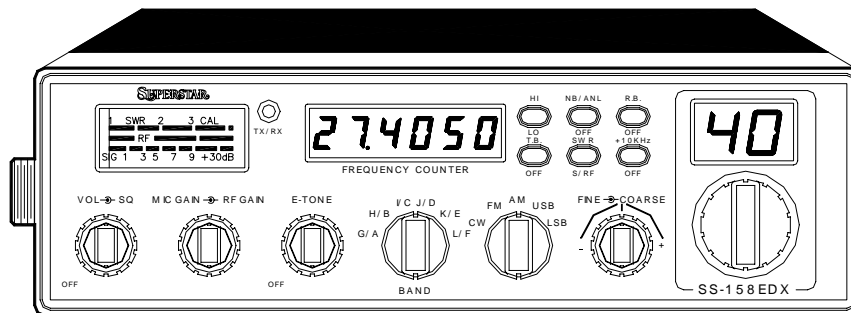


**SUPERSTAR**

# Model SS—158 EDX (B)

©

## Service Manual



# SS-158EDX (B)

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## CHAPTER 1 SPECIFICATIONS

### 1.0 GENERAL

|                     |                                       |
|---------------------|---------------------------------------|
| Model               | SS-158EDX                             |
| Channels            | 480FM, 480AM, 480LSB, 480USB,         |
| Frequency Range     | 28.245 ~ 29.655 MHz                   |
| Frequency Control   | Phase-Lock-loop (PLL) Synthesizer     |
| Frequency Stability | 0.001%                                |
| Temperature Range   | -30°C to +50°C                        |
| Antenna Impedance   | 50 Ohms                               |
| Antenna Connectors  | Standard SO-239 type                  |
| Input Voltage       | 13.8V DC                              |
| Size                | 7 7/8" (W) x 10 3/4" (D) x 2 3/8" (H) |
| Weight              | 5.0 lbs.                              |

### 1.1 TRANSMITTER

|                    |                                     |
|--------------------|-------------------------------------|
| RF Power Output    | AM/FM/CW: 10watts; SSB: 25watts PEP |
| Carrier Emission   | -50 dB                              |
| Spurious Emission  | -50 dB                              |
| Audio Distortion   | 10%                                 |
| Frequency Response | 300 to 2500 Hz                      |
| Microphone         | Dynamic                             |

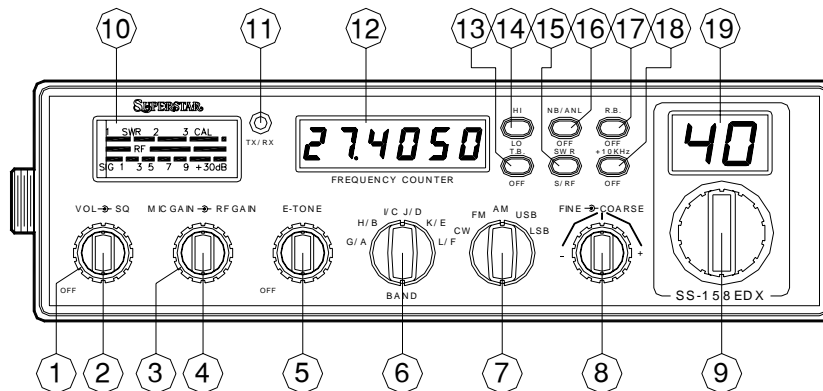
### 1.2 RECEIVER

|                               |  |
|-------------------------------|--|
| Sensitivity for 10 dB (S+N)/N | CW/AM : < 1.0 $\mu$ V ; SSB : < 0.25 $\mu$ V |
| Sensitivity for 20 dB (S+N)/N | FM : < 0.5 $\mu$ V                           |
| Squelch Sensitivity           | < 0.5 $\mu$ V                                |
| Image Rejection               | More than 65 dB                              |
| AGC Figure of Merit           | 100 mV for 10dB Change in Audio Output       |
| Audio Power Output            | 2.5W @ 10% Distortion                        |
| Audio Response                | 300 to 2500 Hz                               |

(SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE)

## CHAPTER 2 OPERATION

### 2.0 FRONT PANEL

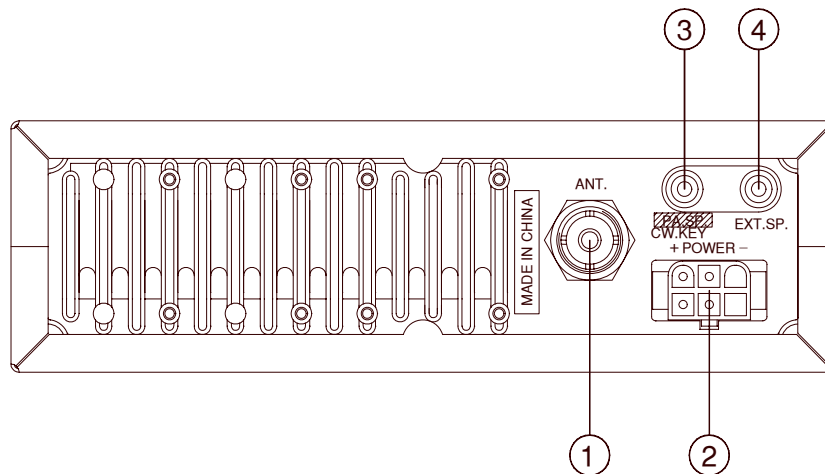


- 1. ON/OFF VOLUME CONTROL :** This knob controls the volume and power to the radio. To turn radio on, rotate the knob clockwise. Turning the knob further will increase the volume of the receiver.
- 2. SQUELCH CONTROL :** This switch is used to eliminate background noise being heard through the receiver which can be disturbing when no transmission are being heard through the received. To use this feature, turn the switch fully counterclockwise and then turn clockwise slowly until the background noise is just eliminated. Further clockwise rotation will increase the threshold level which a signal must overcome in order to be heard. Only strong signal will be heard at a maximum clockwise setting.
- 3. MIC GAIN CONTROL :** Adjust the microphone gain in the transmit modes. This controls the gain to the extent that full talk power is available several inches away from the microphone.
- 4. RF GAIN CONTROL :** This control is used to reduce the gain of the RF amplifier under strong signal conditions.
- 5. E-TONE CONTROL :** This control is used to control the echo effects.
- 6. BAND SELECTOR :** This band selector allow the user to select the desired band.

- 
7. **MODE CONTROL** : This control allows you to select one of the following operating modes : CW/FM/AM/USB/LSB.
  8. **FINE/COARSE CONTROL** : Allows variation of the receive operating frequency above or below the assigned frequency. Although this control is intended primarily to tune in SSB/CW signals, it may be used to optimize AM/FM signals as described in the Operating Procedure paragraphs. Coarse operates both TX/RX but Fine only in RX.
  9. **CHANNEL SELECTOR** : This control is used to select a desired transmit and receive channel.
  10. **FRONT PANEL METER** : The Front Panel Meter allows the user to monitor signal strength, RF output power and SWR level.
  11. **TX/RX LED** : The red LED indicates the unit is in the transmit mode. The green LED indicates the unit is in the receive mode.
  12. **FREQUENCY COUNTER** : This frequency counter indicates the selected channel frequency digitally.
  13. **TALKBACK SWITCH** : This switch is used to monitor the sound feedback effects.
  14. **HI/LOW SWITCH** : This switch select HI or LOW band of operation.
  15. **S-RF/SWR/ SWITCH** : In the S-RF position, the meter swings proportionally to the strength of the received signal. When transmitting, the meter indicates relative RF output power. When in the SWR position, the standing wave ratio is measured.
  16. **NB/ANL/OFF SWITCH** : When the switch is place in the NB/ANL position, the RF Noise Blanker (NB) and the Automatic Noise Limiter (ANL) in the audio circuits are activated. The Noise Blanker is very effective in eliminating repetitive impulse noise such as ignition interference.
  17. **ROGER BEEP** : When this switch is placed in the ROGER BEEP position, the radio automatically transmits an audio tone at the end of your transmission. This indicates the end of your transmission so that people who are having trouble hearing you will know that you are done speaking. As a courtesy to others, use the Roger Beep only when necessary.
  18. **+10KHz SWITCH** : In the +10KHz position, the transmit and receive frequency is shifted 10 KHz up.
  19. **CHANNEL DISPLAY** : The channel display indicates the current selected channel.

---

## 2.1 REAR PANEL



1. **ANTENNA** : This jack accepts 50 ohms coaxial cable with a PL-259 type plug.
2. **DC POWER** : This accepts 13.8V DC power cable with built-in fuse. The power cord provided with the radio has a black and red wire. The black goes to negative and red goes to positive.
3. **CW. KEY** : This jack is for Morse Code operation. To operate, connect a CW Key to this jack and place the Mode Control in the CW position.
4. **EXT. SP** : This jack accepts 4 to 8 ohms, 5 watts external speaker. When the external speaker is connected to this jack, the built-in speaker will be disabled.

---

## **PROCEDURE TO RECEIVE AND TRANSMIT**

### **A. 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 switch to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal voice. This transceiver comes complete with a low impedance dynamic microphone.

### **B. PROCEDURE TO RECEIVE**

1. Be sure that power source, microphone and antenna are connected to the proper connectors before going to the next step.
2. Turn **VOL** knob clockwise to apply power to the radio.
3. Set the **VOL** for a comfortable listening level.
4. Set the **MODE** switch to the desired mode.
5. Listen to the background noise from the speaker. Turn the **SQ** knob slowly clockwise until the noise just disappears. The **SQ** is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the control too far or some of weaker signals will not be heard.
6. Set the **CHANNEL** selector switch to the desired channel.
7. Set the **RF GAIN** control fully clockwise for maximum RF gain.
8. Adjust the **FINE/COARSE** control to clarify the SSB/CW signals or to optimize AM/FM signals.

### **C. PROCEDURE TO TRANSMIT**

1. Select the desired channel of transmission
2. Set the **MIC GAIN** control fully clockwise.
3. If the channel is clear, depress the push-to-talk switch on the microphone and speak in a normal voice.

---

## RECEIVING SSB SIGNALS

There are four types of signals presently used for communications in the Citizens Band : FM, AM, USB and LSB. When the MODE switch on your unit is placed in the AM position, only standard double-side band and in FM position, only frequency deviation, full carrier signals will be detected. An SSB signal may be recognized while in the AM or FM mode by its characteristic "Donald Duck" sound and the inability of the detector to produce an intelligible output. The USB and LSB modes will detect upper side band and lower side band respectively, and standard AM signals.

SSB reception differs from standard AM reception in that an SSB receiver does not require a carrier or opposite side band to produce an intelligible signal. A single-side band transmitted signal consists only of the upper or the lower side band and no carrier is transmitted. The elimination of the carrier from the AM signal helps to eliminate the biggest cause of whistles and tones heard on channels which make even moderately strong AM signals unreadable. Also, SSB takes only half the space of an AM channel, therefore two SSB conversations will fit into each channel, expanding the 40 AM channels to 80 SSB channels. The reduction in channel space required also helps in the receiver because only half of the noise and interference can be received with 100% of the SSB signal.

An SSB signal may be received only when the listening receiver is functioning in the same mode. In other words, an upper side band signal (USB) may be made intelligible only if the receiver is functioning in the USB position.

If a lower side band (LSB) signal is heard when the receiver is in the USB mode, no amount of tuning will make the signal intelligible. The reason for this may be understood if you consider that when the modulation is applied to the transmitter's microphone in the USB mode, the transmitter output frequency is increased whereas in the LSB mode the transmitter's output frequency is decreased.

The result in listening to the receiver is that when the MODE switch is in the proper position (either USB or LSB), a true reproduction of a single tone of modulation will result, and if the tone is increased in frequency (such as a low-pitched whistle or a high-pitched whistle) you will hear the increase in the output tone of the receiver. If the incorrect mode is selected, an increase in tone of a whistle applied to the transmitter will cause a decrease in the resultant tone from the receiver.

Thus when a voice is used in place of a whistle or tone, in the proper listening mode the voice will be received correctly whereas in the incorrect mode, the voice will be translated backwards and cannot be made intelligible by the FINE/COARSE control.

When listening to an AM transmission, a correct side band is heard in either mode since both upper and lower side bands are received.



---

Once the desired SSB mode has been selected, frequency adjustment may be necessary in order to make the incoming signal intelligible. The FINE/COARSE control allows the operator to vary frequency above or below the exact frequency of the channel. If the sound of the incoming signal is high or low pitched, adjust the operation of the FINE/COARSE.

Consider it as performing the same function as a phonograph speed control. When the speed is set too high, voices will be high-pitched and if set too low, voice will be low-pitched. Also, there is only one correct speed that will make a particular record produce the same sound that was recorded. If the record is played on a turntable that is rotated in the wrong direction (opposite side band) no amount of speed control (FINE/COARSE) will produce an intelligible sound.

An AM signal received while listening in one of the SSB modes will produce a steady tone (carrier) in addition to the intelligence, unless the SSB receiver is tuned to exactly the same frequency by the FINE/COARSE control. For simplicity, it is recommended that the AM modes be used to listen to AM signals.

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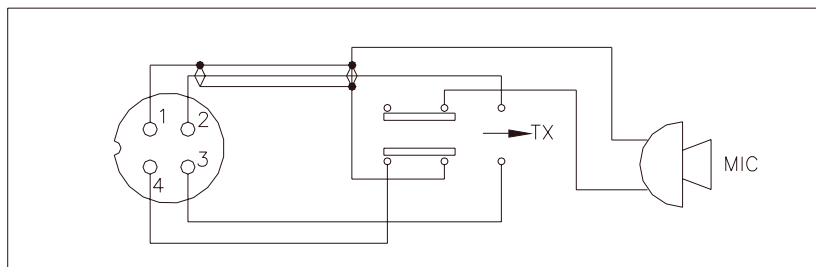
## ALTERNATE MICROPHONES AND INSTALLATION

For best results, the user should select a low-impedance dynamic type microphone or a transistorized microphone. Transistorized type microphones have low output impedance characteristics. The microphones must be provided with a four-lead cable. The audio conductor and its shielded lead comprise two of the leads. The third lead is for transmit control and fourth is for receiving control.

The microphone should provide the functions shown in schematic below.

### 4 WIRE MIC CABLE

| <u>Pin Number</u> | <u>Mic Cable Lead</u> |
|-------------------|-----------------------|
| 1                 | Audio Shield          |
| 2                 | Audio Lead            |
| 3                 | Transmit Control      |
| 4                 | Receive Control       |



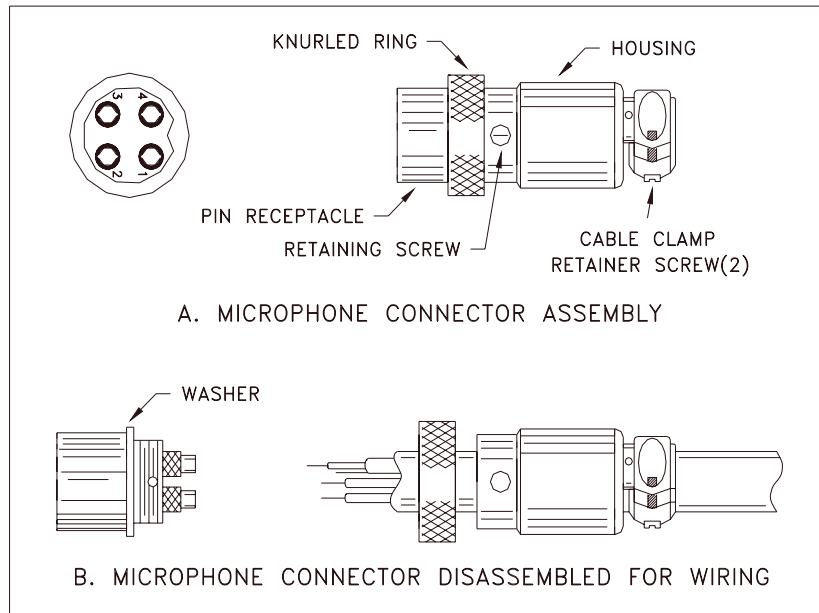
**Fig. 1** Your transceiver microphone schematic.

If the microphone to be used is provided with precut leads, they must be revised as follows.

1. Cut leads so that they extend 7/16" beyond the plastic insulating jacket of the microphone cable.
2. All leads should be cut to the same length. Strip the ends of each wire 1/8" and tin the exposed wire.

Before beginning the actual wiring, read carefully the circuit and wiring information provided with the microphone you select. Use the minimum heat required in soldering

the connections. Keep the exposed wire lengths to a minimum to avoid shorting when the microphone plug is reassembled.



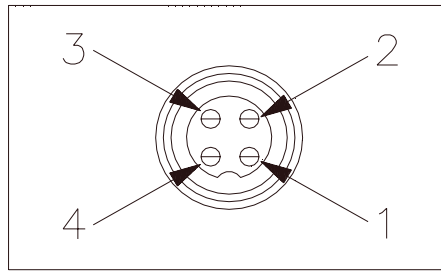
**Fig. 2** Microphone plug wiring

To wire the microphone cable to the plug provided, proceed as follows :

1. Remove the retaining screw.
2. Unscrew the housing from the pin receptacle body.
3. Loosen the two cable clamp retainer screws.
4. Feed the microphone cable through the housing, knurled ring and washer as shown Figure 2.

The wires must now be soldered to the pins as indicated in the above wiring tables. If a vise or clamping tool is available it should be used to hold the pin receptacle body during the soldering operation, so that both hands are free to perform the soldering. If a vise or clamping tool is not available, the pin receptacle body can be held in a stationary position by inserting it into the microphone jack on the front panel. The numbers of the microphone plug are shown in Fig. 3, as viewed from

5. the back of the plug. Before soldering the wire to the pins, pre-tin the wire receptacle of each pin of the plug.



**Fig. 3** Microphone plug pin numbers viewed from rear of pin receptacle.

6. Be sure that the housing and the knurled ring of Figure 2 are pushed back onto the microphone cable before starting to solder. If the washer is not captive to the pin receptacle body, make sure that it is placed on the threaded portion of the pin receptacle body before soldering.
7. If the microphone jack is used to hold the pin receptacle during soldering operation, best results are obtained when the connections to pin 1 and 3 are made first and then the connections to pins 2 and 4. Use a minimum amount of soldering and be careful to prevent excessive solder accumulation on pins, which could cause a short between the pin and the microphone plug housing.
8. When all soldering connections to the pins of the microphone are completed, push the knurled ring and the housing forward and screw the housing onto the threaded portion of the pin receptacle body. Note the location of the screw clearance hole in the plug housing with respect to the threaded hole in the pin receptacle body. When the housing is completely threaded into the pin receptacle body, a final fraction of a turn either clockwise or counterclockwise may be required to align the screw hole with the threaded hole in the pin receptacle body. When these are aligned, the retaining screw is then screwed into place to secure the housing to the pin receptacle body.
9. The two cable clamp retainer screws should now be tightened to secure the housing to the microphone cord. If the cutting directions have been carefully followed, the cable clamp should be secure to the insulation jacket of the microphone cable.
10. Upon completion of the microphone plug wiring, connect and secure the microphone plug in the transceiver.

---

## CHAPTER 3   CIRCUIT DESCRIPTION

### 3.0 INTRODUCTION

This section explains the technical theory of operation for the SS—158 EDX mobile AMATEUR radio.

### 3.1 PLL CIRCUIT

The Phase Lock Loop (PLL) circuit is responsible for developing the receiver's first local oscillator signal and the transmitter's exciter signal. The PLL circuit consists primarily of IC2, IC3, IC4, IC5, Q25, Q27, Q28 and Q29. The PLL circuit is programmed by the rotary channel switch GPS-501. The GPS-501 & Band switch communicates the correct binary data information to the into IC4&IC5. Sum binary code inside IC3 then controls the VCO (Voltage Controlled Oscillator) to oscillate on the correct frequency. This signal is fed either into the receiver's first mixer (for receive operation) or the transmitter's mixer (for transmit operation).

### 3.2 RECEIVER CIRCUIT

The incoming RF signal comes into the radio via the antenna and into the front-end pre-amp, Q17. The RF signal is fed into the mixer circuit of Q18/Q19 and then into the AM/FM/SSB IF section of the receiver. AM/FM IF signal is into FL2 by Q10,Q11,Q12 AMP,AM signal then detected by the AM detector(D30,D31) and then fed to the audio amplifier(IC8) section of the receiver and finally out to the speaker.FM signal then detected by the FM detector(Q12,L4) fed to the audio amplifier(IC8) section of the receiver and finally out to the speaker.SSB IF signal is into FL3 by Q20, Q21, Q22, Q23 AMP,SSB signal then mix with be from X4' frequency and then fed to the audio amplifier(IC8) section of the receiver and finally out to the speaker.

### 3.3 TRANSMITTER MODULATION CIRCUIT

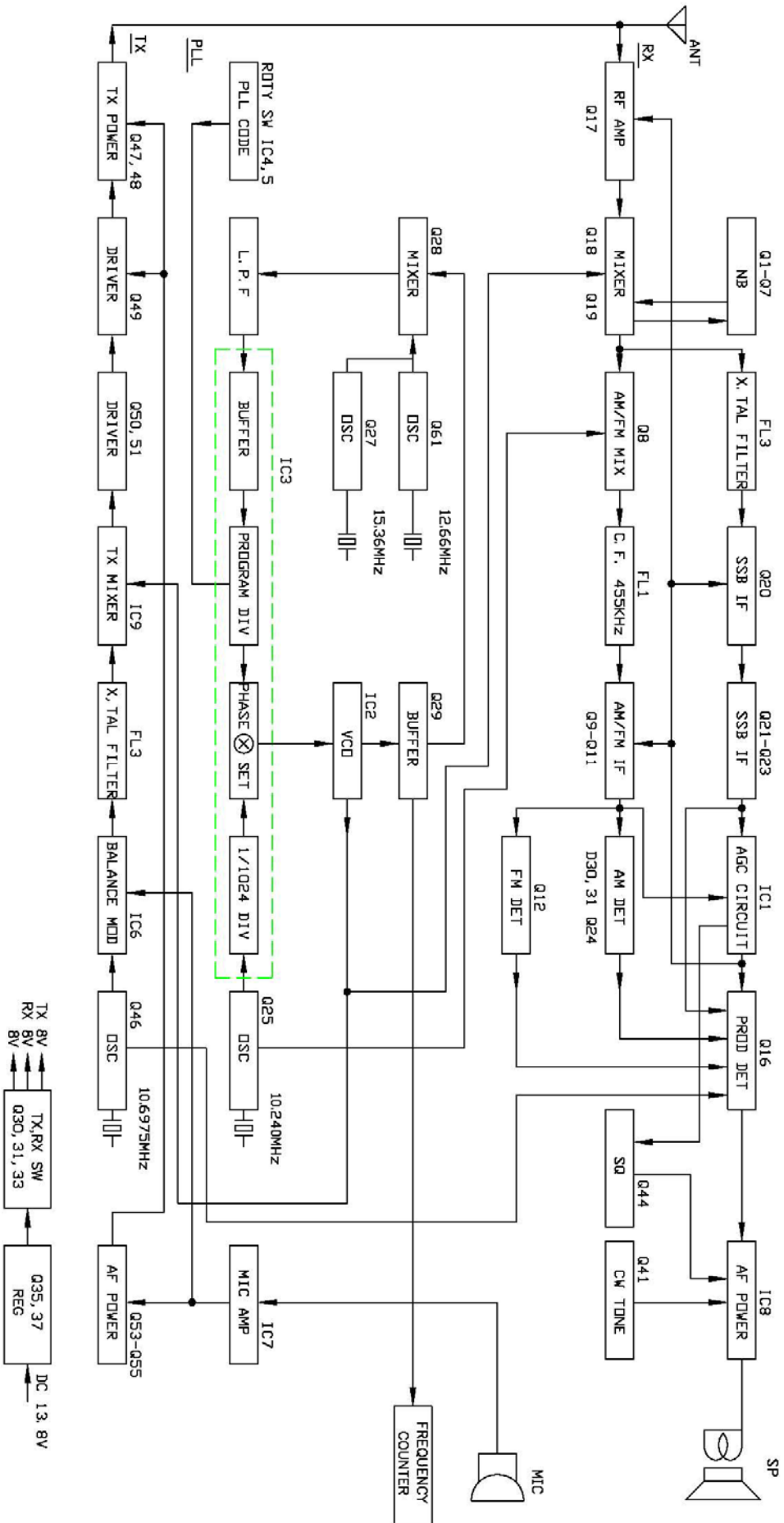
- (1) The transmitter modulation circuit modulates the low-level RF signal from the PLL exciter circuit with the user's audio voice signal from the microphone. The audio from the microphone is then amplified and fed into the transmit amplifier circuit.
- (2) If the transceiver is in the AM mode, the AF power amplifier modulates the last RF amplifier, which produces a true amplitude modulated RF signal.
- (3) If the transceiver is in the SSB mode, the audio signal is mixed with the 10.6975MHz oscillator in IC6.
- (4) If the transceiver is in the FM mode, the audio signal is mixed with the oscillator in IC2.

---

### **3.4 TRANSMITTER AMPLIFIER CIRCUIT**

The transmitter takes the basic exciter signal from IC9 of the TX mixer and amplifies it through a series of amplifiers consisting of Q52, Q51, Q49 ,Q47and Q48 where it is sent out to the antenna connector.

# SS-158EDX(B) BLOCK DIAGRAM



## CHAPTER 4 ALIGNMENT

### 4.0 REQUIRED TEST EQUIPMENT

- |                                  |                                 |
|----------------------------------|---------------------------------|
| ① DC Power Supply (13.8VDC, 10A) | ⑥ Frequency Counter (100 MHz)   |
| ② RF Wattmeter (10W)             | ⑦ RF Signal Generator (100 MHz) |
| ③ Multi-meter                    | ⑧ Automatic Distortion Meter    |
| ④ Automatic Modulation Meter     | ⑨ Oscilloscope (50 MHz)         |
| ⑤ Audio Signal Generator         | ⑩ Sinad Meter                   |

### 4.1 ALIGNMENT PROCEDURES

This transceiver has been aligned at the factory and does not require any adjustments at installation. The required test equipment listed are used for the test setup or alignment shown in Figure 4.1.2 Transmitter Test Setup and Figure 4.1.3 Receiver Test Setup. These test setups are used in part or total during the following adjustments. Refer to page 22 for adjustment locations.

#### 4.1.1 PLL ALIGNMENT

| ITEM             | U.U.T. SETTING  | ADJUST POINT | MEASUREMENT           |
|------------------|---|--------------|-----------------------|
| VCO              | Disconnect 'short PCB' from TP7, TP8 and TP9.<br>Set radio to CH 40 BAND L AM RX mode.<br>Connect Multi-meter to TP2. | L14          | 6.0 VDC $\pm$ 0.1     |
|                  | Set CLARIFIER Control to 12 o'clock.<br>Connect Oscilloscope to TP3.  | L15          | Adjust for max.       |
| AM<br>Frequency  | Set radio to CH 1 BAND G AM RX mode.<br>Connect Frequency Counter to TP3.   | L17          | 16.2700MHz $\pm$ 20Hz |
| AM<br>Frequency  | Set radio to CH 1 BAND A AM RX mode.<br>Connect Frequency Counter to TP3.   | L20          | 13.5700MHz $\pm$ 20Hz |
| USB<br>Frequency | Set radio to CH 1 BAND G USB RX mode.<br>Connect Frequency Counter to TP3.  | L18          | 16.2725MHz $\pm$ 20Hz |



| ITEM                | U.U.T. SETTING   | ADJUST POINT | MEASUREMENT       |
|---------------------|--|--------------|-------------------|
| USB Frequency       | Set radio to CH 1 BAND A USB RX mode.<br>Connect Frequency Counter to TP3.   | L21          | 13.5725MHz ± 20Hz |
| LSB Frequency       | Set radio to CH 1 BAND G USB RX mode.<br>Connect Frequency Counter to TP3.   | L19          | 16.2675MHz ± 20Hz |
| LSB Frequency       | Set radio to CH 1 BAND A USB RX mode.<br>Connect Frequency Counter to TP3.   | L22          | 13.5675MHz ± 20Hz |
| TX Offset Frequency | Set radio to CH 1 BAND G AM TX mode.<br>Connect Frequency Counter to TP3.  | VR7          | 16.2700MHz ± 20Hz |
| AM OSC              | Set radio to CH 1 BAND G AM TX mode.<br>Connect Frequency Counter to TP5.  | L23          | 10.6950MHz ± 10Hz |
| USB OSC             | Set radio to CH 1 BAND G AM TX mode.<br>Connect Frequency Counter to TP5.<br>Set VR6 fully clockwise                   | L24          | 10.6925MHz ± 10Hz |
| LSB OSC             | Set radio to CH1 BAND G AM TX mode.Connect<br>Frequency Counter to TP5.<br>Set VR6 back to mid position when finished. | L25          | 10.6975MHz ± 10Hz |

#### 4.1.2 TRANSMITTER ALIGNMENT

| ITEM         | U.U.T. SETTING   | ADJUST POINT         | MEASUREMENT             |
|--------------|--|----------------------|-------------------------|
| BIAS Current | Set radio to CH 1 BAND G USB TX mode.<br>Modulation Off. Set VR10,11 fully clockwise<br>Set VR12 fully anticlockwise.<br>Remove “short PCB” from TP7, TP8, TP9.<br>Connect current meter to TP7(+) and TP9 (-)<br>Connect current meter to TP7(+) and TP8 (-)<br>Connect current meter to TP7(+) and<br>TP8,TP9(short) (-) | VR12<br>VR10<br>VR11 | 50 mA<br>50 mA<br>100mA |

| ITEM                   | U.U.T. SETTING  | ADJUST POINT        | MEASUREMENT   |
|------------------------|---|---------------------|---|
| SSB APC                | Set radio to CH 19 USB RX mode.<br>Connect Multi-meter to TP7.  | VR17                | 12.5 VDC  |
| SSB TX Power           | Connect "short PCB" to TP7 and TP9.<br>Connect RF Power Meter to antenna jack.<br>Set radio to CH 1 BAND G USB TX mode.<br>AF signal 30mV, 1 KHz to microphone.<br>Set RF PWR fully clockwise.<br>Set MIC GAIN fully clockwise. | L40,L42,<br>L43,L44 | MAX > 28W<br>Spurious Emission<br>Minimum.<br>Balance Power<br>Between CH1 A and<br>CH40 L. |
| SSB ALC                | Set radio to CH 1 BAND G USB TX mode.<br>AF signal 30mV, 1 KHz to microphone.   | VR13                | 25 W  |
| SSB Carrier<br>Balance | Set radio to CH 1 BAND G USB TX mode.<br>Set MIC GAIN fully counter-clockwise.<br>Connect Oscilloscope to antenna connector.  | VR6                 | Spurious Emission to<br>Minimum.  |
| AM TX<br>High Power    | Set radio to CH 1 BAND G AM TX mode.<br>Modulation Off.<br>Set RF POWER fully clockwise.  | VR14                | 10 W  |
| AM TX<br>Low Power     | Set RF POWER fully counterclockwise.  | VR18                | 1W±0.5W   |
| RF Power<br>Meter      | Set radio to CH 1 BAND G AM TX mode.<br>Set RF POWER fully clockwise.<br>Set SWR/MOD/PWR Switch to PWR<br>position.   | VR9                 | For a needle reading<br>of "red-green" on TX<br>PWR scale.                                  |
| AM Modulation          | Set radio to CH 1 BAND G AM TX mode.<br>AF signal 30mV, 1 KHz to microphone.<br>Set MIC Gain fully clockwise.   | VR16                | For a needle reading<br>of 90% on the<br>external modulation<br>meter.                      |
| FM Modulation          | Set radio to CH 40 BAND L FM TX mode.<br>AF signal 30mV, 1 KHz to microphone.<br>Set MIC Gain fully clockwise.  | VR5                 | For a needle reading<br>of 4.8K on the<br>external modulation<br>meter.                     |
| SWR<br>Meter           | Set radio to CH 1 BAND G AM TX mode.<br>Connect 100Ω Load to ANT<br>Set S/RF/SWR/CAL Switch to SWR position   | VR1(SWR<br>PCB)     | For a needle reading<br>of 2 on the SWR<br>scale.   |
| CW                     | Set radio to CH 1 BAND G CW mode.<br>CW Key on  | VR8                 | Audio Output<br>200±20 mV   |

### 4.1.3 RECEIVER ALIGNMENT

| ITEM            | U.U.T. SETTING   | ADJUST POINT                 | MEASUREMENT   |
|-----------------|--|------------------------------|---|
| AM Sensitivity  | Set radio to CH 40 BAND F RX mode.<br>Set RF GAIN Fully Clockwise.<br>Set SQ Fully Counter Clockwise.<br>Set VOL Control at 2 o'clock.<br>Set NB/ANL switch to OFF position.<br>Set CLARIFIER Control to 12 o'clock.<br>Connect RF SG to antenna jack<br>Frequency 26.955 MHz, 1uV. Mod 30%. | L2,L3,L5,L6,<br>L7,L8,L9,L10 | Audio Output > 2V<br>S/N > 10 dB.                   |
|                 | Set radio to CH 40 L AM RX mode.<br>RF SG setting 29.655 MHz.<br>Set radio to CH 1 A AM RX mode.<br>RF SG setting 24.265 MHz.  | L5,L6,L7                     | For Balance Between<br>CH 1 A and CH 40<br>L.       |
| USB Sensitivity | Set radio to CH40 BAND F USB RX mode.<br>Set VOL Control Fully Clockwise.<br>RF SG setting 26.956 MHz, 0.25uV. Mod off.  | L11,L12                      | Audio Output > 2V<br>S/N > 10dB.                    |
| LSB Sensitivity | Set radio to CH40 BAND F LSB RX mode.<br>Set VOL Control Fully Clockwise.<br>RF SG setting 26.954 MHz, 0.25uV. Mod off.  | L11,L12                      | Audio Output > 2V<br>S/N > 10dB.                    |
| FM Sensitivity  | Set radio to CH40 BAND F FM RX mode.<br>Set VOL Control Fully Clockwise.<br>RF SG setting 26.955 MHz, 1mV. Mod 3K.<br>RF SG setting 26.955 MHz, 0.5uV. Mod 3K  | L4                           | Audio Output<br>MAX > 5V<br>S/N > 10dB.             |
| NB Adjust       | Set radio to CH 39 F AM RX mode<br>RF SG setting 26.955 MHz, 1000uV. Mod off.<br>Set NB/OFF switch to ON position.<br>Connect Multi-meter to TP1 (D2 cathode).   | L1                           | DC Voltage to max.<br>( > 2.0V )                    |
| AM Squelch      | Set radio to CH 40 BAND F AM RX mode.<br>Set SQ Control Fully Clockwise.<br>RF SG setting 26.955 MHz, 1mV. Mod 30%.  | VR4                          | Adjust very slowly<br>until squelch just<br>closes. |
| SSB Squelch     | Set radio to CH 40 BAND F USB RX mode.<br>Set SQ Control Fully Clockwise.<br>RF SG setting 26.966 MHz, 1 mV. Mod off.  | VR3                          | Adjust very slowly<br>until squelch just<br>closes  |

| ITEM        | U.U.T. SETTING   | ADJUST POINT | MEASUREMENT                               |
|-------------|--|--------------|---|
| AM S-Meter  | Set radio to CH 40 BAND F AM RX mode.<br>RF SG setting 26.955 MHz, 100uV. Mod 30%. | VR1          | For a reading of “9”<br>on the “S” scale. |
| SSB S-Meter | Set radio to CH 19 USB RX mode.<br>RF SG setting 26.966 MHz, 100uV. Mod off.       | VR2          | For a reading of “9”<br>on the “S” scale  |

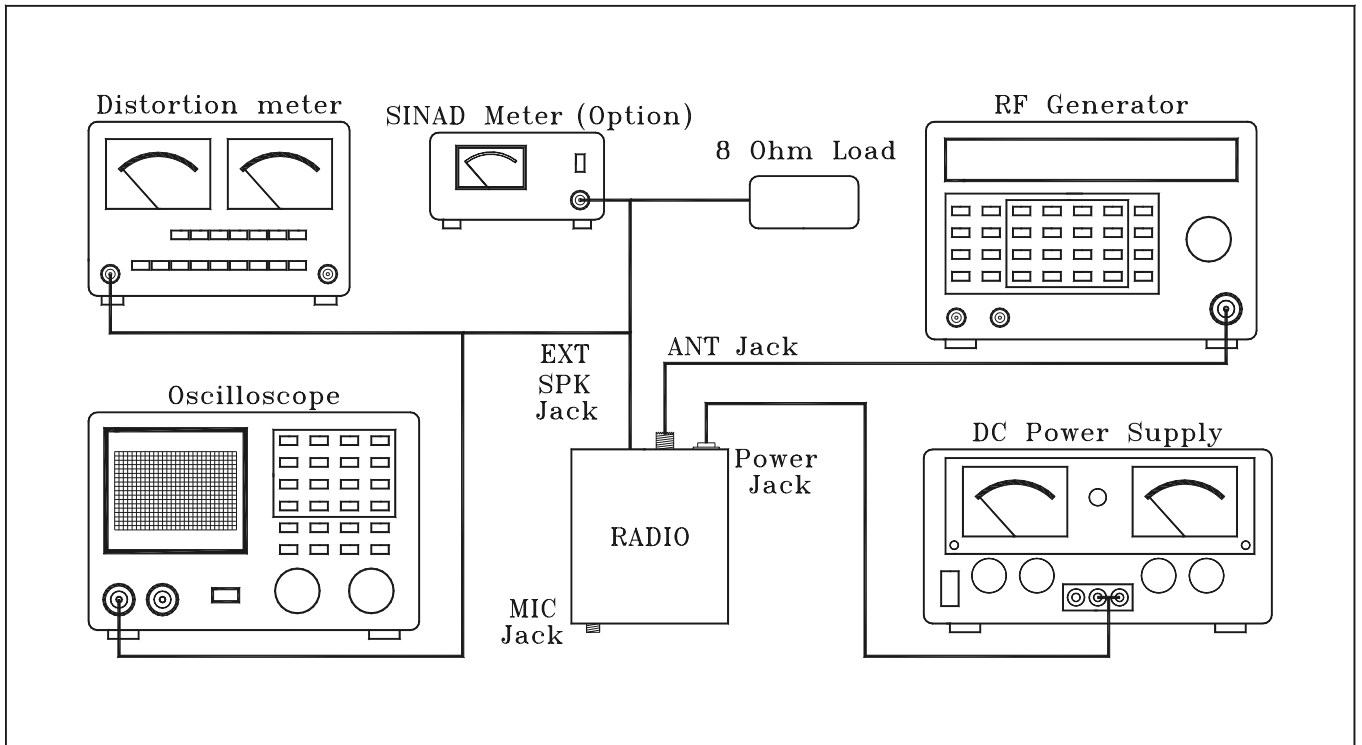


Figure 4.1.2 Transmitter test setup

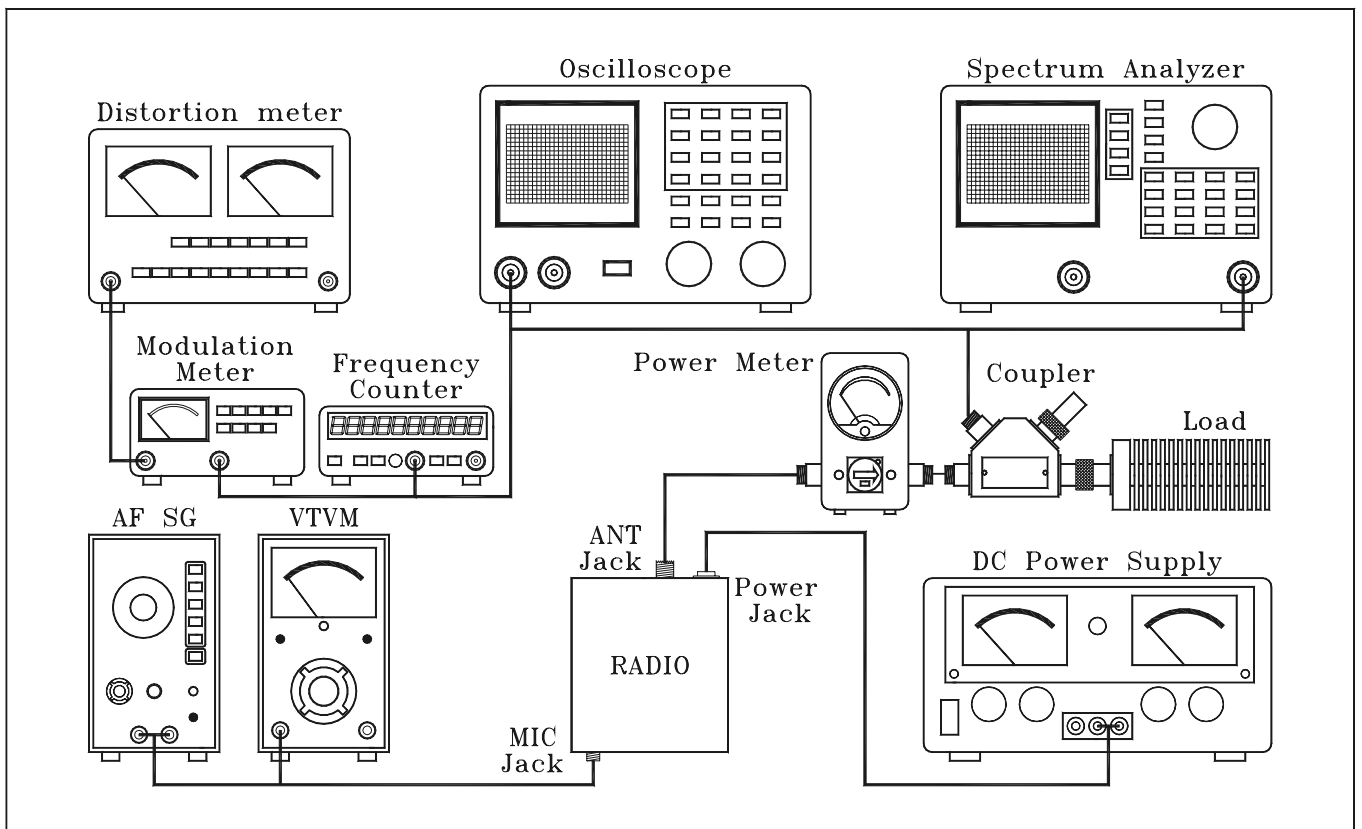
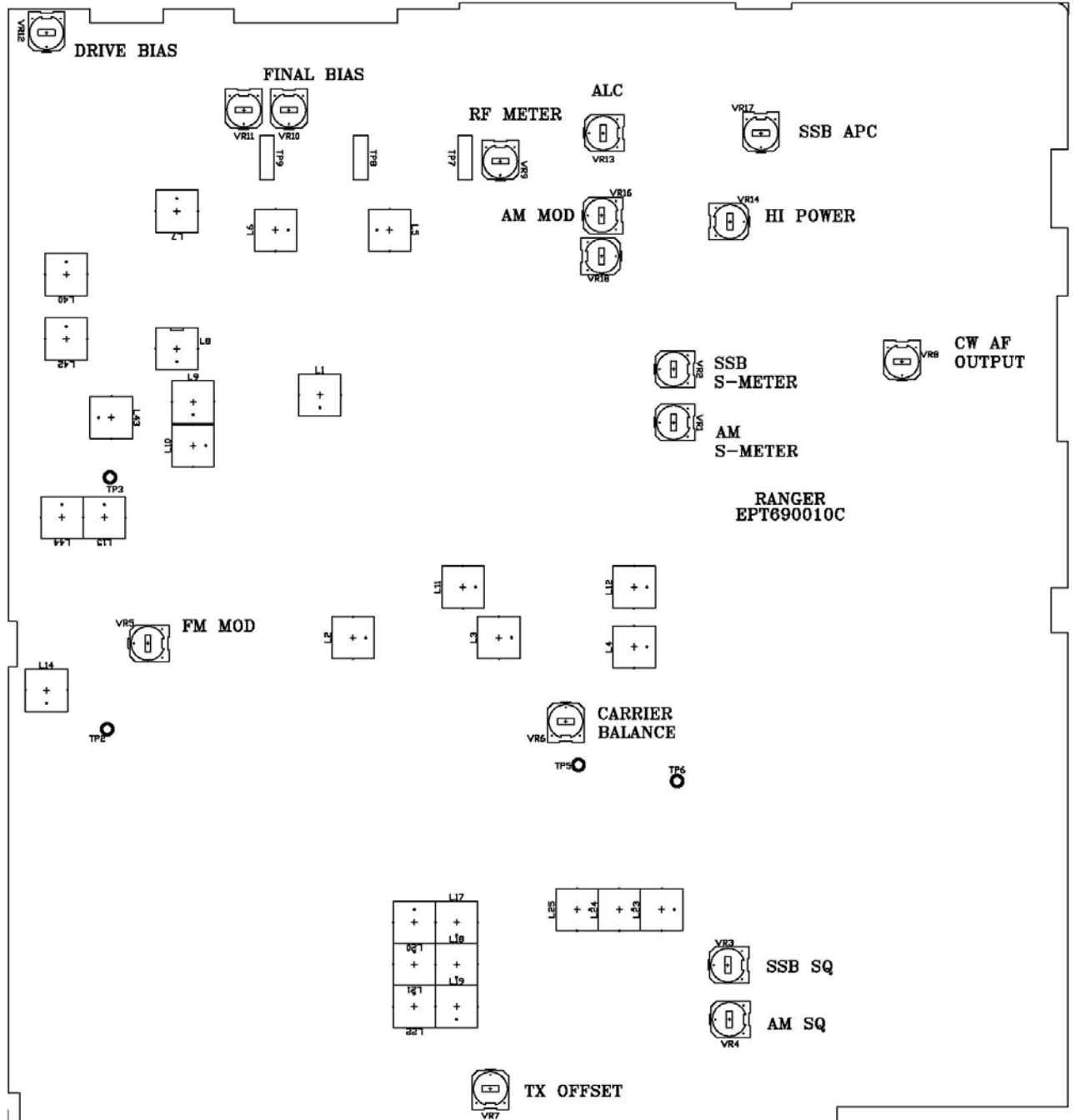


Figure 4.1.3 Receiver test setup

# SS-158EDX (B) MAIN PCB ADJUSTMENT

## LOCATION



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|   |
|---|
| <p style="text-align: center;"><b>CHAPTER 5</b></p> <p style="text-align: center;"><b>MAINTENANCE</b></p> |
|---|

### 5.0 PRECAUTIONS

The inherent quality of the solid-state components used in this transceiver will provide many years of continuous use. Taking the following precautions will prevent damage to the transceiver.

- (i) Never key the transmitter unless an antenna or suitable dummy load is connected to the antenna receptacle.
  
- (ii) Ensure that the input voltage does not exceed 16 VDC or fall below 11.
  
- (iii) Transmitting over long periods can cause heat built-up and cause transmitter damage.

### 5.1 PERIODIC INSPECTION

This unit is aligned at the factory to deliver maximum performance. However, continued performance cannot be expected without periodic inspection and maintenance. Important points to be checked regularly are as follows;

| Check Item                       | Action  |
|----------------------------------|---|
| Whip antenna (option)            | If cracked or broken, replace it.                                     |
| Coaxial cable                    | If sheath is cracked or immersed in water, install new coaxial cable. |
| Coaxial & power plug connections | If loosened, reconnect. If corroded, clean contacts.                  |
| Battery connection               | If corroded, clean power terminals.                                   |
| Ground terminal                  | If corroded, clean terminal.  |

### 5.2 FUSE REPLACEMENT

To protect the equipment from serious damage, a fuse is provided on the power supply lines. The fuse protects against over voltage / reverse polarity or internal fault of the equipment. If the fuse has blown, first find out the cause of the trouble before replacing it. A fuse rated for more than the transceiver requirement should not be used, since it may permanently damage the equipment. Damage due to over fusing is not covered by the warranty.

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## **CHAPTER 6**

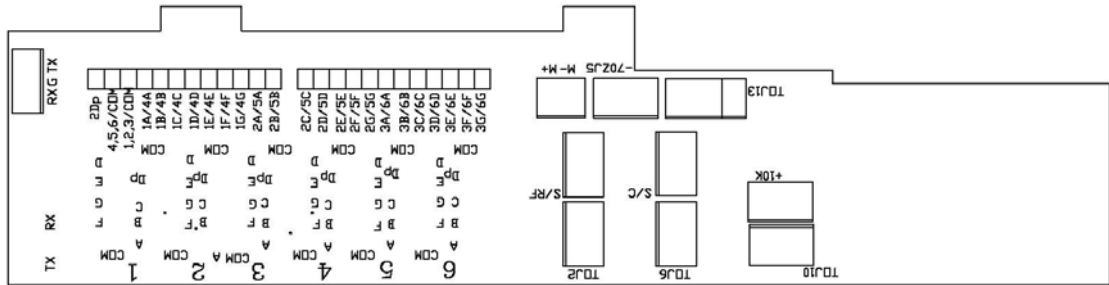
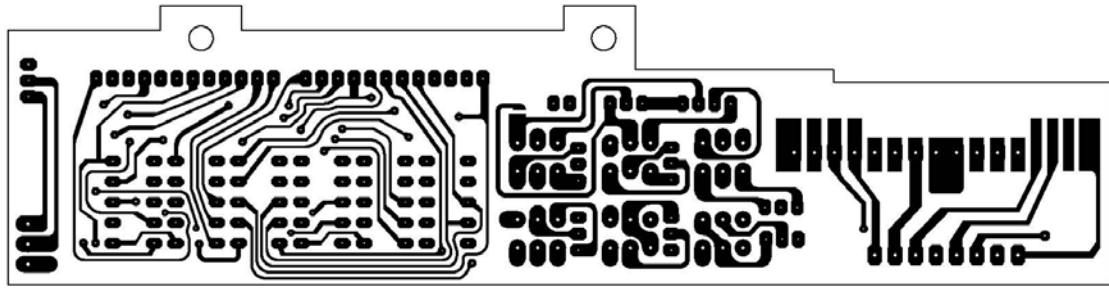
### **DIAGRAMS & PARTS LIST**

#### **6.0 GENERAL**

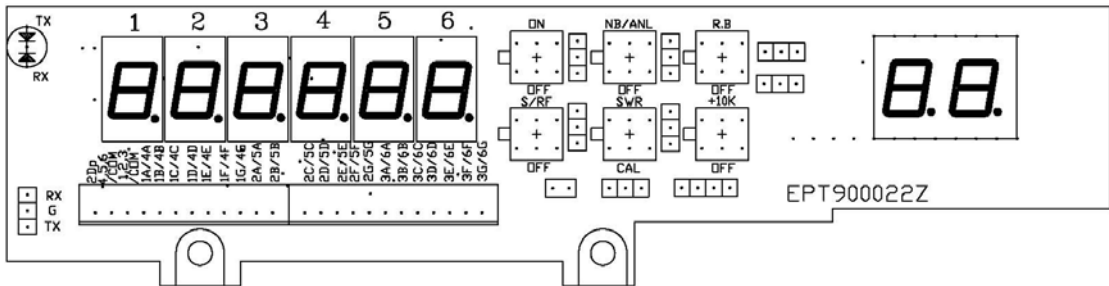
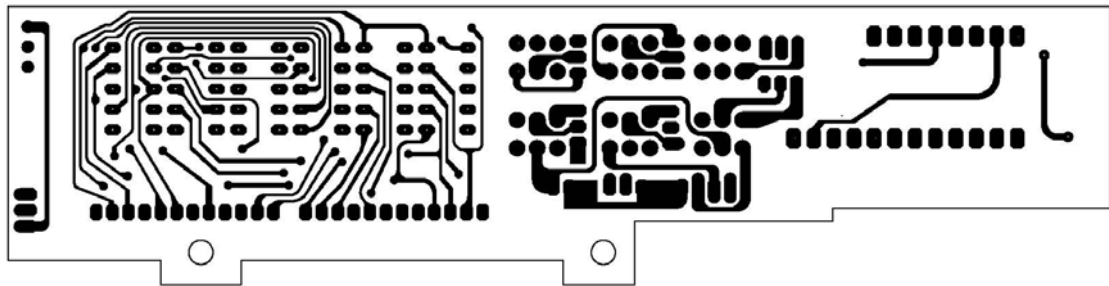
Information on most electrical and mechanical parts is included in the parts list. The reference designators are in alphanumeric order.



# SS-158 EDX (B) DISPLAY PCB (EPT90022Z)



(COPPER SIDE)



(COMPONENT SIDE)

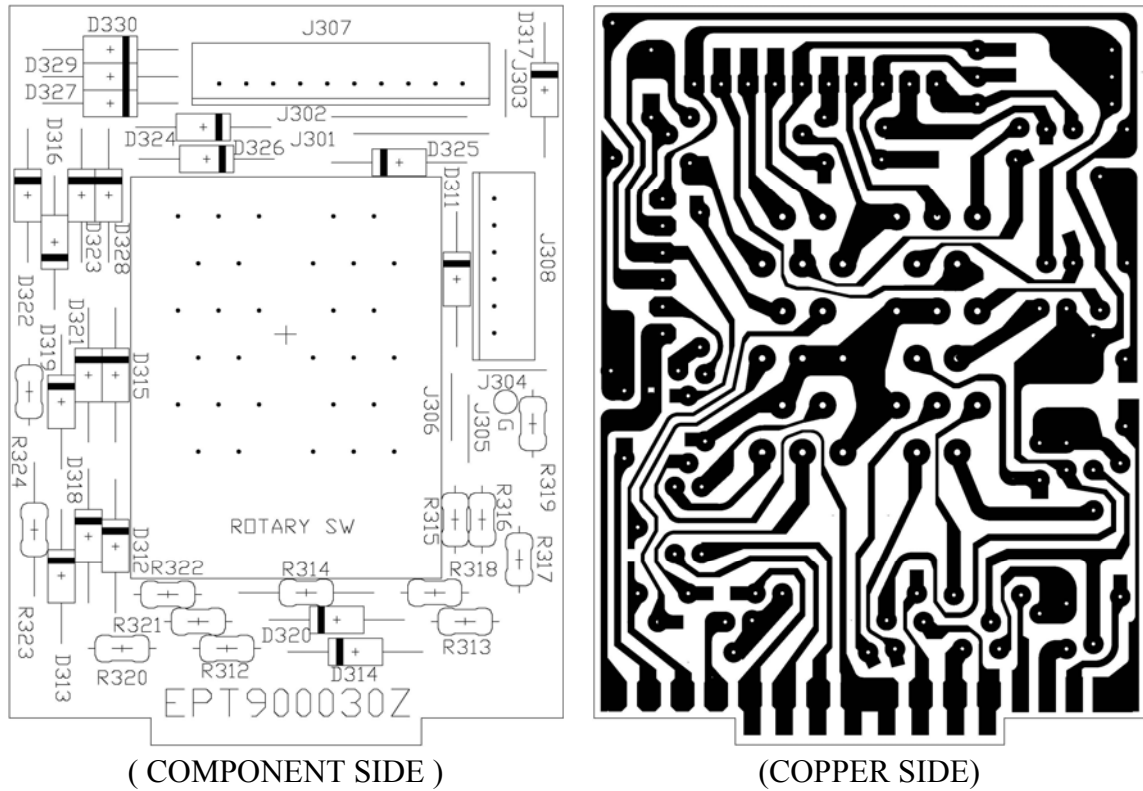
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**PART LIST:**

SS—158 EDX (B) DISPLAY P.C.B

| <b>ITEM</b> | <b>REFERENCE NUMBER</b>   | <b>RANGER PART NUMBER</b> | <b>DESCRIPTION</b>  |
|-------------|---|---------------------------|---------------------|
| 1           |   | EPT90022Z                 | DISPLAY PCB         |
| 2           | CHANNEL DISPLAY   | EX03N40521                | LED DISPLAY         |
| 3           | COUNTER DISPLAY   | EX03N40516                | BLUE LED DISPLAY    |
| 3           | TX/RX LED   | EX01N40004                | RED/GREEN LED       |
| 4           | <b>TALKBACK ,HI/LOW,<br/>S-RF/SWR, NB/ANL/OFF,<br/>ROGER BEEP, +10KHz</b> | EWPS33033X                | PUSH SW             |
| 5           | CN1,CN2   | EX07N48928                | PCB CONNECTOR/S 12P |
| 6           | J10,+10K.S/F  | EX07N48223                | PCB CONNECTOR/S 2P  |
| 7           | J2,J5,J6  | EX07N48350                | PCB CONNECTOR/S 3P  |
| 8           | J13   | EX07N48490                | PCB CONNECTOR/S 4P  |
| 9           | RX/G/TX   | EX07N48947                | PCB CONNECTOR/S 3P  |

## SS-158(B) EDX ROTARY SWITCH PCB (EPT900030Z)

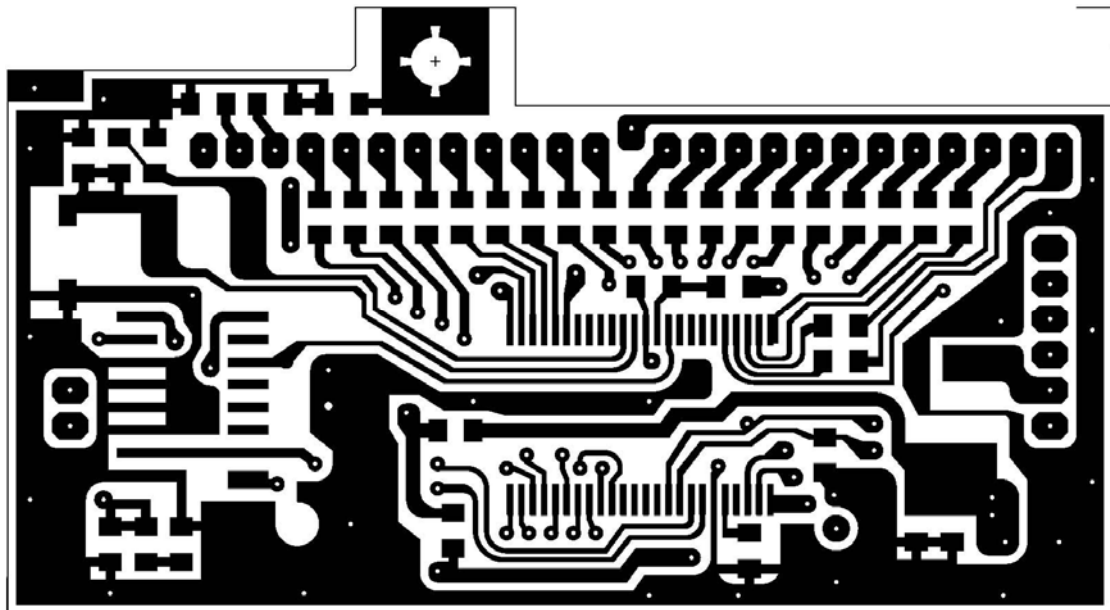
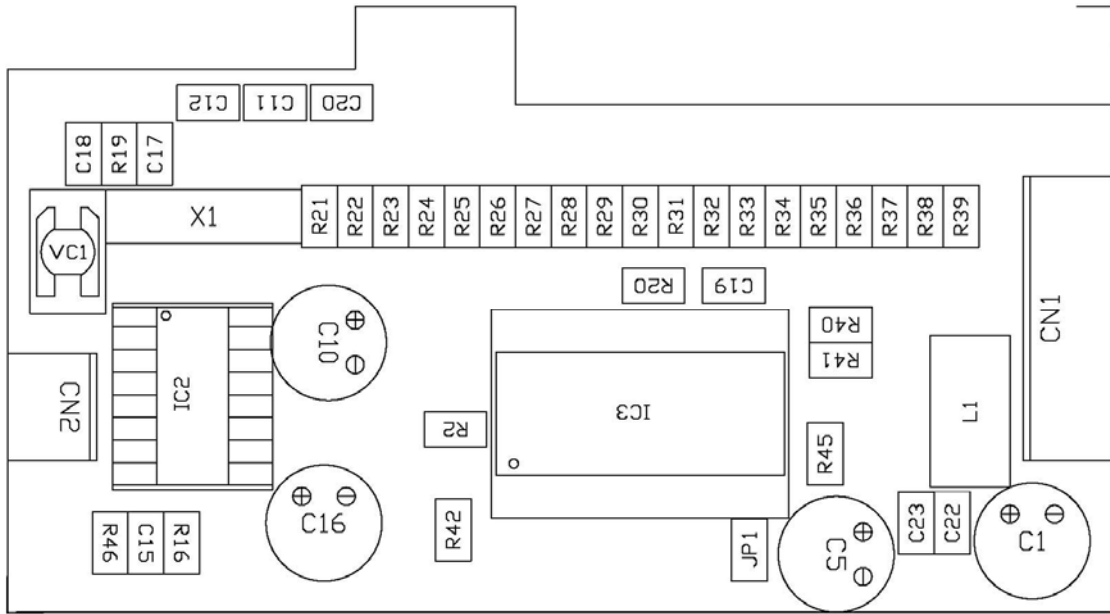


### PART LIST:

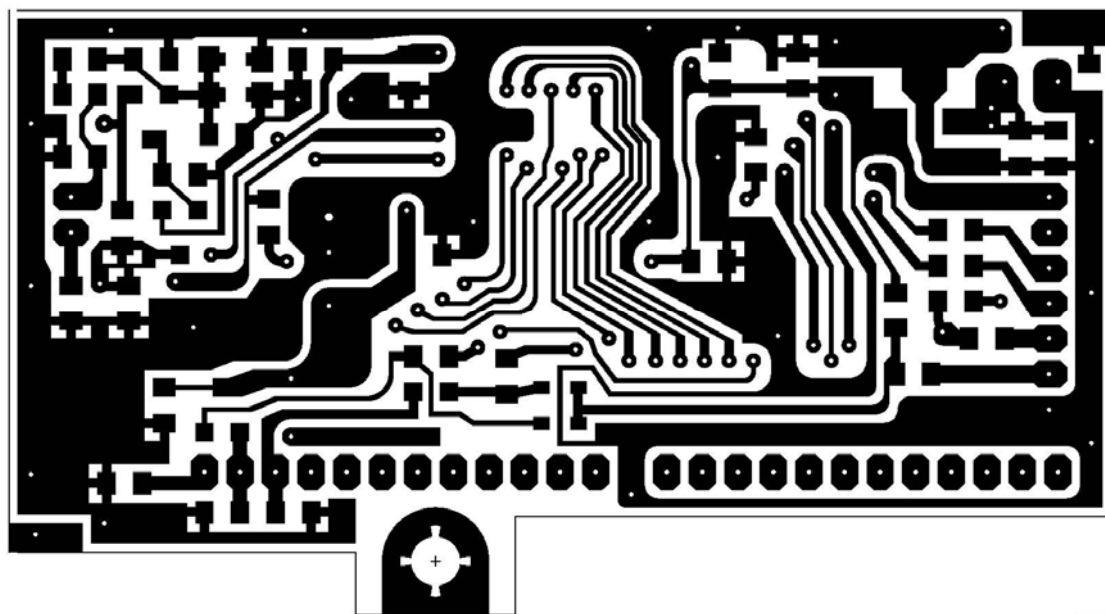
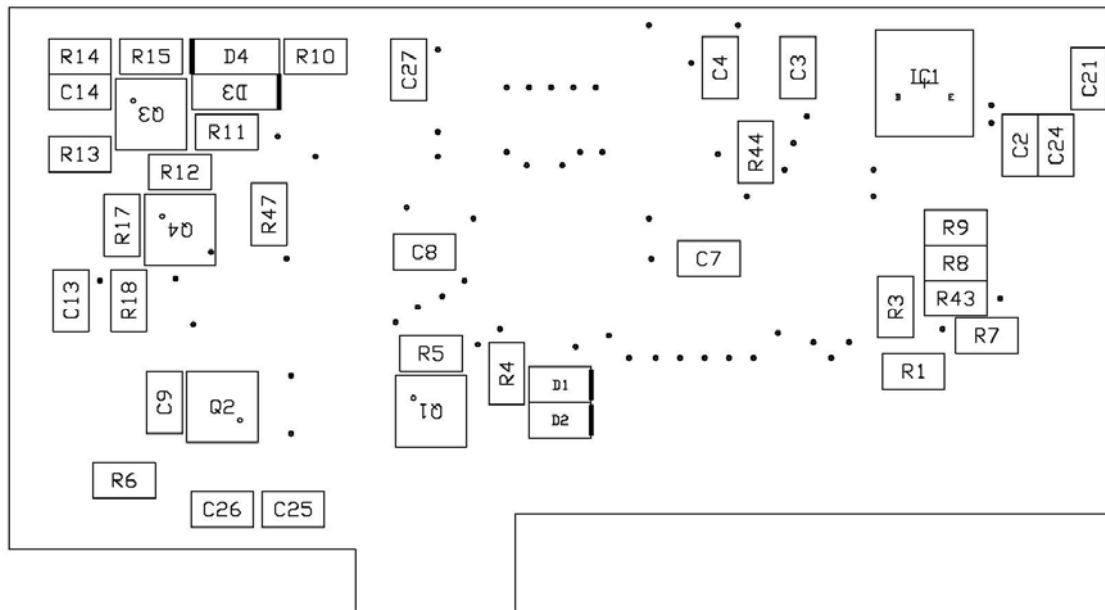
SS-158 EDX (B) ROTARY SWITCH P.C.B

| ITEM | REFERENCE NUMBER  | RANGER PART NUMBER | DESCRIPTION         |
|------|---|--------------------|---------------------|
| 1    |   | EPT900030Z         |                     |
| 2    | R315(BLUE)  | RCP161024Z         | 1K OHM 1/16W P      |
| 3    | R312,313,314,316-324(BLUE)                                  | RCP161524Z         | 1.5K OHM 1/16W P    |
| 3    | J303,304,305,306  | WX01070705         | JUMPER WIRE 7x5x7   |
| 4    | J308  | WX01070708         | JUMPER WIRE 7x8x7   |
| 5    | J301,J302,D311,D312,D313,D314,D315,D316,D323,D324,D325,D326 | WX01070710         | JUMPER WIRE 7x10x7  |
| 6    | J307  | EX07N48209         | PCB CONNECTOR/S 10P |
| 7    | ROTARY SWITCH   | EWRT32000S         | GPS-0501            |

**SS—158 (B) EDX COUNTER PCB (EPT900043Z)**



( COMPONENT SIDE )



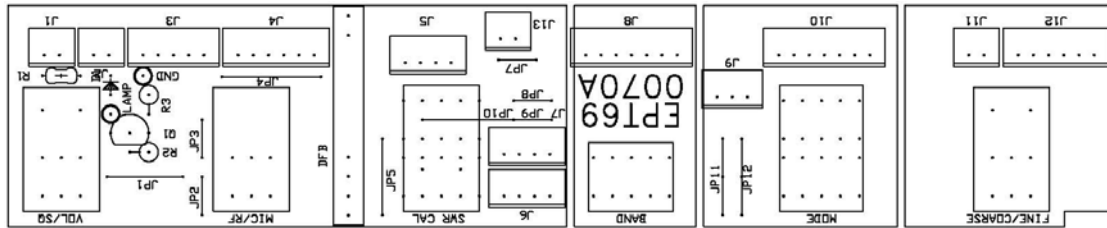
(COPPER SIDE)

**PART LIST:**

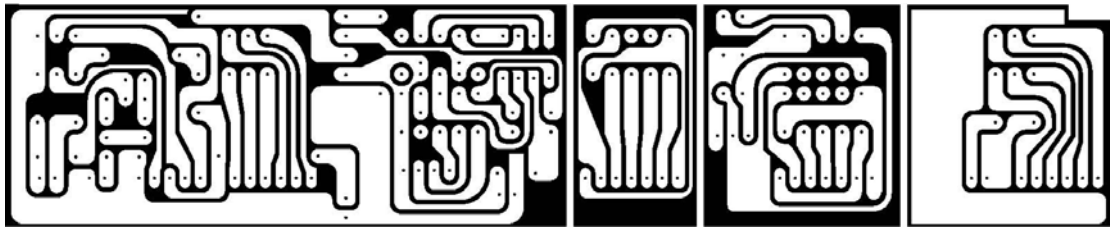
SS-158 EDX (B) COUNTER P.C.B

| ITEM | REFERENCE NUMBER                           | RANGER PART NUMBER | DESCRIPTION            |
|------|--|--------------------|------------------------|
| 1    |  | EPT900043Z         | COUNTER P.C.B          |
| 2    | R2,16                                      | RCY014704Z         | 47 OHM 0.1W            |
| 3    | R10  | RCY011014Z         | 100 OHM 0.1W           |
| 3    | R10,29,30,31,32,33,34,35,36,37,38,39,40,41 | RCY012214Z         | 220 OHM 0.1W           |
| 4    | R18,21-41                                  | RCY013314Z         | 330 OHM 0.1W           |
| 5    | R14,46                                     | RCY011024Z         | 1K OHM 0.1W(0805)      |
| 6    | R1   | RCY012724Z         | 2.7K OHM 0.1W          |
| 7    | R4,5                                       | RCY014724Z         | 4.7K OHM 0.1W          |
| 8    | R3,7,8,9,11,13,43,44,45                    | RCY011034Z         | 10K OHM 0.1W(0805)     |
| 9    | R15  | RCY013934Z         | 39K OHM 0.1W           |
| 10   | R20  | RCY011044Z         | 100K OHM 0.1W          |
| 11   | R19  | RCY011054Z         | 1M OHM 0.1W            |
| 12   | C7,8,9,11,12,14,15,20                      | CK1103AB6U         | 0.01UF 50WV M Z5U      |
| 13   | C2,3,4,13,19,21,22,23,24,25,26,27          | CK1104AB7R         | 0.1uF 50WV ZF 5V       |
| 14   | C17  | CK1150AB4A         | 15PF 50WV J CH         |
| 15   | C1,5,10,16                                 | CEM161077A         | 100UF 16WV H=5mm       |
| 16   | IC1  | YNJR78L05Z         | NJM78L05-UA(SD)        |
| 17   | IC2  | YNPHHC161D         | 74HC161D 16PIN         |
| 18   | IC3  | YNRGFC04SP         | 48PINHT48R50A-48 (SMD) |
| 19   | X1   | EYCAP04500         | HC-49U 4.500MHz        |
| 20   | D1,2                                       | EDSS00355Y         | 1SS355                 |
| 21   | D3,4                                       | ED1N04148Y         | 1N4148                 |
| 22   | Q4   | TY2SA1162G         | 2SA1162GR-TE85L        |
| 23   | Q1,2                                       | TY2SC2712G         | 2SC2712GR-TE85L        |
| 24   | Q3   | TY2SC2714Z         | 2SC2714-TE85L          |
| 25   | VC1  | CV038200AY         | TZC03P200A110 20PF     |
| 26   | L1   | YCTLI1073F         | 100UH TF J (4532)      |
| 27   | CN2  | EX07N48223         | 2P PH=2MM              |
| 28   | CN1  | EX07N48224         | 7P PH=2MM              |
| 29   | CN3,CN4                                    | EX07N48927         | 12P                    |

## SS-158 (B) VR PCB (EPT690070A)



( COMPONENT SIDE )



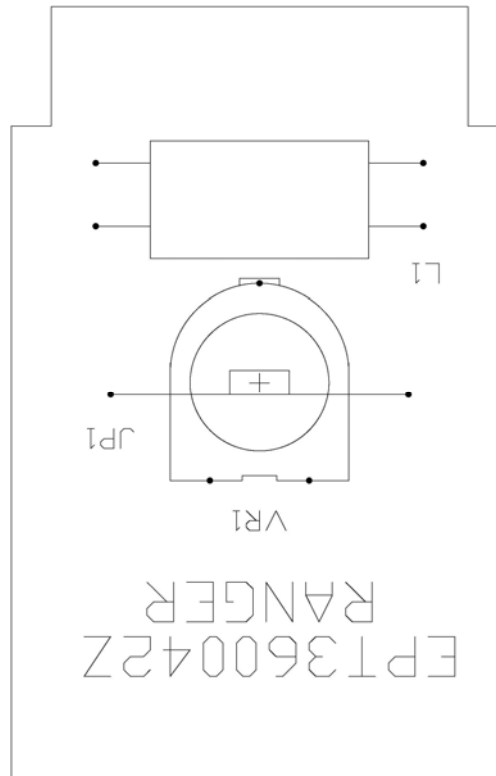
( COPPER SIDE )

### PART LIST:

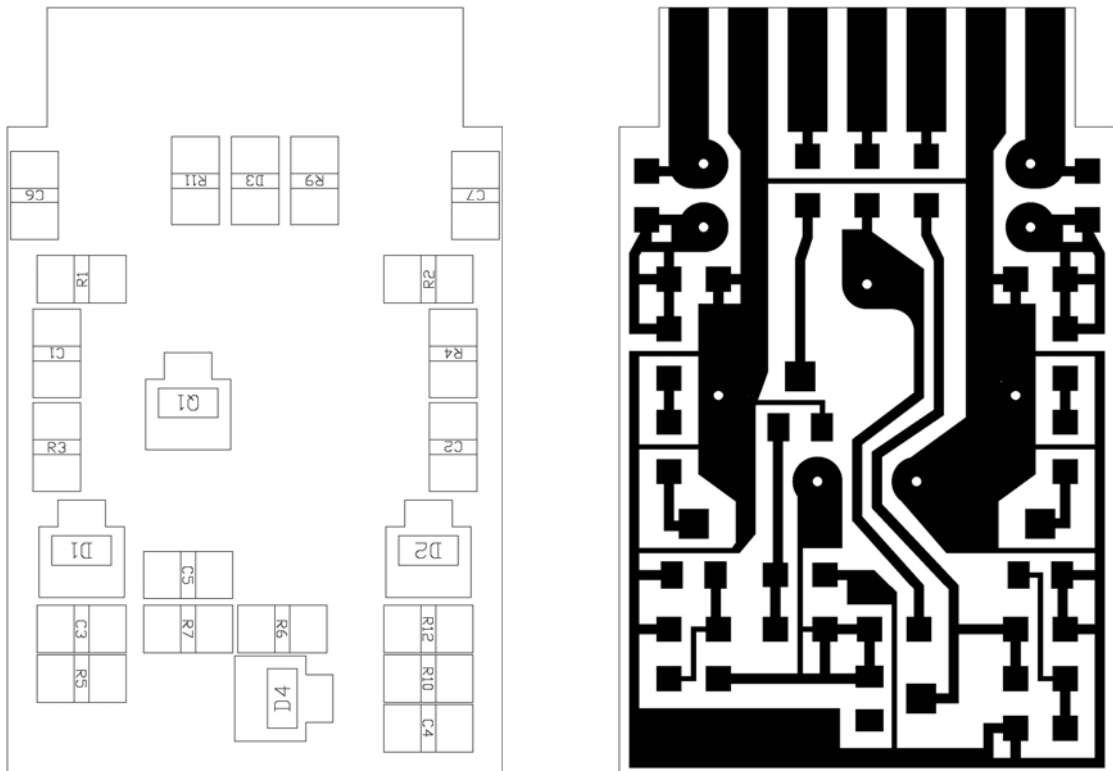
SS-158 EDX (B) VR P.C.B

| ITEM | REFERENCE NUMBER | RANGER PART NUMBER | DESCRIPTION    |
|------|------------------|--------------------|----------------|
| 1    |                  | VR PCB             | EPT690070A     |
| 2    | R1               | RCP161024Z         | 1K OHM 1/16W P |
| 3    | J1,5             | EX07N48223         | 2P PH=2MM      |
| 3    | J7               | EX07N48350         | 3P PH=2MM      |
| 4    | J6               | EX07W48824         | 3P PH=2MM      |
| 5    | J3               | EX07W48826         | 5P PH=2MM      |
| 6    | J10              | EX07N48331         | 6P PH=2MM      |
| 7    | J8               | EX07N48224         | 7P PH=2MM      |
| 8    | J4,12            | EX07W48827         | 6P PH=2MM      |
| 9    | JP3,7,9          | WX01070705         | 7x5x7          |
| 10   | JP1              | WX01070710         | 7x10x7         |
| 11   | VOL/SQ,ECHO/TIME | RV50303522         | 50KB/50KA W/SW |
| 12   | FINE/COARSE      | RV20303523         | 20KB/1KB       |
| 13   | MIC GAIN/RF GAIN | RV10203524         | 1KB/1KA        |
| 14   | BAND SW          | EWRT32094S         | 6N             |
| 15   | AM/FM/CW/USB/LSB | EWRT32083S         | 5N             |

SS-158 (B) ANT PCB (EPT360042Z)



( COMPONENT SIDE )



( COPPER SIDE )



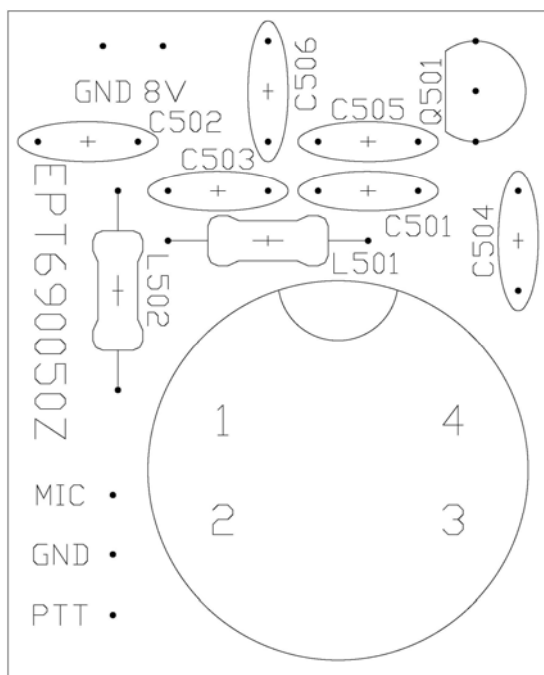
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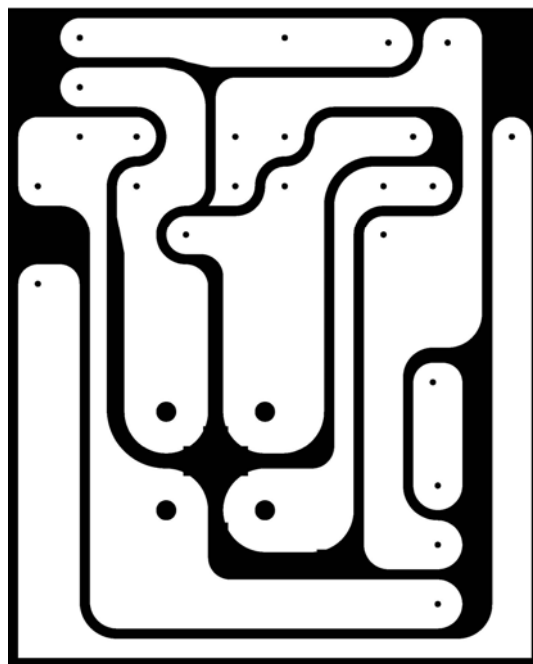
SS-158 EDX (B) ANT P.C.B

| <b>ITEM</b> | <b>REFERENCE NUMBER</b> | <b>RANGER PART NUMBER</b> | <b>DESCRIPTION</b>  |
|-------------|-------------------------|---------------------------|---------------------|
| 1           |                         | EPT360042Z                | ANT PCB             |
| 2           | R9                      | RCY010004Z                | 0 OHM 0.1W          |
| 3           | R1                      | RCY014714Z                | 470 OHM 0.1W        |
| 3           | R3,4                    | RCY011014Z                | 100 OHM 0.1W        |
| 4           | R2                      | RCY013314Z                | 330 OHM 0.1W        |
| 5           | R5,11                   | RCY011024Z                | 1K OHM 0.1W(0805)   |
| 6           | R10,12                  | RCY012224Z                | 2.2K OHM 0.1W(0805) |
| 7           | R7,C5                   | RCY011034Z                | 10K OHM 0.1W(0805)  |
| 8           | C7                      | CK1059AB1A                | 0.5PF 50WV C CH     |
| 9           | C6                      | CK1030AB1A                | 3PF 50WV C CH       |
| 10          | C3,4                    | CK2104AB7R                | 0.1UF 25WV Z Y5V    |
| 11          | C1,2                    | CK1102AB7L                | 0.001UF 50WV Z SL   |
| 12          | Q1                      | TY2SC2712G                | 2SC2712GR-TE85L     |
| 13          | D3                      | EDSS00355Y                | 1SS355              |
| 14          | D1,2                    | EDHM0198SY                | HSM198S             |
| 15          | D4                      | EDMA0028TY                | MA28T               |
| 16          | L1                      | ECRFZ10204                | BF2159576           |
| 17          | VR1                     | RE10300009                | 10K OHM L           |
| 18          | JP1                     | WX01070715                | 7x15x7              |

## SS-158 (B) MIC PCB (EPT690050Z)



( COMPONENT SIDE )



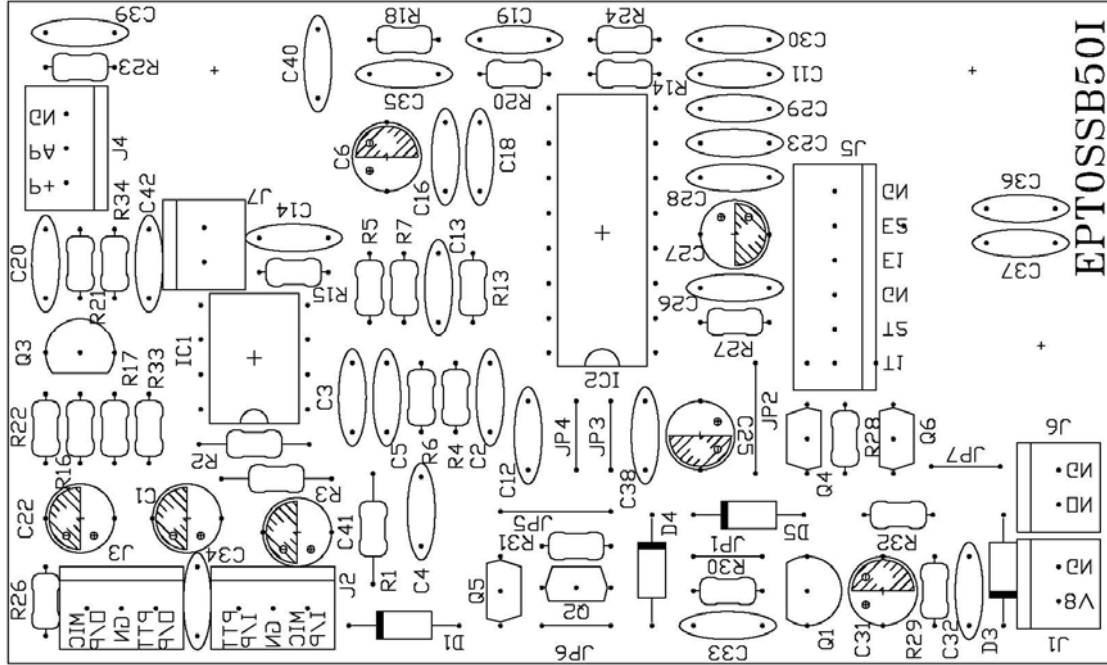
( COPPER SIDE )

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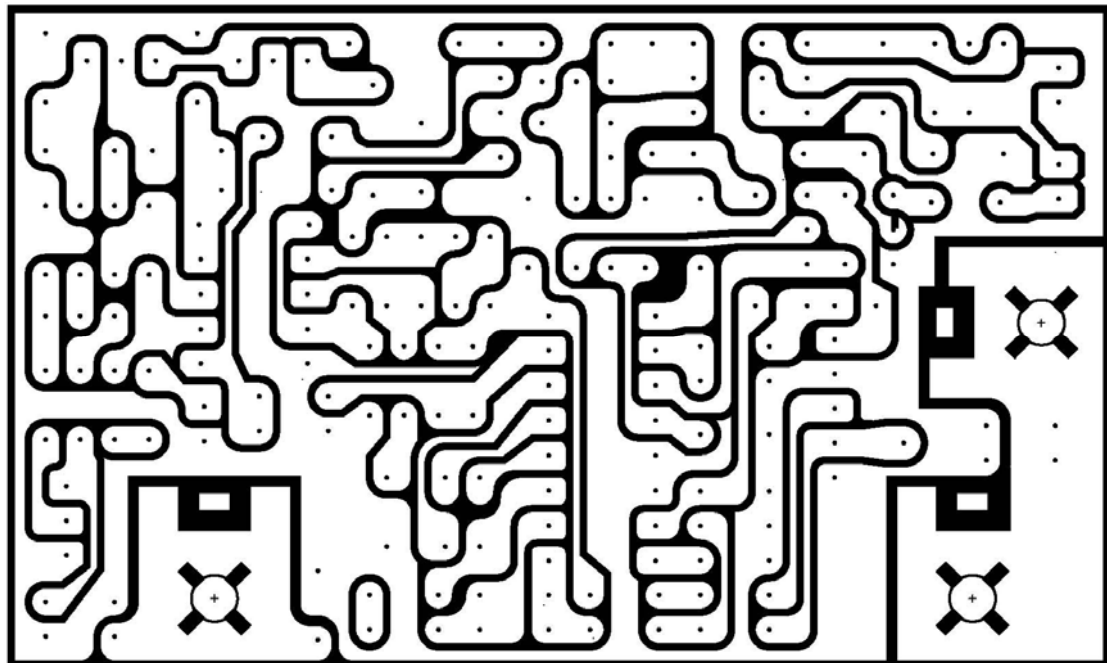
SS-158 EDX (B) MIC P.C.B

| ITEM | REFERENCE NUMBER | RANGER PART NUMBER | DESCRIPTION       |
|------|------------------|--------------------|-------------------|
| 1    |                  | EPT690050Z         | MIC PCB           |
| 2    | C502,503,504,501 | CC0501027L         | 0.001UF 50WV SL Z |
| 3    | C505,506         | CC0501037L         | 0.01UF 50WV SL Z  |
| 3    | Q501             | TDTA0124ES         | DTA124ES          |
| 4    | L501             | ECCHK16001         | 5.6UH             |
| 5    | L502             | ECBAD18526         | 3.5x6x1.2         |
| 6    | MIC seat         | EX06N41020         | SCS-16-4(R)       |
| 7    | MIC-50I(J3)      | EX07N48903         | 3P L=140MM PH=2.5 |

SS-158 (B) ECHO PCB (EPT0SSB50I)



( COMPONENT SIDE )



( COPPER SIDE )

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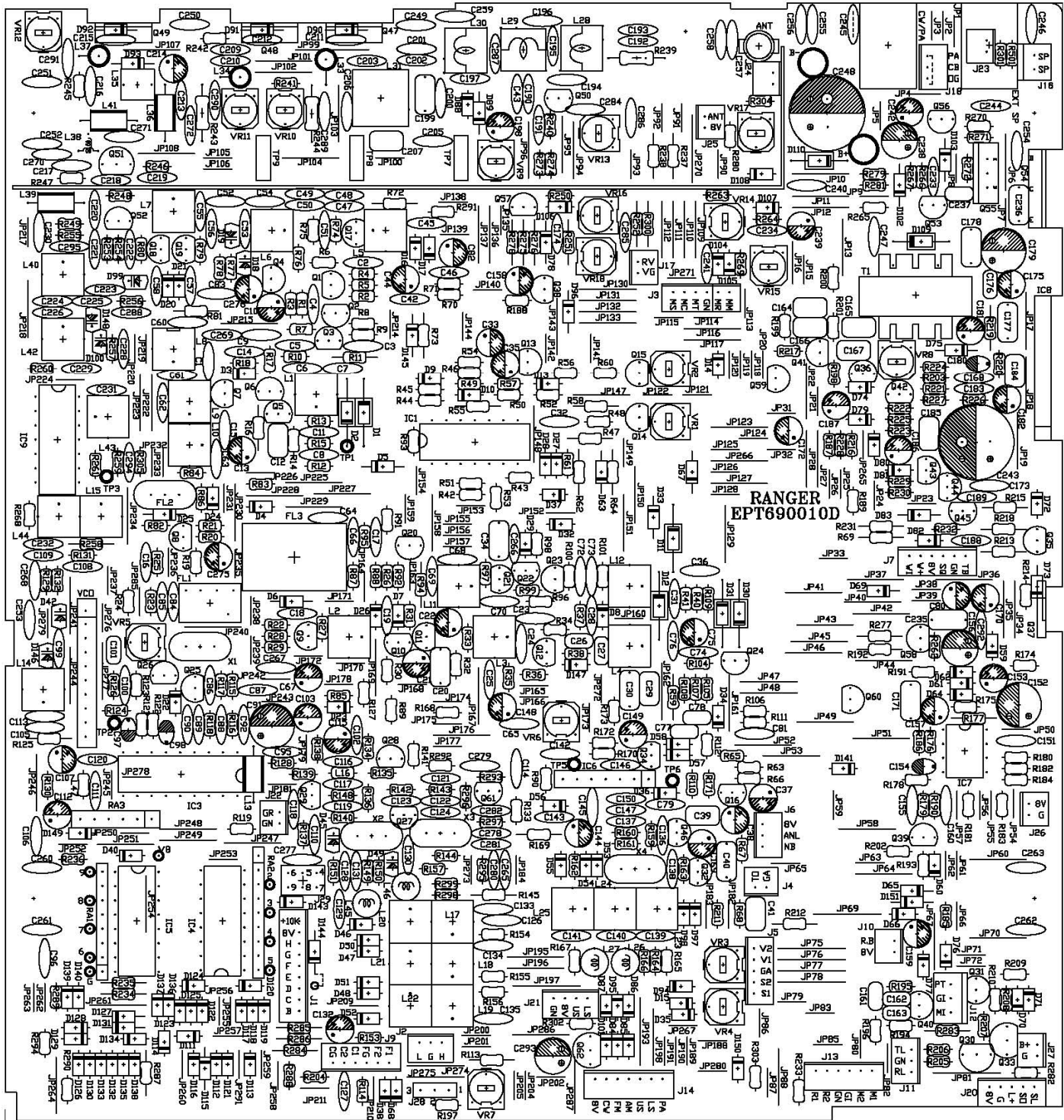
**PART LIST:**

SS-158 EDX (B) ECHO P.C.B

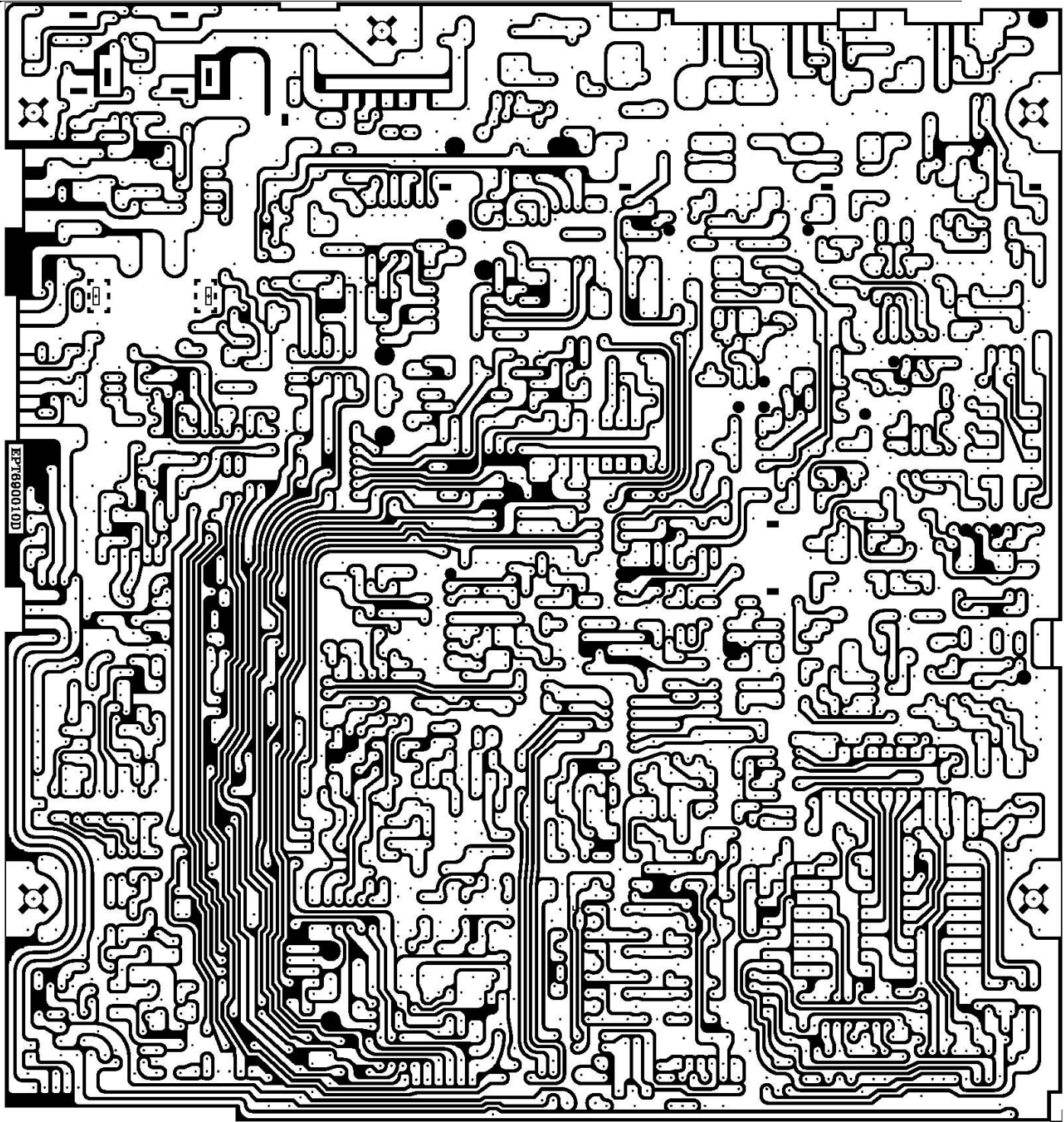
| ITEM | REFERENCE NUMBER                              | RANGER PART NUMBER | DESCRIPTION      |
|------|---|--------------------|------------------|
| 1    |   | EPT0SSB50I         | ECHO PCB         |
| 2    | R3  | RCM1610048         | 10 OHM 1/16W     |
| 3    | R27   | RCM1610145         | 100 OHM 1/16W    |
| 3    | R17   | RCM1610245         | 1K OHM 1/16 W    |
| 4    | R7,16,26                                      | RCM1622245         | 2.2K OHM 1/16W   |
| 5    | R29,30  | RCM1647245         | 4.7K OHM 1/16W   |
| 6    | R22,23,24,32                                  | RCM1610345         | 10K OHM 1/16W    |
| 7    | R5,18,28                                      | RCM1622345         | 22K OHM 1/16W    |
| 8    | R1,2  | RCM1622348         | 22K OHM 1/16W    |
| 9    | R6,13,15                                      | RCM1633345         | 33K OHM 1/16W    |
| 10   | R14   | RCM1639345         | 39K OHM 1/16W    |
| 11   | R4,20,33,34                                   | RCM1647345         | 47K OHM 1/16W    |
| 12   | R21   | RCM1610445         | 100K OHM 1/16W   |
| 13   | R31   | RCM1610545         | 1M OHM 1/16W     |
| 14   | C26   | CC0503315A         | 330PF 50WV CH    |
| 15   | C5,13   | CC0505615L         | 560PF 50WV SL    |
| 16   | C12   | CC0501027L         | 0.001UF 50WV SL  |
| 17   | C4,19,23,34                                   | CC0501037L         | 0.01UF 50WV SL   |
| 18   | C2,3,20,28,29,30,32,33,,36,37<br>,38,39,40,42 | CC0501047L         | 0.1UF 50WV SL    |
| 19   | C11   | CC0501537L         | 0.015UF 50WV SL  |
| 20   | C35   | CC0502237L         | 0.022UF 50WV SL  |
| 21   | C14   | CC0502227L         | 0.0022UF 50WV SL |
| 22   | C16,18  | CC0504737L         | 0.047UF 50WV SL  |
| 23   | C6,25,41                                      | CE0501057Z         | 1UF 50WV         |
| 24   | C22   | CE0502257Z         | 2.2UF 50WV       |
| 25   | C1,31   | CE0504757Z         | 4.7UF 50WV       |
| 26   | C27   | CE0164767Z         | 47UF 16WV        |
| 27   | IC1   | ENJR04558D         | NJM4558D 8PIN    |
| 28   | IC2   | ENES56033E         | ES56033E 16PIN   |
| 29   | Q1,3  | T2SC00945P         | 2SC945P          |
| 30   | Q2,5,6  | TDTC0124ES         | DTC124ES         |
| 31   | Q4  | F2SK00118Z         | 2SK118           |
| 32   | D1,4,5  | ED1N04148Z         | 1N4148           |
| 33   | D3  | EDZD05569Z         | 5.6V 0.5W        |
| 34   | J6,7  | EX07N41226         | 2P T             |
| 35   | J1  | EX07N41330         | 2P T (UL)        |
| 36   | J4  | EX07N41216         | 3P T             |
| 37   | J2,J3   | EX07N41227         | 3P T (UL)        |

| <b>ITEM</b> | <b>REFERENCE NUMBER</b> | <b>RANGER PART NUMBER</b> | <b>DESCRIPTION</b> |
|-------------|-------------------------|---------------------------|--------------------|
| 38          | J5                      | EEX07N41266               | 6P T               |
| 39          | JP1,3,4,6,7             | WX01070705                | 7x5x7              |
| <b>40</b>   | JP2,5                   | WX01070708                | 7x8x7              |

# SS-158 (B) MAIN PCB (EPT690010D)



( COMPONENT SIDE )



( COPPER SIDE )

**PART LIST:****SS-158 EDX (B) MAIN P.C.B**

| REFERENCE NUMBER                           | RANGER PART NO. | DESCRIPTION   |
|--|-----------------|---------------|
|  | EPT690010D      | MAIN PCB      |
| R258                                       | RCP160004Z      | 0 OHM 1/16W P |
| R246                                       | RCM1647945      | 4.7OHM 1/16W  |
| R267                                       | RCM1615045      | 15 OHM 1/16W  |
| R241,242                                   | RCM1622045      | 22 OHM 1/16W  |
| R281                                       | RCM1633045      | 33 OHM 1/16W  |
| R133,253                                   | RCM1647045      | 47 OHM 1/16W  |
| R130,220                                   | RCM1656045      | 56 OHM 1/16W  |
| R101                                       | RCM1668045      | 68 OHM 1/16W  |
| R3,5,8,30,33,76,95,260,174,204,259,263,JP2 | RCM1610145      | 100 OHM 1/16W |
| R32,100,245                                | RCM1615145      | 150 OHM 1/16W |
| R23  | RCM1618145      | 180 OHM 1/16W |
| R140,163                                   | RCM1622145      | 220 OHM 1/16W |
| R31,99                                     | RCM1627145      | 270 OHM 1/16W |
| R6,10,24,248,254                           | RCM1633145      | 330 OHM 1/16W |
| R141,188,250,268,280,293,299,298           | RCM1647145      | 470 OHM 1/16W |
| R266                                       | RCM1656145      | 560 OHM 1/16W |
| R4,50,89,209                               | RCM1668145      | 680 OHM 1/16W |
| R74  | RCM1682145      | 820 OHM 1/16W |

| REFERENCE NUMBER  | RANGER PART NO. | DESCRIPTION     |
|---|-----------------|-----------------|
| R36,67,98,115,116,270,271,118,123,136-138,143,144,154-156,160,164,166,167,179,186,205,206,214,217,303,232,240,261,292,295,291,282 | RCM1610245      | 1K OHM 1/16 W M |
| R88   | RCM1612245      | 1.2K OHM 1/16W  |
| R54,79,80,87,97,132,207,247,255,273,233   | RCM1615245      | 1.5K OHM 1/16W  |
| R9,25,28  | RCM1627245      | 2.7K OHM 1/16W  |
| R18,22,60,66,110,128,191,129,171,274  | RCM1633245      | 3.3K OHM 1/16W  |
| R52,57  | RCM1639245      | 3.9K OHM 1/16W  |
| R26,35,84,165,190,195,196,199,200,131   | RCM1647245      | 4.7K OHM 1/16W  |
| R70,83,92,264,265   | RCM1656245      | 5.6K OHM 1/16W  |
| R14,40,41,82,127,148  | RCM1668245      | 6.8K OHM 1/16W  |
| R90   | RCM1682245      | 8.2K OHM 1/16W  |
| R1,13,17,37,38,56,65,68,86,142,153,159,161,294,168,173,175,181,202,210,216,227,229-230,272,296,262,297,172                        | RCM1610345      | 10K OHM 1/16W   |
| R109,178  | RCM1612345      | 12K OHM 1/16W   |
| R180  | RCM1615345      | 15K OHM 1/16W   |
| R91,187,208   | RCM1622345      | 22K OHM 1/16W   |
| R121  | RCM1627345      | 27K OHM 1/16W   |
| R2  | RCM1633345      | 33K OHM 1/16W   |
| R46   | RCM1639345      | 39K OHM 1/16W   |



| REFERENCE NUMBER  | RANGER PART NO. | DESCRIPTION       |
|---|-----------------|-------------------|
| R7,29,61,63,96,126,14<br>9-151,157,185,236,224                    | RCM1647345      | 47K OHM<br>1/16W  |
| R21,85,105,107  | RCM1668345      | 68K OHM<br>1/16W  |
| R45   | RCM1682345      | 82K OHM<br>1/16W  |
| R12,42-44,51,53,77,78<br>,104,108,112,182,184,<br>221,225,256,257 | RCM1610445      | 100K OHM<br>1/16W |
| R117,135,139,194,201  | RCM1622445      | 220K OHM<br>1/16W |
| R49,170,176   | RCM1627445      | 270K OHM<br>1/16W |
| R47,59  | RCM1622448      | 220K OHM<br>1/16W |
| R55   | RCM1627448      | 270K OHM 1/16W    |
| R15,34,111,183,203  | RCM1647445      | 470K OHM 1/16W    |
| R113,213  | RCM1647048      | 47 OHM 1/16W      |
| R215  | RCM1656048      | 56 OHM 1/16W      |
| R11   | RCM1668048      | 68 OHM 1/16W      |
| R48   | RCM1682445      | 820K OHM 1/16W    |
| R106  | RCM1610545      | 1M OHM 1/16W      |
| R193  | RCM1615545      | 1.5M OHM 1/16W    |
| R124  | RCM1610645      | 10M OHM 1/16W     |
| VR18-J17  | RCM164724A      | 4.7K OHM 1/16W    |
| JP264   | RCM142204A      | 22 OHM 1/4W       |
| R243,244  | RCM121514A      | 150 OHM<br>1/2W   |
| R239  | RCM121034A      | 10K OHM<br>1/2W   |
| R81,169   | RCM1610148      | 100 OHM<br>1/16W  |
| R177  | RCM1622148      | 220 OHM<br>1/16W  |
| R16,300   | RCM1633148      | 330 OHM<br>1/16W  |

| REFERENCE NUMBER     | RANGER PART NO. | DESCRIPTION        |
|----------------------|-----------------|--------------------|
| R94                  | RCM1668148      | 680 OHM 1/16W      |
| R62,64,72,237,238    | RCM1610248      | 1K OHM 1/16W       |
| R192                 | RCM1612248      | 1.2K OHM<br>1/16W  |
| R251                 | RCM1615248      | 1.5K OHM<br>1/16W  |
| R73,283              | RCM1622248      | 2.2K OHM<br>1/16W  |
| R58,219,277          | RCM1633248      | 3.3K OHM<br>1/16W  |
| R252                 | RCM1647248      | 4.7K OHM<br>1/16W  |
| R275                 | RCM1682248      | 8.2K OHM<br>1/16W  |
| R145,212,231,276     | RCM1610348      | 10K OHM 1/16W      |
| R218,234,235         | RCM1647348      | 47K OHM 1/16M      |
| R278                 | RCM1610448      | 100K OHM<br>1/16W  |
| C79                  | CC0500501L      | 5PF 50WV SL        |
| C1,49,119,122,14,279 | CC0501004L      | 10PF 50WV SL       |
| C76,195              | CC0501804L      | 18PF 50WV SL       |
| C36                  | CC0502704L      | 27PF 50WV SL       |
| C24,287              | CC0503304L      | 33PF 50WV SL       |
| C8                   | CC0508204L      | 82PF 50WV SL       |
| C4,53,70             | CC0501015L      | 100PF 50WV         |
| C137                 | CC0501515L      | 150PF 50WV SL<br>K |
| C56,222              | CC0501815L      | 180PF 50WV SL<br>K |
| C28,220              | CC0502215L      | 220PF 50WV SL<br>K |
| C31,136              | CC0502715L      | 270PF 50WV SL<br>K |
| C11,14               | CC0503315L      | 330PF 50WV SL<br>K |
| C23                  | CC0505615L      | 560PF 50WV SL<br>K |

| REFERENCE NUMBER | RANGER PART NO. | DESCRIPTION        |
|------------------|-----------------|--------------------|
| C197             | CC0500591A      | 0.5PF 50WV CH      |
| C52              | CC0500201A      | 2PF 50WV CH        |
| C190,286,225     | CC0500301A      | 3PF 50WV CH        |
| C61,62,90,226    | CC0500501A      | 5PF 50WV CH        |
| C108             | CC0501004A      | 10PF 50WV CH J     |
| C89              | CC0501504A      | 15PF 50WV CH J     |
| C43,224          | CC0501804A      | 18PF 50WV CH J     |
| C150             | CC0502204A      | 22PF 50WV CH J     |
| C84              | CC0502704A      | 27PF 50WV CH J     |
| C95              | CC0503904A      | 39PF 50WV CH J     |
| C202             | CC0504704A      | 47PF 50WV CH J     |
| C88,116,117      | CC0506804A      | 68PF 50WV CH J     |
| C192             | CC0508204A      | 82PF 50WV CH J     |
| C191,284         | CC0501015A      | 100PF 50WV CH<br>K |
| C194             | CC0501515A      | 150PF 50WV CH<br>K |
| C196,295         | CC0501815A      | 180PF 50WV CH<br>K |
| C139,141         | CC0503904D      | 39PF 50WV RH J     |
| C140             | CC0501515D      | 150PF 50WV RH<br>K |
| C130             | CC0500401G      | 4PF 50WV<br>UJ C   |
| C281             | CC0501015G      | 100PF<br>50WV UJ   |
| C282             | CC0501815G      | 180PF<br>50WV K    |
| C128             | CC0500602G      | 6PF 50WV<br>UJ D   |
| C124             | CC0506804G      | 68PF<br>50WV UJ    |
| C123             | CC0501215G      | 120PF<br>50WV UJ   |

| REFERENCE NUMBER   | RANGER PART NO.      | DESCRIPTION             |
|--|----------------------|-------------------------|
| C86  | CC0502715G<br>C/C    | 270PF<br>50WV UJ        |
| C85,201,203,209,210  | CC0503915G           | 390PF<br>50WV UJ        |
| C199   | CD3005614Z<br>MICA/C | 560P<br>300WV J         |
| C7,47,50,74,99,100,110,118,120,129,131,168,174,183,244,246   | CC0501027L           | 0.001UF<br>50WV SL<br>Z |
| C161   | CC0501537L           | 0.015UF<br>50WV SL      |
| C81,83,111,113,126,173,193,206,207,211-213,228,234,236,249,250,256,259,268,272,280,288,292,177,215,R302,C270   | CC0501047L           | 0.1UF 50WV SL<br>Z      |
| C5,18,20,48,65,68,72,87,92,96,102,105,106,143,151,160,233,240,251-253,257,258,260-263,266  | CC0504737L           | 0.047UF 50WV<br>SL Z    |
| C32,42,45,46,162,163,221,64  | CC0504727L           | 0.0047UF<br>50WV SL     |
| C155,166   | CC0502237L           | 0.022UF<br>50WV SL      |
| C200   | CC1001037L           | 0.01UF<br>100WV Z       |
| C2,3,6,9,15-17,19,25,51,57,58,60,63,66,69,73,109,114,121,127,133,134,135,138,142,145,146,164,165,167,189,205,216,217,219,229,230,232,247,254,255,265,267,269,271,277,278,285,188,184,223 | CC0501037L           | 0.01UF 50WV SL<br>Z     |
| C149   | CT0161046Z<br>T/C    | 0.1UF 16WV M            |
| C154   | CT0162246Z<br>T/C    | 0.22UF 16WV M           |
| C97  | CT0164746Z<br>T/C    | 0.47UF 16WV M           |
| C98  | CT0162256Z<br>T/C    | 2.2UF 16WV M            |

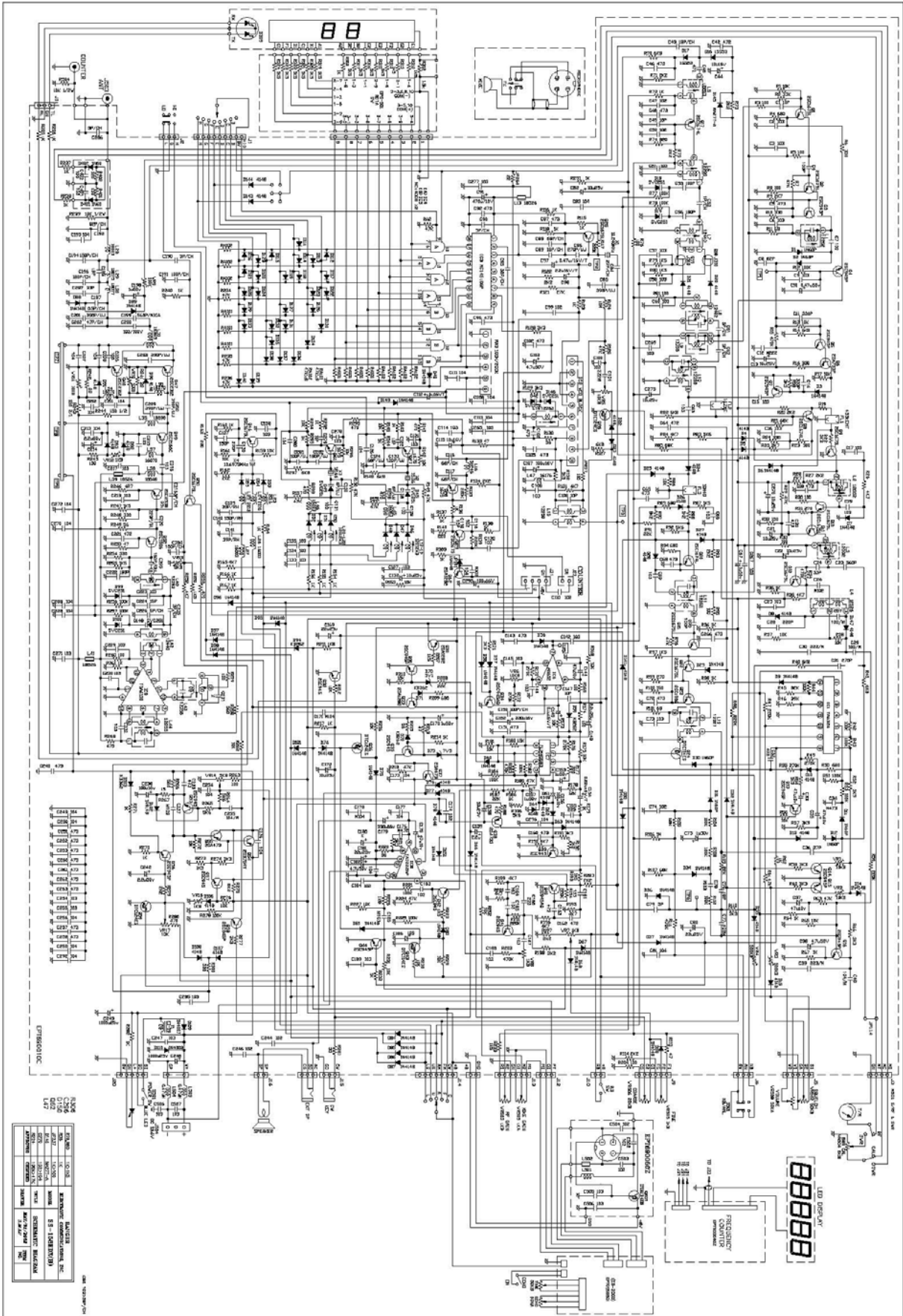
| REFERENCE NUMBER                            | RANGER PART NO.   | DESCRIPTION          | REFERENCE NUMBER   | RANGER PART NO.     | DESCRIPTION              |
|---|-------------------|----------------------|--|---------------------|--------------------------|
| C112  | CT0161056Z<br>T/C | 1UF 16WV M           | X2   | EYCAA15360          | 15.360MHZ<br>20PPM       |
| C40,178,171,235                             | CM0501045Z<br>M/C | 0.1UF 50WV K         | X3   | EYBAA12660          | 12.660MHZ<br>10PPM       |
| C26,27,77,237                               | CM0501024Z<br>M/C | 0.001UF 50WV J       | X4   | EYBAE10697          | 10.6975MHZ<br>10PPM      |
| C29,41,78,185                               | CM0501035Z<br>M/C | 0.01UF 50WV K        | IC1  | ENHI17324Z          | HI17324 14PIN            |
| C39   | CM0502235Z<br>M/C | 0.022UF 50WV K       | IC6  | ENRCI0612Z          | RCI-612                  |
| C176  | CM0504725Z<br>M/C | 0.0047UF 50WV<br>K   | IC3  | ENRG145106          | RCI-145106P<br>18PIN     |
| C34   | CM0504735Z<br>M/C | 0.047UF 50WV K       | IC4,5  | ENMC14008B          | MC14008BCP<br>16PIN      |
| C12,30,101                                  | CM0502225Z<br>M/C | 0.0022UF 50WV<br>K   | IC7  | ENJR04558D          | NJM4558D 8PIN            |
| C10   | CE0504747Z<br>E/C | 0.47UF 50WV Z        | IC9(B107)  | ENRCI6130A          | RANGERRCI-61<br>30 14PIN |
| C67,75,153,157,170,1<br>86,198              | CE0501057Z<br>E/C | 1UF 50WV Z           | VCO  | ENRG0IC090          | (RANGER)IC090<br>10PIN   |
| C148,159,214,242                            | CE0502257Z<br>E/C | 2.2UF 50WV Z         | Q8,17,20   | T2SC02786Z<br>TR    | 2SC2786 NEC              |
| C38,103,182                                 | CE0504757Z<br>E/C | 4.7UF 50WV Z         | Q51  | T2SC02314F<br>TR    | 2SC2314F                 |
| C13,21,22,44,82,115,1<br>32,158,172,275,276 | CE0251067Z<br>E/C | 10UF 25WV<br>Z       | Q23,52   | T2SC01906Z<br>TR    | 2SC1906                  |
| C80,169,181                                 | CE0252267Z<br>E/C | 22UF 25WV Z          | Q26,36,59  | TDTC0124ES<br>TR    | DTC124ES                 |
| C33,37,144,175                              | CE0254767Z<br>E/C | 47UF 25WV Z          | Q24,43   | TDTC0114ES<br>T/R   | DTC114ES                 |
| C107,156,238,293                            | CE0161077Z<br>E/C | 100UF 16WV Z         | Q30,33,62  | T2SA01282E<br>TR    | 2SA1282AE                |
| C152,179                                    | CE0163377Z<br>E/C | 330UF 16WV Z         | Q1,2,9,10-12,21,22,25,<br>27-29,46,50,61                                 | T2SC02787Z<br>TR    | 2SC2787 NEC              |
| C91   | CE0104777Z<br>E/C | 470UF 10WV Z         | Q3-5,7,13-16,31,32,35<br>,39,40-42,44,53,56-58                           | T2SC00945P<br>TR    | 2SC945P                  |
| C243,248                                    | CE0251087Z<br>E/C | 1000UF 25WV Z        | Q6,38  | T2SA00733P<br>TR    | 2SA733P                  |
| C35   | CEM254767Z<br>E/C | 47UF 25WV Z          | Q55  | T2SA01869Z<br>TR    | 2SA1869                  |
| FL1   | EFCFW455HT        | CFW-455HT            | Q34(B325)  | TDTC0114GS<br>TR    | DTC114GS                 |
| FL2   | EFCFE107MX        | SFE10.7MX RED        | Q18,19   | FMOJ00310Z<br>F.E.T | J310(MOTOROL<br>A)       |
| FL3   | EFX8106952        | 10M4D(10.695M<br>HZ) | D5,6,25,63,67,75,78,8<br>9,90,91,92,93,96,115,1<br>27,131,33,144,151,102 | ED1NM41488<br>DIODE | 1N4148                   |
| X1  | EYCAB10240        | 10.240MHZ<br>20PPM   |  |                     |                          |

| REFERENCE NUMBER  | RANGER PART NO.     | DESCRIPTION   |
|---|---------------------|---------------|
| D3,4,7-10,13-15,20-24,26-29,32,34-38,40,46-48,50-58,60-62,66,68,74,76,77,80,81,84-88,95,97,98,101,106,107,108,111-114,116-126,128-130,132-141,143,147,149,82,JP191,64<br>D1,2,11,12,30,31 | ED1NM41485<br>DIODE | 1N4148        |
| D1,2,11,12,30,31  | ED1N00060P<br>DIODE | 1N60P(2-1K60) |
| D110  | ED1N04003Z<br>DIODE | 1N4003        |
| D109  | ED1N04007Z<br>DIODE | 1N4007        |
| D16,17  | EDSS00053Z<br>DIODE | 1SS53         |
| D59,72,94   | EDMA00027W<br>DIODE | MA27W-A       |
| D71,103,145   | EDMA00027T<br>DIODE | MA27T-A       |
| D18,19,42,45,49,99,100,146,148  | EDSV00251Z<br>DIODE | SVC-251SPA    |
| D70   | EDZD05519Z          | 5.1V 0.5W     |
| D73   | EDZD05759Z          | 7.5V 0.5W     |
| L2,3  | ECIFT12002          | I.F.T.        |
| L6  | ECIFT12290          | I.F.T.        |
| L17-22  | ECIFT12012          | I.F.T.        |
| L25   | ECIFT12013          | I.F.T.        |
| L23,24  | ECIFT12016          | I.F.T.        |
| L1,11   | ECIFT12252          | I.F.T.        |
| L44   | ECIFT12255          | I.F.T.        |
| L9,10   | ECIFT12256          | I.F.T.        |
| L12   | ECIFT12257          | I.F.T.        |
| L15   | ECIFT12258          | I.F.T.        |

| REFERENCE NUMBER | RANGER PART NO. | DESCRIPTION          |
|------------------|-----------------|----------------------|
| L43              | ECIFT12265      | I.F.T.               |
| L40              | ECIFT12262      | I.F.T.               |
| L14              | ECIFT12558      | I.F.T.               |
| L5               | ECIFT12253      | I.F.T.               |
| L7,42            | ECIFT12440      | I.F.T.               |
| L8               | ECIFT12492      | I.F.T.               |
| L4               | ECIFT12526      | I.F.T.               |
| L26,27,45,46     | ECCHK16003      | 470UH                |
| T1               | ECCHK16004      | 1.1MH EI-19          |
| L33,34,37        | ECCHK16070      | 22UH                 |
| L47              | ECCHK16176      | 4.7UH 2.4mm          |
| L16              | ECCHK16246      | 22UH 2.4MM           |
| L28              | ECSPG18003      | 0.8x6.5x7.5t         |
| L30              | ECSPG18077      | 0.8x6x6.5t           |
| L29              | ECSPG18075      | 0.8x6x8.5t           |
| L31(B353)        | ECSPG18412      | 1.0x6.5x7.5tmm       |
| L35              | ECSPG18090      | 0.8x3x4t             |
| L38              | ECRFZ10048      | 25UH                 |
| L13,39,41        | ECBAD18526      | 3.5x6x1.2            |
| R249(2314F)      | ECBAD18506      | 3.5x6x1.2            |
| VR7,8,12,16      | RE10200041      | 1K VM6CK<br>PV(1S)   |
| VR13,14          | RE50200042      | 5K VM6CK<br>PV(1S)   |
| VR1,2,5,6,17     | RE10300078      | 10K OHM              |
| VR9              | RE10400043      | 100K VM6CK<br>PV(1S) |

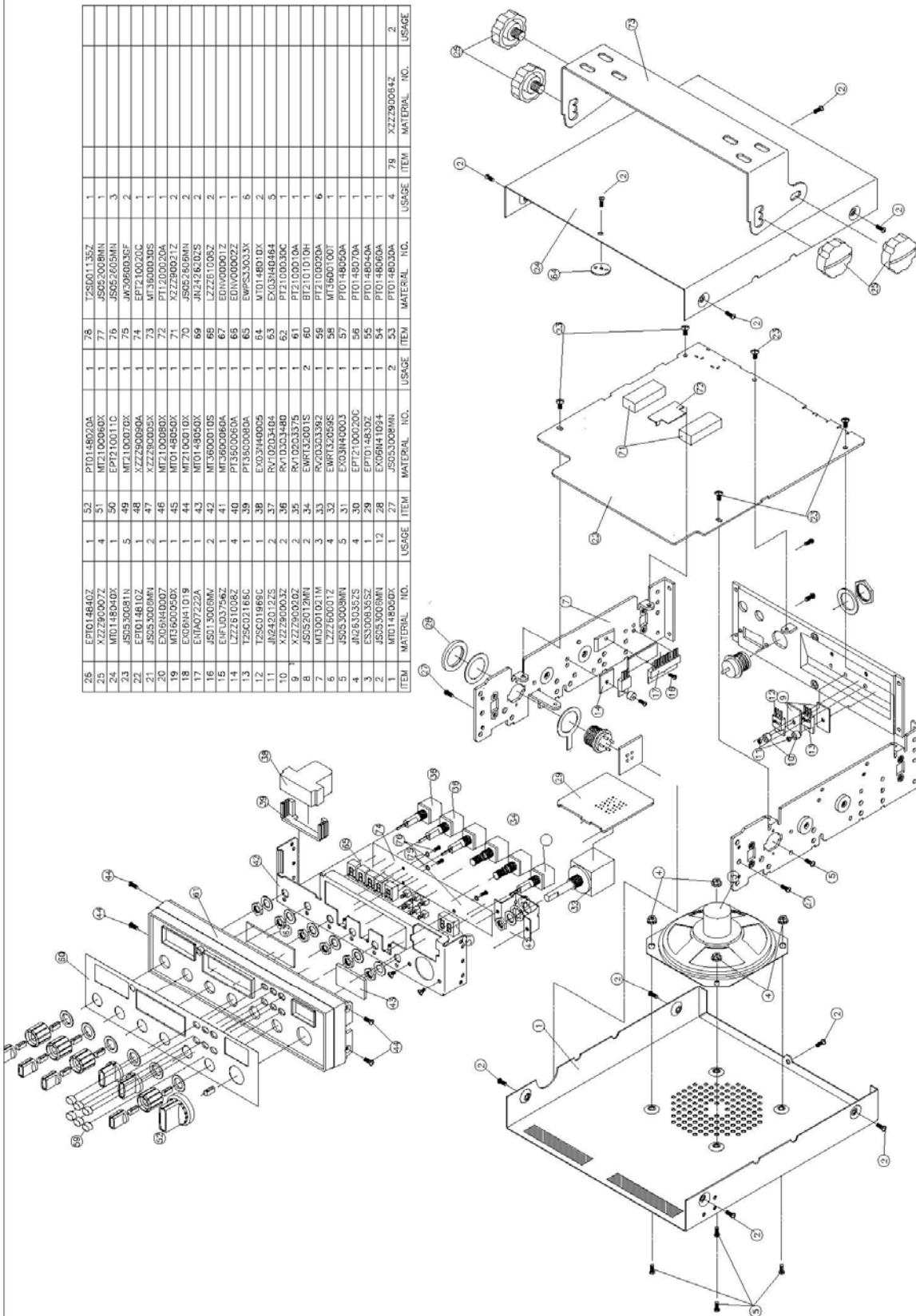
| REFERENCE NUMBER  | RANGER PART NO. | DESCRIPTION           |
|---|-----------------|-----------------------|
| VR3,4   | RE50400087      | 500K OHM              |
| VR10,11   | RE10100074      | 100<br>OHM(KVVSF6-63) |
| RA101   | RCS0870014      | 47K 8P                |
| RA102   | RCS0970015      | 47K 9P                |
| RA103   | RCS0670025      | 100K/200K 6P          |
| Q60,J29   | WX01070703      | 7x3MMx7               |
| JP1-3,5,7-9,15,20,21,23,24,26,31-33,38,39,50,54-57,59,61,62,65,66,71,72,79,80,82,83,86,87,90-93,100,105,106,113-115,118-122,124-126,128,135,138-142,144,190,149,152-157,159,160,163-166,168,170-175,177-179,181-184,188-189 | WX01060605      | 6x5x6                 |
| P200-202,204,205,209,211,214,217,219,220,224,226,231-233,235,236,238,239,242,243,245,250,252,253,255-260,262,263,265,271-273,276,278-280,285,R19,R119,R305,J18,Q45,J267,JP291,C245  | WX01070705      | 7x5x7                 |
| JP6,10-13,16-19,22,27,28,34-37,40-49,51-53,58,60,64,67,70,88,94-96,101-104,107-112,116,117,123,127,129-133,136,137,143,147,148,150,151,158,161,162,167,169,176,195,196,198  | WX01060610      | 6X10X6                |

| REFERENCE NUMBER  | RANGER PART NO. | DESCRIPTION |
|---|-----------------|-------------|
| JP215,218,222,223,225,227-230,234,240,241,244,246-249,251,254,261,266,274,275,277,286,287,L36 | WX01070710      | 7x10x7      |
| JP69,75,77,78,81,193,197  | WX01070712      | 7x12x7      |
| JP99  | WX01070713      | 7x13x7      |
| JP76  | WX01070715      | 7x15x7      |
| J501,502  | EX06N41045      | 3.5mm       |
| J10, J20, J22, J27, J7x2  | EX07N48223      | 2P PH=2MM   |
| J2,6,11   | EX07N48350      | 3P PH=2MM   |
| J3,21   | EX07N48490      | 4P PH=2MM   |
| J5  | EX07N48222      | 5P PH=2MM   |
| J9,13,14  | EX07N48331      | 6P PH=2MM   |
| J1  | EX07N48543      | 9P          |
| J12   | EX07N41227      | 3P T (UL)   |
| SP  | EX07N41330      | 2P T (UL)   |
| J4  | EX07N49140      | 2P          |
| J28   | EX07N48151      | SHORT PIN   |
| TP2,3,5,6   | EX07N48612      | 1PIN L=11.8 |
| J28   | EX07N48244      | 3P          |
| TP7,8,9   | XZZZ90006Z      | PCB STOPPER |



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| 60  | ...      | ... | ...  | ...         |
| 61  | ...      | ... | ...  | ...         |
| 62  | ...      | ... | ...  | ...         |
| 63  | ...      | ... | ...  | ...         |
| 64  | ...      | ... | ...  | ...         |
| 65  | ...      | ... | ...  | ...         |
| 66  | ...      | ... | ...  | ...         |
| 67  | ...      | ... | ...  | ...         |
| 68  | ...      | ... | ...  | ...         |
| 69  | ...      | ... | ...  | ...         |
| 70  | ...      | ... | ...  | ...         |
| 71  | ...      | ... | ...  | ...         |
| 72  | ...      | ... | ...  | ...         |
| 73  | ...      | ... | ...  | ...         |
| 74  | ...      | ... | ...  | ...         |
| 75  | ...      | ... | ...  | ...         |
| 76  | ...      | ... | ...  | ...         |
| 77  | ...      | ... | ...  | ...         |
| 78  | ...      | ... | ...  | ...         |
| 79  | ...      | ... | ...  | ...         |
| 80  | ...      | ... | ...  | ...         |
| 81  | ...      | ... | ...  | ...         |
| 82  | ...      | ... | ...  | ...         |
| 83  | ...      | ... | ...  | ...         |
| 84  | ...      | ... | ...  | ...         |
| 85  | ...      | ... | ...  | ...         |
| 86  | ...      | ... | ...  | ...         |
| 87  | ...      | ... | ...  | ...         |
| 88  | ...      | ... | ...  | ...         |
| 89  | ...      | ... | ...  | ...         |
| 90  | ...      | ... | ...  | ...         |
| 91  | ...      | ... | ...  | ...         |
| 92  | ...      | ... | ...  | ...         |
| 93  | ...      | ... | ...  | ...         |
| 94  | ...      | ... | ...  | ...         |
| 95  | ...      | ... | ...  | ...         |
| 96  | ...      | ... | ...  | ...         |
| 97  | ...      | ... | ...  | ...         |
| 98  | ...      | ... | ...  | ...         |
| 99  | ...      | ... | ...  | ...         |
| 100 | ...      | ... | ...  | ...         |

SS-158 EDX(B) SCHEMATIC DIAGRAM



| ITEM | MATERIAL NO. | USAGE | ITEM | MATERIAL NO. | USAGE | ITEM | MATERIAL NO. | USAGE | ITEM | MATERIAL NO. | USAGE |
|------|--------------|-------|------|--------------|-------|------|--------------|-------|------|--------------|-------|
| 25   | EPT014840Z   | 1     | 52   | PT0148020A   | 1     | 76   | T2500135Z    | 1     |      |              |       |
| 25   | XZZ290007Z   | 4     | 51   | MT2100060X   | 1     | 77   | J5052008MN   | 1     |      |              |       |
| 24   | MD148040X    | 1     | 50   | EPT210011C   | 1     | 76   | J5052005MN   | 3     |      |              |       |
| 23   | J50530081N   | 5     | 49   | MT2100070X   | 1     | 75   | JW3090030F   | 2     |      |              |       |
| 22   | EPT014810Z   | 1     | 47   | XZZ290060A   | 1     | 74   | EPT210020C   | 1     |      |              |       |
| 21   | J50530080N   | 2     | 46   | XZZ290050X   | 1     | 73   | MT3000035S   | 1     |      |              |       |
| 20   | MT3000030X   | 1     | 45   | PT0148050X   | 1     | 72   | XZZ290001Z   | 2     |      |              |       |
| 19   | MT3000030Z   | 1     | 44   | MT0148010X   | 1     | 70   | J5052008MN   | 2     |      |              |       |
| 18   | E308W41019   | 1     | 43   | MT0148050X   | 1     | 69   | JW2424802S   | 2     |      |              |       |
| 17   | EN0A07222A   | 1     | 42   | MT3600010S   | 2     | 68   | LZZ261008Z   | 2     |      |              |       |
| 16   | J5013008M    | 2     | 41   | MT3600060A   | 1     | 67   | EDV00001Z    | 2     |      |              |       |
| 15   | EUF0A0376Z   | 4     | 40   | PT3500060A   | 1     | 65   | EDV00002Z    | 1     |      |              |       |
| 14   | LZZ261008Z   | 4     | 39   | PT3500080A   | 1     | 65   | EWPS33033X   | 6     |      |              |       |
| 13   | T25002165C   | 1     | 38   | E303440005   | 1     | 64   | MT0148010X   | 2     |      |              |       |
| 12   | T25001989C   | 2     | 37   | RV10203404   | 1     | 63   | EX03H40464   | 5     |      |              |       |
| 11   | JW2420122S   | 2     | 36   | RV10203480   | 1     | 62   | PT2100030C   | 1     |      |              |       |
| 10   | XZZ290003Z   | 2     | 35   | RV10203375   | 1     | 61   | PT2100010A   | 1     |      |              |       |
| 9    | XZZ290002Z   | 2     | 34   | EMT32001S    | 2     | 60   | BT210101H    | 1     |      |              |       |
| 8    | J5052012M    | 2     | 33   | RV2030339Z   | 1     | 59   | PT2100020A   | 6     |      |              |       |
| 7    | MT3001021M   | 3     | 32   | EMT320059S   | 1     | 58   | MT3600100T   | 1     |      |              |       |
| 6    | LZZ260001Z   | 4     | 31   | EX03H40003   | 1     | 57   | PT0148050A   | 1     |      |              |       |
| 5    | J50530080M   | 5     | 30   | EPT2100020C  | 1     | 56   | PT0148070A   | 1     |      |              |       |
| 4    | JR2653032S   | 4     | 29   | EPT014830Z   | 1     | 55   | PT0148040A   | 1     |      |              |       |
| 3    | ESS000303Z   | 1     | 28   | E308W41094   | 1     | 54   | PT0148060A   | 1     |      |              |       |
| 2    | J50530080M   | 12    | 27   | J5053008WH   | 1     | 53   | PT0148030A   | 4     |      |              |       |
| 1    | MD148060X    | 1     | 27   | J5053008WH   | 1     | 79   | XZZ290064Z   | 2     |      |              |       |

|                                   |         |          |     |       |    |       |                 |
|-----------------------------------|---------|----------|-----|-------|----|-------|-----------------|
| REVISIONS                         | DATE    | SCALE    | 1/2 | UNITS | MM | MODEL | COBRA 148FGL    |
| APPROVED                          | DATE    | MATERIAL |     |       |    | TITLE | EXPLODE DRAWING |
| TOLERANCE UNLESS OTHERWISE STATED | CHECKED | DRAWN    |     |       |    | DATE  |                 |
|                                   |         |          |     |       |    | DATE  |                 |
|                                   |         |          |     |       |    | USAGE |                 |
|                                   |         |          |     |       |    | FILE  | A2              |

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