAY		
1	AE-3171		
RLS	RELAY SOCKET		
1	AE-3860		
S	SWITCH		
1	ESR-E22CR15D		
2	ESR-448R15A		
3	ESR-485R15A		
4	SP-2022		
5	SLE-12301		
6, 7	SLE-12251		
8	SLE-14201		
9	SLE-14301		
J	JACK		
1	QMS-AB4M		
2	CS-250		
3	SG-7615		
4	SG-8050		
5	FM-144J		
6	XG-8018		
7～10	CN-7017J		
11	SO-239		
12, 14～19, 21	3305-018-011		
13, 20, 22	1150-036-009		
25	CN-1463		
24	SI-8503		
P	PLUG		
24	SI-8501		
F	FUSE		
1	2A	100V～117V	
	1A	200V～234V	
FS	FUSE HOLDER		
1	SN-1001 #2		
PL	PILOT LAMP		
1～3	14V		40mA

FIX UNIT			
PB	PRINTED CIRCUIT BOARD		
1453 (A～Z)	FIX OSC CIRCUIT		
1500 (A～Z)	CRYSTAL BOARD		
Q	TRANSISTOR		
101, 102	2SC372Y		
D	DIODE		
101～111	Si 1S1555		
X	CRYSTAL		
101～111	HC-25/U (OPTION)		
XS	CRYSTAL SOCKET		
101～111	S2-101P		
R	RESISTOR		
	CARBON FILM		
105, 108, 109	¼W		100Ω
104	¼W		220Ω
101	¼W		1.5KΩ
102, 107, 110	¼W		5.6KΩ
106	¼W		8.2KΩ
103	¼W		22KΩ
C	CAPACITOR		
	DIPPED MICA		
130	50WV		15PF
131	50WV		20PF
117～127	50WV		30PF
129	50WV		100PF
128, 132	50WV		200PF
	CERAMIC DISC		
101～116	50WV		0.01μF
TC	TRIMMER CAPACITOR		
101～111	ECV-1ZW 20×40		20PF
L	INDUCTOR		

101～111	EL0610-102K	1mH
112	EL0610-251K	250μH
113	FL-3H 1R2M	1.2μH

LOCAL UNIT

PB	PRINTED CIRCUIT BOARD	
1454 (A～Z)	LOCAL OSC CIRCUIT	
Q	TRANSISTOR	
201		2SC372Y
202, 203		2SC784R
D	DIODE	
201～212	Si	1S1555
225	Ge	1S188FM
226	Varactor	1SV50
X	CRYSTAL	
201	HC-18/U	13.92222MHz
202	〃	13.97777MHz
203	〃	14.03333MHz
204	〃	14.08888MHz
205	〃	14.14444MHz
206	〃	14.20000MHz
207	〃	14.25555MHz
208	〃	14.31111MHz
210 (Repeater)	HC-25/U	★(14.13333MHz)
211 (Repeater)	〃	★(14.32222MHz)
★US Model★★EuropeanModel★★(14.02222MHz)		
XS	CRYSTAL SOCKET	
201	S-14	
R	RESISTOR	
	CARBON FILM	
221, 225	1/4W	100Ω
217, 224	1/4W	220Ω
220	1/4W	560Ω
213, 216, 226	1/4W	1KΩ
222	1/4W	2.2KΩ
201～212	1/4W	3.3KΩ
215, 218	1/4W	4.7KΩ
214, 223	1/4W	10KΩ
219	1/4W	22KΩ
C	CAPACITOR	
	DIPPED MICA	
242	50WV	1PF
239	50WV	5PF
240, 241	50WV	8PF
213～224, 236, 238	50WV	30PF
237	50WV	39PF
234	50WV	150PF
235	50WV	200PF
	CERAMIC DISC	
201～212, 225～230, 232, 233	50WV	0.01μF
231, 243	50WV	0.047μF
TC	TRIMMER CAPACITOR	
201～212	ECV-1ZW 20×40	20PF
L	INDUCTOR	
203	#221026	3.2μH
202, 204, 201	EL0610-220K	22μH
T	TRANSFORMER	
201	R-12 #4797	
202, 203	R-12 #4102	

PLL UNIT

PB	PRINTED CIRCUIT BOARD	
1455 (A～Z)	PLL CIRCUIT	
Q	IC FET & TRANSISTOR	
302	IC	μA703HC
308	〃	TP4011AN
301	FET	2SK19Y
305, 306	〃	2SK19GR
303, 304, 309	Tr	2SC372Y
307	〃	2SC784R
310	〃	MPSA13
D	DIODE	
301	PUT	N13T1
309, 310	Si	1S1555
311	Ge	1S188FM
303, 304	〃	1S1007
302	Zener	WZ061
305, 306	Varactor	1SV50
307, 308	Varactor	1S2209
R	RESISTOR	
	CARBON FILM	
305	1/4W	22Ω
337	1/4W	56Ω
313,315,319,320,329,333, 334	1/4W	100Ω
303	1/4W	150Ω
304, 308, 314, 326, 328	1/4W	220Ω
325	1/4W	270Ω
307	1/4W	330Ω
310, 316,	1/4W	1KΩ
302, 345, 346	1/4W	2.2KΩ
317, 321, 330	1/4W	4.7KΩ
311, 312	1/4W	10KΩ
306, 318, 322, 331	1/4W	22KΩ
301	1/4W	47KΩ
309,323,324,327,340,344	1/4W	100KΩ
339	1/4W	560KΩ
332, 336, 338, 341, 343	1/4W	1MΩ
	CARBON COMPOSITION	
342	1/4W	2.2MΩ
RS	THERMISTOR	
301	SDT-250	
VR	POTENTIOMETER	
301	KVL-SOAA-00B13	1KB
C	CAPACITOR	
	DIPPED MICA	
322, 327	50WV	5PF
339, 340	50WV	6PF
318, 319	50WV	10PF
308, 309	50WV	20PF
325, 326	50WV	30PF
323, 324	50WV	47PF
305, 312, 313	50WV	170PF
307	50WV	200PF
	CERAMIC DISC	
304,306,310,311,314～317	50WV	0.01μF
320,321,328,329,331～336,344, 345, 338		
	MYLAR	
341	50WV	0.01μF
343	50WV	0.1μF
	TANTALUM	
301, 342	35WV	0.1μF
	ELECTROLYTIC	
303, 330	16WV	10μF
302	16WV	100μF

TC	TRIMMER CAPACITOR	
301	ECV-1ZW 10×40	10PF
302, 303	ECV-1ZW 10×51	10PF
L	INDUCTOR	
302	FL-3H-3R3M	3.3μH
304, 306	RFC	10μH
303, 305	RFC	250μH
301	OSC #221013A	
T	TRANSFORMER	
309	#221014	
302, 303	R-12 4102	

RX RF UNIT

PB	PRINTED CIRCUIT BOARD	
1456 (A~Z)	RX RF CIRCUIT	
Q	FET & TRANSISTOR	
401	FET	3SK51(3SK40M)
402, 405	〃	2SK19GR
403, 404		2SC372Y
D	DIODE	
407	G.B	1S1007
401~404, 408	Varactor	1S2209
XF	CRYSTAL FILTER	
401	FMT-30	
R	RESISTOR	
	CARBON FILM	
408, 414, 418, 422, 429	1/4W	100Ω
428	1/4W	220Ω
417, 421	1/4W	470Ω
413	1/4W	1KΩ
409, 426	1/4W	1.5KΩ
423	1/4W	2.2KΩ
425	1/4W	3.9KΩ
415, 419	1/4W	4.7KΩ
416	1/4W	15KΩ
405, 420	1/4W	22KΩ
403, 404, 406, 407, 427	1/4W	100KΩ
	CARBON COMPOSITION	
401, 402, 410, 411, 430	1/4W	1MΩ
C	CAPACITOR	
	DIPPED MICA	
422	50WV	1PF
401, 402, 408, 409	50WV	5PF
429	50WV	6PF
403	50WV	30PF
426	50WV	47PF
411	50WV	100PF
421	50WV	180PF
	CERAMIC DISC	
404, 414, 417	50WV	0.001μF
405~407, 412, 413, 418~420, 424, 425, 427, 428,	50WV	0.01μF
415, 416	50WV	0.047μF
	ELECTROLYTIC	
423	16WV	1μF
TC	TRIMMER CAPACITOR	
401~404	ECV-1ZW 10×40	10PF
405	ECV-1ZW 10×53	10PF
L	INDUCTOR	
401	#221003	
402	#221004	
403	#221005	
404	#221006	
406	EL0610-220K	22μH
407, 408	EL0610-251K	250μH
405	EL0610-102K	1mH
T	TRANSFORMER	
401~404	R-12 4074	
405	R-12 4102	

EXCITER UNIT

PB	PRINTED CIRCUIT BOARD	
1466 (A~Z)	EXCITER CIRCUIT	
Q	FET & TRANSISTOR	
501, 502	FET	2SK19GR
507, 509		2SC372Y
508		2SC373
505		2SC730
506		2SC735Y
504		2SC741
503		2SC784R
D	DIODE	
505~507	Si	1S1555
501~504, 508	Varactor	1S2209
R	RESISTOR	
	CARBON FILM	
516	1/4W	10Ω
520, 532	1/4W	56Ω
509, 513, 531	1/4W	100Ω
512	1/4W	220Ω
515	1/4W	330Ω
526	1/4W	470Ω
522	1/4W	820Ω
535	1/4W	1KΩ
519, 523, 527, 530	1/4W	2.2KΩ
508, 510	1/4W	3.3KΩ
533, 514	1/4W	4.7KΩ
524	1/4W	5.6KΩ
529	1/4W	10KΩ
511, 528	1/4W	15KΩ
525	1/4W	27KΩ
501, 502	1/4W	47KΩ
	CARBON COMPOSITION	
503~507, 536	1/4W	1MΩ
534	1/2W	10Ω
VR	POTENTIOMETER	
501	EVL-SOAA-00B13	1KB
502	EVL-SOAA-00B54	50KB
C	CAPACITOR	
	DIPPED MICA	

511, 512, 514, 519	50WV	5PF
507, 508, 516, 523, 537, 538	50WV	10PF
510, 506, 535	50WV	20PF
528	50WV	39PF
CERAMIC DISC		
513, 534	50WV	1PF
502, 503	50WV	0.001μF
501, 504, 505, 509, 515, 517, 518, 520 ~ 522, 524, 526, 536, 539	50WV	0.01μF
MYLAR		
532	50WV	0.047μF
ELECTROLYTIC		
525, 527, 529, 531	16WV	10μF
530	16WV	22μF
533		33μF
TC TRIMMER CAPACITOR		
501 ~ 505	ECV-1ZW 10×40	10PF
506	ECV-1ZW 20×51	20PF
507, 508	ECV-1ZW 20×32	20PF
L INDUCTOR		
503	#221008	
504, 502	#221009	
507, 510	#221018	
508, 509	#221017	
506	#221036	
T TRANSFORMER		
501	R-12 4073	
502	#221035	

AF UNIT

PB PRINTED CIRCUIT BOARD

1499 (A~Z) AF CIRCUIT

Q IC FET & TRANSISTOR		
602	IC	LD 3001
603	FET	2SK19Y
608, 609	〃	2SK19GR
612		2SA695
614		2SB529
601, 605, 606, 607, 610		2SC372Y
611		2SC711
604		2SC735Y
613		2SD359
D DIODE		
601 ~ 604	Si	1S1555
605	Varistor	MV-5W

R RESISTOR		
CARBON FILM		
642	1/4W	10Ω
641	1/4W	22Ω
628	1/4W	100Ω
647	1/4W	180Ω
622, 629, 644	1/4W	220Ω
626	1/4W	470Ω
611	1/4W	680Ω
601, 616, 638, 639	1/4W	1KΩ
604, 635, 636	1/4W	1.5KΩ
623, 624, 625, 631	1/4W	2.2KΩ
605, 614, 643	1/4W	3.3KΩ
606, 612, 618, 619, 620, 627	1/4W	4.7KΩ
617	1/4W	5.6KΩ
630, 632	1/4W	6.8KΩ
602	1/4W	15KΩ
615	1/4W	22KΩ
621	1/4W	33KΩ
640	1/4W	39KΩ
634, 613	1/4W	47KΩ
603, 633, 637	1/4W	100KΩ
607	1/4W	1MΩ
CARBON COMPOSITION		
608, 609	1/2W	3.3MΩ
610	1/2W	5.6MΩ
WIRE WOUND		
645, 646	1/2W	0.22Ω
RS THERMISTOR		
601	SDT-250	
VR POTENTIOMETER		
605	EVL-SOAA-00B53	5KB
602, 603	EVL-VOAA-00B14	10KB
604	EVL-SOAA-00B14	10KB
606	EVL-SOAA-00B54	50KB
601	EVL-VOAA-00B26	2MB
C CAPACITOR		
DIPPED MICA		
637	50WV	200PF
635	50WV	280PF
628	50WV	330PF
CERAMIC DISC		
605	50WV	470PF
636	50WV	0.047μF
MYLAR		
610, 615	50WV	0.001μF
629, 630	50WV	0.002μF
608, 611, 619, 620	50WV	0.01μF
616 ~ 618	50WV	0.02μF
614, 631	50WV	0.047μF
609	50WV	0.1μF
ELECTROLYTIC		
601, 612, 623, 626	16WV	1μF
621, 622	16WV	4.7μF
602 ~ 604, 606, 607, 613	16WV	10μF
624	10WV	100μF
625, 633	16WV	100μF
627, 632	16WV	220μF

MARKER UNIT

PB PRINTED CIRCUIT BOARD

1459 (A~Z) MARKER CIRCUIT

Q IC & TRANSISTOR		
703	IC	34024PC
701, 702, 704	Tr	2SC372Y
X CRYSTAL		
701	HC-18/U	12.8MHz

R RESISTOR		
CARBON FILM		
701 ~ 708	1/4W	100Ω
711, 713	1/4W	1KΩ
716	1/4W	2.2KΩ
710	1/4W	10KΩ
709, 715	1/4W	22KΩ
714	1/4W	100KΩ
712	1/4W	220KΩ
VR POTENTIOMETER		
701 ~ 708	EVL-SOAA-00B14	10KB
C CAPACITOR		
DIPPED MICA		
709	50WV	3PF
701, 707	50WV	27PF
702, 703	50WV	220PF

CERAMIC DISC		
704～706, 708	50WV	0.01μF
ELECTROLYTIC		
710	16WV	10μF
TC TRIMMER CAPACITOR		
701	ECV-1ZW 20×40	20PF
L INDUCTOR		
702	RFC	22μH
701	RFC	250μH
FM IF UNIT		
PB PRINTED CIRCUIT BOARD		
1463 (A～Z)	FM IF CIRCUIT	
Q IC FET & TRANSISTOR		
802	IC	μA703HC
808	〃	TA7061AP
803	FET	2SK19GR
801, 804～807, 809～811		2SC372Y
D DIODE		
801, 802, 807～810	Si	1S1555
803～806	Ge	1S188FM
X CRYSTAL		
801	HC-18/U	10.245MHz
CF CERAMIC FILTER		
802	CFM 455F	
803	10.7MF-BR	
R RESISTOR		
CARBON		
804, 805, 826	¼W	100Ω
825, 827, 837	¼W	220Ω
824	¼W	470Ω
803, 833, 842	¼W	560Ω
808, 816, 819, 828, 829, 836, 846, 847	¼W	1KΩ
809	¼W	1.5KΩ
839, 840	¼W	2.2KΩ
811, 813, 814, 821, 843, 849～856	¼W	3.3KΩ
801, 830, 831, 835, 844	¼W	4.7KΩ
822, 838	¼W	5.6KΩ
802	¼W	10KΩ
815, 845	¼W	15KΩ
823, 834, 841	¼W	22KΩ
820, 832	¼W	47KΩ
848	¼W	56KΩ
806, 807, 810	¼W	100KΩ
RS THERMISTOR		
801	SDT-250	
C CAPACITOR		
DIPPED MICA		
812	50WV	15PF
806, 807	50WV	30PF
833	50WV	40PF
809, 835, 843	50WV	100PF
801	50WV	200PF
834	50WV	300PF
CERAMIC DISC		
844	50WV	0.001μF
802～805, 808, 813, 815, 816, 819, 836, 845～848	50WV	0.01μF
MYLAR		
810, 830, 831, 837, 838, 841	50WV	0.01μF
828, 829	50WV	0.02μF
811, 817, 818, 820～825	50WV	0.047μF
STYROL		
826	50WV	330PF
827	50WV	1000PF
TANTALUM		
839, 840	25WV	1μF
ELECTROLYTIC		
849, 850	16WV	1μF
832, 842	16WV	4.7μF
L INDUCTOR		
804	EL0610-251K	250μH
801～803, 806, 807	EL0610-102K	1mH
805	EL0610-202K	2mH
T TRANSFORMER		
801, 802	R-12	4074
803		4861D
804		4861E
805		3004
SSB IF UNIT		
PB PRINTED CIRCVIT BOARD		
1462 (A～Z)	SSB IF CIRCUIT	
Q IC FET & TRANSISTOR		
902	IC	TA7045M
903, 906	FET	2SK19GR
904, 905		2SC373
901		2SC784R
907, 908		2SC1000GR
D DIODE		
901～903, 912, 913	Si	1S1555
910	Ge	1S188FM
904～907, 909	G.B	1S1007
911	Zener	WZ110
914	Si	1S1941
XF CRYSTAL FILTER		
901	XF-10A	
R RESISTOR		
CARBON FILM		
909, 912, 914, 915, 919, 932, 933, 939, 940	¼W	100Ω
926, 928	¼W	270Ω
917, 944, 922	¼W	470Ω
901, 902, 927	¼W	560Ω
934, 938, 946, 947, 905 911, 913, 921	¼W	1KΩ
908, 910, 918, 930, 945, 924	¼W	2.2KΩ
925	¼W	2.7KΩ
903, 904, 942	¼W	3.3KΩ
929	¼W	3.9KΩ
935, 936	¼W	4.7KΩ
906	¼W	6.8KΩ
941	¼W	10KΩ
920, 943	¼W	22KΩ
907	¼W	27KΩ
937	¼W	56KΩ
916, 931	¼W	100KΩ
923	¼W	470KΩ
RS THERMISTOR		
901	SDT-250	

VR	**POTENTIOMETER**	
901	EVL-SOAA-00B52	500B
903	EVL-SOAA-00B13	1KB
902	EVL-SOAA-00B53	5KB
C	**CAPACITOR**	
	DIPPED MICA	
915	50WV	10PF
912	50WV	20PF
916	50WV	100PF
	CERAMIC DISC	
901, 902, 909～911, 906 917, 918, 920, 923～929, 933	50WV	0.01μF
903～905, 907, 908, 913, 914	50WV	0.047μF
	MYLAR	
932	50WV	0.0047μF
936, 940, 921	50WV	0.02μF
931, 937	50WV	0.047μF
	ELECTROLYTIC	
930, 939	16WV	1μF
938	16WV	10μF
934, 935, 922	16WV	47μF
TC	**TRIMMER CAPACITOR**	
901	ECV-1ZW 50×40	50PF
L	**INDUCTOR**	
901	EL0610-251K	250μH
T	**TRANSFORMER**	
901, 902	R-12 4074	
903	R-12 4073	

TONE BURST UNIT

PB	**PRINTED CIRCUIT BOARD**	
1461 (A～Z)	TONE BURST CIRCUIT	
Q	**IC & FET**	
1001～1003	IC	TP4011AN
1005		TP4027AN
1004		TP4049AN
1006	FET	2SK19GR
D	**DIODE**	
1001～1003	Ge	1S188FM
R	**RESISTOR**	
	CARBON FILM	
1014	¼W	220Ω
1015	¼W	5.6KΩ
1013	¼W	10KΩ
1011	¼W	180KΩ
1012	¼W	820KΩ
1001～1005, 1008～1010	¼W	1MΩ
	CARBON COMPOSITION	
1006, 1007	¼W	2.2MΩ
VR	**POTENTIOMETER**	
1002, 1003	EVL-SOAA-00B15	100KB
1001	EVL-SOAA-00B26	2MB
C	**CAPACITOR**	
	DIPPED MICA	
1009	50WV	1000PF
	MYLAR	
1001, 1002, 1004, 1005, 1007, 1010	50WV	0.01μF
	TANTALUM	
1003	35WV	0.33μF
1006, 1008	35WV	0.47μF
	ELECTROLYTIC	
1012	16WV	1μF
1013	16WV	4.7μF
1011	16WV	100μF
RL	**RELAY**	
1001	LZ-2G	

MIC AMP UNIT

PB	**PRINTED CIRCUIT BOARD**	
1460 (A～Z)	MIC AMP CIRCUIT	
Q	**IC, FET & TRANSISTOR**	
1104	IC	LD3001
1105, 1106, 1109	FET	2SK19GR
1101～1103, 1107, 1108, 1110	Tr	2SC372Y
D	**DIODE**	
1105, 1106, 1112～1114	Si	1S1555
1103, 1104	Ge	1S188FM
1108～1111	G. B	1S1007
1102	Varactor	FC63
1101	Varistor	MV103
X	**CRYSTAL**	
1101	HC-18/U	10.7000MHz
1102	〃	10.7015MHz
1103	〃	10.6985MHz
1104	〃	10.6993MHz
R	**RESISTOR**	
	CARBON FILM	
1101, 1105, 1112, 1121, 1124 1129, 1131, 1132, 1141, 1148～1153 1152, 1153	¼W	100Ω
1135～1138, 1142	¼W	220Ω
1102, 1114	¼W	470Ω
1155	¼W	560Ω
1159	¼W	820Ω
1106, 1113, 1125, 1127, 1145 1154, 1156	¼W	1KΩ
1122, 1123, 1147	¼W	2.2KΩ
1109	¼W	2.7KΩ
1104, 1128, 1157, 1158	¼W	3.3KΩ
1146	¼W	3.9KΩ
1118, 1120, 1133, 1143	¼W	4.7KΩ
1116, 1134, 1140, 1144, 1151	¼W	5.6KΩ
1139	¼W	6.8KΩ
1108, 1110, 1117	¼W	10KΩ
1115	¼W	12KΩ
1107, 1111	¼W	22KΩ
1103	¼W	27KΩ
1161	¼W	56KΩ
1119	¼W	68KΩ
1126, 1130	¼W	100KΩ
VR	**POTENTIOMETER**	
1102	EVL-SOAA 00B32	300B
1103, 1105	EVL-SOAA 00B13	1KB
1104	EVL-SOAA 00B23	2KB
1101	EVL-SOAA 00B54	50KB
C	**CAPACITOR**	
	DIPPED MICA	
1106	50WV	15PF
1107, 1108, 1147	50WV	100PF
1148	50WV	150PF
1110	50WV	750PF

CERAMIC DISC		
1159	50WV	3PF
1133	50WV	10PF
1158	50WV	15PF
1146	50WV	22PF
1140, 1154～1156	50WV	33PF(CH)
1126～1128, 1143	50WV	220PF
1136	50WV	0.001μF
1101, 1102, 1104, 1134 1135, 1138, 1139, 1141, 1142 1144, 1145, 1149～1153	50WV	0.01μF
1109	50WV	0.047μF

MYLAR		
1116		0.0033μF
1103		0.0047μF
1115, 1122, 1130, 1132		0.022 μF

ELECTROLYTIC		
1117, 1129, 1131	16WV	1μF
1114, 1118, 1119, 1121 1123～1125, 1137	16WV	10μF
1120	16WV	22μF
1112, 1113	16WV	47μF

TANTALUM		
1111	35WV	0.1μF

TC TRIMMER CAPACITOR		
1102～1104	ECV-1ZW 20×40	20PF
1101	ECV-1ZW 50×40	50PF

L INDUCTOR		
1101	#221024	
1107	RFC	10μH
1108～1111	RFC	1mH

T TRANSFORMER	
1101	R12-4074
1102	R12-4073

BOOSTER UNIT

PB PRINTED CIRCUIT BOARD	
1470 (A～Z)	BOOSTER CIRCUIT

Q TRANSISTOR		
1201	2N5590	
1202	2N5591	

D DIODE		
1201, 1202	Si	10D-1
1203, 1205～1208		1S1555
1204	Ge	1S188FM
1209	Zener	1N4740

R RESISTOR		
CARBON COMPOSITION		
1204	½W	10Ω
1201	½W	22Ω
1203	½W	56Ω
1205	½W	100Ω
1202	½W	330Ω
1206	½W	100KΩ
1207	½W	1MΩ

VR POTENTIOMETER		
1201	EVL-SOAA-00B14	10KB
1202	EVL-SOAA-00B54	50KB

C CAPACITOR		
DIPPED MICA		
1216	50WV	2PF
1217, 1223	50WV	5PF
1201	50WV	10PF
1224	50WV	12PF
1227	50WV	15PF
1213～1215	50WV	20PF
1205	50WV	33PF
1212	50WV	39PF
1211	50WV	68PF
1206	50WV	100PF
CERAMIC DISC		
1202, 1204, 1208, 1210	50WV	0.001μF
1218～1220	50WV	0.01μF
MYLAR		
1221	50WV	0.001μF
TANTALUM		
1222	35WV	0.1μF
ELECTROLYTIC		
1203, 1207, 1209	16WV	10μF

TC TRIMMER CAPACITOR		
1201	ECV-1ZW 50×40	50PF
1202～1204	TSN-P-100DS	20PF

L INDUCTOR	
1201, 1207	#221019
1204, 1206, 1208, 1209	#221020
1211, 1212	#221021
1202, 1203	#221022
1205	#221037
1210	EL0610-220K 22μH

RL RELAY			
1201	LZ-2G	DC12	450Ω

VFO UNIT

PB PRINTED CIRCUIT BOARD	
1465 (A～Z)	VFO CIRCUIT

Q FET & TRANSISTOR		
1302	FET	2SK19GR
1301, 1303		2SC372Y

R RESISTOR		
CARBON FILM		
1307, 1311, 1312	¼W	100Ω
1310	¼W	150Ω
1306	¼W	470Ω
1304	¼W	2.2KΩ
1301	¼W	3.3KΩ
1308	¼W	6.8KΩ
1309	¼W	15KΩ
1302	¼W	18KΩ
1303	¼W	33KΩ
1305	¼W	100KΩ

C CAPACITOR		
DIPPED MICA		
1318	50WV	2PF
1302	50WV	20PF
1313	50WV	39PF
1306	50WV	51PF
1311	50WV	68PF
1307	50WV	270PF
1310	50WV	470PF

	CERAMIC DISC	
1308, 1309, 1312, 1314～1316	50WV	0.01μF
	CERAMIC TC	
1303	500WV	5PF UJ
1304	500WV	10PF UJ
1301	500WV	20PF UJ
1305	500WV	82PF NPO
	CERAMIC FEED THRU	
1317	ECK-L1H102PE	1000PF
VC VARIABLE CAPACITOR		
1301	C521	
TC TRIMMER CAPACITOR		
1301	MC10P×2	
1302	KC-30P	
L INDUCTOR		
1301	#221025A	
1302	EL0610-680K	68μH
1303	EL0610-251K	250μH

REG UNIT

PB PRINTED CIRCUIT BOARD		
1469 (A～Z)	REG CIRCUIT BOARD	
Q TRANSISTOR		
1502, 1505	2SC372Y	
1503	2SC735Y	
1501, 1504	2SD313D(2SD235O, Y)	
D DIODE		
1501	Si Bridge	M4B-5
1505	Zener	WZ-061
1502		WZ-090
1503		WZ-110
1504	Thyristor	CW-01B
R RESISTOR		
	CARBON FILM	
1509	¼W	220Ω
1511	¼W	270Ω
1501	¼W	330Ω
1512	¼W	470Ω
1505	¼W	560Ω
1502	¼W	680Ω
1503	¼W	820Ω
1508	¼W	1KΩ
1504	¼W	2.7KΩ
1510	¼W	2.2KΩ
1506	¼W	3.3KΩ
	WIRE WOUND	
1507	1 W	0.4Ω

VR POTENTIOMETER		
1501, 1502	SR-19R	470ΩB
C CAPACITOR		
	CERAMIC DISC	
1504	50WV	0.001μF
1507,	50WV	0.01μF
	MYLAR	
1509	50WV	0.01μF
	ELECTROLYTIC	
1506	16WV	10μF
1503	16WV	100μF
1508	16WV	220μF
1505	16WV	470μF
1501, 1502	25WV	2200μF

KEYING UNIT

PB PRINTED CIRCUIT BOARD		
1568 (A～Z)		
Q IC & TRANSISTOR		
1601	IC	TP4011AN
1602	Tr	2SC372Y
R RESISTOR		
1601, 1603	¼W	1KΩ
1602	¼W	47KΩ
C CAPACITOR		
	TANTALUM	
1602	35WV	0.33μF
	ELECTROLYTIC	
1601	16WV	10μF


YAESU