KENWOOD

Synthesized
FM Two-Way Radio
32 Channel Capability,
20-50W 150-174 MHz.

TK-701S

SERVICE MANUAL

SERVICE MANUAL QUESTIONNAIRE

Your Name _____ Dealer No._____

Company Name _____

Company Address _____

_____ Zip _____

Today's Date _____

Service Manual Title _____

Printing Date (Bottom of Back cover)

USER FEEDBACK (Please print or write legibly)

As the user of this manual, we think you know what kind of information you need to service our equipment. We are willing to listen to your suggestions if we can get them.

1. Is the Installation information good? _____ If not, what do you need? _____

2. Do you use the Circuit Description Section? _____ Is it too difficult, too simple, or OK? _____

3. Do you use the suggested test procedures? _____ Do you have test setups or test procedures that you have found quicker or easier? _____

4. Do you use the suggested alignment procedure? _____ If not, what procedure do you use? _____

5. Are the Parts Lists quick and easy to use? _____ If not, how would you like to see Parts Lists arranged?

6. What other information would you like to see? _____

7. General Comments _____

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CONTENTS

1. SPECIFICATIONS

(GENERAL)

Frequency Range	150 ~ 174 MHz
Number of Channels	6 channel on basic unit 16 semi-duplex channels, or 32 simplex channels, adaptable.
Channel Spacing	30 kHz (PLL channel step 5 kHz)
Input Voltage	13.8V DC negative ground
Current Drain	0.45A on standby
	1.0A on receive
	10.0A on transmit
Duty Cycle	Receiver 100%, Transmitter 20%
Temperature Range	−30°C to +60°C (−22°F to +140°F)
Dimensions	2.56" (65 mm) H × 7.09" (180 mm) W × 9.45" (240 mm) D
Weight	4.9 lbs (2.2 kg)

(RECEIVER)

(Measurements made per EIA standard RS-204-C)

RF Input Impedance	50Ω
Sensitivity	
EIA 12 dB SINAD	0.35μV
20 dB Quieting	0.45μV
Squelch Sensitivity	0.2μV threshold
Modulation Acceptance	±7 kHz
Selectivity	−80 dB
Intermodulation	−75 dB
Spurious and Image Rejection	−85 dB
Audio Power Output	4 watts at less than 5% distortion
Frequency Stability	±0.0005% from −30°C to +60°C
Channel Frequency Spread	4 MHz

(TRANSMITTER)

(Measurements made per EIA standard RS-152-B)

RF Power Output	50 watts adjustable to 20 watts
RF Output Impedance	50Ω
Spurious and Harmonics	−70 dB
Modulation	16F3, ±5 kHz for 100% at 1000 Hz
	Direct FM Modulation
FM Noise	−45 dB
Microphone Impedance	Low impedance
Audio Distortion	Less than 3% at 1000 Hz
Frequency Stability	±0.0005% from −30°C to +60°C
Channel Frequency Spread	7 MHz

2. GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts: components, kits, or chassis. If the part number is not known, include the chassis or kit number of which it is a part, and a sufficient description of the required component for proper identification.

PERSONNEL SAFETY

The following precautions are recommended for personnel safety:

- DO NOT transmit if someone is within two feet (0.6 meter) of the antenna.
- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- All equipment should be properly grounded before power-up for safe operation.
- This equipment should be serviced by a qualified technician only.

OPERATING INSTRUCTIONS

Fig. 2-1 Operating Controls and Indicators

1. POWER-UP

To turn on the radio, rotate the OFF-VOLUME control clockwise until a click is heard. The channel lamp indicator will illuminate to indicate power is ON.

2. TO RECEIVE

Operation	Procedure
1. Disable QT (if so equipped)	Remove microphone from its hanger.
2. Unsquelch radio	Turn SQUELCH control counterclockwise until noise is heard.
3. Set VOLUME control	Adjust VOLUME control for a normal listening level.
4. Set SQUELCH control	Advance SQUELCH control clockwise until noise just stops.
5. Select operating frequency. (Multichannel models only)	Rotate CH selector switch to desired channel.
The radio will now receive all traffic on the selected channel.	
6. Enable QT (if so equipped)	Insert microphone back into its hanger to activate KQT-1 or -2.
You will now hear messages for your system only.	

3. TO TRANSMIT

Operation	Procedure
1. Disable QT (if so equipped)	Depress MONITOR button ON. – or – Remove microphone from hanger.
2. Select operating frequency. (Multichannel models only)	
3. LISTEN	DO NOT TRANSMIT if channel is in use.
4. Key transmitter	Press and hold the microphone PTT switch. The Red LED on the front panel will glow indicating the transmitter is ON.
5. Transmit message	Hold microphone at about 2 inches distance and speak at a normal voice level. Keep transmissions brief.
6. Receive reply	Release the microphone PTT switch.
7. Enable QT at end of the conversation. (if QT equipped)	Depress MONITOR to the out position. and Replace the microphone into its hanger.

PRE-INSTALLATION CONSIDERATIONS

1. UNPACKING

Unpack the radio from its shipping container and check for accessory items. If any item is missing, please contact TRIO-KENWOOD immediately.

2. LICENSING REQUIREMENTS

Federal regulations require a station license for each radio installation (mobile or base) be obtained by the equipment owner. The licensee is responsible for ensuring transmitter power, frequency, and deviation are within the limits permitted by the station license.

Transmitter adjustments may be performed only by a licensed technician holding an FCC first, second or general class commercial radiotelephone operator's license. There is no license required to install or operate the radio.

3. PREINSTALLATION CHECKOUT

3-1. Introduction

Each radio is adjusted and tested before shipment. However, it is recommended that receiver and transmitter operation be checked for proper operation before installation.

3-2. Testing

The radio should be tested complete with all cabling and accessories as they will be connected in the final installation. Transmitter frequency, deviation, and power output should be checked, as should receiver sensitivity, squelch operation, and audio output. QT equipment operation should be verified.

4. PLANNING THE INSTALLATION

4-1. General

Inspect the vehicle and determine how and where the radio antenna and accessories will be mounted.

Plan cable runs for protection against pinching or crushing wiring, and radio installation to prevent overheating.

4-2. Antenna

The favored location for an antenna is in the center of a large, flat conductive area, usually at the roof center. The trunk lid may also provide a good antenna location. If the trunk lid is prefered, bond the trunk lid and vehicle chassis using ground straps to ensure the lid is at chassis ground.

4-3. Radio

The universal mount bracket allows the radio to be mounted in a variety of ways. Be sure the mounting surface is adequate to support the radio's weight. Allow sufficient space around the radio for air cooling. Position the radio close enough to the vehicle operator to permit easy access to the controls when driving.

4-4. DC Power and wiring

1. This radio may be installed in negative ground electrical systems only. Reverse polarity will cause the cable fuse to blow. Check the vehicle ground polarity before installation to prevent wasted time and effort.
2. Connect the positive power lead directly to the vehicle battery positive terminal. Connecting the Positive lead to any other positive voltage source in the vehicle is not recommended.

CAUTION:

If DC power is to be controlled by the vehicle ignition switch, a switching relay should be used to switch the positive power lead. The vehicle ignition switch then controls DC to the relay coil.

---

3. Connect the ground lead directly to the battery negative terminal.
4. The cable provided with the radio is sufficient to handle the maximum radio current demand. If the cable must be extended, be sure the additional wire is sufficient for the current to be carried and length of the added lead.

5. INSTALLATION PLANNING – CONTROL STATIONS

5-1. Antenna system

Control station. The antenna system selection depends on many factors and is beyond the scope of this manual. Your KENWOOD dealer can help you select an antenna system that will best serve your particular needs.

5-2. Radio location

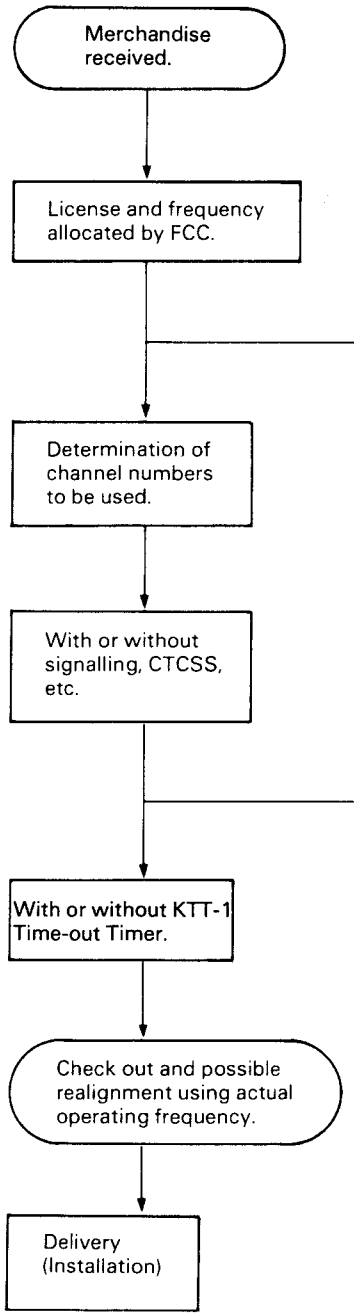
Select a convenient location for your control station radio which is as close as practical to the antenna cable entry point. Secondly, a source of 117 volt, 60 Hz power must be available. Make sure sufficient air can flow around the radio and power supply to allow adequate cooling.

SERVICE

This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained in this manual.

3. FIELD REALIGNMENT

1. DEALER SALES FLOW CHART



Choose transceiver classification by frequency (K, K2, K3 or K4) K: USA MARKET
(M, M2, M3 or M4) M: OTHERS

Frequency range	Type
150 ~ 160 MHz	TK-701S K, M
156 ~ 163 MHz	TK-701S K2, M2
162 ~ 169 MHz	TK-701S K3, M3
168 ~ 174 MHz	TK-701S K4, M4

Two PROM ICs installation Frequency data input by PROM. (Refer to KPT-10 section.)

Basic MODEL

6 CH Duplex.

Frequency allocation.

See 3.1 Frequency PROM writer.

Need 32 channels?

NO

YES

RCC used?

NO

YES

See 3.2 Semiduplex conversion.

See 3.13 RCC conversion.

Other than CTCSS

No signalling.

Which signalling system is used?

See 3.4 Signalling other than KQT-1 or -2

Time-out timer used?

YES (KTT-1)

See 3.11 Time-out timer installation.

NO

See 3.12 Realignment using operating frequency.

Delivery (Installation)

Other than CTCSS.

Which signalling system is used?

No signalling.

See 3.9 Conversion to 32 channels.

CTCSS

CTCSS with ROM?

NO (KQT-2)

YES (KQT-1)

See 3.4 Signalling other than KQT-1 or -2

See 3.9 Conversion to 32 channels.

See 3.5 CTCSS ROM installation.

See 3.10 Conversion to 32 channels.

See 3.6 CTCSS unit installation.

See 3.9 Conversion to 32 channels.

Need 16 channels?

YES

Need duplex?

NO

YES

See 3.2 Duplex conversion.

Other than CTCSS.

Which signalling system is used?

No signalling.

See 3.8 Conversio 16 channe

CTCSS

CTCSS with PROM?

NO (KQT-2)

YES (KQT-1)

See 3.4 Signalling other than KQT-1 or -2

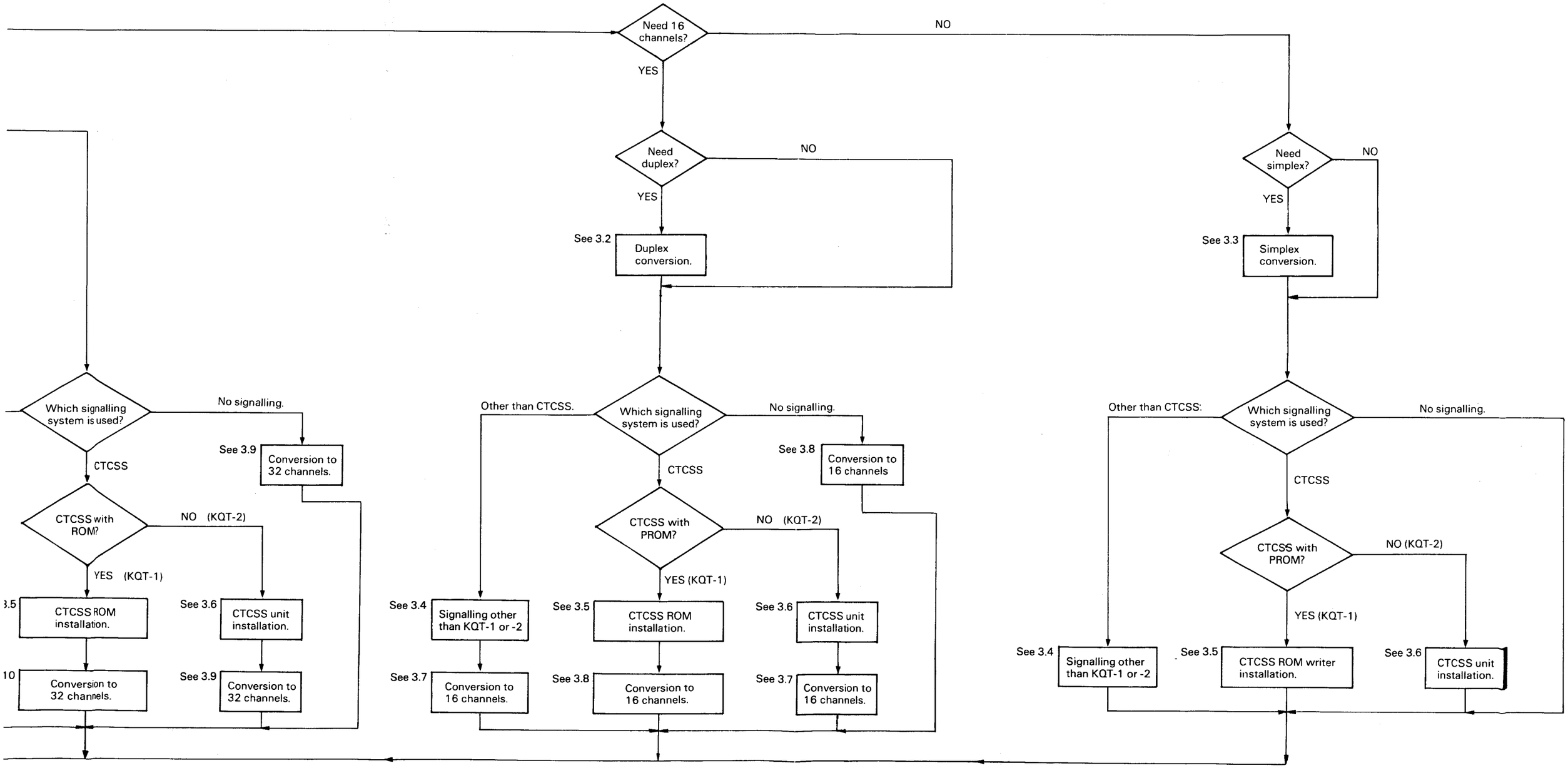
See 3.7 Conversion to 16 channels.

See 3.5 CTCSS ROM installation.

See 3.8 Conversion to 16 channels.

See 3.6 CTCSS unit installation.

See 3.7 Conversion to 16 channels.


Need 16 channels?
NO
YES
Need duplex?
NO
YES
See 3.2
Duplex conversion.
Need simplex?
NO
YES
See 3.3
Simplex conversion.
Which signalling system is used?
No signalling.
CTCSS
See 3.9
Conversion to 32 channels.
CTCSS with ROM?
NO (KQT-2)
YES (KQT-1)
3.5
CTCSS ROM installation.
See 3.6
CTCSS unit installation.
10
Conversion to 32 channels.
See 3.9
Conversion to 32 channels.
Other than CTCSS.
Which signalling system is used?
No signalling.
See 3.8
Conversion to 16 channels
CTCSS
CTCSS with PROM?
NO (KQT-2)
YES (KQT-1)
See 3.4
Signalling other than KQT-1 or -2
See 3.5
CTCSS ROM installation.
See 3.6
CTCSS unit installation.
See 3.7
Conversion to 16 channels.
See 3.8
Conversion to 16 channels.
See 3.7
Conversion to 16 channels.
Other than CTCSS:
Which signalling system is used?
No signalling.
CTCSS
CTCSS with PROM?
NO (KQT-2)
YES (KQT-1)
See 3.4
Signalling other than KQT-1 or -2
See 3.5
CTCSS ROM writer installation.
See 3.6
CTCSS unit installation.

3. INSTALLATION AND CONVERSION

1: Writing a frequency into PROM (Fig. 3-1)
Input an allocated frequency with the PROM writer. For simplex, duplex, etc. input, refer to the PROM writer instructions.

2: To modify a 16CH transceiver for duplex, install JU14 on the PLL unit.

3: To modify a 6CH transceiver for simplex, open JU12 on the PLL unit.

4: Installing Signalling other than KQT-1, -2.
Refer to the manual supplied with the Signalling device.

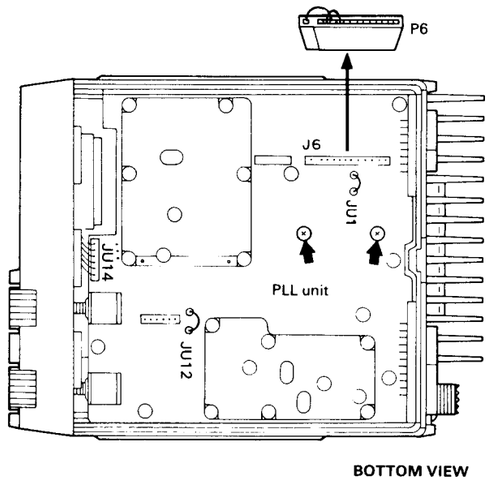


Fig. 3-1

5: Installing KQT-1 (Fig. 3-2, 3)
Connect plug P32 (E31-2181-05) to J32 on the CTCSS unit and that of E31-2181-05 supplied to PLL unit J9.
To install a CTCSS unit, remove the screws in the CTCSS mounting holes, secure the supplied hex bosses in their holes, remove P6 from PLL unit J6 and install the CTCSS plug in J6. Secure the CTCSS unit to the hex bosses with two machine screws.

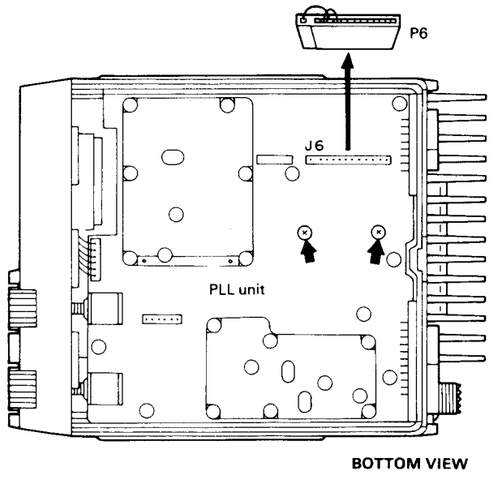


Fig. 3-2

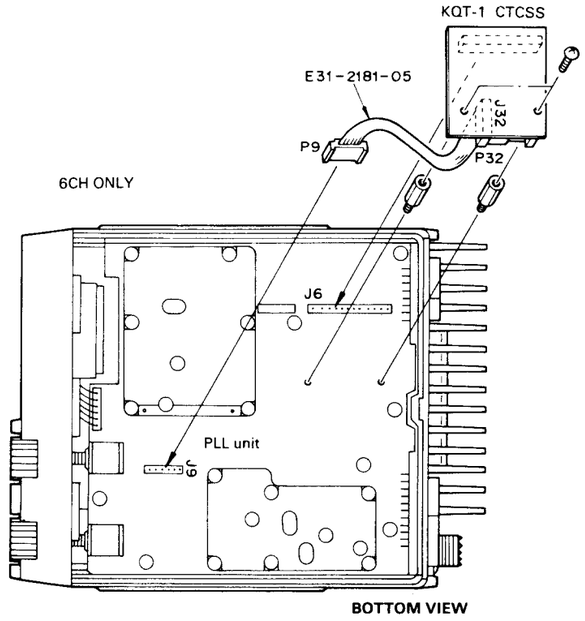


Fig. 3-3

6: Installing KQT-2 (Fig. 3-5)
For installation on the PLL unit, proceed as in item 5. In this case, the cable assembly with plug is not supplied with the CTCSS unit.

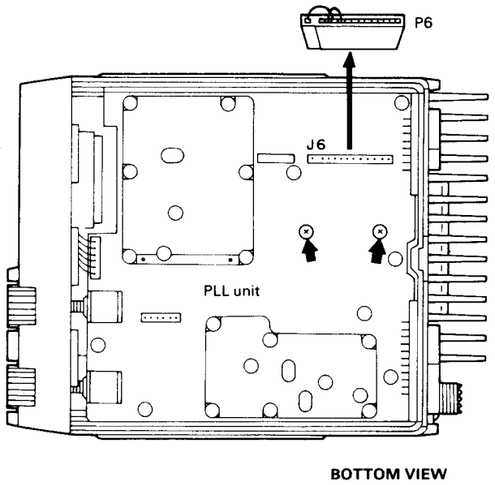


Fig. 3-4

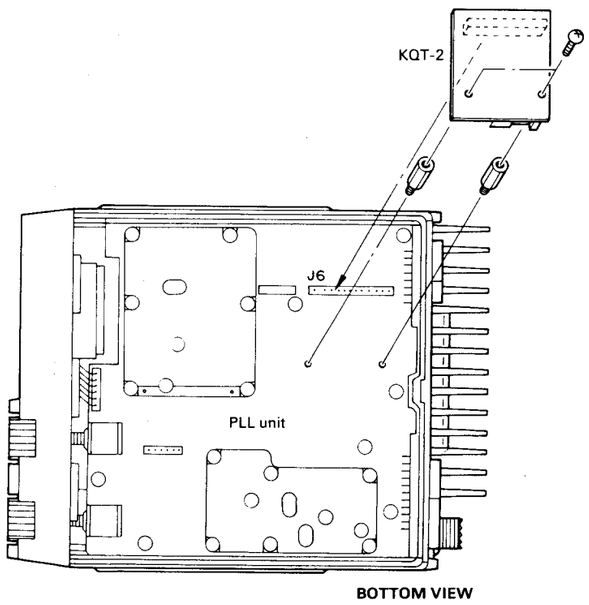


Fig. 3-5

7: Conversion to 16CH with KQT-2 or without CTCSS
Disengage the front panel, remove the 6CH rotary switch S01-1433-05 secured to the chassis, then disconnect the rotary switch plug connected to PLL unit J7. Install the new rotary switch S29-1432-05 and cable E31-2176-05 to the 16CH revision kit PC board. Secure the rotary switch to the chassis and connect the cable plug P9 to PLL unit J9. Cut off the brown and red wires from the plug, since these two wires are not used.

8: Conversion to 16CH with KQT-1
The only difference from item 7 is that cable plug P9 is now connected to CTCSS unit J31.
Cable: E31-2182-05

9: Conversion to 32CH without signalling or CTCSS
Basically the same as in item 7. Use the 32CH revision kit in lieu of the 16CH kit and connect the brown and the red leads (cut in item 7) to the S2 AUX switch on the TX-RX unit, as shown.

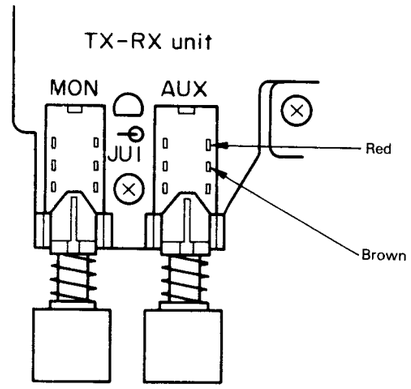


Fig. 3-6

10: C
C
th
11: Ir
Ir
s
J

12: P
th
13: F
(1

(2

(3
(4

(5

6: Installing KQT-2 (Fig. 3-5)
For installation on the PLL unit, proceed as in item 5. In this case, the cable assembly with plug is not supplied with the CTCSS unit.

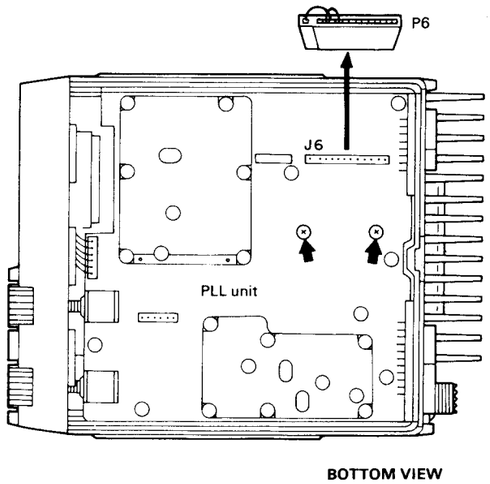


Fig. 3-4

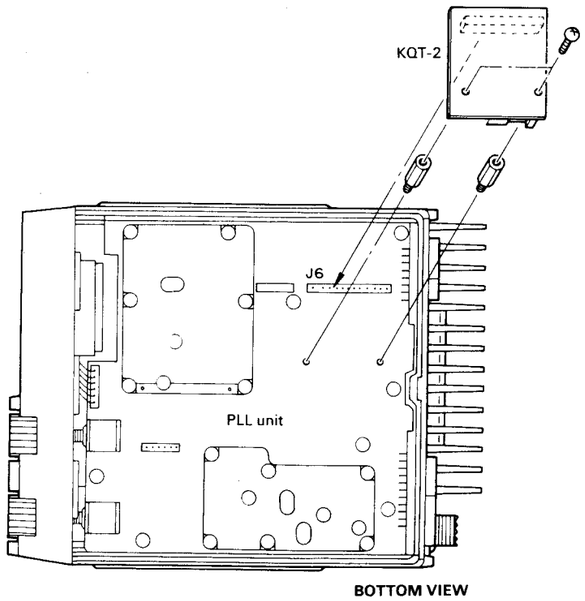


Fig. 3-5

7: Conversion to 16CH with KQT-2 or without CTCSS
Disengage the front panel, remove the 6CH rotary switch S01-1433-05 secured to the chassis, then disconnect the rotary switch plug connected to PLL unit J7. Install the new rotary switch S29-1432-05 and cable E31-2176-05 to the 16CH revision kit PC board. Secure the rotary switch to the chassis and connect the cable plug P9 to PLL unit J9. Cut off the brown and red wires from the plug, since these two wires are not used.

8: Conversion to 16CH with KQT-1
The only difference from item 7 is that cable plug P9 is now connected to CTCSS unit J31.
Cable: E31-2182-05

9: Conversion to 32CH without signalling or CTCSS
Basically the same as in item 7. Use the 32CH revision kit in lieu of the 16CH kit and connect the brown and the red leads (cut in item 7) to the S2 AUX switch on the TX-RX unit, as shown.

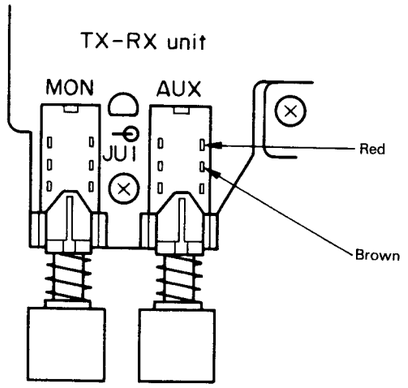


Fig. 3-6

10: Conversion to 32CH with KQT-1
Connecting the cable plug P9 to CTCSS unit J31 is the only difference from item 9.

11: Installing time-out timer KTT-1. (Fig. 3-7)
Install the Time-out timer in place on the PLL unit as shown. Connect Time-out timer plug P45 to PLL unit J5, then open PLL unit JU3.

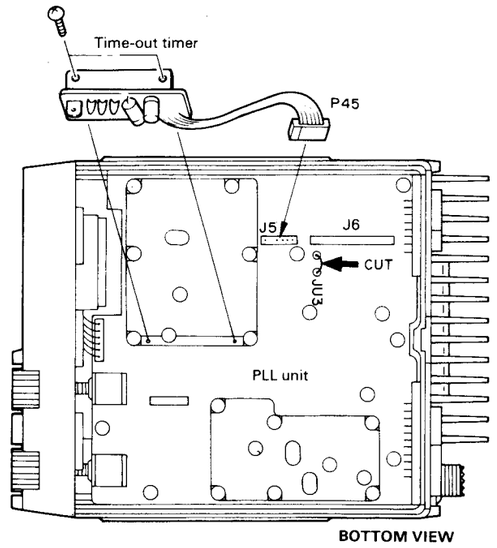


Fig. 3-7

12: Perform operating frequency realignment, following the alignment procedure, page 5-7.

13: For RCC
(1) obtain kit;
KCH-1C (RCC kit for TK-801S)
KCH-1D (RCC kit for TK-701S)
(2) Cut off the red lead ③ from the 16 channel switch.
Cut off the brown lead ② from the 16 channel switch.
(3) Install the rotary switch to the chassis.
(4) Pass the brown lead ⑥, cut in item (2), under the VOL and SQL bracket and solder it to panel side of AUX switch.
Solder the brown lead ① to the common side.
Install the channel knob.
(5) Install PLL unit (X50-1970-21) JU14.

(6) Replace the escutcheon panel with the RCC panel.
TK-801S: A21-0758-04
TK-701S: A21-0759-04
Attach the escutcheon panel with double-faced adhesive tape.

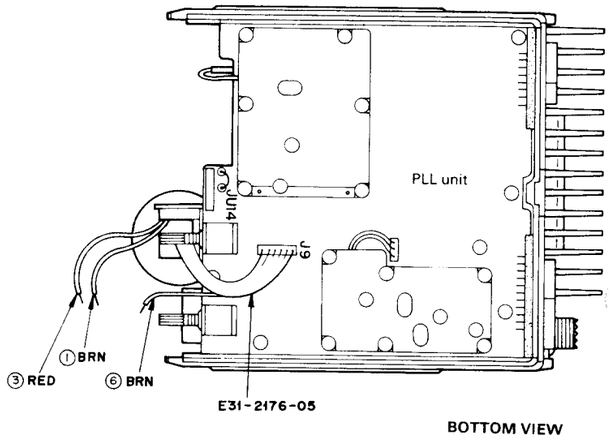


Fig. 3-8

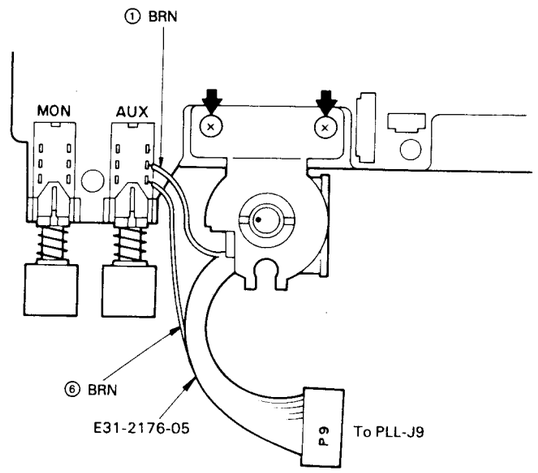


Fig. 3-9

(7) Operation
ROM (out position):
Pre-programmed frequencies change by the 16 channel switch.
HOME (in position):
Pre-programmed HOME frequency pair is automatically selected at "H".

4. CIRCUIT DESCRIPTION

1. TX (Transmitter)

The VHF signal fed from the PLL unit is apmlified at each stage from Q1 (2SC2570A) through Q4 (2SC2630) and is fed to the triple seciton Low Pass Filter (LPF). More or less than 50W is then obtained at the antenna terminal.

For harmonics, both 2nd f and 3rd f provide better than−70 dB.

The signal detected at the Q4 (2SC2630) output varies the applied voltage of Q3 (2SC2539) and Q2 (2SC2538). This controls the antenna output from 20W to 50W. This APC circuit is similar to that of the TK-801. If the final transistor temperature rises abnormally, the temperature protection activates to reduce the thermistor TH 1 resistance. This reduces the standard voltage of the APC circuit and that of the Q6 (2SB946) to reduce the output power.

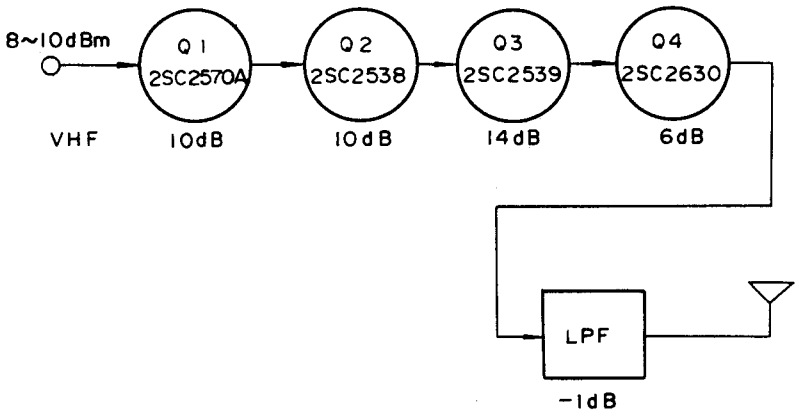


Fig. 4-1 Transmitter Block Diagram

2. RX (Receiver)

Receiver input supplied through the antenna terminal passes through the low pass filter and antenna switching circuit, and is initially VHF-filtered by BPF assembly (L20, 21). The filtered signal is RF amplified by Q10: 2SK241(GR)-1 and is further filtered by BPF L23 and L24. This is then input to the 1st mixer Q11: 2SK125-4. The 1st oscillator injection signal is supplied from the PLL unit to the RXO input. This is multiplied by , filtered by BPF: L18, L19, and coupled to the 1st mixer Q11: 2SK125-4.

The 1st IF signal frequency (21.4 MHz) output from the 1st mixer is filtered by Monolithic Crystal filter (MCF) Z27 and Z28: 21F15B, and is post-amplified by Q12: 2SK241(GR)-1. This is coupled to U13: MC3359P which contains the 2nd local oscillator, mixer, 2nd IF amp, quadrature detector, noise amp and squelch switch.

The 2nd local osc operates at 20.945 MHz to convert the 1st IF from 21.4 MHz to the 2nd IF at 455 kHz. This 2nd IF signal is filtered by ceramic filter Z31: CFV455D, is limiter amplified, and is then quadrature detected.

The detected audio frequency signal output from U13 is amplitude-limited by diode limiters D13 and D14: both 1S1555, and amplified by Q15: 2SC1815(Y), then coupled through the PLL unit for optional tone signalling use. The audio signal returned from the PLL unit is de-emphasized by R62 and C135, and is actively high-pass filtered by Q21: 2SC1815(Y). This is fed to the volume control on the PLL unit.

Again returned from the PLL unit, the signal is amplified by audio PA U17: μPC1242H, and then fed to both the built-in speaker and the external speaker terminals.

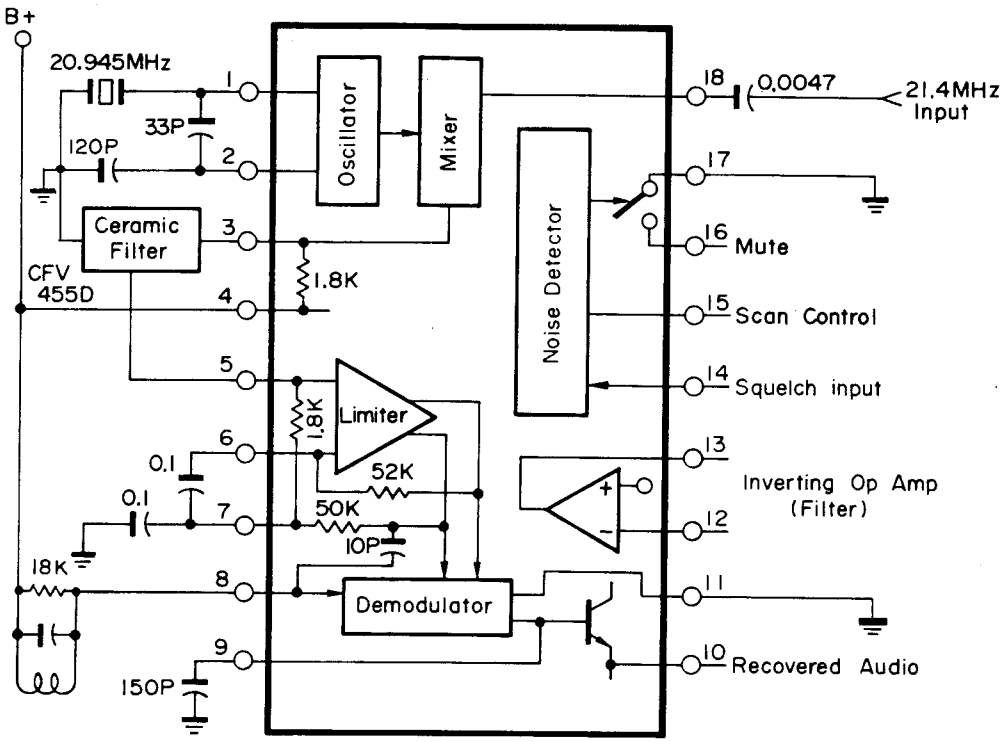


Fig. 4-2 Functional Block Diagram of U13 (MC3359P)

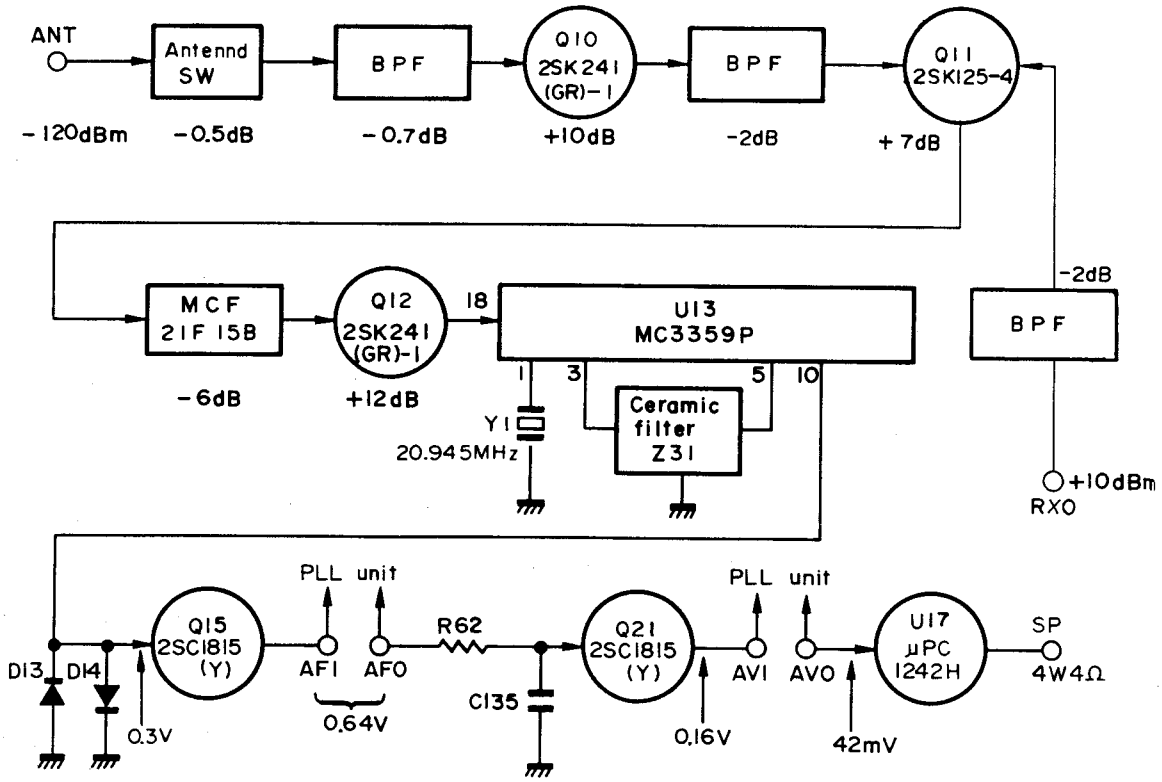


Fig. 4-3 Receiver Block Diagram

Squelch circuit

There are four inputs which activate the squelch gate: noise squelch, signalling squelch, muting and monitor.

Noise squelch is supplied from the audio output of U13: MC3359P to noise amp Q14: 2SC1815(Y) and then to the squelch control located on the PLL unit.

Noise from the squelch control is returned to the noise amplifier section of U13: MC3359P pin 12.
Output from pin 13, it is then rectified and used to control U13 pin 14. Pin 16, mute output is fed to squelch switch Q24: 2SC1815(BL).

Signalling squelch from the PLL unit via the AC terminal is achieved along with microphone hanger switch logic by U200: TC4001BP, and is then supplied to squelch switch Q24: 2SC1815(BL). Muting is directly connected to squelch switch Q24: 2SC1815(BL). These three inputs are all squelched at logic low: that is, no sound is output.

Muting is performed by squelch switch Q24: 2SC1815(BL) and is fed to squelch gate Q22 and Q23: both 2SC1815(BL). The monitor is also coupled to the inputs of Q22 and Q23. When the monitor is opened, squelch is switched on.

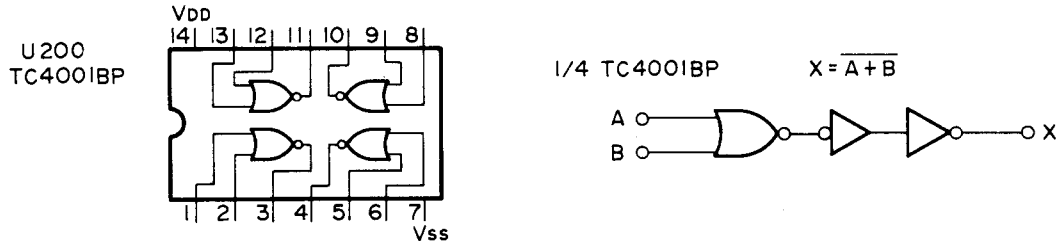


Fig. 4-4 TC4001BP

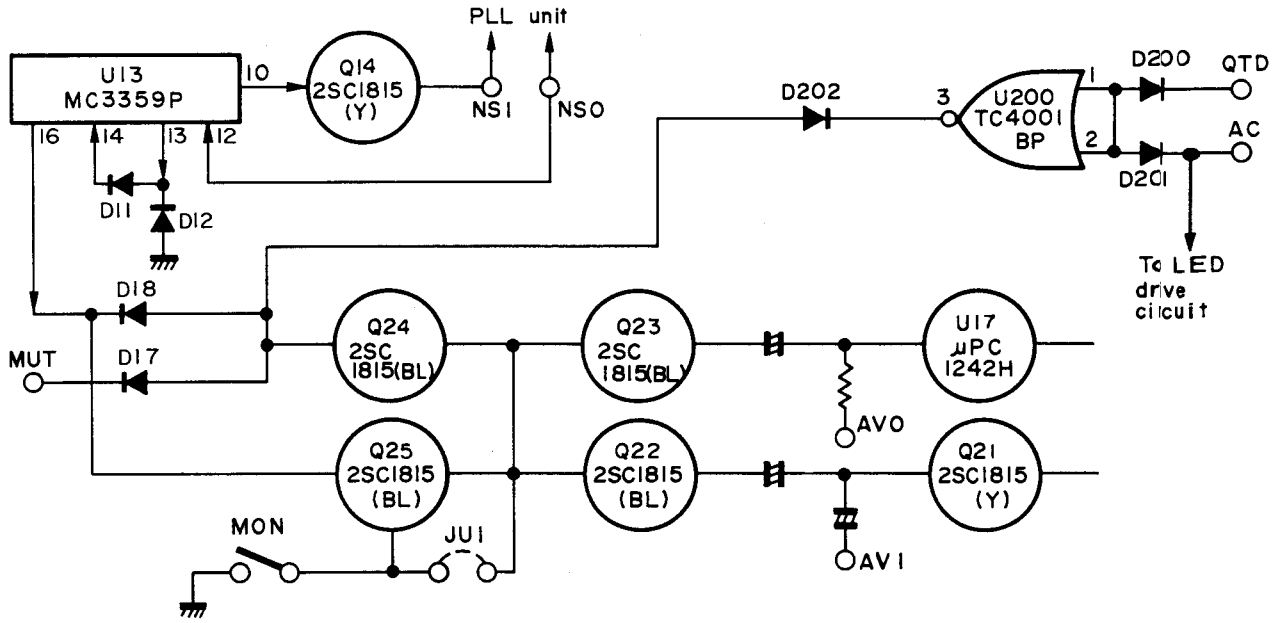


Fig. 4-5 Squelch Circuit

The priority order of each input over the squelch is listed in the following table.

JU1 closed		JU1 opened	
Priority	Input	Priority	Input
1	Monitor	1	Noise squelch
2	Noise squelch	2	Monitor
2	Signalling squelch	3	Signalling squelch
2	Muting	3	Muting

The input level for squelch operation is listed in the following table.

Input	"L" level	"H" level or opened
Monitor	Sound output (Squelch OFF)	No sound (Squelch ON)
Noise squelch (Cathode of D18)	No sound (Squelch ON)	Sound output (Squelch OFF)
Signalling squelch (Cathode of D202)	No sound (Squelch ON)	Sound output (Squelch OFF)
Muting (MUT terminal)	No sound (Squelch ON)	Sound output (Squelch OFF)

The relationship between AC, QTD and signalling squelch output is:

QTD	AC	Signalling squelch (D202 Cathode)
H	H	L
H	L	H
L	H	H
L	L	H

Status indicators

There are two supplied and one optional indicator LEDs; TX and BUSY, and an optional CALL LED. The TX LED is red and lights only when transmitting. The BUSY LED lights green while the noise squelch is opened. The CALL LED flashes yellow while the tone squelch is opened.

Power supply

The power supply section consists of RX/TX switch U16: MB3756, Q18 channel indicator lamp regulator, 9.4V and Q19 "COM" line regulator, 7.5V in receive both 2SC1815(BL).

U16: MB3756 alternately switches R8 and T8 by grounding the key line, and supplies C8 (common, or always ON) output, all at 8V.

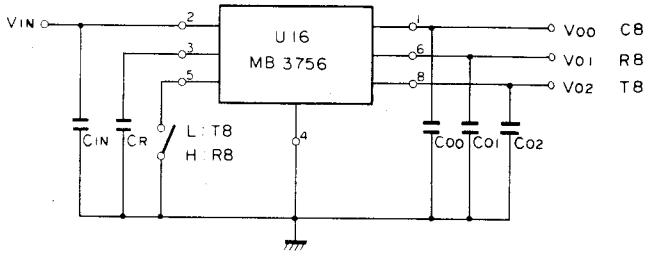


Fig. 4-6 Operational Diagram of U16: MB3756

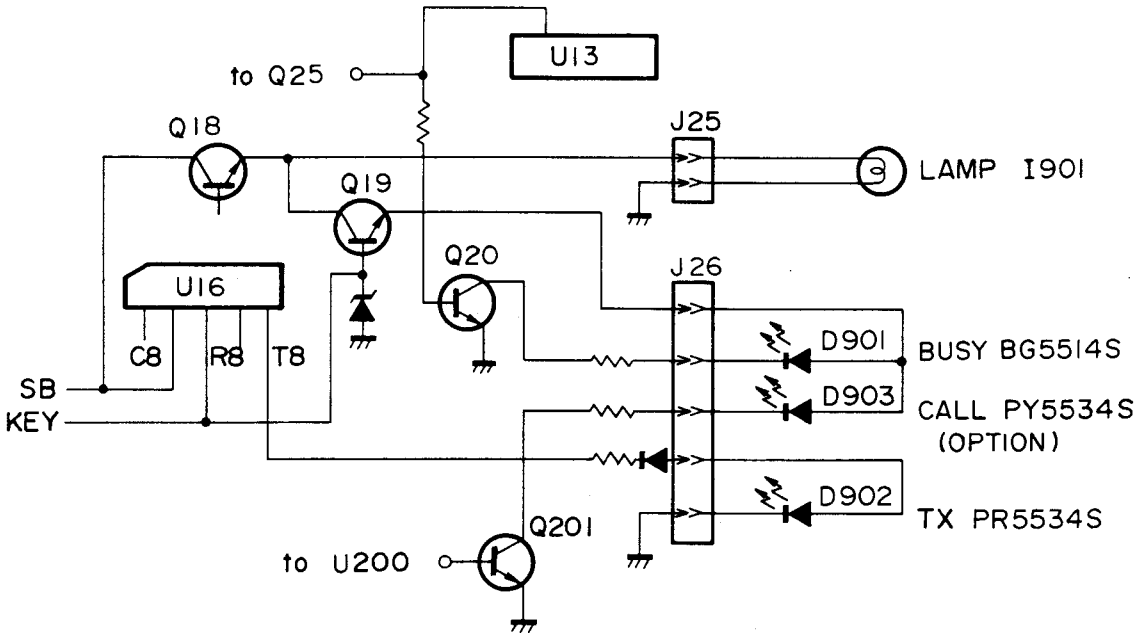


Fig. 4-7 Power Supply and LED Circuit

3. Common PLL

The VCO output from Q1: 2SK125 is buffered by Q2 and Q3: 2SC2668(Y), is switched by diode D2: 1S2588, and is then sent to the RX unit as the RXO signal (receiver 1st local osc.). A sample of this signal is coupled to prescaler U21: μPC571C from the output of Q2 through buffer Q5: 2SC2668(Y).

The prescaler acts as a 1/64 or 1/65 divider controlled by the pulse generated by PLL IC U18 pin 9 (MC145152) and its output is further divided by the ÷ N-counter U18; then it is coupled to the phase comparator.

The output of the reference oscillator Z1: TCXO is divided by U18 after buffering by Q6 and is coupled to the phase comparator. The dividing ratio is determined by 16-bit parallel data set by PROM ICs U22 and U23: M54730AP. The dividing ratio of the reference oscillator output is locked. The output of the phase comparator is fed through the charge pump U20: TC4007UBP and the loop filter and is then coupled back to varicap diode D1: 1SV50E as the VCO control voltage.

RXO frequency range: f_L (MHz)

	f_L (MHz)
F1	128.6000 ~ 138.6000
F2	134.6000 ~ 141.6000
F3	140.6000 ~ 147.6000
F4	146.6000 ~ 152.6000

f_L formula:

If the TX frequency is f_T

$$f_L = f_T - 21.4$$

N value range (f_t: PLL TXO output):

$N = 25720 \sim 30520$

formula:

$$N = \frac{f_t - 21.4}{5} \times 1000$$

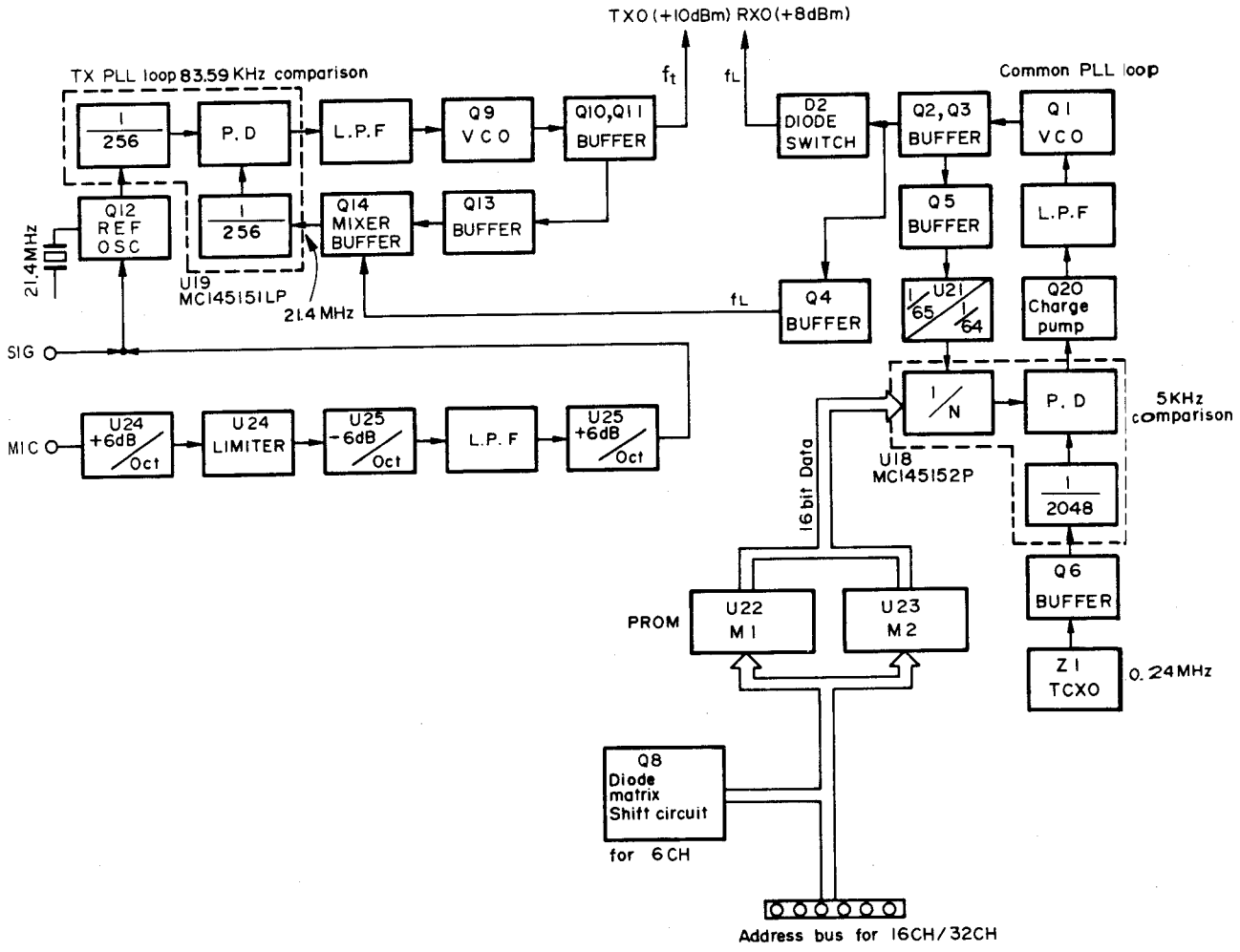


Fig. 4-8 PLL Block Diagram

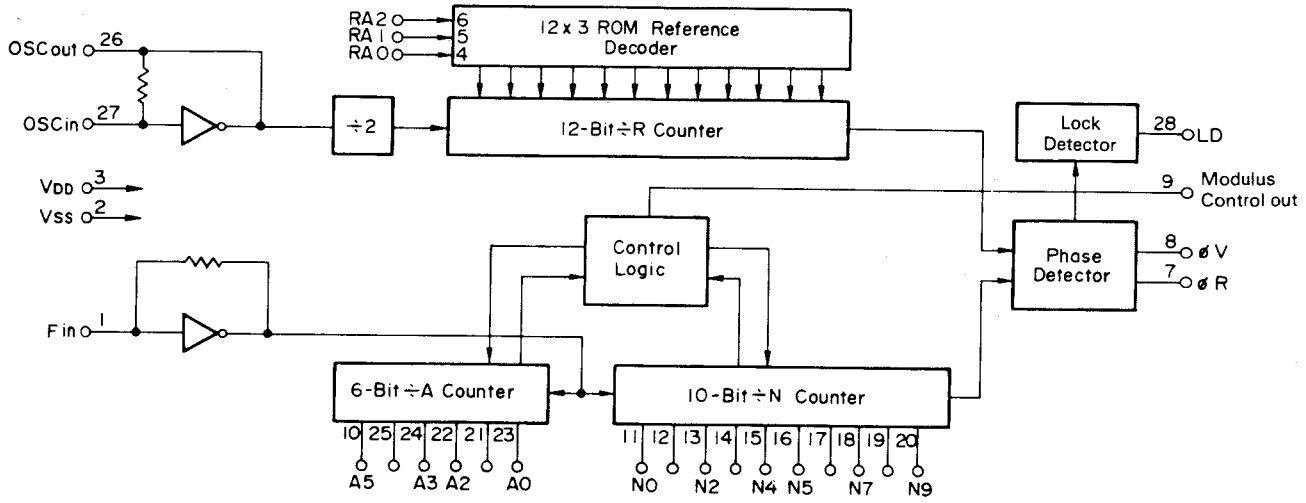


Fig. 4-9 MC145152 (PLL unit U18)

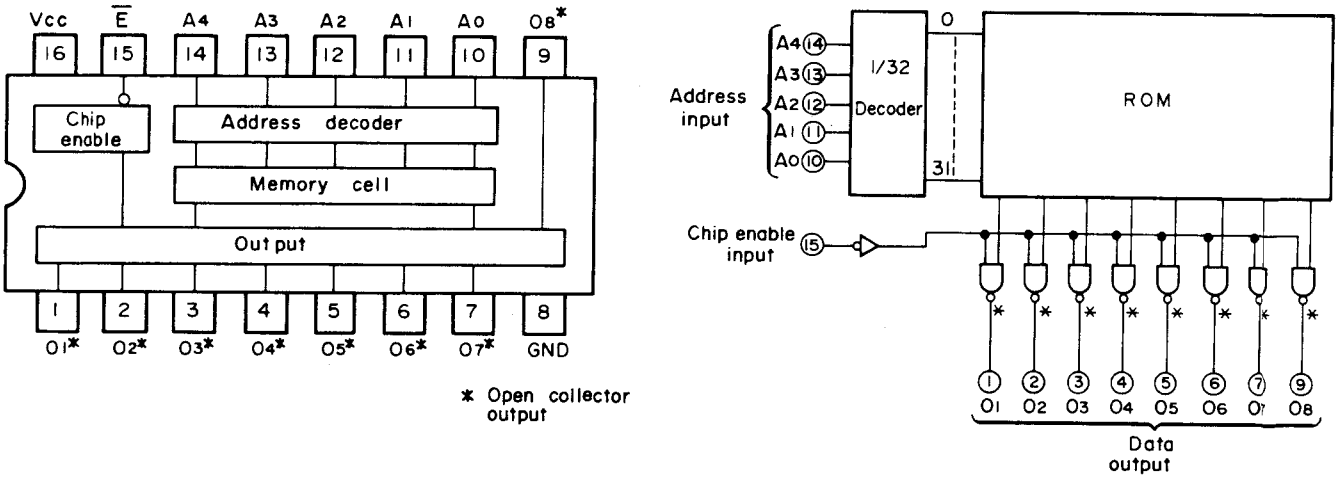


Fig. 4-10 M54730AP (PLL unit U22, 23)

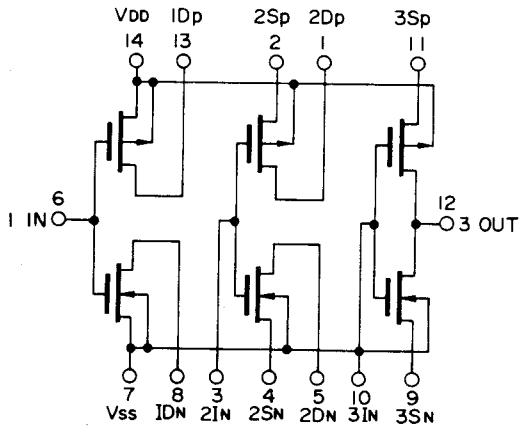
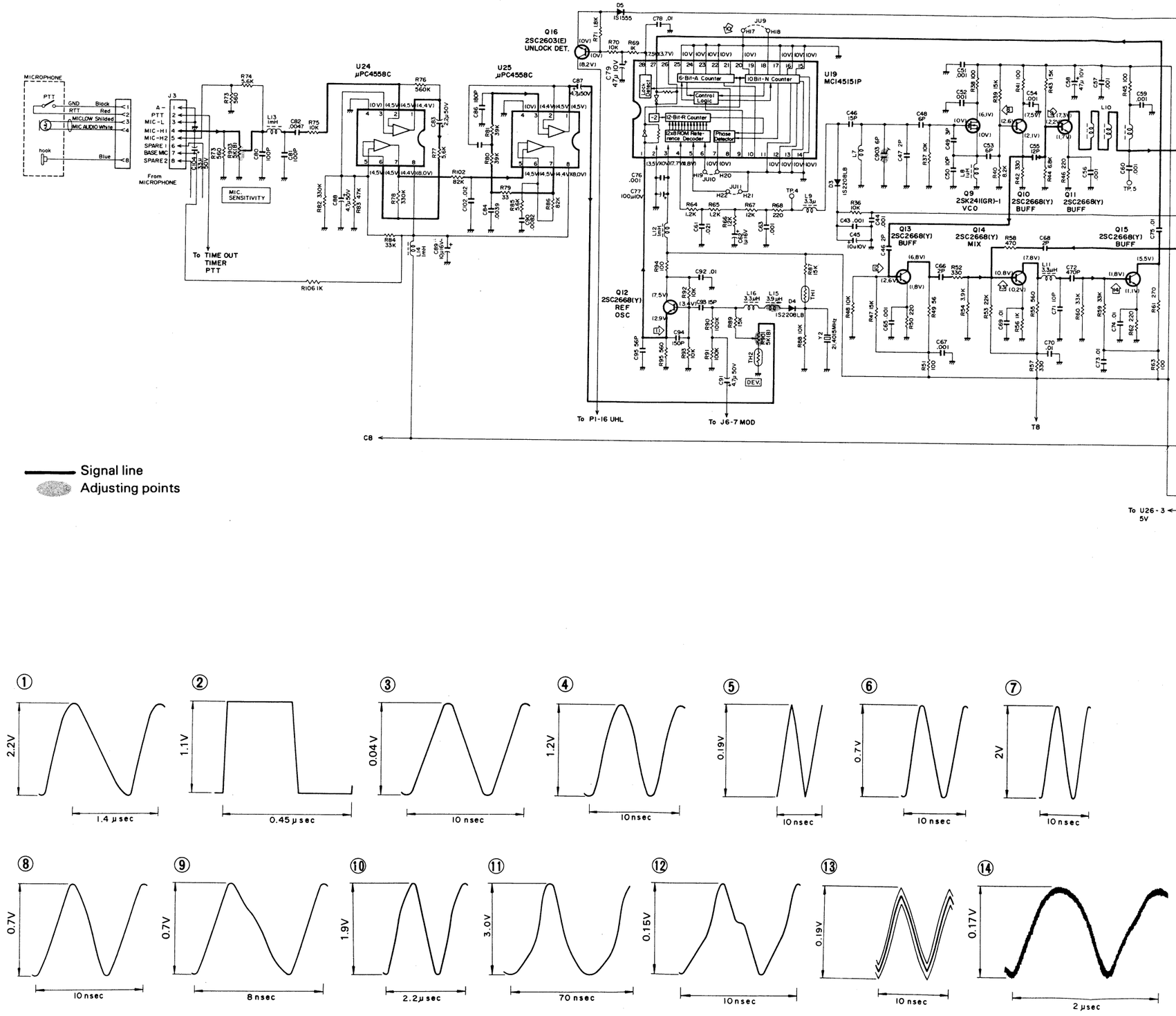


Fig. 4-11 TC4007UBP (PLL unit U20)



Signal line

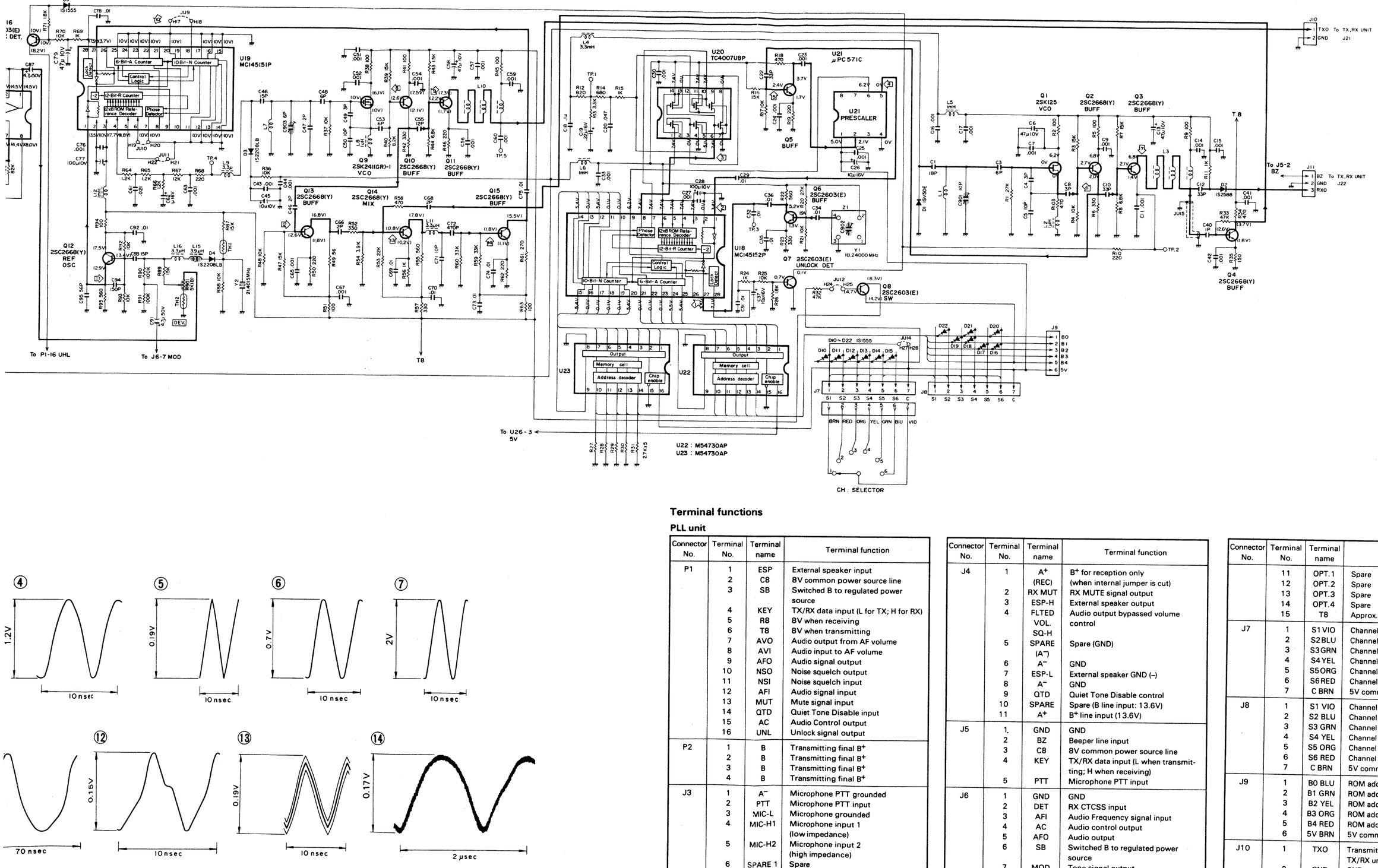
Adjusting points

Terminal functions

PLL unit

Connector No.	Terminal No.	Terminal name	Te
P1	1	ESP	External sp
	2	C8	8V commo
	3	SB	Switched B source
	4	KEY	TX/RX data
	5	R8	8V when re
	6	T8	8V when tr
	7	AVO	Audio outpu
	8	AVI	Audio input
	9	AFO	Audio signa
	10	NSO	Noise squel
	11	NSI	Noise squel
	12	AFI	Audio signa
	13	MUT	Mute signal
	14	QTD	Quiet Tone
	15	AC	Audio Contr
	16	UNL	Unlock sign
P2	1	B	Transmittin
	2	B	Transmittin
	3	B	Transmittin
	4	B	Transmittin
J3	1	A⁻	Microphone
	2	PTT	Microphone
	3	MIC-L	Microphone
	4	MIC-H1	Microphone (low impeda
	5	MIC-H2	Microphone (high imped
	6	SPARE 1	Spare
	7	BASE MIC	Base Mic 8V
	8	QT	MIC hung-u

PLL Signal Path Diagram



Terminal functions

PLL unit

Connector No.	Terminal No.	Terminal name	Terminal function
P1	1	ESP	External speaker input
	2	C8	8V common power source line
	3	SB	Switched B to regulated power source
	4	KEY	TX/RX data input (L for TX; H for RX)
	5	R8	8V when receiving
	6	T8	8V when transmitting
	7	AVO	Audio output from AF volume
	8	AVI	Audio input to AF volume
	9	AFO	Audio signal output
	10	NSO	Noise squelch output
	11	NSI	Noise squelch input
	12	AFI	Audio signal input
	13	MUT	Mute signal input
	14	QTD	Quiet Tone Disable input
	15	AC	Audio Control output
	16	UNL	Unlock signal output
P2	1	B	Transmitting final B^+
	2	B	Transmitting final B^+
	3	B	Transmitting final B^+
	4	B	Transmitting final B^+
J3	1	A^-	Microphone PTT grounded
	2	PTT	Microphone PTT input
	3	MIC-L	Microphone grounded
	4	MIC-H1	Microphone input 1 (low impedance)
	5	MIC-H2	Microphone input 2 (high impedance)
	6	SPARE 1	Spare
	7	BASE MIC	Base Mic 8V DC
	8	QT	MIC hung-up

Connector No.	Terminal No.	Terminal name	Terminal function
J4	1	A^+ (REC)	B^+ for reception only (when internal jumper is cut)
	2	RX MUT	RX MUTE signal output
	3	ESP-H	External speaker output
	4	FLTED VOL. SQ-H	Audio output bypassed volume control
	5	SPARE (A^-)	Spare (GND)
	6	A^-	GND
	7	ESP-L	External speaker GND (–)
	8	A^-	GND
	9	QTD	Quiet Tone Disable control
	10	SPARE	Spare (B line input: 13.6V)
	11	A^+	B^+ line input (13.6V)
J5	1	GND	GND
	2	BZ	Beeper line input
	3	C8	8V common power source line
	4	KEY	TX/RX data input (L when transmitting; H when receiving)
	5	PTT	Microphone PTT input
J6	1	GND	GND
	2	DET	RX CTCSS input
	3	AFI	Audio Frequency signal input
	4	AC	Audio control output
	5	AFO	Audio output
	6	SB	Switched B to regulated power source
	7	MOD	Tone signal output
	8	KEY	TX data output (L when transmitting; L when receiving)
	9	PTT	Microphone PTT input
	10	C8	8V common power source line

Connector No.	Terminal No.	Terminal name	Terminal function
	11	OPT.1	Spare
	12	OPT.2	Spare
	13	OPT.3	Spare
	14	OPT.4	Spare
	15	T8	Approx. 8V when transmitting
J7	1	S1 VIO	Channel switch 1
	2	S2 BLU	Channel switch 2
	3	S3 GRN	Channel switch 3
	4	S4 YEL	Channel switch 4
	5	S5 ORG	Channel switch 5
	6	S6 RED	Channel switch 6
	7	C BRN	5V common line
J8	1	S1 VIO	Channel switch 1
	2	S2 BLU	Channel switch 2
	3	S3 GRN	Channel switch 3
	4	S4 YEL	Channel switch 4
	5	S5 ORG	Channel switch 5
	6	S6 RED	Channel switch 6
	7	C BRN	5V common line
J9	1	B0 BLU	ROM address input
	2	B1 GRN	ROM address input
	3	B2 YEL	ROM address input
	4	B3 ORG	ROM address input
	5	B4 RED	ROM address input
	6	5V BRN	5V common line
J10	1	TXO	Transmit local signal output to TX/RX unit
	2	GND	GND
J11	1	BZ BLU	Audio output
	2	GND	GND
	2	RXO	Receive local signal output to TX/RX unit
		shield	

4. Transmitter PLL

The output signal from VCO Q9: 2SK241(GR)-1 is buffered by Q10 and Q11: 2SC2668(Y) and is output as the TXO signal (transmit frequency). A part of this signal from Q10 is coupled through buffer Q13: 2SC2668(Y) to mixer Q14: 2SC2668(Y). A part of the RXO output fed from the common PLL is also supplied through isolation amp Q4: 2SC2668(Y) to mixer Q14: 2SC2668(Y). The mixer output (21.4 MHz) is amplified by Q15, divided by PLL IC U19: MC145151 and coupled to the phase detector. The 21.4 MHz OFFSET (and modulator) oscillator output is also divided by U19 and coupled to the phase detector.

The output of the phase detector is supplied to the loop filter and then to varicap diode D3: 1S2208 as the VCO control voltage.

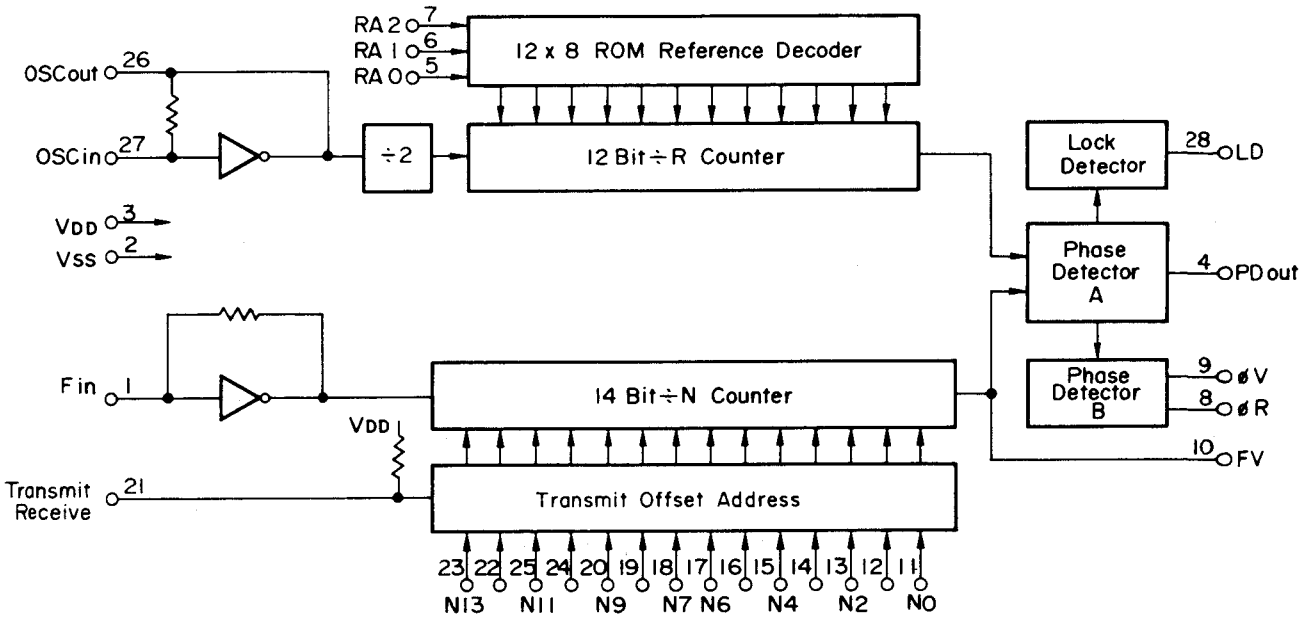


Fig. 4-12 MC145151P (PLL unit U19)

5. Modulator circuit

The transmitter PLL reference (or OFFSET) oscillator Q12: 2SC2668(Y) is directly frequency modulated. An EIA (RS-152-B) frequency modulation characteristic is obtained by mic amplifier-limiter U24 and U25 (both μPC4558C).

6. PLL unlock detection circuit

Unlock condition is detected in the common PLL by Q7: 2SC2603(E) and in the transmit PLL by Q16: 2SC2603(E). When either PLL unlocks, an "UNL" voltage at J1 pin 16 of approximately 8V deactivates the transmitter driver stages to prevent "illegal" output.

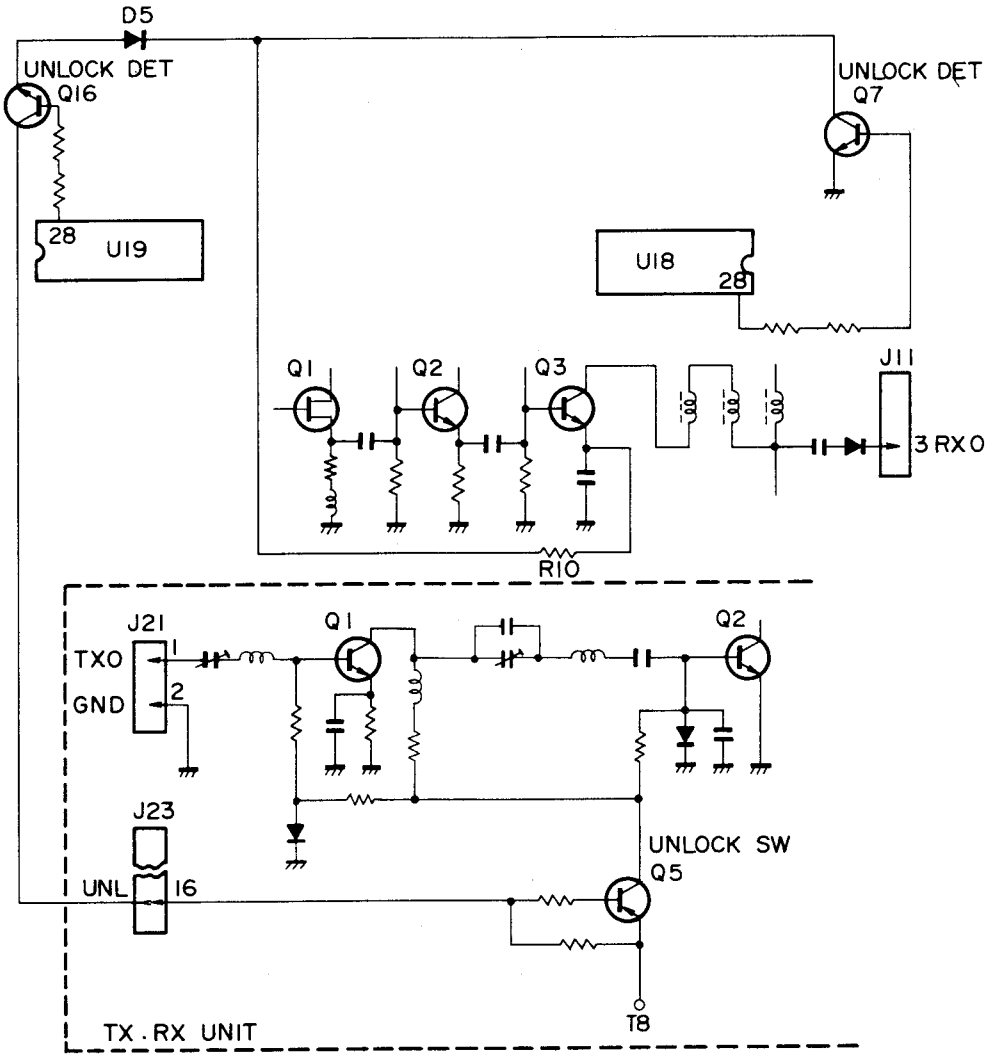


Fig. 4-13 Unlock Detection Circuit

7. QTD invert circuit

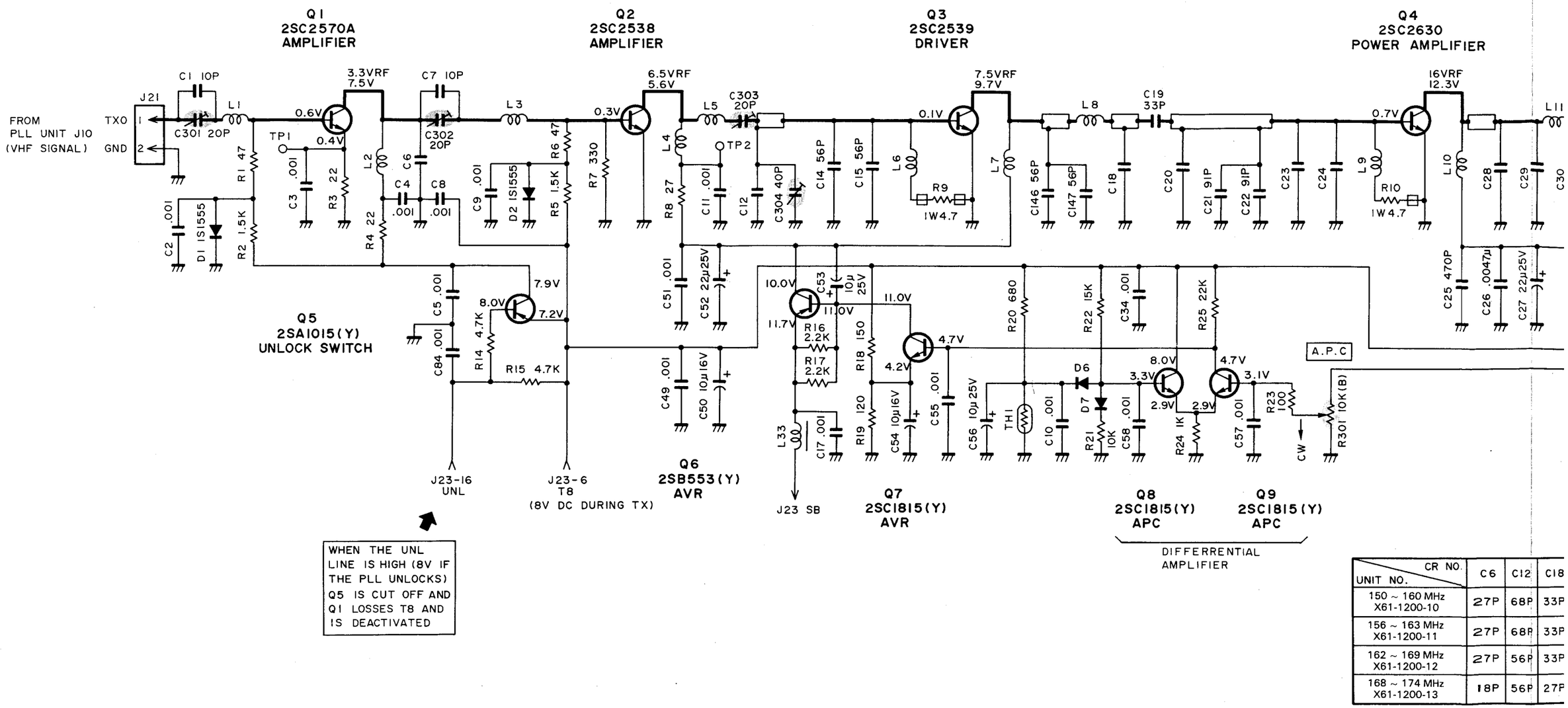
To select polarity (active Low or active High) to control QTD, Q17: 2SC2603(E) can be un-strapped to operate as an inverter.

8. TX frequency shift circuit

In the duplex mode, the first address bit (B4) is set to logic high by Q8: 2SC2604(E) in order to change the data (i.e. change address) in the PROM during transmission. In 6-channel operation, the duplex channel can be selected only from CH1 through CH6 by shift diodes D10 to D15: all 1S1555. (Channels slots in which diodes are installed are duplex.)

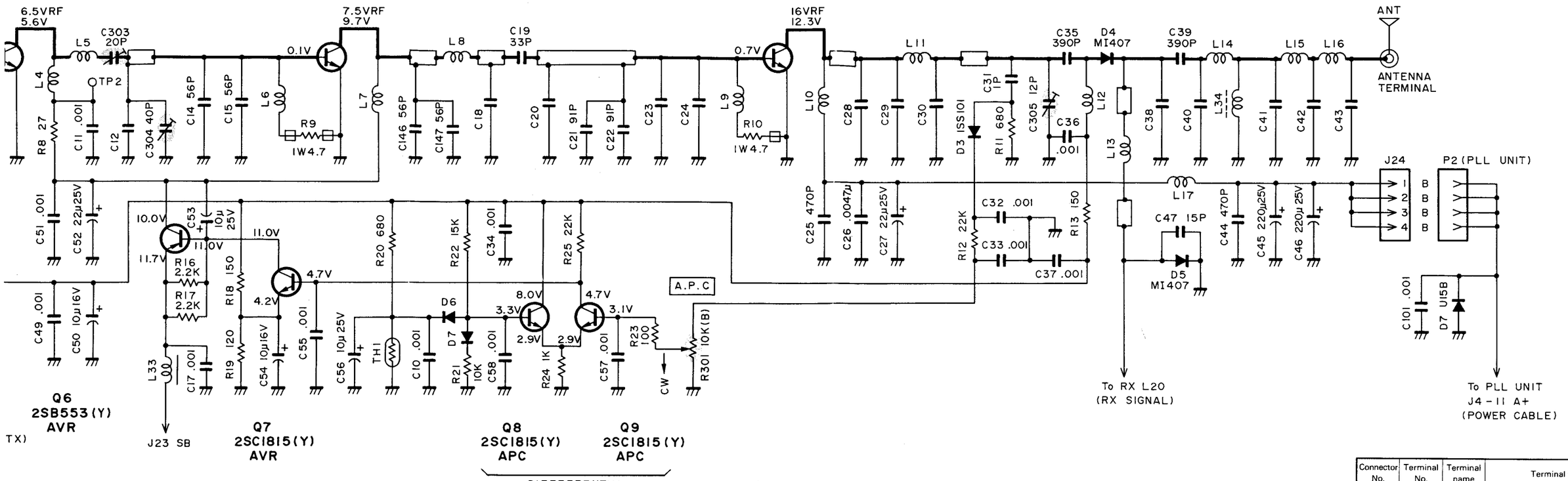
9. Diode matrix

Diodes D16 through D22 (all 1S1555) form a matrix circuit which converts the rotary channel switch status to PROM address data during 6-channel operation.



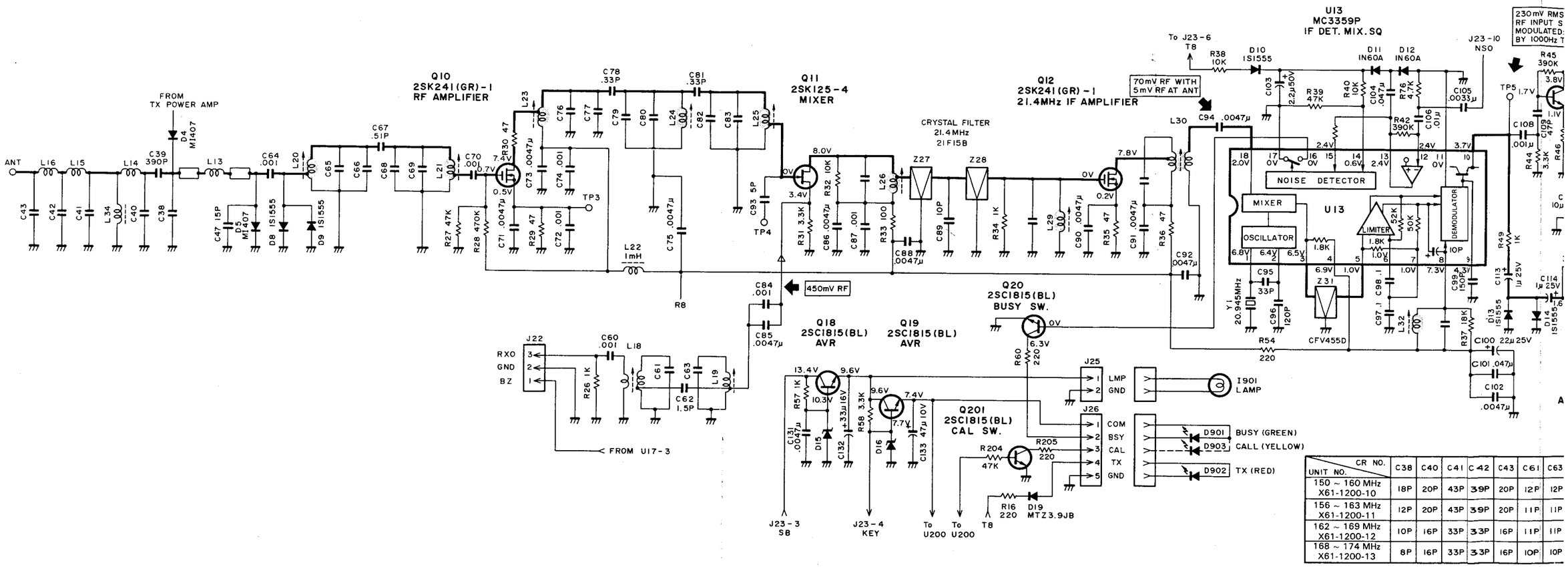
UNIT NO. \ CR NO.	C6	C12	C18
150 ~ 160 MHz X61-1200-10	27P	68P	33P
156 ~ 163 MHz X61-1200-11	27P	68P	33P
162 ~ 169 MHz X61-1200-12	27P	56P	33P
168 ~ 174 MHz X61-1200-13	18P	56P	27P

TX Signal Path Diagram



UNIT NO. \ CR NO.	C6	C12	C18	C20	C23	C24	C28	C29	C30	C38	C40	C41	C42	C43
150 ~ 160 MHz X61-1200-10	27P	68P	33P	33P	180P	180P	100P	100P	27P	18P	20P	43P	39P	20P
156 ~ 163 MHz X61-1200-11	27P	68P	33P	33P	180P	180P	82P	82P	27P	12P	20P	43P	39P	20P
162 ~ 169 MHz X61-1200-12	27P	56P	33P	22P	180P	180P	82P	82P	24P	10P	16P	33P	33P	16P
168 ~ 174 MHz X61-1200-13	18P	56P	27P	22P	150P	150P	68P	82P	22P	8P	16P	33P	33P	16P

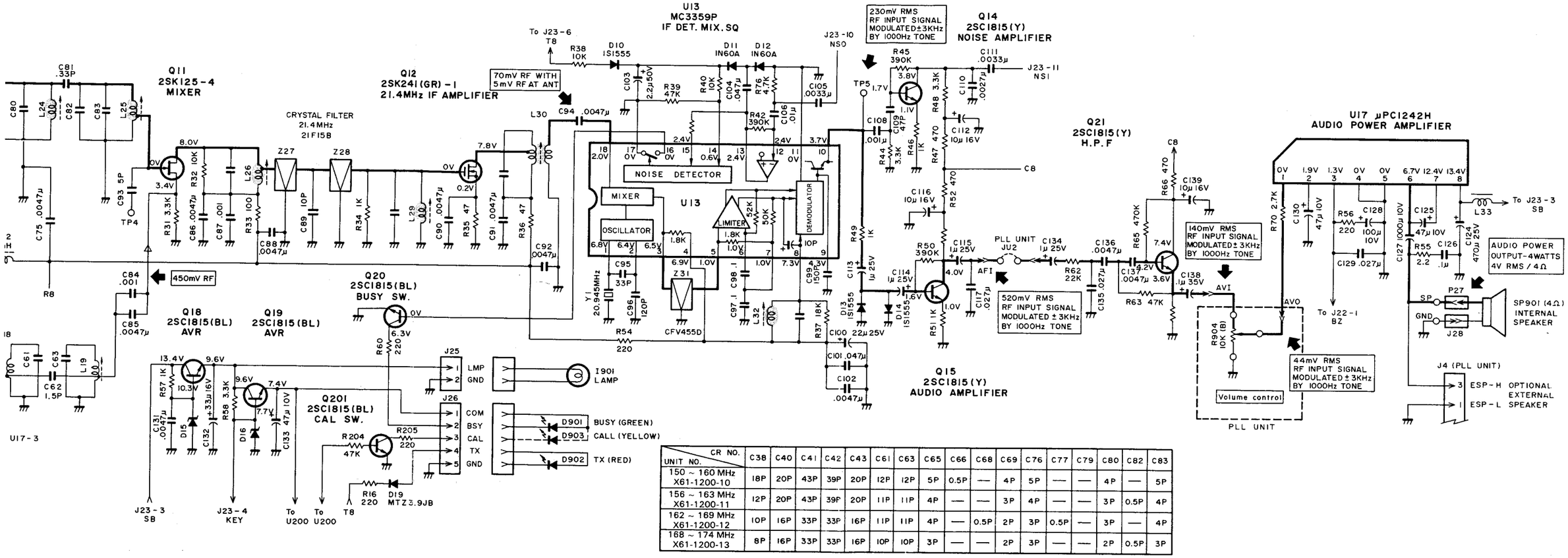
Connector No.	Terminal No.	Terminal name	Terminal function
J21	1	TXO	Transmit signal input from PLL unit
	2	GND	GND
J22	1	BZ	Voice signal output
	2	GND	GND
	3	RXO	Receive signal input from PLL unit
J23	1	ESP	External speaker line output
	2	C8	8V common power source line
	3	SB	Switched B^+ to regulated power source
	4	KEY	TX/RX data output (L when transmitting; H when receiving)
	5	R8	8V when receiving
	6	T8	8V when transmitting
	7	AVO	Voice signal output from AF volume cont.
	8	AVI	Voice signal input to AF volume cont.
	9	AFO	Voice signal output
	10	NSO	Noise squelch signal output
	11	NSI	Noise squelch signal input
	12	AFI	Voice signal input
	13	MUT	Mute signal input
	14	QTD	Quiet Tone Disable output
	15	AC	Audio control output
	16	UNL	Unlock signal input
J24	1	B	B^+ line to transmit final stage
	2	B	B^+ line to transmit final stage
	3	B	B^+ line to transmit final stage
	4	B	B^+ line to transmit final stage
J25	1	LMP(RED)	Channel illumination lamp ⊕
	2	GND(BLK)	GND ⊖
J26	1	COM(BRN)	Common power source for LED
	2	BSY(RED)	BUSY indication LED
	3	CAL(ORG)	Call indication LED CAL
	4	TX(YEL)	TX indication LED
	5	GND(BLK)	GND



CR NO. / UNIT NO.	C38	C40	C41	C42	C43	C61	C63
150 ~ 160 MHz X61-1200-10	18P	20P	43P	39P	20P	12P	12P
156 ~ 163 MHz X61-1200-11	12P	20P	43P	39P	20P	11P	11P
162 ~ 169 MHz X61-1200-12	10P	16P	33P	33P	16P	11P	11P
168 ~ 174 MHz X61-1200-13	8P	16P	33P	33P	16P	10P	10P

Signal line

Adjusting points



UNIT NO. \ CR NO.	C38	C40	C41	C42	C43	C61	C63	C65	C66	C68	C69	C76	C77	C79	C80	C82	C83
150 ~ 160 MHz X61-1200-10	18P	20P	43P	39P	20P	12P	12P	5P	0.5P	—	4P	5P	—	—	4P	—	5P
156 ~ 163 MHz X61-1200-11	12P	20P	43P	39P	20P	11P	11P	4P	—	—	3P	4P	—	—	3P	0.5P	4P
162 ~ 169 MHz X61-1200-12	10P	16P	33P	33P	16P	11P	11P	4P	—	0.5P	2P	3P	0.5P	—	3P	—	4P
168 ~ 174 MHz X61-1200-13	8P	16P	33P	33P	16P	10P	10P	3P	—	—	2P	3P	—	—	2P	0.5P	3P

5. DISASSEMBLY

1. Case screw removal

Remove one screw each securing the top and bottom covers at the rear.

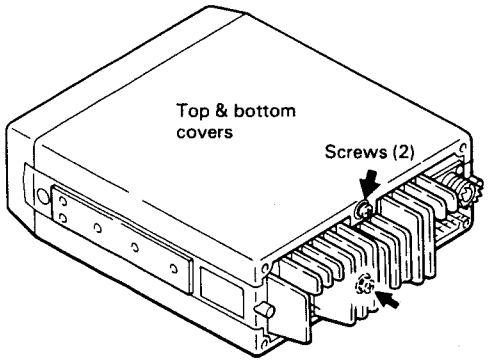


Fig. 5-1

2. Cover removal

1) Remove one screw securing the top cover.
2) Slide the cover to the rear, as shown.

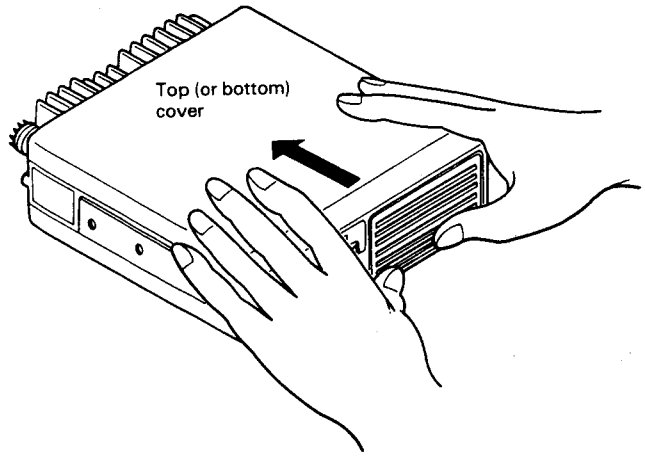


Fig. 5-2

3. Front panel removal

1) To remove the OFF/VOL and QT/SQL knobs from the front panel, pull forward.
2) Remove two screws securing the right and left sides of the front panel.

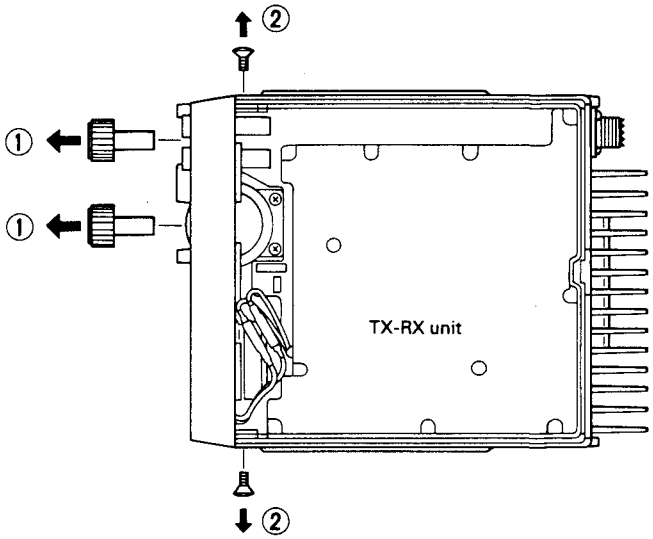


Fig. 5-3

3) Unplug three connectors to the front panel.

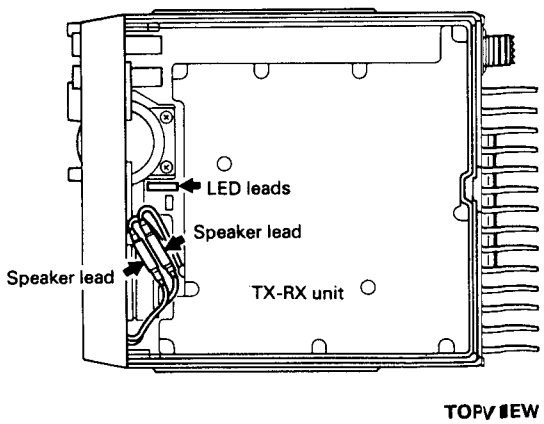


Fig. 5-4

4) Remove the front panel by pulling forward.

4. TX-RX unit removal

1) Remove 12 screws securing the cast shield.

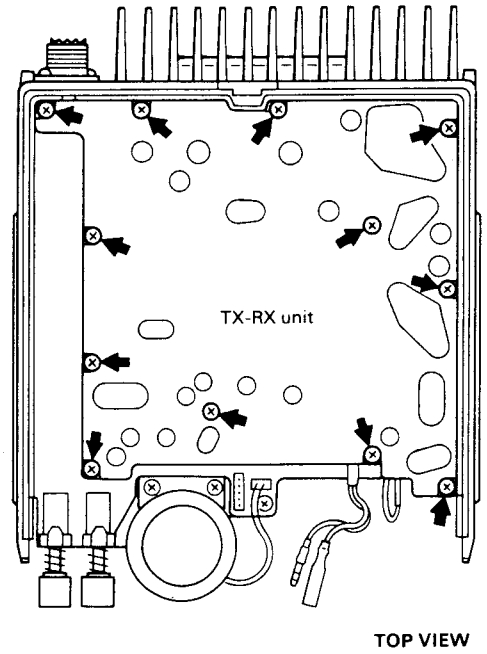


Fig. 5-5

2) Remove 12 screws securing components to chassis.
3) Unplug connectors J21, J22 and J25.

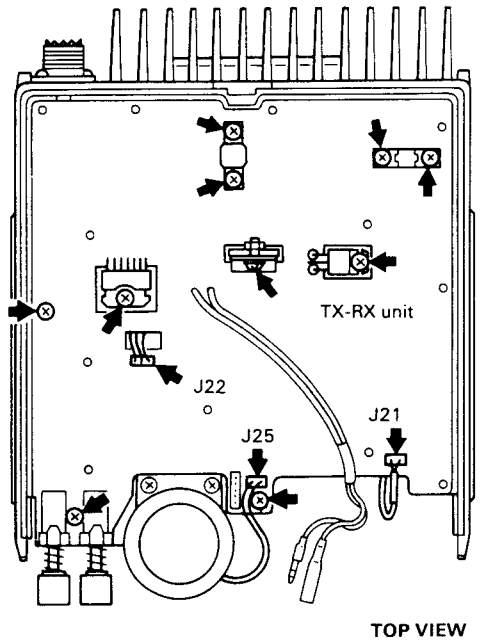


Fig. 5-6

4) Remove two screws securing the UHF connector to the rear panel.

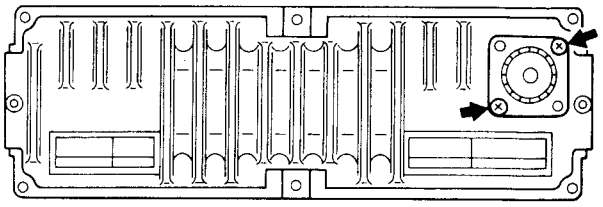


Fig. 5-7

5) Desolder the UHF connector from the TX-RX unit.

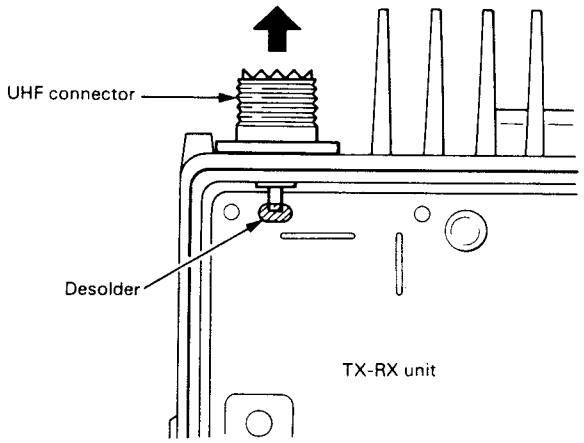


Fig. 5-8

Note: *When reassembling the unit, do not forget to solder the UHF connector. When soldering the connector, press the pin downward.*

6) Remove the TX-RX unit. Lift the front first and then withdraw the circuit board.

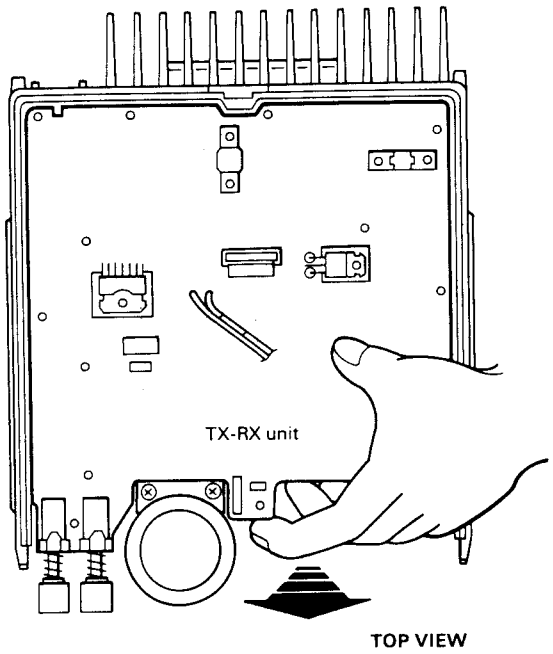


Fig. 5-9

2) Unplug three connectors as shown.

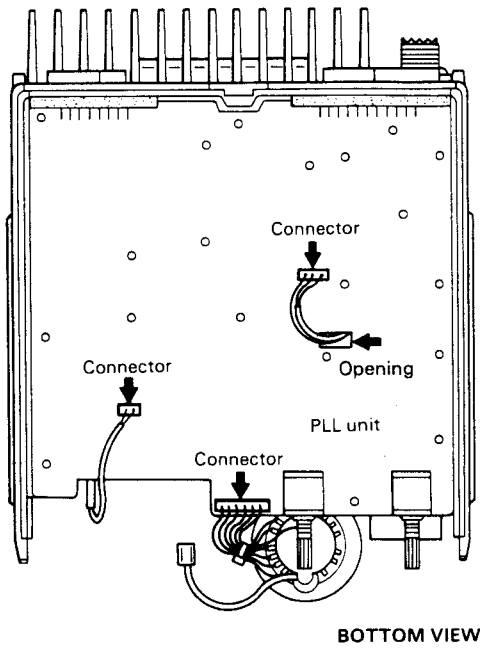


Fig. 5-11

5. PLL unit removal

(Front panel must be removed. Perform step 3 first)

To remove the PLL unit, perform steps 1, 2 and 3.

1) Remove all screws as shown.

Cast shield A:	7 screws
Cast shield B:	7 screws
PLL unit:	9 screws

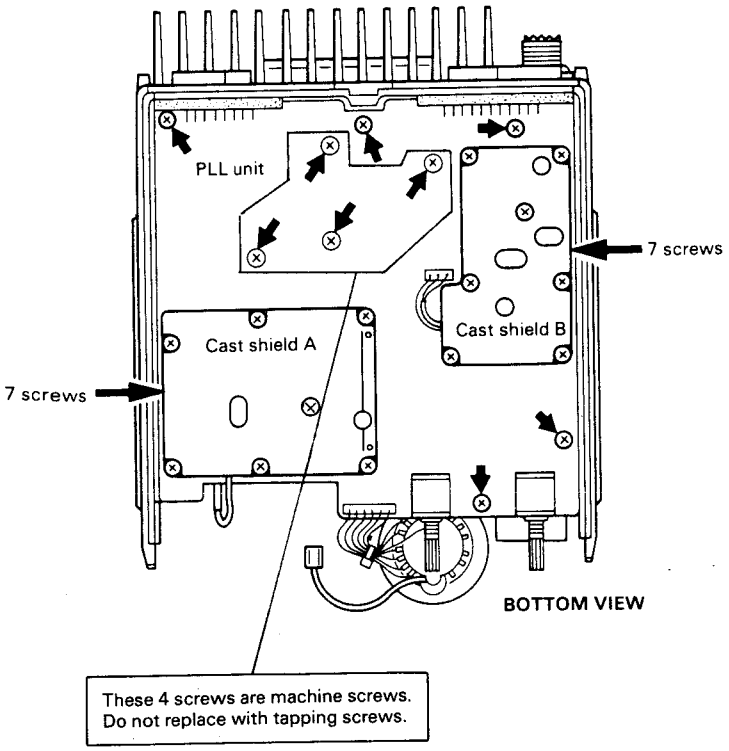


Fig. 5-10

When reinstalling the connector, note that it must be passed through this opening.

3) First lift the front of the unit, then remove.

6. Speaker removal

Perform front panel removal step 3 first.

1) Remove four screws holding the speaker.
2) When replacing the speaker, desolder and reuse the speaker leads.

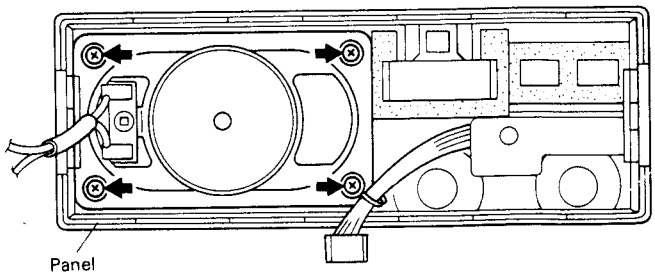


Fig. 5-12a

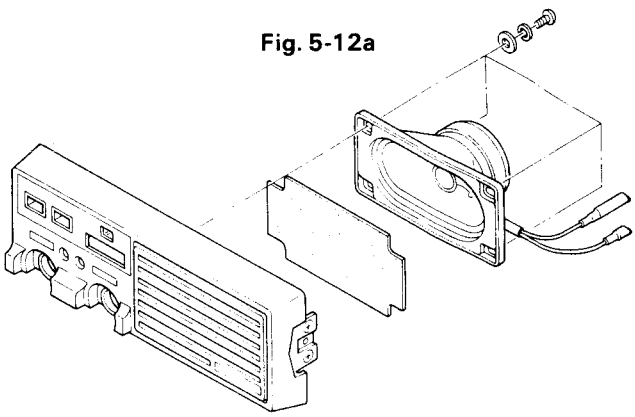


Fig. 5-12b

7. LED replacement

(Proceed after step 3.)

Replacement:

1) Remove one screw holding the LED circuit board to the front panel.

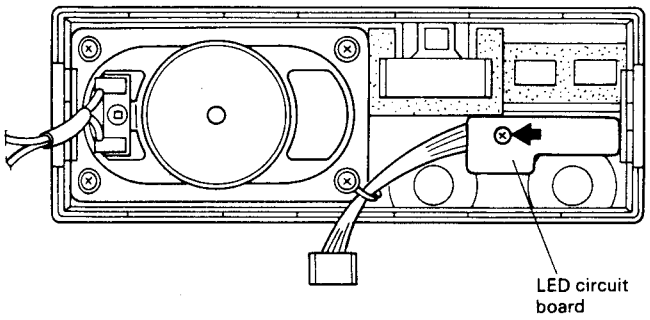


Fig. 5-13

2) Replace the LED as required. Note terminal polarity when replacing.

8. Installing a Yellow CAL (CALL) LED: PY5534S for D903

1) Remove one screw securing the LED PCB to the front panel.
2) Solder the CAL LED to the LED circuit board. Observe polarity.

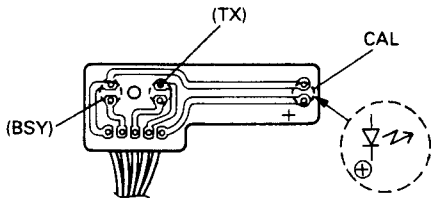


Fig. 5-14

3) Remove the metal plate securing the panel.
4) Using a 5 mm or 13/64 inch drill, carefully open the CALL LED mounting on the front panel. Protect the panel face from scratching.

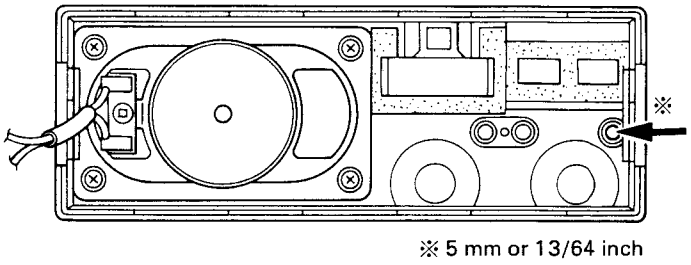


Fig. 5-15

5) Use a countersink to finish the outside edge of the hole on the front panel.
6) Reinstall the LED PCB board. (Now has three LEDs)
7) Reinstall the threaded metal plate to the front panel.

9. Channel illumination lamp replacement

1) To remove the channel knob from the switch, pull UP.
2) Remove the old lamp from the keyway on the channel switch mounting plate and replace with a new lamp assembly.
   Illumination lamp: B30-0829-05

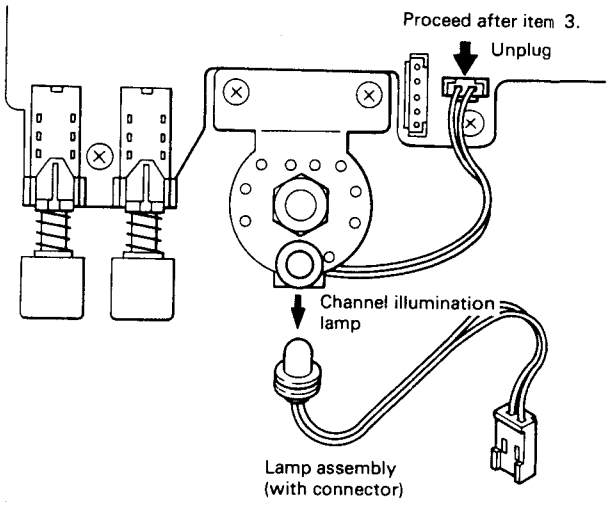


Fig. 5-16

10. Channel switch replacement (1 ~ 6 CH)

Note: *For replacement of the 16 CH or 32 CH switches, refer to item 16/32 channel conversion kit.*

Proceed after item 3.

1) Pull the channel knob UP from the channel switch.
2) Remove and replace the rotary switch assembly as shown.

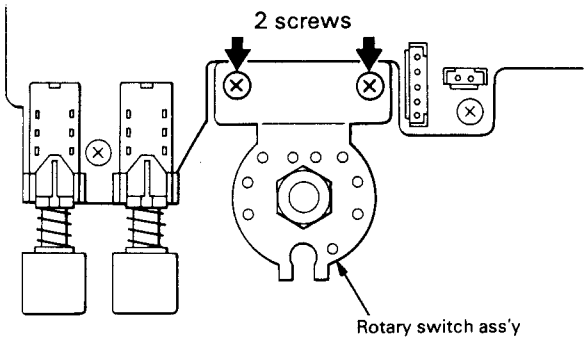


Fig. 5-17a

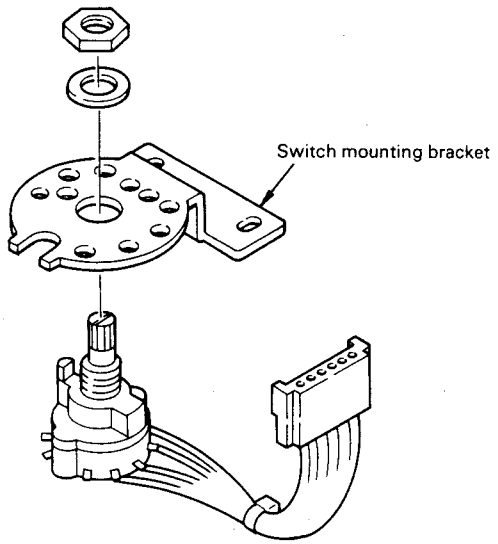


Fig. 5-17b

11. Channel limit switch stop screw placement

Proceed after item 3. Installing the stop screw in the specified channel hole limits the number of channels available from the channel switch.

1) Remove the channel selector knob.
2) Reposition the stop screw in the designated channel hole.

Note: *For six channel configuration, the stop screw is not needed and may be stored as shown.*

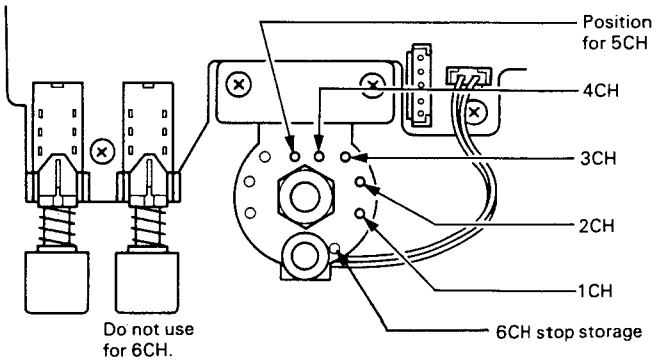


Fig. 5-18

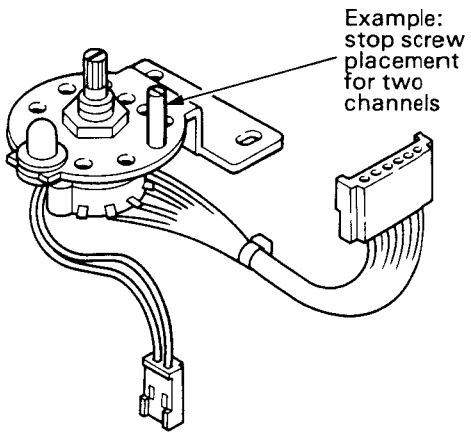


Fig. 5-19

Location stop	Channels					
	1	2	3	4	5	6
for CH1	—					
for CH2	—	—				
for CH3	—	—	—			
for CH4	—	—	—	—		
for CH5	—	—	—	—	—	
None	—	—	—	—	—	—

Fig. 5-20

12. Test equipment required

Test Equipment		Major Specifications
1. Standard Signal Generator (SSG)	Frequency range Modulation Output	150 ~ 174 MHz Frequency modulation and external modulation. 0.1μV to greater than 1 mV.
2. Power meter	Input impedance Operation frequency Measurement capability	50 ohms 150 to 174 MHz or more. Vicinity of 100W and 10W.
3. Deviation meter	Frequency range	150 ~ 174 MHz
4. Digital volt meter (DVM)	Measuring range Accuracy	1 ~ 10V DC. High input impedance for minimum circuit loading.
5. Oscilloscope		DC through 30 MHz.
6. High sensitivity frequency counter	Frequency range Frequency stability	10 MHz to 200 MHz. 0.2 ppm or less.
7. Ammeter		15A
8. AF volt meter	Frequency range Voltage range	50 Hz to 10 kHz. 3 mV to 30V.
9. Audio generator	Frequency range Output	50 Hz to 5 kHz or more. Fine adjustment capable between 0 and 1V.
10. Distortion meter	Capability Input level	3% or less at 1 kHz. 50 mV to 10V rms.
11. VOM	Measuring range Input impedance	Measurable between 1.5 ~ 10V DC or less. 50kohms/V or greater.
12. 4 ohm dummy load		Approx. 4 ohm, 10W.
13. Regulated power source		13.8V, approx. 15A (adjustable from 9 to 17V) Useful if ammeter equipped.
14. Spectrum analyzer	Frequency range	0 ~ 1200 MHz (2nd and 3rd harmonic frequencies measurable) Frequency within fo $\pm$ 100 kHz mesurable.

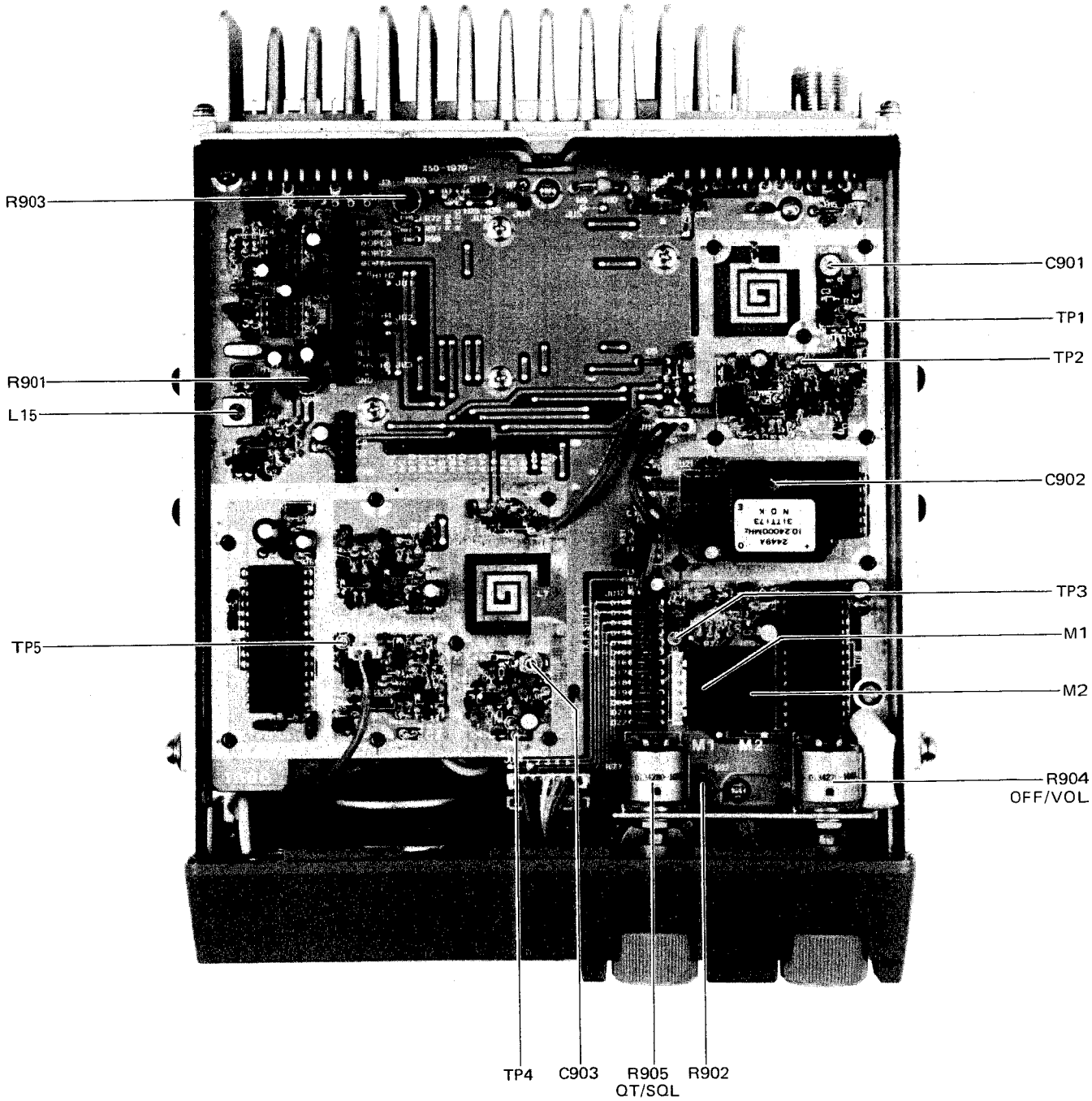
13. Alignment

This adjustment is applied to multi-channel operation. However, when using only one channel, adjust that channel only.

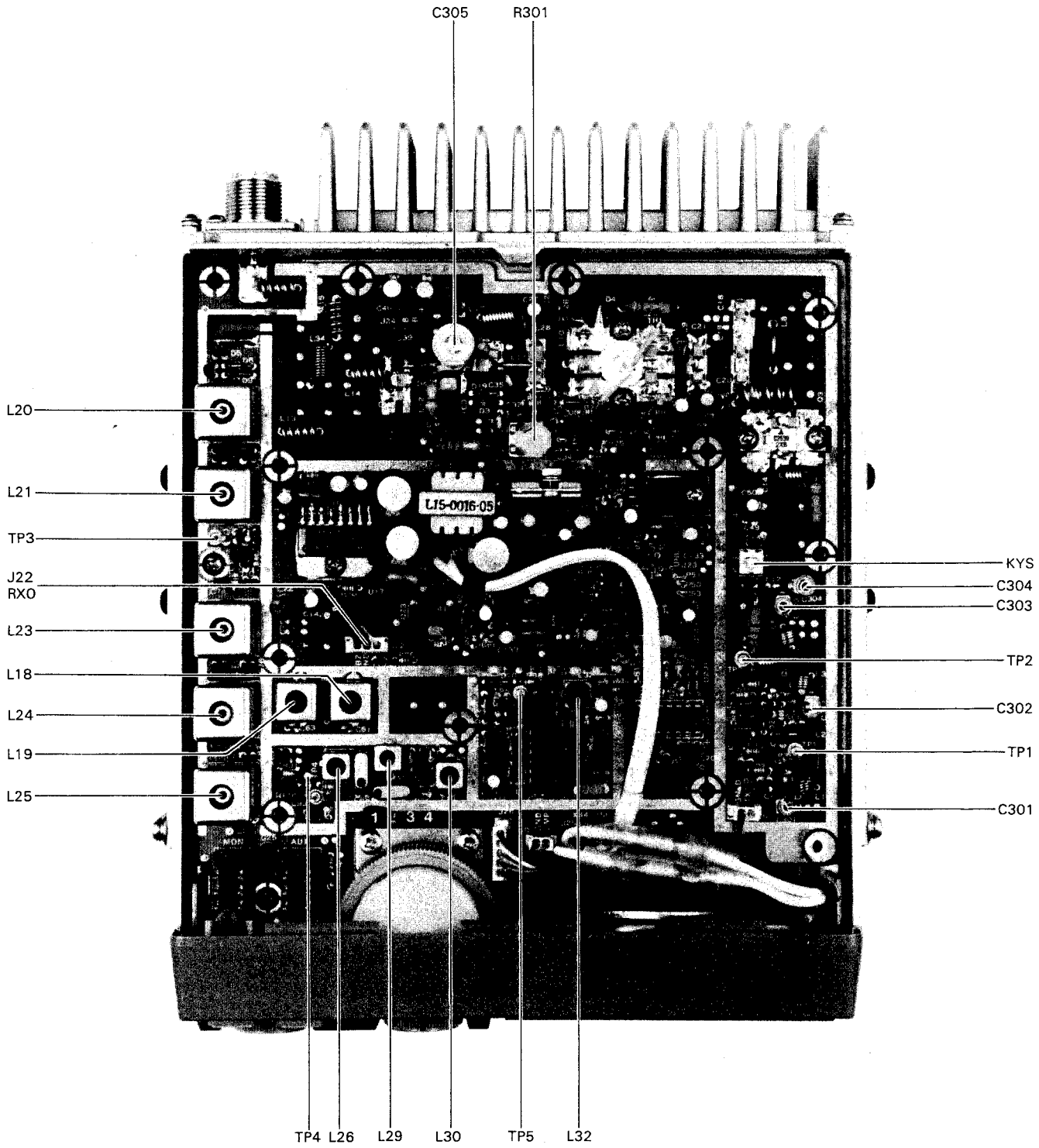
Item	Condition	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Initial setup	1) PLL unit: Insert PROM (M1, M2 frequency stored).							
	2) CH: Any							
	3) Front panel: MONI switch set to out position. QT/SQL just opened.							
	4) Rear panel: Connect power cable and microphone cable.							
	5) CH knob should not be loose. The VOL, QT/SQL, MONI. and AUX knobs should not be pulled off easily.							
	6) Power switch: ON							
2. Common PLL lock voltage	1) CH: Channel in the vicinity of TX center frequency. PTT: ON	Digital volt meter	PLL	TP1	PLL	C901	3.5V ADJ	Verify 6.5V or less in high frequency channel and 1.6V or more in low frequency channel.
3. TCXO frequency adjustment	1) PTT: OFF	Frequency counter	TX-RX	J22 RX0	PLL	C902	RX frequency–21.4 MHz adjustment	Within ± 100 Hz DO NOT adjust if in-spec!
	2) CH: Check other channels storing frequencies.						Verify RX frequency in each channel –21.4 MHz	
4. Transmit PLL lock voltage	1) PTT: ON	Digtal volt meter	PLL	TP4	PLL	C903	3.5V ADJ	Verify 6.5V or less in high frequency channel and 1.6V or more in low frequency channel.
5. Sensitivity	1) CH: Channel in the vicinity of RX center frequency. QT/SQL: Opened	Oscilloscope AF volt meter	Rear panel	ESP (J4-3.7)	Front panel	OFF/VOL	0.78 V/4Ω (noise)	
	2) SSG frequency: Channel 1) Output: 1000 μV/–53 dBm Modulation: OFF				TX-RX	L20 L21 L23 L24 L25 L18 L19 L30	Repeat twice in this order L20, L21, L23, L24, L25, L18, L19. (Lower the SSG level as noise level drops.) Then lower the noise level by L30.	
	3) SSG Output: 1000 μV/-53 dBm Modulation: 1 kHz/± 3 kHz dev.	Oscilloscope Distortion meter	Rear panel	ESP (J4-3.7)	TX-RX	L32	Adjust L32 for maximum AF output.	Repeat twice
						L29	At minimum distortion.	SINAD ≧ 37 dB
	4) SSG Output: 1 μV/–113 dBm				TX-RX	L26	Distortion: Adjust for minimum.	
	5) SSG Output: 0.7 μV/–116 dBm							SINAD ≧ 17 dB

Item	Condition	Measurement			Adjustment			Specifications/ Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
6. Squelch preset	1) Front panel QT/SQL (R905): Counterclockwise (OFF)	SP			PLL	R902	Turn CCW and adjust until squelch just closes.	
	2) Front panel QT/SQL (R905): Threshold	Oscilloscope BUSY	Rear panel	ESP (J4-3.7)			Check	11 : 00 – 13 : 00 threshold.
	3) ANT SSG Output: 0.4μV/–121 dBm Modulation: 1 kHz/± 3 kHz Dev.	Oscilloscope BUSY	Rear panel	ESP (J4-3.7)			Check	Squelch should open. Busy Light on.
	4) QT/SQL (R905): MAX (clockwise)	BUSY	Front panel				Check	Busy Light off.
	5) SSG Output: 2 μV/–107 dBm	Oscilloscope					Check	Squelch should open.
	6) SSG Output: OFF MONI SW: OFF MONI SW: 🎧 → 🖳						Check	Squelch should open.
7. Drive	1) CH: Channel vicinity of TX center frequency. ANT: Power meter TX-RX unit R301: Full CW PTT: ON	TX lamp Power-meter					Check	TX lamp lights.
					TX-RX	C301 C302	} Maximum. Repeat twice	
8. Final	1) CH: Channel vicinity of TX center frequency PTT: ON 2) CH: Any channel except 2 and 3	Power meter	Rear panel	ANT	TX-RX	C303 C304 C305	} Maximum. Repeat twice	50W or greater
						R301	MIN (counterclockwise)	20W or less
							Specified power ADJ	45W +20% -0%
		Ammeter						10A or less
9. Transmit frequency adjustment	1) CH: Channel vicinity of TX center frequency PTT: ON	Frequency counter	TX-RX	ANT	PLL	L15	Frequency adjustment of TX	± 100 Hz
	2) CH: Check other channels.						Verify TX frequency.	
10. Maximum deviation adjustment	1) MIC-H1 AG: 1 kHz/50 mV PLL unit R903: MAX (clockwise) PTT: ON CH: Channel vicinity of TX center frequency	Deviation meter			PLL	R901	± 4.4 kHz ADJ Adjust one more than the other by switching between –P and +P.	± 0.1 kHz
11. Deviation adjustment	1) MIC-H1 (Rear panel J3-4) AG: 1 kHz/5 mV	Deviation meter				R903	± 3 kHz ADJ	± 50 Hz
	2) MIC-H2 (Rear panel J3-5) AG: 1 kHz/5 mV						Check	± 3 kHz or less
12. Suprious	1) CH: To the center channel of the desired band. PTT: ON	Spectrum analyzer	TX-RX	ANT			Near higher harmonic	67 dB or more
							frequency (2f or 3f) within f0 ± 100 kHz.	60 dB or more
13. Monitor	1) Connect the speaker leads. 2) Connect CTCSS (if available). 3) Connect the supplied microphone.	Power meter	TX-RX	ANT			Mutually communicate to monitor.	* The sound should be output correctly. * The sound should not rattle.

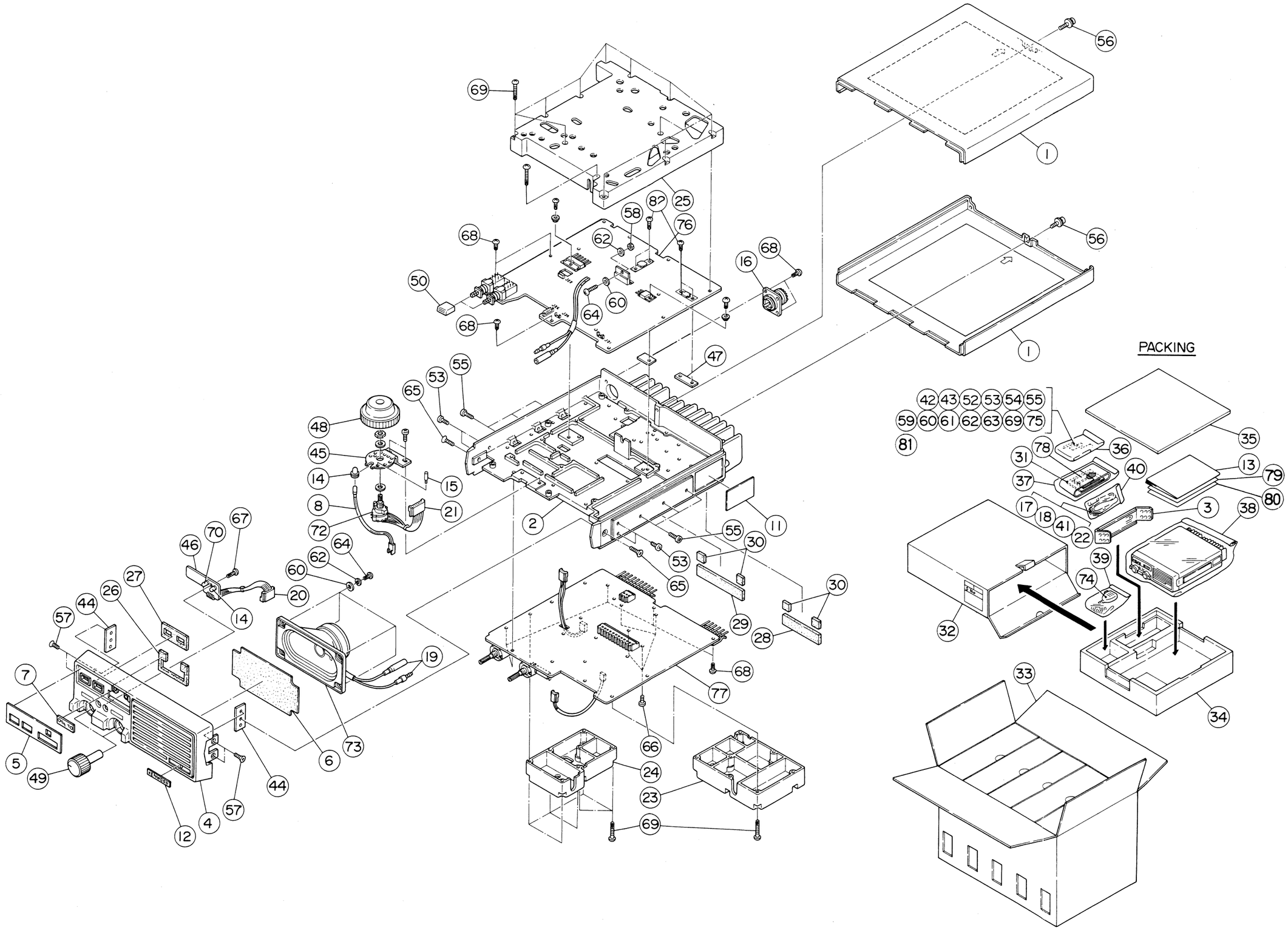
14. ADJUSTMENT PARTS



TK-701S
PLL UNIT (X61-1190-22)
BOTTOM VIEW



TK-701S
TX-RX UNIT (X61-1200-XX)
TOP VIEW


PACKING
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6. DIAGRAM AND PARTS LIST

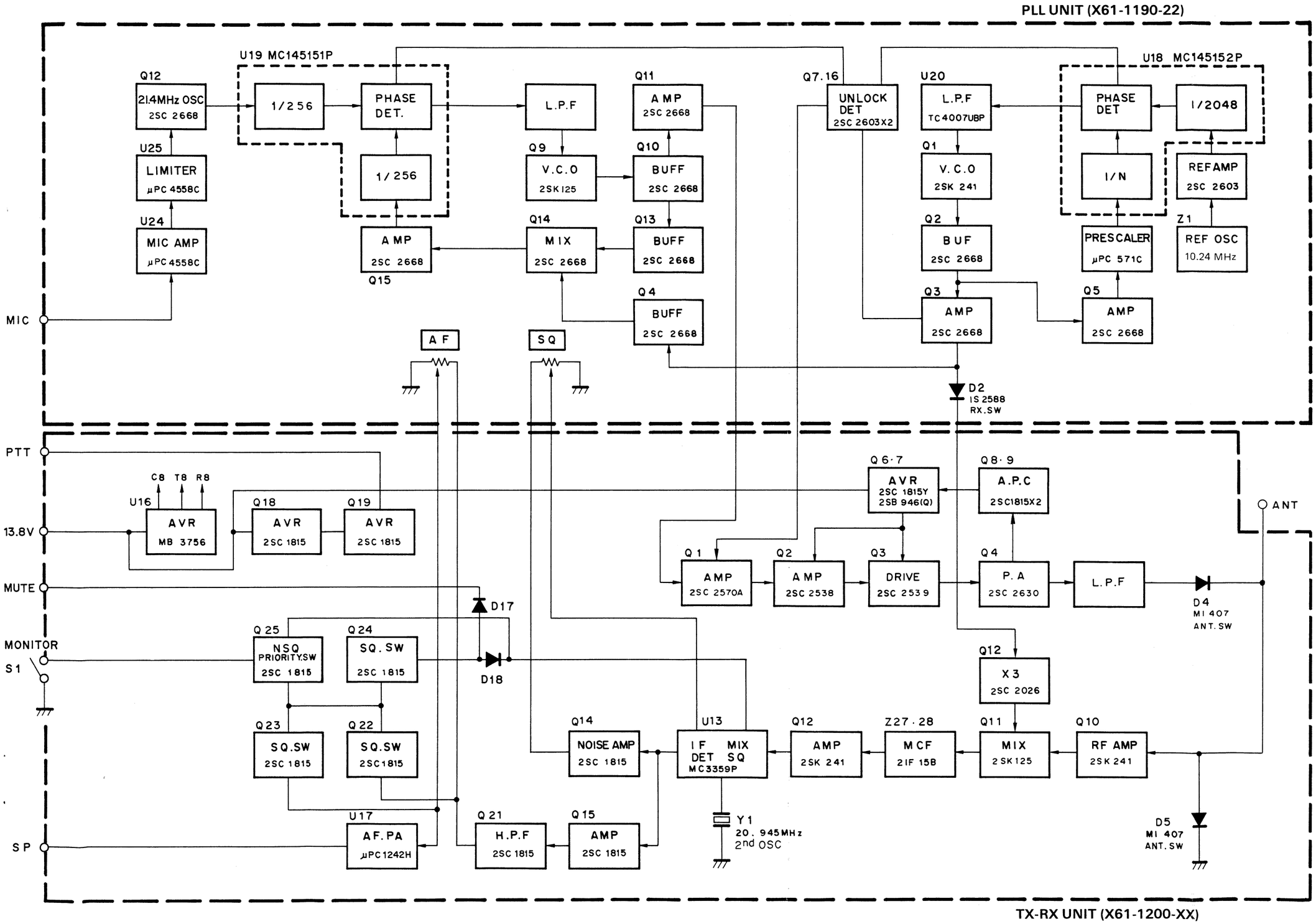
1. DISASSEMBLY DIAGRAM AND PARTS LIST

GENERAL

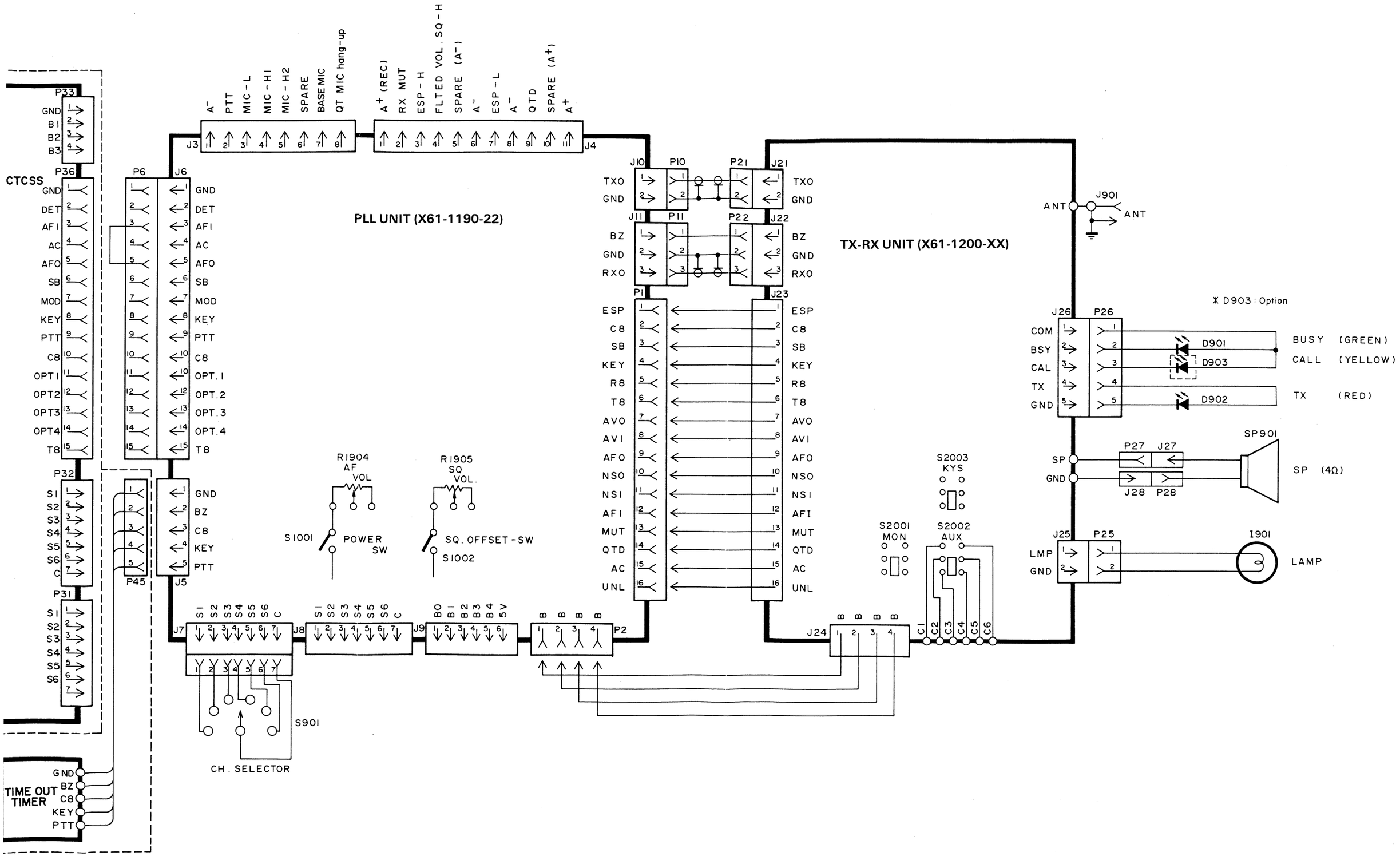
K: USA market, M: Others

Ref. No.	Part No.	Description
1	A01-0951-02	Case, 2 used
2	A10-1248-05	Chassis
3	A13-0641-03	Bracket, mobile, Mounting hardware kit
4	A20-2477-02	Panel
5	A21-0754-04	Escutcheon
6	B05-0728-04	Speaker grill cloth
7	B08-0303-04	Display window
8	B30-0829-05	Lamp with connector, 14V, 480mA, for I901
9		
10		
11	B40-2682-04	Set name plate (K, M)
11	B40-2683-04	Set name plate (K_2, M_2)
11	B40-2684-04	Set name plate (K_3, M_3)
11	B40-2685-05	Set nameplate (K_4, M_4)
12	B43-0691-04	Nameplate
13	B50-4039-00	Instruction manual
14	BG5514S	LED, green, BUSY, 2.1V, 50mA, for D901
15	D32-0406-04	Stop screw, Channel
16	E04-0109-15	UHF receptacle
17	E30-1731-25	DC cable ass'y
18	E30-1733-05	Cable with connector
19	E31-2173-15	Connector with lead, SP
20	E31-2178-15	Connector with lead, LED
21	E31-2186-05	Connector with lead, Channel switch
22	F05-1031-05	Fuse, 10A
22	F05-1031-05	Fuse, 10A (spare)
23	F11-0832-05	Shield cover (A)
24	F11-0833-05	Shield cover (B)
25	F11-0834-05	Shield cover (C)
26	G13-0673-04	Dust seal (A), Channel
27	G13-0674-14	Dust seal (B), Pushswitch
28	G13-0675-04	Dust seal (C), Connector
29	G13-0676-04	Dust seal (D), Connector
30	G13-0677-04	Dust seal (E), Connector, 4 used
31	G13-0682-04	Conductive seal
32	H01-4494-02	Packing carton (inside)
33	H03-2134-04	Packing carton (outside)
34	H10-2574-02	Packing fixture
35	H10-2575-04	Packing fixture
36	H25-0029-04	Poly. bag, Screw, Stopper, Hex. wrench 2.5mm
37	H25-0029-04	Poly. bag, Fuse, ROM, 2 used
38	H25-0106-04	Protective bag, Body
39	H25-0079-04	Protective bag, Microphone
40	H25-0104-04	Poly. bag, DC cable
41	J13-0404-05	Fuse holder
42	J19-1376-05	Mic hanger (A)
43	J19-1382-05	Nylon lead holder, 2 used
44	J21-2796-04	Bracket, Panel, 2 used
45	J21-2797-04	Bracket, Switch
46	J25-3179-04	PCB, LED
47	J30-0524-04	Spacer, 1 used
48	K23-0758-03	Knob, Channel
49	K23-0759-04	Knob, VOL, SOL, 2 used
50	K27-0448-04	Knob, Push, MONI, AUX, 2 used
51	M54730AP	IC, 2 used
52	N09-0008-04	Hex. bolt, Mounting hardware kit, 6 used
53	N35-4006-41	Bind screw, Mic hanger 4 used
54	N09-0633-05	Tapping screw, Mic hanger, 4 used
55	N09-0648-05	Screw, Hex. socket pan head
56	N09-0649-05	Screw with washers, 2 used
57	N09-0650-05	Screw, Pan head, Panel-bracket, 4 used
58	N10-2030-46	Nut, TR
59	N14-0510-04	Nut, Flange, Mounting hardware kit, 6 used
60	N15-1030-46	Washer, Flat, TR, SP, 9 used
61	N15-1060-46	Washer, Flat, Mounting hardware kit, 6 used
62	N16-0030-46	Washer, Spring, TR
63	N16-0060-46	Washer, Spring, Mounting hardware kit, 6 used
64	N30-3008-46	Screw, Pan head, TR
65	N33-4010-41	Screw, Pan head, Round, Panel, 2 used
66	N35-3008-46	Screw, Fillister head, Channel bracket, 6 used
67	N87-3006-46	Screw, Blazer tap tight, LED PCB, SP, 5 used
68	N87-3008-46	Screw, Truss-head tapping, PCB, ANT, 14 used
69	N87-3020-46	Screw, Truss-head tapping, Shield cover, 26 used
70	PR5534S	LED, Red, TX, for D902
72	S01-1433-05	Switch, Rotary, Channel
73	T07-0227-05	Speaker, 4Ω, 3W, for SP901
74	T91-0330-15	Microphone, 400Ω
75	W01-0407-05	Hex. wrench 2.5mm
76	X61-1200-10	TX-RX unit, 150~160MHz (K, M)
	X61-1200-11	TX-RX unit, 156~163MHz (K_2, M_2)
	X61-1200-12	TX-RX unit, 162~169Mhz (K_3, M_3)
	X61-1200-13	TX-RX unit, 168~174Mhz (K_4, M_4)
77	X61-1190-22	PLL unit
78	M54730AP	PROM, U22, 23, 2 used
79	B46-0409-00	Warranty card (K, K2, K3, K4)
80	B50-4088-00	Installation manual
81	N35-4006-41	Screw, Fillister head, Mic hanger, 4used
82	N09-0626-04	Screw, TX-RX unit Q3, Q4, 4 used
	or	
	N87-3010-46	Screw, TX-RX unit Q3, Q4, 4 used from S/N0. 406xxxx

CIRCUIT BLOCK DIAGRAM



SCHEMATIC DIAGRAM



. UNIT Parts List (X61-1190-22)

ef. No.	Part No.	Description
		CC: Ceramic E: Electrolytic ML: Mylar T: Tantalum
	CAPACITORS	
	CC45CH1H180J	CC, 18pF
	CC73FCH1H060D	Chip, 6pF, ±0.5pF
	CC73FCH1H030C	Chip, 3pF, ±0.25pF
	CC73FCH1H100D	Chip, 10pF, ±0.5pF
	CE04W1A470M	E, 47μF, 10V
	CK45B1H102K	CC, 0.001μF
	CC45CH1H030C	CC, 3pF, ±0.25pF
	CK45B1H102K	CC, 0.001μF
)	CC45CH1H330J	CC, 33pF
	CK45B1H102K	CC, 0.001μF
2	CC45CH1H330J	CC, 33pF
3	CE04W1A470M	E, 47μF, 10V
4~17	CK45B1H102K	CC, 0.001μF
8	C91-0431-05	CC, 0.1μF
9	CS15E1VR22M	T, 0.22μF, 35V
)	CQ92M1H473K	ML, 0.047μF
2	CC45CH1H330J	CC, 33pF
3~25	CK45B1H102K	CC, 0.001μF
6	CE04W1C100M	E, 10μF, 16V
7	CK45B1H102K	CC, 0.001μF
8	CE04W1A101M	E, 100μF, 10V
9	C91-0131-05	CC, 0.01μF, SP
)	CK45B1H102K	CC, 0.001μF
1,32	C91-0131-05	CC, 0.01μF,SP
3	CK45B1H102K	CC, 0.001μF
4~36	C91-0131-05	CC, 0.01μF, SP
7	CE04W1C100M	E, 10μF, 16V
8,39	CE04W1A470M	E, 47μF, 10V
0	CC45CH1H010C	CC, 1pF, ±0.25pF
1~44	CK45B1H102K	CC, 0.001μF
5	CE04W1C100M	E, 10μF, 16V
6	CC45CH1H150J	CC, 15pF
7	CC73FCH1H020C	Chip, 2pF, ±0.25pF
8	CC73FCH1H060D	Chip, 6pF, ±0.5pF
9	CC73FCH1H030C	Chip, 3pF, ±0.25pF
0	CC73FCH1H100D	Chip, 10pF, ±0.5pF
1,52	CK45B1H102K	CC, 0.001μF
3	CC45CH1H060D	CC, 6pF, ±0.5pF
4	CK45B1H102K	CC, 0.001μF
5	CC45CH1H120J	CC, 12pF
6,57	CK45B1H102K	CC, 0.001μF
8	CE04W1A470M	E, 47μF, 10V
9,60	CK45B1H102K	CC, 0.001μF
1	CQ92M1H123K	ML, 0.012μF
2	CS15E1C010M	T, 1μF, 16V
3	CK45B1H102K	CC, 0.001μF
4	CC45CH1H020C	CC, 2pF, ±0.25pF
5	CK45B1H102K	CC, 0.001μF
6	CC45CH1H020C	CC, 2pF, ±0.25pF
7	CK45B1H102K	CC, 0.001μF
8	CC45CH1H020C	CC, 2pF, ±0.25pF
9,70	C91-0131-05	CC, 0.01μF, SP
1	CC45CH1H100D	CC, 10pF
2	CC45SL1H471J	CC, 470pF
3~75	C91-0131-05	CC, 0.01μF, SP
6	CK45B1H102K	CC, 0.001μF
7	CE04W1A101M	E, 100μF, 10V
8	C91-0131-05	CC, 0.01μF, SP
9	CE04W1A470M	E, 47μF, 10V
0,81	CC45SL1H101J	CC, 100pF
2	CQ92M1H472K	ML, 0.0047μF
3	CE04W1HR22M	E, 0.22μF, 50V

Ref. No.	Part No.	Description
C84	CQ92M1H392K	ML, 0.0039μF
C85	CQ92M1H103K	ML, 0.01μF
C86	C91-1009-05	Layer, 180pF
C87,88	CE04W1H4R7M	E, 4.7μF, 50V
C89	CE04W1C100M	E, 10μF, 16V
C90	CQ92M1H822K	ML, 0.0082μF
C91	CE04W1H4R7M	E, 4.7μF, 50V
C92	C91-0131-05	CC, 0.01μF, SP
C93	CC45UJ1H150J	CC, 15pF
C94	C91-0479-05	Layer, 150pF
C95	CC45CH1H560J	CC, 56pF
C96	C91-0131-05	CC, 0.01μF, SP
C97	CE04W1H010M	E, 1μF, 50V
C98~99	CK45B1H102K	CC, 0.001μF
C101	CK45B1H102K	CC, 0.001μ
C102	CQ92M1H123K	ML, 0.012μF
C104	CE04W1HR33M	E, 0.33μF, 50V
C901	C05-0325-05	Trimmer, 10pF
C903	C05-0062-05	Trimmer, 6pF
	DIODES	
D1	1SV50E	Voltage variable, 25mW
D2	1S2588	Silicon 30V, 150mA
D3,4	1S2208	Silicon 30V
D5	1S1555	Silicon 35V 100mA
D6	U05B	Silicon 100V 2.5A
D7	U15B	Silicon 100V, 3A
D8~22	1S1555	Silicon 35V, 100mA
	JUMPERS	
JU1,3,4,6,7	E31-2170-05	Wire jumper, pitch 5mm, 0.6mm dia.
JU9	E31-2170-05	Wire jumper (M, M_2)
JU10	E31-2170-05	Wire jumper, pitch 5mm, 0.6mm dia.
JU11	E31-2170-05	Wire jumper (K_2, M_2)
JU12	E31-2170-05	Wire jumper, pitch 5mm, 0.6mm dia.
	CONNECTORS	
J1	E18-1651-05	Pin socket, 16P
J2	E18-0452-05	Pin socket, 4P
J3	E40-7203-05	Connector, 3P (Fem.)
J3,4	E40-7205-05	Connector, 5P (Fem.)
J4	E40-7206-05	Connector, 6P (Fem.)
J5	E40-0564-05	Pin connector, 5P (Male.)
J6	E40-1564-05	Pin connector, 15P (Male.)
J7,8	E40-0773-05	Mini connector, 7P
J9	E40-0673-05	Mini connector, 6P
J10	E40-0273-05	Mini connector, 2P
J11	E40-0373-05	Mini connector, 3P
J12	E31-2187-05	Connector with lead
J13	E40-0373-05	Mini connector, 3P

Ref. No.	Part No.	Description
	COILS	
L2	L40-1092-14	Inductor, 1μH
L3	L19-0345-05	Broad band transformer
L4	L40-3391-14	Inductor, 3.3μH
L5,6	L40-1021-14	Inductor, 1mH
L8	L40-1092-14	Inductor, 1μH
L9	L40-3391-14	Inductor, 3.3μH
L10	L19-0345-05	Broad band transformer
L11	L40-3391-14	Inductor, 3.3μH
L12~14	L40-1021-14	Inductor, 1mH
L15	L34-0872-05	OSC coil, 3.9μH
L16	L40-3391-14	Broad inductor, 3.3μH
L17	L40-4791-14	Inductor, 4.7μH
	TRANSISTORS	
Q1	2SK125	n-channel MOS FET
Q2~5	2SC2668(Y)	Si NPN RF amp.
Q6~8	2SC2603(E)	Si NPN AF amp.
Q9	2SK241(GR)-1	n-channel MOS FET
Q10~15	2SC2668(Y)	Si NPN RF amp.
Q16,17	2SC2603(E)	Si NPN AF amp.
	RESISTORS	
R1	RD14CB2C273J	Carbon 27kΩ 1/6W
R2	RD14CB2C101J	Carbon 100Ω 1/6W
R3	RD14CB2C153J	Carbon 15kΩ 1/6W
R4	RD14CB2C103J	Carbon 10kΩ 1/6W
R5	RD14CB2C101J	Carbon 100Ω 1/6W
R6	RD14CB2C331J	Carbon 330Ω 1/6W
R7	RD14CB2C153J	Carbon 15kΩ 1/6W
R8	RD14CB2C682J	Carbon 6.8kΩ 1/6W
R9	RD14CB2C101J	Carbon 100Ω 1/6W
R10	RD14CB2C221J	Carbon 220Ω 1/6W
R11	RD14CB2C102J	Carbon 1kΩ 1/6W
R12	RD14CB2C821J	Carbon 820Ω 1/6W
R13	RD14CB2C332J	Carbon 3.3kΩ 1/6W
R14	RD14CB2C681J	Carbon 680Ω 1/6W
R15	RD14CB2C102J	Carbon 1kΩ 1/6W
R16	RD14CB2C153J	Carbon 15kΩ 1/6W
R17	RD14CB2C103J	Carbon 10kΩ 1/6W
R18	RD14CB2C471J	Carbon 470Ω 1/6W
R19	RD14CB2C221J	Carbon 220Ω 1/6W
R20	RD14CB2C273J	Carbon 27kΩ 1/6W
R21	RD14CB2C103J	Carbon 10kΩ 1/6W
R22	RD14CB2C561J	Carbon 560Ω 1/6W
R23	RD14CB2C331J	Carbon 330Ω 1/6W
R24	RD14CB2C102J	Carbon 1kΩ 1/6W
R25	RD14CB2C103J	Carbon 10kΩ 1/6W
R26	RD14CB2C182J	Carbon 1.8kΩ 1/6W
R27~31	RD14CB2C272J	Carbon 2.7kΩ 1/6W
R32,33	RD14CB2C473J	Carbon 47kΩ 1/6W
R34	RD14CB2C471J	Carbon 470Ω 1/6W
R35	RD14CB2C151J	Carbon 150Ω 1/6W
R36,37	RD14CB2C103J	Carbon 10kΩ 1/6W
R38	RD14CB2C101J	Carbon 100Ω 1/6W
R39	RD14CB2C153J	Carbon 15kΩ 1/6W
R40	RD14CB2C822J	Carbon 8.2kΩ 1/6W
R41	RD14CB2C101J	Carbon 100Ω 1/6W
R42	RD14CB2C331J	Carbon 330Ω 1/6W
R43	RD14CB2C153J	Carbon 15kΩ 1/6W
R44	RD14CB2C682J	Carbon 6.8kΩ 1/6W
R45	RD14CB2C101J	Carbon 100Ω 1/6W
R46	RD14CB2C221J	Carbon 220Ω 1/6W
R47	RD14CB2C153J	Carbon 15kΩ 1/6W

Ref. No.	Part No.	Description
R48	RD14CB2C103J	Carbon 10kΩ 1/6W
R49	RD14CB2C560J	Carbon 56Ω 1/6W
R50	RD14CB2C221J	Carbon 220Ω 1/6W
R51	RD14CB2C101J	Carbon 100Ω 1/6W
R52	RD14CB2C331J	Carbon 330Ω 1/6W
R53	RD14CB2C223J	Carbon 22kΩ 1/6W
R54	RD14CB2C392J	Carbon 3.9kΩ 1/6W
R55	RD14CB2C102J	Carbon 1kΩ 1/6W
R56	RD14CB2C102J	Carbon 1kΩ 1/6W
R57	RD14CB2C331J	Carbon 330Ω 1/6W
R58	RD14CB2C471J	Carbon 470Ω 1/6W
R59	RD14CB2C333J	Carbon 33kΩ 1/6W
R60	RD14CB2C333J	Carbon 33kΩ 1/6W
R61	NC	
R62	RD14CB2C221J	Carbon 220Ω 1/6W
R63	RD14CB2C101J	Carbon 100Ω 1/6W
R64~66	RD14CB2C122J	Carbon 1.2kΩ 1/6W
R67	RD14CB2C123J	Carbon 12kΩ 1/6W
R68	RD14CB2C221J	Carbon 220Ω 1/6W
R69	RD14CB2C102J	Carbon 1kΩ 1/6W
R70	RD14CB2C103J	Carbon 10kΩ 1/6W
R71	RD14CB2C182J	Carbon 1.8kΩ 1/6W
R72,73	RD14CB2C561J	Carbon 560Ω 1/6W
R74	RD14CB2C562J	Carbon 5.6kΩ 1/6W
R75	RD14CB2C103J	Carbon 10kΩ 1/6W
R76	RD14CB2C564J	Carbon 560kΩ 1/6W
R77	RD14CB2C562J	Carbon 5.6kΩ 1/6W
R78	RD14CB2C334J	Carbon 330kΩ 1/6W
R79	RD14CB2C333J	Carbon 33kΩ 1/6W
R80,81	RD14CB2C393J	Carbon 39kΩ 1/6W
R82	RD14CB2C334J	Carbon 330kΩ 1/6W
R83	RD14CB2C473J	Carbon 47kΩ 1/6W
R84	RD14CB2C333J	Carbon 33kΩ 1/6W
R85	RD14CB2C562J	Carbon 5.6kΩ 1/6W
R86	RD14CB2C823J	Carbon 82kΩ 1/6W
R87	RD14CB2C153J	Carbon 15kΩ 1/6W
R88	RD14CB2C103J	Carbon 10kΩ 1/6W
R89	RD14CB2C153J	Carbon 15kΩ 1/6W
R90,91	RD14CB2C104J	Carbon 100kΩ 1/6W
R92,93	RD14CB2C103J	Carbon 10kΩ 1/6W
R94	RD14CB2C101J	Carbon 100Ω 1/6W
R95	RD14CB2C561J	Carbon 560Ω 1/6W
R96	RD14CB2C102J	Carbon 1kΩ 1/6W
R97,98	RD14CB2C273J	Carbon 27kΩ 1/6W
R99,100	RD14CB2C103J	Carbon 10kΩ 1/6W
R101	RS14AB3D220J	Metal film 22Ω 2W
R102	RD14CB2C683J	Carbon 68kΩ 1/6W
R103	RD14BB2C471J	Carbon 470Ω 1/6W
R106	RD14CB2C102J	Carbon 1kΩ 1/6W
R901	R12-2409-05	Trimmer Pot. 5kΩ (B)
R902	R12-4408-05	Trimmer Pot. 50kΩ (B)
R903	R12-2409-05	Trimmer Pot. 5kΩ (B)
R904	R01-3427-05	Pot. 10kΩ (A) with S, 16mm dia.
R905	R01-3428-05	Pot. 10kΩ (B) with S, 16mm dia. SQ

Description		
arbon	10kΩ	1/6W
arbon	56Ω	1/6W
arbon	220Ω	1/6W
arbon	100Ω	1/6W
arbon	330Ω	1/6W
arbon	22kΩ	1/6W
arbon	3.9kΩ	1/6W
arbon	1kΩ	1/6W
arbon	1kΩ	1/6W
arbon	330Ω	1/6W
arbon	470Ω	1/6W
arbon	33kΩ	1/6W
arbon	33kΩ	1/6W
arbon	220Ω	1/6W
arbon	100Ω	1/6W
arbon	1.2kΩ	1/6W
arbon	12kΩ	1/6W
arbon	220Ω	1/6W
arbon	1kΩ	1/6W
arbon	10kΩ	1/6W
arbon	1.8kΩ	1/6W
arbon	560Ω	1/6W
arbon	5.6kΩ	1/6W
arbon	10kΩ	1/6W
arbon	560kΩ	1/6W
arbon	5.6kΩ	1/6W
arbon	330kΩ	1/6W
arbon	33kΩ	1/6W
arbon	39kΩ	1/6W
arbon	330kΩ	1/6W
arbon	47kΩ	1/6W
arbon	33kΩ	1/6W
arbon	5.6kΩ	1/6W
arbon	82kΩ	1/6W
arbon	15kΩ	1/6W
arbon	10kΩ	1/6W
arbon	15kΩ	1/6W
arbon	100kΩ	1/6W
arbon	10kΩ	1/6W
arbon	100Ω	1/6W
arbon	560Ω	1/6W
arbon	1kΩ	1/6W
arbon	27kΩ	1/6W
arbon	10kΩ	1/6W
letal film	22Ω	2W
arbon	68kΩ	1/6W
arbon	470Ω	1/6W
arbon	1kΩ	1/6W
rimmer Pot. 5kΩ (B)		
rimmer Pot. 50kΩ (B)		
rimmer Pot. 5kΩ (B)		
ot. 10kΩ (A) with S, 16mm dia.		
ot. 10kΩ (B) with S, 16mm dia. SQ		

Ref. No.	Part No.	Description
THERMISTORS		
TH1	112-201-2	200Ω
TH2	112-301-2	300Ω
TERMINALS		
TP1,2	E23-0435-05	Round terminal
TP3	E23-0430-05	Round terminal
TP4,5	E23-0435-05	Round terminal
ICS		
U18	MC145152P	CMOS LSI
U19	MC145151P	CMOS freq. synthesizer
U20	TC4007UBP	Si, Inverter
U21	μPB571C	CMOS LSI
U24,25	μPC4558C	
U26	L78M05	5V regulator
U22,23	M54730AP	PROM Accessory
CRYSTALS		
Z1	L77-1000-05	10.2400 MHz
Y2	L77-0993-05	21.4015 MHz
NON-REFERENCED ITEMS		
	E02-0120-05	IC socket, 16P, U22, U23
	E31-2170-05	Short jumper, Pitch 5mm, 0.6mm dia.
	J21-2798-04	Bracket, potentiometer
	352-6002-05	Glass fiber tube, 6mm dia. 40mm
	212-1019-05	Instruction tube, 1mm dia.
P1	E18-1651-05	Socket, 4P
P2	E18-0452-05	Socket, 16P

PLL UNIT Parts List

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

1 = Type ..... ceramic, electrolytic, etc.
2 = Shape ..... round, square, etc
3 = Temp coefficient
4 = Voltage rating
5 = Value
6 = Tolerance

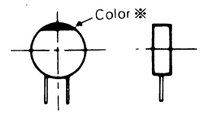
● **Temperature coefficient**

1st Word	C	L	P	R	S	T	U
Color※	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/℃	0	−80	−150	−220	−330	−470	−750

2nd Word	G	H	J	K	L
ppm/℃	±30	±60	±120	±250	±500

Example CC45TH = −470±60ppm/℃

CC45



● **Rating voltage**

2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	—
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	—
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	—

● **Capacitor value**

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF
1 0 3 = 0.01μF
2 2 0 = 22pF
1st number | Multiplier
2nd number

● **Tolerance**

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 −20	+80 −20	+100 −0	More than 10μF −10~+50 / Less than 4.7μF −10~+75

Less than 10 pF

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

PLL UNIT (X61-1190-22)

Terminal functions

Connector No.	Terminal No.	Terminal name	Terminal function
P1	1	ESP	External speaker input
	2	C8	8V common power source line
	3	SB	Switched B to regulated power source
	4	KEY	TX/RX data input (L for TX; H for RX)
	5	R8	8V when receiving
	6	T8	8V when transmitting
	7	AVO	Audio output from AF volume
	8	AVI	Audio input to AF volume
	9	AFO	Audio signal output
	10	NSO	Noise squelch output
	11	NSI	Noise squelch input
	12	AFI	Audio signal input
	13	MUT	Mute signal input
	14	QTD	Quiet Tone Disable input
	15	AC	Audio Control output
	16	UNL	Unlock signal output
P2	1	B	Transmitting final B^+
	2	B	Transmitting final B^+
	3	B	Transmitting final B^+
	4	B	Transmitting final B^+
J3	1	A^-	Microphone PTT grounded
	2	PTT	Microphone PTT input
	3	MIC-L	Microphone grounded
	4	MIC-H1	Microphone input 1 (low impedance)
	5	MIC-H2	Microphone input 2 (high impedance)
	6	SPARE 1	Spare
	7	BASE MIC	Base Mic 8V DC
	8	QT	MIC hang-up
J4	1	A^+ (REC)	B^+ for reception only (when internal jumper is cut)
	2	RX MUT	RX MUTE signal output
	3	ESP-H	External speaker output
	4	FLTED VOL. SQ-H	Audio output bypassed volume control
	5	SPARE (A^-)	Spare (GND)
	6	A^-	GND
	7	ESP-L	External speaker GND (–)
	8	A^-	GND
	9	QTD	Quiet Tone Disable control
	10	SPARE	Spare (B line input: 13.6V)
	11	A^+	B^+ line input (13.6V)
J5	1	GND	GND
	2	BZ	Beeper line input
	3	C8	8V common power source line
	4	KEY	TX/RX data input (L when transmitting; H when receiving)
	5	PTT	Microphone PTT input
J6	1	GND	GND
	2	DET	RX CTCSS input
	3	AFI	Audio Frequency signal input
	4	AC	Audio control output
	5	AFO	Audio output
	6	SB	Switched B to regulated power source
	7	MOD	Tone signal output
	8	KEY	TX data output (L when transmitting; H when receiving)
	9	PTT	Microphone PTT input
	10	C8	8V common power source line

Connector No.	Terminal No.	Terminal name	Terminal function
	11	OPT.1	Spare
	12	OPT.2	Spare
	13	OPT.3	Spare
	14	OPT.4	Spare
	15	T8	Approx. 8V when transmitting
J7	1	S1 VIO	Channel switch 1
	2	S2 BLU	Channel switch 2
	3	S3 GRN	Channel switch 3
	4	S4 YEL	Channel switch 4
	5	S5 ORG	Channel switch 5
	6	S6 RED	Channel switch 6
	7	C BRN	5V common line
J8	1	S1 VIO	Channel switch 1
	2	S2 BLU	Channel switch 2
	3	S3 GRN	Channel switch 3
	4	S4 YEL	Channel switch 4
	5	S5 ORG	Channel switch 5
	6	S6 RED	Channel switch 6
	7	C BRN	5V common line
J9	1	B0 BLU	ROM address input
	2	B1 GRN	ROM address input
	3	B2 YEL	ROM address input
	4	B3 ORG	ROM address input
	5	B4 RED	ROM address input
	6	5V BRN	5V common line
J10	1	TXO	Transmit local signal output to TX/RX unit
	2	GND	GND
J11	1	BZ BLU	Audio output
	2	GND	GND
	2	RXO shield	Receive local signal output to TX/RX unit

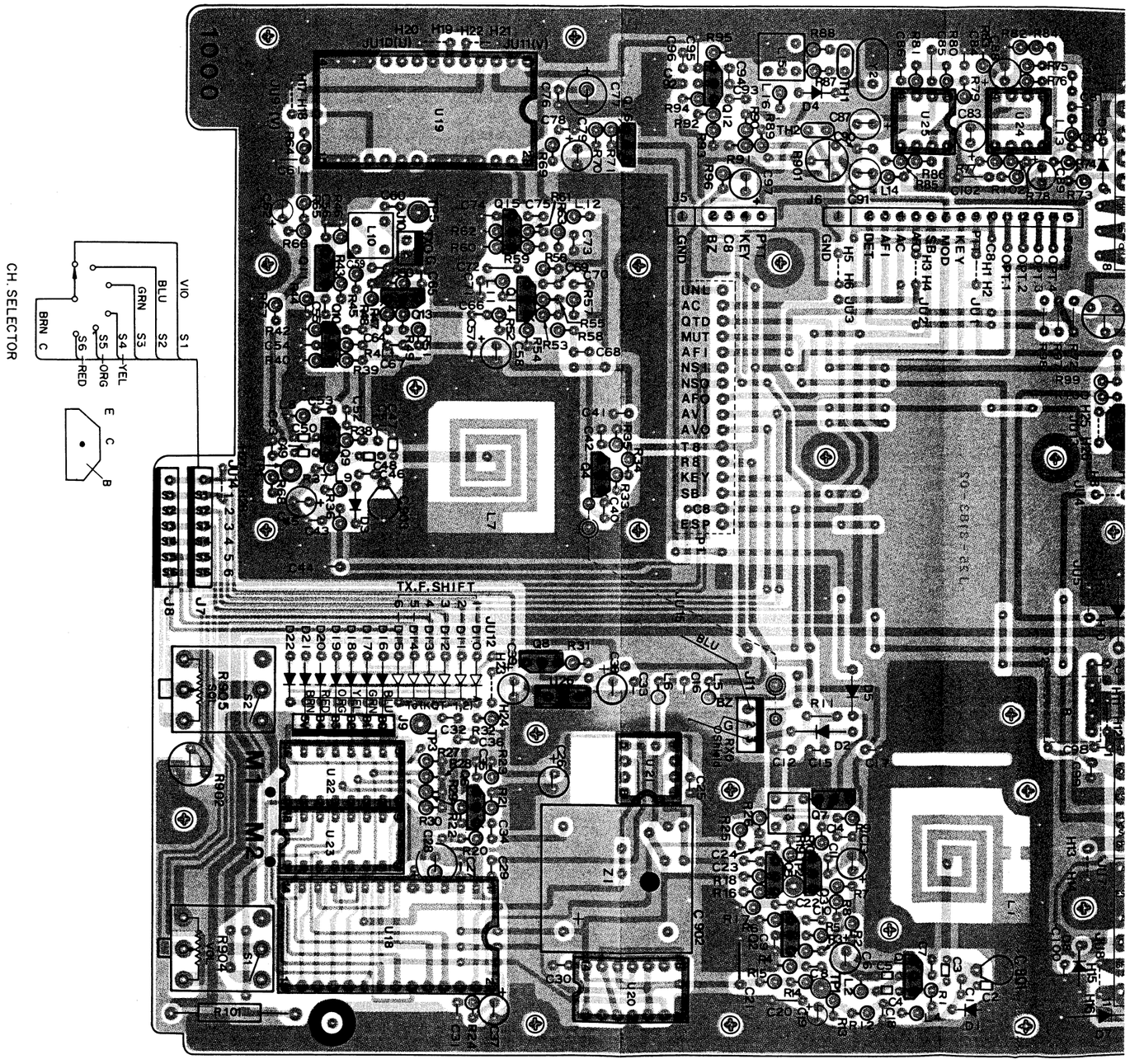
Jumper wire function

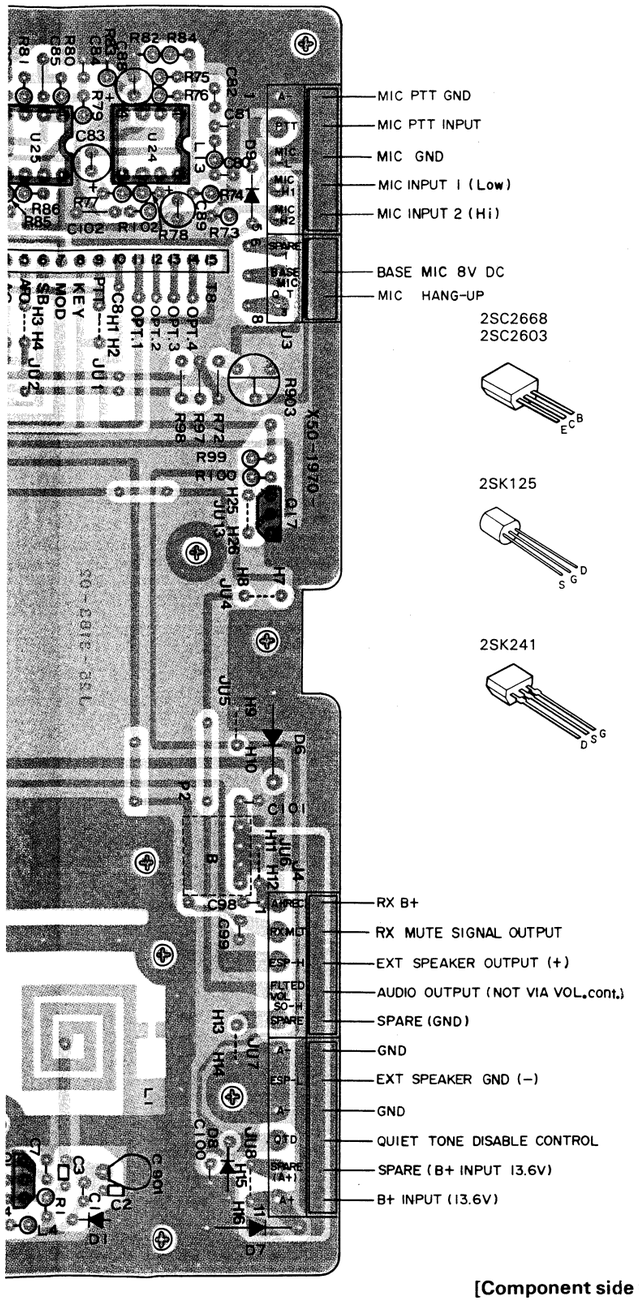
JU1		Cut off during key control by signalling unit.
JU2	×	Short-circuits the CTCSS AF signal input and output terminals.
JU3		Cut off during key control by timer-out timer.
JU4		Outputs AVI signal.
JU5	×	Grounds the QTD.
JU6		Cut off when using Rx power supply.
JU7		Grounds the spare terminal.
JU8		Connects the power and spare terminals.
JU9	△	Installed in TK-701S. } Determines the
JU10	△	Installed in TK-801S. } Tx-PLL dividing
JU11	△	Installed in TK-701S. } ratio.
JU12		Cut off to disable the duplex.
JU13	×	Install to disable the QTD reverse circuit.
JU14	×	Install to convert the 16CH unit to duplex.

× indicates jumper wire not supplied.

PLL UNIT (X61-1190-22)

Printed Circuit Board

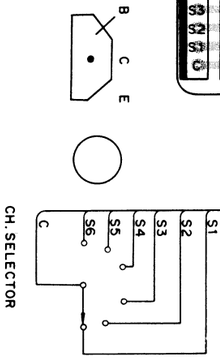


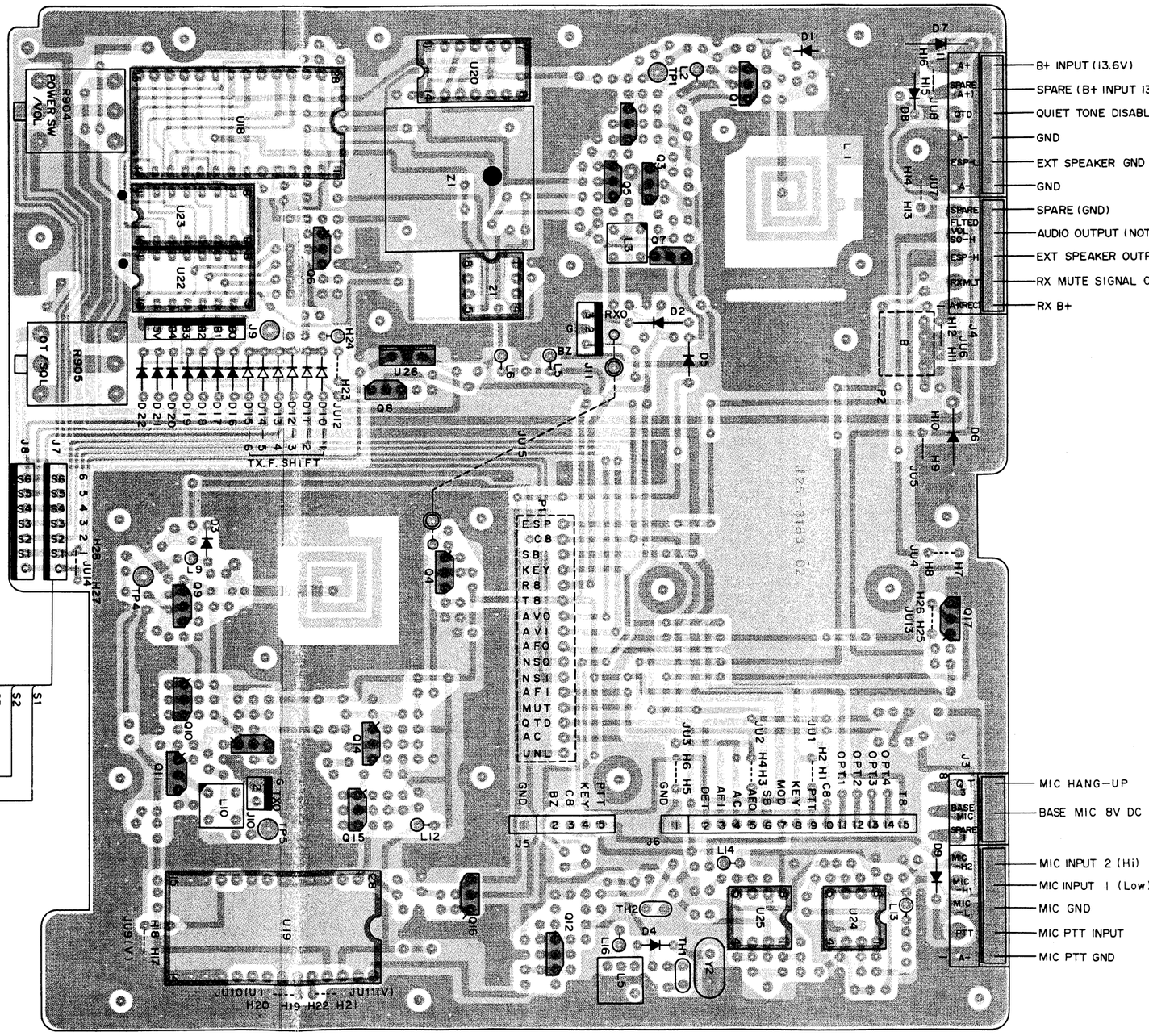


2SC2668
2SC2603

2SK125

2SK241



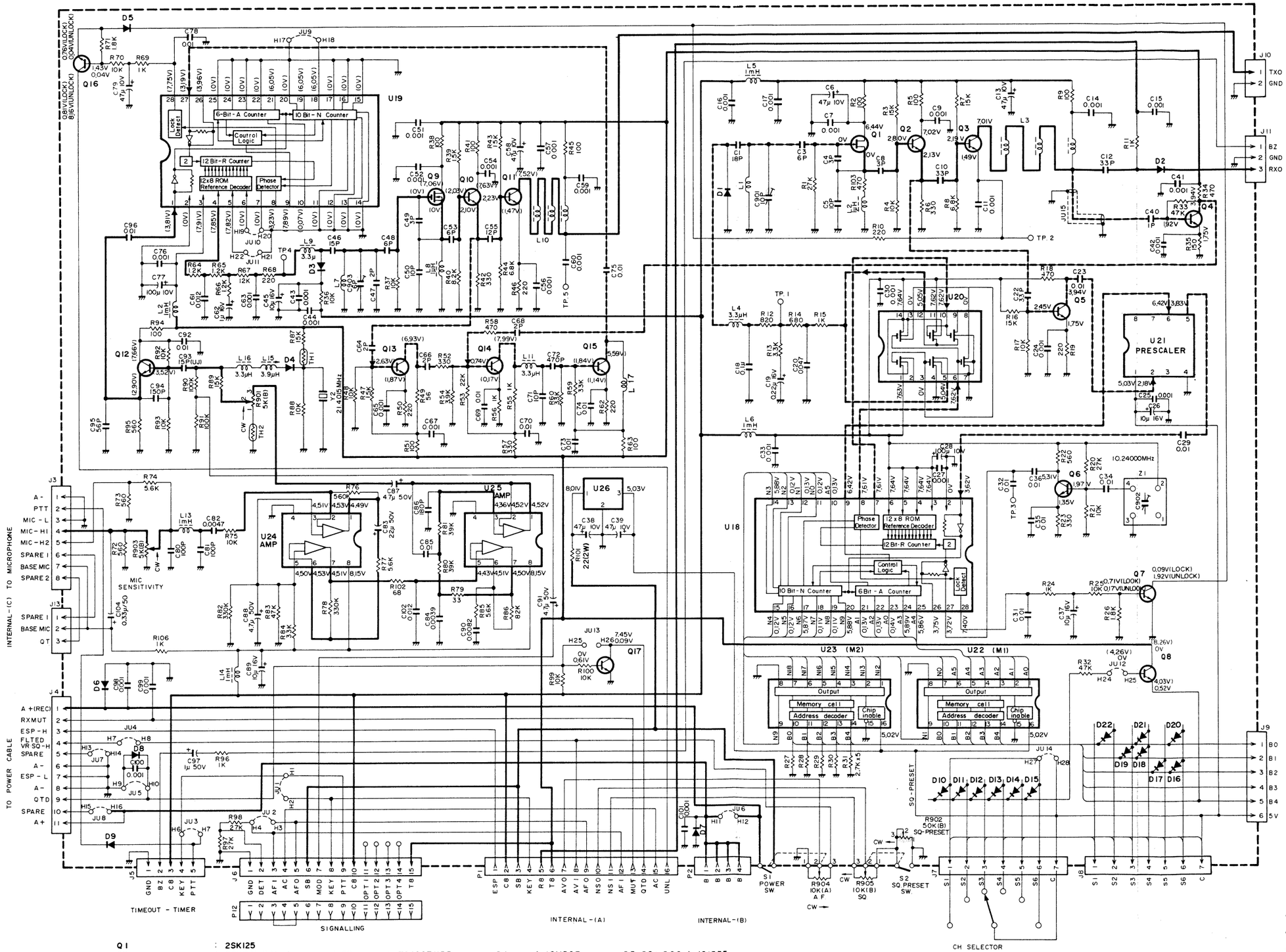


[Component side view]

Foil side
Component side

[Foil side view]

Foil side
Component side



Q1	: 2SK125						
Q9	: 2SK241(GR)-1	U20	: TC4007UBP	D1	: ISV50E	D5,D8~D22	: IS1555
Q2~Q5, Q10~Q15	: 2SC2668(Y)	U21	: μPC571C	D2	: IS2588		
Q6~Q8, Q16, Q17	: 2SC2603(E)	U22, U23	: M54730AP	D3, D4	: IS2208	TH1	: 112-201-2
U18	: MC145152P	U24, U25	: μPC4558C	D6	: U05B	TH2	: 112-301-2
U19	: MC145151P	U26	: L78M05	D7	: U15B		

Signal line
Control line
Common DC line
Adjusting points

[X61-1200-10 150～160MHz (K, M)]
[X61-1200-11 156～163MHz (K2, M2)]
[X61-1200-12 162～169MHz (K3, M4)]
[X61-1200-13 168～174MHz (K4, M4)]

TX-RX UNIT Parts List

Ref. No.	Part No.	Description
	CAPACITORS	CC: Ceramic E: Electrolytic ML: Mylar T: Tantalum
C1	CC45CH1H100D	CC, 10pF
C2～5	CK45B1H102K	CC, 0.001μF
C6	CC45CH1H180J	CC, 18pF (K4, M4)
C6	CC45CH1H270J	CC, 27pF (K, K2, K3, M, M2, M3)
C7	CC45CH1H680D	CC, 68pF
C8,9	CK45B1H102K	CC, 0.001μF
C10	CK73FB1H102K	Chip, 0.001μF
C11	CK45B1H102K	CC, 0.001μF
C12	CC73FCH1H560J	Chip, 56pF (K3, K4, M3, M4)
C12	CC73FCH1H680J	Chip, 68pF (K, K2, M, M2)
C14,15	CC73FCH1H560J	Chip, 56pF
C16,17	CK45B1H102K	CC, 0.001μF
C18	CM73F2H270J	Chip, 27pF (K4, M4)
C18	CM73F2H330J	Chip, 33pF (K, K2, K3, M, M2, M3)
C19	CM73F2H330J	Chip, 33pF
C20	CM73F2H220J	Chip, 22pF (K3, K4, M3, M4)
C20	CM73F2H330J	Chip, 33pF (K1, K2, M1, M2)
C21,22	CM73F2H910J	Chip, 91pF
C23,24	CM73F2H181J	Chip, 180pF (K, K2, K3, M, M2, M3)
C23,24	CM73F2H181J	Chip, 180pF (K4, M4)
C25	CK45B1H471K	CC, 470pF
C26	C91-0105-05	CC, 0.0047μF
C27	CE04W1E220M	E, 22μF, 25V
C28	CM73F2H680J	Chip, 68pF (K4, M4)
C28	CM73F2H820J	Chip, 82pF (K2, K3, M2, M3)
C28	CM73F2H101J	Chip, 100pF (K,M)
C29	CM73F2H820J	Chip, 82pF (K2, K3, K4, M2, M3, M4)
C29	CM73F2H101J	Chip, 100pF (K, M)
C30	CM73F2H220J	Chip, 22pF (K4, M4)
C30	CM73F2H240J	Chip, 24pF (K3, M3)
C30	CM73F2H270J	Chip, 27pF (K, K2, M, M2)
C31	CC73FCH1H010C	Chip, 1pF ±0.25pF
C32,33	CK45B1H102K	CC, 0.001μF
C34	CK73FB1H102K	Chip, 0.001μF
C35	CM73F2H391J	Chip, 390pF
C36,37	CK45B1H102K	CC, 0.001μF
C38	CM73F2H180J	Chip, 18pF (K, M)
C38	CM73F2H120J	Chip, 12pF (K2, M2)
C38	CM73F2H100D	Chip, 10pF (K3, M3)
C38	CM73F2H080D	Chip, 8pF (K4, M4)
C39	CM73F2H391J	Chip, 390pF
C40	CM73F2H160J	Chip, 16pF (K3, K4, M3, M4)
C40	CM73F2H200J	Chip, 20pF (K, K2, M, M2)
C41	CM73F2H330J	Chip, 33pF (K3, K4, M3, M4)
C41	CM73F2H430J	Chip, 43pF (K, K2, M, M2)
C42	CM73F2H330J	Chip, 33pF (K3, K4, M3, M4)
C42	CM73F2H390J	Chip, 39pF (K, K2, M, M2)
C43	CM73F2H200J	Chip, 20pF (K, K2, M, M2)
C43	CM73F2H160J	Chip, 16pF (K3, K4, M3, M4)
C44	CK45B1H471K	CC, 470pF
C45,46	C90-0870-05	E, 220μF, 25V
C47	CC45CH1H150J	CC, 15pF
C48,49	CK45B1H102k	CC, 0.001μF
C50	CE04W1C100M	E, 10μF 16V
C51	CK45B1H102K	CC, 0.001μF
C52	CE04W1E220M	E, 22μF, 25V
C53	CS15E1E100M	T, 10μF, 25V
C54	CE04W1C100M	E, 10μF, 16V
C55	CK45B1H102K	CC, 0.001μF
C56	CS15E1E100M	T, 10μF, 25V
C57	CK73FB1H102K	Chip, 0.001μF
C58,59,60	CK45B1H102K	CC, 0.001μF
C61	CC45RH1H100D	CC, 10pF (K4, M4)
C61	CC45RH1H110J	CC, 11pF (K2, K3, M2, M3)
C61	CC45RH1H120J	CC, 12pF (K, M)
C62	CC45CH1H1R5C	CC, 1.5pF ±0.25pF
C63	CC45RH1H100D	CC, 10pF (K4, M4)
C63	CC45RH1H110J	CC, 11pF (K2, K3, M2, M3)
C63	CC45RH1H120J	CC, 12pF (K, M)
C64	CK45B1H102K	CC, 0.001μF
C65	CC45CH1H030C	CC, 3pF (K4, M4)
C65	CC45CH1H040C	CC, 4pF (K2, K3, M2, M3)
C65	CC45CH1H050C	CC, 5pF (K, M)
C66	CC73FCH1HOR5C	Chip, 0.5pF ±0.25pF
C67	C91-1011-05	Mould, 0.51pF
C68	CC73FCH1HOR5C	Chip, 0.5pF ±0.25pF
C69	CC45CH1H020C	CC, 2pF ±0.25pF (K3, K4, M3, M4)
C69	CC45CH1H030C	CC, 3pF ±0.25pF (K2, M2)
C69	CC45CH1H040C	CC, 4pF ±0.25pF (K, M)
C70	CK45B1H102K	CC, 0.001μF
C71	C91-0105-05	CC, 0.0047μF
C72	CK45B1H102K	CC, 0.001μF
C73	C91-0105-05	CC, 0.0047μF
C74	CK45B1H102K	CC, 0.001μF
C75	C91-0105-05	CC, 0.0047μF
C76	CC45CH1H030C	CC, 3pF ±0.25pF (K3, K4, M3, M4)
C76	CC45CH1H040C	CC, 4pF ±0.25pF (K2, M2)
C76	CC45CH1H050C	CC, 5pF ±0.25pF (K, M)
C77	CC73FCH1HOR5C	Chip, 0.5pF ±0.25pF (K3, M3)
C78	C91-1010-05	Mould, 0.33pF
C80	CC45CH1H020C	CC, 2pF ±0.25pF (K4, M4)
C80	CC45CH1H030C	CC, 3pF ±0.25pF (K2, M3, M2, M3)
C80	CC45CH1H040C	CC, 4pF ±0.25pF (K, M)
C81	C91-1010-05	Mould, 0.33pF
C82	CC73FCH1HOR5C	Chip, 0.5pF ±0.25pF (K2, K4, M2, M4)
C83	CC45CH1H030C	CC, 3pF ±0.25pF (K4, M4)
C83	CC45CH1H040C	CC, 4pF ±0.25pF (K2, K3, M2, M4)
C83	CC45CH1H050C	CC, 5pF ±0.25pF (K, M)
C84	CK45B1H102K	CC, 0.001μF
C85,86	C91-0105-05	CC, 0.0047μF
C87	CK45B1H102K	CC, 0.001μF
C88	C91-0105-05	CC, 0.0047μF
C89	CC45CH1H100D	CC, 10pF
C90,91,92	C91-0105-05	CC, 0.0047μF
C93	CC45CH1H050C	CC, 5pF ±0.25pF
C94	C91-0105-05	CC, 0.0047μF
C95	CC45CH1H330J	CC, 33pF
C96	C91-1012-05	Layer, 120pF
C97,98	C91-0431-05	Layer, 0.1μF
C99	CC45SL1H151J	CC, 150pF
C100	CE04W1E220M	CC, 22pF
C101	CQ92M1H473K	ML, 0.047μF
C102	C91-0105-05	CC, 0.0047μF
C103	CE04W1H2R2M	E, 2.2μF, 50V
C104	CQ92M1H473K	ML, 0.047μF
C105	CQ92M1H332K	ML, 0.0033μF
C106	CQ92M1H103K	Ml, 0.01μF
C108	CQ92M1H102K	ML, 0.001μF
C109	CC45SL1H470J	CC, 47pF
C110	CQ92M1H272K	ML, 0.0027μF
C111	CQ92M1H332K	ML, 0.0033μF
C112	CE04W1C100M	CC, 10pF
C113,114, C115	CS15E1E010M	T, 1μF, 25V
C116	CE04W1C100M	E, 10μF, 16V
C117	CQ92M1H273K	ML, 0.027μF
C118	CE04W1A470M	E, 47μF, 10V
C119	C90-0818-05	E, 470μF, 25V
C120	C91-0105-05	CC, 0.0047μF
C121	CE04W1C330M	E, 33μF, 16V
C122	CE04W1C100M	E, 10μF, 16V
C123	CE04W1A470M	E, 47μF, 10V
C124	C90-0818-05	E, 470μF, 25V
C125	CE04W1A470M	E, 47μF, 10V
C126	CQ92M1H104K	ML, 0.1μF
C127	C90-0869-05	E, 1000μF, 10V
C128	CE04W1A101M	E, 100μF, 10V
C129	CQ92M1H273K	ML, 0.027μF
C130	CE04W1A470M	E, 47μF, 10V
C131	C91-0105-05	CC, 0.0047μF
C132	CE04W1C330M	E, 33μF, 16V
C133	CE04W1A470M	E, 47μF, 10V
C134	CS15E1E010M	T, 1μF, 25V
C135	CQ92M1H273K	ML, 0.027μF
C136,137	CQ92M1H472K	ML, 0.0047μF
C138	CS15E1VOR1M	T, 0.1μF, 35V
C139	CE04W1C100M	E, 10μF, 16V
C140,141	CE04W1A470M	E, 47μF, 10V
C142,143, C144	CE04W1A101M	E, 100μF, 10V
C146,147	CM73F2H560J	Chip, 56pF
C148	CK45B1H102K	CC, 0.001μF
C200	C91-0105-05	CC, 0.0047μF
C201,202	CS15E1VR47M	T, 0.47μF, 35V
C301,302	C05-0030-15	Ceramic Trimmer, 20pF
C303	C05-0030-15	Ceramic Trimmer, 20pF
C304	C05-0309-05	Ceramic Trimmer, 40pF
C305	C05-0305-05 or C05-0330-05	Air-Variable Trimmer, 12pF Air-Variable Trimmer, 15pF
	DIODES	
D1	1S1555	Diode
D2	1S1555	Diode
D3	1SS101	Diode
D4,5	MI407	Diode
D6～10	1S1555	Diode
D11,12	1N60A	Diode
D13,14	1S1555	Diode
D15	WZ-100	Diode
D16	MTZ8.2JB	Diode
D17,18	1S1555	Diode
D19	MTZ3.9JB	Diode
D200	1S1555	Diode
D201	1S1555	Diode
D202	1S1555	Diode
	JUMPERS	
JU1	R92-0150-05	Jumper (0Ω)
JU2	R40-0150-05	Jumper (0Ω)
J21	E40-0273-05	Mini connector, 2P
J22	E40-0373-05	Mini connector, 3P
J23	E19-1651-05	Pin connector, 16P
J24	E19-0452-05	Pin connector, 4P
J25	E40-0273-05	Mini connector, 2P
J26	E40-0573-05	Mini connector, 5P
	COILS	
L1	L34-1085-05	Air-core coil, 4mm dia, 3.5T
L2	L33-0605-05	Ferri-inductor, 0.47μH
L3	L34-1085-05	Air-core coil, 4mm dia, 4.5T
L4	L34-0452-05	Air-core coil, 3mm dia, 6T
L5	L34-0691-05	Air-core coil, 5mm dia, 5T
L6	L34-0742-05	Air-core coil, 3mm dia, 5T
L7	L34-1086-05	Air-core coil, 5mm dia, 5T
L8	L34-1091-05	Air-core coil, 6mm dia, 1T
L9	L33-0666-05	Ferri-inductor
L10,11	L34-1090-05	Air-core coil, 1/2T
L12	L40-4791-13	Ferri-inductor, 4.7μH
L13～16	L34-1087-05	Air-core coil, 4mm dia, 5T
L17	L34-1088-05	Air-core coil, 4mm dia, 10T
L18,19	L34-2167-05	Tuning coil
L20	L34-2163-05	Tuning coil, (B)
L21	L34-2165-05	Tuning coil, (D)
L22	L40-1021-03	Ferri-inductor, 1mH
L23	L34-2164-05	Tuning coil, (C)
L24	L34-2166-05	Tuning coil, (E)
L25	L34-2162-05	Tuning coil, (A)
L26	L30-0520-05	IF Transformer, 21.4MHz
L29	L34-2160-05	Tuning coil, 21.4MHz
L30	L30-0508-05	IF Transformer
L32	L30-0503-05	IF Transformer
L33	L15-0016-05	Hash choke
L34	L33-0649-05	Air-core coil, 4mm dia, 12T
	TRANSISTORS	
Q1	2SC2570A	Si NPN RF Low Noise
Q2	2SC2538	Si NPN RF power amp.
Q3	2SC2539	Si NPN RF power amp.
Q4	2SC2630	Si NPN RF power amp.
Q5	2SA1015(Y)	Si NPN AF amp.
Q6	2SB946(Q)	Si PNP switching of PWR
Q7～9	2SC1815(Y)	Si NPN AF amp.
Q10	2SK241(GR)-1	n-channel MOS FET
Q11	2SK125-4	n-channel MOS FET
Q12	2SK241(GR)-1	n-channel MOS FET
Q14,15	2SC1815(Y)	Si NPN AF amp.
Q18～20	2SC1815(BC)	Si NPN AF amp.
Q21	2SC1815(Y)	Si NPN AF amp.
Q22～25	2SC1815(BL)	Si NPN AF amp.
Q26	2SC2603(E)	Si NPN Voltage amp.
Q201	2SC1815(BL)	Si NPN AF amp.
	RESISTORS	
R1	RD14BB2C470J	47Ω 1/6W
R2	RD14BB2C152J	1.5KΩ 1/6W
R3,4	RD14BB2C220J	22Ω 1/6W
R5	RD14BB2C152J	1.5KΩ 1/6W
R6	RD14BB2C470J	47Ω 1/6W
R7	RD14BB2C331J	330Ω 1/6W
R8	RS14GB3A270J	27Ω 1W
R9,10	RS14GB3A4R7J	4.7Ω 1W
R11	RD14BB2C102J	1KΩ 1/4W
R12	RD14BB2C223J	22KΩ 1/6W
R13	RS14GB3A151J	150Ω 1W
R14,15	RD14BB2C472J	4.7KΩ 1/6W
R16,17	RD14CB2C222J	2.2KΩ 1/6W
R18	RD14BB2C151J	150Ω 1/6W
R19	RD14BB2C121J	120Ω 1/6W
R20	RD14CB2C681J	680Ω 1/6W
R21	RD14BB2C103J	1KΩ 1/6W
R22	RD14BB2C153J	1.5KΩ 1/6W
R23	RD14CB2C101J	100Ω 1/6W
R24	RD14BB2C102J	1KΩ 1/6W
R25	RD14CB2C223J	22KΩ 1/6W

TX-RX UNIT Parts List

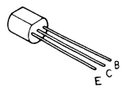
Ref. No.	Part No.	Description
C119	C90-0818-05	E, 470μF, 25V
C120	C91-0105-05	CC, 0.0047μF
C121	CE04W1C330M	E, 33μF, 16V
C122	CE04W1C100M	E, 10μF, 16V
C123	CE04W1A470M	E, 47μF, 10V
C124	C90-0818-05	E, 470μF, 25V
C125	CE04W1A470M	E, 47μF, 10V
C126	CQ92M1H104K	ML, 0.1μF
C127	C90-0869-05	E, 1000μF, 10V
C128	CE04W1A101M	E, 100μF, 10V
C129	CQ92M1H273K	ML, 0.027μF
C130	CE04W1A470M	E, 47μF, 10V
C131	C91-0105-05	CC, 0.0047μF
C132	CE04W1C330M	E, 33μF, 16V
C133	CE04W1A470M	E, 47μF, 10V
C134	CS15E1E010M	T, 1μF, 25V
C135	CQ92M1H273K	ML, 0.027μF
C136,137	CQ92M1H472K	ML, 0.0047μF
C138	CS15E1VOR1M	T, 0.1μF, 35V
C139	CE04W1C100M	E, 10μF, 16V
C140,141	CE04W1A470M	E, 47μF, 10V
C142,143, C144	CE04W1A101M	E, 100μF, 10V
C146,147	CM73F2H560J	Chip, 56pF
C148	CK45B1H102K	CC, 0.001μF
C200	C91-0105-05	CC, 0.0047μF
C201,202	CS15E1VR47M	T, 0.47μF, 35V
C301,302	C05-0030-15	Ceramic Trimmer, 20pF
C303	C05-0030-15	Ceramic Trimmer, 20pF
C304	C05-0309-05	Ceramic Trimmer, 40pF
C305	C05-0305-05 or C05-0330-05	Air-Variable Trimmer, 12pF Air-Variable Trimmer, 15pF
DIODES		
D1	1S1555	Diode
D2	1S1555	Diode
D3	1SS101	Diode
D4,5	MI407	Diode
D6～10	1S1555	Diode
D11,12	1N60A	Diode
D13,14	1S1555	Diode
D15	WZ-100	Diode
D16	MTZ8.2JB	Diode
D17,18	1S1555	Diode
D19	MTZ3.9JB	Diode
D200	1S1555	Diode
D201	1S1555	Diode
D202	1S1555	Diode
JUMPERS		
JU1	R92-0150-05	Jumper (0Ω)
JU2	R40-0150-05	Jumper (0Ω)
J21	E40-0273-05	Mini connector, 2P
J22	E40-0373-05	Mini connector, 3P
J23	E19-1651-05	Pin connector, 16P
J24	E19-0452-05	Pin connector, 4P
J25	E40-0273-05	Mini connector, 2P
J26	E40-0573-05	Mini connector, 5P
COILS		
L1	L34-1085-05	Air-core coil, 4mm dia, 3.5T
L2	L33-0605-05	Ferri-inductor, 0.47μH
L3	L34-1085-05	Air-core coil, 4mm dia 4.5T
L4	L34-0452-05	Air-core coil, 3mm dia, 6T
L5	L34-0691-05	Air-core coil, 5mm dia, 5T
L6	L34-0742-05	Air-core coil, 3mm dia, 5T
L7	L34-1086-05	Air-core coil, 5mm dia, 5T
L8	L34-1091-05	Air-core coil, 6mm dia, 1T
L9	L33-0666-05	Ferri-inductor
L10,11	L34-1090-05	Air-core coil, 1/2T
L12	L40-4791-13	Ferri-inductor, 4.7μH
L13～16	L34-1087-05	Air-core coil, 4mm dia, 5T
L17	L34-1088-05	Air-core coil, 4mm dia, 10T
L18,19	L34-2167-05	Tuning coil
L20	L34-2163-05	Tuning coil, (B)
L21	L34-2165-05	Tuning coil, (D)
L22	L40-1021-03	Ferri-inductor, 1mH
L23	L34-2164-05	Tuning coil, (C)
L24	L34-2166-05	Tuning coil, (E)
L25	L34-2162-05	Tuning coil, (A)
L26	L30-0520-05	IF Transformer, 21.4MHz
L29	L34-2160-05	Tuning coil, 21.4MHz
L30	L30-0508-05	IF Transformer
L32	L30-0503-05	IF Transformer
L33	L15-0016-05	Hash choke
L34	L33-0649-05	Air-core coil, 4mm dia, 12T
TRANSISTORS		
Q1	2SC2570A	Si NPN RF Low Noise
Q2	2SC2538	Si NPN RF power amp.
Q3	2SC2539	Si NPN RF power amp.
Q4	2SC2630	Si NPN RF power amp.
Q5	2SA1015(Y)	Si NPN AF amp.
Q6	2SB946(Q)	Si PNP switching of PWR
Q7～9	2SC1815(Y)	Si NPN AF amp.
Q10	2SK241(GR)-1	n-channel MOS FET
Q11	2SK125-4	n-channel MOS FET
Q12	2SK241(GR)-1	n-channel MOS FET
Q14,15	2SC1815(Y)	Si NPN AF amp.
Q18～20	2SC1815(BC)	Si NPN AF amp.
Q21	2SC1815(Y)	Si NPN AF amp.
Q22～25	2SC1815(BL)	Si NPN AF amp.
Q26	2SC2603(E)	Si NPN Voltage amp.
Q201	2SC1815(BL)	Si NPN AF amp.
RESISTORS		
R1	RD14BB2C470J	47Ω 1/6W
R2	RD14BB2C152J	1.5KΩ 1/6W
R3,4	RD14BB2C220J	22Ω 1/6W
R5	RD14BB2C152J	1.5KΩ 1/6W
R6	RD14BB2C470J	47Ω 1/6W
R7	RD14BB2C331J	330Ω 1/6W
R8	RS14GB3A270J	27Ω 1W
R9,10	RS14GB3A4R7J	4.7Ω 1W
R11	RD14BB2C102J	1KΩ 1/4W
R12	RD14BB2C223J	22KΩ 1/6W
R13	RS14GB3A151J	150Ω 1W
R14,15	RD14BB2C472J	4.7KΩ 1/6W
R16,17	RD14CB2C222J	2.2KΩ 1/6W
R18	RD14BB2C151J	150Ω 1/6W
R19	RD14BB2C121J	120Ω 1/6W
R20	RD14CB2C681J	680Ω 1/6W
R21	RD14BB2C103J	1KΩ 1/6W
R22	RD14BB2C153J	1.5KΩ 1/6W
R23	RD14CB2C101J	100Ω 1/6W
R24	RD14BB2C102J	1KΩ 1/6W
R25	RD14CB2C223J	22KΩ 1/6W
R26	RD14BB2C102J	1KΩ 1/6W
R27	RD14CB2C473J	47KΩ 1/6W
R28	RD14BB2C474J	470KΩ 1/6W
R29	RD14CB2C470J	47Ω 1/6W
R30	RD14BB2C470J	47Ω 1/6W
R31	RD14BB2C332J	3.3KΩ 1/6W
R32	RD14BB2C103J	10KΩ 1/6W
R33	RD14CB2C101J	100Ω 1/6W
R34	RD14BB2C102J	1KΩ 1/6W
R35,36	RD14CB2C470J	470Ω 1/6W
R37	RD14CB2C183J	18KΩ 1/6W
R38	RD14BB2C103J	10KΩ 1/6W
R39	RD14BB2C473J	47KΩ 1/6W
R40	RD14BB2C103J	10KΩ 1/6W
R41	RD14BB2C223J	22KΩ 1/6W
R42	RD14BB2C394J	390KΩ 1/6W
R44	RD14CB2C332J	3.3KΩ 1/6W
R45	RD14CB2C394J	390KΩ 1/6W
R46	RD14CB2C102J	1KΩ 1/6W
R47	RD14CB2C471J	470Ω 1/6W
R48	RD14CB2C332J	3.3KΩ 1/6W
R49	RD14BB2C102J	1KΩ 1/6W
R50	RD14CB2C394J	390KΩ 1/6W
R51	RD14CB2C102J	1KΩ 1/6W
R52	RD14CB2C471J	470Ω 1/6W
R53	RD14CB2C332J	3.3KΩ 1/6W
R54	RD14CB2C221J	220Ω 1/6W
R55	RD14BB2C2R2J	2.2Ω 1/6W
R56	RD14BB2C221J	220Ω 1/6W
R57	RD14BB2C102J	1KΩ 1/6W
R58	RD14BB2C332J	3.3KΩ 1/6W
R59	RD14CB2C472J	4.7KΩ 1/6W
R60	RD14CB2E221J	220Ω 1/4W
R61	RD14BB2E221J	220Ω 1/4W
R62	RD14CB2C223J	22KΩ 1/6W
R63	RD14CB2C473J	47KΩ 1/6W
R64	RD14CB2C272J	2.7KΩ 1/6W
R65	RD14CB2C474J	470KΩ 1/6W
R66	RD14CB2C471J	470Ω 1/6W
R67,68	RD14BB2C102J	1KΩ 1/6W
R69	RD14CB2C272J	2.7KΩ 1/6W
R70	RD14BB2C272J	2.7KΩ 1/6W
R71,72	RD14CB2C103J	10KΩ 1/6W
R73,74	RD14CB2C333J	33KΩ 1/6W
R75	RD14BB2C472J	4.7KΩ 1/6W
R76	RD14CB2C222J	2.2KΩ 1/6W
R77	RD14CB2C684J	680KΩ 1/6W
R78	RD14BB2C102J	1KΩ 1/6W
R79	RD14BB2C392J	3.9KΩ 1/6W
R200,201	RD14CB2C473J	47KΩ 1/6W
R202	RD14CB2C103J	10KΩ 1/6W
R203	RD14CB2E225J	2.2MΩ 1/4W
R204	RD14CB2C473J	47KΩ 1/6W
R205	RD14CB2E221J	220Ω 1/4W
R301	R12-3413-05	Trimmer Pot, 10KΩ
SWITCHES		
S1	S40-2447-05	Push switch, MON
S2	S40-2447-05	Push switch, AUX
S3	S40-2446-05	Push switch, KYS
THERMISTORS		
TH1	SDT1000	Thermistor
IC		
U13	MC3359P	FM, IF
U16	MB3756	8.2V regulator
U17	μpc1242H	Si AF amp, 5.8W
U200	TC400IBP	QUAD NAND
CRYSTAL		
Y1	L77-0991-05	20.945MHz
Z27	L71-0242-05	MCF, 21F15B
Z28	L71-0242-05	MCF, 21F15B
Z31	L72-0339-05	Ceramic filter, CFV455D
OTHERS		
	E23-0435-05	Round terminal
	E31-2174-15	Connector (SP) with lead
	L92-0110-05	Ferrite core
	212-1019-05	Ilux tube

TX-RX UNIT

Terminal functions

Connector No.	Terminal No.	Terminal name	Terminal function
J21	1	TXO	Transmit signal input from PLL unit
	2	GND	GND
J22	1	BZ	Voice signal output
	2	GND	GND
	3	RXO	Receive signal input from PLL unit
J23	1	ESP	External speaker line output
	2	C8	8V common power source line
	3	SB	Switched B^+ to regulated power source
	4	KEY	TX/RX data output (L when transmitting; H when receiving)
	5	R8	8V when receiving
	6	T8	8V when transmitting
	7	AVO	Voice signal output from AF volume cont.
	8	AVI	Voice signal input to AF volume cont.
	9	AFO	Voice signal output
	10	NSO	Noise squelch signal output
	11	NSI	Noise squelch signal input
	12	AFI	Voice signal input
	13	MUT	Mute signal input
	14	QTD	Quiet Tone Disable output
	15	AC	Audio control output
	16	UNL	Unlock signal input
J24	1	B	B^+ line to transmit final stage
	2	B	B^+ line to transmit final stage
	3	B	B^+ line to transmit final stage
	4	B	B^+ line to transmit final stage
J25	1	LMP(RED)	Channel illumination lamp ⊕
	2	GND(BLK)	GND ⊖
J26	1	COM(BRN)	Common power source for LED
	2	BSY(RED)	BUSY indication LED
	3	CAL(ORG)	Call indication LED
	4	TX(YEL)	TX indication LED
	5	GND(BLK)	GND

2SA1015
2SC1815



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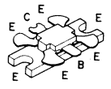
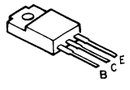


2SK125

2SB946



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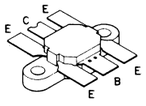
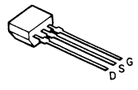
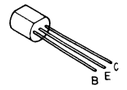


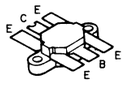
2SK241



2SC2026
2SC2570A



2SC2905



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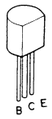
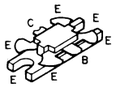
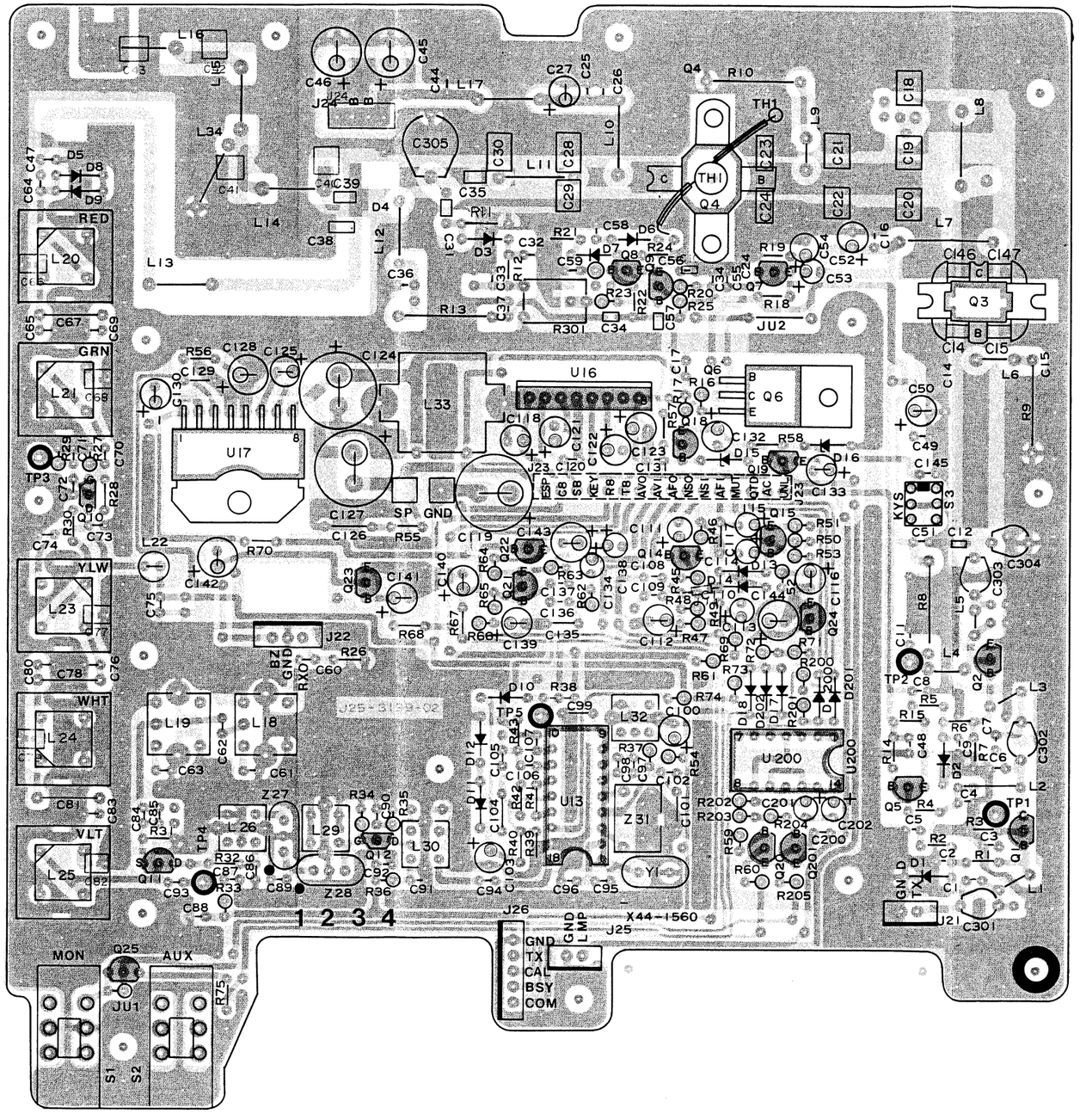


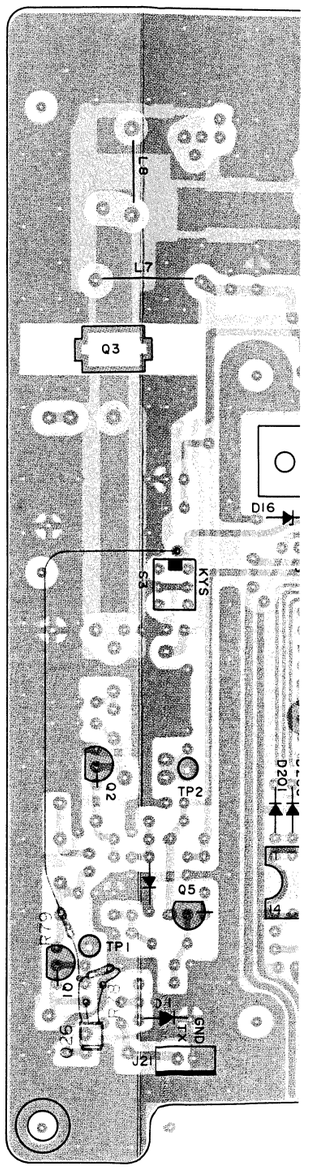
2SC3020
2SC3022



TX-RX UNIT (X61-1200-XX)

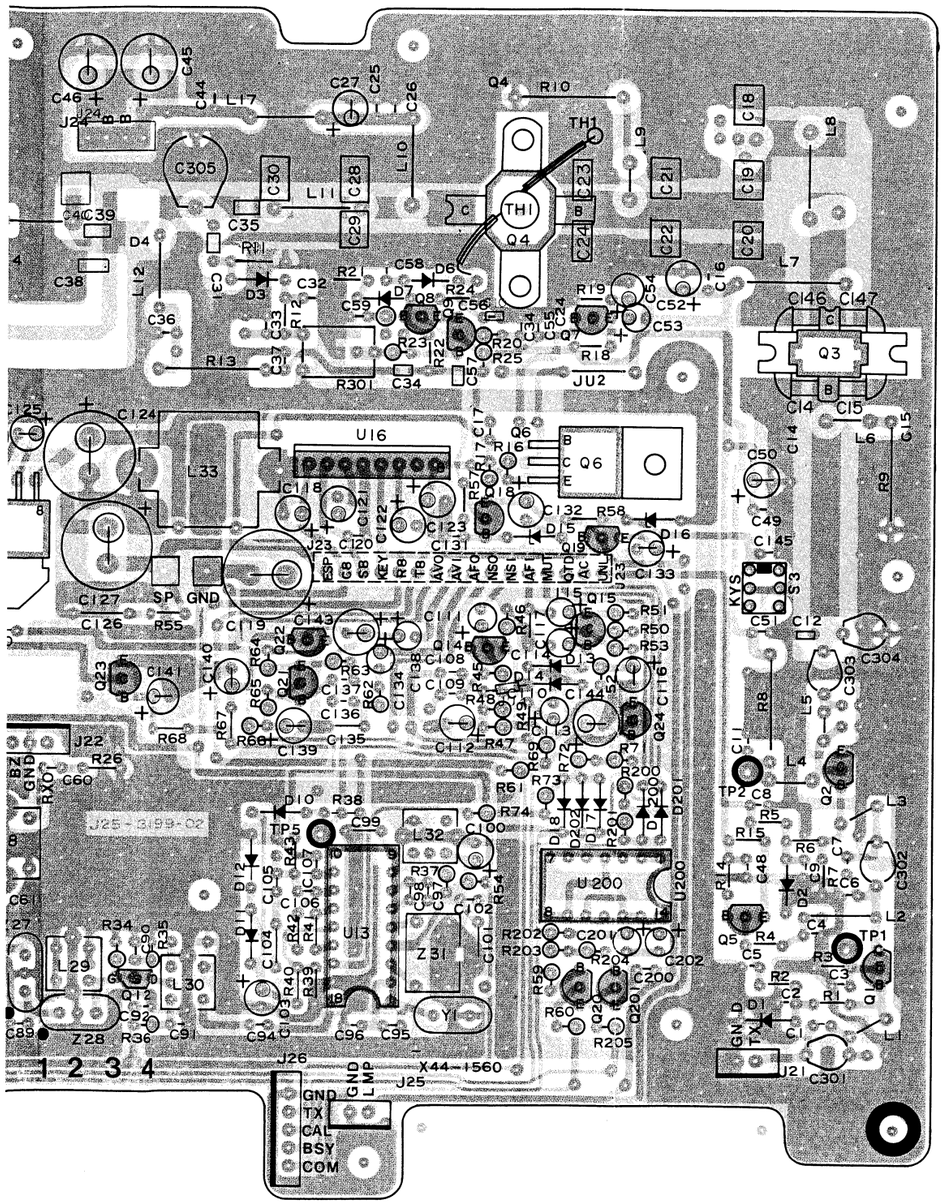
Printed Circuit Board





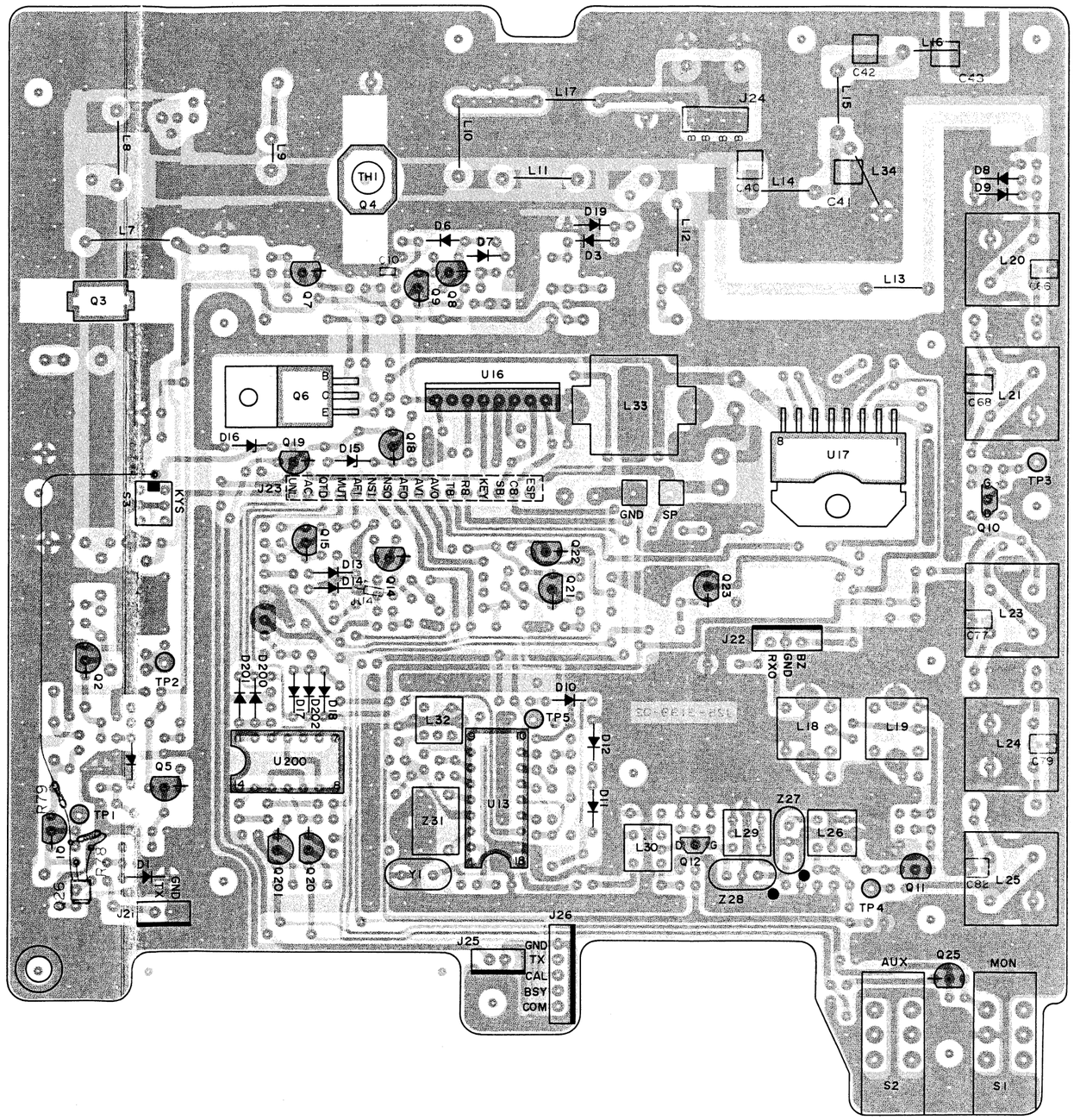
[Component side view]

Foil side
Component side



[Component side view]

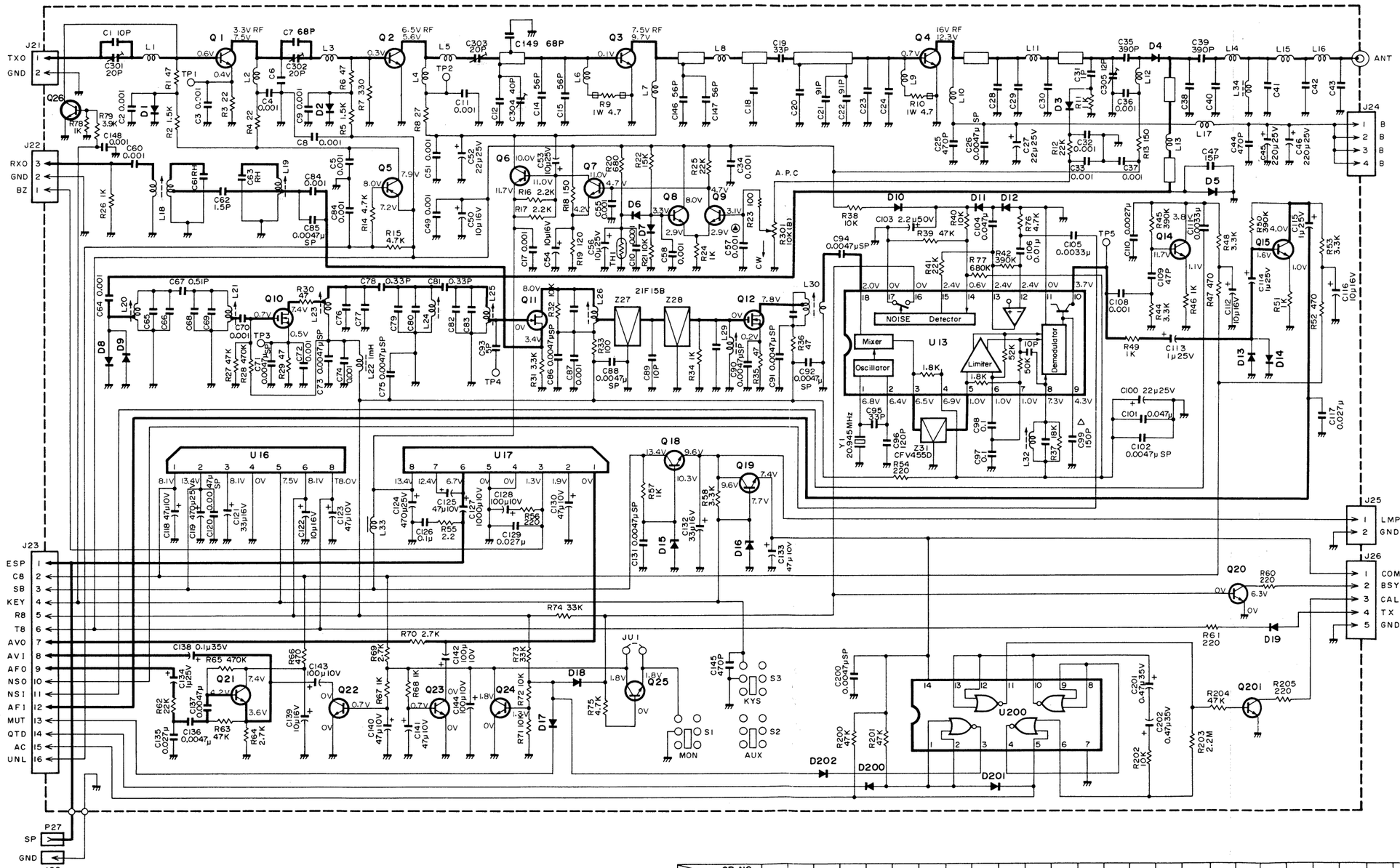
Foil side
Component side



[Foil side view]

Foil side
Component side

TX-RX UNIT Schematic diagram



Q1	: 2SC2570A	Q10,12	: 2SK241(GR)-1	D1,2,6~10,13,14 17,18,200~202	: 1S1555
Q2	: 2SC2538	Q11	: 2SK125-4	D3	: 1SS101
Q3	: 2SC2539	U13	: MC3359P	D4,5	: M1407
Q4	: 2SC2630	U16	: MB3756	D11,12	: IN60A
Q5	: 2SA1015(Y)	U17	: μPC1242H	D15	: WZ-100
Q6	: 2SB946(Q)	Q18~20 22~25,201	: 2SC1815(BL)	D16	: WZ-081
Q7~9,14 15,21	: 2SC1815(Y)	Q26	: 2SC2603(E)	D19	: MTZ3.9JB
		U200	: TC4001BP		

UNIT NO. \ CR NO.	C6	C12	C20	C23	C24	C28	C29	C30	C38	C40	C41	C42	C43	C61	C63	C65	C66	C68	C69	C76	C77	C79	C80	C82	C83	C18
150 — 157 MHz X61-1200-10	27P	68P	33P	180P	180P	100P	100P	27P	18P	20P	43P	39P	20P	12P	12P	5P	0.5P	—	4P	5P	—	—	4P	—	5P	33P
156 — 163MHz X61-1200-11	27P	68P	33P	180P	180P	82P	82P	27P	12P	20P	43P	39P	20P	11P	11P	4P	—	—	3P	4P	—	—	3P	0.5P	4P	33P
162 — 169MHz X61-1200-12	27P	56P	22P	180P	180P	82P	82P	24P	10P	16P	33P	33P	16P	11P	11P	4P	—	0.5P	2P	3P	0.5P	—	3P	—	4P	33P
168 — 174MHz X61-1200-13	18P	56P	22P	150P	150P	68P	82P	22P	8P	16P	33P	33P	16P	10P	10P	3P	—	—	2P	3P	—	—	2P	0.5P	3P	27P

Signal line
Control line
Common DC line
Adjusting points