

Vehicular  
Cross-band Repeater  
**VXR-1000 (VHF)**  
Service Manual

©2003 VERTEX STANDARD CO., LTD.

E137190A

**VERTEX STANDARD CO., LTD.**

4-8-8 Nakameguro, Meguro-Ku, Tokyo 153-8644, Japan

**VERTEX STANDARD**

**US Headquarters**

10900 Walker Street, Cypress, CA 90630, U.S.A.

**YAESU EUROPE B.V.**

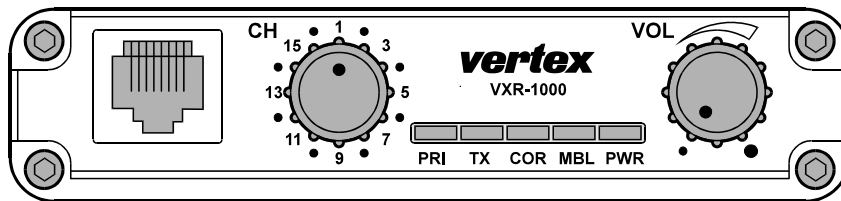
P.O. Box 75525, 1118 ZN Schiphol, The Netherlands

**YAESU UK LTD.**

Unit 12, Sun Valley Business Park, Winnall Close  
Winchester, Hampshire, SO23 0LB, U.K.

**VERTEX STANDARD HK LTD.**

Unit 5, 20/F., Seaview Centre, 139-141 Hoi Bun Road,  
Kwun Tong, Kowloon, Hong Kong



The VXR-1000 Series is designed to provide extended handheld coverage by repeating transmissions in both directions through an existing high power mobile radio.

Reliability is assured by a highly integrated surface mount circuit design and a aluminum extrusion chassis. Important channel frequency data is stored in EEPROM, and is easily programmable by dealers using a personal computer and the Vertex VPL-1 Programming Cable and CE-22 Software.

Please take a few minutes to read this manual carefully. The information presented here will allow you to derive maximum performance from your VXR-1000. After reading it, keep the manual handy for quick reference, in case questions arise later on.

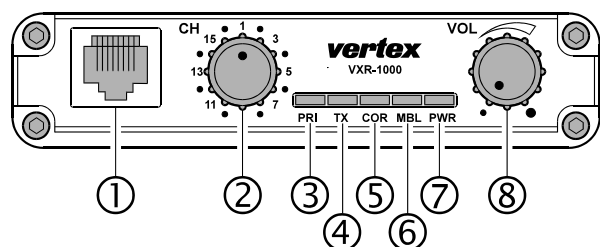
We're glad you joined the Vertex team. Call on us any time, because our business is communications. Let us help you get your message across.

## Contents

<b>Operating Manual Reprint .....</b>	<b>2</b>	<b>Exploded View &amp; Miscellaneous Parts .....</b>	<b>25</b>
<b>Specifications .....</b>	<b>4</b>	<b>Block Diagram .....</b>	<b>26</b>
<b>Installations .....</b>	<b>5</b>	<b>Circuit Description .....</b>	<b>27</b>
<b>Interconnection with</b>		<b>Alignment .....</b>	<b>29</b>
<b>Vertex VX- Series Transceiver .....</b>	<b>7</b>	<b>Repeater Cloning .....</b>	<b>32</b>
<b>VXR-1000 Trunking Interface Manual .....</b>	<b>11</b>	<b>Board Unit (Schematics, Layouts &amp; Parts)</b>	
<b>CE-22 Programming Software .....</b>	<b>14</b>	Main Unit .....	33

## CONTROLS & CONNECTORS

### Front Panel



#### ① Microphone Jack

Connect the microphone plug to this jack.

#### ② CHANNEL Selector Knob

This knob selects the operating channel.

#### ③ PRI Indicator

When on, "PRI" indicates that the unit is at priority count zero and will repeat all transmissions.

#### ④ TX Indicator

When on, "TX" indicates that the repeater is transmitting to the handheld.

#### ⑤ COR Indicator

This lamp *blinks* red when the VXR-1000 is receiving a signal from a handheld, and *glows* red while the VXR-1000 is receiving a sub-audible tone from the handheld.

#### ⑥ MBL Indicator

This lamp *blinks* red when the Mobile is receiving signal from repeater or base, and *glows* red while the Mobile is transmitting to the repeater or base.

#### ⑦ PWR Indicator

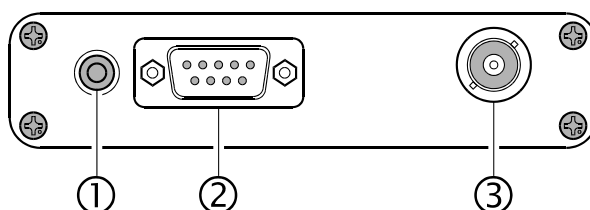
This is the main "POWER ON" indicator for the VXR-1000.

#### ⑧ VOLUME Knob

This knob adjusts the receiver volume.

Error Message	
No Channel Data (Operating Channel is Vacant)	<b>TX, COR, and PWR</b> Indicators Blink
ARTS Out of Range	<b>PWR</b> Indicator Blinks

### Rear Panel



#### ① EXT SP (External Speaker)

An external loudspeaker may be connected to this 2-contact, 3.5-mm mini-phone jack.

#### ② DSUB 9-Pin Accessory Connector

External TX audio line-input, PTT, external RX audio line-output, and other signals may be obtained from this connector for use with accessories.

Pin Assignments		Pin 1	GND
Pin 2	Mobile Transmit Audio	Pin 3	Power Supply Control
Pin 4	Mobile PTT Output	Pin 5	Vcc (13.8V DC)
Pin 6	Mobile Receive Audio	Pin 7	Mobile COR Detect
Pin 8	Mobile Microphone Audio	Pin 9	Mobile TX Detect/Mobile Microphone PTT

#### ③ Antenna Socket

The Antenna socket is a standard 50 Ω BNC antenna connector.

---

---

## HARDWARE SETTINGS

---

---

- JP1004:** Controls the output impedance of the transmit audio line to the mobile radio. Short: low-Z (600  $\Omega$ ); open: high-Z (4.7 k $\Omega$ ) \*
- JP1005:** Controls the maximum drive level of the transmit audio output to the mobile. Short: low level output (0-100 mV)\*; open: high level output (0-5 V).
- JP1001/1002/1003:**  
Polarity of Power supply control. Default setting: active high (JP1003: short).
- VR1001:** Mobile Microphone level
- VR1002:** Mobile RX Audio (External Modulation level)
- VR1007:** Mobile TX Audio (output level)  
\* default setting

The VXR-1000 has a fixed 3 minute time-out timer for base to handheld transmissions. If the mobile COR is active for more than 3 minutes it will send a error blip and cease transmission until the mobile COR is inactive.

---

---

## FUNCTIONAL DESCRIPTION

---

---

When the user leaves the vehicle, they activate their mobile radio via its front panel or a separate switch. When the mobile radio is receiving a signal, the VXR-1000 will begin transmitting on the hand-held's receive frequency. The user is able to hear and respond to all radio traffic, including other hand-helds on the same frequency. The repeater jumpers and potentiometers are custom-configured for use with the particular mobile radio to which it will be connected. The CE-22 software is used to program the repeater for the required operating parameters.

---

---

## TRUNKING OPERATION

---

---

When the radio is connected to a trunking mobile you wish to access the system from your handheld radio, key the handheld briefly then release the PTT key. The radio will attempt to acquire a voice channel on the trunking system by keying the mobile for 200 mS and monitoring the "on-air detect" line from the mobile. If the VXR-1000 does not see the radio transmit at all (system is busy), it will send a low tone to the handheld to alert you that the system is busy. The radio will automatically retry every 5 seconds and send a "busy" tone to the handheld with each unsuccessful attempt, to indicate progress of the call attempt. If unsuccessful after 30 seconds, the radio will transmit an "intercept" tone to alert the handheld that the call attempt failed.

When the VXR-1000 detects that the mobile is transmitting, it will continue to monitor the "on-air detect" line until the transmitter remains keyed for at least 250 mS to determine if the radio is merely handshaking or retrying. After successful acquisition of a voice channel, it will continue to hold the mobile's PTT active for 2 seconds and transmit a "go-ahead" blip to the handheld. You may then key their handheld to speak on the voice channel. If you do not key up within the 2-second period, the radio will unkey the mobile and send the "intercept" tone, as before.

# Specifications

## GENERAL

Frequency Range:	150 - 174 MHz (Receive frequencies within a $\pm 5$ MHz spread over the range 150 - 174 MHz)
Number of Channels:	16 Channels
Channel Spacing:	12.5/25 kHz
Supply Voltage:	13.8V DC, negative ground
Ambient Temperature Range:	-30 °C to +60 °C
Frequency Stability:	$\pm 2.5$ ppm
RF Input-Output Impedance:	50 $\Omega$
Audio Output Impedance:	8 $\Omega$
Case Size (WHD):	111 × 25.4 × 136 mm (4.4" × 1" × 5.4")
Weight:	400 g (0.9 lb.)

## RECEIVER

Circuit Type:	Double Conversion Superheterodyne
Sensitivity:	EIA 12dB SINAD 0.30 $\mu$ V
20 dB Quieting:	0.40 $\mu$ V
Squelch Threshold:	0.2 $\mu$ V to 2 $\mu$ V
Adjacent Channel Selectivity:	60 dB
Intermodulation Rejection:	60 dB
Spurious and Image Rejection:	60 dB
Conducted Spurious Emissions:	-57 dBm
Audio Output:	1 W into 8 $\Omega$ w/<5% THD
Hum and Noise:	-40 dB

## TRANSMITTER

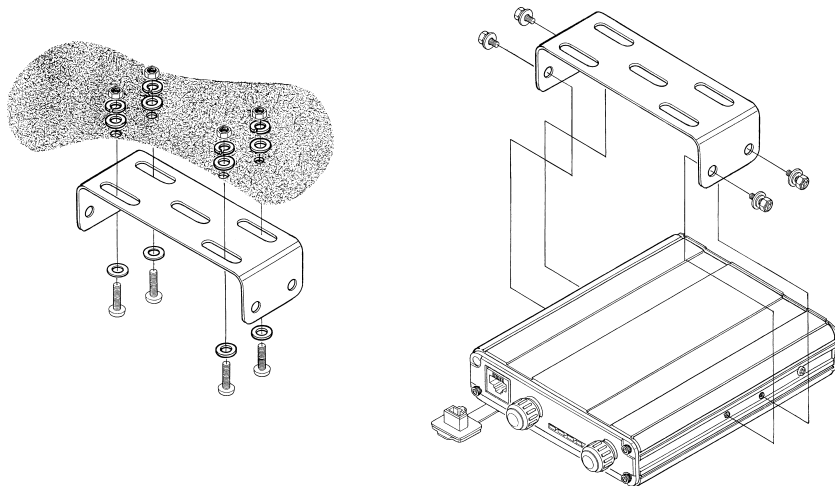
Power Output:	5.0/2.5/1.0/0.5 W
Modulation:	16K0F3E /11K0F3E
Maximum Deviation:	$\pm 5$ kHz/2.5 kHz
Conducted Spurious Emissions:	-60 dBc
FM Hum and Noise:	-40 dB

*Specifications may be subject to change without notice or obligation.*

The VXR-1000 must only be installed in vehicles having a negative ground electrical system. Mount the transceiver where the Indicators, controls, and microphone are easily accessible, using the supplied mounting bracket. The VXR-1000 may be installed in any position, but should not be positioned near a heating vent nor anywhere where it might interfere with driving (either visually or mechanically).

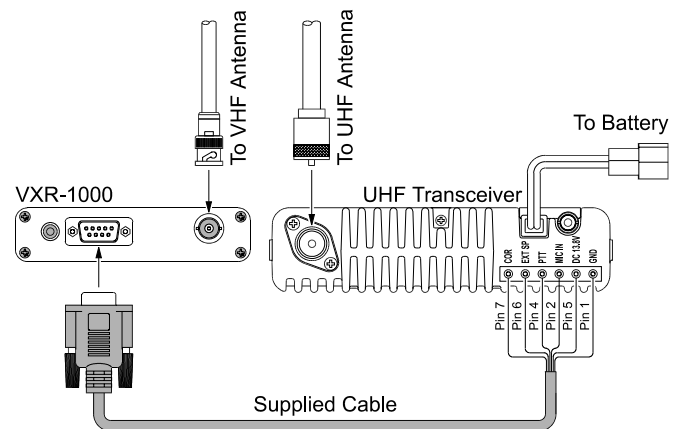
## VXR-1000 Installation

- ❑ Choose a mounting location with sufficient clearance for the VXR-1000, plus space for ventilation around the cooling fan and above and below the VXR-1000. Using the mounting bracket as a template for the mounting holes, use a 4.8 mm (3/16") bit to drill the mounting holes, and secure the mounting bracket with the supplied screws, washers, and nuts (see diagram).
- ❑ Position the VXR-1000 in the bracket so that the holes in the side are aligned with those in the bracket, and bolt the VXR-1000 into place using the supplied short screws and flat washers.



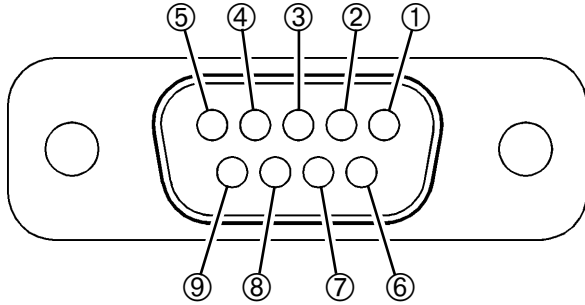
## VXR-1000 Connections

The VXR-1000 provides a convenient rear-panel Accessory Connector for easy connections to your transceiver. The connections to this jack are in accordance with a standard adopted by many commercial radio. However, we recommend that you verify the connections to any cable you already own by comparison to the pictorial below.



# Installations

## VXR-1000 Connections



### Pin 1: GND

Signal Ground

### Pin 2: Mobile Transmit Audio

Receive audio output from the VXR-1000, passed to the MIC jack of the mobile transceiver.

Output impedance can be changed via jumper JP1004.  
open: 4.7 k $\Omega$ , short: 600  $\Omega$  (default: open).

Output level can be changed via jumper JP1005 (range) and VR1007 (value).

open: -15 ~ +7 dBm, short: -40 ~ -15 dBm (default: short).  
Frequency response (pre-emphasis on/off) can be changed via CE-22 software (default: off).

### Pin 3: Power Supply Control

The polarity of the "Power Supply Control" line can be changed via jumpers JP1001/1002/1003.

high: 3 ~ 16 V

JP1001	J1002	J1003	Function
short	short	open	VXR-1000 turns on when this pin connects to ground.
short	open	short	VXR-1000 turns off when this pin connects to ground.
open	short	open	VXR-1000 turns off when this pin is "high" level.
open	open	short	VXR-1000 turn on when this pin is "high" level.

### Pin 4: Mobile PTT Output

This pin controls the mobile transceiver's TX/RX status. This pin is an open-collector, "active-low" circuit. When this pin closes to ground, the mobile transceiver is switched into the TRANSMIT mode. Maximum current: <20 mA.

### Pin 5: Vcc (13.8 V)

This pin is the DC power supply connection for the VXR-1000.

Maximum current: 2A.

### Pin 6: Mobile Receive Audio

Receiver audio input to the VXR-1000 from the mobile transceiver.

Input impedance: 100 k $\Omega$

The input level can be changed via CE-22 (range) and VR1002 (value).

CE-22 EXT MOD level "HIGH": -18 dBm ~ -2 dBm

CE-22 EXT MOD level "LOW": -36 dBm ~ -18 dBm

Frequency response (de-emphasis on/off) can be changed via CE-22 (default: off).

### Pin 7: Mobile COR Detect

Squelch control input (including the effect of a CTCSS or DCS detected tone) or audio mute line, also known as a "BUSY" line.

When this pin is at "high" level (mobile radio Squelch open), the VXR-1000 is commanded into the TRANSMIT mode.

Squelch open: 3 V, Squelch closed: 0 V.

Squelch open: >3 V, Squelch closed: 0 V.

This input level can be switched between "Squelch open" and "Squelch closed" when this pin is at "high" level via CE-22.

Impedance: 1 M $\Omega$ .

The Squelch Threshold level can be changed by adjustment of VR1003.

### Pin 8: Mobile Microphone Audio

Mobile microphone audio input. This is the same audio which is being sent to the mobile radio's Mic Amp circuit (i.e. the microphone's audio is "split" between the mobile radio and the VXR-1000)

Input impedance: 100 k $\Omega$

The input level to the mobile transceiver can be changed via CE-22 (range) and VR1001 (value).

CE-22 EXT MIC level "HIGH": -18 dBm ~ 0 dBm

CE-22 EXT MIC level "LOW": -44 dBm ~ -18 dBm

### Pin 9: Mobile TX detect/Mobile Microphone PTT

Mobile Tx/Rx control input.

This input function can be switched between "Mobile MIC PTT" input and "Mobile Tx Detect" line input via CE-22.

This input level can be switched between "Tx" and "Rx" when this pin is at "high" level via CE-22.

Input impedance: 10 k $\Omega$ .

**Note:** When the VXR-1000 is used in a Trunking system, the "Mobile TX Detect" input signal must be received from the mobile transceiver when connected to the Trunking system (the VXR-1000 checks this pin's level to confirm successful connection to the trunking system). When this pin is at "high" level (>3 V), the VXR-1000 is commanded into the TRANSMIT mode. When a successful "handshake" occurs with the Trunking system, this line goes "low" and the VXR-1000 is released into the RECEIVE mode.

# *Interconnection with Vertex VX- Series Transceivers*

This document outlines the interconnections and hardware settings required for interface of the Vertex VXR-1000 Compact Mobile Repeater to the Vertex VX- series of mobile transceivers.

## 1. Interconnections to Mobile Transceivers

The chart below shows the interconnections between J1004 on the VXR-1000 and the corresponding interface jacks on the compatible mobile transceivers.

VXR-1000 DSUP 9-pin Accessory Connector		FTL-7011		VX-2000		VX-3000	
Pin 1	GND	Pin 8 of J2006	GND	Pin 5 of J1003	GND	Pin 5 of J1004	GND
Pin 2	Mobile Transmit Audio	Pin 4 of J2006	MIC IN	Pin 3 of J1003	MOD IN	Pin 3 of J1004	EXM
Pin 3	Power Supply Control	Pin 12 of J2006	13.8V SWED	Pin 8 of J1003	+5V	Pin 8 of J1004	13 SWD
Pin 4	Mobile PTT Output	Pin 1 of J2006	PTT	Pin 7 of J1003	PTT	Pin 7 of J1004	PTT
Pin 5	V <sub>cc</sub> (13.8 V)	Pin 9 of J2006	13.8V	TP1003	13.8V	13.8 V IN	13.8V
Pin 6	Mobile Receive Audio	Pin 3 of J2001	DET IN	Pin 2 of J1003	DISC OUT	Pin 2 of J1004	LINE
Pin 7	Mobile COR Detect (Note 1)	Pin 1 of J2001 (or Base of Q2005)	SQ SG (AF MUTE)	Pin 1 of J1003 (or Base of Q1008)	SQ (AF MUTE)	Pin 1 of J1004	SQ
Pin 8	Mobile Microphone Audio	No Connection	–	No Connection	–	No Connection	–
Pin 9	Mobile TX detect/Mobile Mic. PTT (Note 2)	Pin 5 of J2005	RX/TX	TP1013	TX 9V	No Connection	–
Shield	GND	GND	–	GND	–	GND	–

Note 1: The Mobile COR Detect line may be connected, inside the mobile transceiver, to either points shown (e.g. for the VX-2000, either to Pin 1 of J1003 (SQ) or to the Base of Q1008 ) (AF MUTE). See Section 6 of this document for information regarding the Mobile COR Detect connection in the VX-3000.

Note 2: When the mobile transceiver is not used in a trunking environment, the “Mobile TX Detect” function is not used.

# Interconnection with Vertex VX-Series Transceivers

## 2. FTL-7011

(HARDWARE/SOFTWARE SETTINGS FOR VXR-1000)

### 2-1: VXR-1000 Internal Jumpers

POWER SUPPLY CONTROL:	JP1001	Open
	JP1002	Open
	JP1003	Jumper
VXR-1000 OUTPUT:	JP1004	Open
	JP1005	Jumper

### 2-2: CE-22 “Common Data” (F2) Settings

Use the “CE22 /P” option when starting the CE-22 Software.

PTT1 State: High (set to “Low” if connecting to the MUTE connection at the base of Q2005)

PTT2 State: Low (if no connection is made to Pin 9 of J1004, set to “High”)

Pre-Emphasis: Off

De-Emphasis: On

EXT MOD Level: Low

EXT MOD Level: Low

## 3. VX-2000

(HARDWARE/SOFTWARE SETTINGS FOR VXR-1000)

### 3-1: VX-2000 Internal Jumpers

These jumpers configure the interconnections made via the D-sub 9-pin connector on the rear of the VX-2000.

JP1002	Open
JP1003	Jumper
JP1004	Jumper
JP1005	Open

### 3-2: VXR-1000 Internal Jumpers

POWER SUPPLY CONTROL:	JP1001	Open
	JP1002	Open
	JP1003	Jumper
VXR-1000 OUTPUT:	JP1004	Open
	JP1005	Jumper

### 3-3: CE-22 “Common Data” (F2) Settings

Use the “CE22 /P” option when starting the CE-22 Software.

PTT1 State: High

PTT2 State: High

Pre-emphasis: Off

De-Emphasis: On

EXT MIC Level: Low

EXT MOD Level: Low

## 4. VX-3000

(HARDWARE/SOFTWARE SETTINGS FOR VXR-1000)

### 4-1: VX-3000 Internal Jumpers

These jumpers configure the interconnections made via the D-sub 9-pin connector on the rear of the VX-3000.

Note that the connections for the VX-3000L (Low-Band) are different from those for the VX-3000U.

VX-3000L	JP1002	Open
	JP1003	Jumper
	JP1004	Open
	JP1005	Jumper
	JP1009	Open
VX-3000U	JP1010	Jumper
	JP1003	Open (RXD)
	JP1004	Jumper (EXRA)
	JP1005	Open (TXD)
	JP1006	Jumper (EXM)
	JP1009	Open
	JP1010	Jumper

Connect a 10 kΩ resistor between Pin 1 and Pin 8 at J1004 of the VX-3000; this is a pull-up resistor for the Squelch line.

### 4-2: VX-3000 Software Settings in CE-19 for PTT and MIC

These settings must be set appropriately within CE19 in order for the VXR-1000 to work correctly with the VX-3000.



# Interconnection with Vertex VX- Series Transceivers

- [COMMON]
  - ↳ [ MISCELLANEOUS]
    - ↳ [ EXTERNAL PTT]
      - ↳ Set to (Mic & Option)
- [GROUP]
  - ↳ [CHANNEL ALLOCATIONS]
    - ↳ [GROUP]
      - ↳ [EXTERNAL MIC]
        - ↳ Set to (Enabled)

## 4-3: VXR-1000 Internal Jumpers

POWER SUPPLY CONTROL:	JP1001	Open
	JP1002	Open
	JP1003	Jumper
VXR-1000 OUTPUT:	JP1004	Open
	JP1005	Jumper

## 4-4: CE-22 “Common Data” (F2) Settings

Use the “CE22 /P” option when starting the CE-22 Software.

PTT1 State:	Low
PTT2 State:	Low
	(set to “High” when connecting to Pin 9 of J1004)
Pre-emphasis:	Off
De-emphasis:	On
EXT MIC Level:	Low
EXT MOD Level:	Low

## 5. Alignment

### 5-1: VXR-1000 Deviation Setting

On the connected mobile transceiver, receive a signal from an external signal source with 1 kHz modulation frequency and deviation level of  $\pm 3.0$  kHz ( $\pm 1.5$  kHz for the “Narrow” mode).

This signal, when passed from the connected mobile transceiver to the VXR-1000, should produce a transmitted signal from the VXR-1000 with 1 kHz deviation at not less than  $\pm 3.0$  kHz ( $\pm 1.5$  kHz for the “Narrow” mode).

If the deviation level from the VXR-1000 is not correct, adjust VR1002 (inside the VXR-

1000) for an output deviation of  $\pm 3.0$  kHz ( $\pm 1.5$  kHz in the “Narrow” mode).

### 5-2: VXR-1000 Receiver Output Level Setting

When the VXR-1000 receives a signal from an external signal source (on the uplink frequency used by the portable transceiver) modulated at 1 kHz at a level of  $\pm 3.0$  kHz ( $\pm 1.5$  kHz in the “Narrow” mode”), the output passed to the connected mobile transceiver should produce a transmitted output signal from the mobile at a level of  $\pm 3.0$  kHz ( $\pm 1.5$  kHz in the “Narrow” mode”).

If the output level to the mobile does not produce correct deviation from the mobile, adjust VR1007 (inside the VXR-1000) so that the transmitted output from the mobile is modulated at a level of  $\pm 3.0$  kHz ( $\pm 1.5$  kHz in the “Narrow” mode”).

## 6. Trunking System configuration

All trunking parameters depend on the configuration of the individual trunking system in which the connected mobile transceiver is used. Please consult the CE22 programming instructions, and the separate “VX-1000R Trunking Interface Manual,” for information about the software and other settings for the VXR-1000 when integrated into a trunking environment.

## 7. Miscellaneous

In order to improve the audio muting performance of the VX-3000, a minor circuit change was adopted from Production Lot #03 (VX-3000L/U) and 04 (VX-3000V), and this change was reflected in CE-19 software version 1.16. This change affects the connection point for the Squelch (Mobile COR Detect) line, and the connection point is identified as “AF MUTE •” in the various documentation for the VX-3000.

The configuration version can be identified by looking for the presence of a jumper connection at jumper pad JP1002 in the VX-3000U, or JP1016 in the VX-3000L. The connections for the Mobile COR Detect line should be made as follows:

## *Interconnection with Vertex VX- Series Transceivers*

### VX-3000U

If JP1002 is not jumpered, connect this line to Pin 8 of Q1043.

If JP1002 is jumpered, connect the Mobile COR Detect line to JP1002.

### VX-3000L

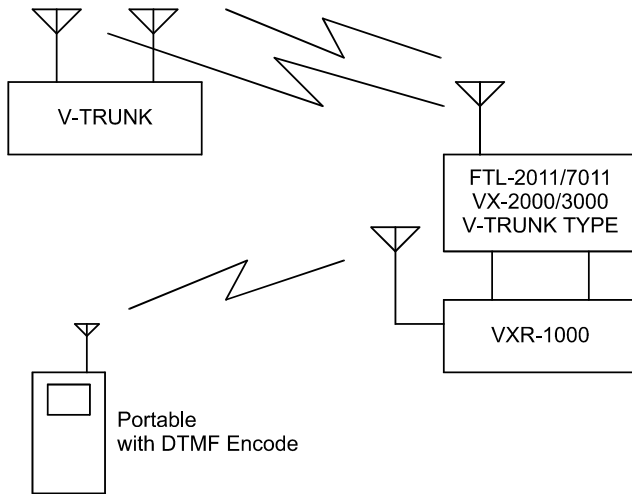
If JP1016 is not jumpered, connect this line to Pin 8 of Q1043.

If JP1016 is jumpered, connect the Mobile COR Detect line to JP1016.

# VXR-1000 Trunking Interface Manual

This document outlines the interconnections and hardware settings required for interface of the Vertex VXR-1000 Compact Mobile Repeater to the Vertex VX- series of mobile transceivers in a trunked environment (using the Vertex VX-Trunk System).

The illustration below outlines the basic configuration of a VX-Trunk system, using the VXR-1000 as a range extender for a portable transceiver.



## 1. EQUIPMENT REQUIRED

**Portable Transceiver:** Must have a DTMF Encoder installed.

**Mobile Transceiver:** Must be configured for operation within VX-Trunk System. Compatible models include FTL-7011, VX-2000, and VX-3000. Please refer to the VX-Trunk System documentation for configuration details for the mobile transceiver.

## 2. INTERCONNECTIONS FROM VXR-1000 TO MOBILE TRANSCEIVERS

### 2-1: Interconnections to FTL-7011/Configuration

#### 2-1-1: VXR-1000 Internal Jumpers

JP1004 Open  
JP1005 Jumpered

### 2-1-2: VXR-1000 Interconnections to FTL-7011

VXR-1000 DSUB 9-pin Accessory Connector	FTL-7011
Pin 1: GND	Pin 8 of J2006
Pin 2: Mobile Transmit Audio	Pin 4 of J2006
Pin 3: Power Supply Control	Pin 12 of J2006
Pin 4: Mobile PTT Output	Pin 1 of J2006
Pin 5: Vcc (13.8 V)	Pin 9 of J2006
Pin 6: Mobile Receive Audio	Pin 3 of J2001
Pin 7: Mobile COR Detect	Pin 1 of J2001
Pin 8: Mobile Microphone Audio	No Connection
Pin 9: Mobile TX detect/Mobile Mic. PTT	No Connection

## 2-2: Interconnections to VX-2000/Configuration

### 2-2-1: VXR-1000 Internal Jumpers

JP1004 Open  
JP1005 Jumpered

### 2-2-2: VX-2000 Internal Jumpers

JP1002 Jumpered  
JP1003 Open  
JP1004 Open  
JP1005 Open  
JP1007 Open  
JP1008 Open  
JP1009 Open

Connect a jumper from Pin 3 of J1003 to the shared side of JP1009/Pin 4 of J1007.

Remove R1010

Connect a jumper from Pin 7 of J1003 to the shared side of JP1008/Pin 1 of J1007.

Connect a jumper between Pin 4 of J1003 and Pin 6 of the connector of the VTM-20 Trunking Controller board.

### 2-2-3: VXR-1000 Interconnections to VX-2000

The chart below describes the individual wire functions for the cable connected between the D-Sub 9-pin connectors on the VXR-1000 (J1004) and VX-2000 (J1003).

VXR-1000 DSUB 9-pin Accessory Connector	VX-2000
Pin 1: GND	Pin 5 of J1003
Pin 2: Mobile Transmit Audio	Pin 3 of J1003
Pin 3: Power Supply Control	Pin 8 of J1003
Pin 4: Mobile PTT Output	Pin 7 of J1003
Pin 5: Vcc (13.8 V)	Switched 13.8VDC output from the Power Switch
Pin 6: Mobile Receive Audio	Pin 2 of J1003
Pin 7: Mobile COR Detect	Pin 4 of J1003
Pin 8: Mobile Microphone Audio	No Connection
Pin 9: Mobile TX detect/Mobile Mic. PTT	No Connection

# VXR-1000 Trunking Interface Manual

## 2-3: Interconnections to VX-3000/Configuration

### 2-3-1: VXR-1000 Internal Jumpers

- \*JP1004 Open
- \*JP1005 Jumpered

### 2-3-2: VX-3000 Internal Jumpers

- \*JP1003 Open
- \*JP1004 Jumpered
- \*JP1005 Open
- \*JP1006 Open
- \*JP1007 Open
- \*JP1008 Open

\* Connect a jumper between the shared side of JP1006/JP1006 and Pin 7 of J1003.

\* Connect a jumper between the shared side of JP1007/JP1008 and Pin 2 of J1005.

### 2-3-3: VXR-1000 Interconnections to VX-3000

The chart below describes the individual wire functions for the cable connected between the D-Sub 9-pin connectors on the VXR-1000 (J1004) and VX-3000 (J1004).

VXR-1000 DSUB 9-pin Accessory Connector	VX-3000
Pin 1: GND	Pin 5 of J1004
Pin 2: Mobile Transmit Audio	Pin 3 of 1004
Pin 3: Power Supply Control	Pin 8 of J1004
Pin 4: Mobile PTT Output	Pin 7 of J1004
Pin 5: Vcc (13.8 V)	Switched 13.8VDC output from the Power Switch
Pin 6: Mobile Receive Audio	Pin 2 of J1004
Pin 7: Mobile COR Detect	Pin 4 of J1004
Pin 8: Mobile Microphone Audio	No Connection
Pin 9: Mobile TX detect/Mobile Mic. PTT	No Connection

## 3. VXR-1000 CONFIGURATION

For operation in a VX-Trunk II environment, note the following setup tips regarding the VXR-1000 (set via the CE-22 software):

- The VXR-1000's "Pri Timer" option must be set to a non-zero value by CE-22).
- In CE-22, set the TRUNKING mode to OFF (for VX-Trunk II only; for other Trunking systems like LTR, this parameter must be set to ON).
- Set PTT1 to HIGH.
- Other parameters such as Master/Slave and Sub\_Audio may be set via CE-22 per the customer's operating requirements.

## 4. VX-TRUNK SYSTEM OPERATING

### EXAMPLE

### 4-1: Making a Call from the Portable

1. Press the portable's PTT key for longer than the "Sampling Time" of the VXR-1000, so as to ensure that the VXR-1000 receives the portable's signal, then press "3 \*" while transmitting to connect to the VX-Trunk II system.
2. When the "3 \*" is completed, immediately release the portable's PTT key, so as to return the portable to the receive mode.
3. If the VX-Trunk system receives the connection command, a double "beep" will be heard from the portable's speaker.
4. Press the portable's PTT key for longer than the "Sampling Time" of the VXR-1000, so as to ensure that the VXR-1000 receives the portable's signal, and enter the other unit's 5-digit subscriber number via the portable's DTMF pad. Now release the portable's PTT key to return the portable to the receive mode.
5. When the subscriber number is successfully received by the VX-Trunk II system, and a connection thereby initiated, the VX-Trunk II system will respond, and a double "beep" will be heard from the speaker of the portable.

### 4-2: Receiving a Call at the Portable

1. When the mobile connected to the VXR-1000 receives a connection request from the VX-Trunk II system, it relays a "connection tone" to the portable. When this happens, press the PTT key on the portable.
2. Hold in the PTT key on the portable longer than the "Sampling Time" programmed for the VXR-1000, then press the DTMF "\*" key. After pressing the "\*" key, release the PTT key on the portable.
3. When the VX-Trunk II system receives the "\*" response from the portable, it will respond, and a double "beep" will be heard from the speaker of the portable.

### 4-3: Terminating a Call from the Portable

1. Press the portable's PTT key.
2. Hold the portable's PTT key for longer than the "Sampling Time" of the VXR-1000, then press the "#" key. The call will now be terminated, and you may release the portable's PTT key.

## 5. NOTES RE TRUNKING OPERATION

5-1:

The VX-Trunk II system operates in a full duplex mode.

In this environment, while a call is in progress, the connected mobile passes the received audio through to the VXR-1000 for re-transmission to the portable. In order for the portable to be able to "capture" the VXR-1000 to make a transmission back to the other party, the VXR-1000 must be set, via the CE-22 software, for a "Priority Timer" setting (Pri Timer) which is not zero. A very short time will allow quick

interruption, but the incoming message from the VXR-1000 to the portable may sound "choppy" due to the frequent interrupts.

When the portable transmits longer than the "Priority Timer" setting, the VXR-1000 will interrupt its transmission, and the VXR-1000 will instantly switch to the "receive" mode on the portable's transmitting frequency.

5-2: VXR-1000 Local Microphone

In order to facilitate the above sampling feature, it is not possible to use a "Local" mic (a DTMF microphone attached to the VXR-1000) for access to the VX-Trunk II system.

# CE-22 Program Software

The Vertex CE-22 program is a software package which controls the VXR-1000's "Clone Edit" feature. This manual outlines the installation and use of the CE-22 software when used with the VXR-1000.

## 1. CE-22 Installation and Operating Modes

The Vertex CE-22 program is an integrated software package designed to work with IBM PC, XT, AT, or compatible computers. In order for CE-22 to run properly, your computer must run DOS v3.0 (or a later version).

### 1-1: CE-22 Installation

There is no installation software included with your distribution diskette.

Use standard DOS procedures to install the software on your hard drive.

For example, let us create a directory named "Vertex" into which we shall install the CE-22 software. First, make a copy of the distribution diskette, then use the archive copy for the installation from (floppy) Drive A:

```
c:\ mkdir vertex [ENTER]
c:\ cd\vertex [ENTER]
c:\ vertex copy a:*.* [ENTER]
```

The files on the archive floppy disk will now be copied to your hard drive into the new "vertex" directory.

### 1-2: Starting CE-22

Before starting the CE-22 program, connect the VPL-1 Cloning Cable between your computer's COM port and the VXR-1000's MIC jack.

Connecting the VPL-1 cable automatically initiates the "CLONE" (programming) mode, and the PWR LED will blink while the CLONE mode is active.

If your computer has more than one COM port, you may select the COM port to be used via the "Common Data" window (accessed by pressing F2 after CE-22 is started). Either COM1 or COM2 may be utilized.

To start CE-22, be sure your computer screen is displaying the DOS prompt. The procedure thereafter is: c:\ ce22 [ENTER]

The CE-22 program will now start. After five seconds in an initial Program Identification screen, the software will automatically switch to the main Channel Editing Screen.

### 1-3: Startup Options

Two mode options for CE-22 are available.

The standard ce22 command allows all normally-required channel data entry parameters to be entered and/or edited. Additionally, the COM port line in the "Common Data" window may also be changed. However, other "Common Data" parameters cannot be changed, although they are visible in the window.

The alternative ce22 /p option allows editing of the other parameters in the "Common Data" window. While changes to these parameters are not normally required, major system changes may necessitate modification of one or more "Common Data" items. If this is the case, type ce22 /p [ENTER] instead of (only) ce22 [ENTER] when starting the program.

## 2. Sending/Downloading Data from the VXR-1000

### 2-1: Reading Data from VXR-1000

When you start up CE-22, it is often useful to download the current channel information from the VXR-1000 for archive purposes.

To do this, press F5. The current data will be read by the computer, and the data will appear on the screen. If you wish to save this data to disk, press F4 and assign a file name into which the archive data will be saved.

### 2-2: Loading Data to VXR-1000

When all channel data has been successfully set up, press F6 to send the channel data to the VXR-1000.

### 2-3: Saving Data to Disk

Channel programming data may be saved to your computer's hard drive, or to a floppy

py diskette, by use of the F4 command. You will be prompted to define a file name to be used. Standard DOS file name specifications should be used (e.g. no more than eight characters in the file name).

If you wish to create a separate sub-directory (so as to store files for different customers in different sub-directories, for example), press [Tab], then press [F3], to activate the [Mk Dir] (Make Directory) function. You can then type in the name you wish to use for this sub-directory, then continue with the file storage process.

### 2-4: Printing Hard Copy

To print a copy of the currently-displayed channel data file, press [F7] when all programming steps have been completed. This allows you to attach a copy of the programming information to the programming work order, for the convenience of the customer.

### 3. Programming Navigation/ Use of SPACE Key

When CE-22 is initially started with a new VXR-1000, only CHANNEL 1 will be showing.

Use the UP and DOWN keys to navigate to different channel numbers. Use the LEFT and RIGHT keys to navigate between the various columns of a particular channel programming line. Beginning in Section 4 of this manual, we will only discuss a single line of channel programming data, as each line of channel programming data is identical (except for the fact that CHANNEL 1's data cannot be hidden).

### 3-1: Hiding/Un-hiding Channel Data using SPACE Bar

The SPACE bar is used in many programming steps to activate or de-activate a particular function.

If the cursor is on the channel number column, however, pressing the SPACE bar will toggle between hiding of that channel number's data and re-activating that channel number's data. CHANNEL 1's data, however, cannot be hidden.

A channel number on which data has been hidden will display "-- --" in place of the field entries. On the VXR-1000, if you select a "hidden" channel, three indicators will blink to alert you to this fact.

If you make a change to the programming of a "hidden" channel at a later time, the channel will automatically be re-activated (removed from "hidden" status). You will need to return to the Rx Freq field in order to re-hide it.

### 3-2: Primary Use for SPACE Bar

In many programming steps, such as CTCSS or DCS tone/code entry, an initial press of the SPACE bar will activate the parameter (turn it on) or de-activate the parameter (turn it off). In each such step, you will be prompted in the upper-right-hand window as to additional steps to be taken to secure the final value for the parameter you are currently setting.

In programming steps where a numerical value is required, press the [Space] bar to increase the value, or [Back Space] to decrease the value.

## 4. Channel Frequency Programming

### 4-1: Rx Freq.

#### (Edit Receive (or Simplex) Frequency)

Use the 0 - 9 keys to enter the desired channel frequency directly, and press [ENTER]. The frequency entered will be adjusted automatically if it does not conform to the "CHANNEL STEP" parameter, and will be adjusted to the nearest "valid" step; the frequency will also appear in the Tx Freq. field (next step) automatically, to simplify entry if the current channel is to be used on Simplex. You do not need to enter all eight digits of the frequency; empty digits to the right will be set to "0" when you press [ENTER]. Pressing [.] ("period") after several digits forces those digits to be "MHz" digits. If you press [.] before entering any digits, only the "kHz" digits will be changed.

Pressing only the SPACE bar, without entering any frequency digits, toggles the data for the entire channel between "hidden" and

## CE-22 Program Software

"active" status (except for CHANNEL 1, which cannot be hidden).

Hidden channels will show "-- --" in place of the various field entries, and they are not available for operation. However, they are still stored in "hidden" form for possible recall later.

**Note:** Any entries or changes made to the Rx Freq. field will also be applied to the Tx Freq. field, so you may need to edit that field after making any changes here.

### 4-2: Tx Freq. (Edit Transmit Frequency)

Use the 0 - 9 keys to enter the desired channel frequency directly, and press [ENTER]. The frequency entered will be adjusted automatically if it does not conform to the "CHANNEL STEP" parameter, and will be adjusted to the nearest "valid" step. You do not need to enter all eight digits of the frequency; empty digits to the right will be set to "0" when you press [ENTER]. Pressing [.] ("period") after several digits forces those digits to be "MHz" digits. If you press [.] before entering any digits, only the "kHz" digits will be changed.

**Note:** The Transmit Frequency is automatically copied from the Receive Frequency's column, so any changes you have made to the Tx Freq. field will be LOST if the Rx Freq. field is modified. Therefore, you should set the Rx Freq. field data first, then edit the Tx Freq. field.

## 5. CTCSS/DCS Decoders and Encoders

### 5-1: CTCSS Decoder

(Toggles CTCSS Decoder ON/OFF, Sets CTCSS Freq.) Press the SPACE bar to toggle the CTCSS Decoder ON or OFF, or press [ENTER] to display the TONE SELECT window, from which you may select a CTCSS frequency using the Arrow keys; press [ENTER] again to accept the selected tone, or press [ESC] to cancel.

If you know the CTCSS frequency you want (the precise value), you can enter it directly using the 0 - 9 keys and the [.] ("period") key.

When the desired CTCSS frequency is dis-

played, press [ENTER] to accept this value. If you keyed in an invalid frequency (not among the "standard" CTCSS tone list), the TONE SELECT window will appear, with the nearest valid CTCSS frequency pre-selected.

Turning CTCSS ON turns DCS OFF (since both cannot be ON). CTCSS cannot be selected for use if ARTS is enabled (ARTS uses DCS only).

### 5-2: DCS Decoder

(Toggles DCS Decoder ON/OFF, Sets DCS Code #)

Press the SPACE bar to toggle the DCS Decoder ON or OFF, or press [ENTER] to display the CODE SELECT window, from which you may select a DCS code using the Arrow keys; press [ENTER] again to accept the selected code, or press [ESC] to cancel.

If you know the three-digit DCS code you want, you can enter it directly using the 0 - 9 keys. When the desired DCS code is displayed, press [ENTER] to accept this value.

If you keyed in an invalid code number (not among the "standard" DCS code list), the CODE SELECT window will appear, with the nearest valid DCS code number pre-selected.

Turning the DCS Decoder ON turns CTCSS OFF (since both cannot be ON). DCS Encode and Decode are both required for ARTS operation.

### 5-3: CTCSS Encoder

(Toggles CTCSS Encoder ON/OFF, Sets CTCSS Freq.)

Press the SPACE bar to toggle the CTCSS Encoder ON or OFF, or press [ENTER] to display the TONE SELECT window, from which you may select a CTCSS frequency using the Arrow keys; press [ENTER] again to accept the selected tone, or press [ESC] to cancel.

If you know the CTCSS frequency you want (the precise value), you can enter it directly using the 0 - 9 keys and the [.] ("period") key.

When the desired CTCSS frequency is displayed, press [ENTER] to accept this value. If you keyed in an invalid frequency (not



among the "standard" CTCSS tone list), the TONE SELECT window will appear, with the nearest valid CTCSS frequency pre-selected.

Turning CTCSS ON turns DCS OFF (since both cannot be ON). CTCSS cannot be selected for use if ARTS is enabled (ARTS uses DCS only).

**Note:** Turning on the CTCSS Encoder automatically turns off the DCS Encoder, if it was on.

### 5-4: DCS Encoder

(Toggles DCS Encoder ON/OFF, Sets DCS Code #)

Press the SPACE bar to toggle the DCS Encoder ON or OFF, or press [ENTER] to display the CODE SELECT window, if you are not viewing it already); press [ENTER] again to accept the selected code, or press [ESC] to cancel.

If you know the three-digit DCS code you want, you can enter it directly using the 0 - 9 keys. When the desired DCS code is displayed, press [ENTER] to accept this value.

If you keyed in an invalid code number (not among the "standard" DCS code list), the CODE SELECT window will appear, with the nearest valid DCS code number pre-selected.

Turning the DCS Encoder ON turns CTCSS OFF (since both cannot be ON). DCS Encode and Decode are both required for ARTS operation.

## 6. ARTS (Automatic Range Transponder System) Operation

The ARTS feature causes the VXR-1000 to "shake hands" electronically with the user's ARTS-compatible portable transceiver. If the portable fails to shake hands with the VXR-1000 in two successive handshake cycles, the PWR lamp will begin blinking, so as to indicate "Out of Range" status for the portable.

ARTS operation requires that DCS Encode and Decode be engaged. It will not function using CTCSS nor carrier-only squelch. The

portable radio's ARTS Mode must be in complement in order for ARTS to function correctly.

### 6-1: ARTS Mode

ARTS operates in one of four modes, described below:

**OFF:** ARTS is not active on this channel. No handshaking is performed.

**RX:** The VXR-1000 receives handshake signals from the portable, but does not send handshake signals itself. If an out-of-range condition occurs, the VXR-1000 will indicate "Out-of-Range" locally, but the portable user will not receive an "Out-of-Range" warning.

**TX:** The VXR-1000 sends out handshake signals, but does not act on handshake signals received. If an out-of-range condition occurs, the portable user will receive an "Out-of-Range" warning (if the portable is properly programmed), but the VXR-1000 will not indicate an out-of-range condition locally.

**TRX:** Both the TX and RX functions described above are active.

Press the SPACE bar to select the desired ARTS Mode.

### 6-2: ARTS Int (Interval)

The ARTS Interval is the amount of time between ARTS handshake transmissions issued by the VXR-1000. Two selections are available: 25 seconds or 55 seconds. The portable radio's ARTS Interval setting must match that of the VXR-1000 in order for ARTS to function correctly.

Press the SPACE bar to select the desired ARTS Interval.

## 7. DCS Type (Normal/Inverted)

### 7-1: DCS Type

This command is effective only when DCS is chosen for squelch control.

**A** = "Normal" DCS

**B** = "Inverted" (complement) DCS

Press the SPACE bar to select the desired DCS Type.

# CE-22 Program Software

## 7-2: DDec Type (DCS Decoder Type)

This command selects the manner in which DCS is to be decoded.

**Fixed** = Decodes the type selected in 7-1 only (Normal or Inverted).

**Auto** = Decodes both types (Normal and Inverted)

Press the SPACE bar to select the desired DCS Decoder Mode.

## 8. Squelch

### 8-1: Sql Ofst (Squelch Offset)

The Squelch Offset function provides a means to fine-tune the VXR-1000 squelch level on a channel-by-channel basis, without having to perform a full alignment.

The available values are an arbitrary scale of 0 to 255. Use the Space bar and the Backspace key to increment/decrement the Squelch Offset level.

**Note:** Although the Squelch Offset range is between 0 and 255, the squelch threshold will be close to saturation if the value is set to about 100 or above. Therefore, you will observe no significant difference in squelch threshold between the values of 100 and 255.

## 9. Encryption

### 9-1: Encryption

When ON, the VXR-1000 operates in the "Encrypted" mode on this channel. The encryption type is compatible with the encryption system used in the Vertex VX-10 (FTT-15 module), VX-200 (FSU-1083), VX-400 (FVP-25), and the VX-500/510 (FVP-22) models.

Press the SPACE bar to toggle Encryption ON and OFF.

## 10. Channel Spacing

### 10-1: W/N (Wide/Narrow Channel Spacing)

This function selects the channel spacing environment in which the VXR-1000 operates.

**Wide** = 25 kHz Channel Spacing,  $\pm 5$  kHz Deviation

**Narrow** = 12.5 kHz Channel Spacing,  $\pm 2.5$  kHz Deviation

Press the SPACE bar to select the desired channel spacing environment.

## 11. Input Modulation

### 11-1: Mod In (Input Modulation Selection)

This function selects how the VXR-1000 will utilize and apply audio signals which are to be transmitted to the associated portable radio.

**Mix:** Any audio being transmitted by the microphone on the mobile radio connected to the VXR-1000 will also be transmitted to the portable on the other band. If a second microphone is connected directly to the VXR-1000 and is also keyed simultaneously with the microphone of the mobile, the audio from both microphones will be mixed and transmitted to the portable.

**Mono:** The VXR-1000 will only select audio from the microphone which first had its PTT key pushed. Audio from the other microphone, if its PTT key is pushed while the first microphone remains keyed, will be ignored.

## 12. Mobile Monitoring

### 12-1: MBL Moni (Mobile Audio Monitoring)

This command determines whether or not the receive audio from the connected mobile radio will be routed to the VXR-1000's EXTERNAL SPEAKER jack.

Press the SPACE bar to toggle the audio between ON and OFF.

## 13. Transmitter Power

### 13-1: Tx Pwr

#### (Transmitter Power Output Selection)

This command selects the desired power output from the VXR-1000 on the current channel. The available values are 0.5, 1.0, 2.5, and 5.0 Watts.

Press the SPACE bar and the Backspace key to increment/decrement the Transmit Power Level.

## 14. Trunking Operation

### 14-1: Trunking

This command activates or de-activates the intercommunication protocol for Trunking operation with the connected mobile radio.

If the mobile radio is a conventional two-way radio, this function must be set to OFF.

If the mobile radio is a trunked radio (Smart-Trunk, LTR, etc.), this function should be set ON. Also, set the Trunking Data parameters in the "Common Data" window as appropriate for operation with the mobile radio. Consult the Service Manuals for the VXR-1000 and the trunked mobile radio to determine the proper settings.

Press the SPACE bar to toggle Trunking operation ON or OFF.

## 15. Courtesy Blip

### 15-1: Cour Blip (Courtesy Blip)

When ON, this function causes the VXR-1000 to send out a "blip" on the portable radio frequency each time the portable radio is unkeyed. This provides audible confirmation to the user that the VXR-1000 was able to receive the transmission from the portable.

This "blip" is not transmitted by the connected mobile radio.

Press the SPACE bar to toggle the Courtesy Blip ON and OFF.

## 16. MBL MIC (Mobile Microphone Configuration)

This command affects the way in which Pin 9 of J1004 (DSUB 9-pin Jack on rear of VXR-1000) responds to PTT commands.

### 16-1: Conventional Mode

If the VXR-1000 and mobile radio are used in a "conventional" two-way radio environment (the Trunking command in section 14 set to OFF), the MBL MIC command selects whether or not the VXR-1000 will transmit together with the mobile radio when the mobile's PTT switch is keyed. If this command is set to ON, the VXR-1000 will trans-

mit in tandem with the mobile radio when the mobile microphone's PTT switch is pressed. If this command is set to OFF, the VXR-1000 will not transmit when the mobile microphone's PTT switch is pressed.

Press the Space bar to toggle this setting to ON or OFF, as needed.

### 16-2: Trunking Mode

If the VXR-1000 is used in a Trunking environment (with the Trunking command in section 14 set to ON), please set the MBL MIC command to ON. This setting allows the "Mobile TX Detect" line to signal the VXR-1000 when the mobile radio is transmitting, whether by local microphone command or by trunking system handshake command.

Press the Space bar to toggle this setting to ON.

## 17. Microphone Control

### 17-1: MIC Cntl

#### (VXR-1000 Microphone Utilization)

This function selects which radio (VXR-1000 and/or mobile) will transmit audio from the microphone connected to the VXR-1000.

**Int:** The VXR-1000 microphone will only cause transmission on the VXR-1000 to the portable radio. It will not cause transmission on the connected mobile radio.

**Ext:** The VXR-1000 microphone will only cause transmission on the connected mobile radio. It will not cause transmission on the VXR-1000 to the portable. Pin 4 of J1004 (on the VXR-1000) will go "Active Low" to provide a PTT output to the mobile radio.

**Both:** The microphone connected to the VXR-1000 will cause transmission on both the VXR-1000 and the mobile.

Pin 4 of J1004 (on the VXR-1000) will go "Active Low" to provide a PTT output to the mobile radio.

Press the Space bar to select the desired mode of operation.

# CE-22 Program Software

## 18. External Radio Control

### 18-1: EXT.R Cntl

This command selects the manner in which the VXR-1000 will control (and be controlled by) the connected mobile radio.

**On:** Signals received by the mobile radio will be re-transmitted to the portable radio AND signals received from the portable radio will be re-transmitted by the mobile radio.

**RX:** Signals received by the mobile radio will be re-transmitted to the portable radio, but signals from the portable radio WILL NOT be re-transmitted by the mobile radio.

**Off:** Signals will not be re-transmitted by the VXR-1000 or mobile radio in either direction.

Press the Space bar to toggle this command function to ON, RX, or OFF.

## 19. Priority Timer

### 19-1: Pri Timer (Priority Timer Polling Interval)

The function sets the interval which separates the momentary polling (by the VXR-1000) of the portable radio; the VXR-1000 will unkey its transmitter, listening for a possible transmission from the portable, and if a transmission is detected, the VXR-1000 will cease its transmission. The VXR-1000 will instantly key up the connected mobile radio to transmit to the "base." Therefore, this feature allows the portable radio user to override an incoming transmission from the "base," if desired.

The available settings are 0.25 second through 3.00 seconds. A setting of "0.00" seconds turns the interval timer off.

Use the Space bar or Backspace key to increment or decrement this setting, respectively.

## 20. Master/Slave Operation Parameters

### 20-1: Master Tone

When LkTn ("Lock Tone") is chosen as the Master/Slave Mode, the user has the option of using either 847.5 Hz or 832.5 Hz as the Master Tone.

Press the Space bar to select the desired Master Tone.

*Note:* If the Master/Slave Mode setting is not set to LkTn, the Master Tone command will not be available.

### 20-2: Master/Slave Mode

This command determines how the VXR-1000 will behave when it is within the range of other VXR-1000s operating on the same frequency, such as when several mobile units are at a common location. One (and only one) VXR-1000 must act as the "Master" to provide portable-to-base relay for all portable units at the scene.

All other VXR-1000s that are present must revert to a "Slaved" (inactive) status, so as to avoid interference to each other.

Ordinarily, the first VXR-1000 arriving at a location will establish itself as the "Master" by periodically transmitting a Master Tone signal. Any other VXR-1000 coming within range will receive this tone (which is transmitted on the same frequency as that used by the portable for uplinking to the VXR-1000); these VXR-1000s, upon receiving the Master Tone, will switch themselves to the "Slaved" status.

If the original Master leaves the location, the first "Slave" VXR-1000 to detect the absence of the Master Tone will then transmit its own Master Tone. If not challenged by any other VXR-1000 within range, this Slave will then become the new Master for this location.

All of these transactions occur automatically, without interruption of voice communications occurring through the VXR-1000 system.

Use the Space bar to choose between the following selections:

**YAESU:** This is a Yaesu/Vertex exclusive system, based on subaudible DCS signalling.

**LkTn:** The Lock Tone system employs audible tone bursts for signalling.

## CE-22 Program Software

**Note:** If the Yaesu system is used, you must program only CTCSS or Carrier Squelch to be used for the main coded squelch signal (for communication between the portable and the VXR-1000. The CE-22 will not allow the use of DCS if the Yaesu system is selected, because the Yaesu system needs to use DCS for coding for the Master Tone signal.

### 20-3: Master/Slave DCS

This function sets the DCS code to be employed by the Master VXR-1000. This DCS code is sent to other arriving VXR-1000s, whereby the first VXR-1000 on the scene announces itself as the Master.

Press [ENTER] to display the CODE SELECT window, from which you may select a DCS code using the Arrow keys; press [ENTER] again to accept the selected code, or press [ESC] to cancel.

If you know the three-digit DCS code you want, you can enter it directly using the 0 - 9 keys. When the desired DCS code is displayed, press [ENTER] to accept this value.

If you keyed in an invalid code number (not among the "standard" DCS code list), the CODE SELECT window will appear, with the nearest valid DCS code number pre-selected.

## 21. Modification of

### "Common Data" Parameters

The following command parameters are found in the "Edit Common Data" window. These parameters are common to all channels in the VXR-1000 being programmed, unlike the previous command parameters (which can be set on a channel-by-channel basis).

#### 21-1: PTT1 State

This command allows customization of the "Mobile COR Detect" signal at Pin 7 of J1004 (on the VXR-1000). This permits the VXR-1000 to work with either "Active High" or "Active Low" COR Detection signals from the mobile.

**High:** If the connected mobile radio uses an "Active High" system, set the PTT1 State parameter to High.

**Low:** If the connected mobile radio uses an "Active Low" system, set the PTT1 State parameter to Low.

For control purposes, High is defined as 33.5 Volts, while "Low" is defined as  $\leq 2.5$  Volts.

There is no "pull up" facility provided on this connector pin.

#### 21-2: PTT2 State

This command allows customization of the status of the "Mobile TX Detect" line applied to Pin 9 of J1004 on the VXR-1000. This allows either "Active High" or "Active Low" TX Detect signals from the connected mobile to be used.

**High:** If the connected mobile radio's "TX Detect" line goes "High" during mobile transmission, set this parameter to High.

**Low:** If the connected mobile radio's "TX Detect" line goes "Low" during mobile transmission, set this parameter to Low.

Levels used for this command are identical to those in section 21-1, and there likewise is no "pull-up" facility provided on this line.

#### 21-3: Pre-Emphasis

When the VXR-1000 is receiving a signal from the portable radio, the received audio is fed to the connected mobile radio via Pin 2 of J1004 (on the VXR-1000). This parameter allows this audio signal to have either a flat response, or to have 6 dB/Octave pre-emphasis applied.

**Off:** No pre-emphasis will be applied.

**On:** Pre-emphasis will be applied to the signal applied to the connected mobile radio's modulator circuit.

If the connected mobile injects this audio signal to its modulator prior to the mobile's internal pre-emphasis network, please set this parameter to Off. If the audio input is applied downstream from the internal pre-

## CE-22 Program Software

emphasis network, please set this parameter to On.

### 21-4: De-Emphasis

The audio signal received by the connected mobile (received from the base station) is applied to the VXR-1000 via Pin 6 of J1004. This command allows de-emphasis to be applied (or not applied) to this audio signal, depending on the condition of the audio signal as it left the mobile radio's receiver section.

**On:** De-emphasis of -6 dB/Octave will be applied to the incoming audio signal.

**Off:** No de-emphasis will be applied to the incoming audio signal.

If the connected mobile applies de-emphasis to the audio prior to routing the audio to the VXR-1000, please set this parameter to Off. If the audio exits the mobile radio before de-emphasis is applied at the mobile radio side, please set this parameter to On.

### 21-5: EXT MIC Level

When audio from the connected mobile radio's microphone is routed to the VXR-1000 (via Pin 8 of J1004) for simultaneous transmission by the mobile and the VXR-1000, using the mobile's microphone as the audio source, this command allows configuration of the VXR-1000 so as to be compatible with the expected microphone audio level.

**High:** The input level is between -18 dBm and 0 dBm.

**Low:** The input level is between -44 dBm and -18 dBm.

### 21-6: EXT MOD Level

When receiver audio from the connected mobile radio is routed to the VXR-1000 (via Pin 6 of J1004), this command allows configuration of the VXR-1000 so as to be compatible with the expected receiver audio level.

**High:** The receiver audio level is between -18 dBm and -2 dBm.

**Low:** The receiver audio level is between -36 dBm and -18 dBm.

### 21-7: Band

This parameter must be set for the band on which the VXR-1000 is transmitting.

### 21-8: COM Port

Set this parameter for the COM port you will use for data uploading and downloading. Either COM1 or COM2 may be used.

### 21-9: Trunking Data

When the connected mobile radio is configured as a trunked radio, the VXR-1000's timing parameters must be compatible with those used in the trunking system in use. The default values are:

E-TX Time:	200 ms.
PTT2 Detector Time:	200 ms.
Connect Wait Time:	4800 ms.
Waiting Time:	2000 ms.

These parameters may be modified, if necessary, per the information presented below.

#### *E-TX Time:*

This is the length of the PTT signal sent to the trunked mobile in response to a connection request from the portable radio.

#### *PTT2 Detect Time:*

This is the length of the Mobile TX Detect response signal sent to the VXR-1000 from the trunked mobile in response to a successful trunking request.

#### *Connect Wait Time:*

This is the length of time which the trunked mobile will wait between connection requests to the trunking system.

#### *Waiting Time:*

When the trunking system has successfully initiated a connection with the connected mobile radio, the connection acknowledgment tone will be sent from the trunked mobile, via the VXR-1000, to the portable. The portable must then respond with its initial transmission within the time window set via this parameter, or else the connection to the trunking system will be terminated (to avoid tying up the system).

#### *Try Counter:*

This parameter sets the number of times that a connection attempt will be made by the mobile radio, after which the trunking connection attempt will terminate.

### 21-10: Master Interval

In the Master/Slave mode of operation, the interval between Master Tone polling transmissions can be set via this parameter.

Intervals between 120 seconds and 300 seconds may be selected.

Use the Space bar or Backspace key to increment or decrement this setting, respectively.

## APPENDIX: Function Key Summaries

### A: Channel Editing Window Function Keys

#### [F1] Help

A comprehensive Help file provides step-by-step instructions for the field on which the cursor is currently located.

#### [F2] Common

Pressing [F2] allows viewing and/or editing of the COMMON DATA parameters. These are parameters shared by all channels.

#### [F3] Disk Load

This option allows you to load a previously-stored channel data file from your computer's hard drive (or from a floppy diskette). When loading from a floppy diskette, be sure to remember to include the drive name (either a:\ or b:\).

#### [F4] Disk Save

This option allows you to save the current screen's data to your hard drive or floppy diskette. You will be asked to define a file name and file path, just as you would if you were saving a word processing file, for example. When saving to a floppy diskette, be sure to remember to include the drive name (either a:\ or b:\).

#### [F5] Read ROM

This option is used to allow you to load currently-installed data from a VXR-1000 to your computer. This allows you to store the

current data as an archive before performing service work, etc., or to check a VXR-1000's data for possible programming errors.

#### [F6] Write ROM

When you have completed the programming steps for the VXR-1000 to be programmed, the Write ROM command is used to send the data from the computer to the radio.

Note that this command does not automatically save the data to your computer's hard drive (use the [F4] command for that purpose).

#### [F7] PrintOut

This command allows you to print the currently-displayed channel data, for paper-file or customer-copy purposes.

#### [F8] Quit

This command is used to exit from CE-22. As with many programs, you will be asked "Are You Sure?" before the "Quit" command is actually executed.

### B: Function Keys within Each Function Key Group

This section will describe the features and capabilities of the [F] keys which appear when each of the function keys (described in section A above) is pressed.

#### B-1: Sub-Functions within [F2] (Common)

##### [F1] Help

This command provides a Help file for each available setting.

##### [F2] Enviro (Hardware Environment)

This window allows viewing of, but no modifications to, the "Hardware Environment" window. Included in the "Hardware Environment" category are such items as frequency range, etc., which are fundamental hardware conditions.

##### [F7] Data Dump

This is a hexadecimal data map for the current data of the VXR-1000, and this function is only used at the factory.

## *CE-22 Program Software*

[F8] Ch Edit

This optional causes you to exit the [F2] (Common) window and return to the Channel Editing screen.

### **B-2: Sub-Functions within [F3] (Disk Load) and [F4] (Disk Save)**

[F1] Help

This command provides a Help file for each available setting.

[F3] Mk Dir

This command allows you to create a new directory in which to store channel data for archive purposes.

[F4] Delete

This command allows you to delete a chan-

nel data file, when it is no longer needed for archive purposes.

[F8] Ch Edit

This optional causes you to exit the [F3] (Disk Load) or [F4] (Disk Save) window and return to the Channel Editing screen.

### **B-3: Sub-Functions within [F5] (Read ROM) and [F6] (Write ROM)**

[F1] Help

This command provides a Help file for each available setting.

[F8] Ch Edit

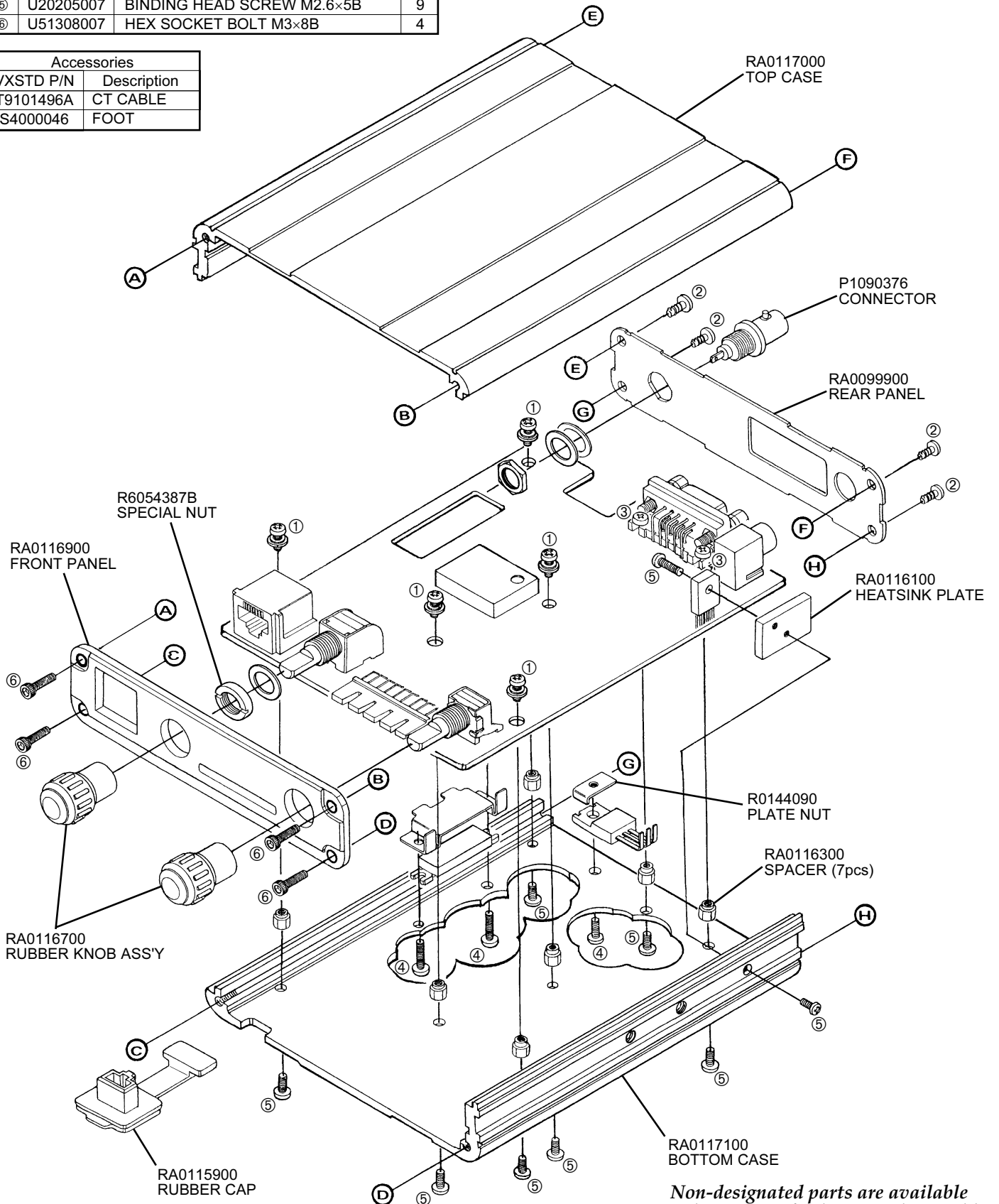
This optional causes you to exit the [F5] (Read ROM) or [F6] (Write ROM) window and return to the Channel Editing screen.



# Exploded View & Miscellaneous Parts

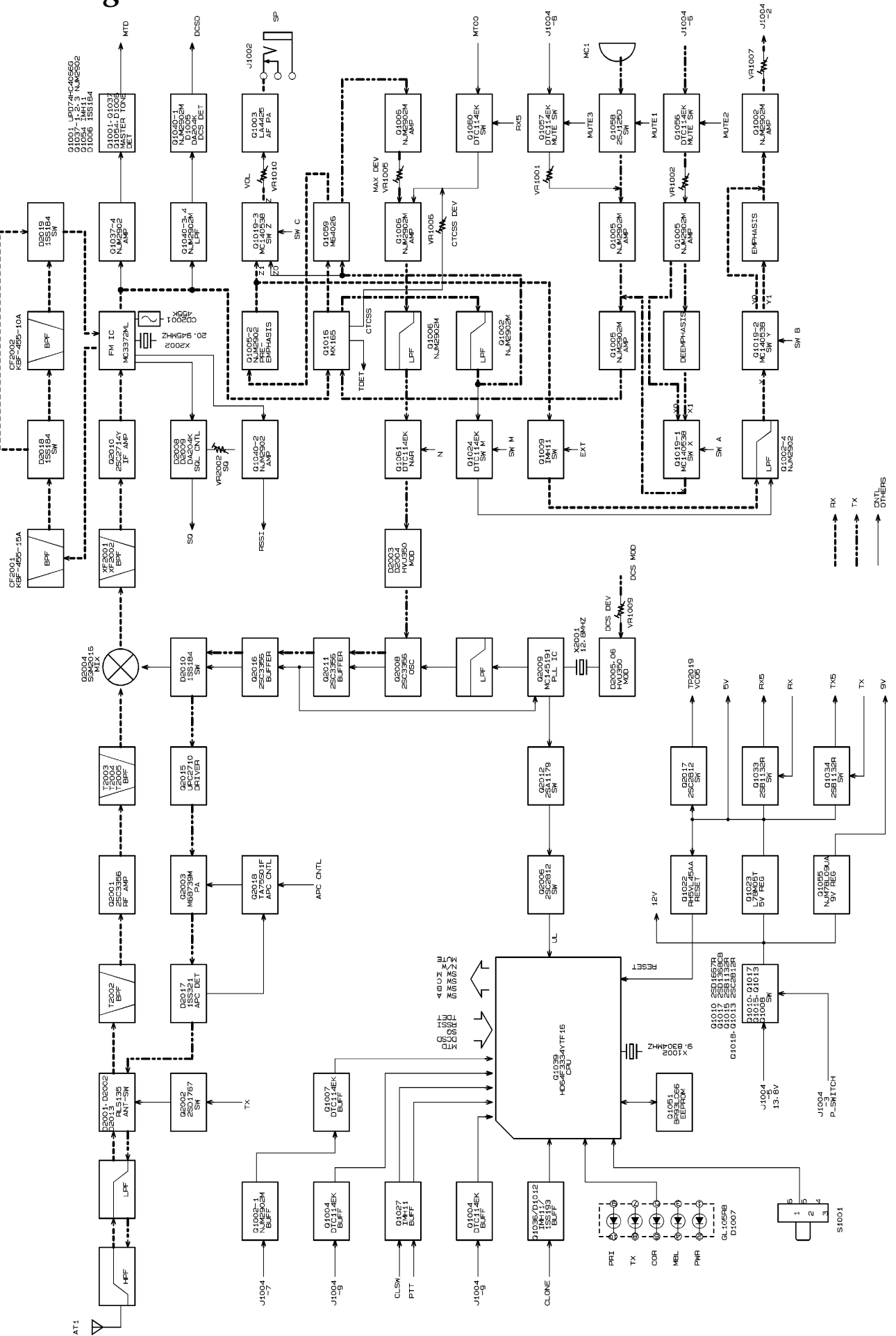
No.	YAESU P/N	Description	Qty.
①	U04204001	SEMS SCREW HSM 2.6×4	5
②	U24306007	TAPTITE SCREW M3×6B	4
③	U20206001	BINDING HEAD SCREW M2.6×6	2
④	U20210007	BINDING HEAD SCREW M2.6×10B	3
⑤	U20205007	BINDING HEAD SCREW M2.6×5B	9
⑥	U51308007	HEX SOCKET BOLT M3×8B	4

Accessories	
VXSTD P/N	Description
T9101496A	CT CABLE
S4000046	FOOT



*Non-designated parts are available only as part of a designated assembly.*

# Block Diagram



## Circuit Description

Reception and transmission are switched by "RX5V" and "TX5V" lines from the microprocessor unit (MPU). The receiver uses double-conversion superheterodyne circuitry, with a 21.4 MHz 1st IF and 455 kHz 2nd IF. The 1st LO, produced by a PLL synthesizer, yields the 21.4 MHz 1st IF.

The 2nd LO uses a 20.945 MHz (21.4 MHz-455 kHz) signal generated by a crystal oscillator. The 2nd mixer and other circuits use a custom IC to convert and amplify the 2nd IF, and detect FM to obtain demodulated signals. During transmit, the PLL synthesizer oscillates at the desired frequency directly, for amplification to obtain RF power output. During transmit, voice modulation and CTCSS (or DCS) modulation are applied to this synthesizer. Transceiver functions, such as tx/rx control, PLL synthesizer settings, and channel programming, are controlled using the MPU.

### Receiver

Incoming RF signals from the antenna connector are delivered to the MAIN Unit, and pass through a low-pass filter (LPF) consisting of coils L2001, L2002, L2004, and L2024, capacitors C2002, C2004, C2009, C2111, C2112, C2113, and C2114, and antenna switching diodes D2001, D2002, and D2013 for delivery to the receiver front end.

The signals are then band-pass filtered and amplified by Q2001 (**2C3356**). The signals are then fed to the input of the 1st mixer, Q2004 (**SGM2016AM**), where they are mixed with the 1st local signal from the PLL. The 21.4 MHz 1st mixer product then passes through monolithic crystal filters XF2001 and XF2002, and is amplified by Q2010 (**2SC2714Y**) and delivered to the input of the FM subsystem IC Q2013 (**MC3372ML**). This IC contains the 2nd mixer, a local oscillator, limiter amplifier, FM detector, and audio amplifier. The 2nd LO in the IF-IC is produced from crystal X2002 (20.945 MHz), and the 1st IF is converted to 455 kHz by the 2nd mixer and stripped of unwanted components by

ceramic filters CF2001 and CF2002. After passing through a limiter amplifier, the signal is demodulated by the FM detector.

Demodulated receive audio from the IF-IC is amplified by Q1005 (**NJM2902M**). After volume adjustment by the AF power amplifier Q1003 (**LA4425A**), the audio signal is passed to the speaker jack.

### PLL synthesizer

The 1st LO maintains stability from the PLL synthesizer by using a 12.8 MHz reference signal from crystal X2001. PLL synthesizer IC Q2009 (**MC145191F**) consists of a prescaler, reference counter, swallow counter, programmable counter, a serial data input port to set these counters based on the external data, a phase comparator, and charge pump.

The PLL-IC divides the 12.8 MHz reference signal by 1,280 using the reference counter (10.0 kHz comparison frequency). The VCO output is divided by the prescaler, swallow counter and programmable counter. These two signals are compared by the phase comparator and applied to the charge pump. A voltage proportional to their phase difference is delivered to the low-pass filter circuit, then fed back to the VCO as an error-correcting voltage, controlling and stabilizing the oscillating frequency.

The VCO is comprised of Q2008 (**2SC3356**) and D2003 (**HVU350**), and oscillates at 21.4 MHz during receive, and at the fundamental frequency during transmit, with direct frequency-modulation using varactor diode D2004 (**HVU350**). The VCO output passes through buffer amplifier Q2011 (**2SC3356**), and a portion is fed to the PLL IC, and at the same time amplified by Q2016 (**2SC3356**) to obtain stable output. The VCO DC supply is regulated by Q2017 (**2SC2812**). Synthesizer output is fed to the 1st mixer by diode switch D2010 (**1SS184**) during receive, and to drive amplifier Q2015 (**μPC2710**) for transmit. The reference oscillator feeds the PLL synthe-

## *Circuit Description*

sizer, and is composed of crystal X2001 (12.8 MHz), the temperature compensation circuit which includes D2007 (**1SS353**) and thermostats TH2001 and TH2002, and the transmit (DCS) modulation circuit D2005/ D2006 (**HVU350**×2).

### *Transmitter*

Voice audio from the microphone or external inputs passes through a low-pass filter Q1005 (**NJM2902M**), and a limiter amplifier and low-pass filter at Q1006 (**NJM2902M**), then is adjusted for optimum deviation level and delivered to the next stage.

Voice input from the microphone, or external inputs and CTCSS, are frequency-modulated at the VCO of the synthesizer, while DCS audio is modulated by the reference frequency oscillator of the synthesizer. Synthesizer output, after passing through diode switch D2010 (**1SS184**), is amplified by driver Q2015 (**μPC2710**) and power module Q2003 (**M68739M**) to obtain full RF output. The RF energy then passes through antenna switch D2001/ D2002 and a low-pass filter circuit and finally to the antenna connector.

RF output power from the final amplifier is sampled by C2117 and C2118 and is rectified by D2017 (**1SS321**). The resulting DC is fed through Automatic Power Controller Q2018 (**TA75S01F**) to transmitter power module Q2003.

Generation of spurious products by the transmitter is minimized by the fundamental carrier

frequency being equal to the final transmitting frequency, modulated directly in the transmit VCO. Additional harmonic suppression is provided by a low-pass filter consisting of L2001, L2002, and L2024 and C2002, C2004, C2009, C2111, C2112, C2113, and C2114, resulting in more than 60 dB of harmonic suppression prior to delivery to the RF energy to the antenna.

### *DCS Demodulator*

DCS signals are demodulated on the RF-UNIT, and are applied to low-pass filter in sections 3 and 4 of Q1040 (**NJM2902M**), as well as the limiter comparator in section 1 of Q1040.

### *CTCSS encoder/decoder*

Generation, demodulation, and detection of the CTCSS tones are carried out by IC Q1014 (**MX165C**).

### *MPU*

Operation is controlled by 8-bit MPU IC Q1039 (**HD64F3334YTF**). The system clock uses a 9.8304 MHz crystal for a time base. IC Q1015 (**RH5VL45AA**) resets the MPU when the power is on, and monitors the voltage of the regulated 5V power supply line.

### *EEPROM*

The EEPROM retains Tx and Rx data for all 16 channels, CTCSS data, DCS data, prescaler dividing, IF frequency, local oscillator injection side (upper/lower), and REF oscillator data (internal/external).

# Alignment

The VXR-1000 has been aligned at the factory for the specified performance across the frequency range specified for each version.

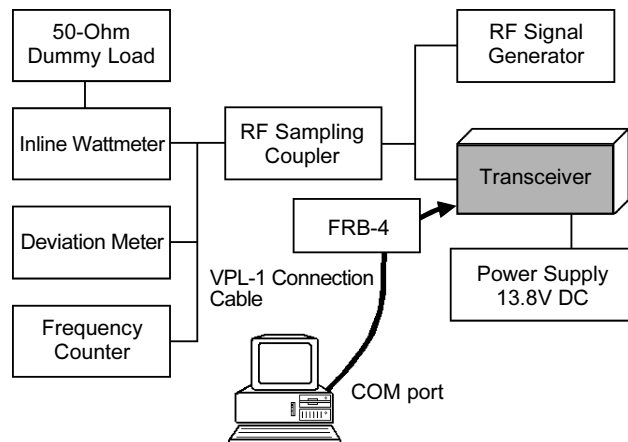
Realignment should therefore not be necessary except in the event of a component failure, or after alteration of the repeater version. All component replacement and service should be performed only by an authorized Vertex representative, or the warranty policy may be voided.

The following test equipment is required for alignment:

- IBM PC/compatible computer w/Vertex VPL-1 cable, FRB-4, and CE-22 channel programming diskette.
- RF signal generator: calibrated output level at 1000 MHz ( $0 \text{ dB}\mu = 1.0 \text{ }\mu\text{V}$  - closed circuit)
- Deviation meter (linear detector)
- AF millivoltmeter
- SINAD meter
- Inline wattmeter: 1000 MHz, 10 W scale
- Regulated DC power supply: adjustable from 10 to 17 V, 3 A
- 50-Ohm non-reactive dummy load: 10 W at 1000 MHz
- Frequency counter: 0.2 ppm accuracy at 1000 MHz
- AF signal generator
- DC Voltmeter: high impedance
- RF Sampling Coupler (attenuation pad)

Before beginning, connect the transceiver and PC using the VPL-1 cable and FRB-4 as shown below, and download the EEPROM data from the transceiver to the computer.

Store this data in a disk file so that it can be saved and retrieved later. Using the table below, program the channel, CTCSS, and DCS alignment settings for your transceiver version. Upload this file to the transceiver.



## PLL & Transmitter

Set up the test equipment as shown for Alignment Setup. Adjust the supply voltage to 13.8 V for all steps. Refer to the "Alignment Points" photo for alignment locations.

### PLL Reference Frequency

- Tune the transceiver to channel #3, connect the sampling coupler and frequency counter between the antenna connector and RF dummy load, key the transmitter, and adjust TC2001 on the MAIN Unit for precisely 162.00 MHz ( $\pm 100$  Hz).

### PLL VCV

- Leave the RF sampling coupler in-line between the antenna jack and the RF dummy load. Connect the frequency counter to the coupler.
- Connect the DC voltmeter between VCV test point TP2006 on the MAIN Unit and chassis ground.
- Set the transceiver to the low band edge channel #1. And adjust T2001 on the MAIN Unit for 0.5 V on the voltmeter.
- Select high band edge channel #2. Key the transmitter, and confirm the low-end VCV is less than 4.4 V on the voltmeter.

# Alignment

## Transmitter Output Power

- Turn the VXR-1000 off.
- Rotate the **CHANNEL** Selector Knob to the "16" position.
- Press and hold in the **PTT** switch while you turn the VXR-1000 on, then rotate the **CHANNEL** Selector Knob counter-clockwise to the "12" position while holding in the **PTT** switch continuously.
- Confirm that the "TX" and "PWR" LEDs are blinking, then release the **PTT** switch. The VXR-1000 now is in the Tx Power Alignment Mode.
- Rotate the **CHANNEL** Selector Knob to the "3" position.
- Press and hold in the **PTT** switch, and rotate the **CHANNEL** Selector Knob so as to achieve 5.0 Watts on the wattmeter.
- Release the **PTT** switch, then turn the VXR-1000 off.

## CTCSS Modulation Level

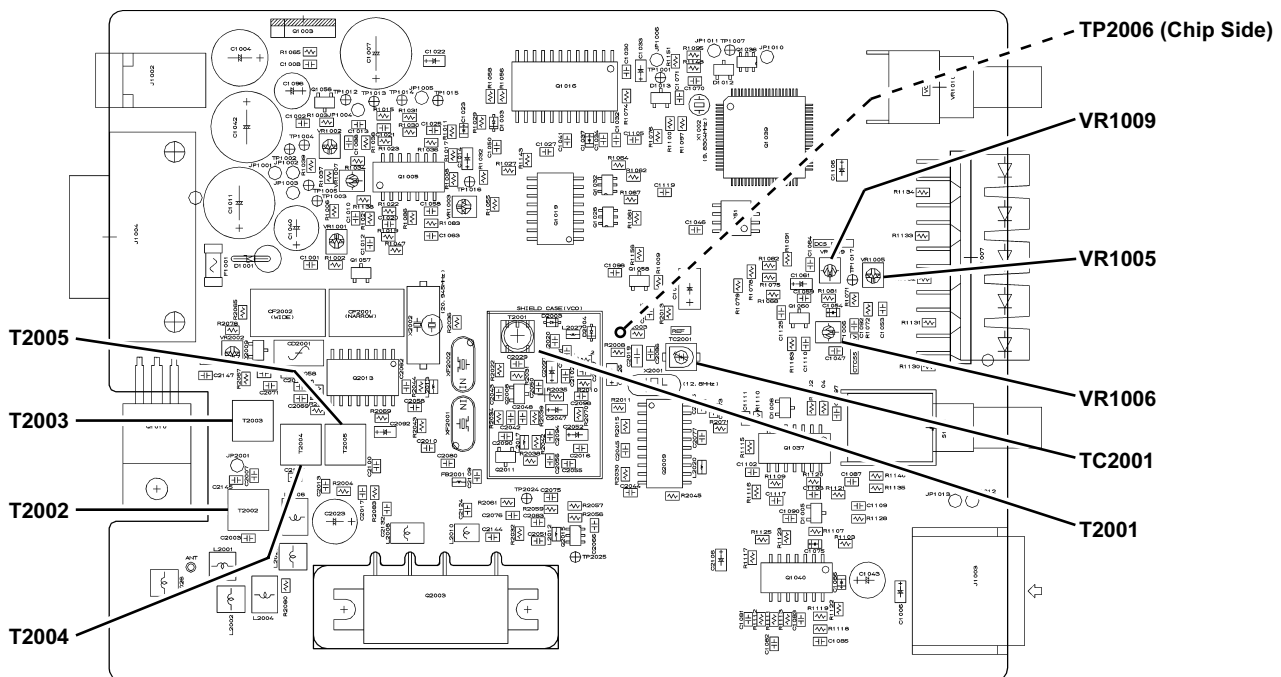
- Select channel #4, with 151.4 Hz CTCSS encode. Transmit, and adjust VR1006 on the MAIN Unit for 0.75 kHz ( $\pm 0.05$  kHz) deviation as indicated on the deviation meter.

## DCS Modulation Level.

- Select channel #5, with DCS 023 enabled. Transmit, and adjust VR1009 on the MAIN Unit for 0.75 kHz ( $\pm 0.1$  kHz) deviation as indicated on the deviation meter.

## Microphone Audio Modulation Level

- Select channel #3, and adjust the AF generator for 30 mV<sub>rms</sub> output at 1 kHz injection to the MIC jack.
- Transmit, and adjust VR1005 on the MAIN Unit for 4.2 kHz ( $\pm 0.1$  kHz) deviation as indicated on the deviation meter.



Alignment Points

## Receiver

- ❑ With the transceiver set to (band center) channel #3, and the RF signal generator tuned to the same frequency, set the generator for 3.0 kHz deviation (for 25 kHz steps) with 1 kHz tone modulation, and set the output level for 100  $\mu\text{V}$  at the antenna jack.
- ❑ Adjust T2002, T2003, T2004, and T2005 on the Main Unit for optimum SINAD, reducing the signal generator output level as necessary for proper meter deflection.
- ❑ After the previous step, the final signal generator level should be less than 0.3  $\mu\text{V}$  for 12 dB SINAD.

### Squelch Threshold I

#### PC Alignment

- ❑ Select channel #3, and adjust the signal generator level for 0 dB $\mu$  (1.0  $\mu\text{V}$ ).
- ❑ Adjust the squelch threshold level by the PC so that it just closes (RX LED turns off).

#### Manual Alignment

- ❑ Turn the VXR-1000 off.
- ❑ Rotate the **CHANNEL** Selector Knob to the "16" position.
- ❑ Press and hold in the **PTT** switch while you turn the VXR-1000 on, then rotate the **CHANNEL** Selector Knob counter-clockwise to the "13" position while holding in the **PTT** switch continuously.
- ❑ Confirm that the "PRI," "COR," and "PWR" LEDs are blinking, then release the **PTT** switch. The VXR-1000 now is in the Squelch Threshold Alignment Mode.

- ❑ Rotate the **CHANNEL** Selector Knob to the "2" position, and adjust the Signal Generator level for 0 dB $\mu$  (1.0  $\mu\text{V}$ ).
- ❑ Press and hold in the **PTT** switch, and rotate the **CHANNEL** Selector Knob so that the "RX" LED turns off (Squelch just closes).
- ❑ Release the **PTT** switch, then turn the VXR-1000 off.

### Squelch Threshold II

You can now adjust the Squelch Threshold for each channel.

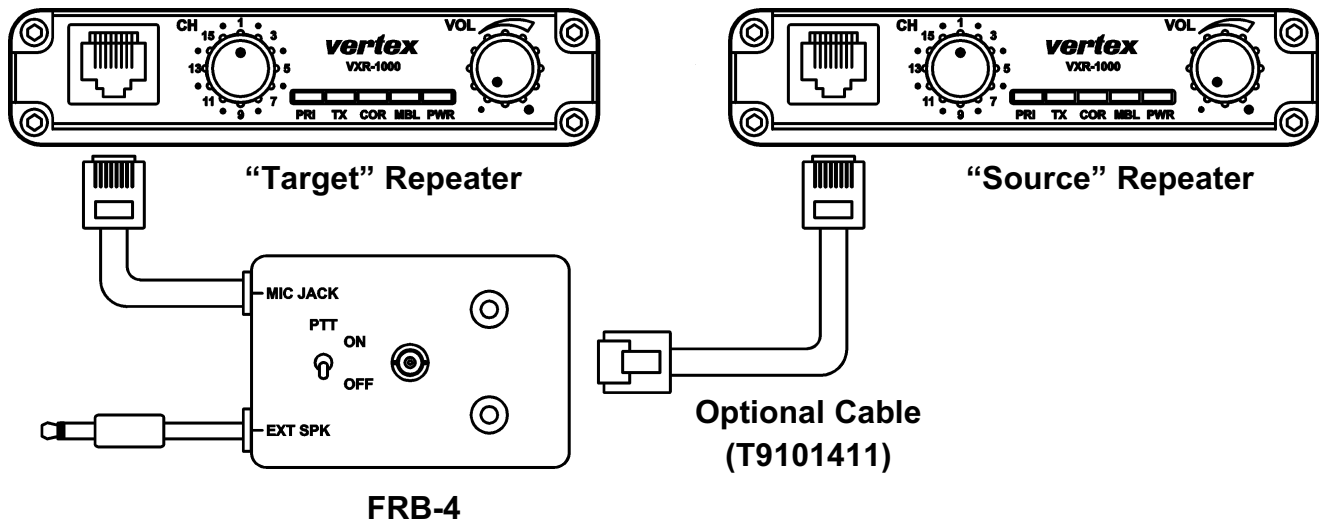
- ❑ Turn the VXR-1000 off.
- ❑ Rotate the **CHANNEL** Selector Knob to the "16" position.
- ❑ Press and hold in the **PTT** switch while you turn the VXR-1000 on, then rotate the **CHANNEL** Selector Knob counter-clockwise to the "14" position while holding in the **PTT** switch continuously.
- ❑ Confirm the "MBL," "COR," and "PWR" LEDs are blinking, then release the **PTT** switch. The VXR-1000 now is in the Squelch Threshold Alignment (for each channel) Mode.
- ❑ Rotate the **CHANNEL** Selector Knob to the channel position where you wish adjust the squelch threshold level.
- ❑ Press and hold in the **PTT** switch, and rotate the **CHANNEL** Selector Knob so that the "RX" LED turns off (Squelch just closes).
- ❑ Release the **PTT** switch, then turn the VXR-1000 off.

# Repeater Cloning

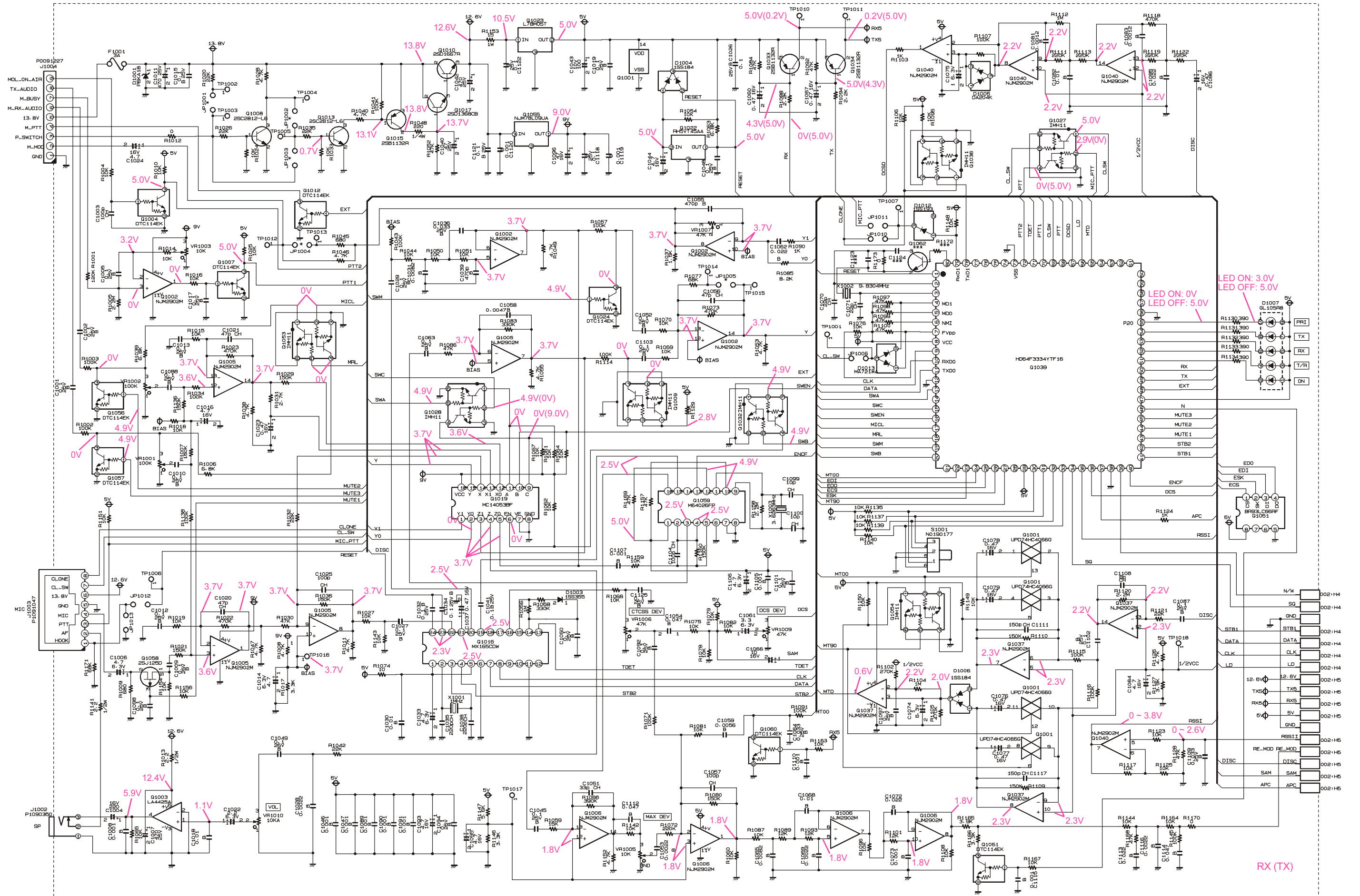
You can transfer data stored in one VXR-1000 to another VXR-1000 by utilizing the handy "Cloning" feature. This requires the optional T9101411 Cable and FRB-4 Alignment Interface Box, so as to connect the Microphone jacks on the two repeaters as shown below.

To clone from one repeater to another, use the following procedure:

- Turn both repeaters off, and connect the T9101411 Cable between the FRB-4 modular jack and the "Source" repeater's Microphone jack. Turn the "Source" repeater **On**.
- Connect the FRB-4 modular connector to the "Target" repeater's Microphone jack.
- Turn the "Target" repeater On, and set the FRB-4's **PTT** switch to **On**. The "Source" repeater will now send its frequency data to the "Target" repeater.
- Wait two seconds, then turn the "Target" repeater off. Now turn the "Source" repeater **off**.
- Remove the T9101411 Cable and the FRB-4. All frequency data for the two repeaters are now identical. They both may be turned on now for normal operation.

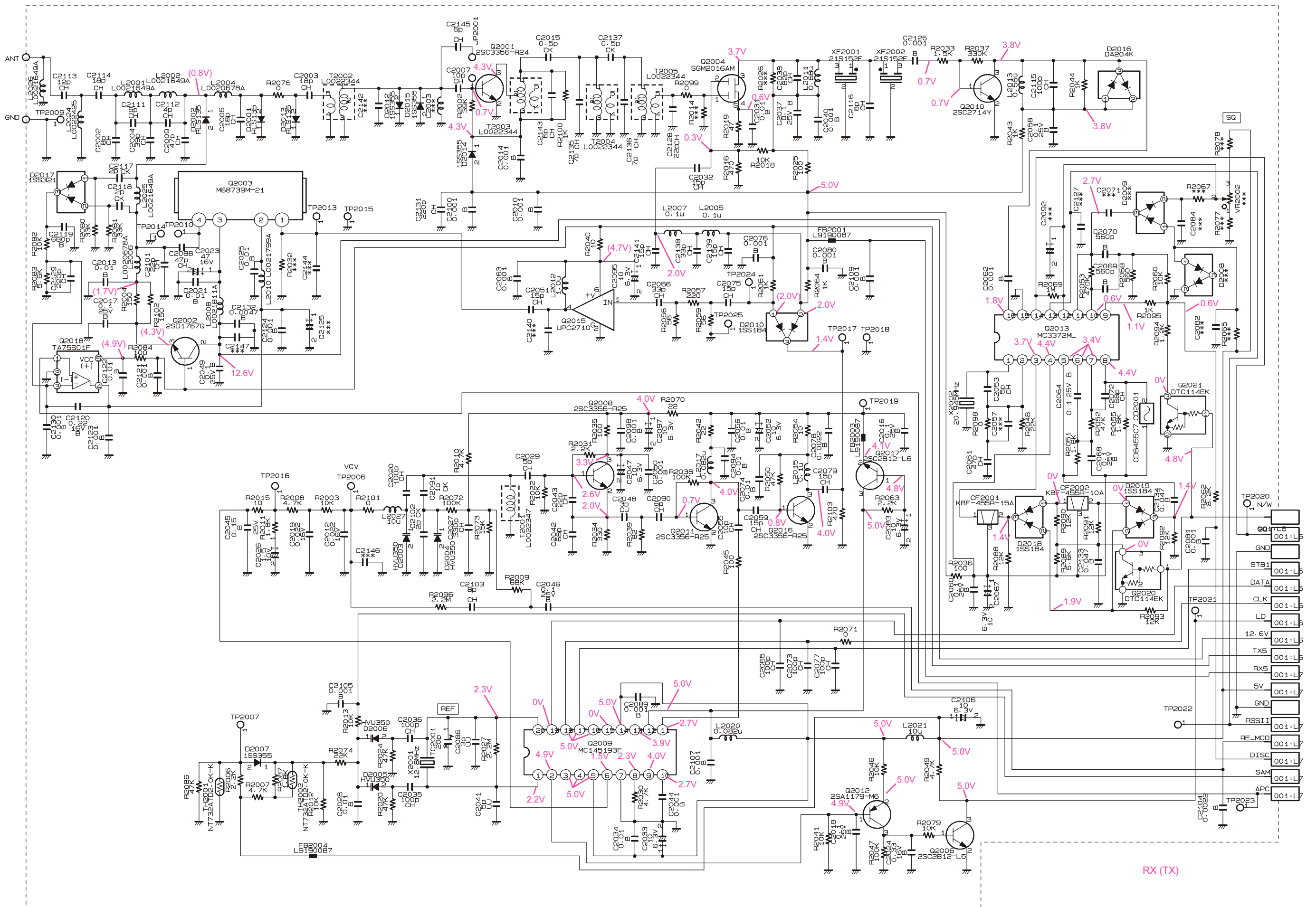






RX (TX)

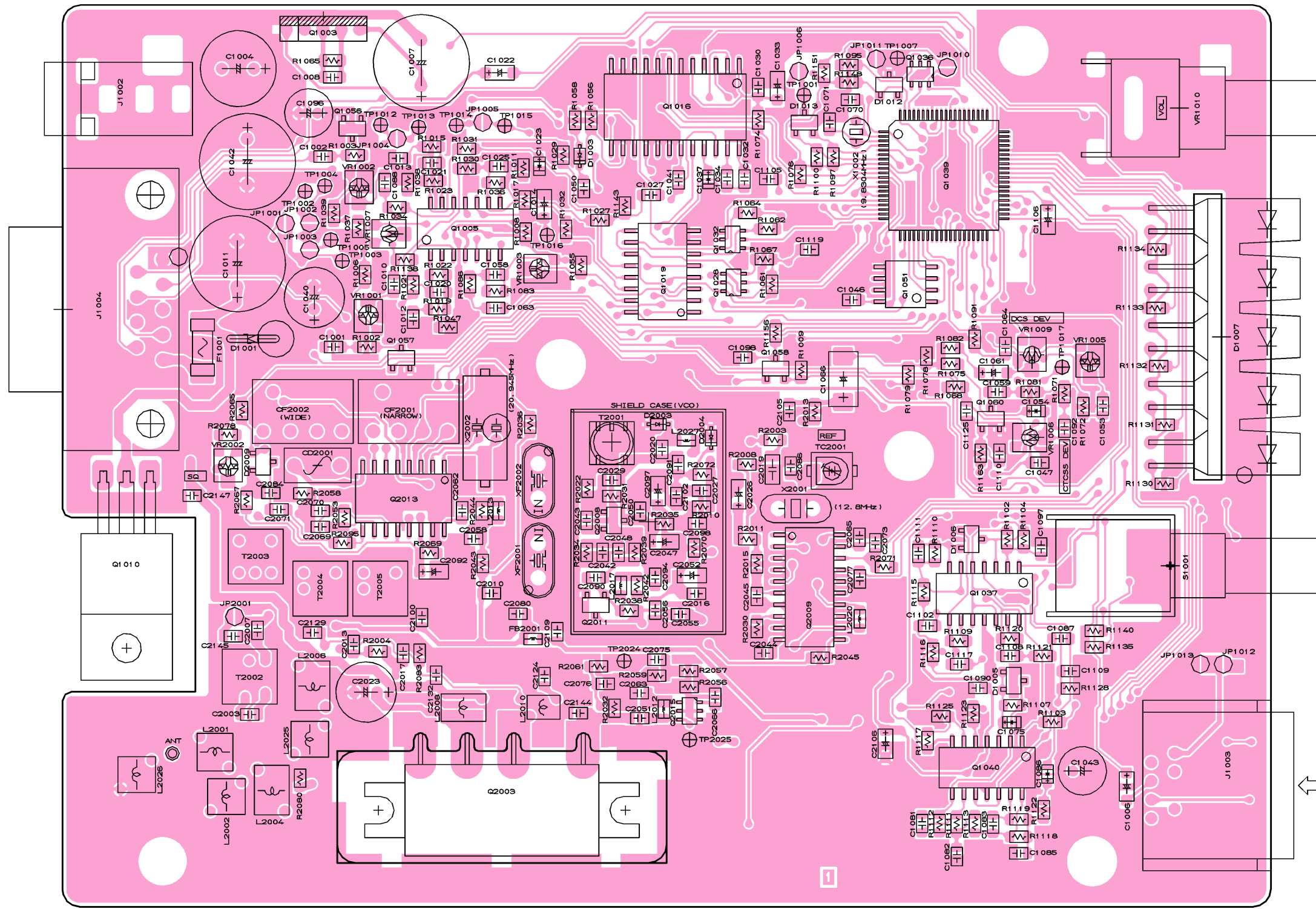
# Main Unit



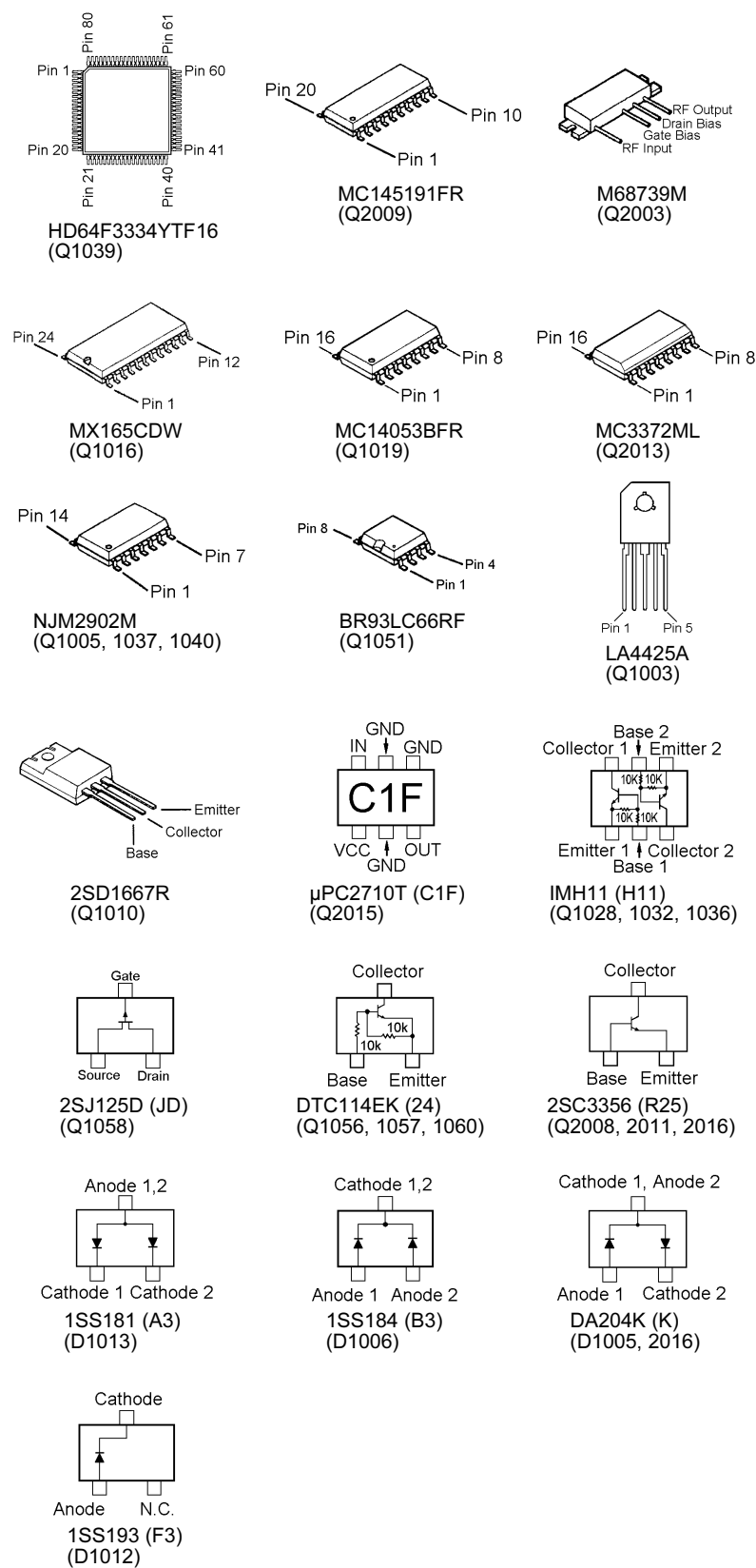
RX (TX)

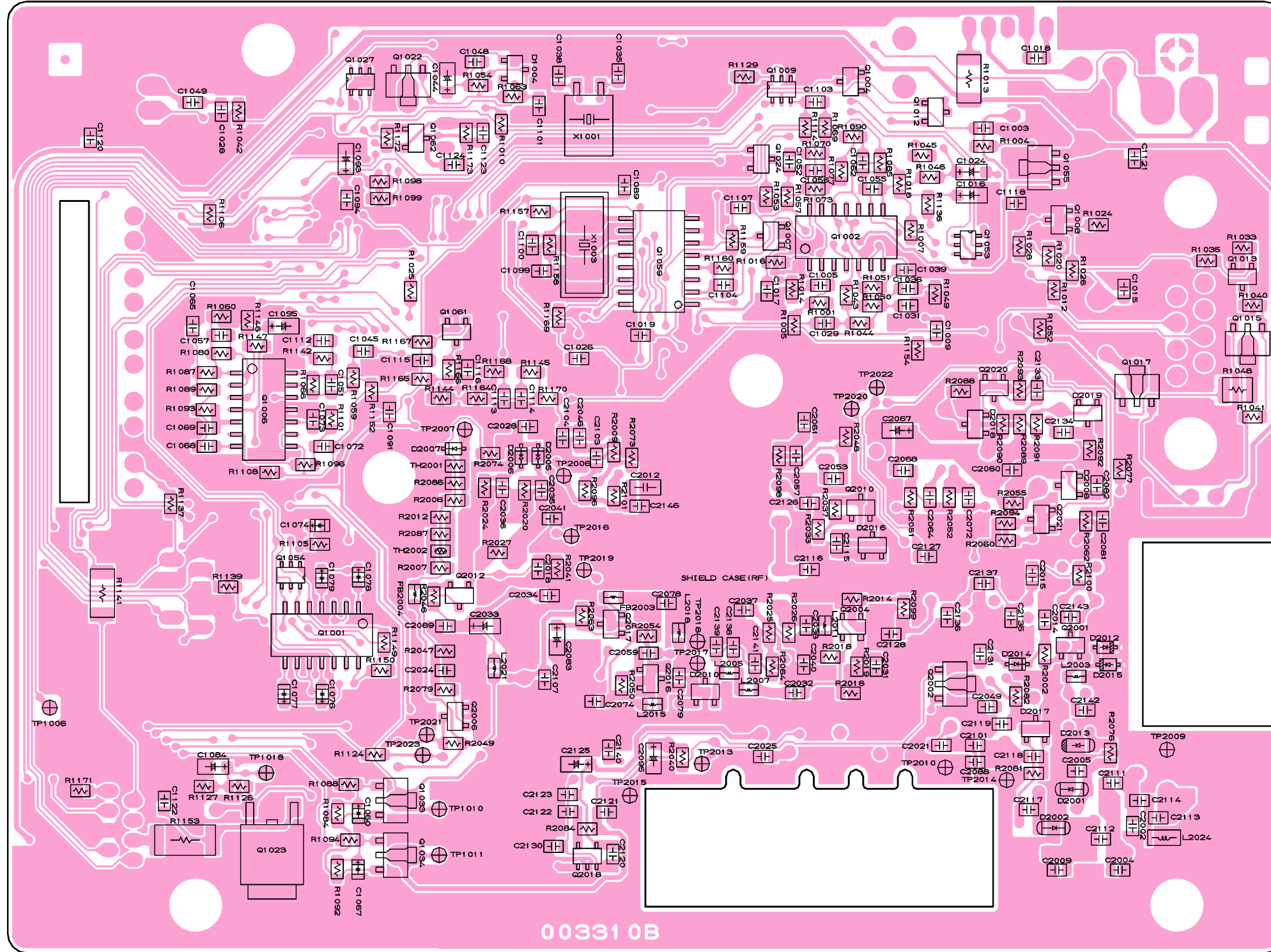


Parts Layout

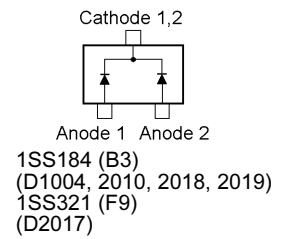
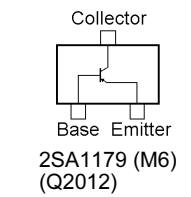
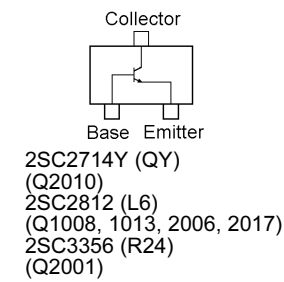
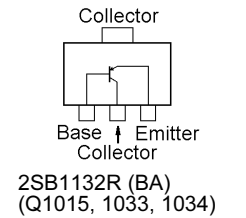
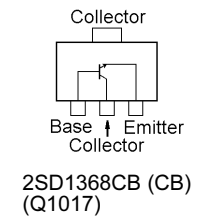
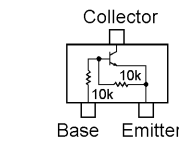
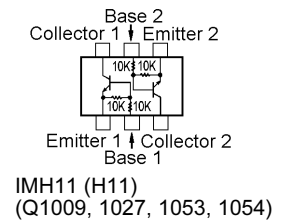
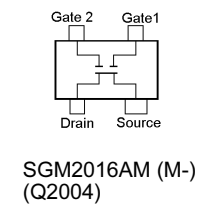
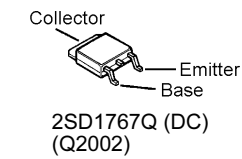
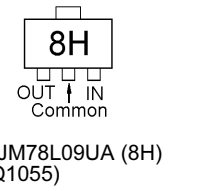
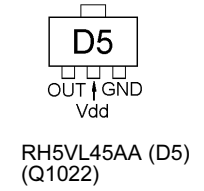
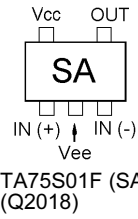
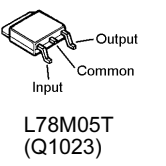
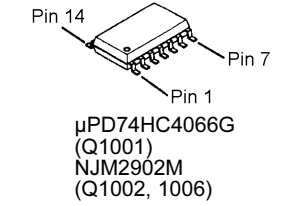
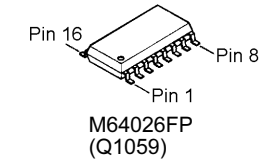


Side A





Side B



00331 0B

## Parts List

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
*** MAIN UNIT ***									
PCB with Components (w/ Q1010 2SD1667R)						CS1630001			
Printed Circuit Board						FR003310B		1-	
C 1001	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1002	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1003	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 1004	AL.ELECTRO.CAP.	220uF	16V		RE2-16V221M 220UF	K40129048		1-	A
C 1005	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1006	CHIP TA.CAP.	4.7uF	6.3V		TEMSVA0J475M-8R	K78080017		1-	A
C 1007	AL.ELECTRO.CAP.	470uF	25V		RE3-25V471M	K40149044		1-	A
C 1008	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1009	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1010	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1011	AL.ELECTRO.CAP.	470uF	25V		RE3-25V471M	K40149044		1-	A
C 1012	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1013	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1014	CHIP TA.CAP.	4.7uF	6.3V		TEMSVA0J475M-8R	K78080017		1-	A
C 1015	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1016	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1017	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1018	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 1019	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1020	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	A
C 1021	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	A
C 1022	CHIP TA.CAP.	2.2uF	6.3V		TESVA0J225M1-8R	K78080009		1-	A
C 1023	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	A
C 1024	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1025	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	A
C 1026	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1027	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1028	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	B
C 1029	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1030	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	A
C 1031	CHIP CAP.	0.0082uF	50V	B	GRM40B822M50PT	K22170816		1-	B
C 1032	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1033	CHIP TA.CAP.	4.7uF	6.3V		TEMSVA0J475M-8R	K78080017		1-	A
C 1034	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1035	CHIP CAP.	68pF	50V	CH	GRM40CH680J50PT	K22170231		1-	B
C 1035	CHIP CAP.	220pF	50V	CH	GRM40CH221J50PT	K22170243		10-	B
C 1036	CHIP CAP.	0.033uF	25V	B	GRM40B333M25PT	K22140810		1-	B
C 1037	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	A
C 1038	CHIP CAP.	68pF	50V	CH	GRM40CH680J50PT	K22170231		1-	B
C 1038	CHIP CAP.	220pF	50V	CH	GRM40CH221J50PT	K22170243		10-	B
C 1039	CHIP CAP.	470pF	50V	B	GRM40B471M50PT	K22170801		1-	B
C 1040	AL.ELECTRO.CAP.	47uF	25V		RC2-25V470M(6X7)	K40149023		1-	A
C 1041	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1042	AL.ELECTRO.CAP.	470uF	25V		RE3-25V471M	K40149044		1-	A
C 1043	AL.ELECTRO.CAP.	100uF	10V		RE2-10V101M 100UF	K40109024		1-	A
C 1044	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1045	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1046	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1047	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1048	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1049	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1050	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1051	CHIP CAP.	33pF	50V	CH	GRM40CH330J50PT	K22170223		1-	B
C 1052	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1053	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	A
C 1054	CHIP TA.CAP.	1uF	6.3V		TESVSP0J105M-8R	K78080028		1-	A
C 1054	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		3-	A

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
C 1055	CHIP CAP.	470pF	50V	B	GRM40B471M50PT	K22170801		1-	B
C 1056	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	B
C 1057	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 1058	CHIP CAP.	0.0047uF	50V	B	GRM40B472M50PT	K22170813		1-	A
C 1059	CHIP CAP.	0.0056uF	50V	B	GRM40B562M50PT	K22170814		1-	A
C 1060	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1061	CHIP TA.CAP.	3.3uF	6.3V		TESVA0J335M1-8R	K78080021		1-	A
C 1062	CHIP CAP.	0.022uF	50V	B	GRM40B223M50PT	K22170821		1-	B
C 1063	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1064	CHIP CAP.	0.033uF	25V	B	GRM40B333M25PT	K22140810		1-	A
C 1065	CHIP CAP.	0.0082uF	50V	B	GRM40B822M50PT	K22170816		1-	B
C 1066	CHIP TA.CAP.	10uF	16V		TESVC1C106M12R	K78120011		1-	A
C 1067	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1068	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 1069	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	B
C 1070	CHIP CAP.	22pF	50V	CH	GRM40CH220J50PT	K22170219		1-	A
C 1071	CHIP CAP.	22pF	50V	CH	GRM40CH220J50PT	K22170219		1-	A
C 1072	CHIP CAP.	0.022uF	50V	B	GRM40B223M50PT	K22170821		1-	B
C 1073	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 1074	CHIP TA.CAP.	1uF	6.3V		TESVSP0J105M-8R	K78080028		1-	B
C 1075	CHIP TA.CAP.	1uF	6.3V		TESVSP0J105M-8R	K78080028		1-	A
C 1076	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1077	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1078	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1079	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	B
C 1081	CHIP CAP.	0.0012uF	50V	B	GRM40B122M50PT	K22170806		1-	A
C 1082	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	A
C 1083	CHIP CAP.	0.0012uF	50V	B	GRM40B122M50PT	K22170806		1-	A
C 1084	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1085	CHIP CAP.	0.022uF	50V	B	GRM40B223M50PT	K22170821		1-	A
C 1086	CHIP TA.CAP.	0.47uF	16V		TESVSP1C474M-8R	K78120035		1-	A
C 1087	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1088	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1089	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 1090	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1091	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 1092	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1093	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1094	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1095	CHIP TA.CAP.	4.7uF	16V		TEMSVA1C475M-8R	K78120031		1-	B
C 1096	AL.ELECTRO.CAP.	47uF	16V		RC2-16V470MS(5X7)	K40129058		1-	A
C 1097	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1098	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1099	CHIP CAP.	10pF	50V	CH	GRM40CH100D50PT	K22170211		1-	B
C 1100	CHIP CAP.	10pF	50V	CH	GRM40CH100D50PT	K22170211		1-	B
C 1101	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1102	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 1103	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1104	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 1105	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1106	CHIP TA.CAP.	4.7uF	6.3V		TEMSVA0J475M-8R	K78080017		1-	A
C 1107	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 1108	CHIP CAP.	8pF	50V	CH	GRM40CH080D50PT	K22170209		1-	A
C 1109	CHIP CAP.	0.033uF	25V	B	GRM40B333M25PT	K22140810		1-	A
C 1110	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1111	CHIP CAP.	150pF	50V	CH	GRM40CH151J50PT	K22170239		1-	A
C 1112	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		1-	B
C 1113	CHIP CAP.	0.022uF	50V	B	GRM40B223M50PT	K22170821		1-	B
C 1114	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		1-	B
C 1115	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
C 1116	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	B
C 1117	CHIP CAP.	150pF	50V	CH	GRM40CH151J50PT	K22170239		1-	A
C 1118	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1119	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 1120	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 1121	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1122	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 1125	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 2002	CHIP CAP.	8pF	50V	CH	GRM40CH080D50PT	K22170209		1-	B
C 2003	CHIP CAP.	18pF	50V	CH	GRM40CH180J50PT	K22170217		1-	A
C 2004	CHIP CAP.	39pF	50V	CH	GRM40CH390J50PT	K22170225		1-	B
C 2005	CHIP CAP.	18pF	50V	CH	GRM40CH180J50PT	K22170217		1-	B
C 2007	CHIP CAP.	10pF	50V	CH	GRM40CH100D50PT	K22170211		1-	A
C 2009	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	B
C 2010	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2012	FILM CAP.	0.022uF	16V		ECHU1C223JB5	K57120011		1-	B
C 2013	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	A
C 2014	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2015	CHIP CAP.	0.5pF	50V	CK	GRM40CK0R5C50PT	K22170201		1-	B
C 2016	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 2017	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A
C 2018	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2019	FILM CAP.	0.022uF	16V		ECHU1C223JB5	K57120011		1-	A
C 2020	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	A
C 2021	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2023	TANTALUM CAP.	47uF	16V		SS2-1C476M	K70120020		1-	A
C 2024	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2024	CHIP CAP.	0.33uF	16V	B	GRM40B334K16PT	K22120807		3-	B
C 2025	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2026	CHIP TA.CAP.	2.2uF	10V		TESVA1A225M1-8R	K78100021		1-	A
C 2026	CHIP TA.CAP.	1.5uF	10V		TESVA1A155M1-8R	K78100009		3-	A
C 2027	CHIP CAP.	330pF	50V	CH	GRM40CH331J50PT	K22170247		1-	A
C 2028	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2029	CHIP CAP.	5pF	50V	CH	GRM40CH050C50PT	K22170206		1-	A
C 2031	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2032	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	B
C 2033	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	B
C 2034	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2035	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 2036	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 2037	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2038	CHIP CAP.	82pF	50V	CH	GRM40CH820J50PT	K22170233		1-	B
C 2040	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2041	CHIP CAP.	5pF	50V	UJ	GRM40UJ050C50PT	K22170306		1-	B
C 2042	CHIP CAP.	68pF	50V	CH	GRM40CH680J50PT	K22170231		1-	A
C 2043	CHIP CAP.	22pF	50V	CH	GRM40CH220J50PT	K22170219		1-	A
C 2044	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2045	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		1-	A
C 2045	CHIP CAP.	0.15uF	25V	B	GRM40B154K25PT	K22140823		3-	A
C 2046	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2047	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	A
C 2048	CHIP CAP.	3pF	50V	CJ	GRM40CJ030C50PT	K22170204		1-	A
C 2049	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2050	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2051	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	A
C 2052	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	A
C 2053	CHIP CAP.	5pF	50V	CH	GRM40CH050C50PT	K22170206		1-	B
C 2055	CHIP CAP.	10pF	50V	CH	GRM40CH100D50PT	K22170211		1-	A
C 2056	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	A
C 2058	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	A



# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
C 2059	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	B
C 2060	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2061	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	B
C 2062	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2063	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2064	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2065	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	A
C 2066	CHIP CAP.	33pF	50V	CH	GRM40CH330J50PT	K22170223		1-	A
C 2067	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	B
C 2068	CHIP CAP.	0.1uF	25V	B	GRM40B104M25PT	K22140811		1-	B
C 2069	CHIP CAP.	560pF	50V	B	GRM40B561M50PT	K22170802		1-	A
C 2070	CHIP CAP.	560pF	50V	B	GRM40B561M50PT	K22170802		1-	A
C 2072	CHIP CAP.	68pF	50V	CH	GRM40CH680J50PT	K22170231		1-	B
C 2073	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	A
C 2074	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2075	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	A
C 2076	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2077	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	A
C 2078	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	B
C 2079	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	B
C 2080	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2081	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2083	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	B
C 2086	CHIP CAP.	3pF	50V	UJ	GRM40UJ030C50PT	K22170304		1-	A
C 2088	CHIP CAP.	47pF	50V	CH	GRM40CH470J50PT	K22170227		1-	B
C 2089	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2090	CHIP CAP.	6pF	50V	CH	GRM40CH060D50PT	K22170207		1-	A
C 2091	CHIP CAP.	1pF	50V	CK	GRM40CK010C50PT	K22170202		1-	A
C 2094	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	A
C 2095	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	B
C 2097	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	A
C 2098	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2100	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2101	CHIP CAP.	22pF	50V	CH	GRM40CH220J50PT	K22170219		1-	B
C 2102	CHIP CAP.	2pF	50V	CK	GRM40CK020C50PT	K22170203		1-	A
C 2103	CHIP CAP.	8pF	50V	CH	GRM40CH080D50PT	K22170209		1-	B
C 2104	CHIP CAP.	0.0022uF	50V	B	GRM40B222M50PT	K22170809		1-	B
C 2105	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2106	CHIP TA.CAP.	10uF	6.3V		TEMSVA0J106M-8R	K78080027		1-	A
C 2107	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2109	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2111	CHIP CAP.	5pF	50V	CH	GRM40CH050C50PT	K22170206		1-	B
C 2112	CHIP CAP.	4pF	50V	CH	GRM40CH040C50PT	K22170205		1-	B
C 2113	CHIP CAP.	12pF	50V	CH	GRM40CH120J50PT	K22170213		1-	B
C 2114	CHIP CAP.	18pF	50V	CH	GRM40CH180J50PT	K22170217		1-	B
C 2115	CHIP CAP.	100pF	50V	CH	GRM40CH101J50PT	K22170235		1-	B
C 2116	CHIP CAP.	8pF	50V	CH	GRM40CH080D50PT	K22170209		1-	B
C 2117	CHIP CAP.	2pF	50V	CK	GRM40CK020C50PT	K22170203		1-	B
C 2118	CHIP CAP.	2pF	50V	CK	GRM40CK020C50PT	K22170203		1-	B
C 2119	CHIP CAP.	680pF	50V	B	GRM40B681M50PT	K22170803		1-	B
C 2120	CHIP CAP.	0.22uF	16V	B	GRM40B224M16PT	K22120806		1-	B
C 2121	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2122	CHIP CAP.	0.01uF	50V	B	GRM40B103M50PT	K22170817		1-	B
C 2123	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2124	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	A
C 2126	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2128	CHIP CAP.	22pF	50V	CH	GRM40CH220J50PT	K22170219		1-	B
C 2129	CHIP CAP.	220pF	50V	CH	GRM40CH221J50PT	K22170243		1-	A
C 2130	CHIP CAP.	0.001uF	50V	B	GRM40B102M50PT	K22170805		1-	B
C 2131	CHIP CAP.	220pF	50V	CH	GRM40CH221J50PT	K22170243		1-	B



# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
C 2132	CHIP CAP.	0.0047uF	50V	B	GRM40B472M50PT	K22170813		1-	A
C 2133	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		1-	B
C 2134	CHIP CAP.	0.047uF	50V	B	GRM40B473M50PT	K22170823		1-	B
C 2135	CHIP CAP.	7pF	50V	CH	GRM40CH070D50PT	K22170208		1-	B
C 2136	CHIP CAP.	7pF	50V	CH	GRM40CH070D50PT	K22170208		1-	B
C 2137	CHIP CAP.	0.5pF	50V	CK	GRM40CK0R5C50PT	K22170201		1-	B
C 2138	CHIP CAP.	33pF	50V	CH	GRM40CH330J50PT	K22170223		1-	B
C 2139	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	B
C 2141	CHIP CAP.	15pF	50V	CH	GRM40CH150J50PT	K22170215		1-	B
C 2143	CHIP CAP.	6pF	50V	CH	GRM40CH060D50PT	K22170207		1-	B
C 2145	CHIP CAP.	6pF	50V	CH	GRM40CH060D50PT	K22170207		1-	A
CD2001	CERAMIC DISC				CDB455C7	H7900180		1-	A
CF2001	CERAMIC FILTER				KBF-455R-15A	H3900394		1-	A
CF2002	CERAMIC FILTER				KBF-455R-10A	H3900490		1-	A
D 1001	SURGE ABSORBER				P6KA18	Q9000721		1-	A
D 1003	DIODE				1SS355 TE-17	G2070470		1-	A
D 1004	DIODE				1SS184 TE85R	G2070009		1-	B
D 1005	DIODE				DA204K T146	G2070388		1-	A
D 1006	DIODE				1SS184 TE85R	G2070009		1-	A
D 1007	LED				GL105R8	G2090725		1-	A
D 1012	DIODE				1SS193 TE85R	G2070052		1-	A
D 1013	DIODE				1SS181 TE85R	G2070001		1-	A
D 1013	DIODE				MA721WA-(TX)	G2070288		10-	A
D 2001	DIODE				RLS135 TE-11	G2070128		1-	B
D 2002	DIODE				RLS135 TE-11	G2070128		1-	B
D 2003	DIODE				HVU350TRF	G2070380		1-	A
D 2004	DIODE				HVU350TRF	G2070380		1-	A
D 2005	DIODE				HVU350TRF	G2070380		1-	B
D 2006	DIODE				HVU350TRF	G2070380		1-	B
D 2007	DIODE				1SS355 TE-17	G2070470		1-	B
D 2010	DIODE				1SS184 TE85R	G2070009		1-	B
D 2012	DIODE				1SS355 TE-17	G2070470		1-	B
D 2013	DIODE				RLS135 TE-11	G2070128		1-	B
D 2014	DIODE				1SS355 TE-17	G2070470		1-	B
D 2015	DIODE				1SS355 TE-17	G2070470		1-	B
D 2016	DIODE				DA204K T146	G2070388		1-	B
D 2017	DIODE				1SS321 TE85R	G2070076		1-	B
D 2018	DIODE				1SS184 TE85R	G2070009		1-	B
D 2019	DIODE				1SS184 TE85R	G2070009		1-	B
F 1001	CHIP FUSE	3A			451003	Q0000052		1-	A
FB2001	FERRITE BEADS				BK2125HS101-T	L9190087		1-	A
FB2003	FERRITE BEADS				BK2125HS101-T	L9190087		1-	B
FB2004	FERRITE BEADS				BK2125HS101-T	L9190087		1-	B
J 1002	CONNECTOR				SG8035#01	P1090350		1-	A
J 1003	CONNECTOR				R41-4904H	P1091047		1-	A
J 1004	CONNECTOR				JEY-9P-1A1A90	P0091227		1-	A
L 2001	COIL A1				4.5T2.5D0.5UEW R	L0021649A		1-	A
L 2002	COIL A1				4.5T2.5D0.5UEW R	L0021649A		1-	A
L 2004	COIL A1				3.5T3.5D0.6UEW R	L0020678A		1-	A
L 2005	M.RFC	0.1uH			LK2125 R10K-T	L1690307		1-	B
L 2006	COIL A1				3.5T3.5D0.6UEW R	L0020678A		1-	A
L 2007	M.RFC	0.1uH			LK2125 R10K-T	L1690307		1-	B
L 2008	COIL A1				2.5T3.0D0.6UEW R	L0021811A		1-	A
L 2010	COIL A1				2.5T2.0D0.5UEW R	L0021799A		1-	A
L 2011	M.RFC	0.68uH			LK2125 R68K-T	L1690317		1-	B
L 2012	M.RFC	1uH			LK2125 1R0K-T	L1690319		1-	A
L 2013	M.RFC	0.56uH			LK2125 R56K-T	L1690316		1-	A
L 2015	M.RFC	0.1uH			LK2125 R10K-T	L1690307		1-	B
L 2017	M.RFC	0.082uH			HK2125 82NK-T	L1690388		1-	A
L 2020	M.RFC	0.082uH			LL2012#F82N	L1690346		1-	A

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
L 2021	M.RFC	10uH			LK2125 100K-T	L1690331		1-	B
L 2024	COIL				E2 0.28-1.0-10TR	L0022425		1-	B
L 2025	COIL A1				4.5T2.5D0.5UEW R	L0021649A		1-	A
L 2026	COIL A1				4.5T2.5D0.5UEW R	L0021649A		1-	A
L 2027	M.RFC	10uH			LK2125 100K-T	L1690331		1-	A
Q 1001	IC				UPD74HC4066G-T2	G1091050		1-	B
Q 1002	IC				NJM2902M-T2	G1090908		1-	B
Q 1002	IC				NJM2902M(TE1)	G1093092		3-	B
Q 1003	IC				LA4425A	G1092241		1-	A
Q 1004	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 1005	IC				NJM2902M-T2	G1090908		1-	A
Q 1005	IC				NJM2902M(TE1)	G1093092		3-	A
Q 1006	IC				NJM2902M-T2	G1090908		1-	B
Q 1006	IC				NJM2902M(TE1)	G1093092		3-	B
Q 1007	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 1008	TRANSISTOR				2SC2812L6-TA	G3328127F		1-	B
Q 1009	TRANSISTOR				IMH11A T110	G3070070		1-	B
Q 1010	TRANSISTOR				2SD1667R	G3416670R		1-	A
Q 1012	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 1013	TRANSISTOR				2SC2812L6-TA	G3328127F		1-	B
Q 1015	TRANSISTOR				2SB1132 T100 R	G3211327R		1-	B
Q 1016	IC				MX165CDW-TR	G1092775		1-	A
Q 1017	TRANSISTOR				2SD1368CB TL	G3413688B		1-	B
Q 1019	IC				MC14053BFR1	G1091524		1-	A
Q 1022	IC				RH5VL45AA-T1	G1090966		1-	B
Q 1022	IC				RH5VT45AA-T1	G1093215		7-	B
Q 1023	IC				L78M05T-TL	G1091731		1-	B
Q 1024	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 1027	TRANSISTOR				IMH11A T110	G3070070		1-	B
Q 1028	TRANSISTOR				IMH11A T110	G3070070		1-	A
Q 1032	TRANSISTOR				IMH11A T110	G3070070		1-	A
Q 1033	TRANSISTOR				2SB1132 T100 R	G3211327R		1-	B
Q 1034	TRANSISTOR				2SB1132 T100 R	G3211327R		1-	B
Q 1036	TRANSISTOR				IMH11A T110	G3070070		1-	A
Q 1037	IC				NJM2902M-T2	G1090908		1-	A
Q 1037	IC				NJM2902M(TE1)	G1093092		3-	A
Q 1039	IC				HD64F3334YTF	✖		1-	A
Q 1040	IC				NJM2902M-T2	G1090908		1-	A
Q 1040	IC				NJM2902M(TE1)	G1093092		3-	A
Q 1051	IC				BR93LC66RF-E2	G1092006		1-	A
Q 1053	TRANSISTOR				IMH11A T110	G3070070		1-	B
Q 1054	TRANSISTOR				IMH11A T110	G3070070		1-	B
Q 1055	IC				NJM78L09UA TE2	G1091305		1-	B
Q 1056	TRANSISTOR				DTC114EK T146	G3070002		1-	A
Q 1057	TRANSISTOR				DTC114EK T146	G3070002		1-	A
Q 1058	FET				2SJ125D-T12-1D	G3701257D		1-	A
Q 1059	IC				M64026FP-650C	G1092754		1-	B
Q 1060	TRANSISTOR				DTC114EK T146	G3070002		1-	A
Q 1061	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 2001	TRANSISTOR				2SC3356-T2B R24	G3333567D		1-	B
Q 2002	TRANSISTOR				2SD1767 T100 Q	G3417677Q		1-	B
Q 2003	IC				M68739M-01	G1092902		1-	A
Q 2003	IC				M68739M-01	G1092902		2-	A
Q 2003	IC				M68739M-21	G1092922		3-	A
Q 2004	FET				SGM2016AM-T7	G4070012		1-	B
Q 2006	TRANSISTOR				2SC2812L6-TA	G3328127F		1-	B
Q 2008	TRANSISTOR				2SC3356-T2B R25	G3333567E		1-	A
Q 2009	IC				MC145191FR2	G1091868		1-	A
Q 2009	IC				MC145193FR2	G1093424		10-	A
Q 2010	TRANSISTOR				2SC2714YTE85R	G3327147Y		1-	B

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
Q 2011	TRANSISTOR				2SC3356-T2B R25	G3333567E		1-	A
Q 2012	TRANSISTOR				2SA1179M6-TA	G3111797F		1-	B
Q 2013	IC				MC3372ML	G1091108		1-	A
Q 2015	IC				UPC2710T-E3	G1091844		1-	A
Q 2016	TRANSISTOR				2SC3356-T2B R25	G3333567E		1-	B
Q 2017	TRANSISTOR				2SC2812L6-TA	G3328127F		1-	B
Q 2018	IC				TA75S01F TE85R	G1091593		1-	B
Q 2020	TRANSISTOR				DTC114EK T146	G3070002		1-	B
Q 2021	TRANSISTOR				DTC114EK T146	G3070002		1-	B
R 1001	CHIP RES.	120k	1/10W	5%	RMC1/10T 124J	J24205124		1-	B
R 1002	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1003	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1004	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1005	CHIP RES.	2.2M	1/10W	5%	RMC1/10T 225J	J24205225		1-	B
R 1006	CHIP RES.	6.8k	1/10W	5%	RMC1/10T 682J	J24205682		1-	A
R 1007	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	B
R 1008	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 1009	CHIP RES.	680	1/10W	5%	RMC1/10T 681J	J24205681		1-	A
R 1010	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1011	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 1012	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 1013	CHIP RES.	2.2	1/2W	5%	RMC1/2 2R2JCTP	J24275229		1-	B
R 1014	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1015	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1016	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1017	CHIP RES.	3.3k	1/10W	5%	RMC1/10T 332J	J24205332		1-	A
R 1018	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1019	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1020	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 1021	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	A
R 1022	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	A
R 1023	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	A
R 1024	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1025	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1026	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 1027	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1028	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1029	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	A
R 1030	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	A
R 1031	CHIP RES.	2.7k	1/10W	5%	RMC1/10T 272J	J24205272		1-	A
R 1032	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	A
R 1033	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1034	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1035	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 1036	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	A
R 1037	CHIP RES.	1.5k	1/10W	5%	RMC1/10T 152J	J24205152		1-	A
R 1038	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 1039	CHIP RES.	6.8k	1/10W	5%	RMC1/10T 682J	J24205682		1-	A
R 1040	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1041	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	B
R 1042	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 1043	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	B
R 1044	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1045	CHIP RES.	680	1/10W	5%	RMC1/10T 681J	J24205681		1-	B
R 1046	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1047	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 1048	CHIP RES.	220	1/4W	5%	RMC1/4 221JATP	J24245221		1-	B
R 1049	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1050	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1051	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
R 1052	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1053	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1054	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1055	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 1056	CHIP RES.	1M	1/10W	5%	RMC1/10T 105J	J24205105		1-	A
R 1057	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	B
R 1058	CHIP RES.	330k	1/10W	5%	RMC1/10T 334J	J24205334		1-	A
R 1059	CHIP RES.	15k	1/10W	5%	RMC1/10T 153J	J24205153		1-	B
R 1060	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1061	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1062	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1063	CHIP RES.	6.8k	1/10W	5%	RMC1/10T 682J	J24205682		1-	B
R 1064	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1065	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1066	CHIP RES.	390k	1/10W	5%	RMC1/10T 394J	J24205394		1-	B
R 1067	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1068	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1069	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1070	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1071	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1072	CHIP RES.	220k	1/10W	5%	RMC1/10T 224J	J24205224		1-	A
R 1073	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	B
R 1074	CHIP RES.	10	1/10W	5%	RMC1/10T 100J	J24205100		1-	A
R 1075	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1076	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1077	CHIP RES.	68k	1/10W	5%	RMC1/10T 683J	J24205683		1-	B
R 1078	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1079	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1080	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	B
R 1081	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1082	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1083	CHIP RES.	330k	1/10W	5%	RMC1/10T 334J	J24205334		1-	A
R 1084	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1085	CHIP RES.	8.2k	1/10W	5%	RMC1/10T 822J	J24205822		1-	B
R 1086	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	A
R 1087	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1088	CHIP RES.	2.2k	1/10W	5%	RMC1/10T 222J	J24205222		1-	B
R 1089	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 1090	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	B
R 1091	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1092	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1093	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 1094	CHIP RES.	2.2k	1/10W	5%	RMC1/10T 222J	J24205222		1-	B
R 1095	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1096	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1097	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	A
R 1098	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1099	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1100	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	A
R 1101	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 1102	CHIP RES.	270k	1/10W	5%	RMC1/10T 274J	J24205274		1-	A
R 1103	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	A
R 1104	CHIP RES.	1M	1/10W	5%	RMC1/10T 105J	J24205105		1-	A
R 1105	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	B
R 1106	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1107	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1108	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1109	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	A
R 1110	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	A
R 1111	CHIP RES.	220k	1/10W	5%	RMC1/10T 224J	J24205224		1-	A

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
R 1112	CHIP RES.	1M	1/10W	5%	RMC1/10T 105J	J24205105		1-	A
R 1113	CHIP RES.	220k	1/10W	5%	RMC1/10T 224J	J24205224		1-	A
R 1114	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	B
R 1115	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1116	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1117	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1118	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	A
R 1119	CHIP RES.	220k	1/10W	5%	RMC1/10T 224J	J24205224		1-	A
R 1120	CHIP RES.	2.2M	1/10W	5%	RMC1/10T 225J	J24205225		1-	A
R 1121	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	A
R 1122	CHIP RES.	220k	1/10W	5%	RMC1/10T 224J	J24205224		1-	A
R 1123	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1124	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	B
R 1125	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1126	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1127	CHIP RES.	3.9k	1/10W	5%	RMC1/10T 392J	J24205392		1-	B
R 1128	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	A
R 1129	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1130	CHIP RES.	390	1/10W	5%	RMC1/10T 391J	J24205391		1-	A
R 1131	CHIP RES.	390	1/10W	5%	RMC1/10T 391J	J24205391		1-	A
R 1132	CHIP RES.	390	1/10W	5%	RMC1/10T 391J	J24205391		1-	A
R 1133	CHIP RES.	390	1/10W	5%	RMC1/10T 391J	J24205391		1-	A
R 1134	CHIP RES.	390	1/10W	5%	RMC1/10T 391J	J24205391		1-	A
R 1135	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1136	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	B
R 1137	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1138	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 1139	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1140	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1141	CHIP RES.	2.2	1/2W	5%	RMC1/2 2R2JCTP	J24275229		1-	B
R 1142	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1143	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1144	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1145	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	B
R 1146	CHIP RES.	3.3k	1/10W	5%	RMC1/10T 332J	J24205332		1-	B
R 1147	CHIP RES.	5.6k	1/10W	5%	RMC1/10T 562J	J24205562		1-	B
R 1148	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1149	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1150	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1151	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1152	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 1153	CHIP RES.	15	1W	5%	RMC1 150JTE	J24305150		1-	B
R 1154	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1156	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1157	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1158	CHIP RES.	2.2M	1/10W	5%	RMC1/10T 225J	J24205225		1-	B
R 1159	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1160	CHIP RES.	150k	1/10W	5%	RMC1/10T 154J	J24205154		1-	B
R 1163	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 1164	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1165	CHIP RES.	3.9k	1/10W	5%	RMC1/10T 392J	J24205392		1-	B
R 1166	CHIP RES.	3.3k	1/10W	5%	RMC1/10T 332J	J24205332		1-	B
R 1167	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 1168	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1169	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 1170	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 1171	CHIP RES.	68k	1/10W	5%	RMC1/10T 683J	J24205683		1-	B
R 1173	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 2002	CHIP RES.	39k	1/10W	5%	RMC1/10T 393J	J24205393		1-	B
R 2003	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
R 2004	CHIP RES.	150	1/10W	5%	RMC1/10T 151J	J24205151		1-	A
R 2006	CHIP RES.	2.2k	1/10W	5%	RMC1/10T 222J	J24205222		1-	B
R 2007	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 2008	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 2009	CHIP RES.	68k	1/10W	5%	RMC1/10T 683J	J24205683		1-	B
R 2010	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	A
R 2011	CHIP RES.	1.5k	1/10W	5%	RMC1/10T 152J	J24205152		1-	A
R 2011	CHIP RES.	1.8k	1/10W	5%	RMC1/10T 182J	J24205182		3-	A
R 2012	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2013	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 2015	CHIP RES.	10	1/10W	5%	RMC1/10T 100J	J24205100		1-	A
R 2016	CHIP RES.	470	1/10W	5%	RMC1/10T 471J	J24205471		1-	B
R 2018	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2019	CHIP RES.	47	1/10W	5%	RMC1/10T 470J	J24205470		1-	B
R 2020	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 2022	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	A
R 2024	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 2025	CHIP RES.	100	1/10W	5%	RMC1/10T 101J	J24205101		1-	B
R 2027	CHIP RES.	2.2M	1/10W	5%	RMC1/10T 225J	J24205225		1-	B
R 2030	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	A
R 2030	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		10-	A
R 2031	CHIP RES.	2.2k	1/10W	5%	RMC1/10T 222J	J24205222		1-	A
R 2033	CHIP RES.	1.5k	1/10W	5%	RMC1/10T 152J	J24205152		1-	B
R 2034	CHIP RES.	330	1/10W	5%	RMC1/10T 331J	J24205331		1-	A
R 2035	CHIP RES.	100	1/10W	5%	RMC1/10T 101J	J24205101		1-	A
R 2036	CHIP RES.	100	1/10W	5%	RMC1/10T 101J	J24205101		1-	A
R 2037	CHIP RES.	330k	1/10W	5%	RMC1/10T 334J	J24205334		1-	B
R 2038	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 2039	CHIP RES.	82	1/10W	5%	RMC1/10T 820J	J24205820		1-	A
R 2040	CHIP RES.	10	1/10W	5%	RMC1/10T 100J	J24205100		1-	B
R 2041	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2042	CHIP RES.	22	1/10W	5%	RMC1/10T 220J	J24205220		1-	A
R 2043	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	A
R 2044	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	A
R 2045	CHIP RES.	100	1/10W	5%	RMC1/10T 101J	J24205101		1-	A
R 2046	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2047	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2047	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		3-	B
R 2048	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 2049	CHIP RES.	4.7k	1/10W	5%	RMC1/10T 472J	J24205472		1-	B
R 2050	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 2051	CHIP RES.	1.8k	1/10W	5%	RMC1/10T 182J	J24205182		1-	B
R 2052	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 2053	CHIP RES.	470k	1/10W	5%	RMC1/10T 474J	J24205474		1-	A
R 2054	CHIP RES.	10	1/10W	5%	RMC1/10T 100J	J24205100		1-	B
R 2055	CHIP RES.	1.8k	1/10W	5%	RMC1/10T 182J	J24205182		1-	B
R 2056	CHIP RES.	56	1/10W	5%	RMC1/10T 560J	J24205560		1-	A
R 2057	CHIP RES.	220	1/10W	5%	RMC1/10T 221J	J24205221		1-	A
R 2058	CHIP RES.	560	1/10W	5%	RMC1/10T 561J	J24205561		1-	A
R 2059	CHIP RES.	56	1/10W	5%	RMC1/10T 560J	J24205560		1-	A
R 2060	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2061	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	A
R 2062	CHIP RES.	8.2k	1/10W	5%	RMC1/10T 822J	J24205822		1-	B
R 2063	CHIP RES.	2.2k	1/10W	5%	RMC1/10T 222J	J24205222		1-	B
R 2064	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	B
R 2069	CHIP RES.	1M	1/10W	5%	RMC1/10T 105J	J24205105		1-	A
R 2070	CHIP RES.	22	1/10W	5%	RMC1/10T 220J	J24205220		1-	A
R 2071	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	A
R 2072	CHIP RES.	100k	1/10W	5%	RMC1/10T 104J	J24205104		1-	A
R 2073	CHIP RES.	15k	1/10W	5%	RMC1/10T 153J	J24205153		1-	B

# MAIN Unit

REF.	DESCRIPTION	VALUE	V/W	TOL.	MFR'S DESIG	YAESU P/N	VERS.	LOT.	SIDE
R 2074	CHIP RES.	22k	1/10W	5%	RMC1/10T 223J	J24205223		1-	B
R 2076	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 2079	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2080	CHIP RES.	33k	1/10W	5%	RMC1/10T 333J	J24205333		1-	A
R 2081	CHIP RES.	33k	1/10W	5%	RMC1/10T 333J	J24205333		1-	B
R 2082	CHIP RES.	10k	1/10W	5%	RMC1/10T 103J	J24205103		1-	B
R 2083	CHIP RES.	5.6k	1/10W	5%	RMC1/10T 562J	J24205562		1-	A
R 2084	CHIP RES.	100	1/10W	5%	RMC1/10T 101J	J24205101		1-	B
R 2086	CHIP RES.	47k	1/10W	5%	RMC1/10T 473J	J24205473		1-	B
R 2087	CHIP RES.	1.8k	1/10W	5%	RMC1/10T 182J	J24205182		1-	B
R 2088	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 2089	CHIP RES.	5.6k	1/10W	5%	RMC1/10T 562J	J24205562		1-	B
R 2090	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 2091	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 2092	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 2093	CHIP RES.	12k	1/10W	5%	RMC1/10T 123J	J24205123		1-	B
R 2094	CHIP RES.	1.2k	1/10W	5%	RMC1/10T 122J	J24205122		1-	B
R 2095	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	A
R 2096	CHIP RES.	2.2M	1/10W	5%	RMC1/10T 225J	J24205225		1-	B
R 2098	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 2099	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 2100	CHIP RES.	1k	1/10W	5%	RMC1/10T 102J	J24205102		1-	B
R 2101	CHIP RES.	0	1/10W	5%	RMC1/10T 000J	J24205000		1-	B
R 2102	CHIP RES.	150	1/10W	5%	RMC1/10T 151J	J24205151		1-	
R 2103	CHIP RES.	470	1/10W	5%	RMC1/10T 471J	J24205471		1-	
S 1001	ROTARY SWITCH				SRZW0L	N0190177		1-	A
T 2001	COIL 05RF	150MHz			CS-4N 5203-JPS-045	L0022347		1-	A
T 2002	COIL 05RF				5KM 150M	L0022344		1-	A
T 2003	COIL 05RF				5KM 150M	L0022344		1-	A
T 2004	COIL 05RF				5KM 150M	L0022344		1-	A
T 2005	COIL 05RF				5KM 150M	L0022344		1-	A
TC2001	TRIMMER CAP.	20pF			ECR-JA020E11X	K91000228		1-	A
TH2001	THERMISTOR				NT732ATD2.0K K	G9090079		1-	B
TH2002	THERMISTOR				NT732ATD2.0K K	G9090079		1-	B
VR1001	POT.	100k			EVN-5ESX50B15	J51811104		1-	A
VR1002	POT.	100k			EVN-5ESX50B15	J51811104		1-	A
VR1003	POT.	10k			EVN-5ESX50B14	J51811103		1-	A
VR1005	POT.	10k			EVN-5ESX50B14	J51811103		1-	A
VR1006	POT.	47k			EVM-7JS-X30-BQ4	J51788473		1-	A
VR1007	POT.	47k			EVM-7JS-X30-BQ4	J51788473		1-	A
VR1009	POT.	47k			EVM-7JS-X30-BQ4	J51788473		1-	A
VR1010	POT.				RK09L1120 L=15 10KA	J60800237		1-	A
X 1001	CERAMIC OSC	1MHz			KBR-1000YTR17	H7900840		1-	B
X 1001	CERAMIC OSC	1MHz			CSB1000J221T	H7900550		10-	B
X 1002	XTAL CSA-309	9.8304MHz			9.8304MHZ-10	H0103050A		1-	A
X 1003	XTAL SX-1315	3.6263MHz			3.6263MHZ	H0103183		1-	B
X 2001	XTAL UM-5	12.8MHz			12.8MHZ	H0103109		1-	A
X 2002	XTAL CSA-309	20.945MHz			20.945MHZ	H0103045		1-	A
XF2001	XTAL FILTER				21S152F	H1102256		1-	A
XF2002	XTAL FILTER				21S152F	H1102256		1-	A



Copyright © 2003  
VERTEX STANDARD CO., LTD.  
All rights reserved

No portion of this manual may be  
reproduced without the permission  
of VERTEX STANDARD CO., LTD.