

# SERVICE MANUAL ADDENDUM



## P25/FM TWO-WAY LAND MOBILE RADIO BASE TECH III BASE/REPEATER STATION

**91-1060-91-1110**  
**91-4050-91-4100**



**LOW CURRENT MODELS**  
**VHF HIGH BAND**  
**UHF BAND**



Part Number: 680-100-2049  
Revision A  
1/12

## Important Information

---

All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language without the written permission of Midland Radio Corporation.

No part of any copyrighted computer programs contained in the products referred to in this manual may be copied or reproduced without the express written consent of Midland Radio Corporation.

Midland Radio Corporation reserves the right to change the products described in this manual without prior notice.

© 2012 Midland Radio Corporation

This manual is designed to facilitate the set-up and service of the Midland 91-1060 / 1110 91-4050 / 91-4100 P25 Base Tech III series. As necessary, service manual supplements will be published and distributed on the following forms:

Manual Addition (MA)	For supplemental information useful in product service or improvement. Printed on BLUE paper.
Change Notice (CN)	For details about changes made during production by model and serial number. Printed on YELLOW paper.
Manual Correction (MC)	For correcting literature errors not related to production changes. Printed on GREEN paper.
Technical Bulletin (TB)	For solutions to field problems and tips for performance improvement. Printed on PINK paper.

Comments or suggestions concerning areas of manual improvement are welcome.

# TABLE OF CONTENTS

<b>Manual Supplement Information</b>	<b>ii</b>
<b>Table of Contents</b>	<b>iii</b>
<b>Acronyms and Abbreviations</b>	<b>iv</b>
<b>GENERAL INFORMATION</b>	
Specifications	1-2
Accessories	3-4
<b>PREPARATION</b>	
Alignment	5-12
<b>CIRCUIT DESCRIPTION</b>	
Description	13-18
<b>DIAGRAMS</b>	
VHF/ UHF General Block Diagrams	19-22
Front Panel Unit Schematic	23
Analog Logic Unit Schematic	24
VHF RX Main Unit Schematic	25
VHF RX VCO Unit Schematic	26
VHF TX Main Unit Schematic	27
UHF RX Main Unit Schematic	28
UHF RX VCO Unit Schematic	29
UHF TX Main Unit Schematic	30
Front Panel Unit Layout	31
Analog Logic Unit Layout	32
VHF RX Main Unit Layouts	33
VHF RX VCO Unit Layout	33
VHF TX Main Unit Layouts	34
UHF RX Main Unit Layouts	35
UHF RX VCO Unit Layout	35
UHF TX Main Unit Layouts	36
Chassis Exploded View	37
Palm Microphone Schematic	39
<b>PARTS</b>	
Low Current Specific Parts List.....	40-56
Replacement Parts Ordering	57

# ACRONYMS AND ABBREVIATIONS

Below is a list of common electrical abbreviations used in documentation.

CTCSS -----	Continuous Tone-Controlled Squelch System
DCS (or CDCSS) -----	Continuous Digital-Controlled Squelch System
EEPROM -----	Electrically Erasable Programmable Read Only Memory
MIL SPEC -----	Military Specification
RX -----	Receive
TX -----	Transmit
SINAD -----	The ratio in decibels of signal + noise + distortion to noise + distortion
VCO -----	Voltage Controlled Oscillator
TCXO -----	Temperature Compensated Crystal Oscillator
PLL -----	Phase Locked Loop

**SPECIFICATIONS -VHF****General**

<b>Frequency Range:</b>	A Band: 136-156 MHz, B Band: 146-174 MHz
<b>Number of Channels:</b>	500 channels with name, 10 groups of 50 channels
<b>Channel Spacing:</b>	FM 12.5 / 20 / 25 / 30 kHz Digital C4FM
<b>Operation Mode:</b>	Simplex / Duplex / Full Duplex/ Repeat
<b>Antenna Impedance:</b>	50 ohm unbalanced
<b>Power Supply:</b>	DC 13.6 V, negative ground only
<b>Consumption:</b>	<120mA Standby
<b>@RX</b>	~1 A
<b>@TX</b>	≤ 12 A (60W), ≤ 20 A (110W)
<b>Environmental Conditions:</b>	-30 to +60 degrees C, 95% humidity @ 35C
<b>Dimensions:</b>	18.2" (w) x 3.4" (h) x 14.2" (d), (462 mm x 88 mm x 360 mm)
<b>Weight:</b>	24 lbs (11 kgs)

**Transmitter**

<b>Output Power:</b>	(91-1060) 25-60 W, continuous (91-1110) 5-110 W, continuous
<b>Switchable Bandwidth:</b>	Full Sub Band
<b>Maximum Deviation:</b>	± 5kHz (wide band), ± 2.5 kHz (narrow band)
<b>Frequency Stability:</b>	≤1.5 ppm std, 10 MHz external optional
<b>Frequency Response:</b>	+1 dB / -3 dB, 300-3000 Hz, 1 kHz reference
<b>FM Hum and Noise:</b>	≤ 50 dB @1kHz 70% mod., ≤ 50 dB Digital mode
<b>Modulation Distortion:</b>	≤ 3%
<b>Spurious &amp; Harmonics:</b>	≤ 0.25μW (≥ 80 dBc)

**Receiver**

<b>Switchable Bandwidth:</b>	Full Sub Band
<b>IF Frequencies:</b>	1 <sup>st</sup> IF: 48.4 MHz, 2 <sup>nd</sup> IF: 455 kHz
<b>Frequency Stability:</b>	≤1.5 ppm
<b>Sensitivity:</b>	≤ 0.40 μV @ 20 dB N.Q., ≤ 0.30 μV @ 12 dB SINAD ≤ 0.30μV, Digital 5% BER
<b>Squelch Sensitivity:</b>	≤ 0.25 μV
<b>Selectivity:</b>	≥ 85 dB @ 25 kHz, ≥ 80 dB @ 12.5 kHz (TIA-603) ≥ 80 dB Digital
<b>Intermodulation:</b>	≥ 85 dB
<b>Spurious Response:</b>	≥ 100 dB
<b>AF Response:</b>	+1 / -3 dB, 300-3000 Hz, 1 kHz reference
<b>AF Distortion:</b>	≤ 3% @ 1 kHz 60% mod.
<b>Audio Output Power:</b>	7.5 Watts @ 8 Ω/ 10 Watts @ 4 Ω
<b>Signal to Noise Ratio:</b>	≥ 50 dB @ 1 kHz 70% mod. (wideband), ≥ 45 dB (narrowband)

# General Information

---

## Low Current Base Tech 3.5 SPECIFICATIONS -UHF

### General

<b>Frequency Range:</b>	A Band: 400-435 MHz, B Band: 440-475 MHz C Band: 465-500 MHz, D Band: 485-520 MHz
<b>Number of Channels:</b>	500 channels with name, 10 groups of 50 channels
<b>Channel Spacing:</b>	FM 12.5 / 20 / 25 / 30 kHz; Digital C4FM
<b>Operation Mode:</b>	Simplex / Duplex / Full Duplex/ Repeat
<b>Antenna Impedance:</b>	50 ohm unbalanced
<b>Power Supply:</b>	DC 13.6 V negative ground only
<b>Consumption:</b>	<120mA Standby
<b>@RX</b>	~1 A
<b>@TX</b>	≤ 12 A (60W), ≤ 20 A (110W)
<b>Environmental Conditions:</b>	-30 to +60 degrees C, 95% humidity @ 35C
<b>Dimensions:</b>	462 mm (w) x 88 mm (h) x 360 mm (d); 18.2" x 3.4" x 14.2"
<b>Weight:</b>	11 kg (24 lbs.)

### Transmitter

<b>Output Power:</b>	(91-4050) 25-50W continuous (91-4100) 2-100W continuous
<b>Switchable Bandwidth:</b>	Full sub band
<b>Maximum Deviation:</b>	± 5 kHz (wide band); ± 2.5 kHz (narrow band)
<b>Frequency Stability:</b>	≤1.5 ppm std, 10 MHz external optional
<b>Frequency Response:</b>	Within +1, -3dB, 300-3000Hz
<b>FM Hum and Noise:</b>	≥ 50 dB @1 kHz 60% mod.; ≥ 50 dB Digital
<b>Modulation Distortion:</b>	≤ 3%
<b>Spurious &amp; Harmonics:</b>	≤ 0.25 μW (-80 dBc)

### Receiver

<b>Switchable Bandwidth:</b>	Full sub band
<b>IF Frequencies:</b>	1 <sup>st</sup> IF: 73.35 MHz, 2 <sup>nd</sup> IF: 455 kHz
<b>Frequency Stability:</b>	≤1.5 ppm
<b>Sensitivity:</b>	≤ 0.40 μV for 20 dB N.Q./ ≤ 0.30 μV for 12 dB SINAD < 0.30 μV Digital 5% BER
<b>Squelch Sensitivity:</b>	≤ 0.25 μV
<b>Selectivity:</b>	≥ 85 dB @ 25 kHz; ≥ 80 dB @ 12.5 kHz (TIA-603); ≥ 80 dB Digital mode
<b>Intermodulation:</b>	≥ 85 dB
<b>Spurious Response:</b>	≥ 100 dB
<b>AF Response:</b>	+1 / -3 dB, 300-3000 Hz, 1 kHz ref.
<b>AF Distortion:</b>	≤ 3% @ 1 kHz 60% mod.
<b>Audio Output (&lt;2% distortion):</b>	7.5 Watts @ 8 Ω/ 10 Watts @ 4 Ω
<b>Signal to Noise Ratio:</b>	≥ 50 dB @ 1kHz 60% mod. (45 dB at narrow)

## **OPTIONS & ACCESSORIES**

71-7220B	30 AMP Rack-mount Power Supply 220/110VAC
71-1230BM	Battery Back-up Module for 7220B
71-0033	DC Power Cable, 48"
71-7801	External TX/RX Antenna Relay (Up to 400 Watts)
71-7751	Internal TX/RX Antenna Relay
71-8820D	31-1/2" Indoor Cabinet, complete with locking doors
71-8830D	40-1/4" Indoor Cabinet, complete with locking doors
71-8082	Slide Rails for TX/RX Unit
71-8834	Hardware Kit for Cabinets
71-8822-2AS	Grounding Kit for 31-1/2" Cabinets
71-8822-2AT	Grounding Kit for 40-1/4" Cabinets
71-8871	12-1/4" Blank Panel
71-8870	10-1/2" Blank Panel
71-8863	3-1/2" Blank Panel
71-8862	1-3/4" Blank Panel
91-1303B	USB Programming Cable
91-1480CD	Base Tech III Programming Software
71-2020E	16 Channel Tone Remote Termination
71-2022E	E&M Expansion Kit used with 71-2020E in 71-8885A/D Option Shelf (only)
71-8885A	Option Shelf with Slides / Easy Access & AC Supply No Battery Charge

## General Information

---

### Low Current Base Tech 3.5

71-8885AC	Option Shelf with Slides / Easy Access & AC Supply with Battery Charge
71-8885D	Option Shelf with Slides / Easy Access & DC Operation
71-7206	Tone Termination Lightning / Surge Protection (2wire / 4-wire)
71-7207	AC Surge Protection Kit (115V only)
71-7655A	RF Line Surge Protection
71-8880	90" Aluminum Rack
71-8881	Shipping Hardware Kit, 71-8880
71-8879	Radio Shelf Support Kit (Relay Racks Only)
71-2315	Palm Microphone
71-2316	Desktop Microphone
71-8155-1	VHF Duplexer (3-5MHz Separation) 350W, 150-160 MHz
71-8155-2	VHF Duplexer (3-5 MHz Separation) 350W, 160-174 MHz
71-8152-3	VHF Duplexer (2 MHz Separation) 350W, 150-160 MHz
71-8152-4	VHF Duplexer (2 MHz Separation) 350W, 160-174 MHz
71-8455A	UHF Duplexer (3-5 MHz Separation) 350W, 440-512 MHz
71-8455D	UHF Duplexer (3-5 MHz Separation) 350W, 406-430 MHz



THIS PAGE INTENTIONALLY LEFT BLANK

# Alignment Procedures

---

## Low Current Base Tech 3.5

### RECEIVER (RX MAIN UNIT)

1. Pre-selector and Post-selector Tuning

Both selectors have been pre-tuned at the factory, so no alignment is required.

2. FVR001 Tight Squelch Level

This potentiometer allows adjustment to the tight squelch level.

3. FVR002 De-mod out Bias Level

This potentiometer allows adjustment to the level of DC Bias on the De-Mod output.

4. L303 VCO Alignment

The VCO has been aligned at the factory to cover full sub-band. However, if you need to re-adjust VCO after a repair, set the VCO voltage to 10.5 V at the highest end of the sub band using L303. The VCO cover must be removed for access.

**Note that tuning slug may be glued and breakage could occur.**

5. RX 0-dBm Level Adjustment

This is 600 ohm audio available on pins 20 and 21 of the EXT Option port. It is electronically adjusted. Ground TP-2 on the Analog Logic Unit PCB, and power-up the radio. **See Figure 3 on page 6.** The station is now in Adjust Mode. Release TP-2 from ground. The display should look as follows:

<b>RXNS &lt;Adjust&gt;</b>
<b>TXN RX 0dbm Out</b>
<b>C0001 27 / 31 AA</b>

Use the "A" and "B" keys on the front panel to adjust the level up or down. Pressing the "#" key will change the mode you are adjusting. The "A" key will increase the level while the "B" key will decrease the level. You will be able to monitor the output if the station is receiving a valid carrier and signaling. Cycle power to the radio to return to normal operation.

NOTE: The other ADJUST Modes are in order of appearance:

**RX 0 dbm**

**REPEAT DEVI**

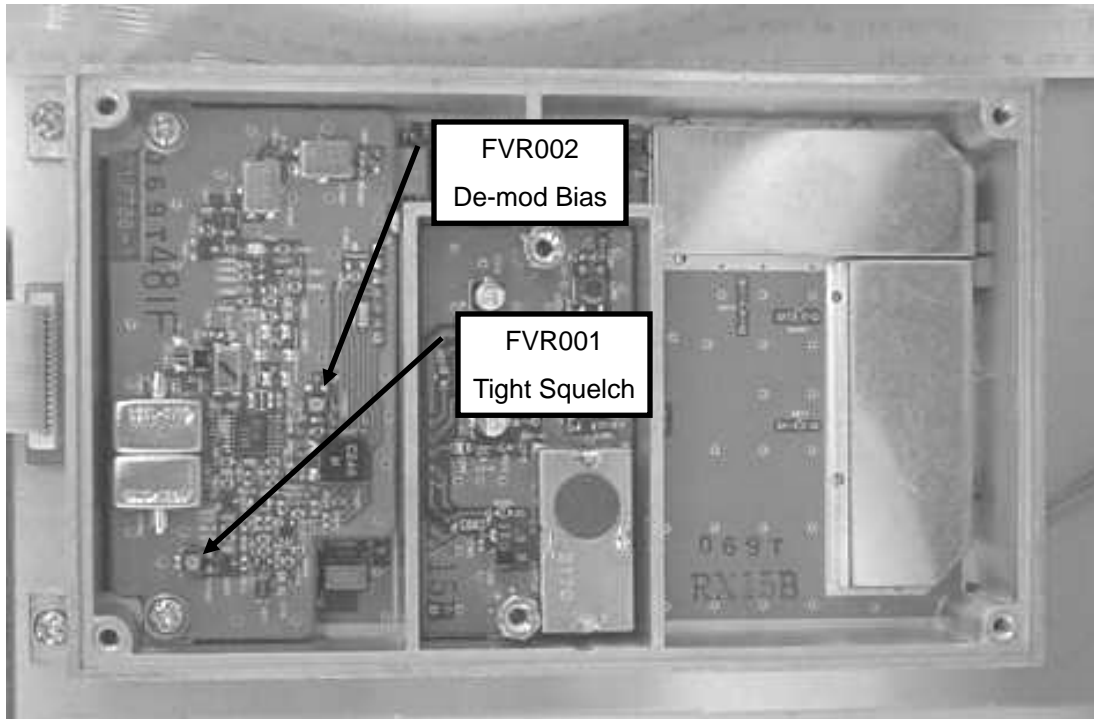
**DIGITAL DEVI**

**ANALOG DEVI**

**TONE DEVI**

**CTC DEVI WID**

**CTC DEVI NRW**



**Figure 1: Receive Module (RX Main Unit) Alignment Adjustments**

# Alignment Procedures

## Low Current Base Tech 3.5

### EXCITER (TX MAIN UNIT)

1) FVR201 Sub-Audible Modulation Balance

This potentiometer sets modulation balance below 300 Hz. Carefully align this potentiometer to obtain flat deviation from the lowest to the highest frequency programmed in the transmitter.

2) FVR202 Sub-Audible Modulation Deviation

This potentiometer determines low frequency (below 300Hz) deviation. When POCSAG and DCS are used, it may be necessary to readjust to have enough deviation and fidelity at lower frequencies. FVR201 and FVR202 are used together to adjust amplitude and fidelity of square wave output of the transmitter in Analog Mode.

3) FVR203 Carrier Frequency Trim

This potentiometer adjusts carrier frequency. Its range will allow for +/- 200 Hz adjustment from the desired (programmed) frequency.

4) FVR204 Exciter Output Power

This potentiometer adjusts the exciter's output power level. This is nominally 80 mW.

5) L303 VCO Alignment

The VCO has already been aligned at the factory. However, if you need to re-adjust VCO after a repair, set the VCO voltage to 10.5 V at TP301 at the highest end of the sub band using L303.. This part can be found beneath the cover. See Figure 2. **Note that tuning slug may be glued and breakage could occur.**

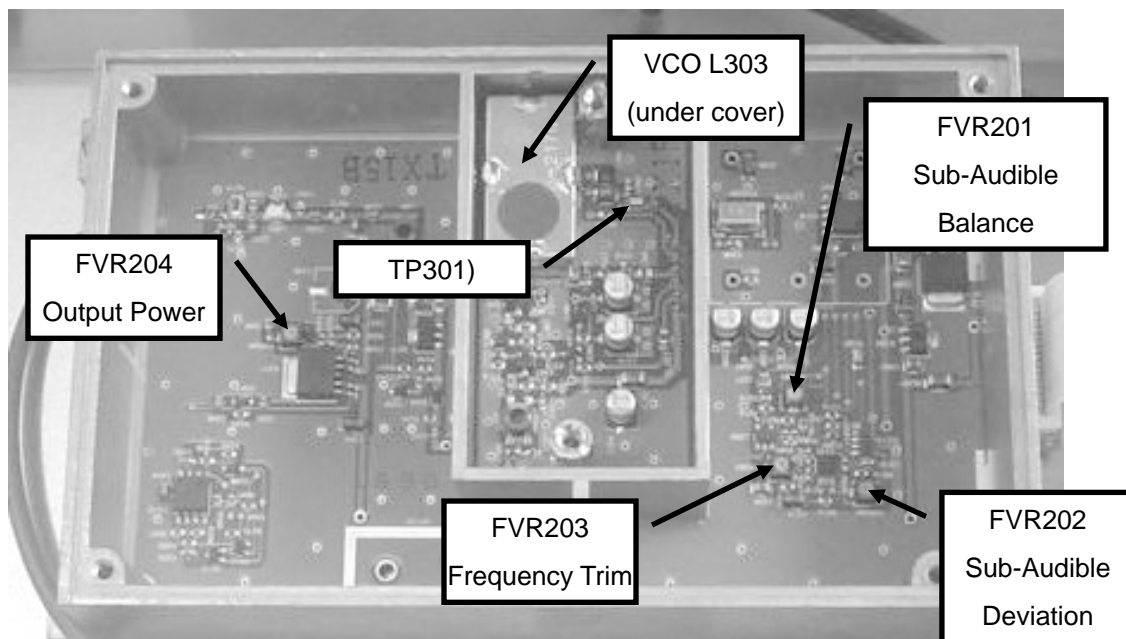
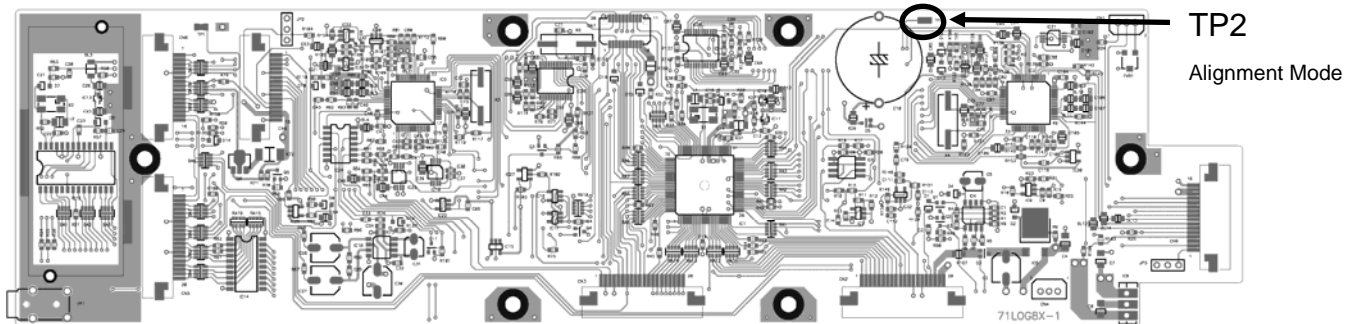


Figure 2: Exciter Module (TX Main Unit) Alignment Adjustments

### 6) Electronic Transmitter Alignment

The station must first be put into "Adjust Mode."



**Figure 3: Entering Alignment Adjust Mode**

### 7) Entering & Exiting Alignment Adjustment Mode

- a) If not already, power off the radio.
- b) Terminate the radio TX port into a 50 ohm load rated for at least 150 Watts.
- c) Place the Local / Remote Switch (on the front panel of the 71-8885 Deluxe Option Housing if equipped) into the Local position.
- d) Ground TP2 on the Analog Logic Unit PCB (the nearby PA Unit chassis is a good ground point.)
- e) Apply power to the radio. The radio should power-on directly into the Adjust mode (indicated by "<Adjust>" displayed on-screen.) If the radio displays an error message on the fourth line of the LCD, check that the Local / Remote Switch is in the Local position.
- f) Open the ground connection to TP2.
- g) When the desired alignment procedures have been conducted, remove power from the radio to exit the adjustment mode. Changes made during alignment will be automatically stored when entered.
- h) The following adjustment are available in order of appearance:

**RX 0 dbm**

**REPEAT DEVI**

**DIGITAL DEVI**

**ANALOG DEVI**

**TONE DEVI**

**CTC DEVI WID**

**CTC DEVI NRW**

# Alignment Procedures

---

## Low Current Base Tech 3.5

- 8) Maximum Analog Deviation Limiting Alignment (Base Station and Repeater)
  - a) Press the “#” key on the Front Panel until second line of the LCD displays “ANALOG DEVI.”
  - b) Apply a 1 kHz tone at the microphone input at a level required to obtain 60% system deviation. Use pins 1 and 2 (pin 2 = ground).
  - c) Activate PTT by grounding pin 4 of the microphone jack. Note the audio generator level setting.
  - d) Increase the audio level by 20 dB (equivalent to 10x voltage increase).
  - e) Press the “A” key to increase or the “B” key to decrease the system deviation until it is just below  $\pm 4.5$  kHz without CTCSS modulation or  $\pm 4.7$  kHz with CTCSS modulation (25 / 30 kHz channel spacing) or  $\pm 2.3$  kHz without CTCSS modulation or  $\pm 2.5$  kHz with CTCSS modulation (12.5 / 15 kHz channel spacing). The radio is in limiting at this point, so distortion will be higher according to the service monitor. Deviation should be measured with at least a 50 Hz to 15 kHz filter enabled (no higher than 20 kHz).
  - f) Deactivate the transmitter.
- 9) Analog Repeater Deviation Alignment (This should be checked AFTER Step 8 has been accomplished)
  - a) Press the “#” key on the Front Panel until second line of the LCD displays “REPEAT DEVI.”
  - b) Set the radio to a channel programmed for **repeat mode** (wide or narrow band).
  - c) Inject a -47 dBm  $\pm$  3 dB RF signal modulated with a 1 kHz tone into the receiver input at 60% system deviation. Enable sub-audible signaling if the radio (repeater) is configured as so.
  - d) At this time, the radio (repeater) should be transmitting.
  - e) Measure the transmitter deviation level. Enable audio filtering of 300 Hz to 3 kHz if sub-audio signaling is present. If sub-audio signaling can not be filtered, set the radio to a channel programmed without sub-audio signaling enabled, and disable sub-audible signaling on the signal source.
  - f) Press the “A” key to increase or the “B” key to decrease the repeater transmitter deviation until it is 60%  $\pm$  5% system deviation.
  - g) Remove the RF signal.
- 10) Analog CWID/DTMF Deviation Alignment
  - a) To best perform this alignment, it is preferred to program a radio channel to the desired operational parameters intended for daily operation. It is typical that this channel is to also transmit the normal CWID tone sequence. If no channel has been programmed as described, continue with the remaining steps.
  - b) Press the “#” key on the Front Panel until second line of the LCD displays “TONE DEVI.”
  - c) Activate PTT.
  - d) Press the “A” key to increase or the “B” key to decrease the CWID transmitter deviation until it is 40%  $\pm$  5% system deviation.
  - e) Deactivate PTT.

### 11) CTCSS Deviation Alignment

- a) Press the “#” key on the Front Panel until the second line of the LCD displays “CTC DEVI WID.”
- b) Activate PTT.
- c) While monitoring peak FM deviation, adjust the deviation level to obtain 500 Hz  $\pm$  10 Hz positive and negative peak deviation. Enable audio filtering below 300 Hz only. Press the “A” key to increase or the “B” key to decrease the transmitter wideband CTCSS deviation level.
- d) Deactivate PTT.
- e) . Press the “#” key on the Front Panel until the second line of the LCD displays “CTC DEVI NRW.”
- f) Activate PTT.
- g) While monitoring peak FM deviation, adjust the deviation level to obtain 250 Hz  $\pm$  10 Hz positive and negative peak deviation. Enable audio filtering below 300 Hz only. Press the “A” key to increase or the “B” key to decrease the transmitter narrowband CTCSS deviation level.
- h) Deactivate PTT.

### 12) C4FM Digital Deviation Alignment

- a) Press the “#” key on the Front Panel until the second line of the LCD displays “DIGITAL DEVI.”
- b) Activate PTT.
- c) While monitoring peak FM deviation, adjust the deviation level to obtain 2827 Hz  $\pm$  283 Hz positive and negative peak deviation. Press the “A” key to increase or the “B” key to decrease the transmitter C4FM digital deviation level.
- d) Deactivate PTT.
- e) Exit alignment mode by cycling power to the radio.
- f) After radio reset is complete, press the Shift key followed by the number 0 key.
- g) Press the number 2 key to transmit the Standard Transmitter Symbol Rate Pattern.
- h) Activate PTT.
- i) Monitor peak FM deviation. Verify that both positive and negative peak deviation levels each fall within 2544 Hz to 3111 Hz deviation.
- j) Press the number 3 key to transmit the Standard Transmitter Low Deviation Pattern.
- k) Monitor peak FM deviation. Verify that both positive and negative peak deviation levels each fall within 848 Hz to 1037 Hz deviation.
- l) Deactivate PTT.

# Alignment Procedures

## Low Current Base Tech 3.5

### FRONT PANEL UNIT


#### 1) VR401 Alignment

This is to set volume level by pulse code switch. Press once and Noise Squelch can be set.

Press again, and the backlight lighting level can be set.

Press a third time, and the backlight timer can be set.

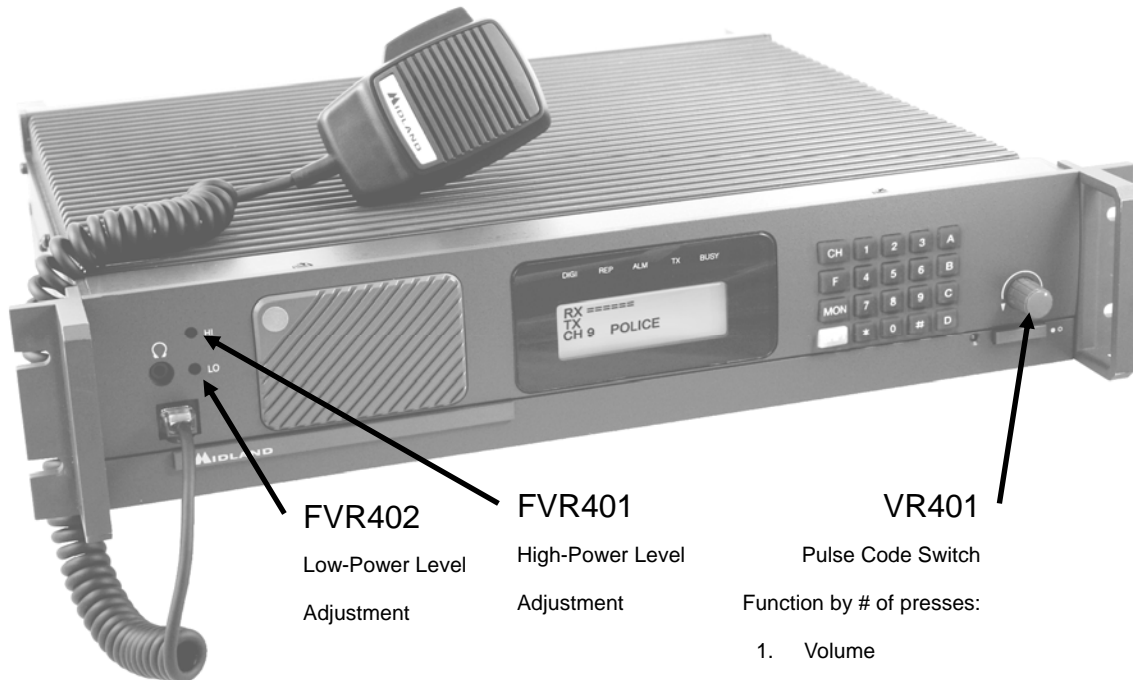
#### 2) FVR401 Transmitter Hi-Power Alignment

This potentiometer allows for fine adjustment of the High-Power level of the transmitter output when the radio is set to High-Power Mode. Station will indicate  in the right side of the display when in High-Power Mode. Press "SHIFT," then "2" to toggle transmitter Power Mode.

**Note: "TX Power Change" MUST be enabled in software programming to toggle TX Power from the Front Panel.**

#### 3) FVR402 Transmitter Low-Power Alignment

This potentiometer allows for fine adjustment of the Low-Power level of the transmitter output when the radio is set to Low-Power Mode. The station must be on a low-power channel, or the station must be placed in the Low-Power Mode. Press "SHIFT," then "2" to toggle transmitter Power Mode.



FVR402

Low-Power Level  
Adjustment

FVR401

High-Power Level  
Adjustment

VR401

Pulse Code Switch

Function by # of presses:

1. Volume
2. Noise Squelch
3. Backlight Dim
4. Backlight Timer



### LOW CURRENT IMPROVEMENTS

In order to improve standby current consumption the Receiver Unit, Transmitter Unit, Analog Logic Unit and Front Panel Unit have been modified from the original Base Tech III configuration. These improvements will start to be incorporated into all Base Tech III radios manufactured in 2012. Earlier versions of Receiver Unit, Transmitter Unit and Analog Logic boards should not be mixed. RF Power Amplifiers remain unchanged. A label marked “**Low Current Variant**” will be affixed to all receiver, transmitter, analog logic and front panel units for easy identification. The Front Panel Unit may be used with either standard or Low Current models.

### RECEIVER UNIT

#### 1) RF Section

An incoming signal is fed to the pre-selector bandpass filter and amplified by Q861. It is then fed to the post-selector bandpass filter. The balanced mixer, consisting of IC811, produces the first IF (VHF = 48.5 MHz/ UHF = 73.35 MHz) by injection from the 1<sup>st</sup> local oscillator generated by RX VCO.

#### 2) IF Section

The first IF signal is fed to crystal filter, XF801, then amplified by Q810. Again, this signal is fed to the 4-pole crystal filters and amplified by Q001. Following amplification, the signal is fed to the 2<sup>nd</sup> IF processor (IC001). The 2<sup>nd</sup> local oscillator (crystal) signal is directed to IC001 to produce the 2<sup>nd</sup> local IF signal (455 kHz). IC001 amplifies the 2<sup>nd</sup> local IF signal, which then becomes an audio baseband signal through a detector circuit internal to IC001. This audio signal is then directed to the low pass filter inclusive within IC002, after which it is sent to audio processor, IC3.

#### 3) VCO section

The oscillator circuit produces the 1<sup>st</sup> local oscillator signal (VHF = RX frequency + 48.5 MHz / UHF = RX frequency – 73.35MHz).

The 1<sup>st</sup> local oscillator signal is amplified by buffer Q302, then amplified by pre-amplifier IC301 and post-amplifier Q303. The amplified signal is fed to the first balanced mixer. The VCC for the VCO has been changed from 7 volts to 5 volts.

#### 4) PLL Section

The PLL IC, IC806, with integrated pre-scaler compares the phase between the VCO frequency and reference oscillator frequency (12.00 MHz) by method of dividing the frequency, and produces VCO control signal. Then, this control signal is fed to the charge pump and fed to the low-pass-filter. The supply voltage of charge pump is multiplied by IC807 (to approx. 13 V) to achieve greater S/N ratio.

#### 5) Low Current Improvements

An additional 5.5 volt dc source has replaced the 12 V dc source for main on board power. An additional 12 volt line has been added for the 7 V dc regulator. This significantly reduces current consumption losses to heat.

# Circuit Description

---

## Low Current Base Tech 3.5

### EXCITER UNIT

#### 1) VCO Section

The oscillator circuit generates transmitter frequency. Then this signal is fed to the 3-stage of amplifier, buffer amplifier Q302, pre-amplifier IC301 and post amplifier Q303 and lead to the final amplifier, and lead to the final amplifier.

#### 2) PLL section

Basically, the circuit description is the same as RX. The PLL IC inclusive with prescaler (IC208) compares the phase between VCO signal and reference oscillator frequency (12.00 MHz) by method of dividing the frequency, and produces VCO control signal. Then this VCO control signal is fed to the charge pump, and fed to the low-pass-filter. The supply voltage of charge pump is amplified by IC210 (to approx. 13 V) to achieve greater S/N ratio.

#### 3) Modulation Section

The modulation signal is fed to both VCO and the reference oscillator (TCVXO 12.00 MHz), this permits very flat modulation characteristics against low frequency (DC). This is an advantage when BASE TECH III is used as a POCSAG transmitter.

#### 4) TX Exciter Section

The VCO signal is amplified by Q211 to achieve 80 mW.

#### 5) Low Current Improvements

An additional 5.5 volt dc source has replaced the 12 V dc source for main on board power. An additional 12 volt line has been added for the 7 V dc regulator. This significantly reduces current consumption losses to heat.

### POWER AMPLIFIER

#### 1) Power Amplifier (VHF = 5-110W/ UHF = 2-100W)

The 80 mW signal from TX Exciter stage is fed to PM501 to produce 10W output. Then, Q504 and Q505 amplify to 110/100W. This signal is fed to the Low-Pass- Filter to eliminate the harmonics and spurious frequencies. An APC circuit formed by IC502 stabilizes the output power at the set level. An IC501 protects final stage transistors from the reverse power caused by a mismatched antenna system

#### 2) Power Amplifier (VHF = 60W / UHF = 50W)

The 80 mW signal is fed to PM501 to achieve 60/50W output power. Then, signal is fed to the LPF to eliminate the harmonics spurious frequencies. An APC circuit formed by IC502, IC503, Q504 and Q505 stabilizes the output power at the set level. IC501 protects PM501 from the reverse power caused by a mismatched antenna system

### DESCRIPTION OF CIRCUITS TO STABILIZE TX AND RX FREQUENCY

The transmitter and receiver each use a TCVXO (Temperature Compensated Voltage-Controlled Crystal Oscillator) to generate the 12.00 MHz reference frequency used within their respective PLL and VCO circuits. The accuracy of the TCVXO is better than +/- 0.00015% over the range of -30 degree C to +60 degree C.

### DESCRIPTION OF CIRCUIT TO SUPPRESS SPURIOUS EMISSIONS AND MODULATION LIMITING

A multiple pole Low Pass Filter is used after the final power amplifier stage. It is designed to sharply attenuate spurious and harmonics frequencies above the highest frequency in the sub-band of the radio. Modulation limiting is performed by TX audio processor, CMX7041L4, located on the Analog Logic Unit. Internal limiting/compression amplifier provides excellent limiting with minimum distortion. In addition to modulation limiting, this device contains all circuitry to perform pre-emphasis, band pass shaping and CTCSS/ DCS encoder.

### ANALOG LOGIC UNIT

#### 1) Microcomputer (CPU) Section

CPU IC1, H8S2239 is the 16-bit processor contained 320kb flash memory 6k RAM inside. The CPU controls all functions of Base Tech III. A flash memory permits on-board-up-grade when new firmware is released.

#### 2) EEROM Section

IC6 is the 64k bit EEROM. This memory contains all the channel data

#### 3) Audio Processor Section

IC2 is for TX and IC3 is for RX audio processors. CTCSS and DCS are processed within these audio processors. In previous releases the CTCSS and DCS were processed within separate processors. This also improves current consumption and simplifies the sub-signaling routines.

#### 4) Low Current Improvements

A DC-DC converter (IC 43) has been added to replace the analog 12 volt to 5 volt regulator (IC5). The DC to Dc converter runs at 170kHz and directly regulates 5.5 volts with no losses to heat dissipation. This significantly reduces overall current consumption.

### DIGITAL LOGIC UNIT (DSP)

IC1 acts as the DSP control for both incoming digital signal converting it to analog and analog signal to C4FM digital signal. External flash memory within IC2, has 4Mb capacity, contains all data. Program data is stored in 256 k-bytes of memory integrated within IC1.

# Circuit Description

---

## Low Current Base Tech 3.5

### FRONT PANEL UNIT

#### 1) LCD Display Section

LCD display is constructed by 20 characters x 4 lines. Each character consist of 7x8 matrix.

The LCD backlight dimmer circuit has been simplified to reduce current consumption.

#### 2) LED Display Section

The 5 LED's are indicating each mode of operation BASE TECH III works.

- a. White LED "DIGI" for indication of Digital operation.
- b. Amber LED "REP" for Repeat mode indication.
- c. Orange LED "ALM" indicates an alarm condition. This could be an RX PLL error, TX PLL error, TX PA error, or Low Battery alarm.
- d. Red LED "TX" for indication of transmitter operation.
- e. Green LED "BUSY" for indication of RF carrier is present.

#### 3) Audio Amplifier Section

IC402 has up to 10 W power into a 4 $\Omega$  impedance speaker.

#### 4) Microphone Pre-Amplifier Section

IC411 is the voice pre-amplifier having -30dBm output to feed TX modulator.

Front panel microphone impedance is 600 $\Omega$ .

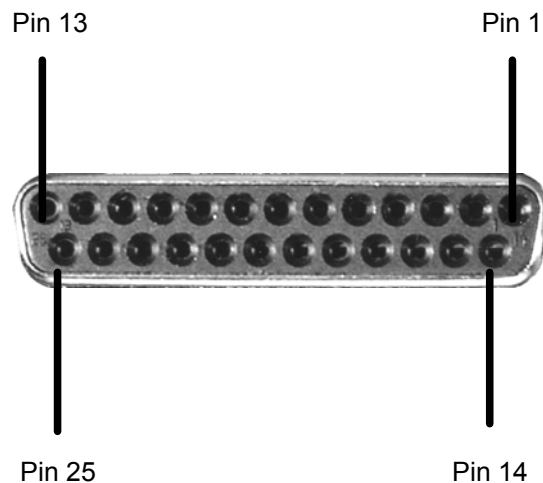
# Circuit Description

## Low Current Base Tech 3.5

### REMOTE CONTROL

A 25-pin D-sub connector for remote control is provided on the rear panel of Base Tech III. The functions of each pin are shown below.

Pin No.	Name	Description	I/O	Levels	Comments
1	CH0	LSB external binary channel selection	I	0-+3.3VDC	0000 is channel 1
2	CH1	External binary channel selection	I	0-+3.3VDC	
3	CH2	External binary channel selection	I	0-+3.3VDC	
4	CH3	MSB External binary channel selection	I	0-+3.3VDC	1111 is channel 16
5	Unassigned				
6	REM MON	Remote Monitor	I	0-+3.3VDC	+3.3V=Monitor On
7	GND				
8	Unassigned				
9	DIG/AN TX	Remote TX Mode	I	0-+3.3VDC	+0.0VDC = Rem Dig TX
10	DEM OUT	Discriminator audio out	O	≈330mVrms 1KHz @ ±3KHz	C4FM on DIG
11	BUSY	Channel busy indication	O	0-+3.3VDC	+3.3V=busy
12	RSSI	Receive signal strength indicator	O	0-+2.5VDC analog	
13	MOD1	External audio modulation input	I	≈50mVrms 1KHz for ±3KHz	
14	GND				
15	PTT	Push to talk	I	0-+3.3VDC	0V=transmit
16	MOD2	External modulation input LOW FREQ i.e. CTCSS/DCS IN	I	≈400mVrms 1KHz for ±3KHz	After limiter and filtering
17	SIMP	Simplex mode selected	O	0-+3.3VDC	0V=simplex
18	ERR	Alarm indication	O	0-+3.3VDC	Duty Cycle Determines which alarm
19	DECODE	Decode valid indication	O	0-+3.3VDC	5V=valid signaling
20	RX AUD1	Buffered receive audio	O	≈700mVrms 1KHz @ ±3KHz	1 & 2 Can produce 0 dBm into
21	RX AUD2	Buffered receive audio	O	≈700mVrms 1KHz @ ±3KHz	600 ohm input
22	TX OUT		O		
23	EXT PW/SW	External power switch	I	0-Open source	0V=ONf
24	REMOTE	External channel selection mode	I	0-+3.3VDC	0V=external
25	+12V				



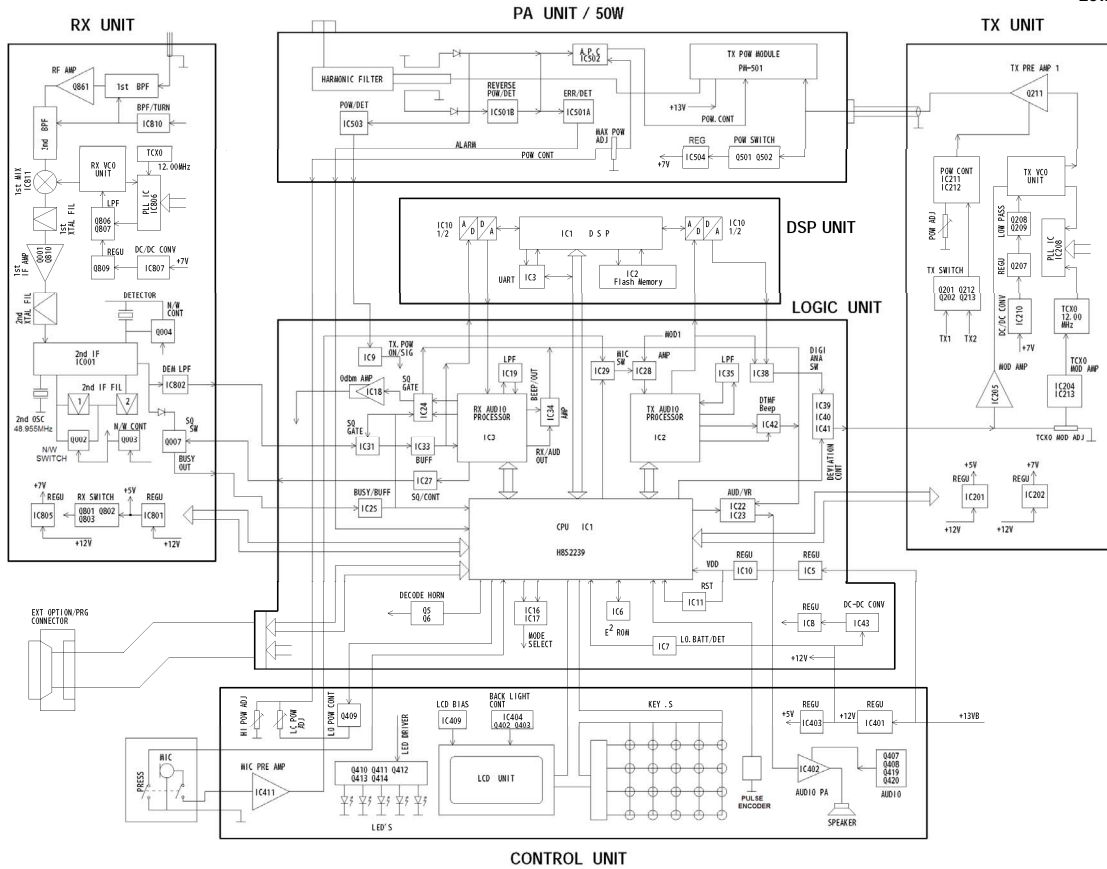
## **Circuit Description**

---

Low Current Base Tech 3.5

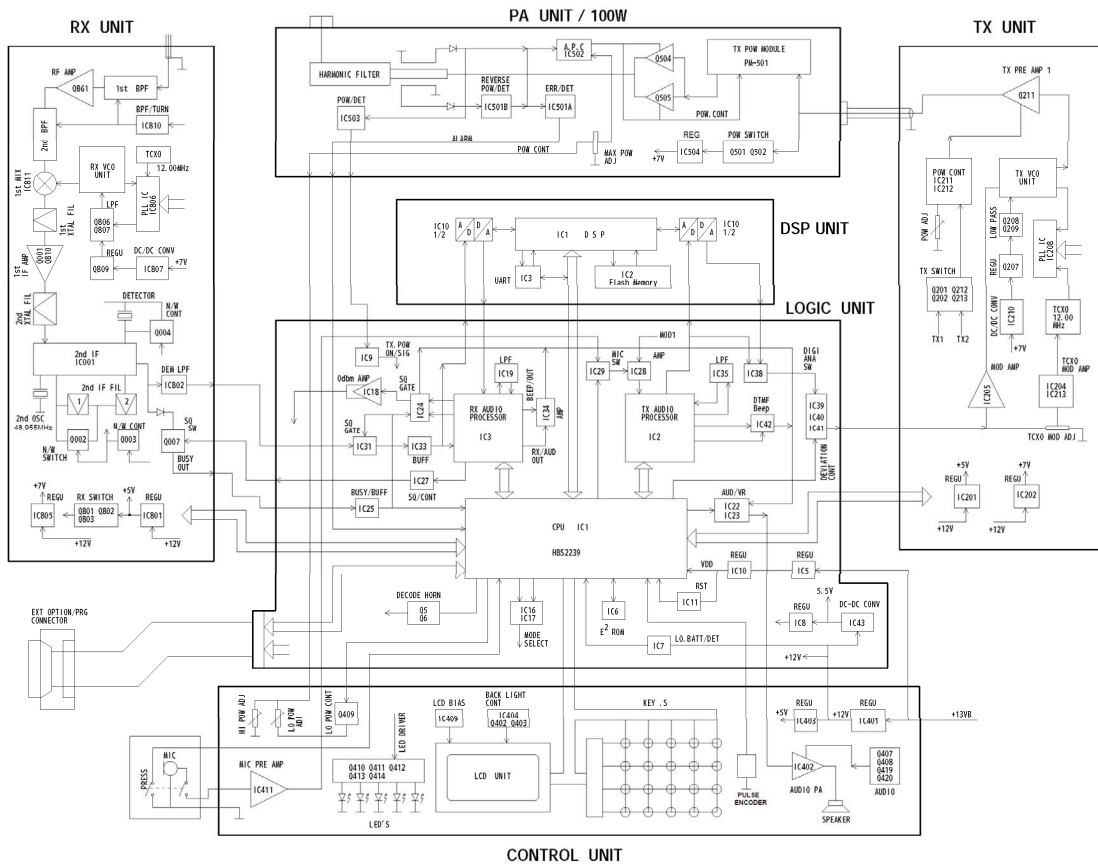
**Notes:**

**Block Diagram VHF 60 Watt**  
 Low Current Base Tech 3.5



# Block Diagram VHF 110 Watt

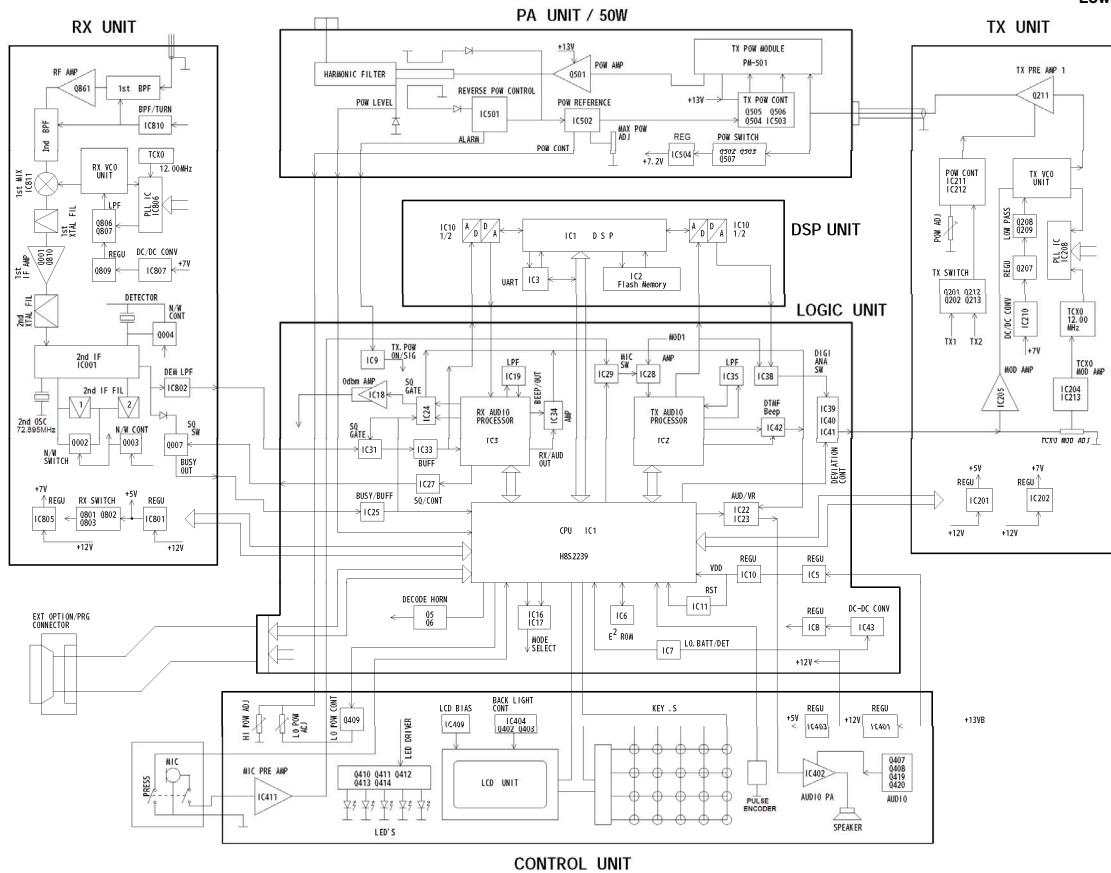
Low Current Base Tech 3.5





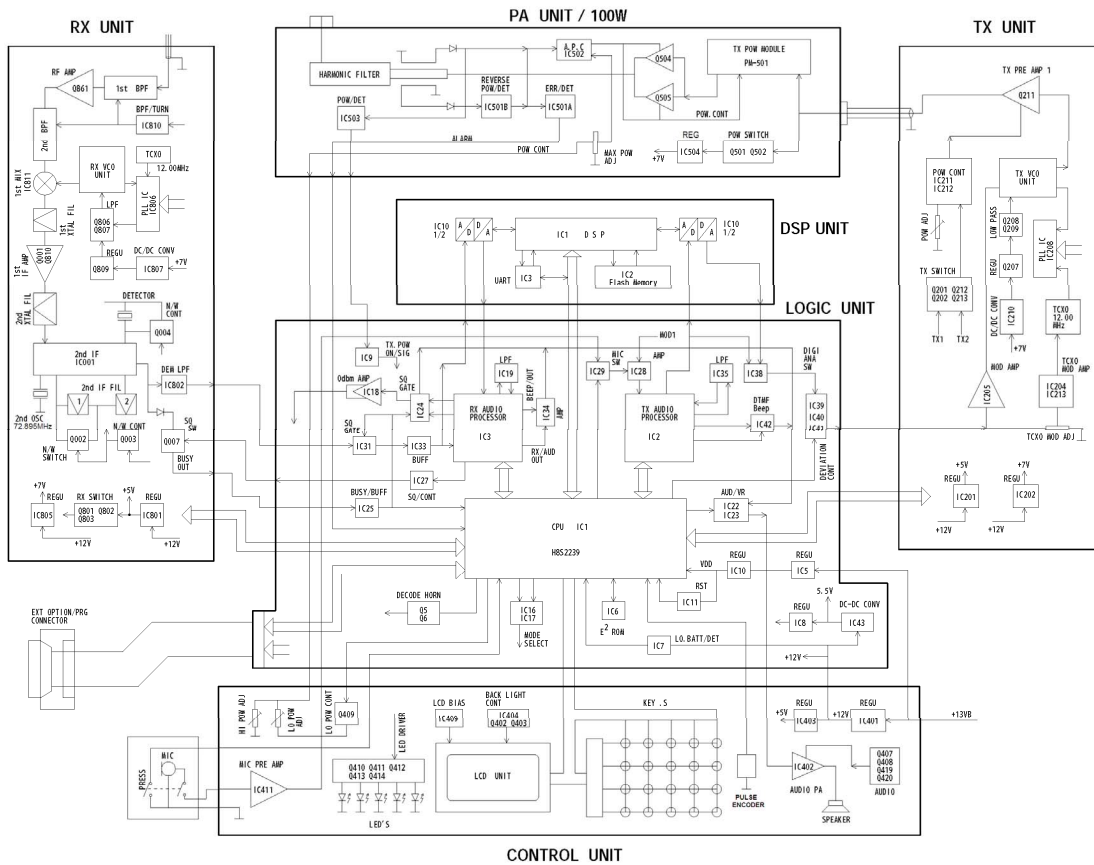
# Block Diagram UHF 50 Watt

Low Current Base Tech 3.5



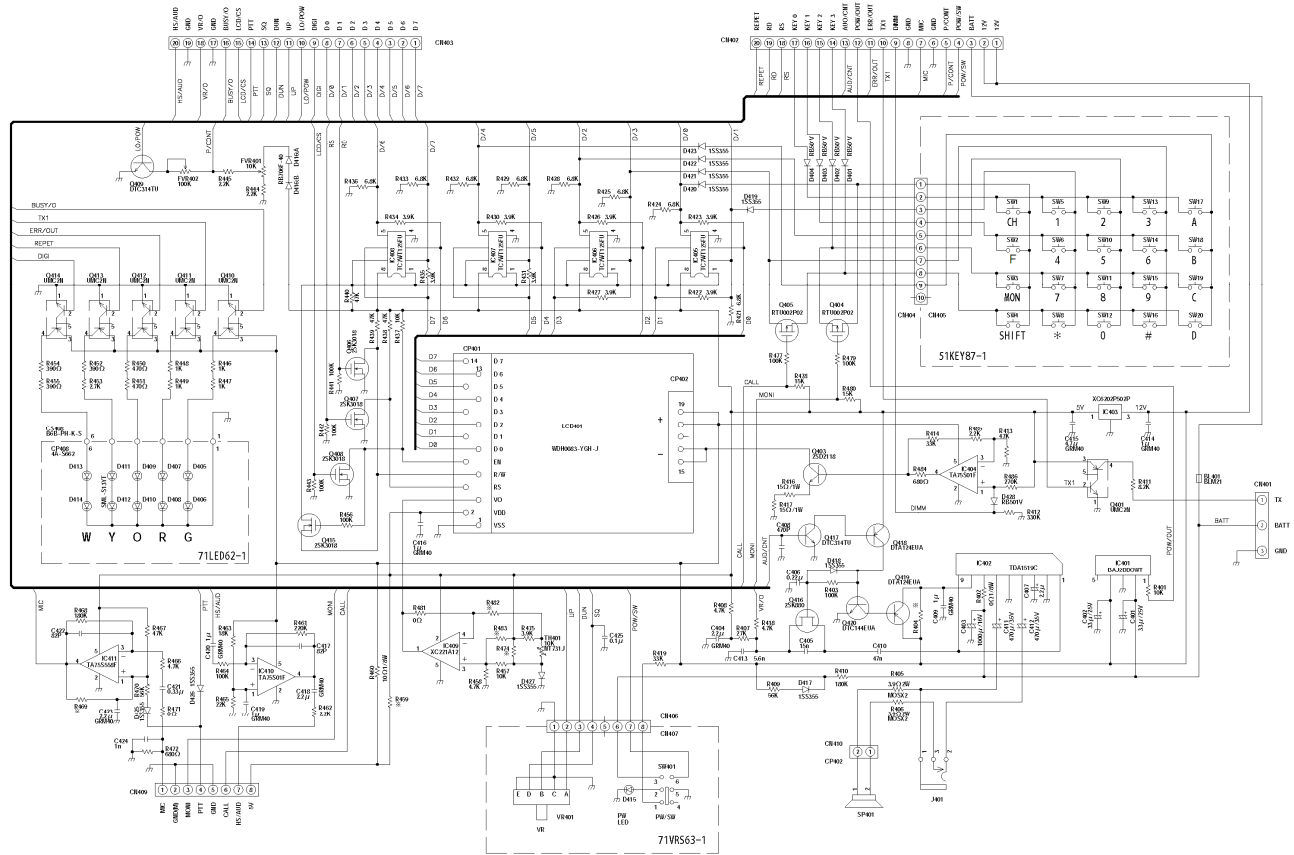
# Block Diagram UHF 100 Watt

Low Current Base Tech 3.5



# Front Panel Unit Schematic

Low Current Base Tech 3.5

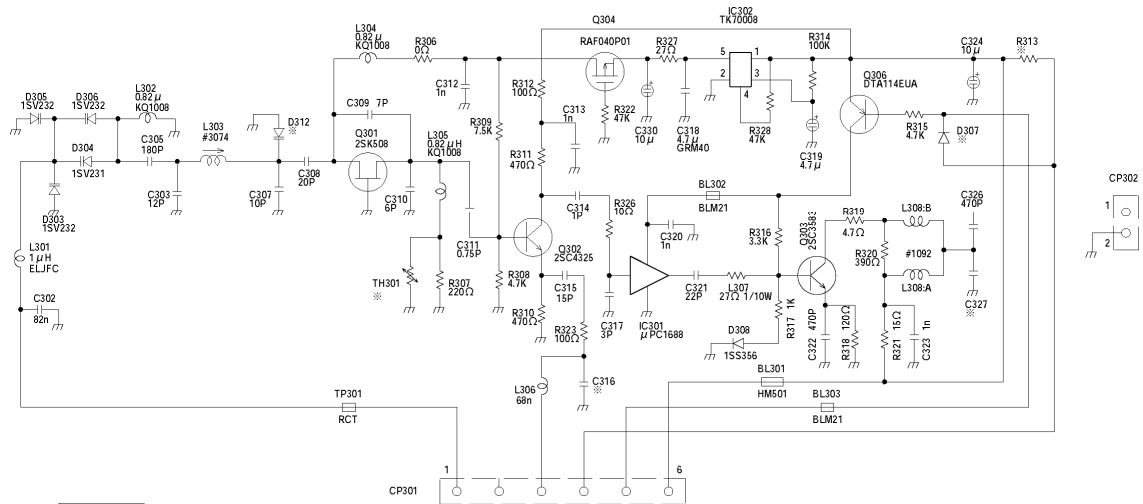






# VHF RX VCO Unit Schematic

Low Current Base Tech 3.5



No	A
C303	
C307	
D306	

A = 136MHz---156MHz  
shown >> B = 146MHz---174MHz

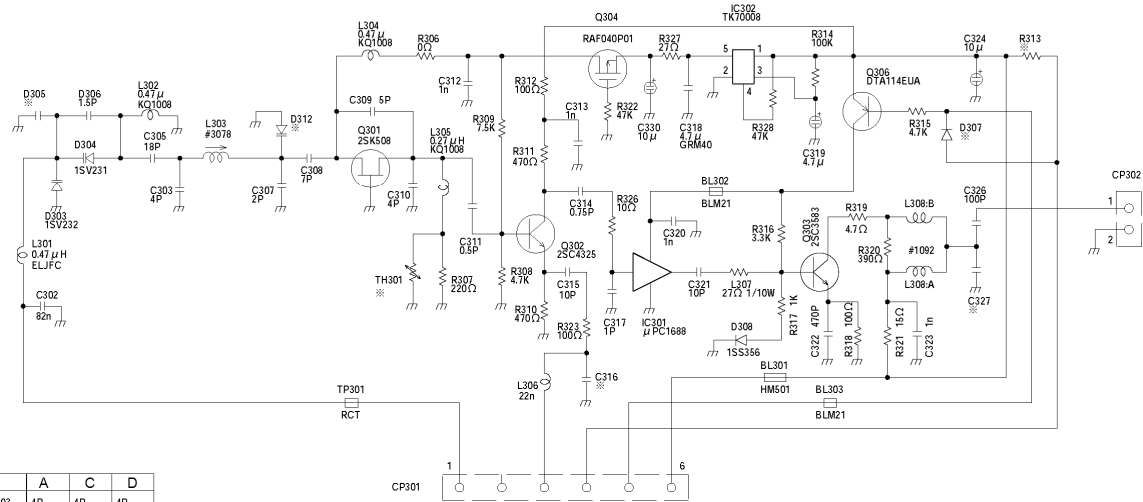






# UHF RX VCO Unit Schematic

Low Current Base Tech 3.5

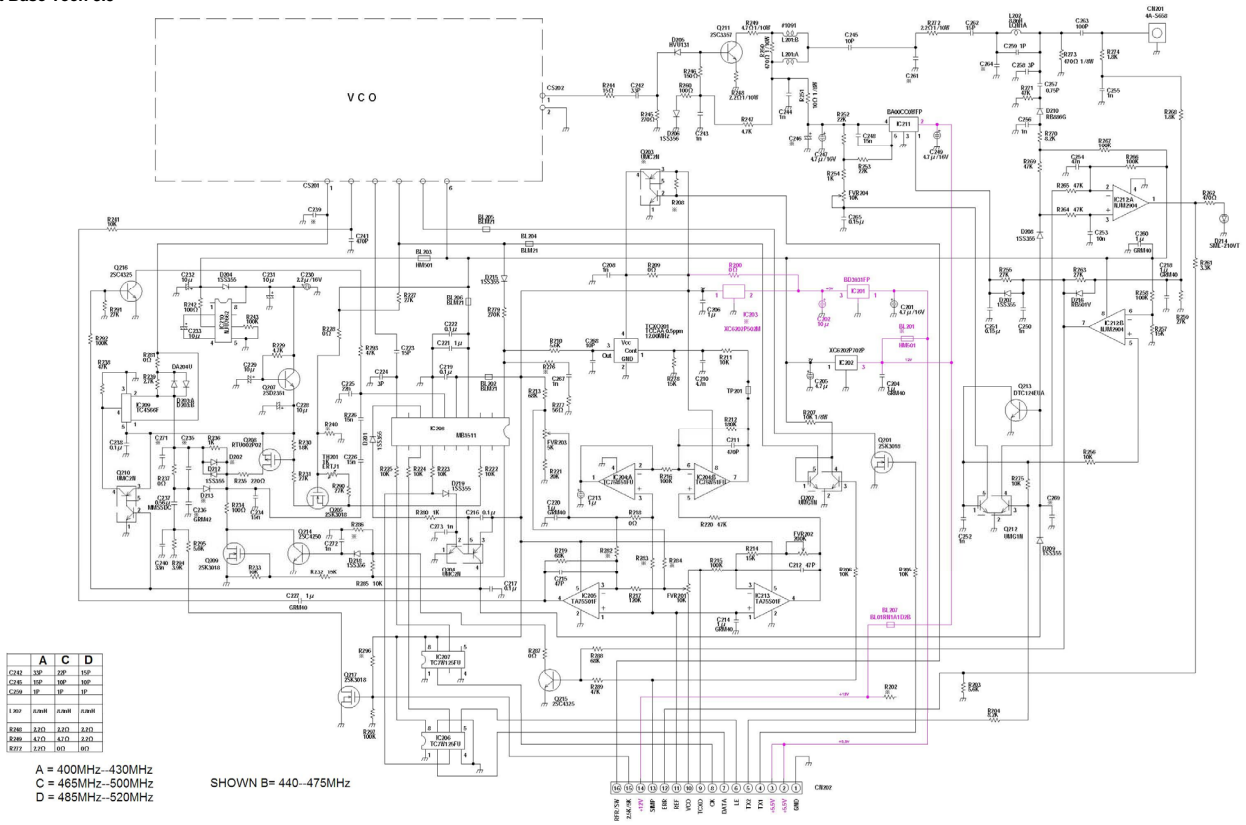


	A	C	D
C303	4P	4P	4P
C305	18P	15P	15P
C307	2.5P	1.5P	0.75P
C308	9P	7P	7P
C309	6P	5P	5P
C310	5P	4P	4P
D303	1SV232	1SV232	1SV232
D305	*	1P	1P
D306	0.5P	1P	1P
L302	#3075	#3078	#3078
L308	#1091	#1091	#1091
R306	15Ω	15Ω	15Ω

A = 400MHz---430MHz  
 shown > B = 440MHz---475MHz  
 C = 465MHz---500MHz  
 D = 485MHz---520MHz

# UHF TX Main Unit Schematic

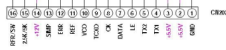
Low Current Base Tech 3.5



	A	C	D
C212	10P	20P	10P
C218	10P	10P	10P
C229	1P	1P	1P
R101	4.7K	4.7K	4.7K
R206	4.7K	4.7K	4.7K
R208	4.7K	4.7K	4.7K
R217	4.7K	4.7K	4.7K

A = 400MHz - 430MHz  
 C = 465MHz - 500MHz  
 D = 485MHz - 520MHz

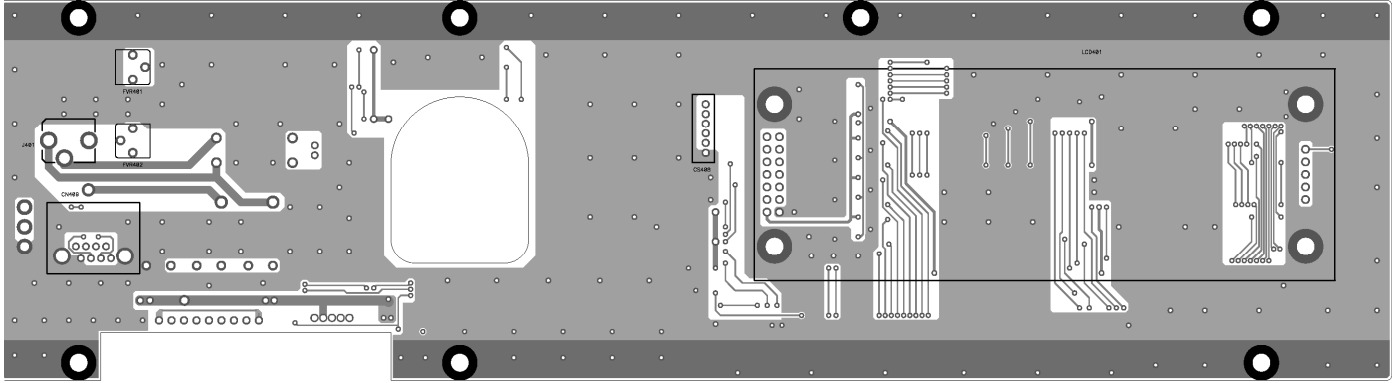
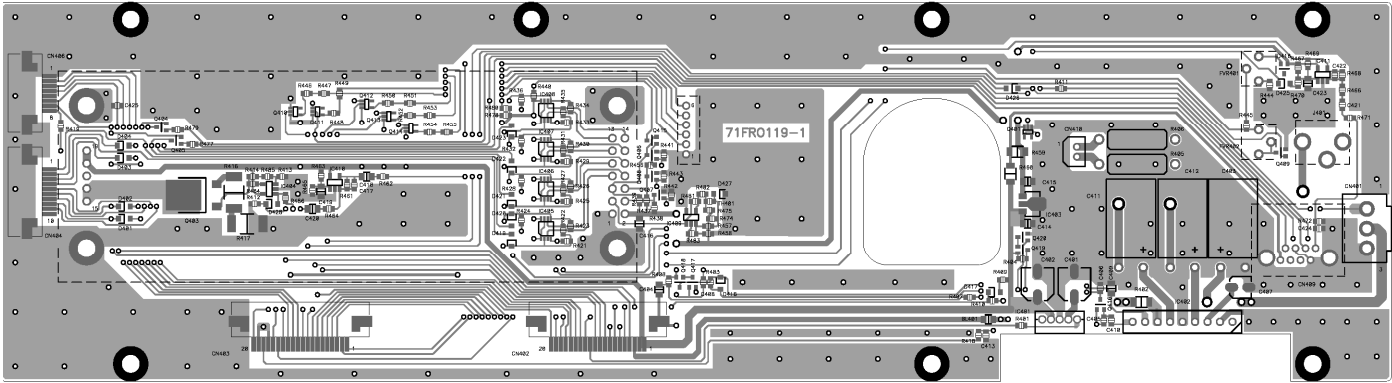
SHOWN B = 440-475MHz



11C300

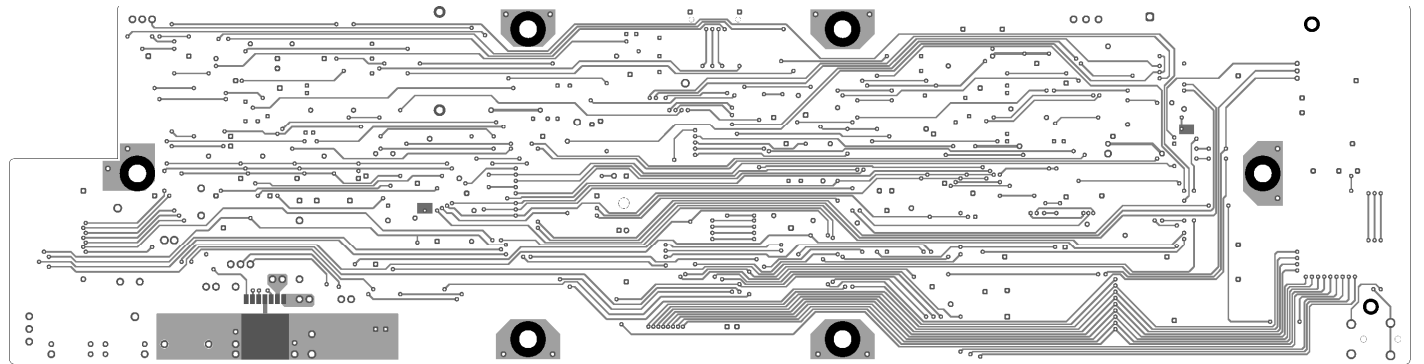
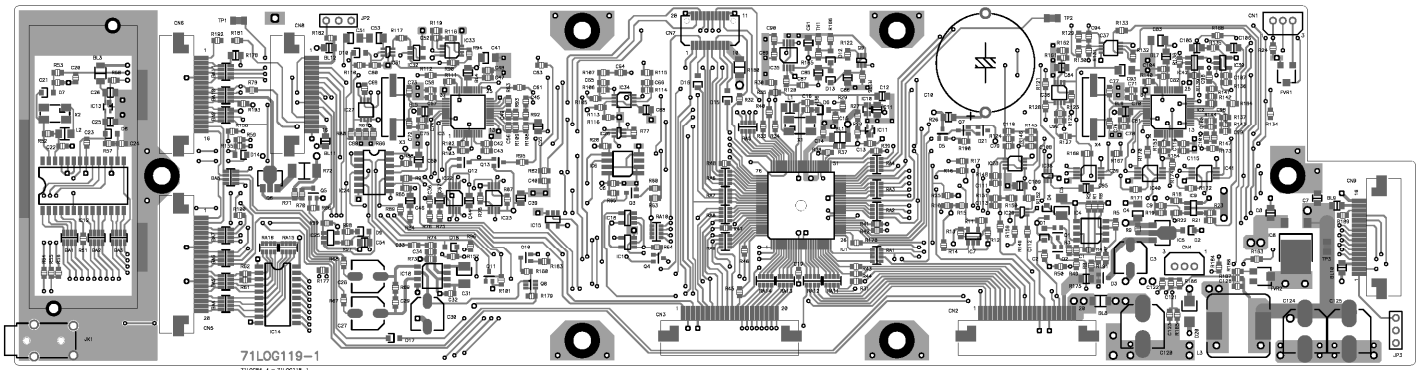
Front Panel Unit Layouts

Low Current Base Tech 3.5



## Analog Logic Unit Layouts

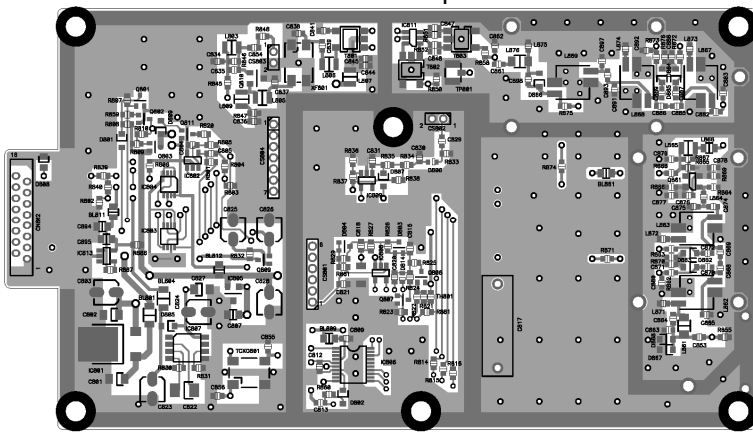
Low Current Base Tech 3.5



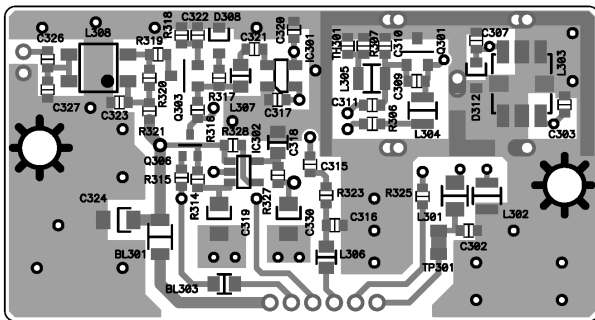
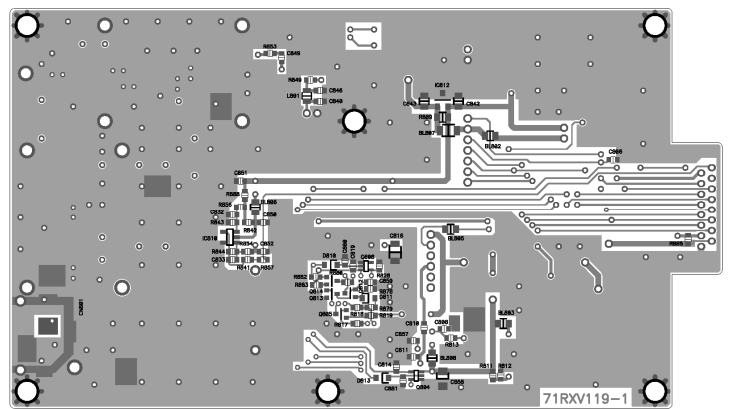
VHF RX Main Unit & RX VCO Unit Layouts

Low Current Base Tech 3.5

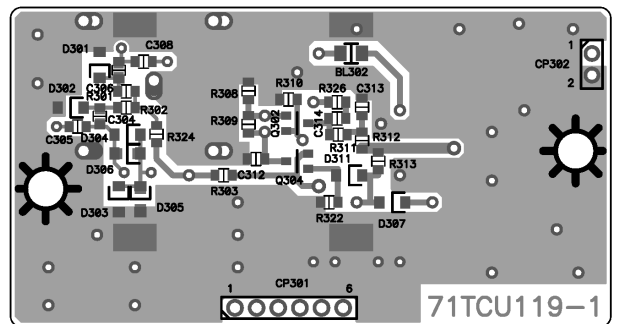
RX Main Unit Top Side



RX Main Unit Bottom Side



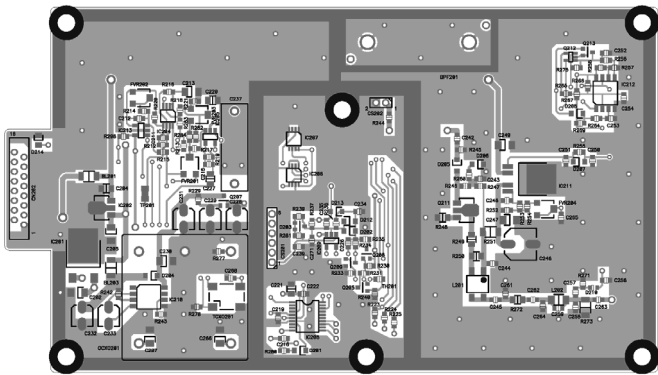
RX VCO Unit Top Side



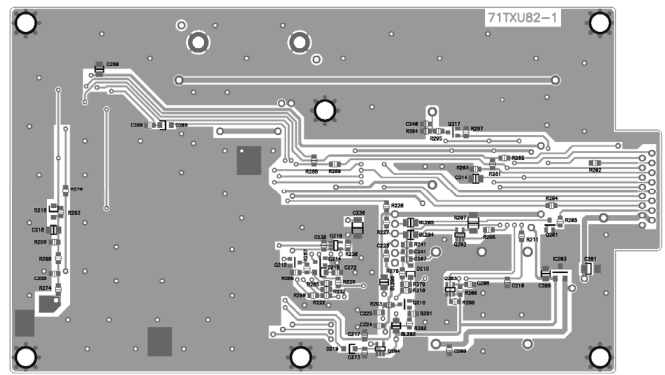
RX VCO Unit Bottom Side

## VHF TX Main Unit Layouts

Low Current Base Tech 3.5



TX Main Unit Top Side

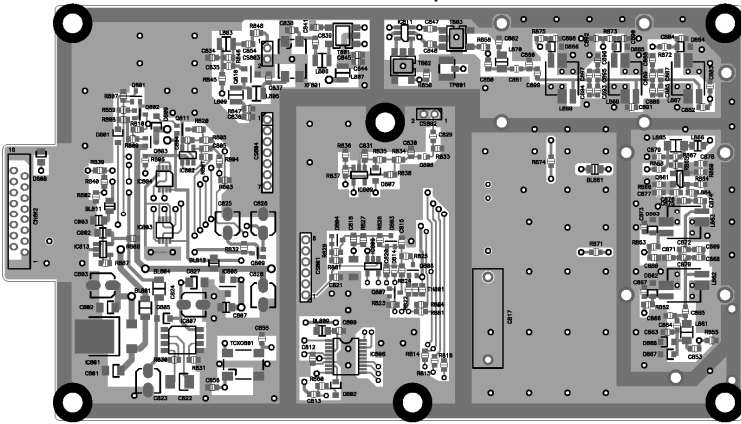


TX Main Unit Bottom Side

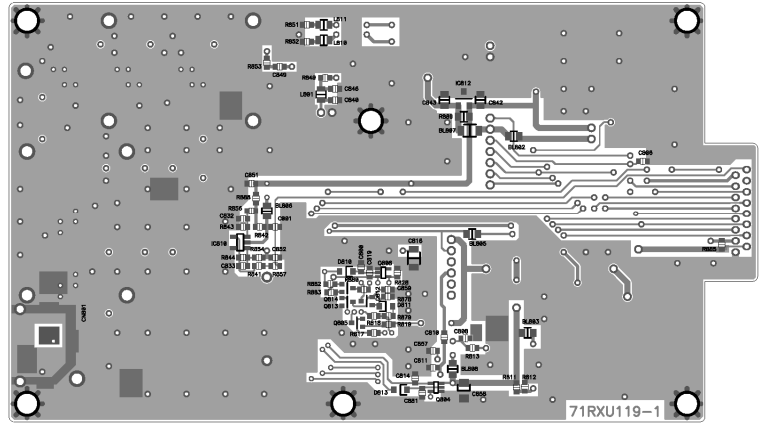
UHF RX Main Unit & RX VCO Unit Layouts

Low current Base Tech 3.5

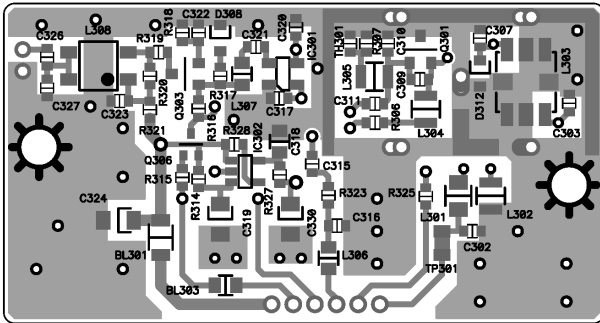
RX Main Unit Top Side



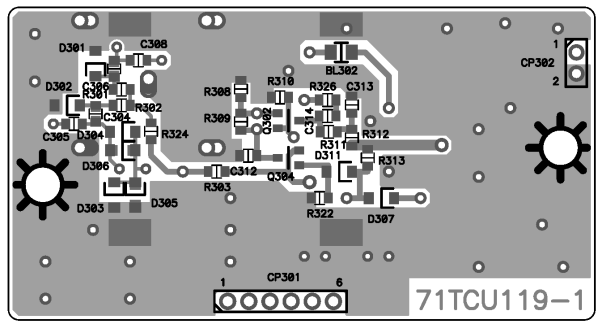
RX Main Unit Bottom Side



RX VCO Unit Top Side

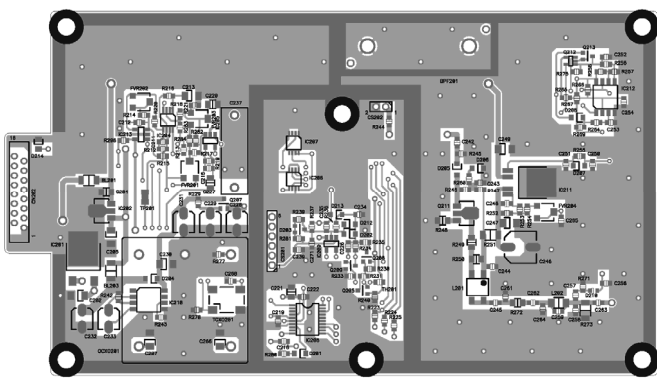


RX VCO Unit Bottom Side

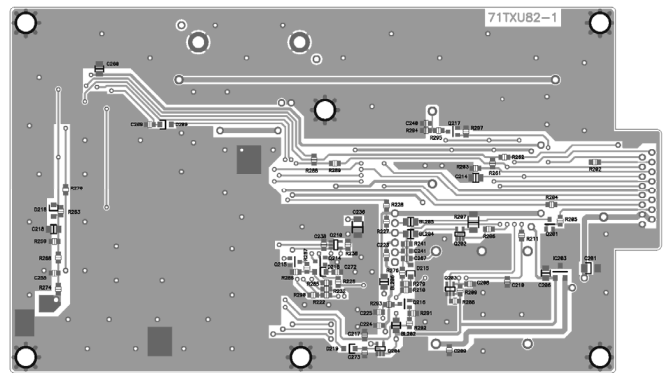


## UHF TX Main Unit Layouts

Low Current Base Tech 3.5



TX Unit Top Side

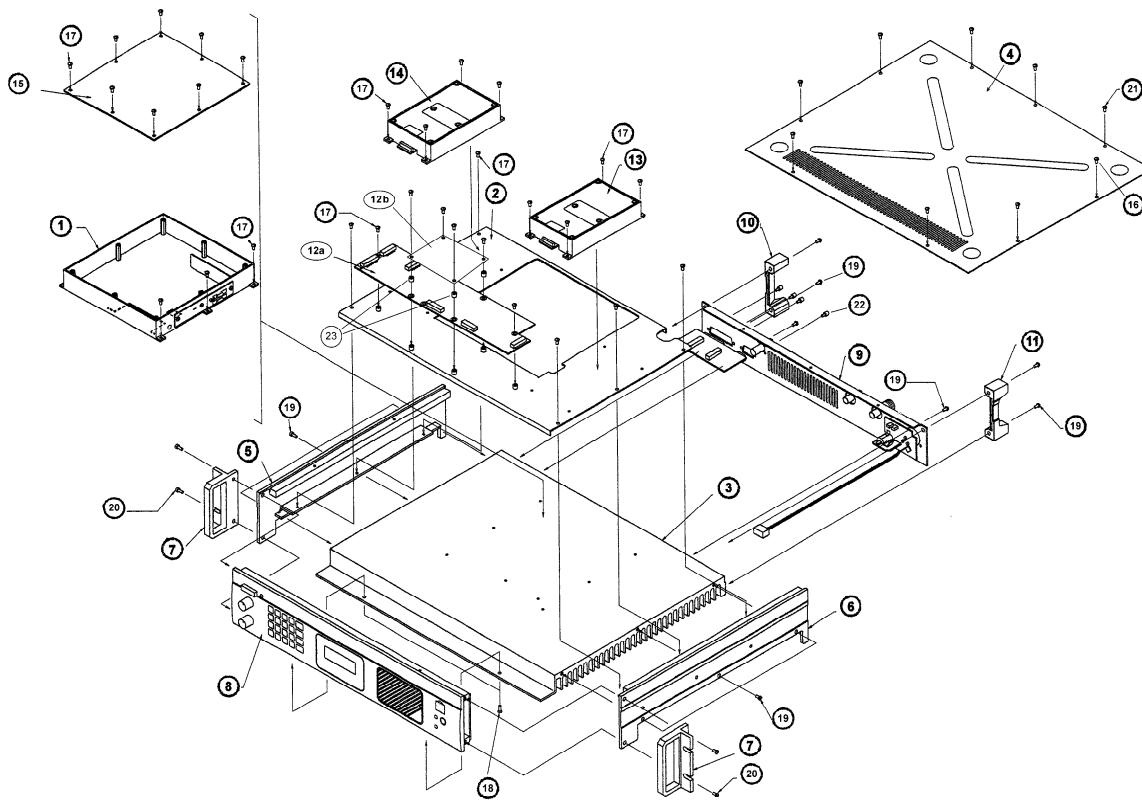


TX Unit Bottom Side



## Chassis Exploded View

Low Current Base Tech 3.5

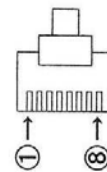
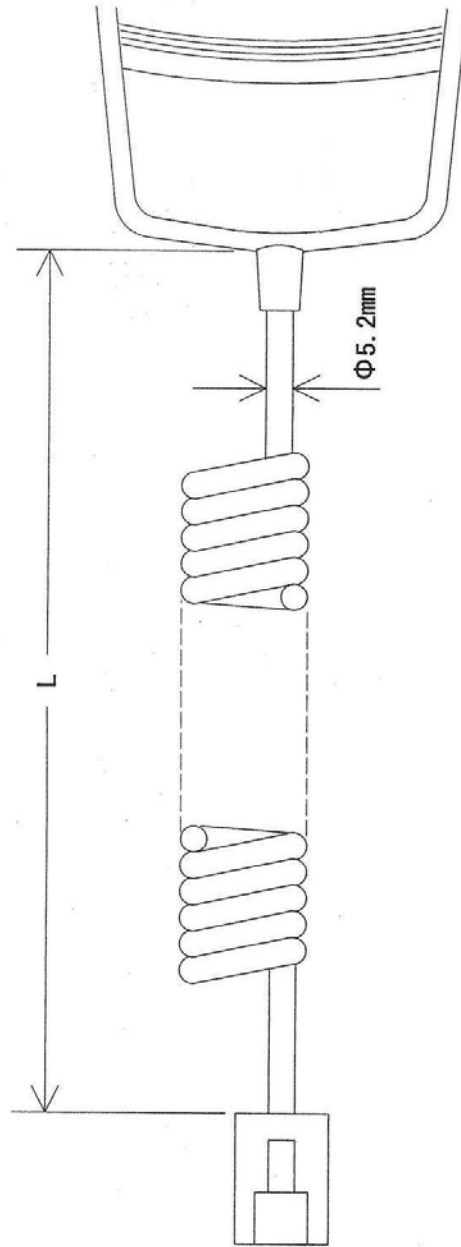
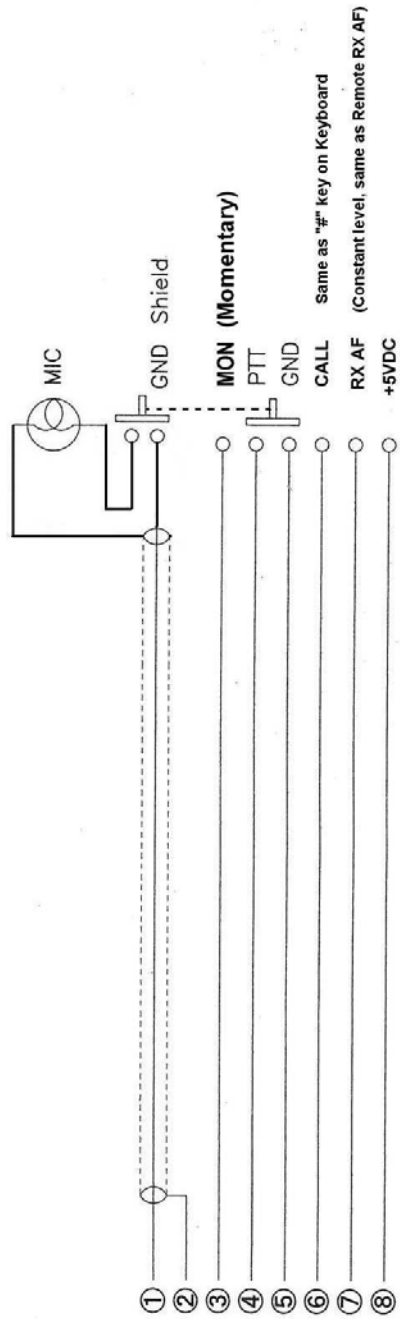


1. PA Unit Chassis
2. Mounting Plate
3. Heat Sink Assy
4. Bottom Cover
5. Right Side Assy
6. Left Side Assy
7. Front Handle
8. Front Panel Unit Assy
9. Rear Panel Assy
10. Right Protector
11. Left Protector
12. Logic Unit PCB Assy
  - a. Analog
  - b. Digital
13. TX Main Unit Assy
14. RX Main Unit Assy
15. PA Unit Cover
16. Screw (3 x 6 mm)
17. Screw (3 x 8 mm)
18. Screw (4 x 8 mm)
19. Screw (4 x 10 mm)
20. Screw (4 x 12 mm)
21. Screw (4 x 6 mm)
22. Screw #4-40 Jack
23. Hex Standoff (3 x 8 mm)

THIS PAGE INTENTIONALLY LEFT BLANK

# Palm Microphone Schematic

Low Current Base Tech 3.5



# Parts List

## Low Current Base Tech 3.5

---

### COMPONENT MODULES

<b>Exploded View #</b> <small>(see page 47)</small>	<b>Description</b>	<b>Part #</b>
8	Front Panel Unit Assembly (Low Current)	550-020-0061
12 a	Analog Logic Unit PCB Assembly (Low Current)	650-010-0016
13	TX Main Unit Assembly, VHF "B" Range (146-174 MHz)	650-230-0054
13	TX Main Unit Assembly, UHF "A" Range (400-430 MHz)	650-230-0055
13	TX Main Unit Assembly, UHF "B" Range (440-475 MHz)	650-230-0056
13	TX Main Unit Assembly, UHF "C" Range (465-500 MHz)	650-230-0057
13	TX Main Unit Assembly, UHF "D" Range (485-520 MHz)	650-230-0058
14	RX Main Unit Assembly, VHF "B" Range (146-174 MHz)	650-110-2015
14	RX Main Unit Assembly, UHF "A" Range (400-430 MHz)	650-110-2016
14	RX Main Unit Assembly, UHF "B" Range (440-475 MHz)	650-110-2017
14	RX Main Unit Assembly, UHF "C" Range (465-500 MHz)	650-110-2018
14	RX Main Unit Assembly, UHF "D" Range (485-520 MHz)	650-110-2019

### FRONT PANEL UNIT

#### INTERGRATED CIRCUITS

BAJ2DD0WT	IC401
TDA1519C	IC402
XC6202P502P	IC403
TA75S01F(TE85R,F)	IC404, IC410
TC7WT125FU	IC405, IC406, IC407, IC408
XC221A1200MR	IC409
TA75S558F(TE85R,F)	IC411
SC2004C	LCD401

#### TRANSISTORS

UMC2N-TR	Q401, Q410, Q411, Q412, Q413, Q414
2SD2118-TLR	Q403
RTU002P02-T106	Q404, Q405
2SK3018-T106	Q406, Q407, Q408, Q415
DTC314TU-T106	Q409, Q417
2SK880GR(TE85L,F)	Q416
DTA124EUA-T106	Q418, Q419
DTC144EUA-T106	Q420

#### DIODES

RB501V-40TE17	D401, D402, D403, D404, D428
RB706F-40	D416
SML-S13YT	D411, D412
1SS355-TE17	D417, D418, D419, D420, D421, D422, D423, D425, D426, D427

#### INDUCTOR

BLM21BD421SN1D	BL401
----------------	-------

#### CAPACITORS

EMVK250ADA330MF55G	C401, C402
EKMG160ELL102MJ16S	C403
GRM21BB10J225KC01L	C404, C418, C423
GRM188B11E153KA01D	C405
GRM188B11A224KA01D	C406
EMVE500ADA2R2MD55G	C407
GRM188B11H471KD01D	C408
GRM21BB11A105KA01L	C409, C414, C416, C419, C420
GRM188B11C473KA01D	C410
EKMG350ELL471MJ16S	C411, C412
GRM188B11H562KD01D	C413
GRM21BB31A475KA74L	C415

GRM1882C1H820JA01D	C417, C422
GRM188B11H334KA01D	C421
GRM188B11H102KA01D	C424
GRM188B11E104KA01D	C425

#### RESISTORS

MCR03EZHZ 103	R401, R437, R457
MCR18EZHZ 000	R402
MCR03EZHZ 104	R403, R441, R442, R443, R456, R464, R477, R479
MOSX2 3.9Ω	R405, R406
MCR03EZHZ 273	R407
MCR03EZHZ 472	R408, R418, R466, R458
MCR03EZHZ 563	R409, R470
MCR03EZHZ 184	R410, R468
MCR03EZHZ 822	R411
MCR03EZHZ 334	R412
MCR03EZHZ 473	R413, R438, R439, R440, R467
MCR03EZHZ 333	R414, R419
MCR100JZHJ150	R416, R417
MCR03EZHZ 682	R421, R424, R425, R428, R429, R432, R433, R436
MCR03EZHZ 392	R422, R423, R426, R427, R430, R431, R434, R435, R475
MCR03EZHZ 222	R444, R445, R462, R485
MCR03EZHZ 102	R446, R447, R448, R449
MCR03EZHZ 471	R450, R451
MCR03EZHZ 391	R452, R454, R455
MCR03EZHZ 272	R453
MCR18EZHZ 100	R460
MCR03EZHZ 224	R461
MCR03EZHZ 183	R463
MCR03EZHZ 223	R465
MCR03EZHZ 000	R471, R481
MCR03EZHZ 681	R472, R484
MCR03EZHZ 153	R478, R480
MCR03EZHZ 274	R486
GF06P 10K	FVR401
GF06P 100K	FVR402
ERTJR103J	TH401

# Parts List

## Low Current Base Tech 3.5

### FRONT PANEL UNIT (CONT.)

#### CONNECTORS

00-6200-520-330-000+	CN402, CN403
00-6200-510-130-000+	CN404
00-6200-508-130-000+	CN406
290A-88-30-119	CN409
FFC-14T7BMEP1B	CP401(LCD)
FFC-5T14AMEP1B	CP402(LCD)
B 3P-VH	CN401
SB20-02WS	CN410
SB20-06WS	CS408
S-G8022#01	J401
Cable Flat, 20p x 3"	70-033046
Cable Flat 10p x 2"	70-033048
Cable Flat, 8p x 5"	70-033049

#### MISCELLANEOUS

4A10-3190	AF PLATE
4A10-3189	AF RADIATOR
ASB-E-307	LCD STANDOFF
SEB-3 X 5	LCD SEMS Screw, Black
SE-3 X 6	LCD SEMS Screw
SE-3 X 10	SEMS Screw
SEB-3 X 12	Heat sink SEMS Screw,Blk
71FRO119-1	PCB

### ANALOG LOGIC UNIT

#### INTERGRATED CIRCUITS

HD64F2239TE20V	IC1
CMX7041L4	IC2, IC3
NJM2405M-T1	IC4
XC6216D502P	IC5
AT24C256N-10SU-1.8	IC6
TA75S393F(TE85R,F)	IC7
BD33KA5FP	IC8
XC221A1200MR	IC9, IC30, IC32
R1180D331C-TR-F	IC10
BU4819FVE	IC11
TC74HC541AF	IC14
BU4SU69	IC15
BU4S01G2-TR	IC16
BU4S81G-TR	IC17, IC25
NJM2073M(TE1)	IC18
DP7113	IC22, IC23

BU4066BCP	IC24
TC7PA53FU(TE85L,F)	IC26, IC29, IC31, IC38
TC75W51FU	IC27, IC28, IC33, IC34, IC36, IC37
MAX7412EUA	IC35
DP7114	IC39, IC40, IC41
BU4S66G2	IC42
BD9778HFP	IC43

#### TRANSISTORS

2SK3018-T106	Q1, Q3, Q4, Q5, Q10, Q11, Q12
DTA144EUA- T106	Q2
2SB1698-T00	Q6
RTU002P02-T106	Q7, Q13
RRL035P03	Q8
UMX1N	Q9

#### DIODES

1SS355-TE17	D1, D4, D9, D10, D12, D13, D15, D16, D17, D18
1SS356-TW11	D2, D6
DAN202U-T106	D3, D5
DA204U	D21
RB501L-40TE-25	D20

#### CRYSTALS

12.00MHz	X1
6.144MHz	X3, X4

#### INDUCTORS

BLA31BD471SN4D	BA4, BA5, BA6, BA7, BA8, BA9, BA10, BA11
FBM3216HM501NT	BL1, BL8
BLM21BD421SN1D	BL4, BL5, BL6, BL7, BL9, BL10, BL11, BL12
#FSLM2520-150J-P2	L1
SPS12080-470M(47μ)	L3

#### CAPACITORS

GRM188B11H103KA01D	C1, C32, C42, C48, C57, C69, C71, C75, C80, C81, C82, C115
GRM188B11H102KA01D	C2
EMVK250ADA330MF55G	C3
TEESVA1C475M8R	C4, C41, C83
TEESVB21C106M8R	C5, C31
GRM188B11E104KA01D	C6, C9, C13, C14, C19, C29, C33, C36, C43, C45, C58, C61, C63, C64, C70, C112, C113, C116
GRM21BB31A475KA74L	C7, C8

### ANALOG LOGIC UNIT (CONT.)

#### CAPACITORS (CONT.)

EECS5R5H105	C10
GRM216B11C105KA01L	C11, C12, C39, C46, C50, C54, C67, C68, C84, C85, C86, C91, C109,
GRM1882C1H150JA01D	C15, C16
EMVK160ADA470MF55G	C27, C28, C30
GRM188B11H152KA01D	C40
GRM188B11H334KA01D	C47, C74, C78, C104, C110
GRM1882C1H820JA01D	C49, C56, C98, C99, C100, C108, C111
TCTAL1C156M8R	C51
GRM1882C1H470JA01D	C52, C65, C66, C94, C107
TEESVA1A106M8R	C53
GRM21BB10J225KA01L	C55, C95, C105
GRM1882C1H220JA01D	C72, C73, C76, C77
GRM188B11A224KA01D	C79, C87, C96, C101
GRM1882C1H5R0DZ01D	C89
GRM1882C1H680JA01D	C90
TEESVA1V105M8R	C93
GRM21BB11E474KA01L	C106
35HVH100M	C120, C124
GRM1882C1H221JA01D	C121, C126
GRM188B11C473KA01D	C122
GRM188B11C154KA01D	C123
25CE220LX	C125

#### RESISTORS

G32AT 104	FVR1
G32AT 502	FVR2
MCR03EZHZ 104	R1, R4, R22, R66, R74, R92, R101, R107, R137, R139, R141, R143, R146, R147, R149, R150, R151, R179, R180, R183
MCR03EZHZ 273	R2
MCR03EZHZ 105	R3, R5, R23
MCR03EZHZ 113	R6
MCR03EZHZ 154	R7, R8, R87, R108, R109, R114, R128, R131, R172, R186
MCR03EZHZ 473	R10, R16, R28, R79, R88, R98, R102, R103, R105, R113, R116, R153, R154, R165, R174, R177, R191
MCR03EZHZ 684	R11
MCR03EZHZ 333	R12, R19
MCR03EZHZ 753	R13
MCR03EZHZ 103	R14, R15, R17, R20, R21, R30, R31, R35, R63, R64, R65, R71, R82, R94, R95, R123, R124, R133, R145, R162, R168, R169, R170, R184

MCR03EZHZ 102	R18, R34, R36, R37, R40
	R46, R47, R75
MCR03EZHZ 752	R24, R25, R164
MCR10EZHZ 100	R26
MCR03EZHZ 472	R27, R60, R70, R78, R86, R95, R171
MCR03EZHZ 471	R32, R33, R39, R41, R42
	R43, R44, R45, R48, R100
	R161, R176
MCR03EZHZ 823	R29
MCR03EZHZ 000	R38, R61, R62, R117, R120, R125, R132, R152, R157, R158, R159, R163, R167, R173, R193
MCR03EZHZ 563	R49
MCR03EZHZ 683	R50
MCR03EZHZ 271	R67, R68
MCR03EZHZ 3R3	R69
MCR50EZHZ 4R7	R72
MCR03EZHZ 332	R73, R122
MCR03EZHZ 474	R76, R85, R91, R99, R190
MCR03EZHZ 242	R89
MCR03EZHZ 225	R90
MCR03EZHZ 754	R80
MCR03EZHZ 393	R81
MCR03EZHZ 822	R84, R188
MCR03EZHZ 124	R93, R97, R112, R115, R142, R144, R148,
MCR03EZHZ 184	R96
MCR03EZHZ 274	R106, R110, R126
MCR03EZHZ 224	R118, R130, R135, R185
MCR03EZHZ 244	R119
MCR03EZHZ 153	R121
MCR03EZHZ 304	R129
MCR03EZHZ 334	R136
MCR03EZHZ 183	R155
MCR18EZHZ 000	R160
MCR03EZHZ 223	R166
MCR10EZHZ 000	C44, R175, R178
MCR03EZHZ 433	R187
MCR03EZHZ 203	C34

#### RESISTOR ARRAYS

MNR14E0ABJ471	RA1, RA2, RA3, RA4, RA5, RA6, RA7, RA8, RA9, RA11, RA12, RA13, RA14,
MNR14E0ABJ473	RA10, RA15, RA16

# Parts List

## Low Current Base Tech 3.5

### ANALOG LOGIC UNIT (CONT.)

#### MISCELLANEOUS

RCTCTE	TP1, TP2, TP3
ERTJ1VT222JA	TH1
DIC-149-3P	JP3
SB20-03WS	CN1, CN4
00-6200-516-230-000+	CN6, CN8, CN9
00-6200-520-330-000+	CN2, CN3, CN5
AXN420-530S	CN7
71LOG119-1	PCB

### RX MAIN UNIT VHF”B”

#### INTERGRATED CIRCUITS

BD3931FP	IC801
XC221A1200MR	IC802, IC810
TC7WT125FU(TE12L,F)	IC803, IC804
MB1511PFV-G-BND-EFE	IC806
NJU7662M-T1-TE1#ZZZB	IC807
TC4S66F(TE85L,F)	IC808
TA75S01F(TE85R,F)	IC809
GN2011	IC811
XC6216B702MR	IC813

#### TRANSISTORS

2SK3018-T106	Q801, Q805, Q807
2SD2351-T106	Q802, Q809
MCH3306-TL	Q803
UMC2N-TR	Q804, Q808
RTU002P02-T106	Q806
2SK508-T1B K53	Q810
DTA144EUA-T106	Q811
2SC4250(TE85R,F)	Q812
2SC4325(TE85R)	Q813, Q814
3SK177-T1 U73	Q861

#### DIODES

1SS355-TE17	D801, D802, D805, D807, D809, D810, D813
DA204U-T106	D804
DAN202U-T106	D803
RB886G-T2R	D806, D814
SML210VT-T86	D808
1SS356-TW11	D811
1SV232(TPH3,F)	D862, D863, D864, D865, D866
HVU131TRF	D867, D868

#### TCXO/ CRYSTAL FILTER

C-TYPE 1.5ppm	TCXO801
MF48Q 48.5MHZ	XF801

#### INDUCTORS

#3060(SMD-0071)	T801, T802, T803
BLM21BD421SN1D	BL802, BL803, BL805, BL806, BL808, BL809, BL811, BL812, BL861
FBM3216HM501NT	BL801, BL804
LL2012-FHL47NJ	L801
KQ1008TTE1R5K	L803
KQ1008TTE1R0K	L805
KQ1008TTE1R2K	L806
KQ1008TTE4R7K	L807, L809
LQW31HN39NJ	L861
#E558CNA-100035=P3	L862, L863, L867, L868
KQ1008TTER68K	L865
#E558CNA-100036=P3	L869
KQ0603TTE15NJ	L871, L875
KQ0603TTE10NJ	L872, L873, L874
LQW31HN23NJ	L876

#### CAPACITORS

TEESVA1C475M8R	C801
TEESVA1A106M8R	C802
EMVK160ADA100MD55G	C803, C823, C824, C825, C826, C828
GRM188B11H272KA01D	C804
GRM188B11H822KA01D	C805
GRM188B11H103KA01D	C806, C808, C820, C844, C852, C856
GRM216B11C105KA01L	C807, C842, C843, C894, C895
GRM188B11C334KA01D	C809, C812
GRM1882C1H101JZ01D	C810, C847, C848, C882
GRM1882C1H5R0DZ01D	C811
GRM188B11E104KA01D	C813, C814, C819, C832, C850
GRM188B11H153KA01D	C815
2AMMCCDC824JE	C817
GRM188B11C473KA01D	C818, C831, C857
TEECVB21C106M8R	C822
TEESVA1C225M8R	C827
GRM1883C1H3R0CZ01D	C829, C875
GRM188B11H102KA01D	C830, C833, C834, C836, C839, C841, C845, C851, C853, C854, C877, C878, C879, C880, C892, C881



### RX MAIN UNIT VHF"B" (CONT.) CAPACITORS (CONT.)

GRM1882C1H120JA01D	C837
GRM1882C1H9R0DD01D	C838
GRM1882C1H150JA01D	C840, C846, C849, C862
GRM1882C1H100JZ01D	C855
TEESVA1A475M8R	C858
GRM188B11A224KA01D	C859
GRM1882C1H560JA01D	C861
GRM1882C1H7R0DZ01D	C863
GRM1882C1H4R0CZ01D	C864
GRM1884C1H2R0CZ01D	C865
GRM1884C1H1R5CZ01D	C868, C869
GRM1882C1H330JA01D	C870, C872, C889
GRM1882C1H151JZ01D	C871, C888
GRM1883C1H2R5CZ01D	C874, C893
GRM1884C1HR75CZ01D	C885
GRM1884C1H1R0CZ01D	C886
GRM1882C1H390JA01D	C887
GRM1882C1H240JA01D	C897
GRM1882C1H6R0DZ01D	C898

### RESISTORS

MCR03EZHZ 000	L864, R861, L866, R888
MCR03EZHZ 471	R801, R839
MCR03EZHZ 563	R802
MCR03EZHZ 104	R803, R807, R831, R835, R837, R838, R859, R862, R870, R872, R873, R875, R882
MCR03EZHZ 682	R804, R805, R834
MCR03EZHZ 224	R806
MCR03EZHZ 473	R808, R809, R828, R836, R878, R880, R881
MCR03EZHZ 153	R810, R865
MCR03EZHZ 103	R811, R813, R814, R815, R816, R817, R854, R855, R869, R871, R874, R876, R823, R887
MCR03EZHZ 432	R812
MCR03EZHZ 472	R819, R832, R846,
MCR03EZHZ 244	R820
MCR03EZHZ 183	R821, R818, R843, R856
MCR03EZHZ 273	R822, R883
MCR03EZHZ 221	R825
MCR03EZHZ 152	R827

MCR03EZHZ 272	R829
MCR03EZHZ 101	R830, R845, R824
MCR03EZHZ 393	R833
MCR03EZHZ 332	R840
MCR03EZHZ 823	R841
MCR03EZHZ 154	R844
MCR03EZHZ 391	R847
MCR03EZHZ 680	R848
MCR03EZHZ 150	R849, R863
MCR03EZHZ 271	R850
MCR03EZHZ 151	R851, R852
MCR03EZHZ 470	R853, R868
MCR03EZHZ 123	R857, R879
MCR03EZHZ 100	R858
MCR03EZHZ 102	R860, R864, R826
MCR03EZHZ 560	R866
MCR03EZHZ 821	R867
MCR10EZHZ 470	R889

### CONNECTORS

ERTJVR102J	TH101
CRS5001-0801F	TP801
52030-1629	CN802
LPC-2FDS+C	CS802, CS803
LPC-6FDS+C	CS801
LPC-7FDS+C	CS804
4A-S587	CN801

### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
OPT-121-00	SPRING
TWT-113-00	SPRING
3A10-0654	RX/RF BPF COVER
4A10-3180	RX ANT SHIELD
4A10-2200	GNB SPRING
4A10-3037	TX COVER
4A10-3000	BOSS
2A10-0210	RX/TX FRAME
4A10-3198	RX SEAL
71RXV119-1	PCB

# Parts List

## Low Current Base Tech 3.5

### RX VCO UNIT VHF "B"

#### INTERGRATED CIRCUITS

UPC1688G-T1	IC301
TK70008	IC302

#### TRANSISTORS

2SK508-T1B K53	Q301
2SC4325(TE85R)	Q302
2SC3583-T1B(R34)	Q303
RAF040P01	Q304, Q306

#### DIODES

1SV231(TPH3,F)	D304
1SV232(TPH3,F)	D303, D305, D306
1SS356-TW11	D308

#### INDUCTORS

BLM21BD421SN1D	BL302, BL303
FBM3216HM501NT	BL301
ELJ-FC1R0KF	L301
KQ1008TTER82K	L302, L304, L305
#3074*	L303
LL2012-FHL68NJ	L306
#1092	L308
HK212522NJ	L309

#### CAPACITORS

GRM188B11C823KA01D	C302
GRM1882C1H120JA01D	C303
GRM1882C1H181JZ01D	C305
GRM1882C1H100JZ01D	C307
GRM1882C1H200JA01D	C308
GRM1882C1H7R0DZ01D	C309
GRM1882C1H6R0DZ01D	C310
GRM1884C1HR75CZ01D	C311
GRM188B11H102KA01D	C312, C313, C320, C323
GRM1884C1H1R0CZ01D	C314
GRM1882C1H150JA01D	C315
GRM1883C1H3R0CZ01D	C317
GRM21BB31A475KA74L	C318
TEESVA1A475M8R	C319
GRM1882C1H220JA01D	C321
GRM188B11H471KD01D	C322, C326
TEESVA1A106M8R	C324, C330

### RESISTORS

MCR03EZHZ 000	R306
MCR03EZHZ 221	R307
MCR03EZHZ 472	R308
MCR03EZHZ 752	R309
MCR03EZHZ 471	R310, R311
MCR03EZHZ 101	R312, R323
MCR03EZHZ 104	R314
MCR03EZHZ 473	R315, R322, R328
MCR03EZHZ 332	R316
MCR03EZHZ 102	R317
MCR03EZHZ 121	R318
MCR03EZHZ 4R7	R319
MCR03EZHZ 391	R320
MCR03EZHZ 150	R321
MCR03EZHZ 100	R326
MCR03EZHZ 270	R327
MCR10EZHZ 270	L307

### MISCELLANEOUS

RCT	TP301
LPC-2T7M+S	CP302
LPC-6T7M+S	CP301
4A10-2169	VCO SHIELD
4A10-2170	VCO COVER
4A10-3029	VCO SHIELD
71TCU11Y-1	PCB

### TX MAIN UNIT VHF "B"

#### INTERGRATED CIRCUITS

BD3931FP	IC201
XC6202P702P	IC202
TC75W51FU(TE12L,F)	IC204
TA75S01F(TE85R,F)	IC205, IC213
TC7WT125FU(TE12L,F)	IC206, IC207
MB1511PFV-G-BND-EFE	IC208
TC4S66F(TE85L,F)	IC209
NJU7662M-T1-TE1#ZZZB	IC210
BA00CC0WFP	IC211
NJM2904M	IC212

### TX MAIN UNIT VHF"B" (CONT.)

#### TRANSISTORS

2SK3018-T106	Q201, Q205, Q209, Q217
UMG1N TR	Q202, Q212
UMC2N-TR	Q204, Q210
2SD2351-T106	Q207
RTU002P02-T106	Q208
2SC2954-T1	Q211
DTC124EUA-T106	Q213
2SC4250(TE85R,F)	Q214
2SC4325(TE85R)	Q215, Q216

#### DIODES

1SS355-TE17	D201, D204, D207, D208, D209, D212, D215, D219
DA204U-T106	D203
HVU131TRF	D205
1SS356-TW11	D206, D218
RB886G-T2R	D210
SML210VT-T86	D214
RB501V-40TE17	D216

#### TCXO

C-TYPE 1.5ppm TX	TCXO201
------------------	---------

#### INDUCTORS

BLM21BD421SN1D	BL202, BL204, BL205, BL206
FBM3216HM501NT	BL203
BL01RN1A1D2B	BL207
#1092	L201
LQW31HN47NJ	L202

#### CAPACITORS

TEESVA1C475M8R	C201, C247, C249
TEESVA1C225M8R	C202, C230, C266
GRM216B11C105KA01L	C204, C206, C214, C220, C221, C227, C260, C218
TEESVA1A475M8R	C205
TEESVA1V105M8R	C207, C213
GRM188B11H102KA01D	C208, C209, C241, C243, C244, C250, C252, C255, C256, C267, C272, C273
GRM188B11H472KD01D	C210
GRM188B11H471KD01D	C211, C263
GRM1882C1H470JA01D	C215, C212, C242
GRM188B11E104KA01D	C219, C222, C238, C216, C217
GRM1882C1H151JZ01D	C223

GRM1882C1H100JZ01D	C224, C258, C268
GRM188B11E223KA01D	C225
GRM188B11H153KA01D	C226, C234, C248, R226
EMVK160ADA100MD55G	C228, C229, C231, C232,
TEESVB21C106M	C233
2AMMSSDC 824JE	C237
GRM188B11E333KA01D	C240
GRM1882C1H330JA01D	C245, C262
GRM188B11E154KA01D	C251, C265
GRM188B11H103KA01D	C253
GRM188B11C473KA01D	C254
GRM1884C1H1R0CZ01D	C257
GRM1882C1H120JA01D	C261

#### RESISTORS

MCR03EZHZ 000	R200, R209, R218, R260, R281, R228, R287, R237
MCR03EZHZ 562	R203, R210, R290, R295
MCR03EZHZ 822	R204, R270
MCR03EZHZ 103	R205, R206, R211, R223, R224, R225, R256, R275, R233
MCR18EZHZ 103	R207
MCR03EZHZ 184	R212
MCR03EZHZ 683	R213, R219, R288
MCR03EZHZ 473	R214, R220, R238, R264, R265, R269, R271, R289, R293
MCR03EZHZ 104	R216, R217, R243, R297, R258, R266, R267, R215, R292
MCR03EZHZ 203	R221
MCR03EZHZ 123	R222
MCR03EZHZ 273	R227, R255, R259, R290, R291, R263
MCR03EZHZ 472	R229, R241, R247
MCR03EZHZ 183	R230, R232
MCR03EZHZ 333	R231
MCR03EZHZ 221	R235
MCR03EZHZ 272	R239
MCR03EZHZ 101	R242, R234
MCR03EZHZ 150	R244
MCR03EZHZ 820	R245
MCR03EZHZ 151	R246
MCR10EZHZ 2R2	R248, R272
MCR10EZHZ 4R7	R249

# Parts List

## Low Current Base Tech 3.5

### TX MAIN UNIT VHF "B" (CONT.)

#### RESISTORS (CONT.)

MCR10EZHZJ 391	R250
MCR18EZHZJ 100	R251
MCR03EZHZJ 223	R252, R253
MCR03EZHZJ 102	R254, R236, R280
MCR03EZHZJ 153	R257, R278, R285
MCR03EZHZJ 332	R261, R294
MCR03EZHZJ 471	R262
MCR03EZHZJ 182	R268, R274
MCR18EZHZJ 471	R273
MCR03EZHZJ 560	R277
MCR03EZHZJ 274	R279

#### CONNECTORS

G32AT 103	FVR201,FVR204
G32AT 204	FVR202
G32AT 502	FVR203
ERTJVR102J	TH201
RCT	TP201
52030-1629	CN202
LPC-2FDS+C	CS202
LPC-6FDS+C	CS201
4A-S586	CN201

#### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
4A10-2200	GNB SPRING
4A10-3000	BOSS
4A10-3037	TX COVER
2A10-0210	TRX/TX FRAME
4A10-3197	TX SEAL
71TXU82-1	PCB

### RX MAIN UNIT UHF "A"

#### INTERGRATED CIRCUITS

BD3931FP	IC801
XC221A1200MR	IC802, IC810
TC7WT125FU(TE12L,F)	IC803, IC804
MB1511PFV-G-BND-EFE	IC806
NJU7662M-T1-TE1#ZZZB	IC807
TC4S66F(TE85L,F)	IC808

TA75S01F(TE85R,F)	IC809
GN2011	IC811
XC6216B702MR	IC813

#### TRANSISTORS

2SK3018-T106	Q801, Q805, Q807
2SD2351-T106	Q802, Q809
MCH3306-TL	Q803
UMC2N-TR	Q804, Q808
RTU002P02-T106	Q806
2SK508-T1B K53	Q810
DTA144EUA-T106	Q811
2SC4250(TE85R,F)	Q812
2SC4325(TE85R)	Q813, Q814
3SK177-T1 U73	Q861

#### DIODES

1SS355-TE17	D801, D802, D805, D807, D809, D810, D813
DAN202U-T106	D803
DA204U-T106	D804
RB886G-T2R	D806, D814
SML210VT-T86	D808
1SS356-TW11	D811
1SV229(TPH3,F)	D862, D863, D864, D865, D866
HVU131TRF	D867, D868

#### TCXO/ CRYSTAL FILTER

C-TYPE 0.5ppm	TCXO801
MF73Q 73.35MHZ	XF801

#### INDUCTORS

#3060(SMD-0071)	T801,T802,T803
FBM3216HM501NT	BL801,BL804
BLM21BD421SN1D	BL802, BL803, BL805, BL806, BL808, BL809, BL811, BL812, BL861
LL2012-FHL27NJ	L801
KQ1008TTER82K	L803
KQ1008TTER27K	L805
KQ1008TTER18K	L806
KQ1008TTE4R7K	L807
KQ1008TTE1R5K	L809
HK2125R22J	L810, L811
LQW31HN8N8J	L861

### RX MAIN UNIT UHF "A" (CONT.)

#### INDUCTORS (CONT.)

#3079	L862, L863, L867, L868, L869
LQW31HNR10J	L865
LL2012-FHL22NJ	L866
LQW31HN23NJ	L870

#### CAPACITORS

GRM216B11C105KA01L	C002, C003, C807, C842, C843
TEESVA1C475M8R	C801
TEESVA1A106M8R	C802
EMVK160ADA100MD55G	C803, C823, C824, C825, C826, C828
GRM188B11H272KA01D	C804
GRM188B11H822KA01D	C805
GRM188B11H103KA01D	C806, C820, C844, C852, C856
GRM188B11H102KA01D	C808, C830, C833, C834, C836, C839, C841, C845, C851, C853, C877, C878, C879, C880, C881, C892
GRM188B11C334KA01D	C809, C812
GRM1882C1H150JA01D	C810, C882
GRM1882C1H5R0DZ01D	C811, C840, C860, C861
GRM188B11E104KA01D	C813, C814, C819, C832, C001
GRM188B11H153KA01D	C815
2AMMSSDC684JE	C817
GRM188B11C473KA01D	C818, C831, C857
TEESVB21C106M8R	C822
TEESVA1C225M8R	C827
GRM1883C1H3R0CZ01D	C829, C849, C865
GRM1882C1H110JZ01D	C837
GRM1882C1H220JA01D	C847, C848
GRM1882C1H7R0DZ01D	C850, C866
GRM1882C1H101JZ01D	C854
GRM1882C1H100JZ01D	C855
TEESVA1A475M8R	C858
GRM188B11A224KA01D	C859
GRM1882C1H330JA01D	C862, C888
GRM1882C1H4R0CZ01D	C864, C867, C870, C872, C873, C874, C875, C884, C887, C889, C890, C895, C897, C898
GRM1884C1HR75CZ01D	C868, C869, C886
GRM1882C1H270JA01D	C871

GRM1884C1H2R0CZ01D	C883
GRM1884C1H1R0CZ01D	C885
GRM1882C1H200JA01D	C896
GRM1882C1H6R0DZ01D	C899

#### RESISTORS

MCR03EZHZ 471	R801, R839
MCR03EZHZ 563	R802
MCR03EZHZ 104	R803, R807, R831, R835, R837, R838, R859, R862, R863, R872, R873, R875, R882
MCR03EZHZ 682	R804, R805, R834, R846
MCR03EZHZ 224	R806
MCR03EZHZ 473	R808, R809, R828, R836, R880, R878, R881
MCR03EZHZ 153	R810, R857, R865
MCR03EZHZ 103	R811, R813, R814, R815, R816, R817, R823, R854, R855, R869, R871, R874, R887
MCR03EZHZ 432	R812
MCR03EZHZ 183	R818, R821, R843, R856
MCR03EZHZ 244	R820
MCR03EZHZ 273	R822, R883
MCR03EZHZ 470	R824, R853
MCR03EZHZ 221	R825, R847
MCR03EZHZ 102	R826, R860
MCR03EZHZ 272	R829
MCR03EZHZ 101	R830, R845
MCR03EZHZ 472	R832, R819
MCR03EZHZ 393	R833
MCR03EZHZ 332	R840
MCR03EZHZ 823	R841
MCR03EZHZ 154	R844
MCR03EZHZ 150	R848, R868
MCR03EZHZ 100	R849
MCR03EZHZ 271	R850
MCR03EZHZ 151	R851, R852
MCR03EZHZ 000	L864, R858, R861, R888
MCR03EZHZ 152	R864, R867, R827
MCR03EZHZ 560	R866
MCR03EZHZ 123	R879
MCR03EZHZ 394	R884
MCR10EZHZ 470	R889
ERTJVR102J	TH801

# Parts List

## Low Current Base Tech 3.5

### RX MAIN UNIT UHF "A" (CONT.)

#### CONNECTORS

CRS5001-0801F	TP801
52030-1629	CN802
LPC-2FDS+C	CS802,CS803
LPC-6FDS+C	CS801
LPC-7FDS+C	CS804
4A-S587	CN801

#### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
OPT-121-00	SPRING
TWT-113-00	SPRING
3A10-0654	RX/RF BPF COVER
4A10-3180	RX ANT SHIELD
4A10-2200	GNB SPRING
4A10-3037	RX/TX COVER
4A10-3000	BOSS
2A10-0210	RX/TX FRAME
4A10-3198	RX SEAL
71RXU119-1	PCB

### RX VCO UNIT UHF "A"

#### INTERGRATED CIRCUITS

UPC1688G-T1	IC301
TK70008	IC302

#### TRANSISTORS

2SK508-T1B K53	Q301
2SC4325(TE85R)	Q302
2SC3583-T1B(R34)	Q303
RAF040P01	Q304, Q306

#### DIODES

1SV232(TPH3,F)	D303, D304
1SS356-TW11	D308

#### INDUCTORS

BLM21BD421SN1D	BL302, BL303
FBM3216HM501NT	BL301
ELJ-FCR47KF	L301
KQ1008TTER47K	L302, L304
#3075	L303

KQ1008TTER27K	L305
LL2012-FHL33NJ	L306
#1091	L308
HK212515NJ	L309

#### CAPACITORS

GRM188B11C823KA01D	C302
GRM1882C1H4R0CZ01D	C303
GRM1882C1H180JA01D	C305
GRM1883C1H2R5CZ01D	C307
GRM1882C1H9R0DD01D	C308
GRM1882C1H6R0DZ01D	C309
GRM1882C1H5R0DZ01D	C310
GRM1884C1HR50CZ01D	C311, D306
GRM188B11H102KA01D	C312, C313, C320, C323
GRM1884C1HR75CZ01D	C314
GRM1882C1H100JZ01D	C315, C321
GRM1884C1H1R0CZ01D	C317
GRM21BB31A475KA74L	C318
TEESVA1A475M8R	C319
GRM188B11H471KD01D	C322
TEESVA1A106M8R	C324, C330
GRM1882C1H101JZ01D	C326

#### RESISTORS

MCR03EZHZ 150	R306, R321
MCR03EZHZ 221	R307
MCR03EZHZ 472	R308
MCR03EZHZ 752	R309
MCR03EZHZ 471	R310, R311
MCR03EZHZ 101	R312, R318, R323
MCR03EZHZ 104	R314
MCR03EZHZ 473	R315, R322, R328
MCR03EZHZ 332	R316
MCR03EZHZ 102	R317
MCR03EZHZ 4R7	R319
MCR03EZHZ 391	R320
MCR03EZHZ 100	R326
MCR03EZHZ 270	R327
MCR10EZHZ 270	L307

### RX VCO UNIT UHF "A" (CONT.)

#### MISCELLANEOUS

RCT	TP301
LPC-2T7M+S	CP302
LPC-6T7M+S	CP301
4A10-2169	VCO SHIELD
4A10-2170	VCO COVER
4A10-3029	VCO SHIELD
71TCU11Y-1	PCB

### TX MAIN UNIT UHF "A"

#### INTERGRATED CIRCUITS

BD3931FP	IC201
XC6202P702P	IC202
TC75W51FU(TE12L,F)	IC204
TA75S01F(TE85R,F)	IC205, IC213
TC7WT125FU(TE12L,F)	IC206, IC207
MB1511PFV-G-BND-EFE	IC208
TC4S66F(TE85L,F)	IC209
NJU7662M-T1-TE1#ZZZB	IC210
BA00CC0WFP	IC211
NJM2904M	IC212

#### TRANSISTORS

2SK3018-T106	Q201, Q205, Q209, Q217
UMG1N TR *	Q202, Q212
UMC2N-TR	Q204, Q210
2SD2351-T106	Q207
RTU002P02-T106	Q208
2SC3357-T1	Q211
DTC124EUA-T106	Q213
2SC4250(TE85R,F)	Q214
2SC4325(TE85R)	Q215, Q216

#### DIODES

1SS355-TE17	D201, D204, D207, D208, D209, D212, D215, D219
DA204U-T106	D203
HVU131TRF	D205
1SS356-TW11	D206, D218
RB886G-T2R	D210
SML210VT-T86	D214
RB501V-40TE17	D216

#### TCXO

C-TYPE 0.5ppm	TCXO201
---------------	---------

#### INDUCTORS

BLM21BD421SN1D	BL202, BL204, BL205, BL206
FBM3216HM501NT	BL203
BL01RN1A1D2B	BL207
#1091	L201
LQW31HN8N8J	L202

#### CAPACITORS

TEESVA1C475M8R	C201, C247, C249
TEESVA1A106M8R	C202
GRM216B11C105KA01L	C204, C206, C214, C220, C221, C227, C260, C218
TEESVA1A475M8R	C205
TEESVA1V105M8R	C207, C213
GRM188B11H102KA01D	C208, C209, C243, C244, C250, C252, C255, C256, C267, C272, C273
GRM188B11H472KA01D	C210
GRM188B11H471KD01D	C211, C241
GRM1882C1H470JA01D	C212, C215
GRM188B11E104KA01D	C216, C217, C219, C222, C238
GRM1882C1H150JA01D	C223, C245, C262
GRM1883C1H3R0CZ01D	C224, C258
GRM188B11E223KA01D	C225
GRM188B11H153KA01D	C226, C234, C248, R226
EMVK160ADA100MD55G	C228, C229, C231, C232
TEESVA1C225M8R	C230, C266
TEESVB21C106M	C233
2EMMSSDC 564JE	C237
GRM188B11E333KA01D	C240
GRM1882C1H330JA01D	C242
GRM188B11E154KA01D	C251, C265
GRM188B11H103KA01D	C253
GRM188B11C473KA01D	C254
GRM1884C1HR75CZ01D	C257
GRM1884C1H1R0CZ01D	C259
GRM1882C1H101JZ01D	C263
GRM1882C1H100JZ01D	C268

# Parts List

## Low Current Base Tech 3.5

### TX MAIN UNIT UHF "A" (CONT.)

#### RESISTORS

MCR03EZHZ 000	R200, R209, R218, R281, R285, R228, R287, R237
MCR03EZHZ 562	R203, R210, R295
MCR03EZHZ 822	R204, R270
MCR03EZHZ 103	R205, R206, R211, R223, R224, R225, R241, R256, R222, R275, R233, R285
MCR18EZHZ 103	R207
MCR03EZHZ 184	R212
MCR03EZHZ 683	R213, R219, R288
MCR03EZHZ 153	R214, R257, R278, R232
MCR03EZHZ 104	R215, R216, R243, R258, R266, R267, R292, R297
MCR03EZHZ 124	R217
MCR03EZHZ 473	R220, R238, R264, R265, R269, R271, R289, R293
MCR03EZHZ 203	R221
MCR03EZHZ 273	R227, R231, R255, R259, R263, R291, R290
MCR03EZHZ 472	R229, R247
MCR03EZHZ 183	R230
MCR03EZHZ 101	R234, R242, R260
MCR03EZHZ 221	R235
MCR03EZHZ 102	R236, R254, R280
MCR03EZHZ 272	R239
MCR03EZHZ 150	R244
MCR03EZHZ 271	R245
MCR03EZHZ 151	R246
MCR10EZHZ 2R2	R248, R272
MCR10EZHZ 4R7	R249
MCR10EZHZ 471	R250
MCR18EZHZ 100	R251
MCR03EZHZ 223	R252, R253
MCR03EZHZ 332	R261
MCR03EZHZ 471	R262
MCR03EZHZ 182	R268, R274
MCR18EZHZ 471	R273
MCR03EZHZ 560	R277
MCR03EZHZ 274	R279
MCR03EZHZ 392	R294
G32AT 103	FVR201, FVR204
G32AT 204	FVR202
G32AT 502	FVR203

#### CONNECTORS

RCT	TP201
ERTJVR102J	TH201
52030-1629	CN202
LPC-2FDS+C	CS202
LPC-6FDS+C	CS201
4A-S586	CN201

#### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
4A10-3000	BOSS
4A10-3037	TX COVER
2A10-0210	RX-TX FRAME
4A10-3197	TX SEAL
71TXU82-1	PCB

### RX MAIN UHF "B"

#### INTERGRATED CIRCUITS

BD3931FP	IC801
XC221A1200MR	IC802, IC810
TC7WT125FU(TE12L,F)	IC803, IC804
MB1511PFV-G-BND-EFE	IC806
NJU7662M-T1-TE1#ZZZB	IC807
TC4S66F(TE85L,F)	IC808
TA75S01F(TE85R,F)	IC809
GN2011	IC811
XC6216B702MR	IC813

#### TRANSISTORS

2SK3018-T106	Q801, Q805, Q807
2SD2351-T106	Q802, Q809
MCH3306-TL	Q803
UMC2N-TR	Q804, Q808
RTU002P02-T106	Q806
2SK508-T1B K53	Q810
DTA144EUA-T106	Q811
2SC4250(TE85R,F)	Q812
2SC4325(TE85R)	Q813, Q814
3SK177-T1 U73	Q861

#### DIODES

1SS355-TE17	D801, D802, D805, D807, D809, D810, D813
DAN202U-T106	D803
DA204U-T106	D804
RB886G-T2R	D806, D814
SML210VT-T86	D808
1SS356-TW11	D811
1SV229(TPH3,F)	D862, D863, D864, D865, D866
HVU131TRF	D867, D868



### RX MAIN UHF "B" (CONT.)

#### TCXO/ CRYSTAL FILTER

C-TYPE 0.5ppm	TCXO801
MF73Q 73.35MHZ	XF801

#### INDUCTORS

#3060(SMD-0071)	T801, T802, T803
FBM3216HM501NT	BL801, BL804
BLM21BD421SN1D	BL802, BL803, BL805, BL806, BL808, BL809, BL811, BL812, BL861
LL2012-FHL22NJ	L801, L866
KQ1008TTER82K	L803
KQ1008TTER27K	L805
KQ1008TTER18K	L806
KQ1008TTE4R7K	L807
KQ1008TTE1R5K	L809
HK2125R22J	L810, L811
LQW31HN8N8J	L861
#E558ANA-100051=P3	L862, L863, L867, L868, L869
LQW31HNR10J	L865
KS3006TTE18NJ	L870

#### CAPACITORS

GRM216B11C105KA01L	C002, C003, C807, C842, C843
TEESVA1C475M8R	C801
TEESVA1A106M8R	C802
EMVK160ADA100MD55G	C803, C823, C824, C825, C826, C828
GRM188B11H272KA01D	C804
GRM188B11H822KA01D	C805
GRM188B11H103KA01D	C806, C820, C844, C852, C856
GRM188B11H102KA01D	C808, C830, C833, C834, C836, C839, C841, C845, C851, C853, C877, C878, C879, C880, C881, C892
GRM188B11C334KA01D	C809, C812
GRM1882C1H150JA01D	C810, C847, C848, C882
GRM1882C1H5R0DZ01D	C811, C840, C861, C867, C873, C875, C884, C889, C890, C898
GRM188B11E104KA01D	C813, C814, C819, C832, C001
GRM188B11H153KA01D	C815
2AMMSSDC684JE	C817
GRM188B11C473KA01D	C818, C831, C857
TEESVB21C106M8R	C822
TEESVA1C225M8R	C827
GRM1883C1H3R0CZ01D	C829, C849, C865
GRM1882C1H110JZ01D	C837
GRM1882C1H6R0DZ01D	C850, C860, C899
GRM1882C1H101JZ01D	C854
GRM1882C1H100JZ01D	C855
TEESVA1A475M8R	C858
GRM188B11A224KA01D	C859
GRM1882C1H270JA01D	C862
GRM1882C1H4R0CZ01D	C864, C870, C872, C874, C887, C895, C897

GRM1882C1H7R0DZ01D	C866
GRM1884C1HR50CZ01D	C868, C869, C885, C886
GRM1882C1H240JA01D	C871
GRM1884C1H2R0CZ01D	C883
GRM1882C1H330JA01D	C888
GRM1882C1H200JA01D	C896

#### RESISTORS

MCR03EZHZ 471	R801, R839
MCR03EZHZ 563	R802
MCR03EZHZ 104	R803, R807, R831, R835, R837, R838, R859, R862, R863, R872, R873, R875, R882
MCR03EZHZ 682	R804, R805, R834, R846
MCR03EZHZ 224	R806
MCR03EZHZ 103	R811, R813, R814, R815, R816, R817, R823, R854, R855, R869, R871, R874, R887
MCR03EZHZ 473	R808, R809, R828, R836, R880, R878, R881
MCR03EZHZ 153	R810, R857, R865
MCR03EZHZ 432	R812
MCR03EZHZ 183	R818, R821, R843, R856
MCR03EZHZ 244	R820
MCR03EZHZ 273	R822, R883
MCR03EZHZ 470	R824, R853
MCR03EZHZ 151	R825, R851, R852
MCR03EZHZ 102	R826, R860
MCR03EZHZ 272	R829
MCR03EZHZ 101	R830, R845
MCR03EZHZ 472	R832, R819
MCR03EZHZ 393	R833
MCR03EZHZ 332	R840
MCR03EZHZ 823	R841
MCR03EZHZ 154	R844
MCR03EZHZ 221	R847
MCR03EZHZ 150	R848, R868
MCR03EZHZ 100	R849
MCR03EZHZ 271	R850
MCR03EZHZ 000	R858, R861, R888, L864
MCR03EZHZ 152	R864, R867, R827
MCR03EZHZ 123	R879
MCR03EZHZ 560	R866
MCR03EZHZ 394	R884
MCR10EZHZ 470	R889
ERTJVR102J	TH801

#### CONNECTORS

CRS5001-0801F	TP801
52030-1629	CN802
LPC-2FDS+C	CS802, CS803
LPC-6FDS+C	CS801
LPC-7FDS+C	CS804
4A-S587	CN801

# Parts List

## Low Current Base Tech 3.5

### RX MAIN UHF "B" (CONT.)

#### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
OPT-121-00	SPRING
TWT-113-00	SPRING
3A10-0654	RX/RF BPF COVER
4A10-3180	RX ANT SHIELD
4A10-2200	GNB SPRING
4A10-3037	TX COVER
4A10-3000	BOSS
2A10-0210	RX/TX FRAME
4A10-3198	RX SEAL
71RXU119-1	PCB

### RX VCO UNIT UHF "B"

#### INTERGRATED CIRCUITS

UPC1688G-T1	IC301
TK70008	IC302

#### TRANSISTORS

2SK508-T1B K53	Q301
2SC4325(TE85R)	Q302
2SC3583-T1B(R34)	Q303
RAF040P01	Q304, Q306

#### DIODES

1SV232(TPH3,F)	D303, D304
1SS356-TW11	D308

#### INDUCTORS

BLM21BD421SN1D	BL302, BL303
FBM3216HM501NT	BL301
ELJ-FCR47KF	L301
KQ1008TTER47K	L302, L304
#3078*	L303
KQ1008TTER27K	L305
LL2012-FHL22NJ	L306
#1091	L308
HK212515NJ	L309

#### CAPACITORS

GRM188B11C823KA01D	C302
GRM1882C1H4R0CZ01D	C303, C310
GRM1882C1H150JA01D	C305
GRM1884C1H2R0CZ01D	C307
GRM1882C1H7R0DZ01D	C308
GRM1882C1H5R0DZ01D	C309

GRM1884C1HR50CZ01D	C311
GRM1884C1HR75CZ01D	C314
GRM1882C1H100JZ01D	C315, C321
GRM188B11H102KA01D	C312, C313, C320, C323
GRM21BB31A475KA74L	C318
TEESVA1A475M8R	C319
GRM1884C1H1R0CZ01D	C317
GRM188B11H471KD01D	C322
TEESVA1A106M8R	C324, C330
GRM1882C1H101JZ01D	C326

#### RESISTORS

MCR03EZHZ 000	R306
MCR03EZHZ 221	R307
MCR03EZHZ 472	R308
MCR03EZHZ 752	R309
MCR03EZHZ 471	R310, R311
MCR03EZHZ 101	R312, R318, R323
MCR03EZHZ 104	R314
MCR03EZHZ 473	R315, R322, R328
MCR03EZHZ 332	R316
MCR03EZHZ 102	R317
MCR03EZHZ 4R7	R319
MCR03EZHZ 391	R320
MCR03EZHZ 150	R321
MCR03EZHZ 100	R326
MCR03EZHZ 270	R327
MCR10EZHZ 270	L307

#### MISCELLANEOUS

RCT	TP301
LPC-2T7M+S	CP302
LPC-6T7M+S	CP301
4A10-2169	VCO SHIELD
4A10-2170	VCO COVER
4A10-3029	VCO SHIELD
71TCU11Y-1	PCB

### TX MAIN UHF "B"

#### INTERGRATED CIRCUITS

BD3931FP	IC201
XC6202P702P	IC202
TC75W51FU(TE12L,F)	IC204
TA75S01F(TE85R,F)	IC205, IC213
TC7WT125FU(TE12L,F)	IC206, IC207
MB1511PFV-G-BND-EFE	IC208
TC4S66F(TE85L,F)	IC209
NJU7662M-T1-TE1#ZZZB	IC210
BA00CC0WFP	IC211
NJM2904M	IC212

#### TRANSISTORS

2SK3018-T106	Q201, Q205, Q209, Q217
UMG1N TR *	Q202, Q212
UMC2N-TR	Q204, Q210
2SD2351-T106	Q207
RTU002P02-T106	Q208
2SC3357-T1	Q211
DTC124EUA-T106	Q213
2SC4250(TE85R,F)	Q214
2SC4325(TE85R)	Q215, Q216

#### DIODES

1SS355-TE17	D201, D204, D207, D208, D209, D212, D215, D219
DA204U-T106	D203
HVU131TRF	D205
1SS356-TW11	D206, D218
RB886G-T2R	D210
SML210VT-T86	D214
RB501V-40TE17	D216

#### TCXO

C-TYPE 0.5ppm	TCXO201
---------------	---------

#### INDUCTORS

BLM21BD421SN1D	BL202, BL204, BL205, BL206
FBM3216HM501NT	BL203
BL01RN1A1D2B	BL207
#1091	L201
LQW31HN8N8J	L202

#### CAPACITORS

TEESVA1C475M8R	C201, C247, C249
TEESVA1A106M8R	C202
GRM216B11C105KA01L	C204, C206, C214, C220, C221, C227, C260, C218
TEESVA1A475M8R	C205
TEESVA1V105M8R	C207, C213
GRM188B11H102KA01D	C208, C209, C243, C244, C250, C252, C255, C256, C267, C272, C273
GRM188B11H472KA01D	C210
GRM188B11H471KD01D	C211, C241
GRM1882C1H470JA01D	C212, C215
GRM188B11E104KA01D	C216, C217, C219, C222, C238
GRM1882C1H150JA01D	C223, C262
GRM1883C1H3R0CZ01D	C224, C258
GRM188B11E223KA01D	C225
GRM188B11H153KA01D	C226, C234, C248, R226
EMVK160ADA100MD55G	C228, C229, C231, C232
TEESVA1C225M8R	C230, C266
TEESVB21C106M	C233
2EMMSSDC 564JE	C237
GRM188B11E333KA01D	C240
GRM1882C1H330JA01D	C242
GRM1882C1H100JZ01D	C245, C268
GRM188B11E154KA01D	C251, C265
GRM188B11H103KA01D	C253
GRM188B11C473KA01D	C254
GRM1884C1HR75CZ01D	C257
GRM1884C1H1R0CZ01D	C259
GRM1882C1H101JZ01D	C263

# Parts List

## Low Current Base Tech 3.5

### TX MAIN UHF "B" (CONT.)

#### RESISTORS

MCR03EZHZ 000	R200, R209, R218, R281, R285, R228, R287, R237
MCR03EZHZ 562	R203, R210, R295
MCR03EZHZ 822	R204, R270
MCR03EZHZ 103	R205, R206, R211, R223, R224, R225, R241, R256, R222, R275, R233, R285
MCR18EZHZ 103	R207
MCR03EZHZ 184	R212
MCR03EZHZ 683	R213, R219, R288
MCR03EZHZ 153	R214, R257, R278, R232
MCR03EZHZ 104	R215, R216, R243, R258, R266, R267, R292, R297
MCR03EZHZ 124	R217
MCR03EZHZ 473	R220, R238, R264, R265, R269, R271, R289, R293
MCR03EZHZ 203	R221
MCR03EZHZ 273	R227, R231, R255, R259, R263, R291, R290
MCR03EZHZ 472	R229, R247
MCR03EZHZ 183	R230
MCR03EZHZ 221	R235
MCR03EZHZ 272	R239
MCR03EZHZ 101	R242, R260, R234
MCR03EZHZ 150	R244
MCR03EZHZ 271	R245
MCR03EZHZ 151	R246
MCR10EZHZ 2R2	R248, R272
MCR10EZHZ 4R7	R249
MCR10EZHZ 471	R250
MCR18EZHZ 100	R251
MCR03EZHZ 223	R252, R253

MCR03EZHZ 102	R254, R236, R280
MCR03EZHZ 332	R261
MCR03EZHZ 182	R268, R274
MCR18EZHZ 471	R273
MCR03EZHZ 560	R277
MCR03EZHZ 274	R279
MCR03EZHZ 392	R294
MCR03EZHZ 471	R262
G32AT 103	FVR201, FVR204
G32AT 204	FVR202
G32AT 502	FVR203

#### CONNECTORS

RCT	TP201
ERTJVR102J	TH201
52030-1629	CN202
LPC-2FDS+C	CS202
LPC-6FDS+C	CS201
4A-S586	CN201

#### MISCELLANEOUS

SE-3 X 6	PCB SEMS SCREW
SE-3 X 8	COVER SEMS SCREW
70-033046	FLAT CABLE, 16P x 3"
4A10-3000	BOSS
4A10-3037	TX COVER
2A10-0210	RX-TX FRAME
4A10-3197	TX SEAL
71TXU82-1	PCB

### REPLACEMENT PARTS ORDERING

To speed delivery and avoid errors, have the following information ready when ordering replacement parts:

1. Identification of the part. The best identification is the Midland Part Number. Otherwise you will need to know the Model and Serial numbers of the equipment in which the part is used, a part description and the schematic reference designator. You may also need to return the old part as a sample.
2. Quantity desired.
3. Ship-to-address and billing address (if different).

Mail or Fax your order to:

Parts Department  
Midland Radio Corporation  
5900 Parretta Drive  
Kansas City, MO 64120  
Voice: 816-241-8500  
FAX: 816-241-5713



5900 PARRETTA DRIVE • KANSAS CITY • MISSOURI • 64120

PHONE: (816) 241-8500 • FAX: (816) 241-5713

[www.midlandradio.com](http://www.midlandradio.com)