

HF TRANSCEIVER

TS-570D

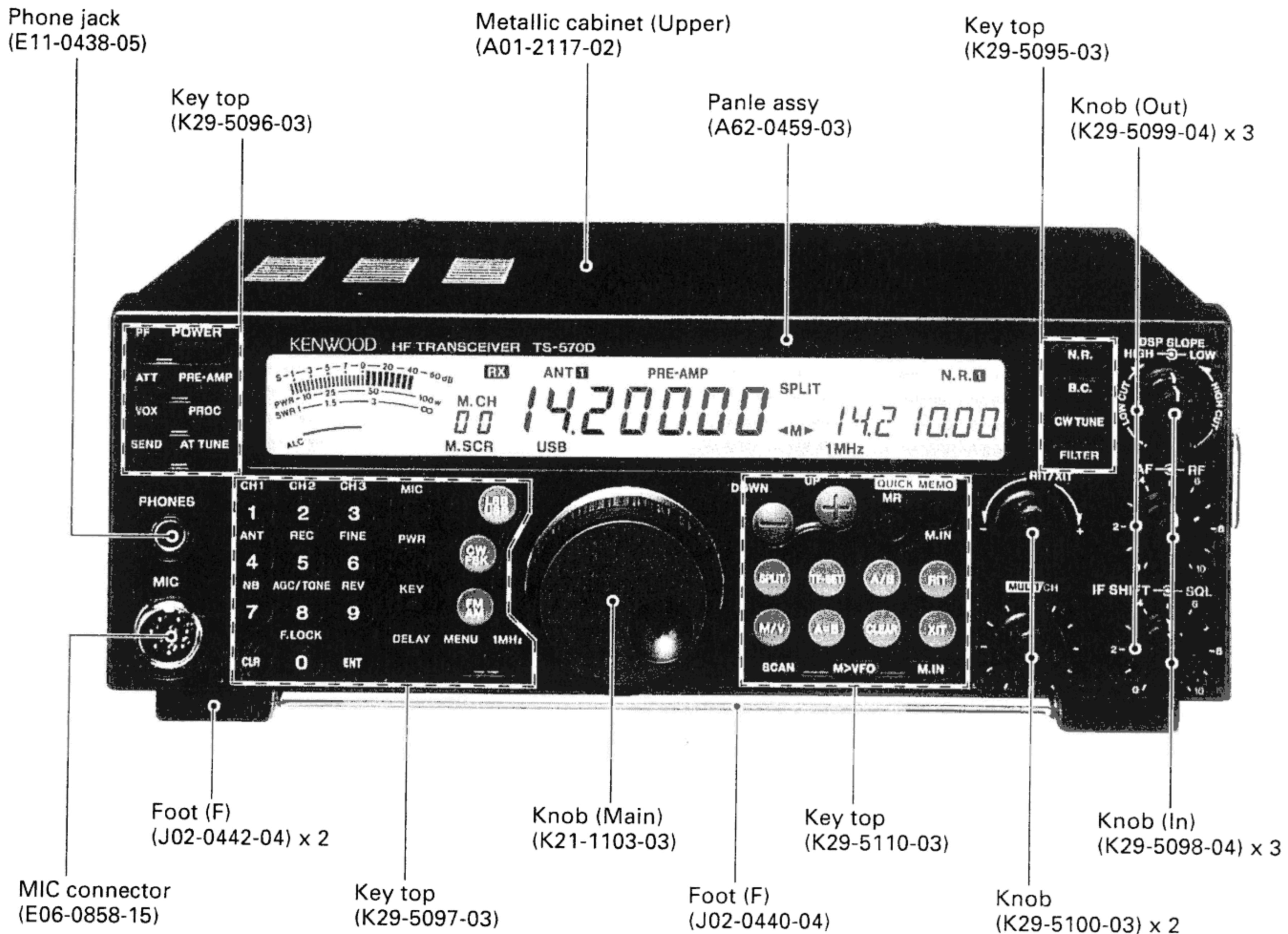
SERVICE MANUAL

KENWOOD



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TS-570D

CIRCUIT DESCRIPTION

Frequency Configuration

The TS-570D utilizes double conversion in all transmit modes and non-FM receive modes, and triple conversion in FM mode.

When the receiver frequency f_{IN} from the antenna in SSB mode is zero beat (i.e., at zero to the SSB signal with a carrier point of f_{IN}), the relationship between these signals is expressed as follows:

$$f_{IN} = f_{LO1} - f_{LO2} - f_{CAR}$$

All the frequencies are generated by the PLL circuit as shown in the PLL block diagram in Figure 2, and the receiver frequency is determined by the reference frequency f_{STD} , the PLL divide ratio and DDS data. Therefore, the reference frequency accuracy equals the operating frequency accuracy.

The accuracy of the reference crystal oscillator in the TS-570D is 10 ppm (-10 to +50°C). If an optional temperature compensated crystal oscillator (TCXO) SO-2 is installed, the accuracy becomes 0.5 ppm (-10 to +50°C).

When the transmitter is used in SSB mode or in other modes, likewise, the frequency is determined by the reference frequency f_{STD} and PLL divide ratio. The display frequencies in the modes are listed in Table 1.

In FSK mode, the TS-570D displays the mark transmitter frequency.

In CW mode, the TS-570D uses the variable CW pitch system so that the receiving pitch can be changed in the range 400 to 1000Hz in 50Hz steps while the desired signal remains in the center of the IF filter band. Since the receiving pitch varies with the side tone, it is possible to zero in by receiving the desired signal at the same pitch as the side tone.

FM transmission is carried out by sending the audio signal from the microphone to the 64.22MHz VCO and modulating f_{LO2} .

Mode	Display frequency
USB, LSB	Carrier point frequency
CW	Transmission carrier frequency
FSK	Mark transmitter frequency
AM, FM	IF filter center frequency

Table 1 Display frequency in each mode

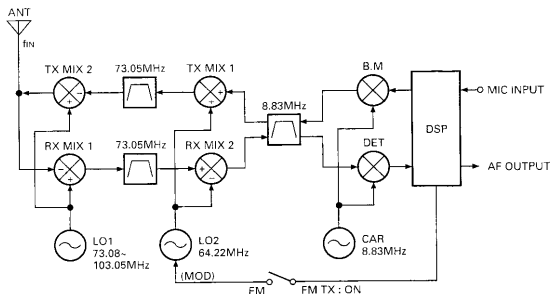


Fig. 1 Frequency configuration

CIRCUIT DESCRIPTION

PLL Circuit

The TS-570D PLL circuit consists of a PLL loop that includes a DDS that covers a frequency range 30kHz to 30MHz in 10Hz or 1Hz steps according to the 20MHz reference frequency, a DDS circuit that generates CAR and a PLL loop that produces LO2.

The divide ratio data to each PLL loop and DDS data are controlled by a microprocessor. Each loop is controlled by a single crystal frequency control system based on the reference frequency f_{STD}. (See the PLL block diagram in Figure 2.)

■ Reference Signal Generation Circuit

The reference frequency f_{STD} used for frequency control is produced by the 20MHz crystal oscillator X500 and Q500: 2SC2714(Y). It is used as the reference signal f_{REF} for the PLL IC and DDS1 in the PLL unit.

The 10MHz signal divided by 2 by DDS1 goes to DDS2 in the LO1 generator. The signal also goes to the CAR generator to produce a 8.83MHz signal.

The crystal oscillator can be replaced by an optional TCXO (SO-2). It is switched to the TCXO by cutting lead resistors R503 and R504.

■ LO2

Q509: 2SK1975(V) in VCO2 generates 64.22MHz. The 20MHz reference frequency f_{REF} is supplied to pin 15 of IC500: MB86001PF, and is divided by 1000 (4000 in FM mode) to produce a 20kHz (5kHz in FM mode) comparison frequency.

The VCO2 output is applied to pin 6 of IC500: MB86001PF and divided by 3211 (12844 in FM mode). The signal is compared with the 20kHz (5kHz in FM mode) signal with the phase comparator. The VCO2 frequency is locked. The divide ratio is transmitted from the control unit.

The output from the PLL passes through buffer Q510, amplified by amplifier Q511, Q546, and passes through a low-pass filter. The impedance is converted and the resulting signal is output to the RF unit as LO2.

■ LO1

Three VCOs Q528, Q530, Q532: 2SK1875(V)x3 generate 73.08MHz to 103.05MHz. The 20MHz reference frequency is applied to pin 15 of PLL IC IC507: MB86001PF, and divided by 40 to produce a 500kHz comparison frequency.

The output passes through the Q535 buffer. One output is amplified by amplifier Q534: 2SC2714(Y) and band-pass filter and goes to the RF unit. The other output passes through buffer Q533: 2SC2714(Y) and goes to pin 5 of mixer IC506: SN76514. A signal of 65.54 to 66.04 MHz is input to pin 11 of IC506 to produce a signal of 7.5 to 37MHz. The signal is output from pin 13, passes through a low-pass filter, a high-pass filter, buffer Q523, and amplifier Q522 and goes to pin 6 of IC507.

This signal is divided by N, and compared with the 500kHz signal with the phase comparator. The mixer output frequency is locked in 500kHz steps. The divide ratio N is transmitted from the control unit as data (N: 15 to 75) corresponding to 0 to 30MHz in 500kHz steps. One of three VCOs is selected by the serial/parallel IC IC14: NJU3718G in the TX-RX unit according to the VCO change signals (VCO1A, VCO1B, and VCO1C).

DDS2 (IC502: F71022) generates a 540 to 1040kHz digital signal. It is converted to an analog signal by a digital-to-analog converter consisting of CP502, CP503, and Q518, passes through a low-pass filter, and goes to pin 6 of IC504: UPC1037GR. The 5MHz signal produced by dividing the 10MHz reference frequency for the DDS2 by 2 goes to pin 8 of the mixer, and a 5.54 and 6.04MHz signal is output from pin 2. The output signal passes through a band-pass filter and buffer Q519, and input to pin 8 of mixer IC506: UPC1686G. It is mixed with the 60MHz signal obtained by tripling 20MHz reference frequency f_{REF} by multiplying circuit Q521 to produce a 64.54- to 66.04MHz signal. This signal passes through a band-pass filter, and goes to pin 11 of mixer IC506.

DDS2 sweeps the 540 to 1040kHz digital signal in 10 or 1Hz steps. LO1 covers 73.08 to 103.05MHz in 10 or 1Hz steps and is output as LO1 to the RF unit.

■ CAR

To generate the 8.83MHz signal used for local oscillation and detection, DDS1 (IC501: F71022) generates a digital signal with the 1.17MHz basic frequency. It is converted to an analog signal by a digital-to-analog converter consisting of CP500, CP501, and Q513. The signal passes through a low-pass filter and goes to pin 6 of mixer IC503: UPC1037GR. The 10MHz chopper output from DDS1 is input to pin 8 of the mixer and the 8.83MHz signal is output from pin 3.

The output signal passes through buffer Q514. Unwanted components are removed by a ceramic filter consisting of CF500 and CF501. The resulting signal passes through amplifier Q515, buffer Q516, and a low-pass filter, and is output to the RF unit as the CAR signal.

CIRCUIT DESCRIPTION

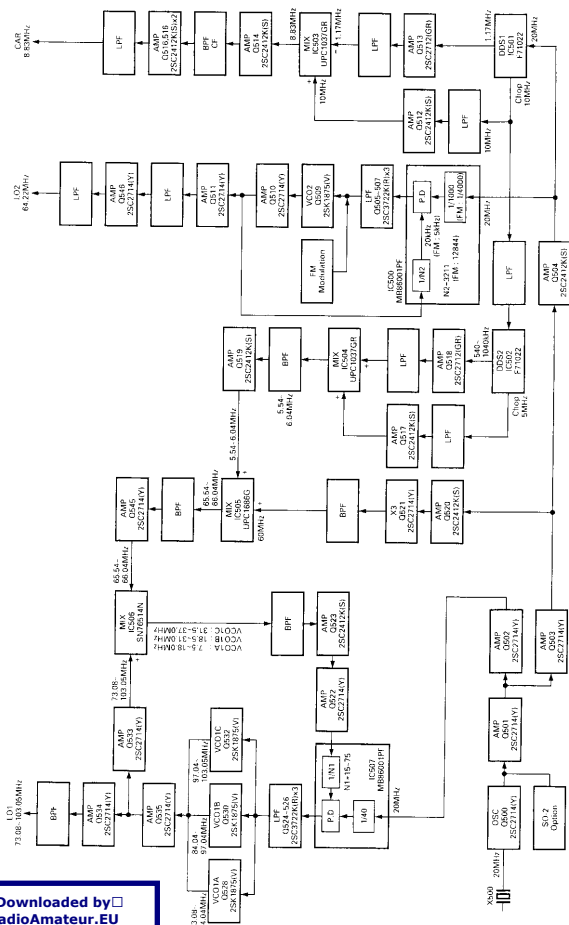


Fig. 2 PLL block diagram

CIRCUIT DESCRIPTION

■ DDS Circuit Configuration

The DDS IC has been developed with standard cells to implement a high-speed operation circuit and large-capacity ROM at a low cost.

1) IC configuration

The IC consists of the following components:

Two 28 bit registers for setting frequency data, one 28 bit frequency shift register for addition to the frequency register, a 23 bit parallel signal input section for frequency modulation with a parallel signal, and a data entry and selection section.

Frequency modulation section comprised of a 28 bit adder that adds frequency data and frequency modulation data

Phase data operation section that adds data from the frequency modulation section with the 28 bit phase data register

SIN-ROM that converts phase data to sine data.

2) Frequency/shift data setting

Using serial signals synchronized with clock pulses, a total of 30 bits (2 bits that specify the destination to which data are set and 28 bits for frequency data) are set in three internal registers.

3) Frequency register selection

The data set in the two frequency registers are selected by the SLAB input of the DDS IC. This pin handles the TXC signal. This function eliminates the need for the TS-570D microprocessor to set frequency data for each transmission and reception.

4) Frequency data selection

The SP5L input of the DDS IC selects whether to use the data in the internal frequency shift register or the data from parallel input as frequency modulation data.

5) Frequency modulation

The MDEN input of the DDS IC enables or disables frequency modulation. When frequency modulation is enabled, frequency data is added, and the result is input to the phase data operation section.

6) Phase data operation

The target frequency phase data is output by accumulating 28 bit frequency data in the 28 bit phase accumulator.

$$F_{out} = F_s/2^{28} \cdot D_{sum}$$

$$F_s : \text{DDS IC input frequency}/2$$

D_{sum} : Frequency data+Frequency modulation data

If 2^{25} is set for D_{sum} when $1/8 F_s$ is output, the phase data must be increased by $\pi/8$.

A 28 bit absolute value operation has been used here, but a 28 bit signed operation can also be used, assuming that the MSB is a sign. If complement data of 8000000 to FFFFFFFF (hex) is set, the phase moves in the negative direction for the positive data.

7) SIN-ROM

Phase data from the phase data operation section is converted to sine data of 0000 to FFFF (hex) in the 16 bit offset binary format.

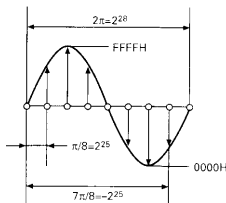


Fig. 3

CIRCUIT DESCRIPTION

Local Signals (LO1 and CAR)

1) LO1

Table 2 lists the DDS2 frequency configuration. DDS2 varies from 540 to 1040kHz. When the display frequency is 490 or 990kHz (for example, 13.99MHz, 14.49MHz), 540kHz is output. When the display frequency increases, the DDS2 frequency increases by the amount of change. When the frequency reaches 1440kHz, the frequency is switched to 540kHz. When the frequency increases to 500kHz (and 1MHz), the frequency returns to 540kHz. (Figure 4)

By changing the 500kHz band in synchronization with the display frequency, the 500kHz comparison PLL circuit is locked and LO1 is generated.

As shown in Table 2, DDS2 (LO1) frequency configuration, the frequency is shifted according to the offset (IF filter setting), RIT, XIT, production mode carrier correction value, and IF shift.

2) CAR

Table 3 lists the DDS1 frequency configuration. The 8.83MHz CAR frequency is generated by the chopper circuit. The DDS1 output frequency is 1.17MHz. The CAR frequency is shifted according to the offset (IF filter setting) correction, carrier correction value, IF shift, CW pitch, and FSK tone.

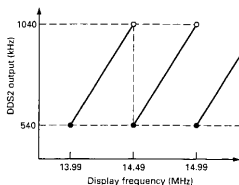


Fig. 4

Component	DDS2 (1Hz)															
	LSB		USB		CW		CW-R		FSK		FSK-R		AM		FM	
	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX
BASE	540kHz-1040kHz															
Offset: WIDE (2.4k)	-1.5k	-1.5k	+1.5k	+1.5k	+0.7k	+0.7k	-0.7k	-0.7k	-85	-85	+85	+85	0	0	0	0
NAR (1800)	-1.5k	-1.5k	+1.5k	+1.5k	+0.4k	+0.4k	-0.4k	-0.4k	-85	-85	+85	+85	0	0	0	0
NAR (500/270)	-1.5k	-1.5k	+1.5k	+1.5k	0	0	0	0	-85	-85	+85	+85	0	0	0	0
CW pitch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FSK tone (H)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FSK tone (L)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FSK shift (M)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FSK shift (S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RIT	+(RIT)	-	+(RIT)	-	+(RIT)	-	+(RIT)	-	+(RIT)	-	+(RIT)	-	+(RIT)	-	+(RIT)	-
XIT	-	+(XIT)	-	+(XIT)	-	+(XIT)	-	+(XIT)	-	+(XIT)	-	+(XIT)	-	+(XIT)	-	+(XIT)
CAR suppression	-(CAR L)	-(CAR L)	+(CAR U)	+(CAR U)	-	-	-	-	-	-	-	-	-	-	-	-
IF shift	-(IF S)	-	+(IF S)	-	+(IF S)	-	-(IF S)	-	-(IF S)	-	+(IF S)	-	-	-	-	-

Table 2 DDS2 (LO1) frequency configuration

CIRCUIT DESCRIPTION

Component	DDS1 (CAR)																
	LSB		USB		CW		CW-R		FSK		FSK-R		AM		FM		
	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	RX	TX	
BASE	1.17MHz (AM RX, FM RX: OFF)																
Offset	WIDE (2.4k)	+1.5k	+1.5k	-1.5k	-1.5k	-0.7k	-0.7k	+0.7k	+0.7k	+85	+85	-85	-85	OFF	0	OFF	0
	NAR (1800)	+1.5k	+1.5k	-1.5k	-1.5k	-0.4k	-0.4k	+0.4k	+0.4k	+85	+85	-85	-85	OFF	0	OFF	0
	NAR (600/270)	+1.5k	+1.5k	-1.5k	-1.5k	0	0	0	0	+85	+85	-85	-85	OFF	0	OFF	0
CW pitch	-	-	-	-	-PITCH	-	+PITCH	-	-	-	-	-	-	-	-	-	-
FSK tone (H)	-	-	-	-	-	-	-	-	+2.125k	-	-	-	-	-	-	-	-
FSK tone (L)	-	-	-	-	-	-	-	-	+1.445k	-	-	-	-	-	-	-	-
FSK shift (M)	-	-	-	-	-	-	-	-	-	0	-	0	-	-	-	-	-
FSK shift (S)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RIT/XIT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CAR suppression	+CAR LI	+CAR LI	-CAR LI	-CAR LI	-	-	-	-	-	-	-	-	-	-	-	-	-
IF shift	+(IF S)	-	-(IF S)	-	-(IF S)	-	+(IF S)	-	+(IF S)	-	-(IF S)	-	-(IF S)	-	-	-	-

Table 3 DDS1 (CAR) frequency configuration

Receiver Circuit Configuration

Figure 5 is a block diagram of the receiver circuit.

The receiver utilizes double conversion with the first IF of 73.05MHz and the second IF of 8.83MHz (triple conversion in FM with the third IF of 455kHz).

The signal coming from the antenna connector passes through the ANT1/ANT2 switching relay, ATIN/THRU switching relay, transmit/receive relay and image filter, and goes to the TX-RX unit. The signal passes through the about-20dB attenuator and IF trap low-pass filter and goes to the 10-part band-pass filter (low-pass filter if the frequency is lower than 1.7MHz). If the frequency is 1.7MHz or higher, the signal passes through a high-pass filter and then a band-pass filter to reduce interference of a strong medium wave output station.

If PRE-AMP is ON, the signal passing through each band-pass filter passes through the low-band and high-band pre-amplifiers. The low-band (21.5MHz or lower) pre-amplifier is a parallel amplifier Q17, Q18: 2SK520x2 with NFB. The high-band (21.5MHz or higher) pre-amplifier is a dual-gate MOS FET Q25: 3SK131 to provide the optimum characteristics for each band. If PRE-AMP is OFF, the pre-amplifiers are bypassed and the dynamic range is boosted.

The signal then passes through the IF trap low-pass filter and is mixed with LO1 by the first mixer Q5 to Q8: 2SK520x4 to produce the first IF of 73.05MHz. The resulting signal passes through two MCFs (XF1) and AGC amplifier Q12: 3SK131, and is mixed with LO2 (64.22MHz) by the second mixer Q10, Q13: 2SK520x2 to produce the second IF of 8.83MHz. The

second IF signal output from the mixer is divided into two signals: one passes through the buffer amplifier and goes to the NB amplifier. The other signal enters the IF amplifier Q11: 3SK131. The AGC is controlled and noise is blanked by the NB in Q11.

The second IF signal passes through the 8.83MHz IF filter. One of THRU, 6kHz, 2.4kHz, and optional bandwidth frequency (1.8kHz, 500Hz, or 270Hz) can be selected for the IF filter.

The signal is then amplified by Q14: 2SC2412K and goes to the FM detection HIC IC7: KCD10 and SSB/AM/CW detection HIC IC15: KCD11. In FM mode, the signal is converted to the third IF of 455kHz by KCD10, passes through the limiter amplifier, and quadrature-detected. In modes other than FM, the signal is amplified by KCD11 and used for the AGC voltage. In SSB and CW, the signal is product-detected and in AM, envelope-detected and output. Each detection output is selected by IC9: BU4066BCFV for each mode and goes to the control unit.

In the control unit, the signal is amplified by IC503: NJM2100M, goes to CODEC IC IC504: AK4506-VS to convert it to a digital signal. The resulting signal is filtered by DSP IC507: ADSP2181KS-115, the volume is controlled, and the subtone is decoded. The signal is converted to an analog signal by the CODEC IC, passes through active filter IC505, IC506: NJM2100M, returns to the TX-RX unit, and amplified to the required level by AF amplifier IC8: LA4446.

CIRCUIT DESCRIPTION

IF Filter Ratings (TX-RX Unit)

Item	XF1 : L71-0401-05	XF2 : L71-0266-05	XF3 : L71-0208-15
Nominal center frequency	73.05MHz	8830kHz	8830kHz
Pass bandwidth	±7.5kHz or more at 3dB	±3.0kHz or more at 6dB	±1.2kHz or more at 6dB
Attenuation bandwidth	±30kHz or less at 40dB	±13kHz or less at 50dB ±16kHz or less at 60dB	±1.5kHz or less at 20dB ±2.2kHz or less at 60dB ±3.0kHz or less at 80dB
Ripple	1.0dB or less	1.0dB or less	2.0dB or less
Insertion loss	3.0dB or less	1.5dB or less	6.0dB or less
Guaranteed attenuation	70dB or more at fo+(500~1000kHz) 70dB or more at fo-(200~1000kHz)	70dB or more at fo±1MHz	80dB or more at fo±1MHz
Center frequency deviation	Within ±1.5kHz at 3dB	-	Within ±150Hz at 6dB
Terminating impedance	2kΩ±10%	1850Ω // 2pF	600Ω±5% // 15pF±5%

Item	CF1 : L72-0372-05	CF500, 501 : L72-0351-05
Nominal center frequency	455kHz	8830kHz
Pass bandwidth	±6kHz or more at 6dB	±50kHz or more at 3dB
Attenuation bandwidth	±13kHz or less at 50dB	35dB or more at +455kHz 45dB or more at +910kHz
Ripple	3dB or less (Within 455±4kHz)	1.0dB or less
Insertion loss	6.0dB or less	6.0dB or less
Guaranteed attenuation	35dB or more at fo±100Hz	-
Terminating impedance	2kΩ	330Ω

Receiver Front-End

The signal input to the TX-RX unit passes through the attenuator switching circuit and the 30MHz low-pass filter. The signal of less than 1.705MHz passes through the low-pass filter and about-20dB attenuator (the attenuator can be disabled by using a short jumper). The signal of 1.705MHz or higher passes through the short wave broadcast band trap (E type only) and passes through the nine-part band-pass filter. A PIN diode for switching band-pass filters is used at the input side to improve inter modulation.

If PRE-AMP is off, D30 and D32 turn on, and the signal passing through each band-pass filter goes to the quad-balance type first mixer by Q5 to Q8: 2SK520x4. If PRE-AMP is on, D43 and D45 turn on, and the signal of less than 21.5MHz passes through parallel amplifier Q17, Q18: 2SK520x2. This amplifier uses NFB to suppress the low-band gain and improve strong signal input characteristics. When the frequency is 22MHz or higher, D51 and D52 turn on, sensitivity-oriented MOS FET amplifier Q25: 3SK131 is selected.

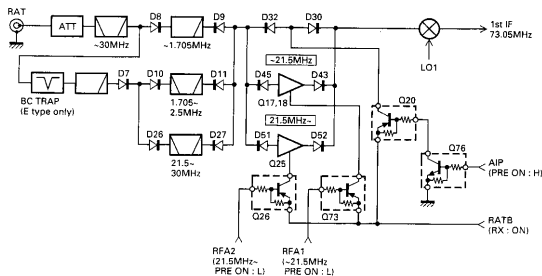


Fig. 6 Receiver front-end block diagram

CIRCUIT DESCRIPTION

Transmitter Circuit Configuration

Figure 9 is a block diagram of the transmitter circuit.

The audio signal from the microphone is AF-processed by the DSP in the control unit and enters CN15 (pin 4: MOD/ANO) of the TX-RX unit. The signal is split and directed to the SSB/AM and FM systems by IC12: BU4066BCFV.

In the SSB system, the signal is amplified by Q36 (2SC2712K(S)), balance-modulated with the CAR signal (8.83MHz) input from CN12 by IC2 (μ PC1037GR), passes through Q38 (2SC2412K(S)), and enters the crystal filter. The SSB signal passing through the filter is amplified by Q29 (3SK131M). It is mixed with the LO2 signal (64.22MHz) from CN5 by Q27 and Q30 to produce a 73.05MHz signal. It is then mixed with the LO1 signal (78.08 to 103.05MHz) from CN2 by Q28, Q31 (3SK184(R)) to generate the desired signal. The signal passes through a band-pass filter, is amplified by Q35 (2SC2954) to produce the drive output, which is output from CN10 and goes to CN1 of the final unit.

The signal is amplified to 100W by Q1 to Q5. Harmonic components are attenuated by a low-pass filter. The signal passes through the forward/reflected wave detection circuit, AT voltage/current detection circuit, transmit/receive change relay K2, AT IN/THRU changeover relay K1, ANT 1/2 changeover relay K3, and is directed to the antenna connector.

In the AM mode, the signal is generated by breaking the balance of the carrier of SSB balance modulator IC2: μ PC1037GR, and output through the same route as the SSB.

In the FM mode, the audio signal from the microphone connector is pre-emphasized and IDC-processed by the DSP in the control unit and goes to the TX-RX unit. The signal is separated from the SSB/AM system by IC12: BU4066BCFV, passes through W5, and enters the PLL unit to modulate LO2 (64.22MHz).

In the CW mode, the key input signal goes to IC5 in the control unit. The CKY signal output from IC6 switches Q24 and Q21 in the TX-RX unit to generate the CW signal.

■ ALC Circuit

The forward wave voltage (VSF) detected by the final unit is changed by a resistor and goes to the differential amplifier comprised of Q1 and Q2. When the VSF rises, the base voltage of Q1 rises, so the emitter voltage of Q1 and Q2 increases and the current flowing through the base of Q2 decreases, and thus the collector voltage of Q2 rises. When this voltage exceeds $V_{BE} + V_E$ (about 2.4V) of Q3, the base current flows and the collector voltage to which ALC time constants C and R are connected drops.

The collector voltage change is shifted by Q4 and D2 and matched with the voltage for keying by Q5 and D3 to generate the ALC voltage. This ALC voltage lowers the second gate voltage of Q29 (3SK131(M)) of the TX-RX unit to activate the ALC.

In AM transmission, Q79 turns on and the ALC voltage is controlled by the average power. The reference voltage, V_{REF} , for the ALC is set by the adjusted value from the microcomputer and output from IC6.

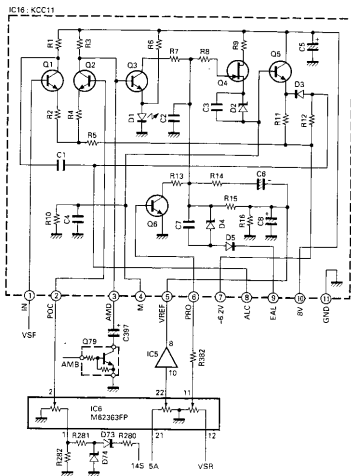


Fig. 10 ALC, Power control, SWR protection circuits

CIRCUIT DESCRIPTION

■ Power Control Circuit

Power is controlled by changing the base voltage (POC) of Q2 of the differential amplifier consisting of Q1 and Q2. The POC is set by the adjustment value from the microcomputer and output from IC6. As the base voltage (POC) of Q2 decreases, the emitter voltage of Q1 and Q2 decreases. This activates ALC and reduces the power even if the base voltage (VSF) of Q1 is low.

■ SWR Protection Circuit

When the reflected wave voltage (VSR) detected by the final unit rises, the PRO voltage output from IC6 increases, and Q6 turns on to reduce the voltage of the line of the ALC time constant circuit. The drive output decreases and the transmission power lowers. The PRO voltage is set according to the VSR by using the adjustment value from the microcomputer.

1) TX-AGC

The DSP controls the input level until it starts modulation. It is like AGC for the microphone amplifier. When the input level exceeds a certain level, the amplifier gain decreases to keep the modulator input level constant. This value is set to the ALC meter ZONE MAX. +2dB. In SSB, the ALC is suppressed to ZONE MAX. +2dB or less even if the MIC LEVEL is maximized or if the input level increases.

In FM, the level is suppressed so that it does not exceed the maximum occupation frequency bandwidth of about 4.4kHz.

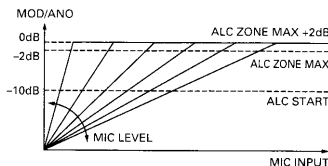


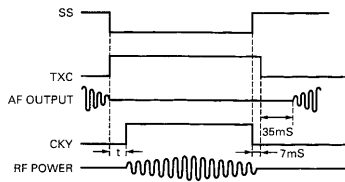
Fig. 11

■ Standby Control Timing

Standby control timing is determined by using software for the main CPU in the control unit. The control signals for the control unit are listed below. (See Figure 12 for each timing chart.)

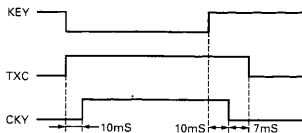
- SS : Standby switch input signal. Active low.
- KEY : Keying input signal from the keyer. Active low.
- TXC : Transmit output signal. Active high. Same timing as TXB.
- CKY : Output signal. Active high.

With the SS line



By full break-in

	t
Menu No.39 "LINEAR" OFF	10mS
ON	25mS



By semi break-in

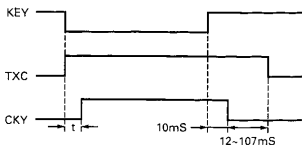


Fig. 12 Transmit/receive signal timing chart

CIRCUIT DESCRIPTION

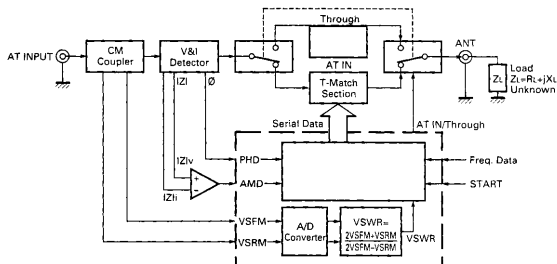


Fig. 16 AT control block diagram

■ IF Filter Switching

The IF filter bandwidth changes automatically as the mode changes. Its details are given below.

IF filter bandwidth	YK-88SN-1 (1800Hz)		YK-88C-1 (500Hz)		YK-88CN-1 (270Hz)
	CW (Hz)	FSK (Hz)	CW (Hz)	FSK (Hz)	CW (Hz)
2.4kHz	2.0k	1.5k	1.0k	1.0k	300 or more
Bandwidth of the installed filter	1.0k or less	1.0k or less	600 or less	500 or less	200 or less

■ Receive Band-Pass Filter Selection

The RF BPF signal from the control unit is sent to the TX-RX unit as serial data. The serial-to-parallel converter in the TX-RX unit converts serial data to parallel data and switches between band-pass filters.

■ Transmit Low-Pass Filter Selection

The LPF signal from the control unit is sent to the final unit as serial data. The serial-to-parallel converter in the final unit converts serial data to parallel data and switches between low-pass filters.

■ Electronic Keyer

The TS-570D uses a dedicated IC (IC3: UPD75004GB-746) to control the electronic keyer. The main CPU reports CH1 to CH3 switch operations to the electronic keyer IC (keyer microcomputer).

CIRCUIT DESCRIPTION

■ Band Data

Frequency (MHz)		RF BPF	LPF		VCO	PLL n	Frequency (MHz)		RF BPF	LPF		VCO	PLL n
Lower limit	Upper limit		E type				Lower limit	Upper limit		E type			
0.030000	0.489999	1	1	1	A	15	13.990000	14.489999	8	5	5	B	43
0.490000	0.989999					16	14.490000	14.499999					44
0.990000	1.489999					17	14.500000	14.989999					45
1.490000	1.705000					18	14.990000	15.489999					46
1.705001	1.989999	2				19	15.490000	15.989999	9	6	6		47
1.990000	2.489999					20	15.990000	16.489999					48
2.490000	2.499999					21	16.490000	16.989999					49
2.500000	2.989999					22	16.990000	17.489999					50
2.990000	3.489999	3	2	2		23	17.490000	17.989999	10	7	7		51
3.490000	3.989999					24	17.990000	18.489999					52
3.990000	4.099999					25	18.490000	18.989999					53
4.100000	4.489999					26	18.990000	19.489999					54
4.490000	4.989999	4	3	3		27	19.490000	19.989999	7	7	7		55
4.990000	5.489999					28	19.990000	20.489999					56
5.490000	5.989999					29	20.490000	20.989999					57
5.990000	6.489999					30	20.990000	21.489999					58
6.490000	6.899999	5				31	21.490000	21.499999	10	7	7		59
6.900000	6.989999					32	21.500000	21.989999					60
6.990000	7.489999					33	21.990000	22.489999					61
7.490000	7.499999					34	22.490000	22.989999					62
7.500000	7.989999	6	5	4		35	22.990000	23.489999	10	7	7		63
7.990000	8.489999					36	23.490000	23.989999					64
8.490000	8.989999					37	23.990000	24.489999					65
8.990000	9.489999					38	24.490000	24.989999					66
9.490000	9.989999	7				39	24.990000	25.489999	10	7	7		67
9.990000	10.489999					40	25.490000	25.989999					68
10.490000	10.499999					41	25.990000	26.489999					69
10.500000	10.989999					42	26.490000	26.989999					70
10.990000	11.489999	8				B	26.990000	27.489999	10	7	7		71
11.490000	11.989999					37	27.490000	27.989999					72
11.990000	12.489999					38	27.990000	28.489999					73
12.490000	12.989999					39	28.490000	28.989999					74
12.990000	13.489999	8				40	28.990000	29.489999	10	7	7		75
13.490000	13.899999					41	29.490000	29.989999					
13.900000	13.989999					42	29.990000	30.000000					

CIRCUIT DESCRIPTION

Control Unit (DSP)

■ Outline

The TS-570D uses the DSP to process audio signals the detection output of the conventional models. The processes are listed below. A block diagram of the DSP and a function block diagram of processes in the DSP are shown below for reference.

- Sidetone and beep generation
- Transmit/receive filter processing
- Voice equalizing processing
- Speech processing
- VOX processing
- Mic amplifier AGC processing
- CW tune function
- Noise and interference processing (noise reduction, beat cancel)
- CTCSS decoder

The DSP circuits are divided into an analog section that processes analog signals and a digital section that processes digital data. The analog section contains a buffer amplifier (IC503, IC505, IC506: NJM2100M) for CODEC input/output, and analog switch (IC502: BU4066BCFV). The digital section contains a clock dividing circuit which supplies clock signals to the CODEC and DSP. The CODEC (IC504: AK4506-VS) interfaces between the analog and digital sections.

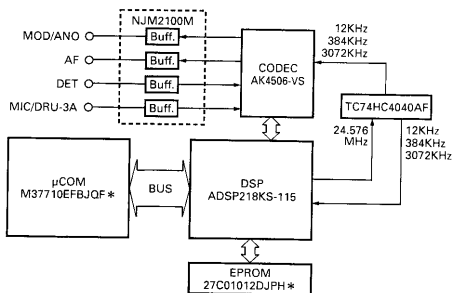


Fig. 17 DSP section block diagram

CIRCUIT DESCRIPTION

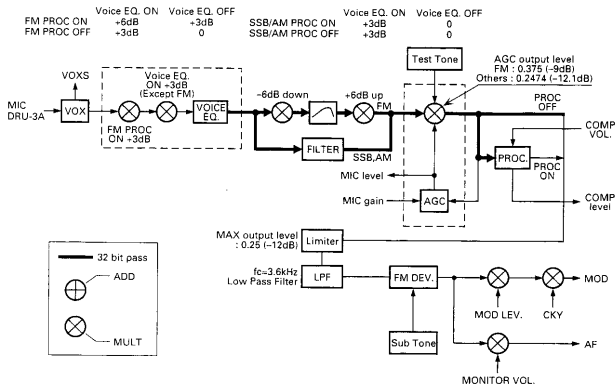


Fig. 18 DSP function block diagram (TX)

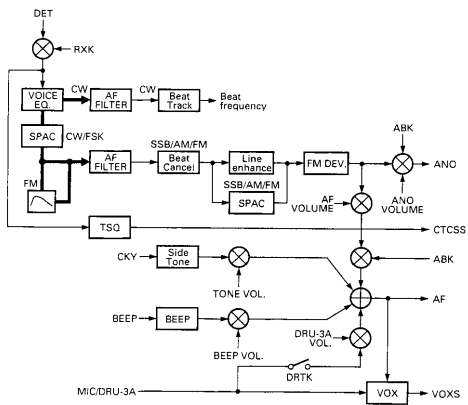


Fig. 19 DSP function block diagram (RX)

CIRCUIT DESCRIPTION

■ Digital Unit

The digital unit consists of a DSP (IC507: ADSP2181KS-115), an EPROM (IC512: AM27C010-120DC), a clock dividing logic (IC508: TC74HC4040AF, IC511: TC7504F), and CODEC (IC504: AK4506-VS), which interfaces with the analog section.

The DSP is a 16-bit fixed-decimal DSP. It operates with the 12.288MHz clock, but the internal clock is 24.576MHz. The internal clock is output from pin 22 (CLKOUT) of the DSP to the clock dividing logic. The DSP IDMA (Internal Direct Memory Access) function is used to transfer commands between the DSP and microcomputer.

The clock dividing logic supplies 3072kHz, 384kHz, and 12kHz to the CODEC using clocks from the DSP. It also supplies the same clock to the DSP to synchronize with the CODEC.

The CODEC is a 16-bit $\Delta\Sigma$ CODEC for audio equipment. There are two channels: R and L. The R channel is used for the microphone input signal and the L channel is used for the receive signal. The CODEC converts analog signals to digital signals or digital signals to analog signals based on the clock from the clock dividing logic with a 12kHz sampling frequency.

■ Flow of Transmit/Receive Signals

The flow of transmit/receive signals is explained below, together with the analog and digital units.

The flow of receive signals is explained first. The receive signal input from pin 6 (DET) of CN502 is amplified by IC503: NJM2100M. If a strong signal is input to DET, its amplitude is limited to prevent entering of signals which exceed the input range into the CODEC (IC504: AK4506-VS). It is then converted to digital data by the CODEC with the 12kHz sampling frequency. This data is transferred from the CODEC to the DSP serially, and operated by the DSP.

The digital data processed by the DSP is sent from the DSP to the CODEC serially and converted to an analog signal. The signal passes through the three-degree low-pass filter IC505 and IC506: NJM2100M to eliminate alias components. The resulting signal is output from pin 1 (AF) of W501, amplified by the AF amplifier (IC8: LA4446) in the TX-RX unit, and output to the speaker and headphone.

The flow of transmit signals is explained below. If the mode is SSB, FM, or AM, the signal from the microphone is input. The signal enters through CN503. The signal is amplified by amplifier IC501: NJM2100M, and goes to the analog switch (IC501: BU4066BCFV). The analog switch is used to switch between the microphone signal, the signal from the DRU, and packet signal. The signal passing through the analog switch is amplified by amplifier IC503: NJM2100M. If there is a strong signal, the amplitude is limited so that the signal exceeding the input range does not enter the CODEC. The CODEC then converts it to digital data with a 12kHz sampling frequency. The data is transferred from the CODEC to the DSP to carry out operations.

Digital data operated by the DSP is transferred from the DSP to the CODEC to convert it to an analog signal. The signal passes through the three-degree low-pass filter IC505: NJM2100M to eliminate alias components. The signal is output pin 4 (MOD/ANO) of CN502 to the TX-RX unit.

■ Sidetone Signal Flow

When the electronic keyer is pressed, the sidetone is output. The sidetone is processed by the DSP. Sidetone data, which is generated by the DSP, is added with digital data of the receive signal and is output to the speaker or headphone in the same process as the receive signal.

■ Beep Signal Flow

When pin 126 (BEEP) of the DSP goes high, the DSP processes and outputs beep data in the same process as the side tone. The DSP can set the frequency and volume of the beep produced with a command.

■ Digital Recording Unit (DRU) Recording and Playback

The DRU is controlled by the microcomputer. During the DRU recording, the microphone signal amplified by the amplifier (IC501: NJM2100M) is input to the DRU and recorded. During DRU playback, the playback signal is input to the CODEC by changing the analog switch (IC502: BU4066BCFV). When the DSP receives a "VOX ON and DRU playback" command from the microcomputer, VOXS data in the DSP goes high. When the microcomputer reads the data, it sets the transceiver to transmit mode. This transmit operation does not occur according to the playback sound level of the DRU. Even if no sound is recorded, the transceiver enters the transmit mode when a DRU playback command arrives with VOX ON.

CIRCUIT DESCRIPTION

■ VS-3 Audio Signal Flow

The audio signal output from the VS-3 is not processed by the DSP. The signal is amplified by the AF amplifier and output to the speaker or headphone. The VS-3 is controlled by the microcomputer.

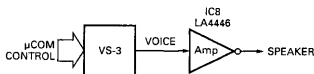


Fig. 20 VS-3 audio signal flow

■ Commands and Data Transferred to or from the Microcomputer

The commands sent from the microcomputer to the DSP and data sent from the DSP to the microcomputer to indicate the microcomputer and DSP processing are described below.

1) DSP commands

Address (HEX)	Bit (HEX)	DSP-MCU	Accept	Function (Parameter)
C+0		COM ←	IRQ2	Parameter processing command (The DSP is cleared after the command is executed.)
C: Command		Clear →		
Area base pointer =0000	0			Receive mode
	1			
	2			TX filter
	3			Voice equalizer
	4			RX filter
	5			CW pitch
	6			Transmit mode
	7			AF VOL
	8			Noise/interference elimination mode
	9			SPAC correlation time
	A			FM subtone frequency
C+1		←	Everytime	Flag 1
	0			
	1			SIC Sidetone ctl 0: OFF, 1: ON (Sidetone permission)
	2			
	3			DRTK DRU-3A microphone 0: OFF, 1: ON (Switch the microphone gain for DRU)
	4			FDEV FM deviation 0: Narrow, 1: Wide
	5			CWBT CW tune 0: OFF, 1: ON
	6			STC FM subtone 0: OFF, 1: ON
	7			PRC Processor 0: OFF, 1: ON
	8			VOX VOX 0: OFF, 1: ON
C+2		←	Everytime	Flag 1
	0			
	1			LITRC Line enhancer trace 0: ON, 1: OFF
				BCTRC Beat canceler trace 0: ON, 1: OFF
C+3		←	IRQ2	TX mode
	0-3			0: SSB 1: SLEEP 2: CW 3: AM
				4: FM 5: FSK 6: SLEEP 7: TEST
C+4		←	IRQ2	RX mode
	0-3			0: SSB 1: SLEEP 2: CW 3: AM
				4: FM 5: FSK 6: SLEEP 7: TEST
C+5		←	IRQ2	TX filter
	0-4			Band
C+6		←	IRQ2	TX voice equalizer
	0-2			TX voice equalizing ON/OFF and selection
C+7		←	IRQ2, MODE	RX SSB/AM filter 1
	0-4			SSB/ AM low cut
C+8		←	IRQ2, MODE	RX SSB/AM filter 2
	0-4			SSB/AM high cut

CIRCUIT DESCRIPTION

Address (HEX)	Bit (HEX)	DSP-MCU	Accept	Function (Parameter)
C+9	0-3 4-7	←	IRQ2 MODE	RX CW filter CW center CW bandwidth
C+A	0-1 2-3	←	IRQ2 MODE	RX FSK filter FSK bandwidth FSK center
C+B	0-3	←	IRQ2, MODE	CW pitch 400Hz~1000Hz, 50Hz step (13)
C+C	0-1 2 3 4	←	IRQ2, MODE	FSK setting FSK shift width 0 : 170Hz, 1 : 200Hz, 2 : 425Hz, 3 : 850Hz FSK tone 0 : Low, 1 : High FSK reverse 0 : Normal, 1 : Reverse FSK polarity 0 : Normal, 1 : Invert
C+D	0-5	←	IRQ2	FM subtone frequency (Hz) 0 : 067.0 1 : 071.9 2 : 074.4 3 : 077.0 4 : 079.7 5 : 082.5 6 : 085.4 7 : 088.5 8 : 091.5 9 : 094.8 10 : 097.4 11 : 100.0 12 : 103.5 13 : 107.2 14 : 110.9 15 : 114.8 16 : 118.8 17 : 123.0 18 : 127.3 19 : 131.8 20 : 136.5 21 : 141.3 22 : 146.2 23 : 151.4 24 : 156.7 25 : 162.2 26 : 167.9 27 : 173.8 28 : 179.9 29 : 186.2 30 : 192.8 31 : 203.5 32 : 210.7 33 : 218.1 34 : 225.7 35 : 233.6 36 : 241.8 37 : 250.3 38 : 1750.0
C+E	0-E	←	Everytime	Beep frequency $f = n \times 12000 + 2^{16}$ (0Hz~6kHz)
C+F	0-E	←	Everytime	PROC compression level 0 : 0dB~S7FFF : 30dB : semi log
C+10	0-7	←	IRQ2	AF VOL 0 : ∞dB~255 : 0dB : Func
C+11	0-E	←	Everytime	DRU-3A VOL 0 : ∞dB~S7FFF : 0dB : linear
C+12	0-E	←	Everytime	Sidetone VOL 0 : ∞dB~S7FFF : 0dB : linear
C+13	0-E	←	Everytime	Beep VOL 0 : ∞dB~S7FFF : 0dB : linear
C+14	0-E	←	Everytime	AND VOL 0 : ∞dB~S7FFF : 0dB : linear
C+15	0-E	←	Everytime	MOD level 0 : ∞dB~S7FFF : 0dB : linear
C+16	0-E	←	Everytime	TX AF AGC gain : MIC 0 : ∞dB~S7FFF : 0dB : semi log
C+17	0-E	←	Everytime	TX AF AGC gain : DRU-3A 0 : ∞dB~S7FFF : 0dB : semi log
C+18	0-E	←	Everytime	TX AF AGC gain : ANJ 0 : ∞dB~S7FFF : 0dB : semi log
C+19	0-E	←	Everytime	Monitor VOL 0 : ∞dB~S7FFF : 0dB : linear
C+1A	0-E	←	Everytime	VOX gain 0 : ∞dB~S7FFF : 0dB : semi log
C+1B	0 1 2	←	IRQ2	Noise/interference elimination mode setting 0 : OFF, 1 : ON Noise reduction (Adaptive filter : Line enhancer) Beat canceler (Adaptive filter) Noise reduction (SPAC)
C+1C	0-9	←	Every time	S-meter 0 : 0~1023 : Full
C+1D	0-3	←	IRQ2	SPAC correlation time 0 : 2msec 1 : 5msec 2 : 7.5msec 3 : 10msec 4 : 15msec 5 : 20msec 6 : 25msec

CIRCUIT DESCRIPTION

Address (HEX)	Bit (HEX)	DSP-MCU	Accept	Function (Parameter)
C+1E		→	Updated at fs intervals	PROC compression level 0 : 0dB-S7FFF : 30dB : semi log
C+1F	0 1	→	Updated at fs intervals	Status VOXS 0 : OFF, 1 : ON CTCSS 1 : Det.
C+20	0-3	←	IRQ2	Adjustment mode 0 : Tone output, The other : Tone stop
C+21	0-E	←	Everytime	Test tone frequency 1 0 : OFF, 1 : $f = n \times 1200 + 2^{16}$ (0Hz-6kHz)
C+22	0-E	←	Everytime	Test tone frequency 1 0 : OFF, 1 : $f = n \times 1200 + 2^{16}$ (0Hz-6kHz)
C+23	0-F	→	Everytime	CW beat tracking : Error frequency 16 bits with a sign : $f = \pm n \times 3000 + 2^{15}$
C+24	0-2	←	IRQ2	RX voice equalizer RX voice equalizing ON/OFF and selection
C+25	0-F	←	Everytime	RF gain VOL 0 : -∞dB-255 : 0dB : Func
C+26	0-E	→	Updated at fs intervals	CW beat tracking frequency 16 bits with a sign : $f = n \times 12000 + 2^{16}$
C+27	0-E	←	Everytime	Line enhancer tracking speed 0 : Default, 1 : Slow-S7FFF : Fast
C+28	0-E	←	Everytime	Beat canceler tracking speed 0 : Default, 1 : Slow-S7FFF : Fast
C+29				Reserve
C+2A				Reserve
C+2B				Reserve
C+2C				Reserve
C+2D				Reserve
C+2E				Reserve
C+2F				Reserve

Other Circuits in the Analog Unit

Several circuits in the analog unit have already been described in the section of the flow of transmit/receive signals. This section explains the other circuits.

1) Reference voltage circuit

Since the TS-570D does not have any negative power supply, it uses a 2.5V reference voltage, which is half the 5V power supply voltage, for operational amplifiers, to process analog signals linearly. The reference voltage circuit is shown below. 2.5V is produced by dividing the power supply voltage with R539 and R540. The voltage is supplied to the circuitry through a buffer amplifier IC506 : NJM2100M.

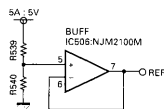


Fig. 21 Reference voltage circuit

2) Pop sound mute circuit

The mute circuit shown below reduces the pop sound when the power switches off. If pin 23 (AMU) of CN3 is low, the mute circuit consisting of Q11, Q12, DTC143EK mutes the AF amplifier (ICB : LA4446) and suppresses the pop sound when the power turns on.

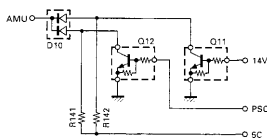


Fig. 22 Pop sound mute circuit

CIRCUIT DESCRIPTION

■ New Functions

The DSP used in the TS-570D processes detected AF signals. The DSP has various functions for processing digital signals. This section describes the functions and other features.

1) Transmission filter processing

Three types of filters are used for transmission: transmission sound quality setting filter, splatter filter, and speech processor filter. Each of the filters is outlined below.

- Transmission sound quality setting filter
Comprised of 8-degree IIR filters.
In SSB/AM, it consists of a band-pass filter, the band is specified by the bandwidth and low edge frequency.
In FM, it consists of a pre-emphasis filter.
- Splatter filter
This filter also functions as an FM splatter filter. It eliminates AF-AGC and limiter distortion.
SSB/AM/FM: 3.6kHz
- Speech processor filter
The input filter is IIR, and the output filter is FIR.
The bandwidth of this filter is linked with that of the transmission sound quality setting filter.

• Transmission sound quality setting filter degree/attenuation

Type	Comprise	Degree	Ripple (dB)	Attenuation (dB)
BPF	IIR	8	0	L : Simple attenuation H : 60
FM pre-emphasis	IIR	1+3	-	-
Splatter filter	IIR	6	0	Simple attenuation
PROC-IN : Low-LPF	IIR	6	0	20/45
PROC-IN : Mid-BPF	IIR	6	0	28/53
PROC-IN : Hi-BPF	IIR	6	0	30/60
PROC-OUT : Low-LPF	FIR	48	0.5	45
PROC-OUT : Mid-LPF	FIR	48	0.5	40/45
PROC-OUT : Hi-LPF	FIR	48	0.5	20/45/20

2) Receive filter processing

Filters used for reception include a high-pass filter and a low-pass filter for slope tuning and a band-pass filter for CW/FSK mode. 10-degree IIR filters are used as the low-pass filter, high-pass filter, band-pass filter, delay equalizer, and deemphasis filter. They are outlined below.

- SSB, AM, FM
AF high-pass filter/low-pass filter for slope tuning
- CW, FSK
AF BPF
The delay equalizer improves the group delay characteristics. The maximum signal delay time is 30ms.
- FM
A de-emphasis filter is inserted before the slope tuning filter.

• Degree/attenuation

Mode	Type	Comprise	Degree	Ripple (dB)	Attenuation (dB)
SSB/AM	LPF	IIR	6	0	70
SSB/AM	HPF	IIR	1-4	0	Simple attenuation/70
CW/FSK	BPF	IIR	6-8	0	65
CW/FSK	Equalizer	IIR	2-4	All pass	All pass
FM	-	IIR	7	De-emphasis filter	-

• Band/setting code

Blank parts cannot be set. The CW low edge: 200Hz or higher

No.	SSB/AM Low cut	SSB/AM Hi cut	CW Center	CW Width	FSK BPF	
					Center	Width
0	10 (0)	1.0k	400	50	2.2100k/1.3600k	250
1	50	1.1k	450	100	2.2250k/1.3750k	500
2	100	1.2k	500	200	2.3375k/1.4875k	1.0k
3	150	1.3k	550	300	2.5500k/1.7000k	1.5k
4	200	1.4k	600	400		
5	250	1.5k	650	600		
6	300	1.6k	700	1k		
7	350	1.7k	750	2k		
8	400	1.8k	800			
9	450	2.0k	850			
10	500	2.2k	900			
11	550	2.4k	950			
12	600	2.6k	1.0k			
13	650	2.8k				
14	700	3.0k				
15	750	3.2k				
16	800	3.4k				
17	850	3.6k				
18	900	4.0k				
19	950	4.4k				
20	1.0k	5.0k				
21	PKT-1					
22	PKT-2					
23	PKT-3					

CIRCUIT DESCRIPTION

3) Voice equalizing processing

A filter for voice equalizing processing is used to change the transmission sound quality. It consists of 32-tap FIR filters. The characteristics of the filters are shown below. To increase the voice equalizing effect, the input signal is increased by 3dB and then filtered when high boost, formant pass, or bass boost is set.

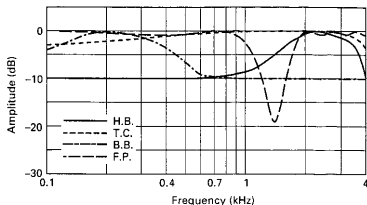


Fig. 23

	TX		RX	
0	Flat	0dB	Flat	0dB
1	Hi boost (H.B.)	2.2kHz peak	Hi boost (H.B.)	2.2kHz peak
2	Formant pass (F.P.)	Suppress 1.2kHz to 1.6kHz.	Formant pass (F.P.)	Suppress 1.2kHz to 1.6kHz.
3	Bass boost (B.B.)	200Hz peak	Bass boost (B.B.)	200Hz peak
4	Conventional (T.C.)	Emphasize 600Hz or higher by 3dB.	Conventional (R.C.)	Emphasize 1kHz or lower by 2dB.

4) Speech processor processing

Speech processor processing is carried out to improve the talk power in transmit mode. The band is divided into three parts to perform compression by suppressing the harmonic distortion. A double-precision band-pass filter, which is a IIR filter, is used for input, and a low-pass filter, which is a FIR filter, for output. The IN-BPF HI output level is increased by 3dB to emphasize the high-frequency range.

IN-BPF LOW	: 200 or 500-800Hz
IN-BPF MID	: 800-1600Hz
IN-BPF HI	: 1600-3000Hz
OUT-LPF LOW	: 800Hz
OUT-LPF MID	: 1600Hz
OUT-LPF HI	: 3000Hz

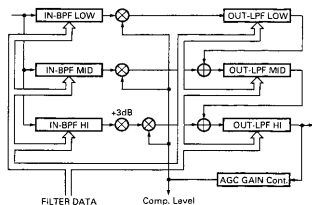


Fig. 24

5) VOX processing

The TS-570D does not have the anti-VOX function because the DSP correlates the receive tone signal and the signal from the microphone and carries out anti-VOX processing automatically. The signal from the microphone is stored in the buffer in the DSP and output with a delay time of 20ms to eliminate the blank time at the beginning.

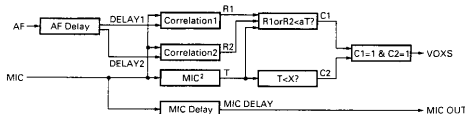


Fig. 25

CIRCUIT DESCRIPTION

6) Microphone amplifier AGC processing

The digital AGC processing is carried out for the signal from the microphone by the DSP. The microphone gain is managed by changing the maximum gain of the AGC. The attack time constant is set to a high value to prevent responding to any noise signals which are input momentarily. The limiter limits the upper limit of the accumulated value in the DSP according to the microphone gain setting.

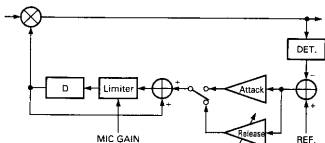


Fig. 26

7) CW tune function

When the conventional models performed CW zero-in, it receives CW receive tone and sidetone and performs tuning by changing the receive frequency manually so that there is no difference in the frequencies of the two tones. The TS-570D is designed to do it automatically. The DSP has an auto notch filter with the CW pitch frequency at the center. The auto notch filter converts the error data for automatic tracking to the beat to DDS frequency data and sends it to the microcomputer. The microcomputer adjusts the receive frequency automatically. The CW zero-in is carried by repeating this process. If the CW signal is weak or if there are several stations in the receive band, they cannot be tuned precisely.

8) CTCSS decode

The TS-570D is the first HF fixed model that has a CTCSS decoder which operates in FM mode. The microcomputer checks CTCSS decode by detecting the subtone in the receive signal using the DSP to turn the audio signal output on and off.

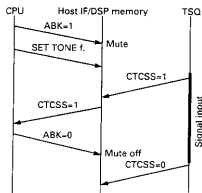


Fig. 27

9) Noise/interference processing

The noise/interference processing, SPAC, line enhancer, and beat cancel functions of the TS-570D are made possible by digital signal processing by the DSP. They are outlined below.

• SPAC (NR2)

SPAC stands for Speech Processing System by use of Auto Correlation function. It extracts periodical signals (target receive signals) using a self-correlation function and suppresses noise. SPAC improves the S/N effectively, but may produce noise because signals discontinue when periodical signals are extracted.

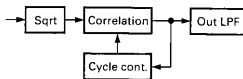


Fig. 28

• Line enhancer

The line enhancer emphasizes the periodical signal and suppresses noise using a 64-tap FIR adaptive filter. The convergence speed of the adaptive filter is changed in proportion to the signal strength meter level. If the signal strength meter level is high, the change of the tone is suppressed. The value of the delay adapted according to the mode is changed to achieve the optimum effect for each mode.

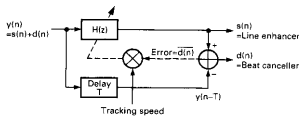


Fig. 29

• Beat cancel

The beat canceler suppresses beat interference by adding the periodical signals with reverse phases using the same 64-tap FIR adaptive filter as for the line enhancer. The FIR filter can suppress several beats. The convergence speed of the adaptive filter is set to the optimum value for producing the beat cancel effect. However, an audio signal may be canceled as it is regarded as a periodical signal.

DESCRIPTION OF COMPONENTS

FINAL UNIT (X45-353X-XX) 0-10 : K,M2 2-71 : E,E2,E3

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1	25C1971	Pre-drive amplifier	Wide-band amplification of HF band
Q2,3	25C3133	Drive amplifier	Push-pull wide-band amplification of HF band
Q4,5	25C2879	Final amplifier	Push-pull wide-band amplification of HF band
Q6	25C3421(Y)	Final bias supply	Temperature compensation of final
Q7	FMC2	Switching	K1 (AT IN ↔ THRU) control
Q8	FMC2	Switching	K2 (TX ↔ RX) control
Q9	FMC2	Switching	K3 (ANT1 ↔ ANT2) control
Q10	DTC114EK	Switching	On when over voltage
Q11	DTC143TK	Switching	K4 (Power on ↔ off) control
Q12,13	DTD123EK	Switching	Fan motor control
Q14	25C2714(Y)	Buffer amplifier	AT control voltage detection signal shaping
Q15	25C2714(Y)	Buffer amplifier	AT control current detection signal shaping
Q16	DTC114EK	Switching	FEN logic inversion
IC1	TA7805S	Regulator	14S → 5A
IC2	TA7808S	Regulator	14S → 8A
IC3	TA75S393F	Comparator	Voltage/current amplitude comparison
IC4	SN74S74NS	D flip-flop	Voltage/current phase comparison
IC5	M54562P	Driver	LPF relay control
IC6	NJU3714G	Decoder	LPF control signal serial → parallel convert
IC7,8	μPD6345GS	Decoder	AT C control signal serial → parallel convert
IC9	μPD6345GS	Decoder	AT L control signal serial → parallel convert
IC10	TA7810S	Regulator	14S → 10A
D1	MA27T-B	Temperature compensation	Temperature sensing of pre-drive
D2	MA27-B	Temperature compensation	Temperature sensing of drive
D3,4	MA27-B	Temperature compensation	Temperature sensing of final
D5	1S5101	High-frequency rectification	Reflected waveform voltage detection
D6	1S5101	High-frequency rectification	Forward waveform voltage detection
D7	LFB01	Surge absorption	K1
D8	LFB01	Surge absorption	K2
D9	LFB01	Surge absorption	K3
D10,11	DSA301LA	Surge absorption	Lighting surge protection
D12	SG-5L(R)	Protection diode	Reverse connection protection
D13	ERZ-M10DK220	Surge absorption	Power surge protection
D14	02CZ18(X,Y)	Zener diode	Over voltage detection
D15	LFB01	Surge absorption	K4
D16	DAN202K	Switching	PSC and BOVR OR
D17	LFB01	Surge absorption	Fan
D18,20,22	1S5226	Clipper	AT control voltage detection signal shaping
D19,21,23	1S5226	Clipper	AT control current detection signal shaping
D24	1S5101	High-frequency rectification	AT control voltage amplitude signal detection
D25	1S5101	High-frequency rectification	AT control current detection signal detection
D26	DSA301LA	Surge absorption	Lighting surge protection
D101-601	LFB01	Surge absorption	LPF switching relay
D801-823	LFB01	Surge absorption	AT switching relay

CONTROL UNIT (X53-369X-XX) 0-10 : K 0-21 : M2 2-71 : E 2-72 : E2 2-73 : E3

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1	DTC143EK	Switching	EEPROM write control
Q2	DTC143EK	Switching	Transmission control (KEY line)
Q3,4	DTC114EK	Switching	Multiplxer
Q5	DTA143EK	Switching	Backup judgement

DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q6	DTC143EK	Switching	AT-300 control (TT, TS)
Q7	DTA143EK	Switching	AT-300 control (TT, TS)
Q8	DTC143TK	Switching	Backup judgement
Q9	DTC143EK	Switching	AT-300 control (TT, TS)
Q10	DTA143EK	Switching	AT-300 control (TT, TS)
Q11, 12	DTC143EK	Switching	AT mute judgement
JC1	AT24C84N10SI27	EEPROM	Adjustment data saving
IC2	CAT35C102KI	EEPROM	Electronic keyer message memory
IC3	UPD75004GB-746	CPU	Electronic keyer control 4 bit microprocessor
IC4	PST9121NR	Reset	Reset signal generation
IC5	CXD1095Q	Extended I/O	
IC6	M37710EFBJQF *	CPU	16 bit main microprocessor
IC7,8	TC4052BF	Multiplexer	Analog signal input
IC9	NJM78L05UA	AVR	14S → 5V
IC10	NJM78L06UA	AVR	14V → 6V
IC11	NJM78L08UA	AVR	14S → 8V
IC501	NJM2100M	Amplifier	Microphone amplifier
IC502	BU4068BCFV	Analog switch	Input changeover
IC503	NJM2100M	Buffer amplifier	CODEC input
IC504	AK4506-VS	A/D, D/A	CODEC
IC505	NJM2100M	LPF/Buffer amplifier	CODEC output
IC506	NJM2100M	Bias/Buffer amplifier	CODEC output
IC507	ADSP2181KS-115	DSP IC	
IC508	TC74HC4040AF	Clock divider	
IC511	TC7S04F	Inverter	Clock inversion
IC512	27C01012DJPHB	EPROM	DSP program saving
IC513	NJM78L05UA	AVR	14S → 5V
D1	1SS355	Protection diode	SS line
D2	1SS355	Protection diode	DOT line
D3	1SS355	Protection diode	DASH line
D4	1SS355	Protection diode	KEY line
D5	DAN202U	Switching (Reverse current prevention)	Lithium battery or DC 13.8V
D6	1SS355	Reverse current prevention	BKC line
D7	1SS355	Reverse current prevention	5C line
D8	02C28.2(Y)	Voltage detection	Backup detection
D9	02C28.2(Y)	Voltage detection	AF mute detection
D10	DAN202U	Switching (Reverse current prevention)	Power switch off or DC down

TX-RX UNIT (X57-500X-XX) : TX-RX 0-10 : K,M2 2-71 : E,E2,E3

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q1	DTA124EK	Switching	ATT changeover
Q2	2SD1757K(S)	Muting	On when TX, Off when RX
Q3	2SB1188(C,R)	Switching	On when RX, Off when TX
Q4	DTC143TK	Switching	On when RX, Off when TX
Q5-8	2SK520(K44)	RX 1st mixer	RF : 30kHz~30MHz, IF : 73.05MHz, LO1 : 73.08~103.05MHz
Q9	RU201	Buffer amplifier	NB
Q10,13	2SK520(K43)	RX 2nd mixer	IF1 : 73.05MHz, IF2 : 8.83MHz, LO2 : 64.22MHz
Q11	3SK131(M)	RX IF amplifier	IF2 : 8.83MHz
Q12	3SK131(M)	RX IF amplifier	IF1 : 73.05MHz
Q14	2SC2412K(S)	IF amplifier	IF2 : 8.83MHz
Q15	2SC2412K(S)	Switching	RF blanking
Q16	2SC3357	Amplifier	LO1

DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q17,18	2SK520(K44)	RF amplifier	Pre-amplifier (f < 21.5MHz)
Q20	DTA124EK	Switching	On when pre-amplifier off
Q21	2SC2412K(S)	Waveform shaping	ALC keying
Q22	2SC2412K(S)	Buffer amplifier	Data output (ACC2 terminal)
Q24	FMC2	Switching	CKY control
Q25	3SK131(M)	RF amplifier	Pre-amplifier (f ≥ 21.5MHz)
Q26	DTA143EK	Switching	On when pre-amplifier on (f ≥ 21.5MHz)
Q27,30	3SK131(M)	TX 1st mixer	IF1 : 73.05MHz, IF2 : 8.83MHz, LO2 : 64.22MHz
Q28,31	3SK184(R)	TX 2nd mixer	RF : 30kHz~30MHz, IF : 73.05MHz, LO1 : 73.08~103.05MHz
Q29	3SK131(M)	TX if amplifier	IF2 : 8.83MHz
Q35	2SC2954	Drive amplifier	
Q36	2SC2412K(S)	Buffer amplifier	Balanced modulator input
Q37	DTC114EK	Switching	On when FM mode
Q38	2SC2412K(S)	Amplifier	Balanced modulator output
Q39	2SA1037K(R)	Switching	DC/DC converter
Q40,41	2SC2412K(S)	Switching	DC/DC converter
Q42	2SB1188(Q,R)	Switching	External control relay (On when TX)
Q49	2SD1624(S)	Power supply	Ripple filter
Q50	DTC114EK	Switching	Squelch control (ACC2 terminal)
Q51	DTC143TK	Switching	External control relay
Q52	DTC124EK	Switching	RX IF gain changeover (On when gain down)
Q57	DTC114EK	Switching	CAR muting (On when RX)
Q59	FMA5	Switching	On when SSB, FM, CW mode
Q61	FMA5	Switching	On when AM mode and power break
Q64	2SC2412K(S)	Muting	AF mute
Q65	DTC114EK	Muting	Modulation line mute
Q66	DTC114EK	Switching	On when except TX FM mode
Q67	DTC114EK	Switching	Forward waveform voltage time constant changeover
Q68	2SB1188(Q,R)	Switching	TXB
Q69	2SB1188(Q,R)	Switching	RXB
Q70	DTC114EK	Switching	Reflected waveform voltage time constant changeover
Q71	DTC143EK	Switching	On when TX
Q72	FMG3A	Switching	On when RX
Q73	DTA143EK	Switching	On when pre-amplifier on (f < 21.5MHz)
Q75	DTC114EK	Switching	RF blanking
Q76	DTC114EK	Switching	On when pre-amplifier off
Q77	DTC114EK	Switching	ATT changeover
Q78	DTC114EK	Switching	External control relay (On when TX)
Q79	DTC114EK	Switching	ALC time constant changeover (On when AM mode)
Q80	DTC124EK	Switching	AGC on/off (On when FM mode and TX)
Q81	DTC114EK	Switching	TX gain changeover
IC1	NJM2904M	DC amplifier	S-meter (Except FM mode)
IC2	μPC1037GR	Balanced modulator	SSB, AM modulation
IC3	BU2090FS	Extended I/O	Serial/parallel conversion (BPF changeover)
IC4	BU4066BCFV	Analog switch	AGC time constant and S-meter output changeover
IC5	NJM2902M	DC amplifier	TX gain, ALC meter and voltage, CAR balance
IC6	M62363FP	DAC	
IC7	KCD10	HIC	FM frequency conversion, detection, S-meter output
IC8	LA4446	AF amplifier	
IC9	BU4066BCFV	Analog switch	Detection output changeover
IC11	TC9174F	Extended I/O	Serial/parallel conversion
IC12	BU4066BCFV	Analog switch	Modulation input changeover
IC13	NJM2904M	DC amplifier	Forward and reflected waveform voltage
IC14	NJU3718G	Extended I/O	Serial/parallel conversion

DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
IC15	KCD11	HIC	SSB, CW, AM detection, s-meter output
IC16	KCC11	HIC	A.L.C. final protection
IC17	TC7S08F	Buffer amplifier	
D1	LFB01	Relay surge absorption	ATT relay
D2,5	RLS245	Lighting surge absorption	
D3,4	V08(G)	Lighting surge absorption	
D6	RN731H	Switching	On when RX, Off when TX
D7	RN731H	Switching	On when RX (From 1.705MHz)
D8	RN731H	Switching	LPF switching (On when $f \leq 1.705\text{MHz}$)
D9	LFB01	Switching	LPF switching (On when $f \leq 1.705\text{MHz}$)
D10	RN731H	Switching	BPF switching (On when $1.705\text{MHz} < f \leq 2.5\text{MHz}$)
D11	LFB01	Switching	BPF switching (On when $1.705\text{MHz} < f \leq 2.5\text{MHz}$)
D12	RN731H	Switching	BPF switching (On when $2.5\text{MHz} \leq f < 4.1\text{MHz}$)
D13	LFB01	Switching	BPF switching (On when $2.5\text{MHz} \leq f < 4.1\text{MHz}$)
D14	RN731H	Switching	BPF switching (On when $4.1\text{MHz} \leq f < 6.9\text{MHz}$)
D15	LFB01	Switching	BPF switching (On when $4.1\text{MHz} \leq f < 6.9\text{MHz}$)
D16	RN731H	Switching	BPF switching (On when $6.9\text{MHz} \leq f < 7.5\text{MHz}$)
D17	LFB01	Switching	BPF switching (On when $6.9\text{MHz} \leq f < 7.5\text{MHz}$)
D18	RN731H	Switching	BPF switching (On when $7.5\text{MHz} \leq f < 10.5\text{MHz}$)
D19	LFB01	Switching	BPF switching (On when $7.5\text{MHz} \leq f < 10.5\text{MHz}$)
D20	RN731H	Switching	BPF switching (On when $10.5\text{MHz} \leq f < 13.9\text{MHz}$)
D21	LFB01	Switching	BPF switching (On when $10.5\text{MHz} \leq f < 13.9\text{MHz}$)
D22	RN731H	Switching	BPF switching (On when $13.9\text{MHz} \leq f < 14.5\text{MHz}$)
D23	LFB01	Switching	BPF switching (On when $13.9\text{MHz} \leq f < 14.5\text{MHz}$)
D24	RN731H	Switching	BPF switching (On when $14.5\text{MHz} \leq f < 21.5\text{MHz}$)
D25	LFB01	Switching	BPF switching (On when $14.5\text{MHz} \leq f < 21.5\text{MHz}$)
D26	RN731H	Switching	BPF switching (On when $21.5\text{MHz} \leq f < 30.0\text{MHz}$)
D27	LFB01	Switching	BPF switching (On when $21.5\text{MHz} \leq f < 30.0\text{MHz}$)
D30	LFB01	Switching	On when pre-amplifier off
D31	MA110	Switching	AGC time constant
D32	LFB01	Switching	On when pre-amplifier off
D33	DAP236K	Switching	8.83MHz filter
D34	1SS312	Switching	8.83MHz filter TX/RX changeover
D35-37	DAP236K	Switching	8.83MHz filter
D38	LFB01	Switching	8.83MHz filter TX/RX changeover (On when RX)
D39	LFB01	Switching	8.83MHz filter TX/RX changeover (On when TX)
D40	DAP236K	Switching	8.83MHz filter
D41	1SS312	Switching	LO2
D42	DAP236K	Switching	8.83MHz filter
D43	RN731H	Switching	On when pre-amplifier on ($f < 21.5\text{MHz}$)
D44	1SS312	Switching	LO1
D45	LFB01	Switching	On when pre-amplifier on ($f < 21.5\text{MHz}$)
D46,47	DAP236K	Switching	8.83MHz filter
D48-50	MA110	Reverse current prevention	
D51	LFB01	Switching	On when pre-amplifier on ($f \geq 21.5\text{MHz}$)
D52	RN731H	Switching	On when pre-amplifier on ($f \geq 21.5\text{MHz}$)
D53,54	DAP236K	Switching	8.83MHz filter
D55	LFB01	Switching	On when TX
D56	RN739D	RF ATT	TX gain control
D57	B30-2001-05	LED	Voltage stability
D58	MA110	Voltage shift	
D61	LFB01	Switching	On when TX
D62	RB751H	Reverse current prevention	
D63	1SS226	Rectification	DC/DC convertor

DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
D64	02C26.2(Y)	Zener diode	Voltage stabilization
D68	LFB01	Relay surge absorption	External control relay
D69,71	RB751H	Reverse current prevention	
D73	02C23.3(Y)	Zener diode	Voltage stabilization
D74	02C24.7(Y)	Zener diode	Voltage stabilization
D75	MA110	Reverse current prevention	
D76	1SS226	Clipper	On when FM large input
D77	02C26.2(Y)	Zener diode	Voltage stabilization
D82	LFB01	Switching	CAR TX/RX changeover (On when TX)
D85	MA110	Reverse current prevention	
D89-92	MA110	Reverse current prevention	
D95	MA110	Reverse current prevention	
D96	02C25.1(Y)	Zener diode	Voltage stabilization
D97	DAP236K	Switching	8.83MHz filter
D98	DAN202K	Switching	ON when FM mode and TX
D99,100	02C24(Y)	Zener diode	Surge absorption of power supply line
D101,102	MA110	Reverse current prevention	
D103,104	LFB01	Surge absorption	

TX-RX UNIT (X57-500X-XX) : PLL 0-10 : K,M2 2-71 : E,E2,E3

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q500	25C2714(Y)	X'tal OSC	20MHz
Q501-503	25C2714(Y)	Buffer amplifier	20MHz
Q504	25C2412K(S)	amplifier	20MHz
Q505	25C3722K(R)	Active LPF	Comparison 20kHz (FM 5kHz)
Q506,507	25C3722K(R)	Active filter	
Q508	DTC143TK	Switching	FM modulation input on/off
Q509	25K1875(V)	VCO	LO2
Q510	25C2714(Y)	Buffer amplifier	64.22MHz
Q511	25C2714(Y)	Amplifier	64.22MHz
Q512	25C2412K(S)	Buffer amplifier	Chopper output (10MHz)
Q513	25C2712(GR)	Buffer amplifier	D/A buffer
Q514	25C2412K(S)	Buffer amplifier	
Q515	25C2412K(S)	Amplifier	CAR
Q516	25C2412K(S)	Buffer amplifier	CAR
Q517	25C2412K(S)	Buffer amplifier	Chopper output (5MHz)
Q518	25C2712(GR)	Buffer amplifier	D/A buffer
Q519	25C2412K(S)	Buffer amplifier	Mixer input buffer (5.54-6.09MHz)
Q520	25C2412K(S)	Buffer amplifier	20MHz
Q521	25C2714(Y)	Tripled circuit	20MHz x 3 = 60MHz
Q522	25C2714(Y)	Amplifier	PLL IC input (7.5-47.5MHz)
Q523	25C2412K(S)	Buffer amplifier	PLL IC input (7.5-47.5MHz)
Q524	25C3722K(R)	Active LPF	Comparison 500kHz
Q525,526	25C3722K(R)	Active LPF	
Q527	DTC114EK	Switching	VCO A changeover
Q528	25K1875(V)	VCO A	73.08-84.04MHz
Q529	DTC114EK	Switching	VCO B changeover
Q530	25K1875(V)	VCO B	84.04-97.04MHz
Q531	DTC114EK	Switching	VCO C changeover
Q532	25K1875(V)	VCO C	97.04-103.05MHz
Q533	25C2714(Y)	Buffer amplifier	Mixer input buffer (73.08-103.05MHz)
Q534	25C2714(Y)	Amplifier	LO1 output (73.08-103.05MHz)

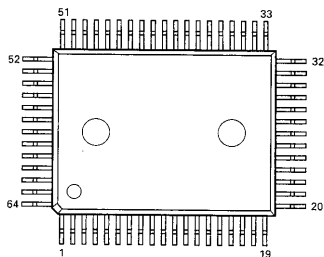
DESCRIPTION OF COMPONENTS

Ref. No.	Parts No.	Use/Function	Operation/Condition/Compatibility
Q535	2SC2714(Y)	Buffer amplifier	LO1 output (73.08~103.05MHz)
Q543	2SC2714(Y)	Switching	VCO A BPF band changeover
Q544	2SC2412K(R)	Ripple filter	8V
Q545	2SC2714(Y)	Buffer amplifier	Mixer input buffer (65.54~66.04MHz)
Q546	2SC2714(Y)	Amplifier	LO2 output
Q800	2SC2714(Y)	Amplifier	NB
Q801	DTC114EK	Switching	NB on/off
Q802	2SC2714(Y)	Amplifier	NB
Q803	2SC2412K(S)	Amplifier	AGC, NB
Q804	2SC2714(Y)	Amplifier	NB
Q805	2SC2412K(S)	Switching	NB
Q806	2SC2714(Y)	Buffer amplifier	NB
Q807	DTA114EK	Switching	NB
IC500	MB86001PF	PLL	2-5 : Division ratio setting input 6 : 64.22MHz input, 9 : Lock voltage output 11 : Unlock output ("L" : Unlock), 15 : 20MHz input
IC501	F71022	DDS	CAR
IC502	F71022	DDS	LO1 (540~1040kHz)
IC503	UPC1037GR	Mixer	10.0 - 1.17 = 8.83MHz
IC504	UPC1037GR	Mixer	540~1040kHz → 5.54~6.04MHz
IC505	UPC1686G	Mixer	5.54~6.04MHz → 65.54~66.04MHz
IC506	SN76514N	Mixer	73.05~103.05MHz + 65.54~66.04MHz = 7.5~47.5MHz
IC507	MB86001PF	PLL	2-5 : Division ratio setting input 6 : 7.5~47.5MHz input 8,9 : Lock voltage output 11 : Unlock output ("L" : Unlock) 15 : 20MHz input
IC508	BU4S66	Inverter	
IC510	TC7S08F	Buffer amplifier	
IC511	NJM78L08UA	AVR	14S → 8V (LO1)
IC900	ADM232LAR	Level shift	RS-232 level shift
D500	1SV269	Vari-cap diode	LO2, VCO
D501	1SV269	Vari-cap diode	LO1, VCO A
D502	RLS135	Switching	LO1, VCO A output
D503	1SV269	Vari-cap diode	LO1, VCO B
D504	RLS135	Switching	LO1, VCO B output
D505	1SV269	Vari-cap diode	LO1, VCO C
D506	RLS135	Switching	LO1, VCO C output
D507	DAP202K	Reverse current prevention	Unlock signal detection
D508,509	MA110	Reverse current prevention	
D800	MA716	RF switch	Noise detection

SEMICONDUCTOR DATA

Extended I/O : CXD1095Q (Control Unit IC5)

■ Terminal connection diagram



■ Terminal function

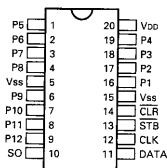
Pin	Name	Port	I/O	Details
1,2	NC			
3	M0	PB1	O	Microphone input switching 'H': Normal microphone input, 'L': Others
4	M1	PB2	O	Microphone input switching 'H': Packet input, 'L': Others
5	M2	PB3	O	Microphone input switching 'H': DRU-3A input, 'L': Others
6	DREN	PB4	O	Enable 'H': DRU-3A serial parallel register through, 'L': DRU-3A serial/parallel register latch
7	VEN1	PB5	O	Enable 'L': TX-RX unit DAC register through, 'H': TX-RX unit DAC register latch
8	REN1	PB6	O	Enable 'H': TX-RX unit serial/parallel register through, 'L': TX-RX unit serial/parallel register latch
9	REN2	PB7	O	Enable 'L': TX-RX unit serial/parallel register through, 'H': TX-RX unit serial/parallel register latch
10		Vss		GND
11	TYPE8	PC0	I	Destination 'L': 50W, 'H': 100W
12	TYPE9	PC1	I	Destination 'L': Not general cover in TX, 'H': General cover in TX
13	50WSW	PC2	I	Setting check 'L': Without restriction, 'H': Restriction on 50W
14~17	K3~K0	PC3~PC6	I	Key matrix
18	ULK	PC7	I	State check 'L': PLL unlock, 'H': Others, normal
19	NC			
20	PEN1	PD0	O	Enable 'H': PLL1 register through, 'L': PLL1 register latch
21	PEN2	PD1	O	Enable 'H': PLL2 register through, 'L': PLL2 register latch
22	DEN1	PD2	O	Enable 'H': DDS1 register through, 'L': DDS1 register latch
23	DEN2	PD3	O	Enable 'H': DDS2 register through, 'L': DDS2 register latch
24	BLANK	PD4	O	LCD driver control 'H': Display goes off
25		Vss		GND
26		Vdd		5V
27	LEN1	PD5	O	Enable 'H': LCD1 driver register through, 'L': LCD1 driver register latch
28	LEN2	PD6	O	Enable 'H': LCD2 driver register through, 'L': LCD2 driver register latch
29	LEN3	PD7	O	Enable 'H': LCD3 driver register through, 'L': LCD3 driver register latch
30~32	IAD0~IAD2	D0~D2	I/O	Pseudo bus
33,34	NC			
35~39	IAD3~IAD7	D3~D7	I/O	Pseudo bus
40		CLR	I	
41		ODEN	I	
42		Vss		GND
43		WR	I	
44		RD	I	

SEMICONDUCTOR DATA

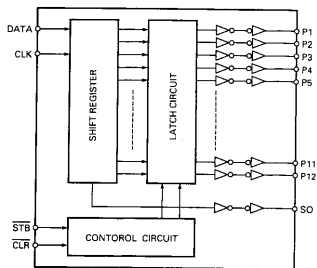
Pin	Name	Port	I/O	Details
45		CS	I	
46-48	IADB-IAD10	A0-A2	I/O	Pseudo bus
49	TTO	PE0	O	External AT control 'H': AT through request, 'L': Others
50	TSO	PE1	O	External AT control 'H': AT tuning request, 'L': Others
51	NC			
52	TSI	PE2	I	External AT control 'H': AT through end, 'L': Others
53	TTI	PE3	I	External AT control 'H': AT tuning end, 'L': Others
54-56	TYPE0-TYPE2	PA0-PA2	I	Destination Unit destination setting
57		Vss		GND
58		Vdd		5V
59,60	TYPE3,TYPE4	PA3,PA4	I	Destination Unit destination setting
61	TYPE5	PA5	I	Destination Unit destination setting (Reserve)
62	TYPE6	PA6	I	Destination 'L': 50MHz band installed, 'H': 50MHz band not installed
63	TYPE7	PA7	I	Destination Unit destination setting (Reserve)
64	FEN	PB0	O	Enable 'H': FFA unit serial/parallel register through, 'L': FFA unit serial/parallel register latch

Decoder : NJU3714G (Final Unit IC6)

■ Terminal connection diagram

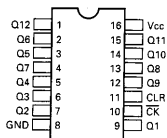


■ Block diagram



Clock Divider : TC74HC4040AF (Control Unit IC508)

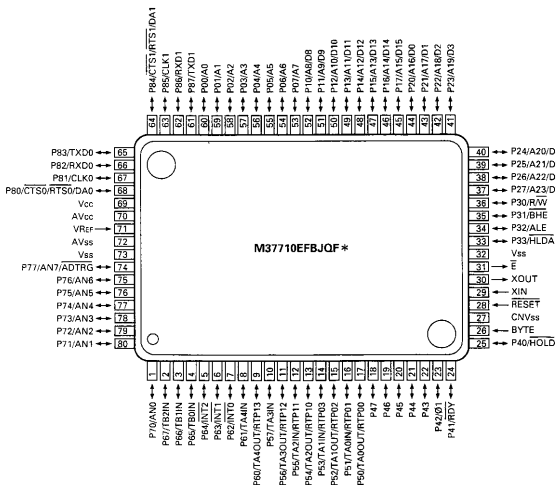
■ Terminal connection diagram



SEMICONDUCTOR DATA

CPU : M37710EFBJQF* (Control Unit IC6)

Terminal connection diagram



Terminal function

Pin	Name	Port	I/O	Details
1	AN0	AN0	I	A/D Analog input switched by ADC1 and ADC2, IC7 x data input.
2	RENB	TB2in	I	Encoder Edge interrupt, Rotation direction check
3	RENA	TB1in	I	Encoder Edge interrupt, Rotation direction check
4	CENA	TB0in	I	Encoder Edge interrupt
5	PSW	INT2	I	Interrupt "H": Power switch interrupt, "L": Normal
6	BOVR	INT1	I	Interrupt "L": Overvoltage interrupt, "L→H": Power restore interrupt, "H": Normal
7	BKC	INT0	I	Interrupt "L": Voltage drop interrupt, "L→H": Power restore interrupt, "H": Normal
8	MENB	TA4in	I	Encoder Main encoder input Two-phase pulse signal processing
9	MENA	TA4out	I	Encoder Main encoder input Two-phase pulse signal processing
10	CENB	P57	I	Encoder Click encoder input Rotation direction check
11	PCK	P56	O	Clock PLL/DDS serial clock
12	PDA	P55	O	Data PLL/DDS serial data
13	CLOCK	P54	I/O	Clock Common serial clock "L": VS-3 is installed, "H": Not installed
14	DATA	P53	O	Data Common serial data
15	SPD	TA1out	O	Electric key control PWM with 1/10 the frequency of WPM
16	VCS	P51	O	Chip select "L": VS-3 is selected, "L→H": Voice synthesis start, "H": Others, normal
17	BEEP	TA4out	O	Beep control "H": Beep output, "L": Others, normal
18	KY	P47	O	Transmitter circuit control "H": Transmission output, "L": Others
19	ABK	P46	O	Receiver circuit control "H": DSP AF mute, "L": Others
20	TXC	P45	O	Transmitter circuit control "H": In transmission mode, "L": Others

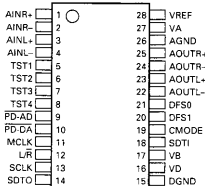
SEMICONDUCTOR DATA

Pin	Name	Port	I/O	Details	
21	RXK	P44	O	Receiver circuit control	'H': DSP signal mute, 'L': Others
22	NAR	P43	I	State check	'H': VS-3 serial latch idle, 'L': Others
23	SCL	P42	O	Clock	EEPROM serial clock
24	SDA	P41	I/O	Data	EEPROM serial data
25	EOM	P40	I	State check	'H': DRU 3A message playback end, 'L': Others
26		BYTE	I	Bus width switching input	
27		CNVss	I	CNVss	
28		RESET	I	Reset input	
29		Xin	I	Clock input	
30		Xout	O	Clock output	
31		E	O	Enable output	
32		Vss		Power input	
33	SCK	P33	O	Clock	Electric key microcomputer serial data clock
34	PKS	P32	I	Transmission request	'L': Packet transmission request, 'H': Normal
35	KYS	P31	I	Installation check	'H': Paddle/electric key installed, 'L': Others
36	DSPEN	P30	O	Bus control	'L' (H→L): Data processing request, 'H': Others, normal
37	RESET	P27	O	Reset	'L': DSP, Electric key, Expansion I/O, VS-3 reset, 'H': Others, normal
38	IACK	P26	O	Bus control	'L': Address latch, 'H': Address through
39	IAL	P25	I	Bus control	'H': DSP chip select can be changed, 'L': DSP chip select cannot be changed
40	PSC	P24	O	Power control	'H': Power ON, 'HiZ': Power OFF
41	IOCS	P23	O	Chip select	'L': Expansion I/O is selected, 'H': Expansion I/O is not selected
42	IS	P22	O	Chip select	'L': DSP is selected, 'H': DSP is not selected
43	IWR	P21	O	Bus control	'L': Data writing, 'H': When data is not written
44	IRD	P20	O	Bus control	'L': Data reading, 'H': When data is not read
45-49	IAD15-IAD11	P17-P13	I/O	Pseudo bus	Address/data multiplex when the DSP is accessed, Not used during expansion I/O access (The previous state is maintained)
50-52	IAD10-IAD8	P12-P10	I/O	Pseudo bus	Address/data multiplex when the DSP is accessed, Address bus during expansion I/O access
53-60	IAD7-IAD0	P07-P00	I/O	Pseudo bus	Address/data multiplex when the DSP is accessed, Data bus during expansion I/O access
61	KEY	P87	I	Transmission request	'L': Transmission request from the keyer, 'H': Normal
62	MEA	P86	I	Electric key control	'H': Electric keyer microcomputer message playback, 'L': Others, normal
63	BSY	P85	I	Electric key control	'H': Electric keyer microcomputer data cannot be set, 'L': Others, normal
64	SS	P84	I	Transmission request	'L': Transmission request by the microphone PTT, 'H': Normal
65	TXD	TXDO	O	UART data	
66	RXD	RXDO	I	UART data	
67	RTS	P81	O	UART control	
68	CTS	CTSO	I	UART control	
69		Vcc		Power input	
70		AVcc		Analog power input	
71		Vref		Reference voltage input	
72		AVss		Analog power input	
73		Vss		Power input	
74	AMD	P77	I	AT control check	Amplitude difference check, 'L': Request to reduce capacity, 'H': Request to increase capacity
75	PHD	P76	I	AT control check	Phase difference check, 'L': Request to reduce capacity, 'H': Request to increase capacity
76,77	ADC2,ADC1	P75,P74	O	Signal switching	Multiplexer switching
78	AN3	AN3	I	A/D	Analog input switched by ADC1 and ADC2, IC8 y data input
79	AN2	AN2	I	A/D	Analog input switched by ADC1 and ADC2, IC8 x data input
80	AN1	AN1	I	A/D	Analog input switched by ADC1 and ADC2, IC7 y data input

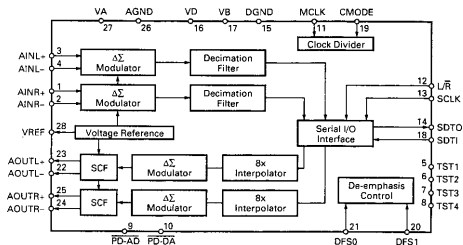
SEMICONDUCTOR DATA

A/D, D/A Converter : AK4506-VS (Control Unit IC504)

■ Terminal connection diagram



■ Block diagram



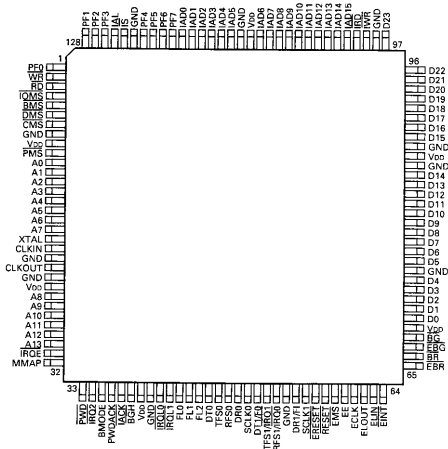
■ Terminal function

Pin No.	Name	I/O	Function
1	AINR+	I	Right-channel analog positive input pin
2	AINR-	I	Right-channel analog negative input pin
3	AINL+	I	Left-channel analog positive input pin
4	AINL-	I	Left-channel analog negative input pin
5	TST1	I	Test pin (Pulldown pin)
6	TST2	I	Open or connect to AGND.
7	TST3	O	Test pin
8	TST4	O	Open
9	PD AD	I	Power down pin. PD AD: ADC power down pin, PD DA: DAC power down pin
10	PD DA	I	When each pin is low, the corresponding part enters the power down mode. When the power turns on, resetting and calibration must be carried out. Resetting is performed by making both PD AD and PD DA low.
11	MCLK	I	Master clock input pin.
12	L/R	I	Input/output channel select pin. The fs clock is input. High: Left channel; Low: Right channel
13	SCLK	I	Serial data clock pin. One bit of data is output at a falling edge of the signal at this pin.
14	SDTO	O	Serial data output pin. Data is two's complement. The MSB is output first, and 16 bits are output by left justification. Goes low after 16 bits are output. Low when the power is down (PD AD: Low).
15	DGND	-	Digital unit ground pin
16	VD	-	Digital unit power supply pin (+5V)
17	VB	-	Silicon PCB power supply pin (+5V)
18	SDTI	I	Serial data input pin. Data is two's complement. The MSB is output first, and 16 bits are output by right justification.
19	CMODE	I	Master clock select pin (Pulldown pin) Low: MCLK=256fs, High: MCLK=384fs
20	DFS1	I	Deemphasis frequency select pin
21	DFS0	I	Supports three frequencies.
22	AOULR-	O	Left-channel analog negative output pin
23	AOULR+	O	Left-channel analog positive output pin
24	AOULR-	O	Right-channel analog negative output pin
25	AOULR+	O	Right-channel analog positive output pin
26	AGND	-	Analog ground pin
27	VA	-	Analog power supply pin (+5V)
28	VREF	O	Reference voltage output pin VA-3.0V Output according to the VA reference. The 10μF electrolytic capacitor and 0.1μF ceramic capacitor are connected between VREF and VA.

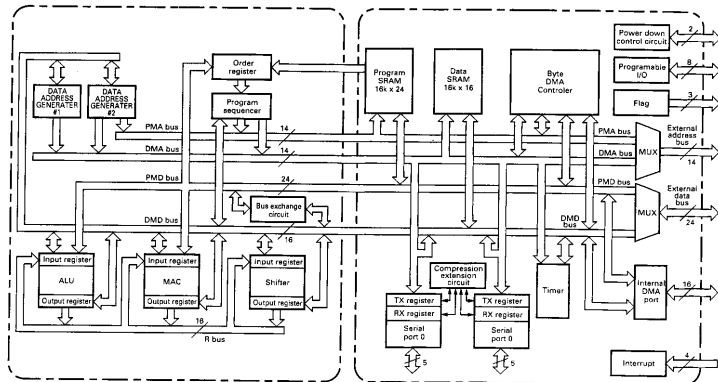
SEMICONDUCTOR DATA

DSP : ADSP2181KS-115 (Control Unit IC507)

■ Terminal connection diagram



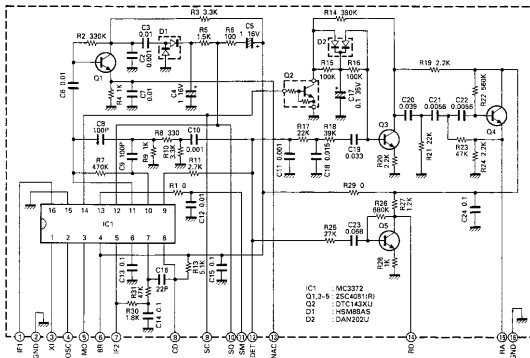
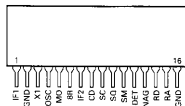
■ Block diagram



SEMICONDUCTOR DATA

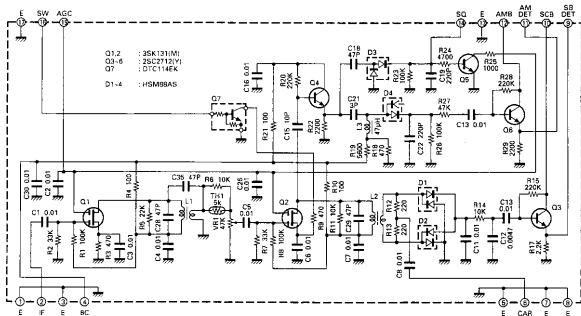
HIC : KCD10 (TX-RX Unit IC7)

- Terminal connection diagram ■ Circuit diagram

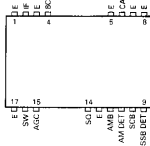


HIC : KCD11 (TX-RX Unit IC15)

- Circuit diagram



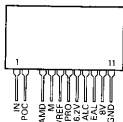
- Terminal connection diagram



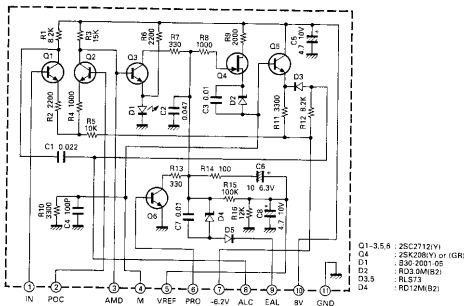
SEMICONDUCTOR DATA

HIC : KCC11 (TX-RX Unit IC16)

Terminal connection diagram

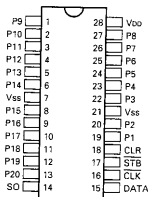


Circuit diagram

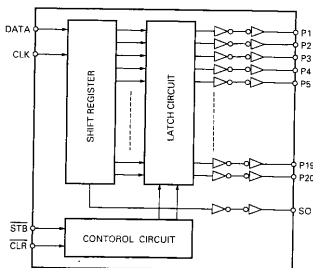


Extended I/O : NJU3718G (TX-RX Unit IC14)

Terminal connection diagram



Block diagram



Terminal function

Pin No.	Symbol	Function
1-6	P9-P14	Parallel convert data output
7	Vss	GND
8-13	P15-P20	Parallel convert data output
14	SO	Serial data output
15	DATA	Serial data input
16	CLK	Clock signal input
17	STB	Strobe signal input
18	CLR	Clear signal input
19,20	P1,P2	Parallel convert data output
21	Vss	GND
22-27	P3-P8	Parallel convert data output
28	Vcc	Power supply (4.5-5.5V)

PARTS LIST

FINAL UNIT (X45-353-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C11			CE04EWE1E100M	ELECTRO 10UF 25WV		C105			CA93S2ZH92J	MICA	820PF J
C12,13			CK73FB1H103K	CHIP C 0.010UF K		C106			CK73FB1H103K	CHIP C	0.010UF K
C14			CK73FB1E104K	CHIP C 0.10UF K		C107			CC73FSL2H661J	CHIP C	500PF J
C15			CK73FB1H102K	CHIP C 1000PF K		C201			CC45FSL2H661J	CERAMIC	500PF J
C16			C90-2193-05	ELECTRO 39UF 25WV		C202			CC45FSL2H121J	CERAMIC	120PF J
C17			CE04EWE1E100M	ELECTRO 10UF 25WV		C203			CC45FSL2H331J	CERAMIC	330PF J
C18			CK73FB1E104K	CHIP C 0.10UF K		C204			CC45FSL2H391J	CERAMIC	390PF J
C19			CC45FSL2H221J	CERAMIC 220PF J		C205			CC45FSL2H471J	CERAMIC	470PF J
C20			CK73FB1E104K	CHIP C 0.10UF K		C206-208			CC45FSL2H151J	CERAMIC	150PF J
C21			CK73FB1H472K	CHIP C 4700PF K		C209			CK73FB1H103K	CHIP C	0.010UF K
C22			CM73F2H102J	CHIP C 1000PF J		C301			CC45FSL2H271J	CERAMIC	270PF J
C23,24			C91-1004-05	CHIP C 6600PF J		C302			CC45FSL2H151J	CERAMIC	150PF J
C25			CK73FB1E104K	CHIP C 0.10UF K		C303			CC45FSL2H271J	CERAMIC	270PF J
C26			CK73FB1H102K	CHIP C 1000PF K		C304			CC45FSL2H221J	CERAMIC	220PF J
C27			CK73FB1H103K	CHIP C 0.010UF K		C305			CC45FSL2H660J	CERAMIC	66PF J
C28			CM73F2H561J	CHIP C 560PF J		C306			CC45FSL2H271J	CERAMIC	270PF J
C29			CK73FB1E104K	CHIP C 0.10UF K		C307			CK73FB1H103K	CHIP C	0.010UF K
C30			CC45FSL2H151J	CERAMIC 150PF J		CA01			CC45FSL2H151J	CERAMIC	180PF J
C31			CK73FB1E104K	CHIP C 0.10UF K		CA02			CC45FSL2H470J	CERAMIC	47PF J
C32			CM73F2H122J	CHIP C 1200PF J		CA03			CC45FSL2H271J	CERAMIC	270PF J
C33			C90-2194-05	ELECTRO 220UF 25WV		CA04,405			CC45FSL2H151J	CERAMIC	150PF J
C34			CK73FB1E104K	CHIP C 0.10UF K		CA06			CK73FB1H103K	CHIP C	0.010UF K
C35			CC73FSL1H221J	CHIP C 220PF J		CA07			CC45FSL2H181J	CERAMIC	180PF J
C36			CC73FCH1H101J	CHIP C 100PF J		CA08			CC45FSL2H200J	CERAMIC	39PF J
C37			CC45FCH2H030C	CERAMIC 3.0PF C		CA09			CC45FSL2H181J	CERAMIC	180PF J
C38			CC73FCH1H560J	CHIP C 56PF J		CA09			CC45FSL2H331J	CERAMIC	330PF J
C39			CC73FSL1H221J	CHIP C 220PF J		CA10,411			CC45FSL2H151J	CERAMIC	150PF J
C40-42			CK73FB1H103K	CHIP C 0.010UF K		CA12			CK73FB1H103K	CHIP C	0.010UF K
C43			CC73FCH1H960J	CHIP C 68PF J		CA13		*	CK73FB1H2050C	CERAMIC	5.0PF C
C44			CC73FCH1H121J	CHIP C 120PF J		CA15			CC45FSL2H121J	CERAMIC	120PF J
C45			CC73FCH1H560J	CHIP C 56PF J		CA16		*	CC45FSL2H050C	CERAMIC	5.0PF C
C46			C91-1075-05	CERAMIC 470PF K		C501			CC45FSL2H101J	CERAMIC	1000PF J
C47			CK73FB1H103K	CHIP C 0.010UF K		C502			CC45FSL2H470J	CERAMIC	47PF J
C48			CK73FB1E104K	CHIP C 0.10UF K		C503			CC45FSL2H221J	CERAMIC	220PF J
C49			CE04EWE1E102M	ELECTRO 1000UF 25WV		C504			CC45FSL2H150J	CERAMIC	15PF J
C50-52			CK73FB1H103K	CHIP C 0.010UF K		C505			CC45FSL2H121J	CERAMIC	120PF J
C53			CK73FB1E104K	CHIP C 0.10UF K		C601			CK73FB1H103K	CHIP C	0.010UF K
C54			CK73FB1H102K	CHIP C 1000PF K		C602			CC45FSL2H680J	CERAMIC	68PF J
C55-57			CK73FB1E104K	CHIP C 0.10UF K		C603			CC45FSL2H470J	CERAMIC	47PF J
C56			CK73FB1E104K	CHIP C 0.10UF K		C803			CC45FSL2H121J	CERAMIC	120PF J
C58,62			CE04EWE1E100M	ELECTRO 10UF 25WV		C804			CC45FSL2H100D	CERAMIC	10PF D
C63			CE04EWE1E102M	ELECTRO 1000UF 25WV		C805			CC45FSL2H120J	CERAMIC	12PF J
C64,65			CK73FB1E104K	CHIP C 0.10UF K		C806			CC45FSL2H680J	CERAMIC	68PF J
C66			CK73FB1H103K	CHIP C 0.010UF K		C807			CK73FB1H103K	CHIP C	0.010UF K
C67			CE04EWE1E471M	ELECTRO 470UF 25WV		C800			CM90D2H660J	MICA	56PF J
C68,74			CK73FB1H103K	CHIP C 0.010UF K		C801-804		*	C91-3115-05	HV C	10PF 2KV
C75			CK73FB1H102K	CHIP C 1000PF K		C805		*	C91-3115-05	HV C	18PF 2KV
C76			CE04EWA470M	ELECTRO 47UF 10WV		C806		*	C91-3118-05	HV C	39PF 2KV
C77,78			CK73FB1H103K	CHIP C 0.010UF K		C807-811		*	C91-3123-05	HV C	150PF 2KV
C79,80			CK73FB1H102K	CHIP C 1000PF K		C812-815		*	C91-3115-05	HV C	10PF 2KV
C81-85			CK73FB1H103K	CHIP C 0.010UF K		C816		*	C91-3116-05	HV C	18PF 2KV
C86-94			CK73FB1H102K	CHIP C 1000PF K		C817		*	C91-3118-05	HV C	39PF 2KV
C95,96			CC45FSL2H221J	CERAMIC 220PF J		C818-822		*	C91-3123-05	HV C	150PF 3KV
C97			CK73FB1E104K	CHIP C 0.10UF K		C823-869			CK73FB1H103K	CHIP C	0.010UF K
C99			CE04EWE1E100M	ELECTRO 10UF 25WV		C835-869			CK73FB1H102K	CHIP C	0.010UF K
C100			CK73FB1E104K	CHIP C 0.10UF K		C870-873		*	C91-3115-05	HV C	10PF 2KV
C101			CM90D2H621J	MICA 820PF J		C874,875		*	CK73FB1H103K	CHIP C	0.010UF K
C102			CC45FSL2H561J	CERAMIC 560PF J		C876-879		*	C91-3115-05	HV C	10PF 2KV
C103			CM90D2H162J	MICA 1600PF J		C901			CK73FB1E104K	CHIP C	0.10UF K
C104			CC45FSL2H181J	CERAMIC 180PF J		C902			CC73FCH1H100D	CHIP C	10PF D

PARTS LIST

FINAL UNIT (X45-353-XX)
CONTROL UNIT (X53-369X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
R52.53			RK73FB2A103J	CHIP R 10K J 1/10W	K.M2	Q11			DTC1437K	DIGITAL TRANSISTOR	
R54.56			RK73FB2A101J	CHIP R 100 J 1/10W		Q12.13			DT0123EK	DIGITAL TRANSISTOR	
R57.60		*	R92-2569-05	JUMPER WIRE 0 OHM		Q14.15			2SC2714(Y)	TRANSISTOR	
R901.502			R92-1265-05	CHIP R 120 J 1/4W		Q16			DT0114EK	DIGITAL TRANSISTOR	
VR1			R12-6730-05	TRIMMING POT. Z20		TH1			5TF41L	THERMISTOR	
VR2			R12-6737-05	TRIMMING POT. 3.3K		CONTROL UNIT (X53-369X-XX)					
VR3			R12-6730-05	TRIMMING POT. Z20		0-10 : K 0-21 : M2 2-71 : E 2-72 : E2 2-73 : E3					
VR4			R12-6738-05	TRIMMING POT. 4.7K		C1			DK73FB1H103K	CHIP C 0.010UF K	
W2.3			R92-0150-05	JUMPER REST 0 OHM		C2			C92-0009-05	CHIP-TAN 4.7UF 16WV	
X1			SS1-2417-05	RELAY		C3.4			DK73FB1H102K	CHIP C 1000PF K	
X2			SS1-1429-05	RELAY	C7			DK73FB1H103K	CHIP C 0.010UF K		
X3			SS1-2417-05	RELAY	C8			C92-0009-05	CHIP-TAN 4.7UF 16WV		
X4			S76-D414-05	RELAY	C9			DK73FF1E104Z	CHIP C 0.10UF Z		
X101.102			SS1-1420-05	RELAY	C10			DK73FB1H102K	CHIP C 1000PF K		
K201.202			SS1-1420-05	RELAY	C11			DK73FF1C105Z	CHIP C 1.0UF Z		
K301.302			SS1-1420-05	RELAY	C12			DK73FB1H103K	CHIP C 0.010UF K		
401.402			SS1-1420-05	RELAY	C13			DK73FF1E104Z	CHIP C 0.10UF Z		
4403.404			SS1-1420-05	RELAY	C14.15			CC73FC1H1030J	CHIP C 33PF J		
K501.502			SS1-1420-05	RELAY	C16.17			DK73FB1H103K	CHIP C 0.010UF K		
K801.802			SS1-1420-05	RELAY	C18			DK73FF1E104Z	CHIP C 0.10UF Z		
K801-814		*	S76-0419-05	RELAY	C19			DK73FF1C105Z	CHIP C 1.0UF Z		
K815-821			S76-0415-05	RELAY	C20.21			DK73FB1H103K	CHIP C 0.010UF K		
K822.823		*	S76-0419-05	RELAY	C22.23			C92-0007-05	CHIP-ELE 10UF 16WV		
Q1			MA27T-8	VARISTOR	C24.27			DK73FB1H102K	CHIP C 1000PF K		
Q2.4			MA27-B	VARISTOR	C28.29			DK73FF1E104Z	CHIP C 0.10UF Z		
Q5.6			1SS101	DIODE	C30			DK73FF1C105Z	CHIP C 1.0UF Z		
Q7.9			1FB01	DIORD	C31.32			DK73FF1E104Z	CHIP C 0.10UF Z		
Q10.11			DSA301LA	DIORD	C33			C92-0040-05	CHIP-ELE 47UF 16WV		
Q12			SG-5L(R)	DIORD	C36.37			CC73FC1H1220J	CHIP C 22PF J		
Q13			ER2-M10DCK220	SURGE ABSORBER	C103			DK73FF1E104Z	CHIP C 0.10UF Z		
Q14			Q2C218(X,Y)	ZENER DIORD	C104-107			DK73FB1H102K	CHIP C 1000PF K		
Q15			1FB01	DIORD	C108.109			DK73FF1E104Z	CHIP C 0.10UF Z		
Q16			DAN202K	DIORD	C110-118			DK73FB1H102K	CHIP C 1000PF K		
Q17			1FB01	DIORD	C119			DK73FF1E104Z	CHIP C 0.10UF Z		
Q18-23			1SS226	DIORD	C120			DK73FB1H102K	CHIP C 1000PF K		
Q24.25			1SS101	DIORD	C121-124			DK73FB1H103K	CHIP C 0.010UF K		
Q26			DSA301LA	DIORD	C125			DK73FF1E104Z	CHIP C 0.10UF Z		
101			1FB01	DIORD	C126			DK73FB1H103K	CHIP C 0.010UF K		
D201			1FB01	DIORD	C127.128			DK73FB1H102K	CHIP C 1000PF K		
D301			1FB01	DIORD	C129.134			DK73FB1H103K	CHIP C 0.010UF K		
D401			1FB01	DIORD	C135-150			DK73FB1H102K	CHIP C 1000PF K		
D402			1FB01	DIORD	C151-154			CC73FC1H101J	CHIP C 100PF J		
D501			1FB01	DIORD	C155			DK73FF1E104Z	CHIP C 0.10UF Z		
D601			1FB01	DIORD	C156			DK73FB1H102K	CHIP C 1000PF K		
D801-823			TA7805S	IC (VOLTAGE REGULATOR +5V)	C158-162			DK73FB1H102K	CHIP C 1000PF K		
IC1			TA7805S	IC (REGULATOR)	C163-169			DK73FB1H102K	CHIP C 1000PF K		
IC2			TA75S393F	IC	C170-172			DK73FF1E104Z	CHIP C 0.10UF Z		
IC3			TA75S393F	IC	C173-183			DK73FB1H102K	CHIP C 1000PF K		
IC4			SN74S74NS	IC (FLIP-FLOP)	C184			DK73FF1E104Z	CHIP C 0.10UF Z		
IC5		*	M54862P	IC (560mA DARLINGTON)	C501			C92-0004-05	CHIP-TAN 1.0UF 16WV		
IC6		*	NJU3714G	IC	C502.503			DK73FB1H102K	CHIP C 1000PF K		
IC7		*	UPD6945GS	IC	C504.505			CK73691H223K	CHIP C 0.022UF K		
IC7-9		*	TA7810S	IC (REGULATOR)	C506-509			DK73FF1E104Z	CHIP C 0.10UF Z		
IC10		*	TA7810S	IC (REGULATOR)	C510			CC736S1H221J	CHIP C 220PF J		
Q1			2SC1971	TRANSISTOR (PWR-DRIVAMP)	C511.512			DK73FF1E104Z	CHIP C 0.10UF Z		
Q2.3			2SC1933	TRANSISTOR (DRIV AMP)	C513			CC73FC0H1102J	CHIP C 1000PF J		
Q4.5			2SC2879	TRANSISTOR (POWER AMP)	C514			C92-0004-05	CHIP-TAN 1.0UF 16WV		
Q6			2SC3421(Y)	TRANSISTOR	C515			C92-0038-05	CHIP-ELE 22UF 16WV		
Q7-9			6MC2	TRANSISTOR	C516			C90-2073-05	ELECTRO 8.8UF 16WV		
Q10			DTC114EK	DIGITAL TRANSISTOR	C517			C92-0007-05	CHIP-ELE 1.0UF 16WV		

PARTS LIST

TX-RX UNIT (X57-500X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
C711-714			CK73FB1H102K	CHIP C 1000PF K		CN21			E40-3237-05	PIN CONNECTOR FOR INSIDE (2P)	
C715			CK73FB1H103K	CHIP C 0.010UF K		CN500			E40-5764-05	PIN CONNECTOR FOR INSIDE (16P)	
C716			CK73FSL1H221J	CHIP C 220PF J		CN501			E04-0154-05	RF COAXIAL CABLE RECEPTACLE	
C718-722			CK73FSL1H221J	CHIP C 220PF J		CN502			E40-3237-05	PIN CONNECTOR FOR INSIDE (2P)	
C724			CK73FSL1H221J	CHIP C 220PF J		CN503			E04-0154-05	RF COAXIAL CABLE RECEPTACLE	
C725			CK73FB1H103K	CHIP C 0.010UF K		J1			E06-0752-05	DIN SOCKET (7P)	
C735			CK73FB1H030C	CHIP C 3.0PF C		J2	*		E56-0408-05	DIN SOCKET (13P)	
C756			CE04EW1A101M	ELECTRO 100UF 10WV		J3			E11-0414-05	PHONE JACK (3.50)	
C758			CK73FB1H102K	CHIP C 1000PF K		J4			E11-0455-05	PHONE JACK (3.50)	
C759			CK73FF1C105Z	CHIP C 1.0UF Z		J5			E11-0438-05	PHONE JACK	
C760-761			CK73FCH1H050C	CHIP C 0.5PF C		J900	*		E58-0435-05	SUB SOCKET	
C762			CK73FB1H102K	CHIP C 1000PF K		W1	*		E37-0651-05	LEAD WIRE WITH CONNECTOR (NB)	
C783			CK73FB1H103K	CHIP C 0.010UF K		W2	*		E37-0649-05	LEAD WIRE WITH PLUG (L02)	
C764			CK73FB1H102K	CHIP C 1000PF K		W3	*		E37-0650-05	LEAD WIRE WITH PLUG (L01)	
C766-768			CK73FB1H102K	CHIP C 1000PF K		W4	*		E37-0652-15	LEAD WIRE WITH CONNECTOR (CAR)	
C788-772			CK73FSL1H221J	CHIP C 220PF J		W5	*		E37-0653-05	LEAD WIRE WITH CONNECTOR (FMM)	
C773			CK73FB1H103K	CHIP C 0.010UF K		W6	*		E37-0654-05	LEAD WIRE WITH CONNECTOR (AF)	
C774			CK73FCH1H050C	CHIP C 5.0PF C		W450	*		E37-0655-05	LEAD WIRE WITH CONNECTOR (VOL)	
775			CK73FCH1H30J	CHIP C 33PF J		A500-501			F10-2062-04	SHIELDING CASE (DD51)	
776			CK73FCH1H80J	CHIP C 88PF J		A502			F10-2092-04	SHIELDING CASE (V02)	
C777			CK73FCH1H202J	CHIP C 2000PF J		A503			F11-1086-14	SHIELDING COVER (V02)	
C778-785			CK73FCH1H470J	CHIP C 47PF J		A505	*		F10-2209-04	SHIELDING COVER (V02)	
C786			CK73FCH1H150J	CHIP C 15PF J		A506	*		F10-2208-04	SHIELDING COVER (V01)	
C787-788			CK73FB1E104K	CHIP C 0.10UF K		F1	TC		F53-0055-05	FUSE (0.8A)	
C800			CK73FB1E103K	CHIP C 0.010UF K		A504	*		G13-1549-04	CUSHION (V02)	
C801			CK73FB1H102K	CHIP C 0.010UF K		A507	*		G13-1550-04	CUSHION (V01)	
C804			C92-0003-05	CHIP-TAN 0.47UF 25WV					J30-0545-05	SPACER (XF1)	
C805-807			CK73FB1H103K	CHIP C 0.010UF K					J30-0564-05	SPACER (XF2)	
C808			C92-0003-05	CHIP-TAN 0.47UF 25WV					J37-0781-04	BOSS	
C809			CK73FB1H103K	CHIP C 0.010UF K		CD1			L79-1013-05	TUNING COIL (455KHZ)	
C810			CK73FB1H102K	CHIP C 1000PF K		CF1			L72-0372-05	CERAMIC FILTER (455KHZ)	
C811			CK73FCH1H100D	CHIP C 10PF D		CF500-501			L72-0251-05	CERAMIC FILTER (8.800MHZ)	
C812			CK73FB1H103K	CHIP C 0.010UF K		L1			L40-2215-48	SMALL FIXED INDUCTOR (270UH)	
C813-815			CK73FB1H103K	CHIP C 0.010UF K		L2	*		L40-6889-15	SMALL FIXED INDUCTOR	E.E2.E3
C816			C92-0004-05	CHIP-TAN 1.0UF 16WV		L3	*		L40-3991-15	SMALL FIXED INDUCTOR	E.E2.E3
C817			CE04EW1A101M	ELECTRO 100UF 10WV		L4			L40-2785-48	SMALL FIXED INDUCTOR (270NH)	
C818,819			CK73FCH1H470J	CHIP C 47PF J		L5			L33-0695-05	CHOKO COIL (1MH)	
C800-903			CK73FF1C105Z	CHIP C 1.0UF Z		L6			L40-4735-48	SMALL FIXED INDUCTOR (4.7UH)	
C804			CK73FB1H103K	CHIP C 0.010UF K		L7,8			L33-0695-05	CHOKO COIL (1MH)	
C905			CE04NW1C470M	ELECTRO 47UF 16WV		L9-11			L40-6891-14	SMALL FIXED INDUCTOR	
C906-913			CK73FB1H102K	CHIP C 1000PF K	E.E2.E3	L12,13			L40-1892-14	SMALL FIXED INDUCTOR	
TC1.2			C05-0344-05	TRIMMER CAPACITOR (30PF)		L14			L40-5691-14	SMALL FIXED INDUCTOR	
TC500			C05-0344-05	TRIMMER CAPACITOR (30PF)		L15,16			L40-1282-14	SMALL FIXED INDUCTOR	
TC502-504			C05-0345-05	TRIMMER CAPACITOR (10PF)		L17			L40-3381-14	SMALL FIXED INDUCTOR	
CN1.2			E18-0254-05	SOCKET		L18,19			L40-1092-14	SMALL FIXED INDUCTOR	
CN3.4			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		L20-22			L34-4767-05	COIL	
CN5			F40-0211-05	PIN CONNECTOR FOR INSIDE (2P)		L23			L40-2792-14	SMALL FIXED INDUCTOR	
CN7			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		L24,25			L40-3382-14	SMALL FIXED INDUCTOR	
CN8.9			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		L26			L40-2292-14	SMALL FIXED INDUCTOR	
CN10			F40-3238-05	PIN CONNECTOR FOR INSIDE (3P)		L27,28			L40-2282-14	SMALL FIXED INDUCTOR	
CN11			F40-3238-05	PIN CONNECTOR FOR INSIDE (3P)		L29-31			L34-4289-05	COIL	
CN12			F40-3238-05	PIN CONNECTOR FOR INSIDE (3P)		L32			L40-1292-14	SMALL FIXED INDUCTOR	
CN14			F40-3238-05	PIN CONNECTOR FOR INSIDE (3P)		L33,34			L40-2282-14	SMALL FIXED INDUCTOR	
CN15			F40-5764-05	PIN CONNECTOR FOR INSIDE (18P)		L35			L40-1292-14	SMALL FIXED INDUCTOR	
CN16			F46-5795-05	PIN CONNECTOR FOR INSIDE (8P)		L36,37			L40-2282-14	SMALL FIXED INDUCTOR	
CN17			E40-5747-05	PIN ASSY SOCKET (11P)		L41			L40-1015-48	SMALL FIXED INDUCTOR (100UH)	
CN18			E40-5747-05	PIN CONNECTOR FOR INSIDE (26P)		L42,43			L40-2785-48	SMALL FIXED INDUCTOR (270NH)	
CN19,20			E40-5487-05	PIN CONNECTOR FOR INSIDE (2P)		L44			L19-0324-05	TROIDAL COIL	

PARTS LIST

TX-RX UNIT (X57-500X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
L45			L34-4413-05	COIL		L520			L40-1095-48	SMALL FIXED INDUCTOR (1.0UH)	
L46-48			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L521			L40-1005-48	SMALL FIXED INDUCTOR (10UH)	
L49			L40-1095-48	SMALL FIXED INDUCTOR (100NH)		L522			L40-1015-48	SMALL FIXED INDUCTOR (100UH)	
L50-51			L34-4468-05	COIL		L523,524			L40-2205-48	SMALL FIXED INDUCTOR (2.2UH)	
L52			L33-0695-05	CHOKO COIL (1MH)		L525	*		L40-3305-48	SMALL FIXED INDUCTOR (33UH)	
L53			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L526,527			L40-1005-48	SMALL FIXED INDUCTOR (10UH)	
L54			L34-4415-05	COIL		L528			L40-5695-48	SMALL FIXED INDUCTOR (5.6UH)	
L55			L34-0943-05	COIL		L529,530			L34-4408-05	COIL	
L56	*		L34-4467-05	COIL		L531			L40-1015-48	SMALL FIXED INDUCTOR (100UH)	
L57			L39-1255-05	TROIDAL COIL		L532			L40-1005-48	SMALL FIXED INDUCTOR (10UH)	
L58			L40-5695-48	SMALL FIXED INDUCTOR (5.6UH)		L533			L34-4408-05	COIL	
L59			L40-4705-48	SMALL FIXED INDUCTOR (47UH)		L534			L34-4399-05	COIL	
L60			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L535			L34-4408-05	COIL	
L61	*		L34-4465-05	COIL		L536			L40-3395-48	SMALL FIXED INDUCTOR (3.3UH)	
L62			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		L537			L40-1595-48	SMALL FIXED INDUCTOR (1.5UH)	
L63			L40-3395-48	SMALL FIXED INDUCTOR (3.3UH)		L538			L40-2295-48	SMALL FIXED INDUCTOR (2.2UH)	
L64			L19-0324-05	TROIDAL COIL		L539			L40-1005-48	SMALL FIXED INDUCTOR (10UH)	
L65			L39-1255-05	TROIDAL COIL		L540			L40-1015-48	SMALL FIXED INDUCTOR (100UH)	
L66			L19-0324-05	TROIDAL COIL		L542			L34-4424-05	COIL	
L67			L34-4264-05	COIL		L543			L34-2360-05	COIL	
L68			L34-4265-05	COIL		L544			L34-4424-05	COIL	
L69			L34-0943-05	COIL		L545			L34-2359-05	COIL	
L70	*		L34-4469-05	COIL		L546			L34-4424-05	COIL	
L71	*		L34-4265-05	COIL		L547			L34-2358-05	COIL	
L72			L34-4333-05	COIL		L548,549			L40-6885-48	SMALL FIXED INDUCTOR (680NH)	
L73			L39-1255-05	TROIDAL COIL		L550			L40-3395-48	SMALL FIXED INDUCTOR (330NH)	
L74-76			L34-4333-05	COIL		L551			L40-1095-48	SMALL FIXED INDUCTOR (100NH)	
L77			L19-0324-05	TROIDAL COIL		L551			L40-4705-48	SMALL FIXED INDUCTOR (47UH)	
L78-81			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L563			L40-2285-48	SMALL FIXED INDUCTOR (220NH)	
L85			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		L564			L40-1011-12	SMALL FIXED INDUCTOR	
L86			L19-0324-05	TROIDAL COIL		L800			L40-8285-48	SMALL FIXED INDUCTOR (820NH)	
L87			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L801			L40-4705-48	SMALL FIXED INDUCTOR (47UH)	
L88			L40-1021-13	SMALL FIXED INDUCTOR		L802	*		L34-4466-05	COIL	
L89			L33-0695-05	CHOKO COIL (1MH)		L803	*		L34-4483-05	COIL	
L90			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L804			L33-0695-05	CHOKO COIL (1MH)	
L91			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		L900			L40-4705-48	SMALL FIXED INDUCTOR (47UH)	
L92			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		L901,904			L40-1015-48	SMALL FIXED INDUCTOR (100UH)	
L97-100			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		X1			L77-1302-15	CRYSTAL RESONATOR (8.375MHZ)	
L101			L40-1095-48	SMALL FIXED INDUCTOR (1UH)		X500			L77-1521-15	CRYSTAL RESONATOR (20.0MHZ)	
L105-106			L33-0695-05	CHOKO COIL (1MH)		XF1			L71-0401-05	MCF (73.05MHZ)	
L107			L40-1001-12	SMALL FIXED INDUCTOR		XF2			L71-0286-05	MCF (8.83MHZ)	
L108			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		XF3			L71-0208-15	CRYSTAL FILTER (8.83MHZ)	
L109			L40-1011-15	SMALL FIXED INDUCTOR					N30-2604-45	PAN HEAD MACHIN SCREW	
L110			L40-2285-48	SMALL FIXED INDUCTOR (220NH)					N30-3008-46	PAN HEAD MACHIN SCREW	
L111			L34-4408-05	COIL					N87-2606-46	PAN HEAD MACHIN SCREW	
L112			L40-1095-48	SMALL FIXED INDUCTOR (1UH)					R90-0121-35	MULTI-COMP 4.7K X 16	
L500			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		OP50-503			RK73EB29560J	CHIP R 56 J 1/8W	
L501			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		R1			RK73EB29471J	CHIP R 470 J 1/8W	
L502			L40-4795-48	SMALL FIXED INDUCTOR (4.7UH)		R2			RK73FB2A472J	CHIP R 4.7K J 1/10W	
L503,504			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		R3			RK73FB2A101J	CHIP R 100 J 1/10W	
L505			L40-4765-48	SMALL FIXED INDUCTOR		R4			RK73FB2A222J	CHIP R 2.2K J 1/10W	
L506			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		R5			RK73FB2A472J	CHIP R 4.7K J 1/10W	
L507			L34-4424-05	COIL		R6			RK73FB2A181J	CHIP R 180 J 1/10W	
L508			L34-2353-05	COIL		R7			RK73FB2A471J	CHIP R 470 J 1/10W	
L509			L40-2285-48	SMALL FIXED INDUCTOR (220NH)		R8			RK73FB2A650J	CHIP R 56 J 1/10W	
L510,511			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		R9			RK73EB29121J	CHIP R 120 J 1/8W	
L512,513			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		R10			RK73FB2A330J	CHIP R 33 J 1/10W	
L514-516			L40-1015-48	SMALL FIXED INDUCTOR (100UH)		R11			RK73EB29121J	CHIP R 120 J 1/8W	
L517,518			L40-2205-48	SMALL FIXED INDUCTOR (2.2UH)		R12			RK73FB2A330J	CHIP R 33 J 1/10W	
L519			L40-1005-48	SMALL FIXED INDUCTOR (10UH)		R13			RK73EB29121J	CHIP R 120 J 1/8W	
						R14			RK73FB2A330J	CHIP R 33 J 1/10W	

PARTS LIST

TX-RX UNIT (X57-500X-XX)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
VR1			R12-8711-05	VARIABLE R	4.7K	D64			02C26.2(Y)	DIODE	
VR2			R12-8707-05	VARIABLE R	1.0K	D68			LF801	DIODE	
VR3			R12-8717-05	VARIABLE R	47K	D69			RB751H	DIODE	
VR4.5			R12-8713-05	VARIABLE R	10K	D71			RB751H	DIODE	
VR8			R12-8740-05	VARIABLE R	10K	D73			02C23.3(Z)	ZENER	
VR9			R12-8703-05	VARIABLE R	220	D74			02C24.7(Y)	ZENER	
VR450		*	R31-0615-05	VARIABLE R		D75			MA110	DIODE (or 1SS355)	
VR451.452		*	R31-0612-05	VARIABLE R		D76			1SS225	DIODE	
K1			SS1-1428-05	RELAY		D77			02C26.2(Y)	ZENER	
K2			SS1-1420-05	RELAY		D82			LF801	DIODE	
D1			LF801	DIODE		D85			MA110	DIODE (or 1SS355)	
D2			RLS245	DIODE		D89-92			MA110	DIODE (or 1SS355)	
D3.4			V08(G)	DIODE		D96			MA110	DIODE (or 1SS355)	
D5			RLS245	DIODE		D98			02C25.1(Y)	ZENER	
D6-8			RN731H	DIODE		D97			DAP236K	DIODE	
D9			LF801	DIODE		D98			DAN202K	DIODE	
D10			RN731H	DIODE		D99.100		*	02C224(Y)	ZENER	
D11			LF801	DIODE		D101.102			MA110	DIODE (or 1SS355)	
D12			RN731H	DIODE		D103.104			LF801	DIODE	
D13			LF801	DIODE		D500.501			1SV269	VARIABLE CAP	
D14			RN731H	DIODE		D502			RLS135	DIODE	
D15			LF801	DIODE		D503			1SV269	VARIABLE CAP	
D16			RN731H	DIODE		D504			RLS135	DIODE	
D17			LF801	DIODE		D505			1SV269	VARIABLE CAP	
D18			RN731H	DIODE		D506			RLS135	DIODE	
D19			LF801	DIODE		D507			DAP202K	DIODE	
D20			RN731H	DIODE		D508.509			MA110	DIODE (or 1SS355)	
D21			LF801	DIODE		D600			MA716	DIODE	
D22			RN731H	DIODE		IC1			NJM2904M	IC (OP AMP X2)	
D23			LF801	DIODE		IC2			UPC1037GR	IC (BALANCED MODULATOR)	
D24			RN731H	DIODE		IC3			BU2090FS	IC (SHIFT/STORE REGISTER)	
D25			LF801	DIODE		IC4			BU4066BCFV	IC (ANALOG SWITCH X4)	
D26			RN731H	DIODE		IC5			NJM2902M	IC (OP AMP X4)	
D27			LF801	DIODE		IC6			MS2835FP	IC (Ibitt D/A CONVERTER)	
D30			LF801	DIODE		IC7			KCD10	HIC	
D31			MA110	DIODE (or 1SS355)		IC8			LA4446	IC (AF POWER AMPL)	
D32			LF801	DIODE		IC9			BU4066BCFV	IC (ANALOG SWITCH X4)	
D33			DAP236K	DIODE		IC11			TC9174F	IC (CMOS I/O EXTENSION)	
D34			1SS312	DIODE		IC12			BU4066BCFV	IC (ANALOG SWITCH X4)	
D35-37			DAP236K	DIODE		IC13			NJM2904M	IC (OP AMP X2)	
D38.39			LF801	DIODE		IC14			NJU3719G	IC (20BIT SERIAL-PARA CHANGER)	
D40			DAP236K	DIODE		IC15		*	KCD11	HIC	
D41			1SS312	DIODE		IC16		*	KCC11	HIC	
D42			DAP236K	DIODE		IC17			TC7S08F	IC (2CH AND GATE)	
D43			RN731H	DIODE		IC500			MB8601PF	IC (PLL FREQUENCY SYNTHESIZER)	
D44			1SS312	DIODE		IC501.502			F71022	IC (DDS)	
D45			LF801	DIODE		IC503.504			UPC1037GR	IC (BALANCED MODULATOR)	
D46.47			DAP236K	DIODE		IC505			UPC1886G	IC (MUX)	
D48-50			MA710	DIODE (or 1SS355)		IC506			SM76514N	IC (MUXER)	
D51			LF801	DIODE		IC507			MB8601PF	IC (PLL FREQUENCY SYNTHESIZER)	
D52			RN731H	DIODE		IC508			BU4566	IC (ANALOG SWITCH)	
D53.54			DAP236K	DIODE		IC510			TC7S08F	IC (2CH AND GATE)	
D55			LF801	DIODE		IC511			NJM78L08JA	IC (VOLTAGE REGULATOR +RV)	
D56			RN730D	DIODE		IC900			ADM323LAR	IC (RS-232C DRIVERS/RECEIVERS)	
D57			B30-2001-05	LED		Q1			DTA124EK	DIGITAL TRANSISTOR	
D58			MA110	DIODE (or 1SS355)		Q2			2SD175(K/S)	TRANSISTOR	
D61			LF801	DIODE		Q3			2SB1180(L/R)	TRANSISTOR	
D62			RB751H	DIODE		Q4			DTC143TK	DIGITAL TRANSISTOR	
D63			1SS226	DIODE		Q5-8			2SK520(K44)	PET	
						Q9			RU201	TRANSISTOR	

PARTS LSIT

TX-RX UNIT (X57-500X-XX)
LCD ASSY (B38-0765-05)

Ref. No.	Address	New parts	Parts No.	Description	Destination	Ref. No.	Address	New parts	Parts No.	Description	Destination
Q10			25K520(K43)	FET		Q543			25C2714(Y)	TRANSISTOR	
Q11,12			35K131(HM)	FET		Q544			25C2412K(R)	TRANSISTOR	
Q13			25K520(K43)	FET		Q545,546			25C2714(Y)	TRANSISTOR	
Q14,15			25C2412K(S)	TRANSISTOR		Q800			25C2714(Y)	TRANSISTOR	
Q16			25C3357	TRANSISTOR		Q801			DTC114EK	DIGITAL TRANSISTOR	
Q17,18			25K520(K44)	FET		Q802			25C2714(Y)	TRANSISTOR	
Q20			DTA124EK	DIGITAL TRANSISTOR		Q803			25C2412K(S)	TRANSISTOR	
Q21,22			25C2412K(S)	TRANSISTOR		Q804			25C2714(Y)	TRANSISTOR	
Q24			FM2C	TRANSISTOR		Q805			25C2412K(S)	TRANSISTOR	
Q25			35K131(HM)	FET		Q806			25C2714(Y)	TRANSISTOR	
Q26			DTA143EK	DIGITAL TRANSISTOR		Q807			DTA114EK	DIGITAL TRANSISTOR	
Q27			35K131(HM)	FET		TH1			157-502-53002	THERMISTOR (5K)	
Q28			35K184(R)	FET		TH2			157-501-53009	THERMISTOR (500)	
Q28,30			35K131(HM)	FET		TH3			157-302-53008	THERMISTOR (3K)	
Q31			35K184(R)	FET		TH4			157-102-53003	THERMISTOR (1K)	
Q35			25C2954	TRANSISTOR		TH5			157-502-53002	THERMISTOR (5K)	
Q36			25C2412K(S)	TRANSISTOR		TH6			157-102-53003	TRANSISTOR (1K)	
Q37			DTC114EK	DIGITAL TRANSISTOR		TH7			157-103-55001	THERMISTOR (10K)	
Q38			25C2412K(S)	TRANSISTOR		TH8			157-102-53003	THERMISTOR (1K)	
Q39			25A1037(KR)	TRANSISTOR		LCD ASSY (B38-0765-05)					
Q40,41			25C2412K(S)	TRANSISTOR		C1			CK73FB1H103K	CHIP C	0.010UF K
Q42			25B1188(Q,R)	TRANSISTOR		C2-10			CK73FB1H102K	CHIP C	1000PF K
Q49			25B1824(S)	TRANSISTOR		C11			CK73FF1E104Z	CHIP C	0.10UF Z
Q50			DTC114EK	DIGITAL TRANSISTOR		C12-21			CK73FB1H103K	CHIP C	0.010UF K
Q51			DTC143TK	DIGITAL TRANSISTOR		C22	*		C92-9672-05	CHIP TAN	22UF 16WV
Q52			DTC124EK	DIGITAL TRANSISTOR		C23-26			CK73FB1H103K	CHIP C	0.010UF K
Q57			DTC114EK	DIGITAL TRANSISTOR		C27			CC73F5L1H881J	CHIP C	680PF J
Q59			FMA5	TRANSISTOR		C28-40			CK73FB1H000J	CHIP C	
Q61			FMA5	TRANSISTOR		C41	*		C92-0677-05	CHIP TAN	22UF 25WV
Q64			25C2412K(S)	TRANSISTOR		C42			CK73FB1H103K	CHIP C	0.010UF K
Q65-67			DTC114EK	DIGITAL TRANSISTOR		C43			CK73FB1H223K	CHIP C	0.022UF K
Q68,69			25B1188(Q,R)	TRANSISTOR		CN1	*		E40-5880-08	CONNECTOR (26P)	
Q70			DTC114EK	DIGITAL TRANSISTOR		CN2	*		E40-3247-05	CONNECTOR (3P)	
Q71			DTC143EK	DIGITAL TRANSISTOR		CN3	*		E29-1181-08	RUBBER CONNECTOR	
Q72			FMG3A	TRANSISTOR		CN4,5	*		E29-1182-08	RUBBER CONNECTOR	
Q73			DTA143EK	DIGITAL TRANSISTOR		J1	*		E06-0858-15	MIC CONNECTOR (8P)	
Q75-79			DTC114EK	DIGITAL TRANSISTOR		L1			L40-1292-18		
Q80			DTC124EK	DIGITAL TRANSISTOR		R1-37			RK73F82A000J	CHIP R	
Q81			DTC114EK	DIGITAL TRANSISTOR		R38,39			R92-0699-05	CHIP R	10 J 1/2W
Q500-503			25C2714(Y)	TRANSISTOR		R40			RK73F82A100J	CHIP R	10 J 1/10W
Q504			25C2412K(S)	TRANSISTOR		R41			RK73F82A182J	CHIP R	1.8K J 1/10W
Q505-507			25C3722K(R)	TRANSISTOR		SW3-50			S70-0447-05	TACT SWITCH	
Q508			DTC143TK	DIGITAL TRANSISTOR		D1-15			1SS355	DIODE	
Q509			25K1875(V)	FET		IC1	*		MSM5285GS-BK	IC (LCD DRIVER)	
Q510,511			25C2714(Y)	TRANSISTOR		IC2			NJUB432BF1	IC	
Q512			25C2412K(S)	TRANSISTOR		IC3			NJUB3715G	IC (SER PARA CHANGEOVER)	
Q513			25C2712(GR)	TRANSISTOR		ICD1	*		B38-0779-08	LCD ELEMENT	
Q514-517			25C2412K(S)	TRANSISTOR		PL1-6	*		B30-2163-08	LAMP	
Q518			25C2712(GR)	TRANSISTOR		Q1			25A1641(S,T)	TRANSISTOR	
Q519,520			25C2412K(S)	TRANSISTOR		Q2			25C2712(Y)	TRANSISTOR	
Q521,522			25C2714(Y)	TRANSISTOR		Q3			25A1162(Y)	TRANSISTOR	
Q523			25C2412K(S)	TRANSISTOR		Q4-6	*		DTC123EK	TRANSISTOR	
Q524-526			25C3722K(R)	TRANSISTOR		Q7			DTC144EK	TRANSISTOR	
Q527			DTC114EK	DIGITAL TRANSISTOR		SW1	*		W02-1901-05	ENCODER (MULTI-CH)	
Q528			25K1875(V)	FET		SW2	*		W02-1902-05	ENCODER (RIT, XIT)	
Q529			DTC114EK	DIGITAL TRANSISTOR							
Q530			25K1875(V)	FET							
Q531			DTC114EK	DIGITAL TRANSISTOR							
Q532			25K1875(V)	FET							
Q533-535			25C2714(Y)	TRANSISTOR							

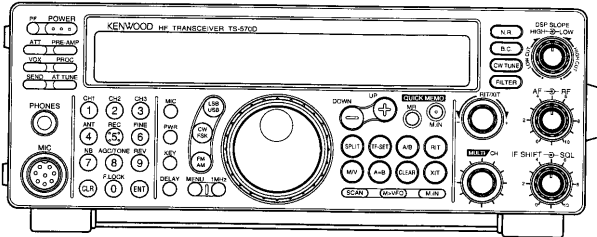
ADJUSTMENT

Preparation

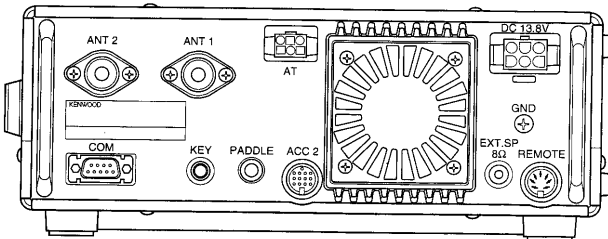
Unless otherwise specified, knobs and switches should be set as follows.

POWER	ON	SQL VR	0	AF VR	0
ATT	OFF	PRE-AMP	ON	RF VR	MAX
AGC	FAST	IF SHIFT	Center	PROC	OFF
NB	OFF	DSP SLOPE	Center		

Front Panel



Rear Panel

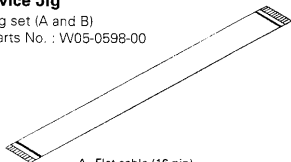


TS-570D

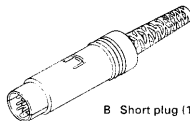
ADJUSTMENT

Service Jig

Jig set (A and B)
Parts No. : W05-0598-00

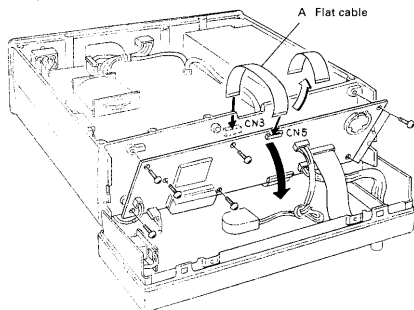


A Flat cable (16 pin)
(E37-0572-05)
About 17cm

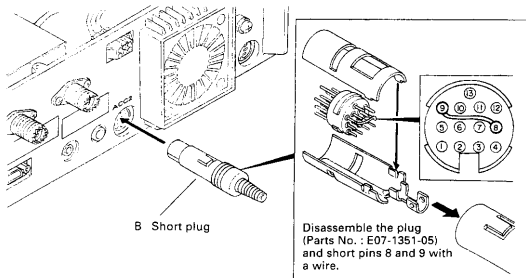


B Short plug (13 pin)

How to Use the Flat Cable



How to Use the Short Plug



Disassemble the plug
(Parts No. : E07-1351-05)
and short pins 8 and 9 with
a wire.

ADJUSTMENT

Service Adjustment Mode

■ Outline

1. The transceiver is adjusted by the normal method and by a method using the service adjustment mode (automatic adjustment).
2. There are adjustment items of menu numbers 00 to 51 in the service adjustment mode. All adjustment data are saved in the EEPROM.
3. When the service adjustment mode is entered, data is read from the EEPROM and placed in the CPU RAM, so it can be modified.
4. The EEPROM is updated only when data is written in Menu No. 51.

■ Operation Procedure

1) Entering the service adjustment mode

1. Before turning the power on, insert the adjustment jig into the ACC2 socket.
2. Hold down the [N.R.] key and [LSB/USB] key and turn the [POWER] switch on. The display (LCD) shows "ADJUST" and then the adjustment mode menu.
3. After "ADJUST" appears, remove the short plug from the ACC2. (The transmitter cannot be adjusted without removing it.)

Service Adjustment Mode Menu

Menu No.	Function	Description
00	AGC	AGC reference voltage (14.1MHz USB)
01	ALC	ALC reference voltage (14.2MHz USB)
02	SSB SQL threshold	(14.1MHz USB)
03	S-meter (SSB)	Start level (S1) setting (14.1MHz USB)
04		S9 level setting (14.1MHz USB)
05		S9+60dB (full scale) level setting (14.1MHz USB)
06	FM SQL threshold	(29.1MHz FM)
07	S-meter (FM)	Start level (S1) setting (29.1MHz FM)
08		Full scale level setting (29.1MHz FM)
09-15	Not use	
16	SQL VR center	SQL VR center voltage reading (14.1MHz)
17	IF SHIFT center	IF SHIFT center voltage reading (14.1MHz)
18	100W protection setting	Read data at the 100W point on the RF meter (14.2MHz USB)
19	50W protection setting	Read data at the 50W point on the RF meter (14.2MHz USB)
20	25W protection setting	Read data at the 25W point on the RF meter (14.2MHz USB)
21	10W protection setting	Read data at the 10W point on the RF meter (14.2MHz USB)
22	5W protection setting	Read data at the 5W point on the RF meter (14.2MHz USB)
23	TGC setting	1.8MHz band (100W) (1.840MHz USB)
24		3.5MHz band (100W) (3.5MHz USB)
25		7MHz band (100W) (7.0MHz USB)
26		10MHz band (100W) (10.1MHz USB)
27		14MHz band (100W) (14.2MHz USB)
28		18MHz band (100W) (18.068MHz USB)
29		21MHz band (100W) (21.0MHz USB)
30		25MHz band (100W) (24.89MHz USB)
31		28MHz band (100W) (29.69MHz USB)

2) Menu number selection

When the [MULTI/CH] control is turned, the menu number changes.

3) Changing the setting data

Setting data can be changed by using the [UP] or [DOWN] key on the transceiver or the microphone.

4) Writing data

Press the [UP] or [DOWN] key on the transceiver or the microphone with MENU No.51 to write data.

5) Canceling the service adjustment mode

When the [CLR] key is pressed, the normal VFO mode display returns.

Notes:

1. The transceiver can transmit signals in the receiver adjustment mode. If a microphone is connected to the transceiver, take special care not to press the PTT key.
2. If the power is switched off during adjustment in the adjustment mode, the adjustment mode is canceled.

ADJUSTMENT

Menu No.	Function	Description
32	Not use	
33	TGC setting	14MHz band (50W) (14.2MHz USB)
34		14MHz band (25W) (14.2MHz USB)
35		14MHz band (10W) (14.2MHz USB)
36		14MHz band (5W) (14.2MHz USB)
37	ALC meter voltage reading	Start level setting (14.2MHz USB)
38		Maximum zone level setting (14.2MHz USB)
39	CAR level setting	CW (14.2MHz CW)
40		AM (14.2MHz AM)
41	FM maximum deviation	(29.69MHz FM)
42	SSB CAR shift compensation	USB (14.2MHz USB)
43		LSB (14.2MHz LSB)
44	SSB CAR suppression	USB (14.2MHz USB)
45		LSB (14.2MHz LSB)
46	SWR protection voltage setting	(14.2MHz CW)
47	HF band SWR=3.0 reading	For display in TX (1.840MHz CW)
48	Not use	
49	Check sum display	Sum of ROM's data (14.1MHz)
50	All LCD segments light	Display checking
51	Writing into EEPROM	

Display Check

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. All reset	1) DC IN : DC 13.8V Pushing [A=B] key down, [POWER] : ON				Front panel	LCD	After displaying "HELLO", the display is reset as follows; DISP f. : 14.000.00 MODE : USB ANT : 1 METER : ALC PRE AMP	Display should be normal. Should be at the reset frequency.
2. All LCD segments light	1) Menu No. : 50	ACC2 Jig (Short plug)					Check	All LCD segments light.

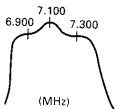
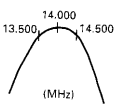
PLL Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reference oscillation (20MHz)	1) Display f. : 14.750MHz MODE : AM	f. counter	TX-RX (PLL)	TP505	TX-RX (PLL)	TC500	20.000.000MHz	±20Hz
2. 60MHz	1) Display f. : 14.750MHz MODE : AM	Oscilloscope		TP506		L529 L530	Repeat for MAX.	
3. 65MHz BPF	1) Display f. : 14.750MHz MODE : AM			TP503		L533 L534 L535	Repeat for MAX.	

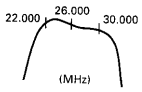
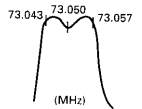

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
4. Lock voltage VCO1A	1) Display f. : 30kHz MODE : AM	DC V.M	TX-RX (PLL)	TP501	TX-RX (PLL)	TC502	2.0V	±0.05V	
	2) Display f. : 10.980MHz						Check	6.5V or less	
5. Lock voltage VCO1B	1) Display f. : 10.990MHz MODE : AM				TX-RX (PLL)	TC503	2.0V	±0.05V	
	2) Display f. : 23.980MHz						Check	6.5V or less	
6. Lock voltage VCO1C	1) Display f. : 23.990MHz MODE : AM				TX-RX (PLL)	TC504	2.0V	±0.05V	
	2) Display f. : 29.990MHz						Check	6.5V or less	
7. LO2 VCO2 voltage	1) Display f. : 14.100MHz MODE : AM			TP504			Check	6.5V or less	
							Check	3.0-6.0V	
8. LO1 level	1) Display f. : 14.100MHz MODE : AM	RF V.M		CN503			Check	0-+3dBm	
9. LO2 level	Measurement condition : 50Ω terminated						CN501	Check	0-+4dBm
10. CAR level							1) Display f. : 14.100MHz MODE : AM	Oscilloscope	CN502

Receiver Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
1. AGC voltage	1) Menu No. : 00 (14.100MHz USB)	DC V.M	TX-RX (RF)	TP2	Front panel	UP or DOWN key	2.9V	±0.03V	
<p>• Writing data : After item 1 has been adjusted, 1) Menu No. : 51 2) [UP] or [DOWN] key : Push once time Display "rEady" → "run" → "good" (If "nG" is displayed, enter data again.) 3) [CLR] key : Push once time.</p>									
2. BPF	1) Display f. : 7.000MHz MODE : FM PRE AMP : ON Spectrum analyzer setting Center f. : 7.100MHz Frequency span : 2MHz Output : -20dBm XdB/DIV : 2dB RBW : 30kHz VBW : 10kHz	Tracking generator	Rear panel	ANT	TX-RX (RF)	L20 L21 L22	Repeat adjustment 2 or 3 times until the level is maximized and the waveform becomes flat.		
	2) Display f. : 14.000MHz Spectrum analyzer setting Center f. : 14.000MHz Frequency span : 5MHz	Spectrum analyzer	TX-RX (RF)	CN7		L29 L30 L31		Repeat adjustment 2 or 3 times until the level is maximized and the waveform becomes flat.	
							<p>Note : If dip point appear, first turn TC2 (RF) and adjust to L29,30,31.</p>		

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
3. RF AMP	1) Display f. : 22.000MHz MODE : FM PRE AMP : ON Spectrum analyzer setting Center f. : 26.000MHz Frequency span : 20MHz Output : -20dBm XdB/DIV : 2dB RBW : 30kHz VBW : 10kHz	Tracking generator Spectrum analyzer	Rear panel TX-RX (RF)	ANT CN7	TX-RX (RF)	L67 L68	Repeat adjustment 2 or 3 times until the level is maximized and within the range of waveform. Note : If dip point appear, first turn TC2 (RF) and adjust to L67,68.	
4. MCF (73MHz)	1) Display f. : 14.000MHz MODE : USB AGC : OFF Spectrum analyzer setting Center f. : 73.050MHz Frequency span : 70kHz ATT : 10dB Output : -20dBm XdB/DIV : 2dB RBW/VBW : 1kHz	Tracking generator Spectrum analyzer	TX-RX (RF)	CN3 CN4	TX-RX (RF)	L45 L54 L50 L51 L111	Repeat adjustment 2 or 3 times until the level is maximized and the waveform becomes flat. 1) Turn L45 and L54 to adjust to the 73.05MHz peak. (Repeat twice) 2) Turn L50, L51, and L111 to make a symmetrical waveform. 3) Make the waveform flat using L45 and L54.	
5. Trap initialize setting E,E2,E3	1) Set the TC2 position as shown right.				TX-RX (RF)	TC2	Turn TC2 180° from the default position.	 Face the concave part of the knob downwards.
6. IF AMP	1) Display f. : 14.100MHz MODE : USB AGC : FAST PRE AMP : ON AF output : 0.63V/8Ω SSG frequency : 14.101MHz SSG output : -113dBm	SSG AF V.M Oscilloscope DM. SP	Rear panel	ANT EXT.SP	TX-RX (RF)	L55 L56 L61 IC15's L1,L2	Repeat adjustment 2 or 3 times until the AF output is maximized.	
7. RX MIX balance	1) Display f. : 100kHz MODE : USB PRE AMP : ON SSG output : OFF					VR1	Noise MIN	
8. IF GAIN	1) Display f. : 14.100MHz MODE : USB AGC : FAST PRE AMP : ON SSG frequency : 14.101MHz SSG output : -105dBm 2) SSG output : -115dBm 3) SSG output : -105dBm				Front panel	AF VR	AF output : 0.63V	
					TX-RX (RF)	IC15's VR1	AF output : 0.4V	±0.05V
							Check	AF output : 0.63V±0.05V
9. Trap E,E2,E3	1) Display f. : 15.200MHz MODE : USB AGC : FAST PRE AMP : ON SSG frequency : 15.201MHz SSG output : -113dBm 2) Display f. : 11.700MHz SSG frequency : 11.701MHz				TX-RX (RF)	TC2	AF output : MIN	There must be a dip point.
						TC1		

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
10. NB	1) Display f.: 14.100MHz MODE: USB AGC: FAST PRE AMP: ON SSG frequency: 14.101MHz SSG output: -103dBm	DC V.M SSG AF V.M Oscilloscope DM. SP	TX-RX (PLL) Rear panel	TP801	TX-RX (PLL)	L802 L803	Voltage MIN	
	2) INB) key: ON/OFF	Noise G.		ANT			EXT.SP	
<ul style="list-style-type: none"> Item 11 to 16 below are adjusted in the adjustment mode. To terminate the adjustment menu in the middle, save your settings with Menu No. 51. 								
11. SSB SQL threshold	1) Menu No.: 02 (14.100MHz USB) SSG output: OFF	SSG AF V.M Oscilloscope DM. SP	Rear panel	ANT	Front panel	UP or DOWN key	1 push	
12. SSB S-meter S1	1) Menu No.: 03 (14.100MHz USB) SSG frequency: 14.101MHz SSG output: -107dBm			EXT SP				
S9	2) Menu No.: 04 (14.100MHz USB) SSG output: -81dBm							
Full scale	3) Menu No.: 05 (14.100MHz USB) SSG output: -21dBm							
13. FM SQL threshold	1) Menu No.: 06 (29.100MHz FM) SSG frequency: 29.100MHz SSG output: OFF							
14. FM S-meter S1	1) Menu No.: 07 (29.100MHz FM) SSG frequency: 29.100MHz SSG output: -117dBm MOD: 1kHz/3kHz							
Full scale	2) Menu No.: 08 (29.100MHz FM) SSG output: -95dBm MOD: 1kHz/3kHz							
15. SQL VR center voltage	1) Menu No.: 16 (14.100MHz USB) SSG frequency: Anything SSG output: OFF						SQL VR: Center 1 push	
16. IF SHIFT VR center voltage	1) Menu No.: 17 (14.100MHz USB) SSG frequency: Anything SSG output: OFF						IF SHIFT VR: Center 1 push	
<ul style="list-style-type: none"> Writing data: After items 11 to 16 have been adjusted: 1) Menu No.: 51 2) [UP] or [DOWN] key: Push once time Display "rEAdy" → "run" → "good" (if "ng" is displayed, enter data again.) 3) [CLR] key: Push once time. 								

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks						
		Test-equipment	Unit	Terminal	Unit	Parts	Method							
17. S/N	1) Display f.: Below AF VR : 0.63V/8Ω SSG frequency : Below However, USB : +1kHz LSB : -1kHz Frequency MODE 550kHz AM 1.550MHz AM 1.800MHz LSB 3.550MHz LSB 7.100MHz LSB 10.100MHz USB 14.100MHz USB 21.100MHz USB 24.800MHz USB 28.800MHz USB 29.800MHz FM	SSG AF V.M Oscilloscope Distortion meter DM. SP	Rear panel	ANT EXT.SP										
										SSG output	SSG MOD	DEV	S/N measurement	10dB or more
										-77dBm	1kHz	60%	MAX sensitivity measurement	0.63V/8Ω or more
										-77dBm	1kHz	60%		
										-119dBm	OFF	OFF	PRE AMP : OFF	Sensitivity down 5-15dB.
										-119dBm	OFF	OFF		
										-119dBm	OFF	OFF	←	
										-119dBm	OFF	OFF		
										-123dBm	OFF	OFF	←	SINAD sensitivity
										-123dBm	OFF	OFF		
-119dBm	1kHz	3kHz												
18. ATT	1) Display f.: 14.300MHz MODE : USB AGC : FAST PRE AMP : ON SSG frequency : 14.301MHz SSG output : -113dBm	SSG AF V.M Oscilloscope DM. SP	Rear panel	ANT EXT.SP	Front panel	ATT key	1) Adjust the AF output to 1V. 2) 1 push the [ATT] key. 3) SSG output :-93dBm	AF output down. AF output : 1V±3dB						
19. VS-3 (Option)	1) Connect the VS-3 to CN16 on the TX-RX unit. AF VR : MIN [PF] key : 1 push	VS-3	TX-RX (RF)	CN16	Front panel	PF key	1 push	The displayed frequency can be heard vocally.						
20. DRU-3A (Option)	1) Connect the DRU-3A to CN17 on the TX-RX unit. Connect a microphone to the MIC jack. [REC] key : 1 push	DRU-3A Microphone	TX-RX (RF) Front panel	CN17 MIC	Front panel	CH1 key	Hold down [CH1], and talk into the microphone.	Can be recorded for about 15 seconds.						
							Press the [CH1] key again.	The recorded voice must be played back.						

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
1. ALC voltage	1) Menu No. : 01 (14.100MHz USB) Transmit	DC V.M	TX-RX (RF)	TP1	Front panel	UP or DOWN key	2.7V	±0.03V	
• Writing data : After item 1 has been adjusted: 1) Menu No. : 51 2) [UP] or [DOWN] key : Push once time Display "rEAdy" → "run" → "good" (if "nG" is displayed, enter data again.) 3) [CLR] key : Push once time. 4) [SPLIT] key : Push once time.									
2. Final idling current	1) Display f.: 14.200MHz MODE : USB Final unit VR1, 2 : MIN Transmit	DC. A	Rear panel	DC IN	Final		(First adjust VR1 and VR2 for minimum)=A		
							VR1	A+250mA	
							VR2	(A+250mA)+250mA	

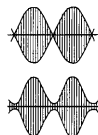
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks			
		Test-equipment	Unit	Terminal	Unit	Parts	Method				
3. TX AMP	1) Display f. : 14.200MHz MODE : CW Connect to CN10 a 50Ω dummy load. Transmit	50Ω dummy Oscilloscope	TX-RX (RF)	CN10	TX-RX (RF)	L69,70 L71,72 L74,75 L76 VR3	Repeat 2 or 3 times for DRV output MAX	Reference value 2.5Vp-p or more			
4. NULL	1) Display f. : 3.500MHz MODE : CW Transmit	Power meter DC V.M (Oscilloscope)	Rear panel Final	ANT CN12	Final	TC1	MIN	Reference value 0.5V or less			
5. Power frequency characteristic	1) Initialize	Power meter	Rear panel	ANT	Final	VR3	Full counterclockwise (VR MIN)				
	2) Menu No. : 18 (14.200MHz USB) Transmit								Front panel	UP or DOWN key	±5.0W
	3) Writing data with Menu No. 51. [CLR] key : Push once time (Adjustment mode terminated)										
	4) Display f. : 29.699MHz MODE : CW Transmit								Final	VR3	Power MAX
6. 14MHz TGC	1) Menu No. 27 (14.200MHz USB) Transmit	Power meter	Rear panel	ANT	Front panel	UP or DOWN key	Setting data : 050				
					TX-RX (RF)	VR9	100W	±3.0W			
	2) Writing data with Menu No. 51.				Front panel	UP or DOWN key	1 push				
* Item 7 to 17 below are adjusted in the adjustment mode. To terminate the adjustment menu in the middle, save your settings with Menu No. 51.											
7. Power 100W 50W 25W 10W 5W	1) Menu No. : 18 (14.200MHz USB) Transmit	Power meter	Rear panel	ANT	Front panel	UP or DOWN key	100W	±5.0W			
	2) Menu No. : 19 (14.200MHz USB) Transmit						50W	±2.5W			
	3) Menu No. : 20 (14.200MHz USB) Transmit						25W	±1.0W			
	4) Menu No. : 21 (14.200MHz USB) Transmit						10W	±1.0W			
	5) Menu No. : 22 (14.200MHz USB) Transmit						5W	±1.0W			
8. TGC 1.9MHz 3.5MHz 7.0MHz 10MHz	1) Menu No. : 23 (1.840MHz USB) Transmit						100W K,M2,E,E3 10W E2	±5W K,M2,E,E3 ±1.0W E2			
	2) Menu No. : 24 (3.500MHz USB) Transmit						100W	±5W			
	3) Menu No. : 25 (7.00MHz USB) Transmit							Note : Skip 14MHz			
	4) Menu No. : 26 (10.100MHz USB) Transmit										

TS-570D

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks	
		Test-equipment	Unit	Terminal	Unit	Parts	Method		
8. TGC 18MHz	5) Menu No. : 28 (18.068MHz USB) Transmit	Power meter	Rear panel	ANT	Front panel	UP or DOWN key	100W	±5W	
	21MHz						6) Menu No. : 29 (21.000MHz USB) Transmit		
	25MHz						7) Menu No. : 30 (24.890MHz USB) Transmit		
	28MHz						8) Menu No. : 31 (29.690MHz USB) Transmit		
9. Power TGC 50W	1) Menu No. : 33 (14.200MHz USB) Transmit						50W	±2.5W	
	25W						2) Menu No. : 34 (14.200MHz USB) Transmit	25W	±1.0W
	10W						3) Menu No. : 35 (14.200MHz USB) Transmit	10W	±1.0W
	5W						4) Menu No. : 36 (14.200MHz USB) Transmit	5W	±1.0W
10. ALC meter Start point	1) Menu No. : 37 (14.200MHz USB) Transmit						1 push		
	Zone MAX						2) Menu No. : 38 (14.200MHz USB) Transmit		
11. CW carrier level	1) Menu No. : 39 (14.200MHz CW) Transmit						ALC meter zone MAX		
12. AM carrier level	1) Menu No. : 40 (14.200MHz AM) Transmit								
13. FM MAX deviation	1) Menu No. : 41 (29.690MHz FM) Transmit	Power meter Linear detector					±4.5kHz According to the larger +, -.	±0.1kHz	
14. SSB carrier point USB	1) Menu No. : 42 (14.200MHz USB) Transmit	Power meter Oscilloscope					Waveform cross	OK	
	LSB						2) Menu No. : 43 (14.200MHz LSB) Transmit	NG	

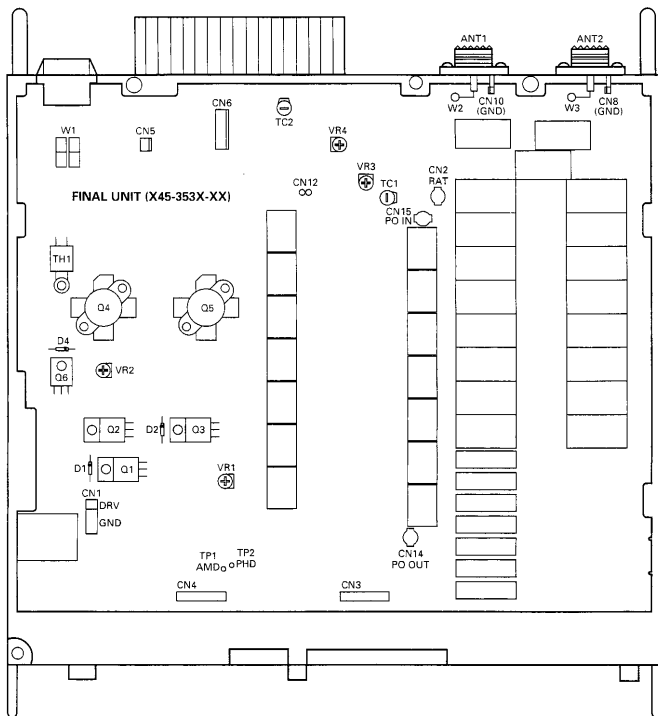


ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
15. SSB carrier suppression USB LSB	1) Menu No. : 44 (14.200MHz USB) Transmit	Power meter Oscilloscope	Rear panel	ANT	TX-RX (RF)	VR4 VR5	Carrier level MIN	60dB or less (Repeat check both LSB and USB.)
	2) Menu No. : 45 (14.200MHz LSB) Transmit							
16. SWR protection	1) Menu No. : 46 (14.200MHz CW) Transmit	150Ω dummy Through type power meter			Front panel	UP or DOWN key	40W	±1.0W <i>Defult. 044</i>
17. SWR meter (SWR : 3.0)	1) Menu No. : 47 (1.840MHz CW) Transmit	150Ω dummy					1 push	
<p>• Writing data : After items 7 to 17 have been adjusted; 1) Menu No. : 51 2) [UP] or [DOWN] key : Push once time Display "rEAdy" → "run" → "good" (If "nG" is displayed, enter data again.) 3) [CLR] key : Push once time.</p>								
18. Spurious	1) Display f. : 24.900MHz MODE : CW Transmit	Power meter Spectrum analyzer	Rear panel	ANT	TX-RX (RF)	VR2	±1.650MHz Spurious level MIN	60dB or less
19. AT amplitude	1) Display f. : 29.690MHz MODE : CW Transmit Power : 10W	Power meter Oscilloscope	Rear panel	ANT	Final	VR4	Turn the VR to the point where the waveform on the oscilloscope changes from high to low. (Threshold point)	
				TP1				
20. AT phase	1) Display f. : 29.690MHz MODE : CW Transmit Power : 10W			TP2		TC2	Turn the VC to the point where the waveform on the oscilloscope changes from high to low.	
21. MIC sensitivity SSB FM	1) Display f. : 14.200MHz MODE : USB AG : 1kHz/5mV Transmit	Power meter AG VTVM	Rear panel Front panel	ANT MIC			Check	90W or more
	1) Display f. : 29.000MHz MODE : FM AG : 1kHz/3mV E,E2,E3 1kHz/5mV K,M2 Transmit	Power meter Linear detector AG VTVM Oscilloscope	Rear panel Front panel	ANT MIC				DEV : ±2.7~3.3kHz
	2) AG : 1kHz/30mV E,E2,E3 1kHz/50mV K,M2 Transmit							DEV : ±4.0~5.0kHz
22. Transmit frequency characteristic	1) Display f. : 14.200MHz MODE : USB/LSB AG : 1kHz/5mV 400Hz/5mV 2.6kHz/5mV Transmit	Power meter AG AF V.M	Rear panel Front panel	ANT MIC			Set AG to 1.0kHz and turn the [MULT/CH] knob to set to 50W. Change the AG frequency and measure the difference between the power levels at 1.0kHz and at another frequency. Take a measurement for each USB and LSB.	Within 6dB

ADJUSTMENT

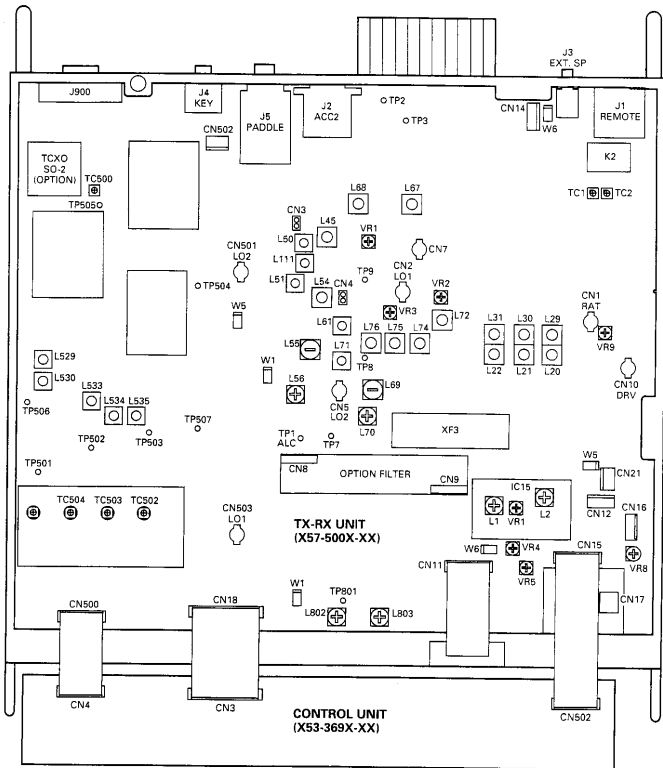
Adjustment Points (Top)



VR1,2 : Final idling current
 VR3 : Power frequency characteristic
 VR4 : AT amplitude
 TC1 : NULL
 TC2 : AT phase

ADJUSTMENT

Adjustment Points (Bottom)



TC1,2 : Trap **E,E2,E3**

TC2 : Trap initialize setting **E,E2,E3**

TC500 : Reference oscillation

TC502 : Lock voltage (VCO1A)

TC503 : Lock voltage (VCO1B)

TC504 : Lock voltage (VCO1C)

L20-22,29-31 : BPF

L45,50,51,54,111 : MCF (73MHz)

L55,56,61 : IF AMP

L67,68 : RF AMP

L69-72,74-76 : TX AMP

L529,530 : 60MHz

L533-535 : 65MHz BPF

L802,803 : NB

VR1 : RX MIX balance

VR2 : Spurious

VR3 : TX AMP

VR4 : SSB carrier suppression (USB)

VR5 : SSB carrier suppression (LSB)

VR9 : 14MHz TGC

IC15's VR1 : IF GAIN

IC15's L1,2 : IF AMP

*VR8 : VS-3 voice output level

TERMINAL FUNCTION

CN No.	Pin No.	Name	I/O	Function	CN No.	Pin No.	Name	I/O	Function
FINAL UNIT (X45-353X-XX)									
CN1	Coaxial	DRV	I	Drive input					
CN2	Coaxial	RAT	O	RX signal output					
CN3		1 GND	-	GND		17 K2	I	Key input 2	
		2 TT	O	AT-300 control signal		18 K3	I	Key input 3	
		3 TS	O	AT-300 control signal		19 5C	O	Usually 5V (For power switch)	
		4 PSC	I	Power supply relay control signal		20 PSW	I	Power switch input signal	
		5 BOVR	O	Over voltage detection signal		21 CENA	I	MULTI/CH encoder pulse A	
		6 THV	O	Thermal protect detection voltage		22 CENB	I	MULTI/CH encoder pulse B	
		7 PHD	O	Phase compare detection signal		23 RENA	I	RIT/XIT encoder pulse A	
		8 AMD	O	Amplitude compare detection signal		24 RENB	I	RIT/XIT encoder pulse B	
		9 14V	O	13.8V (Usually)		25 PB	O	LCD lamp (10V)	
		10 14S	O	13.8V (When power switch on)		26 GND	-	GND	
		11 10A	O	10V	CN2	1 5A	O	Volume power supply (5V)	
		12 8A	O	8A		2 VAF	I	AF VR analog voltage	
		13 UDA	I	Final unit serial data		3 VRF	I	RF VR analog voltage	
		14 UCK	I	Final unit serial clock		4 VSFT	I	SHIFT VR analog voltage	
		15 FEN	I	Final unit enable		5 VSQI	I	SQL VR analog voltage	
		16 GND	-	GND		6 VHC	I	HC VR analog voltage	
						7 VLC	I	LC VR analog voltage	
						8 GND	-	GND	
CN4		1 GND	-	GND	CN3	1 TXC	O	TX control signal	
		2 GND	-	GND		2 NC	NC	NC	
		3 SPG	-	Speaker GND		3 CKY	O	Keying signal	
		4 SP	I	Speaker input		4 KEY	I	Key down signal	
		5 14AG	-	AF amplifier GND		5 KYS	I	Key jack judgement signal	
		6 14AF	O	AF amplifier 14V		6 PKS	I	Standby switch when PKD input	
		7 14S	O	14V when power switch on		7 RCK	O	TX-RX unit serial clock	
		8 14S	O	14V when power switch on		8 RDA	O	TX-RX unit serial data	
		9 8A	O	Analog 8V		9 REN1	O	TX-RX unit IC11 enable	
		10 8A	O	Analog 8V		10 NC	NC	NC	
		11 5A	O	Analog 5V		11 VEN	O	TX-RX unit IC6 enable	
		12 TXB	I	TX 8V		12 SS	I	Standby switch	
		13 VSF	O	Forward waveform detection voltage		13 ALM	I	ALC meter input	
		14 VSR	O	Reflected waveform detection voltage		14 SM	I	S-meter input	
		15 GND	-	GND		15 VSRM	I	Forward waveform detection voltage	
		16 GND	-	GND		16 VSRM	I	Reflected waveform detection voltage	
CN5		1 FAN+		Fan motor drive +		17 REN2	O	TX-RX unit IC14 enable	
		2 FAN-		Fan motor drive -		18 TXD	I	RX data from personal computer	
CN6		1 14S	O	13.8V		19 RXD	O	TX data to personal computer	
		2 AGND	-	Analog GND		20 CTS	O	Data transmit inhibit signal to personal computer	
		3 TT	O	AT-300 control		21 RTS	I	Data transmit inhibit signal from personal computer	
		4 TS	I	AT-300 control		22 5C	O	Usually 5V	
		5 GND	-	GND		23 AMU	O	AF mute signal	
CN13		1 SP	O	Speaker output		24 DOT	I	Electronic keyer dot signal	
		2 SPG	-	Speaker GND		25 DASH	I	Electronic keyer dash signal	
CN14	Coaxial		O	Filter detection circuit (Relay)		26 GND	-	GND	
CN15	Coaxial		I	Filter detection circuit (Relay)	CN4	1 GND	-	GND	
CONTROL UNIT (X53-369X-XX)						2 VCS	O	VS-3 voice synthesize start signal	
CN1		1 GND	-	GND		3 NAR	I	"H" Data input enable to VS-3	
		2 NC	NC	NC		4 RST	O	VS-3 reset signal	
		3 SS	I	Standby switch		5 FSQI	I	FM SQL signal	
		4 MD	I	MIC down signal		6 NC	NC	NC	
		5 MU	I	MIC up signal		7 NC	NC	NC	
		6 BLANK	O	LED goes off control signal		8 GND	-	GND	
		7 8A	O	MIC 8V		9 DEN2	O	DDS IC enable (CAR)	
		8 GND	-	GND		10 DEN1	O	DDS IC enable (LO1)	
		9 5A	O	5V		11 ULK	I	Unlock detection	
		10 LDA	O	LCD serial data		12 PEN2	O	PLL IC enable (LO2)	
		11 LCK	O	LCD serial clock		13 PEN1	O	PLL IC enable (LO1)	
		12 LEN1	O	LCD enable (IC1)		14 PDA	O	PLL serial data	
		13 LEN2	O	LCD enable (IC2)		15 PCK	O	PLL serial clock	
		14 LEN3	O	LCD enable (IC3)		16 GND	-	GND	
		15 K0	I	Key input 0	CN5	1 GND	-	GND	
		16 K1	I	Key input 1		2 FEN	I	Final unit enable	
						3 UCK	I	Final unit serial clock	
						4 JDA	I	Final unit serial data	

TERMINAL FUNCTION

CN No.	Pin No.	Name	I/O	Function	CN No.	Pin No.	Name	I/O	Function	
	5	8A	O	8A	CN12	1	CAR	I	CAR input (8.83MHz)	
	6	10A	O	LCD lamp 10V (Relay)		2	NC	-	GND	
	7	14S	O	13.8V (When power switch on)		3	GND	-	NC	
	8	14V	O	13.8V (Usually)	CN14	1	PH1	O	Audio output for headphone	
	9	AMD	I	Amplitude compare detection signal		2	PH2	I	Audio input when headphone through	
	10	PHD	I	Phase compare detection signal		3	PHG	-	GND	
	11	THV	I	Thermal protect detection voltage	CN15	1	GND	-	GND	
	12	BOVR	I	Over voltage detection signal		2	NC	-	NC	
	13	PSC	O	Power supply relay control		3	GND	-	GND	
	14	TS	I	AT-300 control signal		4	MOD/ANO	I/O	Modulation input/RX AF output	
	15	TT	I	AT-300 control signal		5	BIAS	I	Bias voltage	
	16	GND	-	GND		6	DET	O	Detection output	
	CN6	1	5D	O		5V (Encoder power supply)	7	GND	-	GND
		2	MENB	I		Main encoder pulse B	8	DRO	O	Relay
		3	MENA	I		Main encoder pulse A	9	GND	-	GND
		4	GND	-		GND	10	DRM	I	DRU-3A MIC signal input
CN502	1	GND	-	GND		11	GND	-	GND	
	2	NC	-	NC		12	ANI	O	TX signal input	
	3	GND	-	GND		13	GND	-	GND	
	4	MOD/ANO	O/I	Modulation output/RX AF input		14	DREN	I	Relay	
	5	BIAS	O	Bias voltage		15	EOM	O	Relay	
	6	DET	I	Detection input		16	GND	-	GND	
	7	GND	-	GND	CN16	1	VO	I	VS-3 voice signal input	
	8	DRO	I	DRU playback signal input		2	5C	O	VS-3 power supply (5V)	
	9	GND	-	GND		3	E	-	GND	
	10	DRM	O	DRU-3A MIC signal		4	NAR	I	"H" : Data input enable to VS-3	
	11	GND	-	GND		5	RST	O	VS-3 reset signal	
	12	ANI	O	TX signal output		6	VCS	O	VS-3 voice synthesize start signal	
	13	GND	-	GND		7	VDT	O	VS-3 data	
	14	DREN	O	DRU enable		8	VCK	O	VS-3 clock	
	15	EOM	I	End of message signal (End : 'H')	CN17	1	GND	-	GND	
	16	GND	-	GND		2	DRMG	-	DRU-3A MIC GND	
CN503	1	MIC	I	MIC signal		3	DRM	O	DRU-3A MIC signal	
	2	MSG	-	MIC GND		4	DRO	I	DRU playback signal	
	3	MCG	-	GND		5	5C	O	DRU power supply (5V)	
				6		GND	-	GND		
TX-RX UNIT (X57-500X-XX) : TX-RX										
CN1	Coaxial	RAT	I	RX signal input		7	EOM	I	End of message signal (End : 'H')	
CN2	Coaxial	LO1	I	LO1 input (73.08~103.05MHz)		8	OVF	I	Overflow signal (Overflow : 'L')	
CN3	1	IN	I	MCF adjustment signal input		9	DREN	O	DRU enable	
	2	GND	-	GND		10	SD	O	DRU serial data	
CN4	1	OUT	O	MCF adjustment signal output	11	SCK	O	DRU clock		
	2	GND	-	GND	CN18	1	TXC	I	TX control signal	
CN5	Coaxial	LO2	I	LO2 input (64.22MHz)		2	NC	-	NC	
CN7	Coaxial		O	BPF adjustment signal output		3	CKY	I	Keying signal	
CN8				Option filter		4	KEY	O	Key down signal	
CN9				Option filter		5	KYS	O	Key jack judgement signal	
CN10	Coaxial	DRV	O	Drive output		6	PKS	O	Standby switch when PKD input	
CN11	1	GND	-	GND		7	RCK	I	TX-RX unit serial clock	
	2	GND	-	GND		8	RDA	I	TX-RX unit serial data	
	3	SPG	-	Speaker GND		9	REN1	I	TX-RX unit IC11 enable	
	4	SP	O	Speaker output signal		10	NC	-	NC	
	5	14AG	-	AF amplifier GND		11	VEN	I	TX-RX unit IC6 enable	
	6	14AF	I	AF amplifier 14V	12	SS	O	Standby switch		
	7	14S	I	14V when power switch on	13	ALM	O	ALC meter output		
	8	14S	I	14V when power switch on	14	SM	O	S-meter output		
	9	8A	I	Analog 8V	15	V5FM	O	Forward waveform detection voltage		
	10	8A	I	Analog 8V	16	V5RM	O	Reflected waveform detection voltage		
	11	5A	I	Analog 5V	17	REN2	I	TX-RX unit IC14 enable		
	12	TXB	O	TX 8V	18	TXD	O	RX data from personal computer (Relay)		
	13	V5F	I	Forward waveform detection voltage	19	RXD	I	TX data to personal computer (Relay)		
	14	V5R	I	Reflected waveform detection voltage	20	CTS	I	Data transmit inhibit signal to personal computer (Relay)		
	15	GND	-	GND	21	RTS	O	Data transmit inhibit signal from personal computer (Relay)		
	16	GND	-	GND	22	5C	I	Usually 5V		
				23	AMU	I	AF mute signal			

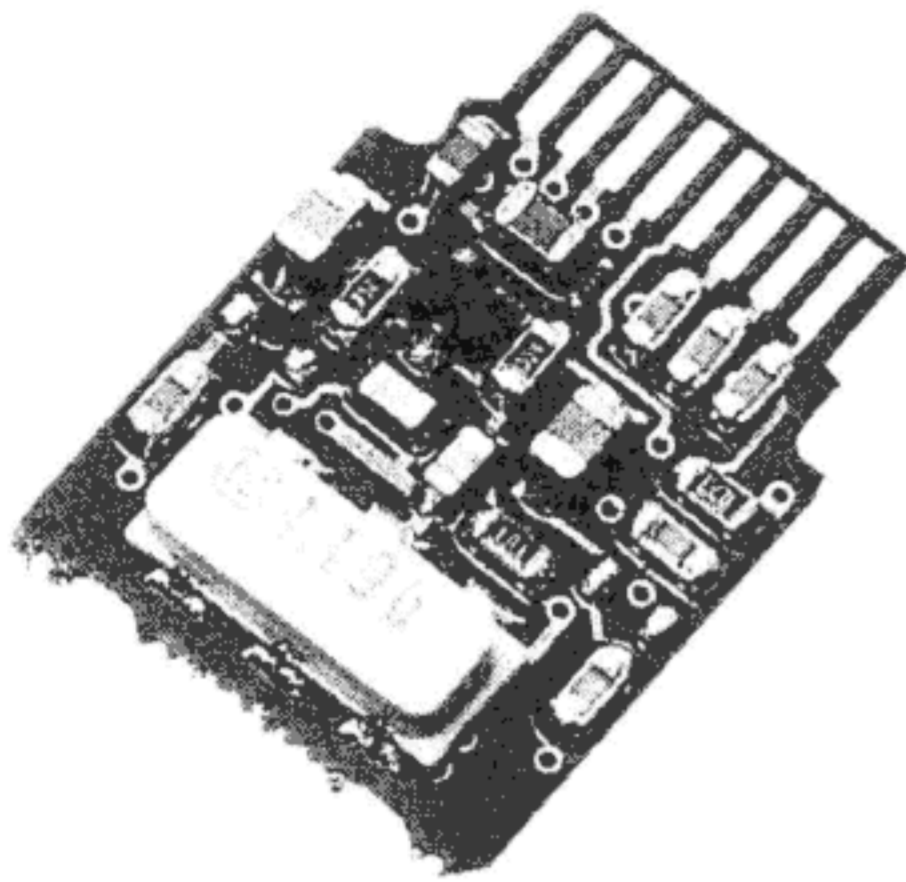
TERMINAL FUNCTION

CN No.	Pin No.	Name	I/O	Function
	24	DOT	O	Electronic keyer dot signal
	25	DASH	O	Electronic keyer dash signal
	26	GND	-	GND
CN19				Short jumper for medium frequency band ATT selection
CN20				Short jumper for medium frequency band ATT selection
CN21	1	AF	I	Audio input
	2	GND	-	GND
W1	1	NBI	I	NB IF signal (8.83MHz)
	2	NBG	I	NB IF signal GND
W5	1	FM/M	I	FM modulation MIC signal
	2	FM/G	I	FM modulation MIC signal GND
W6	1	SP	I	Speaker signal
	2	SPG	I	Speaker signal GND
J1	1	SPO	O	Speaker signal
	2	COM	O	External equipment control relay common terminal
	3	SS	I	Standby switch
	4	MKE	I	External equipment control relay close terminal
	5	BRK	I	External equipment control relay open terminal
	6	ALC	I	External ALC input
	7	RL	O	TX 14V output
J2	1	NC	-	NC
	2	RTY	I	RTTY signal
	3	ANO	O	RX AF output
	4	ANOG	O	RX AF output GND
	5	PSQ	O	Squelch control output
	6	SM	O	S-meter output
	7	NC	-	NC
	8	GND	-	GND
	9	PKS	I	Standby switch when PKD input
	10	NC	-	NC
	11	PKD	I	TX signal input
	12	GND	-	GND
	13	SS	I	Standby switch
J3	1			External speaker GND
	2		O	External speaker audio output
	3		I	Audio input when external speaker disconnect
J4	1	GND	-	GND
	2	GND	-	GND
	3	KYS	I	Key jack judgement signal
	4	NC	-	NC
	5	KEY	I	Key down signal
J5	1	GND	-	GND
	2	NC	-	NC
	3	NC	-	NC
	4	NC	-	NC
	5	DASH	I	Electronic keyer dash signal
	6	DOT	I	Electronic keyer dot signal
	7	NC	-	NC
	8	NC	-	NC
	9	NC	-	NC
	10	KEY	I	Key down signal
	11	KYS	I	Key jack judgement signal
TX-RX UNIT (X57-500X-XX) : PLL				
CN500	1	GND	-	GND
	2	PCK	I	PLL serial clock
	3	PDA	I	PLL serial data
	4	PEN1	I	PLL IC enable (LO1)

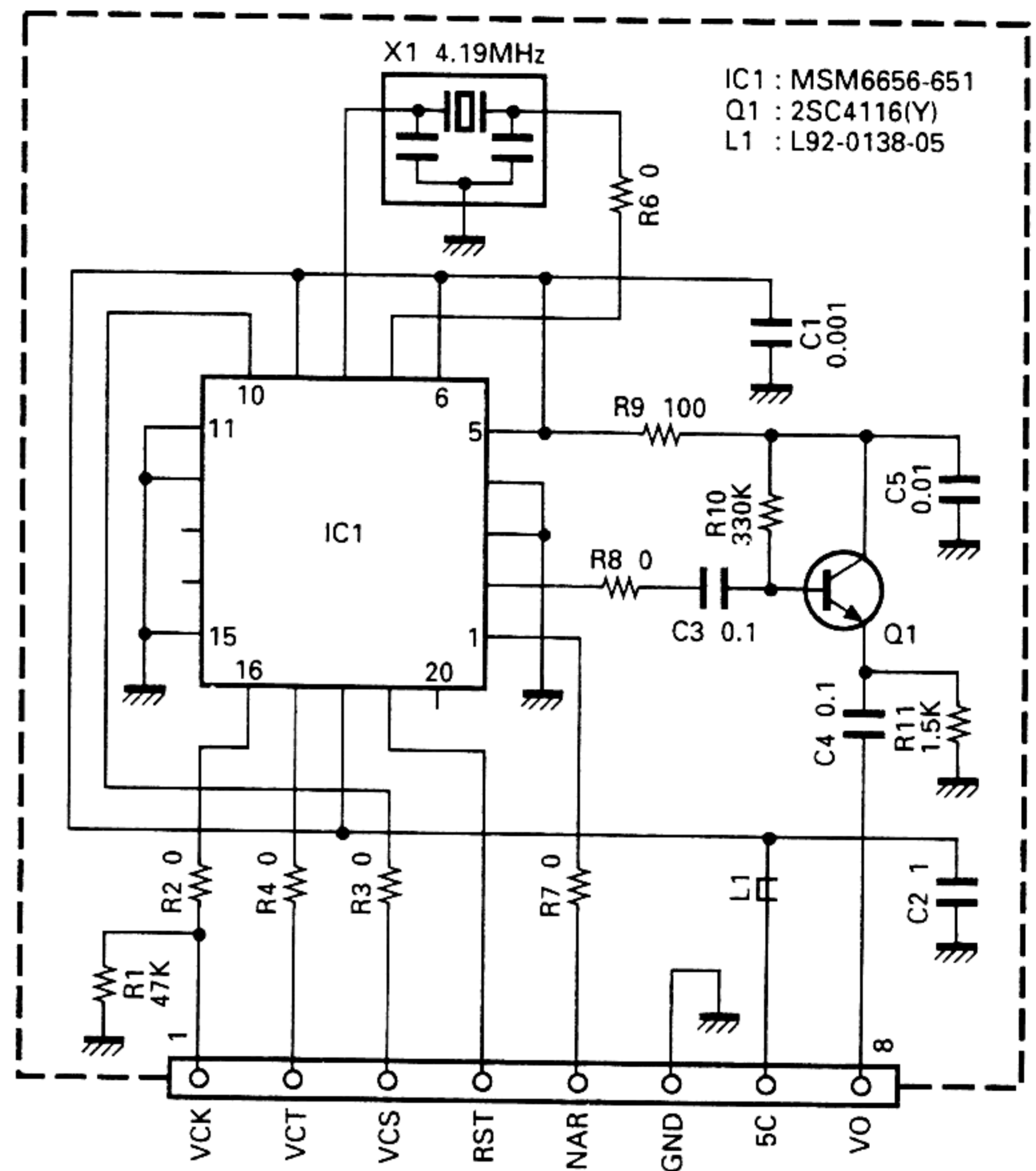
CN No.	Pin No.	Name	I/O	Function
	5	PEN2	I	PLL IC enable (LO2)
	6	ULK	O	Unlock detection output
	7	DEN1	I	DDS IC enable (LO1)
	8	DEN2	I	DDS IC enable (CAR)
	9	GND	-	GND
	10	NC	-	NC
	11	NC	-	NC
	12	FSQL	O	FM SQL signal
	13	RST	I	VS-3 reset signal
	14	NAR	O	"H" Data input enable to VS-3
	15	VCS	I	VS-3 voice synthesize start signal
	16	GND	-	GND
CN501	Coaxial	LO2	O	LO2 output
CN502	1	CAR	O	CAR output
	2	GND	-	GND
CN503	Coaxial	LO1	O	LO1 output
J900	1	GND	-	GND
	2	NC	-	NC
	3	TXD	I	RX data from personal computer
	4	RXD	O	TX data from TS-570
	5	NC	-	NC
	6	NC	-	NC
	7	CTS	O	Data transmit inhibit signal from TS-570
	8	RTS	I	Data transmit inhibit signal from personal computer
	9	NC	-	NC
LCD ASSY (B38-0765-05)				
CN1	1	GND	-	GND
	2	PB	I	LCD lamp (10V)
	3	RENB	O	RIT/XIT encoder pulse B
	4	RENA	O	RIT/XIT encoder pulse A
	5	CENB	O	MULTI/CH encoder pulse B
	6	CENA	O	MULTI/CH encoder pulse A
	7	PSW	O	Power switch output signal
	8	5C	I	Usually 5V (For power switch)
	9	K3	O	Key output 3
	10	K2	O	Key output 2
	11	K1	O	Key output 1
	12	K0	O	Key output 0
	13	LEN3	I	LCD enable (IC3)
	14	LEN2	I	LCD enable (IC2)
	15	LEN1	I	LCD enable (IC1)
	16	LCK	I	LCD serial clock
	17	LDA	I	LCD serial data
	18	5A	I	5V
	19	GND	-	GND
	20	8A	I	MIC 8V
	21	BLANK	O	LED goes off control signal
	22	MU	O	MIC up signal
	23	MD	O	MIC down signal
	24	SS	O	Standby switch
	25	NC	-	NC
	26	GND	-	GND
CN2	1	MIC	O	MIC signal output
	2	MSG	O	MIC GND
	3	MCG	O	GND
J1	1	MIC	I	MIC signal input
	2	SS	I	Standby switch
	3	MD	I	MIC down signal
	4	MU	I	MIC up signal
	5	8M	O	MIC 8V
	6	NC	-	NC
	7	MSG	O	MIC GND
	8	MCG	O	GND

VS-3 (VOICE SYNTHESIZER UNIT) / DRU-3A (DIGITAL RECORDING UNIT)

VS-3 External View

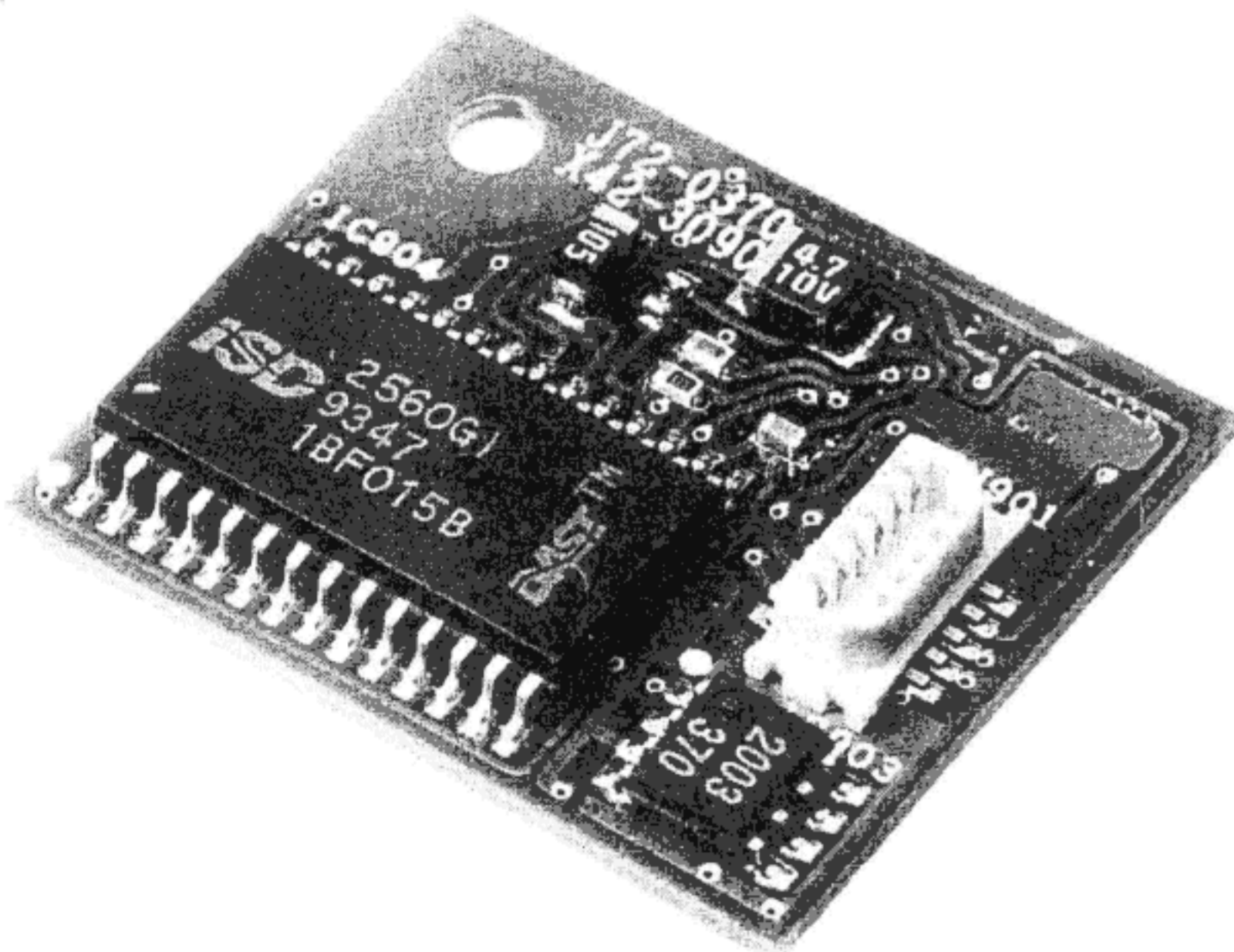


VS-3 Circuit Diagram



DRU-3A External View

Note : Without shielding cover



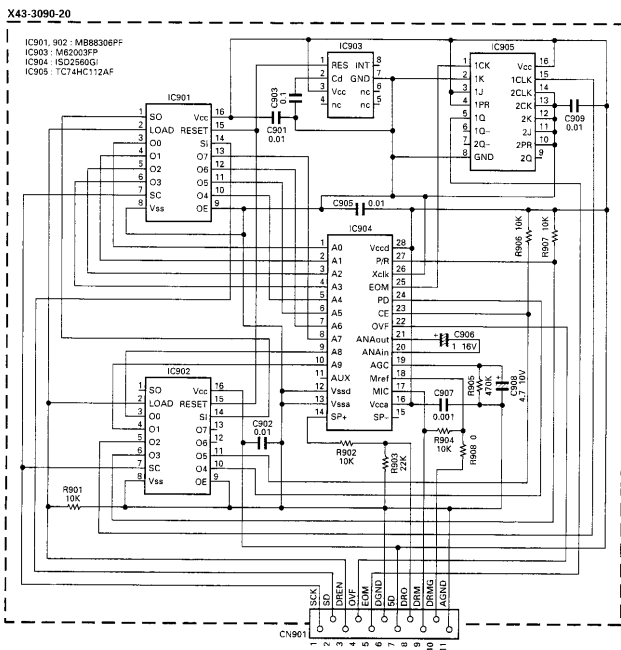
DRU-3A Parts List

Ref. No.	New parts	Parts No.	Description
C901,902		CK73FB1H103K	CHIP C 0.010UF K
C903		CK73FF1E104Z	CHIP C 0.1UF Z
C905		CK73GB1H103K	CHIP C 0.010UF K
C906		C92-0004-05	TAN C 1.0UF 16WV
C907		CK73GB1H102K	CHIP C 1000PF K
C908		C92-0009-05	TAN C 4.7UF 10WV
C909		CK73GB1H103K	CHIP C 1000PF K
CN901		E40-5748-05	PIN CONNECTOR (11P)
700	*	F10-2241-04	SHIELDING COVER
701	*	F10-2242-04	SHIELDING COVER
R901,902		RK73GB1J103J	CHIP R 10K J 1/16W
R903		RK73GB1J223J	CHIP R 22K J 1/16W
R904		RK73GB1J103J	CHIP R 10K J 1/16W
R905		RK73GB1J474J	CHIP R 470K J 1/16W
R906,907		RK73GB1J103J	CHIP R 10K J 1/16W
R908		R92-1252-05	CHIP R 0 OHM
IC901,902		MB88306PF	IC
IC903		M62003FP	IC
IC904		ISD2560G1	IC
IC905		TC74HC112AF	IC

TS-570D

DRU-3A (DIGITAL RECORDING UNIT)

DRU-3A Circuit Diagram



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SPECIFICATIONS

		Item	Rating	
GENERAL	Mode		J3E (LSB, USB), A1A (CW), A3E (AM), F3E (FM), F1D (FSK)	
	Number of memory channels		100	
	Antenna impedance		50Ω (With Antenna Tuner 16.7 to 150Ω)	
	Supply voltage		DC 13.8V ± 15%	
	Grounding method		Negative ground	
	Current	Transmit (Max.)	20.5A	
		Receive (No signal)	2A	
	Usable temperature range		-10°C to +50°C (+14°F to +122°F)	
	Frequency stability (-10°C to +50°C)		Within ± 10PPM	
	Frequency accuracy (At room temperature)		Within ± 10PPM	
	Dimensions [W x H x D] (Projections included)		270 x 96 x 270 mm/10.6 x 3.8 x 10.6 in (281 x 107 x 314 mm/11.1 x 4.2 x 12.4 in)	
	Weight		Approx. 6.8kg (15 lbs)	
	TRANSMITTER	Frequency range	160m band	1.8 ¹ to 2.0 ² MHz
80m band			3.5 to 4.0 ³ MHz	
40m band			7.0 to 7.3 ⁴ MHz	
30m band			10.1 to 10.15 MHz	
20m band			14.0 to 14.35 MHz	
17m band			18.068 to 18.168 MHz	
15m band			21.0 to 21.45 MHz	
12m band			24.89 to 24.99 MHz	
10m band			28.0 to 29.7 MHz	
Output power ⁵		SSB, CW, FSK, FM	Max.	100W
			Min.	5W
		AM	Max.	25W
			Min.	5W
Modulation		SSB	Balanced	
		FM	Reactance	
		AM	Low level	
Spurious emissions		-50dB or less		
Carrier suppression		40dB or more		
Unwanted sideband suppression (Modulation frequency 1.0kHz)		40dB or more		
Maximum frequency deviation (FM)	Wide	± 5kHz or less		
	Narrow	± 2.5kHz or less		
XIT shift frequency range		± 9.99kHz		
Microphone impedance		8Ω		

*1 1.81MHz : Europe, France, Holland; 1.83MHz : Belgium, Spain

*2 1.85MHz : Belgium, France, Holland, Spain

*3 3.8MHz : Europe, Belgium, France, Holland, Spain

*4 7.1MHz : Europe, Belgium, France, Holland, Spain

*5 Belgium, Spain : 10W fixed on 160m band

SPECIFICATIONS

Item		Rating	
Circuit type		Double conversion superheterodyne FM only: Triple conversion superheterodyne	
Frequency range		500kHz to 30MHz	
Intermediate frequency		1st: 73.05MHz, 2nd: 8.83MHz, 3rd: 455kHz (FM only)	
Sensitivity	SSB, CW, FSK (At 10dB (S+N)/N)	500kHz to 1.705MHz	4 μ V or less
		1.705MHz to 24.5MHz	0.2 μ V or less
		24.5MHz to 30MHz	0.13 μ V or less
	AM (At 10dB (S+N)/N)	500kHz to 1.705MHz	31.6 μ V or less
		1.705MHz to 24.5MHz	2 μ V or less
		24.5MHz to 30MHz	1.3 μ V or less
FM (At 12dB SINAD)	28MHz to 30MHz	0.25 μ V or less	
Selectivity	SSB, CW, FSK	-6dB: 2.2kHz, -60dB: 4.4kHz	
	AM	-6dB: 4kHz, -50dB: 20kHz	
	FM	-6dB: 12kHz, -50dB: 25kHz	
Image rejection (1.8MHz to 30MHz)		70dB or more	
1st IF rejection (1.8MHz to 30MHz)		70dB or more	
RIT shift frequency range		\pm 9.9kHz	
Squelch sensitivity	SSB, CW, FSK, AM	500kHz to 1.705MHz	20 μ V or less
		1.705MHz to 30MHz	2 μ V or less
	FM	28MHz to 30MHz	0.25 μ V or less
Audio output (8 Ω , 10% distortion)		1.5W or more	
Audio output impedance		8 Ω	

Specifications are subject to change without notice or obligation due to ongoing technological developments.

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