

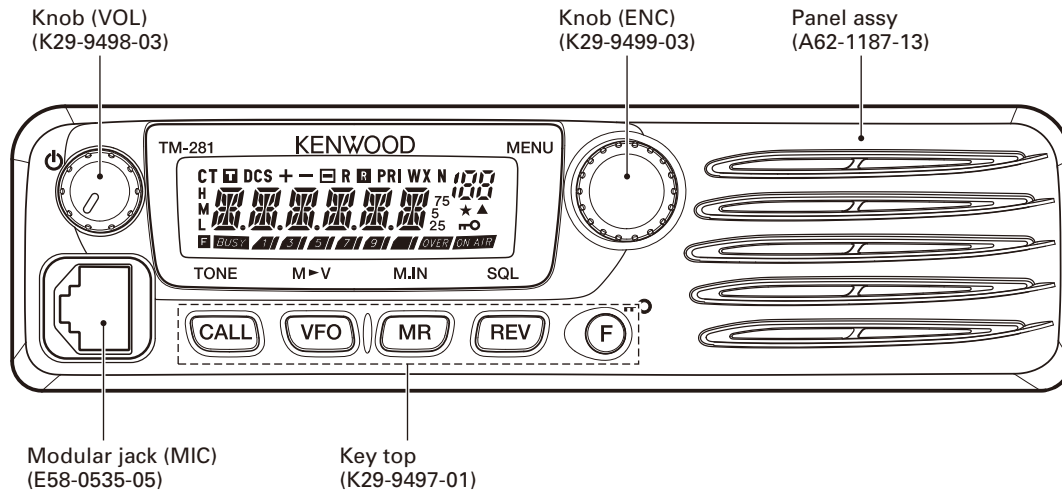
# TM-281A

## SERVICE MANUAL

# KENWOOD

Kenwood Corporation

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# TM-281A

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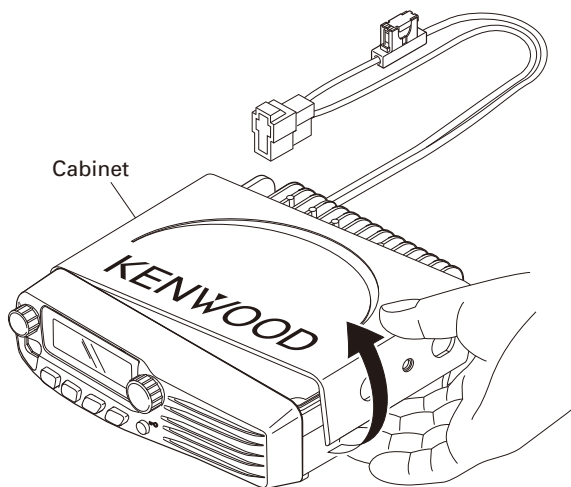
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## DISASSEMBLY FOR REPAIR

### 1. Disassembly Procedure

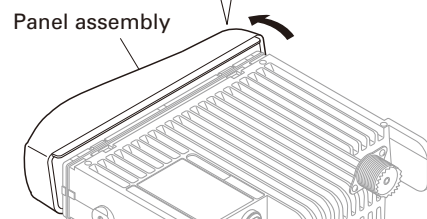
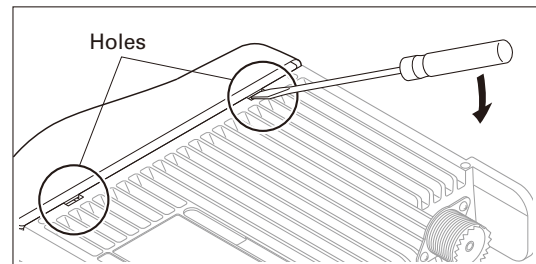
1. When removing the cabinet, first remove the two screws from the right and left with a phillips screwdriver.

Then, hook your finger on the edge of the cabinet and pull it out until it is over the chassis protrusion. Remove the cabinet by prying the cabinet as shown below.



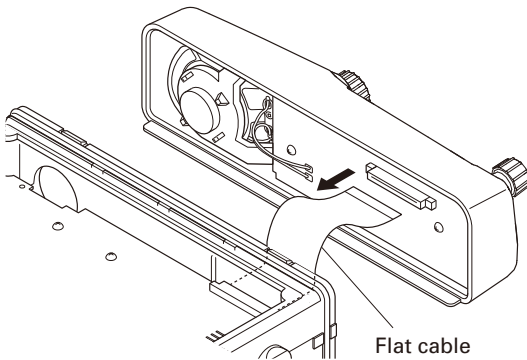
2. To remove the panel assembly, first turn the transceiver upside down.

Then, insert a flat-head screwdriver into the holes of the chassis and tilt it in the direction as shown by the arrow.

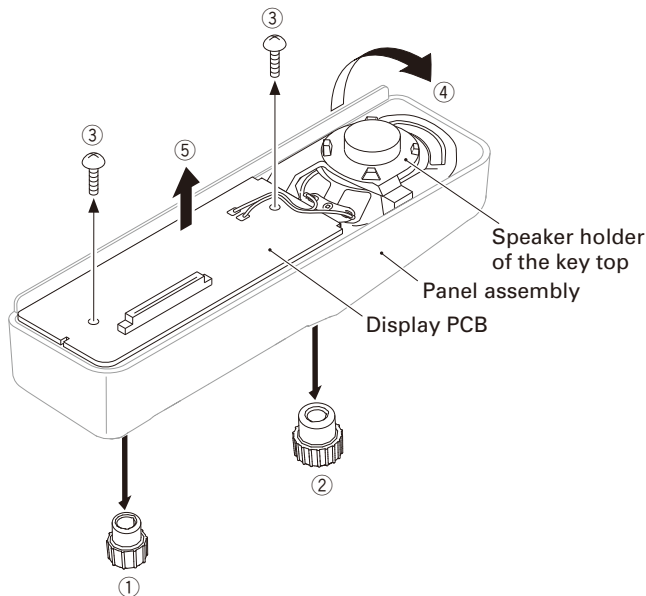


## DISASSEMBLY FOR REPAIR

3. Disconnect the flat cable from the connector of the panel assembly.

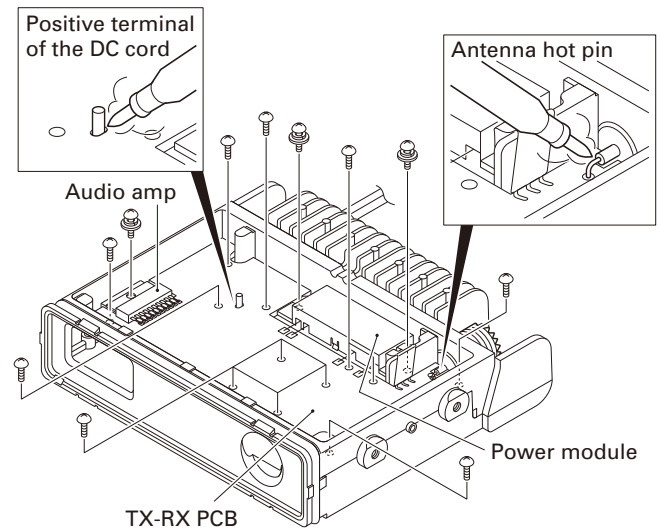


4. To remove the Display PCB, first remove the volume knob ①. Then, remove the encoder knob ②. Remove the two screws ③ from the Display PCB using a phillips screwdriver. Remove the speaker holder of the key top from the speaker. ④ Remove the Display PCB with the speaker from the panel assembly. ⑤



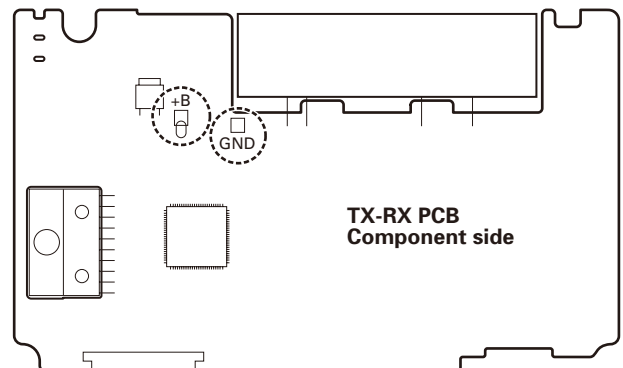
5. When removing the TX-RX PCB, first remove the solder of the antenna hot pin and positive terminal of the DC cord.

Then, remove the 15 screws from the TX-RX PCB, power module, and audio amp.



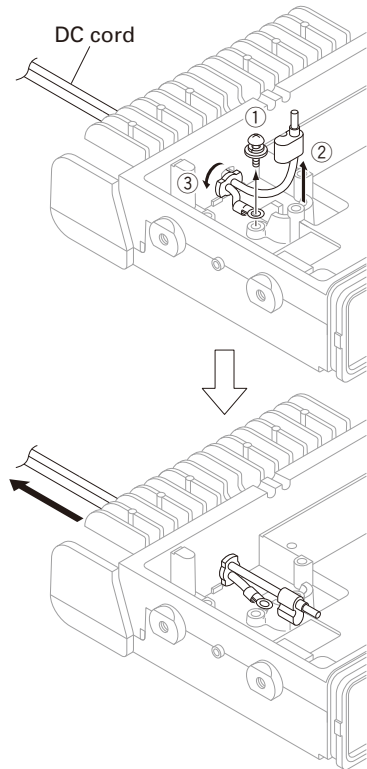
### Note:

When you supply power to the TX-RX PCB after removing the TX-RX PCB from the chassis, solder the positive and ground terminals of the DC cord (recommendation: E30-3448-25) to the +B and GND terminals of the TX-RX PCB.

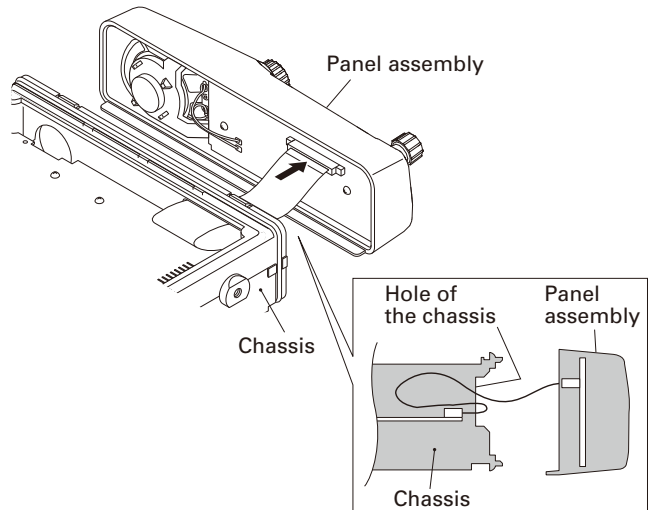


## DISASSEMBLY FOR REPAIR

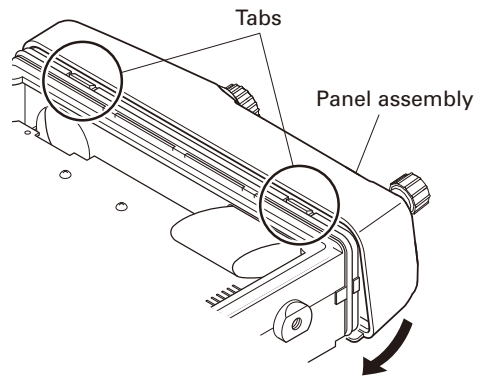
6. Pull it out behind the chassis by rotating the bush ③ of the DC cord 90 degrees in the direction of the arrow after the screw ① in the negative terminal is removed, and the positive terminal ② is removed from the chassis.



2. When mounting the panel assembly, pass the flat cable through the hole of the chassis as shown below, then connect the flat cable to connector of the panel assembly.

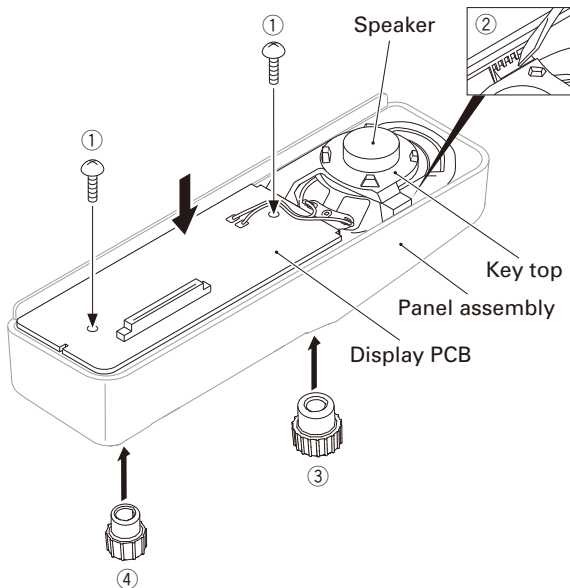


3. Fit the panel assembly into the two tabs of the chassis top side first. Then, fit the panel assembly into the two tabs of the chassis bottom side by turning the panel assembly.



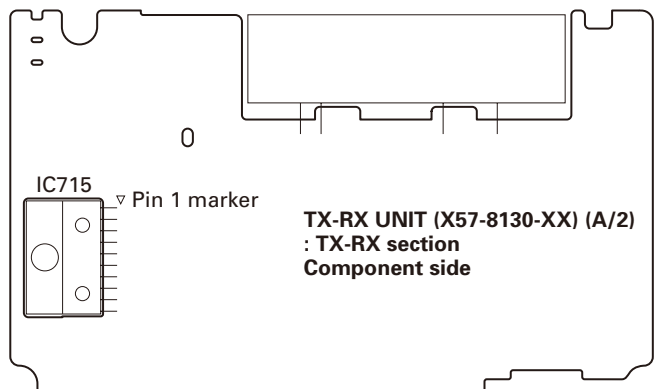
### 2. Precautions for Reassembly

1. Mount the key top and speaker onto the panel assembly. Then, tighten the two screws ① of the Display PCB. Insert the protrusion area of the key top into the groove area of the panel assembly using a flat-head screwdriver. ②  
Then, mount the encoder knob ③ and volume knob ④.



### 3. How to Mount the AF PA IC (IC715)

Solder it onto the TX-RX unit (A/2) so that the AF PA IC part number label "LA4600" is on the reverse side.



## CIRCUIT DESCRIPTION

### Frequency Configuration

The receiver utilizes double conversion. The first IF is 49.95MHz and the second IF is 450kHz. The first local oscillator signal is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies. Figure 1 shows the frequencies.

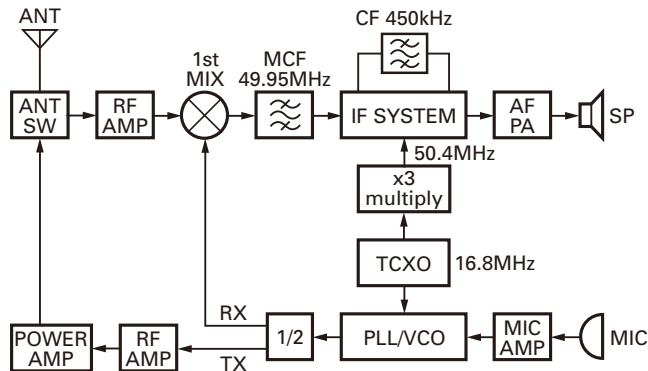


Fig. 1 Frequency configuration

### Receiver System

The receiver is a double conversion superheterodyne. The frequency configuration is shown in Figure 1.

#### ■ Front-end RF Amplifier

An incoming signal from the antenna is applied to an RF amplifier (Q505) after passing through a transmit/receive switch circuit (D309, D311, D306 and D307 are off) and a band pass filter (L515, L514 and varactor diodes: D509, D508). After the signal is amplified, the signal is filtered through a band pass filter (L511, L510 and varactor diodes: D506, D505) to eliminate unwanted signals before it is passed to the first mixer.

The voltage of these diodes are controlled by tracking the MCU (IC707) center frequency of the band pass filter. (See Fig. 2.)

#### ■ First Mixer

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q504) to create a 49.95MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through the monolithic crystal filter (MCF: XF501) to further remove spurious signals.

#### ■ IF Amplifier

The first IF signal is amplified by Q503, and then goes to IC501 (FM processing IC). The signal is heterodyned again with a second local oscillator signal within IC501 to create a 450kHz second IF signal. The second IF signal is then fed through a 450kHz ceramic filter (Wide: CF501, Narrow: CF502) to further eliminate unwanted signals before it is amplified and FM detected in IC501.

| Item                     | Rating                                  |
|--------------------------|---|
| Nominal center frequency | 49.95MHz                                |
| Pass bandwidth           | ±4.0kHz or more at 3dB                  |
| 50dB stop bandwidth      | ±25.0kHz or less                        |
| Ripple                   | 1.0dB or less                           |
| Insertion loss           | 5.0dB or less                           |
| Guaranteed attenuation   | 80dB or more at $f_o \pm 900\text{kHz}$ |
| Spurious                 | 50dB or more at $f_o \pm 1\text{MHz}$   |
| Terminating impedance    | 270Ω / 8.5pF                            |

Table 1 Crystal filter (L71-0655-05): XF501

| Item                     | Rating  |
|--------------------------|---|
| Nominal center frequency | 450kHz  |
| 6dB bandwidth            | ±7.5kHz or more                               |
| 50dB bandwidth           | ±15.0kHz or less                              |
| Ripple                   | 2.0dB or less                                 |
| Insertion loss           | 6.0dB or less                                 |
| Guaranteed attenuation   | 35.0dB or more within $f_o \pm 100\text{kHz}$ |
| I/O matching impedance   | 1.5kΩ   |

Table 2 Ceramic filter (L72-1034-05): CF501

| Item                     | Rating  |
|--------------------------|---|
| Nominal center frequency | 450kHz  |
| 6dB bandwidth            | ±4.5kHz or more                               |
| 50dB bandwidth           | ±10.0kHz or less                              |
| Ripple                   | 2.0dB or less                                 |
| Insertion loss           | 6.0dB or less                                 |
| Guaranteed attenuation   | 60.0dB or more within $f_o \pm 100\text{kHz}$ |
| I/O matching impedance   | 2.0kΩ   |

Table 3 Ceramic filter (L72-0999-05): CF502

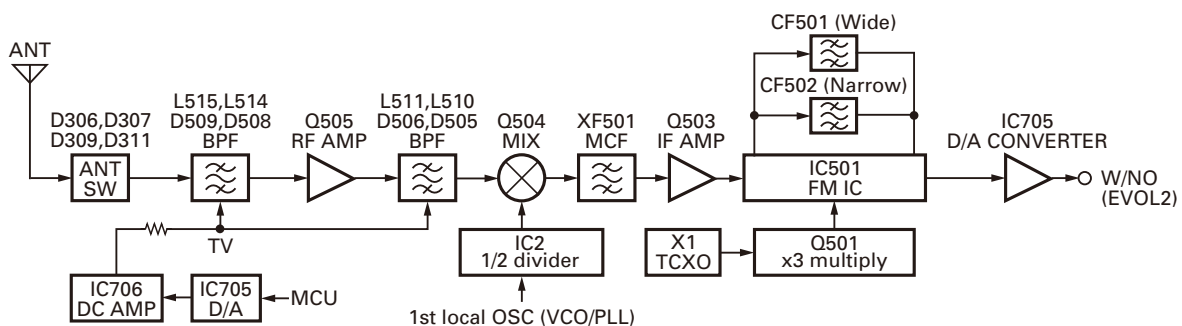


Fig. 2 Receiver system

## CIRCUIT DESCRIPTION

### Wide/Narrow Switching Circuit

The Wide port (pin 65) and Narrow port (pin 64) of the MCU is used to switch between ceramic filters. When the Wide port is high, the ceramic filter SW diodes (D501, D502) cause CF501 to turn on to receive a Wide signal.

When the Narrow port is high, the ceramic filter SW diodes (D501, D502) cause CF502 to turn on to receive a Narrow signal. (See Fig. 3.)

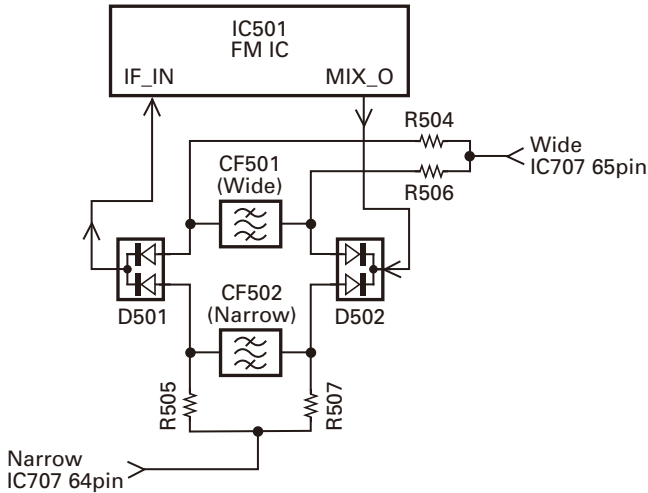


Fig. 3 Wide/Narrow switching circuit

### AF Signal System

The detection signal from the FM IC (IC501) goes to the D/A converter (IC705) to adjust the gain and is output to the AF filter (IC709) for characterizing the signal. The AF signal output from IC709 and the DTMF signal, BEEP signal are summed and the resulting signal goes to the D/A converter (IC705). The AFO output level is adjusted by the D/A converter. The signal output from the D/A converter is input to the audio power amplifier (IC715). The AF signal from IC715 switches between the internal speaker and the speaker jack (J701) output. (See Fig. 4.)

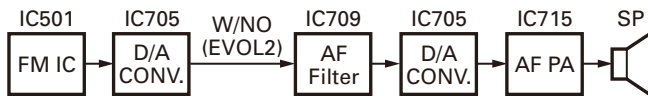


Fig. 4 AF signal system

### Squelch Circuit

The detection output from the FM IC (IC501) passes through a noise amplifier (Q502) to detect noise. A voltage is applied to the MCU (IC707). The MCU controls the squelch according to the voltage (SQIN) level. The signal from the RSSI pin of IC501 is used for the S-meter. The electric field strength of the receive signal can be known before the SQIN voltage is input to the MCU, and the scan stop speed is improved.

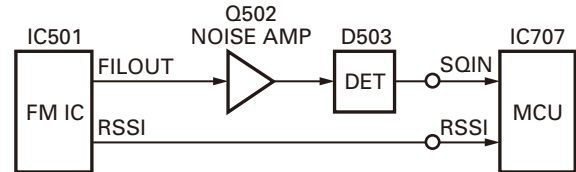


Fig. 5 Squelch circuit

### PLL Frequency Synthesizer

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

#### PLL

The frequency step of the PLL circuit is 5 or 6.25kHz. A 16.8MHz reference oscillator signal is divided at IC1 by a fixed counter to produce the 5 or 6.25kHz reference frequency. The voltage controlled oscillator (VCO) output signal is buffer amplified by Q9, then divided in IC1 by a dual-module programmable counter. The divided signal is compared in phase with the 5 or 6.25kHz reference signal in the phase comparator in IC1. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency. (See Fig. 6.)

#### VCO

Double the operating frequency is generated by Q6 in transmit mode and Q4 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D4 and D6 in transmit mode and D3 and D5 in receive mode). The TX/RX pin is set high in receive mode causing Q7 and Q5 to turn Q6 off, and turn Q4 on. The TX/RX pin is set low in transmit mode. The outputs from Q4 and Q6 are amplified by Q9 and sent to the RF amplifiers through a 1/2 divider (IC2). (See Fig. 6.)

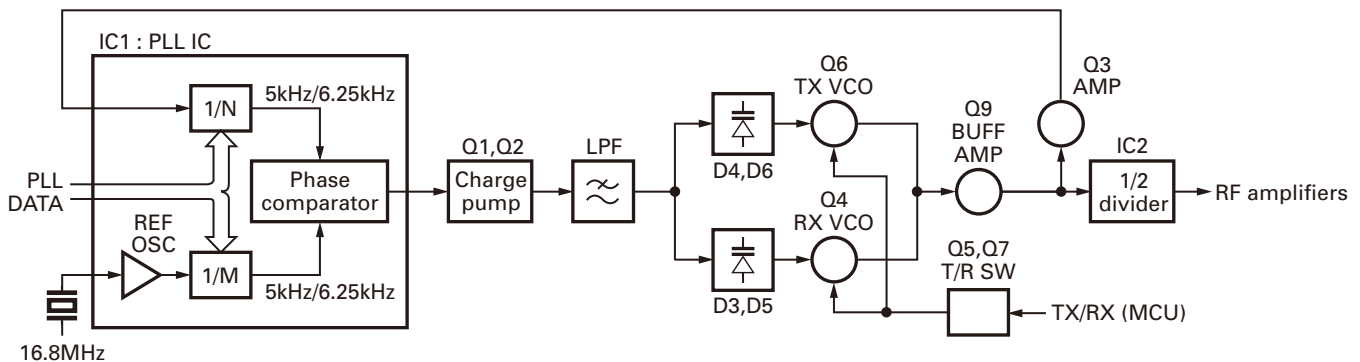


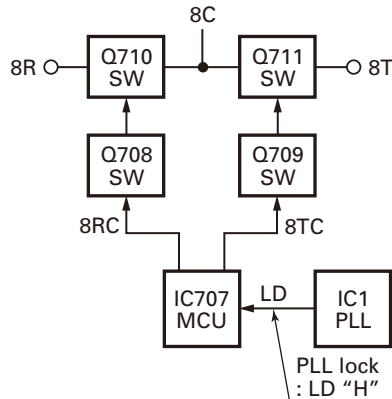
Fig. 6 PLL circuit

## CIRCUIT DESCRIPTION

### ■ Unlock Circuit

During reception, the 8RC signal goes high, the 8TC signal goes low, and Q708 turns on. Q710 turns on and a voltage is applied to 8R. During transmission, the 8RC signal goes low, the 8TC signal goes high and Q709 turns on. Q711 turns on and a voltage is applied to 8T.

The MCU monitors the PLL IC (IC1) LD signal directly. When the PLL is unlocked during transmission, the PLL LD signal goes low. The MCU detects this signal and makes the 8TC signal low. When the 8TC signal goes low, no voltage is applied to 8T, and no signal is transmitted. (See Fig. 7.)



**Fig. 7** Unlock circuit

### Transmitter System

#### ■ Outline

The transmitter circuit produces and amplifies the desired frequency directly. It FM-modulates the carrier signal by means of a varicap diode.

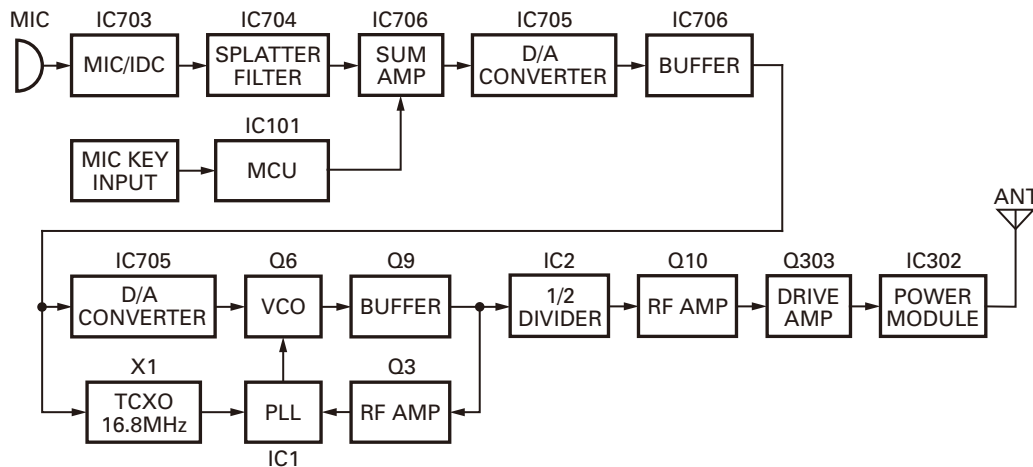
#### ■ Power Amplifier Circuit

The transmit output signal from the VCO passes through a 1/2 divider (IC2) and the transmission/reception selection diode (D9, D10) and is amplified by Q303. The amplified signal goes to the power module (IC302) through a low-pass filter. The low-pass filter removes unwanted high-frequency harmonic components, and the resulting signal is transmitted through the antenna terminal. (See Fig. 8.)

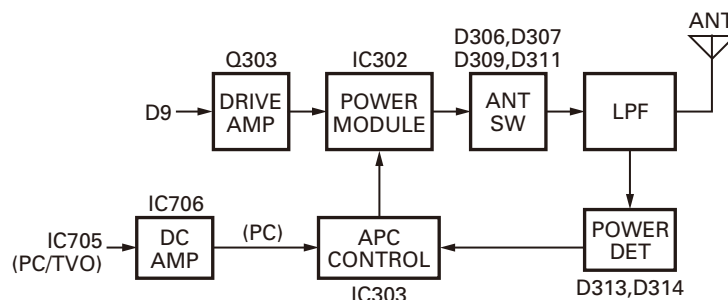
#### ■ APC Circuit

The automatic transmission power control (APC) circuit detects part of a final amplifier output with a diode (D313, D314) and applies a voltage to IC303. IC303 compares the APC control voltage (PC) generated by the D/A converter (IC705) and DC amplifier (IC706) with the detection output voltage. IC303 generates the voltage to control the V<sub>gg</sub> of IC302 and stabilizes the transmission output.

The APC circuit is configured to protect over current of IC302 due to fluctuations of the load at the antenna end and to stabilize transmission output at voltage and temperature variations. (See Fig. 9.)



**Fig. 8** Transmitter system



**Fig. 9** APC circuit

## CIRCUIT DESCRIPTION

### Control Circuit

The MCU carries out the following tasks (See Fig. 10.):

- 1) Controls the WIDE, NARROW, and TX/RX outputs.
- 2) Controls the display circuit.
- 3) Controls the PLL IC (IC1).
- 4) Controls the D/A converter (IC705) and adjusts the volume, modulation and transmission power.

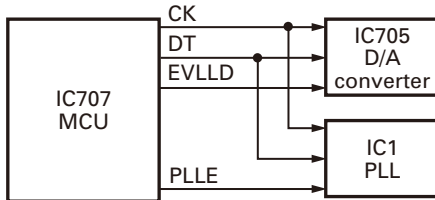


Fig. 10 Control circuit

### Memory Circuit

The transceiver has an 64k-bit EEPROM (IC708). The EEPROM contains adjustment data. The MCU (IC707) controls the EEPROM through three serial data lines. (See Fig. 11.)

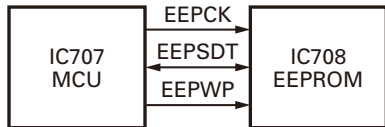


Fig. 11 Memory circuit

### Display Circuit

The MCU (IC707) controls the display LCD and LEDs. When power is on, the LCD driver will use the BL line to control the LCD illumination and key backlight LEDs.

The brightness function is controlled by switch Q904. The LCD driver (IC901) and MCU (IC707) communicate through the CE, CL, DI, and DO lines. (See Fig. 12.)

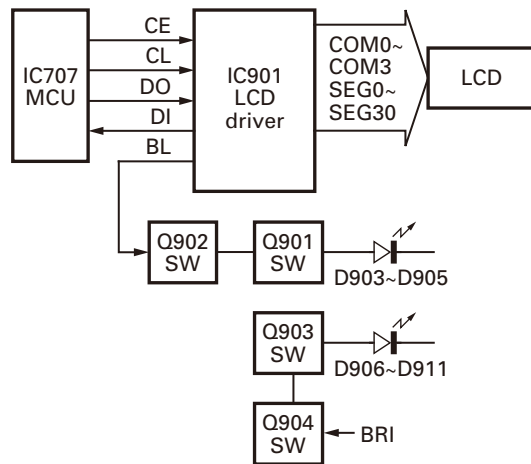


Fig. 12 Display circuit

### Key Matrix Circuit

The front panel has function keys. Each of them is connected to a cross point of a matrix of the KI1 to KI3 and KS1 to KS2 ports of the LCD driver.

The LCD driver monitors the status of the KI1 to KI3 and KS1 to KS2 ports. If the state of one of the ports changes, the LCD driver assumes that the key at the matrix point corresponding to that port has been pressed.

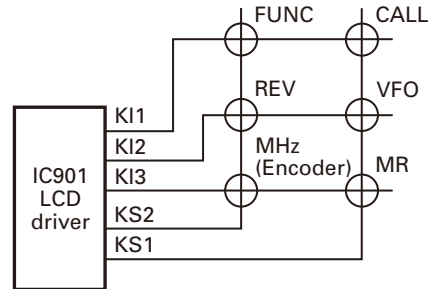


Fig. 13 Key matrix circuit

### Encode

The CTCSS and DCS signals are output from TONE of the MCU (IC707). The DTMF signal is output from DTMF of the MCU (IC707). These signals are summed with a MIC signal by the summing amplifier (IC706), and the resulting signal goes to the D/A converter (IC705) to adjust the MOD level, and then goes to the buffer amplifier (IC706).

Part of the signal goes to the TCXO, and the rest goes to the D/A converter (IC705) in order to adjust the modulation balance between the VCO and TCXO.

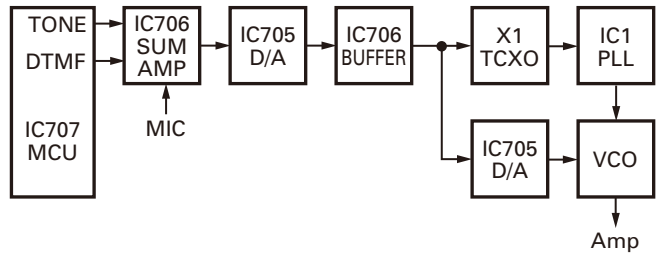


Fig. 14 Encode

### Decode

#### • CTCSS/DCS

The signal (W/NO (EVOL2)) goes to DTMF IN (pin 95) of the MCU (IC707) through the amplifier (IC709). The CTCSS/DCS signal will pass through the low-pass filters in the MCU (IC707) and be decoded within the MCU (IC707).

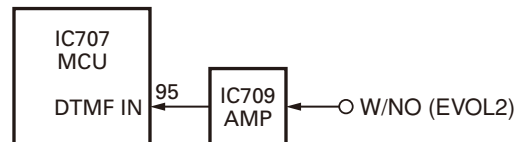


Fig. 15 Decode



## CIRCUIT DESCRIPTION

### ■ D/A Converter

The D/A converter (IC705) is used to adjust the MO modulation, AF volume, TV voltage, FC reference voltage, and PC POWER CONTROL voltage level.

Adjustment values are sent from the MCU as serial data. The D/A converter has a resolution of 256 and the following relationship is valid:

$$\text{D/A output} = (\text{Vin} - \text{VDAREF}) / 256 \times n + \text{VDAREF}$$

Vin: Analog input

VDAREF: D/A reference voltage (Approx. 2.2V)

n: Serial data value from the microprocessor (MCU)

### Power Supply Circuit

When the power switch on the display unit is pressed, the power port on the display unit which is connected to port 17 (POWER), goes low, then port 82 (SBC) goes high, Q713 turns on, SB SW (Q714) turns on and power (SB) is supplied to the radio.

When the DC power is supplied to the radio, the voltage regulator IC (IC713) is supplied to the MCU VDD and reset voltage detect IC (IC714). IC714 will generate a signal (RESET) into the reset terminal of the MCU (IC707) to carry out a power ON reset. If DC power is less than approximately 9.5V, the radio is unable to power on.

When the DC power voltage decreases from the normal voltage, the INT voltage detector IC (IC712) will set to high

on MCU port 18 (INT) if B line becomes less than approximately 9.5V. The MCU will then send the backup data to the EEPROM (IC708) and enter stop mode.

This circuit has an overvoltage protection circuit. If a DC voltage of 18V or higher is applied to the base of Q707, this voltage turns Q707 on and will set to high on MCU port 18 (INT). The MCU will then send the backup data to the EEPROM (IC708) and enter stop mode. (See Fig. 16.)

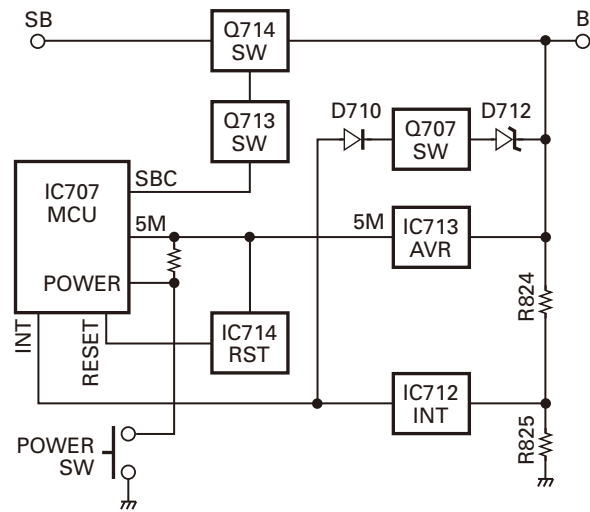


Fig. 16 Power supply circuit

## COMPONENTS DESCRIPTION

### TX-RX UNIT (X57-8130-XX)

| Ref. No. | Use / Function        | Operation / Condition / Compatibility  |
|----------|-----------------------|--|
| IC1      | PLL IC                | Frequency control  |
| IC2      | Divider               | Frequency divider  |
| IC302    | Power module          | TX final amplifier   |
| IC303    | APC controller        | TX power control   |
| IC501    | FM IC                 | FM detector/ 2nd mixer/ RSSI/ Noise amplifier  |
| IC703    | OP amplifier          | MIC amplifier/ IDC   |
| IC704    | OP amplifier          | Splatter filter  |
| IC705    | Digital potentiometer | Frequency adjustment<br>Modulation balance adjustment<br>AF level adjustment<br>Backlight control<br>Modulation limit adjustment<br>TX power/ BPF control<br>RX signal level control |

| Ref. No. | Use / Function    | Operation / Condition / Compatibility                  |
|----------|-------------------|--|
| IC706    | OP amplifier      | Buffer amplifier/ SUM amplifier/ DC amplifier/ 1/2 VCC |
| IC707    | MCU               |  |
| IC708    | EEPROM            | Tuning data/ Memory data                               |
| IC709    | OP amplifier      | Audio filter   |
| IC710    | 5V AVR            | 5C   |
| IC711    | 8V AVR            | 8C   |
| IC712    | Voltage detection | MCU INT voltage detection                              |
| IC713    | 5V AVR            | 5M   |
| IC714    | Voltage detection | MCU reset voltage detection                            |
| IC715    | Audio amplifier   | Audio final amplifier                                  |
| IC901    | LCD driver        | Display control  |
| Q1,2     | Switching         | Charge pump  |
| Q3       | RF amplifier      | PLL Fin  |

## COMPONENTS DESCRIPTION

| Ref. No. | Use / Function             | Operation / Condition / Compatibility   |
|----------|----------------------------|---|
| Q4       | Oscillator                 | RX VCO                                  |
| Q5       | T/R switch                 | On when RX                              |
| Q6       | Oscillator                 | TX VCO                                  |
| Q7       | T/R switch                 |   |
| Q8       | Ripple filter              |   |
| Q9       | Buffer amplifier           | Output of VCO                           |
| Q10      | RF amplifier               | Output of VCO                           |
| Q303     | Drive amplifier            | TX driver                               |
| Q501     | Tripler                    | 16.8MHz × 3                             |
| Q502     | SQL amplifier              | Noise amplifier                         |
| Q503     | IF amplifier               |   |
| Q504     | Mixer                      | 1st mixer                               |
| Q505     | RF amplifier               | LNA                                     |
| Q506     | PC/TV switch               | On when TX                              |
| Q701     | AGC/ MIC mute              |   |
| Q702,703 | Beat shift switch          | Active while beat shift is ON           |
| Q704,705 | AF mute                    | Active while AFM is "H"                 |
| Q706     | Buffer amplifier           | RX audio                                |
| Q707     | Over voltage detection     | Active when PS voltage is more than 18V |
| Q708     | DC switch (8R)             | Active while RX                         |
| Q709     | DC switch (8T)             | Active while TX                         |
| Q710     | DC switch (8R)             | Active while RX                         |
| Q711     | DC switch (8T)             | Active while TX                         |
| Q712     | AF mute                    | Active while SPM is "H"                 |
| Q713,714 | DC switch (SB)             | Active when power is ON                 |
| Q715     | AF mute                    | Active while AMPSW is "H"               |
| Q901     | Key backlight switch       |   |
| Q902     | DC switch                  |   |
| Q903     | LCD backlight switch       |   |
| Q904     | Brightness function switch |   |
| D1       | Voltage dropped            |   |
| D2       | Ripple filter              |   |
| D3       | VCO frequency control      | RX                                      |
| D4       | VCO frequency control      | TX                                      |

| Ref. No. | Use / Function                | Operation / Condition / Compatibility |
|----------|-------------------------------|---------------------------------------|
| D5       | VCO frequency control         | RX                                    |
| D6       | VCO frequency control         | TX                                    |
| D7       | VCO modulation                |                                       |
| D8       | Ripple filter                 |                                       |
| D9,10    | RF switch                     | TX/RX                                 |
| D301     | Voltage protection            | 5.1V Zener diode                      |
| D305     | Protection                    | PC/TV                                 |
| D306,307 | ANT switch                    | On when TX                            |
| D309     | ANT switch                    | On when TX                            |
| D311     | ANT switch                    | On when TX                            |
| D312     | Temperature compensation      |                                       |
| D313,314 | APC voltage detect            |                                       |
| D316     | Protection                    |                                       |
| D501,502 | IF switch                     | Wide/Narrow                           |
| D503     | Detection                     | Noise squelch                         |
| D504     | Protection                    |                                       |
| D505,506 | RF BPF tuning                 |                                       |
| D508,509 | RF BPF tuning                 |                                       |
| D702     | Surge absorption              | CM                                    |
| D704     | Surge absorption              | MIC key                               |
| D705     | Surge absorption              | RXD                                   |
| D706     | Surge absorption              | PTT                                   |
| D708     | MIC mute                      |                                       |
| D709     | Detection                     | AGC                                   |
| D710     | Protection                    |                                       |
| D711     | Limiter                       |                                       |
| D712     | Over voltage detection        | On when PS voltage is more than 18V   |
| D714     | Reverse connection protection |                                       |
| D901     | Reverse connection protection |                                       |
| D902     | Surge absorption              | 6.2V Zener diode                      |
| D903~905 | LED                           | Key backlight                         |
| D906~911 | LED                           | LCD backlight                         |

## SEMICONDUCTOR DATA

### MCU: 30622MEP540GU (TX-RX unit IC707)

| Pin No. | Name   | I/O | Function                  |
|---------|--------|-----|---------------------------|
| 1       | TONE   | O   | CTCSS/DCS output          |
| 2       | DTMF   | O   | DTMF/BEEP/1750Hz output   |
| 3       | PLLE   | O   | PLL IC chip select        |
| 4,5     | NC     | I   | Not used                  |
| 6       | GND    | -   | GND                       |
| 7       | CNVSS  | -   | Not used                  |
| 8       | EVLLD  | O   | D/A converter chip select |
| 9       | BSHIFT | O   | Beat shift                |
| 10      | RESET  | I   | Reset                     |
| 11      | XOUT   | O   | X'tal (8MHz)              |
| 12      | VSS    | -   | GND                       |
| 13      | XIN    | I   | X'tal (8MHz)              |
| 14      | VCC    | -   | +5V                       |
| 15      | GND    | -   | GND                       |
| 16      | NC     | I   | Not used                  |
| 17      | POWER  | I   | Power key input           |
| 18      | INT    | I   | MCU stop                  |
| 19      | NC     | I   | Not used                  |
| 20      | TX/RX  | O   | TX/RX                     |
| 21      | UL     | I   | PLL unlock detect         |
| 22,23   | NC     | I   | Not used                  |
| 24      | EEPSDT | I/O | EEPROM data               |
| 25      | EEPCK  | O   | EEPROM clock              |
| 26      | EEPWP  | O   | EEPROM write protect      |
| 27,28   | NC     | I   | (Nch open drain)          |
| 29      | TXD1   | O   | Not used                  |
| 30      | RXD1   | I   | Not used                  |
| 31      | CLKFLS | I   | Not used                  |
| 32      | BSYFLS | O   | Not used                  |
| 33      | TXD    | O   | To PC                     |
| 34      | RXD    | I   | From PC                   |
| 35      | PTT    | I   | PTT input                 |
| 36~38   | NC     | I   | Not used                  |
| 39      | EMPFLS | I/O | Not used                  |
| 40~43   | NC     | I   | Not used                  |
| 44      | CEFLS  | I/O | Not used                  |
| 45~49   | NC     | I   | Not used                  |
| 50      | AFM    | O   | AF mute                   |
| 51      | SPM    | O   | Speaker mute              |
| 52      | AMPSW  | O   | AF AMP switch             |

| Pin No. | Name      | I/O | Function                |
|---------|-----------|-----|-------------------------|
| 53      | DT        | O   | Common data             |
| 54      | CK        | O   | Common clock            |
| 55      | NC        | I   | Not used                |
| 56      | DST1      | I   | Destination 1           |
| 57~59   | DST2~DST4 | I   | Destination 2~4         |
| 60      | VCC       | -   | +5V                     |
| 61      | NC        | I   | Not used                |
| 62      | VSS       | -   | GND                     |
| 63      | ADJ       | I   | For adjustment mode     |
| 64      | NARROW    | O   | Narrow                  |
| 65      | WIDE      | O   | Wide                    |
| 66,67   | NC        | I   | Not used                |
| 68      | CL        | O   | Clock for LCD           |
| 69      | CE        | O   | Chip enable for LCD     |
| 70      | DO        | O   | Output data to LCD      |
| 71      | DI        | I   | Input data from LCD     |
| 72      | NC        | I   | Not used                |
| 73      | ENCB      | I   | Encoder input B         |
| 74      | ENCA      | I   | Encoder input A         |
| 75,76   | NC        | O   | Not used                |
| 77      | MICMT     | O   | MIC mute                |
| 78      | NC        | I   | Not used                |
| 79      | 8RC       | O   | 8R control              |
| 80      | 8TC       | O   | 8T control              |
| 81      | NC        | I   | Not used                |
| 82      | SBC       | O   | Battery switch          |
| 83~85   | NC        | I   | Not used                |
| 86      | CM        | I   | MIC key check           |
| 87      | MICKEY2   | I   | For AMR DTMF keypad MIC |
| 88      | MICKEY    | I   | For AMR DTMF keypad MIC |
| 89      | VOL       | I   | Volume encoder          |
| 90      | TEMP2     | I   | Temperature 2           |
| 91      | TEMP1     | I   | Temperature 1           |
| 92      | RSSI      | I   | RSSI input              |
| 93      | SQIN      | I   | Squelch input           |
| 94      | AVSS      | -   | GND                     |
| 95      | DTMF IN   | I   | CTCSS/DCS/1050Hz input  |
| 96      | VREF      | -   | +5V                     |
| 97      | AVCC      | -   | +5V                     |
| 98~100  | NC        | I   | Not used                |

# TM-281A

## PARTS LIST

\* New Parts. Δ indicates safety critical components.

Parts without **Parts No.** are not supplied.

Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.

Teile ohne **Parts No.** werden nicht geliefert.

L : Scandinavia

Y : PX (Far East, Hawaii)

C : China

K : USA

T : England

X : Australia

P : Canada

E : Europe

M : Other Areas

### TM-281A

#### TX-RX UNIT (X57-8130-XX)

| Ref. No.       | Address  | New parts | Parts No.     | Description                | Destination | Ref. No. | Address | New parts | Parts No.     | Description  | Destination |      |
|----------------|----------|-----------|---------------|----------------------------|-------------|----------|---------|-----------|---------------|--------------|-------------|------|
| <b>TM-281A</b> |          |           |               |                            |             | C16      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| 1              | 1B       | *         | A02-4156-01   | PLASTIC CABINET            |             | C17      |         |           | CK73HB1H103K  | CHIP C       | 0.010UF     | K    |
| 2              | 2B       | *         | A10-4152-01   | CHASSIS                    |             | C18      |         |           | CK73HB1E104K  | CHIP C       | 0.10UF      | K    |
| 3              | 3A       | *         | A62-1187-13   | PANEL ASSY                 |             | C20,21   |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| 5              | 3A       |           | B11-1809-03   | ILLUMINATION GUIDE (LCD)   |             | C23      |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| 6              | 3A       |           | B38-0885-15   | LCD                        |             | C25      |         |           | C92-0863-05   | CHIP TNTL    | 0.047UF     | 35WV |
| 7              | 3C       | *         | B62-2347-10   | INSTRUCTION MANUAL         | K,M2        | C27      |         |           | C92-0588-05   | CHIP TNTL    | 1.5UF       | 16WV |
| 7              | 3C       | *         | B62-2348-10   | INSTRUCTION MANUAL         | M3          | C28      |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| 7              | 3C       | *         | B62-2349-10   | INSTRUCTION MANUAL         | M4          | C29      |         |           | CS77CA1V0R1M  | CHIP TNTL    | 0.1UF       | 35WV |
| 10             | 2B       |           | E04-0167-15   | RF COAXIAL RECEPTACLE (M)  |             | C34      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| 11             | 2B       |           | E23-1346-04   | GROUND TERMINAL (CLIP)     |             | C35      |         |           | CC73HCH1H820J | CHIP C       | 82PF        | J    |
| 12             | 3A       |           | E29-1201-04   | INTER CONNECTOR (LCD)      |             | C36      |         |           | CC73HCH1H300J | CHIP C       | 30PF        | J    |
| 13             | 2B       | *         | E30-7743-05   | DC CORD                    |             | C38      |         |           | CC73HCH1H100C | CHIP C       | 10PF        | C    |
| 14             | 1C       | *         | E30-7744-05   | DC CORD                    | ACCESSORY   | C39      |         |           | CC73HCH1H080B | CHIP C       | 8.0PF       | B    |
| 15             | 2A       | *         | E37-1542-05   | FLAT CABLE                 |             | C41      |         |           | CC73HCH1H0R5B | CHIP C       | 0.5PF       | B    |
| 16             | 3A       | *         | E37-1545-05   | PARALLEL CORD (SP)         |             | C42,43   |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| 18             | 1C       |           | F52-0024-05   | FUSE (BLADE TYPE) 15A      | ACCESSORY   | C45      |         |           | CC73HCH1H010B | CHIP C       | 1.0PF       | B    |
| 19             | 3A       | *         | G13-2370-04   | CUSHION (LCD)              |             | C46      |         |           | CC73HCH1H0R5B | CHIP C       | 0.5PF       | B    |
| 20             | 3A       | *         | G53-1878-03   | PACKING (PANEL)            |             | C48      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| 22             | 1D       | *         | H12-4330-02   | PACKING FIXTURE (RADIO)    |             | C49      |         |           | CC73HCH1H4R5B | CHIP C       | 4.5PF       | B    |
| 23             | 2D       | *         | H12-4331-02   | PACKING FIXTURE            |             | C50      |         |           | CC73HCH1H100C | CHIP C       | 10PF        | C    |
| 24             | 2D       | *         | H52-2503-02   | ITEM CARTON CASE           | K           | C51      |         |           | CC73HCH1H050B | CHIP C       | 5.0PF       | B    |
| 26             | 1C       |           | J19-1584-15   | HOLDER (MIC)               | ACCESSORY   | C52      |         |           | CC73HCH1H110G | CHIP C       | 11PF        | G    |
| 27             | 3A       |           | J21-9463-03   | MOUNTING HARDWARE (LCD)    |             | C53      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| 28             | 2C       |           | J29-0726-03   | BRACKET                    | ACCESSORY   | C54      |         |           | CC73HCH1H0R3B | CHIP C       | 0.3PF       | B    |
| 30             | 3A       | *         | K29-9497-01   | KEY TOP                    |             | C55      |         |           | CC73HCH1H0R5B | CHIP C       | 0.5PF       | B    |
| 31             | 3A       | *         | K29-9498-03   | KNOB (VOL)                 |             | C56      |         |           | CS77BB21C220M | CHIP TNTL    | 22UF        | 16WV |
| 32             | 3A       | *         | K29-9499-03   | KNOB (ENC)                 |             | C57      |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| A              | 1A,1B    |           | N35-2604-43   | BINDING HEAD MACHINE SCREW |             | C58      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| B              | 1A,1B,2B |           | N67-3008-48   | PAN HEAD SEMS SCREW        |             | C59      |         |           | CK73HB1H471K  | CHIP C       | 470PF       | K    |
| C              | 3A       |           | N80-2008-48   | PAN HEAD TAPTITE SCREW     |             | C60      |         |           | CC73HCH1H060B | CHIP C       | 6.0PF       | B    |
| D              | 1B,2B    |           | N87-2608-48   | BRAZIER HEAD TAPTITE SCREW |             | C61      |         |           | CC73HCH1H030B | CHIP C       | 3.0PF       | B    |
| 34             | 2C       | *         | N99-2082-05   | SCREW SET                  | ACCESSORY   | C62      |         |           | CC73HCH1H020B | CHIP C       | 2.0PF       | B    |
| 36             | 3A       |           | T07-0779-05   | SPEAKER                    |             | C63      |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
| 37             | 1C       |           | T91-0624-65   | MICROPHONE                 | ACCESSORY   | C64      |         |           | CC73HCH1H221J | CHIP C       | 220PF       | J    |
| 37             | 1C       | *         | T91-0641-75   | MICROPHONE (DTMF)          | ACCESSORY   | C65,66   |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C67      |         |           | CC73HCH1H180J | CHIP C       | 18PF        | J    |
|                |          |           |               |                            |             | C68-70   |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C71      |         |           | CC73HCH1H390J | CHIP C       | 39PF        | J    |
|                |          |           |               |                            |             | C72      |         |           | CC73HCH1H180J | CHIP C       | 18PF        | J    |
|                |          |           |               |                            |             | C306     |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C308     |         |           | CK73HB1H122K  | CHIP C       | 1200PF      | K    |
|                |          |           |               |                            |             | C309     |         |           | CC73HCH1H060B | CHIP C       | 6.0PF       | B    |
|                |          |           |               |                            |             | C310     |         |           | CC73HCH1H080B | CHIP C       | 8.0PF       | B    |
|                |          |           |               |                            |             | C312     |         |           | CC73HCH1H120J | CHIP C       | 12PF        | J    |
|                |          |           |               |                            |             | C318     |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C328     |         |           | CC73HCH1H130J | CHIP C       | 13PF        | J    |
|                |          |           |               |                            |             | C329     |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C330     |         |           | CC73HCH1H2R5B | CHIP C       | 2.5PF       | B    |
|                |          |           |               |                            |             | C331     |         |           | CK73HB1E223K  | CHIP C       | 0.022UF     | K    |
|                |          |           |               |                            |             | C332     |         |           | CC73HCH1H151J | CHIP C       | 150PF       | J    |
|                |          |           |               |                            |             | C333     |         |           | CK73FB1A475K  | CHIP C       | 4.7UF       | K    |
|                |          |           |               |                            |             | C334     |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C338     |         |           | CK73HB1H102K  | CHIP C       | 1000PF      | K    |
|                |          |           |               |                            |             | C340     |         |           | CC73HCH1H221J | CHIP C       | 220PF       | J    |
|                |          |           |               |                            |             | D903-911 |         |           | B30-2337-05   | LED (YELLOW) |             |      |
| C1             |          |           | CK73FB0J226M  | CHIP C                     | 22UF        | M        |         |           |               |              |             |      |
| C3,4           |          |           | CC73HCH1H101J | CHIP C                     | 100PF       | J        |         |           |               |              |             |      |
| C5,6           |          |           | CK73HB1H102K  | CHIP C                     | 1000PF      | K        |         |           |               |              |             |      |
| C7             |          |           | CC73HCH1H101J | CHIP C                     | 100PF       | J        |         |           |               |              |             |      |
| C9             |          |           | CK73HB1E104K  | CHIP C                     | 0.10UF      | K        |         |           |               |              |             |      |
| C10            |          |           | CC73HCH1H680J | CHIP C                     | 68PF        | J        |         |           |               |              |             |      |
| C11            |          |           | CK73HB1E104K  | CHIP C                     | 0.10UF      | K        |         |           |               |              |             |      |
| C12            |          |           | CK73FB1A106K  | CHIP C                     | 10UF        | K        |         |           |               |              |             |      |
| C14            |          |           | CK73HB1E104K  | CHIP C                     | 0.10UF      | K        |         |           |               |              |             |      |
| C15            |          |           | CK73FB1A106K  | CHIP C                     | 10UF        | K        |         |           |               |              |             |      |

## PARTS LIST

TX-RX UNIT (X57-8130-XX)

| Ref. No. | Address | New parts | Parts No.     | Description      | Desti-nation | Ref. No. | Address | New parts | Parts No.     | Description      | Desti-nation |
|----------|---------|-----------|---------------|------------------|--------------|----------|---------|-----------|---------------|------------------|--------------|
| C342     |         |           | CC73HCH1H101J | CHIP C 100PF J   |              | C538     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              |
| C343     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C539     |         |           | CC73HCH1H020B | CHIP C 2.0PF B   |              |
| C344,345 |         |           | CC73HCH1H101J | CHIP C 100PF J   |              | C541     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C347     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              | C544     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C348     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C545     |         |           | CC73HCH1H130J | CHIP C 13PF J    |              |
| C350     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C546     |         |           | CC73HCH1H270J | CHIP C 27PF J    |              |
| C354     |         |           | CC73HCH1H220J | CHIP C 22PF J    |              | C547     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C355     |         |           | CC73HCH1H470J | CHIP C 47PF J    |              | C548     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              |
| C356     |         |           | CC73HCH1H220J | CHIP C 22PF J    |              | C549,550 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C365     |         |           | C93-0556-05   | CHIP C 6.0PF D   |              | C551     |         |           | CC73HCH1H101J | CHIP C 100PF J   |              |
| C394     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              | C552     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C395     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C553     |         |           | CC73HCH1H030B | CHIP C 3.0PF B   |              |
| C397     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C554     |         |           | CC73HCH1H240J | CHIP C 24PF J    |              |
| C399     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C555     |         |           | CC73HCH1H010B | CHIP C 1.0PF B   |              |
| C400,401 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C556     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C402     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C557     |         |           | CC73HCH1H050B | CHIP C 5.0PF B   |              |
| C403     |         |           | CC73GCH1H270J | CHIP C 27PF J    |              | C558     |         |           | CC73HCH1H330J | CHIP C 33PF J    |              |
| C404     |         |           | C93-0563-05   | CHIP C 18PF J    |              | C559-562 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C405,406 |         |           | C93-0603-05   | CHIP C 1000PF K  |              | C565-567 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C407     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C568     |         |           | CC73HCH1H101J | CHIP C 100PF J   |              |
| C408     |         |           | CC73GCH1H0R5B | CHIP C 0.5PF B   |              | C569     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C409     |         |           | CC73GCH1H040B | CHIP C 4.0PF B   |              | C570     |         |           | CC73HCH1H010B | CHIP C 1.0PF B   |              |
| C410     |         |           | C93-0563-05   | CHIP C 18PF J    |              | C571     |         |           | CC73HCH1H180J | CHIP C 18PF J    |              |
| C412     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C572     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C413     |         |           | C93-0552-05   | CHIP C 2.0PF C   |              | C573     |         |           | CC73HCH1H040B | CHIP C 4.0PF B   |              |
| C415     |         |           | C93-0564-05   | CHIP C 22PF J    |              | C574     |         |           | CC73HCH1H1R5B | CHIP C 1.5PF B   |              |
| C416     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C575     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C417     |         |           | CC73GCH1H0R5B | CHIP C 0.5PF B   |              | C576     |         |           | CC73HCH1H180J | CHIP C 18PF J    |              |
| C418     |         |           | CC73GCH1H040B | CHIP C 4.0PF B   |              | C577     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C420     |         |           | C93-0554-05   | CHIP C 4.0PF C   |              | C578     |         |           | CC73HCH1H390J | CHIP C 39PF J    |              |
| C421     |         |           | C93-0563-05   | CHIP C 18PF J    |              | C579     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C422     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C581     |         |           | CC73HCH1H330J | CHIP C 33PF J    |              |
| C502     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C582     |         |           | CC73HCH1H010B | CHIP C 1.0PF B   |              |
| C503     |         |           | CC73HCH1H271J | CHIP C 270PF J   |              | C583     |         |           | CC73HCH1H040B | CHIP C 4.0PF B   |              |
| C504     |         |           | CC73HCH1H560J | CHIP C 56PF J    |              | C584-587 |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C505     |         |           | CC73HCH1H680J | CHIP C 68PF J    |              | C702,703 |         |           | CK73HB1A473K  | CHIP C 0.047UF K |              |
| C506     |         |           | CC73HCH1H470J | CHIP C 47PF J    |              | C713     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C507     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C718-720 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C508,509 |         |           | CK73HB1A105K  | CHIP C 1.0UF K   |              | C722     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C510     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C724     |         |           | CK73FB1A106K  | CHIP C 10UF K    |              |
| C511     |         |           | CK73FB1A106K  | CHIP C 10UF K    |              | C725     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C513     |         |           | CC73HCH1H331J | CHIP C 330PF J   |              | C726     |         |           | CK73HB1A393K  | CHIP C 0.039UF K | K,M2,M3      |
| C514,515 |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              | C726     |         |           | CK73HB1A683K  | CHIP C 0.068UF K | M4           |
| C516     |         |           | CC73HCH1H331J | CHIP C 330PF J   |              | C727     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C517     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              | C728     |         |           | CK73GB0J225K  | CHIP C 2.2UF K   |              |
| C518     |         |           | CC73HCH1H101J | CHIP C 100PF J   |              | C729     |         |           | CK73FB1A106K  | CHIP C 10UF K    |              |
| C519     |         |           | CK73FB1A106K  | CHIP C 10UF K    |              | C731     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              |
| C520     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C732     |         |           | CK73HB1H102K  | CHIP C 1000PF K  | K,M2,M3      |
| C521     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C732     |         |           | CK73HB1H681K  | CHIP C 680PF K   | M4           |
| C522     |         |           | CC73HCH1H270J | CHIP C 27PF J    |              | C733     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C523     |         |           | CK73HB1E562K  | CHIP C 5600PF K  |              | C734     |         |           | CK73HB1A393K  | CHIP C 0.039UF K | M4           |
| C524     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              | C734     |         |           | CK73HB1C223K  | CHIP C 0.022UF K | K,M2,M3      |
| C525     |         |           | CK73HB1A224K  | CHIP C 0.22UF K  |              | C735     |         |           | CC73HCH1H680J | CHIP C 68PF J    |              |
| C527     |         |           | CC73HCH1H050B | CHIP C 5.0PF B   |              | C736     |         |           | CK73FB1A106K  | CHIP C 10UF K    |              |
| C528     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |              | C737     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C530     |         |           | CK73HB1E223K  | CHIP C 0.022UF K |              | C738     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C533     |         |           | CC73HCH1H060B | CHIP C 6.0PF B   |              | C739     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |
| C534     |         |           | CK73HB1A393K  | CHIP C 0.039UF K |              | C740     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |              |
| C535     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              | C742     |         |           | CK73HB1H821K  | CHIP C 820PF K   |              |
| C537     |         |           | CC73HCH1H200J | CHIP C 20PF J    |              | C743     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |              |

## PARTS LIST

### TX-RX UNIT (X57-8130-XX)

| Ref. No. | Address | New parts | Parts No.     | Description      | Destination | Ref. No. | Address | New parts | Parts No.     | Description                      | Destination |
|----------|---------|-----------|---------------|------------------|-------------|----------|---------|-----------|---------------|----------------------------------|-------------|
| C744     |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | C828     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C745     |         |           | CC73HCH1H390J | CHIP C 39PF J    |             | C829     |         |           | CK73HB1H103K  | CHIP C 0.010UF K                 |             |
| C746     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | C830     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C747     |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | C831     |         |           | CE32CL1C470M  | ELECTRO 47UF 16WV                |             |
| C748     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | C832     |         |           | CK73HB1E104K  | CHIP C 0.10UF K                  |             |
| C749     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |             | C833-835 |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C750     |         |           | CC73HCH1H151J | CHIP C 150PF J   |             | C836     |         |           | C90-4129-05   | ELECTRO 330UF 25WV               |             |
| C751     |         |           | CK73GB1A105K  | CHIP C 1.0UF K   |             | C837     |         |           | CK73HB1H103K  | CHIP C 0.010UF K                 |             |
| C752     |         |           | CK73HB1H392K  | CHIP C 3900PF K  |             | C838     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C753     |         |           | CK73HB1E472K  | CHIP C 4700PF K  |             | C839     |         |           | C90-4129-05   | ELECTRO 330UF 25WV               |             |
| C754     |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | C840     |         |           | CK73HB1E104K  | CHIP C 0.10UF K                  |             |
| C757,758 |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | C844     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C761     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | C847     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C763     |         |           | CC73HCH1H030B | CHIP C 3.0PF B   |             | C848-851 |         |           | CK73FB1A106K  | CHIP C 10UF K                    |             |
| C764     |         |           | CC73HCH1H050B | CHIP C 5.0PF B   |             | C853,854 |         |           | CK73FB0J226M  | CHIP C 22UF M                    |             |
| C765     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | C901-903 |         |           | CK73HB1A104K  | CHIP C 0.10UF K                  |             |
| C766     |         |           | CC73HCH1H050B | CHIP C 5.0PF B   |             | C910     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C767     |         |           | CC73HCH1H030B | CHIP C 3.0PF B   |             | C912     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C768     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | C915     |         |           | CC73HCH1H101J | CHIP C 100PF J                   |             |
| C769     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | C916-918 |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C771     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | C920     |         |           | CK73HB1H471K  | CHIP C 470PF K                   |             |
| C772     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | C921     |         |           | CK73GB1A105K  | CHIP C 1.0UF K                   |             |
| C774     |         |           | CK73HB1H182K  | CHIP C 1800PF K  |             | C922     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C775     |         |           | CK73HB1H392K  | CHIP C 3900PF K  |             | C924     |         |           | CK73HB1A104K  | CHIP C 0.10UF K                  |             |
| C776     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | C926,927 |         |           | CC73HCH1H101J | CHIP C 100PF J                   |             |
| C777     |         |           | CK73HB1A474K  | CHIP C 0.47UF K  |             | C928     |         |           | CK73HB1H681K  | CHIP C 680PF K                   |             |
| C778     |         |           | CK73GB1A105K  | CHIP C 1.0UF K   |             | C929     |         |           | CK73HB1H102K  | CHIP C 1000PF K                  |             |
| C779     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | TC1      |         |           | C05-0245-05   | CERAMIC TRIMMER CAPACITOR (10PF) |             |
| C781     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | TC2      |         |           | C05-0399-05   | CERAMIC TRIMMER CAPACITOR (6PF)  |             |
| C782     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | CN501    |         |           | E23-1325-05   | TERMINAL                         |             |
| C783     |         |           | CK73GB1A105K  | CHIP C 1.0UF K   |             | CN702    |         | *         | E40-6898-05   | FLAT CABLE CONNECTOR (22P)       |             |
| C784,785 |         |           | CK73HB1H103K  | CHIP C 0.010UF K |             | CN901    |         | *         | E40-6897-05   | FLAT CABLE CONNECTOR (22P)       |             |
| C786     |         |           | CK73HB1A393K  | CHIP C 0.039UF K |             | J701     | 2B      |           | E11-0425-05   | 3.5D PHONE JACK (EXT SP)         |             |
| C787     |         |           | CK73HB1E103K  | CHIP C 0.010UF K |             | J901     |         |           | E58-0535-05   | MODULAR JACK (MIC)               |             |
| C788     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |             | F701     |         |           | F53-0327-15   | FUSE (4A)                        |             |
| C789,790 |         |           | CK73HB1C333K  | CHIP C 0.033UF K |             | CD501    |         |           | L79-1914-05   | TUNING COIL                      |             |
| C793     |         |           | CK73HB1C183K  | CHIP C 0.018UF K |             | CF501    |         |           | L72-1034-05   | CERAMIC FILTER (450KHZ/WIDE)     |             |
| C794     |         |           | CK73HB1C822K  | CHIP C 8200PF K  |             | CF502    |         |           | L72-0999-05   | CERAMIC FILTER (450KHZ/NARROW)   |             |
| C795     |         |           | CK73HB1A224K  | CHIP C 0.22UF K  |             | L1       |         | *         | L92-0622-15   | CHIP FERRITE                     |             |
| C796     |         |           | CK73HB1H122K  | CHIP C 1200PF K  |             | L2       |         |           | L41-1005-08   | SMALL FIXED INDUCTOR (10UH)      |             |
| C797     |         |           | CC73HCH1H390J | CHIP C 39PF J    |             | L3       |         | *         | L92-0621-15   | CHIP FERRITE                     |             |
| C798     |         |           | CK73HB1A224K  | CHIP C 0.22UF K  |             | L5       |         | *         | L92-0620-15   | CHIP FERRITE                     |             |
| C799     |         |           | CK73GB0J475K  | CHIP C 4.7UF K   |             | L6-9     |         |           | L40-2785-92   | SMALL FIXED INDUCTOR (270NH)     |             |
| C800,801 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | L10      |         | *         | L92-0622-15   | CHIP FERRITE                     |             |
| C802     |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | L11      |         |           | L41-4778-14   | SMALL FIXED INDUCTOR (47NH)      |             |
| C804     |         |           | CK73HB1H103K  | CHIP C 0.010UF K |             | L12      |         |           | L41-3378-14   | SMALL FIXED INDUCTOR (33NH)      |             |
| C805     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | L13-16   |         |           | L40-2702-86   | SMALL FIXED INDUCTOR (27UH)      |             |
| C806,807 |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | L17      |         | *         | L92-0622-15   | CHIP FERRITE                     |             |
| C808,809 |         |           | CK73GB1A105K  | CHIP C 1.0UF K   |             | L18      |         |           | L40-3375-71   | SMALL FIXED INDUCTOR (33NH)      |             |
| C810,811 |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | L19      |         | *         | L92-0622-15   | CHIP FERRITE                     |             |
| C814     |         |           | CK73FB1A106K  | CHIP C 10UF K    |             | L20      |         |           | L40-1085-71   | SMALL FIXED INDUCTOR (100NH)     |             |
| C815     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | L21      |         |           | L40-3975-71   | SMALL FIXED INDUCTOR (39NH)      |             |
| C816     |         |           | CK73HB1A224K  | CHIP C 0.22UF K  |             | L302     |         |           | L40-2275-71   | SMALL FIXED INDUCTOR (22NH)      |             |
| C817     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | L305     |         |           | L40-1075-71   | SMALL FIXED INDUCTOR (10NH)      |             |
| C818     |         |           | CK73FB0J226M  | CHIP C 22UF M    |             | L308     |         |           | L40-8265-92   | SMALL FIXED INDUCTOR (8.2NH)     |             |
| C820-823 |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | L309     |         |           | L40-1285-92   | SMALL FIXED INDUCTOR (120NH)     |             |
| C824     |         |           | CK73HB1E104K  | CHIP C 0.10UF K  |             | L310     |         |           | L40-4775-92   | SMALL FIXED INDUCTOR (47NH)      |             |
| C825     |         |           | CK73FB0J226M  | CHIP C 22UF M    |             | L312-314 |         |           | L92-0179-05   | CHIP FERRITE                     |             |
| C826     |         |           | CK73HB1H102K  | CHIP C 1000PF K  |             | L315,316 |         |           | L34-4902-05   | AIR-CORE COIL (9.5T)             |             |
| C827     |         |           | CK73FB1E475K  | CHIP C 4.7UF K   |             |          |         |           |               |                                  |             |

## PARTS LIST

TX-RX UNIT (X57-8130-XX)

| Ref. No. | Address | New parts | Parts No.    | Description                   | Destination | Ref. No. | Address | New parts | Parts No.    | Description         | Destination |
|----------|---------|-----------|--------------|-------------------------------|-------------|----------|---------|-----------|--------------|---------------------|-------------|
| L317     |         |           | L34-1039-05  | AIR-CORE COIL (1.5T)          |             | R336     |         |           | RK73HB1J470J | CHIP R 47 J 1/16W   |             |
| L318-320 |         |           | L34-4903-05  | AIR-CORE COIL (5T)            |             | R337     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             |
| L502-504 |         |           | L40-3381-86  | SMALL FIXED INDUCTOR (0.33UH) |             | R338     |         |           | RK73HB1J154J | CHIP R 150K J 1/16W |             |
| L505     |         |           | L40-3391-86  | SMALL FIXED INDUCTOR (3.3UH)  |             | R339     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| L506,507 |         |           | L41-3998-14  | SMALL FIXED INDUCTOR (390NH)  |             | R340     |         |           | RK73HB1J223J | CHIP R 22K J 1/16W  |             |
| L508     |         |           | L40-4775-71  | SMALL FIXED INDUCTOR (47NH)   |             | R341     |         |           | RK73HB1J154J | CHIP R 150K J 1/16W |             |
| L510,511 |         |           | L41-6878-14  | SMALL FIXED INDUCTOR (68NH)   |             | R342     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             |
| L512     |         |           | L41-3385-14  | SMALL FIXED INDUCTOR (330NH)  |             | R344,345 |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             |
| L514,515 |         |           | L41-6878-14  | SMALL FIXED INDUCTOR (68NH)   |             | R346     |         |           | RK73EB2E221J | CHIP R 220 J 1/4W   |             |
| L701,702 |         | *         | L92-0622-15  | CHIP FERRITE                  |             | R347     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             |
| L901     |         | *         | L92-0621-15  | CHIP FERRITE                  |             | R348     |         |           | RK73HB1J153J | CHIP R 15K J 1/16W  |             |
| X1       |         |           | L77-1944-05  | TCXO (16.8MHZ)                |             | R349     |         |           | RK73EB2E221J | CHIP R 220 J 1/4W   |             |
| X701     |         | *         | L78-1427-05  | RESONATOR (8.00MHZ)           |             | R350     |         |           | RK73HB1J100J | CHIP R 10 J 1/16W   |             |
| XF501    |         |           | L71-0655-05  | MCF (49.95MHZ)                |             | R351     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| CP901    |         |           | RK75GB1J102J | CHIP-COM 1.0K J 1/16W         |             | R377,378 |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R1       |         |           | RK73HB1J104J | CHIP R 100K J 1/16W           |             | R380     | 2B      |           | R92-1061-05  | JUMPER REST 0 OHM   |             |
| R2-4     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R501     |         |           | RK73HB1J124J | CHIP R 120K J 1/16W |             |
| R5       |         |           | RK73HB1J103J | CHIP R 10K J 1/16W            |             | R502     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             |
| R6       |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W           |             | R503     |         |           | RK73HB1J682J | CHIP R 6.8K J 1/16W |             |
| R7       |         |           | RK73HB1J100J | CHIP R 10 J 1/16W             |             | R504-507 |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R8       |         |           | RK73HB1J104J | CHIP R 100K J 1/16W           |             | R508     |         |           | RK73HB1J682J | CHIP R 6.8K J 1/16W |             |
| R9       |         |           | RK73HB1J471J | CHIP R 470 J 1/16W            |             | R509     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R10      |         |           | RK73HB1J822J | CHIP R 8.2K J 1/16W           |             | R510     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R11      |         |           | RK73HB1J103J | CHIP R 10K J 1/16W            |             | R511     |         |           | RK73HB1J223J | CHIP R 22K J 1/16W  |             |
| R12      |         |           | RK73HB1J562J | CHIP R 5.6K J 1/16W           |             | R512     |         |           | RK73HB1J564J | CHIP R 560K J 1/16W |             |
| R13      |         |           | RK73HB1J103J | CHIP R 10K J 1/16W            |             | R514,515 |         |           | RK73HB1J472J | CHIP R 4.7K J 1/16W |             |
| R15      |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R517     |         |           | RK73HB1J182J | CHIP R 1.8K J 1/16W |             |
| R16      |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W            |             | R519     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R17      |         |           | RK73HB1J471J | CHIP R 470 J 1/16W            |             | R520     |         |           | RK73HB1J474J | CHIP R 470K J 1/16W |             |
| R18      |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W            |             | R521     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R19      |         |           | RK73HB1J272J | CHIP R 2.7K J 1/16W           |             | R522     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             |
| R20      |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R523     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R21      |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W           |             | R524     |         |           | RK73HB1J394J | CHIP R 390K J 1/16W |             |
| R22      |         |           | RK73HB1J223J | CHIP R 22K J 1/16W            |             | R525     |         |           | RK73HB1J271J | CHIP R 270 J 1/16W  |             |
| R23      |         |           | RK73HB1J103J | CHIP R 10K J 1/16W            |             | R526     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R24      |         |           | RK73HB1J104J | CHIP R 100K J 1/16W           |             | R527     |         |           | RK73HB1J474J | CHIP R 470K J 1/16W |             |
| R25-27   |         |           | RK73HB1J473J | CHIP R 47K J 1/16W            |             | R528     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R28      |         |           | RK73HB1J221J | CHIP R 220 J 1/16W            |             | R529     |         |           | RK73HB1J394J | CHIP R 390K J 1/16W |             |
| R29      |         |           | RK73HB1J471J | CHIP R 470 J 1/16W            |             | R531     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             |
| R30      |         |           | RK73HB1J104J | CHIP R 100K J 1/16W           |             | R532     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R31      |         |           | RK73HB1J472J | CHIP R 4.7K J 1/16W           |             | R534     |         |           | RK73HB1J221J | CHIP R 220 J 1/16W  |             |
| R32      |         |           | RK73HB1J221J | CHIP R 220 J 1/16W            |             | R535     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R33      |         |           | RK73HB1J101J | CHIP R 100 J 1/16W            |             | R536     |         |           | RK73HB1J561J | CHIP R 560 J 1/16W  |             |
| R34      |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R537     |         |           | RK73HB1J474J | CHIP R 470K J 1/16W |             |
| R35      |         |           | RK73HB1J124J | CHIP R 120K J 1/16W           |             | R538     |         |           | RK73HB1J224J | CHIP R 220K J 1/16W |             |
| R37      |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W            |             | R539     |         |           | RK73HB1J181J | CHIP R 180 J 1/16W  |             |
| R38      |         |           | RK73HB1J101J | CHIP R 100 J 1/16W            |             | R540     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R40      |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R541     |         |           | RK73HB1J333J | CHIP R 33K J 1/16W  |             |
| R41      |         |           | RK73HB1J103J | CHIP R 10K J 1/16W            |             | R542     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R42      |         |           | RK73HB1J822J | CHIP R 8.2K J 1/16W           |             | R543,544 |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             |
| R43-45   |         |           | RK73HB1J101J | CHIP R 100 J 1/16W            |             | R545     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R46      |         |           | RK73HB1J222J | CHIP R 2.2K J 1/16W           |             | R546     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             |
| R304     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W           |             | R547     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R307     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W            |             | R549     |         |           | RK73HB1J151J | CHIP R 150 J 1/16W  |             |
| R312     |         |           | RK73HB1J472J | CHIP R 4.7K J 1/16W           |             | R550     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R314     |         |           | RK73HB1J223J | CHIP R 22K J 1/16W            |             | R551     |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             |
| R326     |         |           | RK73HB1J123J | CHIP R 12K J 1/16W            |             | R552     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R331,332 |         |           | RK73HB1J100J | CHIP R 10 J 1/16W             |             | R553     |         |           | RK73HB1J273J | CHIP R 27K J 1/16W  |             |
| R333,334 |         |           | RK73HB1J101J | CHIP R 100 J 1/16W            |             | R554,555 |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             |
|          |         |           |              |                               |             | R556     |         |           | RK73FB2B000J | CHIP R 0.0 J 1/8W   |             |

## PARTS LIST

### TX-RX UNIT (X57-8130-XX)

| Ref. No. | Address | New parts | Parts No.    | Description         | Destination | Ref. No. | Address | New parts | Parts No.    | Description         | Destination |
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| R557     |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             | R771     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R558     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             | R772     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R559     |         |           | RK73HB1J273J | CHIP R 27K J 1/16W  |             | R773     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R560     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R774     |         |           | RK73HB1J472J | CHIP R 4.7K J 1/16W |             |
| R701     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R775     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R702,703 |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             | R776     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             |
| R704,705 |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R777,778 |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R706     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R779-781 |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R707     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R782     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R708     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R783     |         |           | RK73HB1J393J | CHIP R 39K J 1/16W  |             |
| R710,711 |         |           | RK73GH2A153D | CHIP R 15K D 1/10W  |             | R784     |         |           | RK73HB1J153J | CHIP R 15K J 1/16W  |             |
| R713     |         |           | RK73HB1J821J | CHIP R 820 J 1/16W  |             | R785     |         |           | RK73HB1J123J | CHIP R 12K J 1/16W  |             |
| R714     |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             | R786     |         |           | RK73HB1J154J | CHIP R 150K J 1/16W |             |
| R715     |         |           | RK73HB1J681J | CHIP R 680 J 1/16W  |             | R787     |         |           | RK73HB1J124J | CHIP R 120K J 1/16W |             |
| R716     |         |           | RK73HB1J101J | CHIP R 100 J 1/16W  |             | R789     |         |           | RK73HB1J224J | CHIP R 220K J 1/16W |             |
| R717     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  | M4          | R790     |         |           | RK73HB1J123J | CHIP R 12K J 1/16W  |             |
| R717     |         |           | RK73HB1J183J | CHIP R 18K J 1/16W  | K,M2,M3     | R791     |         |           | RK73GH2A124D | CHIP R 120K D 1/10W |             |
| R718     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             | R792     |         |           | RK73GH2A562D | CHIP R 5.6K D 1/10W |             |
| R719     |         |           | RK73HB1J122J | CHIP R 1.2K J 1/16W |             | R793     |         |           | RK73GH2A913D | CHIP R 91K D 1/10W  |             |
| R721     |         |           | RK73HB1J105J | CHIP R 1.0M J 1/16W | M4          | R794     |         |           | RK73HB1J124J | CHIP R 120K J 1/16W |             |
| R721     |         |           | RK73HB1J754J | CHIP R 750K J 1/16W | K,M2,M3     | R795     |         |           | RK73GH2A562D | CHIP R 5.6K D 1/10W |             |
| R722     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             | R796     |         |           | RK73HB1J183J | CHIP R 18K J 1/16W  |             |
| R723     |         |           | RK73HB1J912J | CHIP R 9.1K J 1/16W |             | R797     |         |           | RK73HB1J272J | CHIP R 2.7K J 1/16W |             |
| R724     |         |           | RK73HB1J682J | CHIP R 6.8K J 1/16W |             | R799     |         |           | RK73HB1J474J | CHIP R 470K J 1/16W |             |
| R725     |         | *         | RK73HB1J244J | CHIP R 240K J 1/16W |             | R800     |         |           | RK73HB1J562J | CHIP R 5.6K J 1/16W |             |
| R726     |         |           | RK73HB1J183J | CHIP R 18K J 1/16W  |             | R801     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R727     |         |           | RK73HB1J334J | CHIP R 330K J 1/16W |             | R802     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R728     |         |           | RK73HB1J823J | CHIP R 82K J 1/16W  |             | R803     |         |           | RK73HB1J392J | CHIP R 3.9K J 1/16W |             |
| R729     |         |           | RK73HB1J124J | CHIP R 120K J 1/16W |             | R804     |         |           | RK73HB1J123J | CHIP R 12K J 1/16W  |             |
| R730     |         |           | RK73HB1J823J | CHIP R 82K J 1/16W  |             | R805     |         |           | RK73HB1J562J | CHIP R 5.6K J 1/16W |             |
| R733     |         |           | RK73HB1J684J | CHIP R 680K J 1/16W |             | R806     |         |           | RK73HB1J272J | CHIP R 2.7K J 1/16W |             |
| R734     |         |           | RK73HB1J224J | CHIP R 220K J 1/16W |             | R807     |         |           | RK73HB1J105J | CHIP R 1.0M J 1/16W |             |
| R735     |         |           | RK73HB1J274J | CHIP R 270K J 1/16W |             | R808     |         |           | RK73HB1J153J | CHIP R 15K J 1/16W  |             |
| R736,737 |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             | R809     |         |           | RK73HB1J471J | CHIP R 470 J 1/16W  |             |
| R738     |         |           | RK73HB1J683J | CHIP R 68K J 1/16W  |             | R810     |         |           | RK73HB1J153J | CHIP R 15K J 1/16W  |             |
| R739     |         |           | RK73HB1J223J | CHIP R 22K J 1/16W  |             | R811     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R740     |         |           | RK73HB1J683J | CHIP R 68K J 1/16W  |             | R812     |         |           | RK73HB1J222J | CHIP R 2.2K J 1/16W |             |
| R741     |         |           | RK73HB1J154J | CHIP R 150K J 1/16W |             | R813     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R742     |         |           | RK73HB1J124J | CHIP R 120K J 1/16W |             | R814     |         |           | RK73HB1J152J | CHIP R 1.5K J 1/16W |             |
| R743-745 |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R815     |         |           | RK73HB1J472J | CHIP R 4.7K J 1/16W |             |
| R746     |         |           | RK73HB1J823J | CHIP R 82K J 1/16W  |             | R816,817 |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R747     |         |           | RK73HB1J104J | CHIP R 100K J 1/16W |             | R818     |         |           | RK73HB1J683J | CHIP R 68K J 1/16W  |             |
| R748     |         |           | RK73HB1J223J | CHIP R 22K J 1/16W  |             | R819     |         |           | RK73HB1J123J | CHIP R 12K J 1/16W  |             |
| R749     |         |           | RK73HB1J562J | CHIP R 5.6K J 1/16W |             | R820     |         |           | RK73HB1J221J | CHIP R 220 J 1/16W  |             |
| R750,751 |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R821     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R752-755 |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             | R822     |         |           | RK73HB1J334J | CHIP R 330K J 1/16W |             |
| R756     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             | R823     |         |           | RK73HB1J391J | CHIP R 390 J 1/16W  |             |
| R757     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             | R824     |         |           | RK73HB1J474J | CHIP R 470K J 1/16W |             |
| R758     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R825     |         |           | RK73HB1J394J | CHIP R 390K J 1/16W |             |
| R759     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R826     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |
| R760,761 |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             | R827     |         |           | RK73HB1J334J | CHIP R 330K J 1/16W |             |
| R762     |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             | R828,829 |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             |
| R763     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R830-833 |         |           | RK73FB2B000J | CHIP R 0.0 J 1/8W   |             |
| R764     |         |           | RK73GB2A000J | CHIP R 0.0 J 1/10W  |             | R834     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             |
| R765     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R835     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  | K           |
| R766-768 |         |           | RK73GB2A000J | CHIP R 0.0 J 1/10W  | K           | R836     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  | M2          |
| R767,768 |         |           | RK73GB2A000J | CHIP R 0.0 J 1/10W  | M4          | R837     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  | M3          |
| R768     |         |           | RK73GB2A000J | CHIP R 0.0 J 1/10W  | M3          | R838     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  | M4          |
| R769     |         |           | RK73HB1J102J | CHIP R 1.0K J 1/16W |             | R841,842 |         |           | RK73HB1J103J | CHIP R 10K J 1/16W  |             |
| R770     |         |           | RK73HB1J000J | CHIP R 0.0 J 1/16W  |             | R843     |         |           | RK73HB1J473J | CHIP R 47K J 1/16W  |             |



## PARTS LIST

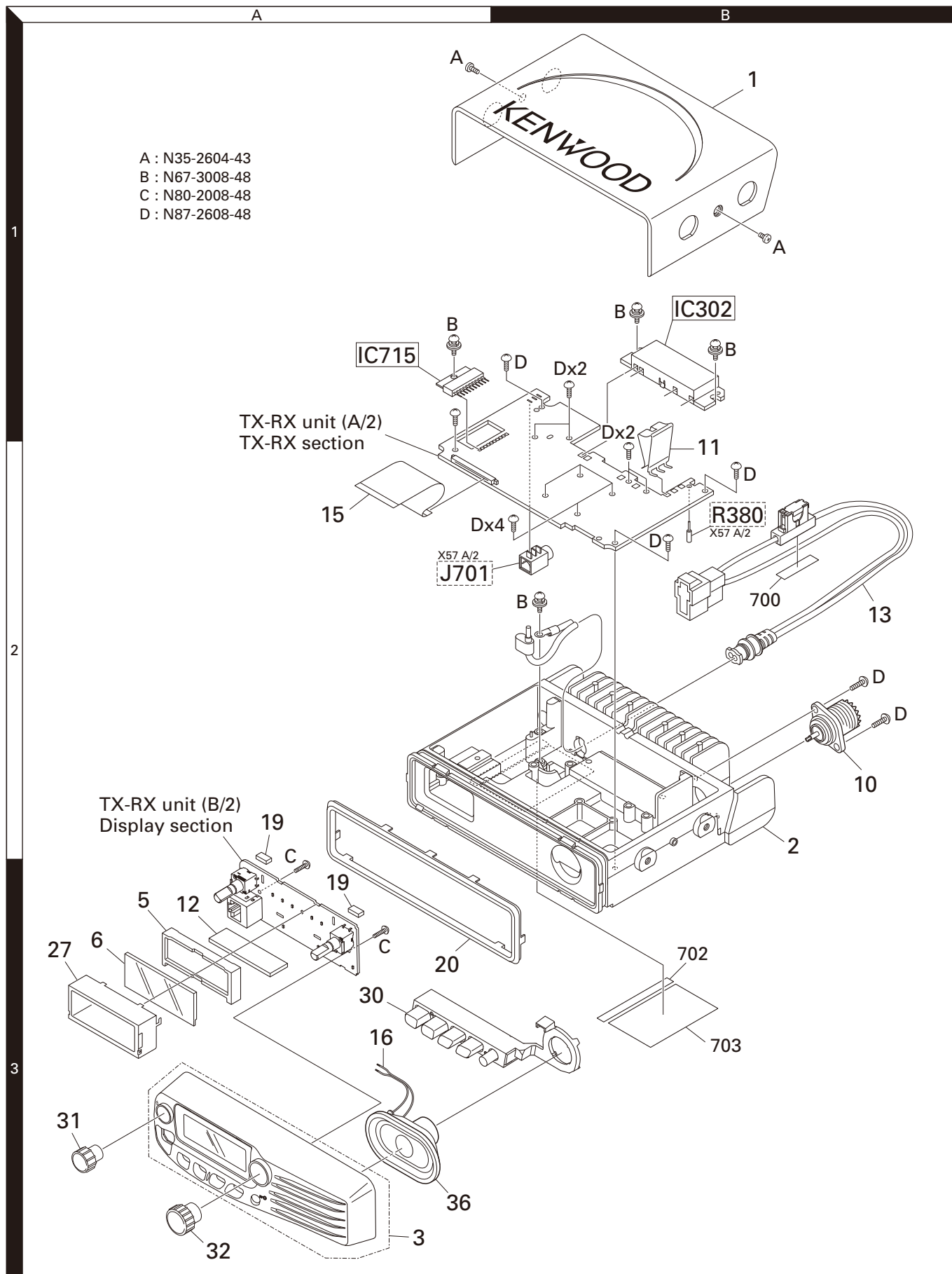
TX-RX UNIT (X57-8130-XX)

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| R844     |         |           | RK73HB1J103J  | CHIP R 10K J 1/16W         |             | IC710     |         |           | XC6209B502P-G  | MOS-IC             |             |
| R901     |         |           | RK73HB1J000J  | CHIP R 0.0 J 1/16W         |             | IC711     |         | *         | TA7808F-NQ     | ANALOGUE IC        |             |
| R902,903 |         |           | RK73HB1J472J  | CHIP R 4.7K J 1/16W        |             | IC712     |         |           | XC61CN4002MR   | MOS-IC             |             |
| R904-906 |         |           | RK73HB1J000J  | CHIP R 0.0 J 1/16W         |             | IC713     |         |           | TA7805F-NQ     | MOS-IC             |             |
| R908     |         |           | RK73HB1J101J  | CHIP R 100 J 1/16W         |             | IC714     |         | *         | XC61CN3202MR   | MOS-IC             |             |
| R909     |         |           | RK73HB1J102J  | CHIP R 1.0K J 1/16W        |             | IC715     | 1A      |           | LA4600         | BI-POLAR IC        |             |
| R910-912 |         |           | RK73HB1J103J  | CHIP R 10K J 1/16W         |             | IC901     |         |           | PT6554LQ       | MOS-IC             |             |
| R913     |         |           | RK73HB1J563J  | CHIP R 56K J 1/16W         |             | Q1        |         |           | 2SA1832(GR)F   | TRANSISTOR         |             |
| R914     |         |           | RK73HB1J102J  | CHIP R 1.0K J 1/16W        |             | Q2        |         |           | 2SC4738(GR)F   | TRANSISTOR         |             |
| R915     |         |           | RK73HB1J152J  | CHIP R 1.5K J 1/16W        |             | Q3        |         |           | 2SC4649(N,P)   | TRANSISTOR         |             |
| R916     |         |           | RK73HB1J183J  | CHIP R 18K J 1/16W         |             | Q4        |         |           | MCH3914(7)-H   | FET                |             |
| R917     |         |           | RK73HB1J392J  | CHIP R 3.9K J 1/16W        |             | Q5        |         |           | 2SJ347F        | FET                |             |
| R918     |         |           | RK73HB1J821J  | CHIP R 820 J 1/16W         |             | Q6        |         |           | MCH3914(7)-H   | FET                |             |
| R919     |         |           | RK73HB1J272J  | CHIP R 2.7K J 1/16W        |             | Q7        |         |           | UMC4N          | TRANSISTOR         |             |
| R920     |         |           | RK73HB1J183J  | CHIP R 18K J 1/16W         |             | Q8        |         |           | KTC4075E(Y,GR) | TRANSISTOR         |             |
| R921     |         |           | RK73HB1J104J  | CHIP R 100K J 1/16W        |             | Q9,10     |         |           | 2SC5108(Y)F    | TRANSISTOR         |             |
| R922-924 |         |           | RK73HB1J331J  | CHIP R 330 J 1/16W         |             | Q303      |         |           | RD00HVS1-T113  | FET                |             |
| VR901    |         |           | R31-0662-05   | VARIABLE RESISTOR          |             | Q501      |         |           | KTC4080E-P     | TRANSISTOR         |             |
| D1       |         |           | HZU5ALL       | DIODE                      |             | Q502      |         |           | 2SC4617(S)     | TRANSISTOR         |             |
| D2       |         |           | DA2S101       | DIODE                      |             | Q503      |         |           | KTC4080E-P     | TRANSISTOR         |             |
| D3-6     |         | *         | HVC359        | VARIABLE CAPACITANCE DIODE |             | Q504      |         |           | 3SK318         | FET                |             |
| D7       |         |           | 1SV278F       | VARIABLE CAPACITANCE DIODE |             | Q505      |         |           | 3SK294-FP      | FET                |             |
| D8       |         |           | DA2S101       | DIODE                      |             | Q506      |         |           | 2SK1830F       | FET                |             |
| D9,10    |         |           | HSC277        | DIODE                      |             | Q701-703  |         |           | 2SC4919-S      | TRANSISTOR         |             |
| D301     |         |           | UDZW5.1(B)    | ZENER DIODE                |             | Q704,705  |         |           | 2SK3019        | FET                |             |
| D305     |         |           | DA2S101       | DIODE                      |             | Q706      |         |           | 2SC2412K       | TRANSISTOR         |             |
| D306,307 |         |           | L407CDB       | DIODE (50V/1W)             |             | Q707-709  |         |           | RT1N141U-T111  | TRANSISTOR         |             |
| D309     |         | *         | JDP2S12CR     | DIODE                      |             | Q710,711  |         |           | 2SB1694        | TRANSISTOR         |             |
| D311     |         | *         | JDP2S12CR     | DIODE                      |             | Q712      |         |           | DTC363EU       | DIGITAL TRANSISTOR |             |
| D312     |         |           | RB521S-30     | DIODE                      |             | Q713      |         |           | RT1N141U-T111  | TRANSISTOR         |             |
| D313,314 |         |           | HSB88AS-E     | DIODE                      |             | Q714      |         |           | 2SJ645         | FET                |             |
| D316     |         |           | RB521S-30     | DIODE                      |             | Q715      |         |           | RT1N141U-T111  | TRANSISTOR         |             |
| D501,502 |         |           | MC2858-T111   | DIODE                      |             | Q901      |         |           | RT1P141U-T111  | TRANSISTOR         |             |
| D503     |         |           | HSB88AS-E     | DIODE                      |             | Q902      |         |           | RT1N141U-T111  | TRANSISTOR         |             |
| D504     |         |           | DA2S101       | DIODE                      |             | Q903      |         |           | 2SB1132(Q,R)   | TRANSISTOR         |             |
| D505,506 |         |           | 1SV325F       | VARIABLE CAPACITANCE DIODE |             | Q904      |         |           | UMG3N          | TRANSISTOR         |             |
| D508,509 |         |           | 1SV325F       | VARIABLE CAPACITANCE DIODE |             | TH501     |         |           | NCP18WM474J0S  | THERMISTOR         |             |
| D702     |         |           | MC2850        | DIODE                      |             | TH702,703 |         |           | NCP18WF104J03  | THERMISTOR         |             |
| D704-706 |         |           | MC2850        | DIODE                      |             | S901      |         |           | W02-3704-05    | ENCODER            |             |
| D708     |         |           | DA2S101       | DIODE                      |             |           |         |           |                |                    |             |
| D709     |         |           | 1SS372F       | DIODE                      |             |           |         |           |                |                    |             |
| D710     |         |           | DA2S101       | DIODE                      |             |           |         |           |                |                    |             |
| D711     |         |           | 1SS372F       | DIODE                      |             |           |         |           |                |                    |             |
| D712     |         |           | UDZW18(B)     | ZENER DIODE                |             |           |         |           |                |                    |             |
| D714     |         |           | Z5W27V        | SURGE ABSORBER             |             |           |         |           |                |                    |             |
| D901     |         |           | 1SS355        | DIODE                      |             |           |         |           |                |                    |             |
| D902     |         |           | UDZW6.2(B)    | ZENER DIODE                |             |           |         |           |                |                    |             |
| IC1      |         |           | MB15A02PFV2E1 | MOS-IC                     |             |           |         |           |                |                    |             |
| IC2      |         |           | UPB1509GV     | BI-POLAR IC                |             |           |         |           |                |                    |             |
| IC302    | 1B      | *         | RA60H1317M231 | MOS-IC (POWER MODULE)      |             |           |         |           |                |                    |             |
| IC303    |         |           | NJM12904RB1   | MOS-IC                     |             |           |         |           |                |                    |             |
| IC501    |         |           | UA31136L      | MOS-IC                     |             |           |         |           |                |                    |             |
| IC703    |         |           | NJM2100V-ZB   | MOS-IC                     |             |           |         |           |                |                    |             |
| IC704    |         |           | NJM12904RB1   | MOS-IC                     |             |           |         |           |                |                    |             |
| IC705    |         |           | M62363FP-F    | MOS-IC                     |             |           |         |           |                |                    |             |
| IC706    |         |           | BA10324AFV    | MOS-IC                     |             |           |         |           |                |                    |             |
| IC707    |         |           | 30622MEP540GU | MICROCONTROLLER IC         |             |           |         |           |                |                    |             |
| IC708    |         |           | EX24064ASAS0A | ROM IC                     |             |           |         |           |                |                    |             |
| IC709    |         |           | BA10324AFV    | MOS-IC                     |             |           |         |           |                |                    |             |

If a part reference number is listed in a shaded box, that part does not come with the PCB.

# TM-281A

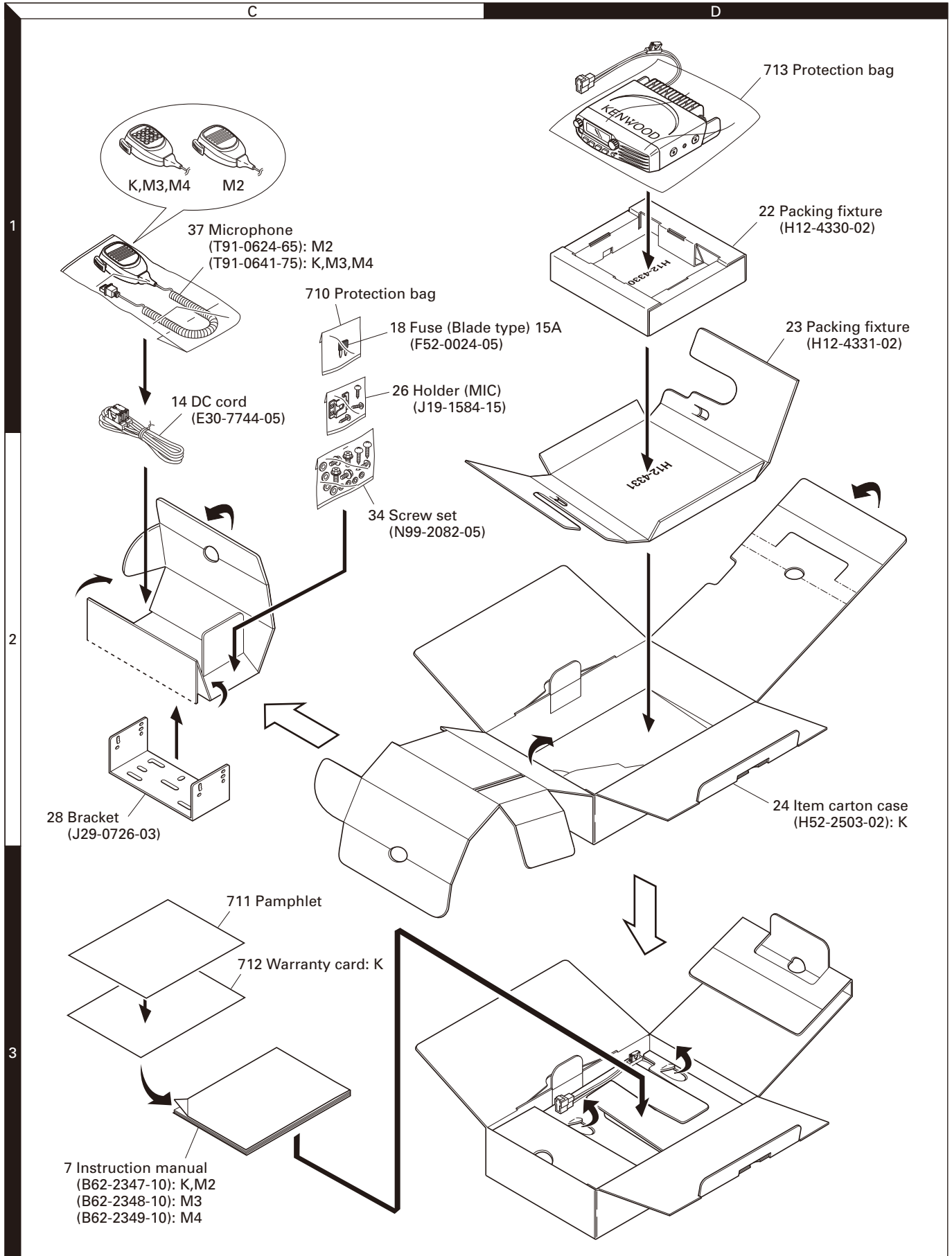
## EXPLODED VIEW



A : N35-2604-43  
 B : N67-3008-48  
 C : N80-2008-48  
 D : N87-2608-48

**18** Parts with the exploded numbers larger than 700 are not supplied.  
 If a part reference number is listed in a box on the exploded view of the PCB, that part does not come with the PCB.  
 These parts must be ordered separately.

## PACKING



Parts with the exploded numbers larger than 700 are not supplied.

## ADJUSTMENT

### Measuring Equipment for Alignment

#### 1. Digital voltmeter (DVM)

Input impedance: High

#### 2. RF voltmeter (RF VM)

Input impedance:  $1M\Omega$  or more, 2pF or less

Voltage range: Full scale=10mV to 300V

Measurable frequency range: Up to 200MHz

#### 3. Frequency counter (f.counter)

Input sensitivity: About 50mV

Frequency range: 10Hz to 1000MHz

#### 4. DC power supply

Voltage: Variable in the range 9 to 17V

Current: 14A or more

#### 5. Power meter

Measurement power: 65W, 25W

Impedance:  $50\Omega$

Measurable frequency: Up to 200MHz

#### 6. AF voltmeter (AF VM)

Input impedance:  $1M\Omega$  or more

Voltage range: Full scale=1mV to 30V

Measurable frequency range: 50Hz to 10kHz

#### 7. AF generator (AG)

Output frequency: 100Hz to 10kHz

Output voltage: 0.5mV to 1V

#### 8. Linear detector

Measurable frequency: Up to 200MHz

#### 9. Spectrum analyzer

Measuring range: 10kHz to 1GHz or more

#### 10. Oscilloscope

High sensitivity with horizontal input terminal

#### 11. Standard signal generator (SSG)

Frequency range: 136 to 174MHz

Output:  $-133\text{dBm}$  ( $0.05\mu\text{V}$ ) to greater than  $-13\text{dBm}$  (50mV)

#### 12. Dummy load (for AF)

$8\Omega$ , about 5W

#### 13. Sweep generator

The sweep generator must be able to sweep the frequency range of 30 to 300MHz.

#### 14. Tracking generator

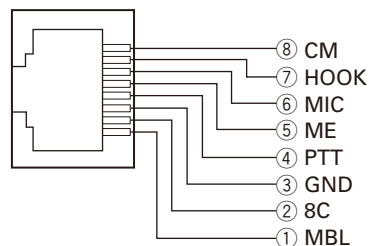
Output voltage: 100mV or more

### Preparation

- Set the controls and switches to the positions listed below unless otherwise specified.

Volume control : Fully counterclockwise

Power switch : OFF



**Microphone socket**  
(as viewed from the front of the transceiver)

- To protect the signal generator, never connect the microphone to the microphone socket when the receiver section is adjusted.
- Before the power cord is connected, make sure the power switch is off.
- Without specification of SSG, standard modulation is applied (MOD: 1kHz, DEV:  $\pm 3\text{kHz}$ )

## ADJUSTMENT

### Adjustment Mode

This mode is used to replace or readjust the EEPROM (IC708). In Adjustment Mode, the transceiver can be adjusted using its panel keys.

#### ■ Items that can be adjusted in Adjustment Mode

- |                            |                        |
|----------------------------|------------------------|
| 1. Frequency Tune          | 8. DTMF Fine Deviation |
| 2. Transmit High Power *1  | 9. Band Pass Tuning *3 |
| 3. Transmit Low Power *1   | 10. Squelch Tight *4   |
| 4. DCS Balance *2          | 11. Squelch Open *4    |
| 5. Max Deviation *2        | 12. S-Meter S1 Level   |
| 6. CTCSS Fine Deviation *2 | 13. S-Meter Full Level |
| 7. DCS Fine Deviation *2   |                        |

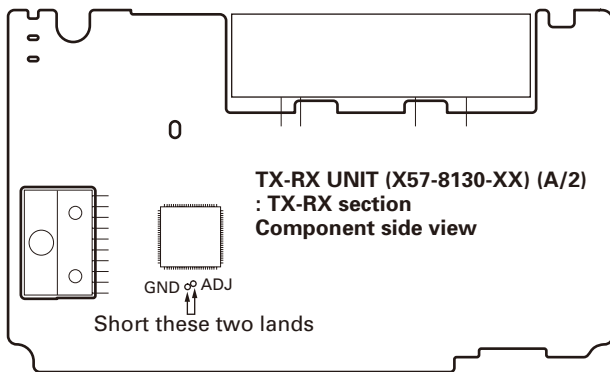
#### Note:

- \*1: Adjusted in 5 points in the transmission operating frequency range.
- \*2: Adjusted in 3 points for the Wide bandwidth in the transmission operating frequency range.  
Adjusted in 1 point for the Narrow bandwidth.
- \*3: Adjusted in 3 points in the reception operating frequency range.
- \*4: Adjusted in 3 points for the Wide bandwidth in the reception operating frequency range.  
Adjusted in 1 point for the Narrow bandwidth.

#### ■ How to Enter Adjustment Mode

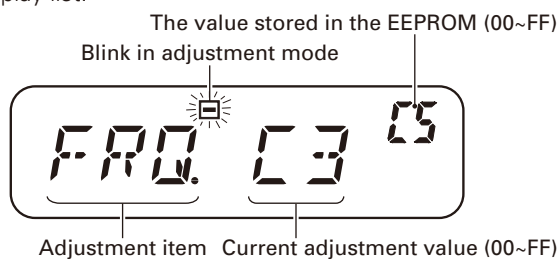
To perform adjustments with the transceiver panel keys, the transceiver must be set to "Adjustment Mode".

While shorting two lands (GND, ADJ) on the component side of the TX-RX unit (A/2) using a pair of tweezers or similar tool, turn the transceiver power ON to enter Adjustment Mode.

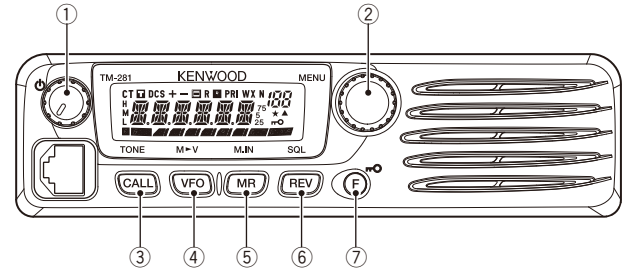


#### ■ LCD Display in Adjustment Mode

Example of Frequency Tune. See "Table 1" for an LCD display list.



#### ■ Panel Key Operation Method in Adjustment Mode



- ① Power switch/Volume control
- ② When the Tuning control is pressed once, the adjustment value display blinks. (Select an adjustment item with the [VFO] or [MR] key before performing the operation. It cannot be performed while transmitting.)  
When the Tuning control is rotated while the adjustment display is blinking, the adjustment value changes. (Adjust transmission items while transmitting.)  
When the Tuning control is pressed again, the adjustment value stops blinking and lights, and the adjustment value is saved in the memory of the transceiver. (For transmission item adjustment, enter receive mode before performing the operation.)
- ③ Changing between adjustment value display and frequency display  
The display changes as follows: Adjustment value display → Transmit frequency display → Receive frequency display → Adjustment value display.  
The frequency for adjustment can be confirmed.
- ④ Moves the adjustment item backward. (If it is operated when a frequency is displayed, the adjustment item display returns.)
- ⑤ Moves the adjustment item forward. (If it is operated when a frequency is displayed, the adjustment item display returns.)
- ⑥ If it is pressed before determining the adjustment value, the adjustment value of the Adjustment item returns to its original value.
- ⑦ Not used in Adjustment Mode.

#### Note:

If Max Power for transmission is low, check the DC cable. If the DC cable connector has poor contact due to rust or stain, a voltage drop may occur frequently and correct transmission power may not be supplied.

In this case, polish the DC cable connector. If the problem still persists, replace the DC cable with a new one.

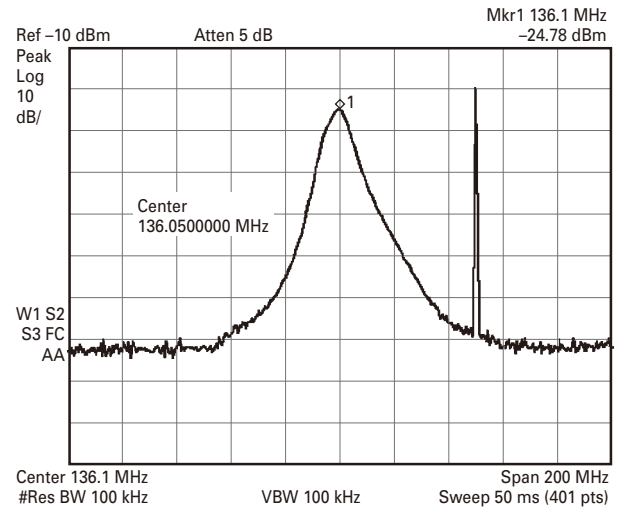
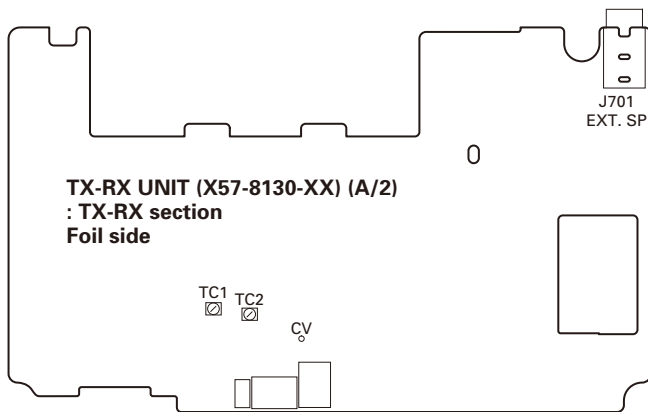
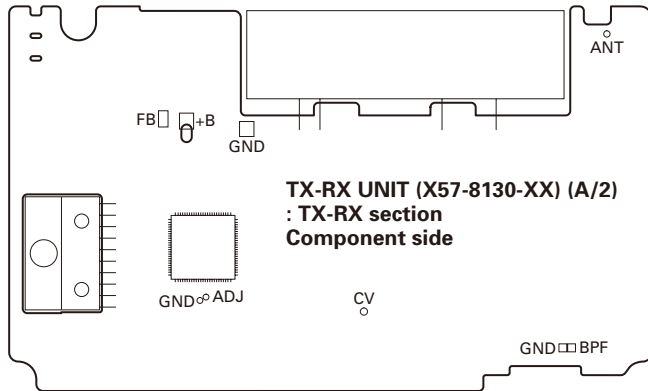
## ADJUSTMENT

| No. | Adjustment Item               | Adjustment Frequency Point | Display      | Note                       | Transmit (MHz) | Receive (MHz) | Signaling      |
|-----|-------------------------------|----------------------------|--------------|----------------------------|----------------|---------------|----------------|
| 1   | Frequency Tune                | Center                     | <i>FPO</i>   |                            | 155.100        | 155.050       |                |
| 2   | TX High Power                 | Low                        | <i>HPL</i>   | "H" icon appear            | 136.100        | 136.050       |                |
|     |                               | Low'                       | <i>HPL I</i> |                            | 142.100        | 142.050       |                |
|     |                               | Center                     | <i>HPC</i>   |                            | 150.100        | 150.050       |                |
|     |                               | High'                      | <i>HPH I</i> |                            | 156.100        | 156.050       |                |
|     |                               | High                       | <i>HPH</i>   |                            | 173.900        | 173.950       |                |
| 3   | TX Low Power                  | Low                        | <i>LPL</i>   | "L" icon appear            | 136.100        | 136.050       |                |
|     |                               | Low'                       | <i>LPL I</i> |                            | 142.100        | 142.050       |                |
|     |                               | Center                     | <i>LPC</i>   |                            | 150.100        | 150.050       |                |
|     |                               | High'                      | <i>LPH I</i> |                            | 156.100        | 156.050       |                |
|     |                               | High                       | <i>LPH</i>   |                            | 173.900        | 173.950       |                |
| 4   | DCS Balance                   | Low                        | <i>BALL</i>  | "DCS" icon appear          | 136.100        | 136.050       | DCS : 023N     |
|     |                               | Center                     | <i>BALC</i>  |                            | 155.100        | 155.050       |                |
|     |                               | High                       | <i>BALH</i>  |                            | 173.900        | 173.950       |                |
| 5   | DCS Balance (Narrow)          | Center                     | <i>BALC</i>  | "DCS" and "N" icon appear  | 155.100        | 155.050       |                |
| 6   | Max Deviation                 | Low                        | <i>MAXL</i>  |                            | 136.100        | 136.050       |                |
|     |                               | Center                     | <i>MAXC</i>  |                            | 155.100        | 155.050       |                |
|     |                               | High                       | <i>MAXH</i>  |                            | 173.900        | 173.950       |                |
| 7   | Max Deviation (Narrow)        | Center                     | <i>MAXC</i>  | "N" icon appear            | 155.100        | 155.050       |                |
| 8   | CTCSS Fine Deviation          | Low                        | <i>DWL</i>   | "CT" icon appear           | 136.100        | 136.050       | CTCSS : 88.5Hz |
|     |                               | Center                     | <i>DWC</i>   |                            | 155.100        | 155.050       |                |
|     |                               | High                       | <i>DWH</i>   |                            | 173.900        | 173.950       |                |
| 9   | CTCSS Fine Deviation (Narrow) | Center                     | <i>DWC</i>   | "CT" and "N" icon appear   | 155.100        | 155.050       |                |
| 10  | DCS Fine Deviation            | Low                        | <i>DWL</i>   | "DCS" icon appear          | 136.100        | 136.050       | DCS : 023N     |
|     |                               | Center                     | <i>DWC</i>   |                            | 155.100        | 155.050       |                |
|     |                               | High                       | <i>DWH</i>   |                            | 173.900        | 173.950       |                |
| 11  | DCS Fine Deviation (Narrow)   | Center                     | <i>DWC</i>   | "DCS" and "N" icons appear | 155.100        | 155.050       |                |
| 12  | DTMF Fine Deviation           | Center                     | <i>DT</i>    |                            | 155.100        | 155.050       | DTMF : 9       |
| 13  | DTMF Fine Deviation (Narrow)  | Center                     | <i>DT</i>    | "N" icon appear            | 155.100        | 155.050       |                |
| 14  | Band Pass Tuning              | Low                        | <i>BPL</i>   | "BUSY" icon appear         | 136.100        | 136.050       |                |
|     |                               | Center                     | <i>BPC</i>   |                            | 155.100        | 155.050       |                |
|     |                               | High                       | <i>BPH</i>   |                            | 173.900        | 173.950       |                |
| 15  | Squelch Tight                 | Low                        | <i>SQTL</i>  |                            | 136.100        | 136.050       |                |
|     |                               | Center                     | <i>SQTC</i>  |                            | 146.100        | 146.050       |                |
|     |                               | High                       | <i>SQTH</i>  |                            | 173.900        | 173.950       |                |
| 16  | Squelch Tight (Narrow)        | Center                     | <i>SQTC</i>  | "N" icon appear            | 146.100        | 146.050       |                |
| 17  | Squelch Open                  | Low                        | <i>SQOL</i>  |                            | 136.100        | 136.050       |                |
|     |                               | Center                     | <i>SQOC</i>  |                            | 146.100        | 146.050       |                |
|     |                               | High                       | <i>SQOH</i>  |                            | 173.900        | 173.950       |                |
| 18  | Squelch Open (Narrow)         | Center                     | <i>SQOC</i>  | "N" icon appear            | 146.100        | 146.050       |                |
| 19  | S-Meter S1 Level              | Center                     | <i>S 1</i>   |                            | 146.100        | 146.050       |                |
| 20  | S-Meter Full Level            | Center                     | <i>S 7</i>   |                            | 146.100        | 146.050       |                |

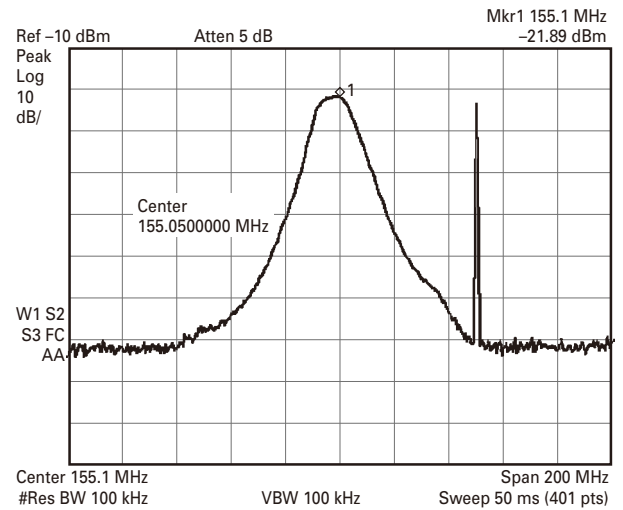
**Table 1 Adjustment items, display and test frequency list**

## ADJUSTMENT

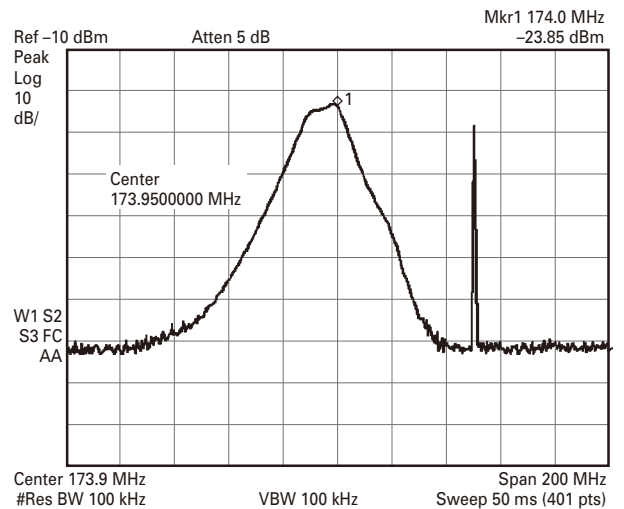
### Adjustment Points



**Fig. 1**




**Fig. 2**



**Fig. 3**

## ADJUSTMENT

### Common Section


| Item   | Condition  | Measurement    |             |          | Adjustment  |       |   | Specifications / Remarks |
|--|--|----------------|-------------|----------|-------------|-------|---|--------------------------|
|  |  | Test-equipment | Unit        | Terminal | Unit        | Parts | Method  |                          |
| 1. Setting                                     | 1) Power supply voltage<br>DC power supply terminal : 13.8V  |                |             |          |             |       |   |                          |
| 2. All LCD segments light check and full reset | <p>1) All LCD segments light check<br/>Turn the transceiver power ON by pressing the power switch while [F] key is pressed. While the [F] key is pressed, all LCD segments light.</p> <p>2) Full reset<br/>After confirming that all LCD segments have lighted described in the step 1 above, release the [F] key, "FL.RST?" appears on the display. Press the [F] key, "SURE ?" appears on the display. Press the [F] key again to perform the full reset.</p> <p><b>Note:</b><br/>When you do not want to remove data such as memory channel data, save the data using the MCP-1A (Memory control program) before performing the full reset, then write the data to the transceiver after performing the adjustment.</p> |                |             |          |             |       | <p>Confirm that all LCD segments light.</p>  |                          |
| 3. VCO Lock voltage RX                         | 1) Frequency: 173.950MHz   | DVM            | TX-RX (A/2) | CV       | TX-RX (A/2) | TC2   | 5.5V  | ±0.1V                    |
|  | 2) Frequency: 136.050MHz   |                |             |          |             |       | Check   | 0.5V or more             |
| TX   | 3) Frequency: 173.900MHz<br>4) Transmit  |                |             |          | TX-RX (A/2) | TC1   | 5.5V  | ±0.1V                    |
|  | 5) Frequency: 136.100MHz<br>6) Transmit  |                |             |          |             |       | Check   | 0.5V or more             |

### Transmitter Section (Refer to the Table 1 on page 22 for the frequencies which will apply in the adjustment mode.)

| Item                | Condition  | Measurement    |            |          | Adjustment  |                |        | Specifications / Remarks                            |        |
|---------------------|--|----------------|------------|----------|-------------|----------------|--------|---|--------|
|                     |  | Test-equipment | Unit       | Terminal | Unit        | Parts          | Method |   |        |
| 1. Frequency        | 1) Adj item: [FRQ.]<br>Adjust: [**]<br>2) Transmit | f. counter     | Rear panel | ANT      | Front panel | Tuning control | Write  | 155.100MHz±50Hz                                     |        |
| 2. High power [Low] | 1) Adj item: [HPL.]<br>Adjust: [**]<br>2) Transmit | Power meter    |            |          |             |                |        | 50W±1W  |        |
|                     | [Low']   |                |            |          |             |                |        | 3) Adj item: [HPL1.]<br>Adjust: [**]<br>4) Transmit | 65W±1W |
|                     | [Center]   |                |            |          |             |                |        | 5) Adj item: [HPC.]<br>Adjust: [**]<br>6) Transmit  | 65W±1W |
|                     | [High']  |                |            |          |             |                |        | 7) Adj item: [HPH1.]<br>Adjust: [**]<br>8) Transmit | 50W±1W |
|                     | [High]   |                |            |          |             |                |        | 9) Adj item: [HPH.]<br>Adjust: [**]<br>10) Transmit | 50W±1W |



## ADJUSTMENT

| Item                  | Condition  | Measurement                     |             |          | Adjustment  |                |   | Specifications / Remarks  |
|-----------------------|--|---------------------------------|-------------|----------|-------------|----------------|---|---|
|                       |  | Test-equipment                  | Unit        | Terminal | Unit        | Parts          | Method  |   |
| 3. Low power<br>[Low] | 1) Adj item: [LPL .]<br>Adjust: [**]<br>2) Transmit  | Power meter                     | Rear panel  | ANT      | Front panel | Tuning control | Write   | 25W±1W  |
| [Low']                | 3) Adj item: [LPL1.]<br>Adjust: [**]<br>4) Transmit  |                                 |             |          |             |                |   |   |
| [Center]              | 5) Adj item: [LPC .]<br>Adjust: [**]<br>6) Transmit  |                                 |             |          |             |                |   |   |
| [High']               | 7) Adj item: [LPH1.]<br>Adjust: [**]<br>8) Transmit  |                                 |             |          |             |                |   |   |
| [High]                | 9) Adj item: [LPH .]<br>Adjust: [**]<br>10) Transmit   |                                 |             |          |             |                |   |   |
| 4. DCS balance        | 1) Adj item: [BALL.]<br>Adjust: [**]<br>Detector: +P HOLD<br>LPF: 3kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit  | Linear detector<br>Oscilloscope |             |          |             |                | By turning the Tuning control, adjust the modulation wave until it becomes the square wave. |  |
| • Wide<br>[Low]       | 3) Adj item: [BALC.]<br>Adjust: [**]<br>4) Transmit  |                                 |             |          |             |                |   |   |
| [Center]              | 5) Adj item: [BALH.]<br>Adjust: [**]<br>6) Transmit  |                                 |             |          |             |                |   |   |
| • Narrow<br>[Center]  | 7) Adj item: [BALC.]<br>("N" icon appear)<br>Adjust: [**]<br>8) Transmit   |                                 |             |          |             |                |   |   |
| 5. MAX deviation      | 1) Adj item: [MAXL.]<br>Adjust: [**]<br>AG: 1kHz/54mV <b>K,M2,M3</b><br>AG: 1kHz/24mV <b>M4</b><br>Detector: +P, -P<br>LPF: 15kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit | Linear detector<br>Oscilloscope | Rear panel  | ANT      |             |                | Write   | 4.0kHz±0.1kHz (According to the larger +P, -P)                                      |
| • Wide<br>[Low]       | 3) Adj item: [MAXC.]<br>Adjust: [**]<br>4) Transmit  |                                 |             |          |             |                |   |   |
| [Center]              | 5) Adj item: [MAXH.]<br>Adjust: [**]<br>6) Transmit  |                                 |             |          |             |                |   |   |
| • Narrow<br>[Center]  | 7) Adj item: [MAXC.]<br>("N" icon appear)<br>Adjust: [**]<br>8) Transmit   |                                 |             |          |             |                |   |   |
|                       |  | AG<br>AF VM                     | Front panel | MIC      |             |                |   | 2.0kHz±0.05kHz (According to the larger +P, -P)                                     |

## ADJUSTMENT

| Item                        | Condition   | Measurement                     |             |          | Adjustment  |                |        | Specifications / Remarks |
|-----------------------------|---|---------------------------------|-------------|----------|-------------|----------------|--------|--------------------------|
|                             |   | Test-equipment                  | Unit        | Terminal | Unit        | Parts          | Method |                          |
| 6. MIC sensitivity (Narrow) | 1) Frequency: 155.100MHz<br>AG: 1kHz/5.4mV <b>K,M2,M3</b><br>AG: 1kHz/2.4mV <b>M4</b><br>Detector: P-P/2<br>LPF: 15kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit | Linear detector<br>Oscilloscope | Rear panel  | ANT      |             |                | Check  | ±1.2~1.9kHz              |
|                             |   | AG<br>AF VM                     | Front panel | MIC      |             |                |        |                          |
| 7. CTCSS fine deviation     | 1) Adj item: [DVL.]<br>("CT" icon appear)<br>Detector: P-P/2<br>LPF: 3kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit  | Linear detector<br>Oscilloscope | Rear panel  | ANT      | Front panel | Tuning control | Write  | 0.75kHz±0.05kHz          |
| • Wide [Low]                |   |                                 |             |          |             |                |        |                          |
| [Center]                    | 3) Adj item: [DVC.]<br>("CT" icon appear)<br>Adjust: [**]<br>4) Transmit  |                                 |             |          |             |                |        |                          |
| [High]                      | 5) Adj item: [DVH.]<br>("CT" icon appear)<br>Adjust: [**]<br>6) Transmit  |                                 |             |          |             |                |        |                          |
| • Narrow [Center]           | 7) Adj item: [DVC.]<br>("CT" and "N" icon appear)<br>Adjust: [**]<br>8) Transmit  |                                 |             |          |             |                |        | 0.37kHz±0.05kHz          |
| 8. DCS fine deviation       | 1) Adj item: [DVL.]<br>("DCS" icon appear)<br>Detector: P-P/2<br>LPF: 3kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit   |                                 |             |          |             |                |        | 0.75kHz±0.05kHz          |
| • Wide [Low]                |   |                                 |             |          |             |                |        |                          |
| [Center]                    | 3) Adj item: [DVC.]<br>("DCS" icon appear)<br>Adjust: [**]<br>4) Transmit   |                                 |             |          |             |                |        |                          |
| [High]                      | 5) Adj item: [DVH.]<br>("DCS" icon appear)<br>Adjust: [**]<br>6) Transmit   |                                 |             |          |             |                |        |                          |
| • Narrow [Center]           | 7) Adj item: [DVC.]<br>("DCS" and "N" icon appear)<br>Adjust: [**]<br>8) Transmit   |                                 |             |          |             |                |        | 0.35kHz±0.05kHz          |
| 9. DTMF fine deviation      | 1) Adj item: [DT.]<br>Detector: P-P/2<br>LPF: 15kHz<br>HPF: OFF<br>De-emphasis: OFF<br>2) Transmit  |                                 |             |          |             |                |        | 3.0kHz±0.1kHz            |
| • Wide                      |   |                                 |             |          |             |                |        |                          |
| • Narrow                    | 3) Adj item: [DT.]<br>("N" icon appear)<br>Adjust: [**]<br>4) Transmit  |                                 |             |          |             |                |        | 1.5kHz±0.1kHz            |

## ADJUSTMENT

**Receiver Section (Refer to the Table 1 on page 22 for the frequencies which will apply in the adjustment mode.)**

| Item                                 | Condition   | Measurement   |                        |          | Adjustment  |                |   | Specifications / Remarks   |
|--------------------------------------|---|---|------------------------|----------|-------------|----------------|---|----------------------------|
|                                      |   | Test-equipment  | Unit                   | Terminal | Unit        | Parts          | Method  |                            |
| 1. Band Pass Tuning<br>[Low]         | 1) Adj item: [BPL.]<br>Adjust: [**]<br>2) Spectrum analyzer setting<br>Center-f: 136.050MHz<br>Span: 200MHz<br>RBW: 100kHz<br>VBW: 100kHz<br>ATT: 5dB<br>3) Tracking generator output<br>: -30dBm | Spectrum analyzer   | Rear panel             | ANT      | Front panel | Tuning control | By turning the Tuning control, adjust the band-pass filter waveform as shown. | Refer to Fig. 1 (page 23). |
|                                      |   | Tracking generator  | TX-RX (A/2)            | BPF      |             |                |   | Refer to Fig. 2 (page 23). |
|                                      | [Center]  | 4) Adj item: [BPC.]<br>Adjust: [**]<br>5) Spectrum analyzer setting<br>Center-f: 155.050MHz<br>Span: 200MHz<br>RBW: 100kHz<br>VBW: 100kHz<br>ATT: 5dB<br>6) Tracking generator output<br>: -30dBm |                        |          |             |                |   |                            |
| [High]                               | 7) Adj item: [BPH.]<br>Adjust: [**]<br>8) Spectrum analyzer setting<br>Center-f: 173.950MHz<br>Span: 200MHz<br>RBW: 100kHz<br>VBW: 100kHz<br>ATT: 5dB<br>9) Tracking generator output<br>: -30dBm |   |                        |          |             |                |   |                            |
| 2. Squelch Tight<br><br>• Wide [Low] | 1) Adj item: [SCTL.]<br>Adjust: [**]<br>2) SSG output<br>: -116dBm (0.35μV)<br>SSG MOD: 1kHz<br>SSG DEV: 3kHz   | SSG Oscilloscope  | Rear panel             | ANT      |             |                | Write   |                            |
|                                      | [Center]  | 3) Adj item: [SQTC.]<br>Adjust: [**]<br>4) SSG output<br>: -116dBm (0.35μV)   | AF VM Distortion meter |          | EXT. SP     |                |   |                            |
|                                      | [High]  | 5) Adj item: [SQTH.]<br>Adjust: [**]<br>6) SSG output<br>: -116dBm (0.35μV)   |                        |          |             |                |   |                            |
|                                      | • Narrow [Center]   | 7) Adj item: [SQTC.]<br>("N" icon appear)<br>Adjust: [**]<br>8) SSG output<br>: -116dBm (0.35μV)<br>SSG MOD: 1kHz<br>SSG DEV: 1.5kHz  |                        |          |             |                |   |                            |

## ADJUSTMENT

| Item                                | Condition  | Measurement                                    |            |  | Adjustment  |                |  | Specifications / Remarks |
|-------------------------------------|--|--|------------|--|-------------|----------------|--|--------------------------|
|                                     |  | Test-equipment                                 | Unit       | Terminal   | Unit        | Parts          | Method   |                          |
| 3. Squelch Open<br><br>• Wide [Low] | 1) Adj item: [SQOL.]<br>2) SSG output : -124dBm (0.14μV)<br>SSG MOD: 1kHz<br>SSG DEV: 3kHz                                       | SSG Oscilloscope<br><br>AF VM Distortion meter | Rear panel | ANT  | Front panel | Tuning control | Write  |                          |
|                                     |  |  |            | EXT. SP  |             |                |  |                          |
|                                     | [Center]   |  |            | 3) Adj item: [SQOC.]<br>Adjust: [**]<br>4) SSG output : -124dBm (0.14μV) |             |                |  |                          |
|                                     | [High]   |  |            | 5) Adj item: [SQOH.]<br>Adjust: [**]<br>6) SSG output : -124dBm (0.14μV) |             |                |  |                          |
| • Narrow [Center]                   | 7) Adj item: [SQOC.]<br>("N" icon apper)<br>Adjust: [**]<br>8) SSG output : -124dBm (0.14μV)<br>SSG MOD: 1kHz<br>SSG DEV: 1.5kHz |  |            |  |             |                |  |                          |
| 4. RSSI writing                     | 1) Frequency: 155.050MHz<br>2) SSG output: -53dBm (501μV)<br>SSG MOD: 1kHz<br>SSG DEV: 3kHz                                      |  |            |  |             |                | RSSI value writing is performed by the "Squelch open" item (center wide). SSG output level is changed and adjusted after Squelch adjustment. This adjustment should not turn the Tuning control. |                          |
| 5. S-meter S1                       | 1) Adj item: [S1.]<br>Adjust: [**]<br>2) SSG output : -118dBm (0.28μV)<br>SSG MOD: 1kHz<br>SSG DEV: 3kHz                         |  |            |  |             |                | Write  |                          |
| 6. S-meter Full scale               | 1) Adj item: [S7.]<br>Adjust: [**]<br>2) SSG output : -96dBm (3.54μV)<br>SSG MOD: 1kHz<br>SSG DEV: 3kHz                          |  |            |  |             |                |  |                          |

## TERMINAL FUNCTION

### TX-RX unit (X57-8130-XX A/2) : TX-RX Section

| Pin No.                    | Name   | I/O | Function                   |
|----------------------------|--------|-----|----------------------------|
| <b>CN702</b>               |        |     |                            |
| 1                          | SPGND  | -   | AF GND                     |
| 2                          | SPGND  | -   | AF GND                     |
| 3                          | SPOUT  | O   | AF out                     |
| 4                          | SPOUT  | O   | AF out                     |
| 5                          | 8C     | O   | 8V DC supply               |
| 6                          | RXD    | I   | RXD/ PC serial data        |
| 7                          | PTT    | I   | PTT/ PC serial data        |
| 8                          | VOL    | I   | Volume                     |
| 9                          | MICKEY | I   | Microphone key             |
| 10                         | 5C     | O   | 5V DC supply               |
| 11                         | CM     | I   | Microphone key check       |
| 12                         | ENCA   | I   | Encoder A                  |
| 13                         | ENCB   | I   | Encoder B                  |
| 14                         | DI     | I   | Data from LCD driver       |
| 15                         | DO     | O   | Data for LCD driver        |
| 16                         | CE     | O   | Chip enable for LCD driver |
| 17                         | CL     | O   | Clock for LCD driver       |
| 18                         | BRI    | O   | LCD brightness control     |
| 19                         | POWER  | I   | Power key                  |
| 20                         | MIC    | I   | Microphone                 |
| 21                         | ME     | -   | GND                        |
| 22                         | GND    | -   | GND                        |
| <b>J701 (EXT. SP jack)</b> |        |     |                            |
| 1                          | EXT SP | O   | External speaker           |
| 2                          | GND    | -   | GND                        |

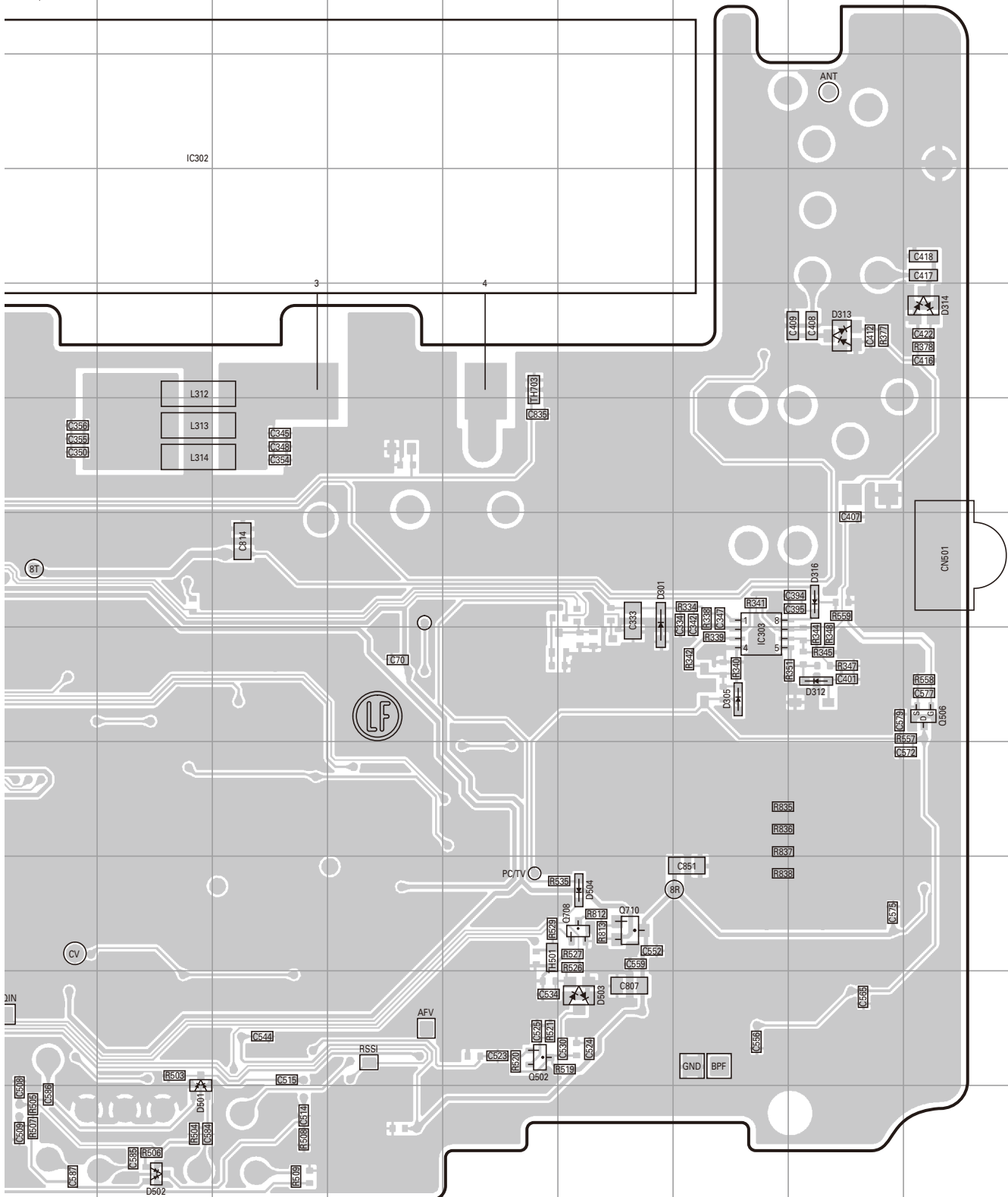
### TX-RX unit (X57-8130-XX B/2) : Display Section

| Pin No.                | Name   | I/O | Function                   |
|------------------------|--------|-----|----------------------------|
| <b>CN901</b>           |        |     |                            |
| 1                      | SPGND  | -   | AF GND                     |
| 2                      | SPGND  | -   | AF GND                     |
| 3                      | SPOUT  | I   | AF out                     |
| 4                      | SPOUT  | I   | AF out                     |
| 5                      | 8C     | I   | 8V DC supply               |
| 6                      | RXD    | O   | RXD/ PC serial data        |
| 7                      | PTT    | O   | PTT/ PC serial data        |
| 8                      | VOL    | O   | Volume                     |
| 9                      | MICKEY | O   | Microphone key             |
| 10                     | 5C     | I   | 5V DC supply               |
| 11                     | CM     | O   | Microphone key check       |
| 12                     | ENCA   | O   | Encoder A                  |
| 13                     | ENCB   | O   | Encoder B                  |
| 14                     | DI     | O   | Data from LCD driver       |
| 15                     | DO     | I   | Data for LCD driver        |
| 16                     | CE     | I   | Chip enable for LCD driver |
| 17                     | CL     | I   | Clock for LCD driver       |
| 18                     | BRI    | I   | LCD brightness control     |
| 19                     | POWER  | O   | Power key                  |
| 20                     | MIC    | O   | Microphone                 |
| 21                     | ME     | -   | GND                        |
| 22                     | GND    | -   | GND                        |
| <b>J901 (MIC jack)</b> |        |     |                            |
| 1                      | MBL    | O   | Key detection              |
| 2                      | 8C     | O   | Switched 8V for MIC        |
| 3                      | GND    | -   | GND                        |
| 4                      | PTT    | I   | PTT/ PC serial data        |
| 5                      | ME     | -   | MIC GND                    |
| 6                      | MIC    | I   | MIC signal input           |
| 7                      | HOOK   | I   | HOOK/ PC serial data       |
| 8                      | CM     | I   | MIC data detection         |

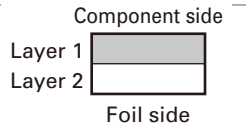


# PC BOARD TM-281A

**TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Component side view (J79-0316-09 A/2)**



| Ref. No. | Address |
|----------|---------|
| IC302    | 3K      |
| IC303    | 8P      |
| IC707    | 9F      |
| IC708    | 7E      |
| IC711    | 6G      |
| IC712    | 7F      |
| IC715    | 9B      |
| Q502     | 11N     |
| Q506     | 8R      |
| Q702     | 7F      |
| Q703     | 7F      |
| Q704     | 10I     |
| Q705     | 10I     |
| Q706     | 10I     |
| Q707     | 6F      |
| Q708     | 100     |
| Q710     | 100     |
| Q712     | 10E     |
| Q713     | 6D      |
| Q714     | 5E      |
| Q715     | 9D      |
| D301     | 70      |
| D305     | 8P      |
| D312     | 8Q      |
| D313     | 5Q      |
| D314     | 5R      |
| D316     | 7Q      |
| D501     | 12K     |
| D502     | 12K     |
| D503     | 110     |
| D504     | 100     |
| D710     | 6F      |
| D712     | 6F      |



# TM-281A PC BOARD

TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION

-10: K -21: M2 -22: M3 -23: M4

Foil side view (J79-0316-09 A/2)

1

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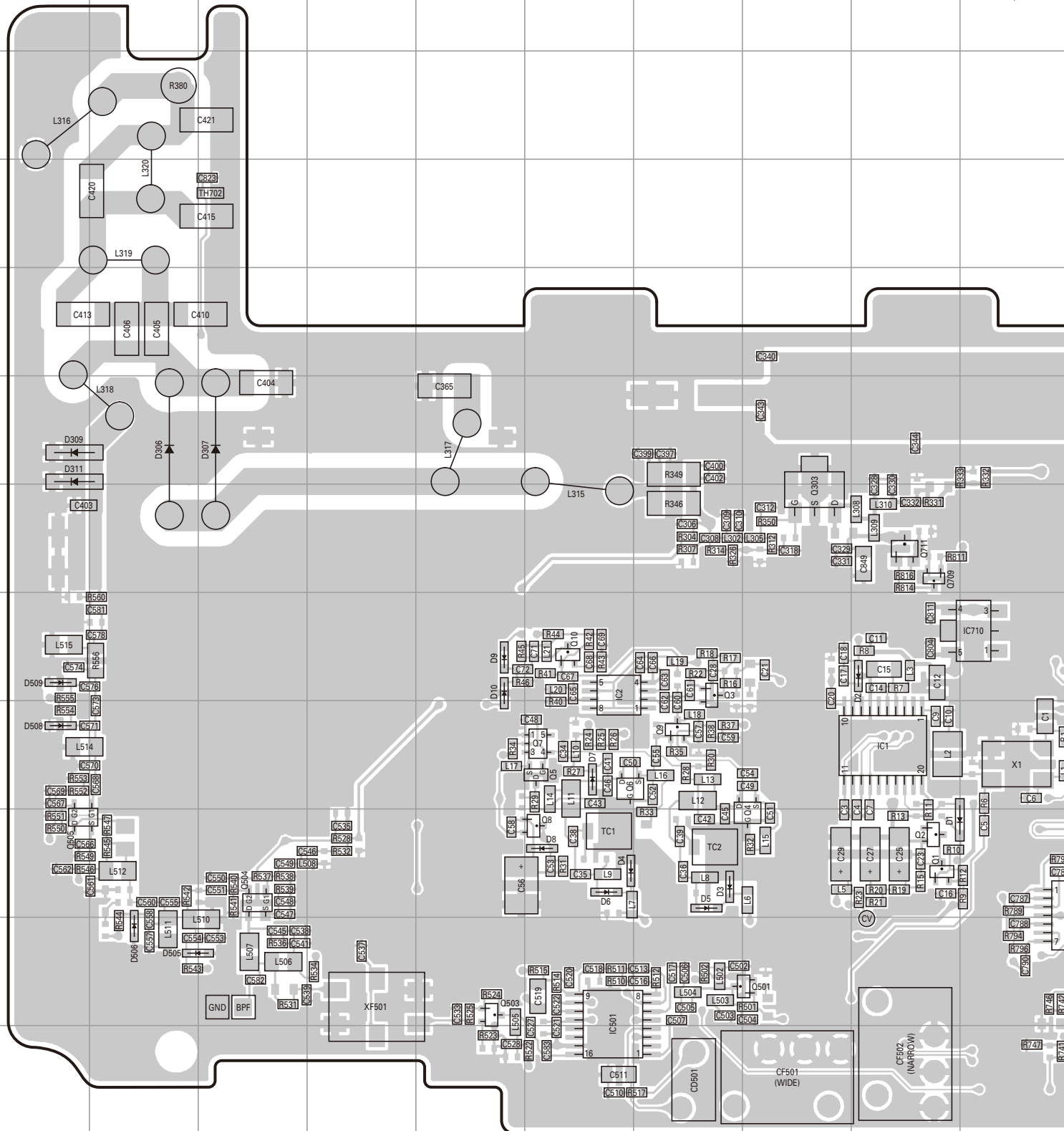
10

11

12

13

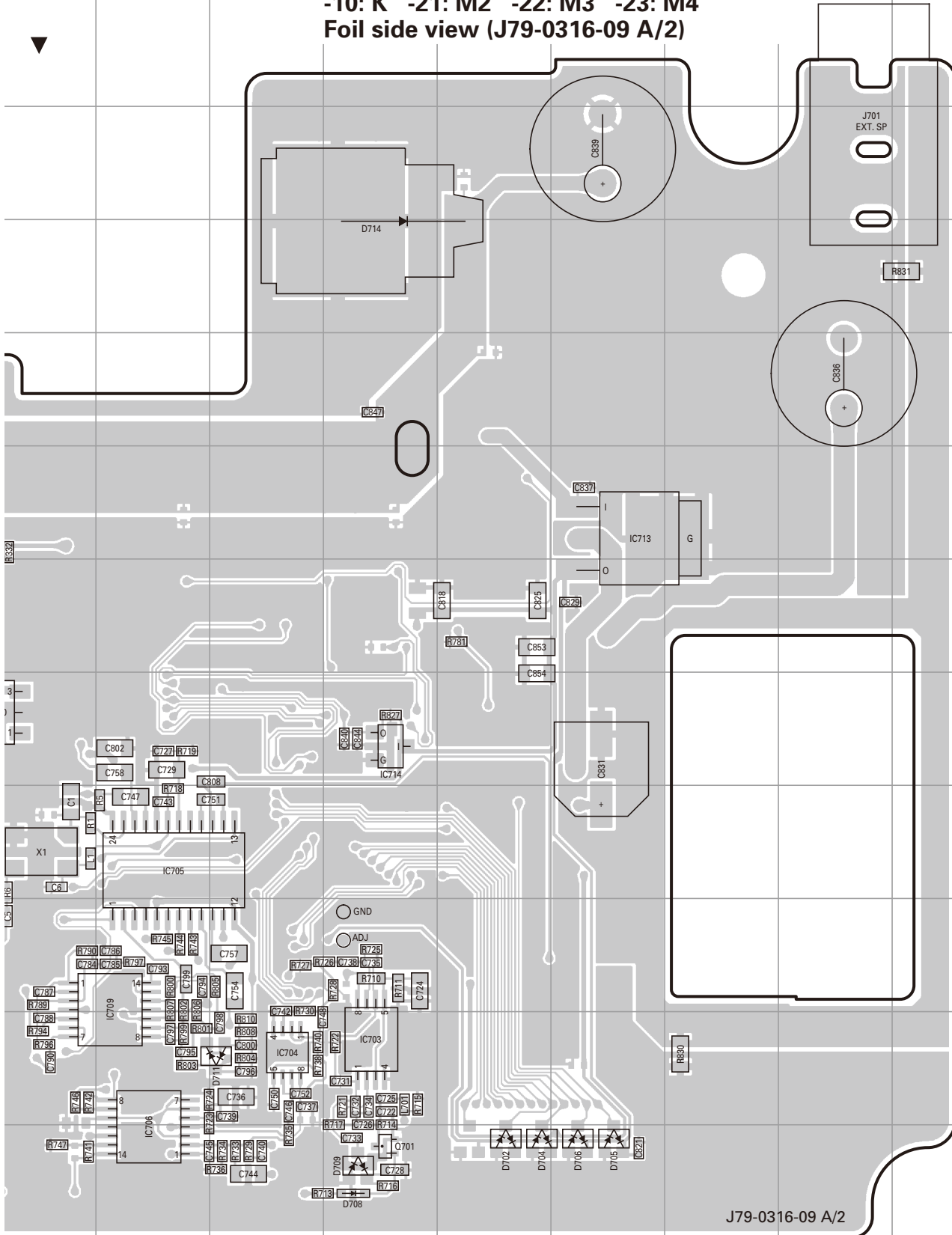
14



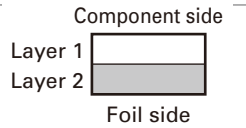


# PC BOARD TM-281A

**TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Foil side view (J79-0316-09 A/2)**

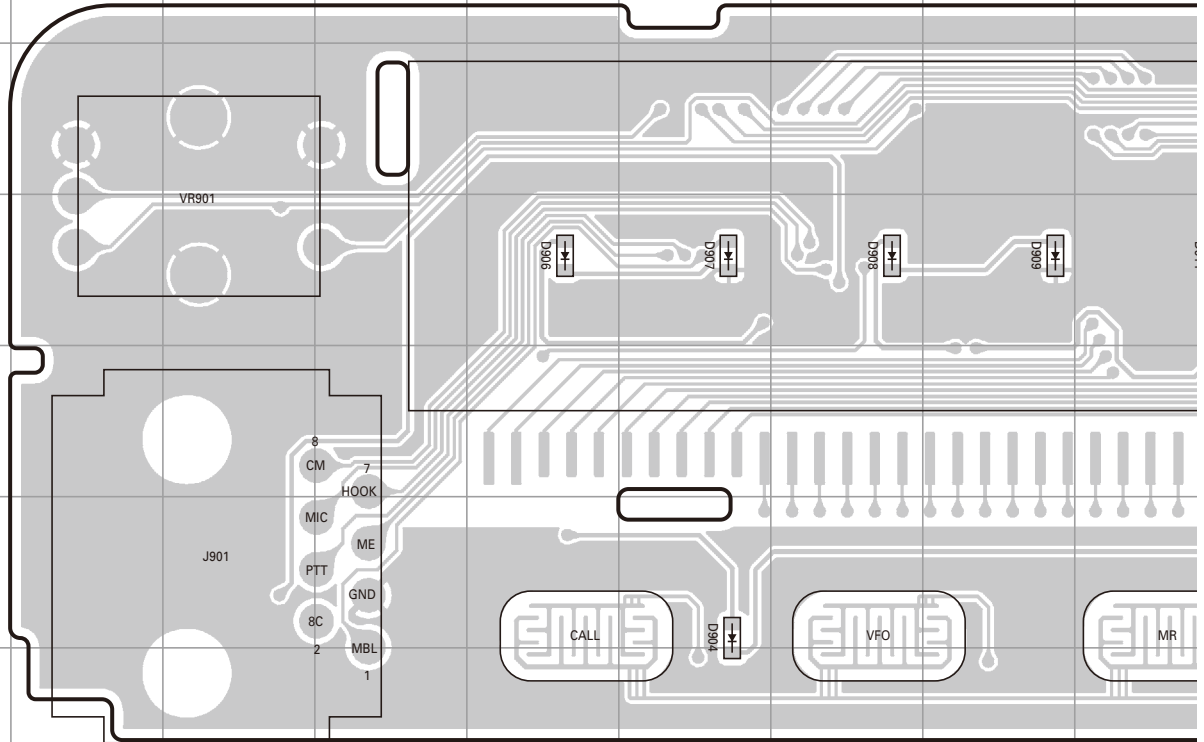


| Ref. No. | Address |
|----------|---------|
| IC1      | 9I      |
| IC2      | 8F      |
| IC501    | 11F     |
| IC703    | 11M     |
| IC704    | 11L     |
| IC705    | 9K      |
| IC706    | 12K     |
| IC709    | 10K     |
| IC710    | 8J      |
| IC713    | 6O      |
| IC714    | 8M      |
| Q1       | 10I     |
| Q2       | 10I     |
| Q3       | 8G      |
| Q4       | 10H     |
| Q5       | 9F      |
| Q6       | 9F      |
| Q7       | 9F      |
| Q8       | 10F     |
| Q9       | 9G      |
| Q10      | 8F      |
| Q303     | 7H      |
| Q501     | 11H     |
| Q503     | 11E     |
| Q504     | 10C     |
| Q505     | 10A     |
| Q701     | 12M     |
| Q709     | 7I      |
| Q711     | 7I      |
| D1       | 10I     |
| D2       | 8I      |
| D3       | 10G     |
| D4       | 10F     |
| D5       | 10G     |
| D6       | 10F     |
| D7       | 9F      |
| D8       | 10F     |
| D9       | 8E      |
| D10      | 8E      |
| D306     | 6B      |
| D307     | 6C      |
| D309     | 6A      |
| D311     | 6A      |
| D505     | 11B     |
| D506     | 11B     |
| D508     | 9A      |
| D509     | 8A      |
| D702     | 12N     |
| D704     | 12N     |
| D705     | 12O     |
| D706     | 12O     |
| D708     | 12M     |
| D709     | 12M     |
| D711     | 11L     |
| D714     | 4M      |

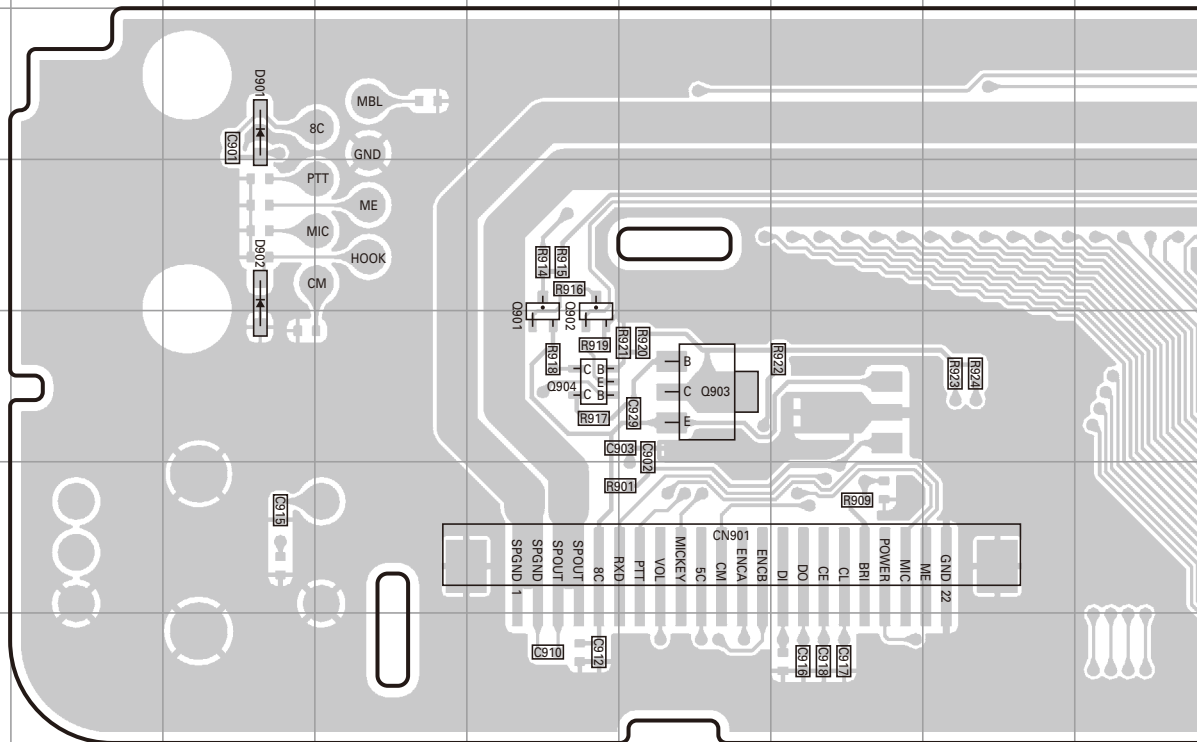


# TM-281A PC BOARD

**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Component side view (J79-0316-09 B/2)**

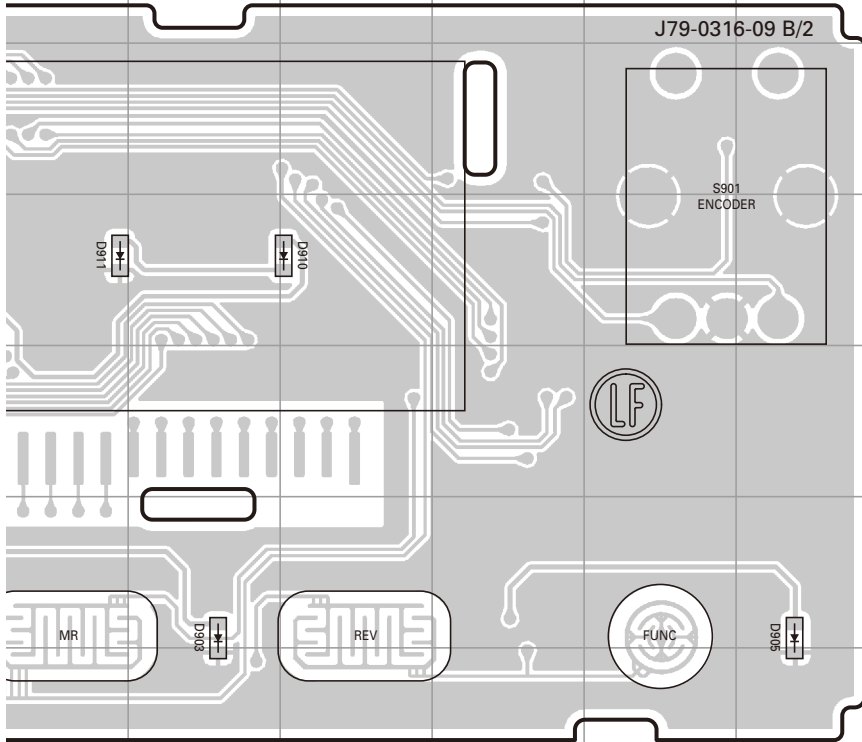


**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Foil side view (J79-0316-09 B/2)**

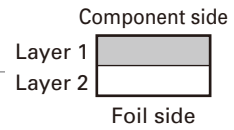


# PC BOARD TM-281A

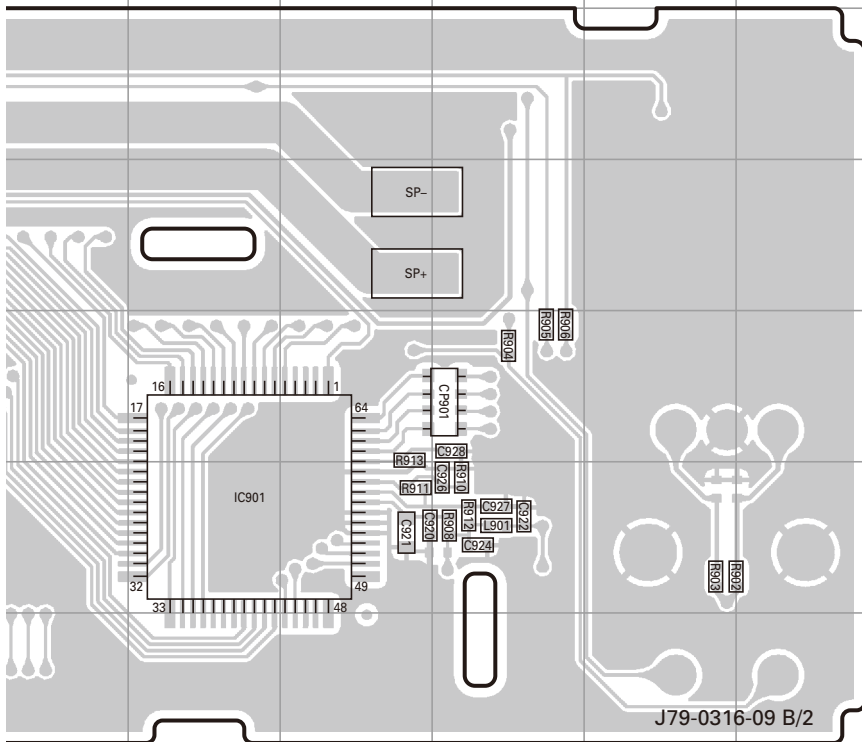
## TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION -10: K -21: M2 -22: M3 -23: M4 Component side view (J79-0316-09 B/2)



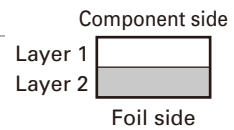
| Ref. No. | Address |
|----------|---------|
| D903     | 6K      |
| D904     | 6G      |
| D905     | 6O      |
| D906     | 4F      |
| D907     | 4G      |
| D908     | 4H      |
| D909     | 4I      |
| D910     | 4L      |
| D911     | 4J      |



## TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION -10: K -21: M2 -22: M3 -23: M4 Foil side view (J79-0316-09 B/2)

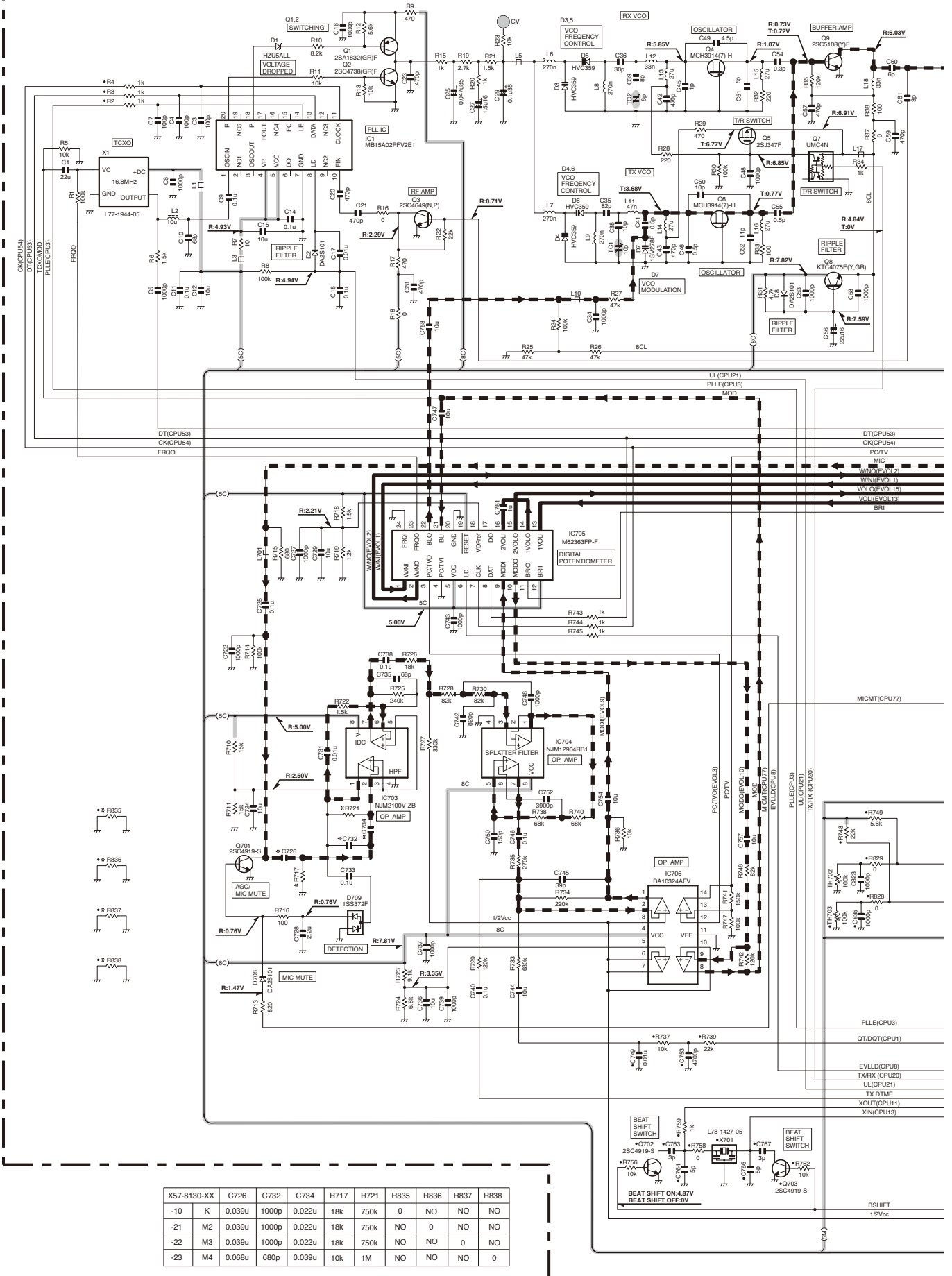


| Ref. No. | Address |
|----------|---------|
| IC901    | 12K     |
| Q901     | 11F     |
| Q902     | 11F     |
| Q903     | 11G     |
| Q904     | 11F     |
| D901     | 9D      |
| D902     | 10D     |



# TM-281A SCHEMATIC DIAGRAM

TX-RX UNIT (X57-8130-XX)(A/2) : TX-RX SECTION

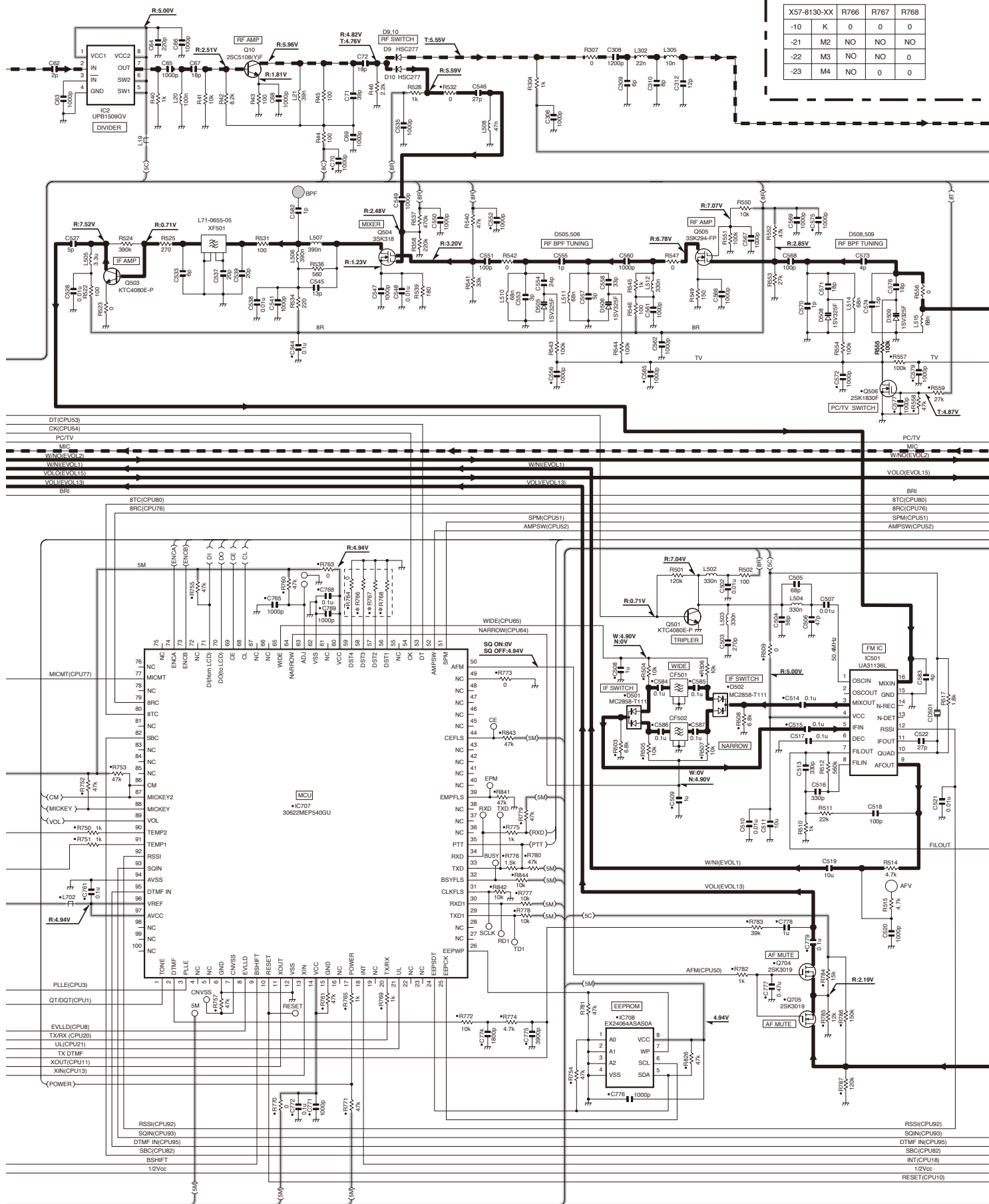


| X57-8130-XX | C726 | C732   | C734  | R717   | R721 | R835 | R836 | R837 | R838 |
|-------------|------|--------|-------|--------|------|------|------|------|------|
| -10         | K    | 0.039u | 1000p | 0.022u | 18k  | 750k | 0    | NO   | NO   |
| -21         | M2   | 0.039u | 1000p | 0.022u | 18k  | 750k | NO   | 0    | NO   |
| -22         | M3   | 0.039u | 1000p | 0.022u | 18k  | 750k | NO   | 0    | NO   |
| -23         | M4   | 0.068u | 680p  | 0.039u | 10k  | 1M   | NO   | NO   | NO   |

# SCHEMATIC DIAGRAM TM-281A

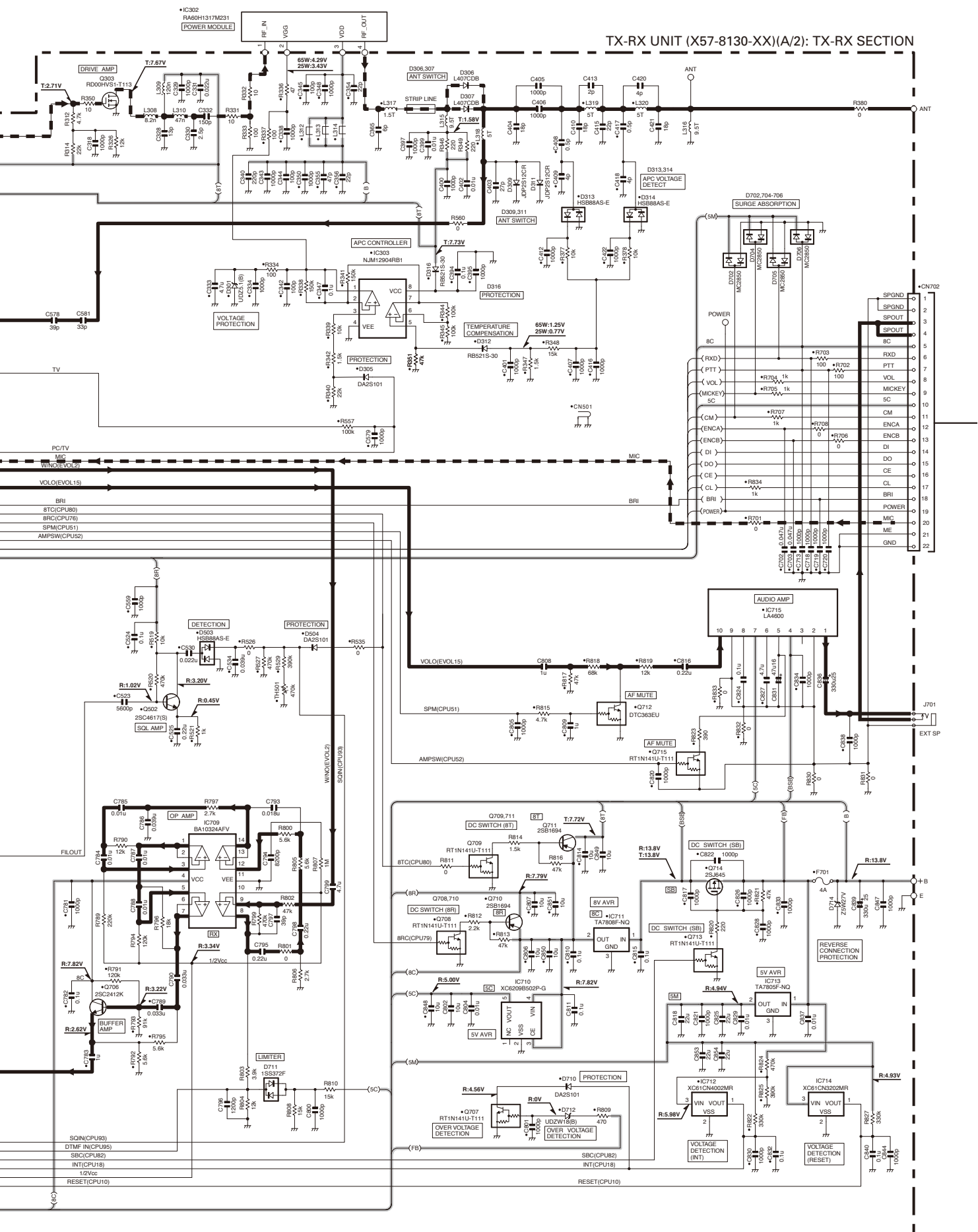
TX-RX UNIT (X57-8130-XX)(A/2): TX-RX SECTION

| X57-8130-XX | R766 | R767 | R768 |
|-------------|------|------|------|
| -10         | K    | 0    | 0    |
| -21         | M2   | NO   | NO   |
| -22         | M3   | NO   | NO   |
| -23         | M4   | NO   | 0    |



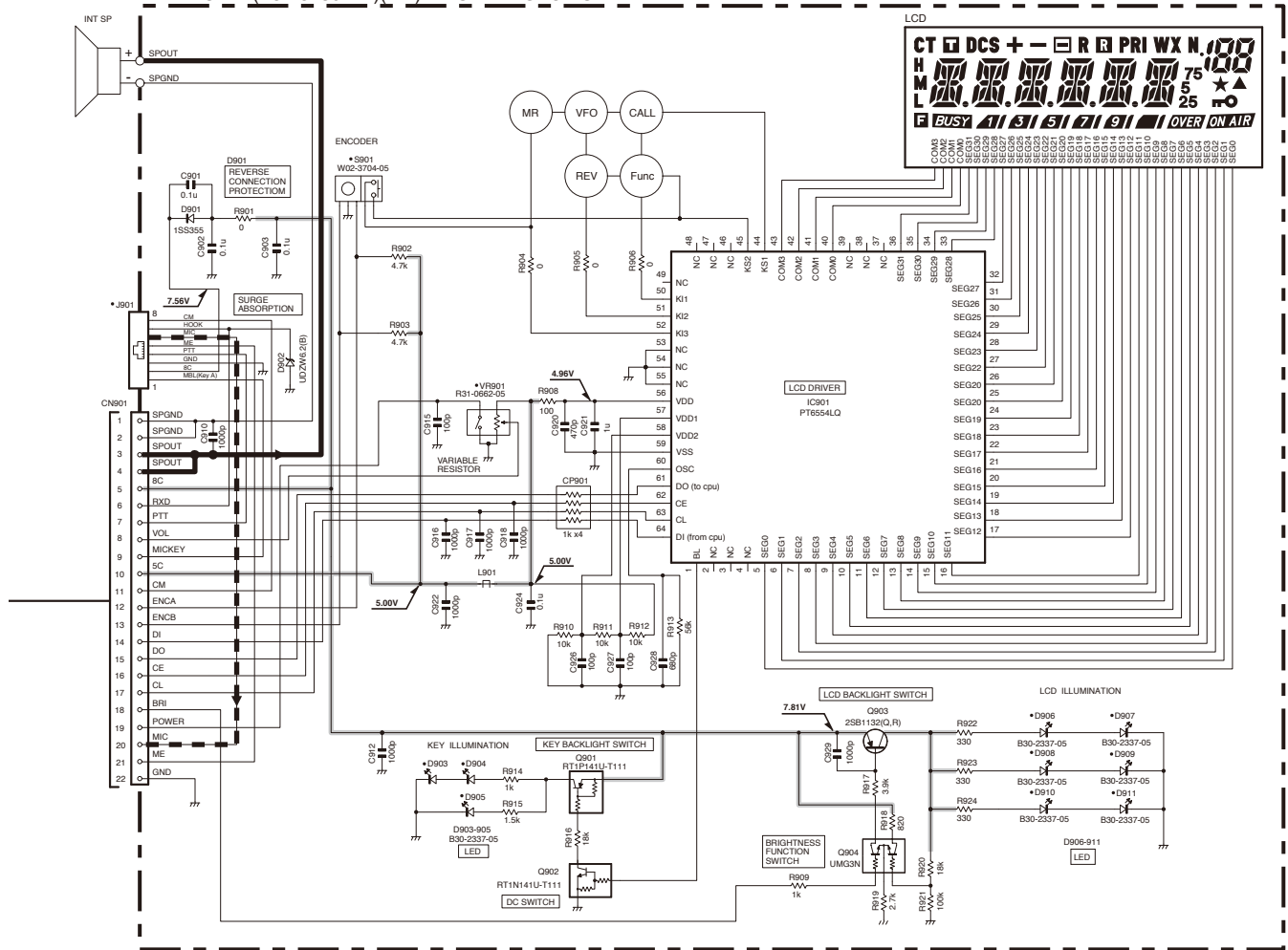
# TM-281A SCHEMATIC DIAGRAM

## TX-RX UNIT (X57-8130-XX)(A/2): TX-RX SECTION



# SCHEMATIC DIAGRAM TM-281A

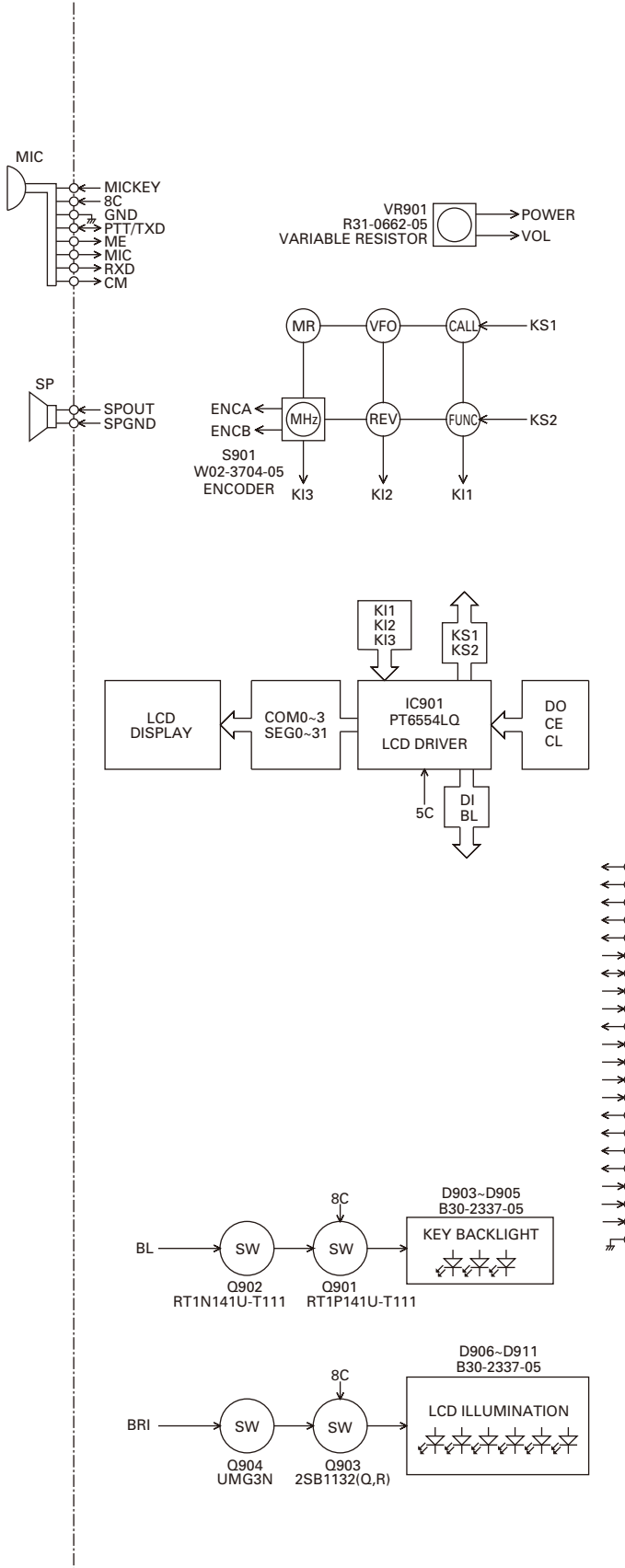
## TX-RX UNIT (X57-8130-XX)(B/2) : DISPLAY SECTION



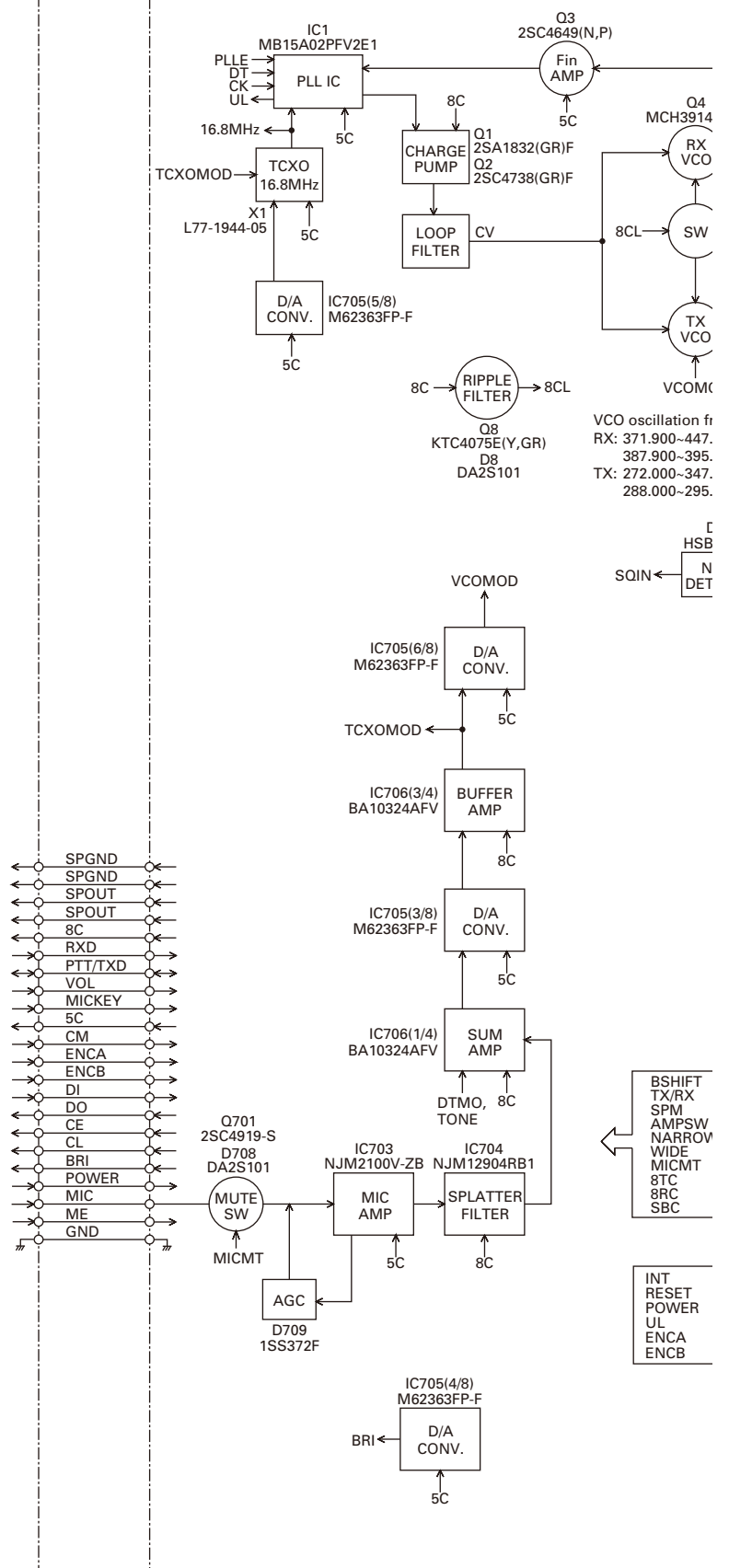
Note: The components marked with a dot (•) are parts of layer 1.

## BLOCK DIAGRAM

TX-RX UNIT (X57-8130-XX B/2): Display section

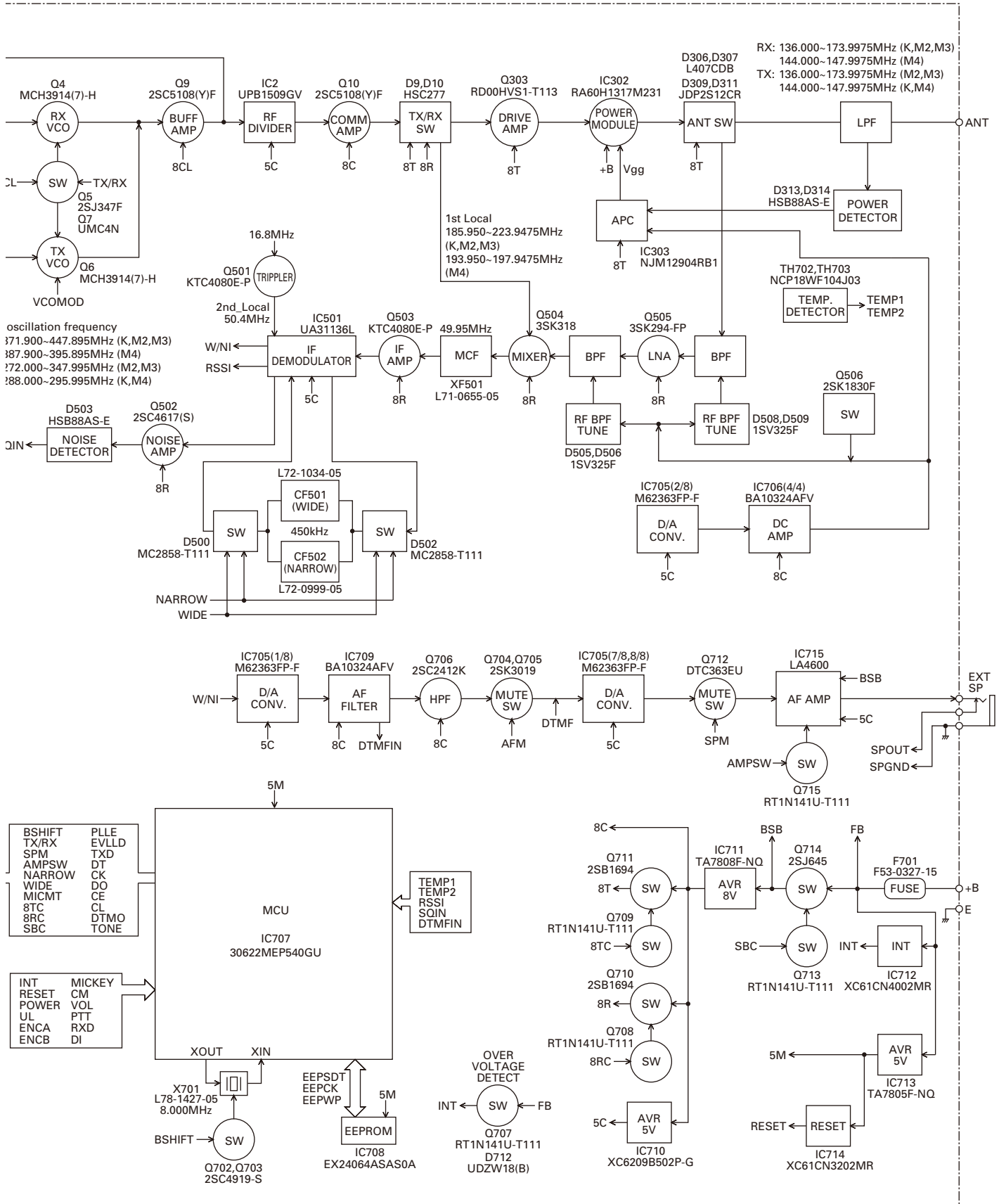


TX-RX UNIT (X57-8130-XX A/2): TX-RX section



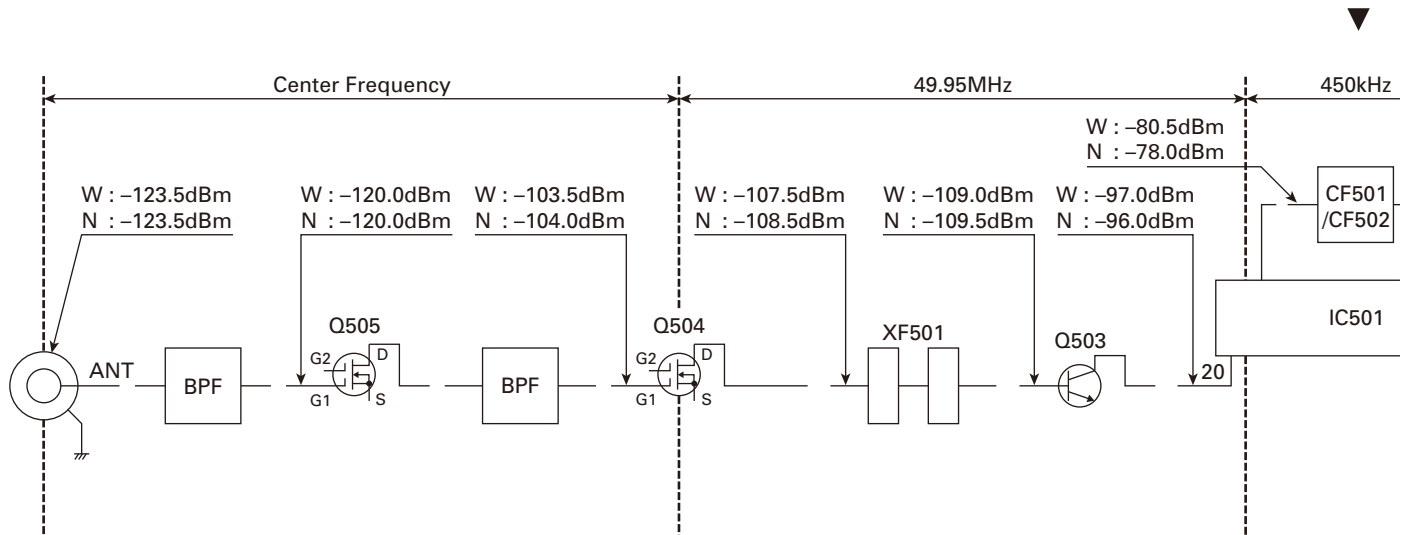


## BLOCK DIAGRAM



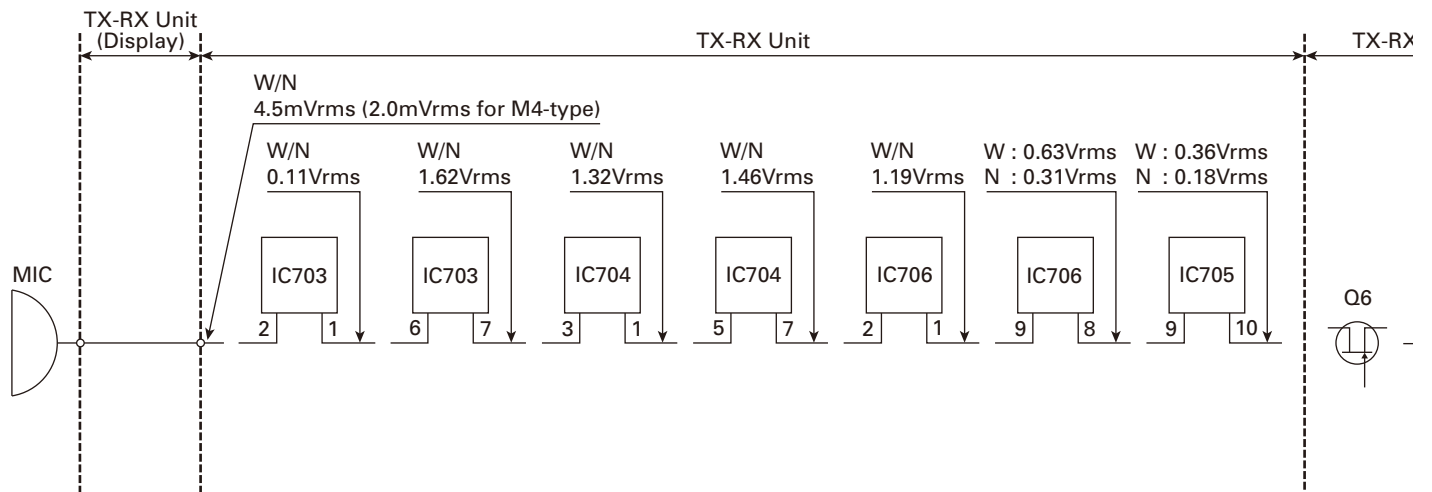
## LEVEL DIAGRAM

### Receiver Section



To make measurements in the RF section, connect the RF level meter in the RF section, use a 0.01 $\mu$ F coupling capacitor. (The display shows the SSG input value required to obtain 12dB SIN.)

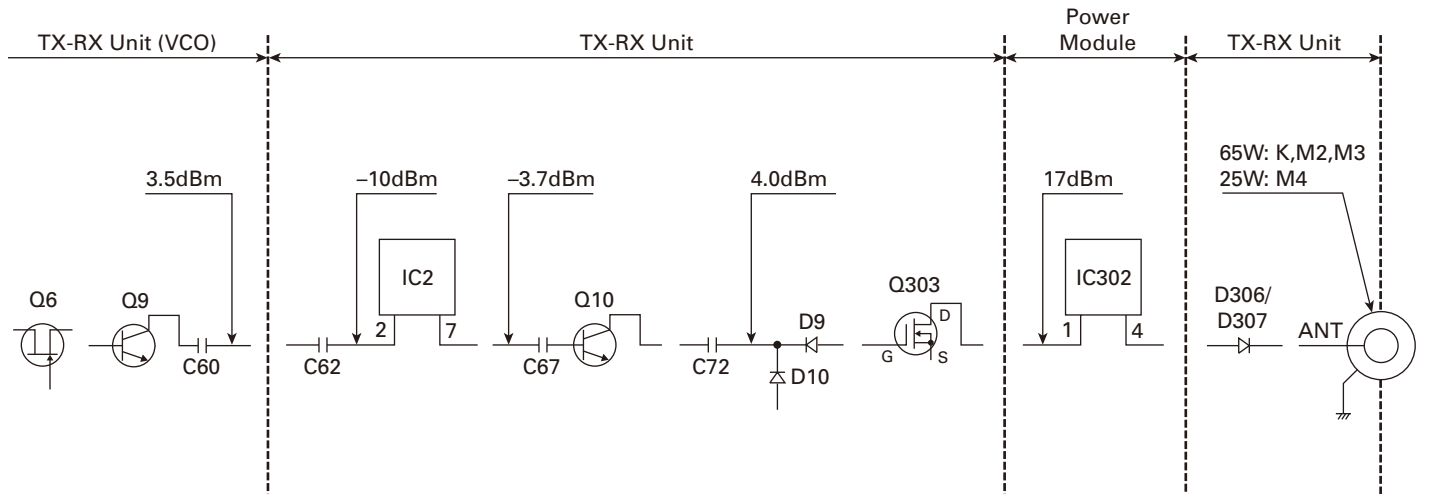
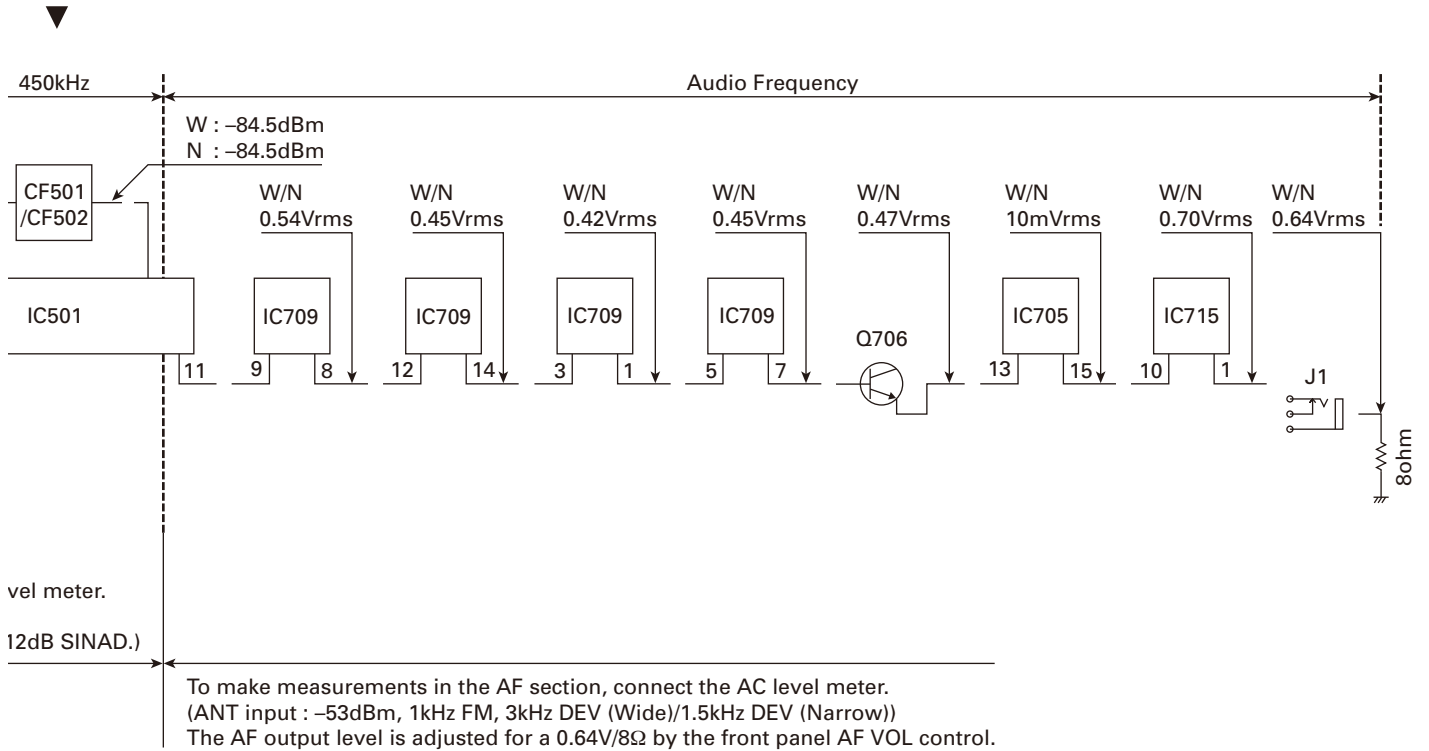
### Transmitter Section



To make measurements in the AF section, connect the AC level meter. AG is set so that MIC input becomes 3kHz/1.5kHz (Wide/Narrow) DEV at 1kHz MOD.

To make

## LEVEL DIAGRAM



To make measurements in the RF section, connect the RF Wattmeter (50Ω).



## SPECIFICATIONS

### GENERAL

|  |   |                   |
|--|---|-------------------|
| Frequency Range                                      |   |                   |
| TX.....  | K,M4: 144~148MHz                          | M2,M3: 136~174MHz |
| RX.....  | K,M2,M3: 136~174MHz                       | M4: 144~148MHz    |
| Mode.....  | F3E (FM)                                  |                   |
| Antenna Impedance.....                               | 50Ω                                       |                   |
| Usable Temperature Range.....                        | -20°C~+60°C (-4°F~+140°F)                 |                   |
| Power Supply.....                                    | 13.8V DC±15% (11.7~15.8V)                 |                   |
| Grounding Method.....                                | Negative ground                           |                   |
| Current  |   |                   |
| Transmit (max.).....                                 | K,M2,M3: 14A or less                      | M4: 8A or less    |
| Receive (at 2W output).....                          | 1.0A or less                              |                   |
| Frequency Stability (-20°C~+60°C).....               | Within ±2.5ppm                            |                   |
| Dimensions (W x H x D projections not included)..... | 160 x 43 x 126 mm / 6.30 x 1.69 x 4.69 in |                   |
| Weight.....  | Approx. 1.13kg / 2.5lb                    |                   |

### RECEIVER

|   |                                   |                        |
|---|-----------------------------------|------------------------|
| Circuitry.....                          | Double conversion superheterodyne |                        |
| Intermediate Frequency (1st / 2nd)..... | 49.95MHz / 450kHz                 |                        |
| Sensitivity (12dB SINAD).....           | Wide: 0.18μV or less              | Narrow: 0.22μV or less |
| Selectivity                             |                                   |                        |
| -6dB.....                               | Wide: 12kHz or more               | Narrow: 10kHz or more  |
| -60dB.....                              | Wide: 30kHz or less               | Narrow: 24kHz or less  |
| Squelch Sensitivity.....                | 0.1μV or less                     |                        |
| Audio Output (8Ω, 5% distortion).....   | 2W or higher                      |                        |
| Audio Output Impedance.....             | 8Ω                                |                        |

### TRANSMITTER

|   |                               |                 |
|---|-------------------------------|-----------------|
| Power Output                              |                               |                 |
| High.....                                 | K,M2,M3: 65W                  | M4: 25W         |
| Low.....                                  | K,M2,M3: Approx. 25W          |                 |
| Modulation.....                           | Variable reactance modulation |                 |
| Spurious Emissions.....                   | -60dB or less                 |                 |
| Maximum Frequency Deviation.....          | Wide: ±5kHz                   | Narrow: ±2.5kHz |
| Audio Distortion (at 60% modulation)..... | 3% or less                    |                 |
| Microphone Impedance.....                 | 600Ω                          |                 |

**Note: All specifications (General, Transmitter and Receiver) are guaranteed within the amateur radio band.**

Guaranteed frequency range..... 144~148MHz

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### Kenwood Electronics Australia Pty. Ltd.

Talavera Business Park Building A, 4 Talavera Road, North Ryde NSW 2113 Australia

### Kenwood Electronics (Hong Kong) Ltd.

Suite 2504, 25/F, Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, New Territories, Hong Kong

### Kenwood Electronics Singapore Pte Ltd

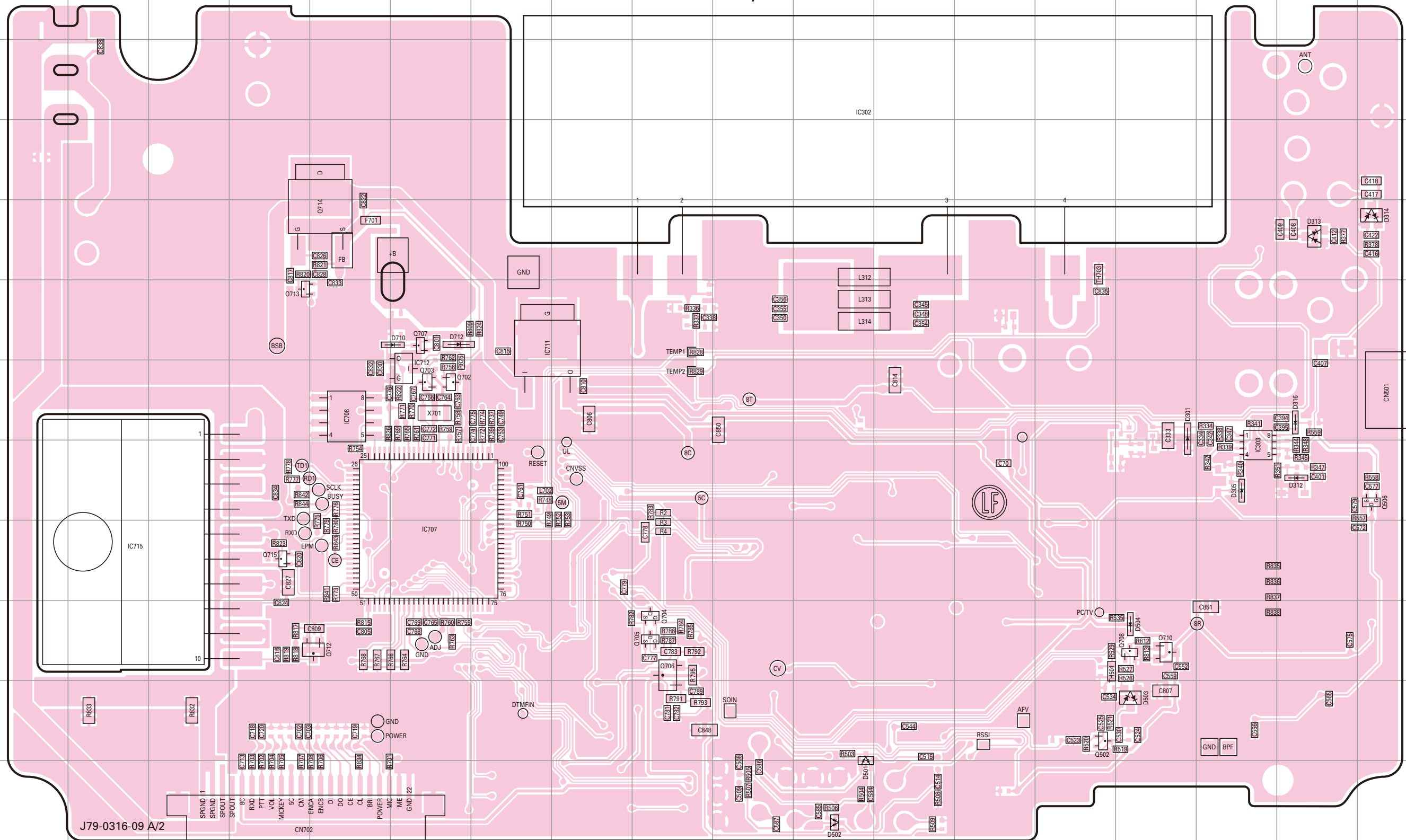
1 Ang Mo Kio Street 63, Singapore 569110

# TM-281A PC BOARD

# PC BOARD TM-281A

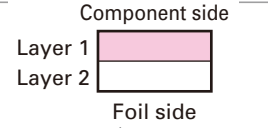
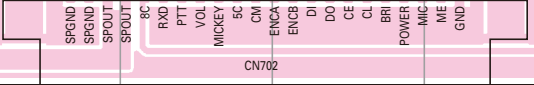
TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION  
 -10: K -21: M2 -22: M3 -23: M4  
 Component side view (J79-0316-09 A/2)

TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION  
 -10: K -21: M2 -22: M3 -23: M4  
 Component side view (J79-0316-09 A/2)



| Ref. No. | Address |
|----------|---------|
| IC302    | 3K      |
| IC303    | 8P      |
| IC707    | 9F      |
| IC708    | 7E      |
| IC711    | 6G      |
| IC712    | 7F      |
| IC715    | 9B      |
| Q502     | 11N     |
| Q506     | 8R      |
| Q702     | 7F      |
| Q703     | 7F      |
| Q704     | 10I     |
| Q705     | 10I     |
| Q706     | 10I     |
| Q707     | 6F      |
| Q708     | 100     |
| Q710     | 100     |
| Q712     | 10E     |
| Q713     | 6D      |
| Q714     | 5E      |
| Q715     | 9D      |
| D301     | 70      |
| D305     | 8P      |
| D312     | 8Q      |
| D313     | 5Q      |
| D314     | 5R      |
| D316     | 7Q      |
| D501     | 12K     |
| D502     | 12K     |
| D503     | 110     |
| D710     | 100     |
| D712     | 6F      |

J79-0316-09 A/2

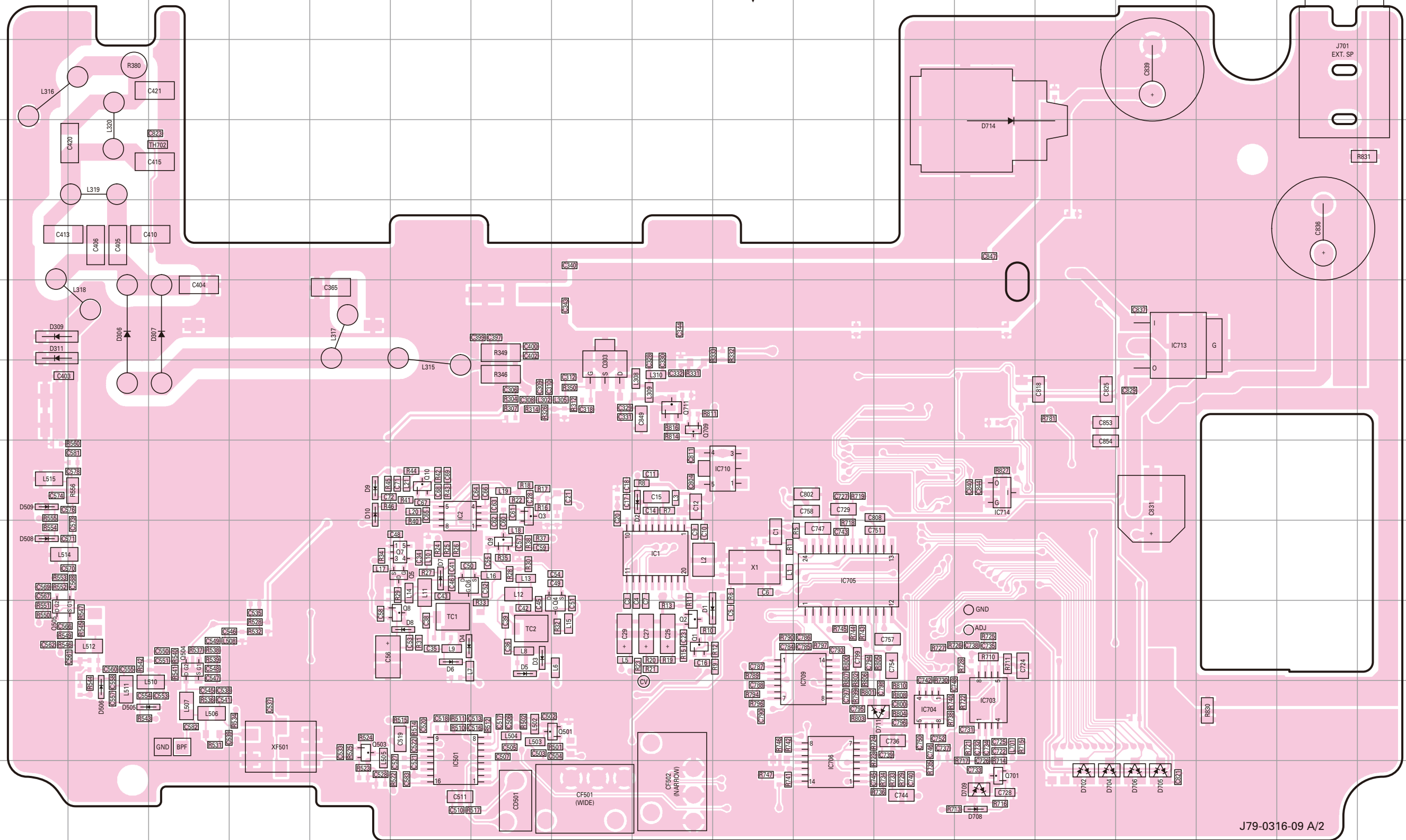


# TM-281A PC BOARD

TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION  
 -10: K -21: M2 -22: M3 -23: M4  
 Foil side view (J79-0316-09 A/2)

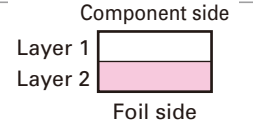
# PC BOARD TM-281A

TX-RX UNIT (X57-8130-XX) (A/2): TX-RX SECTION  
 -10: K -21: M2 -22: M3 -23: M4  
 Foil side view (J79-0316-09 A/2)



| Ref. No. | Address |
|----------|---------|
| IC1      | 9I      |
| IC2      | 8F      |
| IC501    | 11F     |
| IC703    | 11M     |
| IC704    | 11L     |
| IC705    | 9K      |
| IC706    | 12K     |
| IC709    | 10K     |
| IC710    | 8J      |
| IC713    | 6O      |
| IC714    | 8M      |
| Q1       | 10I     |
| Q2       | 10I     |
| Q3       | 8G      |
| Q4       | 10H     |
| Q5       | 9F      |
| Q6       | 9F      |
| Q7       | 9F      |
| Q8       | 10F     |
| Q9       | 9G      |
| Q10      | 8F      |
| Q303     | 7H      |
| Q501     | 11H     |
| Q503     | 11E     |
| Q504     | 10C     |
| Q505     | 10A     |
| Q701     | 12M     |
| Q709     | 7I      |
| Q711     | 7I      |
| D1       | 10I     |
| D2       | 8I      |
| D3       | 10G     |
| D4       | 10F     |
| D5       | 10G     |
| D6       | 10F     |
| D7       | 9F      |
| D8       | 10F     |
| D9       | 8E      |
| D10      | 8E      |
| D306     | 6B      |
| D307     | 6C      |
| D309     | 6A      |
| D311     | 6A      |
| D505     | 11B     |
| D506     | 11B     |
| D508     | 9A      |
| D509     | 8A      |
| D702     | 12N     |
| D704     | 12N     |
| D705     | 12O     |
| D706     | 12O     |
| D708     | 12M     |
| D709     | 12M     |
| D711     | 11L     |
| D714     | 4M      |

J79-0316-09 A/2

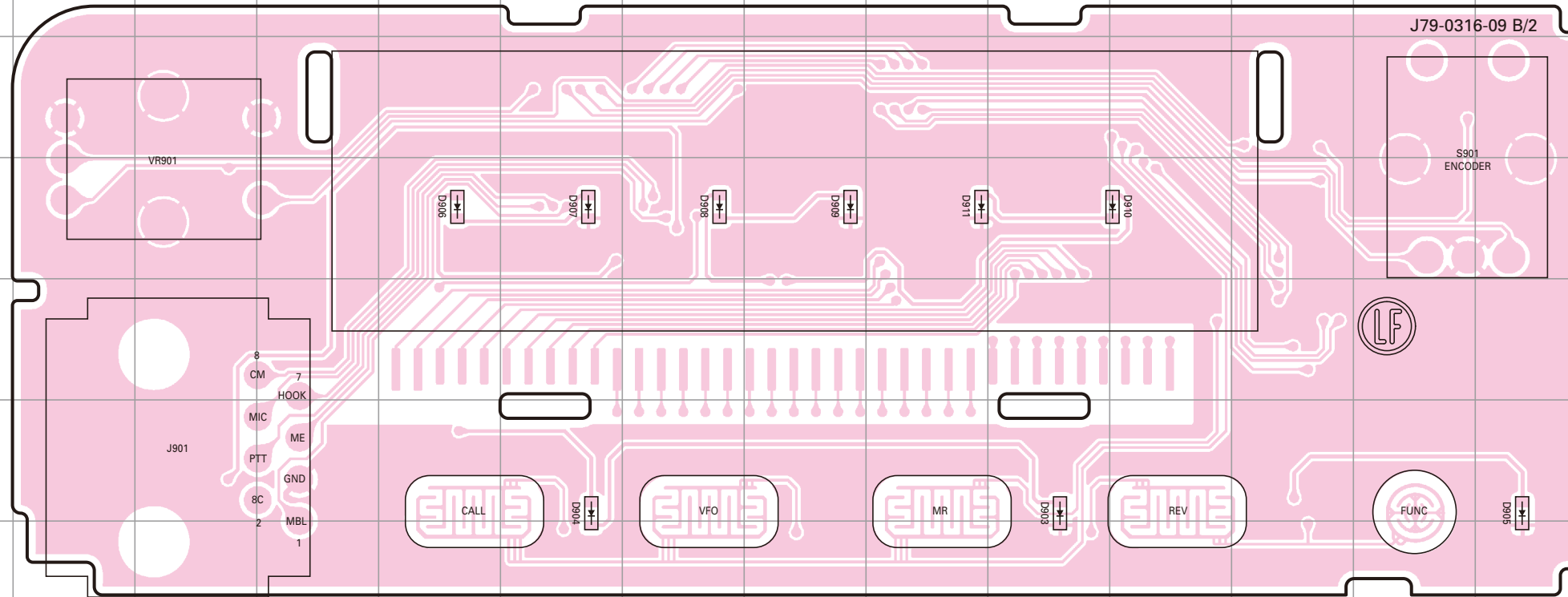


# TM-281A PC BOARD

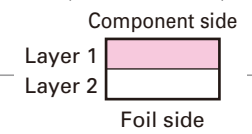
# PC BOARD TM-281A

**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Component side view (J79-0316-09 B/2)**

**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Component side view (J79-0316-09 B/2)**

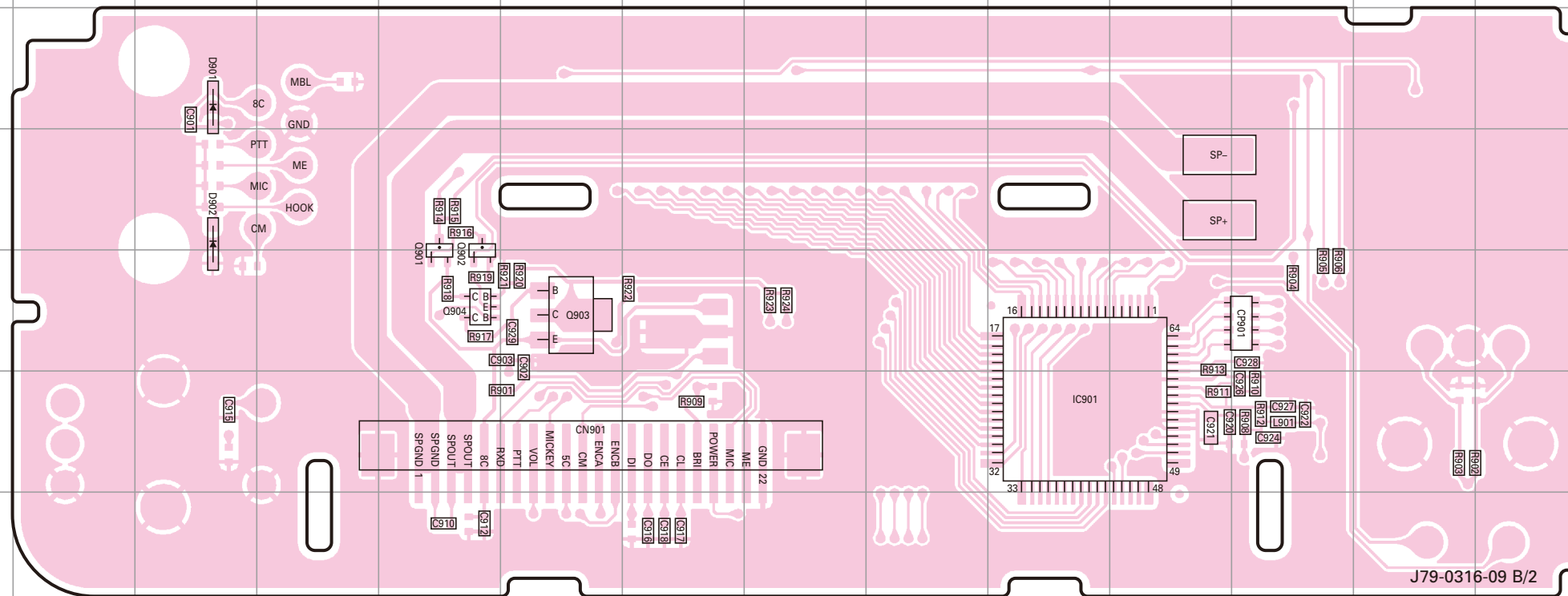


| Ref. No. | Address |
|----------|---------|
| D903     | 6K      |
| D904     | 6G      |
| D905     | 6O      |
| D906     | 4F      |
| D907     | 4G      |
| D908     | 4H      |
| D909     | 4I      |
| D910     | 4L      |
| D911     | 4J      |

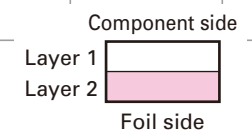


**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Foil side view (J79-0316-09 B/2)**

**TX-RX UNIT (X57-8130-XX) (B/2): DISPLAY SECTION**  
**-10: K -21: M2 -22: M3 -23: M4**  
**Foil side view (J79-0316-09 B/2)**



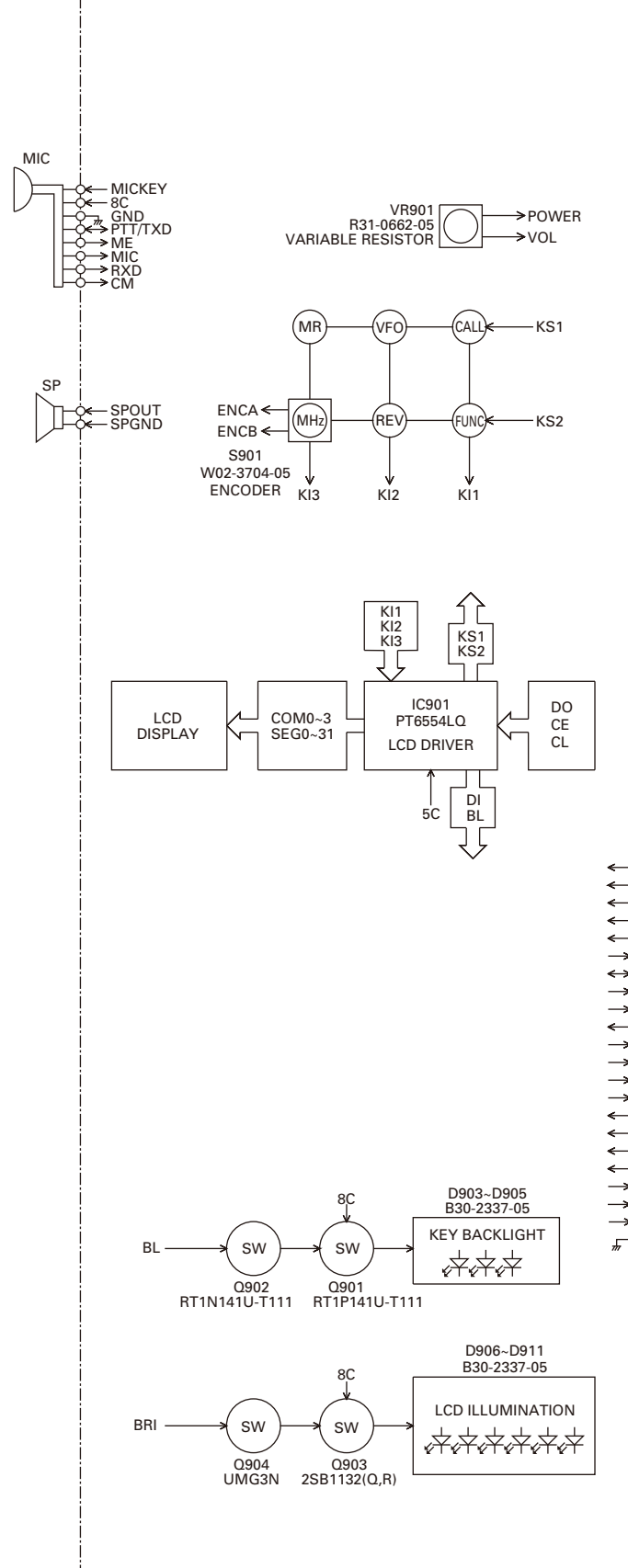
| Ref. No. | Address |
|----------|---------|
| IC901    | 12K     |
| Q901     | 11F     |
| Q902     | 11F     |
| Q903     | 11G     |
| Q904     | 11F     |
| D901     | 9D      |
| D902     | 10D     |



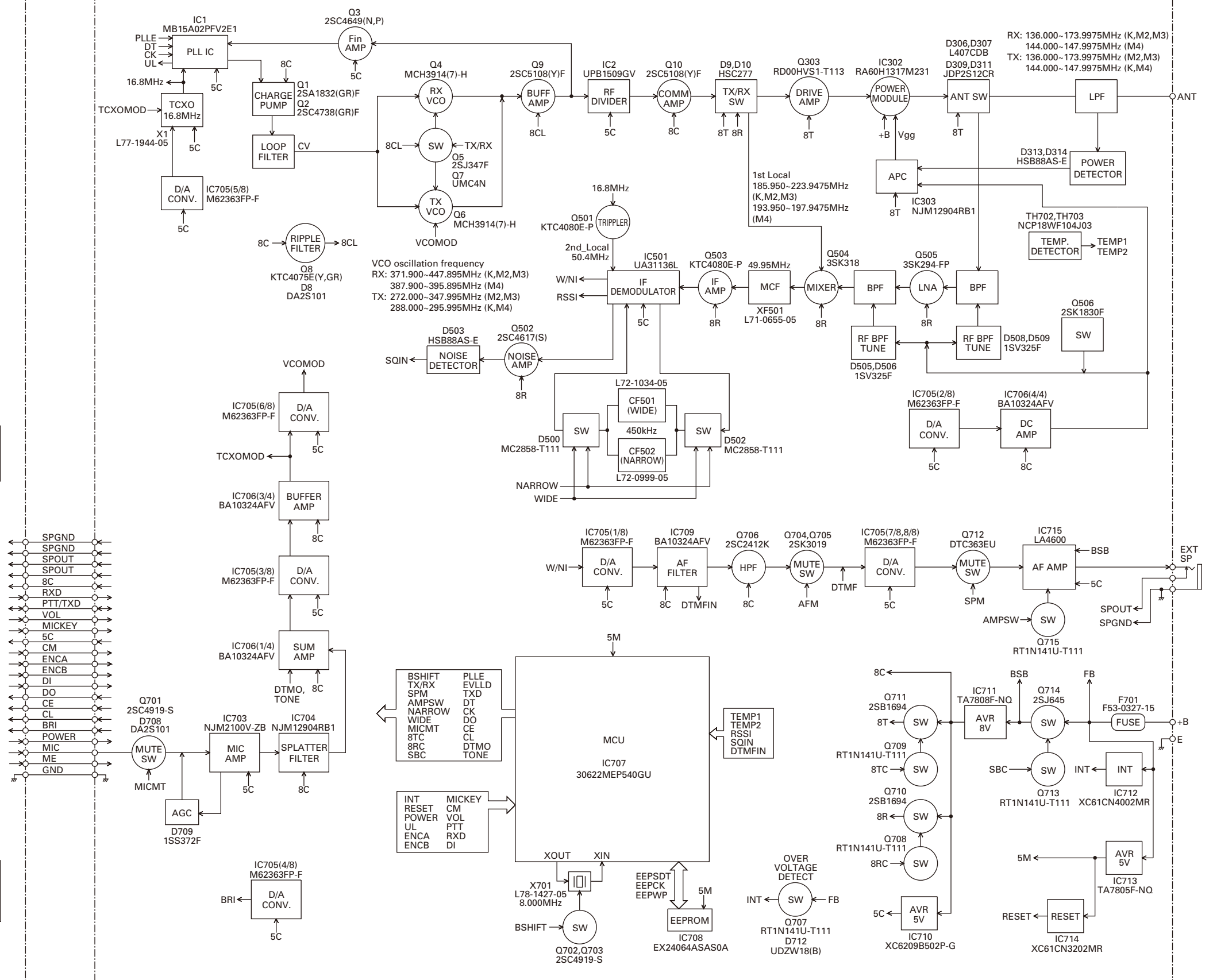




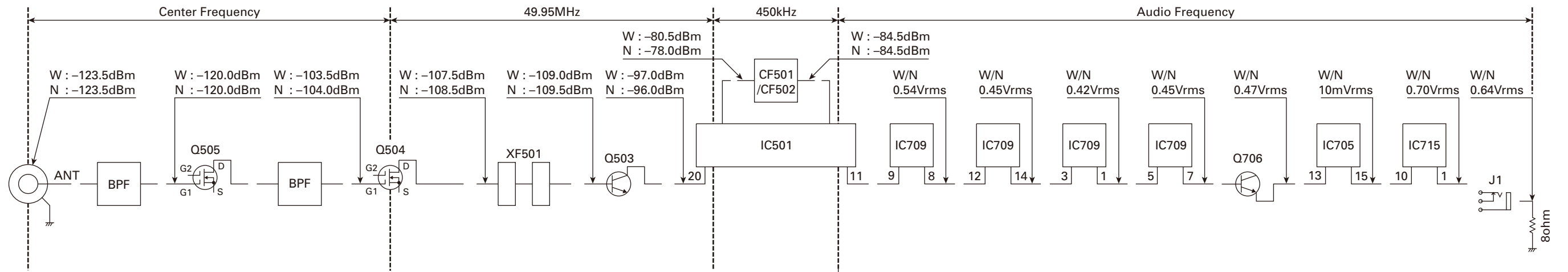
TX-RX UNIT (X57-8130-XX B/2): Display section



TX-RX UNIT (X57-8130-XX A/2): TX-RX section



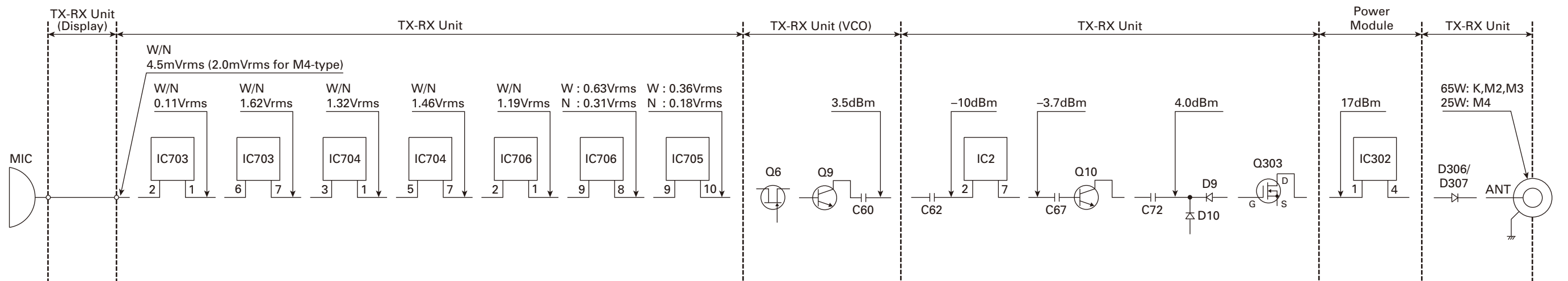
## Receiver Section



To make measurements in the RF section, connect the RF level meter.  
In the RF section, use a 0.01 $\mu$ F coupling capacitor.  
(The display shows the SSG input value required to obtain 12dB SINAD.)

To make measurements in the AF section, connect the AC level meter.  
(ANT input : -53dBm, 1kHz FM, 3kHz DEV (Wide)/1.5kHz DEV (Narrow))  
The AF output level is adjusted for a 0.64V/8 $\Omega$  by the front panel AF VOL control.

## Transmitter Section



To make measurements in the AF section, connect the AC level meter.  
AG is set so that MIC input becomes 3kHz/1.5kHz (Wide/Narrow) DEV at 1kHz MOD.

To make measurements in the RF section, connect the RF Wattmeter (50 $\Omega$ ).