

KENWOOD

SERVICE MANUAL

TM-2550A/E, TM-2530A

MU-1,
MB-10, TU-7,
PG-2K, VS-1

144MHz FM TRANSCEIVER



Photo is TM-2550A.

CONTENTS

| | | | |
|---------------------------------------|----|---|------------|
| CIRCUIT DESCRIPTION | 2 | TERMINAL FUNCTIONS | 37 |
| PARTS LIST | 16 | BLOCK DIAGRAM (TM-2550A, TM-2530A) | 38 |
| DISASSEMBLY | 30 | SCHEMATIC DIAGRAM (TM-2550A, TM-2530A) .. | 39 |
| ADJUSTMENT | 32 | SCHEMATIC DIAGRAM (TM-2550E) | 40 |
| PC BOARD VIEWS | | BLOCK DIAGRAM (TM-2550E) | 41 |
| MIC AMP. (X59-1000-10) | 36 | LEVEL DIAGRAM | 42 |
| MIC AMP., S-METER (X59-1010-10) | 36 | MU-1 (MODEM UNIT) | 42 |
| ALERT, VACANT CH. (X59-1020-10) | 36 | MB-10 (MOBILE MOUNT) | 43 |
| CENTER DETECTOR (X59-1030-10) | 36 | TU-7 (TONE UNIT) | 44 |
| SQUELCH CONTROL (X59-1040-10) | 36 | PG-2K (DC POWER CABLE) | 45 |
| COMPOUND UNIT (X60-1280-XX) | 36 | VS-1 (VOICE SYNTHESIZER) | 46 |
| CONTROL UNIT (X53-1440-XX) | 36 | PACKING (TM-2550A/E, TM-2530A) | 47 |
| PLL UNIT (X50-2030-XX) | 36 | SPECIFICATIONS | BACK COVER |
| DISPLAY UNIT (X54-1860-10) | 37 | | |
| FINAL UNIT (X45-1440-XX) | 37 | | |

CIRCUIT DESESCRIPTION

| | TM-2550A (K1,M1,M3) | TM-2550E (T,W) | TM-2530A (K2,M2,M4) |
|---------------|---------------------|-----------------|---------------------|
| FINAL UNIT | X45-1440-10 | X45-1440-10 | X45-1440-11 |
| PLL UNIT | X50-2030-10 | X50-2030-51 | X50-2030-11 |
| CONTROL UNIT | X53-1440-10 (K1,M1) | X53-1440-51 (T) | X53-1440-10 (K2,M2) |
| | X53-1440-21 (M3) | X53-1440-61 (W) | X53-1440-21 (M4) |
| DISPLAY UNIT | X54-1860-10 | X54-1860-10 | X54-1860-10 |
| COMPOUND UNIT | X60-1280-10 | X60-1280-51 | X60-1280-10 |

Table 1 TM-2550A/E, TM-2530A PC board chart

RX SECTION

Signals from the antenna are applied to the FINAL unit (X60-1280-XX) transmit receive swithing circuit, D2 and D4. In receive, diodes D2 and D4 are reverse biased forcing the incoming receive signal down thru L3 to the RA (Receive Antenna) terminal. There the incoming receive signal is then coupled to the COMPOUND Unit (X60-1280-XX). The signal is filtered by a low pass filter and amplified by Q1 the first RF amplifier, a GaAs FET : 3SK129(S). The amplified RF signal is then mixed with the LR (Receiver Local Oscillator) signal in the first mixer Q2 : 3SK74(L) to obtain the First IF frequency of 10.695MHz. This IF signal is filtered by Helical Resonator, L4, and a two stage MCF (Monolithic Crystal Filter), L8, which combine to provide excellent two-signal characteristics and sensitivity.

The First IF signal from the MCF is then amplified by the First IF amplifier Q3 : 2SC2668(Y) and applied to the FM IF Amplifier/Mixer/Detector, IC2 : TA7761P. This signal IC mixes the IF signal with the 10.24MHz 2nd Local Oscillator signal (L14) to obtain the 2nd IF frequency of 455kHz, then amplifies, routes the signal thru external filter L16, and finally convertes it into the received audio signal with the internal quadrature detector. The 2nd Local Oscillator signal from L14 and IC2 is also used by the PLL unit as a Reference signal.

The detected audio output from IC2 is applied to the SQUELCH CONTROL (X59-1040-10), and to the de-emphasis circuit R56 and C99. The (de-emphasized) audio is amplified by Audio preamplifier Q9 : 2SC2458(Y) and then applied thru the AF GAIN control to the Audio Amplifier IC1 : μ PC1241H which drives the speaker.

The noise component of the detected audio is filtered by a band-pass filter, in order to obtain a frequency of approximately 30kHz (which is well outside the normal voice bandwidth) and then amplified by the noise amplifiers contained inside IC2. This amplified noise is rectified by diodes D6 and D5 and applied to Q1 of the Squelch Switch. Q1 is used to control the conduction of Q2, which controls AF Preamp Q9.

A center-stop tuning circuit is provided to ensure that the incoming signal is actually on frequency before the squelch is opened. A portion of the 455kHz IF signal is coupled thru the secondary of L17 and applied to CENTER STOP unit (X59-1030-10) where Ceramic Discriminator L12, and Window comparator IC1 : NJM4558M are used to determine if the incoming signal is actually the channel center. When the detected signal applied to the window comparator reaches a predetermined level, Q5 of the Squelch Switch will be turned OFF or ON. The Squelch Switch determines if there is an incoming signal at the same time. If the incoming signal is at the proper level, and on frequency, the squelch will open and the C.TUNE indicator in the LCD display will turn ON. This indicator is controlled by IC2, the main microprocessor on the CONTROL unit (X53-1440-XX), thru inputs supplied from the COMPOUND unit via the BD line. During Open Channel Scanning of the DCL system Q3, Q1, and Q2 of the Squelch Switch are controlled by the main microprocessor via the SQS line. During DCL operations open channel search threshold levels are controlled by VR3 of the Compound ass'y. Transistor Q6 of the Squelch Switch, is used to prevent the Center Stop circuit from activating during Open Channel Scan Operation.

Note 1 :

The Center Stop circuit is not activated during Open Channel Scan.

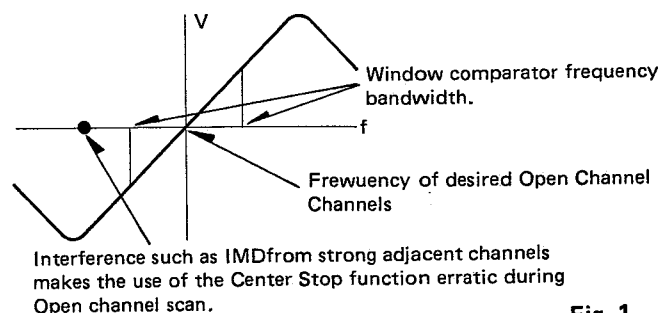


Fig. 1

Audio Preamplifier Q9 is controlled by Q1 of the Alert, Vacant CH. unit (X59-1020-10) during Alert, code Squelch and Open Channel operations.

CIRCUIT DESCRIPTION

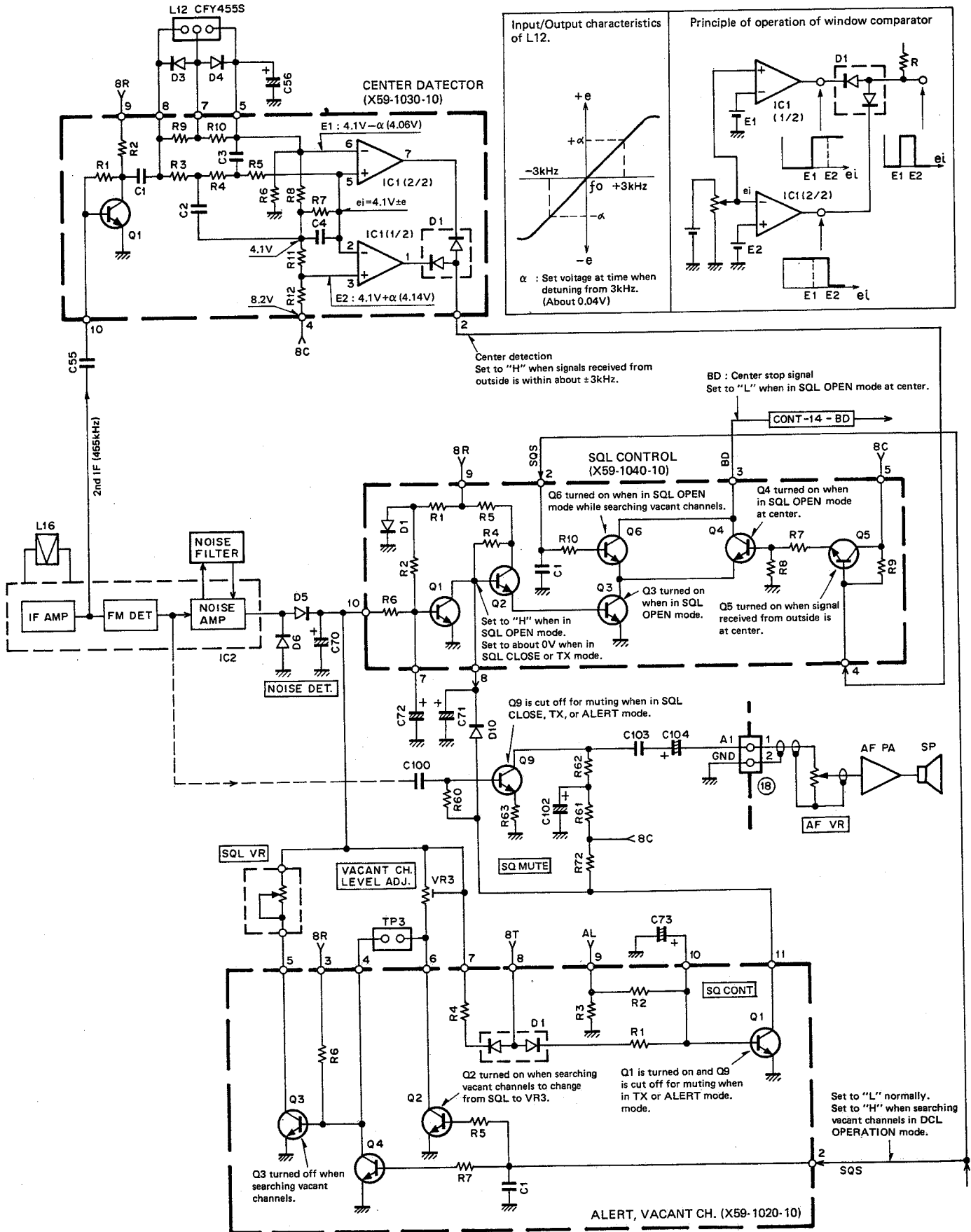


Fig. 2 Center detector, Alert, Vacant CH, SQL control circuit

CIRCUIT DESCRIPTION

| Item | Rating |
|-------------------------------|---|
| Nominal center frequency (fo) | 10.695MHz |
| Pass bandwidth | ±7.5kHz or more at 3dB |
| Attenuation bandwidth | ±25kHz or less at 40dB ±45kHz or less at 60dB |
| Guaranteed attenuation | 1. 70dB or more within ±1MHz 2. Spurious level = 40dB or more at fo-fo + 500kHz 3. Spurious level = 80dB or more at fo-(910kHz±10kHz) |
| Ripple | 1.0dB or less |
| Loss | 1.5dB or less |
| Impedance | 3kΩ/0pF |

Table 2 MCF (L71-0216-05) COMP unit L8

| Item | Rating |
|--|------------------|
| Nominal center frequency (fo) | 455kHz |
| 6dB bandwidth | ±6kHz or more |
| 50dB bandwidth | ±12.5kHz or more |
| Ripple (within 455±5kHz) | 3dB or less |
| Loss | 6dB or less |
| Guaranteed attenuation (within 455±100kHz) | 35dB or more |
| Input and output impedance | 2.0kΩ |

Table 3 Ceramic filter (L72-0315-05) COMP unit L16

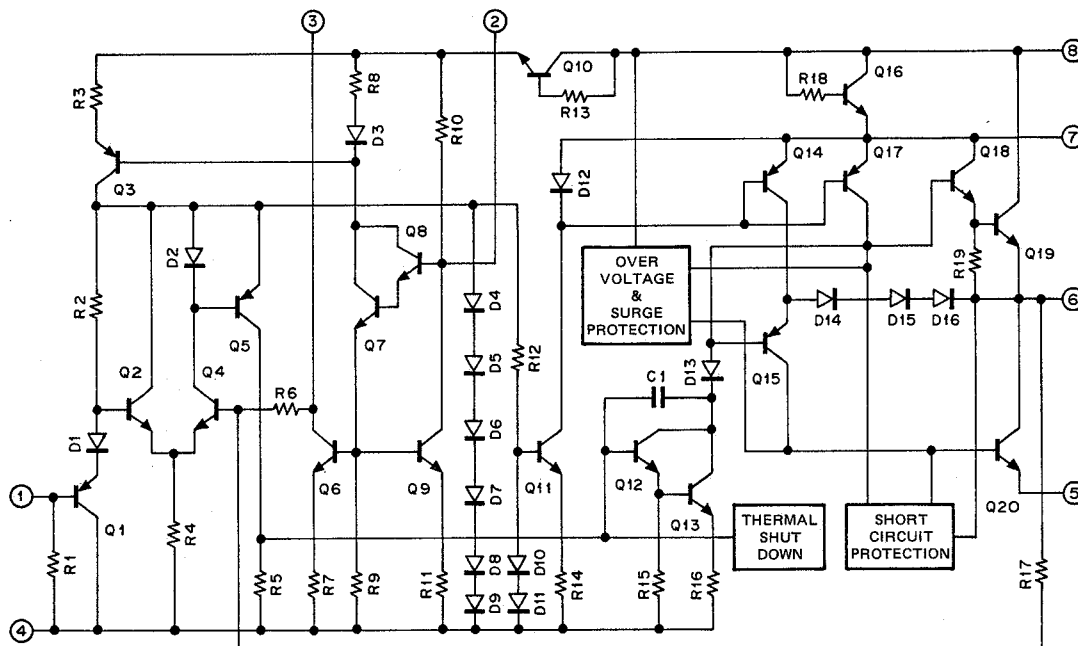


Fig. 3 μPC1241H Equivalent circuit (COMP unit IC1)

TX SECTION

Incoming microphone audio from the DISPLAY unit (X54-1860-10 C/3) is amplified by Q8 : 2SC1775(E). This amplified audio is then buffered by buffer amplifier Q7 : 2SC2458(Y) and applied to D2 : 1SS181 of the MIC AMP/S METER unit (X59-1010-10) for limiting. The signal is then amplified by a portion of IC1 : NJM4558M on the MIC AMP/S METER unit. D2 of the MIC AMP unit (X59-1000-10) provides additional limiting. The microphone audio is filtered by a 2 stage active LPF, IC1 : NJM4558M and applied to varactor diode D3 : 1S2208 in the PLL unit (X50-2030-XX) for phase modulation of the transmit VCO, Q8.

The phase-modulated FM signal is amplified by driver transistors Q10 : 2SC2688(Y), Q11 : 2SC2347 and Q12 : 2SC2538-22-A (TM-2530) or 2SC3019 (TM-2550) and applied to the FINAL unit (X45-1440-10 : TM-2550A/E or X45-1440-11 : TM-2530A).

This signal is amplified by the Hybrid Final Amplifier Module Q1 : M57737 (TM-2530A) or M57726 (TM-2550A/E) and applied to the antenna via the transmit/receive switching diode D2. During transmit, forward bias is applied to D2 allowing the transmit signal to pass. Diode D3 is also forward biased during transmit. The value of L3 was selected to present a high impedance to the transmitted signal. Any of the transmit signal that passes thru L3 is shunted to ground thru D3 to protect the receiver circuits and prevent feedback. Once the signal has been passed thru D2 it proceeds thru the LPF and to the antenna.

The APC (Automatic Protection Circuit) on the FINAL unit consists of two circuit, a negative feedback circuit that senses output power and an SWR protection circuit.

CIRCUIT DESCRIPTION

The negative feedback circuit samples the transmitted signal, rectifies this signal with D4, and applies the rectified signal to NF GAIN amplifier Q6 : 2SC2458(Y). This amplifier supplies a signal to Differential Amplifiers Q4 and Q5 : 2SC2458(Y) which control the bias applied to the PA module pin 2, and driver transistor Q12 of the PLL unit, via bias regulators Q2 : 2SD1406(Y) and Q3 : 2SA1015(Y). High/Low power swithing is accomplished by applying a ground to pin number 1 of connector (2) on the FINAL unit. This causes VR3 to act as a voltage divider that controls the conduction of NF GAIN amplifier Q6.

Reflected power is coupled thru D5 on the FINAL unit and is used to control the conduction of Q7. This transistor function like Q6 to control differential amplifiers Q4 and Q5, and thus the bias applied to the Power Amplifier.

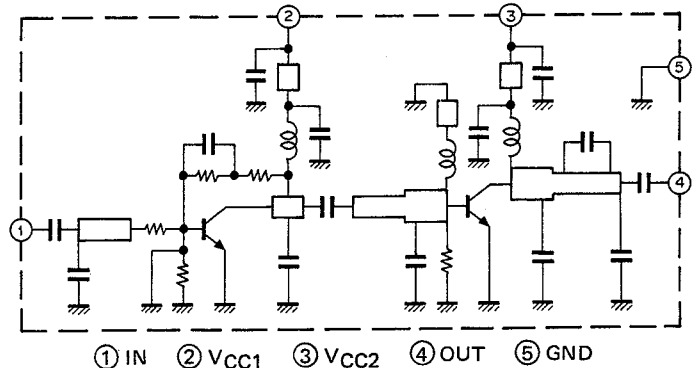


Fig. 5 M57726 Equivalent circuit

| Item | Symbol | Tc(°C) | Condition | Rating |
|----------------------|---------|--------|---------------|--------|
| Operating | Vcc | 25 | | 17V |
| DC current | Icc | 25 | | 7A |
| Operating case temp. | Tc (op) | | -30~ + 110°C | |
| Storage temp. | Tstg | | -40~ + 110°C | |
| Power input | Pin | 25 | Zg = Zl = 50Ω | 0.4W |
| Power output | Po | 25 | Zg = Zl = 50Ω | 40W |

Table 4 M57737 Max. rating (TM-2530A Final unit Q1)

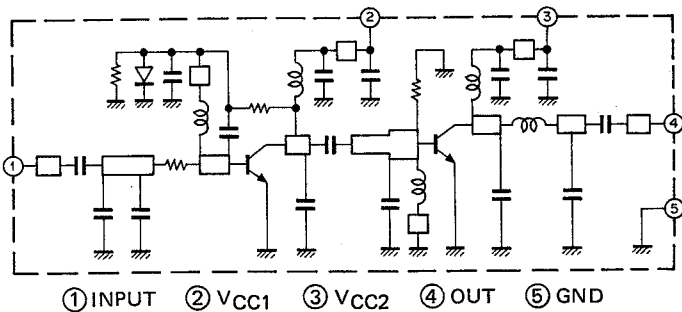


Fig. 4 M57737 Equivalent circuit

PLL CIRCUIT

The PLL circuit is divided into two main loops : transmit and receive.

Receive PLL Loop

The signal generated by the RX VCO (Voltage Controlled Oscillator) Q16 : 2SK192A(GR)*P is applied to buffer amplifier Q17 : 2SC2668(Y) and mixed with the HET (Heterodyne) signal by Q21 : 2SC2668(Y) where it becomes the PLL IF signal (K,M 13.015 to 15.010MHz, T,W 12.865 to 19.86MHz). This PLL IF signal is then amplified by Q20 : 2SC2668(Y) and applied to the Phase Detector IC2 : MC145155P*K where it is divided to obtain a 5kHz signal. The divide ratio is determined by Serial Data from the CONTROL unit. This 5kHz signal is compared with the 5kHz reference signal obtained by dividing the 10.240 MHz Reference signal.

The Phase Detector compares the phase of these two signals and transmits an error control signal to the VCO. The control signal is filtered by an Active Low Pass filter composed of Q13 : 2SK30A(O) and Q14 : 2SC2458(Y) to remove any AC fluctuations to obtain a DC correction voltage. The correction voltage is used to change the capacitance of Varactor Diode D5 : 1SV50, which varies the output of the RX VCO to lock it on frequency.

If the phase difference is too great to be corrected by the control voltage applied to D5, an unlock signal is generated by the Phase Detector. This signal turns OFF Q15 : 2SC2458(Y) which turns OFF output amplifier Q18 : 2SC2668(Y) to prevent operation outside the authorized limits.

The PLL HET Oscillator, Q19 : 2SC2668(Y) oscillates at 39.48MHz. This signal is applied to frequency tripler Q22 : 2SC2688(Y) to obtain a signal of 118.44MHz which is applied to mixer Q21.

| Item | Symbol | Tc (°C) | Rating |
|----------------------|---------|---------|--------------|
| Operating voltage | Vcc | 25 | 17V |
| DC current | Icc | 25 | 14A |
| Operating case temp. | Tc (op) | | -30~ + 110°C |
| Storage temp. | Tstg | | -40~ + 110°C |

Table 5 M57726 Max. rating (TM-2550A/E Final unit Q1)

| Item | Symbol | Tc (°C) | Condition | Value | |
|------------------|--------|---------|---|-------|------|
| | | | | Min. | Typ. |
| Power output | Po | 25 | Vcc = 12.5V, F = 144~148MHz, PIN = 0.4W, ZL = ZG = 50Ω | 43W | 47W |
| Total efficiency | ηT | 25 | Vcc = 12.5V, F = 144~148MHz, PIN = 0.4W, ZL = ZG = 50Ω | 50% | 54% |

Table 6 M57726 Electrical characteristic

CIRCUIT DESCRIPTION

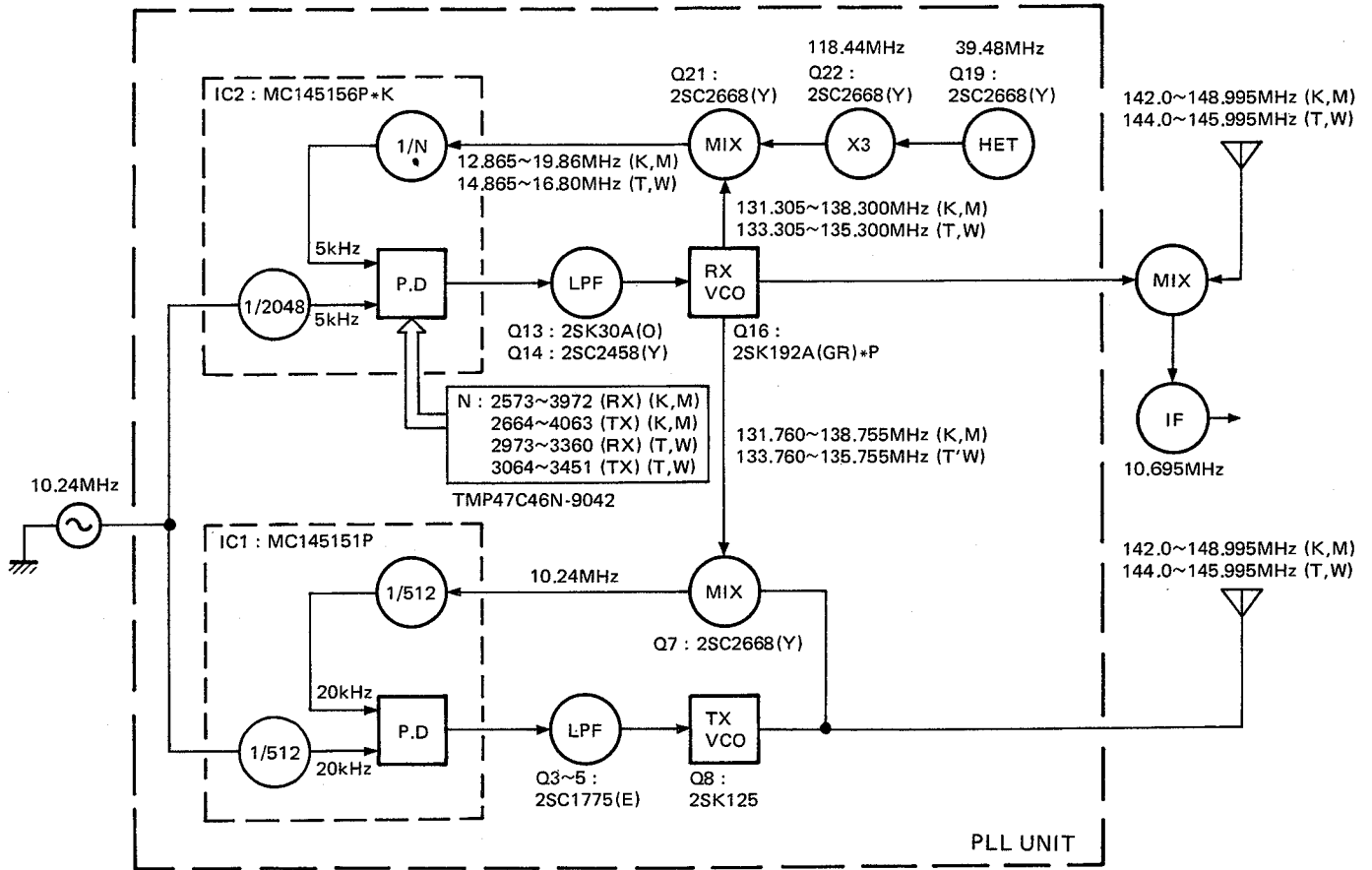


Fig. 8 Frequency-related block diagram

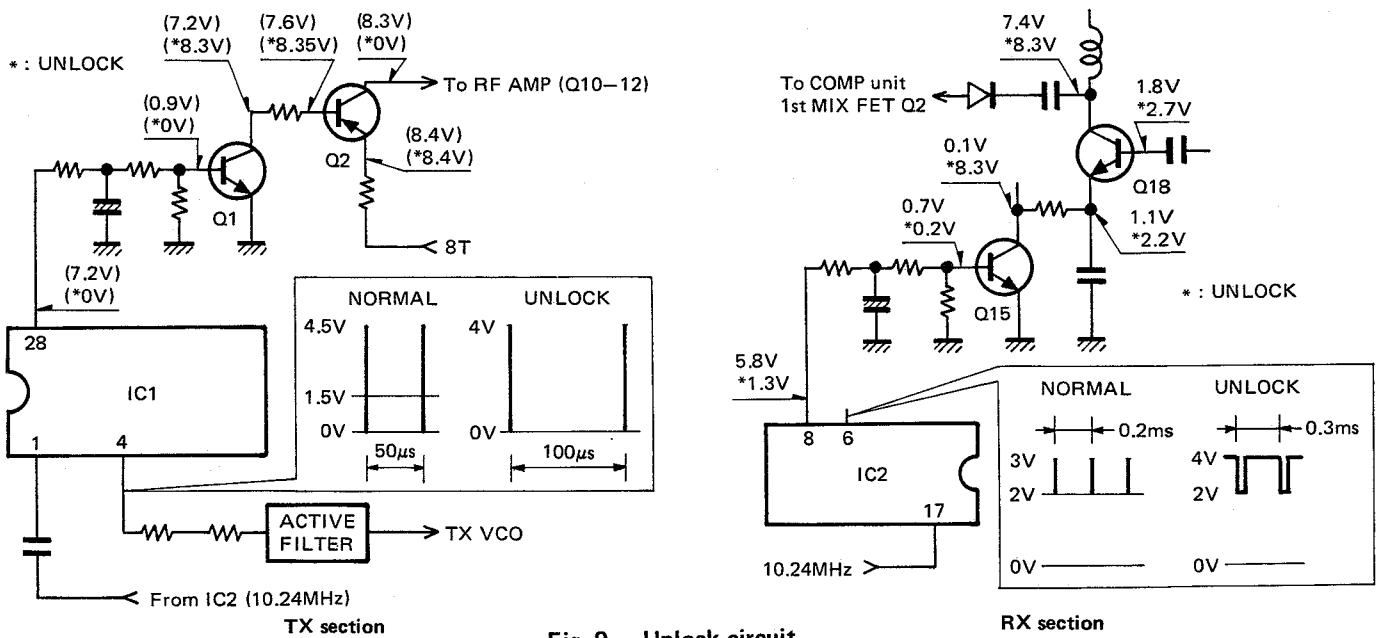


Fig. 9 Unlock circuit

CIRCUIT DESCRIPTION

CONTROL UNIT (X53-1440-XX)

The CONTROL unit uses two Microprocessors. the Main Microprocessor IC2 : TMP47C46N-9042 and Auxilliary Microprocessor IC3 : μ PD75008HC-056. Both utilize 4 bit architecture and have 4K Bytes of ROM available.

The Main Microprocessor controls; frequency, offset, tone, memory frequency, key, switch, encoder, frequency display, DCL system and the Auxilliary Microprocessor. The Auxilliary Microprocessor controls; the voice synthesizer, display/contrl/and memory for telephone number functions, tone frequencies (K,M), audio oscillator, and digital signal conversion and analysis processing for DCL system.

The Main Microprocessor utilizes a serial interface bus to the Auxilliary processor. A CMOS static RAM, IC6 : TC5047AP-1 with a capacity of 1K x 4 bits, is used for external memory storage of operator programmed data such as memory frequencies and telephone number data. It also functions as a data buffer when exchanging data between the Main and Auxilliary processors. Memory addressing is performed by IC5 : TC40H374P with read and write operations being handled by the Data Bus.

Switch Section

With a few exceptions most switch inputs on the front panel are arranged in a diode matrix. The Main Microprocessor reads the inputs via a keyboard status scan system. This system determines which key, if any, has been depressed.

The diode matrix is illustrated in Fig. 10.

The PHONE switch (K,M), P.MR switch (T,W) TONE switch, PTT switch, UP switch and DOWN switch all supply inputs directly to the Main Microprocessor.

Keyboard section

Fig. 11 illustrates the keyboard section circuit diagram. The keyboard receives scan pulses from the Main Microprocessor ports P10 thru P13. The current keyboard status is returned via ports R70 thru R73. Pull-up resistors of P10 thru P13 are controlled by port R90. Keyboard status is scanned when R90 is pulled up from logic low by Q3 : DTA114YF.

Display section

Fig. 11 shows the layout of the LCD.

The LCD driver (Keyboard ass'y) is controlled via 8 data lines and 4 control lines on a parallel bus system by the Main and Auxilliary microprocessors.

Data transfer is possible only when the CS line is Low and in conjunction with the leading edge of the WE pulse. The DCL and CQS LED's are lit by transistors Q4 and Q5 which are controlled by the Main Microprocessor.

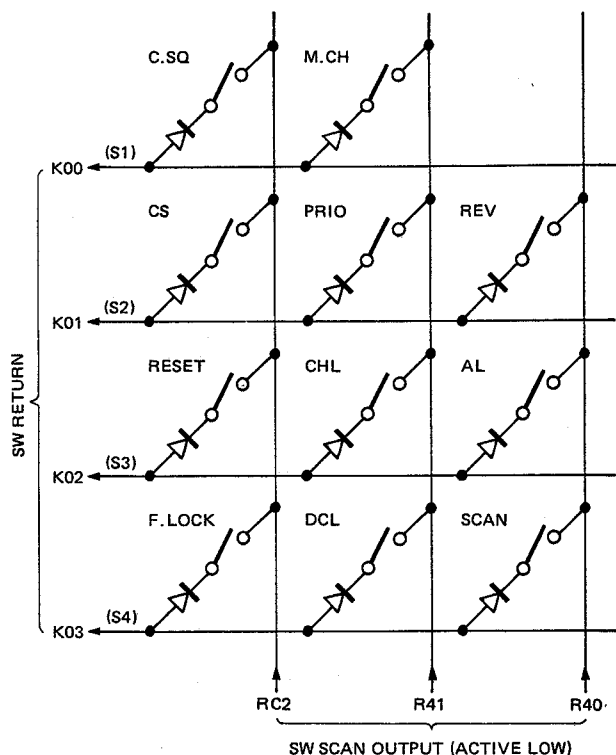


Fig. 10 Diode matrix

CIRCUIT DESCRIPTION

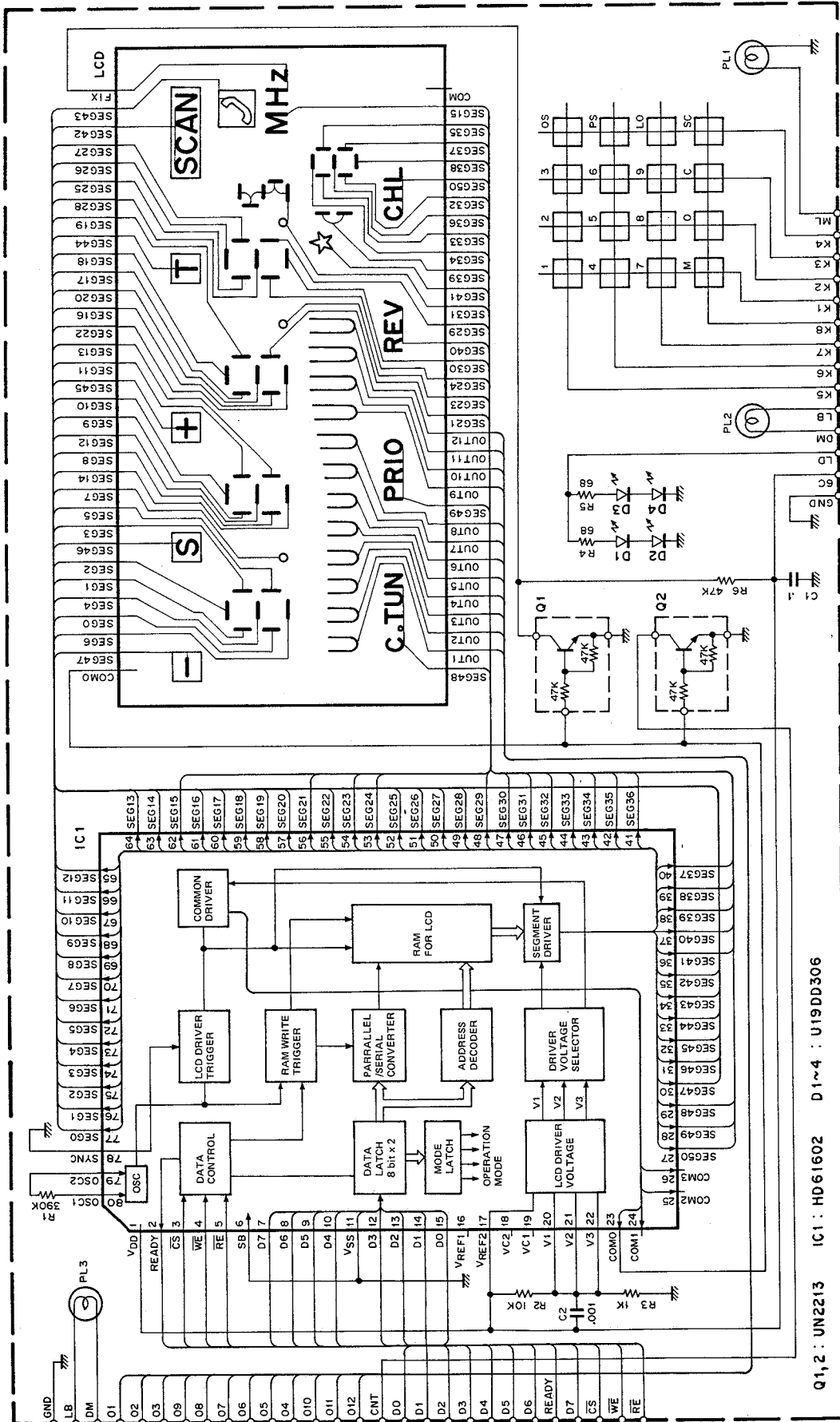


Fig. 11 Keyboard section circuit diagram

CIRCUIT DESCRIPTION

DTMF circuit (K,M Type)

The DTMF (Dual Tone Multiple Frequency) signal is generated by IC4 : LR4087 on the CONTROL unit. Power for the tone generator is obtained from the 8T (8 volts on transmit) line. During receive the IC is grounded preventing unwanted tone generation.

During transmit the non-exclusive port R90 is a logic High, causing pull-up resistors P10 thru P13 to open allowing the DTMF signals to be generated by pressing one of the keyboard keys.

During automatic transmission of telephone number information port R90 is a logic Low, connecting pull-up resistors P10 thru P13. P10 thru P13 apply a logic High, and P70 thru P73 a logic low, so that the desired DTMF signals are generated. While the DTMF signal is being generated IC4 (CONTROL unit) mutes the normal transmitted audio.

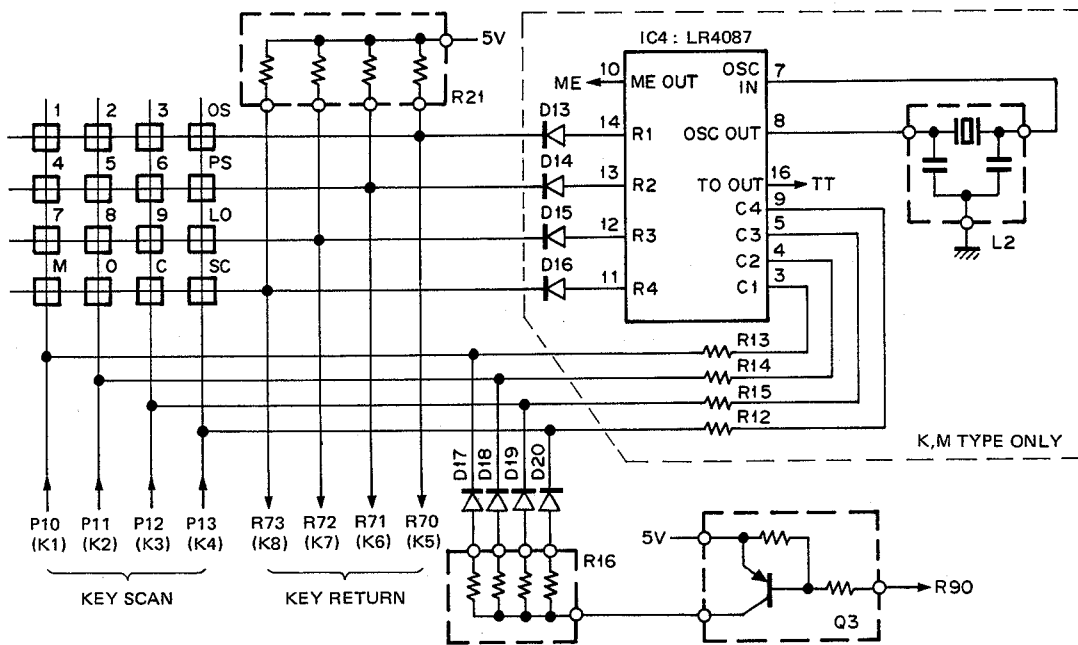


Fig. 12 DTMF circuit

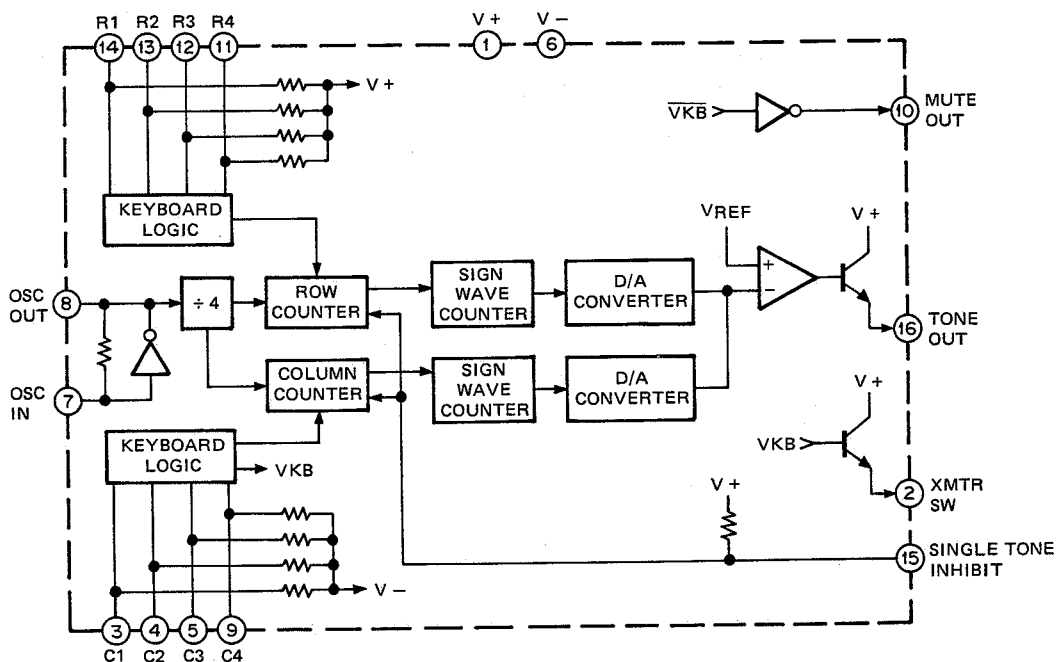


Fig.13 LR4087 Block diagram (Control unit IC4) K, M type only

CIRCUIT DESCRIPTION

PLL and Tone data (K,M type)

PLL and Tone data are sent from the Main Microprocessor on P30 and the Clock signal is on P33. Data and Clock signals are used concurrently. The Enable signal is transmitted on P21 for PLL data and on RC3 for tone data.

Audio Oscillator (CONTROL unit)

An audible confirmation of various keyboard inputs is provided by the TM-2530/50. This audio output is controlled via line P21 of the Auxilliary Microprocessor, IC3. The Oscillator is a portion of IC1 : MC14584BCP and its output is supplied to the COMPOUND unit via the BZ line.

Voice Synthesizer Control Section

The Main Microprocessor (IC2) analyzes inputs from the VOICE unit, and provides control information to the Auxilliary Microprocessor (IC3) necessary for processing the Voice data.

The Auxilliary Microprocessor provides control input and output via data lines PS0 thru PS4, SR and BY.

Rotary Encoder Section

Fig. 14 shows the encoder output waveforms. Waveform B is used as a reference. The phase of waveform A is compared with that of waveform B to determine if the dial base been turned clockwise or counterclockwise. A portion of IC1 is used as a Schmitt trigger to filter out any chattering of the encoder contacts. The inverted waveforms from IC1 are applied to the Main Microprocessor on pins RP0 and RP1, where the phase of the waveforms is compared. the number of input pulses is also counted by the microprocessor to determine how much of a frequency change has been ordered.

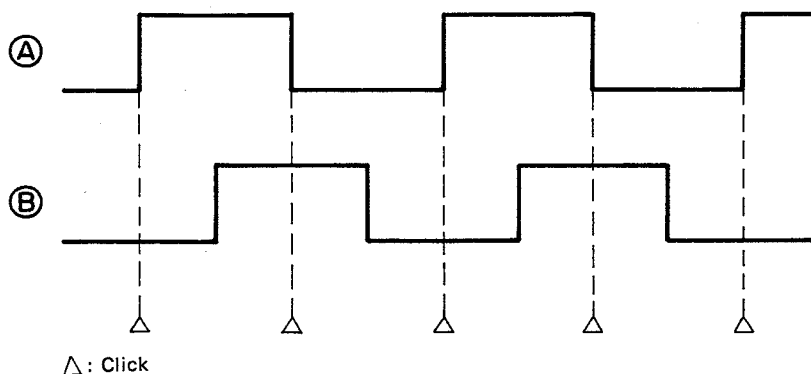


Fig. 14 Encoder output waveforms

Other Input and Output Sections

1) Standby or push-to-talk

PTT switch status is sent to the Main Microprocessor via the SS terminal on PS1. During manual or automatic transmission a logic Low is supplied on the RA2 line to the COMPOUND unit. This signal turns on the transmit voltage regulator and turns OFF the receive voltage regulator.

2) Microphone UP/DOWN switches

Any switch chattering (Keyboard) is filtered by C11 and C12 and the inputs from the UP and DOWN switch are applied to the Main Microprocessor on pins RB3 and RB2 for processing.

3) Busy indicator (BD)

A signal is supplied from the COMPOUND unit Center Tune circuit to the Main Microprocessor via pin RB2 to indicate when the radio has received an input and squelch has opened.

4) Microphone Muting

In order to prevent interference to the Digital signals transmitted when using the DCL system the microphone must be muted. This function is controlled by Auxilliary Microprocessor via pin P61.

5) Squelch Switch (SC)

The Main Microprocessor provides a signal to control the Squelch threshold level during Digital Channel Linkage operations. Specifically this occurs when the radio is scanning for an open channel. When the SC terminal is a logic low, VR3 of the COMPOUND unit is used to control the Squelch Threshold.

6) RX Audio Muting (AL)

The Main Microprocessor provides a logic High on P32 to mute the receive audio during Code Squelch operation, Open Channel search operations, and Priority channel scanning.

CIRCUIT DESCRIPTION

Resetting the Microprocessor

To reset the Main Microprocessor (return to the default settings) ground pin number 49 of the Main Microprocessor. This should normally only be required when replacing the Lithium battery.

The Auxilliary microprocessor is reset by a reset pulse from IC7 : PST520D.

NOTE 2 : The operating system of this radio is in NON-ERASEABLE memory in the microprocessors. Replacing/removing the battery will not require reprogramming of Operating System paramaters. Operator programmed information (telephone numbers, memory frequencies, etc.) will require reentry.

Memory backup

Transistor Q2 : 2SC2458(Y) and zener diode D3 : MTZ7.5JA sense when the voltage supplied to the DC power connector drops below approximately 7.5 Vdc from its normal 13.8 Vdc. If the supply voltage falls below this minimum a control signal is supplied to the HOLD terminal (pin 52) of the Main Microprocessor via a Schmitt trigger. The microprocessor then enters the backup mode and draws power from the Lithium battery.

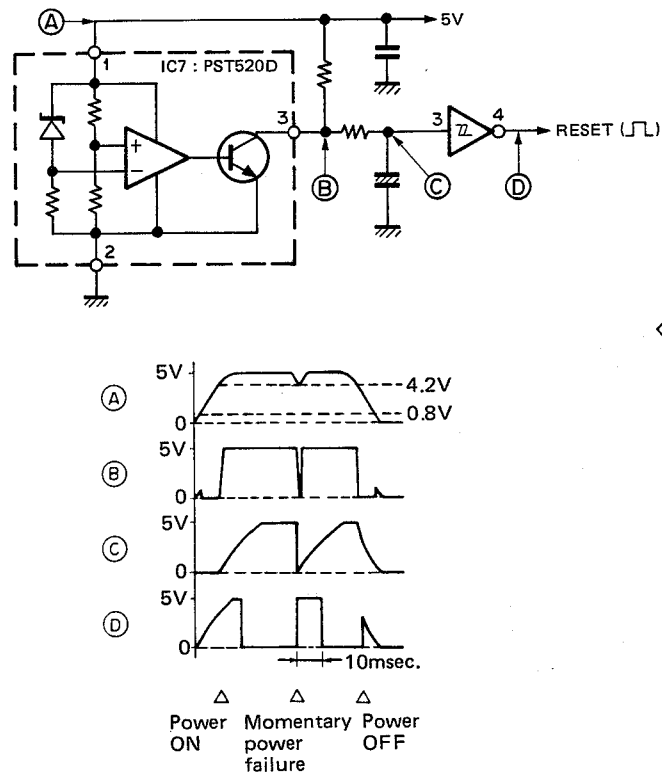


Fig. 15 Reset circuit and waveforms at respective points

DCL Contro System

A block diagram of the DCL control system is shown in Fig. 16

Control of Open Channel searching is performed by the Main Microprocessor. The microprocessor searches for an open channel by controlling the frequency of the receiver section. When an open channel is found the frequency data of that channel is stored into RAM and a control signal is applied to the Auxilliary microprocessor. The Auxilliary microprocessor takes this signal, reads the frequency data that was stored in the RAM, generates the Digital Control signal, and applies this data to the MODEM unit (X57-1140-20). The MODEM unit uses this incoming data to generate the MSK (Minimum Shift Keying) signal which is applied to the COMPOUND unit for transmission.

A portion of the incoming receive signal is applied to the RD terminal of the MODEM unit. The MODEM unit detects the prescence of any Digital Control signal and if present relays it to the Auxilliary Microprocessor.

The Auxilliary microprocessor compares the incoming DCL signal with the preprogrammed DCL data maintained in memory. If the signals are equal a request is made to transfer the incoming data into RAM. The Main microprocessor detects this transfer request and passes the data into RAM, and transmits a signal signifying data has been received, it sounds an audible alarm.

The Main microprocessor performs any frequency shifts or code squelch functions, determined by the incoming data.

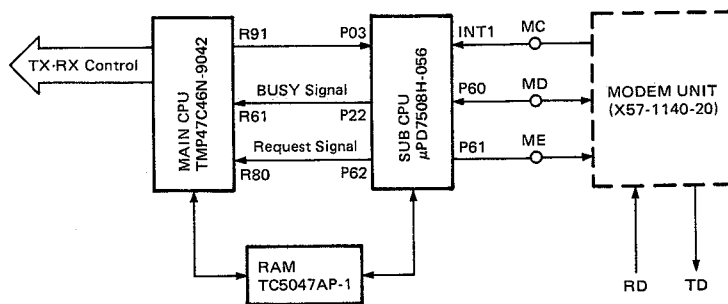


Fig. 16 DCL control system block diagram

CIRCUIT DESESCRIPTION

| Pin No. | Name | In/Out | Function | Logic | Pin No. | Name | In/Out | Function | Logic |
|---------|------|--------|--------------------------|-------|---------|-------|--------|---------------------------|-------|
| 1 | RD0 | I | Encoder E1 | | 33 | P20 | O | 1750Hz Tone Control (T,W) | |
| 2 | RD1 | I | Encoder E2 | | 34 | P21 | O | PLL Enable Signal | |
| 3 | R40 | I/O | Data Bus (D0) | | 35 | P22 | O | HD61602 RE Signal | |
| 4 | R41 | I/O | Data Bus (D1) | | 36 | P23 | O | HD61602 WR Signal | |
| 5 | R42 | I/O | Data Bus (D2) | | 37 | P30 | O | PLL (Tone) Data Output | |
| 6 | R43 | I/O | Data Bus (D3) | | 38 | P31 | O | Squelch Control Signal | |
| 7 | R50 | I/O | Data Bus (D4) | | 39 | P32 | O | Audio Mute Signal | |
| 8 | R51 | I/O | Data Bus (D5) | | 40 | P33 | O | PLL (Tone) Clock Output | |
| 9 | R52 | I/O | Data Bus (D6) | | 41 | RB0 | I | VOICE SW Input | |
| 10 | R53 | I/O | Data Bus (D7) | | 42 | RB1 | I | PHONE (K,M) SW input | |
| 11 | R60 | I | HD61602 READY Signal | | | | | P.MR (T,W) SW input | |
| 12 | R61 | I | SUB CPU Busy Signal | | 43 | RB2 | I | MIC Down SW Input | |
| 13 | R62 | I | Busy Signal | | 44 | RB3 | I | MIC Up SW Input | |
| 14 | R63 | I | Tone SW Input | | 45 | K00 | I | SW Return (S1) | |
| 15 | R70 | I | 16 Key Return (K1) | | 46 | K01 | I | SW Return (S2) | |
| 16 | R71 | I | 16 Key Return (K2) | | 47 | K02 | I | SW Return (S3) | |
| 17 | R72 | I | 16 Key Return (K3) | | 48 | K03 | I | SW Return (S4) | |
| 18 | R73 | I | 16 Key Return (K4) | | 49 | RESET | | Reset Input | |
| 19 | RA0 | O | Memory Lamp | | 50 | Xin | | Clock | |
| 20 | RA1 | O | RAM OD Signal Output | | 51 | Xout | | Clock | |
| 21 | RA2 | O | Standby Signal Output | | 52 | HOLD | | Back up Information Input | |
| 22 | RA3 | O | RAM A8 Signal Output | | 53 | R80 | I | SUB CPU Request Signal | |
| 23 | P00 | O | Address Latch | | 54 | R81 | I | PTT SW Input | |
| 24 | P01 | O | RAM CE1 Signal Output | | 55 | R82 | I | DCL Diode Matrix Input | |
| 25 | P02 | O | HD61602 CS Signal Output | | 56 | R83 | I | SCAN Timer Trigger pulse | |
| 26 | P03 | O | RAM CE2 Signal Output | | 57 | R90 | O | Keyboard select | |
| 27 | P10 | O | 16 Key Scan (K5) | | 58 | R91 | O | Serial Data Output | |
| 28 | P11 | O | 16 Key Scan (K6) | | 59 | R92 | O | Serial Clock Output | |
| 29 | P12 | O | 16 Key Scan (K7) | | 60 | RC0 | O | LED (DCL) Control | |
| 30 | P13 | O | 16 Key Scan (K8) | | 61 | RC1 | O | LED (C.SQ) Control | |
| 31 | TEST | | GND | | 62 | RC2 | O | SW Scan | |
| 32 | Vss | | GND | | 63 | RC3 | O | Tone DATA LOAD Signal | |
| | | | | | 64 | VDD | | Power Supply | |

Table 7 TMP47C46N-9042 Terminal functions (Control unit IC2)

| Pin No. | Name | In/Out | Function | Logic | Pin No. | Name | In/Out | Function | Logic |
|---------|-------|--------|--------------------------|-------|---------|-------|--------|-------------------------|-------|
| 1 | 00OUT | | Open | | 21 | CL2 | | Clock | |
| 2 | P20 | O | VS-1 PS4 | | 22 | INT1 | I | Modem Clock Input | |
| 3 | P21 | O | "Beeper" Switching | | 23 | P00 | I | Backup Clock Input | |
| 4 | P22 | O | MAIN CPU Busy Signal | | 24 | P01 | I | Serial Clock Input | |
| 5 | P23 | O | VS-1 SR | | 25 | P02 | | Open | |
| 6 | P10 | O | Adress Latch | | 26 | P03 | I | Serial Data Input | |
| 7 | P11 | | | | 27 | P60 | I/O | Modem Data Input/Output | |
| 8 | P12 | I | HD61602 READY Signal | | 28 | P61 | O | Modem Me Signal Output | |
| 9 | P13 | O | VS-1 BY | | 29 | P62 | O | MAIN CPU Request Signal | |
| 10 | P30 | O | VS-1 PSO | | 30 | P63 | O | RAM A8 Signal Output | |
| 11 | P31 | O | VS-1 PS1 | | 31 | P50 | I/O | DATA BUS (D0) | |
| 12 | P32 | O | VS-1 PS2 | | 32 | P51 | I/O | DATA BUS (D1) | |
| 13 | P33 | O | VS-1 PS3 | | 33 | P52 | I/O | DATA BUS (D2) | |
| 14 | P70 | O | RAM OD Signal Output | | 34 | P53 | I/O | DATA BUS (D3) | |
| 15 | P71 | O | HD61602 CS Signal Output | | 35 | P40 | I/O | DATA BUS (D4) | |
| 16 | P72 | O | RAM and HD61602 R/W | | 36 | P41 | I/O | DATA BUS (D5) | |
| 17 | P73 | O | RAM CS1 Signal Output | | 37 | P42 | I/O | DATA BUS (D6) | |
| 18 | RESET | | Reset Input | | 38 | P43 | I/O | DATA BUS (D7) | |
| 19 | CL1 | | Clock | | 39 | Vss | | GND | |
| 20 | VDD | | Power Supply | | 40 | EVENT | | GND | |

Table 8 μPD7508H-056 Terminal functions (Control unit IC3)

CIRCUIT DESCRIPTION

TONE unit (X52-1330-20)

Incoming serial data from the Control unit is converted to parallel data by IC2 : MB88306. Serial data on the DT line, and the serial clock is on the CT line. When the ET terminal is high data is transferred, the tone output can be disabled by setting D1 to logic low. This can also be done by switching the ME terminal high.

IC1 : S7116A prevents the tone generator from oscillating outside the specified limits.

MODEM unit (X57-1140-20)

The modem Q3 : μ PD65003C-20 uses a clock frequency of 3.6864MHz that is supplied across pins 18 and 19. Pin 13 is used to select transmit or receive operation of the modem. Transmit is selected when pin 13 is high, and receive when it is low. Pin 12 supplies the modem clock (1200Hz) to the MC terminal for transmit and receive clock timing purposes. Data transfers are based on this clock timing. When the transmit mode has been selected data is transferred to pins 1 thru 5 to produce the 1200 or 1800Hz MSK signal. This signal is then digital to analog converted by a ladder resistor network and applied to the TD terminal.

When the MODEM unit is in the receive mode it processes the signal applied to pin 9. This digitized Audio Frequency signal is received from the RD terminal after passing thru a band-pass filter and comparator circuit. This signal is converted by the MODEM unit and transferred thru pin 7, shaped by the LPF and comparator and applied again to pin 8.

The receive data and clock signal that are generated by the modem are based on the data applied to pins 12 and 14.

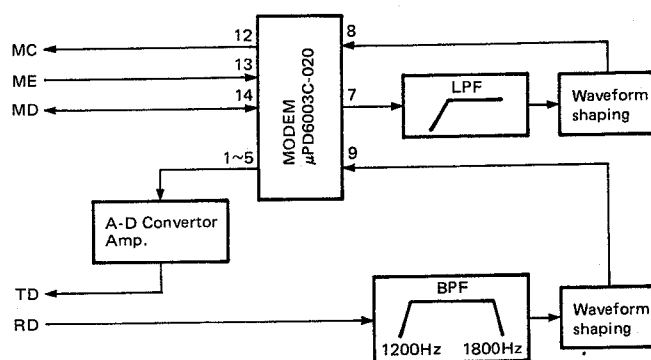


Fig. 17 MODEM unit (X57-1140-20) block diagram

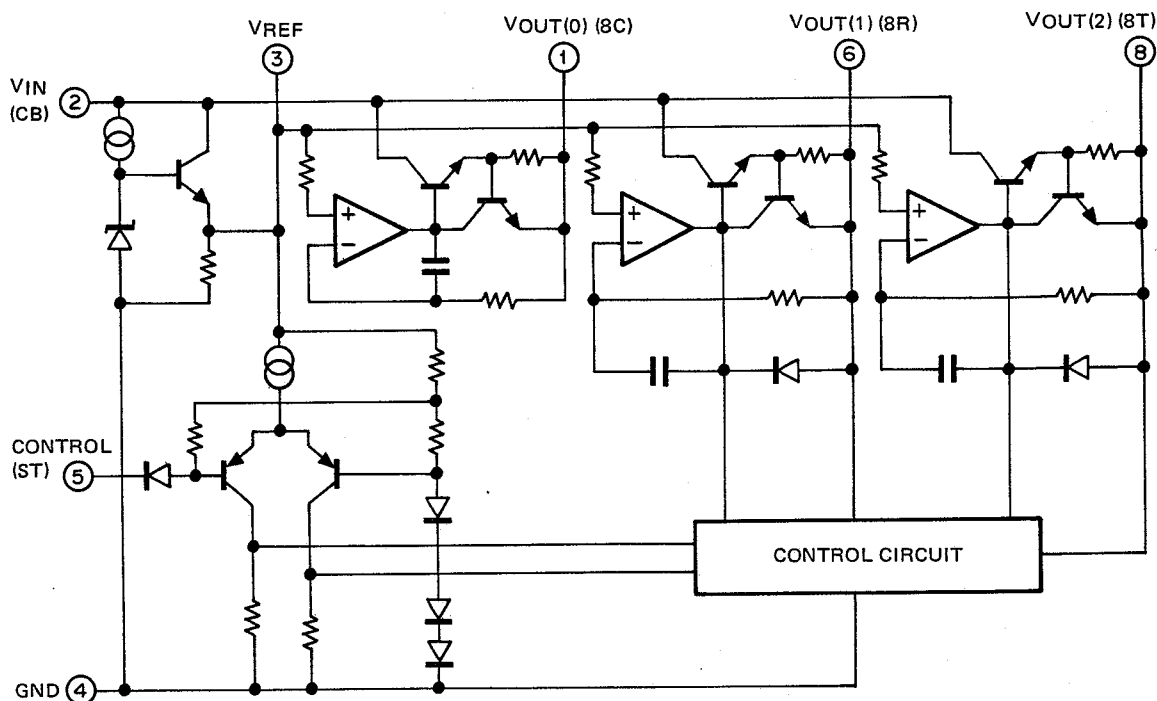


Fig. 18 MB3756 Equivalent circuit (COMP unit IC3)

CIRCUIT DESCRIPTION

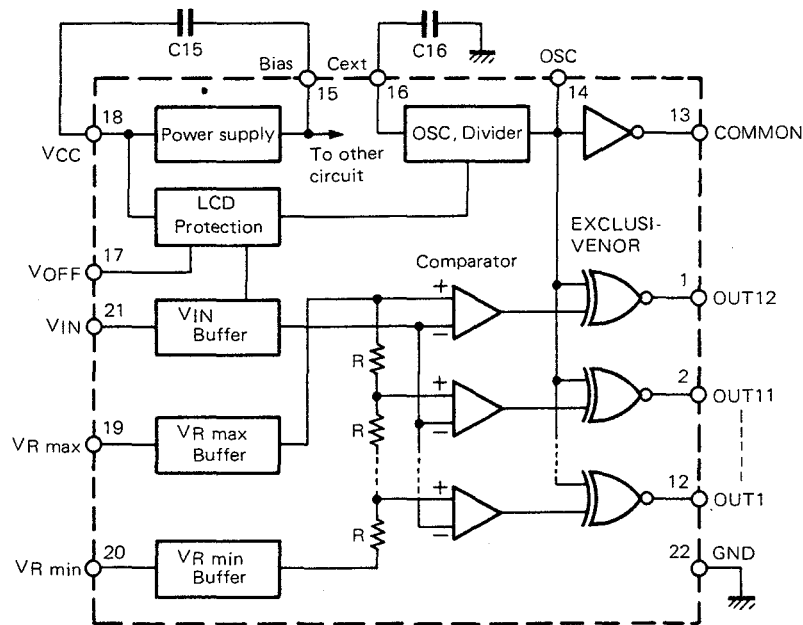


Fig. 19 IR2429 Block diagram (Display unit IC1)

| Pin No. | Pin Name | I/O | Pull U/D | Part Name | Pin No. | Pin Name | I/O | Pull U/D | Remarks |
|---------|----------|-----|----------|--------------|---------|----------|-----|----------|--|
| 3 | S10 | O | - | LCD | 10 | | | | Level meter segment output |
| 5 | S8 | | | | 8 | | | | |
| 7 | S6 | | | | 6 | | | | |
| 8 | S5 | | | | 5 | | | | |
| 9 | S4 | | | | 4 | | | | |
| 10 | S3 | | | | 3 | | | | |
| 11 | S2 | | | | 2 | | | | |
| 12 | S1 | 1 | | | | | | | |
| 15 | BIAS | | - | | | | | | Prevents C12 oscillation |
| 16 | C | | - | GND | | | | | External clock is used; C is grounded. |
| 18 | VCC | I | - | Connector J6 | 8C2 | | I | | 8V power supply |
| 19 | VREF-MAX | | | | | | | | Determines level 10 voltage value. |
| 20 | VREF-MIN | | | GND | | | I | | Determines level 1 voltage value. |
| 21 | VIN | | D R21 | Connector J6 | M | | I | | Meter input (DC) |
| 22 | GND | | - | GND | | | | | GND pin |

Note: Pins not specified must remain open.

Table 9 IR2429 Terminal functions

PARTS LIST

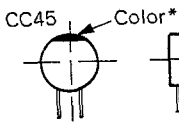
CAPACITORS

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 |



• 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

| 2nd Word | G | H | J | K | L |
|----------|------|------|-------|-------|-------|
| ppm/°C | ± 30 | ± 60 | ± 120 | ± 250 | ± 500 |

Example CC45TH = -470 ± 60 ppm/°C

• Tolerance

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

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

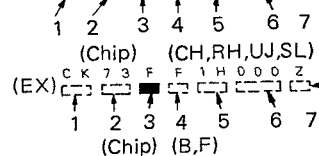
Less than 10 pF

• Rating voltage

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

• Chip capacitors

(EX) CC 73 F S L 1 H 0 0 0 J → Refer to the above table.



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 |

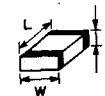
Dimension

| 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 |

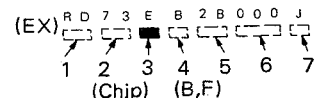
Rating wattage

| 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 | | | | |

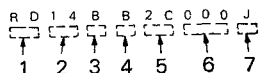
Dimension



• Chip resistor (Carbon)



• Carbon resistor (Normal type)



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

PARTS LIST

SEMICONDUCTOR

N : New parts

* : Please note that parts are sometimes not in stock and it takes much time to deliver.

| Item | Re- marks | Part No. | |
|-------------------|--------------------|---|---|
| Diode | | 1N60 1N60A 1N4448 | |
| | | 1S1555 1S1587 1S2208 1SS106 1SS133 | |
| | | MA856 MC911 MC921 MI308 MI407 | |
| | | U15B UM9401 | |
| | Chip diode | N | 1SS181 |
| | | N | 1SS184 |
| | Vari-cap | | 1SV50 |
| | Zener diode | | MTZ5.6JC MTZ6.2JA MTZ7.5JA MTZ11JC |
| | LED | N | LN38GPL LN222RP LN322GP LN442YP |
| | | N | U19DD306 |
| N | | FSS8066 | |
| Thermister | | 112-502-2 | |
| TR | N | 2SA790(A) 2SA1015(Y) 2SA1048(Y) | |
| | | 2SC496(Y) 2SC1775(E) 2SC2347 2SC2458(Y) 2SC2538-22-A 2SC2668(Y) 2SC3019 | |

| Item | Re- marks | Part No. |
|---------------------|--------------|--|
| Chip TR | | 2SD1406(Y) 2SC2712(BL) 2SC2712(K) 2SC2712(Y) 2SC2714(Y) 2SC3295(B) |
| | | DTA114YF DTC114ES DTC124EF DTC143TS |
| | N | UN2213 |
| FET | | 2SK30A(O) 2SK125 2SK192A(GR)*P |
| | | 3SK74(L) 3SK129(S) |
| Power module | | M57726 M57737 |
| IC | N | HD61602 IR2429 LR4087 |
| | | MB3756 MC14584BCP MC145151P MC145155P*K NE555P NJM78M06A NJM4558M PST520D |
| | N | TA7761P TC40H374P TC5047AP-1 TMP47C46N-9042 |
| | N | μPC1241H μPD7508HC-056 |

| | TM-2550A (K1,M1,M3) | TM-2550E (T,W) | TM-2530A (K2,M2,M4) |
|---------------|---------------------|-----------------|---------------------|
| FINAL UNIT | X45-1440-10 | X45-1440-10 | X45-1440-11 |
| PLL UNIT | X50-2030-10 | X50-2030-51 | X50-2030-11 |
| CONTROL UNIT | X53-1440-10 (K1,M1) | X53-1440-51 (T) | X53-1440-10 (K2,M2) |
| | X53-1440-21 (M3) | X53-1440-61 (W) | X53-1440-21 (M4) |
| DISPLAY UNIT | X54-1860-10 | X54-1860-10 | X54-1860-10 |
| COMPOUND UNIT | X60-1280-10 | X60-1280-51 | X60-1280-10 |

PARTS LIST

× New Parts

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕 向 |
|-------------------------------------|---------------|-------------------|-------------------|-----------------------------------|-------------------------|
| TM-2550A/E, TM-2530A GENERAL | | | | | |
| 1 | 1G, 2F | * | A01-0996-02 | METALLIC CABINET (TOP) | K1, K2, M1-M4 T1, W1 |
| 2 | 3G | * | A01-0997-02 | METALLIC CABINET (BOTTOM) | |
| 3 | 2B, 3F | * | A20-2550-03 | PANEL ASSY | |
| 3 | 2B | * | A20-2559-03 | PANEL ASSY | |
| 4 | 2A | * | A21-0791-04 | DRESSING PANEL (KEYBOARD) | |
| 5 | 2A | * | A21-0795-04 | DRESSING PANEL (DCL) | |
| - | | * | A13-0666-02 | MOUNTAIN BRACKET ASSY (R) ACSY | |
| - | | * | A13-0667-02 | MOUNTAIN BRACKET ASSY (L) ACSY | |
| - | | * | A13-0668-04 | MOUNTAIN HARDWARE | |
| | | * | B11-0436-04 | REFLECTION GLASS (DCS, CSQ) | |
| 10 | 2F, 2G | * | B01-0655-03 | SIDE ESCUTCHEON | |
| 11 | 1F | * | B04-0411-04 | SP METAL | |
| 12 | 1F | * | B05-0708-04 | SP SARAN NET | |
| 13 | 2F | * | B10-0675-04 | FRONT GLASS | |
| 14 | 3G | * | B40-3610-04 | MODEL NAME PLATE | K1, M1, M3 |
| 14 | 3G | * | B40-3611-04 | MODEL NAME PLATE | T1, W1 |
| 14 | 3G | * | B40-3619-04 | MODEL NAME PLATE | K2, M2, M4 |
| 15 | 2A | * | B43-1057-04 | BADGE | K1, M1, M3 |
| 15 | 2A | * | B43-1058-04 | BADGE | T1 |
| 15 | 2A | * | B43-1059-04 | BADGE | W1 |
| 15 | 2A | * | B43-1060-04 | BADGE | K2, M2, M4 |
| - | | * | B11-0429-04 | LIGHT GUIDING PLATE (AL) | |
| - | | * | B11-0430-04 | LIGHT GUIDING PLATE (P. MR) | T1, W1 |
| - | | * | B11-0431-04 | LIGHT GUIDING PLATE (F. LOCK) | |
| - | | * | B11-0432-04 | LIGHT GUIDING PLATE (PHONE) | K1, K2, M1-M4 |
| - | | * | B11-0433-04 | LIGHT GUIDING PLATE (MAIN) | |
| - | | * | B11-0434-04 | REFLECTION GLASS (ON AIR/F. LOCK) | |
| - | | * | B46-0410-00 | WARRANTY CARD | K1, K2 |
| - | | * | B50-8039-00 | INSTRUCTION MANUAL | K1, K2, M1-M4, W1 |
| - | | * | B50-8040-00 | INSTRUCTION MANUAL | T1 |
| - | | * | E30-2022-15 | DC CORD ASSY (ACSY) | |
| 20 | 2G | | F10-1206-04 | GROUNDING SPRING | |
| 21 | 1C | | F15-0649-04 | SHADE SHEET (KEYBOARD PCB) | |
| - | | | F05-1031-05 | FUSE (10A) ACSY | K1, M1, M3, T1, W1 |
| - | | | F05-8021-05 | FUSE (8A) ACSY | K2, M2, M4 |
| - | | | F20-0521-04 | INSULATE PLATE (B) LITHIUM BTRY | |
| 26 | | | G01-0818-04 | COMPRESSION SPRING (KNOB) | |
| 27 | | | G02-0505-05 | KNOB FITTING SPRING (AF/SQ) | |
| 28 | 1C | * | G10-0642-04 | SHADE CLOTH | |
| - | | * | G11-0616-04 | SHADE SHEET (F. LOCK) | |
| - | | * | G13-0823-04 | CUSHION (MOUNTING BRACKET ACSY) | |
| - | | * | H01-4671-03 | ITEM CARTON BOX (INSIDE) | K1, M1, M3 |
| - | | * | H01-4672-03 | ITEM CARTON BOX (INSIDE) | T1 |
| - | | * | H01-4673-03 | ITEM CARTON BOX (INSIDE) | W1 |
| - | | * | H01-4674-03 | ITEM CARTON BOX (INSIDE) | K2, M2, M4 |
| - | | * | H03-2268-04 | OUTER PACKING CASE | K1, M1, M3 |
| - | | * | H03-2269-04 | OUTER PACKING CASE | T1, W1 |
| - | | * | H03-2270-04 | OUTER PACKING CASE | K2, M2, M4 |
| - | | * | H10-2501-03 | POLYSTYRENE FOAMED FIXTURE | |
| - | | * | H10-2608-02 | POLYSTYRENE FOAMED FIXTURE | K1, M1, M3, T1, W1 |
| - | | * | H10-2609-02 | POLYSTYRENE FOAMED FIXTURE | K2, M2, M4 |

PARTS LIST

※ New Parts

Parts without Parts No. are not supplied.

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

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕 向 |
|---|---------------|-------------------|-------------------|---------------------------------|-------------------------|
| - | | | H25-0029-04 | PROTECTION BAG (SCREW,NUT ETC) | |
| - | | | H25-0103-04 | PROTECTION BAG (MIC,MNT BRKT) | |
| - | | | H25-0106-04 | PROTECTION BAG | |
| - | | | H25-0116-04 | PROTECTION BAG (ACSY) | |
| - | | | H25-0117-04 | PROTECTION BAG (DC CORD) | |
| 33 | 1F | | J21-1144-24 | SP MOUNTING HARDWARE (KEY/PC) | |
| 34 | 1C | * | J21-4182-04 | MOUNTING HARDWARE | |
| 35 | 1B,2B | | J29-0409-04 | SW KNOBS GUIDE (KNOB) | |
| - | | | J02-0439-05 | FOOT (ACSY) | |
| - | | | J19-1346-04 | MIC HOOK (ACSY) | |
| - | | | J61-0408-05 | WIRE BAND | |
| 40 | 3F | * | K21-0779-05 | KNOB (MAIN) | |
| 41 | 3F | * | K23-0779-04 | KNOB (AF,SO) | |
| 42 | 2A | * | K29-3039-05 | KNOB ASSY (PUSH SW) | |
| 43 | 2A | * | K29-3044-05 | KNOB ASSY (TACT SW) | |
| 45 | | | N14-0526-14 | ROUND NUT (VSL) | |
| - | | | N09-0008-04 | HEX HEAD SCREW (ACSY) | |
| - | | | N09-0632-05 | TAPTITE SCREW (ACSY) | |
| - | | | N14-0510-04 | FLANGE NUT (ACSY) | |
| - | | | N15-1040-45 | FLAT WASHER | |
| - | | | N15-1060-46 | FLAT WASHER (ACSY) | |
| - | | | N16-0060-46 | SPRING WASHER (ACSY) | |
| - | | | N87-4008-41 | BRAZIER TAPTITE SCREW (ACSY) | |
| - | | | N99-0304-04 | SCREW WITH HEX HOLE (MNT BRKT) | |
| D | | | N09-0697-05 | SEMUS SCREW (PANEL) | |
| K | | | N29-0301-04 | STOPPER RING (TACT KNOB) | |
| - | | | S50-1406-05 | TAKT SW FOR MICROPHONE(UP/DOWN) | |
| 48 | 1F | * | T07-0240-05 | LOUDSPEAKER(FULL RANGE) | |
| - | | | T91-0331-05 | MICROPHONE (ACSY) | K1,K2,M1-M4,W1 |
| - | | | T91-0335-05 | MICROPHONE (ACSY) | T1 |
| 50 | 1C | * | W02-0371-05 | ROTARY ENCODER | |
| - | | | W01-0401-05 | HEX WRENCH (ACSY) | |
| - | | | W09-0326-05 | LITHIUM BATTERY(BR2032) | |
| 55 | 2D,2G | | X45-1440-10 | FINAL UNIT (TM-2550A/E) | K1,M1,M3,T1,W1 |
| 55 | 2D,2G | * | X45-1440-11 | FINAL UNIT (TM-2530A) | K2,M2,M4 |
| 56 | 2G | * | X50-2030-10 | PLL UNIT (TM-2550A) | K1,M1,M3 |
| 56 | 2G | * | X50-2030-11 | PLL UNIT (TM-2530A) | K2,M2,M4 |
| 56 | 2G | * | X50-2030-51 | PLL UNIT (TM-2550E) | T1,W1 |
| 57 | 3F | * | X53-1440-10 | CONTROL UNIT | K1,K2,M1,M2- |
| 57 | 3F | * | X53-1440-21 | CONTROL UNIT | M3,M4 |
| 57 | 3F | * | X53-1440-51 | CONTROL UNIT | T1 |
| 57 | 3F | * | X53-1440-61 | CONTROL UNIT | W1 |
| 58 | 1B,1C | * | X54-1860-10 | DISPLAY UNIT | |
| 59 | 2G | * | X60-1280-10 | COMPOUND UNIT | K1,K2,M1-M4 |
| 59 | 2G | * | X60-1280-51 | COMPOUND UNIT | T1,W1 |
| FINAL UNIT (X45-1440-XX) -10 : K1,M1,M3,T1,W1 -11 : K2,M2,M4 | | | | | |
| C1 | | | CC45SL2H080D | CERAMIC 8.0PF D | K2,M2,M4 |
| C2 | | | CC45SL2H150J | CERAMIC 15PF J | |
| C3 | | | CC45SL2H050C | CERAMIC 5.0PF C | K1,M1,M3,T1,W1 |
| C3 | | | CC45SL2H060D | CERAMIC 6.0PF D | K2,M2,M4 |
| C4 | | | CK45B2H102K | CERAMIC 1000PF K | |

PARTS LIST

× New Parts

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕 向 |
|------------------|---------------|-------------------|-------------------|----------------------------|-------------------------|
| C5 | | | CC45SL2H220J | CERAMIC 22PF J | |
| C6 | | | CC45CH2H010C | CERAMIC 1.0PF C | |
| C7 -9 | | | CC45SL2H220J | CERAMIC 22PF J | |
| C10 | | | CC45CH1H010C | CERAMIC 1.0PF C | |
| C11 ,12 | | | CC45SL2H100D | CERAMIC 10PF D | |
| C13 | | | CE04W1C220M | ELECTRO 22UF 16WV | |
| C14 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C15 | | | CE04W1C220M | ELECTRO 22UF 16WV | |
| C16 -19 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C21 -25 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C26 | | | CS15E1C3R3M | TANTAL 3.3UF 16WV | |
| C27 | | | C91-0667-05 | CERAMIC 0.0047UF K | |
| C28 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C29 | | | C91-0667-05 | CERAMIC 0.0047UF K | |
| C30 -34 | | | CK45B1H102K | CERAMIC 1000PF K | |
| 100 | 3E | | E04-0161-05 | M TYPE RECEPTACLE | |
| 101 | 2D | | E11-0401-05 | EAR PHONE JACK | |
| 102 | 3D,2G | | E30-2021-25 | POWER SUPPLY CORD | |
| 105 | 2E,1G | * | F01-0931-05 | HEAT SINK | K1,M1,M3,T1,W1 |
| 105 | 2E,1G | * | F01-0935-05 | HEAT SINK | K2,M2,M4 |
| F1 | | | F05-1031-05 | FUSE (10A) | K1,M1,M3,T1,W1 |
| F1 | | | F05-8021-05 | FUSE (8A) | K2,M2,M4 |
| 108 | 1D | * | J11-0409-05 | WIRE CLAMPER | |
| 109 | 3D | | J41-0017-05 | BUSHING (CORD) | |
| L1 | | | L34-1020-05 | COIL (ø3,3.5) | |
| L2 | | | L34-0908-05 | COIL (ø3,3.5T) | |
| L3 | | | L34-0692-05 | COIL (ø5,4T) | |
| L4 | | | L34-0452-05 | COIL (ø3,6T) | |
| L5 | | | L34-0908-05 | COIL (ø3,3.5T) | |
| L6 | | | L34-0742-05 | COIL (ø3,5T) | |
| L7 | | | L34-0823-05 | COIL (ø5,3T) | |
| L8 ,9 | | | L40-1092-14 | SMALL FIXED INDUCTOR (1UH) | |
| M | | | N09-0623-04 | SCREW (SEMUSE) | |
| N | | | N09-0626-04 | SCREW (SEMUSE) | |
| R2 | | | R92-0150-05 | JUMPER REST 0 OHM | |
| R2 | | | RD14DB2H151J | SMALL-RD 150 J 1/2W | K1,M1,M3,T1,W1 |
| VR1 | | | RD14DB2H181J | SMALL-RD 180 J 1/2W | K2,M2,M4 |
| VR2 | | | R12-0434-05 | TRIMMING POT. (100OHM) | |
| | | | R12-4417-05 | TRIMMING POT. (50KOHM) | |
| VR3 | | | R12-3455-05 | TRIMMING POT. (10KOHM) | |
| VR4 | | | R12-4417-05 | TRIMMING POT. (50KOHM) | |
| D1 | | | U15B | DIODE | |
| D2 | | | MI407 | DIODE | K2,M2,M4 |
| D2 | | | UM7401 | DIODE | K1,M1,M3,T1,W1 |
| D3 | | | MI308 | DIODE | |
| D4 ,5 | | | 1S1587 | DIODE | |
| Q1 | | | M57726 | POWER MODULE | K1,M1,M3,T1,W1 |
| Q1 | | | M57737 | POWER MODULE | K2,M2,M4 |
| Q2 | | | 2SD1406(Y) | TRANSISTOR | |
| Q3 | | | 2SA1015(Y) | TRANSISTOR | |
| Q4 -7 | | | 2SC2458(Y) | TRANSISTOR | |

PARTS LIST

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|---|---------------|-------------------|-------------------|-------------------------|-------------------------|
| PLL UNIT (X50-2030-XX) -10 : K1,M1,M3 -11 : K2,M2,M4 -51 : T1,W1 | | | | | |
| C1 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C2 | | | CS15E1VR47M | TANTAL | 0.47UF 35WV |
| C4 | | | CF92V1H683J | MF | 0.068UF J |
| C5 | | | C91-1008-05 | CERAMIC | 0.011UF K |
| C6 ,7 | | | CS15E1C2R2M | TANTAL | 2.2UF 16WV |
| C8 | | | CQ92M1H393K | MYLAR | 0.039UF K |
| C9 ,10 | | | CS15E1E010M | TANTAL | 1.0UF 25WV |
| C11 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C12 | | | CC45CH1H150J | CERAMIC | 15PF J |
| C13 | | | CC45CH1H0R5C | CERAMIC | 0.5PF C |
| C14 | | | CC45CH1H100D | CERAMIC | 10PF D |
| C15 | | | CC45CH1H080D | CERAMIC | 8.0PF D |
| C16 | | | CC45CH1H030C | CERAMIC | 3.0PF C |
| C17 | | | CC45CH1H100D | CERAMIC | 10PF D |
| C18 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C19 | | | CE04W1A470M | ELECTRØ | 47UF 10WV |
| C20 | | | CC45CH1H020C | CERAMIC | 2.0PF C |
| C21 | | | CC45CH1H040C | CERAMIC | 4.0PF C |
| C22 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C23 | | | CE04W1A470M | ELECTRØ | 47UF 10WV |
| C24 | | | CC45CH1H330J | CERAMIC | 33PF J |
| C25 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C26 | | | CE04W1A470M | ELECTRØ | 47UF 10WV |
| C27 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C28 ,29 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C30 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C31 ,32 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C33 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C35 | | | CE04W1C100M | ELECTRØ | 10UF 16WV |
| C36 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C37 ,38 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C39 ,40 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C41 | | | CE04W1H4R7M | ELECTRØ | 4.7UF 50WV |
| C42 | | | C91-0667-05 | CERAMIC | 0.0047UF K |
| C43 | | | CK45B1H471K | CERAMIC | 470PF K |
| C44 | | | CC45CH1H270J | CERAMIC | 27PF J |
| C46 | | | CC45CH1H020C | CERAMIC | 2.0PF C |
| C47 | | | C91-0765-05 | CERAMIC | 0.0047UF M |
| C48 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C50 | | | CQ92M1H223K | MYLAR | 0.022UF K |
| C51 ,52 | | | CS15E1C2R2M | TANTAL | 2.2UF 16WV |
| C53 | | | CE04W1A470M | ELECTRØ | 47UF 10WV |
| C54 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C55 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C57 | | | CE04W1A470M | ELECTRØ | 47UF 10WV |
| C58 | | | CK45B1H102K | CERAMIC | 1000PF K |
| C59 | | | CC45CH1H020C | CERAMIC | 2.0PF C |
| C60 | | | CC45CH1H120J | CERAMIC | 12PF J |
| C61 | | | CC45CH1H100D | CERAMIC | 10PF D |
| C62 | | | CC45CH1H070D | CERAMIC | 7.0PF D |
| C63 | | | CE04W1A101M | ELECTRØ | 100UF 10WV |
| C64 | | | C91-0117-05 | CERAMIC | 0.01UF K |
| C65 | | | CC45CH1H030C | CERAMIC | 3.0PF C |

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|------------------|---------------|-------------------|-------------------|------------------------------|-------------------------|
| C66 | | | CC45CH1H120J | CERAMIC 12PF J | |
| C67 | | | CC45CH1H030C | CERAMIC 3.0PF C | |
| C68 ,69 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C70 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C71 | | | CC45CH1H040C | CERAMIC 4.0PF C | |
| C72 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C73 | | | CK45B1H471K | CERAMIC 470PF K | |
| C74 | | | CS15E1E010M | TANTAL 1.0UF 25WV | |
| C75 | | | C91-0757-05 | CERAMIC 0.001UF K | |
| C76 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C77 | | | CE04W1A470M | ELECTRO 47UF 10WV | |
| C78 ,79 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C80 | | | CK45B1H471K | CERAMIC 470PF K | |
| C81 ,82 | | | CC45CH1H270J | CERAMIC 27PF J | |
| C83 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C84 | | | CC45CH1H030C | CERAMIC 3.0PF C | |
| C85 | | | CC45CH1H0R5C | CERAMIC 0.5PF C | |
| C86 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C87 | | | CC45CH1H040C | CERAMIC 4.0PF C | |
| C88 | | | CC45CH1H180J | CERAMIC 18PF J | |
| C89 | | | CC45CH1H220J | CERAMIC 22PF J | |
| C90 ,91 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C92 | | | CC45CH1H070D | CERAMIC 7.0PF D | T1,W1 |
| C92 | | | CC45CH1H121J | CERAMIC 120PF J | K1,K2,M1-M4 |
| C93 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C95 | | | CK45B1H102K | CERAMIC 1000PF K | T1,W1 |
| C96 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C97 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C99 | | | CC45CH1H270J | CERAMIC 27PF J | |
| C100 | | | CC45SL1H101J | CERAMIC 100PF J | |
| C101 | | | CC45CH1H070D | CERAMIC 7.0PF D | |
| C102 | | | CC45CH1H220J | CERAMIC 22PF J | K1,M1,M3,T1,W1 |
| TC1 | | | C05-0062-05 | TRIMMING CAP (6PF) | |
| TC2 ,3 | | | C05-0030-15 | TRIMMING CAP (20PF) | |
| TC4 | | | C05-0062-05 | TRIMMING CAP (6PF) | |
| TC5 | | | C05-0067-05 | TRIMMING CAP (25PF) | T1,W1 |
| | | | E04-0154-05 | RF COAXIAL CABLE RECEPTACLE | |
| L1 | | | L40-3391-03 | SMALL FIXED INDUCTOR (3.3UH) | |
| L2 | | * | L32-0682-05 | OSCILLATING COIL (3.5T) | |
| L3 | | | L40-1021-03 | SMALL FIXED INDUCTOR (1UH) | |
| L4 | | | L34-0894-05 | COIL (5T) | |
| L5 | | | L34-0893-05 | COIL (4T) | |
| L6 | | | L34-0894-05 | COIL (5T) | |
| L7 | | | L34-0893-05 | COIL (4T) | |
| L8 | | | L40-3391-14 | SMALL FIXED INDUCTOR (3.3UH) | |
| L9 | | | L40-3391-03 | SMALL FIXED INDUCTOR (3.3UH) | |
| L10 | | | L32-0664-05 | OSCILLATING COIL (4.5T) | |
| L11 | | | L40-1092-14 | SMALL FIXED INDUCTOR (1UH) | |
| L12 | | | L34-1025-05 | COIL (5.5T) | |
| L13 | | | L40-3391-14 | SMALL FIXED INDUCTOR (3.3UH) | |
| L14 ,15 | | | L34-2035-05 | COIL (TUNING) | |
| L16 | | | L40-4701-14 | SMALL FIXED INDUCTOR (47UH) | T1,W1 |
| L17 | | * | L32-0681-05 | OSCILLATING COIL | |

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|---|---------------|-------------------|-------------------|------------------------------|----------------------------|
| L18 | | | L77-1290-05 | CRYSTAL RESONATOR (39.48MHZ) | |
| R39 | | | RD14DB2H220J | SMALL-RD 22 J 1/2W | K1,M1,M3,T1,W1 K2,M2,M4 |
| R39 | | | RD14DB2H330J | SMALL-RD 33 J 1/2W | |
| R94 | | * | R90-0600-05 | CAPACITOR BLOCK | |
| D1 | | | 1S1555 | DIODE | |
| D2 | | | 1SV50 | VARI CAP | |
| D3 | | | 1S2208 | DIODE | |
| D4 | | | 1S1555 | DIODE | |
| D5 | | | 1SV50 | VARI CAP | |
| D6 | | | MTZ6.2JA | ZENER DIODE | |
| D7 | | | MA856 | DIODE | T1,W1 |
| IC1 | | | MC145151P | IC | |
| IC2 | | | MC145155P*K | IC | |
| Q1 | | | 2SC2458(Y) | TRANSISTOR | |
| Q2 | | | 2SA1048(Y) | TRANSISTOR | |
| Q3 -5 | | | 2SC1775(E) | TRANSISTOR | |
| Q6 ,7 | | | 2SC2668(Y) | TRANSISTOR | |
| Q8 | | | 2SK125 | FET | |
| Q9 | | | 2SC2458(Y) | TRANSISTOR | |
| Q10 | | | 2SC2668(Y) | TRANSISTOR | |
| Q11 | | | 2SC2347 | TRANSISTOR | |
| Q12 | | | 2SC2538-22-A | TRANSISTOR | K2,M2,M4 |
| Q12 | | | 2SC3019 | TRANSISTOR | K1,M1,M3,T1,W1 |
| Q13 | | | 2SK30A(Ø) | FET | |
| Q14 ,15 | | | 2SC2458(Y) | TRANSISTOR | |
| Q16 | | | 2SK192A(GR)*P | FET | |
| Q17 -22 | | | 2SC2668(Y) | TRANSISTOR | |
| Q23 | | | 2SC2458(Y) | TRANSISTOR | T1,W1 |
| CONTROL UNIT (X53-1440-XX) -10 : K1,K2,M1,M2 -21 : M3,M4 -51 : T1 -61 : W1 | | | | | |
| C1 | | | CK45B1H102K | CERAMIC 1000PF K | K1,K2,M1-M4 K1,K2,M1-M4 |
| C2 | | | CE04CW1A330M | ELECTRO 33UF 10WV | |
| C3 | | | CE04W1A101M | ELECTRO 100UF 10WV | |
| C4 | | | C91-1008-05 | CERAMIC 0.022PF | |
| C5 | | | CE04W1A470M | ELECTRO 47UF 10WV | |
| C6 | | | CS15E1A100M | TANTAL 10UF 10WV | |
| C7 | | | CK45B1H681K | CERAMIC 680PF K | |
| C8 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C9 | | | CK45B1H182K | CERAMIC 1800PF K | |
| C10 -16 | | | C91-1008-05 | CERAMIC 0.022PF | |
| C17 | | | CE04W1E3R3M | ELECTRO 3.3UF 25WV | K1,K2,M1-M4 |
| C18 | | | CE04W1H010M | ELECTRO 1.0UF 50WV | |
| C19 ,20 | | | C91-1008-05 | CERAMIC 0.022PF | |
| C23 ,24 | | | C91-1008-05 | CERAMIC 0.022PF | |
| C25 -28 | | | CK45B1H102K | CERAMIC 1000PF K | |
| L1 | | | L78-0013-05 | RESONATOR (4.19MHZ) | K1,K2,M1-M4 |
| L2 | | | L78-0012-05 | RESONATOR (3.58MHZ) | |
| L3 | | | L78-0013-05 | RESONATOR (4.19MHZ) | |
| R8 | | | R90-0202-05 | MULTI-COMP 47KX4 J 1/6W | |
| R16 | | | R90-0286-05 | MULTI-COMP 4.7KX4 J 1/6W | |
| R19 | | | R90-0233-05 | MULTI-COMP 10KX4 J 1/6W | |
| R20 | | | R90-0281-05 | MULTI-COMP 10KX6 J 1/6W | |
| R21 | | | R90-0291-05 | MULTI-COMP 100KX4 J 1/6W | |
| R22 | | | R90-0595-05 | MULTI-COMP | |

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|-----------------------------------|---------------|-------------------|----------------------------|--|-------------------------|
| R35 VR1 | | | R90-0594-05 R12-7408-05 | MULTI-COMP TRIMMING POT. (500KOHM) | |
| D1 | | | MC911 | DIODE | |
| D2 | | | 1N4448 | DIODE | |
| D2 | | | 1S1555 | DIODE | |
| D3 | | | MTZ7.5JA | ZENER DIODE | |
| D4 -8 | | | 1N4448 | DIODE | |
| D4 -8 | | | 1S1555 | DIODE | |
| D9 | | | 1N4448 | DIODE | K1,K2,M1,M2,W1 |
| D9 | | | 1S1555 | DIODE | K1,K2,M1,M2,W1 |
| D10 | | | 1N4448 | DIODE | T1,W1 |
| D10 | | | 1S1555 | DIODE | T1,W1 |
| D11 | | | 1N4448 | DIODE | |
| D11 | | | 1S1555 | DIODE | |
| D12 | | | 1N4448 | DIODE | T1,W1 |
| D12 | | | 1S1555 | DIODE | T1,W1 |
| D13 -16 | | | 1N4448 | DIODE | K1,K2,M1-M4 |
| D13 -16 | | | 1S1555 | DIODE | K1,K2,M1-M4 |
| D17 -21 | | | 1N4448 | DIODE | |
| D17 -21 | | | 1S1555 | DIODE | |
| D22 | | | 1N4448 | DIODE | K1,K2,M1-M4 |
| D22 | | | 1S1555 | DIODE | K1,K2,M1-M4 |
| D23 | | | MTZ5.6JC | ZENER DIODE | K1,K2,M1-M4 |
| D24 | | | 1N4448 | DIODE | |
| D24 | | | 1S1555 | DIODE | |
| D25 +26 | | | 1SS106 | DIODE | |
| D27 | | | 1N4448 | DIODE | |
| D27 | | | 1S1555 | DIODE | |
| D28 | | | 1N4448 | DIODE | K1,K2,M1-M4 |
| D28 | | | 1S1555 | DIODE | K1,K2,M1-M4 |
| D29 | | | 1SS133 | DIODE | |
| IC1 | | | MC14584BCP | IC | |
| IC2 | | | TMP47C46N-9042 | IC (CPU) | |
| IC3 | | | UPD7508HC-056 | IC (CPU) | |
| IC4 | | | LR4087 | IC | K1,K2,M1-M4 |
| IC5 | | | TC40H374P | IC | |
| IC6 | | | TC5047AP-1 | IC | |
| IC7 | | | PST520D | IC (LOW POWER RESET) | |
| Q1 | | | DTC124EF | DIGITAL TRANSISTOR | K1,K2,M1-M4 |
| Q2 | | | 2SC245B(Y) | TRANSISTOR | |
| Q3 | | | DTA114YF | DIGITAL TRANSISTOR | K1,K2,M1-M4 |
| Q4 +5 | | | DTA114YF | DIGITAL TRANSISTOR | |
| Q6 | | | DTC143TY | DIGITAL TRANSISTOR | K1,K2,M1-M4 |
| DISPLAY UNIT (X54-1860-10) | | | | | |
| C1 -7 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C8 | | | CE04CW1C4R7M | ELECTRO 4.7UF 16WV | |
| C9 -11 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C12 -14 | | | CK73FB1H102K | CHIP C 1000PF K | |
| - | | | E06-0858-05 | 8P MIC CONNECTOR | |
| - | | | J61-0408-05 | WIRE BAND | |
| VR1 | | * | R92-0150-05 R05-3436-05 | JUMPER RES 0 OHM POTENTIOMETER (10KOHM WITH SW) | |

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|--|---------------|-------------------|-------------------|----------------------------|-------------------------|
| VR2 | | * | R05-4415-05 | POTENTIOMETER (50KB)SQ | |
| - | | * | S59-0435-05 | KEY BOARD ASSY | |
| S1 -3 | | | S40-2443-05 | PUSH SWITCH (LOCK) | |
| S4 ,5 | | | S40-2444-05 | PUSH SWITCH (NON-LOCK) | |
| S6 ,7 | | | S40-2443-05 | PUSH SWITCH (LOCK) | |
| S8 | | | S40-2444-05 | PUSH SWITCH (NON-LOCK) | |
| S9 -16 | | | S50-1426-05 | SENSITIVE SWITCH (TACT) | |
| - | | * | FSS8066 | LCD (KEYBOARD ASSY) | |
| - | | * | HD61602 | IC (KEYBOARD ASSY) | |
| - | | * | UN2213 | DIGITAL TR (KEYBOARD ASSY) | |
| - | | * | U19DD306 | LED (KEYBOARD ASSY) | |
| D1 -5 | | | 1N4448 | DIODE | |
| D1 -5 | | | 1S1555 | DIODE | |
| D6 ,7 | | | MC921 | LED | |
| D8 ,9 | | | 1N4448 | DIODE | |
| D8 ,9 | | | 1S1555 | DIODE | |
| D10 -13 | | * | LN386PL | LED | |
| D14 | | | LN222RP | LED (RED) | |
| D15 | | | LN322GP | LED (GREEN) | |
| D16 ,17 | | | LN442YP | LED (YELLOW) | |
| IC1 | | | IR2429 | IC | |
| Q1 | | | DTC124EF | DIGITAL TRANSISTOR | |
| Q2 | | * | 2SA790(A) | TRANSISTOR | |
| MIC AMP. (X59-1000-10) | | | | | |
| R1 | | | RK73FB2A682J | CHIP R 6.8K J 1/10W | |
| R2 | | | RK73FB2A221J | CHIP R 220 J 1/10W | |
| R3 | | | RK73FB2A104J | CHIP R 100K J 1/10W | |
| R4 | | | RK73FB2A153J | CHIP R 15K J 1/10W | |
| R5 | | | RK73FB2A333J | CHIP R 33K J 1/10W | |
| R6 -8 | | | RK73FB2A224J | CHIP R 220K J 1/10W | |
| R9 | | | RK73FB2A474J | CHIP R 470K J 1/10W | |
| R10 | | | RK73FB2A153J | CHIP R 15K J 1/10W | |
| R11 | | | RK73FB2A562J | CHIP R 5.6K J 1/10W | |
| R12 | | | RK73FB2A184J | CHIP R 180K J 1/10W | |
| R13 | | | RK73FB2A224J | CHIP R 220K J 1/10W | |
| R14 | | | RK73FB2A474J | CHIP R 470K J 1/10W | |
| C1 | | | CC73FSL1H390J | CHIP C 39PF | |
| C2 | | | CK73FB1H152K | CHIP C 0.0015UF | |
| C3 | | | CC73FSL1H331K | CHIP C 330PF | |
| C4 | | | CC73FSL1H561K | CHIP C 560PF | |
| C5 | | | CC73FSL1H331K | CHIP C 330PF | |
| D1 | | * | 1SS184 | CHIP DIODE | |
| D2 | | * | 1SS181 | CHIP DIODE | |
| IC1 | | | NJM4558M | IC(OP AMP X2) | |
| Q1 | | | 2SC2712(Y) | CHIP TR | |
| MIC AMP., S-METER (X59-1010-10) | | | | | |
| R1 | | | RK73FB2A473J | CHIP R 47K J 1/10W | |
| R2 | | | RK73FB2A474J | CHIP R 470K J 1/10W | |
| R3 | | | RK73FB2A473J | CHIP R 47K J 1/10W | |
| R4 | | | RK73FB2A474J | CHIP R 470K J 1/10W | |
| R5 | | | RK73FB2A224J | CHIP R 220K J 1/10W | |
| R6 | | | RK73FB2A184J | CHIP R 180K J 1/10W | |

PARTS LIST

× New Parts

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕 向 |
|--|---------------|-------------------|--|--|-------------------------|
| R7 R8 R9 R10 | | | RK73FB2A473J RK73FB2A472J RK73FB2A103J RK73FB2A822J | CHIP R 47K J 1/10W CHIP R 4.7K J 1/10W CHIP R 10K J 1/10W CHIP R 8.2K J 1/10W | |
| C1 D1 D2 IC1 | | | CK45FB1H472K 1S5184 1S5181 NJM4558M | CHIP DIODE CHIP DIODE IC(OP AMP X2) | |
| ALERT, VACANT CH. (X59-1020-10) | | | | | |
| R1 R2 R3 R4 R5 -7 | | | RK73FB2A103J RK73FB2A472J RK73FB2A223J RK73FB2A273J RK73FB2A103J | CHIP R 10K J 1/10W CHIP R 4.7K J 1/10W CHIP R 22K J 1/10W CHIP R 27K J 1/10W CHIP R 10K J 1/10W | |
| C1 D1 Q1 -4 | | | CK73FB1H102K 1S5181 2SC2712(Y) | CHIP C 0.001UF CHIP DIODE CHIP TRANSISTOR | |
| CENTER DETECTOR (X59-1030-10) | | | | | |
| R1 R2 R3 R4 R5 .6 | | | RK73FB2A224J RK73FB2A222J RK73FB2A332J RK73FB2A333J RK73FB2A104J | CHIP R 220K J 1/10W CHIP R 2.2K J 1/10W CHIP R 3.3K J 1/10W CHIP R 33K J 1/10W CHIP R 100K J 1/10W | |
| R7 R8 R9 .10 R11 R12 | | | RK73FB2A563J RK73FB2A102J RK73FB2A103J RK73FB2A102J RK73FB2A104J | CHIP R 56K J 1/10W CHIP R 1.0K J 1/10W CHIP R 10K J 1/10W CHIP R 1.0K J 1/10W CHIP R 100K J 1/10W | |
| R13 .14 | | | R92-0670-05 | CHIP R 0 OHM | |
| C1 .2 C3 .4 C5 D1 IC1 | | | CK73FB1H102K CK73FF1E473Z CK73FB1H102K 1S5181 NJM4558M | CHIP C 0.001UF CHIP C 0.047UF CHIP C 0.001UF CHIP DIODE IC(OP AMP X2) | |
| Q1 | | | 2SC2714(Y) | CHIP TRANSISTOR | |
| SQUELCH CONTROL (X59-1040-10) | | | | | |
| R1 R2 R3 R4 R5 | | | RK73FB2A103J RK73FB2A223J RK73FB2A682J RK73FB2A474J RK73FB2A472J | CHIP R 10K J 1/10W CHIP R 22K J 1/10W CHIP R 6.8K J 1/10W CHIP R 470K J 1/10W CHIP R 4.7K J 1/10W | |
| R6 R7 R8 R9 R10 | | | RK73FB2A332J RK73FB2A682J RK73FB2A332J RK73FB2A393J RK73FB2A472J | CHIP R 3.3K J 1/10W CHIP R 6.8K J 1/10W CHIP R 3.3K J 1/10W CHIP R 39K J 1/10W CHIP R 4.7K J 1/10W | |
| R11 | | | R92-0670-05 | CHIP R 0 OHM | |
| C1 D1 Q1 Q2 .3 Q4 | | | CK73FB1H102K 1S5184 2SC2712(Y) 2SC3295(B) 2SC2712(BL) | CHIP C 0.001UF CHIP DIODE CHIP TRANSISTOR CHIP TRANSISTOR CHIP TRANSISTOR | |

PARTS LIST

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名/規格 | Desti- nation 仕向 |
|--|---------------|-------------------|---------------------------|------------------------------------|------------------------|
| Q5 Q6 | | | 2SC2712(Y) 2SC2712(BL) | CHIP TRANSISTOR CHIP TRANSISTOR | |
| COMPOUND UNIT (X60-1280-XX) -10 : K1,K2,M1,M2,M3,M4 -51 : T1,W1 | | | | | |
| C1 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C2 | | | CC45RH1H120J | CERAMIC 12PF J | |
| C3 | | | CC45CH1H030C | CERAMIC 3.0PF C | |
| C4 | | | CC45RH1H100D | CERAMIC 10PF D | |
| C5 | | | CC45CH1H220J | CERAMIC 22PF J | |
| C6 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C7 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C8 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C9 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C10 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C11 | | | CC45CH1H010C | CERAMIC 1.0PF C | |
| C12 | | | CC45CH1H150J | CERAMIC 15PF J | |
| C13 | | | CC45CH1H020C | CERAMIC 2.0PF C | |
| C14 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C15 ,16 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C17 | | | CC45CH1H050C | CERAMIC 5.0PF C | |
| C18 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C19 | | | CC45SL1H101J | CERAMIC 100PF J | |
| C20 ,21 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C22 | | | C91-0757-05 | CERAMIC 0.001UF K | |
| C23 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C24 | | | CQ92M1H473K | MYLAR 0.047UF K | |
| C25 | | | CE04W1C102M | ELECTRO 1000UF 16WV | |
| C27 | | | CE04W1H010M | ELECTRO 1.0UF 50WV | |
| C28 ,29 | | | CE04W1A470M | ELECTRO 47UF 10WV | |
| C31 | | | CQ92M1H104K | MYLAR 0.10UF K | |
| C32 | | | CE04W1A221M | ELECTRO 220UF 10WV | |
| C33 | | | CE04W1A470M | ELECTRO 47UF 10WV | |
| C34 ,35 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C36 | | | CC45SL1H101J | CERAMIC 100PF J | |
| C37 | | | CC45CH1H040C | CERAMIC 4.0PF C | |
| C38 | | | CC45SL1H181J | CERAMIC 180PF J | |
| C39 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C40 | | | CE04W1A470M | ELECTRO 47UF 10WV | |
| C41 | | | CC45SL1H331J | CERAMIC 330PF J | |
| C42 | | | CK45B1H471K | CERAMIC 470PF K | |
| C43 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C44 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C45 | | | C91-0667-05 | CERAMIC 0.0047UF K | |
| C46 | | | CC45CH1H330J | CERAMIC 33PF J | |
| C47 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C48 | | | CC45SL1H121J | CERAMIC 120PF J | |
| C49 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C50 ,51 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C52 -54 | | | CF92V1H104J | MF 0.10UF J | |
| C55 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C56 | | | CE04W1H010M | ELECTRO 1.0UF 50WV | |
| C58 ,59 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C60 | | | CE04W1C330M | ELECTRO 33UF 16WV | |
| C61 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C62 | | | CE04W1C100M | ELECTRO 10UF 16WV | |

PARTS LIST

× New Parts

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| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕 向 |
|------------------|---------------|-------------------|-------------------|------------------------------|-------------------------|
| C63 | | | CE04W1C330M | ELECTRØ 33UF 16WV | |
| C64 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C65 | | | CE04W1C100M | ELECTRØ 10UF 16WV | |
| C66 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C67 | | | CE04W1C100M | ELECTRØ 10UF 16WV | |
| C68 | | | CE04W1A101M | ELECTRØ 100UF 10WV | |
| C69 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C70 | | | CS15E1C2R2M | TANTAL 2.2UF 16WV | |
| C71 | | | CS15E1VR68M | TANTAL 0.68UF 35WV | |
| C72 | | | CS15E1V010M | TANTAL 1.0UF 35WV | |
| C73 | | | CE04W1A470M | ELECTRØ 47UF 10WV | |
| C74 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C76 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C77 | | | CE04W1HR47M | ELECTRØ 0.47UF 50WV | |
| C79 ,80 | | | C91-0117-05 | CERAMIC 0.01UF K | |
| C81 | | | CQ92M1H333K | MYLAR 0.033UF K | |
| C82 -85 | | | CE04W1H010M | ELECTRØ 1.0UF 50WV | |
| C86 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C87 | | | CE04W1C470M | ELECTRØ 47UF 16WV | |
| C88 | | | CE04W1H010M | ELECTRØ 1.0UF 50WV | |
| C89 | | | CK45B1H152K | CERAMIC 1500PF K | |
| C90 | | | CE04W1C100M | ELECTRØ 10UF 16WV | |
| C93 | | | CE04W1A470M | ELECTRØ 47UF 10WV | |
| C94 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C95 | | | CE04W1HOR1M | ELECTRØ 0.1UF 50WV | |
| C96 | | | CC45SL1H101J | CERAMIC 100PF J | |
| C97 | | | CK45B1H102K | CERAMIC 1000PF K | |
| C98 | | | C91-1008-05 | CERAMIC 0.022UF K | |
| C99 | | | CQ92M1H153K | MYLAR 0.015UF K | |
| C100 | | | CQ92M1H183K | MYLAR 0.018UF K | |
| C101 | | | CQ92M1H333K | MYLAR 0.033UF K | |
| C102 | | | CE04W1A470M | ELECTRØ 47UF 10WV | |
| C103 | | | CQ92M1H473K | MYLAR 0.047UF K | |
| C105 | | | CE04W1A470M | ELECTRØ 47UF 10WV | T1,W1 |
| C106 | | | C91-0117-05 | CERAMIC 0.01UF K | T1,W1 |
| C107 | | | C91-0433-05 | CERAMIC 0.0039UF K | T1,W1 |
| C108 | | | CQ92M1H333K | MYLAR 0.033UF K | T1,W1 |
| C109,110 | | | CQ92M1H103K | MYLAR 0.010UF K | T1,W1 |
| C115 | | | CK45B1H102K | CERAMIC 1000PF K | |
| L1 ,2 | | | L31-0267-05 | CØIL (ANT) | |
| L3 | | | L15-0306-05 | LØW-FREQUENCY CHØKE CØIL | |
| L4 | | | L79-0498-15 | HELICAL RESØNATØR | T1,W1 |
| L4 | | | L79-0499-05 | HELICAL RESØNATØR | K1,K2,M1-M4 |
| L5 | | | L34-0683-05 | CØIL (TUNING)PLL HET | |
| L6 | | | L30-0281-15 | IFT (10.24MHZ) | |
| L7 | | | L30-0005-05 | IFT (10.695MHZ) | |
| L8 | | | L71-0216-05 | MCF | |
| L9 | | | L30-0005-05 | IFT (10.695MHZ) | |
| L10 ,11 | | | L40-1021-12 | SMALL FIXED INDUCTØR (1UH) | |
| L12 | | | L79-0446-05 | CERAMIC DISCRI CFY455S | |
| L13 | | | L40-1001-14 | SMALL FIXED INDUCTØR (10UH) | |
| L14 | | | L77-0858-15 | CRYSTAL RESØNATØR (10.24MHZ) | |
| L15 | | * | L30-0531-05 | IFT (455KHZ) | |
| L16 | | | L72-0315-05 | CERAMIC FILTER (CFW455F) | |

PARTS LIST

× New Parts

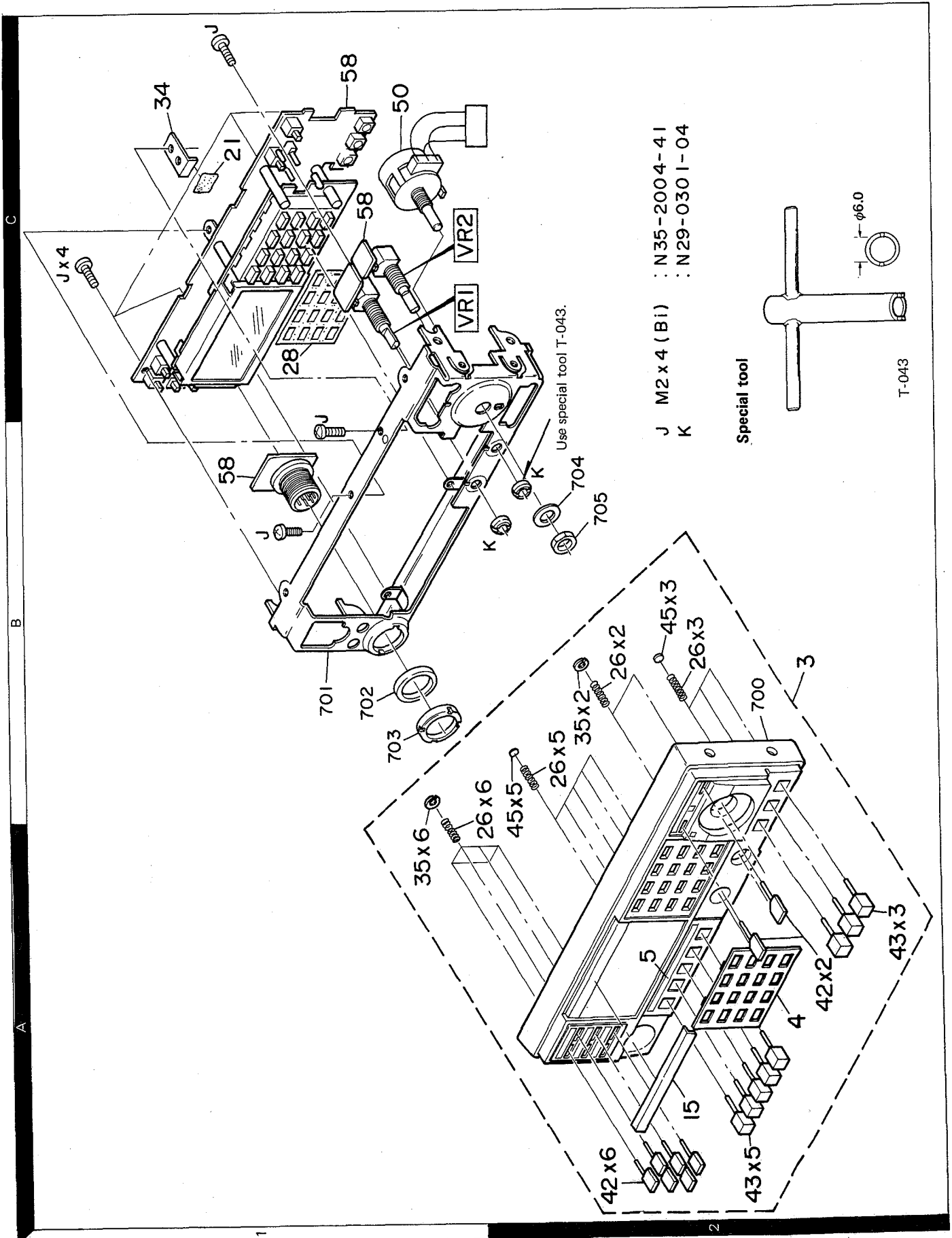
Parts without Parts No. are not supplied.

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

Teile ohne Parts No. werden nicht geliefert.

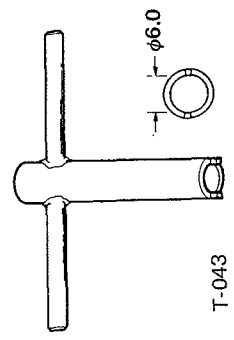
| Ref. No. 参照番号 | Address 位置 | New Parts 新 | Parts No. 部品番号 | Description 部品名 / 規格 | Desti- nation 仕向 |
|------------------|---------------|-------------------|-------------------|-------------------------|------------------------|
| L17 | | | L30-0503-05 | IFT (455KHZ) | |
| R42 | | * | RS14KB3D330J | FL-PROOF RS 33 J 2W | T1,W1 K1,K2,M1-M4 |
| R66 | | | RN14BK2B9102F | RN 91.0K F 1/8W | |
| VR1 | | | R12-2413-05 | TRIMMING PØT. (5K) | |
| VR2 -4 | | | R12-4413-05 | TRIMMING PØT. (50K) | |
| VR5 | | | R12-3443-05 | TRIMMING PØT. (10K) | |
| VR6 | | | R12-4413-05 | TRIMMING PØT. (50K) | T1,W1 |
| VR7 | | | R12-2413-05 | TRIMMING PØT. (5K) | |
| VR8 | | | R12-3521-05 | TRIMMING PØT. (20K) | |
| D1 .2 | | | 1N4448 | DIØDE | T1,W1 |
| D1 .2 | | | 1S1555 | DIØDE | |
| D3 .4 | | | 1N60 | DIØDE | |
| D5 .6 | | | 1N4448 | DIØDE | |
| D5 .6 | | | 1S1555 | DIØDE | |
| D7 | | | MTZ11JC | ZENER DIØDE | |
| D8 | | | 1N4448 | DIØDE | |
| D8 | | | 1S1555 | DIØDE | |
| D9 | | | MTZ6.2JA | ZENER DIØDE | |
| D10 | | | 1N60A | DIØDE | |
| IC1 | | * | UPC1241H | IC | T1,W1 |
| IC2 | | * | TA7761P | IC | |
| IC3 | | | MB3756 | IC | |
| IC4 | | | NJM78M06A | IC | |
| IC5 | | | NE555P | IC | |
| Q1 | | | 3SK129(S) | FET | T1,W1 |
| Q2 | | | 3SK74(L) | FET | |
| Q3 .4 | | | 2SC2668(Y) | TRANSISTØR | |
| Q5 | | | 2SC496(Y) | TRANSISTØR | |
| Q6 .7 | | | 2SC2458(Y) | TRANSISTØR | |
| Q8 | | | 2SC1775(E) | TRANSISTØR | |
| Q9 | | | 2SC2458(Y) | TRANSISTØR | T1,W1 |
| Q10 .11 | | | DTC114ES | DIGITAL TRANSISTØR | |
| TH1 | | | 112-502-2 | THERMISTER (5K ØHM) | |
| | | * | X59-1000-10 | MIC AMP MODULE UNIT | T1,W1 |
| | | * | X59-1010-10 | MIC AMP,S-METER UNIT | |
| | | * | X59-1020-10 | ALERT,VACANT-CH UNIT | |
| | | * | X59-1030-10 | CENTER DETECTOR UNIT | |
| | | * | X59-1040-10 | SQUELCH CONTROL UNIT | |

DISASSEMBLY



J M2 x 4 (Bi) : N35-2004-41
 K : N29-0301-04

Special tool



T-043

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

ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. **DC V.M**
1) High input impedance
2. **RF VTVM (RF V.M)**
1) Input impedance : 1MΩ min., 2pF max.
2) Voltage range : F.S = 10mV ~ 300V
3) Frequency range : Up to 150MHz
3. **Frequency Counter (f. counter)**
1) Input sensitivity : Approx. 50mV
2) Frequency range : Up to 150MHz
4. **DC Power Supply**
1) Voltage : 10V ~ 17V, variable
2) Current : 8A min.
5. **RF Power Meter**
1) Measurement range Approx. : 50W
2) Input impedance : 50Ω
3) Frequency range : 144MHz
6. **AF VTVM (AF V.M)**
1) Input impedance : 1MΩ min.
2) Voltage range : F.S = 1mV ~ 30V
3) Frequency range : 50Hz ~ 10kHz
7. **AF Generator (AG)**
1) Output frequency : 100Hz ~ 10kHz
2) Output voltage : 0.5mV ~ 1V
8. **Linear Detector**
1) Frequency range : 144MHz
9. **Field Strength Meter**
1) Frequency range : 144MHz
10. **Directional Coupler**
11. **Oscilloscope**
1) High sensitivity oscilloscope with horizontal input terminal
12. **SSG**
1) Frequency range : 144~149MHz
2) Modulation : AM and FM MOD.
3) Output level : -20dB to 100dB
13. **Dummy Load**
1) 8Ω, 5W (approx.)
14. **Noise Generator**
1) Must generate ignition-like noise containing harmonics beyond 150MHz.
15. **Sweep Generator**
1) Sweep range : 144~149MHz
16. **Tracking generator**

PREPARATION

1) Unless otherwise specified, knobs and switches should be set as follows **Table 10**.

| | | | |
|------------|-----|------------|-----|
| POWER SW | ON | SQUELCH VR | MIN |
| AL. SW | OFF | AF GAIN VR | MIN |
| PRIO SW | OFF | PHONE SW | OFF |
| LAMP SW | OFF | TONE SW | OFF |
| REV SW | OFF | VOICE SW | OFF |
| SCAN SW | OFF | DCL SW | OFF |
| LOW SW | OFF | C. SQ SW | OFF |
| F. LOCK SW | OFF | CS SW | OFF |

Table 10

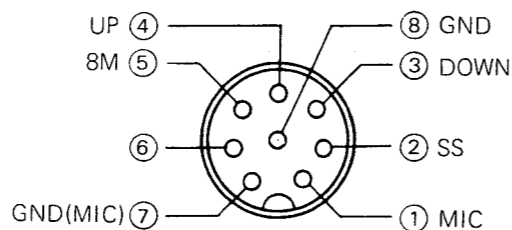


Fig. 20 MIC terminals (view from front panel side)

- 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.

ADJUSTMENT

RX ADJUSTMENT

NOTE : COMP = COMPOUND UNIT (X60-1250-10,-51)

| Item | Condition | Measurement | | | Adjustment | | | Specification/Remarks |
|------------------|--|---|-------|--------------------------|------------|-----------------|---|------------------------------------|
| | | Test equipment | Unit | Terminal | Unit | Part | Method | |
| 1. Reset | 1) Set the power SW on, while depressing PS key. Then, release the PS key. 2) When the lithium battery is replaced, the microprocessor must be reset. Set the power SW on, while depressing PS key and terminal shorted (near Q6 position) on CONTROL unit by driver, etc. Then, release the PS key. | Display | | | | | Terminal | Tone sounds. |
| 2. Voltage check | 1) Power supply : 13.8V DC SQL VR ↻ MIN (fully CCW) 2) Transmit. | DC VM | COMP. | 8R | | JP18 | | 7.8V-8.6V |
| | | | | 8C | | ⑦-1 | | 7.8V-8.6V |
| | | | | 6C | | ⑩-1 | | 5.6V-6.4V |
| | | | | 8T | | ⑪-4 | | 0.3V or less |
| | | | | 8T | | | | 7.8V-8.6V |
| | | | | 8R | | JP18 | | 0.3V or less |
| 3. PLL | 1) IF level Display : 6.000 (K,M) 5.000 (W,T) 2) RX VCO (RX) Display : 2.000 (K,M) 4.000 (W,T) 3) TX VCO Display : 2.000 (K,M) 4.000 (W,T) 4) Receive Display : 7.995 (K,M) 5.995 (W,T) 5) Transmit Display : 7.995 (K,M) 5.995 (W,T) 6) HET. Frequency Receive Display : 6.000 (K,M) 5.000 (W,T) | SCOPE (10 : 1 probe) DC V.M f.counter | PLL | TP1 (R74) | PLL | L14, L15 | MAX When PLL loop is unlocked, ADJ TC4. | 2.0Vp-p or more. |
| | | | | TP2 (C55) | | TC4 | 6.0V (K,M) 5.0V (W,T) | ±0.1V |
| | | | | TP3 (R17) (collector Q5) | | TC1 | 2.5V (K,M) 3.0V (W,T) When PLL loop is unlocked, ADJ TC1. | (1.5V-2.9V) (K,M) |
| | | | | TP2 (C55) | | | | 4.0V-6.0V 3.5V-4.5V Confirm. |
| | | | | TP3 (R17) | | | | 4.5V-5.5V Confirm. |
| | | | | LR (② -6) | | L17 | 135.305MHz ADJ. 134.305MHz ADJ. | ±100Hz ±100Hz |
| 4. Helical | 1) Connect the sweep gen. to ANT terminal. Output : 10dBμ Disconnect the No. ③ connector (SF, GND). | Detector SCOPE | COMP. | TP1 | COMP. | L1, L2, L4 | Adjust to obtain the waveform as right fig. | 144 148 (K,M) 144 146 (T,W) |
| | | | | | | | | |
| 5. SF level | | RF V.M | COMP. | SF | COMP. | L6 | MAX | 0.2V or more |
| 6. GAIN | 1) Display : 6.060 (K,M) 5.060 (T,M) ANT : SSG Output : 5dBμ MOD. : 1kHz DEV. 3kHz f : 146.06MHz (K,M) 145.06MHz (W,T) | DC V.M (3.0V range) | COMP. | JP17 | COMP. | L5, L7, L9, L15 | Minimum voltage reading. Repeat 2 or 3 times. | Ref. 2.35V |

ADJUSTMENT

| Item | Condition | Measurement | | | Adjustment | | | Specification/Remarks |
|--------------------|---|----------------|-------------|----------|------------|------|--|-----------------------|
| | | Test equipment | Unit | Terminal | Unit | Part | Method | |
| 7. DISCRI S/N | 1) ANT 6.060 (K,M) 5.060 (W,T) ANT SSG MOD. : 1kHz, DEV. 3kHz Output : 60dBμ | AF V.M | Rear panel | SP | COMP. | L17 | MAX | |
| | 2) ANT SSG Output : -6dBμ (144.00-147.98MHz) | | | | | | | 12dB SINAD or more. |
| 8. S-Meter | 1) MOD. 1kHz : DEV. 3kHz 6.060 (K,M) 5.060 (W,T) SSG output : 16dBμ | S-LCD | Front panel | | COMP. | VR6 | S-LCD should light. | |
| 9. Vacant CH level | 1) SSG output : -8dBμ MOD/DEV. OFF Short both TP3 terminals. | | | | COMP. | VR3 | Adjust threshold point. | |
| 10. SQ SEN. | 1) Threshold point : no signal | | Front panel | SQL VR | | | Audio noise will disappear. C.TUNE indicator off. | 8 : 30 - 12 : 00 |
| | 2) SSG output : -12dBμ | | | | | | C.TUNE indicator lights. | SQ open. |

TX ADJUSTMENT

| Item | Condition | Measurement | | | Adjustment | | | Specification/Remarks |
|-----------------------|---|-------------------------------------|------------|----------|------------|-------|---|--|
| | | Test equipment | Unit | Terminal | Unit | Part | Method | |
| 1. DRIVE | 1) Transmit. Display : 6.000 (K,M) 5.000 (W,T) Disconnect the coax. cable from the DO terminal in the COMP. unit. Connect the power meter to the DO terminal in the COMP. unit. | POWER (3W) | PLL | DO | PLL | TC2,3 | MAX In case of TM-2550A/E, reduce RF output from peak point to 0.04W down by TC3 (capacity of TC3 will decrease the position.) | 0.5-0.7W 0.25-0.45W (TM-2530A) |
| | | | | | | | | |
| 2. POWER | 1) Connect the coax. cable from the DO terminal in the COMP. unit. Display : 7.995 (K,M) 5.995 (W,T) | P.M Ammeter in the DC power supply. | Rear panel | ANT | FINAL | VR3 | 47W ADJ. (K,M) 28W ADJ. (W,T) RF LCD | 47W±0.5W 28W±0.5W All RF-LED's should light. |
| | 2) 4.000-7.995 (K,M) 4.000-5.995 (W,T) | | | | | | | 43-54W or less. 9.5A or less (K,M) 24-33W or less. 6.5A or less (W,T) |
| 3. LOW POWER | 1) HI/LOW SW : LOW Display : 6.000 (K,M) 5.000 (W,T) | Power meter | | ANT | FINAL | VR4 | 5W ADJ. | 5W±0.5W |
| 4. RF METER | 1) Confirm, then, HI/LOW SW : HI | RF-LCD | | | COMP. | VR4 | Adjust 5 LED's reading. | |
| 5-1 PROTECTION (null) | 1) FINAL unit | | | | FINAL | VR2 | MAX | |
| | 2) Display : 6.000 (K,M) 5.000 (W,T) Transmit. | Power meter | Rear panel | ANT | | | | 45W or more (K,M) 25W or less (W,T) |
| | | DC multi-meter | FINAL | TP | FINAL | VR1 | MIN | 0.5V or less. |

ADJUSTMENT

| Item | Condition | Measurement | | | Adjustment | | | Specification/Remarks |
|------------------------------|---|------------------------------|------|----------|------------|------|--|--|
| | | Test equipment | Unit | Terminal | Unit | Part | Method | |
| 5-2. PROTECTION (Current) | 1) ANT 45/25W : Open 45/25W short 2) After adjusted, connect the power meter. | DC supply V.M | | | FINAL | VR2 | 4A/3A ADJ. | 6A or less (K,M) 5A or less (W,T) |
| 6. MIC GAIN DEV. | 1) Turn VR7 fully CCW. MIC 50mV/1kHz (K,M) 30mV/1kHz (T,W) | Linear detector | | | COMP. | VR7 | ±4.5kHz ADJ. | ±100Hz- |
| | 2) MIC 5mV/1kHz (K,M) 3mV/1kHz (T,W) | | | | | VR5 | | |
| 7. FREQ. check | 1) Display : 6.000 (K,M) 5.000 (W,T) | f.counter | | | | | | 146.000±500Hz (K,M) 145.000±500Hz (W,T) |
| 8. TONE (K,M) | 1) Install TU7 in the CONTROL Press TONE key then, turn the encoder dial to 88.5kHz transmit. | Linear detector f.counter | | | | | | DEV. 0.6-0.9kHz FREQ. 88.5kHz Check output wave of linear detector output. display. |
| 9. TONE (W) | 1) Press TONE key. (Transmit after ADJ.) | | | | COMP. | VR8 | 1.750Hz | ±10Hz DEV. : 2.5kHz or more |
| 10. TONE Burst (T) | 1) Remove the TH/E connector, Connect 5V DC power supply to the TH/E connector (Transmit) | | | | COMP. | VR8 | 1.750Hz | ±10Hz DEV. : 2.5kHz or more |
| | 2) Connect the TH/E connector. (Transmit) TONE SW : ON | Monitor radio | | | | | | |
| 11. Touch tone (K,M) | 1) Transmit Press '3', '6' key at the same time. | Linear detector f.counter | | | COMP. | VR1 | 3kHz ADJ. | ±0.2kHz 1471.9Hz±1% |
| 12. SCAN | 1) SCAN SW : T0 (Confirm VR1 at 12 o'clock.) SQL VR : ↻ MIN (CCW) Key board : Press "SC" | | | | CONT. | VR1 | Check scan time changed when VR1 turn. | |
| | 2) After ADJ. Key board : Press "C" | | | | CONT. | VR1 | Centered. | |

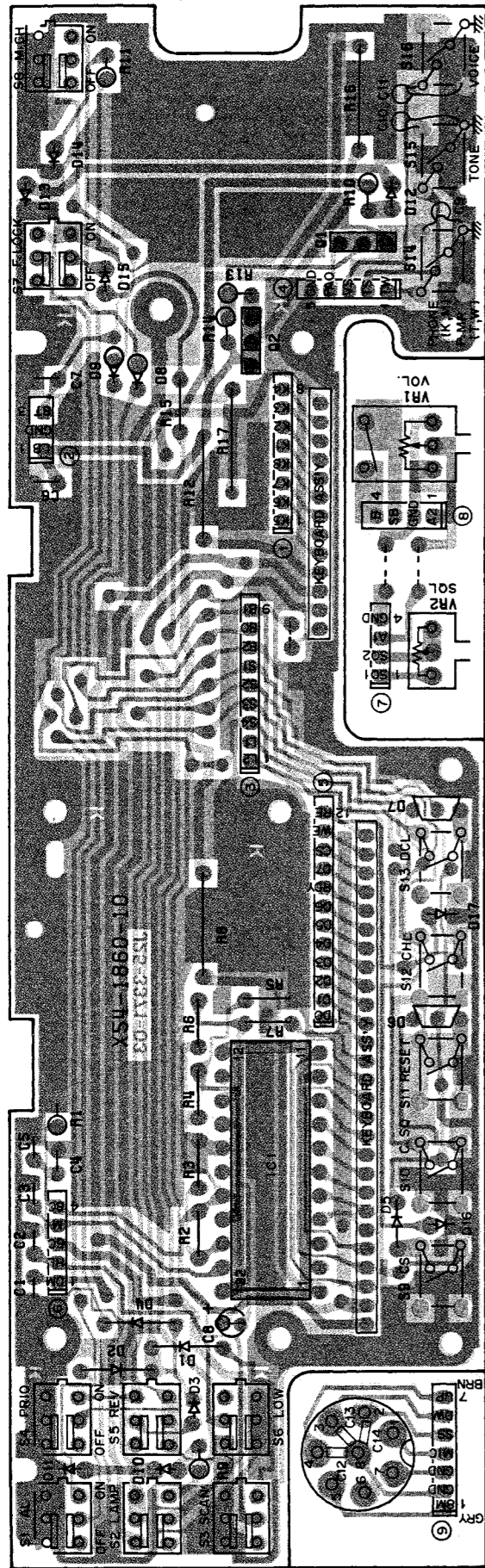
Microprocessor operation check

| Item | Condition | Operation check |
|-------------|---|--|
| 1. Keyboard | 1) SQL : MIN (CCW) ↻ Power SW : ON Reset microprocessor. (See ADJ of "RESET".) | ☐ 4.000 1 |
| | 2) KEY : 1. 9. PS. L0 (K,M) 1. 2. 3. 6. 7. 8. 9. 0. PS. L0 (T,W) | Display does not change. ☐ 4.000 1 |
| | 3) KEY : 2. 2. 2. 2. 4. 2. 2. 2. | Tone sounds. ☐ 2.220 1 ☐ 4.220 1 |

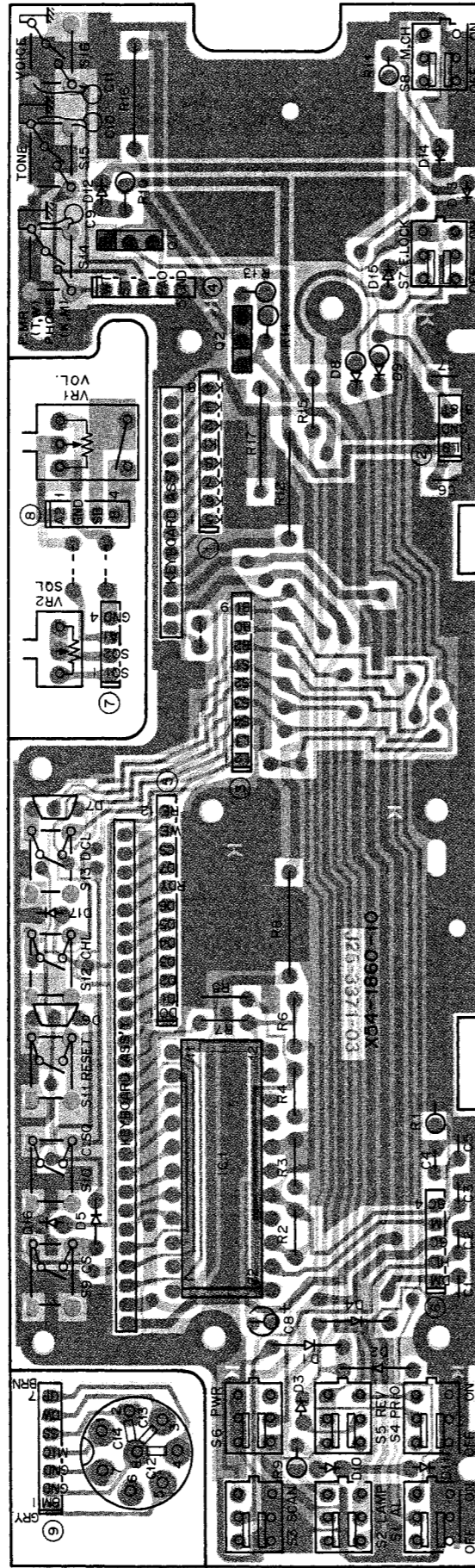
| Item | Condition | Operation check |
|-------------|-------------------------------------|------------------------------|
| 1. Keyboard | 4) KEY : 3. 3. 3. 3. 4. 3. 3. 3. | ☐ 3.330 1 ☐ 4.220 1 |
| | 5) KEY : 4. 4. 4. 4. | ☐ 4.440 1 |
| | 6) KEY : 5. 5. 5. 5. | ☐ 5.555 1 |

PC BOARD VIEWS/TERMINAL FUNCTION **TM-2550A/E,2530A**

DISPLAY UNIT (X54-1860-10) Component side view

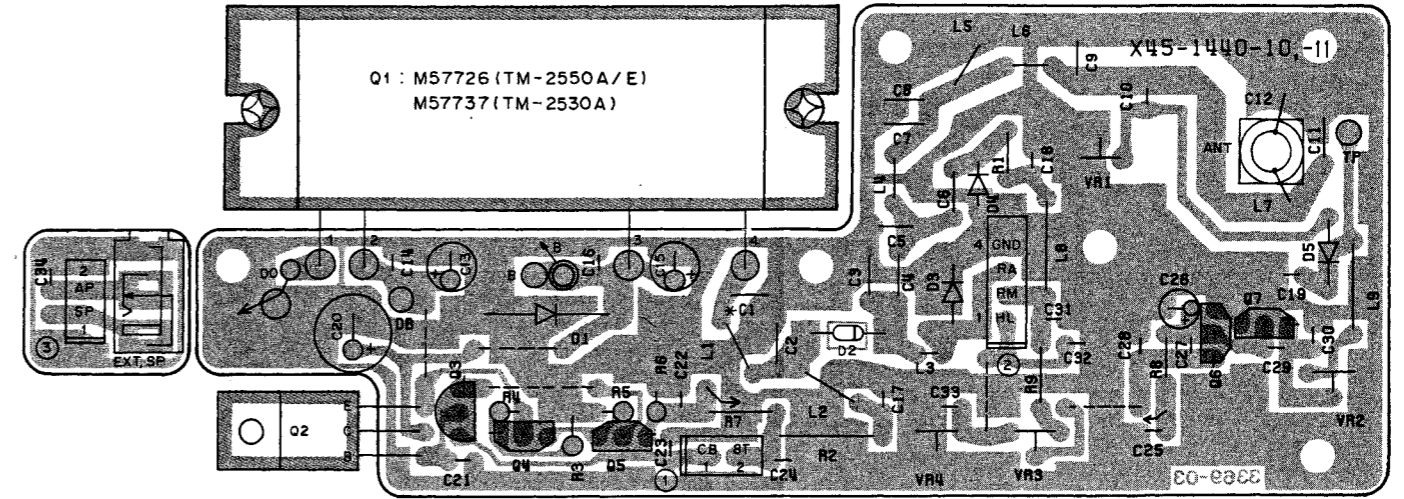


DISPLAY UNIT (X54-1860-10) Foil side view



Q1 : DTC124EF Q2 : 2SA790(A)
 IC1 : IR2429
 D1-5,8,9 : 1S1555 or 1N4448 D6,7 : MC921 D10-13 : LN38GPL D14 : LN222RP D15 : LN322GP D16,17 : LN442YP

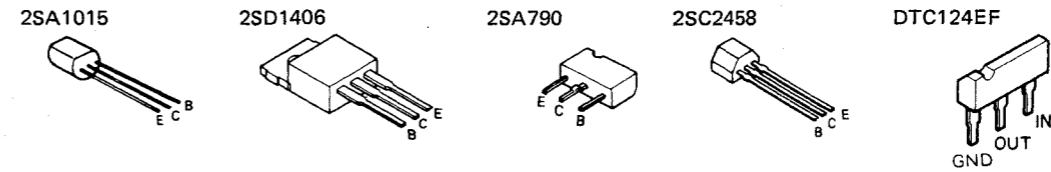
FINAL UNIT (X45-1440-XX) Component side view
 -10 : TM-2550A (K1,M1,M3), TM-2550E (T,W)
 -11 : TM-2530A (K2,M2,M4)



Q1 : M57726 (TM-2550A/E), M57737 (TM-2530A) Q2 : 2SD1406(Y) Q3 : 2SA1015(Y) Q4-7 : 2SC2458(Y)
 D1 : U15B D2 : UM9401 (TM-2550A/E), MI407 (TM-2530A) D3 : MI308 D4,5 : 1S1587

| | |
|------------|----|
| | C1 |
| TM-2550A/E | X |
| TM-2530A | O |

O : Used, X : Not used

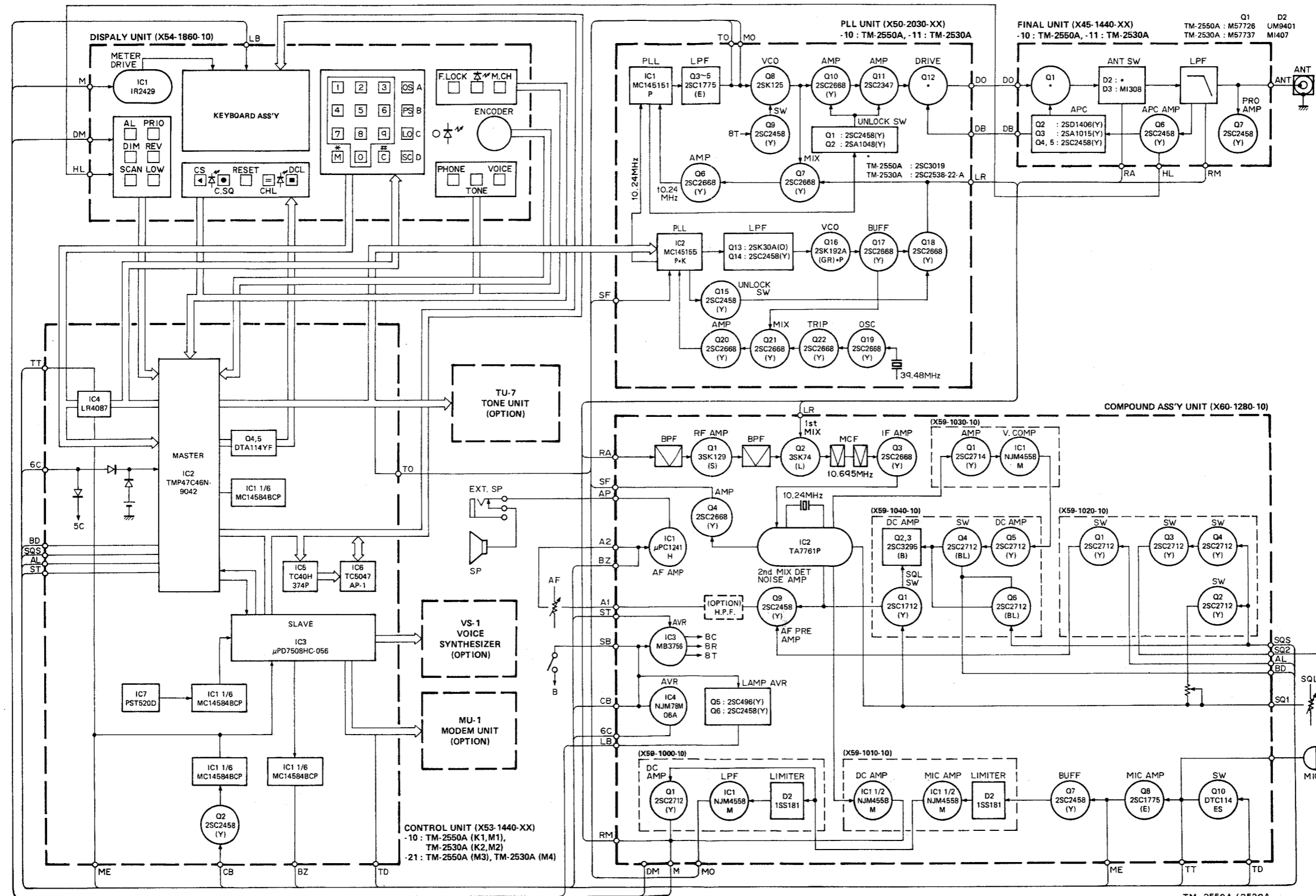


TERMINAL FUNCTION

| Terminal name | Terminal function |
|---------------|--------------------|
| AL | ALERT |
| AP | Audio Power Output |
| A1 | AF Output |
| A2 | AF Input |
| B | + 13.8V |
| BD | Busy Display |
| BZ | Buzzer |
| CB | Common + B |
| CT | Tone Clock |
| CP | PLL Clock |
| 5C | + 5V Common |
| 6C | + 6V Common |
| 8C | + 8V Common |
| DB | Drive + B |
| DT | Tone Data |
| DW | MIC Down SW |
| DP | PLL Data |
| DM | Dimmer |
| DO | Drive Out |
| ET | Tone Enable |
| EP | PLL Enable |
| E1 | Encoder 1 |
| E2 | Encoder 2 |
| HL | HI/LOW |
| G | GND |
| LB | Lamp + B |
| LR | RX Local |

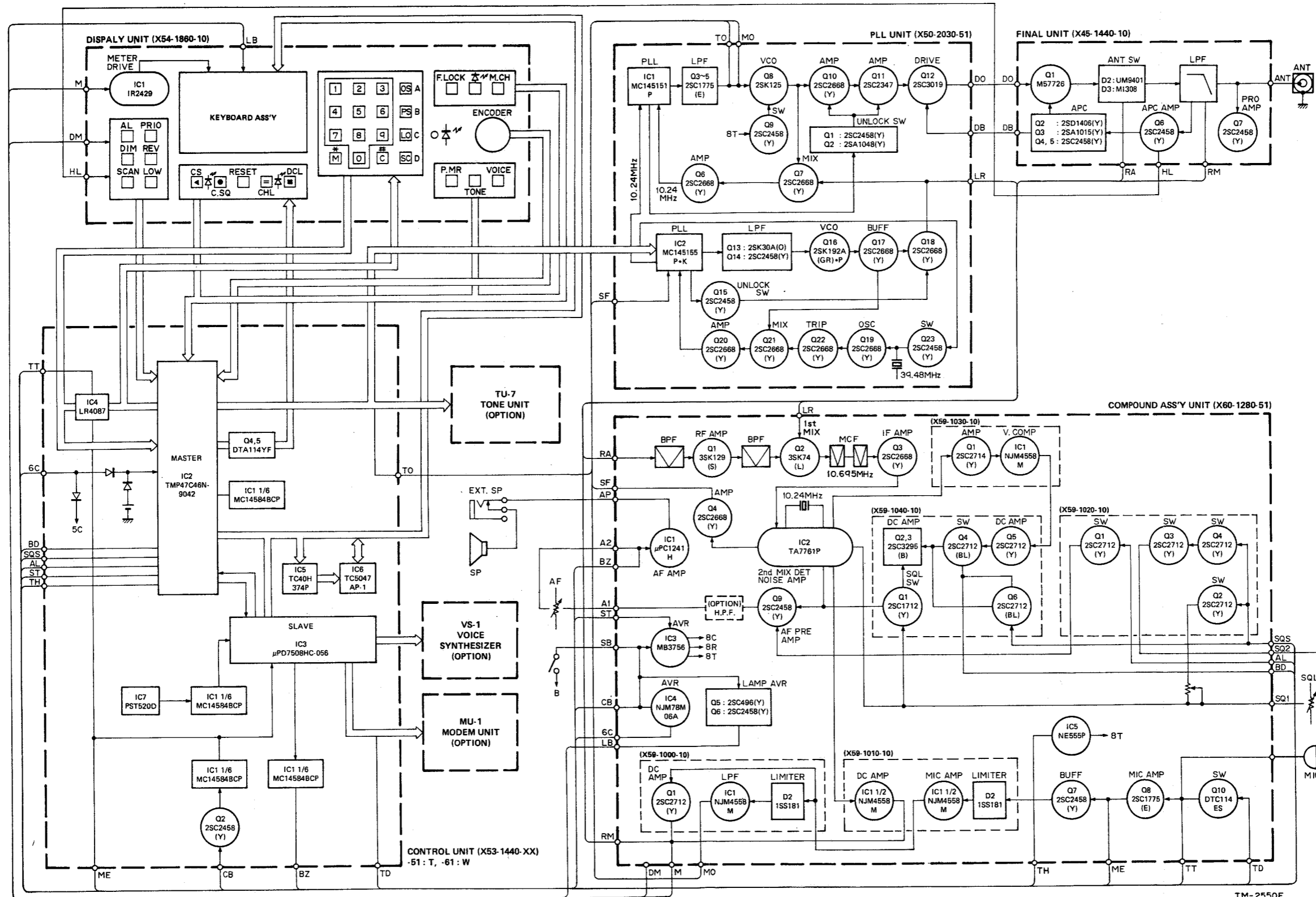
| Terminal name | Terminal function |
|---------------|--------------------|
| ME | Modem Enable |
| MD | Modem Data |
| MC | Modem Clock |
| M | Meter |
| MIC | MIC |
| MO | Modulator Out |
| 8M | MIC 8V |
| NC | Non Connection |
| RD | RX Data |
| RA | RX Antenna |
| RM | RF Meter |
| SF | Standard Frequency |
| ST | Stand By |
| SS | Stand By SW |
| SQS | Squelch Select |
| SQ1 | Squelch 1 |
| SQ2 | Squelch 2 |
| SP | Speaker |
| SB | Switched + B |
| TO | Tone |
| TS | Tone SW |
| TH | Tone Hi |
| TD | TX Data |
| TT | Touch Tone Signal |
| 8T | TX + 8V |
| 8C | + 8V Common |
| UP | MIC UP SW |
| VS | Voice SW |

BLOCK DIAGRAM (K,M TYPE)



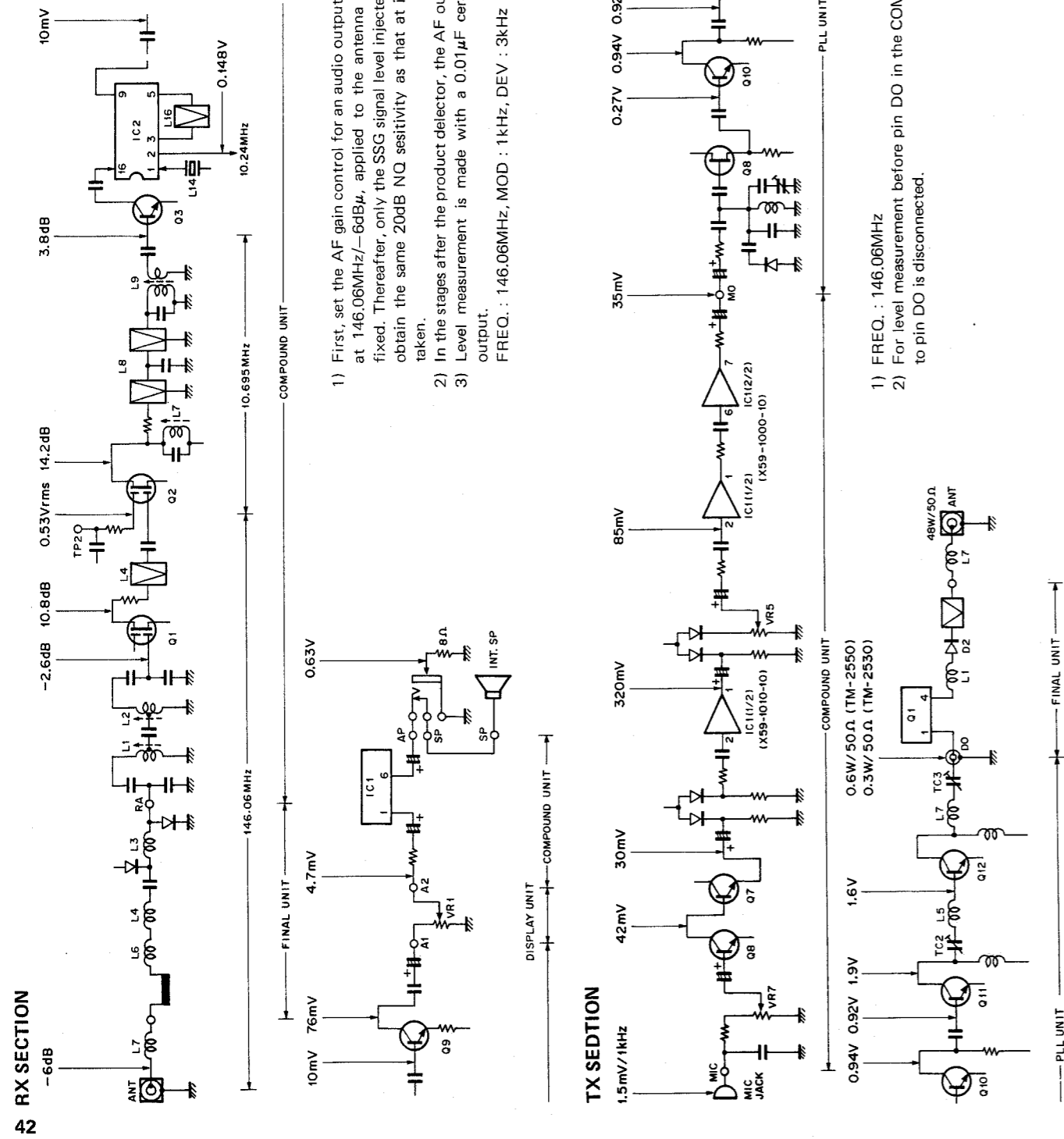
TM-2550A / 2530A

BLOCK DIAGRAM (T,W TYPE)



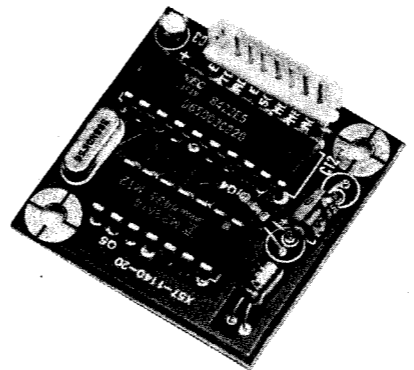
TM-2550E

LEVEL DIAGRAM

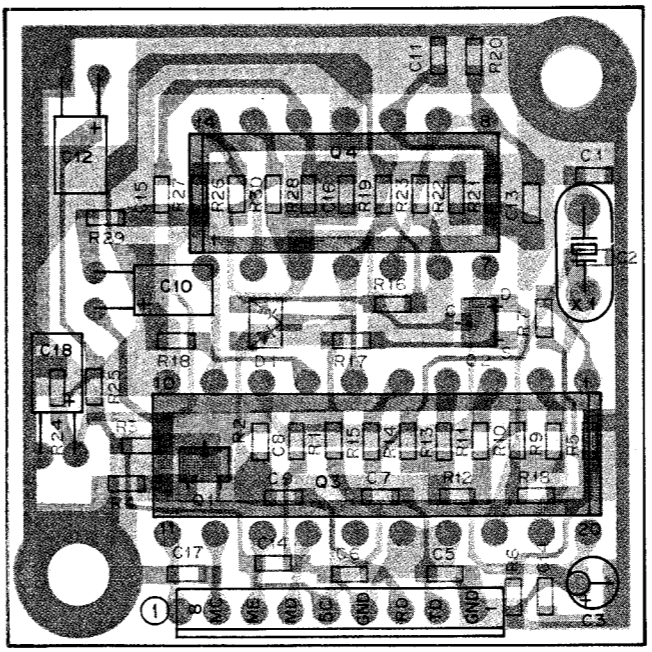


- 1) First, set the AF gain control for an audio output of 0.63V/8Ω for an SSG output signal at 146.06MHz/-6dBμ, applied to the antenna terminal, the AF gain control is now fixed. Thereafter, only the SSG signal level injected at each point is varied, as required to obtain the same 20dB NQ sensitivity as that at initial input of the reference -6dBμ is taken.
 - 2) In the stages after the product detector, the AF output level is measured.
 - 3) Level measurement is made with a 0.01μF ceramic capacitor connected to the SSG output.
- FREQ.: 146.06MHz, MOD: 1kHz, DEV: 3kHz

MU-1 OUTSIDE VIEW



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



MU-1 PARTS LIST

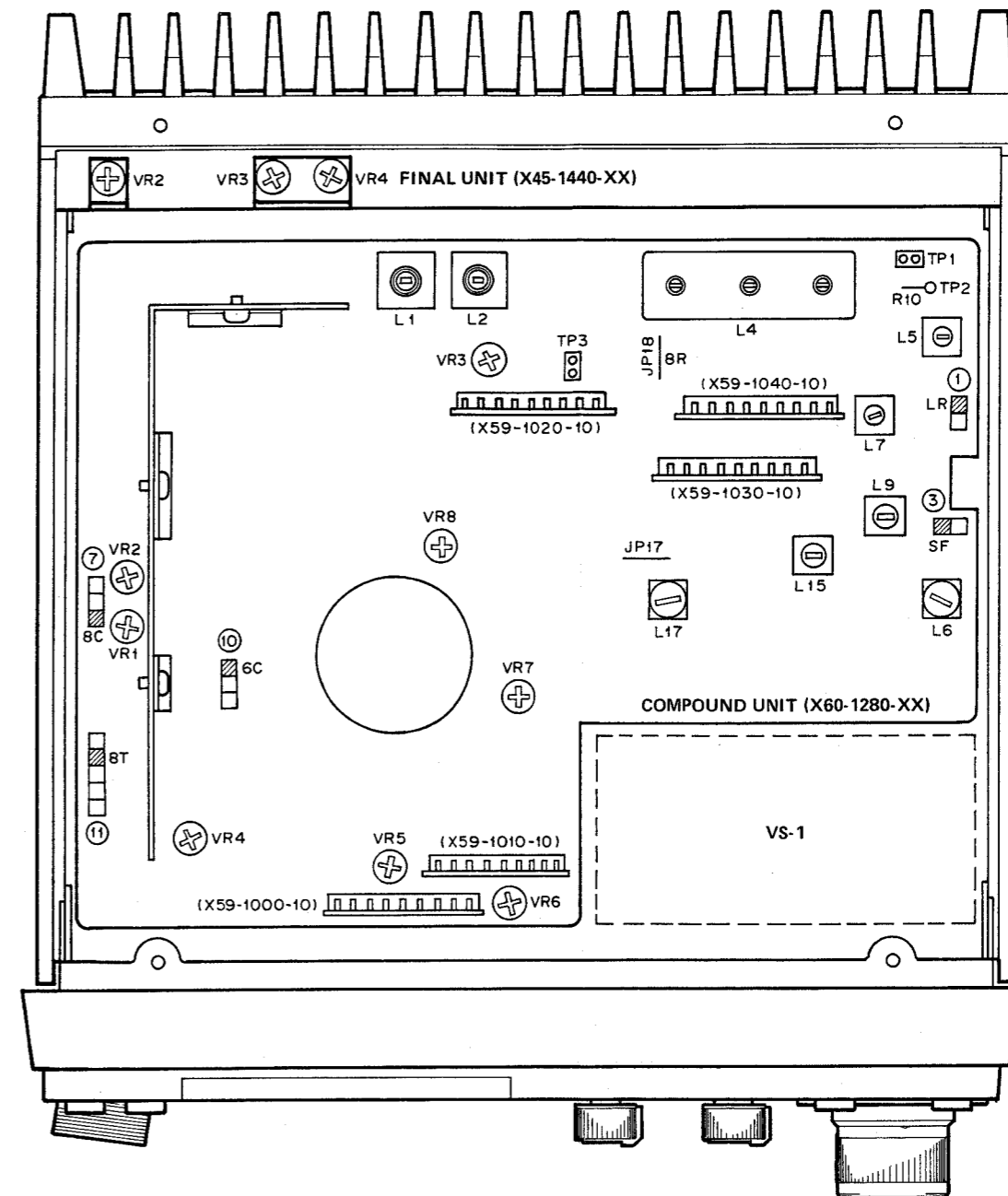
| Part No. | Remarks | Description | Q'Ty | Ref. No. |
|---------------------------------|---------|----------------------------|------|----------------------|
| MU-1 (GENERAL) | | | | |
| B50-8046-00 | N | Instruction manual | 1 | |
| G13-0826-04 | | Cushion | 1 | |
| H01-4680-03 | N | Carton (Inside) | 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 | |
| MODEM UNIT (X57-1140-20) | | | | |
| CC73FCH1H150J | | Chip cap. 15P | 2 | C1,2 |
| CE04CW0J220M | | 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 | C4,7,9,11,14-16 |
| 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 | R8,10,12,14,18,23,30 |
| 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 |
| DAP202(K) | | Chip diode | 1 | D1 |

ADJUSTMENT

| Item | Condition | Operation check | Item | Condition | Operation check | |
|-------------|--|--|---|--|---|---|
| 1. Keyboard | 7) KEY : 6. 6. 6. 6. 5. 6. 6. 6. | ☐ 6.665 1 ☑ 5.665 1 | 5. PS KEY | 1) Turn the M.CH dial to b CH. KEY PS : ON | ☐ 5.000 b Tone sounds. | |
| | 8) KEY : 7. 7. 7. 7. 5. 7. 7. 7. | ☐ 7.775 1* ☑ 5.775 1 | | 2) AL SW : OFF PRIO SW : ON | ☐ 4.000 b PRIO LCD : Lights on | |
| | 9) KEY : 8. 8. 8. 8. 5. 8. 8. 8. | ☐ 8.885 1 ☑ 5.885 1 | 6. SCAN KEY | 1) PRIO SW : OFF KEY SC : ON | PRIO LCD : Lights off ☐ 4.005 b Tone sounds. The display should step up in 5kHz approx. every 6 seconds. | |
| | 10) KEY : 8. 9. 9. 9. 5. 9. 9. 9. | ☐ 8.995 1 ☑ 5.995 1 | | 7. Lamp SW | 1) LAMP SW : ON 2) OFF after checked. KEY C : ON | Key board illuminated. |
| | 11) KEY : 5. 0. 0. 0. | ☐ 5.000 1 | 8. DCL function (Digital channel link) | 1) Install MU-1 in the CONT. unit. 2) Reset microprocessor. See ADJ of "RESET". 3) DCL KEY : Press 4) Memory write to channel "A". | DCL LED : Lights on. | |
| | 12) KEY : OS | Tone sounds. ☐ 5.000 1 | | 5) Digital code setting • CS KEY : Press • C.SQ KEY : Press • RESET KEY : Press • CS KEY : Press again. KEY : Press 4. 9. 4. 0. | 00000 * lights. 1_00 4940 | |
| | 13) Turn the M.CH dial to CCW 1 step. | ☐ 5.000 2 | | 6) Check DCL operation. Set the monitor's radio. Condition : • Display : 4.940 • DCL KEY : Press • CHL KEY : Press | Both radio frequency changed display to "A" channel. Tone sounds. | |
| | 14) KEY : M | Tone sounds. | | | 9. DCS System (Digital code squelch) | 1) C.SQ KEY : Press 2) Monitor's radio Mic PTT : Press |
| | 15) Turn the M.CH dial to CCW. 2. 3. 4. . . . 19. A. b. d. 1. 2. | LCD Memory CH number should indicate. Tone sounds. U→1 (or 2→1) | | 10. VS-1 check | | 1) Install the VS-1 in the CONT. unit. VOICE KEY : Press |
| | 2. M. CH SW | 1) F. LOCK SW : ON | Display does not change when the M.CH dial turn to right and left. ☐ 5.000 2 | 11. PHONE function | 1) PHONE KEY : Press 2) Turn to encoder dial. 3) Set "A1" display PS KEY : Press | Display shows A1-A15. |
| | | 2) M.CH key : Press | Lights on | | 4) Input 7 digit for telephone number (ex. 6399000) | ☑ Telephone indicator light on. |
| | | 3) Turn the M.CH dial to the right 1 step. | Tone sounds. ☐ 4.000 1 | | 5) PHONE KEY : Press again | |
| | 3. REV. PRIO SW | 4) KEY : L0 | Tone sounds. ☐ 4.000 * 1 | 6) PHONE KEY : Press during transmit | Dial tone 7 digits are transmit automatically. | |
| | | 1) M.CH KEY : Press | Lights off | 7) Return to receive mode. PHONE KEY : Press again | | |
| | | 2) REV SW : ON | ☐ 5.000 1 5.600 1 REV LCD : Lights on | 8) C KEY : Press | A--- | |
| 4. AL SW | 1) PRIO SW : OFF SQL VR : MIN (CCW) AL SW : ON VOL VR : 10:00 | ☐ 5.000 1 PRIO LCD : Lights off Noise should momentarily mute approx. 0.3 seconds every 6-7 seconds. | 9) PHONE KEY : Press | ☑ Telephone indicator light off. | | |

ADJUSTMENT

TOP VIEW



COMPOUND UNIT

- L5,7,9,15 : IF GAIN adj.
- VR1 : TOUCH TONE adj. (K,M only)
- VR2 : BEEP LEVEL adj.
- VR3 : VACANT CH. LEVEL adj.
- VR4 : RF-METER adj.
- VR5 : DEV. adj. ±4.5kHz
- VR6 : S-METER adj.
- VR7 : MIC GAIN adj. ±3kHz
- VR8 : TONE adj. (T,W only)

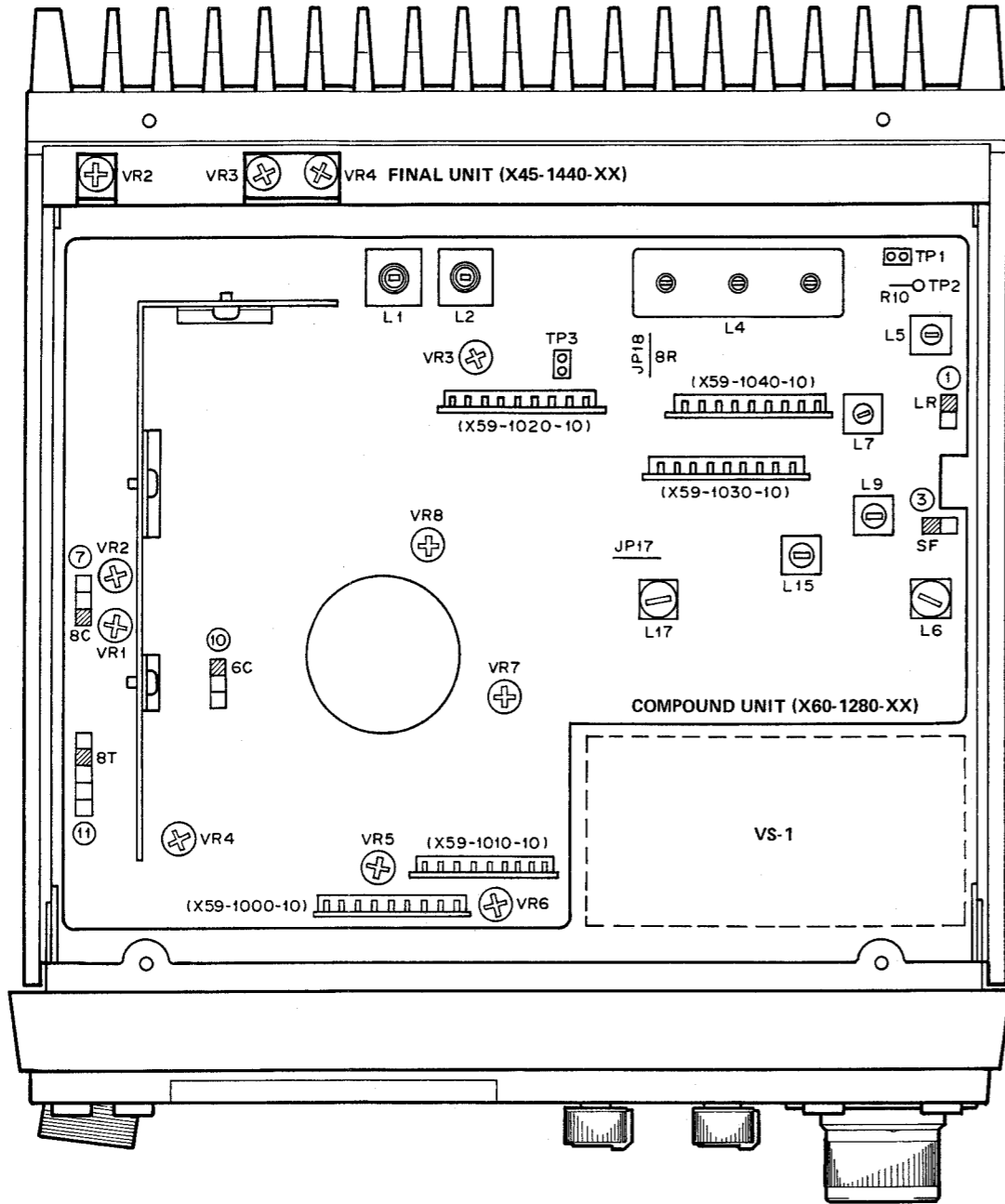
FINAL UNIT

- VR2 : Protection current
- VR3 : High power
- VR4 : Low power

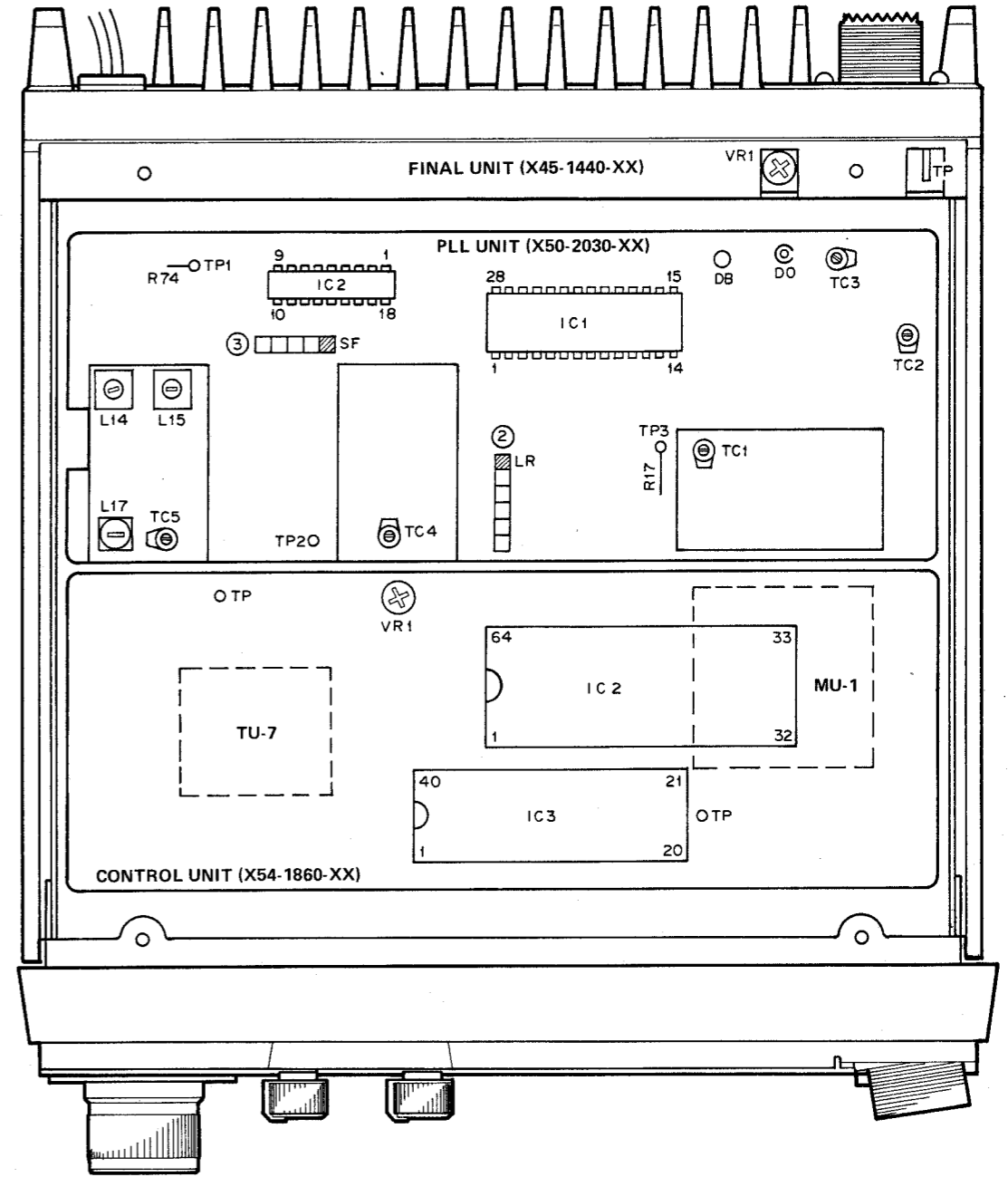
ADJUSTMENT

ADJUSTMENT

TOP VIEW



BOTTOM VIEW



COMPOUND UNIT

- L5,7,9,15 : IF GAIN adj.
- VR1 : TOUCH TONE adj. (K,M only)
- VR2 : BEEP LEVEL adj.
- VR3 : VACANT CH. LEVEL adj.
- VR4 : RF-METER adj.
- VR5 : DEV. adj. ± 4.5 kHz
- VR6 : S-METER adj.
- VR7 : MIC GAIN adj. ± 3 kHz
- VR8 : TONE adj. (T,W only)

FINAL UNIT

- VR2 : Protection current
- VR3 : High power
- VR4 : Low power

FINAL UNIT

- VR1 : NULL POINT

PLL UNIT

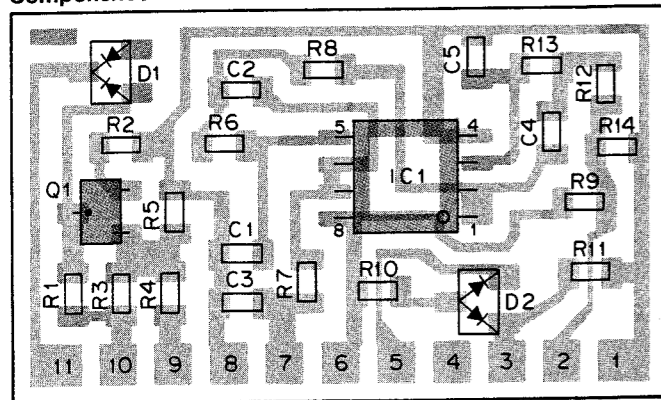
- TC1 : TX VCO (2.0V)
- TC4 : RX VCO (6.0V)
- L14,15 : PLL IF
- L17 : 135.305MHz adj. (K,M type)
- 134.305MHz adj. (T,W type)

CONTROL UNIT

- VR1 : SCAN SPEED

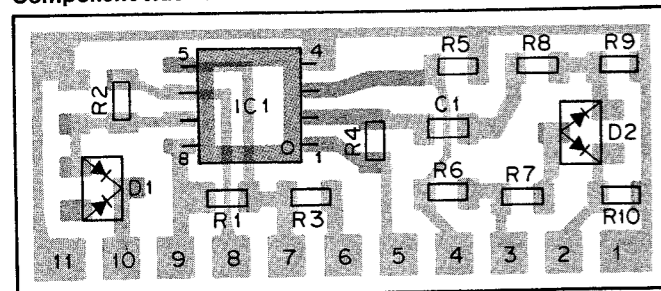
TM-2550A/E, 2530A PC BOARD VIEWS

MIC AMP MODULE UNIT (X59-1000-10)
Component side view



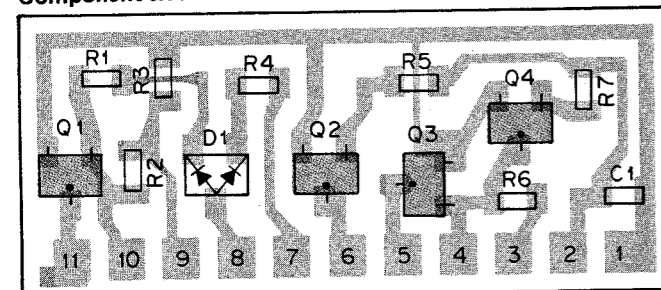
Q1 : 2SC2712(Y) IC1 : NJM4558M
D1 : 1SS184 D2 : 1SS181

MIC AMP, S-METER UNIT (X59-1010-10)
Component side view

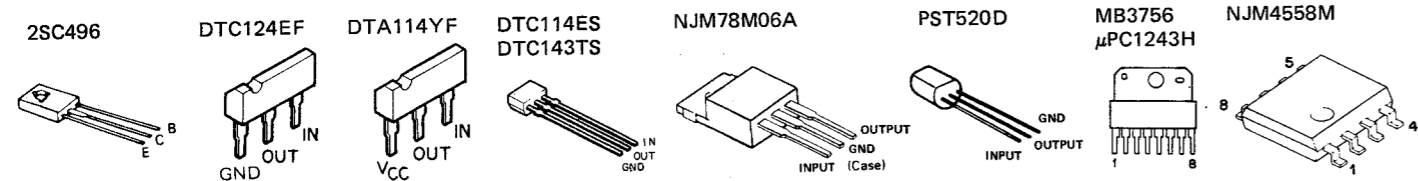


IC1 : NJM4558M
D1 : 1SS184 D2 : 1SS181

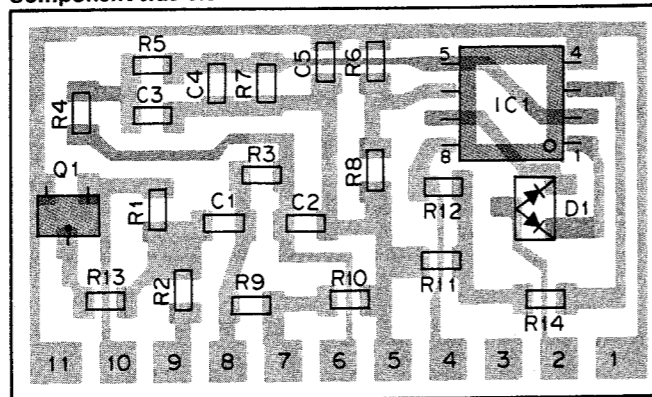
ALERT, VACANT-CH UNIT (X59-1020-10)
Component side view



Q1-4 : 2SC2712(Y)
D1 : 1SS181

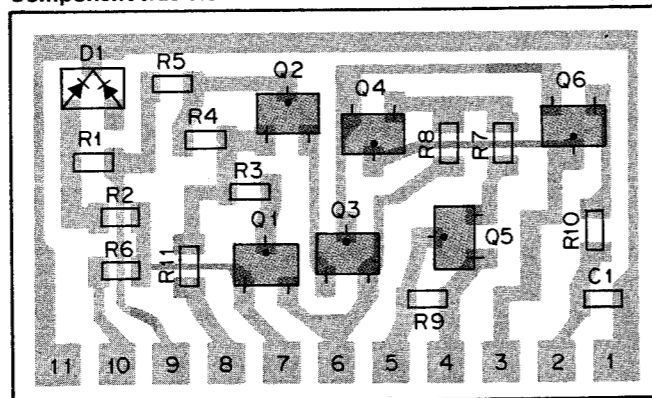


CENTER-DETECTOR UNIT (X59-1030-10)
Component side view

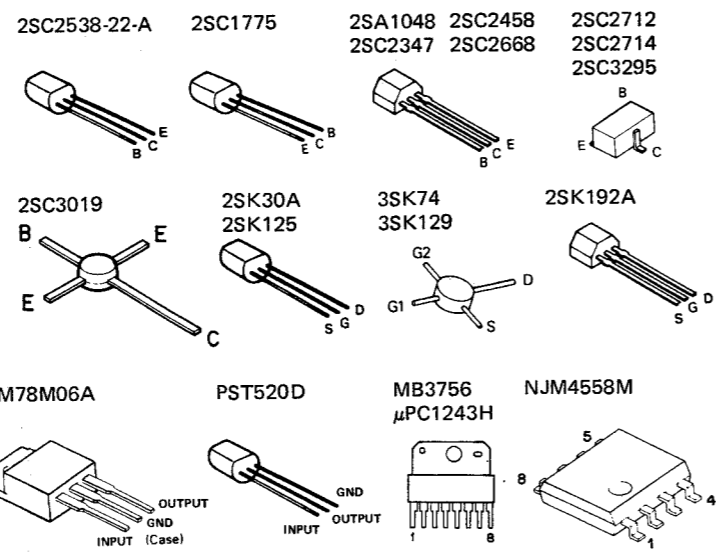


Q1 : 2SC2714(Y) IC1 : NJM4558M
D1 : 1SS181

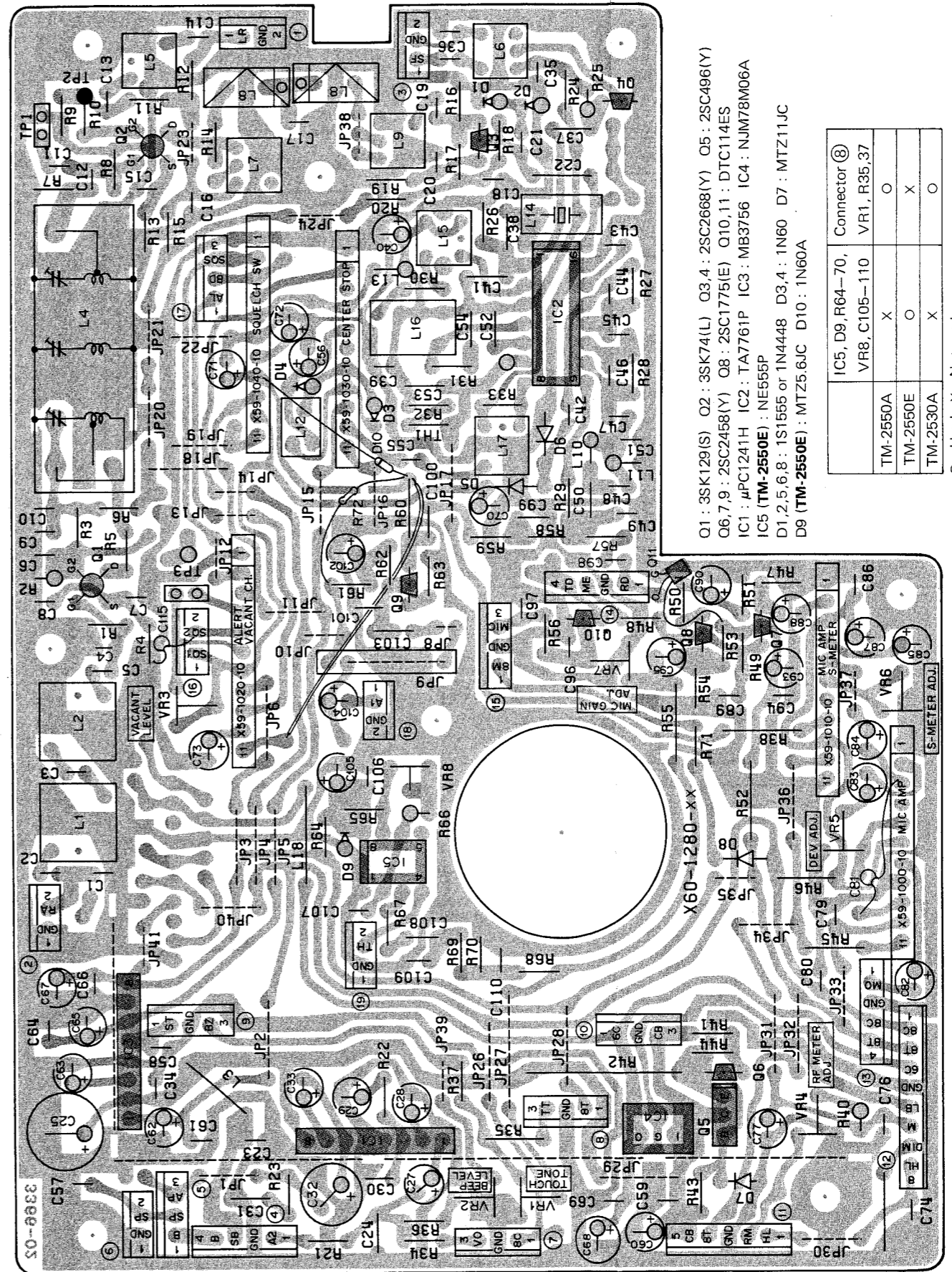
SQUELCH CONTROL UNIT (X59-1040-10)
Component side view



Q1,5 : 2SC2712(K) Q2,3 : 2SC3295(B) Q4,6 : 2SC2712(BL)
D1 : 1SS184



COMPOUND UNIT (X60-1280-XX) Component side view
-10 : TM-2550A (K1,M1,M3), TM-2530A (K2,M2,M4)
-51 : TM-2550E (T,W)

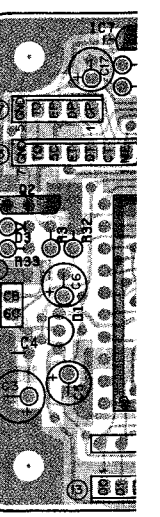


Q1 : 3SK129(S) Q2 : 3SK74(L) Q3,4 : 2SC2668(Y) Q5 : 2SC496(Y)
Q6,7,9 : 2SC2458(Y) Q8 : 2SC1775(E) Q10,11 : DTC114ES
IC1 : μ PC1241H IC2 : TAY761P IC3 : MB3756 IC4 : NJM78M06A
IC5 (TM-2550E) : NE555P
D1,2,5,6,8 : 1S1555 or 1N4448 D3,4 : 1N60 D7 : MTZ114C
D9 (TM-2550E) : MTZ5.6JC D10 : 1N60A

| | | |
|--------------------------------|-------------|-------------|
| IC5, D9, R64-70, VR8, C105-110 | Connector ⑧ | VR1, R35,37 |
| TM-2550A | X | O |
| TM-2550E | O | X |
| TM-2530A | X | O |

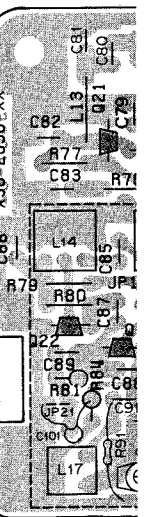
O : Used, X : Not used

CONTROL UI
-10 : TM-2550
-21 : TM-2551
-51 : TM-2552
-61 : TM-2553



Q1 : DTC124EF
Q4,5 : DTA114
IC1 : MC14584E
IC4 (K1,K2,M1-
IC6 : TC5047AF
D1 : MC911 D:
D9 (K1,K2,M1,
D10,12 (T,W) :
D13-16,22,28
D23 (K1,K2,M1

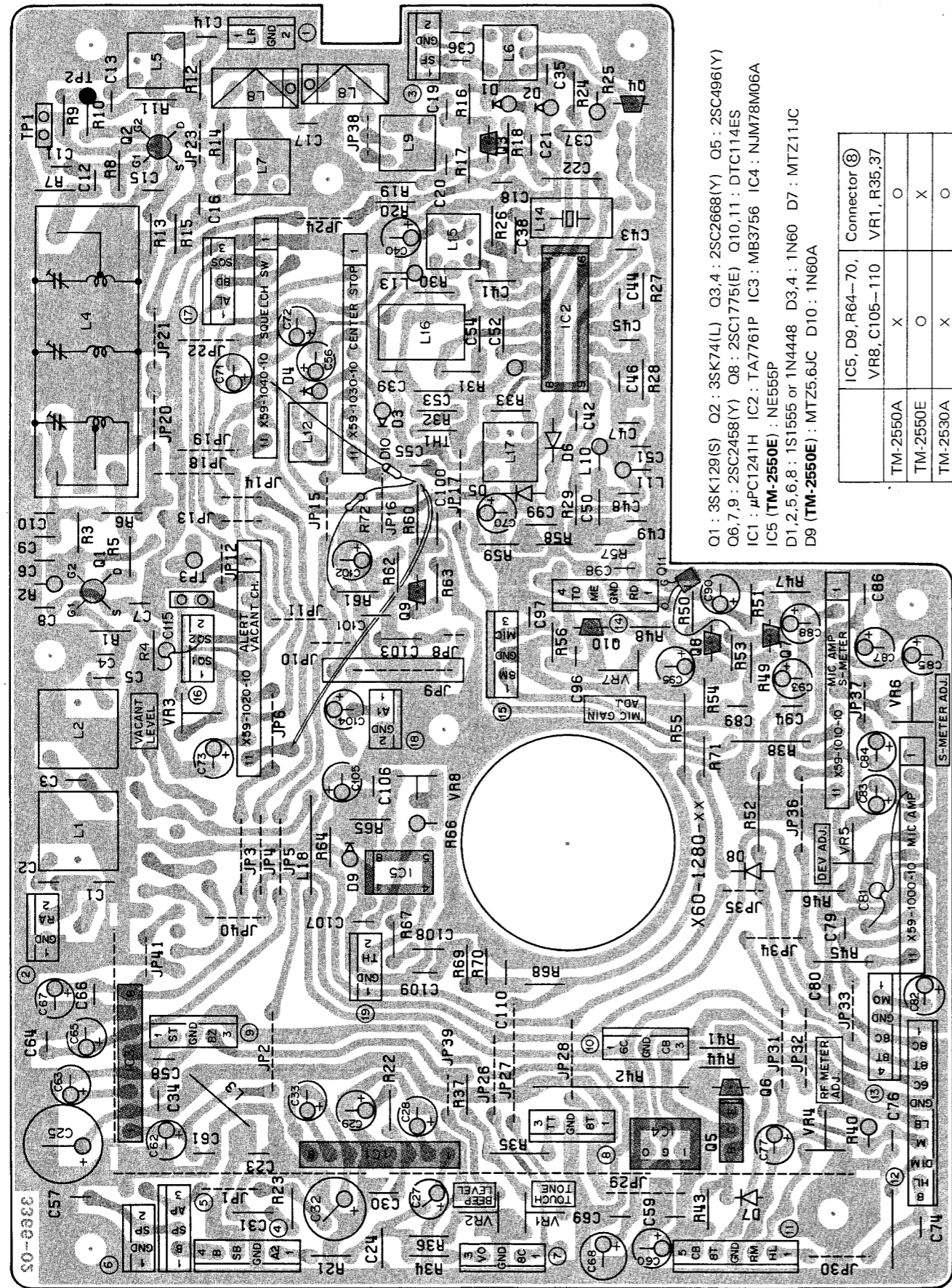
PLL UNIT (X
-10 : TM-2551
-11 : TM-2531
-51 : TM-2552



Q1,9,14,15 : 2S
Q6,7,10,17-22
Q12 (TM-2550A
Q13 : 2SK30A(C
IC1 : MC14515
D1,4 : 1S1555
D7 (TM-2550E)

COMPOUND UNIT (X60-1280-XX) Component side view

- 10 : TM-2550A (K1,M1,M3), TM-2530A (K2,M2,M4)
- 51 : TM-2550E (T,W)



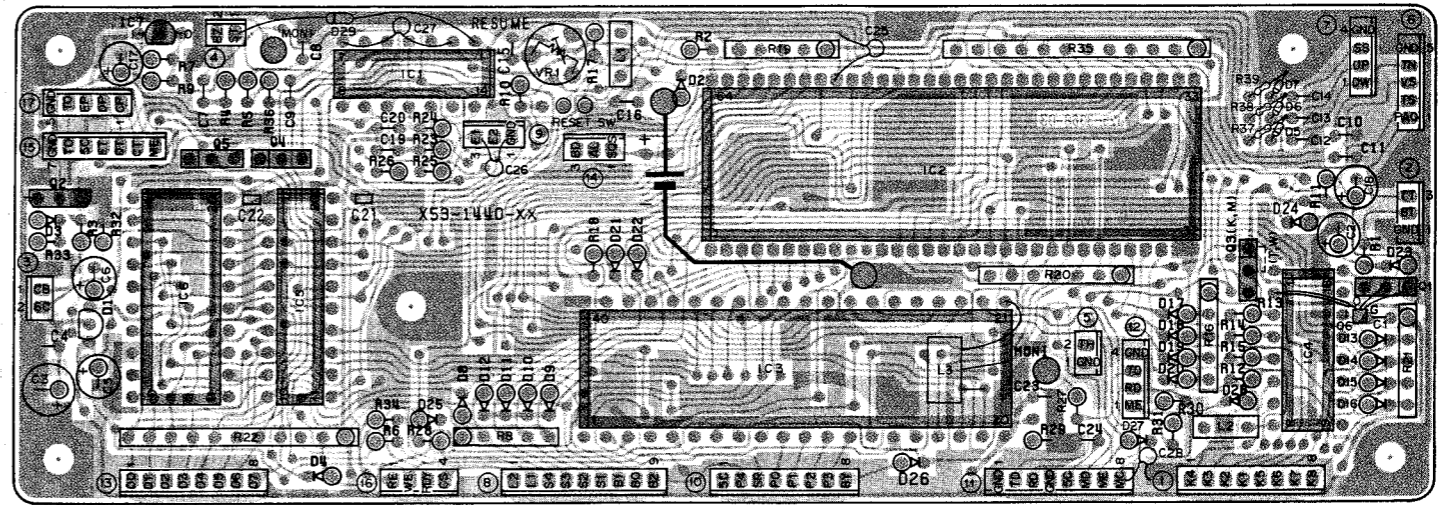
Q1 : 3SK129(S) Q2 : 3SK74(L) Q3,4 : 2SC2668(Y) Q5 : 2SC496(Y)
 Q6,7,9 : 2SC2458(Y) Q8 : 2SC1775(E) Q10,11 : DTC114E5
 IC1 : μ PC1241H IC2 : TA7761P IC3 : MB3756 IC4 : NJM78M06A
 IC5 (TM-2550E) : NE555P
 D1,2,5,6,8 : 1S1555 or 1N4448 D3,4 : 1N60 D7 : MTZ11JC
 D9 (TM-2550E) : MTZ5.6JC D10 : 1N60A

| | IC5, D9, R64-70, VR8, C105-110 VR1, R35,37 | Connector ② |
|----------|--|-------------|
| TM-2550A | X | O |
| TM-2550E | O | X |
| TM-2530A | X | O |

O : Used, X : Not used

CONTROL UNIT (X53-1440-XX) Component side view

- 10 : TM-2550A (K1,M1), TM-2530A (K2,M2)
- 21 : TM-2550A (M3), TM-2530A (M4)
- 51 : TM-2550E (T)
- 61 : TM-2550E (W)



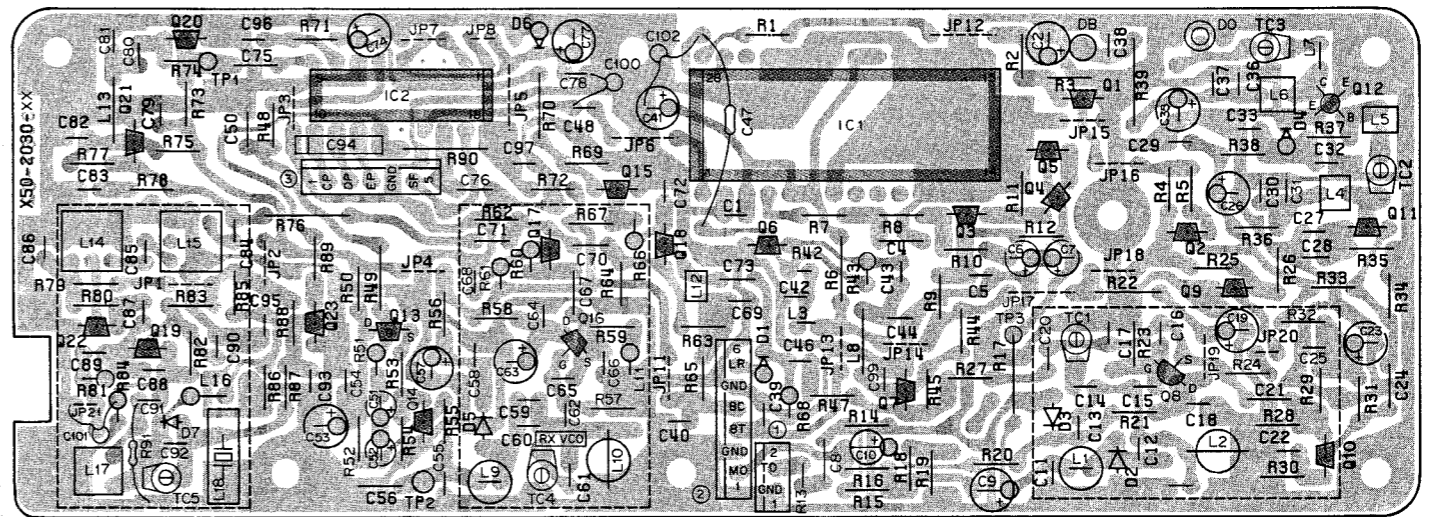
Q1 : DTC124EF Q2 : 2SC2458(Y) Q3 (K1,K2,M1-M4) : DTA114YF
 Q4,5 : DTA114YF Q6 (K1,K2,M1-M4) : DTC143TS
 IC1 : MC14584BCP IC2 : TMP47C46N-9042 IC3 : μ PD7508HC-056
 IC4 (K1,K2,M1-M4) : LR4087 IC5 : TC40H374P
 IC6 : TC5047AP-1 IC7 : PST520D
 D1 : MC911 D2,4-8,11,17-21,24,27 : 1S1555 or 1N4448
 D9 (K1,K2,M1,M2,W) : 1S1555 or 1N4448
 D10,12 (T,W) : 1S1555 or 1N4448
 D13-16,22,28 (K1,K2,M1-M4) : 1S1555 or 1N4448
 D23 (K1,K2,M1-M4) : MTZ5.6JC D25,26 : 1S106 D29 : 1SS133

| | | Q1,3,6, D13-16,22,23,28, IC4, L2, C1,2,18, R1,11-15, Connector ② | D9 | D10,12 |
|----------|-------|---|----|--------|
| TM-2550A | K1,M1 | O | O | X |
| | M3 | O | X | X |
| TM-2550E | T | X | X | O |
| | W | X | O | O |
| TM-2530A | K2,M2 | O | O | X |
| | M4 | O | X | X |

O : Used, X : Not used

PLL UNIT (X50-2030-XX) Component side view

- 10 : TM-2550A (K1,M1,M3)
- 11 : TM-2530A (K2,M2,M4)
- 51 : TM-2550E (T,W)



Q1,9,14,15 : 2SC2458(Y) Q2 : 2SA1048(Y) Q3-5 : 2SC1775(E)
 Q6,7,10,17-22 : 2SC2668(Y) Q8 : 2SK125 Q11 : 2SC2347
 Q12 (TM-2550A/E) : 2SC3019 Q12 (TM-2530A) : 2SC2538-22-A
 Q13 : 2SK30A(O) Q16 : 2SK192A(GR)+P Q23 (TM-2550E) : 2SC2458(Y)
 IC1 : MC145151P IC2 : MC145155P*K
 D1,4 : 1S1555 D2,5 : 1SV50 D3 : 1S2208 D6 : MTZ6.2JA
 D7 (TM-2550E) : MA856

| | Q23, D7, TC5, L16, C95, R85,86,88,89 | C102 |
|----------|--------------------------------------|------|
| TM-2550A | X | O |
| TM-2550E | O | O |
| TM-2530A | X | X |

O : Used, X : Not used

K1,K2,
M1,M2,M3,M4



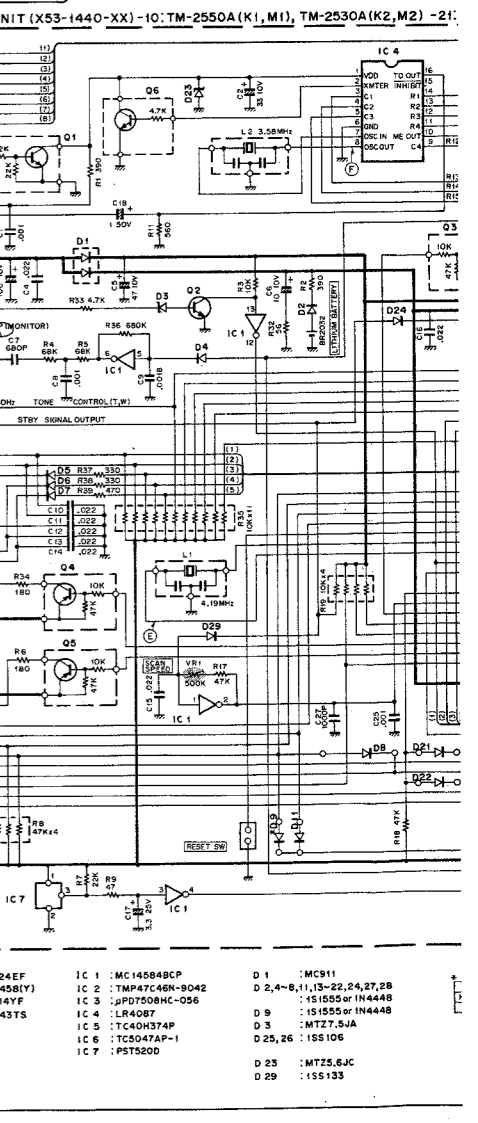
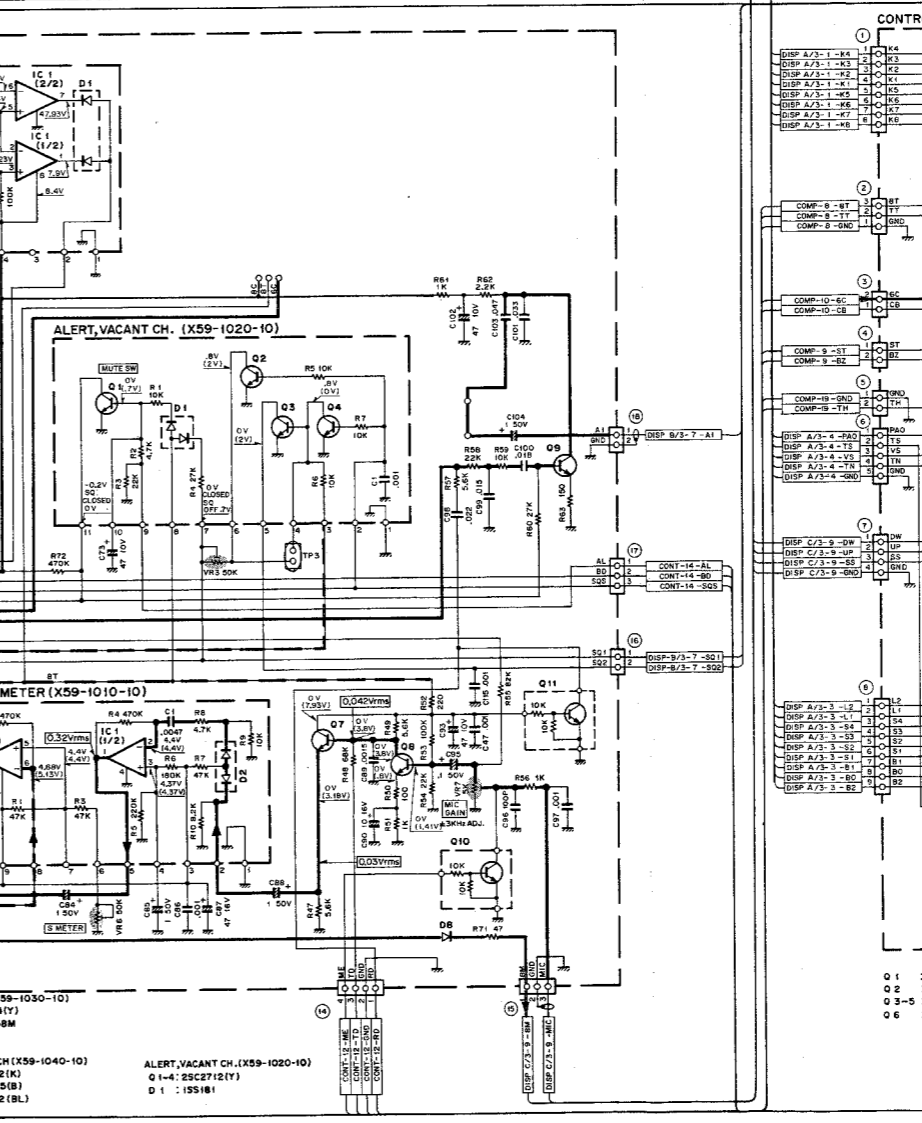
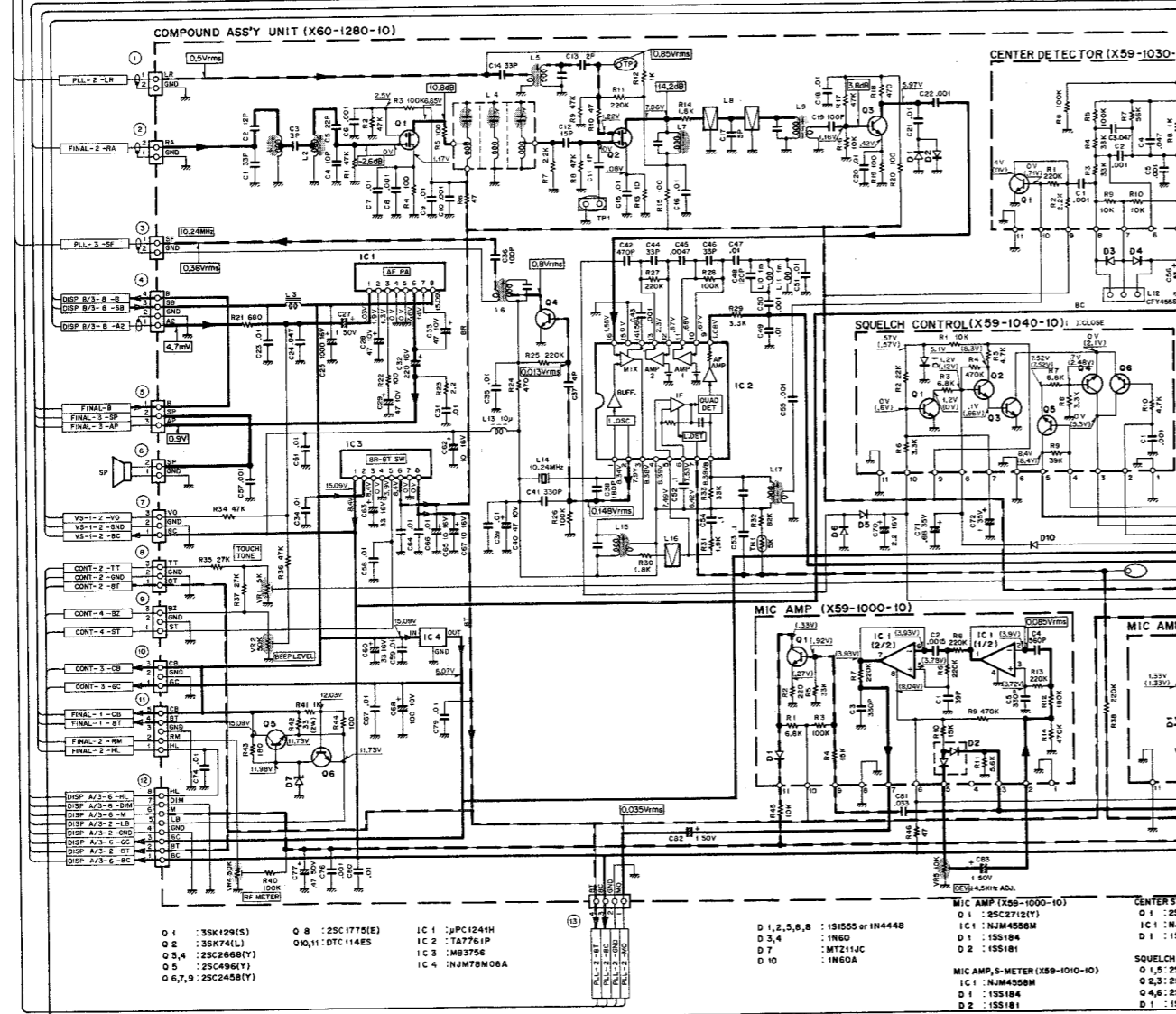
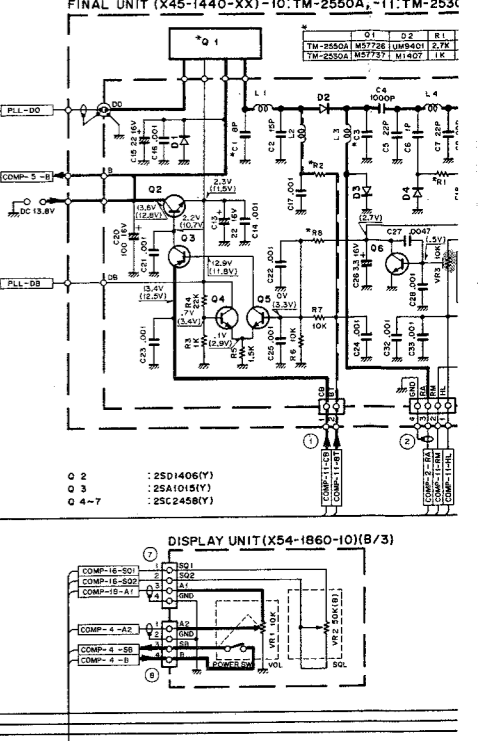
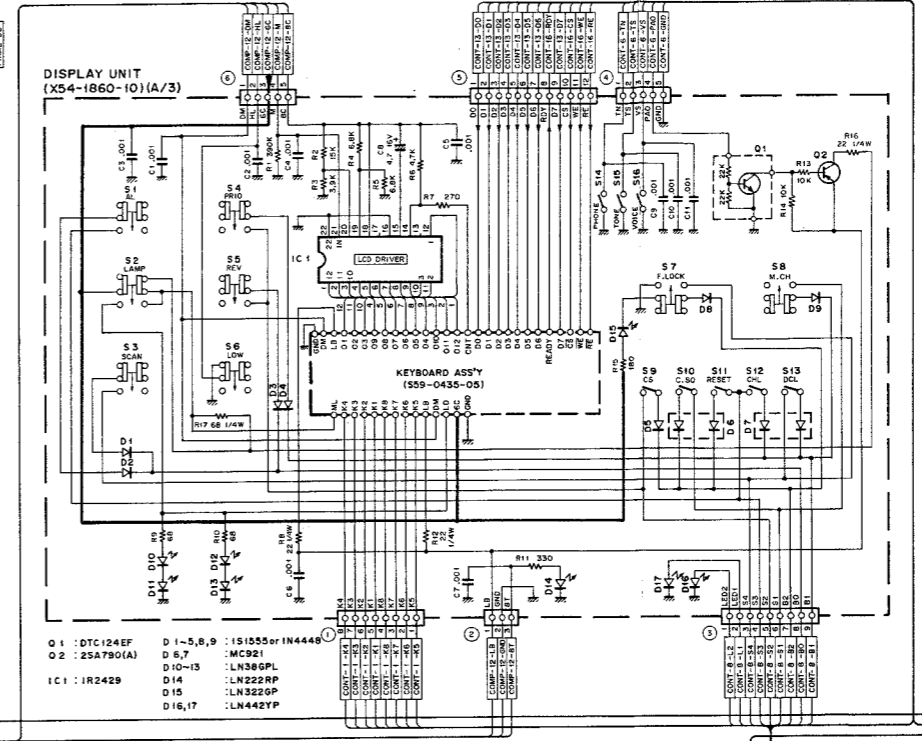
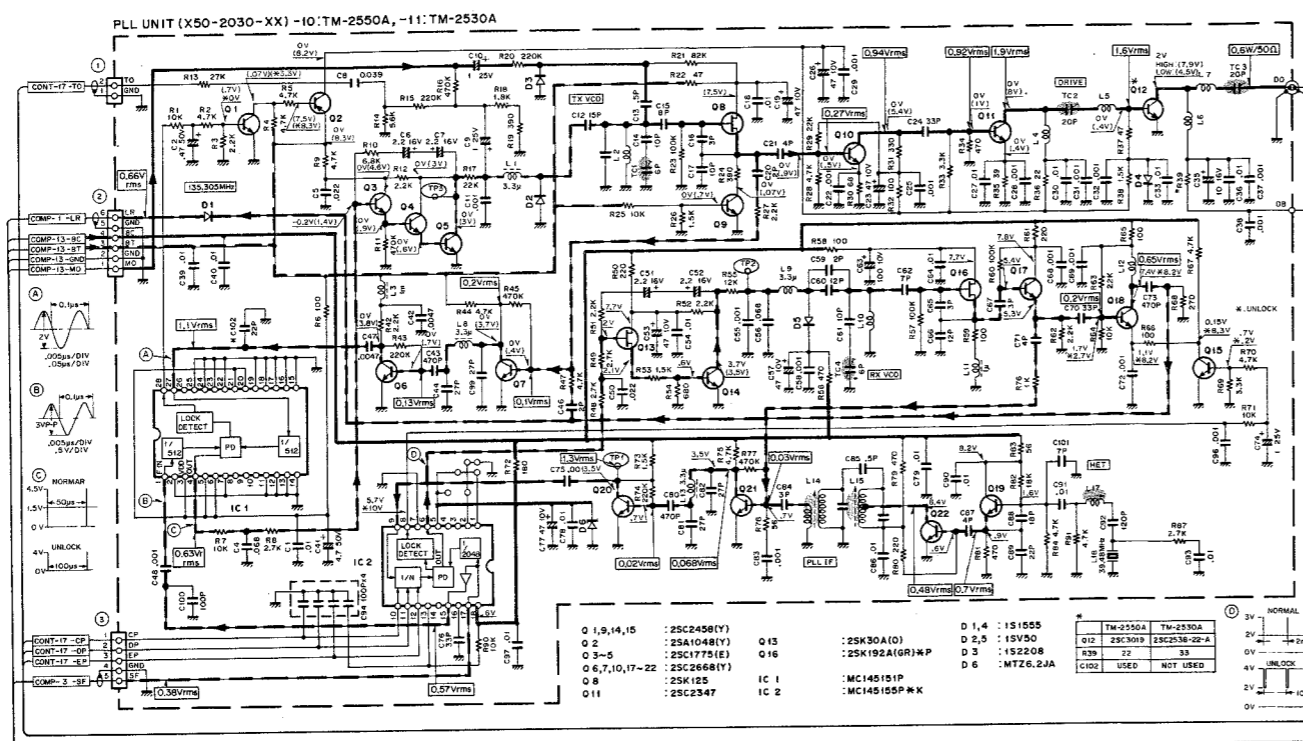
Signal line

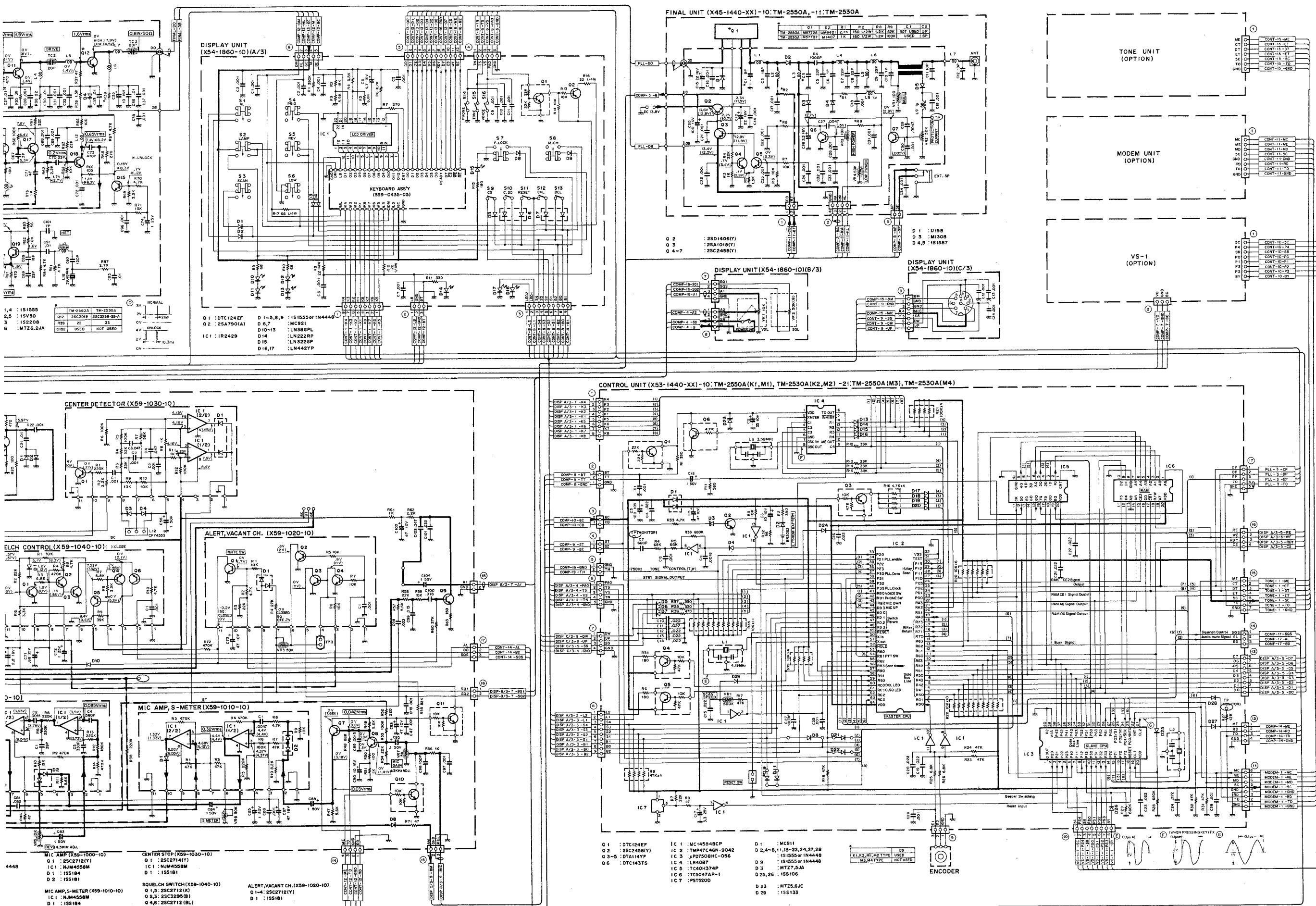
Control line

Common DC line

8T Line

Voltage measurement conditions f = 144.00MHz, RX no signal, () : TX.





| | |
|-----|------------|
| 1,4 | : 151555 |
| 2,5 | : 151587 |
| 3 | : 152208 |
| 6 | : MT26.2JA |

| | |
|------|--------------|
| Q1 | : DTC124EF |
| Q2 | : 25A1015(Y) |
| Q3 | : 25C2458(Y) |
| Q4-7 | : 25C2458(Y) |

| | |
|----------|--------------------|
| D1-5,8,9 | : 151555 or 1N4448 |
| D6,7 | : 1M508 |
| D10-13 | : LN388PL |
| D14 | : LN222RP |
| D15 | : LN322RP |
| D16,17 | : LN442YP |

| | |
|------|---------------|
| Q1 | : 25C2712(Y) |
| Q2 | : 25C2712(BL) |
| Q3 | : 25C295(B) |
| Q4,6 | : 25C2712(BL) |
| D1 | : 15S184 |
| D2 | : 15S181 |

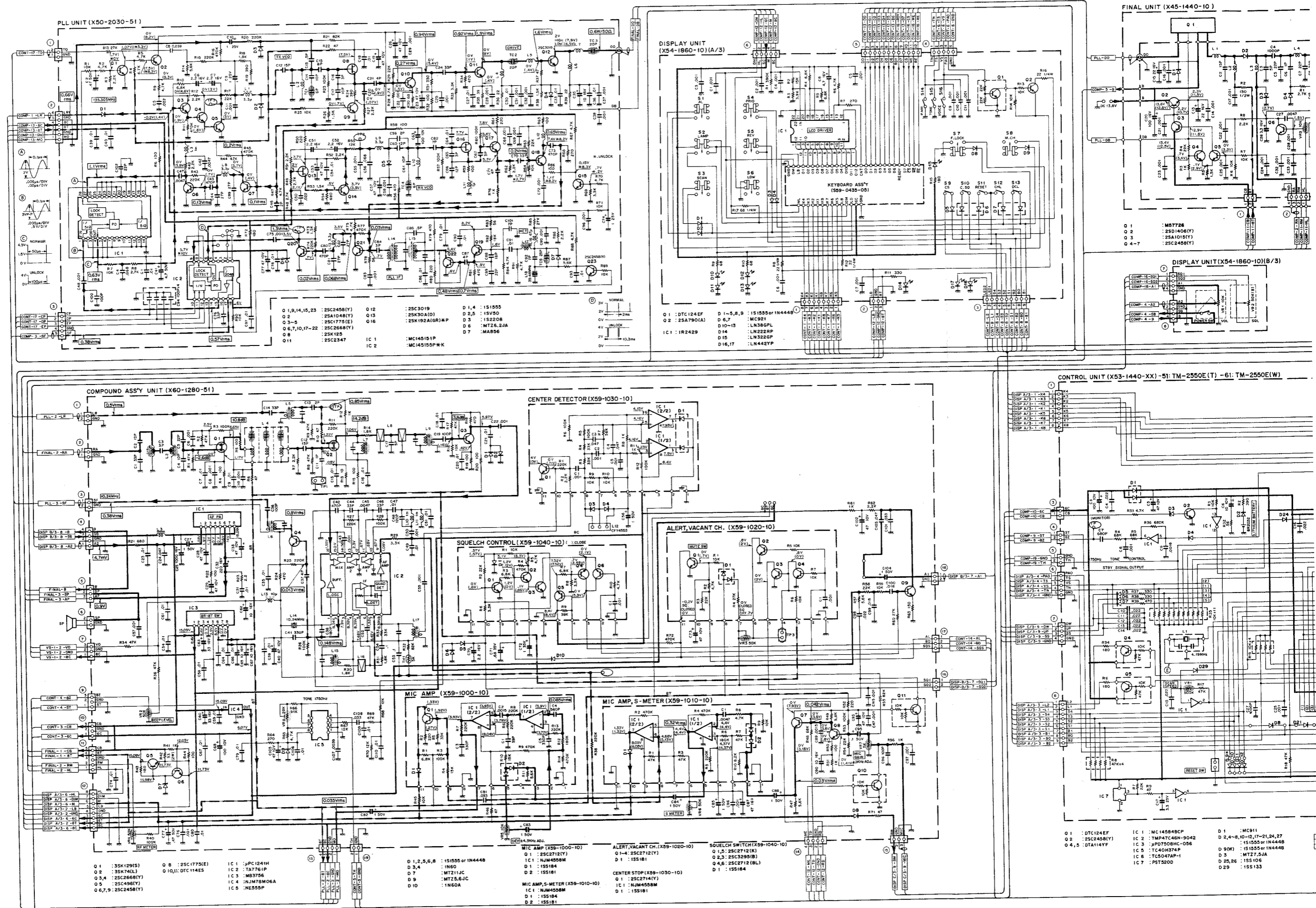
| | |
|------|---------------|
| Q1 | : 25C2712(Y) |
| Q2,3 | : 25C2712(BL) |
| Q4,6 | : 25C2712(BL) |
| D1 | : 15S181 |

| | |
|--------------------------|--------------------|
| Q1 | : DTC124EF |
| Q2 | : 25C458(Y) |
| Q3-5 | : DT1147P |
| Q6 | : DTC143TS |
| IC1 | : MC14584BCP |
| IC2 | : TMP47C46H-9042 |
| IC3 | : PDS0808C-056 |
| IC4 | : LR4087 |
| IC5 | : TC40H374P |
| IC6 | : TC5047AP-1 |
| IC7 | : P5T500D |
| D1 | : MC911 |
| D2,4-8,11,13-22,24,27,28 | : 151555 or 1N4448 |
| D9 | : 151555 or 1N4448 |
| D3 | : MT27.5JA |
| D25,26 | : 15S106 |
| D23 | : MT25.6JC |
| D29 | : 15S133 |

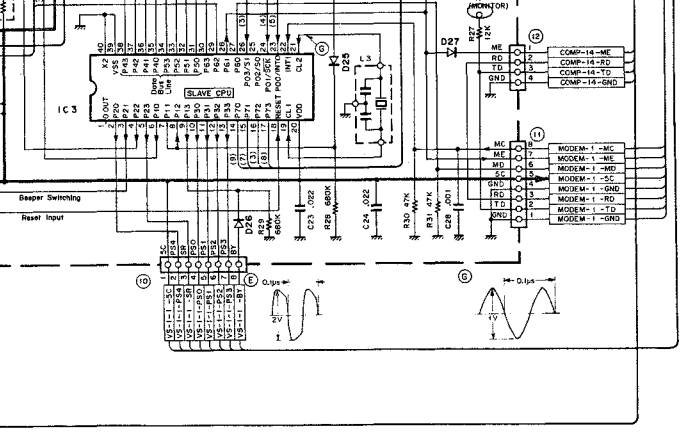
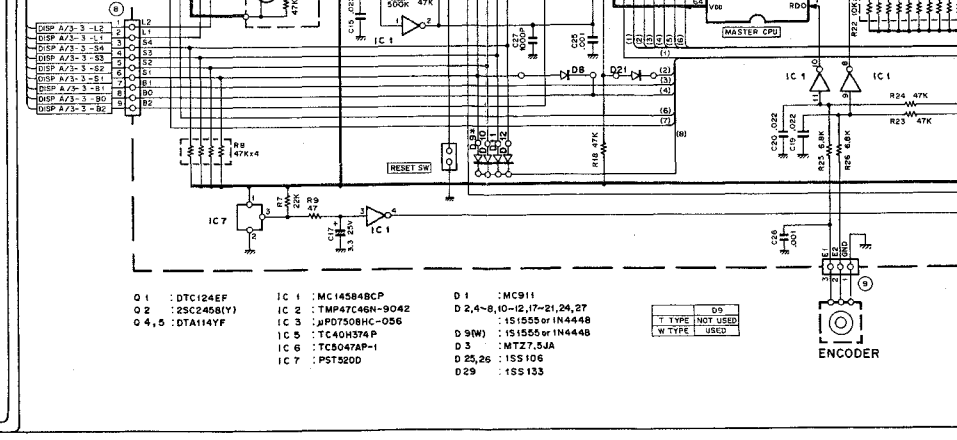
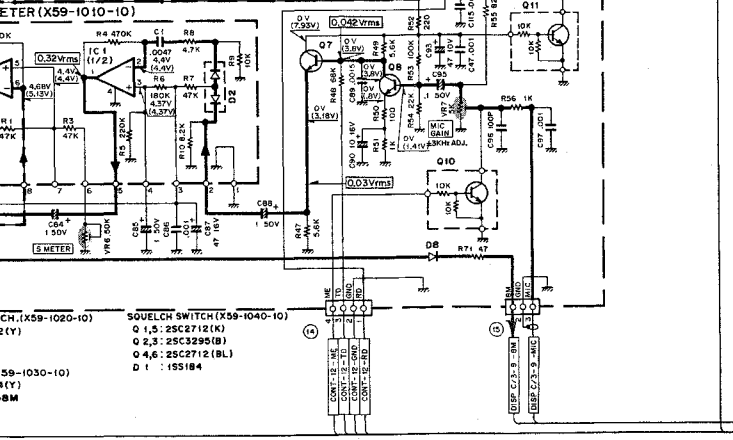
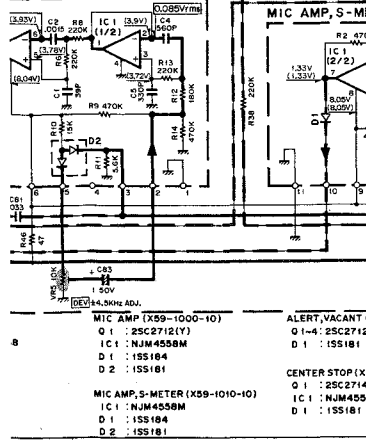
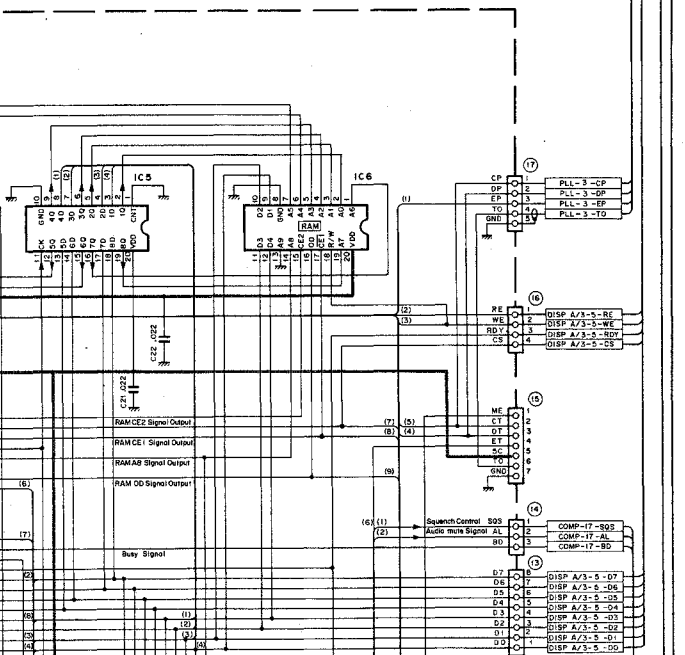
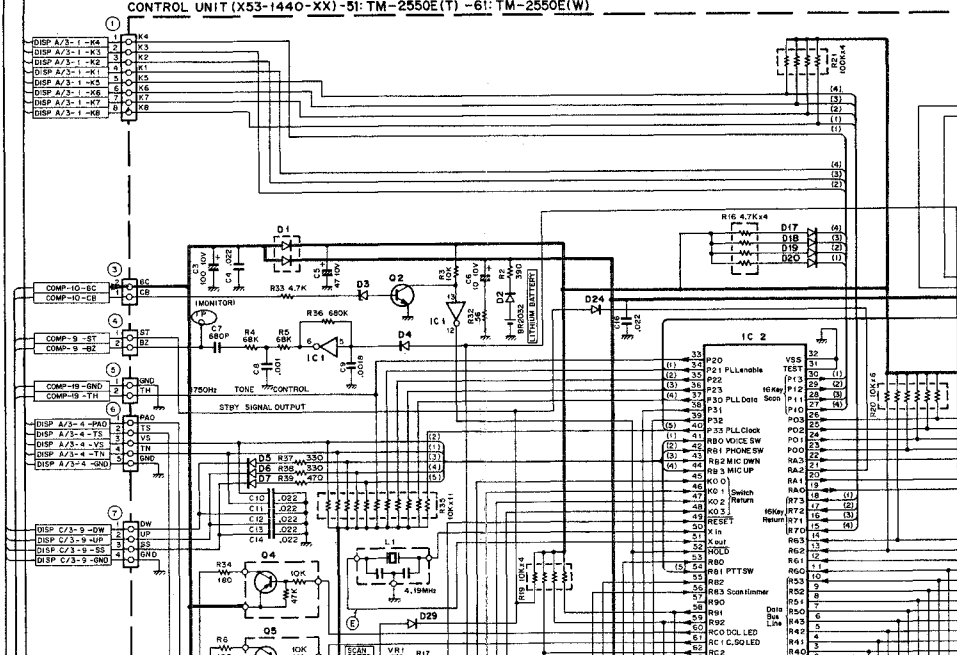
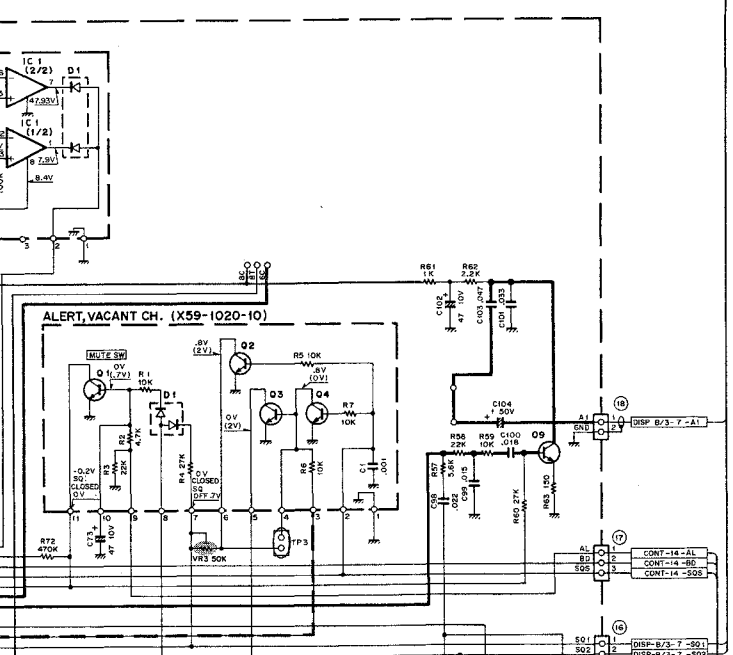
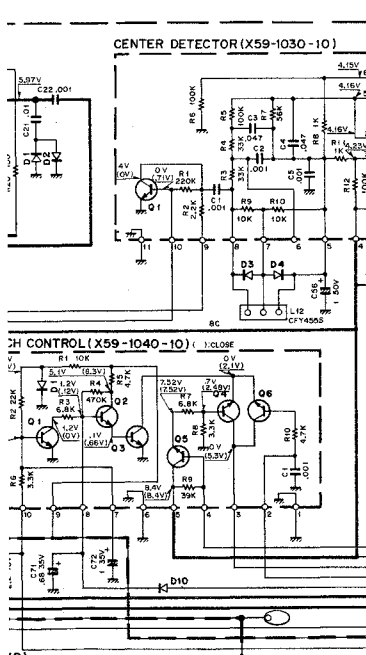
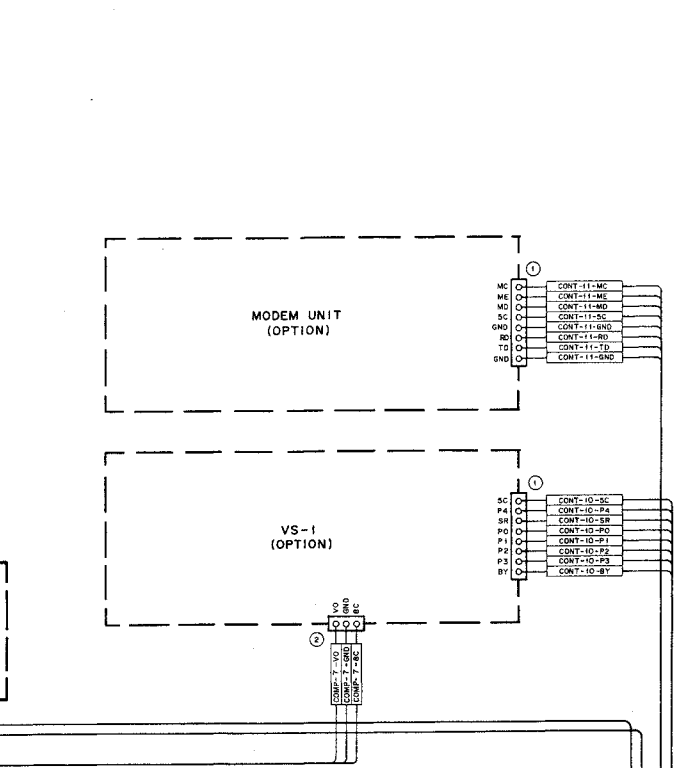
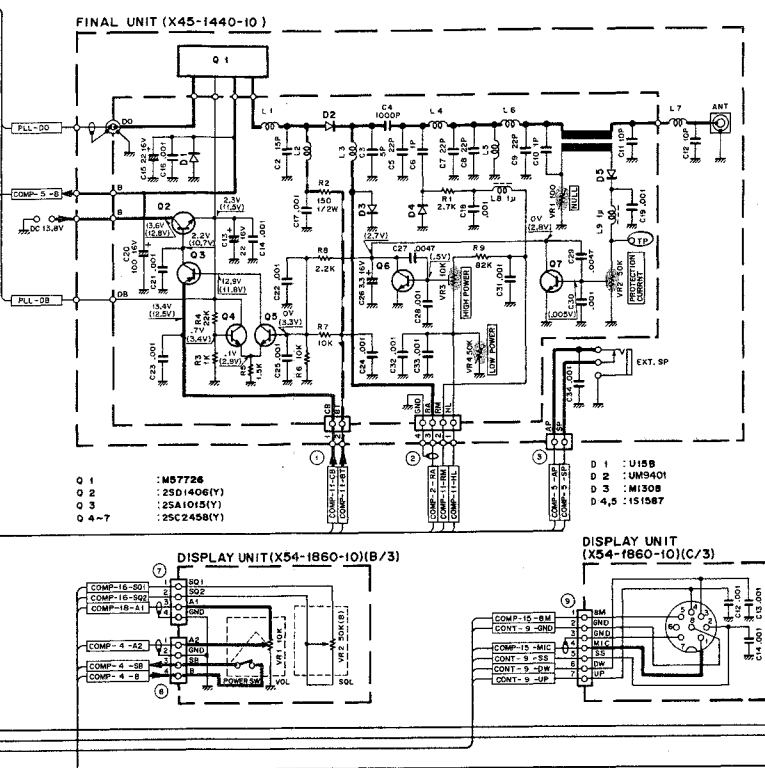
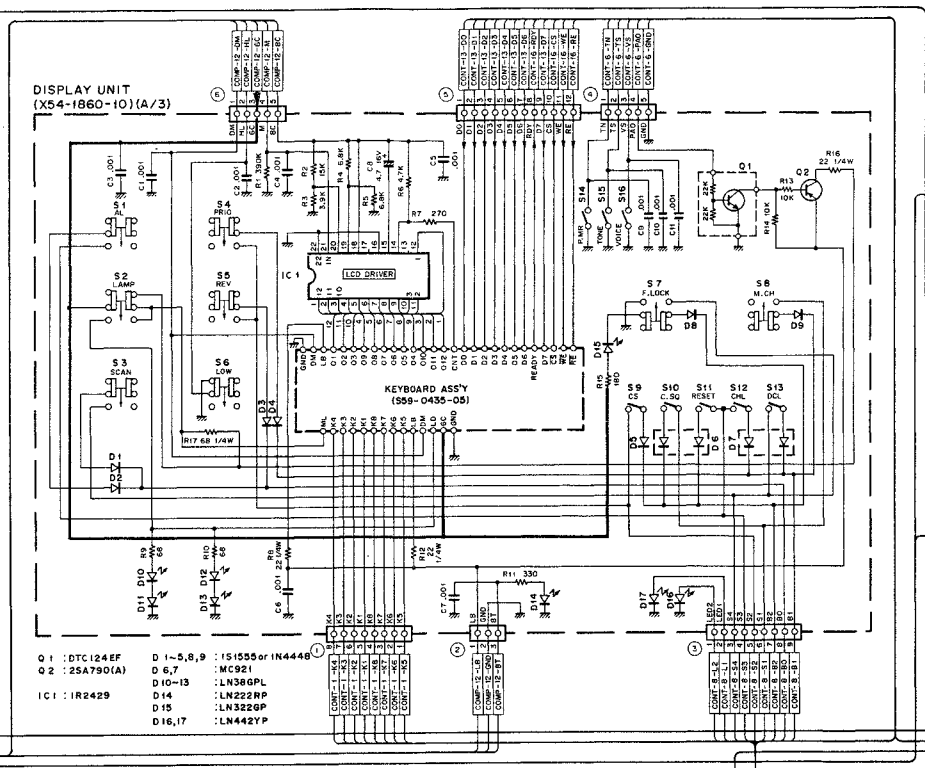
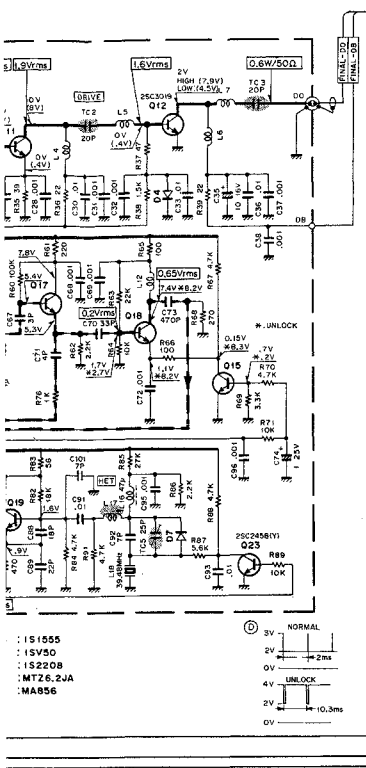
| MS, M4 TYPE | USED | NOT USED |
|-------------|------|----------|
| K1, K2 | | |
| M1, M2 | | |
| M3, M4 | | |

TM-2550A/E, 2530A SCHEMATIC DIAGRAM (T,W TYPE)

Signal line ——— Control line ——— Common DC line



Signal line Control line Common DC line 8T Line Voltage measurement conditions f = 144.00MHz, RX no signal, () : TX.



- MIC AMP (X59-1000-10)
 - Q1 : 25C27(1Y)
 - IC1 : NJM4558M
 - D1 : 1S5184
 - D2 : 1S5181
- ALERT, VACANT CH. (X59-1020-10)
 - Q1-4 : 25C27(1Y)
 - D1 : 1S5181
- SQUELCH SWITCH (X59-1040-10)
 - Q1,5 : 25C27(1Y)
 - Q2,3 : 25C22(8B)
 - Q4,6 : 25C27(1Y)
 - D1 : 1S5184
- CENTER STOP (X59-1030-10)
 - Q1 : 25C27(1Y)
 - IC1 : NJM4558M
 - D1 : 1S5181
- MIC AMP S-METER (X59-1010-10)
 - IC1 : NJM4558M
 - D1 : 1S5184
 - D2 : 1S5181

- Q1 : DTC124EF
- Q2 : 25C2408(1Y)
- Q4,5 : DTA144YF
- IC1 : MC14584BCP
- IC2 : TMP47C46H-9042
- IC3 : JPT0508HC-056
- IC5 : TC40374P
- IC6 : TC5047AP-1
- IC7 : P57320D
- D1 : MC911
- D2,4-9,10-12,17-21,24,27
- D3 : 1S1555 or 1N4448
- D9W : 1S1555 or 1N4448
- D25,26 : 1S5106
- D29 : 1S5133

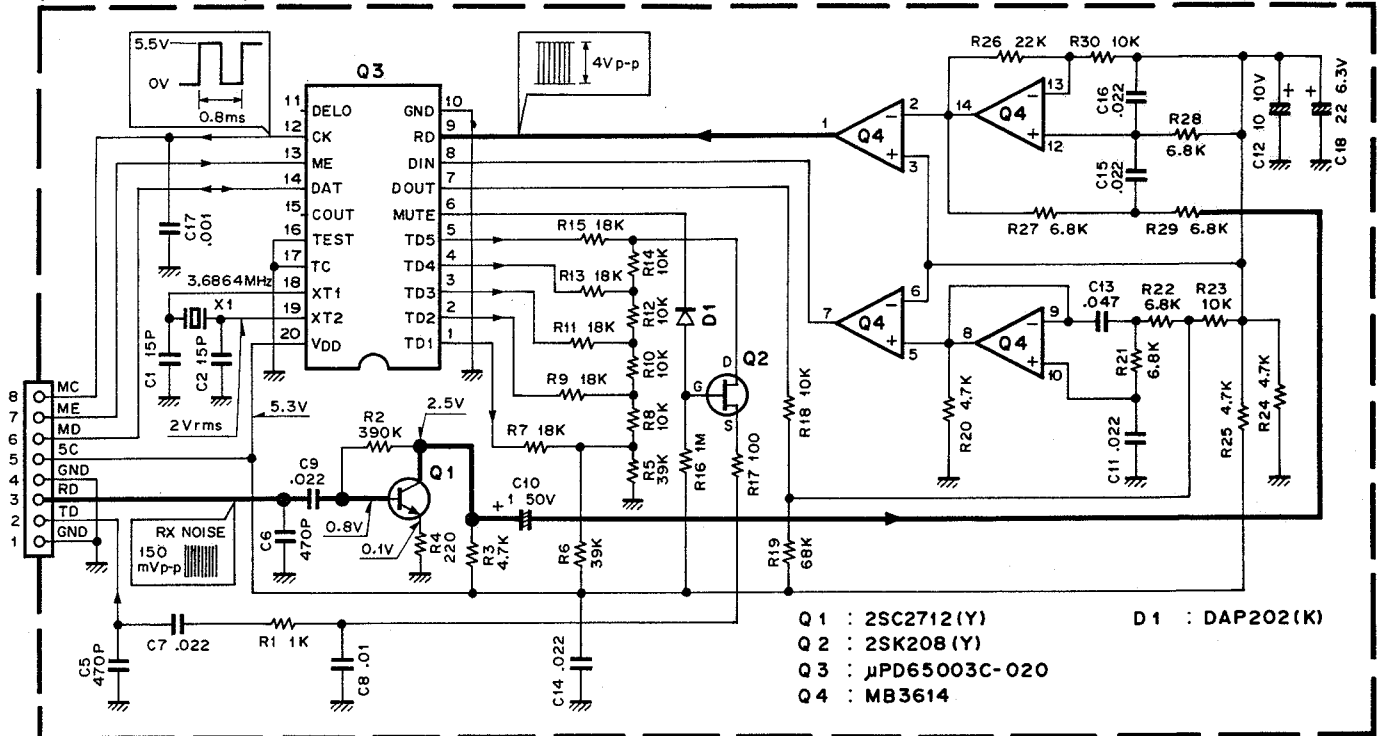
T TYPE NOT USED
W TYPE USED

ENCODER

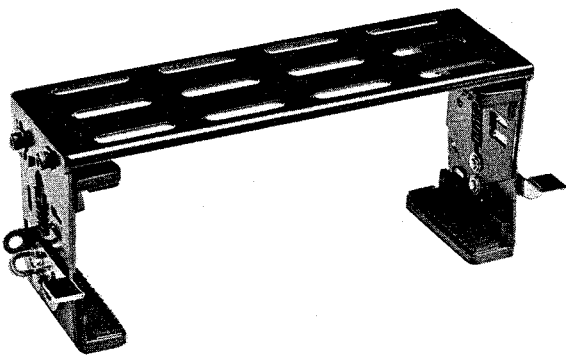
MU-1 (MODEM)/MB-10 (MOBILE MOUNT)

MU-1 SCHEMATIC DIAGRAM

(X57-1140-20)



MB-10 OUTSIDE VIEW

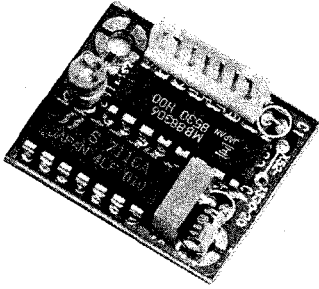


MB-10 PARTS LIST

| Part No. | Re- marks | Description | Q'Ty | Ref. No. |
|--------------|--------------|-------------------------------|------|----------|
| A13-0666-02 | N | Mount bracket ass'y | 1 | |
| A13-0667-02 | N | Mount bracket ass'y | 1 | |
| A13-0668-04 | N | Mount hardware | 1 | |
| B50-8063-00 | N | Instruction manual | 1 | |
| G13-0823-04 | | Cushion | 4 | |
| H01-8006-03 | N | Carton (Inside) | 1 | |
| H13-0803-03 | N | Protective plate | 1 | |
| H13-0805-03 | N | Protective plate | 1 | |
| H25-0029-04) | | Protective bag (Screw etc.) | 1 | |
| H25-0036-04 | | Protective bag (Angle ass'y) | 2 | |
| H25-0116-04) | | Protective bag (Accessory) | 1 | |
| N09-0008-04 | | Hex. head screw (Accessory) | 4 | |
| N09-0632-05 | | Taptite screw (A) (Accessory) | 4 | |
| N14-0510-04 | | Flange nut (Accessory) | 4 | |
| N15-1040-45 | | Flat washer (Accessory) | 4 | |
| N15-1060-46 | | Flat washer (Accessory) | 4 | |
| N16-0060-46 | | Spring washer (Accessory) | 4 | |
| N99-0304-04 | | Hex. hole screw (Accessory) | 4 | |
| W01-0401-05 | | Hex. wrench (Accessory) | 1 | |

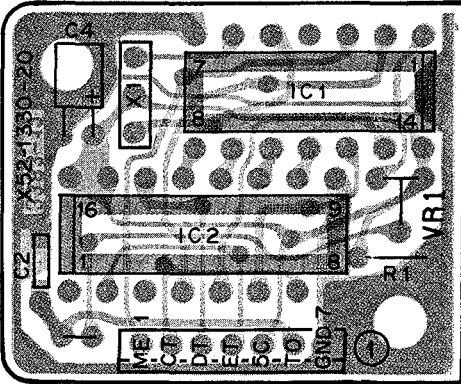
TU-7 (TONE) (K,M TYPE)

TU-7 OUTSIDE VIEW



TU-7 PC BOARD VIEW

(X52-1330-20) Component side view



TU-7 PARTS LIST

| Part No. | Re- marks | Description | Q'Ty | Ref. No. |
|--------------------------------|--------------|----------------------------|------|----------|
| TU-7 (GENERAL) | | | | |
| 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 | |
| TONE UNIT (X52-1330-20) | | | | |
| CE04CW1A100M | | Electro 10 μ 10V | 1 | C4 |
| CK73EB1H473K | | Chip cap. 0.047 μ | 1 | C2 |
| C91-0757-05 | | Ceramic 0.001 μ | 1 | C3 |
| E40-5021-05 | | Mini-connector 7P | 1 | |
| L78-0018-05 | N | Ceramic oscillator | 1 | X1 |
| R12-3445-05 | | Trimming pot. 47k Ω | 1 | VR1 |
| MB88306 | N | IC | 1 | IC2 |
| S7116A | N | IC | 1 | IC1 |

TU-7 INSTALLATION AND TONE FREQUENCY SETTING PROCEDURE

Available CTSS tone frequencies

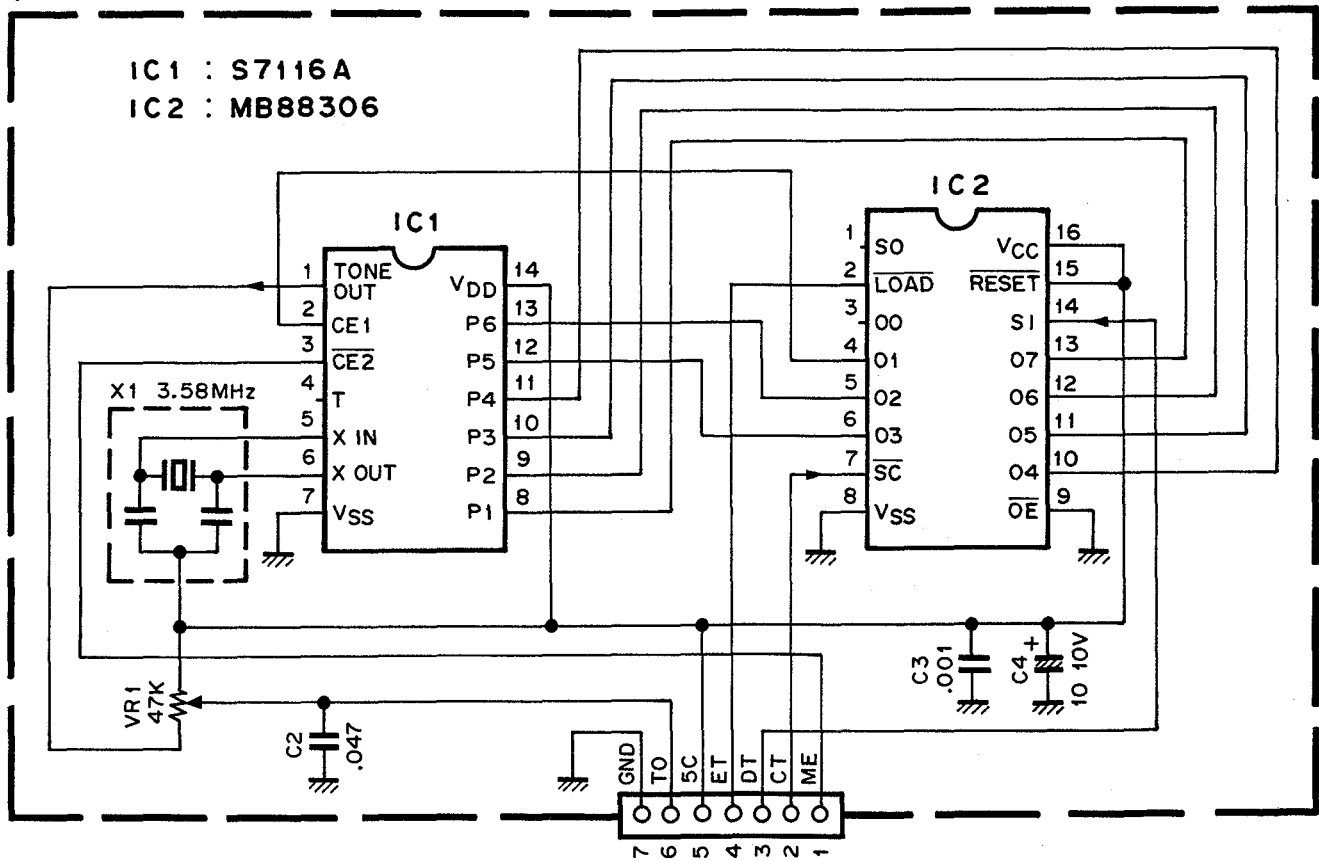
| Hz | Hz | Hz |
|-------|-------|-------|
| 67.0 | 114.8 | 192.8 |
| 71.9 | 118.8 | 203.5 |
| 74.4 | 123.0 | 210.7 |
| 77.0 | 127.3 | 218.1 |
| 79.7 | 131.8 | 225.7 |
| 82.5 | 136.5 | 233.6 |
| 85.4 | 141.3 | 241.8 |
| 88.5 | 146.2 | 250.3 |
| 91.5 | 151.4 | |
| 94.8 | 156.7 | |
| 97.4 | 162.2 | |
| 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.

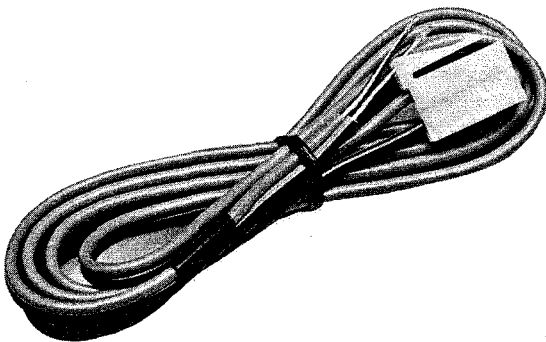
TU-7 (TONE) (K,M TYPE)/PG-2K (DC POWER CABLE)

TU-7 SCHEMATIC DIAGRAM

(X52-1330-20)



PG-2K OUTSIDE VIEW

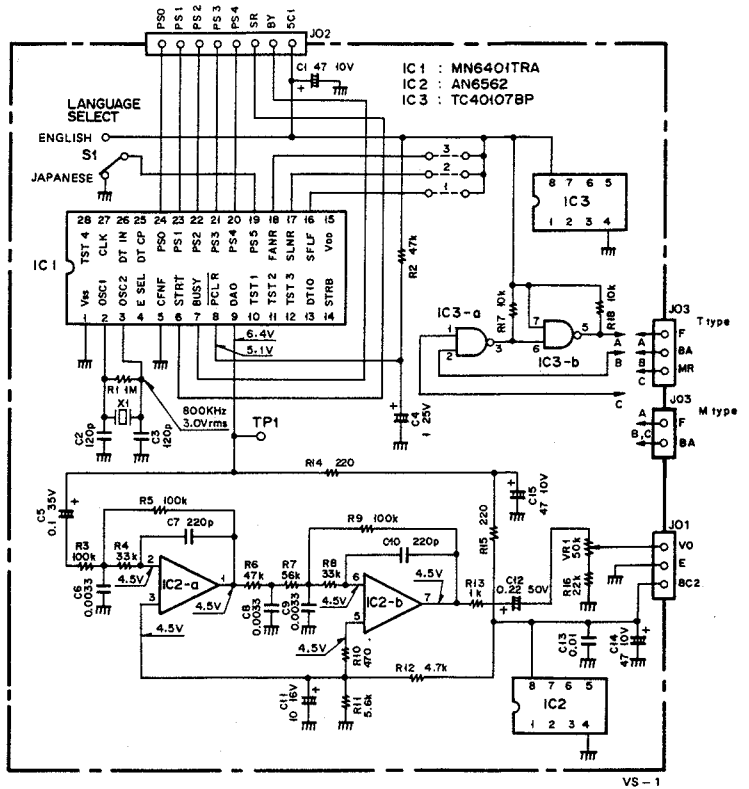


VS-1 (VOICE SYNTHESIZER)

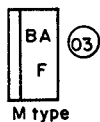
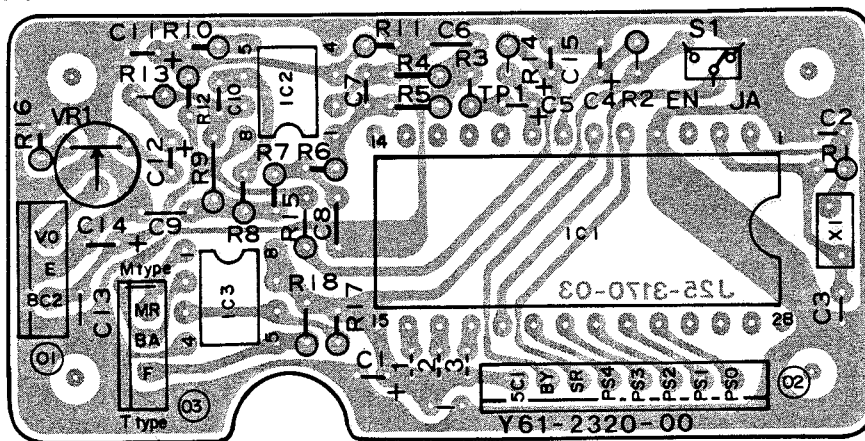
PARTS LIST

| Part No. | Re- marks | Description | Ref. No. |
|--------------|--------------|-------------------------|----------|
| B50-4035-00 | N | Instruction manual | |
| CC45SL1H121J | C | 120P x 2 | C2,3 |
| CE04W1A470M | E | 47 10V | C1,14,15 |
| CE04W1C100M | E | 10 16V | C11 |
| CE04W1HR22M | E | 0.22 50V | C12 |
| CK45B1H221K | C | 220P x 2 | C7,10 |
| CO92M1H332K | 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 |
| E40-0373-05 | Δ | Mini connector 3P | M |
| E40-0373-05 | Δ | Mini connector x 2 3P | T |
| E40-0873-05 | Δ | Mini connector 8P | |
| 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 |

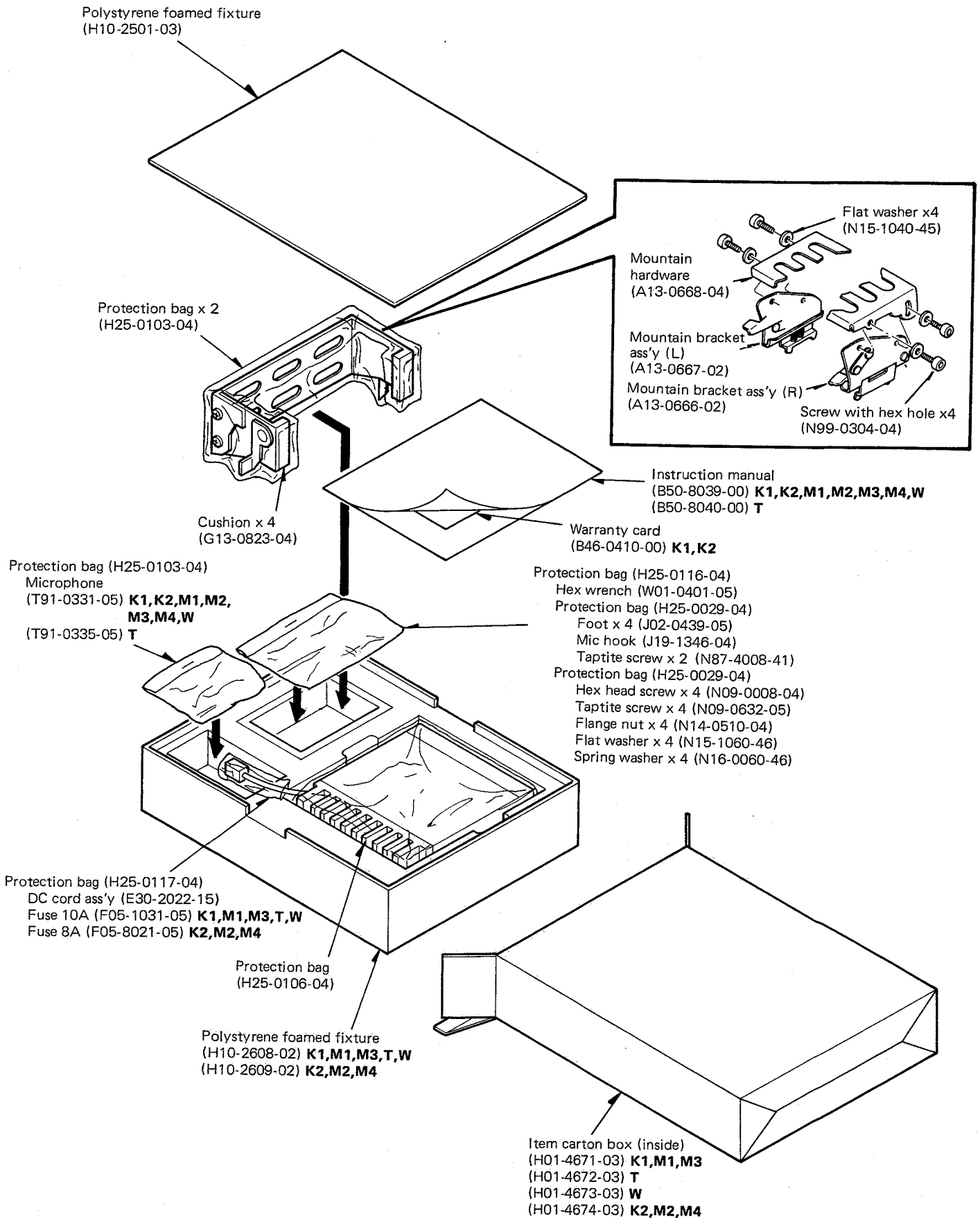
SCHEMATIC DIAGRAM



PC BOARD VIEW



PACKING



TM-2550A/E, 2530A SPECIFICATIONS

| | |
|---|--|
| [General] | |
| Frequency range..... | 144 MHz to 148 MHz (TM-2550A/2530A) 144 MHz to 146 MHz (TM-2550E) |
| Mode..... | FM F3 (F3E), F2 (F2D) (Control signal for DCL system) |
| Antenna impedance..... | 50 ohms |
| Power requirement..... | 13.8 VDC \pm 15% |
| Grounding..... | Negative |
| Operating temperature..... | -20°C to +50°C (-4°F to +122°F) |
| Current drain..... | 0.6 A in receive mode with no input signal (TM-2550A/2550E) Approx. 9.5A in HI transmit mode Approx. 3A in LOW transmit mode (TM-2530A) Approx. 6.5A in HI transmit mode Approx. 2.5A in LOW transmit mode |
| Dimensions..... | 180 mm wide, 60 mm high 215 mm deep (TM-2550A/2550E) 195 mm deep (TM-2530A) (Projection not included) |
| Weight..... | 1.95 kg (4.3 lbs) : TM-2550A/2550E 1.8 kg (4 lbs) : TM-2530A |
| [Transmitter] | |
| Output power (at 13.8 VDC, 50 ohms load)..... | HI: 45 W min. (TM-2550A/2550E) HI: 25 W min. (TM-2530A) LOW: 5 W approx. {Adjustable up to out 40 W TM-2550A/2550E} (Adjustable up to out 20 W TM-2530A) |
| | Note: Recommended duty cycle 1 minute : Transmission 3 minutes : Reception |
| Modulation..... | Reactance |
| Frequency stability..... | Less than \pm 15 PPM |
| Spurious radiation..... | Less than -60 dB |
| Maximum frequency deviation..... | \pm 5 kHz |
| Audio distortion (at 60% modulation)..... | Less than 3% (300 Hz to 3000 Hz) |
| [Receiver] | |
| Circuitry..... | Double conversion superheterodyne |
| Intermediate frequency..... | 1st: 10.695 MHz, 2nd: 455 kHz |
| Sensitivity..... | SINAD 12 dB: Less than 0.25 μ V S + N/N : More than 50 dB at 1 mV input |
| Selectivity..... | More than 12 kHz (-6 dB) Less than 24 kHz (-60 dB) |
| Spurious response..... | Better than 70 dB (except fd-IF/2) |
| Squelch sensitivity..... | Less than 0.125 μ V (threshold) |
| Scan stop level..... | Less than 0.2 μ V (threshold) |
| Output..... | More than 1.5 W across 8 ohms load (5% distortion) |
| External speaker impedance..... | 8 ohms |
| [DCL control] | |
| Code..... | NRZ equal-length code |
| Modulation..... | MSK modulation |
| Frequency deviation..... | \pm 3.5 kHz reference |
| Mark frequency and deviation..... | 1200 Hz \pm 200 PPM |
| Space frequency and deviation..... | 1800 Hz \pm 200 PPM |
| Code transmission speed and deviation..... | 1200 bits/second \pm 200 PPM |

Note: Circuit and rating are subject to change without notice due to development in technology.

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