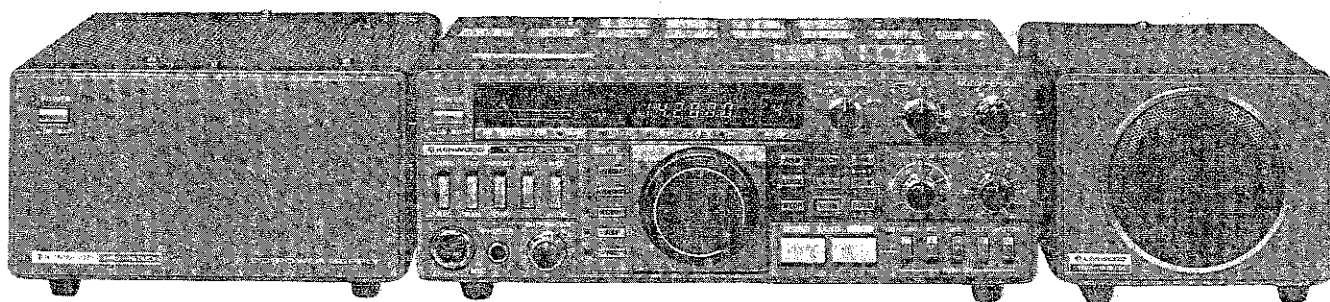


KENWOOD

SERVICE MANUAL

TS-430S FM-430, MB-430, SP-430, PS-430

HF TRANSCEIVER



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TS-430S

SPECIFICATIONS

[GENERAL]

Transmitter Frequency Range: 160, 80, 40, 30*, 20, 17*, 15, 12*, 10 meter Amateur bands
 Receiver Frequency Range: 150 kHz to 30 MHz
 Mode: A3J (LSB, USB), A1 (CW), A3 (AM), F3
 Antenna Impedance: 50 Ω
 Power Requirement: 12.0 to 16.0 V DC (13.8 V nominal)
 Power Consumption: 20A approx. in transmit mode
 1.2A approx. in receive mode
 Dimensions: 270 (10.6)W x 96 (3.8)H x 275 (10.8)D mm (inch)
 Weight: 6.5 kg (14.3 lbs.)

[TRANSMITTER]

Final Power Input:

Band \ Mode	SSB	CW	FM	AM
160m - 15m band	250WPEP	200WDC	-	60W
10m band	250WPEP	200WDC	120W	60W

Modulation:

SSB = Balanced Modulation
 FM = Variable Reactance Direct Shift
 (with FM-430 optional accessory)
 AM = Low Level Modulation (IF stage)

Carrier Suppression:

Better than 40 dB

Unwanted Sideband Suppression:

Better than 50 dB

Harmonic Content:

Less than -40 dB

Maximum Frequency Deviation (FM):

± 5 kHz (with FM-430 optional accessory)

Microphone Impedance:

500 Ω to 50 k Ω

[RECEIVER]

Circuitry:

SSB, CW, AM = Double conversion Superheterodyne

FM = Triple Conversion Superheterodyne

Intermediate Frequency:

1st IF = 48.055 MHz

2nd IF = 8.83 MHz

3rd IF = 455 kHz (only FM)

Sensitivity:

Mode \ Frequency	150kHz - 500kHz	500kHz - 1.8MHz	1.8MHz - 30MHz
SSB/CW(10 dB S/N)	Less than 1 μ V	Less than 4 μ V	Less than 0.25 μ V
AM(10 dB S/N)	Less than 13 μ V	Less than 40 μ V	Less than 2.5 μ V
FM (30 dB S/N)	-	-	*Less than 1 μ V
FM (12 dB SINAD)	-	-	*Less than 0.4 μ V

* with FM-430 optional accessory

Image Ratio:

More than 70 dB (1.8 to 30 MHz)

IF Rejection:

More than 50 dB (FM-3rd image ratio)

Selectivity:

More than 70 dB (1.8 to 30 MHz)

Mode \ Selectivity	-6 dB	-60 dB
SSB/CW	2.4 kHz	4.4 kHz
AM *1	6 kHz	12 kHz
FM *2	15 kHz	32 kHz

* 1 with YK-88A optional filter

* 2 with FM-430 optional accessory

Frequency Stability:

Better than $\pm 30 \times 10^{-6}$ (0°C to +50°C), Within ± 200 Hz from 1 to 60 minutes after turn-on: within ± 30 Hz any 30 minutes period thereafter

Frequency Accuracy:

Better than 10×10^{-6}

RIT Variable Range:

More than ± 1 kHz

Audio Output Impedance:

4 Ω to 16 Ω

Audio Output Power:

More than 1.5W across 8 Ω (at 10% distortion)

* Will transmit on the new 30, 17 and 12 meter bands, Diodes have been installed to prevent accidental transmission. They may be removed easily when government authorization has been granted for Amateur operation.

Note: Circuit and ratings subject to change without notice due to developments in technology.

CIRCUIT DESCRIPTION

OVERVIEW

The TS-430 is a transceiver and general-coverage receiver featuring double conversion at 48.055 and 8.830MHz intermediate-frequencies. Triple-conversion to 455kHz is used during FM receive operation. A microprocessor based 10Hz or 100Hz step switchable digital VFO system is employed for frequency control. The PLL system reference

is a 36MHz master oscillator.

The following features are provided with the TS-430 : dual digital VFOs, 8 memory channels, memory scan, programmable band scan, IF shift, RIT, VOX, CW side tone, speech processor, NB, AF notch, squelch, F step, F lock, Mic UP/DWN.

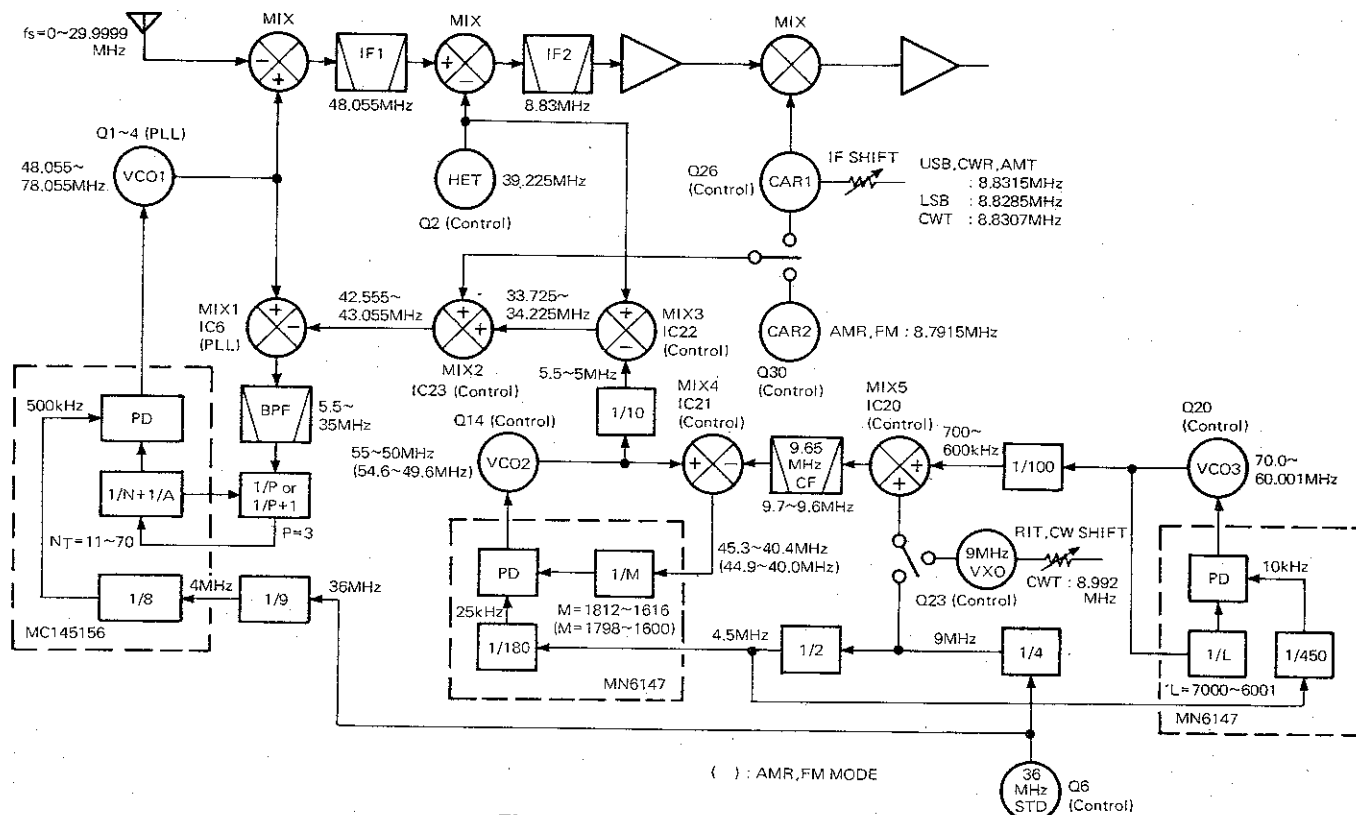


Fig. 1 Frequency configuration

RECEIVER CONFIGURATION

The TS-430 uses a double conversion receiver with a 48.055 MHz 1st intermediate frequency and 8.830MHz 2nd IF for SSB, CW, and AM modes. Triple conversion is used for the FM mode, in which the 3rd IF is 455kHz.

A signal from the antenna passes through one of seven LPF (Low Pass Filters) on the LPF unit, the antenna relay RL1, and enters the RF unit RA terminal. It then passes through the 20dB ATT (ATTENUATOR), controlled by Q14, a 30MHz LPF, the LPF for each band (a combination HPF and LPF for the 0.5 through 1.6MHz band), and the final LPF. The signal is then converted from an unbalanced to a balanced signal by broad-band transformer T2, and is mixed at Q1 & Q2 (JFET's) with the local oscillator signal from the PLL to arrive at the 48.055kHz 1st IF.

The signal passes through the MCF (Monolithic Crystal Filter), is post-amplified by Q3 (3SK74) and mixed at Q5, Q6 (2SK125), the 2nd balanced mixer with the 39.225MHz HET (Heterodyne) signal from the PLL to provide the 8.830MHz 2nd IF. A sample of the signal is picked off

and amplified by the NB (Noise Blanker) chain (Q8-Q13). The main portion of this 2nd IF signal passes through the NB gate (D28-D31). The NB is also triggered by Q33, Q34 from a pulse signal supplies off the Control unit at PLL reset. This suppresses the "click" normally heard when one of the PLL loops resets. The signal is then fed to two outputs : one for the SSB, AM and CW modes, which is supplied to the IF unit, and the other, which is amplified by Darlington Pair Q7, Q43 and supplied to the (optional) FM unit. The signal supplied to the IF unit first passes through the MCF for the selected mode and is then amplified by three stages of IF amplification Q1-Q3 (3SK73 x 3). In the SSB and CW modes, the signal from the amplifiers is detected by the product detector D21-D24 (1N60 x 4).

The audio signal in any mode passes through the notch filter IC1 and IC2 (AN6551 x 2) and then the squelch-switching transistor Q46 (2SC2240) ; the output of the transistor is supplied to the AF GAIN control. Q47, Q18, Q19 and Q33 are the squelch control chain for all modes but FM. In the AM mode circuit, the IF output is ampli-

CIRCUIT DESCRIPTION

fied by Q5. The AGC buffer, and AM detected by D20 (1N60). Its output is fed to the notch filter via buffer amplifier Q6 (2SC2240). D38 and D39 are the AGC rectifiers, Q16 is the AGC amplifier, and Q17 is the AGC-slow time constant switch. Q13 and Q24 are the S meter amplifiers, while in the FM mode Q15 "kills" the IF unit S meter signal : The FM unit supplies the S meter signal during FM operation. In the FM mode, the RF unit FMI output is delivered to the FM unit, where the signal is input to Q5 : MC3357P, a monolithic IC containing the second conversion oscillator, mixer, limiting amplifier, quadrature discriminator, active filter, squelch, scan control, and mute. Q4 : 2SC2240 buffers the detected output and returns this audio signal (via the FAF line) to the IF unit, D26 switch.

FM signal meter drive (FSM) is derived through amplifiers Q6, Q7 : 2SC1815 (Y), transformer T3, and rectifiers D5, D6 : 1N60. The low level audio signal from the AF GAIN control is power amplified by IC5 (μ PC2002V), and is then output to the speaker.

Item	Rating
Nominal center frequency	8830 kHz
Center frequency deviation	Within ± 150 Hz at 6 dB
Pass bandwidth	± 1.2 kHz or more at 6 dB
Attenuation bandwidth	± 1.5 kHz or less at 20 dB ± 2.2 kHz or less at 60 dB ± 3.0 kHz or less at 80 dB
Ripple	20 dB or less
Insertion loss	6 dB or less
Guaranteed attenuation	80 dB or more within ± 3 kHz to 1 MHz
Input and output impedance	600 Ω // 15 pF

**Table 1 MCF (L71-0208-05) YK-88S
(IF unit XF1)**

Item	Rating
Nominal center frequency	48.055 MHz ± 1 kHz
Pass bandwidth	± 9.6 kHz or more at 3 dB
Attenuation bandwidth	± 28 kHz or less at 10 dB
Ripple	0.7 dB or less
Insertion loss	2 dB or less
Guaranteed attenuation	30 dB or more within ± 1 MHz
Input and output impedance	2 k Ω $\pm 10\%$

Table 2 MCF (L71-0214-05) (RF unit XF)

Item	Rating
Center frequency f_0	8830.7 kHz
Center frequency deviation	$f_0 \pm 150$ Hz at 6 dB
6 dB bandwidth	± 250 Hz or more
60 dB bandwidth	± 900 Hz or less
Ripple	2 dB or less
Loss	6 dB ± 2 dB
Guaranteed attenuation	80 dB or more within $f_0 \pm 2$ kHz to ± 1 MHz
Input and output impedance	600 Ω // 15 pF

**Table 3 CW crystal filter YK-88C
(L71-0211-05) Option**

Item	Rating
Center frequency f_0	8830.7 kHz
Center frequency deviation	$f_0 \pm 50$ Hz at 6 dB
6 dB bandwidth	± 125 Hz or more
60 dB bandwidth	± 600 Hz or less
Ripple	2 dB or less
Loss	8 dB ± 2 dB
Guaranteed attenuation	80 dB or more within $f_0 \pm 2$ kHz to ± 1 MHz
Input and output impedance	600 Ω // 15 pF

**Table 4 CW crystal filter YK-88CN
(L71-0221-05) Option**

Item	Rating
Center frequency f_0	8830 kHz
Center frequency deviation	8830 kHz ± 150 Hz at 6 dB
6 dB bandwidth	± 900 Hz or more
60 dB bandwidth	± 1800 Hz or less
Guaranteed attenuation	80 dB or more within $f_0 \pm 2.5$ kHz to ± 1 MHz
Ripple	2 dB or less
Loss	3 dB ± 2 dB
Input and output impedance	600 Ω // 15 pF

**Table 5 SSB crystal filter YK-88SN
(L71-0220-05) Option**

Item	Rating
Center frequency (f_0)	8831.5 kHz ± 250 Hz
-6 dB bandwidth	6 kHz
Attenuation bandwidth	11 kHz
Guaranteed attenuation	80 dB or more
Ripple	2 dB or less
Loss	3 dB ± 2 dB
Input and output impedance	600 Ω // 15 pF
Temperature	$-10^\circ\text{C} \sim +50^\circ\text{C}$

**Table 6 AM crystal filter YK-88A
(L71-0223-05) Option**

CIRCUIT DESCRIPTION

TRANSMITTER CONFIGURATION

This transceiver uses a dual conversion transmitter for all operating modes. The audio signal from the microphone is delivered to the IF unit X48-1370-00 for preamplification by Q34, 2SC2240GR. The output from this stage is routed to three circuits. The amplified audio signal continues either to the microphone gain control through emitter follower Q48, 2SC1815Y, or at processor ON, through IC6, μ PC1158H2, the processor audio amplifier. Q35 2SC1815Y is the processor AGC amplifier, and establishes the degree of compression, while Q37, 2SC945R is a switch, operated at processor ON, which interrupts the normal, non-processed signal flow. The secondary destinations of Q34's output are the VOX circuit input, and the (optional) FM unit microphone input.

Returning from the microphone gain control, the audio signal is amplified by Q38, 2SC2240GR, and input to the balanced modulator IC7, AN612, along with the 8.8MHz carrier signal developed on the Control unit. In the AM mode, the modulator is unbalanced to output a modulated carrier, while in the CW mode, the modulator is unbalanced and amplifier Q38 is disabled to yield only a controlled carrier (D66, Pin Diode) from IC7. This signal is diode switched (D17, D16, D3) through the 8.8kHz MCF (Monolithic Crystal Filter), and thence to the TX IF amplifier Q41, 3SK73GR. Q27 is the CW keying transistor used to control Q41's operating voltage. ALC is also applied to Q41. Q42 and Q43 are the ALC meter amplifiers, while Q44 "kills" the SSB, CW or AM ALC during FM mode operation. Q32 is a phase-shift audio oscillator supplying sidetone in the CW mode.

The signal then exits the IF unit and is sent to the RF unit via the TIF line. On the RF unit X44-1510-11, the signal is up-converted, mixed with the VCO (voltage controlled oscillator) output, then amplified and sent on to the Final Amplifiers. Q15 and Q16, 3SK73GR are the HET (heterodyne) mixers. The 39.225MHz HET injection signal originates on the Control unit, and is amplified by Q4, 2SC1959Y. In the FM mode, the TIF signal is diode switched off (D35); while the FM unit transmit signal output (FMT) line is switched on (D36) into the HET mixers. In the FM mode, the audio signal from the Switch unit "L" goes to the FM unit via the FMC line. In the FM-430 unit, the MIC signal is amplified and limited by Q1 : TA7061AP, an OP AMP, and is applied to varicap diode D1 : 1S2208 to modulate crystal X1.

The 8831.5kHz carrier output generated by oscillator Q2 (2SC460) and amplified Q3 (3SK74) is fed via the FMT line back to the RF unit (connector 20) and into the transmitter balanced mixers (Q15, Q16 : 3SK74).

The output of this mixer stage is filtered and immediately mixed with the VCO output by Q17 and Q18, 3SK73GR. The VCO signal also originates on the Control unit. Q19, 2SK125 is a source follower, which feeds Q20, 2SC2538, the pre-driver amplifier. The Drive signal is then sent to the Final unit for amplification.

During XVRTR (transverter) operation, Q23, 2SC1959Y operates as an emitter follower from Q19, supplying a low

level transmitter signal output through the XVRTR port. At the same time, Q21, 2SC2703 turns off Q20 to interrupt the normal transmitter signal flow from the RF to the Final unit.

In the Final unit X45-1280-00, the signal is amplified by Q1, 2SC2075, then push-pull amplified by Q2 and Q3, 2SC2509. Q4 and Q5 2SC2290 are the final push-pull amplifiers. D4 and Q6 are the driver bias control elements, and D5 and Q7 are the final transistor bias circuit. The Final unit output is then sent to the Filter unit:

In the Filter unit X51-1290-00, the transmitter output is filtered by one of seven filter circuits, automatically selected from the Control unit. ALC and SWR protection sensing are provided by T1, a toroidal directional coupler, and Q3 and Q5, 2SC1815Y.

RECEIVER ANCILLARY CIRCUITS

NOTCH CIRCUIT

IC11 and IC2 in the IF unit constitute a Bi-Quad filter circuit. The notch frequency is determined by the following two formulas.

$$(1) f_N = \sqrt{R6/2\pi} \sqrt{R3 \cdot R5 \cdot R1 \cdot C1 \cdot C2}$$

$$(2) R1 \cdot R6 = R4 \cdot R7$$

If a variable resistor is used for resistor R3, the notch frequency can be controlled according to formula (1). The notch frequency range is from 350 to 2800Hz, and attenuation is from 25 to 50dB. The correlation between the formula and circuit diagram resistor & capacitor values is :

R1 = R80	R4 = R75	R1 = R79
C2 = C52	R2 = R81	R5 = R76
R8 = R77	R3 = R88 + Notch control	
C1 = C51		

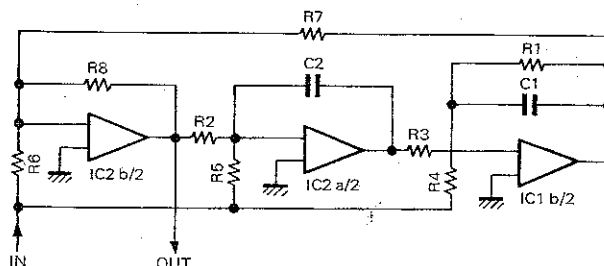


Fig. 2 Theoretical circuit diagram

CIRCUIT DESCRIPTION

TRANSMITTER ANCILLARY CIRCUITS

PROTECTION CIRCUITS

The transmitter output circuit is triple-protected.

● VSWR Protection

Reflected power detected by current transformer T1 is rectified by diode D3, amplified by transistor Q3 and added to the ALC circuit. When the VSWR is high, the ALC circuit reduces the drive signal into the power amplifiers.

● Heat Sink Temperature Protection

Thermistor TH1, mounted on the Final unit heat sink is connected to the inverting inputs of comparators IC1 sections c & d. If the thermistor resistance decreases, due to an excessive increase in heat sink temperature, comparator "d" turns on before comparator "c" since "d's" reference voltage is established higher than that of section "c's". Comparator "d's" output turns on Q6 which starts the fan motor. If the heat sink's temperature continues to rise, due, for example, to continuous transmission or an incorrect load, comparator section "c" turns on Q1 to add a negative D.C. voltage to the ALC circuit. The ALC circuit then forcibly curtails the drive input to the Final unit.

The comparator reference voltages are established for fan turn-on at approximately 65°C, and drive shut-down at approximately 90°C. The fan stops at 60°C because of the hysteresis provided for comparator section "d".

● Protection using RF voltage

The transmitter may be overdriven, although the VSWR is not particularly high, depending on the load connected to the antenna terminal. Excessive drive power could exert stress on the Final unit driver transistor 2SC2509. To protect the driver transistor, RF voltage at the emitter of pre-driver 2SC2075 is rectified, amplified by Filter transistor Q2, and added to the ALC circuit. When the RF voltage at the pre-driver is excessive, the ALC circuit reduces the drive power.

VOX (Voice Operated Transmit)

The VOX circuit is contained on the RF unit, Q24 is the VOX amplifier. Q25 & Q26 supply VOX delay. Q27 & Q28 are a Schmitt Trigger used to control RX & TX voltage switching. The speaker-derived ANTIVOX signal is amplified by Q29, Q30 & Q32 and is applied to Q25 to hold-off the VOX from keying on speaker output. In the CW mode, ANTIVOX is disabled by Q31.

PLL CIRCUIT

The TS-430 PLL circuit consists of three phase locked loops and a 36MHz master oscillator to generate all reference frequencies. PLLs 2 & 3 are on the Control unit, and PLL 1 is on the PLL unit. PLL3 uses an MN6147 (IC7) which contains a phase comparator, programmable frequency divider and frequency divider for generating the reference frequency. This IC uses a 10kHz reference frequency,

and controls VCO3 to generate frequencies from 70 to 60MHz in 10kHz steps. The 36MHz signal is divided by 8 to 4.5MHz before it is input to PLL3. In PLL3, the 4.5MHz signal is divided by 450 to generate the 10kHz reference signal. The microcomputer (IC1) applies 4-bit serial program data, plus 1 clock data bit to the programmable divider to vary the division-ratio from 1/7000 to 1/6001.

The 70 to 60MHz signal generated by VCO3 (Q20 : 2SC1923) is divided by 100 by IC18 (M54459L) to obtain output from 700 to 600kHz. The result is then mixed with the 9MHz reference signal by MIX5 (IC20 : SN16913P) to produce a 9.7 to 9.6MHz signal which is applied to MIX4 (IC21) through a ceramic filter.

PLL2 also uses an MN6147 (IC8). This IC uses 25kHz as its reference frequency and controls VCO2 (Q14) to generate frequencies from 55 to 50MHz. The signal output by VCO2 is mixed with the 9.7 to 9.6MHz signal generated by PLL3 in MIX4 (IC21 : SN16913P) to obtain a 45.3 to 40.4MHz signal, which is applied to the programmable divider in the PLL IC (IC8). The programmable divider uses a division ratio from 1/1812 to 1/1616. Since the divisor is changed in 4 steps, the VCO2 output signal frequency varies from 55 to 50MHz in 100kHz steps.

VCO2 output is divided by 10 at IC19 (μ PB551C), then mixed with the 39.225MHz heterodyne signal by MIX3 (IC22 : SN16913P). The resultant 33.725 to 34.225MHz signal (varied in 10Hz steps) is mixed with the 8.83MHz carrier by MIX2 (IC23 : SN16913P) to generate the 42.555 to 43.055MHz signal which is applied to the PLL unit, MIX1 (IC6) in the PLL1 loop. PLL1 uses 4 VCOs (Q1-Q4) to generate the 48.055 to 78.055MHz VCO signal. It uses an MC14156P PLL IC (IC1) and SN74LS112N (IC2) as a swallow (High Speed) counter (with a division ratio of 1/3 or 1/4). The 36MHz reference signal is divided by 9 at IC5 (M74LS112AP) and IC4 (M74LS196P) to obtain a 4MHz signal, and this 4MHz signal is applied to IC1, where it is divided by 8 to obtain the 500kHz reference signal.

The 48.055 to 78.055MHz signal generated by VCO1 is mixed with the signal from PLL2 by MIX1 (IC6) to generate the 5.5 to 35MHz signal. This signal is applied to the programmable divider in the PLL IC (IC1) through the swallow counter. The microprocessor outputs 3-bit serial data to vary the division ratio (N) from 11 to 70. Thus, PLL1 operates as a PLL using a 500kHz reference signal.

Item	Rating
Nominal center frequency (fo)	9.65MHz
3dB Attenuation bandwidth	$f_o \pm 80\text{kHz}$ or more
Insertion loss	6dB or less $20\text{-log} \left(\frac{E_1}{2E_2} \right)$
Guaranteed attenuation at 9MHz	40dB or more
Spurious (within 9.65+2MHz) (within 9.65-2MHz)	30dB or more 35dB or more
Voltage capacity	DC50V 1minute
Input and output impedance	330 Ω

Table 7 Ceramic filter (L72-0336-05)
(Control unit CF1)

CIRCUIT DESCRIPTION

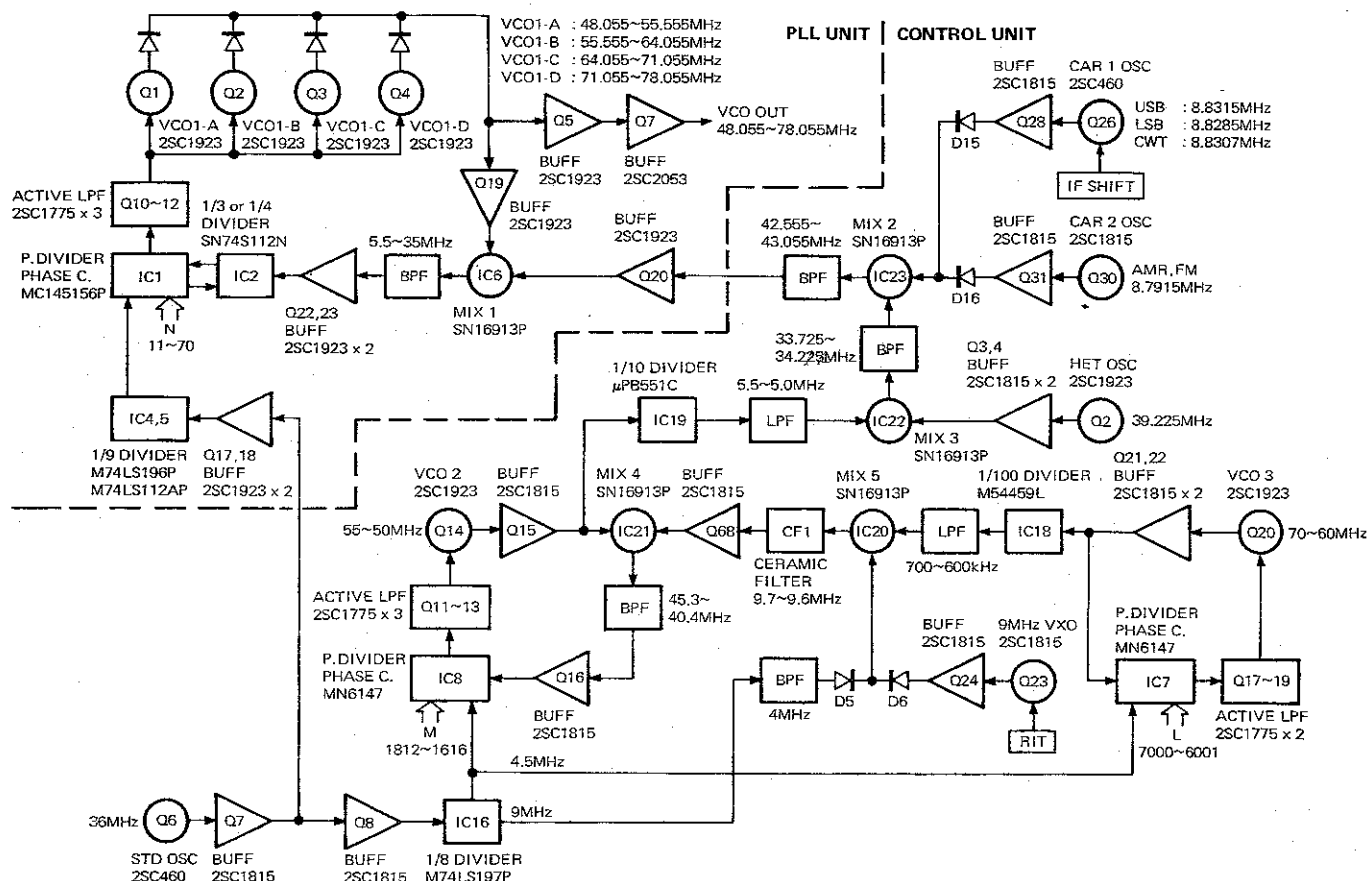


Fig. 3 PLL Block diagram

DIGITAL CONTROL CIRCUIT

The TS-430 digital Control unit consists of a μ PD8049C-279 8-bit microcomputer (IC1), 2 I/O expanders, 2 data selectors, a C-MOS RAM IC for memory and a diode matrix for interfacing.

The MODE SW, BAND SW, M-IN, MR, A=B, HOLD, STEP, MIC UP/DOWN and LOCK switches are connected to the data selectors (IC4 and IC5 : TC4512BP) either directly or through the diode matrix so that the setting of each switch is input to the microcomputer as 1 data bit. The FUNCTION, MEMORY CH, MS and PG.S SW switches are also connected to the microcomputer through the diode matrix. Thus, the settings of these switches are input to the microcomputer as 4 data bits.

I/O expander IC3 (μ PD8243C) is used to output the frequency division data for the PLLs and the band data. The frequency division data is changed only when the frequency is changed. The frequency range from 0 to 30MHz is divided into 10 band segments, and these segments are selected by band data which is output as 4-bit BCD code. The other I/O expander (IC2) outputs frequency data for the 7-segment display and the digit dynamic drive signal. The clock signal used to dynamically drive the display is generated by astable multivibrator IC14 (TC4011BP), which oscillates at approximately 1 kHz.

The encoder interface circuit (consisting of IC9, IC10 and IC11 [TC4011BPs]) multiplies the 250 pulses/rev. 2-phase clock signal generated by the encoder unit by 4 to obtain a 1000 pulses/rev. clock signal which is applied to the microcomputer. The relationship between the phases is detected by IC13 to determine the tuning knob direction of rotation, and this directional data is applied to the microcomputer as the UP/DOWN signal.

The microcomputer clock signal input terminal is also used to input the speed control data for program scan. A clock signal generated by astable multivibrator IC12 (TC4011BP) is applied to this terminal in the program scan mode. The frequency of this multivibrator can be varied from 50 to 250Hz by the slide potentiometer located on the top panel.

The memory backup circuit uses a C-MOS RAM (IC6 : μ PD5101LC) and a 3V lithium battery. The microcomputer monitors the main power supply voltage using a circuit consisting of D22 (RD9.1EB2) Q38 and Q39 (2SC1815s). When the voltage (normally 13.8V DC) drops below about 9.5V, the microcomputer stops normal operation and starts transferring frequency data to the backup RAM (IC6 : μ PD5101LC). The microcomputer then detects a drops in the 5V line voltage and sets the RAM in the standby (or backup) state. Current consumption during backup is approximately 0.1 μ A (typ.), and the

CIRCUIT DESCRIPTION

built-in lithium battery can backup the RAM for about 5 years. Various keyboard functions have a telltale audio "Beep" heard through the speaker. The control pulse is

fed to the IF unit to trigger multivibrator Q30 & Q31, whose output is fed directly to the AF Power amplifier IC5.

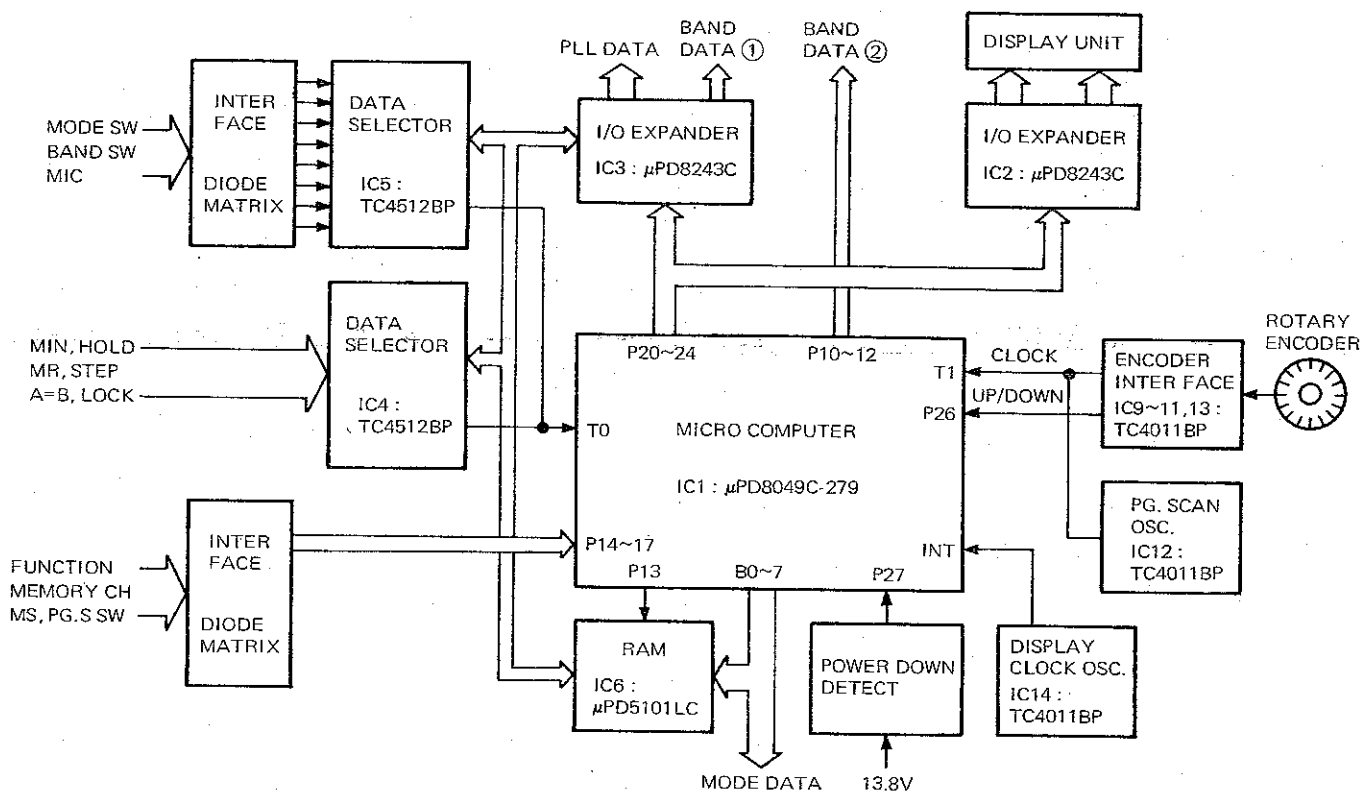


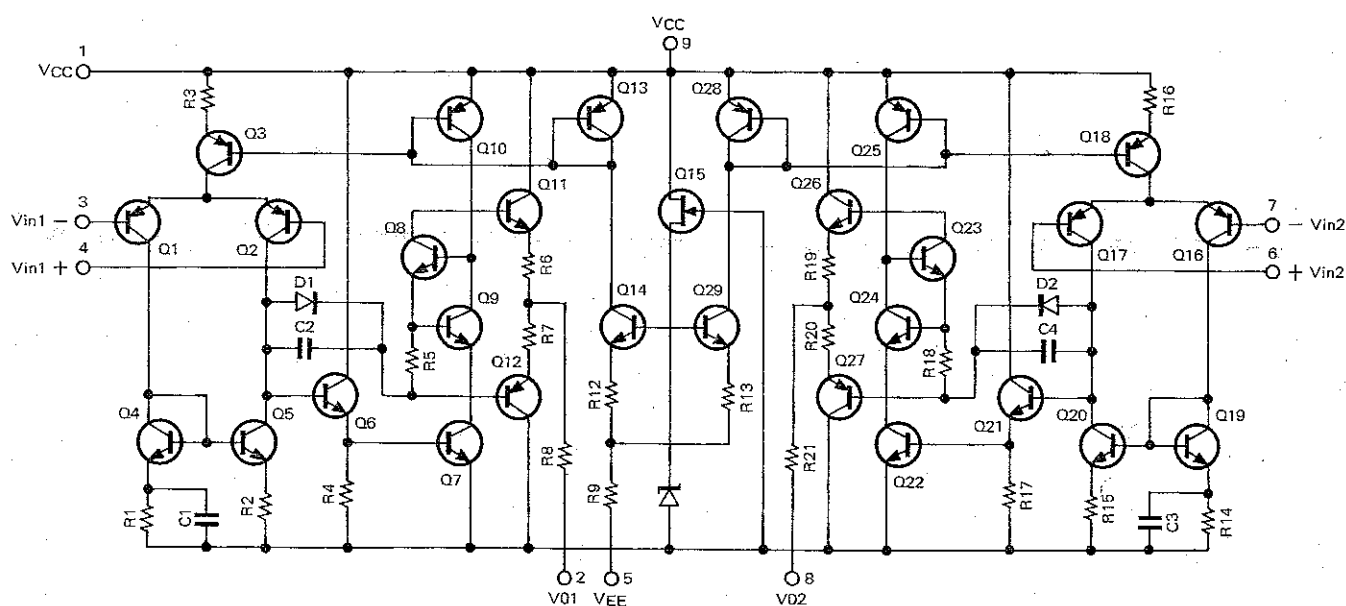
Fig. 4 Digital control system

Terminal No.	Name	Function	Terminal No.	Name	Function
1	T0	Encoder clock, P. SCAN clock input	21	P20	I/O EXPANDER control output
2	XTAL 1	Micro computer clock (5.74MHz) input	22	P21	
3	XTAL 2		23	P22	
4	RESET	Microcomputer reset input operate: "H"	24	P23	
5	SS	Normally "H" (5V)	25	PROG	Power supply 5V
6	INT	Display tube dynamic drive clock input (1 kHz)	26	VDD	
7	EA	Normally "L" (GND)	27	P10	TX inhibit signal (Out of hum band)
8	RD	Not used, normally open	28	P11	TX inhibit signal (Out of hum and WARC band)
9	PSEN		29	P12	28MHz Power down output
10	WR		30	P13	External RAM control output (R/W)
11	ALE	"L": Normal "H": When operating	31	P14	P. SCAN input
12	DB0		32	P15	M. SCAN input
13	DB1		33	P16	FUNCTION input
14	DB2		34	P17	FUNCTION input M.CH input
15	DB3		35	P24	I/O Exp. data selector control output "L": EX (0), DS (1); "H": EX (1), DS (2)
16	DB4		36	P25	External RAM control output (CE)
17	DB5		37	P26	Encoder UP/DOWN input "L": DOWN, "H": UP
18	DB6	"L": Power down "H": Normal	38	P27	Voltage down detection signal input
19	DB7		39	T1	Data selector input
20	GND	GND	40	Vcc	Power supply 5V

Table 8 Function of μPD8049C-279

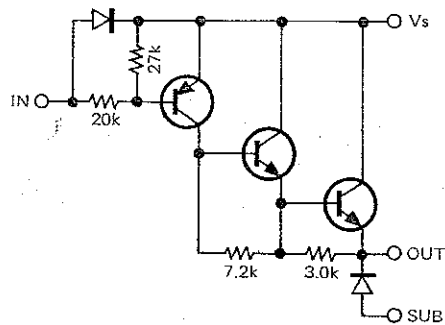
CIRCUIT DESCRIPTION/SEMICONDUCTOR DATA

Terminal No.	Name	Function	Terminal No.	Name	Function
24	Vcc	Power supply 5V	24	Vcc	Power supply 5V
2	P40	BAND data (BCD output)	2	P40	DIGIT output 100Hz
3	P41		3	P41	DIGIT output 1 kHz
4	P42		4	P42	DIGIT output 10 kHz
5	P43		5	P43	DIGIT output 100 kHz
6	CS		6	CS	Chip selector input
7	PROG	Chip selector input	7	PROG	Control input
8	P23	Control input	8	P23	
9	P22		9	P22	
10	P21		10	P21	
11	P20	Data selector output	11	P20	DIGIT output 1 MHz
12	GND		12	GND	
13	P70		13	P70	
14	P71		14	P71	
15	P72	PLL 2 3 data output	15	P72	SEGMENT output g
16	P73		16	P73	Buzzer output ON : "L"
17	P63	PLL select signal Normally : "H"	17	P63	SEGMENT output d
18	P62	PLL 1 ENABLE	18	P62	SEGMENT output c
19	P61	PLL 2 clock output	19	P61	SEGMENT output b
20	P60	PLL 3 clock output	20	P60	SEGMENT output a
21	P53	External RAM data in-output	21	P53	DIGIT output M.CH
22	P52		22	P52	DIGIT output 10 Hz
23	P51		23	P51	DIGIT output 10 MHz
1	P50		1	P50	

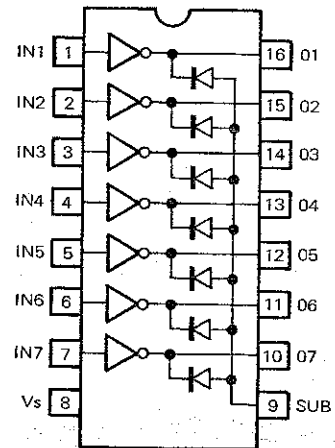
Table 9 I/O EXPANDER (0) IC2: μ PD8243CTable 10 I/O EXPANDER (1) IC3: μ PD8243C

AN6551 Equivalent circuit (IF unit IC1,2)

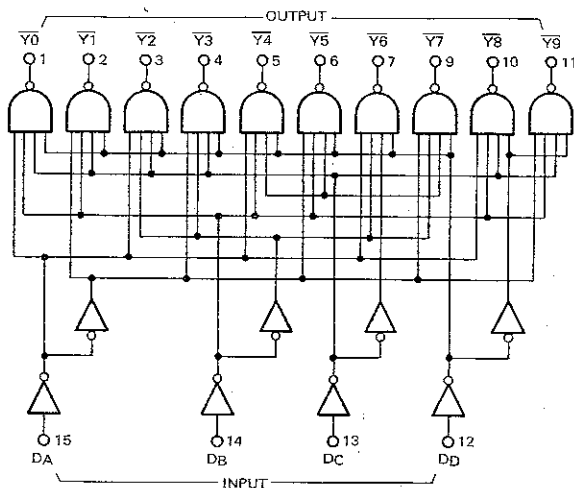
SEMICONDUCTOR DATA



M54561P Equivalent circuit (RF unit IC1)

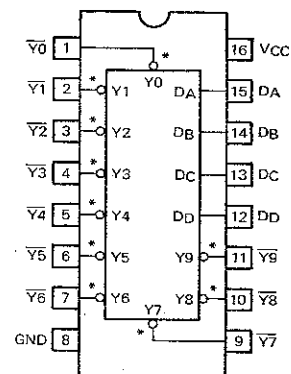


M54561P



M74LS145P Logic circuit (RF unit IC2)

* Open collector output

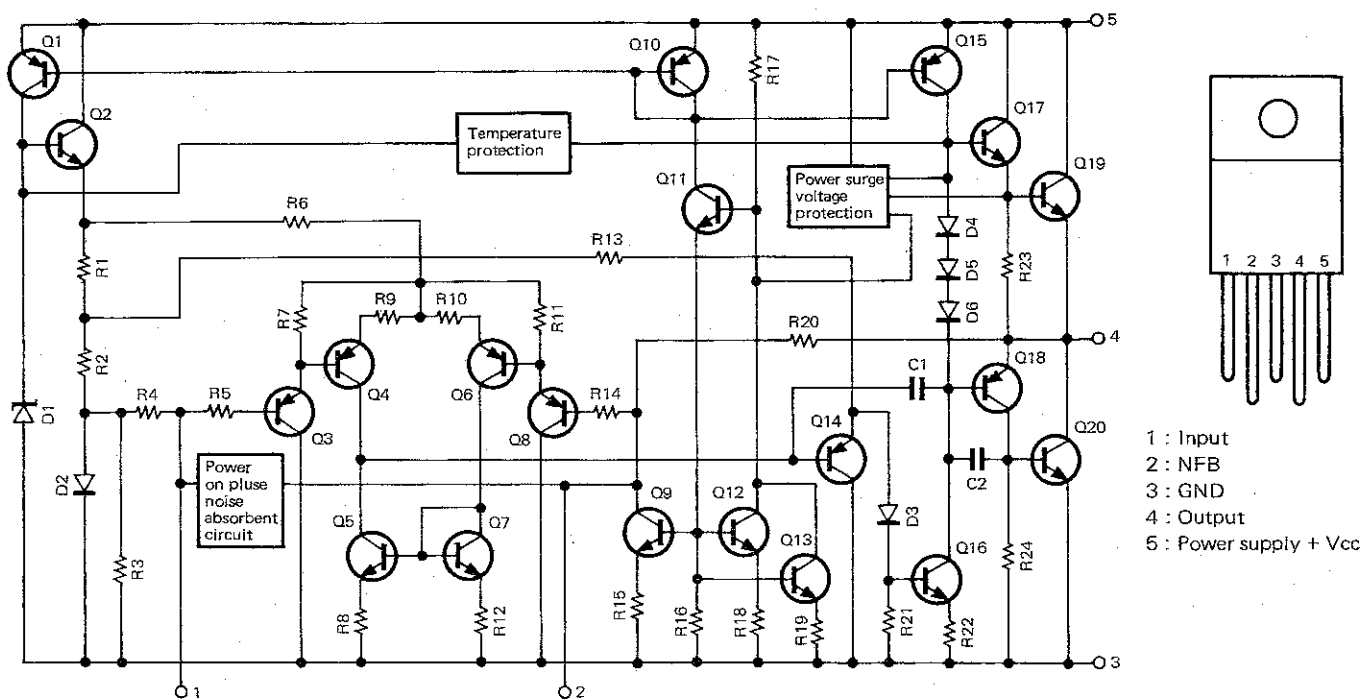


M74LS145P

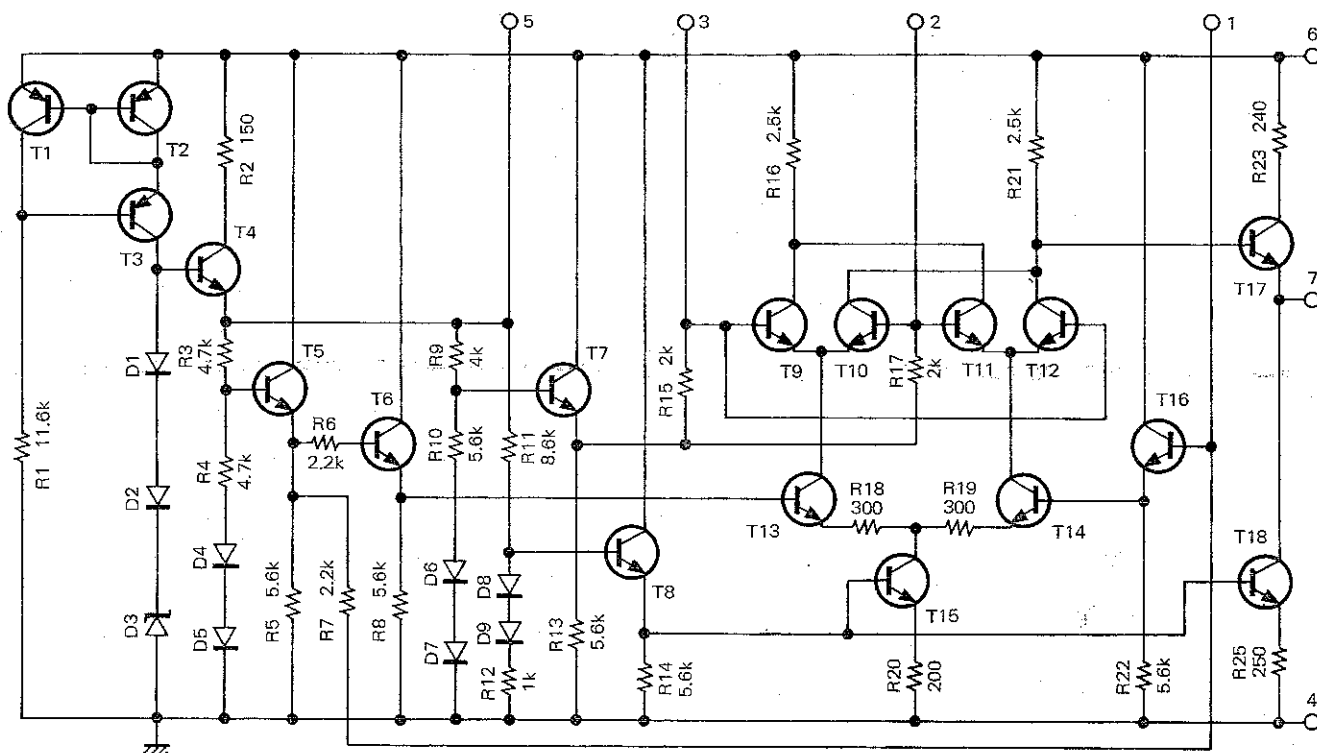
Decade digit	INPUT				OUTPUT									
	DD	DC	DB	DA	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
10	H	L	H	L	H	H	H	H	H	H	H	H	H	H
11	H	L	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	L	L	H	H	H	H	H	H	H	H	H	H
13	H	H	L	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	L	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H

M74LS145P Truth table

SEMICONDUCTOR DATA

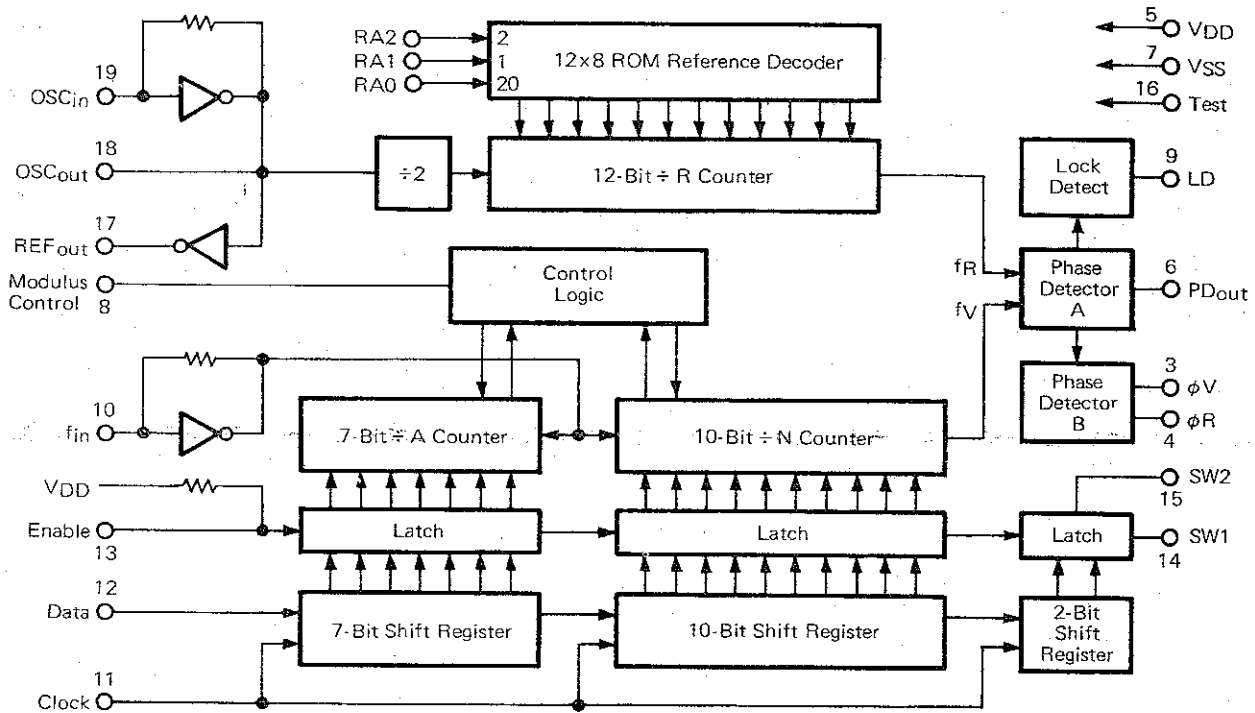


μPC2002V Equivalent circuit (IF unit IC5)

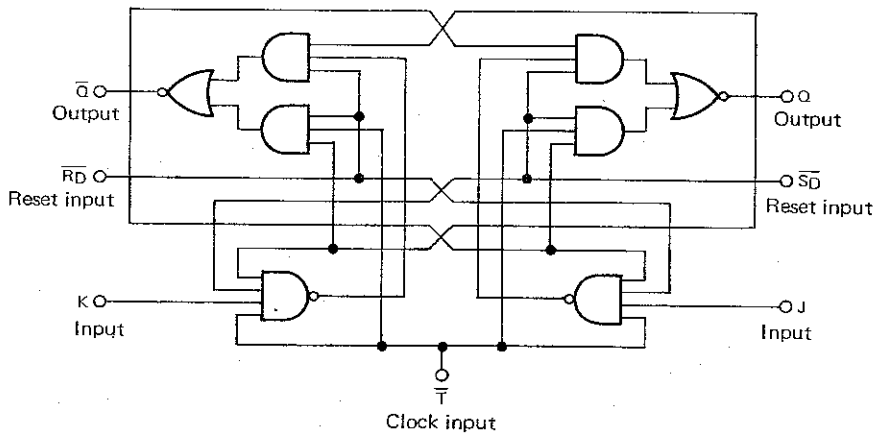


AN612 Equivalent circuit (IF unit IC7)

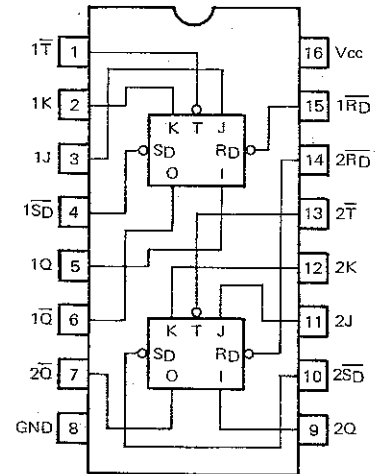
SEMICONDUCTOR DATA



MC14156P Block diagram (PLL unit IC1)

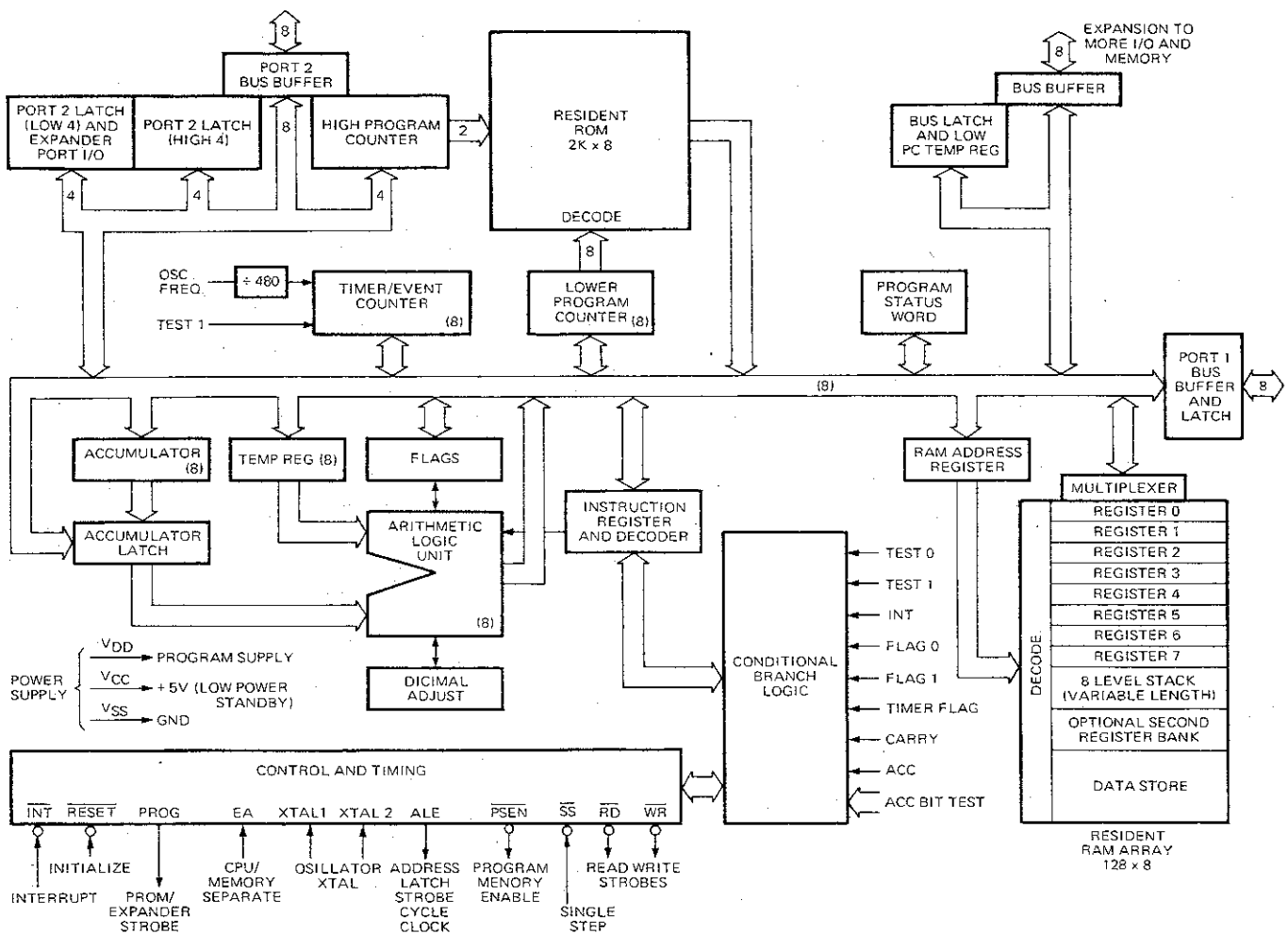


M74LS112AP Logic circuit (PLL unit IC5)

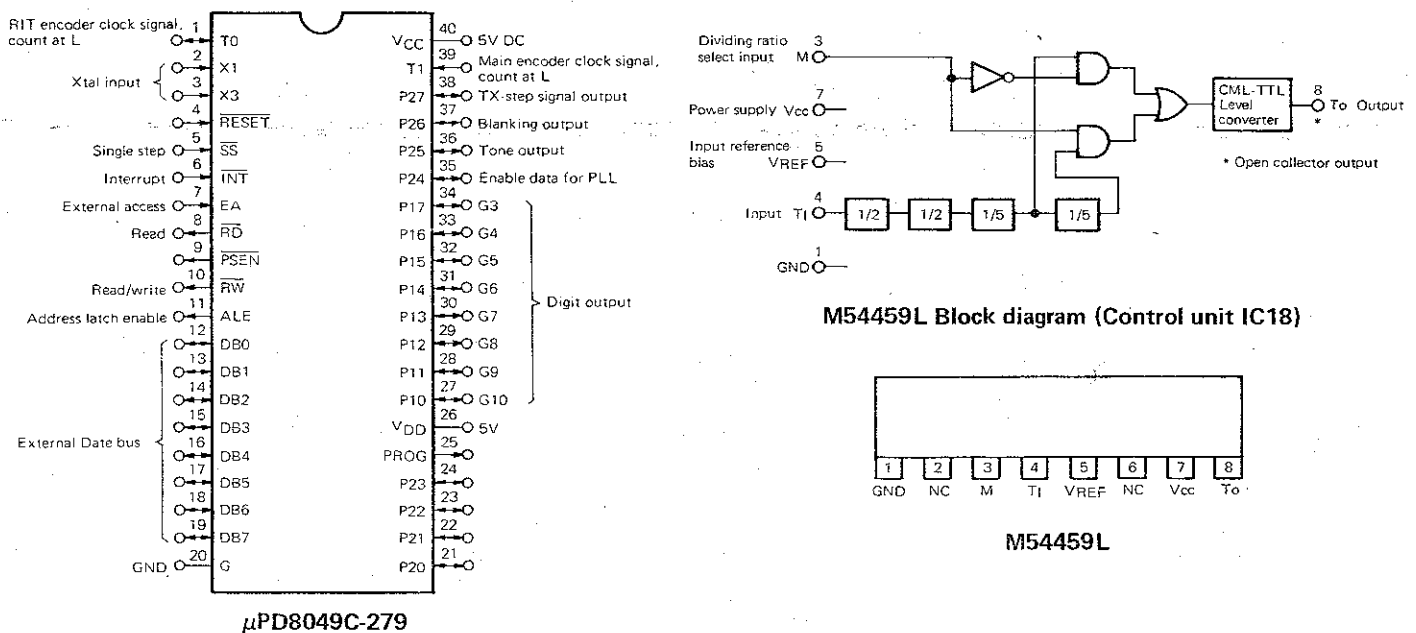


M74LS112AP

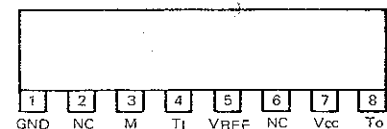
SEMICONDUCTOR DATA



μPD8049C-279 Block diagram (Control unit IC1)

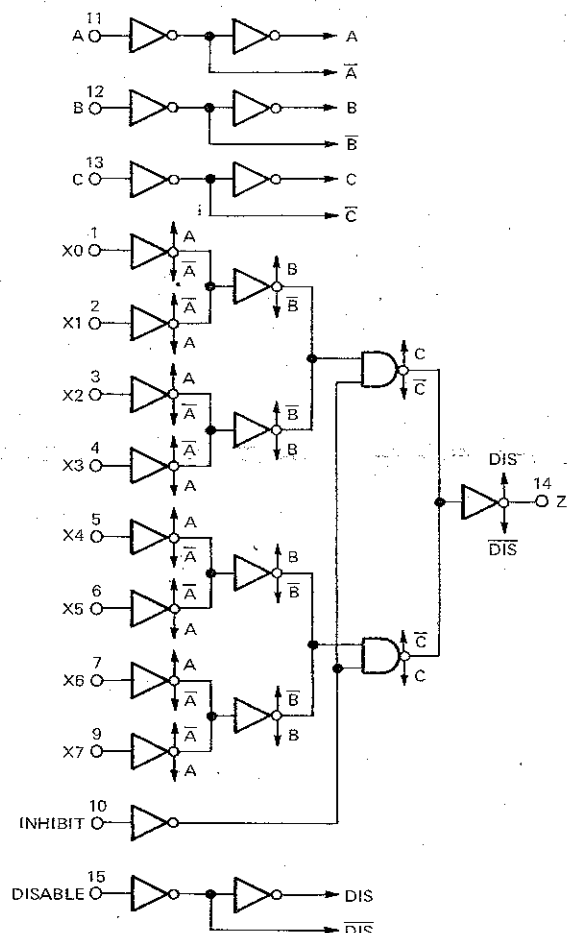


M54459L Block diagram (Control unit IC18)

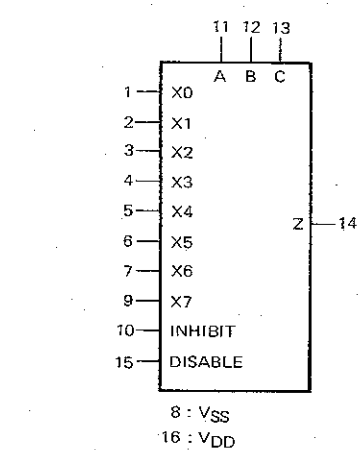


M54459L

SEMICONDUCTOR DATA



TC4512BP Block diagram (Control unit IC4,5)

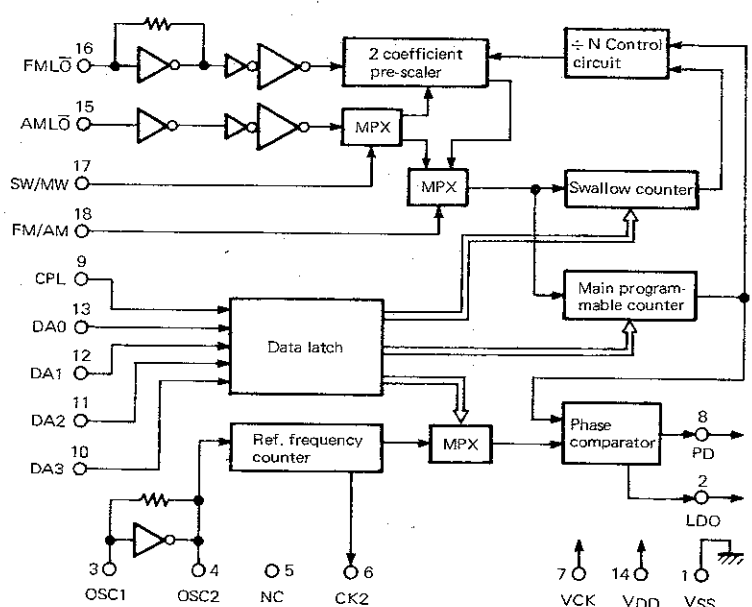


TC4512BP

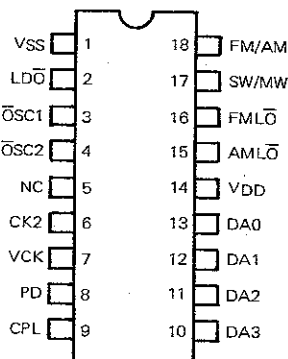
A	B	C	INHIBIT	DISABLE	Z
L	L	L	L	L	X0
H	L	L	L	L	X1
L	H	L	L	L	X2
H	H	L	L	L	X3
L	L	H	L	L	X4
H	L	H	L	L	X5
L	H	H	L	L	X6
H	H	L	L	L	X7
*	*	*	H	L	L
*	*	*	*	H	HZ

* : Don't Care
HZ : High Impedance

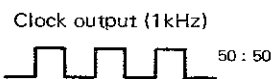
TC4512BP Truth table



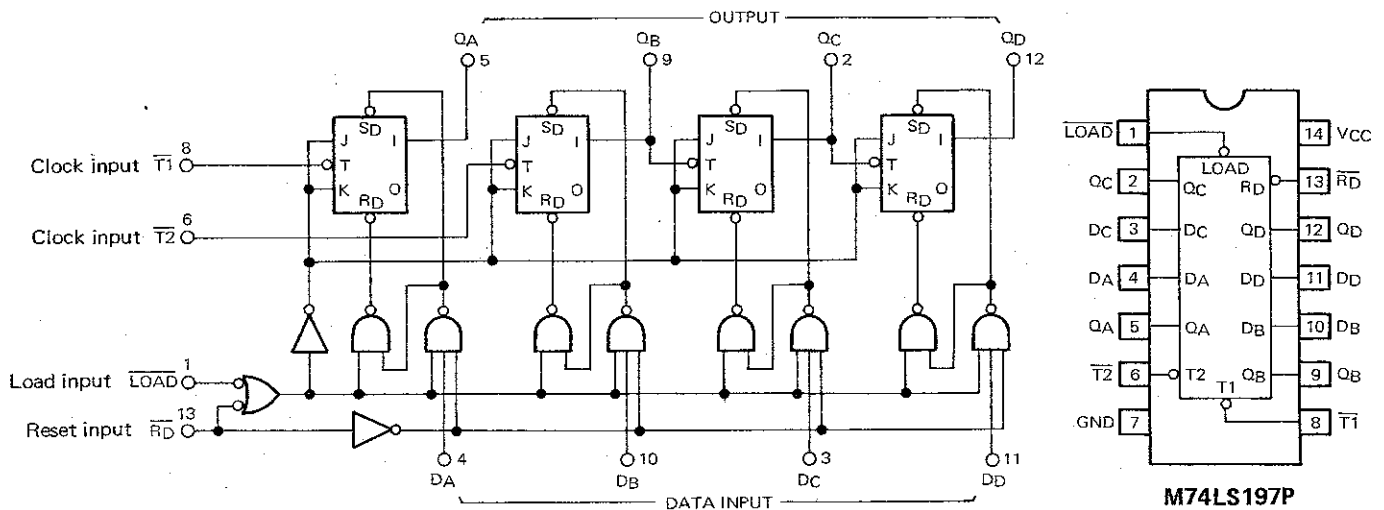
MN6147C Block diagram (Control unit IC7,8)



- VSS : Ground
- LD0 : OSC circuit output
- OSC1 : Ext. clock input
- NC : No connection
- CK2 : Clock output (1kHz)
- VCK : Clock circuit back up
- PD : Phase detector output
- CPL : Latch clock
- DA3-DA0 : Data address
- VDD : Main power supply
- AML0 : AM local OSC input
- FMLO : FM local OSC input
- SW/MW : SW,MW select
- FM/AM : FM,AM select



SEMICONDUCTOR DATA



M74LS197P Logic circuit (Control unit IC16)

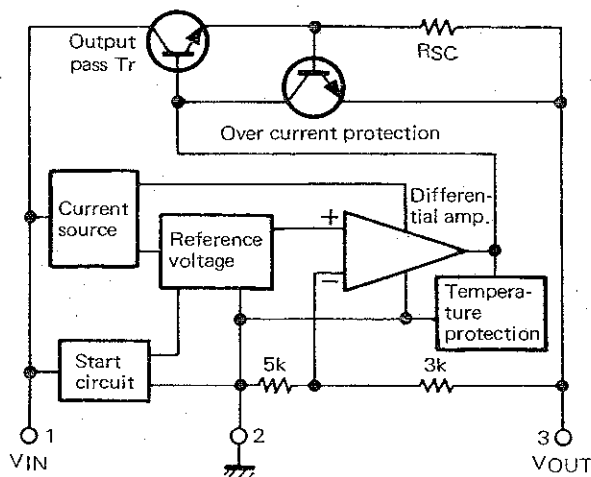
INPUT			OUTPUT			
$\overline{T}$	$\overline{RD}$	LOAD	QA	QB	QC	QD
X	L	X	L	L	L	L
X	H	L	DA	DB	DC	DD
↓	H	H	COUNT			

↓ : Change H to L
X : Either H or L

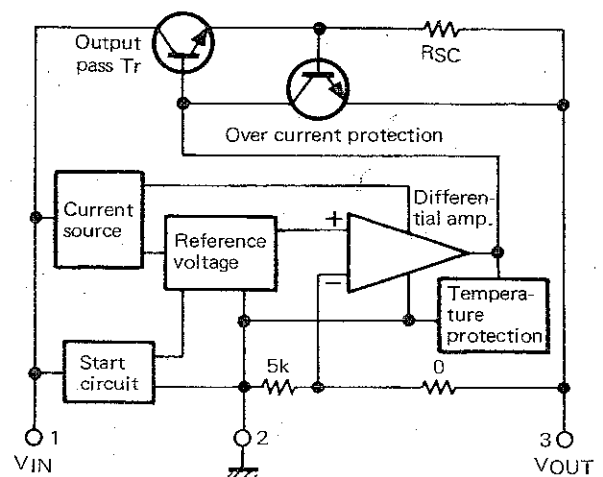
M74LS197P Truth table (1)

COUNT	OUTPUT			
	QA	QB	QC	QD
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H
10	L	H	L	H
11	H	H	L	H
12	L	L	H	H
13	H	L	H	H
14	L	H	H	H
15	H	H	H	H

M74LS197P Truth table (2)



AN7808 Block diagram (IF unit IC8)



AN7805 Block diagram (IF unit IC9)

PARTS LIST

CAPACITORS

<u>CC</u>	<u>45</u>	<u>TH</u>	<u>1H</u>	<u>220</u>	<u>J</u>
1	2	3	4	5	6

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

● Temperature coefficient

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

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

Example CC45TH = -470 ± 60 ppm/°C

 Tolerance

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

Less than 10 pF

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

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W.

The resistance values, in ohms, are indicated on the schematic diagram.

● **Rating voltage**

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

● Capacitor value

$$103 = 0.01 \mu F$$
$$0 \ 1 \ 0 = 1_D F$$
$$1 \ 0 \ 0 = 10_p F$$
 $101 = 100\text{pF}$
$$102 = 1000 \text{ pF} = 0.001 \mu\text{F}$$
$$\begin{array}{ccc} 2 & 2 & 0 \\ \uparrow & \uparrow & \uparrow \\ \text{1st number} & \text{2nd number} & \text{Multiplier} \end{array} = 22pF$$

Symbol	Destination
K	U.S.A.
W	Europe
T	Britain
M	General market

SEMICONDUCTOR

Item	Remarks	Name	Item	Remarks	Name	Item	Remarks	Name	Item	Remarks	Name
Diode	N	1N60	LED	N	LN247RP	N		2SC2053	N		M74LS112AP
		1S1007		N	LN347GP			2SC2075			M74LS145P
		1S1555		N	LN447YP			2SC2240(GR)			M74LS196P
		1S1587			SG238D			2SC2290*J			M74LS197P
		1S2588			SY438D			2SC2509			M54459L
Vari-cap	N	BA379	Surge absorber		ERZC07DK201	N		2SC2538	N		M54561P
		ITT310			ERZD03DK331			2SC2603(E)			MB3614
		LN66(R)						2SC2703(O)			MC145156P
		S31C						2SC2703(O or Y)			MN6147C
		V06B						2SD880(Y)			SN74LS90N
Varistor		1SV53A	Thermistor		25D29	FET		2SK30A(O)			SN74S10N
		1SV54GC		N	32D27			2SK125			SN74S112N
					SDT1000F			2SK192A(GR)			SN16913P
				N	FIP9D7			2SK192(Y)			TC4011BP
								3SK73(GR)			TC4512BP
Zener diode		MV5T	Photo TR	N	PN126S	IC		3SK74(L)			TC5065BP
		MV13									TC5067BP
		SV03Y						74LS90N			μPB551C
		BZ-240			2SA562(Y)						μPC1158H2
		RD3.0EB2			2SA733(R)			AN612			μPC2002V
		RD4.3EB3	TR		2SA1015(Y)	N		AN6551	N		μPD5101LC
		RD5.1EB1						AN7805			μPD8049C-279
		RD6.2EB1			2SC460(B)			AN7808			μPD8243C
		RD6.2EB2			2SC945(Q)			HD74LS90P			
		RD9.1EB2			2SC945(R)						
		RD9.1EB3			2SC1775(E)						
		RD9.1EB3			2SC1815(GR)						
		RD10EB1			2SC1815(Y)						
					2SC1923(O)						
					2SC1959(Y)						

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Part No.	Re- marks	Description	Ref. No.
TS-430 GENERAL				H25-0079-04		Protective bag	MIC M
A01-0935-02	N	Case (A) upper		H25-0112-04		Protective bag	Cord
A01-0936-02	N	Case (B) lower		H25-0116-04		Protective bag	
A20-2457-13	N	Panel		J02-0323-05		Foot x 4	
B05-0708-04		SP grill cloth		J02-0403-04		Rubber foot x 4	
B30-0817-15		Pilot lamp 14V, 80mA		J02-0407-04		Assistant foot	
B31-0639-05	N	Meter		J13-0404-05		Fuse holder	
B39-0407-04		Spacer x 2 Assistant foot		J21-2573-04		Foot mounting hardware x 2	
B42-1767-04	N	VOX name plate Case (A)		J31-0141-04		Spacer ring MIC	
B42-1768-04	N	Switch plate		J61-0019-05		Vinyle tie x 10	
B43-0683-14	N	Name plate	K,M,W	J61-0408-05		Nylon band x 27	
B43-0684-04	N	Name plate	T	K01-0410-05	N	Carring handle	
B46-0410-10		Warranty card	K	K21-0768-04	N	Main knob	
B50-4006-10	N	Instruction manual	K,M	K23-0710-04		Knob (inside) x 4	AF,MIC,NOTCH,RIT
B50-4007-00	N	Instruction manual	T	K23-0753-04		Pointer knob x 2	FUNCTION,M.CH
B50-4130-00	N	Instruction manual	W	K27-0426-14		BAND knob x 2	BAND
CE04W1A470M	E	47 10V Encoder ass'y	C1	K29-0741-24		Knob (outside) x 4	RF,CAR,SQL, IF SHIFT
CK45E2H222P	C	0.0022 500V	C3	K29-0758-04		Push knob	POWER
CK45F1H103Z	C	0.01	C2,4-8	K29-0767-04	N	Push knob x 4	1MHZ STEP, NB, ATT,NOTCH
CK45F1H473Z	C	0.047	C1	K29-0768-04	N	Push knob	RIT
D09-0306-04	N	Slit plate Moving		K29-0769-04	N	Push knob	MODE(LSB,USB, CW,AM,FM)
D09-0307-04	N	Slit plate Fixed		K29-0770-04	N	Push knob	A=B,LOCK,STEP, M.CH,MR,M.IN,MS,PG,S,HOLD
D40-0626-15	N	Detector mech. ass'y		K29-0771-04	N	Knob ring	Main knob
E04-0152-05		UHF type receptacle ANT		N09-0256-05		GND screw x 4	Sub, rear panel
E06-0751-05		7P DIN socket REMOTE		N09-0646-04	N	Round screw x 2	
E06-0851-05		8P DIN socket X.VERTOR, W SW		N10-2030-46		Nut x 2	Mold terminal
E06-0852-05		8P DIN socket ACC,W/O SW		N14-0115-05		Flange nut	GND
E07-0751-05		7P DIN plug Accessory		N14-0509-05		Wing nut	GND
E07-0851-05		8P DIN plug Accessory		N15-1040-46		Flat washer x 2	GND
E08-0671-05		6P square socket		N16-0030-46		Spring washer	
E11-0403-05		Phone jack EXT.SP		N30-2004-46		Round screw x 5	
E11-0404-05		3P phone jack KEY		N30-2604-46		Round screw x 17	
E11-0412-05		3P phone jack PHONE		N30-3008-46		Round screw x 2	Mold terminal
E12-0001-15		Phone plug Accessory		N30-4016-46		Round screw	GND
E20-0315-05		Mold terminal 3P		N32-2604-46		Flat screw x 9	
E23-0417-05		Pressure weld terminal x 2		N32-2606-46		Flat screw x 8	
E29-0407-05		Bridge connector		N32-3006-46		Flat screw x 5	
E30-1637-05		4 cores cable		N33-3006-41		Round flat screw x 4	SP
E30-1638-05		DC cord Accessory		N33-3006-45		Round flat screw x 4	Panel
E31-0431-15		Speaker cord		N35-3006-41		Bind screw x 16	Case (A),(B)
E31-2154-05	N	CAL cord Accessory		N35-3006-46		Bind screw x 16	Panel
F05-2034-05		Fuse 20A		N87-2606-46		Self tapping screw x 2	VFO A,B
F15-0641-04	N	Switch mask Case (A)		N87-3006-41		Self tapping screw x 6	
G02-0505-05		Knob fixed spring x 4		N87-3006-46		Self tapping screw x 8	
G13-0665-04	N	Cushion MODE		N87-3012-46		Self tapping screw x 33	
G13-0666-04	N	Cushion x 2 Panel		N88-3006-46		Flat tapping screw x 16	
G13-0668-04		Cushion VOX		N89-3006-45		Bind tapping screw x 4	Final
G53-0515-04		Packing (B) x 2		R12-2411-06		Trim. pot. 5kΩ(B) x 2	VR1,2
H01-4543-04	N	Packing carton (inside)				Encoder ass'y	
H03-2083-04	N	Packing carton (outside)		RS14AB3A100J		MF 10Ω 1W	R5
H10-2565-02	N	Packing fixture (F)		RS14AB3D472J		MF 4.7kΩ 2W	R6
H10-2566-02	N	Packing fixture (R)		R92-0662-05	N	Cement 10mΩ 5W	R1
H12-1315-04	N	Cushion		S40-2437-05		Push switch	POWER
H20-1410-03		Protective cover					S1

PARTS LIST

Part No.	Re- marks	Description	Ref. No.
T03-0027-15		Speaker	
T91-0352-05		Microphone Accessory M	
W02-0328-10	N	Encoder ass'y	
W09-0326-05		Lithium battery CR2032	
X41-1470-00	N	Switch unit	
X44-1510-11	N	RF unit	
X45-1280-00	N	Final unit	
X48-1370-00	N	IF unit	
X50-1910-00	N	PLL unit	
X51-1290-00	N	Filter unit	
X53-1290-00	N	Control unit	
X54-1710-00	N	Display unit	

Part No.	Re- marks	Description	Ref. No.	Q'ty
S29-1428-05	N	Rotary switch M.CH	S1	1
S36-2408-05	N	Paddle switch SEND/ REC, VOX/MAN	S14,15	2
S36-2411-05	N	Paddle switch PROC, ALC/IC, MAR/WIDE	S16-18	3
S40-2440-15	N	Push switch LOCK, STEP, M.CH,MS, PG.S, HOLD, 1MHz STEP, RIT NB, ATT, NOTCH	S6-8,11-13, 19-23	11
S40-2441-15	N	Push switch A=B, MR, M.IN	S5,9,10	3
S50-1409-05		Tact switch BAND	S3,4	2
S50-1411-05		Tact switch MODE	S24-28	5

RF UNIT (X44-1510-11)

Part No.	Re- marks	Description	Ref. No.	Q'ty
SWITCH UNIT (X41-1470-00)				
CE04W1C222M		E 2200 16V	C2,3	2
CK45B1H102K		C 0.001	C10,11	2
CK45F1H103Z		C 0.01	C5,6	2
CK45F1H473Z		C 0.047	C1,4	2
C91-0456-05		C 0.047	C7,8,12	3
E06-0853-05		8P metal socket MIC		1
E08-0272-05	N	Mini connector 2P		1
E08-0373-05	N	Mini connector 3P		1
E23-0401-05		Round terminal		1
E40-0273-05		Mini connector 2P		5
E40-0473-05		Mini connector 4P		1
E40-0573-05		Mini connector 5P		1
E40-0673-05		Mini connector 6P		4
L15-0016-05		Choke coil	CH1	1
N10-2030-46		Nut		2
N30-3008-46		Round screw 3 x 8		2
R12-4410-05		Trim. pot. 50kΩ	VR1	1
R13-1401-05	N	Pot. 1kΩ(B) ANTI VOX	VR8	1
R13-4401-05	N	Pot. 50kΩ(B) VOX GAIN	VR6	1
R13-6401-05	N	Pot. 250kΩ(B) DELAY, SCAN	VR7,9	2
R19-3415-05	N	Pot. 10kΩ(A) x 2 MIC/ CAR	VR4	1
R19-3416-05	N	Pot. 10kΩ(B), 10kΩ(F) AF/RF	VR2	1
R19-3417-05	N	Pot. 10kΩ(B), 10kΩ(F) RIT/SHIFT	VR3	1
R24-9403-15	N	Pot. 250kΩ/10kΩ(B) 50kΩ(B) NOTCH/SQL	VR5	1
S29-1427-05	N	Rotary switch FUNCTION	S2	1

CC45RH1H010C	C	1P	C141	1
CC45RH1H030C	C	3P	C144,200	2
CC45RH1H050C	C	5P	C93,145	2
CC45RH1H070D	C	7P	C138,140	2
CC45RH1H100D	C	10P	C80,90,134,143	4
CC45RH1H101J	C	100P	C73	1
CC45RH1H270J	C	27P	C101	1
CC45RH1H330J	C	33P	C158	1
CC45RH1H560J	C	56P	C77,78	2
CC45SL1H030C	C	3P	C122	1
CC45SL1H050C	C	5P	C152,159	2
CC45SL1H070D	C	7P	C154	1
CC45SL1H101J	C	100P	C70,71,104,110	4
CC45SL1H121J	C	120P	C58,166,186	3
CC45SL1H151J	C	150P	C59	1
CC45SL1H180J	C	18P	C199	1
CC45SL1H181J	C	180P	C53	1
CC45SL1H221J	C	220P	C46	1
CC45SL1H271J	C	270P	C48,54	2
CC45SL1H330J	C	33P	C72,79	2
CC45SL1H390J	C	39P	C3	1
CC45SL1H470J	C	47P	C2,106,107, 157	4
CC45SL1H560J	C	56P	C63,189	2
CC45SL1H680J	C	68P	C1,64	2
CC45SL1H820J	C	82P	C190	1
CE04W1A101M	E	100 10V	C180	1
CE04W1A220M	E	22 10V	C84	1
CE04W1A470M	E	47 10V	C178,179	2
CE04W1C100M	E	10 16V	C108	1
CE04W1H010M	E	1 50V	C15,23,29,34,37, 45,50,55,60,66, 129,165,177,191	14
CE04W1H3R3M	E	3.3 50V	C173,182	2
CE04W1H4R7M	E	4.7 50V	C174	1
CE04W1HR47M	E	0.47 50V	C108,170	2
CK45B1H102K	C	0.001	C85,92,98-100, 114,116,124,155	9
CK45B1H122K	C	0.0012	C8,26	2
CK45B1H152K	C	0.0015	C18,20,25	3
CK45B1H222K	C	0.0022	C24	1
CK45B1H391K	C	390P	C40,41	2
CK45B1H471K	C	470P	C36,42,47,49	4
CK45B1H561K	C	560P	C125	1
CK45B1H681K	C	680P	C30,31,35	3

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
CK45F1H103Z		C 0.01	C5,61,65,81-83, 87,91,96,97,103, 105,109,111,113, 115,117,120,127, 128,133,135,147, 153,160-162,169, 175,183,184,187, 188,192,202	35	L34-2146-05	N	Tuning coil	T19	1
CK45F1H223Z		C 0.022	C14,22,28,32,38, 43,51,56,88,89, 95,112,118,119, 121,123,126,132, 136,137,139,156, 163,164,168,195 196	27	L40-1001-02		Ferri-inductor 10 μ H	L6-8	3
CQ92M1H103K		ML 0.01	C176	1	L40-1001-14		Ferri-inductor 10 μ H	L15,17,41,65,66	5
CQ92M1H223K		ML 0.022	C181	1	L40-1011-03		Ferri-inductor 100 μ H	L48,53	2
CQ92M1H472K		ML 0.0047	C171	1	L40-1011-14		Ferri-inductor 100 μ H	L67	1
CQ92M1H473K		ML 0.047	C172	1	L40-1021-03		Ferri-inductor 1mH	L3,44	2
C90-0838-05		E 1 50V	C193	1	L40-1092-14		Ferri-inductor 1 μ H	L28	1
C91-0105-05		C 0.0047	C7,10,13,74,75	5	L40-1292-14		Ferri-inductor 1.2 μ H	L31,33	2
C91-0125-05		C 0.0027	C6,19	2	L40-1501-03		Ferri-inductor 15 μ H	L47	1
C91-0131-05		C 0.01	C146,148-150	4	L40-1511-03		Ferri-inductor 150 μ H	L68	1
C91-0132-05		C 0.01	C11,12,16,17	4	L40-1511-13		Ferri-inductor 150 μ H	L63	1
C91-0456-05		C 0.047	C4,9,21,27,33, 39,44,52,57,62, 67-69,86,102, 130,131,151,185, 194,197,201	22	L40-1511-14		Ferri-inductor 150 μ H	L5,50,51,55,64	5
C91-0498-05		C 0.35P	C142	1	L40-1592-14		Ferri-inductor 1.5 μ H	L25	1
E04-0157-05		Mini pin jack A		3	L40-1892-01		Ferri-inductor 1.8 μ H	L54	1
E23-0512-05		Terminal		1	L40-1892-14		Ferri-inductor 1.8 μ H	L27,29	2
E40-0273-05		Mini connector 2P		8	L40-2201-14		Ferri-inductor 22 μ H	L11	1
E40-0373-05		Mini connector 3P		2	L40-2211-14		Ferri-inductor 220 μ H	L4,45	2
E40-0473-05		Mini connector 4P		1	L40-2282-01		Ferri-inductor 0.22 μ H	L2	1
E40-0573-05		Mini connector 5P		3	L40-2282-14		Ferri-inductor 0.22 μ H	L42	1
E40-0673-05		Mini connector 6P		2	L40-2292-14		Ferri-inductor 2.2 μ H	L19,24,26	3
E40-0773-05		Mini connector 7P		1	L40-2701-14		Ferri-inductor 27 μ H	L10,12	2
J31-0502-04		PC board collar		6	L40-3301-14		Ferri-inductor 33 μ H	L62	1
J42-0428-05		PC board bushing		6	L40-3382-01		Ferri-inductor 0.33 μ H	L1,46,56	3
L19-0324-05		Wide bandwidth transf.	T3,23	2	L40-3382-14		Ferri-inductor 0.33 μ H	L38	1
L19-0328-05		Wide bandwidth transf.	T24	1	L40-3391-14		Ferri-inductor 3.3 μ H	L18,60	2
L19-0344-05		Wide bandwidth transf.	T2	1	L40-3982-14		Ferri-inductor 0.39 μ H	L35,36,39,40,43	5
L30-0506-05		Tuning coil	T11	1	L40-3991-14		Ferri-inductor 3.9 μ H	L21,22	2
L30-0511-05		Tuning coil 8.83MHz	T14	1	L40-4701-03		Ferri-inductor 47 μ H	L49,52,57	3
L34-0535-05		Tuning coil	T15	1	L40-4701-13		Ferri-inductor 47 μ H	L59	1
L34-0536-05		Tuning coil	T16	1	L40-4701-14		Ferri-inductor 47 μ H	L13,14,61	3
L34-0697-05		Tuning coil	T18	1	L40-4791-14		Ferri-inductor 4.7 μ H	L23	1
L34-0857-05		Tuning coil	T7	1	L40-5682-14		Ferri-inductor 0.56 μ H	L37	1
L34-0858-05		Tuning coil	T22	1	L40-5691-14		Ferri-inductor 5.6 μ H	L20	1
L34-0859-05		Tuning coil	T5,21	2	L40-6811-03		Ferri-inductor 680 μ H	L9	1
L34-0860-15		Tuning coil	T20	1	L40-6822-14		Ferri-inductor 0.68 μ H	L30,32	2
L34-0862-05		Tuning coil	T17	1	L40-8282-14		Ferri-inductor 0.82 μ H	L34	1
L34-0942-05		Tuning coil	T13	1	L40-8291-14		Ferri-inductor 8.2 μ H	L16	1
L34-2159-05		Tuning coil	T12	1	L71-0214-05		MCF 48.055MHz	XF	1
L34-2142-05	N	Tuning coil	T4,10	2	L92-0110-05		Ferrite-bead	L70,71	2
L34-2143-05	N	Tuning coil	T1	1	R12-1412-05		Trim. pot. 1k Ω	VR1-4	4
L34-2144-05	N	Tuning coil	T8	1	R12-3428-05		Trim. pot. 47k Ω	VR5	1
L34-2145-05	N	Tuning coil	T6	1	R90-0517-05		Resistor block 4.7k Ω x 7	RB1	1
					S51-1404-05		Relay G2E	RL1	1
100W FINAL UNIT (X45-1280-00)									
CC45CH1H220J		C 22P	C5	1	CC45SL2H220J		C 22P 500V	C29	1
CC45SL2H220J		C 22P 500V	C29	1	CC45SL2H101J		C 100P 500V	C10	1
CC45SL2H101J		C 100P 500V	C10	1	CC45SL2H271J		C 270P 500V	C34,35	2
CE04W1C100M		E 10 16V	C17,22	2					
CE04W1E101M		E 100 25V	C19,23	2					
CK45B1H102K		C 0.001	C21	1					
CK45B1H103K		C 0.01	C13,14,26,27	4					

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty	
CK45B1H471K		C 470P	C1	1	CC45SL1H150J		C 15P	C165,166	2	
CK45F1H103Z		C 0.01	C33	1	CC45SL1H221J		C 220P	C64,153	2	
CK45F1H473Z		C 0.047	C6,7,28	3	CC45UJ1H470J		C 47P	C63,65,125,137, 149	5	
CM73F2H122J		Laminated cap. 0.0012 500V	C15	1	CC45UJ1H330J		C 33P	C34	1	
CM93D2H561J		MC 560P 500V	C30	1	CE04BW1HR22M		E 0.22 50V	C55	1	
C91-0456-05		C 0.047	C2-4,8,9,16, 18,20,24,25,31,32	12	CE04BW1HR47M		E 0.47 50V	C99	1	
C91-1004-05	N	Chip cap. 0.0068 50V	C11,12	2	CE04W0J470M		E 47 6.3V	C121	1	
E23-0401-05		Round terminal		1	CE04W1A101M		E 100 10V	C47,147	2	
E40-0273-05		Mini connector 2P		1	CE04W1A221M		E 220 10V	C98	1	
E40-0275-05		Pin connector 2P		1	CE04W1A470M		E 47 10V	C39,56,116,150, 151,158	6	
E40-0373-05		Mini connector 3P		1	CE04W1C100M		E 10 16V	C81,101	2	
F01-0785-05	N	Heat sink		1	CE04W1C220M		E 22 16V	C112	1	
F07-0846-03	N	Heat sink cover		1	CE04W1H0R1M		E 0.1 50V	C57	1	
F09-0405-14		Fan		1	CE04W1H010M		E 1 50V	C44,50,62,68, 70,72,93,100, 102,103,105,111, 118-120,135,146	17	
F20-0078-05		Insulating sheet		3	CE04W1H100M		E 10 50V	C53,97	2	
F29-0014-05		Shoulder washer		7	CE04W1HR22M		E 0.22 50V	C58,164	2	
F29-0406-03		Fan motor ass'y		1	CE04W1HR47M		E 0.47 50V	C41,48,54,59, 106	5	
L19-0338-05		Input matching transf.	T1	1	CE04W1H4R7M		E 4.7 50V	C40,43,104	3	
L19-0342-05	N	Drive transf.	T2	1	CK45B1H102K		C 0.001	C14,21,26,33, 130,148	6	
L19-0343-05	N	Final transf.	T3	1	CK45B1H471K		C 470P	C127	1	
L33-0617-05		Choke coil	L11	1	CK45F1H103Z		C 0.01	C2,3,12,25,36, 38,61,69,71,76, 82,123,126,128, 136,138,144,145, 156,157,160	21	
L33-0651-05		Choke coil	L5-10	6						
L33-0652-05		Choke coil 0.7μH	L1	1						
L40-1011-03		Ferri-inductor 100μH	L12	1						
L40-1021-03		Ferri-inductor 1mH	L3,4	2						
L40-1511-03		Ferri-inductor 150μH	L2	1						
N15-1030-46		Washer		4	CK45F1H223Z		C 0.022	C1,4-11,13, 16-20,23,24, 28,29,31,66,73, 107,139-141	26	
N30-2604-46		Round screw 2.6 x 4		5						
N30-3006-46		Round screw 3 x 6		3						
N30-3008-46		Round screw 3 x 8		4						
N35-3006-45		Bind screw 3 x 6		4						
N87-3006-46		Self tapping screw 3 x 6		8						
N89-3006-45		Bind tapping screw 3 x 6		6						
R12-1406-05		Trim. pot. 1kΩ (B)	VR1,2	2	CQ92M1H102K		ML 0.001	C52,122	2	
RC05GF2H150J		Solid 15Ω 1/2W	R15,16	2	CQ02M1H103K		ML 0.01	C108,109	2	
RC05GF2H221J		Solid 220Ω 1/2W	R8,11	2	CQ92M1H104K		ML 0.1	C77,90	2	
RC05GF2H3R9J		Solid 3.9Ω 1/2W	R6	1	CQ92M1H123K		ML 0.012	C86-89	4	
RS14AB3D150J		MF 15Ω 2W	R23	1	CQ92M1H153K		ML 0.015	C96	1	
RS14GB3D2R2J		MF 2.2Ω 2W	R12,13	2	CQ92M1H222K		ML 0.0022	C37	1	
RS14GB3F390J		MF 39Ω 3W	R14,17	2	CQ92M1H223K		ML 0.022	C110	1	
R92-0150-05		Short jumper		9	CQ92M1H333K		ML 0.033	C42,46	2	
T42-0301-05		Fan motor		1	CQ92M1H392K		ML 0.0039	C51	1	
IF UNIT (X48-1370-00)										
C05-0309-05		Ceramic trimmer 40P	TC1	1	CQ92M1H472K		ML 0.0047	C80	1	
CC45SL1H050C	C 5P		C142	1	CQ92M1H473K		ML 0.047	C74,83,85,95	4	
CC45SL1H100D	C 10P		C30	1	CQ92M1H822K		ML 0.0082	C154	1	
CC45SL1H101J	C 100P		C32,91,94	3	CS16E1ER47M		T 0.47 25V	C161	1	
					CS15E1VR22M		T 0.22 35V	C159	1	
					C90-0838-05		E 1 50V	C49,67	2	
					C90-0840-05		E 10 10V	C60,84	2	
					C90-0847-05		E 47 10V	C92,152	2	
					C90-0848-05		E 47 16V	C115	1	
					C90-0864-05		E 220 10V	C75	1	
					C90-0866-05		E 470 6.3V	C79	1	
					C91-0119-05		C 0.047	C15,22,27,45,78, 113,114,117,124	9	
					C91-1008-05		C 0.022	C162,163	2	

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
E23-0512-05		Terminal		2	CC45TH1H330J		C 33P	C30	1
E29-0413-05		1P connector (female)		1	CC45TH1H390J		C 39P	C28	1
E40-0273-05		Mini connector 2P		13					
E40-0373-05		Mini connector 3P		2	CE04W1A101M		E 100 10V	C44	1
E40-0473-05		Mini connector 4P		4	CE04W1A470M		E 47 10V	C8,11,15,21,27 49,55	7
E40-0573-05		Mini connector 5P		3					
E40-0673-05		Mini connector 6P		3	CE04W1V100M		E 10μ 16V	C78	1
E40-0773-05		Mini connector 7P		1					
E40-0873-05		Mini connector 8P		1	CK45B1H102K		C 0.001	C77,91-93,101	5
					CK45B1H222K		C 0.0022	C5	1
F20-0516-05		Insulating sheet		1	CK45F1H103Z		C 0.01	C1-4,12,16, 22,26,33,36,54, 57,62,69-74,79, 82,90,97,98	24
F29-0014-05		Shoulder washer		1					
J31-0502-04		PC board collar		7	CK45F1H223Z		C 0.022	C94-96	3
J42-0428-05		PC board bushing		7					
L34-0535-05		Tuning coil	L3,9	2	CQ92M1H102K		ML 0.001	C47	1
L34-0536-06		Tuning coil	L4	1	CQ92M1H104K		ML 0.1	C46	1
L34-0708-05		Tuning coil	L1	1					
L34-2077-05		Tuning coil	L2	1	C91-0119-05		C 0.047 (SR)	C37,39,48,52,65	5
L40-1011-14		Ferri-inductor 100μH	L14,15	2	C91-0131-05		C 0.01	C6	1
L40-1021-03		Ferri-inductor 1mH	L5	1	C91-0456-05		C 0.047	C7,31,35,40,45, 50,51,53,58,60, 63,64,68,75,81, 99,102	17
L40-1511-03		Ferri-inductor 150μH	L10,11	2					
L40-3391-03		Ferri-inductor 3.3μH	L6	1					
L40-4711-03		Ferri-inductor 470μH	L13	1					
L40-1511-13		Ferri-inductor 150μH	L16	1					
L71-0208-05		MCF YK-88S	XF1	1	E04-0157-04		Mini pin jack A		1
					E23-0046-04		Square terminal		2
N09-0641-05		Screw		4	E40-0273-05		Mini connector 2P		2
N30-3006-46		Round screw 3 x 6		4	E40-0473-05		Mini connector 4P		2
					E40-0673-05		Mini connector 6P		1
R12-1408-05		Trim. pot. 4.7kΩ	VR4,5,9	3	J31-0502-04		PC board collar		6
R12-1412-05		Trim. pot. 1kΩ	VR1	1	J42-0428-05		PC board bushing		6
R12-3427-05		Trim. pot. 10kΩ	VR2,8,12	3					
R12-3428-05		Trim. pot. 47kΩ	VR6,7,10	3	L19-0344-05	N	Wide bandwidth transf.	T5	1
R12-6405-05	N	Trim. pot. 470kΩ	VR3,11	2	L34-0851-05		Tuning coil	T6,9	2
					L34-0852-05		Tuning coil	T1	1
R90-0559-05	N	Inline block	IB1,3-7	6	L34-0853-05		Tuning coil	T2	1
					L34-0854-05		Tuning coil	T3	1
R92-0150-05		Short jumper		51	L34-0855-05		Tuning coil	T4	1
					L34-0856-05		Tuning coil	T7,8	2
PLL UNIT (X50-1910-00)					L40-1011-03		Ferri-inductor 100μH	L23,27	2
CC45CH1H050C	C	5P	C10,14,18,24,34, 66	6	L40-1011-14		Ferri-inductor 100μH	L32	1
CC45CH1H120J	C	12P	C67	1	L40-1511-03		Ferri-inductor 150μH	L9,11,20,21,25	5
CC45CH1H180J	C	18P	C32	1	L40-2282-01		Ferri-inductor 0.22μH	L15	1
CC45CH1H270J	C	27P	C42	1	L40-3301-03		Ferri-inductor 33μH	L22	1
CC45CH1H330J	C	33P	C13,19,25,38,43	5	L40-3382-01		Ferri-inductor 0.33μH	L14,16,17	1
CC45RH1H050C	C	5P	C86	1	L40-4701-03		Ferri-inductor 47μH	L5-8,26,30 31	7
CC45RH1H070D	C	7P	C89	1					
CC34RH1H080D	C	8P	C85,87	2	L40-4711-03		Ferri-inductor 470μH	L10,18,19,24,28, 29	6
CC34RH1H100D	C	10P	C84,88	2	L40-4711-13		Ferri-inductor 470μH	L13,33	2
CC45RH1H560J	C	56P	C17	1	L40-4782-02		Ferri-inductor 0.47μH	L12	1
CC45RH1H680J	C	68P	C9	1					
CC45SH1H470J	C	47P	C23	1	R92-0150-05		Short jumper		12
CC45SL1H101J	C	100P	C59	1					
CC45SL1H151J	C	150P	C41	1					
CC45SL1H680J	C	68P	C83	1					
CC45SL1H221J	C	220P	C100	1					
CC45TH1H050C	C	5P	C29	1					

PARTS LIST

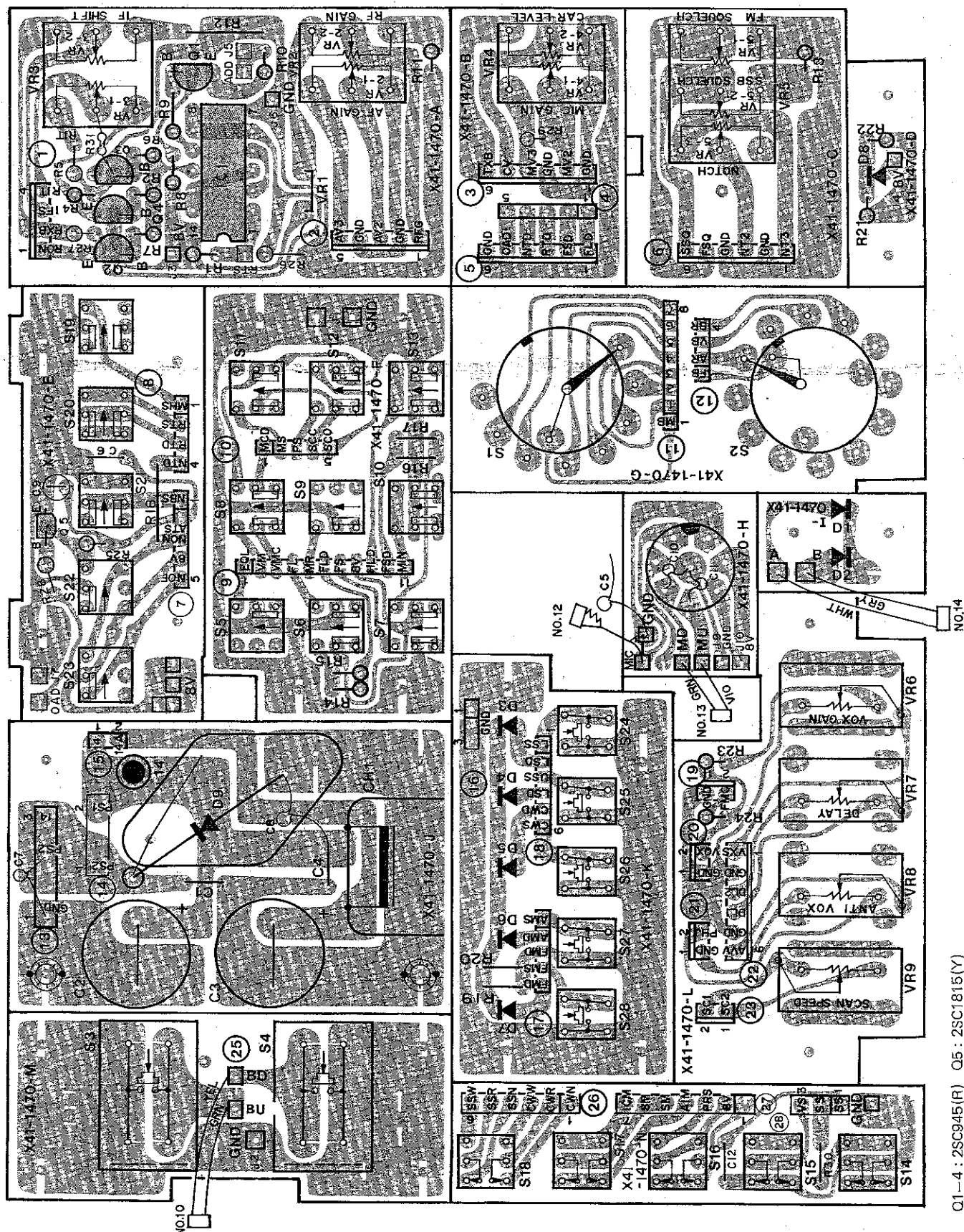
Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
FILTER UNIT (X51-1290-00)					CONTROL UNIT (X53-1290-00)				
C05-0043-05		Ceramic trimmer 20P	TC1	1	L34-3062-05	N	LPF coil N 23-30	L13,14	2
CC45SL2H030C	C	3P 500V	C82	1	L34-3081-05	N	LPF coil C 2.5-4	L3	1
CC45SL2H100D	C	10P 500V	C65,72	2	L34-3082-05	N	LPF coil D 2.5-4	L4	1
CC45SL2H101J	C	100P 500V	C35,60	2	L39-0406-05		Detector coil	T1	1
CC45SL2H120J	C	12P 500V	C14	1	L40-1011-13		Ferri-inductor 100μH	L4	1
CC45SL2H121J	C	120P 500V	C38,51,40	3	L40-1011-14		Ferri-inductor 100μH	L37-40	4
CC45SL2H180J	C	18P 500V	C46	1	L40-1021-03		Ferri-inductor 1mH	L15-17	3
CC45SL2H151J	C	150P 500V	C4,7	2	L40-1511-03		Ferri-inductor 150μH	L18,19	2
CC45SL2H181J	C	180P 500V	C3,18,24,34,57,68	6	R12-0427-05		Trim. pot. 500Ω	VR5	1
CC45SL2H221J	C	220P 500V	C15,26,39,47,79	5	R12-2410-05		Trim. pot. 5kΩ	VR4	1
CC45SL2H271J	C	270P 500V	C21	1	R12-3434-05		Trim. pot. 10kΩ	VR3	1
CC45SL2H330J	C	33P 500V	C37,52	2	R12-4411-05		Trim. pot. 50kΩ	VR1,2	2
CC45SL2H391J	C	390P 500V	C12,29,36	3	RC05GF2H181J		Solid 180Ω 1/2W	R40	1
CC45SL2H470J	C	47P 500V	C23,48,55,61	4	R92-0150-05		Short jumper		20
CC45SL2H471J	C	470P 500V	C6,8,17,25	4	S51-1404-05		Relay G2E	RL2-15	14
CC45SL2H560J	C	56P 500V	C13,45,64,71	4	S51-2407-05		Relay FBR321	RL1	1
CC45SL2H680J	C	68P 500V	C28,43,58,81	4					
CC45SL2H681J	C	680P 500V	C9	1					
CC45SL2H820J	C	82P 500V	C98,106	2					
CE04W1C100M	E	10 16V	C84	1	C05-0035-05		Ceramic trimmer 50P	TC1	1
CE04W1H010M	E	1 50V	C88	1	C05-0067-05		Ceramic trimmer 25P	TC5,6	2
CE04W1HR47M	E	0.47 50V	C86	1	C05-0309-05		Ceramic trimmer 40P	TC2-4	3
CK45F1H103Z	C	0.01	C1,74,75,77,78,83,87,93,94,99,102-104	13	CC45CH1H0R5C	C	0.5P	C47	1
CK45F1H473Z	C	0.047	C19,31,32,41,42,53,54,62,73,76,80,85,105	13	CC45CH1H020C	C	2P	C31,116,135	3
CM93D2H102J	MC	0.001	C16	1	CC45CH1H150J	C	15P	C3,30,33,36,178,179	6
CM93D2H182J	MC	0.0018	C5	1	CC45CH1H220J	C	22P	C136	1
CM93D2H821J	MC	820P	C95	1	CC45CH1H560J	C	56P	C29,38	2
C91-0119-05	C	0.047 (SR)	C2,10,11,20,63,89-92,101	10	CC45RH1H030C	C	3P	C58	1
E04-0154-04		Coax. connector		1	CC45RH1H050C	C	5P	C67	1
E04-0157-04		Mini pin jack		1	CC45RH1H070D	C	7P	C57	1
E23-0512-04		Square terminal		2	CC45RH1H100D	C	10P	C56	1
E29-0413-05		1P connector (female)		1	CC45RH1H120J	C	12P	C6,66,68	3
E40-0273-05		Mini connector 2P		4	CC45RH1H220J	C	22P	C16,18,55,124	4
E40-0373-05		Mini connector 3P		3	CC45RH1H270J	C	27P	C127	1
E40-0473-05		Mini connector 4P		2	CC45RH1H560J	C	56P	C115,117	2
E40-0673-05		Mini connector 6P		1	CC45RH1H820J	C	82P	C100	1
J31-0502-04		PC board collar		6	CC45SL1H030C	C	3P	C144	1
J42-0428-05		PC board bushing		6	CC45SL1H050C	C	5P	C40,42,85,144	4
L33-0672-05		Ferri-inductor 100μH	L21-36	16	CC45SL1H100D	C	10P	C32,86,110	3
L34-3038-05		LPF coil A 1.5-2.5	L1	1	CC45SL1H101J	C	100P	C12,41,92,94,114,133,143	7
L34-3039-05		LPF coil B 1.5-2.5	L2	1	CC45SL1H120J	C	12P	C84	1
L34-3054-05	N	LPF coil E 4-6.5	L5	1	CC45SL1H150J	C	15P	C43,112	2
L34-3055-05	N	LPF coil F 4-6.5	L6	1	CC45SL1H151J	C	150P	C140	1
L34-3056-05	N	LPF coil G 6.5-10.5	L7	1	CC45SL1H221J	C	220P	C93,107	2
L34-3057-05	N	LPF coil H 6.5-10.5	L8	1	CC45SL1H270J	C	27P	C24,26	2
L34-3058-05	N	LPF coil J 10.5-16	L9	1	CC45SL1H470J	C	47P	C211	1
L34-3059-05	N	LPF coil K 10.5-16	L10	1	CC45SL1H560J	C	56P	C25	1
L34-3060-05	N	LPF coil L 16-23	L11,12	2	CC45SL1H680J	C	68P	C108	1
					CC45TH1H120J	C	12P	C6	1
					CC45TH1H150J	C	15P	C54	1
					CC45TH1H270J	C	27P	C53,58	2
					CC45UJ1H030C	C	3P	C5,17	2
					CC45UJ1H120J	C	12P	C4	1
					CC45UJ1H180J	C	18P	C39	1
					CC45UJ1H220J	C	22P	C82,106,213	3
					CC45UJ1H221J	C	220P	C105	1
					CC45UJ1H270J	C	27P	C126	1
					CC45UJ1H330J	C	33P	C139	1

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
CE04W1A101M		E 100 10V	C48,79,118,119, 175	5	L34-3067-05	N	BPF coil 42.5MHz	T7,9	2
CE04W1A470M		E 47 10V	C75,147,151,163	4	L34-3068-05	N	BPF coil 42.5MHz	T8	1
CE04W1H010M		E 1 50V	C148,174	2	L40-1011-03		Ferri-inductor 100μH	L1,4-7,11, 13-15,17,27,35	12
CE04W1H3R3M		E 3.3 50V	C150	1	L33-0672-05		Ferri-inductor 100μH	L36-41	6
CE04W1HR47M		E 0.47 50V	C129,195,196,149	4	L40-1011-04		Ferri-inductor 100μH	L25,26	2
CK45B1H102K		C 0.001	C34,155,158-162, 202,205,212	10	L40-1021-03		Ferri-inductor 1mH	L8,9	2
CK45B1H222K		C 0.0022	C52,80	2	L40-1511-03		Ferri-inductor 150μH	L34,43	2
CK45B1H471K		C 470P	C132,142	2	L40-2201-03		Ferri-inductor 22μH	L2,3,42	3
CK45F1H103Z		C 0.01	C1,7-11,13-15,19 -23,27,35,37,44, 45,59-65,69-72, 81,87-89,91,95, 102,103,104,109, 111,113,123,125, 128,130,131,134, 137,138,141,145, 146,165-173,177, 180-194,200,201, 206,209,210	83	L40-2211-03		Ferri-inductor 220μH	L16,19,20,24,30 32,33	7
CK45F1H223Z		C 0.022	C197	1	L40-4711-03		Ferri-inductor 470μH	L21,28,29	3
CQ92M1H102K		ML 0.001	C50	1	L72-0336-05	N	Ceramic filter 9.65MHz	CF1	1
CQ02M1H104K		ML 0.1	C51	1	L77-0485-05		Crystal 8.8315MHz	X2	1
CQ92M1H152K		ML 0.0015	C76	1	L77-0486-05		Crystal 8.8285MHz	X1	1
CQ92M1H683K		ML 0.068	C77	1	L77-0978-05	N	Crystal 36MHz	X4	1
CQ92M1H822K		ML 0.0082	C154	1	L77-0979-05	N	Crystal 39.225MHz	X5	1
C91-0131-05		C 0.01	C203	1	L77-0980-05	N	Crystal 8.7915MHz	X3	1
C91-0456-05		C 0.047	C2,28,46,49,73, 74,78,90,96-99, 120,121,122,156, 164,176,198,199, 204,207,208 C153,157	23	L77-0981-05	N	Crystal 9MHz	X6	1
C91-0457-05		C 0.022		2	L78-0005-05		Ceramic OSC 5.75MHz	X7	1
E04-0157-05		Mini pin jack A		1	R12-1038-05		Trim. pot. 1kΩ	VR1,2	2
E23-0046-04		Square terminal		5	R12-1040-05		Trim. pot. 4.7kΩ	VR3	1
E40-0273-05		Mini connector 2P		8	R90-0515-05		Resistor block 10kΩ x 4	RB1	1
E40-0274-05		Mini connector 2P		1	R90-0561-05	N	Resistor block 22kΩ x 6	RB3	1
E40-0373-05		Mini connector 3P		4	R90-0562-05	N	Resistor block 22kΩ x 8	RB2	1
E40-0473-05		Mini connector 4P		8	R92-0150-05		Short jumper		94
E40-0573-05		Mini connector 5P		4	S31-1005-05		Slide switch	S1	1
E40-0673-05		Mini connector 6P		1	DISPLAY UNIT (X54-1710-00)				
E40-0773-05		Mini connector 7P		2					
E40-0873-05		Mini connector 8P		1	CE04W0J221M	E	220 6.3V	C2	1
J31-0502-04		PC board collar		7	CE04W1A470M	E	47 10V	C1	1
J42-0428-05		PC board bushing		7	CE04W1V100M	E	10 35V	C3,5-7	4
L32-0198-05		OSC coil	L10	1	CQ92M1H103K		ML 0.01	C4	1
L32-0201-05		OSC coil 8.83MHz	T14	1	C91-0456-05		C 0.047	C8	1
L32-0639-05		OSC coil	L18	1	E40-0273-05		Mini connector 2P		1
L33-0636-05		Choke coil 28μH	L31	1	E40-0473-05		Mini connector 4P		1
L33-0663-05	N	Choke coil 1μH	L12	1	E40-0773-05		Mini connector 7P		1
L33-0664-05	N	Choke coil 2.7μH	L22	1	E40-0873-05		Mini connector 8P		1
L33-0665-05	N	Choke coil 39μH	L23	1	L19-0305-05		OSC transf.	T1	1
L34-2140-05	N	Tuning coil 9.67MHz	T10	1	L40-1011-04		Ferri-inductor 100μH	L1	1
L34-2141-05	N	Tuning coil 9MHz	T12,13	2	L40-1511-03		Ferri-inductor 150μH	L2	1
L34-3064-05	N	BPF coil 43MHz	T1,3,4,6	4	N30-2604-46		Round screw 2.6 x 4		6
L34-3065-05	N	BPF coil 43MHz	T2	1	N87-3006-46		Self tapping screw 3 x 6		2
L34-3066-05	N	BPF coil 34MHz	T5	1	R90-0511-05		Resistor block 47kΩ x 8	RB1	1
					R90-0521-05		Resistor block 47kΩ x 7	RB2	1
					R92-0150-05		Short jumper		11

TS-430S PC BOARD VIEW

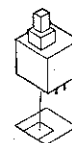
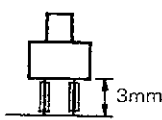
SWITCH UNIT (X41-1470-00) Component side view



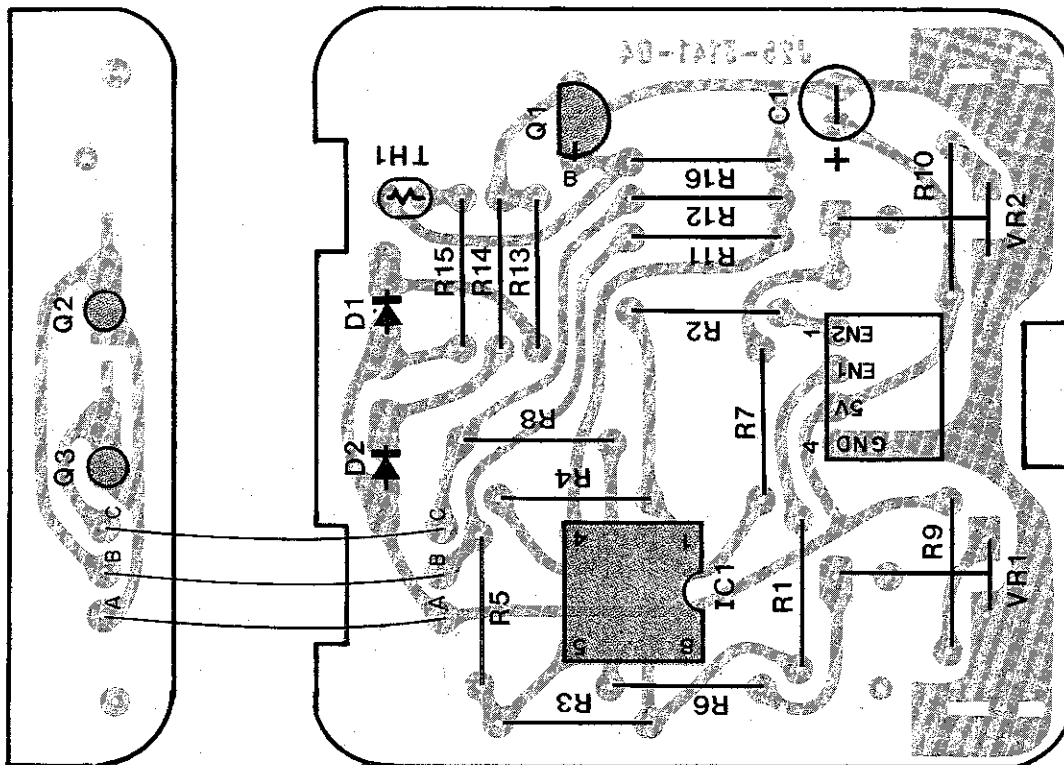
Q1-4 : 2SC945(R) Q5 : 2SC1815(Y)
 D1,2,6-8 : SY438D D3-5 : SG238D D9 : S31C(S)
 IC1 : TC4011BP

<Attachment method of D1-8>

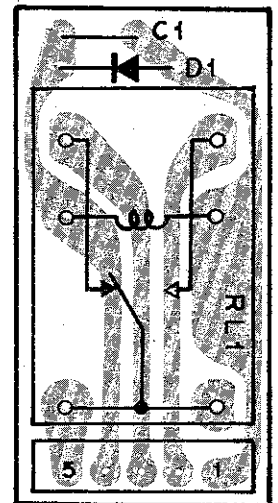
<Attachment direction of S5-13,19-23>



ENCODER ASS'Y (J25-3141-04) Component side view



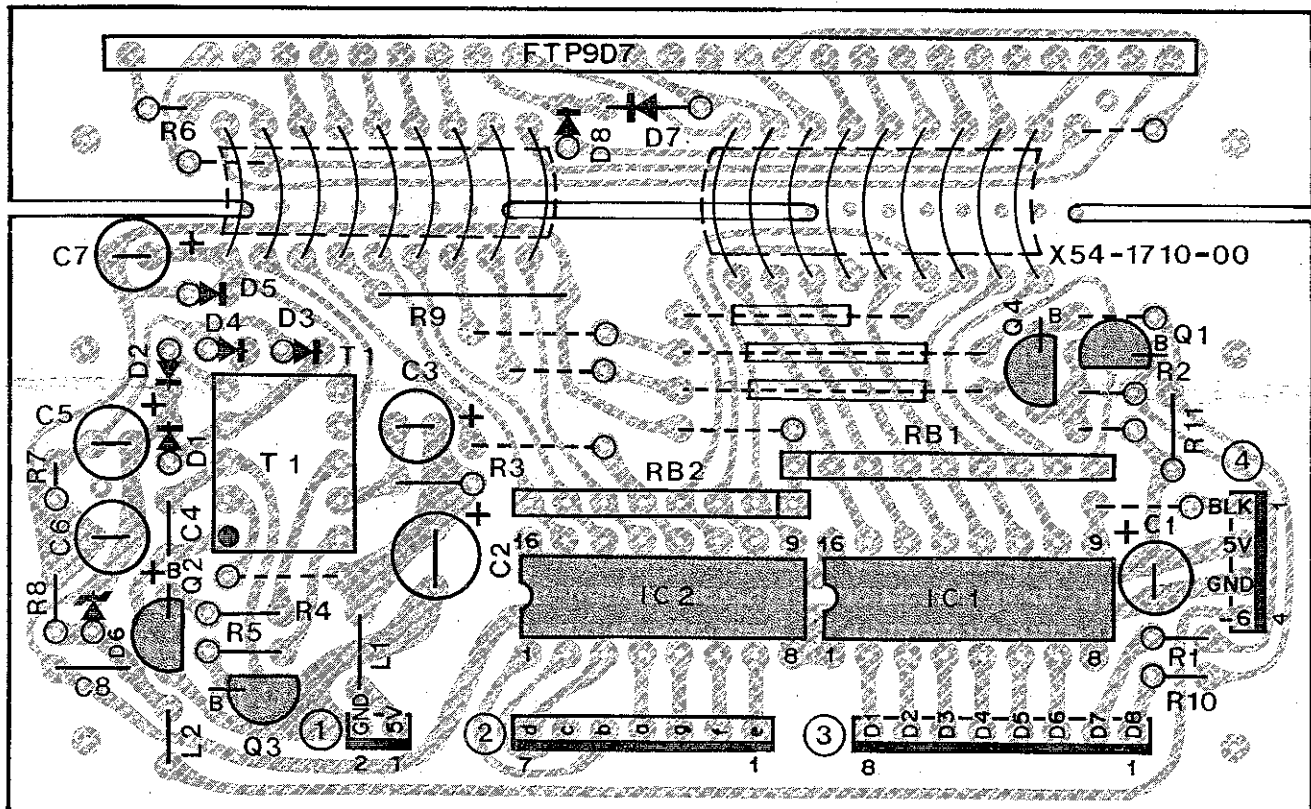
RELAY BOARD Component side view



Q1 : 2SA1015(Y) Q2,3 : PN126S
D1,2 : LN66(R)
IC1 : LM358P

D1 : 1S1555

DISPLAY UNIT (X54-1710-00) Component side view



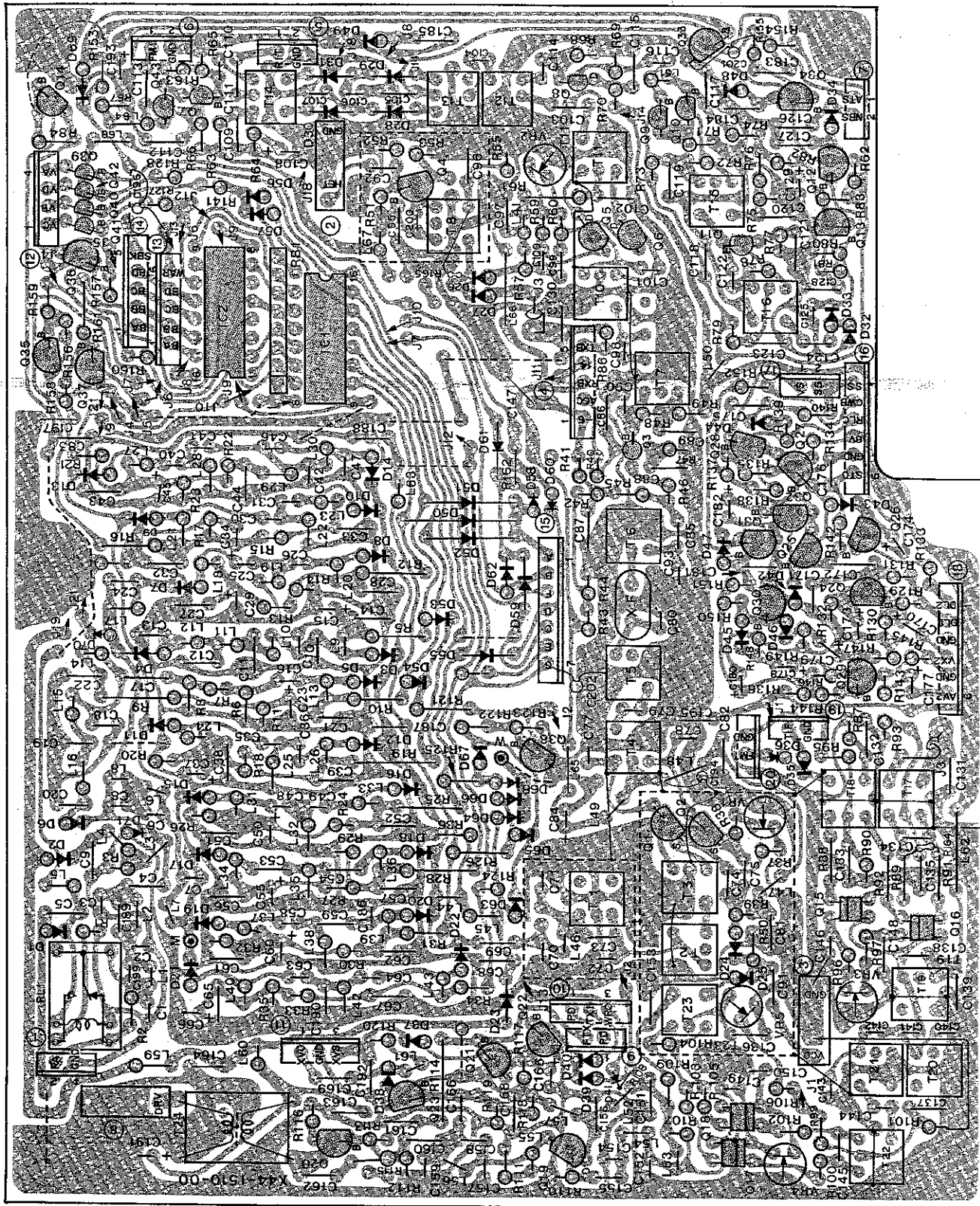
2SC945
2SC1015
2SC1815
2SC1959

PN126S

Q1,4 : 2SA1015(Y) Q2,3 : 2SC1959(Y)
D1-4,7,8 : 1S1555 D5 : RD9.1EB2 D6 : RD6.2EB2

TS-430S PC BOARD VIEW

RF UNIT (X44-1510-11) Component side view



2SA1015
2SC1815
2SC1959
2SC2703

2SC2538

2SC460

2SA562

2SK125

3SK73

3SK74

MV-13

2SC2603

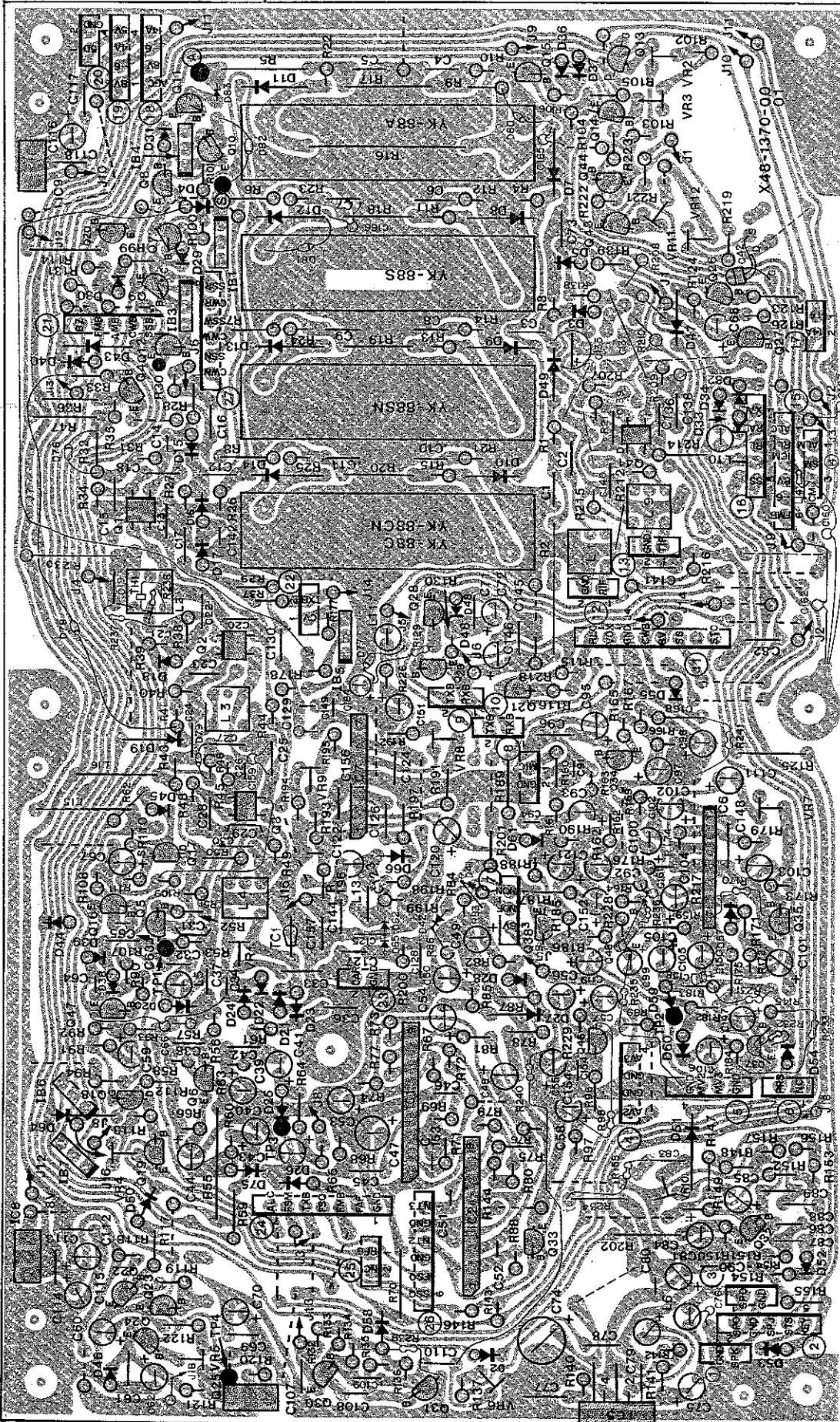
2SK192A

G2
G1
S
D

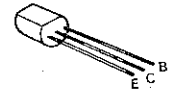
GREEN

TS-430S PC BOARD VIEW

IF UNIT (X48-1370-00) Component side view



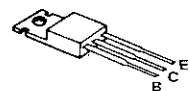
2SA1015
2SC945
2SC1815
2SC2240
2SC2703



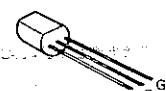
2SA562
2SA733



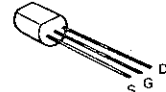
2SD880



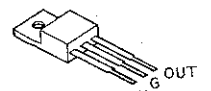
2SK192A



2SK30A



AN7805
AN7808



3SK73



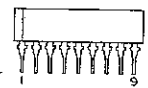
μPC1158H2



AN612



AN6551



<Attachment method of Q18>

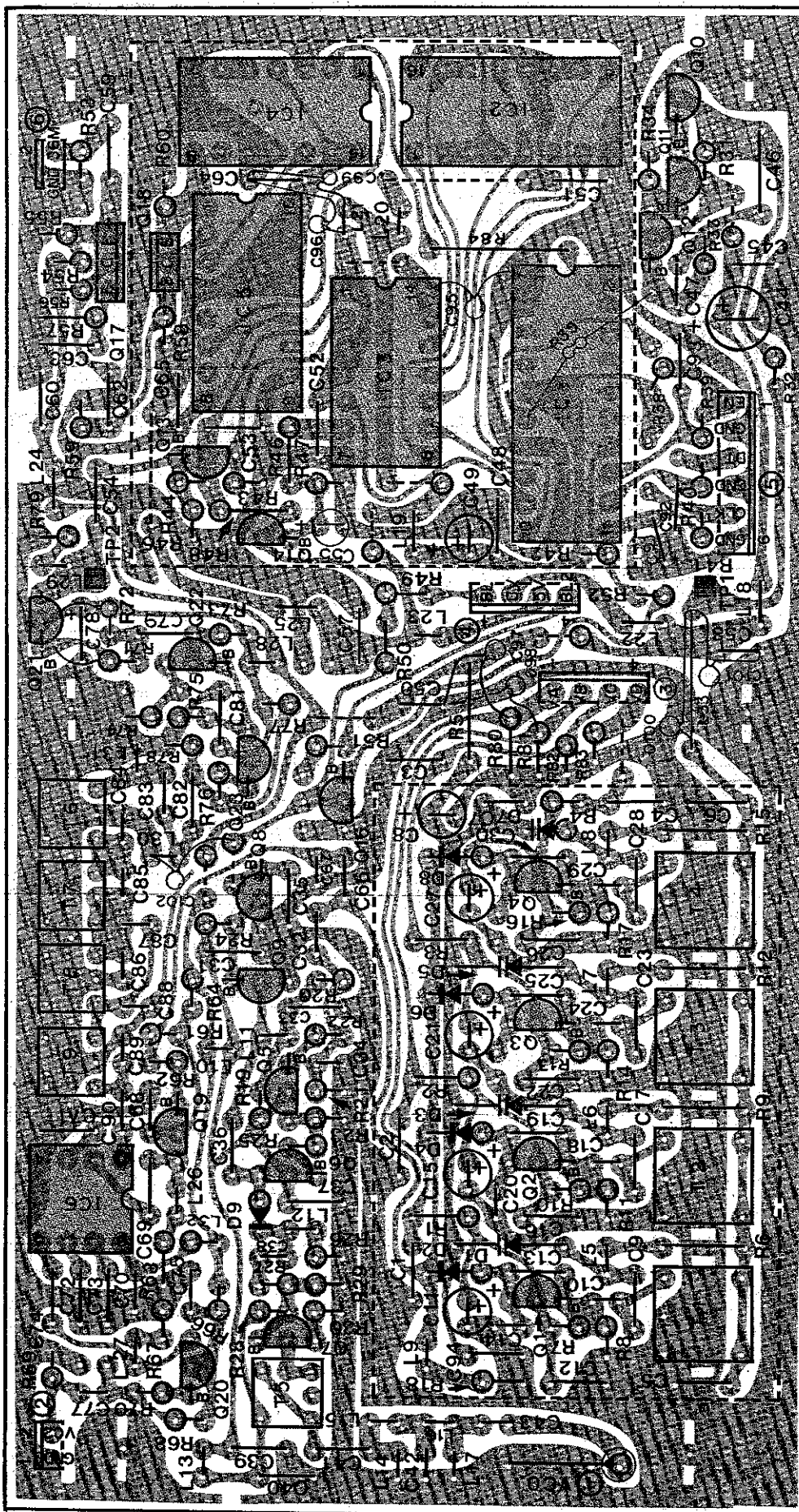


<Attachment direction of Inline Block>

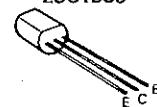


TS-430S PC BOARD VIEW

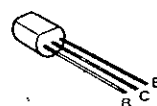
PLL UNIT (X50-1910-00) Component side view



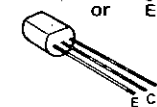
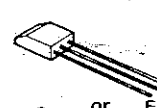
2SC1775
2SC1815
2SC1923
2SC1959



2SC2053



2SC460

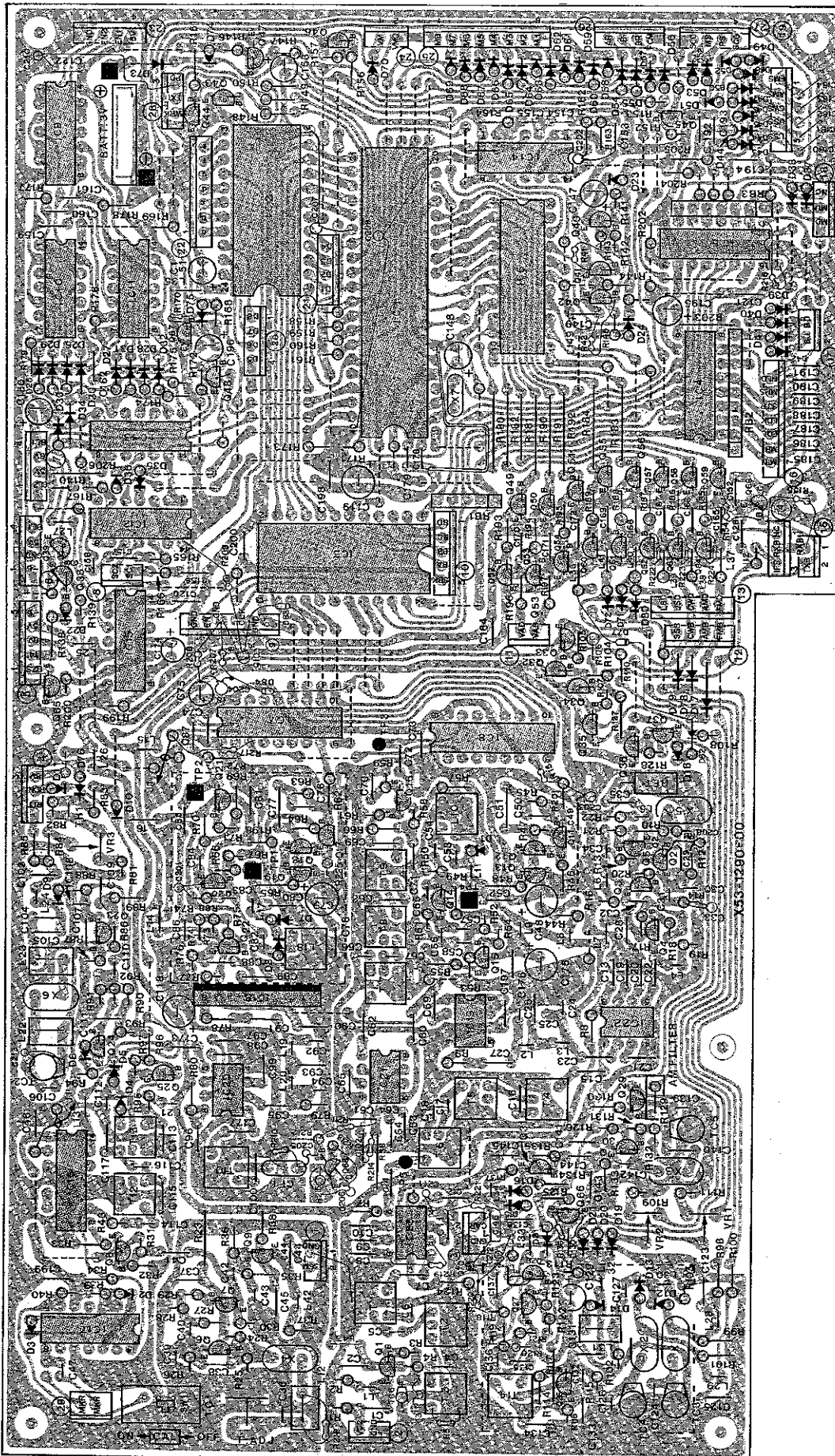


PLL UNIT (X50 - 1910 - 00)

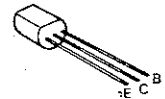


TS-430S PC BOARD VIEW

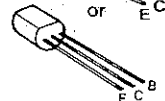
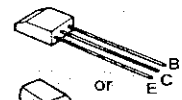
CONTROL UNIT (X53-1290-00) Component side view



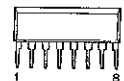
2SA1015
2SC945
2SC1775
2SC1815
2SC1923
2SC1959



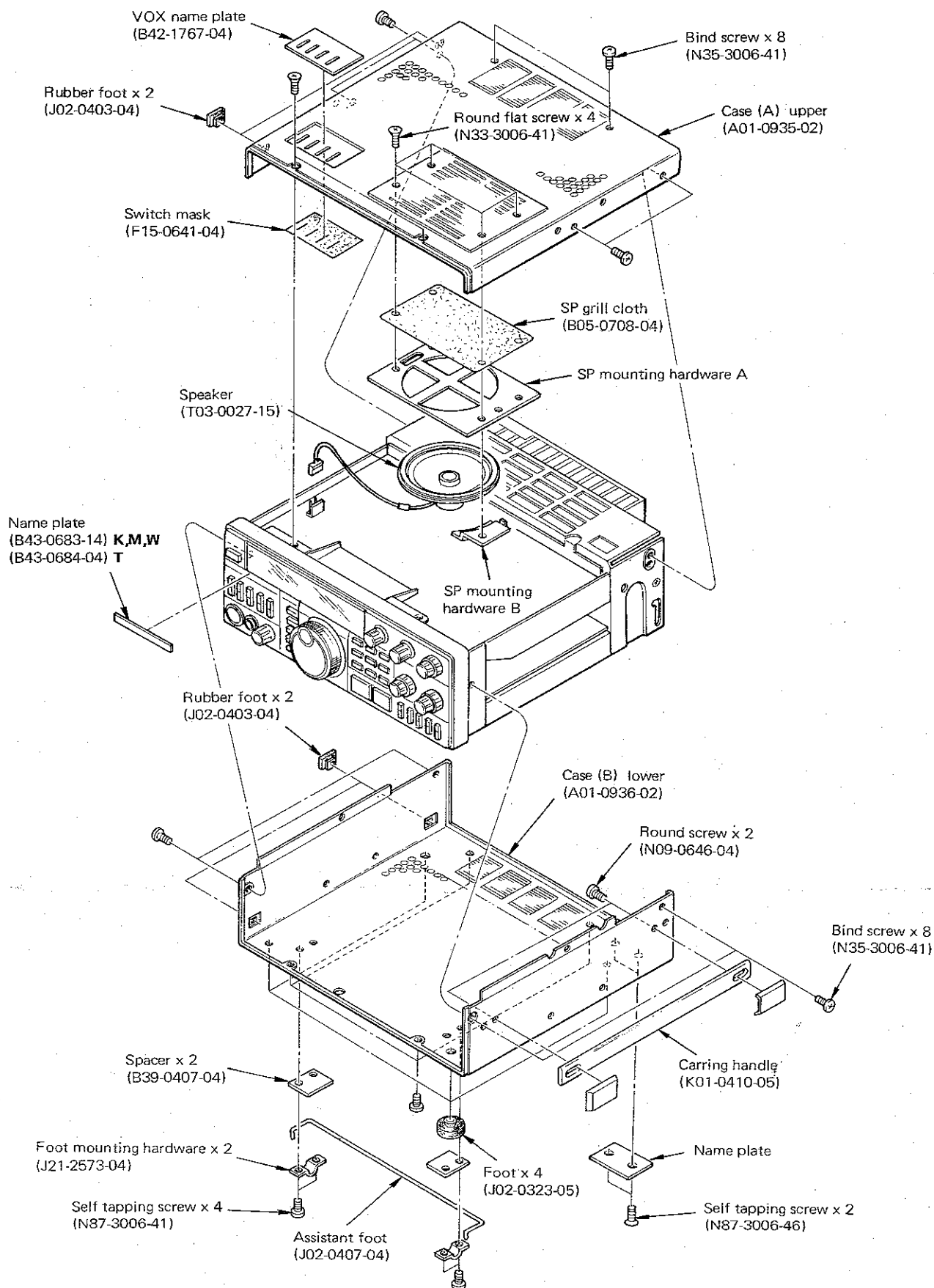
2SC460



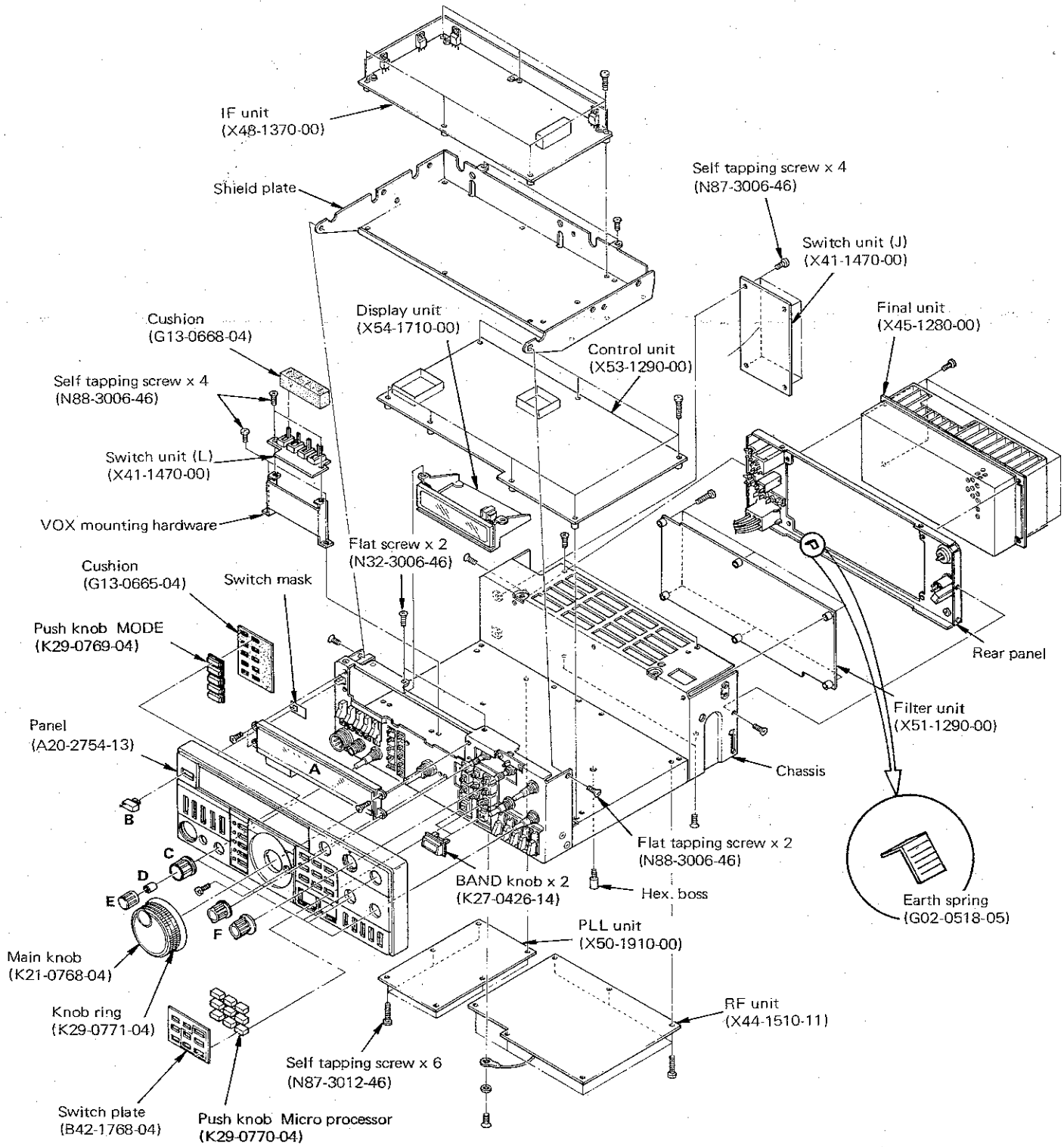
M54459L



DISASSEMBLY



DISASSEMBLY

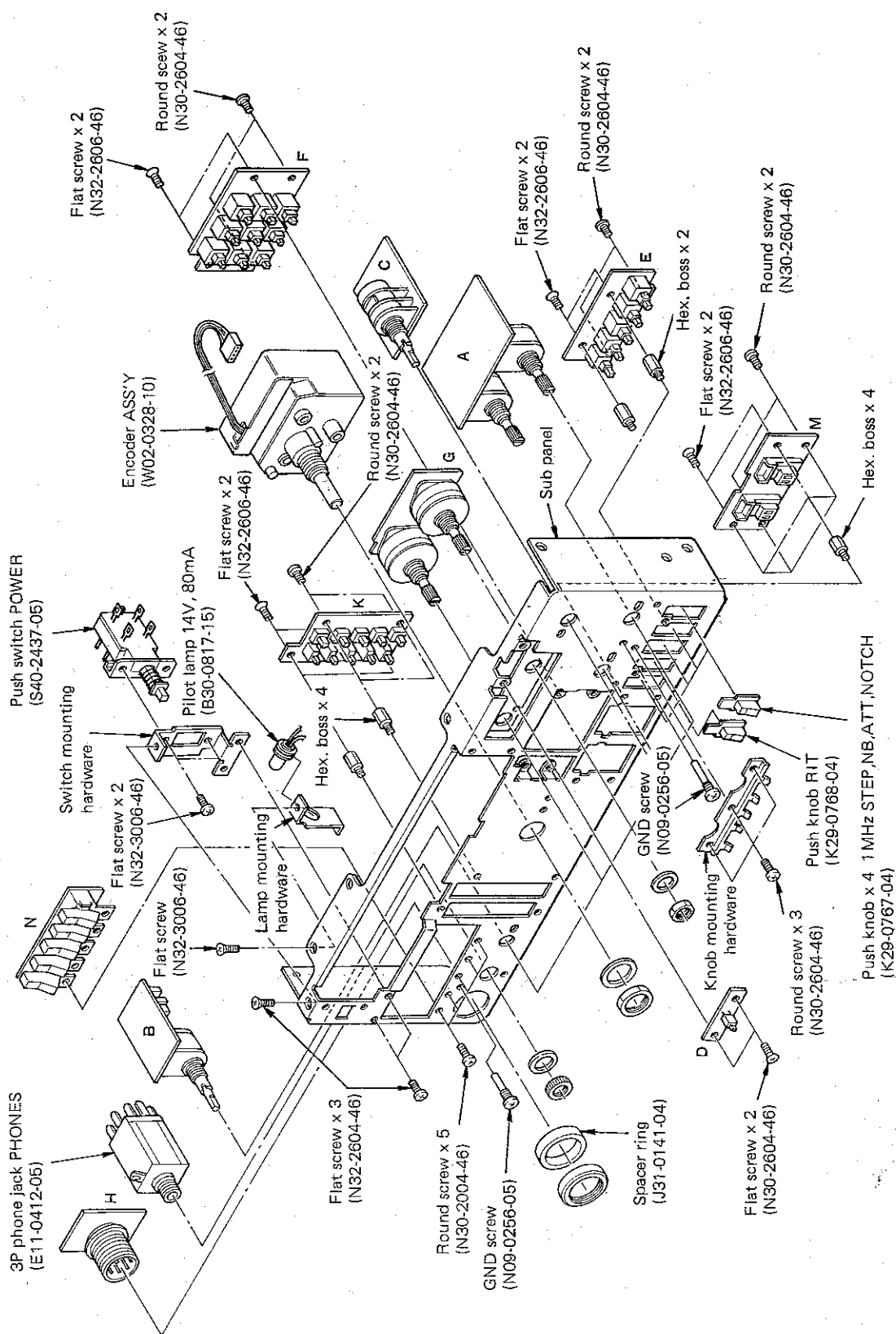


- A Meter (B31-0639-05)
- B Push knob POWER (K29-0758-04)

- C Knob (outside) x 4 RF,CAR,SQL,IF SHIFT (K29-0741-24)
- D Knob fixed spring x 4 (G02-0505-05)

- E Knob (inside) x 4 AF,MIC,NOTCH,RIT (K23-0710-04)
- F Pointer knob x 2 FUNCTION,M.CH (K23-0753-04)

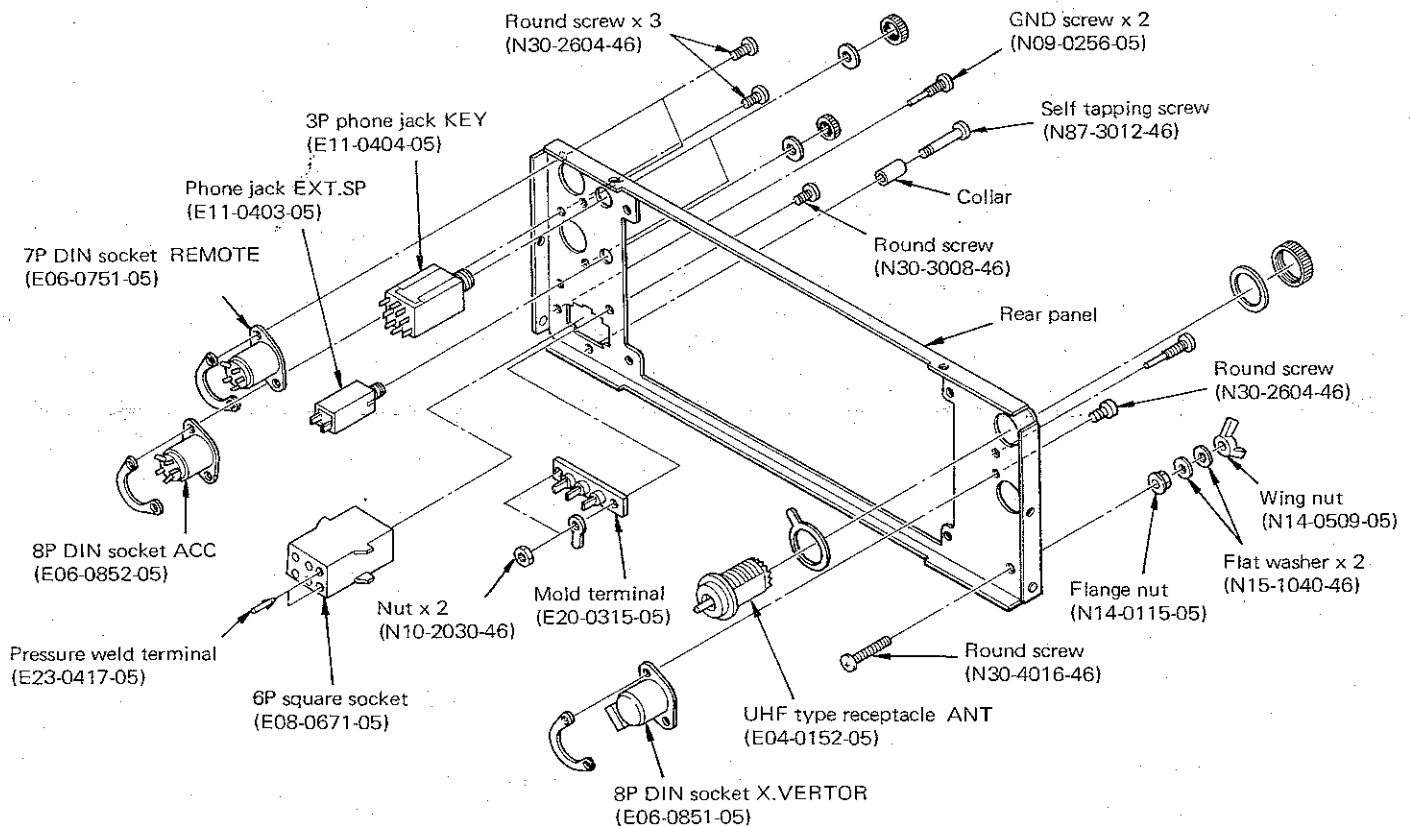
DISASSEMBLY



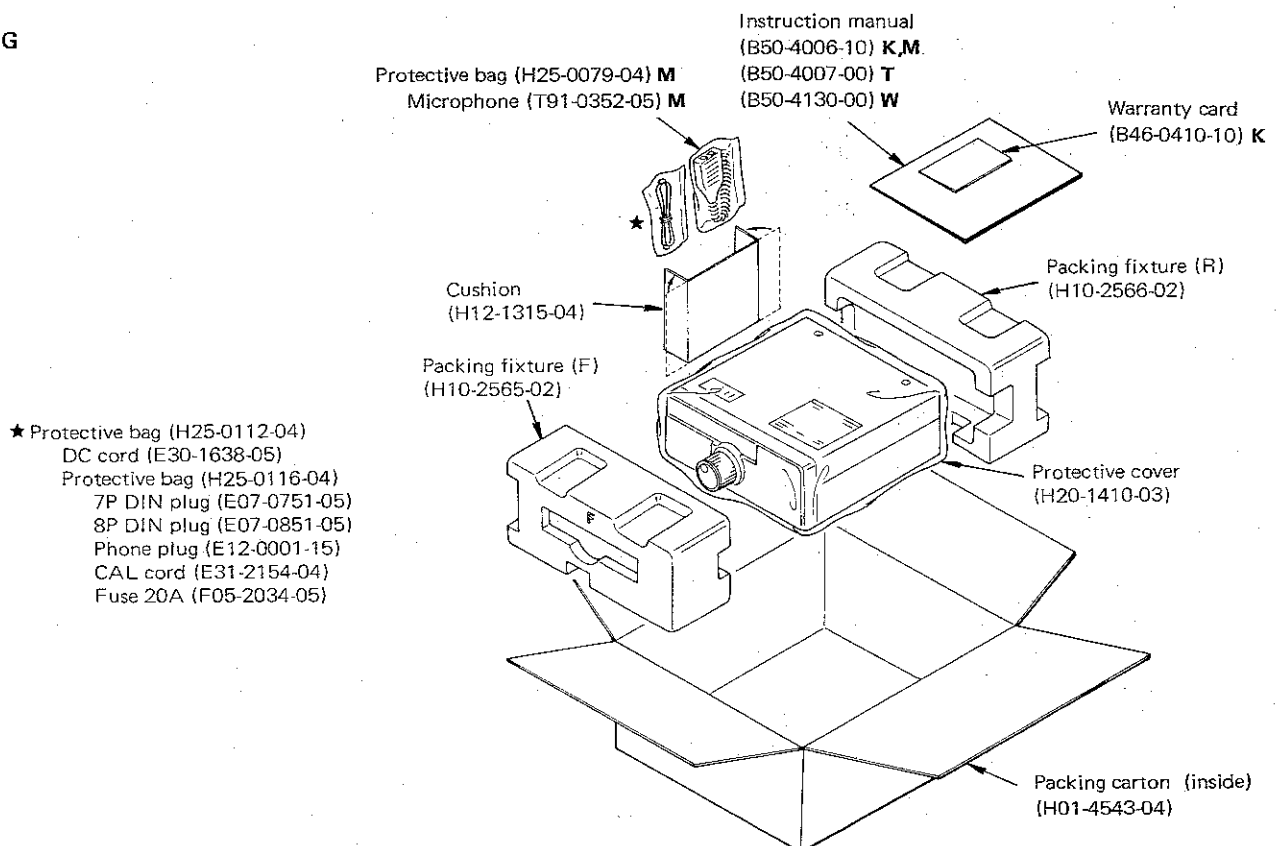
SWITCH UNIT A~N

A	VR2	(R19-3416-05)	Pot. AF/RF	G	S1	(S29-1428-05)	Rotary switch M.CH
B	VR3	(R19-3417-05)	Pot. RIT/IF SHIFT	H	S2	(S29-1427-05)	Rotary switch FUNCTION
C	VR4	(R19-3415-05)	Pot. MIC/CAR	K	S24-28	(E06-0853-05)	8P metal socket MIC
D	VR5	(R24-9403-15)	Pot. NOTCH/SQL	L	D3-6	(S50-1411-05)	Tact switch MODE
E	D8	(SY438D)	LED M.CH	M	D6,7	(SG238D)	LED LSB, USB, CW
F	S19-23	(S40-2440-15)	Push knob 1MHz STEP, RIT, NB, ATT, NOTCH	N	S3,4	(SY438D)	LED AM, FM
	S5,9,10	(S40-2441-15)	Push knob A=B, MR, M.IN		S14,15	(S50-1409-05)	Tact switch BAND
	S6-8,11-13	(S40-2441-15)	Push knob LOCK, STEP, M.CH, MS, PG.S, HOLD		S16-18	(S36-2408-05)	Paddle switch SEND/REC, VOX/MAN
						(S36-2411-05)	Paddle switch PROC, ALC/IC, NAR/WIDE

DISASSEMBLY/PACKING



PACKING



ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. DC Voltmeter (DC V.M)
 - 1) Input resistance : More than $1\text{M}\Omega$
 - 2) Voltage range : 1.5 to 1000 V AC/DC

NOTE : A high-precision multimeter may be used. However, accurate readings can not be obtained for high-impedance circuits.
2. DC Ammeter
 - 1) Current range : 1.5A, 3A, 20A, High-precision ammeter may be used.
3. RF VTVM (RF V.M)
 - 1) Input impedance : $1\text{M}\Omega$ and less than 3pF, min.
 - 2) Voltage range : 10mV to 300V
 - 3) Frequency range : 10kHz to 100MHz or greater
4. AF Voltmeter (AF V.M)
 - 1) Frequency range : 50Hz to 10kHz
 - 2) Input resistance : $1\text{M}\Omega$ or greater
 - 3) Voltage range : 10mV to 30V
5. AF Generator (AG)
 - 1) Frequency range : 200Hz to 5kHz
 - 2) Output : 1mV or less to 1V, low distortion
6. AF Dummy Load
 - 1) Impedance : 8Ω
 - 2) Dissipation : 3W or greater
7. Oscilloscope

Requires high sensitivity, and external synchronization capability.
8. Sweep Generator
 - 1) Center frequency : 50kHz to 90MHz
 - 2) Frequency deviation : Maximum $\pm 35\text{MHz}$
 - 3) Output voltage : 0.1V or greater
9. Standard Signal Generator (SSG)
 - 1) Frequency range : 50kHz to 50MHz
 - 2) Output : $-20\text{dB}/0.1\mu\text{V}$ to $120\text{dB}/1\text{V}$
 - 3) Output impedance : 50Ω
 - 4) AM and FM modulation can be possible.

NOTE : Generator must be frequency stable.
10. Frequency Counter (f. counter)
 - 1) Minimum input voltage : 50mV
 - 2) Frequency range : 50MHz or greater
11. Noise Generator

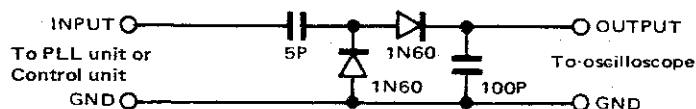
Must generate ignition noise containing harmonics beyond 30MHz.
12. RF Dummy Load
 - 1) Impedance : 150Ω
 - 2) Dissipation : 150W or greater
13. Power Meter
 - 1) Impedance : 50Ω
 - 2) Dissipation : 150W continuous or greater
 - 3) Frequency limits : 60MHz or greater

14. Spectrum Analyzer

- 1) Frequency range : 100kHz to 110MHz or greater
- 2) Bandwidth : 1kHz to 3MHz

15. Detector

- 1) For adjustment of PLL/VCO BPF



16. Directional Coupler

17. Power supply

PS-430

18. Microphone

MC-60A or MC-42S

PREPARATION

Unless otherwise specified, set the controls as follows.

POWER.....ON	NAR/WIDE.....WIDE
BAND.....14	1MHz STEP.....OFF
AF.....MIN	RIT SW.....OFF
RF.....MAX	NB SW.....OFF
MIC.....MIN	ATT SW.....OFF
CAR.....MIN	NOTCH SW.....OFF
NOTCH.....CEN	MODE.....USB
SQUELCH.....MIN	LOCK SW.....OFF
MEMORY.CH....1	STEP SW.....OFF
FUNCTION.....A	M.CH SW.....OFF
SEND/REC.....REC	MS SW.....OFF
VOX/MAN.....MAN	PG.S.....OFF
PROCESSOR SW..OFF	HOLD.....OFF

< REFERENCE >

Japanese "SG"	American "SG"
-6 dB	0.25 μV
0 dB	0.5 μV
6 dB	1 μV
12 dB	2 μV
24 dB	8 μV
30 dB	15.8 μV
40 dB	50 μV
50 dB	158 μV
60 dB	500 μV
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5 V

TS-430S

ADJUSTMENT

VOLTAGE CHECK, ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Voltage	1) POWER : ON RF GAIN : MAX MODE : USB STBY : REC	DC V.M	IF	⑬-1			Check	7.4–8.4V
				⑬-4				4.75–5.25V
				⑬-2				–5.8 – –6.3V
				⑨-1				8.3–9.1V
				⊕(BATT)				3.0V or more
				②-1	SW“A”	VR1		+0.05V, –0V
	2) STBY : SEND			TP4	IF	VR5	8.8V	±0.1V

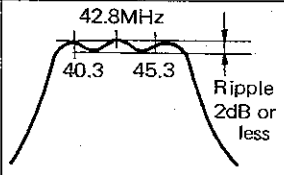
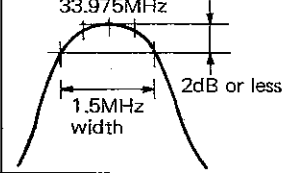
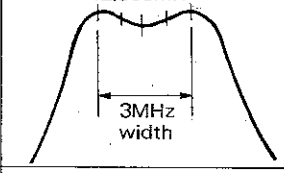
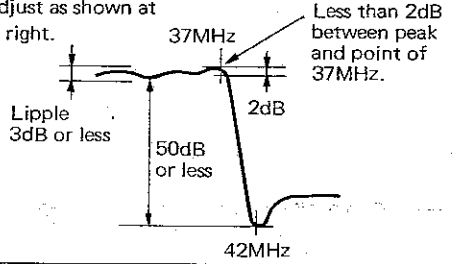
IF UNIT Q1–3,41 : 3SK73(GR)*1
3SK73(BL)*2

PLL ADJUSTMENT

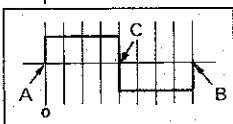
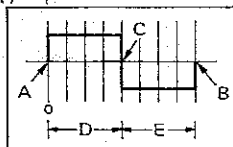
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reference oscillator frequency	1) 36MHz	f. counter	Cont	①-2	Cont	TC1	36,000,000 Hz	±10Hz
	HET			Check			39,224,500—39,225,500Hz	
2. RIT	1) RIT Pot. : CEN RIT SW : ON STBY : REC	f. counter	Cont	D5 cathode	Cont	TC2	9,000,000 Hz	±50 Hz Use oscilloscope's probe.
	2) RIT Pot. : Full CW (+) RIT Pot. : Full CCW (—)						Verify	8,990,000Hz or less 9,010,000Hz or more
	3) MODE : CW STBY : SEND					VR3	8,992,000Hz	±10Hz
3. CAR	1)	RF VTVM	Cont	③-2	Cont	T14	0.28V (Turn core out from peak)	
	2) MODE : USB IF SHIFT Pot. : CEN STBY : REC	f. counter				TC4	8,831,500Hz	±10Hz *
	STBY : SEND					VR2	No change in freq.	±10Hz
	3) IF SHIFT Pot. : Full CW STBY : REC	* Note : This is an initial adjustment only. You must also perform dyrp 10 of the TX adjustment if you adjust TC3 and or TC4.					Verify	8,832,400Hz or more
	IF SHIFT Pot. : Full CCW							8,830,600 Hz or less
	4) MODE : LSB IF SHIFT Pot. : Centerd STBY : REC					TC3	8,828,500Hz	±10Hz*
	5) MODE : CW STBY : SEND					VR1	8,830,700Hz	±10Hz
	6) MODE : FM STBY : SEND					TC5	8,791,500Hz	±10Hz
	7) MODE : AM						Verify	8,789,850—8,790,150Hz
4. VCO-1 (Voltage control oscillator)	1) FREQ : . . 0.0kHz To obtain this frequency 1st set dial to 9.9 . Then using mic push button depress UP button one step. (10Hz/step obtained by mic UP or DOWN button).	DC V.M	Cont	TP1	Cont	L18	6.0V	±0.1V
	2) FREQ : . . 9.9 kHz To obtain this frequency 1st set dial to 0.0 . Then depress mic up or down button one step.						Verify	2.1V±0.5V
5. PLL 9MHz IF	1) RIT SW : OFF	RF VTVM	Cont	IC20-5	Cont	T12,13	MAX	(150mV)
6. PLL 9.65MHz IF	1) FREQ : . . 5.0kHz RIT SW : OFF	RF VTVM	Cont	Q68-C	Cont	T10	MAX	(160mV)

* Note : This is an initial adjustment only. You must also perform dyp 10 of the TX adjustment if you adjust TC3 and or TC4.

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
7. PLL 42.8MHz BPF	1) Connect a 0.01 μ F capacitor between Q14 Base and GND. (To stop oscillation) Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscilloscope	Cont TP3	IC21-5	Cont	T7,8,9	Adjust as shown at right.	
8. PLL 33.975MHz BPF	1) Connect a 0.01 μ F capacitor between Q14 Base and GND. (Stop oscillation) Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscilloscope	Cont TP5	IC22-5	Cont	T4,5,6	Adjust as shown at right.	
9. PLL 42.805MHz BPF	1) Disconnect connector ② VC2. Reconnect connector ② after adjustment. Connect a 0.01 μ F capacitor between D15 cathode and GND. Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscilloscope	Cont ②-2	TP5	Cont	T1,2,3	Adjust as shown at right.	
10. VCO-2	1) FREQ : ,000.0 kHz To obtain this frequency 1st set dial to ,999.9 . Then using mic push button depress UP button one step.	DC V.M	Cont	TP4	Cont	L10	6.5V	$\pm 0.1V$
	2) FREQ : ,999.9 kHz To obtain this frequency 1st set dial to ,000.0 . Then using mic push button depress DOWN button one step.						Check	2.1V $\pm 0.5V$
11. VC2 level		RF VTVM	Cont	Connector ②	Cont	TC6	50mV	$\pm 1dB$
12. VCO-BPF	1) Disconnect PLL unit connector ② . Reconnect connector ② after adjustment. Connect 560 Ω resistor in Tracking Gen. output line. Use high impedance probe to connect to spectrum analyzer. (or connect 150 Ω in series)	Tracking Gen. Detector Spectrum analyzer	PLL	IC6-1 TP2	PLL	T6-9	Adjust as shown at right.	
13. VCO-3A	1) FREQ : 7,499.9 kHz To obtain this frequency 1st set dial to 7,500.0 . Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T1	2.1V	$\pm 0.1V$
	2) FREQ : 0,000.0 kHz						Check	6.5V or less
14. VCO-3B	1) FREQ : 15,999.9 kHz To obtain this frequency 1st set dial to 16,000.0 . Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T2	2.1V	$\pm 0.1V$
	2) FREQ : 7,500.0 kHz						Check	6.5V or less
15. VCO-3C	1) FREQ : 22,999.9 kHz To obtain this frequency 1st set dial to 23,000.0 . Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T3	2.1V	$\pm 0.1V$
	2) FREQ : 16,000.0 kHz						Check	6.5V or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
16. VCO-3D	1) FREQ : 29,999.9[9] kHz Turn VFO to frequency stop.	DC V.M	PLL	TP1	PLL	T4	1.6V	±0.1V
	2) FREQ : 23,000.0[0] kHz						Check	6.5V or less
17. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300 rpm.	Oscilloscope	Cont	③-3				Point C may be located anywhere. When a motor is not available, manually turn the VFO to check the duty ratio.
	2) EN1 duty ratio adjustment : Turn both CW and CCW.				Encoder	VR1		After adjusting with the VFO control turned CW, check that intervals D and E are also identical when the VFO control is turned CCW.
	3) EN2 duty ratio adjustment : Turn in the both directions.			③-2		VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

RX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. IF AMP	1) FREQ : 160.0kHz MODE : LSB RF GAIN Control : MAX Use the minimum SSG input possible during alignment.	SSG	Rear panel	ANT	RF	T8,4-7	MAX	S/N 10dB or more at -6dBμ input. 1V or more/8Ω at AF GAIN Control MAX.
		AF V.M		EXT. SP		10-14 VR2		
	2) FREQ : 29,000.0kHz MODE : FM (If FM-430 is installed) SSG : 1kHz audio at 5kHz dev.	Oscilloscope AF Dummy load			IF	L1-4		
2. Internal spurious beat	1) FREQ : 500.0kHz RF GAIN Control : Minimum level possible.				RF	VR1	MIN	
3. RX DET Balance	1) RF GAIN Control : MIN	RF VTVM (Oscilloscope)	IF	TP1	IF	VR1 TC1	MIN	
4. 48.055MHz IF trap	1) FREQ : 24,999.9kHz SSG output : 48.055MHz, 80dB RF GAIN Control : Minimum level as possible	SSG	Rear panel	ANT	RF	T1	MIN	70dB or more
5. S meter	1) No signal (SSG output : OFF)	S meter			IF	VR2	Set to starting point. (Meter zero)	
	2) FREQ : 14,175.0kHz MODE : USB SSG output : 14,175.0kHz, 8dB	SSG	Rear panel	ANT		L3	S1 Adjust counter clockwise from peak. (turn slug out).	8.0dB±4dB
	3) SSG output : 40dB	S meter				VR3	S9	40dB±6dB
	4) FREQ : 29,000.0kHz MODE : FM SSG output : 29,000.0kHz, 30dB (If FM-430 is installed.)				FM IF	VR2	Full scale	30dB±10dB

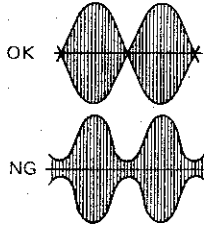
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
6. Squelch threshold	1) MODE : CW NAR/WIDE SW : WIDE SQL control : 12 o'clock	Speaker		EXT. SP	IF	VR4	Adjust VR slowly and stop at threshold.	12 o'clock
7. Noise Blanker	1) FREQ : 14,175.0kHz NB SW : ON SSG output : 14,175.0kHz First adjust 20dB input, then using the minimum input as possible.	SSG	Rear panel RF	ANT R82	RF	T15, 16	MIN	
	2) Noise Gen. : Low level	Noise Gen. SP	Rear panel	ANT EXT. SP		T15, 16	MIN noise level.	
8. Beeper	1) AF GAIN control : MIN Jumper connector ②⑩ to GND.	AF V.M Oscilloscope AF dummy load		EXT. SP	IF	VR6	50mV/8Ω	

TX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. IC meter null	1) ALC/IC SW : IC STBY : SEND Disconnect RF and DRV connector. Adjust to minimum current by VR1 and VR2 in Final unit.	S meter			Filter	VR4	Set to S meter "0".	*If this adjustment is performed, step 2.1) Base current must also be performed.
2. Base current	1) MODE : USB MIC LEVEL control : MIN Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal Adjust to minimum current with VR1 and VR2 in the Final unit. STBY : SEND	Ammeter			Final	VR1	Current drain (Minimum current) +200mA	First adjust VR1 and VR2 for minimum. Adjust VR1 for an increase of 200mA when switched to TX. Then adjust VR2 for 200mA over this reading.
	2) STBY : REC (After adjustment)					VR2	Current drain (Minimum current) + Driver current (200mA)+200mA	
3. TX AMP	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : MAX Disconnect DRV connector from RF unit. Reconnect this connector after adjustment. STBY : SEND	50Ω RF dummy load Oscilloscope	RF	DRV	IF RF	L9 T17—19 VR3, T20—22 VR4,5	MAX	*If this adjustment is performed, step 8. must also be performed. Readjust VR3,4,5 for Min. spurious, step 8).
4. NULL	1) FREQ : 29,900.0 kHz MODE : CW CAR LEVEL control : 50—60W output power STBY : SEND	Power meter	Rear panel	ANT	Filter	VR2 TC1	Mechanically set to 9—10 o'clock. MAX	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. ALC (RF output power)	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : ALC scale MAX STBY : SEND	Power meter	Rear panel	ANT	Filter	VR1	95W	Caution : In no case should the power be adjusted for greater than 110 watts.
6. Power down	1) FREQ : 28,500.0kHz MODE : CW CAR LEVEL control : ALC scale MAX Connect ACC socket pin ⑥ to GND. STBY : SEND	Power meter	Rear panel	ANT	Filter	VR3	50W	
7. Protection	1) FREQ : 14,300MHz MODE : CW Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal Adjust at frequency BAND with maximum current drain. Coax. cable to 150Ω dummy load should be 1m long. STBY : SEND	150Ω RF dummy load Ammeter Power meter	Rear panel	ANT	Filter	VR2	30W	
	2) ANT : OPEN	Am meter						18A or less
8. Spurious	1) FREQ : 21,200.0kHz MODE : CW CAR LEVEL control : ALC scale MAX STBY : SEND	Spectrum analyzer power meter	Rear panel	ANT (Directional coupler)	RF	VR4,5	MIN/±5.7MHz	*If this adjustment is performed, step 3. must also be performed
						VR3	MIN/±0.36MHz	
9. Carrier suppression	1) FREQ : 14,175.0kHz MODES : USB and LSB MIC LEVEL control : MIN STBY : SEND	Oscilloscope	Rear panel	ANT (Directional coupler)	IF	VR8,9	MIN	-40dB or less
10. SSB mode frequency response	1) FREQ : 14,175.0kHz MODES : USB and LSB AG output : Two tone 7mV 300, 2700Hz Set output to 50W using MIC control. STBY : SEND If two tone generator is not available adjust for equal output power at 300, 2700Hz, as measured on wattmeter.	Oscilloscope	Rear panel	ANT (Directional coupler)	Cont	TC4 (USB) TC3 (LSB)	Adjust as shown at right.	*If this adjustment is performed, step 9. must also be performed. 
11. FM IF (If FM-430 is installed)	1) FREQ : 29,000.0kHz MODE : FM STBY : SEND	RF VTVM	FM IF	D2 cathode	FM IF	T1	MAX	
12. Deviation (If FM-430 is installed)	1) FREQ : 29,000.0kHz MODE : FM AG output : 1 kHz, 20mV STBY : SEND	Linear detector Power meter (50Ω)	Rear panel	ANT (Directional coupler)	FM IF	VR1	5kHz	
	2) AG output : 2mV						Check	3.5kHz or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
13. IC meter	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : current drain 17.5A Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal STBY : SEND	IC meter (Power meter)		ANT	Filter	VR5	14A	
14. ALC meter	1) MODE : USB MIC LEVEL control : MIN METER SW : ALC STBY : SEND	ALC meter			IF	VR12	Set to ALC meter starting point.	
	2) FREQ : 14,175.0kHz AG output : 1kHz, 5mV MIC LEVEL control : Set to ALC meter starting point.	Power meter (50Ω)		ANT				
	AG output : +6dB				IF	VR11	Adjust for maximum ALC scale reading.	
15. Speech processor	1) MODE : USB MIC LEVEL control : MIN AG output : 1kHz, 10mV PROC SW : ON and OFF STBY : REC.	AM V.M	IF	TP2	IF	VR7	Level should be the same between ON and OFF.	140mV (Reference value)
16. CW side tone	1) MODE : CW AF GAIN control : 12 o'clock VOX SW : MAN STBY : REC Connect KEY to KEY jack and close the key contacts.	AF V.M Oscilloscope AF dummy load	Rear panel	EXT. SP	IF	VR10	0.63V/8Ω	

ADJUSTMENT

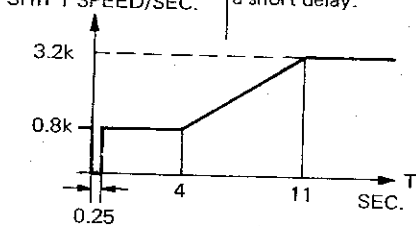
MICROPROCESSOR OPERATION CHECK

Item	Condition	Operation check
1. Reset check	1) FUNCTION SW : A POWER SW : OFF Set the POWER SW ON while depressing the A=B key. Then release the A=B key.	FREQ : 14,000.0kHz MODE : USB VFO A : Lights The "Beeper" sounds simultaneously with POWER ON.
	2) FUNCTION SW : B	FREQ : 14,000.0kHz MODE : USB VFO B : Lights
	3) M.CH SW : ON M.CH SW : change the channels in 1 through 8 order.	The frequency display disappears. M.CH display lights and displays 1-8 in order.
2. Band	1) M.CH SW : OFF 1 MHz STEP SW : OFF Depress the "BAND : UP" key once. Press repeatedly.	FREQ : 1 8 , 0 00.0kHz The "Beeper" sounds simultaneously. The MHz display □□.□ counts up. The "Beeper" sounds simultaneously.
	2) Hold the "BAND : UP" on.	FREQ : 14,000.0 ↑ 10,000.0 ↑ 7,000.0 ↑ 3,500.0 ↑ 1,500.0 18,000.0 ↓ 21,000.0 ↓ 24,500.0 ↓ 28,500.0 ↓ 29,500.0 The "Beeper" sounds at each Key-press.
	3) Depress the "BAND : DOWN" key once. Repeat the operation.	FREQ : □□.□ 00.0kHz Displays 1 MHz lower frequency from that previously displayed in 2). The "Beeper" sounds. The frequency display steps down 1 MHz at each key-press. The "Beeper" sounds.
	4) Hold the "BAND : DOWN" key on.	The frequency display in 2) steps down. The "Beeper" sounds at each key-press.
	5) 1 MHz STEP SW : ON Hold the "UP" key on. Hold the "DOWN" key on.	FREQ : □□ ,000.0kHz The MHz display □□ advances 1 MHz at each key-press. The display steps down 1 MHz at each key-press.

Item	Condition	Operation check	
3. Dial	1) FREQ : 0,000.0kHz ① Check to see if the display does not change by turning the VFO control counterclockwise. And adjust the index by turning it in the same way. ② Turn the VFO control slowly clockwise. [STEP] SW : OFF	One revolution of VFO is 9.5—10kHz.	
	2) [STEP] SW : ON	One revolution of VFO is 95—100kHz.	
4. Memory write	1) FREQ : 14,000.0kHz MODE : USB M.CH SW : 1 [MIN] SW : ON	The "Beeper" sounds when "M.IN" key is depressed.	
	2) M.CH SW : 6 [MIN] SW : ON		
	3) FREQ : 14,010.0kHz M.CH SW : 7 [MIN] SW : ON		
	4) M.CH SW : 8 [MIN] SW : ON	The "Beeper" sounds continuously when "M.IN" key is depressed.	
	5) FREQ : 14,020.0kHz M.CH SW : 8 [MIN] SW : ON	The continuous tone stops when the "M.IN" key is depressed.	
	6) FREQ : 7,000.0kHz MODE : LSB M.CH SW : 2 [MIN] SW : ON	The "Beeper" sounds when the "M.IN" key is depressed.	
	7) FREQ : 21,000.0kHz MODE : CW M.CH SW : 3 [MIN] SW : ON		
	8) FREQ : 24,500.0kHz MODE : AM M.CH SW : 4 [MIN] SW : ON		
	9) FREQ : 29,500.0kHz MODE : FM M.CH SW : 5 [MIN] SW : ON		
5. Memory recall (1)	1) [MCH] SW : ON STBY SW : REC	"M.CH" display lights.	
	M.CH SW : 1	FREQ.	MODE
	2	14,000.0kHz	USB
	3	7,000.0kHz	LSB
	4	21,000.0kHz	CW
5	24,500.0kHz	AM	
6	29,500.0kHz	FM	
7	14,000.0kHz	USB	
		14,010.0kHz	USB
	2) M.CH SW : 8 STBY SW : REC	FREQ : 14,010.0kHz USB	
	STBY SW : SEND	FREQ : 14,020.0kHz USB	

ADJUSTMENT

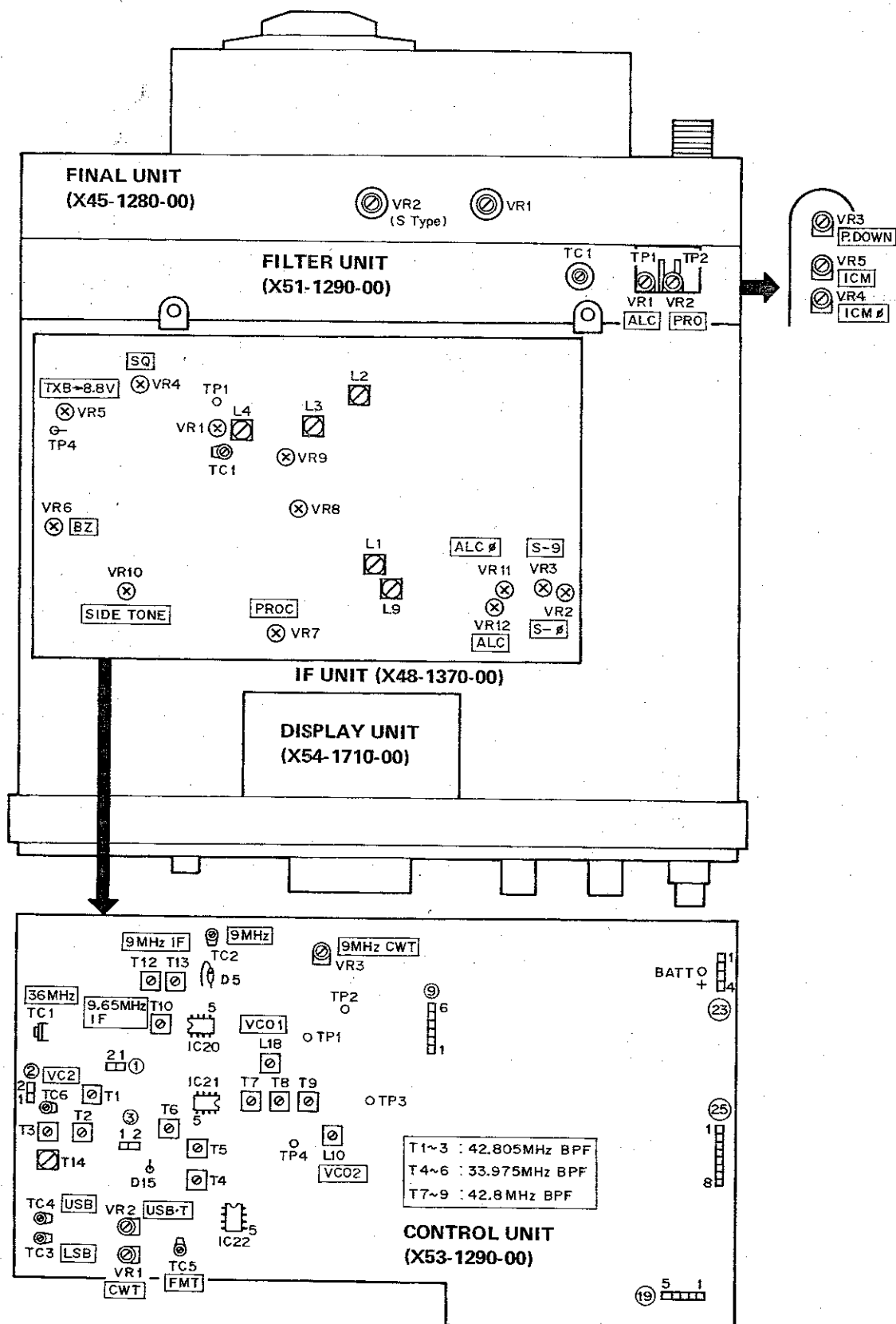
Item	Condition	Operation check
6. Memory recall (2)	1) M.CH SW : 1 [MR] SW : ON	FREQ : 14,000.0kHz The "Beeper" sounds.
	2) Turn the VFO both clockwise and counterclockwise.	The display shows normal frequency control.
	3) [MR] SW : ON	FREQ : 14,000.0kHz The tone sounds simultaneously.
7. Memory erase	1) M.CH SW : 8 STBY : REC Place the [MIN] SW : ON While depressing either UP or DOWN BAND SW key.	The frequency display clears after the BAND and [MIN] SW keys are released. The "Beeper" sounds.
8. Memory scan	1) [MS] SW : ON	M.CH : $\begin{array}{c} \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \\ \leftarrow 7 \leftarrow 6 \leftarrow 5 \leftarrow \end{array}$ Displays the frequencies and modes in Item 5. 1).
9. Program scan	1) [MS] SW : OFF [PG.S] SW : ON PG. SCAN SPEED Pot. : MIN.	The scan starts from M.CH : 6 (FREQ : 14,000.0kHz) to M.CH : 7 (FREQ : 14,010.0kHz). When the frequency reaches 14,010.0kHz, the scan returns to 14,000.0kHz and starts again. The scan speed is approx. 500Hz/sec. The "Beeper" sounds at the start and at return to the starting frequency.
	PG. SCAN SPEED Pot. : MAX	The scan speed is approx. 2.5kHz/sec. (five times faster than MIN).
	2) [HOLD] SW : ON	The scan stops
	Turn the VFO clockwise.	The scan repeats within the preset range from M.CH : 6 → M.CH : 7 The "Beeper" sounds at the start and at return to the starting frequency.
	Turn the VFO counterclockwise	The scan stops at the frequency preset in M.CH : 6.
	3) [HOLD] SW : OFF	The scan resumes from the displayed frequency.

Item	Condition	Operation check
10. A=B (Function)	1) [MS] SW : OFF [PG.S] SW : OFF [M.CH] SW : OFF FUNCTION : B FREQ : 7,000.0kHz MODE : LSB	"VFO B" display lights.
	FUNCTION : A FREQ : 14,000.0kHz MODE : USB	"VFO A" display lights.
11. UP/DOWN (Microphone)	2) FUNCTION : A [A=B] SW : ON FUNCTION : B	FREQ : 14,000.0kHz MODE : USB FREQ : 14,000.0kHz MODE : USB
	1) Connect a microphone (MC-60A or MC-42S). Momentarily depress the "UP" key several times.	When the 100Hz digit changes, the 100Hz upper frequency is displayed after ten key-presses.
	2) Hold the "UP" key on.	The frequency continuously advances forward after a short delay.
	SHIFT SPEED/SEC. 	
12. Lock	3) Momentarily depress the "DOWN" key.	When the display of 100Hz range changes, the 100Hz lower frequency is displayed after ten key-pressed.
	4) Hold the "DOWN" key on.	The frequency continuously advances backward after a short delay.
	1) [LOCK] SW : ON Turn the VFO both clockwise and counterclockwise. 2) Depress both BAND UP and DOWN keys. 3) Hold the microphone (MC-60A or MC-42S) "UP" and "DOWN" key on.	The frequency displayed at lock does not change.

TS-430S

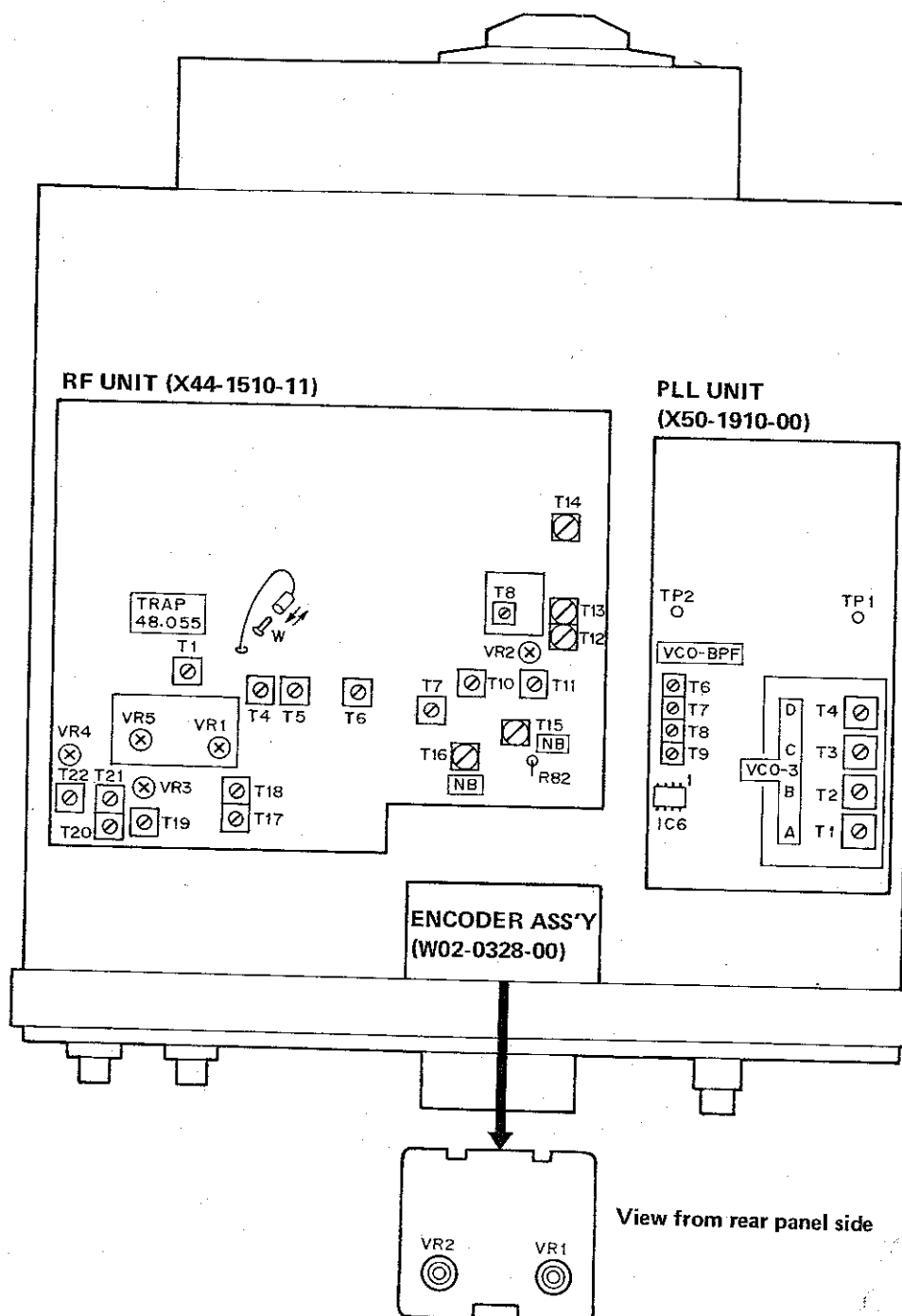
ADJUSTMENT

TOP VIEW



ADJUSTMENT

BOTTOM VIEW



LEVEL DIAGRAM

RX SECTION

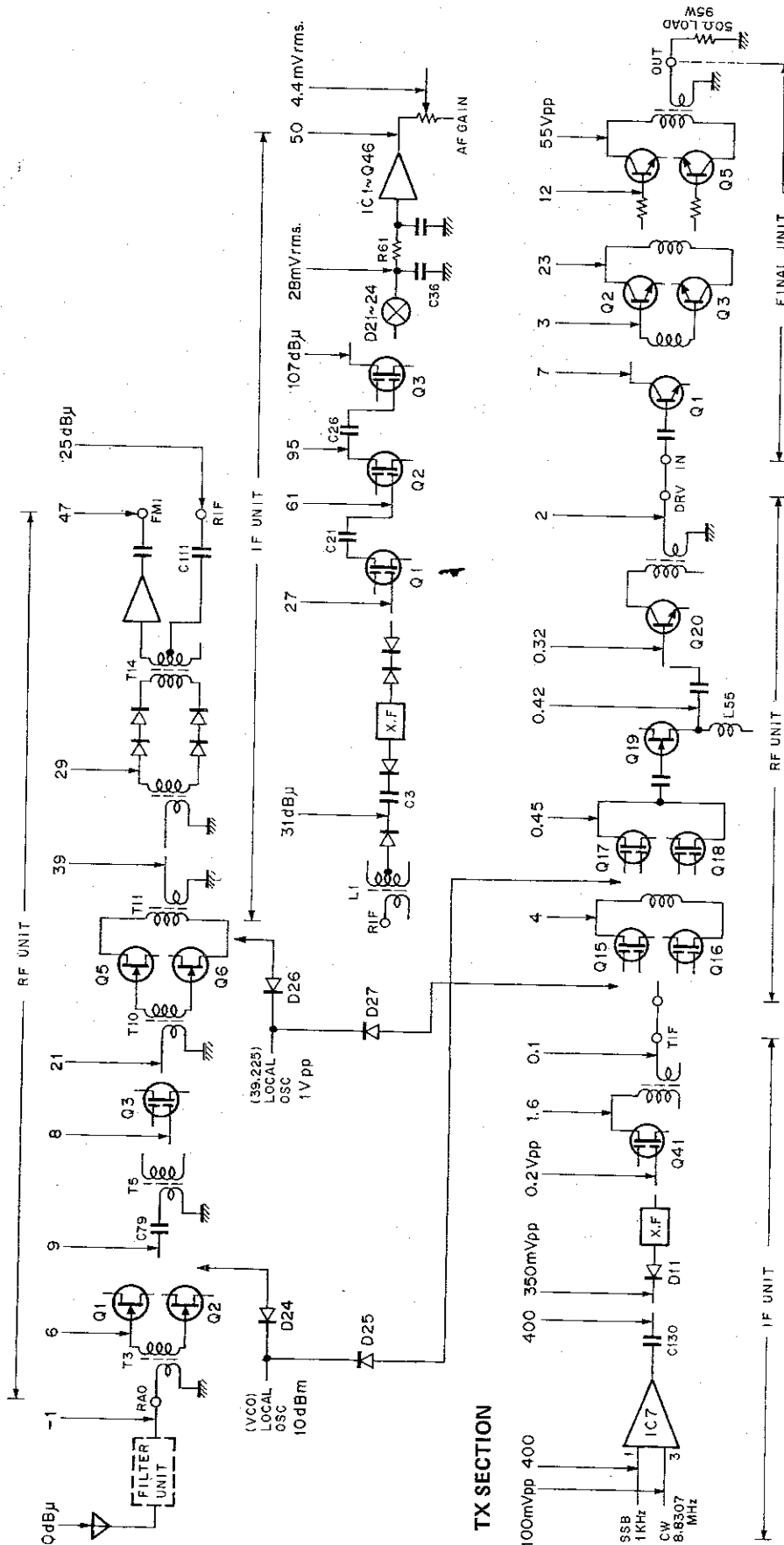
FREQUENCY : 14.200MHz

INPUT : 0dBμ

AF OUTPUT : 0.63V at 8Ω

NOTES

- 1) The figures shown are signal generator output required for a constant audio output with a constant AF gain control setting. Set the AF gain control for 0.63V/8Ω (50mW) audio output at 0dB signal generator input at 14.200MHz.
- 2) To measure signal generator output connect a 0.01μF 500WV capacitor between the signal generator and the check point.



FREQUENCY : 14.200MHz

AF INPUT

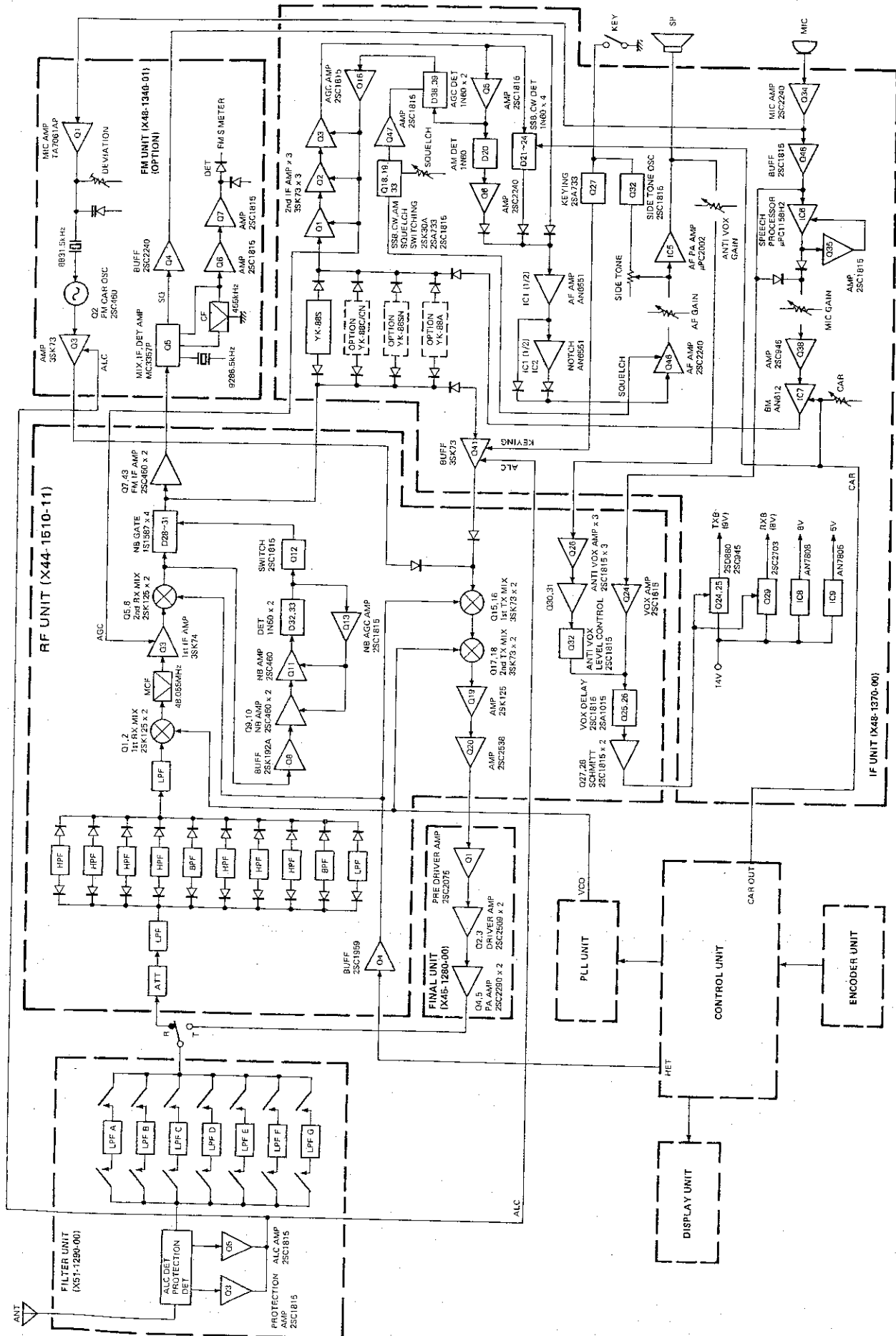
SSB : 1kHz, 400mVpp to IC7 1pin.

CW : 8.8307MHz, 100mVpp to IC7 3pin.

NOTES

- 1) Adjust ALC level control for full scale reading.

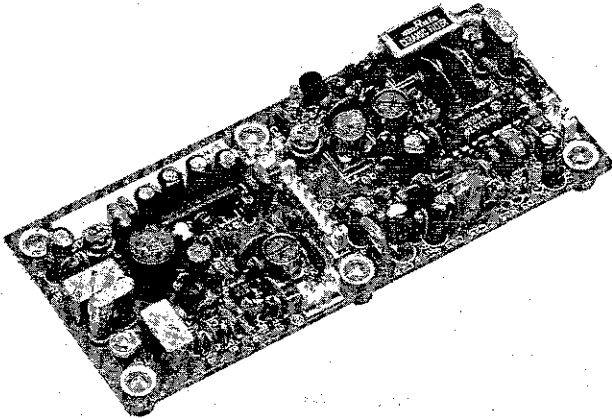
BLOCK DIAGRAM TS-430S



TS-430S

FM-430

OUTSIDE VIEW



PARTS LIST

SEMICONDUCTOR

Item	Re- marks	Name	Item	Re- marks	Name
Diode		1N60	FET		3SK73(GR)
		1S1555			
		1S2208			
Zener diode		WZ-071	IC		MC3357P
		2SA1015(Y)			TA7061AP
		2SC460(B)			
TR		2SC1815(Y)			
		2SC2240(GR)			

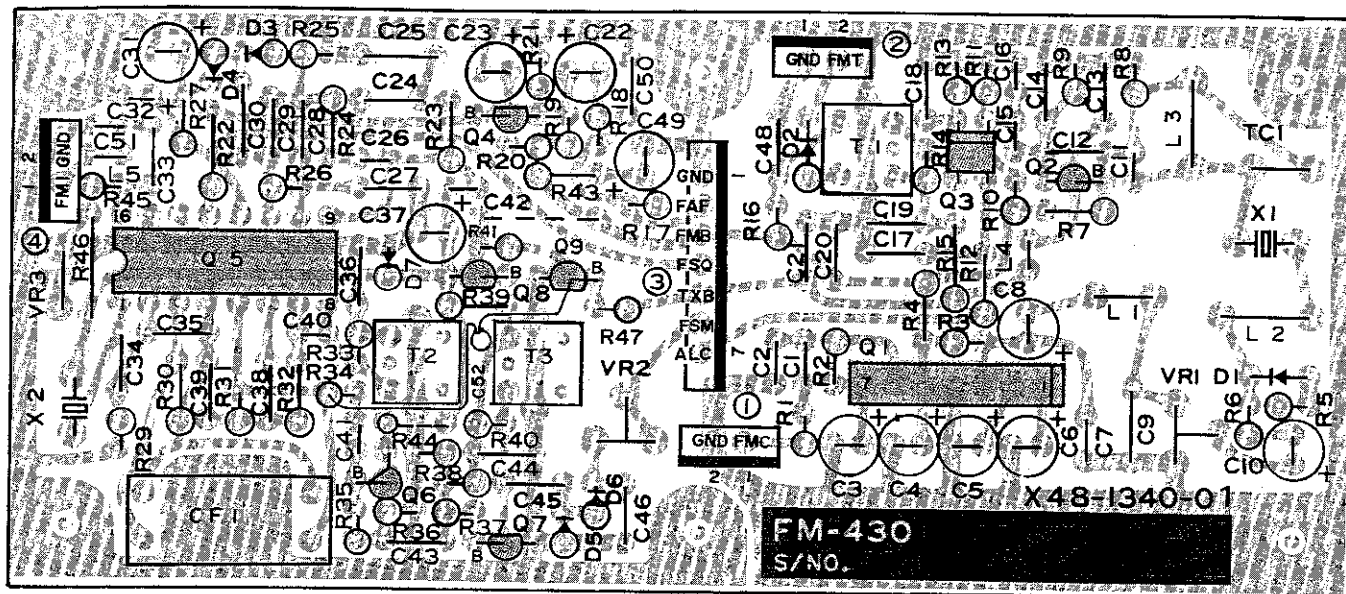
N : New parts

Part No.	Re- marks	Description	Ref. No.
FM-430 GENERAL			
B50-4029-00	N	Instruction manual	
H01-4471-13	N	Packing carton (inside)	
H12-0483-04		Cushion	
H25-0029-04		Protective bag, Screw	
H25-0120-04		Protective bag, Unit	
J61-0401-05		Nylon band x 4	
N87-3012-46		Self tapping screw x 6	
X48-1340-01	N	FM unit	

Part No.	Re- marks	Description	Ref. No.	Q'ty
FM UNIT (X48-1340-01)				
C05-0031-15		Ceramic trimmer 10P	TC1	1
CC45SL1H050C	C	5P	C15	1
CC45SL1H101J	C	100P	C29	1
CC45SL1H120J	C	12P	C40	1
CC45SL1H121J	C	120P	C34	1
CC45SL1H150J	C	15P	C51	1
CC45SL1H220J	C	22P	C16,41	1
CC45SL1H221J	C	220P	C12,14	2
CC45SL1H560J	C	56P	C35	1
CC45SL1H680J	C	68P	C27,28	2
CC45UJ1H070D	C	7P	C11	1
CE04W1A101M	E	100 10V	C37	1
CE04W1A220M	E	22 10V	C4,23	2
CE04W1A470M	E	47 10V	C3,6	2
CE04W1E4R7M	E	4.7 25V	C49	1
CE04W1H010M	E	1 50V	C5,8,10,22,31	5
CK45B1H102K	C	0.001	C26,45	2
CK45B1H152K	C	0.0015	C42	1
CK45F1H103Z	C	0.01	C13,17,20,21,33, 36,43,46	8
CK45F1H223Z	C	0.022	C18,19,44,48	4
CK45F1H473Z	C	0.047	C38,39	2
CQ92M1H103K	ML	0.01	C2,7,24	3
CQ92M1H333K	ML	0.033	C50	1
CQ92M1H393K	ML	0.039	C9	1
CQ92M1H472K	ML	0.0047	C1	1
CQ92M1H473K	ML	0.047	C25,30	2
CS15E1C2R2M	T	2.2 16V	C32	1
E40-0273-05		Mini connector 2P		3
E40-0773-05		Mini connector 7P		1
J31-0502-04		PC board collar		6
J42-0428-05		PC board bushing		6
L30-0199-06		Tuning coil	T3	1
L30-0503-05		Tuning coil	T2	1
L34-0535-05		Tuning coil	T1	1
L33-0639-05		Choke coil 10μH	L3	1
L33-0640-05		Choke coil 12μH	L2	1
L40-1511-03		Ferri-inductor 150μH	L4	1
L40-1541-27		Ferri-inductor 150mH	L1	1
L40-6891-01		Ferri-inductor 6.8μH	L5	1
C72-0309-06		Ceramic filter CFT455F2	CF1	1
C77-0939-05		Crystal 9.2865MHz	X2	1
C77-0940-05		Crystal 8.8315MHz	X1	1
R12-3430-05		Trim. pot. 10kΩ(B)	VR1	1
R12-4408-05		Trim. pot. 50kΩ(B)	VR2	1
R12-4410-05		Trim. pot. 50kΩ	VR3	1
R92-0150-05		Short jumper		2

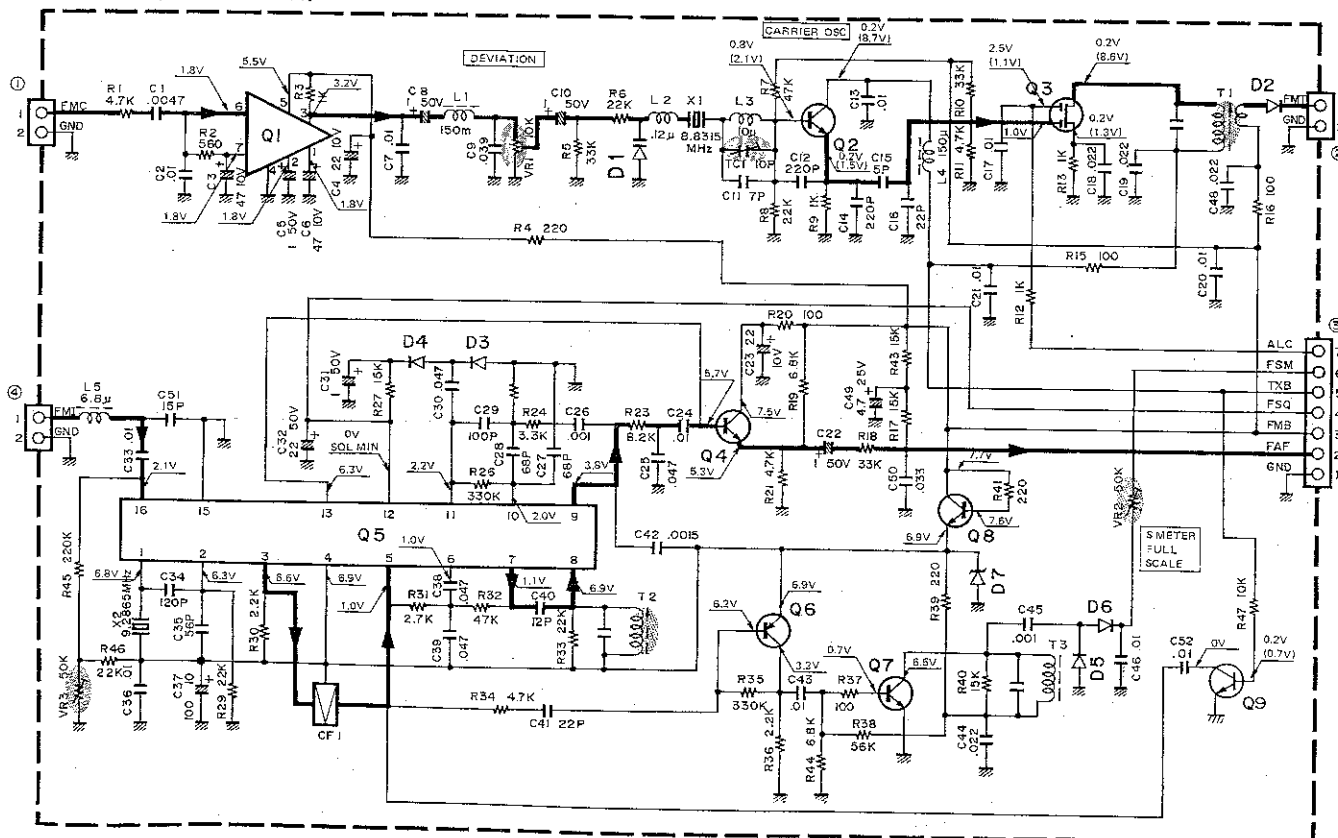
FM-430

PC BOARD VIEW



SCHEMATIC DIAGRAM

FM UNIT (X48-1340-01)



2SA1015 2SC1815
2SC2240

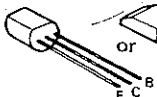
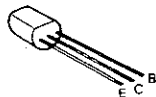
2SC460

TC7061AP

Q1 : TA7061AP
Q2 : 2SC460(B)
Q3 : 3SK73(GR)
Q4 : 2SC2240(GR)

Q5 : MC3357P
Q6 : 2SA1015(Y)
Q7 ~ 9 : 2SC1815(Y)

D1 : IS2208
D2 : IS1555
D3 ~ 6 : 1N60
D7 : WZ071



TS-430S

PS-430

SPECIFICATIONS

Input voltage:	120/220/240V AC±10%, 50/60Hz
Output voltage:	13.8V DC (standard voltage)
Output current:	20 A (25% duty cycle) 15A (50% duty cycle)
Continuous load current:	10 A max. (including external output terminal)
Output voltage fluctuation:	Within ±0.7 V at AC 120V, 220V, 240V±10% (Load current: 15A) Within 0.7 V between 2—15 A load. (No-load output voltage: Less than 16V at 120V/220/240V. AC)
Ripple voltage.	Less than 20 mV (rms) at 13.8V, output current 15A.
Power consumption:	Approx. 480 W (at 120/220/240V AC, 13.8V DC, 20A)
Dimensions:	173 (6-13/16) W x 95 (3-3/4) H x 245 (9-5/8) D mm (inch)
Weight:	Approx. 7 kg (15.4 lbs.)

PARTS LIST

SEMICONDUCTOR

N : New parts

Item	Re- marks	Name	Item	Re- marks	Name
Diode		1S1555 S25VB10 U05B	Thermistor		32D27 SDT1000(F) 2N5885 2SA562(Y) 2SB512(P)
Zener diode		RD9.1EB2	TR		
LED		SLP144B			2SC1815(Y)

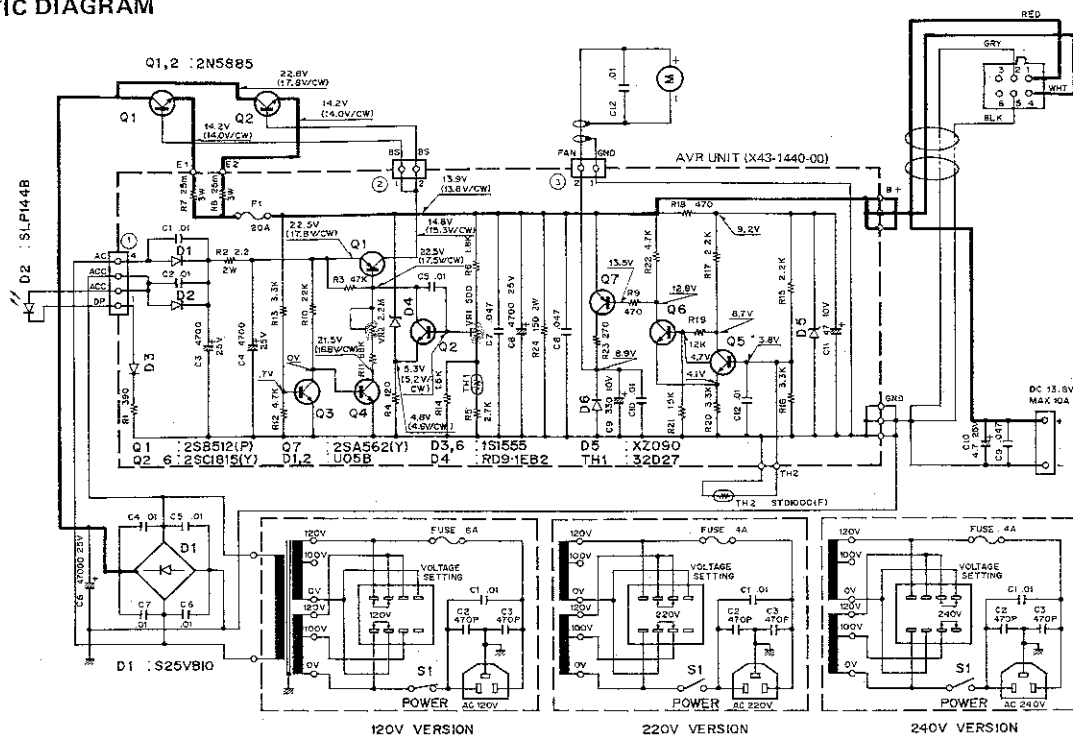
Part No.	Re- marks	Description	Ref. No.
E30-1645-05		AC cord W	
E30-1647-05		AC cord X	
E31-0500-05		Cable with plug	
F01-0786-03	N	Heat sink plate	
F01-0787-13	N	Heat sink	
F05-4022-05		Fuse 4A K	
F05-4022-05		Fuse 4A x 2 M,T,W,X	
F05-6021-05		Fuse 6A x 2 K	
F05-6021-05		Fuse 6A M,T,W,X	
F07-0847-04	N	Fan cover	
F09-0405-24		Fan	
H01-4451-14	N	Packing carton (inside) K,M,W,X	
H01-4452-04	N	Packing carton (inside) T	
H10-2567-02	N	Packing fixture (F)	
H10-2568-02	N	Packing fixture (R)	
H12-1319-04	N	Cushion	
H20-1420-03		Protective cover	
H25-0105-04		Protective bag	
J02-0323-05		Foot x 2	
J02-0427-04	N	Assistant foot	
J13-0033-15		Fuse holder	
J42-0403-05		Cord bushing	
J42-0095-05	N	Rubber bushing x 3	
K29-0758-04		Push knob	
L01-8166-25	N	Power transf.	
S29-2406-05		Voltage selector switch	S2
S40-1405-05	N	Power switch	S1
T42-0301-05		Fan motor	
X43-1440-00	N	AVR unit	

Part No.	Re- marks	Description	Ref. No.	Q'ty
AVR UNIT (X43-1440-00)				
CE04W1A331M		E 330 10V	C9	1
CE04W1A470M		E 47 10V	C11	1
CK45F1H103Z		C 0.01	C1,2,5	3
CK45F1H473Z		C 0.047	C7,8	2
C90-0814-05		E 4700 25V	C3,4,6	3
E23-0022-04		Terminal		8
E23-0046-04		Square terminal		2
E40-0273-05		Mini connector 2P		2
E40-0473-05		Mini connector 4P		1
F05-2035-15		Fuse 20A		1
J31-0502-04		PC board collar		4
J42-0428-05		PC board bushing		4
R12-0427-05		Trim. pot. 500Ω (B)	VR1	1
R12-8404-05		Trim. pot. 2.2MΩ (B)	VR2	1
RS14GB3D2R2J		MF 2.2Ω 2W	R2	1
R92-0663-05	N	Cement 0.025Ω 3W	R7,8	2

Part No.	Re- marks	Description	Ref. No.
PS-430 GENERAL			
A01-0937-02	N	Case (upper)	
A01-0938-12	N	Case (lower)	
A20-2461-13	N	Panel K,M,W,X	
A20-2462-03	N	Panel T	
B39-0407-04		Spacer x 2	
B40-2634-04	N	Name plate	
B41-0626-14	N	Voltage sheet 120V K	
B41-0627-14	N	Voltage sheet 220V M,W	
B41-0630-04	N	Voltage sheet 240V T,X	
B42-1733-14		Voltage sheet	
B42-1770-04	N	Current indication sheet M,T,W,X	
B46-0404-00		Warranty card K	
B50-4014-10	N	Instruction manual K,M,W,X	
B50-4015-00	N	Instruction manual T	
CE04W1E4R7M	E	4.7 25V	C10
CK45E2H103P	C	0.01 500V x 4	C4-7
CK45F1H473Z	C	0.047 x 2	C9,11
C90-0865-05	N	E 47000 25V	C8
C91-0079-05		C 0.01	C1
C91-0496-05		C 470P x 2	C2,3
E18-0351-05		3P Inlet	
E20-0282-05		2P terminal plate	
E22-0472-05		Lug plate	
E23-0015-04		GND lug	
E23-0425-05		Lug terminal	
E30-1643-15		AC cord K,M	
E30-1644-15		AC cord T	

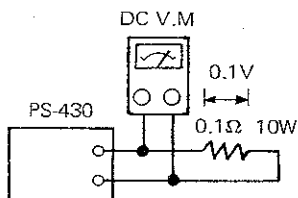
PS-430

SCHEMATIC DIAGRAM



ADJUSTMENT

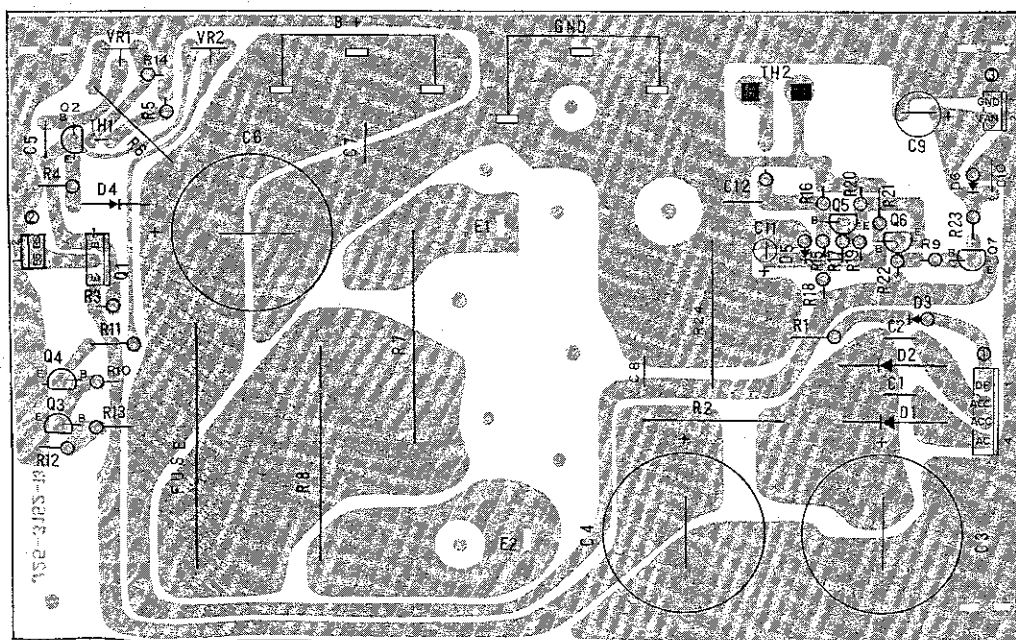
1. Connect the load and set the current to 15A.
2. Adjust output voltage to $13.8V \pm 0.4V$ with VR1.
3. Protection circuit



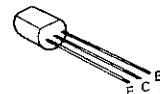
Connect a 0.1Ω 10W resistor and adjust VR2 so that 0.1V DC is obtained.

PC BOARD VIEW

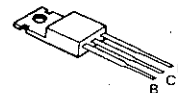
AVR UNIT (X43-1440-00) Component side view



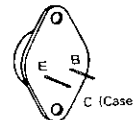
2SC1815



2SB512



2N5885

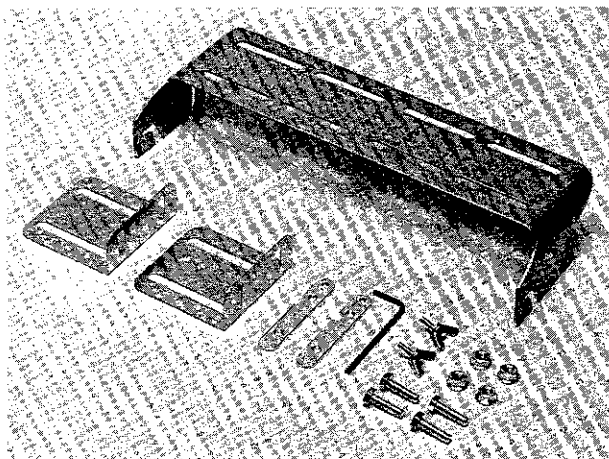


SLP-144B



MB-430/SP-430

MB-430 OUTSIDE VIEW



SP-430 SPECIFICATIONS

SPEAKER SIZE	3"
RATED INPUT	1.0 watts
IMPEDANCE	8 ohms
FREQUENCY RESPONSE	300 Hz to 5 kHz
DIMENSIONS	4-7/8" wide x 3-3/4" high x 9-1/3" deep (excluding feet)
WEIGHT	3.1 lbs.

SP-430 PARTS LIST

N : New parts

Part No.	Re- marks	Description	Ref. No.
A01-0942-03	N	Case (B)	
A01-0944-13	N	Case (A)	
A20-2468-03	N	Panel	K,M
A20-2469-03	N	Panel	T
A23-1431-04		Rear panel	
B04-0406-04	N	SP grill	
B07-0613-14		SP ring	
B39-0407-04		Spacer x 2	
B46-0404-00		Warranty card	K
B50-4026-10	N	Instruction manual	K,M
B50-4027-00	N	Instruction manual	T

MB-430 PARTS LIST

N : New parts

Part No.	Re- marks	Description	Ref. No.
A13-0635-03	N	Angle	
B50-4016-00	N	Instruction manual	
H01-4453-13	N	Packing control (inside) M	
H01-4454-13	N	Packing control (inside) T	
H25-0077-04		Protective bag	
H25-0098-04		Protective bag 150 x 480	
J30-0521-04	N	Spacer x 2	
N09-0007-05		Wing bolt x 5	
N09-0008-04		Hex. screw x 6	
N14-0009-04		Nut x 6	
N15-1060-46		Flat washer x 6	
N16-0060-46		Spring washer x 6	
N32-3006-46		Flat screw x 4	
N99-0309-04	N	Hex. head screw x 6	
W01-0401-04		Hex. wrench	

Part No.	Re- marks	Description	Ref. No.
E20-0208-04		Terminal plate	
E30-1629-15		SP cord	
G53-0507-04		Packing x 4.	
H01-4468-14	N	Packing carton	K,M
H01-4469-04	N	Packing carton	T
H10-2513-02		Packing fixture (F)	
H10-2514-12		Packing fixture (R)	
H12-0445-04		Cushion	
H20-1407-03		Protective cover	
H25-0077-03		Protective bag Accessory	
J02-0323-05		Foot x 4	
J02-0409-04		Assistant foot	
J21-1144-14		SP mounting hardware x 2	
J21-2573-04		Foot mounting hardware x 2	
J61-0019-05		Vinyle tie	
N15-1030-46		Washer x 8	
N30-3008-46		Round screw x 4	
N35-3006-41		Bind screw x 12 Case	
N87-3006-46		Self tapping screw x 6	
N87-3008-46		Self tapping screw x 4	
T07-0224-05	N	Speaker	

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