

430MHz ALL MODE TRANSCEIVER

# TR-851A/E

## SERVICE MANUAL

# KENWOOD

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Photo is TR-851A.

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## CIRCUIT DESCRIPTION

| UNIT NAME                          | MODEL NAME     |                                    |
|------------------------------------|----------------|------------------------------------|
|                                    | TR-851A (K, M) | TR-851E (T, W)                     |
| FINAL UNIT                         | X45-3030-11    | X45-3030-51                        |
| CAR UNIT                           | X50-3040-00    | X50-3040-00                        |
| COMPOSITE UNIT (PLL, DRIVE, FRONT) | X50-3050-11    | X50-3050-11                        |
| CONTROL UNIT                       | X53-1460-12    | X53-1460-52 (T)<br>X53-1460-62 (W) |
| COMPOSITE UNIT (RX)                | X60-1320-01    | X60-1320-01                        |

Table 1 TR-851A/E PC board chart

| Destination | Frequency (MHz)      | VFO step (kHz) |      | TX OFFSET |     | Repeater shift (kHz) | Tone circuit    |
|-------------|----------------------|----------------|------|-----------|-----|----------------------|-----------------|
|             |                      | FM             | SSB  | DISPLAY   |     |                      |                 |
| K, M        | 430.0 ~<br>439.99995 | 25kHz          | 5kHz | —         | +   | ±5                   | Option          |
| T           |                      | 12.5kHz        | 5kHz | —         | +   | ±1.6                 | 1750 Tone burst |
| W           |                      | 12.5kHz        | 5kHz | D-A       | D-B | —7.6<br>—1.6         | 1750 Tone       |

Table 2 Frequency configuration of destination

### FREQUENCY CONFIGURATION

The TR-851A/E utilizes a PLL synthesizer system incorporating a digital VFO, which covers each band in 50Hz steps. (See Fig. 1.)

Received signals are mixed with the first local oscillator (388.585 to 398.585MHz) to produce the first intermediate frequency of 41.415MHz. In SSB or CW, the receiver operates as a double conversion system. The 10.695MHz IF signal is mixed with the second local oscillator (30.72 MHz) to produce the second intermediate frequency of 10.695MHz. The 10.695MHz IF signal is applied to crystal filter XF1 (L71-0249-05), and the signal is then applied to the ring detector to obtain the audio output.

In FM, the receiver operates as a double conversion system. The 10.695MHz signal is mixed with the PLL reference frequency of 10.24MHz to produce the second intermediate frequency of 455kHz.

The transmitter system operates as a double conversion system. In SSB mode, output from the carrier oscillator is modulated by a balanced modulator to produce an intermediate frequency signal, which is then mixed with the first local oscillator signal to produce the two meter transmit signal. The carrier oscillator circuit is controlled by the microprocessor according to the selected mode.

During USB or CW receive, the carrier oscillator frequency is 10.6935MHz. During LSB receive, it is 10.6965 MHz. During CW transmit, it is 10.6943MHz. In FM, a

10.695MHz crystal oscillator frequency is used that is directly modulated and then mixed with the first local oscillator signal.

To minimize internal heterodyne tones and spurs in the frequency generator and analysis are controlled by a microprocessor. The PLL-based frequency system consists of two PLL synthesizer loops controlled by a 4-bit high-speed microprocessor and a stable, analog RIT oscillator circuit.

| Item                                                             | Rating                                                                    |
|------------------------------------------------------------------|---------------------------------------------------------------------------|
| Nominal frequency                                                | 10.695MHz                                                                 |
| Allowable center freq' deviation                                 | Within ±200Hz at 6dB                                                      |
| Pass bandwidth and attenuation bandwidth (based on minimum loss) | 2.2kHz or more at 6dB<br>Within ±1.5kHz at 20dB<br>Within ±2.4kHz at 60dB |
| Ripple                                                           | 2dB or less                                                               |
| Minimum loss                                                     | 5dB or less                                                               |
| Guaranteed attenuation                                           | 60dB or more within ±40kHz                                                |
| I/O terminating impedance                                        | 1.2kΩ ±5%/6pF ±5%                                                         |

Table 3 Crystal filter 10F2.2S (L71-0249-05) characteristics (Composit unit (RX) XF1)

## CIRCUIT DESCRIPTION

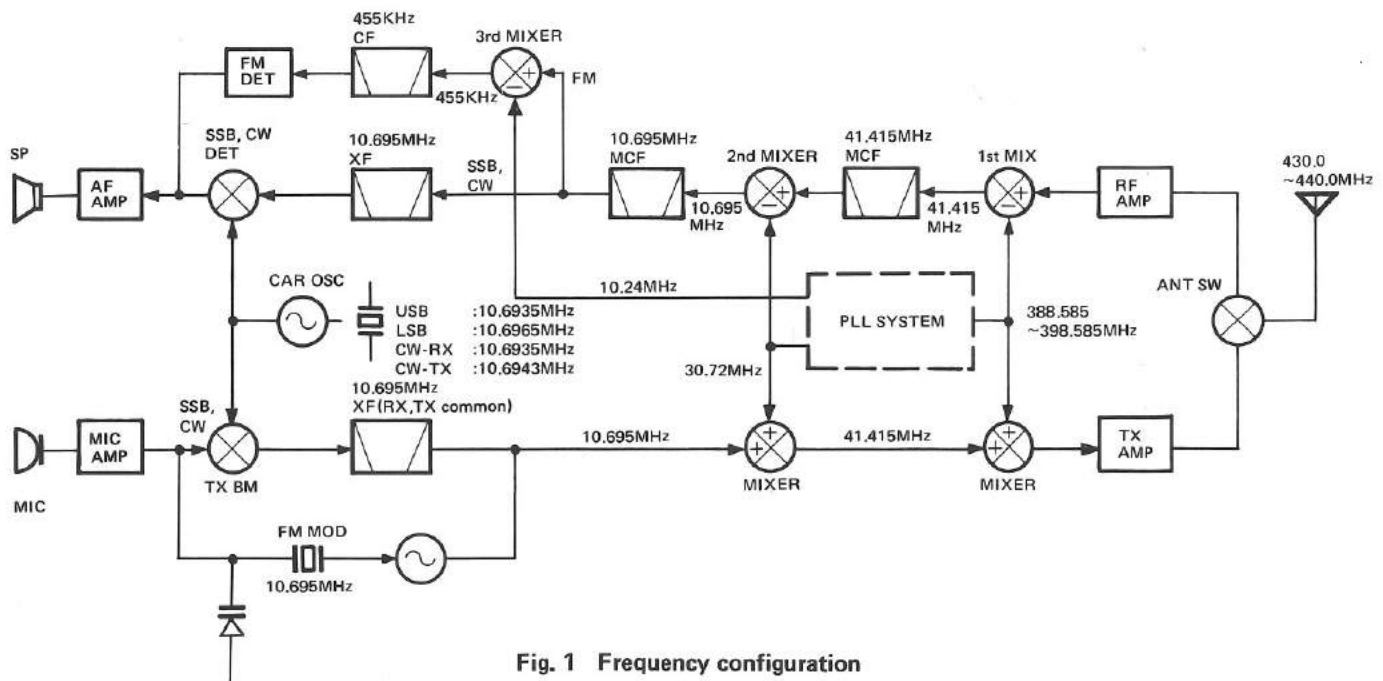


Fig. 1 Frequency configuration

## RECEIVER SYSTEM

## • General

Incoming signals from the antenna pass through a low-pass filter in the Transmitter Final unit and a diode switch (D3,D4) for transmit/receive selection. The signals then go through antenna coil (L301) and then are amplified by a GaAs FETs and junction FET (Q301, 302). Undesired signals are removed from the RF signal by a 2-pole helical resonators (L303,304) and the resulting signal is then applied to the first mixer (Q303). The signal is mixed there with the first local oscillator signal from the PLL system to produce the first IF signal of 41.415MHz. Undesirable adjacent channel signals are removed from the first IF signal by a monolithic crystal filter (MCF : XF1).

The first IF signal is then distributed to either the SSB or FM circuits.

In the SSB circuit, the first IF signal goes through noise blanker gate (D1) then amplified by a Dual Gate MOS FET (Q1) and then applied to the SSB crystal filter (XF1). The filtered signal is then amplified by the 1st IF Amplifier (Q2) and the 2nd IF Amplifier (Q3) and then applied to the ring detector (D5,D6) to obtain received audio signal.

In the FM circuit, the first IF signal is amplified by a Grounded Gate (Q4) J-FET and applied to the second mixer (Q5). The IF signal is mixed with 10.24MHz to produce the second IF signal of 455kHz. Adjacent channel interference is removed from the second IF signals by FM ceramic filter (CF1), the second IF signal is then amplified and detected by IC2 to obtain the received audio signal.

The audio signal from the SSB and FM circuits is then amplified by a common audio preamplifier Q1 (X59-1110-00). High-frequency components are removed from the audio signal by an active LPF (Q2). The audio signal is then applied to the audio volume control on the front panel. The audio signal is amplified again by audio amplifier IC201 (X50-3050-11) and then applied to the speaker.

## CIRCUIT DESCRIPTION

### ● Front end and AGC circuit

The performance of any receiver is determined largely by the performance of its front end section. Important factors which determine the performance of a receiver are sensitivity and two signal characteristics. Recently, most single mode receivers have used GaAs FETs to improve their sensitivity, while all-mode receivers used Dual Gate MOS FETs for improved AGC characteristics and RF gain control of their high frequency amplifiers. This was because, even though the AGC line was placed between the high frequency amplifier and intermediate frequency amplifier, the best way to improve the AGC characteristic had been to control the second gate of the dual-gate MOS FET. When GaAs FET's were used, such AGC characteristics had not been obtained even if the second gate was controlled by the same voltage that was used for a Dual Gate MOS FET. Fig. 2 shows the AGC Vs. gain attenuation characteristics obtained from the high frequency amplifier (MOS FET : 3SK76) and GaAs FET : 3SK184 used in a TR-9500. Since the intermediate frequency amplifier uses a MOS FET : 3SK73, almost no attenuation occurs in the high frequency amplifier even if the AGC voltage is fed directly into the GaAs FET.

| Item                     | Rating                                             |
|--------------------------|----------------------------------------------------|
| Nominal center frequency | 10.695MHz                                          |
| Pass bandwidth           | ±7.5kHz or more at 3dB                             |
| Attenuation bandwidth    | ±25kHz or less at 18dB                             |
| Guaranteed attenuation   | 30dB or more within ±1MHz<br>18dB or more spurious |
| Ripple                   | 0.5dB or less                                      |
| Insertion loss           | 2.0dB or less                                      |
| Terminating impedance    | 3.0kΩ/2pF                                          |

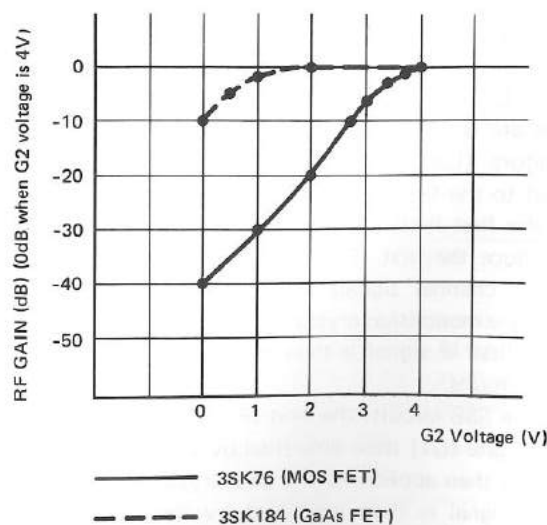
**Table 5 10.695MHz MCF (L71-0230-05) characteristics (Composit unit (FRONT) XF2)**

| Item                                     | Rating                         |
|------------------------------------------|--------------------------------|
| Nominal center frequency                 | 455kHz±1kHz                    |
| 6dB bandwidth                            | ±6kHz or more (from 455kHz)    |
| 50dB bandwidth                           | ±12.5kHz or less (from 455kHz) |
| Ripple (within 455±4kHz)                 | 3dB or less                    |
| Insertion loss                           | 6dB or less                    |
| Guaranteed attenuation (within 455±4kHz) | 35dB or more                   |
| I/O matching impedance                   | 2.0kΩ                          |

**Table 6 Ceramic filter CFW455F (L72-0315-05) characteristics (Composit unit (RX) CF1)**

| Item                     | Rating                                                      |
|--------------------------|-------------------------------------------------------------|
| Nominal center frequency | 41.415MHz                                                   |
| Pass bandwidth           | ±7.5kHz or more at 3dB                                      |
| Attenuation bandwidth    | ±2.5kHz or less at 18dB                                     |
| Guaranteed attenuation   | 20dB or more within ±1MHz<br>except fo~fo + 300kHz spurious |
| Ripple                   | 0.5dB or less                                               |
| Insertion loss           | 1.5dB or less                                               |
| Terminating impedance    | 4kΩ/1pF                                                     |

**Table 4 41.415MHz MCF (L71-0268-05) characteristics (Composit unit (RX) XF1)**



**Fig. 2 AGC attenuation comparison**



## CIRCUIT DESCRIPTION

The TR-851A/E AGC circuit has been designed to allow the AGC voltage to control the GaAs FET similar to the control that was obtained with the MOS FET. As shown in Fig. 3, AGC voltage from an amplifier similar to that used in previous models is fed into the intermediate frequency amplifier. The AGC voltage is approx. 4V when no signal is present. The AGC voltage is amplified by the non-DC current inversion amplifier circuit that is composed of Op Amplifier (IC3). Its output is then applied to the GaAs FET. The output voltage is set to approx. 2.5V when no signal is present, or at minimum RF gain. The AGC characteristics are shown in Fig. 4. The AGC time constant is automatically switched to slow in SSB mode or to fast in CW mode. The high sensitivity of the receiver system is thus obtained without sacrificing any two signal characteristic.

Additionally, the RF gain control, provides a convenient method of tuning out undesired signals even when receiving signals that are too strong from near by local stations.

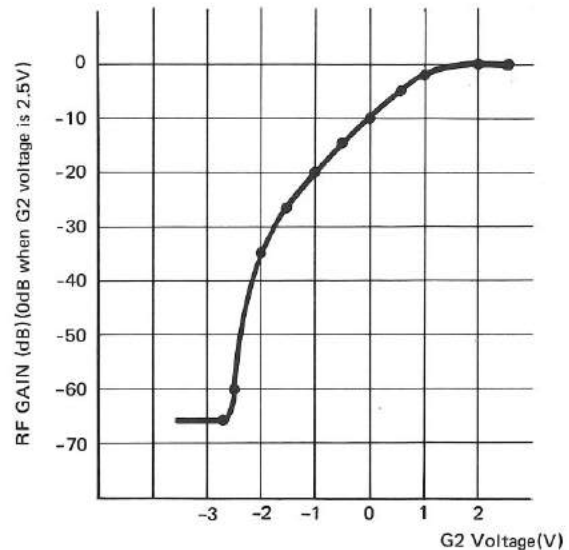


Fig. 4 AGC attenuation comparison

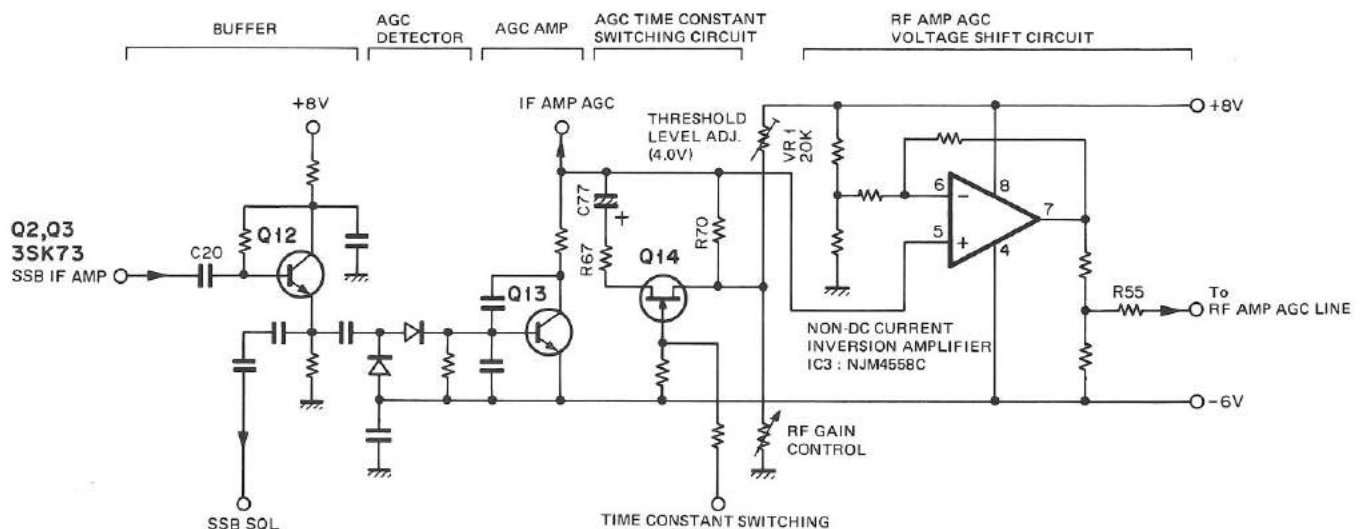


Fig. 3 AGC circuit block diagram

### • SSB squelch circuit

The TR-851A/E SSB squelch circuit is a noise operated type squelch. As compared with signal type squelch, noise detection squelch may be opened even by very weak signals, such as are frequently encountered in SSB.

The high sensitivity of the squelch circuit provides advantages when receiving UHF signals from distant stations and when scanning. Generally, signal type squelch cannot surpass noise detection type in sensitivity, since they are opened by changes in the AGC voltage. It means that, to open a signal type squelch, sufficient voltage level of signal to deflect the S meter is required. The sensitivity of the TR-851A/E squelch is 0.1μV or less (a weak signal which will not deflect the S meter.)

The squelch signal is applied to IC2 used in FM mode, through the SSB filter, SSB IF, and buffer amplifier. This IC, mixes the signal with 10.24MHz to produce 455kHz. Like the FM IF, the 455kHz signal is also amplified by IC2 and applied to the same squelch circuit as that used in FM mode. Since SSB signals do not contain carrier, unlike FM signals, the time constant circuit is switched between FM mode and SSB mode to get an appropriate response time.

## CIRCUIT DESCRIPTION

### TRANSMITTER SYSTEM

#### • General

The transmitter system operates as a double conversion system.

Audio signals from the microphone are amplified by a low-noise transistor (Q25) and applied to the SSB or FM circuits which provide approx. 26dB gain.

In SSB, the amplified signal passes through the SSB microphone gain control, and is amplified by (Q27) and applied to the balanced modulator (IC4). The balanced modulator consists of an IC that provides stable carrier suppression without being influenced by changes in temperature. Signals from the microphone amplifier are mixed with the carrier to produce a DSB signal. The DSB signal is applied to the SSB filter (with a center frequency of 10.695MHz) to produce the SSB signal.

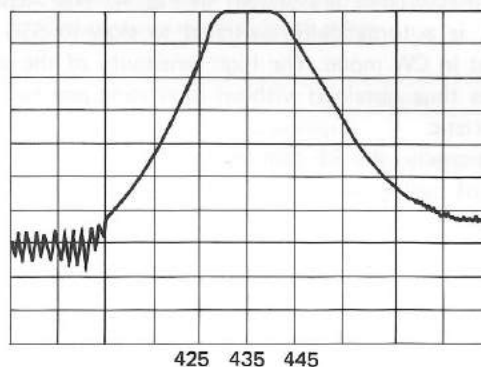
In FM, the signal amplified by the SSB/FM common microphone amplifier (Q25) is applied through the buffer amplifier (Q26) and FM microphone gain control, and then to the pre-emphasis circuit, amplified by (IC1), and limited by Op amplifier (IC1). High frequency components are then removed from the signal by a 18dB/oct splatter filter, and the signal is sent to the FM modulation circuit.

In the FM modulation circuit, signals from the 10.695 MHz crystal oscillator circuit are directly modulated by varactor diode (D21), variable capacitor. This direct frequency modulation enables a flat transmitter frequency response to be obtained from low frequencies to high frequencies. If the frequency deviation becomes excessive, the deviation level will vary from the upper to the lower portion of the signal. The TR-851A/E is designed so that the upper and lower portions of the signal are balanced even with maximum frequency deviation.

A diode switching circuit selects either the SSB signal or the FM signal for input to the first IF amplifier (Q24), depending on the mode that has been selected. This amplifier is based on a dual-gate MOS FET circuit (Q24) and produces the 10.695 MHz first IF signal. Balanced Mixer (Q3,4) mixes the first IF signal with 30.72MHz from the PLL unit to generate the 2nd IF frequency of 41.415MHz. This signal is filtered by a bandpass filter circuit and amplified by Q5, a dual-gate MOS FET.

The 2nd IF is then mixed with the HET OSC signal from the PLL, in a diode based double-balanced mixer to yield the transmitter frequency in the 430MHz region. This signal is amplified by a bandpass amplifier circuit (Fig. 5) consisting of 3 high-Q coils that removes any spurious signals. The signal is then amplified by Q203 and Q204, and applied to the Final amplifier circuit via the DO (Drive Output) line.

Final amplifier (Q1) amplifies the DO signal to the final output power. This signal passes transmit/receive switching diodes D3 and D4, and is then filtered by a low pass filter consisting of L4 to L6 and C9 to C16. The signal is fed directly to the antenna terminal from the low pass filter. The output power is controlled by ALC voltage that is supplied to the second gate of each IF stage.



CENTER..... 435MHz  
FREQUENCY  
SPAN ..... 10MHz/DIV  
SCALE ..... 10dB/DIV

Fig. 5 TX band pass amplifier characteristics

#### • CW circuit description

In CW, the balanced modulator is unbalanced by AGC signal to allow the carrier to pass.

CW keying is performed by gates of the balanced mixer in the second IF circuit and a bias voltage is applied to the first gate of amplifier. The leading and trailing edges are smoothed to prevent key clicks.

To facilitate CW communications, the CW circuit contains CW semi break-in and side tone circuits.

The CW semi break-in circuit is a Schmitt circuit consisting of transistors (Q1-Q4) or the break-in sub assembly. The delay time can be adjusted with VR7.

The side tone circuit operates whenever the key is closed. The side tone circuit operates in modes other than CW, so key adjustment and morse code practice can be performed. Transistor (Q9) is used as the oscillator. Signals from the side tone circuit are amplified by the audio amplifier (IC1). The output frequency of approx. 800Hz can be adjusted with potentiometer (VR4).

## CIRCUIT DESCRIPTION

### • ALC and SWR protection circuits

Fig. 6 shows the ALC and SWR protection circuits.

The forward power and reflected power are detected by the CM coupler (split line). The signal from the coupler is used by the ALC and SWR circuits.

A portion of the signal from the CM coupler circuit is fed to a voltage doubler that forms a portion of the ALC circuit. This generates the negative control voltage used for ALC. The greater the output power the more negative the voltage. This control voltage is amplified by Q205 and then applied to the second gate of each IF MOS FET, to control the transmitter output. This sophisticated design provides a

clean, low distortion SSB output in the TR-851A/E.

The SWR circuit uses a portion of the signal coupled from the CM coupler to sense any reflected power. The signal is amplified by Q5 and then used to control the ALC reference voltage, and thus reduce the gain of the signal applied to the final amplifier.

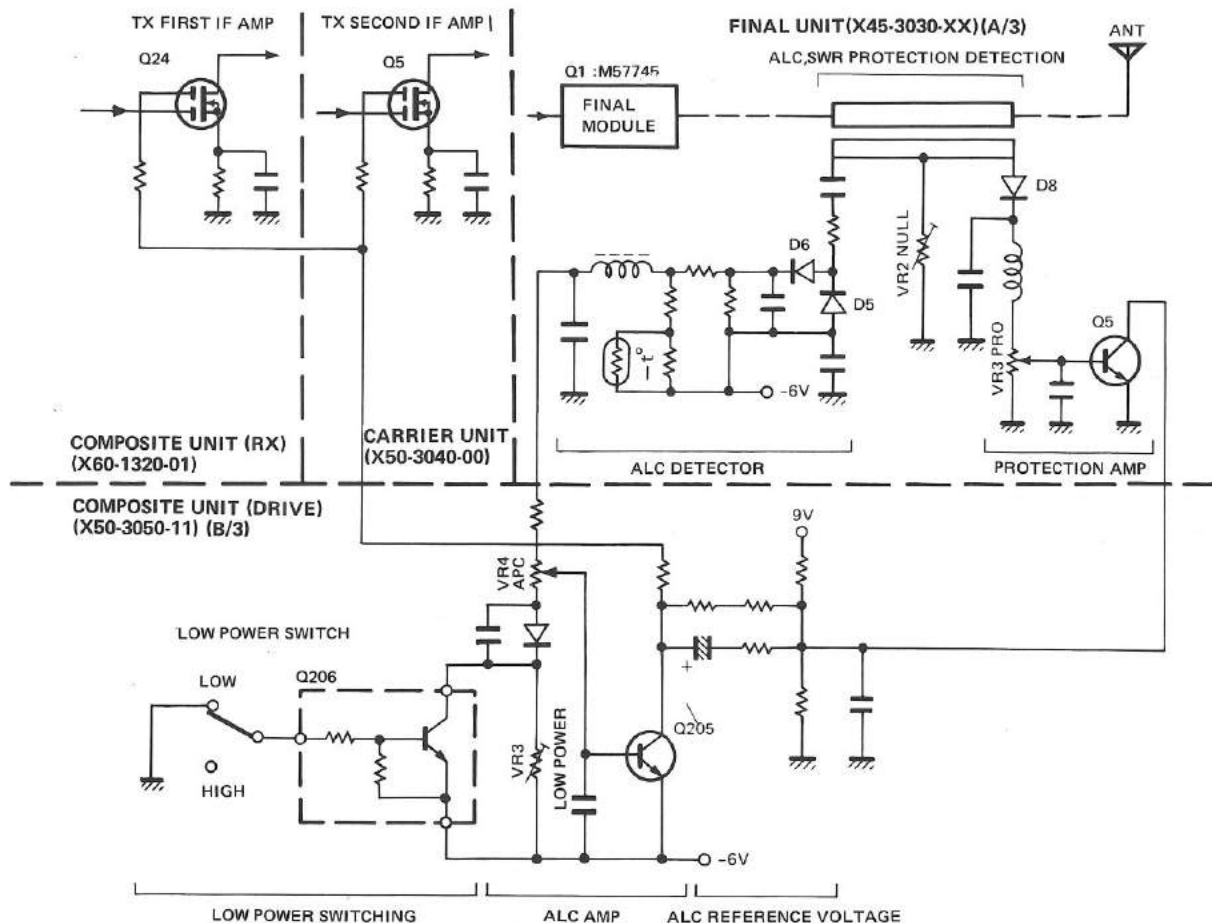


Fig. 6 ALC and SWR protection circuits

### PLL SYNTHESIZER

Fig. 7 is the PLL system block diagram.

The most important feature of the TR-851A/E PLL system is that the main loop VCO (Loop A) is composed of a sub-unit to avoid the unit being influenced by outside forces (especially vibration), which improve the frequency stability. During mobile operation in SSB or CW, this provides a great increase advantage in reliability.

The PLL system uses two loops to form a digital VFO which covers each band in 50Hz steps. Each of the loops uses a PLL IC (TC9172P) with pulse swallow type pre-scaler.

The B loop utilizes a 2.5kHz comparison frequency. The range of its VCO output frequency is from 28.6 to 27.6 MHz (frequency division ratio 11200 to 10800 : 1). The B loop VCO output is frequency divided by 50 (to produce 572 to 552kHz). Which is used to produce a signal that covers 20kHz from 9.668 to 9.688 MHz in 50Hz steps. This signal is then mixed with the reference oscillator frequency to 10.24MHz.

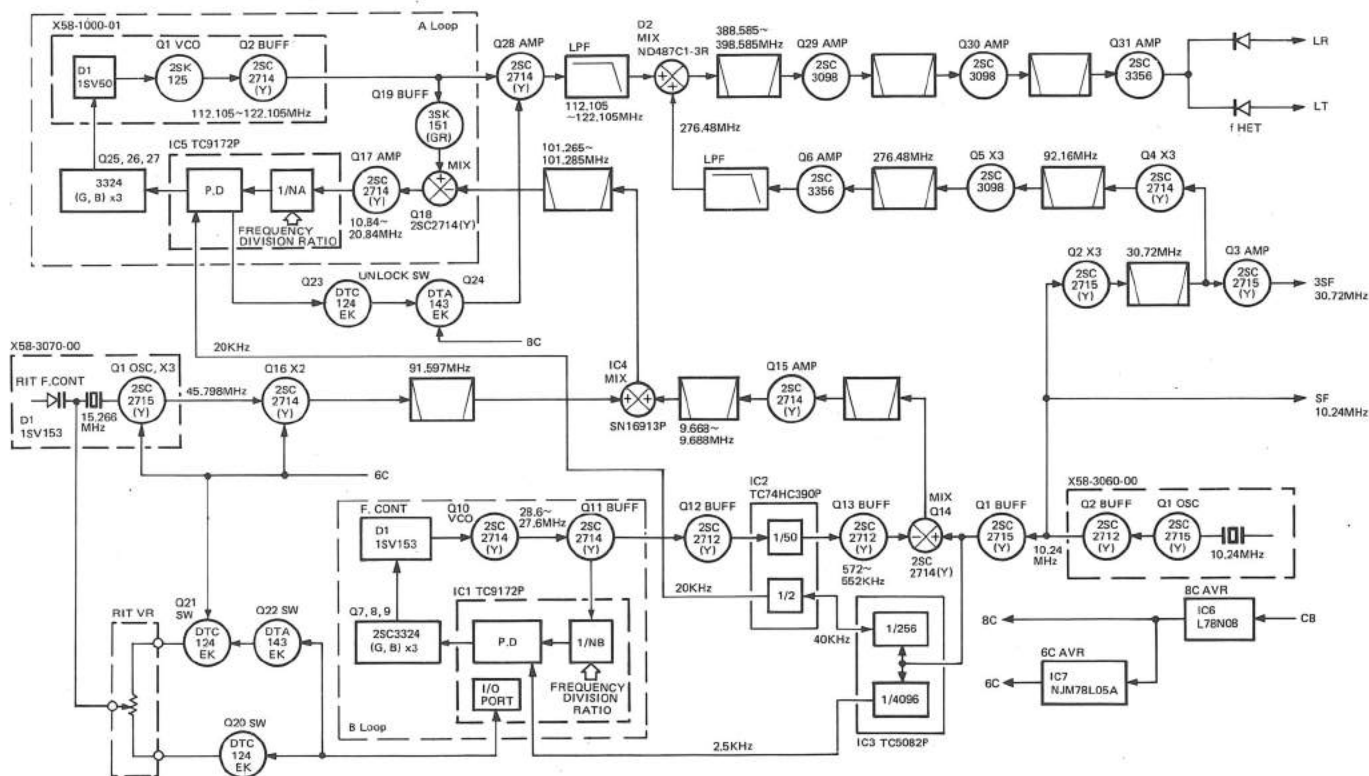
## CIRCUIT DESCRIPTION

The RIT oscillator circuit utilizes a signal of 15.266MHz which is multiplied by 6 to obtain a 91.597MHz signal. The oscillator frequency can be varied within a range of  $\pm 1.2$  kHz from this center frequency by varying the voltage of the varactor diode in the oscillator. When the RIT switch is OFF, the variable capacitor voltage is fixed, because of high resistance, and the RIT oscillator operates as a stable local frequency oscillator. The RIT ON signal is detected by the microprocessor and transferred to the PLL IC containing which contains an I/O port to control the RIT switching circuit. The RIT oscillator output is mixed with a 9.668 to 9.688MHz signal to produce a local frequency range of 101.265 to 101.285MHz for loop A mixing.

The A loop uses a 20kHz comparison frequency to control loop A over a range of 10.84 to 20.84MHz to yield a VCO frequency from 112.105 to 122.105MHz (frequency division ratio 542 to 1042 : 1). To cover the entire 10MHz band in 50Hz steps, the VCO output is mixed with the local oscillator signal (101.265 to 101.285MHz).

The reference oscillator frequency of 10.24MHz produced in the sub-unit has three functions. The first is to provide a reference for loops A and B. The second uses a tuning coil to produce a local oscillator signal for the third mixer used in FM receive. The third use is to multiply the signal by three to produce the local oscillator signal (30.72 MHz) for transmitter and receiver mixing. This particular signal is multiplied by 3, two more times to yield a 276.48 MHz signal, which is mixed with the loopA output signal to yield a VFO that can cover the entire 10MHz band from 388.585 to 398.585MHz in 50Hz steps.

The 10.24MHz reference signal is also used as a local oscillator for transmit/receive mixing, which aids in PLL frequency stability.



|                  | FM                | USB                 | LSB                 | CW-RX               | CW-TX |
|------------------|-------------------|---------------------|---------------------|---------------------|-------|
| f <sub>HET</sub> | 388.585 ~ 398.585 | 388.5865 ~ 398.5865 | 388.5835 ~ 398.5835 | 388.5857 ~ 398.5857 | ←     |
| NA               | 542 ~ 1042        | ←                   | 541 ~ 1041          | 542 ~ 1042          | ←     |
| NB               | 11440 ~ 11040     | ←                   | ←                   | ←                   | ←     |

Fig. 7 PLL system block diagram

## CIRCUIT DESCRIPTION

## DIGITAL CONTROL UNIT

## • General

The control unit consists of two PC boards : one mounted on the front panel, and the other on the main chassis. Processing is controlled by three microprocessors (MPU's).

Fig. 8 is a block diagram of the control unit. The control unit includes three MPU's, their peripheral circuitry, and input circuit (rotary encoder, keyboard, and switches), a reset/backup circuit, a mode switching circuit, and various other switching circuits.

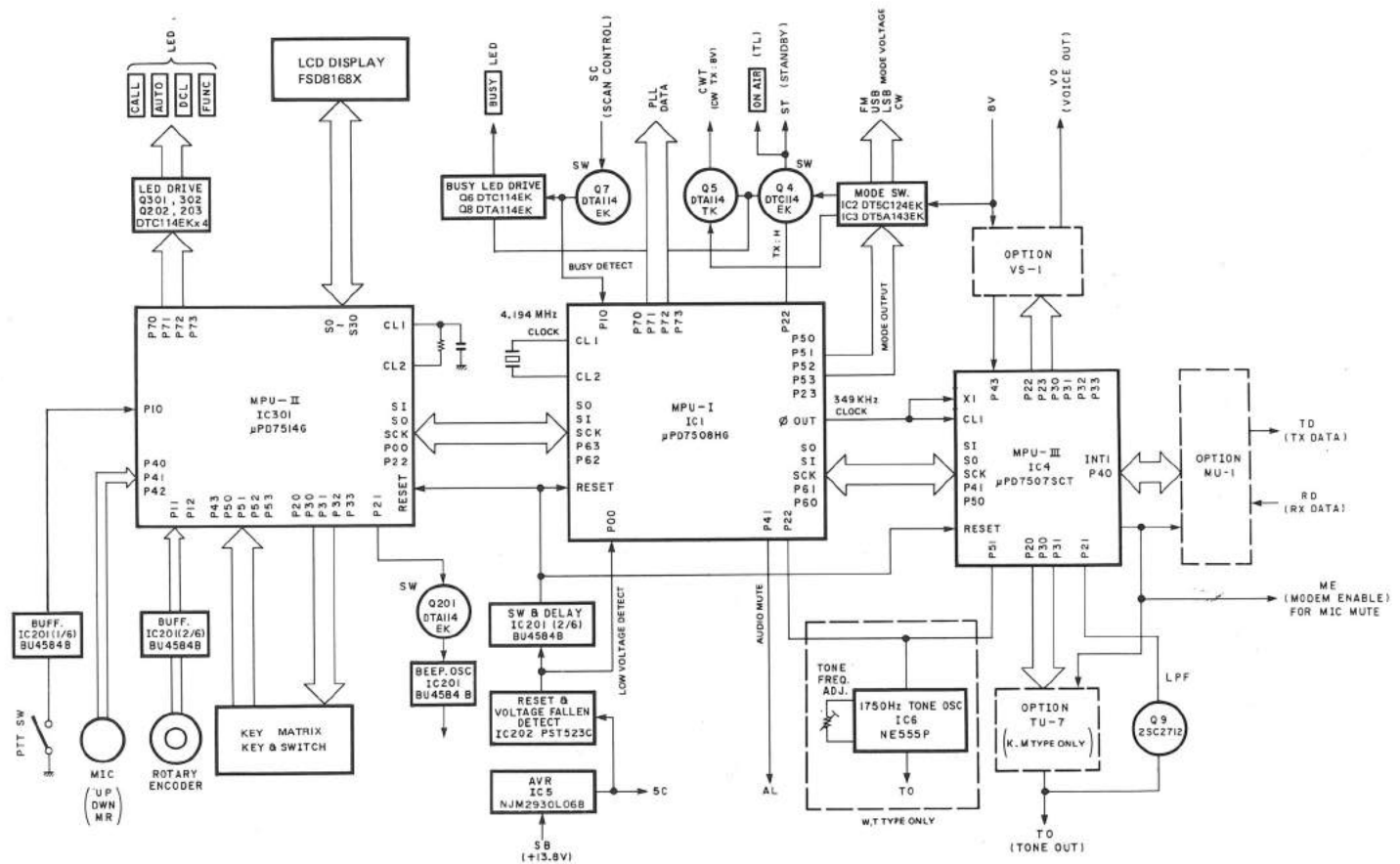


Fig. 8 Control unit block diagram



## CIRCUIT DESCRIPTION

### ● MPU interface circuits

Fig. 9 shows how the three MPUs are interfaced. To exchange data between the MPUs, three clock and data I/O lines ( $\overline{\text{SCK}}$ , SI and SO) and two each of control lines SCK, SQR, DCK, and DRQ are provided.

### ● Reset backup circuit

Fig. 9 also shows the reset backup circuit. When the transceiver power is turned on, an approx. 20ms H level pulse is sent from the reset circuit using a dedicated reset IC (IC201) to the RES line. Since the RES line is connected to all MPUs (MPU-I, MPU-II, MPU-III), the MPUs begin operation at the same time. When the power is turned off, IC202 recognizes that the voltage of the 5V line fell to 4.5V or less, and sets the low voltage fallen detect line (VFD) to a low level. The VFD signal is sent to MPU-I P00 and MPU enters the backup mode.

Output voltage from the lithium battery for backup is supplied to MPU-I and MPU-II providing backup for two MPUs.

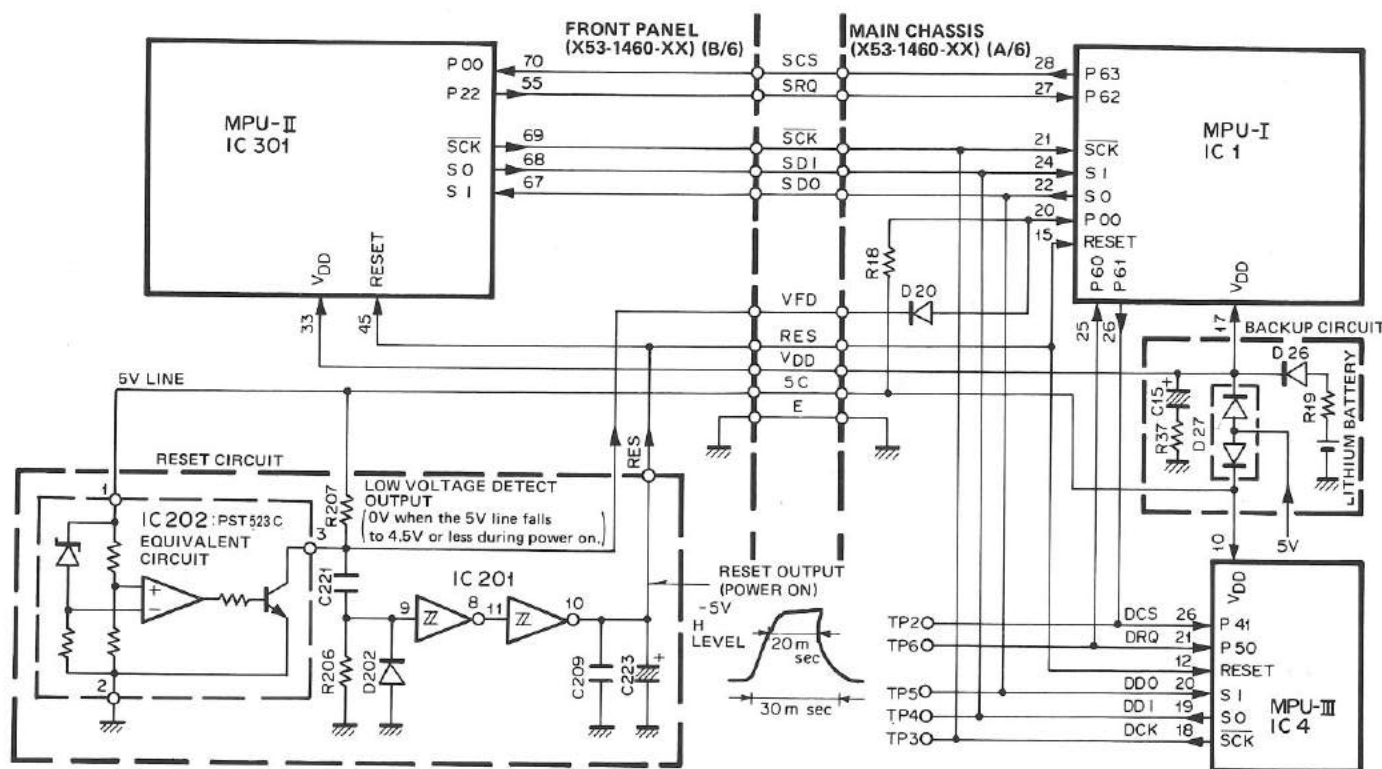


Fig. 9 Interface between MPUs and reset backup circuit

## CIRCUIT DESCRIPTION

• Key, switch and encoder circuits

Fig. 10 shows the key, switch, and encoder input circuits. The front panel keys are arranged in a matrix and key signals are sent to MPU-II, using a key scan technique. The microphone switch lines (PTT, UP, DOWN, etc.) are connected to MPU-II through the protection diodes, CR time constant circuit, and chatter absorption circuits. The encoder is also connected to MPU-II through the CR time constant circuit and the inverter of the Schmitt trigger inputs (IC201) for chattering absorption.

| MIC Pin     | 3   | 4  | 6  |
|-------------|-----|----|----|
| Port bit    | 2   | 1  | 0  |
| Switch/Port | DWN | UP | MR |
| UP + DWN    | 0   | 0  | 0  |
| RES         | 0   | 0  | 1  |
| DOWN        | 0   | 1  | 0  |
| CHL         | 0   | 1  | 1  |
| UP          | 1   | 0  | 0  |
| MR          | 1   | 0  | 1  |
| OFF(MC-55)  | 1   | 1  | 0  |
| OFF(MC-56)  | 1   | 1  | 1  |

Table 7 Microphone input logic

|     | P53      | P52       | P51      | P50      | P43        |
|-----|----------|-----------|----------|----------|------------|
| P20 |          | ▼/F. LOCK | ▲/AL     | COM/TONE | VOICE/TONE |
| P30 |          |           |          | RIT      | FUNC.      |
| P31 | CS       | CSQ       | RES      | CHL      | DCL        |
| P32 | 1 AUTO   | 2 FM/LSB  | 3 USB/CW | 4 REV    | 5 MR       |
| P33 | 6 F.STEP | 7 SCAN    | 8 M      | 9 OFFSET | φ A/B      |

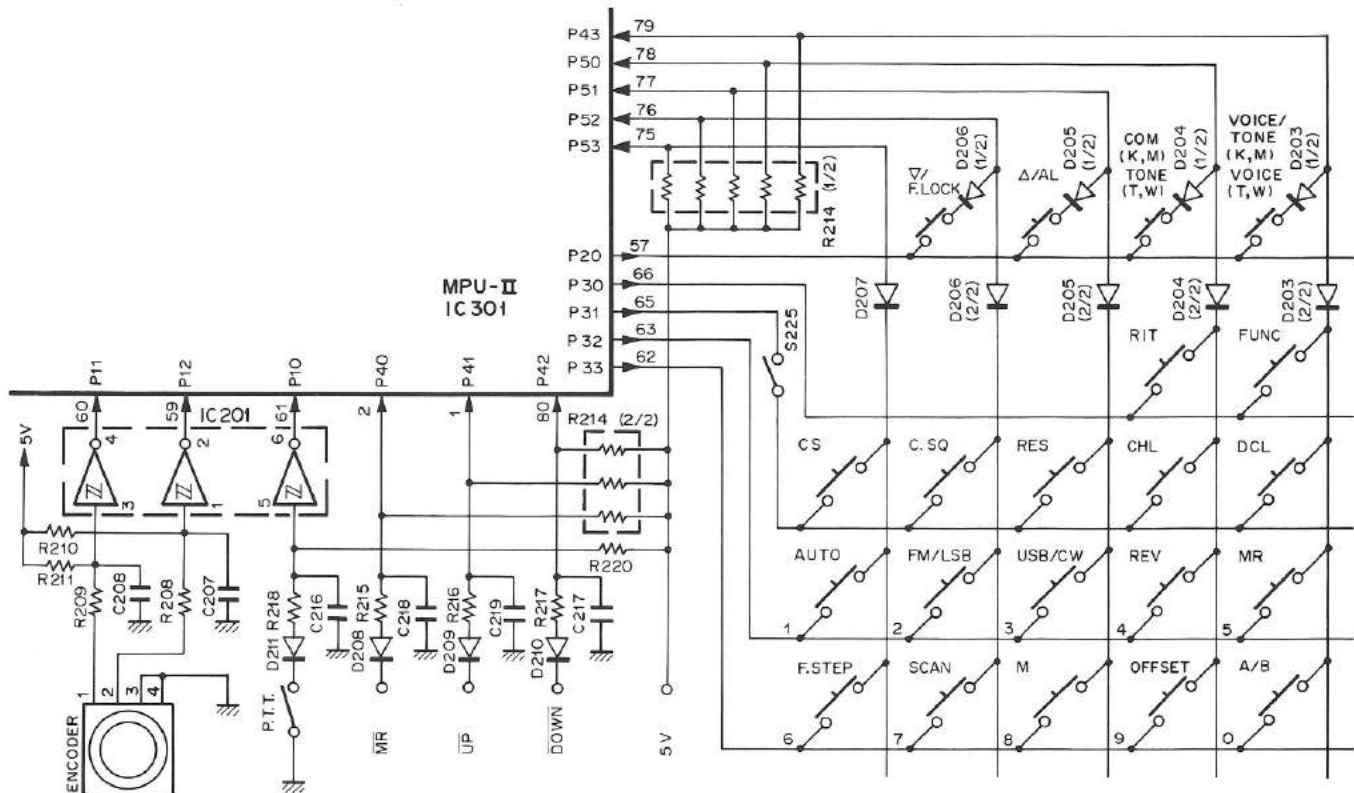


Fig. 10 Key, switch and encoder input circuit

## CIRCUIT DESCRIPTION

### • Mode voltage switching and standby circuit

Fig. 11 shows the mode voltage switching and standby circuit. When a mode is selected with a front panel key, the corresponding port on MPU-I is set to high (5V) and an appropriate mode voltage is transmitted by switching the 8V line.

When the PTT is pressed, MPU-II sends information to MPU-I, and port P22 of MPU-I is set to H, switching Q4.

### • Other I/O circuits

#### 1. Busy input circuit

The Busy input circuit is used to determine whether the scan or DCL system has received a signal. The squelch signal from the receiver system is switched by Q7 and applied to port P10 of MPU-I. This signal also turns the BUSY indicator on, using Q6 and Q8 for switching.

#### 2. Audio mute output (AL)

When checking memory channel M1, performing code squelch during alert operations, port P41 of MPU-I is set to H (5V) to mute audio output.

#### 3. Microphone mute output (ME)

The ME signal is used to mute audio inputs from the microphone when the DCL system transmits a control signal. Port P53 of MPU-III is set to H (5V) to switch Q26 in the MIC input of the RX unit. This signal is also used to control a modem IC in the modem unit MU-1.

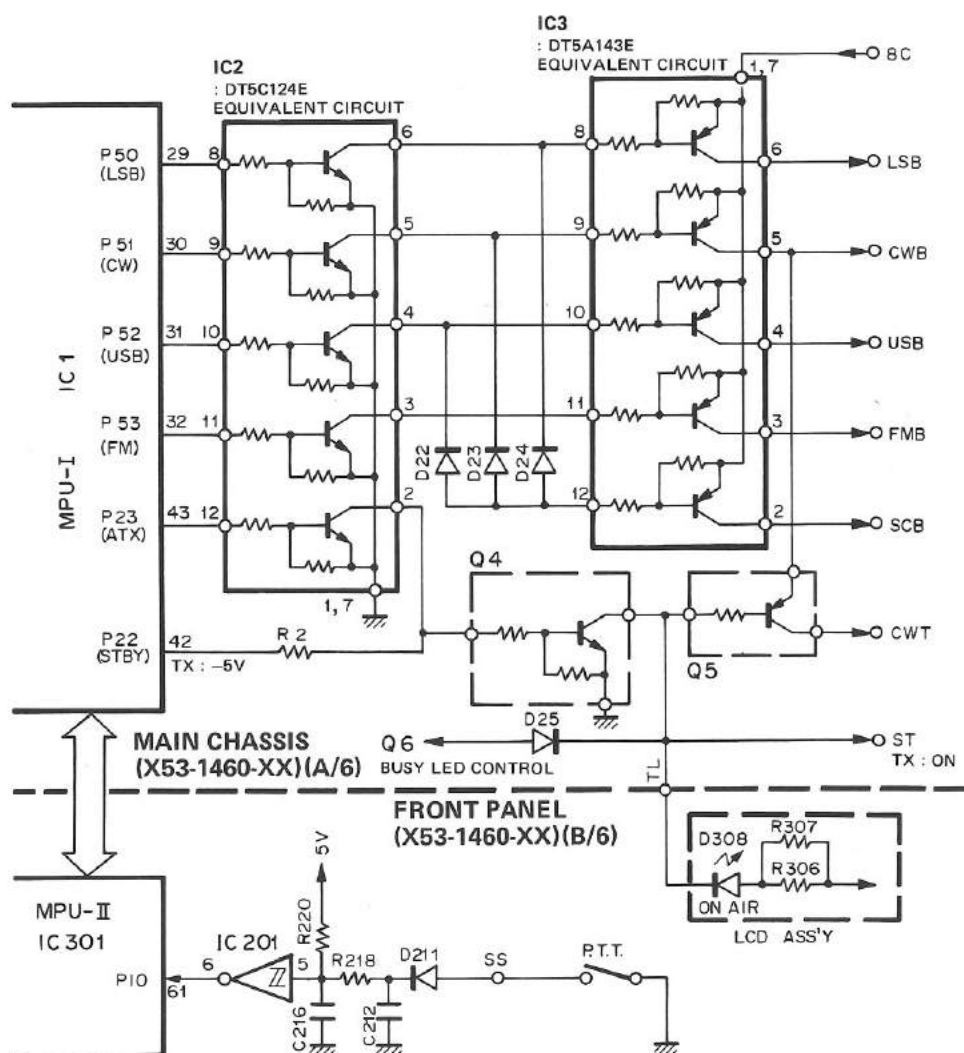


Fig. 11 MODE voltage switching and standby circuit

## CIRCUIT DESCRIPTION

## Test points

|     |     |                       |                                                                                                                                                                                                                                                              |
|-----|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TP2 | DCS | DCL Chip Select       | Data line between MPU-I and MPU-II. Temporarily set to H when an MU-1 or VS-1 related operation is performed. If this line is not reset to L, MPU-III or its peripheral circuit is bad.                                                                      |
| TP6 | DRQ | DCL Request           |                                                                                                                                                                                                                                                              |
| TP7 | VFD | Voltage Fallen Detect | Detects a voltage drop in the 5V line. The voltage of this line is 5V when power is on, and 0V when power is off, or when the 5V line falls to 4.5V or less. When the voltage of this line is abnormal, the VFD line is broken, or IC201 or IC202 is faulty. |
| TP8 |     |                       | Used to monitor the your own DCL control signal through the internal speaker.<br>To monitor it, connect this pin to TP201.<br>Connect only when CD-10 is used.                                                                                               |

## Microprocessor clock

|     |            |        |                                                                                                                                    |
|-----|------------|--------|------------------------------------------------------------------------------------------------------------------------------------|
| IC1 | $\phi$ OUT | 39 pin | Sends the 349kHz produced by frequency dividing X1 (4.19MHz) by 12.<br>This clock is supplied to CL1 of MPU-III (IC4) through C12. |
| IC4 | CL1        | 13 pin | Clock input for the above pin. The 349kHz square wave can be monitored at this pin.                                                |

## Connectors

|    |     |                               |                                                                                                                                                                                                                                                                             |
|----|-----|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| J5 | VFD | Voltage Fallen Detect         | Same function as TP7 above.                                                                                                                                                                                                                                                 |
|    | VDD | Microprocessor backup voltage | Power line between MPU-I (IC1) and MPU-III (IC4). Backed up by a lithium battery when the transceiver power is off. Set to 5V when power is on, 2.5V when power is off. When the voltage drops, the battery is exhausted, or its peripheral circuit (D26 or C15) is faulty. |
|    | RES | Reset                         | Reset line between MPU-I, MPU-II, and MPU-III.<br>Supplies a 5V peak wave for approx. 20ms when power is turned on.                                                                                                                                                         |
|    | SCS | Slave Chip Select             | Data line between MPU-I and MPU-II. Temporarily set to H when a front panel operation is made.<br>When this line is not reset to L, the SCS, SRQ, SCK, SDI, or SDO line is broken, or the LCD assembly may be faulty.                                                       |
|    | SRQ | Slave Request                 |                                                                                                                                                                                                                                                                             |

Table 8 Test pins

| Pin No. | Name  | I/O | Function                           | Logic | Pin No. | Name       | I/O | Function                               | Logic |
|---------|-------|-----|------------------------------------|-------|---------|------------|-----|----------------------------------------|-------|
| 1       | P10   | I   | BUSY input (H : Busy, L : Open)    |       | 23      | NC         | —   | Not used                               |       |
| 2       | P11   | I   | D17 detect input                   |       | 24      | SI         | I   | Serial data input                      |       |
| 3       | P12   | I   | D16 detect input                   |       | 25      | P60        | O   | DCL request (DRQ) (to IC4)             |       |
| 4       | P13   | —   | Not used (NC)                      |       | 26      | P61        | O   | DCL chip select (DCS) (to IC4)         |       |
| 5       | P30   | —   | Not used (NC)                      |       | 27      | P62        | O   | Slave request (SRQ) (to IC301)         |       |
| 6       | P31   | O   | Output for D16/D17 detection       |       | 28      | P63        | O   | Slave chip select (SCS) (to IC301)     |       |
| 7       | P32   | O   | Tone control output 1750Hz (for W) |       | 29      | P50        | O   | LSB mode select output (in LSB : H)    |       |
| 8       | P33   | —   | Not used (NC)                      |       | 30      | P51        | O   | CW mode select output (in CW : H)      |       |
| 9       | P70   | O   | PLL serial data                    |       | 31      | P52        | O   | USB mode select output (in USB : H)    |       |
| 10      | P71   | O   | PLL serial clock                   |       | 32      | P53        | O   | FM model select output (in FM : H)     |       |
| 11      | NC    | —   | Not used                           |       | 33      | P40        | —   | Not used (NC)                          |       |
| 12      | NC    | —   | Not used                           |       | 34      | P41        | O   | Audio mute output(in Alert search : H) |       |
| 13      | P72   | O   | PLL A loop enable                  |       | 35      | P42        | O   | SQ select output (in open search : H)  |       |
| 14      | P73   | O   | PLL B loop enable                  |       | 36      | P43        | —   | Not used (NC)                          |       |
| 15      | RESET | I   | Reset input                        |       | 37      | Vss        | —   | GND                                    |       |
| 16      | CL1   | —   | Connect to oscillator              |       | 38      | EVENT      | —   | Not used (GND)                         |       |
| 17      | VDD   | —   | Power pin (5V)                     |       | 39      | $\phi$ OUT | O   | 349kHz output (To IC4)                 |       |
| 18      | CL1   | —   | Connect to oscillator              |       | 40      | P20        | O   | Output for switching diode             |       |
| 19      | INT 1 | —   | Not used (GND)                     |       | 41      | P21        | O   | Output for switching diode             |       |
| 20      | P00   | I   | Low voltage detect input (VFD)     |       | 42      | P22        | O   | Transmit select (transmit mode : H)    |       |
| 21      | SCK   | I   | Serial clock input (SCK, DCK)      |       | 43      | P23        | O   | Transmit disable                       |       |
| 22      | SO    | O   | Serial data output (SDO, DDO)      |       | 44      | NC         | —   | Not used                               |       |

SQ = Squelch

Table 9  $\mu$ PD7508HG-564-22 (MPU-I) pin functions (Control unit IC1)

## CIRCUIT DESCRIPTION

| Pin No. | Name  | I/O | Function                            | Logic | Pin No. | Name | I/O | Function                              | Logic |
|---------|-------|-----|-------------------------------------|-------|---------|------|-----|---------------------------------------|-------|
| 1       | P43   | I   | Option VS-1 BUSY input              |       | 15      | CL2  | -   | Not used (NC)                         |       |
| 2       | X1    | -   | Not used                            |       | 16      | INT1 | I   | Model clock input (from MU-1)         |       |
| 3       | X2    | -   | Not used                            |       | 17      | INT0 | -   | Not used (GND)                        |       |
| 4       | P20   | O   | Option TU-7 latch output (for K, M) |       | 18      | SCK  | O   | Serial clock (DCK)                    |       |
| 5       | P21   | -   | Not used                            |       | 19      | SO   | O   | Serial data output (DDI)              |       |
| 6       | P22   | O   | Option VS-1 strobe output (SR)      |       | 20      | SI   | I   | Serial data input (DDO)               |       |
| 7       | P23   | O   | PS4 Option VS-1 data output         |       | 21      | P50  | O   | DCL request (DRQ) (to MU-1)           |       |
| 8       | P30   | O   | PS3 VS-1/TU-7 clock, data output    |       | 22      | P51  | -   | Option TU-7 clock output (for W, T)   |       |
| 9       | P31   | O   | PS2 VS-1/TU-7 clock output          |       | 23      | P52  | -   | Not used (NC)                         |       |
| 10      | P32   | O   | PS1 Option VS-1 data output         |       | 24      | P53  | O   | Modem enable output (to MU-1)         |       |
| 11      | P33   | O   | PS0 Option VS-1 data output         |       | 25      | P40  | I/O | Model data input and output (to MU-1) |       |
| 12      | RESET | I   | Reset input                         |       | 26      | P41  | I   | DCL chip select (DCS) (from IC1)      |       |
| 13      | CL1   | I   | 349kHz clock input (from IC1)       |       | 27      | P42  | -   | Not used (NC)                         |       |
| 14      | VDD   | -   | Power pin (5V)                      |       | 28      | Vss  | -   | GND                                   |       |

Table 10  $\mu$ PD7507SCT-226 (MPU-III) pin functions (Control unit IC4)

| Pin No. | Name | I/O | Function                   | Logic | Pin No. | Name  | I/O | Function                                 | Logic |
|---------|------|-----|----------------------------|-------|---------|-------|-----|------------------------------------------|-------|
| 1       | P41  | I   | Microphone switch input    |       | 41      | S4    | O   | Segment display output                   |       |
| 2       | P40  | I   | Microphone switch output   |       | 42      | NC    | -   | Not used                                 |       |
| 3       | X2   | -   | Not used (NC)              |       | 43      | S3    | O   | Segment display output                   |       |
| 4       | X1   | -   | Not used (GND)             |       | 44      | S4    | O   |                                          |       |
| 5       | VLC3 | -   | LCD binary voltage pin     |       | 45      | S1    | O   |                                          |       |
| 6       | VLC2 | -   |                            |       | 46      | S0    | O   |                                          |       |
| 7       | VLC1 | -   |                            |       | 47      | INT1  | -   | Not used (GND)                           |       |
| 8       | COM3 | -   | Not used (NC)              |       | 48      | RESET | I   | Reset input                              |       |
| 9       | COM2 | -   | Not used (NC)              |       | 49      | CL1   | -   | Connect to CR for clock oscillator       |       |
| 10      | COM1 | O   | LCD common display output  |       | 50      | CL2   | -   | Connect to CR for clock oscillator       |       |
| 11      | COM0 | O   |                            |       | 51      | P73   | -   | Not used (NC)                            |       |
| 12      | S31  | O   | Not used (NC)              |       | 52      | P72   | O   | DCL LED display output                   |       |
| 13      | S30  | O   | LCD segment display output |       | 53      | P71   | O   | AUTO LED display output                  |       |
| 14      | S29  | O   |                            |       | 54      | P70   | O   | CALL LED display output                  |       |
| 15      | S28  | O   |                            |       | 55      | P22   | O   | Slave request (SRQ) (to IC1)             |       |
| 16      | S27  | O   |                            |       | 56      | P21   | O   | Beep output (on : H)                     |       |
| 17      | S26  | O   |                            |       | 57      | P20   | O   | Key scan output                          |       |
| 18      | S25  | O   |                            |       | 58      | P13   | -   | Not used (GND)                           |       |
| 19      | S24  | O   |                            |       | 59      | P12   | I   | Encoder input                            |       |
| 20      | S23  | O   |                            |       | 60      | P11   | I   | Encoder input                            |       |
| 21      | S22  | O   |                            |       | 61      | P10   | I   | PTT switch input                         |       |
| 22      | S21  | O   |                            |       | 62      | P33   | O   | Key scan output                          |       |
| 23      | NC   | -   | Not used                   |       | 63      | P32   | O   | Key scan output                          |       |
| 24      | S20  | O   | LCD segment display output |       | 64      | Vss   | -   | GND                                      |       |
| 25      | S19  | O   |                            |       | 65      | P31   | O   | Key scan output                          |       |
| 26      | S18  | O   |                            |       | 66      | P30   | O   | Key scan output                          |       |
| 27      | S17  | O   |                            |       | 67      | SI    | I   | Serial data input (SDO)                  |       |
| 28      | S16  | O   |                            |       | 68      | SO    | O   | Serial data output (SDI)                 |       |
| 29      | S15  | O   |                            |       | 69      | SCK   | O   | Serial clock                             |       |
| 30      | S14  | O   |                            |       | 70      | P00   | I   | Slave chip select (SCS) (from IC1)       |       |
| 31      | S13  | O   |                            |       | 71      | P63   | -   | Not used (GND)                           |       |
| 32      | S12  | O   |                            |       | 72      | P62   | -   | Not used (GND)                           |       |
| 33      | VDD  | -   | Power pin (5V)             |       | 73      | P61   | O   | FUNC LED output                          |       |
| 34      | S11  | O   | Segment display output     |       | 74      | P60   | O   | LCD bias control (Nor.: L, Power off: H) |       |
| 35      | S10  | O   |                            |       | 75      | P53   | I   | Key scan input                           |       |
| 36      | S9   | O   |                            |       | 76      | P52   | I   |                                          |       |
| 37      | S8   | O   |                            |       | 77      | P51   | I   |                                          |       |
| 38      | S7   | O   |                            |       | 78      | P50   | I   |                                          |       |
| 39      | S6   | O   |                            |       | 79      | P43   | I   |                                          |       |
| 40      | S5   | O   |                            |       | 80      | P42   | I   | Microphone switch input                  |       |

Nor. = Normal

Table 11  $\mu$ PD7514G-143-12 (MPU-II) pin functions (LCD assembly IC301)

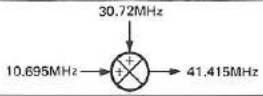


## ELEMENT FUNCTIONS

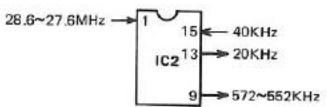
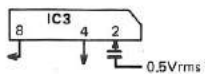
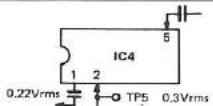
## FINAL UNIT (X45-3030-XX)

| Element | Function                                       | Description                                                                                                                                                                   |
|---------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q1      | Power amplifier                                |                                                                                                                                                                               |
| Q2~Q4   | Drive + B AVR                                  |                                                                                                                                                                               |
| Q5      | SWR protection control                         | Adjustable with VR3. Normally, base voltage is 0V and collector voltage is 4.0V in TX mode. When the antenna is opened, base voltage is 0.7V and collector voltage is 1.7V.   |
| D1      | Protection against reverse power connection    | A short-circuit occurs when DC power connection is reversed. If power is not turned on when correct DC power connection is made, it may be due to a burned negative DC cable. |
| D2      | AVR temperature compensation for drive circuit |                                                                                                                                                                               |
| D3,D4   | Transmit/receive select                        | Transmit mode : On. If DC source current flows, and no transmitter output is present, either of the diodes may be faulty.                                                     |
| D5,D6   | ALC detection                                  | ALC, the RF output coupled with C46 and R12 in the Final unit, is rectified by D5 and D6, and supplied as a DC control voltage to the preceding circuitry.                    |
| D7      | RF meter detection                             | Adjustable with VR1. The RF meter reads 8 at 26W.                                                                                                                             |
| D8      | Reflected wave detection                       | Adjustable with VR3. 4A flows when the antenna is short-circuited.                                                                                                            |

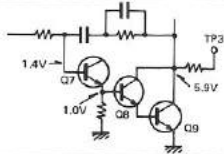
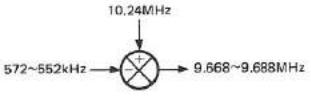
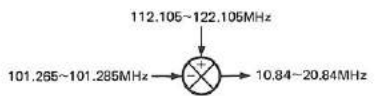
## CAR UNIT (X50-3030-00)

| Element | Function            | Description                                                                                                                                                 |
|---------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Q1      | Carrier OSC         | Operates in SSB or CW mode.                                                                                                                                 |
| Q2      | Buffer amp.         | Operates in SSB or CW mode.                                                                                                                                 |
| Q3,4    | Transmit mixer      | Operates in the transmit mode. <div style="text-align: right;">  </div> |
| Q5      | Transmit IF amp.    | Operates in the transmit mode. 41.415MHz.                                                                                                                   |
| D1      | CAR X'TAL switching | LSB transmit mode : ON (1/2), CW transmit mode : ON (1/2).                                                                                                  |
| D2      | CAR X'TAL switching | CW receive or USB mode : ON.                                                                                                                                |

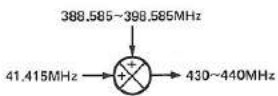
## COMPOSITE UNIT (PLL) (X50-3050-11) (A/3)

| Element | Function                        | Description                                                                                                                                                                                                                                                                                                                |
|---------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC1     | Loop                            | Loop B.                                                                                                                                                                                                                                                                                                                    |
| IC2     | Frequency divider 1/2, 1/50     | <div style="display: flex; justify-content: space-between;"> <div> <p>① 28.6 to 27.6MHz input.</p> <p>⑨ 572 to 552kHz output.</p> <p>⑬ 20kHz output.</p> <p>⑮ 40kHz input.</p> </div> <div style="text-align: right;">  </div> </div> |
| IC3     | Frequency divider 1/256, 1/4096 | <div style="display: flex; justify-content: space-between;"> <div> <p>② input (10.24MHz).</p> <p>④ 2.5kHz output.</p> <p>⑧ 40kHz output.</p> </div> <div style="text-align: right;">  </div> </div>                                   |
| IC4     | Mixer                           | <div style="display: flex; justify-content: space-between;"> <div> <p>① 101.256 to 101.285MHz output.</p> <p>② 91.597MHz input.</p> <p>⑤ 9.668 to 9.688MHz input.</p> </div> <div style="text-align: right;">  </div> </div>          |
| IC5     | PLL                             | Loop A                                                                                                                                                                                                                                                                                                                     |
| IC6     | 8V AVR                          | Input : 13.2V (CB), output : 8.1V                                                                                                                                                                                                                                                                                          |
| IC7     | 6V AVR                          | Input : 8.1V, output : 6.2V.                                                                                                                                                                                                                                                                                               |
| Q1      | Buffer amp.                     | 10.24MHz.                                                                                                                                                                                                                                                                                                                  |
| Q2      | 3 frequency multiplication      | 30.72MHz output.                                                                                                                                                                                                                                                                                                           |
| Q3      | Output amp.                     | 30.72MHz.                                                                                                                                                                                                                                                                                                                  |
| Q4      | 3 frequency multiplication      | 92.16MHz output.                                                                                                                                                                                                                                                                                                           |
| Q5      | 3 frequency multiplication      | 276.48MHz output.                                                                                                                                                                                                                                                                                                          |
| Q6      | Amp.                            | 276.48MHz.                                                                                                                                                                                                                                                                                                                 |

## ELEMENT FUNCTIONS

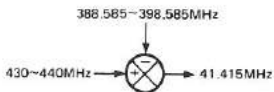
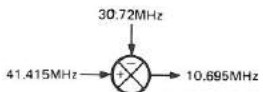
| Element | Function                   | Description                                                                          |
|---------|----------------------------|--------------------------------------------------------------------------------------|
| Q7~9    | Loop B PLL low-pass filter |   |
| Q10     | Loop B VCO                 | 28.6 to 27.6MHz.                                                                     |
| Q11,12  | Buffer amp.                | 28.6 to 27.6MHz.                                                                     |
| Q13     | Buffer amp.                | 572 to 552kHz.                                                                       |
| Q14     | Mixer                      |   |
| Q15     | Amp.                       | 9.668 to 8.688MHz.                                                                   |
| Q16     | 2 frequency multiplication | 91.597MHz output.                                                                    |
| Q17     | Loop A PLL IF amp.         | 10.84 to 20.84MHz.                                                                   |
| Q18     | Mixer                      |    |
| Q19     | Buffer amp.                | 112.105 to 122.105MHz.                                                               |
| Q20~22  | RIT switching              | RIT OFF : OFF, RIT ON : ON.                                                          |
| Q23,24  | Unlock switching           | LOCK ON, UNLOCK : OFF.                                                               |
| Q25~27  | Loop A PLL low-pass filter |                                                                                      |
| Q28     | Amp.                       | 112.105 to 122.105MHz.                                                               |
| Q29~31  | Amp.                       | 388.585 to 398.585MHz.                                                               |
| D1      | Loop B VCO                 |                                                                                      |
| D2      | Mixer                      |  |
| D3      | Q31 idling                 |                                                                                      |
| D4,5    | Output switching           | Receive : ON.                                                                        |

### COMPOSIT UNIT (DRIVE) (X50-3050-11) (B/3)

| Element  | Function                                      | Description                                                                                                    |
|----------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| IC201    |                                               |                                                                                                                |
| Q201,202 | Transmit amp.                                 | Transmit : operation, 435MHz bandwidth.                                                                        |
| Q203     | Transmit pre-amp.                             | Transmit : operation, 435MHz bandwidth.                                                                        |
| Q204     | Transmit driver                               | Transmit : operation, 435MHz bandwidth.                                                                        |
| Q205     | ALC amp.                                      |                                                                                                                |
| Q206     | Transmit output select                        | HI : ON, LOW : OFF.                                                                                            |
| Q207     | Sidetone oscillator                           | Approx. 800Hz.                                                                                                 |
| Q208     | Key detect switch                             | No key : OFF, Key in CW mode : ON.                                                                             |
| Q209     | Key detect switch                             | Q208 OFF : ON, Q208 ON : OFF.                                                                                  |
| Q210     | Transmit switch                               | Q209 ON or KEY DOWN : ON, Q209 OFF or KEY UP : OFF.                                                            |
| D201     | Transmit mixer                                | <br>Transmit : operation. |
| D202     | Q203 idling                                   |                                                                                                                |
| D203     | Q204 idling                                   |                                                                                                                |
| D204     | Current reversal prevention                   |                                                                                                                |
| D205     | ALC circuit temperature compensation          |                                                                                                                |
| D206     | Sidetone OSC circuit temperature compensation |                                                                                                                |
| D207     | Side tone switching                           | KEY DOWN : ON.                                                                                                 |
| D208     | Current reversal prevention                   |                                                                                                                |

## ELEMENT FUNCTIONS

## COMPOSIT UNIT (FRONT) (X50-3050-11) (C/3)

| Element  | Function                    | Description                                                                                                 |
|----------|-----------------------------|-------------------------------------------------------------------------------------------------------------|
| Q301,302 | RF amp.                     | Receive : operation.                                                                                        |
| Q303     | 1st mixer                   | Receive : operation.<br> |
| Q304     | 2nd mixer                   | Receive : operation.<br> |
| Q305,306 | 8R edge-rising time setting | Approx. 10ms delay.                                                                                         |
| D301     | 30.72MHz signal switch      | Transmit : ON (carrier side 1/2), Receive : ON (front side 1/2).                                            |

## VCO (X58-1000-01)

| Element | Function                   | Description            |
|---------|----------------------------|------------------------|
| Q1      | Loop A VCO                 | 112.105 to 122.105MHz. |
| Q2      | Buffer amp.                | 112.105 to 122.105MHz. |
| D1      | Loop A VCO voltage control |                        |

## 10.24MHz OSC (X58-3060-00)

| Element | Function                    | Description |
|---------|-----------------------------|-------------|
| Q1      | 10.24MHz crystal oscillator | 10.24MHz.   |
| Q2      | Voltage amp.                | 10.24MHz.   |

## RIT (X58-3070-00)

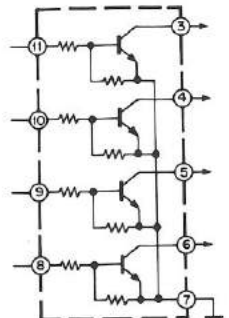
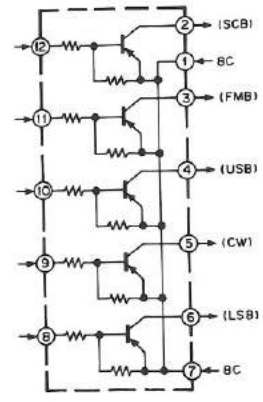
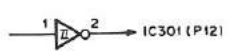
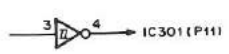
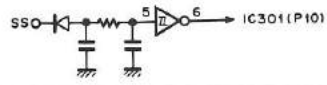
| Element | Function                  | Description |
|---------|---------------------------|-------------|
| Q1      | RIT crystal oscillator    | 15.226MHz.  |
| D1      | RIT OSC frequency control |             |

## CW BREAK-IN (X59-1130-00)

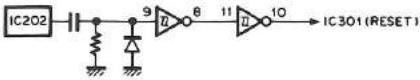
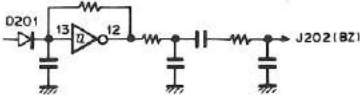
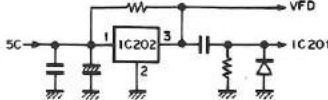
| Element | Function                | Description                                               |
|---------|-------------------------|-----------------------------------------------------------|
| Q1      | KEY DOWN detection      | KEY DOWN in CW mode : ON.                                 |
| Q2      | Schmitt trigger circuit | KEY DOWN in CW mode : ON.                                 |
| Q3      | Schmitt trigger circuit | KEY DOWN in CW mode : OFF.                                |
| Q4      | Transmit switching      | KEY DOWN in CW mode : ON, information to microprocessors. |

## ELEMENT FUNCTIONS

### CONTROL UNIT (X53-1460-XX)

| Element     | Function                       | Description                                                                                                                                                                                                                                                                                                                                                        |
|-------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC1         | Microprocessor I               | See Circuit Description.                                                                                                                                                                                                                                                                                                                                           |
| IC2         | Mode + B switching             | <p>FM mode : ③ LOW, ⑪ HI<br/>           USB mode : ④ LOW, ⑩ HI<br/>           CW mode : ⑤ LOW, ⑨ HI<br/>           LSB mode : ⑥ LOW, ⑧ HI</p> <p>When a mode is selected with a front panel key, a port (P50 to P53) corresponding to the MPU-I PC board is set to H (5V).</p>  |
| IC3         | Mode + B switching             | <p>USB, CW, LSB mode : ② + 8V, ⑫ LOW<br/>           FM mode : ③ + 8V, ⑪ LOW<br/>           USB mode : ④ + 8V, ⑩ LOW<br/>           CW mode : ⑤ + 8V, ⑨ LOW<br/>           LSB mode : ⑥ + 8V, ⑧ LOW</p>                                                                         |
| IC4         | Microprocessor II              | See Circuit Description.                                                                                                                                                                                                                                                                                                                                           |
| IC5         | 5.6V AVR                       |                                                                                                                                                                                                                                                                                                                                                                    |
| Q4          | Standby switching              | Transmit mode : On. The power circuit is switched.                                                                                                                                                                                                                                                                                                                 |
| Q5          | CW transmit + B switching      | CW transmit mode : On.                                                                                                                                                                                                                                                                                                                                             |
| Q6          | BUSY LED switching             | Q7 On : On, Q7 Off : Off.                                                                                                                                                                                                                                                                                                                                          |
| Q7          | Scan switching                 | SC High : Off, SC Low : On.                                                                                                                                                                                                                                                                                                                                        |
| Q8          | BUSY LED switching             | Q6 On : On, Q6 Off : Off.                                                                                                                                                                                                                                                                                                                                          |
| D17,D18     | Microprocessor port protection |                                                                                                                                                                                                                                                                                                                                                                    |
| D19         | Current reversal prevention    | USB + LSB = SSB.                                                                                                                                                                                                                                                                                                                                                   |
| D20,D21     | Microprocessor port protection |                                                                                                                                                                                                                                                                                                                                                                    |
| D22         | Current reversal prevention    | USB mode : On. IC3 ② outputs + 8V.                                                                                                                                                                                                                                                                                                                                 |
| D23         | Current reversal prevention    | CW mode : On. IC3 ② outputs + 8V.                                                                                                                                                                                                                                                                                                                                  |
| D24         | Current reversal prevention    | LSB mode : On. IC3 ② outputs + 8V.                                                                                                                                                                                                                                                                                                                                 |
| D25         | Current reversal prevention    | Prevents current reversal from the RX.                                                                                                                                                                                                                                                                                                                             |
| D26         | Current reversal prevention    | Prevents current from flowing to the backup battery.                                                                                                                                                                                                                                                                                                               |
| D27         | Current reversal prevention    | Prevents backup battery current from flowing to inappropriate circuits.                                                                                                                                                                                                                                                                                            |
| D29         | Microprocessor port protection |                                                                                                                                                                                                                                                                                                                                                                    |
| IC201 (1/6) | Encoder rectification          | Chatter absorption.<br>                                                                                                                                                                                                                                                       |
| IC201 (2/6) | Encoder rectification          | Chatter absorption.<br>                                                                                                                                                                                                                                                       |
| IC201 (3/6) | Standby rectification          | Chatter absorption.<br>                                                                                                                                                                                                                                                       |

## ELEMENT FUNCTIONS

| Element           | Function                            | Description                                                                                                                                                                                                      |
|-------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC201 (4/6),(5/6) | Reset pulse rectification           |                                                                                                                               |
| IC201 (6/6)       | Beeper oscillation                  | Approx. 1.9kHz<br>                                                                                                            |
| IC202             | Reset pulse generation              | When the transceiver power is turned on, the reset circuit IC202 emits an approx. 20ms high level pulse via the RES line.<br> |
| Q201              | Beeper switching                    | Beeper On : Off, normal : On.                                                                                                                                                                                    |
| Q202              | DCL LED switching                   | DCL On : On.                                                                                                                                                                                                     |
| Q203              | FUNC LED switching                  | FUNC LED On : On.                                                                                                                                                                                                |
| D201              | Current reversal prevention         |                                                                                                                                                                                                                  |
| D202              | Protection against negative voltage | Negative pulse absorption.                                                                                                                                                                                       |
| D203-D207         | Current reversal prevention         | Protection against key scan pulse.                                                                                                                                                                               |
| D208-D211         | For protection                      | Protection against current from the microphone pins.                                                                                                                                                             |
| D212              | FUNC LED                            | FUNC On : On.                                                                                                                                                                                                    |
| D213              | DCL LED                             | DCL On : On.                                                                                                                                                                                                     |

### LCD ASSEMBLY (W02-03XX-05)

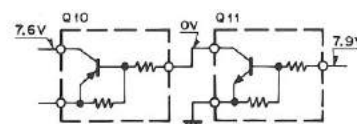
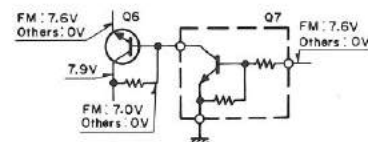
| Element | Function           | Description              |
|---------|--------------------|--------------------------|
| IC301   | Microprocessor III | See Circuit Description. |
| Q301    | CALL LED switching | Call mode : On.          |
| Q302    | AUTO LED switching | AUTO mode : On.          |
| D301    | CALL LED           | CALL mode : On.          |
| D302    | AUTO LED           | AUTO mode : On.          |
| D303    | LSB LED            | LSB mode : On.           |
| D304    | CW LED             | CW mode : On.            |
| D305    | USB LED            | USB mode : On.           |
| D306    | FM LED             | FM mode : On.            |
| D307    | BUSY LED           | BUSY mode : On.          |
| D308    | ON AIR LED         | Transmit mode : On.      |



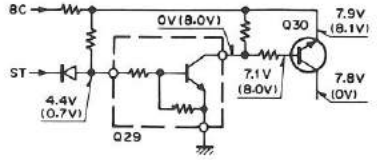
## ELEMENT FUNCTIONS

### COMPOSITE UNIT (RX) (X60-1320-01)

| Element   | Function                                                                                 | Description                                                                                                                                                                                                                                                    |
|-----------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IC1       | Noise amplifier for noise blanker                                                        | Amplifies 455kHz in SSB or CW mode.                                                                                                                                                                                                                            |
| IC2       | FM 455kHz IF amplification and detection<br>Squelch noise amplifier<br>SSB squelch mixer | ⑦ FM S meter output, ⑨ Detector output<br>⑬ Noise amplifier output<br>⑯ SSB IF signal input.                                                                                                                                                                   |
| IC3 (1/2) | FM S meter inversion amplifier                                                           | Use VR5 to set the S meter to 0dBμ (antenna input), VR6 to set the S meter to full scale.                                                                                                                                                                      |
| IC3 (2/2) | Non-inversion amplifier for RF AGC                                                       | Sets AGC voltage to approx. 2.5V at maximum RF gain settings and to approx. -3.5V at minimum RF gain settings.                                                                                                                                                 |
| IC4       | For SSB balanced modulator                                                               | Carrier suppression is controlled with VR8 and VR9.<br>① Microphone amplifier input in SSB mode.<br>Carrier is obtained by adding DC current to unbalance the element in the CW mode.<br>③ Carrier input : 10.695MHz, 0.3Vrms.<br>⑦ 10.695MHz DSB or CW output |
| IC5       | 8V AVR                                                                                   | Input : 13.2V, output : 8.1V.                                                                                                                                                                                                                                  |
| Q1        | SSB first IF amplifier (level 1)                                                         | Operates in SSB or CW receive mode (10.695MHz).                                                                                                                                                                                                                |
| Q2        | SSB first IF amplifier (level 2)                                                         | Operates in SSB or CW receive mode (10.695MHz).                                                                                                                                                                                                                |
| Q3        | SSB first IF amplifier (level 3)                                                         | Operates in SSB or CW receive mode (10.695MHz).                                                                                                                                                                                                                |
| Q4        | FM first IF amplifier                                                                    | Operates in receive mode (10.695MHz).                                                                                                                                                                                                                          |
| Q5        | FM second mixer                                                                          | Operates in receive mode. 10.24MHz is used to produce 455kHz.                                                                                                                                                                                                  |
| Q6        | FM receive + B switching                                                                 | FM receive mode : On.                                                                                                                                                                                                                                          |
| Q7        | FM receive + B switching                                                                 | SSB or CW mode : On.                                                                                                                                                                                                                                           |
| Q8        | Noise blanker AGC                                                                        | Controls IC1 gain with NB AGC in SSB or CW mode.                                                                                                                                                                                                               |
| Q9        | Noise blanker switching                                                                  | Switches NB gate when NB is on. Connector : 3.5V (FM).<br>Turns on when pulse noise is present.                                                                                                                                                                |
| Q10       | SSB/CW receive + B switching                                                             | SSB/CW mode : On.                                                                                                                                                                                                                                              |
| Q11       | SSB/CW receive + B switching                                                             | SSB/CW mode : On.                                                                                                                                                                                                                                              |
| Q12       | AGC buffer amplifier                                                                     | Operates in SSB or CW mode (10.695MHz).                                                                                                                                                                                                                        |
| Q13       | AGC amplifier                                                                            | Operates in SSB or CW mode (10.695MHz). AGC is amplified after being rectified by D10 and D11.                                                                                                                                                                 |
| Q14       | AGC time constant switching                                                              | SSB mode : On.                                                                                                                                                                                                                                                 |
| Q15       | SSB S meter amplifier                                                                    | Use VR3 for S meter zero adjustment (S-φ).                                                                                                                                                                                                                     |
| Q16       | SSB S meter amplifier                                                                    | Use VR4 for S meter sensitivity adjustment (S-9) : 20dB                                                                                                                                                                                                        |
| Q17       | S meter switching                                                                        | SSB or CW receive mode : On (base voltage in SSB or CW mode : 7.6V).<br>Sets FM S meter amplifier output to 0V.                                                                                                                                                |
| Q18       | For FM transmit modulation                                                               | Operates in FM transmit mode (10.695MHz). 10.695MHz output from the crystal oscillator is frequency modulated with a variable capacitor.                                                                                                                       |
| Q19       | Buffer amplifier for FM transmit modulation                                              | Operates in FM transmit mode (10.695MHz).                                                                                                                                                                                                                      |
| Q20       | FM transmit + B switching                                                                | FM transmit mode : On.                                                                                                                                                                                                                                         |
| Q21       | FM transmit + B switching                                                                | SSB/CW mode : On.                                                                                                                                                                                                                                              |
| Q22       | SSB/CW transmit + B switching                                                            | SSB/CW transmit : On.                                                                                                                                                                                                                                          |
| Q23       | SSB/CW transmit + B switching                                                            | Transmit mode : On.                                                                                                                                                                                                                                            |
| Q24       | Transmit IF amplifier                                                                    | Transmit mode : On (10.695MHz).                                                                                                                                                                                                                                |
| Q25       | Microphone amplifier (level 1)                                                           | Amplifier used in all modes.                                                                                                                                                                                                                                   |
| Q26       | FM buffer amplifier                                                                      | Use VR12 for FM microphone gain adjustment.                                                                                                                                                                                                                    |
| Q27       | SSB microphone amplifier                                                                 | Use VR11 for SSB microphone gain adjustment.                                                                                                                                                                                                                   |
| Q28       | Microphone amplifier mute switch                                                         | Turns on when a DCL control signal is sent.                                                                                                                                                                                                                    |



## ELEMENT FUNCTIONS

| Element                                                                             | Function                                          | Description                                                                                                        |
|-------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Q29                                                                                 | Receive + B switching                             | Transmit mode : Off.                                                                                               |
| Q30                                                                                 | Receive + B switching                             | Receive mode : On.                                                                                                 |
|  |                                                   |                                                                                                                    |
| Q31–Q33                                                                             | Transmit + 9V AVR control                         | Operates in transmit mode. Set 9V with VR13 in transmit mode.                                                      |
| Q34                                                                                 | Amplifier for illumination + B AVR                | Approx. 10.5V                                                                                                      |
| Q35                                                                                 | Detector output switching                         | SSB or CW mode : On (base voltage in SSB or CW mode : 7.9V).<br>FM detector output is set to 0V in SSB or CW mode. |
| Q36                                                                                 | Receive audio amplifier mute                      | Alert on and M1 search in progress in transmit mode : On.<br>Audio output is set to 0V.                            |
| D1                                                                                  | Noise blanker gate                                | Normal : On, NB on for noise suppression : Off.                                                                    |
| D2                                                                                  | Noise blanker gate                                | Normal : On, NB on for noise suppression : Off,<br>Anode in SSB or CW mode : 2.9V.                                 |
| D3,D4                                                                               | Crystal filter switch                             | Switched between SSB/CW receive mode and SSB/CW transmit mode.                                                     |
| D5–D8                                                                               | Ring detection                                    |                                                                                                                    |
| D9                                                                                  | Current reversal prevention                       |                                                                                                                    |
| D10,D11                                                                             | AGC rectification                                 |                                                                                                                    |
| D12                                                                                 | Protection FM S meter reverse deflection          |                                                                                                                    |
| D13                                                                                 | FM S meter deflection prevention in transmit mode | Operation amplifier output is forced negative in FM transmit + 8V mode.                                            |
| D14                                                                                 | 455kHz IF amplifier input switching               | SSB/CW receive mode : On.                                                                                          |
| D15                                                                                 | Current reversal prevention                       |                                                                                                                    |
| D16                                                                                 | Second mixer output switching                     | SSB/CW receive mode : On.                                                                                          |
| D17                                                                                 | Second mixer output switching                     | FM receive mode : On.                                                                                              |
| D18                                                                                 | Current reversal prevention                       | FM receive mode : On.                                                                                              |
| D19                                                                                 | Noise rectifier for noise blanker                 |                                                                                                                    |
| D20                                                                                 | Noise blanker switching                           |                                                                                                                    |
| D21                                                                                 | For FM modulation                                 |                                                                                                                    |
| D22                                                                                 | Transmit IF amplifier input switching             | Switched between SSB/CW transmit mode and FM transmit mode.                                                        |
| D23                                                                                 | Current reversal prevention                       |                                                                                                                    |
| D24,D25                                                                             | Carrier switching                                 | SSB/CW transmit mode : On.                                                                                         |
| D26                                                                                 | Balanced modulator output switching               | SSB/CW transmit mode : On.                                                                                         |
| D27                                                                                 | Transmit + 9V AVR temperature compensation        |                                                                                                                    |
| D28                                                                                 | Current reversal prevention                       |                                                                                                                    |
| D29                                                                                 | For lamp AVR reference voltage                    |                                                                                                                    |
| D30                                                                                 | For –6V stabilization                             |                                                                                                                    |
| D31                                                                                 | Current reversal prevention                       |                                                                                                                    |
| D32                                                                                 | Squelch noise rectifier                           |                                                                                                                    |
| D33,D34                                                                             | Current reversal prevention                       |                                                                                                                    |

## ELEMENT FUNCTIONS

### -6V DC-DC (X59-1100-00)

| Element | Function                    | Description                         |
|---------|-----------------------------|-------------------------------------|
| Q1      | Multi-vibrator              | Supplies approx. 19kHz square wave. |
| Q2      | Multi-vibrator              |                                     |
| D1      | Voltage multiplying current |                                     |

### AF PRE AMP (X59-1110-00)

| Element | Function        | Description      |
|---------|-----------------|------------------|
| Q1      | Preamplifier    | Squelch On : On. |
| Q2      | Low-pass filter |                  |

### SQL SW (X59-1120-00)

| Element | Function                        | Description                              |
|---------|---------------------------------|------------------------------------------|
| Q1      | Squelch switching               | Squelch On : On.                         |
| Q2      | Squelch time constant switching |                                          |
| Q3      | Squelch switching               | Squelch On : On.                         |
| D1      | Base bias setting               |                                          |
| D2      | Current reversal prevention     | Reversal prevention in SSB and CW modes. |

### MIC AMP (X59-3000-01)

| Element   | Function           | Description        |
|-----------|--------------------|--------------------|
| IC1 (1/2) | Low-pass filter    | ①, ② : output.     |
| IC1 (2/2) | Limiting amplifier | ⑥ input, ⑦ output. |
| Q1        | Tone amplifier     |                    |

## PARTS LIST

### CAPACITORS

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

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

#### • Temperature Coefficient

| 1st Word | C     | L   | P      | R      | S     | T    | U      |
|----------|-------|-----|--------|--------|-------|------|--------|
| Color*   | Black | Red | Orange | Yellow | Green | Blue | Violet |
| ppm/°C   | 0     | -80 | -150   | -220   | -330  | -470 | -750   |

#### • Tolerance

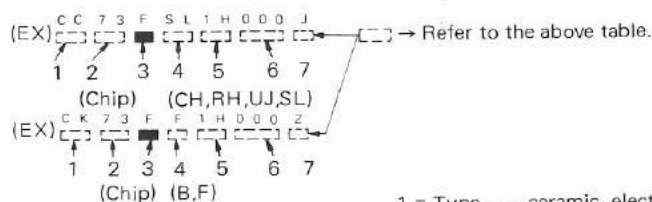
| Code | C      | D     | G   | J   | K    | M    | X            | Z            | P            | No code                     |
|------|--------|-------|-----|-----|------|------|--------------|--------------|--------------|-----------------------------|
| (%)  | ± 0.25 | ± 0.5 | ± 2 | ± 5 | ± 10 | ± 20 | + 40<br>- 20 | + 80<br>- 20 | + 100<br>- 0 | 10μF-10~+50<br>4.7μF-10~+75 |

Less than 10 pF

#### • Rating voltage

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

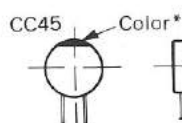
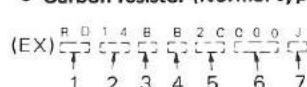
#### • Chip capacitors



#### • Chip resistor (Carbon)



#### • Carbon resistor (Normal type)



#### • Capacitor value

- 0 1 0 = 1pF  
1 0 0 = 10pF  
1 0 1 = 100pF  
1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

2 2 0 = 22pF  
1st number | Multiplier  
2nd number

Example CC45TH = -470 ± 60 ppm/°C

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

#### Dimension

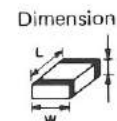
| Dimension code | L         | W          | T              |
|----------------|-----------|------------|----------------|
| Empty          | 5.6 ± 0.5 | 5.0 ± 0.5  | Less than 2.0  |
| E              | 3.2 ± 0.2 | 1.6 ± 0.2  | Less than 1.25 |
| F              | 2.0 ± 0.3 | 1.25 ± 0.2 | Less than 1.25 |

#### Dimension

| Dimension code | L         | W          | T    | Wattage |
|----------------|-----------|------------|------|---------|
| E              | 3.2 ± 0.2 | 1.6 ± 0.2  | 0.57 | 2B      |
| F              | 2.0 ± 0.3 | 1.25 ± 0.2 | 0.45 | 2A      |

#### Rating wattage

| Cord | Wattage | Cord | Wattage | Cord | Wattage |
|------|---------|------|---------|------|---------|
| 2A   | 1/10W   | 2E   | 1/4W    | 3A   | 1W      |
| 2B   | 1/8W    | 2H   | 1/2W    | 3D   | 2W      |
| 2C   | 1/6W    |      |         |      |         |



## PARTS LIST

※ New Parts

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.

| Ref. No.<br>参照番号 | Address<br>位置 | New<br>Parts<br>新 | Parts No.<br>部品番号 | Description<br>部品名 / 規格         | Desti-<br>nation<br>仕向 | Re-<br>marks<br>備考 |
|------------------|---------------|-------------------|-------------------|---------------------------------|------------------------|--------------------|
| TR-851A/E        |               |                   |                   |                                 |                        |                    |
| 1                | 1E            |                   | A01-1003-02       | METALLIC CABINET(UPPER)         |                        |                    |
| 2                | 4D            | *                 | A01-1025-02       | METALLIC CABINET(LOWER)         |                        |                    |
| 5                | 1B            |                   | A20-2606-03       | PANEL ASSY                      | K1M1                   |                    |
| 5                | 1B            |                   | A20-2608-03       | PANEL ASSY                      | T1W1                   |                    |
| -                |               |                   | A13-0666-12       | MOUNTING BRACKET ASSY(R)ACSY    |                        |                    |
| -                |               |                   | A13-0667-12       | MOUNTING BRACKET ASSY(L)ACSY    |                        |                    |
| -                |               |                   | A13-0668-04       | MOUNTING ANGLE (ACSY)           |                        |                    |
| -                |               |                   | A20-2565-13       | PANEL (WITH TONE)               | K1M1                   |                    |
| -                |               |                   | A20-2579-13       | PANEL                           | T1W1                   |                    |
| 10               | 2C, 3E        |                   | B01-0655-13       | SIDE ESCUTCHEON                 |                        |                    |
| 11               | 3D            |                   | B04-0411-04       | SP METAL                        |                        |                    |
| -                |               |                   | B10-0677-04       | FRONT GLASS (COM)               | K1M1                   |                    |
| -                |               |                   | B10-0678-04       | FRONT GLASS                     | T1W1                   |                    |
| -                |               |                   | B11-0434-04       | REFLECTION GLASS(FUNG,DCL)      |                        |                    |
| -                |               |                   | B11-0439-04       | FILTER (TOP)                    |                        |                    |
| -                |               |                   | B12-0701-04       | INDICATOR PLATE(MODE)           |                        |                    |
| -                |               |                   | B42-2424-03       | LABEL (COM)                     | K1M1                   |                    |
| -                |               |                   | B42-2432-03       | LABEL (TONE)                    | T1W1                   |                    |
| -                |               | *                 | B43-1071-04       | BADGE (TR-851A)                 | K1M1                   |                    |
| -                |               | *                 | B43-1092-04       | BADGE (TR-851E)                 | T1                     |                    |
| -                |               | *                 | B43-1093-04       | BADGE (TR-851E)                 | W1                     |                    |
| -                |               |                   | B46-0410-10       | WARRANTY CARD                   | K1                     |                    |
| -                |               | *                 | B50-8111-00       | INSTRUCTION MANUAL              |                        |                    |
| -                |               |                   | E09-0471-05       | 4P PLUG (ACSY)                  |                        |                    |
| -                |               |                   | E30-2053-05       | DC CORD (ACSY)                  |                        |                    |
| -                |               | *                 | E31-3221-25       | CONNECTOR WITH CABLE            |                        |                    |
| 31               | 3D            |                   | F20-0520-04       | INSULATING BOARD(SPEAKER)       |                        |                    |
| -                |               |                   | F05-2036-05       | FUSE (20A)                      |                        |                    |
| -                |               |                   | F05-8021-05       | FUSE (8A) ACSY                  |                        |                    |
| -                |               |                   | F20-0521-04       | INSULATING BOARD(B)LITHUM BATT  |                        |                    |
| 32               | 2D            |                   | G02-0569-04       | GND SPRING                      |                        |                    |
| 36               | 1A, 1B        |                   | G01-0818-04       | COILED SPRING                   |                        |                    |
| 37               | 3C            |                   | G02-0505-05       | KNOB FITING SPRING              |                        |                    |
| 39               | 1D            |                   | G10-0626-04       | FELT                            |                        |                    |
| 40               | 3D            |                   | G10-0643-04       | FELT                            |                        |                    |
| 42               | 4D            |                   | G16-0508-04       | ANTI-VIBRATIVE (SPEAKER)        |                        |                    |
| -                |               |                   | G02-0550-04       | GND SPRING                      |                        |                    |
| -                |               |                   | G13-0823-04       | CUSHION (MOUNTING ANGLE)ACSY    |                        |                    |
| -                |               |                   | G53-0515-04       | FELT                            |                        |                    |
| -                |               |                   | H01-8047-03       | ITEM CARTON BOX                 | K1M1                   |                    |
| -                |               |                   | H01-8049-03       | ITEM CARTON BOX                 | W1T1                   |                    |
| -                |               |                   | H10-2501-03       | POLYSTYRENE FOAMED FIXTURE(TOP) |                        |                    |
| -                |               |                   | H10-2624-12       | POLYSTYRENE FOAMED FIXTURE      |                        |                    |
| -                |               |                   | H13-0808-04       | PROTECTION PLATE                |                        |                    |
| -                |               |                   | H25-0029-04       | PROTECTION BAG (SCREW ETC)      |                        |                    |
| -                |               |                   | H25-0103-04       | PROTECTION BAG (MIC,MNT ANGLE)  |                        |                    |
| -                |               |                   | H25-0106-04       | PROTECTION BAG                  |                        |                    |
| -                |               |                   | H25-0116-04       | PROTECTION BAG (ACSY)           |                        |                    |
| -                |               |                   | H25-0117-04       | PROTECTION BAG (DC CORD,ETC)    |                        |                    |
| 60               | 3E            | *                 | J32-0901-04       | ROUND (BOSS)                    |                        |                    |
| 61               | 2D            | *                 | J32-0902-04       | ROUND (BOSS)                    |                        |                    |
| 64               | 3D            |                   | J21-1144-34       | SP MOUNTING HARDWARE            |                        |                    |

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|------------------|---------------|-------------------|-------------------|------------------------------------|----------------------------|--------------------|
| 65               | 1B            |                   | J29-0407-04       | SW GUIDE (1-0)                     | K1                         |                    |
| 66               | 1B            |                   | J29-0409-04       | SW GUIDE                           |                            |                    |
| 67               | 2C, 3D        |                   | J42-0449-05       | BUSHING (PANEL)                    |                            |                    |
| -                |               |                   | J02-0439-05       | FOOT (ACSY)                        |                            |                    |
| -                |               |                   | J19-1346-04       | MIC HOOK (ACSY)                    |                            |                    |
| -                |               |                   | J61-0307-05       | WIRE BAND                          |                            |                    |
| 71               | 3C            |                   | K21-0780-03       | KNOB (MAIN)                        |                            |                    |
| 72               | 3C            |                   | K23-0783-04       | KNOB (VOL, RIT)                    |                            |                    |
| 73               | 1A            |                   | K27-0482-03       | KNOB (BUTTON) 1                    |                            |                    |
| 74               | 1A            |                   | K27-0483-03       | KNOB (BUTTON) 2                    |                            |                    |
| 75               | 1A            |                   | K27-0484-03       | KNOB (BUTTON) 3                    |                            |                    |
| 76               | 1A            |                   | K27-0485-03       | KNOB (BUTTON) 4                    | K1                         |                    |
| 77               | 1B            |                   | K27-0486-03       | KNOB (BUTTON) 5                    |                            |                    |
| 78               | 1A            |                   | K27-0487-03       | KNOB (BUTTON) 6                    |                            |                    |
| 79               | 1A            |                   | K27-0488-03       | KNOB (BUTTON) 7                    |                            |                    |
| 80               | 1A            |                   | K27-0489-03       | KNOB (BUTTON) 8                    |                            |                    |
| 81               | 1A            |                   | K27-0490-03       | KNOB (BUTTON) 9                    |                            |                    |
| 82               | 1A            |                   | K27-0491-03       | KNOB (BUTTON) 0                    |                            |                    |
| 83               | 1A, 1B        |                   | K29-3044-05       | KNOB                               |                            |                    |
| 84               | 1A            |                   | K29-3045-05       | KNOB (FUNC)                        |                            |                    |
| 85               | 3C            |                   | K29-3046-04       | KNOB (SQ, RF GAIN)                 |                            |                    |
| 86               | 3C            |                   | K29-3047-04       | KNOB RING                          | K1                         |                    |
| -                |               |                   | N09-0008-04       | HEX. HEAD SCREW (ACSY)             |                            |                    |
| -                |               |                   | N09-0632-05       | TAPTITE SCREW A (ACSY)             |                            |                    |
| -                |               |                   | N09-0633-05       | TAPTITE SCREW (ACSY)               |                            |                    |
| -                |               |                   | N14-0510-04       | FLANGE NUT (ACSY)                  |                            |                    |
| -                |               |                   | N15-1040-45       | FLAT WASHER (MNT ANGLE)            |                            |                    |
| -                |               |                   | N15-1060-46       | FLAT WASHER (ACSY)                 |                            |                    |
| -                |               |                   | N16-0060-46       | SPRING WASHER (ACSY)               |                            |                    |
| -                |               |                   | N99-0304-04       | HEX HEAD SCREW (MNT ANGLE)         |                            |                    |
| A                | 2C, 3E        |                   | N09-0666-05       | BIND SCREW (CAR UNIT ETC)          |                            |                    |
| B                | 3C, 3D        |                   | N09-0700-04       | BIND SCRW (FRONT PANEL)            |                            |                    |
| C                | 2A            |                   | N32-2004-46       | FLAT BINDING SCREW (CONT UNIT)     | K1M1<br>T1W1<br>K1M1<br>T1 |                    |
| D                | 2D, 2E        |                   | N32-3006-46       | FLAT BINDING SCREW (HEAT SINK)     |                            |                    |
| E                | 4D            |                   | N33-3006-45       | OVAL HEAD MACHINE SCREW (SPKR)     |                            |                    |
| F                | 1B, 2B        |                   | N35-2005-46       | BINDING SCREW (SW UNIT)            |                            |                    |
| G                | 2D, 3D        |                   | N87-2605-46       | BRAZIER SCREW (RX UNIT, ETC)       |                            |                    |
| H                | 1D, 4E        |                   | N35-2604-46       | BINDING SCREW (PLL, CAR UNIT)      |                            |                    |
| J                | 2C, 4D        |                   | N89-3006-45       | BINDING SCREW (CASE, ETC)          |                            |                    |
| -                |               |                   | S50-1406-05       | TACT SWITCH                        |                            |                    |
| 93               | 3D            |                   | T07-0241-05       | LOUDSPEAKER (FULL RANGE)           |                            |                    |
| -                |               |                   | T91-0357-15       | MICROPHONE                         |                            |                    |
| 97               | 2D            |                   | W01-0401-05       | WRENCH                             | W1                         |                    |
|                  |               |                   | W09-0326-05       | LITHIUM BATTERY (BR2032)           |                            |                    |
| 99               | 4E            | *                 | X50-3040-00       | CAR UNIT                           |                            |                    |
| 100              | 3A, 2E        | *                 | X45-3030-11       | FINAL UNIT                         |                            |                    |
| 100              | 3A, 2E        | *                 | X45-3030-51       | FINAL UNIT                         |                            |                    |
| 101              | 2B, 2D        | *                 | X53-1460-12       | CONTROL UNIT                       |                            |                    |
| 101              | 2B, 2D        | *                 | X53-1460-52       | CONTROL UNIT                       |                            |                    |
| 101              | 2B, 2D        | *                 | X53-1460-62       | CONTROL UNIT                       |                            |                    |
| 102              | 2D, 3D        | *                 | X50-3050-11       | COMPOSITE UNIT (PLL, DRIVE, FRONT) |                            |                    |

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|------------------------------------------------------|---------------|-------------------|-------------------|------------------------------|------------------------|--------------------|
| 103                                                  | 3D            | *                 | X60-1320-01       | COMPOSITE UNIT(RX)           |                        |                    |
| FINAL UNIT (X45-3030-XX) -11 : TR-851A -51 : TR-851E |               |                   |                   |                              |                        |                    |
| 110                                                  | 3B            |                   | B42-2426-04       | LABEL                        |                        |                    |
| C1                                                   |               |                   | C90-0875-05       | ELECTR0 100UF 16WV           |                        |                    |
| C2                                                   |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| C3                                                   |               |                   | C90-2039-05       | ELECTR0 15UF 16WV            |                        |                    |
| C4                                                   |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| C5                                                   |               |                   | C90-0871-05       | ELECTR0 220UF 16WV           |                        |                    |
| C6                                                   |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| C7                                                   |               |                   | CM73F2H020C       | CHIP C 2.0PF C               |                        |                    |
| C8                                                   |               |                   | CC45SL2H040C      | CERAMIC 4.0PF C              |                        |                    |
| C9                                                   |               |                   | CC45SL2H030C      | CERAMIC 3.0PF C              |                        |                    |
| C10                                                  |               |                   | CM73F2H150J       | CHIP C 15PF J                |                        |                    |
| C11                                                  |               |                   | CC45SL2H120J      | CERAMIC 12PF J               |                        |                    |
| C12                                                  |               |                   | CM73F2H220J       | CHIP C 22PF J                |                        |                    |
| C13                                                  |               |                   | CC45SL2H040C      | CERAMIC 4.0PF C              |                        |                    |
| C14                                                  |               |                   | CM73F2H160J       | CHIP C 16PF J                |                        |                    |
| C15                                                  |               |                   | CC45SL2H060D      | CERAMIC 6.0PF D              |                        |                    |
| C16                                                  |               |                   | CC45SL2H030C      | CERAMIC 3.0PF C              |                        |                    |
| C17                                                  |               |                   | CS15E1VR47M       | TANTAL 0.47UF 35WV           |                        |                    |
| C18 -22                                              |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| C23                                                  |               |                   | CK45B1H102K       | CERAMIC 1000PF K             |                        |                    |
| C24                                                  |               |                   | CC45CH1H050C      | CERAMIC 5.0PF C              |                        |                    |
| C25 -44                                              |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| C46                                                  |               |                   | CK73FB1H102K      | CHIP C 1000PF K              |                        |                    |
| 112                                                  | 3B,2E         |                   | E30-2021-35       | DC CABLE                     |                        |                    |
| -                                                    |               |                   | E31-2108-05       | CONNECTING WIRE(D0)          |                        |                    |
| -                                                    |               |                   | E31-3186-00       | CONNECTING WIRE KIT(B)REMOTE |                        |                    |
| -                                                    |               | *                 | E31-3215-15       | CONNECTING WIRE(RA)          |                        |                    |
| J1                                                   |               |                   | E40-3241-05       | PIN CONNECTOR (6P)           |                        |                    |
| J2                                                   |               |                   | E40-3239-05       | PIN CONNECTOR (4P)           |                        |                    |
| J3                                                   | 3B            |                   | E11-0401-05       | EAR PHONE JACK (EXT.SP)      |                        |                    |
| J4                                                   | 3A            |                   | E11-0424-05       | PHONE JACK (KEY)             |                        |                    |
| J5                                                   | 3B            |                   | E04-0162-25       | ANT RECEPTACLE (N TYPE)      | T1W1                   |                    |
| J5                                                   | 3B            |                   | E04-0164-05       | ANT RECEPTACLE (M TYPE)      | K1M1                   |                    |
| J6                                                   | 3B            |                   | E08-0471-05       | 4P CONNECTOR                 |                        |                    |
| TP1                                                  |               |                   | E23-0401-05       | TERMINAL                     |                        |                    |
| 115                                                  | 3B,2E         | *                 | F01-0951-05       | HEAT SINK                    |                        |                    |
| -                                                    |               |                   | F05-8021-05       | FUSE (8A)                    |                        |                    |
| 118                                                  | 3B            |                   | J41-0017-05       | BUSHING                      |                        |                    |
| -                                                    |               |                   | J61-0307-05       | WIRE BAND                    |                        |                    |
| L1                                                   |               |                   | L34-1040-05       | COIL (5.1T)                  |                        |                    |
| L2                                                   |               |                   | L34-0908-05       | COIL (3.9.5T)                |                        |                    |
| L3                                                   |               |                   | L34-1019-05       | COIL (3.2.5T)                |                        |                    |
| L4                                                   |               |                   | L34-1032-05       | COIL (3.3.5T)                |                        |                    |
| L5                                                   |               |                   | L34-1113-05       | COIL (3.1.5T)                |                        |                    |
| L6                                                   |               |                   | L34-1040-05       | COIL (5.1T)                  |                        |                    |
| L7                                                   |               |                   | L40-1092-16       | SMALL FIXED INDUCTOR(1UH)    |                        |                    |
| L8                                                   |               |                   | L40-1092-14       | SMALL FIXED INDUCTOR(1UH)    |                        |                    |
| L9                                                   |               |                   | L40-1092-16       | SMALL FIXED INDUCTOR(1UH)    |                        |                    |
| N                                                    | 3A            |                   | N09-0623-04       | SEMUS SCREW                  |                        |                    |

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| P<br>Q                 | 3B<br>3A      |                   | N87-3008-41<br>N09-0626-04 | BRAZIER HEAD TAPTITE SCREW<br>SEMUS SCREW |                        |                    |
| R1                     |               |                   | RD14BB2E151J               | RD 150 J 1/4W                             |                        |                    |
| R2                     |               |                   | RK73FB2A472J               | CHIP R 4.7K J 1/10W                       |                        |                    |
| R3                     |               |                   | RK73FB2A182J               | CHIP R 1.8K J 1/10W                       |                        |                    |
| R4                     |               |                   | RK73FB2A561J               | CHIP R 560 J 1/10W                        |                        |                    |
| R5                     |               |                   | RD14DB2H181J               | SMALL-RD 180 J 1/2W                       |                        |                    |
| R6                     |               |                   | RK73FB2A473J               | CHIP R 47K J 1/10W                        |                        |                    |
| R7                     |               |                   | RK73FB2A822J               | CHIP R 8.2K J 1/10W                       |                        |                    |
| R8                     |               |                   | RK73FB2A472J               | CHIP R 4.7K J 1/10W                       |                        |                    |
| R9                     |               |                   | RK73FB2A103J               | CHIP R 10K J 1/10W                        |                        |                    |
| R10                    |               |                   | RK73FB2A104J               | CHIP R 100K J 1/10W                       |                        |                    |
| R11                    |               |                   | RK73FB2A472J               | CHIP R 4.7K J 1/10W                       |                        |                    |
| R12                    |               |                   | RK73FB2A101J               | CHIP R 100 J 1/10W                        |                        |                    |
| VR1                    |               |                   | R12-4417-05                | TRIMMING PØT. (51K)                       |                        |                    |
| VR2                    |               |                   | R12-0434-05                | TRIMMING PØT. (100)                       |                        |                    |
| VR3                    |               |                   | R12-3455-05                | TRIMMING PØT. (10K)                       |                        |                    |
| RY1                    |               |                   | S51-1428-05                | RELAY                                     |                        |                    |
| D1                     |               |                   | DSA3A1                     | DIØDE                                     |                        |                    |
| D2                     |               |                   | 1SS181                     | CHIP DIØDE                                |                        |                    |
| D3                     |               |                   | MI407                      | DIØDE                                     |                        |                    |
| D4                     |               |                   | MI308                      | DIØDE                                     |                        |                    |
| D5 -8                  |               |                   | 1SS101                     | DIØDE                                     |                        |                    |
| D9                     |               |                   | 1SS181                     | CHIP DIØDE                                |                        |                    |
| D10                    |               |                   | MTZ6.2JA                   | ZENER DIØDE                               |                        |                    |
| Q1                     |               |                   | M57745                     | POWER MODULE                              |                        |                    |
| Q2                     |               |                   | 2SA1307(Y)                 | TRANSISTØR                                |                        |                    |
| Q3                     |               |                   | 2SC245B(Y)                 | TRANSISTØR                                |                        |                    |
| Q4                     |               |                   | 2SA1162(Y)                 | CHIP TRANSISTØR                           |                        |                    |
| Q5                     |               |                   | 2SC245B(Y)                 | TRANSISTØR                                |                        |                    |
| TH1                    |               |                   | 112-502-2                  | TERMISTØR (5K)                            |                        |                    |
| CAR UNIT (X50-3040-00) |               |                   |                            |                                           |                        |                    |
| -                      |               | *                 | A11-0403-03                | SUB CHASSIS ASSY                          |                        |                    |
| C1 ,2                  |               |                   | CK73FB1H102K               | CHIP C 1000PF K                           |                        |                    |
| C3 ,4                  |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C5                     |               |                   | CC73FCH1H220J              | CHIP C 22PF J                             |                        |                    |
| C6                     |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C7                     |               |                   | CC73FCH1H180J              | CHIP C 18PF J                             |                        |                    |
| C8                     |               |                   | CC73FCH1H390J              | CHIP C 39PF J                             |                        |                    |
| C9 ,10                 |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C11 ,12                |               |                   | CC73FCH1H151J              | CHIP C 150PF J                            |                        |                    |
| C13                    |               |                   | CC73FCH1H220J              | CHIP C 22PF J                             |                        |                    |
| C14                    |               |                   | CC73FCH1H020C              | CHIP C 2.0PF C                            |                        |                    |
| C15 -17                |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C18 -21                |               |                   | CK73FB1H102K               | CHIP C 1000PF K                           |                        |                    |
| C22                    |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C23                    |               |                   | CC73FCH1H080D              | CHIP C 8.0PF D                            |                        |                    |
| C24                    |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C25                    |               |                   | CC73FSL1H101J              | CHIP C 100PF J                            |                        |                    |
| C26 -28                |               |                   | CK73FB1H103K               | CHIP C 0.010UF K                          |                        |                    |
| C29 ,30                |               |                   | CK73FB1H102K               | CHIP C 1000PF K                           |                        |                    |
| C31                    |               |                   | CC73FCH1H120J              | CHIP C 12PF J                             |                        |                    |
| C32                    |               |                   | CC73FCH1H0R5C              | CHIP C 0.5PF C                            |                        |                    |

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|---------------------------------------------|---------------|-------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| C33<br>C34<br>C35 -38<br>TC1 ,2<br>TC3      |               | *                 | CC73FCH1H070D<br>CC73FCH1H330J<br>CK73FB1H102K<br>C05-0303-05<br>C05-0097-05 | CHIP C 7.0PF D<br>CHIP C 33PF J<br>CHIP C 1000PF K<br>TRIMMING CAP (20PF)<br>TRIMMING CAP (30PF)                                  |                        |                    |
| J1<br>J3<br>J6<br>J7                        |               |                   | E40-0274-05<br>E40-3238-05<br>E40-3241-05<br>E40-3237-05                     | PIN CONNECTOR (2P)<br>PIN ASSY (3P)<br>PIN ASSY (6P)<br>PIN ASSY (2P)                                                             |                        |                    |
| 200                                         | 4E            | *                 | G02-0573-04                                                                  | GND SPRING (PLATE)                                                                                                                |                        |                    |
| L1 -4<br>L5<br>L7<br>L8<br>L9 -13           |               | *                 | L40-1021-14<br>L34-4024-05<br>L34-4026-05<br>L34-4025-05<br>L34-4027-05      | SMALL FIXED INDUCTOR(1MH)<br>TUNING COIL (10.7MHZ CAR)<br>TUNING COIL (30MHZ)<br>TUNING COIL (10.7MHZ,MIX)<br>TUNING COIL (42MHZ) |                        |                    |
| X1<br>X2                                    |               | *                 | L77-1329-05<br>L77-1330-05                                                   | CRYSTAL RESONATOR(10.6965MHZ)<br>CRYSTAL RESONATOR(10.6943MHZ)                                                                    |                        |                    |
| R                                           | 4E            |                   | N35-2604-41                                                                  | BINDING HEAD MACHINE SCREW                                                                                                        |                        |                    |
| R1 ,2<br>R3<br>R4<br>R5<br>R6               |               |                   | RK73FB2A101J<br>RK73FB2A473J<br>R92-0670-05<br>RK73FB2A473J<br>R92-0670-05   | CHIP R 100 J 1/10W<br>CHIP R 47K J 1/10W<br>CHIP R 0 OHM<br>CHIP R 47K J 1/10W<br>CHIP R 0 OHM                                    |                        |                    |
| R7<br>R8<br>R9<br>R10<br>R11                |               |                   | RK73FB2A562J<br>RK73FB2A332J<br>RK73FB2A102J<br>RK73FB2A682J<br>RK73FB2A223J | CHIP R 5.6K J 1/10W<br>CHIP R 3.3K J 1/10W<br>CHIP R 1.0K J 1/10W<br>CHIP R 6.8K J 1/10W<br>CHIP R 22K J 1/10W                    |                        |                    |
| R12<br>R13<br>R14<br>R15 ,16<br>R17         |               |                   | RK73FB2A102J<br>RK73FB2A330J<br>RK73FB2A224J<br>RK73FB2A102J<br>RK73FB2A103J | CHIP R 1.0K J 1/10W<br>CHIP R 33 J 1/10W<br>CHIP R 220K J 1/10W<br>CHIP R 1.0K J 1/10W<br>CHIP R 10K J 1/10W                      |                        |                    |
| R18<br>R19<br>R20<br>R21<br>R22             |               |                   | RK73FB2A331J<br>RK73FB2A180J<br>RK73FB2A331J<br>RK73FB2A103J<br>RK73FB2A331J | CHIP R 330 J 1/10W<br>CHIP R 18 J 1/10W<br>CHIP R 330 J 1/10W<br>CHIP R 10K J 1/10W<br>CHIP R 330 J 1/10W                         |                        |                    |
| R23<br>R24<br>R25<br>R26<br>R27             |               |                   | RK73FB2A180J<br>RK73FB2A331J<br>RK73FB2A683J<br>RK73FB2A103J<br>R92-0670-05  | CHIP R 18 J 1/10W<br>CHIP R 330 J 1/10W<br>CHIP R 68K J 1/10W<br>CHIP R 10K J 1/10W<br>CHIP R 0 OHM                               |                        |                    |
| R28<br>R29<br>R30<br>R31<br>R32 ,33         |               |                   | RK73FB2A470J<br>R92-0670-05<br>RK73FB2A470J<br>R92-0679-05<br>RK73FB2A470J   | CHIP R 47 J 1/10W<br>CHIP R 0 OHM<br>CHIP R 47 J 1/10W<br>CHIP R 0 OHM<br>CHIP R 47 J 1/10W                                       |                        |                    |
| R34 ,35<br>R36<br>R37 ,38<br>R39<br>R40 ,41 |               |                   | RK73FB2A471J<br>RK73FB2A101J<br>R92-0670-05<br>RK73FB2A103J<br>RK73FB2A102J  | CHIP R 470 J 1/10W<br>CHIP R 100 J 1/10W<br>CHIP R 0 OHM<br>CHIP R 10K J 1/10W<br>CHIP R 1.0K J 1/10W                             |                        |                    |

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|--------------------------------------------------|---------------|-------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------|--------------------|
| R42<br>R43<br>R44 -46<br>R47                     |               |                   | RK73FB2A101J<br>RK73FB2A331J<br>R92-0670-05<br>RK73FB2A222J                       | CHIP R 100 J 1/10W<br>CHIP R 330 J 1/10W<br>CHIP R 0 0HM<br>CHIP R 2.2K J 1/10W              |                        |                    |
| D1 ,2<br>Q1 ,2<br>Q3 -5<br>TH1                   |               | *                 | 1S5268<br>2SC2714(Y)<br>3SK151(GR)<br>112-102-2                                   | CHIP DIODE<br>CHIP TRANSISTOR<br>CHIP FET<br>THERMISTOR (1K)                                 |                        |                    |
| COMPOSITE UNIT (PLL, DRIVE, FRONT) (X50-3050-11) |               |                   |                                                                                   |                                                                                              |                        |                    |
| C1<br>C2<br>C3<br>C4<br>C5                       |               |                   | CC73FCH1H470J<br>CC73FSL1H101J<br>CC73FCH1H470J<br>CC73FCH1H030C<br>CC73FCH1H100D | CHIP C 47PF J<br>CHIP C 100PF J<br>CHIP C 47PF J<br>CHIP C 3.0PF C<br>CHIP C 10PF D          |                        |                    |
| C6<br>C7<br>C8<br>C9<br>C10                      |               |                   | CK73FB1E223K<br>CK73FB1H103K<br>CE04EW1A470M<br>CC73FSL1H101J<br>CC73FCH1H220J    | CHIP C 0.022UF K<br>CHIP C 0.010UF K<br>ELECTR0 47UF 10WV<br>CHIP C 100PF J<br>CHIP C 22PF J |                        |                    |
| C11<br>C12<br>C13<br>C14<br>C15 ,16              |               |                   | CK73FB1E223K<br>CC73FSL1H101J<br>CC73FCH1H0R5C<br>CC73FCH1H100D<br>CK73FB1E223K   | CHIP C 0.022UF K<br>CHIP C 100PF J<br>CHIP C 0.5PF C<br>CHIP C 10PF D<br>CHIP C 0.022UF K    |                        |                    |
| C17<br>C18<br>C19<br>C20<br>C21                  |               |                   | CK73FB1H103K<br>CC73FCH1H330J<br>CC73FCH1H100D<br>CK73FB1H102K<br>CC73FCH1H0R5C   | CHIP C 0.010UF K<br>CHIP C 33PF J<br>CHIP C 10PF D<br>CHIP C 1000PF K<br>CHIP C 0.5PF C      |                        |                    |
| C22 -24<br>C25<br>C26<br>C27<br>C28              |               |                   | CK73FB1H102K<br>CC73FCH1H030C<br>CK73FB1H102K<br>CK73FB1E223K<br>CK73FB1H102K     | CHIP C 1000PF K<br>CHIP C 3.0PF C<br>CHIP C 1000PF K<br>CHIP C 0.022UF K<br>CHIP C 1000PF K  |                        |                    |
| C29<br>C30<br>C31 ,32<br>C33<br>C34              |               |                   | CC73FSL1H101J<br>CC73FCH1H040C<br>CK73FB1H102K<br>CC73FSL1H101J<br>CK73FB1H102K   | CHIP C 100PF J<br>CHIP C 4.0PF C<br>CHIP C 1000PF K<br>CHIP C 100PF J<br>CHIP C 1000PF K     |                        |                    |
| C35<br>C36 ,37<br>C38<br>C39<br>C40              |               |                   | CC73FCH1H120J<br>CC73FCH1H270J<br>CC73FCH1H120J<br>CQ92M1H473K<br>CQ92M1H822K     | CHIP C 12PF J<br>CHIP C 27PF J<br>CHIP C 12PF J<br>MYLAR 0.047UF K<br>MYLAR 8200PF K         |                        |                    |
| C41<br>C42<br>C43<br>C44 ,45<br>C46 ,47          |               |                   | CK73FB1H103K<br>CE04EW1A470M<br>CK73FB1H102K<br>CC73FCH1H180J<br>CC73FCH1H330J    | CHIP C 0.010UF K<br>ELECTR0 47UF 10WV<br>CHIP C 1000PF K<br>CHIP C 18PF J<br>CHIP C 33PF J   |                        |                    |
| C48<br>C49<br>C50<br>C51 ,52<br>C53 ,54          |               |                   | CK73FB1H103K<br>CC73FCH1H030C<br>CK73FB1H103K<br>CC73FCH1H120J<br>CC73FCH1H470J   | CHIP C 0.010UF K<br>CHIP C 3.0PF C<br>CHIP C 0.010UF K<br>CHIP C 12PF J<br>CHIP C 47PF J     |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| C55, 56          |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C57              |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C58, 59          |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C60              |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C61              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C62              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C63              |               |                   | CC73FCH1H150J     | CHIP C 15PF J           |                        |                    |
| C64 -67          |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C68              |               |                   | C90-2041-05       | ELECTR0 10UF 10WV       |                        |                    |
| C69 -72          |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C73              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C74 -76          |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C77              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C78              |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C79              |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C80              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C81              |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C82              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C83              |               |                   | CC73FCH1H040C     | CHIP C 4.0PF C          |                        |                    |
| C84              |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                        |                    |
| C85              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C86              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C87              |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                        |                    |
| C88              |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C89              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C90              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C91              |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                        |                    |
| C92              |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C93              |               |                   | CC73FCH1H0R5C     | CHIP C 0.5PF C          |                        |                    |
| C94              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C95              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C96 -99          |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C100             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C101             |               |                   | CC73FCH1H0R5C     | CHIP C 0.5PF C          |                        |                    |
| C102             |               |                   | CC73FCH1H050C     | CHIP C 5.0PF C          |                        |                    |
| C103             |               |                   | CC73FCH1H010C     | CHIP C 1.0PF C          |                        |                    |
| C104, 105        |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C106, 107        |               |                   | CC73FCH1H150J     | CHIP C 15PF J           |                        |                    |
| C108             |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                        |                    |
| C109             |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C110-112         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C114             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C115             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C116             |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C117             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C118             |               |                   | CE04EW1E101M      | ELECTR0 100UF 25WV      |                        |                    |
| C119, 120        |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C121             |               |                   | CE04CW1C470M      | ELECTR0 47UF 16WV       |                        |                    |
| C122             |               |                   | CE04EW1HR47M      | ELECTR0 0.47UF 50WV     |                        |                    |
| C123             |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C124             |               |                   | CQ92M1H222K       | MYLAR 2200PF K          |                        |                    |
| C125, 126        |               |                   | CS15E1E010M       | TANTAL 1.0UF 25WV       |                        |                    |
| C127             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C128             |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C129, 130        |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|-------------------------|--------------------|
| C131             |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                         |                    |
| C132             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                         |                    |
| C133             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C134,135         |               |                   | CC73FCH1H010C     | CHIP C 1.0PF C          |                         |                    |
| C136             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C137             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C138             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                         |                    |
| C139             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C140             |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                         |                    |
| C141,142         |               |                   | CC73FCH1H680J     | CHIP C 68PF J           |                         |                    |
| C143             |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                         |                    |
| C144             |               |                   | CC73FCH1H010C     | CHIP C 1.0PF C          |                         |                    |
| C145-147         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C148             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C149             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C150             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C151,152         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C153             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C154             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C155             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C156,157         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C158             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C159             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C160             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C161,162         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C163,164         |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C201,202         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C203             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C204             |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                         |                    |
| C205             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C206             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C207             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C208-210         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C211             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C212             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C213             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C214,215         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C216             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C217             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C218             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C219             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C220             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C221             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C222             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C223             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C224             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C225             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                         |                    |
| C226             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C227             |               |                   | C90-0478-05       | ELECTR0 10UF 16WV       |                         |                    |
| C228             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C229,230         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C231,232         |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C233-237         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |
| C238             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                         |                    |
| C239             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                         |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| C240             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C241             |               |                   | CS15E1VR47M       | TANTAL 0.47UF 35WV      |                        |                    |
| C242             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C243             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C244             |               |                   | CE04EW1C471M      | ELECTR0 470UF 16WV      |                        |                    |
| C245             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C246             |               |                   | CE04EW1V101M      | ELECTR0 100UF 35WV      |                        |                    |
| C247             |               |                   | CE04EW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C248             |               |                   | CQ92M1H104K       | MYLAR 0.10UF K          |                        |                    |
| C249             |               |                   | C90-0824-05       | ELECTR0 1UF 50WV        |                        |                    |
| C250,251         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C252             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C253             |               |                   | CE04EW1E101M      | ELECTR0 100UF 25WV      |                        |                    |
| C254-257         |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C258             |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C259,260         |               |                   | C90-0478-05       | ELECTR0 10UF 16WV       |                        |                    |
| C261-264         |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C265             |               |                   | CK73EB1E104K      | CHIP C 0.10UF K         |                        |                    |
| C266-269         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C270             |               | *                 | C90-2055-05       | ELECTR0 3.3UF 16WV      |                        |                    |
| C271             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C272             |               |                   | CK73EB1E104K      | CHIP C 0.10UF K         |                        |                    |
| C273             |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C274             |               |                   | CC73FCH1H050C     | CHIP C 5.0PF C          |                        |                    |
| C275             |               |                   | CC73FCH1H010C     | CHIP C 1.0PF C          |                        |                    |
| C301             |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                        |                    |
| C302             |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C303             |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C304             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C305             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C306             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C307             |               |                   | CC73FCH1H010C     | CHIP C 1.0PF C          |                        |                    |
| C308-310         |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C311             |               |                   | CC73FCH1H390J     | CHIP C 39PF J           |                        |                    |
| C312             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C313             |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                        |                    |
| C314             |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C315             |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                        |                    |
| C316             |               |                   | CC73FCH1H060D     | CHIP C 6.0PF D          |                        |                    |
| C317             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C318             |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C319             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C320             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C321             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C322             |               |                   | CC73FCH1H330J     | CHIP C 33PF J           |                        |                    |
| C323             |               |                   | CC73FCH1H020C     | CHIP C 2.0PF C          |                        |                    |
| C324             |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C325,326         |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C327             |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C328             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C329             |               |                   | CC73FCH1H680J     | CHIP C 68PF J           |                        |                    |
| C330             |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C331             |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C332             |               |                   | C92-0004-05       | CHIP TAN 1UF 16WV       |                        |                    |
| TC1              |               |                   | C05-0337-05       | TRIMMING CAP (30PF)     |                        |                    |

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|------------------|---------------|-------------------|-------------------|-----------------------------|-------------------------|--------------------|
| TC2              |               |                   | C05-0030-15       | TRIMMING CAP (20PF)         |                         |                    |
| TC3              |               |                   | C05-0031-15       | TRIMMING CAP (10PF)         |                         |                    |
| TC201, 202       |               |                   | C05-0031-15       | TRIMMING CAP (10PF)         |                         |                    |
| TC301            |               |                   | C05-0329-05       | TRIMMING CAP (6PF)          |                         |                    |
| TC302, 303       |               |                   | C05-0062-05       | TRIMMING CAP (6PF)          |                         |                    |
| -                |               |                   | E04-0154-05       | COAX. CONNECTOR             |                         |                    |
| -                |               |                   | E04-0157-05       | MINI PIN SOCKET             |                         |                    |
| -                |               |                   | E23-0465-05       | TERMINAL                    |                         |                    |
| -                |               | *                 | E31-3219-25       | CONNECTING WIRE(LT)         |                         |                    |
| J1               |               |                   | E40-3239-05       | PIN CONNECTOR (4P)          |                         |                    |
| J2               |               |                   | E40-3238-05       | PIN CONNECTOR (3P)          |                         |                    |
| J3               |               |                   | E40-3242-05       | PIN CONNECTOR (7P)          |                         |                    |
| J201             |               |                   | E40-3237-05       | PIN CONNECTOR (2P)          |                         |                    |
| J202             |               |                   | E40-3238-05       | PIN CONNECTOR (3P)          |                         |                    |
| J203             |               |                   | E40-3240-05       | PIN CONNECTOR (5P)          |                         |                    |
| J204, 205        |               |                   | E40-3238-05       | PIN CONNECTOR (3P)          |                         |                    |
| J206             |               |                   | E40-3242-05       | PIN CONNECTOR (7P)          |                         |                    |
| J207             |               |                   | E40-3237-05       | PIN CONNECTOR (2P)          |                         |                    |
| J208             |               |                   | E40-3242-05       | PIN CONNECTOR (7P)          |                         |                    |
| J301             |               |                   | E40-3237-05       | PIN CONNECTOR (2P)          |                         |                    |
| J302             |               |                   | E40-3238-05       | PIN CONNECTOR (3P)          |                         |                    |
| J303             |               |                   | E40-0311-05       | PIN CONNECTOR (3P)          |                         |                    |
| TP301            |               |                   | E40-0211-05       | PIN CONNECTOR (2P)          |                         |                    |
| -                |               |                   | G02-0535-04       | GND SPRING                  |                         |                    |
| CF1 ,2           |               |                   | L72-0336-05       | CERAMIC FILTER              |                         |                    |
| L1 ,2            |               |                   | L40-4791-14       | SMALL FIXED INDUCTOR(4.7UH) |                         |                    |
| L3               |               |                   | L40-4711-14       | SMALL FIXED INDUCTOR(470UH) |                         |                    |
| L4               |               |                   | L30-0281-15       | IFT (10.7MHZ)               |                         |                    |
| L5 ,6            |               |                   | L34-2038-05       | COIL (31.0MHZ)              |                         |                    |
| L7               |               |                   | L34-2045-05       | COIL (31MHZ)                |                         |                    |
| L8               |               |                   | L40-1011-14       | SMALL FIXED INDUCTOR(100UH) |                         |                    |
| L9 ,10           |               |                   | L34-2249-05       | COIL (105MHZ)               |                         |                    |
| L11              |               | *                 | L79-0801-05       | HELICAL (276MHZ)            |                         |                    |
| L12              |               |                   | L40-1092-14       | SMALL FIXED INDUCTOR(1UH)   |                         |                    |
| L13              |               |                   | L34-0893-05       | COIL (3.4T)                 |                         |                    |
| L14 -16          |               |                   | L34-1058-05       | COIL (3,2.5T)               |                         |                    |
| L17              |               |                   | L40-1011-14       | SMALL FIXED INDUCTOR(100UH) |                         |                    |
| L18              |               |                   | L32-0675-05       | OSCILLATING COIL(VCO)       |                         |                    |
| L19              |               |                   | L40-3391-14       | SMALL FIXED INDUCTOR(3.3UH) |                         |                    |
| L20 ,21          |               |                   | L40-3311-14       | SMALL FIXED INDUCTOR(330UH) |                         |                    |
| L22              |               |                   | L34-2140-05       | COIL (9.6MHZ)               |                         |                    |
| L23 ,24          |               |                   | L34-2249-05       | COIL (105MHZ)               |                         |                    |
| L27 ,28          |               |                   | L34-2249-05       | COIL (105MHZ)               |                         |                    |
| L29              |               |                   | L40-3391-14       | SMALL FIXED INDUCTOR(3.3UH) |                         |                    |
| L30              |               |                   | L34-2015-05       | COIL (10.7MHZ)              |                         |                    |
| L31              |               |                   | L40-1092-14       | SMALL FIXED INDUCTOR(1UH)   |                         |                    |
| L32              |               |                   | L40-1011-14       | SMALL FIXED INDUCTOR(100UH) |                         |                    |
| L33              |               |                   | L40-1092-14       | SMALL FIXED INDUCTOR(1UH)   |                         |                    |
| L34              |               |                   | L40-1011-14       | SMALL FIXED INDUCTOR(100UH) |                         |                    |
| L35              |               |                   | L34-0908-05       | COIL (3,9.5T)               |                         |                    |
| L36 -38          |               |                   | L34-1025-05       | COIL (3,5.5T)               |                         |                    |
| L39 ,40          |               | *                 | L39-0428-05       | TOROIDAL COIL               |                         |                    |
| L41 -43          |               |                   | L79-0802-05       | HELICAL (393MHZ)            |                         |                    |
| L44              |               | *                 | L34-1164-05       | COIL (3,3T)                 |                         |                    |

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|--------------------------------------------------|---------------|-------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| L202,203<br>L204-206<br>L207,208<br>L209<br>L210 |               | *                 | L39-0428-05<br>L79-0649-05<br>L34-1052-05<br>L34-1083-05<br>L34-1052-05      | TOROIDAL COIL<br>HELICAL (435MHZ,TX)<br>COIL (3,1.5T)<br>COIL (3,1T)<br>COIL (3,1.5T)                         |                        |                    |
| L211<br>L301<br>L302<br>L303,304<br>L305         |               |                   | L40-4791-14<br>L34-1051-05<br>L34-1052-05<br>L79-0690-05<br>L34-1153-05      | SMALL FIXED INDUCTOR(4.7UH)<br>COIL<br>COIL (3,1.5T)<br>HELICAL (435MHZ,RX)<br>COIL (3,7T)                    |                        |                    |
| L306,307<br>L308,309<br>L310<br>L311,312<br>XF1  |               |                   | L34-1083-05<br>L34-2041-05<br>L34-2045-05<br>L30-0281-15<br>* L71-0268-05    | COIL (3,1T)<br>COIL (42MHZ)<br>COIL (31MHZ)<br>IFT (10.7MHZ)<br>MCF (41.415MHZ)                               |                        |                    |
| XF2                                              |               |                   | L71-0230-05                                                                  | MCF (10.695MHZ)                                                                                               |                        |                    |
| -                                                |               |                   | N35-3006-46                                                                  | BINDING HEAD MACHINE SCREW                                                                                    |                        |                    |
| R1<br>R2<br>R3<br>R4<br>R5                       |               |                   | RK73FB2A334J<br>RK73FB2A101J<br>RK73FB2A102J<br>RK73FB2A152J<br>RK73FB2A221J | CHIP R 330K J 1/10W<br>CHIP R 100 J 1/10W<br>CHIP R 1.0K J 1/10W<br>CHIP R 1.5K J 1/10W<br>CHIP R 220 J 1/10W |                        |                    |
| R6<br>R7<br>R8<br>R9<br>R10                      |               |                   | RK73FB2A334J<br>RK73FB2A471J<br>RK73FB2A473J<br>RK73FB2A103J<br>RK73FB2A221J | CHIP R 330K J 1/10W<br>CHIP R 470 J 1/10W<br>CHIP R 47K J 1/10W<br>CHIP R 10K J 1/10W<br>CHIP R 220 J 1/10W   |                        |                    |
| R11 -13<br>R14 ,15<br>R16<br>R17<br>R18          |               |                   | RK73FB2A101J<br>RK73FB2A102J<br>RK73FB2A221J<br>RK73FB2A332J<br>RK73FB2A102J | CHIP R 100 J 1/10W<br>CHIP R 1.0K J 1/10W<br>CHIP R 220 J 1/10W<br>CHIP R 3.3K J 1/10W<br>CHIP R 1.0K J 1/10W |                        |                    |
| R19<br>R20<br>R21<br>R22<br>R23                  |               |                   | RK73FB2A101J<br>RK73FB2A222J<br>RK73FB2A102J<br>RK73FB2A101J<br>RK73EB2B101J | CHIP R 100 J 1/10W<br>CHIP R 2.2K J 1/10W<br>CHIP R 1.0K J 1/10W<br>CHIP R 100 J 1/10W<br>CHIP R 100 J 1/8W   |                        |                    |
| R24<br>R25<br>R26<br>R27<br>R28                  |               |                   | R92-0670-05<br>RK73FB2A331J<br>RK73FB2A180J<br>RK73FB2A331J<br>RK73FB2A332J  | CHIP R 0 OHM<br>CHIP R 330 J 1/10W<br>CHIP R 18 J 1/10W<br>CHIP R 330 J 1/10W<br>CHIP R 3.3K J 1/10W          |                        |                    |
| R29<br>R30<br>R31<br>R32 ,33<br>R34              |               |                   | RK73FB2A224J<br>RK73FB2A333J<br>RK73FB2A152J<br>RK73FB2A103J<br>RK73FB2A101J | CHIP R 220K J 1/10W<br>CHIP R 33K J 1/10W<br>CHIP R 1.5K J 1/10W<br>CHIP R 10K J 1/10W<br>CHIP R 100 J 1/10W  |                        |                    |
| R35<br>R36<br>R37<br>R38<br>R39                  |               |                   | RK73FB2A223J<br>RK73FB2A103J<br>RK73FB2A471J<br>RK73FB2A101J<br>RK73FB2A124J | CHIP R 22K J 1/10W<br>CHIP R 10K J 1/10W<br>CHIP R 470 J 1/10W<br>CHIP R 100 J 1/10W<br>CHIP R 120K J 1/10W   |                        |                    |
| R40                                              |               |                   | RK73FB2A152J                                                                 | CHIP R 1.5K J 1/10W                                                                                           |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| R41              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R42              |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W     |                        |                    |
| R43              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R44              |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R45              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R46              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R47              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R48 ,49          |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R50              |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W     |                        |                    |
| R51              |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R52 ,53          |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R54              |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W     |                        |                    |
| R55              |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R56              |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W     |                        |                    |
| R57              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R58              |               |                   | RK73FB2A221J      | CHIP R 220 J 1/10W      |                        |                    |
| R59              |               |                   | R92-0679-05       | CHIP R 0 0HM            |                        |                    |
| R60              |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W     |                        |                    |
| R61              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R62              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R63              |               |                   | RK73FB2A680J      | CHIP R 68 J 1/10W       |                        |                    |
| R64              |               |                   | RK73FB2A334J      | CHIP R 330K J 1/10W     |                        |                    |
| R65              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R66              |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                        |                    |
| R67              |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R68              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R69 ,70          |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R71              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R72              |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R73              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R75              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R76              |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R77              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R78              |               |                   | RK73FB2A124J      | CHIP R 120K J 1/10W     |                        |                    |
| R79              |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R80              |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R81              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R82              |               |                   | R92-0679-05       | CHIP R 0 0HM            |                        |                    |
| R83 ,84          |               |                   | RK73FB2A272J      | CHIP R 2.7K J 1/10W     |                        |                    |
| R85              |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R86              |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                        |                    |
| R87              |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R88              |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R89              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R90              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R91              |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R92              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R93              |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R94              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R95              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R96              |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R97              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R98              |               |                   | RK73FB2A151J      | CHIP R 150 J 1/10W      |                        |                    |
| R99              |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R100             |               |                   | RK73FB2A151J      | CHIP R 150 J 1/10W      |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| R101             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R102             |               |                   | RK73FB2A180J      | CHIP R 18 J 1/10W       |                        |                    |
| R103             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R104             |               |                   | R92-0679-05       | CHIP R 0 0HM            |                        |                    |
| R105             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R106             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R107,108         |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R109             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R110             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R111,112         |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R113             |               |                   | R92-0679-05       | CHIP R 0 0HM            |                        |                    |
| R114             |               |                   | RK73FB2A151J      | CHIP R 150 J 1/10W      |                        |                    |
| R115             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R116             |               |                   | RK73FB2A151J      | CHIP R 150 J 1/10W      |                        |                    |
| R117             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R118             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R119             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R120             |               |                   | RK73FB2B101J      | CHIP R 100 J 1/8W       |                        |                    |
| R121             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R122             |               |                   | RK73FB2A180J      | CHIP R 18 J 1/10W       |                        |                    |
| R123             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R124             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R125,126         |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R127             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R128,129         |               |                   | R92-0679-05       | CHIP R 0 0HM            |                        |                    |
| R130             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R174             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R201             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R202             |               |                   | RK73FB2A180J      | CHIP R 18 J 1/10W       |                        |                    |
| R203,204         |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R205             |               |                   | RK73FB2A180J      | CHIP R 18 J 1/10W       |                        |                    |
| R206             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R207             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R208             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R209             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R210             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R211             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R212,213         |               |                   | RK73FB2A220J      | CHIP R 22 J 1/10W       |                        |                    |
| R214             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R215             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R216             |               |                   | RK73FB2A330J      | CHIP R 33 J 1/10W       |                        |                    |
| R217             |               |                   | RK73FB2A220J      | CHIP R 22 J 1/10W       |                        |                    |
| R218             |               |                   | RK73FB2A330J      | CHIP R 33 J 1/10W       |                        |                    |
| R220             |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R221             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R222             |               |                   | RK73FB2A330J      | CHIP R 33 J 1/10W       |                        |                    |
| R223-225         |               |                   | RK73FB2A220J      | CHIP R 22 J 1/10W       |                        |                    |
| R226             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R227             |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R228             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R229             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R230             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R231             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R231             |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R232,233         |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W     |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| R234             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R235             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R236             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R237             |               |                   | RK73FB2A822J      | CHIP R 8.2K J 1/10W     |                        |                    |
| R238             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R239             |               |                   | RK73FB2A822J      | CHIP R 8.2K J 1/10W     |                        |                    |
| R240             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R241             |               |                   | RK73FB2A124J      | CHIP R 120K J 1/10W     |                        |                    |
| R242             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R243             |               |                   | RK73FB2A124J      | CHIP R 120K J 1/10W     |                        |                    |
| R244             |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R245             |               |                   | RK73FB2A272J      | CHIP R 2.7K J 1/10W     |                        |                    |
| R246             |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R247             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R248             |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R249             |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R250             |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R251             |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R252             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R253             |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R254             |               |                   | RK73FB2A124J      | CHIP R 120K J 1/10W     |                        |                    |
| R255             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R256             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R257             |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R258             |               |                   | RK73FB2A124J      | CHIP R 120K J 1/10W     |                        |                    |
| R260             |               |                   | RD14BB2C152J      | RD 1.5K J 1/6W          |                        |                    |
| R261             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R301             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R302             |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R303             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R304, 305        |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R306             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R307             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R308             |               |                   | RK73FB2A220J      | CHIP R 22 J 1/10W       |                        |                    |
| R309             |               |                   | RK73FB2A680J      | CHIP R 68 J 1/10W       |                        |                    |
| R310             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R311             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R312             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R313             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R314             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R315             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R316             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R317             |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R318             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R319             |               |                   | RK73FB2A334J      | CHIP R 330K J 1/10W     |                        |                    |
| R320             |               |                   | RK73FB2A470J      | CHIP R 47 J 1/10W       |                        |                    |
| R321             |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R322             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R323             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R324             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| R325             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R326             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R327             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R328             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R329             |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |

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|------------------|---------------|-------------------|-------------------|----------------------------|------------------------|--------------------|
| R330             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W        |                        |                    |
| R331             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W         |                        |                    |
| R332             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W         |                        |                    |
| VR1              |               |                   | R12-1069-05       | TRIMMING P8T. (4.7K)       |                        |                    |
| VR3              |               |                   | R12-3097-05       | TRIMMING P8T. (22K)        |                        |                    |
| VR4              |               |                   | R12-1430-05       | TRIMMING P8T. (3K)         |                        |                    |
| VR5 ,6           |               |                   | R12-3099-05       | TRIMMING P8T. (47K)        |                        |                    |
| VR7              |               |                   | R12-6012-05       | TRIMMING P8T. (470K)       |                        |                    |
| D1               |               |                   | 1SV153            | VARI-CAP DIODE             |                        |                    |
| D2               |               |                   | ND487C1-3R        | DIODE                      |                        |                    |
| D3               |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D4 ,5            |               |                   | 1SS277            | DIODE                      |                        |                    |
| D201             |               |                   | ND487C1-3R        | DIODE                      |                        |                    |
| D202             |               |                   | 1SS226            | CHIP DIODE                 |                        |                    |
| D203,204         |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D205             |               |                   | 1N60PSPA          | DIODE                      |                        |                    |
| D206-208         |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D301             |               |                   | 1SS268            | CHIP DIODE                 |                        |                    |
| IC1              |               |                   | TC9172P           | IC(PRE SCALER PLL)         |                        |                    |
| IC2              |               |                   | TC74HC390P        | IC                         |                        |                    |
| IC3              |               |                   | TC5082P-G         | IC                         |                        |                    |
| IC4              |               |                   | SN16913P          | IC(DUBLE BALANCED MIXERS)  |                        |                    |
| IC5              |               |                   | TC9172P           | IC(PRE SCALER PLL)         |                        |                    |
| IC6              |               |                   | L78N08            | IC                         |                        |                    |
| IC7              |               |                   | NJM78L05A         | IC(VOLTAGE REGULATOR/ +5V) |                        |                    |
| IC201            |               |                   | MB3712            | IC(AF POWER AMP)           |                        |                    |
| Q1 -3            |               |                   | 2SC2715(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q4               |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q5               |               |                   | 2SC3098           | CHIP TRANSISTOR            |                        |                    |
| Q6               |               |                   | 2SC3356           | CHIP TRANSISTOR            |                        |                    |
| Q7 -9            |               |                   | 2SC3324(G,B)      | CHIP TRANSISTOR            |                        |                    |
| Q10 ,11          |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q12 ,13          |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q14 -18          |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q19              |               |                   | 3SK151(GR)        | CHIP FET                   |                        |                    |
| Q20 ,21          |               |                   | DTC124EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q22              |               |                   | DTA143EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q23              |               |                   | DTC124EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q24              |               |                   | DTA143EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q25 -27          |               |                   | 2SC3324(G,B)      | CHIP TRANSISTOR            |                        |                    |
| Q28              |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q29 ,30          |               |                   | 2SC3098           | CHIP TRANSISTOR            |                        |                    |
| Q31              |               |                   | 2SC3356           | CHIP TRANSISTOR            |                        |                    |
| Q201,202         |               |                   | 2SC3098           | CHIP TRANSISTOR            |                        |                    |
| Q203             |               |                   | 2SC3356           | CHIP TRANSISTOR            |                        |                    |
| Q204             |               |                   | 2SC2762           | TRANSISTOR                 |                        |                    |
| Q205             |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q206             |               |                   | DTC124EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q207             |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q208             |               |                   | DTA143EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q209             |               |                   | 2SA1162(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q210             |               |                   | DTA143EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q301             |               |                   | 3SK184(S)         | CHIP FET                   |                        |                    |
| Q302             |               |                   | 2SK125            | FET                        |                        |                    |

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|------------------------------------------------------|---------------|-------------------|------------------------------------------------|------------------------------------------------------------------|-------------------------|--------------------|
| Q303<br>Q304<br>Q305<br>Q306                         |               | *                 | 3SK184(S)<br>3SK179(L)<br>DTA114EK<br>DTC114EK | CHIP FET<br>CHIP FET<br>DIGITAL TRANSISTOR<br>DIGITAL TRANSISTOR |                         |                    |
| -                                                    |               | *                 | X58-1000-01                                    | VCO UNIT                                                         |                         |                    |
| -                                                    |               | *                 | X58-3060-00                                    | 10.240SC UNIT                                                    |                         |                    |
| -                                                    |               | *                 | X58-3070-00                                    | RIT UNIT                                                         |                         |                    |
| -                                                    |               | *                 | X59-1130-00                                    | CW BREAK IN UNIT                                                 |                         |                    |
| CONTROL UNIT (X53-1460-XX) -12 : K,M -52 : T -62 : W |               |                   |                                                |                                                                  |                         |                    |
| -                                                    |               |                   | A33-0404-02                                    | REFLECTOR                                                        |                         |                    |
| -                                                    |               | *                 | B11-0438-03                                    | LIGHT GLUIDING PLATE                                             |                         |                    |
| -                                                    |               | *                 | B31-0658-15                                    | METER                                                            |                         |                    |
| D213                                                 |               | *                 | B30-0846-05                                    | LED (AMBER)                                                      | K1M1                    |                    |
| D301                                                 |               | *                 | B30-0844-05                                    | LED (ORANGE)                                                     |                         |                    |
| D302                                                 |               | *                 | B30-0842-05                                    | LED (RED)                                                        |                         |                    |
| D303-305                                             |               | *                 | B30-0843-05                                    | LED (GREEN)                                                      |                         |                    |
| D306                                                 |               | *                 | B30-0844-05                                    | LED (ORANGE)                                                     |                         |                    |
| D307                                                 |               | *                 | B30-0843-05                                    | LED (GREEN)                                                      |                         |                    |
| D308                                                 |               | *                 | B30-0842-05                                    | LED (RED)                                                        |                         |                    |
| PL1                                                  |               | *                 | B30-0845-05                                    | LAMP FOR METER                                                   |                         |                    |
| PL301,302                                            |               |                   | B30-0828-05                                    | LAMP (12V60MA)GREEN CAP                                          |                         |                    |
| C1                                                   |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C2                                                   |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C4 -7                                                |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C8                                                   |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C9 -11                                               |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C12                                                  |               |                   | CK73FB1E223K                                   | CHIP C 0.022UF K                                                 |                         |                    |
| C13 ,14                                              |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C15                                                  |               |                   | C90-2041-05                                    | ELECTRO 10UF 10WV                                                |                         |                    |
| C16                                                  |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C17                                                  |               |                   | CE04EW1A470M                                   | ELECTRO 47UF 10WV                                                |                         |                    |
| C18                                                  |               |                   | C90-0822-05                                    | ELECTRO 47UF 16WV                                                |                         |                    |
| C19                                                  |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C20 ,21                                              |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C22                                                  |               |                   | C90-0824-05                                    | ELECTRO 1UF 50WV                                                 |                         |                    |
| C28                                                  |               |                   | CE04CW1H2R2M                                   | ELECTRO 2.2UF 50WV                                               |                         |                    |
| C29                                                  |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  | T1W1                    |                    |
| C30                                                  |               |                   | CK73FB1H472K                                   | CHIP C 4700PF K                                                  | T1W1                    |                    |
| C31                                                  |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 | T1W1                    |                    |
| C32                                                  |               |                   | CK73EB1H333K                                   | CHIP C 0.033UF K                                                 | T1W1                    |                    |
| C33                                                  |               |                   | C90-0480-05                                    | ELECTRO 47UF 10WV                                                | T1W1                    |                    |
| C34                                                  |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 | T1W1                    |                    |
| C35                                                  |               |                   | C91-0433-05                                    | CERAMIC 0.0039                                                   | T1W1                    |                    |
| C36 ,37                                              |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C38                                                  |               |                   | CK73FB1H103K                                   | CHIP C 0.010UF K                                                 |                         |                    |
| C39 -44                                              |               |                   | CC73FCH1H101J                                  | CHIP C 100PF J                                                   |                         |                    |
| C45                                                  |               |                   | C90-0824-05                                    | ELECTRO 1UF 50WV                                                 | K1M1                    |                    |
| C46                                                  |               |                   | CK73FB1E223K                                   | CHIP C 0.022UF K                                                 |                         |                    |
| C49                                                  |               |                   | CE04CW1H100M                                   | ELECTRO 10UF 50WV                                                | T1                      |                    |
| C201                                                 |               |                   | CK73FB1H182K                                   | CHIP C 1800PF K                                                  |                         |                    |
| C202                                                 |               |                   | CK73FB1H102K                                   | CHIP C 1000PF K                                                  |                         |                    |
| C204                                                 |               |                   | CK73FB1H332K                                   | CHIP C 3300PF K                                                  |                         |                    |
| C205                                                 |               |                   | CK73FB1H471K                                   | CHIP C 470PF K                                                   |                         |                    |

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|----------------------------------------------|---------------|-------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| C206<br>C207, 208<br>C209<br>C210<br>C211    |               |                   | CE04CW1C100M<br>CK73FB1E223K<br>CK73FB1H102K<br>CK73FB1H103K<br>CC73FCH1H101J | ELECTRO 10UF 16WV<br>CHIP C 0.022UF K<br>CHIP C 1000PF K<br>CHIP C 0.010UF K<br>CHIP C 100PF J               |                        |                    |
| C212-215<br>C216-219<br>C220<br>C221<br>C222 |               |                   | CK73FB1H102K<br>CK73FB1E223K<br>CK73FB1H102K<br>CK73EB1H473K<br>CK73FB1H102K  | CHIP C 1000PF K<br>CHIP C 0.022UF K<br>CHIP C 1000PF K<br>CHIP C 0.047UF K<br>CHIP C 1000PF K                |                        |                    |
| C223<br>C301-304<br>C305                     |               |                   | C90-2031-05<br>CK73FB1H103K<br>CC73FCH1H330J                                  | ELECTRO 4.7UF 10WV<br>CHIP C 0.010UF K<br>CHIP C 33PF J                                                      |                        |                    |
| -<br>-<br>-<br>-<br>J1                       |               |                   | E06-0858-05<br>E23-0512-05<br>E29-0428-04<br>E29-0469-08<br>E40-5069-05       | 8P METAL SOCKET<br>TERMINAL<br>TERMINAL (SW UNIT)<br>INTER CONNECTOR<br>PIN CONNECTOR (12P)                  |                        |                    |
| J2<br>J3<br>J4<br>J5<br>J6                   |               |                   | E40-5068-05<br>E40-3242-05<br>E40-3240-05<br>E40-5067-05<br>E40-3243-05       | PIN CONNECTOR (11P)<br>PIN CONNECTOR (7P)<br>PIN CONNECTOR (5P)<br>PIN CONNECTOR (10P)<br>PIN CONNECTOR (8P) |                        |                    |
| J7<br>J8 ,9<br>J10<br>J201<br>J202           |               |                   | E40-5021-05<br>E40-5022-05<br>E40-5019-05<br>E40-3237-05<br>E40-3241-05       | PIN CONNECTOR (7P)<br>PIN CONNECTOR (8P)<br>PIN CONNECTOR (5P)<br>PIN CONNECTOR (2P)<br>PIN CONNECTOR (6P)   | K1M1                   |                    |
| J203<br>J204<br>J205<br>TP9                  |               |                   | E40-5067-05<br>E40-3243-05<br>E40-3238-05<br>E40-0211-05                      | PIN CONNECTOR (10P)<br>PIN CONNECTOR (8P)<br>PIN CONNECTOR (3P)<br>PIN CONNECTOR (2P)                        | T1W1                   |                    |
| -                                            |               | *                 | J19-1421-04                                                                   | COVER                                                                                                        |                        |                    |
| X1                                           |               | *                 | L78-0017-05                                                                   | RESONATOR (4.194MHZ)                                                                                         |                        |                    |
| -<br>-                                       |               | *                 | N09-0608-05<br>N09-0698-05                                                    | SCREW<br>SCREW (Ø1.7X5)                                                                                      |                        |                    |
| JR1<br>JR2<br>JR4<br>JR5<br>JR201            |               |                   | R92-0670-05<br>R92-0670-05<br>R92-0670-05<br>R92-0670-05<br>R92-0670-05       | CHIP R 0 0HM<br>CHIP R 0 0HM<br>CHIP R 0 0HM<br>CHIP R 0 0HM<br>CHIP R 0 0HM                                 | K1M1<br>T1W1           |                    |
| JR301, 302<br>R1<br>R2 ,3<br>R4 -6<br>R7     |               | *                 | R92-0670-05<br>R90-0462-05<br>RK73FB2A103J<br>RD14CB2C151J<br>RD14CB2C331J    | CHIP R 0 0HM<br>MULTI-COMP (47KX8)<br>CHIP R 10K J 1/10W<br>RD 150 J 1/6W<br>RD 330 J 1/6W                   |                        |                    |
| R8<br>R9<br>R10<br>R11 -15<br>R16 ,17        |               |                   | RD14BB2C151J<br>RK73FB2A473J<br>RK73FB2A472J<br>RK73FB2A473J<br>RK73FB2A273J  | RD 150 J 1/6W<br>CHIP R 47K J 1/10W<br>CHIP R 4.7K J 1/10W<br>CHIP R 47K J 1/10W<br>CHIP R 27K J 1/10W       |                        |                    |
| R18                                          |               |                   | RK73FB2A103J                                                                  | CHIP R 10K J 1/10W                                                                                           |                        |                    |

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|------------------|---------------|-------------------|-------------------|----------------------------|------------------------|--------------------|
| R19              |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W         |                        |                    |
| R20              |               |                   | RD14DB2H470J      | SMALL-RD 47 J 1/2W         |                        |                    |
| R21              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W         |                        |                    |
| R24              |               |                   | RK73FB2A183J      | CHIP R 18K J 1/10W         | K1M1                   |                    |
| R32              |               |                   | RK73FB2A273J      | CHIP R 27K J 1/10W         | T1W1                   |                    |
| R33              |               |                   | RK73FB2A393J      | CHIP R 39K J 1/10W         | T1W1                   |                    |
| R34              |               |                   | RK73FB2A123J      | CHIP R 12K J 1/10W         | T1W1                   |                    |
| R35              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W        | T1W1                   |                    |
| R36              |               |                   | RN14BK2B9102F     | RN 91.0K F 1/8W            | T1W1                   |                    |
| R37              |               |                   | RK73FB2A560J      | CHIP R 56 J 1/10W          |                        |                    |
| R38              |               |                   | RK73FB2A273J      | CHIP R 27K J 1/10W         |                        |                    |
| R40              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W        |                        |                    |
| R41              |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W        |                        |                    |
| R42              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W        | T1                     |                    |
| R43              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W         |                        |                    |
| R201             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W         |                        |                    |
| R203             |               |                   | RK73FB2A823J      | CHIP R 82K J 1/10W         |                        |                    |
| R204             |               |                   | RK73FB2A683J      | CHIP R 68K J 1/10W         |                        |                    |
| R205             |               |                   | RK73FB2A684J      | CHIP R 680K J 1/10W        |                        |                    |
| R206             |               |                   | RK73FB2A564J      | CHIP R 560K J 1/10W        |                        |                    |
| R207             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W         |                        |                    |
| R208, 209        |               |                   | RK73FB2A182J      | CHIP R 1.8K J 1/10W        |                        |                    |
| R210, 211        |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W         |                        |                    |
| R212             |               |                   | RD14BB2E470J      | RD 47 J 1/4W               |                        |                    |
| R213             |               |                   | RD14BB2E100J      | RD 10 J 1/4W               |                        |                    |
| R214             |               | *                 | R90-0462-05       | MULTI-COMP (47KXB)         |                        |                    |
| R215-217         |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W        |                        |                    |
| R218             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W         |                        |                    |
| R219             |               |                   | RD14BB2C101J      | RD 100 J 1/6W              |                        |                    |
| R220             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W         |                        |                    |
| R221             |               |                   | RK73EB2B821J      | CHIP R 820 J 1/8W          |                        |                    |
| R222             |               |                   | RK73EB2B122J      | CHIP R 1.2K J 1/8W         |                        |                    |
| R224             |               |                   | RK73EB2B122J      | CHIP R 1.2K J 1/8W         |                        |                    |
| R225             |               |                   | RK73EB2B821J      | CHIP R 820 J 1/8W          |                        |                    |
| R301-303         |               |                   | RK73EB2B152J      | CHIP R 1.5K J 1/8W         | K1M1                   |                    |
| R304-307         |               |                   | RK73EB2B222J      | CHIP R 2.2K J 1/8W         |                        |                    |
| R308, 309        |               |                   | RK73EB2B123J      | CHIP R 12K J 1/8W          |                        |                    |
| R310             |               |                   | RK73EB2B393J      | CHIP R 39K J 1/8W          |                        |                    |
| VR2              |               | *                 | R12-3523-05       | TRIMMING POT. (20K)        | T1W1                   |                    |
| VR4              |               | *                 | R23-3403-05       | POTENTIOMETER (10KBX2)     |                        |                    |
| VR5              |               | *                 | R23-9402-05       | POTENTIOMETER (10KK, 50KB) |                        |                    |
| S201-204         |               |                   | S40-1411-05       | TACT SWITCH                |                        |                    |
| S205             |               |                   | S40-2444-05       | PUSH SWITCH (NON LOCK)     |                        |                    |
| S206, 207        |               |                   | S40-2443-05       | PUSH SWITCH (LOCK)         |                        |                    |
| S208             |               |                   | S40-2444-05       | PUSH SWITCH (NON LOCK)     |                        |                    |
| S209-218         |               |                   | S50-1426-05       | TACT SWITCH                |                        |                    |
| S219-223         |               |                   | S40-1411-05       | TACT SWITCH                |                        |                    |
| S225             |               |                   | S31-1411-05       | SLIDE SWITCH               |                        |                    |
| -                |               | *                 | FSD-8168B         | LCD                        | K1M1T1                 |                    |
| -                |               | *                 | FSD-8168G         | LCD                        | W1                     |                    |
| D1               |               |                   | 1SS133            | DIODE                      | T1W1                   |                    |
| D2               |               |                   | 1SS133            | DIODE                      |                        |                    |
| D3               |               |                   | 1SS133            | DIODE                      | K1M1                   |                    |

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|-------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| D4 -5             |               |                   | 1SS133            | DIODE                   | W1                     |                    |
| D6                |               |                   | 1SS133            | DIODE                   | T1                     |                    |
| D7                |               |                   | 1SS133            | DIODE                   |                        |                    |
| D8                |               |                   | 1SS133            | DIODE                   | T1W1                   |                    |
| D9                |               |                   | 1SS133            | DIODE                   |                        |                    |
| D11               |               |                   | 1SS133            | DIODE                   |                        |                    |
| D14               |               |                   | 1SS133            | DIODE                   | K1M1                   |                    |
| D16 -18           |               |                   | 1SS133            | DIODE                   |                        |                    |
| D19 ,20           |               |                   | DAN202(K)         | CHIP DIODE              |                        |                    |
| D19 ,20           |               |                   | 1SS184            | CHIP DIODE              |                        |                    |
| D21               |               |                   | DAP202(K)         | CHIP DIODE              |                        |                    |
| D21               |               |                   | 1SS181            | CHIP DIODE              |                        |                    |
| D22 -24           |               |                   | 1SS133            | DIODE                   |                        |                    |
| D25 ,26           |               |                   | DAN202(K)         | CHIP DIODE              |                        |                    |
| D25 ,26           |               |                   | 1SS184            | CHIP DIODE              |                        |                    |
| D27               |               |                   | DAP202(K)         | CHIP DIODE              |                        |                    |
| D27               |               |                   | 1SS181            | CHIP DIODE              |                        |                    |
| D29               |               |                   | 1SS106            | DIODE                   |                        |                    |
| D30               |               |                   | DAN202(K)         | CHIP DIODE              | T1W1                   |                    |
| D30               |               |                   | 1SS184            | CHIP DIODE              | T1W1                   |                    |
| D31               |               |                   | DAN202(K)         | CHIP DIODE              |                        |                    |
| D31               |               |                   | 1SS184            | CHIP DIODE              |                        |                    |
| D33               |               |                   | DAN202(K)         | CHIP DIODE              |                        |                    |
| D33               |               |                   | 1SS184            | CHIP DIODE              |                        |                    |
| D201-206          |               |                   | DAP202(K)         | CHIP DIODE              |                        |                    |
| D201-206          |               |                   | 1SS181            | CHIP DIODE              |                        |                    |
| D207-211          |               |                   | 1SS133            | DIODE                   |                        |                    |
| D212              |               | *                 | LN322GP           | LED (GREEN)             |                        |                    |
| IC1               |               | *                 | 7508HG-564-22     | IC(MICROPROCESSOR)      |                        |                    |
| IC2               |               | *                 | DT5C124E          | IC                      |                        |                    |
| IC3               |               | *                 | DT5A143E          | IC                      |                        |                    |
| IC4               |               |                   | UPD7507SCT-226    | IC(MICROPROCESSOR)      |                        |                    |
| IC5               |               |                   | NJM2930L-06B      | IC                      |                        |                    |
| IC6               |               |                   | NE555P            | IC                      |                        |                    |
| IC201             |               | *                 | BU4584B           | IC(INVERTER X6)         | T1W1                   |                    |
| IC202             |               | *                 | PST523C           | IC(SYSTEM RESET)        |                        |                    |
| IC301             |               | *                 | UPD7514G-143-12   | IC(MICROPROCESSOR)      |                        |                    |
| Q4                |               |                   | DTC114EK          | DIGITAL TRANSISTOR      |                        |                    |
| Q5                |               | *                 | DTA114TK          | DIGITAL TRANSISTOR      |                        |                    |
| Q6                |               |                   | DTC114EK          | DIGITAL TRANSISTOR      |                        |                    |
| Q7 ,8             |               | *                 | DTA114EK          | DIGITAL TRANSISTOR      |                        |                    |
| Q201-203          |               |                   | DTC114EK          | DIGITAL TRANSISTOR      |                        |                    |
| Q301              |               | *                 | DTC114EK          | DIGITAL TRANSISTOR      | K1M1                   |                    |
| Q302              |               | *                 | DTC114EK          | DIGITAL TRANSISTOR      |                        |                    |
| -                 |               | *                 | W02-0376-05       | LCD ASSY                | K1M1                   |                    |
| -                 |               | *                 | W02-0377-05       | LCD ASSY                | T1                     |                    |
| -                 |               | *                 | W02-0387-05       | LCD ASSY                | W1                     |                    |
| S224              |               | *                 | W02-0374-05       | ROTARY ENCODER (SGF)    |                        |                    |
| VCO (X58-1000-01) |               |                   |                   |                         |                        |                    |
| C1                |               |                   | CQ92M1H473K       | MYLAR 0.047UF K         |                        |                    |
| C2                |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C3                |               |                   | CC73FCH1H200J     | CHIP C 20PF J           |                        |                    |
| C4                |               |                   | CC73FCH1H060D     | CHIP C 6.0PF D          |                        |                    |
| C5                |               |                   | CC73FCH1H070D     | CHIP C 7.0PF D          |                        |                    |

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|-------------------------------|---------------|-------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------|--------------------|
| C6<br>C7<br>C8<br>C9<br>TC1   |               |                   | CK73FB1H102K<br>CC73FCH1H180J<br>CC73FCH1H050C<br>CK73FB1H102K<br>C05-0031-15    | CHIP C 1000PF K<br>CHIP C 18PF J<br>CHIP C 5.0PF C<br>CHIP C 1000PF K<br>TRIMMING CAP (10P) |                        |                    |
| -                             |               |                   | E23-0464-05                                                                      | TEST PIN                                                                                    |                        |                    |
| -                             |               | *                 | F11-1018-04                                                                      | SHIELDING COVER (VCOA COVER)                                                                |                        |                    |
| -                             |               | *                 | F11-1021-04                                                                      | SHIELDING CASE                                                                              |                        |                    |
| -                             |               |                   | F20-0563-14                                                                      | INSULATING BOARD                                                                            |                        |                    |
| L1                            |               | *                 | L33-0690-05                                                                      | CHOKE COIL (3.3UH)                                                                          |                        |                    |
| L2                            |               | *                 | L34-2300-05                                                                      | COIL (5.5T)                                                                                 |                        |                    |
| R1                            |               |                   | RK73FB2A103J                                                                     | CHIP R 10K J 1/10W                                                                          |                        |                    |
| R2                            |               |                   | RK73FB2A331J                                                                     | CHIP R 330 J 1/10W                                                                          |                        |                    |
| R3                            |               |                   | RK73FB2A473J                                                                     | CHIP R 47K J 1/10W                                                                          |                        |                    |
| R4                            |               |                   | RK73FB2A470J                                                                     | CHIP R 47 J 1/10W                                                                           |                        |                    |
| R5                            |               |                   | RK73FB2A102J                                                                     | CHIP R 1.0K J 1/10W                                                                         |                        |                    |
| D1                            |               |                   | 1SV50                                                                            | VARI CAP DIODE                                                                              |                        |                    |
| Q1                            |               |                   | 2SK125                                                                           | FET                                                                                         |                        |                    |
| Q2                            |               |                   | 2SC2714(Y)                                                                       | CHIP TRANSISTOR                                                                             |                        |                    |
| 10.24MHz OSC (X58-3060-00)    |               |                   |                                                                                  |                                                                                             |                        |                    |
| C1<br>C2<br>C3<br>C4<br>C5 ,6 |               |                   | CK73FB1H103K<br>CC73FCH1H390J<br>CC73FCH1H040C<br>CC73FTH1H220J<br>CC73FCH1H151J | CHIP C 0.010UF K<br>CHIP C 39PF J<br>CHIP C 4.0PF C<br>CHIP C 150PF J                       |                        |                    |
| C7 ,8<br>TC1                  |               | *                 | CK73FB1H103K<br>C05-0344-05                                                      | CHIP C 0.010UF K<br>TRIMMING CAP (30P)                                                      |                        |                    |
| -                             |               | *                 | E23-0486-05                                                                      | TERMINAL                                                                                    |                        |                    |
| -                             |               | *                 | F11-1055-05                                                                      | SHIELDING CASE                                                                              |                        |                    |
| -                             |               | *                 | G13-0841-04                                                                      | CUSHION                                                                                     |                        |                    |
| X1                            |               | *                 | L77-1332-05                                                                      | CRYSTAL RESONATOR (10.24MHZ)                                                                |                        |                    |
| R1                            |               |                   | RK73FB2A330J                                                                     | CHIP R 33 J 1/10W                                                                           |                        |                    |
| R2                            |               |                   | RK73FB2A223J                                                                     | CHIP R 22K J 1/10W                                                                          |                        |                    |
| R3                            |               |                   | RK73FB2A333J                                                                     | CHIP R 33K J 1/10W                                                                          |                        |                    |
| R4                            |               |                   | RK73FB2A102J                                                                     | CHIP R 1.0K J 1/10W                                                                         |                        |                    |
| R5                            |               |                   | RK73FB2A222J                                                                     | CHIP R 2.2K J 1/10W                                                                         |                        |                    |
| R6                            |               |                   | RK73FB2A104J                                                                     | CHIP R 100K J 1/10W                                                                         |                        |                    |
| R7                            |               |                   | RK73FB2A681J                                                                     | CHIP R 680 J 1/10W                                                                          |                        |                    |
| Q1                            |               |                   | 2SC2715(Y)                                                                       | CHIP TRANSISTOR                                                                             |                        |                    |
| Q2                            |               |                   | 2SC2712(Y)                                                                       | CHIP TRANSISTOR                                                                             |                        |                    |
| RIT (X58-3070-00)             |               |                   |                                                                                  |                                                                                             |                        |                    |
| C1<br>C2<br>C3<br>C4 ,5<br>C6 |               |                   | CK73FB1H103K<br>CC73FRH1H100D<br>CC73FRH1H300J<br>CC73FCH1H151J<br>CK73FB1H102K  | CHIP C 0.010UF K<br>CHIP C 10PF D<br>CHIP C 30PF J<br>CHIP C 150PF J<br>CHIP C 1000PF K     |                        |                    |
| TC1                           |               | *                 | C05-0345-05                                                                      | TRIMMING CAP (10P)                                                                          |                        |                    |
| J1                            |               |                   | E40-S047-05                                                                      | PIN CONNECTOR (4P)                                                                          |                        |                    |

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|------------------------------|---------------|-------------------|-------------------|------------------------------|------------------------|--------------------|
| -                            |               | *                 | F11-1056-04       | SHIELDING CASE               |                        |                    |
| -                            |               | *                 | F11-1058-04       | SHIELDING COVER              |                        |                    |
| L1                           |               |                   | L33-0648-05       | CHOKE COIL (4.7U)            |                        |                    |
| L2                           |               | *                 | L34-4037-05       | COIL                         |                        |                    |
| X1                           |               | *                 | L77-1331-05       | CRYSTAL RESONATOR(15.266MHZ) |                        |                    |
| R1                           |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W           |                        |                    |
| R2                           |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W          |                        |                    |
| R3                           |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W          |                        |                    |
| R4                           |               |                   | RK73FB2A221J      | CHIP R 220 J 1/10W           |                        |                    |
| R5                           |               |                   | RK73FB2A561J      | CHIP R 560 J 1/10W           |                        |                    |
| D1                           |               |                   | 1SV153            | VARI CAP DIODE               |                        |                    |
| Q1                           |               |                   | 2SC2715(Y)        | CHIP TRANSISTOR              |                        |                    |
| -6V DC-DC (X59-1100-00)      |               |                   |                   |                              |                        |                    |
| E1 ,2                        |               |                   | CK73FB1H222K      | CHIP C 2200PF K              |                        |                    |
| -                            |               |                   | E23-0471-05       | TERMINAL                     |                        |                    |
| JR1 -3                       |               |                   | R92-0670-05       | CHIP R 0 OHM                 |                        |                    |
| R1                           |               |                   | RK73FB2A272J      | CHIP R 2.7K J 1/10W          |                        |                    |
| R2 ,3                        |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W           |                        |                    |
| R4                           |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W           |                        |                    |
| R5                           |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W           |                        |                    |
| D1                           |               |                   | 1SS226            | CHIP DIODE                   |                        |                    |
| Q1 ,2                        |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR              |                        |                    |
| Q3                           |               |                   | 2SA1162(Y)        | CHIP TRANSISTOR              |                        |                    |
| AF PRE AMP (X59-1110-00)     |               |                   |                   |                              |                        |                    |
| C1                           |               |                   | CK73FB1H103K      | CHIP C 0.010UF K             |                        |                    |
| C2                           |               |                   | CK73FB1H392K      | CHIP C 3900PF K              |                        |                    |
| C3                           |               |                   | CC73FCH1H101J     | CHIP C 100PF J               |                        |                    |
| C4                           |               |                   | CK73FB1H471K      | CHIP C 470PF K               |                        |                    |
| -                            |               |                   | E23-0471-05       | TERMINAL                     |                        |                    |
| JR1 ,2                       |               |                   | R92-0670-05       | CHIP R 0 OHM                 |                        |                    |
| R1                           |               |                   | RK73FB2A123J      | CHIP R 12K J 1/10W           |                        |                    |
| R2                           |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W           |                        |                    |
| R3                           |               |                   | RK73FB2A272J      | CHIP R 2.7K J 1/10W          |                        |                    |
| R4                           |               |                   | RK73FB2A151J      | CHIP R 150 J 1/10W           |                        |                    |
| R5                           |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W          |                        |                    |
| R6                           |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W          |                        |                    |
| R7                           |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W           |                        |                    |
| R8                           |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W          |                        |                    |
| R9                           |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W          |                        |                    |
| Q1 ,2                        |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR              |                        |                    |
| SQUELCH SWITCH (X59-1120-00) |               |                   |                   |                              |                        |                    |
| -                            |               |                   | E23-0471-05       | TERMINAL                     |                        |                    |
| R1 -3                        |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W           |                        |                    |
| R4 ,5                        |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W           |                        |                    |
| R6                           |               |                   | RK73FB2A474J      | CHIP R 470K J 1/10W          |                        |                    |
| R7                           |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W          |                        |                    |
| D1 ,2                        |               |                   | 1SS184            | CHIP DIODE                   |                        |                    |
| Q1 -3                        |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR              |                        |                    |

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|-----------------------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| CW BREAK IN (X59-1130-00)         |               |                   |                   |                         |                        |                    |
| -                                 |               |                   | E23-0471-05       | TERMINAL                |                        |                    |
| R1                                |               |                   | RK73FB2A563J      | CHIP R 56K J 1/10W      |                        |                    |
| R2                                |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R3                                |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R4                                |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R5                                |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R6                                |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R7                                |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W     |                        |                    |
| R8                                |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R9                                |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| Q1                                |               |                   | DTA114EK          | DIGITAL TRANSISTOR      |                        |                    |
| Q2 -4                             |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR         |                        |                    |
| MIC AMP (X59-3000-01)             |               |                   |                   |                         |                        |                    |
| C1                                |               |                   | CC73FCH1H101J     | CHIP C 100PF J          |                        |                    |
| C2                                |               |                   | CK73FB1H561K      | CHIP C 560PF K          |                        |                    |
| C3                                |               |                   | CC73FCH1H390J     | CHIP C 39PF J           |                        |                    |
| C4                                |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C5                                |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| -                                 |               |                   | E23-0471-05       | TERMINAL                |                        |                    |
| JR1                               |               |                   | R92-0670-05       | CHIP R 0 OHM            |                        |                    |
| R1                                |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                        |                    |
| R2                                |               |                   | RK73FB2A823J      | CHIP R 82K J 1/10W      |                        |                    |
| R3                                |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W     |                        |                    |
| R4                                |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R5 -7                             |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                        |                    |
| R8                                |               |                   | RK73FB2A182J      | CHIP R 1.8K J 1/10W     |                        |                    |
| R9                                |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| IC1                               |               |                   | NJM4558M          | IC(OP AMP X2)           |                        |                    |
| Q1                                |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR         |                        |                    |
| COMPOSITE UNIT (RX) (X60-1320-01) |               |                   |                   |                         |                        |                    |
| C1                                |               |                   | CC73FCH1H040C     | CHIP C 4.0PF C          |                        |                    |
| C2                                |               |                   | C90-0868-05       | ELECTR 10UF 16WV        |                        |                    |
| C3                                |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C4                                |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C5                                |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C6                                |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C7 ,8                             |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C9                                |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C10                               |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C11 -16                           |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C17                               |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C18 ,19                           |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C20                               |               |                   | CC73FCH1H100D     | CHIP C 10PF D           |                        |                    |
| C21                               |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C22                               |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C23                               |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C24                               |               |                   | CK73EB1E473K      | CHIP C 0.047UF K        |                        |                    |
| C25 -28                           |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C29                               |               |                   | CK73FB1H471K      | CHIP C 470PF K          |                        |                    |
| C30                               |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| C31              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C32              |               |                   | CC73FCH1H150J     | CHIP C 15PF J           |                        |                    |
| C33 -35          |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C36              |               |                   | C90-0868-05       | ELECTR0 10UF 16WV       |                        |                    |
| C37              |               |                   | CC73FSL1H331J     | CHIP C 330PF J          |                        |                    |
| C38              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C39              |               |                   | CS15E1E010M       | TANTAL 1.0UF 25WV       |                        |                    |
| C40              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C41 ,42          |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C43              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C44              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C45              |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |
| C46 ,47          |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C48              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C49              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C50              |               |                   | CE04CW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C51 ,52          |               |                   | CK73EB1E104K      | CHIP C 0.10UF K         |                        |                    |
| C53              |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C54              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C55 ,56          |               | *                 | CK73EB1E104K      | CHIP C 0.10UF K         |                        |                    |
| C57 ,58          |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C59              |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C60              |               |                   | CK73FB1H472K      | CHIP C 4700PF K         |                        |                    |
| C61              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C62              |               |                   | CC73FCH1H220J     | CHIP C 22PF J           |                        |                    |
| C63              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C64              |               |                   | CK73EB1H153K      | CHIP C 0.015UF K        |                        |                    |
| C65              |               |                   | CC73FSL1H121J     | CHIP C 120PF J          |                        |                    |
| C66              |               |                   | CK73FB1H472K      | CHIP C 4700PF K         |                        |                    |
| C67              |               |                   | CK73EB1E104K      | CHIP C 0.10UF K         |                        |                    |
| C68              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C69              |               |                   | CK73EB1E473K      | CHIP C 0.047UF K        |                        |                    |
| C70 ,71          |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C72              |               |                   | CC73FSL1H331J     | CHIP C 330PF J          |                        |                    |
| C73              |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C74              |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C75              |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C76              |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C77              |               |                   | CS15E1E010M       | TANTAL 1.0UF 25WV       |                        |                    |
| C78 ,79          |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C80              |               |                   | CE04CW1A470M      | ELECTR0 47UF 10WV       |                        |                    |
| C81              |               |                   | C90-0478-05       | ELECTR0 10UF 16WV       |                        |                    |
| C82              |               |                   | C90-0824-05       | ELECTR0 1UF 50WV        |                        |                    |
| C83              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C84              |               |                   | CC45UJ1H020C      | CERAMIC 2.0PF C         |                        |                    |
| C85              |               |                   | CC45UJ1H100D      | CERAMIC 10PF D          |                        |                    |
| C86              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C87 ,88          |               |                   | CC73FSL1H221J     | CHIP C 220PF J          |                        |                    |
| C89              |               |                   | CK73FB1H103K      | CHIP C 0.010UF K        |                        |                    |
| C90              |               |                   | CC73FCH1H030C     | CHIP C 3.0PF C          |                        |                    |
| C91              |               |                   | CC73FCH1H050C     | CHIP C 5.0PF C          |                        |                    |
| C92              |               |                   | CC73FCH1H470J     | CHIP C 47PF J           |                        |                    |
| C93 -95          |               |                   | CK73FB1E223K      | CHIP C 0.022UF K        |                        |                    |
| C96              |               |                   | CK73FB1H102K      | CHIP C 1000PF K         |                        |                    |
| C97 ,98          |               |                   | CC73FSL1H101J     | CHIP C 100PF J          |                        |                    |

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|------------------------------------------------|---------------|-------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------|--------------------|
| C99<br>C100<br>C101<br>C102<br>C103            |               |                   | CK73FB1H102K<br>CC73FSL1H101J<br>CE04CW1A470M<br>C90-0824-05<br>C90-0478-05    | CHIP C 1000PF K<br>CHIP C 100PF J<br>ELECTR0 47UF 10WV<br>ELECTR0 1UF 50WV<br>ELECTR0 10UF 16WV        |                        |                    |
| C104<br>C105, 106<br>C107<br>C108<br>C109      |               |                   | CK73FB1H103K<br>C90-0824-05<br>CK73FB1H103K<br>CE04CW1A470M<br>C90-0478-05     | CHIP C 0.010UF K<br>ELECTR0 1UF 50WV<br>CHIP C 0.010UF K<br>ELECTR0 47UF 10WV<br>ELECTR0 10UF 16WV     |                        |                    |
| C110<br>C111<br>C112<br>C113<br>C114           |               |                   | C90-0824-05<br>CK73FB1H103K<br>CK73FB1H102K<br>CK73FB1E223K<br>CE04CW1A330M    | ELECTR0 1UF 50WV<br>CHIP C 0.010UF K<br>CHIP C 1000PF K<br>CHIP C 0.022UF K<br>ELECTR0 33UF 10WV       |                        |                    |
| C115<br>C116-118<br>C119<br>C120<br>C121       |               |                   | CK73FB1E223K<br>CK73FB1H103K<br>CC73FCH1H470J<br>CK73FB1E223K<br>CC73FCH1H470J | CHIP C 0.022UF K<br>CHIP C 0.010UF K<br>CHIP C 47PF J<br>CHIP C 0.022UF K<br>CHIP C 47PF J             |                        |                    |
| C122<br>C123, 124<br>C125<br>C126, 127<br>C128 |               |                   | CC73FCH1H050C<br>CK73FB1E223K<br>CK73FB1H103K<br>CK73FB1H102K<br>C90-2033-05   | CHIP C 5.0PF C<br>CHIP C 0.022UF K<br>CHIP C 0.010UF K<br>CHIP C 1000PF K<br>ELECTR0 1000UF 16WV       |                        |                    |
| C129<br>C130<br>C131, 132<br>C133<br>C134      |               |                   | CK73FB1E223K<br>CK73FB1H102K<br>CK73FB1H103K<br>CE04CW1A470M<br>C90-0478-05    | CHIP C 0.022UF K<br>CHIP C 1000PF K<br>CHIP C 0.010UF K<br>ELECTR0 47UF 10WV<br>ELECTR0 10UF 16WV      |                        |                    |
| C135<br>C136<br>C137<br>C138, 139<br>C140, 141 |               |                   | CE04W1C101M<br>C90-0820-05<br>CE04CW1C470M<br>CE04W1C330M<br>CK73FB1H103K      | ELECTR0 100UF 16WV<br>ELECTR0 470UF 16WV<br>ELECTR0 47UF 16WV<br>ELECTR0 33UF 16WV<br>CHIP C 0.010UF K |                        |                    |
| C142<br>C143<br>C144<br>C145<br>C146           |               |                   | CS15E1C2R2M<br>CS15E1C4R7M<br>CS15E1C100M<br>C90-0868-05<br>C90-0478-05        | TANTAL 2.2UF 16WV<br>TANTAL 4.7UF 16WV<br>TANTAL 10UF 16WV<br>ELECTR0 10UF 16WV<br>ELECTR0 10UF 16WV   |                        |                    |
| C147<br>C148<br>C149, 150<br>C151<br>C152      |               | *                 | CK73EB1E473K<br>CE04CW1A470M<br>CK73EB1E104K<br>C90-0478-05<br>CK73FB1H102K    | CHIP C 0.047UF K<br>ELECTR0 47UF 10WV<br>CHIP C 0.10UF K<br>ELECTR0 10UF 16WV<br>CHIP C 1000PF K       |                        |                    |
| C153<br>C154<br>C155-157<br>C158<br>C159       |               |                   | CK73FB1H103K<br>CK73FB1H471K<br>CK73FB1E223K<br>CK73FB1H471K<br>CK73FB1E223K   | CHIP C 0.010UF K<br>CHIP C 470PF K<br>CHIP C 0.022UF K<br>CHIP C 470PF K<br>CHIP C 0.022UF K           |                        |                    |
| TC1<br>TC2                                     |               |                   | C05-0030-15<br>C05-0062-05                                                     | TRIMMING CAP (20P)<br>TRIMMING CAP (6P)                                                                |                        |                    |
| J1<br>J2                                       |               |                   | E40-3240-05<br>E40-3238-05                                                     | PIN ASSY (5P)<br>PIN ASSY (3P)                                                                         |                        |                    |

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|------------------|---------------|-------------------|-------------------|------------------------------|------------------------|--------------------|
| J3               |               |                   | E40-3241-05       | PIN ASSY (6P)                |                        |                    |
| J4               |               |                   | E40-5067-05       | PIN ASSY (10P)               |                        |                    |
| J5               |               |                   | E40-3242-05       | PIN ASSY (7P)                |                        |                    |
| J6               |               |                   | E40-3238-05       | PIN ASSY (3P)                |                        |                    |
| J7               |               |                   | E40-3241-05       | PIN ASSY (6P)                |                        |                    |
| J8 ,9            |               |                   | E40-3237-05       | PIN ASSY (2P)                |                        |                    |
| J10 ,11          |               |                   | E40-3241-05       | PIN ASSY (6P)                |                        |                    |
| J12              |               |                   | E40-3237-05       | PIN ASSY (2P)                |                        |                    |
| J13              |               |                   | E40-0273-05       | PIN ASSY (2P)                |                        |                    |
| JP1              |               |                   | E31-0381-05       | CONNECTING WIRE(10MM)        |                        |                    |
| JP2              |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP3              |               | *                 | E31-0381-05       | CONNECTING WIRE(10MM)        |                        |                    |
| JP4              |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP5              |               | *                 | E31-1960-05       | CONNECTING WIRE(15MM)        |                        |                    |
| JP6              |               |                   | E31-0381-05       | CONNECTING WIRE(10MM)        |                        |                    |
| JP7              |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP8 -11          |               | *                 | E31-1960-05       | CONNECTING WIRE(15MM)        |                        |                    |
| JP12,13          |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP14             |               |                   | E31-0381-05       | CONNECTING WIRE(10MM)        |                        |                    |
| JP15             |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP16             |               | *                 | E31-1960-05       | CONNECTING WIRE(15MM)        |                        |                    |
| JP17             |               |                   | E31-1449-05       | CONNECTING WIRE(7.5MM)       |                        |                    |
| JP18             |               |                   | E31-1959-05       | CONNECTING WIRE(12.5MM)      |                        |                    |
| JP19             |               | *                 | E31-1960-05       | CONNECTING WIRE(15MM)        |                        |                    |
| JP20             |               |                   | E31-1449-05       | CONNECTING WIRE(7.5MM)       |                        |                    |
| JP21             |               |                   | E31-0381-05       | CONNECTING WIRE(10MM)        |                        |                    |
| JP22,23          |               | *                 | E31-1960-05       | CONNECTING WIRE(15MM)        |                        |                    |
| JP24             |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| JP25             |               |                   | E31-1449-05       | CONNECTING WIRE(7.5MM)       |                        |                    |
| JP26             |               | *                 | E31-0302-05       | CONNECTING WIRE(20MM)        |                        |                    |
| TP1 -4           |               |                   | E23-0465-05       | TERMINAL                     |                        |                    |
| -                |               | *                 | F02-0421-04       | HEAT SINK(CAP/ADDITION TYPE) |                        |                    |
| -                |               |                   | G02-0535-04       | LEAF SPRING,FLAT SPRING      |                        |                    |
| CF1              |               |                   | L72-0315-05       | CERAMIC FILTER (CFW455F)     |                        |                    |
| L1 -7            |               |                   | L30-0281-15       | IFT                          |                        |                    |
| L8               |               |                   | L30-0503-05       | IFT                          |                        |                    |
| L9               |               |                   | L40-4791-14       | SMALL FIXED INDUCTOR(4.7U)   |                        |                    |
| L10              |               |                   | L30-0503-05       | IFT                          |                        |                    |
| L11              |               |                   | L40-1021-14       | SMALL FIXED INDUCTOR(1MH)    |                        |                    |
| L13              |               |                   | L30-0503-05       | IFT                          |                        |                    |
| L14              |               |                   | L40-1021-14       | SMALL FIXED INDUCTOR(1MH)    |                        |                    |
| L15              |               |                   | L30-0503-05       | IFT                          |                        |                    |
| L16 ,17          |               |                   | L40-1021-14       | SMALL FIXED INDUCTOR(1MH)    |                        |                    |
| L18              |               | *                 | L33-0691-05       | CHOKE COIL (15U)             |                        |                    |
| L19              |               |                   | L40-1011-16       | SMALL FIXED INDUCTOR(100U)   |                        |                    |
| L20              |               |                   | L40-1021-14       | SMALL FIXED INDUCTOR(1MH)    |                        |                    |
| L21              |               |                   | L30-0515-05       | IFT                          |                        |                    |
| L22              |               |                   | L15-0306-05       | LOW-FREQUENCY CHOKE COIL     |                        |                    |
| L23              |               |                   | L40-1021-14       | SMALL FIXED INDUCTOR(1MH)    |                        |                    |
| X1               |               | *                 | L77-1305-05       | CRYSTAL RESONATOR(10.695)    |                        |                    |
| XF1              |               |                   | L71-0249-05       | CRYSTAL FILTER (10F2.2S)     |                        |                    |
| -                |               |                   | N35-3006-46       | BINDING HEAD MACHINE SCREW   |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| -                |               |                   | R92-0150-05       | JUMPER REST 0 0HM       |                        |                    |
| JR1 -4           |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| JR6 ,7           |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| JR9 -13          |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| JR50-58          |               |                   | R92-0679-05       | FIXED RESISTOR          |                        |                    |
| JR60,61          |               |                   | R92-0670-05       | CHIP R 0 0HM            |                        |                    |
| JR62-68          |               |                   | R92-0679-05       | FIXED RESISTOR          |                        |                    |
| JR70-77          |               |                   | R92-0679-05       | FIXED RESISTOR          |                        |                    |
| R1               |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R2               |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R3               |               |                   | RK73FB2A273J      | CHIP R 27K J 1/10W      |                        |                    |
| R4               |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                        |                    |
| R5               |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R6               |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R7 -10           |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R11              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R12              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R14              |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R15              |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R16              |               |                   | RK73EB2B101J      | CHIP R 100 J 1/8W       |                        |                    |
| R17              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R18              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R20              |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                        |                    |
| R21              |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W     |                        |                    |
| R22              |               |                   | RK73EB2B101J      | CHIP R 100 J 1/8W       |                        |                    |
| R23 ,24          |               |                   | RK73FB2A221J      | CHIP R 220 J 1/10W      |                        |                    |
| R25              |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W     |                        |                    |
| R26              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R27 ,28          |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R29              |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                        |                    |
| R30              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R31              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R32              |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                        |                    |
| R33              |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W     |                        |                    |
| R34              |               |                   | RK73FB2A681J      | CHIP R 680 J 1/10W      |                        |                    |
| R35              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R36              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R37              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R38              |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R39              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R40              |               |                   | RK73FB2A182J      | CHIP R 1.8K J 1/10W     |                        |                    |
| R41              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R43              |               |                   | RK73FB2A392J      | CHIP R 3.9K J 1/10W     |                        |                    |
| R44 ,45          |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R46              |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W     |                        |                    |
| R47              |               |                   | RK73FB2A182J      | CHIP R 1.8K J 1/10W     |                        |                    |
| R48              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R49              |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R50 ,51          |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                        |                    |
| R52              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R53              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R54              |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                        |                    |
| R55              |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                        |                    |
| R56              |               |                   | RK73FB2A823J      | CHIP R 82K J 1/10W      |                        |                    |
| R57              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|-------------------------|--------------------|
| R58              |               |                   | RK73FB2A334J      | CHIP R 330K J 1/10W     |                         |                    |
| R59              |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                         |                    |
| R60              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R61              |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                         |                    |
| R62              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R63              |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                         |                    |
| R64              |               |                   | RK73FB2A681J      | CHIP R 680 J 1/10W      |                         |                    |
| R65              |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                         |                    |
| R66              |               |                   | RK73FB2A334J      | CHIP R 330K J 1/10W     |                         |                    |
| R67              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R68              |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                         |                    |
| R69              |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                         |                    |
| R70              |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                         |                    |
| R71              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R72              |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                         |                    |
| R73              |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                         |                    |
| R74              |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                         |                    |
| R75              |               |                   | RK73FB2A682J      | CHIP R 6.8K J 1/10W     |                         |                    |
| R76              |               |                   | RK73FB2A105J      | CHIP R 1.0M J 1/10W     |                         |                    |
| R77              |               |                   | RK73FB2A273J      | CHIP R 27K J 1/10W      |                         |                    |
| R78              |               |                   | RK73FB2A334J      | CHIP R 330K J 1/10W     |                         |                    |
| R79              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                         |                    |
| R80              |               |                   | RK73FB2A273J      | CHIP R 27K J 1/10W      |                         |                    |
| R81              |               |                   | RK73FB2A683J      | CHIP R 68K J 1/10W      |                         |                    |
| R82              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R83              |               |                   | RK73FB2A183J      | CHIP R 18K J 1/10W      |                         |                    |
| R84              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R85              |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                         |                    |
| R86              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                         |                    |
| R87              |               |                   | RK73FB2A331J      | CHIP R 330 J 1/10W      |                         |                    |
| R88              |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                         |                    |
| R89              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R90              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                         |                    |
| R91              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R92              |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                         |                    |
| R93              |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                         |                    |
| R94              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R94              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R95              |               |                   | RK73FB2A153J      | CHIP R 15K J 1/10W      |                         |                    |
| R96              |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                         |                    |
| R97              |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                         |                    |
| R98              |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R99              |               |                   | RK73FB2A104J      | CHIP R 100K J 1/10W     |                         |                    |
| R100             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                         |                    |
| R101             |               |                   | RK73EB2B101J      | CHIP R 100 J 1/8W       |                         |                    |
| R102             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                         |                    |
| R103             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                         |                    |
| R104             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |
| R106             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                         |                    |
| R107             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                         |                    |
| R108             |               |                   | RK73FB2A223J      | CHIP R 22K J 1/10W      |                         |                    |
| R109             |               |                   | RK73EB2B101J      | CHIP R 100 J 1/8W       |                         |                    |
| R110             |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                         |                    |
| R111             |               |                   | RK73FB2A221J      | CHIP R 220 J 1/10W      |                         |                    |
| R112             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                         |                    |

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|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| R113             |               |                   | RK73FB2A471J      | CHIP R 470 J 1/10W      |                        |                    |
| R114             |               |                   | RK73FB2A224J      | CHIP R 220K J 1/10W     |                        |                    |
| R115             |               |                   | RK73EB2B101J      | CHIP R 100 J 1/8W       |                        |                    |
| R116             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R117             |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R118             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R119,120         |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R121,122         |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R123             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R124             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R125             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R126             |               |                   | RD14CB2E2R2J      | RD 2.2 J 1/4W           |                        |                    |
| R127             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R128             |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R129             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R130             |               |                   | RD14CB2E2R2J      | RD 2.2 J 1/4W           |                        |                    |
| R131             |               |                   | RD14BB2C222J      | RD 2.2K J 1/6W          |                        |                    |
| R132             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R133             |               |                   | RK73FB2A472J      | CHIP R 4.7K J 1/10W     |                        |                    |
| R134             |               |                   | RK73FB2A152J      | CHIP R 1.5K J 1/10W     |                        |                    |
| R135             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R136             |               |                   | RS14KB3D330J      | FL-PROOF RS 33 J 2W     |                        |                    |
| R137             |               |                   | RD14BB2E2R2J      | RD 2.2 J 1/4W           |                        |                    |
| R138             |               |                   | RK73FB2A221J      | CHIP R 220 J 1/10W      |                        |                    |
| R139             |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R140             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R141             |               |                   | RK73FB2A332J      | CHIP R 3.3K J 1/10W     |                        |                    |
| R142             |               |                   | RK73FB2A101J      | CHIP R 100 J 1/10W      |                        |                    |
| R143             |               |                   | RK73FB2A562J      | CHIP R 5.6K J 1/10W     |                        |                    |
| R144             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R145             |               |                   | RK73FB2A473J      | CHIP R 47K J 1/10W      |                        |                    |
| R146             |               |                   | RK73FB2A222J      | CHIP R 2.2K J 1/10W     |                        |                    |
| R147             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| R148             |               |                   | RK73FB2A103J      | CHIP R 10K J 1/10W      |                        |                    |
| R149             |               |                   | RK73FB2A333J      | CHIP R 33K J 1/10W      |                        |                    |
| R150             |               |                   | RK73FB2A102J      | CHIP R 1.0K J 1/10W     |                        |                    |
| VR1              |               |                   | R12-3450-05       | TRIMMING PØT. (20K)     |                        |                    |
| VR2              |               | *                 | R12-1435-05       | TRIMMING PØT. (2K)      |                        |                    |
| VR3              |               |                   | R12-3443-05       | TRIMMING PØT. (10K)     |                        |                    |
| VR4              |               |                   | R12-7408-05       | TRIMMING PØT. (500K)    |                        |                    |
| VR5 ,6           |               |                   | R12-3450-05       | TRIMMING PØT. (20K)     |                        |                    |
| VR7              |               |                   | R12-3443-05       | TRIMMING PØT. (10K)     |                        |                    |
| VR8              |               |                   | R12-2413-05       | TRIMMING PØT. (5K)      |                        |                    |
| VR9              |               |                   | R12-3443-05       | TRIMMING PØT. (10K)     |                        |                    |
| VR10             |               |                   | R12-5420-05       | TRIMMING PØT. (100K)    |                        |                    |
| VR11             |               |                   | R12-3443-05       | TRIMMING PØT. (10K)     |                        |                    |
| VR12             |               |                   | R12-2413-05       | TRIMMING PØT. (5K)      |                        |                    |
| VR13             |               |                   | R12-1428-05       | TRIMMING PØT. (1K)      |                        |                    |
| VR14             |               |                   | R12-3444-05       | TRIMMING PØT. (10K)     |                        |                    |
| D1               |               | *                 | 1SS272            | CHIP DIØDE              |                        |                    |
| D3 ,4            |               |                   | 1SS184            | CHIP DIØDE              |                        |                    |
| D5 ,6            |               |                   | HSM88AS           | CHIP DIØDE              |                        |                    |
| D9               |               |                   | 1SS181            | CHIP DIØDE              |                        |                    |
| D10 ,11          |               |                   | 1SS106            | DIØDE                   |                        |                    |

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|------------------|---------------|-------------------|-------------------|----------------------------|------------------------|--------------------|
| D12 -15          |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D16              |               |                   | 1SS133            | DIODE                      |                        |                    |
| D17              |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D18              |               |                   | 1SS181            | CHIP DIODE                 |                        |                    |
| D19              |               |                   | 1SS226            | CHIP DIODE                 |                        |                    |
| D20              |               |                   | 1SS133            | DIODE                      |                        |                    |
| D21              |               |                   | 1S2208            | DIODE                      |                        |                    |
| D22              |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D23              |               |                   | 1SS181            | CHIP DIODE                 |                        |                    |
| D24              |               | *                 | 1SS272            | CHIP DIODE                 |                        |                    |
| D26              |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D27              |               |                   | 1SS226            | CHIP DIODE                 |                        |                    |
| D28              |               |                   | 1SS181            | CHIP DIODE                 |                        |                    |
| D29              |               |                   | MTZ11JC           | ZENER DIODE                |                        |                    |
| D30              |               |                   | MTZ6.2JA          | ZENER DIODE                |                        |                    |
| D31              |               |                   | 1SS181            | CHIP DIODE                 |                        |                    |
| D32              |               |                   | HSM88AS           | CHIP DIODE                 |                        |                    |
| D33 ,34          |               |                   | 1SS184            | CHIP DIODE                 |                        |                    |
| D35              |               |                   | 1SS181            | CHIP DIODE                 |                        |                    |
| IC1              |               |                   | TA7302P           | IC(FM IF)                  |                        |                    |
| IC2              |               |                   | TA7761P           | IC(FM IF)                  |                        |                    |
| IC3              |               |                   | NJM4558D          | IC(OP AMP X2)              |                        |                    |
| IC3              |               |                   | UPC4558C          | IC(OP AMP X2)              |                        |                    |
| IC4              |               |                   | AN612             | IC(BALANCE MODULATOR)      |                        |                    |
| IC5              |               |                   | UPC78M08H         | IC(VOLTAGE REGULATOR/ +8V) |                        |                    |
| Q1 -3            |               |                   | 3SK73(GR)         | FET                        |                        |                    |
| Q4               |               |                   | 2SK125            | FET                        |                        |                    |
| Q5               |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q6               |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q7               |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q8 ,9            |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q10              |               |                   | DTA114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q11              |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q12 ,13          |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q14 ,15          |               |                   | 2SK208(O)         | CHIP FET                   |                        |                    |
| Q16              |               |                   | 2SA1162(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q17              |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q18 ,19          |               |                   | 2SC2714(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q20              |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q21              |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q22              |               |                   | DTA114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q23              |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q24              |               |                   | 3SK73(GR)         | FET                        |                        |                    |
| Q25 -27          |               | *                 | 2SC3324(G,B)      | CHIP TRANSISTOR            |                        |                    |
| Q28 ,29          |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q30              |               |                   | 2SA1115(E)        | TRANSISTOR                 |                        |                    |
| Q31              |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q32              |               |                   | 2SA1307(Y)        | TRANSISTOR                 |                        |                    |
| Q33              |               |                   | 2SA1162(Y)        | CHIP TRANSISTOR            |                        |                    |
| Q34              |               |                   | 2SC3419(Y)        | TRANSISTOR                 |                        |                    |
| Q35              |               |                   | DTC114EK          | DIGITAL TRANSISTOR         |                        |                    |
| Q36              |               |                   | 2SC2712(Y)        | CHIP TRANSISTOR            |                        |                    |
| TH1              |               |                   | 112-202-2         | THERMISTOR (2K)            |                        |                    |
| TH2              |               |                   | 112-102-2         | THERMISTOR (1K)            |                        |                    |
| TH3              |               |                   | 112-103-2         | THERMISTOR (10K)           |                        |                    |

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

△ indicates safety critical components.

## PARTS LIST

\* New Parts

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.

| Ref. No.<br>参照番号 | Address<br>位置 | New<br>Parts<br>新 | Parts No.<br>部品番号 | Description<br>部品名 / 規格 | Desti-<br>nation<br>仕向 | Re-<br>marks<br>備考 |
|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|--------------------|
| -                |               | *                 | X59-1100-00       | -6V DC-DC UNIT          |                        |                    |
| -                |               | *                 | X59-1110-00       | AF PRE AMP UNIT         |                        |                    |
| -                |               | *                 | X59-1120-00       | SQL SW UNIT             |                        |                    |
| -                |               | *                 | X59-3000-01       | MIC AMP UNIT            |                        |                    |

E: Scandinavia &amp; Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

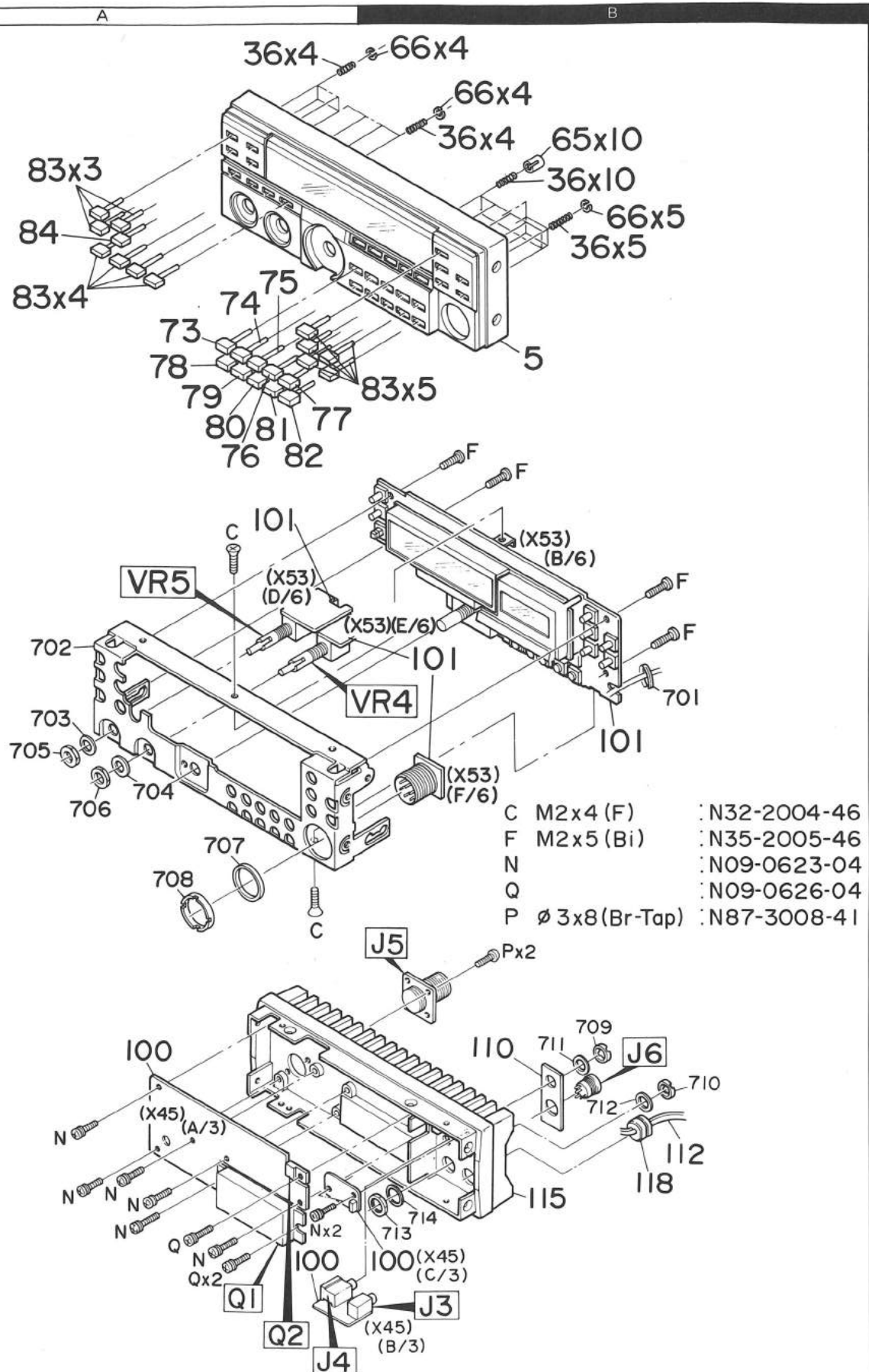
⚠ indicates safety critical components.

## SEMICONDUCTOR

N : New Parts

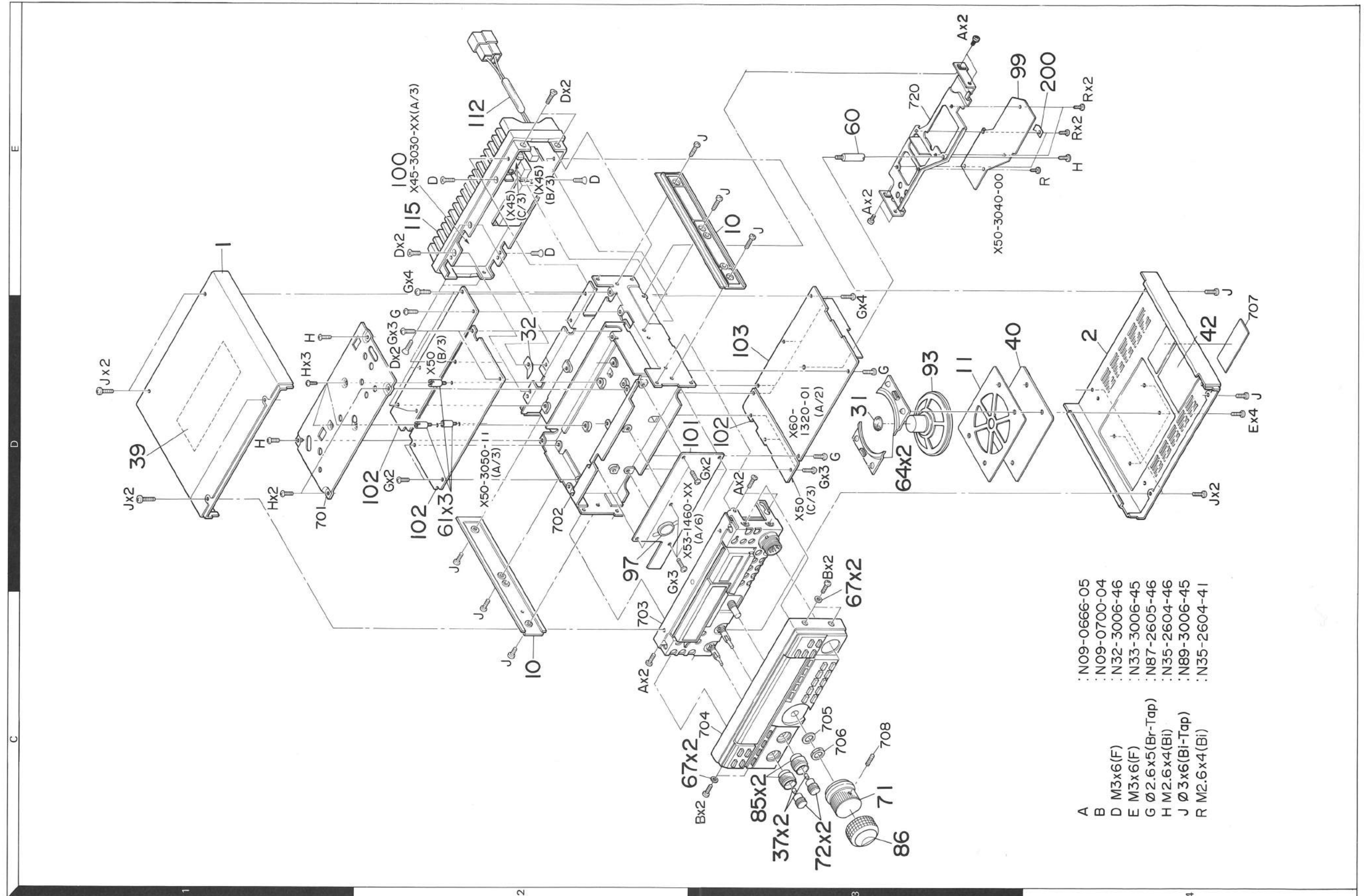
| Item                      | Re-<br>marks | Parts No.   | Item              | Re-<br>marks | Parts No.    | Item                           | Re-<br>marks | Parts No.       |
|---------------------------|--------------|-------------|-------------------|--------------|--------------|--------------------------------|--------------|-----------------|
| <b>Diode</b>              |              | 1N60PSPA    | <b>LCD</b>        | N            | FSD-8168B    | <b>Power<br/>Module<br/>IC</b> |              | M57745          |
|                           |              | 1S2208      |                   | N            | FSD-8168G    |                                | N            | 7508HG-564-22   |
|                           |              | 1SS101      | <b>Thermister</b> |              | 112-102-2    |                                |              | AN612           |
|                           |              | 1SS106      |                   |              | 112-103-2    |                                | N            | BU4584B         |
|                           |              | 1SS133      |                   |              | 112-202-2    |                                | N            | DT5A143E        |
|                           |              | 1SS208      |                   |              | 112-502-2    |                                | N            | DT5C124E        |
|                           |              | 1SS226      | <b>TR</b>         |              | 2SA1115(E)   |                                |              | L78N08          |
|                           |              | 1SS277      |                   |              | 2SA1307(Y)   |                                |              | MB3712          |
|                           |              | DSA3A1      |                   |              | 2SC2458(Y)   |                                |              | NE555P          |
|                           |              | MI308       | <b>Chip TR</b>    |              | 2SC2762      |                                |              | NJM78L05A       |
|                           |              | MI407       |                   |              | 2SC3419(Y)   |                                |              | NJM2930L-06B    |
|                           |              | ND487C1-3R  |                   |              | 2SA1162(Y)   |                                |              | NJM4558D        |
| <b>Vari-cap<br/>diode</b> |              | 1SV50       |                   |              | 2SC2712(Y)   |                                |              | NJM4558M        |
|                           |              | 1SV153      |                   |              | 2SC2714(Y)   |                                | N            | PST523C         |
| <b>Chip<br/>diode</b>     |              | 1SS181      |                   |              | 2SC2715(Y)   |                                |              | SN16913P        |
|                           |              | 1SS184      |                   | N            | 2SC3098      |                                |              | TA7302P         |
|                           |              | 1SS226      |                   |              | 2SC3324(G,B) |                                |              | TA7761P         |
|                           | N            | 1SS268      |                   |              | 2SC3356      |                                |              | TC74HC390P      |
|                           | N            | 1SS272      |                   |              | 3SK151(GR)   |                                |              | TC5082P-G       |
|                           |              | DAN202(K)   | <b>Digital TR</b> |              | DTA114EK     |                                |              | TC9172P         |
|                           |              | DAP202(K)   |                   | N            | DTA114TK     |                                |              | μPC78M08H       |
|                           |              | HSM88AS     |                   | N            | DTA143EK     |                                |              | μPC4558C        |
| <b>Zener<br/>diode</b>    |              | MTZ6.2JA    |                   | N            | DTC114EK     |                                |              | μPD7507SCT-226  |
|                           |              | MTZ11JC     | <b>FET</b>        |              | DTC124EK     |                                | N            | μPD7514G-143-12 |
| <b>LED</b>                | N            | B30-0842-05 |                   |              | 2SK125       |                                |              |                 |
|                           | N            | B30-0843-05 |                   |              | 3SK73(GR)    |                                |              |                 |
|                           | N            | B30-0844-05 | <b>Chip FET</b>   |              | 2SK208(O)    |                                |              |                 |
|                           | N            | B30-0846-05 |                   |              | 3SK151(GR)   |                                |              |                 |
|                           | N            | LN322GP     |                   |              | 3SK179(L)    |                                |              |                 |
|                           |              |             |                   |              | 3SK184(S)    |                                |              |                 |

## EXPLODED VIEW





## EXPLODED VIEW



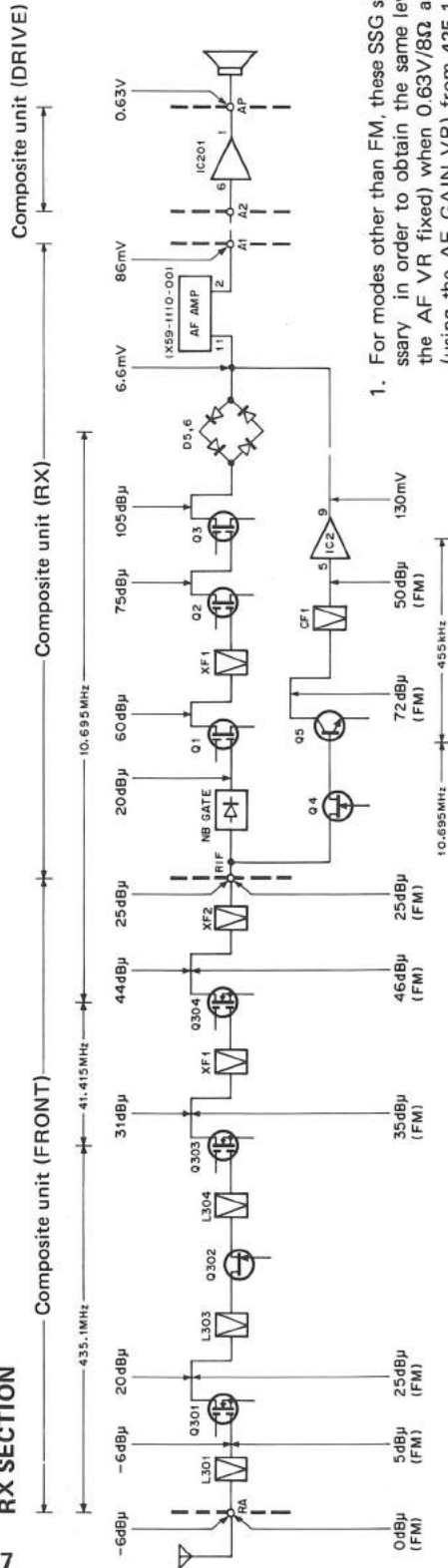
- A : N09-0666-05
- B : N09-0700-04
- D M3x6(F)
- E M3x6(F)
- G Ø 2.6x5(Br-Tap)
- H M2.6x4(Bi)
- J Ø 3x6(Bi-Tap)
- R M2.6x4(Bi)
- : N32-3006-46
- : N33-3006-45
- : N87-2605-46
- : N35-2604-46
- : N89-3006-45
- : N35-2604-41



## LEVEL DIAGRAM

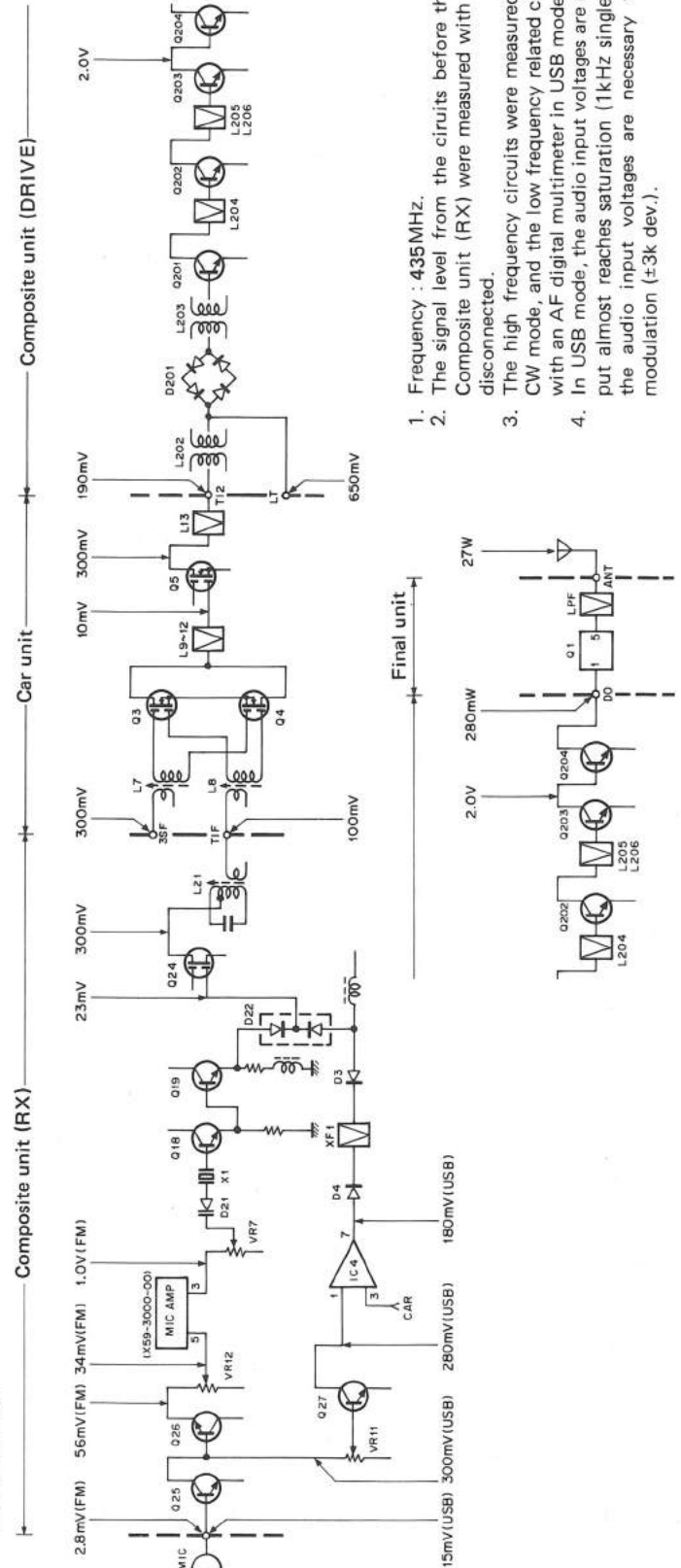
57

### RX SECTION



1. For modes other than FM, these SSG signal level values are necessary in order to obtain the same level of audio output (with the AF VR fixed) when 0.63V/8Ω audio signals are obtained (using the AF GAIN VR) from 435.1MHz, -6dBμ signal input from the antenna.
2. For FM mode, this SSG signal level value is necessary in order to obtain the same level audio output as is obtained when the S meter reading of 0dBμ signal is applied from the antenna.
3. The level of output from the circuits following the ring detector is the same as the AF output level.
4. SSG output was measured, using a 0.01μF capacitor.

### TX SECTION



1. Frequency : 435MHz.
2. The signal level from the circuits before the DO terminal in the Composite unit (RX) were measured with the DO coaxial cable disconnected.
3. The high frequency circuits were measured with a RF probe in CW mode, and the low frequency related circuits were measured with an AF digital multimeter in USB mode.
4. In USB mode, the audio input voltages are necessary to that output almost reaches saturation (1kHz single tone). In FM mode, the audio input voltages are necessary to perform standard modulation (±3k dev.).

## ADJUSTMENT

### REQUIRED TEST EQUIPMENT

1. **DC V.M**
  - 1) High input impedance
2. **RF VTVM (RF V.M)**
  - 1) Input impedance :  $1M\Omega$  min.,  $2pF$  max.
  - 2) Voltage range : F.S =  $10mV \sim 300V$
  - 3) Frequency range : Up to  $450MHz$
3. **Frequency Counter (f. counter)**
  - 1) Input sensitivity : Approx.  $50mV$
  - 2) Frequency range : Up to  $450MHz$
4. **DC Power Supply**
  - 1) Voltage :  $10V \sim 17V$ , variable
  - 2) Current :  $8A$  min.
5. **Power Meter**
  - 1) Measurement range Approx. :  $30W, 3W, 1W$
  - 2) Input impedance :  $50\Omega$
  - 3) Frequency range :  $450MHz$
6. **AF VTVM (AF V.M)**
  - 1) Input impedance :  $1M\Omega$  min.
  - 2) Voltage range : F.S =  $1mV \sim 30V$
  - 3) Frequency range :  $50Hz \sim 10kHz$
7. **AF Generator (AG)**
  - 1) Output frequency :  $100Hz \sim 10kHz$
  - 2) Output voltage :  $0.5mV \sim 1V$
8. **Linear Detector**
  - 1) Frequency range :  $450MHz$
9. **Field Strength Meter**
  - 1) Frequency range :  $450MHz$
10. **Directional Coupler**
11. **Oscilloscope**
  - 1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
  - 1) Frequency range :  $144MHz$  and  $430MHz$  bands
  - 2) Modulation : AM and FM MOD.
  - 3) Output level :  $-20dB$  to  $100dB$
13. **Dummy Load**
  - 1)  $8\Omega$ ,  $5W$  (approx.)
14. **Noise Generator**
  - 1) Must generate ignition-like noise containing harmonics beyond  $450MHz$ .

### 15. Sweep Generator

- 1) Sweep range :  $1440MHz$  and  $430MHz$  bands

### 16. Tracking generator

### PREPARATION

- 1) Unless otherwise specified, knobs and switches should be set as follows **Table 12**.

|            |        |             |     |
|------------|--------|-------------|-----|
| POWER SW   | ON     | COM (K, M)  | OFF |
| VOL VR     | MIN    | TONE (W, T) |     |
| SQL VR     | MIN    | LOW SW      | OFF |
| RIT VR     | CENTER | NB SW       | OFF |
| RF GAIN VR | MAX    | RIT SW      | OFF |
|            |        | DCL SW      | OFF |

Table 12

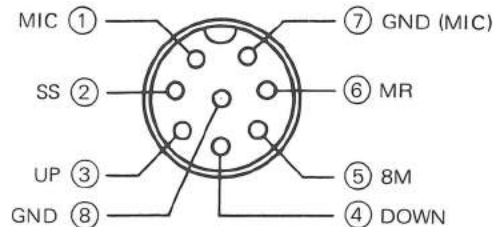


Fig. 12 MIC terminals (view from front panel side)

- 2) Use an insulated adjusting rod to adjust trimmers and coils.
- 3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
- 4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
- 5) SSG output levels are those at the time the output terminal is open.
- 6) Meter and display section should be set as follows

Fig. 13.

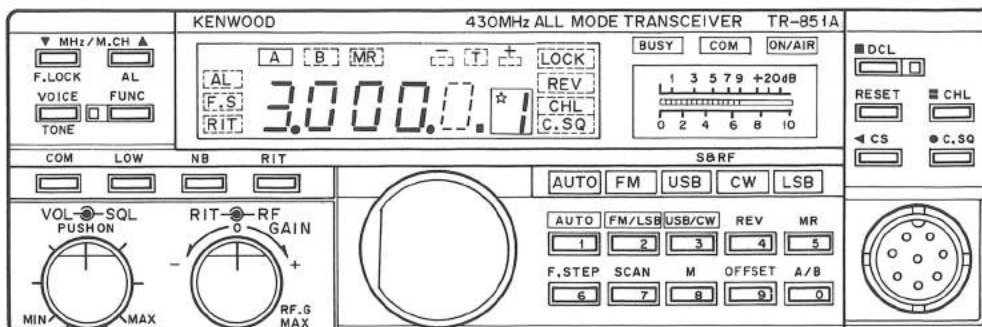


Fig. 13

## ADJUSTMENT

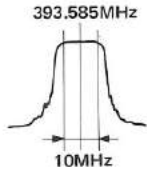
## COMMON ADJUSTMENT

| Item               | Condition                                                                                                                                                                                                    | Measurement         |      |          | Adjustment |           |        | Specification/Remarks                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------|----------|------------|-----------|--------|------------------------------------------------------------------------------------|
|                    |                                                                                                                                                                                                              | Test equipment      | Unit | Terminal | Unit       | Part      | Method |                                                                                    |
| 1. Setting         | 1) Disconnect connectors J12 (TIF) and LT from the COMP. unit (FRONT).<br>2) Connect DC power supply to the DC connector on the panel (13.8V DC). Before connecting the power supply, turn the Power SW OFF. |                     |      |          |            |           |        |                                                                                    |
| 2. Reset           | 1) Turn the Power SW ON, holding the M SW down.<br>2) Release the M SW and select MODE : FM                                                                                                                  |                     |      |          |            |           |        | $\overline{A}$<br>3.000 Beeper sound.<br>$\overline{AUTO}$ $\overline{FM}$ LED ON. |
| 3. Voltage setting | 1) RF GAIN VR : MAX                                                                                                                                                                                          | Digital multi-meter | RX   | TP3 (3J) | RX         | VR1 (3J)  | 4.0V   | $\pm 0.1V$                                                                         |
|                    | 2) Transmit signals (9T)                                                                                                                                                                                     |                     |      | TP1 (4I) |            | VR13 (3H) | 9.1V   | $\pm 0.1V$                                                                         |
|                    | 3) Return to receive mode.                                                                                                                                                                                   |                     |      |          |            |           |        |                                                                                    |

## PLL SYSTEM ADJUSTMENT

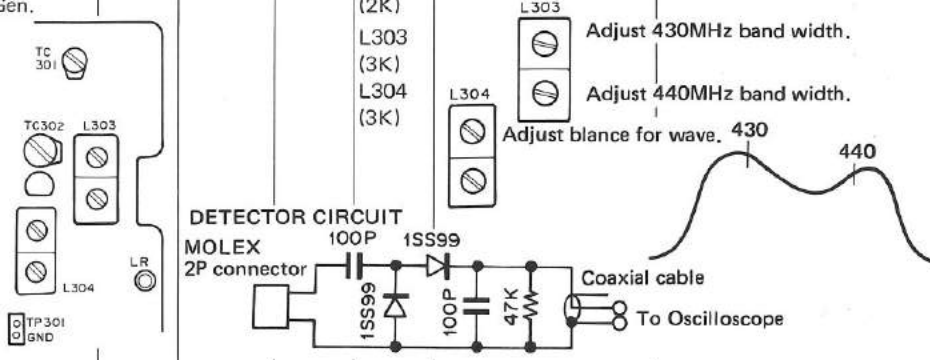
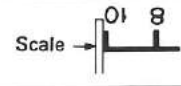
| Item            | Condition                                                                                                                    | Measurement         |      |             | Adjustment |                            |                 | Specification/Remarks                                                                                                                                                                             |
|-----------------|------------------------------------------------------------------------------------------------------------------------------|---------------------|------|-------------|------------|----------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                                                                                                              | Test equipment      | Unit | Terminal    | Unit       | Part                       | Method          |                                                                                                                                                                                                   |
| 1. PLL (B)      | 1) Remove the seven screws from the shield plate of the COMP. unit (PLL).<br>FREQ. : Any value ( $\square$ .00)<br>MODE : FM | Digital multi-meter | PLL  | TP3 (3B)    | PLL        | L18 (4B)                   | 6.0V            | $\pm 0.1V$                                                                                                                                                                                        |
|                 | 2) MODE : LSB<br>F.STEP : ON<br>FREQ. : Any value ( $\square$ .001.4) or ( $\square$ .001.4.)                                |                     |      |             |            |                            | Check           | 3.0~4.2V                                                                                                                                                                                          |
|                 | 3) MODE : LSB<br>FREQ. : Any value ( $\square$ .001.5)                                                                       |                     |      | TP4 (4C)    | PLL        | L22 (4C)                   | MAX             | 0.1~0.25Vrms                                                                                                                                                                                      |
| 2-1. 10.24MHz   | 1) MODE : LSB<br>FREQ. : Any value                                                                                           | RF V.M              | PLL  | J1-SF (3E)  | PLL        | L4 (4E)                    | MAX             | 0.25~0.5V                                                                                                                                                                                         |
| 2-2. 30.72MHz   |                                                                                                                              |                     |      | J1-3SF (3E) |            | L5(3E)<br>L6(3E)<br>L7(3E) | Repeat for MAX. | 0.2~0.5V                                                                                                                                                                                          |
| 2-3. 92.16MHz   |                                                                                                                              |                     |      | TP1 (3E)    |            | L9,10 (3E)<br>TC1(3D)      | Repeat for MAX. | 0.65~1.2V                                                                                                                                                                                         |
| 2-4. 276.48 MHz |                                                                                                                              |                     |      | TP2 (3D)    |            | L10,11 (3E)                | MAX             | 0.25~0.65V                                                                                                                                                                                        |
| 3. RIT BPF      | 1) MODE : LSB<br>FREQ. : Any value                                                                                           | RF V.M              | PLL  | TP5 (4C)    | PLL        | L23 (4D)<br>L24 (4D)       | Repeat for MAX. | 0.2~0.4V<br>If the voltage is less than 0.2V, adjust as follows :<br>1. Turn the core of L24 up the case surface level.<br>2. Repeat the adjustment of L23 and L24 to obtain the MAX. deflection. |
|                 |                                                                                                                              |                     |      |             | RIT        | L2 (4D)                    |                 |                                                                                                                                                                                                   |

## ADJUSTMENT

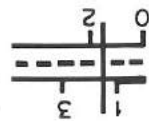
| Item             | Condition                                                                                                                                                                                                     | Measurement                                     |      |                  | Adjustment |                                                                            |                                                                                                                                          | Specification/Remarks                                                                 |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------|------------------|------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                  |                                                                                                                                                                                                               | Test equipment                                  | Unit | Terminal         | Unit       | Part                                                                       | Method                                                                                                                                   |                                                                                       |
| 4. PLL (A)       | 1) MODE : LSB<br>FREQ. : Any value                                                                                                                                                                            | RF V.M                                          | PLL  | TP6 (4C)         | PLL        | L28 (4C)<br>L30 (4C)<br>L27 (4D)                                           | Repeat for MAX.<br>Turn the core of L28, L27 counterclockwise from the MAX position. Repeat the adjustment in order of L28, L30 and L27. | 0.5~1.3V                                                                              |
|                  | 2) FREQ. : 0.000.0<br>F.STEP : ON                                                                                                                                                                             | Digital multi-meter                             |      | TP7 (4C)         | VCO        | TC1 (3C)                                                                   | 2.0V                                                                                                                                     | ±0.1V                                                                                 |
|                  | 3) FREQ. : 9.999.9                                                                                                                                                                                            |                                                 |      |                  |            |                                                                            | Check                                                                                                                                    | 6.2~7.2V                                                                              |
| 5. OSC X27       | 1) MODE : FM<br>FREQ. : 5.000                                                                                                                                                                                 | f.counter                                       | PLL  | TP2 (3D)         | OSC        | TC1 (4E)                                                                   | 276.480MHz                                                                                                                               | ±50Hz                                                                                 |
|                  |                                                                                                                                                                                                               |                                                 |      | D4(3B) (Cathode) | RIT        | TC1 (4D)                                                                   | 393.585MHz                                                                                                                               | ±50Hz                                                                                 |
| 6. RIT Zero beat | 1) MODE : USB<br>RIT VR : Centered<br>RIT SW : ON                                                                                                                                                             | f.counter                                       | PLL  | D4(3B) (Cathode) | PLL        | VR1 (3D)                                                                   | Adjust of same freq. to the RIT OFF position.                                                                                            | ±50Hz (393.585MHz)                                                                    |
|                  | 2) RIT VR : MIN ( - direction)                                                                                                                                                                                |                                                 |      |                  |            |                                                                            |                                                                                                                                          | Less than -1.2kHz                                                                     |
|                  | 3) RIT VR : MAX ( + direction)                                                                                                                                                                                |                                                 |      |                  |            |                                                                            |                                                                                                                                          | More than + 1.2kHz                                                                    |
| 7. Carrier       | 1) Remove the two screws from the CAR unit (Frame of the CAR unit).                                                                                                                                           | RF V.M                                          | RX   | J8-CAR (2I)      | CAR        | L5(6I)                                                                     | Turn the core of L5 counterclockwise from the peak point to set the value of 0.3V 0.3Vrms.                                               |                                                                                       |
|                  | 2) MODE : USB                                                                                                                                                                                                 |                                                 |      |                  |            | TC3 (6I)                                                                   | 10.693.50MHz                                                                                                                             | ±50Hz                                                                                 |
|                  | 3) MODE : LSB                                                                                                                                                                                                 |                                                 |      |                  |            | TC1 (6I)                                                                   | 10.696.50MHz                                                                                                                             | ±50Hz                                                                                 |
|                  | 4) MODE : CW<br>Select CW and transmit.                                                                                                                                                                       |                                                 |      |                  |            | TC2                                                                        | 10.694.30MHz                                                                                                                             | ±50Hz                                                                                 |
|                  | 5) Return to receive.                                                                                                                                                                                         |                                                 |      |                  |            |                                                                            |                                                                                                                                          |                                                                                       |
| 8. T12 output    | 1) MODE : FM<br>Transmit.                                                                                                                                                                                     | RF V.M                                          | CAR  | J7-T12 (6K)      | CAR        | L7(6J)<br>L8(6J)<br>L9(6J)<br>L10 (6J)<br>L11 (6J)<br>L12 (6K)<br>L13 (6K) | Repeat for MAX.                                                                                                                          | 0.08~0.15V                                                                            |
| 9. HET helical   | 1) Connect the tracking gen. to the TP9 (coax. connector) from the COMP. unit (RX).<br>FREQ. : 393.585MHz<br>Output : 0dBm<br>Then connect the spectrum analyzer to the LT terminal from the COMP. unit (RX). | Tracking Gen.<br>Spectrum analyzer<br>f.counter | PLL  | LT (3B)          | PLL        | TC3 (3B)<br>L41 (3C)<br>L42 (3C)<br>L43 (3B)                               | Repeat 2 or 3 times. to obtain the proper 10MHz bandwidth.                                                                               |  |
| 10. HET output   | 1) FREQ. : 5.000.0                                                                                                                                                                                            | RF V.M                                          | PLL  | D4(3B) (Cathode) | PLL        | TC2 (3C)<br>TC3 (3B)                                                       | Repeat for MAX.                                                                                                                          | 0.35~0.75V                                                                            |

## ADJUSTMENT

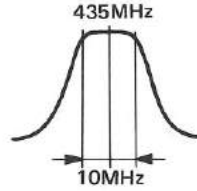
### RECEIVER SYSTEM ADJUSTMENT

| Item                        | Condition                                                                                                                                                                                                                                                            | Measurement                          |        |            | Adjustment |                                                                             |                                                                                                                                        | Specification/Remarks                                                                     |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------|------------|------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
|                             |                                                                                                                                                                                                                                                                      | Test equipment                       | Unit   | Terminal   | Unit       | Part                                                                        | Method                                                                                                                                 |                                                                                           |
| 1. Helical                  | 1) Disconnect coax. plug (LR) from the COMP. unit (FRONT).<br>RF GAIN : MAX<br>2) Connect the sweep gen. to the ANT terminal (25dB) and the oscilloscope to the detector output.<br>3) After adjustment, reconnect LR.                                               | Detector<br>OSCILLO<br>Sweep<br>Gen. | FRO-NT | TP301 (3K) | FRO-NT     | TC301 (2K)<br>TC302 (2K)<br>L303 (3K)<br>L304 (3K)                          | Adjust for the waveform: perform shown on right.<br> |                                                                                           |
| 2-1. Sensitivity ADJ. (FM)  | 1) Connect SSG to ANT terminal.<br>SSG MOD : 1kHz<br>SSG DEV : 3kHz<br>Connect an 8Ω dummy load oscilloscope, and AF digital multimeter to the EXT. SP terminal.<br>SQL VR : MIN<br>RF GAIN VR : MAX<br>MODE : FM<br>FREQ. : 5.04<br>SSG output : 0dBμ (unmodulated) | S-meter                              |        |            | FRO-NT     | TC303 (3K)<br>L308 (3K)<br>L309 (3K)<br>L310 (4K)<br>L311 (4K)<br>L312 (4K) | Repeat for MAX.                                                                                                                        | 12dB SINAD<br>Less than -9dBμ<br><b>Note</b> Do not connect a microphone to the MIC jack. |
|                             | 2) SSG output : -10dBμ (modulated)                                                                                                                                                                                                                                   | AF V.M                               |        |            | RX         | L7(4J)<br>L13 (3J)                                                          | MAX                                                                                                                                    |                                                                                           |
| 2-2. Sensitivity ADJ. (SSB) | 1) MODE : CW<br>RF GAIN VR : MIN                                                                                                                                                                                                                                     | OSCILLO                              | RX     | TP4 (2J)   | RX         | TC1 (2I)                                                                    | MIN                                                                                                                                    | Less than 5mVp-p                                                                          |
|                             | 2) SSG output : -10dBμ (unmodulated)<br>RF GAIN VR : MAX                                                                                                                                                                                                             | AF V.M                               |        |            |            | L3(3K)<br>L4(3J)<br>L5(3I)<br>L6(2I)<br>L2(4K)<br>L1(4K)                    | Repeat for MAX                                                                                                                         | MODE : CW (either USB or LSB)<br>More than 10dB at SSG output -13dBμ.                     |
| 3-1. S-meter (FM)           | 1) MODE : FM<br>RF GAIN VR : MAX<br>SSG output : 0dBμ (unmodulated)                                                                                                                                                                                                  | S-meter                              |        |            | FRO-NT     | L312 (4K)                                                                   | MAX                                                                                                                                    |                                                                                           |
|                             | 2) SSG output : 0dBμ (modulated)                                                                                                                                                                                                                                     |                                      |        |            | RX         | L7(4J)                                                                      |                                                                                                                                        |                                                                                           |
|                             | 3) SSG output : 30dBμ (modulated)                                                                                                                                                                                                                                    |                                      |        |            |            | VR5 (2J)                                                                    | Set the RF scale to "2"                                                                                                                |                                                                                           |
|                             | 4) Repeat steps 2) and 3).                                                                                                                                                                                                                                           |                                      |        |            |            | VR6 (2J)                                                                    | Set the RF scale to a value greater than "10"                                                                                          |      |
| 3-2. S-meter (SSB)          | 1) MODE : CW<br>SSG output : OFF (no signal)                                                                                                                                                                                                                         | S-meter                              |        |            | RX         | VR3 (2J)                                                                    | Set the S meter to mechanical 0 point.                                                                                                 |                                                                                           |
|                             | 2) RIT SW : ON<br>SSG output : 0dBμ (unmodulated)<br>Apply a signal and set the S-meter to MAX with the RIT VR.                                                                                                                                                      |                                      |        |            |            |                                                                             |                                                                                                                                        |                                                                                           |

## ADJUSTMENT

| Item                | Condition                                                                                                                                              | Measurement       |      |          | Adjustment |                    |                                                                                                                                                 | Specification/Remarks                                                                                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|----------|------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                                                                                                                                                        | Test equipment    | Unit | Terminal | Unit       | Part               | Method                                                                                                                                          |                                                                                                                                                          |
| 3-2. S-meter (SSB)  | 3) SSG output : $-3\text{dB}\mu$                                                                                                                       | S-meter           |      |          | RX         | L5(3I)             | Turn the core of L5 counterclockwise to set the S meter to "1.5".                                                                               | Center point between S scale's 1 and RF scale's 2 (upside down view)  |
|                     | 4) SSG output : $30\text{dB}\mu$                                                                                                                       |                   |      |          |            | VR4 (2J)           | Set S meter to "+ 10".                                                                                                                          |                                                                                                                                                          |
|                     | 5) Repeat steps 3) and 4).                                                                                                                             |                   |      |          |            |                    |                                                                                                                                                 |                                                                                                                                                          |
| 4. Noise blanker    | 1) MODE : CW<br>SSG output : $10\text{dB}\mu$                                                                                                          | DC V.M            | RX   | TP2 (4J) | RX         | L10 (3J)<br>L8(4J) | MIN                                                                                                                                             |                                                                                                                                                          |
|                     | 2) Connect the noise generator to the ANT terminal.                                                                                                    |                   |      |          |            |                    |                                                                                                                                                 | Turn the NB switch on and then off and check that the noise blanker operates.                                                                            |
| 5. FM Tight squelch | 1) Connect the SSG to the ANT terminal.<br>MODE : FM<br>SQL VR : MAX<br>SSG output : $-5\text{dB}\mu$ (no modulated)                                   | OSCILLO           |      |          | RX         | VR14 (4I)          | Turn the VR14 clockwise to the point at which squelch just close, then turn the VR14 counterclockwise to the point at which squelch just opens. |                                                                                                                                                          |
| 6. SSB Squelch      | 1) Connect the SSG to the ANT terminal.<br>SSG output : $-9\text{dB}\mu$<br>RIT SW : ON<br>Turn the RIT VR until the AF V.M reads MAX.<br>SQL VR : MAX | AF V.M<br>OSCILLO |      |          | RX         | VR2 (2I)           | Turn the VR2 clockwise to the point at which squelch just opens.                                                                                |                                                                                                                                                          |

## TRANSMITTER SYSTEM ADJUSTMENT

| Item             | Condition                                                                                                                                                                                                                                                                                                                                      | Measurement                        |       |              | Adjustment |                                                                 |                                                                                                                                                                  | Specification/Remarks                                                                                                          |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------|--------------|------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                  |                                                                                                                                                                                                                                                                                                                                                | Test equipment                     | Unit  | Terminal     | Unit       | Part                                                            | Method                                                                                                                                                           |                                                                                                                                |
| 1. Helical       | 1) Connect the J201 (T12) connector from COMP. unit (DRIVE).<br>2) Connect the J7 (T12) from the CAR unit.<br>3) Disconnect the LT connector from COMP. unit (DRIVE).<br>4) Connect the tracking gen. to the TP201 and the spectrum analyzer to the D0 terminal from COMP. unit (DRIVE).<br>Output : $-30\text{dBm}$<br>MODE : FM<br>Transmit. | Tracking Gen.<br>Spectrum analyzer | DRIVE | D0 (2D)      | DRIVE      | L204 (2B)<br>L205 (2C)<br>L206 (2C)<br>TC201 (2C)<br>TC202 (2D) | Repeat 2 or 3 times. Adjust for the waveform perform shown right, using TC201 and TC202 to adjust the max gain of 435 MHz and obtain the proper 10MHz bandwidth. | 435MHz<br>                                |
| 2. IF output     | 1) Disconnect J12 (T1F) from the COMP. unit (RX).<br>MODE : FM<br>COMP. unit (RX) TC2 : Centered<br>Transmit.                                                                                                                                                                                                                                  | RF V.M                             | RX    | J12-T1F (3K) | RX         | L21 (3K)                                                        | MAX                                                                                                                                                              | 0.2~0.3V<br>Back panel<br><br>Front panel |
| 3. Carrier level | 1) MODE : CW<br>Transmit                                                                                                                                                                                                                                                                                                                       | RF V.M                             | RX    | J12-T1F (3K) | RX         | VR10 (3I)                                                       | 0.25V                                                                                                                                                            | $\pm 0.01\text{V}$                                                                                                             |
| 4. FM FREQ.      | 1) MODE : FM<br>Transmit                                                                                                                                                                                                                                                                                                                       | f.counter                          | RX    | J12-T1F (3K) | RX         | TC2 (3I)                                                        | 10.695.0MHz                                                                                                                                                      | $\pm 50\text{Hz}$                                                                                                              |
|                  | 2) Return to the receive mode and reconnect J12.                                                                                                                                                                                                                                                                                               |                                    |       |              |            |                                                                 |                                                                                                                                                                  |                                                                                                                                |



## ADJUSTMENT

| Item              | Condition                                                                                                                                                                                               | Measurement                                                   |       |              | Adjustment |                          |                                                                                                                              | Specification/Remarks                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------|--------------|------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                   |                                                                                                                                                                                                         | Test equipment                                                | Unit  | Terminal     | Unit       | Part                     | Method                                                                                                                       |                                                                                   |
| 5. Drive output   | 1) MODE : CW<br>FREQ. : 5.00<br>Connect 0.6 to 1.0W power meter to the D0 terminal from the COMP. unit (DRIVE).<br>Transmit.                                                                            | Power meter                                                   | DRIVE | D0 (2D)      | DRIVE      | TC201 (2D)<br>TC202 (2D) | Repeat for MAX                                                                                                               | More than 0.25W                                                                   |
|                   |                                                                                                                                                                                                         |                                                               |       |              |            |                          |                                                                                                                              |                                                                                   |
| 6. RF output      | 1) Connect the coax. cable to the D0 terminal from the COMP. unit (DRIVE).<br>Power meter 50W<br>COMP. unit (DRIVE) VR4 : MAX<br>MODE : CW<br>Transmit.                                                 | Power meter                                                   |       |              | DRIVE      | VR4 (2E)                 | 26W                                                                                                                          | 35W or more.                                                                      |
|                   |                                                                                                                                                                                                         |                                                               |       |              |            |                          |                                                                                                                              | Current consumption :<br>Less than 7.0A.<br>HI power : 25~29W<br>LOW power : 2~4W |
| 7. RF meter       | 1) MODE : CW<br>Transmit                                                                                                                                                                                | RF meter                                                      |       |              | FINAL      | VR1 (2C)                 | Set to the RF scale reads "8".                                                                                               |                                                                                   |
| 8. Protection     | 1) MODE : CW<br>Transmit.                                                                                                                                                                               | DC V.M                                                        | FINAL | TP1 (2K)     | FINAL      | VR2 (2B)                 | MIN                                                                                                                          |                                                                                   |
|                   | 2) Disconnect the power meter from the ANT terminal and open the ANT terminal.                                                                                                                          | DC A.M (DC power supply galvo-meter)                          |       |              |            | VR3 (2B)                 | 4.5A                                                                                                                         | Less than 5.0A                                                                    |
| 9. Low power      | 1) LOW SW : ON<br>Connect the power meter to the ANT terminal.                                                                                                                                          | Power meter                                                   |       |              | DRIVE      | VR3 (2E)                 | 5W                                                                                                                           |                                                                                   |
|                   |                                                                                                                                                                                                         | RF meter                                                      |       |              |            |                          |                                                                                                                              | RF scale should read from "2" to "5".                                             |
| 10. DEV.          | 1) MODE : FM<br>LOW SW : OFF (HI)<br>Apply a 1kHz, 28mV signal to the MIC terminal<br>Linear detector                                                                                                   | Linear detector or modulation analyzer                        |       |              | RX         | VR7 (4I)                 | 4.6kHz                                                                                                                       | ±100Hz                                                                            |
|                   | • MS-57A/61A (Anrits)<br>HPF : OFF<br>LPF : 20kHz<br>De-emphasis : OFF                                                                                                                                  | • 4101 (WAVETEK)<br>FILTER : 25kHz/15kHz<br>De-emphasis : OFF |       |              |            |                          |                                                                                                                              |                                                                                   |
|                   | 2) MIC input : 2.8mV                                                                                                                                                                                    |                                                               |       |              |            | VR12 (3H)                | 3.0kHz                                                                                                                       | ±100Hz                                                                            |
|                   | 3) MIC input : 28mV                                                                                                                                                                                     |                                                               |       |              |            |                          |                                                                                                                              | Ensure that the freq' is 4.6kHz±100Hz.<br>If not, return to step 1).              |
| 11. TONE T,W      | 1) MIC input : OFF<br>TONE SW : ON<br>Connect the TP9 terminal in the CONT unit to the ground.                                                                                                          | f.counter                                                     | CONT  | TP9 (4K)     | CONT       | VR2 (4K)                 | Connect the f.counter to the linear detector output.                                                                         | 1750Hz±10Hz                                                                       |
| 12. Carrier point | 1) MODE : USB<br>COMP. unit (RX) VR11 : Centered<br>Disconnect J12 (TIF) from COMP. unit (RX).<br>Apply a 400Hz and a 2600Hz signals to the MIC terminal at the same time (using a two tone generator). | OSCILLO                                                       | RX    | J12-TIF (3K) | CAR        | TC3 (6I)                 |                                                                                                                              | Signal should not contain any noise.                                              |
|                   |                                                                                                                                                                                                         |                                                               |       |              |            |                          |                                                                                                                              |                                                                                   |
|                   | 2) If only one AG is available,<br>Set the AG output to 10W RF output.<br>AG : 1.5kHz<br>Adjust AG output to obtain 10W.                                                                                |                                                               |       |              |            |                          | Change AG freq' from 400 to 2600Hz, and adjust so that the same power is obtained at both frequencies (both of USB and LSB). |                                                                                   |

## ADJUSTMENT

| Item                    | Condition                                                                                                                                                                                      | Measurement                           |      |              | Adjustment |                      |                                                                        | Specification/Remarks                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------|--------------|------------|----------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
|                         |                                                                                                                                                                                                | Test equipment                        | Unit | Terminal     | Unit       | Part                 | Method                                                                 |                                                                                                                            |
| 12. Carrier point       | 3) MODE : LSB                                                                                                                                                                                  | OSCILLO                               | RX   | J12-TIF (3K) | CAR        | TC1 (6I)             | Make the same adjustment as in step 1).                                |                                                                                                                            |
|                         | 4) Connect J12 (TIF) to the COMP. unit (RX).                                                                                                                                                   |                                       |      |              |            |                      |                                                                        |                                                                                                                            |
| 13. Carrier suppression | 1) MODE : LSB<br>LOW SW : ON<br>COMP. unit (RX) VR11 : MIN                                                                                                                                     | Spectrum analyzer                     |      |              | RX         | VR8 (3I)<br>VR9 (3I) | Repeat for until MIN                                                   | Less than -55dB<br><b>Note)</b> If you perform the carrier point adjustment, you must also adjust the carrier suppression. |
|                         | 2) MODE : USB                                                                                                                                                                                  |                                       |      |              |            |                      |                                                                        | Less than -45dB                                                                                                            |
| 14. SSB MIC gain        | 1) LOW SW : OFF (HI)<br>MODE : USB<br>MIC input : 5.0mV/<br>1kHz <b>K,M</b><br>2.8mV/<br>1kHz <b>T,W</b>                                                                                       | Power meter                           |      |              | RX         | VR11 (4H)            | 13W                                                                    |                                                                                                                            |
| 15. Side tone           | 1) MODE : CW<br>AF VR : Centered<br>Connect a CW key (or its equivalent) to the KEY terminal.<br>Connect an 8 $\Omega$ dummy load, AF digital multimeter, and OSCILLO to the EXT. SP terminal. | AF V.M                                |      |              | DRIVE      | VR6 (3D)             | Press the key and confirm that signals are transmitted, then set 0.5V. | $\pm 0.1V$                                                                                                                 |
| 16. Break-in            | 1) MODE : CW<br>COMP. unit (DRIVE) VR7 : Centered                                                                                                                                              | ON AIR LED                            |      |              |            |                      |                                                                        | Check that the ON AIR LED remains on for a brief period after the key is repressed.                                        |
| 17. BEEP                | 1) Select the squelch threshold point.<br>MODE : Any mode<br>AF VR : Centered<br>M SW : ON<br>Receive.                                                                                         | OSCILLO (connect to the audio output) |      |              | DRIVE      | VR6 (3D)             | 0.6Vp-p                                                                | $\pm 0.1V$                                                                                                                 |

## ADJUSTMENT

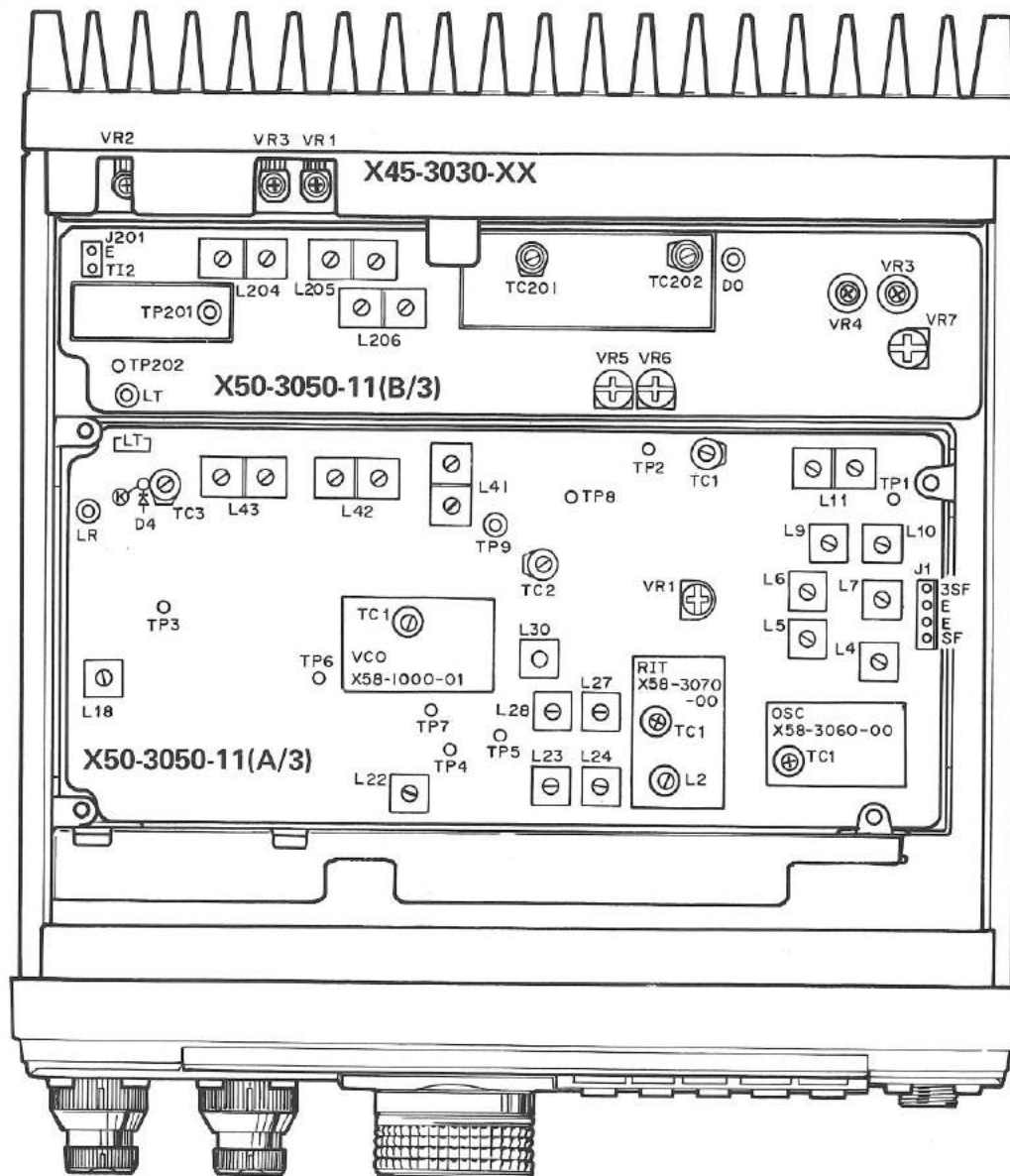
## Microprocessor operation check

| Item                                         | Condition                                                                                                                                                                                                                                                                                                                                                             | Operation check                                                                                                                                                                                        |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|--------|--|------|--|--|--|--|-------|-----|----|-----|----|------|----|-----|----|------|------|-------|----|----|------|-------------------------------------------------------------------------------------------------------------------------------|
| 1. Reset                                     | 1) Turn the POWER switch on, holding down the M switch.                                                                                                                                                                                                                                                                                                               | <div><div>A</div><div>0.000 1</div></div> <p>Beeper sound.</p>                                                                                                                                         |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| 2. MODE function<br>(AUTO, FM, USB, CW, LSB) | 1) Press a mode switch (press FM).                                                                                                                                                                                                                                                                                                                                    | Morse code F " - - - - - " is output.                                                                                                                                                                  |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|                                              | 2) Press FM again.                                                                                                                                                                                                                                                                                                                                                    | System enters LSB mode and Morse code L " - - - - - " is output.                                                                                                                                       |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|                                              | 3) Press USB.                                                                                                                                                                                                                                                                                                                                                         | System enters USB mode and Morse code U " - - - - - " is output.                                                                                                                                       |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|                                              | 4) Press USB again.                                                                                                                                                                                                                                                                                                                                                   | System enters CW mode and Morse code C " - - - - - " is output.                                                                                                                                        |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| 3. Encoder /step                             | 1) <table><tr><td>MODE</td><td colspan="2">FM</td><td colspan="2">SSB/CW</td></tr><tr><td>STEP</td><td></td><td></td><td></td><td></td></tr><tr><td>DEST.</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr><tr><td>K, M</td><td>5K</td><td>10K</td><td>5K</td><td>50Hz</td></tr><tr><td>T, W</td><td>12.5K</td><td>5K</td><td>5K</td><td>50Hz</td></tr></table> | MODE                                                                                                                                                                                                   | FM     |      | SSB/CW |  | STEP |  |  |  |  | DEST. | OFF | ON | OFF | ON | K, M | 5K | 10K | 5K | 50Hz | T, W | 12.5K | 5K | 5K | 50Hz | <div><div>F.S</div><div>4.980.0</div><div>↑</div></div> <p>This segment goes on and off each time the encoder is clicked.</p> |
| MODE                                         | FM                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                        | SSB/CW |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| STEP                                         |                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                        |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| DEST.                                        | OFF                                                                                                                                                                                                                                                                                                                                                                   | ON                                                                                                                                                                                                     | OFF    | ON   |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| K, M                                         | 5K                                                                                                                                                                                                                                                                                                                                                                    | 10K                                                                                                                                                                                                    | 5K     | 50Hz |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| T, W                                         | 12.5K                                                                                                                                                                                                                                                                                                                                                                 | 5K                                                                                                                                                                                                     | 5K     | 50Hz |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| 4. A/B                                       | 1) Reset the micro-processor (as in step 1.).                                                                                                                                                                                                                                                                                                                         | <div><div>A</div><div>0.000</div></div>                                                                                                                                                                |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|                                              | 2) Press A/B key.                                                                                                                                                                                                                                                                                                                                                     | <div><div>B</div><div>3.000</div></div> <p>Beeper sound.</p>                                                                                                                                           |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
| 5. ▼MHz/<br>M.CH▲                            | 1) MHz step operation.<br>Press ▼ or ▲ key.                                                                                                                                                                                                                                                                                                                           | <p>A value on the MHz digit increment by one.<br/>Example</p> <div><div>A</div><div>2.70</div><div>→</div><div>A</div><div>1.700</div></div> <p>Note : In auto mode, mode changes from 0 FM → USB.</p> |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |
|                                              | 2) M CH operation<br>Enter a frequency into memory.<br><br>Press MR key.<br>PRESS ▼ or ▲ key.                                                                                                                                                                                                                                                                         | <div><div>MR</div><div>5.700 1</div></div> <p>The frequency is displayed.</p> <div><div>MR</div><div>5.700 1</div></div> <p>The number in this position changes.</p>                                   |        |      |        |  |      |  |  |  |  |       |     |    |     |    |      |    |     |    |      |      |       |    |    |      |                                                                                                                               |

| Item                                                           | Condition                                                           | Operation check                                                                                                                                                                                                                        |
|----------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6. FUNC. function                                              | 1) F.LOCK operation<br>Press FUNC key (orange).                     | Beeper sound.<br>Green LED on. <br>LOCK at upper right of LCD goes on.<br>Encoder or keyboard is not possible.                                      |
|                                                                | Press MHC key.                                                      | Beeper sound.                                                                                                                                                                                                                          |
|                                                                | Repeat the above operation.                                         | Green LED on. <br>LOCK goes off.                                                                                                                    |
|                                                                | 2) AL (alert) operation.<br>Press FUNC key.<br>Press /M.CH key.     | Beeper sound.<br>Green LED on. <br>AL at upper left of LCD goes on.                                                                                 |
|                                                                | Repeat above operation.                                             | Beeper sound.                                                                                                                                                                                                                          |
|                                                                |                                                                     | Green LED on. <br>AL goes off.                                                                                                                      |
| 7. RIT                                                         | 1) Doesn't operate in the FM mode.                                  | Warning output when RIT is turned on in FM mode.                                                                                                                                                                                       |
|                                                                | 2) Select CW or SSB mode, and press RIT key.                        | Beeper sound.<br>RIT at lower left of LCD goes on.                                                                                                                                                                                     |
|                                                                | 3) Press RIT key again.                                             | RIT goes off.                                                                                                                                                                                                                          |
| 8. COM CH.                                                     | 1) Press COM key.                                                   | ← A and B disappear.<br><div style="text-align: center;">  </div> COM above meter goes on.<br>Frequency does not change even if encoder is turned. |
| 9. Memory entry                                                | 1) Set the frequency to be entered into memory and press the M key. | During the period the beeper is sounding, press a key to enter the frequency.<br>9 and 0 indicate stop channels, so different frequency values can be set for reception and transmission.                                              |
| 10. Memory recall<br>(read the freq' that was set in step 9.). | 1) Press MR key.                                                    | Beeper sound.<br><div style="text-align: center;"> <div>MR</div>  </div>                                                                          |
|                                                                | 2) Press ▼ MHz/M.CH ▲ key.                                          | Frequency set in step 9. is displayed.<br>Note : Mode also changes.                                                                                                                                                                    |

# ADJUSTMENT

TOP VIEW



## FINAL UNIT (X45-3030-XX)

VR1 : RF METER  
VR2 : PROTECTION (NULL)  
VR3 : PROTECTION (ANT OPEN)

## COMPOSITE UNIT (PLL) (X50-3050-11) (A/3)

VR1 : RIT  
L4 : 10.24MHz TUNING COIL  
L5~7 : 30.72MHz TUNING COIL  
L9,10 : 92.16MHz TUNING COIL  
L11(TC1) : 276.48MHz TUNING COIL  
L18 : LOOP B VCO COIL  
L22 : 9.668~9.688MHz TUNING COIL  
L23,24 : RIT BPF (91.597MHz) TUNING COIL  
L27,28,30 : LOOP A TUNING COIL  
L41~43 : HET HELICAL  
TC1(L11) : 276.48MHz  
TC2,3 : HET OUTPUT

## COMPOSITE UNIT (DRIVE) (X50-3050-11) (B/3)

VR3 : LOW POWER  
VR4 : HI POWER (APC)  
VR5 : BEEP LEVEL  
VR6 : SIDE TONE LEVEL  
VR7 : CW BREAK IN DELAY (MECHANICAL CENTER)  
L204~206 : TRANSMIT HELICAL  
TC201,202 : TRANSMIT HELICAL

## VCO (X58-1000-01)

TC1 : LOOP A VCO

## OSC (X58-3060-00)

TC1 : 276.480MHz

## RIT (X58-3070-00)

L2 : RIT BPF  
TC1 : 393.585MHz

BOTTOM VIEW

CAR UN  
L5 : CAR  
L7~13 : T  
TC1 : L5B  
TC2 : CW  
TC3 : USE

COMPOS  
L303,304  
L308~312

# TR-851A/E

The diagram illustrates a complex electronic assembly with the following components and labels:

- Top Section:** X45-3030-XX
- Left Section:** X60-1320-01
- Right Section:** X50-3050-11 (C/3)
- Bottom Section:** X50-3040-00
- Components:**
  - Resistors: VR1, VR2, VR3, VR4, VR5, VR6, VR7, VR8, VR9, VR10, VR11, VR12, VR13, VR14
  - Capacitors: L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15
  - Transistors: TC1, TC2, TC3, TC301, TC302, TC303
  - Other: J8, J12, J7, J12, TP1, TP2, TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10, TP11, TP12, TP13, TP14, TP15, TP16, TP17, TP18, TP19, TP20, TP21, TP22, TP23, TP24, TP25, TP26, TP27, TP28, TP29, TP30, TP31, TP32, TP33, TP34, TP35, TP36, TP37, TP38, TP39, TP40, TP41, TP42, TP43, TP44, TP45, TP46, TP47, TP48, TP49, TP50, TP51, TP52, TP53, TP54, TP55, TP56, TP57, TP58, TP59, TP60, TP61, TP62, TP63, TP64, TP65, TP66, TP67, TP68, TP69, TP70, TP71, TP72, TP73, TP74, TP75, TP76, TP77, TP78, TP79, TP80, TP81, TP82, TP83, TP84, TP85, TP86, TP87, TP88, TP89, TP90, TP91, TP92, TP93, TP94, TP95, TP96, TP97, TP98, TP99, TP100

## TERMINAL FUNCTIONS

| Connector No.                                        | Terminal No. | Terminal Name | Terminal Function             |
|------------------------------------------------------|--------------|---------------|-------------------------------|
| <b>FINAL UNIT (X45-3030-XX)</b>                      |              |               |                               |
| J1                                                   | 1            | 9T            | TX + 9V                       |
|                                                      | 2            | RM            | RF Meter                      |
|                                                      | 3            | PRO           | Protection                    |
|                                                      | 4            | DB            | Drive + B                     |
|                                                      | 5            | -6            | -6V                           |
|                                                      | 6            | APC           | Auto power control            |
| —                                                    | —            | RA            | RX ANT                        |
|                                                      | —            | E             | GND                           |
|                                                      | —            | IN            | Drive power input             |
|                                                      | —            | E             | GND                           |
| —                                                    | 1            | AP            | Audio power                   |
|                                                      | 2            | K2            | Key 2                         |
|                                                      | 3            | K1            | Key 1                         |
| —                                                    | 1            | SP            | Speaker                       |
|                                                      | 2            | E             | GND                           |
|                                                      | 3            | B             | + B                           |
| —                                                    | 1            | 9T            | TX + 9V                       |
|                                                      | 2            | ALC           | ALC                           |
| J2                                                   | 1            | EX2           | Ext. Control 2                |
|                                                      | 2            | EX1           | Ext. Control 1                |
|                                                      | 3            | E             | GND                           |
|                                                      | 4            | EAL           | Ext. ALC input                |
| <b>CAR UNIT (X50-3040-00)</b>                        |              |               |                               |
| J1                                                   | 1            | E             | GND                           |
|                                                      | 2            | SP            | Speaker                       |
| J2                                                   | 1            | E             | GND                           |
|                                                      | 2            | SP            | Speaker                       |
| J3                                                   | 1            | SCB           | SSB, CW + B                   |
|                                                      | 2            | CWT           | CW TX + B                     |
|                                                      | 3            | LSB           | LSB + B                       |
| J4                                                   | 1            | CAR           | Carrier                       |
|                                                      | 2            | E             | GND                           |
| J5                                                   | 1            | E             | GND                           |
|                                                      | 2            | 3SF           | 3rd standard freq' (30.72MHz) |
| J6                                                   | 1            | ALC           | ALC                           |
|                                                      | 2            | ALC           | ALC                           |
|                                                      | 3            | KL            | Keying line                   |
|                                                      | 4            | 9T            | TX + 9V                       |
|                                                      | 5            | E             | GND                           |
|                                                      | 6            | TIF           | TX 1st IF (10.695MHz)         |
| J7                                                   | 1            | Ti2           | TX 2nd IF (41.415MHz)         |
|                                                      | 2            | E             | GND                           |
| <b>COMPOSITE UNIT (PLL,DRIVE,FRONT)(X50-3050-11)</b> |              |               |                               |
| J1                                                   | 1            | 3SF           | 3rd standard freq' (30.72MHz) |
|                                                      | 2            | E             | GND                           |
|                                                      | 3            | E             | GND                           |
|                                                      | 4            | SF            | Standard freq' (10.24MHz)     |
| J2                                                   | 1            | R3            | RIT volume 3                  |
|                                                      | 2            | R2            | RIT volume 2                  |
|                                                      | 3            | R1            | RIT volume 1                  |
| J3                                                   | 1            | 5C            | + 5V                          |
|                                                      | 2            | E             | GND                           |
|                                                      | 3            | EA            | PLL A enable                  |
|                                                      | 4            | EB            | PLL B enable                  |
|                                                      | 5            | CP            | PLL clock                     |
|                                                      | 6            | DP            | PLL data                      |
|                                                      | 7            | CB            | Common + B                    |
| J201                                                 | 1            | Ti2           | TX 2nd IF (41.415MHz)         |
|                                                      | 2            | E             | GND                           |

| Connector No.                     | Terminal No. | Terminal Name | Terminal Function                                             |
|-----------------------------------|--------------|---------------|---------------------------------------------------------------|
| J202                              | 1            | E             | GND                                                           |
|                                   | 2            | AP            | Audio power                                                   |
|                                   | 3            | CB            | Common + B                                                    |
| J203                              | 1            | BZ            | Beep output                                                   |
|                                   | 2            | VO            | Voice output                                                  |
|                                   | 3            | E             | GND                                                           |
|                                   | 4            | A2            | Audio volume 2                                                |
|                                   | 5            | E             | GND                                                           |
| J204                              | 1            | CWB           | CW + B                                                        |
|                                   | 2            | HL            | Hi/Low switch                                                 |
|                                   | 3            | SS            | Standby switch                                                |
| J205                              | 1            | AP            | Audio power                                                   |
|                                   | 2            | K1            | Key 1                                                         |
|                                   | 3            | K2            | Key 2                                                         |
| J206                              | 1            | KL            | Keying line                                                   |
|                                   | 2            | AP            | Audio power                                                   |
|                                   | 3            | -6            | -6V                                                           |
|                                   | 4            | ALC           | ALC                                                           |
|                                   | 5            | 9T            | TX + 9V                                                       |
|                                   | 6            | RM            | RF meter                                                      |
|                                   | 7            | 8C            | + 8V                                                          |
| J207                              | 1            | ALC           | ALC                                                           |
|                                   | 2            | 9T            | TX + 9V                                                       |
| J208                              | 1            | DB            | Drive + B                                                     |
|                                   | 2            | 9T            | TX + 9V                                                       |
|                                   | 3            | RM            | RF meter                                                      |
|                                   | 4            | E             | GND                                                           |
|                                   | 5            | PRO           | Protection                                                    |
|                                   | 6            | APC           | Auto power control                                            |
|                                   | 7            | -6            | -6V                                                           |
| J301                              | 1            | 3SF           | 3rd standard freq' (30.72MHz)                                 |
|                                   | 2            | E             | GND                                                           |
| J302                              | 1            | E             | GND                                                           |
|                                   | 2            | 3SF           | 3rd standard freq' (30.72MHz)                                 |
|                                   | 3            | E             | GND                                                           |
| J303                              | —            | 8R            | RX + 8V                                                       |
|                                   | —            | E             | GND                                                           |
|                                   | —            | RIF           | RX IF (10.695MHz)                                             |
| —                                 | —            | LR            | RX local                                                      |
| —                                 | —            | LT            | TX local                                                      |
| —                                 | —            | E             | GND                                                           |
| —                                 | —            | LT            | TX local                                                      |
| —                                 | —            | DO            | Drive power output                                            |
| —                                 | —            | LR            | RX local                                                      |
| —                                 | —            | RA            | RX ANT                                                        |
| —                                 | —            | AGC           | AGC                                                           |
| <b>CONTROL UNIT (X53-1460-XX)</b> |              |               |                                                               |
| J1                                | 1            | PS0           | VS-1 Data                                                     |
|                                   | 2            | PS1           |                                                               |
|                                   | 3            | PS2           |                                                               |
|                                   | 4            | PS3           |                                                               |
|                                   | 5            | PS4           |                                                               |
|                                   | 6            | SR            | + 5V<br>PLL B Enable<br>PLL A Enable<br>PLL Clock<br>PLL Data |
|                                   | 7            | BY            |                                                               |
|                                   | 8            | 5C            |                                                               |
|                                   | 9            | EB            |                                                               |
|                                   | 10           | EA            |                                                               |
|                                   | 11           | CP            |                                                               |
|                                   | 12           | DP            |                                                               |



# TERMINAL FUNCTIONS

| Connector No. | Terminal No. | Terminal Name | Terminal Function     |
|---------------|--------------|---------------|-----------------------|
| J2            | 1            | SQ            | Squelch               |
|               | 2            | SQ1           | Squelch Volume 1      |
|               | 3            | SQ2           | Squelch Volume 2      |
|               | 4            | AL            | Alert Mute            |
|               | 5            | ST            | Standby               |
|               | 6            | E             | GND                   |
|               | 7            | CWB           | CW + B                |
|               | 8            | CWB           | CW + B                |
|               | 9            | SSB           | SSB + B               |
|               | 10           | 8C            | +8V                   |
|               | 11           | SCB           | SSB, CW + B           |
| J3            | 1            | LSB           | LSB + B               |
|               | 2            | CWB           | CW + B                |
|               | 3            | USB           | USB + B               |
|               | 4            | FMB           | FM + B                |
|               | 5            | TL            | TX LED                |
|               | 6            | BD            | Busy LED              |
|               | 7            | E             | GND                   |
| J4            | 1            | SCB           | SSB, CW + B           |
|               | 2            | LSB           | LSB + B               |
|               | 3            | CWT           | CW TX + B             |
|               | 4            | 5C            | +5V                   |
|               | 5            | E             | GND                   |
| J5            | 1            | E             | GND                   |
|               | 2            | SCS           | Slave Chip Select     |
|               | 3            | SRQ           | Slave Request         |
|               | 4            | SCK           | Slave Clock           |
|               | 5            | SDO           | Slave Data Output     |
|               | 6            | RES           | Reset                 |
|               | 7            | SDI           | Slave Data Input      |
|               | 8            | VDD           | Backup voltage        |
|               | 9            | 5C            | +5V                   |
|               | 10           | VFD           | Voltage Fallen Detect |
| J6            | 1            | SB            | Switched + B (13.8V)  |
|               | 2            | SB            | Switched + B (13.8V)  |
|               | 3            | SC            | Scan Control          |
|               | 4            | ME            | Mic Enable            |
|               | 5            | TO            | Tone Output           |
|               | 6            | E             | GND                   |
|               | 7            | RD            | RX Data               |
|               | 8            | E             | GND                   |
| J8            | 1            | E             | GND                   |
|               | 2            | TD            | TX Data               |
|               | 3            | RD            | RX Data               |
|               | 4            | E             | GND                   |
|               | 5            | 5C            | +5V                   |
|               | 6            | MD            | Modem Data            |
|               | 7            | ME            | Mic Enable            |
|               | 8            | MC            | Modem Clock           |
| J9            | 1            | SB            | Switched + B (13.8V)  |
|               | 2            | B             | + B                   |
|               | 3            | A1            | Audio Volume 1        |
|               | 4            | E             | GND                   |
|               | 5            | E             | GND                   |
|               | 6            | A2            | Audio Volume 2        |
|               | 7            | SQ1           | Squelch Volume 1      |
|               | 8            | SQ2           | Squelch Volume 2      |
| J10           | 1            | R3            | RIT Volume 3          |
|               | 2            | R2            | RIT Volume 2          |
|               | 3            | R1            | RIT Volume 1          |
|               | 4            | E             | GND                   |
|               | 5            | RG2           | RF Gain 2             |

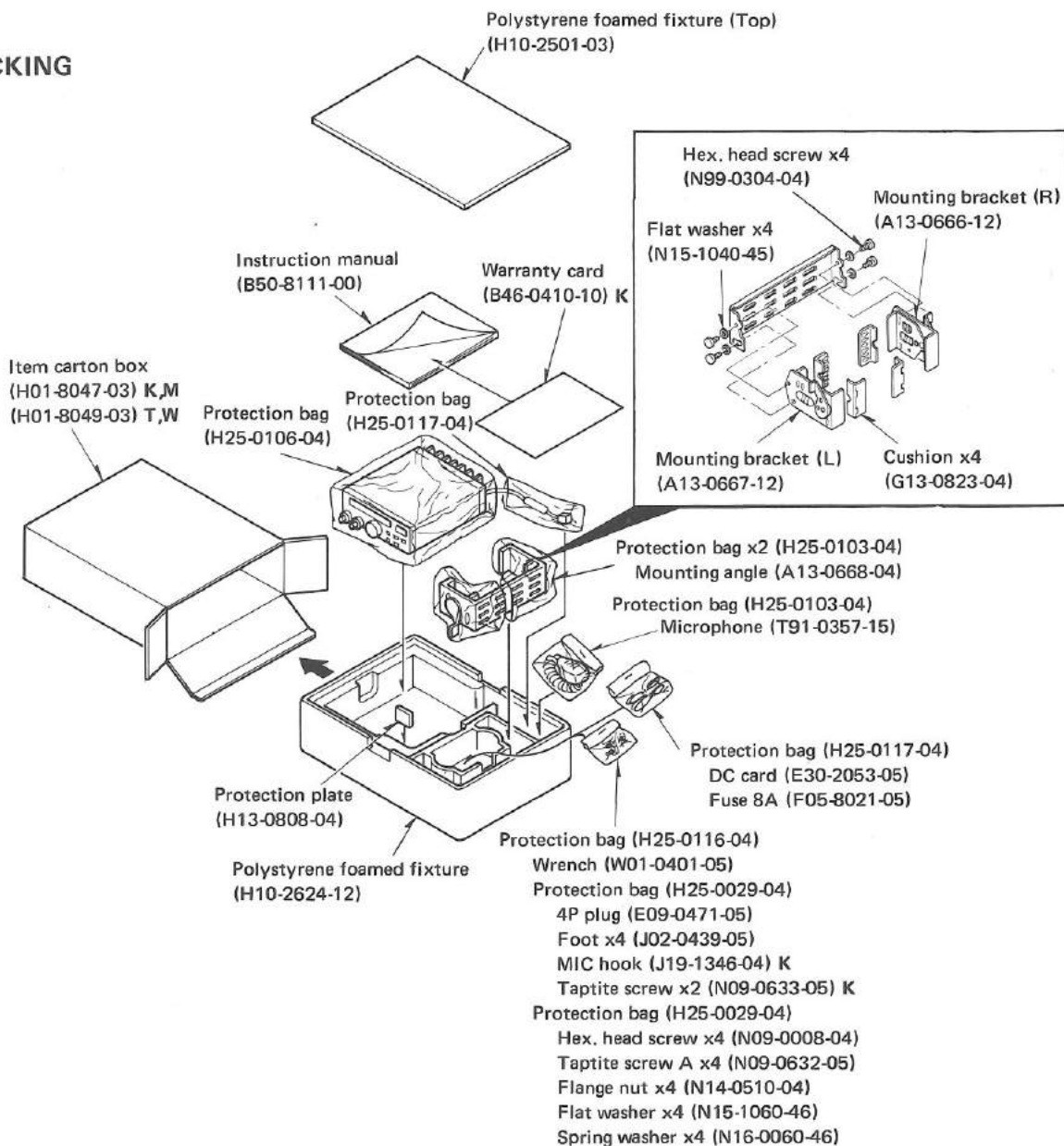
| Connector No.                    | Terminal No. | Terminal Name | Terminal Function         |
|----------------------------------|--------------|---------------|---------------------------|
| J12                              | 1            | E             | GND                       |
|                                  | 2            | MIC           | MIC AF Input              |
|                                  | 3            | SS            | Standby switch            |
|                                  | 4            | E             | GND                       |
|                                  | 5            | DW            | Mic Down                  |
|                                  | 6            | UP            | Mic Up                    |
|                                  | 7            | 8M            | Mic +8V                   |
|                                  | 8            | MR            | Memory Recall             |
| J201                             | 1            | E             | GND                       |
|                                  | 2            | SM            | S-Meter                   |
| J202                             | 1            | LB            | Lamp + B                  |
|                                  | 2            | SM            | S-Meter                   |
|                                  | 3            | BZ            | Beep Output               |
|                                  | 4            | SS            | Standby Switch            |
|                                  | 5            | HL            | Hi/Low Switch             |
|                                  | 6            | NBS           | Noise Blanker Switch      |
| J203                             | 1            | E             | GND                       |
|                                  | 2            | SCS           | Slave Chip Select         |
|                                  | 3            | SRQ           | Slave Request             |
|                                  | 4            | SCK           | Slave Clock               |
|                                  | 5            | SDO           | Slave Data Output         |
|                                  | 6            | RES           | Reset                     |
|                                  | 7            | SDI           | Slave Data Input          |
|                                  | 8            | VDD           | Backup Voltage            |
|                                  | 9            | 5C            | +5V                       |
|                                  | 10           | VFD           | Voltage Fallen Detect     |
| J204                             | 1            | MR            | Memory Recall             |
|                                  | 2            | 8M            | Mic +8V                   |
|                                  | 3            | UP            | Mic Up                    |
|                                  | 4            | DW            | Mic Down                  |
|                                  | 5            | E             | GND                       |
|                                  | 6            | SS            | Standby Switch            |
|                                  | 7            | MIC           | Mic AF Input              |
|                                  | 8            | E             | GND                       |
| J205                             | 1            | 8C            | +8V                       |
|                                  | 2            | MIC           | Mic AF Input              |
|                                  | 3            | E             | GND                       |
| COMPOSITE UNIT (RX)(X60-1320-01) |              |               |                           |
| J1                               | 1            | SF            | Standard Freq' (10.24MHz) |
|                                  | 2            | E             | GND                       |
|                                  | 3            | FSM           | FM S-Meter                |
|                                  | 4            | SSQ           | SSB Squelch               |
|                                  | 5            | E             | GND                       |
| J2                               | 1            | RD            | RX Data                   |
|                                  | 2            | E             | GND                       |
|                                  | 3            | SQ            | Squelch                   |
| J3                               | 1            | SC            | Scan Control              |
|                                  | 2            | AL            | Alert Mute                |
|                                  | 3            | 8C            | +8V                       |
|                                  | 4            | 8C            | +8V                       |
|                                  | 5            | A1            | Audio Volume 1            |
|                                  | 6            | E             | GND                       |
| J4                               | 1            | SCB           | SSB, CW + B               |
|                                  | 2            | 9T            | TX +9V                    |
|                                  | 3            | 9T            | TX +9V                    |
|                                  | 4            | TO            | Tone Output               |
|                                  | 5            | E             | GND                       |
|                                  | 6            | CWB           | CW + B                    |
|                                  | 7            | MIC           | Mic AF Input              |
|                                  | 8            | E             | GND                       |
|                                  | 9            | ME            | Mic Enable                |
|                                  | 10           | ST            | Standby                   |

## TERMINAL FUNCTIONS/PACKING

| Connector No. | Terminal No. | Terminal Name | Terminal Function    |
|---------------|--------------|---------------|----------------------|
| J5            | 1            | CB            | Common + B           |
|               | 2            | CB            | Common + B           |
|               | 3            | -6            | -6V                  |
|               | 4            | -6            | -6V                  |
|               | 5            | SB            | Switched + B (13.8V) |
|               | 6            | E             | GND                  |
|               | 7            | B             | + B                  |
| J6            | 1            | B             | + B                  |
|               | 2            | E             | GND                  |
|               | 3            | SP            | Speaker              |
| J7            | 1            | 8C            | + 8V                 |
|               | 2            | 8C            | + 8V                 |
|               | 3            | 8C            | + 8V                 |
|               | 4            | E             | GND                  |
|               | 5            | LB            | Lamp + B             |
|               | 6            | E             | GND                  |
| J8            | 1            | CAR           | Carrier              |
|               | 2            | E             | GND                  |

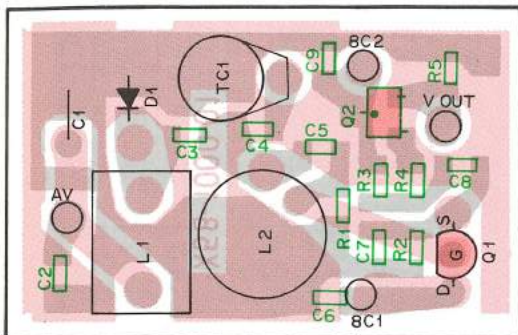
| Connector No. | Terminal No. | Terminal Name | Terminal Function    |
|---------------|--------------|---------------|----------------------|
| J9            | 1            | SSQ           | SSB Squelch          |
|               | 2            | E             | GND                  |
| J10           | 1            | SM            | S-Meter              |
|               | 2            | RM            | RF Meter             |
|               | 3            | SCR           |                      |
|               | 4            | 8C            | + 8V                 |
|               | 5            | RG2           | RF Gain 2            |
|               | 6            | FSM           | FM S-Meter           |
| J11           | 1            | SSB           | SSB + B              |
|               | 2            | -6            | -6V                  |
|               | 3            | NBS           | Noise Blanker Switch |
|               | 4            | 9T            | TX + 9V              |
|               | 5            | 9T            | TX + 9V              |
|               | 6            | ALC           | ALC                  |
| J12           | 1            | E             | GND                  |
|               | 2            | TIF           | TX IF                |
| J13           | 1            | E             | GND                  |
|               | 2            | SP            | Speaker              |

### PACKING



# VCO (X58-1000-01)

Component side view

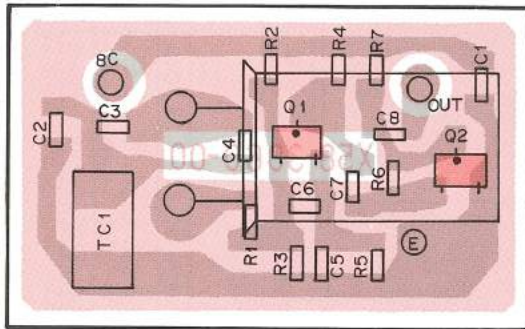


Q1 : 2SK125 Q2 : 2SC2714(Y)

D1 : 1SV150

# 10.24MHz OSC (X58-3060-00)

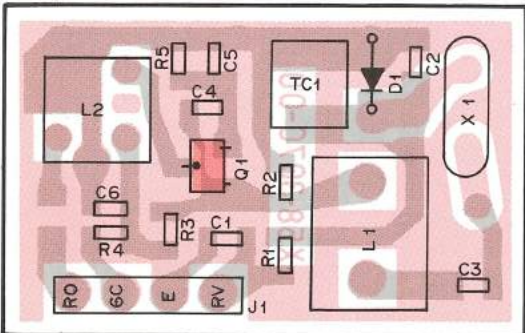
Component side view



Q1 : 2SC2715(Y) Q2 : 2SC2712(Y)

# RIT (X58-3070-00)

Component side view

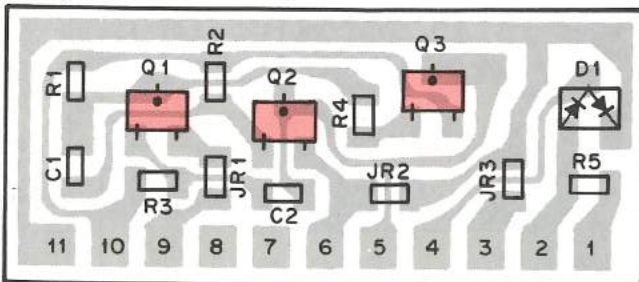


Q1 : 2SC2715(Y)

D1 : 1SV153

# -6V DC-DC (X59-1100-00)

Component side view

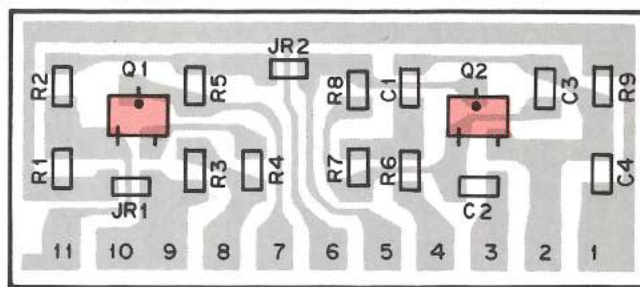


Q1,2 : 2SC2712(Y) Q3 : 2SA1162(Y)

D1 : 1SS226

# AF PRE AMP (X59-1110-00)

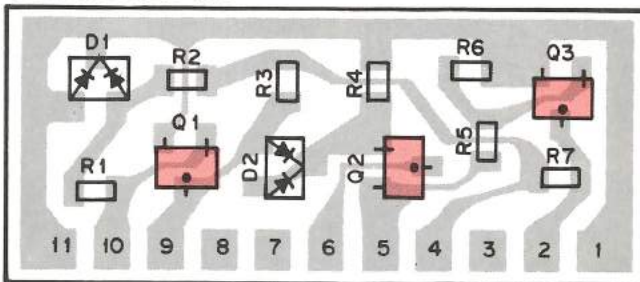
Component side view



Q1,2 : 2SC2712(Y)

# SQUELCH SWITCH (X59-1120-00)

Component side view

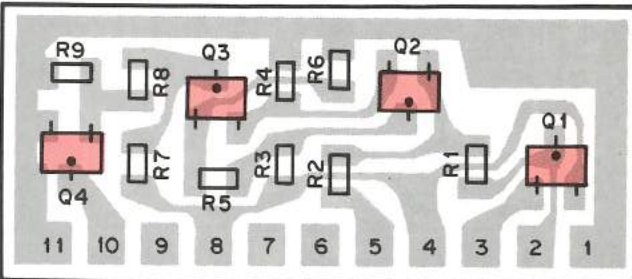


Q1-3 : 2SC2712(Y)

D1,2 : 1SS184 or DAN202K

# CW BREAK IN (X59-1130-00)

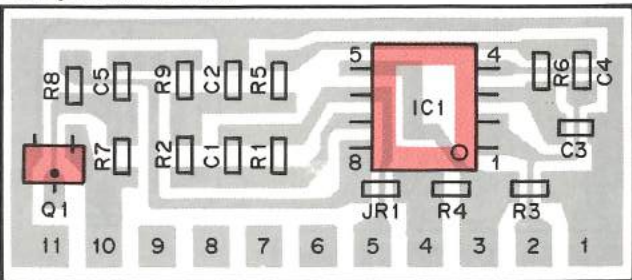
Component side view



Q1 : DTA114EK Q2-4 : 2SC2712(Y)

# MIC AMP (X59-3000-01)

Component side view



Q1 : 2SC2712(Y) IC1 : NJM4558M

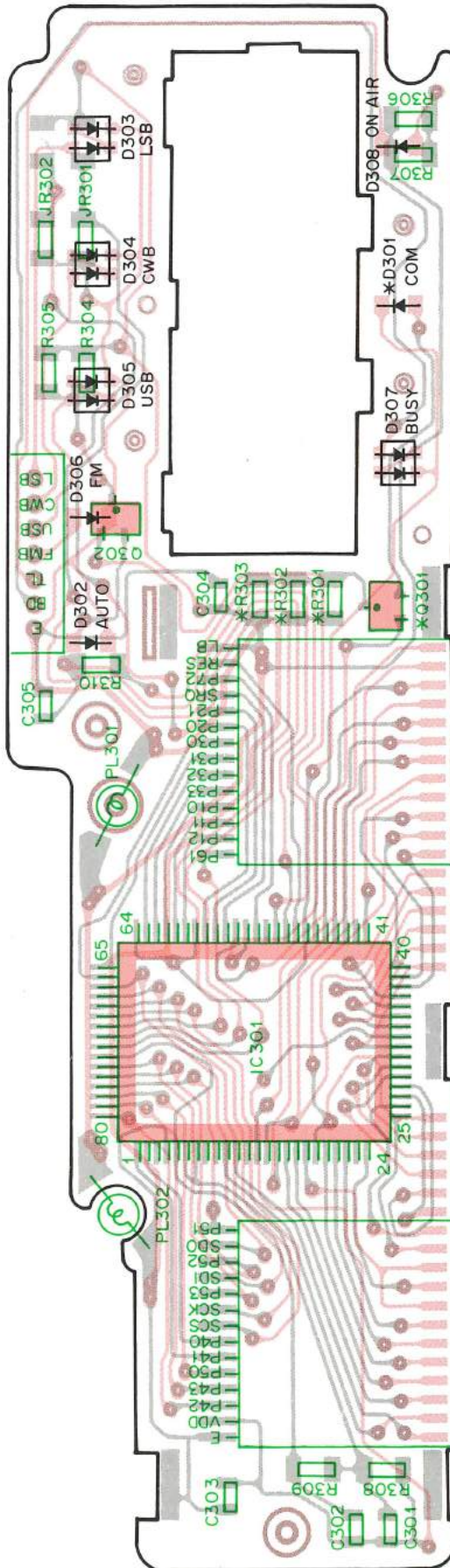
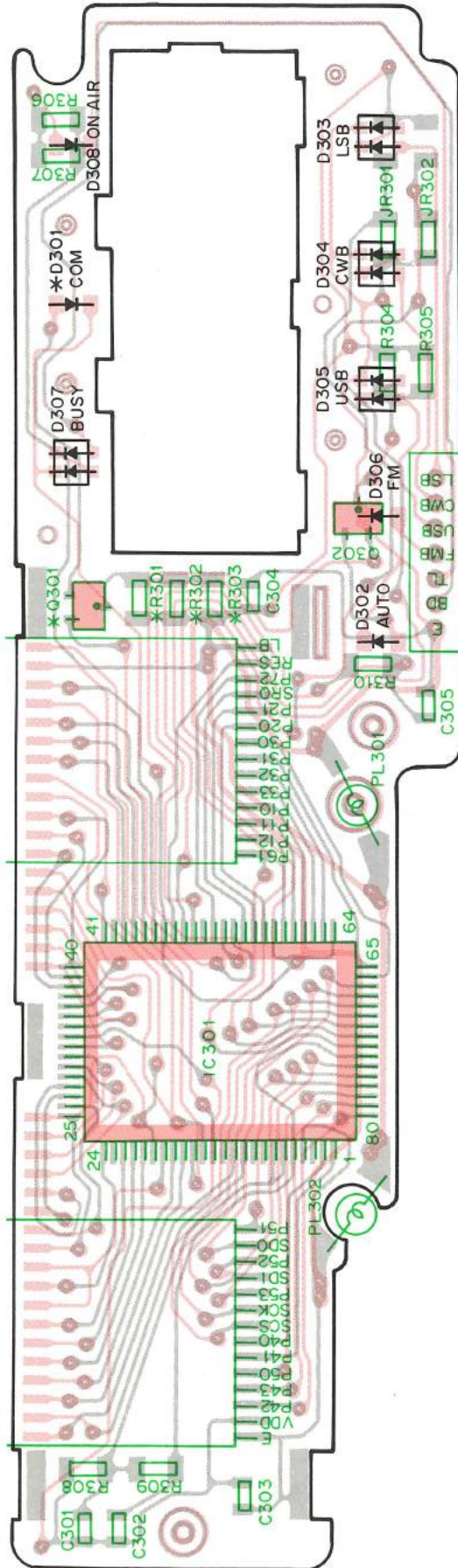


# PC BOARD VIEW TR-851A/E

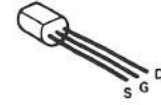
LCD ASS'Y (W02-03XX-05) -0376 : K,M -0377 : T -0387 : W

Component side view

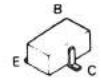
Foil side view



2SK125



2SA1162 2SC2714  
2SC2712 2SC2715



DTC114EK



DTA114EK



|     | Q301 | D301 | R301-303 |
|-----|------|------|----------|
| K,M | O    | O    | O        |
| T,W | X    | X    | X        |

O : Used, X : Not used

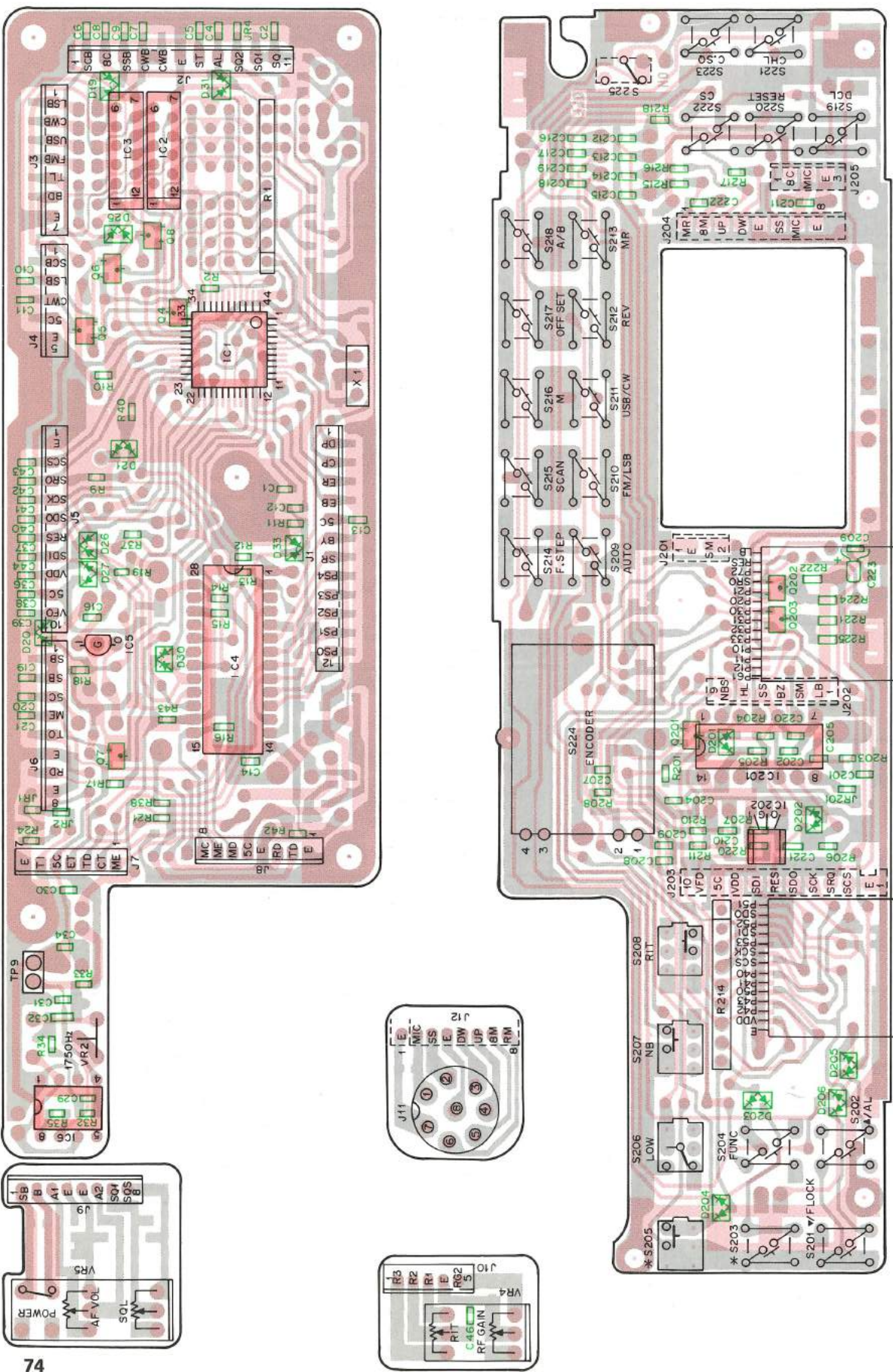
Q301,302 : DTC114EK IC301 :  $\mu$ PD7514G-143-12  
D301,306 : B30-0844-05 D302,308 : B30-0842-05 D303-305,307 : B30-0843-05  
LCD : FSD-8168B(K,M,T) FSD-8168G(W)



## 73



CONTROL UNIT (X53-1460-XX) -12 : K,M -52 : T -62 : W Foil side view

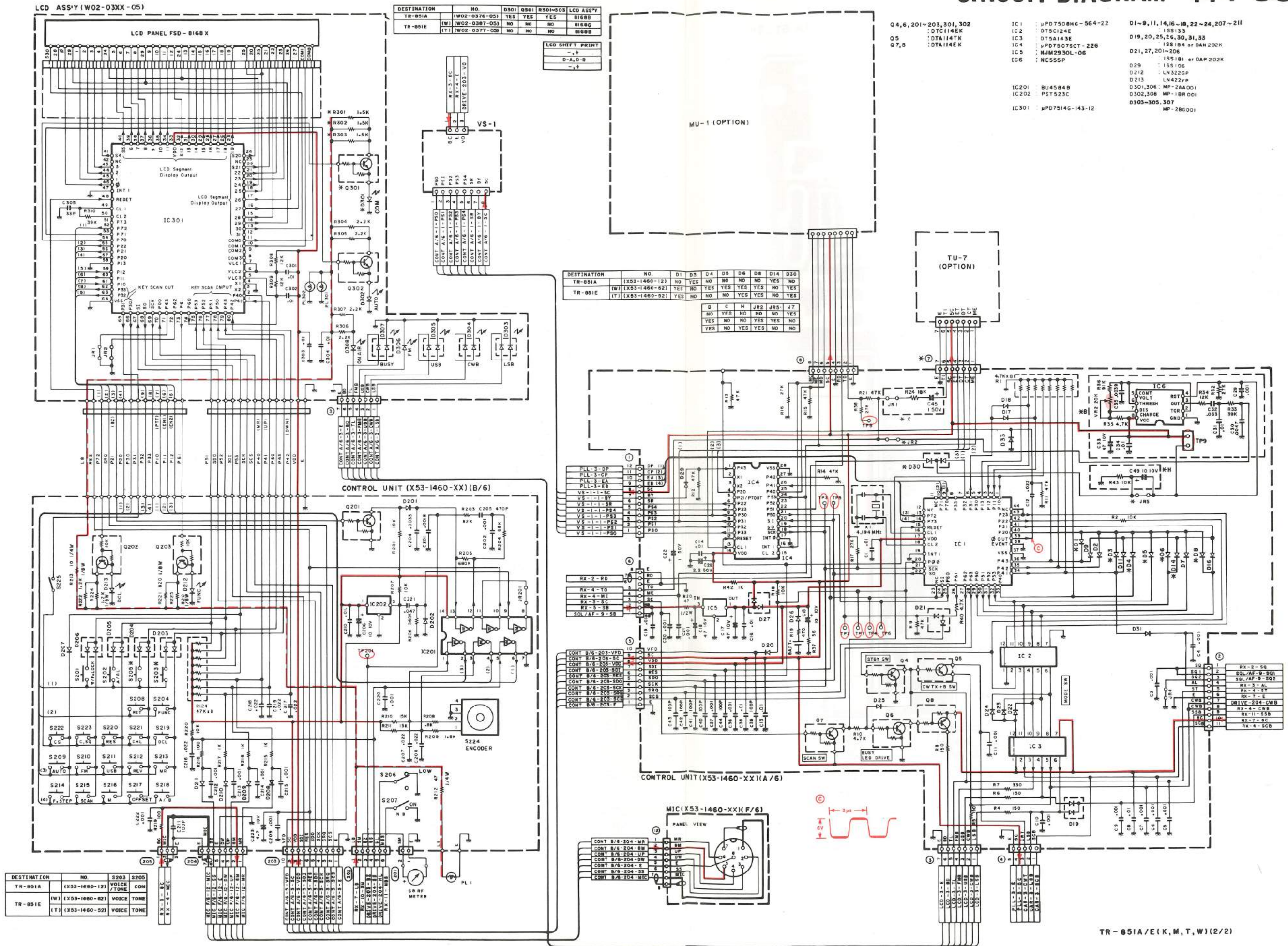


|           | IC6 | VR2 | TP9 | Connector J7 | D1 | D3 | D4 | D5 | D6 | D8 | D14 | D30 | JR1 | JR2 | JR5 | C29-35 | C45 | C49 | R24 | R32-36 | R43 | S203       | S205 |
|-----------|-----|-----|-----|--------------|----|----|----|----|----|----|-----|-----|-----|-----|-----|--------|-----|-----|-----|--------|-----|------------|------|
| -12 (K,M) | X   | X   | X   | O            | X  | O  | X  | X  | X  | X  | O   | X   | O   | X   | X   | X      | O   | X   | O   | X      | X   | VOICE/TONE | COM  |
| -52 (T)   | O   | O   | O   | X            | O  | X  | X  | X  | O  | O  | X   | O   | X   | O   | O   | O      | X   | O   | X   | O      | O   | VOICE      | TONE |
| -62 (W)   | O   | O   | O   | X            | O  | X  | X  | O  | O  | O  | X   | O   | X   | O   | O   | O      | X   | X   | X   | X      | X   | VOICE      | TONE |

O : Used, X : Not used

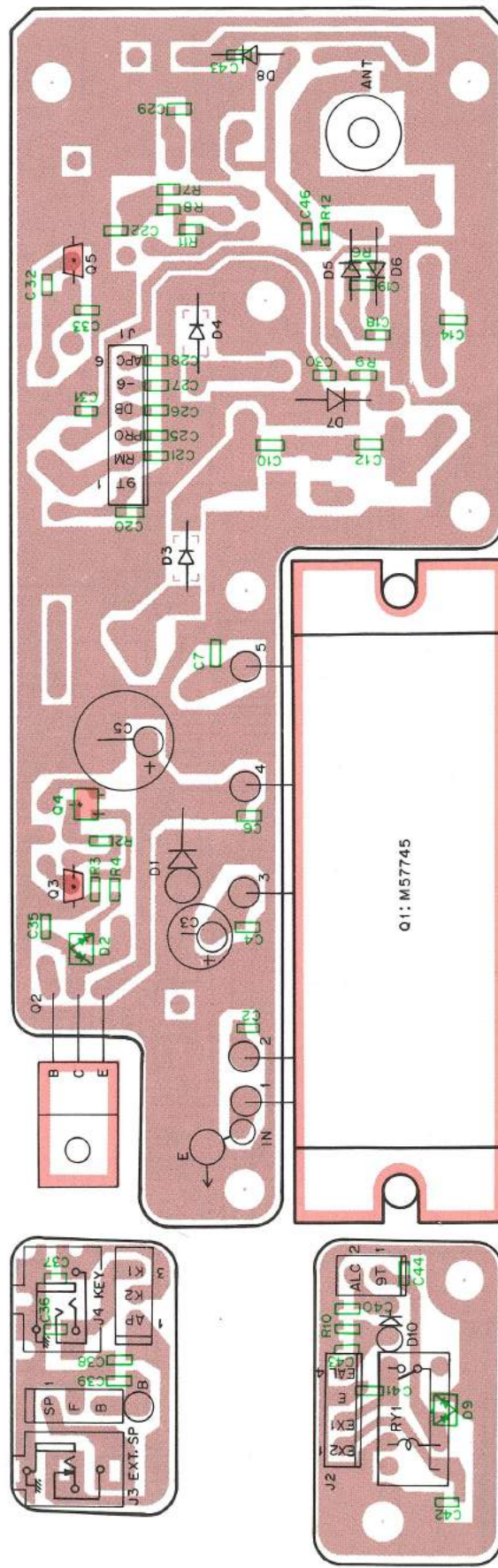


# CIRCUIT DIAGRAM TR-851A/E





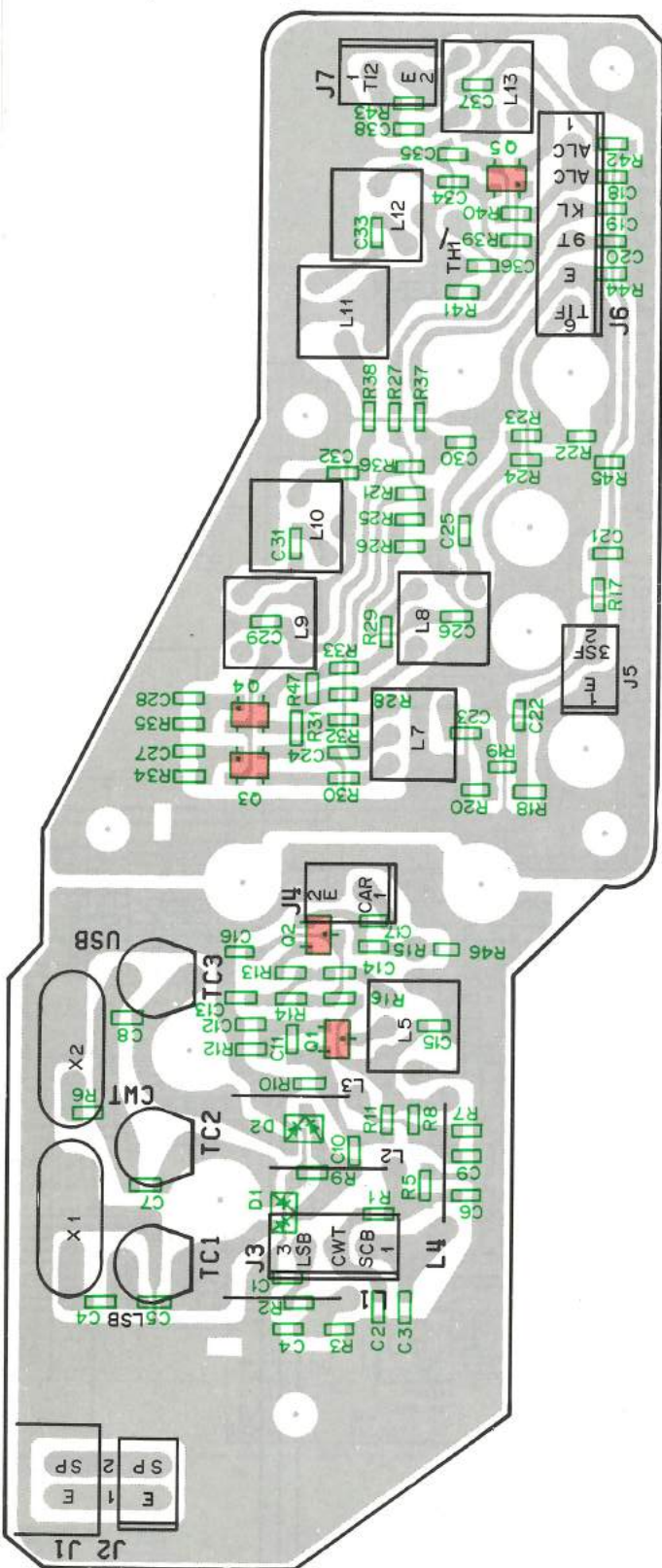
**FINAL UNIT (X45-3030-XX) -11 : TR-851A -51 : TR-851E**  
Foil side view



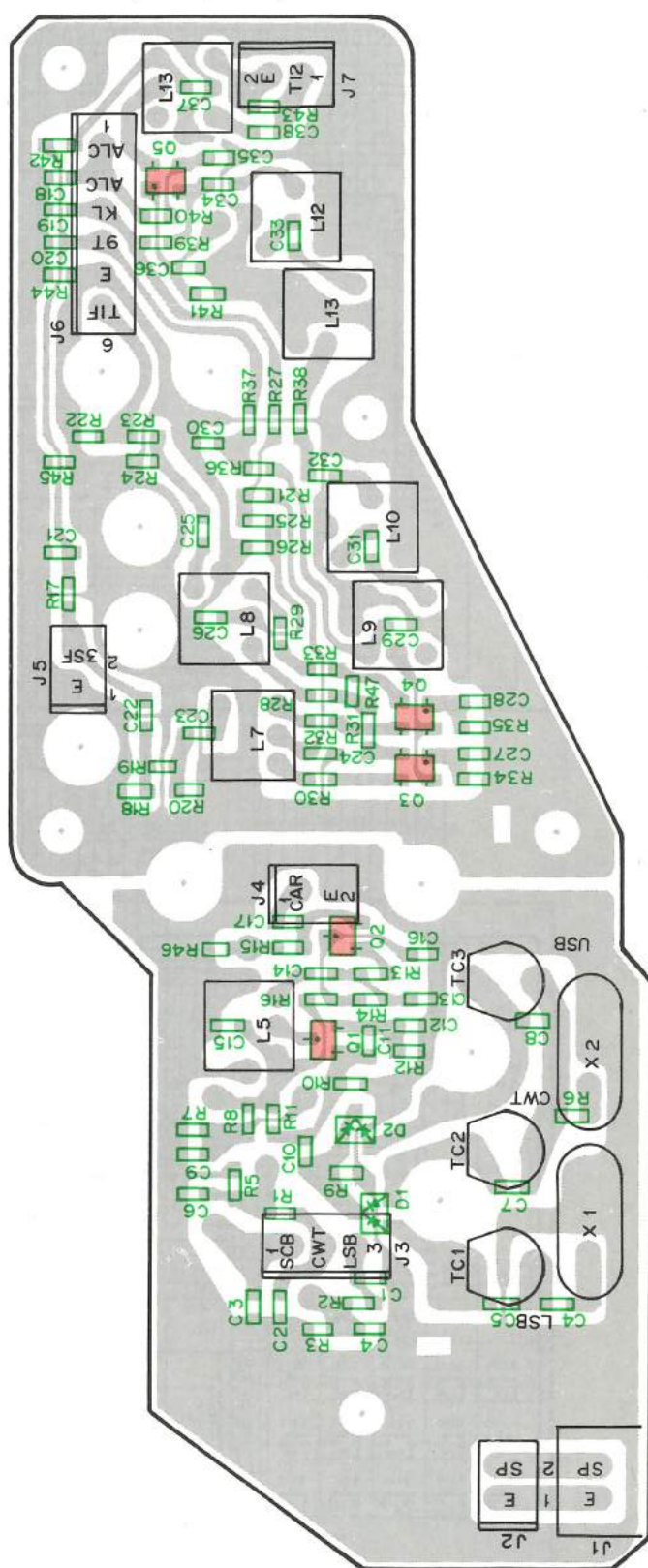
Q1 : M57745 Q2 : 2SA1307(Y) Q3,5 : 2SC2458(Y) Q4 : 2SA1162(Y)  
D1 : DSA3A1 D2,9 : 1SS181 D3 : MI407 D4 : MI308 D5-8 : 1SS101  
D10 : MTZ6.21A



CAR UNIT (X50-3040-00) Component side view



CAR UNIT (X50-3040-00) Foil side view

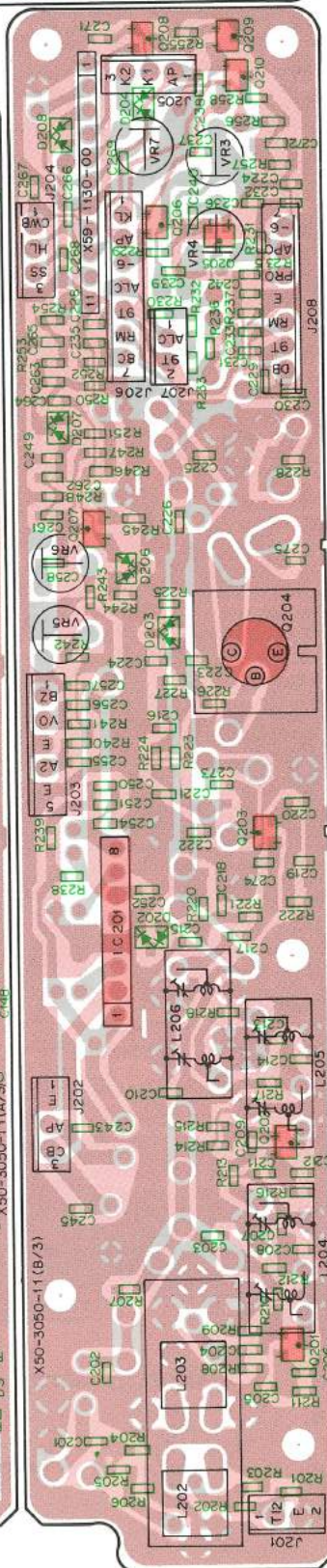


Q1,2 : 2SC2714(Y) Q3-5 : 3SK151(GR)  
D1,2 : 1SS268



Q1-3: 2SC2715(Y) Q4,10,11,14-18,28: 2SC2714(Y) Q5,29,30,201,202: 2SC3098 Q6,31,203: 2SC3356 Q7-9,25-27: 2SC3324(G,B) Q12,13,205,207: 2SC2712(Y) Q19: 3SK151(G,R)  
Q20,21,32,206: DTC124EK Q22,24,208,210: DTA143EK Q204: 2SC2762 Q209: 2SA2162(Y) Q301,303: 3SK184(S) Q302: 2SK125 Q304: 3SK179(L)  
Q306: DTA114EK Q307: DTC114EK  
IC1.5: TC9172P IC2: TC74HC390P IC3: TC5082P-G IC4: SN16913P IC6: L78N08 IC7: NJM78L05A IC201: MB3712  
D1: 1SV153 D2,201: ND487C1-3R D3,203,204,206-208: 1SS184 D4,5: 1SS277 D202: 1SS226 D205: 1N60PSPA D301: 1SS268





A diagram of a 3-core cable with a hexagonal jacket. Three conductors are shown extending from the jacket. The middle conductor is labeled 'B' and the rightmost conductor is labeled 'C'.



RCE

A diagram of a 3-pin connector. It consists of a rectangular housing with three pins extending from one end. The two outer pins are labeled 'S' and 'G' respectively.

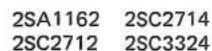
A diagram of a 4-pin DIP package. The pins are labeled from left to right as G<sub>2</sub>, D, G<sub>1</sub>, and S.

Diagram of a 3-pin D-sub connector. The pins are labeled IN, OUT, and GND.

A diagram of a 3-pin D-sub connector. The top-left pin is labeled 'IN', the top-right pin is labeled 'OUT', and the bottom pin is labeled 'VCC'.



**COMPOSITE UNIT (RX)(X60-1320-01) Component side view**



2SA1307

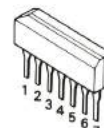
2SK125

3SK73

2SK208

TA7302P

AN612





Q1-3,24 : 3SK73(GR) Q4 : 2SK125 Q5,18,19 : 2SC2714(Y) Q6,8,9,12,13,20,31,36 : 2SC2712(Y) Q7,11,17,21,23,28,29,35 : DTC114EK Q10,22 : DTA114EK  
Q14,15 : 2SK208(O) Q16,33 : 2SA1162(Y) Q25-27 : 2SC3324(G,B) Q30 : 2SA1115(E) Q32 : 2SA1307(Y) Q34 : 2SC3419(Y)  
IC1 : TA7302P IC2 : TA7761P IC3 : NJM4558D or  $\mu$ PC4558C IC4 : AN612 IC5 :  $\mu$ PC78M08H  
D1,24 : 1SS272 D3,4,12-15,17,22,26,33,34 : 1SS184 D5,6,32 : HSM88AS D9,18,23,28,31,35 : 1SS181 D10,11 : 1SS106 D19,27 : 1SS226 D16,20 : 1SS133  
D21 : 1SS208 D29 : MTZ11JC D30 : MTZ6,2JA

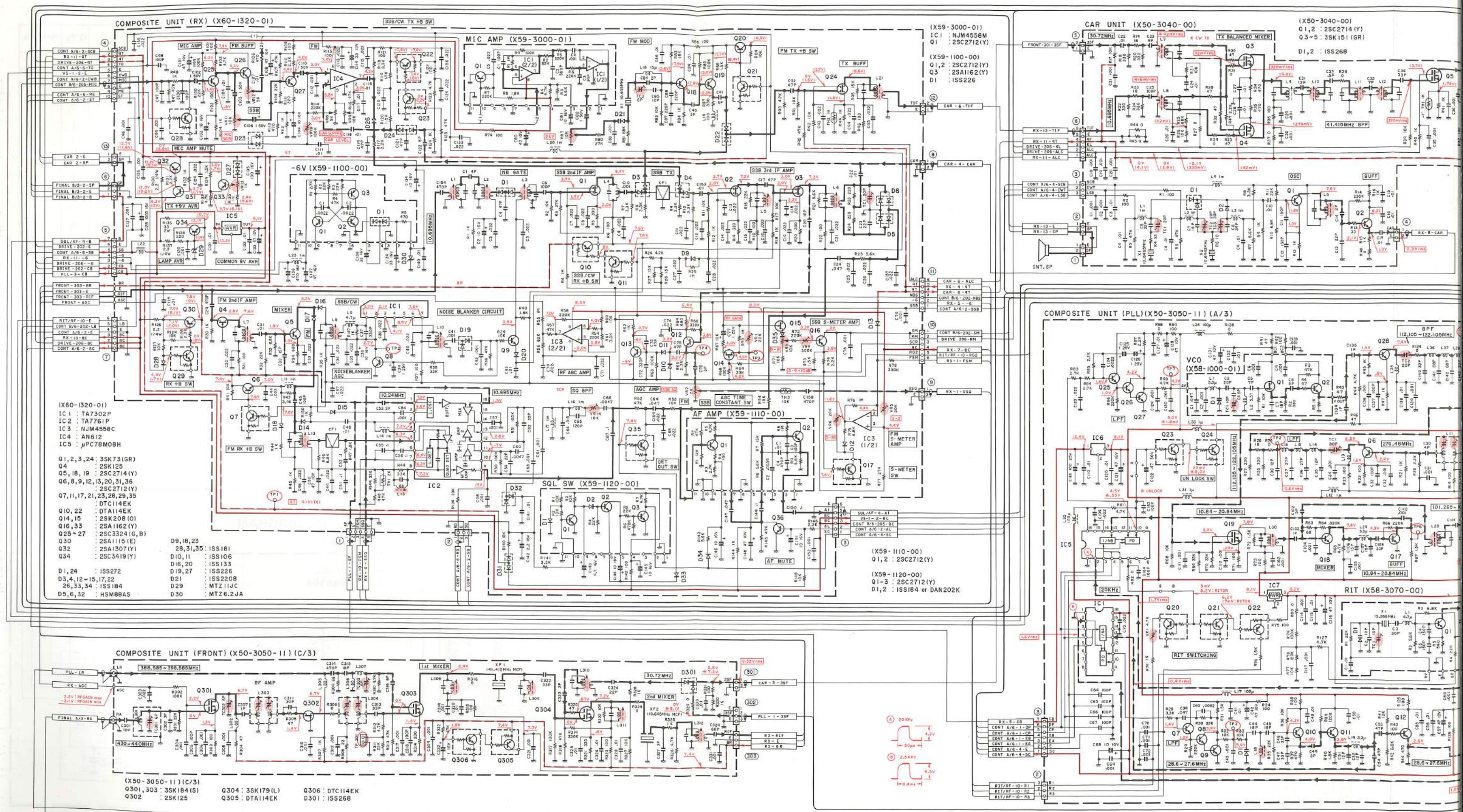
DTA114EK





# SCHEMATIC DIAG

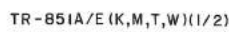
Signal line — Control line — Common DC line





# TR-851A/E

86



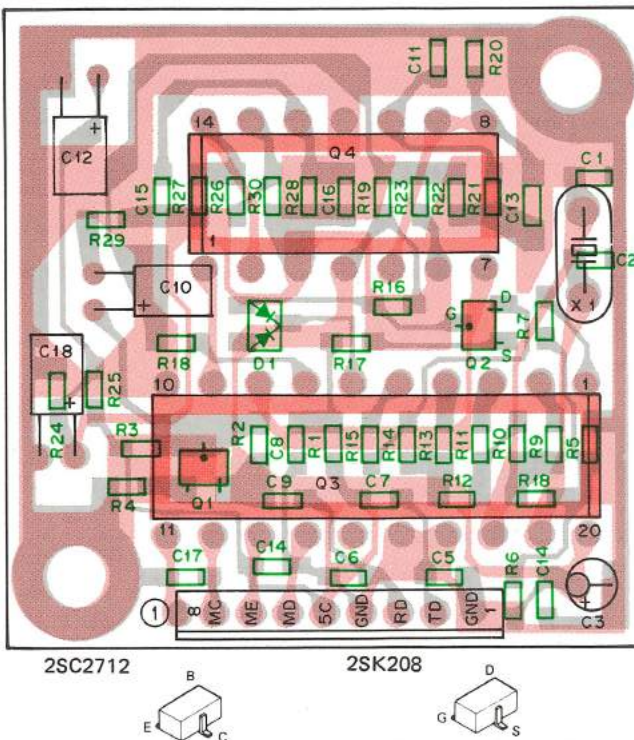


## MU-1 (MODEM UNIT)

### MU-1 OUTSIDE VIEW



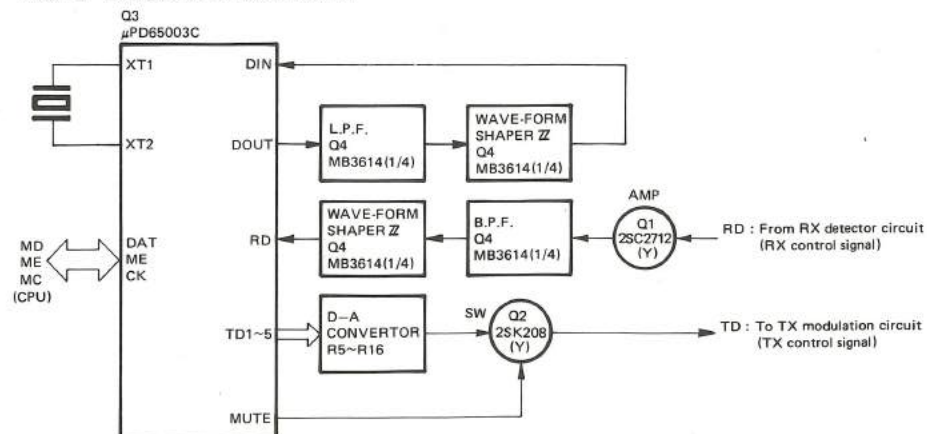
### MU-1 PC BOARD VIEW (X57-1140-20) Component side view



### MU-1 PARTS LIST

| Part No.                        | Re-<br>marks | Description                | Q'Ty | Ref. No.                 |
|---------------------------------|--------------|----------------------------|------|--------------------------|
| <b>MU-1 (GENERAL)</b>           |              |                            |      |                          |
| B50-8046-10                     | N            | Instruction manual         | 1    |                          |
| G13-0826-04                     |              | Cushion                    | 1    |                          |
| H01-4680-03                     | N            | Carton (Inside)            | 1    |                          |
| H25-0029-04                     |              | Protective bag             | 2    |                          |
| J32-0791-04                     |              | Hex. head boss             | 1    |                          |
| N35-2604-41                     |              | Binding screw              | 2    |                          |
| X57-1140-20                     | N            | MODEM unit                 | 1    |                          |
| <b>MODEM UNIT (X57-1140-20)</b> |              |                            |      |                          |
| CC73FCH1H150J                   |              | Chip cap. 15P              | 2    | C1,2                     |
| CE04CWQJ220M                    |              | Electro 22μ 6.3V           | 1    | C18                      |
| CE04CW1A100M                    |              | Electro 10μ 10V            | 2    | C3,12                    |
| CE04CW1H010M                    |              | Electro 1μ 50V             | 1    | C10                      |
| CK73EB1E473K                    |              | Chip cap. 0.047μ           | 1    | C13                      |
| CK73FB1H102K                    |              | Chip cap. 0.001μ           | 1    | C17                      |
| CK73FB1H103K                    |              | Chip cap. 0.01μ            | 1    | C8                       |
| CK73FB1H223K                    |              | Chip cap. 0.022μ           | 7    | C4,7,9,11,<br>14-16      |
| CK73FB1H471K                    |              | Chip cap. 470P             | 2    | C5,6                     |
| E40-5022-05                     |              | Mini-connector 8P          | 1    |                          |
| L77-1295-05                     | N            | X'tal oscillator 3.6864MHz | 1    | X1                       |
| RK73FB2A101J                    |              | Chip res. 100Ω             | 1    | R17                      |
| RK73FB2A102J                    |              | Chip res. 1kΩ              | 1    | R1                       |
| RK73FB2A103J                    |              | Chip res. 10kΩ             | 7    | R8,10,12,14,<br>18,23,30 |
| RK73FB2A105J                    |              | Chip res. 1MΩ              | 1    | R16                      |
| RK73FB2A183J                    |              | Chip res. 18kΩ             | 5    | R7,9,11,13,15            |
| RK73FB2A221J                    |              | Chip res. 220Ω             | 1    | R4                       |
| RK73FB2A223J                    |              | Chip res. 22kΩ             | 1    | R26                      |
| RK73FB2A393J                    |              | Chip res. 39kΩ             | 2    | R5,6                     |
| RK73FB2A394J                    |              | Chip res. 390kΩ            | 1    | R2                       |
| RK73FB2A472J                    |              | Chip res. 4.7kΩ            | 4    | R3,20,24,25              |
| RK73FB2A682J                    |              | Chip res. 6.8kΩ            | 5    | R21,22,27-29             |
| RK73FB2A683J                    |              | Chip res. 68kΩ             | 1    | R19                      |
| 2SC2712(Y)                      |              | Chip TR                    | 1    | Q1                       |
| 2SK208(Y)                       |              | Chip FET                   | 1    | Q2                       |
| μPD65003C-020                   |              | IC                         | 1    | Q3                       |
| MB3614                          |              | IC                         | 1    | Q4                       |
| DAN202(K)                       |              | Chip diode                 | 1    | D1                       |

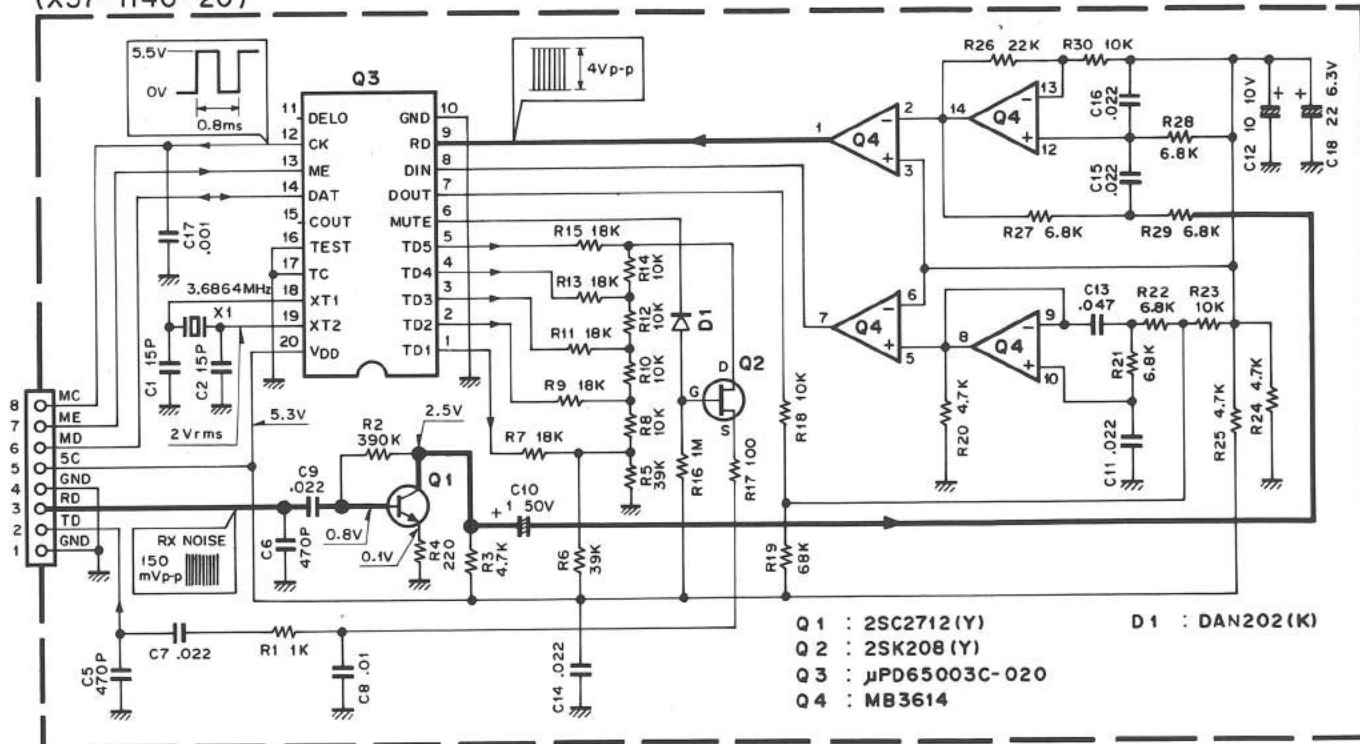
### MU-1 BLOCK DIAGRAM



## MU-1 (MODEM UNIT)

### MU-1 SCHEMATIC DIAGRAM

(X57-1140-20)



#### ● Modulation output (TD terminal output on MODEM unit)

| Condition |    | TD terminal output |                    |
|-----------|----|--------------------|--------------------|
| ME        | MD | Frequency (Hz)     | Output voltage (V) |
| 5V        | 5V | 1,200              | 1.3 $\pm$ 0.15     |
| 5V        | 0V | 1,800              | 1.1 $\pm$ 0.15     |

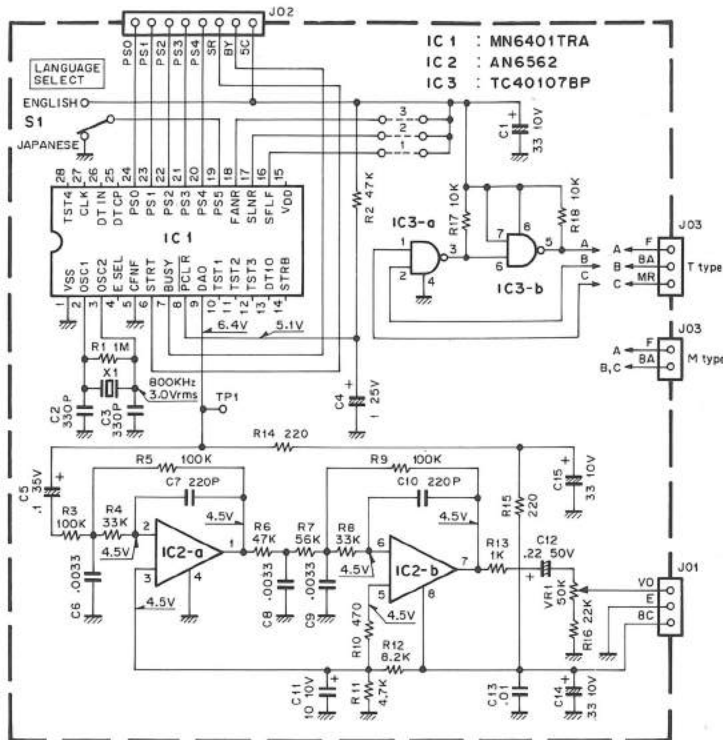
#### ● Demodulation output

Operation condition (RD terminal) : 40mV $\pm$ 3dB  
 (Confirm DAT terminal voltage by receiving a 60dB $\mu$  signal from SSG)

| SSG MOD. frequency | DAT terminal voltage |
|--------------------|----------------------|
| 1,200Hz            | 5V                   |
| 1,800Hz            | 0V                   |

## VS-1 (VOICE SYNTHESIZER)

### VS-1 SCHEMATIC DIAGRAM



### VS-1 PARTS LIST

| Part No.     | Re-<br>marks | Description             | Ref. No.  |
|--------------|--------------|-------------------------|-----------|
| B50-4035-00  | N            | Instruction manual      |           |
| CK45B1H331K  | C            | 330P x 2                | C2,3      |
| CE04CW1A330M | E            | 33 10V                  | C1,14,15  |
| CE04CW1A100M | E            | 10 10V                  | C11       |
| CE04CW1HR22M | E            | 0.22 50V                | C12       |
| CK45B1H221K  | C            | 220P x 2                | C7,10     |
| CQ92M1H332K  | ML           | 0.0033 x 3              | C6,8,9    |
| CS15E1E010M  | T            | 1 25V                   | C4        |
| CS15E1V0R1M  | T            | 0.1 35V                 | C5        |
| C91-0131-05  | C            | 0.01 (SP)               | C13       |
| E40-0273-05  | Δ            | Mini connector 2P       | M J03     |
| E40-0373-05  | Δ            | Mini connector 3P       | M J01     |
| E40-0373-05  | Δ            | Mini connector x 2 3P   | T J03,J01 |
| E40-0873-05  | Δ            | Mini connector 8P       | J02       |
| H01-4481-03  | NΔ           | Packing carton (inside) | M         |
| H01-4501-03  | NΔ           | Packing carton (inside) | T         |
| H25-0029-04  |              | Protective bag x 2      |           |
| L78-0006-05  | N            | Ceramic OSC             | X1        |
| N89-3006-46  |              | Tapping screw x 4       |           |
| R12-4408-05  |              | Trim. pot. 50kΩ         | VR1       |
| S31-1411-05  | N            | Slide switch            | S1        |
| AN6562       | N            | IC                      | IC2       |
| MN6401TRA    | N            | IC                      | IC1       |
| TC40107BP    | N            | IC                      | IC3       |

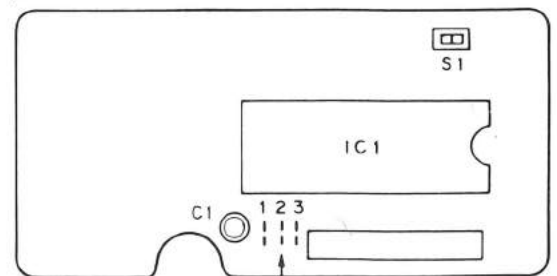
### TALK SPEED SELECTION

Speed is factory set at "standard" talk speed. Three different speeds can be selected.

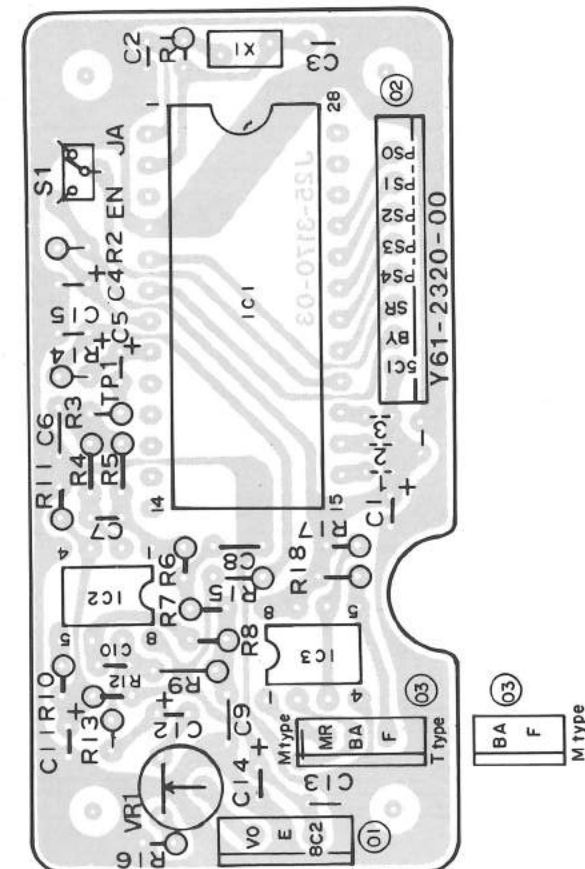
Note: When placing the jumper, solder carefully.

| Speed<br>Jumper place | Std. speed | 30% more<br>than Std. | 60% more<br>than Std. |
|-----------------------|------------|-----------------------|-----------------------|
| 1                     | X          | X                     | ○                     |
| 2                     | X          | X                     | ○                     |
| 3                     | X          | ○                     | X                     |

Symbol ○, denotes the place in which a jumper wire is placed.



The place which a jumper wire to be placed.





## TU-7 (TONE UNIT)

### TU-7 OUTSIDE VIEW



### TU-7 INSTALLATION AND TONE FREQUENCY SETTING PROCEDURE

Available CTSS tone frequencies

| Hz    | Hz    | Hz    |
|-------|-------|-------|
| 67.0  | 114.8 | 192.8 |
| 71.9  | 118.8 | 203.5 |
| 74.4  | 123.0 | 210.7 |
| 77.0  | 127.3 | 218.1 |
| 79.7  | 131.8 | 225.7 |
| 82.5  | 136.5 | 233.6 |
| 85.4  | 141.3 | 241.8 |
| 88.5  | 146.2 | 250.3 |
| 91.5  | 151.4 |       |
| 94.8  | 156.7 |       |
| 97.4  | 162.2 |       |
| 100.0 | 167.9 |       |
| 103.5 | 173.8 |       |
| 107.2 | 179.9 |       |
| 110.9 | 186.2 |       |

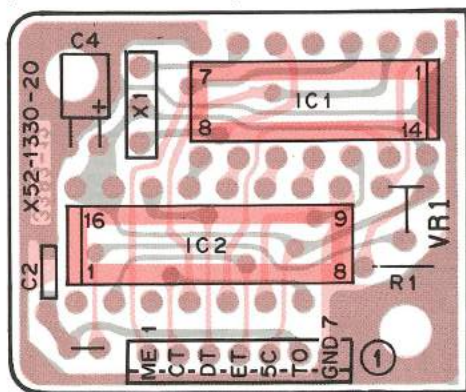
Refer to the instruction manual provided with the transceiver.

### TU-7 PARTS LIST

| Part No.                       | Re-<br>marks | Description                | Q'Ty | Ref. No. |
|--------------------------------|--------------|----------------------------|------|----------|
| <b>TU-7 (GENERAL)</b>          |              |                            |      |          |
| B50-8045-00                    | N            | Instruction manual         | 1    |          |
| E31-3150-05                    | N            | Cable assembly             | 1    |          |
| G13-0826-04                    | N            | Cushion                    | 1    |          |
| G31-0826-04                    |              | Foam spacer                | 1    |          |
| H01-4679-03                    | N            | Carton (Inside)            | 1    |          |
| H25-0029-04                    |              | Protective bag             | 2    |          |
| J32-0791-04                    | N            | Hex. head boss             | 1    |          |
| N35-2604-41                    |              | Binding screw              | 2    |          |
| X52-1330-20                    | N            | Tone unit                  | 1    |          |
| <b>TONE UNIT (X52-1330-20)</b> |              |                            |      |          |
| CE04CW1A100M                   |              | Electro 10 $\mu$ 10V       | 1    | C4       |
| CK73EB1H473K                   |              | Chip cap. 0.047 $\mu$      | 1    | C2       |
| C91-0757-05                    |              | Ceramic 0.001 $\mu$        | 1    | C3       |
| E40-5021-05                    |              | Mini-connector 7P          | 1    |          |
| L78-0018-05                    | N            | Ceramic oscillator         | 1    | X1       |
| R12-3445-05                    |              | Trimming pot. 47k $\Omega$ | 1    | VR1      |
| MB88306                        | N            | IC                         | 1    | IC2      |
| S7116A                         | N            | IC                         | 1    | IC1      |

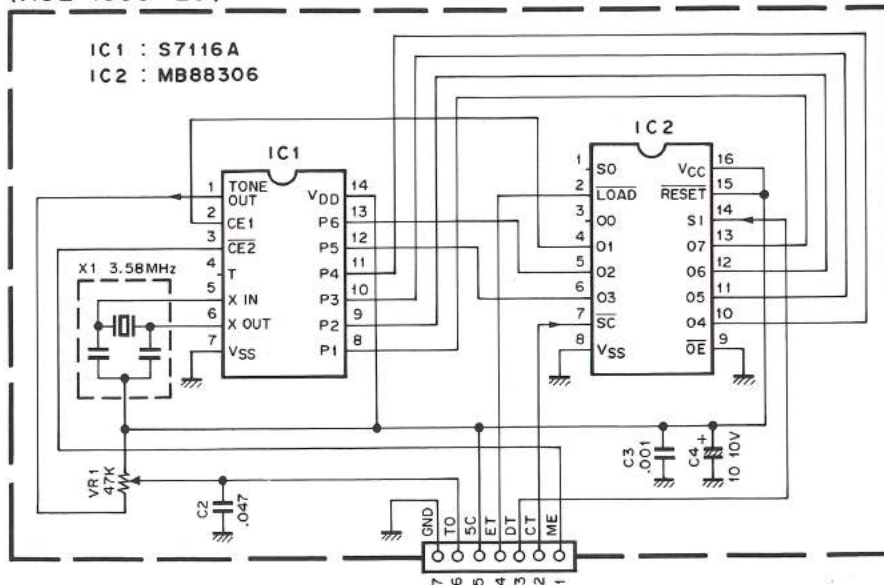
### TU-7 PC BOARD VIEW

(X52-1330-20) Component side view

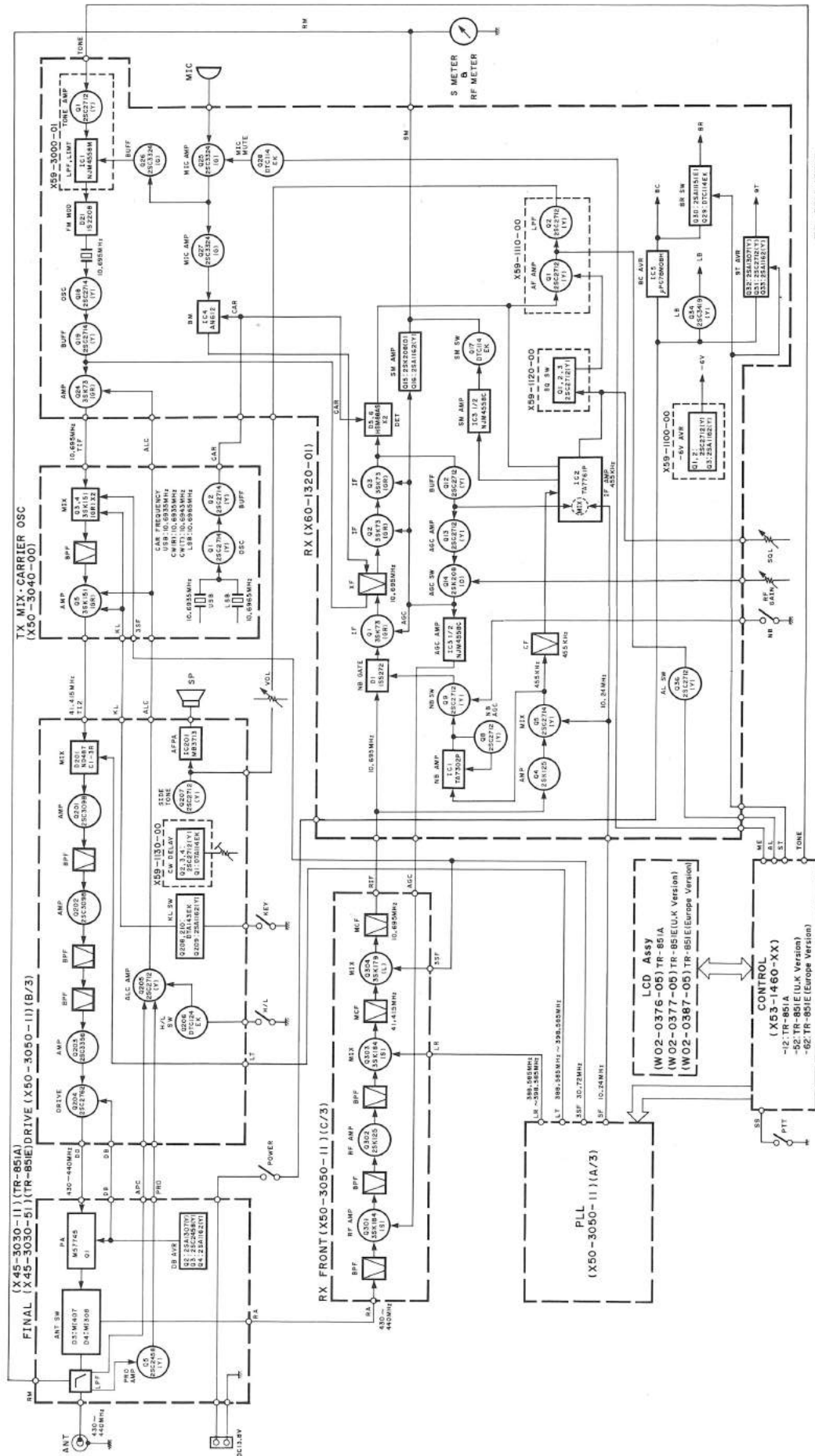


### TU-7 SCHEMATIC DIAGRAM

(X52-1330-20)



## BLOCK DIAGRAM



## SPECIFICATIONS

| Specification       |                                               | Model                                            | TR-851A/E                                                                       |                   |
|---------------------|-----------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------|-------------------|
| General             | Frequency range                               |                                                  | 430 to 440 MHz                                                                  |                   |
|                     | Mode                                          |                                                  | USB/LSB (J3E), CW (A1A), FM (F3E, F2D for the control signal of the DCL system) |                   |
|                     | Antenna impedance                             |                                                  | 50 ohms                                                                         |                   |
|                     | Power requirement                             |                                                  | 13.8 VDC $\pm 15\%$                                                             |                   |
|                     | Grounding                                     |                                                  | Negative                                                                        |                   |
|                     | Current drain                                 | Receive mode with no input signal                | 0.8 A                                                                           |                   |
|                     |                                               | Transmit mode (Max.)                             | 7.5A                                                                            |                   |
|                     | Frequency stability ( -20°C to +60°C)         |                                                  | Better than $\pm 20 \times 10^{-6}$                                             |                   |
|                     | Operating temperature                         |                                                  | -20°C to +60°C ( -4°F to +140°F)                                                |                   |
|                     | Dimensions (W x H x D) (Projections included) |                                                  | 180 x 63 x 233 mm                                                               |                   |
| Weight              |                                               | 2.5 kg (5.5 lbs)                                 |                                                                                 |                   |
| Transmitter         | Output power *                                | HI                                               | 25 W                                                                            |                   |
|                     |                                               | LOW                                              | 5 W (Adjustable up to out 25 W)                                                 |                   |
|                     | Modulation                                    | USB/LSB                                          | Balanced modulation                                                             |                   |
|                     |                                               | FM                                               | Reactance modulation                                                            |                   |
|                     | Spurious radiation                            |                                                  | Less than -60 dB                                                                |                   |
|                     | Carrier suppression (SSB)                     |                                                  | More than 40 dB                                                                 |                   |
|                     | Unwanted sideband suppression (SSB)           |                                                  | More than 40 dB                                                                 |                   |
|                     | Maximum frequency deviation (FM)              |                                                  | $\pm 5$ kHz                                                                     |                   |
|                     | Audio distortion (FM, at 60% modulation)      |                                                  | Less than 3% (300 to 3000 Hz)                                                   |                   |
|                     | Microphone impedance                          |                                                  | 500 to 600 ohms                                                                 |                   |
| Receiver            | Circuitry                                     | USB/LSB/CW                                       | Double conversion superheterodyne                                               |                   |
|                     |                                               | FM                                               | Tripple conversion superheterodyne                                              |                   |
|                     | Intermediate frequency                        |                                                  | 41.415 MHz/10.695 MHz/455 kHz (FM only)                                         |                   |
|                     | Sensitivity                                   | USB/LSB/CW (10 dB S+N/N)                         | Less than 0.11 $\mu$ V                                                          |                   |
|                     |                                               | FM (12 dB SINAD)                                 | Less than 0.18 $\mu$ V                                                          |                   |
|                     | Selectivity                                   | USB/LSB/CW                                       | -6 dB                                                                           | More than 2.2 kHz |
|                     |                                               |                                                  | -60 dB                                                                          | Less than 4.8 kHz |
|                     |                                               | FM                                               | -6 dB                                                                           | More than 12 kHz  |
|                     |                                               |                                                  | -60 dB                                                                          | Less than 24 kHz  |
|                     | Spurious response                             |                                                  | Better than 60 dB                                                               |                   |
| RIT variable range  |                                               | More than $\pm 1.2$ kHz                          |                                                                                 |                   |
| Squelch sensitivity |                                               | Less than 0.1 $\mu$ V                            |                                                                                 |                   |
| Output              |                                               | More than 2 W across 8 ohms load (5% distortion) |                                                                                 |                   |
| DCL control         | External speaker impedance                    |                                                  | 8 ohms                                                                          |                   |
|                     | Code                                          |                                                  | NRZ equal-length code                                                           |                   |
|                     | Modulation                                    |                                                  | MSK modulation                                                                  |                   |
|                     | Frequency deviation                           |                                                  | $\pm 3.5$ kHz (Reference)                                                       |                   |
|                     | Mark frequency and deviation                  |                                                  | 1200 Hz, $\pm 2 \times 10^{-4}$                                                 |                   |
|                     | Space frequency and deviation                 |                                                  | 1800 Hz, $\pm 2 \times 10^{-4}$                                                 |                   |
|                     | Code transmission speed and deviation         |                                                  | 1200 bits/second, $\pm 2 \times 10^{-4}$                                        |                   |

### Notes:

1. Circuit and ratings are subject to change without notice due to advancements in technology.

2. \* Recommended duty cycle  
1 minute : Transmission  
3 minutes: Reception

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