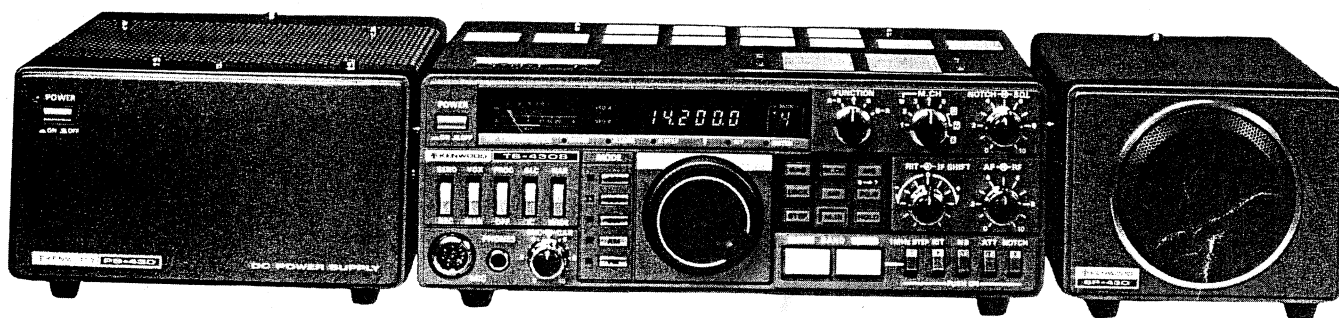


KENWOOD

SERVICE MANUAL

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

HF TRANSCEIVER



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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)
Better than 40 dB
Better than 50 dB
Less than -40 dB
 ± 5 kHz (with FM-430 optional accessory)
500 Ω to 50 k Ω

Carrier Suppression:

Unwanted Sideband Suppression:

Harmonic Content:

Maximum Frequency Deviation (FM):

Microphone Impedance:

[RECEIVER]

Circuitry:

SSB, CW, AM = Double conversion Superheterodyne
FM = Triple Conversion Superheterodyne
1st IF = 48.055 MHz
2nd IF = 8.83 MHz
3rd IF = 455 kHz (only FM)

Intermediate Frequency:

Sensitivity:

Frequency \ Mode	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)
More than 50 dB (FM-3rd image ratio)
More than 70 dB (1.8 to 30 MHz)

IF Rejection:

Selectivity:

Selectivity \ Mode	-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:

RIT Variable Range:

Audio Output Impedance:

Audio Output Power:

Better than 10×10^{-6}
More than ± 1 kHz
4 Ω to 16 Ω
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.

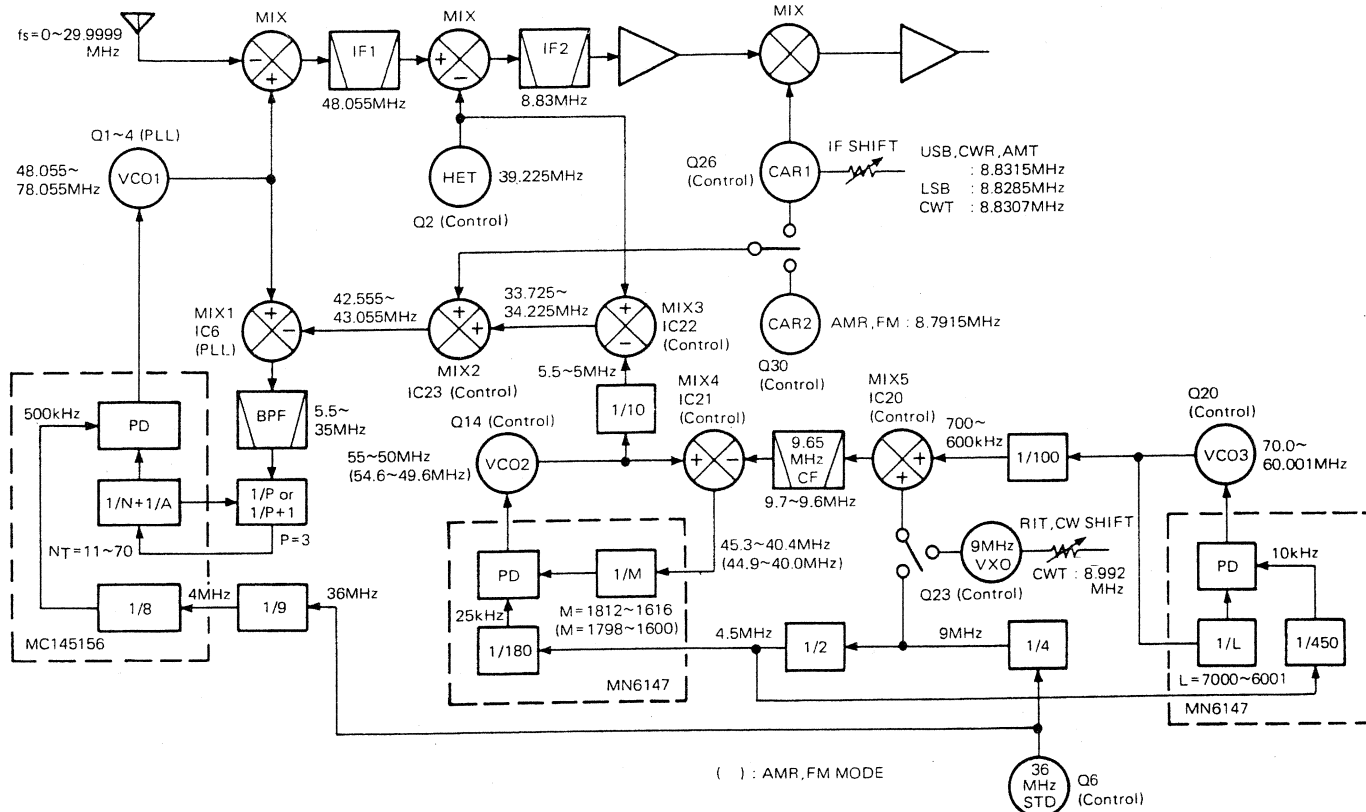


Fig. 1 Frequency configuration

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

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

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

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

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

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

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

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

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

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

Item	Rating
Center frequency (fo)	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 //15pF
Temperature	-10°C ~ +50°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		

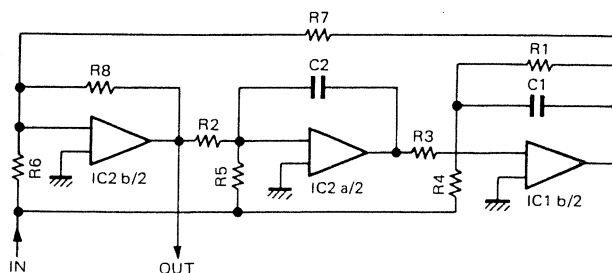


Fig. 2 Theoretical circuit diagram

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 fre-

quency, 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	$f_0 \pm 80\text{kHz}$ or more
Insertion loss	6dB or less $20 \cdot \log \left(\frac{E_1}{2E_2} \right)$
Guaranteed attenuation at 9MHz	40dB or more
Spurious (within 9.65+2MHz)	30dB or more
Spurious (within 9.65-2MHz)	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

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.

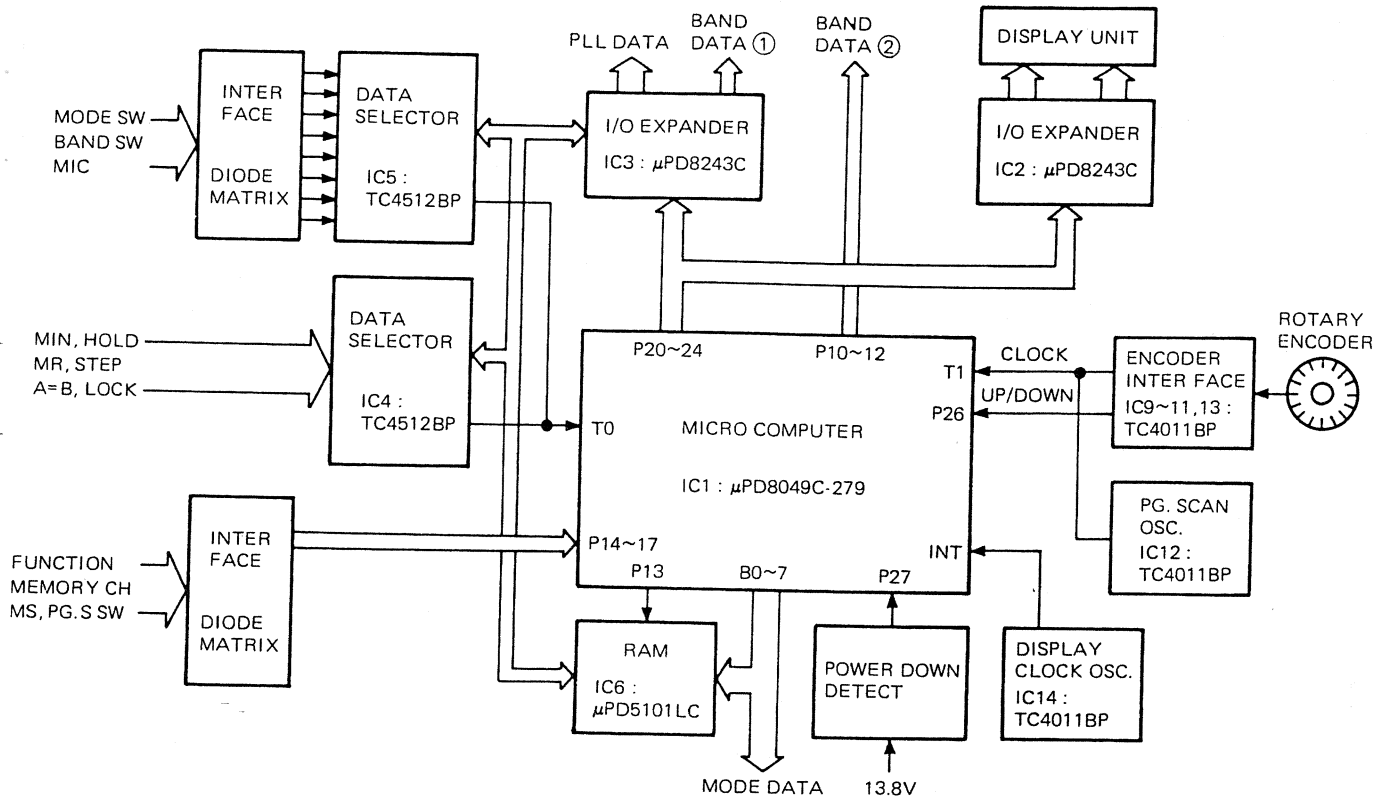


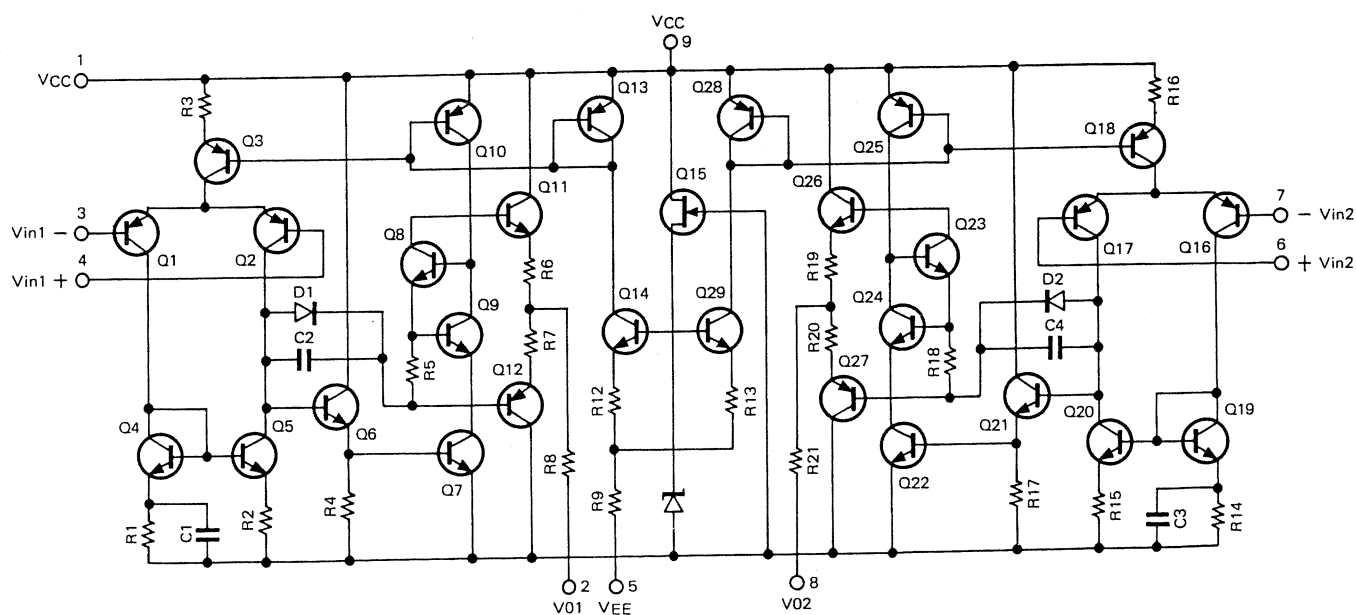
Fig. 4 Digital control system

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	Not used, normally open	30	P13	External RAM control output (R/W)
11	ALE		31	P14	P. SCAN input
12	DB0	VFO A indicator output	32	P15	M. SCAN input
13	DB1	VFO B indicator output	33	P16	FUNCTION input
14	DB2	No memory signal output	34	P17	
15	DB3	MODE output LSB	35	P24	I/O Exp. data selector control output "L": EX (0), DS (1)
16	DB4	MODE output USB	36	P25	External RAM control output (CE)
17	DB5	MODE output CW	37	P26	Encoder UP/DOWN input "L": DOWN, "H": UP
18	DB6	MODE output AM	38	P27	Voltage down detection signal input "L": Power down
19	DB7	MODE output FM	39	T1	Data selector input
20	GND	GND	40	Vcc	Power supply 5V

Table 8 Function of μPD8049C-279

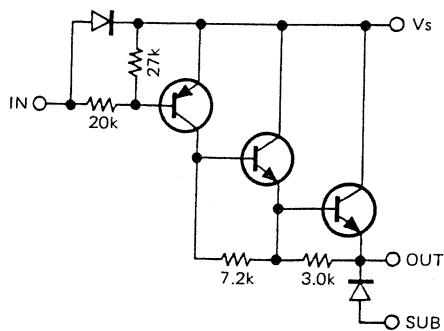
CIRCUIT DESCRIPTION/SEMICONDUCTOR DATA

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 1kHz
4	P42		4	P42	DIGIT output 10kHz
5	P43		5	P43	DIGIT output 100kHz
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	GND	11	P20	GND
12	GND		12	GND	
13	P70		13	P70	
14	P71		14	P71	SEGMENT output e
15	P72	PLL 2 3 data output	15	P72	SEGMENT output f
16	P73		16	P73	SEGMENT output g
17	P63	PLL select signal Normally : "H"	16	P73	Buzzer output ON : "L"
18	P62	PLL 1 ENABLE	17	P63	SEGMENT output d
19	P61	PLL 2 clock output	18	P62	SEGMENT output c
20	P60	PLL 3 clock output	19	P61	SEGMENT output b
21	P53	Data selector output	20	P60	SEGMENT output a
22	P52		21	P53	DIGIT output M.CH
23	P51		22	P52	DIGIT output 10Hz
1	P50		23	P51	DIGIT output 10MHz
		External RAM data in-output	1	P50	DIGIT output 1MHz

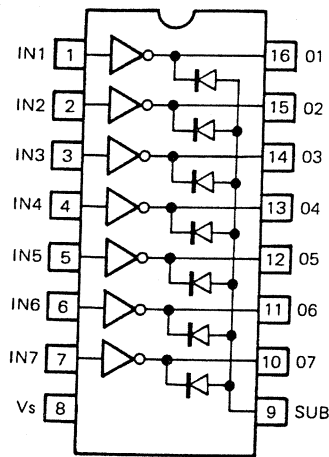
Table 9 I/O EXPANDER (0) IC2: μ PD8243CTable 10 I/O EXPANDER (1) IC3: μ PD8243C

AN6551 Equivalent circuit (IF unit IC1,2)

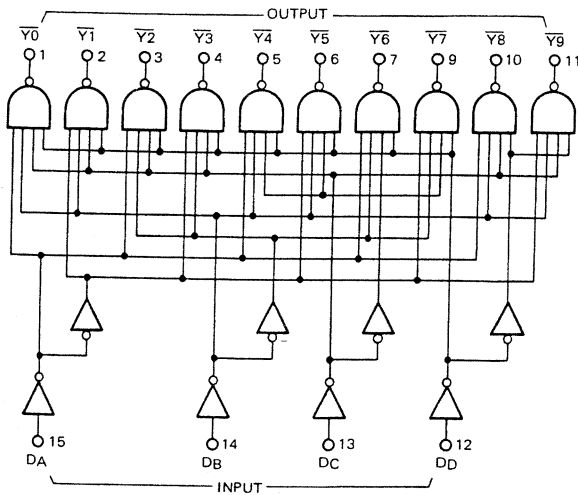
SEMICONDUCTOR DATA



M54561P Equivalent circuit (RF unit IC1)

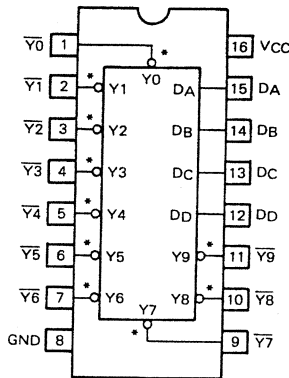


M54561P



M74LS145P Logic circuit (RF unit IC2)

* Open collector output

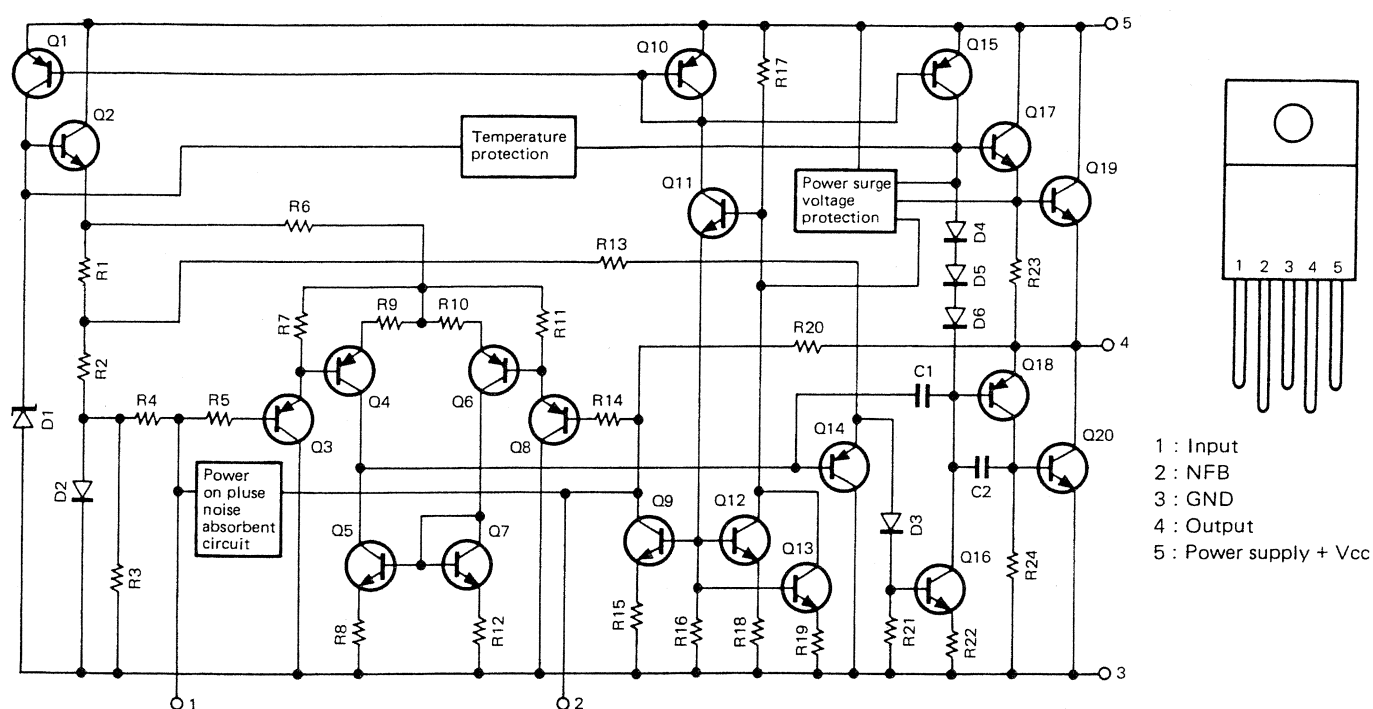


M74LS145P

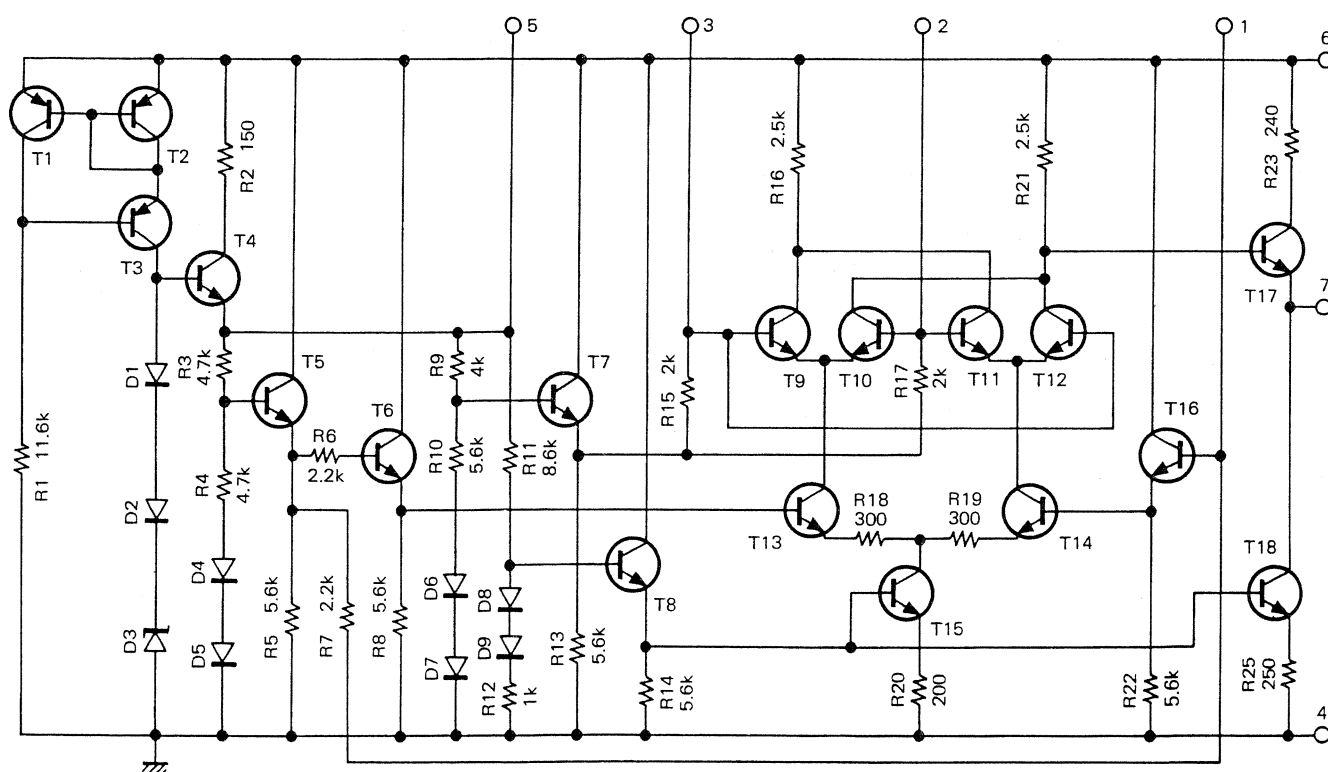
Decade digit	INPUT				OUTPUT									
	DD	DC	DB	DA	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	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

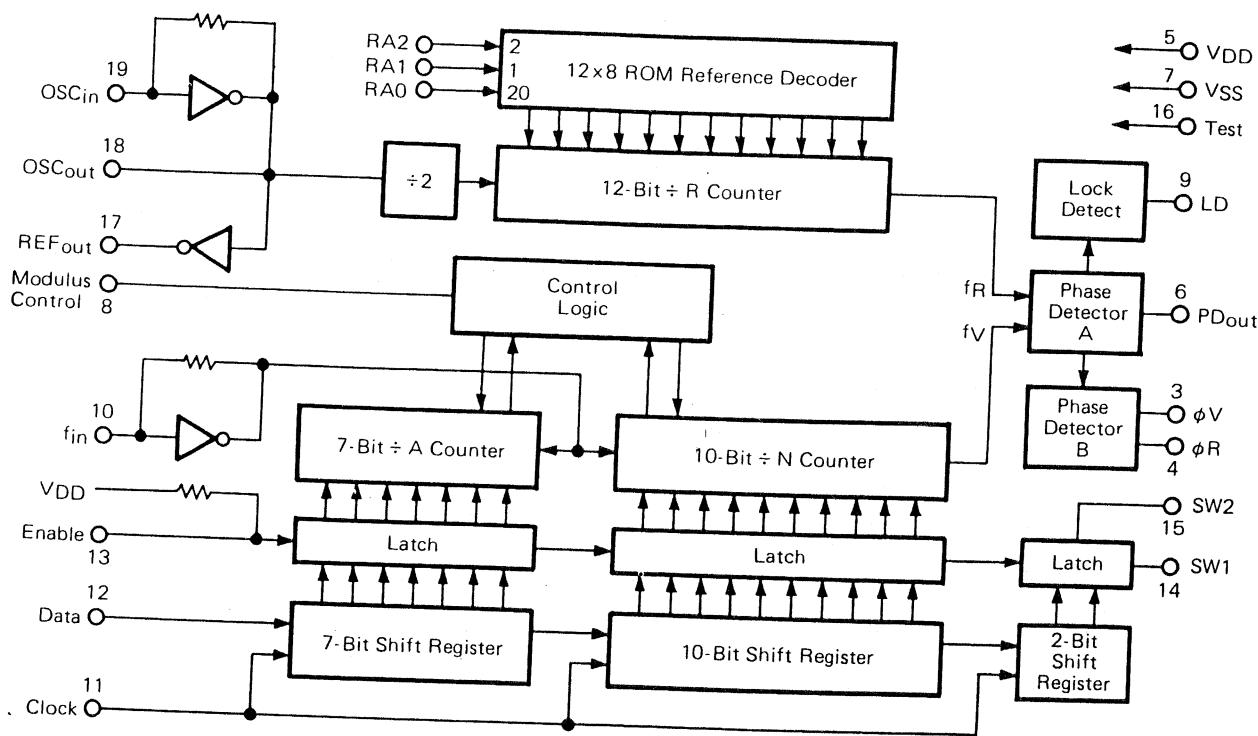


μPC2002V Equivalent circuit (IF unit IC5)

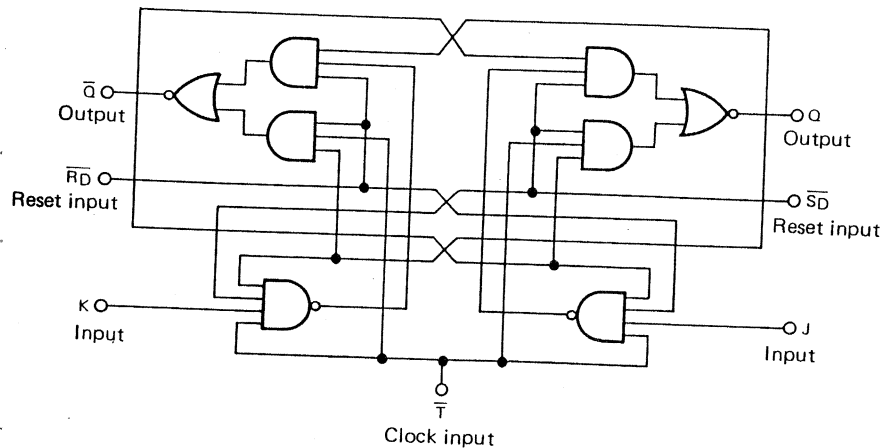


AN612 Equivalent circuit (IF unit IC7)

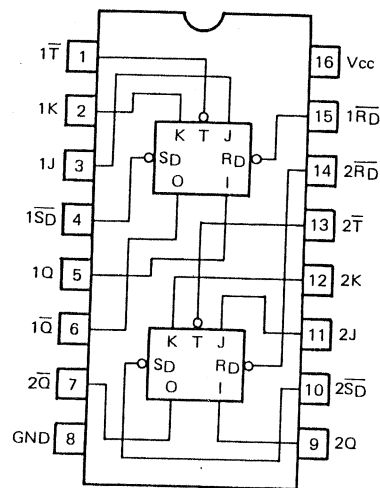
SEMICONDUCTOR DATA



MC14156P Block diagram (PLL unit IC1)

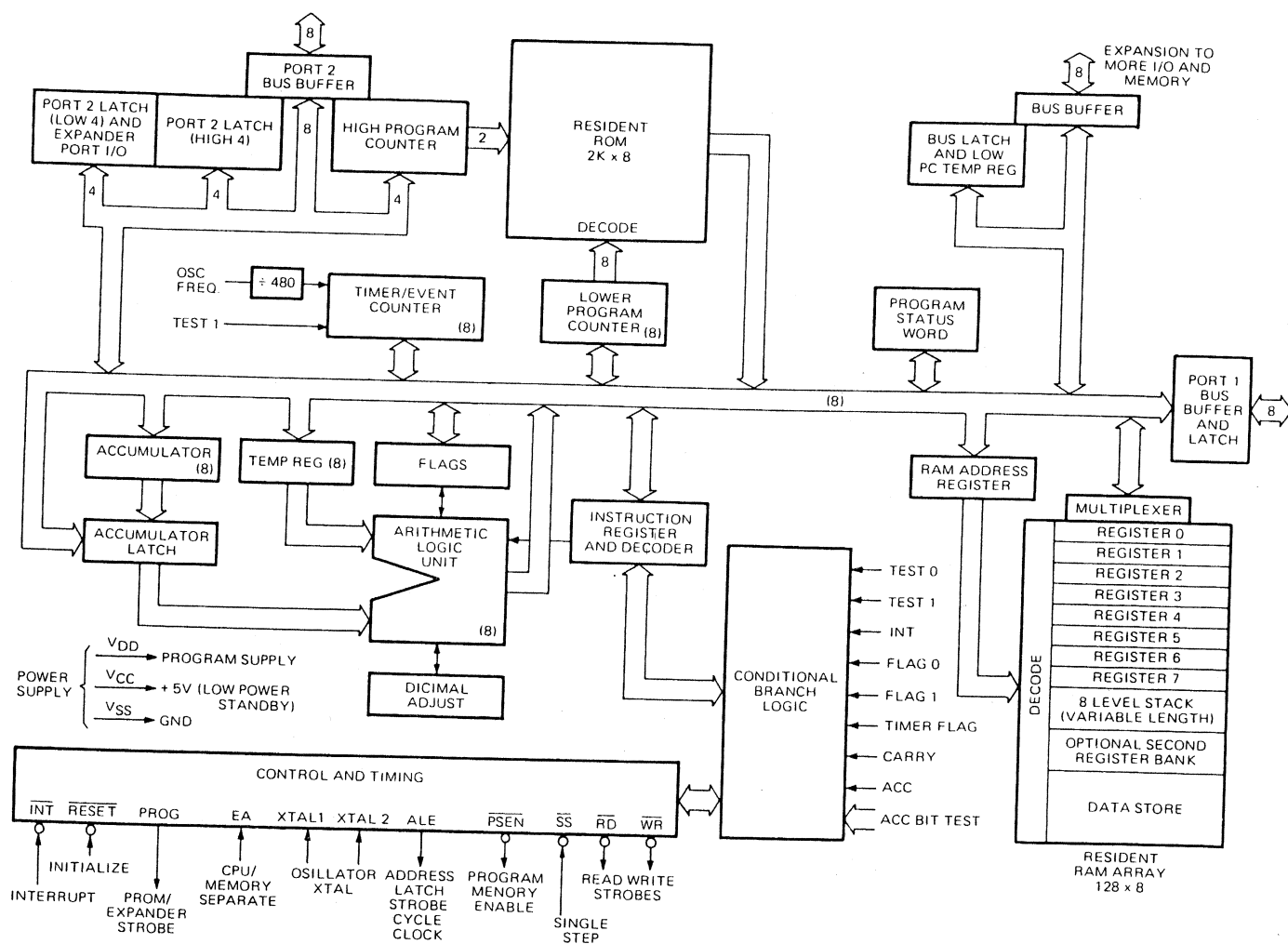
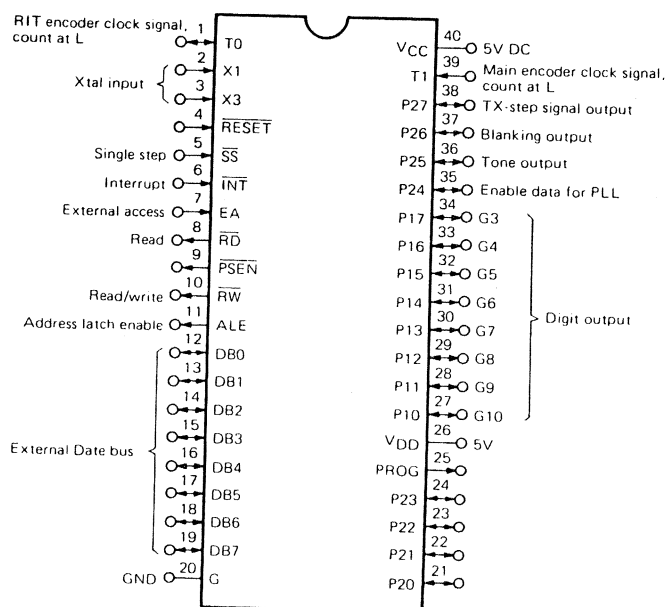
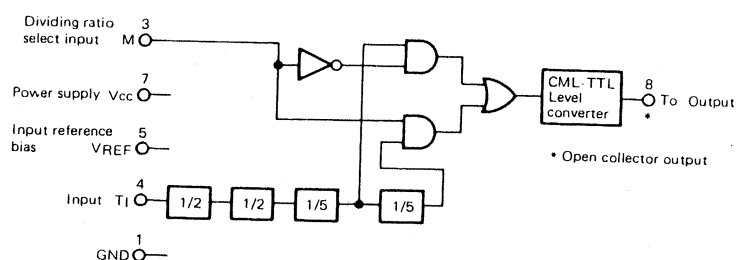
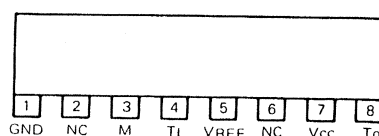


M74LS112AP Logic circuit (PLL unit IC5)

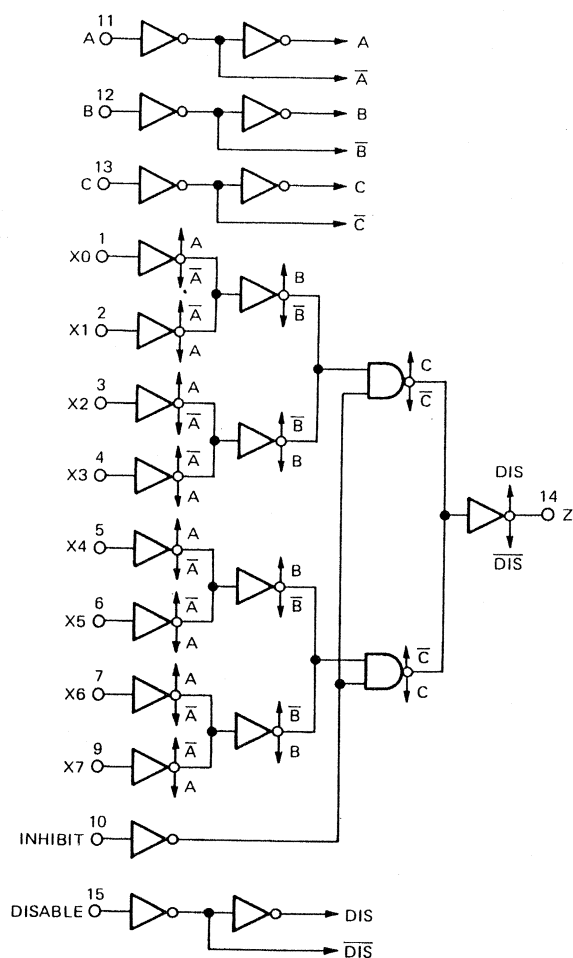


M74LS112AP

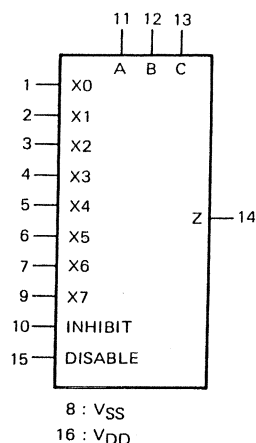
SEMICONDUCTOR DATA

**μPD8049C-279 Block diagram (Control unit IC1)****μPD8049C-279****M54459L Block diagram (Control unit IC18)****M54459L**

SEMICONDUCTOR DATA



TC4512BP Block diagram (Control unit IC4,5)



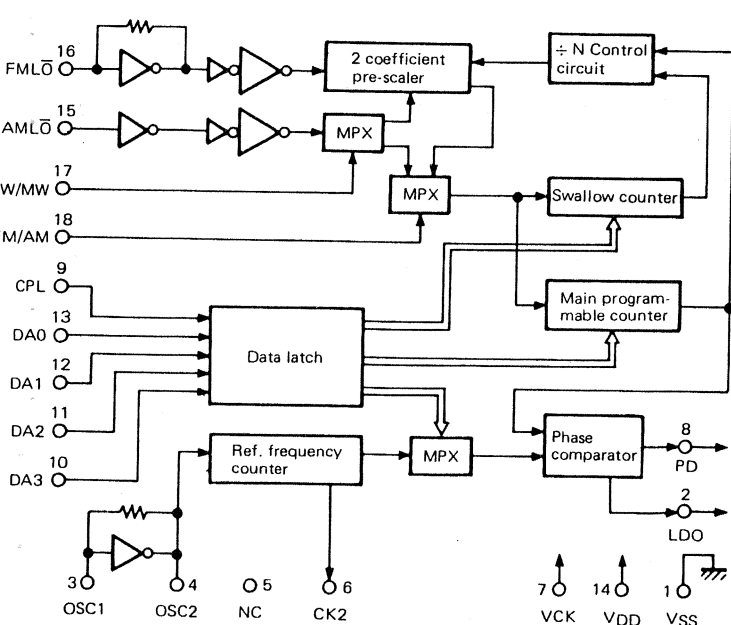
TC4512BP

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

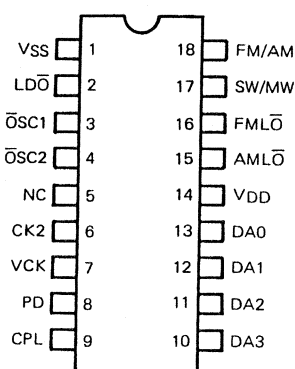
* : Don't Care

HZ : High Impedance

TC4512BP Truth table

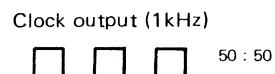


MN6147C Block diagram (Control unit IC7,8)

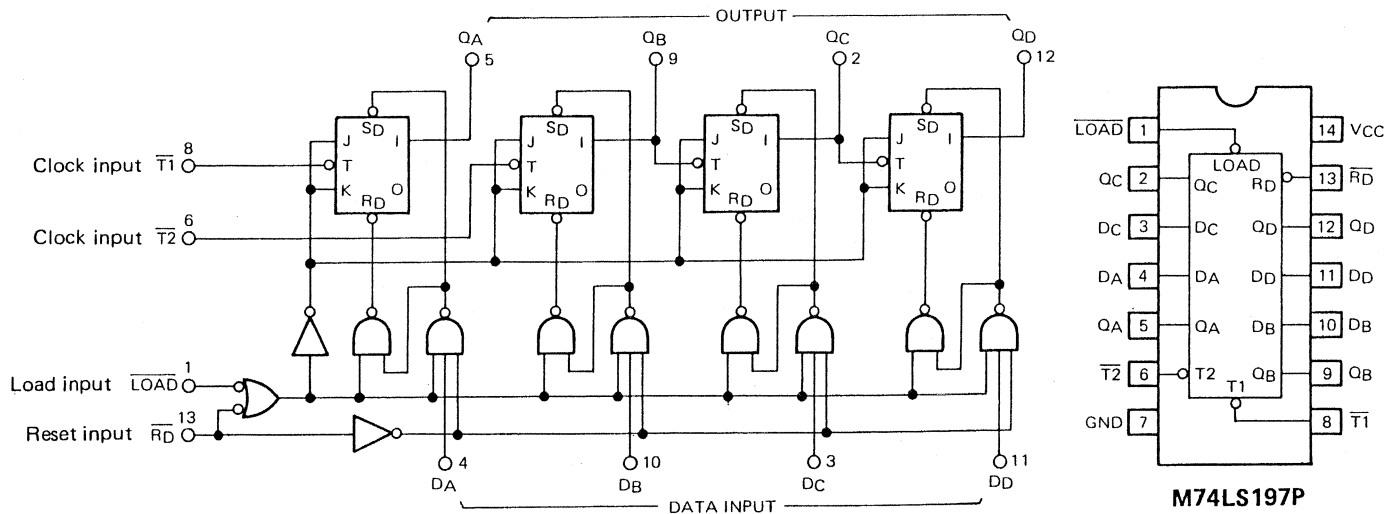


VSS : Ground
LD0 : OSC circuit output
OSC1 : Ext. clock input
NC : No connection
CK2 : Clock output (1kHz)
VCK : Clock circuit back up
PD : Phase detector output

CPL : Latch clock
DA3-DA0 : Data address
VDD : Main power supply
AMLO : 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)

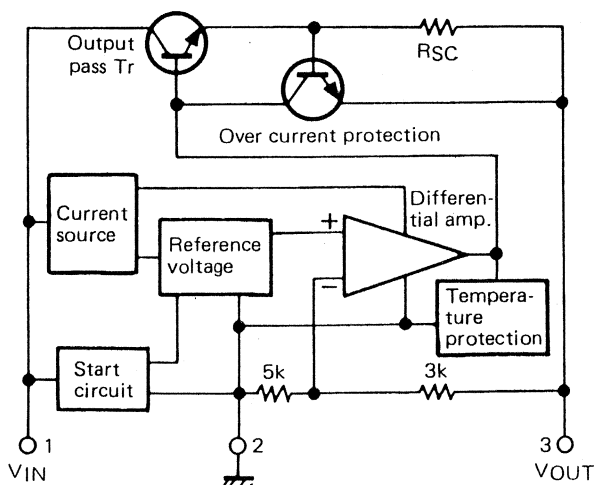
INPUT			OUTPUT			
T	RD	LOAD	QA	QB	QC	QD
X	L	X	L	L	L	L
X	H	L	DA	DB	DC	DD
↓	H	H	COUNT			

↓ : Change H to L
X : Either H or L

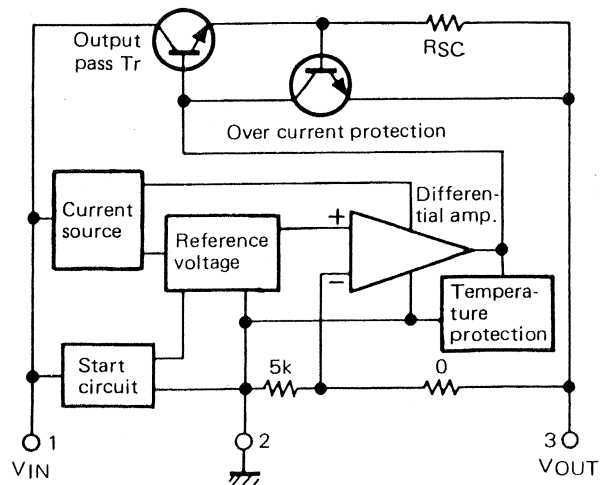
M74LS197P Truth table (1)

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

CC 45 TH 1H 220 J
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 10μF - 10 ~ +50 Less than 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		

● Rating voltage

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

● Capacitor value

0 1 0 = 1pF

1 0 0 = 10pF

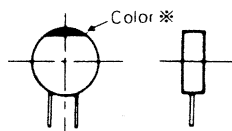
1 0 1 = 100pF

1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

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

CC45



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

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.

N : New parts

SEMICONDUCTOR

Item	Re- marks	Name	Item	Re- marks	Name	Item	Re- marks	Name	Item	Re- marks	Name
Diode		1N60	LED	N	LN247RP	FET		2SC2053	N	N	M74LS112AP
		1S1007		N	LN347GP			2SC2075		N	M74LS145P
		1S1555		N	LN447YP			2SC2240(GR)			M74LS196P
		1S1587	Surge absorber		SG238D			2SC2290*J		N	M74LS197P
		1S2588			SY438D			2SC2509		N	M54459L
								2SC2538		N	M54561P
Vari-cap		BA379	Thermistor		ERZC07DK201			2SC2603(E)			MB3614
		ITT310			ERZD03DK331			2SC2703(O)			MC145156P
		LN66(R)					N	2SC2703(O or Y)		N	MN6147C
		S31C	Display tube		25D29	IC		2SD880(Y)	N		SN74LS90N
Varistor		V06B			32D27			2SK30A(O)			SN74S10N
				N	SDT1000F			2SK125			SN74S112N
		1SV53A	Photo TR		FIP9D7			2SK192A(GR)			SN16913P
Zener diode		1SV54GC			PN126S			2SK192(Y)			TC4011BP
				N	2SA562(Y)			3SK73(GR)			TC4512BP
		MV5T	TR		2SA733(R)			3SK74(L)			TC5065BP
		MV13			2SA1015(Y)			74LS90N			TC5067BP
		SV03Y			2SC460(B)						μPB551C
					2SC945(Q)		N	AN612		N	μPC1158H2
					2SC945(R)		N	AN6551		N	μPC2002V
					2SC1775(E)		N	AN7805		N	μPD5101LC
					2SC1815(GR)		N	AN7808		N	μPD8049C-279
					2SC1815(Y)			HD74LS90P			μPD8243C
					2SC1923(O)						
					2SC1959(Y)			LM358P			

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Part No.	Re- marks	Description	Ref. No.
TS-430 GENERAL				H20-1410-03		Protective cover	
A01-0935-02	N	Case (A) upper		H25-0029-04		Protective bag	K
A01-0936-02	N	Case (B) lower		H25-0079-04		Protective bag	MIC M
A20-2457-03	N	Panel		H25-0112-04		Protective bag	Cord
				H25-0116-04		Protective bag	
B05-0701-04		SP grill cloth		J02-0323-05		Foot x 4	
B30-0817-15		Pilot lamp 14V, 80mA		J02-0403-04		Rubber foot x 4	
B31-0639-05	N	Meter		J02-0407-04		Assistant foot	
B39-0407-04		Spacer x 2 Assistant foot		J13-0404-05		Fuse holder	
B42-1767-04	N	VOX name plate Case (A)		J21-2573-04		Foot mounting hardware x 2	
B42-1768-04	N	Switch plate		J31-0141-04		Spacer ring MIC	
B43-0683-14	N	Name plate	K,M,W	J61-0019-05		Vinyle tie x 10	
B43-0684-04	N	Name plate	T	J61-0401-05		Nylon band x 10	
B46-0058-10		Warranty card	K				
B50-4006-10	N	Instruction manual	K,M,W	K01-0410-05	N	Carring handle	
B50-4007-00	N	Instruction manual	T	K21-0768-04	N	Main knob	
CE04W1A470M	E	47 10V Encoder ass'y	C1	K23-0710-04		Knob (inside) x 4 AF,MIC,NOTCH,RIT	
CK45E2H222P	C	0.0022 500V	C3	K23-0753-04		Pointer knob x 2 FUNCTION,M.CH	
CK45F1H103Z	C	0.01	C4-7	K27-0426-14		BAND knob x 2 BAND	
CK45F1H473Z	C	0.047	C1	K29-0741-14		Knob (outside) x 4 RF,CAR,SQL, IF SHIFT	
D09-0306-04	N	Slit plate Moving		K29-0758-04		Push knob POWER	
D09-0307-04	N	Slit plate Fixed		K29-0767-04	N	Push knob x 4 1MHz STEP, NB, ATT,NOTCH	
D40-0626-15	N	Detector mech. ass'y		K29-0768-04	N	Push knob RIT	
E04-0152-05		UHF type receptacle ANT		K29-0769-04	N	Push knob MODE(LSB,USB, CW,AM,FM)	
E06-0751-05		7P DIN socket REMOTE		K29-0770-04	N	Push knob A=B,LOCK,STEP, M.CH,MR,M.IN,MS,PG,S,HOLD	
E06-0851-05		8P DIN socket X.VERTOR, W SW		K29-0771-04	N	Knob ring Main knob	
E06-0852-05		8P DIN socket ACC,W/O SW		N09-0256-05		GND screw x 4 Sub, rear panel	
E07-0751-05		7P DIN plug Accessory		N09-0646-04	N	Round screw x 2	
E07-0851-05		8P DIN plug Accessory		N10-2030-46		Nut x 2 Mold terminal	
E07-0852-05		8P metal socket K		N14-0115-05		Flange nut GND	
E08-0671-05		6P square socket		N14-0509-05		Wing nut GND	
E11-0403-05		Phone jack EXT.SP		N15-1040-46		Flat washer x 2 GND	
E11-0404-05		3P phone jack KEY		N16-0026-46		Spring washer	
E11-0412-05		3P phone jack PHONE		N30-2004-46		Round screw x 5	
E12-0001-15		Phone plug Accessory		N30-2604-46		Round screw x 17	
E20-0315-05		Mold terminal 3P		N30-3008-46		Round screw x 2 Mold terminal	
E23-0417-05		Pressure weld terminal x 2		N30-4016-46		Round screw GND	
E29-0407-05		Bridge connector		N32-2604-46		Flat screw x 9	
E30-1637-05		4 cores cable		N32-2606-46		Flat screw x 8	
E30-1638-05		DC cord Accessory		N32-3006-46		Flat screw x 5	
E31-0431-05		Speaker cord		N33-3006-41		Round flat screw x 4 SP	
E31-2154-05	N	CAL cord Accessory		N33-3006-45		Round flat screw x 4 Panel	
F05-2034-05		Fuse 20A		N35-3006-41		Bind screw x 16 Case (A),(B)	
F15-0641-04	N	Switch mask Case (A)		N35-3006-46		Bind screw x 16 Panel	
G02-0505-05		Knob fixed spring x 4		N87-2606-46		Self tapping screw x 2 VFO A,B	
G13-0665-04	N	Cushion MODE		N87-3006-41		Self tapping screw x 6	
G13-0666-04	N	Cushion x 2 Panel		N87-3006-46		Self tapping screw x 8	
G13-0668-04		Cushion VOX		N87-3012-46		Self tapping screw x 33	
G53-0515-04		Packing (B) x 2		N88-3006-46		Flat tapping screw x 16	
H01-4445-14	N	Packing carton (inside) K,M,W		N89-3006-45		Bind tapping screw x 4 Final	
H01-4446-04	N	Packing carton (inside) T		R12-2411-06		Trim. pot. 5kΩ(B) x 2 Encoder ass'y	VR1,2
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	S1

PARTS LIST

Part No.	Re- marks	Description	Ref. No.	Part No.	Re- marks	Description	Ref. No.	Q'ty	
03-0027-15		Speaker		S29-1428-05	N	Rotary switch M.CH	S1	1	
91-0316-15		Microphone Accessory M		S36-2408-05	N	Paddle switch SEND/ REC, VOX/MAN	S14,15	2	
02-0328-10	N	Encoder ass'y		S36-2411-05	N	Paddle switch PROC, ALC/IC, MAR/WIDE	S16-18	3	
09-0323-05		Lithium battery CR2032		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	
41-1470-00	N	Switch unit		S40-2441-15	N	Push switch A=B, MR, M.IN	S5,9,10	3	
44-1510-11	N	RF unit		S50-1409-05		Tact switch BAND	S3,4	2	
45-1280-00	N	Final unit		S50-1411-05		Tact switch MODE	S24-28	5	
48-1370-00	N	IF unit							
50-1910-00	N	PLL unit							
51-1290-00	N	Filter unit							
53-1290-00	N	Control unit							
54-1710-00	N	Display unit							
RF UNIT (X44-1510-11)									
SWITCH UNIT (X41-1470-00)				CC45RH1H010C	C	1P	C141	1	
E04W1C222M		E 2200 16V	C2,3	2	CC45RH1H030C	C	3P	C144,200	2
45F1H103Z	C	0.01	C5	1	CC45RH1H050C	C	5P	C93,145	2
45F1H473Z	C	0.047	C1,4	2	CC45RH1H070D	C	7P	C138,140	2
91-0456-05	C	0.047	C7,8	2	CC45RH1H100D	C	10P	C80,90,134,143	4
06-0853-05		8P metal socket MIC		1	CC45RH1H101J	C	100P	C73	1
08-0272-05	N	Mini connector 2P		1	CC45RH1H270J	C	27P	C101	1
08-0373-05	N	Mini connector 3P		1	CC45RH1H330J	C	33P	C158	1
23-0401-05		Round terminal		1	CC45RH1H560J	C	56P	C77,78	2
40-0273-05		Mini connector 2P		5	CC45SL1H030C	C	3P	C122	1
40-0473-05		Mini connector 4P		1	CC45SL1H050C	C	5P	C152,159	2
40-0573-05		Mini connector 5P		1	CC45SL1H070D	C	7P	C154	1
40-0673-05		Mini connector 6P		4	CC45SL1H101J	C	100P	C70,71,104,110	4
15-0016-05		Choke coil	CH1	1	CC45SL1H121J	C	120P	C58,166,186	3
10-2030-46		Nut		2	CC45SL1H151J	C	150P	C59	1
130-3008-46		Round screw 3 x 8		2	CC45SL1H180J	C	18P	C199	1
112-4410-05		Trim. pot. 50kΩ	VR1	1	CC45SL1H181J	C	180P	C53	1
113-1401-05	N	Pot. 1kΩ(B) ANTI VOX	VR8	1	CC45SL1H221J	C	220P	C46	1
113-4401-05	N	Pot. 50kΩ(B) VOX GAIN	VR6	1	CC45SL1H271J	C	270P	C48,54	2
113-6401-05	N	Pot. 250kΩ(B) DELAY, SCAN	VR7,9	2	CC45SL1H330J	C	33P	C72,79	2
119-3415-05	N	Pot. 10kΩ(A) x 2 MIC/ CAR	VR4	1	CC45SL1H390J	C	39P	C3	1
119-3416-05	N	Pot. 10kΩ(B), 10kΩ(F) AF/RF	VR2	1	CC45SL1H470J	C	47P	C2,106,107, 157	4
119-3417-05	N	Pot. 10kΩ(B), 10kΩ(F) RIT/SHIFT	VR3	1	CC45SL1H560J	C	56P	C63,189	2
124-9403-15	N	Pot. 250kΩ/10kΩ(B) 50kΩ(B) NOTCH/SQL	VR5	1	CC45SL1H680J	C	68P	C1,64	2
192-0150-05		Short jumper		5	CC45SL1H820J	C	82P	C190	1
29-1427-05	N	Rotary switch FUNCTION	S2	1	CE04W1A101M	E	100 10V	C180	1
					CE04W1A470M	E	47 10V	C178,179	2
					CE04W1C100M	E	10 16V	C108	1
					CE04W1C220M	E	22 16V	C84	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	C170	1
					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
					CK45B1H331K	C	330P	C125	1
					CK45B1H391K	C	390P	C40,41	2
					CK45B1H471K	C	470P	C36,42,47,49	4
					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	C5,61,65,82,83, 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	34	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	L40-1011-13		Ferri-inductor 100 μ H	L69	1
CQ92M1H473K		ML 0.047	C172	1	L40-1011-14		Ferri-inductor 100 μ H	L67	1
C90-0838-05		E 1 50V	C193	1	L40-1021-03		Ferri-inductor 1mH	L3,44	2
C91-0105-05		C 0.0047	C7,10,13,74,75	5	L40-1092-14		Ferri-inductor 1 μ H	L28	1
C91-0125-05		C 0.0027	C6,19	2	L40-1292-14		Ferri-inductor 1.2 μ H	L31,33	2
C91-0131-05		C 0.01	C146,148-150	4	L40-1501-03		Ferri-inductor 15 μ H	L47	1
C91-0456-05		C 0.047	C4,9,21,27,33, 38,44,52,57,62, 67-69,86,102, 130,131,151,185, 194,197,201	22	L40-1511-03		Ferri-inductor 150 μ H	L68	1
C91-0498-05		C 0.35P	C142	1	L40-1511-13		Ferri-inductor 150 μ H	L63	1
E04-0157-05		Mini pin jack A		3	L40-1511-14		Ferri-inductor 150 μ H	L5,50,51,55,64	5
E23-0512-05		Terminal		2	L40-1592-14		Ferri-inductor 1.5 μ H	L25	1
E29-0434-05	N	1P connector		1	L40-1892-01		Ferri-inductor 1.8 μ H	L54	1
E40-0273-05		Mini connector 2P		8	L40-1892-14		Ferri-inductor 1.8 μ H	L27,29	2
E40-0373-05		Mini connector 3P		2	L40-2201-14		Ferri-inductor 22 μ H	L11	1
E40-0473-05		Mini connector 4P		1	L40-2211-14		Ferri-inductor 220 μ H	L4,45	2
E40-0573-05		Mini connector 5P		3	L40-2282-01		Ferri-inductor 0.22 μ H	L2	1
E40-0673-05		Mini connector 6P		2	L40-2282-14		Ferri-inductor 0.22 μ H	L42	1
E40-0773-05		Mini connector 7P		1	L40-2292-14		Ferri-inductor 2.2 μ H	L19,24,26	3
J31-0502-04		PC board collar		6	L40-2701-14		Ferri-inductor 27 μ H	L10,12	2
J42-0428-05		PC board bushing		6	L40-3301-14		Ferri-inductor 33 μ H	L62	1
L19-0324-05		Wide bandwidth transf.	T3,23	2	L40-3382-01		Ferri-inductor 0.33 μ H	L1,46,56	3
L19-0328-05		Wide bandwidth transf.	T24	1	L40-3382-14		Ferri-inductor 0.33 μ H	L38	1
L19-0344-05		Wide bandwidth transf.	T2	1	L40-3391-14		Ferri-inductor 3.3 μ H	L18,60	2
L30-0506-05		Tuning coil	T11	1	L40-3982-14		Ferri-inductor 0.39 μ H	L35,36,39,40,43	5
L30-0511-05		Tuning coil 8.83MHz	T14	1	L40-3991-14		Ferri-inductor 3.9 μ H	L21,22	2
L34-0535-05		Tuning coil	T15	1	L40-4701-03		Ferri-inductor 47 μ H	L49,52,57	3
L34-0536-05		Tuning coil	T16	1	L40-4701-13		Ferri-inductor 47 μ H	L59	1
L34-0697-05		Tuning coil	T18	1	L40-4701-14		Ferri-inductor 47 μ H	L13,14,61	3
L34-0857-05		Tuning coil	T7	1	L40-4791-14		Ferri-inductor 4.7 μ H	L23	1
L34-0858-05		Tuning coil	T22	1	L40-5682-14		Ferri-inductor 0.56 μ H	L37	1
L34-0859-05		Tuning coil	T5,21	2	L40-5691-14		Ferri-inductor 5.6 μ H	L20	1
L34-0860-15		Tuning coil	T20	1	L40-6811-03		Ferri-inductor 680 μ H	L9	1
L34-0862-05		Tuning coil	T17	1	L40-6822-14		Ferri-inductor 0.68 μ H	L30,32	2
L34-0942-05		Tuning coil	T13	1	L40-8282-14		Ferri-inductor 0.82 μ H	L34	1
L34-2159-05		Tuning coil	T12	1	L40-8291-14		Ferri-inductor 8.2 μ H	L16	1
L34-2142-05	N	Tuning coil	T4,10	2	L71-0214-05		MCF 48.055MHz	XF	1
L34-2143-05	N	Tuning coil	T1	1	L92-0110-05		Ferrite-bead	L70,71	2
L34-2144-05	N	Tuning coil	T8	1	R12-1412-05		Trim. pot. 1k Ω	VR1-4	4
L34-2145-05	N	Tuning coil	T6	1	R12-3428-05		Trim. pot. 47k Ω	VR5	1
					R90-0517-05		Resistor block 4.7k Ω x 7	RB1	1
					R92-0150-65		Short jumper		19
					S51-1415-05		Relay FBR211A	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					

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Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
45B1H471K		C 470P	C1	1	CC45SL1H150J		C 15P	C165,166	2
45F1H103Z		C 0.01	C33	1	CC45SL1H221J		C 220P	C64,153	2
45F1H473Z		C 0.047	C6,7,28	3	CC45SL1H470J		C 47P	C63,65,125,137, 149	5
73F2H122J		Laminated cap. 0.0012 500V	C15	1	CC45UJ1H150J		C 15P	C34	1
93D2H561J		MC 560P 500V	C30	1	CE04BW1HR22M		E 0.22 50V	C55	1
-0456-05		C 0.047	C2-4,8,9,16, 18,20,24,25,31,32	12	CE04BW1HR47M		E 0.47 50V	C99	1
-1004-05	N	Chip cap. 0.0068 50V	C11,12	2	CE04WOJ470M		E 47 6.3V	C121	1
-0401-05		Round terminal		1	CE04W1A101M		E 100 10V	C47,147	2
-0273-05		Mini connector 2P		1	CE04W1A221M		E 220 10V	C98	1
-0275-05		Pin connector 2P		1	CE04W1A470M		E 47 10V	C39,56,92,116, 150-152,158	8
-0373-05		Mini connector 3P		1	CE04W1C100M		E 10 16V	C60,81,84,101	4
-0785-05	N	Heat sink		1	CE04W1C220M		E 22 16V	C112	1
-0846-03	N	Heat sink cover		1	CE04W1C470M		E 47 16V	C115	1
-0405-14		Fan		1	CE04W1H0R1M		E 0.1 50V	C57	1
-0078-05		Insulating sheet		3	CE04W1H010M		E 1 50V	C44,49,50,62,67, 68,70,72,93,100, 102,103,105,111, 118-120,135,146	19
-0014-05		Shoulder washer		7	CE04W1H100M		E 10 50V	C53,97	2
-0406-03		Fan motor ass'y		1	CE04W1HR22M		E 0.22 50V	C58,164	2
-0338-05		Input matching transf.	T1	1	CE04W1HR47M		E 0.47 50V	C41,48,54,59, 106	5
-0342-05	N	Drive transf.	T2	1	CE04W1H4R7M		E 4.7 50V	C40,43,104	3
-0343-05	N	Final transf.	T3	1	CK45B1H102K		C 0.001	C14,21,26,33, 130,148	6
-0617-05		Choke coil	L11	1	CK45B1H471K		C 470P	C127	1
-0651-05		Choke coil	L5-10	6	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
-0652-05		Choke coil 0.7μH	L1	1					
-1011-03		Ferri-inductor 100μH	L12	1					
-1021-03		Ferri-inductor 1mH	L3,4	2					
-1511-03		Ferri-inductor 150μH	L2	1					
-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
-2604-46		Round screw 2.6 x 4		5					
-3006-46		Round screw 3 x 6		3					
-3008-46		Round screw 3 x 8		4					
-3006-45		Bind screw 3 x 6		4					
-3006-46		Self tapping screw 3 x 6		8					
-3006-45		Bind tapping screw 3 x 6		6					
-1406-05		Trim. pot. 1kΩ (B)	VR1,2	2					
5GF2H150J		Solid 15Ω 1/2W	R15,16	2					
5GF2H221J		Solid 220Ω 1/2W	R8,11	2					
5GF2H3R9J		Solid 3.9Ω 1/2W	R6	1					
4AB3D150J		MF 15Ω 2W	R23	1					
4GB3D2R2J		MF 2.2Ω 2W	R12,13	2					
4GB3F390J		MF 39Ω 3W	R14,17	2					
-0150-05		Short jumper		9					
0301-05		Fan motor		1					
IF UNIT (X48-1370-00)									
0030-15		Ceramic trimmer 20P	TC1	1					
5SL1H050C		C 5P	C142	1					
5SL1H100D		C 10P	C30	1					
5SL1H101J		C 100P	C32,91,94	3					
					C90-0864-05	N	E 220 10V	C75	1
					C90-0866-05		E 470 6.3V	C79	1
					C91-0456-05		C 0.047	C15,22,27,45,78, 113,114,117,124	9
					C91-0457-05		C 0.022	C162,163	2
					C91-0472-05		C 0.1	C90	1

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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	CK45B1H102K	C	0.001	C77,91-93,101	5
E40-0773-05		Mini connector 7P		1	CK45B1H222K	C	0.0022	C5	1
E40-0873-05		Mini connector 8P		1	CK45F1H103Z	C	0.01	C1-4,12,16, 22,26,33,36,54, 62,69-74,79, 82,90,97,98 C94-96	23
F20-0516-05		Insulating sheel		1					
F29-0014-05		Shoulder washer		1	CK45F1H223Z	C	0.022		3
J31-0502-04		PC board collar		7	CQ92M1H102K	ML	0.001	C47	1
J42-0428-05		PC board bushing		7	CQ92M1H104K	ML	0.1	C46	1
L34-0535-05		Tuning coil	L3,9	2					
L34-0536-06		Tuning coil	L4	1	C91-0131-05	C	0.01	C6	1
L34-0708-05		Tuning coil	L1	1	C91-0456-05	C	0.047	C7,31,35,37,39, 40,45,48,50-53, 58,60,63-65,68, 75,78,81,99,102	23
L34-2077-05		Tuning coil	L2	1					
L40-1011-14		Ferri-inductor 100μH	L14,15	2	E04-0157-04		Mini pin jack A		1
L40-1021-03		Ferri-inductor 1mH	L5	1	E23-0046-04		Square terminal		2
L40-1511-03		Ferri-inductor 150μH	L10,11,16	3	E40-0273-05		Mini connector 2P		2
L40-3391-03		Ferri-inductor 3.3μH	L6	1	E40-0473-05		Mini connector 4P		2
L40-4711-03		Ferri-inductor 470μH	L13	1	E40-0673-05		Mini connector 6P		1
L71-0208-05		MCF YK-88S	XF1	1					
N09-0641-05		Screw		4	J31-0502-04		PC board collar		6
N30-3005-46		Round screw 3 x 6		4	J42-0428-05		PC board bushing		6
R12-1408-05		Trim. pot. 4.7kΩ	VR4,5,9	3	L19-0344-05	N	Wide bandwidth transf.	T5	1
R12-1412-05		Trim. pot. 1kΩ	VR1	1	L34-0851-05		Tuning coil	T6,9	2
R12-3427-05		Trim. pot. 10kΩ	VR2,8,12	3	L34-0852-05		Tuning coil	T1	1
R12-3428-05		Trim. pot. 47kΩ	VR6,10	2	L34-0853-05		Tuning coil	T2	1
R12-5416-05		Trim. pot. 100kΩ	VR7	1	L34-0854-05		Tuning coil	T3	1
R12-6405-05	N	Trim. pot. 470kΩ	VR3,11	2	L34-0855-05		Tuning coil	T4	1
R90-0559-05	N	Inline block	IB1,3-7	6	L34-0856-05		Tuning coil	T7,8	2
R92-0150-05		Short jumper		51					
PLL UNIT (X50-1910-00)					L40-1011-03		Ferri-inductor 100μH	L27	1
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	L40-4711-13		Ferri-inductor 470μH	L10,13,18,19,24, 28,29,33	8
CC34RH1H080D	C	8P	C85,87	2	L40-4782-02		Ferri-inductor 0.47μH	L12	1
CC34RH1H100D	C	10P	C84,88	2	R92-0150-05		Short jumper		12
CC45RH1H560J	C	56P	C17	1					
CC45RH1H680J	C	68P	C9	1					
CC45SH1H470J	C	47P	C23	1					
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					

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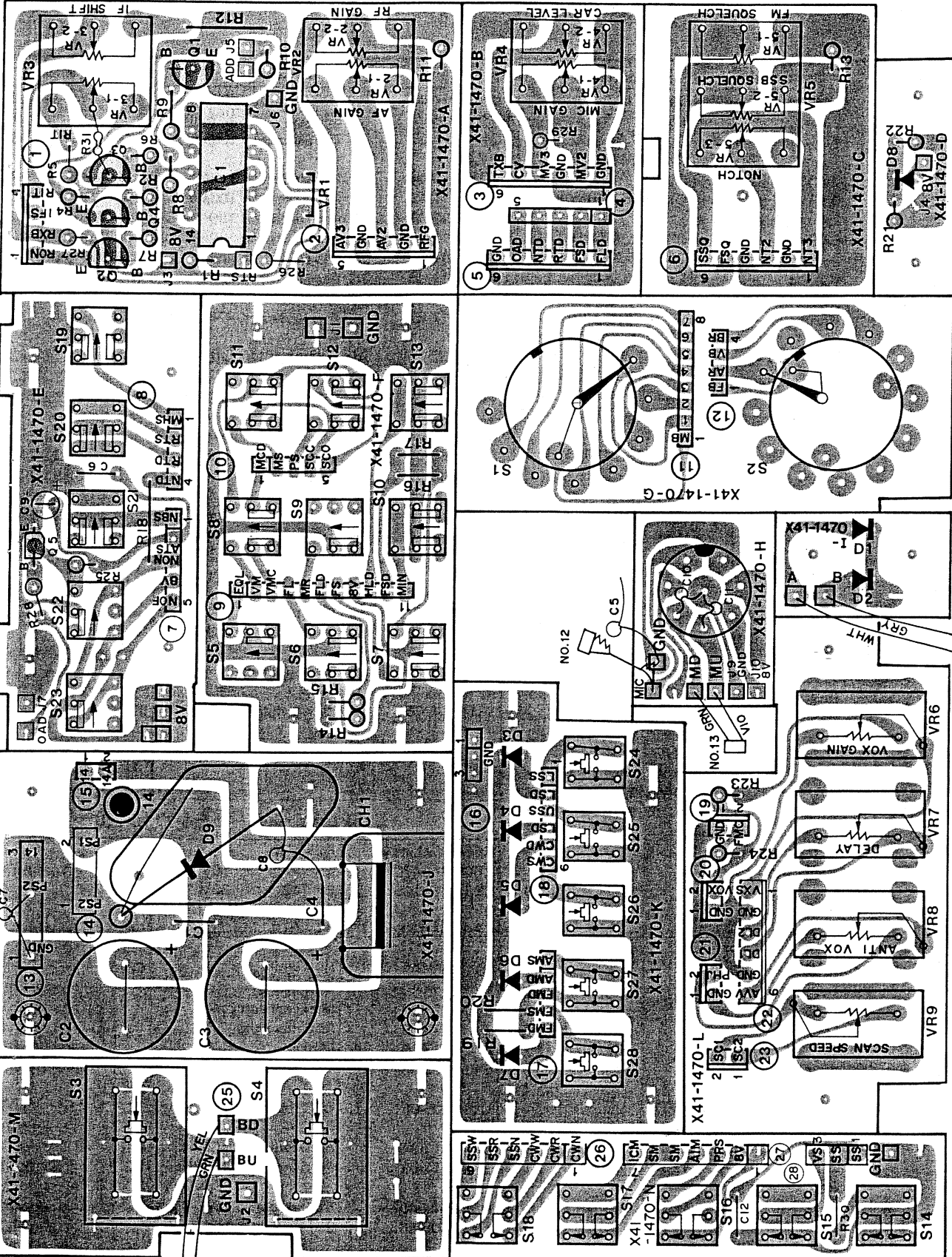
Part No.	Re- marks	Description	Ref. No.	Q'ty	Part No.	Re- marks	Description	Ref. No.	Q'ty
FILTER UNIT (X51-1290-00)									
05-0043-05		Ceramic trimmer 20P	TC1	1	L34-3062-05	N	LPF coil N 23-30	L13,14	2
C45SL2H030C	C	3P 500V	C82	1	L34-3081-05	N	LPF coil C 2.5-4	L3	1
C45SL2H100D	C	10P 500V	C65,72	2	L34-3082-05	N	LPF coil D 2.5-4	L4	1
C45SL2H101J	C	100P 500V	C35,60	2	L39-0406-05		Detector coil	T1	1
C45SL2H120J	C	12P 500V	C14	1	L40-1011-12		Ferri-inductor 100μH	L21-36	16
C45SL2H121J	C	120P 500V	C38,51,40	3	L40-1011-14		Ferri-inductor 100μH	L37-40	4
C45SL2H180J	C	18P 500V	C46	1	L40-1021-03		Ferri-inductor 1mH	L15-17	3
C45SL2H151J	C	150P 500V	C4,7	2	L40-1511-03		Ferri-inductor 150μH	L18,19	2
C45SL2H181J	C	180P 500V	C3,18,24,34,57,68	6	R12-0427-05		Trim. pot. 500Ω	VR5	1
C45SL2H221J	C	220P 500V	C15,26,39,47,79	5	R12-2410-05		Trim. pot. 5kΩ	VR4	1
C45SL2H271J	C	270P 500V	C21	1	R12-3434-05		Trim. pot. 10kΩ	VR3	1
C45SL2H330J	C	33P 500V	C37,52	2	R12-4411-05		Trim. pot. 50kΩ	VR1,2	2
C45SL2H391J	C	390P 500V	C12,29,36	3	RC05GF2H181J		Solid 180Ω 1/2W	R40	1
C45SL2H470J	C	47P 500V	C23,48,55,61	4	R92-0150-05		Short jumper		20
C45SL2H471J	C	470P 500V	C6,8,17,25	4	S51-1415-05	N	Relay FBR211	RL2-15	14
C45SL2H560J	C	56P 500V	C13,45,64,71	4	S51-2407-05		Relay FBR321	RL1	1
C45SL2H680J	C	68P 500V	C28,43,58,81	4	CONTROL UNIT (X53-1290-00)				
C45SL2H681J	C	680P 500V	C9	1	C05-0035-05		Ceramic trimmer 50P	TC1	1
C45SL2H820J	C	82P 500V	C55,98,106	3	C05-0067-05		Ceramic trimmer 25P	TC5,6	2
E04W1C100M	E	10 16V	C84	1	C05-0309-05		Ceramic trimmer 40P	TC2-4	3
E04W1H010M	E	1 50V	C88	1	CC45CH1H0R5C	C	0.5P	C47	1
E04W1HR47M	E	0.47 50V	C86	1	CC45CH1H020C	C	2P	C31,116,135	3
E45F1H103Z	C	0.01	C1,74,75,77,78,83,87,93,94,99,102-104	13	CC45CH1H070D	C	7P	C36	1
E45F1H473Z	C	0.047	C19,31,32,41,42,53,54,62,73,76,80,85,101,105	14	CC45CH1H150J	C	15P	C3,30,33,36,178,179	6
I93D2H102J	MC	0.001	C16	1	CC45CH1H220J	C	22P	C136	1
I93D2H182J	MC	0.0018	C5	1	CC45CH1H470J	C	47P	C221	1
I93D2H821J	MC	820P	C95	1	CC45CH1H560J	C	56P	C29,38	2
I-0456-05	C	0.047	C2,10,11,20,63,89-92	9	CC45RH1H030C	C	3P	C5,17,58	3
I-0154-04		Coax. connector		1	CC45RH1H050C	C	5P	C67	1
I-0157-04		Mini pin jack		1	CC45RH1H070D	C	7P	C57	1
I-0047-04		Square terminal		2	CC45RH1H100D	C	10P	C56	1
I-0413-05		1P connector (female)		1	CC45RH1H120J	C	12P	C4,6,66,68	4
I-0273-05		Mini connector 2P		4	CC45RH1H220J	C	22P	C16,18,55,124	4
I-0373-05		Mini connector 3P		3	CC45RH1H270J	C	27P	C126,127	2
I-0473-05		Mini connector 4P		2	CC45RH1H560J	C	56P	C115,117	2
I-0673-05		Mini connector 6P		1	CC45RH1H820J	C	82P	C100	1
I-0502-04		PC board collar		6	CC45SL1H050C	C	5P	C40,42,85,144	4
I-0428-05		PC board bushing		6	CC45SL1H100D	C	10P	C32,86,110	3
I-3038-05		LPF coil A 1.5-2.5	L1	1	CC45SL1H101J	C	100P	C92,94,114,133,143	5
I-3039-05		LPF coil B 1.5-2.5	L2	1	CC45SL1H120J	C	12P	C84	1
I-3054-05	N	LPF coil E 4-6.5	L5	1	CC45SL1H150J	C	15P	C43,112	2
I-3055-05	N	LPF coil F 4-6.5	L6	1	CC45SL1H151J	C	150P	C140	1
I-3056-05	N	LPF coil G 6.5-10.5	L7	1	CC45SL1H220J	C	22P	C41	1
I-3057-05	N	LPF coil H 6.5-10.5	L8	1	CC45SL1H221J	C	220P	C93,107	2
I-3058-05	N	LPF coil J 10.5-16	L9	1	CC45SL1H270J	C	27P	C24,26	2
I-3059-05	N	LPF coil K 10.5-16	L10	1	CC45SL1H560J	C	56P	C25	1
I-3060-05	N	LPF coil L 16-23	L11,12	2	CC45SL1H680J	C	68P	C108	1
					CC45TH1H150J	C	15P	C54	1
					CC45TH1H270J	C	27P	C53,83	2
					CC45UJ1H180J	C	18P	C39	1
					CC45UJ1H220J	C	22P	C82,106,213	3
					CC45UJ1H221J	C	220P	C105	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	L40-1011-04		Ferri-inductor 100μH	L25,26	2
CE04W1HR47M	E	0.47 50V	C129,195,196	3	L40-1011-12		Ferri-inductor 100μH	L36-41	6
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	C1,7-15,19-23, 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	84	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
CQ92M1H104K	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, 120,121,122,149, 156,164,176,198, 199,204,207,208 C153,157	24	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	CE04W0J221M	E	220 6.3V	C2	1
E40-0873-05		Mini connector 8P		1	CE04W1A470M	E	47 10V	C1	1
J31-0502-04		PC board collar		7	CE04W1V100M	E	10 35V	C3,5-7	4
J42-0428-05		PC board bushing		7	CQ92M1H103K		ML 0.01	C4	1
L32-0198-05		OSC coil	L10	1	C91-0456-05	C	0.047	C8	1
L32-0201-05		OSC coil 8.83MHz	T14	1	E40-0273-05		Mini connector 2P		1
L32-0639-05		OSC coil	L18	1	E40-0473-05		Mini connector 4P		1
L33-0636-05		Choke coil 28μH	L31	1	E40-0773-05		Mini connector 7P		1
L33-0663-05	N	Choke coil 1μH	L12	1	E40-0873-05		Mini connector 8P		1
L33-0664-05	N	Choke coil 2.7μH	L22	1	L19-0305-05		OSC transf.	T1	1
L33-0665-05	N	Choke coil 39μH	L23	1	L40-1011-04		Ferri-inductor 100μH	L1	1
L34-2140-05	N	Tuning coil 9.67MHz	T10	1	L40-1511-03		Ferri-inductor 150μH	L2	1
L34-2141-05	N	Tuning coil 9MHz	T12,13	2	N30-2504-46		Round screw 2.6 x 4		6
L34-3064-05	N	BPF coil 43MHz	T1,3,4,6	4	N87-3006-46		Self tapping screw 3 x 6		2
L34-3065-05	N	BPF coil 43MHz	T2	1	R90-0511-05		Resistor block 47kΩ x 8	RB1	1
L34-3066-05	N	BPF coil 34MHz	T5	1	R90-0521-05		Resistor block 47kΩ x 7	RB2	1
					R92-0150-05		Short jumper		11

TS-430S PC BOARD VIEW

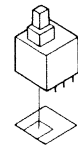
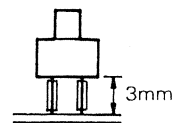
SWITCH UNIT (X41-1470-00) Component side view



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

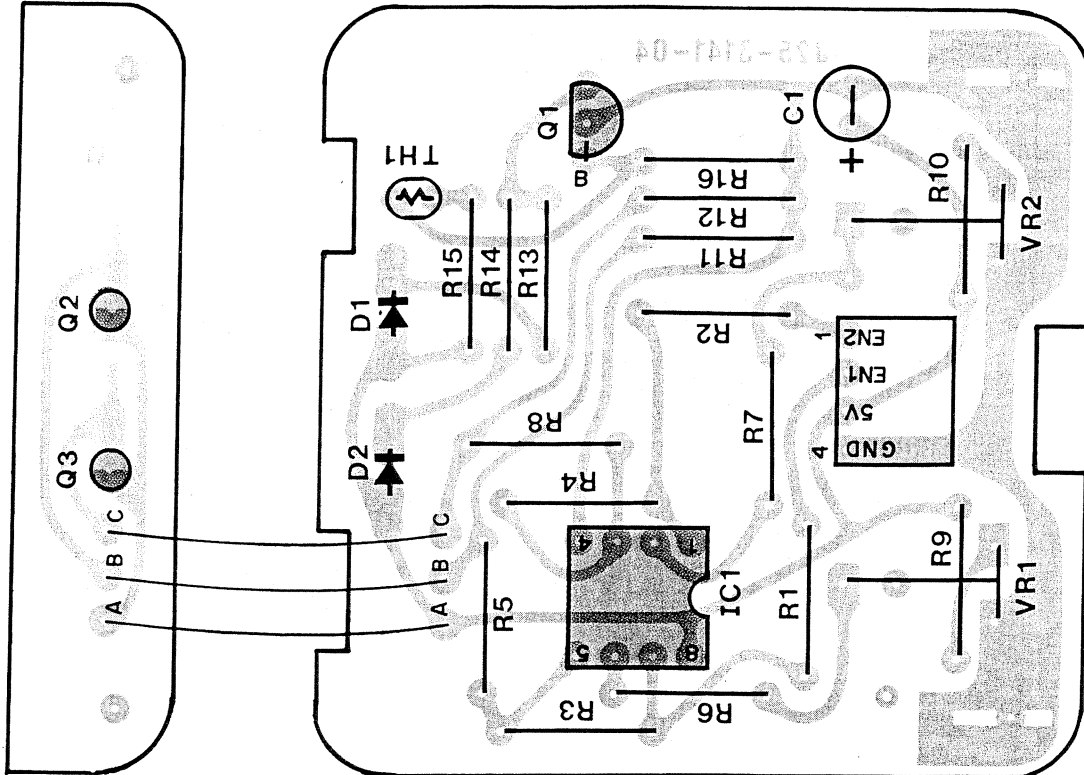
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<Attachment direction of S5-13,19-23>



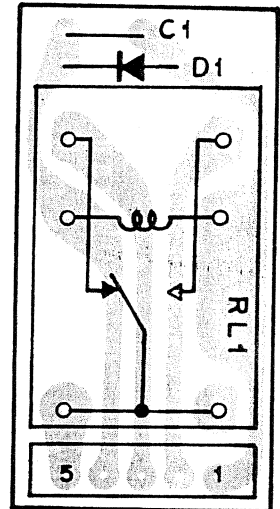
PC BOARD VIEWS TS-430S

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



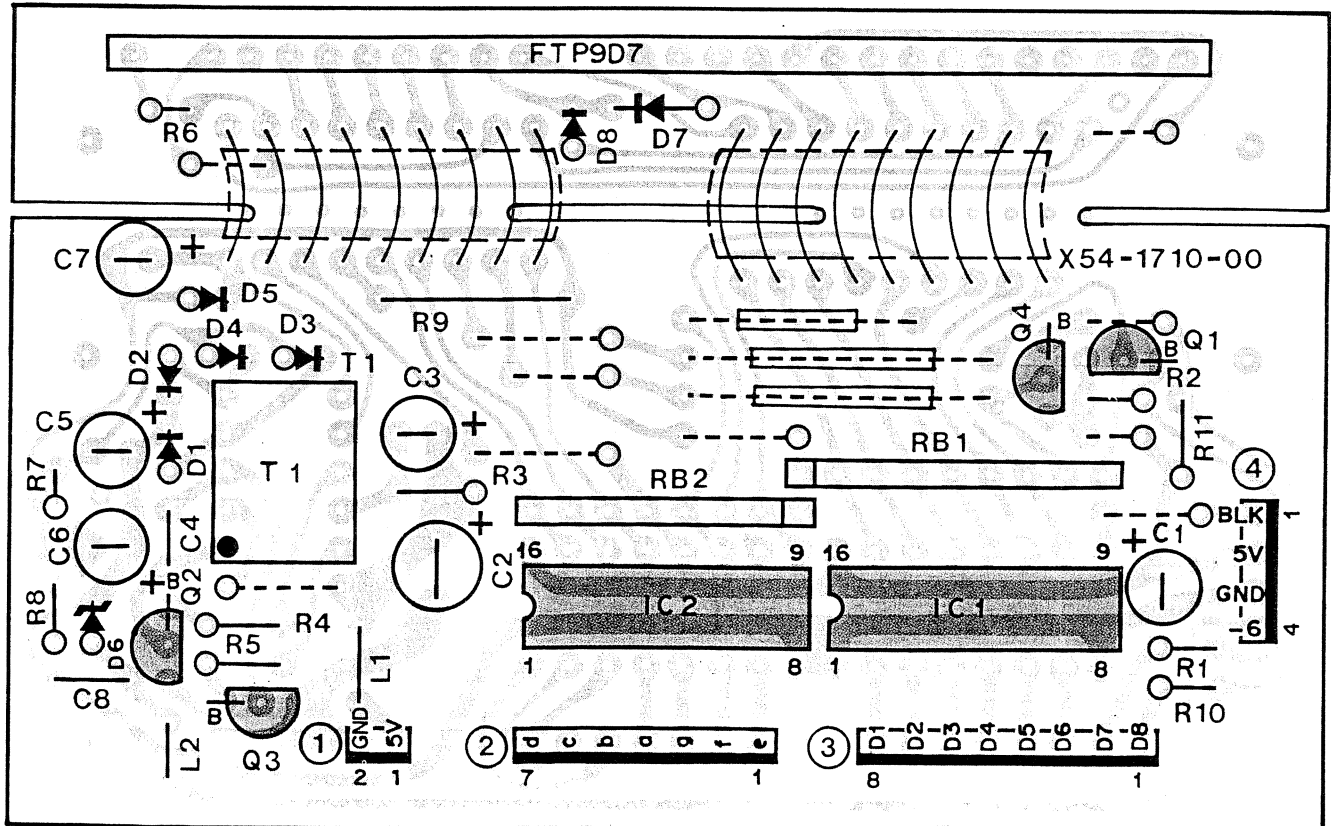
Q1 : 2SA1015(Y) Q2,3 : PN126S
D1,2 : LN66(R)
IC1 : LM358P

RELAY BOARD Component side view

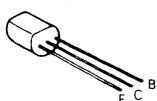


D1 : 1S1555

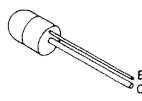
DISPLAY UNIT (X54-1710-00) Component side view



2SC945
2SC1015
2SC1815
2SC1959



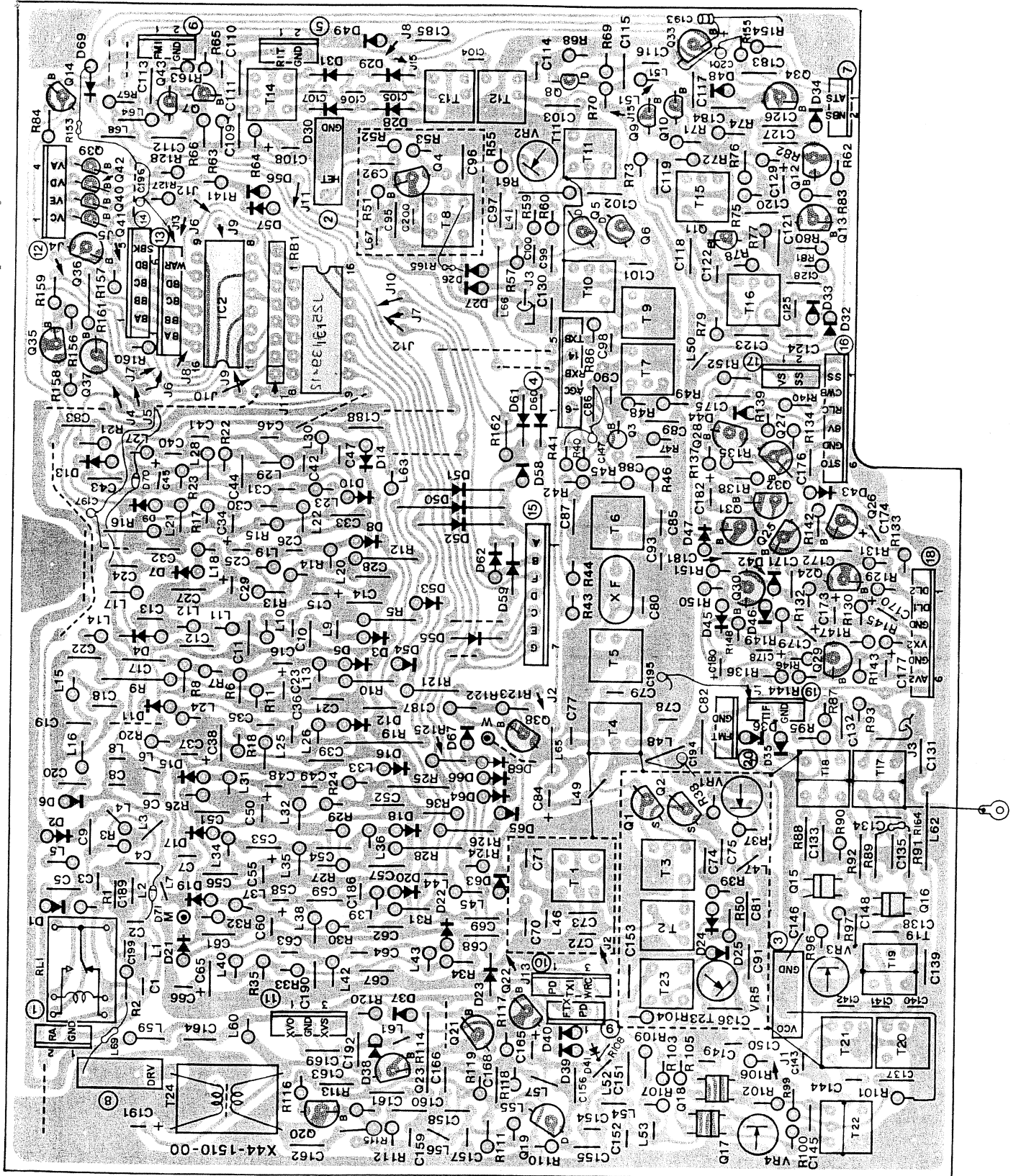
PN126S



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

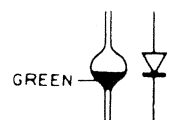
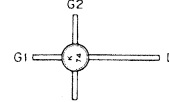
3SK73

3SK74

MV-13

2SC2603

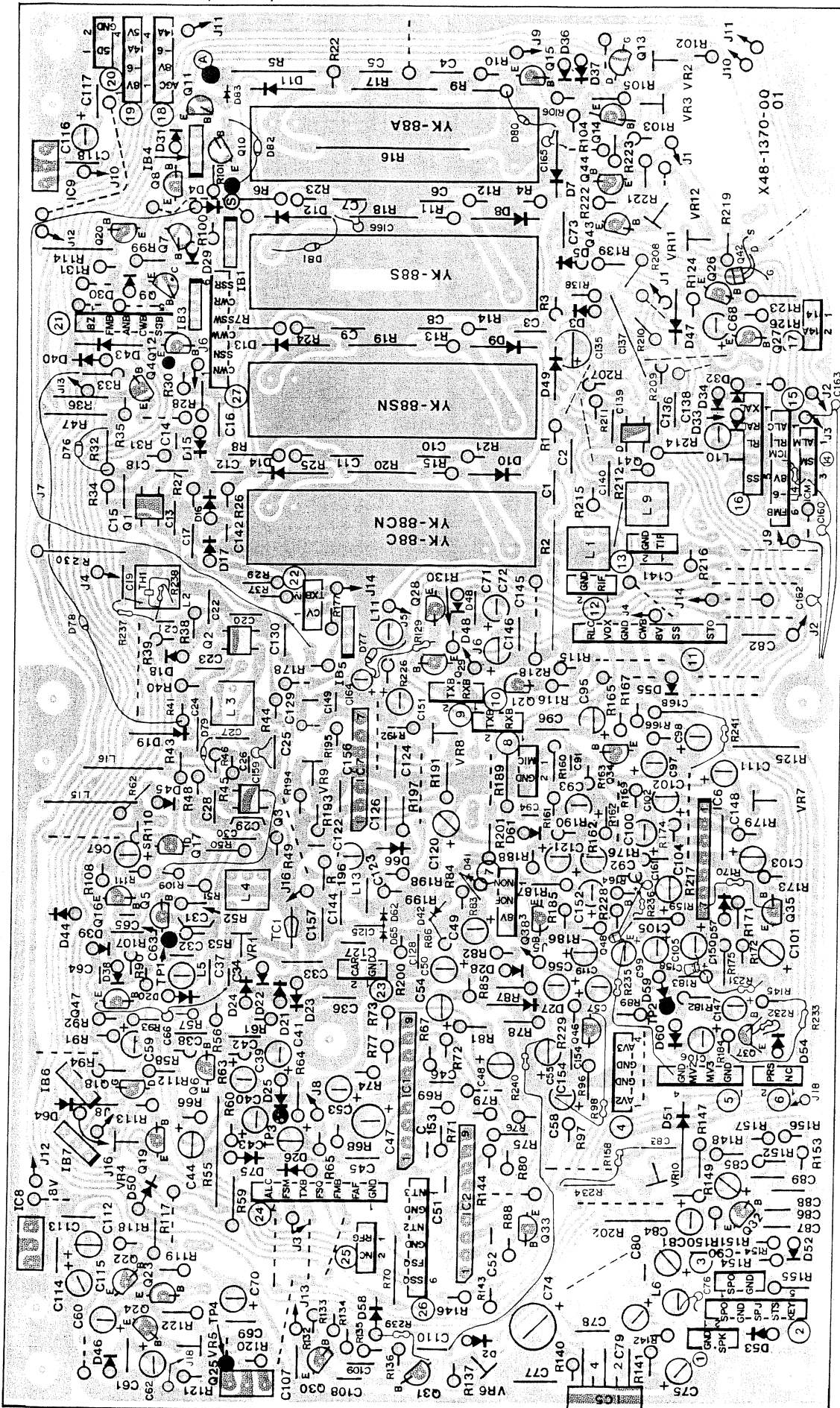
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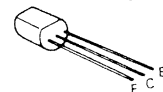


TS-430S PC BOARD VIEW

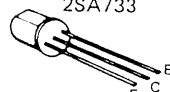
IF UNIT (X48-1370-00) Component side view



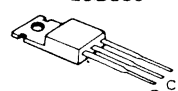
2SA1015
2SC945
2SC1815
2SC2240
2SC2703



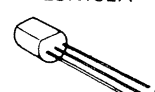
2SA562
2SA733



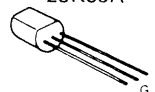
2SD880



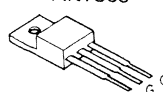
2SK192A



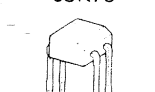
2SK30A



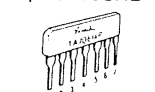
AN7805
AN7808



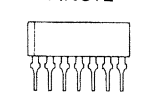
3SK73



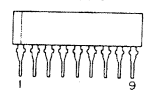
μPC1158H2



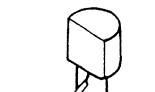
AN612



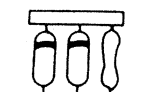
AN6551



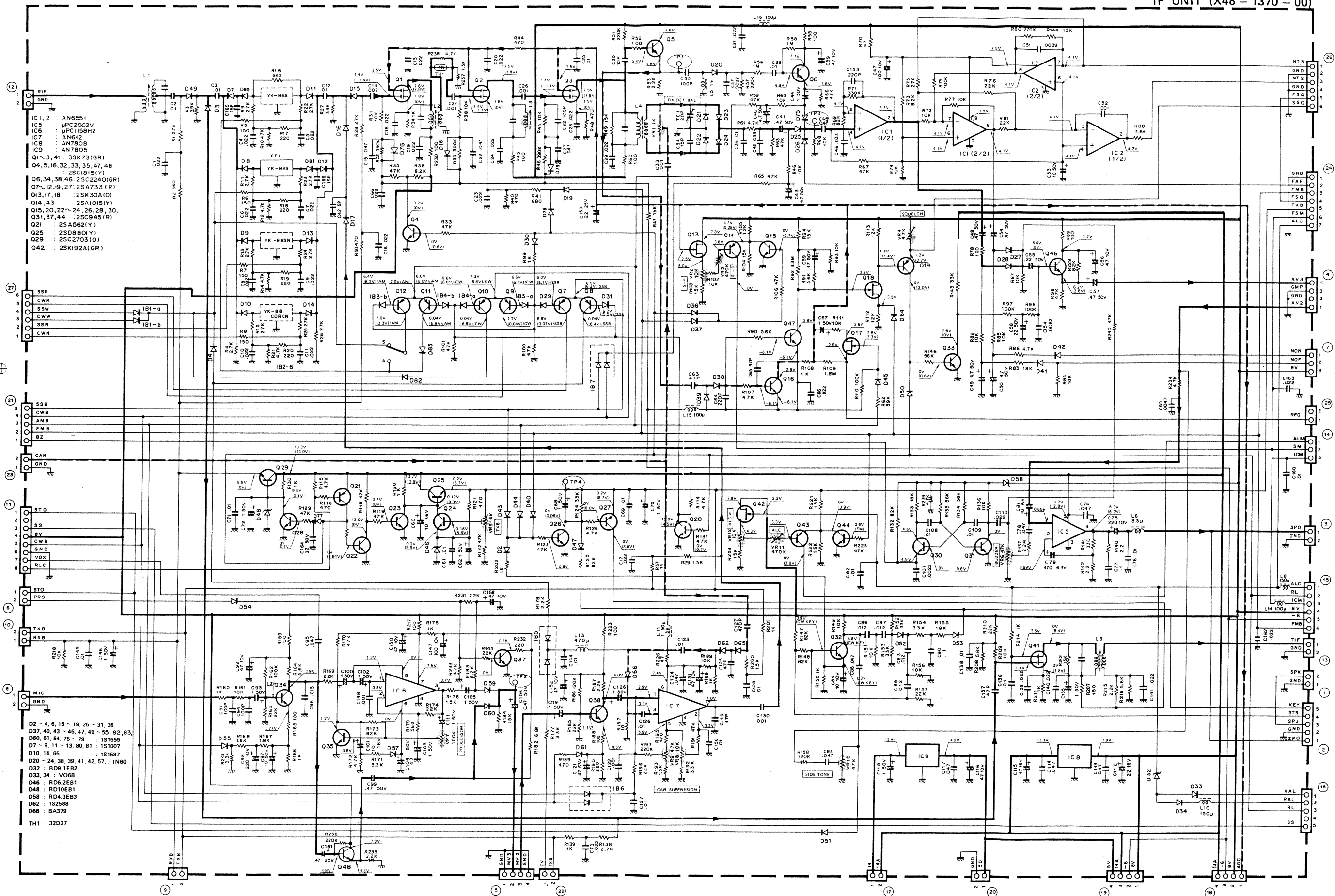
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<Attachment direction of Inline Block >

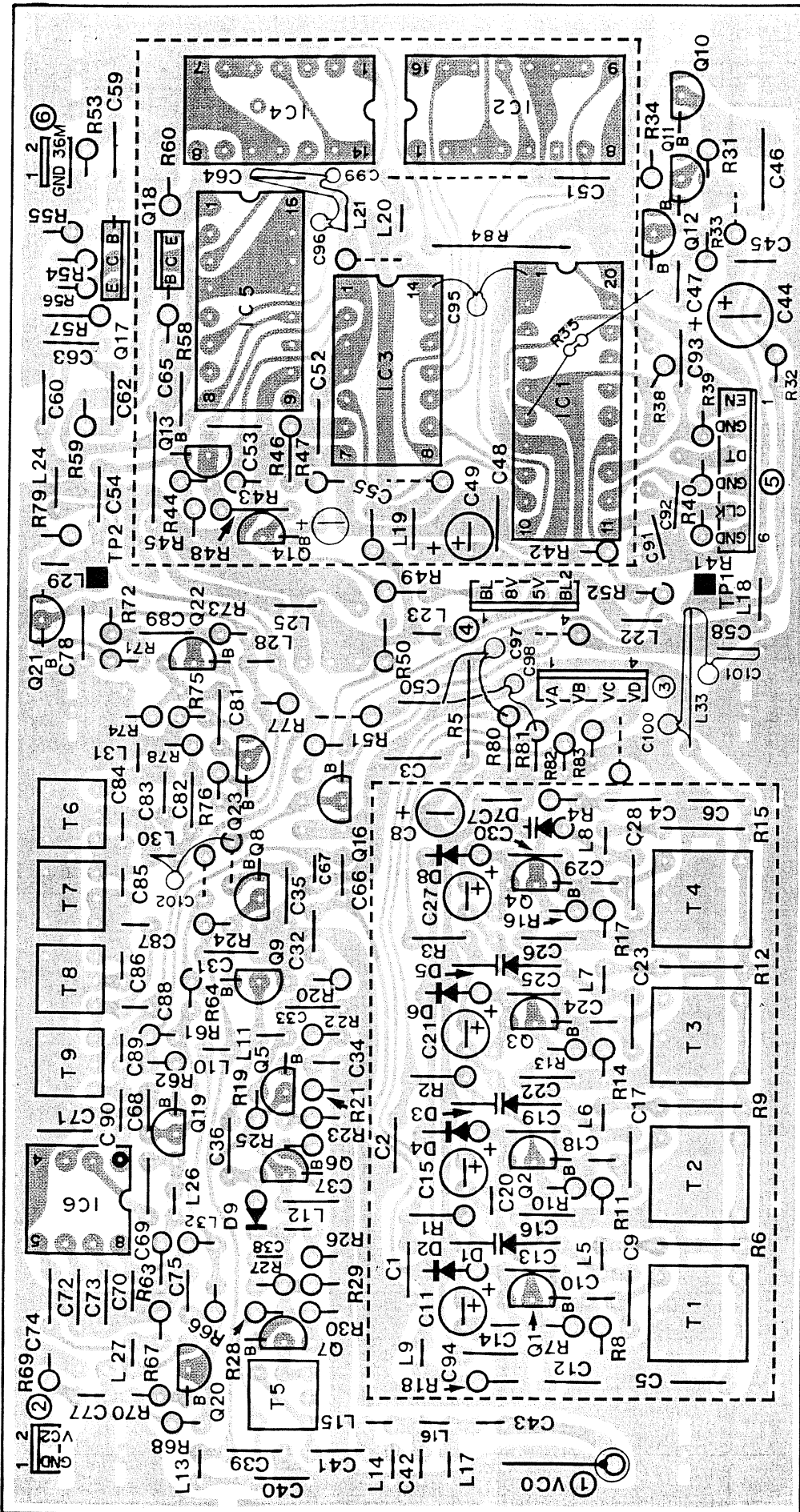


IF UNIT (X48-1370-00)

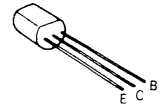


TS-430S PC BOARD VIEW

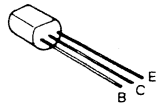
PLL UNIT (X50-1910-00) Component side view



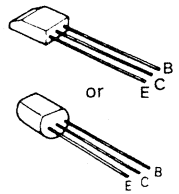
2SC1775
2SC1815
2SC1923
2SC1959

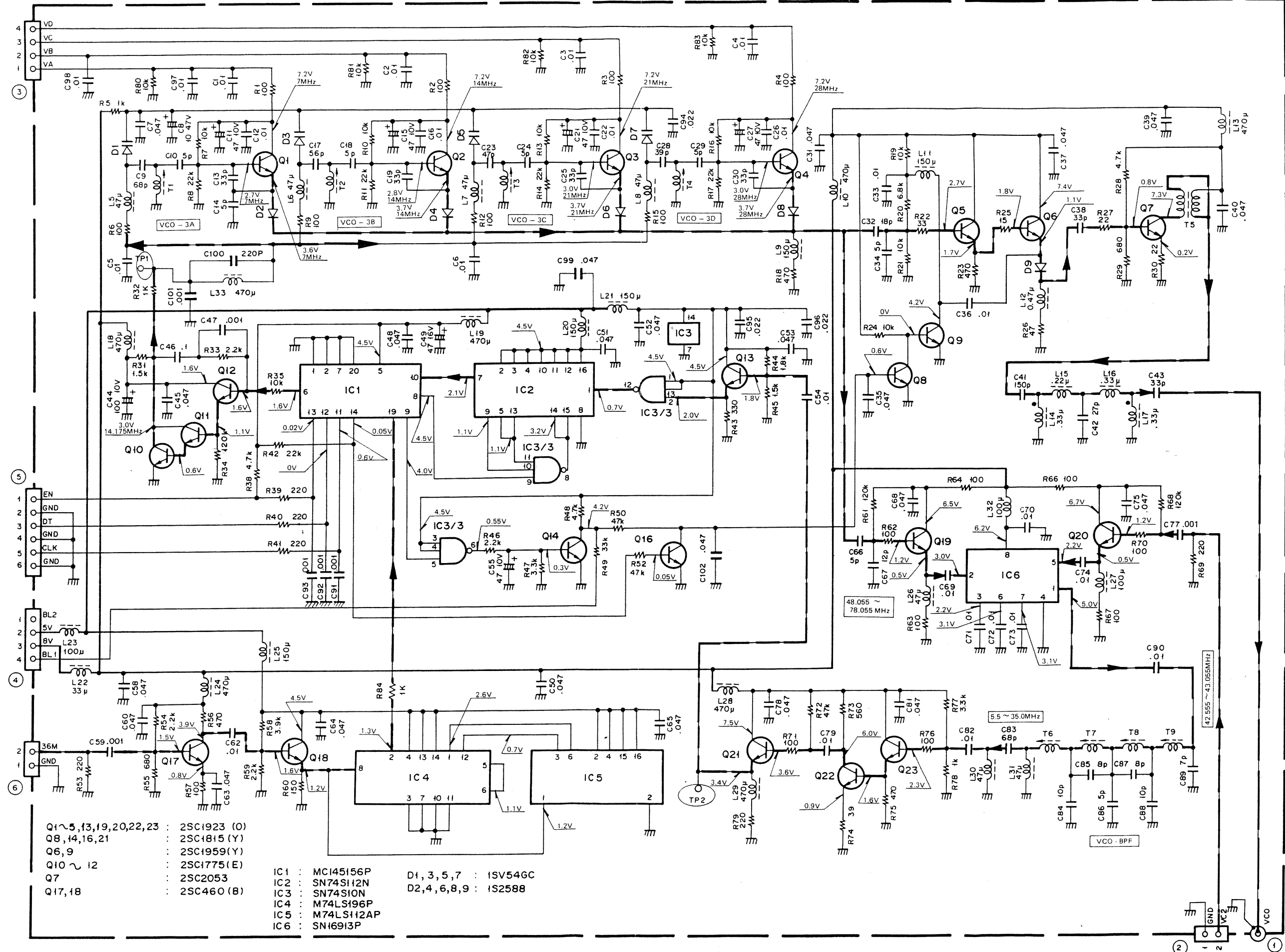


2SC2053



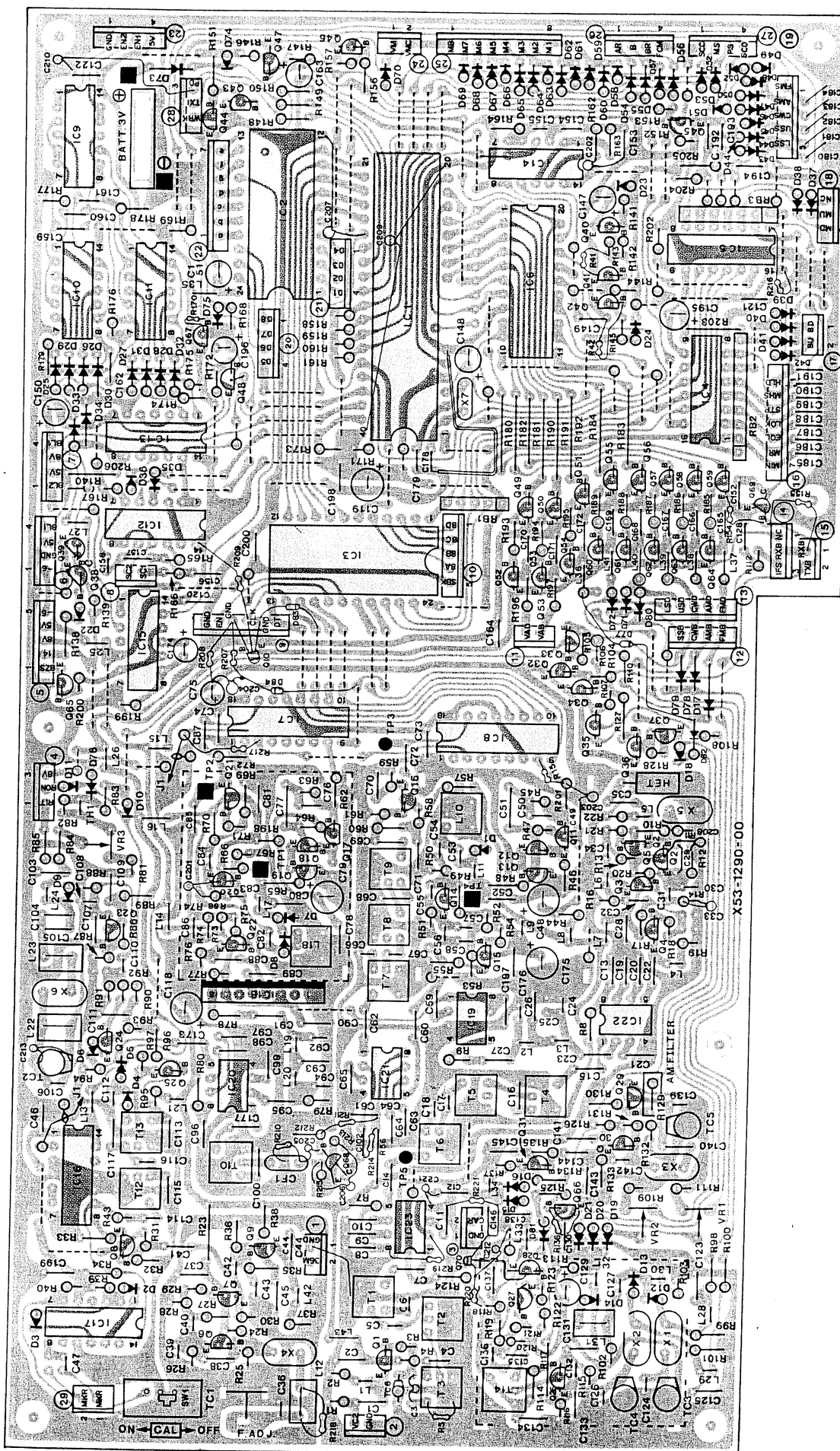
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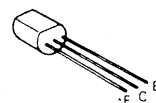


TS-430S PC BOARD VIEW

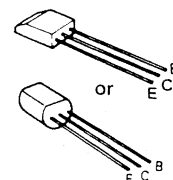
CONTROL UNIT (X53-1290-00) Component side view



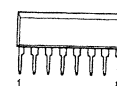
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2SC945
2SC1775
2SC1815
2SC1923
2SC1959

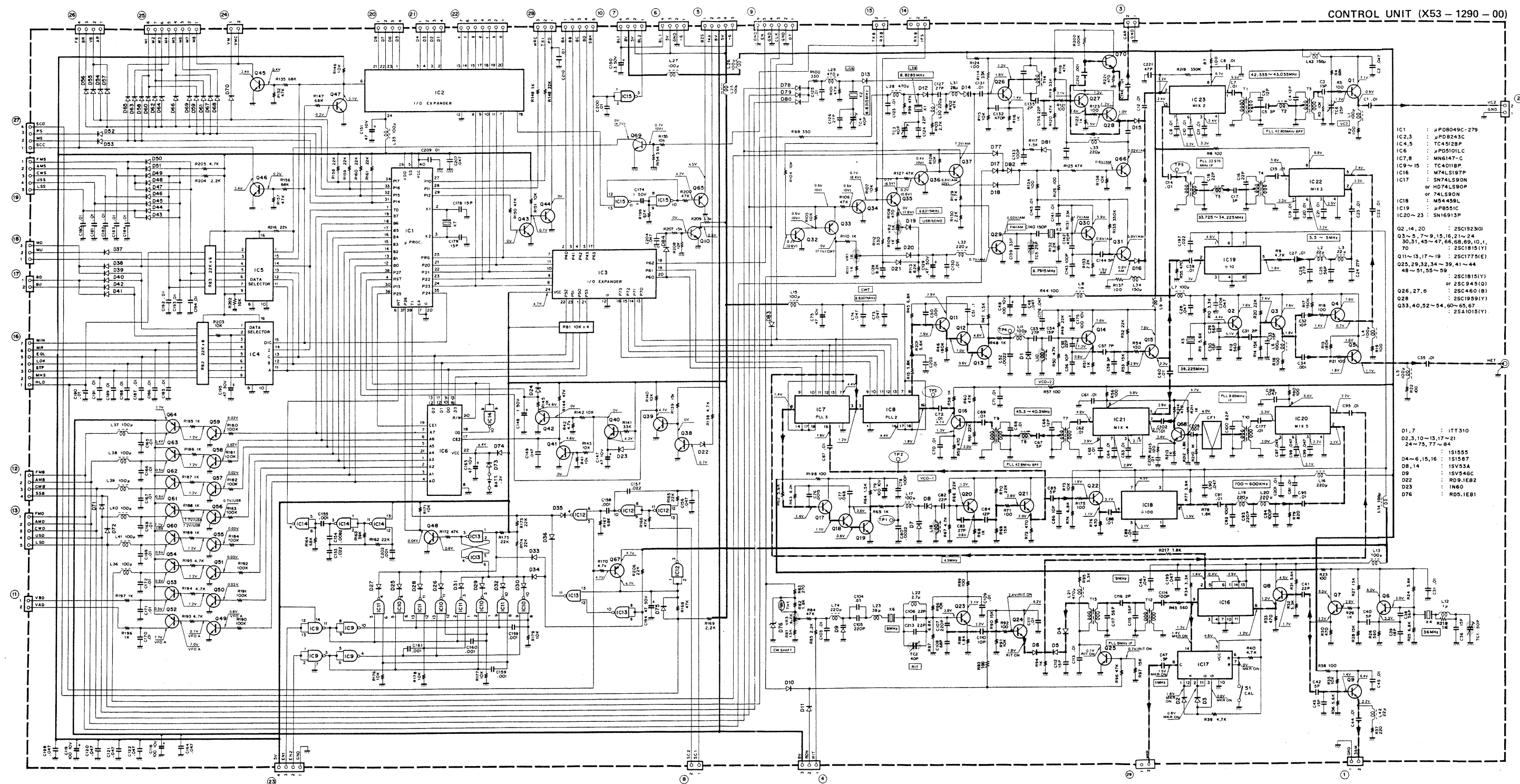


2SC460



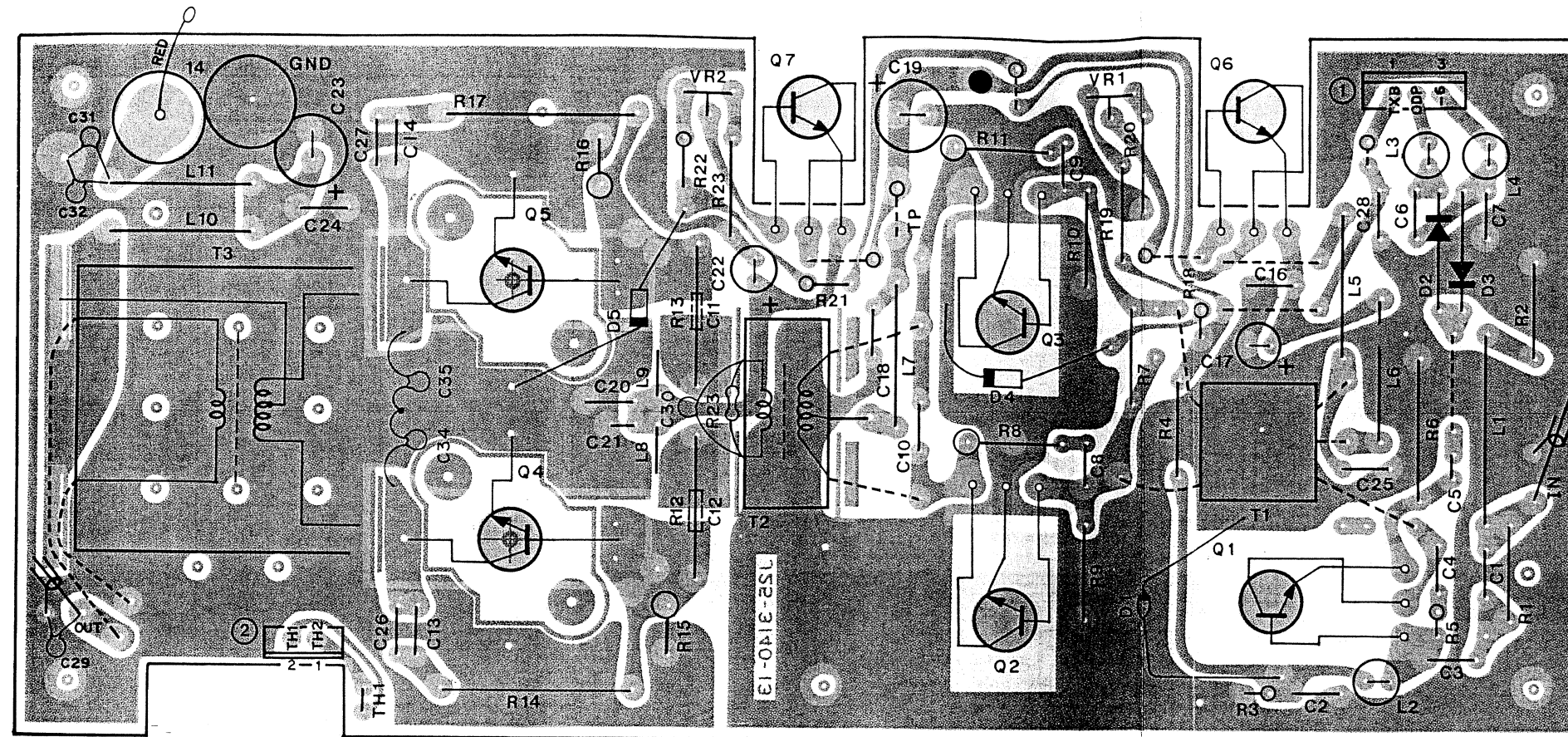
M54459L



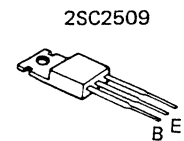
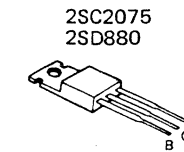


TS-430S PC BOARD VIEWS

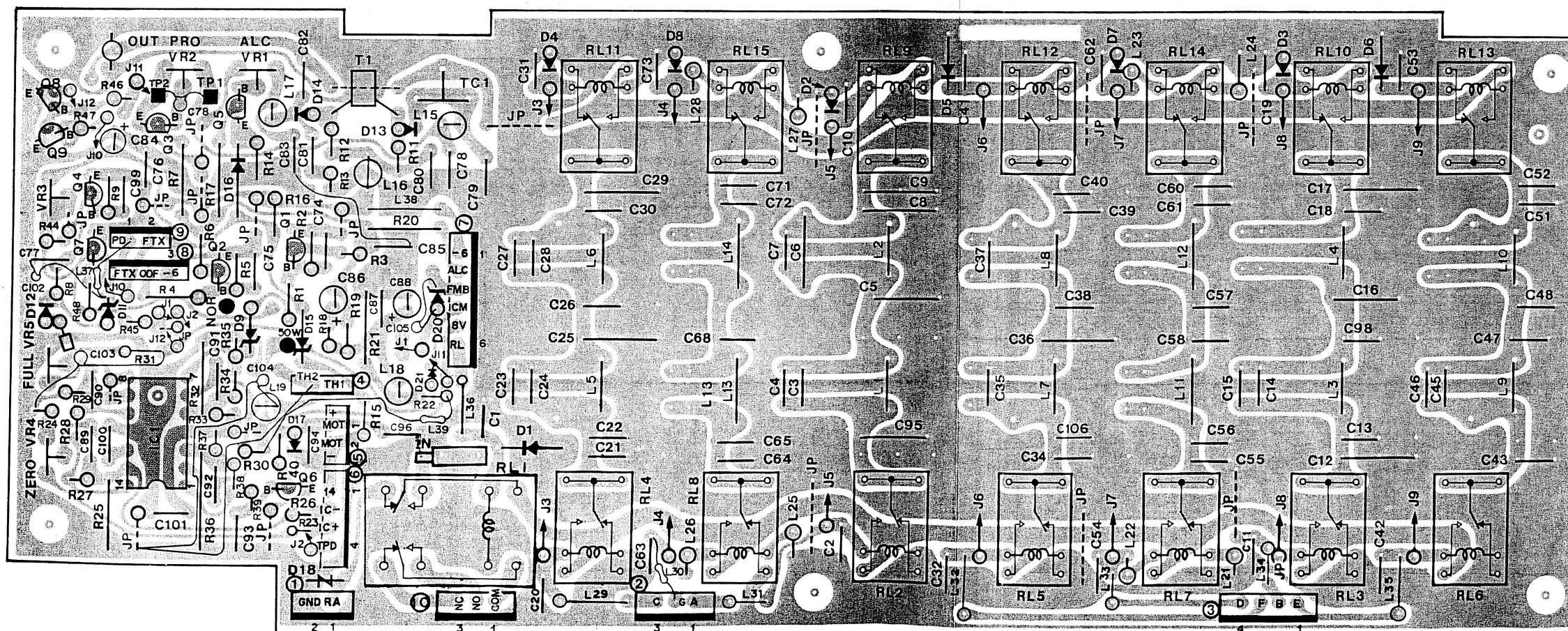
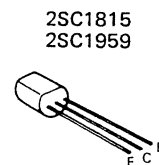
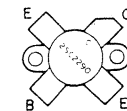
100W FINAL UNIT (X45-1280-00) Component side view



Q1 : 2SC2075 Q2,3 : 2SC2509
Q4,5 : 2SC2290*J Q6,7 : 2SD880(Y)
D1 : MV-5T D2,3 : 1N60 D4,5 : SV03Y
TH1 : SDT1000F

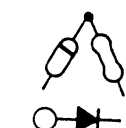


2SC2290*J

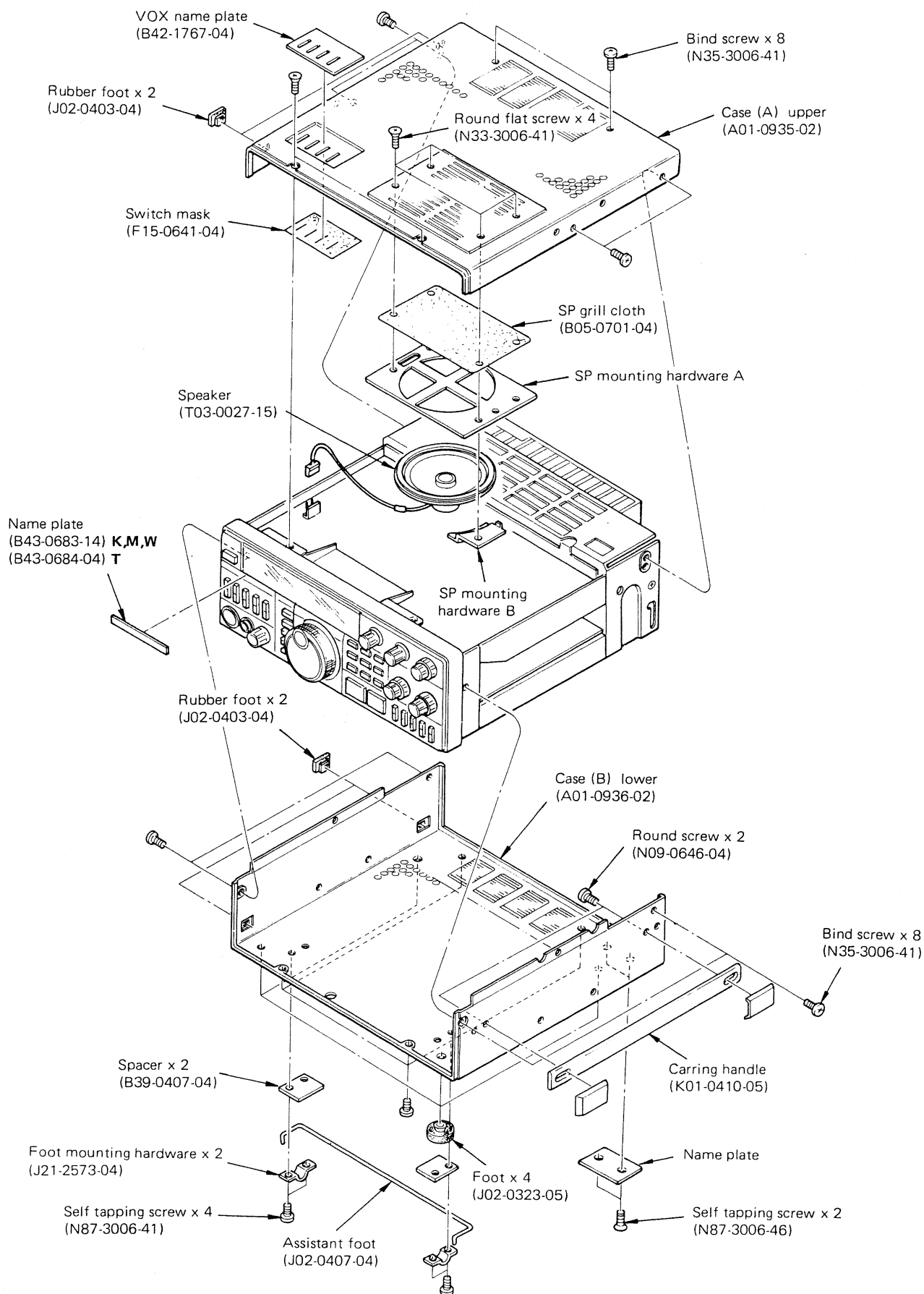


Q1-5,7-9 : 2SC1815(Y) Q6 : 2SC1959(Y)
D1-8,12,17,21 : 1S1555
D9,11,15,20 : RD9.1EB3 D13,14 : 1N60
D16 : RD4.3EB3 D18 : ERZD03DK331
IC1 : MB3614

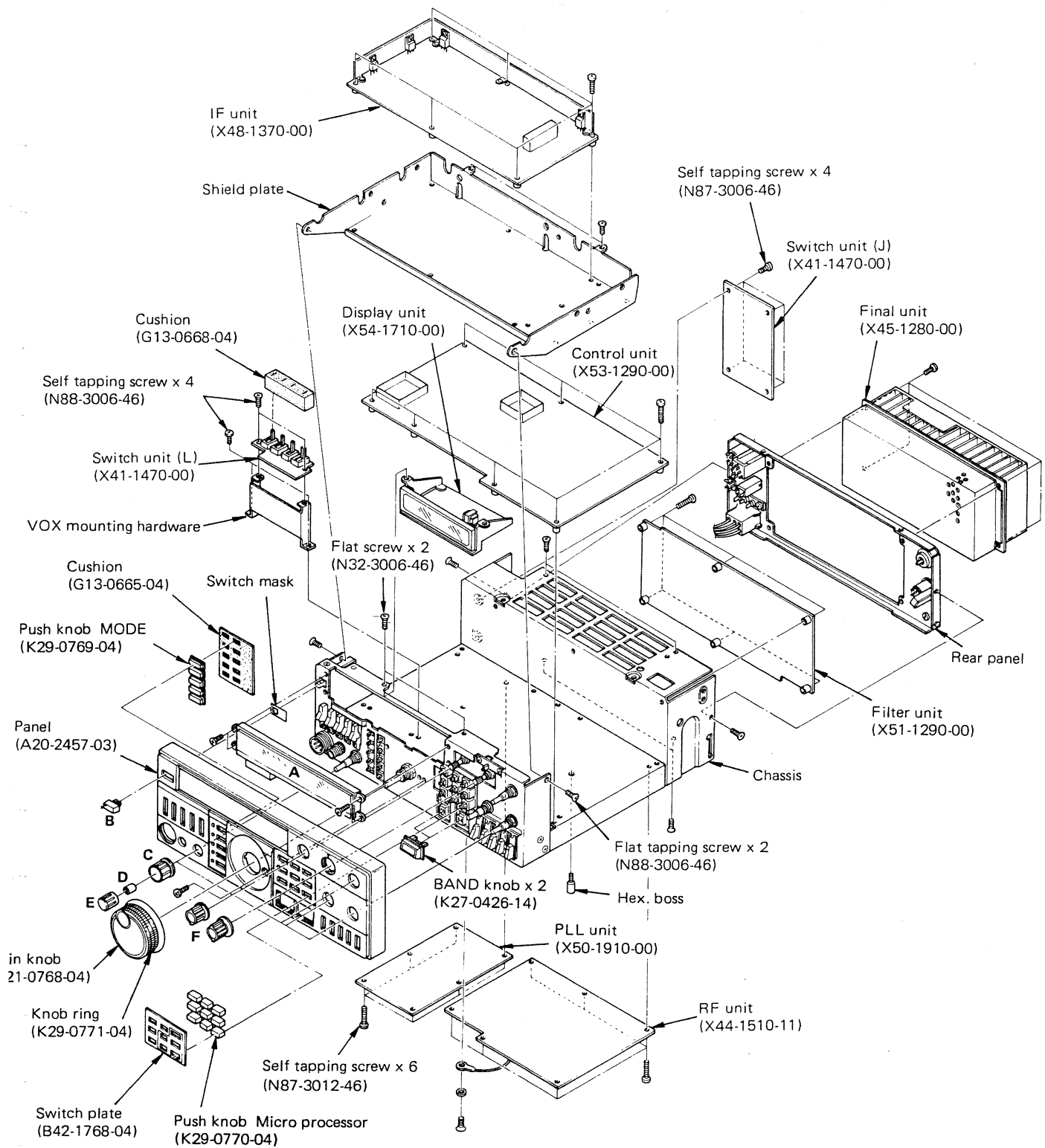
<Attachment method of D21,L40>



DISASSEMBLY



DISASSEMBLY



A Meter
(B31-0639-05)

B Push knob POWER
(K29-0758-04)

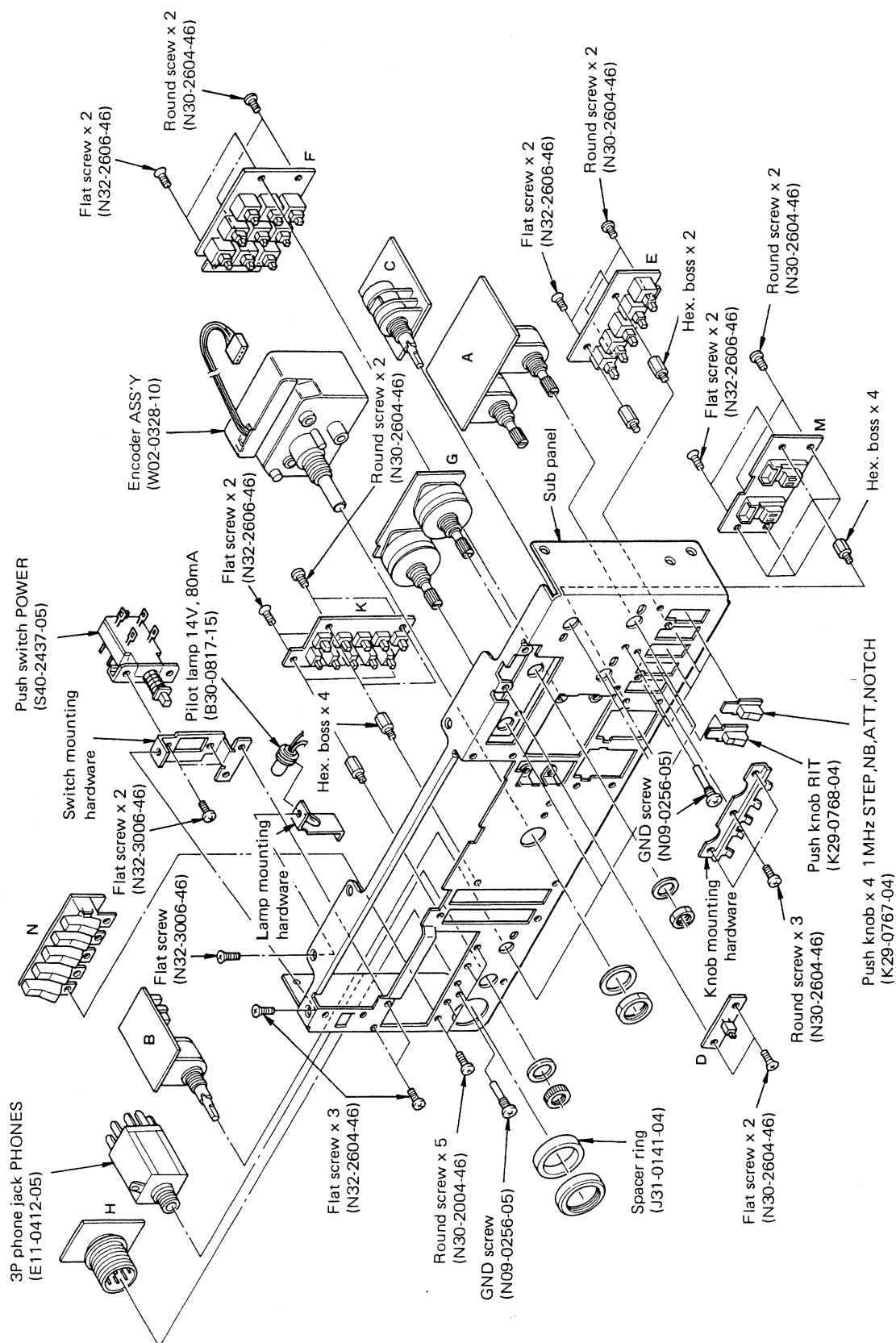
C Knob (outside) x 4 RF,CAR,SQL,IF SHIFT
(K29-0741-14)

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)

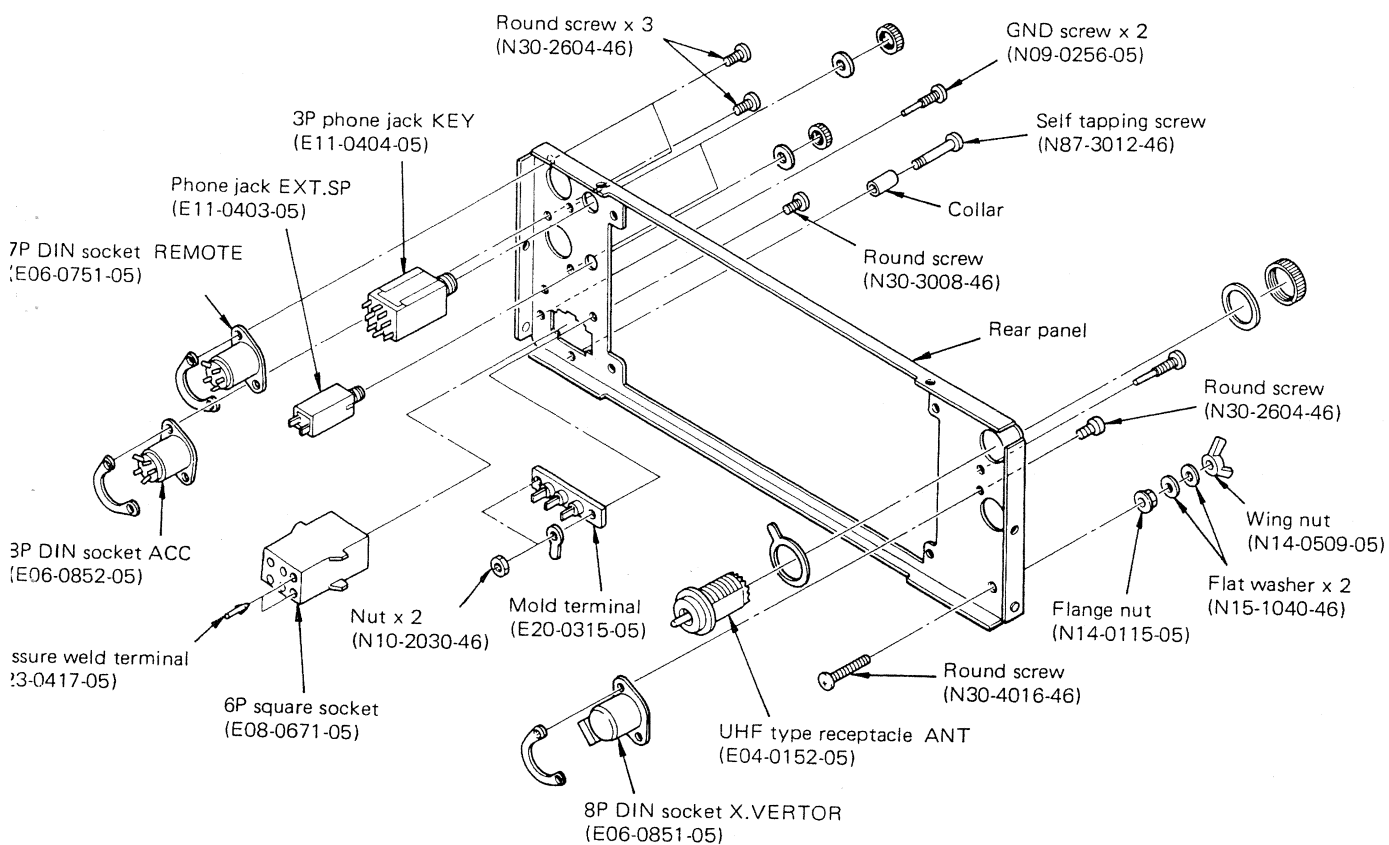
DISASSEMBLY



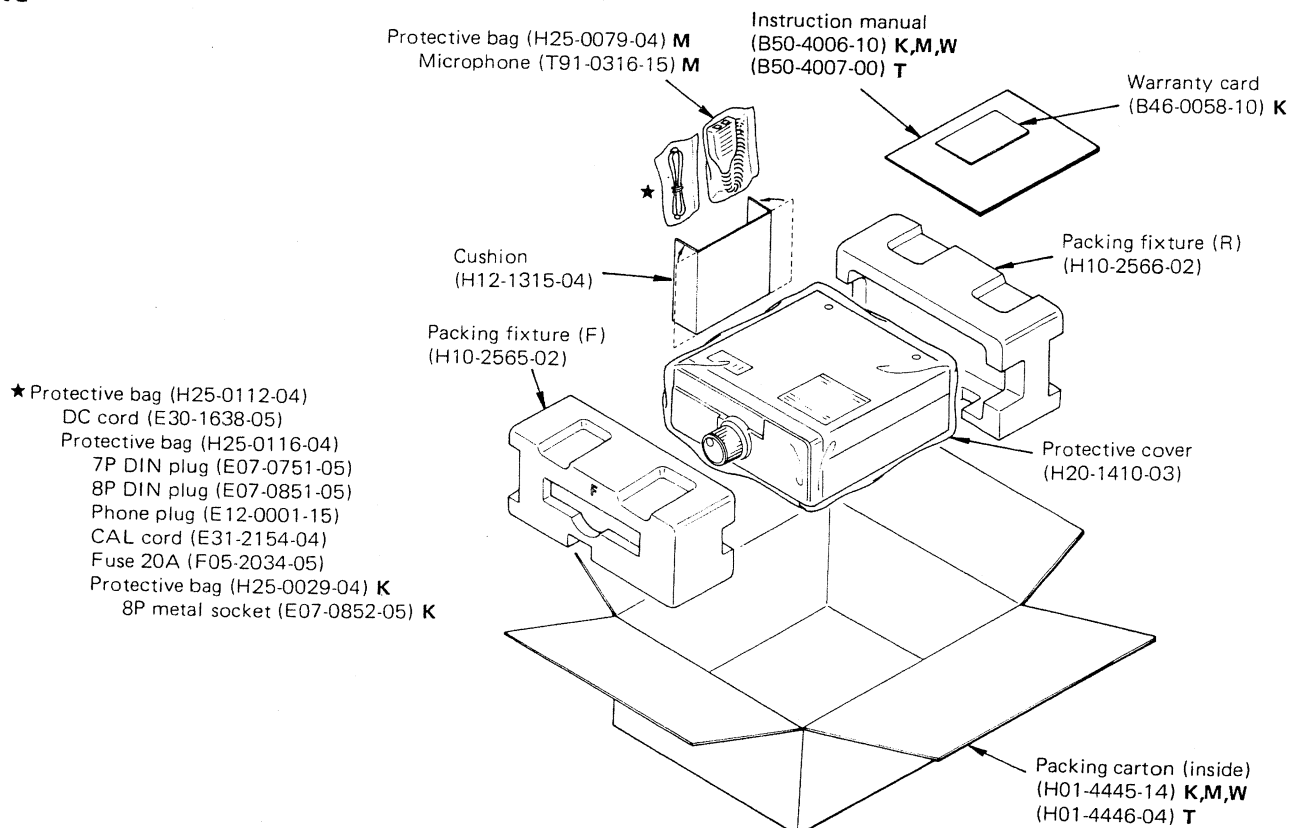
SWITCH UNIT A~N

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/SOL	D3-5	(S50-1411-05)	(S50-1411-05)	Tact switch MODE
E	D8	(SY438D)	LED M.CH	D6.7	(SG238D)	(SG238D)	LED LSB, USB, CW
F	S19-23	(S40-2440-15)	Push knob 1MHz STEP, RIT, NB, ATT, NOTCH	M	(SY438D)	(SY438D)	LED AM, FM
S5,9,10	(S40-2441-15)	(S40-2441-15)	Push knob A=B, MR, M.IN	N	(S50-1409-05)	(S50-1409-05)	Tact switch BAND
S6-8,11-13	(S40-2441-15)	(S40-2441-15)	Push knob LOCK, STEP, M.CH, MS, PG.S, HOLD	N	(S36-2408-05)	(S36-2408-05)	Paddle switch SEND/REC, VOX/MAN
				S16-18	(S36-2411-05)	(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 1M Ω
 - 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 : 1M Ω and less than 3pF, min.
 - 2) Voltage range : 10mV to 300 V
 - 3) Frequency range : 10kHz to 100MHz or greater
4. AF Voltmeter (AF V.M)
 - 1) Frequency range : 50Hz to 10kHz
 - 2) Input resistance : 1M Ω or greater
 - 3) Voltage range : 10mV to 30 V
5. AF Generator (AG)
 - 1) Frequency range : 200Hz to 5kHz
 - 2) Output : 1 mV or less to 1 V, low distortion
6. AF Dummy Load
 - 1) Impedance : 8 Ω
 - 2) Dissipation : 3W or greater
7. Oscilloscope

Requires high sensitivity, and external synchronization capability.
8. Sweep Generator
 - 1) Center frequency : 50 kHz to 90MHz
 - 2) Frequency deviation : Maximum ± 35 MHz
 - 3) Output voltage : 0.1 V or greater
9. Standard Signal Generator (SSG)
 - 1) Frequency range : 50 kHz to 50MHz
 - 2) Output : -20dB/0.1 μ V to 120dB/1 V
 - 3) Output impedance : 50 Ω
 - 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

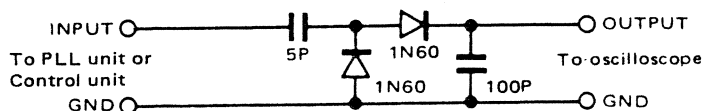
Must generate ignition noise containing harmonics beyond 30MHz.
12. RF Dummy Load
 - 1) Impedance : 150 Ω
 - 2) Dissipation : 150W or greater
13. Power Meter
 - 1) Impedance : 50 Ω
 - 2) Dissipation : 150W continuous or greater
 - 3) Frequency limits : 60MHz or greater

14. Spectrum Analyzer

- 1) Frequency range : 100kHz to 110MHz or greater
- 2) Bandwidth : 1 kHz 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 μ V
0 dB	0.5 μ V
6 dB	1 μ V
12 dB	2 μ V
24 dB	8 μ V
30 dB	15.8 μ V
40 dB	50 μ V
50 dB	158 μ V
60 dB	500 μ V
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5 V

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	⑨-1			Check	7.4-8.4V		
				⑨-4				4.75-5.25V		
				⑨-2				-5.9--6.3V		
				⑨-1				8.3-9.1V		
				⊕(BATT)				3.0V or more		
				②⑤-1	SW''A''	VR1	2.6V	+0.05V,-0V		
	2) STBY : SEND			TP4	IF	VR5	8.8V	±0.1V		

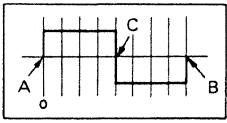
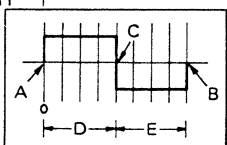
PLL ADJUSTMENT

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	±10 Hz
	2) HET (39.225MHz)			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	±10 Hz
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 STBY : SEND	f. counter				TC4	8,831,500Hz	±10 Hz
						VR2	No change in freq.	±10 Hz
	3) IF SHIFT Pot. : Full CW STBY : REC IF SHIFT Pot. : Full CCW						Verify	8,832,400 Hz or more 8,830,600 Hz or less
	4) MODE : LSB IF SHIFT Pot. : Centerd STBY : REC					TC3	8,828,500Hz	±10 Hz
	5) MODE : CW STBY : SEND					VR1	8,830,700Hz	±10 Hz
	6) MODE : FM STBY : SEND					TC5	8,791,500 Hz	±10 Hz
	7) MODE : AM						Verify	8,789,850-8,790,150 Hz
4. VCO-1 (Voltage control oscillator)	1) FREQ : □□.□□0.0kHz To obtain this frequency 1st set dial to □99□. 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 : □□.□□99.9 kHz To obtain this frequency 1st set dial to □00□. 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)

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 kHz Turn VFO to frequency stop.	DC V.M	PLL	TP1	PLL	T4	1.6V	$\pm 0.1V$
	2) FREQ : 23,000.0 kHz						Check	6.5V or less
17. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300 rpm.	Oscilloscope	Cont	②3-3				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.			②3-2		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 AF V.M	Rear panel	ANT	RF	T8,4-7 10-14 VR2	MAX	S/N 10dB or more at $-6\text{dB}\mu$ input. 1V or more/ 8Ω at AF GAIN Control MAX.
		Oscilloscope AF Dummy load		EXT. SP	IF	L1-4		
	2) FREQ : 29,000.0kHz MODE : FM (If FM-430 is installed) SSG : 1kHz audio at 5kHz dev.				FM IF	VR3 T2	MAX	
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 AF V.M	Rear panel	ANT EXT. SP	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 S meter	Rear panel	ANT		L3	S1 Adjust counter clockwise from peak. (turn slug out).	8.0dB $\pm$ 4dB
	3) SSG output : 40dB					VR3	S9	40dB $\pm$ 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 $\pm$ 10dB

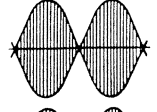
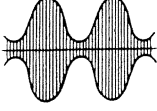
ADJUSTMENT

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	ANT	RF	T15, 16	MIN	
	2) Noise Gen. : Low level	DC V.M (Oscilloscope)	RF	R82		T15, 16	MIN noise level.	
8. Beeper	1) AF GAIN control : MIN Jumper connector ② to GND.	Noise Gen. SP	Rear panel	ANT 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	
	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 : 29,900.0kHz 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	
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	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. OK  NG 
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 : 1kHz, 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 : 1 kHz, 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 : 1 kHz, 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	

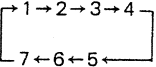
ADJUSTMENT

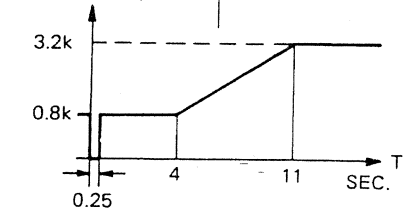
MICROPROCESSOR OPERATION CHECK

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 : 14,000.0 kHz MODE : USB VFO A : Lights The "Beeper" sounds simultaneously with POWER ON.
	2) FUNCTION SW : B	FREQ : 14,000.0 kHz MODE : USB VFO B : Lights
	3) [MCH] 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) [MCH] SW : OFF 1 MHz STEP SW : OFF Depress the "BAND : UP" key once. Press repeatedly.	FREQ : [1][8][0] 00.0 kHz 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.	FREQ : [][][] 00.0 kHz Displays 1 MHz lower frequency from that previously displayed in 2). The "Beeper" sounds.
	Repeat the operation.	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.	FREQ : [][] ,000.0 kHz The MHz display [][] advances 1 MHz at each key-press.
	Hold the "DOWN" key on.	The display steps down 1 MHz at each key-press.

Item	Condition	Operation check	
3. Dial	1) FREQ : 0,000.0 kHz 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—10 kHz.	
	2) [STEP] SW : ON	One revolution of VFO is 95—100 kHz.	
4. Memory write	1) FREQ : 14,000.0 kHz MODE : USB M.CH SW : 1 [M.IN] SW : ON	The "Beeper" sounds when "M.IN" key is depressed.	
	2) M.CH SW : 6 [M.IN] SW : ON		
	3) FREQ : 14,010.0 kHz M.CH SW : 7 [M.IN] SW : ON		
	4) M.CH SW : 8 [M.IN] SW : ON	The "Beeper" sounds continuously when "M.IN" key is depressed.	
	5) FREQ : 14,020.0 kHz M.CH SW : 8 [M.IN] SW : ON	The continuous tone stops when the "M.IN" key is depressed.	
	6) FREQ : 7,000.0 kHz MODE : LSB M.CH SW : 2 [M.IN] SW : ON	The "Beeper" sounds when the "M.IN" key is depressed.	
	7) FREQ : 21,000.0 kHz MODE : CW M.CH SW : 3 [M.IN] SW : ON		
	8) FREQ : 24,500.0 kHz MODE : AM M.CH SW : 4 [M.IN] SW : ON		
	9) FREQ : 29,500.0 kHz MODE : FM M.CH SW : 5 [M.IN] SW : ON		
5. Memory recall (1)	1) [MCH] SW : ON STBY SW : REC M.CH SW : 1 2 3 4 5 6 7	"M.CH" display lights.	
	2) M.CH SW : 8 STBY SW : REC STBY SW : SEND	FREQ : 14,010.0 kHz USB FREQ : 14,020.0 kHz USB	
		FREQ.	MODE
		14,000.0 kHz	USB
		7,000.0 kHz	LSB
		21,000.0 kHz	CW
		24,500.0 kHz	AM
		29,500.0 kHz	FM
		14,000.0 kHz	USB
		14,010.0 kHz	USB

ADJUSTMENT

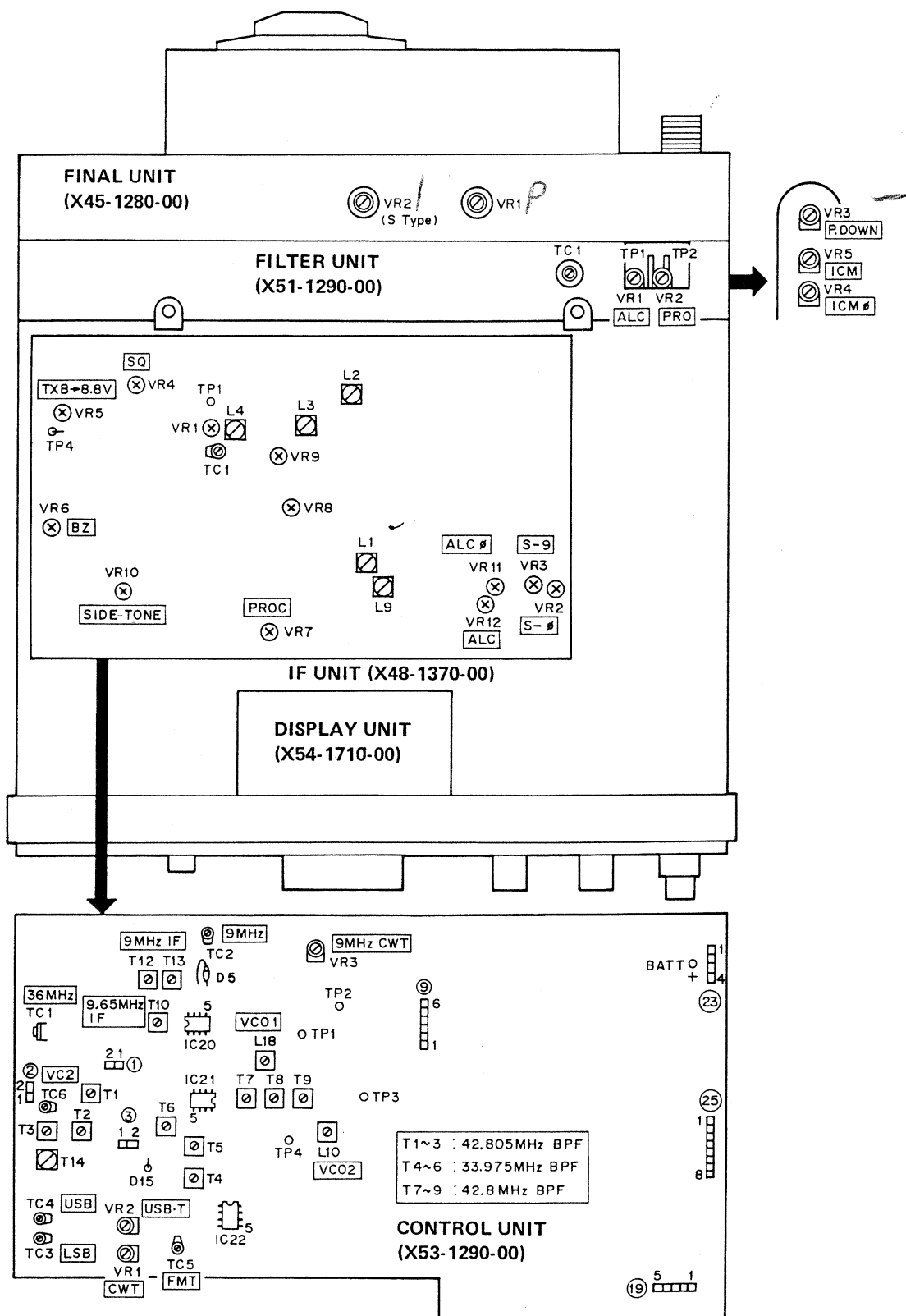
Item	Condition	Operation check
6. Memory recall (2)	1) M.CH SW : 1 [MR] SW : ON	FREQ : 14,000.0kHz The "Beeper" sounds.
	2) Turn the VFO both clockwise and counterclockwise.	The display shows normal frequency control.
	3) [MR] SW : ON	FREQ : 14,000.0kHz The tone sounds simultaneously.
7. Memory erase	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 :  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. 	
	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.
12. Lock	1) [LOCK] SW : ON Turn the VFO both clockwise and counterclockwise.	The frequency displayed at lock does not change.
	2) Depress both BAND UP and DOWN keys.	
	3) Hold the microphone (MC-60A or MC-42S) "UP" and "DOWN" key on.	

TS-430S

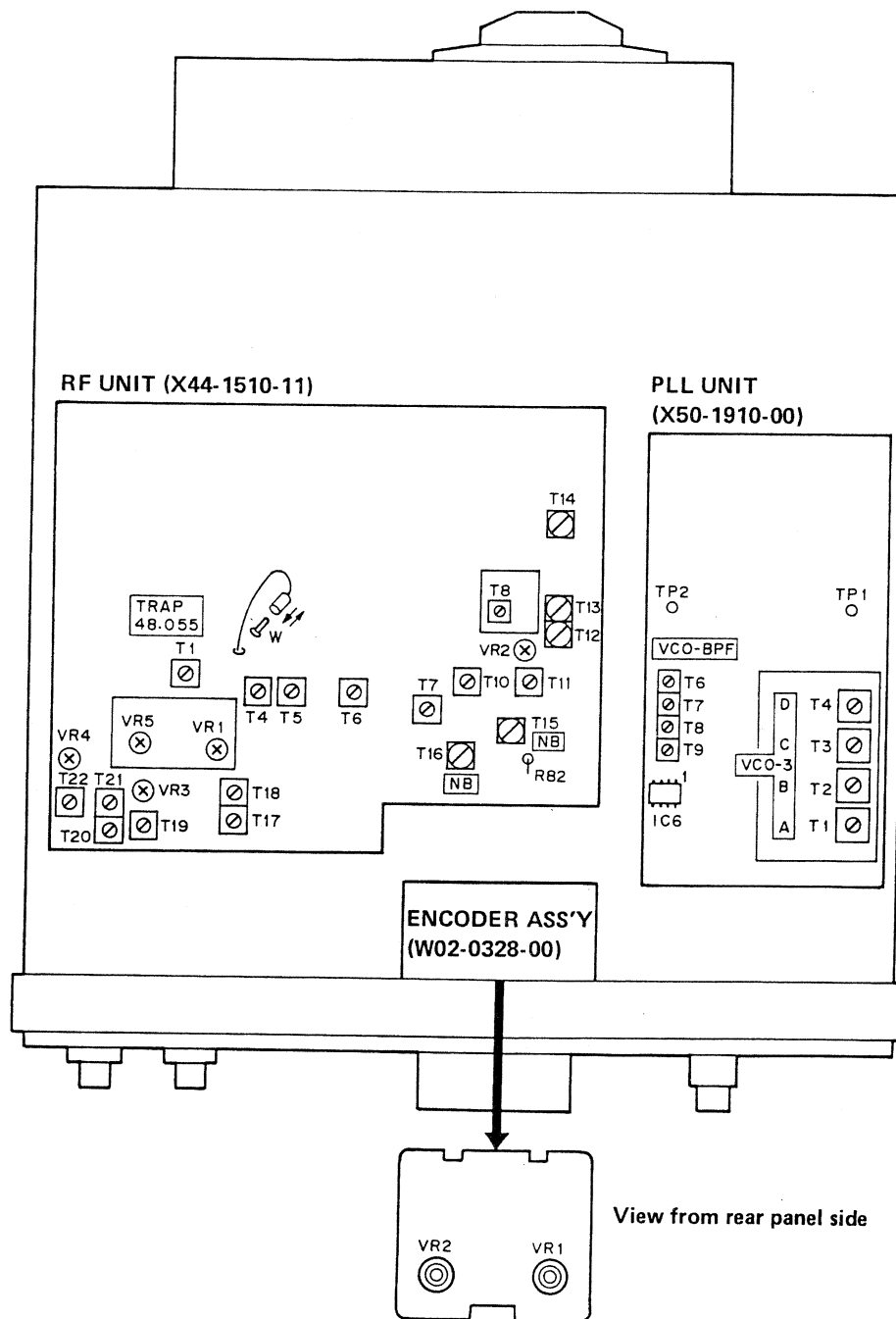
ADJUSTMENT

TOP VIEW



ADJUSTMENT

BOTTOM VIEW



LEVEL DIAGRAM

RX SECTION

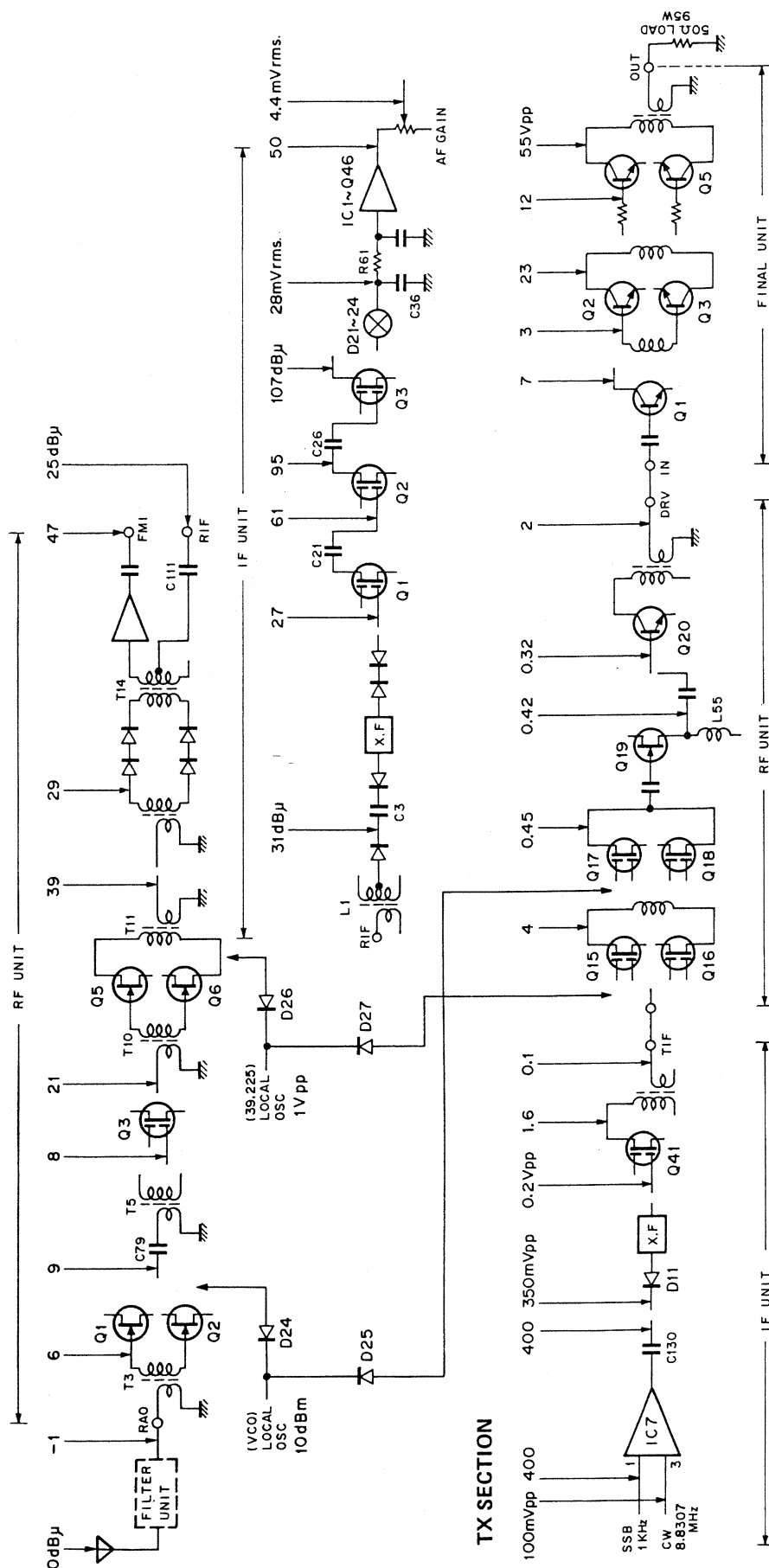
FREQUENCY : 14.200MHz

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

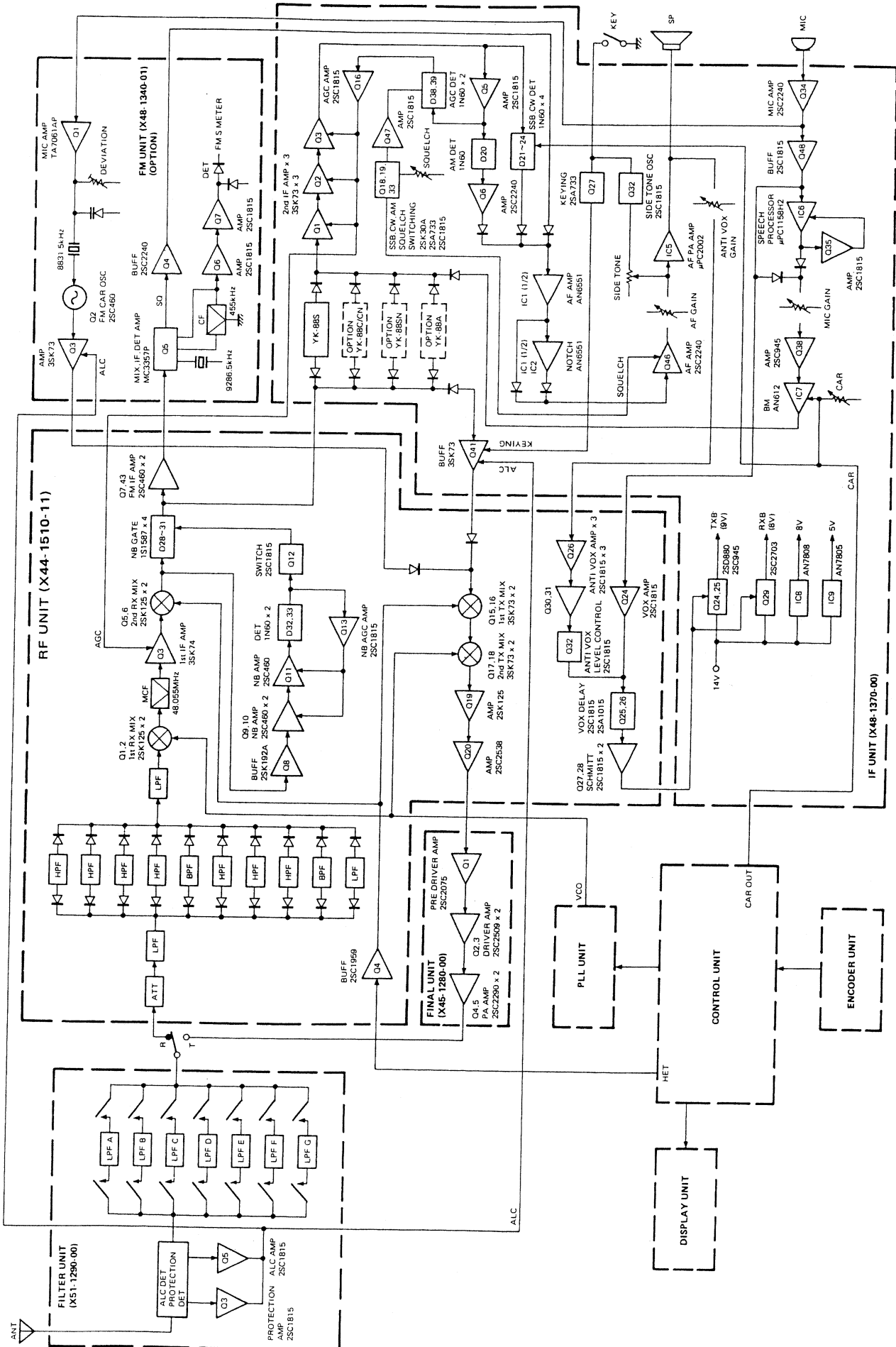
SSB : 1kHz, 400mVpp to IC7 1pin.

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

NOTES

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

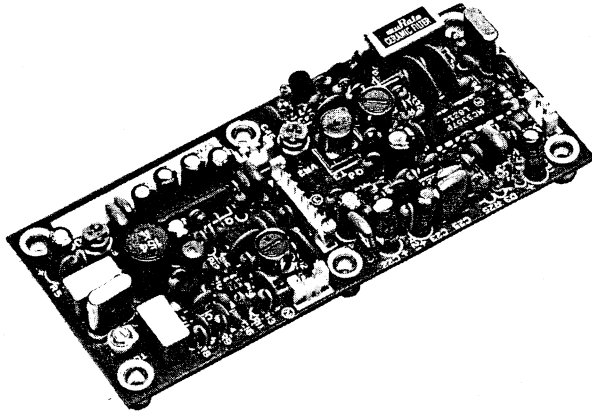
BLOCK DIAGRAM TS-430S



TS-430S

FM-430

OUTSIDE VIEW



PARTS LIST

SEMICONDUCTOR

N : New parts

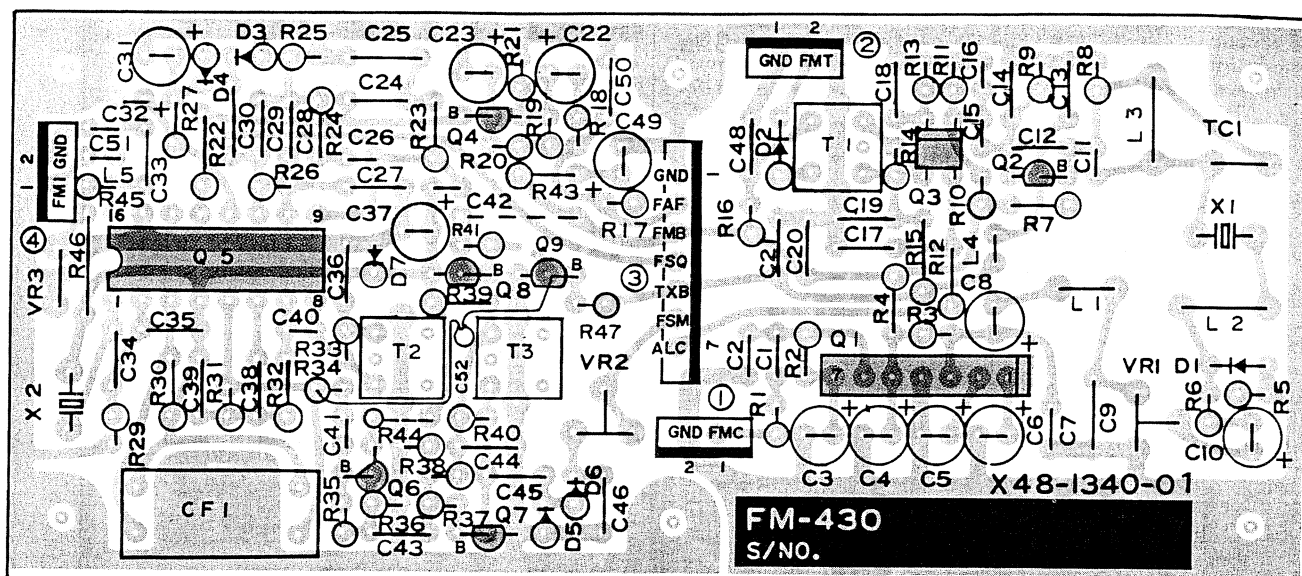
Item	Re- marks	Name	Item	Re- marks	Name
Diode		1N60	FET		3SK73(GR)
		1S1555	IC		MC3357P
		1S2208			TA7061AP
Zener diode		WZ-071			
TR		2SA1015(Y)			
		2SC460(B)			
		2SC1815(Y)			
		2SC2240(GR)			

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	2
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

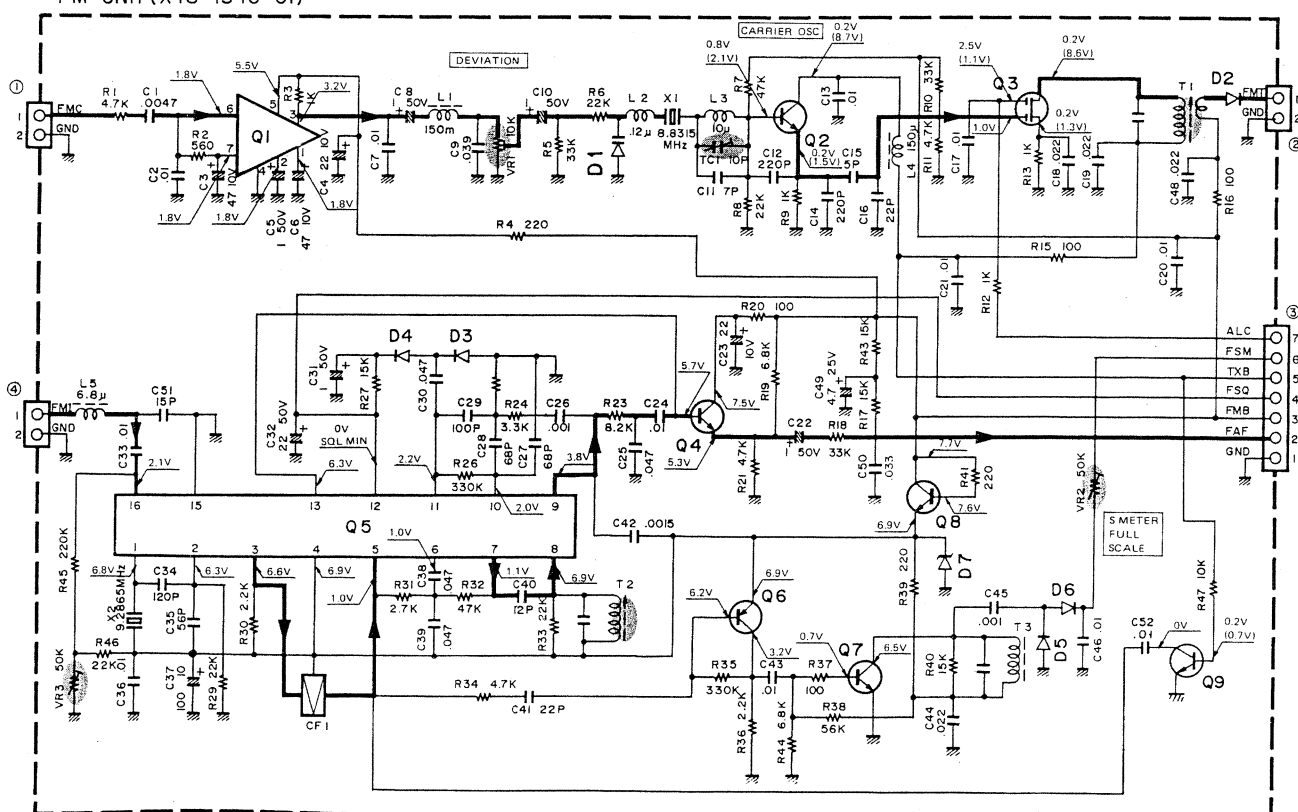
FM-430

PC BOARD VIEW



SCHEMATIC DIAGRAM

FM UNIT (X48-1340-01)



2SA1015 2SC1815
2SC2240

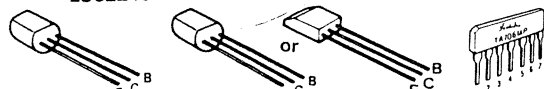
2SC460

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 : IN60
D7 : WZ071



SPECIFICATIONS

Input voltage:	120/220/240V AC±10%, 50/60 Hz
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	Thermistor		32D27
		S25VB10			SDT1000(F)
		U05B			2N5885
Zener diode		RD9.1EB2	TR		2SA562(Y)
					2SB512(P)
LED		SLP144B			2SC1815(Y)

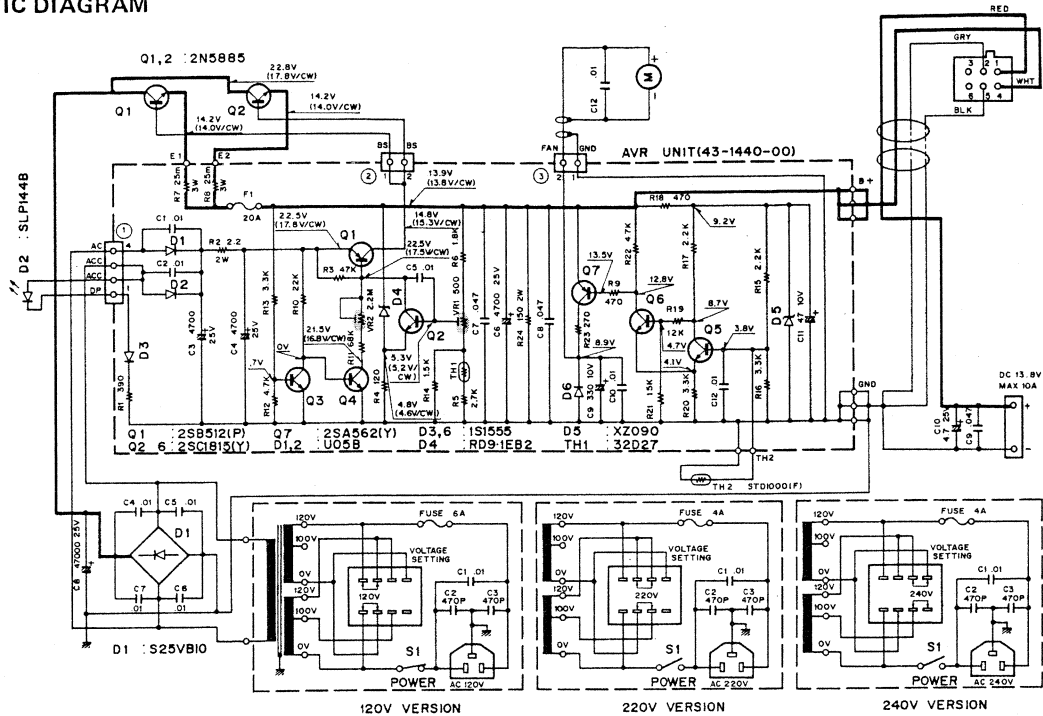
Part No.	Re- marks	Description	Ref. No.
PS-430 GENERAL			
A01-0937-02	N	Case (upper)	
A01-0938-12	N	Case (lower)	
A20-2461-13	N	Panel	K,M,W,X
A20-2462-03	N	Panel	T
B39-0407-04		Spacer x 2	
B40-2634-04	N	Name plate	
B41-0626-14	N	Voltage sheet 120V	K
B41-0627-14	N	Voltage sheet 220V	M,W
B41-0630-04	N	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

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	
X43-1400-00	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
RS14GB3D4R7J		MF 4.7Ω 2W	R2	1
R92-0663-05	N	Cement 0.025Ω 3W	R7,8	2

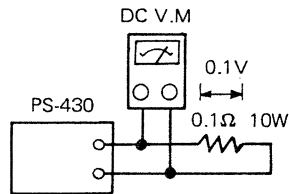
PS-430

SCHEMATIC DIAGRAM



ADJUSTMENT

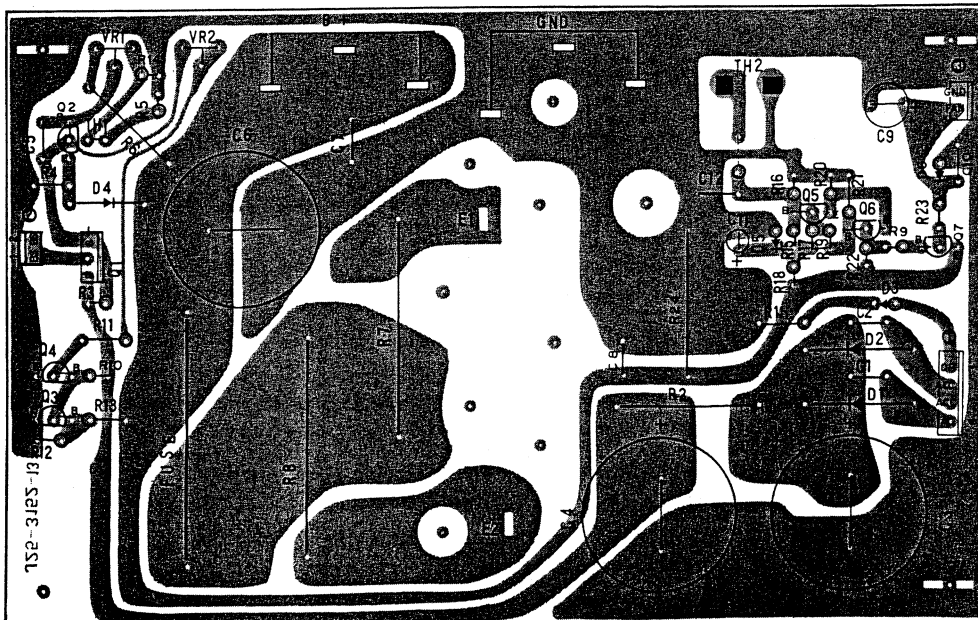
1. Connect the load and set the current to 15A.
2. Adjust output voltage to $13.8V \pm 0.4V$ with VR1.
3. Protection circuit



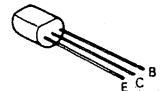
Connect a 0.1Ω 10W resistor and adjust VR2 so that 0.1V DC is obtained.

PC BOARD VIEW

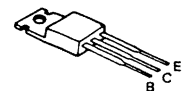
AVR UNIT (X43-1440-00) Component side view



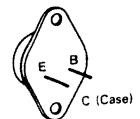
2SC1815



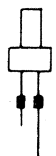
2SB512



2N5885

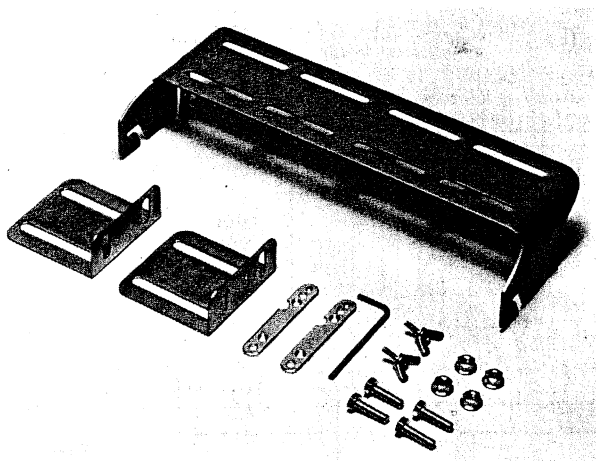


SLP-144B



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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