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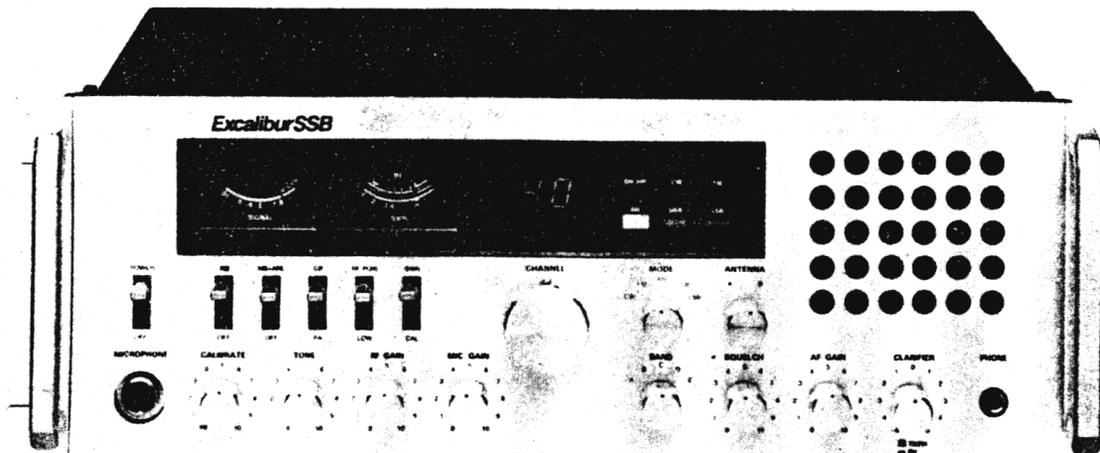
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Excalibur[®]



SSB

OWNER'S MANUAL

3000 Channels All-Mode AM/FM/SSB/CW
Deluxe Base Station Transceiver
with 110/220V AC Switchable, Roger Beep

Section 1 Specification

Thank you for your confidence in selecting Excalibur two-way radio equipment. We know you'll find your transceiver as exciting as it is practical. Many years of valuable experience designing electronic products are behind our two-way communications systems. Only the highest quality components are incorporated into Excalibur radios to assure reliability and maximum performance.

Installing and operating the Excalibur is not complicated, but the flexibility provided by its numerous operating features may not be fully appreciated until a little time is spent becoming familiar with its controls and connections. It will be to your advantage to save all the packing materials - cartons, fillers, cushioning, etc., they will prove valuable in preventing damage should you ever have occasion to transport or ship the Excalibur.

Specifications

General

Channels	3000 channels
Modulation Modes	CW, FM, AM, USB, LSB
Frequency Range	26.065 to 28.305 MHz
Frequency Control	Phase-locked synthesizer
Frequency Tolerance	±0.005%
Frequency Stability	±0.003%
Operating Temperature Range	-30°C to +50°C
Microphone	Plug-in [4-pin], 600 Ohm dynamic type
AC Input Voltage	110V/220V 50/60Hz
AC Power Consumption	75W
Antenna Connectors [A and B]	Standard SO-239 type X2
Semiconductors	6 IC, 1 FETs, 43 Transistors
Meter #1	Indicates relative RF power output/antenna SWR
Meter #2	Indicates received signal strength

Transmitter

Power Output	Low 0.5-AM 0.5-FM 3-SSB(W) Normal 5-AM 5-FM 12-SSB(W)
SSB Generation	Dual-balanced modulation
AM Modulation	Class B amplitude, collectors modulation
AM Modulation Capability	Up to 100%
FM Deviation	±1.5 KHz @ 1,250 Hz 20 mV audio
Clarifier Range	±5 KHz
Harmonic and Spurious Emission	Better than 60 dB
AM/FM Frequency Response	400 to 5,000 Hz
SSB Frequency Response	400 to 3,000 Hz
Output Impedance [A and B]	50 Ohms unbalanced X2
Output Indicators	RF Meter shows relative RF output power.

Receiver

AM Sensitivity	1 μV for 10 dB S/N
FM Sensitivity	1 μV for 20 dB S/N
SSB Sensitivity	0.2 μV for 10 dB S/N
AM/FM Selectivity	5 dB at 4 kHz, 50 dB at 10 kHz
SSB Selectivity	5 dB at 2 kHz
Image Rejection	More than 50 dB
IF Rejection	More than 80 dB at 455 kHz
AGC	Change in audio output less than 12 dB: from 10 μV to 0.4V
Squelch	Adjustable -threshold less than 0.7 μV
Audio Frequency Response	400 to 2,500 Hz
Distortion	Less than 10% at 2 watts output into 8 Ohms
Adjacent Channel Rejection	>75 dB
Cross Modulation Intermediate Frequency	>50 dB 10.695 MHz [Am-1st, SSB], 455 KHz [AM-2nd]
Clarifier Range	±5 KHz
Noise blanker	IF single gate type
Audio Output Power	More than 3 watts into 8 Ohms
Built-in Speaker	8 Ohms, dynamic
External Speaker (optional)	Disables internal speaker when connected

Section 2 Installation

Location/Connection

The transceiver should be placed in a convenient operating location close to an AC power outlet and the antenna lead-in cable (s).

The transceiver is attached with the AC power cord set. Proceed as follows to complete all necessary connections to the transceiver.

1) Your transceiver has two standard antenna connectors of type SO-239 both located on rear panel, for easy connection to standard PL-259 coax plugs. If the coax antenna cable must be made longer, use coax cable with impedance of 50 ohms, frequency ratings for 27 MHz, and use only enough cable to suit your needs. This will insure a proper impedance match and maximum power transfer from the transmitter to the antenna.

2) **AC Power Operation** : Use 110 or 220 volts AC power for the base station.

Noise Interference

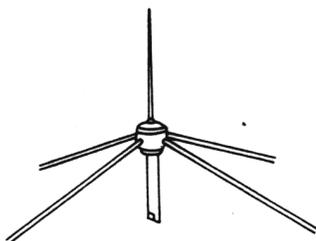
There are several kinds of noise interfering you may encounter in base station operation. Some of these noise sources are; fluorescent buzz, nearby commercial broadcast, electrical appliance, lawnmower, and electrical storms, etc. Commercial products are available to reduce interference from these sources. Consult your dealer or CB/amateur radio supply shops.

Antennas

For best transmission and reception, your CB transceiver should use an antenna especially designed for a frequency of 27 MHz. Antennas are purchased separately and include installation instructions. Numerous types of CB antennas are available that range from emphasis on ease of installation to emphasis on performance. Often the difference in performance between many of the antenna is modest. You can connect 2 antennas to your CB, or 1 antenna and 1 dummy load.

1) Vertical Ground Plane Antennas.

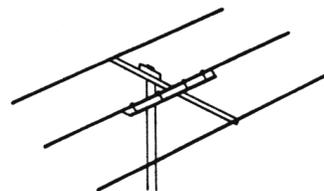
These are omnidirectional antennas that provide optimum performance for contacting other fixed stations using vertical type antennas in addition to all mobile stations. For medium long range communications work.



Ground Plane

2) Directional Beam Antennas.

Highly efficient and directional antennas generally intended for fixed-to-fixed very long range communications.



Directional Beam
Antenna

Remote Speaker

The external speaker jack (EXT. SP) on the rear panel is used for remote receiver monitoring. The external speaker should have 8 ohms impedance and be able to handle at least 3 watts. When the external speaker is plugged in, the internal speaker is disconnected.

Note. The PHONE jack on the front panel overrides both external and internal speakers. When the plug from a head-phone is plugged to the PHONE jack, both internal and external speakers are silenced simultaneously.

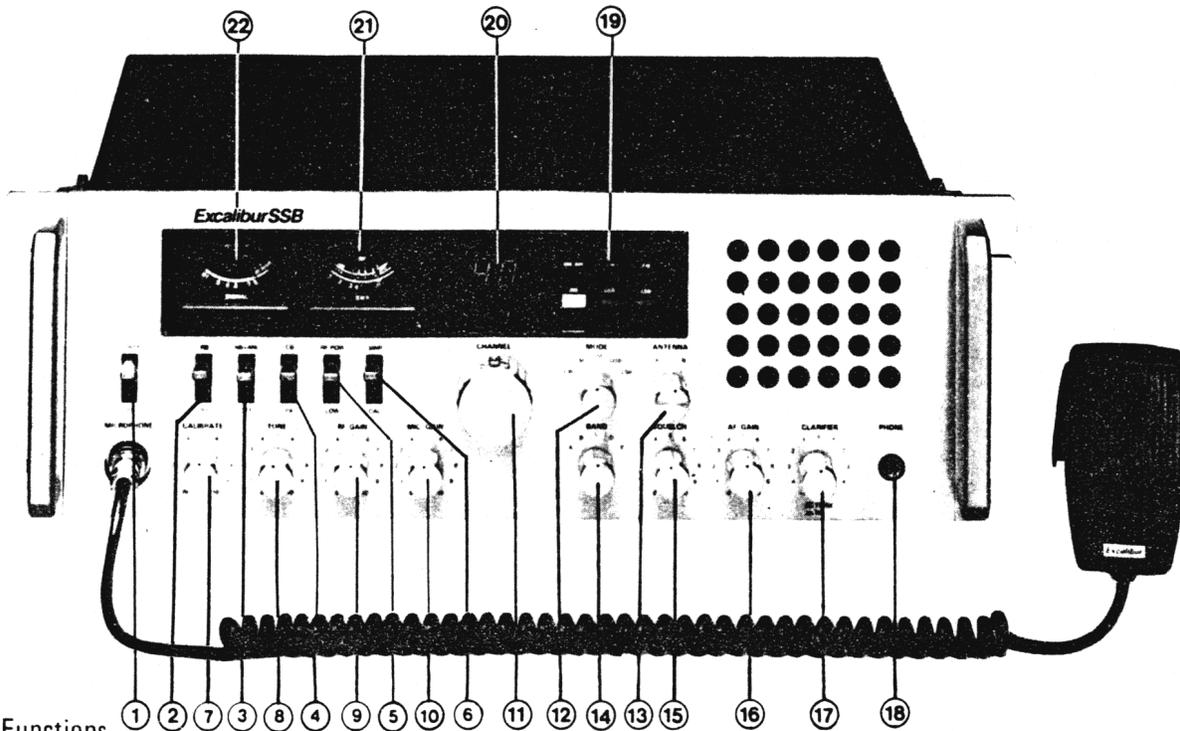
Public Address

An external 8 ohm, 3 watt speaker must be connected to the PA jack located on the rear panel when the transceiver is used as a public address system. The speaker should be directed away from the microphone to prevent acoustic feedback. Physical separation or isolation of the microphone and speaker is important when operating the PA at high output levels.

Section 3 Operation

Controls/Indicators

There are 17 controls and 10 indicators on the front panel of your Excalibur.



Control Functions

1 Power/Qn-off

Place in **Power** (lever up) position to apply power to the unit.

2 RB Switch

This switch activates the ROGER BEEP circuit when placed in RB (lever up) position.

3 NB + ANL Switch

This switch activates the noise blanker circuit and the automatic noise limiter in the audio when placed in NB + ANL (lever up) position.

4 CB-PA Switch

This switch selects the public address mode of the transceiver. The PA function should not be used unless an external speaker is connected to the PA SP jack on the rear panel. See the Public Address Operation on page 6.

5 RF Power Select Switch

During AM or FM operation, with this switch placed in the **RF Power** position, the transceiver will produce full rated transmit power for long range communication. The **Low** position will produce lower transmit power for shorter range communication.

6 SWR-Calibrate Switch

This switch changes the SWR meter function in two ways:

- **CALIB (lever down):** Used to calibrate the SWR Meter before measuring your antenna SWR ratio.

- **SWR (lever up):** Used to directly read the SWR of antenna connected to the unit. See Accessory Circuit Operation.

7 Calibrate Control

This control is used for calibrating the SWR meter for accurate SWR readout in conjunction with the SWR-CALIB Switch.

Note: So that the meter functions as RF power meter, be sure to set this control to fully counterclockwise position marked **RF**.

8 Tone Control

This changes tonal sound quality when receiving. Clockwise rotation will emphasize the high tone.

9 RF Gain

This control is used primarily to optimize the reception in strong signal areas. Under normal operating conditions the control should be turned fully clockwise. When strong overloading or distorted signals are received rotate this control counterclockwise to reduce gain.

Note: The Squelch Control (15) may require readjustment with reduced RF Gain control.

10 Microphone Gain

A preamplifier circuit is built into this unit to increase microphone gain. Experiment with this control for the setting that will best suit your individual use.

11 Channel Selector

Has 40 detents in a turn and selects one of the channels desired. Use the Channel selector in conjunction with the Band Select switch. The selected channel is digitally displayed in the window above the selector.

12 Mode Selector

Selects the mode of operation in either CW, standard FM, AM or USB and LSB. Transmissions in any mode can only be communicated to stations operating in the same mode.

13 Antenna A-B Switch

For switching between two types of antennas or dummy load that may be connected to the unit. You may connect a ground plane antenna which is nondirectional to Antenna A. Receptacle, and a beam type antenna that is highly directional to the Antenna B Receptacle for long-range communications. Placing this switch in either position connects the unit antenna input circuit to the appropriate antenna receptacle.

14 Band Select Switch

Used with the channel selector. Selects one of 5 bands of 40 frequencies.. See back cover to page 11 for information of channel provision and frequencies.

15 Squelch

This control is used to cut off or eliminate receiver background noise in the absence of an incoming signal. For maximum receiver sensitivity it is desired that the control be adjusted only to the point where the receiver background noise or ambient background noise is eliminated. Turn fully counterclockwise then slowly clockwise until the receiver noise just disappears. Any signal to be received must now be slightly stronger than the average received noise. Further clockwise rotation will increase the threshold level which a signal must overcome in order to be heard. Only strong signals will be heard at a maximum clockwise setting.

16 AF Gain

Permits you to adjust the listening level when receiving.

17 Clarifier

When the knob is depressed in position, the clarifier control provides precise tuning of the receiver. On regular AM or FM reception, this will permit adjustment of off-frequency transmissions. In the SSB or CW reception, this control is used as a voice clarifier to adjust for clearer voice reception.

When this knob is pulled out, the control can be used to vary both the receive and transmit frequencies to enable you to operate in between channels.

18 Phone Jack

Accepts a plug from a headset of 4 to 32 Ohm impedance. Insertion of the plug will silence the built in speaker (and external speaker connected to External Speaker jack).

19 Function Indicators

LED indicators located in the LED area permit you to know instantly the mode to which the unit is engaged.

On Air: Lights up during transmit mode indicating you are on-the-air.

CW-FM-AM-USB-LSB: Indicates a corresponding mode selected by the Mode selector 12).

20 Channel Readout

This is the LED [light emitting diode] digital readout to indicate the channel selected by the Channel selector.

21 Power/SWR Meter

Used for two purpose - to indicate relative transmitter power when transmitting and to indicate antenna SWR [standing wave ratio]. Note that the power meter has separate scales for AM (FM) and SSB (CW) transmission, respectively.

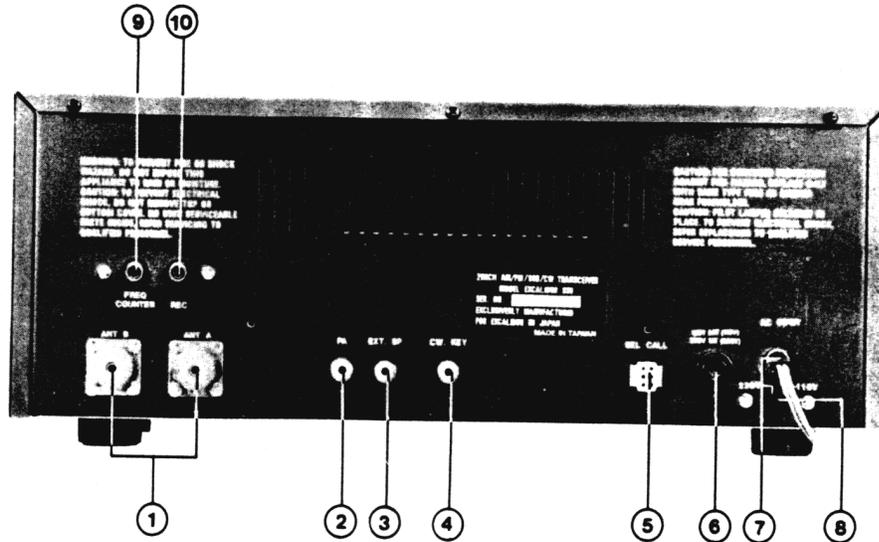
22 S [Signal] Meter

The left hand meter provides a relative indication of the signal strength of a received signal in S units during reception. Note that SSB signals will respond this meter only during voice modulation. This being due to the fact that SSB transmissions do not contain a continuous RF carrier as is found on AM or FM and CW.

23 Push-to-Talk Microphone

The receiver and transmitter are controlled by the Push-to-Talk switch on the microphone. Press the switch and the transmitter is activated; release the switch to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal voice. The radio comes complete with the low impedance dynamic microphone (supplied). Note: Depressing the Push-to-Talk switch on the microphone is also required to activate the PA system.

Rear Panel



Rear Panel Connectors

1 Antenna Receptacle A/B

Accept PL-259 type coaxial plugs from antenna system. Switching to connect the transceiver output to either receptacle is done with the Antenna A-B switch on the front panel.

2 PA Speaker Jack

Used for public address operation. The PA speaker should be connected to this jack using 1/8" (3.6mm) diameter plug. Insertion of an external speaker into the External Speaker jack will not interrupt the PA operation.

3 External Speaker Jack

Used to connect an external speaker for extra sound source. Use 1/8" (3.6mm) diameter plug for connection. Insertion of the plug into this jack will silence the internal speaker.

4 CW Key

Use for morse code operation. Connect a CW key to this jack and place the CW/FM/AM/USB/LSB switch in the CW position.

5 Selective Call Jack

A provision has been made which enables your transceiver to couple with a selective call set (available from your dealer). This jack is used to connect the selective call set to the unit, and is normally occupied with a plug prewired for normal CB operation. Do not remove the plug unless you are using the jack. Following the dealer's advise and instruction manual accompanying the purchased selective call set will ensure proper selective call installation and operation.

6 Fuse

Accommodates a fuse for AC input circuit protection. Use 125V 2A or 250V 1A fuse for replacement.

Note. Before replacing the fuse, see your dealer to check to find out the reason why the fuse was blown. Replacing without check may only blow the fuse again.

7 AC Power Cord

Connects to AC power outlet for AC mains supply.

8 110 or 220 Volts Selector

Use for 110 or 220 volts selected of AC power supply.

9 Frequency Counter Output Jack

The RCA-type (pin) jack is used to connect an optional frequency counter so that you can watch channel frequency digitally. The frequency counter readout will be possible on transmitting only.

10 Recording Output Jack

The RCA-type (pin) jack provides output for connection to a tape recorder to permit recording of received signals or your modulating voice.

Operating Procedure To Receive

IMPORTANT: Make sure that the antenna, power source, and microphone are connected before you operate.

- 1) Set the CB-PA switch to CB position.
- 2) Turn the unit on by setting the Power Switch to On position. Now the meters, Channel Indicator, and Function Indicators will be illuminated.
- 3) Temporarily, set the Mode Switch in AM position.
- 4) Set the Squelch Control in fully counterclockwise position and adjust the AF Gain control for a comfortable listening level.
- 5) Listen to the background noise from the speaker. Turn the Squelch Control slowly clockwise until the noise just disappears (no signal should be present). Leave the Squelch Control at this setting. The Squelch Control is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the Squelch Control too far clockwise or some of the weaker signals will not be heard.
- 6) Depress the Clarifier and set it to the center (12 o'clock) position.
- 7) Select a desired mode of operation, CW, FM, AM, USB or LSB and adjust the Clarifier.
- 8) Select a channel you desire by the Band Select switch, then by the Channel Selector.

Note. If you want to operate in between channels, pull out the clarifier knob and rotate it upscale or downscale. (This also affects in transmitting mode.)

Operating Procedure To Transmit

- 1) Select the desired channel and mode of transmission.
 - 2) If the channel is clear, depress the Push-to-Talk switch on the microphone. Speak in a normal tone of voice.
- Standby-Beep**

A special provision has been built in your radio to give other stations a sign which tells that you are turning to receive. Without needing switching operation to activate this feature, a beep tone is automatically transmitted at each time you release the push-to-talk switch on the microphone to turn to receive mode.

Microphone gain control

A preamplifier circuit is built into the radio to increase the microphone gain. Experiment with the control for setting that will best suit your individual use.

Note. When the microphone gain control is set to maximum, ambient noise may also be picked up by the microphone. In high noise situations, low microphone gain setting may produce the best results.

The microphone gain control is also used to adjust PA loudness.

Public Address Operation

To use this feature of the transceiver, a speaker having a voice coil impedance of 8 to 16 ohms and a power handling capability of at least 3 watts should be connected to the PA SP jack on the rear panel. Be sure that there is physical separation between the microphone and the PA speaker itself. If the PA speaker is located very close to the microphone, acoustic feedback will result when the PA amplifier is operated at high volume (or when PA is used indoors). Adjustment of PA volume is made with the MIC GAIN control.

SWR Measurement

Most antennas are factory tuned, but the antenna efficiency may be peaked by slightly adjusting the length of antenna using the SWR meter built into the unit. This adjustment may improve the antenna standing wave ratio (SWR). The SWR permits you to determine how well matched the antenna and its cables are to your transceiver.

- 1) Set the unit in the receive mode as instructed under the Operating Procedure to Receive section.
- 2) Set the Mode switch to AM position; the SWR-Cal 6) switch to the Cal position.
- 3) Press the Push-to-Talk switch on the microphone and turn the Calibrate Control clockwise (past click) so that the SWR meter pointer exactly coincides with the Set mark on the scale. Release the Push-to-Talk switch.
- 4) Set the SWR-Cal switch to the SWR position and depress the Push-to-Talk switch again. The SWR of your antenna is read directly on the scale.

Note: An SWR below 2 or less is desired as this indicates that over 95% of the transmitted power is broadcast into the air.

Section 4 Maintenance & Adjustment

Circuit Theory

The concept of PLL system frequency synthesization is not of recent development, however, it has not been a long age since the digital theory has been coupled with the PLL synthesization technology. Although details of the PLL theory is somewhat complicated and not within the scope of this brochure, we hereby provide the fundamental theory of it.

PLL Circuitry. PLL is an abbreviation of the phase-locked loop which is fundamental composed of a closed loop feedback circuit. The feedback component is the balance of frequency drifts and the PLL circuit acts to cancel it out. To detect out the frequency drift of the PLL output, a fixed reference oscillator (10 kHz, 1/1024 divided down from 10.240 MHz) is compared constantly with the input frequency (10 kHz). The input frequency is obtained by dividing the VCO frequency. A functional block diagram is provided below under 'PLL Circuit' for the easier understanding.

Off-Set frequency oscillator TR-29 The off-set-frequency oscillator TR-29 oscillates at 14.460 MHz for all band. Switching between these oscillating frequencies is made by biasing the diodes D 97 to D111.

The off-set frequency signal is obtained at TR-29 emitter and flows through L-16 and C-88 into TR-25 mixer where it is beat with the VCO signal. The VCO signal is obtained from the following:

$$f_{VCO} = f_{\text{off-set}} + N f_r$$

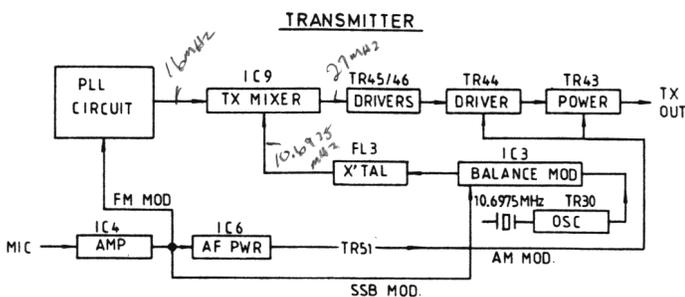
Where, f_{VCO} = VCO frequency, N = programming code for divider output, f_r = reference frequency step, 0.01 MHz.

i.e. At channel #1 in band A, and AM band corresponding N code is 91.

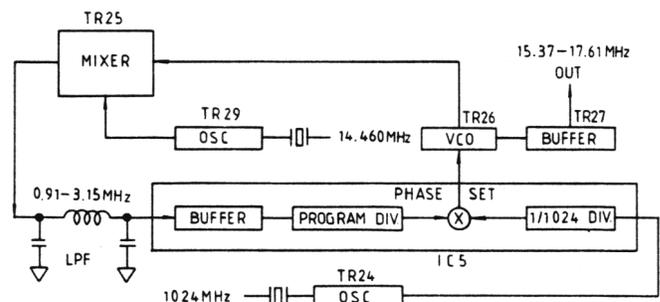
$$f_{VCO} = 14.460 + 91 \times 0.01 = 15.370 \text{ MHz}$$

Since the mixer output is determined by two factors-the off- set frequency output (dependent on band selector switch) and the VCO output, the mixer output contains the subtracted frequencies of 0.91 to 3.15 MHz. These frequencies appear in pin #2 of IC-1 through C-82, and divided by the programmable divider in IC-1 down to 10 KHz which is compared with another 10 KHz signal obtained from the reference oscillator (10.240 MHz).

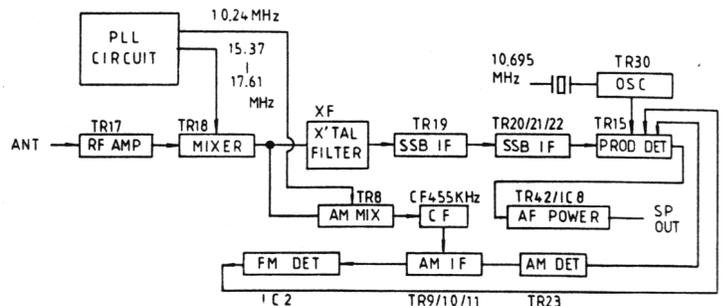
The VCO output is mixed with the off-set frequency signal and applied to the TX mixer IC-9 through band-pass filters L-43 and L-44. i.e. At channel 1 in band A, and AM band, the TX mixer IC-9 accepts $15.370 + 10.695 \text{ MHz} = 26.065 \text{ MHz}$ is TX frequency. The mixed with 10.695 MHz signal from Tr-30. When receiving channel 1 in band A (26.065 MHz), the 1st RX mixer TR-18 accepts 15.370 local signal at its base, and converts down it to 10.695 MHz IF (for AM/FM modes, this is the 1st intermediate frequency). TR-18 off-sets the 10.695 MHz signal so that TR-30 can oscillates at 10.6975 MHz for LSB.



PLL CIRCUIT



RECEIVER



Alignment Procedure

1- Measurement Condition

- (1) Reference temperature _____ 25° C
- (2) Reference humidity _____ 65%

Note: Unless otherwise specified, alignment may be performed under the room temperature of 5°– 35° C and the room humidity of 45 – 80%.

- 3) Power supply _____ AC 110V or 220V ±3%

2- Test Equipment. All test equipment should be properly calibrated.

- a) 50 Ohms resistive antenna load, 20W.
- b) Frequency counter operable in the required frequency range.
- c) HF signal generator operable over 50 kHz to 60 MHz.
- d) Synchroscope, 0–100 MHz, high input Z.
- e) FM deviation meter.
- f) Digital voltmeter
- g) 8 Ohms 5W resistive speaker load.
- h) Two audio signal generators, 10 Hz to 20 kHz, attenuative.
- i) RF wattmeter, 50 ohm/15 watt, thermocoupled.
- j) Circuit tester, input impedance 20 kOhm/V.
- k) Regulated DC power supply, more than 4A.
- l) Dummy microphone plugs, receive and transmit mode.
- m) VTVM, 0.1 mV measurable.

3- PLL Circuit Alignment

A. [10.24 MHz] Reference Frequency Adjustment (Check)

- 1) Connect frequency counter to pin terminal between C-78 and C-79.
- 2) Check counter reads 10.24000 MHz.
- 3) Tolerance within ±200 Hz is acceptable. Otherwise, replace X-1 (10.24 MHz).

B. [10.695/10.6925/10.6975 MHz] Adjustment.

- 1) Connect frequency counter to TP-6 → (R-102)
- 2) 10.695 MHz: Set the mode selector to CW. Adjust L-26 to 10.695 MHz + 0, –100 Hz.
- 3) 10.6925 MHz: Reset Mode Selector to USB. Adjust L-27 to 10.6925 MHz, + 0, –100 Hz.
- 4) 10.6975 MHz: Reset Mode Selector to LSB. Adjust L-28 to 10.6975 MHz, + 0, –100 Hz.

C. PLL Input Level Adjustment

- 1) Set the mode selector to AM, and the clarifier Control to center, and set the band selector to Position C of CH 19.
- 2) Connect synchroscope to TP-4 (pin terminal between the C-82 and R-107).
- 3) Adjust L-16 for maximum RF output.

D. [VCO] Adjustment

- 1) Set the mode selector to AM, and the clarifier control to center, and set the band selector to position E with CH 40.
- 2) Connect synchroscope to TP-3.

- 3) Adjust L-18 for maximum RF output.
- 4) Connect DC voltmeter to TP-2 (pin terminal between the R-109 and R-258 from IC-5).
- 5) Adjust L-17 to DC 5.0 + 0.1V.
- 6) Check A band of CH7, must be DC 1.5V minimum.

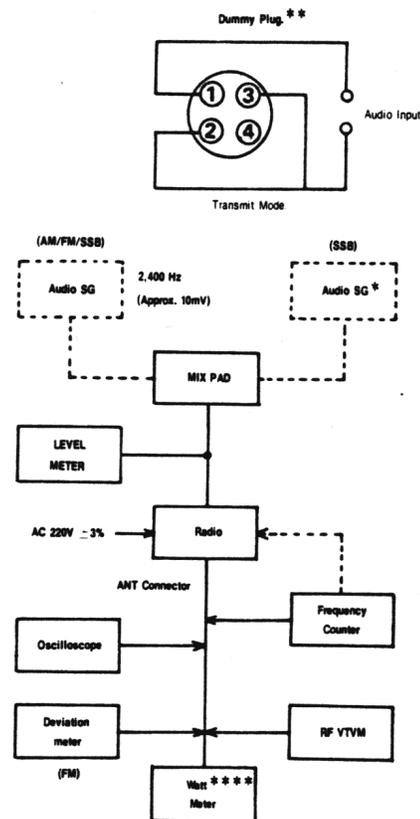
E. [Off-set Frequency] Adjustment (R-74)

- 1) Connect frequency counter to TP-3 (pin terminal of L-18).
- 2) Set the Mode Selector to AM, and the Clarifier Control to center.
- 3) Set the Band Selector to position C of CH19.
- 4) Adjust L-19 for 16.040 MHz ± 50 Hz.
- 5) Set the mode Selector to USB.
- 6) Adjust L-20 for 16.0425 MHz ± 50 Hz.
- 7) Set the mode Selector to LSB.
- 8) Adjust L-21 for 16.0375 MHz ± 50 Hz.
- 9) Set the mode Selector to LSB. and transmit station.
- 10) Adjust VR-15 for 16.0375 MHz ± 50 Hz.

4.- Transmitter Alignment

A. Test set-up

Connect testing unit to the unit as shown:

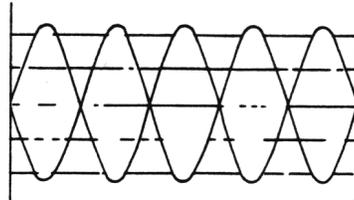


- B. RF Power Transistor of Current Adjustment**
- 1) Set the mode selector to USB, and the band selector to C of CH 19.
 - 2) Connect current meter to TP-9 (+) and TP-8 (-).
 - 3) Adjust VR 11 to 10 ± 0.5 mA.
 - 4) Connect current meter to TP-9 (+) and TP-7 (-).
 - 5) Adjust VR 10 to 100 ± 5 mA.
- C. RF Power Amplifier Adjustment**
- 1) Set the Mode Selector to USB.
 - 2) Apply 1,000 Hz 30 mV audio to microphone input circuit (use dummy microphone plug).
 - 3) Set the band Selector to E with CH40.
 - 4) Adjust VR-12 and L-42 for maximum RF output.
 - 5) Adjust L-40, L-43, L-44 and L-33 for maximum RF output.
 - 6) Repeat steps 3) through 5) until no further improvement is obtained.
 - 7) Adjust L-42 for balance of E band CH40 and A band CH1 with RF output.
- D. Two-Tone Adjustment**
- 1) Apply 500 Hz and 2,400 Hz (30 mV) audio tones to the microphone input circuit at the same time. Use two audio signal generator set with attenuators.
 - 2) Adjust test audio levels of 500 Hz generator by means of attenuator on the generator so that the scope present wave figure like 'A' as shown below.
 - 3) Adjust VR-12 to 12 W p-p power output.
- E. AM/FM/CW RF Power Output Adjustment**
- 1) Set the Mode Selector to AM.
 - 2) Select the Band Selector to C.
 - 3) Select the Channel Selector to 19.
 - 4) Adjust VR-13 for 5 W RF power output.
- F. AM Modulation Adjustment**
- 1) Apply 1,000 Hz 30 mV audio to the unit.
 - 2) Adjust VR-14 for modulation depth of greater than 90%.
- G. FM Deviation Adjustment**
- 1) Set the Mode Selector to FM.
 - 2) Apply 1,000 Hz 30 mV audio to modulation circuit. Use dummy microphone plug.
 - 3) Connect deviation meter (or linear detector) to antenna output on the unit.
 - 4) Adjust VR-5 to obtain 2-3 KHz.
- H. RF power Meter Adjustment**
- 1) Set the Mode Selector to AM.
 - 2) Comparing the reading of external RF power and the built-in meter, Adjust VR-8 for equal indication on the unit power meter.
- I. CW Tone Level Adjustment**
- 1) Set the mode selector to CW.
 - 2) Connet 8 Ohm dummy load and AF VTVM to ext S.P jack, and connect a key sw to key sw Jack.
 - 3) Key sw on and adjust VR-16 to 200 ± 10 mV.

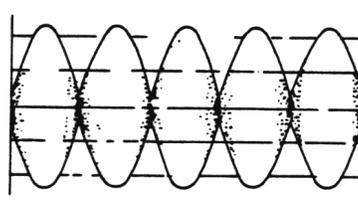
Reference –SSB Two-Tone Alignment

Important: RV-12 (bias) Adjustment: RV-12 should not be rotated clockwise beyond 2 o'clock position, or the RF power transistor will be destroyed.

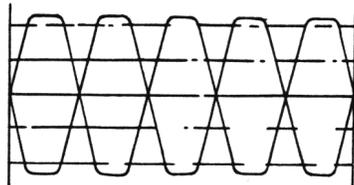
A. Properly adjusted transmitter.



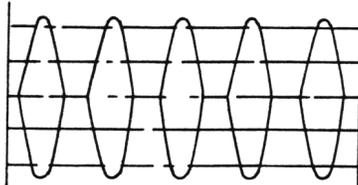
B. Unequal tones-Adjust generator outputs to balance.



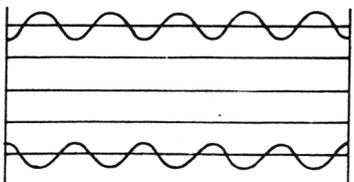
C. Excessive modulation - Adjust RV12 counterclockwise.



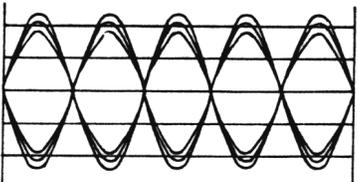
D. Final transistor incorrectly biased - Adjust RV 12.



E. Undermodulation-Adjust RV 12 clockwise.



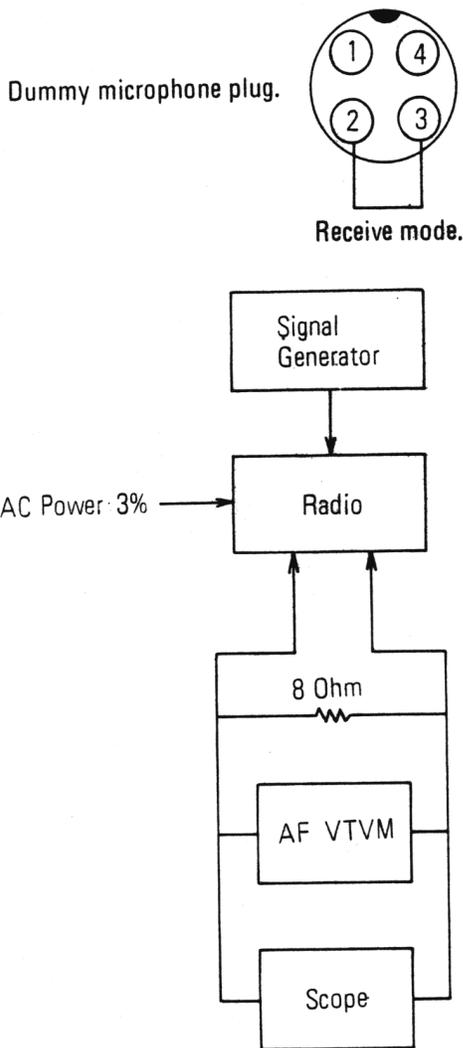
F. Similar to A but showing hum-Check for proper testing condition.



5.- Receiver Alignment

A. Test set-up

Connect testing equipment to the unit as shown:



B. AM Sensitivity Adjustment

- 1) Set signal generator to 27.185 MHz 30% modulation.
- 2) Set the Channel Selector 19 in Band C.
- 3) Set the Mode Selector to AM.
- 4) Adjust L3, L4, L6, L7, L8, L10, L11, and L12 for maximum audio output from speaker output terminals (across dummy load).
NOTE: Keep generator output level as low as possible to avoid AGC action.
- 5) After completing above; adjust L-8 for balance A band and E band.

C. SSB Sensitivity Adjustment

- 1) Set signal generator to 27.186 MHz. without Modulation.
- 2) Set the Channel Selector to channel 19 in Band C.
- 3) Set the Mode Selector to USB.
- 4) Adjust L-13 and L-14 for maximum audio output. Set clarifier to center.

D. FM IF/Demodulator Alignment (FM Sensitivity Adjustment)

- 1) Select channel 19 in Band C, set the Mode Selector to FM.
- 2) Set signal-generator to 27.185 MHz.
- 3) Apply FM signal (1 μ V, 1.5 KHz deviation with 1 KHz audio) to unit.
- 4) Readjust L-5 for maximum audio output.

E. Squelch Adjustment

- 1) Set the Mode Selector to AM.
- 2) Set signal generator to provide RF input signal of 60 dB (1000 μ V), 1 KHz 30% modulated, and rotate squelch control to the fully clockwise position.
- 3) Connect scope to speaker output terminal. Adjust VR-4 to a point at which audio output is critically disappeared on scope.
Check the Squelch circuit will operate within 48-70 dB at all modes. SSB RX squelch is automatically adjust by VR-3 and requires no particular adjustment.

F. S-Meter Adjustment

- 1) Set the Mode Selector to AM.
- 2) Adjust signal generator output to 40 dB (100 μ V).
- 3) Adjust VR-1 so that S-meter indicates '9' on the unit meter scale.
- 4) Set the Mode Selector to USB.
- 5) Adjust VR-2 so that S-meter indicates '9'.

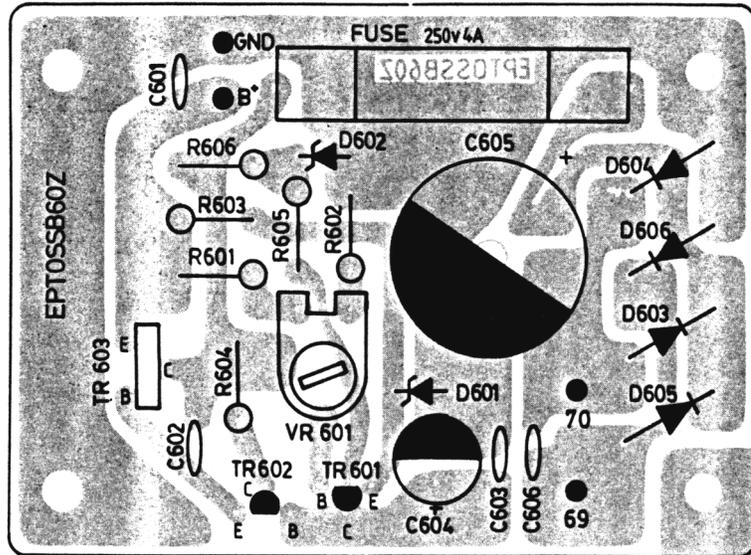
G. Noise blaker Adjustment

- 1) Set the mod selector to AM, select channel 40 in band A.
- 2) Set signal generator to ~~26.945~~ 26.495 MHz (CH 39 position) without Modulation, RF input signal of 40 dB (100 μ V).
- 3) The NB/ANL SW ON.
- 4) Connet DC voltmeter to TP-1.
- 5) Adjust L-1 and L-2 to obtain DC 2-3V.

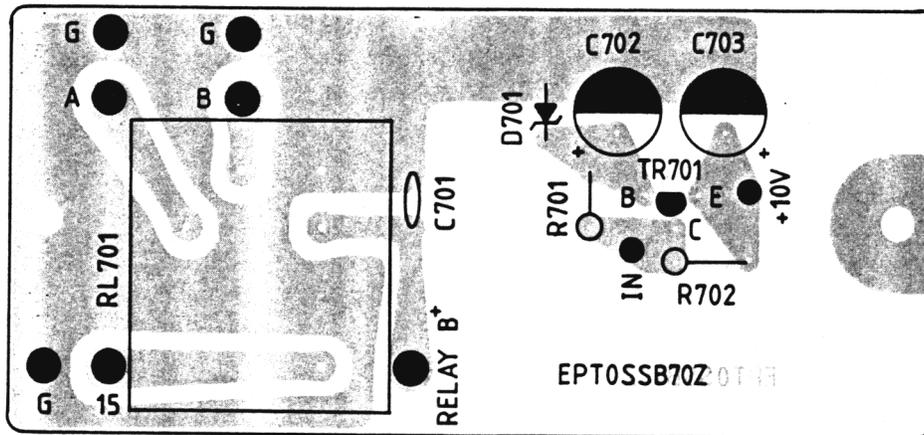
Frequency/Channel Chart

A-Band		B-Band		C-Band		D-Band		E-Band	
Channel	MHz Frequency								
1.	26.065	1.	26.515	1.	26.965	1.	27.415	1.	27.865
2.	26.075	2.	26.525	2.	26.975	2.	27.425	2.	27.875
3.	26.085	3.	26.535	3.	26.985	3.	27.435	3.	27.885
4.	26.105	4.	26.555	4.	27.005	4.	27.455	4.	27.905
5.	26.115	5.	27.565	5.	27.015	5.	27.465	5.	27.915
6.	26.125	6.	26.575	6.	27.025	6.	27.475	6.	27.925
7.	26.135	7.	26.585	7.	27.035	7.	27.485	7.	27.935
8.	26.155	8.	26.605	8.	27.055	8.	27.505	8.	27.955
9.	26.165	9.	26.615	9.	27.065	9.	27.515	9.	27.965
10.	26.175	10.	26.625	10.	27.075	10.	27.525	10.	27.975
11.	26.185	11.	26.635	11.	27.085	11.	27.535	11.	27.985
12.	26.205	12.	26.655	12.	27.105	12.	27.555	12.	28.005
13.	26.215	13.	26.665	13.	27.115	13.	27.565	13.	28.015
14.	26.225	14.	26.675	14.	27.125	14.	27.575	14.	28.025
15.	26.235	15.	26.685	15.	27.135	15.	27.585	15.	28.035
16.	26.255	16.	26.705	16.	27.155	16.	27.605	16.	28.055
17.	26.265	17.	26.715	17.	27.165	17.	27.615	17.	28.065
18.	26.275	18.	26.725	18.	27.175	18.	27.625	18.	28.075
19.	26.285	19.	26.735	19.	27.185	19.	27.635	19.	28.085
20.	26.305	20.	26.755	20.	27.205	20.	27.655	20.	28.105
21.	26.315	21.	26.765	21.	27.215	21.	27.665	21.	28.115
22.	26.325	22.	26.775	22.	27.225	22.	27.675	22.	28.125
23.	26.355	23.	26.805	23.	27.255	23.	27.705	23.	28.155
24.	26.335	24.	26.785	24.	27.235	24.	27.685	24.	28.135
25.	26.345	25.	26.795	25.	27.245	25.	27.695	25.	28.145
26.	26.365	26.	26.815	26.	27.265	26.	27.715	26.	28.165
27.	26.375	27.	26.825	27.	27.275	27.	27.725	27.	28.175
28.	26.385	28.	26.835	28.	27.285	28.	27.735	28.	28.185
29.	26.395	29.	26.845	29.	27.295	29.	27.745	29.	28.195
30.	26.405	30.	26.855	30.	27.305	30.	27.755	30.	28.205
31.	26.415	31.	26.865	31.	27.315	31.	27.765	31.	28.215
32.	26.425	32.	26.875	32.	27.325	32.	27.775	32.	28.225
33.	26.435	33.	26.885	33.	27.335	33.	27.785	33.	28.235
34.	26.445	34.	26.895	34.	27.345	34.	27.795	34.	28.245
35.	26.455	35.	26.905	35.	27.355	35.	27.805	35.	28.255
36.	26.465	36.	26.915	36.	27.365	36.	27.815	36.	28.265
37.	26.475	37.	26.925	37.	27.375	37.	27.825	37.	28.275
38.	26.485	38.	26.935	38.	27.385	38.	27.835	38.	28.285
39.	26.495	39.	26.945	39.	27.395	39.	27.845	39.	28.295
40.	26.505	40.	26.955	40.	27.405	40.	27.855	40.	28.305

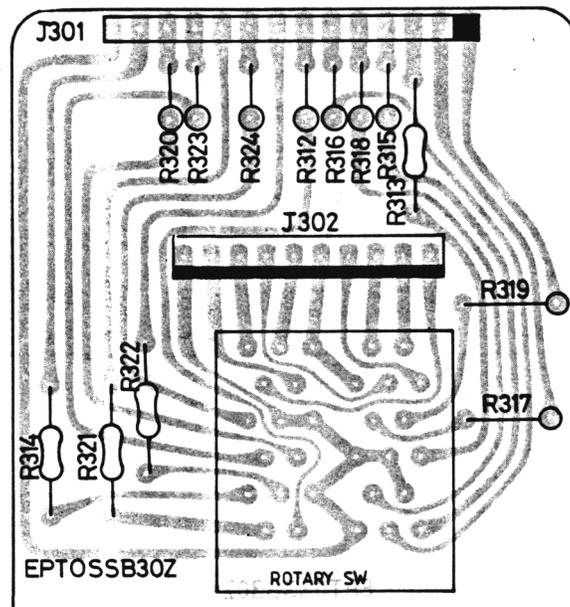
PC Board Layout



EPTOSSB60Z Power Supply

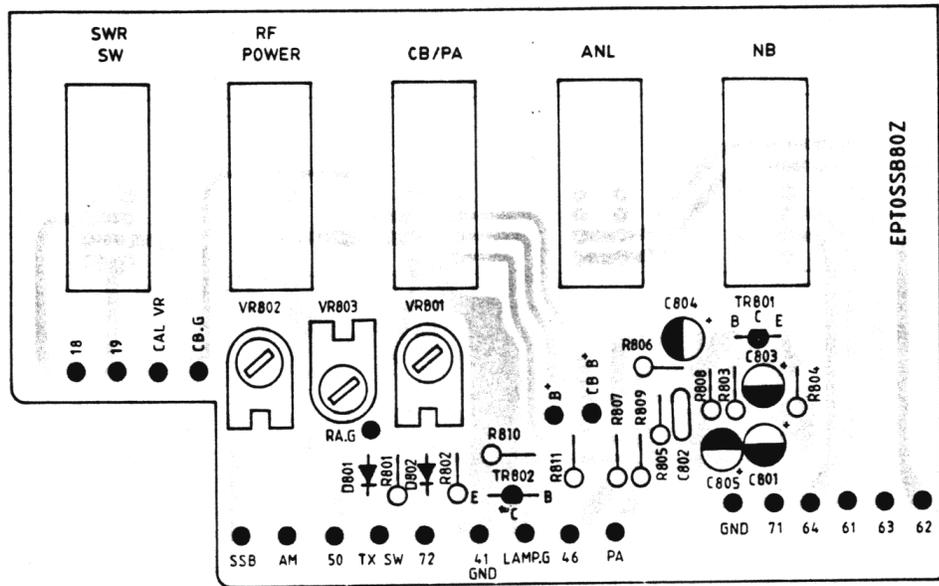


EPTOSSB70Z Antenna Selector

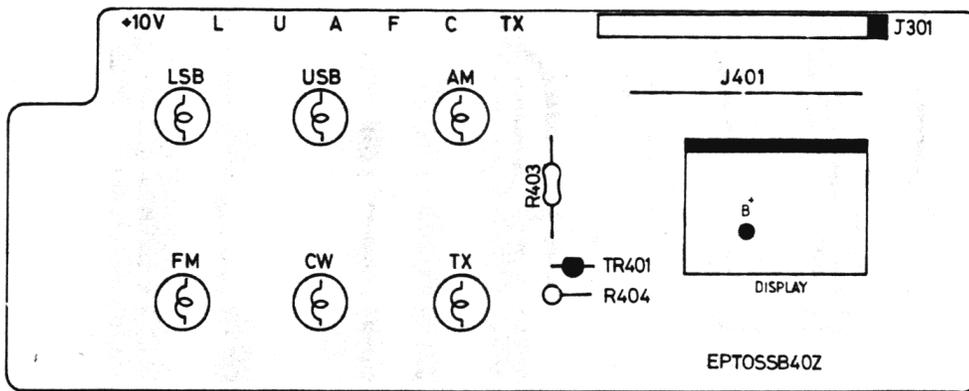


EPTOSSB30Z Channel Selector

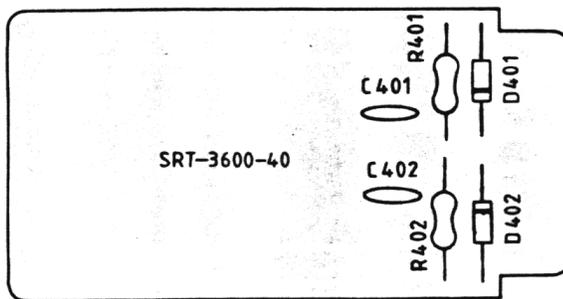
PC Board Layout



EPTOSSB80Z Function Selector

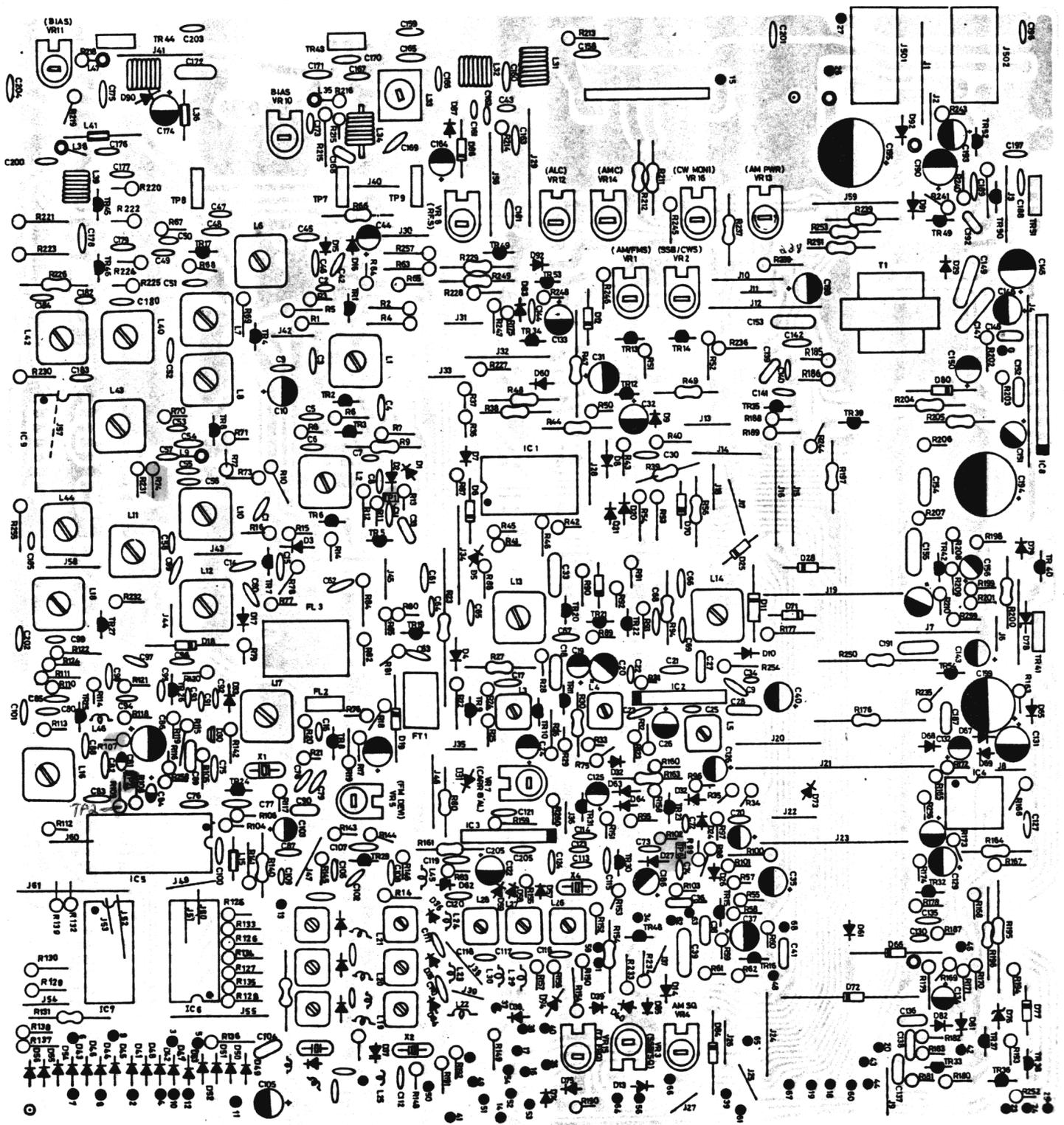


EPTOSSB40Z Channel Readout



EPT360040Z SWR

EPT360010Z Main Board



Replacement Part List

Circuit Symbol	Description	Part NO.	Circuit Symbol	Description	Part NO.
R216	Resistor Carbon 1 ohm ¼W	RCP 141094Z	R3, 86.	Resistor Carbon 680 ohm ¼W	RCU 146814Z
218	Resistor Carbon 2.2 ohm ¼W	RCP 142294Z	R67	Resistor Carbon 820 ohm ¼W	RCU 148214Z
R410	Resistor Carbon 100 ohm ¼W	RCP 141014Z	R33, 53, 59, 65, 91, 104, 105, 110, 112, 147, 149, 150, 151, 157, 172, 209, 214, 236, 311, 312, 313, 315, 316, 317, 319, 320, 323, 324, 701, 804, 809, 811.	Resistor Carbon 1K ohm ¼W	RCU 141024Z
R402	Resistor Carbon 150 ohm ¼W	RCP 141514Z	R82, 177.	Resistor Carbon 1.2K ohm ¼W	RCU 141224Z
R196	Resistor Carbon 680 ohm ¼W	RCP 146814Z	R18, 81, 90, 190 193, 221, 227. R233	Resistor Carbon 1.5K ohm ¼W	RCU 141524Z
R192	Resistor Carbon 1K ohm ¼W	RCP 141024Z	R17, 24, 64, 68, 87, 108, 113, 155, 180, 189, 191, 257, 803, 805, 807.	Resistor Carbon 1.8K ohm ¼W	RCU 141824Z
R74	Resistor Carbon 2.2Kohm ¼W	RCP 142224Z	R7, 25.	Resistor Carbon 2.2K ohm ¼W	RCU 142224Z
R23	Resistor Carbon 2.7Kohm ¼W	RCP 142724Z	R16, 22, 51, 52, 58, 95, 115, 141, 158, 202, 244, 245, 259. R50, 124.	Resistor Carbon 2.7K ohm ¼W	RCU 142724Z
R102, 107, 106, 250. R47	Resistor Carbon 3.3Kohm ¼W	RCP 143324Z	R77, 146, 156, 178, 182, 183, 185, 186, 207, 802, 808. R78, 85, 184, 239, 801. R12, 31, 35, 63, 76, 119, 148, 254. R83, 248.	Resistor Carbon 3.3K ohm ¼W	RCU 143324Z
R79	Resistor Carbon 3.9Kohm ¼W	RCP 143924Z	R1, 11, 14, 57, 61, 62, 71, 114 117, 123, 142, 152, 153, 160, 169, 174, 187, 194, 206, 134, 242, 258, 404, 806, 810. R173	Resistor Carbon 3.9K ohm ¼W	RCU 143924Z
R195	Resistor Carbon 10K ohm ¼W	RCP 141034Z	R118, 166.	Resistor Carbon 4.7K ohm ¼W	RCU 144724Z
R131	Resistor Carbon 22K ohm ¼W	RCP 142234Z	R84, 96, 144.	Resistor Carbon 8.2K ohm ¼W	RCU 148224Z
R253	Resistor Carbon 47K ohm ¼W	RCM 143304B	R235	Resistor Carbon 10K ohm ¼W	RCU 141034Z
R9, 94.	Resistor Carbon 33 ohm ¼W	RCM 146804B	R2	Resistor Carbon 27K ohm ¼W	RCU 142234Z
R30, 161, 237.	Resistor Carbon 68 ohm ¼W	RCM 146804B	R6, 54, 55, 89, 125, 126, 127, 128, 129, 130, 132, 133, 134, 135, 136, 137, 138, 139, 171, 201, 263, R19, 75, 99, 101.	Resistor Carbon 33K ohm ¼W	RCU 142724Z
R154	Resistor Carbon 100 ohm ¼W	RCM 141014B	R37, 72.	Resistor Carbon 47K ohm ¼W	RCU 144734Z
R44	Resistor Carbon 680 ohm ¼W	RCM 142214B	R10, 36, 41, 42, 45, 46, 97, 98, 167, 170, 247. R106, 122, 181, 188. R43, 159, 260. R103	Resistor Carbon 5.6K ohm ¼W	RCU 145624Z
R56, 66, 80, 140 200, 211, 212, 313, 314, 321, 322, 403. 348, 226.	Resistor Carbon 1K ohm ¼W	RCM 141024B	R13, 168.	Resistor Carbon 68K ohm ¼W	RCU 146834Z
R205	Resistor Carbon 1.5Kohm ¼W	RCM 141524B		Resistor Carbon 82K ohm ¼W	RCU 148234Z
R205	Resistor Carbon 1.8Kohm ¼W	RCM 141824B		Resistor Carbon 100K ohm ¼W	RCU 141044Z
R251	Resistor Carbon 2.2Kohm ¼W	RCM 142224B		Resistor Carbon 220K ohm ¼W	RCU 142244Z
R163, 238.	Resistor Carbon 5.6Kohm ¼W	RCM 145624B		Resistor Carbon 270K ohm ¼W	RCU 142744Z
R49, 164, 197, 249. R229	Resistor Carbon 10K ohm ¼W	RCM 141034B		Resistor Carbon 390K ohm ¼W	RCU 143944Z
R229	Resistor Carbon 18K ohm ¼W	RCM 141834B		Resistor Carbon 470K ohm ¼W	RCU 144744Z
R38	Resistor Carbon 39K ohm ¼W	RCM 143934B		Resistor Carbon 560 ohm ¼W	RCU 145614Z
R27	Resistor Carbon 47K ohm ¼W	RCM 144734B			
R39	Resistor Carbon 220Kohm ¼W	RCM 142224B			
R204	Resistor Carbon 470Kohm ¼W	RCM 144744B			
R220	Resistor Carbon 10 ohm ¼W	RCU 141004Z			
R241	Resistor Carbon 15 ohm ¼W	RCU 141504Z			
R199, 215, 224, 252. R111, 121, 198, 203. R26, 32, 69, 70, 73, 88, 162, 230, 231. R28, 93, 219, 223. R21, 120. R4, 256. R29, 92. 5, 8, 15, 20, 222, 225. R60, 143, 175, 208, 228, 246, 255, 261, 318. R145, 232, 240.	Resistor Carbon 47 ohm ¼W Resistor Carbon 56 ohm ¼W Resistor Carbon 100 ohm ¼W Resistor Carbon 150 ohm ¼W Resistor Carbon 180 ohm ¼W Resistor Carbon 220 ohm ¼W Resistor Carbon 270 ohm ¼W Resistor Carbon 330 ohm ¼W Resistor Carbon 470 ohm ¼W Resistor Carbon 560 ohm ¼W	RCU 144704Z RCU 145604Z RCU 141014Z RCU 141514Z RCU 141814Z RCU 142214Z RCU 142714Z RCU 143314Z RCU 144714Z RCU 145614Z			

Circuit Symbol	Description	Part NO.	Circuit Symbol	Description	Part NO.
R165	Resistor Carbon 560K ohm ¼W	RCU 145644Z	C72	Capacitor Ceramic 5 PF SL 50WV	CC0500501L
R210	Resistor Carbon 680K ohm ¼W	RCU 146844Z	C1, 49, 97, 123.	Capacitor Ceramic 10 PF SL 50WV	CC0501004L
R217, 243.	Resistor Carbon 150 ohm ¼W	RCP 121514Z	C88	Capacitor Ceramic 15 PF SL 50WV	CC0501504L
R213, (-70)	Resistor Carbon 10K ohm ½W	RCP 121034Z	C73	Capacitor Ceramic 18 PF SL 50WV	CC0501804L
R604, 702.	Resistor Carbon 47 ohm 1W	RCP 104704Z	C80, 94.	Capacitor Ceramic 22 PF SL 50WV	CC0502204L
R605	Resistor Carbon 100 ohm 1W	RCP 101014Z	C34	Capacitor Ceramic 27 PF SL 50WV	CC0502704L
R606	Resistor Carbon 220 ohm 1W	RCP 102214Z	C83	Capacitor Ceramic 33 PF SL 50WV	CC0503304L
R602, 603.	Resistor Carbon 820 ohm 1W	RCP 108214Z	C22	Capacitor Ceramic 68 PF SL 50WV	CC0506804L
R601	Resistor Carbon 1.2K ohm 1W	RCP 101224Z	C8	Capacitor Ceramic 82 PF SL 50WV	CC0508204L
C10	Capacitor/E 0.47 uF 50WV	CE 0504747Z	C4, 67.	Capacitor Ceramic 100 PF SL 50WV	CC0501015L
C24, 71, 128, 132 143, 157, 164, 804.	Capacitor/E 1 uF 50WV	CE 0501057Z	C114, 160.	Capacitor Ceramic 150 PF SL 50WV	CC0501515L
C126, 134, 174, 193.	Capacitor/E 2.2 uF 25WV	CE 0252257Z	C54	Capacitor Ceramic 180 PF SL 50WV	CC0501815L
C105, 151.	Capacitor/E 4.7 uF 25WV	CE 0254757Z	C70	Capacitor Ceramic 220 PF SL 50WV	CC0502215L
C12, 19, 20, 44, 133, 198.	Capacitor/E 10 uF 16WV	CE 0161067Z	C29, 77, 96, 115 180.	Capacitor Ceramic 270 PF SL 50WV	CC0502715L
C40, 103, 150, 186.	Capacitor/E 22 uF 16WV	CE 0162267Z	C11, 15.	Capacitor Ceramic 330 PF SL 50WV	CC0503315L
C26, 31, 32, 35, 37, 122, 146, 156, 803, 805.	Capacitor/E 47 uF 16WV	CE 0164767Z	C178	Capacitor Ceramic 470 PF SL 50WV	CC0504715L
C86, 131, 190, 701, 702.	Capacitor/E 100 uF 16WV	CE 0161077Z	C91, 95.	Capacitor Ceramic 560 PF SL 50WV	CC0505615L
C604	Capacitor/E 100 uF 35WV	CE 0351077Z	C7, 47, 50, 53, 55 57, 82, 110, 111 112, 119, 130, 144, 205, 206.	Capacitor Ceramic 0.0047uF SL 50WV	CC0504727L
C145, 199.	Capacitor/E 330 uF 16WV	CE 0163377Z	C30, 42, 45, 46, 502.	Capacitor Ceramic 0.01 uF SL 50WV	CC0501037L
C194, 195.	Capacitor/E 1000 uF 25WV	CE 0251087Z	C2, 3, 6, 9, 14, 16, 51, 56, 60, 63, 64, 69, 85, 98, 99, 101, 102 108, 113, 121, 176, 183, 185, 205, 401, 402, 506, 507, 601, 701.	Capacitor Ceramic 0.047 uF SL 50WV	CC0504737L
C603	Capacitor/E 3300 uF 35WV	CE 0353387Z	C5, 17, 23, 48, 61 62, 65, 66, 68, 100, 109, 120, 127, 135, 159, 181, 188, 189, 202, 203, 204, 603.	Capacitor Ceramic 0.01 uF SL 50WV	CC0501047L
C125	Capacitor/T 0.1 uF 35WV	CT 0351045Z	C169	Capacitor Ceramic 0.1 uF SL 50WV	CC0504726S
C129	Capacitor/T 0.22 uF 25WV	CT 0252245Z	C179	Capacitor Ceramic 0.0047uF D 50WV	CC0501036S
C81	Capacitor/T 0.47 uF 16WV	CT 0164745Z	C173, 177, 184, 200, 201.	Capacitor Ceramic 0.01 uF D 50WV	CC0502237L
C84	Capacitor/T 2.2 uF 16WV	CT 0162255Z	C602, 606.	Capacitor Ceramic 0.022 uF SL 100WV	CC0500505G
C90	Capacitor Mylar 0.0015uF 50WV	CM 0501525Z	C87, 162.	Capacitor Ceramic 5 PF 50WV (UJ)	CC0500805G
C13	Capacitor Mylar 0.0022uF 50WV	CM 0502225Z	C92	Capacitor Ceramic 8 PF 50WV (UJ)	CC0501505G
C137, 138.	Capacitor Mylar 0.0047uF 50WV	CM 0504725Z	C88	Capacitor Ceramic 15 PF 50WV (UJ)	CC0506805G
C27, 28, 36, 148, 192.	Capacitor Mylar 0.001 uF 50WV	CM 0501025Z	C75, 106.	Capacitor Ceramic 68 PF 50WV (UJ)	CC0501015G
C41, 104, 140, 141, 142, 152, 168.	Capacitor Mylar 0.01 uF 50WV	CM 0501035Z	C91	Capacitor Ceramic 100 PF 50WV (UJ)	CC0502215G
C136	Capacitor Mylar 0.015 uF 50WV	CM 0501535Z	C167	Capacitor Ceramic 220 PF 50Wv (UJ)	CC0502715G
C38, 139, 153, 187.	Capacitor Mylar 0.022 uF 50WV	CM 0502235Z	C107, 175.	Capacitor Ceramic 270 PF 50WV (UJ)	CC0503915G
C18, 33, 89, 154 191, 802.	Capacitor Mylar 0.047 uF 50WV	CM 0504735Z	C79	Capacitor Ceramic 390 PF 50WV (UJ)	CC0504715G
C147	Capacitor Mylar 0.068uF 50WV	CM 0506835Z	C165, 166, 177.	Capacitor Ceramic 470 PF 50WV (UJ)	CC0505615G
C39, 149, 155, 172.	Capacitor Mylar 0.1 uF 50WV	CM 0501045Z	C170	Capacitor Ceramic 560 PF 50WV (UJ)	
C161	Capacitor Ceramic 1 PF SL 50WV	CC 0500101L			
C52, 58, 59, 182.	Capacitor Ceramic 3 PF SL 50WV	CC 0500301L			

Circuit Symbol	Description	Part NO.	Circuit Symbol	Description	Part NO.
C25, 76.	Capacitor Ceramic 1 5 PF 50WV (CH)	CC0501505A	TR3, 4, 5, 7, 12, 13, 14, 15, 16	Transistor 2SC945AQ/2SC1815Y	T2SC00945Q
93	Capacitor Ceramic 3 3 PF 50WV (CH)	CC0503305A	23, 31, 32, 35 37, 39, 40, 48		
C501, 502.	Capacitor Ceramic 3 9 PF 50WV (CH)	CC0503904A	49, 52, 53, 54 401, 602, 801		
C158	Capacitor Ceramic 8 2 PF 50WV (CH)	CC0508205A	TR22, 46.	Transistor 2SC1730L	T2SC01730L
C124, 163.	Capacitor Ceramic 100 PF 50WV (CH)	CC0501015A	TR36, 38, 50.	Transistor 2SB525C	T2SB00525C
			TR6, 34.	Transistor 2SA733P	T2SA00733P
C43	Capacitor Ceramic 1 8 PF 50WV (RH)	CC0501805D	TR33, 42.	Transistor 2SC1815GR	T2SC01815R
C78	Capacitor Ceramic 3 3 PF 50WV (RH)	CC0503305D	TR45	Transistor 2SC2086	T2SC02086Z
C116, 118.	Capacitor Ceramic 3 9 PF 59WV (RH)	CC0503905D	TR701, 802.	Transistor 2SC1318S	T2SC01318S
C78, 117.	Capacitor Ceramic 5 6 PF 50WV (RH)	CC0505605D	TR603	Transistor 2SD613D	T2SD00613D
			TR601	Transistor 2SC1571G	T2SC01571G
L1	I.F.T. YTKAC-24073F	ECIFT12000	TR18	FET J310	EZZJ00310Z
L2, 13.	I.F.T. YTKAC-25365N	ECIFT12001			
L3, 4.	I.F.T. 7MC-7172ABW	ECIFT12002	D93	Diode 1N4003	ED1N04003Z
L5	I.F.T. 7MC-7174Y	ECIFT12003	D29	Diode 1N4007	ED1N04007Z
L6	I.F.T. YKXNF-25439N	ECIFT12004	D15, 16.	Diode MC301	EDMC00301Z
	I.F.T. YTKXC-25114N	ECIFT12005	D1, 2, 10, 11, 23 24, 83, 401, 402.	Diode 1N60	DE1N00060Z
L10, 11, 44.	I.F.T. YTKAC-27242A	ECIFT12007	D65, 79.	Diode KB262	EDKB00262Z
L12	I.F.T. YTKAC-27869N	ECIFT12008	D77	Diode KB362	EDKB00362Z
L14	I.F.T. YTKAC-27241A	ECIFT12009	D88, 89.	Diode MV1Y	EDMV00001Y
16, 18, 43.	I.F.T. YTKXC-18501N	ECIFT12010	D37	Diode MV201	EDMV00201Z
L19, 20, 21.	I.F.T. 113CN-6514X	ECIFT12012	D30	Diode SVC251	EDSV00251Z
L28	I.F.T. 113CN06485Z	ECIFT12013	D3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 17, 18, 19, 20, 21, 22, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 38, 39, 40, 49, 57, 58, 59, 60, 61, 62, 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 80, 81, 82, 84, 85, 86, 87, 90, 91, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 501, 801, 802.	Diode 1N4148	ED1N04148Z
L40	I.F.T. YTKXC-27205BZD	ECIFT12014	D78	Diode Zener 7.5V 500MW XE-072	EDZD05739Z
L42	I.F.T. YTKXC-24279UH	ECIFT12015	D76	Zener Diode 5.1V 500MW UZ-5.1B	EDZD05519Z
L26, 27.	I.F.T. 11CN-6344Z	ECIFT12016	D701	Zener Diode 11V	EDZD05110Z
L17	I.F.T. YVTXNA-XP1376Y	ECIFT12017	D602	Zener Diode 16.2V 1W	EDZD10160Z
L18	I.F.T. TKXB-28609AN	ECIFT12022	D601	Zener Diode 5.6V 1W	EDZD10569Z
L39	Spring Coil 0.8cx4.2cx6.5T	ECSPG18000	D803, 804, 805 806.	Diode 1N5404	ED1N05404Z
L37	Spring Coil 0.8cx3.5cx7T	ECSPG18001	X2	Crystal 14.460MHZ + -20PPM	ECY144600Z
L34	Spring Coil 0.8cx4.5cx7T	ECSPG18002	X1	Crystal 10.240MHZ + -20PPM	ECY102400Z
L31, 32.	Spring Coil 0.8cx6.5cx7.5T	ECSPG18003	X4	Crystal 10.6975MHZ + -20 PPM	ECY106975Z
TR41	Transistor 2SA473(O) With Mica, Teflon Washer	T2SA004730			
TR51	Transistor 2SA1012(O) With Mica, Teflon Washer	T2SA010120			
TR44	Transistor 2SC2166C With Mica Teflon Washer	T2SC02166C			
TR43	Transistor 2SC1969C/2SC2312C Teflon Washer	T2SC01969C			
TR8, 17, 19, 29.	Transistor 2SC1674L	T2SC01674L			
TR1, 2, 9, 10, 11 20, 21, 24, 25 26, 27, 30, 47	Transistor 2SC1675L	T2SC01675L			

Circuit Symbol	Description	Part NO.	Circuit Symbol	Description	Part NO.
FL3	Crystal 10.695MHz 8 Pole	EFX8106952			
FL2	Ceramic Filter SFE10.7MX	EFCFE107MX			
FL1	Ceramic Filter CFW455HT	EFCFW455HT			
IC1	IC LA6324/LM324	ENSA06324Z			
IC3	IC AN612	ENMI00612Z			
IC5	IC MC145106	ENMC45106Z			
IC9	IC S042P	EN8M00042P			
IC6, 7.	IC MC14008B	ENMC14008B			
IC2	IC UPC1028H	ENNE01028H			
IC8	IC TA7222AP With Mica	ENTA07222P			
IC4	IC JRC4558D	ENJR04558D			
L33	RF Coil 0.23 UH SU-028C	ECRFZ10001			
L503, 504.	Choke Coil 0.47 UH	ECCHK16000			
L501	Choke Coil 5.6 UH	ECCHK16001			
L46	Choke Coil 100 UH	ECCHK16002			
L22, 23, 24, 25, 29, 30, 45.	Choke Coil 470 UH	ECCHK16003			
T1	Choke Coil EI-19 TF-083	ECCHK16004			
L9, 35, 47, 502.	Bead Core D 3.5 x 6 x 1.2 SU-B-172D	ECBAD18504			
L41	Bead Coil E 3.5 x 6 x 1.2 SU-B-172E	ECBAD18505			
L15, 36, 38.	Bead Coil F 3.5 x 6 x 1.2 SU-B-172F	ECBAD18506			
(-60) P.C.B.	Fuse 4A 250V 6.5c x 30 W/Copper Wire	EX02N40208			
(-70) P.C.B.	Relay 12V	EX05N40805			
VR10	Semi-Fixed Resistor 8 Ω Lay 100 ohm	RE10100018			
VR601	Semi-Fixed Resistor 8 Ω Lay 500 ohm	RE50100001			
VR14, 803.	Semi-Fixed Resistor 8 Ω Lay 1 K	RE10200003			
VR11, 16, 801, 802.	Semi-Fixed Resistor 8 Ω Lay 3 K	RE30200019			
VR13	Semi-Fixed Resistor 8 Ω Lay 5K	RE50200006			
VR1, 2, 5, 7, 12.	Semi-Fixed Resistor 8 Ω Lay 10 K	RE10300009			
VR8	Semi-Fixed Resistor 8 Ω Lay 100 K	RE10400020			
VR3, 4.	Semi-Fixed Resistor 8 Ω Lay 500 K	RE50400021			